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THE
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A
DICTIONARY
OF
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ELEVENTH EDITION

VOLUME IX

EDWARDES to EVANGELICAL ASSOCIATION

GEORGE E. MAYCOCK

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[1] A complete list, showing all individual contributors, appears in the final volume.

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C. H. Ha.	Carlton Huntley Hayes, A.M., Ph.D. Assistant Professor of History in Columbia University, New York City. Member of the American Historical Association.	**Eugenius III. and IV.**
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J. M. M.	John Malcolm Mitchell. Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London College (University of London). Joint Editor of Grote's *History of Greece*.	**Erigena** (*in part*).
J. M. Ma.	John Matthews Manly, A.M., Ph.D. Professor and Head of the Department of English in the University of Chicago. Managing Editor of *Modern Philology*. Author of *The Language of Chaucer's Legend of Good Women*; &c. Editor of *Specimens of the Pre-Shakespearean Drama*; *English Prose, 1137–1890*; *English Poetry, 1170–1892*; &c.	**English Literature (II.).**
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J. S. M.	John Sturgeon Mackay, M.A., LL.D., F.R.S. (Edin.). Chief Mathematical Master at Edinburgh Academy, 1873–1904. First President of the Edinburgh Mathematical Society. Author of *Arithmetical Exercises*; *Elements of Euclid*.	**Euclid.**
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L. V.*	Luigi Villari. Italian Foreign Office (Emigration Department). Formerly Newspaper Correspondent in East of Europe. Italian Vice-Consul in New Orleans, 1906; Philadelphia, 1907; and Boston, U.S.A., 1907–1910. Author of *Italian Life in Town and Country*; &c.	**Este.**

M. G.	Moses Gaster, Ph.D. (Leipzig). Chief Rabbi of the Sephardic Communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and Byzantine Literature, 1886 and 1891. President, Folklore Society of England. Vice-President, Anglo-Jewish Association. Author of *History of Rumanian Popular Literature*; &c.	**Eminescu, Michail.**
M. H. S.	Marion H. Spielmann, F.S.A. Formerly Editor of the *Magazine of Art.* Member of Fine Art Committee of International Exhibitions of Brussels, Paris, Buenos Aires, Rome, and the Franco-British Exhibition, London. Author of *History of "Punch"*; *British Portrait Painting to the Opening of the Nineteenth Century*; *Works of G. F. Watts, R.A.*; *British Sculpture and Sculptors of To-day*; *Henriette Ronner*; &c.	**Effigies** (*in part*).
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M. O. B. C.	Maximilian Otto Bismarck Caspari, M.A. Reader in Ancient History at London University. Lecturer in Greek at Birmingham University, 1905–1908.	**Epaminondas.**
M. N. T.	Marcus Niebuhr Tod, M.A. Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. Joint Author of *Catalogue of the Sparta Museum.*	**Ephor.**
M. P.	Mark Pattison. See the biographical article: Pattison, Mark.	**Erasmus** (*in part*).
N. M.	Norman McLean, M.A. Lecturer in Aramaic, Cambridge University. Fellow and Hebrew Lecturer, Christ's College, Cambridge. Joint Editor of the larger *Cambridge Septuagint.*	**Ephraem Syrus.**
O. E.*	Oliver Elton, M.A. Professor of English Literature at the University of Liverpool. Author of *Modern Studies*; *The Augustan Ages*; *Michael Drayton*; &c.	**English Literature (III., IV.).**
O. J. R. H.	Osbert John Radcliffe Howarth, M.A. Christ Church, Oxford. Geographical Scholar, 1901. Assistant Secretary of the British Association.	**England:** *Topography, Population and Industries* (I., VI., VIII., IX.); **English Channel** (*in part*).
P. A. K.	Prince Peter Alexeivitch Kropotkin. See the biographical article: Kropotkin, Prince P. A.	**Esthonia** (*in part*).
P. La.	Philip Lake, M.A., F.G.S. Lecturer on Physical and Regional Geography in Cambridge University. Formerly of the Geological Survey of India. Author of *Monograph of British Cambrian Trilobites.* Translator and Editor of Kayser's *Comparative Geology.*	**Europe:** *Geology.*
P. M. T. C.	Mrs Craigie ("John Oliver Hobbes"). See the biographical article: Craigie, P. M. T.	**Eliot, George.**
P. S. A.	Percy Stafford Allen, M.A. Fellow of Merton College, Oxford. Editor of the *Letters of Erasmus.*	**Erasmus** (*in part*).
R. Ad.	Robert Adamson, LL.D. See the biographical article: Adamson, R.	**Erigena** (*in part*).
R. A. S. M.	Robert Alexander Stewart Macalister, M.A., F.S.A. Director of Excavations for the Palestine Exploration Fund.	**Ekron;** **Eleutheropolis.**
R. C. J.	Sir Richard Claverhouse Jebb, D.C.L., LL.D. See the biographical article: Jebb, Sir Richard C.	**Euripides.**
R. H. C.	Rev. Robert Henry Charles, M.A., D.D., D.Litt. Grinfield Lecturer, and Lecturer in Biblical Studies, Oxford. Fellow of the British Academy. Formerly Professor of Biblical Greek, Trinity College, Dublin. Author of *Critical History of the Doctrine of a Future Life*; *Book of Jubilees*; &c.	**Enoch, Book of;** **Esther:** *Additions to.*
R. H. V.	Colonel Robert Hamilton Vetch, R.E., C.B. Employed on defences of Bermuda, Bristol Channel, Plymouth Harbour and Malta, 1861–1876. Secretary of R.E. Institute, Chatham, 1877–1883. Commanded R.E. Submarine Mining Batt., 1884. Deputy Inspector-General of Fortifications, 1889–1894. Author of *Gordon's Campaign in China*; *Life of Lieutenant-General Sir Gerald Graham.* Editor of the *Professional Papers of the Corps of R.E.*; also the *R.E. Journal*, 1877–1884.	**Egypt:** *Military Operations,* 1885–1900.
R. J. M.	Ronald John McNeill, M.A. Christ Church, Oxford. Barrister-at-Law. Formerly Editor of the *St James's Gazette*, London.	**Emmet, Robert;** **Emmet, Thomas Addis.**
R. L.*	Richard Lydekker, F.R.S., F.Z.S., F.G.S. Formerly Member of the Staff of the Geological Survey of India. Author of *Catalogues of Fossil Mammals, Reptiles and Birds in British Museum*; *The Deer of all Lands*; &c.	**Eland; Elephant;** **Elk;** **Equidae.**
R. N.	Richard Norton. Formerly Director of the American School of Classical Studies in Rome, and Professor of History of Art and Archaeology, Bryn Mawr College, Pennsylvania.	**Etruria** (*in part*).
R. N. B.	Robert Nisbet Bain (d. 1909). Assistant Librarian, British Museum. Author of *Scandinavia: the Political History of Denmark, Norway and Sweden, 1513–1900*; *The First Romanovs, 1613 to 1725*; *Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796*; &c.	**Elizabeth Petrovna;** **Eötvös, Baron; Eric XIV.;** **Esterházy of Galántha.**

R. S. C.	Robert Seymour Conway, M.A., D.Litt. (Cantab.). Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin, University College, Cardiff, and Fellow of Gonville and Caius College, Cambridge.	**Etruria:** *Language.*
R. S. P.	Reginald Stuart Poole. See the biographical article: Poole, Reginald Stuart.	**Egypt:** *History*, I. (*in part*).
R. W.*	Richard Williams.	**Eisteddfod.**
R. We.	Richard Webster, A.M. Formerly Fellow in Classics, Princeton University. Editor of *The Elegies of Maximianus*; &c.	**Edwards, Jonathan** (*in part*).
S. A. C.	Stanley Arthur Cook. Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904–1908. Council of Royal Asiatic Society, 1904–1905. Author of *Glossary of Aramaic Inscriptions*; *The Laws of Moses and the Code of Hammurabi*; *Critical Notes on Old Testament History*; *Religion of Ancient Palestine*; &c.	**Eli** (*in part*); **Elijah** (*in part*); **Elisha** (*in part*); **Ephod;** **Esau.**
St G. S.	St George Stock, M.A. Pembroke College, Oxford. Lecturer in Greek in the University of Birmingham.	**Essenes** (*in part*).
S. L.-P.	Stanley Lane-Poole, M.A., Litt.D. Formerly Professor of Arabic, Dublin University, and Examiner in the University of Wales. Corresponding Member of the Imperial Russian Archaeological Society. Member of the Khedivial Commission for the Preservation of the Monuments of Arab Art, &c. Author of *Life of Lord Stratford de Redcliffe*; *Life of Sir Harry Parkes*; *Cairo*; *Turkey*; &c. Edited *The Koran*; *The Thousand and One Nights*; &c.	**Egypt:** *History*, II. (*in part*).
S. R. G.	Samuel Rawson Gardiner, LL.D., D.C.L. See the biographical article: Gardiner, S. R.	**English History (VIII., IX., X.).**
S. W.	Sir Spencer Walpole, K.C.B. See the biographical article: Walpole, Sir Spencer.	**English History:** XII. (*in part*).
T. A. I.	Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.	**England:** *Local Government*, X. (*in part*).
T. Ba.	Sir Thomas Barclay, M.P. Member of the Institute of International Law. Member of the Supreme Council of the Congo Free State. Officer of the Legion of Honour. Author of *Problems of International Practice and Diplomacy*; &c. M.P. for Blackburn, 1910.	**Embargo.**
T. F. C.	Dr Theodore Freylinghuysen Collier, Ph.D. Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.	**Elvira, Synod of;** **Ephesus, Council of.**
T. G. Br.	Thomas Gregor Brodie, M.D., F.R.S. Professor of Physiology in the University of Toronto. Author of *Essentials of Experimental Physiology*.	**Epithelial, Endothelial, Glandular Tissues.**
T. K.	Thomas Kirkup, M.A., LL.D. Author of *An Inquiry into Socialism*; *Primer of Socialism*; &c.	**Essenes** (*in part*).
T. K. C.	Rev. Thomas Kelly Cheyne, LL.D., D.D., D.Litt. See the biographical article: Cheyne, T. K.	**Esther.**
T. L. H.	Sir Thomas Little Heath, K.C.B., M.A., D.Sc. (Cantab.). Assistant Secretary to the Treasury. Formerly Fellow of Trinity College, Cambridge. Author of *Treatise on Conic Sections*; &c.	**Erathosthenes of Alexandria.**
T. R. R. S.	Rev. Thomas Roscoe Rede Stebbing, M.A., F.R.S., F.L.S., F.Z.S. Fellow of King's College, London. Hon. Fellow, and formerly Tutor, of Worcester College, Oxford. Zoological Secretary of Linnaean Society, 1903–1907. Author of *A History of Crustacea*; *The Naturalist of Cumbrae*; &c.	**Entomostraca.**
T. Se.	Thomas Seccombe, M.A. Balliol College, Oxford. Lecturer in History, East London and Birkbeck Colleges, University of London. Stanhope Prizeman, Oxford, 1887. Assistant Editor of *Dictionary of National Biography*, 1891–1901. Author of *The Age of Johnson*; &c.	**English Literature (V., VI.).**
W. A. B. C.	Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880–1881. Author of *Guide du Haut Dauphiné*; *The Range of the Tödi*; *Guide to Grindelwald*; *Guide to Switzerland*; *The Alps in Nature and in History*; &c. Editor of the *Alpine Journal*, 1880–1889; &c.	**Einsiedeln;** **Embrun;** **Engadine;** **Engelberg.**
W. A. P.	Walter Alison Phillips, M.A. Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of *Modern Europe*; &c.	**English History (XI.);** **Episcopacy; Esquire;** **Europe:** *History* (*in part*).
W. Ba.	William Bacher, Ph.D. Professor of Biblical Science at the Rabbinical Seminary, Budapest. Author of *Die exegetische Terminologie der jüdischen Traditionslitteratur*; &c.	**Elias Levita.**
W. C. D. W.	William Cecil Dampier Whetham, M.A., F.R.S. Fellow and Tutor of Trinity College, Cambridge. Author of *Theory of Solution*; *Recent Development of Physical Science*; *The Family and the Nation*; &c.	**Electrolysis.**
W. C. T.	W. Cave Thomas. Author of *Symmetrical Education*; *Mural or Monumental Decoration*; *Revised Theory of Light*.	**Encaustic Painting.**

W. E. Co.	Rt. Rev. William Edward Collins, M.A., D.D. Bishop of Gibraltar. Formerly Professor of Ecclesiastical History, King's College, London. Lecturer of Selwyn and St John's Colleges, Cambridge. Author of *The Study of Ecclesiastical History*; *Beginnings of English Christianity*; &c.	**Establishment;** **Eucharist:** ***Reservation.***
W. G.	William Garnett, M.A., D.C.L. Educational Adviser to the London County Council. Formerly Fellow and Lecturer of St John's College, Cambridge. Principal and Professor of Mathematics, Durham College of Science, Newcastle-on-Tyne. Author of *Elementary Dynamics*; &c.	**Energy** *(in part).*
W. G. M.	Walter G. M'Millan, F.C.S., M.I.Mech.E. (d. 1904). Formerly Secretary of the Institute of Electrical Engineers, and Lecturer on Metallurgy, Mason College, Birmingham. Author of *A Treatise on Electrometallurgy.*	**Electrochemistry;** **Electrometallurgy.**
W. Hu.	Rev. William Hunt, M.A., Litt.D. President of Royal Historical Society, 1905–1909. Author of *History of the English Church, 597–1066*; *The Church of England in the Middle Ages*; &c.	**England, Church of.**
W. M. F. P.	William Matthew Flinders Petrie, F.R.S., D.C.L., Litt.D. See the biographical article: Petrie, W. M. F.	**Egypt:** *Art and Archaeology.*
W. O.	Wilhelm Ostwald, D.Sc., LL.D. Formerly Professor of Chemistry at the University of Leipzig. Nobel Prizeman in Chemistry, 1909. Author of *Energetische Grundlagen der Kulturwissenschaft*; *Die Energie*; *Prinzipien der Chemie*; &c.	**Element.**
W. P. A.	Lieut.-Colonel William Patrick Anderson, M.Inst.C.E., F.R.G.S. Chief Engineer, Department of Marine and Fisheries of Canada. Member of the Geographic Board of Canada. Past President of Canadian Society of Civil Engineers.	**Erie, Lake.**
W. P. P.	William Plane Pycraft, F.Z.S. Assistant in the Zoological Department, British Museum. Formerly Assistant Linacre Professor of Comparative Anatomy, Oxford. Vice-President of the Selborne Society. Author of *A History of Birds*; &c.	**Egg.**
W. R. S.	William Robertson Smith, LL.D. See the biographical article: Smith, W. R.	**Eli** *(in part)*; **Elijah** *(in part)*; **Elisha** *(in part).*
W. W.	William Wallace. See the biographical article: Wallace, William (1844–1897).	**Empedocles** *(in part)*; **Epictetus** *(in part)*; **Epicurus** *(in part).*
W. Wr.	Williston Walker, Ph.D., D.D. Professor of Church History, Yale University. Author of *History of the Congregational Churches in the United States*; *The Reformation*; *John Calvin*; &c.	**Eliot, John.**

PRINCIPAL UNSIGNED ARTICLES

Egoism.
Elbe.
Election.
Electoral Commission.
Electroplating.
Electrotherapeutics.
Elevators.
Elginshire.
Elis.
Ellipse.
Elm.
Ely.
Elzevir.
Embalming.
Embezzlement.
Employers' Liability and Workmen's Compensation.
Encyclopaedia.
Endospora.
Engineers: *Military.*
Engraving.
Engrossing.
Epigram.
Epilepsy.
Epitaph.
Equity.
Ericaceae.
Eritrea.
Erysipelas.
Escorial.
Eskimo.
Essex.
Estate.
Etching.
Ethnology and Ethnography.
Etna.
Eton.
Eucalyptus.
Euchre.
Euler.
Euphorbiaceae.

ENCYCLOPÆDIA BRITANNICA

ELEVENTH EDITION

VOLUME IX

EDWARDES, SIR HERBERT BENJAMIN (1819–1868), English soldier-statesman in India, was born at Frodesley in Shropshire on the 12th of November 1819. His father was Benjamin Edwardes, rector of Frodesley, and his grandfather Sir John Edwardes, baronet, eighth holder of a title conferred on one of his ancestors by Charles I. in 1644. He was educated at a private school and at King's College, London. Through the influence of his uncle, Sir Henry Edwardes, he was nominated in 1840 to a cadetship in the East India Company; and on his arrival in India, at the beginning of 1841, he was posted as ensign in the 1st Bengal Fusiliers. He remained with this regiment about five years, during which time he mastered the lessons of his profession, obtained a good knowledge of Hindustani, Hindi and Persian, and attracted attention by the political and literary ability displayed in a series of letters which appeared in the *Delhi Gazette*.

In November 1845, on the breaking out of the first Sikh War, Edwardes was appointed aide-de-camp to Sir Hugh (afterwards Viscount) Gough, then commander-in-chief in India. On the 18th of December he was severely wounded at the battle of Mudki. He soon recovered, however, and fought by the side of his chief at the decisive battle of Sobraon (February 10, 1846). He was soon afterwards appointed third assistant to the commissioners of the trans-Sutlej territory; and in January 1847 was named first assistant to Sir Henry Lawrence, the resident at Lahore. Lawrence became his great exemplar and in later years he was accustomed to attribute to the influence of this "father of his public life" whatever of great or good he had himself achieved. He took part with Lawrence in the suppression of a religious disturbance at Lahore in the spring of 1846, and soon afterwards assisted him in reducing, by a rapid movement to Jammu, the conspirator Imam-ud-din. In the following year a more difficult task was assigned him—the conduct of an expedition to Bannu, a district on the Waziri frontier, in which the people would not tolerate the presence of a collector, and the revenue had consequently fallen into arrear. By his rare tact and fertility of resource, Edwardes succeeded in completely conquering the wild tribes of the valley without firing a shot, a victory which he afterwards looked back upon with more satisfaction than upon others which brought him more renown. His fiscal arrangements were such as to obviate all difficulty of collection for the future. In the spring of 1848, in consequence of the murder of Mr vans Agnew and Lieutenant Anderson at Multan, by order of the diwan Mulraj, and of the raising of the standard of revolt by the latter, Lieutenant Edwardes was authorized to march against him. He set out immediately with a small force, occupied Leiah on the left bank of the Indus, was joined by Colonel van Cortlandt, and, although he could not attack Multan, held the enemy at bay and gave a check at the critical moment to their projects. He won a great victory over a greatly superior Sikh force at Kinyeri (June 18), and received in acknowledgment of his services the local rank of major. In the course of the operations which followed near Multan, Edwardes lost his right hand by the explosion of a pistol in his belt. On the arrival of a large force under General Whish the siege of Multan was begun, but was suspended for several months in consequence of the desertion of Shere Singh with his army and artillery. Edwardes distinguished himself by the part he took in the final operations, begun in December, which ended with the capture of the city on the 4th of January 1849. For his services he received the thanks of both houses of parliament, was promoted major by brevet, and created C.B. by special statute of the order. The directors of the East India Company conferred on him a gold medal and a good service pension of £100 per annum.

After the conclusion of peace Major Edwardes returned to England for the benefit of his health, married during his stay there, and wrote and published his fascinating account of the scenes in which he had been engaged, under the title of *A Year on the Punjab Frontier in 1848–1849*. His countrymen gave him fitting welcome, and the university of Oxford conferred on him the degree of D.C.L. In 1851 he returned to India and resumed his civil duties in the Punjab under Sir Henry Lawrence. In November 1853 he was entrusted with the responsible post of commissioner of the Peshawar frontier, and this he held when the Mutiny of 1857 broke out. It was a position of enormous difficulty, and momentous consequences were involved in the way the crisis might be met. Edwardes rose to the height of the occasion. He saw as if by inspiration the facts and the needs, and by the prompt measures which he adopted he rendered a service of incalculable importance, by effecting a reconciliation with Afghanistan, and securing the neutrality of the amir and the frontier tribes during the war. So effective was his procedure for the safety of the border that he was able to raise a large force in the Punjab and send it to co-operate in the siege and capture of Delhi. In 1859 Edwardes once more went to England, his health so greatly impaired by the continual strain of arduous work that it was doubtful whether he could ever return to India. During his stay he was created K.C.B., with the rank of brevet colonel; and the degree of LL.D. was conferred upon him by the university of Cambridge. Early in 1862 he again sailed for India, and was appointed commissioner of Umballa and agent for the Cis-Sutlej states. He had been offered the governorship of the Punjab, but on the ground of failing health had declined it. In February 1865 he was compelled to finally resign his post and return to England. A second good service pension was at once conferred on him; in May 1866 he was created K.C. of the Star of India; and early in 1868 was promoted major-general in the East Indian Army. He had been for some time engaged on a life of Sir Henry Lawrence, and high expectations were formed of the work; but he did not live to complete it, and after his death it was put into the hands of Mr Herman Merivale. He died in London on the 23rd of December 1868. Great in council and great in war, he was singularly beloved by his friends, generous and unselfish to a high degree, and a man of deep religious convictions.

See *Memorials of the Life and Letters of Sir Herbert Benjamin Edwardes*, by his wife (2 vols., London, 1886); T. R. E. Holmes, *Four Soldiers* (London, 1889); J. Ruskin, *Bibl. pastorum*, iv. "A Knight's Faith" (1885), passages from the life of Edwardes.

EDWARDS, AMELIA ANN BLANDFORD (1831–1892), English author and Egyptologist, the daughter of one of Wellington's officers, was born in London on the 7th of June 1831. At a very early age she displayed considerable literary and artistic talent. She became a contributor to various magazines and newspapers, and besides many miscellaneous works she wrote eight novels, the most successful of which were *Debenham's Vow* (1870) and *Lord Brackenbury* (1880). In the winter of 1873–1874 she visited Egypt, and was profoundly impressed by the new openings for archaeological research. She learnt the hieroglyphic characters, and made a considerable collection of Egyptian antiquities. In 1877 she published *A Thousand Miles up the Nile*, with illustrations by herself. Convinced that only by proper scientific investigations could the wholesale destruction of Egyptian antiquities be avoided, she devoted herself to arousing public opinion on the subject, and ultimately, in 1882, was largely instrumental in founding the Egypt Exploration Fund, of which she became joint honorary secretary with Reginald Stuart Poole. For the business of this Fund she abandoned her other literary work, writing only on Egyptology. In 1889–1890 she went on a lecturing tour in the United States. The substance of her lectures was published in volume form in 1891 as *Pharaohs, Fellahs, and Explorers*. She died at Weston-super-Mare, Somerset, on the 15th of April 1892, bequeathing her valuable collection of Egyptian antiquities to University College, London, together with a sum to found a chair of Egyptology. Miss Edwards received, shortly before her death, a civil list pension from the British government.

EDWARDS, BELA BATES (1802–1852), American man of letters, was born at Southampton, Massachusetts, on the 4th of July 1802. He graduated at Amherst College in 1824, was a tutor there in 1827–1828, graduated at Andover Theological Seminary in 1830, and was licensed to preach. From 1828 to 1833 he was assistant secretary of the American Education Society (organized in Boston in 1815 to assist students for the ministry), and from 1828 to 1842 was editor of the society's organ, which after 1831 was called the *American Quarterly Register*. He also founded (in 1833) and edited the *American Quarterly Observer*; in 1836–1841 edited the *Biblical Repository* (after 1837 called the *American Biblical Repository*) with which the *Observer* was merged in 1835; and was editor-in-chief of the *Bibliotheca Sacra* from 1844 to 1851. In 1837 he became professor of Hebrew at Andover, and from 1848 until his death was associate professor of sacred literature there. He died at Athens, Georgia, on the 20th of April 1852. Among his numerous publications were *A Missionary Gazetteer* (1832), *A Biography of Self-Taught Men* (1832), a once widely known *Eclectic Reader* (1835), a translation, with Samuel Harvey Taylor (1807–1871), of Kühner's *Schulgrammatik der Griechischen Sprache* and *Classical Studies* (1844), essays in ancient literature and art written in collaboration with Barnas Sears and C. C. Felton.

Edwards' *Addresses and Sermons*, with a memoir by Rev. Edwards A. Park, were published in two volumes at Boston in 1853.

EDWARDS, BRYAN (1743–1800), English politician and historian, was born at Westbury, Wiltshire, on the 21st of May 1743. His father died in 1756, when his maintenance and education were undertaken by his maternal uncle, Zachary Bayly, a wealthy merchant of Jamaica. About 1759 Bryan went to Jamaica, and joined his uncle, who engaged a private tutor to complete his education, and when Bayly died his nephew inherited his wealth, succeeding also in 1773 to the estate of another Jamaica resident named Hume. Edwards soon became a leading member of the colonial assembly of Jamaica, but in a few years he returned to England, and in 1782 failed to secure a seat in parliament as member for Chichester. He was again in Jamaica from 1787 to 1792, when he settled in England as a West India merchant, making in 1795 another futile attempt to enter parliament, on this occasion as the representative of Southampton. In 1796, however, he became member of parliament for Grampound, retaining his seat until his death at Southampton on the 15th or 16th of July 1800. In general Edwards was a supporter of the slave trade, and was described by William Wilberforce as a powerful opponent. By his wife, Martha, daughter of Thomas Phipps of Westbury, he left an only son, Hume.

In 1784 Edwards wrote *Thoughts on the late Proceedings of Government respecting the Trade of the West India Islands with the United States of America*, in which he attacked the restrictions placed by the government upon trade with the United States. In 1793 he published in two volumes his great work, *History, Civil and Commercial, of the British Colonies in the West Indies*, and in 1797 published his *Historical Survey of the French Colony in the Island of St Domingo*. In 1801 a new edition of both these works with certain additions was published in three volumes under the title of *History of the British Colonies in the West Indies*. This has been translated into German and parts of it into French and Spanish, and a fifth edition was issued in 1819. When Mungo Park returned in 1796 from his celebrated journey in Africa, Edwards, who was secretary of the Association for Promoting the Discovery of the Interior Parts of Africa, drew up from Park's narrative an account of his travels, which was published by the association in their *Proceedings*; and when Park wrote an account of his journeys he availed himself of Edwards' assistance. Edwards also wrote some poems and some other works relating to the history of the West Indies.

He left a short sketch of his life which was prefixed to the edition of the *History of the West Indies*, published in 1801.

EDWARDS, GEORGE (1693–1773), English naturalist, was born at Stratford, Essex, on the 3rd of April 1693. In his early years he travelled extensively over Europe, studying natural history, and gained some reputation for his coloured drawings of animals, especially birds. In 1733, on the recommendation of Sir Hans Sloane, he was appointed librarian to the Royal College of Physicians in London. In 1743 he published the first volume of his *History of Birds*, the fourth volume of which appeared in 1751, and three supplementary volumes, under the title *Gleanings of Natural History*, were issued in 1758, 1760 and 1764. The two works contain engravings and descriptions of more than 600 subjects in natural history not before described or delineated. He likewise added a general index in French and English, which was afterwards supplied with Linnaean names by Linnaeus himself, with whom he frequently corresponded. About 1764 he retired to Plaistow, Essex, where he died on the 23rd of July 1773. He also wrote *Essays of Natural History* (1770) and *Elements of Fossilogy* (1776).

EDWARDS, HENRY THOMAS (1837–1884), Welsh divine, was born on the 6th of September 1837 at Llan ym Mawddwy, Merioneth, where his father was vicar. He was educated at Westminster and at Jesus College, Oxford (B.A., 1860), and after teaching for two years at Llandovery went to Llangollen as his father's curate. He became vicar of Aberdare in 1866 and of Carnarvon in 1869. Here he began his lifelong controversy with Nonconformity, especially as represented by the Rev. Evan Jones (Calvinistic Methodist) and Rev. E. Herber Evans (Congregationalist). In 1870 he fought in vain for the principle of all-round denominationalism in the national education system, and in the same year addressed a famous letter to Mr Gladstone on "The Church of the Cymry," pointing out that the success of Nonconformity in Wales was largely due to "the withering effect of an alien episcopate." One immediate result of this was the appointment of the Welshman Joshua Hughes (1807–1889) to the vacant see of St Asaph. Edwards became dean of Bangor in 1876 and at once set about restoring the cathedral, and he promoted a clerical education society for supplying the diocese with educated Welsh-speaking clergy. He was a popular preacher and an earnest patriot; his chief defect was a lack of appreciation of the theological attainments of Nonconformity, and a Welsh commentary on St Matthew, which he had worked at for many years and published in two volumes in 1882, was severely handled by a Bangor Calvinistic Methodist minister. Edwards suffered from overwork and insomnia and a Mediterranean cruise in 1883 failed to restore his health; and he died by his own hand on the 24th of May 1884 at Ruabon.

See V. Morgan, *Welsh Religious Leaders in the Victorian Era.*

EDWARDS, JONATHAN (1703–1758), American theologian and philosopher, was born on the 5th of October 1703 at East (now South) Windsor, Connecticut. His earliest known ancestor was Richard Edwards, Welsh by birth, a London clergyman in Elizabeth's reign. His father Timothy Edwards (1669–1758), son of a prosperous merchant of Hartford, had graduated at Harvard, was minister at East Windsor, and eked out his salary by tutoring boys for college. His mother, a daughter of the Rev. Solomon Stoddard, of Northampton, Mass., seems to have been a woman of unusual mental gifts and independence of character. Jonathan, the only son, was the fifth of eleven children. The boy was trained for college by his father and by his elder sisters, who all received an excellent education. When ten years old he wrote a semi-humorous tract on the immateriality of the soul; he was interested in natural history, and at the age of twelve wrote a remarkable essay on the habits of the "flying spider." He entered Yale College in 1716, and in the following year became acquainted with Locke's *Essay*, which influenced him profoundly. During his college course he kept note books labelled "The Mind," "Natural Science" (containing a discussion of the atomic theory, &c.), "The Scriptures" and "Miscellanies," had a grand plan for a work on natural and mental philosophy, and drew up for himself rules for its composition. Even before his graduation in September 1720 as valedictorian and head of his class, he seems to have had a well formulated philosophy. The two years after his graduation he spent in New Haven studying theology. In 1722–1723 he was for eight months stated supply of a small Presbyterian church in New York city, which invited him to remain, but he declined the call, spent two months in study at home, and then in 1724–1726 was one of the two tutors at Yale, earning for himself the name of a "pillar tutor" by his steadfast loyalty to the college and its orthodox teaching at the time when Yale's rector (Cutler) and one of her tutors had gone over to the Episcopal Church.

The years 1720 to 1726 are partially recorded in his diary and in the resolutions for his own conduct which he drew up at this time. He had long been an eager seeker after salvation and was not fully satisfied as to his own "conversion" until an experience in his last year in college, when he lost his feeling that the election of some to salvation and of others to eternal damnation was "a horrible doctrine," and reckoned it "exceedingly pleasant, bright and sweet." He now took a great and new joy in the beauties of nature, and delighted in the allegorical interpretation of the Song of Solomon. Balancing these mystic joys is the stern tone of his Resolutions, in which he is almost ascetic in his eagerness to live earnestly and soberly, to waste no time, to maintain the strictest temperance in eating and drinking. On the 15th of February 1727 he was ordained minister at Northampton and assistant to his grandfather, Solomon Stoddard. He was a student minister, not a visiting pastor, his rule being thirteen hours of study a day. In the same year he married Sarah Pierrepont, then aged seventeen, daughter of James Pierrepont (1659–1714), a founder of Yale, and through her mother great-granddaughter of Thomas Hooker. Of her piety and almost nun-like love of God and belief in His personal love for her, Edwards had known when she was only thirteen, and had written of it with spiritual enthusiasm; she was of a bright and cheerful disposition, a practical housekeeper, a model wife and the mother of his twelve children. Solomon Stoddard died on the 11th of February 1729, leaving to his grandson the difficult task of the sole ministerial charge of one of the largest and wealthiest congregations in the colony, and one proud of its morality, its culture and its reputation.

In 1731 Edwards preached at Boston the "Public Lecture" afterwards published under the title *God Glorified in Man's Dependence.* This was his first public attack on Arminianism. The leading thought was God's absolute sovereignty in the work of redemption: that while it behoved God to create man holy, it was of His "good pleasure" and "mere and arbitrary grace" that any man was now made holy, and that God might deny this grace without any disparagement to any of His perfections. In 1733 a revival of religion began in Northampton, and reached such intensity in the winter of 1734 and the following spring as to threaten the business of the town. In six months nearly three hundred were admitted to the church. The revival gave Edwards an opportunity of studying the process of conversion in all its phases and varieties, and he recorded his observations with psychological minuteness and discrimination in *A Faithful Narrative of the Surprising Work of God in the Conversion of Many Hundred Souls in Northampton* (1737). A year later he published *Discourses on Various Important Subjects*, the five sermons which had proved most effective in the revival, and of these none, he tells us, was so immediately effective as that on the *Justice of God in the Damnation of Sinners*, from the text, "That every mouth may be stopped." Another sermon, published in 1734, on the *Reality of Spiritual Light* set forth what he regarded as the inner, moving principle of the revival, the doctrine of a "special" grace in the immediate and supernatural divine illumination of the soul. In the spring of 1735 the movement began to subside and a reaction set in. But the relapse was brief, and the Northampton revival, which had spread through the Connecticut valley and whose fame had reached England and Scotland, was followed in 1739–1740 by the Great Awakening, distinctively under the leadership of Edwards. The movement met with no sympathy from the orthodox leaders of the church. In 1741 Edwards published in its defence *The Distinguishing Marks of a Work of the Spirit of God*, dealing particularly with the phenomena most criticized, the swoonings, outcries and convulsions. These "bodily effects," he insisted, were not "distinguishing marks" of the work of the Spirit of God; but so bitter was the feeling against the revival in the more strictly Puritan churches that in 1742 he was forced to write a second apology, *Thoughts on the Revival in New England*, his main argument being the great moral improvement of the country. In the same pamphlet he defends an appeal to the emotions, and advocates preaching terror when necessary, even to children, who in God's sight "are young vipers . . . if not Christ's." He considers "bodily effects" incidentals to the real work of God, but his own mystic devotion and the experiences of his wife during the Awakening (which he gives in detail) make him think that the divine visitation usually overpowers the body, a view in support of which he quotes Scripture. In reply to Edwards, Charles Chauncy anonymously wrote *The Late Religious Commotions in New England Considered* (1743), urging conduct as the sole test of conversion; and the general convention of Congregational ministers in the Province of Massachusetts Bay protested "against disorders in practice which have of late obtained in various parts of the land." In spite of Edwards's able pamphlet, the impression had become widespread that "bodily effects" were recognized by the promoters of the Great Awakening as the true tests of conversion. To offset this feeling Edwards[1] preached at Northampton during the years 1742 and 1743 a series of sermons published under the title of *Religious Affections* (1746), a restatement in a more philosophical and general tone of his ideas as to "distinguishing marks." In 1747 he joined the movement started in Scotland called the "concert in prayer," and in the same year published *An Humble Attempt to Promote Explicit Agreement and Visible Union of God's People in Extraordinary Prayer for the Revival of Religion and the Advancement of Christ's Kingdom on Earth.* In 1749 he published a memoir of David Brainerd; the latter had lived in his family for several months, had been constantly attended by Edwards's daughter Jerusha, to whom he had been engaged to be married, and had died at Northampton on the 7th of October 1747; and he had been a case in point for the theories of conversion held by Edwards, who had made elaborate notes of Brainerd's conversations and confessions.

In 1748 there had come a crisis in his relations with his congregation. The Half-Way Covenant adopted by the synods of 1657 and 1662 had made baptism alone the condition to the civil privileges of church membership, but not of participation in the sacrament of the Supper. Edwards's grandfather and predecessor, Solomon Stoddard, had been even more liberal, holding that the Supper was a converting ordinance and that baptism was a sufficient title to all the privileges of the church. As early as 1744 Edwards, in his sermons on the Religious Affections, had plainly intimated his dislike of this practice. In the same year he had published in a church meeting the names of certain young people, members of the church, who were suspected of reading improper books,[2] and also the names of those who were to be called as witnesses in the case. But witnesses and accused were not distinguished on this list, and the congregation was in an uproar. A great many, fearing a scandal, now opposed an investigation which all had previously favoured. Edwards's preaching became unpopular; for four years no candidate presented himself for admission to the church; and when one did in 1748, and was met with Edwards's formal but mild and gentle tests, as expressed in the *Distinguishing Marks* and later in *Qualifications for Full Communion* (1749) the candidate refused to submit to them; the church backed him and the break was complete. Even permission to discuss his views in the pulpit was refused him. The ecclesiastical council voted by 10 to 9 that the pastoral relation be dissolved. The church by a vote of more than 200 to 23 ratified the action of the council, and finally a town meeting voted that Edwards should not be allowed to occupy the Northampton pulpit, though he did this on occasion as late as May 1755. He evinced no rancour or spite; his "Farewell Sermon" was dignified and temperate; nor is it to be ascribed to chagrin that in a letter to Scotland after his dismissal he expresses his preference for Presbyterian to Congregational church government. His position at the time was not unpopular throughout New England, and it is needless to say that his doctrine that the Lord's Supper is not a cause of regeneration and that communicants should be professing Christians has since (very largely through the efforts of his pupil Joseph Bellamy) become a standard of New England Congregationalism.

Edwards with his large family was now thrown upon the world, but offers of aid quickly came to him. A parish in Scotland could have been procured, and he was called to a Virginia church. He declined both, to become in 1750 pastor of the church in Stockbridge and a missionary to the Housatonic Indians. To the Indians he preached through an interpreter, and their interests he boldly and successfully defended by attacking the whites who were using their official position among them to increase their private fortunes. In Stockbridge he wrote the *Humble Relation*, also called *Reply to Williams* (1752), which was an answer to Solomon Williams (1700–1776), a relative and a bitter opponent of Edwards as to the qualifications for full communion; and he there composed the treatises on which his reputation as a philosophical theologian chiefly rests, the essay on *Original Sin*, the *Dissertation concerning the Nature of True Virtue*, the *Dissertation concerning the End for which God created the World*, and the great work on the Will, written in four months and a half, and published in 1754 under the title, *An Inquiry into the Modern Prevailing Notions Respecting that Freedom of the Will which is supposed to be Essential to Moral Agency.*

In 1757, on the death of President Burr, who five years before had married Edwards's daughter Esther, he reluctantly accepted the presidency of the College of New Jersey (now Princeton University), where he was installed on the 16th of February 1758. Almost immediately afterwards he was inoculated for smallpox, which was raging in Princeton and vicinity, and, always feeble, he died of the inoculation on the 28th of March 1758. He was buried in the old cemetery at Princeton. He was slender and fully six feet tall, and with his oval, gentle, almost feminine face looked the scholar and the mystic.

The Edwardean System.—It is difficult to separate Edwards's philosophy from his theology, except as the former is contained in the early notes on the Mind, where he says that matter exists only in idea; that space is God; that minds only are real; that in metaphysical strictness there is no being but God; that entity is the greatest and only good; and that God as infinite entity, wherein the agreement of being with being is absolute, is the supreme excellency, the supreme good. It seems certain that these conclusions were independent of Berkeley and Malebranche, and were not drawn from Arthur Collier's *Clavis universalis* (1713), with which they have much in common, but were suggested, in part at least, by Locke's doctrine of ideas, Newton's theory of colours, and Cudworth's Platonism, with all of which Edwards was early familiar. But they were never developed systematically, and the conception of the material universe here contended for does not again explicitly reappear in any of his writings. The fundamental metaphysical postulate that being and God are ultimately identical remained, however, the philosophical basis of all his thinking, and reverence for this being as the supreme good remained the fundamental disposition of his mind. That he did not interpret this idea in a Spinozistic sense was due to his more spiritual conception of "being" and to the reaction on his philosophy of his theology. The theological interest, indeed, came in the end to predominate, and philosophy to appear as an instrument for the defence of Calvinism. Perhaps the best criticism of Edwards's philosophy as a whole is that, instead of being elaborated on purely rational principles, it is mixed up with a system of theological conceptions with which it is never thoroughly combined, and that it is exposed to all the disturbing effects of theological controversy. Moreover, of one of his most central convictions, that of the sovereignty of God in election, he confesses that he could give no account.

Edwards's reputation as a thinker is chiefly associated with his treatise on the Will, which is still sometimes called "the one large contribution that America has made to the deeper philosophic thought of the world." The aim of this treatise was to refute the doctrine of free-will, since he considered it the logical, as distinguished from the sentimental, ground of most of the Arminian objections to Calvinism. He defines the will as that by which the "mind chooses anything." To act voluntarily, he says, is to act electively. So far he and his opponents are agreed. But choice, he holds, is not arbitrary; it is determined in every case by "that motive which as it stands in the view of the mind is the strongest," and that motive is strongest which presents in the immediate object of volition the "greatest apparent good," that is, the greatest degree of agreeableness or pleasure. What this is in a given case depends on a multitude of circumstances, external and internal, all contributing to form the "cause" of which the voluntary act and its consequences are the "effect." Edwards contends that the connexion between cause and effect here is as "sure and perfect" as in the realm of physical nature and constitutes a "moral necessity." He reduces the opposite doctrine to three assumptions, all of which he shows to be untenable: (1) "a self-determining power in the will"; (2) "indifference,... that the mind previous to the act of volition (is) in equilibrio"; (3) "contingence ... as opposed to ... any fixed and certain connexion (of the volition) with some previous ground or reason for its existence." Although he denies liberty to the will in this sense—indeed, strictly speaking, neither liberty nor necessity, he says, is properly applied to the will, "for the will itself is not an agent that has a will"—he nevertheless insists that the subject willing is a free moral agent, and argues that without the determinate connexion between volition and motive which he asserts and the libertarians deny, moral agency would be impossible. Liberty, he holds, is simply freedom from constraint, " the power . . . that any one has to do as he pleases." This power man possesses. And that the right or wrong of choice depends not on the cause of choice but on its nature, he illustrates by the example of Christ, whose acts were necessarily holy, yet truly virtuous, praiseworthy and rewardable. Even God Himself, Edwards here maintains, has no other liberty than this, to carry out without constraint His will, wisdom and inclination.

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[1] Edwards recognized the abuse of impulses and impressions, opposed itinerant and lay preachers, and defended a well-ordered and well-educated clergy.

[2] These were probably not fiction like *Pamela*, as Sir Leslie Stephen suggested, for Edwards listed several of Richardson's novels for his own reading, and considered *Sir Charles Grandison* a very moral and excellent work.

There is no necessary connexion between Edwards's doctrine of the motivation of choice and the system of Calvinism with which it is congruent. Similar doctrines have more frequently perhaps been associated with theological scepticism. But for him the alternative was between Calvinism and Arminianism, simply because of the historical situation, and in the refutation of Arminianism on the assumptions common to both sides of the controversy, he must be considered completely successful. As a general argument his account of the determination of the will is defective, notably in his abstract conception of the will and in his inadequate, but suggestive, treatment of causation, in regard to which he anticipates in important respects the doctrine of Hume. Instead of making the motive to choice a factor within the concrete process of volition, he regards it as a cause antecedent to the exercise of a special mental faculty. Yet his conception of this faculty as functioning only in and through motive and character, inclination and desire, certainly carries us a long way beyond the abstraction in which his opponents stuck, that of a bare faculty without any assignable content. Modern psychology has strengthened the contention for a fixed connexion between motive and act by reference to subconscious and unconscious processes of which Edwards, who thought that nothing could affect the mind which was unperceived, little dreamed; at the same time, at least in some of its developments, especially in its freer use of genetic and organic conceptions, it has rendered much in the older forms of statement obsolete, and has given a new meaning to the idea of self-determination, which, as applied to an abstract power, Edwards rightly rejected as absurd.

Edwards's controversy with the Arminians was continued in the essay on *Original Sin*, which was in the press at the time of his death. He here breaks with Augustine and the Westminster Confession by arguing, consistently with his theory of the Will, that Adam had no more freedom of will than we have, but had a special endowment, a supernatural gift of grace, which by rebellion against God was lost, and that this gift was withdrawn from his descendants, not because of any fictitious imputation of guilt, but because of their real participation in his guilt by actual identity with him in his transgression.

The *Dissertation on the Nature of True Virtue*, posthumously published, is justly regarded as one of the most original works on ethics of the 18th century, and is the more remarkable as reproducing, with no essential modification, ideas on the subject written in the author's youth in the notes on the Mind. Virtue is conceived as the beauty of moral qualities. Now beauty, in Edwards's view, always consists in a harmonious relation in the elements involved, an agreement of being with being. He conceives, therefore, of virtue, or moral beauty, as consisting in the cordial agreement or consent to intelligent being. He defines it as benevolence (good-will), or rather as a disposition to benevolence, towards being in general. This disposition, he argues, has no regard primarily to beauty in the object, nor is it primarily based on gratitude. Its first object is being, " simply considered," and it is accordingly proportioned, other things being equal, to the object's " degree of existence." He admits, however, benevolent being as a second object, on the ground that such an object, having a like virtuous propensity, " is, as it were, enlarged, extends to, and in some sort comprehends being in general." In brief, since God is the " being of beings " and comprehends, in the fullest extent, benevolent consent to being in general, true virtue consists essentially in a supreme love to God. Thus the principle of virtue—Edwards has nothing to say of " morality "—is identical with the principle of religion. From this standpoint Edwards combats every lower view. He will not admit that there is any evidence of true virtue in the approbation of virtue and hatred of vice, in the workings of conscience or in the exercises of the natural affections; he thinks that these may all spring from self-love and the association of ideas, from " instinct " or from a " moral sense of a secondary kind " entirely different from " a sense or relish of the essential beauty of true virtue." Nor does he recognize the possibility of a natural development of true virtue out of the sentiments directed on the " private systems "; on the contrary, he sets the love of particular being, when not subordinated to being in general, in opposition to the latter and as equivalent to treating it with the greatest contempt. All that he allows is that the perception of natural beauty may, by its resemblance to the primary spiritual beauty, quicken the disposition to divine love in those who are already under the influence of a truly virtuous temper.

Closely connected with the essay on Virtue is the boldly speculative *Dissertation on the End for which God Created the World*. As, according to the doctrine of virtue, God's virtue consists primarily in love to Himself, so His final end in creation is conceived to be, not as the Arminians held, the happiness of His creatures, but His own glory. Edwards supposes in the nature of God an original disposition to an " emanation " of His being, and it is the excellency of this divine being, particularly in the elect, which is, in his view, the final cause and motive of the world.

Edwards makes no attempt to reconcile the pantheistic element in his philosophy with the individuality implied in moral government. He seems to waver between the opinion that finite individuals have no independent being and the opinion that they have it in an infinitesimal degree; and the conception of " degrees of existence " in the essay on Virtue is not developed to elucidate the point. His theological conception of God, at any rate, was not abstractly pantheistic, in spite of the abstractness of his language about " being," but frankly theistic and trinitarian. He held the doctrine of the trinitarian distinctions indeed to be a necessity of reason. His *Essay on the Trinity*, first printed in 1903, was long supposed to have been withheld from publication because of its containing Arian or Sabellian tendencies. It contains in fact nothing more questionable than an attempted deduction of the orthodox Nicene doctrine, unpalatable, however, to Edwards's immediate disciples, who were too little speculative to appreciate his statement of the subordination of the " persons " in the divine " oeconomy," and who openly derided the doctrine of the eternal generation of the Son as " eternal nonsense "; and this perhaps was the original reason why the essay was not published.

Though so typically a scholar and abstract thinker on the one hand and on the other a mystic, Edwards is best known to the present generation as a preacher of hell fire. The particular reason for this seems to lie in a single sermon preached at Enfield, Connecticut, in July 1741 from the text, " Their foot shall slide in due time," and commonly known from its title, *Sinners in the Hands of an Angry God*. The occasion of this sermon is usually overlooked. It was preached to a congregation who were careless and loose in their lives at a time when " the neighbouring towns were in great distress for their souls." A contemporary account of it says that in spite of Edwards's academic style of preaching, the assembly was " deeply impressed and bowed down, with an awful conviction of their sin and danger. There was such a breathing of distress and weeping, that the preacher was obliged to speak to the people and desire silence, that he might be heard." Edwards preached other sermons of this type, but this one was the most extreme. The style of the imprecatory sermon, however, was no more peculiar to him than to his period. He was not a great preacher in the ordinary meaning of the word. His gestures were scanty, his voice was not powerful, but he was desperately in earnest, and he held his audience whether his sermon contained a picturesque and detailed description of the torments of the damned, or, as was often the case, spoke of the love and peace of God in the heart of man. He was an earnest, devout Christian, and a man of blameless life. His insight into the spiritual life was profound. Certainly the most able metaphysician and the most influential religious thinker of America, he must rank in theology, dialectics, mysticism and philosophy with Calvin and Fénelon, Augustine and Aquinas, Spinoza and Novalis; with Berkeley and Hume as the great English philosophers of the 18th century; and with Hamilton and Franklin as the three American thinkers of the same century of more than provincial importance.

Edwards's main aim had been to revivify Calvinism, modifying it for the needs of the time, and to promote a warm and vital Christian piety. The tendency of his successors was—to state the matter roughly—to take some one of his theories and develop it to an extreme. Of his immediate followers Joseph Bellamy is distinctly Edwardean in the keen logic and in the spirit of his *True Religion Delineated*, but he breaks with his master in his theory of general (not limited) atonement. Samuel Hopkins laid even greater stress than Edwards on the theorem that virtue consists in disinterested benevolence; but he went counter to Edwards in holding that unconditional resignation to God's decrees, or more concretely, willingness to be damned for the glory of God, was the test of true regeneration; for Edwards, though often quoted as holding this doctrine, protested against it in the strongest terms. Hopkins, moreover, denied Edwards's identity theory of original sin, saying that our sin was a result of Adam's and not identical with it; and he went much further than Edwards in his objection to " means of grace," claiming that the unregenerate were more and more guilty for continual rejection of the gospel if they were outwardly righteous and availed themselves of the means of grace. Stephen West (1735-1819), too, out-Edwardsed Edwards in his defence of the treatise on the *Freedom of the Will*, and John Smalley (1734–1820) developed the idea of a natural (not moral) inability on the part of man to obey God. Emmons, like Hopkins, considered both sin and holiness " exercises " of the will. Timothy Dwight (1752–1847) urged the use of the means of grace, thought Hopkins and Emmons pantheistic, and boldly disagreed with their theory of " exercises," reckoning virtue and sin as the result of moral choice or disposition, a position that was also upheld by Asa Burton (1752–1836), who thought that on regeneration the disposition of man got a new relish or " taste."

JONATHAN EDWARDS[1] the younger (1745–1801), second son of the philosopher, born at Northampton, Massachusetts, on the 26th of May 1745, also takes an important place among his followers. He lived in Stockbridge in 1751–1755 and spoke the language of the Housatonic Indians with ease, for six months studied among the Oneidas, graduated at Princeton in 1765, studied theology at Bethlehem, Connecticut, under Joseph Bellamy, was licensed to preach in 1766, was a tutor at Princeton in 1766–1769, and was pastor of the White Haven Church, New Haven, Connecticut, in 1769–1795, being then dismissed for the nominal reason that the church could not support him, but actually because of his opposition to the Half-Way Covenant as well as to slavery and the slave trade. He preached at Colebrook, Connecticut, in 1796–1799 and then became president of Union College, Schenectady, New York, where he died on the 1st of August 1801. His studies of the Indian dialects were scholarly and valuable. He edited his father's incomplete *History of the Work of Redemption*, wrote in answer to Stephen West, *A Dissertation Concerning Liberty and Necessity* (1797), which defended his father's work on the Will by a rather strained interpretation, and in answer to Chauncy on universal salvation formulated what is known as the "Edwardean," New England or Governmental theory of the atonement in *The Necessity of the Atonement and its Consistency with Free Grace in Forgiveness* (1785). His collected works were edited by his grandson Tryon Edwards in two volumes, with memoir (Andover, 1842). His place in the Edwardean theology is principally due to his defence against the Universalists of his father's doctrine of the atonement, namely, that Christ's death, being the equivalent of the eternal punishment of sinners, upheld the authority of the divine law, but did not pay any debt, and made the pardon of all men a possibility with God, but not a necessity.

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[1] Besides the younger Jonathan many of Edwards's descendants

Bibliography.—There have been various editions of Edwards's works. His pupil, Samuel Hopkins, in 1765 published two volumes from manuscript containing eighteen sermons and a memoir; the younger Jonathan Edwards with Dr Erskine published an edition in 4 volumes (1744 sqq.), and Samuel Austin in 1808 edited an edition in 8 volumes. In 1829 Sereno E. Dwight, a great-grandson of Edwards, published the *Life and Works* in 10 volumes, the first volume containing the memoir, which is still the most complete and was the standard until the publication (Boston, 1889) of *Jonathan Edwards*, by A. V. G. Allen, who attempts to "distinguish what he (Edwards) meant to affirm from what he actually teaches." In 1865 the Rev. Alexander B. Grosart edited from original manuscripts *Selections from the Unpublished Writings of Jonathan Edwards of America* (Edinburgh, 1865, printed for private circulation). This was the only part of a complete edition planned by Grosart that ever appeared. It contained the important Treatise on Grace, Annotations on the Bible, Directions for Judging of Persons' Experiences, and Sermons, the last for the most part merely in outline. E. C. Smyth published from a copy *Observations Concerning the Scripture Oeconomy of the Trinity and Covenant of Redemption* (New York, 1880), a careful edition from the manuscript of the essay on the Flying Spider (in the *Andover Review*, January 1890) and "Some Early Writings of Jonathan Edwards," with specimens from the manuscripts (in *Proceedings of the American Antiquarian Society*, October, 1895). In 1900 on the death of Prof. Edwards A. Park, the entire collection of Edwards's manuscripts loaned to him by Tryon Edwards was transferred to Yale University. Professor Park, like Mr. Grosart before him, had been unable to accomplish the great task of editing this mass of manuscript. "A Study of the Manuscripts of Jonathan Edwards" was published by F. B. Dexter in the *Proceedings of the Massachusetts Historical Society*, series 2, vol. xv. (Boston, 1902), and in the same volume of the *Proceedings* appeared "A Study of the Shorthand Writings of Jonathan Edwards," by W. P. Upham. The long sought for essay on the Trinity was edited (New York, 1903) with valuable introduction and appendices by G. P. Fisher under the title, *An Unpublished Essay of Edwards's on the Trinity*. The only other edition of Edwards (in whole or in part) of any importance is *Selected Sermons of Jonathan Edwards* (New York, 1904), edited by H. N. Gardiner, with brief biographical sketch and annotations on seven sermons, one of which had not previously been published.

For estimates of Edwards consult: *The Volume of the Edwards Family Meeting at Stockbridge, Massachusetts, September 6-7, A.D. 1870* (Boston, 1871); *Jonathan Edwards, a Retrospect, Being the Addresses Delivered in Connecticut with the Unveiling of a Memorial in the First Church of Christ in Northampton, Massachusetts, on the One Hundred and Fiftieth Anniversary of his Dismissal from the Pastorate of that Church*, edited by H. N. Gardiner (Boston, 1901); *Exercises Commemorating the Two Hundredth Anniversary of the Birth of Jonathan Edwards, held at Andover Theological Seminary, October 4-5, 1903* (Andover, 1904); and among the addresses delivered at Stockbridge in October 1903, John De Witt, "Jonathan Edwards: A Study," in the *Princeton Theological Review* (January, 1904). Also H. C. King, "Edwards as Philosopher and Theologian," in *Hartford Theological Seminary Record*, vol. xiv. (1903), pp. 23-57; H. N. Gardiner, "The Early Idealism of Jonathan Edwards," in the *Philosophical Review*, vol. ix. (1900), pp. 573-596; E. C. Smyth, *American Journal of Theology*, vol. i. (1897), pp. 960-964; Samuel P. Hayes, "An Historical Study of the Edwardean Revivals," in *American Journal of Psychology*, vol. xiii. (1902), pp. 550 ff.; J. H. MacCracken, "Philosophical Idealism of Edwards" in *Philosophical Review*, vol. xi. (1902), pp. 26-42, suggesting that Edwards did not know Berkeley, but Collier, and the same author's *Jonathan Edwards' Idealismus* (Halle, 1899); F. J. E. Woodbridge, "Jonathan Edwards," in *Philosophical Review*, vol. xiii. (1904) pp. 393-408; W. H. Squires, *Jonathan Edwards und seine Willenslehre* (Leipzig, 1901); Samuel Simpson, "Jonathan Edwards, A Historical Review," in *Hartford Seminary Record*, vol. xiv. (1903), pp. 3-22; and *The Edwardean, a Quarterly Devoted to the History of Thought in America* (Clinton, New York, 1903–1904), edited by W. H. Squires, of which only four parts appeared, all devoted to Edwards and all written by Squires. (H. N. G.; R. We.)

EDWARDS, LEWIS (1809–1887), Welsh Nonconformist divine, was born in the parish of Llanbadarn Fawr, Cardiganshire, on the 27th of October 1809. He was educated at Aberystwyth and at Llangeitho, and then himself kept school in both these places. He had already begun to preach for the Calvinistic Methodists when, in December 1830, he went to London to take advantage of the newly-opened university. In 1832 he settled as minister at Laugharne in Carmarthenshire, and the following year went to Edinburgh, where a special resolution of the senate allowed him to graduate at the end of his third session. He was now better able to further his plans for providing a trained ministry for his church. Previously, the success of the Methodist preachers had been due mainly to their natural gifts. Edwards made his home at Bala, and there, in 1837, with David Charles, his brother-in-law, he opened a school, which ultimately became the denominational college for north Wales. He died on the 19th of July 1887.

Edwards may fairly be called one of the makers of modern Wales. Through his hands there passed generation after generation of preachers, who carried his influence to every corner of the principality. By fostering competitive meetings and by his writings, especially in *Y Traethodydd* ("The Essayist"), a quarterly magazine which he founded in 1845 and edited for ten years, he did much to inform and educate his countrymen on literary and theological subjects. A new college was built at Bala in 1867, for which he raised £10,000. His chief publication was a noteworthy book on *The Doctrine of the Atonement*, cast in the form of a dialogue between master and pupil; the treatment is forensic, and emphasis is laid on merit. It was due to him that the North and South Wales Calvinistic Methodist Associations united to form an annual General Assembly; he was its moderator in 1866 and again in 1876. He was successful in bringing the various churches of the Presbyterian order into closer touch with each other, and unwearying in his efforts to promote education for his countrymen.

See *Bywyd a Llythyrau y Parch.* (*i.e.* Life and Letters of the Rev.) *Lewis Edwards, D.D.*, by his son T. C. Edwards.

EDWARDS, RICHARD (*c.* 1523–1566), English musician and playwright, was born in Somersetshire, became a scholar of Corpus Christi College, Oxford, in 1540, and took his M. A. degree in 1547. He was appointed in 1561 a gentleman of the chapel royal and master of the children, and entered Lincoln's Inn in 1564, where at Christmas in that year he produced a play which was acted by his choir boys. On the 3rd of September 1566 his play, *Palamon and Arcite*, was performed before Queen Elizabeth in the Hall of Christ Church, Oxford. Another play, *Damon and Pithias*, tragic in subject but with scenes of vulgar farce, entered at Stationers' Hall in 1567–8, appeared in 1571 and was reprinted in 1582; it may be found in Dodsley's

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were great, brilliant or versatile men. Among them were: his son Pierrepont (1750–1826), a brilliant but erratic member of the Connecticut bar, tolerant in religious matters and bitterly hated by stern Calvinists, a man whose personal morality resembled greatly that of Aaron Burr; his grandsons, William Edwards (1770–1851), an inventor of important leather rolling machinery; Aaron Burr the son of Esther Edwards; Timothy Dwight (1752–1817), son of Mary Edwards, and his brother Theodore Dwight, a Federalist politician, a member, the secretary and the historian of the Hartford Convention; his great-grandsons, Tryon Edwards (1809–1894) and Sereno Edwards Dwight, theologian, educationalist and author; and his great-great-grandsons, Theodore William Dwight, the jurist, and Timothy Dwight, second of that name to be president of Yale.

Old Plays, vol. i., and *Ancient British Drama*, vol. i. It is written in rhymed lines of rude construction, varying in length and neglecting the *caesura*. A number of the author's shorter pieces are preserved in the *Paradise of Dainty Devices*, first published in 1575, and reprinted in the *British Bibliographer*, vol. iii.; the best known are the lines on May, the *Amantium Irae*, and the *Commendation of Music*, which has the honour of furnishing a stanza to *Romeo and Juliet*. The *Historie of Damocles and Dionise* is assigned to him in the 1578 edition of the *Paradise*. Sir John Hawkins credited him with the part song "In going to my lonely bed"; the words are certainly his, and probably the music. In his own day Edwards was highly esteemed. The fine poem, "The Soul's Knell," is supposed to have been written by him when dying.

See *Grove's Dict. of Music* (new edition); the *Shakespeare Soc. Papers*, vol. ii. art. vi.; Ward, *English Dram. Literature*, vol. i.

EDWARDS, THOMAS CHARLES (1837–1900), Welsh Nonconformist divine and educationist, was born at Bala, Merioneth, on the 22nd of September 1837, the son of Lewis Edwards (*q.v.*). His resolve to become a minister was deepened by the revival of 1858–1859. After taking his degrees at London (B.A. 1861, M.A. 1862), he matriculated at St Alban Hall, Oxford, in October 1862, the university having just been opened to dissenters. He obtained a scholarship at Lincoln College in 1864, and took a first class in the school of Literae Humaniores in 1866. He was especially influenced by Mark Pattison and Jowett, who counselled him to be true to the church of his father, in which he had already been ordained. Early in 1867 he became minister at Windsor Street, Liverpool, but left it to become first principal of the University College of Wales at Aberystwyth, which had been established through the efforts of Sir Hugh Owen and other enthusiasts. The college was opened with a staff of three professors and twenty-five students in October 1872, and for some years its career was chequered enough. Edwards, however, proved a skilful pilot, and his hold on the affection of the Welsh people enabled him to raise the college to a high level of efficiency. When it was destroyed by fire in 1885 he collected £25,000 to rebuild it; the remainder of the necessary £40,000 being given by the government (£10,000) and by the people of Aberystwyth (£5000). In 1891 he gave up what had been the main work of his life to accept an undertaking that was even nearer his heart, the principalship of the theological college at Bala. A stroke of paralysis in 1894 fatally weakened him, but he continued at work till his death on the 22nd of March 1900. The Calvinistic Methodist Church of Wales bestowed on him every honour in their possession, and he received the degree of D.D. from the universities of Edinburgh (1887) and Wales (1898). His chief works were a *Commentary on 1 Corinthians* (1885), the *Epistle to the Hebrews* ("Expositor's Bible" series, 1888), and *The God-Man* ("Davies Lecture," 1895).

EDWARDSVILLE, a city and the county-seat of Madison county, Illinois, U.S.A., in the south-western part of the state, on Cahokia Creek, about 18 m. N.E. of St Louis. Pop. (1890) 3561; (1900) 4157 (573 foreign-born); (1910) 5014. Edwardsville is served by the Toledo, St Louis & Western, the Wabash, the Litchfield & Madison, and the Illinois Terminal railways, and is connected with St Louis by three electric lines. It has a Carnegie library. The city's principal manufactures are carriages, ploughs, brick, machinery, sanitary ware and plumber's goods. Bituminous coal is extensively mined in the vicinity. Adjoining Edwardsville is the co-operative village Leclaire (unincorporated), with the factory of the N. O. Nelson Manufacturing Co., makers of plumber's supplies, brass goods, sanitary fixtures, &c.; the village was founded in 1890 by Nelson O. Nelson (b. 1844), and nearly all of the residents are employed by the company of which he is the head; they share to a certain extent in its profits, and are encouraged to own their own homes. The company supports a school, Leclaire Academy, and has built a club-house, bowling alleys, tennis-courts, base-ball grounds, &c. The first settlement on the site of Edwardsville was made in 1812, and in 1815 the town was laid out and named in honour of Ninian Edwards (1775–1833), the governor of the Illinois Territory (1809–1818), and later United States senator (1818–1824) and governor of the state of Illinois (1826–1830). Edwardsville was incorporated in 1819 and received its present charter in 1872.

EDWARDSVILLE, a borough of Luzerne county, Pennsylvania, U.S.A., on the north branch of the Susquehanna river, adjoining Kingston and close to the north-western limits of Wilkes-Barre (on the opposite side of the river), in the north-eastern part of the state; the official name of the post office is Edwardsdale. Pop. (1890), 3284; (1900), 5165, of whom 2645 were foreign-born; (1910 census), 8407. It is served by the electric line of the Wilkes-Barre & Wyoming Valley Traction Co. Coal mining and brewing are the chief industries. Edwardsville was incorporated in 1884.

EDWIN, AEDUINI or EDWINE (585–633), king of Northumbria, was the son of Ella of Deira. On the seizure of Deira by Æthelfrith of Bernicia (probably 605), Edwin was expelled and is said to have taken refuge with Cadfan, king of Gwynedd. After the battle of Chester, in which Æthelfrith defeated the Welsh, Edwin fled to Rœdwald, the powerful king of East Anglia, who after some wavering espoused his cause and defeated and slew Æthelfrith at the river Idle in 617. Edwin thereupon succeeded to the Northumbrian throne, driving out the sons of Æthelfrith. There is little evidence of external activity on the part of Edwin before 625. It is probable that the conquest of the Celtic kingdom of Elmet, a district in the neighbourhood of the modern Leeds, ruled over by a king named Cerdic (Ceredig) is to be referred to this period, and this may have led to the later quarrel with Cadwallon, king of Gwynedd. Edwin seems also to have annexed Lindsey to his kingdom by 625. In this year he entered upon negotiations with Eadbald of Kent for a marriage with his sister Æthelberg. It was made a condition that Christianity should be tolerated in Northumbria, and accordingly Paulinus was consecrated bishop by Justus in 625, and was sent to Northumbria with Æthelberg. According to Bede, Edwin was favourably disposed towards Christianity owing to a vision he had seen at the court of Rœdwald, and in 626 he allowed Eanfled, his daughter by Æthelberg, to be baptized. On the day of the birth of his daughter, the king's life had been attempted by Eomer, an emissary of Cwichelm, king of Wessex. Preserved by the devotion of his thegn Lilla, Edwin vowed to become a Christian if victorious over his treacherous enemy. He was successful in the ensuing campaign, and abstained from the worship of the gods of his race. A letter of Pope Boniface helped to decide him, and after consulting his friends and counsellors, of whom the priest Coifi afterwards took a prominent part in destroying the temple at Goodmanham, he was baptized with his people and nobles at York, at Easter 627. In this town he granted Paulinus a see, built a wooden church and began one of stone. Besides York, Yeavering and Maelmin in Bernicia, and Catterick in Deira, were the chief scenes of the work of Paulinus. It was the influence of Edwin which led to the conversion of Eorpwald of East Anglia. Bede notices the peaceful state of Britain at this time, and relates that Edwin was preceded on his progresses by a kind of standard like that borne before the Roman emperors. In 633 Cadwallon of North Wales and Penda of Mercia rose against Edwin and slew him at Hatfield near Doncaster. His kinsman Osric succeeded in Deira, and Eanfrith the son of Æthelfrith in Bernicia. Bede tells us that Edwin had subdued the islands of Anglesey and Man, and the *Annales Cambriae* record that he besieged Cadwallon (perhaps in 632) in the island of Glannauc (Puffin Island). He was definitely recognized as overlord by all the other Anglo-Saxon kings of his day except Eadbald of Kent.

See Bede, *Hist. Eccl.* (ed. Plummer, Oxford, 1896), ii. 5, 9, 11, 12, 13, 15, 16, 18, 20; Nennius (ed. San Marte, 1844), § 63; *Vita S. Oswaldi*, ix. Simeon of Durham (ed. Arnold, London, 1882–1885, vol. i. R.S.). (F. G. M. B.)

EDWIN, JOHN (1749–1790), English actor, was born in London on the 10th of August 1749, the son of a watchmaker. As a youth, he appeared in the provinces, in minor parts; and at Bath in 1768 he formed a connexion with a Mrs Walmsley, a milliner, who bore him a son, but whom he afterwards deserted. His first London appearance was at the Haymarket in 1776 as

Flaw in Samuel Foote's *The Cozeners*, but when George Colman took over the theatre he was given better parts and became its leading actor. In 1779 he was at Covent Garden, and played there or at the Haymarket until his death on the 31st of October 1790. Ascribed to him are *The Last Legacy of John Edwin*, 1780; *Edwin's Jests* and *Edwin's Pills to Purge Melancholy*.

His son, JOHN EDWIN (1768–1805), made a first appearance on the stage at the Haymarket as Hengo in Beaumont and Fletcher's *Bonduca* in 1778, and from that time acted frequently with his father, and managed the private theatricals organized by his intimate friend Lord Barrymore at Wargrave, Berks. In 1791 he married Elizabeth Rebecca Richards, an actress already well known in juvenile parts, and played at the Haymarket and elsewhere thereafter with her. He died in Dublin on the 22nd of February 1805. His widow joined the Drury Lane company (then playing, on account of the fire of 1809, at the Lyceum), and took all the leading characters in the comedies of the day. She died on the 3rd of August 1854.

EDWY (EADWIG), "THE FAIR" (*c.* 940–959), king of the English, was the eldest son of King Edmund and Ælfgifu, and succeeded his uncle Eadred in 955, when he was little more than fifteen years old. He was crowned at Kingston by Archbishop Odo, and his troubles began at the coronation feast. He had retired to enjoy the company of the ladies Æthelgifu (perhaps his foster-mother) and her daughter Ælfgifu, whom the king intended to marry. The nobles resented the king's withdrawal, and he was induced by Dunstan and Cynesige, bishop of Lichfield, to return to the feast. Edwy naturally resented this interference, and in 957 Dunstan was driven into exile. By the year 956 Ælfgifu had become the king's wife, but in 958 Archbishop Odo of Canterbury secured their separation on the ground of their being too closely akin. Edwy, to judge from the disproportionately large numbers of charters issued during his reign, seems to have been weakly lavish in the granting of privileges, and soon the chief men of Mercia and Northumbria were disgusted by his partiality for Wessex. The result was that in the year 957 his brother, the Ætheling Edgar, was chosen as king by the Mercians and Northumbrians. It is probable that no actual conflict took place, and in 959, on Edwy's death, Edgar acceded peaceably to the combined kingdoms of Wessex, Mercia and Northumbria.

AUTHORITIES.—*Saxon Chronicle* (ed. Earle and Plummer, Oxford), *sub ann.*; *Memorials of St Dunstan* (ed. Stubbs, Rolls Series); William of Malmesbury, *Gesta regum* (ed. Stubbs, Rolls Series); Birch, *Cartularium Saxonicum*, vol. ii. Nos. 932-1046; Florence of Worcester.

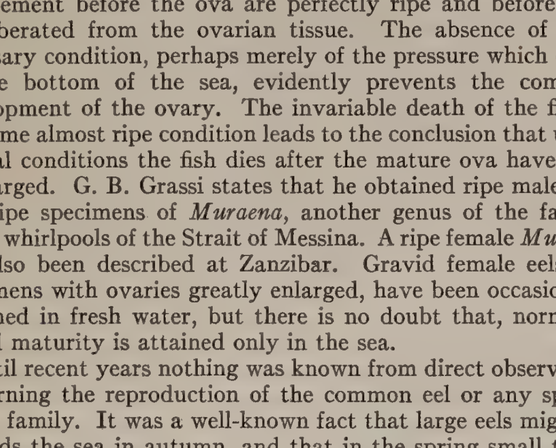
EECKHOUT, GERBRAND VAN DEN (1621–1674), Dutch painter, born at Amsterdam on the 19th of August 1621, entered early into the studio of Rembrandt. Though a companion pupil to F. Bol and Govaert Flinck, he was inferior to both in skill and in the extent of his practice; yet at an early period he assumed Rembrandt's manner with such success that his pictures were confounded with those of his master; and, even in modern days, the "Resurrection of the Daughter of Jairus," in the Berlin museum, and the "Presentation in the Temple," in the Dresden gallery, have been held to represent worthily the style of Rembrandt. As evidence of the fidelity of Eeckhout's imitation we may cite his "Presentation in the Temple," at Berlin, which is executed after Rembrandt's print of 1630, and his "Tobit with the Angel," at Brunswick, which is composed on the same background as Rembrandt's "Philosopher in Thought." Eeckhout not merely copies the subjects; he also takes the shapes, the figures, the Jewish dress and the pictorial effects of his master. It is difficult to form an exact judgment of Eeckhout's qualities at the outset of his career. His earliest pieces are probably those in which he more faithfully reproduced Rembrandt's peculiarities. Exclusively his is a tinge of green in shadows marring the harmony of the work, a certain gaudiness of jarring tints, uniform surface and a touch more quick than subtle. Besides the pictures already mentioned we should class amongst early productions on this account the "Woman taken in Adultery," at Amsterdam; "Anna presenting her Son to the High Priest," in the Louvre; the "Epiphany," at Turin; and the "Circumcision," at Cassel. Eeckhout matriculated early in the Gild of Amsterdam. A likeness of a lady at a dressing-table with a string of beads, at Vienna, bears the date of 1643, and proves that the master at this time possessed more imitative skill than genuine mastery over nature. As he grew older he succeeded best in portraits, a very fair example of which is that of the historian Dappers (1669), in the Städel collection. Eeckhout occasionally varied his style so as to recall in later years the "small masters" of the Dutch school. Waagen justly draws attention to his following of Terburg in "Gambling Soldiers," at Stafford House, and a "Soldiers' Merrymaking," in the collection of the marquess of Bute. A "Sportsman with Hounds," probably executed in 1670, now in the Vander Hoo gallery, and a "Group of Children with Goats" (1671), in the Hermitage, hardly exhibit a trace of the artist's first education. Amongst the best of Eeckhout's works "Christ in the Temple" (1662), at Munich, and the "Haman and Mordecai" of 1665, at Luton House, occupy a good place. Eeckhout died at Amsterdam on the 22nd of October 1674.

EEL. The common freshwater eel (Lat. *anguilla*; O. Eng. *æl*) belongs to a group of soft-rayed fishes distinguished by the presence of an opening to the air-bladder and the absence of the pelvic fins. With its nearest relatives it forms the family *Muraenidae*, all of which are of elongated cylindrical form. The peculiarities of the eel are the rudimentary scales buried in the skin, the well-developed pectoral fins, the rounded tail fin continuous with the dorsal and ventral fins. Only one other species of the family occurs in British waters, namely, the conger, which is usually much larger and lives in the sea. In the conger the eyes are larger than in the eel, and the upper jaw overlaps the lower, whereas in the eel the lower jaw projects beyond the upper. Both species are voracious and predatory, and feed on almost any animal food they can obtain, living or dead. The conger is especially fond of squid or other Cephalopods, while the eel greedily devours carrion. The common eel occurs in all the rivers and fresh waters of Europe, except those draining towards the Arctic Ocean, the Black Sea and the Caspian Sea. It also occurs on the Atlantic side of North America. The conger has a wider range, extending from the western and southern shores of Britain and Ireland to the East Indian Archipelago and Japan. It is common in the Mediterranean.

The ovaries of the eel resemble somewhat those of the salmon in structure, not forming closed sacs, as in the majority of Teleostei, but consisting of laminae exposed to the body cavity. The laminae in which the eggs are produced are very numerous, and are attached transversely by their inner edges to a membranous band running nearly the whole length of the body-cavity. The majority of the eels captured for market are females with the ovaries in an immature condition. The male eel was first discovered in 1873 by Syrski at Trieste, the testis being described by him as a lobed elongated organ, in the same relative position as the ovary in the female, surrounded by a smooth surface without laminae. He did not find ripe spermatozoa. He discovered the male by examining small specimens, all the larger being female. L. Jacoby, a later observer, found no males exceeding 19 in. in length, while the female may reach a length of 39 in. or more. Dr C. G. J. Petersen, in a paper published in 1896, states that in Denmark two kinds of eels are distinguished by the fishermen, namely, yellow eels and silver eels. The silver eels are further distinguished by the shape of the snout and the size of the eyes. The snout in front of the eyes is not flat, as in the yellow eels, but high and compressed, and therefore appears more pointed, while the eyes are much larger and directed outwards. In both kinds there are males and females, but Petersen shows that the yellow eels change into silver eels when they migrate to the sea. The sexual organs in the silver eels are more developed than in the yellow eels, and the former have almost or entirely ceased to take food. The male silver eels are from 11½ to 19 in. in length, the females from 16½ to about 39 in. It is evident, therefore, that if eels only spawn once, they do not all reach the same size when they become sexually mature. The male conger was first described in 1879 by Hermes, who obtained a ripe specimen in the Berlin Aquarium. This specimen was not quite 2½ ft. in length, and of the numerous males which have been identified at the Plymouth Laboratory, none exceeded this length. The large numbers of conger above this size caught for the market are all immature females. Female conger of 5 or 6 ft. in length and weighing from 30 to 50 lb are common enough, and occasionally they exceed these limits. The largest recorded was 8 ft. 3 in. long, and weighed 128 lb.

There is every reason to believe that eels and conger spawn but once in their lives, and die soon after they have discharged their generative products. When kept in aquaria, both male and female conger are vigorous and voracious. The males sooner or later cease to feed, and attain to the sexually mature condition, emitting ripe milt when handled and gently squeezed. They live in this condition five or six months, taking no food and showing gradual wasting and disease of the bodily organs. The eyes and skin become ulcerated, the sight is entirely lost, and the bones become soft through loss of lime. The females also after a time cease to feed, and live in a fasting condition for five or six months, during which time the ovaries develop and reach great size and weight, while the bones become soft and the teeth disappear. The female, however, always dies in confinement before the ova are perfectly ripe and before they are liberated from the ovarian tissue. The absence of some necessary condition, perhaps merely of the pressure which exists at the bottom of the sea, evidently prevents the complete development of the ovary. The invariable death of the fish in the same almost ripe condition leads to the conclusion that under normal conditions the fish dies after the mature ova have been discharged. G. B. Grassi states that he obtained ripe male eels, and ripe specimens of *Muraena*, another genus of the family, in the whirlpools of the Strait of Messina. A ripe female *Muraena* has also been described at Zanzibar. Gravid female eels, *i.e.* specimens with ovaries greatly enlarged, have been occasionally obtained in fresh water, but there is no doubt that, normally, sexual maturity is attained only in the sea.

Until recent years nothing was known from direct observation concerning the reproduction of the common eel or any species of the family. It was a well-known fact that large eels migrated towards the sea in autumn, and that in the spring small transparent eels of 2 in. in length and upwards were common on the shore under stones, and ascended rivers and streams in vast swarms. It was reasonable, therefore, to infer that the mature eels spawned in the sea, and that there the young were developed.



Leptocephali. (By permission of J. & A. Churchill.)

A group of peculiar small fishes were, however, known which were called Leptocephali, from the small proportional size of the head. The first of these described was captured in 1763 near Holyhead, and became the type of *L. Morrisii*, other specimens of which have been taken either near the shore or at the surface of the sea. Other forms placed in the same genus had been taken by surface fishing in the Mediterranean and in tropical ocean currents. The chief peculiarities of Leptocephali, in addition to the smallness of the head, are their ribbon-like shape and their glassy transparency during life. The body is flattened from side to side, and broad from the dorsal to the ventral edge. Like the eels, they are destitute of pelvic fins, and no generative organs have been observed in them (see fig.).

In 1864 the American naturalist, T. N. Gill, published the conclusion that *L. Morrisii* was the young or larva of the conger, and Leptocephali generally the young stages of species of *Muraenidae*. In 1886 this conclusion was confirmed from direct observation by Yves Delage, who kept alive in a tank at Roscoff a specimen of *L. Morrisii*, and saw it gradually transformed into a young conger. From 1887 to 1892 Professor Grassi and Dr Calandruccio carried on careful and successful researches into the development of the Leptocephali at Catania, in Sicily. The specimens were captured in considerable numbers in the harbour, and the transformation of *L. Morrisii* into young conger, and of various other forms of Leptocephalus into other genera of *Muraenidae*, such as *Muraena*, *Congromuraena* and *Ophichthys*, was observed. In 1894 the same authors published the announcement that another species of Leptocephalus, namely, *L. brevirostris*, was the larva of the common eel. This larval form was captured in numbers with other Leptocephali in the strong currents of the Strait of Messina. In the metamorphosis of all Leptocephali a great reduction in size occurs. The *L. brevirostris* reaches a length of 8 cm., or a little more than 2½ in., while the perfectly-formed young eel is 2 in. long or a little more.

The Italian naturalists have also satisfied themselves that certain pelagic fish eggs originally described by Raffaele at Naples are the eggs of *Muraenidae*, and that among them are the eggs of *Conger* and *Anguilla*. They believe that these eggs, although free in the water, remain usually near the bottom at great depths, and that fertilization takes place under similar conditions. No fish eggs of the kind to which reference is here made have yet been obtained on the British coasts, although conger and eels are so abundant there. Raffaele described and figured the larva newly hatched from one of the eggs under consideration, and it is evident that this larva is the earliest stage of a Leptocephalus.

Although young eels, some of them more or less flat and transparent, are common enough on the coasts of Great Britain and north-western Europe in spring, neither eggs nor specimens of *Leptocephalus brevirostris* have yet been taken in the North Sea, English Channel or other shallow waters in the neighbourhood of the British Islands, or in the Baltic. Marked eels have been proved to migrate from the inmost part of the Baltic to the Kattegat. Recently, however, search has been made for the larvae in the more distant and deeper portions of the Atlantic Ocean. In May 1904 a true larval specimen was taken at the surface south-west of the Faeroe Islands, and another was taken 40 m. north by west of Achill Head, Ireland. In 1905 numbers were taken in deep water in the Atlantic. The evidence at present available indicates that the spawning of mature eels takes place beyond the 100 fathom line, and that the young eels which reach the coast are already a year old. As eels, both young and old, are able to live for a long time out of water and have the habit of travelling at night over land in wet grass and in damp weather, there is no difficulty in explaining their presence in wells, ponds or other isolated bodies of fresh water at any distance from the sea.

See "The Eel Question," *Report U.S. Commissioner of Fisheries for 1879* (Washington, 1882); J. T. Cunningham, "Reproduction and Development of the Conger," *Journ. Mar. Biol. Assn.* vol. ii.; C. G. J. Petersen, *Report Dan. Biol. Station*, v. (1894); G. B. Grassi, *Quart. Journ. Mic. Sci.* vol. xxxix. (1897). (J. T. C.)

EFFENDI (a Turkish word, corrupted from the Gr. αὐθέντης, a lord or master), a title of respect, equivalent to the English "sir," in the Turkish empire and some other eastern countries. It follows the personal name, when that is used, and is generally given to members of the learned professions, and to government officials who have no higher rank, such as Bey, Pasha, &c. It may also indicate a definite office, as *Hakim effendi*, chief physician to the sultan. The possessive form *effendim* (my master) is used by servants and in formal intercourse.

EFFIGIES, MONUMENTAL. An "effigy" (Lat. *effigies*, from *effingere*, to fashion) is, in general, a material image or likeness of a person; and the practice of hanging or burning people "in effigy," *i.e.* their semblance only, preserves the more general sense of the word. Such representations may be portraits, caricatures or models. But, apart from general usages of the term (see *e.g.* Wax Figures), it is more particularly applied in the history of art to a particular class of sculptured figures, in the flat or the round, associated with Christian sepulchral monuments, dating from the 12th century. The earliest of these attempts at commemorative portraiture were executed in low relief upon coffin-lids of stone or purbeck marble, some portions of the designs for the most part being executed by means of incised lines, cut upon the raised figure. Gradually, with the increased size and the greater architectural dignity of monumental structures, effigies attained to a high rank as works of art, so that before the close of the 13th century very noble examples of figures of this order are found to have been executed in full relief; and, about the same period, similar figures also began to be engraved, either upon monumental slabs of stone or marble, or upon plates of metal, which were affixed to the surfaces of slabs that were laid in the pavements of churches.

Engraved plates of this class, known as "Brasses" (see Brasses, Monumental), continued in favour until the era of the Reformation, and in recent times their use has been revived. It seems probable that the introduction and the prevalence of flat engraved memorials, in place of commemorative effigies in relief, was due, in the first instance, to the inconvenience resulting from increasing numbers of raised stones on the pavement of churches; while the comparatively small cost of engraved plates, their high artistic capabilities, and their durability, combined to secure for them the popularity they unquestionably enjoyed. If considerably less numerous than contemporary incised slabs and engraved brasses, effigies sculptured in relief—with some exceptions in full relief—continued for centuries to constitute the most important features in many medieval monuments. In the 13th century, their origin being apparently derived from the endeavour to combine a monumental effigy with a monumental cross upon the same sepulchral stone (whether in sculpture or by incised lines), parts only of the human figure sometimes were represented, such as the head or bust, and occasionally also the feet; in some of the early examples of this curious class the cross symbol was not introduced, and after awhile half-length figures became common.

Except in very rare instances, that most important element, genuine face-portraiture, is not to be looked for, in even the finest sculptured effigies, earlier than about the middle of the 15th century. In works of the highest order of art, indeed, the memorials of personages of the most exalted rank, effigies from an early period in their existence may be considered occasionally to have been portraits properly so called; and yet even in such works as these an approximately correct general resemblance but too frequently appears to have been all that was contemplated or desired. At the same time, in the earliest monumental effigies we possess contemporary examples of vestments, costume,[1] armour, weapons, royal and knightly insignia, and other personal appointments and accessories, in all of which accurate fidelity has been certainly observed with scrupulous care and minute exactness. Thus, since the monumental effigies of England are second to none in artistic merit, while they have been preserved in far greater numbers, and generally in better condition than those in other countries, they represent in unbroken continuity an unrivalled series of original personal representations of successive generations, very many of them being, in the most significant acceptation of that term, veritable contemporaneous portraits.

Once esteemed to be simply objects of antiquarian curiosity, and either altogether disregarded or too often subjected to injurious indignity, the monumental effigies in England long awaited the formation of a just estimate of their true character and their consequent worth in their capacity as authorities for face-portraiture. In the original contract for the construction of the monument at Warwick to Richard Beauchamp, the fifth earl, who died in 1439, it is provided that an effigy of the deceased noble should be executed in bronze gilt, with all possible care, by the most skilful and experienced artists of the time; and the details of the armour and the ornaments of the figure are specified with minute precision. It is remarkable, however, that the effigy itself is described only in the general and indefinite terms—"an image of a man armed." There is no provision that the effigy should be "an image" of the earl; and much less is anything said as to its being such a "counterfeit presentment" of the features and person of the living man, as the contemporaries of Shakespeare had learned to expect in what they would accept as true portraiture. The effigy, almost as perfect as when it left the sculptor's hands, still bears witness, as well to the conscientious care with which the conditions of the contract were fulfilled, as to the eminent ability of the artists employed. So complete is the representation of the armour, that this effigy might be considered actually to have been equipped in the earl's own favourite suit of the finest Milan steel. The cast of the figure also was evidently studied from what the earl had been when in life, and the countenance is sufficiently marked and endowed with the unmistakable attributes of personal character. Possibly such a resemblance may have been the highest aim in the image-making of the period, somewhat before the middle of the 15th century. Three-quarters of a century later, a decided step towards fidelity in true portraiture is shown to have been taken, when, in his will (1510 A.D.), Henry VII. spoke of the effigies of himself and of his late queen, Elizabeth of York, to be executed for their monument, as "an image of our figure and another of hers." The existing effigies in the Beauchamp chapel and in Henry VII.'s chapel, with the passages just quoted from the contract made by the executors of the Lancastrian earl, strikingly illustrate the gradual development of the idea of true personal portraiture in monumental effigies, during the course of the 15th and at the commencement of the 16th century in England.

Study of the royal effigies still preserved must commence in Worcester Cathedral with that of King John. This earliest example of a series of effigies of which the historical value has never yet been duly appreciated is rude as a work of art, and yet there is on it the impress of such individuality as demonstrates that the sculptor did his best to represent the king. Singularly fine as achievements of the sculptor's art are the effigies of Henry III., Queen Eleanor of Castile, and her ill-fated son Edward II., the two former in Westminster Abbey, the last in Gloucester cathedral; and of their fidelity also as portraits no doubt can be entertained. In like manner the effigies of Edward III. and his queen Philippa, and those of their grandson Richard II. and his first consort, Anne of Bohemia (all at Westminster), and of their other grandson, Henry of Lancaster, with his second consort, Joan of Navarre, at Canterbury—all convince us that they are true portraits. Next follow the effigies of Henry VII. and Elizabeth of York,—to be succeeded, and the royal series to be completed, by the effigies of Queen Elizabeth and Mary Stuart, all of them in Westminster Abbey. Very instructive would be a close comparison between the two last-named works and the painted portraits of the rival queens, especially in the case of Mary, the pictures of whom differ so remarkably from one another.

As the 15th century advanced, the rank of the personage represented and the character of the art that distinguishes any effigy goes far to determine its portrait qualities. Still later, when more exact face-portraiture had become a recognized element, sculptors must be supposed to have aimed at the production of such resemblance as their art would enable them to give to their works; and accordingly, when we compare effigies with painted portraits of the same personages, we find that they corroborate one another. The prevalence of portraiture in the effigies of the 16th and 17th centuries, when their art generally underwent a palpable decline, by no means raises all works of this class, or indeed the majority of them, to the dignity of true portraits; on the contrary, in these effigies, as in those of earlier periods, it is the character of the art in each particular example that affects its merit, value and authority as a portrait. In judging of these latter effigies, however, we must estimate them by the standard of art of their own era; and, as a general rule, the effigies that are the best as works of art in their own class are the best also and the most faithful in their portraiture. The earlier effigies, usually produced without any express aim at exact portraiture, as we now employ that expression, have nevertheless strong claims upon our veneration. Often their sculpture is very noble; and even when they are rudest as works of art, there is rarely lacking a rough grandeur about them, as exhibited in the fine bold figure of Fair Rosamond's son, Earl William of the Long Sword, which reposes in such dignified serenity in his own cathedral at Salisbury. These effigies may not bring us closely face to face with remote generations, but they do place before us true images of what the men and women of those generations were.

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[1] It is well known that the costume of effigies nearly always represented what was actually worn by the remains of the person commemorated, when prepared for interment and when lying in state; and, in like manner, the aspect of the lifeless countenance, even if not designedly reproduced by medieval "image" makers, may long have exercised a powerful influence upon their ideas of consistent monumental portraiture.

Observant students of monumental effigies will not fail to appreciate the singular felicity with which the medieval sculptors adjusted their compositions to the recumbent position in which their "images" necessarily had to be placed. Equally worthy of notice is the manner in which many monumental effigies, particularly those of comparatively early date, are found to have assumed an aspect neither living nor lifeless, and yet impressively life-like. The sound judgment also, and the good taste of those early sculptors, were signally exemplified in their excluding, almost without exception, the more extravagant fashions in the costume of their era from their monumental sculpture, and introducing only the simpler but not less characteristic styles of dress and appointments. Monumental effigies, as commonly understood, represent recumbent figures, and the accessories of the effigies themselves have been adjusted to that position. With the exceptions when they appear on one side resting on the elbow (as in the case of Thomas Owen (d. 1598) and Sir Thomas Heskett (d. 1605), both in Westminster Abbey), these effigies lie on their backs, and as a general rule (except in the case of episcopal figures represented in the act of benediction, or of princes and warriors who sometimes hold a sceptre or a sword) their hands are uplifted and conjoined as in supplication. The crossed-legged attitude of numerous armed effigies of the era of mail-armour has been supposed to imply the personages so represented to have been crusaders or Knights of the Temple; but in either case the supposition is unfounded and inconsistent with unquestionable facts. Much beautiful feeling is conveyed by figures of ministering angels being introduced as in the act of supporting and smoothing the pillows or cushions that are placed in very many instances to give support to the heads of the recumbent effigies. The animals at the feet of these effigies, which frequently have an heraldic significance, enabled the sculptors, with equal propriety and effectiveness, to overcome one of the special difficulties inseparable from the recumbent position. In general, monumental effigies were carved in stone or marble, or cast in bronze, but occasionally they were of wood: such is the effigy of Robert Curthose, son of William I. (d. 1135), whose altar tomb in Gloucester cathedral was probably set up about 1320.

In addition to recumbent statues, upright figures must receive notice here, especially those set in wall-monuments in churches mainly. These usually consisted in half-length figures, seen full-face, placed in a recess within an architectural setting more or less elaborate. They belong mainly to the 16th and 17th centuries. Among the many examples in old St Paul's cathedral (destroyed in the Great Fire of 1666) were those of Dean Colet (d. 1519), William Aubrey (1595) and Alexander Nowell (d. 1601). In St Giles's, Cripplegate, is the similarly designed effigy of John Speed (d. 1629); while that of John Stow (d. 1605) is a full-length, seated figure. This, like the figure of Thomas Owen, is in alabaster, but since its erection has always been described as terra-cotta—a material which came into considerable favour for the purpose of busts and half-lengths towards the end of the 16th century, imported, of course, from abroad. Sometimes the stone monuments were painted to resemble life, as in the monuments to Shakespeare and John Combe (the latter now over-painted white), in Holy Trinity Church, Stratford-on-Avon.

BIBLIOGRAPHY.—Among the more noteworthy publications are the following: *Monumental Effigies in Great Britain* (Norman Conquest to Henry VIII.), by C. A. Stothard, folio (London, 1876); *The Recumbent Monumental Effigies in Northamptonshire*, by A. Hartshorne (4to, London, 1867–1876); *Sepulchral Memorials* (Northamptonshire), by W. H. Hyett (folio, London, 1817); *Ancient Sepulchral Effigies and Monumental Sculpture of Devon*, by W. H. H. Rogers (4to, Exeter, 1877); *The Ancient Sepulchral Monuments of Essex*, ed. by C. M. Carlton (4to, Chelmsford, 1890); and other works dealing with the subject according to counties. Of particular value is the *Report of the Sepulchral Monuments Committee* of the Society of Antiquaries, laboriously compiled at the request of the Office of Works, arranged (1) personally and chronologically, and (2) locally (1872). (C. B.; M. H. S.)

EGAN, PIERCE (1772–1849), English sporting writer, was born in London in 1772. He began life as sporting reporter for the newspapers, and was soon recognized as the best of his day. In 1814 he wrote, set and printed a book about the relations of the prince regent (afterwards George IV.) and Miss Robinson, called *The Mistress of Royalty, or the Loves of Florizel and Perdita.* But his best-known work is *Life in London, or Days and Nights of Jerry Hawthorne and his Elegant Friend Corinthian Tom* (1821), a book describing the amusements of sporting men, with illustrations by Cruikshank. This book took the popular fancy and was one of Thackeray's early favourites (see his *Roundabout Papers*). It was repeatedly imitated, and several dramatic versions were produced in London. A sequel containing more of country sports and misadventures probably suggested Dickens's *Pickwick Papers*. In 1824 *Pierce Egan's Life in London and Sporting Guide* was started, a weekly newspaper afterwards incorporated with *Bell's Life*. Among his numerous other books are *Boxiana* (1818), *Life of an Actor* (1824), *Book of Sports* (1832), and the *Pilgrims of the Thames* (1838). Egan died at Pentonville on the 3rd of August 1849.

His son, Pierce Egan (1814–1880), illustrated his own and his father's books, and wrote a score of novels of varying merit, of which *The Snake in the Grass* (1858) is perhaps the best.

EGBO, a secret society flourishing chiefly among the Efiks of the Calabar district, West Africa. Egbo or Ekpé is a mysterious spirit who lives in the jungle and is supposed to preside at the ceremonies of the society. Only males can join, boys being initiated about the age of puberty. Members are bound by oath of secrecy, and fees on entrance are payable. The Egbo-men are ranked in seven or nine grades, for promotion to each of which fresh initiation ceremonies, fees and oaths are necessary. The society combines a kind of freemasonry with political and law-enforcing aims. For instance any member wronged in an Egbo district, that is one dominated by the society, has only to address an Egbo-man or beat the Egbo drum in the Egbo-house, or "blow Egbo" as it is called, *i.e.* sound the Egbo horn before the hut of the wrong-doer, and the whole machinery of the society is put in force to see justice done. Formerly the society earned as bad a name as most secret sects, from the barbarous customs mingled with its rites; but the British authorities have been able to make use of it in enforcing order and helping on civilization. The Egbo-house, an oblong building like the nave of a church, usually stands in the middle of the villages. The walls are of clay elaborately painted inside and ornamented with clay figures in relief. Inside are wooden images, sometimes of an obscene nature, to which reverence is paid. Much social importance attaches to the highest ranks of Egbo-men, and it is said that very large sums, sometimes more than a thousand pounds, are paid to attain these dignities. At certain festivals in the year the

Egbo-men wear black wooden masks with horns which it is death for any woman to look on.

See Mary H. Kingsley, *West African Studies* (1901); Rev. Robt. H. Nassau, *Fetichism in West Africa* (1904); C. Partridge, *Cross River Natives* (1905).

EGEDE, HANS (1686–1758), Norwegian missionary, was born in the vogtship of Senjen, Norway, on the 31st of January 1686. He studied at the university of Copenhagen, and in 1706 became pastor at Vaagen in the Lofoten islands, but the study of the chronicles of the northmen having awakened in him the desire to visit the colony of Northmen in Greenland, and to convert them to Christianity, he resigned his charge in 1717; and having, after great difficulty, obtained the sanction and help of the Danish government in his enterprise, he set sail with three ships from Bergen on the 3rd of May 1721, accompanied by his wife and children. He landed on the west coast of Greenland on the 3rd of July, but found to his dismay that the Northmen were entirely superseded by the Eskimo, in whom he had no particular interest, and whose language he would be able to master, if at all, only after years of study. But, though compelled to endure for some years great privations, and at one time to see the result of his labours almost annihilated by the ravages of small-pox, he remained resolutely at his post. He founded the colony of Godthaab, and soon gained the affections of the people. He converted many of them to Christianity, and established a considerable commerce with Denmark. Ill-health compelling him to return home in 1736, he was made principal of a seminary at Copenhagen, in which workers were trained for the Greenland mission; and from 1740 to 1747 he was superintendent of the mission. He died on the 5th of November 1758. He is the author of a book on the natural history of Greenland.

His work in Greenland was continued, on his retirement, by his son Paul Egede (1708–1789), who afterwards returned to Denmark and succeeded his father as superintendent of the Greenland mission. Paul Egede also became professor of theology in the mission seminary. He published a Greenland-Danish-Latin dictionary (1750), Greenland grammar (1760) and Greenland catechism (1756). In 1766 he completed the translation begun by his father of the New Testament into the Greenland tongue; and in 1787 he translated Thomas à Kempis. In 1789 he published a journal of his life in Greenland.

EGER, AQIBA (1761–1837), Jewish scholar, was for the last twenty-five years of his life rabbi of Posen. He was a rigorous casuist of the old school, and his chief works were legal notes on the Talmud and the code of Qaro (*q.v.*). He believed that religious education was enough, and thus opposed the party which favoured secular schools. He was a determined foe of the reform movement, which began to make itself felt in his time.

EGER (Czech, *Cheb*), a town of Bohemia, Austria, 148 m. W.N.W. of Prague by rail. Pop. (1900) 23,665. It is situated on the river Eger, at the foot of one of the spurs of the Fichtelgebirge, and lies in the centre of a German district of about 40,000 inhabitants, who are distinguished from the surrounding population by their costumes, language, manners and customs. On the rock, to the N.W. of the town, lies the Burg or Castle, built probably in the 12th century, and now in ruins. It possesses a massive black tower, built of blocks of lava, and in the courtyard is an interesting chapel, in Romanesque style with fantastic ornamentations, which was finished in the 13th century. In the banquet-room of this castle Wallenstein's officers Terzky, Kinsky, Illo and Neumann were assassinated a few hours before Wallenstein himself was murdered by Captain Devereux. The murder took place on the 25th of February 1634 in the town-house, which was at that time the burgomaster's house. The rooms occupied by Wallenstein have been transformed since 1872 into a museum, which contains many historical relics and antiquities of the town of Eger. The handsome and imposing St Nicholas church was built in the 13th century and restored in 1892. There is a considerable textile industry, together with the manufacture of shoes, machinery and milling. Eger was the birthplace of the novelist and playwright Braun von Braunthal (1802–1866). About 3 m. N.W. of Eger is the well-known watering place of Franzensbad (*q.v.*).

The district of Eger was in 870 included in the new margraviate of East Franconia, which belonged at first to the Babenbergs, but from 906 to the counts of Vohburg, who took the title of margraves of Eger. By the marriage, in 1149, of Adela of Vohburg with the emperor Frederick I., Eger came into the possession of the house of Swabia, and remained in the hands of the emperors until the 13th century. In 1265 it was taken by Ottakar II. of Bohemia, who retained it for eleven years. After being repeatedly transferred from the one power to the other, according to the preponderance of Bohemia or the empire, the town and territory were finally incorporated with Bohemia in 1350, after the Bohemian king became the emperor Charles IV. Several imperial privileges, however, continued to be enjoyed by the town till 1849. It suffered severely during the Hussite war, during the Swedish invasion in 1631 and 1647, and in the War of the Austrian Succession in 1742.

See Drivok, *Ältere Geschichte der deutschen Reichstadt Eger und des Reichsgebietes Egerland* (Leipzig, 1875).

EGER (Ger. *Erlau*, Med. Lat. *Agria*), a town of Hungary, capital of the county of Heves, 90 m. E.N.E. of Budapest by rail. Pop. (1900) 24,650. It is beautifully situated in the valley of the river Eger, an affluent of the Theiss, and on the eastern outskirts of the Mátra mountains. Eger is the see of an archbishopric, and owing to its numerous ecclesiastical buildings has received the name of "the Hungarian Rome." Amongst the principal buildings are the beautiful cathedral in the Italian style, with a handsome dome 130 ft. high, erected in 1831–1834 by the archbishop Ladislaus Pyrker (1772–1847); the church of the Brothers of Mercy, opposite which is a handsome minaret, 115 ft. high, the remains of a mosque dating from the Turkish occupation, other Roman Catholic churches, and an imposing Greek church. The archiepiscopal palace; the lyceum, with a good library and an astronomical observatory; the seminary for Roman priests; and the town-hall are all noteworthy. On an eminence N.E. of the town, laid out as a park, are the ruins of the old fortress, and a monument of Stephen Dobó, the heroic defender of the town against the assaults of the Turks in 1552. The chief occupation of the inhabitants is the cultivation of the vineyards of the surrounding hills, which produce the red Erlauer wine, one of the best in Hungary. To the S.W. of Eger, in the same county of Heves, is situated the town of Gyöngyös (pop. 15,878). It lies on the south-western outskirts of the Mátra mountains, and carries on a brisk trade in the Erlauer wine, which is produced throughout the district. The Hungarians defeated the Austrians at Gyöngyös on the 3rd of April 1849. To the S.W. of Gyöngyös is situated the old town of Hatvan (pop. 9698), which is now a busy railway junction, and possesses several industrial establishments.

Eger is an old town, and owes its importance to the bishopric created by King Stephen in 1010, which was one of the richest in the whole of Hungary. In 1552 Eger resisted the repeated assaults of a large Turkish force; in 1596, however, it was given up to the Turks by the Austrian party in the garrison, and remained in their possession until 1687. It was created an archbishopric in 1814. During the revolution of 1848–1849, Eger was remarkable for the patriotic spirit displayed by its inhabitants; and it was here that the principal campaigns against the Austrians were organized.

EGERIA, an ancient Italian goddess of springs. Two distinct localities were regarded as sacred to her,—the grove of Diana Nemorensis at Aricia, and a spring in the immediate neighbourhood of Rome at the Porta Capena. She derives her chief importance from her legendary connexion with King Numa, who had frequent interviews with her and consulted her in regard to his religious legislation (Livy i. 19; Juvenal iii. 12). These meetings took place on the spot where the sacred shield had fallen from heaven, and here Numa dedicated a grove to the Camenae, like Egeria deities of springs. After the death of Numa, Egeria was said to have fled into the grove of Aricia, where she was changed into a spring for having interrupted the rites of Diana by her lamentations (Ovid, *Metam.* xv. 479). At Aricia there was also a Manius Egerius, a male counterpart of Egeria. Her connexion with Diana Nemorensis, herself a birth goddess, is confirmed by the fact that her aid was invoked by pregnant women. She also possessed the gift of prophecy; and the statement (Dion. Halic. ii. 60) that she was one of the Muses is due to her connexion with the Camenae, whose worship was displaced by them.

EGERTON, SIR PHILIP DE MALPAS GREY, Bart. (1806–1881), English palaeontologist, was born on the 13th of November 1806, the son of the 9th baronet. He was educated at Eton and Christ Church, Oxford, where he graduated B.A. in 1828. While at college his interest in geology was aroused by the lectures of W. Buckland, and by his acquaintance with W. D. Conybeare. Subsequently when travelling in Switzerland with Lord Cole (afterwards 3rd earl of Enniskillen) they were introduced to Prof. L. Agassiz at Neufchatel, and determined to make a special study of fossil fishes. During the course of fifty years they gradually gathered together two of the largest and finest of private collections—that of Sir Philip Grey Egerton being at Oulton Park, Tarporley, Cheshire. He described the structure and affinities of numerous species in the publications of the Geological Society of London, the *Geological Magazine* and the Decades of the Geological Survey; and in recognition of his services the Wollaston medal was awarded to him in 1873 by the Geological Society. He was elected F.R.S. in 1831, and was a trustee of the British Museum. As a member of Parliament he represented the city of Chester in 1830, the southern division of Cheshire from 1835 until 1868, and the western division from 1868 to 1881. He died in London on the 6th of April 1881. His collection of fossil fishes is now in the British Museum.

EGG, AUGUSTUS LEOPOLD (1816–1863), English painter, was born on the 2nd of May 1816 in London, where his father carried on business as a gun-maker. He had some schooling at Bexley, and was not at first intended for the artistic profession; but, developing a faculty in this line, he entered in 1834 the drawing class of Mr Sass, and in 1836 the school of the Royal Academy. His first exhibited picture appeared in 1837 at the Suffolk Street gallery. In 1838 he began exhibiting in the Academy, his subject being a "Spanish Girl"; altogether he sent twenty-seven works to this institution. In 1848 he became an associate and in 1860 a full member of the Academy: he had considerable means, apart from his profession. In 1857 he took a leading part in selecting and arranging the modern paintings in the Art-Treasures Exhibition in Manchester. His constitution being naturally frail, he went in 1853, with Dickens and Wilkie Collins, to Italy for a short trip, and in 1863 he visited Algeria. Here he benefited so far as his chronic lung-disease was concerned; but exposure to a cold wind while out riding brought on an attack of asthma, from which he died on the 26th of March 1863 at Algiers, near which city his remains were buried.

Egg was a gifted and well-trained painter of genre, chiefly in the way of historical anecdote, or of compositions from the poets and novelists. Among his principal pictures may be named: 1843, the "Introduction of Sir Piercie Shafton and Halbert Glendinning" (from Scott's *Monastery*); 1846, "Buckingham Rebuffed"; 1848, "Queen Elizabeth discovers she is no longer young"; 1850, "Peter the Great sees Catharine for the first time"; 1854, "Charles I. raising the Standard at Nottingham" (a study); 1855, the "Life and Death of Buckingham"; 1857 and 1858, two subjects from Thackeray's *Esmond*; 1858, "Past and Present, a triple picture of a faithless wife"; 1859, the "Night before Naseby"; 1860, his last exhibited work, the Dinner Scene from *The Taming of the Shrew*. The Tate Gallery contains one of his earlier pictures, Patricio entertaining two Ladies, from the *Diable boiteux*; it was painted in 1844.

Egg was rather below the middle height, with dark hair and a handsome well-formed face; the head of Peter the Great (in the picture of Peter and Catharine, which may be regarded as his best work, along with the Life and Death of Buckingham) was studied, but of course considerably modified, from his own countenance. He was manly, kind-hearted, pleasant, and very genial and serviceable among brother-artists; social and companionable, but holding mainly aloof from fashionable circles. As an actor he had uncommon talent. He appeared among Dickens's company of amateurs in 1852 in Lord Lytton's comedy *Not so Bad as we Seem*, and afterwards in Wilkie Collins's *Frozen Deep*, playing the humorous part of Job Want.

EGG (O.E. *aeg*, cf. Ger. *Ei*, Swed. *aegg*, and prob. Gr. *ὠόν*, Lat. *ovum*), the female reproductive cell or ovum of animals, which gives rise generally only after fertilization to the young. The largest eggs are those of birds; and this because, to the minute essential portion of the egg, or germ, from which the young bird grows, there is added a large store of food-material—the yolk and white of the egg—destined to nourish the growing embryo while the whole is enclosed within a hard shell.

The relative sizes of eggs depend entirely on the amount of the food-yolk thus enclosed with the germ; while the form and texture of the outer envelope are determined by the nature of the environment to which the egg is exposed. Where the food material is infinitesimal in quantity the egg is either not extruded—the embryo being nourished by the maternal tissues,—or it passes out of the parental body and gives rise at once to a free-living organism or "larva" (see Larval Forms), as in the case of many lowly freshwater and marine animals. In such cases no "egg" in the usual sense of the term is produced.

The number of eggs periodically produced by any given individual depends on the risks of destruction to which they, and the young to which they give rise, are exposed: not more than a single egg being annually laid by some species, while with others the number may amount to millions.

Birds' Eggs.—The egg of the bird affords, for general purposes, the readiest example of the modifications imposed on eggs by the external environment. Since it must be incubated by the warmth of the parent's body, the outer envelope has taken the form of a hard shell for the protection of the growing chick from pressure, while the dyes which commonly colour the surface of this shell serve as a screen to hide it from egg-eating animals.

Carbonate of lime forms the principal constituent of this shell; but in addition phosphate of lime and magnesia are also present. In section, this shell will be found to be made up of three more or less distinct crystalline layers, traversed by vertical canals, whereby the shell is made porous so as to admit air to the developing chick.

The outermost, or third, layer of this shell often takes the form of a glaze, as of procelain, as for example in the burnished egg of the ostrich: or it may assume the character of a thick, chalky layer as in some cuckoos (*Guira*, *Crotophaga ani*), cormorants, grebes and flamingoes: while in some birds as in the auks, gulls and tinamous, this outer layer is wanting; yet the tinamous have the most highly glazed eggs of all birds, the second layer of the shell developing a surface even more perfectly burnished than that formed by the outermost, third layer in the ostrich.

While the eggs of some birds have the shell so thin as to be translucent, *e.g.* kingfisher, others display considerable thickness, the maximum being reached in the egg of the extinct *Aepyornis*.

Though in shape differing but little from that of the familiar hen's egg, certain well-marked modifications of form are yet to be met with. Thus the eggs of the plover are pear-shaped, of the sand-grouse more or less cylindrical, of the owls and titmice spherical and of the grebes biconical.

In the matter of coloration the eggs of birds present a remarkable range. The pigments to which this coloration is due have been shown, by means of their absorption spectra (Sorby, *Proc. Zool. Soc.*, 1875), to be seven in number. The first of these, oorhodeine, is brown-red in tone, and rarely absent: the second and third, oocyanin, and banded oocyanin, are of a beautiful blue, and though differing spectroscopically give rise to the same product when oxidized: the fourth and fifth are yellow, and rufous ooxanthine, the former combining with oocyanin gives rise to the wonderful malachite green of the emu's egg, while the latter occurs only in the eggs of tinamous: the sixth is lichenoxanthine, a pigment not yet thoroughly known but present in the shells of all eggs having a peculiar brick-red colour. Still less is known of the seventh pigment which is, as yet, nameless. It is a substance giving a banded absorption spectrum, and which, mixed with other pigments, imparts an abnormally browner tint. The origin of these pigments is yet uncertain, but it is probable that they are derived from the haemoglobin or red colouring matter of the blood. This being so, then the pigments of the egg-shell differ entirely in their nature from those which colour the yolk or the feathers.

While many eggs are either colourless or of one uniform tint, the majority have the surface broken up by spots or lines, or a combination of both, of varying tints: the pigment being deposited as the egg passes down the lower portion of the oviduct. That the egg during this passage turns slowly on its long axis is shown by the fact that the spots and lines have commonly a spiral direction; though some of the markings are made during periods of rest, as is shown by their sharp outlines, movement giving a blurred effect. Where the egg is pyriform, the large end makes way for the smaller. Many eggs display, in addition to the strongly marked spots, more or fewer fainter spots embedded in a deeper layer of the shell, and hence such eggs are said to be "double-spotted," *e.g.* rails and plovers.

Among some species, as in birds of prey, the intensity of this coloration is said to increase with age up to a certain point, when it as gradually decreases. Frequently, especially where but two eggs are laid (Newton), all the dye will be deposited, sometimes on the first, sometimes on the last laid, leaving the other colourless. But although of a number of eggs in a "clutch"—as the full complement of eggs in a nest is called—no two are exactly alike, they commonly bear a very close resemblance. Among certain species, however, which lay several eggs, one of the number invariably differs markedly from the rest, as for example in the eggs of the house-sparrow or in those of the sparrow-hawk, where, of a clutch of six, two generally differ conspicuously from the rest. Differing though these eggs do from the rest of the clutch, all yet present the characters common to the species. But the eggs of some birds, such as the Australian swamp quail, *Synoecus australis*, present a remarkably wide range of variation in the matter of coloration, no two clutches being alike, the extremes ranging from pure white to eggs having a greenish ground colour and rufous spots or blotches. But a still more interesting illustration of variation equally marked is furnished by the chikor partridge (*Caccabis chukar*), since here the variation appears to be correlated with the geographical distribution of the species. Thus eggs taken in Greece are for the most part cream-coloured and unspotted; those from the Grecian Archipelago are generally spotted and blotched; while more to the eastward spots are invariably present, and the blotches attain their maximum development.

But in variability the eggs of the guillemot (*Lomvia troile*) exceed all others: both in the hue of the ground colour and in the form of the superimposed markings, these eggs exhibit a wonderful range for which no adequate explanation has yet been given.

Individual peculiarities of coloration are commonly reproduced, not only with this species but also in others, year after year.

The coloration of the egg bears no sort of relation to the coloration of the bird which lays it; but it bears on the other hand a more or less direct relation to the nature of the environment during incubation.

Significance of colour.

White eggs may generally be regarded as representing the primitive type of egg, since they agree in this particular with the eggs of reptiles. And it will generally be found that eggs of this hue are deposited in holes or in domed nests. So long indeed as nesting-places of this kind are used will the eggs be white. And this because coloured eggs would be invisible in dimly lighted chambers of this description, and therefore constantly exposed to the risk of being broken by the sitting bird, or rolling out of reach where the chamber was large enough to admit of this, whereas white eggs are visible so long as they can be reached by the faintest rays of light. Pigeons invariably lay white eggs; and while some deposit them in holes others build an open nest, a mere platform of sticks. These exceptions to the rule show that the depredations of egg-eating animals are sufficiently guarded against by the overhanging foliage, as well as by the great distance from the ground at which the nest is built. Birds which have reverted to the more ancient custom of nesting in holes after having developed pigmented eggs, have adopted the device of covering the shell with a layer of chalky matter (*e.g.* puffins), or, to put the case more correctly, they have been enabled to maintain survival after their return to the more ancient mode of nidification, because this reversion was accompanied by the tendency to cover the pigmented surface of the shell with this light-reflecting chalky incrustation.

Eggs which are deposited on the bare ground, or in other exposed situations, are usually protectively coloured: that is to say, the hue of the shell more or less completely harmonizes with the ground on which the egg is placed. The eggs of the plover tribe afford the most striking examples of this fact.

But the majority of birds deposit their eggs in a more or less elaborately constructed nest, and in such cases the egg, so far from being protectively coloured, often displays tints that would appear calculated rather to attract the attention of egg-stealing animals; bright blue or blue spotted with black being commonly met with. It may be, however, that coloration of this kind is less conspicuous than is generally supposed, but in any case the safety of the egg depends not so much on its coloration as on the character of the nest, which, where protective devices are necessary, must harmonize sufficiently with its surroundings to escape observation from prowling egg-stealers of all kinds.

The size of the egg depends partly on the number produced and partly on the conditions determining the state of the young bird at hatching: hence there is a great disparity in the relative sizes of the eggs of different birds. Thus it will be found that young birds which emerge in the world blind, naked and helpless are the product of relatively small eggs, while on the contrary young hatched from relatively large eggs are down-clad and active from birth.

The fact that the eggs must be brooded by the parent is also a controlling factor in so far as number is concerned, for no more can be hatched than can be covered by the sitting bird. Other factors, however, less understood, also exercise a controlling influence in this matter. Thus the ostrich lays from 12 to 16, the teal 15, the partridge 12–20, while among many other species the number is strictly limited, as in the case of the hornbills and guillemots, which lay but a single egg; the apteryx, divers, petrels and pigeons never lay more than 2, while the gulls and plovers never exceed 4. Tropical species are said to lay fewer eggs than their representatives in temperate regions, and further immature birds lay more and smaller eggs than when fully adult.

Partly owing to the uniformity of shape, size and texture of the shell, the eggs of birds are by no means easy to distinguish, except in so far as their family resemblances are concerned; that is to say, except in particular cases, they cannot be specifically distinguished, and hence they are of but little or no value for the purposes of classification.

Save only among the megapodes, all birds brood their eggs, the period of incubation varying from 13 days, as in small passerine birds, to 8 weeks, as in the cassowary, though eggs of the rhea and of *Struthio* hatch in from 5 to 6 weeks. But the megapodes deposit their eggs in mounds of decaying vegetable matter or in sand in the neighbourhood of hot springs, and there without further apparent care leave them. Where the nestling is active from the moment of hatching the eggs have a relatively longer incubation period than in cases where the nestlings are for a long while helpless.

Eggs of Mammals.—Only in the spiny ant-eater, or *Echidna*, and the duck-billed platypus, or *Ornithorhynchus*, among the Mammalia, are the eggs provided with a large store of yolk, enclosed within a shell, and extruded to undergo development apart from the maternal tissues. In the case of the echidna the eggs, two in number, are about as large as those of a sparrow, similar in shape, and have a white, parchment-like shell. After expulsion they are transferred by the beak of the mother to a pouch resembling that of the marsupial kangaroos, and there they undergo development. The *Ornithorhynchus*, on the other hand, lays from two to four eggs, which in size and general appearance resemble those of the echidna. They are, however, deposited in a loosely constructed nest at the end of a long burrow and there brooded. In Marsupials, the eggs are smaller than those of *Echidna* and *Ornithorhynchus*, and they contain a larger proportion of yolk than occurs in higher mammals.

Eggs of Reptiles.—The eggs of reptiles are invariably provided with a large amount of food yolk and enclosed with a firm test or shell, which though generally parchment-like in texture may be calcareous as in birds, as, for example, in many of the tortoises and turtles and in the crocodiles.

Among reptiles the egg is always white or yellowish, while the number laid often far exceeds that in the case of birds. The tuatara of New Zealand, however, lays but ten—white hard-shelled, long and oval—at intervals between November and January. The long intervals between the appearance of the successive eggs is a characteristic feature of the reptiles, but is met with among the birds only in the megapodes, which, like the reptiles, do not "brood" their eggs.

Among the Chelonia the number of eggs varies from two to four in some of the tortoises, to 200 in some of the turtles: while in the crocodiles between 20 and 30 are produced, hard-shelled and white.

The eggs of the lizards are always white or yellowish, and generally soft-shelled; but the geckos and the green lizard lay hard-shelled eggs. Many of the soft-shelled eggs are remarkable for the fact that they increase in size after extrusion, owing to the stretching of the membranous shell by the growing embryo. In the matter of number lizards are less prolific than many of the Chelonia, a dozen eggs being the general number, though as many as thirty may be produced at a time, as in the case of the common chameleon.

While as a general rule the eggs of lizards are laid in burrows or buried, some are retained within the body of the parent until the young are ready to emerge; or they may even hatch within the oviduct. This occurs with some chameleons and some lizards, *e. g.* the slow-worm. The common English lizard is also viviparous. Normally the young leaves the egg immediately after its extrusion, but if by any chance this extrusion is delayed they escape while yet in the oviduct.

The majority of the snakes lay eggs, but most of the vipers and the aquatic snakes are viviparous, as also are a few terrestrial species. The shell of the egg is always soft and parchment-like. As a rule the number of eggs produced among the snakes is not large, twenty or thirty being common, but some species of python lay as many as a hundred. Generally, among the oviparous snakes the eggs are buried, but some species of boas jealously guard them, enclosing them within the coils of the body.

Eggs of Amphibia.—Among the amphibia a greater variety obtains in the matter of the investment of the egg, as well as in the number, size and method of their disposal. The outer covering is formed by a toughening of the surface of a thick gelatinous coat which surrounds the essential parts of the egg. This coat in many species of salamander—using this name in the wide sense—is produced into threads which serve either to anchor the eggs singly or to bind them together in bunches.

Viviparity occurs both among the limbless and the tailed Amphibia, the eggs hatching before they leave the oviduct or immediately after extrusion. The number of young so produced is generally not large, but the common salamander (*Salamandra maculosa*) may produce as many as fifty at a birth, though fifteen is the more normal figure. When the higher number is reached the young are relatively small and weak.

As a rule among the Amphibia the young leave the egg in the form of larvae, generally known as "tadpoles"; but many species produce eggs containing a sufficient amount of food material to enable the whole of the larval phase to be completed before hatching.

Among the tailless Amphibia (frogs and toads) there are wide differences in the number of eggs produced, while the methods by which these eggs are disposed of present a marvellous variety.

As a rule vast quantities of eggs are shed by the female into the water in the form of "spawn." In the common toad as many as 7000 eggs may be extruded at a time. These leave the body in the form of two long strings—one from each oviduct—of translucent globules, gelatinous in texture, and enclosing a central sphere of yolk, the upper pole of which is black. The spawn of the common frog differs from that of the toad in that the eggs all adhere to form a huge jelly-like mass. But in many species the number of eggs produced are few; and these may be sufficiently stored with food-yolk to allow of the tadpole stage being passed before hatching, as in frogs of the genus *Hylodes*. In many cases the eggs are deposited out of the water and often in quite remarkable ways.

Eggs of Fishes.—The eggs of fishes present an extremely wide range of form, and a no less extensive range in the matter of number. Both among the cartilaginous and bony fishes viviparity occurs. Most of the sharks and rays are viviparous, but in the oviparous species the eggs present some interesting and peculiar forms. Large in size, the outer coat or "shell" is in all cases horn-like and flexible, but differs greatly in shape. Thus in the egg of the larger spotted dog-fish it is oblong in shape, flattened from side to side, and has the angles produced into long, slender tendrils. As the egg is laid the lower tendrils project from the vent, and the mother rubs herself against some fixed body. The tendrils soon catch fast in some slight projection, when the egg is dragged forth there to remain till hatching takes place. A couple of narrow slits at each corner of the upper end serve to admit fresh water to the imprisoned embryo during the later stages of development; when development is complete escape is made through the end of the shell. In the rays or "skates," long spines take the place of tendrils, the egg simply resting at the bottom of the sea. The empty egg-cases of the rays are often found on the seashore, and are known as "Mermaids' purses." The egg of the Port Jackson shark (*Cestracion*) is of enormous size, pear-shaped, and provided with a spiral flange extending along the whole length of the capsule. In the *Chimaera* the egg is long, more or less spindle-shaped, and produced on each side into a broad flange having a fringed edge, so that the whole bears a close resemblance to a long leaf, broad and notched at one end, pointed at the other. This likeness to the seaweed among which it rests is doubtless a protective device, akin to that of protectively coloured birds' eggs.

Among the bony fishes the eggs generally take the form of small spheres, enclosed within a tough membrane or capsule. But they present many important differences, being in some fishes heavy and remaining at the bottom of the water, in other light and floating on the surface. While in some species they are distributed separately, in others they adhere together in masses. The eggs of the salmon, for example, are heavy, hard and smooth, and deposited separately in a trough dug by the parent and afterwards covered to prevent them from being carried away by the stream. In the perch they are adhesive and form long band-like masses of spawn adhering to water-plants. In the gobies the egg is spindle-shaped, and attached by one end by means of a network of fibres, resembling rootlets; while in the smelt the egg is loosely suspended by a membrane formed by the peeling off of a part of the outer sheath of the capsule. The eggs of the garfish (*Belone vulgaris*) and of the flying-fish of the genus *Exocoetus*, attach themselves to foreign objects, or to one another, by means of threads or cords developed at opposite poles of the egg.

Among a number of fishes the eggs float at the surface of the sea, often in enormous masses, when they are carried about at the mercy of tides and currents. An idea of the size which such masses attain may be gathered from the fact that the spawn of the angler-fish, *Lophius piscatorius*, takes the form of a sheet from 2 to 3 ft. wide, and 30 ft. long. Another remarkable feature of these floating eggs is their transparency, inasmuch as they are extremely difficult to see, and hence they probably escape the rapacious maws of spawn-eating animals. The cod tribe and flat-fishes lay floating eggs of this description.

The maximum number of eggs laid by fishes varies greatly, some species laying relatively few, others an enormous number. But in all cases the number increases with the weight and age of the fish. Thus it has been calculated that the number laid by the salmon is roughly about 1000 to every pound weight of the fish, a 15 ℔ salmon laying 15,000 eggs. The sturgeon lays about 7,000,000; the herring 50,000; the turbot 14,311,000; the sole 134,000; the perch 280,000. Briefly, the number is greatest where the risks of destruction are greatest.

The eggs of the degenerate fishes known as the lampreys and hag-fishes are remarkable for the fact that in the latter they are large in size, cylindrical in shape, and provided at each end with hooklets whereby they adhere one to another; while in the lampreys they are extremely small and embedded in a jelly.

Molluscs.—Among the Mollusca, Crustacea and Insecta yolk-stored eggs of very remarkable forms are commonly produced.

In variety, in this connexion, the Mollusca must perhaps be given the first place. This diversity, indeed, is strikingly illustrated by the eggs of the Cephalopoda. In the squids (*Loligo*), for example, the eggs are enclosed in long cylindrical cases, of which there are several hundreds, attached by one end to a common centre; the whole series looking strangely like a rough mop-head. Each case, in such a cluster, contains about 250 eggs, or about 40,000 in all. By way of contrast the eggs of the true cuttle-fish (*Sepia*) are deposited separately, each enclosed in a tough, black, pear-shaped capsule which is fastened by a stalk to fronds of sea-weed or other object. They appear to be extruded at short intervals, till the full complement is laid, the whole forming a cluster looking like a bunch of grapes. The octopus differs yet again in this matter, its eggs being very small, berry-like, and attached to a stalk which runs through the centre of the mass.

The eggs of the univalve Mollusca are hardly less varied in the shapes they take. In the common British *Purpura lapillus* they resemble delicate pink grains of rice set on stalks; in *Busycon* they are disk-shaped, and attached to a band nearly 3 ft. long. The eggs of the shell-bearing slugs (*Testacella*) are large, and have the outer coat so elastic that if dropped on a stone floor they will rebound several inches; while some of the snails (*Bulimus*) lay eggs having a white calcareous and slightly iridescent shell, in size and shape closely resembling the egg of the pigeon. Some are even larger than the egg of the wood-pigeon. The beautiful violet-snail (*Ianthina*)—a marine species—carries its eggs on the under side of a gelatinous raft. No less remarkable are the eggs of the whelk; since, like those of the squids, they are not laid separately but enveloped in capsules, and these to the number of many hundreds form the large, ball-like masses so commonly met with on the seashore. When the eggs in these capsules hatch, the crowd of embryos proceed to establish an internecine warfare, devouring one another till only the strongest survives!

With the Mollusca, as with other groups of animals, where the eggs are exposed to great risks they are small, produced in great numbers, and give rise to larvae. This is well illustrated by the common oyster which annually disperses about 60,000,000 eggs. But where the risk of destruction is slight, the eggs are large and produce young differing from the parent only in size, as in the case of the pigeon-like eggs of *Bulimus*.

Crustaceans.—Among the higher Crustacea, as a rule, the eggs are carried by the female, attached to special appendages on the under side of the body. But in some—Squillas—they are deposited in burrows. Generally they are relatively small so that the young which emerge therefrom differ markedly in appearance from the parents, but in deep-sea and freshwater species the eggs are large, when the young, on emerging, differ but little from the adults in appearance.

Insects, &c.—The eggs of insects though minute, are also remarkable for the great variety of form which they present, while they are frequently objects of great beauty owing to the sculptured markings of the shell. They are generally laid in clusters, either on the ground, on the leaves of plants, or in the water. Some of the gnats (*Culex*) lay them on the water. Cylindrical in shape they are packed closely together, set on end, the whole mass forming a kind of floating raft. Frequently, as in the case of the stick and leaf insect, the eggs are enclosed in capsules of very elaborate shapes and highly ornamented.

As to the rest of the Invertebrata—above the Protozoa the eggs are laid in water, or in damp places. In the former case they are as a rule small, and give rise to larvae; while eggs hatched on land are sometimes enclosed in capsules, "cocoons," as in the case of the earthworm, where this capsule is filled with a milky white fluid, of a highly nutritious character, on which the embryos feed.

Among some invertebrates two different kinds of eggs are laid by the same individual. The water-flea, *Daphnia* (a crustacean), lays two kinds of eggs known as "summer" and "winter" eggs. The summer eggs are carried by the female in a "brood-pouch" on the back. The "winter" eggs, produced at the approach of winter, differ markedly in appearance from the summer eggs, being larger, darker in colour, thicker shelled, and enclosed in a capsule formed from the shell or carapace, of the parent's body. "Winter eggs," however, may be produced in the height of summer. While the "summer eggs" are unfertilized, the winter eggs are fertilized by the male, and possess the remarkable power of lying dormant for months or even years before they develop. The production of these two kinds of eggs is a device to overcome the cold of winter, or the drying up of the pools in which the species lives, during the heat of the summer. The power of resistance which such eggs possess may be seen in the fact that a sample of mud which had been kept dry for ten years still contained living eggs. In deep water where neither drought nor winter cold can seriously affect the *Daphnias*, they propagate all the year round by unfertilized "summer" eggs.

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EGGENBERG, HANS ULRICH VON, PRINCE (1568–1634), Austrian statesman, was a son of Siegfried von Eggenberg (d. 1594), and began life as a soldier in the Spanish service, becoming about 1596 a trusted servant of the archduke of Styria, afterwards the emperor Ferdinand II. Having become a Roman Catholic, he was soon the chancellor and chief adviser of Ferdinand, whose election as emperor he helped to secure in 1619. He directed the imperial policy during the earlier part of the Thirty Years' War, and was in general a friend and supporter of Wallenstein, and an opponent of Maximilian I., duke of Bavaria, and of Spain. He was largely responsible for Wallenstein's return to the imperial service early in 1632, and retired from public life just after the general's murder in February 1634, dying at Laibach, on the 18th of October 1634. Eggenberg's influence with Ferdinand was so marked that it was commonly said that Austria rested upon three hills (*Berge*): Eggenberg, Questenberg and Werdenberg. He was richly rewarded for his services to the emperor. Having received many valuable estates in Bohemia and elsewhere, he was made a prince of the Empire in 1623, and duke of Krumau in 1625.

See H. von Zwiedineck-Südenhorst, *Hans Ulrich, Fürst von Eggenberg* (Vienna, 1880); and F. Mares, *Beiträge zur Geschichte der Beziehungen des Fürsten J. U. von Eggenberg zu Kaiser Ferdinand II und zu Waldstein* (Prague, 1893).

EGGER, ÉMILE (1813–1885), French scholar, was born in Paris on the 18th of July 1813. From 1840 till 1855 he was assistant professor, and from 1855 till his death professor of Greek literature in the Faculté des Lettres at Paris University. In 1854 he was elected a member of the Académie des Inscriptions and in 1873 of the Conseil supérieur de l'instruction publique. He was a voluminous writer, a sound and discerning scholar, and his influence was largely responsible for the revival of the study of classical philology in France. His most important works were *Essai sur l'histoire de la critique chez les Grecs* (1849), *Notions élémentaires de grammaire comparée* (1852), *Apollonius Dyscole, essai sur l'histoire des théories grammaticales dans l'antiquité* (1854), *Mémoires de littérature ancienne* (1862), *Mémoires d'histoire ancienne et de philologie* (1863), *Les Papyrus grecs du Musée du Louvre et de la Bibliothèque Impériale* (1865), *Études sur les traités publics chez les Grecs et les Romains* (1866), *L'Hellénisme en France* (1869), *La Littérature grecque* (1890). He was also the author of *Observations et réflexions sur le développement de l'intelligence et du langage chez les enfants* (1879). Egger died in Paris on the 1st of September 1885.

EGGLESTON, EDWARD (1837–1902), American novelist and historian, was born in Vevay, Indiana, on the 10th of December 1837, of Virginia stock. Delicate health, by which he was more or less handicapped throughout his life, prevented his going to college, but he was naturally a diligent student. He was a Methodist circuit rider and pastor in Indiana and Minnesota (1857–1866); associate editor (1866–1867) of *The Little Corporal*, Chicago; editor of *The National Sunday School Teacher*, Chicago (1867–1870); literary editor and later editor-in-chief of *The Independent*, New York (1870–1871); and editor of *Hearth and Home* in 1871–1872. He was pastor of the church of Christian Endeavour, Brooklyn, in 1874–1879. From 1880 until his death on the 2nd of September 1902, at his home on Lake George, New York, he devoted himself to literary work. His fiction includes *Mr Blake's Walking Stick* (1869), for children; *The Hoosier Schoolmaster* (1871); *The End of the World* (1872); *The Mystery of Metropolisville* (1873); *The Circuit Rider* (1874); *Roxy* (1878); *The Hoosier Schoolboy* (1883); *The Book of Queer Stories* (1884), for children; *The Graysons* (1888), an excellent novel; *The Faith Doctor* (1891); and *Duffels* (1893), short stories. Most of his stories portray the pioneer manners and dialect of the Central West, and the *Hoosier Schoolmaster* was one of the first examples of American local realistic fiction; it was very popular, and was translated into French, German and Danish. During the last third of his life Eggleston laboured on a *History of Life in the United States*, but he lived to finish only two volumes—*The Beginners of a Nation* (1896) and *The Transit of Civilization* (1900). In addition he wrote several popular compendiums of American history for schools and homes.

See G. C. Eggleston, *The First of the Hoosiers* (Philadelphia, 1903), and Meredith Nicholson, *The Hoosiers* (1900).

His brother GEORGE CARY EGGLESTON (1839–), American journalist and author, served in the Confederate army; was managing editor and later editor-in-chief of *Hearth and Home* (1871–1874); was literary editor of the *New York Evening Post* (1875–1881), literary editor and afterwards editor-in-chief of the New York *Commercial Advertiser* (1884–1889), and editorial writer for *The World* (New York) from 1889 to 1900. Most of his books are stories for boys; others, and his best, are romances dealing with life in the South especially in the Virginias and the Carolinas—before and during the Civil War. Among his publications may be mentioned: *A Rebel's Recollections* (1874); *The Last of the Flatboats* (1900); *Camp Venture* (1900); *A Carolina Cavalier* (1901); *Dorothy South* (1902); *The Master of Warlock* (1903); *Evelyn Byrd* (1904); *A Daughter of the South* (1905); *Blind Alleys* (1906); *Love is the Sum of it all* (1907); *History of the Confederate War* (1910); and *Recollections of a Varied Life* (1910).

EGHAM, a town in the Chertsey parliamentary division of Surrey, England, on the Thames, 21 m. W.S.W. of London by the London & South Western railway. Pop. (1901) 11,895. The church of St John the Baptist is a reconstruction of 1817; it contains monuments by John Flaxman. Above the right bank of the river a low elevation, Cooper's Hill, commands fine views over the valley, and over Windsor Great Park to the west. On the hill was the Royal Indian Civil Engineering College, commonly called Cooper's Hill College, of which Sir George Tomkyns Chesney was the originator and first president (1871). It educated men for the public works, accounts, railways and telegraph departments of India, and included a school of forestry; but it was decided, in the face of some opposition, to close it in 1906, on the theory that it was unnecessary for a college with such a specialized object to be maintained by the government, in view of the readiness with which servants for these departments could be recruited elsewhere. Part of the organization, including the school of forestry, was transferred to Oxford University. Cooper's Hill gives name to a famous poem of Sir John Denham (1642). A large and handsome building houses the Royal Holloway College for Women (1886), founded by Thomas Holloway; in the neighbourhood is the sanatorium of the same founder (1885) for the treatment of mental ailments, accommodating about 250 patients. The college for women, surrounded by extensive grounds, commands a wide view from the wooded slope on which it stands. The recreation hall, with its fine art collection, is the most notable room in this handsome building, which can receive 250 students. Within the parish, bordering the river, is the field of Runnymede, which, with Magna Charta Island lying off it, is famous in connexion with the signature of the charter by King John. Virginia Water, a large and picturesque artificial lake to the south of Windsor Great Park, is much frequented by visitors. It was formed under the direction of the duke of Cumberland, about 1750, and was the work of the brothers Thomas and Paul Sandby.

EGIN (Armenian *Agn*, "the spring"), an important town in the Mamuret el-Aziz vilayet of Asiatic Turkey (altitude 3300 ft.). Pop. about 20,000, fairly equally divided between Armenian Christians and Moslems. It is picturesquely situated in a theatre of lofty, abrupt rocks, on the right bank of the western Euphrates, which is crossed by a wooden bridge. The stone houses stand in terraced gardens and orchards, and the streets are mere rock ladders. Egin was settled by Armenians who emigrated from Van in the 11th century with Senekherim. On the 8th of November 1895 and in the summer of 1896 many Armenians were massacred here. (D. G. H.)

EGLANTINE (E. Frisian, *egeltiere*; Fr. *aiglantier*), a plant-name of which Dr R. C. A. Prior (*Popular Names of British Plants*, p. 70) says that it "has been the subject of much discussion, both as to its exact meaning and as to the shrub to which it properly belongs." The eglantine of the herbalists was the sweet-brier, *Rosa rubiginosa*. The signification of the word seems to be thorn-tree or thorn-bush, the first two syllables probably representing the Anglo-Saxon *egla*, *egle*, a prick or thorn, while the termination is the Dutch *tere*, *taere*, a tree. Eglantine is frequently alluded to in the writings of English poets, from Chaucer downwards. Milton, in *L'Allegro*, is thought by the term "twisted eglantine" to denote the honeysuckle, *Lonicera Periclymenum*, which is still known as eglantine in north-east Yorkshire.

EGLINTON, EARLS OF. The title of earl of Eglinton has been held by the famous Scottish family of Montgomerie since 1508. The attempts made to trace the descent of this house to Roger of Montgomery, earl of Shrewsbury (d. 1094), one of William the Conqueror's followers, will not bear examination, and the sure pedigree of the family only begins with Sir John Montgomerie, lord of Eaglesham, who fought at the battle of Otterbourne in

1388 and died about 1398. His grandson, Sir Alexander Montgomerie (d. *c.* 1460), was made a lord of the Scottish parliament about 1445 as Lord Montgomerie, and Sir Alexander's great-grandson Hugh, the 3rd lord (*c.* 1460–1545), was created earl of Eglinton, or Eglintoun, in 1508. Hugh, who was a person of importance during the minority of James V., was succeeded by his grandson Hugh (d. 1546), and then by the latter's son Hugh (*c.* 1531–1585), who became 3rd earl of Eglinton. This nobleman was a firm supporter of Mary queen of Scots, for whom he fought at Langside, and of the Roman Catholic Church; his son and successor, Hugh, was murdered in April 1586 by the Cunninghams, a family with which his own had an hereditary blood feud. In 1612, by the death of Hugh, the 5th earl, the male line of the Montgomeries became extinct.

Having no children Earl Hugh had settled his title and estates on his cousin, Sir Alexander Seton of Foulstruther (1588–1661), a younger son of Robert Seton, 1st earl of Wintoun (*c.* 1550–1603), and his wife Margaret, daughter of the 3rd earl of Eglinton. Alexander, who thus became the 6th earl of Eglinton and took the name of Montgomerie, was commonly called Greysteel; he was a prominent Covenanter and fought against Charles I. at Marston Moor. Later, however, he supported the cause of Charles II., and fell into the hands of Cromwell, who imprisoned him. His fifth son, Robert Montgomerie (d. 1684), a soldier of distinction, fought against Cromwell at Dunbar and at Worcester, afterwards escaping from the Tower of London and serving in Denmark. Robert's elder brother, Hugh, 7th earl of Eglinton (1613–1669), who also fought against Cromwell, was the grandfather of Alexander, the 9th earl (*c.* 1660–1729), who married, for his third wife, Susannah (1689–1780), daughter of Sir Archibald Kennedy, Bart., of Culzean, a lady celebrated for her wit and beauty. Alexander, the 10th earl (1723–1769), a son of the 9th earl, was one of the first of the Scottish landowners to carry out improvements on his estates. He was shot near Ardrossan by an excise officer named Mungo Campbell on the 24th of October 1769. His brother and successor, Archibald, the 11th earl (1726–1796), raised a regiment of Highlanders with which he served in America during the Seven Years' War. As he left no male issue he was succeeded in the earldom by his kinsman Hugh Montgomerie (1739–1819), a descendant of the 6th earl, who was created a peer of the United Kingdom as Baron Ardrossan in 1806. Before succeeding to the earldom Hugh had served in the American war and had been a member of parliament; after this event he began to rebuild Eglinton castle on a magnificent scale and to construct a harbour at Ardrossan.

This earl's successor was his grandson, Archibald William, the 13th earl (1812–1861), who was born at Palermo in the 29th of September 1812. His father was Archibald, Lord Montgomerie (1773–1814), the eldest son of the 12th earl, and his mother was Mary (d. 1848), a daughter of the 11th earl. Educated at Eton, the young earl's main object of interest for some years was the turf; he kept a large racing stud and won success and reputation in the sporting world. In 1839 his name became more widely known in connexion with the famous tournament which took place at Eglinton castle and is said to have cost him £30,000 or £40,000. This was made the subject of much ridicule and was partly spoiled by the unfavourable weather, the rain falling in torrents. Yet it was a real tournament and the "knights" broke their spears in the orthodox way. Prince Louis Napoleon (Napoleon III.) took part in it, and Lady Seymour, a daughter of Thomas Sheridan and the wife of Lord Seymour, afterwards 12th duke of Somerset, was the queen of beauty. A list of the challengers with an account of the jousts and the melée will be found in the volume on the tournament written by John Richardson, with drawings by J. H. Nixon. It is also described by Disraeli in *Endymion*. Eglinton was a staunch Tory, and in February 1852 he became lord-lieutenant of Ireland under the earl of Derby. He retired with the ministry in the following December, having by his princely hospitality made himself one of the most popular of Irish viceroys. When Derby returned to office in February 1858 he was again appointed lord-lieutenant, and he discharged the duties of this post until June 1859. In this year he was created earl of Winton, an earldom which had been held by his kinsfolk, the Setons, from 1600 until 1716, when George Seton, the 5th earl (*c.* 1678–1749), was deprived of his honours for high treason. The earl died on the 4th of October 1861, and was succeeded by his eldest son Archibald William (1841–1892). When this earl died in 1892 his younger brother George Arnulph (b. 1848) became 15th earl of Eglinton and 3rd earl of Winton.

See Sir W. Fraser, *Memorials of the Montgomeries, earls of Eglinton* (1859).

EGMONT, EARLS OF. John Perceval, 1st earl of Egmont (1683–1748), Irish politician, and partner with J. E. Oglethorpe in founding the American colony of Georgia, was created earl in 1733. He claimed descent from the Egmonts of Flanders, but his title was taken from the place in County Cork where the family residence stood. Its name of Burton House, and that of Burton manor which formed part of the family estates, were a reminiscence of Burton in Somerset, where was the earlier English family property of his great-great-grandfather Richard Perceval (1550–1620), Burghley's secret agent, and author of a Spanish dictionary published in 1591, whose son Sir Philip Perceval (1605–1647) acquired the Irish estates by judicious use of his opportunities as commissioner for land titles and of his interest at court. Sir Philip's son John, grandfather of the 1st earl, was made a baronet in 1661. The first earl of Egmont (who had been made Baron Perceval in 1715, and Viscount Perceval in 1723) is chiefly important for his connexion with the colonization of Georgia, and for his voluminous letters and writings on biography and genealogy.

John Perceval, 2nd earl of Egmont (1711–1770), his eldest son, was an active politician, first lord of the admiralty (1763–1766), and political pamphleteer, and like his father an ardent genealogist. He was twice married, and had eight sons and eight daughters. One of his younger sons was Spencer Perceval, prime minister of England. His eldest son succeeded as 3rd earl, and the eldest by his second marriage (with Catherine Compton, baroness of Arden in Ireland) was in 1802 created Baron Arden of the United Kingdom, a title which subsequently became merged in the Egmont earldom.

EGMONT (EGMOND), **LAMORAL,** COUNT OF, prince of Gavre (1522–1568), was born in Hainaut in 1522. He was the younger of the two sons of John IV., count of Egmont, by his wife Françoise of Luxemburg, princess of Gavre. On the death of his elder brother Charles, about 1541, he succeeded to his titles and estates. In this year he served his apprenticeship as a soldier in the expedition of the emperor Charles V. to Algiers, distinguishing himself in the command of a body of cavalry. In 1544 he married Sabina, sister of the elector palatine Frederick III., and the wedding was celebrated at Spires with great pomp in the presence of the emperor and his brother Ferdinand, afterwards emperor. Created knight of the Golden Fleece in 1546, he accompanied Philip of Spain in his tour through the Netherland towns, and in 1554 he went to England at the head of a special embassy to ask the hand of Mary of England for Philip, and was afterwards present at the wedding ceremony at Winchester. In the summer of 1557 Egmont was appointed commander of the Flemish cavalry in the war between Spain and France; and it was by his vehement persuasion that the battle of St Quentin was fought. The victory was determined by the brilliant charge that he led against the French. The reputation which he won at St Quentin was raised still higher in 1558, when he encountered the French army under de Thermes at Gravelines, on its march homewards after the invasion of Flanders, totally defeated it, and took Marshal de Thermes prisoner. The battle was fought against the advice of the duke of Alva, and the victory made Alva Egmont's enemy. But the count now became the idol of his countrymen, who looked upon him as the saviour of Flanders from the devastations of the French. He was nominated by Philip stadtholder of Flanders and Artois. At the conclusion of the war by the treaty of Cateau Cambrésis, Egmont was one of the four hostages selected by the king of France as pledges for its execution.

The attempt made by King Philip to convert the Netherlands into a Spanish dependency and to govern it by Spanish ministers excited the resentment of Egmont and other leading members of the Netherlands aristocracy. Between him and Cardinal Granvella, the all-powerful minister of the regent Margaret of Parma, there was no love lost. As a member of the council of state Egmont joined the prince of Orange in a vigorous protest addressed to Philip (1561) against the autocratic proceedings of the minister; and two years later he again protested in conjunction with the prince of Orange and Count Horn. In the spring of 1564 Granvella left the Netherlands, and the malcontent nobles once more took their places in the council of state. The resolve, however, of Philip to enforce the decrees of the council of Trent throughout the Netherlands once more aroused their resentment. Although himself a good Catholic, Egmont had no wish to see the Spanish Inquisition established in his native country. Orange, Egmont and others were convinced that the enforcement of the decrees in the Netherlands was impossible, and, in January 1665, Egmont accepted a special mission to Spain to make known to Philip the state of affairs and the disposition of the people. At Madrid the king gave him an ostentatiously cordial reception, and all the courtiers vied with one another in lavishing professions of respect upon him. They knew his vain and somewhat unstable character, and hoped to win him over without conceding anything to the wishes of the Netherlanders. The king gave him plenty of flatteries and promises, but steadily evaded any serious discussion of the object of his mission, and Egmont finally returned home without having accomplished anything. At the same time Philip sent further instructions to the regent to abate nothing of the severity of the persecution.

Egmont was naturally indignant at the treatment he had received, while the terrors of the Inquisition were steadily rousing the people to a state of frenzied excitement. In 1566 a confederacy of the lesser nobility was formed (*Les Gueux*) whose principles were set out in a document known as the Compromise. From this league Egmont held aloof; he declined to take any step savouring of actual disloyalty to his sovereign. He withdrew to his government of Flanders, and as stadtholder took active measures for the persecution of heretics. But in the eyes of Philip he had long been a marked man. The Spanish king had temporized only until the moment arrived when he could crush opposition by force. In the summer of 1567 the duke of Alva was despatched to the Netherlands at the head of an army of veterans to supersede the regent Margaret and restore order in the discontented provinces. Orange fled to Germany after having vainly warned Egmont and Horn of the dangers that threatened them. Alva was at pains to lull their suspicions, and then suddenly seized them both and threw them in the castle of Ghent. Their trial was a farce, for their fate had already been determined before Alva left Spain. After some months of imprisonment they were removed to Brussels, where sentence was pronounced upon them (June 4) by the infamous Council of Blood erected by Alva. They were condemned to death for high treason. It was in vain that the most earnest intercessions were made in behalf of Egmont by the emperor Maximilian, by the knights of the order of the Golden Fleece, by the states of Brabant, and by several of the German princes. Vain, too, was the pathetic pleading of his wife, who with her eleven children was reduced to want, and had taken refuge in a convent. Egmont was beheaded at Brussels in the square before the town hall on the day after his sentence had been publicly pronounced (June 5, 1568). He met his fate with calm resignation; and in the storm of terror and exasperation to which this tragedy gave rise Egmont's failings were forgotten, and he and his fellow-victim to Spanish tyranny were glorified in the popular imagination as martyrs of Flemish freedom. From this memorable event, which Goethe made the theme of his play *Egmont* (1788), is usually dated the beginning of the famous revolt of the Netherlands. In 1865 a monument to Counts Egmont and Horn, by Fraiken, was erected on the spot where they were beheaded.

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EGOISM (from Gr. and Lat. *ego*, I, the 1st personal pronoun), a modern philosophical term used generally, in opposition to "Altruism," for any ethical system in which the happiness or the good of the individual is the main criterion of moral action. Another form of the word, "Egotism," is really interchangeable, though in ordinary language it is often used specially (and similarly "egoism," as in George Meredith's *Egoist*) to describe the habit of magnifying one's self and one's achievements, or regarding all things from a selfish point of view. Both these ideas derive from the original meaning of *ego*, myself, as opposed to everything which is outside myself. This antithesis of ego and non-ego, self and not-self, may be understood in several senses according to the connexion in which it is used. Thus the self may be held to include one's family, property, business, and an indefinitely wider range of persons or objects in which the individual's interest is for the moment centred, *i.e.* everything which I can call "mine." In this, its widest, sense "a man's Self is the sum total of all that he *can* call his" (Wm. James, *Principles of Psychology*, chap x.). This self may be divided up in many ways according to the various forms in which it may be expressed. Thus James (*ibid.*) classifies the various "selves" as the material, the spiritual, the social and the "pure." Or again the self may be narrowed down to a man's own person, consisting of an individual mind and body. In the true philosophical sense, however, the conception of the ego is still further narrowed down to the individual consciousness as opposed to all that is outside it, *i.e.* can be its object. This conception of the self belongs mainly to metaphysics and involves the whole problem of the relation between subject and object, the nature of reality, and the possibility of knowledge of self and of object. The ordinary idea of the self as a physical entity, obviously separate from others, takes no account of the problem as to how and in what sense the individual is conscious of himself; what is the relation between subject and object in the phenomenon of self-consciousness, in which the mind reflects upon itself both past and present? The mind is in this case both subject and object, or, as William James puts it, both "I" and "me." The phenomenon has been described in various ways by different thinkers. Thus Kant distinguished the two selves as rational and empirical, just as he distinguished the two egos as the noumenal or real and the phenomenal from the metaphysical standpoint. A similar distinction is made by Herbart. Others have held that the self has a complex content, the subject self being, as it were, a fuller expression of the object-self (so Bradley); or again the subject self is the active content of the mind, and the object self the passive content which for the moment is exciting the attention. The most satisfactory and also the most general view is that consciousness is complex and unanalysable.

The relation of the self to the not-self need not to be treated here (see METAPHYSICS). It may, however, be pointed out that in so far as an object is cognized by the mind, it becomes in a sense part of the complex self-content. In this sense the individual is in himself his own universe, his whole existence being, in other words, the sum total of his psychic relations, and nothing else being *for him* in existence at all. A similar idea is prominent in many philosophico-religious systems wherein the idea of God or the Infinite is, as it were, the union of the ego and the non-ego, of subject and object. The self of man is regarded as having limitations, whereas the Godhead is infinite and all-inclusive. In many mystical Oriental religions the perfection of the human self is absorption in the infinite, as a ripple dies away on the surface of water. The problems of the self may be summed up as follows. The psychologist investigates the ideal construction of the self, *i.e.* the way in which the conception of the self arises, the different aspects or contents of the self and the relation of the subject to the object self. At this point the epistemologist takes up the question of empirical knowledge and considers the kind of validity, if any, which it can possess. What existence has the known object for the knowing subject? The result of this inquiry is generally intellectual scepticism in a greater or less degree, namely, that the object has no existence for the knower except a relative one, *i.e.* in so far as it is "known" (see RELATIVITY OF KNOWLEDGE). Finally the metaphysician, and in another sphere the theologian, consider the nature of the pure or transcendental self apart from its relations, *i.e.* the absolute self.

In ethics, egoistic doctrines disregard the ultimate problems of selfhood, and assume the self to consist of a man's person and those things in which he is or ought to be directly interested. The general statement that such doctrines refer all moral action to criteria of the individual's happiness, preservation, moral perfection, raises an obvious difficulty. Egoism merely asserts that the self is all-important in the application of moral principles, and does not in any way supply the material of these principles. It is a purely formal direction, and as such merely an adjunct to a substantive ethical criterion. A practical theory of ethics seeks to establish a particular moral ideal; if it is an absolute criterion, then the altruist would place first the attainment of that ideal by others, while the egoist would seek it for himself. The same is true of ethical theories which may be described as material. Of the second type are those, *e.g.* of Hobbes and Spinoza, which advocate self-preservation as the ideal, as contrasted with modern evolutionist moralists who advocate race-preservation. Again, we may contrast the early Greek hedonists, who bade each man seek the greatest happiness (of whatever kind), with modern utilitarian and social hedonists, who prefer the greatest good or the greatest happiness of the greatest number. It is with hedonistic and other empirical theories that egoism is generally associated. As a matter of fact, however, egoism has been no less prominent in intuitional ethics. Thus the man who seeks only or primarily his own moral perfection is an egoist par excellence. Such are ascetics, hermits and the like, whose whole object is the realization of their highest selves.

The distinction of egoistical and altruistic action is further complicated by two facts. In the first place, many systems combine the two. Thus Christian ethics may be said to insist equally on duty to self and duty to others, while crudely egoistic systems become unworkable if a man renders himself obnoxious to his fellows. On the other hand, every deliberate action based on an avowedly altruistic principle necessarily has a reference to the agent; if it is right that A should do a certain action for the benefit of B, then it tends to the moral self-realization of A that he should do it. Upon whatsoever principle the rightness of an action depends, its performance is right *for the agent*. The self-reference is inevitable in every action in so far as it is regarded as voluntary and chosen as being of a particular moral quality.

It is this latter fact which has led many students of human character to state that men do in fact aim at the gratification of their personal desires and impulses. The laws of the state and the various rules of conduct laid down by religion or morality are merely devices adopted for general convenience. The most remarkable statement of this point of view is that of Friedrich Nietzsche, who went so far as to denounce all forms of self-denial as cowardice:—let every one who is strong seek to make himself dominant at the expense of the weak.

EGORIEVSK, a town of Russia, in the government of Ryazañ, 70 m. by rail E.S.E. of Moscow, by a branch line (15 m.) connecting with the Moscow to Ryazañ main line. The cotton mills and other factories give occupation to 6000 persons. Egorievsk has important fairs for grain, hides, &c., which are exported. Pop. (1897) 23,932.

EGREMONT, EARLS OF. In 1749 Algernon Seymour, 7th duke of Somerset, was created earl of Egremont, and on his childless death in February 1750 this title passed by special remainder to his nephew, Sir Charles Wyndham or Windham, Bart. (1710–1763), a son of Sir William Wyndham of Orchard Wyndham, Somerset. Charles, who had succeeded to his father's baronetcy in 1740, inherited Somerset's estates in Cumberland and Sussex. He was a member of parliament from 1734 to 1750, and in October 1761 he was appointed secretary of state for the southern department in succession to William Pitt. His term of office, during which he acted in concert with his brother-in-law, George Grenville, was mainly occupied with the declaration of war on Spain and with the negotiations for peace with France and Spain, a peace the terms of which the earl seems to have disliked. He was also to the fore during the proceedings against Wilkes, and he died on the 21st of August 1763. Horace Walpole perhaps rates Egremont's talents too low when he says he "had neither knowledge of business, nor the smallest share of parliamentary abilities."

The 2nd earl's son and successor, George O'Brien Wyndham (1751–1837), was more famous as a patron of art and an agriculturist than as a politician, although he was not entirely indifferent to politics. For some time the painter Turner lived at his Sussex residence, Petworth House, and in addition to Turner, the painter Leslie, the sculptor Flaxman and other talented artists received commissions from Egremont, who filled his house with valuable works of art. Generous and hospitable, blunt and eccentric, the earl was in his day a very prominent figure in English society. Charles Greville says, "he was immensely rich and his munificence was equal to his wealth"; and again that in his time Petworth was "like a great inn." The earl died unmarried on the 11th of November 1837, and on the death of his nephew and successor, George Francis Wyndham, the 4th earl (1785–1845), the earldom of Egremont became extinct. Petworth, however, and the large estates had already passed to George Wyndham (1787–1869), a natural son of the 3rd earl, who was created Baron Leconfield in 1859.

EGREMONT, a market town in the Egremont parliamentary division of Cumberland, England, 5 m. S.S.E. of Whitehaven, on a joint line of the London & North Western and Furness railways. Pop. of urban district (1901) 5761. It is pleasantly situated in the valley of the Ehen. Ruins of a castle command the town from an eminence. It was founded *c.* 1120 by William de Meschines; it is moated, and retains a Norman doorway and some of the original masonry, as well as fragments of later date. The church of St Mary is a modern reconstruction embodying some of the Norman features of the old church. Iron ore and limestone are raised in the neighbourhood.

It seems impossible to find any history for Egremont until after the Norman Conquest, when Henry I. gave the barony of Coupland to William de Meschines, who erected a castle at Egremont around which the town grew into importance. The barony afterwards passed by marriage to the families of Lucy and Multon, and finally came to the Percys, earls of Northumberland, from whom are descended the present lords of the manor of Egremont. The earliest evidence that Egremont was a borough occurs in a charter, granted by Richard de Lucy in the reign of King John, which gave the burgesses right to choose their reeve, and set out the customs owing to the lord of the manor, among which was that of providing twelve armed men at his castle in the time of war. The borough was represented by two members in the parliament of 1295, but in the following year was disfranchised, on the petition of the burgesses, on account of the expense of sending members. In 1267 Henry III. granted Thomas de Multon a market every Wednesday at Egremont, and a fair every year on the eve, day and morrow of the Nativity of the Virgin Mary. In the *Quo Warranto* rolls he is found to have claimed by prescription another weekly market on Saturday. The market rights were purchased from Lord Leconfield in 1885, and the market on Saturday is still held. Richard de Lucy's charter shows that dyeing, weaving and fulling were carried on in the town in his time.

EGRESS (Lat. *egressus*, going out), in astronomy, the end of the apparent transit of a small body over the disk of a larger one; especially of a transit of a satellite of Jupiter over the disk of that planet. It designates the moment at which the smaller body is seen to leave the limb of the other.

EGYPT, a country forming the N.E. extremity of Africa.[1] In the following account a division is made into (I.) *Modern Egypt*, and (II.) *Ancient Egypt*; but the history from the earliest times is given as a separate section (III.).

Section I. includes Geography, Economics, Government, Inhabitants, Finance and Army. Section II. is subdivided into:—(A) Exploration and Research; (B) The Country in Ancient Times; (C) Religion; (D) Language and Writing; (E) Art and Archaeology; (F) Chronology. Section III. is divided into three main periods:—(1) Ancient History; (2) the Mahommedan Period; (3) Modern History (from Mehemet Ali).

I. MODERN EGYPT

Boundaries and Areas.—Egypt is bounded N. by the Mediterranean, S. by the Anglo-Egyptian Sudan, N.E. by Palestine, E. by the Red Sea, W. by Tripoli and the Sahara. The western frontier is ill-defined. The boundary line between Tripoli and Egypt is usually taken to start from a point in the Gulf of Sollum and to run S. by E. so as to leave the oasis of Siwa to Egypt. South of Siwa the frontier, according to the Turkish firman of 1841, bends eastward, approaching the cultivated Nile-land near Wadi Halfa, *i.e.* the southern frontier. This southern frontier is fixed by agreement between Great Britain and Egypt at the 22° N. The N.E. frontier is an almost direct line drawn from Taba, near the head of the Gulf of Akaba, the eastern of the two gulfs into which the Red Sea divides, to the Mediterranean at Rafa in 34° 15′ E. The peninsula of Sinai, geographically part of Asia, is thus included in the Egyptian dominions. The total area of the country is about 400,000 sq. m., or more than three times the size of the British Isles. Of this area $\frac{14}{15}$ths is desert. Canals, roads, date plantations, &c., cover 1900 sq. m.; 2850 sq. m. are comprised in the surface of the Nile, marshes, lakes, &c. A line corresponding with the 30° N., drawn just S. of Cairo, divides the country into Lower and Upper Egypt, natural designations in common use, Lower Egypt being the Delta and Upper Egypt the Nile valley. By the Arabs Lower Egypt is called Er-Rif, the cultivated or fertile; Upper Egypt Es Sa‘id, the happy or fortunate. Another division of the country is into Lower, Middle and Upper Egypt, Middle Egypt in this classification being the district between Cairo and Assiut.

General Character.—The distinguishing features of Egypt are the Nile and the desert. But for the river there would be nothing to differentiate the country from other parts of the Sahara. The Nile, however, has transformed the land through which it passes. Piercing the desert, and at its annual overflow depositing rich sediment brought from the Abyssinian highlands, the river has created the Delta and the fertile strip in Upper Egypt. This cultivable land is Egypt proper; to it alone is applicable the ancient name—"the black land." The *Misr* of the Arabs is restricted to the same territory. Beyond the Nile valley east and west stretch great deserts, containing here and there fertile oases. The general appearance of the country is remarkably uniform. The Delta is a level plain, richly cultivated, and varied alone by the lofty dark-brown mounds of ancient cities, and the villages set in groves of palm-trees, standing on mounds often, if not always, ancient. Groves of palm-trees are occasionally seen besides those around the villages, but other trees are rare. In Upper Egypt the Nile valley is very narrow and is bounded by mountains of no great height. They form the edge of the desert on either side of the valley, of which the bottom is level rock. The mountains rarely take the form of peaks. Sometimes they approach the river in bold promontories, and at others are divided by the dry beds of ancient water-courses. The bright green of the fields, the reddish-brown or dull green of the great river, contrasting with the bare yellow rocks, seen beneath a brilliant sun and a deep-blue sky, present views of great beauty. In form the landscape varies little and is not remarkable; in colour its qualities are always splendid, and under a general uniformity show a continual variety.

The Coast Region.—Egypt has a coast-line of over 600 m. on the Mediterranean and about 1200 m. on the Red Sea. The Mediterranean coast extends from the Gulf of Sollum on the west to Rafa on the east. From the gulf to the beginning of the Delta the coast is rock-bound, but slightly indented, and possesses no good harbourage. The cliffs attain in places a height of 1000 ft. They are the termination of a stony plateau, containing several small oases, which southward joins the more arid and uninhabitable wastes of the Libyan Desert. The Delta coast-line, composed of sandhills and, occasionally, limestone rocks, is low, with cape-like projections at the Nile mouths formed by the river silt. Two bays are thus formed, the western being the famous Bay of Aboukir. It is bounded W. by a point near the ancient Canopic mouth, eastward by the Rosetta mouth. Beyond the Delta eastward the coast is again barren and without harbours. It rises gradually southward, merging into the plateau of the Sinai peninsula. The Red Sea coast is everywhere mountainous. The mountains are the northern continuation of the Abyssinian table-land, and some of the peaks are over 6000 ft. above the sea. The highest peaks, going from north to south, are Jebels Gharib, Dukhan, Es Shayib, Fatira, Abu Tiur, Zubara and Hammada (Hamata). The coast has a general N.N.W. and S.S.E. trend, and, save for the two gulfs into which it is divided by the massif of Sinai, is not deeply indented. Where the frontier between Egypt and the Sudan reaches the sea is Ras Elba (see further RED SEA).

The Nile Valley (see also NILE).—Entering Egypt proper, a little north of the Second Cataract, the Nile flows through a valley in sandstone beds of Cretaceous age as far as 25° N., and throughout this part of its course the valley is extremely narrow, rarely exceeding 2 m. in width. At two points, namely, Kalabsha—the valley here being only 170 yds. wide and the river over 100 ft. deep—and Assuan (First Cataract), the course of the river is interrupted by outcrops of granites and other crystalline rocks, which have been uncovered by the erosion of the overlying sandstone, and to-day form the mass of islands, with numerous small rapids, which are described not very accurately as cataracts; no good evidence exists in support of the view that they are the remains of a massive barrier, broken down and carried away by some sudden convulsion. From 25° N. northwards for 518 m. the valley is of the "rift-valley" type, a level depression in a limestone plateau, enclosed usually by steep cliffs, except where the tributary valleys drained into the main valley in early times, when there was a larger rainfall, and now carry off the occasional rainstorms that burst on the desert. The cliffs are highest between Esna and Kena, where they reach 1800 ft. above sea-level. The average width of the cultivated land is about 10 m., of which the greater part lies on the left (western) bank of the river; and outside this is a belt, varying from a few hundred yards to 3 or 4 m., of stony and sandy ground, reaching up to the foot of the limestone cliffs, which rise in places to as much as 1000 ft. above the valley. This continues as far as 29° N., after which the hills that close in the valley become lower, and the higher plateaus lie at a distance of 10 or 15 m. back in the desert.

The Fayum.—The fertile province of the Fayum, west of the Nile and separated from it by some 6 m. of desert, seems to owe its existence to movements similar to those which determined the valley itself. Lying in a basin sloping in a series of terraces from an altitude of 65 ft. above sea-level in the east to about 140 ft. *below* sea-level on the north-west, at the margin of the Birket-el-Kerun, this province is wholly irrigated by a canalized channel, the Bahr Yusuf, which, leaving the Nile at Derut esh Sherif in Upper Egypt, follows the western margin of the cultivation in the Nile valley, and at length enters the Fayum through a gap in the desert hills by the XIIth Dynasty pyramids of Lahun and Hawara (see FAYUM).

The Delta.—About 30° N., where the city of Cairo stands, the hills which have hitherto run parallel with the Nile turn W.N.W. and E.N.E., and the triangular area between them is wholly deltaic. The Delta measures 100 m. from S. to N., having a width of 155 m. on the shore of the Mediterranean between Alexandria on the west and Port Said on the east. The low sandy shore of the Delta, slowly increasing by the annual deposit of silt by the river, is mostly a barren area of sand-hills and salty waste land. This is the region of the lagoons and marshes immediately behind the coast-line. Southwards the quality of the soil rapidly improves, and becomes the most fertile part of Egypt. This area is watered by the Damietta and the Rosetta branches of the Nile, and by a network of canals. The soil of the Delta is a dark grey fine sandy soil, becoming at times almost a stiff clay by reason of the fineness of its particles, which consist almost wholly of extremely small grains of quartz with a few other minerals, and often numerous flakes of mica. This deposit varies in thickness, as a rule, from 55 to 70 ft., at which depth it is underlain by a series of coarse and fine yellow quartz sands, with occasional pebbles, or even banks of gravel, while here and there thin beds of clay occur. These sand-beds are sharply distinguished by their colour from the overlying Nile deposit, and are of considerable thickness. A boring made in 1886 for the Royal Society at Zagazig attained a depth of 375 ft. without reaching rock, and another, subsequently sunk near Lake Aboukir (close to Alexandria), reached a depth of 405 ft. with the same result. Numerous other borings to depths of 100 to 200 ft. have given similar results, showing the Nile deposit to rest generally on these yellow sands, which provide a constant though not a very large supply of good water; near the northern limits of the Delta this cannot, however, be depended on, since the well water at these depths has proved on several occasions to be salt. The surface of the Delta is a wide alluvial plain sloping gently towards the sea, and having an altitude of 29 ft. above it at its southern extremity. Its limits east and west are determined by the higher ground of the deserts, to which the silt-laden waters of the Nile in flood time cannot reach. This silt consists largely of alumina (about 48%) and calcium carbonate (18%) with smaller quantities of silica, oxide of iron and carbon. Although the Nile water is abundantly charged with alluvium, the annual deposit by the river, except under extraordinary circumstances, is smaller than might be supposed. The mean ordinary rate of the increase of the soil of Egypt is calculated as about 4½ in. in a century.

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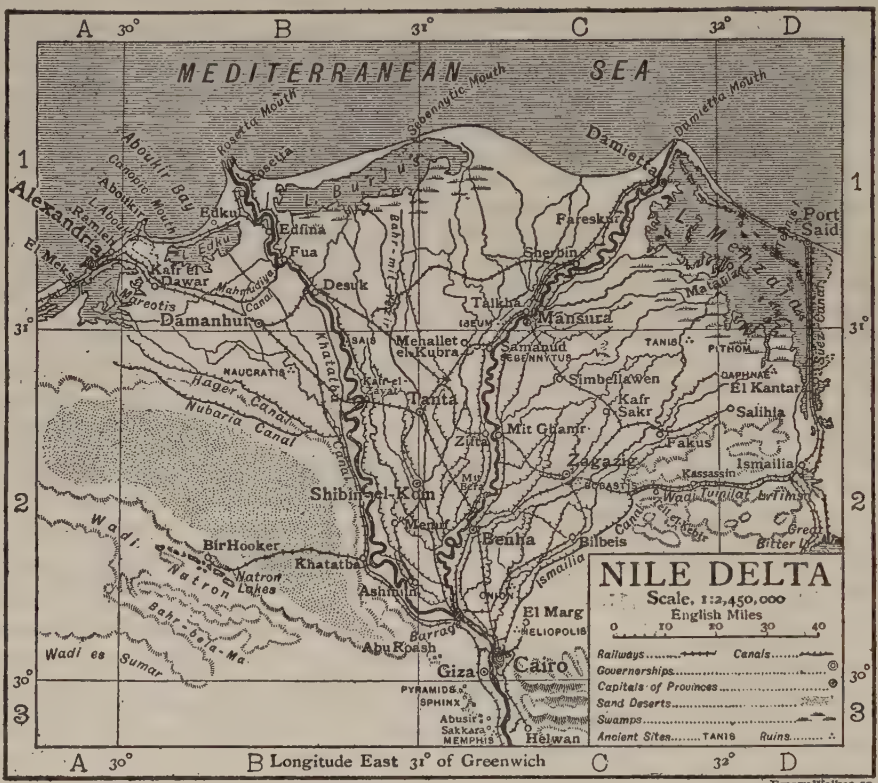
[1] By the Greek and Roman geographers Egypt was usually assigned to Libya (Africa), but by some early writers the Nile was thought to mark the division between Libya and Asia. The name occurs in Homer as Αἴγυπτος, but is of doubtful origin.

The Lakes.—The lagoons or lakes of the Delta, going from west to east, are Mareotis (Mariut), Edku, Burlus and Menzala. The land separating them from the Mediterranean is nowhere more than 10 m. wide. East of the Damietta mouth of the Nile this strip is in places not more than 200 yds. broad. All the lakes are shallow and the water in them salt or brackish. Mareotis, which bounds Alexandria on the south side, varies considerably in area according to the rise or fall of the Nile; when the Nile is low there is a wide expanse of marsh, when at its highest the lake covers about 100 sq. m. In ancient times Mareotis was navigable and was joined by various canals to the Nile. The country around was cultivated and produced the famous Mareotic wine. The canals being neglected, the lake decreased in size, though it was still of considerable area in the 15th and 16th centuries, and was then noted for the value of its fisheries. When the French army occupied Egypt in 1798, Mareotis was found to be largely a sandy plain. In April 1801 the British army besieging Alexandria cut through the land between Aboukir and the lake, admitting the waters of the sea into the ancient bed of Mareotis and laying under water a large area then in cultivation. This precedent was twice imitated, first by the Turks in 1803 and a second time by the British in 1807. Mareotis has no outlet, and the water is kept at a uniform level by means of powerful pumps which neutralize the effect of the Nile flood. A western arm has been cut off from the lake by a dyke, and in this arm a thick crust of salt is formed each year after the evaporation of the flood water. Near the shores of the lake wild flowers grow in rich profusion. Like all the Delta lakes, Mareotis abounds in wild-fowl. North-east of Mareotis was Lake Aboukir, a small sheet of water, now dry, lying S.W. of Aboukir Bay. East of this reclaimed marsh and reaching to within 4 m. of the Rosetta branch of the Nile, lies Edku, 22 m. long and in places 16 wide, with an opening, supposed to be the ancient Canopic mouth of the Nile, into Aboukir Bay. Burlus begins a little eastward of the Rosetta channel, and stretches bow-shaped for 64 m. Its greatest width is about 16 m. Adjoining it S.E. is an expanse of sandy marsh. Several canals or canalized channels enter the lake. Opposite the spot where the Bahr-mit Yezir enters is an opening into the Mediterranean. Canal and opening indicate the course of the ancient Sebennytic branch of the Nile. Burlus is noted for its water-melons, which are yellow within and come into season after those grown on the banks of the Nile.


A
30°
B
31°
C
32°
D
1
2
3
MEDITERRANEAN SEA
Aboukir Bay
Rosetta Mouth
Sebennytic Mouth
Damietta Mouth
Canopic Mouth
Alexandria
El Meks
Ramleh
L. Aboukir
Rosetta
L. Burlus
Edku
L. Edku
Edfina
Fua
Kafr el Dawar
Mahmudiya Canal
Desuk
Mareotis
Damanhur
Bahr-mit
Khatatba
Naucratis
Hager Canal
Nubaria Canal
Sais
Mehallet el Kubra
Talkha
Mansura
Samanud
Sebennytus
Sherbin
Fareskur
Damietta
L. Menzala
Matariya
Port Said
Tanis
Pithom
Daphnae
El Kantara
Simbellawen
Tanta
Kafr-el-Zayat
Kafr Sakr
Salihia
Mit Ghamr
Zifta
Fakus
Zagazig
Kassassin
Ismailia
Bubastis
Wadi Tumilat
L. Timsah
Tell el Kebir
Great Bitter L.
Shibin-el-Kum
Menuf
Benha
Bilbeis
Ismailia Canal
Bir Hooker
Wadi Natron
Natron Lakes
Bahr-bela-Ma
Khatatba
Ashmun
Barrage
Abu Roash
El Marg
Heliopolis
On
Wadi es Sumar
Giza
Cairo
Pyramids
Sphinx
Abusir
Sakkara
Memphis
Helwan
NILE DELTA
Scale, 1:2,450,000
English Miles
0 10 20 30 40
Railways
Canals
Governorships
Capitals of Provinces
Sand Deserts
Swamps
Ancient Sites ... TANIS
Ruins
Longitude East 31° of Greenwich

Emery Walker sc.

Menzala greatly exceeds the other Delta lakes in size, covering over 780 sq. m. It extends from very near the Damietta branch of the Nile to Port Said. It receives the waters of the canalized channels which were once the Tanitic, Mendesian and Pelusiac branches. The northern shore is separated from the sea by an extremely narrow strip of land, across which, when the Mediterranean is stormy and the lake full, the waters meet. Its average length is about 40 m., and its average breadth about 15. The depth is greater than that of the other lakes, and the water is salt, though mixed with fresh. It contains a large number of islands, and the whole lake abounds in reeds of various kinds. Of the islands Tennis (anciently Tennesus) contains ruins of the Roman period. The lake supports a considerable population of fishermen, who dwell in villages on the shore and islands and live upon the fish of the lake. The reeds are cover for waterfowl of various kinds, which the traveller sees in great numbers, and wild boars are found in the marshes to the south. The Suez Canal runs in a straight line for 20 m. along the eastern edge of the lake. That part of the lake east of where the canal was excavated is now marshy plain, and the Tanitic and Pelusiac mouths of the Nile are dry. East of Menzala is the site of Serbonis, another dried-up lake, which had the general characteristics of the Delta lagoons. In the Isthmus of Suez are Lake Timsa and the Great and Little Bitter Lakes, occupying part of the ancient bed of the Red Sea. All three were dry or marshy depressions previously to the cutting of the Suez Canal, at which time the waters of the Mediterranean and Red Sea were let into them (see SUEZ CANAL).

A chain of natron lakes (seven in number) lies in a valley in the western desert, 70 to 90 m. W.N.W. of Cairo. In the Fayum province farther south is the Birket-el-Kerun, a lake, lying below the level of the Nile, some 30 m. long and 5 wide at its broadest part. Kerun is all that is left of the Lake of Moeris, an ancient artificial sheet of water which played an important part in the irrigation schemes of the Pharaohs. The water of el-Kerun is brackish, though derived from the Nile, which has at all seasons a much higher level. It is bounded on the north by the Libyan Desert, above which rises a bold range of mountains; and it has a strange and picturesque wildness. Near the lake are several sites of ancient towns, and the temple called Kasr-Karun, dating from Roman times, distinguishes the most important of these. South-west of the Fayum is the Wadi Rayan, a large and deep depression, utilizable in modern schemes for re-creating the Lake of Moeris (*q.v.*).

The Desert Plateaus.—From the southern borders of Egypt to the Delta in the north, the desert plateaus extend on either side of the Nile valley. The eastern region, between the Nile and the Red Sea, varies in width from 90 to 350 m. and is known in its northern part as the Arabian Desert. The western region has no natural barrier for many hundreds of miles; it is part of the vast Sahara. On its eastern edge, a few miles west of Cairo, stand the great pyramids (*q.v.*) of Gizeh or Giza. North of Assuan it is called the Libyan Desert. In the north the desert plateaus are comparatively low, but from Cairo southwards they rise to 1000 and even 1500 ft. above sea-level. Formed mostly of horizontal strata of varying hardness, they present a series of terraces of minor plateaus, rising one above the other, and intersected by small ravines worn by the occasional rainstorms which burst in their neighbourhood. The weathering of this desert area is probably fairly rapid, and the agents at work are principally the rapid heating and cooling of the rocks by day and night, and the erosive action of sand-laden wind on the softer layers; these, aided by the occasional rain, are ceaselessly at work, and produce the successive plateaus, dotted with small isolated hills and cut up by valleys (wadis) which occasionally become deep ravines, thus forming the principal type of scenery of these deserts. From this it will be seen that the desert in Egypt is mainly a rock desert, where the surface is formed of disintegrated rock, the finer particles of which have been carried away by the wind; and east of the Nile this is almost exclusively the case. Here the desert meets the line of mountains which runs parallel to the Red Sea and the Gulf of Suez. In the western desert, however, those large sand accumulations which are usually associated with a desert are met with. They occur as lines of dunes formed of rounded grains of quartz, and lie in the direction of the prevalent wind, usually being of small breadth as compared with their length; but in certain areas, such as that lying S.W. and W. of the oases of Farafra and Dakhla, these lines of dunes, lying parallel to each other and about half a mile apart, cover immense areas, rendering them absolutely impassable except in a direction parallel to the lines themselves. East of the oases of Baharia and Farafra is a very striking line of these sand dunes; rarely more than 3 miles wide, it extends almost continuously from Moghara in the north, passing along the west side of Kharga Oasis to a point near the Nile in the neighbourhood of Abu Simbel—having thus a length of nearly 550 m. In the northern part of this desert the dunes lie about N.W.-S.E., but farther south incline more towards the meridian, becoming at last very nearly north and south.

Oases.—In the western desert lie the five large oases of Egypt, namely, Siwa, Baharia, Farafra, Dakhla and Kharga or Great Oasis, occupying depressions in the plateau or, in the case of the last three, large indentations in the face of limestone escarpments which form the western versant of the Nile valley hills. Their fertility is due to a plentiful supply of water furnished by a sandstone bed 300 to 500 ft. below the surface, whence the water rises through natural fissures or artificial boreholes to the surface, and sometimes to several feet above it. These oases were known and occupied by the Egyptians as early as 1600 B.C., and Kharga (*q.v.*) rose to special importance at the time of the Persian occupation. Here, near the town of Kharga, the ancient Hebi, is a temple of Ammon built by Darius I., and in the same oasis are other ruins of the period of the Ptolemies and Caesars. The oasis of Siwa (Jupiter Ammon) is about 150 m. S. of the Mediterranean at the Gulf of Sollum and about 300 m. W. of the Nile (see SIWA). The other four oases lie parallel to and distant 100 to 150 m. from the Nile, between 25° and 29° N., Baharia being the most northerly and Kharga the most southerly.

Besides the oases the desert is remarkable for two other valleys. The first is that of the natron lakes already mentioned. It contains four monasteries, the remains of the famous anchorite settlement of Nitriae. South of the Wadi Natron, and parallel to it, is a sterile valley called the Bahr-bela-Ma, or "River without Water."

The Sinai Peninsula.—The triangular-shaped Sinai peninsula has its base on the Mediterranean, the northern part being an arid plateau, the desert of Tih. The apex is occupied by a massif of crystalline rocks. The principal peaks rise over 8500 ft. Owing to the slight rainfall, and the rapid weathering of the rocks by the great range of temperature, these hills rise steeply from the valleys at their feet as almost bare rock, supporting hardly any vegetation. In some of the valleys wells or rock-pools filled by rain occur, and furnish drinking-water to the few Arabs who wander in these hills (see also SINAI).

[*Geology.*—Just as the Nile valley forms the chief geographical feature of Egypt, so the geology of the country is intimately related to it. The north and south direction of the river has been largely determined by faults, though the geologists of the Egyptian Survey are finding that the influence of faulting in determining physical outline has, in some cases, been overestimated. The oldest rocks, consisting of crystalline schists with numerous intrusions of granite, porphyry and diorite, occupy the eastern portion of the country between the Nile south of Assuan and the Red Sea. The intrusive rocks predominate over the schists in extent of area covered. They furnished the chief material for the ancient monuments. At Assuan (Syene) the well-known syenite of Werner occurs. It is, however, a hornblende granite and does not possess the mineralogical composition of the syenites of modern petrology. Between Thebes and Khartum the western banks of the Nile are composed of Nubian Sandstone, which extends westward from the river to the edge of the great Libyan Desert, where it forms the bed rock. The age of this sandstone has given rise to much dispute. The upper part certainly belongs to the Cretaceous formation; the lower part has been considered to be of Karroo age by some geologists, while others regard the whole formation to be of Cretaceous age. In the Kharga Oasis the upper portion consists of variously coloured unfossiliferous clays with intercalated bands of sandstone containing fossil silicified woods (*Nicolia Aegyptiaca* and *Araucarioxylon Aegypticum*). They are conformably overlain by clays and limestones with *Exogyra Overwegi* belonging to the Lower Danian, and these by clays and white chalk with *Ananchytes ovata* of the Upper Danian. In many instances the Tertiary formation, which occurs between Esna and Cairo, unconformably overlies the Cretaceous, the Lower Eocene being absent. The fluvio-marine deposits of the Upper Eocene and Oligocene formations contain an interesting mammalian fauna, proving that the African continent formed a centre of radiation for the mammalia in early Tertiary times. *Arsinoitherium* is the precursor of the horned Ungulata; while *Moeritherium* and *Palaeomastodon* undoubtedly include the oldest known elephants. Miocene strata are absent in the southern Tertiary areas, but are present at Moghara and in the north. Marine Pliocene strata occur to the south of the pyramids of Giza and in the Fayum province, where, in addition, some gravel terraces, at a height of 500 ft. above sea-level, are attributed to the Pliocene period. The Lake of Moeris, as a large body of fresh water, appears to have come into existence in Pleistocene times. It is represented now by the brackish-water lake of the Birket-el-Kerun. The superficial sands of the deserts and the Nile mud form the chief recent formations. The Nile deposits its mud over the valley before reaching the sea, and consequently the Delta receives little additional material. At Memphis the alluvial deposits are over 50 ft. thick. The superficial sands of the desert region, derived in large part from the disintegration of the Nubian Sandstone, occupy the most extensive areas in the Libyan Desert. The other desert regions of Egypt are elevated stony plateaus, which are diversified by extensively excavated valleys and oases, and in which sand frequently plays quite a subordinate part. These regions present magnificent examples of dry erosion by wind-borne sand, which acts as a powerful sand blast etching away the rocks and producing most beautiful sculpturing. The rate of denudation in exposed positions is exceedingly rapid; while spots sheltered from the sand blast suffer a minimum of erosion, as shown by the preservation of ancient inscriptions. Many of the Egyptian rocks in the desert areas and at the cataracts are coated with a highly polished film, of almost microscopic thinness, consisting chiefly of oxides of iron and manganese with salts of magnesia and lime. It is supposed to be due to a chemical change within the rock and not to deposition on the surface.]

Minerals.—Egypt possesses considerable mineral wealth. In ancient times gold and precious stones were mined in the Red Sea hills. During the Moslem period mining was abandoned, and it was not until the beginning of the 20th century that renewed efforts were made to develop the mining industry. The salt obtained from Lake Mareotis at Meks, a western suburb of Alexandria, supplies the salt needed for the country, except a small quantity used for curing fish at Lake Menzala; while the lakes in the Wadi Natron, 45 m. N.W. of the pyramids of Giza, furnish carbonate of soda in large quantities. Alum is found in the western oases. Nitrates and phosphates are also found in various parts of the desert and are used as manures. The turquoise mines of Sinai, in the Wadi Maghara, are worked regularly by the Arabs of the peninsula, who sell the stones in Suez; while there are emerald mines at Jebel Zubara, south of Kosseir. Petroleum occurs at Jebel Zeit, on the west shore of the Gulf of Suez. Considerable veins of haematite of good quality occur both in the Red Sea hills and in Sinai. At Jebel ed-Dukhan are porphyry quarries, extensively worked under the Romans, and at Jebel el-Fatira are granite quarries. At El-Hammāmāt, on the old way from Coptos to Philoteras Portus, are the breccia verde quarries, worked from very early times, and having interesting hieroglyphic inscriptions. At the various mines, and on the routes to them and to the Red Sea, are some small temples and stations, ranging from the Pharaonic to the Roman period. The quarries of Syene (Assuan) are famous for extremely hard and durable red granite (syenite), and have been worked since the days of the earliest Pharaohs. Large quantities of this syenite were used in building the Assuan dam (1898–1902). The cliffs bordering the Nile are largely quarried for limestone and sandstone.

Gold-mining recommenced in 1905 at Um Rus, a short distance inland from the Red Sea and some 50 m. S. of Kosseir, where milling operations were started in March of that year. Another mine opened in 1905 was that of Um Garaiat, E.N.E. of Korosko, and 65 m. distant from the Nile.

Climate.—Part of Upper Egypt is within the tropics, but the greater part of the country is north of the Tropic of Cancer. Except a narrow belt on the north along the Mediterranean shore, Egypt lies in an almost rainless area, where the temperature is high by day and sinks quickly at night in consequence of the rapid radiation under the cloudless sky. The mean temperature at Alexandria and Port Said varies between 57° F. in January and 81° F. in July; while at Cairo, where the proximity of the desert begins to be felt, it is 53° F. in January, rising to 84° F. in July. January is the coldest month, when occasionally in the Nile valley, and more frequently in the open desert, the temperature sinks to 32° F., or even a degree or two below. The mean maximum temperatures are 99° F. for Alexandria and 110° F. for Cairo. Farther south the range of temperature becomes greater as pure desert conditions are reached. Thus at Assuan the mean maximum is 118° F., the mean minimum 42° F. At Wadi Halfa the figures in each case are one degree lower.

The relative humidity varies greatly. At Assuan the mean value for the year is only 38%, that for the summer being 29%, and for the winter 51%; while for Wadi Halfa the mean is 32%, and 20% and 42% are the mean values for summer and winter respectively. A white fog, dense and cold, sometimes rises from the Nile in the morning, but it is of short duration and rare occurrence. In Alexandria and on all the Mediterranean coast of Egypt rain falls abundantly in the winter months, amounting to 8 in. in the year; but southwards it rapidly decreases, and south of 31° N. little rain falls.

Records at Cairo show that the rainfall is very irregular, and is furnished by occasional storms rather than by any regular rainy season; still, most falls in the winter months, especially December and January, while, on the other hand, none has been recorded in June and July. The average annual rainfall does not exceed 1·50 in. In the open desert rain falls even more rarely, but it is by no means unknown, and from time to time heavy storms burst, causing sudden floods in the narrow ravines, and drowning both men and animals. These are more common in the mountainous region of the Sinai peninsula, where they are much dreaded by the Arabs. Snow is unknown in the Nile valley, but on the mountains of Sinai and the Red Sea hills it is not uncommon, and a temperature of 18° F. at an altitude of 2000 ft. has been recorded in January.

The atmospheric pressure varies between a maximum in January and a minimum in July, the mean difference being about 0·29 in.

In a series of records extending over 14 years the mean pressure varied between 29·84 and 29·90 in.

The most striking meteorological factor in Egypt is the persistence of the north wind throughout the year, without which the climate would be very trying. It is this "Etesian" wind which enables sailing boats constantly to ascend the Nile, against its strong and rapid current. In December, January and February, at Cairo, the north wind slightly predominates, though those from the south and west often nearly equal it, but after this the north blows almost continuously for the rest of the year. In May and June the prevailing direction is north and north-north-east, and for July, August, September and October north and north-west. From the few observations that exist, it seems that farther south the southern winter winds decrease rapidly, becoming westerly, until at Assuan and Wadi Halfa the northerly winds are almost invariable throughout the year. The *khamsin*, hot sand-laden winds of the spring months, come invariably from the south. They are preceded by a rapid fall of the barometer for about a day, until a gradient from south to north is formed, then the wind commences to blow, at first gently, from the south-east; rapidly increasing in violence, it shifts through south to south-west, finally dropping about sunset. The same thing is repeated on the second and sometimes the third day, by which time the wind has worked round to the north again. During a khamsin the temperature is high and the air extremely dry, while the dust and sand carried by the wind form a thick yellow fog obscuring the sun. Another remarkable phenomenon is the *zobaa*, a lofty whirlwind of sand resembling a pillar, which moves with great velocity. The southern winds of the summer months which occur in the low latitudes north of the equator are not felt much north of Khartum.

One of the most interesting phenomena of Egypt is the mirage, which is frequently seen both in the desert and in the waste tracts of uncultivated land near the Mediterranean; and it is often so truthful in its appearance that one finds it difficult to admit the illusion.

Flora.—Egypt possesses neither forests nor woods and, as practically the whole of the country which will support vegetation is devoted to agriculture, the flora is limited. The most important tree is the date-palm, which grows all over Egypt and in the oases. The lower branches being regularly cut, this tree grows high and assumes a much more elegant form than in its natural state. The dom-palm is first seen a little north of 26° N., and extends southwards. The vine grows well, and in ancient times was largely cultivated for wine; oranges, lemons and pomegranates also abound. Mulberry trees are common in Lower Egypt. The sunt tree (*Acacia nilotica*) grows everywhere, as well as the tamarisk and the sycamore. In the deserts halfa grass and several kinds of thorn bushes grow; and wherever rain or springs have moistened the ground, numerous wild flowers thrive. This is especially the case where there is also shade to protect them from the midday sun, as in some of the narrow ravines in the eastern desert and in the palm groves of the oases, where various ferns and flowers grow luxuriantly round the springs. Among many trees which have been imported, the "lebbek" (*Albizzia lebbek*), a thick-foliaged mimosa, thrives especially, and has been very largely employed. The weeping-willow, myrtle, elm, cypress and eucalyptus are also used in the gardens and plantations.

The most common of the fruits are dates, of which there are nearly thirty varieties, which are sold half-ripe, ripe, dried, and pressed in their fresh moist state in mats or skins. The pressed dates of Siwa are among the most esteemed. The Fayum is celebrated for its grapes, and chiefly supplies the market of Cairo. The most common grape is white, of which there is a small kind far superior to the ordinary sort. The black grapes are large, but comparatively tasteless. The vines are trailed on trelliswork, and form agreeable avenues in the gardens of Cairo. The best-known fruits, besides dates and grapes, are figs, sycamore-figs and pomegranates, apricots and peaches, oranges and citrons, lemons and limes, bananas, which are believed to be of the fruits of Paradise (being always in season), different kinds of melons (including some of aromatic flavour, and the refreshing water-melon), mulberries, Indian figs or prickly pears, the fruit of the lotus and olives. Among the more usual cultivated flowers are the rose (which has ever been a favourite among the Arabs), the jasmine, narcissus, lily, oleander, chrysanthemum, convolvulus, geranium, dahlia, basil, the henna plant (*Lawsonia alba*, or Egyptian privet, which is said to be a flower of Paradise), the helianthus and the violet. Of wild flowers the most common are yellow daisies, poppies, irises, asphodels and ranunculuses. The *Poinsettia pulcherrima* is a bushy tree with leaves of brilliant red.

Many kinds of reeds are found in Egypt, though they were formerly much more common. The famous byblus or papyrus no longer exists in the country, but other kinds of *cyperi* are found. The lotus, greatly prized for its flowers by the ancient inhabitants, is still found in the Delta, though never in the Nile itself. There are two varieties of this water-lily, one with white flowers, the other with blue.

Fauna.—The chief quadrupeds are all domestic animals. Of these the camel and the ass are the most common. The ass, often a tall and handsome creature, is indigenous. When the camel was first introduced into Egypt is uncertain—it is not pictured on the ancient monuments. Neither is the buffalo, which with the sheep is very numerous in Egypt. The horses are of indifferent breed, apparently of a type much inferior to that possessed by the ancient Egyptians. Wild animals are few. The principal are the hyena, jackal and fox. The wild boar is found in the Delta. Wolves are rare. Numerous gazelles inhabit the deserts. The ibex is found in the Sinaitic peninsula and the hills between the Nile and the Red Sea, and the mouflon, or maned sheep, is occasionally seen in the same regions. The desert hare is abundant in parts of the Fayum, and a wild cat, or lynx, frequents the marshy regions of the Delta. The ichneumon (Pharaoh's rat) is common and often tame; the coney and jerboa are found in the eastern mountains. Bats are very numerous. The crocodile is no longer found in Egypt, nor the hippopotamus, in ancient days a frequenter of the Nile. The common or pariah dog is generally of sandy colour; in Upper Egypt there is a breed of wiry rough-haired black dogs, noted for their fierceness. Among reptiles are several kinds of venomous snakes—the horned viper, the hooded snake and the echis. Lizards of many kinds are found, including the monitor. There are many varieties of beetle, including a number of species representing the scarabaeus of the ancients. Locusts are comparatively rare. The scorpion, whose sting is sometimes fatal, is common. There are many large and poisonous spiders and flies; fleas and mosquitoes abound. Fish are plentiful in the Nile, both scaled and without scales. The scaly fish include members of the carp and perch kind. The *bayad*, a scaleless fish commonly eaten, reaches sometimes 3½ ft. in length. A somewhat rare fish is the *Polypterus*, which has thick bony scales and 16 to 18 long dorsal fins. The *Tetrodon*, or ball fish, is found in the Red Sea, as well as in the Nile.

Some 300 species of birds are found in Egypt, and one of the most striking features of a journey up the Nile is the abundance of bird life. Many of the species are sedentary, others are winter visitants, while others again simply pass through Egypt on their way to or from warmer or colder regions. Birds of prey are very numerous, including several varieties of eagles—the osprey, the spotted, the golden and the imperial. Of vultures the black and white Egyptian variety (*Neophron percnopterus*) is most common. The griffon and the black vulture are also frequently seen. There are many kinds of kites, falcons and hawks, kestrel being numerous. The long-legged buzzard is found throughout Egypt, as are owls. The so-called Egyptian eagle owl (*Bubo ascalaphus*) is rather rare, but the barn owl is common. The kingfisher is found beside every watercourse, a black and white species (*Ceryle rudis*) being much more numerous than the common kingfisher. Pigeons and hoopoes abound in every village. There are various kinds of plovers—the black-headed species (*Pluvianus Aegyptius*) is most numerous in Upper Egypt; the golden plover and the white-tailed species are found chiefly in the Delta. The spurwing is supposed to be the bird mentioned by Herodotus as eating the parasites covering the inside of the mouth of the crocodile. Of game-birds the most plentiful are sandgrouse, quail (a bird of passage) and snipe. Red-legged and other partridges are found in the eastern desert and the Sinai hills. Of aquatic birds there is a great variety. Three species of pelican exist, including the large Dalmatian pelican. Storks, cranes, herons and spoonbills are common. The sacred ibis is not found in Egypt, but the buff-backed heron, the constant companion of the buffalo, is usually called an ibis. The glossy ibis is occasionally seen. The flamingo, common in the lakes of Lower Egypt, is not found on the Nile. Geese, duck and teal are abundant. The most common goose is the white-fronted variety; the Egyptian goose is more rare. Both varieties are depicted on the ancient monuments; the white-fronted goose being commonly shown. Several birds of gorgeous plumage come north into Egypt in the spring, among others the golden oriole, the sun-bird, the roller and the blue-cheeked bee-eater.

Egypt as a Health Resort.—The country is largely resorted to during the winter months by Europeans in search of health as well as pleasure. Upper Egypt is healthier than Lower Egypt, where, especially near the coast, malarial fevers and diseases of the respiratory organs are not uncommon. The least healthy time of the year is the latter part of autumn, when the inundated soil is drying. In the desert, at a very short distance from the cultivable land, the climate is uniformly dry and unvaryingly healthy. The most suitable places for the residence of invalids are Helwan, where there are natural mineral springs, in the desert, 14 m. S. of Cairo, and Luxor and Assuan in Upper Egypt.

The diseases from which Egyptians suffer are very largely the result of insanitary surroundings. In this respect a great improvement has taken place since the British occupation in 1882. Plague, formerly one of the great scourges of the country, seems to have been stamped out, the last visitation having been in 1844, but cholera epidemics occasionally occur.[1] Cholera rarely extends south of Cairo. In 1848 it is believed that over 200,000 persons died from cholera, but later epidemics have been much less fatal. Smallpox is not uncommon, and skin diseases are numerous, but the two most prevalent diseases among the Egyptians are dysentery and ophthalmia. The objection entertained by many natives to entering hospitals or to altering their traditional methods of "cure" renders these diseases much more malignant and fatal than they would be in other circumstances. The government, however, enforces certain health regulations, and the sanitary service is under the direction of a European official.

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[1] A vivid description of Cairo during the prevalence of plague in 1835 will be found in A. W. Kinglake's *Eothen*.

Chief Towns.—Cairo (*q.v.*) the capital, a city of Arab foundation, is built on the east bank of the Nile, about 12 m. above the point where the river divides, and in reference to its situation at the head of the Delta has been called by the Arabs "the diamond stud in the handle of the fan of Egypt." It has a population (1907) of 654,476 and is the largest city in Africa. Next in importance of the cities of Egypt and the chief seaport is Alexandria (*q.v.*), pop. (with Ramleh) 370,009, on the shore of the Mediterranean at the western end of the Delta. Port Said (*q.v.*), pop. 49,884, at the eastern end of the Delta, and at the north entrance to the Suez Canal, is the second seaport. Between Alexandria and Port Said are the towns of Rosetta (*q.v.*), pop. 16,810, and Damietta (*q.v.*), pop. 29,354, each built a few miles above the mouth of the branch of the Nile of the same name. In the middle ages, when Alexandria was in decay, these two towns were busy ports; with the revival of Alexandria under Mehemet Ali and the foundation of Port Said (*c.* 1860), their trade declined. The other ports of Egypt are Suez (*q.v.*), pop. 18,347, at the south entrance of the canal, Kosseir (794) on the Red Sea, the seat of the trade carried on between Upper Egypt and Arabia, Mersa Matruh, near the Tripolitan frontier, and El-Arish, pop. 5897, on the Mediterranean, near the frontier of Palestine, and a halting-place on the caravan route from Egypt to Syria. In the interior of the Delta are many flourishing towns, the largest being Tanta, pop. 54,437, which occupies a central position. Damanhur (38,752) lies on the railway between Tanta and Alexandria; Mansura (40,279) is on the Damietta branch of the Nile, to the N.E. of Tanta; Zagazig (34,999) is the largest town in the Delta east of the Damietta branch; Bilbeis (13,485) lies N.N.E. of Cairo, on the edge of the desert and in the ancient Land of Goshen. Ismailia (10,373) is situated midway on the Suez Canal. All these towns, which depend largely on the cotton industry, are separately noticed.

Other towns in Lower Egypt are: Mehallet el-Kubra, pop. 47,955, 16 m. by rail N.E. of Tanta, with manufactories of silk and cottons; Salihia (6100), E.N.E. of and terminus of a railway from Zagazig, on the edge of the desert south of Lake Menzala, and the starting-point of the caravans to Syria; Mataria (15,142) on Lake Menzala and headquarters of the fishing industry; Zifta (15,850) on the Damietta branch and the site of a barrage; Samanud (14,408), also on the Damietta branch, noted for its pottery, and Fua (14,515), where large quantities of tarbushes are made, on the Rosetta branch. Shibin el-Kom (21,576), 16 m. S. of Tanta, is a cotton centre, and Menuf (22,316), 8 m. S.W. of Shibin, in the fork between the branches of the Nile, is the chief town of a rich agricultural district. There are many other towns in the Delta with populations between 10,000 and 20,000.

In Upper Egypt the chief towns are nearly all in the narrow valley of the Nile. The exceptions are the towns in the oases comparatively unimportant, and those in the Fayum province. The capital of the Fayum, Medinet el-Fayum, has a population (1907) of 37,320. The chief towns on the Nile, taking them in their order in ascending the river from Cairo, are Beni Suef, Minia, Assiut, Akhmim, Suhag, Girga, Kena, Luxor, Esna, Edfu, Assuan and Korosko. Beni Suef (23,357) is 77 m. from Cairo by rail. It is on the west bank of the river, is the capital of a *mudiria* and a centre for the manufacture of woollen goods. Minia (27,221) is 77 m. by rail farther south. It is also the capital of a mudiria, has a considerable European colony, possesses a large sugar factory and some cotton mills. It is the starting-point of a road to the Baharia oasis. Assiut (*q.v.*), pop. 39,442, is 235 m. S. of Cairo by rail, and is the most important commercial centre in Upper Egypt. At this point a barrage is built across the river. Suhag (17,514) is 56 m. by rail S. of Assiut and is the headquarters of Girga mudiria. The ancient and celebrated Coptic monasteries El Abiad (the white) and El Ahmar (the red) are 3 to 4 m. W. and N.W. respectively of Suhag. A few miles above Suhag, on the opposite (east) side of the Nile is Akhmim (*q.v.*) or Ekhmim (23,795), where silk and cotton goods are made. Girga (*q.v.*), pop. 19,893, is 22 m. S. by rail of Suhag, and on the same (the west) side of the river. It is noted for its pottery. Kena (*q.v.*), pop. 20,069, is on the east bank of the Nile, 145 m. by rail from Assiut. It is the chief seat of the manufacture of the porous earthenware water-bottles used all over Egypt. Luxor (*q.v.*), pop. (with Karnak) 25,229, marks the site of Thebes. It is 418 m. from Cairo, and here the gauge of the railway is altered from broad to narrow. Esna (*q.v.*), pop. 19,103, is another place where pottery is made in large quantities. It is on the west bank of the Nile, 36 m. by rail S. of Luxor. Edfu (*q.v.*), pop. 19,262, is also on the west side of the river, 30 m. farther south. It is chiefly famous for its ancient temple. Assuan (*q.v.*), pop. 12,618, is at the foot of the First Cataract and 551 m. S. of Cairo by rail. Three miles farther south, at Shellal, the Egyptian railway terminates. Korosko, 118 m. by river above Assuan, is a small place notable as the northern terminus of the caravan route from the Sudan across the Nubian desert. Since the building of the railway—which starts 96 m. higher up, at Wadi Halfa—to Khartum, this route is little used, and Korosko has lost what importance it had.

Ancient Cities and Monuments.—Many of the modern cities of Egypt are built on the sites of ancient cities, and they generally contain some monuments of the time of the Pharaohs, Greeks or Romans. The sites of other ancient cities now in complete ruin may be indicated. Memphis, the Pharaonic capital, was on the west bank of the Nile, some 14 m. above Cairo, and Heliopolis lay some 5 m. N.N.E. of Cairo. The pyramids of Giza or Gizeh, on the edge of the desert, 8 m. west of Cairo, are the largest of the many pyramids and other monuments, including the famous Sphinx, built in the neighbourhood of Memphis. The site of Thebes has already been indicated. Syene stood near to where the town of Assuan now is; opposite, on an island in the Nile, are scanty ruins of the city of Elephantine, and a little above, on another island, is the temple of Philae. The ancient Coptos (Keft) is represented by the village of Kuft, between Luxor and Kena. A few miles north of Kena is Dendera, with a famous temple. The ruins of Abydos, one of the oldest places in Egypt, are 8 m. S.W. of Balliana, a small town in Girga mudiria. The ruined temples of Abu Simbel are on the west side of the Nile, 56 m. above Korosko. On the Red Sea, south of Kosseir, are the ruins of Myos Hormos and Berenice. Of the ancient cities in the Delta there are remains, among others, of Sais, Iseum, Tanis, Bubastis, Onion, Sebennytus, Pithom, Pelusium, and of the Greek cities Naucratis and Daphnae. There are, besides the more ancient cities and monuments, a number of Coptic towns, monasteries and churches in almost every part of Egypt, dating from the early centuries of Christianity. The monasteries, or *ders*, are generally fort-like buildings and are often built in the desert. Tombs of Mahommedan saints are also numerous, and are often placed on the summit of the cliffs overlooking the Nile. The traveller in Egypt thus views, side by side with the activities of the present day, where occident and orient meet and clash, memorials of every race and civilization which has flourished in the valley of the Nile.

Trade Routes and Communications.—Its geographical position gives Egypt command of one of the most important trade routes in the world. It is, as it were, the fort which commands the way from Europe to the East. This has been the case from time immemorial, and the provision, in 1869, of direct maritime communication between the Mediterranean and the Red Sea, by the completion of the Suez Canal, ensured for the Egyptian route the supremacy in sea-borne traffic to Asia, which the discovery of the passage to India by way of the Cape of Good Hope had menaced for three and a half centuries. The Suez Canal is 87 m. long, 66 actual canal and 21 lakes. It has sufficient depth to allow vessels drawing 27 ft. of water to pass through. It is administered by a company whose headquarters are in Paris, and no part of its revenue reaches the Egyptian exchequer (see SUEZ CANAL). Besides the many steamship lines which use the Suez Canal, other steamers run direct from European ports to Alexandria. There is also a direct mail service between Suez and Port Sudan.

The chief means of internal communication are, in the Delta the railways, in Upper Egypt the railway and the river. The railways are of two kinds: (1) those state-owned and state-worked, (2) agricultural light railways owned and worked by private companies. Railway construction dates from 1852, when the line from Alexandria to Cairo was begun, by order of Abbas I. The state railways, unless otherwise indicated, have a gauge of 4 ft. 8½ in. The main system is extremely simple. Trunk lines from Alexandria (via Damanhur and Tanta) and from Port Said (via Ismailia) traverse the Delta and join at Cairo. From Cairo the railway is continued south up the valley of the Nile and close to the river. At first it follows the west bank, crossing the stream at Nag Hamadi, 354 m. from Cairo, by an iron bridge 437 yds. long. Thence it continues on the east bank to Luxor, where the broad gauge ceases. From Luxor the line continues on the standard African gauge (3 ft. 6 in.) to Shellal, 3 m. above Assuan and 685 m. from Alexandria. This main line service is supplemented by a steamer service on the Nile from Shellal to Wadi Halfa, on the northern frontier of the Anglo-Egyptian Sudan, whence there is direct railway communication with Khartum and the Red Sea (see SUDAN).

Branch lines connect Cairo and Alexandria with Suez and with almost every town in the Delta. From Cairo to Suez via Ismailia is a distance of 160 m. Before the Suez Canal was opened passengers and goods were taken to Suez from Cairo by a railway 84 m. long which ran across the desert. This line, now disused, had itself superseded the "overland route" organized by Lieut. Thomas Waghorn, R.N., *c.* 1830, for the conveyance of passengers and mails to India. In Upper Egypt a line, 40 m. long, runs west from Wasta, a station 56 m. S. of Cairo, to Abuksa in the Fayum mudiria. Another railway goes from Kharga Junction, a station on the main line 24 m. S. of Girga, to the oasis of Kharga. These lines are privately owned.

In the Delta the light railways supplement the ordinary lines and connect the villages with the towns and seaports. There are over 700 m. of these lines. The railway development of Egypt has not been very rapid. In 1880 944 m. of state lines were open; in 1900 the figure was 1393, and in 1905, 1688. For several years before 1904 the administration of the railways was carried on by an international or mixed board for the security of foreign creditors. In the year named the railways came directly under the control of the Egyptian government, which during the next four years spent £E.3,000,000 on improving and developing the lines. In the five years 1902–1906 the capital value of the state railways increased from £E.20,383,000 to £E.23,200,000 and the net earnings from £E.1,059,000 to £E.1,475,000. The number of passengers carried in the same period rose from 12½ to over 22 millions, and the weight of goods from slightly under 3,000,000 to nearly 6,750,000 tons. In 1906 the light railways carried nearly a million tons of goods and over 6,800,000 passengers.

Westward from Alexandria a railway, begun in 1904 by the khedive, Abbas II., runs parallel with the coast, and is intended to be continued to Tripoli. The line forms the eastern end of the great railway system which will eventually extend from Tangier to Alexandria.

The Nile is navigable throughout its course in Egypt, and is largely used as a means of cheap transit of heavy goods. Lock and bridge tolls were abolished in 1899 and 1901 respectively. As a result, river traffic greatly increased. Above Cairo the Nile is the favourite tourist route, while between Shellal (Assuan) and the Sudan frontier it is the only means of communication. Among the craft using the river the dahabiya is a characteristic native sailing vessel, somewhat resembling a house-boat. From the Nile, caravan routes lead westward to the various oases and eastward to the Red Sea, the shortest (120 m.) and most used of the eastern routes being that from Kena to Kosseir. Roads suitable for wheeled vehicles are found in Lower Egypt, but the majority of the tracks are bridle-paths, goods being conveyed on the backs of donkeys, mules and camels.

Posts and Telegraphs.—The Egyptian postal system is highly organized and efficient, and in striking contrast with its condition in 1870, when there were but nineteen post-offices in the country. All the branches of business transacted in European post-offices are carried on by the Egyptian service, Egypt being a member of the Postal Union. It was the first foreign country to establish a penny postage with Great Britain, the reduction from 2½d. being made in 1905. The inland letters and packages carried yearly exceed 20,000,000 and foreign letters (30% to England) number over 4,000,000. Over £17,000,000 passes yearly through the post. A feature of the service are the travelling post-offices, of which there are some 200.

All the important towns are connected by telegraph, the telegraphs being state-owned and worked by the railway administration. Egypt is also connected by cables and land-lines with the outside world. One land-line connects at El-Arish with the line through Syria and Asia Minor to Constantinople. Another line connects at Wadi Halfa with the Sudan system, affording direct telegraphic communication via Khartum and Gondokoro with Uganda and Mombasa. The Eastern Telegraph Company, by concessions, have telegraph lines across Egypt from Alexandria via Cairo to Suez, and from Port Said to Suez, connecting their cables to Europe and the East. The principal cables are from Alexandria to Malta, Gibraltar and England; from Alexandria to Crete and Brindisi; from Suez to Aden, Bombay, China and Australia.

The telephone is largely used in the big towns, and there is a trunk telephone line connecting Alexandria and Cairo.

Standard Time.—The standard time adopted in Egypt is that of the longitude of Alexandria, 30° E., *i.e.* two hours earlier than Greenwich time. It thus corresponds with the standard time of British South Africa.

Agriculture and Land Tenure.—The chief industry of Egypt is agriculture. The proportions of the industry depend upon the area of land capable of cultivation. This again depends upon the fertilizing sediment brought down by the Nile and the measure in which lands beyond the natural reach of the flood water can be rendered productive by irrigation. By means of canals, "basins," dams and barrages, the Nile flood is now utilized to a greater extent than ever before (see IRRIGATION: *Egypt*). The result has been a great increase in the area of cultivated or cultivable land.

At the time of the French occupation of Egypt in 1798, it was found that the cultivable soil covered 4,429,400 acres, but the quantity actually under cultivation did not exceed 3,520,000 acres, or six-elevenths of the entire surface. Under improved conditions the area of cultivated land, or land in process of reclamation, had risen in 1906 to 5,750,000 acres, while another 500,000 acres of waste land awaited reclamation.

Throughout Egypt the cultivable soil does not present any very great difference, being always the deposit of the river; it contains, however, more sand near the river than at a distance from it. Towards the Mediterranean its quality is injured by the salt with which the air is impregnated, and therefore it is not so favourable to vegetation. Of the cultivated land, some three-fourths is held, theoretically, in life tenancy. The state, as ultimate proprietor, imposes a tax which is the equivalent of rent. These lands are *Kharaji* lands, in distinction from the *Ushuri* or tithe-paying lands. The *Ushuri* lands were originally granted in fee, and are subject to a quit-rent. All tenants are under obligation to guard or repair the banks of the Nile in times of flood, or in any case of sudden emergency. Only to this extent does the *corvée* now prevail. The land-tax is proportionate, *i.e.* land under perennial irrigation pays higher taxes than land not so irrigated (see below, *Finance*). The unit of land is the *feddan*, which equals 1·03 acre. Out of 1,153,759 proprietors of land in 1905, 1,005,705 owned less than 5 *feddans*. The number of proprietors owning over 50 *feddans* was 12,475. The acreage held by the first class was 1,264,084, that by the second class, 2,356,602. Over 1,600,000 *feddans* were held in holdings of from 5 to 50 *feddans*. The state domains cover over 240,000 *feddans*, and about 600,000 *feddans* are owned by foreigners. The policy of the government is to maintain the small proprietors, and to do nothing tending to oust the native in favour of European landowners.

The kind of crops cultivated depends largely on whether the land is under perennial, flood or "basin" irrigation. Perennial irrigation is possible where there are canals which can be supplied with water all the year round from the Nile. This condition exists throughout the Delta and Middle Egypt, but only in parts of Upper Egypt. Altogether some 4,000,000 acres are under perennial irrigation. In these regions two and sometimes three crops can be harvested yearly. In places where perennial irrigation is impossible, the land is divided by rectangular dikes into "basins." Into these basins—which vary in area from 600 to 50,000 acres—water is led by shallow canals when the Nile is in flood. The water is let in about the middle of August and the basins are begun to be emptied about the 1st of October. The land under basin irrigation covers about 1,750,000 acres. In the basins only one crop can be grown in the year. This basin system is of immemorial use in Egypt, and it was not until the time of Mehemet Ali (*c.* 1820) that perennial irrigation began. High land near the banks of the Nile which cannot be reached by canals is irrigated by raising water from the Nile by steam-pumps, water-wheels (*sakias*) worked by buffaloes, or water-lifts (*shadufs*) worked by hand. There are several thousand steam-pumps and over 100,000 *sakias* or *shadufs* in Egypt. The *fellah* divides his land into little square plots by ridges of earth, and from the small canal which serves his holding he lets the water into each plot as needed. The same system obtains on large estates (see further IRRIGATION: *Egypt*).

There are three agricultural seasons: (1) summer (*sefi*), 1st of April to 31st of July, when crops are grown only on land under perennial irrigation; (2) flood (*Nili*), 1st of August to 30th of November; and (3) winter (*shetwi*), 1st of December to 31st of March. Cotton, sugar and rice are the chief summer crops; wheat, barley, flax and vegetables are chiefly winter crops; maize, millet and "flood" rice are *Nili* crops; millet and vegetables are also, but in a less degree, summer crops. The approximate areas under cultivation in the various seasons are, in summer, 2,050,000 acres; in flood, 1,500,000 acres; in winter, 4,300,000 acres. The double-cropped area is over 2,000,000 acres. Although on the large farms iron ploughs, and threshing and grain-cleaning machines, have been introduced, the small cultivator prefers the simple native plough made of wood. Corn is threshed by a *norag*, a machine resembling a chair, which moves on small iron wheels or thin circular plates fixed to axle-trees, and is drawn in a circle by oxen.

Crops.—Egypt is third among the cotton-producing countries of the world. Its production per acre is the greatest of any country but, owing to the restricted area available, the bulk raised is not more than one-tenth of that of the United States and about half that of India. Some 1,600,000 acres of land, five-sixths being in Lower Egypt, are devoted to cotton growing. The climate of Lower Egypt being very suitable to the growth of the plant, the cotton produced there is of excellent quality. The seed is sown at the end of February or beginning of March and the crop is picked in September and October. The cotton crop increased from 1,700,000 *kantars*[1] in 1878 to 4,100,000 in 1890, had reached 5,434,000 in 1900, and was 6,750,000 in 1905. Its average value, 1897–1905, was over £14,000,000 a year. The cotton exported was valued in 1907 at £E.23,598,000, in 1908 at £E.17,091,612.

While cotton is grown chiefly in the Delta, the sugar plantations, which cover about 100,000 acres, are mainly in Upper Egypt. The canes are planted in March and are cut in the following January or February. Although since 1884 the production of sugar has largely increased, there has not been a corresponding increase in its value, owing to the low price obtained in the markets of the world. Beetroot is also grown to a limited extent for the manufacture of sugar. The sugar exported varied in annual value in the period 1884–1905 from £400,000 to £765,000.

A coarse and strong tobacco was formerly extensively grown, but its cultivation was prohibited in 1890. Flax and hemp are grown in a few places.

Maize in Lower Egypt and millet (of which there are several varieties) in Upper Egypt are largely grown for home consumption, these grains forming a staple food of the peasantry. The stalk of the maize is also a very useful article. It is used in the building of the houses of the fellahin, as fuel, and, when green, as food for cattle. Wheat and barley are important crops, and some 2,000,000 acres are sown with them yearly. The barley in general is not of good quality, but the desert or "Mariut" barley, grown by the Bedouins in the coast region west of Alexandria, is highly prized for the making of beer. Beans and lentils are extensively sown, and form an important article of export. The annual value of the crops is over £3,000,000. Rice is largely grown in the northern part of the Delta, where the soil is very wet. Two kinds are cultivated: *Sultani*, a summer crop, and *Sabaini*, a flood crop. *Sabaini* is a favourite food of the fellahin, while *Sultani* rice is largely exported. In the absence of grass, the chief green food for cattle and horses is clover, grown largely in the basin lands of Upper Egypt. To a less extent vetches are grown for the same purpose.

Vegetables and Fruit.—Vegetables grow readily, and their cultivation is an important part of the work of the fellahin. The onion is grown in great quantities along the Nile banks in Upper Egypt, largely for export. Among other vegetables commonly raised are tomatoes (the bulk of which are exported), potatoes (of poor quality), leeks, marrows, cucumbers, cauliflowers, lettuce, asparagus and spinach.

The common fruits are the date, orange, citron, fig, grape, apricot, peach and banana. Olives, melons, mulberries and strawberries are also grown, though not in very large numbers. The olive tree flourishes only in the Fayum and the oases. The Fayum also possesses extensive vineyards. The date is a valuable economic asset. There are some 6,000,000 date-palms in the country, 4,000,000 being in Upper Egypt. The fruit is one of the chief foods of the people. The value of the crop is about £1,500,000 a year.

Roses and Dyes.—There are fields of roses in the Fayum, which supply the market with rose-water. Of plants used for dyeing, the principal are bastard saffron, madder, woad and the indigo plant. The leaves of the henna plant are used to impart a bright red colour to the palms of the hands, the soles of the feet, and the nails of both hands and feet, of women and children, the hair of old ladies and the tails of horses. Indigo is very extensively employed to dye the shirts of the natives of the poorer classes, and is, when very dark the colour of mourning; therefore, women at funerals, and generally after a death, smear themselves with it.

Domestic Animals.—The Egyptians are not particularly a pastoral people, though the wealth of the Bedouin in the Eastern or Arabian Desert consists in their camels, horses, sheep and goats. In the Nile valley the chief domestic animals are the camel, donkey, mule, ox, buffalo, sheep and goat. Horses are comparatively few, and are seldom seen outside the large towns, the camel and donkey being the principal beasts of burden. The cattle are short-horned, rather small and well formed. They are quiet in disposition, and much valued for agricultural labour by the people, who therefore very rarely slaughter them for meat. Buffaloes of an uncouth appearance and of a dark slaty colour, strikingly contrasting with the neat cattle, abound in Egypt. They are very docile, and the little children of the villagers often ride them to or from the river. The buffaloes are largely employed for turning the *sakias*. Sheep (of which the greater number are black) and goats are abundant, and mutton is the ordinary butcher's meat. The wool is coarse and short. Swine are very rarely kept, and then almost wholly for the European inhabitants, the Copts generally abstaining from eating their meat. Poultry is plentiful and eggs form a considerable item in the exports. Pigeons are kept in every village and their flesh is a common article of food.

Fishing.—The chief fishing-ground is Lake Menzala, where some 4000 persons are engaged in the industry, but fish abound in the Nile also, and are caught in large quantities along the coast of the Delta. The salting and curing of the fish is done chiefly at Mataria, on Lake Menzala, and at Damietta. Dried and salted fish eggs, called *batarekh*, command a ready market. The average annual value of the fisheries is about £200,000.

Canals.—The irrigation canals, which are also navigable by small craft, are of especial importance in a country where the rainfall is very slight. The Delta is intersected by numerous canals which derive their supply from four main channels. The Rayya Behera, known in its lower courses first as the Khatatba and afterwards as the Rosetta canal, follows the west bank of the Rosetta branch of the Nile and has numerous offshoots. The most important is the Mahmudia (50 m. long), which connects Alexandria with the Rosetta branch, taking a similar direction to that of the ancient canal which it succeeded. This canal supplies Alexandria with fresh water.

The Rayya Menufia, or Menuf canal, connects the two branches of the Nile and supplies water to the large number of canals in the central part of the Delta. Following the right (eastern) bank of the Damietta branch is the Rayya Tewfiki, known below Benha as the Mansuria, and below Mansura as the Fareskur, canal. This canal has many branches. Farther east are other canals, of which the most remarkable occupy in part the beds of the Tanitic and Pelusiac branches. That following the old Tanitic channel is called the canal of Al-Mo'izz, the first Fatimite caliph who ruled in Egypt, having been dug by his orders, and the latter bears the name of the canal of Abu-l-Muneggi, a Jew who executed this work, under the caliph Al-Amir, in order to water the province called the Sharkia. From this circumstance this canal is also known as the Sharkawia. From a town on its bank it is called in its lower course the Shibini canal. The superfluous water from all the Delta canals is drained off by *bahrs* (rivers) into the coast lakes. The Ismailia or Fresh-water canal branches from the Nile at Cairo and follows, in the main, the course of the canal which anciently joined the Nile and the Red Sea. It dates from Pharaonic times, having been begun by "Sesostris," continued by Necho II. and by Darius Hystaspes, and at length finished by Ptolemy Philadelphus. This canal, having fallen into disrepair, was restored in the 7th century A.D. by the Arabs who conquered Egypt, but appears not long afterwards to have again become unserviceable. The existing canal was dug in 1863 to supply fresh water to the towns on the Suez Canal. Although designed for irrigation purposes, the Delta canals are also used for the transport of passengers and goods.

In Upper Egypt the most important canals are the Ibrahimia and the Bahr Yusuf (the River of Joseph). They are both on the west side of the Nile. The Ibrahimia takes its water from the Nile at Assiut, and runs south to below Beni Suef. It now supplies the Bahr Yusuf, which runs parallel with and west of the Ibrahimia, until it diverges to supply the Fayum—a distance of some 350 m. It leaves the Ibrahimia at Derut near its original point of departure from the Nile. Although the Joseph whence it takes its name is the celebrated Saladin, it is related that he merely repaired it, and it is not doubted to be of a much earlier period. Most probably it was executed under the Pharaohs. By some authorities it is believed to be a natural channel canalized. Besides supplying the canals of the Fayum with summer water, it fills many of the "basins" of Upper Egypt with water in flood time.

Manufactures and Native Industries.—Although essentially an agricultural country, Egypt possesses several manufactures. In connexion with the cotton industry there are a few mills where calico is made or oil crushed, and ginning-mills are numerous. In Upper Egypt there are a number of factories for sugar-crushing and refining, and one or two towns of the Delta possess rice mills. Flour mills are found in every part of the country, the maize and other grains being ground for home consumption. Soap-making and leather-tanning are carried on, and there are breweries at Alexandria and Cairo. The manufacture of tobacco into cigarettes, carried on largely at Alexandria and Cairo, is another important industry. Native industries include the weaving of silk, woollen, linen and cotton goods, the hand-woven silk shawls and draperies being often rich and elegant. The silk looms are chiefly at Mehallet el-Kubra, Cairo and Damietta. The Egyptians are noted for the making of pottery of the commoner kinds, especially water-jars. There is at Cairo and in other towns a considerable industry in ornamental wood and metal work, inlaying with ivory and pearl, brass trays, copper vessels, gold and silver ornaments, &c. At Cairo and in the Fayum, attar of roses and other perfumes are manufactured. Boat-building is an important trade.

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[1] A *kantar* equals 99 lb.

Commerce.—The trade of Egypt has developed enormously since the British occupation in 1882 ensured to all classes of the community the enjoyment of the profit of their labour. The total value of the exterior trade increased in the 20 years 1882 to 1902 from £19,000,000 to £32,400,000. The wealth of Egypt lying in the cultivation of its soil, almost all the exports are agricultural produce, while the imports are mostly manufactured goods, minerals and hardware. The chief exports in order of importance are: raw cotton, cotton seed, sugar, beans, cigarettes, onions, rice and gum-arabic. The gum is not of native produce, being in transit from the Sudan. Of less importance are the exports of hides and skins, eggs, wheat and other grains, wool, quails, lentils, dates and Sudan produce in transit. The principal articles imported are: cotton goods and other textiles, coal, iron and steel, timber, tobacco, machinery, flour, alcoholic liquors, petroleum, fruits, coffee and live animals. There is an *ad valorem* duty of 8% on imports and of about 1% on exports. Tobacco and precious stones and metals pay heavier duties. The tobacco is imported chiefly from Turkey and Greece, is made into cigarettes in Egypt, and in this form exported to the value of about £500,000 yearly.

In comparison with cotton, all other exports are of minor account. The cotton exported, of which Great Britain takes more than half, is worth over three-fourths of the total value of goods sent abroad. Next to cotton, sugar is the most important article exported. A large proportion of the sugar manufactured is, however, consumed in the country and does not figure in the trade returns. Of the imports the largest single item is cotton goods, nearly all being sent from England. Woollen goods come chiefly from England, Austria and Germany, silk goods from France. Large quantities of ready-made clothes and fezes are imported from Austria. Iron and steel goods, machinery, locomotives, &c., come chiefly from England, Belgium and Germany, coal from England, live stock from Turkey and the Red Sea ports, coffee from Brazil, timber from Russia, Turkey and Sweden.

A British consular report (No. 3121, annual series), issued in 1904, shows that in the period 1887–1902 the import trade of Egypt nearly doubled. In the same period the proportion of imports from the United Kingdom fell from 39·63 to 36·76%. Though the percentage decreased, the value of imports from Great Britain increased in the same period from £2,500,000 to £4,500,000. In addition to imports from the United Kingdom, British possessions took 6·0% of the import trade. Next to Great Britain, Turkey had the largest share of the import trade, but it had declined in the sixteen years from 19 to 15%. France about 10%, and Austria 6·72%, came next, but their import trade was declining, while that of Germany had risen from less than 1 to over 3%, and Belgium imports from 1·74 to 4·27%.

In the same period (1887–1902) Egyptian exports to Great Britain decreased from 63·25 to 52·30%, Germany and the United States showing each an increase of over 6·0%. Exports to Germany had increased from 0·13 to 6·75%, to the United States from 0·26 to 6·70%. Exports to France had remained practically stationary at 8·0%; those to Austria had dropped from 6·30 to 4·0%, to Russia from 9·11 to 8·43%.

For the quinquennial period 1901–1905, the average annual value of the exterior trade was:—imports £17,787,296; exports £18,811,588; total £36,598,884. In 1907 the total value of the merchandise imported and exported, exclusive of transit, re-exportation and specie, was £E.54,134,000—constituting a record trade return. The value of the imports was £E.26,121,000, of the exports £E.28,013,000.

Shipping.—More than 90% of the external trade passes through the port of Alexandria. Port Said, which in consequence of its position at the northern entrance of the Suez Canal has more frequent and regular communication with Europe, is increasing in importance and is the port where mails and passengers are landed. Over 3000 ships enter and clear harbour at Alexandria every year. The total tonnage entering the port increased in the five years 1901–1905 from 2,555,259 to 3,591,281. In the same period the percentage of British shipping, which before 1900 was nearly 50, varied from 40 to 45. No other nation had more than 12% of the tonnage, Italy, France, Austria and Turkey each having 9 to 12%. The tonnage of German ships increased in the five years mentioned from 3 to 7%. In number of steamships entering the harbour Great Britain is first, with some 800 yearly, or about 50% of all steamers entering. The sailing boats entering the harbour are almost entirely Turkish. They are vessels of small tonnage.

The transit trade with the East, which formerly passed overland through Egypt, has been diverted to the Suez Canal, the traffic through which has little to do with the trade or shipping of Egypt. The number of ships using the canal increased in the 20 years 1880–1900 from 2000 to 4000, while in the same period the tonnage rose from 4,300,000 to 14,000,000. In 1905 the figures were:—Number of ships that passed through the canal, 4116 (2484 being British and 600 German), net tonnage 13,134,105 (8,356,940 British and 2,113,484 German). Next to British and German the nationality of ships using the canal in order of importance is French, Dutch, Austrian, Italian and Russian. About 250,000 passengers (including some 40,000 pilgrims to Mecca) pass through the canal in a year (see further SUEZ).

Currency.—The monetary system in force dates from 1885, when through the efforts of Sir Edgar Vincent the currency was placed on a sound basis. The system is based on the single gold standard. The unit is a gold coin called a pound and equal to £1, 0s. 6d. in English currency. The Egyptian pound (£E.) is divided into 100 piastres, of which there are coins in silver of 20,10,5 and 2 piastres. One, ½, ⅕ and ⅒ piastre pieces are coined in nickel and $\frac{1}{20}$ and $\frac{1}{40}$ piastre pieces in bronze. The one piastre piece is worth a fraction over 2½d. The $\frac{1}{40}$ of a piastre is popularly called a para and the native population generally reckon in paras. The legal piastre is called the piastre tariff (P.T.), to distinguish it from the ½ piastre, which in local usage in Cairo and Alexandria is called a piastre. Officially the ½ piastre is known as 5 milliemes, and so with the coins of lower denomination, the para being ¼ millieme. The old terms *kis* or "purse" (500 piastres) and *khazna* or "treasury" (1000 purses) are still occasionally used. Formerly European coins of all kinds were in general circulation, now the only foreign coins current are the English sovereign, the French 20 franc piece and the Turkish mejidie, a gold coin worth 18 shillings. For several years no Egyptian gold pieces have been coined. Egyptian silver money is minted at Birmingham, and nickel and bronze money at Vienna. Bank-notes, of the National Bank, are issued for £E.100, £E.50, £E.10, £E.5 and £E.1, and for 50 piastres. The notes are not legal tender, but are accepted by the government in payment of taxes.

The history of the currency reform in Egypt is interesting as affording a practical example of a system much discussed in connexion with the currency question in India, namely, a gold standard without a gold coinage. The Egyptian pound is practically non-existent, nearly all that were coined having been withdrawn from circulation. Their place has been taken by foreign gold, principally the English sovereign, which circulates at a value of 97½ piastres. In practice the system works perfectly smoothly, the gold flowing in and out of the country through the agency of private banking establishments in proportion to the requirements of the circulation. It is, moreover, very economical for the government. As in most agricultural countries, there is a great expansion of the circulation in the autumn and winter months in order to move the crops, followed by a long period of contracted circulation throughout the rest of the year. Under the existing system the fluctuating requirements of the currency are met without the expense of alternately minting and melting down.

Weights and Measures.—The metrical system of weights and measures is in official but not in popular use, except in the foreign quarters of Cairo, Alexandria, &c. The most common Egyptian measures are the *fitr*, or space measured by the extension of the thumb and first finger; the *shibr*, or span; and the cubit (of three kinds = 22⅔, 25 and 26½ in.). The measure of land is the *feddan*, equal to 1·03 acres, subdivided into 24 *kirats*. The *ardeb* is equal to about 5 bushels, and is divided into 6 *waybas*, and each *wayba* into 24 *rubas*. The *okieh* equals 1·32 oz., the *rotl* ·99 ℔, the *oke* 2·75 ℔, the *kantar* (or 100 *rotls* or 36 *okes*) 99·04 ℔.

Constitution and Administration.—Egypt is a tributary state of the Turkish empire, and is ruled by an hereditary prince with the style of khedive, a Persian title regarded as the equivalent of king. The succession to the throne is by primogeniture. The central administration is carried on by a council of ministers, appointed by the khedive, one of whom acts as prime minister. To these is added a British financial adviser, who attends all meetings of the council of ministers, but has not a vote; on the other hand, no financial decision may be taken without his consent. The ministries are those of the interior, finance, public works, justice, war, foreign affairs and public instruction,[1] and in each of these are prepared the drafts of decrees, which are then submitted to the council of ministers for approval, and on being signed by the khedive become law. No important decision, however, has been taken since 1882 without the concurrence of the British minister plenipotentiary. With a few exceptions, laws cannot, owing to the Capitulations, be enforced against foreigners except with the consent of the powers.

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[1] To the ministry of public instruction was added in 1906 a department of agriculture and technical instruction.

While the council of ministers with the khedive forms the legislative authority, there are various representative bodies with strictly limited powers. The legislative council is a consultative body, partly elective, partly nominative. It examines the budget and all proposed administrative laws, but cannot initiate legislation, nor is the government bound to adopt its suggestions. The general assembly consists of the legislative council and the ministers of state, together with popularly elected members, who form a majority of the whole assembly. It has no legislative functions, but no new direct personal tax nor land tax can be imposed without its consent. It must meet at least once in every two years.

For purposes of local government the chief towns constitute governorships (*moafzas*), the rest of the country being divided into *mudirias* or provinces. The governors and *mudirs* (heads of provinces) are responsible to the ministry of the interior. The provinces are further divided into districts, each of which is under a *mamur*, who in his turn supervises and controls the *omda*, mayor or head-man, of each village in his district.

The governorships are: Cairo; Alexandria, which includes an area of 70 sq. m.; Suez Canal, including Port Said and Ismailia; Suez and El-Arish. Lower Egypt is divided into the provinces of: Behera, Gharbia, Menufia, Dakahlia, Kaliubia, Sharkia. The oasis of Siwa and the country to the Tripolitan frontier are dependent on the province of Behera. Upper Egypt: Giza, Beni Suef, Fayum, Minia, Assiut, Girga, Kena, Assuan. The peninsula of Sinai is administered by the war office.

Justice.—There are four judicial systems in Egypt: two applicable to Egyptian subjects only, one applicable to foreigners only, and one applicable to foreigners and, to a certain extent, natives also. This multiplicity of tribunals arises from the fact that, owing to the Capitulations, which apply to Egypt as part of the Turkish empire, foreigners are almost entirely exempt from the jurisdiction of the native courts. It will be convenient to state first the law as regards foreigners, and secondly the law which concerns Egyptians. Criminal jurisdiction over foreigners is exercised by the consuls of the fifteen powers possessing such right by treaty, according to the law of the country of the offender. These consular courts also judge civil cases between foreigners of the same nationality.

Jurisdiction in civil matters between natives and foreigners and between foreigners of different nationalities is no longer exercised by the consular courts. The grave abuse to which the consular system was subject led to the establishment, in February 1876, at the instance of Nubar Pasha and after eight years of negotiation, of International or "Mixed" Tribunals to supersede consular jurisdiction to the extent indicated. The Mixed Tribunals employ a code based on the *Code Napoléon* with such additions from Mahommedan law as are applicable. There are three tribunals of first instance, and an appeal court at Alexandria. These courts have both foreign and Egyptian judges—the foreign judges forming the majority of the bench. In certain designated matters they enjoy criminal jurisdiction, including, since 1900, offences against the bankruptcy laws. Cases have to be conducted in Arabic, French, Italian and English, English having been admitted as a "judicial language" by khedivial decree of the 17th of April 1905. Besides their judicial duties, the courts practically exercise legislative functions, as no important law can be made applicable to Europeans without the consent of the powers, and the powers are mainly guided by the opinions of the judges of the Mixed Courts.

The judicial systems applicable solely to Egyptians are supervised by the ministry of justice, to which has been attached since 1890 a British judicial adviser. Two systems of laws are administered:—(1) the *Mehkemehs*, (2) the Native Tribunals. The *mehkemehs*, or courts of the cadis, judge in all matters of personal status, such as marriage, inheritance and guardianship, and are guided in their decisions by the code of laws founded on the Koran. The grand cadi, who must belong to the sect of the *Hanifis*, sits at Cairo, and is aided by a council of *Ulema* or learned men. This council consists of the sheikh or religious chief of each of the four orthodox sects, the sheikh of the mosque of Azhar, who is of the sect of the *Shafi'is*, the chief (*nakib*) of the *Sherifs*, or descendants of Mahomet, and others. The cadis are chosen from among the students at the Azhar university. (In the same manner, in matters of personal law, Copts and other non-Moslem Egyptians are, in general, subject to the jurisdiction of their own religious chiefs.)

For other than the purposes indicated, the native judicial system, both civil and criminal, was superseded in 1884 by tribunals administering a jurisprudence modelled on that of the French code. It is, in the words of Lord Cromer, "in many respects ill adapted to meet the special needs of the country" (*Egypt*, No. 1, 1904, p. 33). The system was, on the advice of an Anglo-Indian official (Sir John Scott), modified and simplified in 1891, but its essential character remained unaltered. In 1904, however, more important modifications were introduced. Save on points of law, the right of appeal in criminal cases was abolished, and assize courts, whose judgments were final, established. At the same time the penal code was thoroughly revised, so that the Egyptian judges were "for the first time provided with a sound working code" (*Ibid.* p. 49). The native courts have both native and foreign judges. There are courts of summary jurisdiction presided over by one judge, central tribunals (or courts of first instance) with three judges, and a court of appeal at Cairo. A committee of judicial surveillance watches the working of the courts of first instance and the summary courts, and endeavours, by letters and discussions, to maintain purity and sound law. There is a *procureur-général*, who, with other duties, is entrusted with criminal prosecutions. His representatives are attached to each tribunal, and form the *parquet* under whose orders the police act in bringing criminals to justice. In the *markak* (district) tribunals, created in 1904 and presided over by magistrates with jurisdiction in cases of misdemeanour, the prosecution is, however, conducted directly by the police. Special Children's Courts have been established for the trial of juvenile offenders.

The police service, which has been subject to frequent modification, was in 1895 put under the orders of the ministry of the interior, to which a British adviser and British inspectors are attached. The provincial police is under the direction of the local authorities, the *mudirs* or governors of provinces, and the *mamurs* or district officials; to the *omdas*, or village head-men, who are responsible for the good order of the villages, a limited criminal jurisdiction has been entrusted.

Religion.—The great majority of the inhabitants are Mahommedans. In 1907 the Moslems numbered over ten millions, or 91·8% of the entire population. The Christians in the same year numbered 880,000, or 8% of the population. Of these the Coptic Orthodox church had some 667,000 adherents. Among other churches represented were the Greek Orthodox, the Armenian, Syrian and Maronite, the Roman Catholic and various Protestant bodies. The last-named numbered 37,000 (including 24,000 Copts). There were in 1907 over 38,000 Jews in Egypt.

The Mahommedans are Sunnites, professing the creed commonly termed "orthodox," and are principally of the persuasion of the *Shafi'is*, whose celebrated founder, the imam ash-Shafi'i, is buried in the great southern cemetery of Cairo. Many of them are, however, *Hanifis* (to which persuasion the Turks chiefly belong), and in parts of Lower, and almost universally in Upper, Egypt, *Mālikis*. Among the Moslems the *Sheikh-el-Islam*, appointed by the khedive from among the *Ulema* (learned class), exercises the highest religious and, in certain subjects, judicial authority. There is also a grand cadi, nominated by the sultan of Turkey from among the *Ulema* of Stamboul. Valuable property is held by the Moslems in trust for the promotion of religion and for charitable purposes, and is known as the Wakfs administration. The revenue derived is over £250,000 yearly.

The Coptic organization includes in Egypt three metropolitans and twelve bishops, under the headship of the patriarch of Alexandria. The minor orders are arch-priests, priests, archdeacons, deacons, readers and monks (see COPTS: *Coptic Church*).

Education.—Two different systems of education exist, one founded on native lines, the other European in character. Both systems are more or less fully controlled by the ministry of public instruction. The government has primary, secondary and technical schools, training colleges for teachers, and schools of agriculture, engineering, law, medicine and veterinary science. The government system, which dates back to a period before the British occupation, is designed to provide, in the main, a European education. In the primary schools Arabic is the medium of instruction, the use of English for that purpose being confined to lessons in that language itself. The school of law is divided into English and French sections according to the language in which the students study law. Besides the government primary and secondary schools, there are many other schools in the large towns owned by the Moslems, Copts, Hebrews, and by various missionary societies, and in which the education is on the same lines. A movement initiated among the leading Moslems led in 1908 to the establishment as a private enterprise of a national Egyptian university devoted to scientific, literary and philosophical studies. Political and religious subjects are excluded from the curriculum and no discrimination in regard to race or religion is allowed.

Education on native lines is given in *kuttabs* and in the Azhar university in Cairo. *Kuttabs* are schools attached to mosques, found in every village and in every quarter of the larger towns. In these schools the instruction given before the British occupation was very slight. All pupils were taught to recite portions of the Koran, and a proportion of the scholars learnt to read and write Arabic and a little simple arithmetic. Those pupils who succeeded in committing to memory the whole of the Koran were regarded as *fiki* (learned in Mahommedan law), and as such escaped liability to military conscription. The government has improved the education given in the *kuttabs*, and numbers of them have been taken under the direct control of the ministry of public instruction. In these latter schools an excellent elementary secular education is given, in addition to the instruction in the Koran, to which half the school hours are devoted. The number of pupils in 1905 was over 12,000 boys and 2000 girls. Grants-in-aid are given to other schools where a sufficiently good standard of instruction is maintained. No grant is made to any *kuttab* where any language other than Arabic is taught. In all there are over 10,000 kuttabs, attended by some 250,000 scholars. The number of pupils in private schools under government inspection was in 1898, the first year of the grant-in-aid system, 7536; in 1900, 12,315; in 1905, 145,691. The number of girls in attendance rose from 598 in 1898 to 997 in 1900 and 9611 in 1905. The Copts have about 1000 primary schools, in which the teaching of Coptic is compulsory, a few industrial schools, and one college for higher instruction.

Cairo holds a prominent place as a seat of Moslem learning, and its university, the Azhar, is considered the first of the eastern world. Its professors teach "grammatical inflexion and syntax, rhetoric, versification, logic, theology, the exposition of the Koran, the traditions of the Prophet, the complete science of jurisprudence, or rather of religious, moral, civil and criminal law, which is chiefly founded on the Koran and the traditions, together with arithmetic as far as it is useful in matters of law. Lectures are also given on algebra and on the calculations of the Mahommedan calendar, the times of prayer, &c." (E. W. Lane, *Modern Egyptians*). The students come from all parts of the Mahommedan world. They number about 8000, of whom some 2000 are resident. The students pay no fees, and the professors receive no salaries. The latter maintain themselves by private teaching and by copying manuscripts, and the former in the same manner, or by reciting the Koran. To meet the demand for better qualified judges for the Moslem courts a training college for cadis was established in 1907. Besides the subjects taught at the Azhar university, instruction is given in literature, mathematics and physical science. The necessity for a reorganization of the Azhar system itself being also recognized by the high Moslem dignitaries in Egypt, a law was passed in 1907 creating a superior board of control under the presidency of the Sheikh el-Azhar to supervise the proceedings of the university and other similar establishments. This attempt to reform the Azhar met, however, with so much opposition that in 1909 it was, for the time, abandoned.

In 1907, of the sedentary Egyptian population over seven years of age, some 12 % of the Moslems could read and write, female literacy having increased 50 % since 1897; of the foreign population over seven years of age 75 % could read and write. Of the Coptic community about 50 % can read and write.

Literature and the Press.—Since the British occupation there has been a marked renaissance of Arabic learning and literature in Egypt. Societies formed for the encouragement of Arabic literature have brought to light important texts bearing on Mahommedan history, antiquities and religion. Numbers of magazines and reviews are published in Arabic which cater both for the needs of the moment and the advancement of learning. Side by side with these literary organs there exists a vernacular press largely devoted to nationalist propaganda. Prominent among these papers is *Al Lewa* (*The Standard*), founded in 1900. Other papers of a similar character are *Al Omma*, *Al Moayad* and *Al Gerida*. The *Mokattam* represents the views of the more enlightened and conservative section of the native population. In Cairo and Alexandria there are also published several newspapers in English and French.

AUTHORITIES.—(*a*) General descriptions, geography, travel, &c.: *Description de l'Égypte*, 10 folio vols. and atlas of 10 vols. (Paris, 1809–1822), compiled by the scientific commission sent to Egypt by Bonaparte; Clot Bey, *Aperçu général sur l'Égypte*, 2 vols. (Paris, 1840); Boinet Bey, *Dictionnaire géographique de l'Égypte* (Cairo, 1899); Murray's and Baedeker's handbooks and *Guide Joanne*; G. Ebers, *Egypt, Descriptive, Historical and Picturesque*, translated from the German edition of 1879 by Clara Bell, new edition, 2 vols. (London, 1887); Sir Gardiner Wilkinson, *Modern Egypt and Thebes* (2 vols., London, 1843); Lady Duff Gordon, *Letters from Egypt*, complete edition (London, 1902), an invaluable account of social conditions in the period 1862–1869; A. B. Edwards, *A Thousand Miles up the Nile* (2nd edition, London, n.d. [1889]); *Pharaohs, Fellahs and Explorers* (London, 1892); H. W. Mardon, *Geography of Egypt* . . . (London, 1902), an excellent elementary text-book; D. G. Hogarth, *The Nearer East* (London, 1902), contains brief but suggestive chapters on Egypt; S. Lane Poole, *Egypt* (London, 1881); A. B. de Guerville, *New Egypt*, translated from the French (London, 1905); R. T. Kelly, *Egypt Painted and Described* (London, 1902). The best maps are those of the Survey Department, Cairo, on the scale of 1 : 50000 (1·3 in. to the mile).

(*b*) Administration: Sir John Bowring's *Report on Egypt* . . . to Lord Palmerston (London, 1840) shows the system obtaining at that period. For the study of the state of Egypt at the time of the British occupation, 1882, and the development of the country since, the most valuable documents[1] are:

I. *Official.*—The *Reports on the Finances, Administration and Condition of Egypt*, issued yearly since 1892 (the reports 1888–1891 were exclusively financial). Up to 1906 the reports were by Lord Cromer (Sir Evelyn Baring). They clearly picture the progress of the country. The following reports are specially valuable as exhibiting the difficulties which at the outset confronted the British administrators:—*Correspondence respecting the Reorganization of Egypt* (1883); *Reports by Mr Villiers Stuart respecting Reorganization of Egypt* (1883 and 1895); *Despatch from Lord Dufferin forwarding the Decree constituting the New Political Institutions of Egypt* (1883); *Reports on the State of Egypt and the Progress of Administrative Reforms* (1885); *Reports by Sir H. D. Wolff on the Administration of Egypt* (1887). Annual returns are published in Cairo in English or French by the various ministries, and British consular reports on the trade of Egypt and of Alexandria and of the tonnage and shipping of the Suez Canal are also issued yearly.

II. *Non-official.*—Lord Cromer, *Modern Egypt* (2 vols., 1908), an authoritative record; Alfred (Lord) Milner, *England in Egypt*, first published in 1892, the story being brought up to 1904 in the 11th edition; Sir A. Colvin, *The Making of Modern Egypt* (1906); J. Ward, *Pyramids and Progress* (1900); A. S. White, *The Expansion of Egypt* (1899); and F. W. Fuller, *Egypt and the Hinterland* (1901). See also the works cited in *History*, last section.

(*c*) Law: H. Lamba, *De l'évolution de la condition juridique des Européens en Égypte* (Paris, 1896); J. H. Scott, *The Law affecting Foreigners in Egypt* . . . (Edinburgh, 1907); *The Egyptian Codes* (London, 1892).

(*d*) Irrigation, agriculture, geology, &c.: *Despatch from Sir Evelyn Baring enclosing Report on the Condition of the Agricultural Population in Egypt* (1888); *Notes on Egyptian Crops* (Cairo, 1896); Yacub Artin Bey, *La Propriété foncière en Égypte* (Bulak, 1885); *Report on Perennial Irrigation and Flood Protection for Egypt*, 1 vol. and atlas (Cairo, 1894). The reports (*Egypt*, No. 2, 1901, and *Egypt*, No. 2, 1904), by Sir William Garstin on irrigation projects on the Upper Nile are very valuable records—notably the 1904 report. W. Willcocks, *Egyptian Irrigation* (2nd ed., 1899); H. G. Lyons, *The Physiography of the River Nile and its Basin* (Cairo, 1906); Leigh Canney, *The Meteorology of Egypt and its Influence on Disease* (1897). Annual meteorological reports are issued by the Public Works Department, Cairo. The same department issues special irrigation reports. See for geology Carl von Zittel, *Beiträge zur Geologie und Paläontologie der libyschen Wüste* (Cassel, 1883); *Reports of the Geological Survey of Egypt* (Cairo, 1900, et seq.).

(*e*) Natural history, anthropology, &c.: F. Pruner, *Ägyptens Naturgeschichte und Anthropologie* (Erlangen, 1848); R. Hartmann, *Naturgeschichtliche Skizze der Nilländer* (Berlin, 1866); Captain G. E. Shelley, *Birds of Egypt* (London, 1872). (F. R. C.)

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[1] The place of publication is London unless otherwise stated.

Inhabitants.

The population enumerated at the census taken in April 1907 was 11,189,978. In these figures nomad Arabs or Bedouins, estimated to number 97,381, are not included. The total population was thus returned at 11,287,359, or some 16% more than in 1897 when the inhabitants numbered 9,734,405. The figures for 1897 compared with 6,813,919 in 1882, an increase of 43.5% in fifteen years. Thus, during the first twenty-five years of the British occupation of the country the population increased by nearly 4,500,000. In 1800 the French estimated the population at no more than 2,460,000; the census of 1846 gave the figures at 4,476,440. From that year to 1882 the average annual increase was 1.25%. If the desert regions be excluded, the population of Egypt is extremely dense, being about 939 per sq. m. This figure may be compared with that of Belgium, the most densely populated country in Europe, 589 per sq. m., and with that of Bengal, 586 per sq. m. In parts of Menufia, a Delta province, the density rises to 1352 per sq. m., and in the Kena province of Upper Egypt to 1308.

The population is generally divisible into—

1. The fellahin or peasantry and the native townsmen.
2. The Bedouins or nomad Arabs of the desert.
3. The Nuba, Nubians or Berberin, inhabitants of the Nile valley between Assuan and Dongola.
4. Foreigners.

The first of these divisions includes both the Moslem and Coptic inhabitants. The Bedouins, or the Arabs of the desert, are of two different classes: first, Arabic-speaking tribes who range the deserts as far south as 26° N.; secondly, the tribes inhabiting the desert from Kosseir to Suakin, namely the Hadendoa, Bisharin and the Ababda tribes. This group speak a language of their own, and are probably descendants of the Blemmyes, who occupied these parts in ancient times (see ARABS; BEDOUINS; HADENDOA; BISHĀRĪN; &c.). The Nubas are of mixed negro and Arab blood. They are mainly agriculturists, though some are keen traders (see NUBIA).

Foreigners number over 150,000 and form 1½% of the total population. They are chiefly Greeks—of whom the majority live in Alexandria—Italians, British and French. Syrians and Levantines are numerous, and there is a colony of Persians. The Turkish element is not numerically strong—a few thousands only—but holds a high social position.

Of the total population, about 20% is urban. In addition to the 97,000 pure nomads, there are half a million Bedouins described as "semi-sedentaries," *i.e.* tent-dwelling Arabs, usually encamped in those parts of the desert adjoining the cultivated land. The rural classes are mainly engaged in agriculture, which occupies over 62% of the adults. The professional and trading classes form about 10% of the whole population, but 50% of the foreigners are engaged in trade. Of the total population the males exceed the females by some 46,000.

Physical characteristics of the Egyptians.

The Coptic inhabitants are described in the article COPTS, and the rural population under FELLAH. It remains here to describe characteristics and customs common to the Moslem Egyptians and particularly to those of the cities. In some respects the manner of life of the natives has been modified by contact with Europeans, and what follows depicts in general the habits of the people where little affected by western culture. With regard to physical characteristics the Egyptians are of full average height (the men are mostly 5 ft. 8 in. or 5 ft. 9 in.), and both sexes are remarkably well proportioned and of strong physique. The Cairenes and the inhabitants of Lower Egypt generally have a clear complexion and soft skin of a light yellowish colour; those of Middle Egypt have a tawny skin, and the dwellers in Upper Egypt a deep bronze or brown complexion. The face of the men is of a fine oval, forehead prominent but seldom high, straight nose, eyes deep set, black and brilliant, mouth well formed, but with rather full lips, regular teeth beautifully made, and beard usually black and curly but scanty. Moustaches are worn, while the head is shaved save for a small tuft (called *shusheh*) upon the crown. As to the women, "from the age of about fourteen to that of eighteen or twenty, they are generally models of beauty in body and limbs; and in countenance most of them are pleasing, and many exceedingly lovely; but soon after they have attained their perfect growth, they rapidly decline." There are few Egyptian women over forty who retain either good looks or good figures. "The forms of womanhood begin to develop themselves about the ninth and tenth year: at the age of fifteen or sixteen they generally attain their highest degree of perfection. With regard to their complexions, the same remarks apply to them as to the men, with only this difference, that their faces, being generally veiled when they go abroad, are not quite so much tanned as those of the men. They are characterized, like the men, by a fine oval countenance, though in some instances it is rather broad. The eyes, with very few exceptions, are black, large and of a long almond-form, with long and beautiful lashes, and an exquisitely soft, bewitching expression—eyes more beautiful can hardly be conceived: their charming effect is much heightened by the concealment of the other features (however pleasing the latter may be), and is rendered still more striking by a practice universal among the females of the higher and middle classes, and very common among those of the lower orders, which is that of blackening the edge of the eyelids both above and below the eye, with a black powder called 'kohl'" (Lane, *Modern Egyptians*). Both sexes, but especially the women, tattoo several parts of the person, and the women stain their hands and feet with the red dye of the henna.

Dress and social life.

The dress of the men of the upper and middle classes who have not adopted European clothing—a practice increasingly common—consists of cotton drawers, and a cotton or silk shirt with very wide sleeves. Above these are generally worn a waistcoat without sleeves, and a long vest of silk, called kaftan, which has hanging sleeves, and reaches nearly to the ankles. The kaftan is confined by the girdle, which is a silk scarf, or cashmere or other woollen shawl. Over all is worn a long cloth robe, the gibbeh (or jibbeh) somewhat resembling the kaftan in shape, but having shorter sleeves, and being open in front. The dress of the lower orders is the shirt and drawers, and waistcoat, with an outer shirt of blue cotton or brown woollen stuff; some wear a kaftan. The head-dress is the red cloth fez or tarbush round which a turban is usually worn. Men who have otherwise adopted European costume retain the tarbush. Many professions and religions, &c., are distinguished by the shape and colour of the turban, and various classes, and particularly servants, are marked by the form and colour of their shoes; but the poor go usually barefoot. Many ladies of the upper classes now dress in European style, with certain modifications, such as the head-veil. Those who retain native costume wear a very full pair of silk trousers, bright coloured stockings (usually pink), and a close-fitting vest with hanging sleeves and skirts, open down the front and at the sides, and long enough to turn up and fasten into the girdle, which is generally a cashmere shawl; a cloth jacket, richly embroidered with gold, and having short sleeves, is commonly worn over the vest. The hair in front is combed down over the forehead and cut across in a straight line; behind it is divided into very many small plaits, which hang down the back, and are lengthened by silken cords, and often adorned with gold coins and ornaments. A small tarbush is worn on the back of the head, sometimes having a plate of gold fixed on the crown, and a handkerchief is tastefully bound round the temples. The women of the lower orders have trousers of printed or dyed cotton, and a close waistcoat. All wear the long and elegant head-veil. This is a simple "breadth" of muslin, which passes over the head and hangs down behind, one side, being drawn forward over the face in the presence of a man. A lady's veil is of white muslin, embroidered at the ends in gold and colours; that of a person of the lower class is simply dyed blue. In going abroad the ladies wear above their indoor dress a loose robe of coloured silk without sleeves, and nearly open at the sides, and above it a large enveloping piece of black silk, which is brought over the head, and gathered round the person by the arms and hands on each side. A face-veil entirely conceals the features, except the eyes; it is a long and narrow piece of thick white muslin, reaching to a little below the knees. The women of the lower orders have the same out-door dress of different materials and colour. Ladies use slippers of yellow morocco, and abroad, inner boots of the same material, above which they wear, in either case, thick shoes, having only toes. The poor wear red shoes, very like those of the men. The women, especially in Upper Egypt, not infrequently wear nose-rings.

Children, though often neglected, are not unkindly treated, and reverence for their parents and the aged is early inculcated. They are also well grounded in the leading doctrines of Islam. Boys are circumcised at the age of five or six years, when the boy is paraded, generally with a bridal procession, on a gaily caparisoned horse and dressed in woman's clothes. Most parents send their boys to school where a knowledge of reading and writing Arabic—the common tongue of the Egyptians—is obtainable, and from the closing years of the 19th century a great desire for the education of girls has arisen (see § *Education*).

It is deemed disreputable for a young man not to marry when he has attained a sufficient age; there are, therefore, few unmarried men. Girls, in like manner, marry very young, some at ten years of age, and few remain single beyond the age of sixteen; they are generally very prolific. The bridegroom never sees his future wife before the wedding night, a custom rendered more tolerable than it otherwise might be by the facility of divorce. A dowry is always given, and a simple marriage ceremony performed by a *fiki* (a schoolmaster, or one who recites the Koran, properly one learned in *fiqh*, Mahommedan law) in the presence of two witnesses. The bridal of a virgin is attended with great festivity and rejoicing, a grandee's wedding sometimes continuing eleven days and nights. On the last day, which should be that terminating with the eve of Friday, or of Monday, the bride is taken in procession to the bridegroom's house, accompanied by her female friends, and a band of musicians, jugglers, wrestlers, &c. As before stated, a boy about to be circumcised joins in such a procession, or, frequently, a succession of such boys. Though allowed by his religion four wives, most Egyptians are monogamists. A man may, however, possess any number of concubines, who, though objects of jealousy to the legal wife, are tolerated by her in consideration of her superior position and power over them, a power which she often uses with great tyranny; but certain privileges are possessed by concubines, especially if they have borne sons to their master. A divorce is rendered obligatory by the simple words "Thou art divorced." Repudiation may take place twice without being final, but if the husband repeats thrice "Thou art divorced" the separation is absolute. In that case the dowry must be returned to the wife.

Elaborate ceremonies are observed at funerals. Immediately on death the corpse is turned towards Mecca, and the women of the household, assisted by hired mourners, commence their peculiar wailing, while fikis recite portions of the Koran. The funeral takes place on the day of the death, if that happen in the morning; otherwise on the next day. The corpse, having been washed and shrouded, is placed in an open bier, covered with a cashmere shawl, in the case of a man; or in a closed bier, having a post in front, on which are placed feminine ornaments, in that of a woman or child. The funeral procession is headed by a number of poor, and generally blind, men, chanting the profession of the faith, followed by male friends of the deceased, and a party of schoolboys, also chanting, generally from a poem descriptive of the state of the soul after death. Then follows the bier, borne on the shoulders of friends, who are relieved by the passers-by, such an act being deemed highly meritorious. Behind come the women relatives and the hired wailers. On the way to the cemetery the corpse is generally carried to some revered mosque. Here the funeral service is performed by the imam, and the procession then proceeds to the tomb. In the burials of the rich, water and bread are distributed to the poor at the grave; and sometimes a buffalo or several buffaloes are slaughtered there, and the flesh given away. The tomb is a vault, surmounted by an oblong stone monument, with a stele at the head and feet; and a cupola, supported by four walls, covers the whole in the case of sheikhs' tombs and those of the wealthy. During the night following the interment, called the Night of Desolation, or that of Solitude, the soul being believed to remain with the body that one night, fikis are engaged at the house of the deceased to recite various portions of the Koran, and, commonly, to repeat the first clause of the profession of the faith, "There is no God but God," three thousand times. The women alone put on mourning attire, by dyeing their veils, shirts, &c., dark blue, with indigo; and they stain their hands, and smear the walls, with the same colour. Everything in the house is also turned upside down. The latter customs are not, however, observed on the death of an old man. At certain periods after the burial, a khatmeh, or recitation of the whole of the Koran, is performed, and the tomb is visited by the women relations and friends of the deceased. The women of the peasants of Upper Egypt perform strange dances, &c., at funerals, which are regarded partly as relics of ancient Egyptian customs.

The harem system of appointing separate apartments to the women, and secluding them from the gaze of men, is observed in Egypt as in other Moslem countries, but less strictly. The women of an Egyptian household in which old customs are maintained never sit in the presence of the master, but attend him at his meals, and are treated in every respect as inferiors. The mother, however, forms a remarkable exception to this rule; in rare instances, also, a wife becomes a companion to her husband. On the other hand, if a pair of women's shoes are placed outside the door of the harem apartments, they are understood to signify that female visitors are within, and a man is sometimes thus excluded from the upper portion of his own house for many days. Ladies of the upper or middle classes lead a life of extreme inactivity, spending their time at the bath, which is the general place of gossip, or in receiving visits, embroidering, and the like, and in absolute *dolce far niente*. Both sexes are given to licentiousness.

The principal meals are breakfast, about an hour after sunrise; dinner, or the mid-day meal, at noon; and supper, which is the chief meal of the day, a little after sunset. Pastry, sweetmeats and fruit are highly esteemed. Coffee is taken at all hours, and is, with a pipe, presented at least once to each guest. Tobacco is the great luxury of the men of all classes in Egypt, who begin and end the day with it, and generally smoke all day with little intermission. Many women, also, especially among the rich, adopt the habit. The smoking of hashish, though illegal, is indulged in by considerable numbers of people. Men who can afford to keep a horse, mule or ass are very seldom seen to walk. Ladies ride asses and sit astride. The poorer classes cannot fully observe the harem system, but the women are in general carefully veiled. Some of them keep small shops, and all fetch water, make fuel, and cook for their households. Domestic slavery lingers but is moribund. The majority of the slaves are negresses employed in household duties.

In social intercourse the Egyptians observe many forms of salutation and much etiquette; they are very affable, and readily enter into conversation with strangers. Their courtesy and dignity of manner are very striking, and are combined with ease and a fluency of discourse. They have a remarkable quickness of apprehension, a ready wit, a retentive memory, combined, however, with religious pride and hypocrisy, and a disregard for the truth. Their common discourse is full of asseverations and expressions respecting sacred things. They entertain reverence for their Prophet; and the Koran is treated with the utmost respect—never, for example, being placed in a low situation—and this is the case with everything they esteem holy. They are fatalists, and bear calamities with surprising resignation. Their filial piety and respect for the aged have been mentioned, and benevolence and charity are conspicuous in their character. Humanity to animals is another virtue, and cruelty is openly discountenanced in the streets. Their affability, cheerfulness and hospitality are remarkable, as well as frugality and temperance in food and drink, and honesty in the payment of debt. Their cupidity is mitigated by generosity; their natural indolence by the necessity, especially among the peasantry, to work hard to gain a livelihood. Egyptians, however, are as a rule suspicious of all not of their own creed and country. Murders and other grave crimes are rare, but petty larcenies are very common.

The amusements of the people are generally not of a violent kind, being in keeping with their sedentary habits and the heat of the climate. The bath is a favourite resort of both sexes and all classes. They are acquainted with chess, draughts, backgammon, and other games, among which is one peculiar to themselves, called Mankalah, and played with cowries. Notwithstanding its condemnation by Mahomet, music is the most favourite recreation of the people; the songs of the boatmen, the religious chants, and the cries in the streets are all musical. There are male and female musical performers; the former are both instrumental and vocal, the latter (called *'Almeh*, pl. *'Awālim*) generally vocal. The 'Awālim are, as their name ("learned") implies, generally accomplished women, and should not be confounded with the Ghawāzi, or dancing-girls. There are many kinds of musical instruments. The music, vocal and instrumental, is generally of little compass, and in the minor key; it is therefore plaintive, and strikes a European ear as somewhat monotonous, though often possessing a simple beauty, and the charm of antiquity, for there is little doubt that the favourite airs have been handed down from remote ages. The Ghawāzi (sing. Ghāzīa) form a separate class, very similar to the gipsies. They intermarry among themselves only, and their women are professional dancers. Their performances are often objectionable and are so regarded by many Egyptians. They dance in public, at fairs and religious festivals, and at private festivities, but, it is said, not in respectable houses. Mehemet Ali banished them to Esna, in Upper Egypt; and the few that remained in Cairo called themselves 'Awālim, to avoid punishment. Many of the dancing-girls of Cairo to-day are neither 'Awālim nor Ghawāzi, but women of the very lowest class whose performances are both ungraceful and indecent. A most objectionable class of male dancers also exists, who imitate the dances of the Ghawāzi, and dress in a kind of nondescript female attire. Not the least curious of the public performances are those of the serpent-charmers, who are generally Rifā'iā (Saadīa) dervishes. Their power over serpents has been doubted, yet their performances remain unexplained; they, however, always extract the fangs of venomous serpents. Jugglers, rope-dancers and farce-players must also be mentioned. In the principal coffee-shops of Cairo are to be found reciters of romances, surrounded by interested audiences.

Public festivals.

The periodical public festivals are exceedingly interesting, but many of the remarkable observances connected with them are passing away. The first ten days of the Mahommedan year are held to be blessed, and especially the tenth; and many curious practices are observed on these days, particularly by the women. The tenth day, being the anniversary of the martyrdom of Hosain, the son of Ali and grandson of the Prophet, the mosque of the Hasanēn at Cairo is thronged to excess, mostly by women. In the evening a procession goes to the mosque, the principal figure being a white horse with white trappings, upon which is seated a small boy, the horse and the lad, who represents Hosain, being smeared with blood. From the mosque the procession goes to a private house, where a mullah recites the story of the martyrdom. Following the order of the lunar year, the next festival is that of the Return of the Pilgrims, which is the occasion of great rejoicing, many having friends or relatives in the caravan. The Mahmal, a kind of covered litter, first originated by Queen Sheger-ed-Dur, is brought into the city in procession, though not with as much pomp as when it leaves with the pilgrims. These and other processions have lost much of their effect since the extinction of the Mamelukes, and the gradual disuse of gorgeous dress for the retainers of the officers of state. A regiment of regular infantry makes but a sorry substitute for the splendid cavalcade of former times. The Birth of the Prophet (Molid en-Nebi), which is celebrated in the beginning of the third month, is the greatest festival of the whole year. For nine days and nights Cairo has more the aspect of a fair than of a city keeping a religious festival. The chief ceremonies take place in some large open spot round which are erected the tents of the khedive, of great state officials, and of the dervishes. Next in time, and also in importance, is the Molid El-Hasanēn, commemorative of the birth of Hosain, and lasting fifteen days and nights; and at the same time is kept the Molid of al-Ṣāliḥ Ayyūb, the last sovereign but two of the Ayyubite dynasty. In the seventh month occur the Molid of the sayyida Zenab, and the commemoration of the Miarāg, or the Prophet's miraculous journey to heaven. Early in the eighth month (Sha'bān), the Molid of the imam Shāfi'i is observed; and the night of the middle of that month has its peculiar customs, being held by the Moslems to be that on which the fate of all living is decided for the ensuing year. Then follows Ramadān, the month of abstinence, a severe trial to the faithful; and the Lesser Festival (Al-'id aṣ-ṣaghīr), which commences Shawwāl, is hailed by them with delight. A few days after, the Kiswa, or new covering for the Ka'ba at Mecca, is taken in procession from the citadel, where it is always manufactured, to the mosque of the Hasanēn to be completed; and, later, the caravan of pilgrims departs, when the grand procession of the Mahmal takes place. On the tenth day of the last month of the year the Great Festival (Al-'id al-kabīr), or that of the Sacrifice (commemorating the willingness of Ibrahim to slay his son Ismail—according to the Arab legend), closes the calendar. The Lesser and Great Festivals are those known in Turkish as the Bairam (*q.v.*).

The rise of the Nile is naturally the occasion of annual customs, some of which are doubtless relics of antiquity; these are observed according to the Coptic calendar. The commencement of the rise is commemorated on the night of the 11th of Baūna, the 17th of June, called that of the Drop (Lelet-en-Nukta), because a miraculous drop is then supposed to fall and cause the swelling of the river. The real rise begins at Cairo about the summer solstice, or a few days later, and early in July a crier in each district of the city begins to go his daily rounds, announcing, in a quaint chant, the increase of water in the nilometer of the island of Rōda. When the river has risen 20 or 21 ft., he proclaims the Wefā en-Nil, "Completion" or "Abundance of the Nile." On the following day the dam which closed the canal of Cairo was cut with much ceremony. The canal having been filled up in 1897 the ceremony has been much modified, but a brief description of what used to take place may be given. A pillar of earth before the dam is called the "Bride of the Nile," and Arab historians relate that this was substituted, at the Moslem conquest, for a virgin whom it was the custom annually to sacrifice, to ensure a plentiful inundation. A large boat, gaily decked out, representing that in which the victim used to be conveyed, was anchored near, and a gun on board fired every quarter of an hour during the night. Rockets and other fireworks were also let off, but the best, strangely, after daybreak. The governor of Cairo attended the ceremony, with the cadi and others, and gave the signal for the cutting of the dam. As soon as sufficient water had entered, boats ascended the canal to the city. The crier continues his daily rounds, with his former chant, excepting on the Coptic New Year's Day, when the cry of the Wefā is repeated, until the Salib, or Discovery of the Cross, the 26th or 27th of September, at which period, the river having attained its greatest height, he concludes his annual employment with another chant, and presents to each house some limes and other fruit, and dry lumps of Nile mud.

The period of the hot winds, called the khamsin, that is, "the fifties," is calculated from the day after the Coptic Easter, and terminates on the day of Pentecost, and the Moslems observe the Wednesday preceding this period, called "Job's Wednesday," as well as its first day, when many go into the country from Cairo, "to smell the air." This day is hence called Shem en-Nesim, or "the smelling of the zephyr." The Ulema observe the same custom on the first three days of the spring quarter.

Tombs of saints abound, one or more being found in every town and village; and no traveller up the Nile can fail to remark how every prominent hill has the sepulchre of its patron saint. The great saints of Egypt are the imam Ash-Shāfi'i, founder of the persuasion called after him, the sayyid Aḥmad al-Baiḍāwī, and the sayyid Ibrāhīm Ed-Desūkī, both of whom were founders of orders of dervishes. Al-Baiḍāwī, who lived in the 13th century A.D., is buried at the town of Tanta, in the Delta, and his tomb attracts many thousands of visitors at each of the three festivals held yearly in his honour; Ed-Desūkī is also much revered, and his festivals draw together, in like manner, great crowds to his birthplace, the town of Desūk. But, besides the graves of her native saints, Egypt boasts of those of several members of the Prophet's family, the tomb of the sayyida Zeyneb, daughter of 'Ali, that of the sayyida Sekeina, daughter of Hosain, and that of the sayyida Nefisa, great-granddaughter of Hasan, all of which are held in high veneration. The mosque of the Hasanēn (or that of the "two Hasans") is the most reverenced shrine in the country, and is believed to contain the head of Hosain. Many orders of Dervishes live in Egypt, the following being the most celebrated:—(1) the Rifā'iā, and their sects the 'Ilwānīa and Saadīa; (2) the Qādirīa (Kāhirīa), or howling dervishes; (3) the Ahmedīa, or followers of the sayyid Aḥmad al-Baiḍāwī, and their sects the Beyūmīa (known by their long hair), Shinnawīa, Sharawīa and many others; and (4) the Barāmīa, or followers of the sayyid Ibrāhīm Ed-Desūkī. These are all presided over by a direct descendant of the caliph Abu Bekr, called the Sheikh El-Bekri. The Saadīa are famous for charming and eating live serpents, &c., and the 'Ilwānīa for eating fire, glass, &c. The Egyptians firmly believe in the efficacy of charms, a belief associated with that in an omnipresent and over-ruling providence. Thus the doors of houses are inscribed with sentences from the Koran, or the like, to preserve from the evil eye, or avert the dangers of an unlucky threshold; similar inscriptions may be observed over most shops, while almost every one carries some charm about his person. The so-called sciences of magic, astrology and alchemy still flourish.

AUTHORITIES.—The standard authority for the Moslem Egyptians is E. W. Lane's *Manners and Customs of the Modern Egyptians*, first published in 1836. The best edition is that of 1860, edited, with additions, by E. S. Poole. See also B. Saint-John, *Village Life in Egypt* (2 vols., 1852); S. Lane Poole, *Social Life in Egypt* (1884); P. Arminjon, *L'Enseignement, la doctrine, et la vie dans les universités musulmanes d'Égypte* (Paris, 1907). For the language see J. S. Willmore, *The Spoken Arabic of Egypt* (2nd ed., London, 1905); Spitta Bey, *Grammatik des arabischen Vulgardialektes von Ägypten*, *Contes arabes modernes* (Leiden, 1883). For statistical information consult the reports on the censuses of 1897 and 1907, published by the Ministry of the Interior, Cairo, in 1898 and 1909.

(E. S. P.; S. L.-P.; F. R. C.)

Finance.

The important part which the financial arrangements have played in the political and social history of Egypt since the accession of Ismail Pasha in 1863 is shown in the section *History* of this article. Here it is proposed to trace the steps by which Egypt, after having been brought to a state of bankruptcy, passed through a period of great stress, and finally attained prosperity and a large measure of financial autonomy.

In 1862 the foreign debt of Egypt stood at £3,292,000. With the accession of Ismail (*q.v.*) there followed a period of wild extravagance and reckless borrowing accompanied by the extortion of every piastre possible from the fellahin. The real state of affairs was disclosed in the report of Mr Stephen Cave, a well-known banker, who was sent by the British government in December 1875 to inquire into the situation. The Cave report showed that Egypt suffered from "the ignorance, dishonesty, waste and extravagance of the East" and from "the vast expense caused by hasty and inconsiderate endeavours to adopt the civilization of the West." The debtor and creditor account of the state from 1864 to 1875 showed receipts amounting to £148,215,000. Of this sum over £94,000,000 had been obtained from revenue and nearly £4,000,000 by the sale of the khedive's shares in the Suez Canal to Great Britain. The rest was credited to: loans £31,713,000, floating debt £18,243,000. The cash which reached the Egyptian treasury from the loans and floating debt was far less than the nominal amount of such loans, none of which cost the Egyptian government less than 12% per annum. When the expenditure during the same period was examined the extraordinary fact was disclosed that the sum raised by revenue was only three millions less than that spent on administration, tribute and public works, including a sum of £10,500,000, described as "expenses of questionable utility or policy." The whole proceeds of the loans and floating debt had been absorbed in payment of interest and sinking funds, with the exception of £16,000,000 debited to the Suez Canal. In other words, Egypt was burdened with a debt of £91,000,000—funded or floating—for which she had no return, for even from the Suez Canal she derived no revenue, owing to the sale of the khedive's shares.

Soon after Mr Cave's report appeared (March 1876), default took place on several of the loans. Nearly the whole of the debt, it should be stated, was held in England or France, and at the instance of French financiers the stoppage of payment was followed by a scheme to unify the debt. This scheme included the distribution of a bonus of 25% to holders of treasury bonds. These bonds had then reached a sum exceeding £20,000,000 and were held chiefly by French firms. The unification scheme was elaborated in a khedivial decree of the 7th of May 1876, but was rendered abortive by the opposition of the British bondholders. Its place was taken by another scheme drawn up by Mr (afterwards Lord) Goschen and M. Joubert, who represented the British and French bondholders respectively. The details of this settlement, promulgated by decree of the 17th of November 1876, need not be given, as it was superseded in 1880. One of the securities devised for the benefit of the bondholders in the abortive scheme of May 1876 was retained in the

Goschen-Joubert settlement, and being continued in later settlements grew to be one of the most important institutions in Egypt. This security was the establishment of a Treasury of the Public Debt, known by its French title of *Caisse de la Dette*, and commonly spoken of simply as "the Caisse." The duty of this body was to act as receivers of the revenues assigned to the service of the debt. To render their powers effective they were given the right to sue the Egyptian government in the Mixed Tribunals for any breach of engagement to the bondholders.

The Law of Liquidation.

The Goschen-Joubert settlement was accompanied by guarantees against maladministration by the appointment of an Englishman and a Frenchman to superintend the revenue and expenditure—the "Dual Control"; while a commission was appointed in 1878 to investigate the condition of the country. The settlement of 1880 was effected on the basis of the proposals made by this commission, and was embodied in the Law of Liquidation of July 1880—after the deposition of Ismail. For the purposes of the new settlement the loans raised by Ismail on his private estates, those known as the Daïra (*i.e.* "administrations") and Domains loans, were brought into account. By the Law of Liquidation the floating debt was paid off, the whole debt being consolidated into four large loans, upon which the rate of interest was reduced to a figure which it was considered Egypt was able to bear. The Egyptian debt under this composition was:

Privileged debt	£22,609,000
Unified debt	58,018,000
Daïra Sanieh loan	9,513,000
Domains loan	8,500,000
	£98,640,000

The rate of interest was, on the Privileged debt and Domains loan, 5%; on the Unified debt and Daïra loan, 4%. Under this settlement the total annual charges on the country amounted to £4,500,000, about half the then revenue of Egypt. These charges included the services of the Privileged and Unified debts, the tribute to Turkey and the interest on the Suez Canal shares held by Great Britain, but excluded the interest on the Daïra and Domains loans, expected to be defrayed by the revenues from the estates on which those loans were secured. The general revenue of Egypt was divided between the bondholders and the government, any surplus on the bondholders' share being devoted to the redemption of the capital.

The 1880 settlement proved little more lasting than that of 1876. After a brief period of prosperity, the Arabi rising, the riots at Alexandria, and the events generally which led to the British occupation of Egypt in 1882, followed by the losses incurred in the Sudan in the effort to prevent it falling into the hands of the Mahdi, brought Egypt once more to the verge of financial disaster. The situation was an anomalous one. While the revenue assigned to the service of the debt was more than sufficient for the payment of interest and the sinking fund was in full operation, the government found that their share of the revenue was altogether inadequate for the expenses of administration, and they were compelled to borrow on short loans at high rate of interest. Moreover, to make good the losses incurred at Alexandria, and to get money to pay the charges arising out of the Sudan War and the Arabi rebellion, a new loan was essential. On the initiative of Great Britain a conference between the representatives of the great powers and Turkey was held in London, and resulted in the signing of a convention in March 1885. The terms agreed upon in this instrument, known as the London Convention, were embodied in a khedivial decree, which, with some modification in detail, remained for twenty years the organic law under which the finances of Egypt were administered.

Provisions of the London Convention.

The principle of dividing the revenue of the country between the Caisse, as representing the bondholders, and the government was maintained by the London Convention. The revenue assigned to the service of the debt, namely, that derived from the railway, telegraphs, port of Alexandria, customs (including tobacco) and from four of the provinces, remained as before. It was recognized, however, that the non-assigned revenue was insufficient to meet the necessary expenses of government, and a scale of administrative expenditure was drawn up. This was originally fixed at £E.5,237,000,[1] but subsequently other items were allowed, and in 1904, the last year in which the system described existed, it was £E.6,300,600. The Caisse was authorized, after payment of the coupons on the debt, to make good out of their balance in hand the difference between the authorized expenditure and the non-assigned revenue. If a surplus remained to the Caisse after making good such deficit the surplus was to be divided equally between the Caisse and the government; the government to be free to spend its share as it pleased, while the Caisse had to devote its share to the reduction of the debt. This limitation of administrative expenditure was the cardinal feature and the leading defect of the convention. Those responsible for this arrangement—the most favourable for Egypt that Great Britain could secure—failed to recognize the complete change likely to result from the British occupation of Egypt, and probably regarded that occupation as temporary. The system devised might have been justifiable as a check on a retrograde government, but was wholly inapplicable to a reforming government and a serious obstacle to the attainment of national prosperity. In practice administrative expenditure always exceeded the amount fixed by the convention. Any excess could, however, only be met out of the half-share of the eventual surplus reached in the manner described. Consequently, in order to meet new expenditure necessitated by the growing wants of a country in process of development, just double the amount of revenue had to be raised.

To return to the provisions of the London Convention. The convention left the permanent rate of interest on the debt, as fixed by the Law of Liquidation, unchanged, but to afford temporary relief to the Egyptian exchequer a reduction of 5% on the interest of the debt was granted for two years, on condition that if at the end of that period payment, including the arrears of the two years, was not resumed in full, another international commission was to be appointed to examine into the whole financial situation. Lastly, the convention empowered Egypt to raise a loan of nine millions, guaranteed by all the powers, at a rate of interest of 3%. For the service of this loan—known as the Guaranteed loan—an annuity of £315,000 was provided in the Egyptian budget for interest and sinking fund. The £9,000,000 was sufficient to pay the Alexandria indemnities, to wipe out the deficits of the preceding years, to give the Egyptian treasury a working balance of £E.500,000 and thereby avoid the creation of a fresh floating debt, and to provide a million for new irrigation works. To the wise foresight which, at a moment when the country was sinking beneath a weight of debt, did not hesitate to add this million for expenditure on productive works, the present prosperity of Egypt is largely due.

The provisions of the London Convention did not exhaust the restrictions placed upon the Egyptian government in respect of financial autonomy. These restrictions were of two categories, (1) those independent of the London Convention, (2) those dependent upon that instrument. In the first category came (*a*) the prohibition to raise a loan without the consent of the Porte. The right to raise loans had been granted to the khedive Ismail in 1873, but was taken away in 1879 by the firman appointing Tewfik khedive. (*b*) Next came the inability to levy taxes on foreigners without the consent of their respective governments. This last obligation was, in virtue of the Capitulations, applicable to Egypt as part of the Ottoman empire. The only exception, resulting from the Ottoman law under which foreigners are allowed to acquire and hold real property, is the land tax. (All taxes formerly paid by natives and not by foreigners have been abolished in Egypt, but the immunity described constitutes a most serious obstacle to the redistribution of the burden of taxation in a more equitable manner.)

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[1] The figures of the debt are always given in £ sterling. The budget figures are in £E. (pounds Egyptian), equal to £1, 0s. 6d.

From the purely Egyptian point of view the most powerful restriction in this first category remains to be named. In 1883 the supervision exercised over the finances by French and British controllers was replaced by that of a British official called the financial adviser. The British government has declared that "no financial decision shall be taken without his consent," a declaration never questioned by the Egyptian government. This restriction, therefore, is at the same time the chief safeguard for the purity of Egypt's finances.

In the second category of restrictions, namely, those dependent on the London Convention, were the various commissions or boards known as Mixed Administrations and having relations of a quasi-independent character with the ministry of finance. Of these boards by far the most important was the Caisse. As first constituted it consisted of a French, an Austrian, and an Italian member; a British member was added in 1877 and a German and a Russian member in 1885. The revenue assigned to the debt charges was paid direct to the Caisse without passing through the ministry of finance. The assent of the Caisse (as well as that of the sultan) was necessary before any new loan could be issued, and in the course of a few years from its creation this body acquired very extensive powers. Besides the Caisse there was the Railway Board, which administered the railways, telegraphs and port of Alexandria for the benefit of the bondholders, and the Daïra and Domains commissions, which administered the estates mortgaged to the holders of those loans. Each of the three boards last named consisted of an Englishman, a Frenchman and an Egyptian.

The race against bankruptcy.

During the two years that followed the signing of the London Convention, the financial policy of the Egyptian government was directed to placing the country in a position to resume full payment of the interest on the debt in 1887, and thereby to avoid the appointment of an international commission. By the exercise of the most rigid economy in all branches this end was attained, though budgetary equilibrium was only secured by a variety of financial expedients, justified by the vital importance of saving Egypt from further international interference. By such means this additional complication was averted, but the struggle to put Egypt in a genuinely solvent position was by no means over. It was not until his report on the financial results of 1888 that Sir Evelyn Baring (afterwards Lord Cromer) was able to inform the British government that the situation was such that "it would take a series of untoward events seriously to endanger the stability of Egyptian finance and the solvency of the Egyptian government." From this moment the corner was turned, and the era of financial prosperity commenced. The results of the labours of the preceding six years began to manifest themselves with a rapidity which surprised the most sanguine observers. The principal feature of the successive Egyptian budgets of 1890–1894 was the fiscal relief afforded to the population. From 1894 onward more attention was paid than had hitherto been possible to the legitimate demands of the spending departments and to the prosecution of public works. Of these the most notable was the construction (1898–1902) of the Assuan dam, which by bringing more land under cultivation permanently increased the resources of the country and widened the area of taxation.

Reserve funds.

With the accumulating proofs of the financial stability of the country various changes were made in connexion with the debt charges. With the consent of the powers a General Reserve Fund was created by decree of the 12th of July 1888, into which was paid the Caisse's half-share in the eventual surplus of revenue. This fund, primarily intended as a security for the bondholders, might be drawn upon for extraordinary expenditure with the consent of the commissioners of the Caisse. Large sums were so advanced for the purposes of drainage and irrigation and other public works, and in relief of taxation. The defect of this arrangement consisted in the necessity of obtaining the consent of the commissioners—a consent sometimes withheld on purely political grounds. At the same time it is believed that but for the faculty given by the decree of 1888 to spend the General Reserve Fund on public works, the financial system elaborated by the London Convention would have broken down altogether. Between 1888 and 1904 about £10,000,000 was devoted from this fund to public works.

In June 1890 the assent of the powers was obtained to the conversion of the Preference (Privileged), Domains and Daïra loans on the following conditions, imposed at the initiative of the French government:—

1. The employment of the economies resulting from the conversion was to be the subject of future agreement with the powers.
2. The Daïra loan was to be reimbursed at 85%, instead of 80%, as provided by the Law of Liquidation.
3. The sales of Domains and Daïra lands were to be restricted to £E.300,000 a year each, thus prolonging the period of liquidation of those estates.

The interest on the Preference stock was reduced from 5 to 3½%, and on the Domains from 5 to 4¼%. As regards the Daïra loan, there was no apparent reduction in the rate of interest, which remained at 4%, but the bondholders received £85 of the new stock for every £100 of the old. The capital of the debt was increased by £1,945,000 by these conversions, while the annual economy to the Egyptian government amounted at the time of the conversion to £E.348,000. Further, an engagement was entered into that there should be no reimbursement of the loans till 1905 for the Preference and Daïra, and 1908 for the Domains. By an arrangement concluded in June 1898, between the Egyptian government and a syndicate, the unsold balance of the Daïra estates was taken over by the syndicate in October 1905, for the amount of the debt remaining, when the Daïra loan ceased to exist. The fund formed by the accumulation of the economies resulting from the conversion of the Privileged, Daïra and Domains loan was known as the Conversion Economies Fund. The fund could not be used for any purpose without the consent of the powers, and the money paid into it was invested by the Caisse in Egyptian stock. The fund therefore acted as a very expensive sinking fund, the market price of the stock purchased being above par. Up to 1904 the consent of the powers to the employment of this fund for any purpose of public utility was withheld. On the 31st of December of that year the fund amounted to £E.6,031,000. It may be added that besides the General Reserve Fund and the Conversion Economies Fund, there existed another fund called the Special Reserve Fund. This was constituted in 1886 and was chiefly made up of the net savings of the Egyptian government on its share of the annual surpluses from revenue. Of the three funds this last-named was the only one at the absolute disposal of the government. The whole of the extraordinary expenditure of the Sudan campaigns of 1896–1898, with the exception of £800,000 granted by the British government, was paid out of this fund—a sum amounting in round figures to £1,500,000.

An era of prosperity.

Notwithstanding all the hampering conditions stated, the prosperity of the country became more manifest each succeeding year. During the four years 1883–1886, both inclusive, the aggregate deficit amounted to £E.2,606,000. In 1887 there was practical equilibrium in the budget, in 1888 there was a deficit of £E.53,000. In 1889 there was a surplus of £E.218,000, and from that date onward every year has shown a surplus. In 1895 the surplus exceeded, for the first time, £E.1,000,000. The growth of revenue was no less marked. "In 1883—the first complete year after the British occupation—the revenue was slightly under 9 millions. This sum was collected with difficulty. The revenue steadily rose until, in 1890, the figure of 10 millions was exceeded. In 1897 a figure of over 11 millions was attained. Continuing to rise with ever-increasing rapidity, a revenue of close on 12 millions was collected in 1901 and 1902, in spite of the fact that during the latter of these two years the Nile flood was one of the lowest on record. In 1903 the revenue amounted to 12½ millions, and in 1904 the unprecedented figure of £E.13,906,000 was reached."[1] Yet during this period the amount of direct taxation remitted reached £E.1,900,000 a year. Arrears of land tax to the extent of £E.1,245,000 were cancelled. In indirect taxation the salt tax had been reduced by 40%, the postal, railway and telegraph rates lowered, octroi duties and bridge and lock dues abolished. The only increase of taxation had been on tobacco, on which the duty was raised from

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[1] *Egypt*, No. 1 (1905), p. 20.

P.T. 14 to P.T. 20 per kilogramme. At the same time the house duty, with the consent of the powers, had been imposed on European residents. The fact that during the period under review Egypt suffered very severely from the general fall in the price of commodities makes the prosperity of the country the more remarkable. Had it not been for the great increase of production as the result of improved irrigation and the fiscal relief afforded to landowners, the agricultural depression would have impaired the financial situation. In this connexion it should be stated that during 1899 the reassessment of the land tax, a much-needed reform, was seriously taken in hand. The existing assessment, made before the British occupation, had long been condemned by all competent authorities, but the inherent intricacies and difficulties of the problem had hitherto postponed a solution. After careful study and a preliminary examination of the land, a scheme was passed which has given satisfaction to the landowning community, and which distributes the tax equitably in proportion to the fertility of the soil. The reassessment was completed in 1907.

The cost of internationalism.

While the country thus prospered it also suffered greatly from the restrictions imposed by the system of international control. This system produced a great disproportion between the sums available for capital and those available for administrative expenditure. Although the money for public works could be obtained out of grants from the General Reserve Fund, there was no fund from which to provide a sufficient sum to keep those works in order. Moreover, to avoid having to pay half the amount received into the General Reserve Fund the government was compelled to keep certain items of revenue and expenditure out of the accounts altogether—a violation of the principles of sound finance. Then there was the glaring anomaly of allowing the Conversion Economies to accumulate at compound interest in the hands of the commissioners of the Caisse, instead of using the money for remunerative purposes. The net result of internationalism was to impose an extra charge of about £1,750,000 a year on the Egyptian treasury.

Egypt gains financial liberty.

All these cumbersome restrictions were swept away by the khedivial decree of the 28th of November 1904, a decree which received the assent of the powers and was the result of the Anglo-French agreement of April 1904 (see § *History*). The decree did not affect the inability of Egypt to tax foreigners without their consent nor remove the right of Turkey to veto the issue of new loans, but in other respects the financial changes made by it were of a radical character. The main effect was to give to the Egyptian government a free hand in the disposal of its own resources so long as the punctual payment of interest on the debt was assured. The plan devised by the London Convention of fixing a limit to administrative expenditure was abolished. The consent of the Caisse to the raising of a new loan was no longer required. The Caisse itself remained, but shorn of all political and administrative powers, its functions being strictly limited to receiving the assigned revenues and to ensuring the due payment of the coupon. The nature of the assigned revenue was altered, the land tax being substituted for those previously assigned, that tax being chosen as it had a greater character of stability than any other source of revenue. By this means Egypt gained complete control of its railways, telegraphs, the port of Alexandria and the customs, and as a consequence the mixed administration known as the Railway Board ceased to exist. Moreover, it was provided that when the Caisse had received from the land tax the amount needed for the service of the debt, the balance of the tax was to be paid direct to the Egyptian treasury. The Conversion Economies Fund was also placed at the free disposal of the Egyptian government. The General Reserve Fund ceased to exist, but for the better security of the bondholders a reserve fund of £1,800,000 was constituted and left in the hands of the Caisse to be used in the highly improbable event of the land tax being insufficient to meet the debt charges. Moreover, the Caisse started under the new arrangement with a cash balance of £1,250,000. The interest of the money lying in the hands of the Caisse goes towards meeting the debt charges and thus reduces the amount needed from the land tax. The bondholders gained a further material advantage by the consent of the Egyptian government to delay the conversion of the loans, which under previous arrangements they would have been free to do in 1905. It was agreed that there should be no conversion of the Guaranteed or Privileged debts before 1910 and no conversion of the Unified debt until 1912. Such were the chief provisions of the khedivial decree, and in 1905, for the first time, it was possible to draw up the Egyptian budget in accordance with the needs of the country and on perfectly sound principles.

In the system adopted in 1905 and since maintained, recurring and non-recurring expenditure were shown separately, the non-recurring expenditure being termed "special." At the same time a new General Reserve Fund was created, made up chiefly of the surpluses of the old General Reserve, Special Reserve, and Conversion Economies funds. This new fund started with a capital of £13,376,000 and was replenished by the surpluses of subsequent years, by the interest earned by its temporary investment, and by the sums accruing by the liquidation of the Daïra and Domains loans. During 1905 and 1906 about £3,000,000 was paid into the fund through the liquidation of the Daïra loan. From this fund, which had a balance of over £12,000,000 in 1906, is taken capital expenditure on remunerative public works in Egypt and the Sudan, and while the fund lasts the necessity for any new loan is avoided. The greater freedom of action attained as the result of the Anglo-French declaration of 1904 enabled the Egyptian government to advance simultaneously along the lines of fiscal reform and increased administrative expenditure. Thus in 1906 the salt monopoly was abolished at a cost to the revenue of £175,000, while the reduction of import duties on coal and other fuels, live-stock, &c., involved a further loss of £118,000, and an increase of over £1,000,000 in expenditure was budgeted for. The accounts for 1907 showed a total revenue of £E.16,368,000 and a total expenditure of £E.14,280,000, a surplus of £E.2,088,000. The annual growth of revenue for the previous five years averaged over £E.500,000. About one-third of the annual revenue is derived from the land tax; customs and tobacco duties yield about £3,000,000, and an equal or larger amount is received from railways and other revenue-earning departments. The chief items of ordinary expenditure are tribute and debt charges, the expenses of the civil administration, of the Egyptian army (between £500,000 and £600,000 yearly), of the revenue-earning departments and of pensions.

It will be convenient here to summarize the position of the Egyptian debt at the close of 1905, that is at the period immediately following the liquidation of the Daïra loan. In a previous table it has been shown that under the Law of Liquidation of 1880 the total debt was £98,640,000. In 1883, the first complete year after the British occupation, the capital of the debt—then exclusively held by the public—was £96,457,000. In 1885 the Guaranteed loan, the nominal capital of which was £9,424,000, was issued, and in 1891 the debt reached its maximum figure of £106,802,000. At that period the charge for interest and sinking fund was £4,127,000. On the 31st of December 1905 the total capital of the debt was as follows:—

Guaranteed 3 %	£7,849,000
Preference $3\frac{1}{2}$ %	31,128,000
Unified 4 %	55,972,000
Domains $4\frac{1}{4}$ %	1,535,000
Total	£96,484,000

The charge on account of interest and sinking fund was £3,709,000. Thus the capital of the debt in 1905 stood at almost the exact figure it did in 1883, although by borrowing and conversion operations nearly £17,000,000 had in the meantime been added to the capital. This reduction was brought about by surplus revenue, and by the operation of the sinking fund in the case of the Guaranteed loan, while £15,729,000 had been wiped out by the sale of Daïra and Domains property. These figures do not, however, indicate fully the prosperity of the country, for although the nominal amount of the capital was practically identical in 1883 and 1905, in the latter year the Egyptian government or the Caisse held stock (bought with surplus revenue) to the value of £8,770,000. The amount of debt in the hands of the public was therefore only £87,714,000, that is to say £8,743,000 less than in 1883, while the interest charge to be borne by the taxpayer of Egypt was £3,378,000, being £890,000 less than in 1883. The charge amounts to about 40 % of the national expenditure. On the other hand, Egypt is not now weighed down with a huge warlike expenditure. There is no navy to support, and the army costs but 7 % of the total expenditure.

AUTHORITIES.—A concise view of the financial situation in 1877 will be found in J. C. McCoan's *Egypt as it is* (London n.d.). Mr Cave's report is printed in an appendix. The subsequent history of Egyptian finance is told in the following blue-books, &c. :—*Correspondence respecting the State Domains of Egypt* (1883); *Statement of the Revenue and Expenditure of Egypt, together with a List of the Egyptian Bonds and the Charges for their Services* (1885);

Reports on the Finances of Egypt, by the British agent, yearly from 1888; *Convention . . . relative to the Finance of Egypt, signed at London, March 18, 1885*; *Khedivial decree of the 28th November 1904*; *Compte général de l'administration des finances*, issued yearly at Cairo. Consult also the works of Lord Cromer, Lord Milner, and Sir A. Colvin cited under § *History*, last section. (E. Go.; F. R. C.)

The Egyptian Army.

The fellah soldier has been aptly likened to a bicycle, which although incapable of standing up alone, is very useful while under the control of a skilful master. It is generally believed that the successes gained in the time of the Pharaohs were due to foreign legions; and from Cambyses to Alexander, from the Ptolemies to Antony (Cleopatra), from Augustus to the 7th century, throughout the Arab period, and from Saladin's dynasty down to the middle of the 13th century, the military power of Egypt was dependent on mercenaries. The Mamelukes (slaves), imported from the eastern borders of the Black Sea and then trained as soldiers, usurped the government of Egypt, and held it till 1517, when the Ottomans began to rule. This form of government, speaking generally, endured till the French invasion at the end of the 18th century. British and Turkish troops drove the French out after an occupation of two years, the British troops remaining till 1803. Then Mehemet Ali, a small tobacconist of Kavala, Macedonia, coming with Albanian mercenaries, made himself governor, and later (1811), by massacring the Mamelukes, became the actual master of the country, and after seven years' war brought Arabia under Egypt's rule. He subdued Nubia and Sennar in 1820–22; and then, requiring a larger army, he obtained instructors from France. To them were handed over 1000 Turks and Circassians to be trained as officers, who later took command of 30,000 Sudanese. These died so rapidly in Egypt from pneumonia[1] that Mehemet Ali conscripted over 250,000 fellahin, and in so arbitrary a fashion that many peasants mutilated themselves to avoid the much-dreaded service. The common practice was to place a small piece of nitrate of silver into the eye, which was then kept tightly bandaged till the sight was destroyed. Battalions were then formed of one-eyed men, and of soldiers who, having cut off their right-hand fingers, were made to shoot from the left shoulder. Every man who could not purchase exemption, with the exception of those living in Cairo, Alexandria and Suez, on becoming 19 years old was liable nominally to 12 years' service; but many men were kept for 30 or 40 years, in spite of constant appeals. Nevertheless the experiment succeeded. The docile, yet robust and hardy peasants, under their foreign leaders, gained an unbroken series of successes in the first Syrian War; and after the bloody battle of Konia (1832), where the raw Turkish army was routed and the grand vizier taken prisoner, it was only European intervention which prevented the Egyptian general, Ibrahim Pasha, from marching unopposed to the Bosphorus. The defeat of the Turkish army at Nizib (Nezeeb or Nisib), in the second Syrian War (1839), showed that it was possible to obtain favourable military results with Egyptians when stiffened by foreigners and well commanded. Ibrahim, the hero of Konia, declared, however, that no native Egyptian ought to rise higher than the rank of sergeant; and in the Syrian campaigns nearly all the officers were Turks or Circassians, as were several non-commissioned officers. In the cavalry and artillery many of the privates were foreigners, numbers of the janissaries who escaped the massacre at Stamboul (1832) having joined Mehemet Ali's army.

Early history.

In the reign of Abbas, who succeeded Mehemet Ali, the Egyptian troops were driven from Nejd, and the Wahhabi state recovered its independence. The next viceroy, Said, began as an ardent soldier, but took to agriculture, and at his death (1863) 3000 men only were retained under arms. Ismail, on succeeding, immediately added 27,000 men, and in seven years was able to put 100,000 men, well equipped, in the field. He sent 10,000 men to help to suppress a rebellion in Crete, and conquered the greater part of the (Nile) Sudan; but an expedition of 11,000 men, sent to Abyssinia under Prince Hasan and Rateb Pasha, well equipped with guns and all essentials, was, in two successive disasters (1875 and 1876), practically destroyed. The education of Egyptians in continental cities had not produced the class of leaders who led the fellahin to victory at Konia.

Ismail's exactions from the Egyptian peasantry reacted on the army, causing discontent; and when he was tottering on the throne he instigated military demonstrations against his own government, and, by thus sapping the foundations of discipline, assisted Arabi's revolution; the result was the battle of Tell el-Kebir, the British occupation, and the disbandment of the army, which at that time in Egypt proper consisted of 18,000 men. Ismail had collected 500 field-guns, 200 Armstrong cannon, and had created factories of warlike and other stores. These latter were conducted extravagantly, and badly administered.

In January 1883, Major-General Sir Evelyn Wood, V.C., was given £200,000, and directed to spend it in raising a fellahin force of 6000 men for the defence of Egypt. He was assisted at first by 26 officers, amongst whom were two who later became successively sirdars—Colonel F. Grenfell, commanding a brigade, and Lieutenant H. Kitchener, R.E., second in command of the cavalry regiment. There were four batteries, eight battalions, and a camel company. Each battalion of the 1st infantry brigade had three British mounted officers, Turks and Egyptians holding the corresponding positions in the battalions of the 2nd Brigade. The sirdar selected these native officers from those of Arabi's followers who had been the least prominent in the recent mutiny; non-commissioned officers who had been drill-instructors in the old army were recalled temporarily, but all the privates were conscripted from their villages. The earlier merciless practice had been in theory abolished by a decree based on the German system, published in 1880; but owing to defective organization, and internal disturbances induced by Khedive Ismail's follies, the law had not been applied, and the 6000 recruits collected at Cairo in January 1883 represented the biggest and strongest peasants who could not purchase exemption by bribing the officials concerned. The difficulties experienced in applying the 1880 decree were great, but the perseverance of British officers gave the oppressed peasants, in 1885, an equitable law, which has been since improved by the decree of 1900. General considerations later caused the sirdar to allow exemption by payment of (Badalia) £20 before ballot. This tax, which is popular amongst the peasantry, produced in 1906 £E.150,000, and over £250,000 in 1908. This is a marked indication of the increasing prosperity of the fellahin. A portion of the badalia is expended in the betterment of the soldier's position. He is no longer drafted into the police on completing his army service, but goes free at the end of five years with a gift of £E.20. The sirdar is allowed, moreover, to use £20,000 per annum of the badalia for the improvement of the education of the rank and file. As an experiment the police is now a voluntary service, except in Alexandria and Cairo, for which cities peasants are conscripted for the police under army conditions. The recruiting superintending committee, travelling through districts, supervise every ballot, and work under stringent rules which render systematic bribery difficult. The recruits who draw unlucky numbers at 19 years of age are seldom called up till they are 23, when they are summoned by name and escorted by a policeman to Cairo. To prevent substitution on the journey each recruit wears a string girdle sealed in lead. The periods of service are: with the colours, 5 years; in the reserve, 5 years, during which time they may be called up for police service, manœuvres, &c. The pay is £E.3, 14s. per annum for all services, and the liberal scale of rations of meat, bread and rice remains as before in theory, but in practice the value of pay and food received is greatly enhanced. So also with the pension and promotion regulations. They were in 1882 sufficiently liberal on paper, but had never been carried into effect.

Reorganization.

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[1] Similar mortality, though on a smaller scale, recurred in 1889, when Sudanese battalions coming from Suakin were detained temporarily in Cairo.

The efforts of 48 American officers, who under Gen. C. P. Stone zealously served Ismail, had entirely failed to overcome Egyptian venality and intrigue; and in spite of the military schools, with a comprehensive syllabus, the only perceptible difference between the Egyptian officer and private in 1879 consisted, according to one of the Americans, in the fact that the first was the product of the harem, and the second of the field. Marshal Marmont, writing in 1839, mentions the capacity of the Egyptians for endurance; and it was tested in 1883, especially in the 2nd Brigade, since its officers (Turks and Egyptians), anxious to excel as drill-masters, worked their men not only from morn till eve, but also by lamplight in the corridors of the barracks. On the 31st March 1883, ten weeks after the arrival of the first draft of recruits, about 5600 men went through the ceremonial parade movements as practised by the British guards in Hyde Park, with unusual precision. The British officers had acquired the words of command in Turkish, as used in the old army, an attempt to substitute Egyptian words having failed owing to lack of crisp, sharp-sounding words. As the Egyptian brigadier, who had spent some years in Berlin, spoke German fluently, and it was also understood by the senior British officers, that language was used for all commands given by the sirdar on that special parade. The British drill-book, minus about one-third of the least serviceable movements, was translated by an English officer, and by 1900 every necessary British official book had been published in English and Arabic, except the new Recruiting Law (1885) and a manufacturing manual, for which French and Arabic editions are in use. The discipline of the old army had been regulated by a translation of part of the Code Napoleon, which was inadequate for an Eastern army, and the sirdar replaced it by the British Army Act of 1881, slightly modified, and printed in Arabic.

The task undertaken by the small body of British officers was difficult. There was not one point in the former administration of the army acceptable to English gentlemen. That there had been no adequate auxiliary departments, without which an army cannot move or be efficient, was comparatively a minor difficulty. To succeed, it was essential that the fellah should be taught that discipline might be strict without being oppressive, that pay and rations would be fairly distributed, that brutal usage by superiors would be checked, that complaints would be thoroughly investigated, and impartial justice meted out to soldiers of all ranks. An epidemic of cholera in the summer of 1883 gave the British officers their first chance of acquiring the esteem and confidence of their men, and the opportunity was nobly utilized. While the patient fellah, resigned to the decrees of the Almighty, saw the ruling Egyptian class hurry away from Cairo, he saw also those of his comrades who were stricken tenderly nursed, soothed in death's struggles, and in many cases actually washed, laid out and interred by their new self-sacrificing and determined masters. The regeneration of the fellahin army dates from that epidemic.

When the Egyptian Army of the Delta was dispersed at Tell el-Kebir, the khedive had 40,000 troops in the Sudan, scattered from Massawa on the Red Sea to 1200 m. towards the west, and from Wadi Halfa, 1500 m. southward to Wadelai, near Albert Nyanza. These were composed of Turks, Albanians, Circassians and some Sudanese. Ten thousand fellahin, collected in March 1883, mainly from Arabi's former forces, set out from Duem, 100 m. south of Khartum, in September 1883, under Hicks Pasha, a dauntless retired Indian Army officer, to vanquish the Mahdi. They disappeared in the deserts of Kordofan, where they were destroyed by the Mahdists about 50 m. south of El Obeid. In the wave of successful rebellion, except at Khartum, few of the Egyptian garrisons were killed when the posts fell, long residence and local family ties rendering easy their assimilation in the ranks of the Mahdists.

Baker Pasha, with about 4000 constabulary, who were old soldiers, attempted to relieve Tokar in February 1884. He was attacked by 1200 tribesmen and utterly routed, losing 4 Krupp guns, 2 machine guns and 3000 rifles. Only 1400 Egyptians escaped the slaughter.

The sirdar made an attempt to raise a battalion of Albanians, but the few men obtained mutinied when ordered to proceed to the Sudan, and it was deemed advisable, after the ringleaders had been executed, to abandon the idea, and rely on blacks to stiffen the fellahin. Then the 9th (Sudanese) Battalion was created for service at Suakin, and four others having been successively added, these (with one exception—at Gedaref) have since borne the brunt of all the fighting which has been done by the khedivial troops. The Egyptian troops in the operations near Suakin behaved well; and there were many instances of personal gallantry by individual soldiers. In the autumn of 1884, when a British expedition went up the Nile to endeavour to relieve the heroic Gordon, besieged in Khartum, the Egyptians did remarkably good work on the line of communication from Assiut to Korti, a distance of 800 m., and the training and experience thus gained were of great value in all subsequent operations. The honesty and discipline of the fellah were shown to be undoubtedly of a high order. When the crews of the whale-boats were conveying stores, the forwarding officers tried to keep brandy and such like medical comforts from the European crews, coffee and tea from Canadian voyageurs and sugar from Kroo boys. The only immaculate carrier was the Egyptian. A large sum of specie having failed under British escort to reach Dongola, an equivalent sum was handed to an Egyptian lieutenant of six months' service, with 10 men, and duly reached its destination.

Twelve years later the standard of honesty was unimpaired, and the British officers had imparted energy and activity into Egyptians of all ranks. The intelligent professional knowledge of the native officers, taught under British gentlemen, and the constant hard work cheerfully rendered by the fellah soldiers, were the main factors of the success achieved at Omdurman on the 2nd of September 1898. The large depots of stores at Assuan, Halfa and Dongola could only be cursorily supervised by British officers, and yet when the stores were received at the advance depot the losses were infinitesimal.

Character of Egyptian soldier.

By nature the fellah is unwarlike. Born in the valley of a great river, he resembles in many respects the Bengali, who exists under similar conditions; but the Egyptian has proved capable of greater improvement. He is stronger in frame, and can undergo greater exertion. Singularly unemotional, he stood steady at Tell el-Kebir after Arabi Pasha and all his officers, from general to subaltern, had fled, and gave way only when decimated by the British field artillery firing case shot. At El Teb, however, in 1884 he allowed himself to be slaughtered by tribesmen formerly despised, and only about one-fourth of the force under General Valentine Baker escaped. Baker Pasha's force was termed constabulary, yet his men were all old soldiers, though new to their gallant leader and to the small band of their brave but strange British officers. Since that fatal day, however, many of the fellahin have shown they are capable of devoted conduct, and much has been done to raise in the soldiers a sense of self-respect, and, in spite of centuries of oppression, of veracity. The barrack-square drill was smart under the old system, but there was no fire discipline, and all individuality was crushed. Now both are encouraged, and the men, receiving their full rations, are unsurpassable in endurance at work and in marching. All the troops present in the surprise fight when the Dervish force was destroyed at Firket in June 1896 had covered long distances, and one battalion (the 10th Sudanese) accomplished 90 m. within 72 hours, including the march back to railhead immediately after the action. The troops under Colonel Parsons, Royal Artillery, who beat the Dervishes at Gedaref, were so short of British officers that all orders were necessarily given in Arabic and carried to commanders of units by Arabs. While an Egyptian battalion was attacking in line, it was halted to repel a rush from the rear, and front and rear ranks were simultaneously engaged, firing in opposite directions—yet the fellahin were absolutely steady; they shot well and showed no signs of trepidation. On the other hand, neither was there any exultation after their victory. It has been aptly said "the fellah would make an admirable soldier if he only wished to kill some one!" The fellahin furnish three squadrons, five batteries, three garrison artillery companies and nine battalions.

The well-educated Egyptian officer, with his natural aptitude for figures, does subordinate regimental routine carefully, and works well when supervised by men of stronger character. The ordinary Egyptian is not self-reliant or energetic by nature, and, like most Eastern people, finds it difficult to be impartial where duty and family or other personal relations are in the balance. The black soldier has, on the other hand, many of the finest fighting qualities. This was observed by British officers, from the time of the preliminary operations about Kosha and at the action near Ginnis in December 1885 down to the brilliant operations in the pursuit of the Mahdists on the Blue Nile after the action of Gedaref (subsequent to the battle of Omdurman), and the fighting in Kordofan in 1899, which resulted in the death of the khalifa and his amirs.

Black soldiers served in the army of Mehemet Ali, but their fighting value was not then duly appreciated. Prior to the death of the khalifa, many of his soldiers deserted to join their brethren who had been captured by the sirdar's troops, during the gradual advance up the Nile. After 1899 many more enlisted: the greater number were Shilluks and Dinkas coming from the country between Fashoda and the equatorial provinces, but a proportion came from the western borders of the Sudan, and some from Wadai and Bornu. Many were absolute savages, difficult to control, wayward and thoughtless like children. Sudanese are very excitable and apt to get out of hand; unlike the fellahs they are not fond of drill, and are slow to acquire it; but their dash, pugnacious instincts and desire to close with an enemy, are valuable military qualities. The Sudanese, moreover, shoot better than the fellahin, whose eyesight is often defective. The Sudanese captain can seldom read or write, and is therefore in the hands of the Egyptian-born company quartermaster-sergeant as regards pay and clothing accounts. He is slow, and as a rule has little knowledge of drill. Nevertheless he is self-reliant, much respected by his men, and can be trusted in the field to carry out any orders received from his British officer. The most efficient companies in the Sudanese battalions are apparently those in which the captain is a black and the lieutenants are Egyptians.

In 1908 the Egyptian army, with a total establishment of 18,000, consisted of three squadrons of cavalry (one composed of Sudanese) each numbering 116 men; four batteries of field artillery and a Maxim battery, horses and mules being used, with a total strength of 1257 of all ranks; the camel corps, 626 of all ranks (fellahin and Sudanese); and nine fellahin and six Sudanese infantry battalions, 10,631 of all ranks. Every battalion receives two additional companies on mobilization and takes the field with six companies.

The armament of the infantry is Martini-Henry rifle and bayonet; of the cavalry, lance, sword and carbine.

There are seven gunboats on the Nile.

The medical department (reorganized in 1883 by Surgeon-Major J. G. Rogers at the time of the cholera epidemic) controls in peace fourteen station hospitals, and in war furnishes a mobile field hospital to each brigade. There are also veterinary station hospitals. The supply department controls mills at Tura, Halfa and Khartum.

The stringent system of selecting British officers, originated by the first sirdar in 1883, is shown by the fact that of the 24 employed in creating the army, 14 rose to be generals. The competition for employment in the army is still severe. In 1908 there were 140 British warrant and non-commissioned officers. Four of the fellahin battalions were officered by Orientals; in the other five, British officers commanded. Seven officers were employed with the artillery, six with the camel corps. Each of the Sudanese battalions had four British officers, and each squadron of cavalry one. Twelve medical and two veterinary officers are also employed departmentally, as well as officers acting as directors of supply, &c. Since the assumption of command by the third sirdar, Colonel (afterwards Lord) Kitchener, the ordnance, supply and engineer services have been separately administered, and a financial secretary is charged with the duty of preparing the budget, making contracts, &c. The total annual expenditure is £500,000.

The reorganized military school system under British control, for supplying officers, dates from 1887. The course lasts for about two years, and two hundred students can be accommodated. After the reconquest of the Sudan one-fourth of the cadets in the military school of Cairo were Sudanese. Later, however, the Sudanese cadets were transferred to a branch school at Khartum.

The army raised by the first sirdar in January 1883 was highly commended for its work on the line of communication in 1884–1885, and its artillery and camelry distinguished themselves in the action at Kirbekan in February 1885. Colonel Sir Francis Grenfell succeeded General Sir Evelyn Wood in March 1885, and while under his command the army continued to improve, and fought successful actions at Gemaiza, Argin, Toski and Tokar. At Toski the Dervish force was nearly annihilated. In March 1892 Colonel Kitchener succeeded General Sir Francis Grenfell, and four years later began his successful reconquest of the Sudan. In June 1896, owing to the indefatigable exertions of Major Wingate, a perfected system of secret intelligence enabled the sirdar to bring an overwhelming force of 6 to 1 against the Dervish outpost at Firket and destroy it. In September 1896 a skirmish at Hafir, with similarly successful tactics, gave the British commander the possession of Dongola. On the 7th of August 1897 Colonel Hunter surprised and annihilated a weak Dervish garrison at Abu Hamed, to which place, by the 31st of October 1897, a railway had been laid across the Nubian desert from Wadi Halfa, a distance of 230 m., the " record " construction of 5300 yds surveyed, embanked and laid in one day having been attained. On the 26th of December 1897 the Italian troops handed over Kassala to Colonel Parsons, R.A. On the 8th of April 1898 a British division, with the Egyptian army, destroyed the Dervish force under the amir Mahmud Ahmed, on the Atbara river. On the 2nd of September the khalifa attacked the British-Egyptian troops at Kerreri (near Omdurman), and being routed, his men dispersed; Khartum was occupied, and on the 19th of September the Egyptian flag was rehoisted at Fashoda. On the 22nd of September 1898 Gedaref was taken from the amir Ahmed Fedil by Colonel Parsons, and on the 26th of December the army of Ahmed Fedil was finally defeated and dispersed near Roseires. The khalifa's army, reduced to an insignificant number, after several unsuccessful engagements withdrew to the west of the Nile, where it was attacked, on the 24th of November 1899, after a forced march by Colonel Wingate, and annihilated. The khalifa himself was killed; while the victor, who had joined the Egyptian army in 1883 as aide-de-camp to the first sirdar, in December 1899 became the fourth sirdar, as Major-General Sir F. R. Wingate, K.C.B., K.C.M.G., D.S.O., &c. (E. Wo.)

II. Ancient Egypt

A. *Exploration and Research.*—Owing to its early development of a high civilization with written records, its wealth, and its preservative climate, Egypt is the country which most amply repays archaeological research. It is especially those long ages during which Egypt was an independent centre of culture and government, before its absorption in the Persian empire in the 6th century B.C., that make the most powerful appeal to the imagination and can often justify this appeal by the splendour of the monuments representing them. Later, however, the history of Hellenism, the provincial history of the Roman empire, the rise of Christianity and the triumph of Islam successively receive brilliant illustration in Egypt.

As early as the 17th century travellers began to bring home specimens of ancient Egyptian handiwork: a valuable stele from Sakkara of the beginning of the Old Kingdom was presented to the Ashmolean Museum at Oxford in 1683. In the following century the Englishman R. Pococke (1704–1765), the Dane F. L. Norden (1708–1742), both travelling in 1737, and others later, planned, described or figured Egyptian ruins in a primitive way and identified many of the sites with cities named in classical authors. Napoleon's great military expedition in 1798 was accompanied by a scientific commission including artists and archaeologists, the results of whose labours fill several of the magnificent volumes of the *Description de l'Égypte.* The antiquities collected by the expedition, including the famous Rosetta stone, were ceded to the British government at the capitulation of Alexandria, in 1801. Thereafter Mehemet Ali threw Egypt freely open to Europeans, and a busy traffic in antiquities began, chiefly through the agency of the consuls of different powers. From the year 1820 onwards the growth of the European collections was rapid, and Champollion's decipherments (see below, § "Language and Writing") of the hieroglyphic inscriptions, dating from 1821, added fresh impetus to the fashion of collecting, in spite of doubts as to their trustworthiness. In 1827 a combined expedition led by Champollion and Rosellini was despatched by the governments of France and Tuscany, and accomplished a great deal of valuable work in copying scenes and inscriptions. But the greatest of such expeditions was that of Lepsius, under the auspices of the

Prussian government, in 1842–1845. Its labours embraced not only Egypt and Nubia (as far as Khartum) but also the Egyptian monuments in Sinai and Syria; its immense harvest of material is of the highest value, the new device of taking paper impressions or "squeezes" giving Lepsius a great advantage over his predecessors, similar to that which was later conferred by the photographic camera.

A new period was opened in Egyptian exploration in 1858 when Mariette was appointed director of archaeological works in Egypt, his duties being to safeguard the monuments and prevent their exploitation by dealers. As early as 1835 Mehemet Ali had given orders for a museum to be formed; little however, was accomplished before the whole of the resulting collection was given away to the Archduke Maximilian of Austria in 1855. Mariette, who was appointed by the viceroy Said Pasha at the instance of the French government, succeeded in making his office effective and permanent, in spite of political intrigues and the whims of an Oriental ruler; he also secured a building on the island of Bulak (Bulaq) for a viceregal museum in which the results of his explorations could be permanently housed. Supported by the French interest, the established character of this work as a department of the Egyptian government (which also claims the ancient sites) has been fully recognized since the British occupation. The "Service of Antiquities" now boasts a large annual budget and employs a number of European and native officials—a director, curators of the museum, European inspectors and native sub-inspectors of provinces (at Luxor for Upper Egypt and Nubia, at Assiut for Middle Egypt and the Fayum, at Mansura for Lower Egypt, besides a European official in charge of the government excavations at Memphis). The museum, no longer the property of an individual, was removed in 1889 from the small building at Bulak to a disused palace at Giza, and since 1902 has been established at Kasr-en-Nil, Cairo, in a special building, of ample size and safe from fire and flood. In the year 1881 the directorship of the museum was temporarily undertaken by Prof. Maspero, who resumed it in 1899. The admirably conducted Archaeological Survey of the portion of Nubia threatened by the raising of the Assuan dam is in the charge of another department—the Survey department, directed for many years up to 1909 by Captain H. G. Lyons. Non-official agencies (supported by voluntary contributions) for exploration in Egypt comprise the Egypt Exploration Fund, started in London in 1881, with its two branches, viz. the Archaeological Survey (1890) for copying and publishing the monuments above ground, and the Graeco-Roman Branch (1897), well known through the brilliant work in Greek papyri of B. P. Grenfell and A. S. Hunt; and the separate Research Account founded by Professor W. M. Flinders Petrie in London (University College) in 1896, and since 1905 called the British School of Archaeology in Egypt (see especially MEMPHIS). The *Mission archéologique française au Caire*, established as a school by the French government in 1881, was re-organized in 1901 on a lavish scale under the title *Institut français d'archéologie orientale du Caire*, and domiciled with printing-press and library in a fine building near the museum. As the result of an excellent bargain, it was afterwards removed to the Munira palace in the south-east part of the city. An archaeologist is attached to the German general consulate to look after the interests of German museums, and is director of the German Institute of Archaeology. The Orient-Gesellschaft (German Orient-Society) has worked in Egypt since 1901 with brilliant results. Excavations and explorations are also conducted annually by the agents of universities and museums in England, America and Germany, and by private explorers, concessions being granted generally on the terms that the Egyptian government shall retain half of the antiquities discovered, while the other half remains for the finders.

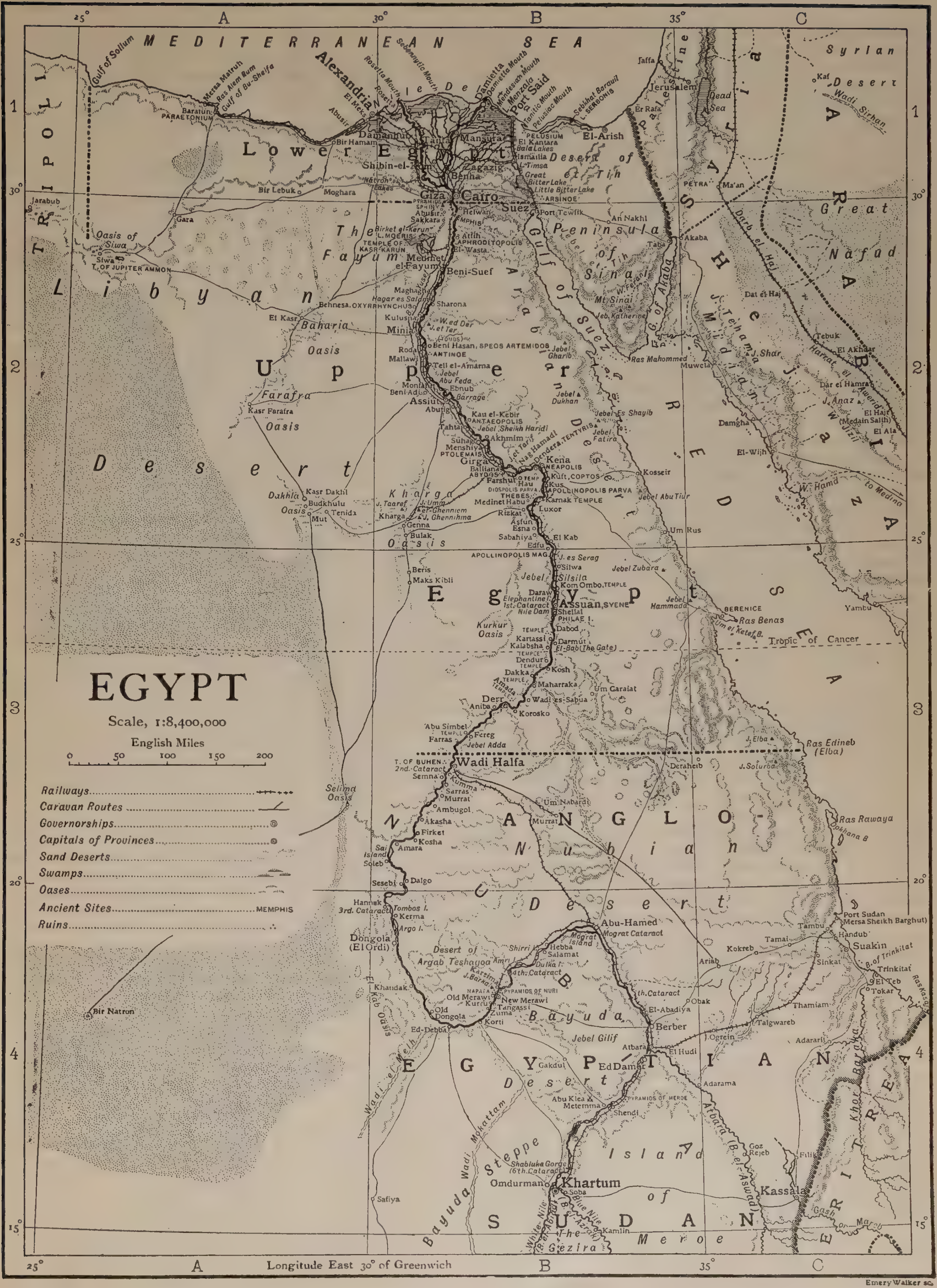
The era of scientific excavation began with Flinders Petrie's work at Tanis in 1883. Previous explorers kept scientific aims in view, but the idea of scientific archaeology was not realized by them. The procedure in scientific excavation is directed to collecting and interpreting all the information that can be obtained from the excavation as to the history and nature of the site explored, be it town, temple, house, cemetery or individual grave, wasting no evidence that results from it touching the endless problems which scientific archaeology affords—whether in regard to arts and crafts, manners and customs, language, history or beliefs. This is a totally different thing from mere hunting for inscriptions, statues or other portable objects which will present a greater or less value in themselves even when torn from their context. Such may, of course, form the greater part of the harvest and working material of a scientific excavator; their presence is most welcome to him, but their complete absence need be no bar to his attainment of important historical results. The absence of scientific excavation in Egypt was deplored by the Scottish archaeologist Alexander Henry Rhind (1833–1863), as early as 1862. Since Flinders Petrie began, the general level of research has gradually risen, and, while much is shamefully bad and destructive, there is a certain proportion that fully realizes the requirements of scientific archaeology.

Antiquities, Sites, &c.—The remains for archaeological investigation in Egypt may be roughly classified as material and literary: to the latter belong the texts on papyri and the inscriptions, to the former the sites of ancient towns with the temples, fortifications and houses; remains of roads, canals, quarries and other matters falling within the domain of ancient topography; the larger monuments, as obelisks, statues, stelae, &c.; and finally the small antiquities—utensils, clothes, weapons, amulets, &c. Where moisture can reach the antiquities their preservation is no better in Egypt than it would have been in other countries; for this reason all the papyri in the Delta have perished unless they happen to have been charred by fire. A terrible pest is a kind of termite which is locally abundant and has probably visited most parts of Egypt at one time or another, destroying all dead vegetable or animal material in the soil that was not specially protected.

In Lower Egypt the cities built of crude brick were very numerous, especially after the 7th century B.C., but owing to the value of stone very few of their monuments have escaped destruction: even the mounds of rubbish which marked their sites furnish a valuable manure for the fields and in consequence are rapidly disappearing. Granite and other hard stones, having but a limited use (for millstones and the like), have the best chance of survival. At Bubastis, Tanis, Behbeit (Iseum) and Heliopolis considerable stone remains have been discovered. In the north of the Delta wherever salt marshes have prevented cultivation in modern times, the mounds, such as those of Pelusium, still stand to their full height, and the more important are covered with ruins of brick structures of Byzantine and Arab date.

Middle and Upper Egypt were less busy and prosperous in the later ages than Lower Egypt. There was consequently somewhat less consumption of the old stone-work. Moreover, in many places equally good material could be obtained without much difficulty from the cliffs on both sides of the Nile. Yet even the buried portions of limestone buildings have seldom been permitted to survive on the cultivated land; the Nubian sandstone of Upper Egypt was of comparatively little value, and, generally speaking, buildings in that material have fallen into decay rather than been destroyed by quarrying.

Starting from Cairo and going southward we have first the great pyramid-field, with the necropolis of Memphis as its centre; stretching from Abū Roāsh on the north to Lisht on the south, it is followed by the pyramid group of Dahshūr, the more isolated pyramids of Medūm and Illahūn, and that of Hawāra in the Fayūm. On the east bank are the limestone quarries of Turra and Masāra opposite Memphis. South of the Fayūm on the western border of the desert are the tombs of Deshāsha, Meir and Assiūt, and on the east bank those of Beni Hasan, the rock-cut temple of Speos Artemidos, the tombs of El Bersha and Sheikh Said, the tombs and stelae of El Amarna with the alabaster quarries of Hanub in the desert behind them, and the tombs of Deir el Gebrāwi. Beyond Assiūt are the tombs of Dronka and Rīfa, the temples of Abydos and Dendera, and the tombs, &c., at Akhmīm and Kasr es Saiyād. Farther south are the stupendous


EGYPT
Scale, 1:8,400,000
English Miles
0
50
100
150
200
Railways
Caravan Routes
Governorships
Capitals of Provinces
Sand Deserts
Swamps
Oases
Ancient Sites
MEMPHIS
Ruins
Longitude East 30° of Greenwich
25°
30°
35°
A
B
C
1
2
3
4
15°
20°
25°
30°
MEDITERRANEAN SEA
TRIPOLI
Alexandria
Gulf of Sollum
Mersa Matruh
Ras Alem Rum
Gulf of Bu-Sheifa
Baratun
PARAETONIUM
Abusir
El Meks
Rosetta
Rosetta Mouth
Sebennytic Mouth
Nile Delta
Damietta
Damietta Mouth
Mendesian Mouth
Menzala
Tanitic Mouth
Pelusiac Mouth
Port Said
Sebkhat Bardawil
SERBONIS
PELUSIUM
El Kantara
Bala Lakes
Ismailia
L. Timsa
Great Bitter Lake
Little Bitter Lake
ARSINOE
El-Arish
Damanhur
Bir Hamam
Tanta
Mansura
Shibin-el-Kom
Zagazig
Benha
Lower Egypt
Natron Lakes
Bir Lebuk
Moghara
Jarabub
Gara
Oasis of Siwa
Siwa
T. OF JUPITER AMMON
Giza
Cairo
PYRAMIDS
SPHINX
Abusir
Sakkara
MEMPHIS
Helwan
Suez
Port Tewfik
Birket el-Kerun
L. MOERIS
TEMPLE OF KASR KARUN
The Fayum
Medinet el-Fayum
Atfih
APHRODITOPOLIS
El-Wasta
Beni-Suef
Maghagha
Hagar es Saldm
Behnesa, OXYRRHYNCHUS
Sharona
Kulusna
Minia
W. ed Der
J. et Ter
Roda
(TOMUS)
Beni Hasan, SPEOS ARTEMIDOS
ANTINOE
Mallawi
Tell el-Amarna
Jebel Abu Feda
Montfalut
Beni Adi
Ebnub
Barrage
Assiut
Abutig
El Kasr
Baharia Oasis
Upper Egypt
Farafra
Kasr Farafra
Oasis
Libyan Desert
Kau el-Kebir
ANTAEOPOLIS
Jebel Sheikh Haridi
Tahta
Suhag
Akhmim
Menshiya
PTOLEMAIS
Girga
Balliana
ABYDOS
Farshut
Hau
DIOSPOLIS PARVA
Nag Hamadi
Dendera, TENTYRIS
Kena
NEAPOLIS
Kuft, COPTOS
Kus
APOLLINOPOLIS PARVA
THEBES
Karnak TEMPLE
Medinet Habu
Luxor
Rizkat
Asfun
Esna
El Kab
Sabahiya
Edfu
APOLLINOPOLIS MAG.
J. es Serag
Silwa
Jebel Silsila
Kom Ombo, TEMPLE
Daraw
Elephantine I.
1st. Cataract
Nile Dam
Assuan, SYENE
Shellal
PHILAE I.
Kurkur Oasis
Dabod
Kartassi
Kalabsha
Darmut
El-Bab (The Gate)
Dendur
Kosh
Dakka
Maharraka
Um Garaiat
Amada
Wadi es-Sabua
Dert
Aniba
Korosko
Abu Simbel
Fereg
Farras
Jebel Adda
Dakhla Oasis
Kasr Dakhl
Budkhulu
Tenida
Mut
Kharga Oasis
J. Taaref
J. Umm el-Ghenniem
Kharga
J. Ghennihma
Genna
Bulak
Beris
Maks Kibli
Egypt
Selima Oasis
T. OF BUHEN
2nd. Cataract
Wadi Halfa
Semna
Kumma
Sarras
Murrat
Ambugol
Akasha
Firket
Kosha
Sai Island
Amara
Soleb
Dalgo
Sesebi
Hannek
3rd. Cataract
Tombos I.
Kerma
Argo I.
Dongola (El Ordi)
Desert of Argab Teshagoa
Khandak
Old Merawi
Kurru
Old Dongola
Ed-Debba
Korti
Zuma
Tangassi
New Merawi
NAPATA
PYRAMIDS OF NURI
J. Barkal
Karsima
Amri
Shirri
4th. Cataract
Dulka I.
Hebba
Salamat
Mograt Island
Mograt Cataract
Abu-Hamed
Um Nabardi
Murrat
Anglo-Egyptian
Nubian Desert
Bayuda
5th. Cataract
El-Abadiya
Berber
Obak
Jebel Gilif
Atbara
El Hudi
Ed Damer
Gakdul
Desert
Abu Klea
Metemma
PYRAMIDS OF MEROE
Shendi
Island of Meroe
Atbara (B. el-Aswad)
Adarama
Goz Rejeb
Kassala
Khor Baraka
Shabluka Gorge (6th Cataract)
Omdurman
Khartum
Soba
White Nile
Blue Nile
Bahr el Abiad
Bahr el Azrak
Kamlin
The Gezira
Sudan
Wadi el-Mukattam
Wadi el-Melh
Bayuda Steppe
Bayuda Wadi
Safiya
El Kab Oasis
Bir Natron
Eritrea
Gash
Marab
Red Sea
Gulf of Suez
Gulf of Akaba
Peninsula of Sinai
Desert of et-Tih
An Nakhl
Jebel et-Tih
Mt. Sinai
Jeb. Katherine
Ras Mohammed
Jebel Gharib
Arabian Desert
Jebel Dukhan
Jebel Es Shayib
Jebel Fatira
Kosseir
Jebel Abu Tiur
Um Rus
Jebel Zubara
Jebel Hammada
BERENICE
Ras Benas
Um el Ketef B.
Tropic of Cancer
J. Elba
Ras Edineb (Elba)
J. Soturba
Deraheib
Ras Rawaya
Okhana B.
Port Sudan (Mersa Sheikh Barghut)
Tambu
Handub
Suakin
B. of Trinkitat
Trinkitat
Tamai
Kokreb
Ariab
Sinkat
El Teb
Tokar
Thamiam
Talgwareb
J. Ogrein
Adarari
Ras Kasar
Jaffa
Jerusalem
Er Rafa
Dead Sea
Palestine
Syrian Desert
Kaf
Wadi Sirhan
Great Nafad
Arabia
Petra
Ma'an
Akaba
Taba
Darb el Haj
Dat el Haj
Midian
J. Tehama
J. Shar
Muwela
Hejaz
Tebuk
El Akhdar
Harrat el Awerid
Dar el Hamra
J. Anaz
El Haj (Medain Salih)
El Ala
Damgha
El-Wijh
W. Hamd
to Medina
Yambu

Emery Walker sc.

ruins of Thebes on both sides of the river, the temple of Esna, the ruins and tombs of El Kāb, the temple of Edfū, the quarries of Silsila and the temple of Ombos, followed by the inscribed rocks of the First Cataract, the tombs and quarries of Assuan and the temples of Philae.

In Nubia, owing to the poverty of the country and its scanty population, the proportion of monuments surviving is infinitely greater than in Egypt. Here are the temples of Debōd, the temple and quarries of Kertassi, the temples of Kalabsha, Bēt el Wali, Dendūr, Gerf Husēn, Dakka, Maharaka, Es-Sebūʽa, ʽAmāda and Derr, the grottos of Ellesīya, the tombs of Anība, the temple of Ibrīm, the great rock-temples of Abū-Simbel, the temples at Jebel Adda and Wadi Halfa, the forts and temples of Semna, the temples of Amāra (Meroitic) and Sōleb. Beyond are the Ethiopian temples and pyramids of Jebel Barkal and the other pyramids of Napata at Tangassi, &c., the still later pyramids of Meroe at Begerawīa, and the temples of Mesauwarāt and Nāga reaching to within 50 m. of Khartūm.

Outside the Nile valley on the west are temples in the Great and Little Oases and the Oasis of Ammon: on the east quarries and stelae on the Hammamāt road to the Red Sea, and mines and other remains at Wadi Maghāra and Serābīt el Khādim in the Sinai peninsula. In Syria there are tablets of conquest on the rocks at the mouth of the Nahr el Kelb.

Of the collections of Egyptian antiquities in public museums, those of the British Museum, Leiden, Berlin, the Louvre, Turin were already very important in the first half of the 19th century, also in a less degree those of Florence, Bologna and the Vatican. Most of these have since been greatly increased and many others have been created. By far the largest collection in the world is that at Cairo. In America the museums and universities of Boston, Chicago, Philadelphia, San Francisco and New York have collections of greater or less interest. Besides these the museums of Edinburgh, Liverpool, Manchester and Oxford are noteworthy in Great Britain for their Egyptian antiquities, as are those of St Petersburg, Vienna, Marseilles, Munich, Copenhagen, Palermo and Athens; there are also collections in most of the British colonies. Private collections are numerous.

Literary Records.—In estimating the sources of information regarding pre-Christian Egypt, the native sources, first opened to us by Champollion, are infinitely the most important. With very few exceptions they are contemporary with the events which they record. Of the composition of history and the description of their own manners and customs by the Egyptians for posterity, few traces have reached our day. Consequently the information derived from their monuments, in spite of their great abundance, is of a fortuitous character. For one early papyrus that survives, many millions must have perished. If the journals of accounts, the letters and business documents, had come down to us *en masse*, they would no doubt have yielded to research the history and life of Egypt day by day; but those that now represent a thousand years of the Old Kingdom and Middle Kingdom together would not half fill an ordinary muniment chest. A larger proportion of the records on stone have survived, but that an event should be inscribed on stone depends on a variety of circumstances and not necessarily on its importance. There may seem to be a great abundance of Egyptian monuments, but they have to cover an enormous space of time, and even in the periods which are best represented, gravestones recording the names of private persons with a prayer or two are scarcely material for history. A scrap of annals has been found extending from the earliest times to the Vth Dynasty, as well as a very fragmentary list of kings reaching nearly to the end of the Middle Kingdom, to help out the scattered data of the other monuments. As to manners and customs, although we possess no systematic descriptions of them from a native source, the native artists and scribes have presented us with exceptionally rich materials in the painted and sculptured scenes of the tombs from the Old and Middle Kingdoms and the New Empire. For the Deltaic dynasties these sources fail absolutely, the scenes being then either purely religious or conventional imitations of the earlier ones.

Fortunately the native records are largely supplemented by others: valuable information comes from cuneiform literature, belonging to two widely separated periods. The first group is contemporary with the XVIIIth and XIXth Dynasties and consists in the first place of the Tell el Amarna tablets with others related to them, containing the reports of governors of the Syrian possessions of Egypt, and the correspondence of the kings of Babylon, Assur, Mitanni and Khatti (the Hittites) with the Pharaohs. The sequel to this is furnished by Winckler's discovery of documents relating to Rameses II. of the XIXth Dynasty in the Hittite capital at Boghaz Keui (see also HITTITES and PTERIA). The other group comprises the annals and inscriptions of the Assyrian kings Esarhaddon and Assur-bani-pal, recording their invasions of Egypt under the XXVth Dynasty. There are also a few references to Egypt of later date down to the reign of Darius. In Hebrew literature the Pentateuch, the historical books and the prophets alike contain scanty but precious information regarding Egypt. Aramaic papyri written principally by Jews of the Persian period (5th century B.C.) have been found at Syene and Memphis.

Of all the external sources the literary accounts written in Greek are the most valuable. They comprise fragments of the native historian Manetho, the descriptions of Egypt in Herodotus and Diodorus, the geographical accounts of Strabo and Ptolemy, the treatise of Plutarch on Isis and Osiris and other monographs or scattered notices of less importance. Our knowledge of the history of Alexander's conquest, of the Ptolemies and of the Roman occupation is almost entirely derived from Greek sources, and in fact almost the same might be said of the history of Egypt as far back as the beginning of the XXVIth Dynasty. The non-literary Greek remains in papyri and inscriptions which are being found in great abundance throw a flood of light on life in Egypt and the administration of the country from the time of Ptolemy Philadelphus to the Arab conquest. On the other hand, papyri and inscriptions in Latin are of the greatest rarity, and the literary remains in that language are of small importance for Egypt.

Arabic literature appears to be entirely barren of authentic information regarding the earlier condition of the country. Two centuries of unchallenged Christianity had broken almost completely the traditions of paganism, even if the Moslems had been willing to consider them, either in their fanciful accounts of the origins of cities, &c., or elsewhere.

B. *The Country in Ancient Times.*—The native name of Egypt was Kēmi (KM·T), clearly meaning "the black land," Egypt being so called from the blackness of its alluvial soil (cf. Plut. *De Is. et Os.* cap. 33): in poetical inscriptions *Kēmi* is often opposed to *Toshri*, "the red land," referring to the sandy deserts around, which however, would probably be included in the term Kēmi in its widest sense. Egypt is called in Hebrew Mizraim, מִצְרַיִם, possibly a dual form describing the country in reference to its two great natural and historical divisions of Upper Egypt and Lower Egypt: but Mizraim (poetically sometimes Māzōr) often means Lower Egypt, Upper Egypt being named Pathros, "the south land." In Assyrian the name was Muṣri, Miṣri: in Arabic it is Miṣr, مصْر, pronounced Maṣr in the vulgar dialect of Egypt. These names are certainly of Semitic origin and perhaps derive from the Assyrian with the meaning "frontier-land" (see MIZRAIM). Winckler's theory of a separate Muṣri immediately south of Palestine is now generally rejected (see, for instance, Ed. Meyer, *Die Israeliten und ihre Nachbarstämme*, 455). The Greek Αἴγυπτος (Aegyptus) occurs as early as Homer; in the *Odyssey* it is the name of the Nile (masc.) as well as of the country (fem.): later it was confined to the country. Its origin is very obscure (see Pietschmann in Pauly-Wissowa, *Realencyclopädie*, *s.v.* "Aigyptos"). Brugsch's derivation from Hakeptah, a name of the northern capital, Memphis, though attractive, is unconfirmed.

Egypt normally included the whole of the Nile valley from the First Cataract to the sea; pure Egyptians, however, formed the population of Lower Nubia above the Cataract in prehistoric times; at some periods also the land was divided into separate kingdoms, while at others Egypt stretched southward into Nubia, and it generally claimed the neighbouring Libyan deserts and oases on the west and the Arabian deserts on the east to the shore of the Red Sea, with Sinai and the Mediterranean coast as far as Rhinocorura (El Arīsh). The physical features in ancient times were essentially the same as at the present day. The bed of the Nile was lower: it appears to have risen by its own deposits at a rate of about 4 in. in a century. In the north of the Delta, however, there was a sinking of the land, in consequence of which the accumulations on some of the ancient sites there extend below the present sea-level. On the other hand at the south end of the Suez canal the land may have risen bodily, since the head of the Gulf of Suez has been cut off by a bank of rock from the Bitter lakes, which were probably joined to it in former days. The banks of the Nile and the islands in it are subject to gradual but constant alteration—indeed, several ancient sites have been much eroded or destroyed—and the main volume of the stream may in course of time be diverted into what has previously been a secondary channel. According to the classical writers, the mouths or branches of the Nile in the Delta were five in number (seven including two that were artificial): now there are only two. In Upper Egypt the main stream tended as now to flow along the eastern edge of the valley, while to the west was a parallel stream corresponding to the Bahr Yusuf. From the latter a canal or branch led to the Lake of Moeris, which, until the 3rd century B.C., filled the deep depression of the Fayum, but is now represented only by the strongly brackish waters of the Birket el Kerūn, left in the deepest part. The area of alluvial land has probably not changed greatly in historic times. The principal changes that have occurred are due to the grip which civilization has taken upon the land in the course of thousands of years, often weakening but now firmer than ever. In early days no doubt the soil was cultivated in patches, but gradually a great system of canals was organized under the control of the central government, both for irrigation and for transport. The wild flora of the alluvial valley was probably always restricted and eventually was reduced almost to the "weeds of cultivation," when every acre of soil, at one period of the year under water, and at another roasted under the burning heat of a semi-tropical sun, was carefully tilled. The acacia abounded on the borders of the valley, but the groves were gradually cut down for the use of the carpenter and the charcoal-burner. The desert was full of wild life, the balance of nature being preserved by the carnivorous animals preying on the herbivorous; trees watered by soakage from the Nile protected the undergrowth and encouraged occasional rainfall. But this balance was upset by the early introduction of the goat and later of the camel, which destroyed the sapling trees, while the grown ones fell to the axe of the woodcutter. Thus in all probability the Egyptian deserts have become far poorer in animals and trees than they were in primitive times. Much of Lower Egypt was left in a wilder state than Upper Egypt. The marshy lands in the north were the resort of fishermen and fowlers, and the papyrus, the cultivation of which was a regular industry, protected an abundance of wild life. The abandonment of papyrus culture in the 8th century A.D., the neglect of the canals, and the inroads of the sea, have converted much of that country into barren salt marsh, which only years of draining and washing can restore to fertility.

The rich alluvial deposits of the Nile which respond so readily to the efforts of the cultivator ensured the wealth of the country. Moulded into brick, without burning, this black clay also supplied the common wants of the builder, and even the palaces of the greatest kings were constructed of crude brick. For more lasting and ambitious work in temples and tombs the materials could be obtained from the rocks and deserts of the Nile valley. The chief of these was limestone of varying degrees of fineness, composing the cliffs which lined the valley from the apex of the Delta to the neighbourhood of El Kāb; the best quality was obtained on the east side opposite Memphis from the quarries of Turra and Masāra. From El Kāb southward its place was taken by Libyan sandstone, soft and easily worked, but unsuitable for fine sculpture. These two were the ordinary building stones. In the limestone was found the flint or chert used for weapons and instruments in early times. For alabaster the principal quarry was that of Hanub in the desert 10 m. behind El Amarna, but it was obtained elsewhere in the limestone region, including a spot near Alexandria. A hard and fine-grained quartzite sandstone was quarried at Jebel Ahmar behind Heliopolis, and basalt was found thence along the eastern edge of the Delta to near the Wadi Tumilāt. Red granite was obtained from the First Cataract, breccia and diorite were quarried from very early times in the Wadi Hammamāt, on the road from Coptos to the Red Sea, and porphyry was brought, chiefly in Roman times but also in the prehistoric age, from the same region at Jebel Dokhān.

Egypt was poor in metals. Gold was obtained chiefly from Nubia: iron was found in small quantities in the country and at one time was worked in the neighbourhood of Assuān. Some copper was obtained in Sinai. Of stones that were accounted precious Sinai produced turquoise and the Egyptian deserts garnet, carnelian and jasper.

The native supply of wood for industrial purposes was exceedingly bad: there was no native wood long enough and straight enough to be used in joiners' work or sculpture without fitting and patching: palm trees were abundant, and if the trees could be spared, their split stems could be used for roofing. For boatbuilding papyrus stems and acacia wood were employed, and for the best work cedar-wood was imported from Lebanon.

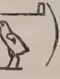
Egypt was isolated by the deserts and the sea. The Nile valley afforded a passage by ship or on foot into Nubia, where, however, little wealth was to be sought, though gold and rarities from the Sudan, such as ivory and ebony, came that way and an armed raid could yield a good spoil in slaves and cattle. The poverty-stricken and barbarous Nubians were strong and courageous, and gladly served in Egypt as mercenary soldiers and police. Through the oases also ran paths to the Sudan by which the raw merchandise of the southern countries could be brought to Egypt. Eastward, roads led through the Arabian mountains to the Red Sea, whence ships made voyages to the incense-bearing land of Puoni (Punt) on the Somali coast of Africa, rich also in gold and ivory. The mines of Sinai could be reached either by sea or by land along the route of the Exodus. The roads to Syria skirted the east border of the Delta and then followed the coast from near Pelusium through El Arīsh and Gaza. A secondary road branched off through the Wadi Tumilāt, whence the ways ran northwards to Syria and southwards to Sinai. On the Libyan side the oasis of Sīwa could be reached from the Lake of Moeris or from Terrana (Terenuthis), or by the coast route which also led to the Cyrenaica. The Egyptians had some traffic on the Mediterranean from very remote times, especially with Byblus in Phoenicia, the port for cedar-wood.

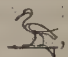
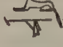
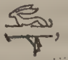
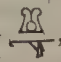
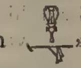
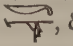
Of the populations surrounding Egypt the negroes (Neḥsi) in the south (Cush) were the lowest in the scale of civilization: the people of Puoni and of Libya (the Tehen, &c.) were pale in colour and superior to the negroes, but still show no sign of a high culture. The Syrians and the Keftiu, the latter now identified with the Cretans and other representatives of the Aegean civilization, are the only peoples who by their elaborate clothing and artistic products reveal themselves upon the ancient Egyptian monuments as the equals in culture of the Egyptian nation.

The Egyptians seem to have applied no distinctive name to themselves in early times: they called themselves proudly *rōmi* (RMṮW), *i.e.* simply "men," "people," while the despised races around them, collectively Ḫ'SWT, "desert-peoples," were distinguished by special appellations. The races of mankind, including the Egyptians, were often called the Nine Archers. Ultimately the Egyptians, when their insularity disappeared under the successive dominations of Ethiopia, Assyria and Persia, described themselves as *rem-n-Kēmi*, "men of Egypt." Whence the population of Egypt as we trace it in prehistoric and historic times came, is not certain. The early civilization of Egypt shows remarkable coincidences with that of Babylonia, the language is of a Semitic type, the religion may well be a compound of a lower African and a higher Asiatic order of ideas. According to the evidence of the mummies, the Egyptians were of slender build, with dark hair and of Caucasian type. Dr Elliott Smith, who has examined thousands of skeletons and mummies of all periods, finds that the prehistoric population of Upper Egypt, a branch of the North African-Mediterranean-Arabian race, changed with the advent of the dynasties to a stronger type, better developed than before in skull and muscle. This was apparently due to admixture with the Lower Egyptians, who themselves had been affected by Syrian immigration. Thereafter little further change is observable, although the rich lands of Egypt must have attracted foreigners from all parts. The Egyptian artists of the New Empire assigned distinctive types of feature as well as of dress to the different races with which they came into contact, Hittites, Syrians, Libyans, Bedouins, negroes, &c.

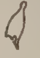
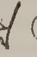
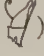
The people of Egypt were not naturally fierce or cruel. Intellectually, too, they were somewhat sluggish, careless and unbusinesslike. In the mass they were a body of patient labourers, tilling a rich soil, and hating all foreign lands and ways. The wealth of their country gave scope for ability within the population and also attracted it from outside: it enabled the kings to organize great monumental enterprises as well as to arm irresistible raids upon the inferior tribes around. Urged on by necessity and opportunity, the Egyptians possessed sufficient enterprise and originating power to keep ahead of their neighbours in most departments of civilization, until the more warlike empires of Assyria and Persia overwhelmed them and the keener intellects of the Greeks outshone them in almost every department. The debt of civilization to Egypt as a pioneer must be considerable, above all perhaps in religious thought. The moral ideals of its nameless teachers were high from an early date: their conception of an after-life was exceedingly vivid: the piety of the Egyptians in the later days was a matter of wonder and scoffing to their contemporaries; it is generally agreed that certain features in the development of Christianity are to be traced to Egypt as their birthplace and nidus.

For researches into the ethnography of Egypt and the neighbouring countries, see W. Max Müller, *Asien und Europa nach den altäg. Inschriften* (Leipzig, 1893), *Egyptological Researches* (Washington, 1906); for measurements of Egyptian skulls, Miss Fawcett in *Biometrika* (1902); A. Thomson and D. Randall-MacIver, *The Ancient Races of the Thebaid* (Oxford, 1905) (cf. criticisms in *Man*, 1905; and for comparisons with modern measurements, C. S. Myers, *Journ. Anthropological Institute*, 1905, 80). W. Flinders Petrie has collected and discussed a series of facial types shown in prehistoric and early Egyptian sculpture, *Journal Anthropological Institute*, 1901, 248. For Elliott Smith's results see *The Cairo Scientific Journal*, No. 30, vol. iii., March 1909.

Divisions.—In ancient times Egypt was divided into two regions, representing the kingdoms that existed before Menes. Lower Egypt, comprising the Delta and its borders, formed the "North Land," *To-meh*, and reached up the valley to include Memphis and its province or "nome," while the remainder of the Egyptian Nile valley was "the South,' *Shema* (ŠM'W ). The south, if only as the abode of the sun, always had the precedence over the north in Egypt, and the west over the east. Later the two regions were known respectively as P-to-rēs (Pathros), "the south land," and P-to-meh, "the north land." In practical administration this historic distinction was sometimes observed, at others ignored, but in religious tradition it had a firm hold. In Roman times a different system marked off a third region, namely Middle Egypt, from the point of the Delta southward. Theoretically, as its name Heptanomis implies, this division contained seven nomes, actually from the Hermopolite on the south to the Memphite on the north (excluding the Arsinoite according to the papyri). Some tendency to this existed earlier. Egypt to the south of the Heptanomis was the Thebais, called P-tesh-en-Ne, "the province of Thebes," as early as the XXVIth Dynasty. The Thebais was much under the influence of the Ethiopian kingdom, and was separated politically in the troubled times of the XXIIIrd Dynasty, though the old division into Upper and Lower Egypt was resumed in the XXVIth Dynasty.

If Upper and Lower Egypt represented ancient kingdoms, the nomes have been thought to carry on the traditions of tribal settlements. They are found in inscriptions as early as the end of the IIIrd Dynasty, and the very name of Thoth, and that of another very ancient god, are derived from those of two contiguous nomes in Lower Egypt. The names are written by special emblems placed on standards, such as an ibis , a jackal , a hare , a feathered crown , a sistrum , a blade , &c., suggesting tribal badges. Some nomes having a common badge but distinguished as "nearer" or "further," *i.e* "northern" or "southern," have simply been split, as they are contiguous: in one case, however, corresponding "eastern" and "western" Harpoon nomes are widely separated on opposite sides of the Delta. In a few cases, such as "the West," "the Beginning of the East," it is obvious that the names are derived solely from their geographical situation. It is quite possible that the divisions are geographical in the main, but it seems likely that there were also religious, tribal and other historical reasons for them. How their boundaries were determined is not certain: in Upper Egypt in many cases a single nome embraced both sides of the river. The number and nomenclature of the nomes were never absolutely fixed. In temples of Ptolemaic and Roman age the full series is figured presenting their tribute to the god, and this series approximately agrees with the scattered data of early monuments. The normal number of the nomes in the sacred lists appears to be 42, of which 22 belonged to Upper Egypt and 20 to Lower Egypt. In reality again these nome-divisions were treated with considerable freedom, being split or reunited and their boundaries readjusted. Each nome had its metropolis, normally the seat of a governor or nomarch and the centre of its religious observances. During the New Empire, except at the beginning, the nomes seem to have been almost entirely ignored: under the Deltaic dynasties (except of course in the traditions of the sacred writing) they were named after the metropolis, as "the province (*tosh*) of Busiris," "the province of Sais," &c.: hence the Greek names Βουσιρίτης νομός, &c. The Arsinoite nome was added by the Ptolemies after the draining of the Lake of Moeris (*q.v.*), and in the later Ptolemaic and the Roman times many changes and additions to the list must have been made. In Christian texts the "provinces" appear to have been very numerous.

See H. Brugsch, *Geographische Inschriften altägyptischer Denkmäler* (3 vols., Leipzig, 1857–1860), and for the nomes on monuments of the Old Kingdom, N. de G. Davies, *Mastaba of Ptahhetep and Akhethetep* (London, 1901), p. 24 et sqq.

King and Government.—The government of Egypt was monarchical. The king (for titles see PHARAOH) was the head of the hierarchy: he was himself divine and is often styled "the good god," and was the proper mediator between gods and men. He was also the dispenser of office, confirmer of hereditary titles and estates and the fountain of justice. Oaths were generally sworn by the "life" of the king. The king wore special head-dresses and costumes, including the crowns of Upper  and Lower Egypt  (often united ), and the cobra upon his forehead. Females were admitted to the succession, but very few instances occur before the Cleopatras. The most notable Pharaonic queen in her own right was Hatshepsut in the XVIIIth Dynasty, but her reign was ignored by the later rulers even of her own family. A certain Nitōcris of about the VIIIth Dynasty and Scēmiophris of the XIIth Dynasty are in the lists, but are quite obscure. Yet inheritance through the female line was fully recognized, and marriage with the heiress princess was sought by usurpers to legitimate the claims of their offspring.

Often, especially in the XIIth Dynasty, the king associated his heir on the throne with him to ensure the succession.

From time to time feudal conditions prevailed: the great landowners and local princes had establishments of their own on the model of the royal court, and were with difficulty kept in order by the monarch. In rare cases during the Middle Kingdom (inscriptions in the tomb of Ameni at Beni Hasan, graffiti in the quarries of Hanub) documents were dated in the years of reign of these feudatory nobles. Under the Empire all power was again centralized in the hands of the Pharaoh. The apportionment of duties amongst the swarm of officials varied from age to age, as did their titles. Members of the royal family generally held high office. Under the Empire Egypt was administered by a vast bureaucracy, at the head of which, responsible to the king, was the vizier, or sometimes two viziers, one for Upper Egypt, the other for Lower Egypt (in which case the former, stationed at Thebes, had the precedence). The duties of the vizier and the procedure in his court are detailed in a long inscription which is repeated in three tombs of the XVIIIth Dynasty at Thebes (Breasted, *Records*, ii. § 663 et seqq.). The strictest impartiality was enjoined upon him, and he was advised to hold aloof from the people in order to preserve his authority. The office of vizier was by no means a sinecure. All the business of the country was overlooked by him—treasury, taxation, army, law-courts, expeditions of every kind. Egypt was the vast estate of Pharaoh, and the vizier was the steward of it.

Army.—The youth of Egypt was liable to be called upon for service in the field under the local chiefs. Their training consisted of gymnastic and warlike exercises which developed strength and discipline that would be as useful in executing public works and in dragging large monuments as in strictly military service. They were armed in separate companies with bows and arrows, spears, daggers and shields, and the officers carried battle-axes and maces. The army, commanded in chief by Una under the VIth Dynasty for raids in Sinai or Palestine, comprised levies from every part of Egypt and from Nubia, each under its own leader. Under the New Empire, when Egypt was almost a military state, the army was a more specialized institution, the art of war in siege and strategy had developed, divisions were formed with special standards, there were regiments armed with battle-axes and scimitars, and chariots formed an essential part of the host. Egyptian cavalry are not represented upon the monuments, and we hear little of such at any time. Herodotus divides the army into two classes, the Calasiries and the Hermotybies; these names, although he was not aware of it, mean respectively horse- and foot-soldiers, but it is possible that the former name was only traditional and had characterized those who fought from chariots, a mode of warfare that was obsolete in Herodotus's own day: as a matter of fact both classes are said to have served on the warships of Xerxes' fleet.

Arms and Armour.—From the contents of graves and other remains, and the sculptured and painted scenes, an approximate idea can be obtained of the weapons of the Egyptians at all periods from the prehistoric age onwards. Only a few points are here noted. Stone mace-heads are found in the earliest cemeteries, together with flint implements that may be the heads of lances, &c., and thin leaf-shaped daggers of bronze. Stone arrow-heads are common on the surface of the desert. Thin bronze arrow-heads appear at an early date; under the Empire they are stouter and furnished with a tang, and later still, towards the Greek period, they are socketed (often three-sided), or, if of iron, still tanged. The wooden club, a somewhat primitive weapon, seems to have been considered characteristic of foreigners from very early times, and, in scenes dating from the Middle Kingdom, belong principally to the levies from the surrounding barbarians. The dagger grew longer and stouter, but the sword made its appearance late, probably first in the hands of the *Sherdana* (Sardinian?), mercenaries of the time of Rameses II. A peculiar scimitar, *khopsh* , is characteristic of the Empire. Slings are first heard of in Egyptian warfare in the 8th century B.C. The chariot was doubtless introduced with the horse in the Hyksos period; several examples have been discovered in the tombs of the New Kingdom. Shields were covered with ox-hide and furnished with round sighting-holes above the middle. Cuirasses of bronze scales were worn by the kings and other leaders. The linen corslets of the Egyptian soldiery at a later time were famous, and were adopted by the Persian army. According to the paintings of the Middle Kingdom in the tombs of Beni Hasan, the battlements of brick fortresses were attacked and wrenched away with long and massive spears. No siege engines are depicted, even in the time of the Empire, and the absence of original representations after the XXth Dynasty renders it difficult to judge the advances made in the art of war during the first half of the last millennium B.C. The inscription of Pankhi, however, proves that in the 8th century approaches and towers were raised against the walls of besieged cities.

Priesthood.—The priesthood was in a great degree hereditary, though perhaps not essentially so. In each temple the priests were divided into four orders (until Ptolemy Euergetes added a fifth), each of which served in turn for a lunar month under the chief priest or prophet. They received shares of the annual revenues of the temple in kind, consisting of linen, oil, flesh, bread, vegetables, wine, beer, &c. The "divine servants" or "prophets" had residences assigned them in the temple area In late times the priests were always shaven, and paid the greatest attention to cleanliness and ceremonial purity already implied in their ancient name. Fish and beans then were abhorred by them. Among the priests were the most learned men of Egypt, but probably many were illiterate. For the Hellenistic period see W. Otto, *Priester und Tempel im hellenistichen Ägypten* (Leipzig, 1905 foll.).

For ancient Egyptian life and civilization in all departments, the principal work is Ad. Erman, *Life in Ancient Egypt*, translated by H. M. Tirard (London, 1894), (the original *Ägypten und ägyptisches Leben im Altertum*, 2 vols., was published in 1885 at Tübingen); G. Maspero, *Life in Ancient Egypt and Assyria*, translated by A. P. Morton (London, 1892), (*Lectures historiques*, Paris, 1890); also J. G. Wilkinson, *Manners and Customs of the Ancient Egyptians*, new ed. by S. Birch (3 vols., London, 1878). The annual *Archaeological Reports* of the Egypt Exploration Fund contain summaries of the work done each year in the several departments of research.

Of the innumerable publications of Egyptian monuments, scenes and inscriptions, C. R. Lepsius, *Denkmäler aus Ägypten und Äthiopien* (Berlin, 1849–1859), and Memoirs of the *Archaeological Survey* of the Egypt Exploration Fund, may be specified. For antiquities in museums there is the sumptuous *Catalogue général des antiquités égyptiennes du musée de Caire*; for excavations the Memoirs of the Egypt Exploration Fund, of the Research Account, of the British School of Archaeology, of the Liverpool School of Archaeology, of the Deutsche Orient-Gesellschaft, of the Hearst Egyptian Expedition, of the Theodore M. Davis excavations (Tombs of the Kings).

Trade and Money.—There is little evidence to show how buying and selling were carried on in ancient Egypt. A unique scene in a tomb of the IVth Dynasty, however, shows men and women exchanging commodities against each other—fish, fish-hooks, fans, necklaces, &c. Probably this was a market in the open air such as is held weekly at the present time in every considerable village. Rings of metal, gold, silver and bronze played some part in exchange, and from the Hyksos period onwards formed the usual standards by which articles of all kinds might be valued. In the XVIIIth Dynasty the value of meat, &c., was reckoned in gold; somewhat later copper seems the commonest standard, and under the Deltaic dynasties silver. But barter must have prevailed much longer. The precious metals were kept in the temples under the tutelage of the deities. During the XXVth and XXVIth Dynasties silver of the treasury of Harshafe (at Heracleopolis Magna) was commonly prescribed in contracts, and in the reign of Darius we hear of silver of the treasury of Ptah (at Memphis). Aryandes, satrap of Egypt, is said by Herodotus to have been punished by Darius for coining money of equal fineness with that of the king in Persia: thus coinage had then begun in Egypt. But the early coins that have been found there are mainly Greek, and especially Athenian, and it was not until the introduction of a regular currency in the three metals under the Ptolemies that much use was made of coined money.

Corn was the staple produce of Egypt and may have been exported regularly, and especially when there was famine in other countries. In the Tell el-Amarna letters the friendly kings ask Pharaoh for "much gold." Papyrus rolls and fine linen were good merchandise in Phoenicia in the 10th century B.C. From the earliest times Egypt was dependent on foreign countries to supply its wants in some degree. Vessels were fashioned in foreign stone as early as the Ist Dynasty. All silver must have been imported, and all copper except a little that the Pharaohs obtained from the mines of Sinai. Cedar wood was brought from the forests of Lebanon, ivory, leopard skins and gold from the south, all kinds of spices and ingredients of incense from Somaliland and Arabia, fine linen and beautifully worked vessels from Syria and the islands. Such supplies might be obtained by forcible raiding or as tribute of conquered countries, or perhaps as the free offerings of simple savages awed by the arrival of ships and civilized well-armed crews, or again by royal missions in which rich gifts on both sides were exchanged, or lastly by private trading. For deciding how large a share was due to trade, there is almost no evidence. But there are records of expeditions sent out by the king to obtain the rarities of different countries, and the hero of the Story of the Shipwrecked Sailor was upon this quest. Egyptian objects of the age of the XVIIIth Dynasty are found in the Greek islands and on the mainland among remains of the Mycenaean epoch, and on the other hand the products of the workshops of Crete and other centres of that culture are found in Egypt and are figured as "tribute of the Keftiu" in the tomb-paintings, though we have no information of any war with or conquest of that people. It must be a case of trade rather than tribute here and in like instances. According to the papyrus of Unamun at the end of the weak XXth Dynasty payment for cedar was insisted on by the king of Byblus from the Egyptian commissioner, and proofs were shown to him of payment having been made even in the more glorious times of Egypt. Trade both internal and external must have been largely in the hands of foreigners. It is impossible to say at what period Phoenician traffic by sea with Egypt began, but it existed as early as the IIIrd Dynasty. In the time of Herodotus much wine was imported from Syria and Greece. Amasis II. (*c.* 570 B.C.) established Naucratis as the centre of Greek trade in Egypt. Financial transactions by Jews settled at the southern extremity of Egypt, at Assuan, are found as early as the reign of Artaxerxes.

Hunting, Fishing, &c.—In the desert hunting was carried on by hunters with bows and arrows, dogs and nets to check the game. Here in ancient times were found the oryx, addax, ibex, gazelle, bubale, ostrich, hyena and porcupine, more rarely the wild ox and wild sheep (*O. tragelaphus*). All of these were considered fit for the table. The lion, leopard and jackal were not eaten. Pigeons and other birds were caught in traps, and quails were netted in the fields and on the sea-shore. In the papyrus marshes the hippopotamus was slain with harpoons, the wild boar, too, was probably hunted, and the sportsman brought down wild-fowl with the boomerang, or speared or angled for fish. Enormous quantities of wild-fowl of many sorts were taken in clap-nets, to be preserved in jars with salt. Fish were taken sometimes in hand-nets, but the professional fishermen with their draw-nets caught them in shoals. The fishing industry was of great importance: the annual catch in the Lake of Moeris and its canal formed an important part of the Egyptian revenue. The fish of the Nile, which were of many kinds (including mullets, &c., which came up from the sea), were split and dried in the sun: others were salted and so preserved. A supply of sea fish would be obtained off the coast of the Delta and at the mouth of the Lake Serbonis.

Farming, Horticulture, &c.—The wealth of Egypt lay in its agriculture. The regular inundations, the ease of irrigating the rich alluvial flats, and the great heat of the sun in a cloudless sky, while limiting the natural flora, gave immense opportunities to the industrious farmer. The normal rise of the Nile was sixteen cubits at the island of Roda, and two cubits more or less caused a failure of the harvest. In the paintings we see gardens irrigated by handbuckets and *shadufs*; the latter (buckets hung on a lever-pole) were probably the usual means of raising water for the fields in ancient times, and still are common in Egypt and Nubia, although water-wheels have been known since the Ptolemaic age, if not earlier. Probably a certain amount of cultivation was possible all the year round, and there was perhaps a succession of harvests; but there was a pause after the main harvests were gathered in by the end of April, and from then till June was the period in which taxes were collected and loans were repaid. Under the Ptolemaic régime the records show a great variety of crops, wheat and barley being probably the largest (see B. P. Grenfell and A. S. Hunt, *Tebtunis Papyri*, i. 560; J. P. Mahaffy and J. G. Smyly, *Petrie Papyri*, iii. p. 205). Earlier the *bōti*, in Greek ὀλύρα (spelt? or durra?) was the main crop, and earlier again inferior varieties of wheat and barley took the lead, with *bōti* apparently in the second place. The bread was mainly made of *bōti*, the beer of barley. There were green crops such as clover, and lentils, peas, beans, radishes, onions, lettuces (as a vegetable and for oil), castor oil and flax were grown. The principal fruit trees were the date palm, useful also for its wood and fibre, the pomegranate, fig and fig-sycamore. The vine was much cultivated in early times, and the vintage is a subject frequently depicted. Later the wine of the Mareotic region near Alexandria was celebrated even amongst Roman epicures. Papyrus, which grew wild in the marshes, was also cultivated, at least in the later ages: its stems were used for boat-building, and according to the classical authors for rope-making, as well as for the famous writing material. About the 8th century A.D. paper drove the latter out of use, and the papyrus plant quickly became extinct. The Indian lotus described by Herodotus is found in deposits of the Roman age. Native lotuses, blue and white, were much used for decoration in garlands, &c., also the chrysanthemum and the corn-flower.

See chapters on plant remains by Newberry in W. M. F. Petrie, *Hawara, Biahmu, and Arsinoe* (London, 1889); *Kahun, Gurob and Hawara* (1890); V. Loret, *La Flore pharaonique* (2nd ed., Paris, 1892), and the authorities there cited.

Domestic Animals and Birds.—The farmer kept up a large stock of animals: in the houses there were pets and in the temples sacred creatures of many kinds. Goats browsed on the trees and herbage at the edge of the desert. Sheep of a peculiar breed with horizontal twisted horns and hairy coat are figured on the earliest monuments: a more valuable variety, woolly with curved horns, made its appearance in the Middle Kingdom and pushed out the older form: sheep were driven into the ploughed fields to break the clods and trample in the seed. The oxen were long-horned, short-horned and polled. They drew the plough, trampled the corn sheaves round the circular threshing floor, and were sometimes employed to drag heavy weights. The pig is rarely figured and was less and less tolerated as the Egyptians grew in ceremonial purity. A variety of wild animals caught in the chase were kept alive and fed for slaughter. Geese and ducks of different sorts were bred in countless numbers by the farmers, also pigeons and quails, and in the early ages cranes. The domestic fowl was unknown in Egypt before the Deltaic dynasties, but Diodorus in the first century B.C. describes how its eggs were hatched artificially, as they are at the present day. Bee-keeping, too, must have been a considerable industry, though dates furnished a supply of sweetening material.

The farm lands were generally held at a rent from an overlord, who might according to times and circumstances be the king, a feudal prince, or a temple-corporation. The stock also might be similarly held, or might belong to the farmers. The ordinary beast of burden, even in the desert, was the ass. The horse seems to have been introduced with the chariot during the Hyksos period. It is thought that the camel is shown in rude figures of the earliest age, but it is scarcely traceable again before the XXVIth Dynasty. In the Ptolemaic period it was used for desert transport and gradually became common. Strange to say, it is only very rarely that men are depicted riding on animals, and never before the New Kingdom.

The dog was of many varieties as early as the XIIth Dynasty, when the greyhound and turnspit and other well-marked forms are seen. The cat was sometimes trained by the sportsman to catch birds. Monkeys were commonly kept as pets. The sacred beasts in the various temples, tame as far as possible, were of almost every conceivable variety, from the vulture to the swallow or the goose, from the lion to the shrew-mouse, from the hippopotamus to the sheep and the monkey, from the crocodile to the tortoise and the cobra, from the carp to the eel; the scorpion and the scarab beetle were perhaps the strangest in this strange company of deities.

For agriculture see J. J. Tylor and F. Ll. Griffith, *The Tomb of Paheri* at El Kab, in the XIth Memoir of the Egypt Exploration Fund. Together with hunting and fishing it is illustrated in many of the Memoirs of the *Archaeological Survey* of the same society. See also Lortet and M. C. Gaillard, *La Faune momifiée de l'ancienne Égypte* (Lyons, 1905).

Law.—No code of Egyptian laws has come down to us. Diodorus names a series of Egyptian kings who were law-givers, ending with Amasis (Aḥmosi II.) and Darius. Frequent reference is made in inscriptions to customs and laws which were traditional, and perhaps had been codified in the sacred books. From time to time regulations on special points were issued by royal decree: a fragment of such a decree, directed by Horemheb of the XVIIIth Dynasty against oppression of the peasantry by officials and prescribing penalties, is preserved on a stela in the temple of Karnak, and enactments of Ptolemy Philadelphus and Euergetes II. are known from papyri. In the Ptolemaic age matters arising out of native contracts were decided according to native law by λαοκριταί, while travelling courts of *χρηματισταί* representing the king settled litigation on Greek contracts and most other disputes. Affairs were decided in accordance with the code of the country, *τῆς χώρας νόμοι*, the Greek code, *πολιτικοὶ νόμοι*, modelled, it would seem, on Athenian law or royal decrees, *προστάγματα*. "Native" law was still quoted in Roman times, but the significance of the expression remains to be ascertained. In ancient Egypt petitions were sent to the king or the great feudal landowners in whose territory the petitioner or his adversary dwelt or the injury was committed: courts were composed of royal or feudal officials, or in the New Kingdom of officials or responsible citizens. The right of appeal to the king probably existed at all times. The statement of the case and the evidence were frequently ordered to be put in writing. the evidence was supported by oath: in criminal cases, such as the harem conspiracy against Rameses III., torture of the accused was resorted to to extract evidence, the bastinado being applied on the hands and the feet. Penalties in the New Kingdom were death (by starvation or self-inflicted), fines, beating with a certain number of blows so as to open a specified number of wounds on as many different parts of the body (*e.g.* five wounds, *i.e.* on hands, feet and back?), also cutting off the nose with banishment to Nubia or the Syrian frontier. In the times of the Old Kingdom decapitation was in use, and a decree exists of the Middle Kingdom degrading a nomarch of Coptos and his family for ever from his office and from the priesthood on account of services to a rival pretender.

As to legal instruments: contracts agreed to in public or before witnesses and written on papyrus are found as early as the Middle Kingdom and perhaps belong to all historic times, but are very scarce until the XXVth Dynasty. Two wills exist on papyrus of the XIIth Dynasty, but they are isolated, and such are not again found among native documents, though they occur in Greek in the Ptolemaic age. The virtual will of a high priest of Ammon under the XXIInd Dynasty is put in the form of a decree of the god himself.

From the time of the XXVth Dynasty there is a great increase in written documents of a legal character, sales, loans, &c., apparently due to a change in law and custom; but after the reign of Darius I. there is again almost a complete cessation until the reign of Alexander, probably only because of the disturbed condition of the country. Under Ptolemy Philadelphus Greek documents begin to be numerous: under Euergetes II. (Physcon) demotic contracts are particularly abundant, but they cease entirely after the first century of Roman rule.

Marriage contracts are not found earlier than the XXVIth Dynasty. Women had full powers of inheritance (though not of dealing with their property), and succession through the mother was of importance. In the royal line there are almost certain instances of the marriage of a brother with an heiress-sister in Pharaonic times: this was perhaps helped by the analogy of Osiris and Isis: in the Ptolemaic dynasty it was an established custom, and one of the stories of Khamois, written in the Ptolemaic age, assumes its frequency at a very remote date. It would be no surprise to find examples of the practice in other ranks also at an early period, as it certainly was prevalent in the Hellenistic age, but as yet it is very difficult to prove its occurrence. The native contracts with the wife gave to her child all the husband's property, and divorce or separation was provided for, entailing forfeiture of the dowry. The "native law" of Roman times allowed a man to take his daughter away from her husband if the last quarrelled with him.

Slavery is traceable from an early date. Private ownership of slaves, captured in war and given by the king to their captor or otherwise, is certainly seen at the beginning of the XVIIIth Dynasty. Sales of slaves occur in the XXVth Dynasty, and contracts of servitude are found in the XXVIth Dynasty and in the reign of Darius, appearing as if the consent of the slave was then required. Presumably at this late period there were eunuchs in Egypt, though adequate evidence of their existence there is not yet forthcoming. They must have originated among a more cruel people. That circumcision (though perhaps not till puberty) was regularly practised is proved by the mummies (agreeing with the testimony of Herodotus and the indications of the early tomb sculptures) until an edict of Hadrian forbade it: after that, only priests were circumcised.

See A. H. Gardiner, *The Inscription of Mes* (from Sethe's *Untersuchungen zur Geschichte und Altertumskunde Ägyptens,* iv.); J. H. Breasted, *Ancient Records*, Egypt, *passim*, esp. i. § 190, 535 et seqq., 773, ii. 54, 671, iii. 45, 367, iv. 416, 499, 795; F. Ll. Griffith, *Catalogue of the John Rylands Demotic Papyri*; B. P. Grenfell and J. P. Mahaffy, *Revenue Laws of Philadelphus* (Oxford, 1896); B. P. Grenfell and A. S. Hunt, *Tebtunis Papyri*, part i. (London, 1902); Bouché-Leclercq, *Histoire des Lagides*, tome iv. (Paris, 1907).

Science.—The Egyptians sought little after knowledge for its own sake: they might indulge in religious speculation, but their science was no more than the knowledge of practical methods. Undoubtedly the Egyptians acquired great skill in the application of simple means to the fulfilment of the most difficult tasks. But the books that have come down to us prove how greatly their written theoretical knowledge fell short of their practical accomplishment. The explanation of the fact may partly be that the mechanical and other discoveries of the most ingenious minds among them, when not in constant requisition by later generations, were misunderstood or forgotten, and even in other cases were preserved only as rules of thumb by the craftsmen and experts, who would jealously hide them as secrets of trade. Men of genius were not wanting in the long history of Egypt; two doctors, Imhōtp (Imuthes), the architect of Zoser, in the IIIrd Dynasty, and Amenōphis (Amenhotp), son of Hap, the wise scribe under Amenōphis III. in the XVIIIth, eventually received the honours of deification; and Hardadf under Cheops of the IVth Dynasty was little behind these two in the estimation of posterity. Such men, who, capable in every field, designed the Great Pyramids and bestowed the highest monumental fame on their masters, must surely have had an insight into scientific principles that would hardly be credited to the Egyptians from the written documents alone.

Mathematics.—The Egyptian notation for whole numbers was decimal, each power of 10 up to 100,000 being represented by a different figure, on much the same principle as the Roman numerals. Fractions except $\frac{2}{3}$ were all primary, *i.e.* with the numerator unity: in order to express such an idea as $\frac{9}{13}$ the Egyptians were obliged to reduce it to a series of primary fractions through double fractions $\frac{2}{13}+\frac{2}{13}+\frac{2}{13}+\frac{2}{13}+\frac{1}{13}=4(\frac{1}{8}+\frac{1}{52}+\frac{1}{104})+\frac{1}{13}=\frac{1}{2}+\frac{2}{13}+\frac{1}{26}=\frac{1}{2}+\frac{1}{8}+\frac{1}{26}+\frac{1}{52}+\frac{1}{104}$; this operation was performed in the head, only the result being written down, and to facilitate it tables were drawn up of the division of 2 by odd numbers. With integers, besides adding and subtracting, it was easy to double and to multiply by 10: multiplying and dividing by 5 and finding the $1\frac{1}{2}$ value were also among the fundamental instruments of calculation, and all multiplication proceeded by repetitions of these processes with addition, *e.g.* $9\times7=(9\times2\times2)+(9\times2)+9$. Division was accomplished by multiplying the divisor until the dividend was reached; the answer being the number of times the divisor was so multiplied. Weights and measures proceeded generally on either a decimal or a doubling system or a combination of the two. Apart from a few calculations and accounts, practically all the materials for our knowledge of Egyptian mathematics before the Hellenistic period date from the Middle Kingdom.

The principal text is the Rhind Mathematical Papyrus in the British Museum, written under a Hyksos king *c.* 1600 B.C.; unfortunately it is full of gross errors. Its contents fall roughly into the following scheme, but the main headings are not shown in the original:—

I. *Arithmetic.*—A. Tables and rule to facilitate the employment of fractions.

- (*a*) Table of the divisions of 2 by odd numbers from 3 to 99 (*e.g.* $2\div11=\frac{1}{6}+\frac{1}{66}$), see above.
- (*b*) Conversions of compound fractions (*e.g.* $\frac{2}{3}\times\frac{1}{3}=\frac{1}{6}+\frac{1}{18}$), with rule for finding $\frac{2}{3}$ of a fraction.

B. The "bread" calculation—a division by 10 of the units 1 to 9.

C. "Completing" calculations.

- (*a*) Adding multiples of a fraction to produce a more convenient fraction (perhaps connected with the use of palms and cubits in decoration in a proportion based on the number 8).
- (*b*) Finding the difference between a given fraction and a given whole number.

D. *Ahe*[1] or "mass"-problems (of the form $x+\frac{x}{n}=a$, to find the *ahe* x).

E. *Tooun*- problems (*tooun*, "rising," seems to be the difference between the shares of two sets of persons dividing an amount between them on a lower and a higher scale).

II. *Geometry.*—A. Measurement of volume (amounts of grain in cylindrical and rectangular spaces of different dimensions and *vice versa*).

B. Measurement of area (areas of square, circular, triangular, &c., fields).

C. Proportions of pyramids and other monuments with sloping sides.

III. *Miscellaneous problems* (and tables) such as are met with in bread-making, beer-making, food of live-stock, &c. &c.

The method of estimating the area of irregular fields and the cubic contents of granaries, &c., is very faulty. It would be interesting to find material of later date, such as Pythagoras is reported to have studied.

See A. Eisenlohr, *Ein mathematisches Handbuch der alten Ägypter* (Leipzig, 1877); F. Ll. Griffith, "The Rhind Mathematical Papyrus" in *Proceedings of the Soc. of Biblical Archaeology*, Nov. 1891, March, May and June 1894.

Astronomy.—The brilliant skies of day and night in Egypt favoured the development of astronomy. A papyrus of the Roman period in the British Museum attributes the invention of horoscopes to the Egyptians, but no early instance is known. Professor Petrie has indeed suggested, chiefly on chronological grounds, that a table of stars on the ceiling of the Ramesseum temple and another in the tomb of Rameses VI. (repeated in that of Rameses IX. without alteration) were horoscopes of Rameses II. and VI.; but Mahler's interpretation of the tables on which this would rest appears to be false. Astronomy played a considerable part in religious matters for fixing the dates of festivals and determining the hours of the night. The titles of several temple books are preserved recording the movements and phases of the sun, moon and stars. The rising of Sothis (Sirius) at the beginning of the inundation was a particularly important point to fix in the yearly calendar (see below, § "Chronology"). The primitive clock[2] of the temple time-keeper (horoscopus), consisting of a ὡρολόγιον καὶ φοίνικα (Clemens Alex. *Strom.*, vi. 4. 35), has been identified with two inscribed objects in the Berlin Museum; these are a palm branch with a sight-slit in the broader end, and a short handle from which a plummet line was hung. The former was held close to the eye, the latter in the other hand, perhaps at arm's length. From the above-mentioned tables of culmination in the tombs of Rameses VI. and IX. it seems that for fixing the hours of the night a man seated on the ground faced the horoscopus in such a position that the line of observation of the Pole-star passed over the middle of his head. On the different days of the year each hour was determined by a fixed star culminating or nearly culminating in it, and the position of these stars at the time is given in the tables as "in the centre," "on the left eye," "on the right shoulder," &c. According to the texts, in founding or rebuilding temples the north axis was determined by the same apparatus, and we may conclude that it was the usual one for astronomical observations. It is conceivable that in ingenious and careful hands it might give results of a high degree of accuracy.

See L. Borchardt, "Ein altägyptisches astronomisches Instrument" in *Zeitschrift für ägyptische Sprache*, xxxvii. (1899), p. 10; Ed. Meyer, *Ägyptische Chronologie*, p. 36. Besides the sun and moon, five planets, thirty-six dekans, and constellations to which animal and other forms are given, appear in the early astronomical texts and paintings. The zodiacal signs were not introduced till the Ptolemaic period. See H. Brugsch, *Die Ägyptologie* (Leipzig, 1891), pp. 315 et seqq., for a full account of all these.

Medicine.—Except that splints are sometimes found on the limbs of bodies of all periods, at present nothing is known, from texts or otherwise, of the existence of Egyptian surgery or dentistry. For historical pathology the examination of mummies and skeletons is yielding good results. There is little sign of the existence of gout or of syphilitic diseases until late times (see MUMMY). A number of papyri have been discovered containing medical prescriptions. The earliest are of the XIIth Dynasty from Kahūn, one being veterinary, the other gynaecological. The finest non-religious papyrus known, the Ebers Papyrus, is a vast collection of receipts. One section, giving us some of "the mysteries of the physician," shows how lamentably crude were his notions of the constitution of the body. It teaches little more than that the pulse is felt in every part of the body, that there are vessels leading from the heart to the eyes, ears, nose and all the other members, and that "the breath entering the nose goes to the heart and the lungs." The prescriptions are for a great variety of ailments and afflictions—diseases of the eye and the stomach, sores and broken bones, to make the hair grow, to keep away snakes, fleas, &c. Purgatives and diuretics are particularly numerous, and the medicines take the form of pillules, draughts, liniments, fumigations, &c. The prescriptions are often fanciful and may thus bear some absurd relation to the disease to be cured, but generally they would be to some extent effective. Their action was assisted by spells, for general use in the preparation or application, or for special diseases. In most cases several ingredients are prescribed together: when the amounts are indicated it is by measure not by weight, and evidently no very potent drugs were employed, for the smallest measure specified is equal to about half of a cubic inch. Little has yet been accomplished in identifying the diseases and the substances named in the medical papyri.

See G. A. Reisner, *The Hearst Medical Papyrus* (Leipzig, 1905), (XVIIIth Dynasty), and for a great magical text of the Roman period (3rd century A.D.) with some prescriptions, F. Ll. Griffith and H. Thompson, *The Demotic Magical Papyrus of London and Leiden* (London, 1904).

Literature.—The vast mass of writing which has come down to us from the ancient Egyptians comprises documents of almost every conceivable kind, business documents and correspondence, legal documents, memorial inscriptions, historical, scientific, didactic, magical and religious literature; also tales and lyrics and other compositions in poetical language. Most of these classes are dealt with in this article under special headings. In addition there should be mentioned the abundant explanatory inscriptions attached to wall-scenes as a secondary element in those compositions. As early as the Middle Kingdom, papyri are found containing classified lists of words, titles, names of cities,

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[1] Formerly transcribed *hau* or "heap"-problems.

[2] Clepsydras inscribed in hieroglyphic are found soon after the Macedonian conquest.

&c., and of nomes with their capitals, festivals, deities and sacred things, calendars, &c.

To a great extent the standard works in all classes date from an early age, not later than the Middle Kingdom, and subsequent works of religion and learning like the later additions were largely written in the same style. Several books of proverbs or "instructions" were put in circulation during the Middle Kingdom. Kagemni and Ptahhotp of the Old Kingdom were nominally or really the instructors in manners: King Amenemhē I. laid down the principles of conduct in government for his son Senwosri I., preaching on the text of beneficence rewarded by treachery; Kheti points out in detail to his schoolboy son Pepi the advantages enjoyed by scribes and the miseries of all other careers. Some of these books are known only in copies of the New Kingdom. The instructions of Ani to his son Khenshotp are of later date. In demotic the most notable of such works is a papyrus of the first century A.D. at Leiden.

A number of Egyptian tales are known, dating from the Middle Kingdom and later. Some are so sober and realistic as to make it doubtful whether they are not true biographies and narratives of actual events. Such are the story of Sinūhi, a fugitive to Syria in the reign of Sesostris [Senwosri] I., and perhaps the narrative of Unamun of his expedition in quest of cedar wood for the bark of the Theban Ammon in the XXIst Dynasty. Others are highly imaginative or with miraculous incidents, like the story of the Predestined Prince and the story of the Two Brothers, which begins with a pleasing picture of the industrious farmer, and, in demotic of the Ptolemaic and Roman periods, two stories of the learned Sethon Khamois, son of Rameses II. and high priest of Ptah, with his rather tragical experiences at the hands of magicians. The stories of the Middle Kingdom were in choice diction, large portions of them being rhetorical or poetical compositions attributed to the principal characters. The story of Sinūhi is of this description and was much read during the New Kingdom. Another, of the Eloquent Peasant whose ass had been stolen, was only a framework to the rhetoric of endless petitions. The tale of the Shipwrecked Sailor in the Red Sea was a piece of simpler writing, not unpicturesque, of the marvellous type of a Sindbad story. If all these are deficient in literary merit, they are deeply interesting as revelations of primitive mind and manners. Of New Kingdom tales, the story of the Two Brothers is frankly in the simplest speech of everyday life, while others are more stilted. The demotic stories of Khamois are simple, but the "Rape of Inarōs' Cuirass" (at Vienna) is told in a stiff and high-flown style.

In general it may be said of Egyptian literary compositions that apart from their interest as anthropological documents they possess no merit which would entitle them to survive. They are more or less touched by artificiality, but so far as we are able to appreciate them at present they very seldom attain to any degree of literary beauty. Most of the compositions in the literary language, whether old or archaistic, are in a stilted style and often with parallelisms of phrase like those of Hebrew poetry. Simple prose narrative is here quite exceptional. Some few hymns contain stanzas of ten lines, each line with a break in the middle. There is no sign of rhyming in Egyptian poetry, and the rhythm is not yet recognizable owing to our ignorance of the ancient vocalization. In old Egyptian tales the narrative portions are frequently in prose; New Egyptian and demotic contain as a rule little else. Hymns exist in both of these later forms of the language, and a few love songs in Late Egyptian.

See W. M. F. Petrie, *Egyptian Tales* (2 vols., London, 1895); G. Maspero, *Les Contes populaires de l'Égypte ancienne* (3rd edition, Paris, 1906); W. Max Müller, *Die Liebespoesie der alten Ägypter* (Leipzig, 1899). (F. Ll. G.)

C. *Religion.*—1. *Introductory.*—Copious as are the sources of information from which our knowledge of the Egyptian religion is drawn, there is nevertheless no aspect of the ancient civilization of Egypt that we really so little understand. While the youth of Egyptological research is in part responsible for this, the reason lies still more in the nature of the religion itself and the character of the testimony bearing upon it. For a true appreciation of the chaotic polytheism that reveals itself even in the earliest texts it would be necessary to be able to trace its development, stage by stage, out of a number of naive primitive cults; but the period of growth lies behind recorded history, and we are here reduced to hypotheses and *a posteriori* reconstructions. The same criticism applies, no doubt, to other religions, like those of Greece and Rome. In Egypt, however, the difficulty is much aggravated by the poor quality of the evidence. The religious books are textually very corrupt, one-sided in their subject-matter, and distributed over a period of more than two thousand years. The greatest defect of all is their relative silence with regard to the myths. For the story of Isis and Osiris we have indeed the late treatise ascribed to Plutarch, and a few fragments of other myths may be culled from earlier native sources. But in general the tales that passed current about the gods are referred to only in mysterious and recondite allusions; as Herodotus for his own times explicitly testifies, a reticence in such matters seems to have been encouraged by the priests. Thus with regard to Egyptian theology we are very imperfectly informed, and the account that is here given of it must be looked upon as merely provisional. The actual practices of the cult, both funerary and divine, are better known, and we are tolerably familiar with the doctrines as to the future state of the dead. There is good material, too, for the study of Egyptian magic, though this branch has been somewhat neglected hitherto.

2. *Main Sources.*—(*a*) *The Pyramid texts*, a vast collection of incantations inscribed on the inner walls of five royal tombs of the Vth and VIth Dynasties at Sakkāra, discovered and first published by Maspero. Much of these texts is of extreme antiquity; one incantation at least has been proved to belong to an age anterior to the unification of the Northern and Southern kingdoms. Later copies also exist, but possess little independent critical value. The subject-matter is funerary, *i.e.* it deals with the fate of the dead king in the next life. Some chapters describe the manner in which he passes from earth to heaven and becomes a star in the firmament, others deal with the food and drink necessary for his continued existence after death, and others again with the royal prerogatives which he hopes still to enjoy; many are directed against the bites of snakes and stings of scorpions. It is possible that these incantations were recited as part of the funerary ritual, but there is no doubt that their mere presence in the tombs was supposed to be magically effective for the welfare of the dead. Originally these texts had an application to the king alone, but before the beginning of the XIIth Dynasty private individuals had begun to employ them on their own behalf. They seem to be relatively free from textual corruption, but the vocabulary still occasions much difficulty to the translator.

(*b*) *The Book of the Dead* is the somewhat inappropriate name applied to a large similar collection of texts of various dates, certain chapters of which show a tendency to become welded together into a book of fixed content and uniform order. A number of chapters contained in the later recensions are already found on the sarcophagi of the Middle Kingdom, together with a host of funereal texts not usually reckoned as belonging to the Book of the Dead; these have been published by Lepsius and Lacau. The above-mentioned nucleus, combined with other chapters of more recent origin, is found in the papyri of the XVIIIth–XXth Dynasties, and forms the so-called Theban recension, which has been edited by Naville in an important work. Here already more or less rigid groups of chapters may be noted, but individual manuscripts differ greatly in what they include and exclude. In the Saite period a sort of standard edition was drawn up, consisting of 165 chapters in a fixed order and with a common title "the book of going forth in the day"; this recension was published by Lepsius in 1842 from a Turin papyrus Like the Pyramid texts, the Book of the Dead served a funerary purpose, but its contents are far more heterogeneous; besides chapters enabling the dead man to assume what shape he will, or to issue triumphant from the last judgment, there are lists of gates to be passed and demons to be encountered in the nether world, formulae such as are inscribed on sepulchral figures and amulets, and even hymns to the sun-god. These texts are for the most part excessively corrupt, and despite the translations of Pierret, Renouf and Budge, much labour must yet be expended upon them before they can rank as a first-rate source.

(*c*). The texts of the *Tombs of the Kings at Thebes* (XVIIIth–XXth Dyn.) consist of a series of theological books compiled at an uncertain date; they have been edited by Naville and Lefébure. The chief of these, extant in a longer and a shorter version, is called *The book of that which is in the Nether World* (familiarly known as the *Am Duat*) and deals with the journey of the sun during the twelve hours of the night. *The Book of Gates* treats of the same topic from a more theological standpoint. *The Litanies of the Sun* contain the acclamations with which the sun-god Re was greeted, when at eventide his bark reached the entrance of the nether world. Another treatise relates the destruction of mankind, and the circumstances that led to the creation of the heavens in the form of a cow.

(*d*) Among the *later religious books* one or two deserve a special mention, such as *The Overthrowing of Apophis*, the serpent enemy of the sun-god; *The Lamentations of Isis and Nephthys* over their murdered brother Osiris; *The Book of Breathings*, a favourite book among the later Theban priests. Several of these books were used in the ritual of feast days, but all have received a secondary funerary employment, and are therefore found buried with the dead in their tombs.

(*e*) The *Ritual texts* have survived only in copies not earlier than the New Kingdom. The temple ritual employed in the daily cult is illustrated by the scenes depicted on the inner walls of the great temples: the formulae recited during the performance of the ceremonies are recorded at length in the temple of Seti I. (XIXth Dyn.) at Abydos, as well as in some later papyri in Berlin. The whole material has been collected and studied by Moret. The funerary ritual is known from texts in the Theban tombs (XVIIIth–XXth Dyn.) and papyri and sarcophagi of later date; older versions are contained in the Pyramid texts and *The Book of the Dead*. Schiaparelli has done much towards gathering together this scattered material. The ritual observed during the process of embalmment is preserved in late papyri in Paris and Cairo published by Maspero.

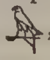
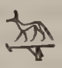
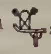
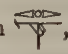
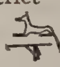
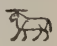
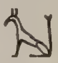
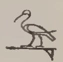
(*f*) The *magical* documents have been comparatively little studied, in spite of their great interest. They deal for the most part with the hearing of diseases, the bites of snakes and scorpions, &c., but incidentally cast many sidelights on the mythology and superstitious beliefs. The best-known of these books is the *Papyrus Harris* published by F. J. Chabas, but other papyri of as great or greater importance are to be found in the Leiden, Turin and other collections. A curious book published by A. Erman contains spells to be used by mothers for the protection of their children. A papyrus in London contains a calendar of lucky and unlucky days. A late class of stelae, of which the best specimen has been published by Golenischeff, consists of spells of various kinds originally intended for the use of the living, but later employed for funerary purposes.

(*g*) Under the heading *Miscellaneous* we must mention a number of sources of great value: the grave-stones, or stelae, especially those from Abydos, which throw much light on funerary beliefs; the great *Papyrus Harris*, the longest of all papyri, which enumerates the gifts of Rameses III. (XXth Dyn.) to the various temples of Egypt; the hymns to the gods preserved in Cairo and Leiden papyri; and the inscriptions of the Ptolemaic temples (Dendera, Edfu, &c.), which teem with good religious material. Nor can any attempt here be made to summarize the remaining native Egyptian sources, literary and archaeological, that deserve notice.

(*h*) Among the classical writers, Plutarch in his treatise *Concerning Isis and Osiris* is the most important. Diodorus also is useful. Herodotus, owing to his religious awe and dread of divulging sacred mysteries, is only a second-rate source.

3. *The Gods.*—The end of the pre-dynastic period, in which we dimly descry a number of independent tribes in constant warfare with one another, was marked by the rise of a united Egyptian state with a single Pharaonic ruler at its head. The era of peace thus inaugurated brought with it a rapid progress in all branches of civilization; and there soon emerged not only a national art and a condition of material prosperity shared by the entire land in common, but also a state religion, which gathered up the ancient tribal cults and floating cosmical conceptions, and combining them as best it could, imposed them on the people as a whole. By the time that the Pyramid texts were put into writing, doubtless long before the Vth Dynasty, this religion had assumed a stereotyped appearance that clung to it for ever afterwards. But the multitude of the deities and the variety of the myths that it strove to incorporate prevented the development of a uniform theological system, and the heterogeneous origin of the religion remained irretrievably stamped upon its face. Written records were few at the time when the pantheon was built up, so that the process of construction cannot be followed historically from stage to stage; but it is possible by arguing backwards from the later facts to discern the main tendencies at work, and the principal elementary cults that served as the materials.

Classification of pre-dynastic gods.

The gods of the pre-dynastic period may be divided into two chief groups, the tribal or local divinities and the cosmic or explanatory deities. At the beginning each tribe had its own particular god, who in essence was nothing but the articulate expression of the inner cohesion and of the outward independence of the tribe itself, but who outwardly manifested himself in the form of some animal or took up his abode in some fetish of wood or stone. In times of peace this visible emblem of the god's presence was housed in a rude shrine, but in war-time it was taken thence and carried into the battlefield on a standard. We find such divine standards often depicted on the earliest monuments, and among the symbols placed upon them may be detected the images of many deities destined to play an important part in the later national pantheon, such as the falcon Horus , the wolf Wepwawet (Ophois) , the goddess Neith , symbolized by a shield transfixed with arrows, and the god Min , the nature of whose fetish is obscure. In course of time the tribes became localized in particular districts, under the influence of a growing central authority, and their gods then passed from tribal into local deities. Hence it came about that the provincial districts or nomes, as they were called, often derived their names from the gods of tribes that settled in them, these names being hieroglyphically written with the sign for " district " surmounted by standards of the type above described, *e.g.* , "the nome of the dog Anubis," the 17th or Cynopolite nome of Upper Egypt. In this way a large number of deities came to enjoy special reverence in restricted territories, *e.g.* the ram  Khnum in Elephantine, the jerboa or okapi (?)  Seth in Ombos, the ibis  Thoth in Hermopolis Magna, and of the gods named above, Horus in Hieraconpolis, Wepwawet in Assiut, Neith in Sais, and Min in Coptos. As towns and villages gradually sprang up, they too adopted as their patron some one or other of the original tribal gods, so that these came to have different seats of worship all over Egypt. For this reason it is often hard to tell where the primitive cult-centre of a particular deity is to be sought; thus Horus seems equally at home both at Buto in the Delta and at Hieraconpolis in Upper Egypt, and the earliest worship of Seth appears to have been claimed no less by Tanis in the north than by Ombos in the south. The effect of the localization of gods in many different places was to give them a double aspect; so, for instance, Khnum the god of Elephantine could in one minute be regarded as identical with

Khnum the god of Esna, while in the next minute and without any conscious sense of contradiction the two might be looked upon as entirely separate beings. In order that there might be no ambiguity as to what divinity was meant, it became usual, in speaking of any local deity, to specify the place of which he was "lord." The tendency to create new forms of a god by instituting his worship in new local centres persisted throughout the whole course of Egyptian history, unhindered by the opposite tendency which made national out of local gods. Some of the cosmic gods, like the sun-god Re of Heliopolis and of Hermonthis, early acquired a local in addition to their cosmic aspect.

In the innermost principle of their existence, as patrons and protectors of restricted communities, the primitive tribal gods did not differ from one another. But externally they were distinguishable by the various shapes that their worshippers ascribed to them; and there can be little doubt that even in the beginning each had his own special attributes and particular mythical traits. These, however, may have borne little resemblance to the later conceptions of the same gods with which we are made familiar by the Pyramid texts. Thus we have no means of ascertaining what the earliest people of Sais thought about their goddess Neith, though her fetish would seem to point to her warlike nature. Nor are we much wiser in respect of those primitive tribal gods that are represented on the oldest monuments in animal form. For though we may be sure that the shape of an animal was that in which these gods were literally visible to their worshippers, yet it is impossible to tell whether some one living animal was chosen to be the earthly tenement of the deity, or whether he revealed himself in every individual of a species, or whether merely the cult-image was roughly hewn into the shape of an animal. Not too much weight must be attached to later evidence on this point; for the New Kingdom and still more the Graeco-Roman period witnessed a strange recrudescence of supposed primitive cults, to which they gave a form that may or may not have been historically exact. In some places whole classes of animals came to be deemed sacred. Thus at Bubastis, where the cat-headed Bast (Ubasti) was worshipped, vast cemeteries of mummified cats have been found; and elsewhere similar funerary cults were accorded to crocodiles, lizards, ibises and many other animals. In Elephantine Khnum was supposed to become incarnate in a ram, at whose death the divinity left him and took up his abode in another. So too the bull of Apis (a black animal with white spots) was during its lifetime regarded as a reincarnation of Ptah, the local god of Memphis, and similarly the Mnevis and Bacis bulls were accounted to be "the living souls" of Etom of Heliopolis and of Re of Hermonthis respectively; these latter cults are certainly secondary, for Ptah himself was never, either early or late, depicted otherwise than in human form, as a mummy or as a dwarf; and Etom and Re are but different names of the sun-god. The form of a snake, attributed to many local goddesses, especially in later times (*e.g.* Meresger of the Theban necropolis), was borrowed from the very ancient deity Outo (Buto); the semblance of a snake became so characteristic of female divinities that even the word "goddess" was written with the hieroglyph of a snake. Other animal shapes particularly affected by goddesses were those of a lioness (Sakhmi, Pakhe) or a cow (Hathor, Isis). The primitive animal gods are not to be confused with the animal forms ascribed to many cosmic deities; thus when the sun-god Re was pictured as a scarabaeus, or dung-beetle, rolling its ball of dung behind it, this was certainly mere poetical imagery. Or else a cosmic god might assume an animal shape through assimilation with some tribal god, as when Re was identified with Horus and therefore depicted as a falcon.

With the advance of civilization and the transformation of the tribal gods into national divinities, the beliefs held about them must have become less crude. At a very early date the anthropomorphizing tendency caused the animal deities to be represented with human bodies, though as a rule they retained their animal heads; so in the case of Seth as early as the IInd Dynasty. The other gods carry their primitive fetishes in their hands (like Neith, who is depicted holding arrows) or on their heads (so Nefertem [Iphthimis] with his lotus-flower). At the same time the gods began to acquire human personalities. In a few instances this may have come about by the emphasizing of a really primitive trait; as when the wolf Ophois, in consonance with the predatory nature of that animal, developed into a god of war. In other cases the transitional steps are shrouded in mystery; we do not know, for example, why the ibis Thoth subsequently became the patron of the fine arts, the inventor of writing, and the scribe of the gods. But the main factor in this evolutionary process was undoubtedly the formation of myths, which brought gods of independent origin into relation with one another, and thus imbued them with human passions and virtues. Here dim historic recollections often determined the features of the story, and in one famous legend that knits together a group of gods all seemingly local in origin we can still faintly trace how the tale arose, was added to, and finally crystallized in a coherent form.

Osiris was a wise and beneficent king, who reclaimed the Egyptians from savagery, gave them laws and taught them handicrafts. The prosperous reign of Osiris was brought to a premature close by the machinations of his wicked brother Seth, who with seventy-two fellow-conspirators invited him to a banquet, induced him to enter a cunningly-wrought coffin made exactly to his measure, then shut down the lid and cast the chest into the Nile. Isis, the faithful wife of Osiris, set forth in search of her dead husband's body, and after long and adventure-fraught wanderings, succeeded in recovering it and bringing it back to Egypt. Then while she was absent visiting her son Horus in the city of Buto, Seth once more gained possession of the corpse, cut it into fourteen pieces, and scattered them all over Egypt. But Isis collected the fragments, and wherever one was found, buried it with due honour; or, according to a different account, she joined the limbs together by virtue of her magical powers, and the slain Osiris, thus resurrected, henceforth reigned as king of the dead in the nether world. When Horus grew up he set out to avenge his father's murder, and after terrible struggles finally conquered and dispossessed his wicked uncle; or, as another version relates, the combatants were separated by Thoth, and Egypt divided between them, the northern part falling to Horus and the southern to Seth. Such is the story as told by Plutarch, with certain additions and modifications from older native sources. There existed, however, a very ancient tradition according to which Horus and Seth were hostile brothers, not nephew and uncle; and many considerations may be urged in support of the thesis which regards their struggles as reminiscences of wars between two prominent tribes or confederations of tribes, one of which worshipped the falcon Horus while the other had the okapi (?) Seth as its patron and champion. The Horus-tribes were the victors, and it was from them that the dynastic line sprang; hence the Pharaoh always bore the name of Horus, and represented in his own hallowed person the ancient tribal deity. Of Osiris we can only state that he was originally the local god of Busiris, whatever further characteristics he primitively possessed being quite obscure. Isis was perhaps the local goddess of Buto, a town not far distant from Busiris; this geographical proximity would suffice to explain her connexion with Osiris in the tale. A legend now arose, we know not how or why, which made Seth the brother and murderer of Osiris; and this led to a fusion of the Horus-Seth and the Seth-Isis-Osiris *motifs*. The relationships had now to be readjusted, and the most popular view recognized Horus as the son and avenger of Osiris. The more ancient account survived, however, in the myth that Osiris, Horus, Seth, Isis and Nephthys (a goddess who plays but a minor part in the Osiris cycle) were all children of the earth-god Keb and the sky-goddess Nut, born on the five consecutive days added on at the end of the year (the so-called epagomenal days). Later generations reconciled these contradictions by assuming the existence of two Horuses, one, the brother of Osiris, Seth and Isis, being named Haroeris, *i.e.* Horus the elder, while the other, the child of Isis and Osiris, was called Harpocrates, *i.e.* Horus the child.

Cosmic deities.

The second main class of divinities that entered into the composition of the Egyptian pantheon was due to that innate and universal speculative bent which seeks, and never fails to find, an explanation of the facts of the external world. Behind the great natural phenomena that they perceived all around them, the Egyptians, like other primitive folk, postulated the existence of divine wills not dissimilar in kind to their own, though vastly superior in power. Chief among these cosmic deities was the sun-god Re, whose supremacy seemed predestined under the cloudless sky of Egypt. The oldest conceptions represented Re as sailing across the heavens in a ship called "Manzet," "the bark of the dawn"; at sunset he stepped aboard another vessel named "Mesenktet," "the bark of the dusk," which bore him back from west to east during the night. Later theories symbolized Re in many different ways. For some he was identical with Horus, and then he was falcon-headed and was called Hor-akhti, the Horus of the horizons. Others pictured him to themselves as a tiny infant in the early dawn, as full-grown at noon, and as an infirm old man in the evening. When the sky was imagined as a cow, he was a calf born anew every morning. The moon was a male deity, who likewise fared across the heavens in a boat; hence he was often named Chons, "the sailor." The ibis-god Thoth was early identified with the moon. The stars and planets were likewise gods. Among them the bright star Sirius was held in special esteem; it was a goddess Sothis (Sopde), often identified by the Egyptians with Isis. The constellations that seemed unceasingly to speed across the sky were named "the never-resting ones," and the circumpolar stars, which never sink beneath the horizon, were known as "the imperishables." Concerning earth and sky there were many different opinions. Some thought that the sky was a goddess Nut, whom the god Show held aloof from her husband Keb the earth, on whose back the plants and trees grew. Others believed in a celestial ocean, personified under the name of Nun, over which the heavenly bodies sailed in boats. At a later date the sky was held to be a cow (Hathor) whose four feet stood firm upon the soil; or else a vast face, in which the right eye was the sun and the left eye the moon. Alongside these fanciful conceptions there existed a more sober view, according to which the earth was a long oval plain, and the sky an iron roof supported by the tops of mountains or by four pillars at the cardinal points. Beneath the ground lay a dark and mysterious region, now conceived as an inverse heaven (Nenet), now as a vast series of caverns whose gates were guarded by demons. This nether world was known as the Duat (Dat, Têi), and through it passed the sun on his journey during the hours of night; here too, as many thought, dwelt the dead and their king Osiris. That great natural feature of Egypt, the Nile, was of course one of the gods; his name was Hapi, and as a sign of his fecundity he had long pendulous breasts like a woman. In contradistinction to the tribal gods, it rarely happened that the cosmic deities enjoyed a cult. But there are a few important exceptions: Re in Heliopolis (here identified with a local god Etom) and in Hermonthis; Hathor at Dendera and elsewhere. Certain of the tribal gods early became identified with cosmic divinities, and the latter thus became the objects of a cult; so, for instance, the Horus of Edfu was a sun-god, and Thoth in Hermopolis Magna was held to be the moon.

Minor deities and demons.

An extension of the principle that created the cosmic gods gave rise to a large number of minor deities and demons. Day and night, the year, the seasons, eternity, and many similar conceptions were each represented by a god or goddess of their own, who nevertheless possessed but a shadowy and doubtful existence. Human attributes like Taste, Knowledge, Joy and so forth were likewise personified, no less than abstract ideas such as Fate, Destiny and others; rather more clearly defined than the rest was Maat, the goddess of Truth and Right, who was fabled to be the daughter of Re and may even have had a cult. Certain gods were purely functional, that is to say, they appeared at special times to perform some appointed task, at the completion of which they vanished. Such were Nepri, the god of the corn-harvest; Meskhonit, the goddess who attended every child-bed; Tait, the goddess of weaving. Numberless semi-divine beings had no other purpose than to fill out the myths, as, for instance, the chattering apes that greeted the sun-god Re as he rose above the eastern horizon, and the demons who opened the gates of the nether world at the approach of the setting sun.

Foreign deities.

We take this opportunity of mentioning sundry other divinities who were later introduced to swell the already overcrowded ranks of the pantheon. Contact with foreign lands brought with it several new deities, Baal, Anat and Resheph from Syria, and the misshapen dwarf Bes from the south; earlier than these, the Astarte of Byblus, whom the Egyptians identified with Hathor. In Thebes Amenophis I. and his spouse Nefertari were worshipped as patron gods of the necropolis many centuries after their death. Two men of exceptional wisdom received divine honours, and had temples of their own in the Ptolemaic period; these were Imouthes, who had lived under Zoser of the IIIrd Dynasty, and Amenophis son of Hapu, a contemporary of the third king of the same name (XVIIIth Dyn.). The hill of Sheikh Abd-el-gurna at Thebes was looked upon as a particularly holy place, and was revered as a goddess. Almost anything that was regarded with awe, any object used in the divine ritual could at a given moment be envisaged as a deity. Thus the boat of Osiris (Neshemet) and those of the sun-god were goddesses; and various wands and sceptres belonging to certain gods were imagined as harbouring the divine being. Truly it might have been said in ancient Egypt: of the making of gods there is no end!

Theological combinations.

For such order as can be discerned in the mythological conceptions of the Egyptians the priesthood was largely responsible. At a very early date the theological school of Heliopolis undertook the task of systematizing the gods and the myths, and it is mainly to them that is due the Egyptian religion as we find it in the Pyramid texts. Their influence is particularly conspicuous in the prominent place accorded to the sun-god Re, and in the creation-legend that made him the father of gods and men. First of all living things was Re; legend told how he arose as a naked babe from a lotus-flower that floated on the primeval ocean Nun. Others held the view that he crept from an egg that lay on a hill in the midst of a lake called Desdes; and a third, more barbarous, tale related his obscene act of self-procreation. Re became the father of the pair of gods Show and Tefnut (Tphenis), who emanated from his spittle. They again gave birth to Keb and Nut, from whom in their turn sprang Osiris and Seth, Isis and Nephthys. These nine gods were together known as the great Ennead or cycle of nine. A second series of nine deities, with Horus as its first member, was invented at the same time or not long afterwards, and was called the Lesser Ennead. In later times the theory of the Ennead became very popular and was adopted by most of the local priesthoods, who substituted their own favourite god for Re, sometimes retaining and sometimes changing the names of the other eight deities. Thus locally many different gods came to be viewed as the creators of the world. Only in two instances, however, did a local god ever obtain wide acceptance in the capacity of demiurge: Ptah of Memphis, who was famed as an artist and master-builder, and Khnum of Elephantine, who was said to have moulded mankind on the potter's wheel.

Already in the Pyramid texts the importance of Osiris almost rivals that of Re. His worship does not seem to have been due to Heliopolitan influence, and may possibly have been propagated by active missionary effort. It is apparently through the funeral cult that Osiris so early took a firm hold on the imagination of the people; for at a very ancient date he was identified with every dead king, and it needed but a slight extension of this idea to make him into a king of the dead. In later times the moral aspect of his tale was doubtless the main cause of its continued popularity; Osiris was named Onnophris, "the good Being" *par excellence*, and Seth was contrasted with him as the author and the root of all evil. Still the Egyptians themselves seem to have been somewhat at a loss to account for the great veneration that they paid to Osiris. Successive theories interpreted him as the god of the earth, as the god of the Nile, as a god of vegetation, as a moon-god and as a sun-god; and nearly every one of these theories has been claimed to be the primitive truth by some scholar or another.

Nowhere is the conservatism of the Egyptians more clearly displayed than in the tenacity with which they clung to the old forms of the theology, such as we have essayed to describe. Neither the influx of new deities nor the diligence of the priestly authors and commentators availed to break down the cast-iron traditions with which the compilers of the Pyramid texts were already familiar. It is true that with the displacement of the capital town certain local deities attained a degree of power that, superficially regarded, seems to alter the entire perspective of the religion. Thus Ammon, originally the obscure local god of Thebes, was raised by the Theban monarchs of the XIIth and of the XVIIIth to XXIst Dynasties to a predominant position never equalled by any other divinity; and, by similar means, Suchos of the Fayum, Ubasti of Bubastis, and Neith of Sais, each enjoyed for a short space of time a consideration that no other cause would have secured to them. But precisely the example of Ammon proves the hopelessness of any attempt to change the time-honoured religious creed; his priests identified him with the sun-god Re, whose cult-centre was thus merely transferred a few hundred miles to the South. Nor could even the violent religious revolution of Akhenaton (Amenophis IV.), of which we shall later have occasion to speak, sweep away for ever beliefs that had persisted for so many generations.

But if the facts of the religion, broadly viewed, never underwent a change, the interpretation of those facts did so in no small degree. The religious books were for the most part written in archaic language, which was only imperfectly understood by the priests of later times; and hence great scope was given to them to exercise their ingenuity as commentators. By the time of the XVIIIth Dynasty some early chapters of the Book of the Dead had been provided with a triple commentary. Unfortunately the methods pursued were as little reasonable as those adopted by the medieval Jewish Rabbis; instead of the context being studied as a whole, with a view to the recovery of its literal sense, each single verse was considered separately, and explained as an allusion to some obscure myth or as embodying some mystical meaning. Thus so far from simplifying or really elucidating the religion, these priestly labours tended rather to confuse one legend with another and to efface the personality of individual gods. The ease with which one god could be identified with another is perhaps the most striking characteristic of later Egyptian theology. There are but few of the greater deities who were not at some time or another identified with the solar god Re. His fusion with Horus and Etom has already been noted; further we find an Ammon-Re, a Sobk-Re, a Khnum-Re; and Month, Onouris, Show and Osiris are all described as possessing the attributes of the sun. Ptah was early assimilated to the sepulchral gods Sokaris and Osiris. Pairs of deities whose personalities are often blended or interchanged are Hathor and Nut, Sakhmi and Pakhe, Seth and Apophis. So too in Abydos, his later home, Osiris was identified with Khante-Amentiu (Khentamenti, Khentamenthes), "the chief of those who are in the West," a name that was given to a vaguely-conceived but widely-venerated divinity ruler of the dead. Many factors helped in the process of assimilation. The unity of the state was largely influential in bringing about the suppression of local differences of belief. The less important priesthoods were glad to enhance the reputation of the deity they served by identifying him with some more important god. And the mystical bent of the Egyptians found satisfaction in the multiplicity of forms that their gods could assume; among the favourite epithets which the hymns apply to divinities are such as "mysterious of shapes," "multiple of faces."

The goal towards which these tendencies verged was monotheism; and though this goal was only once, and then quite ephemerally, reached, still the monotheistic idea was at most periods, so to speak, in the air. Sometimes the qualities common to all the gods were abstracted, and the resultant notion spoken of as "the god." At other times, and especially in the hymns addressed to some divinity, all other gods were momentarily forgotten, and he was eulogized as "the only one," "the supreme," and so forth. Or else several of the chief deities were consciously combined and regarded as different emanations or aspects of a Sole Being; thus a Ramesside hymn begins with the words "Three are all the gods, Ammon, Re and Ptah," and then it is shown how these three gods, each in his own particular way, gave expression and effect to a single divine purpose.

Monotheistic tendency.

Akhenaton.

For a brief period at the end of the XVIIIth Dynasty a real monotheism, as exclusive as that of Judaism or of Islam, was adopted as the state religion of Egypt. The young Pharaoh Amenophis IV. seems to have been fired by genuine fanatical enthusiasm, though political motives, as well as doctrinal considerations, may have prompted him in the planning of his religious revolution (see also § *History*). The Theban god Ammon-Re was then supreme, and the ever-growing power of his priesthood may well have inflamed the jealousy of their Heliopolitan rivals. Amenophis began his reign in Thebes as an adherent of the traditional faith, but after a few years he abandoned that town and built a new capital for his god Aton 200 m. farther north, at a place now called El Amarna. The new deity was a personification of the sun's disk. The name Re was suppressed, as too intimately associated with that of Ammon; and Ammon, together with all the other gods, was put to the ban. Amenophis even changed his own name, of which the name of Ammon formed an element, to Akhenaton, "the brilliancy of the Aton," and the capital was called Khitaton, "The Horizon of the Aton." The new dogmas were known as "the Teaching," and their tenets, as revealed in the poems composed in honour of the Aton, breathe the purest and most exalted monotheistic spirit. The movement had, no doubt, met with serious opposition from the very start, and the reaction soon set in. The immediate successors of Akhenaton strove to follow in his footsteps, but the conservative nature of Egypt quickly asserted itself. Not sixty years after the accession of Akhenaton, his city was abandoned, its rulers branded as heretics, and the old religion restored in Thebes as completely as if the Aton had never existed.

Having thus failed to become rational, Egyptian theology took refuge in learning. The need for a more spiritual and intellectual interpretation of the pantheon still remained, and gave rise to a number of theological sciences. The names of the gods and the places of their worship were catalogued and classified, and manuals were devoted to the topography of mythological regions. Much ingenuity was expended on the development of a history of the gods, the groundwork of which had been laid in much earlier times. Re was not only the creator of the world, but he was also the first king of Egypt. He was followed on the throne by the other eight members of his Ennead, then by the lesser Ennead and by other gods, and finally by the so-called "worshippers of Horus." The latter were not wholly mythical personages, though they were regarded as demigods (Manetho calls them "the dead," νέκυες); they have been shown to be none other than the dim rulers of the predynastic age. The Pharaohs of the historic period were thus divine, not only by virtue of their connexion with Horus (see above), but also as descendants of Re; and the king of Egypt was called "the good god" during his lifetime, and "the great god" after his death. The later religious literature is much taken up with the mythical and semi-mythical dynasties of kings, and the priests compiled, with many newly-invented details, the chronicles of the wars they were supposed to have waged.

In a similar manner, the ethical and allegorical methods of interpretation came into much greater prominence towards the end of the New Kingdom. The Osirian legend, as we have already seen, was early accepted as symbolizing the conflict between good and evil. So too the victories of Re over the serpent named Apophis were more or less clearly understood as a simile of the antithetical nature of light and darkness. In one text at least as ancient as the XVIIIth Dynasty (the copy that we have dates only from the Ethiopian period) an ingenious attempt is made to represent Ptah as the source of all life: from him, it is said, emanated Horus as "heart" or "mind" and Thoth as "tongue," and through the conjoint action of these two, the mind conceiving the design and the tongue uttering the creative command, all gods and men and beasts obtained their being. Of this kind of speculation much more must have existed than has reached us. It is doubtless such explanations as these that the Greeks had in view when they praised the wisdom of the ancient Egyptians; and in the classical period similar semi-philosophical interpretations altogether supplanted, among the learned at least, the naive literal beliefs of earlier times. Plutarch in his treatise on Isis and Osiris well exemplifies this standpoint: for him every god and every rite is symbolic of some natural or moral truth.

Later developments.

The final stages of the Egyptian religion are marked by a renewed popularity of all its more barbarous elements. Despairing, as it would seem, of discovering the higher wisdom that the more philosophic of the priests supposed that religion to conceal, the simpler-minded sought to work out their own salvation by restoring the worship of the gods to its most primitive forms. Hence came the fanatical revival of animal-worship which led to feud and bloodshed between neighbouring towns—a feature of Egyptian religion that at once amused and scandalized contemporary Greek and Latin authors (Plut. De Iside, 72; Juv. xv. 33). Nevertheless Egyptian cults, and particularly those of Serapis and Isis, found welcome acceptance on European soil; and the shrines of Egyptian deities were established in all the great cities of the Roman Empire. Serapis was a god imported by the first Ptolemy from Sinope on the Black Sea, who soon lost his own identity by assimilation with Osiris-Apis, the bull revered in Memphis. Far down into the Roman age the worship of Serapis persisted and flourished, and it was only when the Serapeum of Alexandria was razed to the ground by order of Theodosius the Great (A.D. 391) that the death-blow of the old Egyptian religion was struck.

Notes are here added on some divinities who have received inadequate or no attention in the preceding pages. For information as to Ammon, Anubis, Apis, Bes, Bubastis, Buto, Isis and Thoth, reference must be made to the special articles on these gods.

ARSAPHES, in Egyptian *Harshafe*, "he who is upon his lake," the ram-headed god of Heracleopolis Magna, gained an ephemeral importance during the IXth Dynasty, which arose from his town. Outwardly, he resembles Khnum. Little is known about him, and he is seldom mentioned. The burial-place of his priests in later times was in 1904 discovered at Abusir el Meleq.

CHONS, "he who travels by boat," perhaps originally a mere epithet of the moon-god Ioh or Thoth, is chiefly familiar as the third member of the Theban triad. As such he is represented as a youthful god, wearing a skull-cap surmounted by the moon. His cult was revived and became popular in Ptolemaic times. A curious story about the sending of his statue to Mesopotamia to heal a daughter of the king of Bakhtan is related upon a stele that purports to date from the Ramesside period: it has been proved to be a pious fraud invented by the priests not earlier than the Greek period.

HATHOR, whose name means "house of Horus," was at all times a very important deity. She is depicted as a cow, or with a broad human countenance, the cow's ears just showing from under a massive wig. Probably at first a goddess of the sky, she is early mentioned in connexion with Re. Later she was often identified with Isis, and her name was used to designate foreign goddesses like those of Puoni and Byblus. Unlike most cosmic deities, she was worshipped in many localities, chief among which was Dendera, where her magnificent temple, of Ptolemaic date, still stands. "The seven Hathors" is a name given to certain fairies, who appeared shortly after the birth of an infant, and predicted his future.

KHNUM or KHNOUM, a ram-headed god, whose principal place of worship was the island of Elephantine (there associated with Satis and Anukis), but also revered elsewhere, *e.g.* together with Nebtu in Esna. He enjoyed great repute as a creator, and was supposed to use the potter's wheel for the purpose. In this capacity he is sometimes accompanied by the frog-headed goddess Heket.

MONTH, a hawk-headed god of the Thebaid: in Thebes itself his cult was superseded by that of Ammon, but it persisted in Hermonthis. He was often given the solar attributes, and was credited as a great warrior.

MIN, the god of Coptos and Panopolis (Akhmim), seems to have been early looked upon as a deity of the harvest and crops. His cult dates from the earliest times. Represented as ithyphallic, with two tall plumes on his head, the right arm upraised and bearing a scourge. In old times he is identified with Horus: later Ammon was confused with him, and depicted in his image.

NECHBET (Nekhbi, Nekhebi), the vulture-goddess of El Kab, called Eileithyia by the Greeks. She gained an ascendancy as patroness of the south at the time when the two kingdoms were striving for the mastery. It is as such, in opposition to Buto the goddess of the north, that she is most often named on the monuments.

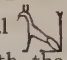
NEITH, the very ancient and important goddess of Sais, the Greek Athene. On the earliest monuments she is represented by a shield transfixed by arrows. Later she wears the crown of Lower Egypt, and carries in her hands a bow and arrows, a sign of her warlike character. In the XXVIth Dynasty, when a line of Pharaohs sprang from Sais, she regained a prominent position, and was given many cosmogonic attributes, including the title of mother of Re.

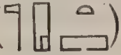
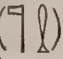
NEPHTHYS, the sister of Osiris and wife of Seth, daughter of Keb and Nut, plays a considerable rôle in the Osiris story. She sided with Isis and aided her to bring Osiris back to life. Isis and Nephthys are often mentioned together as protectresses of the dead.

ONOURIS, Egyptian *En-hūri*, "sky-bearer," the god of Thinis. Later identified with Shu (Show), who holds heaven and earth apart.

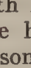
PTAH, the Hephaestus of the Greeks, a demiurgic and creative god, special patron of hand-workers and artisans. Worshipped in Memphis, he perhaps owed his importance more to the political prominence of that town than to anything else. He was early identified with an ancient but obscure god Tenen, and further with the sepulchral deity Sokaris. He is represented either as a closely enshrouded figure whose protruding hands grasp a composite sceptre, the whole standing on a pedestal within a shrine; or else as a misshapen dwarf.

SAKHMI, a lion-headed goddess of war and strife, whose name signifies the mighty. She was worshipped at Latopolis (Esna), but also at a late date as a member of the Memphite triad, with Ptah as husband and Nefertem (Iphthimis) as son: often, too, confounded with Ubasti.

SETH (Egyptian Sēt, Stẖ or Stš), by the Greeks called Typhon, was depicted as an animal  that has been compared with the jerboa by some, and with the okapi by others, but which the Egyptians themselves occasionally conceived to be nothing but a badly drawn ass. In historic times his cult was celebrated at Tanis and Ombos. He regained a certain prestige as god of the Hyksos rulers, and two Pharaohs of the XIXth Dynasty derived their name Sethos (Seti) from him. But, generally speaking, he was abominated as a power of evil, and his figure was often obliterated on the monuments. He is named in similes as a great warrior, and as such and "son of Nut" he is identified with the Syrian Baal.

4. *The Divine Cult.*—In the midst of every town rose the temple of the local god, a stately building of stone, strongly contrasting with the mud and plaster houses in which even the wealthiest Egyptians dwelt. It was called the "house of the god" (), and in it the deity was supposed to reside, attended by his "servants" () the priests. There was indeed a certain justification for this contention, even when a contrary theory assigned to the divinity a place in the sky, as in the case of the lunar divinity Thoth; for in the inmost sanctuary stood a statue of the god, which served as his representative for the purposes of the cult. Originally each temple was dedicated to one god only; but it early became usual to associate with him a mate of the opposite sex, besides a third deity who might be represented either as a second wife or as a child. As examples of such triads, as they are called, may be mentioned that of Thebes, consisting of Ammon, Mut and Chons, father, mother and child; and as typical of the other kind, where a god was accompanied by two goddesses, that of Elephantine, consisting of Khnum, Satis and Anukis. The needs of the god were much the same as those of mortals; no more than they could he dispense with food and drink, clothes for his apparel, ointment for his limbs, and music and dancing to rejoice his heart. The only difference was that the divine statue was half-consciously recognized as a lifeless thing that required carefully regulated rites and ceremonies to enable it to enjoy the good things offered to it. Early every morning the officiating priest proceeded to the holy of holies, after the preliminaries of purification had cleansed him from any miasma that might interfere with the efficacy of the rites. Then with the prescribed gestures, and reciting appropriate formulae all the while, he broke the seal upon the door of the shrine, loosed the bolts, and at last stood face to face with the

god. There followed a series of prostrations and adorations, culminating in the offering of a small image of Maat, the goddess of Truth. This seems to have been the psychological moment of the entire service: hitherto the statue had been at best a god in *posse*; now the symbolical act placed him in possession of all his faculties, he was a god in truth, and could participate like any mortal in the food and luxuries that his servants put before him. The daily ceremony closed with ablutions, anointings and a bountiful feast of bread, geese, beer and oxen; having taken his fill of these, the god returned to his shrine until the next morning, when the ritual was renewed. The words that accompanied the manual gestures are, in the rituals that have come down to us, wholly dominated by the myth of Osiris: it is often hard to discern much connexion between the acts and the formulae recited, but the main thought is clearly that the priest represents Horus, the pious son of the dead divinity Osiris. That this conception is very old is proved by the fact that even in the Pyramid texts "the eye of Horus" is a synonym for all offerings: an ancient tale of which only shreds have reached us related how Seth had torn the eye of Horus from him, though not before he himself had suffered a still more serious mutilation; and by some means, we know not how, the restoration of the eye was instrumental in bringing about the vindication of Osiris. As to the manual rites of the daily cult, all that can here be said is that incense, purifications and anointings with various oils played a large part; the sacrifices consisted chiefly of slaughtered oxen and geese; burnt offerings were a very late innovation.

At an early date the rites practised in the various temples were conformed to a common pattern. This holds good not only for the daily ritual, but also for many festivals that were celebrated on the same day throughout the whole length of the land. Such were the calendrical feasts, called "the beginnings of the seasons," and including, for example, the monthly and half-monthly festivals, that of the New Year and that of the rising of Sirius (Sothis). But there were also local feast days like that of Neith in Sais (Hdt. ii. 62) or that of Ammon in southern Opi (Luxor). These doubtless had a more individual character, and often celebrated some incident supposed to have occurred in the lifetime of the god. Sometimes, as in the case of the feast of Osiris in Abydos, a veritable drama would be enacted, in which the whole history of the god, his sufferings and final triumph were represented in mimic form. At other times the ceremonial was more mysterious and symbolical, as in the feast of the raising of the Ded-column  when a column of the kind was drawn by cords into an upright position. But the most common feature of these holy days was the procession of the god, when he was carried on the shoulders of the priests in his divine boat far beyond the precincts of his temple; sometimes, indeed, even to another town, where he paid a visit to the god of the place. These occasions were public holidays, and passed amid great rejoicings. The climax was reached when at a given moment the curtains of the shrine placed on the boat were withdrawn, and the god was revealed to the eyes of the awe-struck multitude. Music and dancing formed part of the festival rites.

Temples.

As with the rites and ceremonies, so also the temples were early modelled upon a common type. Lofty enclosure walls, adorned with scenes from the victorious campaigns of the Pharaoh, shut off the sacred buildings from the surrounding streets. A small gateway between two massive towers or pylons gave admittance to a spacious forecourt open to the sky, into which the people were allowed to enter at least on feast days. Farther on, separated from the forecourt by smaller though still massive pylons, lay a hypostyle hall, so called from its covered colonnades; this hall was used for all kinds of processions. Behind the hypostyle hall, to which a second similar one might or might not be added, came the holy of holies, a dark narrow chamber where the god dwelt; none but the priests were admitted to it. All around lay the storehouses that contained the treasures of the god and the appurtenances of the divine ritual. The temples of the earliest times were of course far more primitive than this: from the pictures that are all that is now left to indicate their nature, they seem to have been little more than huts or sheds in which the image of the god was kept. One temple of a type different from that above described has survived at Abusir, where it has been excavated by German explorers. It was a splendid edifice dedicated to the sun-god Re by a king of the Vth Dynasty, and was probably a close copy of the famous temple of Heliopolis. The most conspicuous feature was a huge obelisk on a broad superstructure : the obelisk always remained closely connected with the solar worship, and probably took the place of the innermost shrine and statue of other temples. The greater part of the sanctuary was left uncovered, as best befitted a dwelling-place of the sun. Outside its walls there was a huge brick model of the solar bark in which the god daily traversed the heavens.

As the power of the Pharaohs increased, the maintenance of the cult became one of the most important affairs of state. The most illustrious monarchs prided themselves no less on the buildings they raised in honour of the gods than on the successful wars they waged: indeed the wars won a religious significance through the gradual elevation of the god of the capital to god of the nation, and a large part of the spoils was considered the rightful perquisite of the latter. Countless were the riches that the kings heaped upon the gods in the hope of being requited with long life and prosperity on the throne of the living. It became the theory that the temples were the gifts of the Pharaoh to his fathers the gods, and therefore in the scenes of the cult that adorn the inner walls it is always he who is depicted as performing the ceremonies. As a matter of fact the priesthoods were much more independent than was allowed to appear. Successive grants of land placed no small portion of the entire country in their hands, and the administration of the temple estates gave employment to a large number of officials and serfs. In the New Kingdom the might of the Theban god Ammon gradually became a serious menace to the throne: in the reign of Rameses III. he could boast of more than 80,000 dependants, and more than 400,000 cattle. It is not surprising that a few generations later the high priests of Ammon supplanted the Pharaohs altogether and founded a dynasty of their own.

Power of the priests.

At no period did the priests form a caste that was quite distinctly separated from the laity. In early times the feudal lords were themselves the chief priests of the local temples. Under them stood a number of subordinate priests, both professional and lay. Among the former were the *kher-heb*, a learned man entrusted with the conduct of the ceremonies, and the "divine fathers," whose functions are obscure. The lay priests were divided into four classes that undertook the management of the temple in alternate months; their collective name was the "hour-priesthood." Perhaps it was to them that the often recurring title *oueb*, "the pure," should properly be restricted, though strict rules as to personal purity, dress and diet were demanded of all priests. The personnel of the temple was completed by various subordinate officials, doorkeepers, attendants and slaves. In the New Kingdom the leading priests were more frequently mere clerics than theretofore, though for instance the high priest of Ammon was often at the same time the vizier of southern Egypt. In some places the highest priests bore special names, such as the *Ouer maa*, "the Great Seer," of Re in Heliopolis, or the *Khorp himet*, "chief artificer," of the Memphite Ptah. Women could also hold priestly rank, though apparently in early times only in the service of goddesses; "priestess of Hathor" is a frequent title of well-born ladies in the Old Kingdom. At a later date many wealthy dames held the office of "musicians" (*shemat*) in the various temples. In the service of the Theban Ammon two priestesses called "the Adorer of the God" and the "Wife of the God" occupied very influential positions, and towards the Saite period it was by no means unusual for the king to secure these offices for his daughters and so to strengthen his own royal title.

5. *The Dead and their Cult.*—While the worship of the gods

tended more and more to become a monoply of the state and the priests, and provided no adequate outlet for the religious cravings of the people themselves, this deficiency was amply supplied by the care which they bestowed upon their dead: the Egyptians stand alone among the nations of the world in the elaborate precautions which they took to secure their own welfare beyond the tomb. The belief in immortality, or perhaps rather the incapacity to grasp the notion of complete annihilation, is traceable from the very earliest times: the simplest graves of the prehistoric period, when the corpses were committed to the earth in sheepskins and reed mats, seldom lack at least a few poor vases or articles of toilet for use in the hereafter. In proportion as the prosperity of the land increased, and the advance of civilization afforded the technical means, so did these primitive burials give place to a more lavish funereal equipment. Tombs of brick with a single chamber were succeeded by tombs of stone with several chambers, until they really merited the name of "houses of eternity" that the Egyptians gave to them. The conception of the tomb as the residence of the dead is the fundamental notion that underlies all the ritual observances in connexion with the dead, just as the idea of the temple as the dwelling-place of the god is the basis of the divine cult. The parallelism between the attitude of the Egyptians towards the dead and their attitude towards the gods is so striking that it ought never to be lost sight of: nothing can illustrate it better than the manner in which the Osirian doctrines came to permeate both kinds of cult.

Tombs.

The general scheme of Egyptian tombs remained the same throughout the whole of the dynastic period, though there were many variations of detail. By preference they were built in the Western desert, the Amente, near the place where the sun was seen to go to rest, and which seemed the natural entrance to the nether world. A deep pit led down to the sepulchral chamber where the dead man was deposited amid the funereal furniture destined for his use; and no device was neglected that might enable him to rest here undisturbed. This aim is particularly conspicuous in the pyramids, the gigantic tombs which the Pharaohs of the Old Kingdom constructed for themselves: the passages that lead to the burial chamber were barred at intervals by vast granite blocks, and the narrow opening that gave access to them was hidden from view beneath the stone casing of the pyramid sides. Quite separate from this part of the tomb lay the rooms employed for the cult of the dead: their walls were often adorned with pictures from the earthly life of the deceased, which it was hoped he might still continue to enjoy after death. The innermost chamber was the chapel proper: on its western side was sculptured an imitation door for the dead man to pass through, when he wished to participate in the offerings brought by pious relatives. It was of course only the few who could afford elaborate tombs of the kind: the poor had to make shift with an unpretentious grave, in which the corpse was placed enveloped only by a few rags or enclosed in a rough wooden coffin.

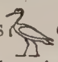
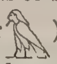
Embalming and burial.

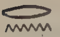
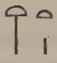
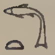
The utmost care was taken to preserve the body itself from decay. Before the time of the Middle Kingdom it became usual for the rich to have their bodies embalmed. The intestines were removed and placed in four vases (the so-called Canopic jars) in which they were supposed to enjoy the protection of the four sons of Horus, the man-headed Mesti, the ape-headed Hapi, the jackal Duamutef and the falcon Kebhsenuf. The corpse was treated with natron and asphalt, and wound in a copious swathing of linen bandage, with a mask of linen and stucco on the face. The "mummy" thus prepared was then laid on its side like a sleeper, the head supported by a head-rest, in a sarcophagus of wood or stone. The operations in connexion with the mummy grow more and more elaborate towards the end of the Pharaonic period: already in the New Kingdom the wealthiest persons had their mummies laid in several coffins, each of which was gaudily painted with mythological scenes and inscriptions. The costliest process of embalmment lasted no less than seventy days. Many superstitious rites had to be observed in the course of the process: a late book has preserved to us the magical formulae that were repeated by the wise *kher-heb* priest (who in the necropolis performed the functions of taricheutes, "embalmer"), as each bandage was applied.

A large number of utensils, articles of furniture and the like were placed in the burial-chamber for the use of the dead—jars, weapons, mirrors, and even chairs, musical instruments and wigs. In the early times statuettes of servants, representing them as engaged in their various functions (brewers, bakers, &c.), were included for the same purpose; they were supposed to perform their menial functions for their deceased lord in the future life. In the Middle Kingdom these are gradually replaced by small models of the mummy itself, and the belief arose that when their owner was called upon to perform any distasteful work in the nether world, they would answer to his name and do the task for him. The later *ushebti*-figures, little statuettes of wood, stone or faience, of which several hundreds are often found in a single tomb, are confused survivals of both of the earlier classes of statuettes. Still more important than all such funereal objects are the books that were placed in the grave for the use of the dead: in the pyramids they are written on the walls of the sepulchral chamber and the passages leading to it; in the Middle Kingdom usually inscribed on the inner sides of the sarcophagus; in later times contained in rolls of papyrus. The Pyramid texts and the *Book of the Dead* are the most important of these, and teach us much about the dangers and needs that attended the dead man beyond the tomb, and about the manner in which it was thought they could be counteracted.

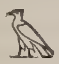
The burial ceremony itself must have been an imposing spectacle. In many cases the mummy had to be conveyed across the Nile, and boats were gaily decked out for this purpose. On the western bank a stately procession conducted the deceased to his last resting-place. At the door of the tomb the final ceremonies were performed; they demanded a considerable number of actors, chief among whom were the *sem*-priest and the *kher-heb* priest. It was a veritable drama that was here enacted, and recalled in its incidents the story of Osiris, the divine prototype of all successive generations of the Egyptian dead.

The soul.

However carefully the preliminary rites of embalmment and burial might have been performed, however sumptuous the tomb wherein the dead man reposed, he was nevertheless almost entirely at the mercy of the living for his welfare in the other world: he was as dependent on a continued cult on the part of the surviving members of his family as the gods were dependent on the constant attendance of their priests. That portion of a man's individuality which required, even after death, food and drink, and the satisfaction of sensuous needs, was called by the Egyptians the *ka*, and represented in hieroglyphs by the uplifted hands . This *ka* was supposed to be born together with the person to whom it belonged, and on the very rare occasions when it is depicted, wears his exact semblance. The conception of this psychical entity is too vaguely formulated by the Egyptians and too foreign to modern thought to admit of exact translation: of the many renderings that have been proposed, perhaps "double" is the most suitable. At all events the *ka* has to be distinguished from the soul, the *bai* (in hieroglyphs  or ), which was of more tangible nature, and might be descried hovering around the tomb in the form of a bird or in some other shape; for it was thought that the soul might assume what shape it would, if the funerary rites had been duly attended to. The gods had their *ka* and *bai*, and the forms attributed to the latter are surprising; thus we read that the soul of the sky Nun is Re, that of Osiris the Goat of Mendes, the souls of Sobk are crocodiles, and those "of all the gods are snakes"; similarly the soul of Ptah was thought to dwell in the Apis bull, so that each successive Apis was during its lifetime the reincarnation of the god. Other parts of a man's being to which at given moments and in particular contexts the Egyptians assigned a certain degree of separate existence are the "name"

 *ran*, the "shadow" , *khaibet*, and the "corpse" , *khat*.

It was, however, the *ka* alone to which the cult of the dead was directly addressed. This cult was a positive duty binding on the children of a dead man, and doubtless as a rule discharged by them with some regularity and conscientiousness; at least, on feast-days offerings would be brought to the tomb, and the ceremonies of purification and opening the mouth of the deceased would be enacted. But there could be little guarantee that later generations would perpetuate the cult. It therefore became usual under the Old Kingdom for the wealthiest persons to make testamentary dispositions by which certain other persons agreed for a consideration to observe the required rites at stated periods: they received the name of "servants of the *ka*," and stood in the same relation to the deceased as the priests to the gods. Or again, contracts might be made with a neighbouring temple, the priesthood of which bound itself to reserve for the contracting party some portion of the offerings that had already been used for the divine cult. There is probably a superstitious reason for the preference shown by the dead for offerings of this kind; no wish is commoner than that one may receive "bread and beer that had gone up on to the altar of the local god," or "with which the god had been sated"; something of the divine sanctity still clung about such offerings and made them particularly desirable. In spite of all the precautions they took and the contracts they made, the Egyptians could never quite rid themselves of the dread that their tombs might decay and their cult be neglected; and they sought therefore to obtain by prayers and threats what they feared they might lose altogether. The occasional visitor to the tomb is reminded by its inscriptions of the many virtues of the dead man while he yet lived, and is charged, if he be come with empty hands, at least to pronounce the funerary formula; it will indeed cost him nothing but "the breath of his mouth"! Against the would-be desecrator the wrath of the gods is invoked: "with him shall the great god reckon there where a reckoning is made."

The funerary customs that have been described are meaningless except on the supposition that the tomb was the regular dwelling-place of the dead. But just as the Egyptians found no contradiction between the view of the temple as the residence of the god and the conception of him as a cosmic deity, so too they often attributed to the dead a continued existence quite apart from the tomb. According to a widely-spread doctrine of great age the deceased Egyptian was translated to the heavens, where he lived on in the form of a star. This theme is elaborated with great detail in the Pyramid texts, where it is the dead king to whom this destiny is promised. It was perhaps only a restricted aristocracy who could aspire to such high honour: the  *ikh*, or "glorified being," who has his place in the sky seems often to hold an intermediate position between the gods and the rank and file of the dead. But in a few early passages the required qualification appears to be rather moral integrity than exalted station. The life of the dead man in the sky is variously envisaged in different texts: at one moment he is spoken of as accompanying the sun-god in his celestial bark, at another as a mighty king more powerful than Re himself; the crudest fancy of all pictures him as a hunter who catches the stars and gods, and cooks and eats them. According to another conception that persisted in the imagination of the Egyptians longer than any of the ideas just mentioned, the home of the dead in the heavens was a fertile region not very different form Egypt itself, intersected by canals and abounding in corn and fruit; this place was called the Sokhet Earu or "field of Reeds."

Even in the oldest texts these beliefs are blended inextricably with the Osirian doctrines. It is not so much as king of the dead that Osiris here appears, but every deceased Egyptian was regarded as himself an Osiris, as having undergone all the indignities inflicted upon the god, but finally triumphant over the powers of death and evil impersonated by Seth. This notion became so popular, that beside it all other views of the dead sink into insignificance; it permeates the funerary cult in all its stages, and from the Middle Kingdom onwards the dead man is regularly called "the Osiris so-and-so," just as though he were completely identical with the god. One incident of the tale of Osiris acquired a deep ethical meaning in connexion with the dead. It was related how Seth had brought an accusation against Osiris in the great judgment hall of Heliopolis, and how the latter, helped by the skilful speaker Thoth, had emerged from the ordeal acquitted and triumphant. The belief gradually grew up that every dead man would have to face a similar trial before he could be admitted to a life of bliss in the other world. A well-known vignette in the *Book of the Dead* depicts the scene. In a shrine sits Osiris, the ruler and judge of the dead, accompanied by forty-two assessors; and before him stands the balance on which the heart of the deceased man is to be weighed against Truth; Thoth stands behind and registers the result. The words that accompany this picture are still more remarkable: they form a long negative confession, in which the dead man declares that he has sinned neither against man nor against the gods. Not all the sins named are equally heinous according to modern conceptions; many of them deal with petty offences against religious usages that seem to us but trifling. But it is clear that by the time this chapter was penned it was believed that no man could attain to happiness in the hereafter if he had not been upright, just and charitable in his earthly existence. The date at which these conceptions became general is not quite certain, but it can hardly be later than the Middle Kingdom, when the dead man has the epithet "justified" appended to his name in the inscriptions of his tomb.

It was but a natural wish on the part of the Egyptians that they should desire to place their tombs near the traditional burying-place of Osiris. By the time of the XIIth Dynasty it was thought that this lay in Abydos, the town where the kings of the earliest times had been interred. But it was only in a few cases that such a wish could be literally fulfilled. It therefore became customary for those who possessed the means to dedicate at least a tombstone in the neighbourhood of "the staircase of the great god," as the sacred spot was called. And those who had found occasion to visit Abydos in their lifetime took pleasure in recalling the part that they had there taken in the ceremonies of Osiris. Such pilgrims doubtless believed that the pious act would stand to their credit when the day of death arrived.

6. *Magic.*—Among the rites that were celebrated in the temples or before the statues of the dead were many the mystical meaning of which was but imperfectly understood, though their efficacy was never doubted. Symbolical or imitative acts, accompanied by spoken formulae of set form and obscure content, accomplished, by some peculiar virtues of their own, results that were beyond the power of human hands and brain. The priests and certain wise men were the depositaries of this mysterious but highly useful art, that was called *hik* or "magic"; and one of the chief differences between gods and men was the superior degree in which the former were endowed with magical powers. It was but natural that the Egyptians should wish to employ magic for their own benefit or self-gratification, and since religion put no veto on the practice so long as it was exercised within legal bounds, it was put to a widespread use among them. When magicians made figures of wax representing men whom they desired to injure, this was of course an illegal act like any other, and the law stepped in to prevent it: one papyrus that has been preserved records the judicial proceedings taken in such a case in connexion with the harem conspiracy against Rameses III.

One of the chief purposes for which magic was employed was to avert diseases. Among the Egyptians, as in other lands, illnesses were supposed to be due to evil spirits or the ghosts of dead men who had taken up their abode in the body of the sufferer, and they could only be driven thence by charms and spells. But out of these primitive notions arose a real medical science: when the ailment could be located and its nature roughly determined, a more materialistic view was taken of it; and many herbs and drugs that were originally used for some superstitious reason, when once they had been found to be actually effective, easily lost their magical significance and were looked upon as natural specifics. It is extremely hard to draw any fixed line in Egypt between magic and medicine; but it is curious to note that simple diagnoses and prescriptions were employed for the more curable diseases, while magical formulae and amulets are reserved for those that are harder to cope with, such as the bites of snakes and the stings of scorpions.

The formulae recited for such purposes are not purely cabalistic, though inasmuch as mystery is of the very essence of magic, foreign words and outlandish names occur in them by preference. Often the magician relates some mythical case where a god had been afflicted with a disease similar to that of the patient, but had finally recovered: a number of such tales were told of Horus, who was usually healed by some device of his mother Isis, she being accounted as a great enchantress. The mere recitation of such similar cases with their happy issue was supposed to be magically effective; for almost unlimited power was supposed to be inherent in mere words. Often the demon is directly invoked, and commanded to come forth. At other times the gods are threatened with privations or even destruction if they refuse to aid the magician: the Egyptians seem to have found little impiety in such a use of the divine name, though to us it would seem the utmost degree of profanity when, for instance, a magician declares that if his spell prove ineffective, he "will cast fire into Mendes and burn up Osiris."

The verbal spells were always accompanied by some manual performance, the tying of magical knots or the preparation of an amulet. In these acts particular significance was attached to certain numbers: a sevenfold knot, for example, was more efficacious than others. Often the formula was written on a strip of rag or a scrap of papyrus and tied round the neck of the person for whom it was intended. Beads and all kinds of amulets could be infused with magical power so as to be potent phylacteries to those who wore them.

In conclusion, it must be emphasized that in Egypt magic stands in no contrast or opposition to religion, at least as long as it was legitimately used. The religious rites and ceremonies are full of it. When a pretence was made of opening, with an iron instrument, the mouth of the divine statue, to the accompaniment of recited formulae, this can hardly be termed anything but magic. Similarly, the potency attributed to *ushebti*-figures and the copies of the *Book of the Dead* deposited in the tombs is magical in quality. What has been considered under this heading, however, is the use that the same principles of magic were put to by men in their own practical life and for their own advantage.

AUTHORITIES.—An excellent list of books and articles on the various topics connected with Egyptian Religion will be found in H. O. Lange's article on the subject in P.D. Chantepie de la Saussaye, *Lehrbuch der Religionsgeschichte* (Tübingen, 1905), vol. i. pp. 172-245. Among general works may be especially recommended A. Erman, *Die ägyptische Religion* (Berlin, 1905); and chapters 2 and 3 in G. Maspero, *Histoire ancienne des peuples de l'Orient, les origines*, vol. i. (Paris, 1895). (A. H. G.)

D. *Egyptian Language and Writing.*—*Decipherment.*—Although attempts were made to read Egyptian hieroglyphs so far back as the 17th century, no promise of success appeared until the discovery of the Rosetta stone in 1799 by the French engineers attached to Napoleon's expedition to Egypt. This tablet was inscribed with three versions, in hieroglyphic, demotic and Greek, of a long decree of the Egyptian priests in honour of Ptolemy V., Epiphanes and his wife Cleopatra. The Greek and demotic versions were still almost perfect, but most of the hieroglyphic text had been broken away with the top of the tablet; portions of about half of the lines remained, but no single line was complete. In 1802 J. D. Akerblad, a Swedish orientalist attached to the embassy in Paris, identified the proper names of persons which occurred in the demotic text, being guided to them by the position of their equivalents in the Greek. These names, all of them foreign, were written in an alphabet of a limited number of characters, and were therefore analysed with comparative ease.

The hieroglyphic text upon the Rosetta stone was too fragmentary to furnish of itself the key to the decipherment. But the study of this with the other scanty monuments and imperfect copies of inscriptions that were available enabled the celebrated physicist Thomas Young (1773–1829) to make a beginning. In an article completed in 1819 and printed (over the initials I. J.) in the supplement to the 4th, 5th and 6th editions of the *Encyclopaedia Britannica* (vol. iv., 1824), he published a brief account of Egyptian research, with five plates containing the "rudiments of an Egyptian vocabulary." It appears that Young could place the hieroglyphic, demotic and Greek texts of the Rosetta stone very correctly parallel; but he could not accurately break up the Egyptian sentences into words, much less could he attribute to the words their proper sounds. Yet he recognized correctly the names of Apis and Re, with many groups for words such as "assembly," "good," "name," and important signs such as those which distinguish feminine words. In a bad copy of another monument he rightly guessed the royal name of Berenice in its cartouche by the side of that of Ptolemy, which was already known from its occurrence on the Rosetta stone. He considered that these names must be written in phonetic characters in the hieroglyphic as in demotic, but he failed to analyse them correctly. It was clear, however, that with more materials and perseverance such efforts after decipherment must eventually succeed.

Meanwhile J. F. Champollion "le Jeune" (see CHAMPOLLION; and Hartleben, *Champollion, sein Leben und sein Werk*, Berlin, 1906) had devoted his energies whole-heartedly since 1802, when he was only eleven years old, to preparing himself for the solution of the Egyptian problem, by wide linguistic and historical studies, and above all by familiarizing himself with every scrap of Egyptian writing which he could find. By 1818 he made many equations between the demotic and the hieroglyphic characters, and was able to transcribe the demotic names of Ptolemy and Cleopatra into hieroglyphics. At length, in January 1822, a copy of the hieroglyphic inscription on the Bankes obelisk, which had long been fruitlessly in the hands of Young, reached the French savant. On the base of this obelisk was engraved a Greek inscription in honour of Ptolemy Euergetes II. and Cleopatra; of the two cartouches on the obelisk one was of Ptolemy, the other was easily recognized as that of Cleopatra, spelt nearly as in Champollion's experimental transcript of the demotic name, only more fully. This discovery, and the recognition of the name Alexander, gave fourteen alphabetic signs, including homophones, with ascertained values. Starting from these, by the beginning of September Champollion had analysed a long series of Ptolemaic and Roman cartouches. His next triumph was on the 14th of September, when he read the names of the ancient Pharaohs Rameses and Tethmosis in some drawings just arrived from Egypt, proving that his alphabetic characters were employed, in conjunction with syllabic signs, for spelling native names; this gave him the assurance that his discovery touched the essential nature of the Egyptian writing and not merely, as had been contended, a special cipher for the foreign words which might be quite inapplicable to the rest of the inscriptions. His progress continued unchecked, and before the end of the year the connexion of ancient Egyptian and Coptic was clearly established. Subsequently visits to the museums of Italy and an expedition to Egypt in 1828–1829 furnished Champollion with ample materials. The *Précis du système hiéroglyphique* (1st ed. 1823, 2nd ed. 1828) contained the philological results of his decipherments down to a certain point. But his MS. collections were vast, and his illness after the strenuous labours of the expedition and his early death in 1832 left all in confusion. The *Grammaire égyptienne* and *Dictionnaire égyptien*, edited from these MSS. by his brother, precious as they were, must be a very imperfect register of the height of his attainments. In his last years he was able to translate long texts in hieroglyphic and in hieratic of the New Kingdom and of the later periods with some accuracy, and his comprehension of demotic was considerable. Champollion outdistanced all his competitors from the first, and had practically nothing to thank them for except material to work on, and too often that had been intentionally withheld from him. In eleven years he broke ground in all directions; if the ordinary span of life had been allowed him, with twenty or thirty more years of labour he might have brought order into the chaos of different ages and styles of language and writing; but, as it was, the task of co-ordination remained to be done by others. For one year, before his illness incapacitated him, Champollion held a professorship in Paris; but of his pupils and fellow-workers, F. P. Salvolini, insincere and self-seeking, died young, and Ippolito Rosellini (1800–1843) showed little original power. From 1832 to 1837 there was a pause in the march of Egyptology, and it seemed as if the young science might be overwhelmed by the storm of doubts and detraction that was poured upon it by the enemies of Champollion. Then, however, Lepsius in Germany and Samuel Birch in England took up the thread where the master had dropped it, and E. de Rougé, H. Brugsch, François Joseph Chabas and a number of lesser lights quickly followed. Brugsch (*q.v.*) was the author of a hieroglyphic and demotic dictionary which still holds the field, and from time to time carried forward the study of demotic by a giant's stride. De Rougé (d. 1872) in France was a brilliant translator of hieroglyphic texts and the author of an important grammatical work. Chabas (1817–1882) especially addressed himself to the reading of the hieratic texts of the New Kingdom. By such labours after forty years the results attained by Champollion in decipherment were entirely superseded. Yet, while the values of the signs were for the most part well ascertained, and the meanings of most works fixed with some degree of accuracy, few grammatical rules had as yet been established, the varieties of the language at different periods had not been defined, and the origins of the hieroglyphs and of their values had not been investigated beyond the most obvious points. At this time a rare translator of Egyptian texts in all branches was arising in G. Maspero (*q.v.*), while E. Revillout addressed himself with success to the task of interpreting the legal documents of demotic which had been almost entirely neglected for thirty years. But the honour of inaugurating an epoch marked by greater precision belongs to Germany. The study of Coptic had begun in Europe early in the 17th century, and reached a high level in the work of the Dane Georg Zoega (1755–1809) at the end of the 18th century. In 1835, too late for Champollion to use it, Amadeo Peyron (1785–1870) of Turin published a Coptic lexicon of great merit which is still standard, though far from satisfying the needs of scholars of the present day. In 1880 Ludwig Stern (*Koptische Grammatik*) admirably classified the grammatical forms of Coptic. The much more difficult task of recovering the grammar of Egyptian has occupied thirty years of special study by Adolf Erman and his school at Berlin, and has now reached an advanced stage. The greater part of Egyptian texts after the Middle Kingdom having been written in what was even then practically a dead language, as dead as Latin was to the medieval monks in Italy who wrote and spoke it, Erman selected for special investigation those texts which really represented the growth of the language at different periods, and, as he passed from one epoch to another, compared and consolidated his results.

The *Neuägyptische Grammatik* (1880) dealt with texts written in the vulgar dialect of the New Kingdom (Dyns. XVIII. to XX.). Next followed, in the *Zeitschrift für ägyptische Sprache und Alterthumskunde*, studies on the Old Kingdom inscription of Una, and the Middle Kingdom contracts of Assiut, as well as on an "Old Coptic" text of the 3rd century A.D. At this point a papyrus of stories written in the popular language of the Middle Kingdom provided Erman with a stepping-stone from Old Egyptian to the Late Egyptian of the *Neuägyptische Grammatik*, and gave the connexions that would bind solidly together the whole structure of Egyptian grammar (see *Sprache des Papyrus Westcar*, 1889). The very archaic pyramid texts enabled him to sketch the grammar of the earliest known form of Egyptian (*Zeitschrift d. Deutsch. Morgenl. Gesellschaft*, 1892), and in 1894 he was able to write a little manual of Egyptian for beginners (*Ägyptische Grammatik*, 2nd ed., 1902), centring on the language of the standard inscriptions of the Middle and New Kingdoms, but accompanying the main sketch with references to earlier and later forms. Of the work of Erman's pupils we may mention G. Steindorff's little *Koptische Grammatik* (1894, ed. 1904), improving greatly on Stern's standard work in regard to phonology and the relationship of Coptic forms to Egyptian, and K. Sethe's *Das Ägyptische Verbum* (1899). The latter is an extensive monograph on the verb in Egyptian and Coptic by a brilliant and laborious philologist. Owing to the very imperfect notation of sound in the writing, the highly important subject of the verbal roots and verbal forms was perhaps the obscurest branch of Egyptian grammar when Sethe first attacked it in 1895. The subject has been reviewed by Erman, *Die Flexion des ägyptischen Verbums* in the *Sitzungsberichte* of the Berlin Academy, 1900. The Berlin school, having settled the main lines of the grammar, next turned its attention to lexicography. It has devised a scheme, founded on that for the Latin Thesaurus of the Berlin Academy, which almost mechanically sorts the whole number of occurrences of every word in any text examined. Scholars in England, America and Denmark, as well as in Germany, have taken part in this great enterprise, and though the completion of it may be far off, the collections of classified material already made are very valuable for consultation.[1] At present Egyptologists depend on Heinrich Brugsch's admirable but somewhat antiquated *Wörterbuch* and on Levi's useful but entirely uncritical *Vocabolario*. Though demotic has not yet received serious attention at Berlin, the influence of that great school has made itself felt amongst demotists, especially in Switzerland, Germany, America and England. The death of Heinrich Brugsch in 1895 was a very severe blow to demotic studies; but it must be admitted that his brilliant gifts lay in other directions than exact grammatical analysis. Apart from their philological interest, as giving the history of a remarkable language during a period of several thousand years, the grammatical studies of the last quarter of the 19th century and afterwards are beginning to bear fruit in regard to the exact interpretation of historical documents on Egyptian monuments and papyri. Not long ago the supposed meaning of these was extracted chiefly by brilliant guessing, and the published translations of even the best scholars could carry no guarantee of more than approximate exactitude, where the sense depended at all on correct recognition of the syntax. Now the translator proceeds in Egyptian with some of the sureness with which he would deal with Latin or Greek. The meaning of many words may be still unknown, and many constructions are still obscure; but at least he can distinguish fairly between a correct text and a corrupt text. Egyptian writing lent itself only too easily to misunderstanding, and the writings of one period were but half intelligible to the learned scribes of another. The mistaken readings of the old inscriptions by the priests at Abydos (Table of Abydos), when attempting to record the names of the kings of the Ist Dynasty on the walls of the temple of Seti I., are now admitted on all sides; and no palaeographer, whether his field be Greek, Latin, Arabic, Persian or any other class of MSS., will be surprised to hear that the Egyptian papyri and inscriptions abound in corruptions and mistakes. The translator of to-day can, if he wishes, mark where certainty ends and mere conjecture begins, and it is to be hoped that advantage will be taken more widely of this new power. The Egyptologist who has long lived in the realm of conjecture is too prone to consider any series of guesses good enough to serve as a translation, and forgets to insert the notes of interrogation which would warn workers in other fields from implicit trust.

Language and Writing.—The history of the Egyptian language is evidenced by documents extending over a very long range of time. They begin with the primitive inscriptions of the Ist Dynasty (not later than 3300 B.C.) and end with the latest Coptic compositions of about the 14th century A.D. The bulk of the hieroglyphic inscriptions are written in a more or less artificial literary language; but in business documents, letters, popular tales, &c., the scribes often adhered closely to the living form of the tongue, and thus reveal its progressive changes.

The stages of the language are now distinguished as follows:—

Old Egyptian.—This is properly the language of the Old Kingdom. In it we have (*a*) the recently discovered inscriptions of the Ist Dynasty, too brief and concise to throw much light on the language of that time; and the great collections of spells and ritual texts found inscribed in the Pyramids of the Vth and VIth Dynasties, which must even then have been of high antiquity, though they contain later additions made in the same style. (*b*) A few historical texts and an abundance of short inscriptions representing the language of the IVth, Vth and VIth Dynasties. The ordinary *literary language* of the later monuments is modelled on Old Egyptian. It is often much affected by contemporary speech, but preserves in the main the characteristics of the language of the Old Kingdom.

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[1] Annual reports of the progress of the work are printed in the *Sitzungsberichte* of the Berlin Academy of Sciences; see also Erman, *Zur ägyptischen Sprachforschung*, *ib.* for 1907, p. 400, showing the general trend of the results.

Middle and Late Egyptian.—These represent the vulgar speech of the Middle and New Kingdoms respectively. The former is found chiefly in tales, letters, &c., written in hieratic on papyri of the XIIIth Dynasty to the end of the Middle Kingdom; also in some inscriptions of the XVIIIth Dynasty. Late Egyptian is seen in hieratic papyri of the XVIIIth to the XXIst Dynasties. The spelling of Late Egyptian is very extraordinary, full of false etymologies, otiose signs, &c., the old orthography being quite unable to adapt itself neatly to the profoundly modified language; nevertheless, this clumsy spelling is expressive, and the very mistakes are instructive as to the pronunciation.

Demotic.—Demotic Egyptian seems to represent approximately the vulgar speech of the Saite period, and is written in the "demotic" character, which may be traced back to the XXVIth Dynasty, if not to a still earlier time. With progressive changes, this form of the language is found in documents reaching down to the fall of Paganism in the 4th century A.D.[1] Under the later Ptolemies and the Roman rule documents in Greek are more abundant than in demotic, and the language of the ruling classes must have begun to penetrate the masses deeply.

Coptic.—This, in the main, represents the popular language of early Christian Egypt from the 3rd to perhaps the 10th century A.D., when the growth of Coptic as a literary language must have ceased. The Greek alphabet, reinforced by a few signs borrowed from demotic, rendered the spoken tongue so accurately that four distinct, though closely allied, dialects are readily distinguishable in Coptic MSS.; ample remains are found of renderings of the Scriptures into all these dialects. The distinctions between the dialects consist largely in pronunciation, but extend also to the vocabulary, word-formation and syntax. Such interchanges are found as *l* for *r*, ϭ (*k*, *ch*) for ϫ (*dj*), final *i* for final *e*, *a* for *e*, *a* for *o*. Early in the 2nd century A.D., pagan Egyptians, or perhaps foreigners settled in Egypt, essayed, as yet unskilfully, to write the native language in Greek letters. This *Old Coptic*, as it is termed, was still almost entirely free from Greek loan-words, and its strong archaisms are doubtless accounted for by the literary language, even in its most "vulgar" forms, having moved more slowly than the speech of the people. Christian Coptic, though probably at first contemporary with some documents of Old Coptic, contrasts strongly with the latter. The monks whose task it was to perfect the adaptation of the alphabet to the dialects of Egypt and translate the Scriptures out of the Greek, flung away all pagan traditions. It is clear that the basis which they chose for the new literature was the simplest language of daily life in the monasteries, charged as it was with expressions taken from Greek, pre-eminently the language of patristic Christianity. There is evidence that the amount of stress on syllables, and the consequent length of vowels, varied greatly in spoken Coptic, and that the variation gave much trouble to the scribes; the early Christian writers must have taken as a model for each dialect the deliberate speech of grave elders or preachers, and so secured a uniform system of accentuation. The remains of Old Coptic, though very instructive in their marked peculiarities, are as yet too few for definite classification. The main divisions of Christian Coptic as recognized and named at present are: Sahidic (formerly called Theban), spoken in the upper Thebais; Akhmimic, in the neighbourhood of Akhmim, but driven out by Sahidic about the 5th century; Fayumic, in the Fayum (formerly named wrongly "Bashmuric," from a province of the Delta); Bohairic, the dialect of the "coast district" (formerly named "Memphite"), spoken in the north-western Delta. Coptic, much alloyed with Arabic, was spoken in Upper Egypt as late as the 15th century, but it has long been a dead language.[2] Sahidic and Bohairic are the most important dialects, each of these having left abundant remains; the former spread over the whole of Upper Egypt, and the latter since the 14th century has been the language of the sacred books of Christianity throughout the country, owing to the hierarchical importance of Alexandria and the influence of the ancient monasteries established in the north-western desert.

The above stages of the Egyptian language are not defined with absolute clearness. Progress is seen from dynasty to dynasty or from century to century. New Egyptian shades off almost imperceptibly into demotic, and it may be hoped that gaps which now exist in the development will be filled by further discovery.

Coptic is the only stage of the language in which the spelling gives a clear idea of the pronunciation. It is therefore the mainstay of the scholar in investigating or restoring the word-forms of the ancient language. Greek transcriptions of Egyptian names and words are valuable as evidence for the vocalization of Egyptian. Such are found from the 6th century B.C. in the inscription of Abu Simbel, from the 5th in Herodotus, &c., and abound in Ptolemaic and later documents from the beginning of the 3rd century B.C. onwards. At first sight they may seem inaccurate, but on closer examination the Graecizing is seen to follow definite rules, especially in the Ptolemaic period. A few cuneiform transcriptions, reaching as far back as the XVIIIth Dynasty, give valuable hints as to how Egyptian was pronounced in the 15th century B.C. Coptic itself is of course quite inadequate to enable us to restore Old Egyptian. In it the Old Egyptian verbal forms are mostly replaced by periphrases; though the strong roots are often preserved entire, the weaker consonants and the ꜥ have largely or entirely disappeared, so that the language appears as one of biliteral rather than triliteral roots. Coptic is strongly impregnated with Greek words adopted late; moreover, a certain number of Semitic loan-words flowed into Egyptian at all ages, and especially from the 16th century B.C. onwards, displacing earlier words. It is only by the most careful scrutiny, or the exercise of the most piercing insight, that the imperfectly spelled Egyptian has been made to yield up one grammatical secret after another in the light brought to bear upon it from Coptic. Demotic grammar ought soon to be thoroughly comprehensible in its forms, and the study of Late Egyptian should not stand far behind that of demotic. On the other hand, Middle Egyptian, and still more Old Egyptian, which is separated from Middle Egyptian by a wide gap, will perhaps always be to us little more than consonantal skeletons, the flesh and blood of their vocalization being for the most part irretrievably lost.[3]

In common with the Semitic languages, the Berber languages of North Africa, and the Cushite languages of North-East Africa, Egyptian of all periods possesses grammatical gender, expressing masculine and feminine. Singularly few language groups have this peculiarity; and our own great Indo-European group, which possesses it, is distinguished from those above mentioned by having the neuter gender in addition. The characteristic triliteral roots of all the Semitic languages seemed to separate them widely from others; but certain traits have caused the Egyptian, Berber and Cushite groups to be classed together as three subfamilies of a Hamitic group, remotely related to the Semitic. The biliteral character of Coptic, and the biliteralism which was believed to exist in Egyptian, led philologists to suspect that Egyptian might be a surviving witness to that far-off stage of the Semitic languages when triliteral roots had not yet been formed from presumed original biliterals; Sethe's investigations, however, prove that the Coptic biliterals are themselves derived from Old Egyptian triliterals, and that the triliteral roots enormously preponderated in Egyptian of the earliest known form; that view is, therefore, no longer tenable. Many remarkable resemblances have been observed in the grammatical structure of the Berber and Cushite groups with Semitic (cf. H. Zimmern, *Vergleichende Grammatik d. semitischen Sprachen*, Berlin, 1898, especially pronouns and verbs); but the relationship must be very distant, and there are no ancient documents that can take back the history of any one of those languages more than a few centuries. Their connexion with Semitic and Egyptian, therefore, remains at present an obscure though probable hypothesis. On the other hand, Egyptian is certainly related to Semitic. Even before the triliterality of Old Egyptian was recognized, Erman showed that the so-called pseudo-participle had been really in meaning and in form a precise analogue of the Semitic perfect, though its original employment was almost obsolete in the time of the earliest known texts. Triliteralism is considered the most essential and most peculiar feature of Semitic. But there are, besides, many other resemblances in structure between the Semitic languages and Egyptian, so that, although the two vocabularies present few points of clear contact, there is reason to believe that Egyptian was originally a characteristic member of the Semitic family of languages. See Erman, "Das Verhältnis d. ägyptischen zu d. semitischen Sprachen" (*Zeitschrift d. deutschen morgenl. Gesellschaft*, 1892); Zimmern, *Vergl. Gram.*, 1898; Erman, "Flexion d. ägyptischen Verbums" (*Sitzungsberichte d. Berl. Akad.*, 1900). The Egyptians proper are not, and so far as we can tell never were, Semitic in physical feature. As a possible explanation of the facts, Erman supposes that a horde of conquering Semites, like the Arabs of a later day, imposed their language on the country, but disappeared, being weakened by the climate or absorbed by the native population. The latter acquired the Semitic language imperfectly from their conquerors; they expressed the verbal conjugations by periphrases, mispronounced the consonants, and so changed greatly the appearance of the vocabulary, which also would certainly contain a large proportion of native non-Semitic roots. Strong consonants gave place to weak consonants (as ق has done to ا, in the modern Arabic of Egypt), and then the weak consonants disappearing altogether produced biliterals from the triliterals. Much of this must have taken place, according to the theory, in the prehistoric period; but the loss of weak consonants, of ע, and of one of two repeated consonants, and the development of periphrastic conjugations continued to the end. The typical Coptic root thus became biliteral rather than triliteral, and the verb, by means of periphrases, developed tenses of remarkable precision. Such verbal resemblances as exist between Coptic and Semitic are largely due to late exchanges with Semitic neighbours.

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[1] In the temple of Philae, where the worship of Isis was permitted to continue till the reign of Justinian, Brugsch found demotic inscriptions with dates to the end of the 5th century.

[2] The Arabic dialects, which gradually displaced Coptic as Mahommedanism supplanted Christianity, adopted but few words of the old native stock.

[3] In the articles referring to matters of Egyptology in this edition, Graecized forms of Old Egyptian names, where they exist, are commonly employed; in other cases names are rendered by their actual equivalents in Coptic or by analogous forms. Failing all such means, recourse is had to the usual conventional renderings of hieroglyphic spelling, a more precise transcription of the consonants in the latter being sometimes added.

The following sketch of the Egyptian language, mainly in its earliest form, which dates from some three or four thousand years B.C., is founded upon Erman's works. It will serve to contrast with Coptic grammar on the one hand and Semitic grammar on the other.

The Egyptian Alphabet

𓇋 =*ỉ*; so conventionally transcribed since it unites two values, being sometimes *y* but often א (especially at the beginning of words), and from the earliest times used in a manner corresponding to the Arabic *hamza*, to indicate a prosthetic vowel. Often lost.

𓏭 and 𓇌 are frequently employed for *y*.

𓄿 =ʾ(א); easily lost or changes to *y*.

𓂝 =ʿ(ע); lost in Coptic. This rare sound, well known in Semitic, occurs also in Berber and Cushite languages.

𓅱 =*w*; often changes to *y*.

𓃀 =*b*.

𓊪 =*p*.

𓆑 =*f*.

𓅓 =*m*.

𓈖 =*n*.

𓂋 =*r*; often lost, or changes to *y*. *r* and *l* are distinguished in later demotic and in Coptic.

𓉔 =*h*
𓎛 =*ḥ* } distinction lost in Coptic.

𓐍 =*h*; in Coptic ϣ (*sh*) or ϧ (*kh*) correspond to it.

𓄡 =*ẖ*; generally written with 𓈙 (*š*) in the Old Kingdom, but 𓄡 corresponds to *kh* in Coptic.

𓊃 =*s*
𓋴 =*ś* } distinction lost at the end of the Old Kingdom.

𓈙 =*š* (*sh*).

𓈎 =*q*; Coptic ⲕ.

𓎡 =*k*
𓎼 =*g* } Coptic ⲕ; or ϭ, ϫ, according to dialect.
Coptic ⲕ; or ϭ.

𓏏 =*t*; often lost at the end of words.

𓍿 =*ṯ* (*θ*); often changes to *t*, otherwise Coptic ⲧ; or ϫ, ϭ.

𓂧 =*d*; in Coptic reduced to *t*.

𓆓 =*ḏ* (*z*); often changes to *d*, Coptic ⲧ; otherwise in Coptic ϫ.

ROOTS

Egyptian roots consist of consonants and semi-consonants only, the inflexion being effected by internal vowel-change and the addition of consonants or vowels at the beginning or end. The Egyptian system of writing, as opposed to the Coptic, showed only the consonantal skeletons of words: it could not record internal vowel-changes; and semi-consonants, even when radicals, were often omitted in writing.

PERSONAL PRONOUNS

Sing.	Pl.	Du.
1. c. *ỉw* (?) later *wỉ*.	1. c. *n*.	
2. m. *kw*.	2. c. *ṯn*.	2. c. *ṯny*.
f. *ṯn*.		
3. m. *fy, surviving only in a special verbal form.	3. m. *śn*, early lost, except as suffix.	3. c. *śny*.
f. *śy*.	f. *śt surviving as 3. c.	

From these are derived the suffixes, which are shortened forms attached to nouns to express the possessor, and to verbs to express the subject. In the latter case the verb was probably in the participle, so that *śḏmỉỉ-śn*, "they hear," is literally "hearing are they." The singular suffixes are: (1) c.-*ỉ*; (2) m. -*k*, f. -*ṯ*; (3) m. -*f*, f. -*ś*;—the dual and plural have no special forms.

Another series of absolute pronouns is: (2) m. *ṯwt*, *ṯw*; f. *ṯmt*, *ṯm*; (3) m. *śwt*, *św*; f. *śtt*, *śt*. Of these *ṯwt*, *ṯmt*, &c., are emphatic forms.

Many of the above absolute pronouns were almost obsolete even in the Old Kingdom. In ordinary texts some survive, especially as objects of verbs, namely, *wỉ*, *tw*, *ṯn*, *sw*, *st*. The suffixes of all numbers and persons except the dual were in full use throughout, to Coptic; *sn*, however, giving way to a new suffix, -*w*, which developed first in the New Kingdom.

Another absolute pronoun of the first person is *ỉnk*, ⲁⲛⲟⲕ, like Heb. אנכי. It is associated with a series for the second and third persons: *nt-k*, *nt-ṯ*, *nt-f*, *nt-śn*, &c.; but from their history, use and form, it seems probable that the last are of later formation, and are not to be connected with the Semitic pronouns (chiefly of the 2nd person) resembling them.

DEMONSTRATIVE PRONOUNS

There are several series based on m. *p*; f. *t*; pl. *n*; but *n* as a plural seems later than the other two. From them are developed a weak demonstrative to which possessive suffixes can be attached, producing the definite and possessive articles (*pʾ*, *tʾ*, *nʾ*, "the," *pʾy-f*, "**his**," *pʾy-s* "her," &c.) of Middle Egyptian and the later language.

NOUNS

Two genders, m. (ending *w*, or nothing), f. (ending *t*). Three numbers: singular, dual (m. *wỉ*, f. *tỉ*, gradually became obsolete), plural (m. *w*; f. *wt*). No case-endings are recognizable, but construct forms—to judge by Coptic—were in use. Masculine and feminine nouns of instrument or material are formed from verbal roots by prefixing *m*; *e.g.* *m·sdm·t*, "stibium," from *sdm*, "paint the eye." Substantives and adjectives are formed from substantives and prepositions by the addition of *y* in the masculine; *e.g.* *n·t*, "city," *nt·y*, "belonging to a city," "citizen"; *ḥr*, "upon," *ḥr·y* (f. *ḥr·t*; pl. *ḥr·w*), "upper." This is not unlike the Semitic *nisbe* ending *iy*, *ay* (*e.g.* Ar. *beled*, "city," *beledi*, "belonging to a city"). Adjectives follow the nouns they qualify.

NUMERALS

1, *w‘*; 2, *śn*; 3, *ḫmt*; 4, *fdw*; 5, *dw’*; 6, *sỉs* (or *sw’*?); 7, *sfḫ*; 8, *ḫmn*; 9, *psḏ*; 10, *mt*. 2, 6, 7, 8 and 9 (?) resemble Semitic numerals. 20 and 30 (*m‘b*) had special names; 40-90 were named as if plurals of the units 4-9, as in Semitic. 100, *šnt*; 1000, *ḫ’*; 10,000, *zb‘*; 100,000, *ḥfnw*.

VERBS

The forms observable in hieroglyphic writing lead to the following classification:—

STRONG VERBS.	Biliteral . .	Often showing traces of an original III. inf.; in early times very rare.
	Triliteral . .	Very numerous.
	Quadriliteral Quinqueliteral	Generally formed by reduplication. In Late Egyptian they were no longer inflected, and were conjugated with the help of *ỉry*, "do."
WEAK VERBS.	II. geminatae .	Properly triliterals, but, with the 2nd or 3rd radical alike, these coalesced in many forms where no vowel intervened, and gave the word the appearance of a biliteral.
	III. gem. . . .	Rare.
	III. inf. . . .	Numerous. III. *w*, and III. *ỉ* were unified early. Some very common verbs, "do," "give," "come," "bring" are irregular.
	IV. inf. . . .	Partly derived from adjectival formations in *y*, from nouns and infinitives:—*e.g.* *ś·ỉp*, inf. *śỉpt*; adj. *śỉpty*; verb (4 lit.), *śỉpty*.

Many verbs with weak consonants—I*y*, I*w*, II. inf. (*m*[*w*]*t*), and those with א—are particularly difficult to trace accurately, owing to defective writing.

It seems that all the above classes may be divided into two main groups, according to the form of the infinitive:—with masculine infinitive the strong triliteral type, and with feminine infinitive the type of the III. inf. The former group includes all except III. inf., IV. inf., and the causative of the biliterals, which belong to the second group.

It is probable that the verb had a special form denoting condition, as in Arabic. There was a causative form prefixing *ś*, and traces of forms resembling *Pi‘el* and *Niphal* are observed. Some roots are reduplicated wholly or in part with a frequentative meaning, and there are traces of gemination of radicals.

Pseudo-Participle.—In very early texts this is the past indicative, but more commonly it is used in sentences such as, *gm-n-f wỉ ‘ḥ‘·kwỉ*, "he found me I stood," *i.e.* "he found me standing." The indicative use was soon given up and the pseudo-participle was employed only as predicate, especially indicating a state; *e.g.* *ntr·t šm·tỉ*, "the goddess goes"; *ỉw-k wḏ’·tỉ*, "thou art prosperous." The endings were almost entirely lost in New Egyptian. For early times they stand thus:—

Sing.	3.	masc.	*ỉ*, late *w*.	Dual *wỉỉ*.	Pl.	*w*.
		fem.	*tỉ*.	*tỉỉw*		*tỉ*.
	2.	masc.	*tỉ*			*tỉwny*.
		fem.	*tỉ*			
	1.	c.	*kwỉ*.			*wyn*.

The pseudo-participle seems, by its inflexion, to have been the perfect of the original Semitic conjugation. The simplest form being that of the 3rd person, it is best arranged like the corresponding tense in Semitic grammars, beginning with that person. There is no trace of the Semitic imperfect in Egyptian. The ordinary conjugation is formed quite differently. The verbal stem is here followed by the subject-suffix or substantive—*śḏm-f*, "he hears"; "*śḏmw śtn*, "the king hears." It is varied by the addition of particles, &c., *n*, *ỉn*, *ḥr*, *tw*, thus:—

śḏm-f, "he hears"; *śḏm-w-f*, "he is heard" (*pl.* *śḏm-ỉỉ-śn*, "they are heard"); *śḏm-tw-f*, "he is heard"; *śḏm-n-f*, "he heard"; *śḏm-n-tw-f*, "he was heard"; also, *śḏm-ỉn-f*, *śḏm-ḥr-f*, *śḏm-k’-f*. Each form has special uses, generally difficult to define. *śḏm-f* seems rather to be imperfect, *śḏm-n-f* perfect, and generally to express the past. Later, *śḏm-f* is ordinarily expressed by periphrases; but by the loss of *n*, *śḏm-n-f* became itself *sdm-f*, which is the ordinary past in demotic. Coptic preserves *śḏm-f* forms of many verbs in its causative (*e.g.* ⲦⲀⲚϦⲞϤ "cause him to live," from Egyptian *dỉ·t·nḫ-f*), and, in its periphrastic conjugation, the same forms of *wn*, "be," and *ỉry*, "do." With *śḏm-f* (*śeḏmo-f*) was a more emphatic form (*eśḏomef*), at any rate in the weak verbs.

The above, with the relative forms mentioned below, are supposed by Erman to be derived from the participle, which is placed first for emphasis: thus, *śḏm·w śtn*, "hearing is the king"; *śḏm-f*, for *śḏm-fy*, "hearing he is." This Egyptian paraphrase of Semitic is just like the Irish paraphrase of English, "It is hearing he is."

The *imperative* shows no ending in the singular; in the plural it has *y*, and later *w*; cf. Semitic imperative.

The *infinitive* is of special importance on account of its being preserved very fully in Coptic. It is generally of masculine form, but feminine in III. inf. (as in Semitic), and in causatives of biliterals.

There are relative forms of *śḏm-f* and *śḏm-n-f*, respectively *śḏm·w-f* (masc.), *śḏm·t-n-f* (fem.), &c. They are used when the relative is the object of the relative sentence, or has any other position than the subject. Thus *śḏm·t-f* may mean "she whom he hears," "she who[se praises] he hears," "she [to] whom he hears [someone speaking]," &c. There are close analogies between the function of the relative particles in Egyptian and Semitic; and the Berber languages possess a relative form of the verb.

Participles.—These are active and passive, perfect and imperfect, in the old language, but all are replaced by periphrases in Coptic.

Verbal Adjectives.—There is a peculiar formation, *śḏm·ty-fy*, "he who shall hear," probably meaning originally "he is a hearer," *śḏm·ty* being an adjective in *y* formed from a feminine (*t*) form of the infinitive, which is occasionally found even in triliteral verbs; the endings are: sing., masc. *ty-fy*, fem. *ty-śy*; pl., masc. *ty-śn*, fem, *ty-śt*. It is found only in Old Egyptian.

Particles.—There seems to be no special formation for adverbs, and little use is made of adverbial expressions. Prepositions, simple and compound, are numerous. Some of the commonest simple prepositions are *n* "for," *r* "to," *m* "in, from," *ḥr* "upon." A few enclitic conjunctions exist, but they are indefinite in meaning—*śwt* a vague "but," *grt* a vague "moreover," &c.

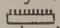
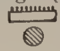
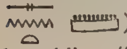
Coptic presents a remarkable contrast to Egyptian in the precision of its periphrastic conjugation. There are two present tenses, an imperfect, two perfects, a pluperfect, a present and a past frequentative, and three futures besides future perfect; there are also conjunctive and optative forms. The negatives of some of these are expressed by special prefixes. The gradual growth of these new forms can be traced through all the stages of Egyptian. Throughout the history of the language we note an increasing tendency to periphrasis; but there was no great advance towards *precision* before demotic. In demotic there are distinguishable a present tense, imperfect, perfect, frequentative, future, future perfect, conjunctive and optative; also present, past and future negatives, &c. The passive was extinct before demotic; demotic and Coptic express it, clumsily it must be confessed, by an impersonal "they," *e.g.* "they bore him" stands for "he was born."

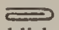
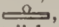
It is worth noting how, in other departments besides the verb, the Egyptian language was far better adapted to practical ends during and after the period of the Deltaic dynasties (XXII.–XXX.) than ever it was before. It was both simplified and enriched. The inflexions rapidly disappeared and little was left of the distinctions between masculine and feminine, singular, dual and plural—except in the pronouns. The dual number had been given up entirely at an earlier date. The pronouns, both personal and demonstrative, retained their forms very fully. As prefixes, suffixes and articles, they, together with some auxiliary verbs, provided the principal mechanism of the renovated language. An abundant supply of useful adverbs was gradually accumulated, as well as conjunctions, so far as the functions of the latter were not already performed by the verbal prefixes. These great improvements in the language correspond to great changes in the economic condition of the country; they were the result of active trade and constant intercourse of all classes of Egyptians with foreigners from Europe and Asia. Probably the best stage of Egyptian speech was that which immediately preceded Coptic. Though Coptic is here and there more exactly expressive than the best demotic, it was spoilt by too much Greek, duplicating and too often expelling native expressions that were already adequate for its very simple requirements. Above all, it is clumsily pleonastic.

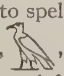
THE WRITING

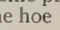
The ancient Egyptian system of writing, so far as we know, originated, developed and finally expired strictly within the limits of the Nile Valley. The germ of its existence may have come from without, but, as we know it, it is essentially Egyptian and intended for the expression of the Egyptian language. About the 1st century B.C., however, the semi-barbarous rulers of the Ethiopian kingdoms of Meroe and Napata contrived the "Meroitic" alphabet, founded on Egyptian writing, and comprising both a hieroglyphic and a cursive form (see ETHIOPIA). As yet both of these kinds of Nubian writing are undeciphered. Egyptian hieroglyphic was carried by conquest into Syria, certainly under the XVIIIth Dynasty, and again under the XXVIth for the engraving of Egyptian inscriptions; but in the earlier period the cuneiform syllabary, and in the later the "Phoenician" alphabet, had obtained a firm hold there, and we may be sure that no attempt was made to substitute the Egyptian system for the latter. Cuneiform tablets in Syria, however, seem almost confined to the period of the XVIIIth Dynasty. Although it cannot be proved it seems quite possible that the traders of Phoenicia and the Aegean adopted the papyrus and Egyptian hieratic writing together, before the end of the New Kingdom, and developed their "Phoenician" alphabet from the latter about 1000 B.C. In very early times a number of systems of writing already reigned in different countries forming a compact and not very large area—perhaps from South Arabia to Asia Minor, and from Persia to Crete and Egypt. Whether they all sprang from one common stock of picture-writing we shall perhaps never know, nor can we as yet trace the influence which one great system may have had on another, owing to the poverty of documents from most of the countries concerned.

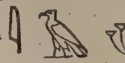
It is certain that in Egypt from the IVth Dynasty onwards the mode of writing was essentially the same as that which was extinguished by the fall of paganism in the 4th century A.D. Its elements in the hieroglyphic form are pictorial, but each hieroglyph had one or more well-defined functions, fixed by convention in such a manner that the Egyptian language was expressed in writing word by word. Although a picture sign may at times have embarrassed the skilled native reader by offering a choice of fixed values or functions, it was never intended to convey merely an idea, so as to leave to him the task of putting the idea into his own words. How far this holds good for the period before the IVth Dynasty it is difficult to say. The known inscriptions of the earlier times are so brief and so limited in range that the system on which they were written cannot yet be fully investigated. As far back as the Ist Dynasty, phonograms (see below) were in full use. But the spelling then was very concise: it is possible that some of the slighter words, such as prepositions, were omitted in the writing, and were intended to be supplied from the context. As a whole, we gain the impression that a really distinct and more primitive stage of hieroglyphic writing by a substantially vaguer notation of words lay not far behind the time of the Ist Dynasty.

The employment of the signs are of three kinds: any given sign represents either (1) a whole word or root; or (2) a sound as part of a word; or (3) pictorially defines the meaning of a word the sound of which has already been given by a sign or group of signs preceding. The number of phonograms is very restricted, but some signs have all these powers. For instance,  is the conventional picture of a draughtboard (shown in plan) with the draughtsmen (shown in elevation) on its edge:—this sign (1) signifies the root *mn*, "set," "firm"; or (2) in the group , represents the same sound as part of the root *mnḫ*, "good"; or (3) added to the group *snt* (thus: ), shows that the meaning intended is "draughtboard," or "draughts," and not any of the other meanings of *snt*. Thus signs, according to their employment, are said to be (1) "word-signs," (2) "phonograms," or (3) "determinatives."

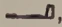
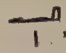
Word-signs.—The word-sign value of a sign is, in the first place, the name of the object it represents, or of some material, or quality, or action, or idea suggested by it. Thus is *ḥr*, "face"; , a vase of ointment, is *mrḥ.t*, "ointment";  is *wdb*, "turn." Much investigation is still required to establish the origins of the values of the signs; in some cases the connexion between the pictures and the *primary* values seems to be curiously remote. Probably all the signs in the hieroglyphic signary can be employed in their primary sense. The *secondary* value expresses the consonantal root of the name or other primary value, and any, or almost any, derivative from that root: as when , a mat with a cake upon it, is not only *ḥtp*, an "offering-mat," but also *ḥtp* in the sense of "conciliation," "peace," "rest," "setting" (of the sun), with many derivatives. In the third place, some signs may be *transferred* to express another root having the same consonants as the first: thus , the ear, by a play upon words can express not only *šḏm*, "hear," but also *šdm*, "paint the eyes."

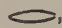
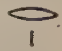
Phonograms.—Only a limited number of signs are found with this use, but they are of the greatest importance. By searching throughout the whole mass of normal inscriptions, earlier than the periods of Greek and Roman rule when great liberties were taken with the writing, probably no more than one hundred different phonograms can be found. The number of those commonly employed in good writing is between seventy and eighty. The most important phonograms are the *uniliteral* or *alphabetic* signs, twenty-four in number in the Old Kingdom and without any homophones: later these were increased by homophones to thirty. Of *biliteral* phonograms—each expressing a combination of two consonants—there were about fifty commonly used: some fifteen or twenty were rarely used. As Egyptian roots seldom exceeded three letters, there was no need for *triliteral* phonograms to spell them. There is, however, one triliteral phonogram, the eagle, , *tyw*, or *tiu* (?), used for the plural ending of adjectives in *y* formed from words ending in *t* (whether radical or the feminine ending).

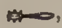
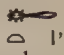
The phonetic values of the signs are derived from their word-sign values and consist usually of the bare root, though there are rare examples of the retention of a flexional ending; they often ignore also the weaker consonants of the root, and on the same principle reduce a repeated consonant to a single one, as when the hoe , *ḥnn*, has the phonetic value *ḥn*. The history of some of the alphabetic signs is still very obscure, but a sufficient number of them have been explained to make it nearly certain that the values of all were obtained on the same principles.[1] Some of the ancient words from which the phonetic values were derived probably fell very early into disuse, and may never be discoverable in the texts that have come down to us. The following are among those most easily explained:—

, reed flower, value *y* and א; from , *y'*, "reed."

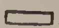
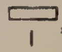
(It seems as if the two values *y* and א were obtained by choosing first one and then the other of the two semi-consonants composing the name. They are much confused, and a conventional symbol ỉ has to be adopted for rendering .)

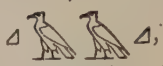
, forearm, value ʻ(*y*); from , ʻ(*y*), "hand."

, mouth, value *r*; from , *r*, "mouth."

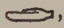
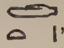
, belly and teats, value *ẖ*; from , *ẖ.t*, "belly."

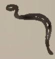
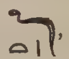
(The feminine ending is here, as usual, neglected.)

, tank, value *š*; from , *š*, "tank."

, slope of earth or brickwork, value *q*; " , *q''*, "slope," "height."

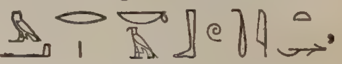
(The doubled weak consonant is here neglected.)

, hand, value *d*; from , *d.t*, "hand."

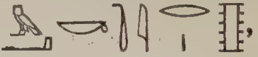
, cobra, value *z*; from , *z.t*, "cobra."

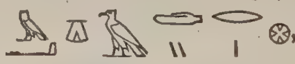
For some alphabetic signs more than one likely origin might be found, while for others, again, no clear evidence of origin is yet forthcoming.

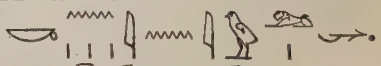
It has already been explained that the writing expresses only consonants. In the Graeco-Roman period various imperfect attempts were made to render the vowels in foreign names and words by the semi-vowels as also by , the consonant *y* which originally represented having been reduced in speech by that time to the power of א, only. Thus, Πτολεμαιος is spelt *Ptwrmys*, Antoninus, ʻ*Nt'nynws* or *Intnyns*, &c. &c. Much earlier, throughout the New Kingdom, a special "syllabic" orthography, in which the alphabetic signs for the consonants are generally replaced by groups or single signs having the value of a consonant followed by a semi-vowel, was used for foreign names and words, *e.g.*

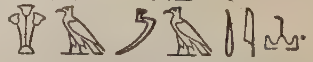
מרכבת, "chariot," was written ,

in Coptic ⲃⲉⲣⲉϭⲱⲟⲩⲧ.

מגדל, "tower," was written ,

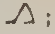
, Coptic ⲙⲉϭⲧⲟⲗ.

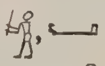
כנור, "harp," was written .

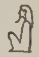
חמת, "Hamath," was written .

According to W. Max Müller (*Asien und Europa*, 1893, chap. v.), this represents an endeavour to express the vocalization; but, if so, it was carried out with very little system. In practice, the semi-vowels are generally negligible. This method of writing can be traced back into the Middle Kingdom, if not beyond, and it greatly affected the spelling of native words in New Egyptian and demotic.

Determinatives.—Most signs can on occasion be used as determinatives, but those that are very commonly employed as phonograms or as secondary word-signs are seldom employed as determinatives; and when they are so used they are often somewhat differentiated. Certain generic determinatives are very common, *e.g.*:—

; of motion.

; of acts involving force.

; of divinity.

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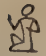
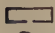
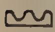
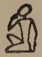
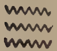
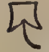
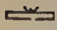
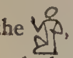
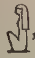
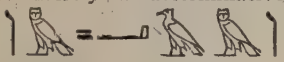
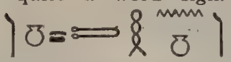
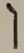
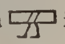
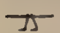
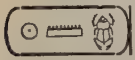
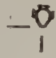
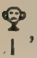
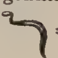
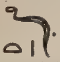
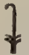
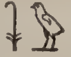
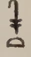
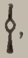
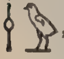
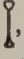
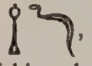
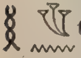
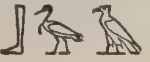
[1] It seems that "acrophony" (giving to a sign the value of the first letter of its name) was indulged in only by priests of the latest age, inventing fantastic modes of writing their "vain repetitions" on the temple walls.

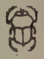
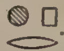
; of a person or a man's name.
; of buildings.
; of inhabited places.
; of foreign countries.
; club; of foreigners.
; of all actions of the mouth—eating and speaking, likewise silence and hunger.
; ripple-lines; of liquid.
; hide; of animals, also leather, &c.
; of plants and fibres.
; of flesh.
; a sealed papyrus-roll; of books, teaching, law, and of abstract ideas generally.

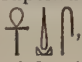
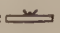
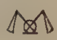
In the earliest inscriptions the use of determinatives is restricted to the , , &c., after proper names, but it developed immensely later, so that few words beyond the particles were written without them in the normal style after the Old Kingdom.

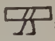
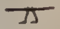
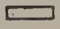
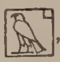
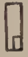
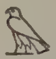
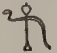
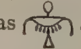
Some few signs ideographic of a group of ideas are made to express particular words belonging to that group by the aid of phonograms which point out the special meaning. In such cases the ideogram is not merely a determinative nor yet quite a word-sign. Thus  "Semite,"  "Libyan," &c., but  cannot stand by itself for the name of any particular foreign people. So also in monogram  is *šm* "go,"  is "conduct."

Orthography.—The most primitive form of spelling in the hieroglyphic system would be by one sign for each word, and the monuments of the Ist Dynasty show a decided tendency to this mode. Examples of it in later times are preserved in the royal cartouches, for here the monumental style demanded special consciseness. Thus, for instance, the name of Tethmosis III.—MN–ḪPR–Rʿ—is spelled  (as Rʿ is the name of the sun-god, with customary deference to the deity it is written first though pronounced last). A number of common words—prepositions, &c.—with only one consonant are spelled by single alphabetic signs in ordinary writing. Word-signs used singly for the names of objects are generally marked with I in classical writing, as , *ib*, "heart," , *ḥr*, "face," &c.

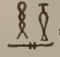
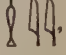
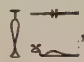
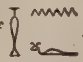
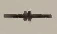
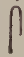
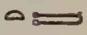
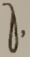
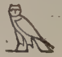
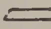
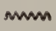
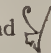
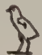
But the use of bare word-signs is not common. Flexional consonants are almost always marked by phonograms, except in very early times; as when the feminine word  = *z.t*, "cobra," is spelled . Also, if a sign had more than one value, a phonogram would be added to indicate which of its values was intended: thus  in  is *šw*, "he," but in  it is *štn*, "king." Further, owing to the vast number of signs employed, to prevent confusion of one with another in rapid writing they were generally provided with "phonetic complements," a group being less easily misread than a single letter. *E.g.* , *wz*, "command," is regularly written , *wz* (*w*); but , *ḥz*, "white," is written , *ḥz*(*z*). This practice had the advantage also of distinguishing determinatives from phonograms. Thus the root or syllable *ḥn* is regularly written  to avoid confusion with the determinative . Redundance in writing is the rule; for instance, *b* is often spelled  (*b*)*b*ʾ(ʾ). Biliteral phonograms are very rare as phonetic complements, nor are two biliteral phonograms employed together in writing the radicals of a word.

Spelling of words purely in phonetic or even alphabetic characters is not uncommon, the determinative being generally added. Thus in the pyramidal texts we find *ḫpr*, "become," written  in one copy of a text, in another . Such variant spellings are very important for fixing the readings of word-signs. It is noteworthy that though words were so freely spelled in alphabetic characters, especially in the time of the Old Kingdom, no advance was ever made towards excluding the cumbersome word-signs and biliteral phonograms, which, by a judicious use of determinatives, might well have been rendered quite superfluous.

Abbreviations.—We find , strictly *ʿnḫ z*ʾ *š* standing for the ceremonial *vival ʿnḫ wz, šnb.* "Life, Prosperity and Health," and in course of time  was used in accounts instead of  *dmz*, "total."

Monograms are frequent and are found from the earliest times. Thus ,  mentioned above are monograms, the association of  and having no pictorial meaning. Another common monogram is , *i.e.*  and  for *Ḥ·t-Ḥrw* "Hathor." A word-sign may be compounded with its phonetic complement, as  *ḥz* "white," or with its determinative, as  *ḥz* "silver."

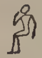
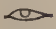
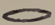
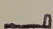
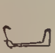
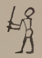
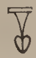
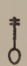
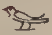
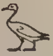
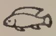
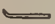
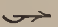
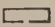
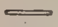
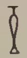
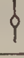
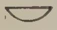
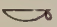
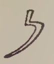
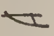
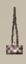
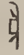
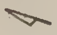
The table on the opposite page shows the uses of a few of the commoner signs.

The decorative value of hieroglyphic was fully appreciated in Egypt. The aim of the artist-scribe was to arrange his variously shaped characters into square groups, and this could be done in great measure by taking advantage of the different ways in which many words could be spelt. Thus *ḥs* could be written , *ḥsy* , *ḥs-f* , *ḥs-n-f* . But some words in the classical writing were intractable from this point of view. It is obvious that the alphabetic signs played a very important part in the formation of the groups, and many words could only be written in alphabetic signs. A great advance was therefore made when several homophones were introduced into the alphabet in the Middle and New Kingdoms, partly as the result of the wearing away of old phonetic distinctions, giving the choice between  and ,  and ,  and ,  and ,  and . In later times the number of homophones in use increased greatly throughout the different classes, the tendency being much helped by the habit of fanciful writing; but few of these homophones found their way into the cursive script. Occasionally a scribe of the old times indulged his fancy in "sportive" or "mysterious" writing, either inventing new signs or employing old ones in unusual meanings. Short sportive inscriptions are found in tombs of the XIIth Dynasty; some groups are so written cursively in early medical papyri, and certain religious inscriptions in the royal tombs of the XIXth and XXth Dynasties are in secret writing. Fanciful writing abounds on the temples of the Ptolemaic and Roman periods.

PALAEOGRAPHY

Hieroglyphic.—The main division is into monumental or epigraphic hieroglyphs and written hieroglyphs. The former may be rendered by the sculptor or the painter in stone, on wood, &c., with great delicacy of detail, or may be simply sunk or painted in outline. When finely rendered they are of great value to the student investigating the origins of their values. No other system of writing bears upon its face so clearly the history of its development as the Egyptian; yet even in this a vast amount of work is still required to detect and disentangle the details. Monumental hieroglyphic did not cease till the 3rd century A.D. (Temple of Esna). The written hieroglyphs, formed by the scribe with the reed pen on papyrus, leather, wooden tablets, &c., have their outlines more or less abbreviated, producing eventually the cursive scripts hieratic and demotic. The written hieroglyphs were employed at all periods, especially for religious texts.

Hieratic.—A kind of cursive hieroglyphic or hieratic writing is found even in the Ist Dynasty. In the Middle Kingdom it is well

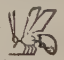
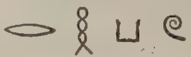
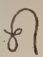
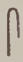
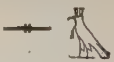
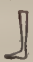
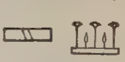
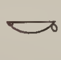
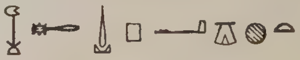
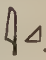
Sign.	Description.	Name.	Word-sign Value.	Phonetic Value.	Determinative Value.
	child	hrd (khrod)			youth
	face	ḥr (ḥor)	ḥr	[ḥr]	
	eye	ỉr.t (yori.t)	ỉr	ỉr	see, &c.
	mouth	r (ro)	r	r	
	forearm	ʿ(ʿei)	ʿ	ʿ	[action of hand or arm]
	arm with stick	nḫt " be strong "	nḫt		violent action
	man with stick	nḫt " be strong "	nḫt		violent action
	lungs and windpipe	smꜣ	smꜣ		
	heart	ỉb			heart
	heart and windpipe	?	nfr		
	sparrow	?	šr		evil, worthlessness, smallness
	widgeon	sꜣ.t	sꜣ	sꜣ	
	bolti-fish	ỉn.t	ỉn	ỉn	
	tusk	(1) ỉbḥ " tooth " (2) ḥw " taste "	bḥ ḥw	bḥ	bite, &c.
	cut branch	ḫt	ḫt	[ḫt]	wood, tree
	threshing-floor	sp.t	sp		
	sun	(1) rʿ " sun " (2) hrw " day "			(1) sun (2) division of time
	chamber, house	pr	pr		
	flat land	tꜣ	tꜣ	tꜣ	(boundless horizon, eternity
	libation vase	ḥs.t	ḥs	ḥs	
	cord on stick	wz	wz	wz	
	basket	nb.t	nb		
	looped basket	?	k	k	
	sickle	?	mꜣ	mꜣ	tillage
	composite hoe	[mr ?]	mr	mr	tillage
	fire-drill	zꜣ.t(?)	zꜣ	zꜣ	
	attendant's equipment	šmś " follow "	šmś		
	knife	dś	dś		cut, prick, cutting instrument

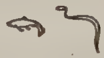
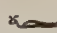
characterized, and in its most cursive form seems hardly to retain any definable trace of the original hieroglyphic pictures. The style varies much at different periods.

Demotic.—Widely varying degrees of cursiveness are at all periods observable in hieratic; but, about the XXVIth Dynasty, which inaugurated a great commercial era, there was something like a definite parting between the uncial hieratic and the most cursive form afterwards known as demotic. The employment of hieratic was thenceforth almost confined to the copying of religious and other traditional texts on papyrus, while demotic was used not only for all business but also for writing literary and even religious texts in the popular language. By the time of the XXVth Dynasty the cursive of the conservative Thebais had become very obscure. A better form from Lower Egypt drove this out completely in the time of Amasis II. and is the true demotic. Before the Macedonian conquest the cursive ligatures of the old demotic gave birth to new symbols which were carefully and distinctly formed, and a little later an epigraphic variety was engraved on stone, as in the case of the Rosetta stone itself. One of the most characteristic distinctions of later demotic is the minuteness of the writing.

Hieroglyphic is normally written from right to left, the signs facing to the commencement of the line; hieratic and demotic follow the same direction. But monumental hieroglyphic may also be written from left to right, and is constantly so arranged for purposes of symmetry, *e.g.* the inscriptions on the two jambs of a door are frequently turned in opposite directions; the same is frequently done with the short inscriptions scattered over a scene amongst the figures, in order to distinguish one label from another.

In modern founts of type, the hieroglyphic signs are made to run from left to right, in order to facilitate the setting where European text is mixed with the Egyptian. The table on next page shows them in their more correct position, in order to display more clearly their relation to the hieratic and demotic equivalents.

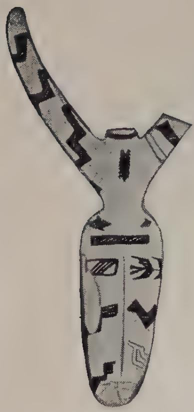
Clement of Alexandria states that in the Egyptian schools the pupils were first taught the "epistolographic" style of writing (*i.e.* demotic), secondly the "hieratic" employed by the sacred scribes, and finally the "hieroglyphic" (*Strom.* v. 657). It is doubtful whether they classified the signs of the huge hieroglyphic syllabary with any strictness. The only native work on the writing that has come to light as yet is a fragmentary papyrus of Roman date which has a table in parallel columns of hieroglyphic signs, with their hieratic equivalents and words written in hieratic describing them or giving their values or meanings. The list appears to have comprised about 460 signs, including most of those that occur commonly in hieratic. They are to some extent classified. The bee  heads the list as a royal sign, and is followed by figures of nobles and other human figures in various attitudes, more or less grouped among themselves, animals, reptiles and fishes, scorpion, animals again, twenty-four alphabetic characters, parts of the human body carefully arranged from to , thirty-two in number, parts of animals, celestial signs, terrestrial signs, vases. The arrangement down to this point is far from strict, and beyond it is almost impossible to describe concisely, though there is still a rough grouping of characters according to resemblance of form, nature or meaning. It is a curious fact that not a single bird is visible on the fragments, and the trees and plants, which might easily have been collected in a compact and well-defined section, are widely scattered. Why the alphabetic characters are introduced where they are is a puzzle; the order of these is:—  (?)  (?)  (?)  (?) —  —  (?)  (?)  (?) .

Three others,  and , had already occurred amongst the fish and reptiles. There seems to be no logical aim in this arrangement of the alphabetic characters and the series is incomplete. Very probably the Egyptians never constructed a really systematic list of hieroglyphs. In modern lists the signs are classified according to the nature of the objects they depict, as human figures, plants, vessels, instruments, &c. Horapollon's *Hieroglyphica* may be cited as a native work, but its author, if really an Egyptian, had no knowledge of good writing. His production consists of two elaborate complementary lists: the one describing sign-pictures and giving their meanings, the other cataloguing ideas in order to show how they could be expressed in hieroglyphic. Each seems to us to be made up of curious but perverted reminiscences eked out by invention; but they might some day prove to represent more truly the usages of mystics and magicians in designing amulets, &c., at a time approaching the middle ages.

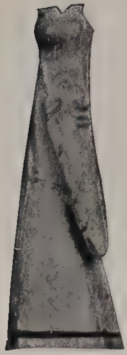
EGYPT

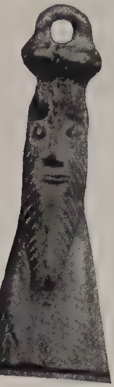
PLATE I.

EARLIEST EGYPTIAN ART

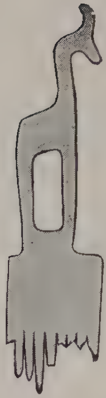


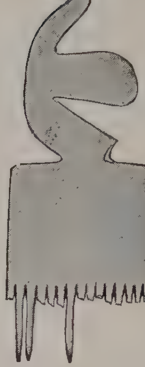
1. TATOOED FEMALE,
LIMESTONE SLAG.



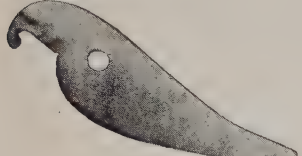


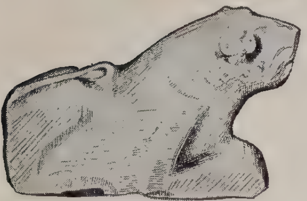
2. HEADS ON IVORY TUSKS. 3.



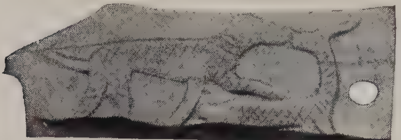


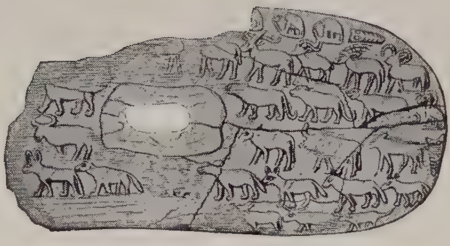
4. ANIMALS ON BONE COMBS. 5.



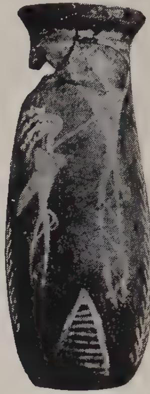


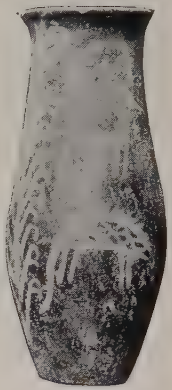
6. IVORY HAWK.
7. LIMESTONE LION.



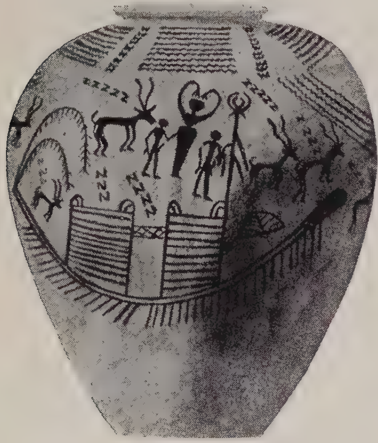


8. IVORY DOG AND GAZELLE.
9. IVORY HANDLE OF KNIFE.

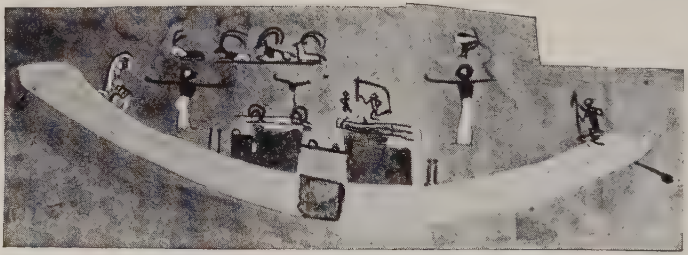




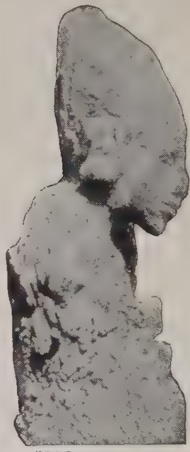
10 } WHITE ON RED VASES;
11 } MEN AND ANIMALS.



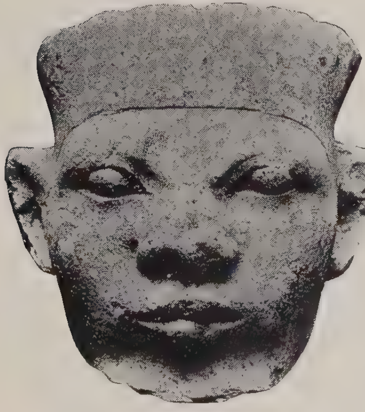
12. SHIP ON A VASE.

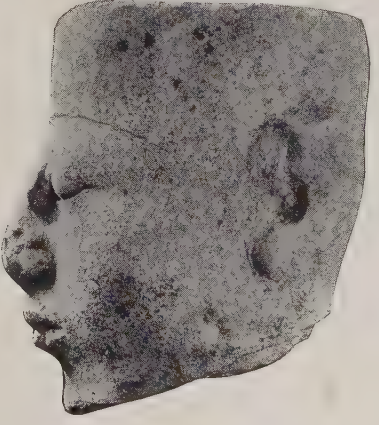


13. SHIP ON A WALL PAINTING.

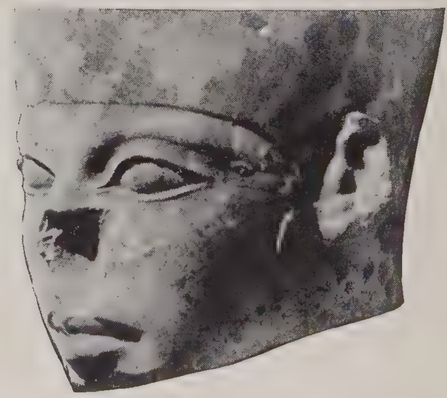


14. IVORY KING.





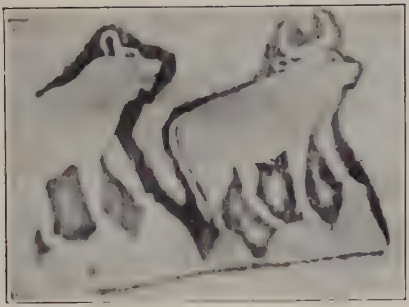
15. ARCHAIC KING'S HEAD, STUDY IN LIMESTONE. 16.

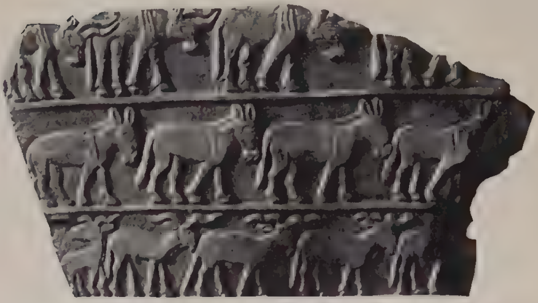


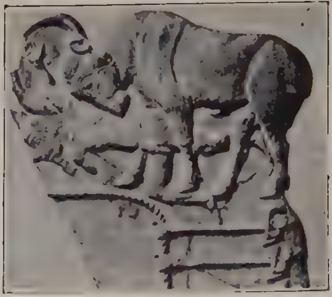
17. HEAD OF KHASEKHEM.

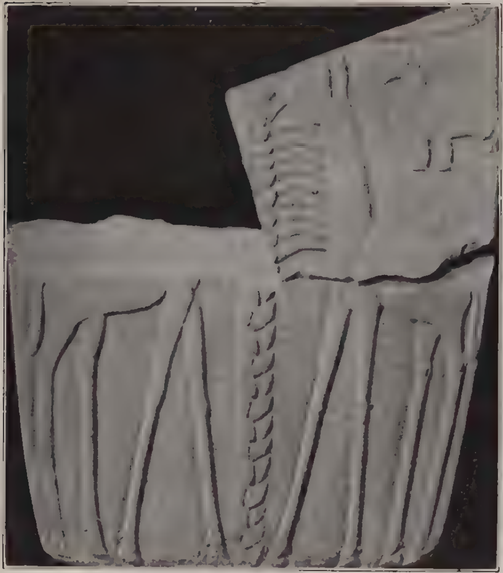
EGYPT

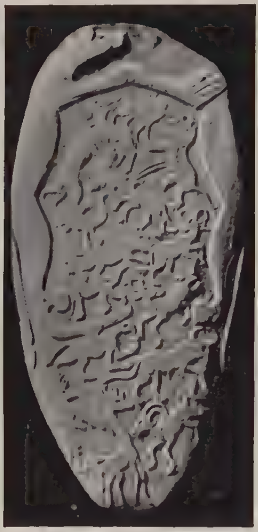
EARLY EGYPTIAN ART.

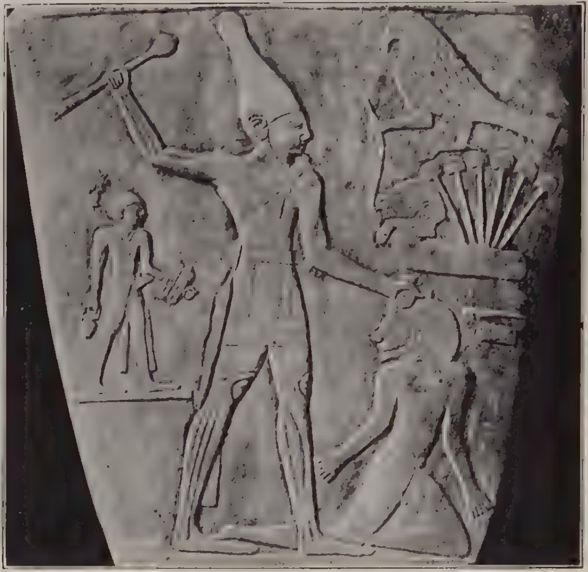

18. LIMESTONE RELIEF.

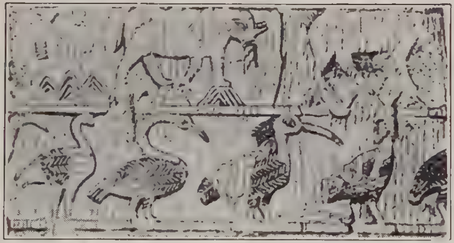

Photo, Mansell.
19. ANIMALS ON SLATE PALETTE.

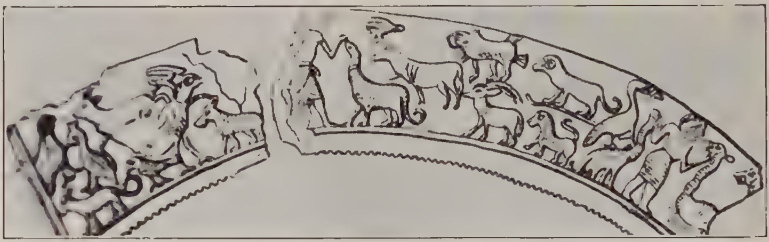

20. CONQUEROR AS A BULL

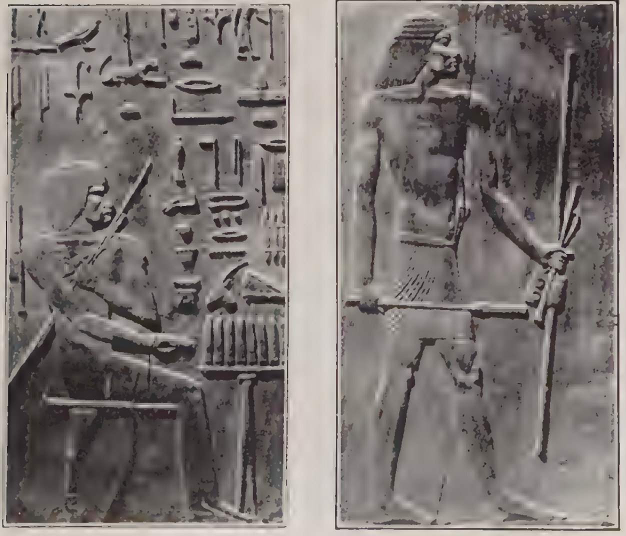

21. GAZELLES AND PALM, SLATE

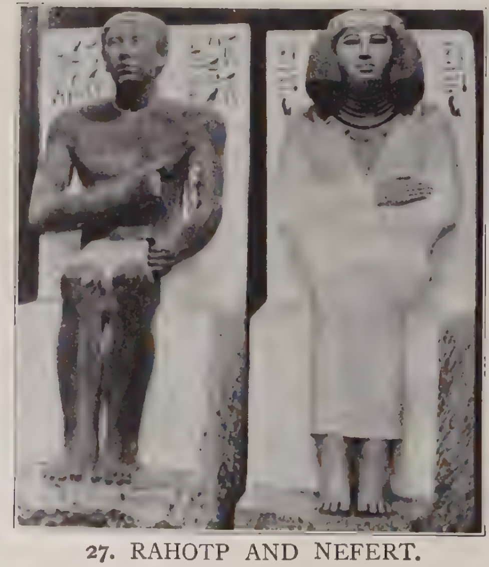

22. ANIMALS, SLATE.

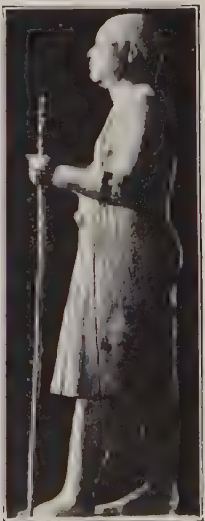

23. KING NARMER, SLATE PALETTE.

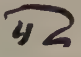
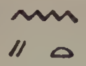
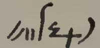
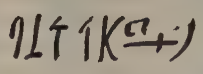
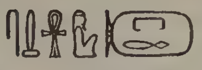
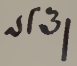
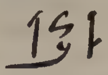
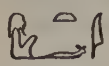
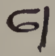
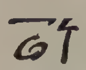
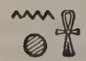
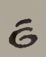
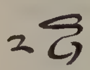
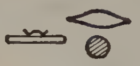
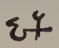
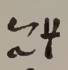
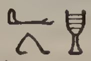
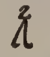
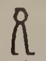
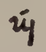
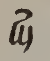
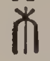
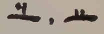
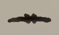
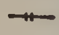
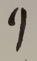
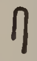
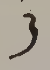
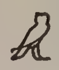
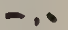
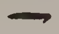
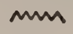

24. IVORY TUSK, WITH ANIMALS.

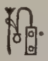

25. IVORY WAND, WITH ANIMALS.


26. WOODEN PANELS OF HESI.

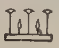
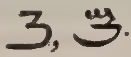

27. RAHOTP AND NEFERT.

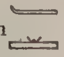
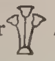
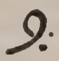

28. WOODEN FIGURE.

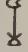
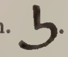
	Demotic.	Hieratic.	Hieroglyphic.	
ent, "who" . . .				*nty*
Perso ("Pharaoh") .				*Perꜥo ꜥnḫ wz, śnb*
yôt, "father" . .				*ỉtf*
ʻônkh, "live" . .				*ꜥnḫ*
ekh, "know" . .				*rḫ*
ahe, "stand" . .				*ꜥḥꜥ*
eine, "carry" . .				*ỉn*
ms (phon.) . . .				*ms*
s (alph.)				*s*
s (alph.)				*ś*
m (alph.) . . .				*m*
n (alph.) . . .				*n*

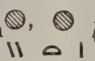
The early scribe's outfit, often carried slung over his shoulder, is seen in the hieroglyph . It consisted of frayed reed pens or brushes, a small pot of water, and a palette with two circular cavities in which black and red ink were placed, made of finely powdered colour solidified with gum. In business and literary documents red ink was used for contrast, especially in headings; in demotic, however, it is very rarely seen. The pen became finer in course of time, enabling the scribe to write very small. The split reed of the Greek penman was occasionally adopted by the late demotic scribes.

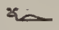
Egypt had long been bilingual when, in papyri of the 2nd century A.D., we begin to find transcripts of the Egyptian language into Greek letters, the latter reinforced by a few signs borrowed from the demotic alphabet: so written we have a magical text and a horoscope, probably made by foreigners or for their use. The infinite superiority of the Greek alphabet with its full notation of vowels was readily seen, but piety and custom as yet barred the way to its full adoption. The triumph of Christianity banished the old system once and for all; even at the beginning of the 4th century the native Egyptian script scarcely survived north of the Nubian frontier at Philae; a little later it finally expired. The following eight signs, however, had been taken over from demotic by the Copts:

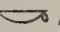
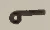
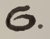
ϣ = *š*, from  *šꜣ*, dem. .

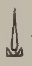
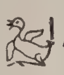
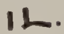
ϩ = *h*, probably from  *ḥw* (or  *ḥꜣ*), dem. .

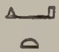
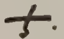
ϧ (Boh.) = *ḫ*, from  *ḫꜣ*, dem. .

ⳉ (Akhm.) = *ḫ*, from  *ḫy*, *ḫt*, dem. .

ϥ = *f*, from  *f*, dem. .

ϭ = *č*, from  *k* (or *ḫ*), dem. , .

ϫ = *ǧ*, from  *dꜣ* (or  *tꜣ*), dem. .

ϯ = *ti*, from  *dy·t*, dem. .

For origins of hieroglyphs, see Petrie's *Medum* (1892); F. Ll. Griffith, *A Collection of Hieroglyphs* (1898); N. de G. Davies, *The Mastaba of Ptahhetep and Akhethetep*, pt. i. (1900); M. A. Murray, *Saqqara Mastabas* (London, 1905); also Petrie and Griffith, *Two Hieroglyphic Papyri from Tanis* (London, 1889) (native sign-list); G. Möller, *Hieratische Paläographie* (Leipzig, 1909); Griffith, *Catalogue of Demotic Papyri in the J. Rylands Collection* (Manchester, 1909). (F. Ll. G.)

E. *Art and Archaeology.*—In the following sections a general history of the characteristics of Ancient Egyptian art is first given, showing the variation of periods and essentials of style; and this is followed by an account of the use made of material products, of the tools and instruments employed, and of the monuments. For further details see also the separate topographical headings (for excavations, &c.), and the general articles on the various arts and art-materials (for references to Egypt); also PYRAMIDS; MUMMY, &c.

General Characteristics.

The wide and complex subject of Egyptian art will be treated here in six periods: Prehistoric, Early Kings, Pyramid Kings, XIIth Dynasty, XVIIIth-XXth Dynasties, XXVIth Dynasty and later. In each age will be considered the (A) statuary, (B) reliefs, (C) painting.

Prehistoric.—The earliest civilized population of Egypt was highly skilled in mechanical accuracy and regularity, but had little sense of organic forms. They kept the unfinished treatment of the limbs and extremities which is so characteristic of most barbaric art; and the action was more considered than the form.

(A) In the round there are in the earlier graves female figures of two races, the Bushman type and European, both probably representing servants or slaves. These have the legs always united, sloping to a point without feet (Plate I. fig. 1); the arms are only stumps. The face has a beaky nose and some indication of eyes. Upon the surface is colouring; red for the Bushman, with black whisker though female; white for the European type, with black tattoo patterns. Other female figures are modelled in a paste, upon a stick, and the black hair is sometimes made separately to fit on as a wig over the red head, showing that wigs were then used. Male figures are generally only heads in the earlier times. Tusks with carved heads (Plate I. figs. 2, 3) are the earliest, beginning at S.D. (sequence date) 33;[1] heads on the top of combs are found, from S.D. 42 to the close of such combs in the fifties. All of these heads show a high forehead and a pointed beard; and such expression as may be discovered is grave but not savage. In later times whole figures of ivory, stone and clay are found, with the legs united, and the arms usually joined to the body. A favourite way of indicating the eyes was by drilling two holes and inserting a white shell bead in each. The figures of animals (Plate I. figs. 4, 5) are quite as rude as the human figures: they only summarily indicate the mature, and often hardly express the genus. They are most usual on combs and pins; but sacred animals are also found. The lion is the most usual (Plate I. fig. 7), but the legs are roughly marked, if at all: the leonine air is given, but the attitude is more distinct than the form. The hawk (Plate I. fig. 6) is modelled in block without any legs. The slate palettes in the form of animals are even more summary, and continually degraded until they lost all trace of their origin. There are also curious figures of animals chipped in flint, which show some character, but no detail.

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[1] In the prehistoric age when absolute dating is out of reach a "sequence dating" by means of the sequence of types in pottery, tools, &c., has been proposed in Petrie's *Diospolis Parva*, pp. 4 et sqq. The earliest prehistoric graves yet known are placed at S.D. 30, and shortly before S.D. 80 the period of the first historic dynasty is entered.

(B) Reliefs with animal figures belong to the later part of the prehistoric age. The relief is low, and the form hatched across with lines (Plate I. fig. 8), a style copied from drawing. There is more animation than in the round figures. At the close of this age the fashion of long processions of animals appears (Plate I. fig. 9); some character is shown in these, but no sense of action.

(C) Drawing is found from the earliest civilization, done in white slip on red vases. Figures of men are very rare (Plate I. fig. 10); they have the body triangular, the waist being very narrow; the legs are two lines linked by a zigzag, as if to express that they move to and fro. The usual figures are goats and hippopotami; always having the body covered with cross lines to express the connexion of the outlines (Plate I. fig. 11). This technique is in every way closely akin to that of the modern Kabyle. An entirely different mode is common at a later time when designs were painted in thin red colour on a light brown ware. The subjects of the earlier of these examples are imitations of cordage, of marbling, and of basket-work; later there are rows of men and animals, and ships (Plate I. figs. 12, 13), with various minor signs. The figures are never cross-hatched as in earlier drawing, but always filled in altogether. The fact that the ships have oars and not sails makes it probable that they were rather for the sea than for Nile traffic, and a starfish among the motives on such pottery also points to the sea connexion. The ulterior meaning of the decoration is probably religious and funereal, but the objects which are figured must have been familiar.

For this whole period see Jean Capart, *Débuts de l'art en Égypte* (1904; trans. *Primitive Art in Ancient Egypt*).

The Early Kings.—The dynastic race wrought an entire transformation in the art of Egypt; in place of the clumsy and undetailed representations, there suddenly appears highly artistic work, full of character, action and anatomical detail.

(A) The earliest statues of this age are the colossi of the god Min from Coptos; that they belong to the artistic race is evident from the spirited reliefs upon them (see below, B), but the figures were very rude, the legs and arms being joined all in the mass. The main example of this early art is a limestone head of a king (Plate I. figs. 15, 16), which is a direct study from life, to serve as a model. For the accuracy of the facial curves, and the grasp of character and type, it is equal to any later work; and in its entire absence of conventions and its pure naturalism there is no later sculpture so good: as Prof. A. Michaelis says, "it renders the race type with astounding keenness, and shows an excellent power of observation in the exact representation of the eyes." By the portrait, it is probably of King Narmer or some king related to him, that is, about the beginning of the Ist Dynasty. The ivory statuette of an aged king (Plate I. fig. 14) is probably slightly later. It shows the same subtle sense of character, and is unsurpassed in its reality. Many ivory figures of men, women and animals are known from Nekhen (Hieraconpolis) and Abydos; and they all show the same school of work, simple, dignified, observant, and with an air which places them on a higher plane of truthfulness and precision than later art. There is none of the mannerism of a long tradition, but a nobility pervades them which has no self-consciousness. The lower class of work of this age is shown by great numbers of glazed pottery figures both human and animal. Later in the IInd Dynasty, the head of Khasekhem (Plate I. fig. 17) shows the beginning of convention, but yet has a delicacy about the mouth which surpasses later works.

(B) Reliefs abound at this age, and include the most important evidences of the development of the art. The earliest examples are those of animals (Plate II. fig. 18) and shells on the colossi of Coptos. They show a keen sense of form, and the stag's head, which is probably the earliest, already bears an artistic feeling wholly different to that of any of the prehistoric works (P.K. iii. iv.). The carvings on slate palettes appear to begin with work crudely accurate and forceful, the heavy limbs being ridged with tendons and muscles (Plate II. fig. 19), but there is more proportion, with the same massive strength (Plate II. fig. 20). Soon after, with a leap, the artist produced the first pure work of art that is known (Plate II. fig. 21), a design for its own sake without the tie of symbolism or history. The group of two long-necked gazelles facing a palm tree is of extraordinary refinement, and shows the artistic consciousness in every part; the symmetric rendering of the palm tree, reduced to fit the scale of the animals, the dainty grace of the smooth gazelles contrasted with the rugged stem, the delicacy of the long flowing curves and the fine indications of the joints, all show a sense of design which has rarely been equalled in the ceaseless repetitions of the tree and supporters motive during every age since. Passing the various palettes with hunting scenes and animals (Plate II. fig. 22), we come to the great historical carving of King Narmer (Plate II. fig. 23). Here the anatomy has reached its limits for such work; the precision of the muscles on the inner and outer sides of the leg, of the uniform grip in the left arm, and the tense muscle upholding the right arm, prove that the artist knew that part of his work perfectly. The large ceremonial mace-heads recording the *Sed* festivals of the king Narmer and another, belong also to this school; but owing to their smaller size they have not such artistic detail. With them were found many reliefs in ivory, on tusks, wands and cylinders. The main motive in these is a long procession of animals (Plate II. figs. 24, 25) often grotesquely crowded; but there is much observation shown and the figures are expressive. No drawing of this age has survived.

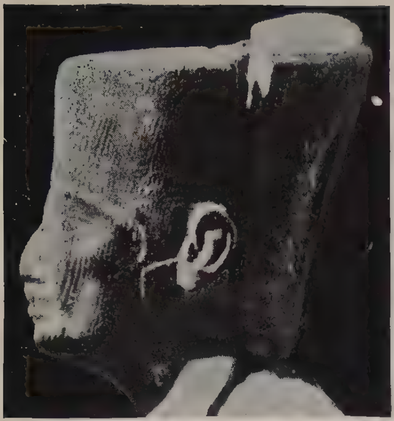
The Pyramid Kings.—A different ideal appears in the pyramid times; in place of the naturalism of the earlier work there is more regularity, some convention, and the sense of a school in the style. The prevailing feeling is a noble spaciousness both in scale and in form, an equanimity based upon knowledge and character, a grandeur of conception expressed by severely simple execution. There is nothing superfluous, nothing common, nothing trivial. The smallest as well as the largest work seems complete, inevitable, immutable, without limitations of time, or labour or thought.

(A) The statuette of Khufu or Cheops (Plate III. fig. 29) though only a minute figure in ivory, shows the character of immense energy and will; the face is an astonishing portrait to be expressed in a quarter of an inch. The life-size statue of Khafrē or Chephren (Plate III. fig. 30) is a majestic work, serene and powerful; carved in hard diorite, yet unhesitating in execution. The muscular detail is full, but yet kept in harmony with the massive style of the figure. The private persons have entirely different treatment according to the character of their position. In place of the awful dignity of the kings there is the placid high-bred Princess Nofri (Plate II. fig. 27, Plate III. fig. 31), the calm conscientious dignitary Hemset (Plate III. fig. 32), the bustling, active, middle-class official, Ka-aper (Plate II. fig. 28, Plate III. fig. 33), and the kneeling figure of a servitor. The differences of character are very skilfully rendered in all the sculpture of this age. The whole figures are stiff in the earlier time, as the figure of Nes; then square and massive, but true in form, as Rahotp and Nofri (Plate II. fig. 27); and afterwards easier and less monumental, as Ka-aper (Plate II. fig. 28). The skill in beaten copper work is shown by the portrait of the Prince Mer-en-ra (Plate III. fig. 35).

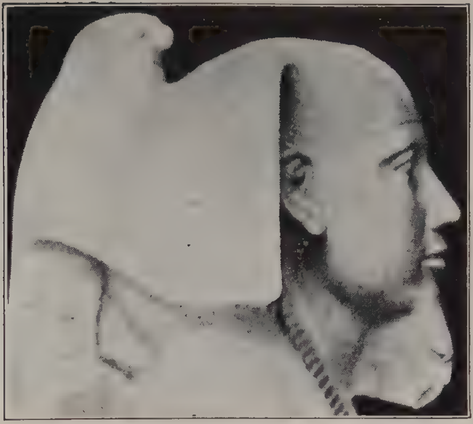
(B) The reliefs are quite equal to the statuary. The wooden panels of Hesi (Plate II. fig. 26) show the archaic style of great detail, with a bold, stark vigour of attitude. Later work is abundant in the tomb-sculptures of this age, with a fulness of variety and detail which makes them the most interesting of all

EGYPT

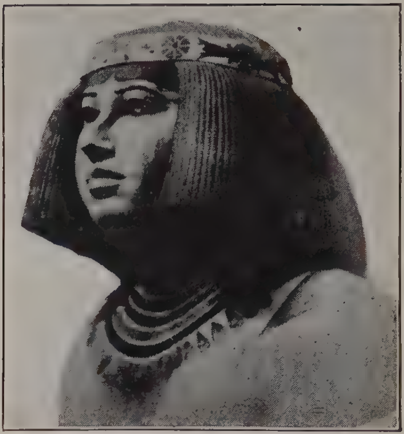
PYRAMID PERIOD.



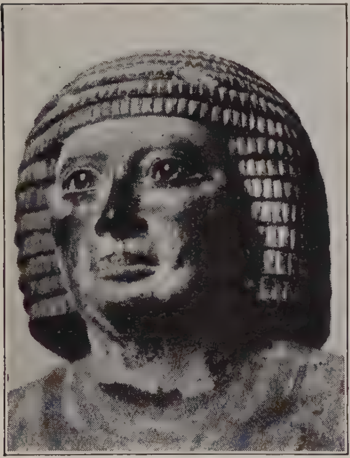
29. IVORY OF CHEOPS.



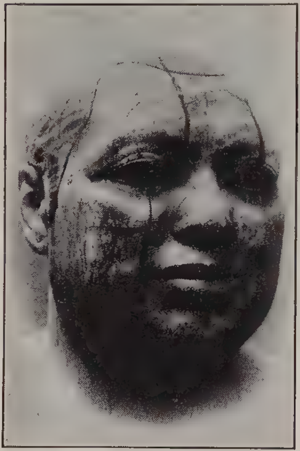
30. DIORITE OF CHEPHREN.



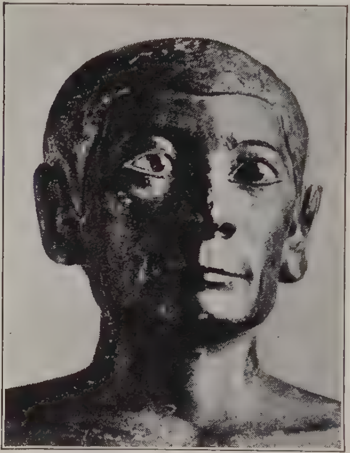
31. LIMESTONE OF NEFERT.



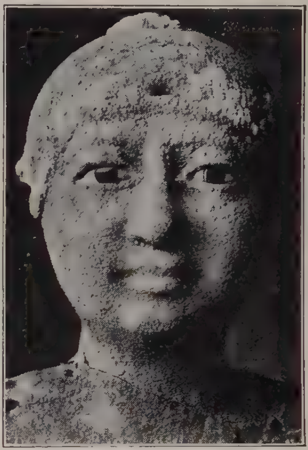
32. HEMSET: LIMESTONE.



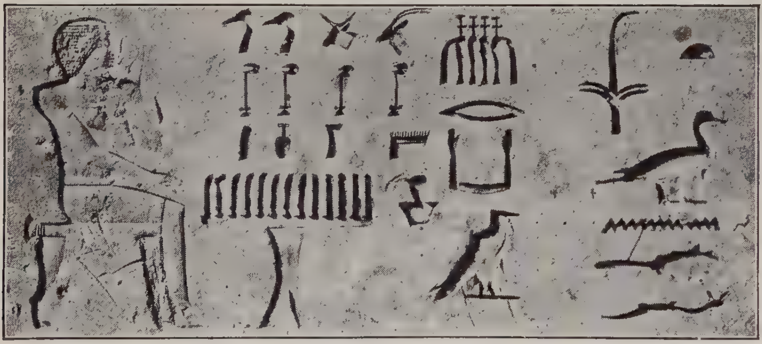
33. WOOD (see Fig. 28).



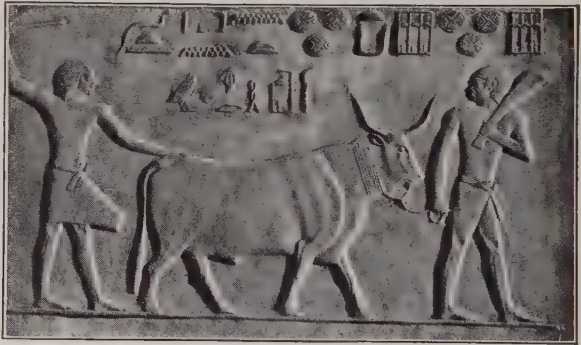
34. SCRIBE: LIMESTONE.



35. MER-EN-RA: COPPER.

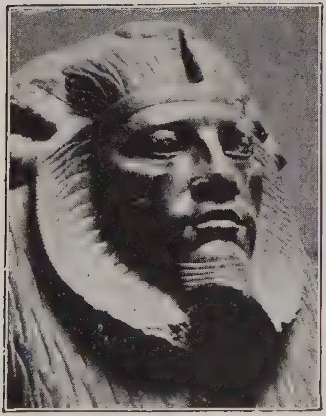


36. LIMESTONE SLAB OF KHENT-ER-KA.

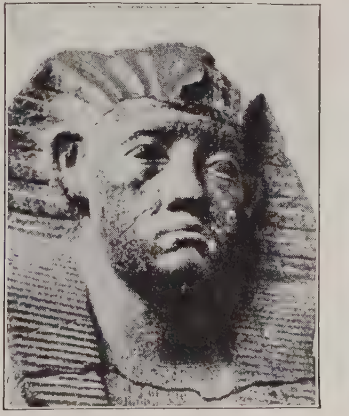


Photo, Bonfils.

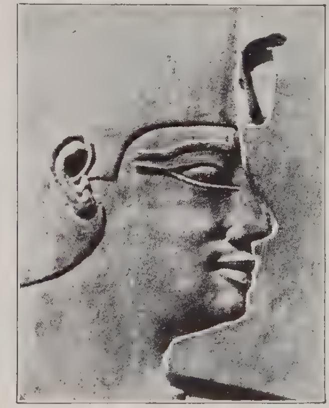
37. THE OXHERDS: LIMESTONE.

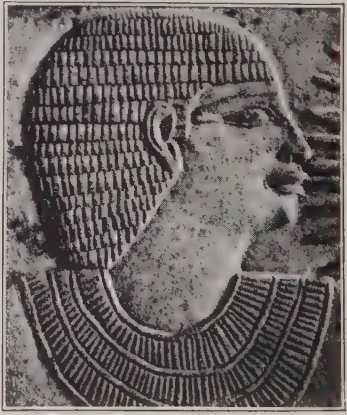


38. GRANITE SPHINX.



39. AMENEMHĒ III.

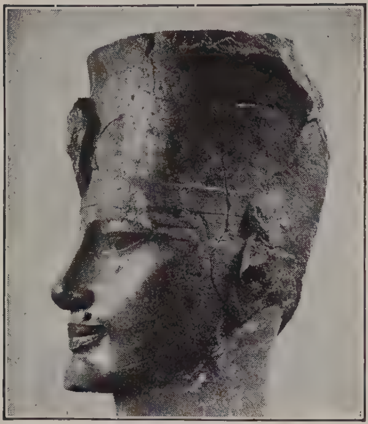


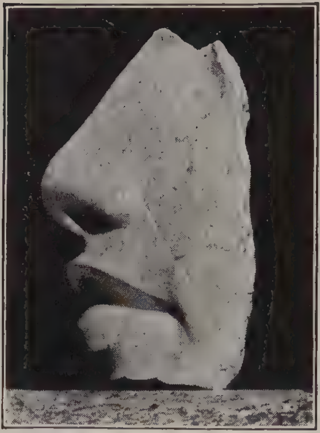


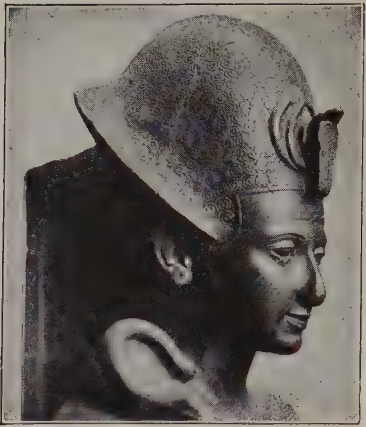
40. SENWOSRI I.: LIMESTONE RELIEFS: HOTEPA. 41

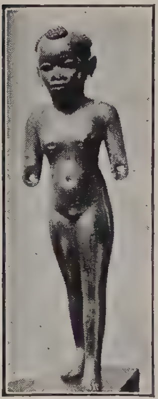
EGYPT

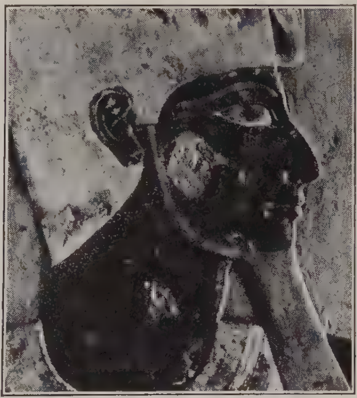
1400 B. C. TO ROMAN.

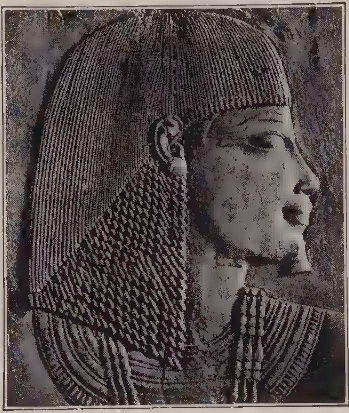

Photo, Mansell.
42. AMENOPHIS III. : GRANITE.

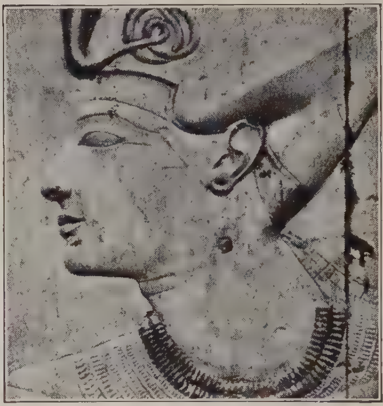

43. QUEEN TAIA : LIMESTONE.

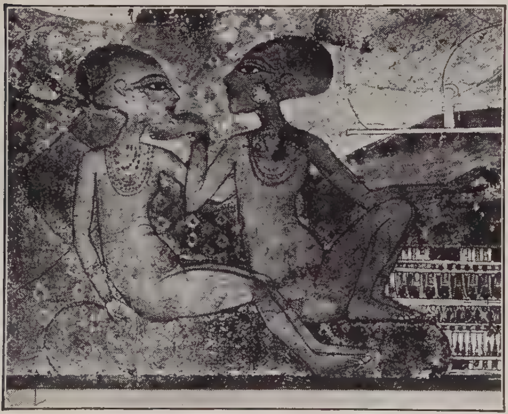

Photo, Anderson.
44. RAMESES II. : GRANITE.

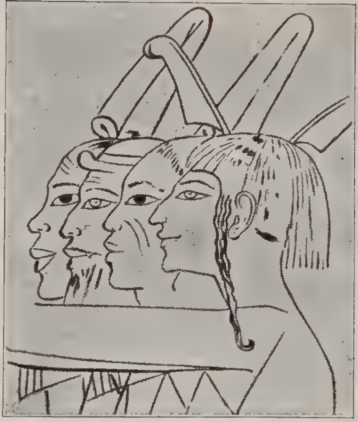

45. NEGRESS : EBONY.

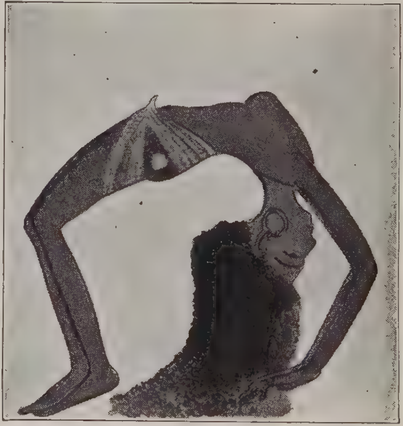

46. QUEEN HATSHEPSUT.

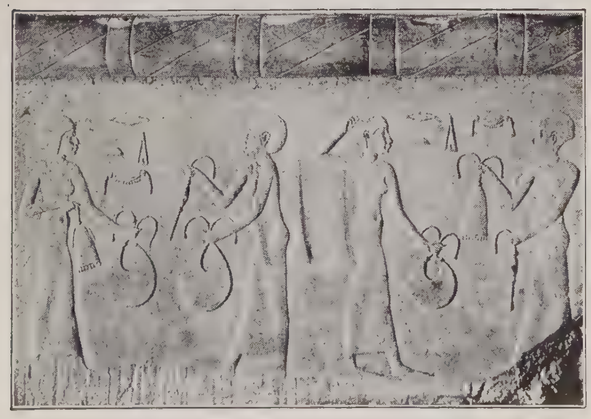

47. KHA-EM-HAT.

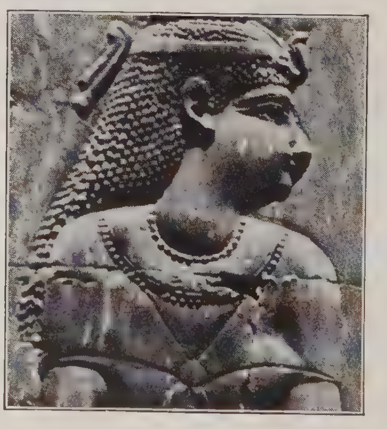

48. SETI I.

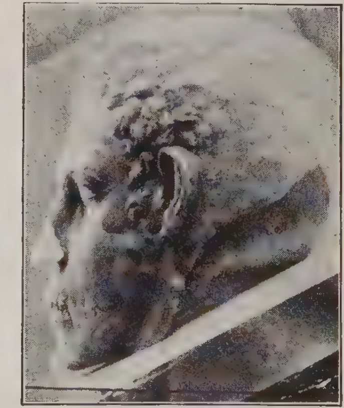

49. PRINCESSES: FRESCO.


50. FOUR RACES OF MAN.


51. TUMBLER.


52. SCENE IN XXVI. DYNASTY.


53. PTOLEMAIC RELIEF.


54. MODELLED HEAD AND SKULL.

branches of the art. The general effect cannot be judged without a large scene, but the figures of two men and an ox (Plate III. fig. 37) show the freshness and vigour of the style, which is even higher than this in some examples. The clear, noble spacing of the surface work is well shown by a group of offerings and inscribed titles (Plate III. fig. 36).

(C) Flat drawings of this age are rare. Some fine examples, such as the geese from Mēdūm, show that such work kept pace with the reliefs; but most of the fresco-work has perished, and there are few instances of line drawing.

The XIIth Dynasty.—This age overlaps the previous in its style. The end of the last age was in the very degraded tomb work of the early XIth Dynasty.

(A) The new style begins with the royal statues, which it seems we must attribute to the foreign kings from whom the XIIth Dynasty was descended. These statues were later appropriated by the Hyksos, and so came to be called by their name, which is a misnomer. The type of face (Plate III. fig. 38) is thick-featured, full of force, with powerful masses of facial muscle covering the skull. The style is very vigorous and impassioned, without any trace of relenting towards conventional work. The surfaces are not in the least subdued by a general breadth of style, as in the last period; but, on the contrary, revel in the full detail of variety. There is perhaps no age where nature is so little controlled by convention in either the living character or its sculptured expression. One of these kings might well be the founder of the IXth Dynasty, "Achthoes (Kheti), who did much injury to all the inhabitants," "Khuther Taurus the tyrant"; the expression is that of a Chlodwig or an Alboin. From this type evidently descended the milder and more civilized kings of the XIIth Dynasty, the resemblance being so strong that the fierce figures have even been identified with that dynasty by some. A good example is that of the statue of Amenemhat (Amenemhē) III. (Plate III. fig. 39). The style of the XIIth Dynasty may be summed up as clean, highly-finished work, strong in facial detail; but with neither the grandeur of the IVth nor the vivacity of the XVIIIth Dynasty. This passed in the XIIIth Dynasty into a graceful but weak manner, as in the statues of Sebkhotp (Sebek-hotep) III. and Neferhotp.

(B) The relief work shows most clearly the rise of the new style. In the middle of the XIth Dynasty an entirely fresh treatment appears; the Old Kingdom work had died out in very bad sunk-reliefs, the fresh style (Plate III. fig. 41) was a low relief with sharp edges above the field. It was full of delicate variety in the surfaces, and of elaborated close-packed lines of hair and ornaments. By the time of the early XIIth Dynasty, this reached a perfection of refinement in the detail of facial curves, with an ostentatiously low relief (P.K. ix. i.), rather on the lines of modern French work; but the whole with clean, firm outlines, severely restrained in the expression, and without any trace of emotion. It is the work of a school, in which high training took the place of the reliance on nature. Sunk relief was also well used, as by Senusert (Senwosri) I. (Plate III. fig. 40). There was a steady decline during the XIIth Dynasty and onward, but the same tone was followed.

(C) In some tombs painting only was used, and it followed the general character of the relief treatment, being more rigid, detailed, and scholastic than the older style.

The XVIIIth-XXth Dynasties.—The obvious, not to say superficial, character of this age has rendered it one of the most popular in Egyptian art. The older breadth, fulness, and vigour have vanished, those great qualities which stamp the immortal works of early times. The difference is much like that between the Parthenon and the Niobids, or between Jacopo Avanzi and Caracci. In this change is the whole difference between the art of character and the art of emotion; and though the emotional side is the more popular, as needing less thought to understand it, yet the unfailing canon is that in every age and land the true quality of art is proportionate to the expression of character as apart from transient emotion. This may perhaps apply to other arts as well as to sculpture and painting. If we accept frankly the emotional nature of this age, we may admire its graceful outlines, its vivacious manner, its romantic style, with an occasional sauciness which is amusing and attractive. It revelled in rich detail, and close masses of lines, as in wigs and ribbed dresses. It sported with a seductive Syrian type of face, especially under Amenophis (Amenhotep) III.; but we find the anatomy giving way to mere smoothness of surface, for the sake of contrast with the masses of detail. The romantic element increased, solemn funereal statues show husband and wife hand in hand; and it culminated under Akhenaton, who is seen kissing his wife in the chariot, or dancing her on his knee. An overwhelming naturalism swamped the older reserves of Egyptian art, and the expression of the postures, actions and familiarities of daily life, or the instantaneous attitudes of animals, became the *dernier cri* of fashion. It was all charming and wonderful, but it was the end,—nothing could come after it. The XIXth Dynasty, at its best under Seti I., could only excel in high finish of smoothness and graceful curves; life, character, meaning, had vanished. And soon after, under Rameses II., mere mechanical copying, hard lifeless routine of stone-cutting, regardless of truth and of nature, dominated the whole.

(A) In sculpture there is a certain baldness of style at first, as in the Amenophis I. at Turin or Mutnefert at Cairo. More fulness and richness of character succeeded, as in Tahutmes (Tethmosis) III. and Amenophis III. (Plate IV. fig. 42, British Museum). And the feeling of the age finds greater scope in private statues, many of which have a personal fascination about them, as in the seated figures at Cairo and Florence, and the freer work in wood, of which the ebony negress (Plate IV. fig. 45) is the best example. The burst of naturalism under Akhenaton resulted in some marvellous portraiture, of which the fragment of a queen's head (Plate IV. fig. 43) is perhaps the most brilliant instance; the fidelity in the delicate curves of the nose and around the mouth is enhanced by the touch of artistic convention in the facing of the lips. The only work of ability in the XIXth Dynasty is the black granite figure (Plate IV. fig. 44) of Rameses II. at Turin. The ordinary statuary of his reign is painfully stiff and poor, and there is no later work in the period worth notice.

(B) The reliefs of the early XVIIIth Dynasty are closely like the scenes of the tombs in the pyramid age, but soon carving was superseded by the cheaper painting, and but few tombs in relief are known. The temples were the principal places for reliefs; and they steadily deteriorate from the first great example, Deir el Bahri (see ARCHITECTURE: *Egyptian*), down to the late Ramessides. The portraiture is strong and clear-cut (Plate IV. fig. 46), but somewhat mechanical and without muscular detail: the sameness is rather more than is probable. There is a good deal of repetition for mere effect, even in the fine work of Kha-em-hat (Plate IV. fig. 47), under Amenophis III. That the artists were conscious of their poverty of thought is shown by some precise imitations of the style of early monuments. On reaching the age of Akhenaton, the peculiar style of that school is obvious in every relief; the older conventions were deserted, and, for good or for bad, a new start from nature was attempted. After that the smooth finish of the Seti reliefs at Abydos (Plate IV. fig. 48) shows no life or observation; and only occasionally the artist triumphed over the stone-worker, as in the portrait of Bantanta at Memphis, which is precisely like another head of her found in Sinai. The innumerable reliefs of the XIXth-XXth Dynasty temples are only of historic interest, and are all despicable in comparison with earlier works.

(C) Painting was the art most congenial to this age; the lightness of touch, abundance of incident, and even comedy, of the scenes are familiar in the frescoes in the British Museum. And under Akhenaton this was pervaded by an entire naturalism of posture, as seen in the two little princesses (Plate IV. fig. 49). Drawing continued to be the strong point of the art after the more laborious sculpture had lost all vitality. The tomb of Seti shows exquisitely firm line drawing; and the heads of four races (Plate IV. fig. 50), Western, Syrian, and two Negro, here show the unfailing line-work which has never been matched in later times. The artist habitually drew the long lines of whole limbs without a single hesitation or revoke; and the drawing of a tumbling girl (Plate IV. fig. 51) shows how credibly such contortions could be represented. The comic papyri of the XXth Dynasty have also a very strong sense of character, even through coarse drawing and some childish combinations.

The subsequent centuries show continuous decline, and in whatever branch we compare the work, we see that each dynasty was poorer than that which preceded it. The XXVIth Dynasty is often looked on as a renaissance; but when we compare similar work we see that it was poorer than the XXIInd, as that was poorer than the XIXth. The alabaster statue of Amenardus of the XXVth is faulty in pose, and perfunctory in modelling; the resemblance between this and the head of her nephew Tirhaka is perhaps the best evidence of truthful work. After this there was a strong archaistic fashion, much like that under Hadrian; in both cases it may have arrested decay, but it did not lift the art up again. The work of this age can always be detected by the faulty jointing (Plate IV. fig. 52) and muscular treatment. The elements are right enough, but there was not the vital sense to combine them properly. Hence the monstrous protuberances (Plate IV. fig. 53) on relief figures of this age; a fault which the Greek fell into in his decline, as shown in the Farnese Hercules.

Portraiture, with its limited demand on imagination and lack of ideals, was the form of art which flourished latest. The Saitic heads in basalt show a school of close observation, with fair power of rendering the personal character; and even in Roman times there still were provincial artists who could model a face very truthfully, as is shown in one case in which the stucco head (Plate IV. fig. 54) from a coffin is here superposed on the view of the actual skull to show the accuracy of the work. The school of portrait-painting belongs entirely to Greek art, and is therefore not touched upon here. (See Edgar, *Catalogue of Graeco-Egyptian Coffins*, 48 plates, for this subject.)

Lastly we must recognize the different schools of Egyptian sculpture which are as distinct as those of recent painting. The black-granite school in every age is the finest; its seat we do not know, but its vitality and finish always exceed those of contemporary works. The limestone school was probably the next best, to judge from the reliefs, but hardly any statues of this school have survived; it probably was seated at Memphis. The quartzite work from Jebel Ahmar near Cairo stands next, as often very fine design is found in this hard material. The red granite school of Assuan comes lower, the work being usually clumsy and with unfinished corners and details. And the lowest of all was the sandstone school of Silsila, which is always the worst. Broadly speaking, the Lower Egyptian was much better than the Upper Egyptian; a conclusion also evident in the art of the tombs done on the spot. But the secret of the black granite school, and its excellence, is the main problem unsolved in the history of the art. (W. M. F. P.)

Tools and Material Products.

Tools (see Illustrations 1 to 111).—The history of tools is a very large subject which needs to be studied for all countries; the various details of form are too numerous to specify here, but the general outline of tools used in Egypt may be briefly stated under *general* and *special* types. The *general* include tools for striking, slicing and scraping; the *special* tools are for fighting, hunting, agriculture, building and thread-work.

Striking Tools.—The wooden mallet of club form (1) was used in the VIth and XIIth Dynasties; of the modern mason's form (2) in the XIIth and XVIIIth. The stone mace head was a sharp-edged disk (3), in the prehistoric from 31–40 sequence date; of the pear shape (4) from S.D. 42, which was actually in use till the IVth Dynasty, and represented down to Roman time. The metal or stone hammer with a long handle was unknown till Greek or Roman times; but, for beating out metal, hemispherical stones (5) were held in the hand, and swung at arm's length overhead. Spherical hard stone hammers (6) were held in the hand for dressing down granite. The axe was at the close of the prehistoric age a square slab of copper (7) with one sharp edge; small projecting tails then appeared at each end of the back (8), and increased until the long tail for lashing on to the handle is more than half the length of the axe in an iron one of Roman (?) age (13). Flint axes were made in imitation of metal in the XIIth Dynasty (9). Battle-axes with rounded outline started as merely a sharp edge of metal (10) inserted along a stick (10, 11); they become semicircular (12) by the VIth Dynasty, lengthen to double their width in the XIIth, and then thin out to a waist in the middle by the XVIIIth Dynasty. Flint hoes (14) are common down to the XIIth Dynasty. Small copper hoes (15) with a hollow socket are probably of about the XXIInd Dynasty. Long iron picks (16), like those of modern navvies, were made by Greeks in the XXVIth Dynasty.

Slicing Tools.—The knife was originally a flint saw (17), having minute teeth; it must have been used for cutting up animals, fresh or dried, as the teeth break away on soft wood. The double-edged straight flint knife dates from S.D. 32-45. The single-edged knife (18) is from 33–65. The flint knives of the time of Menes are finely curved (19), with a handle-notch; by the end of the IInd Dynasty they were much coarser (20) and almost straight in the back. In the XIth-XIIth Dynasty they were quite straight in the back (21), and without any handle-notch. The copper knives are all one-edged with straight back (22) down to the XVIIIth Dynasty, when two-edged symmetrical knives (23) become usual. Long thin one-edged knives of iron begin about 800 B.C. Various forms of one-edged iron knives, straight (24) and curved (25), belong to Roman times. A cutting-out knife, for slicing through textiles, began double-edged (26) in the Ist Dynasty, and went through many single-edged forms (27-29) until it died out in the XXth Dynasty (*Man*, 1901, 123). A small knife hinged on a pointed backing of copper (31) seems to have been made for hair curling and toilet purposes. Razors (30) are known of the XIIth Dynasty, and became common in the XVIIIth. A curious blade of copper (32), straight sided, and sharpened at both ends, belongs to the close of the prehistoric age. Shears are only known of Roman age and appear to have been an Italian invention: there is a type in Egypt with one blade detachable, so that each can be sharpened apart. Chisels of bronze began of very small size (33) at S.D. 38, and reached a full size at the close of the prehistoric age. In historic times the chisels are about 1×½, ×6 to 8 in. long (34). Small chisels set in wooden handles are found (35) of the XIIth and XVIIIth Dynasties. Ferrules first appear in the Assyrian iron of the 7th century B.C. The rise of stone work led to great importance of heavy chisels (36) for trimming limestone and Nubian sandstone; such chisels are usually round rods about ¾ in. thick and 6 in. long. The cutting edge was about ½ in. wide for flaking tools (36), which were not kept sharp, and 1 in. wide for facing tools (37) which had a good edge. In Greek times the iron chisels are shorter and merge into wedges (39). The socketed or mortising chisel (38) is unknown till the Italian bronze of the 8th century B.C., and the Naucratis iron of the 6th century. Adzes begin in S.D. 56, as plain slips of copper (40) 4 to 6 in. long, about 1 wide and ⅛th thick. The square end was rounded in the early dynastic times, and went through a series of changes down to the XIXth Dynasty. Adzes of iron are probably of Greek times. A fine instance of a handle about 4 ft. long is represented in the IIIrd Dynasty (P.M. XI.). The adze (41) was used not only for wood-work but also for dressing limestone.

Scraping Tools.—Flint scrapers are found from S.D. 40 and onward. The rectangular scraper (42) began in S.D. 63, and continued into the IInd Dynasty: the flake with rounded ends (43) was used from the Ist to the IVth Dynasty (P. Ab. i. xiv., xv.). Round scrapers were also made (44). Flint scrapers were used in dressing down limestone sculpture in the IIIrd Dynasty. Rasps of conical form (45), made of a sheet of bronze punched and coiled round, were common in the XVIIIth Dynasty, apparently as personal objects, possibly used for rasping dried bread. In the Assyrian iron tools of the 7th century B.C. the long straight rasp (46) is exactly of the modern type. The saw is first found as a notched bronze knife of the IIIrd Dynasty. Larger toothed saws (47) are often represented in the IVth-VIth Dynasty, as used by carpenters. There are no dated specimens till the Assyrian iron saws (48) of the 7th century B.C. Drills were of flint (49) for hard material and bead-making, of bronze for woodwork. In the Assyrian tools iron drills are of slightly twisted scoop form (50), and of centre-bit type with two scraping edges (51). In Roman times the modern V drill (52) is usual. The drill was worked by a stock with a loose cap (53), rotated by a drill bow, in the XIIth to Roman dynasties. The pump drill with cords twisted round it was in Roman use. The bow drill (56) was used as a fire drill to rotate wood (55) on wood (57); and the cap (54) for such use was of hard stone with a highly polished hollow. The drill brace appears to have been used by Assyrians in the 7th century B.C. Piercers of bronze tapering (58), to enlarge holes in leather, &c., were common in all ages.

Fighting Weapons.—The battle-axe has been described above with axes. The flint dagger (59) is found from S.D. 40-56. A very finely made copper dagger (60) with deep midrib is dated to between 55 and 60 S.D. Copper daggers with parallel ribbing (61) down the middle are common in the XIth-XIVth Dynasties; and in the XVIIIth-XXth Dynasties they are often shown in scenes and on figures. The falchion with a curved blade (62) belongs to the XVIIIth-XXth Dynasty. The rapier (63) or lengthened dagger is rarely found, and is probably of prehistoric Greek origin. The sword is of Greek and Roman age, always double-edged and of iron. The spear is not commonly found in Egypt, until the Greek age, but it is represented from the XIth Dynasty onward; it belonged to the Semitic people (L.D. ii. 133). The bow was always of wood, in one piece in the prehistoric and early times, also of two horns in the Ist Dynasty; but the compound bow of horn is rarely found, only as an importation, in the XVIIIth Dynasty. The arrow-heads of flint (64-66) and of bone (68–69) were pointed, and also square-ended (67) for hunting (P.R.T. ii. vi.; vii. A., 7; xxxiv.). The copper arrow-heads appear in the XIXth Dynasty, of blade form with tang (70); the triangular form (72), and leaf form with socket (71), are of the XXVIth Dynasty. Triangular iron arrows with tang are of the same age. Tangs show that the shaft was a reed, sockets show that it was of wood. Many early arrows (XIIth) have only hard wood points of conical form. The sling is rarely shown in the XIXth-XXth Dynasties; and the only known example is probably of the XXVIth.

Hunting Weapons.—The forked lance of flint was at first wide with slight hollow (73) from S.D. 32-43; then the hollow became a V notch (74) in 38 S.D. and onward. The lance was fixed in a wooden shaft for throwing, and held in by a check-cord from flying too far if it missed the animal (P.N. LXXIII.). The harpoon for fishing was at first of bone (75), and was imitated in copper (76, 77) from S.D. 36 onwards. The boomerang or throw-stick (78) was used from the Ist to the XXIInd Dynasty, and probably later. Fish-hooks of copper (79-82) are found from the Ist Dynasty to Roman times. A trap for animals' legs, formed by splints of palm stick radiating round a central hole, is figured in S.D. 60, and one was found of probably the XXth Dynasty. Fishing nets were common in all historic times, and the lead sinkers (83) and stone sinkers (84) are often found under the XVIIIth-XXth Dynasties.

Agricultural Tools.—The hoe of wood (85) is the main tool from the late prehistoric time, and many have been found of the XVIIIth Dynasty. With the handle lengthened (86) and turned forward, this became the plough (87 is the hieroglyph, 88 the drawing, of a plough); this was always sloping, and never the upright post of the Italic type. The rake of wood (89) is usual in the XIIth and XVIIIth Dynasties. The fork (90), used for tossing straw, was common in the Old Kingdom, but none has been found. The sickle was of wood (92), with flints (91) inserted, apparently a copy of the ox-jaw and teeth. The notched flints for it are common from the Ist to the XVIIIth Dynasty. In Roman times the same principle was followed, by making an iron sickle with a deep groove, in which was inserted the cutting blade of steel (P.E. XXIX.). Shovel-boards, to hold in right (93) or left hand for scraping up the grain in winnowing, are usual in the XVIIIth Dynasty, and are figured in use in the Old Kingdom. Pruning knives with curved blades (94) are Italic, and were made of iron by the Romans. Corn grinders were flat oval stones, with a smaller one lying cross-ways (95), and slid from end to end. Such were used from the Old Kingdom down to late times. In the Roman period a larger stone was used, with a rectangular slab (96) sliding on it, in which a long trough held the grain and let it slip out below for grinding. The quern with rotary motion is late Roman, and still used by Arabs. The large circular mill-stones of Roman age worked by horse-power are usually made from slices of granite columns.

Building Tools.—The adze described above was used for dressing blocks of limestone. The brick-mould was an open frame, with one side prolonged into a handle (97), exactly as the modern mould. The plasterers' floats (98) were entirely cut out of wood. The mud rake for mixing mortar is rather narrower than the modern form. The square (99) and plummet (100,101) have remained unchanged since the XIXth Dynasty. For dressing flat surfaces three wooden pegs (102) of equal length were used; a string was stretched between the tops of two, and the third peg was set on the point to be tested and tried against the string.

Thread-Work.—Stone spindle whorls (103) are common in the prehistoric age; wooden ones were usual, of a cylindrical form (104) in the XIIth, and conical (105) in the XVIIIth Dynasty. The thread was secured by a spiral notch in the stick. In Roman times an iron hook on the top held the thread (106) as in modern spindles. Needles of copper were made in the prehistoric, as early as S.D. 48, and very delicate ones by S.D. 71. Gold needles are found of the Ist Dynasty. Fine ones of bronze are common in the XVIIIth Dynasty, and some with two eyes at right angles, one above the other, to carry two different threads. The copper bodkin is found in S.D. 70. Netters are common, of rib bones, pointed (107); the thread was wound round them. Long netting needles were probably brought in by the dynastic people as they figure in the hieroglyphs. Finely-made ones are found in the XVIIIth Dynasty and later. Reels were also commonly used for net making, of pottery (108) or even pebbles (109) with a groove chipped around. The flint vase-grinders were used in the early dynasties (110), and also sandstone grinders for hollowing larger vases (111).

Stone-Work.—In the prehistoric ages stone building was unknown, but many varieties of stones were used for carving into vases, amulets and ornaments. The stone vases were at first of cylindrical forms, with a foot, and ears for hanging. These are worked in brown basalt, syenite, porphyry, alabaster and limestone. In the second prehistoric civilization barrel-shaped vases became usual; and to the former materials were added slate, grey limestone and breccia. Serpentine appears later, and diorite towards the close of the prehistoric ages. Flat dishes were used in earlier times; gradually deeper forms appear, and lastly the deep bowl with turned-in edge belongs to the close of the prehistoric time and continued common in the earlier dynasties (P.D.P. 19). This stone-work was usually formed on the outside with rotary motion, but sometimes the vase was rotated upon the grinder (Q. H. 17). The interior was ground out by cutters (figs. 110,111) fixed in the end of a stick and revolved with a weight on the top, as shown in scenes on the tombs of the Vth Dynasty. The cutters were sometimes flints of a crescent shape (P. Ab. ii. liii. 24), but more usually grinders blocks of quartzite sandstone (26-34), and occasionally of diorite (Q. H. xxxii. lxii.). These blocks were fed with sand and water to give the bite on the stone (P. Ab. i. 26). The outsides of the vases were entirely wrought by handwork, with the polishing lines crossing diagonally. Probably the first forming was done by chipping and hammer-dressing, as in later times; the final facing of the hard stones was doubtless by means of emery in block or powder, as emery grinding blocks are found.

In the early dynasties the hard stones were still worked, and the Ist dynasty was the most splendid age for vases, bowls, and dishes of the finest stones. The royal tombs have preserved an enormous quantity of fragments, from which five hundred varied forms have been drawn (P.R.T. ii. xlvi.-liii. 6). The materials are quartz crystal, basalt, porphyry, syenite, granite, volcanic ash, various metamorphics, serpentine, slate, dolomite marble, alabaster, many coloured marbles, saccharine marble, grey and white limestones. The most splendid vase is one from Nekhen (Hieraconpolis), of syenite, 2 ft. across and 16 in. high, hollowed so as to be marvellously light and highly polished (Q. H. xxxvii). Another branch of stone-work, surface carving, was early developed by the artistic dynastic race. The great palettes of slate covered with elaborate reliefs are probably all of the pre-Menite kings; the most advanced of them having the figure of Narmer, who preceded Menes. Other carving full of detail is on the great mace-heads of Narmer and the Scorpion king, where scenes of ceremonials are minutely engraved in relief. In the Ist Dynasty the large tombstones of the kings are of bold work, but the smaller stones of private graves vary much in the style, many being very coarse. All of this work was by hammer-dressing and scraping. The scrapers seem to have always been of copper.

The earliest use of stone in buildings is in the tomb of King Den (Ist Dynasty), where some large flat blocks of red granite seem to have been part of the construction. The oldest stone chamber known is that of Khasekhemui (end of the IInd Dynasty). This is of blocks of limestone whose faces follow the natural cleavages, and only dressed where needful; part is hammer-dressed, but most of the surfaces are adze-dressed. The adze was of stone, probably flint, and had a short handle (P.R.T. ii. 13). The same king also wrought granite with inscriptions in relief. In the close of the IIIrd Dynasty a great impetus was given to stone-work, and the grandest period of refined masonry is at the beginning of the IVth Dynasty under Cheops. The tombs of Mēdūm under Snefru are built with immense blocks of limestone of 20 and 33 tons weight. The dressing of the face between the hieroglyphs was done partly with copper and partly with flint scrapers (P.M. 27). The most splendid masonry is that of the Great Pyramid of Cheops. The blocks of granite for the roofing are 56 in number, of an average weight of 54 tons each. These were cut from the water-worn rocks at the Cataract—the soundest source for large masses, as any incipient flaws are well exposed by wear. The blocks were quarried by cleavage; a groove was run along the line intended, and about 2 ft. apart holes about 4 in. wide were jumped downward from it in the intended plane; this prevented a skew fracture (P.T. 93). In shallower masses a groove was run, and then holes, apparently for wedges, were sunk deeper in the course of it; whether wetted wood was used for the expansive force is not known, but it is probable, as no signs are visible of crushing the granite by hard wedges. The facing of the cloven surfaces was done by hammer-dressing, using rounded masses of quartzose hornstone, held in the hand without any handle. In order to get a hold for moving the blocks without bruising the edges, projecting lumps or bosses were left on the faces, about 6 or 8 in. across and 1 or 2 in. thick. After the block was in place the boss was struck off and the surface dressed and polished (P.T. 78, 82). In the pyramid of Cheops the blocks were all faced before building; but the later granite temple of Chephren and the pyramid of Mycerinus (Menkaura, Menkeurē) show a system of building with an excess of a few inches left rough on the outer surface, which was dressed away when in position (P.T. 110, 132).

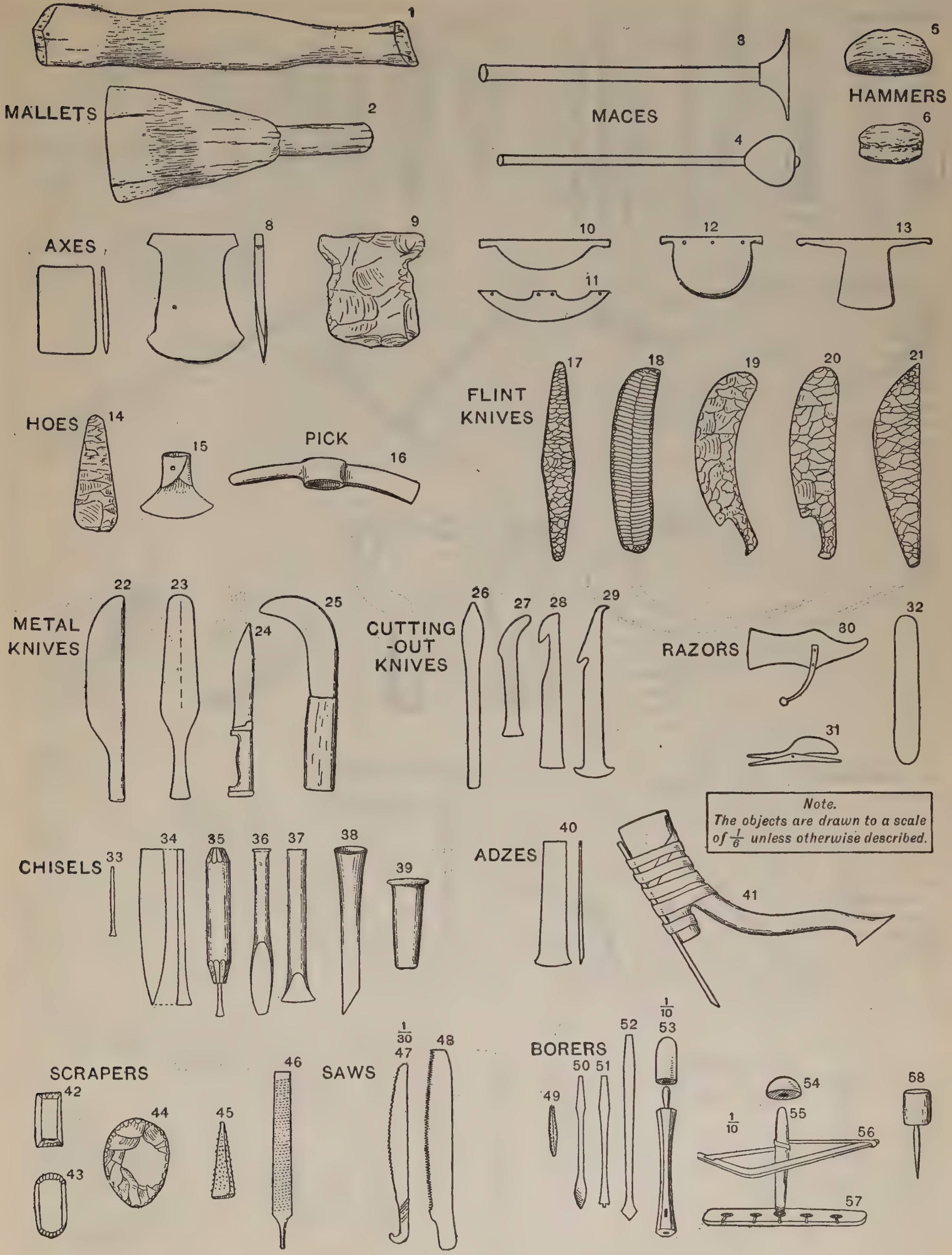
The flatness of faces of stone or rock (both granite and limestone) was tested by placing a true-plane trial plate, smeared with red ochre, against the dressed surface, as in modern engineering. The contact being thus reddened showed where the face had to be further dressed away; and this process was continued until the ochre touched points not more than an inch apart all over the joint faces, many square feet in area. On stones too large for facing-plates a diagonal draft was run, so as to avoid any wind in the plane (P.T. 83).

The cutting of granite was not only by cleavage and hammer dressing, but also by cutting with harder materials than quartz such as emery. Long saws of copper were fed with emery powder, and used to saw out blocks as much as $7\frac{1}{2}$ ft. long (P.T. Plate XIV.). In other cases the very deep scores in the sides of the saw-cut suggest that fixed cutting points were inserted in the copper saws; and this would be parallel to the saw-cuts in the very hard limestone of the Palace of Tiryns, in which a piece of a copper saw has been broken, and where may be yet found large chips of emery, too long and coarse to serve as a powder, but suited for fixed teeth. A similar method was common for circular holes, which were cut by a tube, either with powder or fixed teeth. These tubular drills were used from the IVth Dynasty down to late times, in all materials from alabaster up to carnelian. The resulting cores are more regular than those of modern rock-drilling.

Limestone in the Great Pyramid, as elsewhere, was dressed by chopping it with an adze, a tool used from prehistoric to Roman times for all soft stones and wood. This method was carried on up to the point of getting contact with the facing-plate at every inch of the surface; the cuts cross in various directions. For removing rock in reducing a surface to a level, or in quarrying, cuts were made with a pick, forming straight trenches, and the blocks were then broken out between these. In quarrying the cuts are generally 4 or 5 in. wide, just enough for the workman's arm to reach in; for cutting away rock the grooves are 20 in. wide, enough to stand in, and the squares of rock about 9 ft. wide between the grooves (P.T. 100). The accuracy of the workmanship in the IVth Dynasty is astonishing. The base of the pyramid of Snefru had an average variation of 6 in. on 5765 and 10′ of squareness. But, immediately after, Cheops improved on this with a variation of less than 6 in. on 9069 in. and 12″ of direction. Chephren fell off, having 1·5 error on 8475, and 33″ of variation; and Mycerinus (Menkeurē) had 3 in. error on 4154 and 1′ 50″ variation of direction (P.M. 6; P.T. 39, 97, 111). Of perhaps later date the two south pyramids of Dahshur show errors of 3·7 on 7459 and 1·1 on 2065 in., and variation of direction of 4′ and 10′ (P.S. 28, 30). The above smallest error of only 1 in 16,000 in lineal measure, and 1 in 17,000 of angular measure, is that of the rock-cutting for the foundation of Khufu, and the masonry itself (now destroyed) was doubtless more accurate. The error of flatness of the joints from a straight line and a true square is but $\frac{1}{100}$th in. on 75 in. length; and the error of level is only $\frac{1}{50}$th in. along a course, or about 10″ on a long length (P.T. 44). We have entered thus fully on the details of this period, as it is the finest age for workmanship in every respect. But in the XIIth Dynasty the granite sarcophagus of Senwosri II. is perhaps the finest single piece of cutting yet known; the surfaces of the granite are all dull-ground, the errors from straight lines and parallelism are only about $\frac{1}{200}$th inch (P. 1, 3).

In later work we may note that copper scrapers were used for facing the limestone work in the VIth, the XIIth and the XVIIIth Dynasties. In the latter age granite surfaces were ground, hieroglyphs were chipped out and polished by copper tools fed with emery; outlines were graved by a thick sheet of copper held in the hand, and sawed to and fro with emery. Corners of signs and intersections of lines were first fixed by minute tube-drill holes, into which the hand tool butted, so that it should not slip over the outer surface.

The marking out of work was done by fine black lines; and supplemental lines at a fixed distance from the true one were put in to guard against obliteration in course of working (P.T. 92); similarly in building a brick pyramid the axis was marked, and there were supplemental marks two cubits to one side (P.K. 14). When cutting a passage in the rock a rough drift-way was first made, the roof was smoothed, a red axis line was drawn along it, and then the sides were cut parallel to the axis. For setting out a mastaba with sloping sides, on an irregular foundation at different levels, hollow corner walls were built outside the place of each corner; the distances of the faces at the above-ground level were marked on the inner faces of the walls; the above-ground level was also marked; then sloping lines at the intended angle of the face were drawn downward from the ground-level measures, and each face was set out so as to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PICK
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FLINT KNIVES
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METAL KNIVES
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CUTTING -OUT KNIVES
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RAZORS
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ADZES
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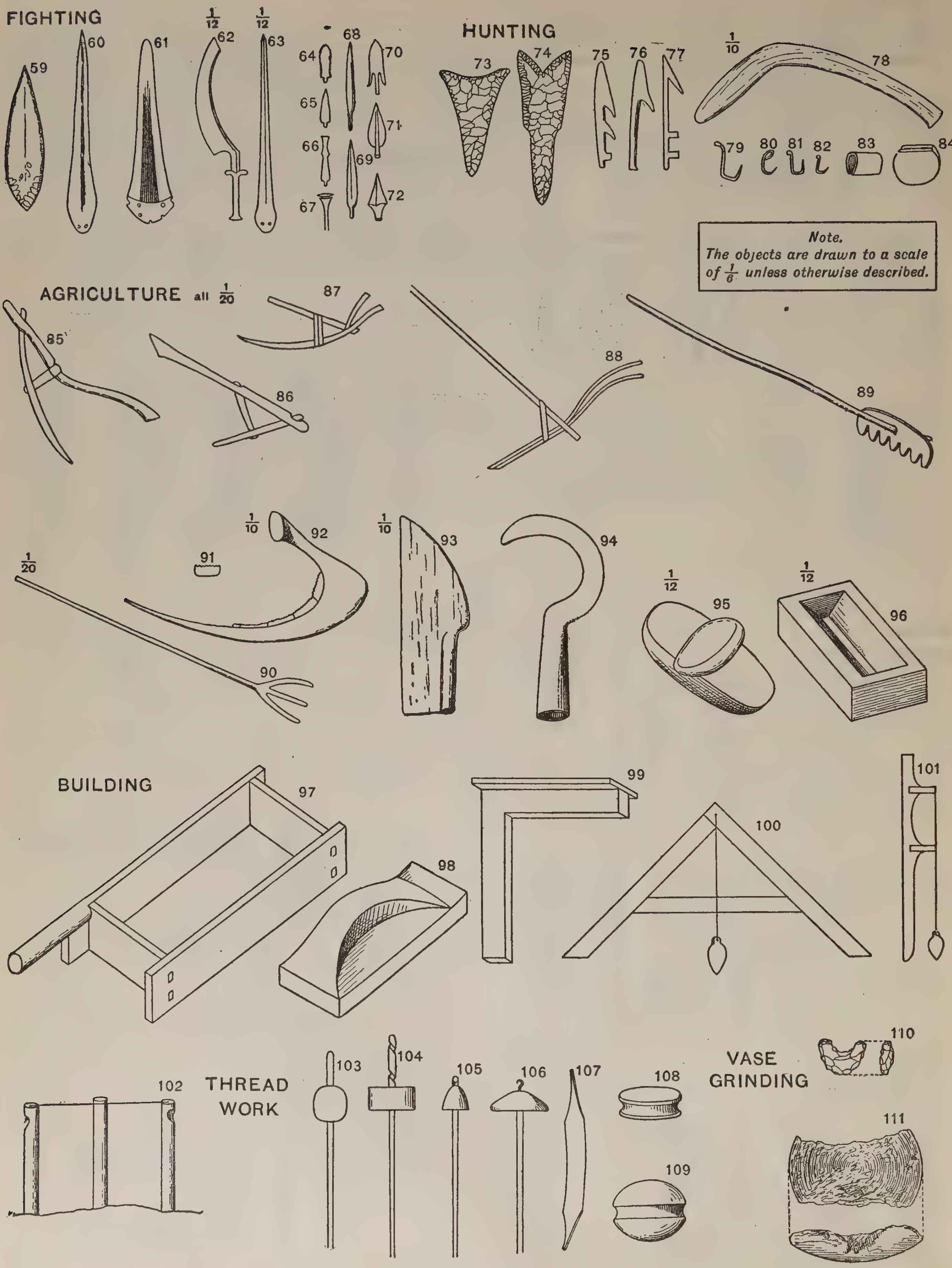
Note.
The objects are drawn to a scale of $\frac{1}{6}$ unless otherwise described.

Ancient Egyptian Tools.


FIGHTING
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HUNTING
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AGRICULTURE all 1/20
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1/20 90
91
1/10 92
1/10 93
94
1/12 95
1/12 96
BUILDING
97
98
99
100
101
102
THREAD WORK
103
104
105
106
107
108
109
VASE GRINDING
110
111

Note.
The objects are drawn to a scale of $\frac{1}{6}$ unless otherwise described.

Ancient Egyptian Tools.

lie in the plane thus defined by two traces at the ends (P.M. VIII.).

Metal-Work.—Copper was wrought into pins, a couple of inches long, with loop heads, as early as the oldest prehistoric graves, before the use of weaving, and while pottery was scarcely developed. The use of harpoons and small chisels of copper next arose, then broad flaying knives, needles and adzes, lastly the axe when the metal was commoner. On these prehistoric tools, when in fine condition, the original highly-polished surface remains. It shows no trace of grinding lines or attrition, nor yet of the blows of a hammer. Probably it was thus highly finished by beating between polished stone hammers which were almost flat on the face. Most likely the forms of the tools were cast to begin with, and then finished and polished by fine hammering. A series of moulds for casting in the XIIth Dynasty show that the forms were carved out in thick pieces of pottery, and then lined with fine ashy clay. The mould was single, so that one side of the tool was the open face of metal. As early as the pyramid times solid casting by *cire perdue* was already used for figures: but the copper statues of Pepi and his son seem, by their thinness and the piecing together of the parts, to have been entirely hammered out. The portraiture in such hammer work is amazingly life-like. By the time of the XIIth Dynasty, and perhaps earlier, *cire perdue* casting over an ash core became usual. This was carried out most skilfully, the metal being often not $\frac{1}{50}$th in. thick, and the core truly centred in the mould. Casting bronze over iron rods was also done, to gain more stiffness for thin parts.

In gold work the earliest jewelry, that of King Zer of the Ist Dynasty, shows a perfect mastery of working hollow balls with minute threading holes, and of soldering with no trace of excess nor difference of colour. Thin wire was hammered out, but there is no ancient instance of drawn wire. Castings were not trimmed by filing or grinding, but by small chisels and hammering (P.R.T. ii. 17). In the XIIth Dynasty the soldering of the thin cells for the *cloisonnée* inlaid pectorals, on to the base plate, is a marvellous piece of delicacy; every cell has to be perfectly true in form, and yet all soldered, apparently simultaneously, as the heat could not be applied to successive portions (M.D. i.). Such work was kept up in the XVIIIth and XXVIth Dynasties. There is nothing distinctive in later jewelry different from Greek and Roman work elsewhere.

Glaze and Glass.—From almost the beginning of the prehistoric age there are glazed pottery beads found in the graves: and glazing on amulets of quartz or other stones begins in the middle of the prehistoric. Apparently then glazing went together with the working of the copper ores, and probably accidental slags in the smelting gave the first idea of using glaze intentionally. The development of glazing at the beginning of the dynasties was sudden and effective. Large tiles, a foot in length, were glazed completely all over, and used to line the walls of rooms; they were retained in place by deep dovetails and ties of copper wire. Figures of glazed ware became abundant; a kind of visiting card was made with the figure of a man and his titles to present in temples which he visited; and glazed ornaments and toggles for fastening dresses were common (P. Ab. ii.). Further, besides thus using glaze on a large scale, differently coloured glazes were used, and even fused together. A piece of a large tile, and part of a glazed vase, have the royal titles and name of Menes, originally in violet inlay in green glaze. There was no further advance in the art until the great variety of colours came into use about 4000 years later. In the XIIth Dynasty a very thin smooth glaze was used, which became rather thicker in the XVIIIth. The most brilliant age of glazes was under Amenophis III. and his son Akhenaton. Various colours were used; beside the old green and blue, there were purple, violet, red, yellow and white. And a profusion of forms is shown by the moulds and actual examples, for necklaces, decorations, inlay in stone and applied reliefs on vases. Under Seti II. cartouches of the king in violet and white glaze are common; and under Rameses III. there were vases with relief figures, with painted figures, and tiles with coloured reliefs of captives of many races. The latter development of glazing was in thin delicate apple-green ware with low relief designs, which seem to have originated under Greek influence at Naucratis. The Roman glaze is thick and coarse, but usually of a brilliant Prussian blue, with dark purple and apple-green; and high reliefs of wreaths, and sometimes figures, are common.

Though glaze begins so early, the use of the glassy matter by itself does not occur till the XVIIIth Dynasty; the earlier reputed examples are of stone or frit. The first glass is black and white under Tethmosis (Tahutmes) III. It was not fused at a high point, but kept in a pasty state when working. The main use of it was for small vases; these were formed upon a core of sandy paste, which was modelled on a copper rod, the rod being the core for the neck. Round this core threads of glass were wound of various colours; the whole could be reset in the furnace to soften it for moulding the foot or neck, or attaching handles, or dragging the surface into various patterns. The colours under later kings were as varied as those of the glazes. Glass was also wheel-cut in patterns and shapes under Akhenaton. In later times the main work was in mosaics of extreme delicacy. Glass rods were piled together to form a pattern in cross-section. The whole was then heated until it perfectly adhered, and the mass was drawn out lengthways so as to render the design far more minute, and to increase the total length for cutting up. The rod was then sliced across, and the pieces used for inlaying. Another use of coloured glass was for cutting in the shapes of hieroglyphs for inlaying in wooden coffins to form inscriptions. Glass amulets were also commonly placed upon Ptolemaic mummies. Blown glass vessels are not known until late Greek and Roman times, when they were of much the same manufacture as glass elsewhere. The supposed figures of glass-blowers in early scenes are really those of smiths, blowing their fires by means of reeds tipped with clay. The variegated glass beads belonging to Italy were greatly used in Egypt in Roman times, and are like those found elsewhere. A distinctively late Egyptian use of glass was for weights and vase-stamps, to receive an impress stating the amount of the weight or measure. The vase-stamps often state the name of the contents (always seeds or fruits), probably not to show what was in them, but to show for what kind of seed the vessel was a true measure. These measure stamps bear names dating them from A.D. 680 to about 950. The large weights of ounces and pounds are disks or cuboid blocks; they are dated from 720 to 785 for the lesser, and to A.D. 915 for larger, weights. The greater number are, however, small weights for testing gold and silver coins of later caliphs from A.D. 952 to 1171. The system was not, however, Arab, as there are a few Roman vase-stamps and weights. Of other medieval glass may be noted the splendid glass vases for lamps, with Arab inscriptions fused in colours on the outsides. No enamelling was ever done by Egyptians, and the few rare examples are all of Roman age due to foreign work.

The manufacture of glass is shown by examples in the XVIIIth Dynasty. The blue or green colour was made by fritting together silica, lime, alkaline carbonate and copper carbonate; the latter varied from 3% in delicate blues to 20% in deep purple blues. The silica was needed quite pure from iron, in order to get the rich blues, and was obtained from calcined quartz pebbles; ordinary sand will only make a green frit. These materials were heated in pans in the furnace so as to combine in a pasty, half-fused condition. The coloured frit thus formed was used as paint in a wet state, and also used to dissolve in glass or to fuse over a surface in glazing. The brown tints often seen in glazed objects are almost always the result of the decomposition of green glazes containing iron. The blue glazes, on the other hand, fade into white. The essential colouring materials are, for blue, copper; green, copper and iron; purple, cobalt; red, haematite; white, tin. An entirely clear colourless glass was made in the XVIIIth Dynasty, but coloured glass was mainly used. After fusing a panful of coloured glass, it was sampled by taking pinches out with tongs; when perfectly combined it was left to cool in the pan, as with modern optical glass. When cold the pan was chipped away, and the cake of glass broken up into convenient pieces, free of sediment and of scum. A broken lump would then be heated to softness in the furnace; rolled out under a bar of metal, held diagonally across the roll; and when reduced to a rod of a quarter of an inch thick, it was heated and pulled out into even rods about an eighth of an inch thick. These were used to wind round glass vases, to form lips, handles, &c.; and to twist together for spiral patterns. Glass tube was similarly drawn out. Beads were made by winding thin threads of glass on copper wires, and the greater contraction of the copper freed the bead when cold. The coiling of beads can always be detected by (1) the little tails left at the ends, (2) the streaks, (3) the bubbles, seen with a magnifier. Roman glass beads are always drawn out, and nicked off hot, with striation lengthways; except the large opaque variegated beads which are coiled. Modern Venetian beads are similarly coiled. In the XXIIIrd Dynasty beads of a rich transparent Prussian blue glass were made, until the XXVIth. About the same time the eyed beads, with white and brown eyes in a blue mass, also came in (P.A. 25-27, Plate XIII.).

Pottery (see fig. 112).—The earliest style of pottery is entirely hand made, without any rotary motion; the form being built up with a flat stick inside and the hand outside, and finally scraped and burnished in a vertical direction. The necks of vases were the first part finished with rotation, at the middle and close of the prehistoric age. Fully turned forms occur in the Ist Dynasty; but as late as the XIIth Dynasty the lower part of small vases is usually trimmed with a knife. In the earlier part of the prehistoric age there was a soft brown ware with haematite facing, highly burnished. This was burnt mouth-down in the oven, and the ashes on the ground reduced the red haematite to black magnetic oxide of iron; some traces of carbonyl in the ash helped to rearrange the magnetite as a brilliant mirror-like surface of intense black. The lower range of jars in the oven had then black tops, while the upper ranges were entirely red. A favourite decoration was by lines of white clay slip, in crossing patterns, figures of animals, and, rarely, men. This is exactly of the modern Kabyle style in Algeria, and entirely disappeared from Egypt very early in the prehistoric age. Being entirely hand made, various oval, doubled and even square forms were readily shaped.

The later prehistoric age is marked by entirely different pottery, of a hard pink-brown ware, often with white specks in it, without any applied facing beyond an occasional pink wash, and no polishing. It is decorated with designs in red line, imitating cordage and marbling, and drawings of plants, ostriches and ships. The older red polished ware still survived in a coarse and degraded character, and both kinds together were carried on into the next age (P.D.P.).

The early dynastic pottery not only shows the decadent end of the earlier forms, but also new styles, such as grand jars of 2 or 3 ft. high which were slung in cordage, and which have imitation lines of cordage marked on them. Large ring-stands also were brought in, to support jars, so that the damp surfaces should not touch the dusty ground. The pyramid times show the great jars reduced to short rough pots, while a variety of forms of bowls are the most usual types (P.R.T.; P.D.; P. Desh.)

In the XIIth Dynasty a hard thin drab ware was common, like the modern *qulleh* water flasks. Drop-shaped jars with spherical bases are typical, and scrabbled patterns of incised lines. Large jars of light brown pottery were made for storing liquids and grain, with narrow necks which just admit the hand (P.K.).

The XVIIIth Dynasty used a rather softer ware, decorated at first with a red edge or band around the top, and under Tethmosis (Tahutmes) III. black and red lines were usual. Under Amenophis III. blue frit paint was freely used, in lines and bands around vases; it spread to large surfaces under Amenophis IV., and continued in a poor style into the Ramesside age. In the latter part of the XVIIIth and the XIXth Dynasties a thick hard light pottery, with white specks and a polished drab-white facing, was generally used for all fine purposes. The XIXth and XXth Dynasties only show a degradation of the types of the XVIIIth; and even through to the XXVth Dynasty there is no new movement (P.K.; P.I; P.A.; P.S.T.).

The XXVIth Dynasty was largely influenced by Greek amphorae imported with wine and oil. The native pottery is of a very fine paste, smooth and thin, but poor in forms. Cylindrical cups, and jars with cylindrical necks and no brim, are typical. The small necks and trivial handles begin now, and are very common in Ptolemaic times (P.T. ii.).

The great period of Roman pottery is marked by the ribbing on the outsides. The amphorae began to be ribbed about A.D. 150, and then ribbing extended to all the forms. The ware is generally rather rough, thick and brown for the amphorae, thin and red for smaller vessels. At the Constantine age a new style begins, of hard pink ware, neatly made, and often with "start-patterns" made by a vibrating tool while the vessel rotated: this was mainly used for bowls and cups (P.E.). Of the later pottery of Arab times we have no precise knowledge.

The abbreviations used above refer to the following sources of information:—

M.D.	Morgan,	*Dahshur*;
P.A.	Petrie,	*Tell el Amarna*;
P. Ab.	,,	*Abydos*;
P.D.	,,	*Dendereh*;
P. Desh.	,,	*Deshasheh*;
P.D.P.	,,	*Diospolis Parva*;
P.E.	,,	*Ehnasya*;
P.I.	,,	*Illahun*;
P.K.	,,	*Kahun*;
P.M.	,,	*Medum*;
P.N.	,,	*Naqada*;
P.R.T.	,,	*Royal Tombs*;
P.S.	,,	*Season in Egypt*;
P.S.T.	,,	*Six Temples*;
P.T.	,,	*Pyramids and Temples of Gizeh*;
P.T. ii.	,,	*Tanis, ii.*;
Q.H.	Quibell,	*Hieraconpolis.*

(W. M. F. P.)

Monuments.—The principal monuments that are yet remaining to illustrate the art and history of Egypt may be best taken in historical order. Of the prehistoric age there are many rock carvings, associated with others of later periods: they principally remain on the sandstone rocks about Silsila, and their age is shown by the figures of ostriches which were extinct in later times. One painted tomb was found at Nekhen (Hieraconpolis), now in the Cairo Museum; the brick walls were colour-washed and covered with irregular groups of men, animals and ships, painted with red, black and green. The cemeteries otherwise only contain graves, cut in gravel or brick lined, and formerly roofed with poles and brushwood. The Ist to IIIrd Dynasties have left at Abydos large forts of brickwork, remains of two successive temples, and the royal tombs (see Abydos). Elsewhere are but few other monuments; at Wadi Maghāra in Sinai is a rock sculpture of Semerkhet of the Ist Dynasty in perfect state, at Gīza is a group of tombs of a prince and retinue of the Ist Dynasty, and at Gīza and Bēt Khallaf are two large brick mastabas with extensive passages closed by trap-doors, of kings of the IIIrd Dynasty. The main structure of this age is the step-pyramid of Sakkara, which is a mastaba tomb with eleven successive coats of masonry, enlarging it to about 350 by 390 ft. and 200 ft. high. In the interior is sunk in the rock a chamber 24×23 ft. and 77 ft. high, with a granite sepulchre built in the floor of it, and various passages and chambers branching from it. The doorway of one room (now in Berlin Museum) was decorated with polychrome glazed tiles with the name of King Neterkhet. The complex original work and various alterations of it need thorough study, but it is now closed and research is forbidden.

The IVth to VIth Dynasties are best known by the series of pyramids (see Pyramid) in the region of Memphis. Beyond these tombs, and the temples attached to them, there are very few fixed monuments; of Cheops and Pepi I. there are temple foundations at Abydos (*q.v.*), and a few blocks on other sites; of Neuserre (Raenuser) there is a sun temple at Abusīr; and of several kings there were tablets in Sinai, now in the Cairo Museum. A few tablets of the IXth Dynasty have been found at Sakkāra, and a tomb of a prince at Assiūt. Of the XIth Dynasty is the

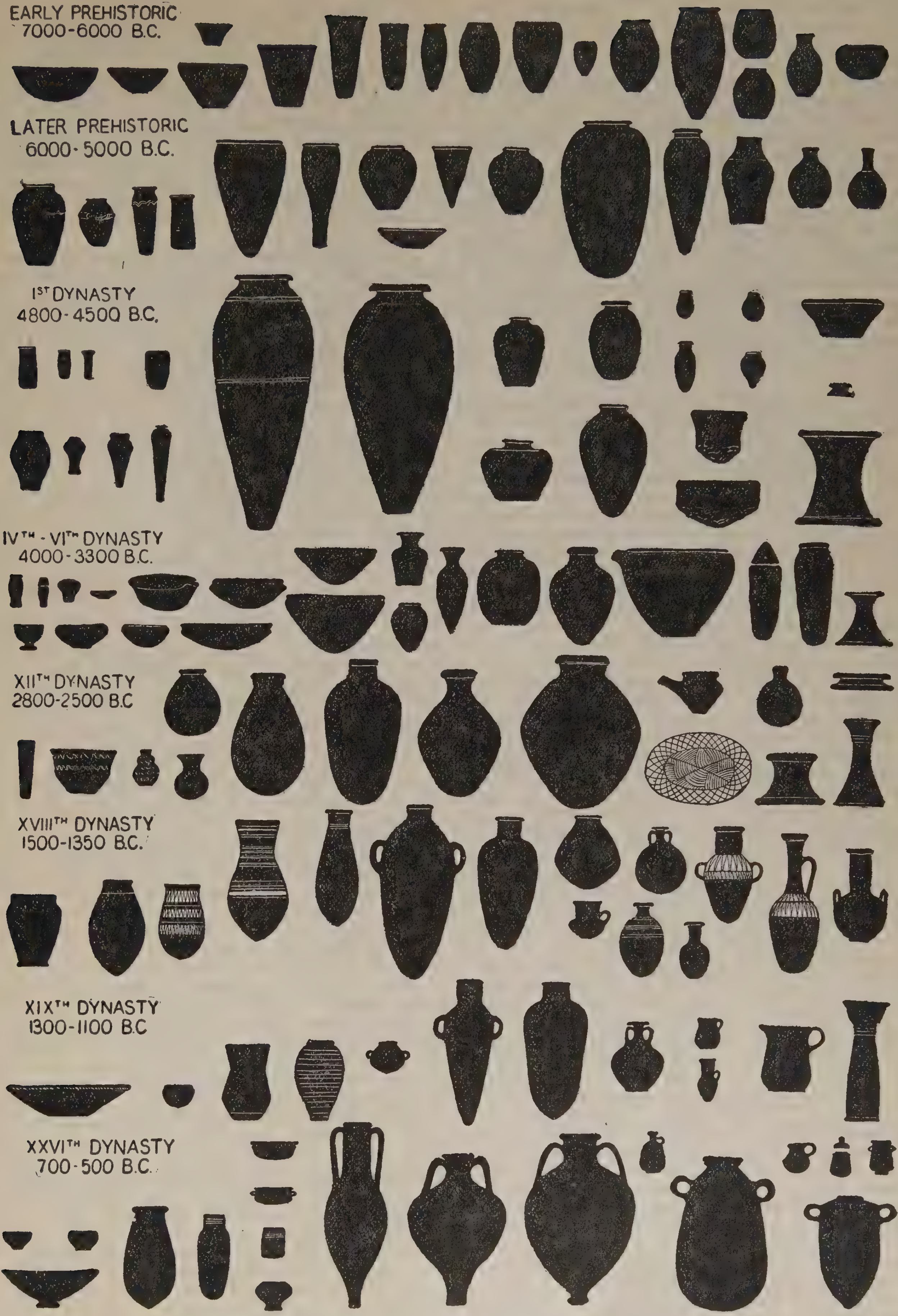

EARLY PREHISTORIC
7000-6000 B.C.
LATER PREHISTORIC
6000-5000 B.C.
1ST DYNASTY
4800-4500 B.C.
IVTH - VITH DYNASTY
4000-3300 B.C.
XIITH DYNASTY
2800-2500 B.C
XVIIITH DYNASTY
1500-1350 B.C.
XIXTH DYNASTY
1300-1100 B.C
XXVITH DYNASTY
700-500 B.C.

FIG. 112.—Principal Types of Pottery of Ancient Egypt. (Scale 1 : 20.)

terrace-temple of Menthotp III. recently excavated at Thebes: also foundations of this king and of Sankhkerē at Abydos. In the XIIth Dynasty there is the celebrated red granite obelisk of Heliopolis, one of a pair erected by Senwosri (Senusert) I. in front of his temple which has now vanished. Another large obelisk of red granite, 41 ft. high, remains in the Fayūm. The most important pictorial tombs of Beni Hasan belong to this age; the great princes appear to have largely quarried stone for their palaces, and to have cut the quarry in the form of a regular chamber, which served for the tomb chapel. These great rock chambers were covered with paintings, which show a large range of the daily life and civilization. The pyramids and temples of Senwosri II. and III. and Amenemhē III. remain at Illahūn, Dahshūr and Hawāra. The latter was the celebrated Labyrinth, which has been entirely quarried away, so that only banks of chips and a few blocks remain. At the first of these sites is the most perfect early town, of which hundreds of houses still remain. Of Senwosri III. there are the forts and temples above the second cataract at Semna and Kumma. Of the Hyksos age there are the scanty remains of a great fortified camp at Tell el-Yehudia.

In the XVIIIth to XXth Dynasties we reach the great period of monuments. Of Amāsis (Aahmes) and Amenophis I. there are but fragments left in later buildings; and of the latter a great quantity of sculpture has been recovered at Karnak. The great temple of Karnak had existed since the XIth Dynasty or earlier, but the existing structure was begun under Tethmosis (Tahutmes) I., and two of the great pylons and one obelisk of his remain in place. He also built the simple and dignified temple of Medinet Habu at Thebes, which was afterward overshadowed by the grandiose work of Rameses III. The next generation—Tethmōsis II. and Hatshepsut—added to their father's work; they also built another pylon and some of the existing chambers at Karnak, set up the great obelisks there and carved some colossi. The obelisks are exquisitely cut in red granite, each sign being sawn in shape by copper tools fed with emery, and the whole finished with a perfection of proportion and delicacy not seen on other granite work. One obelisk being overthrown and broken we can examine the minute treatment of the upper part, which was nearly a hundred feet from the ground. The principal monument of this period is the temple of Deir el Bahri, the funeral temple of Hatshepsut, on which she recorded the principal event of her reign, the expedition to Punt. The erasures of her name by Tethmosis III., and reinsertions of names under later kings, the military scenes, and the religious groups showing the sacred kine of Hathor, all add to the interest of the remarkable temple. It stands on three successive terraces, rising to the base of the high limestone cliffs behind it. The rock-cut shrine at Speos Artemidos, and the temple of Serabīt in Sinai are the only other large monuments of this queen yet remaining. Tethmosis III. was one of the great builders of Egypt, and much remains of his work, at about forty different sites. The great temple of Karnak was largely built by him; most of the remaining chambers are his, including the beautiful botanical walls showing foreign plants. Of his work at Heliopolis there remain the obelisks of London and New York; and from Elephantine is the obelisk at Sion House. On the Nubian sites his work may still be seen at Amāda, Ellesīa, Ibrīm, Semna and in Sinai at Serabīt el Khādem. Of Amenophis II. and Tethmosis IV. there are no large monuments, they being mainly known by additions at Karnak. The well known stele of the sphinx was cut by the latter king, to commemorate his dream there and his clearing of the sphinx from sand. Amenophis III. has left several large buildings of his magnificent reign. At Karnak the temple had a new front added as a great pylon, which was later used as the back of the hall of columns by Seti I. But three new temples at Karnak, that of Month (Mentu), of Mut and a smaller one, all are due to this reign, as well as the long avenue of sphinxes before the temple of Khons; these indicate that the present Ramesside temple of Khons has superseded an earlier one of this king. The great temple of Luxor was built to record the divine origin of the king as son of Ammon; and on the western side of Thebes the funerary temple of Amenophis was an immense pile, of which the two colossi of the Theban plain still stand before the front of the site, where yet lies a vast tablet of sandstone 30 ft. high. The other principal buildings are the temples of Sedenga and of Sōlib in Nubia. Akhenaton has been so consistently eclipsed by the later kings who destroyed his work, that the painted pavement and the rock tablets of Tell el Amarna are the only monuments of his still in position, beside a few small inscriptions. Harmahib (Horemheb) resumed the work at Karnak, erecting two great pylons and a long avenue of sphinxes. The rock temple at Silsila and a shrine at Jebel Adda are also his.

In the XIXth Dynasty the great age of building continued, and the remains are less destroyed than the earlier temples, because there were subsequently fewer unscrupulous rulers to quarry them away. Seti I. greatly extended the national temple of Karnak by his immense hall of columns added in front of the pylon of Amenophis III. His funerary temple at Kurna is also in a fairly complete condition. The temple of Abydos is celebrated owing to its completeness, and the perfect condition of its sculptures, which render it one of the most interesting buildings as an artistic monument; and the variety of religious subjects adds to its importance. The very long reign and vanity of Rameses II. have combined to leave his name at over sixty sites, more widely spread than that of any other king. Yet very few great monuments were originated by him; even the Ramesseum, his funerary temple, was begun by his father. Additions, appropriations of earlier works and scattered inscriptions are what mark this reign. The principal remaining buildings are part of a court at Memphis, the second temple at Abydos, and the six Nubian temples of Bēt el-Wāli, Jerf Husein, Wadi es-Sebūa, Derr, and the grandest of all—the rock-cut temple of Abu Simbel, with its neighbouring temple of Hathor. Mineptah has left few original works; the Osireum at Abydos is the only one of which much remains, his funerary temple having been destroyed as completely as he destroyed that of Amenophis III. The celebrated Israel stele from this temple in his principal inscription. The rock shrines at Silsila are of small importance. There is no noticeable monument of the dozen troubled years of the end of the dynasty.

The XXth Dynasty opened with the great builder Rameses III. Probably he did not really exceed other kings in his activity; but as being the last of the building kings at the western side of Thebes, his temple has never been devastated for stone by the claims of later work. The whole building of Medinet Habu is about 500 ft. long and 160 wide, entirely the work of one reign. The sculptures of it are mainly occupied with the campaigns of the king against the Libyans, the Syrians and the negroes, and are of the greatest importance for the history of Egypt and of the Mediterranean lands. Another large work was the clearance and rebuilding of much of the city of Tell el Yehudia, the palace hall of which contained the celebrated coloured tiles with figures of captives. At Karnak three temples, to Ammon, Khonsu and Mut, all belong to this reign. The blighted reigns of the later Ramessides and the priest-kings did not leave a single great monument, and they are only known by usurpations of the work of others. The Tanite kings of the XXIst Dynasty rebuilt the temple of their capital, but did little else. The XXIInd Dynasty returned to monumental work. Sheshonk I. added a large wall at Karnak, covered with the record of his Judaean war. Osorkon (Uasarkon) I. built largely at Bubastis, and Osorkon II. added the great granite pylon there, covered with scenes of his festival; but at Thebes these kings only inscribed previous monuments. The Ethiopian (XXVth) dynasty built mainly in their capital under Mount Barkal, and Shabako and Tirhaka (Tahrak) also left chapels and a pylon at Thebes; and the latter added a great colonnade leading up to the temple of Karnak, of which one column is still standing.

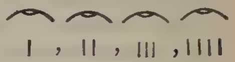
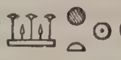
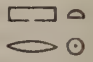
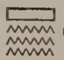
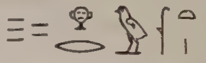
Of the Saite kings there are very few large monuments. Their work was mainly of limestone and built in the Delta, and hence it has been entirely swept away. The square fort of brickwork at Daphnae (*q.v.*) was built by Psammetichus I. Of Apries (Haa-ab-ra, Hophra) an obelisk and two monolith shrines are the principal remains. Of Amasis (Aahmes) II. five great shrines are known; but the other kings of this age have only left minor works. The Persians kept up Egyptian monuments. Darius I. quarried largely, and left a series of great granite decrees along his Suez canal; he also built the great temple in the oasis of Kharga.

The XXXth Dynasty renewed the period of great temples. Nekhtharheb built the temple of Behbēt, now a ruinous heap of immense blocks of granite. Beside other temples, now destroyed, he set up the great west pylon of Karnak, and the pylon at Kharga. Nekhtnebf built the Hathor temple and great pylon at Philae, and the east pylon of Karnak, beside temples elsewhere, now vanished. Religious building was continued under the Ptolemies and Romans; and though the royal impulse may not have been strong, yet the wealth of the land under good government supplied means for many places to rebuild their old shrines magnificently. In the Fayum the capital was dedicated to Queen Arsinoe, and doubtless Ptolemy rebuilt the temple, now destroyed. At Sharona are remains of a temple of Ptolemy I. Dendera is one of the most complete temples, giving a noble idea of the appearance of such work anciently. The body of the temple is of Ptolemy XIII., and was carved as late as the XVIth (Caesarion), and the great portico was in building from Augustus to Nero. At Coptos was a screen of the temple of Ptolemy I. (now at Oxford), and a chapel still remains of Ptolemy XIII. Karnak was largely decorated; a granite cella was built under Philip Arrhidaeus, covered with elaborate carving; a great pylon was added to the temple of Khonsu by Ptolemy III.; the inner pylon of the Ammon-temple was carved by Ptolemy VI. and IX.; and granite doorways were added to the temples of Month and Mūt by Ptolemy II. At Luxor the entire cella was rebuilt by Alexander. At Medīnet Habū the temple of Tethmosis III. had a doorway built by Ptolemy X., and a forecourt by Antoninus. The smaller temple was built under Ptolemy X. and the emperors. South of Medīnet Habū a small temple was built by Hadrian and Antoninus. At Esna the great temple was rebuilt and inscribed during a couple of centuries from Titus to Decius. At El Kab the temple dates from Ptolemy IX. and X. The great temple of Edfū, which has its enclosure walls and pylon complete, and is the most perfect example remaining, was gradually built during a century and a half from Ptolemy III. to XI. The monuments of Philae begin with the wall of Nekhtnebf. Ptolemy II. began the great temple, and the temple of Arhesnofer (Arsenuphis) is due to Ptolemy IV., that of Asclepius to Ptolemy V., that of Hathor to Ptolemy VI., and the great colonnades belong to Ptolemy XIII. and Augustus. The beautiful little riverside temple, called the "kiosk," was built by Augustus and inscribed by Trajan; and the latest building was the arch of Diocletian.

Farther south, in Nubia, the temples of Dabōd and Dakka were built by the Ethiopian Ergamenes, contemporary of Ptolemy IV.; and the temple of Dendūr is of Augustus. The latest building of the temple style is the White Monastery near Suhag. The external form is that of a great temple, with windows added along the top; while internally it was a Christian church. The modern dwellings in it have now been cleared out, and the interior admirably preserved and cleaned by a native Syrian architect.

Beside the great monuments, which we have now noticed, the historical material is found on several other classes of remains. These are: (1) The royal tombs, which in the Vth, VIth, XVIIIth, XIXth and XXth Dynasties are fully inscribed; but as the texts are always religious and not historical, they are less important than many other remains. (2) The royal coffins and wrappings, which give information by the added graffiti recording their removals; (3) Royal tablets, which are of the highest value for history, as they often describe or imply historical events; (4) Private tombs and tablets, which are in many cases biographical. (5) Papyri concerning daily affairs which throw light on history; or which give historic detail, as the great papyrus of Rameses III., and the trials under Rameses X. (6) The added inscriptions on buildings by later restorers, and alterations of names for misappropriation. (7) The statues which give the royal portraits, and sometimes historical facts. (8) The *ostraca*, or rough notes of work accounts, and plans drawn on pieces of limestone or pottery. (9) The scarabs bearing kings' names, which under the Hyksos and in some other dark periods, are our main source of information. (10) The miscellaneous small remains of toilet objects, ornaments, weapons, &c., many of which bear royal names.

Every object and monument with a royal name will be found catalogued under each reign in Petrie's *History of Egypt*, 3 vols., the last editions of each being the fullest. (W. M. F. P.)

F. *Chronology.*—1. *Technical.*—The standard year of the Ancient Egyptians consisted of twelve months of thirty days[1] each, with five epagomenal days, in all 365 days. It was thus an effective compromise between the solar year and the lunar month, and contrasts very favourably with the intricate and clumsy years of other ancient systems. The leap-year of the Julian and Gregorian calendars confers the immense benefit of a fixed correspondence to the seasons which the Egyptian year did not possess, but the uniform length of the Egyptian months is enviable even now. The months were grouped under three seasons of four months each, and were known respectively as the first, second, third and fourth month  of  (ỉ'ẖ·t) "inundation" or "verdure,"  *pr·t* (*pro*) "seed-time," "winter," and  *šmw* (*shôm*) "harvest," "summer," the  "five (days) over the year" being outside these seasons and the year itself, according to the Egyptian expression, and counted either at the beginning or at the end of the year. Ultimately the Egyptians gave names to the months taken from festivals celebrated in them, in order as follows:—Thoth, Paophi, Athyr, Choiak, Tōbi, Mechīr, Phamenōth, Pharmūthi, Pachons, Payni, Epiphi, Mesore, the epagomenal days being then called "the short year." In Egypt the agricultural seasons depend more immediately on the Nile than on the solar movements; the first day of the first month of inundation, *i.e.* nominally the beginning of the rise of the Nile, was the beginning of the year, and as the Nile commences to rise very regularly at about the date of the annual heliacal rising of the conspicuous dog-star Sothis (Sirius) (which itself follows extremely closely the slow retrogression of the Julian year), the primitive astronomers found in the heliacal rising of Sothis as observed at Memphis (on July 19 Julian) a very correct and useful starting-point for the seasonal year. But the year of 365 days lost one day in four years of the Sothic or Julian year, so that in 121 Egyptian years New Year's day fell a whole month too early according to the seasons, and in 1461 years a whole year was lost. This "Sothic period" or era of 1460 years, during which the Egyptian New Year's day travelled all round the Sothic year, is recorded by Greek and Roman writers at least as early as the 1st century B.C. The epagomenal days appear on a monument of the Vth Dynasty and in the very ancient Pyramid texts. They were considered unlucky, and perhaps this accounts for the curious fact that, although they are named in journals and in festival lists, &c., where precise dating was needed, no known monument or legal document is dated in them. It is, however, quite possible that by the side of the year of 365 days a shorter year of 360 was employed for some purposes. Lunar months were observed in the regulation of temples, and lunar years, &c., have been suspected. To find uniformity in any department in Egyptian practice would be exceptional. By the decree of Canopus, Ptolemy III. Euergetes introduced through the assembly of priests an extra day every fourth year, but this reform had no acceptation until it was reimposed by Augustus with the Julian calendar. Whether any earlier attempt was made to adjust the civil to the solar or Sothic year in order to restore the festivals to their proper places in the seasons temporarily or otherwise, is a question of great importance for chronology, but at present it remains unanswered. Probably neither the Sothic nor any other era was employed by the ancient Egyptians, who dated solely by regnal years (see below). An inscription of Rameses II. at Tanis is dated in the 400th year of the reign of the god Sēth of Ombos, probably with reference to some religious ordinance during the rule of the Seth-worshipping Hyksos; Rameses II. may well have celebrated its quatercentenary, but it is wrong to argue from this piece of evidence alone that an era of Sēth was ever observed.

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[1] Ten-day periods as subdivisions of the month can be traced as far back as the Middle Kingdom. The day consisted of twenty-four hours, twelve of day (counted from sunrise to sunset) and twelve of night; it began at sunrise.

From the Middle Kingdom onward to the Roman period, the dates upon Egyptian documents are given in regnal years. On the oldest monuments the years in a reign were not numbered consecutively but were named after events; thus in the Ist Dynasty we find "the year of smiting the Antiu-people," in the beginning of the IIIrd Dynasty "the year of fighting and smiting the people of Lower Egypt." But under the IInd Dynasty there was a census of property for taxation every two years, and the custom, continuing (with some irregularities) for a long time, offered a uniform mode of marking years, whether current or past. Thus such dates are met with as "the year of the third time of numbering" of a particular king, the next being designated as "the year after the third time of numbering." Under the Vth Dynasty this method was so much the rule that the words "of numbering" were commonly omitted. It would seem that in the course of the next dynasty the census became annual instead of biennial, so that the "times" agreed with the actual years of reign; thenceforward their consecutive designation as "first time," "second time," for "first year," "second year," was as simple as it well could be, and lasted unchanged to the fall of paganism. The question arises from what point these regnal dates were calculated. Successive regnal years might begin (1) on the anniversary of the king's accession, or (2) on the calendrical beginning in each year (normally on the first day of the nominal First month of inundation, *i.e.* 1st Thoth in the later calendar). In the latter case there would be a further consideration: was the portion of a calendar year following the accession of the new king counted to the last year of the outgoing king, or to the first year of the new king? In Dynasties I., IV.-V., XVIII. there are instances of the first mode (1), in Dynasties II., VI. (?), XII., XXVI. and onwards they follow the second (2). It may be that the practice was not uniform in all documents even of the same age. In Ptolemaic times not only were Macedonian dates sometimes given in Greek documents, but there were certainly two native modes of dating current; down to the reign of Euergetes there was a "fiscal" dating in papyri, according to which the year began in Paophi, besides a civil dating probably from Thoth; later, all the dates in papyri start from Thoth.

The Macedonian year is found in early Ptolemaic documents. The fixed year of the Canopic decree under Euergetes (with 1st Thoth on Oct. 22) was never adopted. Augustus established an "Alexandrian" era with the fixed Julian year, retaining the Egyptian months, with a sixth epagomenal day every fourth year. The capture of Alexandria having taken place on the 1st of August 30 B.C., the era began nominally in 30 B.C., but it was not actually introduced till some years later, from which time the 1st Thoth corresponded with the 29th of August in the Julian year. The vague "Egyptian" year, however, continued in use in native documents for some centuries along with the Alexandrian "Ionian" year. The era of Diocletian dates from the 29th of August 284, the year of his reforms; later, however, the Christians called it the era of the Martyrs (though the persecution was not until 302), and it survived the Arab conquest. The dating by indictions, *i.e.* Roman tax-censuses, taking place every fifteenth year, probably originated in Egypt, in A.D. 312, the year of the defeat of Maxentius. The indictions began in Payni of the fixed year, when the harvest had been secured.

See F. K. Ginzel, *Handbuch der mathematischen und technischen Chronologie*, Bd. i. (Leipzig, 1906), and the bibliography in the following section.

2. *Historical.*[1]—As to absolute chronology, the assigning of a regnal year to a definite date B.C. is clear enough (except in occasional detail) from the conquest by Alexander onwards. Before that time, in spite of successive efforts to establish a chronology, the problem is very obscure. The materials for reconstructing the absolute chronology are of several kinds: (1) Regnal dates as given on contemporary monuments may indicate the *lengths of individual reigns*, but not with accuracy, as they seldom reach to the end of a reign and do not allow for co-regencies. Records of the time that has elapsed between two regnal dates in the reigns of different kings are very helpful; thus stelae from the Serapeum recording the ages of the Apis bulls with the dates of their birth and death have fixed the chronology of the XXVIth Dynasty. Traditional evidence for the lengths of reigns exists in the Turin Papyrus of kings and in Manetho's history; unfortunately the papyrus is very fragmentary and preserves few reign-lengths entire, and Manetho's evidence seems very untrustworthy, being known only from late excerpts. (2) The duration of a period may be calculated by *generations* or the probable average lengths of reigns, but such calculations are of little value, and the succession of generations even when the evidence seems to be full is particularly difficult to ascertain in Egyptian, owing to adoptions and the repetition of the same name even in one family of brothers and sisters. (3) *Synchronisms* in the histories of other countries furnish reliable dates—Greek, Persian, Babylonian and Biblical dates for the XXVIth Dynasty, Assyrian for the XXVth; less precise are the Biblical date of Rehoboam, contemporary with the invasion of Shishak (Sheshonk) in the XXIInd Dynasty, and the date of the Babylonian and Assyrian kings contemporary with Amenhotp IV. in the XVIIIth Dynasty. The last, about 1400 B.C., is the earliest point to which such coincidences reach. (4) *Astronomical data*, especially the heliacal risings of Sothis recorded by dates of their celebration in the vague year. These are easily calculated on the assumption first that the observations were correctly made, secondly that the calendrical dates are in the year of 365 days beginning on 1st Thoth, and thirdly that this year subsequently underwent no readjustment or other alteration before the reign of Euergetes. The assumption may be a reasonable one, and if the results agree with probabilities as deduced from the rest of the evidence it is wise to adopt it; if on the other hand the other evidence seems in any serious degree contrary to those results it may be surmised that the assumption is faulty in some particular. The harvest date referred to below helps to show that the first part of the assumption is justified.

The duration of the reigns in several dynasties is fairly well known from the incontrovertible evidence of contemporary monuments. The XXVIth Dynasty, which lasted 139 years, is particularly clear, and synchronisms fix its regnal dates to the years B.C. within an error of one or two years at most. The lengths of several reigns in the XIIth, XVIIIth and XIXth Dynasties are known, and the sum total for the XIIth Dynasty is preserved better than any other in the Turin Papyrus, which was written under the XIXth Dynasty. The succession and number of the kings are also ascertained for other dynasties, together with many regnal dates, but very serious gaps exist in the records of the Egyptian monuments, the worst being between the XIIth and the XVIIIth Dynasties, between the XIth and the VIth, and at Dynasties I.-III. For the chronology before the time of the XXVIth Dynasty Herodotus's history is quite worthless. Manetho alone of all authorities offers a complete chronology from the Ist Dynasty to the XXXth. In the case of the six kings of the XXVIth Dynasty, Africanus, the best of his excerptors, gives correct figures for five reigns, but attributes six instead of sixteen years to Necho; the other excerptors have wrong numbers throughout. For the XIXth Dynasty Manetho's figures are wrong wherever we can check them; the names, too, are seriously faulty. In the XVIIIth Dynasty he has too many names and few are clearly identifiable, while the numbers are incomprehensible. In the XIIth Dynasty the number of the kings is correct and many of the names can be justified, but the reign-lengths are nearly, if not quite, all wrong. The summations of years for the Dynasties XII. and XVIII. are likewise wrong. It seems, therefore, that the known texts of Manetho, serviceable as they have been in the reconstruction of Egyptian history, cannot be employed as a serious guide to the early chronology, since they are faulty wherever we can check them, even in the XXVIth Dynasty whose kings were so celebrated among the Greeks. There remain the astronomical data. Of these, the Sothic date furnished by a calendar in the Ebers Papyrus of the 9th year of Amenophis I. (when interpreted on the assumption stated above), and another at Elephantine of an uncertain year of Tethmosis III., tally well with each other (1550–1546, 1474–1470 B.C.) and with the Babylonian synchronism (not yet accurately determined) under Amenhotp IV. (Akhenaton). Another Sothic date of the 7th year of Senwosri III. on a Berlin papyrus from Kahūn, similarly interpreted (1882–1878 B.C.), gives for the XIIth Dynasty a range from 2000 to 1788 B.C. This (discovered by L. Borchardt in 1899) seems to offer a welcome ray, piercing the obscurity of early Egyptian chronology; guided by it the historian Ed. Meyer, and K. Sethe have framed systems of chronology in close agreement with each other, reaching back to the Ist Dynasty at about 3400 B.C. To Meyer is further due a calculation that the Egyptian calendar was introduced in 4241–4238 B.C.[2] Their results in general have been adopted by the "Berlin school," including Erman, Steindorff (in Baedeker's *Egypt*) and Breasted in America. Nevertheless many Egyptologists are unwilling to accept the new chronology, the chief obstacle being that it allows so short an interval for the six dynasties between the XIIth and the XVIIIth. If the XIIth Dynasty ended about 1790 B.C. and the XVIIIth began about 1570 B.C., taking what seems to be the utmost interval that it permits, 220 years have to contain a crowd of kings of whom nearly 100 are already known by name from monuments and papyri, while fresh names are being added annually to the long list; the shattered fragments of the last columns in the Turin Papyrus show space for 150 or perhaps 180 kings of this period, apparently without reaching the XVIIth Dynasty. An estimate of 160 to 200 kings would therefore not be excessive. The dates that have come down to us are very few; the only ones known from the Hyksos period are of a 12th and a 33rd year. In the Turin Papyrus two reign-lengths of less than a year, seven others of less than five years each, one of ten years and one of thirteen seem attributable to the XIIIth and XIVth Dynasties. Probably most of the reigns were short, as Manetho also decidedly indicates. It is possible that the compiler of the Turin Papyrus, who excluded contemporary reigns in the period between the VIth and the XIIth Dynasties, here admitted such; nor is a correspondingly large number of kings in so short a period without analogies in history. Professor Petrie, however, thinks it best, while accepting the evidence of the Sirius date, to suppose further that a whole Sothic period of 1460 years had passed in the interval, making a total of 1650 years for the six dynasties in place of 220 years. This, however, seems greatly in excess of probability, and several Egyptologists familiar with excavation are willing to accept Meyer's figures on archaeological grounds. To the present writer it seems that Meyer's chronology provides a convenient working theory, but involves such an improbability in regard to the interval between the XIIth and the XVIIIth Dynasties that the interpretation of the Sothic date on which it is founded must be viewed with suspicion until clear facts are found to corroborate it. Corroboration has been sought by Mahler, Sethe and Petrie in the dates of new moons, of warlike and other expeditions, and of high Nile, but their evidence so far is too vague and uncertain to affect the question seriously. It is remarkable that no records of eclipses are known from Egyptian documents. The interesting date of the harvest at El Bersha, quoted by Meyer in Breasted, *Records*, i. p. 48, confirms the Sothic date for the XIIth Dynasty in some measure, but it belongs to the same age, and therefore its evidence would be equally vitiated with the other by any subsequent alteration in the Egyptian calendar. Before the discovery of the Kahun Sothic date, Professor Petrie put the end of the XIIth Dynasty at 2565 B.C.; in 1884 even Meyer had suggested 1930 B.C. as its *minimum* date, thus allowing 400 years at the least for the period from the XIIIth Dynasty to the XVIIth.

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[1] For the "sequence" dating (S.D.) used by archaeologists for the prehistoric period see above (§ *Art and Archaeology, ad init.* note).

Dynasty.	Meyer 1887 (minimum date).	Petrie 1894, &c.	Meyer 1904–1908.	Sethe 1905.	Breasted 1906.	Petrie 1906.
I.	3180	4777	3315	3360	3400	5510
II.		4514		3110		5247
III.		4212	2895	2810	2980	4945
IV.	2830	3998	2840	2720	2900	4731
V.		3721	2680	2630	2750	4454
VI.	2530	3503	2540	2480	2625	4206
VII.		3322		2300	2475	4003
VIII.		3252				3933
IX.		3106	2360		2445	3787
X.		3006				3687
XI.		2821	2160	2100	2160	3502
XII.	2130	2778	2000	2000	2000	3459
XIII.	1930	2565	1791		1788	3246
XIV.		2112				2793
XV.	1780		1680[1]			2533
XVI.		1928				2249
XVII.		1738				1731
XVIII.	1530	1587	1580		1580	1580
XIX.	1320	1327	1321		1350	1322

Dynasty.	Wiedemann 1884.	Meyer 1884.	Petrie 1905-1906.	Breasted 1906.	Maspero 1904.
XIX.	1490	1320	(1328), 1322	1350	
XX.	1280	1180	1202	1200	
XXI.	1100	1060	1102	1090	
XXII.	975	930	952	945	
XXIII.	810		755	745	
XXIV.	720		721	718	
XXV.	715	728	715	712	
XXVI.	664	663	664	663	
XXVII.	525	525	525	525	425
XXVIII.	415		405		*c.* 405
XXIX.	408		399		399
XXX.	387		378		380
Ochus	350		342		342

Beyond the XIIth Dynasty estimates must again be vague. The spacing of the years on the Palermo stone has given rise to some calculations for the early dynasties. Others are grounded on the dates of certain operations which are likely to have taken place at particular seasons of the year so that they can be roughly calculated on the Sothic basis, others on Manetho's figures, average lengths of reigns, evidence of the Turin Papyrus, &c.

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[1] Meyer makes XIII. overlap XV. (Hyksos), and XIV. (Xoite), contemporary with XVI. (Hyksos) and XVII. (Theban).

[2] Reisner (*Early Dynastic Cemeteries*, p. 126), from his work in the prehistoric cemeteries, believes that Egypt was too uncivilized at that early date to have performed this scientific feat.

Table I. page 79 shows the chronology of the first nineteen dynasties, according to recent authorities, before and after the discovery of the Kahun Sothic date.

The dates of the earlier dynasties in this table are always intended to be only approximate; for instance, Meyer in 1904 allowed an error of 100 years either of excess or deficiency in the dates he assigned to the dynasties from the Xth upwards.

The other dynasties are dated as in Table II. by different authorities.

See Ed. Meyer, *Geschichte des Altertums*, Bd. i. (Stuttgart, 1884), *Geschichte des alten Ägyptens* (1887), *Ägyptische Chronologie* (*Abhandl.* of Prussian Academy) (Berlin, 1904, with the supplement *Nachträge zur ägypt. Chronologie, ib.* 1907); K. Sethe, "Beiträge zur ältesten Geschichte Ägyptens" (in his *Untersuchungen*, Bd. iii.) (Leipzig, 1905); J. H. Breasted, *Ancient Records of Egypt*, "Historical Documents," vol. i. (Chicago, 1906); W. M. F. Petrie, *A History of Egypt*, vol. i. (London, 1884), vol. iii. (1905), *Researches in Sinai* (London, 1906); G. Maspero, *Histoire ancienne des peuples de l'orient* (Paris, 1904); A. Wiedemann, *Ägyptische Geschichte* (Gotha, 1884); articles by Mahler and others in the *Zeitschrift für ägyptische Sprache* and *Orientalistische Literaturzeitung* (recent years). (F. Ll. G.)

III. HISTORY

1. *From the Earliest Times to the Moslem Conquest.*

In the absence of a strict chronology, the epochs of Pharaonic history are conveniently reckoned in dynasties according to Manetho's scheme, and these dynasties are grouped into longer periods:—the Old Kingdom (Dynasties I. to VIII.), including the Earliest Dynasties (I. to III.) and the Pyramid Period (Dynasties IV. to VI.); the Middle Kingdom (Dynasties IX. to XVII.), including the Heracleopolite Dynasties (IX. to X.) and the Hyksos Period (Dynasties XV. to XVII.); the New Empire (Dynasties XVIII. to XX.); the Deltaic Dynasties (Dynasties XXI. to XXXI.), including the Saite and Persian Periods (Dynasties XXVI. to XXXI.). The conquest by Alexander ushers in the Hellenistic age, comprising the periods of Ptolemaic and Roman rule.

The Prehistoric Age.—One of the most striking features of recent Egyptology is the way in which the earliest ages of the civilization, before the conventional Egyptian style was formed, have been illustrated by the results of excavation. Until 1895 there seemed little hope of reaching the records of those remote times, although it was plain that the civilization had developed in the Nile valley for many centuries before the IVth Dynasty, beyond which the earliest known monuments scarcely reached. Since that year, however, there has been a steady flow of discoveries in prehistoric and early historic cemeteries, and, partly in consequence of this, monuments already known, such as the annals of the Palermo stone, have been made articulate for the beginnings of history in Egypt.

It is probable that certain rudely chipped flints, so-called eoliths, in the alluvial gravels (formed generally at the mouth of wadis opening on to the Nile) at Thebes and elsewhere, are the work of primitive man; but it has been shown that such are produced also by natural forces in the rush of torrents. On the surface of the desert, at the borders of the valley, palaeolithic implements of well-defined form are not uncommon, and bear the marks of a remote antiquity. In some cases they appear to lie where they were chipped on the sites of flint factories. Geologists and anthropologists are not yet agreed on the question whether the climate and condition of the country have undergone large changes since these implements were deposited. As yet none have been found in such association with animal remains as would help in deciding their age, nor have any implements been discovered in rock-shelters or in caves.

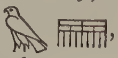
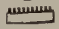
Of neolithic remains, arrowheads and other implements are found in some numbers in the deserts. In the Fayūm region, about the borders of the ancient Lake of Moeris and beyond, they are particularly abundant and interesting in their forms. But their age is uncertain; some may be contemporary with the advanced culture of the XIIth Dynasty in the Nile valley. Definite history on the other hand has been gained from the wonderful series of "prehistoric" cemeteries excavated by J. de Morgan, Petrie, Reisner and others on the desert edgings of the cultivated alluvium. The succession of archaeological types revealed in them has been tabulated by Petrie in his *Diospolis Parva*; and the detailed publication of Reisner's unusually careful researches is bringing much new light on the questions involved, amongst other things showing the exact point at which the "prehistoric" series merges into the Ist Dynasty, for, as might be surmised, in many cases the prehistoric cemeteries continued in use under the earliest dynasties. The finest pottery, often painted but all hand-made without the wheel, belongs to the prehistoric period; so also do the finest flint implements, which, in the delicacy and exactitude of their form and flaking, surpass all that is known from other countries. Metal seems to be entirely absent from the earliest type of graves, but immediately thereafter copper begins to appear (bronze is hardly to be found before the XIIth Dynasty). The paintings on the vases show boats driven by oars and sails rudely figured, and the boats bear emblematic standards or ensigns. The cemeteries are found throughout Upper and Middle Egypt, but as yet have not been met with in the Delta or on its borders. This might be accounted for by the inhabitants of Lower Egypt having practised a different mode of disposing of the dead, or by their cemeteries being differently placed.

Tradition, mythology and later customs make it possible to recover a scrap of the political history of that far-off time. Menes, the founder of the Ist Dynasty, united the two kingdoms of Upper and Lower Egypt. In the prehistoric period, therefore, these two realms were separate. The capital of Upper Egypt was Nekheb, now represented by the ruins of El Kab, with the royal residence across the river at Nekhen (Hieraconpolis); that of Lower Egypt was at Buto (Putō or Dep) in the marshes, with the royal residence in the quarter called Pe. Nekhêbi, goddess of El Kab, represented the Upper or Southern Kingdom, which was also under the tutelage of the god Seth, the goddess Buto and the god Horus similarly presiding over the Lower Kingdom. The royal god in the palace of each was a hawk or Horus. The spirits of the deceased kings were honoured respectively as the jackal-headed spirits of Nekhen and the hawk-headed spirits of Pe. As we hear also of the "spirits of On" it is probable that Heliopolis was at one time capital of a kingdom. In after days the prehistoric kings were known as "Worshippers of Horus" and in Manetho's list they are the νέκυες "Dead," and ἥρωες "Heroes," being looked upon as intermediate between the divine dynasties and those of human kings. It is impossible to estimate the duration of the period represented by the prehistoric cemeteries; that the two kingdoms existed throughout unchanged is hardly probable.

According to the somatologist Elliott Smith, the most important change in the physical character of the people of Upper Egypt, in the entire range of Egyptian archaeology, took place at the beginning of the dynastic period; and he accounts for this by the mingling of the Lower with the Upper Egyptian population, consequent on the uniting of the two countries under one rule. From remains of the age of the IVth Dynasty he is able to define to some extent the type of the population of Lower Egypt as having a better cranial and muscular development than that of Upper Egypt, probably through immigration from Syria. The advent of the dynasties, however, produced a quickening rather than a dislocation in the development of civilization.

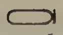
It is doubtful whether we possess any writing of the prehistoric age. A few names of the kings of Lower Egypt are preserved in the first line of the Palermo stone, but no annals are attached to them. Petrie considers that one of the kings buried at Abydos, provisionally called Nar-mer and whose real name may be Mer or Ḅeza, preceded Menes; of him there are several inscribed records, notably a magnificent carved and inscribed slate palette found at Hieraconpolis, with figures of the king and his vizier, war-standards and prisoners. To identify him with Bezau (Boethos) of the IInd Dynasty runs counter to much archaeological evidence. Sethe places him next after Menes and some would identify him with that king. Another inscribed palette may be pre-dynastic; it perhaps mentions a king named "Scorpion."

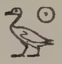
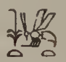
The earliest dynasties.

The Old Kingdom.—The names of a number of kings attributable to the Ist Dynasty are known from their tombs at Abydos. Unfortunately, they are almost exclusively Horus titles , in place of the personal names by which they were recorded in the lists of Abydos and Manetho; some, however, of the latter are found, and prove that the scribes of the New Kingdom were unable to read them correctly. Important changes and improvements took place in the writing even during the Ist Dynasty. The personal name of Menes  is given by one only of many relics of a king whose Horus-name was Aha, "the Fighter." Doubts have been expressed about the identification with Menes, but it is strongly corroborated by the very archaic style of the remains. The name of Aha (Menes) was found in two tombs, one at Nagāda north of Thebes and nearly opposite the road to the Red Sea, the other at Abydos. Manetho makes the Ist Dynasty Thinite, this being the capital of the nome in which Abydos lay. Upper Egypt always had precedence over Lower Egypt, and it seems clear that Menes came from the former and conquered the latter. According to tradition he founded Memphis which lay on the frontier of his conquest; probably he resided there as well as at Abydos; at any rate relics of one of the later kings of the Ist Dynasty have already been recognized in its vast necropolis. Of the eight kings of the Ist Dynasty, three—the fifth, sixth and seventh in the Ramesside list of Abydos—are positively identified by tomb-remains from Abydos, and others are scarcely less certain. Two of the kings have also left tablets at the copper and turquoise mines of Wadi Maghāra in Sinai. The royal tombs are built of brick, but one of them, that of Usaphais, had its floor of granite from Elephantine. They must have been filled with magnificent furniture and provisions of every kind, including annual record-tablets of the reigns, carved in ivory and ebony. From a fragment on the Palermo stone it is clear that material existed as late as the Vth Dynasty for a brief note of the height of the Nile and other particulars in each year of the reign of these kings.

The IInd Dynasty of Manetho appears to have been separated from the Ist even on the Palermo stone; it also was Thinite, and the tombs of several of its nine (?) kings were found at Abydos. The IIIrd Dynasty is given as Memphite by Manetho. Two of the kings built huge mastaba-tombs at Bêt Khallaf near Abydos, but the architect and learned scribe Imhōtp designed for one of these two kings, named Zoser, a second and mightier monument at Memphis, the great step-pyramid of Sakkara. In Ptolemaic times Imhōtp was deified, and the traditional importance of Zoser is shown by a forged grant of the Dodecaschoenus to the cataract god Khnûm, purporting to be from his reign, but in reality dating from the Ptolemaic age. With Snefru, at the end of this dynasty, we reach the beginning of Egyptian history as it was known before the recent discoveries. Monuments and written records are henceforth more numerous and important, and the Palermo annals show a fuller scale of record. The events in the three years that are preserved include a successful raid upon the negroes, and the construction of ships and gates of cedar-wood which must have been brought from the forests of the Lebanon. Snefru also set up a tablet at Wadi Maghāra in Sinai. He built two pyramids, one of them at Mēdūm in steps, the other, probably in the perfected form, at Dahshūr, both lying between Memphis and the Fayūm.

The pyramid period.

Pyramids did not cease to be built in Egypt till the New Kingdom; but from the end of the IIIrd to the VIth Dynasty is pre-eminently the time when the royal pyramid in stone was the chief monument left by each successive king. Zoser and Snefru have been already noticed. The personal name enclosed in a cartouche  is henceforth the commonest title of the king. We now reach the IVth Dynasty containing the famous names of Cheops (*q.v.*), Chephren (Khafrê) and Mycerinus (Menkeurê), builders respectively of the Great, the Second and the Third Pyramids of Giza. In the best art of this time there was a grandeur which was never again attained. Perhaps the noblest example of Egyptian sculpture in the round is a diorite statue of Chephren, one of several found by Mariette in the so-called Temple of the Sphinx. This "temple" proves to be a monumental gate at the lower end of the great causeway leading to the plateau on which the pyramids were built. A king Dedefrê, between Cheops and Chephren, built a pyramid at Abu-Roāsh. Shepseskaf is one of the last in the dynasty. Tablets of most of these kings have been found at the mines of Wadi Maghāra. In the neighbourhood of the pyramids there are numerous mastabas of the court officials with fine sculpture in the chapels, and a few decorated tombs from the end of this centralized dynasty of absolute monarchs are known in Upper Egypt. A tablet which describes Cheops as the builder of various shrines about the Great Sphinx has been shown to be a priestly forgery, but the Sphinx itself may have been carved out of the rock under the splendid rule of the IVth Dynasty.

The Vth Dynasty is said to be of Elephantine, but this must be a mistake. Its kings worshipped Rē, the sun, rather than Horus, as their ancestor, and the title  "son of the Sun" began to be written by them before the cartouche containing the personal name, while another "solar" cartouche, containing a name compounded with Rē, followed the title  "king of Upper and Lower Egypt." Sahurē and the other kings of the dynasty built magnificent temples with obelisks dedicated to Rē, one of which, that of Neuserrē at Abusīr, has been thoroughly explored. The marvellous tales of the Westcar Papyrus, dating from the Middle Kingdom, narrate how three of the kings were born of a priestess of Rē. The pyramids of several of the kings are known. The early ones are at Abusīr, and the best preserved of the pyramid temples, that of Sahurē, excavated by the German Orient-Gesellschaft, in its architecture and sculptured scenes has revealed an astonishingly complete development of art and architecture as well as of warlike enterprise by sea and land at this remote period; the latest pyramid belonging to the Vth Dynasty, that of Unas at Sakkāra, is inscribed with long ritual and magical texts. Exquisitely sculptured tombs of this time are very numerous at Memphis and are found throughout Upper Egypt. Of work in the traditional temples of the country no trace remains, probably because, being in limestone, it has all perished. The annals of the Palermo stone were engraved and added to during this dynasty; the chief events recorded for the time are gifts and endowments for the temples. Evidently priestly influence was strong at the court. Expeditions to Sinai and Puoni (Punt) are commemorated on tablets.

The VIth Dynasty if not more vigorous was more articulate; inscribed tombs are spread throughout the country. The most active of its kings was the third, named Pepi or Phiops, from whose pyramid at Sakkara the capital, hitherto known as "White Walls," derived its later name of Memphis (MN-NFR, Mempi); a tombstone from Abydos celebrates the activity of a certain Una during the reigns of Pepi and his successor in organizing expeditions to the Sinai peninsula and south Palestine, and in transporting granite from Elephantine and other quarries. Herkhuf, prince of Elephantine and an enterprising leader of caravans to the south countries both in Nubia and the Libyan oases, flourished under Merenrē and Pepi II. called Neferkerē. On one occasion he brought home a dwarf dancer from the Sudan, described as being like one brought from Puoni in the time of the fifth-dynasty king Assa; this drew from the youthful Pepi II. an enthusiastic letter which was engraved in full upon the façade of Herkhuf's tomb. The reign of the last-named king, begun early, lasted over ninety years, a fact so long remembered that even Manetho attributes to him ninety-four years; its length probably caused the ruin of the dynasty. The local princelings and monarchs had been growing in culture, wealth and power, and after Pepi II. an ominous gap in the monuments, pointing to civil war, marks the end of the Old Kingdom. The VIIth and VIIIth Dynasties are said to have been Memphite, but of them no record survives beyond some names of kings in the lists.

Heracleopolite period.

The Middle Kingdom.—The long Memphite rule was broken by the IXth and Xth Dynasties, of Heracleopolis Magna (Hnês) in Middle Egypt. Kheti or Achthoës was apparently a favourite name with the kings, but they are very obscure. They may have spread their rule by conquest over Upper Egypt and then overthrown the Memphite dynasty. The chief monuments of the period are certain inscribed tombs at Assiūt; it appears that one of the kings, whose praenomen was Mikerê, supported by a fleet and army from Upper Egypt, and especially by the prince of Assiūt, was restored to his paternal city of Heracleopolis, from which he had probably been driven out; his pyramid, however, was built in the old royal necropolis at Memphis. Later the princes of Thebes asserted their independence and founded the XIth Dynasty, which pushed its frontiers northwards until finally it occupied the whole country. Its kings were named Menthotp, from Mont, one of the gods of Thebes; others, perhaps sub-kings, were named Enyotf (Antef). They were buried at Thebes, whence the coffins of several were obtained by the early collectors of the 19th century. Nibhôtp Menthotp I. probably established his rule over all Egypt. The funerary temple of Nebhepré Menthotp III., the last but one of these kings, has been excavated by the Egypt Exploration Fund at Deir el Bahri, and must have been a magnificent monument. His successor Sankhkerê Menthotp IV. is known to have sent an expedition by the Red Sea to Puoni.

The XIIth Dynasty is the central point of the Middle Kingdom, to which the decline of the Memphite and the rise of the Heracleopolite dynasty mark the transition, while the growth of Thebes under the XIth Dynasty is its true starting-point. Monuments of the XIIth Dynasty are abundant and often of splendid design and workmanship, whereas previously there had been little produced since the VIth Dynasty that was not half barbarous. Although not much of the history of the XIIth Dynasty is ascertained, the Turin Papyrus and many dated inscriptions fix the succession and length of reign of the eight kings very accurately. The troubled times that the kingdom had passed through taught the long-lived monarchs the precaution of associating a competent successor on the throne. The nomarchs and the other feudal chiefs were inclined to strengthen themselves at the expense of their neighbours; a firm hand was required to hold them in check and distribute the honours as they were earned by faithful service. The tombs of the most favoured and wealthy princes are magnificent, particularly those of certain families in Middle Egypt at Beni Hasan, El Bersha, Assiūt and Deir Rīfa, and it is probable that each had a court and organization within his nome like that of the royal palace in miniature. Eventually, in the reigns of Senwosri III. and Amenemhê III., the succession of strong kings appears to have centralized all authority very completely. The names in the dynasty are Amenemhê (Ammenemes) and Senwosri (formerly read Usertesen or Senusert). The latter seems to be the origin of the Sesostris (*q.v.*) and Sesoosis of the legends. Amenemhê I., the first king, whose connexion with the previous dynasty is not known, reigned for thirty years, ten of them being in partnership with his son Senwosri I. He had to fight for his throne and then reorganize the country, removing his capital or residence from Thebes to a central situation near Lisht about 25 m. south of Memphis. His monuments are widespread in Egypt, the quarries and mines in the desert as far as Sinai bear witness to his great activity, and we know of an expedition which he made against the Nubians. The "Instructions of Amenemhê to his son Senwosri," whether really his own or a later composition, refer to these things, to his care for his subjects, and to the ingratitude with which he was rewarded, an attempt on his life having been made by the trusted servants in his own palace. The story of Sinûhi is the true or realistic history of a soldier who, having overheard the secret intelligence of Amenemhê's death, fled in fear to Palestine or Syria and there became rich in the favour of the prince of the land; growing old, however, he successfully sued for pardon from Senwosri and permission to return and die in Egypt.

Senwosri I. was already the executive partner in the time of the co-regency, warring with the Libyans and probably in the Sudan. After Amenemhê's death he fully upheld the greatness of the dynasty in his long reign of forty-five years. The obelisk of Heliopolis is amongst his best-known monuments, and the damming of the Lake of Moeris (*q.v.*) must have been in progress in his reign. He built a temple far up the Nile at Wadi Halfa and there set up a stela commemorating his victories over the tribes of Nubia. The fine tombs of Ameni at Beni Hasan and of Hepzefa at Assiūt belong to his reign. The pyramids of both father and son are at Lisht.

Amenemhê II. was buried at Dahshūr; he was followed by Senwosri II., whose pyramid is at Illahūn at the mouth of the Fayūm. In his reign were executed the fine paintings in the tomb of Khnemhotp at Beni Hasan, which include a remarkable scene of Semitic Bedouins bringing eye-paint to Egypt from the eastern deserts. In Manetho he is identified with Sesostris (see above), but Senwosri I., and still more Senwosri III., have a better claim to this distinction. The latter warred in Palestine and in Nubia, and marked the south frontier of his kingdom by a statue and stelae at Semna beyond the Second Cataract. Near his pyramid was discovered the splendid jewelry of some princesses of his family (see Jewelry *ad init.*). The tomb of Thethotp at El Bersha, celebrated for the scene of the transport of a colossus amongst its paintings, was finished in this reign.

Amenemhê III. completed the work of Lake Moeris and began a series of observations of the height of the inundation at Semna which was continued by his successors. In his long reign of forty-six years he built a pyramid at Dahshūr, and at Hawāra near the Lake of Moeris another pyramid together with the Labyrinth which seems to have been an enormous funerary temple attached to the pyramid. His name was remembered in the Fayūm during the Graeco-Roman period and his effigy worshipped there as Pera-marres, *i.e.* Pharaoh Marres (Marres being his praenomen graecized). Amenemhê IV.'s reign was short, and the dynasty ended with a queen Sebeknefru (Scemiophris), whose name is found in the scanty remains of the Labyrinth. The XIIth Dynasty numbered eight rulers and lasted for 213 years. Great as it was, it created no empire outside the Nile valley, and its most imposing monument, which according to the testimony of the ancients rivalled the pyramids, is now represented by a vast stratum of chips.

The history of the following period down to the rise of the New Empire is very obscure. Manetho gives us the XIIIth (Diospolite) Dynasty, the XIVth (Xoite from Xois in Lower Egypt), the XVth and XVIth (Hyksos) and the XVIIth (Diospolite), but his names are lost except for the Hyksos kings. The Abydos tablet ignores all between the XIIth and XVIIIth Dynasties. The Turin Papyrus preserves many names on its shattered fragments, and the monuments are for ever adding to the list, but it is difficult to assign them accurately to their places. The Hyksos names can in some cases be recognized by their foreign aspect, the peculiar style of the scarabs on which they are engraved or by resemblances to those recorded in Manetho. The kings of the XVIIth Dynasty too are generally recognizable by the form of their name and other circumstances. Manetho indicates marvellous crowding for the XIIIth and XIVth Dynasties, but it seems better to suggest a total duration of 300 or 400 years for the whole period than to adopt Meyer's estimate of about 210 years (see above, *Chronology*).

Amongst the kings of the XIIIth Dynasty (including perhaps the XIVth), not a few are represented by granite statues of colossal size and fine workmanship, especially at Thebes and Tanis, some by architectural fragments, some by graffiti on the rocks about the First Cataract. Some few certainly reigned over all Egypt. Sebkhotp (Sekhotp, Σοχωτης) is a favourite name, no doubt to be connected with the god of the Fayūm. Several of the Theban kings named Antef (Enyotf) must be placed here rather than in the XIth Dynasty. A decree of one of them degrading a monarch who had sided with his enemies was found at Coptos engraved on a doorway of Senwosri I.

The Hyksos period.

In its divided state Egypt would fall an easy prey to the foreigner. Manetho says that the Hyksos (*q.v.*) gained Egypt without a blow. Their domination must have lasted a considerable time, the Rhind mathematical papyrus having been copied in the thirty-third year of a king Apophis. The monuments and scarabs of the Hyksos kings are found throughout Upper and Lower Egypt; those of Khian somehow spread as far as Crete and Bagdad. The Hyksos, in whom Josephus recognized the children of Israel, worshipped their own Syrian deity, identifying him with the Egyptian god Seth, and endeavoured to establish his cult throughout Egypt to the detriment of the native gods. It is to be hoped that definite light may one day be forthcoming on the whole of this critical episode which had such a profound effect on the character and history of the Egyptian people. The spirited overthrow of the Hyksos ushered in the glories in arms and arts which marked the New Empire. The XVIIth Dynasty probably began the struggle, at first as semi-independent kinglets at Thebes. Seqenenrê is here a leading name; the mummy of the third Seqenenrê, the earliest in the great find of royal mummies at Deir el Bahri, shows the head frightfully hacked and split, perhaps in a battle with the Hyksos.

XVIIIth Dynasty.

The New Empire.—The epithet "new" is generally attached to this period, and "empire" instead of "kingdom" marks its wider power. The glorious XVIIIth Dynasty seems to have been closely related to the XVIIth. Its first task was to crush the Hyksos power in the north-east of the Delta; this was fully accomplished by its founder Ahmosi (dialectically Ahmasi, Amōsis or Amāsis I.) capturing their great stronghold of Avāris. Amasis next attacked them in S.W. Palestine, where he captured Sharuhen after a siege of three years. He fought also in Syria and in Nubia, besides overcoming factious opposition in his own land. The principal source for the history of this time is the biographical inscription at El Kab of a namesake of the king, Ahmosi son of Abana, a sailor and warrior whose exploits extend to the reign of Tethmōsis I. Amenōphis I. (Amenhotp), succeeding Amasis, fought in Libya and Ethiopia. Tethmosis I. (*c.* 1540 B.C.) was perhaps of another family, but obtained his title to the throne through his wife Ahmosi. After some thirty years of settled rule uninterrupted by revolt, Egypt was now strong and rich enough to indulge to the full its new taste for war and lust of conquest. It had become essentially a military state. The whole of the administration was in the hands of the king with his vizier and other court officials; no trace of the feudalism of the Middle Kingdom survived. Tethmosis thoroughly subdued Cush, which had already been placed under the government of a viceroy. This province of Cush extended from Napata just below the Fourth Cataract on the south to El Kab in the north, so that it included the first three nomes of Upper Egypt, which agriculturally were not greatly superior to Nubia. Turning next to Syria, Tethmosis carried his arms as far as the Euphrates. It is possible that his predecessor had also reached this point, but no record survives to prove it. These successful campaigns were probably not very costly, and prisoners, plunder and tribute poured in from them to enrich Egypt. Tethmosis I. made the first of those great additions to the temple of the Theban Ammon at Karnak by which the Pharaohs of the Empire rendered it by far the greatest of the existing temples in the world. The temple of Deir el Bahri also was designed by him. Towards the end of his reign, his elder sons being dead, Tethmosis associated Hatshepsut, his daughter by Ahmosi, with himself upon the throne. Tethmosis I. was the first of the long line of kings to be buried in the Valley of the Tombs of the Kings of Thebes. At his death another son Tethmosis II. succeeded as the husband of his half-sister, but reigned only two or three years, during which he warred in Nubia and placed Tethmosis III., his son by a concubine Ēsi, upon the throne beside him (*c.* 1500 B.C.). After her husband's death the ambitious Hatshepsut assumed the full regal power; upon her monuments she wears the masculine garb and aspect of a king though the feminine gender is retained for her in the inscriptions. On some monuments of this period her name appears alone, on others in conjunction with that of Tethmosis III., while the latter again may appear without the queen's; but this extraordinary woman must have had a great influence over her stepson and was the acknowledged ruler of Egypt. Tethmosis, to judge by the evidence of his mummy and the chronology of his reign, was already a grown man, yet no sign of the immense powers which he displayed later has come down to us from the joint reign. Hatshepsut cultivated the arts of peace. She restored the worship in those temples of Upper and Lower Egypt which had not yet recovered from the religious oppression and neglect of the Hyksos. She completed and decorated the temple of Deir el Bahri, embellishing its walls with scenes calculated to establish her claims, representing her divine origin and upbringing under the protection of Ammon, and her association on the throne by her human father. The famous sculptures of the great expedition by water to Puoni, the land of incense on the Somali coast, are also here, with many others. At Karnak Hatshepsut laboured chiefly to complete the works projected in the reigns of Tethmosis I. and II., and set up two obelisks in front of the entrance as it then was. One of these, still standing, is the most brilliant ornament of that wonderful temple. A date of the twenty-second year of her reign has been found at Sinai, no doubt counted from the beginning of the co-regency with Tethmosis I. Not much later, in his twenty-second year, Tethmosis III. is reigning alone in full vigour. While she lived, the personality of the queen secured the devotion of her servants and held all ambitions in check. Not long after her death there was a violent reaction. Prejudice against the rule of a woman, particularly one who had made her name and figure so conspicuous, was probably the cause of this outbreak, and perhaps sought justification in the fact that, however complete was her right, she had in some degree usurped a place to which her stepson (who was also her nephew) had been appointed. Her cartouches began to be defaced or her monuments hidden up by other buildings, and the same rage pursued some of her most faithful servants in their tombs. But the beauty of the work seems to have restrained the hand of the destroyer. Then came the religious fanaticism of Akhenaton, mutilating all figures of Ammon and all inscriptions containing his name; this made havoc of the exquisite monuments of Hatshepsut; and the restorers of the XIXth Dynasty, refusing to recognize the legitimacy of the queen, had no scruples in replacing her names by those of the associate kings Tethmosis I., II. or III. These acts of vandalism took place throughout Egypt, but in the distant mines of Sinai the cartouches of Hatshepsut are untouched. In the royal lists of Seti I. and Rameses II. Hatshepsut has no place, nor is her reign referred to on any later monument.[1]

Queen Hatshepsut.

Wars of Tethmosis III.

The immense energy of Tethmosis III. now found its outlet in war. Syria had revolted, perhaps on Hatshepsut's death, but by his twenty-second year the monarch was ready to lead his army against the rebels. The revolt, headed by the city of Kadesh on the Orontes, embraced the whole of western Syria. The movements of Tethmosis in this first campaign, including a battle with the Syrian chariots and infantry at Megiddo and the capture of that city, were chronicled from day to day, and an extract from this chronicle is engraved on the walls of the sanctuary of Karnak, together with a brief record of the subsequent expeditions. In a series of five carefully planned campaigns he consolidated his conquests in southern Syria and secured the ports of Phoenicia (*q.v.*). Kadesh fell in the sixth campaign. In the next year Tethmosis revisited the Phoenician ports, chastised the rebellious and received the tribute of Syria, all the while preparing for further advance, which did not take place until another year had gone by. Then, in the thirty-third year of his reign, he marched through Kadesh, fought his way to Carchemish, defeated the forces that opposed him there and crossed over the Euphrates into the territory of the king of Mitanni. He set up a tablet by the side of that of Tethmosis I. and turned southward, following the river as far as Niy. Here he stayed to hunt a herd of 120 elephants, and then, marching westwards, received the tribute of Naharina and gifts from the Hittites in Asia Minor and from the king of Babylon. In all he fought seventeen campaigns in Syria until the spirit of revolt was entirely crushed in a second capture of Kadesh. The wars in Libya and Ethiopia were of less moment. In the intervals of war Tethmosis III. proved to be a wonderfully efficient administrator, with his eye on every corner of his dominions. The Syrian expeditions occupied six months in most of his best years, but the remaining time was spent in activity at home, repressing robbery and injustice, rebuilding and adorning temples with the labour of his captives and the plunder and tribute of conquered cities, or designing with his own hand the gorgeous sacred vessels of the sanctuary of Ammon. In his later years some expeditions took place into Nubia. Tethmosis died in the fifty-fourth year of his reign. His mummy, found in the *cachette* at Deir el Bahri, is said to be that of a very old man. He was the greatest Pharaoh in the New Empire, if not in all Egyptian history.

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[1] The history of Hatshepsut has been very obscure, and the mutilations of her cartouches have been variously accounted for. Recent discoveries by M. Legrain at Karnak and Prof. Petrie at Sinai have limited the field of conjecture. The writer has followed M. Naville's guidance in his biography of the queen (in T. M. Davis, *The Tomb of Hatshopsîtû*, London, 1906, pp. 1 et seq.), made with very full knowledge of the complicated data.

Amenophis III.

Tethmosis III. was succeeded by his son Amenophis II., whom he had associated on the throne at the end of his reign. One of the first acts of the new king was to lead an army into Syria, where revolt was again rife; he reached and perhaps crossed the Euphrates and returned home to Thebes with seven captive kings of Tikhsi and much spoil. The kings he sacrificed to Ammon and hanged six bodies on the walls, while the seventh was carried south to Napata and there exposed as a terror to the Ethiopians. Amenophis reigned twenty-six years and left his throne to his son Tethmosis IV., who is best remembered by a granite tablet recording his clearance of the Great Sphinx. He also warred in northern Syria and in Cush. His son Amenophis III., *c.* 1400 B.C., was a mighty builder, especially at Thebes, where his reign marks a new epoch in the history of the great temples, Luxor being his creation, while avenues of rams, pylons, &c., were added on a vast scale to Karnak. He married a certain Taia, who, though apparently of humble parentage, was held in great honour by her husband as afterwards by her son. Amenophis III. warred in Ethiopia, but his sway was long unquestioned from Napata to the Euphrates. Small objects with his name and that of Taia are found on the mainland and in the islands of Greece. Through the fortunate discovery of cuneiform tablets deposited by his successor in the archives at Tell el-Amarna, we can see how the rulers of the great kingdoms beyond the river, Mitanni, Assyria and even Babylonia, corresponded with Amenophis, gave their daughters to him in marriage, and congratulated themselves on having his friendship. The king of Cyprus too courted him; while within the empire the descendants of the Syrian dynasts conquered by his father, having been educated in Egypt, ruled their paternal possessions as the abject slaves of Pharaoh. A constant stream of tribute poured into Egypt, sufficient to defray the cost of all the splendid works that were executed. Amenophis caused a series of large scarabs unique in their kind to be engraved with the name and parentage of his queen Taia, followed by varying texts commemorating like medals the boundaries of his kingdom, his secondary marriage with Gilukhipa, daughter of the king of Mitanni, the formation of a sacred lake at Thebes, a great hunt of wild cattle, and the number of lions the king slew in the first ten years of his reign. The colossi known to the Greeks by the name of the Homeric hero Memnon, which look over the western plain of Thebes, represent this king and were placed before the entrance of his funerary temple, the rest of which has disappeared. His palace lay farther south on the west bank, built of crude brick covered with painted stucco. Towards the end of his reign of thirty-six years, Syria was invaded by the Hittites from the north and the people called the Khabiri from the eastern desert; some of the kinglets conspired with the invaders to overthrow the Egyptian power, while those who remained loyal sent alarming reports to their sovereign.

Amenophis IV.

Amenophis IV., son of Amenophis III. and Taia, was perhaps the most remarkable character in the long line of the Pharaohs. He was a religious fanatic, who had probably been high priest of the sun-god at Heliopolis, and had come to view the sun as the visible source of life, creation, growth and activity, whose power was demonstrated in foreign lands almost as clearly as in Egypt. Thrusting aside all the multitudinous deities of Egypt and all the mythology even of Heliopolis, he devoted himself to the cult of the visible sun-disk, applying to it as its chief name the hitherto rare word Aton, meaning "sun"; the traditional divine name Harakht (Horus of the horizon), given to the hawk-headed sun-god of Heliopolis, was however allowed to subsist and a temple was built at Karnak to this god. The worship of the other gods was officially recognized until his fifth year, but then a sweeping reform was initiated by which apparently the new cult alone was permitted. Of the old deities Ammon represented by far the wealthiest and most powerful interests, and against this long favoured deity the Pharaoh hurled himself with fury. He changed his own name from Amenhotp, "Ammon is satisfied," to Akhenaton, "pious to Aton," erased the name and figure of Ammon from the monuments, even where it occurred as part of his own father's name, abandoned Thebes, the magnificent city of Ammon, and built a new capital at El Amarna in the plain of Hermopolis, on a virgin site upon the edge of the desert. This with a large area around he dedicated to Aton in the sixth year, while splendid temples, palaces, houses and tombs for his god, for himself and for his courtiers were rising around him; apparently also this "son of Aton" swore an oath never to pass beyond the boundaries of Aton's special domain. There are signs also that the polytheistic word "gods" was obliterated on many of the monuments, but other divine names, though almost entirely excluded from Akhenaton's work, were left untouched where they already existed. In all local temples the worship of Aton was instituted. The confiscated revenues of Ammon and the tribute from Syria and Cush provided ample means for adorning Ekhaton (Akhetaton), "the horizon of Aton," the new capital, and for richly rewarding those who adopted the Aton teaching fervently. But meanwhile the political needs of the empire were neglected; the dangers which threatened it at the end of the reign of Amenophis III. were never properly met; the dynasts in Syria were at war amongst themselves, intriguing with the great Hittite advance and with the Khabiri invaders. Those who relied on Pharaoh and remained loyal as their fathers had done sent letter after letter appealing for aid against their foes. But though a general was despatched with some troops, he seems to have done more harm than good in misjudging the quarrels. At length the tone of the letters becomes one of despair, in which flight to Egypt appears the only resource left for the adherents of the Egyptian cause. Before the end of the reign Egyptian rule in Syria had probably ceased altogether. Akhenaton died in or about the seventeenth year of his reign, *c.* 1350 B.C. He had a family of daughters, who appeared constantly with him in all ceremonies, but no son. Two sons-in-law followed him with brief reigns; but the second, Tutenkhaton, soon changed his name to Tutenkhamûn, and, without abandoning Ekhaton entirely, began to restore to Karnak its ancient splendour, with new monuments dedicated to Ammon. Akhenaton's reform had not reached deep amongst the masses of the population; they probably retained all their old religious customs and superstitions, while the priesthoods throughout the country must have been fiercely opposed to the heretic's work, even if silenced during his lifetime by force and bribes. One more adherent of his named Ay, a priest, ruled for a short time, but now Aton was only one of many gods. At length a general named Harmahib, who had served under Akhenaton, came to the throne as a whole-hearted supporter of the old religion; soon Aton and his royal following suffered the fate that they had imposed upon Ammon; their monuments were destroyed and their names and figures erased, while those of Ammon were restored. From the time of Rameses II. onwards the years of the reigns of the heretics were counted to Harmahib, and Akhenaton was described as "that criminal of Akhetaton." Harmahib had to bring order as a practical man into the long-neglected administration of the country and to suppress the extortions of the official classes by severe measures. His laws to this end were engraved on a great stela in the temple of Karnak, of which sufficient remains to bear witness to his high aims, while the prosperity of the succeeding reigns shows how well he realized the necessities of the state. He probably began also to re-establish the prestige of Egypt by military expeditions in the surrounding countries.

XIXth Dynasty.

Harmahib appears to have legitimated his rule by marriage to a royal princess, but it is probable that Rameses I., who succeeded as founder of the XIXth Dynasty, was not closely related to him. Rameses in his brief reign of two years planned and began the great colonnaded hall of Karnak, proving that he was a man of great ideas, though probably too old to carry them out; this task he left to his son Seti I., who reigned one year with his father and on the latter's death was ready at once to subdue the Bedouin Shasu, who had invaded Palestine and withheld all tribute. This task was quickly accomplished and Seti pushed onward to the Lebanon. Here cedars were felled for him by the Syrian princes, and the Phoenicians paid homage before he returned home in triumph. The Libyans had also to be dealt with, and afterwards Seti advanced again through Palestine, ravaged the land of the Amorites and came into conflict with the Hittites. The latter, however, were now firmly established in the Orontes valley, and a treaty with Mutallu, the king of Kheta, reigning far away in Cappadocia, probably ended the wars of Seti. In his ninth year he turned his attention to the gold mines in the eastern desert of Nubia and improved the road thither. Meanwhile the great work at Karnak projected by his father was going forward, and throughout Egypt the injuries done to the monuments by Akhenaton were thoroughly repaired; the erased inscriptions and figures were restored, not without many blunders. Seti's temple at Abydos and his galleried tomb in the Valley of the Tombs of the Kings stand out as the most splendid examples of their kind in design and in decoration.

Rameses II.

Rameses II. succeeded at an early age and reigned sixty-seven years, during which he finished much that was begun by Seti and filled all Egypt and Nubia with his own monuments, some of them beautiful, but most, necessarily entrusted to inferior workmen, of coarse execution. The excavation of the rock temple of Abu Simbel and the completion of the great hall of Karnak were his greatest achievements in architecture. His wars began in his second year, their field comprising the Nubians, the Libyans, the Syrians and the Hittites. In his fifth year, near Kadesh on the Orontes, his army was caught unprepared and divided by a strong force of chariots of the Hittites and their allies, and Rameses himself was placed in the most imminent danger; but through his personal courage the enemy was kept at bay till reinforcements came up and turned the disaster into a victory. The incidents of this episode were a favourite subject in the sculptures of his temples, where their representation was accompanied by a poetical version of the affair and other explanatory inscriptions. Kadesh, however, was not captured, and after further contests, in his twenty-first year Rameses and the Hittite king Khattusil (Kheta-sar) made peace, with a defensive alliance against foreign aggression and internal revolt (see HITTITES). Thanks to Winckler's discoveries, the cuneiform text of this treaty from Boghaz Keui can now be compared with the hieroglyphic text at Karnak. In the thirty-fourth year, *c.* 1250 B.C., Khattusil with his friend or subject the king of Kode came from his distant capital to see the wonders of Egypt in person, bringing one of his daughters to be wife of the splendid Pharaoh. Rameses II. paid much attention to the Delta, which had been neglected until the days of Seti I., and resided there constantly; the temple of Tanis must have been greatly enlarged and adorned by him; a colossus of the king placed here was over 90 ft. in height, exceeding in scale even the greatest of the Theban colossi which he had erected in his mortuary temple of the Ramesseum. Towards the end of the long reign the vigilance and energy of the old king diminished. The military spirit awakened in the struggle with the Hyksos had again departed from the Egyptian nation; mercenaries from the Sudan, from Libya and from the northern nations supplied the armies, while foreigners settled in the rich lands of the Delta and harried the coasts. It was a time too when the movements of the nations that so frequently occurred in the ancient world were about to be particularly active. Mineptah, *c.* 1225 B.C., succeeding his father Rameses II., had to fight many battles for the preservation of his kingdom and empire. Apparently most of the fighting was finished by the fifth year of his reign; in his mortuary temple at Thebes he set up a stela of that date recording a great victory over the Libyan immigrants and invaders, which rendered the much harried land of Egypt safe. The last lines picture this condition with the crushing of the surrounding tribes. Libya was wasted, the Hittites pacified, Canaan, Ashkelon (Ascalon), Gezer, Yenoam sacked and plundered: "Israel is desolated, his seed is not, Khor (Palestine) has become a widow (without protector) for Egypt." The Libyans are accompanied by allies whose names, Sherden, Shekelesh, Ekwesh, Lukku, Teresh, suggest identifications with Sardinians, Sicels, Achaeans, Lycians and Tyrseni or Etruscans. The Sherden had been in the armies of Rameses II., and are distinguished by their remarkable helmets and apparently body armour of metal. The Lukku are certainly the same as the Lycians. Probably they were all sea-rovers from the shores and islands of the Mediterranean, who were willing to leave their ships and join the Libyans in raids on the rich lands of Egypt. Mineptah was one of the most unconscionable usurpers of the monuments of his predecessors, including those of his own father, who, it must be admitted, had set him the example. The coarse cutting of his cartouches contrasts with the splendid finish of the Middle Kingdom work which they disfigure. It may be questioned whether it was due to a wave of enthusiasm amongst the priests and people, leading them to rededicate the monuments in the name of their deliverer, or a somewhat insane desire of the king to perpetuate his own memory in a singularly unfortunate manner. Mineptah, the thirteenth son in the huge family of Rameses, must have been old when he ascended the throne; after his first years of reign his energies gave way, and he was followed by a quick succession of inglorious rulers, Seti II., the queen Tuosri, Amenmesse, Siptah; the names of the last two were erased from their monuments.

XXth Dynasty.

A great papyrus written after the death of Rameses III. and recording his gifts to the temples briefly reviews the conditions of these troublous times. "The land of Egypt was in the hands of chiefs and rulers of towns, great and small slaying each other; afterwards a certain Syrian made himself chief; he made the whole land tributary before him; he united his companions and plundered their property (*i.e.* of the other chiefs). They made the gods like men, and no offerings were presented in the temples. But when the gods inclined themselves to peace . . . they established their son Setenkhot (Setnekht) to be ruler of every land." Of the Syrian occupation we know nothing further. Setenkhot, *c.* 1200 B.C., had a very short reign and was not counted as legitimate, but he established a lasting dynasty (probably by conciliating the priesthood). He was father of Rameses III., who revived the glories of the empire. The dangers that menaced Egypt now were similar to those which Mineptah had to meet at his accession. Again the Libyans and the "peoples of the sea" were acting in concert. The latter now comprised Peleset (the Cretans, ancestors of the Philistines), Thekel, Shekelesh, Denyen (Danaoi?) and Weshesh; they had invaded Syria from Asia Minor, reaching the Euphrates, destroying the Hittite cities and progressing southwards, while their ships gathered plunder from the coasts of the Delta. This fleet joined the Libyan invaders, but was overthrown with heavy loss by the Egyptians, in whose ranks there actually served many Sherden and Kehaka, Sardinian and Libyan mercenaries. Egypt itself was thus clear of enemies; but the chariots and warriors of the Philistines and their associates were advancing through Syria, their families and goods following in ox-carts, and their ships accompanying them along the shore. Rameses led out his army and fleet against them and struck them so decisive a blow that the migrating swarm submitted to his rule and paid him tribute. In his eleventh year another Libyan invasion had to be met, and his suzerainty in Palestine forcibly asserted. His vigour was equal to all these emergencies and the later years of his reign were spent in peace. Rameses III., however, was not a great ruler. He was possessed by the spirit of decadence, imitative rather than originating. It is evident that Rameses II. was the model to which he endeavoured to conform, and he did not attempt to preserve himself from the weakening influences of priestcraft. To the temples he not only restored the property which had been given to them by former kings, but he also added greatly to their wealth; the Theban Ammon naturally received by far the greatest share, more than those of all the other gods together. The land held in the name of different deities is estimated at about 15% of the whole of Egypt; various temples of Ammon owned two-thirds of this, Re of Heliopolis and Ptah of Memphis being the next in wealth. His palace was at Medinet Habu on the west bank of Thebes in the south quarter; and here he built a great temple to Ammon, adorned with scenes from his victories and richly provided with divine offerings. Although Egypt probably was prosperous on the whole, there was undoubtedly great distress amongst certain portions of the population. We read in a papyrus of a strike of starving labourers in the Theban necropolis who would not work until corn was given to them, and apparently the government storehouse was empty at the time, perhaps in consequence of a bad Nile. Shortly before the death of the old king a plot in the harem to assassinate him, and apparently to place one of his sons on the throne, was discovered and its investigation ordered, leading after his death to the condemnation of many high-placed men and women. Nine kings of the name of Rameses now followed each other ingloriously in the space of about eighty years to the end of the XXth Dynasty, the power of the high priests of Ammon ever growing at their expense. At this time the Theban necropolis was being more systematically robbed than ever before. Under Rameses IX. an investigation took place which showed that one of the royal tombs before the western cliffs had been completely ransacked and the mummies burnt. Three years later the Valley of the Tombs of the Kings was attacked and the sepulchres of Seti I. and Rameses II. were robbed.

The Deltaic Dynasties; Libyan period.

The authority of the last king of the XXth Dynasty, Rameses XII., was shadowy. Hrihor, the high priest in his reign, gradually gathered into his own hands all real power, and succeeded him at Thebes, *c.* 1100 B.C., while a prince at Tanis named Smendes (Esbentêti) founded a separate dynasty in the Delta (Dynasty XXI.). From this period dates a remarkable papyrus containing the report of an envoy named Unamûn, sent to Syria by Hrihor to obtain cedar timber from Byblus. He took with him an image of Ammon to bestow life and health on the prince of Byblus, but apparently no other provision for the journey or for the negotiations beyond a letter of recommendation to Smendes and a little gold and silver. Smendes had trading ships in the Phoenician ports, but even his influence was not greater than that of other commercial or pirate centres, while Hrihor was of no account except in so far as he might pay well for the cedar wood he required. Unamûn was robbed on the voyage, the prince of Byblus rebuffed him, and when at last the latter agreed to provide the timber it was only in exchange for substantial gifts hastily sent for from Egypt (including rolls of papyrus) and the promise of more to follow. The prince, however, seems to have acknowledged to some extent the divinity of Ammon and the debt owed by Phoenicia to Egyptian culture, and pitied the many misfortunes of Unamûn. The narrative shows the feebleness of Egypt abroad. The Tanite line of kings generally had the overlordship of the high priests of Thebes; the descendants of Hrihor, however, sometimes by marriage with princesses of the other line, could assume cartouches and royal titles, and in some cases perhaps ruled the whole of Egypt. Ethiopia may have been ruled with the Thebais, but the records of the time are very scanty. Syria was wholly lost to Egypt. The mummies from the despoiled tombs of the kings were the object of much anxious care to the kings of this dynasty; after being removed from one tomb to another, they were finally deposited in a shaft near the temple of Deir el Bahri, where they remained for nearly three thousand years, until the demand for antiquities at last brought the plunderer once more to their hiding-place; eventually they were all secured for the Cairo museum, where they may now be seen.

Libyan soldiers had long been employed in the army, and their military chiefs settled in the large towns and acquired wealth and power, while the native rulers grew weaker and weaker. The Tanite dynasty may have risen from a Libyan stock, though there is nothing to prove it; the XXIInd Dynasty are clearly from their names of foreign extraction, and their genealogy indicates distinctly a Libyan military origin in a family of rulers of Heracleopolis Magna, in Middle Egypt. Sheshonk (Shishak) I., the founder of the dynasty, *c.* 950 B.C., seems to have fixed his residence at Bubastis in the Delta, and his son married the daughter of the last king of the Tanite dynasty. Heracleopolis seems henceforth for several centuries to have been capital of Middle Egypt, which was considered as a more or less distinct province. Sheshonk secured Thebes, making one of his sons high priest of Ammon, and whereas Solomon appears to have dealt with a king of Egypt on something like an equal footing, Sheshonk re-established Egyptian rule in Palestine and Nubia, and his expedition in the fifth year of Rehoboam subdued Israel as well as Judah, to judge by the list of city names which he inscribed on the wall of the temple of Karnak. Osorkon I. inherited a prosperous kingdom from his father, but no further progress was made. It required a strong hand to curb the Libyan chieftains, and divisions soon began to show themselves in the kingdom. The XXIInd Dynasty lasted through many generations; but there were rival kings, and M. Legrain thinks that he has proof that the XXIIIrd Dynasty was contemporaneous with the end of the XXIInd. The kings of the XXIIIrd Dynasty had little hold upon the subject princes, who spent the resources of the country in feuds amongst themselves. A native kingdom had meanwhile been established in Ethiopia. Our first knowledge of it is at this moment, when the Ethiopian king Pankhi already held the Thebais. The energetic prince of Sais, Tefnakht, followed by most of the princes of the Delta, subdued most of Middle Egypt, and by uniting these forces threatened the Ethiopian border. Heracleopolis Magna, however, with its petty king Pefteuaubasti, held out against Tefnakht, and Pankhi coming to its aid not only drove Tefnakht out of Middle Egypt, but also captured Memphis and received the submission of the princes and chiefs; in all these included four "kings" and fourteen other chiefs. According to Diodorus the Ethiopian state was theocratic, ruled through the king by the priests of Ammon. The account is probably exaggerated; but even in Pankhi's record the piety of the king, especially towards Ammon, is very marked.

Ethiopian Dynasty.

The XXIVth Dynasty consisted of a single Saite king named Bocchoris (Bekerrinf), son of Tefnachthus, apparently the above Tefnakht. Another Ethiopian invader, Shabako (Sabacon), is said to have burnt Bocchoris alive. The Ethiopian rule of the XXVth Dynasty was now firmly established, and the resources of the two countries together might have been employed in conquest in Syria and Phoenicia; but at this very time the Assyrian empire, risen to the highest pitch of military greatness, began to menace Egypt. The Ethiopian could do no more than encourage or support the Syrians in their fight for freedom against Sargon and Sennacherib. Shabako was followed by Shebitku and Shebitku by Tirhaka

(Tahrak, Taracos). Tirhaka was energetic in opposing the Assyrian advance, but in 670 B.C. Esarhaddon defeated his army on the border of Egypt, captured Memphis with the royal harem and took great spoil. The Egyptian resistance to the Assyrians was probably only half-hearted; in the north especially there must have been a strong party against the Ethiopian rule. Tirhaka laboured to propitiate the north country, and probably rendered the Ethiopian rule acceptable throughout Egypt. Notwithstanding, the Assyrian king entrusted the government and collection of tribute to the native chiefs; twenty princes in all are enumerated in the records, including one Assyrian to hold the key of Egypt at Pelusium. Scarcely had Esarhaddon withdrawn before Tirhaka returned from his refuge in the south and the Assyrian garrisons were massacred. Esarhaddon promptly prepared a second expedition, but died on the way to Egypt in 668 B.C.; his son Assur-bani-pal sent it forward, routed Tirhaka and reinstated the governors. At the head of these was Necho (Niku), king of Sais and Memphis, father of Psammetichus, the founder of the XXVIth Dynasty. We next hear that correspondence with Tirhaka was intercepted, and that Necho, together with Pekrûr of Psapt (at the entrance to the Wadi Tumilat) and the Assyrian governor of Pelusium, was taken to Nineveh in chains to answer the charge of treason. Whatever may have occurred, it was deemed politic to send Necho back loaded with honours and surrounded by a retinue of Assyrian officials. Upper Egypt, however, was loyal to Tirhaka, and even at Memphis the burial of an Apis bull was dated by the priests as in his reign. Immediately afterwards he died. His nephew Tandamane, received by the Upper country with acclamations, besieged and captured Memphis, Necho being probably slain in the encounter. But in 661 (?) Assur-bani-pal drove the Ethiopian out of Lower Egypt, pursued him up the Nile and sacked Thebes. This was the last and most tremendous visitation of the Assyrian scourge.

XXVIth Dynasty.

Psammetichus (Psammêtk), 664–610 B.C., the son of Necho, succeeded his father as a vassal of Assyria in his possessions of Memphis and Sais, allied himself with Gyges, king of Lydia, and aided by Ionian and Carian mercenaries, extended and consolidated his power.[1] By the ninth year of his reign he was in full possession of Thebes. Assur-bani-pal's energies throughout this crisis were entirely occupied with revolts nearer home, in Babylon, Elam and Arabia. The Assyrian arms again triumphed everywhere, but at the cost of complete exhaustion. Under the firm and wise rule of Psammetichus, Egypt recovered its prosperity after the terrible losses inflicted by internal wars and the decade of Assyrian invasions. The revenue went up by leaps and bounds. Psammetichus guarded the frontiers of Egypt with three strong garrisons, placing the Ionian and Carian mercenaries especially at the Pelusiac Daphnae in the N.E., from which quarter the most formidable enemy was likely to appear. The Assyrians did not move against him, but a great Scythian horde, destroying all before it in its southward advance, is said by Herodotus to have been turned back by presents and entreaties. Diplomacy backed up by vigorous preparations may have deterred the Scythians from the dangerous enterprise of crossing the desert to Egypt. Before his death Psammetichus had advanced into southern Palestine and captured Azotus.

When Psammetichus began to reign the situation of Egypt was very different from what it had been under the Empire. The development of trade in the Mediterranean and contact with new peoples and new civilizations in peace and war had given birth to new ideas among the Egyptians and at the same time to a loss of confidence in their own powers. The Theban supremacy was gone and the Delta was now the wealthy and progressive part of Egypt; piety increased amongst the masses, unenterprising and unwarlike, but proud of their illustrious antiquity. Thebes and Ammon and the traditions of the Empire savoured too much now of the Ethiopian; the priests of the Memphite and Deltaic dynasty thereupon turned deliberately for their models to the times of the ancient supremacy of Memphis, and the sculptures and texts on tomb and temple had to conform as closely as possible to those of the Old Kingdom. In other than religious matters, however, the Egyptians were inventing and perhaps borrowing. To enumerate a few examples of this which are already definitely known: we find that the forms of legal and business documents became more precise; the mechanical arts of casting in bronze on a core and of moulding figures and pottery were brought to the highest pitch of excellence; and portraiture in the round on its highest plane was better than ever before and admirably lifelike, revealing careful study of the external anatomy of the individual.

Psammetichus died in the fifty-fourth year of his reign and was succeeded by his son Necho, 610–594 B.C. Taking advantage of the helpless state of the Assyrians, whose capital was assailed by the Medes and the Babylonians, the new Pharaoh prepared an expedition to recover the ancient possessions of the Empire in Syria. Josiah alone, faithful to the king of Assyria, opposed him with his feeble force at Megiddo and was easily overcome and slain. Necho went forward to the Euphrates, put the land to tribute, and, in the case of Judah at any rate, filled the throne with his own nominee (see JEHOIAKIM). The fall of Nineveh and the division of the spoil gave to Nabopolasser, king of Babylon, the inheritance of the Assyrians in the west, and he at once despatched his son Nebuchadrezzar to fight Necho. The Babylonian and Egyptian forces met at Carchemish (605), and the rout of the latter was so complete that Necho relinquished Syria and might have lost Egypt as well had not the death of Nabopolasser recalled the victor to Babylon. Herodotus relates that in Necho's reign a Phoenician ship despatched from Egypt actually circumnavigated Africa, and the attempt was made to complete a canal through the Wadi Tumilat, which connected the Mediterranean and Red Seas by way of the Lower Egyptian Nile. (See SUEZ.) The next king, Psammetichus II., 594–589 B.C., according to one account made an expedition to Syria or Phoenicia, and apparently sent a mercenary force into Ethiopia as far as Abu Simbel. Pharaoh Hophra (Apries), 589–570 B.C., fomented rebellion against the Babylonian suzerainty in Judah, but accomplished little there. Herodotus, however, describes his reign as exceedingly prosperous. The mercenary troops at Elephantine mutinied and attempted to desert to Ethiopia, but were brought back and punished. Later, however, a disastrous expedition sent to aid the Libyans against the Greek colony of Cyrene roused the suspicion and anger of the native soldiery at favours shown to the mercenaries, who of course had taken no part in it. Amasis (Aḥmosi) II. was chosen king by the former (570–525 B.C.), and his swarm of adherents overcame the Greek troops in Apries' pay (see AMASIS). None the less Amasis employed Greeks in numbers, and cultivated the friendship of their tyrants. His rule was confined to Egypt (and perhaps Cyprus), but Egypt itself was very prosperous. At the beginning of his long reign of forty-four years he was threatened by Nebuchadrezzar; later he joined the league against Cyrus and saw with alarm the fall of his old enemy. A few months after his death, 525 B.C., the invading host of the Persians led by Cambyses reached Egypt and dethroned his son Psammetichus III.

The Persian period, XXVIIth Dynasty.

Cambyses at first conciliated the Egyptians and respected their religion; but, perhaps after the failure of his expedition into Ethiopia, he entirely changed his policy, and his memory was generally execrated. He left Egypt so completely crushed that the subsequent usurpation of the Persian throne was marked by no revolt in that quarter. Darius, 521–486 B.C., proved himself a beneficent ruler, and in a visit to Egypt displayed his consideration for the religion of the country. In the Great Oasis he built a temple to Ammon. The annual tribute imposed on the satrapy of Egypt and Cyrene was heavy, but it was probably raised with ease. The canal from the Nile to the Red Sea was completed or repaired, and commerce flourished. Documents dated in the thirty-fourth and thirty-fifth years of Darius are not uncommon, but apparently at the very end of his reign, some years after the disaster of Marathon, Egypt was induced to rebel. Xerxes, 486–467 B.C., who put down the revolt with severity, and his successor Artaxerxes, 466–425 B.C., like Cambyses, were hateful to the Egyptians. The disorders which marked the accession of Artaxerxes gave Egypt another opportunity to rebel. Their leaders were Inaros the Libyan of Marea and the Egyptian Amyrtaeus. Aided by an Athenian force, Inaros slew the satrap Achaemenes at the battle of Papremis and destroyed his army; but the garrison of Memphis held out, and a fresh host from Persia raised the siege and in turn besieged the Greek and Egyptian forces on the island of Papremis. At last, after two years, having diverted the river from its channel, they captured and burnt the Athenian ships and quickly ended the rebellion. The reigns of Xerxes II. and Darius II. are marked by no recorded incident in Egypt until a successful revolt about 405 B.C. interrupted the Persian domination.

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[1] This, it may be remarked, is the time vaguely represented by the Dodecarchy of Herodotus.

Monuments of the Persian rule in Egypt are exceedingly scanty. The inscriptions of Pefteuauneit, priest of Neith at Sais, and from his position the native authority who was most likely to be consulted by Cambyses and Darius, tells of his relations with these two kings. For the following reigns Egyptian documents hardly exist, but some papyri written in Aramaic have been found at Elephantine and at Memphis. Those from the former locality show that a colony of Jews with a temple dedicated to Yahweh (Jehovah) had established themselves at that garrison and trading post (see ASSUAN). Herodotus visited Egypt in the reign of Artaxerxes, about 440 B.C. His description of Egypt, partly founded on Hecataeus, who had been there about fifty years earlier, is the chief source of information for the history of the Saite kings and for the manners of the times, but his statements prove to be far from correct when they can be checked by the scanty native evidence. (F. Ll. G.)

Dynasties XXVIII.-XXXI.

Amyrtaeus (Amnertais) of Sais, perhaps a son of Pausiris and grandson of the earlier Amyrtaeus, revolted from Darius II. *c.* 405 B.C., and Egypt regained its independence for about sixty years. The next king Nefeurēt (Nepherites I.) was a Mendesian and founded the XXIXth Dynasty. After Hakor and Nefeurēt II. the sovereignty passed to Dynasty XXX., the last native Egyptian line. Monuments of all these kings are known, and art flourished particularly under the Mendesian kings Nekhtharheb (Nectanebes or Nectanebus I.) and Nekhtnebf (Nectanebes II.). The former came to the throne when a Persian invasion was imminent, 378 B.C. Hakor had already formed a powerful army, largely composed of Greek mercenaries. This army Nekhtharheb entrusted to the Athenian Chabrias. The Persians, however, succeeded in causing his recall and in gaining the services of his fellow-countryman Iphicrates. The invading army consisted of 200,000 barbarians under Pharnabazus and 20,000 Greeks under Iphicrates. After the Egyptians had experienced a reverse, Iphicrates counselled an immediate advance on Memphis. His advice was not followed by Pharnabazus; the Egyptian king collected his forces and won a pitched battle near Mendes. Pharnabazus retreated and Egypt was free.

Nekhtharheb was succeeded by Tachos or Teos, whose short reign was occupied by a war with Persia, in which the king of Egypt secured the services of a body of Greek mercenaries under the Spartan king Agesilaus and a fleet under the Athenian general Chabrias. He entered Phoenicia with every prospect of success, but having offended Agesilaus he was dethroned in a military revolt which gave the crown to Nekhtnebf or Nectanebes II., the last native king of Egypt. At this moment a revolt broke out. The prince of Mendes almost succeeded in overthrowing the new king. Agesilaus defeated the rival pretender and left Nekhtnebf established on the throne. But the opportunity of a decisive blow against Persia was lost. The new king, Artaxerxes III. Ochus, determined to reduce Egypt. A first expedition was defeated by the Greek mercenaries of Nekhtnebf, but a second, commanded by Ochus himself, subdued Egypt with no further resistance than that of the Greek garrison of Pelusium. Nekhtnebf, instead of endeavouring to relieve them, retreated to Memphis and fled thence to Ethiopia, 340 (?) B.C. Thus miserably fell the monarchy of the Pharaohs, after an unexampled duration of 3000 years, or as some think far longer. More than 2000 years have since passed, and though Egypt has from time to time been independent, not one native prince has sat on the throne of the Pharaohs. "There shall be no more a prince of the land of Egypt" (Ezek. xxx. 13) was prophesied in the days of Apries as the final state of the land.

Ochus treated his conquest barbarously. From this brief re-establishment of Persian dominion (counted by Manetho as Dynasty XXXI.) no document survives except one papyrus that appears to be dated in the reign of Darius III.

See J. H. Breasted, *A History of Egypt from the Earliest Times to the Persian Conquest* (New York and London, 1905); *A History of the Ancient Egyptians* (New York and London, 1908); *Ancient Records of Egypt: Historical Documents from the Earliest Times to the Persian Conquest, collected, edited and translated* (5 vols., Chicago, 1906–1907); W. M. F. Petrie, *A History of Egypt* (from the earliest times to the XXXth Dynasty) (3 vols., London, 1899–1905); E. A. W. Budge, *A History of Egypt*, vols. i-vii. (London, 1902); G. Maspero, *Histoire ancienne des peuples de l'orient* (6th ed., 1904), *The Dawn of Civilization, The Struggle of the Nations, The Passing of the Empires* (London, 1904, &c.); P. E. Newberry and J. Garstang, *A Short History of Ancient Egypt* (London, 1904); G. Steindorff, *Die Blütezeit des Pharaonenreiches* (*Dyn. XVIII.*) (Bielefeld and Leipzig, 1900); H. Winckler, *The Tell el Amarna Letters* (Berlin, London and New York, 1896).

The Conquest by Alexander.—When, in 332 B.C., after the battle of Issus, Alexander entered Egypt, he was welcomed as a deliverer. The Persian governor had not forces enough to oppose him, and he nowhere experienced even the show of resistance. He visited Memphis, founded Alexandria, and went on pilgrimage to the oracle of Ammon (Oasis of Siwa). The god declared him to be his son, renewing thus an old Egyptian convention or belief; Olympias was supposed to have been in converse with Ammon, even as the mothers of Hatshepsut and Amenophis III. are represented in the inscriptions of the Theban temples to have received the divine essence. At this stage of his career the treasure and tribute of Egypt were of great importance to the Macedonian conqueror. He conciliated the inhabitants by the respect which he showed for their religion; he organized the government of the natives under two officers, who must have been already known to them (of these Petisis, an Egyptian, soon resigned his share into the charge of his colleague Doloaspis, who bears a Persian name.) But Alexander designed his Greek foundation of Alexandria to be the capital, and entrusted the taxation of Egypt and the control of its army and navy to Greeks. Early in 331 B.C. he was ready to depart, and led his forces away to Phoenicia. A granite gateway to the temple of Khnūm at Elephantine bears his name in hieroglyphic, and demotic documents are found dated in his reign.

The Ptolemaic Period.—On the division of Alexander's dominions in 323 B.C., Egypt fell to Ptolemy the son of Lagus, the founder of the Ptolemaic dynasty (see PTOLEMIES). Under these rulers the rich kingdom was heavily taxed to supply the sinews of war and to support every kind of lavish expenditure. Officials, and the higher ones were nearly all Greeks, were legion, but the whole system was so judiciously worked that there was little discontent amongst the patient peasantry. During the reign of Philadelphus the land gained from the bed of the lake of Moeris was assigned to veteran soldiers; the great armies of the Ptolemies were rewarded or supported by grants of farm lands, and men of Macedonian, Greek and Hellenistic extraction were planted in colonies and garrisons or settled themselves in the villages throughout the country. Upper Egypt, farthest from the centre of government, was probably least affected by the new influences, though the first Ptolemy established the Greek colony of Ptolemais to be its capital. Intermarriages, however, gradually had their effect; after the revolt of the natives in the reign of Ptolemy V., we find the Greek and Egyptian elements closely intermingled. Ptolemy I. had established the cult of the Memphite Serapis in a Graeco-Egyptian form, affording a common ground for native and Hellenistic worshippers. The greater number of the temples to the native deities in Upper Egypt and in Nubia (to 50 m. south of the Cataract, within the Dodecaschoenus) were built under the Ptolemies. No serious effort was made to extend the Ptolemaic rule into Ethiopia, and Ergamenes, the Hellenizing king of Ethiopia, was evidently in alliance with Philopator; in the next reign two native kings, probably supported by Ethiopia, reigned in succession at Thebes. That famous city lost all except its religious importance under the Ptolemies; after the "destruction" or dismantling by Lathyrus it formed only a series of villages. The population of Egypt in the time of Ptolemy I. is put at 7,000,000 by Diodorus, who also says that it was greater then than it ever was before; at the end of the dynasty, in his own day, it was not much less though somewhat diminished. Civil wars and revolts must have greatly injured both Upper and Lower Egypt. It is remarkable that, while the building and decoration of temples continued in the reigns of Ptolemy Auletes and the later Ptolemies and Cleopatra, papyri of those times whether Greek or Egyptian are scarcely to be found.

The Roman Period.—In 30 B.C. Augustus took Egypt as the prize of conquest. He treated it as a part of his personal domain, free from any interference by the senate. In the main lines the Ptolemaic organization was preserved, but Romans were gradually introduced into the highest offices. On Egypt Rome depended for its supplies of corn; entrenched there, a revolting general would be difficult to attack, and by simply holding back the grain ships could threaten Rome with starvation. No senator therefore was permitted to take office or even to set foot in the country without the emperor's special leave, and by way of precaution the highest position, that of prefect, was filled by a Roman of equestrian rank only. As the representative of the emperor, this officer assumed the place occupied by the king under the old order, except that his power was limited by the right of appeal to Caesar. The first prefect, Cornelius Gallus, tamed the natives of Upper Egypt to the new yoke by force of arms, and meeting ambassadors from Ethiopia at Philae, established a nominal protectorate of Rome over the frontier district, which had been abandoned by the later Ptolemies. The third prefect, Gaius Petronius, cleared the neglected canals for irrigation; he also repelled an invasion of the Ethiopians and pursued them far up the Nile, finally storming the capital of Napata. But no attempt was made to hold Ethiopia. In succeeding reigns much trouble was caused by jealousies and quarrels between the Greeks and the Jews, to whom Augustus had granted privileges as valuable as those accorded to the Greeks. Aiming at the spice trade, Aelius Gallus, the second prefect of Egypt under Augustus, had made an unsuccessful expedition to conquer Arabia Felix; the valuable Indian trade, however, was secured by Claudius for Egypt at the expense of Arabia, and the Red Sea routes were improved. Nero's reign especially marks the commencement of an era of prosperity which lasted about a century. Under Vespasian the Jewish temple at Leontopolis in the Delta, which Onias had founded in the reign of Ptolemy Philometor, was closed; worse still, a great Jewish revolt and massacre of the Greeks in the reign of Trajan resulted, after a stubborn conflict of many months with the Roman army under Marcius Livianus Turbo, in the virtual extermination of the Jews in Alexandria and the loss of all their privileges. Hadrian, who twice visited Egypt (A.D. 130, 134), founded Antinoë in memory of his drowned favourite. From this reign onwards buildings in the Graeco-Roman style were erected throughout the country. A new Sothic cycle began in A.D. 139. Under Marcus Aurelius a revolt of the Bucolic or native troops recruited for home service was taken up by the whole of the native population and was suppressed only after several years of fighting. The Bucolic war caused infinite damage to the agriculture of the country and marks the beginning of its rapid decline under a burdensome taxation. The province of Africa was now of equal importance with Egypt for the grain supply of the capital. Avidius Cassius, who led the Roman forces in the war, usurped the purple, and was acknowledged by the armies of Syria and Egypt. On the approach of Marcus Aurelius, the adherents of Cassius slew him, and the clemency of the emperor restored peace. After the downfall of the house of the Antonines, Pescennius Niger, who commanded the forces in Egypt, was proclaimed emperor on the death of Pertinax (A.D. 193). Severus overthrew his rival (A.D. 194) and, the revolt having been a military one, did not punish the province; in 202 he gave a constitution to Alexandria and the nome capitals. In his reign the Christians of Egypt suffered the first of their many persecutions. When Christianity was planted in the country we do not know, but it must very early have gained adherents among the learned Jews of Alexandria, whose school of thought was in some respects ready to welcome it. From them it rapidly passed to the Greeks. Ultimately the new religion spread to the Egyptians; their own creed was worn out, and they found in Christianity a doctrine of the future life for which their old belief had made them not unready; while the social teaching of Christianity came with special fitness to a subject race. The history of the Coptic Version has yet to be written. It presents some features of great antiquity, and, unlike all others, has the truly popular character of being written in the three dialects of the language. Side by side there grew up an Alexandrian church, philosophic, disputative, ambitious, the very centre of Christian learning, and an Egyptian church, ascetic, contemplative, mystical. The two at length influenced one another; still we can generally trace the philosophic teachers to a Greek origin, the mystics to an Egyptian.

Christianity.

Caracalla, in revenge for an affront, massacred all the men capable of bearing arms in Alexandria. His granting of the Roman citizenship to all Egyptians in common with the other provincials was only to extort more taxes. Under Decius, A.D. 250, the Christians again suffered from persecution. When the empire broke up in the weak reign of Gallienus, the prefect Aemilianus, who took the surname Alexander or Alexandrinus, was made emperor by the troops at Alexandria, but was conquered by the forces of Gallienus. In his brief reign of only a few months he had driven back an invasion of the Blemmyes. This predatory tribe, issuing from Nubia, was long to be the terror of Upper Egypt. Zenobia, queen of Palmyra, after an unsuccessful invasion, on a second attempt conquered Egypt, which she added to her empire, but lost it when Aurelian made war upon her (A.D. 272). The province was, however, unsettled, and the conquest of Palmyra was followed in the same year by the suppression of a revolt in Egypt (A.D. 273). Probus, who had governed Egypt for Aurelian and Tacitus, was subsequently chosen by the troops to succeed Tacitus, and is the first governor of this province who obtained the whole of the empire. He expelled the Blemmyes, who were dominating the whole of the Thebaid. Diocletian invited the Nobatae to settle in the Dodecaschoenus as a barrier against their incursions, and subsidized both Blemmyes and Nobatae. The country, however, was still disturbed, and in A.D. 296 a formidable revolt broke out, led by Achilleus, who as emperor took the name Domitius Domitianus. Diocletian, finding his troops unable to determine the struggle, came to Egypt, captured Alexandria and put his rival to death (296). He then reorganized the whole province, and the well-known "Pompey's Pillar" was set up by the grateful and repentant Alexandrians to commemorate his gift to them of part of the corn tribute.

The Coptic era of Diocletian or of the Martyrs dates from the accession of Diocletian (A.D. 284). The edict of A.D. 303 against the Christians, and those which succeeded it, were rigorously carried out in Egypt, where Paganism was still strong and face to face with a strong and united church. Galerius, who succeeded Diocletian in the government of the East, implacably pursued his policy, and this great persecution did not end until the persecutor, perishing, it is said, of the dire malady of Herod and Philip II. of Spain, sent out an edict of toleration (A.D. 311).

By the edict of Milan (A.D. 313), Constantine, with the agreement of his colleague Licinius, acknowledged Christianity as having at least equal rights with other religions, and when he gained sole power he wrote to all his subjects advising them, like him, to become Christians (A.D. 324). The Egyptian Church, hitherto free from schism, was now divided by a fierce controversy, in which we see two Greek parties, rather than a Greek and an Egyptian, in conflict. The council of Nicaea was called together (A.D. 325) to determine between the Orthodox and the party of the Alexandrian presbyter Arius. At that council the native Egyptian bishops were chiefly remarkable for their manly protest against enforcing celibacy on the clergy. The most conspicuous controversialist on the Orthodox side was the young Alexandrian deacon Athanasius, who returned home to be made archbishop of Alexandria (A.D. 326). After being four times expelled by the Arians, and once by the emperor Julian, he died, A.D. 373, at the moment when an Arian persecution began. So large a proportion of the population had taken religious vows that under Valens it became necessary to abolish the privilege of monks which exempted them from military service. The reign of Theodosius I. witnessed the overthrow of Arianism, and this was followed by the suppression of Paganism, against which a final edict was promulgated A.D. 390. In Egypt, the year before, the temple of Serapis at Alexandria had been captured after much bloodshed by the Christian mob and turned into a church. Generally the Coptic Christians were content to build their churches within the ancient temples, plastering over or effacing the sculptures which were nearest to the ground and in the way of the worshippers. They do not seem to have been very zealous in the work of destruction; the native religion was already dead and they had no fear of it. The prosperity of the church was the sign of its decay, and before long we find persecution and injustice disgracing the seat of Athanasius. Cyril, the patriarch of Alexandria (A.D. 415), expelled the Jews from the capital with the aid of the mob, and by the murder of the beautiful philosopher Hypatia marked the lowest depth to which ignorant fanaticism could descend. A schism now produced lengthened civil war and alienated Egypt from the empire. The distinction between religion and politics seemed to be lost, and the government grew weaker and weaker. The system of local government by citizens had now entirely disappeared. Offices, with new Byzantine names, were now almost hereditary in the wealthy land-owning families. The Greek rulers of the Orthodox faith were unable to protect the tillers of the soil, and these being of the Monophysite persuasion and having their own church and patriarch, hated the Orthodox patriarch (who from the time of Justinian onwards was identical with the prefect) and all his following. Towards the middle of the 5th century, the Blemmyes, quiet since the reign of Diocletian, recommenced their incursions, and were even joined in them by the Nobatae. These tribes were twice brought to account severely for their misdoings, but not effectually checked. It was in these circumstances that Egypt fell without a conflict when attacked by Chosroës (A.D. 616). After ten years of Persian dominion the success of Heraclius restored Egypt to the empire, and for a time it again received a Greek governor. The Monophysites, who had taken advantage of the Persian occupation, were persecuted and their patriarch expelled. The Arab conquest was welcomed by the native Christians, but with it they ceased to be the Egyptian nation. Their language is still used in their churches, but it is no longer spoken, and its literature, which is wholly ecclesiastical, has been long unproductive.

The decline of Egypt was due to the purely military government of the Romans, and their subsequent alliance with the Greek party of Alexandria, which never represented the country. Under weak emperors, the rest of Egypt was exposed to the inroads of savages, and left to fall into a condition of barbarism. Ecclesiastical disputes tended to alienate both the native population and the Alexandrians. Thus at last the country was merely held by armed force, and the authority of the governor was little recognized beyond the capital, except where garrisons were stationed. There was no military spirit in a population unused to arms, nor any disinclination to be relieved from an arbitrary and persecuting rule. Thus the Moslem conquest was easy.

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(R. S. P.; F. LL. G.)

2. *Mahommedan Period.*

(1) *Moslem Conquest of Egypt.*—In accordance with the scheme of universal conquest conceived by the founder of Islam, an army of some 4000 men was towards the end of the year A.D. 639 sent against Egypt under the command of ‘Amr (see ‘AMR-IBN-EL-ASS), by the second caliph, Omar I., who had some doubt as to the expediency of the enterprise. The commander marched from Syria through El-‘Arīsh, easily took Farama or Pelusium, and thence proceeded to Bilbeis, where he was delayed for a month; having captured this place, he proceeded to a point on the Nile called Umm Dunain, the siege of which also occasioned him some difficulty. After taking it, he crossed the Nile to the Fayum. On the 6th of June of the following year (640) a second army of 12,000 men, despatched by Omar, arrived at Heliopolis (On). ‘Amr recrossed the river and joined it, but presently was confronted by a Roman army, which he defeated at the battle of Heliopolis (July 640); this victory was followed by the siege of Babylon, which after some futile attempts at negotiation was taken partly by storm and partly by capitulation on Good Friday, the 6th of April 641. ‘Amr next proceeded in the direction of Alexandria, which was surrendered to him by a treaty signed on the 8th of November 641, under which it was to be occupied by the Moslems on the 29th of September of the following year. The interval was spent by him in founding the city Fostat (Fusṭāṭ), near the modern Cairo, and called after the camp (*Fossatum*) occupied by him while besieging Babylon; and in reducing those coast towns that still offered resistance. The Thebaid seems to have surrendered with scarcely any opposition.

The ease with which this valuable province was wrenched from the Roman empire appears to have been due to the treachery of the governor of Egypt, Cyrus, patriarch of Alexandria, and the incompetence of the generals of the Roman forces. The former, called by the Arabs Mukaukis (Muqauqis) from his Coptic name Pkauchios, had for ten years before the arrival of ‘Amr maintained a fierce persecution of the Jacobite sect, to which the bulk of the Copts belonged. During the siege of Babylon he had been recalled and exiled, but after the death of Heraclius had been reinstated as patriarch by Heraclonas, and been welcomed back to Alexandria with general rejoicing in September 641. Since Alexandria could neither have been stormed nor starved out by the Arabs, his motives for surrendering it, and with it the whole of Egypt, have been variously interpreted, some supposing him to have been secretly a convert to Islam. The notion that the Arab invaders were welcomed and assisted by the Copts, driven to desperation by the persecution of Cyrus, appears to be refuted by the fact that the invaders treated both Copts and Romans with the same ruthlessness; but the dissensions which prevailed in the Christian communities, leading to riots and even civil war in Alexandria and elsewhere, probably weakened resistance to the common enemy. An attempt was made in the year 645 with a force under Manuel, commander of the Imperial forces, to regain Alexandria for the Byzantine empire; the city was surprised, and held till the summer of 646, when it was again stormed by ‘Amr. In 654 a fleet was equipped by Constans with a view to an invasion, but it was repulsed, and partly destroyed by storm. From that time no serious effort was made by the Eastern Empire to regain possession of the country. And it would appear that at the time of the attempt by Manuel the Arabs were actually assisted by the

Copts, who at the first had found the Moslem lighter than the Roman yoke.

Terms of capitulation.

A question often debated by Arabic authors is whether Egypt was taken by storm or capitulation, but, so far as the transference of the country was accomplished by the first taking of Alexandria, there seems no doubt that the latter view is correct. The terms were those on which conquered communities were ordinarily taken under Moslem protection. In return for a tribute of money (*jizyah*) and food for the troops of occupation (*ḍarībat-al-ṭaʿām*), the Christian inhabitants of Egypt were to be excused military service, and to be left free in the observance of their religion and the administration of their affairs.

From 639 to 968 Egypt was a province of the Eastern Caliphate, and was ruled by governors sent from the cities which at different times ranked as capitals. Like other provinces of the later Abbasid Caliphate its rulers were, during this period, able to establish quasi-independent dynasties, such being those of the Tulunids who ruled from 868 to 905, and the Ikshidis from 935–969. In 969 the country was conquered by Jauhar for the Fatimite caliph Moʿizz, who transferred his capital from Mahdia (*q.v.*) in the Maghrib to Cairo. This dynasty lasted till 1171, when Egypt was again embodied in the Abbasid empire by Saladin, who, however, was himself the founder of a quasi-independent dynasty called the Ayyubites or Ayyubids, which lasted till 1252. The Ayyubites were followed by the Mameluke dynasties, usually classified as Baḥri from 1252–1382, and Burji from 1382–1517; these sovereigns were nominally under the suzerainty of Abbasid caliphs, who were in reality instruments of the Mameluke sultans, and resided at Cairo. In 1517 Egypt became part of the Ottoman empire and was governed by pashas sent from Constantinople, whose influence about 1707 gave way to that of officials chosen from the Mamelukes who bore the title Sheik al-balad. After the episode of the French occupation, government by pashas was restored; Mehemet Ali (appointed pasha in 1805) obtained from the Porte in 1841 the right to bequeath the sovereignty to his descendants, one of whom, Ismail Pasha, received the title Khedive, which is still held by Mehemet Ali's descendants.

(2) The following is a list of the governors of Egypt in these successive periods:—

(a) During the undivided Caliphate.

ʿAmr-ibn-el-Ass, A.H. 18–24 (A.D. 639–645).
ʿAbdallah b. Saʿd b. Abī Sarh, 24–36 (645–656).
Qais b. Saʿd b. ʿUbādah, 36 (657–658).
Mahommed b. Abu Bekr, 37–38 (658).
Ashtar Mālik b. al-Hārith appointed, but never governed).
ʿAmr-ibn-el-Ass, 38–43 (658–663).
ʿUtbah b. Abu Sofiān, 43–44 (664–665).
ʿUtbah b. ʿĀmir, 44–45 (665).
Maslama b. Mukhallad, 45–62 (665–682).
Saʿīd b. Yazīd b. ʿAlqamah, 62–64 (682–684).
Abdarrahman b. ʿUtbah b. Jahdam, 64–65 (684).
Abdalazīz (ʿAbd al-ʿAzīz) b. Merwān, 65–86 (685–705).
ʿAbdallah b. ʿAbd al-Malik, 86–90 (705–708).
Qurrah b. Sharīk al-ʿAbsī, 90–96 (709–714).
ʿAbd al-Malik b. Rifāʿah al-Fahmī, 96–99 (715–717).
Ayyūb b. Shuraḥbīl al-Aṣbaḥī, 99–101 (717–720).
Bishr b. Ṣafwān al-Kalbī, 101–102 (720–721).
Ḥanzalah b. Ṣafwān, 102–105 (721–724).
Mahommed b. ʿAbd al-Malik, 105 (724).
Ḥurr b. Yūsuf, 105–108 (724–727).
Ḥafṣ b. al-Walīd, 108 (727).
ʿAbd al-Malik b. Rifāʿah, 109 (727).
Walīd b. Rifāʿah, 109–117 (727–735).
ʿAbd al-Raḥmān b. Khālid, 117–118 (735).
Ḥanẓalah b. Ṣafwān, 118–124 (735–742).
Ḥafṣ b. al-Walīd, 124–127 (742–745).
Ḥassān b. ʿAtāhiyah al-Tuʿjibī, 127 (745).
Ḥafṣ b. al-Walīd, 127 (745).
Hautharah b. Suhail al-Bāhilī, 128–131 (745–749).
Mughīrah b. ʿUbaidallah al-Fazārī, 131–132 (749).
ʿAbd al-Malik b. Marwān al-Lakhmī, 132 (750).
Ṣāliḥ b. ʿAlī, 133 (750–751).
Abū ʿAun ʿAbdalmalik b. Yazīd, 133–136 (751–753).
Ṣāliḥ b. ʿAlī, 136–137 (753–755)—second time.
Abū ʿAun, 137–141 (755–758)—second time.
Mūsā b. Kaʿb b. ʿUyainah al-Tamīmī, 141 (758–759).
Mahommed b. al-Ashʿath b. ʿUqbah al-Khuzāʿī, 141–143 (759–760).
Ḥumaid b. Qaḥṭabah b. Shabīb al-Ṭāʾī, 143–144 (760-762).
Yazīd b. Ḥātim b. Kabīsah al-Muhallabī, 144–152 (762–769).
ʿAbdallah b. ʿAbdarraḥmān b. Moawiya b. Ḥudaij, 152–155 (769–772).
Mahommed b. Abdarraḥman b. Moawiya b. Ḥudaij, 155 (772).
Mūsā b. ʿUlayy b. Rabāh al-Lakhmī, 155–161 (772–778).
ʿĪsā b. Luqmān b. Mahommed al-Jumahī, 161–162 (778).
Wāḍiḥ, 162 (779).
Manṣūr b. Yazīd b. Manṣūr al-Ruʿainī, 162 (779).
Abū Ṣāliḥ Yaḥyā b. Dāwūd b. Mamdūd, 162–164 (779–780).
Sālim b. Sawādah al-Tamīmī, 164 (780–781).
Ibrāhīm b. Ṣāliḥ b. ʿAlī, 165–167 (781–784).
Mūsā b. Musʿab b. al-Rabī al-Khathʿamī, 167–168 (784–785).
Usāmah b. ʿAmr b. ʿAlqamah al-Maʿāfirī, 168 (785).
al Faḍl b. Ṣāliḥ b. ʿAlī al-ʿAbbāsī, 168–169 (785–786).
ʿAlī b. Sulaimān b. ʿAlī al-ʿAbbāsī, 169–171 (786–787).
Mūsā b. ʿĪsā b. Mūsā al-ʿAbbāsī, 171–172 (787–789).
Maslamah b. Yaḥyā b. Qurrah al-Bājilī, 172–173 (789–790).
Mahommed b. Zuhair al-Azdī, 173 (790).
Dāwūd b. Yazīd b. Ḥātim al-Muhallabī, 174–175 (790).
Mūsā b. ʿĪsā al-ʿAbbāsī, 175–176 (790–792).
Ibrāhīm b. Ṣāliḥ, 176 (792).
Ṣāliḥ b. Ibrāhīm, 176 (792).
Abdallah b. al-Musayyib b. Zuhair al Ḍabbī, 176–177 (792–793).
Isḥāq b. Sulaimān b. ʿAlī al-ʿAbbāsī, 177–178 (793–794).
Harthamah b. Aʿyan, 178 (794–795).
ʿObaidallah b. al-Mahdī, 179 (795).
Mūsā b. ʿĪsā al-ʿAbbāsī, 179–180 (795–796).
ʿObaidallah b. al-Mahdī, 180–181 (796–797)—second time.
Ismāʿīl b. Ṣāliḥ b. ʿAlī al-ʿAbbāsī, 181–182 (797–798).
Ismāʿīl b. ʿĪsā b. Mūsā al-ʿAbbāsī, 182–183 (798).
Laith b. al-Faḍl al-Abīwardī, 183–187 (798–803).
Aḥmad b. Ismāʿīl b. ʿAlī al-ʿAbbāsī, 187–189 (803–805).
ʿObaidallah b. Mahommed b. Ibrāhīm al-ʿAbbāsī, 189–190 (805–806).
Ḥusain b. Jamīl, 190–192 (806–808).
Mālik b. Dalham b. ʿĪsā al-Kalbī, 192–193 (808).
Ḥasan b. al-Taḥtāḥ, 193–194 (808–809).
Ḥātim b. Harthamah b. Aʿyan, 194–195 (809–811).
Jābir b. al-Ashʿath b. Yaḥyā al-Ṭāʾī, 195–196 (811–812).
ʿAbbād b. Mahommed b. Ḥayyān al-Balkhī, 196–198 (812–813).
Moṭṭalib b. ʿAbdallah b. Mālik al-Khuzāʿī, 198 (813–814).
ʿAbbās b. Mūsā b. ʿĪsā al-ʿAbbāsī, 198–199 (814).
Moṭṭalib b. ʿAbdallah, 199–200 (814–816)—second time.
Sarī b. al-Ḥakam b. Yūsuf, 200–201 (816).
Sulaimān b. Ghālib b. Jibrīl al-Bājilī, 201 (816–817).
Sarī b. al Ḥakam, 201–205 (817–820).
Abū Naṣr Mahommed b. al-Sarī, 205 (820–821).
ʿObaidallah b. al-Sarī, 205–211 (821–826).
ʿAbdallah b. Ṭāhir, 211–213 (826–829).
Mahommed b. Hārūn (al-Moʿtasim), 213–214 (829).
ʿUmair b. Al-Walīd al-Tamīmī al-Bādhaghīsī, 214 (829).
ʿĪsā b. Yazīd, 214 (829).
ʿAbduyah b. Jabalah, 215–216 (830–831).
ʿĪsā b. Manṣūr b. Mūṣā al-Rāfiʿī, 216–217 (831–832).
Naṣr b. Abdallah Kaidar al-Ṣafadī, 217–219 (832–834).
Muzaffar b. Kaidar, 219 (834).
Mūsā b. Abi'l-ʿAbbās Thābit al Hanafī, 219–224 (834–839).
Mālik b. Kaidar al Ṣafadī, 224–226 (839–841).
ʿAlī b. Yaḥyā abu l-Hasan al-Armanī, 226–228 (841–842).
ʿIsā b. Manṣūr al-Rāfiʿī, 229–233 (843–847).
Harthamah b. al-Naḍir al Jabalī, 233–234 (848–849).
Ḥātim b. Harthamah, 234 (849).
ʿAlī b. Yaḥyā, 234–235 (849–850).
Ishāq b. Yaḥyā al-Khatlānī, 235–236 (850–851).
ʿAbd al-Wāhid b. Yaḥyā b. Manṣūr, 236–238 (851–852).
ʿAnbasa b. Ishāq b. Shamir, 238–242 (852–856).
Yazīd b. ʿAbdallah b. Dīnār, 242–253 (856–867).
Muzāhim b. Khāqān al-Turkī, 253–254 (867–868).
Aḥmad b. Muzāhim b. Khāqān, 254 (868).
Urjūz b. Ulugh Ṭarkhān al-Turkī, 254 (868).

Tulunid house.

Aḥmad b. Ṭūlūn, 254–270 (868–884).
Khomārūya b. Aḥmad, 270–282 (884–896).
Jaish b. Khomārūya, 282 (896).
Hārūn b. Khomārūya, 283–292 (896–904).

Shaibān b. Aḥmad, 292 (905).
ʿĪsā b. Mahommed al-Naūsharī, 292 (905).
Mahommed b. ʿAli al-Khalanjī, 292–293 (905–906).
ʿĪsā al-Naūsharī, 293–297 (906–910)—second time.
Takīn b. Abdallah al-Khazarī, 297–302 (910–915).
Dhukā al-Rūmī, 303–307 (915–919).
Takīn b. ʿAbdallah, 307–309 (919–921)—second time.
Abū Qābūs Maḥmūd b. Ḥamal, 309 (921).
Hilāl b. Badr, 309–311 (921–923).

Aḥmad b. Kaighlagh, 311 (923).
Takīn b. Abdallah, 311–321 (923–933)—third time.
Mahommed b. Takīn, 321 (933).

Ikshīdī house.

Mahommed b. Ṭughj al-Ikshīd, 321 (933).
[Aḥmad b. Kaighlagh, 321–322 (933–934)].
Mahommed b. Ṭughj, 323–334 (934–946)—second time.
Ūnjūr b. al-Ikshīd, 334–349 (946–961).
‘Alī b. al-Ikshīd, 349–355 (961–966).
Kāfūr b. Abdallah al-Ikshīdī, 355–357 (966–968).
Abu’l-Fawāris Aḥmad b. ‘Alī b. al-Ikshīd, 357 (968).

(*b*) *Fāṭimite Caliphs*, 357–567 (969–1171).

Mo‘izz Abū Tamīm Ma‘add (or li-dīn allāh), 357–365 (969–975).
‘Azīz Abū Manṣūr Nizār (al-‘Azīz billāh), 365–386 (975–996).
Ḥākim [Abū ‘Alī Manṣūr], 386–411 (996–1020).
Ẓāhir [Abu’l-Ḥasan ‘Alī], 411–427 (1020–1035).
Mostanṣir [Abū Tamīm Ma‘add], 427–487 (1035–1094).
Mosta‘lī [Abu’l-Qāsim Aḥmad], 487–495 (1094–1101).
Amir [Abū ‘Alī Manṣūr], 495–524 (1101–1130).
Ḥāfiz [Abu’l-Maimūn ‘Abd al-Majīd], 524–544 (1130–1149).
Ẓāfir [Abu’l-Manṣūr Ismā‘īl], 544–549 (1149–1154).
Fā‘iz [Abu’l-Qāsim ‘Īsā], 549–555 (1154–1160).
‘Ādid [Abū Mahommed ‘Abdallah], 555–567 (1160–1171).

(*c*) *Ayyūbite Sultans*, 564–648 (1169–1250).

Malik al-Nāṣir Ṣalāḥ al-dīn Yūsuf b. Ayyūb (SALADIN), 564–589 (1169–1193).
Malik al-‘Azīz ‘Imād al-dīn Othman, 589–595 (1193–1198).
Malik al-Manṣūr Mahommed, 595–596 (1198–1199).
Malik al-‘Ādil Saif al-dīn Abū Bakr, 596–615 (1199–1218).
Malik AL-KĀMIL Mahommed, 615–635 (1218–1238).
Malik al-‘Ādil II. Saif al-dīn Abū Bakr, 635–637 (1238–1240).
Malik al-Ṣāliḥ Najm al-dīn Ayyūb, 637–647 (1240–1249).
Malik al-Mo‘azzam Tūrānshāh, 647–648 (1249–1250).
Malik al-Ashraf Mūsā, 648–650 (1250–1252).

(*d*) *Baḥri Mamelukes*, 648–792 (1250–1390).

Shajar al-durr, 648 (1250).
Malik al-Mo‘izz ‘Izz al-dīn Aibek, 648–655 (1250–1257).
Malik al-Manṣūr Nureddin ‘Alī, 655–657 (1257–1259).
Malik al-Moẓaffar Saif al-dīn KOTUZ, 657–658 (1259–1260).
Malik al-Ẓāhir [Rukn al-dīn (Rukneddin) BIBARS Bundukdārī], 658–676 (1260–1277).
Malik al-Sa‘īd Nāṣir al-dīn Barakah Khān, 676–678 (1277–1279).
Malik al-‘Ādil Badr al-dīn Salāmish, 678 (1279).
Malik al-Manṣūr Saif al-dīn QALĀ’ŪN, 678–689 (1279–1290).
Malik al-Ashraf [Ṣalāḥ al-dīn KHALĪL], 689–693 (1290–1293).
Malik al-Nāṣir [Nāṣir al-dīn Mahommed], 693–694 (1293–1294).
Malik al-‘Ādil [Zain al-dīn KITBOGA], 694–696 (1294–1296).
Manṣūr [Ḥusām al-dīn LĀJĪN], 696–698 (1296–1298).
NĀṢIR MAHOMMED (again), 698–708 (1298–1308).
Moẓaffar [Rukn al-dīn Bibars Jāshengīr], 708–709 (1308–1310).
Nāṣir Mahommed (third time), 709–741 (1310–1341).
Manṣūr [Saif al-dīn ABŪ BAKR], 741–742 (1341).
Ashraf [Alā’u ’l-dīn KUCHUK], 742 (1341–1342).
Nāṣir [Shihāb al-dīn Aḥmad], 742–743 (1342).
Ṣāliḥ ‘Imād al-dīn Ismā‘īl], 743–746 (1342–1345).
Kāmil [Saif al-dīn SHA‘BAN], 746–747 (1345–1346).
Moẓaffar [Saif al-dīn ḤAJJI], 747–748 (1346–1347).
Nāṣir [Nāṣir al-dīn Ḥasan], 748–752 (1347–1351).
Ṣāliḥ [Ṣalāḥ al-dīn Ṣāliḥ], 752–755 (1351–1354).
Nāṣir [Ḥasan] (again), 755–762 (1354–1361).
Manṣūr [Ṣalāḥ al-dīn Mahommed], 762–764 (1361–1363).
Ashraf [Nāṣir al-dīn Sha‘bān], 764–778 (1363–1377).
Manṣūr [‘Alā’u ’l-dīn ‘Alī], 778–783 (1377–1381).
Ṣāliḥ [Ṣalāḥ al-dīn Ḥājjī], 783–784 (1381–1382).
Barḳūḳ or Barqūq (see below), 784–791 (1382–1389).
Ḥājjī again, with title of Moẓaffar, 791–792 (1389–1390).

(*e*) *Burji Mamelukes*, 784–922 (1382–1517).

Ẓāhir [Saif al-dīn Barqūq], 784–801 (1382–1398) [interrupted by Ḥājjī, 791–792].
Nāṣir [Nāṣir al-dīn FARAJ], 801–808 (1398–1405).
Manṣūr [‘Izz al-dīn Abdalaziz (‘Abd al-‘Azīz)], 808–809 (1405–1406).
Nāṣir Faraj (again), 809–815 (1406–1412).
‘Ādil Mosta‘īn (Abbasid caliph), 815 (1412).
Mu’ayyad [Sheikh], 815–824 (1412–1421).
Moẓaffar [Aḥmad], 824 (1421).
Ẓāhir [Saif al-dīn Tatār], 824 (1421).
Ṣāliḥ [Nāṣir al-dīn Mahommed], 824–825 (1421–1422).
Ashraf [Saif al-dīn Barsbai], 825–842 (1422–1438).
‘Azīz [Jamāl al-dīn Yūsuf], 842 (1438).
Ẓāhir [Saif al-dīn Jakmak], 842–857 (1438–1453).
Manṣūr [Fakhr al-dīn Othman], 857 (1453).
Ashraf [Saif al-dīn Īnāl], 857–865 (1453–1461).
Mu’ayyad [Shihāb al-dīn Aḥmad], 865 (1461).
Ẓāhir [Saif al-dīn Khoshkadam], 865–872 (1461–1467).
Ẓāhir [Saif al-dīn Yelbai or Bilbai], 872 (1467).
Ẓāhir [Tīmūrboghā], 872–873 (1467–1468).
Ashraf [Saif al-dīn (KAIT BEY)], 873–901 (1468–1495).
Nāṣir [Mahommed], 901–904 (1495–1498).
Ẓāhir [Kānsūh], 904–905 (1498–1499).
Ashraf [Jānbalāt or Jan Belāt], 905–906 (1499–1501).
‘Ādil Tumanbey (1501).
Ashraf [Kānsūh Ghūrī], 906–922 (1501–1516).
Ashraf [Tūmānbey], 922 (1516–1517).

(*f*) *Turkish Governors after the Ottoman Conquest.*

Khair Bey, 923 (1517).
Muṣṭafā Pasha, 926 (1520).
Aḥmad, 929 (1523).
Qāsim, 930 (1524).
Ibrāhīm, 931 (1525).
Suleimān, 933 (1527).
Dāwūd, 945 (1538).
‘Alī, 956 (1549).
Mahommed, 961 (1554).
Iskandar, 963 (1556).
‘Alī al-Khādim, 968 (1561).
Muṣṭafā, 969 (1561).
‘Alī al-Sūfī, 971 (1563).
Maḥmūd, 973 (1566).
Sinān, 975 (1567).
Ḥosain, 980 (1573).
Masīḥ, 982 (1575).
Ḥasan al-Khādim, 988 (1580).
Ibrāhīm, 991 (1583).
Sinān, 992 (1584).
Uwais, 994 (1585).
Ḥāfiz Aḥmad, 999 (1591).
Kurṭ, 1003 (1595).
Sayyid Mahommed, 1004 (1596).
Khiḍr, 1006 (1598).
‘Alī al-Silaḥdār, 1009 (1601).
Ibrāhīm, 1012 (1604).
Mahommed al-Kūrjī, 1013 (1605).
Ḥasan, 1014 (1605).
Mahommed al-Sūfī, 1016 (1607).
Aḥmad al-Daftardār, 1022 (1613).
Muṣṭafā Lafakli, 1026 (1617).
Ja‘far, 1027 (1618).
Muṣṭafā, 1028 (1619).
Ḥosain, 1028 (1619).
Mahommed, 1031 (1622).
Ibrāhīm, 1031 (1622).
Muṣṭafā, 1032 (1623).
‘Alī, 1032 (1623).
Muṣṭafā, 1032 (1624).
Bairām, 1036 (1626).
Mahommed, 1037 (1627).
Mūsā, 1040 (1631).
Khalīl al-Bustānjī, 1041 (1631).
Aḥmad al-Kūrjī, 1042 (1633).
Ḥosain, 1045 (1636).
Mahommed b. Aḥmad, 1047 (1638).
Muṣṭafā al-Bustānjī, 1049 (1639).
Maqsūd, 1050 (1641).
Suyān Bey, 1054 (1644).
Ayyūb, 1055 (1645).
Mahommed b. Ḥaidar, 1057 (1647).
Aḥmad, 1058 (1648).
‘Abd al-Raḥmān, 1061 (1651).
Mahommed al-Silaḥdār, 1062 (1652).
Ghāzī, 1066 (1655).
Omar, 1067 (1652).
Aḥmad, 1077 (1666).
Ibrāhīm, 1078 (1667).
Ḥosain, 1085 (1674).
Ḥasan al-Jānbalāṭ, 1087 (1676).
Othmān, 1091 (1680).
Ḥasan al-Silaḥdār, 1099 (1688).
Aḥmad, 1101 (1690).
‘Alī Qilij, 1102 (1691).
Ismā‘īl, 1107 (1696).
Ḥosain, 1109 (1697).
Qarā Mahommed or Aḥmad, 1111 (1699).
Mahommed Rāmī, 1116 (1704).
‘Alī Muslim, 1118 (1706).
Ḥosain Ketkhudā, 1119 (1707).
Ibrāhīm Qabūdān, 1121 (1709).
Khalīl, 1122 (1710).
Walī, 1123 (1711).
‘Ābidīn, 1127 (1715).
‘Alī Izmīrli, 1129 (1717).
Rajab, 1130 (1718).
Mahommed al-Bāshimī, 1132 (1720).
‘Alī, 1138 (1728).
Bākīr, 1141 (1729).
‘Abdallah Kubūrlu, 1142 (1729).
Mahommed Silaḥdār, 1144 (1732).
Othman Ḥalabī, 1146 (1733).
Bākīr, 1148 (1735).
Muṣṭafā, 1149 (1736).
Sulaimān b. al-‘Aẓīm, 1152 (1739).
‘Alī Ḥakīm Oghlu, 1153 (1740).
Yaḥyā, 1154 (1741).
Mahommed Yedkeshi, 1156 (1743).
Mahommed Rāghib, 1158 (1745).
Aḥmad Kuruzīr, 1161 (1748).
Sharīf ‘Abdallāh, 1163 (1750).
Mahommed Amīn, 1166 (1753).
Muṣṭafā, 1166 (1753).
‘Alī Ḥakīm Oghlu, 1169 (1756).
Mahommed Sa‘īd, 1171 (1758).
Muṣṭafā, 1173 (1759).
Aḥmad Kāmil, 1174 (1761).
Bākīr, 1175 (1761).
Ḥasan, 1176 (1761).
Ḥamzah, 1179 (1765).
Mahommed Rāqim, 1181 (1767).
Mahommed Urflu, 1182 (1768).
Aḥmad, 1183 (1770).
Qara Khalīl, 1184 (1770).
Muṣṭafā Nābulsī, 1188 (1774).
Ibrāhīm ‘Arabgīrli, 1189 (1775).
Mahommed ‘Izzet, 1190 (1776).
Ismā‘īl, 1193 (1779).
Mahommed Mālik, 1195 (1781).
Sharīf ‘Alī Qaṣṣāb, 1196 (1782).
Mahommed Silaḥdār, 1198 (1783).
Mahommed Yeyen, 1200 (1785).
‘Ābidīn Sharīf, 1201 (1787).
Ismā‘īl Tūnisī, 1203 (1788).
Ṣāliḥ Qaisarli, 1209 (1794).
Abū Bakr Ṭarābulsī, 1211 (1796).

French Occupation.

Khosrev, 1216 (1802).
Ṭāhir, 1218 (1803).
Ali Jazā’irlī or Ṭarābulsī, 1218 (1803).
Khorshīd, 1219 (1804).

(*g*) *Hereditary Pashas* (*later Khedives*), *from* 1220 (*from* 1805).

Mehemet ‘Alī, 1220–1264 (1805–1848).
Ibrāhīm, 1264 (1848).
‘Abbās I., 1264–1270 (1848–1854).
Sa‘īd, 1270–1280 (1854–1863).
Ismā‘īl, 1280–1300 (1863–1882).
Tewfīk, 1300–1309 (1882–1892).
Abbās II., 1309 (1892).

(3) *Period under Governors sent from the Metropolis of the eastern Caliphate.*—The first governor of the newly acquired province was the conqueror ‘Amr, whose jurisdiction was

presently restricted to Lower Egypt; Upper Egypt, which was divided into three provinces, being assigned to Abdallāh b. Sa'd, on whom the third caliph conferred the government of Lower Egypt also, 'Amr being recalled, owing to his unwillingness to extort from his subjects as much money as would satisfy the caliph. In the troubles which overtook the Islamic empire with the accession of Othman, Egypt was greatly involved, and it had to be reconquered from the adherents of Ali for Moawiya (Mo'awiyah) by 'Amr, who in A.H. 38 was rewarded for his services by being reinstated as governor, with the right to appropriate the surplus revenue instead of sending it as tribute to the metropolis. In the confusion which followed on the death of the Omayyad caliph Yazīd the Egyptian Moslems declared themselves for Abdallāh b. Zobair, but their leader was defeated in a battle near Ain Shams (December 684) by Merwān b. Ḥakam (Merwān I.), who had assumed the Caliphate, and the conqueror's son Abd al-'Azīz was appointed governor. They also declared themselves against the usurper Merwān II. in 745, whose lieutenant al-Ḥautharah had to enter Fostat at the head of an army. In 750 Merwān II. himself came to Egypt as a fugitive from the Abbasids, but found that the bulk of the Moslem population had already joined with his enemies, and was defeated and slain in the neighbourhood of Giza in July of the same year. The Abbasid general, Ṣāliḥ b. Ali, who had won the victory, was then appointed governor.

During the period that elapsed between the Moslem conquest and the end of the Omayyad dynasty the nature of the Arab occupation had changed from what had originally been intended, the establishment of garrisons, to systematic colonization. Conversions of Copts to Islam were at first rare, and the old system of taxation was maintained for the greater part of the first Islamic century. This was at the rate of a dinar per *feddan*, of which the proceeds were used in the first place for the pay of the troops and their families, with about half the amount in kind for the rations of the army. The process by which the first of these contributions was turned into coin is still obscure; it is clear that the corn when threshed was taken over by certain public officials who deducted the amount due to the state. In general the system is well illustrated by the papyri forming the Schott-Reinhardt collection at Heidelberg (edited by C. H. Becker, 1906), which contain a number of letters on the subject from Qurrah b. Sharīk, governor from A.H. 90 to 96. The old division of the country into districts (*nomoi*) is maintained, and to the inhabitants of these districts demands are directly addressed by the governor of Egypt, while the head of the community, ordinarily a Copt, but in some cases a Moslem, is responsible for compliance with the demand. An official called "receiver" (*qabbāl*) is chosen by the inhabitants of each district to take charge of the produce till it is delivered into the public magazines, and receives 5% for his trouble. Some further details are to be found in documents preserved by the archaeologist Maqrīzī, from which it appears that the sum for which each district was responsible was distributed over the unit in such a way that artisans and tradesmen paid at a rate similar to that which was enforced on those employed in agriculture. It is not known at what time the practice of having the amount due settled by the community was altered into that according to which it was settled by the governor, or at what time the practice of deducting from the total certain expenses necessary for the maintenance of the community was abandoned. The researches of Wellhausen and Becker have made it clear that the difference which is marked in later Islam between a poll-tax (*jizyah*) and a land-tax (*kharāj*) did not at first exist: the papyri of the 1st century know only of the jizyah, which, however, is not a poll-tax but a land-tax (in the main). The development of the poll-tax imposed on members of tolerated cults seems to be due to various causes, chief of them the acquisition of land by Moslems, who were not at first allowed to possess any, the conversion of Coptic landowners to Islam, and the enforcement (towards the end of the 1st century of Islam) of the poll-tax on monks. The treasury could not afford to lose the land-tax, which it would naturally forfeit by the first two of the above occurrences, and we read of various expedients being tried to prevent this loss. Such were making the Christian community to which the proselyte had belonged pay as much as it had paid when his lands belonged to it, making proselytes pay as before their conversion, or compelling them to abandon their lands on conversion. Eventually the theory spread that all land paid land-tax, whereas members of tolerated sects paid a personal tax also; but during the evolution of this doctrine the relations between conquerors and conquered became more and more strained, and from the time when the control of the finance was separated from the administration of the country (A.D. 715) complaints of extortion became serious; under the predecessor of Qurrah, 'Abdallāh b. 'Abd al-Malik, the country suffered from famine, and under this ruler it was unable to recover. Under the finance minister Obaidallah b. Ḥabḥāb (720–734) the first government survey by Moslems was made, followed by a census; but before this time the higher administrative posts had been largely taken out of the hands of Copts and filled with Arabs. The resentment of the Copts finally expressed itself in a revolt, which broke out in the year 725, and was suppressed with difficulty. Two years after, in order that the Arab element in Egypt might be strengthened, a colony of North Arabians (Qaisites) was sent for and planted near Bilbeis, reaching the number of 3000 persons; this immigration also restored the balance between the two branches of the Arab race, as the first immigrants had belonged almost exclusively to the South Arabian stock. Meanwhile the employment of the Arabic language had been steadily gaining ground, and in 706 it was made the official language of the bureaux, though the occasional use of Greek for this purpose is attested by documents as late as the year 780. Other revolts of the Copts are recorded for the year 739 and 750, the last year of Omayyad domination. The outbreaks in all cases are attributed to increased taxation.

Coptic revolt.

The Abbasid period was marked at its commencement by the erection of a new capital to the north of Fostat, bearing the name '*Askar* or "camp." Apparently at this time the practice of farming the taxes began, which naturally led to even greater extortion than before; and a fresh rising of the Copts is recorded for the fourth year of Abbasid rule. Governors, as will be seen from the list, were frequently changed. The three officials of importance whose nomination is mentioned by the historians in addition to that of the governor were the commander of the bodyguard, the minister of finance and the judge. Towards the beginning of the 3rd Islamic century the practice of giving Egypt in fief to a governor was resumed by the caliph Mamūn, who bestowed this privilege on 'Abdallāh b. Ṭāhir, who in 827 was sent to recover Alexandria, which for some ten years had been held by exiles from Spain. 'Abdallāh b. Ṭāhir decided to reside at Bagdad, sending a deputy to Egypt to govern for him; and this example was afterwards followed. In 828, when Mamūn's brother Motaṣim was feudal lord, a violent insurrection broke out in the Ḥauf, occasioned, as usual, by excessive taxation; it was partly quelled in the next year by Motaṣim, who marched against the rebels with an army of 4000 Turks. The rebellion broke out repeatedly in the following years, and in 831 the Copts joined with the Arabs against the government; the state of affairs became so serious that the caliph Mamūn himself visited Egypt, arriving at Fostat in February 832; his general Afshīn fought a decisive battle with the rebels at Bāsharūd in the Ḥauf region, at which the Copts were compelled to surrender; the males were massacred and the women and children sold as slaves.

This event finally crushed the Coptic nation, which never again made head against the Moslems. In the following year the caliph Motaṣim, who surrounded himself with a foreign bodyguard, withdrew the stipends of the Arab soldiers in Egypt; this measure caused some of the Arab tribes who had been long settled in Egypt to revolt, but their resistance was crushed, and the domination of the Arab element in the country from this time gave way to that of foreign mercenaries, who, belonging to one nation or another, held it for most of its subsequent history. Egypt was given in fief to a Turkish general Ashnās

Turkish governors appointed.

(Ashinas), who never visited the country, and the rule of individuals of Turkish origin prevailed till the rise of the Fāṭimites, who for a time interrupted it. The presence of Turks in Egypt is attested by documents as early as 808. While the governor was appointed by the feudal lord, the finance minister continued to be appointed by the caliph. On the death of Ashnās in 844 Egypt was given in fief to another Turkish general Ītākh, but in 850 this person fell out of favour, and the fief was transferred to Montaṣir, son of the caliph Motawakkil. In 856 it was transferred from him to the vizier Fatḥ b. Khāqān, who for the first time appointed a Turkish governor. The chief places in the state were also filled with Turks. The period between the rise of the Abbasids and the quasi-independent dynasties of Egypt was marked by much religious persecution, occasioned by the fanaticism of some of the caliphs, the victims being generally Moslem sectarians. (For Egypt under Motawakkil see CALIPHATE, § c. par. 10.)

The policy of these caliphs also led to severe measures being taken against any members of the Alid family or adherents of their cause who were to be found in Egypt.

Ṭūlūnid Dynasty.

In the year 868 Egypt was given in fief to a Turkish general Bayikbeg, who sent thither as his representative his stepson Aḥmad b. Ṭūlūn, the first founder of a quasi-independent dynasty. This personage was himself the son of a Turk who, originally sent as a slave to Bagdad, had risen to high rank in the service of the caliphs. Aḥmad b. Ṭūlūn spent some of his early life in Tarsus, and on his return distinguished himself by rescuing his caravan, which conveyed treasure belonging to the caliph, from brigands who attacked it; he afterwards accompanied the caliph Mosta'īn into exile, and displayed some honourable qualities in his treatment of the fallen sovereign. He found a rival in Egypt in the person of Ibn al-Modabbir, the finance minister, who occupied an independent position, and who started the practice of surrounding himself with an army of his own slaves or freedmen; of these Ibn Ṭūlūn succeeded in depriving the finance minister, and they formed the nucleus of an army by which he eventually secured his own independence. Insurrections by adherents of the Alids gave him the opportunity to display his military skill; and when in 870 his stepfather died, by a stroke of luck the fief was given to his father-in-law, who retained Aḥmad in the lieutenancy, and indeed extended his authority to Alexandria, which had till that time been outside it. The enterprise of a usurper in Syria in the year 872 caused the caliph to require the presence of Aḥmad in that country at the head of an army to quell it; and although this army was not actually employed for the purpose, it was not disbanded by Aḥmad, who on his return founded a fresh city called Kaṭā'i', "the fiefs," S.E. of modern Cairo, to house it. On the death of Aḥmad's father-in-law in the same year, when Egypt was given in fief to the caliph's brother Mowaffaq (famous for his defeat of the Zanj), Aḥmad secured himself in his post by extensive bribery at headquarters; and in the following year the administration of the Syrian frontier was conferred on him as well. By 875 he found himself strong enough to refuse to send tribute to Bagdad, preferring to spend the revenues of Egypt on the maintenance of his army and the erection of great buildings, such as his famous mosque; and though Mowaffaq advanced against him with an army, the project of reducing Aḥmad to submission had to be abandoned for want of means. In 877 and 878 Aḥmad advanced into Syria and obtained the submission of the chief cities, and at Tarsus entered into friendly relations with the representatives of the Byzantine emperor. During his absence his son 'Abbās revolted in Egypt; on the news of his father's return he fled to Barca, whence he endeavoured to conquer the Aghlabite dominions in the Maghrib; he was, however, defeated by the Aghlabite ruler, and returned to Barca, where he was again defeated by his father's forces and taken prisoner.

In 882 relations between Aḥmad and Mowaffaq again became strained, and the former conceived the bold plan of getting the caliph Mo'tamid into his power, which, however, was frustrated by Mowaffaq's vigilance; but an open rupture was the result, as Mowaffaq formally deprived Aḥmad of his lieutenancy, while Aḥmad equally formally declared that Mowaffaq had forfeited the succession. A revolt that broke out at Tarsus caused Aḥmad to traverse Syria once more in 883, but illness compelled him to return, and on the 10th of May 884 he died at his residence in Kaṭā'i'. He was the first to establish the claim of Egypt to govern Syria, and from his time Egypt grew more and more independent of the Eastern caliphate. He appears to have invented the fiction which afterwards was repeatedly employed, by which the money spent on mosque-building was supposed to have been furnished by discoveries of buried treasure.

He was succeeded by his son Khomārūya, then twenty years of age, who immediately after his accession had to deal with an attempt on the part of the caliph to recover Syria; this attempt failed chiefly through dissensions between the caliph's officers, but partly through the ability of Khomārūya's general, who succeeded in winning a battle after his master had run away from the field. By 886 Mowaffaq found it expedient to grant Khomārūya the possession of Egypt, Syria, and the frontier towns for a period of thirty years, and ere long, owing to the disputes of the provincial governors, Khomārūya found it possible to extend his domain to the Euphrates and even the Tigris. On the death of Mowaffaq in 891 the Egyptian governor was able to renew peaceful relations with the caliphs, and receive fresh confirmation in his possessions for thirty years. The security which he thereby gained gave him the opportunity to indulge his taste for costly buildings, parks and other luxuries, of which the chroniclers give accounts bordering on the fabulous. After the marriage of his daughter to the caliph, which was celebrated at enormous expense, an arrangement was made giving the Ṭūlūnid sovereign the viceroyalty of a region extending from Barca on the west to Hīt on the east; but tribute, ordinarily to the amount of 300,000 dinars, was to be sent to the metropolis. His realm enjoyed peace till his death in 896, when he fell a victim to some palace intrigue at Damascus.

His son and successor Abu'l-'Asākir Jaish was fourteen years old at his accession, and being without adequate guidance soon revealed his incompetence, which led to his being murdered after a reign of six months by his troops, who gave his place to his brother Hārūn, who was of about the same age. In the eight years of his government the Ṭūlūnid empire contracted, owing to the revolts of the deputies which Hārūn was unable to quell, though in 898 he endeavoured to secure a new lease of the sovereignty in Egypt and Syria by a fresh arrangement with the caliph, involving an increase of tribute. The following years witnessed serious troubles in Syria caused by the Carmathians, which called for the intervention of the caliph, who at last succeeded in defeating these fanatics; the officer Mahommed b. Solaimān, to whom the victory was due, was then commissioned by the caliph to reconquer Egypt from the Ṭūlūnids, and after securing the allegiance of the Syrian prefects he invaded Egypt by sea and land at once. Before the arrival of these troops Hārūn had met his death at the hands of an assassin, or else in an affray, and his uncle Shaibān, who was placed on the throne, found himself without the means to collect an army fit to grapple with the invaders. Fostat was taken by Mahommed b. Solaimān after very slight resistance, at the beginning of 905, and after the infliction of severe punishment on the inhabitants Egypt was once more put under a deputy, 'Īsā al-Naushārī, appointed directly by the caliph.

The old régime was not restored without an attempt made by an adherent of the Ṭūlūnids to reconquer Egypt ostensibly for their benefit, and for a time the caliph's viceroy had to quit the capital. The vigorous measures of the authorities at Bagdad speedily quelled this rebellion, and the Ṭūlūnid palace at Kaṭā'i' was then destroyed in order that there might be nothing to remind the Egyptians of the dynasty. In the middle of the year 914 Egypt was invaded for the first time by a Fāṭimite force sent by the caliph al-Mahdī 'Obaidallah, now established at Kairawān. The Mahdi's son succeeded in taking Alexandria, and advancing as far as the Fayūm; but once more the Abbasid caliph sent a powerful army to assist his viceroy, and the invaders were driven out of the country and pursued as far as Barca; the Fāṭimite caliph, however, continued to maintain active propaganda in Egypt. In 919 Alexandria was again seized by the Mahdi's son, afterwards the caliph al-Qā'im, and while his forces advanced northward as far as Ushmunain (Eshmunain) he was reinforced by a fleet which arrived at Alexandria. This fleet was destroyed by a far smaller one sent by the Bagdad caliph to Rosetta; but Egypt was not freed from the invaders till the year 921, when reinforcements had been repeatedly sent from Bagdad to deal with them. The extortions necessitated by these wars for the maintenance of armies and the incompetence of the viceroys brought Egypt at this time into a miserable condition; and the numerous political crises at Bagdad prevented for a time any serious measures being taken to improve it. After a struggle between various pretenders to the viceroyalty, in which some pitched battles were fought, Mahommed b. Ṭughj, son of a Ṭūlūnid prefect of Damascus, was sent by the caliph to restore order; he had to force his entrance into the country by an engagement with one of the pretenders, Ibn Kaighlagh, in which he was victorious, and entered Fostat in August 935.

Ikshidite Dynasty.

Mahommed b. Ṭughj was the founder of the Ikshīdī dynasty, so called from the title Ikshīd, conferred on him at his request by the caliph shortly after his appointment to the governorship of Egypt; it is said to have had the sense of "king" in Ferghana, whence this person's ancestors had come to enter the service of the caliph Motaṣim. He had himself served under the governor of Egypt, Takīn, whose son he displaced, in various capacities, and had afterwards held various governorships in Syria. One of the historians represents his appointment to Egypt as effected by bribery and even forgery. He united in his person the offices of governor and minister of finance, which had been separate since the time of the Ṭūlūnids. He endeavoured to replenish the treasury not only by extreme economy, but by inflicting fines on a vast scale on persons who had held offices under his predecessor and others who had rendered themselves suspect. The disaffected in Egypt kept up communications with the Fāṭimites, against whom the Ikshīd collected a vast army, which, however, had first to be employed in resisting an invasion of Egypt threatened by Ibn Rāiq, an adventurer who had seized Syria; after an indecisive engagement at Lajūn the Ikshīd decided to make peace with Ibn Rāiq, undertaking to pay him tribute. The favour afterwards shown to Ibn Rāiq at Bagdad nearly threw the Ikshīd into the arms of the Fāṭimite caliph, with whom he carried on a friendly correspondence, one letter of which is preserved. He is even said to have given orders to substitute the name of the Fāṭimite caliph for that of the Abbasid in public prayer, but to have been warned of the unwisdom of this course. In 941, after the death of Ibn Rāiq, the Ikshīd took the opportunity of invading Syria, which the caliph permitted him to hold with the addition of the sacred cities of Mecca and Medina, which the Ṭūlūnids had aspired to possess. He is said at this time to have started (in imitation of Aḥmad Ibn Ṭūlūn) a variety of vexatious enactments similar to those afterwards associated with the name of Hākim, *e.g.* compelling his soldiers to dye their hair, and adding to their pay for the purpose.

In the year 944 he was summoned to Mesopotamia to assist the caliph, who had been driven from Bagdad by Tūzūn and was in the power of the Ḥamdānids; and he proposed, though unsuccessfully, to take the caliph with him to Egypt. At this time he obtained hereditary rights for his family in the government of that country and Syria. The Ḥamdānid Saif addaula shortly after this assumed the governorship of Aleppo, and became involved in a struggle with the Ikshīd, whose general, Kāfūr, he defeated in an engagement between Homs and Hamah (Hamath). In a later battle he was himself defeated by the Ikshīd, when an arrangement was made permitting Saif addaula to retain most of Syria, while a prefect appointed by the Ikshīd was to remain in Damascus. The Buyid ruler, who was now supreme at Bagdad, permitted the Ikshīd to remain in possession of his viceroyalty, but shortly after receiving this confirmation he died at Damascus in 946.

The second of this dynasty was the Ikshīd's son Ūnjūr, who had been proclaimed in his father's time, and began his government under the tutelage of the negro Kāfūr. Syria was immediately overrun by Saif addaula, but he was defeated by Kāfūr in two engagements, and was compelled to recognize the overlordship of the Egyptian viceroy. At the death of Ūnjūr in 961 his brother Abu'l-Ḥasan 'Alī was made viceroy with the caliph's consent by Kāfūr, who continued to govern for his chief as before. The land was during this period threatened at once by the Fāṭimites from the west; the Nubians from the south, and the Carmathians from the east; when the second Ikshīdī died in 965, Kāfūr at first made a pretence of appointing his young son Aḥmad as his successor, but deemed it safer to assume the viceroyalty himself, setting an example which in Mameluke times was often followed. He occupied the post little more than three years, and on his death in 968 the aforementioned Aḥmad, called Abu'l-Fawāris, was appointed successor, under the tutelage of a vizier named Ibn Furāt, who had long served under the Ikshīdīs. The accession of this prince was followed by an incursion of the Carmathians into Syria, before whom the Ikshīdī governor fled into Egypt, where he had for a time to undertake the management of affairs, and arrested Ibn Furāt, who had proved himself incompetent.

The administration of Ibn Furāt was fatal to the Ikshīdīs and momentous for Egypt, since a Jewish convert, Jacob, son of Killis, who had been in the Ikshīd's service, and was ill-treated by Ibn Furāt, fled to the Fāṭimite sovereign, and persuaded him that the time for invading Egypt with a prospect of success had arrived, since there was no one in Fostat capable of organizing a plan of defence, and the dissensions between the Buyids at Bagdad rendered it improbable that any succour would arrive from that quarter. The Fāṭimite caliph Mo'izz li-dīn allāh was also in correspondence with other residents in Egypt, where the Alid party from the beginning of Abbasid times had always had many supporters; and the danger from the Carmathians rendered the presence of a strong government necessary. The Fāṭimite general Jauhar (variously represented as of Greek, Slav and Sicilian origin), who enjoyed the complete confidence of the Fāṭimite sovereign, was placed at the head of an army of 100,000 men—if Oriental numbers are to be trusted—and started from Rakkāda at the beginning of March 969 with the view of seizing Egypt.

Before his arrival the administration of affairs had again been committed to Ibn Furāt, who, on hearing of the threatened invasion, at first proposed to treat with Jauhar for the peaceful surrender of the country; but though at first there was a prospect of this being carried out, the majority of the troops at Fostat preferred to make some resistance, and an advance was made to meet Jauhar in the neighbourhood of Giza. He had little difficulty in defeating the Egyptian army, and on the 6th of July 969 entered Fostat at the head of his forces. The name of Mo'izz was immediately introduced into public prayer, and coins were struck in his name. The Ikshīdī governor of Damascus, a cousin of Abu'l-Fawāris Aḥmad, endeavoured to save Syria, but was defeated at Ramleh by a general sent by Jauhar and taken prisoner. Thus the Ikshīdī Dynasty came to an end, and Egypt was transferred from the Eastern to the Western caliphate, of which it furnished the metropolis.

(4) *The Fāṭimite period* begins with the taking of Fostat by Jauhar, who immediately began the building of a new city, al-Kāhira or Cairo, to furnish quarters for the army which he had brought. A palace for the caliph and a mosque for the army were immediately constructed, the latter still famous as al-Azhar, and for many centuries the centre of Moslem learning. Almost immediately after the conquest of Egypt, Jauhar found himself engaged in a struggle with the Carmathians (*q.v.*), whom the Ikshīdī prefect of Damascus had pacified by a promise of tribute; this promise was of course not held binding by the Fāṭimite general (Ja'far b. Falāḥ) by whom Damascus was taken, and the Carmathian leader al-Ḥasan b. Aḥmad al-A'ṣam received

aid from Bagdad for the purpose of recovering Syria to the Abbasids. The general Jaʽfar, hoping to deal with this enemy independently of Jauhar, met the Carmathians without waiting for reinforcements from Egypt, and fell in battle, his army being defeated. Damascus was taken by the Carmathians, and the name of the Abbasid caliph substituted for that of Moʽizz in public worship. Ḥasan al-Aʽṣam advanced from Damascus through Palestine to Egypt, encountering little resistance on the way; and in the autumn of 971 Jauhar found himself besieged in his new city. By a timely sortie, preceded by the administration of bribes to various officers in the Carmathian host, Jauhar succeeded in inflicting a severe defeat on the besiegers, who were compelled to evacuate Egypt and part of Syria.

Meanwhile Moʽizz had been summoned to enter the palace that had been prepared for him, and after leaving a viceroy to take charge of his western possessions he arrived in Alexandria on the 31st of May 973, and proceeded to instruct his new subjects in the particular form of religion (Shīʽism) which his family represented. As this was in origin identical with that professed by the Carmathians, he hoped to gain the submission of their leader by argument; but this plan was unsuccessful, and there was a fresh invasion from that quarter in the year after his arrival, and the caliph found himself besieged in his capital. The Carmathians were gradually forced to retreat from Egypt and then from Syria by some successful engagements, and by the judicious use of bribes, whereby dissension was sown among their leaders. Moʽizz also found time to take some active measures against the Byzantines, with whom his generals fought in Syria with varying fortune. Before his death he was acknowledged as caliph in Mecca and Medina, as well as Syria, Egypt and North Africa as far as Tangier.

In the reign of the second Egyptian Fāṭimite ʽAzīz billah, Jauhar, who appears to have been cashiered by Moʽizz, was again employed at the instance of Jacob b. Killis, who had been raised to the rank of vizier, to deal with the situation in Syria, where a Turkish general Aftakīn had gained possession of Damascus, and was raiding the whole country; on the arrival of Jauhar in Syria the Turks called the Carmathians to their aid, and after a campaign of many vicissitudes Jauhar had to return to Egypt to implore the caliph himself to take the field. In August 977 ʽAzīz met the united forces of Aftakīn and his Carmathian ally outside Ramleh in Palestine and inflicted a crushing defeat on them, which was followed by the capture of Aftakīn; this able officer was taken to Egypt, and honourably treated by the caliph, thereby incurring the jealousy of Jacob b. Killis, who caused him, it is said, to be poisoned. This vizier had the astuteness to see the necessity of codifying the doctrines of the Fāṭimites, and himself undertook this task; in the newly-established mosque of el-Azhar he got his master to make provision for a perpetual series of teachers and students of his manual. It would appear, however, that a large amount of toleration was conceded by the first two Egyptian Fāṭimites to the other sects of Islam, and to other communities. Indeed at one time in ʽAzīz's reign the vizierate of Egypt was held by a Christian, Jesus, son of Nestorius, who appointed as his deputy in Syria a Jew, Manasseh b. Abraham. These persons were charged by the Moslems with unduly favouring their co-religionists, and the belief that the Christians of Egypt were in league with the Byzantine emperor, and even burned a fleet which was being built for the Byzantine war, led to some persecution. Azīz attempted without success to enter into friendly relations with the Buyid ruler of Bagdad, ʽAḍod addaula, who was disposed to favour the ʽAlids, but caused the claim of the Fāṭimites to descend from ʽAli to be publicly refuted. He then tried to gain possession of Aleppo, as the key to ʽIrāk, but this was prevented by the intervention of the Byzantines. His North African possessions were maintained and extended by ʽAli, son of Bulukkīn, whom Moʽizz had left as his deputy; but the recognition of the Fāṭimite caliph in this region was little more than nominal.

His successor *Abū ʽAlī al-Manṣūr*, who reigned under the title *al-Ḥākim biʽamr allāh*, came to the throne at the age of eleven, being the son of ʽAzīz by a Christian mother. He was at first under the tutelage of the Slav Burjuwān, whose policy it was to favour the Turkish element in the army as against the Maghribine, on which the strength of the Fāṭimites had till then rested; his conduct of affairs was vigorous and successful, and he concluded a peace with the Greek emperor. After a few years' regency he was assassinated at the instance of the young sovereign, who at an early age developed a dislike for control and jealousy of his rights as caliph. He is branded by historians as the Caligula of the East, who took a delight in imposing on his subjects a variety of senseless and capricious regulations, and persecuting different sections of them by cruel and arbitrary measures. It is observable that some of those with which Ḥākim is credited are also ascribed to Ibn Ṭūlūn and the Ikshīd (Mahommed b. Tughj). He is perhaps best remembered by his destruction of the church of the Holy Sepulchre at Jerusalem (1010), a measure which helped to provoke the Crusades, but was only part of a general scheme for converting all Christians and Jews in his dominions to his own opinions by force. A more reputable expedient with the same end in view was the construction of a great library in Cairo, with ample provision for students; this was modelled on a similar institution at Bagdad. It formed part of the great palace of the Fāṭimites, and was intended to be the centre of their propaganda. At times, however, he ordered the destruction of all Christian churches in Egypt, and the banishment of all who did not adopt Islām. It is strange that in the midst of these persecutions he continued to employ Christians in high official positions. His system of persecution was not abandoned till in the last year of his reign (1020) he thought fit to claim divinity, a doctrine which is perpetuated by the Druses (*q.v.*), called after one Darazī, who preached the divinity of Ḥākim at the time; the violent opposition which this aroused among the Moslems probably led him to adopt milder measures towards his other subjects, and those who had been forcibly converted were permitted to return to their former religion and rebuild their places of worship. Whether his disappearance at the beginning of the year 1021 was due to the resentment of his outraged subjects, or, as the historians say, to his sister's fear that he would bequeath the caliphate to a distant relative to the exclusion of his own son, will never be known. In spite of his caprices he appears to have shown competence in the management of external affairs; enterprises of pretenders both in Egypt and Syria were crushed with promptitude; and his name was at times mentioned in public worship in Aleppo and Mosul.

His son *Abū'l-Ḥasan ʽAli*, who succeeded him with the title *al-Ẓāhir li'iʽzāz dīn allāh*, was sixteen years of age at the time, and for four years his aunt Sitt al-Mulk acted as regent; she appears to have been an astute but utterly unscrupulous woman. After her death the caliph was in the power of various ministers, under whose management of affairs Syria was for a time lost to the Egyptian caliphate, and Egypt itself raided by the Syrian usurpers, of whom one, Ṣāliḥ b. Mirdās, succeeded in establishing a dynasty at Aleppo, which maintained itself after Syria and Palestine had been recovered for the Fāṭimites by Anushtakin al-Dizbarī at the battle of Ukhuwānah in 1029. His career is said to have been marked by some horrible caprices similar to those of his father. After a reign of nearly sixteen years he died of the plague.

His successor, *Abū Tamīm Maʽadd*, who reigned with the title *al-Mostanṣir*, was also an infant at the time of his accession, being little more than seven years of age. The power was largely in the hands of his mother, a negress, who promoted the interests of her kinsmen at court, where indeed even in Ḥākim's time they had been used as a counterpoise to the Maghribine and Turkish elements in the army. In the first years of this reign affairs were administered by the vizier al-Jarjarāʼī, by whose mismanagement Aleppo was lost to the Fāṭimites. At his death in 1044 the chief influence passed into the hands of Abu Saʽd, a Jew, and the former master of the queen-mother, and at the end of four years he was assassinated at the instance of another Jew (Ṣadaḳah, perhaps Zedekiah, b. Joseph al-Falāḥī), whom he had appointed vizier. In this reign Moʻizz b. Badis, the 4th ruler of the dependent Zeirid dynasty which had ruled in the Maghrib since the migration of the Fāṭimite Moʻizz to Egypt, definitely abjured his allegiance (1049) and returned to Sunnite principles and subjection to the Bagdad caliphate. The Zeirids maintained Mahdia (see ALGIERS), while other cities of the Maghrib were colonized by Arab tribes sent thither by the Cairene vizier. This loss was more than compensated by the enrolment of Yemen among the countries which recognized the Fāṭimite caliphate through the enterprise of one ʻAli b. Mahommed al-Ṣulaiḥī, while owing to the disputes between the Turkish generals who claimed supremacy at Bagdad, Mostanṣir's name was mentioned in public prayer at that metropolis on the 12th of January 1058, when a Turkish adventurer Basāsīrī was for a time in power. The Egyptian court, chiefly owing to the jealousy of the vizier, sent no efficient aid to Basāsīrī, and after a year Bagdad was retaken by the Seljūk Toghrul Beg, and the Abbasid caliph restored to his rights. In the following years the troubles in Egypt caused by the struggles between the Turkish and negro elements in Mostanṣir's army nearly brought the country into the dominion of the Abbasids. After several battles of various issue the Turkish commander Nāṣir addaula b. Hamdān got possession of Cairo, and at the end of 1068 plundered the caliph's palace; the valuable library which had been begun by Ḥākim was pillaged, and an accidental fire caused great destruction. The caliph and his family were reduced to destitution, and Nāṣir addaula began negotiations for restoring the name of the Abbasid caliph in public prayer; he was, however, assassinated before he could carry this out, and his assassin, also a Turk, appointed vizier. Mostanṣir then summoned to his aid Badr al-Jamālī, an Armenian who had displayed competence in various posts which he had held in Syria, and this person early in 1074 arrived in Cairo accompanied by a bodyguard of Armenians; he contrived to massacre the chiefs of the party at the time in possession of power, and with the title Amīr al-Juyūsh ("prince of the armies") was given by Mostanṣir complete control of affairs. The period of internal disturbances, which had been accompanied by famine and pestilence, had caused usurpers to spring up in all parts of Egypt, and Badr was compelled practically to reconquer the country. During this time, however, Syria was overrun by an invader in league with the Seljūk Malik Shah, and Damascus was permanently lost to the Fāṭimites; other cities were recovered by Badr himself or his officers. He rebuilt the walls of Cairo, of more durable material than that which had been employed by Jauhar—a measure rendered necessary partly by the growth of the metropolis, but also by the repeated sieges which it had undergone since the commencement of Fāṭimite rule. The time of Mostanṣir is otherwise memorable for the rise of the Assassins (*q.v.*), who at the first supported the claims of his eldest son Nizār to the succession against the youngest Aḥmed, who was favoured by the family of Badr. When Badr died in 1094 his influence was inherited by his son al-Afḍal Shāhinshāh, and this, at the death of Mostanṣir in the same year, was thrown in favour of *Aḥmed*, who succeeded to the caliphate with the title *al-Mostaʻlī billāh.*

The Crusades.

Mostaʻlī's succession was not carried through without an attempt on the part of Nizār to obtain his rights, the title which he chose being *al-Moṣṭafā lidīn allāh;* for a time he maintained himself in Alexandria, but the energetic measures of his brother soon brought the civil war to an end. The beginning of this reign coincided with the beginning of the Crusades, and al-Afḍal made the fatal mistake of helping the Franks by rescuing Jerusalem from the Ortokids, thereby facilitating its conquest by the Franks in 1099. He endeavoured to retrieve his error by himself advancing into Palestine, but he was defeated in the neighbourhood of Ascalon, and compelled to retire to Egypt. Many of the Palestinian possessions of the Fāṭimites then successively fell into the hands of the Franks. After a reign of seven years Mostaʻlī died and the caliphate was given by al-Afḍal to an infant son, aged five years at the time, who was placed on the throne with the title *al-Āmir biahkām allāh*, and for twenty years was under the tutelage of al-Afḍal. He made repeated attempts to recover the Syrian and Palestinian cities from the Franks, but with poor success. In 1118 Egypt was invaded by Baldwin I., who burned the gates and the mosques of Farama, and advanced to Tinnis, whence illness compelled him to retreat. In August 1121 al-Afḍal was assassinated in a street of Cairo, it is said, with the connivance of the caliph, who immediately began the plunder of his house, where fabulous treasures were said to be amassed. The vizier's offices were given to one of the caliph's creatures, Mahommed b. Fātik al-Batā'iḥī, who took the title *al-Ma'mūn.* His external policy was not more fortunate than that of his predecessor, as he lost Tyre to the Franks, and a fleet equipped by him was defeated by the Venetians. On the 4th of October 1125 he with his followers was seized and imprisoned by order of the Caliph Āmir, who was now resolved to govern by himself, with the assistance of only subordinate officials, of whom two were drawn from the Samaritan and Christian communities. The vizier was afterwards crucified with his five brothers. The caliph's personal government appears to have been incompetent, and to have been marked by extortions and other arbitrary measures. He was assassinated in October 1129 by some members of the sect who believed in the claims of Nizār, son of Mostanṣir.

The succeeding caliph, *Abu'l-Maimūn ʻAbd al-Majīd*, who took the title *al-Ḥāfiẓ lidīn allāh*, was not the son but the cousin of the deceased caliph, and of ripe age, being about fifty-eight years old at the time; for more than a year he was kept in prison by the new vizier, a son of al-Afḍal, whom the army had placed in the post; but towards the end of 1131 this vizier fell by the hand of assassins, and the caliph was set free. The reign of Ḥāfiẓ was disturbed by the factions of the soldiery, between which several battles took place, ending in the subjection of the caliph for a time to various usurpers, one of these being his own son Ḥasan, who had been provoked to rebel by the caliph nominating a younger brother as his successor. For some months the caliph was under this son's control; but the latter, who aimed at conciliating the people, speedily lost his popularity with the troops, and his father was able to get possession of his person and cause him to be poisoned (beginning of 1135).

His son *Abu'l-Manṣūr Ismāʻīl*, who was seventeen years old at the time of Ḥāfiẓ's death, succeeded him with the title *al-Ẓāfir liaʻdā allāh.* From this reign to the end of the Fāṭimite period we have the journals of two eminent men, Usāmah b. Muniqdh and Umārah of Yemen, which throw light on the leading characters. The civil dissensions of Egypt were notorious at the time. The new reign began by an armed struggle between two commanders for the post of vizier, which in January 1150 was decided in favour of the Amir Ibn Sallār. This vizier was presently assassinated by the direction of his stepson 'Abbās, who was raised to the vizierate in his place. This event was shortly followed by the loss to the Fāṭimites of Ascalon, the last place in Syria which they held; its loss was attributed to dissensions between the parties of which the garrison consisted. Four years later (April 1154) the caliph was murdered by his vizier ʻAbbās, according to Usāmah, because the caliph had suggested to his favourite, the vizier's son, to murder his father; and this was followed by a massacre of the brothers of Ẓāfir, followed by the raising of his infant son *Abu'l-Qāsim ʻĪsā* to the throne.

The new caliph, who was not five years old, received the title *al-Fā'iz binaṣr allāh*, and was at first in the power of ʻAbbās. The women of the palace, however, summoned to their aid Ṭalā'iʻ b. Ruzzīk, prefect of Ushmunain, at whose arrival in Cairo the troops deserted ʻAbbās, who was compelled to flee into Syria, taking his son and Usāmah with him. ʻAbbās was killed by the Franks near Ascalon, his son sent in a cage to Cairo where he was executed, while Usāmah escaped to Damascus.

The infant Fā'iz, who had been permanently incapacitated by the scenes of violence which accompanied his accession, died in 1160. Ṭalā'iʻ chose to succeed him a grandson of Ẓāfir, who was nine years of age, and received the title *al-ʻĀḍid lidīn allāh.* Ṭalā'iʻ, who had complete control of affairs, introduced the practice of farming the taxes for periods of six months instead of a year, which led to great misery, as the taxes were demanded twice. His death was brought on by the rigour with which he treated the princesses, one of whom, with or without the connivance of the caliph, organized a plot for his assassination, and he died in September 1160. His son Ruzzīk inherited his post and maintained himself in it for more than a year, when another prefect of Upper Egypt, Shāwar b. Mujīr, brought a force to Cairo, before which Ruzzīk fled, to be shortly afterwards captured and beheaded. Shāwar's entry into Cairo was at the beginning of 1163; after nine months he was compelled to flee before another adventurer, an officer in the army named Ḍirghām. Shāwar's flight was directed to Damascus, where he was favourably received by the prince Nureddin, who sent with him to Cairo a force of Kurds under Asad al-dīn Shīrgūh. At the same time Egypt was invaded by the Franks, who raided and did much damage on the coast. Dirghām was defeated and killed, but a dispute then arose between Shāwar and his Syrian allies for the possession of Egypt.

Frankish invasion.

Shāwar, being unable to cope with the Syrians, demanded help of the Frankish king of Jerusalem Amalric (Amauri) I., who hastened to his aid with a large force, which united with Shāwar's and besieged Shīrgūh in Bilbeis for three months; at the end of this time, owing to the successes of Nureddin in Syria, the Franks granted Shīrgūh a free passage with his troops back to Syria, on condition of Egypt being evacuated (October 1164). Rather more than two years later Shīrgūh persuaded Nureddin to put him at the head of another expedition to Egypt, which left Syria in January 1167, and, entering Egypt by the land route, crossed the Nile at Itfīḥ (Atfih), and encamped at Giza; a Frankish army hastened to Shāwar's aid. At the battle of Bābain (April 11th, 1167) the allies were defeated by the forces commanded by Shīrgūh and his nephew Saladin, who was presently made prefect of Alexandria, which surrendered to Shīrgūh without a struggle.

Saladin.

Saladin was soon besieged by the allies in Alexandria; but after seventy-five days the siege was raised, Shīrgūh having made a threatening movement on Cairo, where a Frankish garrison had been admitted by Shāwar. Terms were then made by which both Syrians and Franks were to quit Egypt, though the garrison of Cairo remained; the hostile attitude of the Moslem population to this garrison led to another invasion at the beginning of 1168 by King Amalric, who after taking Bilbeis advanced to Cairo. The caliph, who up to this time appears to have left the administration to the viziers, now sent for Shīrgūh, whose speedy arrival in Egypt caused the Franks to withdraw. Reaching Cairo on the 6th of January 1169, he was soon able to get possession of Shāwar's person, and after the prefect's execution, which happened some ten days later, he was appointed vizier by the caliph. After two months Shīrgūh died of indigestion (23rd of March 1169), and the caliph appointed Saladin as successor to Shīrgūh; the new vizier professed to hold office as a deputy of Nureddin, whose name was mentioned in public worship after that of the caliph. By appropriating the fiefs of the Egyptian officers and giving them to his Kurdish followers he stirred up much ill-feeling, which resulted in a conspiracy, of which the object was to recall the Franks with the view of overthrowing the new régime; but this conspiracy was revealed by a traitor and crushed. Nureddin loyally aided his deputy in dealing with Frankish invasions of Egypt, but the anomaly by which he, being a Sunnite, was made in Egypt to recognize a Fāṭimite caliph could not long continue, and he ordered Saladin to weaken the Fāṭimite by every available means, and then substitute the name of the Abbasid for his in public worship. Saladin and his ministers were at first afraid lest this step might give rise to disturbances among the people; but a stranger undertook to risk it on the 17th of September 1171, and the following Friday it was repeated by official order; the caliph himself died during the interval, and it is uncertain whether he ever heard of his deposition. The last of the Fāṭimite caliphs was not quite twenty-one years old at the time of his death.

(5) *Ayyubite Period.*—Saladin by the advice of his chief Nureddin cashiered the Fāṭimite judges and took steps to encourage the study of orthodox theology and jurisprudence in Egypt by the foundation of colleges and chairs. On the death of the ex-caliph he was confirmed in the prefecture of Egypt as deputy of Nureddin; and on the decease of the latter in 1174 (12th of April) he took the title sultan, so that with this year the Ayyubite period of Egyptian history properly begins. During the whole of it Damascus rather more than Cairo counted as the metropolis of the empire. The Egyptian army, which was motley in character, was disbanded by the new sultan, whose troops were Kurds. Though he did not build a new metropolis he fortified Cairo with the addition of a citadel, and had plans made for a new wall to enclose both it and the double city; this latter plan was never completed, but the former was executed after his death, and from this time till the French occupation of Egypt the citadel of Cairo was the political centre of the country. It was in 1183 that Saladin's rule over Egypt and North Syria was consolidated. Much of Saladin's time was spent in Syria, and his famous wars with the Franks belong to the history of the Crusades and to his personal biography. Egypt was largely governed by his favourite Karākūsh, who lives in popular legend as the "unjust judge," though he does not appear to have deserved that title.

Saladin at his death divided his dominions between his sons, of whom ʿOthman succeeded to Egypt with the title *Malik al-Azīz ʿImāl al-aīn.* The division was not satisfactory to the heirs, and after three years (beginning of 1196) the Egyptian sultan conspired with his uncle Malik al-ʿĀdil to deprive Saladin's son al-Afḍal of Damascus, which had fallen to his lot. The war between the brothers was continued with intervals of peace, during which al-ʿĀdil repeatedly changed sides: eventually he with al-ʿAzīz besieged and took Damascus, and sent al-Afḍal to Sarkhad, while al-ʿĀdil remained in possession of Damascus. On the death of al-ʿAzīz on the 29th of November 1198 in consequence of a hunting accident, his infant son Mahommed was raised to the throne with the title *Malik al-Manṣūr Nāṣir al-dīn*, and his uncle al-Afḍal sent for from Sarkhad to take the post of regent or Atābeg. So soon as al-Afḍal had got possession of his nephew's person, he started on an expedition for the recovery of Damascus: al-ʿĀdil not only frustrated this, but drove him back to Egypt, where on the 25th of January 1200 a battle was fought between the armies of the two at Bilbeis, resulting in the defeat of al-Afḍal, who was sent back to Sarkhad, while al-ʿĀdil assumed the regency, for which after a few months he substituted the sovereignty, causing his nephew to be deposed. He reigned under the title *Malik al-ʿĀdil Saif al-dīn.* His name was Abū Bakr.

Though the early years of his reign were marked by numerous disasters, famine, pestilence and earthquake, of which the second seems to have been exceedingly serious, he reunited under his sway the whole of the empire which had belonged to his brother, and his generals conquered for him parts of Mesopotamia and Armenia, and in 1215 he got possession of Yemen. He followed the plan of dividing his empire between his sons, the eldest Mahommed, called *Malik al-Kāmil*, being his viceroy in Egypt, while al-Muʿazzam ʿĪsā governed Syria, al-Ashraf Mūsā his eastern and al-Malik al-Auḥad Ayyūb his northern possessions. His attitude towards the Franks was at the first peaceful, but later in his reign he was compelled to adopt more strenuous measures. His death occurred at Alikin (1218), a village near Damascus, while the Franks were besieging Damietta—the first operation of the Fifth Crusade—which was defended by al-Kāmil, to whom his father kept sending reinforcements. The efforts of al-Kāmil after his accession to the independent sovereignty were seriously hindered by the endeavour of an amir named Aḥmed b. Mashṭūb to depose him and appoint in his place a brother called al-Fā'iz Sābiq al-dīn Ibrāhīm: this attempt was frustrated by the timely interposition of al-Muʿazzam ʿĪsā, who came to Egypt to aid his brother in February 1219, and compelled al-Fā'iz to depart for Mosul. After a siege of sixteen and a half months Damietta was taken by the Franks on Tuesday the 6th of November 1219; al-Kāmil thereupon proclaimed the

Jihād, and was joined at his fortified camp, afterwards the site of Manṣūra, by troops from various parts of Egypt, Syria and Mesopotamia, including the forces of his brothers ʿĪsā and Mūsā. With these allies, and availing himself of the advantages offered by the inundation of the Nile, al-Kāmil was able to cut off both the advance and the retreat of the invaders, and on the 31st of August 1221 a peace was concluded, by which the Franks evacuated Egypt.

For some years the dominions of al-ʿĀdil remained divided between his sons: when the affairs of Egypt were settled, al-Kāmil determined to reunite them as before, and to that end brought on the Sixth Crusade. Various cities in Palestine and Syria were yielded to Frederick II. as the price of his help against the son of Muʿazzam ʿĪsā, who reigned at Damascus with the title of Malik al-Nāṣir. About 1231–32 Kāmil led a confederacy of Ayyūbite princes against the Seljuk Kaikobad into Asia Minor, but his allies mistrusted him and victory rested with Kaikobad (see SELJUKS). Before Kāmil's death he was mentioned in public prayer at Mecca as lord of Mecca (Hejāz), Yemen, Zabīd, Upper and Lower Egypt, Syria and Mesopotamia.

At his death (May 8th, 1238) at Damascus, his son Abū Bakr was appointed to succeed with the title *Malik al-ʿĀdil Saif al-dīn*; but his elder brother Malik al-Sālih Najm al-dīn Ayyūb, having got possession of Damascus, immediately started for Egypt, with the view of adding that country to his dominions: meanwhile his uncle Ismāʿil, prince of Hamath, with the prince of Homs, seized Damascus, upon hearing which the troops of Najm al-dīn deserted him at Nablus, when he fell into the hands of Malik al-Nāṣir, prince of Kerak, who carried him off to that city and kept him a prisoner there for a time; after which he was released and allowed to return to Nablus. On the 31st of May 1240 the new sultan was arrested at Bilbeis by his own amirs, who sent for Najm al-dīn to succeed him; and on the 19th of June of the same year Najm al-dīn entered Cairo as sultan, and imprisoned his brother in the citadel, where he died in 1248. Meanwhile in 1244 Jerusalem had been finally wrested from the Franks. The administration of Najm al-dīn is highly praised by Ibn Khallikan, who lived under it. He made large purchases of slaves (Mamelukes) for his army, and when the inhabitants of Cairo complained of their lawlessness, he built barracks for them on the island of Roda (Rauḍa), whence they were called Bahrī or Nile Mamelukes, which became the name of the first dynasty that originated from them. Much of his time was spent in campaigns in Syria, where the other Ayyūbites allied themselves against him with the Crusaders, whereas he accepted the services of the Khwarizmians: eventually he succeeded in recovering most of the Syrian cities. His name is commemorated by the town of Salihia, which he built in the year 1246 as a resting-place for his armies on their marches through the desert from Egypt to Palestine. In 1249 he was recalled from the siege of Homs by the news of the invasion of Egypt by Louis IX. (the Seventh Crusade), and in spite of illness he hastened to Ushmum Tannā, in the neighbourhood of Damietta, which he provisioned for a siege. Damietta was taken on the 6th of June 1249, owing to the desertion of his post by the commander Fakhr ud-dīn, and the Banū Kinānah, to whom the defence of the place had been entrusted: fifty-four of their chieftains were afterwards executed by the sultan for this proceeding. On the 22nd of November the sultan died of disease at Manṣūra, but his death was carefully concealed by the amirs Lājīn and Aktai, acting in concert with the Queen Shajar al-durr, till the arrival from Syria of the heir to the throne, *Tūrānshāh*, who was proclaimed some four months later. At the battle of Fāriskūr, 6th of April 1250, the invaders were utterly routed and the French king fell into the hands of the Egyptian sultan. The Egyptian authorities now resolved to raze Damietta, which, however, was rebuilt shortly after. The sultan, who himself had had no share in the victory, advanced after it from Manṣūra to Fāriskūr, where his conduct became menacing to the amirs who had raised him to the throne, and to Shajar al-durr; she in revenge organized an attack upon him which was successful, fire, water, and steel contributing to his end.

(6) *Period of Baḥrī Mamelukes.*—The dynasties that succeeded the Ayyūbites till the conquest of Egypt by the Ottomans bore the title Dynasties of the Turks, but are more often called Mameluke dynasties, because the sultans were drawn from the enfranchised slaves who constituted the court, and officered the army. The family of the fourth of these sovereigns, Kaʿāʾūn (Qalāʾūn), reigned for 110 years, but otherwise no sultan was able to found a durable dynasty: after the death of a sultan he was usually succeeded by an infant son, who after a short time was dethroned by a new usurper.

After the death of the Sultan Tūrānshāh, his step-mother at first was raised to the vacant throne, when she committed the administration of affairs to the captain of the retainers, Aibek; but the rule of a queen caused scandal to the Moslem world, and Shajar al-durr gave way to this sentiment by marrying Aibek and allowing the title sultan to be conferred on him instead of herself. For policy's sake, however, Aibek nominally associated with himself on the throne a scion of the Ayyūbite house, Malik al-Ashraf Musa, who died in prison (1252 or 1254). Aibek meanwhile immediately became involved in war with the Ayyūbite Malik al-Nāṣir, who was in possession of Syria, with whom the caliph induced him after some indecisive actions to make peace: he then successfully quelled a mutiny of Mamelukes, whom he compelled to take refuge with the last Abbasid caliph Mostasim in Bagdad and elsewhere. On the 10th of April 1257 Aibek was murdered by his wife Shajar al-durr, who was indignant at his asking for the hand of another queen: but Aibek's followers immediately avenged his death, placing on the throne his infant son *Malik al-Manṣūr*, who, however, was almost immediately displaced by his guardian *Koṭuz*, on the plea that the Mongol danger necessitated the presence of a grown man at the head of affairs. In 1260 the Syrian kingdom of al-Nāṣir was destroyed by Hulaku (Hulagu), the great Mongol chief, founder of the Ilkhan Dynasty (see MONGOLS), who, having finally overthrown the caliph of Bagdad (see CALIPHATE, sect. c. § 37), also despatched a threatening letter to Koṭuz; but later in the same year Syria was invaded by Koṭuz, who defeated Hulagu's lieutenant at the battle of ʿAin Jālūt (3rd of September 1260), in consequence of which event the Syrian cities all rose against the Mongols, and the Egyptian sultan became master of the country with the exception of such places as were still held by the Crusaders.

Rule of Bibars.

Abbasid caliphate revived.

Before Koṭuz had reigned a year he was murdered at Sālihia by his lieutenant Bibars (October 23rd, 1260), who was piqued, it is said, at the governorship of Aleppo being withheld from him. The sovereignty was seized by this person with the title of *Malik al-Qāhir*, presently altered to *al-Zāhir*. He had originally been a slave of Malik al-Sālih, had distinguished himself at the battle after which Louis IX. was captured, and had helped to murder Tūrānshāh. Sultan Bibars, who proved to be one of the most competent of the Baḥrī Mamelukes, made Egypt the centre of the Moslem world by re-establishing in theory the Abbasid caliphate, which had lapsed through the taking of Bagdad by Hulagu, followed by the execution of the caliph. Bibars recognized the claim of a certain Abu'l-Qāsim Aḥmed to be the son of Zāhir, the 35th Abbasid caliph, and installed him as Commander of the Faithful at Cairo with the title *al-Mostanṣir billāh*. Mostanṣir then proceeded to confer on Bibars the title sultan, and to address to him a homily, explaining his duties. This document is preserved in the MS. life of Bibars, and translated by G. Weil. The sultan appears to have contemplated restoring the new caliph to the throne of Bagdad: the force, however, which he sent with him for the purpose of reconquering Irȧk was quite insufficient for the purpose, and Mostanṣir was defeated and slain. This did not prevent Bibars from maintaining his policy of appointing an Abbasid for the purpose of conferring legitimacy on himself; but he encouraged no further attempts at re-establishing the Abbasids at Bagdad, and his principle, adopted by successive sultans, was that the caliph should not leave Cairo except when accompanying the sultan on an expedition.

The reign of Bibars was spent largely in successful wars against the Crusaders, from whom he took many cities, notably Safad, Caesarea and Antioch; the Armenians, whose territory he repeatedly invaded, burning their capital Sis; and the Seljukids of Asia Minor. He further reduced the Ismāʽīlians or Assassins, whose existence as a community lasted on in Syria after it had nearly come to an end in Persia. He made Nubia tributary, therein extending Moslem arms farther south than they had been extended by any previous sultan. His authority was before his death recognized all over Syria (with the exception of the few cities still in the power of the Franks), over Arabia, with the exception of Yemen, on the Euphrates from Birah to Kerkesia (Circesium) on the Chaboras (Khabur), whilst the amirs of north-western Africa were tributary to him. His successes were won not only by military and political ability, but also by the most absolute unscrupulousness, neither flagrant perjury nor the basest treachery being disdained. He was the first sultan who acknowledged the equal authority of the four schools of law, and appointed judges belonging to each in Egypt and Syria; he was thus able to get his measures approved by one school when condemned by another.

Kalāʽūn.

On the 1st of July 1277 Bibars died, and the events that followed set an example repeatedly followed during the period of the Mamelukes. The sultan's son *Malik al-Saʽīd* ascended the throne; but within little more than two years he was compelled to abdicate in favour of his father-in-law *Kalāʽūn*, a Mameluke who had risen high in the former sovereign's service. The accession of Kalāʽūn was also marked by an attempt on the part of the governor of Damascus to form Syria into an independent kingdom, an attempt frequently imitated on similar occasions. The Syrian forces were defeated at the battle of Jazūrah (April 26th, 1280) and Kalāʽūn resumed possession of the country; but the disaffected Syrians entered into relations with the Mongols, who proceeded to invade Syria, but were finally defeated by Kalāʽūn on the 30th of October 1281 under the walls of Homs (Emesa).

The conversion to Islam of Nikudar Aḥmad, the third of the Ilkhan rulers of Persia, and the consequent troubles in the western Mongol empire, let to a suspension of hostilities between Egypt and the Ilkhans (see Persia: *History*, § B), though the latter did not cease to agitate in Europe for a renewal of the Crusades, with little result. Kalāʽūn, without pursuing any career of active conquest, did much to consolidate his dominions, and especially to extend Egyptian commerce, for which purpose he started passports enabling merchants to travel with safety through Egypt and Syria as far as India. After the danger from the Mongols had ceased, however, Kalāʽūn directed his energies towards capturing the last places that remained in the hands of the Franks, and proceeded to take Markab, Latakia, and Tripoli (April 26th, 1289). In 1290 he planned an attack on Acre, but died (November 10th) in the middle of all his preparations. Under Kalāʽūn we first hear of the Burjite Mamelukes, who owe their name to the citadel (Burj) of Cairo, where 3700 of the whole number of 12,000 Mamelukes maintained by this sovereign were quartered. He also set an example, frequently followed, of the practice of dismissing all non-Moslems from government posts: this was often done by his successors with the view of conciliating the Moslems, but it was speedily found that the services of the Jewish and Christian clerks were again required. He further founded a hospital for clinical research on a scale formerly unknown.

Malik al-Nāṣir.

Mongol Wars.

Kalāʽūn was followed by his son *Khalīl* (*Malik al-Ashraf Salāḥ al-dīn*), who carried out his father's policy of driving the Franks out of Syria and Palestine, and proceeded with the siege of Acre, which he took (May 18th, 1291) after a siege of forty-three days. The capture and destruction of this important place were followed by the capture of Tyre, Sidon, Haifa, Athlit and Beirut, and thus Syria was cleared of the Crusaders. He also planned an expedition against the prince of Lesser Armenia, which was averted by the surrender of Behesna, Marash and Tell Ḥamdūn. The disputes between his favourite, the vizier Ibn al-Saʽlūs, and his viceroy Baidara, led to his being murdered by the latter (December 12th, 1293), who was proclaimed sultan, but almost immediately fell a victim to the vengeance of the deceased sultan's party, who placed a younger son of Kalāʽūn, *Mahọmmed Malik al-Nāṣir*, on the throne. This prince had the singular fortune of reigning three times, being twice dethroned: he was first installed on the 14th of December 1293, when he was nine years old, and the affairs of the kingdom were undertaken by a cabinet, consisting of a vizier (ʽAlam al-dīn Sinjar), a viceroy (Kitboga), a war minister (Ḥusām al-dīn Lājīn al-Rūmī), a prefect of the palace (Rokneddin Bibars Jāshengir) and a secretary of state (Rokneddin Bibars Manṣūrī). This cabinet naturally split into rival camps, in consequence of which Kitboga, himself a Mongol, with the aid of other Mongols who had come into Egypt after the battle of Homs, succeeded in ousting his rivals, and presently, with the aid of the surviving assassins of the former sultan, compelling Malik al-Nāṣir to abdicate in his favour (December 1st, 1294). The usurper was, however, able to maintain himself for two years only, famine and pestilence which prevailed in Egypt and Syria during his reign rendering him unpopular, while his arbitrary treatment of the amirs also gave offence. He was dethroned in 1296, and one of the murderers of Khalil, Ḥusām al-dīn *Lājīn*, son-in-law of the sultan Bibars and formerly governor of Damascus, installed in his palace (November 26th, 1296). It had become the practice of the Egyptian sultans to bestow all offices of importance on their own freedmen (Mamelukes) to the exclusion of the older amirs, whom they could not trust so well, but who in turn became still more disaffected. Ḥusām al-dīn fell a victim to the jealousy of the older amirs whom he had incensed by bestowing arbitrary power on his own Mameluke Mengutimur, and was murdered on the 16th of January 1299. His short reign was marked by some fairly successful incursions into Armenia, and the recovery of the fortresses Marash and Tell Hamdūn, which had been retaken by the Armenians. He also instituted a fresh survey and division of land in Egypt and Syria, which occasioned much discontent. After his murder the deposed sultan Malik al-Nāṣir, who had been living in retirement at Kerak, was recalled by the army and reinstated as sultan in Cairo (February 7th, 1299), though still only fourteen years of age, so that public affairs were administered not by him, but by Salār the viceroy, and Bibars Jāshengir, prefect of the palace. The 7th Ilkhan, Ghazan Mahmud, took advantage of the disorder in the Mameluke empire to invade Syria in the latter half of 1299, when his forces inflicted a severe defeat on those of the new sultan, and seized several cities, including the capital Damascus, of which, however, they were unable to storm the citadel; in 1300, when a fresh army was collected in Egypt, the Mongols evacuated Damascus and made no attempt to secure their other conquests. The fear of further Mongolian invasion led to the imposition of fresh taxes in both Egypt and Syria, including one of 33% on rents, which occasioned many complaints. The invasion did not take place till 1303, when at the battle of Marj al-Ṣaffar (April 20th) the Mongols were defeated. This was the last time that the Ilkhans gave the Egyptian sultans serious trouble; and in the letter written in the sultan's name to the Ilkhan announcing the victory, the former suggested that the caliphate of Bagdad should be restored to the titular Abbasid caliph who had accompanied the Egyptian expedition, a suggestion which does not appear to have led to any actual steps being taken. The fact that the Mongols were in ostensible alliance with Christian princes led to a renewal by the sultan of the ordinances against Jews and Christians which had often been abrogated, as often renewed and again fallen into abeyance; and their renewal led to missions from various Christian princes requesting milder terms for their co-religionists. The amirs Salār and Bibars having usurped the whole of the sultan's authority, he, after some futile attempts to free himself of them, under the pretext of pilgrimage to Mecca, retired in March 1309 to Kerak, whence he sent his abdication to Cairo; in consequence of which, on the 5th of April 1309, *Bibars Jāshengir* was proclaimed sultan, with the title *Malik al-Moẓaffar*. This prince was originally a freedman of Kalā'ūn, and was the first Circassian who ascended the throne of Egypt. Before the year was out the new sultan had been rendered unpopular by the occurrence of a famine, and Malik al-Nāṣir was easily able to induce the Syrian amirs to return to his allegiance, in consequence of which Bibars in his turn abdicated, and Malik al-Nāṣir re-entered Cairo as sovereign on the 5th of March 1310. He soon found the means to execute both Bibars and Salār, while other amirs who had been eminent under the former régime fled to the Mongols. The relations between their Ilkhan and the Egyptian sultan continued strained, and the 8th Ilkhan Oeljeitu (1304–1316) addressed letters to Philip the Fair and the English king Edward I. (answered by Edward II. in 1307), desiring aid against Malik al-Nāṣir; and for many years the courts of the sultan and the Ilkhan continued to be the refuge of malcontents from the other kingdom. Finally in 1322 terms of peace and alliance were agreed on between the sultan and Abū Sa'īd the 9th Ilkhan. The sultan also entered into relations with the Mongols of the Golden Horde and in 1319 married a daughter of the reigning prince Uzbeg Khan (see MONGOLS: *Golden Horde*). Much of Malik al-Nāṣir's third administration was spent in raids into Nubia, where he endeavoured to set up a creature of his own as sovereign, in attempts at bringing the Bedouins of south-eastern Egypt into subordination, and in persecuting the Nosairīs, whose heresy became formidable about this time. Like other Egyptian sultans he made considerable use of the Assassins, 124 of whom were sent by him into Persia to execute Kara Sonkor, at one time governor of Damascus, and one of the murderers of Malik al-Ashraf; but they were all outwitted by the exile, who was finally poisoned by the Ilkhan in recompense for a similar service rendered by the Egyptian sultan. For a time Malik al-Nāṣir was recognized as suzerain in north Africa, the Arabian Irak, and Asia Minor, but he was unable to make any permanent conquests in any of these countries. He brought Medīna, which had previously been governed by independent sherīfs, to acknowledge his authority. His diplomatic relations were more extensive than those of any previous sultan, and included Bulgarian, Indian, and Abyssinian potentates, as well as the pope, the king of Aragon and the king of France. He appears to have done his utmost to protect his Christian subjects, incurring thereby the reproaches of the more fanatical Moslems, especially in the year 1320 when owing to incendiarism in Cairo there was danger of a general massacre of the Christian population. His internal administration was marked by gross extravagance, which led to his viziers being forced to practise violent extortion for which they afterwards suffered. He paid considerable attention to sheep-breeding and agriculture, and by a canal which he had dug from Fuah to Alexandria not only assisted commerce but brought 100,000 feddans under cultivation. His taste for building and street improvement led to the beautifying of Cairo, and his example was followed by the governors of other great cities in the empire, notably Aleppo and Damascus. He paid exceptionally high prices for Mamelukes, many of whom were sold by their Mongol parents to his agents, and accustomed them to greater luxury than was usual under his predecessors. In 1315 he instituted a survey of Egypt, and of the twenty-four parts into which it was divided ten were assigned to the sultan and fourteen to the amirs and the army. He took occasion to abolish a variety of vexatious imposts, and the new budget fell less heavily on the Christians than the old. Among the literary ornaments of his reign was the historian and geographer Ismā'īl Abulfeda (*q.v.*), to whom Malik al-Nāṣir restored the government of Hamath, which had belonged to his ancestors, and even gave the title sultan. He died on the 7th of June 1341. The son, *Abu Bakr*, to whom he had left the throne, was able to maintain himself only a few months on it, being compelled to abdicate on the 4th of August 1341 in favour of his infant brother *Kuchuk*; the revolution was brought about by Kausūn, a powerful Mameluke of the preceding monarch. This person's authority was, however, soon overthrown by a party formed by the Syrian prefects, and on the 11th of January *Malik al-Nāṣir Aḥmad*, an elder son of the former sultan of the same title, was installed in his place, though he did not actually arrive in Cairo till the 6th of November, being unwilling to leave Kerak, where he had been living in retirement. After a brief sojourn in Cairo he speedily returned thither, thereby forfeiting his throne, which was conferred by the amirs on his brother *Ismā'īl al-Malik al-Ṣāliḥ* (June 27th, 1342). This sultan was mainly occupied during his short reign with besieging and taking Kerak, whither Aḥmad had taken refuge, and himself died on the 3rd of August 1345, when another son of Malik al-Nāṣir, named *Sha'bān*, was placed on the throne. The constant changes of sultan led to great disorder in the provinces, and many of the subject principalities endeavoured to shake off the Egyptian yoke. Sha'bān proved no more competent than his predecessors, being given to open debauchery and profligacy, an example followed by his amirs; and fresh discontent led to his being deposed by the Syrian amirs, when his brother *Ḥājjī* was proclaimed sultan in his place (September 18th, 1346). Ḥājjī was deposed and killed on the 10th of December 1347, and another infant son of Malik al-Nāṣir, *Ḥasan*, who took his father's title, was proclaimed, the real power being shared by three amirs, Sheikhun, Menjek and Yelbogha Arus. During this reign (1348–1349) Egypt was visited by the "Black Death," which is said to have carried off 900,000 of the inhabitants of Cairo and to have raged as far south as Assuan. Towards the beginning of 1351 the sultan got rid of his guardians and attempted to rule by himself; but though successful in war, his arbitrary measures led to his being dethroned on the 21st of August 1351 by the amirs, who proclaimed his brother Ṣāliḥ with the title of *Malik al-Ṣāliḥ*. He too was only fourteen years of age. The power was contested for by various groups of amirs, whose struggles ended with the deposition of the sultan Ṣāliḥ on the 20th of October 1354, and the reinstatement of his brother *Ḥasan*, who was again dethroned on the 16th of March 1361 by an amir Yelbogha, whom he had offended, and who, having got possession of the sultan's person, murdered him. The next day a son of the dethroned sultan Ḥājjī was proclaimed sultan with the title *Malik al-Manṣūr*. On the 29th of May 1363 this sultan was also dethroned on the ground of incompetence, and his place was given to another grandson of Malik al-Nāṣir, *Sha'bān*, son of Ḥosain, then ten years old. The amir Yelbogha at first held all real power and is said to have acquired a degree of authority which no other subject ever held. During this reign, on the 8th of October 1365, a landing was effected at Alexandria by a Frankish fleet under Peter I. of Cyprus, which presently took possession of the city; the Franks were speedily compelled to embark again after plundering the city, for which compensation was afterwards demanded by Yelbogha from the Christian population of Egypt and Syria. Alexandria was further made the seat of a viceroy, having previously only had a prefect. On the 11th of December 1366 Yelbogha was himself attacked by the sultan, captured and slain. His successor in the office of first minister was a mere tool in the hands of his Mamelukes, who compelled him to institute and depose governors, &c., at their pleasure. In 1374 the Egyptians raided Cilicia and captured Leo VI., prince of Lesser Armenia, which now became an Egyptian province with a Moslem governor. On the 15th of March 1377 the sultan was murdered by the Mamelukes, owing to his refusing a largess of money which they demanded. The infant son of the late sultan *'Alī*, a lad of eight years, was proclaimed with the title *Malik al-Manṣūr*; the power was in the hands of the ministers Kartai and Ibek, the latter of whom overthrew the former with the aid of his own Mamelukes, Berekeh and Barkūk. An insurrection in Syria which spread to Egypt presently caused the fall of Ibek, and led to the occupation of the highest posts by the Circassian freedmen Berekeh and Barkūk, of whom the latter ere long succeeded in ousting the former and usurping the sultan's place; on the 19th of May 1381, when the sultan 'Alī died, his place was given to an infant brother Ḥājjī, but on the 26th of November 1382, *Barkūk* set this child aside and had himself proclaimed sultan (with the title *Malik al-Ẓāhir*), thereby ending the Bahrī dynasty and commencing that of the Circassians. For a short period, however, Ḥājjī

Decline of the Bahri power.

was restored, when on the 1st of June 1389 Cairo was taken by Yelbogha, governor of Damascus, and Barkūk expelled; Ḥājjī reigned at first under the guardianship of Yelbogha, who was then overthrown by Mintāsh; Barkūk, who had been relegated to Kerak, succeeded in again forming a party, and in a battle fought at Shakhab, January 1390, succeeded in gaining possession of the person of the sultan Ḥājjī, and on the 21st of January he was again proclaimed sultan in Cairo.

Timur in Syria.

Wars with European powers.

(7) *Period of Burjī Mamelukes.*—Barkūk presently entered into relations with the Ottoman sultan Bāyezīd I., and by slaying an envoy of Timur incurred the displeasure of the world-conqueror; and in 1394 led an army into Syria with the view of restoring the Jelairid Ilkhan Aḥmad to Bagdad (as Barkūk's vassal), and meeting the Mongol invasion. Barkūk, however, died (June 20th, 1399) before Timur had time to invade Syria. According to the custom that had so often proved disastrous, a young son of Barkūk, *Faraj*, then aged thirteen, was appointed sultan under the guardianship of two amirs. Incursions were immediately made by the Ottoman sultan into the territory of Egyptian vassals at Derendeh and Albistan (Ablestin), and Malatia was besieged by his forces. Timur, who was at this time beginning his campaign against Bāyezīd, turned his attention first to Syria, and on the 30th of October 1400 defeated the Syrian amirs near Aleppo, and soon got possession of the city and the citadel. He proceeded to take Hamah, Homs (Emesa) and other towns, and on the 20th of December started for Damascus. An endeavour was made by the Egyptian sultan to relieve Damascus, but the news of an insurrection in Cairo caused him to retire and leave the place to its fate. In the first three months of 1401 the whole of Northern Syria suffered from Timur's marauders. In the following year (September 29th, 1402) Timur who had in the interval inflicted a crushing defeat on the Ottoman sultan, sent to demand homage from Faraj, and his demand was readily granted, together with the delivery of the princes who had sought refuge from Timur in Egyptian territory. The death of Timur in February 1405 restored Egyptian authority in Syria, which, however, became a rendezvous for all who were discontented with the rule of Faraj and his amirs, and two months after Timur's death was in open rebellion against Faraj. Although Faraj succeeded in defeating the rebels, he was compelled by insubordination on the part of his Circassian Mamelukes to abdicate (September 20th, 1405), when his brother *Abd al-‘aziz* was proclaimed with the title *Malik al-Manṣūr*; after two months this prince was deposed, and Faraj, who had been in hiding, recalled. Most of his reign was, however, occupied with revolts on the part of the Syrian amirs, to quell whom he repeatedly visited Syria; the leaders of the rebels were the amirs Newruz and Sheik Maḥmūdī, afterwards sultan. Owing to disturbances and misgovernment the population of Egypt and Syria is said to have shrunk to a third in his time, and he offended public sentiment not only by debauchery, but by having his image stamped on his coins. On the 23rd of May 1412, after being defeated and shut up in Damascus, he was compelled by Sheik Maḥmūdī to abdicate, and an Abbasid caliph, Mosta‘īn, was proclaimed sultan, only to be forced to abdicate on the 6th of November of the same year in *Sheik's* favour, who took the title *Malik al-Mu‘ayyad*, his colleague Newruz having been previously sent to Syria, where he was to be autocrat by the terms of their agreement. In the struggle which naturally followed between the two, Newruz was shut up in Damascus, defeated and slain. Sheik himself invaded Asia Minor and forced the Turkoman states to acknowledge his suzerainty. After the sultan's return they soon rebelled, but were again brought into subjection by Sheik's son Ibrāhīm; his victories excited the envy of his father, who is said to have poisoned him. Sheik himself died a few months after the decease of his son (January 13th, 1421), and another infant son, *Aḥmad*, was proclaimed with the title *Malik al-Moẓaffar*, the proclamation being followed by the usual dissensions between the amirs, ending with the assumption of supreme power by the amir *Tatar*, who, after defeating his rivals, on the 29th of August 1421 had himself proclaimed sultan with the title *Malik al-Ẓāhir.* This usurper, however, died on the 30th of November of the same year, leaving the throne to an infant son *Mohammed*, who was given the title *Malik al-Ṣāliḥ*; the regular intrigues between the amirs followed, leading to his being dethroned on the following 1st of April 1422, when the amir appointed to be his tutor, *Barsbai*, was proclaimed sultan with the title *Malik al-Ashraf.* This sultan avenged the attacks on Alexandria repeatedly made by Cyprian ships, for he sent a fleet which burned Limasol, and another which took Famagusta (August 4th, 1425), but failed in the endeavour to annex the island permanently. An expedition sent in the following year (1426) succeeded in taking captive the king of Cyprus, who was brought to Cairo and presently released for a ransom of 200,000 dinars, on condition of acknowledging the suzerainty of the Egyptian sultan and paying him an annual tribute. Barsbai appears to have excelled his predecessors in the invention of devices for exacting money from merchants and pilgrims, and in juggling with the exchange. This led to a naval demonstration on the part of the Venetians, who secured better terms for their trade, and to the seizure of Egyptian vessels by the king of Aragon and the prince of Catalonia. In a census made during Barsbai's reign, it was found that the total number of towns and villages in Egypt had sunk to 2170, whereas in the 4th century A.H. it had stood at 10,000. Much of Barsbai's attention was occupied with raids into Asia Minor, where the Dhu 'l-Kadiri Turkomans frequently rebelled, and with wars against Kara Yelek, prince of Amid, and Shah Rokh, son of Timur. Barsbai died on the 7th of June 1438. In accordance with the custom of his predecessors he left the throne to a son still in his minority, *Abu'l-Mahāsin Yūsuf*, who took the title *Malik al-‘Azīz*, but as usual after a few months he was displaced by the regent *Jakmak*, who on the 9th of September 1438 was proclaimed sultan with the title *Malik al-Ẓāhir.* In the years 1442–1444 this sultan sent three fleets against Rhodes, where the third effected a landing, but was unable to make any permanent conquest. In consequence of a lengthy illness Jakmak abdicated on the 1st of February 1453, when his son *‘Othman* was proclaimed sultan with the title *Malik al-Manṣūr.* Though not a minor, he had no greater success than the sons of the usurpers who preceded him, being dethroned after six weeks (March 15th, 1453) in favour of the amir *Inal al-‘Alā'ī*, who took the title *Malik al-Ashraf.* His reign was marked by friendly relations with the Ottoman sultan Mahommed II., whose capture of Constantinople (1453) was the cause of great rejoicings in Egypt, but also by violent excesses on the part of the Mamelukes, who dictated the sultan's policy. On his death on the 26th of February 1461 his son *Aḥmad* was proclaimed sultan with the title *Malik al-Mu'ayyad*; he had the usual fate of sultans' sons, earned in his case by an attempt to bring the Mamelukes under discipline; he was compelled to abdicate on the 28th of June 1461, when the amir *Khoshkadam*, who had served as a general, was proclaimed sultan. Unlike the other Mameluke sovereigns, who were Turks or Circassians, this man had originally been a Greek slave.

Early relations with Turkey.

In his reign (1463) there began the struggle between the Egyptian and the Ottoman sultanates which finally led to the incorporation of Egypt in the Ottoman empire. The dispute began with a struggle over the succession in the principality of Karaman, where the two sultans favoured rival candidates, and the Ottoman sultan Mahommed II. supported the claim of his candidate with force of arms, obtaining as the price of his assistance several towns in which the suzerainty of the Egyptian sultan had been acknowledged. Open war did not, however, break out between the two states in Khoshkadam's time. This sultan is said to have taken money to permit innocent persons to be ill-treated or executed. He died on the 9th of October 1467, when the Atābeg *Yelbai* was selected by the Mamelukes to succeed him, and was proclaimed sultan with the title of *Malik al-Ẓāhir.* This person, proving incompetent, was deposed by a revolution of the Mamelukes on the 4th of December 1467, when the Atābeg *Timurbogha* was proclaimed with the title *Malik al-Ẓāhir.* In a month's time, however, there was another palace revolution, and the new Atābeg *Kait Bey* or *Kaietbai* (January 31st, 1468) was proclaimed sultan, the dethroned Timurbogha being, however, permitted to go free whither he pleased. Much of Kait Bey's reign was spent in struggles with Ūzūn Hasan, prince of Diārbekr, and Shah Siwār, chief of the Dhu'l-Kādiri Turkomans. He also offended the Ottoman sultan Bāyezid II. by entertaining his brother Jem, who was afterwards poisoned in Europe. Owing to this, and also to the fact that an Indian embassy to the Ottoman sultan was intercepted by the agents of Kait Bey, Bāyezid II. declared war against Egypt, and seized Adana, Tarsus and other places within Egyptian territory; extraordinary efforts were made by Kait Bey, whose generals inflicted a severe defeat on the Ottoman invaders. In 1491, however, after the Egyptians had repeatedly defeated the Ottoman troops, Kait Bey made proposals of peace which were accepted, the keys of the towns which the Ottomans had seized being restored to the Egyptian sultan. Kait Bey endeavoured to assist his co-religionists in Spain who were threatened by King Ferdinand, by threatening the pope with reprisals on Syrian Christians, but without effect. As the consequence of a palace intrigue, which Kait Bey was too old to quell, on the 7th of August 1496, a day before his death, his son *Mahommed* was proclaimed sultan with the title *Malik al-Nāṣir*; this was in order to put the supreme power into the hands of the Atābeg Kānsūh, since the new sultan was only fourteen years old. An attempt of the Atābeg to oust the new sultan, however, failed. After a reign of little more than two years, filled mainly with struggles between rival amirs, Malik al-Nāṣir was murdered (October 31st, 1498), and his uncle and vizier *Kānsūh* proclaimed sultan with the title *Malik al-Ẓāhir.* His reign only lasted about twenty months; on the 30th of June 1500 he was dethroned by Tūmānbey, who caused *Jān Belāt*, the Atābeg, to be proclaimed sultan. A few months later *Tūmānbey*, at the suggestion of Kasrawah, governor of Damascus, whom he had been sent to reduce to subjection, ousted Jān Belāt, and was himself proclaimed sultan with the title *Malik al-ʻĀdil* (January 25th, 1501). His reign lasted only one hundred days, when he was displaced by *Kānsūh al-Ghūrī* (April 20th, 1501). His reign was remarkable for a naval conflict between the Egyptians and the Portuguese, whose fleet interfered with the pilgrim route from India to Mecca, and also with the trade between India and Egypt; Kānsūh caused a fleet to be built which fought naval battles with the Portuguese with varying results.

The Turkish conquest.

In 1515 there began the war with the Ottoman sultan Selim I. which led to the close of the Mameluke period, and the incorporation of Egypt and its dependencies in the Ottoman empire (see TURKEY: *History*). Kānsūh was charged by Selim with giving the envoys of the Ṣafawid Ismaʻil passage through Syria on their way to Venice to form a confederacy against the Turks, and with harbouring various refugees. The actual declaration of war was not made by Selim till May 1515, when the Ottoman sultan had made all his preparations; and at the battle of Merj Dabik, on the 24th of August 1515, Kānsūh was defeated by the Ottoman forces and fell fighting. Syria passed quickly into the possession of the Turks, whose advent was in many places welcome as meaning deliverance from the Mamelukes. In Cairo, when the news of the defeat and death of the Egyptian sultan arrived, the governor who had been left by Kānsūh, *Tūmānbey*, was proclaimed sultan (October 17th, 1516). On the 20th of January 1517 Cairo was taken by the Ottomans, and Selim shortly after declared sultan of Egypt. Tūmānbey continued the struggle for some months, but was finally defeated, and after being captured and kept in prison seventeen days was executed on the 15th of April 1517.

(8) *The Turkish Period.*—The sultan Selim left with his viceroy Khair Bey a guard of 5000 janissaries, but otherwise made few changes in the administration of the country. The register by which a great portion of the land was a fief of the Mamelukes was left unchanged, and it is said that a proposal made by the sultan's vizier to appropriate these estates was punished with death. The Mameluke amirs were to be retained in office as heads of twelve sanjaks into which Egypt was divided; and under the next sultan, Suleiman I., two chambers were created, called respectively the Greater and the Lesser Divan, in which both the army and the ecclesiastical authorities were represented, to aid the pasha by their deliberations. Six regiments altogether were constituted by the conqueror Selim for the protection of Egypt; to these Suleiman added a seventh, of Circassians. As will be seen from the tables, it was the practice of the Porte to change the governor of Egypt at very short intervals—after a year or even some months. The third governor, Aḥmad Pasha, hearing that orders for this execution had come from Constantinople, endeavoured to make himself an independent ruler and had coins struck in his own name. His schemes were frustrated by two of the amirs whom he had imprisoned and who, escaping from their confinement, attacked him in his bath and killed him. In 1527 the first survey of Egypt under the Ottomans was made, in consequence of the official copy of the former registers having perished by fire; yet this new survey did not come into use until 1605. Egyptian lands were divided in it into four classes—the sultan's domain, fiefs, land for the maintenance of the army, and lands settled on religious foundations.

Troubles with the army.

It would seem that the constant changes in the government caused the army to get out of control at an early period of the Ottoman occupation, and at the beginning of the 11th Islamic century mutinies became common; in 1013 (1604) the governor Ibrahim Pasha was murdered by the soldiers, and his head set on the Bab Zuwēla. The reason for these mutinies was the attempt made by successive pashas to put a stop to the extortion called *Tulbah*, a forced payment exacted by the troops from the inhabitants of the country by the fiction of debts requiring to be discharged, which led to grievous ill-usage. In 1609 something like civil war broke out between the army and the pasha, who had on his side some loyal regiments and the Bedouins. The soldiers went so far as to choose a sultan, and to divide provisionally the regions of Cairo between them. They were defeated by the governor Mahommed Pasha, who on the 5th of February 1610 entered Cairo in triumph, executed the ringleaders, and banished many others to Yemen. The contemporary historian speaks of this event as a second conquest of Egypt for the Ottomans. A great financial reform was now effected by Mahommed Pasha, who readjusted the burdens imposed on the different communities of Egypt in accordance with their means. With the troubles that beset the metropolis of the Ottoman empire, the governors appointed thence came to be treated by the Egyptians with continually decreasing respect. In July 1623 there came an order from the Porte dismissing Muṣṭafā Pasha and appointing ʻAlī Pasha governor in his place. The officers met and demanded from the newly-appointed governor's deputy the customary gratuity; when this was refused they sent letters to the Porte declaring that they wished to have Muṣṭafā Pasha and not ʻAlī Pasha as governor. Meanwhile ʻAlī Pasha had arrived at Alexandria, and was met by a deputation from Cairo telling him that he was not wanted. He returned a mild answer; and, when a rejoinder came in the same style as the first message, he had the leader of the deputation arrested and imprisoned. Hereupon the garrison of Alexandria attacked the castle and rescued the prisoner; whereupon ʻAlī Pasha was compelled to embark. Shortly after a rescript arrived from Constantinople confirming Muṣṭafā Pasha in the governorship. Similarly in 1631 the army took upon themselves to depose the governor Mūsā Pasha, in indignation at his execution of Kītās Bey, an officer who was to have commanded an Egyptian force required for service in Persia. The pasha was ordered either to hand over the executioners to vengeance or to resign his place; as he refused to do the former he was compelled to do the latter, and presently a rescript came from Constantinople, approving the conduct of the army and appointing one Khalīl Pasha as Mūsā's successor. Not only was the governor unsupported by the sultan against the troops, but each new governor regularly inflicted a fine upon his outgoing predecessor, under the name of money due to the treasury; and the outgoing governor would not be allowed to leave Egypt till he had paid it. Besides the extortions to which this practice gave occasion the country suffered greatly in these centuries from famine and pestilence. The latter in the spring of 1619 is said to have carried off 635,000 persons, and in 1643 completely desolated 230 villages.

Rise of the Beys.

By the 18th century the importance of the pasha was quite superseded by that of the beys, and two offices, those of Sheik al-Balad and Amīr al-Ḥājj, which were held by these persons, represented the real headship of the community. The process by which this state of affairs came about is somewhat obscure, owing to the want of good chronicles for the Turkish period of Egyptian history. In 1707 the Sheik al-Balad, Qāsim Iywāz, is found at the head of one of two Mameluke factions, the Qāsimites and the Fiqārites, between whom the seeds of enmity were sown by the pasha of the time, with the result that a fight took place between the factions outside Cairo, lasting eighty days. At the end of that time Qāsim Iywāz was killed and the office which he had held was given to his son Ismā'īl. Ismā'īl held this office for sixteen years, while the pashas were constantly being changed, and succeeded in reconciling the two factions of Mamelukes. In 1724 this person was assassinated through the machinations of the pasha, and Shirkas Bey, of the opposing faction, elevated to the office of Sheik al-Balad in his place. He was soon driven from his post by one of his own faction called Dhu'l-Fiqār, and fled to Upper Egypt. After a short time he returned at the head of an army, and some engagements ensued, in the last of which Shirkas Bey met his end by drowning; Dhu'l-Fiqār was himself assassinated in 1730 shortly after this event. His place was filled by Othman Bey, who had served as his general in this war. In 1743 Othman Bey, who had governed with wisdom and moderation, was forced to fly from Egypt by the intrigues of two adventurers, Ibrāhīm and Riḍwān Bey, who, when their scheme had succeeded, began a massacre of beys and others thought to be opposed to them; they then proceeded to govern Egypt jointly, holding the two offices mentioned above in alternate years. An attempt made by one of the pashas to rid himself of these two persons by a *coup d'état* signally failed owing to the loyalty of their armed supporters, who released Ibrāhīm and Riḍwān from prison and compelled the pasha to fly to Constantinople. An attempt made by a subsequent pasha in accordance with secret orders from Constantinople was so far successful that some of the beys were killed. Ibrāhīm and Riḍwān escaped, and compelled the pasha to resign his governorship and return to Constantinople. Ibrāhīm shortly afterwards fell by the hand of an assassin who had aspired to occupy one of the vacant beyships himself, which was conferred instead on 'Alī, who as 'Alī Bey was destined to play an important part in the history of Egypt. The murder of Ibrāhīm Bey took place in 1755, and his colleague Riḍwān perished in the disputes that followed upon it.

'Alī Bey.

'Alī Bey, who had first distinguished himself by defending a caravan in Arabia against bandits, set himself the task of avenging the death of his former master Ibrāhīm, and spent eight years in purchasing Mamelukes and winning other adherents. He thereby excited the suspicions of the Sheik al-Balad Khalīl Bey, who organized an attack upon him in the streets of Cairo, in consequence of which he fled to Upper Egypt. Here he met one Ṣāliḥ Bey, who had injuries to avenge on Khalīl Bey, and the two organized a force with which they returned to Cairo and defeated Khalīl, who was forced to fly to Ṭanṭa, where for a time he concealed himself; eventually, however, he was discovered, sent to Alexandria and finally strangled. The date of 'Alī Bey's victory was 1164 A.H. (A.D. 1750), and after it he was made Sheik al-Balad. In that capacity he executed the murderer of his former master Ibrāhīm; but the resentment which this act aroused among the beys caused him to leave his post and fly to Syria, where he won the friendship of the governor of Acre, Ẓāhir b. Omar, who obtained for him the goodwill of the Porte and reinstatement in his post as Sheik al-Balad. In 1766, after the death of his supporter the grand vizier Rāghib Pasha, he was again compelled to fly from Egypt to Yemen, but in the following year he was told that his party at Cairo was strong enough to permit of his return. Resuming his office he raised eighteen of his friends to the rank of bey, among them Ibrāhīm and Murād, who were afterwards at the head of affairs, as well as Mahommed Abu'l-Dhahab, who was closely connected with the rest of 'Alī Bey's career. He appears to have done his utmost to bring Egyptian affairs into order, and by very severe measures repressed the brigandage of the Bedouins of Lower Egypt. He appears to have aspired to found an independent monarchy, and to that end endeavoured to disband all forces except those which were exclusively under his own control. In 1769 a demand came to 'Alī Bey for a force of 12,000 men to be employed by the Porte in the Russian war. It was suggested, however, at Constantinople that 'Alī would employ this force when he collected it for securing his own independence, and a messenger was sent by the Porte to the pasha with orders for his execution. 'Alī, being apprised by his agents at the metropolis of the despatch of this messenger, ordered him to be waylaid and killed; the despatches were seized and read by 'Alī before an assembly of the beys, who were assured that the order for execution applied to all alike, and he urged them to fight for their lives. His proposals were received with enthusiasm by the beys whom he had created. Egypt was declared independent and the pasha given forty-eight hours to quit the country. Ẓāhir Pasha of Acre, to whom was sent official information of the step taken by 'Alī Bey, promised his aid and kept his word by compelling an army sent by the pasha of Damascus against Egypt to retreat.

The Porte was not able at the time to take active measures for the suppression of 'Alī Bey, and the latter endeavoured to consolidate his dominions by sending expeditions against marauding tribes, both in north and south Egypt, reforming the finance, and improving the administration of justice. His son-in-law, Abu'l-Dhahab, was sent to subject the Hawwārah, who had occupied the land between Assuan and Assiut, and a force of 20,000 was sent to conquer Yemen. An officer named Ismā'īl Bey was sent with 8000 to acquire the eastern shore of the Red Sea, and one named Ḥasan Bey to occupy Jidda. In six months the greater part of the Arabian peninsula was subject to 'Alī Bey, and he appointed as sherīf of Mecca a cousin of his own, who bestowed on 'Alī by an official proclamation the titles Sultan of Egypt and Khākān of the Two Seas. He then, in virtue of this authorization, struck coins in his own name (1185 A.H.) and ordered his name to be mentioned in public worship.

His next move turned out fatally. Abu'l-Dhahab was sent with a force of 30,000 men in the same year (A.D. 1771) to conquer Syria; and agents were sent to negotiate alliances with Venice and Russia. Abu'l-Dhahab's progress through Palestine and Syria was triumphant. Reinforced by 'Alī Bey's ally Ẓāhir, he easily took the chief cities, ending with Damascus; but at this point he appears to have entered into secret negotiations with the Porte, by which he undertook to restore Egypt to Ottoman suzerainty. He then proceeded to evacuate Syria, and marched with all the forces he could collect to Upper Egypt, occupying Assiut in April 1772. Having collected some additional troops from the Bedouins, he marched on Cairo. Ismā'īl Bey was sent by 'Alī Bey with a force of 3000 to check his advance; but at Basātīn Ismā'īl with his troops joined Abu'l-Dhahab. 'Alī Bey intended at first to defend himself so long as possible in the citadel at Cairo; but receiving information to the effect that his friend Ẓāhir of Acre was still willing to give him refuge, he left Cairo for Syria (8th of April 1772), one day before the entrance of Abu'l-Dhahab.

At Acre 'Alī's fortune seemed to be restored. A Russian vessel anchored outside the port, and, in accordance with the agreement which he had made with the Russian empire, he was supplied with stores and ammunition, and a force of 3000 Albanians. He sent one of his officers, 'Alī Bey al-Ṭanṭāwī, to recover the Syrian towns evacuated by Abu'l-Dhahab, and now in the possession of the Porte. He himself took Jaffa and Gaza, the former of which he gave to his friend Ẓāhir of Acre. On the 1st of February 1773 he received information from Cairo that Abu'l-Dhahab had made himself Sheik al-Balad, and in that capacity was practising unheard-of extortions, which were making Egypt with one voice call for the return of ʿAlī Bey. He accordingly started for Egypt at the head of an army of 8000 men, and on the 19th of April met the army of Abu'l-Dhahab at Sālihia. ʿAlī's forces were successful at the first engagement; but when the battle was renewed two days later he was deserted by some of his officers, and prevented by illness and wounds from himself taking the conduct of affairs. The result was a complete defeat for his army, after which he declined to leave his tent; he was captured after a brave resistance, and taken to Cairo, where he died seven days later.

After ʿAlī Bey's death Egypt became once more a dependency of the Porte, governed by Abu'l-Dhahab as Sheik al-Balad with the title pasha. He shortly afterwards received permission from the Porte to invade Syria, with the view of punishing ʿAlī Bey's supporter Ẓāhir, and left as his deputies in Cairo Ismāʿīl Bey and Ibrāhīm Bey, who, by deserting ʿAlī at the battle of Sālihia, had brought about his downfall. After taking many cities in Palestine Abu'l-Dhahab died, the cause being unknown; and Murād Bey (another of the deserters at Sālihia) brought his forces back to Egypt (26th of May 1775).

Ismāʿīl Bey now became Sheik al-Balad, but was soon involved in a dispute with Ibrāhīm and Murād, who after a time succeeded in driving Ismāʿīl out of Egypt and establishing a joint rule (as Sheik al-Balad and Amīr al-Ḥājj respectively) similar to that which had been tried previously. The two were soon involved in quarrels, which at one time threatened to break out into open war; but this catastrophe was averted, and the joint rule was maintained till 1786, when an expedition was sent by the Porte to restore Ottoman supremacy in Egypt. Murād Bey attempted to resist, but was easily defeated; and he with Ibrāhīm decided to fly to Upper Egypt and await the trend of events. On the 1st of August 1782 the Turkish commander entered Cairo, and, after some violent measures had been taken for the restoration of order, Ismāʿīl Bey was again made Sheik al-Balad and a new pasha installed as governor. In January 1791 a terrible plague began to rage in Cairo and elsewhere in Egypt, to which Ismāʿīl Bey and most of his family fell victims. Owing to the need for competent rulers Ibrāhīm and Murād Bey were sent for from Upper Egypt and resumed their dual government. These two persons were still in office when Bonaparte entered Egypt.

Moslem Authorities.—Arabic literature being cosmopolitan, and Arabic authors accustomed to travel from place to place to collect traditions and obtain oral instruction from contemporary authorities, or else to enjoy the patronage of Maecenates, the literary history of Egypt cannot be dissociated from that of the other Moslem countries in which Arabic was the chief literary vehicle. Hence the list of authors connected with Egypt, which occupies pages 161-275 of Suyūṭī's work, *Ḥusn al-muḥādarah fi akhbāri Misr wal-Qāhirah* (Cairo, 1321 A.H.), contains the names of persons like Mutanabbī, who stayed there for a short time in the service of some patron; Abū Tammām, who lived there before he acquired fame as a poet; ʿUmāra of Yemen, who came there at a mature age to spend some years in the service of Fāṭimite viziers; each of whom figures in lists of authors belonging to some other country also. So long as the centre of the Islamic world was not in Egypt, the best talent was attracted elsewhere; but after the fall of Bagdad, Cairo became the chief seat of Islamic learning, and this rank, chiefly owing to the university of Azhar, it has ever since continued to maintain. The following composed special histories of Egypt: Ibn ʿAbd al-Ḥakam, d. 257 A.H.; ʿAbd al-Raḥīm b. Yūnus, d. 347; Mahommed b. Yūsuf al-Kindī, d. somewhat later; Ibn Zūlāq, d. 387; ʿIzz al-Mulk Mahommed al-Musabbihī, d. 420; Mahommed b. Salāmah al-Qodāʿī, d. 454; Jamāl al-dīn ʿAlī al-Qifṭī, d. 568; Jamāl al-dīn al-Ḥalabī, d. 623; ʿAbd al-Laṭīf al-Baghdādī, d. 629; Mahommed b. ʿAbd al-Azīz al-Idrīsī (history of Upper Egypt), d. 649; his son Jaʿfar (history of Cairo), d. 676; Ibn Saʿīd, d. 685; Ibrāhīm b. Waṣīf Shāh; Ibn al-Mutawwaj, d. 703; Mahommed b. Dani'āl, d. 710; Jaʿfar b. Thaʿlab Kamāl al-dīn al-Adfuʿī (history of Upper Egypt), d. 730; ʿAbd al-Qarūn al-Ḥalabī, d. 735; Ibn Ḥabīb, d. 779; Ibn Duqmāq, d. 790; Ibn Tughān, Shihāb al-dīn al-Auḥadī, d. 790; Ibn al-Mulaqqin, d. 806; Maqrīzī, Taqiyy al-dīn Aḥmad, d. 840; Ibn Ḥajar al-ʿAsqalānī, d. 852; al-Sakhāwī, d. 902; Abu'l-Mahāsin b. Taghrībirdī, d. 874; Jalāl al-dīn al-Suyūṭī, d. 911; Ibn Zunbul al-Rammāl; Ibn Iyās, d. after 928; Mahommed b. Abī Surūr, d. after 1017; Zain al-dīn al Karamī, d. 1033; ʿAbd al-Raḥmān Jabartī, d. after 1236. Of many of the Mameluke sultans there are special chronicles preserved in various European and Oriental libraries. The works of many of the authors enumerated are topographical and biographical as well as purely historical. To these there should be added the Survey of Egypt, called *al-tuḥfah al-saniyyah* of Ibn Jī'ān, belonging to the time of Kait Bey; the treatise on the Egyptian constitution called *Zubdat Kashf al-Mamālik*, by Khalīl al-Ẓāhirī, of the same period; and the encyclopaedic work on the same subject called *Ṣubḥ al-Inshā*, by al-Qalqashandī, d. 821.

Arabic poetry is in the main encomiastic and personal, and from the beginning of the Omayyad period sovereigns and governors paid poets to celebrate their achievements; of those of importance who are connected with Egypt we may mention Nusaib, encomiast of ʿAbd al-Azīz b. Merwān, d. 180; the greater Nāshi (Abu l-Abbās ʿAbdallah), d. 293; Ibn Ṭabāṭabā, d. 345; Abu'l-Raqaʿmaq, encomiast of al-Mo'izz, d. 399; Ṣarīʿ al-Dilā (ʿAlī b. ʿAbd al-Wāhid), encomiast of the Fāṭimite al-Ẓāhir, d. 412; Sanajāt al-ḍauḥ (Mahommed b. al-Qāsim), encomiast of Ḥākim; ʿAlī b. ʿAbbād al-Iskandarī, encomiast of the vizier al-Afḍal, executed by Ḥāfiẓ; Ibn Qalāqis al-Iskandarī, encomiast of the Ayyūbites, d. 607; Muhaddhab b. Mamētī, encomiast of the Ayyūbites, d. 616; Ibn Sana' al-Mulk, encomiast of the Ayyūbites, d. 658; Ibn al-Munajjim, d. 626; Ibn Maṭrūḥ, encomiast of the Ayyūbites, d. 654; Bahāʿ al-dīn Zuhair, encomiast of al-Ṣāliḥ, d. 656; Ibn ʿAmmār, d. 675; al-Miʿmār, d. 749; Ibn Nubātah, d. 768; Ibn Abī Ḥajalah, d. 776; Burhān al-din al-Qīrāṭī, d. 801; Ibn Mukānis, d. 864; Ibn Ḥijjah al-Ḥamawī, d. 837. Poets distinguished for special lines are al-Ḥakīm b. Dāniʿ āl, d. 608, author of the Shadow-play; and al-Būsīrī (Mahommed b. Saʿīd), d. 694, author of the ode in praise of the prophet called Burdah. The poets of Egypt are reckoned with those of Syria in the *Yatīmah* of Thaʿ ālibī; a special work upon them was written by Ibn Faḍl allāh (d. 740); and a list of poets of the 11th century is given by Khafājī in his *Raiḥānat al-alibbā*.

The needs of the Egyptian court produced a number of elegant letter-writers, of whom the most famous were ʿAbd al-Raḥīm b. ʿAlī al-Baisāni, ordinarily known as al-Qāḍīʿ al-Fāḍil, d. 596, secretary of state to Saladin and other Ayyūbite sultans; ʿImād al-dīn al-Ispahānī, d. 597, also secretary of state and official chronicler; and Ibn ʿAbd al-Ẓāhir, d. 692, secretary of state to Bibars I. and succeeding sultans; he was followed by his son Faṭḥ al-dīn, to whom the title "Secret writer" was first given.

In the subject of law Egypt boasts that the Imām Shāfiʿī, founder of one of the schools, resided at Fosṭāṭ from 195 till his death in 204; his system, though displaced for a time by that invented by the Fāṭimites, and since the Turkish conquest by the Ḥanifite system, has always been popular in Egypt: in Ayyūbite times it was dominant, whereas in Mameluke times all four systems were officially recognized. The eminent jurists who flourished in Moslem Egypt form a very lengthy list. Among the Egyptian traditionalists the most eminent is Dāraquṭnī, d. 385.

Among Egyptian mystics the most famous as authors are the poet Ibn al-Fāriḍ, d. 632, and Abd al-Wahhāb Sha rānī, d. 973. Abu'l-Ḥasan al-Shādhilī (d. 656) is celebrated as the founder of the Shādhilī order; but there were many others of note. The dictionary of physicians, compiled in the 7th century, enumerates nearly sixty men of science who resided in Egypt; the best-known among them are Saʿīd b. Biṭrīq, Moses Maimonides and Ibn Baiṭār. Of Egyptian miscellaneous writers two of the most celebrated are Ibn Daqīq alʿ-īd, d. 702, and Jalāl al-din Suyūṭī.

European Authorities.—For the Moslem conquest, A. J. Butler, *The Arab Conquest of Egypt* (Oxford, 1902); for the period before the Fāṭimites, Wüstenfeld, "Die Statthalter von Ägypten," in *Abhandlungen der königlichen Gesellschaft der Wissenschaften zu Göttingen*, vols. xx. and xxi.; for the Fāṭimite period, Wüstenfeld, "Geschichte der Fatimiden-Chalifen," *ibid.* vols. xxvi. and xxvii.; for the Ayyūbite period, Ibn Khallikan's *Biographical Dictionary*, translated by MʻG. de Slane (London, 1842–1871); for the Mameluke period, Weil, *Geschichte der Chalifen*, vols. iv. and v. (also called *Geschichte des Abbasidenchalifats in Agypten*), (Stuttgart, 1860–1862); Sir W. Muir, *The Mameluke or Slave Dynasty of Egypt* (London, 1896); for the Turkish period, G. Zaidan, *History of Modern Egypt* (Arabic), vol. ii. (Cairo, 1889). See also Maqrizi, *Description topographique et historique de l'Égypte*, translated by Bouriant (Paris, 1895, &c.); C. H. Becker, *Beiträge zur Geschichte Ägyptens* (Strassburg, 1902). (D. S. M.*)

(9) *From the French Occupation to the Rise of Mehemet Ali.*—The ostensible object of the French expedition to Egypt was to reinstate the authority of the Sublime Porte, and suppress the Mamelukes; and in the proclamation printed with the Arabic types brought from the Propaganda press, and issued shortly after the taking of Alexandria, Bonaparte declared that he reverenced the prophet Mahomet and the Koran far more than the Mamelukes reverenced either, and argued that all men were equal except so far as they were distinguished by their intellectual and moral excellences, of neither of which the Mamelukes had

any great share. In future all posts in Egypt were to be open to all classes of the inhabitants; the conduct of affairs was to be committed to the men of talent, virtue, and learning; and in proof of the statement that the French were sincere Moslems the overthrow of the papal authority in Rome was alleged. That there might be no doubt of the friendly feeling of the French to the Porte, villages and towns which capitulated to the invaders were required to hoist the flags of both the Porte and the French republic, and in the thanksgiving prescribed to the Egyptians for their deliverance from the Mamelukes, prayer was to be offered for both the sultan and the French army. It does not appear that the proclamation convinced many of the Egyptians of the truth of these professions. After the battle of Ambabah, at which the forces of both Murād Bey and Ibrāhīm Bey were dispersed, the populace readily plundered the houses of the beys, and a deputation was sent from al-Azhar to Bonaparte to ascertain his intentions; these proved to be a repetition of the terms of his proclamation, and, though the combination of loyalty to the French with loyalty to the sultan was unintelligible, a good understanding was at first established between the invaders and the Egyptians. A municipal council was established in Cairo, consisting of persons taken from the ranks of the sheiks, the Mamelukes and the French; and presently delegates from Alexandria and other important towns were added. This council did little more than register the decrees of the French commander, who continued to exercise dictatorial power. The destruction of the French fleet at the battle of the Nile, and the failure of the French forces sent to Upper Egypt (where they reached the first cataract) to obtain possession of the person of Murād Bey, shook the faith of the Egyptians in their invincibility; and in consequence of a series of unwelcome innovations the relations between conquerors and conquered grew daily more strained, till at last, on the occasion of the introduction of a house tax, an insurrection broke out in Cairo on the 22nd of October 1798, of which the headquarters were in the Moslem university of Azhar. On this occasion the French general Dupuy, lieutenant-governor of Cairo, was killed. The prompt measures of Bonaparte, aided by the arrival from Alexandria of General J. B. Kléber, quickly suppressed this rising; but the stabling of the French cavalry in the mosque of Azhar gave great and permanent offence. In consequence of this affair, the deliberative council was suppressed, but on the 25th of December a fresh proclamation was issued, reconstituting the two divans which had been created by the Turks; the special divan was to consist of 14 persons chosen by lot out of 60 government nominees, and was to meet daily. The general divan was to consist of functionaries, and to meet on emergencies.

Battle of the Nile.

In consequence of despatches which reached Bonaparte on the 3rd of January 1799, announcing the intention of the Porte to invade the country with the object of recovering it by force, Bonaparte resolved on his Syrian expedition, and appointed governors for Cairo, Alexandria, and Upper Egypt, to govern during his absence. From that ill-fated expedition he returned at the beginning of June. Advantage had been taken of this opportunity by Murād Bey and Ibrāhīm Bey to collect their forces and attempt a joint attack on Cairo, but this Bonaparte arrived in time to defeat, and in the last week of July he inflicted a crushing defeat on the Turkish army that had landed at Aboukir, aided by the British fleet commanded by Sir Sidney Smith. Shortly after his victory Bonaparte left Egypt, having appointed Kléber to govern in his absence, which he informed the sheiks of Cairo was not to last more than three months. Kléber himself regarded the condition of the French invaders as extremely perilous, and wrote to inform the French republic of the facts. A double expedition shortly after Bonaparte's departure was sent by the Porte for the recovery of Egypt, one force being despatched by sea to Damietta, while another under Yūsuf Pasha took the land route from Damascus by al-Arish. Over the first some success was won, in consequence of which the Turks agreed to a convention (signed January 24, 1800), by virtue of which the French were to quit Egypt. The Turkish troops advanced to Bilbeis, where they were received by the sheiks from Cairo, and the Mamelukes also returned to that city from their hiding-places. Before the preparations for the departure of the French were completed, orders came to Sir Sidney Smith from the British government, forbidding the carrying out of the convention unless the French army were treated as prisoners of war; and when these were communicated to Kléber he cancelled the orders previously given to the troops, and proceeded to put the country in a state of defence. His departure with most of the army to attack the Turks at Mataria led to riots in Cairo, in the course of which many Christians were slaughtered; but the national party were unable to get possession of the citadel, and Kléber, having defeated the Turks, was soon able to return to the capital. On the 14th of April he bombarded Bulak, and proceeded to bombard Cairo itself, which was taken the following night. Order was soon restored, and a fine of twelve million francs imposed on the rioters. Murād Bey sought an interview with Kléber and succeeded in obtaining from him the government of Upper Egypt. He died shortly afterwards and was succeeded by Osman Bey al-Bardīsī.

On the 14th of June Kléber was assassinated by a fanatic named Suleiman of Aleppo, said to have been incited to the deed by a Janissary refugee at Jerusalem, who had brought letters to the sheiks of the Azhar, who, however, refused to give him any encouragement. Three of these, nevertheless, were executed by the French as accessories before the fact, and the assassin himself was impaled, after torture, in spite of a promise of pardon having been made to him on condition of his naming his associates. The command of the army then devolved on General J. F. (Baron de) Menou (1750–1810), a man who had professed Islam, and who endeavoured to conciliate the Moslem population by various measures, such as excluding all Christians (with the exception of one Frenchman) from the divan, replacing the Copts who were in government service by Moslems, and subjecting French residents to taxes. Whatever popularity might have been gained by these measures was counteracted by his declaration of a French protectorate over Egypt, which was to count as a French colony.

In the first weeks of March 1801 the English, under Sir R. Abercromby, effected a landing at Aboukir, and proceeded to invest Alexandria, where on the 21st they were attacked by Menou; the French were repulsed, but the English commander was mortally wounded in the action. On the 25th fresh reinforcements arrived under Husain, the Kapudan Pasha, or high admiral; and a combined English and Turkish force was sent to take Rosetta. On the 30th of May, General A. D. Belliard, who had been left in charge at Cairo, was assailed on two sides by the British forces under General John Hely Hutchinson (afterwards 2nd earl of Donoughmore), and the Turkish under Yūsuf Pasha; after negotiations Belliard agreed to evacuate Cairo and to sail with his 13,734 troops to France. On the 30th of August, Menou at Alexandria was compelled to accept similar conditions, and his force of 10,000 left for Europe in September. This was the termination of the French occupation of Egypt, of which the chief permanent monument was the *Description de l'Égypte*, compiled by the French savants who accompanied the expedition. Further than this, "it brought to the attention of a few men in Egypt a keen sense of the great advantage of an orderly government, and a warm appreciation of the advance that science and learning had made in Europe" (Hajji Browne, *Bonaparte in Egypt and the Egyptians of to-day*, 1907, p. 268).

French evacuation.

Soon after the evacuation of Egypt by the French, the country became the scene of more severe troubles, in consequence of the attempts of the Turks to destroy the power of the Mamelukes. In defiance of promises to the British government, orders were transmitted from Constantinople to Husain Pasha, the Turkish high admiral, to ensnare and put to death the principal beys. Invited to an entertainment, they were, according to the Egyptian contemporary historian al-Jabarti, attacked on board the flag-ship; Sir Robert Wilson and M. F. Mengin, however, state that they were fired on, in open boats, in the Bay of Aboukir. They offered an heroic resistance, but were overpowered, and some killed, some made prisoners; among the last was Osman Bey al-Bardīsī, who was severely wounded. General Hutchinson, informed of this treachery, immediately assumed threatening measures against the Turks, and in consequence the killed, wounded and prisoners were given up to him. At the same time Yūsuf Pasha arrested all the beys in Cairo, but was shortly compelled by the British to release them. Such was the beginning of the disastrous struggle between the Mamelukes and the Turks.

British, Turks and Mamelukes.

Mahommed Khosrev was the first Turkish governor of Egypt after the expulsion of the French. The form of government, however, was not the same as that before the French invasion, for the Mamelukes were not reinstated. The pasha, and through him the sultan, endeavoured on several occasions either to ensnare them or to beguile them into submission; but these efforts failing, Mahommed Khosrev took the field, and a Turkish detachment 7000 strong was despatched against them to Damanhur, whither they had descended from Upper Egypt, and was defeated by a small force under al-Alfī; or, as Mengin says, by 800 men commanded by al-Bardīsī, when al-Alfī had left the field. Their ammunition and guns fell into the hands of the Mamelukes.

In March 1803 the British evacuated Alexandria, and Mahommed Bey al-Alfī accompanied them to England to consult respecting the means to be adopted for restoring the former power of the Mamelukes, who meanwhile took Minia and interrupted communication between Upper and Lower Egypt. About six weeks after, the Arnaut (or Albanian) soldiers in the service of Khosrev tumultuously demanded their pay, and surrounded the house of the defterdār (or finance minister), who in vain appealed to the pasha to satisfy their claims. The latter opened fire from the artillery of his palace on the insurgent soldiery in the house of the defterdār, across the Ezbekia. The citizens of Cairo, accustomed to such occurrences, immediately closed their shops, and every man who possessed any weapon armed himself. The tumult continued all the day, and the next morning a body of troops sent out by the pasha failed to quell it. Tāhir, the commander of the Albanians, then repaired to the citadel, gained admittance through an embrasure, and, having obtained possession of it, began to cannonade the pasha over the roofs of the intervening houses, and then descended with guns to the Ezbekia and laid close siege to the palace. On the following day Mahommed Khosrev made good his escape, with his women and servants and his regular troops, and fled to Damietta by the river. This revolt marks the beginning in Egypt of the breach between the Albanians and Turks, which ultimately led to the expulsion of the latter, and of the rise to power of the Albanian Mehemet Ali (*q.v.*), who was destined to rule the country for nearly forty years and be the cause of serious European complications.

First appearance of Mehemet Ali.

Tāhir Pasha assumed the government, but in twenty-three days he met with his death from exactly the same cause as that of the overthrow of his predecessor. He refused the pay of certain of the Turkish troops, and was immediately assassinated. A desperate conflict ensued between the Albanians and Turks; and the palace was set on fire and plundered. The masters of Egypt were now split into these two factions, animated with the fiercest animosity against each other. Mehemet Ali, then in command of an Albanian regiment, became the head of the former, but his party was the weaker, and he therefore entered into an alliance with the Mameluke leaders Ibrahim Bey and ’Osmān Bey al-Bardīsī. A certain Ahmed Pasha, who was about to proceed to a province in Arabia, of which he had been appointed governor, was raised to the important post of pasha of Egypt, through the influence of the Turks and the favour of the sheiks; but Mehemet Ali, who with his Albanians held the citadel, refused to assent to their choice; the Mamelukes moved over from El-Giza, whither they had been invited by Tāhir Pasha, and Ahmed Pasha betook himself to the mosque of al-Ẓāhir, which the French had converted into a fortress. He was compelled to surrender by the Albanians; the two chiefs of the Turks who killed Tāhir Pasha were taken with him and put to death, and he himself was detained a prisoner. In consequence of the alliance between Mehemet Ali and al-Bardīsī, the Albanians gave the citadel over to the Mamelukes; and soon after, these allies marched against Khosrev Pasha, who having been joined by a considerable body of Turks, and being in possession of Damietta, was enabled to offer an obstinate resistance. After much loss on both sides, he was taken prisoner and brought to Cairo; but he was treated with respect. The victorious soldiery sacked the town of Damietta, and were guilty of the barbarities usual with them on such occasions.

A few days later, Ali Pasha Jazāirli landed at Alexandria with an imperial firmān constituting him pasha of Egypt, and threatened the beys, who now were virtual masters of Upper Egypt, as well as of the capital and nearly the whole of Lower Egypt. Mehemet Ali and al-Bardīsī therefore descended to Rosetta, which had fallen into the hands of a brother of Ali Pasha, and having captured the town and its commander, al-Bardīsī purposed to proceed against Alexandria; but the troops demanded arrears of pay which it was not in his power to give, and the pasha had cut the dyke between the lakes of Aboukir and Mareotis, thus rendering the approach to Alexandria more difficult. Al-Bardīsī and Mehemet Ali therefore returned to Cairo. The troubles of Egypt were now increased by an insufficient inundation, and great scarcity prevailed, aggravated by the taxation to which the beys were compelled to resort in order to pay the troops; while murder and rapine prevailed in the capital, the riotous soldiery being under little or no control. Meanwhile, Ali Pasha, who had been behaving with violence towards the Franks in Alexandria, received a *hatt-i-sherif* from the sultan, which he sent by his secretary to Cairo. It announced that the beys should live peaceably in Egypt, with an annual pension each of fifteen purses (a "purse" = 500 piastres) and other privileges, but that the government should be in the hands of the pasha. To this the beys assented, but with considerable misgivings; for they had intercepted letters from Ali to the Albanians, endeavouring to alienate them from their side to his own. Deceptive answers were returned to these, and Ali was induced by them to advance towards Cairo at the head of 3000 men. The forces of the beys, with the Albanians, encamped near him at Shalakān, and he fell back on a place called Zufeyta. They next seized his boats conveying soldiers, servants, and his ammunition and baggage; and, following him, they demanded wherefore he brought with him so numerous a body of men, in opposition to usage and to their previous warning. Finding they would not allow his troops to advance, forbidden himself to retreat with them to Alexandria, and being surrounded by the enemy, he would have hazarded a battle, but his men refused to fight. He therefore went to the camp of the beys, and his army was compelled to retire to Syria. In the hands of the beys Ali Pasha again attempted treachery. A horseman was seen to leave his tent one night at full gallop; he was the bearer of a letter to Osmān Bey Hasan, the governor of Kine. This offered a fair pretext to the Mamelukes to rid themselves of a man proved to be a perfidious tyrant. He was sent under a guard of forty-five men towards the Syrian frontier; and about a week after, news was received that in a skirmish with some of his own soldiers he had fallen mortally wounded.

The Mamelukes and Ali Pasha.

The death of Ali Pasha produced only temporary tranquillity; in a few days (February 12, 1804) the return of Mahommed Bey al-Alfī (called the Great) from England was the signal for fresh disturbances, which, by splitting the Mamelukes into two parties, accelerated their final overthrow. An ancient jealousy existed between al-Alfī and the other most powerful bey, al-Bardīsī. The latter was now supreme among the Mamelukes, and this fact considerably heightened their old enmity. While the guns of the citadel, those at Old Cairo, and even those of the palace of al-Bardīsī, were thrice fired in honour of al-Alfī, preparations were immediately begun to oppose him. His partisans were collected opposite Cairo, and al-Alfī the Less held Giza; but treachery was among them; Husain Bey (a relative of al-Alfī) was assassinated by emissaries of al-Bardīsī, and Mehemet Ali, with his Albanians, gained possession of Giza, which was, as usual, given over to the troops to pillage. In the meanwhile al-Alfī the Great embarked at Rosetta, and not apprehending opposition, was on his way to Cairo, when a little south of the town of Manūf he encountered a party of Albanians, and with difficulty made his escape. He gained the eastern branch of the Nile, but the river had become dangerous, and he fled to the desert. There he had several hairbreadth escapes, and at last secreted himself among a tribe of Arabs at Rās al-Wādī. A change in the fortune of al-Bardīsī, however, favoured his plans for the future. That chief, in order to satisfy the demands of the Albanians for their pay, gave orders to levy heavy contributions from the citizens of Cairo; and this new oppression roused them to rebellion. The Albanians, alarmed for their safety, assured the populace that they would not allow the order to be executed; and Mehemet Ali himself caused a proclamation to be made to that effect. Thus the Albanians became the favourites of the people, and took advantage of their opportunity. Three days later (March 12th, 1804) they beset the house of the aged Ibrahim Bey, and that of al-Bardīsī, both of whom effected their escape with difficulty. The Mamelukes in the citadel directed a fire of shot and shell on the houses of the Albanians which were situated in the Ezbekīa; but, on hearing of the flight of their chiefs, they evacuated the place; and Mehemet Ali, on gaining possession of it, once more proclaimed Mahommed Khosrev pasha of Egypt. For one day and a half he enjoyed the title; the friends of the late Tāhir Pasha then accomplished his second degradation,[1] and Cairo was again the scene of terrible enormities, the Albanians revelling in the houses of the Mameluke chiefs, whose hareems met with no mercy at their hands. These events were the signal for the reappearance of al-Alfī.

The Albanians now invited Ahmed Pasha Khorshīd to assume the reins of government, and he without delay proceeded from Alexandria to Cairo. The forces of the partisans of al-Bardīsī were ravaging the country a few miles south of the capital and intercepting the supplies of corn by the river; a little later they passed to the north of Cairo and successively took Bilbeis and Kalyub, plundering the villages, destroying the crops, and slaughtering the herds of the inhabitants. Cairo was itself in a state of tumult, suffering severely from a scarcity of grain, and the heavy exactions of the pasha to meet the demands of his turbulent troops, at that time augmented by a Turkish detachment. The shops were closed, and the unfortunate people assembled in great crowds, crying "Yā Latīf! Yā Latīf!" ("O Gracious [God]!") Al-Alfī and Osmān Bey Hasan had professed allegiance to the pasha; but they soon after declared against him, and they were now approaching from the south; and having repulsed Mehemet Ali, they took the two fortresses of Turā. These Mehemet Ali speedily retook by night with 4000 infantry and cavalry; but the enterprise was only partially successful. On the following day the other Mamelukes north of the metropolis actually penetrated into the suburbs; but a few days later were defeated in a battle fought at Shubra, with heavy loss on both sides. This reverse in a measure united the two great Mameluke parties, though their chiefs remained at enmity. Al-Bardīsī passed to the south of Cairo, and the Mamelukes gradually retreated towards Upper Egypt. Thither the pasha despatched three successive expeditions (one of which was commanded by Mehemet Ali), and many battles were fought, but without decisive result.

At this period another calamity befell Egypt; about 3000 Delīs (Kurdish troops) arrived in Cairo from Syria. These troops had been sent for by Khorshīd in order to strengthen himself against the Albanians; and the events of this portion of the history afford sad proof of their ferocity and brutal enormities, in which they far exceeded the ordinary Turkish soldiers and even the Albanians. Their arrival immediately recalled Mehemet Ali and his party from the war, and instead of aiding Khorshīd was the proximate cause of his overthrow.

Cairo was ripe for revolt; the pasha was hated for his tyranny and extortion, and execrated for the deeds of his troops, especially those of the Delīs: the sheiks enjoined the people to close their shops, and the soldiers clamoured for pay. At this juncture a firmān arrived from Constantinople conferring on Mehemet Ali the pashalic of Jedda; but the occurrences of a few days raised him to that of Egypt.

Struggle between Khorshīd and Mehemet Ali.

On the 12th of Safar 1220 (May 12th, 1805) the sheiks, with an immense concourse of the inhabitants, assembled in the house of the ķāḍī; and the ulemā, amid the prayers and cries of the people, wrote a full statement of the heavy wrongs which they had endured under the administration of the pasha. The ulemā, in answer, were desired to go to the citadel; but they were apprised of treachery; and on the following day, having held another council at the house of the ķāḍī, they proceeded to Mehemet Ali and informed him that the people would no longer submit to Khorshīd. "Then whom will ye have?" said he. "We will have *thee*," they replied, "to govern us according to the laws; for we see in thy countenance that thou art possessed of justice and goodness." Mehemet Ali seemed to hesitate, and then complied, and was at once invested. On this, a bloody struggle began between the two pashas. Khorshīd, being informed of the insurrection, immediately prepared to stand a siege in the citadel. Two chiefs of the Albanians joined his party, but many of his soldiers deserted. Mehemet Ali's great strength lay in the devotion of the citizens of Cairo, who looked on him as a deliverer from their afflictions; and great numbers armed themselves, advising constantly with Mehemet Ali, having the sayyid Omar and the sheiks at their head, and guarding the town at night. On the 19th of the same month Mehemet Ali began to besiege Khorshīd. After the siege had continued many days, Khorshīd gave orders to cannonade and bombard the town; and for six days his commands were executed with little interruption, the citadel itself also lying between two fires. Mehemet Ali's position at this time was very critical: his troops became mutinous for their pay; the silāhdār, who had commanded one of the expeditions against the Mamelukes, advanced to the relief of Khorshīd; and the latter ordered the Delīs to march to his assistance. The firing ceased on the Friday, but began again on the eve of Saturday and lasted until the next Friday. On the day following (May 28th) news came of the arrival at Alexandria of a messenger from Constantinople. The ensuing night in Cairo presented a curious spectacle; many of the inhabitants, believing that this envoy would put an end to their miseries, fired off their weapons as they paraded the streets with bands of music. The silāhdār, imagining the noise to be a fray, marched in haste towards the citadel, while its garrison sallied forth and began throwing up entrenchments in the quarter of Arab al-Yesār, but were repulsed by the armed inhabitants and the soldiers stationed there; and during all this time the cannonade and bombardment from the citadel, and on it from the batteries on the hill, continued unabated.

Mehemet Ali granted the pashalic.

The envoy brought a firmān confirming Mehemet Ali and ordering Khorshīd to go to Alexandria, there to await further orders; but this he refused to do, on the ground that he had been appointed by a *hatt-i-sherīf*. The firing ceased on the following day, but the troubles of the people were rather increased than assuaged; murders and robberies were daily committed by the soldiery, the shops were all shut and some of the streets barricaded. While these scenes were being enacted, al-Alfī was besieging Damanhur, and the other beys were returning towards Cairo, Khorshīd having called them to his assistance: but Mehemet Ali forced them to retreat.

Soon after this, a squadron under the command of the Turkish high admiral arrived at Aboukir Bay, with despatches confirming the firmān brought by the former envoy, and authorizing

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[1] Khosrev Pasha afterwards filled several of the highest offices at Constantinople. He died on the 1st of February 1855. He was a bigot of the old school, strongly opposed to the influences of Western civilization, and consequently to the assistance of France and Great Britain in the Crimean War.

Mehemet Ali to continue to discharge the functions of governor. Khorshīd at first refused to yield; but at length, on condition that his troops should be paid, he evacuated the citadel and embarked for Rosetta.

First massacre of the Mamelukes.

Mehemet Ali now possessed the title of Governor of Egypt, but beyond the walls of Cairo his authority was everywhere disputed by the beys, who were joined by the army of the silāhdār of Khorshīd; and many Albanians deserted from his ranks. To replenish his empty coffers he was also compelled to levy exactions, principally from the Copts. An attempt was made to ensnare certain of the beys, who were encamped north of Cairo. On the 17th of August 1805 the dam of the canal of Cairo was to be cut, and some chiefs of Mehemet Ali's party wrote, informing them that he would go forth early on that morning with most of his troops to witness the ceremony, inviting them to enter and seize the city, and, to deceive them, stipulating for a certain sum of money as a reward. The dam, however, was cut early in the preceding night, without any ceremony. On the following morning, these beys, with their Mamelukes, a very numerous body, broke open the gate of the suburb al-Husainia, and gained admittance into the city from the north, through the gate called Bāb el-Futūḥ. They marched along the principal street for some distance, with kettle-drums behind each company, and were received with apparent joy by the citizens. At the mosque called the Ashrafia they separated, one party proceeding to the Azhar and the houses of certain sheiks, and the other continuing along the main street, and through the gate called Bāb Zuwēla, where they turned up towards the citadel. Here they were fired on by some soldiers from the houses; and with this signal a terrible massacre began. Falling back towards their companions, they found the bye-streets closed; and in that part of the main thoroughfare called Bain al-Kasrain they were suddenly placed between two fires. Thus shut up in a narrow street, some sought refuge in the collegiate mosque Barkukia, while the remainder fought their way through their enemies and escaped over the city-wall with the loss of their horses. Two Mamelukes had in the meantime succeeded, by great exertions, in giving the alarm to their comrades in the quarter of the Azhar, who escaped by the eastern gate called Bāb al-Ghoraib. A horrible fate awaited those who had shut themselves up in the Barkukia. Having begged for quarter and surrendered, they were immediately stripped nearly naked, and about fifty were slaughtered on the spot; and about the same number were dragged away, with every brutal aggravation of their pitiful condition, to Mehemet Ali. Among them were four beys, one of whom, driven to madness by Mehemet Ali's mockery, asked for a drink of water; his hands were untied that he might take the bottle, but he snatched a dagger from one of the soldiers, rushed at the pasha, and fell covered with wounds. The wretched captives were then chained and left in the court of the pasha's house; and on the following morning the heads of their comrades who had perished the day before were skinned and stuffed with straw before their eyes. One bey and two others paid their ransom and were released; the rest, without exception, were tortured and put to death in the course of the ensuing night. Eighty-three heads (many of them those of Frenchmen and Albanians) were stuffed and sent to Constantinople, with a boast that the Mameluke chiefs were utterly destroyed. Thus ended Mehemet Ali's first massacre of his too confiding enemies.

The beys, after this, appear to have despaired of regaining their ascendancy; most of them retreated to Upper Egypt, and an attempt at compromise failed. Al-Alfī offered his submission on the condition of the cession of the Fayum and other provinces; but this was refused, and that chief gained two successive victories over the pasha's troops, many of whom deserted to him.

At length, in consequence of the remonstrances of the English, and a promise made by al-Alfī of 1500 purses, the Porte consented to reinstate the twenty-four beys and to place al-Alfī at their head; but this measure met with the opposition of Mehemet Ali and the determined resistance of the majority of the Mamelukes, who, rather than have al-Alfī at their head, preferred their present condition; for the enmity of al-Bardīsī had not subsided, and he commanded the voice of most of the other beys. In pursuance of the above plan, a squadron under Sālih Pasha, shortly before appointed high admiral, arrived at Alexandria on the 1st of July 1806 with 3000 regular troops and a successor to Mehemet Ali, who was to receive the pashalik of Salonica. This wily chief professed his willingness to obey the commands of the Porte, but stated that his troops, to whom he owed a vast sum of money, opposed his departure. He induced the ulemā to sign a letter, praying the sultan to revoke the command for reinstating the beys, persuaded the chiefs of the Albanian troops to swear allegiance to him, and sent 2000 purses contributed by them to Constantinople. Al-Alfī was at that time besieging Damanhur, and he gained a signal victory over the pasha's troops; but the dissensions of the beys destroyed their last chance of a return to power. Al-Alfī and his partisans were unable to pay the sum promised to the Porte; Sālih Pasha received plenipotentiary powers from Constantinople, in consequence of the letter from the ulemā; and, on the condition of Mehemet Ali's paying 4000 purses to the Porte, it was decided that he should continue in his post, and the reinstatement of the beys was abandoned. Fortune continued to favour the pasha. In the following month al-Bardīsī died, aged forty-eight years; and soon after, a scarcity of provisions excited the troops of al-Alfī to revolt. That bey very reluctantly raised the siege of Damanhur, being in daily expectation of the arrival of an English army; and at the village of Shubra-ment he was attacked by a sudden illness, and died on the 30th of January 1807, at the age of fifty-five. Thus was the pasha relieved of his two most formidable enemies; and shortly after he defeated Shāhīn Bey, with the loss to the latter of his artillery and baggage and 300 men killed or taken prisoners.

The British expedition of 1807.

On the 17th of March 1807 a British fleet appeared off Alexandria, having on board nearly 5000 troops, under the command of General A. Mackenzie Fraser; and the place, being disaffected towards Mehemet Ali, opened its gates to them. Here they first heard of the death of al-Alfī, upon whose co-operation they had founded their chief hopes of success; and they immediately despatched messengers to his successor and to the other beys, inviting them to Alexandria. The British resident, Major Missett, having represented the importance of taking Rosetta and Rahmanieh, to secure supplies for Alexandria, General Fraser, with the concurrence of the admiral, Sir John Duckworth, detached the 31st regiment and the Chasseurs Britanniques, accompanied by some field artillery under Major-General Wauchope and Brigadier-General Meade, on this service; and these troops entered Rosetta without encountering any opposition; but as soon as they had dispersed among the narrow streets, the garrison opened a deadly fire on them from the latticed windows and the roofs of the houses. They effected a retreat on Aboukir and Alexandria, after a very heavy loss of 185 killed and 281 wounded, General Wauchope and three officers being among the former, and General Meade and nineteen officers among the latter. The heads of the slain were fixed on stakes on each side of the road crossing the Ezbekīa in Cairo.

Mehemet Ali, meanwhile, was conducting an expedition against the beys in Upper Egypt, and he had defeated them near Assiut, when he heard of the arrival of the British. In great alarm lest the beys should join them, especially as they were far north of his position, he immediately sent messengers to his rivals, promising to comply with all their demands if they should join in expelling the invaders; and this proposal being agreed to, both armies marched towards Cairo on opposite sides of the river.

To return to the unfortunate British expedition. The possession of Rosetta being deemed indispensable, Brigadier-Generals Sir William Stewart and Oswald were despatched thither with 2500 men. For thirteen days a cannonade of the town was continued without effect; and on the 20th of April, news having come in from the advanced guard at Hamād of large reinforcements to the besieged, General Stewart was compelled to retreat; and a dragoon was despatched to Lieutenant-colonel Macleod, commanding at Hamād, with orders to fall back. The messenger, however, was unable to penetrate to the spot; and the advanced guard, consisting of a detachment of the 31st, two companies of the 78th, one of the 35th, and De Roll's regiment, with a picquet of dragoons, the whole mustering 733 men, was surrounded, and, after a gallant resistance, the survivors, who had expended all their ammunition, became prisoners of war. General Stewart regained Alexandria with the remainder of his force, having lost, in killed, wounded and missing, nearly 900 men. Some hundreds of British heads were now exposed on stakes in Cairo, and the prisoners were marched between these mutilated remains of their countrymen.

The beys became divided in their wishes, one party being desirous of co-operating with the British, the other with the pasha. These delays proved ruinous to their cause; and General Fraser, despairing of their assistance, evacuated Alexandria on the 14th of September. From that date to the spring of 1811 the beys from time to time relinquished certain of their demands; the pasha on his part granted them what before had been withheld; the province of the Fayum, and part of those of Giza and Benī-Suef, were ceded to Shāhīn; and a great portion of the Sa'īd, on the condition of paying the land-tax, to the others. Many of them took up their abode in Cairo, but tranquillity was not secured; several times they met the pasha's forces in battle and once gained a signal victory. Early in the year 1811, the preparations for an expedition against the Wahhābīs in Arabia being complete, all the Mameluke beys then in Cairo were invited to the ceremony of investing Mehemet Ali's favourite son, Tūsūn, with a pelisse and the command of the army. As on the former occasion, the unfortunate Mamelukes fell into the snare. On the 1st of March, Shāhīn Bey and the other chiefs (one only excepted) repaired with their retinues to the citadel, and were courteously received by the pasha. Having taken coffee, they formed in procession, and, preceded and followed by the pasha's troops, slowly descended the steep and narrow road leading to the great gate of the citadel; but as soon as the Mamelukes arrived at the gate it was suddenly closed before them. The last of those to leave before the gate was shut were Albanians under Sālih Kush. To these troops their chief now made known the pasha's orders to massacre all the Mamelukes within the citadel; therefore, having returned by another way, they gained the summits of the walls and houses that hem in the road in which the Mamelukes were confined, and some stationed themselves upon the eminences of the rock through which that road is partly cut. Thus securely placed, they began a heavy fire on their victims; and immediately the troops who closed the procession, and who had the advantage of higher ground, followed their example. Of the betrayed chiefs, many were laid low in a few moments; some, dismounting, and throwing off their outer robes, vainly sought, sword in hand, to return, and escape by some other gate. The few who regained the summit of the citadel experienced the same fate as the rest, for no quarter was given. Four hundred and seventy Mamelukes entered the citadel; and of these very few, if any, escaped. One of these is said to have been a bey. According to some, he leapt his horse from the ramparts, and alighted uninjured, though the horse was killed by the fall; others say that he was prevented from joining his comrades, and discovered the treachery while waiting without the gate. He fled and made his way to Syria. This massacre was the signal for an indiscriminate slaughter of the Mamelukes throughout Egypt, orders to this effect being transmitted to every governor; and in Cairo itself the houses of the beys were given over to the soldiery. During the two following days the pasha and his son Tūsūn rode about the streets and tried to stop the atrocities; but order was not restored until 500 houses had been completely pillaged. The heads of the beys were sent to Constantinople.

Final massacre of the Mamelukes.

A remnant of the Mamelukes fled to Nubia, and a tranquillity was restored to Egypt to which it had long been unaccustomed. In the year following the massacre the unfortunate exiles were attacked by Ibrahim Pasha, the eldest son of Mehemet Ali, in the fortified town of Ibrīm, in Nubia. Here the want of provisions forced them to evacuate the place; a few who surrendered were beheaded, and the rest went farther south and built the town of New Dongola (correctly Dunkulah), where the venerable Ibrahim Bey died in 1816, at the age of eighty. As their numbers thinned, they endeavoured to maintain their little power by training some hundreds of blacks; but again, on the approach of Ismail, another son of the pasha of Egypt, sent with an army in 1820 to subdue Nubia and Sennār, some returned to Egypt and settled in Cairo, while the rest, amounting to about 100 persons, fled in dispersed parties to the countries adjacent to Sennār.

See A. A Paton, *History of the Egyptian Revolution* (2 vols., 2nd ed., enlarged 1870); and FRENCH REVOLUTIONARY WARS.
(E. S. P.; S. L.-P.; D. S. M.*)

3. *Modern History.*

(1) *Rule of Mehemet Ali.*—Mehemet Ali was now undisputed master of Egypt, and his efforts henceforth were directed primarily to the maintenance of his practical independence. The suzerainty of the sultan he acknowledged, and at the reiterated commands of the Porte he despatched in 1811 an army of 8000 men, including 2000 horse, under the command of his son Tūsūn, a youth of sixteen, against the Wahhābīs (*q.v.*). After a successful advance, this force met with a serious repulse at the pass of Jedeida, near Safra, and retreated to Yembo' (Yambu). In the following year Tūsūn, having received reinforcements, again assumed the offensive, and captured Medīna after a prolonged siege. He next took Jidda and Mecca, defeating the Wahhābīs beyond the latter place and capturing their general. But some mishaps followed, and Mehemet Ali, who had determined to conduct the war in person, left Egypt for that purpose in the summer of 1813. In Arabia he encountered serious obstacles from the nature of the country and the harassing mode of warfare adopted by his adversaries. His arms met with various fortunes; but on the whole his forces proved superior to those of the enemy. He deposed and exiled the sharif of Mecca, and after the death of the Wahhābī leader Saud II. he concluded in 1815 a treaty with Saud's son and successor, Abdullah. Hearing of the escape of Napoleon from Elba—and fearing danger to Egypt from the plans of France or Great Britain—Mehemet Ali returned to Cairo by way of Kosseir and Kena. He reached the capital on the day of the battle of Waterloo. His return was hastened by reports that the Turks, whose cause he was upholding in Arabia, were treacherously planning an invasion of Egypt.

Wars in Arabia.

During Mehemet Ali's absence in Arabia his representative at Cairo had completed the confiscation, begun in 1808, of almost all the lands belonging to private individuals, who were forced to accept instead inadequate pensions. By this revolutionary method of land "nationalization" Mehemet Ali became proprietor of nearly all the soil of Egypt, an iniquitous measure against which the Egyptians had no remedy. The attempt which in this year (1815) the pasha made to reorganize his troops on European lines led, however, to a formidable mutiny in Cairo. Mehemet Ali's life was endangered, and he sought refuge by night in the citadel, while the soldiery committed many acts of plunder. The revolt was reduced by presents to the chiefs of the insurgents, and Mehemet Ali ordered that the sufferers by the disturbances should receive compensation from the treasury. The project of the *Nizām Gedid* (New System), as the European system was called, was, in consequence of this mutiny, abandoned for a time.

Tūsūn returned to Egypt on hearing of the military revolt at Cairo, but died in 1816 at the early age of twenty. Mehemet Ali, dissatisfied with the treaty concluded with the Wahhābīs, and with the non-fulfilment of certain of its clauses, determined to send another army to Arabia, and to include in it the soldiers who had recently proved unruly. This expedition, under his eldest son Ibrahim Pasha, left in the autumn of 1816. The war was long and arduous, but in 1818 Ibrahim captured the Wahhābī capital of Deraiya. Abdullah, their chief, was made prisoner, and with his treasurer and secretary was sent to Constantinople, where, in spite of Ibrahim's promise of safety, and of Mehemet Ali's intercession in their favour, they were put to death. At the close of the year 1819, Ibrahim returned to Cairo, having subdued all present opposition in Arabia.

Meanwhile the pasha had turned his attention to the improvement of the manufactures of Egypt, and engaged very largely in commerce. He created for himself a monopoly in the chief products of the country, to the further impoverishment of the people, and set up and kept going for years factories which never paid. But some of his projects were sound. The work of digging (1819–1820) the new canal of Alexandria, called the Mahmudiya (after the reigning sultan of Turkey), was specially important. The old canal had long fallen into decay, and the necessity of a safe channel between Alexandria and the Nile was much felt. Such was the object of the canal then excavated, and it answered its purpose; but the sacrifice of life was enormous (fully 20,000 workmen perished), and the labour of the unhappy fellahin was forced. Another notable fact in the economic progress of the country was the development of the cultivation of cotton in the Delta in 1822 and onwards. The cotton grown had been brought from the Sudan by Maho Bey, and the organization of the new industry—from which in a few years Mehemet Ali was enabled to extract considerable revenues—was entrusted to a Frenchman named Jumel.

Conquest of the Sudan begun.

In 1820 Mehemet Ali ordered the conquest of the eastern Sudan to be undertaken. He first sent an expedition westward (Feb. 1820) which conquered and annexed the oasis of Siwa. Among the pasha's reasons for wishing to extend his rule southward were the desire to capture the valuable caravan trade then going towards the Red Sea, and to secure the rich gold mines which he believed to exist in Sennār. He also saw in the campaign a means of getting rid of the disaffected troops, and of obtaining a sufficient number of captives to form the nucleus of the new army. The forces destined for this service were led by Ismail, then the youngest son of Mehemet Ali; they consisted of between 4000 and 5000 men, Turks and Arabs, and left Cairo in July 1820. Nubia at once submitted, the Shagia Arabs immediately beyond the province of Dongola were worsted, the remnant of the Mamelukes dispersed, and Sennār reduced without a battle. Mahommed Bey, the defterdār, with another force of about the same strength, was then sent by Mehemet Ali against Kordofan with a like result, but not without a hard-fought engagement. In October 1822 Ismail was, with his retinue, burnt to death by Nimr, the *mek* (king) of Shendi; and the defterdār, a man infamous for his cruelty, assumed the command of those provinces, and exacted terrible retribution from the innocent inhabitants. Khartum was founded at this time, and in the following years the rule of the Egyptians was largely extended and control obtained of the Red Sea ports of Suakin and Massawa (see SUDAN: *History*).

In 1824 a native rebellion of a religious character broke out in Upper Egypt headed by one Aḥmad, an inhabitant of Es-Sālimiya, a village situated a few miles above Thebes. He proclaimed himself a prophet, and was soon followed by between 20,000 and 30,000 insurgents, mostly peasants, but some of them deserters from the "Nizām Gedid," for that force was yet in a half-organized state, and in part declared for the impostor. The insurrection was crushed by Mehemet Ali, and about one-fourth of Ahmad's followers perished, but he himself escaped and was never after heard of. Few of these unfortunates possessed any other weapon than the long staff (*nebbut*) of the Egyptian peasant; still they offered an obstinate resistance, and the combat in which they were defeated resembled a massacre. This movement was the last internal attempt to destroy the pasha's authority.

Sufferings of the fellahin.

The fellahin, a patient, long-suffering race save when stirred by religious fanaticism, submitted to the kurbash, freely used by the Turkish and Bashi Bazuk tax-gatherers employed by Mehemet Ali to enforce his system of taxation, monopolies, corvée and conscription. Under this régime the resources of the country were impoverished, while the finances fell into complete and incomprehensible chaos.

A vivid picture of the condition to which Egypt was reduced is painted in the report drawn up in 1838 by the British consul-general, Colonel Campbell:—

> "The government (he wrote), possessing itself of the necessaries of life at prices fixed by itself, disposes of them at arbitrary prices. The fellah is thus deprived of his harvest and falls into arrears with his taxes, and is harassed and bastinadoed to force him to pay his debts. This leads to deterioration of agriculture and lessens the production. The pasha having imposed high taxes has caused the high prices of the necessaries of life. It would be difficult for a foreigner now coming to Egypt to form a just idea of the actual state of the country as compared with its former state. In regard to the general rise in prices, all the ground cultivated under the Mamelukes was employed for producing food—wheat, barley, beans, &c.—in immense quantities. The people reared fowls, sheep, goats, &c., and the prices were one-sixth, or even one-tenth, of those at present. This continued until Mehemet Ali became viceroy in 1805. From that period until the establishment of monopolies prices have gradually increased; but the great increase has chiefly taken place since 1824, when the pasha established his regular army, navy and factories."

The conclusion in 1838 of a commercial treaty with Turkey, negotiated by Sir Henry Bulwer (Lord Dalling), struck a deathblow to the system of monopolies, though the application of the treaty to Egypt was delayed for some years. The picture of Egypt under Mehemet Ali is nevertheless not complete without regard being had to the beneficent side of his rule. Public order was rendered perfect; the Nile and the highways were secure to all travellers, Christian or Moslem; the Bedouin tribes were won over to peaceful pursuits, and genuine efforts were made to promote education and the study of medicine. To European merchants, on whom he was dependent for the sale of his exports, Mehemet Ali showed much favour, and under his influence the port of Alexandria again rose into importance. It was also under Mehemet Ali's encouragement that the overland transit of goods from Europe to India via Egypt was resumed.

Ibrahim in the Morea.

Mehemet Ali was fully conscious that the empire which he had so laboriously built up might at any time have to be defended by force of arms against his master Sultan Mahmud II., whose whole policy had been directed to curbing the power of his too ambitious valis, and who was under the influence of the personal enemies of the pasha of Egypt, notably of Khosrev, the grand vizier, who had never forgiven his humiliation in Egypt in 1803. Mahmud also was already planning reforms borrowed from the West, and Mehemet Ali, who had had plenty of opportunity of observing the superiority of European methods of warfare, was determined to anticipate the sultan in the creation of a fleet and an army on modern lines, partly as a measure of precaution, partly as an instrument for the realization of yet wider schemes of ambition. Before the outbreak of the War of Greek Independence in 1821 he had already expended much time and energy in organizing a fleet and in training, under the supervision of French instructors, native officers and artificers; though it was not till 1829 that the opening of a dockyard and arsenal at Alexandria enabled him to build and equip his own vessels. By 1823, moreover, he had succeeded in carrying out the reorganization of his army on European lines, the turbulent Turkish and Albanian elements being replaced by negroes and fellahin.[1] His foresight was rewarded by the invitation of the sultan to help him in the task of subduing the Greek insurgents, offering as reward the pashaliks of the Morea and of Syria. Mehemet Ali had already, in 1821, been appointed governor of Crete, which he had occupied with a small Egyptian force. In the autumn of 1824 a fleet of sixty Egyptian war-ships carrying a large force of disciplined troops concentrated in Suda Bay, and, in the following March, Ibrahim as commander-in-chief landed in the Morea. But for the action of European powers the intervention of Mehemet Ali would have been decisive. His naval superiority wrested from the Greeks the command of the sea, on which the fate of the insurrection ultimately depended, while on land the Greek irregular bands were everywhere routed by Ibrahim's disciplined troops. The history of the events that led up to the battle of Navarino and the liberation of Greece is told elsewhere (see NAVARINO and GREEK INDEPENDENCE, WAR OF); the withdrawal of the Egyptians from the Morea was ultimately due to the action of Admiral Sir Edward Codrington, who early in August 1828 appeared before Alexandria and induced the pasha, by no means sorry to have a reasonable excuse, by a threat of bombardment, to sign a convention undertaking to recall Ibrahim and his army.

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[1] The work was carried out under the supervision of the Frenchman, Colonel Sève, who had turned Mahommedan and was known in Islam as Suleiman Pasha. The effectiveness of the new force was first tried in the suppression of a revolt of the Albanians in Cairo (1823) by six disciplined Sudanese regiments; after which Mehemet Ali was no more troubled with military *émeutes*.

The Syrian campaigns.

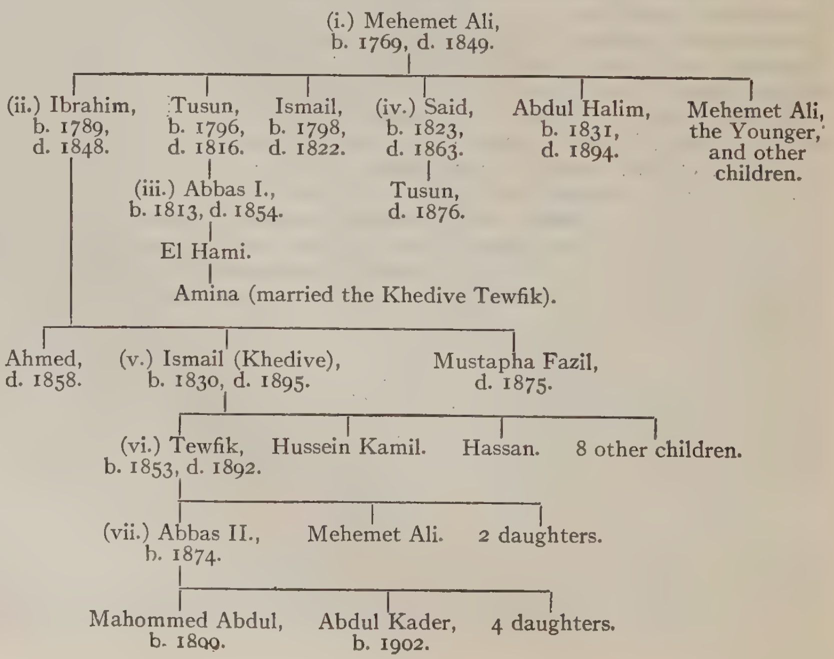
Before the final establishment of the new kingdom of Greece, the Eastern question had late in 1831 entered into a new and more perilous phase, owing to the revolt of Mehemet Ali against the sultan on pretext of chastising the ex-slave Abdullah, pasha of Acre, for refusing to send back Egyptian fugitives from the effects of Mehemet Ali's "reforms." The true reason was the refusal of Sultan Mahmud to hand over Syria according to agreement, and Mehemet Ali's determination to obtain at all hazards what had been from time immemorial an object of ambition to the rulers of Egypt. For ten years from this date the relations of sultan and pasha remained in the forefront of the questions which agitated the diplomatic world. It was not only the very existence of the Ottoman empire that seemed to be at stake, but Egypt itself had become more than ever an object of attention, to British statesmen especially, and in the issue of the struggle were involved the interests of Great Britain in the two routes to India by the Isthmus of Suez and the valley of the Euphrates. The diplomatic and military history of this period will be found sketched in the article on Mehemet Ali. Here it will suffice to say that the victorious career of Ibrahim, who once more commanded in his father's name, beginning with the storming of Acre on the 27th of May 1832, and culminating in the rout and capture of Reshid Pasha at Konia on the 21st of December, was arrested by the intervention of Russia. As the result of endless discussions between the representatives of the powers, the Porte and the pasha, the convention of Kutaya was signed on the 14th of May 1833, by which the sultan agreed to bestow on Mehemet Ali the pashaliks of Syria, Damascus, Aleppo and Itcheli, together with the district of Adana. The announcement of the pasha's appointment had already been made in the usual way in the annual firman issued on the 3rd of May. Adana, reserved for the moment, was bestowed on Ibrahim under the style of *muhassil*, or collector of the crown revenues, a few days later.

Mehemet Ali now ruled over a virtually independent empire, subject only to a moderate tribute, stretching from the Sudan to the Taurus Mountains. But though he was hailed, especially in France, as the pioneer of European civilization in the East, the unsound foundations of his authority were not long in revealing themselves. Scarcely a year from the signing of the convention of Kutaya the application by Ibrahim of Egyptian methods of government, notably of the monopolies and conscription, had driven Syrians, Druses and Arabs, who had welcomed him as a deliverer, into revolt. The unrest was suppressed by Mehemet Ali in person, and the Syrians were terrorized and disarmed. But their discontent encouraged Sultan Mahmud to hope for revenge, and a renewal of the conflict was only staved off by the anxious efforts of the powers. At last, in the spring of 1839, the sultan ordered his army, concentrated under Reshid in the border district of Bîr on the Euphrates, to advance over the Syrian frontier. Ibrahim, seeing his flank menaced, attacked it at Nezib on the 24th of June. Once more the Ottomans were utterly routed. Six days later, before the news reached Constantinople, Mahmud died. Once more the Ottoman empire lay at the feet of Mehemet Ali; but the powers were now more prepared to meet a contingency which had been long foreseen. Their intervention was prompt; and the dubious attitude of France, which led to her exclusion from the concert and encouraged Mehemet Ali to resist, only led to his obtaining less favourable terms. (See MEHEMET ALI.)

Mehemet Ali's authority confined to Egypt.

The end was reached early in 1841. New firmans were issued which confined the pasha's authority to Egypt, the Sinai peninsula and certain places on the Arabian side of the Red Sea, and to the Sudan. The most important of these documents are dated the 13th of February 1841. The government of the pashalik of Egypt was made hereditary in the family of Mehemet Ali.[1] A map showing the boundaries of Egypt accompanied the firman granting Mehemet Ali the pashalik, a duplicate copy being retained by the Porte. The Egyptian copy is supposed to have been lost in a fire which destroyed a great part of the Egyptian archives. The Turkish copy has never been produced and its existence now appears doubtful. The point is of importance, as in 1892 and again in 1906 boundary disputes arose between Turkey and Egypt (see below). Various restrictions were laid upon Mehemet Ali, emphasizing his position of vassalage. He was forbidden to maintain a fleet, and his army was not to exceed 18,000 men. The pasha was no longer a figure in European politics, but he continued to occupy himself with his improvements, real or imaginary, in Egypt. The condition of the country was deplorable; in 1842 a murrain of cattle was followed by a destructive Nile flood; in 1843 there was a plague of locusts, whole villages were depopulated. Meantime the uttermost farthing was wrung from the wretched fellahin, while they were forced to the building of magnificent public works by unpaid labour. In 1844–1845 there was some improvement in the condition of the country as a result of financial reforms the pasha was compelled to execute. Mehemet Ali, who had been granted the honorary rank of grand vizier in 1842, paid a visit to Stamboul in 1846, where he became reconciled to his old enemy Khosrev Pasha, whom he had not seen since he spared his life at Cairo in 1803. In 1847 Mehemet Ali laid the foundation stone of the great barrage across the Nile at the beginning of the Delta. He was barely persuaded from ordering the barrage to be built with stone from the pyramids! Towards the end of 1847 the aged pasha's mind began to give way, and by the following June he was no longer capable of administering the government. In September 1848 Ibrahim was acknowledged by the Porte as ruler of the pashalik, but he died in the November

[1] THE DYNASTY OF MEHEMET ALI.


(i.) Mehemet Ali, b. 1769, d. 1849.
(ii.) Ibrahim, b. 1789, d. 1848.
Tusun, b. 1796, d. 1816.
Ismail, b. 1798, d. 1822.
(iv.) Said, b. 1823, d. 1863.
Abdul Halim, b. 1831, d. 1894.
Mehemet Ali, the Younger, and other children.
(iii.) Abbas I., b. 1813, d. 1854.
Tusun, d. 1876.
El Hami.
Amina (married the Khedive Tewfik).
Ahmed, d. 1858.
(v.) Ismail (Khedive), b. 1830, d. 1895.
Mustapha Fazil, d. 1875.
(vi.) Tewfik, b. 1853, d. 1892.
Hussein Kamil.
Hassan.
8 other children.
(vii.) Abbas II., b. 1874.
Mehemet Ali.
2 daughters.
Mahommed Abdul, b. 1899.
Abdul Kader, b. 1902.
4 daughters.

following. Mehemet Ali survived another eight months, dying on the 2nd of August 1849, aged eighty. He had done a great work in Egypt; the most permanent being the weakening of the tie binding the country to Turkey, the starting of the great cotton industry, the recognition of the advantages of European science, and the conquest of the Sudan. (F. R. C.)

Abbas I. and Said Pasha.

(2) *From the Death of Mehemet Ali to the British Occupation.*—On Ibrahim's death in November 1848 the government of Egypt fell to his nephew Abbas I. (*q.v.*), the son of Tusun. Abbas put an end to the system of commercial monopolies, and during his reign the railway from Alexandria to Cairo was begun at the instigation of the British government. Opposed to European ways, Abbas lived in great seclusion, and after a reign of less than six years he was murdered (July 1854) by two of his slaves. He was succeeded by his uncle Said Pasha, the favourite son of Mehemet Ali, who lacked the strength of mind or physical health needed to execute the beneficent projects which he conceived. His endeavour, for instance, to put a stop to the slave raiding which devastated the Sudan provinces was wholly ineffectual. He had a genuine regard for the welfare of the fellahin, and a land law of 1858 secured to them an acknowledgment of freehold as against the crown. The pasha was much under French influence, and in 1856 was induced to grant to Ferdinand de Lesseps a concession for the construction of the Suez Canal. Lord Palmerston was opposed to this project, and the British opposition delayed the ratification of the concession by the Porte for two years. To the British Said also made concessions—one to the Eastern Telegraph Company, and another (1854) allowing the establishment of the Bank of Egypt. He also began the national debt by borrowing £3,293,000 from Messrs Frühling & Göschen, the actual amount received by the pasha being £2,640,000. In January 1863 Said Pasha died and was succeeded by his nephew Ismail, a son of Ibrahim Pasha.

Ismail's megalomania.

The reign of Ismail (*q.v.*), from 1863 to 1879, was for a while hailed as introducing a new era into modern Egypt. In spite of his vast schemes of reform and the *éclat* of his Europeanizing innovations, his oriental extravagance led to bankruptcy, and his reign is historically important simply for its compelling European intervention in the internal affairs of Egypt. Yet in its earlier years much was done which seemed likely to give Ismail a more important place in history. In 1866 he was granted by the sultan a firman—obtained on condition of the increase of the tribute from £376,000 to £720,000—by which the succession to the throne of Egypt was made to descend "to the eldest of thy male children and in the same manner to the eldest sons of thy successors," instead of, after Turkish law, to the eldest male of the family. In the following year another firman bestowed upon him the title of *khedive* in lieu of that of *vali*, borne by Mehemet Ali and his immediate successors. In 1873 a further firman placed the khedive in many respects in the position of an independent sovereign. Ismail re-established and improved the administrative system organized by Mehemet Ali, and which had fallen into decay under Abbas's indolent rule; he caused a thorough remodelling of the customs system, which was in an anarchic state, to be made by English officials; in 1865 he established the Egyptian post office; he reorganized the military schools of his grandfather, and gave some support to the cause of education. Railways, telegraphs, lighthouses, the harbour works at Suez, the breakwater at Alexandria, were carried out by some of the best contractors of Europe. Most important of all, the Suez Canal was opened in 1869. But the funds required for these public works, as well as the actual labour, were remorselessly extorted from a poverty-stricken population.

A striking picture of the condition of the people at this period is given by Lady Duff Gordon in *Last Letters from Egypt*. Writing in 1867 she said: "I cannot describe the misery here now—every day some new tax. Every beast, camel, cow, sheep, donkey and horse is made to pay. The fellaheen can no longer eat bread; they are living on barley-meal mixed with water, and raw green stuff, vetches, &c. The taxation makes life almost impossible: a tax on every crop, on every animal first, and again when it is sold in the market; on every man, on charcoal, on butter, on salt. . . . The people in Upper Egypt are running away by wholesale, utterly unable to pay the new taxes and do the work exacted. Even here (Cairo) the beating for the year's taxes is awful."

Steps leading to the deposition of Ismail.

In the years that followed the condition of things grew worse. Thousands of lives were lost and large sums expended in extending Ismail's dominions in the Sudan (*q.v.*) and in futile conflicts with Abyssinia. In 1875 the impoverishment of the fellah had reached such a point that the ordinary resources of the country no longer sufficed for the most urgent necessities of administration; and the khedive Ismail, having repeatedly broken faith with his creditors, could not raise any more loans on the European market. The taxes were habitually collected many months in advance, and the colossal floating debt was increasing rapidly. In these circumstances Ismail had to realize his remaining assets, and among them sold 176,602 Suez Canal shares to the British government for £3,976,582[1] (see BEACONSFIELD). This comparatively small financial operation brought about the long-delayed crisis and paved the way for the future prosperity of Egypt, for it induced the British government to inquire more carefully into the financial condition of the country. In December 1875 Mr Stephen Cave, M.P., and Colonel (afterwards Sir John) Stokes, R.E., were sent to Egypt to inquire into the financial situation; and Mr Cave's report, made public in April 1876, showed that under the existing administration national bankruptcy was inevitable. Other commissions of inquiry followed, and each one brought Ismail more under European control. The establishment of the Mixed Tribunals in 1876, in place of the system of consular jurisdiction in civil actions, made some of the courts of justice international. The Caisse de la Dette, instituted in May 1876 as a result of the Cave mission, led to international control over a large portion of the revenue. Next came (in November 1876) the mission of Mr (afterwards Lord) Goschen and M. Joubert on behalf of the British and French bondholders, one result being the establishment of Dual Control, *i.e.* an English official to superintend the revenue and a French official the expenditure of the country. Another result was the internationalization of the railways and the port of Alexandria. Then came (May 1878) a commission of inquiry of which the principal members were Sir Rivers Wilson, Major Evelyn Baring (afterwards Lord Cromer) and MM. Kremer-Baravelli and de Blignières. One result of that inquiry was the extension of international control to the enormous landed property of the khedive. Driven to desperation, Ismail made a virtue of necessity and accepted, in September 1878, in lieu of the Dual Control, a constitutional ministry, under the presidency of Nubar Pasha (*q.v.*), with Rivers Wilson as minister of finance and de Blignières as minister of public works. Professing to be quite satisfied with this arrangement, he pompously announced that Egypt was no longer in Africa, but a part of Europe; but before seven months had passed he found his constitutional position intolerable, got rid of his irksome cabinet by means of a secretly-organized military riot in Cairo, and reverted to his old autocratic methods of government. England and France could hardly sit still under this affront, and decided to administer chastisement by the hand of the suzerain power, which was delighted to have an opportunity of asserting its authority. On the 26th of June 1879 Ismail suddenly received from the sultan a curt telegram, addressed to him as ex-khedive of Egypt, informing him that his son Tewfik was appointed his successor. Taken unawares, he made no attempt at resistance, and Tewfik was at once proclaimed khedive.

After a short period of inaction, when it seemed as if the change might be for the worse, England and France summoned up courage to look the situation boldly in the face, and, in November 1879, re-established the Dual Control in the persons of Major Baring and M. de Blignières. For two years the Dual Control governed Egypt, and initiated the work of progress

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[1] Part of this money was devoted to an expedition sent against Abyssinia in 1876 to avenge losses sustained in the previous year. The new campaign was, however, equally unsuccessful.

Re-establishment of Dual Control.

Arabi and the revolt of 1882.

that England was to continue alone. Its essential defect was what might be called insecurity of tenure. Without any efficient means of self-protection and coercion at its disposal, it had to interfere with the power, privileges and perquisites of a class which had long misgoverned the country. This class, so far as its civilian members were concerned, was not very formidable, because these were not likely to go beyond the bounds of intrigue and passive resistance; but it contained a military element who had more courage, and who had learned their power when Ismail employed them for overturning his constitutional ministry. Among the mutinous soldiers on that occasion was a fellah officer calling himself Ahmed Arabi the Egyptian. He was not a man of exceptional intelligence or remarkable powers of organization, but he was a fluent speaker, and could exercise some influence over the masses by a rude kind of native eloquence. Behind him were a group of men, much abler than himself, who put him forward as the figurehead of a party professing to aim at protecting the Egyptians from the grasping tyranny of their Turkish and European oppressors. The movement began among the Arab officers, who complained of the preference shown to the officers of Turkish origin; it then expanded into an attack on the privileged position and predominant influence of foreigners, many of whom, it must be confessed, were of a by no means respectable type; finally, it was directed against all Christians, foreign and native.[1] The government, being too weak to suppress the agitation and disorder, had to make concessions, and each concession produced fresh demands. Arabi was first promoted, then made under-secretary for war, and ultimately a member of the cabinet. The danger of a serious rising brought the British and French fleets in May 1882 to Alexandria, and after a massacre (11th of June) had been perpetrated by the Arab mob in that city, the British admiral bombarded the forts (11th of July 1882). The leaders of the national movement prepared to resist further aggression by force. A conference of ambassadors was held in Constantinople, and the sultan was invited to quell the revolt; but he hesitated to employ his troops against Mussulmans who were professing merely to oppose Christian aggression.

(3) *Egypt occupied by the British.*—At last the British government determined to employ armed force, and invited France to co-operate. The French government declined, and a similar invitation to Italy met with a similar refusal. England therefore, having to act alone, landed troops at Ismailia under Sir Garnet Wolseley, and suppressed the revolt by the battle of Tell-el-Kebir on the 13th of September 1882. The khedive, who had taken refuge in Alexandria, returned to Cairo, and a ministry was formed under Sherif Pasha, with Riaz Pasha as one of its leading members. On assuming office, the first thing it had to do was to bring to trial the chiefs of the rebellion. Had the khedive and Riaz been allowed a free hand, Arabi and his colleagues would have found little mercy. Thanks to the intervention of the British government, their lives were spared. Arabi pleaded guilty, was sentenced to death, the sentence being commuted by the khedive to banishment; and Riaz resigned in disgust. This solution of the difficulty was brought about by Lord Dufferin, then British ambassador at Constantinople, who had been sent to Egypt as high commissioner to adjust affairs and report on the situation. One of his first acts, after preventing the application of capital punishment to the ringleaders of the revolt, was to veto the project of protecting the khedive and his government by means of a Praetorian guard recruited from Asia Minor, Epirus, Austria and Switzerland, and to insist on the principle that Egypt must be governed in a truly liberal spirit. Passing in review all the departments of the administration, he laid down the general lines on which the country was to be restored to order and prosperity, and endowed, if possible, with the elements of self-government for future use.

Sir Evelyn Baring appointed consul-general, 1884.

The laborious task of putting these general indications into a practical shape fell to Sir Evelyn Baring (Lord Cromer), who arrived as consul-general and diplomatic agent, in succession to Sir Edward Malet, in January 1884. At that moment the situation was singularly like that which had existed on two previous occasions: firstly, when Ismail was deposed; and secondly, when the Dual Control had undermined the existing authority without having any power to enforce its own. For the third time in little more than three years the existing authority had been destroyed and a new one had to be created. But there was one essential difference: the power that had now to reorganize the country possessed in the British army of occupation a support sufficient to command respect. Without that support Sir Evelyn Baring could have done little or nothing; with it he did perhaps more than any other single man could have done. His method may be illustrated by an old story long current in Cairo. Mehemet Ali was said to have appointed as *mudir* or governor in a turbulent district a young and inexperienced Turk, who asked, "But how am I to govern these people?" "Listen," replied the pasha; "buy the biggest and heaviest *kurbash* you can find; hang it up in the centre of the *mudirieh*, well within your reach, and you will very seldom require to use it." The British army of occupation was Sir Evelyn's *kurbash*; it was well within his reach, as all the world knew, and its simple presence sufficed to prevent disorder and enforce obedience. He had one other advantage over previous English reformers in Egypt: his position towards France was more independent. The Dual Control had been abolished by a khedivial decree of 18th January 1883, and replaced by an English financial adviser. France naturally objected; but having refused to co-operate with England in suppressing the revolt, she could not reasonably complain that her offer of co-operation in the work of reorganization was declined. But though Dual Control was at an end, the Caisse de la Dette remained, and this body was to prove a constant clog on the financial measures of the Egyptian government.

The Policy of evacuation.

At first the intention of the British government was simply to restore the power of the khedive, to keep his highness for some time in the right path by friendly advice, and to withdraw the British troops as soon as possible. As Lord Granville explained in a circular to the powers, the position of England in Egypt imposed on her "the duty of giving advice with the object of securing that the order of things to be established shall be of a satisfactory character and possess the elements of stability and progress." But there was to be no embarking on a general scheme of reforms, which would increase unnecessarily the responsibilities of the protecting power and necessitate the indefinite prolongation of the military occupation. So far, therefore, as the British government had a definite policy in Egypt, it was a *politique de replâtrage*. Even this policy was not strictly adhered to. Mr Gladstone's cabinet was as unstable as the public opinion it sought to conciliate. It had its hot fits and its cold fits, and it gave orders now to advance and now to retreat. In the long run circumstances proved too strong for it, and it had to undertake a great deal more than it originally intended. Each little change in the administration engendered a multitude of others, so that the modest attempts at reform were found to be like the letting out of water. A tiny rill gradually became a boisterous stream, and the boisterous stream grew into a great river, which spread to all sections of the administration and ended by inundating the whole country.

The Sudan question.

Of the numerous questions awaiting solution, the first to claim immediate attention was that of the Sudan. The British government had begun by excluding it from the problem, and by declaring that for events in these outlying territories it must not be held responsible. In that sphere of activity, therefore, the Egyptian government might do as it thought fit. The principle of limited liability which this attitude assumed was soon found to be utterly untenable. The Sudan was an integral part of the khedive's dominions, and caused, even in ordinary times, a deficit of

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[1] Lord Cromer, writing in 1905, declared that the movement "was, in its essence, a genuine revolt against misgovernment," and "was not essentially anti-European" (vide *Egypt No. 1*, 1905, p. 2).

£200,000 to the Egyptian treasury. At that moment it was in a state of open rebellion, stirred up by a religious fanatic who proclaimed himself a mahdi of Islam. An army of 10,000 men under an English officer, Colonel William Hicks, formerly of the Bombay army, otherwise Hicks Pasha, had been sent to suppress the revolt, and had been annihilated in a great battle fought on the 5th of November 1883, near Obeid. The Egyptian government wished to make a new attempt to recover the lost province, and the idea was certainly very popular among the governing class, but Sir Evelyn Baring vetoed the project on the ground that Egypt had neither soldiers nor money to carry it out. In vain the khedive and his prime minister, Sherif Pasha, threatened to resign, and the latter actually carried out his threat. The British representative remained firm, and it was decided that the Sudan should be, for the moment at least, abandoned to its fate. Nubar, though as strongly opposed to the abandonment policy as Sherif, consented to take his place and accepted somewhat reluctantly the new régime, which he defined as "the administration of Egypt under the government of Baring." By this time the Mahdi was master of the greater part of the Sudan, but Khartum and some other fortified points still held out. The efforts made to extricate the garrisons, including the mission of General Gordon, the fall of Khartum, and the Nile Expedition under Lord Wolseley, are described below separately in the section of this article dealing with the military operations. The practical result was that the khedive's authority was limited to the Nile valley north of Wadi Halfa.

Internal reorganization.

With the internal difficulties Sir Evelyn Baring had been struggling bravely ever since his appointment, trying to evolve out of the ever-changing policy and contradictory orders of the British government some sort of coherent line of action, and to raise the administration to a higher standard. For two or three years it seemed doubtful whether he would succeed. All over Egypt there was a feeling of unrest, and the well-meant but not very successful efforts of the British to improve the state of things were making them very unpopular. The introduction of English officials and English influence into all the administrative departments was resented by the native officials, and the action of the irrigation officers in preventing the customary abuses of the distribution of water was resented by the great landowners, who had been, from time immemorial, in the habit of taking as much as they wanted, to the detriment of the fellahin. Even these latter, who gained most by the reforms, considered that they had good reason to complain, for the defeat of Arabi and the re-establishment of order had enabled the Christian money-lenders to return and insist on the payment of claims, which were supposed to have been extinguished by the rebellion. Worst of all, the government was drifting rapidly towards insolvency, being quite unable to fulfil its obligations to the bondholders and meet the expenses of administration. All departments were being starved, and even the salaries of poorly paid officials were in arrear. To free itself from its financial difficulties the government adopted a heroic remedy which only created fresh troubles. On the advice of Lord Northbrook, who was sent out to Cairo in September 1884 to examine the financial situation, certain revenues which should have been paid into the Caisse for the benefit of the bondholders were paid into the treasury for the ordinary needs of the administration. Immediately the powers protested against this infraction of the law of liquidation, and the Caisse applied for a writ to the Mixed Tribunals. In this way the heroic remedy failed, and to the internal difficulties were added international complications.

Fortunately for Egypt, the British government contrived to solve the international difficulty by timely concessions to the powers, and succeeded in negotiating the London Convention of March 1885, by which the Egyptian government was relieved from some of the most onerous stipulations of the law of liquidation, and was enabled to raise a loan of £9,000,000 for an annual payment of £135,000. After paying out of the capital the sums required for the indemnities due for the burning of Alexandria and the deficits of the years 1882 and 1883, it still had a million sterling, and boldly invested it in the improvement of irrigation. The investment proved most remunerative, and helped very materially to save the country from bankruptcy and internationalism. The danger of being again subjected to the evils of an international administration was very great, for the London Convention contained a stipulation to the effect that if Egypt could not pay her way at the end of two years, another international commission would be appointed.

To obviate this catastrophe the British reformers set to work most energetically. Already something in the way of retrenchment and reform had been accomplished. The public accounts had been put in order, and the abuses in the collection of the land tax removed. The constant drain of money and men for the Sudan had been stopped. A beginning had been made for creating a new army to replace the one that had been disbanded and to allow of a portion of the British garrison being withdrawn. In this work Sir Evelyn Wood had shown much sound judgment as well as great capacity for military organization, and had formed an efficient force out of very unpromising material (see the section above on the *Egyptian Army*). His colleague in the department of public works, Sir Colin Scott-Moncrieff, had been not less active. By mitigating the hardships of the *corvée*, and improving the irrigation system, on which the prosperity of the country mainly depends, he had conferred enormous benefits on the fellahin, and had laid the foundation of permanent budgetary equilibrium for the future. Not less active was Sir Edgar Vincent, the financial adviser, who kept a firm hold on the purse-strings and ruthlessly cut down expenditure in all departments except that of irrigation (see § *Finance*).

The activity of the British officials naturally produced a certain amount of discontent and resistance on the part of their Egyptian colleagues, and Lord Granville was obliged to declare very plainly that such resistance could not be tolerated. Writing (January 1884) to Sir Evelyn Baring, he said:

> "It should be made clear to the Egyptian Ministers and Governors of Provinces that the responsibility which for the time rests on England obliges H.M. Government to insist on the adoption of the policy which they recommend; and that it will be necessary that those Ministers and Governors who do not follow this course should cease to hold their offices."

Relations between British and native officials.

Nubar Pasha, who continued to be prime minister, resisted occasionally. What he chiefly objected to was direct interference in the provincial administration and the native tribunals, and he succeeded for a time in preventing such interference. Sir Benson Maxwell and Mr Clifford Lloyd, who had been sent out to reform the departments of justice and the interior, after coming into conflict with each other were both recalled, and the reforming activity was for a time restricted to the departments of war, public works and finance. Gradually the tension between natives and foreigners relaxed, and mutual confidence was established. Experience had evolved the working principle which was officially formulated at a much later period: "Our task is not to rule the Egyptians, but as far as possible to teach the Egyptians to rule themselves. . . . European initiative suggests measures to be executed by Egyptian agency, while European supervision controls the manner in which they are executed." If that principle had been firmly laid down and clearly understood at the beginning, a good deal of needless friction would have been avoided.

International problems.

The international difficulty remained. The British position in Egypt was anomalous, and might easily give rise to international complications. The sultan might well protest against the military occupation of a portion of his empire by foreign troops. It was no secret that France was ready to give him diplomatic support, and other powers might adopt a similar attitude. Besides this, the British government was anxious to terminate the occupation as soon as possible. With a view to regularizing the situation and accelerating the evacuation, Sir Henry Drummond Wolff was sent to Constantinople in August 1885 on a special mission. On the 24th of October of that year he concluded a preliminary convention by which an Ottoman and a British high commissioner, acting in concert with the khedive, should reorganize the Egyptian army, tranquillize the Sudan by pacific means, and consider what changes might be necessary in the civil administration. When the two commissioners were assured of the security of the frontier and the good working and stability of the Egyptian government, they should present reports to their respective governments, and these should consult as to the conclusion of a convention regulating the withdrawal of the English troops. Mukhtar Pasha and Sir Henry Drummond Wolff were appointed commissioners, and their joint inquiry lasted till the end of 1886, when the former presented his report and the latter went home to report orally. The remaining stipulations of the preliminary convention were duly carried out. Sir Henry Drummond Wolff proceeded to Constantinople and signed on the 22nd of May 1887 the definitive convention, according to which the occupation should come to an end in three years, but England should have a right to prolong or renew it in the event of internal peace or external security being seriously threatened. The sultan authorised the signature of this convention, but under pressure of France and Russia he refused to ratify it. Technically, therefore, the preliminary convention still remains in force, and in reality the Ottoman commissioner continued to reside in Cairo till the close of 1908.

Progress of reform.

The steadily increasing prosperity of the country during the years 1886 and 1887 removed the danger of national bankruptcy and international interference, and induced Sir Evelyn Baring to widen the area of administrative reforms. In the provinces the local administration and the methods of dispensing justice were still scandalously unsatisfactory, and this was the field to which the British representative next directed his efforts. Here he met with unexpected opposition on the part of the prime minister, Nubar Pasha, and a conflict ensued which ended in Nubar's retirement in June 1888. Riaz Pasha took his place, and remained in office till May 1891. During these three years the work of reform and the prosperity of the country made great progress. The new Egyptian army was so far improved that it gained successes over the forces of the Mahdi; the burden of the national debt was lightened by a successful conversion; the *corvée* was abolished;[1] the land tax was reduced 30% in the poorest provinces, and in spite of this and other measures for lightening the public burdens, the budgetary surplus constantly increased; the quasi-judicial special commissions for brigandage, which were at once barbarous and inefficient, were abolished; the native tribunals were improved, and Mr (afterwards Sir John) Scott, an Indian judge of great experience and sound judgment, was appointed judicial adviser to the khedive. This appointment was opposed by Riaz Pasha, and led to his resignation on the plea of ill-health. His successor, Mustafa Pasha Fehmi, continued the work and co-operated cordially with the English officials. The very necessary reform of the native tribunals was then taken seriously in hand. The existing procedure was simplified and accelerated; the working of the courts was greatly improved by a carefully organized system of inspection and control; the incompetent judges were eliminated and replaced by men of better education and higher moral character; and for the future supply of well-qualified judges, barristers, and law officials, an excellent school of law was established. Later on the reforming activity was extended to prisons, public health, and education, and has attained very satisfactory results.

Accession of Abbas.

In January 1892 the khedive Tewfik, who had always maintained cordial relations with Sir Evelyn Baring, died suddenly, and was succeeded by his son, Abbas Hilmi, a young man without political experience, who failed at first to understand the peculiar situation in which a khedive ruling under British protection is necessarily placed. Aspiring to liberate himself at once from foreign control, he summarily dismissed Mustafa Pasha Fehmi (15th January 1893), whom he considered too amenable to English influence, and appointed in his place Fakhri Pasha, who was not a *persona grata* at the British Agency. Such an incident, which might have constituted a precedent for more important acts of a similar kind, could hardly be overlooked by the British representative. He had always maintained that what Egypt most required, and would require for many years to come, was an order of things which would render practically impossible any return to that personal system of government which had well-nigh ruined the country. In this view the British agent was warmly supported by Lord Rosebery, then secretary of state for foreign affairs. The young khedive was made therefore to understand that he must not make such changes in the administration without a previous agreement with the representative of the protecting power; and a compromise was effected by which Fakhri Pasha retired, and the post of premier was confided once more to Riaz. With this compromise the friction between the khedive and Sir Evelyn Baring, who had now become Lord Cromer, did not end. For some time Abbas Hilmi clung to his idea of liberating himself from all control, and secretly encouraged a nationalist and anti-British agitation in the native press; but he gradually came to perceive the folly, as well as the danger to himself, of such a course, and accordingly refrained from giving any overt occasion for complaint or protest. In like manner the relations between the British officials and their Egyptian colleagues gradually became more cordial, so that it was found possible at last to reform the local administration in the provinces according to the recommendations of Mr (afterwards Sir) Eldon Gorst, who had been appointed adviser to the ministry of the interior. Nubar Pasha, it is true, who succeeded Riaz as prime minister in April 1894, objected to some of Mr Gorst's recommendations, and in November 1895 resigned. He was succeeded by Mustafa Fehmi, who had always shown a conciliatory spirit, and who had been on that account, as above stated, summarily dismissed by the khedive in January 1893. After his reinstatement the Anglo-Egyptian condominium worked without serious friction.

Fashoda.

The success of the Anglo-Egyptian condominium, and the consequent economic and financial prosperity of Egypt proper, rendered it possible, during 1896–1898, to recover from the Mahdists the Sudanese provinces (see *Military Operations*), and to delimit in that part of Africa, in accordance with Anglo-Egyptian interests, the respective spheres of influence of Great Britain and France. The arrangement was not effected without serious danger of a European conflict. Taking advantage of the temporary weakness of Egypt, the French government formed the project of seizing the Upper Nile valley and uniting her possessions in West Africa with those at the entrance to the Red Sea. With this object a small force under Major Marchand was sent from the French Congo into the Bahr-el-Ghazal, with orders to occupy Fashoda on the Nile; whilst a Franco-Abyssinian Expedition was despatched from the eastward, to join hands with Major Marchand. The small force from the French Congo reached its destination, and a body of Abyssinian troops, accompanied by French officers, appeared for a short time a little higher up the river; but the grand political scheme was frustrated by the victorious advance of an Anglo-Egyptian force under General Kitchener and the resolute attitude of the British government. Major Marchand had to retire from Fashoda, and as a concession to French susceptibilities he was allowed to retreat by the Abyssinian route. By an agreement signed by Lord Salisbury and the French ambassador on the 21st of March 1899, and appended to Art. IV. of the Anglo-French convention of June 14th, 1898, which dealt with the British and French spheres of influence in the region of the Niger, France was excluded from the basin of the Nile, and a line marking the respective spheres of influence of the two countries was drawn on the map from the northern frontier of the Congo Free State to the southern frontier of the Turkish province of Tripoli.

The administration of the Sudan (*q.v.*) was organized on the basis of an agreement between the British and Egyptian governments signed on the 19th of January 1899. According to that agreement the British and Egyptian flags are used together,

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[1] Except in so far as it was necessary to call out men to guard the banks of the Nile in the season of high flood.

The Anglo-Egyptian Sudan.

and the supreme military and civil command is vested in a governor-general, who is appointed by the khedive on the recommendation of the British government, and who cannot be removed without the British government's consent. Neither consular jurisdiction, nor that of the mixed tribunals, was permitted, the Sudan being made absolutely free of the international fetters which bound Egypt. Sir Reginald Wingate, the sirdar of the Egyptian army (in which post he succeeded Lord Kitchener at the close of 1899) was named governor-general, and in the work of regeneration of the country, the officials, British, Egyptian and Sudanese, had the cordial co-operation of the majority of the inhabitants.

Egypt's growing prosperity.

The growing prosperity of Egypt in the opening years of the 20th century was very marked, and is reflected in the annual reports on the country supplied to the British foreign office by Lord Cromer. Thus, in 1901 he was able to declare that " the foundations on which the well-being and material prosperity of a civilized community should rest have been laid. . . . The institution of slavery is virtually defunct. The *corvée* has been practically abolished. Law and order everywhere reign supreme. The *curbash* is no longer employed as an instrument of government." So little danger to internal peace was apprehended that during this year Arabi Pasha, who had been in exile in Ceylon since 1882, was permitted to return to Egypt. This happy condition had been brought about largely as the result of giving fiscal reform, accompanied by substantial relief to the taxpayers, the first place in the government's programme, and with the abolition of octroi duties in 1902 disappeared the last of the main defects in the fiscal system as existing at the time of the British occupation. In these conditions the machinery of government, despite its many imperfections and anomalies, worked smoothly. Land increased in value as irrigation schemes were completed, and European capital was increasingly eager to find employment in the country. The bulk of the fellahin enjoyed a material prosperity to which they had been strangers for centuries. In the midst of this return of plenty Lord Cromer (in his report for 1903) sounded a note of warning:—

> " As regards moral progress (he wrote), all that can be said is that it must necessarily be slower than advance in a material direction. I hope and believe, however, that some progress is being made. In any case the machinery which will admit of progress has been created. The schoolmaster is abroad. . . . Every possible facility and every encouragement are afforded for the Egyptians to advance along the path of moral improvement. More than this no government can do. It remains for the Egyptians to take advantage of the opportunities offered to them."

The Anglo-French under-standing of 1904.

The facilities enjoyed by the British and Egyptian governments for securing the material if not the moral development of Egypt were greatly enlarged in 1904, as the result of the understanding then come to between France and Great Britain. The natural irritation in France arising from the British occupation of the Nile valley, and the non-fulfilment of the pledge to withdraw the British garrison from Egypt, which had grown less acute with the passing of years, flamed out afresh at the time of the Fashoda crisis, while the Anglo-Boer war of 1899–1902 led to another access of irritation against England. During 1903 a great change came over public opinion on both sides of the Channel, with the result that the statesmen of both countries were enabled to complete negotiations settling many points in dispute between the two nations. On the 8th of April 1904 a declaration was signed by the representatives of France and Great Britain which virtually recognized the dominant position of France in Morocco and of Britain in Egypt. The chief provisions concerning Egypt were:—

> " His Britannic Majesty's government declare that they have no intention of altering the political status of Egypt.
>
> " The government of the French Republic, for their part, declare that they will not obstruct the action of Great Britain in that country by asking that a limit of time be fixed for the British occupation, or in any other manner.
>
> " His Britannic Majesty's government, for their part, will respect the rights which France, in virtue of treaties, conventions and usage, enjoys in Egypt."

Similar declarations and engagements were made by Germany, Austria and Italy. Annexed to the Anglo-French agreement was the text of a proposed khedivial decree altering the relations between Egypt and the foreign bond-holders. With the consent of the powers this decree (promulgated on the 28th of November 1904) came into operation on the 1st of January 1905. The combined effect of the declaration and the khedivial decree was great. The first-named put an end to an anomalous situation and gave a practically valid sanction to the presence of Britain in Egypt, removing all ground for the reproach that Great Britain was not respecting its international obligations. In effect it was a European recognition that Britain was the protecting power in Egypt. It put a period to a question which had long embittered the relations between England and France, and locally it caused the cessation of the systematic opposition of the French agents in Cairo to everything tending to strengthen the British position—however beneficial to Egypt the particular scheme opposed might be. Scarcely less important were the results of the khedivial decree. By it Egypt achieved in effect financial independence. The power of the Caisse de la Dette, which had virtually controlled the execution of the international agreements concerning the finances, was swept away, together with almost all the other financial fetters binding Egypt. The Railway and Port of Alexandria Board ceased to exist. For the first time since 1875 Egypt was free to control her own revenue. In return she pledged the greater part of the land tax to the service of the debt. The functions of the Caisse were restricted to the receipt of the funds necessary for this service. It was entirely deprived of its former power to interfere in the machinery of government. Moreover, some £10,000,000, being accumulated surpluses in the hands of the Caisse after meeting the charges of the debt, were handed over to the Egyptian treasury. The Egyptian government was henceforth free to take full advantage of the financial prosperity of the country.

Evils of the Capitulations.

In one respect the Anglo-French agreement made no alteration—it left untouched the extra-territoriality enjoyed by Europeans in Egypt in virtue of the treaties with Turkey, *i.e.* the system of Capitulations. One of the anomalies under that system had, it is true, been got rid of, for, as has been stated, consular jurisdiction in civil matters had been replaced in 1876 by that of the Mixed Tribunals. In criminal cases, however, foreign consuls still exercised jurisdiction, but the main evil of the Capitulations régime was the absence of any proper machinery for enacting laws applicable to the whole of the inhabitants of Egypt. No change could be made in any law applicable to Europeans without the unanimous consent of fifteen foreign powers—a state of affairs wholly incompatible with the condition of Egypt in the 20th century, " an oriental country which has assimilated a very considerable portion of European civilization and which is mainly governed by European methods." It was, however, far easier to acknowledge that the Capitulations régime was defective and had outlived its time than to devise a remedy and get all the nations interested to accept it. The solution favoured by Lord Cromer (*vide* Blue-books, *Egypt No. 1* (1906), pp. 1-8, and *Egypt No. 1* (1907), pp. 10-26) was the creation of a council—distinct from the existing native legislative council and assembly—composed of Europeans, which should have the power to pass legislation which when promulgated by the Egyptian government, with the assent of the British government, would bind all foreigners resident in Egypt. Every reservation for the benefit of British subjects should enure for the benefit of subjects of other powers. The jurisdiction exercised by consuls in civil and criminal affairs Lord Cromer proposed should cease *pari passu* with the provision by the Egyptian government, under the powers conferred by the treaty required to set up the new council, of courts having competence to deal with such matters, various safeguards being introduced to prevent injustice in criminal cases. As to civil cases the proposal was to make permanent the Mixed Tribunals, hitherto appointed for quinquennial periods (so that if not reappointed consular jurisdiction in civil cases would revive).

The pan-Islamic movement.

While the removal of ancient jealousies among the European powers interested in Egypt helped to smooth the path pursued by the Egyptian administration under the guiding hand of Great Britain, the intrigues of the Turks and the danger of a revival of Moslem fanaticism threatened during 1905–1906 to disturb the peace of the country. A party had also arisen, whose best-known leader was Mustafa Kamel Pasha (1874–1908), which held that Egypt was ready for self-government and which saw in the presence of the British a hindrance to the attainment of their ideal. This "national" party lent what weight it had to the pan-Islamic agitation which arose in the summer and autumn of 1905, regardless of the fact that a pan-Islamic triumph meant the re-assertion of direct Turkish rule in Egypt and the end of the liberty the Egyptians enjoyed. The pan-Islamic press, allowed full licence by the Cairo authorities, spread abroad rumours that the Egyptian government intended to construct fortifications in the Sinai peninsula with the design of menacing the railway, under construction by Turkey, from Damascus to Mecca. This baseless report led to what is known as the Taba incident (see below). This incident inflamed the minds of many Egyptians, and almost all the opposition elements in the country were united by the appeal to religious fanaticism, of which the incident was partly the effect and partly the cause. The inflammatory writing of the newspapers indicated, encouraged by many persons holding high positions both inside and outside Egypt, created, by every process of misrepresentation, an anti-Christian and anti-European feeling among the mass of the people. After more than a quarter of a century of just rule, *i.e.* since the accession of Tewfik, the tyranny of the Turkish system was apt to be forgotten, while the appeal to rally in support of their khalif found a response in the hearts of many Egyptians. The feeling entertained by large numbers even of the educated class of Egyptians was strikingly illustrated by the terms of an anonymous letter received by Lord Cromer in May 1906. The writer, probably a member of the Ulema class, addressing the British agent as the reformer of Egypt, said:—

> ". . . He must be blind who sees not what the English have wrought in Egypt; the gates of justice stand open to the poor; the streams flow through the land and are not stopped by order of the strong; the poor man is lifted up and the rich man pulled down, the hand of the oppressor and the briber is struck when outstretched to do evil. Our eyes see these things and they know from whom they come. . . . While peace is in the land the spirit of Islam sleeps. . . . But it is said, 'There is war between England and Abdul Hamid Khan.' If that be so a change must come. The words of the Imam are echoed in every heart, and every Moslem hears only the cry of the Faith. . . . Though the Khalif were hapless as Bayezid, cruel as Murad, or mad as Ibrahim, he is the shadow of God, and every Moslem must leap up at his call. . . . You will say, 'The Egyptian is more ungrateful than a dog, which remembers the hand that fed him. He is foolish as the madman who pulls down the roof-tree of his house upon himself.' It may be so to worldly eyes, but in the time of danger to Islam the Moslem turns away from the things of this world and thirsts only for the service of his Faith, even though he looks in the face of death. . . ."

Denshawai.

To establish confidence in the minds of the Egyptian public that the authorities could maintain order and tranquillity, it was determined to increase permanently the strength of the British garrison. An incident occurred in June 1906 which illustrated the danger which might arise if anything happened to beget the idea that the protecting power had weakened its hold. While mounted infantry of the British army were marching from Cairo to Alexandria, five officers went (on the 13th of June) to the village of Denshawai to shoot pigeons.[1] An attack was made on the party by the villagers. The officers were told by their guide that they might shoot, but the villagers had not given permission and were incensed at the shooting of their pigeons by other officers in the previous year. A premeditated attack was made on the officers; a gun seized from one of them went off and slightly injured four natives—one a woman. The attack had been preceded by a trifling fire at a threshing floor, either accidentally caused (but not by the officers' shots) or lit as a signal for the assault. Captain S. C. Bull of the 6th Dragoons received serious injuries and died a few hours later, and two other officers were seriously injured. A number of persons were arrested and tried by a special tribunal created in 1895 to deal with offences against the army of occupation. On the 27th of the same month four of the ringleaders were sentenced to death, others received various terms of imprisonment,[2] and seven were sentenced to fifty lashes. The executions and floggings were carried out the next day at the scene of the outrage and in the presence of some five hundred natives. The quieting effect that this drastic action might have had was marred by the fact that certain members of the British parliament called in question the justice of the sentences—passed unanimously by a court of which the best English and the best native judge were members. For a time there was considerable ferment in Egypt. The Anglo-Egyptian authorities received, however, the firm support of Sir Edward Grey, the foreign secretary in the liberal administration formed in December 1905. As far as responsible statesmen were concerned the change of government in Great Britain made no difference in the conduct of Egyptian affairs.

The Taba incident.

The Taba incident, to which reference has been made, arose in the beginning of 1906 over the claim of the sultan of Turkey to jurisdiction in the Sinai peninsula. The origin of the dispute dated back, however, to 1892, when Abbas Hilmi became khedive. Mehemet Ali and his successors up to and including Tewfik had not only administered the Sinai peninsula but certain posts on the Hejaz or Arabian side of the gulf of Akaba. The firman of investiture issued by the sultan on the occasion of the succession of Abbas differed, however, from the text of former firmans, the intention being, apparently, to exclude Egypt from the administration of the Sinai peninsula. The British government intervened and after considerable pressure upon Turkey obtained a telegram (dated the 8th of April 1892) from the grand vizier in which it was declared that the *status quo* was maintained in the Sinai peninsula, but that the sultan resumed possession of the posts in the Hejaz heretofore garrisoned by Egypt. To this last course Great Britain raised no objection. As officially stated by the British government at the time, the eastern frontier of the Sinai peninsula was taken to be a line running in a south-easterly direction from Rafa, a place on the Mediterranean, east of El Arish, to the head of the gulf of Akaba. The fort of Akaba and other posts farther east Egypt abandoned. So matters rested until in 1905 in consequence of lawlessness among the Bedouins of the peninsula a British official was appointed commandant and inspector of the peninsula and certain administrative measures taken. The report was spread by pan-Islamic agents that the intention of the Egyptian government was to construct fortifications on the frontier near Akaba, to which place the Turks were building a branch railway from the Damascus-Mecca line. In January 1906 the sultan complained to the British ambassador at Constantinople of Egyptian encroachments on Turkish territory, whereupon the khedive asked that the frontier should be delimited, a request which Turkey rejected. A small Egyptian force was then directed to occupy Taba, a port near Akaba but on the western side of the gulf. Before this force could reach Taba that place had been seized by the Turkish commandant at Akaba. A period of considerable tension ensued, the Turks removing the boundary posts at Rafa and sending strong reinforcements to the frontier. The British government intervened on behalf of the khedive and consistently maintained that the Rafa-Akaba line must be the frontier. In April a conference was held between the khedive and Mukhtar Pasha, the Ottoman commissioner. It then appeared that Turkey was unwilling to recognize the British interpretation of the telegram of the 8th of April 1892. Turkey claimed that the peninsula of Sinai consisted only of the territory south of a straight line from Akaba to Suez, and that Egyptian territory north of that line was traced from Rafa to Suez. As a compromise Mukhtar Pasha suggested as the frontier a line drawn direct from Rafa to Ras Mahommed (the most southern point of the Sinai peninsula), which would have left the whole of the gulf of Akaba in Turkish territory. In other words the claim of the Porte was, to quote Lord Cromer:—

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[1] The Egyptians keep large numbers of pigeons, which are allowed to be shot only by permission of the village omdeh (head-man). After the occurrence here related, officers were prohibited from shooting pigeons in any circumstances.

[2] On the 8th of January 1908, the anniversary of the khedive's accession, the whole of the Denshawai prisoners were pardoned and released. For the Denshawai incident see the British parliamentary papers, *Egypt No. 3* and *Egypt No. 4* of 1906.

> "to carry the Turkish frontier and strategical railways to Suez on the banks of the canal; or that if the Ras Mahommed line were adopted, the Turkish frontier would be advanced to the neighbourhood of Nekhl, *i.e.* within easy striking distance of Egypt, and that . . . the gulf of Akaba . . . would practically become a *mare clausum* in the possession of Turkey and a standing menace to the security of the trade route to the East."

Such proposals could not be entertained by Great Britain; and as the sultan remained obstinate the British ambassador on the 3rd of May presented a note to the Porte requiring compliance with the British proposals within ten days. The Turkish ambassador in London was informed by Sir Edward Grey, foreign secretary, that if it were found that Turkish suzerainty in Egypt were incompatible with the rights of the British government to interfere in Egyptian affairs, and with the British occupation, the British position in Egypt would be upheld by the whole force of the empire. Thereupon the sultan gave way and agreed (on the 14th of May) that the line of demarcation should start at Rafa and run towards the south-east "in an approximately straight line as far as a point on the gulf of Akaba at least 3 m. distant from Akaba."[1] The Turkish troops were withdrawn from Taba, and the delimitation of the frontier was undertaken by a joint Turco-Egyptian commission. An agreement was signed on the 1st of October finally settling the frontier line.

With the ending of this dispute and the strengthening of the British garrison in Egypt a demonstration was given of the ability of the protecting power to maintain its position. At the same time encouragement was given to that section of Egyptian society which sought the reform of various Moslem institutions without injury to the principles underlying the faith of Islam: a more truly national movement than that of the agitators who clamoured for parliamentary government.

Resignation of Lord Cromer.

In April 1907, a few days after the appearance of his report for 1906, in which the "Nationalist" and pan-Islamic movements were shown to be detrimental to the welfare of Egypt, Lord Cromer resigned his post of British agent and consul-general. His resignation, dictated by reasons of health, was described by Sir Edward Grey as "the greatest personal loss which the public service of this country (Britain) could suffer." Lord Cromer's work was in a sense complete. He left the country in a state of unexampled material prosperity, free from the majority of the international fetters with which it was bound when he took up his task in 1883, and with the legitimate expectation that the work he had done would endure. The magnitude of the task he had accomplished is shown by the preceding pages, and it need only be added that the transformation effected in Egypt and the Sudan, during his twenty-four years' occupancy of the British Agency, was carried out in every department under his guidance and inspiration. Lord Cromer was succeeded by Sir Eldon Gorst, who had served in Egypt eighteen years under him, and was at the time of his appointment to Cairo an assistant under secretary of state for foreign affairs.

Notwithstanding, or, rather, as a consequence of, the unexampled material prosperity of the country, 1907 was a year of severe financial crisis, due to over-trading, excessive credit and the building mania induced by the rapid economic progress of Egypt, and aggravated by the unfavourable monetary conditions existing in America and Europe during the latter part of the year. Though the crisis had results disastrous to the speculators, the position of the fellahin was hardly affected; the cotton crop was marketed with regularity and at an average price higher than that of 1906, while public revenue showed a satisfactory increase. The noisy "Nationalist" agitation which was maintained during this period of financial stringency reacted unfavourably on public order. Although the degree of insecurity prevailing in the provinces was greatly exaggerated—serious crime in 1907 being less than in the preceding year—an increasing number of crimes were left untraced to their authors. The release of the Denshawai prisoners in January 1908 and the death of Mustafa Kamel in the following month had a quieting effect on the public mind; while the fact that in the elections (December 1907) for the legislative council and the general assembly only 5% of the electors went to the polls, afforded a striking commentary alike on the appreciation of the average Egyptian of the value of parliamentary institutions and of the claims of the "Nationalist" members of the assembly to represent the Egyptian people. The "Nationalists" were, too, divided into many warring sections—Mahommed Bey Ferid, chosen as successor to Mustafa Kamel, had to contend with the pretensions of several other "leaders." The khedive, moreover, markedly abstained from any association with the agitation of the Nationalists, who viewed with disfavour his highness's personal friendship with Sir Eldon Gorst. The agitators gained their chief strength from the support accorded them by certain Radical politicians in England. A number of members of the council and assembly visited England in July 1908 and were received by Sir Edward Grey, who gave them assurances that Great Britain would always strive to remedy the legitimate grievances of Egyptians.

The establishment of constitutional rule in Turkey in the summer of 1908 excited the hopes of the Egyptian Nationalists, and a deputation was sent to Constantinople to confer with the Young Turk committee. From the Young Turks, however, the deputation received no encouragement for their agitation and returned with the advice to work in co-operation with the British. In view of the rumours current, Sir Eldon Gorst, in the form of an interview in *El Mokattam*, a widely read native paper, restated (October 1908) the British view as to the occupation of the country and the demand for a parliament. Great Britain, he declared, had no intention of proclaiming a protectorate over Egypt; on the other hand, recent events in Turkey in no way affected the question of self-government in Egypt. It would be folly to think of introducing unrestricted parliamentary government at present, the conditions for its successful working not existing. The "wild and foolish" agitation on this question only served to confirm the impression that the Egyptians were not yet fit to govern themselves. At the same time steps were being taken to give them a much greater part in the management of local affairs. If the Egyptians showed that the existing institutions and the new provincial councils could do useful work, it would prove the best argument for extending their powers. Sir Eldon Gorst's statements were approved by the British government.

In November 1908 Mustafa Fehmi, who had been premier since 1895, resigned and was succeeded by Boutros Pasha, a Copt of marked ability, who had been for several years foreign minister. Boutros incurred the enmity of the "Nationalists" and was murdered in February 1910. (D. M. W.; F. R. C.)

Authorities.—D. A. Cameron, *Egypt in the Nineteenth Century* (London, 1898), a clear and useful summary of events up to 1882; E. Dicey, *The Story of the Khedivate* (London, 1902); J. C. McCoan, *Egypt under Ismail* (London, 1899); P. Mouriez, *Histoire de Méhémet-Ali* (4 vols., Paris, 1855–1858); L. Bréhier, *L'Égypte de 1789 à 1900* (Paris, 1901); C. de Freycinet, *La Question d'Égypte* (Paris, 1905). See also Mehemet Ali.

For the period immediately preceding and during the British occupation the standard authority is Lord Cromer's *Modern Egypt* (2 vols., London, 1908). In this invaluable work the history of Egypt from 1875 to 1892 and that of the Anglo-Egyptian Sudan from 1882 to 1907 is treated fully. Lord Cromer's annual reports (1888–1906) to the British government on the affairs of Egypt should also be consulted. Next in interest are Alfred (Lord) Milner's *England in Egypt* (11th ed., London, 1904), and Sir A. Colvin's *The Making of Modern Egypt* (London, 1906). Consult also *Khedives and Pashas* (London, 1884), by C. F. Moberly Bell (published anonymously); D. M. Wallace, *Egypt and the Egyptian Question* (London, 1883); W. S. Blunt, *Secret History of the English Occupation of Egypt* (2nd ed., London, 1907), a partisan record; C. v. Malortie, *Egypt,*

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[1] See *Egypt No. 2* (1906), Correspondence respecting the Turco-Egyptian Frontier in the Sinai Peninsula (with a map).

Native Rulers and Foreign Interference, 2 vols. (London, 1883); O. Borelli, *Choses politiques d'Égypte, 1883–1895* (Paris, 1895); H. Resener, *Ägypten unter englischer Okkupation* (Berlin, 1896). Morley's *Life of Gladstone* and Fitzmaurice's *Life of Granville* throw considerable light on the inner history of the period 1880–1893. See further the historical works cited in SUDAN: *Anglo-Egyptian*, and those given at the end of the first section of this article.

For military operations 1882–1899 see C. Royle, *The Egyptian Campaigns 1882 to 1899*, revised ed. (London, 1900); H. Brackenbury, *Narrative of the Advance of the River Column of the Nile Expeditionary Force* (Edinburgh, 1885); Sir W. F. Butler, *Campaign of the Cataracts* (London, 1887); Count A. E. W. Gleichen, *With the Camel Corps up the Nile* (London, 1888); *Gordon's Last Journal* (London, 1885); Sir C. W. Wilson, *From Korti to Khartum* (Edinburgh, 1886); J. Grant, *Cassell's History of the War in the Soudan*, 6 vols. (London, 1885 et seq.); "An Officer," *Sudan Campaigns 1896–1899* (London, 1899); G. W. Steevens, *With Kitchener to Khartum* (Edinburgh, 1898); W. S. Churchill, *The River War*, new edition (London, 1902).

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MILITARY OPERATIONS OF 1882–1885

Bombardment of Alexandria.

In February 1879 a slight outbreak of discharged officers and soldiers occurred at Cairo, which led to the despatch of British and French ships to Alexandria. On the 26th of June of that year Ismail Pasha was removed from Egypt, and Tewfik assumed the khediviate, becoming practically the *protégé* of the two western powers. On the 1st of February 1881 a more serious disturbance arose at Cairo from the attempt to try three colonels, Ahmed Arabi, Ali Fehmy, and Abd-el-Al, who had been arrested as the ringleaders of the military party. The prisoners were released by force, and proceeded to dictate terms to the khedive. Again British and French warships were despatched to Alexandria, and were quickly withdrawn, their presence having produced no apparent impression. It soon became clear that the khedive was powerless, and that the military party, headed by Arabi, threatened to dominate the country. The "dual note," communicated to the khedive on the 6th of January 1881, contained an intimation that Great Britain and France were prepared to afford material support if necessary; but the fall of Gambetta's ministry produced a reaction, and both governments proceeded to minimize the meaning of their language. The khedive was practically compelled to form a government in which Arabi was minister of war and Mahmud Sami premier, and Arabi took steps to extend his influence throughout his army. The situation now became critically serious: for the third time ships were sent to Alexandria, and on the 25th of May 1882 the consuls-general of the two powers made a strong representation to Mahmud Sami which produced the resignation of the Egyptian ministry, and a demand, to which the khedive yielded, by the military party for the reinstatement of Arabi. The attitude of the troops in Alexandria now became threatening; and on the 29th the British residents pointed out that they were "absolutely defenceless." This warning was amply justified by the massacres of the 11th of June, during which more than one hundred persons, including an officer and two seamen, were killed in the streets of Alexandria, almost under the guns of the ships in harbour. It was becoming clear that definite action would have to be taken, and on the 15th the channel squadron was ordered to Malta. By the end of June twenty-six warships, representing the navies of Great Britain, France, Germany, Italy, Austria, Russia, the United States, Spain, Greece and Turkey, lay off the port of Alexandria, and large numbers of refugees were embarked. The order received by Admiral Sir Beauchamp Seymour (afterwards Lord Alcester) on the 3rd of July was as follows:—

> "Prevent any attempt to bar channel into port. If work is resumed on earthworks, or fresh guns mounted, inform military commander that you have orders to prevent it; and if not immediately discontinued, destroy earthworks and silence batteries if they open fire, having given sufficient notice to population, shipping and foreign men-of-war."

On the 9th the admiral received a report that working parties had been seen in Fort Silsileh "parbuckling two smoothbore guns—apparently 32-pounders—towards their respective carriages and slides, which were facing in the direction of the harbour." Fort Silsileh was an old work at the extreme east of the defences of Alexandria, and its guns do not bear on the harbour. On the 10th an ultimatum was sent to Toulba Pasha, the military commandant, intimating that the bombardment would commence at sunrise on the following morning unless "the batteries on the isthmus of Ras-el-Tin and the southern shore of the harbour of Alexandria" were previously surrendered "for the purpose of disarming." The fleet prepared for action, and the bearer of the reply, signed by the president of the council, and offering to dismount three guns in the batteries named, only succeeded in finding the flagship late at night. This proposal was rejected, and at 7 A.M. on the 11th of July the "Alexandra" opened fire and the action became general. The attacking force was disposed in three groups: (1) the "Alexandra," "Sultan" and "Superb," outside the reef, to engage the Ras-el-Tin and the earthworks under weigh; (2) the "Monarch," "Invincible" and "Penelope," inside the harbour, to engage the Meks batteries; and (3) the "Inflexible" and "Temeraire," to take up assigned stations outside the reef and to co-operate with the inshore squadron. The gunboats "Beacon," "Bittern," "Condor," "Cygnet" and "Decoy" were to keep out of fire at first and seek opportunities of engaging the Meks batteries. Meks fort was silenced by about 12.45 P.M., and a party from the "Invincible" landed and disabled the guns. As the fire delivered under weigh was not effective, the offshore squadron anchored at about 10.30 A.M., and succeeded in silencing Fort Ras-el-Tin at about 12.30 P.M., and Fort Adda, by the explosion of the main magazine, at 1.35 P.M. The "Inflexible" weighed soon after 8 A.M. and engaged Ras-el-Tin, afterwards attacking Forts Pharos and Adda. The "Condor," followed by the "Beacon," "Bittern" and "Decoy," engaged Fort Marabout soon after 8 A.M. till 11 A.M., when the gunboats were recalled. After the works were silenced, the ships moved in closer, with a view to dismount the Egyptian guns. The bombardment ceased at 5 P.M.; but a few rounds were fired by the "Inflexible" and "Temeraire" on the morning of the 12th at the right battery in Ras-el-Tin lines.

The bombardment of the forts of Alexandria is interesting as a gauge of the effect to be expected from the fire of ships under specially favourable conditions. The Egyptians at different times during the day brought into action about 33 R.M.L. guns (7-in. to 10-in.), 3 R.B.L. guns (40 prs.), and 120 S.B. guns (6·5-in. and 10-in.), with a few mortars. These guns were disposed over a coast-line of about 10 sea miles, and were in many cases indifferently mounted. The Egyptian gunners had been little trained, and many of them had never once practised with rifled ordnance. Of seventy-five hits on the hulls of the ships only five can with certainty be ascribed to projectiles from rifled guns, and thirty were unquestionably due to the old smoothbores, which were not provided with sights. The total loss inflicted was 6 killed and 27 wounded. The British ships engaged fired 1741 heavy projectiles (7-in. to 16-in.) and 1457 light (7-prs. to 64-prs.), together with 33,493 machine-gun and rifle bullets. The result was comparatively small. About 8 rifled guns and 19 smoothbores were dismounted or disabled and 4 and 1 temporarily put out of action respectively. A considerable portion of this injury was inflicted, after the works had been silenced, by the deliberate fire of the ships. As many as twenty-eight rifled guns and 140 smoothbores would have opened fire on the following day. The Egyptians made quite as good a stand as could be expected, but were driven from their guns, which they were unable to use with adequate effect; and the bombardment of Alexandria confirms previous experience that the fire of ships cannot really compete with that of well-mounted and well-handled guns on shore.

In the afternoon of the 12th, fires, which were the work of incendiaries, began to break out in the best quarters of Alexandria; and the town was left to murder and pillage till the following day, when a party of bluejackets and marines was landed at about 3 P.M.

Military intervention being now imperatively demanded, a vote of credit for £2,300,000 was passed in the British House of Commons on the 27th of July. Five days later the French government failed to secure a similar vote, and Great Britain was left to deal with the Egyptian question alone. An

British expedition under Sir Garnet Wolseley.

expeditionary force detailed from home stations and from Malta was organized in two divisions, with a cavalry division, corps troops, and a siege train, numbering in all about 25,000 men. An Indian contingent numbering about 7000 combatants, complete in all arms and with its own transport, was prepared for despatch to Suez. General Sir Garnet Wolseley was appointed commander-in-chief, with Lieutenant-General Sir J. Adye as chief of the staff. The plan of operations contemplated the seizure of Ismailia as the base for an advance on Cairo, Alexandria and its suburbs to be held defensively, and the Egyptian forces in the neighbourhood to be occupied by demonstrations. The expeditionary force having rendezvoused at Alexandria, means were taken by Rear-Admiral Hoskins and Sir W. Hewett for the seizure of the Suez canal. Under orders from the former, Captain Fairfax, R.N., occupied Port Said on the night of 19th August, and Commander Edwards, R.N., proceeded down the canal, taking possession of the *gares* and dredgers, while Captain Fitzroy, R.N., occupied Ismailia after slight opposition. Before nightfall on the 20th of August the canal was wholly in British hands. Meanwhile, leaving Sir E. Hamley in command at Alexandria, Sir G. Wolseley with the bulk of the expeditionary force arrived at Port Said on the 20th of August, a naval demonstration having been made at Abukir with a view to deceive the enemy as to the object of the great movement in progress. The advance from Ismailia now began. On the 21st Major-General Graham moved from Ismailia with about 800 men and a small naval force, occupying Nefiche, the junction with the Suez line, at 1.30 A.M. without opposition. On the 22nd he made a reconnaissance towards Suez, and on the 23rd another to El-Magfar, 4 m. from Nefiche. It now appeared that the enemy had dammed the sweet-water canal and blocked the railway at Tell-el-Mahuta, where entrenchments had been thrown up and resistance seemed to be contemplated. At 4 A.M. on the 24th Sir Garnet Wolseley advanced with 3 squadrons of cavalry, 2 guns, and about 1000 infantry, placed under the orders of Lieutenant-General Willis. The enemy showed in force, estimated at 7000 with 12 guns, and a somewhat desultory action ensued. Reinforcements from Ismailia were ordered up, and the British cavalry, operating on the right, helped to check the enemy's attack, which showed little vigour. At night the troops, now reinforced by the Guards Brigade, an infantry battalion, 2 cavalry regiments and 10 guns, bivouacked on the ground. Early on the morning of the 25th the advance was continued to Tell-el-Mahuta, which the enemy evacuated, while the mounted troops and horse artillery pressed on to Mahsama, capturing the Egyptian camp, with 7 guns and large quantities of ammunition and supplies. On the same evening Major-General Graham, with about 1200 marines (artillery and light infantry), reached Mahsama, and on the following day he occupied Kassassin without opposition. The advance guard had now outrun its communications and was actually short of food, while a considerable force was distributed at intervals along the line Ismailia-Kassassin. The situation on the 27th tempted attack by an enterprising enemy, and Major-General Graham's force, consisting of a squadron of the 19th Hussars, the York and Lancaster Regiment, the duke of Cornwall's Light Infantry, the Marine Artillery Battalion and two R.H.A. guns, short of ammunition, was in danger of being overwhelmed by vastly superior numbers from Tell-el-Kebir. On the 28th Major-General Graham's troops were attacked, and after repulsing the enemy, made a general advance about 6.45 P.M. The cavalry, summoned by heliograph from Mahsama, co-operated, and in a moonlight charge inflicted considerable loss. The British casualties amounted to 14 killed and 83 wounded. During the lull which followed the first action of Kassassin, strenuous efforts were made to bring up supplies and troops and to open up railway communication to the front. On the 9th of September the Egyptians again attacked Kassassin, but were completely repulsed by 9 A.M., with a loss of 4 guns, and were pursued to within extreme range of the guns of Tell-el-Kebir. The British casualties were 3 killed and 78 wounded. The three following days were occupied in concentrating troops at Kassassin for the attack on Tell-el-Kebir, held by about 38,000 men with 60 guns. The Egyptian defences consisted of a long line of trench (2½ m.) approximately at right angles to the railway and the sweet-water canal. At 11 P.M. on the 12th of September the advance of about 15,000 men commenced; the 1st division, under Lieutenant-General Willis, was on the right, and the 2nd division, under Lieutenant-General Hamley, was on the left. Seven batteries of artillery, under Brigadier-General Goodenough, were placed in the centre. The cavalry, under Major-General Drury Lowe, was on the right flank, and the Indian contingent, under Major-General Macpherson, starting one hour later, was ordered to move south of the sweet-water canal. The night was moonless, and the distance to be covered about 6¼ m. The ground was perfectly open, slightly undulating, and generally firm gravel. The conditions for a night march were thus ideal; but during the movement the wings closed towards each other, causing great risk of an outbreak of firing. The line was, however, rectified, and after a halt the final advance began. By a fortunate accident the isolated outwork was just missed in the darkness by the left flank of the 2nd Division; otherwise a premature alarm would have been given, which must have changed all the conditions of the operation. At dawn the Highland Brigade of the 2nd Division struck the enemy's trenches, and carried them after a brief struggle. The 1st Division attacked a few minutes later, and the cavalry swept round the left of the line of entrenchments, cutting down any fugitives who attempted resistance and reaching the enemy's camp in rear. The Indian contingent, on the south of the canal, co-operated, intercepting the Egyptians at the canal bridge. The opposition encountered at some points was severe, but by 6 A.M. all resistance was at an end. The British loss amounted to 58 killed, 379 wounded and 22 missing; nearly 2000 Egyptians were killed, and more than 500 wounded were treated in hospital. An immediate pursuit was ordered, and the Indian contingent, under Major-General Macpherson, reached Zagazig, while the cavalry, under Major-General Drury Lowe, occupied Belbeis and pushed on to Cairo, 65 m. from Tell-el-Kebir, next day. On the evening of the 14th the 10,000 troops occupying Abbasia barracks, and 5000 in the citadel of Cairo, surrendered. On the 15th General Sir Garnet Wolseley, with the brigade of Guards under H.R.H. the duke of Connaught, entered the city.

Tell-el-Kebir.

The prompt following up of the victory at Tell-el-Kebir saved Cairo from the fate of Alexandria and brought the rebellion to an end. The Egyptian troops at Kafr Dauar, Abukir and Rosetta surrendered without opposition, and those at Damietta followed on the 23rd of September, after being threatened with attack. On the 25th the khedive entered Cairo, where a review of the British troops was held on the 30th. The expeditionary force was now broken up, leaving about 10,000 men, under Major-General Sir A. Alison, to maintain the authority of the khedive. In twenty-five days, from the landing at Ismailia to the occupation of Cairo, the rebellion was completely suppressed, and the operations were thus signally successful.

The Sudan question.

The authority of the khedive and the maintenance of law and order now depended absolutely on the British forces left in occupation. Lord Dufferin, who had been sent to Cairo to draw up a project of constitutional reforms, advocated the re-establishment of a native army, not to exceed 5000 to 6000 men, with a proportion of British officers, for purely defence purposes within the Delta; and on the 13th of December 1882 Sir Evelyn Wood left England to undertake the organization of this force, with the title of sirdar. Lord Dufferin further advised the formation of a gendarmerie, which "should be in a great measure a mounted force and empowered with a semi-military character" (despatch of January 1st, 1883). The strength of this military police force was fixed at 4400 men with 2562 horses, and Baker Pasha (General Valentine Baker) was entrusted with its formation, with the title of inspector-general.

In a despatch of the 6th of February 1883 Lord Dufferin dealt with the Sudan, and stated that Egypt "could hardly be expected to acquiesce" in a policy of withdrawal from her Southern territories. At the same time he pointed out that,

> "Unhappily, Egyptian administration in the Sudan had been almost uniformly unfortunate. The success of the present mahdi in raising the tribes and extending his influence over great tracts of country was a sufficient proof of the government's inability either to reconcile the inhabitants to its rule or to maintain order. The consequences had been most disastrous. Within the last year and a half the Egyptians had lost something like 9000 men, while it was estimated that 40,000 of their opponents had perished."

Moreover, to restore tranquillity in the Sudan,

> "the first step necessary was the construction of a railway from Suakin to Berber, or what, perhaps, would be more advisable, to Shendi, on the Nile. The completion of this enterprise would at once change all the elements of the problem."

Disaster to Hicks Pasha.

The immense responsibilities involved were most imperfectly understood by the British government. Egyptian sovereignty in the Sudan dates from 1820, when Mehemet Ali sent a large force into the country, and ultimately established his authority over Sennar and Kordofan. In 1865 Suakin and Massawa were assigned to Egyptian rule by the sultan, and in 1870 Sir Samuel Baker proceeded up the Nile to the conquest of the Equatorial provinces, of which General Gordon was appointed governor-general in 1874. In the same year Darfur and Harrar were annexed, and in 1877 Gordon became governor-general of the Sudan, where, with the valuable assistance of Gessi Pasha, he laboured to destroy the slave trade and to establish just government. In August 1879 he returned to Cairo, and was succeeded by Raouf Pasha. Misrule and oppression in every form now again prevailed throughout the Sudan, while the slave traders, exasperated by Gordon's stern measures, were ready to revolt. The authority of Egypt was represented by scattered garrisons of armed men, badly officered, undisciplined and largely demoralized. In such conditions a leader only was required to ensure widespread and dangerous rebellion. A leader appeared in the person of Mahommed Ahmed, born in 1848, who had taken up his abode on Abba Island, and, acquiring great reputation for sanctity, had actively fomented insurrection. In August 1881 a small force sent by Raouf Pasha to arrest Mahommed Ahmed was destroyed, and the latter, proclaiming himself the mahdi, stood forth as the champion of revolt. Thus, at the time when the Egyptian army was broken up at Tell-el-Kebir, the Sudan was already in flames. On the 7th of June 1882, 6000 men under Yusef Pasha, advancing from Fashoda, were nearly annihilated by the mahdists. Payara and Birket in Kordofan quickly fell, and a few days before the battle of Tell-el-Kebir was fought, the mahdi, with a large force, was besieging El Obeid. That town was captured, after an obstinate defence, on the 17th of January 1883, by which time almost the whole of the Sudan south of Khartum was in open rebellion, except the Bahr-el-Ghazal and the Equatorial provinces, where for a time Lupton Bey and Emin Pasha were able to hold their own. Abd-el-Kader, who had succeeded Raouf, telegraphed to Cairo for 10,000 additional troops, and pointed out that if they were not sent at once four times this number would be required to re-establish the authority of the government in the Sudan. After gaining some small successes, Abd-el-Kader was superseded by Suliman Niagi on the 20th of February 1883, and on the 26th of March Ala-ed-din Pasha was appointed governor-general. Meanwhile 5000 men, who had served in the Egyptian army, were collected and forcibly despatched to Khartum via Suakin. In March 1883 Colonel William Hicks, late of the Bombay army, who in January had been appointed by the khedive chief of the staff of the army of the Sudan, found himself at Khartum with nine European officers and about 10,000 troops of little military value. The reconquest of the Sudan having been determined upon, although Sir E. Malet reported that the Egyptian government could not supply the necessary funds, and that there was great risk of failure, Colonel Hicks, who had resigned his post on the 23rd of July, and had been appointed commander-in-chief, started from Khartum on 9th September, with a total force of about 10,000 men, including non-combatants, for Kordofan. On the 22nd of May Sir E. Malet had informed Sherif Pasha that,

> "although Colonel Hicks finds it convenient to communicate with Lord Dufferin or with me, it must not be supposed that we endorse in any way the contents of his telegrams. . . . Her Majesty's government are in no way responsible for his operations in the Sudan, which have been undertaken under the authority of His Highness's government."

Colonel Hicks was fully aware of the unfitness of his rabble forces for the contemplated task, and on the 5th of August he telegraphed: "I am convinced it would be best to keep the two rivers and province of Sennar, and wait for Kordofan to settle itself." Early in November the force from Khartum was caught by the mahdists short of water at Kashgil, near El Obeid, and was almost totally destroyed, Colonel Hicks, with all his European officers, perishing. Sinister rumours having reached Cairo, Sir E. Baring (Lord Cromer), who had succeeded Sir E. Malet, telegraphed that "if Colonel Hicks's army is destroyed, the Egyptian government will lose the whole of the Sudan, unless some assistance from the outside is given," and advised the withdrawal to some post on the Nile. On the following day Lord Granville replied: "We cannot lend English or Indian troops; if consulted, recommend abandonment of the Sudan within certain limits"; and on the 25th he added that "Her Majesty's government can do nothing in the matter which would throw upon them the responsibilities for operations in the Sudan." In a despatch of the 3rd of December Sir E. Baring forcibly argued against British intervention in the affairs of the Sudan, and on the 13th of December Lord Granville telegraphed that "Her Majesty's government recommend the ministers of khedive to come to an early decision to abandon all territory south of Assuan, or, at least, of Wadi Halfa." On the 4th of January 1884 Sir E. Baring was directed to insist upon the policy of evacuation, and on the 18th General Gordon left London to assist in its execution.

Defeat of General Baker.

The year 1883 brought a great accession of power to the mahdi, who had captured about 20,000 rifles, 19 guns and large stores of ammunition. On the Red Sea littoral Osman Digna, a slave dealer of Suakin, appointed amir of the Eastern Sudan, raised the local tribes and invested Sinkat and Tokar. On the 16th of October and the 4th of November Egyptian reinforcements intended for the former place were destroyed, and on the 2nd of December a force of 700 men was annihilated near Tamanieb. On the 23rd of December General Valentine Baker, followed by about 2500 men, gendarmerie, blacks, Sudanese and Turks, with 10 British officers, arrived at Suakin to prepare for the relief of Sinkat and Tokar. The khedive appears to have been aware of the risks to be incurred, and in a private letter he informed the general that "I rely upon your prudence and ability not to engage the enemy except under the most favourable circumstances." The tragedy of Kashgil was repeated on the 4th of February 1884, when General Baker's heterogeneous force, on the march from Trinkitat to Tokar, was routed at El Teb by an inferior body of tribesmen. Of 3715 men, 2375, with 11 European officers, were killed. Suakin was now in danger, and on the 6th of February British bluejackets and marines were landed for the defence of the town.

British expedition under Sir G. Graham: battles of El Teb and Tamanieb.

Two expeditions in the Sudan led by British officers having thus ended in disaster, and General Gordon with Lieutenant-Colonel J. D. Stewart having reached Khartum on the 18th of February, the policy of British non-intervention in regard to Sudan affairs could no longer be maintained. Public opinion in England was strongly impressed by the fact that the Egyptian garrisons of Tokar and Sinkat were perishing within striking distance of the Red Sea littoral. A British force about 4400 strong, with 22 guns, made up of troops from Egypt and from units detained on passage from India, was rapidly concentrated at Suakin and placed under the orders of Major-General Sir G. Graham, with Major-Generals Sir R. Buller and J. Davis as brigadiers. News of the fall of Sinkat, where the starving garrison, under Tewfik Bey, made a gallant sortie and was cut to pieces, reached Suakin on the 12th of February. On the 24th General Graham's force disembarked at Trinkitat and received information of the surrender of Tokar. At 8 A.M. on the 29th the force advanced towards Tokar in square, and came under fire at 11.20 A.M. from the enemy entrenched at El Teb. The tribesmen made desperate efforts to rush the square, but were repulsed, and the position was taken by 2 P.M. The cavalry, 10th and 19th Hussars, under Brigadier-General Sir H. Stewart, became involved in a charge against an unbroken enemy, and suffered somewhat severely. The total British loss was 34 killed and 155 wounded; that of the tribesmen was estimated at 1500 killed. On the following day Tokar was reached, and on the 2nd of March the force began its return to Suakin, bringing away about 700 people belonging to the late garrison and the civil population, and destroying 1250 rifles and a quantity of ammunition found in a neighbouring village. On the 9th of March the whole force was back at Suakin, and on the evening of the 11th an advance to Tamai began, and the force bivouacked and formed a zeriba in the evening. Information was brought by a native that the enemy had assembled in the Khor Ghob, a deep ravine not far from the zeriba. At about 8.30 A.M. on the 13th the advance began in echelon of brigade squares from the left. The left and leading square (2nd Brigade) moved towards the khor, approaching at a point where a little ravine joined it. The enemy showing in front, the leading face of the square was ordered to charge up to the edge of the khor. This opened the square, and a mass of tribesmen rushed in from the small ravine. The brigade was forced back in disorder, and the naval guns, which had been left behind, were temporarily captured. After a severe hand-to-hand struggle, in which the troops behaved with great gallantry, order was restored and the enemy repulsed, with the aid of the fire from the 1st Brigade square and from dismounted cavalry. The 1st Brigade square, having a sufficient field of fire, easily repelled all attempts to attack, and advancing as soon as the situation had been restored, occupied the village of Tamai. The British loss was 109 killed and 104 wounded; of the enemy nearly 2000 were killed. On the following day the force returned to Suakin.

Two heavy blows had now been inflicted on the followers of Osman Digna, and the road to Berber could have been opened, as General Graham and Brigadier-General Sir H. Stewart suggested. General Gordon, questioned on the point, telegraphed from Khartum, on the 7th of March, that he might be cut off by a rising at Shendi, adding, "I think it, therefore, most important to follow up the success near Suakin by sending a small force to Berber." He had previously, on the 29th of February, urged that the Suakin-Berber road should be opened up by Indian troops. This, and General Gordon's proposal to send 200 British troops to Wadi Halfa, was opposed by Sir E. Baring, who, realizing soon afterwards the gravity of the situation, telegraphed on the 16th of March:—

> "It has now become of the utmost importance not only to open the road between Suakin and Berber, but to come to terms with the tribes between Berber and Khartum."

The government refused to take this action, and Major-General Graham's force was employed in reconnaissances and small skirmishes, ending in the destruction of the villages in the Tamanieb valley on 27th March. On the 28th the whole force was reassembled at Suakin, and was then broken up, leaving one battalion to garrison the town.

Entanglement of General Gordon at Khartum.

The abrupt disappearance of the British troops encouraged the tribesmen led by Osman Digna, and effectually prevented the formation of a native movement, which might have been of great value. The first attempt at intervention in the affairs of the Sudan was made too late to save Sinkat and Tokar. It resulted only in heavy slaughter of the tribesmen, which afforded no direct or indirect aid to General Gordon or to the policy of evacuation. The public announcement of the latter was a grave mistake, which increased General Gordon's difficulties, and the situation at Khartum grew steadily worse. On the 24th of March Sir E. Baring telegraphed:—

> "The question now is, how to get General Gordon and Colonel Stewart away from Khartum. . . . Under present circumstances, I think an effort should be made to help General Gordon from Suakin, if it is at all a possible military operation. . . . We all consider that, however difficult the operations from Suakin may be, they are more practicable than any operations from Korosko and along the Nile."

A telegram from General Gordon, received at Cairo on the 19th of April, stated that

> "We have provisions for five months and are hemmed in. . . . Our position will be much strengthened when the Nile rises. . . . Sennar, Kassala and Dongola are quite safe for the present."

At the same time he suggested "an appeal to the millionaires of America and England" to subscribe money for the cost of "2000 or 3000 nizams" (Turkish regulars) to be sent to Berber. A cloud now settled down upon Khartum, and subsequent communications were few and irregular. The foreign office and General Gordon appeared to be somewhat at cross purposes. The former hoped that the garrisons of the Sudan could be extricated without fighting. The latter, judging from the tenor of some of his telegrams, believed that to accomplish this work entailed the suppression of the mahdi's revolt, the strength of which he at first greatly underestimated. He had pressed strongly for the employment of Zobeir as "an absolute necessity for success" (3rd of March); but this was refused, since Sir H. Gordon advised at this time that it would be dangerous. On the 9th of March General Gordon proposed, "if the immediate evacuation of Khartum is determined upon irrespective of outlying towns," to send down the "Cairo *employés*" and the garrison to Berber with Lieutenant-Colonel J. D. Stewart, to resign his commission, and to proceed with the stores and the steamers to the equatorial provinces, which he would consider as placed under the king of the Belgians. On the 13th of March Lord Granville gave full power to General Gordon to "evacuate Khartum and save that garrison by conducting it himself to Berber without delay," and expressed a hope that he would not resign his commission.

Relief expedition: question of route.

By the end of March 1884 Sir E. Baring and the British officers in Egypt were convinced that force would have to be employed, and the growing danger of General Gordon, with the grave national responsibility involved, began to be realized in Great Britain. Sir Henry Gordon, however, who was in personal communication with Mr Gladstone, considered that his brother was in no peril, and for some time disbelieved in the need for a relief expedition. Meanwhile it was at least necessary to evolve some plan of action, and on the 8th of April the adjutant-general addressed a memorandum to the secretary of state for war detailing the measures required for placing 6500 British troops "in the neighbourhood of Shendi." The battle of the routes began much earlier, and was continued for some months. Practically the choice lay between the Nile and the Suakin-Berber road. The first involved a distance of 1650 m. from Cairo along a river strewn with cataracts, which obstructed navigation to all but small boats, except during the period of high water. So great was this obstruction that the Nile had never been a regular trade route to the Sudan. The second entailed a desert march of about 250 m., of which one section, Obak-Bir Mahoba (52 m.), was waterless, and the rest had an indifferent water supply (except at Ariab, about half-way to Berber), capable, however, of considerable development. From Berber the Nile is followed (210 m.) to Khartum. This was an ancient trade route with the Sudan, and had been used without difficulty by the reinforcements sent to Hicks Pasha in 1883, which were accompanied by guns on wheels. The authorities in Egypt, headed by General Stephenson, subsequently supported by the Admiral Lord John Hay, who sent a naval officer to examine the river as far as Dongola, were unanimous in favour of the Suakin-Berber route. From the first Major-General Sir A. Clarke, then inspector-general of fortifications, strongly urged this plan, and proposed to begin at once a metre gauge railway from Suakin, to be constructed by Indian labour under officers skilled in laying desert lines. Some preliminary arrangements were made, and on the 14th of June the government sanctioned certain measures of preparation at Suakin. On the other side were the adjutant-general (Lord Wolseley) and a small number of officers who had taken part in the Red River expedition of 1870. The memorandum of the adjutant-general above referred to was based on the hypothesis that Khartum could not hold out beyond the 15th of November, and that the expedition should reach Berber by the 20th of October. Steamers were to be employed in such reaches as proved practicable, but the force was to be conveyed in special whale-boats, by which "the difficulty of transport is reduced to very narrow limits." The mounted force was to consist of 400 men on native horses and 450 men on horses or camels. The question of routes continued to be the subject of animated discussion, and on the 29th of July a committee of three officers who had served in the Red River expedition reported:—

> "We believe that a brigade can easily be conveyed in small boats from Cairo to Dongola in the time stated by Lord Wolseley; and, further, that should it be necessary to send a still larger force by water to Khartum, that operation will present no insuperable difficulties."

Lord Wolseley sent out; Nile route adopted.

This most inconclusive report, and the baseless idea that the adoption of the Nile route would involve no chance of bloodshed, which the government was anxious to avoid, seem to have decided the question. On the 8th of August the secretary of state for war informed General Stephenson that "the time had arrived when some further measures for obtaining accurate information as to his (General Gordon's) position, and, if necessary, for rendering him assistance, should be adopted." General Stephenson still urged the Suakin-Berber route, and was informed on the 26th of August that Lord Wolseley would be appointed to take over the command in Egypt for the purposes of the expedition, for which a vote of credit had been taken in the House of Commons on the 5th of August. On the 9th of September Lord Wolseley arrived at Cairo, and the plan of operations was somewhat modified. A camel corps of 1100 men selected from twenty-eight regiments at home was added, and the "fighting force to be placed in line somewhere in the neighbourhood of Shendi" was fixed at 5400. The construction of whale-boats began on the 12th of August, and the first batch arrived at Wadi Halfa on the 14th of October, and on the 25th the first boat was hauled through the second cataract. The mounted forces proceeded up the banks, and the first half-battalion embarked at Gemai, 870 m. from Khartum, on the 5th of November, ten days before the date to which it had been assumed General Gordon could hold out. In a straggling procession the boats worked their way up to Korti, piloted by Canadian *voyageurs*. The labour was very great, and the troops, most of whom were having their first lesson in rowing, bore the privations of their unaccustomed conditions with admirable cheerfulness. By the 25th of December 2220 men had reached Korti, of whom about 800 only had been conveyed by the whale-boats, the last of which did not arrive till the 27th of January. Beyond Korti lay the very difficult section of the river to Abu Hamed, which was quite unknown. Meanwhile news of the loss of the "Abbas" and of the murder of Colonel J. D. Stewart and his party on the 18th of September had been received. A letter from Gordon, dated the 4th of November and received on the 17th of November, stated that his steamers would await the expedition at Metemma, and added, "We can hold out forty days with ease; after that it will be difficult." In his diary, on the 13th of December, when his difficulties had become extreme, he noted that "if the expeditionary force does not come in ten days, the town may fall."

Stewart's Desert Column; battle of Abu Klea wells.

It was clear at Korti that something must be done at once; and on the 13th of December 1100 men, with 2200 camels, under General Sir H. Stewart, were despatched to occupy Jakdul wells, 96 m. on the desert route to Metemma. Stewart returned on the 5th of January, and started again on the 8th, with orders to establish a fort at Abu Klea and to occupy Metemma. The Desert Column, 1800 men, with 2880 camels in poor condition and 153 horses, found the enemy in possession of Abu Klea wells on the 16th, and was desperately attacked on the 17th. The want of homogeneity of the force, and the unaccustomed tactics imposed upon the cavalry, somewhat hampered the defence, and the square was broken at the left rear corner. Driven back upon the camels in the centre, the troops fought hand to hand with the greatest gallantry. Order was quickly restored, and the attack was repulsed, with a loss of 74 killed and 94 wounded. At least 1100 of the enemy were killed. The wells being occupied and a zeriba formed, the column started on the evening of the 18th. The wrong road was taken, and great confusion occurred, during the night, but at dawn this was rectified; and after forming a rough fort under fire, by which General Sir H. Stewart was fatally wounded, an advance was made at 3 P.M. The square was again heavily attacked, but the Arabs could not get to close quarters and in the evening a bivouac was formed on the Nile. The British losses on this day were 23 killed and 98 wounded. The Desert Column was now greatly exhausted. On the 20th the village of Gubat was occupied; and on the following day Sir C. Wilson, on whom the command had devolved, advanced against Metemma, which was found too strong to assault. On this day General Gordon's four steamers arrived; and on the morning of the 24th Sir C. Wilson, with 20 British soldiers in red coats and about 280 Sudanese, started in the "Bordein" and "Telahawiyeh" for Khartum. The "Bordein" grounded on the following day, and again on the 26th, by which twenty-four hours were lost. At 11 A.M. on the 28th Khartum was sighted, and it soon became clear that the town was in the hands of the enemy. After reconnoitring farther, the steamers turned and proceeded down stream under a heavy fire, the Sudanese crews showing signs of disaffection. The "Telahawiyeh" was wrecked on the 29th of January and the "Bordein" on the 31st, Sir C. Wilson's party being rescued on the 4th of February by Lord C. Beresford in the "Safieh," which had come up from Gubat on receipt of news carried there by Lieutenant Stuart Wortley in a row-boat. Khartum had been taken and General Gordon killed on the morning of the 26th of January 1885, having thus held out thirty-four days beyond the date when he had expected the end. The garrison had been reduced to starvation; and the arrival of twenty British soldiers, with orders to return at once, could not have affected the situation. The situation of the Desert Column and of its transport was most imperfectly understood at Korti, where impossible plans were formed. Fortunately Major-General Sir R. Buller, who arrived at Gubat on the 11th of February, decided upon withdrawal, thus averting impending disaster, and by the 16th of March the Desert Column had returned to Korti.

Failure of relief expedition.

The advance from Korti of the River Column, under Major-General Earle, began on the 28th of December, and great difficulties of navigation were encountered. On the 10th of February an action was fought at Kirbekan with about 800 of the enemy, entailing a loss of 10 killed, including Major-General Earle, and 47 wounded. The column, now commanded by Brigadier-General Brackenbury, continued its slow advance, and on the morning of the 24th of February it was about 26 m. below Abu Hamed, a point where the Korosko desert route strikes the Nile, 350 m. from Khartum. Here it received orders to retire, and it reached Korti on the 8th of March.

Suakin operations.

The verbal message received from General Gordon on the 30th of December 1884 rendered the extreme danger of the position at Khartum painfully apparent, and the secretary of state for war, acting on Sir E. Baring's advice, offered to make an active demonstration from Suakin. To this proposal Lord Wolseley demurred, but asked that ships of war should be sent to Suakin, and that "marines in red coats should be frequently landed and exercised." Lord Hartington replied that the government did not consider that a demonstration of this kind could be effective, and again suggested stronger measures. On the 8th of January 1885 Lord Wolseley repeated that "the measures you propose will not assist my operations against Khartum," adding:—

> "I have from first endeavoured to impress on government that I am strong enough to relieve Khartum, and believe in being able to send a force, when returning by way of Berber, to Suakin, to open road and crush Osman Digna."

On this very day the small Desert Column started from Korti on its hazardous mission to the relief of a town fully 270 m. distant, held by a starving garrison, and invested by 30,000 fighting men, mostly armed with good rifles. Before reaching the Nile the Desert Column had lost 300 men and was unable to take Metemma, while its transport had completely broken down. On the 8th of February Lord Wolseley telegraphed, "The sooner you can now deal with Osman Digna the better," and recommended the despatch of Indian troops to Suakin, to "co-operate with me in keeping road to Berber open." On the 11th of February, the day on which Sir R. Buller most wisely decided to withdraw the Desert Column from a position of extreme danger, it was determined at Korti that the River Column should proceed to attack Berber, and Lord Wolseley accepted the proposal of the government to make a railway from Suakin, telegraphing to Lord Hartington:—

> "By all means make railway by contract to Berber, or as far as you can, during summer. It will be invaluable as a means of supply, and I recommend it being begun immediately. Contract to be, if possible, for so much per ton military stores and supplies and men carried, per mile."

Battle of Hashin.

Every effort was now concentrated upon sending an expeditionary force to Suakin, and before the end of March about 13,000 men, including a brigade from India and a field battery from New South Wales, with nearly 7000 camels and 1000 mules, were there assembled. Lieutenant-General Sir G. Graham was placed in command of this force, with orders to break down the power of Osman Digna and to press the construction of the railway towards Berber. The troops at Suakin, on arrival, were much harassed by small night attacks, which ceased as soon as the scattered camps were drawn together. On the 19th of March Sir G. Graham, with the cavalry brigade and the infantry of the Indian contingent, reconnoitred as far as Hashin, finding the country difficult on account of the dense mimosa scrub. The enemy occupied the hills and fired upon the cavalry. On the 20th Sir G. Graham, with about 9000 men, again advanced to Hashin, and Dehilbat hill was taken by the Berkshire regiment and the Royal Marines. A squadron of the 9th Royal Lancers, which was dismounted in the thick bush, was driven back with the loss of 9 men; but elsewhere the Arabs never succeeded in closing, and the troops returned to Suakin in the afternoon, leaving the East Surrey regiment in a zeriba covering some low hills near Hashin village. The total British loss was 9 killed and 39 wounded.

McNeill's zeriba.

On the 22nd of March a force, consisting of two British and three Indian battalions, with a naval brigade, a squadron of lancers, two companies of engineers, and a large convoy of camels carrying water and supplies, under Major-General Sir J. McNeill, started from Suakin for Tamai, with orders to form a half-way zeriba. The advance was much impeded by the dense bush, and the force halted at Tofrik, about 6 m. out, at 10.30 A.M. A native had brought information that the enemy intended to attack while the zeriba was being formed, and this actually occurred. The force was caught partly unprepared soon after 2.30 P.M., and severe fighting took place. The enemy were repulsed in about twenty minutes, the naval brigade, the Berkshire regiment, the Royal Marines, and the 15th Sikhs showing the greatest gallantry. The casualties, including those among non-combatants, were 150 killed, 148 missing, and 174 wounded. More than 500 camels were killed. The tribesmen lost more than 1000 killed. As soon as firing was heard at Suakin, Sir G. Graham, with two battalions of Guards and a battery of horse artillery, started for Tofrik, but returned on being assured that reinforcements were not required. On the 24th and 26th convoys proceeding in square to Tofrik were attacked, the enemy being repulsed without difficulty. On the 2nd of April a force exceeding 7000 men, with 14 guns and 1600 transport animals, started from Suakin at 4.30 A.M., and bivouacked twelve hours later at Tesela Hill. Next morning an advance was made towards Tamai, and a number of huts in the Khor Ghob were burned. The force then returned to Suakin. The railway was now pushed on without interruption, reaching Otao on the 30th. On the night of the 6th of May a combined movement was made from Suakin and Otao, which resulted in the surprise and break-up of a force of the enemy under Mahommed Sardun, and the capture of a large number of sheep and goats. The moral effect of this operation was marked, and large numbers of tribesmen placed themselves unconditionally at the disposal of Sir G. Graham. A great native movement could now have been organized, which would have kept the route to Berber and enabled the railway to be rapidly pushed forward.

Political and military situation at end of operations.

Meanwhile many communications had passed between the war office and Lord Wolseley, who at first believed that Berber could be taken before the summer. In a long despatch of the 6th of March he discussed the general situation, and pointed out that although the force at his disposal "was amply sufficient" for raising the siege of Khartum and defeating the mahdi, the conditions were changed by the fall of the town. It was now "impossible . . . to undertake any offensive operations until about the end of the summer," when twelve additional British battalions, four strong squadrons of British cavalry, and two R.H.A. batteries, together with a large extension of the Wadi Halfa railway, eleven steamers, and three hundred more whale-boats, would be required. He considered it necessary to hold Dongola, and he reported that he was "distributing this army along the left bank of the Nile, on the open reach of water" between the Hannek cataract and Abu Dom, opposite Merawi. On the 30th of March Lord Wolseley quitted the army and proceeded to Cairo. A cloud having arisen on the frontiers of Afghanistan, the withdrawal of the troops from the Sudan was ordered on the 11th of May. On the formation of Lord Salisbury's cabinet, the new secretary of state for war, Mr W. H. Smith, inquired whether the retirement could be arrested, but Major-General Sir R. Buller reported that the difficulties of reoccupation would be great, and that if Dongola was to be held, a fresh expedition would be required. On the 22nd of June, before the British rearguard had left Dongola, the mahdi died. The withdrawal of the Suakin force began on the 17th of May, and the friendly tribes, deprived of support, were compelled to make terms with Osman Digna, who was soon able to turn his attention to Kassala, which capitulated in August, nearly at the same time as Sennar.

The failure of the operations in the Sudan had been absolute and complete, and the reason is to be sought in a total misconception of the situation, which caused vacillation and delay, and in the choice of a route by which, having regard to the date of the decision, the relief of General Gordon and Khartum was impossible. (G. S. C.)

MILITARY OPERATIONS IN EGYPT AND THE SUDAN, 1885 TO 1896

The operations against Mahdism during the eleven years from the end of the Nile expedition and the withdrawal from the Sudan to the commencement of the Dongola campaign will be more easily understood if, instead of narrating them in one chronological sequence, the operations in each province are considered separately. The mahdi, Mahommed Ahmed, died at Omdurman on the 22nd of June 1885. He was succeeded by the principal khalifa, Abdullah el Taaisha, a Baggara Arab, who for the next thirteen years ruled the Sudan with despotic power. Cruel, vicious, unscrupulous and strong, the country groaned beneath his oppression. He removed all possible rivals, concentrated at Omdurman a strong military force composed of men of his own tribe, and maintained the ascendancy of that tribe over all others. As the British troops retired to Upper Egypt, his followers seized the evacuated country, and the khalifa cherished the idea, already formulated by the mahdi, of the conquest of Egypt, but for some years he was too much occupied in quelling risings, massacring the Egyptians in the Sudan, and fighting Abyssinia, to move seriously in the matter.

Upper Egypt.—Mahommed el Kheir, dervish amir of Dongola, however, advanced towards the frontier in the autumn of 1885, and at the end of November came in touch with the frontier field force, a body of some 3000 men composed in nearly equal parts of British and Egyptian troops. A month of harassing skirmishes ensued, during which the Egyptian troops showed their mettle at Mograka, where 200 of them held the fort against a superior number of dervishes, and in combats at Ambigol, Kosha and Firket. Sir Frederick Stephenson, commanding the British army of occupation in Egypt, then concentrated the frontier field force at Firket, and attacked the main body of the enemy at Ginnis on the 30th of December 1885, completely defeating it and capturing two guns and twenty banners. It was here the new Egyptian army received its baptism of fire and acquitted itself very creditably. Although checked, the dervishes were not discouraged, and continued to press upon the frontier in frequent raids, and thus in many bloody skirmishes the fighting qualities of the Egyptian troops were developed. In April 1886 the frontier was drawn back to Wadi Halfa, a fortified camp at the northern end of the desolate defile, Batn-el-Hagar, through which the Nile tumbles amid black, rocky hills in a succession of rapids, and debouches on a wide plain. The protection of the frontier was now left in the hands of the Egyptian army, a British force remaining at Assuan, 200 m. to the north, as a reserve in case of emergency, and two years later even this precaution was deemed unnecessary.

In October 1886 Wad en Nejumi, the amir who had defeated Hicks Pasha in Kordofan three years before, and led the assault at Khartum when General Gordon was slain in January 1885, replaced Mahommed el Kheir as "commander of the force for the conquest of Egypt," and brought large reinforcements to Dongola. An advanced column under Nur-el-Kanzi occupied Sarras in April 1887, was attacked by the Egyptian force under Colonel H. Chermside on the 28th of that month, and after a stubborn resistance was defeated with great loss. Nur-el-Kanzi was killed and ten standards taken.

The troubles in Darfur and with Abyssinia (*q.v.*) induced the khalifa to reduce the garrisons of the north; nevertheless, the dervishes reoccupied Sarras, continued active in raids and skirmishes, and destroyed the railway south of Sarras, which during the Nile expedition of 1884 and 1885 had been carried as far as Akasha. It was not until May 1889 that an invasion of the frontier on a large scale was attempted. At this time the power and prestige of the khalifa were at their height: the rebellions in Darfur and Kordofan had been stamped out, the anti-mahdi was dead, and even the dervish defeat by the Abyssinians had been converted by the death of King John and the capture of his body into a success. It was therefore an opportune time to try to sweep the Turks and the British into the sea. On the 22nd of June Nejumi was at Sarras with over 6000 fighting men and 8000 followers. On the 2nd of July Colonel J. Wodehouse headed off a part of this force from the river at Argin, and, after a sharp action, completely defeated it, killing 900, among whom were many important amirs, and taking 500 prisoners and 12 banners, with very small loss to his own troops. A British brigade was on its way up stream, but the sirdar, who had already arrived to take the command in person, decided not to wait for it. The Egyptian troops, with a squadron of the 20th Hussars, concentrated at Toski, and thence, on the 3rd of August, General Grenfell, with slight loss, gained a decisive victory. Wad en Nejumi, most of his amirs, and more than 1200 Arabs were killed; 4000 prisoners and 147 standards were taken, and the dervish army practically destroyed. No further serious attempts were made to disturb the frontier, of which the most southerly outpost was at once advanced to Sarras.

Battle of Toski.

The escape from Omdurman of Father Ohrwalder and of two of the captive nuns in December 1891, of Father Rossignoli in October 1894, and of Slatin Bey in February 1895, revealed the condition of the Sudan to the outside world, threw a vivid light on the rule of the khalifa, and corroborated information already received of the discontent which existed among the tribes with the oppression and despotism under which they lived.

The Eastern Sudan.—In 1884 Colonel Chermside, governor of the Red Sea littoral, entered into arrangements with King John of Abyssinia for the relief of the beleaguered Egyptian garrisons. Gera, Amadib, Senhit and Gallabat were, in consequence, duly succoured, and their garrisons and Egyptian populations brought away to the coast by the Abyssinians in 1885. Unfortunately famine compelled the garrison of Kassala to capitulate on the 30th of July of that year, and Osman Digna hurried there from Tamai to raise a force with which to meet the Abyssinian general, Ras Alula, who was preparing for its relief. By the end of August Osman Digna had occupied Kufit, in the Barea country, with 10,000 men and entrenched himself. On the 23rd of September Ras Alula attacked him there with an equal number of men and routed him with great slaughter. Over 3000 dervishes with their principal amirs, except Osman Digna, lay dead on the field, and many more were killed in the pursuit. The Abyssinians lost 40 officers and 1500 men killed, besides many more wounded. Instead of marching on to Kassala, Ras Alula, who at this time was much offended by the transfer of Massawa by the Egyptians to Italy, made a triumphant entry into Asmara, and absolutely refused to make any further efforts to extricate Egyptian garrisons from the grip of the khalifa. Meanwhile Osman Digna, who had fled from Kufit to Kassala, wreaked his vengeance upon the unhappy captives at Kassala.

In the neighbourhood of Suakin there were many tribes disaffected to the khalifa's cause, and in the autumn of 1886 Colonel H. Kitchener, who was at the time governor of the Red Sea littoral, judiciously arranged a combination of them to overthrow Osman Digna, with the result that his stronghold at Tamai was captured on the 7th of October, 200 of his men killed, and 50 prisoners, 17 guns and a vast store of rifles and ammunition captured. For about a year there was comparative quiet. Then at the end of 1887 Osman Digna again advanced towards Suakin, but his force at Taroi was routed by the "Friendlies," and he fell back on Handub. Kitchener unsuccessfully endeavoured to capture Osman Digna on the 17th of January 1888, but in the attack was himself severely wounded, and was shortly after invalided. Later in the year Osman Digna collected a large force and besieged Suakin. In December the sirdar arrived with reinforcements from Cairo, and on the 20th sallied out and attacked the dervishes in their trenches at Gemaiza, clearing the whole line and inflicting considerable loss on the enemy, who retired towards Handub, and the country was again fairly quiet for a time. During 1889 and 1890 Tokar became the centre of dervish authority, while Handub continued to be occupied for the khalifa. In January 1891 Osman Digna showed signs of increased activity, and Colonel (afterwards Sir Charles) Holled Smith, then governor of the Red Sea littoral, attacked Handub successfully on the 27th and occupied it, then seized Trinkitat and Teb, and on the 19th of February fought the decisive action of Afafit, occupied Tokar, and drove Osman Digna back to Temrin with a loss of 700 men, including all his chief amirs. This action proved the final blow to the dervish power in the neighbourhood of Suakin, for although raiding continued on a small scale, the tribes were growing tired of the khalifa's rule and refused to support Osman Digna.

Handub.

Battle of Afafit.

In the spring of 1891 an agreement was made between England and Italy by which the Italian forces in Eritrea were at liberty, if they were able, to capture and occupy Kassala, which lay close to the western boundary of their new colony, on condition that they restored it to Egypt at a future day when required to do so. Three years passed before they availed themselves of this agreement. In 1893 the dervishes, 12,000 strong, under Ahmed Ali, invaded Eritrea, and were met on the 29th of December at Agordat by Colonel Arimondi with 2000 men of a native force. Ahmed Ali's force was completely routed and himself killed, and in the following July Colonel Baratieri, with 2500 men, made a fine forced march from Agordat, surprised and captured

Kassala on the 17th of that month, and continued to hold it for three years and a half.

The Abyssinian Frontier.—On the Abyssinian frontier Ras Adal was in command of a considerable force of Abyssinians early in 1886, and in June of that year he invaded Gallabat and defeated the dervishes on the plain of Madana; the dervish amir Mahommed Wad Ardal was killed and his camp captured. In the following year the amir Yunis ed Dekeim made two successful raids into Abyssinian territory, upon which Ras Adal collected an enormous army, said to number 200,000 men, for the invasion of the Sudan. The khalifa sent the amir Hamdan Abu Angar, a very skilful leader, with an army of over 80,000 men against him. Abu Angar entered Abyssinia and, in August 1887, attacked Ras Adal in the plain of Debra Sin and, after a prolonged battle, defeated the Abyssinians, captured their camp, and marched on Gondar, the ancient capital of Abyssinia, which he sacked, and then returned into Gallabat. King John, the negus of Abyssinia, burning to avenge this defeat, marched, in February 1889, with an enormous army to Gallabat, where the amir Zeki Tumal commanded the khalifa's forces, some 60,000 strong, and had strongly fortified the town and the camp. On the 9th of March 1889 the Abyssinians made a terrific onslaught, stormed and burnt the town, and took thousands of prisoners. A small party of dervishes still held a zeriba when King John was struck by a stray bullet. The Abyssinians decided to retire, fighting ceased, and they moved off with their prisoners and the wounded negus. That night the king died, and the greater part of the army having gone ahead with the prisoners, a party of Arabs pursued the rearguard, which consisted of the king's bodyguard, routed them, and captured the king's body, which was sent to Omdurman to confirm the report of a brilliant victory sent by Zeki Tumal to the khalifa. Internal strife prevented the new negus of Abyssinia from prosecuting the war, which thus, in spite of the Abyssinian success, resulted in the increased prestige of the khalifa. From this time, however, the dervishes ceased to trouble the Abyssinians.

Darfur and Kordofan.—On the outbreak of the mahdi's rebellion Slatin Bey was governor of the province, and when Madibbo, the insurgent sheikh of Rizighat, attacked and occupied Shakka and was following up his success, Slatin twice severely defeated him, and, having concentrated his forces at El Fasher, repulsed the enemy again at Om Shanga. Mahdism, however, spread over Darfur in spite of Slatin's efforts to stay it. He fought no fewer than twenty-seven actions in various parts of his province, but his own troops, in course of time, became infected with the new faith and deserted him. He was obliged to surrender at Dara in December 1883, and was a prisoner, first at Obeid and then at Omdurman, until he escaped in 1895. In January 1884 Zogal, the new dervish amir of the province, attacked El Fasher, where Said Bey Guma and an Egyptian garrison 1000 strong with 10 guns was still holding out, and captured it. He also reduced the Jebel Marra district, where the loyal hill-people gave him some trouble.

After the death of the mahdi in 1885, Madibbo revolted against the khalifa, but was defeated by Karamalla, the dervish amir of the Bahr-el-Ghazal, and was caught and executed. A war then sprang up between Karamalla and Sultan Yusef, who had succeeded Zogal as amir of Darfur. Yusef was joined in 1887 by Sultan Zayid, the black ruler of Jebel Marra, and Karamalla's trusted general, Ketenbur, was defeated with great slaughter at El Towaish on the 29th of June 1887. Osman wad Adam (Ganu), amir of Kordofan, was sent by the khalifa to Karamalla's assistance. He forced back the Darfurians near Dara on the 26th of December, routed Zayid in a second battle, entered El Fasher, and, in 1888, became complete master of the situation, the two sultans being killed. The Darfurian chiefs then allied themselves with Abu Gemaiza, sheikh of the Masalit Arabs, who had proclaimed himself "Khalifa Osman," and was known as the anti-mahdi. The revolt assumed large proportions, and became the more dangerous to Abdullah, the khalifa, by reason of its religious character, wild rumours spreading over the country and reaching to Egypt and Suakin of the advent to power of an opposition mahdi. Abu Gemaiza attacked a portion of Osman Adam's force, under Abd-el-Kader, at Kebkebia, 30 m. from El Fasher, and almost annihilated it on the 16th of October 1888; and a week later another large force of Osman Adam met with the same fate at the same place. Instead of following up his victories, Abu Gemaiza retired to Dar Tama to augment his army, to which thousands flocked as the news of his achievements spread far and wide. He again advanced to El Fasher in February 1889, but was seized with smallpox. His army, however, under Fiki Adam, fought a fierce battle close to El Fasher on the 22nd, which resulted in its defeat and dispersion, and Abu Gemaiza himself dying the following day, the movement collapsed.

In 1891 Darfur and Kordofan were again disturbed, and Sultan Abbas succeeded in turning the dervishes out of the Jebel Marra district. Two years later a saint of Sokoto, Abu Naal Muzil el Muhan, collected many followers and for a time threatened the khalifa's power, but the revolt gradually died out.

The Bahr-el-Ghazal.—The first outbreak in favour of Mahdism in the Bahr-el-Ghazal took place at Liffi in August 1882, when the Dinka tribe, under Jango, revolted and was defeated by Lupton Bey with considerable slaughter at Tel Gauna, and again in 1883 near Liffi. In September of that year Lupton's captain, Rufai Aga, was massacred with all his men at Dembo, and Lupton, short of ammunition, was forced to retire to Dem Suliman, where he was completely cut off from Khartum. After gallantly fighting for eighteen months he was compelled by the defection of his troops to surrender on the 21st of April 1884 to Karamalla, the dervish amir of the province. He died at Omdurman in 1888.

In 1890 the Shilluks in the neighbourhood of Fashoda rose against the khalifa, and the dervish amir of Gallabat, Zeki Tumal, was engaged for two years in suppressing the rebellion. He got the upper hand in 1892, and was recalled to oppose an Italian force said to be advancing from Massawa; but on reporting that it was impossible to invade Eritrea, as the khalifa wished him to do, he was summoned to Omdurman and put to death. The country then relapsed into its original barbarous condition, and dervish influence was nominal only. In 1892 the Congo State expedition established posts up to the seventh parallel of north latitude. In 1893 the dervish amir, Abu Mariam, fought with the Dinka tribe and was killed and his force destroyed, the fugitives taking refuge in Shakka. In the following year the Congo expedition established further posts, and in consequence the khalifa sent 3000 men, under the amir Khatem Musa, from Shakka to reoccupy the Bahr-el-Ghazal. The Belgians at Liffi retired before him, and he entered Faroga. Famine and disease broke out in Khatem Musa's camp in 1895, and a retreat was made towards Kordofan.

Equatoria.—In the Equatorial Province, which extended from the Albert Nyanza to Lado, Emin Bey, who had a force of 1300 Egyptian troops and 3000 irregulars, distributed among many stations, held out, hoping for reinforcements. In March 1885, however, Amadi fell to the dervishes, and on the 18th of April Karamalla arrived near Lado, the capital, and sent to inform Emin of the fall of Khartum. Emin and Captain Casati, an Italian, moved south to Wadelai, giving up the northern posts, and opened friendly relations with Kabarega, king of Unyoro. On the 26th of February 1886 Emin received despatches from Cairo via Zanzibar, from which he learned all that had occurred during the previous three years, and that "he might take any step he liked, should he decide to leave the country." He determined to remain where he was and "hold together, as long as possible, the remnant of the last ten years." His troops were in a mutinous state, wishing to go north rather than south, as Emin had ordered them to do, and unsuccessfully endeavoured to carry him with them by force.

His communications to Europe through Zanzibar led to the relief expedition under H. M. Stanley, which went to his rescue by way of the Congo in 1887, and after encountering incredible dangers and experiencing innumerable sufferings, met with Emin and Casati at Nsabé, on the Albert Nyanza, on the 29th of April 1888. Stanley went back in May to pick up his belated rearguard, leaving Mounteney Jephson and a small escort to accompany Emin round his province. The southern garrisons decided to go with Emin, but the troops at Labore mutinied, and a general revolt broke out, headed by Fadl-el-Maula, governor of Fabbo. On arriving at Dufile in August 1888, Emin and Jephson were made prisoners by the Egyptian mutineers. In the meantime the arrival of Stanley at Lake Albert had caused rumours, which quickly spread to Omdurman, of a great invading white pasha, with the result that in July the khalifa sent up the river three steamers and six barges, containing 4000 troops, to oppose this new-comer. In October Omar-Saleh, the Mahdist commander, took Rejaf and sent messengers to Dufile to summon Emin to surrender; but on the 15th of November the mutineers released both Emin and Jephson, who returned to Lake Albert with some 600 refugees, and joined Stanley in February 1889. The expedition arrived at Zanzibar at the end of the year.

Emin's mutinous troops kept the dervishes at bay between Wadelai and Rejaf, and eventually severely defeated them, driving them back to Rejaf. They did not, however, follow up their victory, and under the leadership of Fadl-el-Maula Bey remained about Wadelai, while the dervishes strengthened their post at Rejaf. In 1893 Fadl-el-Maula Bey and many of his men took service with Baert of the Congo State expedition. The bey was killed fighting the dervishes at Wandi in January 1894, and the remnant of his men eventually were found by Captain Thruston from Uganda on the 23rd of March 1894 at Mahagi, on the Albert Nyanza, whither they had drifted from Wadelai in search of supplies. They were enlisted by Thruston and brought back under the British flag to Uganda.

In consequence of the Franco-Congolese Treaty of 1894, Major Cunningham and Lieutenant Vandeleur were sent from Uganda to Dufile, where they planted the British flag on the 15th of January 1895.

SUDAN OPERATIONS, 1896–1900

The wonderful progress—political, economical and social—which Egypt had made during British occupation, so ably set forth in Sir Alfred Milner's *England in Egypt* (published in 1892), together with the revelation in so strong a light of the character of the khalifa's despotism in the Sudan and the miserable condition of his misgoverned people, as detailed in the accounts

Dongola campaign, 1896.

of their captivity at Omdurman by Father Ohrwalder and Slatin Bey (published in 1892 and 1896), stirred public opinion in Great Britain, and brought the question of the recovery of the Sudan into prominence. A change of ministry took place in 1895, and Lord Salisbury's cabinet, which had consistently assailed the Egyptian policy of the old, was not unwilling to consider whether the flourishing condition of Egyptian finance, the prosperity of the country and the settled state of its affairs, with a capable and proved little army ready to hand, did not warrant an attempt being made to recover gradually the Sudan provinces abandoned by Egypt in 1885 on the advice of Mr Gladstone's government.

Such being the condition of public and official sentiment, the crushing defeat of the Italians by the Abyssinians at the battle of Adowa on the 1st of March 1896, and the critical state of Kassala—held by Italy at British suggestion, and now closely invested by the dervishes—made it not only desirable but necessary to take immediate action.

On the 14th of March 1896 Major-General Sir H. Kitchener, who succeeded Sir Francis Grenfell as sirdar of the Egyptian army in 1892, received orders to reoccupy Akasha, 50 m. south of Sarras, and to carry the railway on from Sarras. Subsequent operations were to depend upon the amount of resistance he encountered. On the 20th of March Akasha was occupied without opposition by an advanced column of Egyptian troops under Major J. Collinson, who formed an entrenched camp there. The reserves of the Egyptian army were called out, and responded with alacrity. The troops were concentrated at Wadi Halfa; the railway reconstruction, under Lieutenant E. P. Girouard, R.E., pushed southward; and a telegraph line followed the advance. At the commencement of the campaign the Egyptian army, including reserves, consisted of 16 battalions of infantry, of which 6 were Sudanese, 10 squadrons of cavalry, 5 batteries of artillery, 3 companies of garrison artillery, and 8 companies of camel corps, and it possessed 13 gunboats for river work. Colonel H. M. L. Rundle was chief of the staff; Major F. R. Wingate was head of the intelligence department, with Slatin Bey as his assistant; and Colonel A. Hunter was in command of Sarras, and south. The 1st battalion of the North Staffordshire regiment moved up from Cairo to join the Egyptian army.

In the meantime the advance to Akasha had already relieved the pressure at Kassala, Osman Digna having withdrawn a considerable force from the investing army and proceeded with it to Suakin. To meet Osman Digna's movement Lieutenant-Colonel G. E. Lloyd, the Suakin commandant, advanced to the Taroi Wells, 19 m. south of Suakin, on the 15th of April to co-operate with the "Friendlies," and with Major H. M. Sidney, advancing with a small force from Tokar. His cavalry, under Major M. A. C. B. Fenwick, went out to look for Sidney's force, and were surprised by a large number of dervishes. Fenwick, with some 40 officers and men, seized an isolated hill and held it through the night, repulsing the dervishes, who were the same night driven back with such heavy loss in attacking Lloyd's zeriba that they retired to the hills, and comparative quiet again reigned at Suakin. At the end of May an Indian brigade arrived for garrison duty, and the Egyptian troops were released for service on the Nile.

The dervishes first came in contact with the Egyptian cavalry on the Nile near Akasha, on the 1st of May, and were repulsed. The army concentrated at Akasha early in June, and on the 6th Kitchener moved to the attack of Firket 16 m. away, where the amir Hamuda, with 3000 men, was encamped. The attack was made in two columns: one, under Colonel Hunter, marching along the river-bank, approached Firket from the north; while the other, under Major Burn-Murdoch, making a detour through the desert, approached it from the south. The co-operation of the two columns was admirably timed, and on the morning of the 7th the dervish camp was surrounded, and, after a sharp fight, Hamuda and many amirs and about 1000 men were killed, and 500 prisoners taken. The dash and discipline of the Egyptian troops in this victory were a good augury for the future.

By the end of June the railway was advanced beyond Akasha, and headquarters were at Kosha, 10 m. farther south. Cholera and fever were busy both with the North Staffordshire regiment at Gemai, whither they had been moved on its approach, and with the Egyptian troops at the front, and carried off many officers and men. The railway reached Kosha early in August; the cholera disappeared, and stores were collected and arrangements steadily made for a farther advance. The North Staffordshire moved up to the front, and in September the army moved on Kerma, which was found to be evacuated, the dervishes having crossed the river to Hafir. There they were attacked by the gunboats and Kitchener's artillery from the opposite bank, and forced to retire, with their commander, Wad Bishara, seriously wounded. Dongola was bombarded by the gunboats and captured by the army on the 23rd of September. Bishara and his men retreated, but were pursued by the Egyptians until the retreat became a hopeless rout. Guns, small arms and ammunition, with large stores of grain and dates, were captured, many prisoners taken, while hundreds surrendered voluntarily, among them a brother of the amir Wad en Nejumi. The dervish Dongola army had practically ceased to exist. Debba was seized on the 3rd October, Korti and Merawi occupied soon after, and the principal sheiks came in and submitted to the sirdar. The Dongola campaign was over, and the province recovered to Egypt. The Indian brigade at Suakin returned to India, and was replaced by Egyptians. The North Staffordshire returned to Cairo. The work of consolidation began, and preparations were made for a farther advance when everything should be ready.

The Sudan campaign, 1897.

The railway up the right bank of the Nile was continued to Kerma, in order to evade the difficulties of the 3rd cataract; but the sirdar had conceived the bold project of cutting off the great angle of the Nile from Wadi Halfa to Abu Hamed, involving nearly 600 m. of navigation and including the 4th cataract, by constructing a railway across the Nubian desert, and so bringing his base at Wadi Halfa within a few hours of his force, when it should have advanced to Abu Hamed, instead of ten days. Early in 1897 this new line of railway was commenced from Wadi Halfa across the great Nubian desert 230 m. to Abu Hamed. The first-mentioned line reached Kerma in May, and by July the second had advanced 130 m. into the desert towards Abu Hamed, when it became necessary, before it was carried farther, to secure that terminus by an advance from Merawi.

In the meantime the khalifa was not idle. He occupied Abu Klea wells and Metemma; recalled the amir Ibrahim Khalil, with 4000 men, from the Ghezira; brought to Omdurman the army of the west under Mahmud—some 10,000 men; entrusted the line of the Atbara—Ed Damer, Adarama, Asubri and El Fasher—to Osman Digna; constructed defences in the Shabluka gorge; and personally superintended the organization and drill of the forces gathered at Omdurman, and the collection of vast stores of food and supplies of camels for offensive expeditions.

Towards the end of June the chief of the Jaalin tribe, Abdalla wad Said, who occupied Metemma, angered by the khalifa, made his submission to Kitchener and asked for support, at the same time foolishly sending a defiant letter to the khalifa. The sirdar sent him rifles and ammunition across the desert from Korti; but before they arrived, Mahmud's army, sent by the khalifa, swept down on Metemma on the 1st of July and massacred Abdalla wad Said and his garrison.

On the 29th of July, after several reconnaissances, Major-General Hunter, with a flying column, marched up the Nile from near Merawi to Abu Hamed, 133 m. distant, along the edge of the Monassir desert. He arrived on the 7th of August and captured it by storm, the dervishes losing 250 killed and 50 prisoners. By the end of the month the gunboats had surmounted the 4th cataract and reached Abu Hamed. Berber was found to be deserted, and occupied by Hunter on the 5th of September, and in the following month a large force was entrenched there. The khalifa, fearing an attack on Omdurman, moved Osman Digna from Adarama to Shendi. In the 23rd of October Hunter, with a flying column lightly equipped, left

Berber for Adarama, which he burned on the 2nd of November, and after reconnoitring for 40 m. up the Atbara, returned to Berber. The Nile was falling, and Kitchener decided to keep the gunboats above the impassable rapid at Um Tuir, 4 m. north of the confluence of the Atbara with the Nile, where he constructed a fort. The gunboats made repeated reconnaissances up the river, bombarding Metemma with effect. The railway reached Abu Hamed on the 4th of November, and was pushed rapidly forward along the right bank of the Nile towards Berber.

The forces of the khalifa remaining quiet, the sirdar visited Kassala and negotiated with the Italian General Caneva for its restoration to Egypt. The Italians were anxious to leave it; and on Christmas day 1897 Colonel (afterwards General Sir Charles) Parsons, with an Egyptian force from Suakin, took it formally over, together with a body of Arab irregulars employed by the Italians. These troops were at once despatched to capture the dervish posts at Asabri and El Fasher, which they did with small loss.

Sudan campaign, 1898.

On his return from Kassala to Berber the sirdar received information of an intended advance of the khalifa northward. He at once ordered a concentration of Egyptian troops towards Berber, and telegraphed to Cairo for a British brigade. By the end of January the concentration was complete, and the British brigade, under Major-General Gatacre, was at Dakhesh, south of Abu Hamed. Disagreement among the khalifa's generals postponed the dervish advance and gave Kitchener much-needed time. But at the end of February, Mahmud crossed the Nile to Shendi with some 12,000 fighting men, and with Osman Digna advanced along the right bank of the Nile to Aliab, where he struck across the desert to Nakheila, on the Atbara, intending to turn Kitchener's left flank at Berber. The sirdar took up a position at Ras el Hudi, on the Atbara. His force consisted of Gatacre's British brigade (1st Warwicks, Lincolns, Seaforths and Camerons) and Hunter's Egyptian division (3 brigades under Colonels Maxwell, MacDonald and Lewis respectively), Broadwood's cavalry, Tudway's camel corps and Long's artillery. The dervish army reached Nakheila on the 20th of March, and entrenched themselves there in a formidable zeriba. After several reconnaissances in which fighting took place with Mahmud's outposts, it was ascertained from prisoners that their army was short of provisions and that great leakage was going on. Kitchener, therefore, did not hurry. He sent his flotilla up the Nile and captured Shendi, the dervish depôt, on the 27th of March. On the 4th of April he advanced to Abadar. A final reconnaissance was made on the 5th. On the following day he bivouacked at Umdabia, where he constructed a strong zeriba, which was garrisoned by an Egyptian battalion, and on the night of the 7th he marched to the attack of Mahmud's zeriba, which, after an hour's bombardment on the morning of the 8th of April, was stormed with complete success. Mahmud and several hundred dervishes were captured, 40 amirs and 3000 Arabs killed, and many more wounded; the rest escaped to Gedaref. The sirdar's casualties were 80 killed and 472 wounded.

Preparations were now made for the attack on the khalifa's force at Omdurman; and in the meantime the troops were camped in the neighbourhood of Berber, and the railway carried on to the Atbara. At the end of July reinforcements were forwarded from Cairo; and on the 24th of August the following troops were concentrated for the advance at Wad Hamad, above Metemma, on the western bank of the 6th cataract:—British division, under Major-General Gatacre, consisting of 1st Brigade, commanded by Colonel A. G. Wauchope (1st Warwicks, Lincolns, Seaforths and Camerons), and 2nd Brigade, commanded by Colonel the Hon. N. G. Lyttelton (1st Northumberlands and Grenadier Guards, 2nd Lancashire and Rifle Brigade); Egyptian division, under Major-General Hunter, consisting of four brigades, commanded by Colonels MacDonald, Maxwell, Lewis and Collinson; mounted troops—21st Lancers, camel corps, and Egyptian cavalry; artillery, under Colonel Long, 2 British batteries, 5 Egyptian batteries, and 20 machine guns; detachment of Royal Engineers. The flotilla, under Commander Keppel, R.N., consisted of 10 gunboats and 5 transport steamers. The total strength was nearly 26,000 men.

Battle of Omdurman.

While the army moved along the west bank of the river, a force of Arab irregulars or "Friendlies" marched along the east bank, under command of Major Stuart-Wortley and Lieutenant Wood, to clear it of the enemy as far as the Blue Nile; and on the 1st of September the gunboats bombarded the forts on both sides of the river and breached the great wall of Omdurman. Kitchener met with no opposition; and on the 1st of September the army bivouacked in zeriba at Egeiga, on the west bank of the Nile, within 4 m. of Omdurman. Here, on the morning of the 2nd of September, the khalifa's army, 40,000 strong, attacked the zeriba, but was repulsed with slaughter. Kitchener then moved out and marched towards Omdurman, when he was again twice fiercely attacked on the right flank and rear, MacDonald's brigade bearing the brunt. MacDonald distinguished himself by his tactics, and completely repulsed the enemy. The 21st Lancers gallantly charged a body of 2000 dervishes which was unexpectedly met in a khor on the left flank, and drove them westward, the Lancers losing a fifth of their number in killed and wounded. The khalifa was now in full retreat, and the sirdar, sending his cavalry in pursuit, marched into Omdurman. The dervish loss was over 10,000 killed, as many wounded, and 5000 prisoners. The khalifa's black flag was captured and sent home to Queen Victoria. The British and Egyptian casualties together were under 500. The European prisoners of the khalifa found in Omdurman—Charles Neufeld, Joseph Ragnotti, Sister Teresa Grigolini, and some 30 Greeks—were released; and on Sunday the 4th of September the sirdar, with representatives from every regiment, crossed the river to Khartum, where the British and Egyptian flags were hoisted, and a short service held in memory of General Gordon, near the place where he met his death.

The results of the battle of Omdurman were the practical destruction of the khalifa's army, the extinction of Mahdism in the Sudan, and the recovery of nearly all the country formerly under Egyptian authority.

The khalifa fled with a small force to Obeid in Kordofan. The British troops were quickly sent down stream to Cairo, and the sirdar, shortly afterwards created Lord Kitchener of Khartum, was free to turn his attention to the reduction of the country to some sort of order.

Captain Marchand at Fashoda.

He had first, however, to deal with a somewhat serious matter—the arrival of a French expedition at Fashoda, on the White Nile, some 600 m. above Khartum. He started for the south on the 10th of September, with 5 gunboats and a small force, dispersed a body of 700 dervishes at Reng on the 15th, and four days later arrived at Fashoda, to find the French Captain Marchand, with 120 Senegalese soldiers, entrenched there and the French flag flying. He arranged with Marchand to leave the political question to be settled by diplomacy, and contented himself with hoisting the British and Egyptian flags to the south of the French flag, and leaving a gunboat and a Sudanese battalion to guard them. He then steamed up the river and established a post at Sobat; and after sending a gunboat up the Bahr-el-Ghazal to establish another post at Meshra-er-Rek, he returned to Omdurman. The French expedition had experienced great difficulties in the swampy region of the Bahr-el-Ghazal, and had reached Fashoda on the 10th of July. It had been attacked by a dervish force on the 25th of August, and was expecting another attack when Kitchener arrived and probably saved it from destruction. The Fashoda incident was the subject of important diplomatic negotiations, which at one time approached an acute phase; but ultimately the French position was found to be untenable, and on the 11th of December Marchand and his men returned to France by the Sobat, Abyssinia and Jibuti. In the following March the spheres of interest of Great Britain and France in the Nile basin were defined by a declaration making an addition to Article IV. of the Niger convention of the previous year.

During the sirdar's absence from Omdurman Colonel Hunter commanded an expedition up the Blue Nile, and by the end of

September had occupied and garrisoned Wad Medani, Sennar, Karkoj and Roseires. In the meantime Colonel Parsons marched with 1400 men from Kassala on the 7th of September, to capture Gedaref. He encountered 4000 dervishes under the amir Saadalla outside the town, and after a desperate fight, in which he lost 50 killed and 80 wounded, defeated them and occupied the town on the 22nd. The dervishes left 500 dead on the field, among whom were four amirs. Having strongly entrenched himself, Parsons beat off, with heavy loss to the dervishes, two impetuous attacks made on the 28th by Ahmed Fedil. But the garrison of Gedaref suffered from severe sickness, and Colonel Collinson was sent to their aid with reinforcements from Omdurman. He steamed up the Blue Nile and the Rahad river to Ain-el-Owega, whence he struck across the desert, reaching Gedaref on the 21st of October, to find that Ahmed Fedil had gone south with his force of 5000 men towards Roseires. Colonel Lewis, who was at Karkoj with a small force, moved to Roseires, where he received reinforcements from Omdurman, and on the 26th of December caught Ahmed Fedil's force as it was crossing the Blue Nile at Dakheila, and after a very severe fight cut it up. The dervish loss was 500 killed, while the Egyptians had 24 killed and 118 wounded. Two thousand five hundred fighting men surrendered later, and the rest escaped with Ahmed Fedil to join the khalifa in Kordofan.

Operations in the Sudan, 1899.

On the 25th of January 1899 Colonel Walter Kitchener was despatched by his brother, in command of a flying column of 2000 Egyptian troops and 1700 Friendlies, which had been concentrated at Faki Kohi, on the White Nile, some 200 m. above Khartum, to reconnoitre the khalifa's camp at Sherkela, 130 m. west of the river, in the heart of the Baggara country in Kordofan, and if possible to capture it. The position was found to be a strong one, occupied by over 6000 men; and as it was not considered prudent to attack it with an inferior force at such a distance from the river base, the flying column returned. No further attempt was made to interfere with the khalifa in his far-off retreat until towards the end of the year, when, good order having been generally established throughout the rest of the Sudan, it was decided to extend it to Kordofan.

Death of the khalifa.

In the autumn of 1899 the khalifa was at Jebel Gedir, a hill in southern Kordofan, about 80 m. from the White Nile, and was contemplating an advance. Lord Kitchener concentrated 8000 men at Kaka, on the river, 380 m. south of Khartum, and moved inland on the 20th of October. On arriving at Fongor it was ascertained that the khalifa had gone north, and the cavalry and camel corps having reconnoitred Jebel Gedir, the expedition returned. On the 13th November the amir Ahmed Fedil debouched on the river at El Alub, but retired on finding Colonel Lewis with a force in gunboats. Troops and transport were then concentrated at Faki Kohi, and Colonel Wingate sent with reinforcements from Khartum to take command of the expedition and march to Gedid, where it was anticipated the khalifa would be obliged to halt. A flying column, comprising a squadron of cavalry, a field battery, 6 machine guns, 6 companies of the camel corps, and a brigade of infantry and details, in all 3700 men, under Wingate, left Faki Kohi on the 21st of November. The very next day he encountered Ahmed Fedil at Abu Aadel, drove him from his position with great loss, and captured his camp and a large supply of grain he was convoying to the khalifa. Gedid was reached on the 23rd, and the khalifa was ascertained to be at Om Debreikat. Wingate marched at midnight of the 24th, and was resting his troops on high ground in front of the khalifa's position, when at daybreak of the 25th his picquets were driven in and the dervishes attacked. They were repulsed with great slaughter, and Wingate advancing, carried the camp. The khalifa Abdullah el Taaisha, unable to rally his men, gathered many of his principal amirs around him, among whom were his sons and brothers, Ali Wad Helu, Ahmed Fedil, and other well-known leaders, and they met their death unflinchingly from the bullets of the advancing Sudanese infantry. Three thousand men and 29 amirs of importance, including Sheik-ed-din, the khalifa's eldest son and intended successor, surrendered. The dervish loss in the two actions was estimated at 1000 killed and wounded, while the Egyptian casualties were only 4 killed and 29 wounded. Thus ended the power of the khalifa and of Mahdism.

On the 19th of January 1900 Osman Digna, who had been so great a supporter of Mahdism in the Eastern Sudan, and had always shown great discretion in securing the safety of his own person, was surrounded and captured at Jebel Warriba, as he was wandering a fugitive among the hills beyond Tokar.

The reconquest of Dongola and the Sudan provinces during the three years from March 1896 to December 1898, considering the enormous extent and difficulties of the country, was achieved at an unprecedentedly small cost, while the main item of expenditure—the railway—remains a permanent benefit to the country. The figures are:—

Railways	£E.1,181,372
Telegraphs	21,825
Gunboats	154,934
Military	996,223
Total	£E.2,354,354

Towards this expense the British government gave a grant-in-aid of £800,000, and the balance was borne by the Egyptian treasury. The railway, delayed by the construction of the big bridge over the Atbara, was opened to the Blue Nile opposite Khartum, 187 m. from the Atbara, at the end of 1899. (R. H. V.)

EHRENBERG, CHRISTIAN GOTTFRIED (1795–1876), German naturalist, was born at Delitzsch in Saxony on the 19th of April 1795. After studying at Leipzig and Berlin, where he took the degree of doctor of medicine in 1818, he was appointed professor of medicine in the university of Berlin (1827). Meanwhile in 1820 he was engaged in a scientific exploration conducted by General von Minutoli in Egypt. They investigated parts of the Libyan desert, the Nile valley and the northern coasts of the Red Sea, where Ehrenberg made a special study of the corals. Subsequently parts of Syria, Arabia and Abyssinia were examined. Some results of these travels and of the important collections that had been made were reported on by Humboldt in 1826; and afterwards Ehrenberg was enabled to bring out two volumes *Symbolae physicae* (1828–1834), in which many particulars of the mammals, birds, insects, &c., were made public. Other observations were communicated to scientific societies. In 1829 he accompanied Humboldt through eastern Russia to the Chinese frontier. On his return he gave his attention to microscopical researches. These had an important bearing on some of the infusorial earths used for polishing and other economic purposes; they added, moreover, largely to our knowledge of the microscopic organisms of certain geological formations, especially of the chalk, and of the modern marine and freshwater accumulations. Until Ehrenberg took up the study it was not known that considerable masses of rock were composed of minute forms of animals or plants. He demonstrated also that the phosphorescence of the sea was due to organisms. He continued until late in life to investigate the microscopic organisms of the deep sea and of various geological formations. He died in Berlin on the 27th of June 1876.

PUBLICATIONS.—*Die Infusionsthierchen als vollkommene Organismen* (2 vols. fol., Leipzig, 1838); *Mikrogeologie* (2 vols. fol., Leipzig, 1854); and "Fortsetzung der mikrogeologischen Studien," in *Abhandl. der k. Akad. der Wissenschaft* (Berlin, 1875).

EHRENBREITSTEIN, a town of Germany, in the Prussian Rhine province, on the right bank of the Rhine, facing Coblenz, with which it is connected by a railway bridge and a bridge of boats, on the main line of railway Frankfort-on-Main-Cologne. Pop. (including the garrison) 5300. It has an Evangelical and two Roman Catholic churches, a Capuchin monastery, tanneries, soap-works and a considerable trade in wine. Above the town, facing the mouth of the Mosel, on a rock 400 ft. high, lies the magnificent fortress of Ehrenbreitstein, considered practically impregnable. The sides towards the Rhine and the south and south-east are precipitous, and on the south side, on which is the winding approach, strongly defended. The central fort or citadel is flanked by a double line of works with three tiers of casemate batteries. The works towards the north and north-east end in a separate outlying fort. The whole forms a part of the system of fortifications which surround Coblenz.

The site of the castle is said to have been occupied by a Roman fort built in the time of the emperor Julian. In the 11th century the castle was held by a noble named Erembert, from whom it is said to have derived its name. In the 12th century it came into the possession of Archbishop Hillin (de Fallemagne) of Trier, who strengthened the defences in 1153. These were again extended by Archbishop Henry II. (de Fénétrange) in 1286, and by Archbishop John II. of Baden in 1481. In 1631 it was surrendered by the archbishop elector Philip Christopher von Soetern to the French, but was recovered by the Imperialists in 1637 and given to the archbishop elector of Cologne. It was restored to the elector of Trier in 1650, but was not strongly fortified until 1672. In 1688 the French bombarded it in vain, but in 1759 they took it and held it till 1762. It was again blockaded in 1795, 1796 and 1797, in vain; but in 1799 they starved it into surrender, and at the peace of Lunéville in 1801 blew it up before evacuating it. At the second peace of Paris the French paid 15,000,000 francs to the Prussian government for its restoration, and from 1816 to 1826 the fortress was reconstructed by General E. L. Aster (1778–1855).

EHUD, in the Bible, a "judge" who delivered Israel from the Moabites (Judg. iii. 12-30). He was sent from Ephraim to bear tribute to Eglon king of Moab, who had crossed over the Jordan and seized the district around Jericho. Being, like the Benjamites, left-handed (cf. xx. 16), he was able to conceal a dagger and strike down the king before his intentions were suspected. He locked Eglon in his chamber and escaped. The men from Mt Ephraim collected under his leadership and by seizing the fords of the Jordan were able to cut off the Moabites. He is called the son of Gera a Benjamite, but since both Ehud and Gera are tribal names (2 Sam. xvi. 5, 1 Chron. viii. 3, 5 sq.) it has been thought that this notice is not genuine. The tribe of Benjamin rarely appears in the old history of the Hebrews before the time of Saul. See further BENJAMIN; JUDGES.

EIBENSTOCK, a town of Germany, in the kingdom of Saxony, near the Mulde, on the borders of Bohemia, 17 m. by rail S.S.E. of Zwickau. Pop. (1905) 7460. It is a principal seat of the tambour embroidery which was introduced in 1775 by Clara Angermann. It possesses chemical and tobacco manufactories, and tin and iron works. It has also a large cattle market. Eibenstock, together with Schwarzenberg, was acquired by purchase in 1533 by Saxony and was granted municipal rights in the following year.

EICHBERG, JULIUS (1824–1893), German musical composer, was born at Düsseldorf on the 13th of June 1824. When he was nineteen he entered the Brussels Conservatoire, where he took first prizes for violin-playing and composition. For eleven years he occupied the post of professor in the Conservatoire of Geneva. In 1857 he went to the United States, staying two years in New York and then proceeding to Boston, where he became director of the orchestra at the Boston Museum. In 1867 he founded the Boston Conservatory of Music. Eichberg published several educational works on music; and his four operettas, *The Doctor of Alcantara*, *The Rose of Tyrol*, *The Two Cadis* and *A Night in Rome*, were highly popular. He died in Boston on the 18th of January 1893.

EICHENDORFF, JOSEPH, FREIHERR VON (1788–1857), German poet and romance-writer, was born at Lubowitz, near Ratibor, in Silesia, on the 10th of March 1788. He studied law at Halle and Heidelberg from 1805 to 1808. After a visit to Paris he went to Vienna, where he resided until 1813, when he joined the Prussian army as a volunteer in the famous Lützow corps. When peace was concluded in 1815, he left the army, and in the following year he was appointed to a judicial office at Breslau. He subsequently held similar offices at Danzig, Königsberg and Berlin. Retiring from public service in 1844, he lived successively in Danzig, Vienna, Dresden and Berlin. He died at Neisse on the 26th of November 1857. Eichendorff was one of the most distinguished of the later members of the German romantic school. His genius was essentially lyrical. Thus he is most successful in his shorter romances and dramas, where constructive power is least called for. His first work, written in 1811, was a romance, *Ahnung und Gegenwart* (1815). This was followed at short intervals by several others, among which the foremost place is by general consent assigned to *Aus dem Leben eines Taugenichts* (1826), which has often been reprinted. Of his dramas may be mentioned *Ezzelin von Romano* (1828); and *Der letzte Held von Marienburg* (1830), both tragedies; and a comedy, *Die Freier* (1833). He also translated several of Calderon's religious dramas (*Geistliche Schauspiele*, 1846). It is, however, through his lyrics (*Gedichte*, first collected 1837) that Eichendorff is best known; he is the greatest lyric poet of the romantic movement. No one has given more beautiful expression than he to the poetry of a wandering life; often, again, his lyrics are exquisite word pictures interpreting the mystic meaning of the moods of nature, as in *Nachts*, or the old-time mystery which yet haunts the twilight forests and feudal castles of Germany, as in the dramatic lyric *Waldesgespräch* or *Auf einer Burg*. Their language is simple and musical, which makes them very suitable for singing, and they have been often set, notably by Schubert and Schumann.

In the later years of his life Eichendorff published several works on subjects in literary history and criticism such as *Über die ethische und religiöse Bedeutung der neuen romantischen Poesie in Deutschland* (1847), *Der deutsche Roman des 18. Jahrhunderts in seinem Verhältniss zum Christenthum* (1851), and *Geschichte der poetischen Litteratur Deutschlands* (1856), but the value of these works is impaired by the author's reactionary standpoint. An edition of his collected works in six volumes, appeared at Leipzig in 1870.

Eichendorff's *Sämtliche Werke* appeared in 6 vols., 1864 (reprinted 1869–1870); his *Sämtliche poetische Werke* in 4 vols. (1883). The latest edition is that edited by R. von Gottschall in 4 vols. (1901). A good selection edited by M. Koch will be found in vol. 145 of Kürschner's *Deutsche Nationalliteratur* (1893). Eichendorff's critical writings were collected in 1866 under the title *Vermischte Schriften* (5 vols.). Cp. H. von Eichendorff's biographical introduction to the *Sämtliche Werke*; also H. Keiter, *Joseph von Eichendorff* (Cologne, 1887); H. A. Krüger, *Der junge Eichendorff* (Oppeln, 1898).

EICHHORN, JOHANN GOTTFRIED (1752–1827), German theologian, was born at Dörrenzimmern, in the principality of Hohenlohe-Oehringen, on the 16th of October 1752. He was educated at the state school in Weikersheim, where his father was superintendent, at the gymnasium at Heilbronn and at the university of Göttingen (1770–1774), studying under J. D. Michaelis. In 1774 he received the rectorship of the gymnasium at Ohrdruf, in the duchy of Gotha, and in the following year was made professor of Oriental languages at Jena. On the death of Michaelis in 1788 he was elected professor *ordinarius* at Göttingen, where he lectured not only on Oriental languages and on the exegesis of the Old and New Testaments, but also on political history. His health was shattered in 1825, but he continued his lectures until attacked by fever on the 14th of June 1827. He died on the 27th of that month. Eichhorn has been called "the founder of modern Old Testament criticism." He first properly recognized its scope and problems, and began many of its most important discussions. "My greatest trouble," he says in the preface to the second edition of his *Einleitung*, "I had to bestow on a hitherto unworked field—on the investigation of the inner nature of the Old Testament with the help of the Higher Criticism (not a new name to any humanist)." His investigations led him to the conclusion that "most of the writings of the Hebrews have passed through several hands." He took for granted that all the so-called supernatural facts relating to the Old and New Testaments were explicable on natural principles. He sought to judge them from the standpoint of the ancient world, and to account for them by the superstitious beliefs which were then generally in vogue. He did not perceive in the biblical books any religious ideas of much importance for modern times; they interested him merely historically and for the light they cast upon antiquity. He regarded many books of the Old Testament as spurious, questioned the genuineness of 2 *Peter* and *Jude*, denied the Pauline authorship of *Timothy* and *Titus*, and suggested that the canonical gospels were based upon various translations and editions of a primary Aramaic gospel. He did not appreciate as sufficiently as David Strauss and the Tübingen critics the difficulties which a natural theory has to surmount, nor did he support his conclusions by such elaborate discussions as they deemed necessary.

His principal works were—*Geschichte des Ostindischen Handels vor Mohammed* (Gotha, 1775); *Allgemeine Bibliothek der biblischen Literatur* (10 vols., Leipzig, 1787–1801); *Einleitung in das Alte Testament* (3 vols., Leipzig, 1780–1783); *Einleitung in das Neue Testament* (1804–1812); *Einleitung in die apokryphischen Bücher des Alten Testaments* (Gött., 1795); *Commentarius in apocalypsin Joannis* (2 vols., Gött., 1791); *Die Hebr. Propheten* (3 vols., Gött., 1816–1819); *Allgemeine Geschichte der Cultur und Literatur des neuern Europa* (2 vols., Gött., 1796–1799); *Literärgeschichte* (1st vol., Gött., 1799, 2nd ed. 1813, 2nd vol. 1814); *Geschichte der Literatur von ihrem Anfange bis auf die neuesten Zeiten* (5 vols., Gött., 1805–1812); *Übersicht der Französischen Revolution* (2 vols., Gött., 1797); *Weltgeschichte* (3rd ed., 5 vols., Gött., 1819–1820); *Geschichte der drei letzten Jahrhunderte* (3rd ed., 6 vols., Hanover, 1817–1818); *Urgeschichte des erlauchten Hauses der Welfen* (Hanover, 1817).

See R. W. Mackay, *The Tübingen School and its Antecedents* (1863), pp. 103 ff.; Otto Pfleiderer, *Development of Theology* (1890), p. 209; T. K. Cheyne, *Founders of Old Testament Criticism* (1893), pp. 13 ff.

EICHHORN, KARL FRIEDRICH (1781–1854), German jurist, son of the preceding, was born at Jena on the 20th of November 1781. He entered the university of Göttingen in 1797. In 1805 he obtained the professorship of law at Frankfort-on-Oder, holding it till 1811, when he accepted the same chair at Berlin. On the call to arms in 1813 he became a captain of horse, and received at the end of the war the decoration of the Iron Cross. In 1817 he was offered the chair of law at Göttingen, and, preferring it to the Berlin professorship, taught there with great success till ill-health compelled him to resign in 1828. His successor in the Berlin chair having died in 1832, he again entered on its duties, but resigned two years afterwards. In 1832 he also received an appointment in the ministry of foreign affairs, which, with his labours on many state committees and his legal researches and writings, occupied him till his death at Cologne on the 4th of July 1854. Eichhorn is regarded as one of the principal authorities on German constitutional law. His chief work is *Deutsche Staats- und Rechtsgeschichte* (Göttingen, 1808–1823, 5th ed. 1843–1844). In company with Savigny and J. F. L. Göschen he founded the *Zeitschrift für geschichtliche Rechtswissenschaft.* He was the author besides of *Einleitung in das deutsche Privatrecht mit Einschluss des Lehnrechts* (Gött., 1823) and the *Grundsätze des Kirchenrechts der Katholischen und der Evangelischen Religionspartei in Deutschland*, 2 Bde. (*ib.*, 1831–1833).

See Schulte, *Karl Friedrich Eichhorn, sein Leben und Wirken* (1884).

EICHSTÄTT, a town and episcopal see of Germany, in the kingdom of Bavaria, in the deep and romantic valley of the Altmühl, 35 m. S. of Nuremberg, on the railway to Ingolstadt and Munich. Pop. (1905) 7701. The town, with its numerous spires and remains of medieval fortifications, is very picturesque. It has an Evangelical and seven Roman Catholic churches, among the latter the cathedral of St Wilibald (first bishop of Eichstätt),—with the tomb of the saint and numerous pictures and relics,—the church of St Walpurgis, sister of Wilibald, whose remains rest in the choir, and the Capuchin church, a copy of the Holy Sepulchre. Of its secular buildings the most noticeable are the town hall and the Leuchtenberg palace, once the residence of the prince bishops and later of the dukes of Leuchtenberg (now occupied by the court of justice of the district), with beautiful grounds. The Wilibaldsburg, built on a neighbouring hill in the 14th century by Bishop Bertold of Hohenzollern, was long the residence of the prince bishops of Eichstätt, and now contains an historical museum. There are an episcopal lyceum, a clerical seminary, a classical and a modern school, and numerous religious houses. The industries of the town include bootmaking, brewing and the production of lithographic stones.

Eichstätt (Lat. *Aureatum* or *Rubilocus*) was originally a Roman station which, after the foundation of the bishopric by Boniface in 745, developed into a considerable town, which was surrounded with walls in 908. The bishops of Eichstätt were princes of the Empire, subject to the spiritual jurisdiction of the archbishops of Mainz, and ruled over considerable territories in the Circle of Franconia. In 1802 the see was secularized and incorporated in Bavaria. In 1817 it was given, with the duchy of Leuchtenberg, as a mediatized domain under the Bavarian crown, by the king of Bavaria to his son-in-law Eugène de Beauharnais, ex-viceroy of Italy, henceforth styled duke of Leuchtenberg. In 1855 it reverted to the Bavarian crown.

EICHWALD, KARL EDUARD VON (1795–1876), Russian geologist and physician, was born at Mitau in Courland on the 4th of July 1795. He became doctor of medicine and professor of zoology in Kazañ in 1823; four years later professor of zoology and comparative anatomy at Vilna; in 1838 professor of zoology, mineralogy and medicine at St Petersburg; and finally professor of palaeontology in the institute of mines in that city. He travelled much in the Russian empire, and was a keen observer of its natural history and geology. He died at St Petersburg on the 10th of November 1876. His published works include *Reise auf dem Caspischen Meere und in den Caucasus*, 2 vols. (Stuttgart and Tübingen, 1834–1838); *Die Urwelt Russlands* (St Petersburg, 1840–1845); *Lethaea Rossica, ou paléontologie de la Russie*, 3 vols. (Stuttgart, 1852–1868), with Atlases.

EIDER, a river of Prussia, in the province of Schleswig-Holstein. It rises to the south of Kiel, in Lake Redder, flows first north, then west (with wide-sweeping curves), and after a course of 117 m. enters the North Sea at Tönning. It is navigable up to Rendsburg, and is embanked through the marshes across which it runs in its lower course. Since the reign of Charlemagne, the Eider (originally *Ägyr Dör*—Neptune's gate) was known as *Romani terminus imperii* and was recognized as the boundary of the Empire in 1027 by the emperor Conrad II., the founder of the Salian dynasty. In the controversy arising out of the Schleswig-Holstein Question, which culminated in the war of Austria and Prussia against Denmark in 1864, the Eider gave its name to the "Eider Danes," the *intransigeant* Danish party which maintained that Schleswig (Sønderjylland, South Jutland) was by nature and historical tradition an integral part of Denmark. The Eider Canal (*Eider-Kanal*), which was constructed between 1777 and 1784, leaves the Eider at the point where the river turns to the west and enters the Bay of Kiel at Holtenau. It was hampered by six sluices, but was used annually by some 4000 vessels, and until its conversion in 1887–1895 into the Kaiser Wilhelm Canal afforded the only direct connexion between the North Sea and the Baltic.

EIDER (Icelandic, *Æður*), a large marine duck, the *Somateria mollissima* of ornithologists, famous for its down, which, from its extreme lightness and elasticity, is in great request for filling bed-coverlets. This bird generally frequents low rocky islets near the coast, and in Iceland and Norway has long been afforded every encouragement and protection, a fine being inflicted for killing it during the breeding-season, or even for firing a gun near its haunts, while artificial nesting-places are in many localities contrived for its further accommodation. From the care thus taken of it in those countries it has become exceedingly tame at its chief resorts, which are strictly regarded as property, and the taking of eggs or down from them, except by authorized persons, is severely punished by law. In appearance the eider is somewhat clumsy, though it flies fast and dives admirably. The female is of a dark reddish-brown colour barred with brownish-black. The adult male in spring is conspicuous by his pied plumage of velvet-black beneath, and white above: a patch of shining sea-green on his head is only seen on close inspection. This plumage he is considered not to acquire until his third year, being when young almost exactly like the female, and it is certain that the birds which have not attained their full dress remain in flocks by themselves without going to the breeding-stations. The nest is generally in some convenient corner among large stones, hollowed in the soil, and furnished with a few bits of dry grass, seaweed or heather. By the time that the full number of eggs (which rarely if ever exceeds five) is laid the down is added. Generally the eggs and down are taken at intervals of a few days by the owners of the "eider-fold," and the birds are thus kept depositing both during the whole season; but some experience is needed to ensure the greatest profit from each commodity. Every duck is ultimately allowed to hatch an egg or two to keep up the stock, and the down of the last nest is gathered after the birds have left the spot. The story of the drake's furnishing down, after the duck's supply is exhausted is a fiction. He never goes near the nest. The eggs have a strong flavour, but are much relished by both Icelanders and Norwegians. In the Old World the eider breeds in suitable localities from Spitsbergen to the Farne Islands off the coast of Northumberland—where it is known as St Cuthbert's duck. Its food consists of marine animals (molluscs and crustaceans), and hence the young are not easily reared in captivity. The eider of the New World differs somewhat, and has been described as a distinct species (*S. dresseri*). Though much diminished in numbers by persecution, it is still abundant on the coast of Newfoundland and thence northward. In Greenland also eiders are very plentiful, and it is supposed that three-fourths of the supply of down sent to Copenhagen comes from that country. The limits of the eider's northern range are not known, but the Arctic expedition of 1875 did not meet with it after leaving the Danish settlements, and its place was taken by an allied species, the king-duck (*S. spectabilis*), a very beautiful bird which sometimes appears on the British coast. The female greatly resembles that of the eider, but the male has a black chevron on his chin and a bright orange prominence on his forehead, which last seems to have given the species its English name. On the west coast of North America the eider is represented by a species (*S. v-nigrum*) with a like chevron, but otherwise resembling the Atlantic bird. In the same waters two other fine species are also found (*S. fischeri* and *S. stelleri*), one of which (the latter) also inhabits the Arctic coast of Russia and East Finmark and has twice reached England. The Labrador duck (*S. labradoria*), now extinct, also belongs to this group. (A. N.)

EIFEL, a district of Germany, in the Prussian Rhine Province, between the Rhine, the Moselle and the frontier of the grand duchy of Luxemburg. It is a hilly region, most elevated in the eastern part (Hohe Eifel), where there are several points from 2000 up to 2410 ft. above sea-level. In the west is the Schneifels or Schnee-Eifel; and the southern part, where the most picturesque scenery and chief geological interest is found, is called the Vorder Eifel.

The Eifel is an ancient massif of folded Devonian rocks upon the margins of which, near Hillesheim and towards Bitburg and Trier, rest unconformably the nearly undisturbed sandstones, marls and limestones of the Trias. On the southern border, at Wittlich, the terrestrial deposits of the Permian Rothliegende are also met with. The slates and sandstones of the Lower Devonian form by far the greater part of the region; but folded amongst these, in a series of troughs running from south-west to north-east lie the fossiliferous limestones of the Middle Devonian, and occasionally, as for example near Büdesheim, a few small patches of the Upper Devonian. Upon the ancient floor of folded Devonian strata stand numerous small volcanic cones, many of which, though long extinct, are still very perfect in form. The precise age of the eruptions is uncertain. The only sign of any remaining volcanic activity is the emission in many places of carbon dioxide and of heated waters. There is no historic or legendary record of any eruption, but nevertheless the eruptions must have continued to a very recent geological period. The lavas of Papenkaule are clearly posterior to the excavation of the valley of the Kyll, and an outflow of basalt has forced the Uess to seek a new course. The volcanic rocks occur both as tuffs and as lava-flows. They are chiefly leucite and nepheline rocks, such as leucitite, leucitophyre and nephelinite, but basalt and trachyte also occur. The leucite lavas of Niedermendig contain haüyne in abundance. The most extensive and continuous area of volcanic rocks is that surrounding the Laacher See and extending eastwards to Neuwied and Coblenz and even beyond the Rhine.

The numerous so-called crater-lakes or *maare* of the Eifel present several features of interest. They do not, as a rule, lie in true craters at the summit of volcanic cones, but rather in hollows which have been formed by explosions. The most remarkable group is that of Daun, where the three depressions of Gemünd, Weinfeld and Schalkenmehren have been hollowed out in the Lower Devonian strata. The first of these shows no sign of either lavas or scoriae, but volcanic rocks occur on the margins of the other two. The two largest lakes in the Eifel region, however, are the Laacher See in the hills west of Andernach on the Rhine, and the Pulvermaar S.E. of the Daun group, with its shores of peculiar volcanic sand, which also appears in its waters as a black powder (*pulver*).

EIFFEL TOWER. Erected for the exposition of 1889, the Eiffel Tower, in the Champ de Mars, Paris, is by far the highest artificial structure in the world, and its height of 300 metres (984 ft.) surpasses that of the obelisk at Washington by 429 ft., and that of St Paul's cathedral by 580 ft. Its framework is composed essentially of four uprights, which rise from the corners of a square measuring 100 metres on the side; thus the area it covers at its base is nearly 2½ acres. These uprights are supported on huge piers of masonry and concrete, the foundations for which were carried down, by the aid of iron caissons and compressed air, to a depth of about 15 metres on the side next the Seine, and about 9 metres on the other side. At first they curve upwards at an angle of 54°; then they gradually become straighter, until they unite in a single shaft rather more than half-way up. The first platform, at a height of 57 metres, has an area of 5860 sq. yds., and is reached either by staircases or lifts. The next, accessible by lifts only, is 115 metres up, and has an area of 32 sq. yds; while the third, at 276, supports a pavilion capable of holding 800 persons. Nearly 25 metres higher up still is the lantern, with a gallery 5 metres in diameter. The work of building this structure, which is mainly composed of iron lattice-work, was begun on the 28th of January 1887, and the full height was reached on the 13th of March 1889. Besides being one of the sights of Paris, to which visitors resort in order to enjoy the extensive view that can be had from its higher galleries on a clear day, the tower is used to some extent for scientific and semi-scientific purposes; thus meteorological observations are carried on. The engineer under whose direction the tower was constructed was Alexandre Gustave Eiffel (born at Dijon on the 15th of December 1832), who had already had a wide experience in the construction of large metal bridges, and who designed the huge sluices for the Panama Canal, when it was under the French company.

EILDON HILLS, a group of three conical hills, of volcanic origin, in Roxburghshire, Scotland, 1 m. S. by E. of Melrose, about equidistant from Melrose and St Boswells stations on the North British railway. They were once known as Eldune—the *Eldunum* of Simeon of Durham (fl. 1130)—probably derived from the Gaelic *aill*, "rock," and *dun*, "hill"; but the name is also said to be a corruption of the Cymric *moeldun*, "bald hill." The northern peak is 1327 ft. high, the central 1385 ft. and the southern 1216 ft. Whether or not the Roman station of *Trimontium* was situated here is matter of controversy. According to General William Roy (1726–1790) Trimontium—so called, according to this theory, from the triple Eildon heights—was Old Melrose; other authorities incline to place the station on the northern shore of the Solway Firth. The Eildons have been the subject of much legendary lore. Michael Scot (1175–1234), acting as a confederate of the Evil One (so the fable runs) cleft Eildon Hill, then a single cone, into the three existing peaks. Another legend states that Arthur and his knights sleep in a vault beneath the Eildons. A third legend centres in Thomas of Erceldoune. The Eildon Tree Stone, a large moss-covered boulder, lying on the high road as it bends towards the west within 2 m. of Melrose, marks the spot where the Fairy Queen led him into her realms in the heart of the hills. Other places associated with this legend may still be identified. Huntly Banks, where "true Thomas" lay and watched the queen's approach, is half a mile west of the Eildon Tree Stone, and on the west side of the hills is Bogle Burn, a streamlet that feeds the Tweed and probably derives its name from his ghostly visitor. Here, too, is Rhymer's glen, although the name was invented by Sir Walter Scott, who added the dell to his Abbotsford estate. Bowden, to the south of the hills, was the birthplace of the poets Thomas Aird (1802–1876) and James Thomson, and its parish church contains the burial-place of the dukes of Roxburghe. Eildon Hall is a seat of the duke of Buccleuch.

EILENBURG, a town of Germany, in the Prussian province of Saxony, on an island formed by the Mulde, 31 m. E. from Halle, at the junction of the railways Halle-Cottbus and Leipzig-Eilenburg. Pop. (1905) 15,145. There are three churches, two Evangelical and one Roman Catholic. The industries of the town include the manufacture of chemicals, cloth, quilting, calico, cigars and agricultural implements, bleaching, dyeing, basket-making, carriage-building and trade in cattle. In the neighbourhood is the iron foundry of Erwinhof. Opposite the town, on the steep left bank of the Mulde, is the castle from which it derives its name, the original seat of the noble family of Eulenburg. This castle (Ilburg) is mentioned in records of the reigns of Henry the Fowler as an important outpost against the Sorbs and Wends. The town itself, originally called Mildenau, is of great antiquity. It is first mentioned as a town in 981, when it belonged to the house of Wettin and was the chief town of the East Mark. In 1386 it was incorporated in the margraviate of Meissen. In 1815 it passed to Prussia.

See Gundermann, *Chronik der Stadt Eilenburg* (Eilenburg, 1879).

EINBECK, or EIMBECK, a town of Germany, in the Prussian province of Hanover, on the Ilm, 50 m. by rail S. of Hanover. Pop. (1905) 8709. It is an old-fashioned town with many quaint wooden houses, notable among them the "Northeimhaus," a beautiful specimen of medieval architecture. There are several churches, among them the Alexanderkirche, containing the tombs of the princes of Grubenhagen, and a synagogue. The schools include a *Realgymnasium* (*i.e.* predominantly for "modern" subjects), technical schools for the advanced study of machine-making, for weaving and for the textile industries, a preparatory training-college and a police school. The industries include brewing, weaving and the manufacture of cloth, carpets, tobacco, sugar, leather-grease, toys and roofing-felt.

Einbeck grew up originally round the monastery of St Alexander (founded 1080), famous for its relic of the True Blood. It is first recorded as a town in 1274, and in the 14th century was the seat of the princes of Grubenhagen, a branch of the ducal house of Brunswick. The town subsequently joined the Hanseatic League. In the 15th century it became famous for its beer ("Eimbecker," whence the familiar "Bock"). In 1540 the Reformation was introduced by Duke Philip of Brunswick-Saltzderhelden (d. 1551), with the death of whose son Philip II. (1596) the Grubenhagen line became extinct. In 1626, during the Thirty Years' War, Einbeck was taken by Pappenheim and in October 1641 by Piccolomini. In 1643 it was evacuated by the Imperialists. In 1761 its walls were razed by the French.

See H. L. Harland, *Gesch. der Stadt Einbeck*, 2 Bde. (Einbeck, 1854–1859; abridgment, *ib.* 1881).

EINDHOVEN, a town in the province of North Brabant, Holland, and a railway junction 8 m. by rail W. by S. of Helmond. Pop. (1900) 4730. Like Tilburg and Helmond it has developed in modern times into a flourishing industrial centre, having linen, woollen, cotton, tobacco and cigar, matches, &c., factories and several breweries.

EINHARD (*c.* 770–840), the friend and biographer of Charlemagne; he is also called Einhartus, Ainhardus or Heinhardus, in some of the early manuscripts. About the 10th century the name was altered into Agenardus, and then to Eginhardus, or Eginhartus, but, although these variations were largely used in the English and French languages, the form Einhardus, or Einhartus, is unquestionably the right one.

According to the statement of Walafrid Strabo, Einhard was born in the district which is watered by the river Main, and his birth has been fixed at about 770. His parents were of noble birth, and were probably named Einhart and Engilfrit; and their son was educated in the monastery of Fulda, where he was certainly residing in 788 and in 791. Owing to his intelligence and ability he was transferred, not later than 796, from Fulda to the palace of Charlemagne by abbot Baugulf; and he soon became very intimate with the king and his family, and undertook various important duties, one writer calling him *domesticus palatii regalis*. He was a member of the group of scholars who gathered around Charlemagne and was entrusted with the charge of the public buildings, receiving, according to a fashion then prevalent, the scriptural name of Bezaleel (Exodus xxxi. 2 and xxxv. 30-35) owing to his artistic skill. It has been supposed that he was responsible for the erection of the basilica at Aix-la-Chapelle, where he resided with the emperor, and the other buildings mentioned in chapter xvii. of his *Vita Karoli Magni*, but there is no express statement to this effect. In 806 Charlemagne sent him to Rome to obtain the signature of Pope Leo III. to a will which he had made concerning the division of his empire; and it was possibly owing to Einhard's influence that in 813, after the death of his two elder sons, the emperor made his remaining son, Louis, a partner with himself in the imperial dignity. When Louis became sole emperor in 814 he retained his father's minister in his former position; then in 817 made him tutor to his son, Lothair, afterwards the emperor Lothair I.; and showed him many other marks of favour. Einhard married Emma, or Imma, a sister of Bernharius, bishop of Worms, and a tradition of the 12th century represented this lady as a daughter of Charlemagne, and invented a romantic story with regard to the courtship which deserves to be noticed as it frequently appears in literature. Einhard is said to have visited the emperor's daughter regularly and secretly, and on one occasion a fall of snow made it impossible for him to walk away without leaving footprints, which would lead to his detection. This risk, however, was obviated by the foresight of Emma, who carried her lover across the courtyard of the palace; a scene which was witnessed by Charlemagne, who next morning narrated the occurrence to his counsellors, and asked for their advice. Very severe punishments were suggested for the clandestine lover, but the emperor rewarded the devotion of the pair by consenting to their marriage. This story is, of course, improbable, and is further discredited by the fact that Einhard does not mention Emma among the number of Charlemagne's children. Moreover, a similar story has been told of a daughter of the emperor Henry III. It is uncertain whether Einhard had any children. He addressed a letter to a person named Vussin, whom he calls *fili* and *mi nate*, but, as Vussin is not mentioned in documents in which his interests as Einhard's son would have been concerned, it is possible that he was only a young man in whom he took a special interest. In January 815 the emperor Louis I. bestowed on Einhard and his wife the domains of Michelstadt and Mulinheim in the Odenwald, and in the charter conveying these lands he is called simply Einhardus, but, in a document dated the 2nd of June of the same year, he is referred to as abbot. After this time he is mentioned as head of several monasteries: St Peter, Mount Blandin and St Bavon at Ghent, St Servais at Maastricht, St Cloud near Paris, and Fontenelle near Rouen, and he also had charge of the church of St John the Baptist at Pavia.

During the quarrels which took place between Louis I. and his sons, in consequence of the emperor's second marriage, Einhard's efforts were directed to making peace, but after a time he grew tired of the troubles and intrigues of court life. In 818 he had given his estate at Michelstadt to the abbey of Lorsch, but he retained Mulinheim, where about 827 he founded an abbey and erected a church, to which he transported some relics of St Peter and St Marcellinus, which he had procured from Rome. To Mulinheim, which was afterwards called Seligenstadt, he finally retired in 830. His wife, who had been his constant helper, and whom he had not put away on becoming an abbot, died in 836, and after receiving a visit from the emperor, Einhard died on the 14th of March 840. He was buried at Seligenstadt, and his epitaph was written by Hrabanus Maurus. Einhard was a man of very short stature, a feature on which Alcuin wrote an epigram. Consequently he was called *Nardulus*, a diminutive form of Einhardus, and his great industry and activity caused him to be likened to an ant. He was also a man of learning and culture. Reaping the benefits of the revival of learning brought about by Charlemagne, he was on intimate terms with Alcuin, was well versed in Latin literature, and knew some Greek. His most famous work is his *Vita Karoli Magni*, to which a prologue was added by Walafrid Strabo. Written in imitation of the *De vitis Caesarum* of Suetonius, this is the best contemporary account of the life of Charlemagne, and could only have been written by one who was very intimate with the emperor and his court. It is, moreover, a work of some artistic merit, although not free from inaccuracies. It was written before 821, and having been very popular during the middle ages, was first printed at Cologne in 1521. G. H. Pertz collated more than sixty manuscripts for his edition of 1829, and others have since come to light. Other works by Einhard are: *Epistolae*, which are of considerable importance for the history of the times; *Historia translationis beatorum Christi martyrum Marcellini et Petri*, which gives a curious account of how the bones of these martyrs were stolen and conveyed to Seligenstadt, and what miracles they wrought; and *De adoranda cruce*, a treatise which has only recently come to light, and which has been published by E. Dümmler in the *Neues Archiv der Gesellschaft für ältere deutsche Geschichtskunde*, Band xi. (Hanover, 1886). It has been asserted that Einhard was the author of some of the Frankish annals, and especially of part of the annals of Lorsch (*Annales Laurissenses majores*), and part of the annals of Fulda (*Annales Fuldenses*). Much discussion has taken place on this question, and several of the most eminent of German historians, Ranke among them, have taken part therein, but no certain decision has been reached.

The literature on Einhard is very extensive, as nearly all those who deal with Charlemagne, early German and early French literature, treat of him. Editions of his works are by A. Teulet, *Einhardi omnia quae extant opera* (Paris, 1840–1843), with a French translation; P. Jaffé, in the *Bibliotheca rerum Germanicarum*, Band iv. (Berlin, 1867); G. H. Pertz in the *Monumenta Germaniae historica*, Bände i. and ii. (Hanover, 1826–1829), and J. P. Migne in the *Patrologia Latina*, tomes 97 and 104 (Paris, 1866). The *Vita Karoli Magni*, edited by G. H. Pertz and G. Waitz, has been published separately (Hanover, 1880). Among the various translations of the *Vita* may be mentioned an English one by W. Glaister (London, 1877) and a German one by O. Abel (Leipzig, 1893). For a complete bibliography of Einhard, see A. Potthast, *Bibliotheca historica*, pp. 394-397 (Berlin, 1896), and W. Wattenbach, *Deutschlands Geschichtsquellen*, Band i. (Berlin, 1904). (A. W. H.*)

EINHORN, DAVID (1809–1879), leader of the Jewish reform movement in the United States of America, was born in Bavaria. He was a supporter of the principles of Abraham Geiger (*q.v.*), and while still in Germany advocated the introduction of prayers in the vernacular, the exclusion of nationalistic hopes from the synagogue service, and other ritual modifications. In 1855 he migrated to America, where he became the acknowledged leader of reform, and laid the foundation of the régime under which the mass of American Jews (excepting the newly arrived Russians) now worship. In 1858 he published his revised prayer book, which has formed the model for all subsequent revisions. In 1861 he strongly supported the anti-slavery party, and was forced to leave Baltimore where he then ministered. He continued his work first in Philadelphia and later in New York. (I. A.)

EINSIEDELN, the most populous town in the Swiss canton of Schwyz. It is built on the right bank of the Alpbach (an affluent of the Sihl), at a height of 2908 ft. above the sea-level on a rather bare moorland, and by rail is 25 m. S.E. of Zürich, or by a roundabout railway route about 38 m. north of Schwyz, with which it communicates directly over the Hacken Pass (4649 ft.) or the Holzegg Pass (4616 ft.). In 1900 the population was 8496, all (save 75) Romanists and all (save 111) German-speaking. The town is entirely dependent on the great Benedictine abbey that rises slightly above it to the east. Close to its present site Meinrad, a hermit, was murdered in 861 by two robbers, whose crime was made known by Meinrad's two pet ravens. Early in the 10th century Benno, a hermit, rebuilt the holy man's cell, but the abbey proper was not founded till about 934, the church having been consecrated (it is said by Christ Himself) in 948. In 1274 the dignity of a prince of the Holy Roman Empire was confirmed by the emperor to the reigning abbot. Originally under the protection of the counts of Rapperswil (to which town on the lake of Zürich the old pilgrims' way still leads over the Etzel Pass, 3146 ft., with its chapel and inn), this position passed by marriage with their heiress in 1295 to the Laufenburg or cadet line of the Habsburgs, but from 1386 was permanently occupied by Schwyz. A black wooden image of the Virgin and the fame of St Meinrad caused the throngs of pilgrims to resort to Einsiedeln in the middle ages, and even now it is much frequented, particularly about the 14th of September. The existing buildings date from the 18th century only, while the treasury and the library still contain many precious objects, despite the sack by the French in 1798. There are now about 100 fully professed monks, who direct several educational institutions. The Black Virgin has a special chapel in the stately church. Zwingli was the parish priest of Einsiedeln 1516–1518 (before he became a Protestant), while near the town Paracelsus (1493–1541), the celebrated philosopher, was born.

See Father O. Ringholz, *Geschichte d. fürstl. Benediktinerstiftes Einsiedeln*, vol. i. (to 1526), (Einsiedeln, 1904). (W. A. B. C.)

EISENACH, a town of Germany, second capital of the grand-duchy of Saxe-Weimar-Eisenach, lies at the north-west foot of the Thuringian forest, at the confluence of the Nesse and Hörsel, 32 m. by rail W. from Erfurt. Pop. (1905) 35,123. The town mainly consists of a long street, running from east to west. Off this are the market square, containing the grand-ducal palace, built in 1742, where the duchess Hélène of Orleans long resided, the town-hall, and the late Gothic St Georgenkirche; and the square on which stands the Nikolaikirche, a fine Romanesque building, built about 1150 and restored in 1887. Noteworthy are also the Klemda, a small castle dating from 1260; the Lutherhaus, in which the reformer stayed with the Cotta family in 1498; the house in which Sebastian Bach was born, and that (now a museum) in which Fritz Reuter lived (1863–1874). There are monuments to the two former in the town, while the resting-place of the latter in the cemetery is marked by a less pretentious memorial. Eisenach has a school of forestry, a school of design, a classical school (*Gymnasium*) and modern school (*Realgymnasium*), a deaf and dumb school, a teachers' seminary, a theatre and a Wagner museum. The most important industries of the town are worsted-spinning, carriage and wagon building, and the making of colours and pottery. Among others are the manufacture of cigars, cement pipes, iron-ware and machines, alabaster ware, shoes, leather, &c., cabinet-making, brewing, granite quarrying and working, tile-making, and saw- and corn-milling.

The natural beauty of its surroundings and the extensive forests of the district have of late years attracted many summer residents. Magnificently situated on a precipitous hill, 600 ft. above the town to the south, is the historic Wartburg (*q.v.*), the ancient castle of the landgraves of Thuringia, famous as the scene of the contest of Minnesingers immortalized in Wagner's Tannhäuser, and as the place where Luther, on his return from the diet of Worms in 1521, was kept in hiding and made his translation of the Bible. On a high rock adjacent to the Wartburg are the ruins of the castle of Mädelstein.

Eisenach (*Isenacum*) was founded in 1070 by Louis II. the Springer, landgrave of Thuringia, and its history during the middle ages was closely bound up with that of the Wartburg, the seat of the landgraves. The Klemda, mentioned above, was built by Sophia (d. 1284), daughter of the landgrave Louis IV., and wife of Duke Henry II. of Brabant, to defend the town against Henry III., margrave of Meissen, during the succession contest that followed the extinction of the male line of the Thuringian landgraves in 1247. The principality of Eisenach fell to the Saxon house of Wettin in 1440, and in the partition of 1485 formed part of the territories given to the Ernestine line. It was a separate Saxon duchy from 1596 to 1638, from 1640 to 1644, and again from 1662 to 1741, when it finally fell to Saxe-Weimar. The town of Eisenach, by reason of its associations, has been a favourite centre for the religious propaganda of Evangelical Germany, and since 1852 it has been the scene of the annual conference of the German Evangelical Church, known as the Eisenach conference.

See Trinius, *Eisenach und Umgebung* (Minden, 1900); and H. A. Daniel, *Deutschland* (Leipzig, 1895), and further references in U. Chevalier, "Répertoire des sources," &c., *Topo-bibliogr.* (Montbéliard, 1894–1899), s.v.

EISENBERG (*Isenberg*), a town of Germany, in the duchy of Saxe-Altenburg, on a plateau between the rivers Saale and Elster, 20 m. S.W. from Zeitz, and connected with the railway Leipzig-Gera by a branch to Crossen. Pop. (1905) 8824. It possesses an old castle, several churches, and monuments to Duke Christian of Saxe-Eisenberg (d. 1707), Bismarck, and the philosopher Karl Christian Friedrich Krause (*q.v.*). Its principal industries are weaving, and the manufacture of machines, ovens, furniture, pianos, porcelain and sausages.

See Back, *Chronik der Stadt und des Amtes Eisenberg* (Eisenb., 1843).

EISENERZ ("Iron ore"), a market-place and old mining town in Styria, Austria, 68 m. N.W. of Graz by rail. Pop. (1900) 6494. It is situated in a deep valley, dominated on the east by the Pfaffenstein (6140 ft.), on the west by the Kaiserschild (6830 ft.), and on the south by the Erzberg (5030 ft.). It has an interesting example of a medieval fortified church, a Gothic edifice founded by Rudolph of Habsburg in the 13th century and rebuilt in the 16th. The Erzberg or Ore Mountain furnishes such rich ore that it is quarried in the open air like stone, in the summer months. There is documentary evidence of the mines having been worked as far back as the 12th century. They afford employment to two or three thousand hands in summer and about half as many in winter, and yield some 800,000 tons of iron per annum. Eisenerz is connected with the mines by the Erzberg railway, a bold piece of engineering work, 14 m. long, constructed on the Abt's rack-and-pinion system. It passes through some beautiful scenery, and descends to Vordernberg (pop. 3111), an important centre of the iron trade situated on the south side of the Erzberg. Eisenerz possesses, in addition, twenty-five furnaces, which produce iron, and particularly steel, of exceptional excellence. A few miles to the N.W. of Eisenerz lies the castle of Leopoldstein, and near it the beautiful Leopoldsteiner Lake. This lake, with its dark-green water, situated at an altitude of 2028 ft., and surrounded on all sides by high peaks, is not big, but is very deep, having a depth of 520 ft.

EISLEBEN (Lat. *Islebia*), a town of Germany, in the Prussian province of Saxony, 24 m. W. by N. from Halle, on the railway to Nordhausen and Cassel. Pop. (1905) 23,898. It is divided into an old and a new town (Altstadt and Neustadt). Among its principal buildings are the church of St Andrew (Andreaskirche), which contains numerous monuments of the counts of Mansfeld; the church of St Peter and St Paul (Peter-Paulkirche), containing the font in which Luther was baptized; the royal gymnasium (classical school), founded by Luther shortly before his death in 1546; and the hospital. Eisleben is celebrated as the place where Luther was born and died. The house in which he was born was burned in 1689, but was rebuilt in 1693 as a free school for orphans. This school fell into decay under the régime of the kingdom of Westphalia, but was restored in 1817 by King Frederick William III. of Prussia, who, in 1819, transferred it to a new building behind the old house. The house in which Luther died was restored towards the end of the 19th century, and his death chamber is still preserved. A bronze statue of Luther by Rudolf Siemering (1835–1905) was unveiled in 1883. Eisleben has long been the centre of an important mining district (Luther was a miner's son), the principal products being silver and copper. It possesses smelting works and a school of mining.

The earliest record of Eisleben is dated 974. In 1045, at which time it belonged to the counts of Mansfeld, it received the right to hold markets, coin money, and levy tolls. From 1531 to 1710 it was the seat of the cadet line of the counts of Mansfeld-Eisleben. After the extinction of the main line of the counts of Mansfeld, Eisleben fell to Saxony, and, in the partition of Saxony by the congress of Vienna in 1815, was assigned to Prussia.

See G. Grössler, *Urkundliche Gesch. Eislebens bis zum Ende des 12. Jahrhunderts* (Halle, 1875); *Chronicon Islebiense; Eisleben Stadtchronik aus den Jahren 1520–1738*, edited from the original, with notes by Grössler and Sommer (Eisleben, 1882).

EISTEDDFOD (plural Eisteddfodau), the national bardic congress of Wales, the objects of which are to encourage bardism and music and the general literature of the Welsh, to maintain the Welsh language and customs of the country, and to foster and cultivate a patriotic spirit amongst the people. This institution, so peculiar to Wales, is of very ancient origin.[1] The term *Eisteddfod*, however, which means "a session" or "sitting," was probably not applied to bardic congresses before the 12th century.

The Eisteddfod in its present character appears to have originated in the time of Owain ap Maxen Wledig, who at the close of the 4th century was elected to the chief sovereignty of the Britons on the departure of the Romans. It was at this time, or soon afterwards, that the laws and usages of the Gorsedd were codified and remodelled, and its motto of "Y gwir yn erbyn y byd" (The truth against the world) given to it. "Chairs" (with which the Eisteddfod as a national institution is now inseparably connected) were also established, or rather perhaps resuscitated, about the same time. The chair was a kind of convention where disciples were trained, and bardic matters discussed preparatory to the great Gorsedd, each chair having a distinctive motto. There are now existing four chairs in Wales,—namely, the "royal" chair of Powys, whose motto is "A laddo a leddir" (He that slayeth shall be slain); that of Gwent and Glamorgan, whose motto is "Duw a phob daioni" (God and all goodness); that of Dyfed, whose motto is "Calon wrth galon" (Heart with heart); and that of Gwynedd, or North Wales, whose motto is "Iesu," or "O Iesu! na'd gamwaith" (Jesus, or Oh Jesus! suffer not iniquity).

The first Eisteddfod of which any account seems to have descended to us was one held on the banks of the Conway in the 6th century, under the auspices of Maelgwn Gwynedd, prince of North Wales. Maelgwn on this occasion, in order to prove the superiority of vocal song over instrumental music, is recorded to have offered a reward to such bards and minstrels as should swim over the Conway. There were several competitors, but on their arrival on the opposite shore the harpers found themselves unable to play owing to the injury their harps had sustained from the water, while the bards were in as good tune as ever. King Cadwaladr also presided at an Eisteddfod about the middle of the 7th century.

Griffith ap Cynan, prince of North Wales, who had been born in Ireland, brought with him from that country many Irish musicians, who greatly improved the music of Wales. During his long reign of 56 years he offered great encouragement to bards, harpers and minstrels, and framed a code of laws for their better regulation. He held an Eisteddfod about the beginning of the 12th century at Caerwys in Flintshire, "to which there repaired all the musicians of Wales, and some also from England and Scotland." For many years afterwards the Eisteddfod appears to have been held triennially, and to have enforced the rigid observance of the enactments of Griffith ap Cynan. The places at which it was generally held were Aberffraw, formerly the royal seat of the princes of North Wales; Dynevor, the royal castle of the princes of South Wales; and Mathrafal, the royal palace of the princes of Powys; and in later times

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[1] According to the Welsh Triads and other historical records, the *Gorsedd* or assembly (an essential part of the modern Eisteddfod, from which indeed the latter sprung) is as old at least as the time of Prydain the son of Ædd the Great, who lived many centuries before the Christian era. Upon the destruction of the political ascendancy of the Druids, the Gorsedd lost its political importance, though it seems to have long afterwards retained its institutional character as the medium for preserving the laws, doctrines and traditions of bardism.

Caerwys in Flintshire received that honourable distinction, it having been the princely residence of Llewelyn the Last. Some of these Eisteddfodau were conducted in a style of great magnificence, under the patronage of the native princes. At Christmas 1107 Cadwgan, the son of Bleddyn ap Cynfyn, prince of Powys, held an Eisteddfod in Cardigan Castle, to which he invited the bards, harpers and minstrels, "the best to be found in all Wales"; and "he gave them chairs and subjects of emulation according to the custom of the feasts of King Arthur." In 1176 Rhys ab Gruffydd, prince of South Wales, held an Eisteddfod in the same castle on a scale of still greater magnificence, it having been proclaimed, we are told, a year before it took place, "over Wales, England, Scotland, Ireland and many other countries."

On the annexation of Wales to England, Edward I. deemed it politic to sanction the bardic Eisteddfod by his famous statute of Rhuddlan. In the reign of Edward III. Ifor Hael, a South Wales chieftain, held one at his mansion. Another was held in 1451, with the permission of the king, by Griffith ab Nicholas at Carmarthen, in princely style, where Dafydd ab Edmund, an eminent poet, signalized himself by his wonderful powers of versification in the Welsh metres, and whence "he carried home on his shoulders the silver chair" which he had fairly won. Several Eisteddfodau, were held, one at least by royal mandate, in the reign of Henry VII. In 1523 one was held at Caerwys before the chamberlain of North Wales and others, by virtue of a commission issued by Henry VIII. In the course of time, through relaxation of bardic discipline, the profession was assumed by unqualified persons, to the great detriment of the regular bards. Accordingly in 1567 Queen Elizabeth issued a commission for holding an Eisteddfod at Caerwys in the following year, which was duly held, when degrees were conferred on 55 candidates, including 20 harpers. From the terms of the royal proclamation we find that it was then customary to bestow "a silver harp" on the chief of the faculty of musicians, as it had been usual to reward the chief bard with "a silver chair." This was the last Eisteddfod appointed by royal commission, but several others of some importance were held during the 16th and 17th centuries, under the patronage of the earl of Pembroke, Sir Richard Neville, and other influential persons. Amongst these the last of any particular note was one held in Bewper Castle, Glamorgan, by Sir Richard Basset in 1681.

During the succeeding 130 years Welsh nationality was at its lowest ebb, and no general Eisteddfod on a large scale appears to have been held until 1819, though several small ones were held under the auspices of the Gwyneddigion Society, established in 1771,—the most important being those at Corwen (1789), St Asaph (1790) and Caerwys (1798).

At the close of the Napoleonic wars, however, there was a general revival of Welsh nationality, and numerous Welsh literary societies were established throughout Wales, and in the principal English towns. A large Eisteddfod was held under distinguished patronage at Carmarthen in 1819, and from that time to the present they have been held (together with numerous local Eisteddfodau), almost without intermission, annually. The Eisteddfod at Llangollen in 1858 is memorable for its archaic character, and the attempts then made to revive the ancient ceremonies, and restore the ancient vestments of druids, bards and ovates.

To constitute a provincial Eisteddfod it is necessary that it should be proclaimed by a graduated bard of a Gorsedd a year and a day before it takes place. A local one may be held without such a proclamation. A provincial Eisteddfod generally lasts three, sometimes four days. A president and a conductor are appointed for each day. The proceedings commence with a Gorsedd meeting, opened with sound of trumpet and other ceremonies, at which candidates come forward and receive bardic degrees after satisfying the presiding bard as to their fitness. At the subsequent meetings the president gives a brief address; the bards follow with poetical addresses; adjudications are made, and prizes and medals with suitable devices are given to the successful competitors for poetical, musical and prose compositions, for the best choral and solo singing, and singing with the harp or "Pennillion singing"[1] as it is called, for the best playing on the harp or stringed or wind instruments, as well as occasionally for the best specimens of handicraft and art. In the evening of each day a concert is given, generally attended by very large numbers. The great day of the Eisteddfod is the "chair" day—usually the third or last day—the grand event of the Eisteddfod being the adjudication on the chair subject, and the chairing and investiture of the fortunate winner. This is the highest object of a Welsh bard's ambition. The ceremony is an imposing one, and is performed with sound of trumpet. (See also the articles BARD, CELT: *Celtic Literature*, and WALES.) (R. W.*)

EJECTMENT (Lat. *e*, out, and *jacere*, to throw), in English law, an action for the recovery of the possession of land, together with damages for the wrongful withholding thereof. In the old classifications of actions, as real or personal, this was known as a mixed action, because its object was twofold, viz. to recover both the realty and personal damages. It should be noted that the term "ejectment" applies in law to distinct classes of proceedings—ejectments as between rival claimants to land, and ejectments as between those who hold, or have held, the relation of landlord and tenant. Under the Rules of the Supreme Court, actions in England for the recovery of land are commenced and proceed in the same manner as ordinary actions. But the historical interest attaching to the action of ejectment is so great as to render some account of it necessary.

The form of the action as it prevailed in the English courts down to the Common Law Procedure Act 1852 was a series of fictions, among the most remarkable to be found in the entire body of English law. A, the person claiming title to land, delivered to B, the person in possession, a declaration in ejectment in which C and D, fictitious persons, were plaintiff and defendant. C stated that A had devised the land to him for a term of years, and that he had been ousted by D. A notice signed by D informed B of the proceedings, and advised him to apply to be made defendant in D's place, as he, D, having no title, did not intend to defend the suit. If B did not so apply, judgment was given against D, and possession of the lands was given to A. But if B did apply, the Court allowed him to defend the action only on condition that he admitted the three fictitious averments—the lease, the entry and the ouster—which, together with title, were the four things necessary to maintain an action of ejectment. This having been arranged the action proceeded, B being made defendant instead of D. The names used for the fictitious parties were John Doe, plaintiff, and Richard Roe, defendant, who was called "the casual ejector." The explanation of these mysterious fictions is this. The writ *de ejectione firmae* was invented about the beginning of the reign of Edward III. as a remedy to a lessee for years who had been ousted of his term. It was a writ of trespass, and carried damages, but in the time of Henry VII., if not before that date, the courts of common law added thereto a species of remedy neither warranted by the original writ nor demanded by the declaration, viz. a judgment to recover so much of the term as was still to run, and a writ of possession thereupon. The next step was to extend the remedy—limited originally to leaseholds—to cases of disputed title to freeholds. This was done indirectly by the claimant entering on the land and there making a lease for a term of years to another person; for it was only a term that could be recovered by the action, and to create a term required actual possession in the granter. The lessee remained on the land, and the next person who entered even by chance was accounted an ejector of the lessee, who then served upon him a writ of trespass and ejectment. The case then went to trial as on a common action of trespass; and the claimant's title, being the real foundation of the lessee's right, was thus indirectly determined. These proceedings might take place without the knowledge of the person really in possession; and to prevent the abuse of the action a rule was laid down that the plaintiff in ejectment must give notice to the party in possession, who might then come in and defend the action. When the action came into general use as a mode of trying the title to freeholds, the actual entry, lease and ouster which were necessary to found the action were attended with much inconvenience, and accordingly Lord Chief Justice Rolle during the Protectorate (*c.* 1657) substituted for them the fictitious averments already described. The action of ejectment is now only a curiosity of legal history. Its fictitious suitors were swept away by the Common Law Procedure Act of 1852. A form of writ was prescribed, in which the person in possession of the disputed premises by name and all persons entitled to defend the possession were informed that the plaintiff claimed to be entitled to possession, and required to appear in court to defend the possession of the property or such part of it as they should think fit. In the form of the writ and in some other respects ejectment still differed from other actions. But, as already mentioned, it has now been assimilated (under the name of action for the recovery of lands) to ordinary actions by the Rules of the Supreme Court. It is commenced by writ of summons, and—subject to the rules as to summary judgments (*v. inf.*)—proceeds along the usual course of pleadings and trial to judgment; but is subject to one special rule, viz: that except by leave of the Court or a judge the only claims which may be joined with one for recovery of land are claims in respect of arrears of rent or double value for holding over, or mesne profits (*i.e.* the value of the land during the period of illegal possession), or damages for breach of a contract under which the premises are held or for any wrong or injury to the premises claimed (R.S.C., O. xviii. r. 2). These claims were formerly recoverable by an independent action.

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[1] According to Jones's *Bardic Remains*, "To sing 'Pennillion with a Welsh harp is not so easily accomplished as may be imagined. The singer is obliged to follow the harper, who may change the tune, or perform variations *ad libitum*, whilst the vocalist must keep time, and end precisely with the strain. The singer does not commence with the harper, but takes the strain up at the second, third or fourth bar, as best suits the 'pennill' he intends to sing. . . . Those are considered the best singers who can adapt stanzas of various metres to one melody, and who are acquainted with the twenty-four measures according to the bardic laws and rules of composition."

With regard to actions for the recovery of land—apart from the relationship of landlord and tenant—the only point that need be noted is the presumption of law in favour of the actual possessor of the land in dispute. Where the action is brought by a landlord against his tenant, there is of course no presumption against the landlord's title arising from the tenant's possession. By the Common Law Procedure Act 1852 (ss. 210-212) special provision was made for the prompt recovery of demised premises where half a year's rent was in arrear and the landlord was entitled to re-enter for non-payment. These provisions are still in force, but advantage is now more generally taken of the summary judgment procedure introduced by the Rules of the Supreme Court (Order 3, r. 6.). This procedure may be adopted when (*a*) the tenant's term has expired, (*b*) or has been duly determined by notice to quit, or (*c*) has become liable to forfeiture for non-payment of rent, and applies not only to the tenant but to persons claiming under him. The writ is specially endorsed with the plaintiff's claim to recover the land with or without rent or mesne profits, and summary judgment obtained if no substantial defence is disclosed. Where an action to recover land is brought against the tenant by a person claiming adversely to the landlord, the tenant is bound, under penalty of forfeiting the value of three years' improved or rack rent of the premises, to give notice to the landlord in order that he may appear and defend his title. Actions for the recovery of land, other than land belonging to spiritual corporations and to the crown, are barred in 12 years (Real Property Limitation Acts 1833 (s. 29) and 1874 (s. 1). A landlord can recover possession in the county court (i.) by an action for the recovery of possession, where neither the value of the premises nor the rent exceeds £100 a year, and the tenant is holding over (County Courts Acts of 1888, s. 138, and 1903, s. 3); (ii.) by "an action of ejectment," where (*a*) the value or rent of the premises does not exceed £100, (*b*) half a year's rent is in arrear, and (*c*) no sufficient distress (see Rent) is to be found on the premises (Act of 1888, s. 139; Act of 1903, s. 3; County Court Rules 1903, Ord. v. rule 3). Where a tenant at a rent not exceeding £20 a year of premises at will, or for a term not exceeding 7 years, refuses nor neglects, on the determination or expiration of his interest, to deliver up possession, such possession may be recovered by proceedings before justices under the Small Tenements Recovery Act 1838, an enactment which has been extended to the recovery of allotments. Under the Distress for Rent Act 1737, and the Deserted Tenements Act 1817, a landlord can have himself put by the order of two justices into premises deserted by the tenant where half a year's rent is owing and no sufficient distress can be found.

In *Ireland*, the practice with regard to the recovery of land is regulated by the Rules of the Supreme Court 1891, made under the Judicature (Ireland) Act 1877; and resembles that of England. Possession may be recovered summarily by a special indorsement of the writ, as in England; and there are analogous provisions with regard to the recovery of small tenements (see Land Act, 1860 ss. 84 and 89). The law with regard to the ejectment or eviction of tenants is consolidated by the Land Act 1860. (See ss. 52-66, 68-71, and further under Landlord and Tenant.)

In *Scotland*, the recovery of land is effected by an action of "removing" or summary ejection. In the case of a tenant "warning" is necessary unless he is bound by his lease to remove without warning. In the case of possessors without title, or a title merely precarious, no warning is needed. A summary process of removing from small holdings is provided for by Sheriff Courts (Scotland) Acts of 1838 and 1851.

In the United States, the old English action of ejectment was adopted to a very limited extent, and where it was so adopted has often been superseded, as in Connecticut, by a single action for all cases of ouster, disseisin or ejectment. In this action, known as an action of disseisin or ejectment, both possession of the land and damages may be recovered. In some of the states a tenant against whom an action of ejectment is brought by a stranger is bound under a penalty, as in England, to give notice of the claim to the landlord in order that he may appear and defend his title.

In *French law* the landlord's claim for rent is fairly secured by the hypothec, and by summary powers which exist for the seizure of the effects of defaulting tenants. Eviction or annulment of a lease can only be obtained through the judicial tribunals. The Civil Code deals with the position of a tenant in case of the sale of the property leased. If the lease is by authentic act (*acte authentique*) or has an ascertained date, the purchaser cannot evict the tenant unless a right to do so was reserved on the lease (art. 1743), and then only on payment of an indemnity (arts. 1744-1747). If the lease is not by authentic act, or has not an ascertained date, the purchaser is not liable for indemnity (art. 1750). The tenant of rural lands is bound to give the landlord notice of acts of usurpation (art. 1768). There are analogous provisions in the Civil Codes of Belgium (arts. 1743 et seq.), Holland (arts. 1613, 1614), Portugal (art. 1572); and see the German Civil Code (arts. 535 et seq.). In many of the colonies there are statutory provisions for the recovery of land or premises on the lines of English law (cf. Ontario, Rev. Stats. 1897, c. 170. ss. 19 et seq.; Manitoba, Rev. Stats. 1902, c. 1903). In others (*e.g.* New Zealand, Act. No. 55 of 1893, ss. 175-187; British Columbia, Revised Statutes, 1897, c. 182; Cyprus, Ord. 15 of 1895) there has been legislation similar to the Small Tenements Recovery Act 1838.

Authorities.—*English Law*: Cole on *Ejectment*; Digby, *History of Real Property* (3rd ed., London, 1884); Pollock and Maitland, *History of English Law* (Cambridge, 1895); Foa, *Landlord and Tenant* (4th ed., London, 1907); Fawcett, *Landlord and Tenant* (London, 1905). *Irish Law*: Nolan and Kane's *Statutes relating to the Law of Landlord and Tenant* (5th ed., Dublin, 1898); Wylie's *Judicature Acts* (Dublin, 1900). *Scots Law*: Hunter on *Landlord and Tenant* (4th ed., Edin., 1878); Erskine's *Principles* (20th ed., Edin., 1903). *American Law*: *Two Centuries' Growth of American Law* (New York and London, 1901); Bouvier's *Law Dictionary* (Boston and London, 1897); Stimson, *American Statute Law* (Boston, 1886). (A. W. R.)

EKATERINBURG, a town of Russia, in the government of Perm, 311 m. by rail S.E. of the town of Perm, on the Iset river, near the E. foot of the Ural Mountains, in 56° 49′ N. and

60° 35′ E., at an altitude of 870 ft. above sea-level. It is the most important town of the Urals. Pop. (1860) 19,830; (1897) 55,488. The streets are broad and regular, and several of the houses of palatial proportions. In 1834 Ekaterinburg was made the see of a suffragan bishop of the Orthodox Greek Church. There are two cathedrals—St Catherine's, founded in 1758, and that of the Epiphany, in 1774—and a museum of natural history, opened in 1853. Ekaterinburg is the seat of the central mining administration of the Ural region, and has a chemical laboratory for the assay of gold, a mining school, the Ural Society of Naturalists, and a magnetic and meteorological observatory. Besides the government mint for copper coinage, which dates from 1735, the government engineering works, and the imperial factory for the cutting and polishing of malachite, jasper, marble, porphyry and other ornamental stones, the industrial establishments comprise candle, paper, soap and machinery works, flour and woollen mills, and tanneries. There is a lively trade in cattle, cereals, iron, woollen and silk goods, and colonial products; and two important fairs are held annually. Nearly forty gold and platinum mines, over thirty iron-works, and numerous other factories are scattered over the district, while wheels, travelling boxes, hardware, boots and so forth are extensively made in the villages. Ekaterinburg took its origin from the mining establishments founded by Peter the Great in 1721, and received its name in honour of his wife, Catherine I. Its development was greatly promoted in 1763 by the diversion of the Siberian highway from Verkhoturye to this place.

EKATERINODAR, a town of South Russia, chief town of the province of Kubañ, on the right bank of the river Kubañ, 85 m. E.N.E. of Novo-rossiysk on the railway to Rostov-on-Don, and in 45° 3′ N. and 38° 50′ E. It is badly built, on a swampy site exposed to the inundations of the river; and its houses, with few exceptions, are slight structures of wood and plaster. Founded by Catherine II. in 1794 on the site of an old town called Tmutarakan, as a small fort and Cossack settlement, its population grew from 9620 in 1860 to 65,697 in 1897. It has various technical schools, an experimental fruit-farm, a military hospital, and a natural history museum. A considerable trade is carried on, especially in cereals.

EKATERINOSLAV, a government of south Russia, having the governments of Poltava and Kharkov on the N., the territory of the Don Cossacks on the E., the Sea of Azov and Taurida on the S., and Kherson on the W. Area, 24,478 sq. m. Its surface is undulating steppe, sloping gently south and north, with a few hills reaching 1200 ft. in the N.E., where a slight swelling (the Don Hills) compels the Don to make a great curve eastwards. Another chain of hills, to which the eastward bend of the Dnieper is due, rises in the west. These hills have a crystalline core (granites, syenites and diorites), while the surface strata belong to the Carboniferous, Permian, Cretaceous and Tertiary formations. The government is rich in minerals, especially in coal—the mines lie in the middle of the Donets coalfield—iron ores, fireclay and rock-salt, and every year the mining output increases in quantity, especially of coal and iron. Granite, limestone, grindstone, slate, with graphite, manganese and mercury are found. The government is drained by the Dnieper, the Don and their tributaries (*e.g.* the Donets and Volchya) and by several affluents (*e.g.* the Kalmius) of the Sea of Azov. The soil is the fertile black earth, but the crops occasionally suffer from drought, the average annual rainfall being only 15 in. Forests are scarce. Pop. (1860) 1,138,750; (1897) 2,118,946, chiefly Little Russians, with Great Russians, Greeks (48,740), Germans (80,979), Rumanians and a few gypsies. Jews constitute 4·7% of the population. The estimated population in 1906 was 2,708,700.

Wheat and other cereals are extensively grown; other noteworthy crops are potatoes, tobacco and grapes. Nearly 40,000 persons find occupation in factories, the most imporant being iron-works and agricultural machinery works, though there are also tobacco, glass, soap and candle factories, potteries, tanneries and breweries. In the districts of Mariupol the making of agricultural implements and machinery is carried on extensively as a domestic industry in the villages. Bees are kept in very considerable numbers. Fishing employs many persons in the Don and the Dnieper. Cereals are exported in large quantities via the Dnieper, the Sevastopol railway, and the port of Mariupol. The chief towns of the eight districts, with their populations in 1897, are Ekaterinoslav (135,552 inhabitants in 1900), Alexandrovsk (28,434), Bakhmut (30,585), Mariupol (31,772), Novomoskovsk (12,862), Pavlograd (17,188), Slavyanoserbsk (3120), and Verkhne-dnyeprovsk (11,607).

EKATERINOSLAV, a town of Russia, capital of the government of the same name, on the right bank of the Dnieper above the rapids, 673 m. by rail S.S.W. of Moscow, in 48° 21′ N. and 35° 4′ E., at an altitude of 210 ft. Pop. (1861) 18,881, without suburbs; (1900) 135,552. If the suburb of Novyikoindak be included, the town extends for upwards of 4 m. along the river. The oldest part lies very low and is much exposed to floods. Contiguous to the towns on the N.W. is the royal village of Novyimaidani or the New Factories. The bishop's palace, mining academy, archaeological museum and library are the principal public buildings. The house now occupied by the Nobles Club was formerly inhabited by the author and statesman Potemkin. Ekaterinoslav is a rapidly growing city, with a number of technical schools, and is an important depot for timber floated down the Dnieper, and also for cereals. Its iron-works, flour-mills and agricultural machinery works give occupation to over 5000 persons. In fact since 1895 the city has become the centre of numerous Franco-Belgian industrial undertakings. In addition to the branches just mentioned, there are tobacco factories and breweries. Considerable trade is carried on in cattle, cereals, horses and wool, there being three annual fairs. On the site of the city there formerly stood the Polish castle of Koindak, built in 1635, and destroyed by the Cossacks. The existing city was founded by Potemkin in 1786, and in the following year Catherine II. laid the foundation-stone of the cathedral, though it was not actually built until 1830–1835. On the south side of it is a bronze statue of the empress, put up in 1846. Paul I. changed the name of the city to Novo-rossiysk, but the original name was restored in 1802.

EKHOF, KONRAD (1720–1778), German actor, was born in Hamburg on the 12th of August 1720. In 1739 he became a member of Johann Friedrich Schönemann's (1704–1782) company in Lüneburg, and made his first appearance there on the 15th of January 1740 as Xiphares in Racine's *Mithridate*. From 1751 the Schönemann company performed mainly in Hamburg and at Schwerin, where Duke Christian Louis II. of Mecklenburg-Schwerin made them comedians to the court. During this period Ekhof founded a theatrical academy, which, though short-lived, was of great importance in helping to raise the standard of German acting and the status of German actors. In 1757 Ekhof left Schönemann to join Franz Schuch's company at Danzig; but he soon returned to Hamburg, where, in conjunction with two other actors, he succeeded Schönemann in the direction of the company. He resigned this position, however, in favour of H. G. Koch, with whom he acted until 1764, when he joined K. E. Ackermann's company. In 1767 was founded the National Theatre at Hamburg, made famous by Lessing's *Hamburgische Dramaturgie*, and Ekhof was the leading member of the company. After the failure of the enterprise Ekhof was for a time in Weimar, and ultimately became co-director of the new court theatre at Gotha. This, the first permanently established theatre in Germany, was opened on the 2nd of October 1775. Ekhof's reputation was now at its height; Goethe called him the only German tragic actor; and in 1777 he acted with Goethe and Duke Charles Augustus at a private performance at Weimar, dining afterwards with the poet at the ducal table. He died on the 16th of June 1778. His versatility may be judged from the fact that in the comedies of Goldoni and Molière he was no less successful than in the tragedies of Lessing and Shakespeare. He was regarded by his contemporaries as an unsurpassed exponent of naturalness on the stage; and in this respect he has been not unfairly compared with Garrick. His fame, however, was rapidly eclipsed by that of Friedrich U. L.

Schröder. His literary efforts were chiefly confined to translations from French authors.

See H. Uhde, biography of Ekhof in vol. iv. of *Der neue Plutarch* (1876), and J. Rüschner, *K. Ekhofs Leben und Wirken* (1872). Also H. Devrient, *J. F. Schönemann und seine Schauspielergesellschaft* (1895).

EKRON (better, as in the Septuagint and Josephus, Accaron, Ἀκκαρών), a royal city of the Philistines commonly identified with the modern Syrian village of ʿAḳir, 5 m. from Ramleh, on the southern slope of a low ridge separating the plain of Philistia from Sharon. It lay inland and off the main line of traffic. Though included by the Israelites within the limits of the tribe of Judah, and mentioned in Judges xix. as one of the cities of Dan, it was in Philistine possession in the days of Samuel, and apparently maintained its independence. According to the narrative of the Hebrew text, here differing from the Greek text and Josephus (which read Askelon), it was the last town to which the ark was transferred before its restoration to the Israelites. Its maintenance of a sanctuary of Baal Zebub is mentioned in 2 Kings i. From Assyrian inscriptions it has been gathered that Padi, king of Ekron, was for a time the vassal of Hezekiah of Judah, but regained his independence when the latter was hard pressed by Sennacherib. A notice of its history in 147 B.C. is found in 1 Macc. x. 89; after the fall of Jerusalem A.D. 70 it was settled by Jews. At the time of the crusades it was still a large village. Recently a Jewish agricultural colony has been settled there. The houses are built of mud, and in the absence of visible remains of antiquity, the identification of the site is questionable. The neighbourhood is fertile. (R. A. S. M.)

ELABUGA, a town of Russia, in the government of Vyatka, on the Kama river, 201 m. by steamboat down the Volga from Kazan and then up the Kama. It has flour-mills, and carries on a brisk trade in exporting corn. Pop. (1897) 9776.

The famous *Ananiynskiy Mogilnik* (burial-place) is on the right bank of the Kama, 3 m. above the town. It was discovered in 1858, was excavated by Alabin, Lerch and Nevostruyev, and has since supplied extremely valuable collections belonging to the Stone, Bronze and Iron Ages. It consisted of a mound, about 500 ft. in circumference, adorned with decorated stones (which have disappeared), and contained an inner wall, 65 ft. in circumference, made of uncemented stone flags. Nearly fifty skeletons were discovered, mostly lying upon charred logs, surrounded with cinerary urns filled with partially burned bones. A great variety of bronze decorations and glazed clay pearls were strewn round the skeletons. The knives, daggers and arrowpoints are of slate, bronze and iron, the last two being very rough imitations of stone implements. One of the flags bore the image of a man, without moustaches or beard, dressed in a costume and helmet recalling those of the Circassians.

ELAM, the name given in the Bible to the province of Persia called Susiana by the classical geographers, from Susa or Shushan its capital. In one passage, however (Ezra iv. 9), it is confined to Elymais, the north-western part of the province, and its inhabitants distinguished from those of Shushan, which elsewhere (Dan. viii. 2) is placed in Elam. Strabo (xv. 3. 12, &c.) makes Susiana a part of Persia proper, but a comparison of his account with those of Ptolemy (vi. 3. 1, &c.) and other writers would limit it to the mountainous district to the east of Babylonia, lying between the Oroatis and the Tigris, and stretching from India to the Persian Gulf. Along with this mountainous district went a fertile low tract of country on the western side, which also included the marshes at the mouths of the Euphrates and Tigris and the north-eastern coast land of the Gulf. This low tract, though producing large quantities of grain, was intensely hot in summer; the high regions, however, were cool and well watered.

The whole country was occupied by a variety of tribes, speaking agglutinative dialects for the most part, though the western districts were occupied by Semites. Strabo (xi. 13. 3, 6), quoting from Nearchus, seems to include the Susians under the Elymaeans, whom he associates with the Uxii, and places on the frontiers of Persia and Susa; but Pliny more correctly makes the Eulaeus the boundary between Susiana and Elymais (*N.H.* vi. 29-31). The Uxii are described as a robber tribe in the mountains adjacent to Media, and their name is apparently to be identified with the title given to the whole of Susiana in the Persian cuneiform inscriptions, *Uwaja*, *i.e.* "Aborigines." Uwaja is probably the origin of the modern Khuzistan, though Mordtmann would derive the latter from خوز "a sugar-reed." Immediately bordering on the Persians were the Amardians or Mardians, as well as the people of Khapirti (Khatamti, according to Scheil), the name given to Susiana in the Neo-Susian texts. Khapirti appears as Apir in the inscriptions of Mal-Amir, which fix the locality of the district. Passing over the Messabatae, who inhabited a valley which may perhaps be the modern Māh-Sabadan, as well as the level district of Yamutbal or Yatbur which separated Elam from Babylonia, and the smaller districts of Characene, Cabandene, Corbiana and Gabiene mentioned by classical authors, we come to the fourth principal tribe of Susiana, the Cissii (Aesch. *Pers.* 16; Strabo xv. 3. 2) or Cossaei (Strabo xi. 5. 6, xvi. 11. 17; Arr. *Ind.* 40; Polyb. v. 54, &c.), the Kassi of the cuneiform inscriptions. So important were they, that the whole of Susiana was sometimes called Cissia after them, as by Herodotus (iii. 91, v. 49, &c.). In fact Susiana was only a late name for the country, dating from the time when Susa had been made a capital of the Persian empire. In the Sumerian texts of Babylonia it was called Numma, "the Highlands," of which Elamtu or Elamu, "Elam," was the Semitic translation. Apart from Susa, the most important part of the country was Anzan (Anshan, contracted Assan), where the native population maintained itself unaffected by Semitic intrusion. The exact position of Anzan is still disputed, but it probably included originally the site of Susa and was distinguished from it only when Susa became the seat of a Semitic government. In the lexical tablets Anzan is given as the equivalent of Elamtu, and the native kings entitle themselves kings of "Anzan and Susa," as well as "princes of the Khapirti."

The principal mountains of Elam were on the north, called Charbanus and Cambalidus by Pliny (vi. 27, 31), and belonging to the Parachoathras chain. There were numerous rivers flowing into either the Tigris or the Persian Gulf. The most important were the Ulai or Eulaeus (*Kūran*) with its tributary the Pasitigris, the Choaspes (*Kerkhah*), the Coprates (river of *Diz* called Itītē in the inscriptions), the Hedyphon or Hedypnus (*Jerrāhi*), and the Croatis (*Hindyan*), besides the monumental Surappi and Ukni, perhaps to be identified with the Hedyphon and Oroatis, which fell into the sea in the marshy region at the mouth of the Tigris. Shushan or Susa, the capital now marked by the mounds of *Shush*, stood near the junction of the Choaspes and Eulaeus (see Susa); and Badaca, Madaktu in the inscriptions, lay between the *Shapur* and the river of *Diz*. Among the other chief cities mentioned in the inscriptions may be named Naditu, Khaltemas, Din-sar, Bubilu, Bit-imbi, Khidalu and Nagitu on the sea-coast. Here, in fact, lay some of the oldest and wealthiest towns, the sites of which have, however, been removed inland by the silting up of the shore. J. de Morgan's excavations at Susa have thrown a flood of light on the early history of Elam and its relations to Babylon. The earliest settlement there goes back to neolithic times, but it was already a fortified city when Elam was conquered by Sargon of Akkad (3800 B.C.) and Susa became the seat of a Babylonian viceroy. From this time onward for many centuries it continued under Semitic suzerainty, its high-priests, also called "Chief Envoys of Elam, Sippara and Susa," bearing sometimes Semitic, sometimes native "Anzanite" names. One of the kings of the dynasty of Ur built at Susa. Before the rise of the First Dynasty of Babylon, however, Elam had recovered its independence, and in 2280 B.C. the Elamite king Kutur-Nakhkhunte made a raid in Babylonia and carried away from Erech the image of the goddess Nanā. The monuments of many of his successors have been discovered by de Morgan and their inscriptions deciphered by V. Scheil. One of them was defeated by Ammi-zadoq of Babylonia (*c.* 2100 B.C.); another would have been the Chedor-laomer (Kutur-Lagamar) of Genesis xiv. One of the greatest builders among them was Untas-GAL (the pronunciation of the second element in the name is uncertain). About 1330 B.C. Khurba-tila was captured by Kuri-galzu III., the Kassite king of Babylonia, but a later prince Kidin-Khutrutas avenged his defeat, and Sutruk-Nakhkhunte (1220 B.C.) carried fire and sword through Babylonia, slew its king Zamama-sum-iddin and carried away a stela of Naram-Sin and the famous code of laws of Khammurabi from Sippara, as well as a stela of Manistusu from Akkuttum or Akkad. He also conquered the land of Asnunnak and carried off from Padan a stela belonging to a refugee from Malatia. He was succeeded by his son who was followed on the throne by his brother, one of the great builders of Elam. In 750 B.C. Umbadara was king of Elam; Khumban-igas was his successor in 742 B.C. In 720 B.C. the latter prince met the Assyrians under Sargon at Dur-ili in Yamutbal, and though Sargon claims a victory the result was that Babylonia recovered its independence under Merodach-baladan and the Assyrian forces were driven north. From this time forward it was against Assyria instead of Babylonia that Elam found itself compelled to exert its strength, and Elamite policy was directed towards fomenting revolt in Babylonia and assisting the Babylonians in their struggle with Assyria. In 716 B.C. Khumban-igas died and was followed by his nephew, Sutruk-Nakhkhunte. He failed to make head against the Assyrians; the frontier cities were taken by Sargon and Merodach-baladan was left to his fate. A few years later (704 B.C.) the combined forces of Elam and Babylonia were overthrown at Kis, and in the following year the Kassites were reduced to subjection. The Elamite king was dethroned and imprisoned in 700 B.C. by his brother Khallusu, who six years later marched into Babylonia, captured the son of Sennacherib, whom his father had placed there as king, and raised a nominee of his own, Nergal-yusezib, to the throne. Khallusu was murdered in 694 B.C., after seeing the maritime part of his dominions invaded by the Assyrians. His successor Kudur-Nakhkhunte invaded Babylonia; he was repulsed, however, by Sennacherib, 34 of his cities were destroyed, and he himself fled from Madaktu to Khidalu. The result was a revolt in which he was killed after a reign of ten months. His brother Umman-menan at once collected allies and prepared for resistance to the Assyrians. But the terrible defeat at Khalulē broke his power; he was attacked by paralysis shortly afterwards, and Khumba-Khaldas II. followed him on the throne (689 B.C.). The new king endeavoured to gain Assyrian favour by putting to death the son of Merodach-baladan, but was himself murdered by his brothers Urtaki and Teumman (681 B.C.), the first of whom seized the crown. On his death Teumman succeeded and almost immediately provoked a quarrel with Assur-bani-pal by demanding the surrender of his nephews who had taken refuge at the Assyrian court. The Assyrians pursued the Elamite army to Susa, where a battle was fought on the banks of the Eulaeus, in which the Elamites were defeated, Teumman captured and slain, and Umman-igas, the son of Urtaki, made king, his younger brother Tammaritu being given the district of Khidalu. Umman-igas afterwards assisted in the revolt of Babylonia under Samas-sum-yukin, but his nephew, a second Tammaritu, raised a rebellion against him, defeated him in battle, cut off his head and seized the crown. Tammaritu marched to Babylonia; while there, his officer Inda-bigas made himself master of Susa and drove Tammaritu to the coast whence he fled to Assur-bani-pal. Inda-bigas was himself overthrown and slain by a new pretender, Khumba-Khaldas III., who was opposed, however, by three other rivals, two of whom maintained themselves in the mountains until the Assyrian conquest of the country, when Tammaritu was first restored and then imprisoned, Elam being utterly devastated. The return of Khumba-Khaldas led to a fresh Assyrian invasion; the Elamite king fled from Madaktu to Dur-undasi; Susa and other cities were taken, and the Elamite army almost exterminated on the banks of the Itite. The whole country was reduced to a desert, Susa was plundered and razed to the ground, the royal sepulchres were desecrated, and the images of the gods and of 32 kings "in silver, gold, bronze and alabaster," were carried away. All this must have happened about 640 B.C. After the fall of the Assyrian empire Elam was occupied by the Persian Teispes, the forefather of Cyrus, who, accordingly, like his immediate successors, is called in the inscriptions "king of Anzan." Susa once more became a capital, and on the establishment of the Persian empire remained one of the three seats of government, its language, the Neo-Susian, ranking with the Persian of Persepolis and the Semitic of Babylon as an official tongue. In the reign of Darius, however, the Susianians attempted to revolt, first under Assina or Atrina, the son of Umbadara, and later under Martiya, the son of Issainsakria, who called himself Immanes; but they gradually became completely Aryanized, and their agglutinative dialects were supplanted by the Aryan Persian from the south-east.

Elam, "the land of the cedar-forest," with its enchanted trees, figured largely in Babylonian mythology, and one of the adventures of the hero Gilgamesh was the destruction of the tyrant Khumbaba who dwelt in the midst of it. A list of the Elamite deities is given by Assur-bani-pal; at the head of them was In-Susinak, "the lord of the Susians,"—a title which went back to the age of Babylonian suzerainty,—whose image and oracle were hidden from the eyes of the profane. Nakhkhunte, according to Scheil, was the Sun-goddess, and Lagamar, whose name enters into that of Chedorlaomer, was borrowed from Semitic Babylonia.

See W. K. Loftus, *Chaldaea and Susiana* (1857); A. Billerbeck, *Susa* (1893); J. de Morgan, *Mémoires de la Délégation en Perse* (9 vols., 1899–1906). (A. H. S.)

ELAND (=elk), the Dutch name for the largest of the South African antelopes (*Taurotragus oryx*), a species near akin to the kudu, but with horns present in both sexes, and their spiral much closer, being in fact screw-like instead of corkscrew-like. There is also a large dewlap, while old bulls have a thick forelock. In the typical southern form the body-colour is wholly pale fawn, but north of the Orange river the body is marked by narrow vertical white lines, this race being known as *T. oryx livingstonei*. In Senegambia the genus is represented by *T. derbianus*, a much larger animal, with a dark neck; while in the Bahr-el-Ghazal district there is a gigantic local race of this species (*T. derbianus giganteus*). (R. L.*)

ELASTICITY. 1. Elasticity is the property of recovery of an original size or shape. A body of which the size, or shape, or both size and shape, have been altered by the application of forces may, and generally does, tend to return to its previous size and shape when the forces cease to act. Bodies which exhibit this tendency are said to be *elastic* (from Greek, ἐλαύνειν, to drive). All bodies are more or less elastic as regards size; and all solid bodies are more or less elastic as regards shape. For example: gas contained in a vessel, which is closed by a piston, can be compressed by additional pressure applied to the piston; but, when the additional pressure is removed, the gas expands and drives the piston outwards. For a second example: a steel bar hanging vertically, and loaded with one ton for each square inch of its sectional area, will have its length increased by about seven one-hundred-thousandths of itself, and its sectional area diminished by about half as much; and it will spring back to its original length and sectional area when the load is gradually removed. Such changes of size and shape in bodies subjected to forces, and the recovery of the original size and shape when the forces cease to act, become conspicuous when the bodies have the forms of thin wires or planks; and these properties of bodies in such forms are utilized in the construction of spring balances, carriage springs, buffers and so on.

It is a familiar fact that the hair-spring of a watch can be coiled and uncoiled millions of times a year for several years without losing its elasticity; yet the same spring can have its shape permanently altered by forces which are much greater than those to which it is subjected in the motion of the watch. The incompleteness of the recovery from the effects of great forces is as important a fact as the practical completeness of the recovery from the effects of comparatively small forces.

The fact is referred to in the distinction between "perfect" and "imperfect" elasticity; and the limitation which must be imposed upon the forces in order that the elasticity may be perfect leads to the investigation of "limits of elasticity" (see §§ 31, 32 below). Steel pianoforte wire is perfectly elastic within rather wide limits, glass within rather narrow limits; building stone, cement and cast iron appear not to be perfectly elastic within any limits, however narrow. When the limits of elasticity are not exceeded no injury is done to a material or structure by the action of the forces. The strength or weakness of a material, and the safety or insecurity of a structure, are thus closely related to the elasticity of the material and to the change of size or shape of the structure when subjected to forces. The "science of elasticity" is occupied with the more abstract side of this relation, viz. with the effects that are produced in a body of definite size, shape and constitution by definite forces; the "science of the strength of materials" is occupied with the more concrete side, viz. with the application of the results obtained in the science of elasticity to practical questions of strength and safety (see STRENGTH OF MATERIALS).

2. *Stress.*—Every body that we know anything about is always under the action of forces. Every body upon which we can experiment is subject to the force of gravity, and must, for the purpose of experiment, be supported by other forces. Such forces are usually applied by way of pressure upon a portion of the surface of the body; and such pressure is exerted by another body in contact with the first. The supported body exerts an equal and opposite pressure upon the supporting body across the portion of surface which is common to the two. The same thing is true of two portions of the same body. If, for example, we consider the two portions into which a body is divided by a (geometrical) horizontal plane, we conclude that the lower portion supports the upper portion by pressure across the plane, and the upper portion presses downwards upon the lower portion with an equal pressure. The pressure is still exerted when the plane is not horizontal, and its direction may be obliquely inclined to, or tangential to, the plane. A more precise meaning is given to "pressure" below. It is important to distinguish between the two classes of forces: forces such as the force of gravity, which act all through a body, and forces such as pressure applied over a surface. The former are named "body forces" or "volume forces," and the latter "surface tractions." The action between two portions of a body separated by a geometrical surface is of the nature of surface traction. Body forces are ultimately, when the volumes upon which they act are small enough, proportional to the volumes; surface tractions, on the other hand, are ultimately, when the surfaces across which they act are small enough, proportional to these surfaces. Surface tractions are always exerted by one body upon another, or by one part of a body upon another part, across a surface of contact; and a surface traction is always to be regarded as one aspect of a "stress," that is to say of a pair of equal and opposite forces; for an equal traction is always exerted by the second body, or part, upon the first across the surface.

3. The proper method of estimating and specifying stress is a matter of importance, and its character is necessarily mathematical. The magnitudes of the surface tractions which compose a stress are estimated as so much force (in dynes or tons) per unit of area (per sq. cm. or per sq. in.). The traction across an assigned plane at an assigned point is measured by the mathematical limit of the fraction F/S, where F denotes the numerical measure of the force exerted across a small portion of the plane containing the point, and S denotes the numerical measure of the area of this portion, and the limit is taken by diminishing S indefinitely. The traction may act as "tension," as it does in the case of a horizontal section of a bar supported at its upper end and hanging vertically, or as "pressure," as it does in the case of a horizontal section of a block resting on a horizontal plane, or again it may act obliquely or even tangentially to the separating plane. Normal tractions are reckoned as positive when they are tensions, negative when they are pressures. Tangential tractions are often called "shears" (see § 7 below). Oblique tractions can always be resolved, by the vector law, into normal and tangential tractions. In a fluid at rest the traction across any plane at any point is normal to the plane, and acts as pressure. For the complete specification of the "state of stress" at any point of a body, we should require to know the normal and tangential components of the traction across every plane drawn through the point. Fortunately this requirement can be very much simplified (see §§ 6, 7 below).

4. In general let ν denote the direction of the normal drawn in a specified sense to a plane drawn through a point O of a body; and let T_ν denote the traction exerted across the plane, at the point O, by the portion of the body towards which ν is drawn upon the remaining portion. Then T_ν is a vector quantity, which has a definite magnitude (estimated as above by the limit of a fraction of the form F/S) and a definite direction. It can be specified completely by its components X_ν, Y_ν, Z_ν, referred to fixed rectangular axes of x, y, z. When the direction of ν is that of the axis of x, in the positive sense, the components are denoted by X_x, Y_x, Z_x; and a similar notation is used when the direction of ν is that of y or z, the suffix x being replaced by y or z.

5. Every body about which we know anything is always in a state of stress, that is to say there are always internal forces acting between the parts of the body, and these forces are exerted as surface tractions across geometrical surfaces drawn in the body. The body, and each part of the body, moves under the action of all the forces (body forces and surface tractions) which are exerted upon it; or remains at rest if these forces are in equilibrium. This result is expressed analytically by means of certain equations—the "equations of motion" or "equations of equilibrium" of the body.

Let ρ denote the density of the body at any point, X, Y, Z, the components parallel to the axes of x, y, z of the body forces, estimated as so much force per unit of mass; further let f_x, f_y, f_z denote the components, parallel to the same axes, of the acceleration of the particle which is momentarily at the point (x, y, z). The equations of motion express the result that the rates of change of the momentum, and of the moment of momentum, of any portion of the body are those due to the action of all the forces exerted upon the portion by other bodies, or by other portions of the same body. For the changes of momentum, we have three equations of the type

$$\iiint \rho X dx\, dy\, dz + \iint X_\nu dS = \iiint \rho f_x dx\, dy\, dz, \quad . \quad (1)$$

in which the volume integrations are taken through the volume of the portion of the body, the surface integration is taken over its surface, and the notation X_ν is that of § 4, the direction of ν being that of the normal to this surface drawn outwards. For the changes of moment of momentum, we have three equations of the type

$$\iiint \rho(yZ - zY) dx\, dy\, dz + \iint (yZ_\nu - zY_\nu) dS = \iiint \rho(yf_z - zf_y) dx\, dy\, dz. \quad (2)$$

The equations (1) and (2) are the equations of motion of any kind of body. The equations of equilibrium are obtained by replacing the right-hand members of these equations by zero.

6. These equations can be used to obtain relations between the values of X_ν, Y_ν, . . . for different directions ν. When the equations are applied to a very small volume, it appears that the terms expressed by surface integrals would, unless they tend to zero limits in a higher order than the areas of the surfaces, be very great compared with the terms expressed by volume integrals. We conclude that the surface tractions on the portion of the body which is bounded by any very small closed surface, are ultimately in equilibrium. When this result is interpreted for a small portion in the shape of a tetrahedron, having three of its faces at right angles to the co-ordinate axes, it leads to three equations of the type

$$X_\nu = X_x \cos(x,\nu) + X_y \cos(y,\nu) + X_z \cos(z,\nu), \quad . \quad (1)$$

where ν is the direction of the normal (drawn outwards) to the remaining face of the tetrahedron, and (x, ν) . . . denote the angles which this normal makes with the axes. Hence X_ν, . . . for any direction ν are expressed in terms of X_x, ... When the above result is interpreted for a very small portion in the shape of a cube, having its edges parallel to the co-ordinate axes, it leads to the equations

$$Y_z = Z_y, \quad Z_x = X_z, \quad X_y = Y_x. \quad . \quad . \quad (2)$$

When we substitute in the general equations the particular results which are thus obtained, we find that the equations of motion take such forms as

$$\rho X + \frac{\partial X_x}{\partial x} + \frac{\partial X_y}{\partial y} + \frac{\partial Z_x}{\partial z} = \rho f_x, \quad . \quad . \quad . \quad (3)$$

and the equations of moments are satisfied identically. The equations of equilibrium are obtained by replacing the right-hand members by zero.

7. A state of stress in which the traction across any plane of a set of parallel planes is normal to the plane, and that across any perpendicular plane vanishes, is described as a state of "simple tension" ("simple pressure" if the traction is negative). A state of stress in which the traction across any plane is normal to the plane, and the traction is the same for all planes passing through any point, is described as a state of "uniform tension" ("uniform pressure" if the traction is negative). Sometimes the phrases "isotropic tension" and "hydrostatic pressure" are used instead of "uniform" tension or pressure. The distinction between the two states, simple tension and uniform tension, is illustrated in fig. 1.

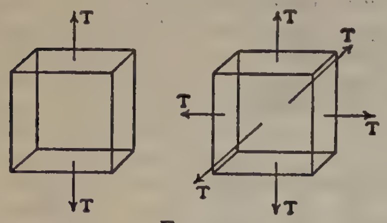

FIG. 1.

A state of stress in which there is purely tangential traction on a plane, and no normal traction on any perpendicular plane, is described as a state of "shearing stress." The result (2) of § 6 shows that tangential tractions occur in pairs. If, at any point, there is tangential traction, in any direction, on a plane parallel to this direction, and if we draw through the point a plane at right angles to the direction of this traction, and therefore containing the normal to the first plane, then there is equal tangential traction on this second plane in the direction of the normal to the first plane. The result is illustrated in fig. 2, where a rectangular block is subjected on two opposite faces to opposing tangential tractions, and is held in equilibrium by equal tangential tractions applied to two other faces.

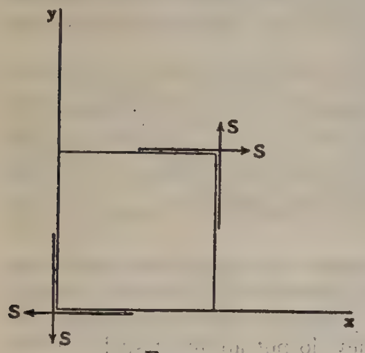

FIG. 2.

Through any point there always pass three planes, at right angles to each other, across which there is no tangential traction. These planes are called the "principal planes of stress," and the (normal) tractions across them the "principal stresses." Lines, usually curved, which have at every point the direction of a principal stress at the point, are called "lines of stress."

8. It appears that the stress at any point of a body is completely specified by six quantities, which can be taken to be the X_x, Y_y, Z_z and Y_z, Z_x, X_y of § 6. The first three are tensions (pressures if they are negative) across three planes parallel to fixed rectangular directions, and the remaining three are tangential tractions across the same three planes. These six quantities are called the "components of stress." It appears also that the components of stress are connected with each other, and with the body forces and accelerations, by the three partial differential equations of the type (3) of § 6. These equations are available for the purpose of determining the state of stress which exists in a body of definite form subjected to definite forces, but they are not sufficient for the purpose (see § 38 below). In order to effect the determination it is necessary to have information concerning the constitution of the body, and to introduce subsidiary relations founded upon this information.

9. The definite mathematical relations which have been found to connect the components of stress with each other, and with other quantities, result necessarily from the formation of a clear conception of the nature of stress. They do not admit of experimental verification, because the stress within a body does not admit of direct measurement. Results which are deduced by the aid of these relations can be compared with experimental results. If any discrepancy were observed it would not be interpreted as requiring a modification of the concept of stress, but as affecting some one or other of the subsidiary relations which must be introduced for the purpose of obtaining the theoretical result.

10. *Strain.*—For the specification of the changes of size and shape which are produced in a body by any forces, we begin by defining the "average extension" of any linear element or "filament" of the body. Let l_0 be the length of the filament before the forces are applied, l its length when the body is subjected to the forces. The average extension of the filament is measured by the fraction $(l-l_0)/l_0$. If this fraction is negative there is "contraction." The "extension at a point" of a body in any assigned direction is the mathematical limit of this fraction when one end of the filament is at the point, the filament has the assigned direction, and its length is diminished indefinitely. It is clear that all the changes of size and shape of the body are known when the extension at every point in every direction is known.

The relations between the extensions in different directions around the same point are most simply expressed by introducing the extensions in the directions of the co-ordinate axes and the angles between filaments of the body which are initially parallel to these axes. Let e_{xx}, e_{yy}, e_{zz} denote the extensions parallel to the axes of x, y, z, and let e_{yz}, e_{zx}, e_{xy} denote the cosines of the angles between the pairs of filaments which are initially parallel to the axes of y and z, z and x, x and y. Also let e denote the extension in the direction of a line the direction cosines of which are l, m, n. Then, if the changes of size and shape are slight, we have the relation

$$e=e_{xx}l^2+e_{yy}m^2+e_{zz}n^2+e_{yz}mn+e_{zx}nl+e_{xy}lm.$$

The body which undergoes the change of size or shape is said to be "strained," and the "strain" is determined when the quantities e_{xx}, e_{yy}, e_{zz} and e_{yz}, e_{zx}, e_{xy} defined above are known at every point of it. These quantities are called "components of strain." The three of the type e_{xx} are extensions, and the three of the type e_{yz} are called "shearing strains" (see § 12 below).

11. All the changes of relative position of particles of the body are known when the strain is known, and conversely the strain can be determined when the changes of relative position are given. These changes can be expressed most simply by the introduction of a vector quantity to represent the *displacement* of any particle.

When the body is deformed by the action of any forces its particles pass from the positions which they occupied before the action of the forces into new positions. If x, y, z are the co-ordinates of the position of a particle in the first state, its co-ordinates in the second state may be denoted by $x+u$, $y+v$, $z+w$. The quantities, u, v, w are the "components of displacement." When these quantities are small, the strain is connected with them by the equations

$$\left.\begin{array}{lll} e_{xx}=\partial u/\partial x, & e_{yy}=\partial v/\partial y, & e_{zz}=\partial w/\partial z, \\ e_{yz}=\dfrac{\partial w}{\partial y}+\dfrac{\partial v}{\partial z}, & e_{zx}=\dfrac{\partial u}{\partial z}+\dfrac{\partial w}{\partial x}, & e_{xy}=\dfrac{\partial v}{\partial x}+\dfrac{\partial u}{\partial y}. \end{array}\right\} \quad . \quad (1)$$

12. These equations enable us to determine more exactly the nature of the "shearing strains" such as e_{xy}. Let u, for example, be of the form sy, where s is constant, and let v and w vanish. Then $e_{xy}=s$, and the remaining components of strain vanish. The nature of the strain (called "simple shear") is simply appreciated by imagining the body to consist of a series of thin sheets, like the leaves of a book, which lie one over another and are all parallel to a plane (that of x, z); and the displacement is seen to consist in the shifting of each sheet relative to the sheet below in a direction (that of x) which is the same for all the sheets. The displacement of any sheet is proportional to its distance y from a particular sheet, which remains undisplaced. The shearing strain has the effect of distorting the shape of any portion of the body without altering its volume. This is shown in fig. 3, where a square ABCD is distorted by simple shear (each point moving parallel to the line marked xx) into a rhombus A′B′C′D′, as if by an extension of the diagonal BD and a contraction of the diagonal AC, which extension and contraction are adjusted so as to leave the area unaltered. In the general case, where u is not of the form sy and v and w do not vanish, the shearing strains such as e_{xy} result from the composition of pairs of simple shears of the type which has just been explained.

13. Besides enabling us to express the extension in any direction and the changes of relative direction of any filaments of the body, the components of strain also express the changes of size of volumes and areas. In particular, the "cubical dilatation," that is to say, the increase of volume per unit of volume, is expressed by the quantity $e_{xx}+e_{yy}+e_{zz}$ or $\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}$. When this quantity is negative there is "compression."

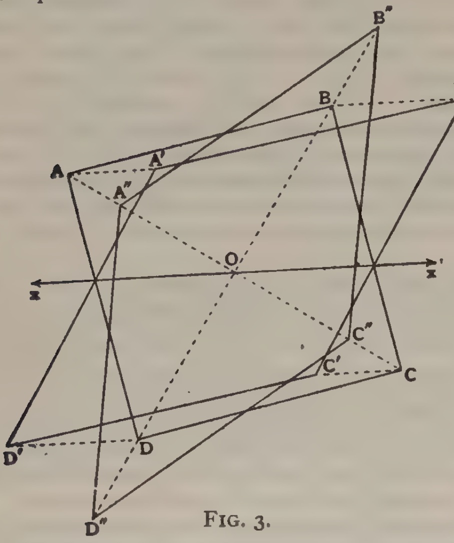

FIG. 3.

14. It is important to distinguish between two types of strain: the "rotational" type and the "irrotational" type. The distinction is illustrated in fig. 3, where the figure A″B″C″D″ is obtained from the figure ABCD by contraction parallel to AC and extension parallel to BD, and the figure A′B′C′D′ can be obtained from ABCD by the same contraction and extension followed by a rotation through the angle A″OA′. In strains of the irrotational type there are at any point three filaments at right angles to each other, which are such that the particles which lie in them before strain continue to lie in them after strain. A small spherical element of the body with its centre at the point becomes a small ellipsoid with its axes in the directions of these three filaments. In the case illustrated in the figure, the lines of the filaments in question, when the figure ABCD is strained into the figure A″B″C″D″, are OA, OB and a line through O at right angles to their plane. In strains of the rotational type, on the other hand, the single existing set of three filaments (issuing from a point) which cut each other at right angles both before and after strain do not retain their directions after strain, though one of them may do so in certain cases. In the figure, the lines of the filaments in question, when the figure ABCD is strained into A′B′C′D′, are OA, OB and a line at right angles to their plane before strain, and after strain they are OA′, OB′, and the same third line. A rotational strain can always be analysed into an irrotational strain (or "pure" strain) followed by a rotation.

Analytically, a strain is irrotational if the three quantities

$$\frac{\partial w}{\partial y}-\frac{\partial v}{\partial z},\quad \frac{\partial u}{\partial z}-\frac{\partial w}{\partial x},\quad \frac{\partial v}{\partial x}-\frac{\partial u}{\partial y}$$

vanish, rotational if any one of them is different from zero. The halves of these three quantities are the components of a vector quantity called the "rotation."

15. Whether the strain is rotational or not, there is always one set of three linear elements issuing from any point which cut each other at right angles both before and after strain. If these directions are chosen as axes of x, y, z, the shearing strains e_{yz}, e_{zx}, e_{xy} vanish at this point. These directions are called the "principal axes of strain," and the extensions in the directions of these axes the "principal extensions."

16. It is very important to observe that the relations between components of strain and components of displacement imply relations between the components of strain themselves. If by any process of reasoning we arrive at the conclusion that the state of strain in a body is such and such a state, we have a test of the possibility or impossibility of our conclusion. The test is that, if the state of strain is a possible one, then there must be a displacement which can be associated with it in accordance with the equations (1) of § 11.

We may eliminate u, v, w from these equations. When this is done we find that the quantities e_{xx}, . . . e_{yz} are connected by the two sets of equations

$$\left.\begin{aligned}\frac{\partial^2 e_{yy}}{\partial z^2}+\frac{\partial^2 e_{zz}}{\partial y^2}&=\frac{\partial^2 e_{yz}}{\partial y\partial z}\\ \frac{\partial^2 e_{zz}}{\partial x^2}+\frac{\partial^2 e_{xx}}{\partial z^2}&=\frac{\partial^2 e_{zx}}{\partial_z\partial x}\\ \frac{\partial^2 e_{xx}}{\partial y^2}+\frac{\partial^2 e_{yy}}{\partial x^2}&=\frac{\partial^2 e_{xy}}{\partial x\partial y}\end{aligned}\right\}\quad . \quad . \quad (1)$$

and

$$\left.\begin{aligned}2\frac{\partial^2 e_{xx}}{\partial y\partial z}&=\frac{\partial}{\partial x}\left(-\frac{\partial e_{yz}}{\partial x}+\frac{\partial e_{zx}}{\partial y}+\frac{\partial e_{xy}}{\partial z}\right)\\ 2\frac{\partial^2 e_{yy}}{\partial z\partial x}&=\frac{\partial}{\partial y}\left(\frac{\partial e_{yz}}{\partial x}-\frac{\partial e_{zx}}{\partial y}+\frac{\partial e_{xy}}{\partial z}\right)\\ 2\frac{\partial^2 e_{zz}}{\partial x\partial y}&=\frac{\partial}{\partial z}\left(\frac{\partial e_{yz}}{\partial x}+\frac{\partial e_{zx}}{\partial y}-\frac{\partial e_{xy}}{\partial z}\right)\end{aligned}\right\}\quad . \quad . \quad (2)$$

These equations are known as the *conditions of compatibility of strain-components.* The components of strain which specify any possible strain satisfy them. Quantities arrived at in any way, and intended to be components of strain, if they fail to satisfy these equations, are not the components of any possible strain; and the theory or speculation by which they are reached must be modified or abandoned.

When the components of strain have been found in accordance with these and other necessary equations, the displacement is to be found by solving the equations (1) of § 11, considered as differential equations to determine u, v, w. The most general possible solution will differ from any other solution by terms which contain arbitrary constants, and these terms represent a possible displacement. This "complementary displacement" involves no strain, and would be a possible displacement of an ideal perfectly rigid body.

17. The relations which connect the strains with each other and with the displacement are geometrical relations resulting from the definitions of the quantities and not requiring any experimental verification. They do not admit of such verification, because the strain within a body cannot be measured. The quantities (belonging to the same category) which can be measured are displacements of points on the surface of a body. For example, on the surface of a bar subjected to tension we may make two fine transverse scratches, and measure the distance between them before and after the bar is stretched. For such measurements very refined instruments are required. Instruments for this purpose are called barbarously "extensometers," and many different kinds have been devised. From measurements of displacement by an extensometer we may deduce the average extension of a filament of the bar terminated by the two scratches. In general, when we attempt to measure a strain, we really measure some displacements, and deduce the values, not of the strain at a point, but of the average extensions of some particular linear filaments of a body containing the point; and these filaments are, from the nature of the case, nearly always superficial filaments.

18. In the case of transparent materials such as glass there is available a method of studying experimentally the state of strain within a body. This method is founded upon the result that a piece of glass when strained becomes doubly refracting, with its optical principal axes at any point in the directions of the principal axes of strain (§ 15) at the point. When the piece has two parallel plane faces, and two of the principal axes of strain at any point are parallel to these faces, polarized light transmitted through the piece in a direction normal to the faces can be used to determine the directions of the principal axes of the strain at any point. If the directions of these axes are known theoretically the comparison of the experimental and theoretical results yields a test of the theory.

19. *Relations between Stresses and Strains.*—The problem of the extension of a bar subjected to tension is the one which has been most studied experimentally, and as a result of this study it is found that for most materials, including all metals except cast metals, the measurable extension is proportional

to the applied tension, provided that this tension is not too great. In interpreting this result it is assumed that the tension is uniform over the cross-section of the bar, and that the extension of longitudinal filaments is uniform throughout the bar; and then the result takes the form of a law of proportionality connecting stress and strain: The tension is proportional to the extension. Similar results are found for the same materials when other methods of experimenting are adopted, for example, when a bar is supported at the ends and bent by an attached load and the deflexion is measured, or when a bar is twisted by an axial couple and the relative angular displacement of two sections is measured. We have thus very numerous experimental verifications of the famous law first enunciated by Robert Hooke in 1678 in the words "*Ut Tensio sic vis*"; that is, "the Power of any spring is in the same proportion as the Tension (– stretching) thereof." The most general statement of Hooke's Law in modern language would be:—*Each of the six components of stress at any point of a body is a linear function of the six components of strain at the point.* It is evident from what has been said above as to the nature of the measurement of stresses and strains that this law in all its generality does not admit of complete experimental verification, and that the evidence for it consists largely in the agreement of the results which are deduced from it in a theoretical fashion with the results of experiments. Of such results one of a general character may be noted here. If the law is assumed to be true, and the equations of motion of the body (§ 5) are transformed by means of it into differential equations for determining the components of displacement, these differential equations admit of solutions which represent periodic vibratory displacements (see § 85 below). The fact that solid bodies can be thrown into states of isochronous vibration has been emphasized by G. G. Stokes as a peremptory proof of the truth of Hooke's Law.

20. According to the statement of the generalized Hooke's Law the stress-components vanish when the strain-components vanish. The strain-components contemplated in experiments upon which the law is founded are measured from a zero of reckoning which corresponds to the state of the body subjected to experiment before the experiment is made, and the stress-components referred to in the statement of the law are those which are called into action by the forces applied to the body in the course of the experiment. No account is taken of the stress which must already exist in the body owing to the force of gravity and the forces by which the body is supported. When it is desired to take account of this stress it is usual to suppose that the strains which would be produced in the body if it could be freed from the action of gravity and from the pressures of supports are so small that the strains produced by the forces which are applied in the course of the experiment can be compounded with them by simple superposition. This supposition comes to the same thing as measuring the strain in the body, not from the state in which it was before the experiment, but from an ideal state (the "unstressed" state) in which it would be entirely free from internal stress, and allowing for the strain which would be produced by gravity and the supporting forces if these forces were applied to the body when free from stress. In most practical cases the initial strain to be allowed for is unimportant (see §§ 91-93 below).

21. Hooke's law of proportionality of stress and strain leads to the introduction of important physical constants: the *moduluses of elasticity* of a body. Let a bar of uniform section (of area ω) be stretched with tension T, which is distributed uniformly over the section, so that the stretching force is $T\omega$, and let the bar be unsupported at the sides. The bar will undergo a longitudinal extension of magnitude T/E, where E is a constant quantity depending upon the material. This constant is called *Young's modulus* after Thomas Young, who introduced it into the science in 1807. The quantity E is of the same nature as a traction, that is to say, it is measured as a force estimated per unit of area. For steel it is about $2{\cdot}04\times 10^{12}$ dynes per square centimetre, or about 13,000 tons per sq. in.

22. The longitudinal extension of the bar under tension is not the only strain in the bar. It is accompanied by a lateral contraction by which all the transverse filaments of the bar are shortened. The amount of this contraction is $\sigma T/E$, where σ is a certain number called *Poisson's ratio*, because its importance was at first noted by S. D. Poisson in 1828. Poisson arrived at the existence of this contraction, and the corresponding number σ, from theoretical considerations, and his theory led him to assign to σ the value $\frac{1}{4}$. Many experiments have been made with the view of determining σ, with the result that it has been found to be different for different materials, although for very many it does not differ much from $\frac{1}{4}$. For steel the best value (Amagat's) is 0·268. Poisson's theory admits of being modified so as to agree with the results of experiment.

23. The behaviour of an elastic solid body, strained within the limits of its elasticity, is entirely determined by the constants E and σ if the body is *isotropic*, that is to say, if it has the same quality in all directions around any point. Nevertheless it is convenient to introduce other constants which are related to the action of particular sorts of forces. The most important of these are the "modulus of compression" (or "bulk modulus") and the "rigidity" (or "modulus of shear"). To define the *modulus of compression*, we suppose that a solid body of any form is subjected to uniform hydrostatic pressure of amount p. The state of stress within it will be one of uniform pressure, the same at all points, and the same in all directions round any point. There will be compression, the same at all points, and proportional to the pressure; and the amount of the compression can be expressed as p/k. The quantity k is the modulus of compression. In this case the linear contraction in any direction is $p/3k$; but in general the linear extension (or contraction) is not one-third of the cubical dilatation (or compression).

24. To define the *rigidity*, we suppose that a solid body is subjected to forces in such a way that there is shearing stress within it. For example, a cubical block may be subjected to opposing tractions on opposite faces acting in directions which are parallel to an edge of the cube and to both the faces. Let S be the amount of the traction, and let it be uniformly distributed over the faces. As we have seen (§ 7), equal tractions must act upon two other faces in suitable directions in order to maintain equilibrium (see fig. 2 of § 7). The two directions involved may be chosen as axes of x, y as in that figure. Then the state of stress will be one in which the stress-component denoted by X_y is equal to S, and the remaining stress-components vanish; and the strain produced in the body is shearing strain of the type denoted by e_{xy}. The amount of the shearing strain is S/μ, and the quantity μ is the "rigidity."

25. The modulus of compression and the rigidity are quantities of the same kind as Young's modulus. The modulus of compression of steel is about $1{\cdot}43\times 10^{12}$ dynes per square centimetre, the rigidity is about $8{\cdot}19\times 10^{11}$ dynes per square centimetre. It must be understood that the values for different specimens of nominally the same material may differ considerably.

The modulus of compression k and the rigidity μ of an isotropic material are connected with the Young's modulus E and Poisson's ratio σ of the material by the equations

$$k = E/3(1-2\sigma), \quad \mu = E/2(1+\sigma).$$

26. Whatever the forces acting upon an isotropic solid body may be, provided that the body is strained within its limits of elasticity, the strain-components are expressed in terms of the stress-components by the equations

$$\left.\begin{aligned} e_{xx} &= (X_x - \sigma Y_y - \sigma Z_z)/E, & e_{yz} &= Y_z/\mu, \\ e_{yy} &= (Y_y - \sigma Z_z - \sigma X_x)/E, & e_{zx} &= Z_x/\mu, \\ e_{zz} &= (Z_z - \sigma X_x - \sigma Y_y)/E, & e_{xy} &= X_y/\mu. \end{aligned}\right\} \quad . \quad . \quad (1)$$

If we introduce a quantity λ, of the same nature as E or μ, by the equation

$$\lambda = E\sigma/(1+\sigma)(1-2\sigma), \quad . \quad . \quad . \quad . \quad (2)$$

we may express the stress-components in terms of the strain-components by the equations

$$\left.\begin{aligned} X_x &= \lambda(e_{xx}+e_{yy}+e_{zz}) + 2\mu e_{xx}, & Y_z &= \mu e_{yz}, \\ Y_y &= \lambda(e_{xx}+e_{yy}+e_{zz}) + 2\mu e_{yy}, & Z_x &= \mu e_{zx}, \\ Z_z &= \lambda(e_{xx}+e_{yy}+e_{zz}) + 2\mu e_{zz}, & X_y &= \mu e_{xy}; \end{aligned}\right\} \quad . \quad (3)$$

and then the behaviour of the body under the action of any forces depends upon the two constants λ and μ. These two constants were introduced by G. Lamé in his treatise of 1852. The importance of the quantity μ had been previously emphasized by L. J. Vicat and G. G. Stokes.

27. The potential energy per unit of volume (often called the "resilience") stored up in the body by the strain is equal to

$$\tfrac{1}{2}(\lambda+2\mu)(e_{xx}+e_{yy}+e_{zz})^2+\tfrac{1}{2}\mu(e_{yz}^2+e_{zx}^2+e_{xy}^2-4e_{yy}e_{zz}-4e_{zz}e_{xx}-4e_{xx}e_{yy}),$$

or the equivalent expression

$$\tfrac{1}{2}[(X_x^2+Y_y^2+Z_z^2)-2\sigma(Y_yZ_z+Z_zX_x+X_xY_y)+2(1+\sigma)(Y_z^2+Z_x^2+X_x^2)]/E.$$

The former of these expressions is called the "strain-energy-function"

28. The Young's modulus E of a material is often determined experimentally by the direct method of the extensometer (§ 17), but more frequently it is determined indirectly by means of a result obtained in the theory of the flexure of a bar (see §§ 47, 53 below). The rigidity μ is usually determined indirectly by means of results obtained in the theory of the torsion of a bar (see §§ 41, 42 below). The modulus of compression k may be determined directly by means of the piezometer, as was done by E. H. Amagat, or it may be determined indirectly by means of a result obtained in the theory of a tube under pressure, as was done by A. Mallock (see § 78 below). The value of Poisson's ratio σ is generally inferred from the relation connecting it with E and μ or with E and k, but it may also be determined indirectly by means of a result obtained in the theory of the flexure of a bar (§ 47 below), as was done by M. A. Cornu and A. Mallock, or directly by a modification of the extensometer method, as has been done recently by J. Morrow.

29. The *elasticity of a fluid* is always expressed by means of a single quantity of the same kind as the *modulus of compression* of a solid body. To any increment of pressure, which is not too great, there corresponds a proportional cubical compression, and the amount of this compression for an increment δp of pressure can be expressed as $\delta p/k$. The quantity that is usually tabulated is the reciprocal of k, and it is called the *coefficient of compressibility*. It is the amount of compression per unit increase of pressure. As a physical quantity it is of the same dimensions as the reciprocal of a pressure (or of a force per unit of area). The pressures concerned are usually measured in atmospheres (1 atmosphere = $1{\cdot}014 \times 10^6$ dynes per sq. cm.). For water the coefficient of compressibility, or the compression per atmosphere, is about $4{\cdot}5 \times 10^{-5}$. This gives for k the value $2{\cdot}22 \times 10^{10}$ dynes per sq. cm. The Young's modulus and the rigidity of a fluid are always zero.

30. The relations between stress and strain in a material which is not isotropic are much more complicated. In such a material the Young's modulus depends upon the direction of the tension, and its variations about a point are expressed by means of a surface of the fourth degree. The Poisson's ratio depends upon the direction of the contracted lateral filaments as well as upon that of the longitudinal extended ones. The rigidity depends upon both the directions involved in the specification of the shearing stress. In general there is no simple relation between the Young's moduluses and Poisson's ratios and rigidities for assigned directions and the modulus of compression. Many materials in common use, all fibrous woods for example, are actually *aeolotropic* (that is to say, are not isotropic), but the materials which are aeolotropic in the most regular fashion are natural crystals. The elastic behaviour of crystals has been studied exhaustively by many physicists, and in particular by W. Voigt. The strain-energy-function is a homogeneous quadratic function of the six strain-components, and this function may have as many as 21 independent coefficients, taking the place in the general case of the 2 coefficients λ, μ which occur when the material is isotropic—a result first obtained by George Green in 1837. The best experimental determinations of the coefficients have been made indirectly by Voigt by means of results obtained in the theories of the torsion and flexure of aeolotropic bars.

31. *Limits of Elasticity.*—A solid body which has been strained by considerable forces does not in general recover its original size and shape completely after the forces cease to act. The strain that is left is called *set*. If set occurs the elasticity is said to be "imperfect," and the greatest strain (or the greatest load) of any specified type, for which no set occurs, defines the "limit of perfect elasticity" corresponding to the specified type of strain, or of stress. All fluids and many solid bodies, such as glasses and crystals, as well as some metals (copper, lead, silver) appear to be perfectly elastic as regards change of volume within wide limits; but malleable metals and alloys can have their densities permanently increased by considerable pressures. The limits of perfect elasticity as regards change of shape, on the other hand, are very low, if they exist at all, for glasses and other hard, brittle solids; but a class of metals including copper, brass, steel, platinum are very perfectly elastic as regards distortion, provided that the distortion is not too great. The question can be tested by observation of the torsional elasticity of thin fibres or wires. The limits of perfect elasticity are somewhat ill-defined, because an experiment cannot warrant us in asserting that there is no set, but only that, if there is any set, it is too small to be observed.

32. A different meaning may be, and often is, attached to the phrase "limits of elasticity" in consequence of the following experimental result:—Let a bar be held stretched under a moderate tension, and let the extension be measured; let the tension be slightly increased and the extension again measured; let this process be continued, the tension being increased by equal increments. It is found that when the tension is not too great the extension increases by equal increments (as nearly as experiment can decide), but that, as the tension increases, a stage is reached in which the extension increases faster than it would do if it continued to be proportional to the tension. The beginning of this stage is tolerably well marked. Some time before this stage is reached the limit of perfect elasticity is passed; that is to say, if the load is removed it is found that there is some permanent set. The limiting tension beyond which the above law of proportionality fails is often called the "limit of *linear* elasticity." It is higher than the limit of perfect elasticity. For steel bars of various qualities J. Bauschinger found for this limit values varying from 10 to 17 tons per square inch. The result indicates that, when forces which produce any kind of strain are applied to a solid body and are gradually increased, the strain at any instant increases proportionally to the forces up to a stage beyond that at which, if the forces were removed, the body would completely recover its original size and shape, but that the increase of strain ceases to be proportional to the increase of load when the load surpasses a certain limit. There would thus be, for any type of strain, a *limit of linear elasticity*, which exceeds the limit of perfect elasticity.

33. A body which has been strained beyond the limit of linear elasticity is often said to have suffered an "over-strain." When the load is removed, the *set* which can be observed is not entirely permanent; but it gradually diminishes with lapse of time. This phenomenon is named "elastic after-working." If, on the other hand, the load is maintained constant, the strain is gradually increased. This effect indicates a gradual flowing of solid bodies under great stress; and a similar effect was observed in the experiments of H. Tresca on the punching and crushing of metals. It appears that all solid bodies under sufficiently great loads become "plastic," that is to say, they take a set which gradually increases with the lapse of time. No plasticity is observed when the limit of linear elasticity is not exceeded.

34. The values of the elastic limits are affected by overstrain. If the load is maintained for some time, and then removed, the limit of linear elasticity is found to be higher than before. If the load is not maintained, but is removed and then reapplied, the limit is found to be lower than before. During a period of rest a test piece recovers its elasticity after overstrain.

35. The effects of repeated loading have been studied by A. Wöhler, J. Bauschinger, O. Reynolds and others. It has been found that, after many repetitions of rather rapidly alternating stress, pieces are fractured by loads which they have many times withstood. It is not certain whether the fracture

is in every case caused by the gradual growth of minute flaws from the beginning of the series of tests, or whether the elastic quality of the material suffers deterioration apart from such flaws. It appears, however, to be an ascertained result that, so long as the limit of linear elasticity is not exceeded, repeated loads and rapidly alternating loads do not produce failure of the material.

36. The question of the conditions of safety, or of the conditions in which rupture is produced, is one upon which there has been much speculation, but no completely satisfactory result has been obtained. It has been variously held that rupture occurs when the numerically greatest principal stress exceeds a certain limit, or when this stress is tension and exceeds a certain limit, or when the greatest difference of two principal stresses (called the "stress-difference") exceeds a certain limit, or when the greatest extension or the greatest shearing strain or the greatest strain of any type exceeds a certain limit. Some of these hypotheses appear to have been disproved. It was held by G. F. Fitzgerald (*Nature*, Nov. 5, 1896) that rupture is not produced by pressure symmetrically applied all round a body, and this opinion has been confirmed by the recent experiments of A. Föppl. This result disposes of the greatest stress hypothesis and also of the greatest strain hypothesis. The fact that short pillars can be crushed by longitudinal pressure disposes of the greatest tension hypothesis, for there is no tension in the pillar. The greatest extension hypothesis failed to satisfy some tests imposed by H. Wehage, who experimented with blocks of wrought iron subjected to equal pressures in two directions at right angles to each other. The greatest stress-difference hypothesis and the greatest shearing strain hypothesis would lead to practically identical results, and these results have been held by J. J. Guest to accord well with his experiments on metal tubes subjected to various systems of combined stress; but these experiments and Guest's conclusion have been criticized adversely by O. Mohr, and the question cannot be regarded as settled. The fact seems to be that the conditions of rupture depend largely upon the nature of the test (tensional, torsional, flexural, or whatever it may be) that is applied to a specimen, and that no general formula holds for all kinds of tests. The best modern technical writings emphasize the importance of the limits of linear elasticity and of tests of dynamical resistance (§ 87 below) as well as of statical resistance.

37. The question of the conditions of rupture belongs rather to the science of the strength of materials than to the science of elasticity (§ 1); but it has been necessary to refer to it briefly here, because there is no method except the methods of the theory of elasticity for determining the state of stress or strain in a body subjected to forces. Whatever view may ultimately be adopted as to the relation between the conditions of safety of a structure and the state of stress or strain in it, the calculation of this state by means of the theory or by experimental means (as in § 18) cannot be dispensed with.

38. *Methods of determining the Stress in a Body subjected to given Forces.*—To determine the state of stress, or the state of strain, in an isotropic solid body strained within its limits of elasticity by given forces, we have to use (i.) the equations of equilibrium, (ii.) the conditions which hold at the bounding surface, (iii.) the relations between stress-components and strain-components, (iv.) the relations between strain-components and displacement. The equations of equilibrium are (with notation already used) three partial differential equations of the type

$$\frac{\partial X_x}{\partial x}+\frac{\partial X_y}{\partial y}+\frac{\partial Z_x}{\partial z}+\rho X=0. \quad . \quad . \quad (1)$$

The conditions which hold at the bounding surface are three equations of the type

$$X_x \cos(x,\nu)+X_y \cos(y,\nu)+Z_x \cos(z,\nu)=\overline{X}_\nu, \quad (2)$$

where ν denotes the direction of the outward-drawn normal to the bounding surface, and $\overline{X}_\nu$ denotes the x-component of the applied surface traction. The relations between stress-components and strain-components are expressed by either of the sets of equations (1) or (3) of § 26. The relations between strain-components and displacement are the equations (1) of § 11, or the equivalent conditions of compatibility expressed in equations (1) and (2) of § 16.

39. We may proceed by either of two methods. In one method we eliminate the stress-components and the strain-components and retain only the components of displacement. This method leads (with notation already used) to three partial differential equations of the type

$$(\lambda+\mu)\frac{\partial}{\partial x}\left(\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}\right)+\mu\left(\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2}\right)+\rho X=0, \quad (3)$$

and three boundary conditions of the type

$$\lambda\cos(x,\nu)\left(\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}\right)+\mu\left\{2\cos(x,\nu)\frac{\partial u}{\partial x}+\cos(y,\nu)\left(\frac{\partial v}{\partial x}+\frac{\partial u}{\partial y}\right)\right.$$
$$\left.+\cos(z,\nu)\left(\frac{\partial u}{\partial z}+\frac{\partial w}{\partial x}\right)\right\}=\overline{X}_\nu. \quad (4)$$

In the alternative method we eliminate the strain-components and the displacements. This method leads to a system of partial differential equations to be satisfied by the stress-components. In this system there are three equations of the type

$$\frac{\partial X_x}{\partial x}+\frac{\partial X_y}{\partial y}+\frac{\partial Z_x}{\partial z}+\rho X=0, \quad . \quad . \quad (1\ bis)$$

three of the type

$$\frac{\partial^2 X_x}{\partial x^2}+\frac{\partial^2 X_x}{\partial y^2}+\frac{\partial^2 X_x}{\partial z^2}+\frac{1}{1+\sigma}\frac{\partial^2}{\partial x^2}(X_x+Y_y+Z_z)=$$
$$-\frac{\sigma}{1-\sigma}\rho\left(\frac{\partial X}{\partial x}+\frac{\partial Y}{\partial y}+\frac{\partial Z}{\partial z}\right)-2\rho\frac{\partial X}{\partial x}, \quad (5)$$

and three of the type

$$\frac{\partial^2 Y_z}{\partial x^2}+\frac{\partial^2 Y_z}{\partial y^2}+\frac{\partial^2 Y_z}{\partial z^2}+\frac{1}{1+\sigma}\frac{\partial^2}{\partial y\partial z}(X_x+Y_y+Z_z)=-\rho\left(\frac{\partial Z}{\partial y}+\frac{\partial Y}{\partial z}\right), \quad (6)$$

the equations of the two latter types being necessitated by the conditions of compatibility of strain-components. The solutions of these equations have to be adjusted so that the boundary conditions of the type (2) may be satisfied.

40. It is evident that whichever method is adopted the mathematical problem is in general very complicated. It is also evident that, if we attempt to proceed by help of some intuition as to the nature of the stress or strain, our intuition ought to satisfy the tests provided by the above systems of equations. Neglect of this precaution has led to many errors. Another source of frequent error lies in the neglect of the conditions in which the above systems of equations are correct. They are obtained by help of the supposition that the relative displacements of the parts of the strained body are small. The solutions of them must therefore satisfy the test of smallness of the relative displacements.

41. *Torsion.*—As a first example of the application of the theory we take the problem of the torsion of prisms. This problem, considered first by C. A. Coulomb in 1784, was finally solved by B. de Saint-Venant in 1855. The problem is this:—A cylindrical or prismatic bar is held twisted by terminal couples; it is required to determine the state of stress and strain in the interior. When the bar is a circular cylinder the problem is easy. Any section is displaced by rotation about the central-line through a small angle, which is proportional to the distance z of the section from a fixed plane at right angles to this line. This plane is a terminal section if one of the two terminal sections is not displaced. The angle through which the section z rotates is τz, where τ is a constant, called the amount of the *twist*; and this constant τ is equal to $G/\mu I$, where G is the twisting couple, and I is the moment of inertia of the cross-section about the central-line. This result is often called "Coulomb's law." The stress within the bar is shearing stress, consisting, as it must, of two sets of equal tangential tractions on two sets of planes which are at right angles to each other. These planes are the cross-sections and the axial planes of the bar. The tangential traction at any point of the cross-section is directed at right angles to the axial plane through the point, and the tangential traction on the axial plane is directed parallel to the length of the bar. The amount of either at a distance r from the axis is $\mu\tau r$ or Gr/I. The result that $G = \mu\tau I$ can be used to determine μ experimentally, for τ may be measured and G and I are known.

42. When the cross-section of the bar is not circular it is clear that this solution fails; for the existence of tangential traction, near the prismatic bounding surface, on any plane which does not cut this surface at right angles, implies the existence of traction applied to this surface. We may attempt to modify the theory by retaining the supposition that the stress consists of shearing stress, involving tangential traction distributed in some way over the cross-sections. Such traction is obviously a necessary constituent of any stress-system which could be produced by terminal couples around the axis.

We should then know that there must be equal tangential traction directed along the length of the bar, and exerted across some planes or other which are parallel to this direction. We should also know that, at the bounding surface, these planes must cut this surface at right angles. The corresponding strain would be shearing strain which could involve (i.) a sliding of elements of one cross-section relative to another, (ii.) a relative sliding of elements of the above mentioned planes in the direction of the length of the bar. We could conclude that there may be a longitudinal displacement of the elements of the cross-sections. We should then attempt to satisfy the conditions of the problem by supposing that this is the character of the strain, and that the corresponding displacement consists of (i.) a rotation of the cross-sections in their planes such as we found in the case of the circle, (ii.) a distortion of the cross-sections into curved surfaces by a displacement (w) which is directed normally to their planes and varies in some manner from point to point of these planes. We could show that all the conditions of the problem are satisfied by this assumption, provided that the longitudinal displacement (w), considered as a function of the position of a point (x,y) in the cross-section, satisfies the equation

$$\frac{\partial^2 w}{\partial x^2}+\frac{\partial^2 w}{\partial y^2}=0, \quad . \quad . \quad . \quad . \qquad (1)$$

and the boundary condition

$$\left(\frac{\partial w}{\partial x}-\tau y\right)\cos(x,\nu)+\left(\frac{\partial w}{\partial y}+\tau x\right)\cos(y,\nu)=0, \quad . \qquad (2)$$

where τ denotes the amount of the twist, and ν the direction of the normal to the boundary. The solution is known for a great many forms of section. (In the particular case of a circular section w vanishes.) The tangential traction at any point of the cross-section is directed along the tangent to that curve of the family ψ=const. which passes through the point, ψ being the function determined by the equations

$$\frac{\partial w}{\partial x}=\tau\left(\frac{\partial \psi}{\partial y}+y\right), \quad \frac{\partial w}{\partial y}=-\tau\left(\frac{\partial \psi}{\partial x}+x\right).$$

The amount of the twist τ produced by terminal couples of magnitude G is G/C, where C is a constant, called the "torsional rigidity" of the prism, and expressed by the formula

$$C=\mu\iint\left\{\left(\frac{\partial \psi}{\partial x}\right)^2+\left(\frac{\partial \psi}{\partial y}\right)^2\right\}dxdy,$$

the integration being taken over the cross-section. When the coefficient of μ in the expression for C is known for any section, μ can be determined by experiment with a bar of that form of section.

43. The distortion of the cross-sections into curved surfaces is shown graphically by drawing the contour lines (w =const.). In general the section is divided into a number of compartments, and the portions that lie within two adjacent compartments are respectively concave and convex. This result is illustrated in the accompanying figures (fig. 4 for the *ellipse*, given by $x^2/b^2+y^2/c^2=1$; fig. 5 for the *equilateral triangle*, given by $(x+\frac{1}{3}a)(x^2-3y^2-\frac{4}{3}ax+\frac{4}{9}a^2)=0$; fig. 6 for the square).

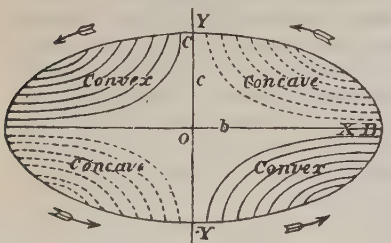

FIG. 4.

44. The distribution of the shearing stress over the cross-section is determined by the function ψ already introduced. If we draw the curves ψ=const., corresponding to any form of section, for equidifferent values of the constant, the tangential traction at any point on the cross-section is directed along the tangent to that curve of the family which passes through the point, and the magnitude of it is inversely proportional to the distance between consecutive curves of the family. Fig. 7 illustrates the result in the case of the *equilateral* triangle. The boundary is, of course, one of the lines. The "lines of shearing stress" which can thus be drawn are in every case identical with the lines of flow of frictionless liquid filling a cylindrical vessel of the same cross-section as the bar, when the liquid circulates in the plane of the section with uniform spin. They are also the same as the contour lines of a flexible and slightly extensible membrane, of which the edge has the same form as the bounding curve of the cross-section of the bar, when the membrane is fixed at the edge and slightly deformed by uniform pressure.

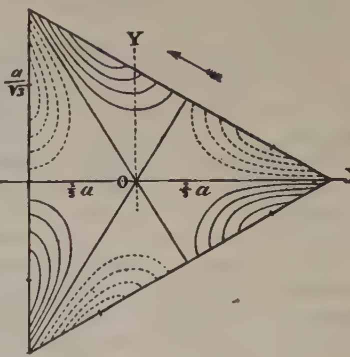

FIG. 5.

45. Saint-Venant's theory shows that the true torsional rigidity is in general less than that which would be obtained by extending Coulomb's law (G=$\mu\tau$I) to sections which are not circular. For an elliptic cylinder of sectional area ω and moment of inertia I about its central-line the torsional rigidity is $\mu\omega^4/4\pi^2$I, and this formula is not far from being correct for a very large number of sections. For a bar of square section of side a centimetres, the torsional rigidity in C.G.S. units is $(0\cdot1406)\mu a^4$ approximately, μ being expressed in dynes per square centimetre. How great the defect of the true value from that given by extending Coulomb's law may be in the case of sections with projecting corners is shown by the diagrams (fig. 8 especially no. 4). In these diagrams the upper of the two numbers under each figure indicates the fraction which the true torsional rigidity corresponding to the section is of that value which would be obtained by extending Coulomb's law; and the lower of the two numbers indicates the ratio which the torsional rigidity for a bar of the corresponding section bears to that of a bar of circular section of the same material and of equal sectional area. These results have an important practical application, inasmuch as they show that strengthening ribs and projections, such as are introduced in engineering to give stiffness to beams, have the reverse of a good effect when torsional stiffness is an object, although they are of great value in increasing the resistance to bending. The theory shows further that the resistance to torsion is very seriously diminished when there is in the surface any dent approaching to a re-entrant angle. At such a place the shearing strain tends to become infinite, and some

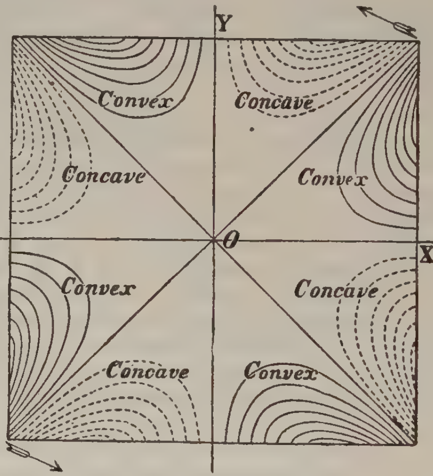

FIG. 6.

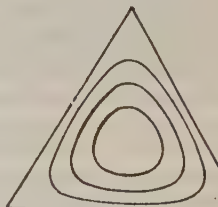

FIG. 7.

permanent set is produced by torsion. In the case of a section of any form, the strain and stress are greatest at points on the contour, and these points are in many cases the points of the contour which are nearest to the centroid of the section. The theory has also been applied to show that a longitudinal flaw near the axis of a shaft transmitting a torsional couple has little influence on the strength of the shaft, but that in the neighbourhood of a similar flaw which is much nearer to the surface than to the axis the shearing strain may be nearly doubled, and thus the possibility of such flaws is a source of weakness against which special provision ought to be made.

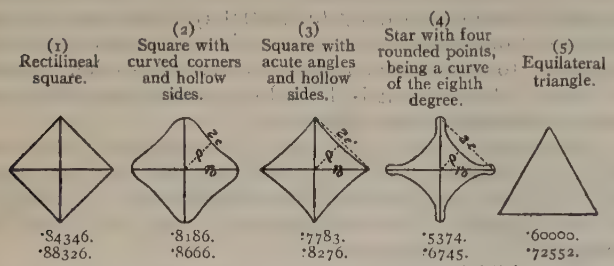
(1)
Rectilineal square.
(2)
Square with curved corners and hollow sides.
(3)
Square with acute angles and hollow sides.
(4)
Star with four rounded points, being a curve of the eighth degree.
(5)
Equilateral triangle.
2c
ρ
r
2c
ρ
r
2c
ρ
r
·84346.
·88326.
·8186.
·8666.
·7783.
·8276.
·5374.
·6745.
·60000.
·72552.

FIG. 8.—Diagrams showing Torsional Rigidities.

46. *Bending of Beams.*—As a second example of the application of the general theory we take the problem of the flexure of a beam. In this case also we begin by forming a simple intuition as to the nature of the strain and the stress. On the side of the beam towards the centre of curvature the longitudinal filaments must be contracted, and on the other side they must be extended. If we assume that the cross-sections remain plane, and that the central-line is unaltered in length, we see (at once from fig. 9) that the extensions (or contractions) are given by the formula y/R, where y denotes the distance of a longitudinal filament from the plane drawn through the unstrained central-line at right-angles to the plane of bending, and R is the radius of curvature of the curve into which this line is bent (shown by the dotted line in the figure). Corresponding to this strain there must be traction acting across the cross-sections. If we assume that there is no other stress, then the magnitude of the traction in question is Ey/R, where E is Young's modulus, and it is tension on the side where the filaments are extended and pressure on the side where they are contracted. If the plane of bending contains a set of principal axes of the cross-sections at their centroids, these tractions for the whole cross-section are equivalent to a couple of moment EI/R, where I now denotes the moment of inertia of the cross-section about an axis through its centroid at right angles to the plane of bending, and the plane of the couple is the plane of bending. Thus a beam of any form of section can be held bent in a "principal plane" by terminal couples of moment M, that is to say by a "bending moment" M; the central-line will take a curvature M/EI, so that it becomes an arc of a circle of radius EI/M; and the stress at any point will be tension of amount My/I, where y denotes distance (reckoned positive towards the side remote from the centre of curvature) from that plane which initially contains the central-line and is at right angles to the plane of the couple. This plane is called the "neutral plane." The restriction that the beam is bent in a principal plane means that the plane of bending contains one set of principal axes of the cross-sections at their centroids; in the case of a beam of rectangular section the plane would bisect two opposite edges at right angles. In order that the theory may hold good the radius of curvature must be very large.

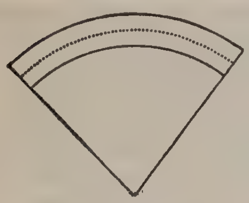

FIG. 9.

47. In this problem of the bending of a beam by terminal couples the stress is tension, determined as above, and the corresponding strain consists therefore of longitudinal extension of amount My/EI or y/R (contraction if y is negative), accompanied by lateral contraction of amount $\sigma My/EI$ or $\sigma y/R$ (extension if y is negative), σ being Poisson's ratio for the material. Our intuition of the nature of the strain was imperfect, inasmuch as it took no account of these lateral strains. The necessity for introducing them was pointed out by Saint-Venant. The effect of them is a change of shape of the cross-sections in their own planes. This is shown in an exaggerated way in fig. 10, where the rectangle ABCD represents the cross-section of the unstrained beam, or a rectangular portion of this cross-section, and the curvilinear figure A′B′C′D′ represents in an exaggerated fashion the cross-section (or the corresponding portion of the cross-section) of the same beam, when bent so that the centre of curvature of the central-line (which is at right angles to the plane of the figure) is on the line EF produced beyond F. The lines A′B′ and C′D′ are approximately circles of radii R/σ, when the central-line is a circle of radius R, and their centres are on the line FE produced beyond E. Thus the neutral plane, and each of the faces that is parallel to it, becomes strained into an *anticlastic surface*, whose principal curvatures are in the ratio $\sigma : 1$. The general appearance of the bent beam is shown in an exaggerated fashion in fig. 11, where the traces of the surface into which the neutral plane is bent are dotted. The result that the ratio of the principal curvatures of the anticlastic surfaces, into which the top and bottom planes of the beam (of rectangular section) are bent, is Poisson's ratio σ, has been used for the experimental determination of σ. The result that the radius of curvature of the bent central-line is EI/M is used in the experimental determination of E. The quantity EI is often called the "flexural rigidity" of the beam. There are two principal flexural rigidities corresponding to bending in the two principal planes (cf. § 62 below).

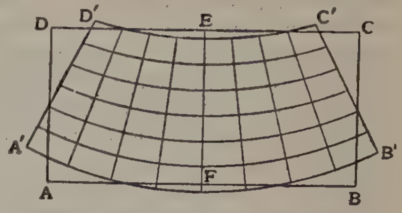

FIG. 10.

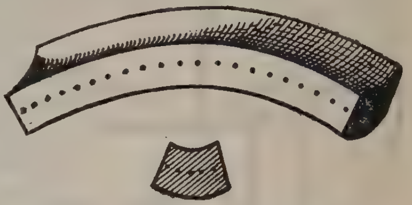

FIG. 11.

48. That this theory requires modification, when the load does not consist simply of terminal couples, can be seen most easily by considering the problem of a beam loaded at one end with a weight W, and supported in a horizontal position at its other end. The forces that are exerted at any section p, to balance the weight W, must reduce statically to a vertical force W and a couple, and these forces arise from the action of the part Ap on the part Bp (see fig. 12), *i.e.* from the stresses across the section at p. The couple is equal to the moment of the applied load W about an axis drawn through the centroid of the section p at right angles to the plane of bending. This moment is called the "bending moment" at the section, it is the product of the load W and the distance of the section from the loaded end, so that it varies uniformly along the length of the beam. The stress that suffices in the simpler problem gives rise to no vertical force, and it is clear that in addition to longitudinal tensions and pressures there must be tangential tractions on the cross-sections. The resultant of these tangential tractions must be a force equal to W, and directed vertically;

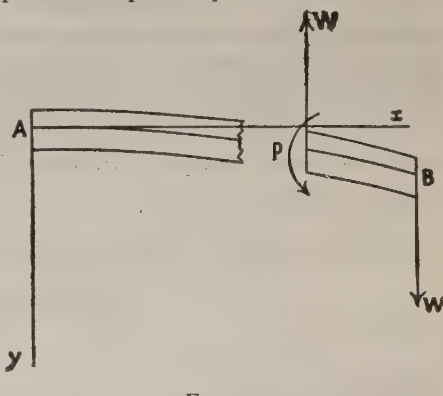

FIG. 12.

but the direction of the traction at a point of the cross-section need not in general be vertical. The existence of tangential traction on the cross-sections implies the existence of equal tangential traction, directed parallel to the central-line, on some planes or other which are parallel to this line, the two sets of tractions forming a shearing stress. We conclude that such shearing stress is a necessary constituent of the stress-system in the beam bent by terminal transverse load. We can develop a theory of this stress-system from the assumptions (i.) that the tension at any point of the cross-section is related to the bending moment at the section by the same law as in the case of uniform bending by terminal couples; (ii.) that, in addition to this tension, there is at any point shearing stress, involving tangential tractions acting in appropriate directions upon the elements of the cross-sections. When these assumptions are made it appears that there is one and only one distribution of shearing stress by which the conditions of the problem can be satisfied. The determination of the amount and direction of this shearing stress, and of the corresponding strains and displacements, was effected by Saint-Venant and R. F. A. Clebsch for a number of forms of section by means of an analysis of the same kind as that employed in the solution of the torsion problem.

49. Let *l* be the length of the beam, *x* the distance of the section *p* from the fixed end A, *y* the distance of any point below the horizontal plane through the centroid of the section at A, then the bending moment at *p* is $W(l-x)$, and the longitudinal tension P or X_x at any point on the cross-section is $-W(l-x)y/I$, and this is related to the bending moment exactly as in the simpler problem.

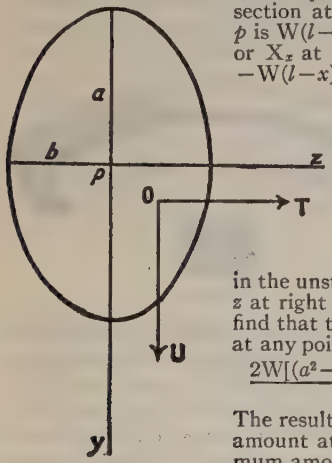

FIG. 13.

50. The expressions for the shearing stresses depend on the shape of the cross-section. Taking the beam to be of isotropic material and the cross-section to be an ellipse of semiaxes *a* and *b* (fig. 13), the *a* axis being vertical in the unstrained state, and drawing the axis *z* at right angles to the plane of flexure, we find that the vertical shearing stress U or X_y at any point (y, z) on any cross-section is

$$\frac{2W[(a^2-y^2)\{2a^2(1+\sigma)+b^2\}-z^2a^2(1-2\sigma)]}{\pi a^3b(1+\sigma)(3a^2+b^2)}.$$

The resultant of these stresses is W, but the amount at the centroid, which is the maximum amount, exceeds the average amount, $W/\pi ab$, in the ratio

$$\{4a^2(1+\sigma)+2b^2\}/(3a^2+b^2)(1+\sigma).$$

If $\sigma=\frac{1}{4}$, this ratio is $\frac{7}{5}$ for a circle, nearly $\frac{4}{3}$ for a flat elliptic bar with the longest diameter vertical, nearly $\frac{8}{5}$ for a flat elliptic bar with the longest diameter horizontal.

In the same problem the horizontal shearing stress T or Z_x at any point on any cross-section is of amount

$$-\frac{4Wyz\{a^2(1+\sigma)+b^2\sigma\}}{\pi a^3b(1+\sigma)(3a^2+b^2)}.$$

The resultant of these stresses vanishes; but, taking as before $\sigma=\frac{1}{4}$, and putting for the three cases above $a=b$, $a=10b$, $b=10a$, we find that the ratio of the maximum of this stress to the average vertical shearing stress has the values $\frac{3}{5}$, nearly $\frac{1}{15}$, and nearly 4. Thus the stress T is of considerable importance when the beam is a plank.

As another example we may consider a circular tube of external radius r_0 and internal radius r_1. Writing P, U, T for X_x, X_y, Z_x, we find

$$\left.\begin{aligned} P&=-\frac{4W}{\pi(r_0^4-r_1^4)}(l-x)y,\\ U&=\frac{W}{2(1+\sigma)\pi(r_0^4-r_1^4)}\Big[(3+2\sigma)\Big\{r_0^2+r_1^2-y^2\\ &\qquad-\frac{r_0^2r_1^2}{(y^2+z^2)^2}(y^2-z^2)\Big\}-(1-2\sigma)z^2\Big]\\ T&=-\frac{W}{(1+\sigma)\pi(r_0^4-r_1^4)}\Big\{1+2\sigma+(3+2\sigma)\frac{r_0^2r_1^2}{(y^2+z^2)^2}\Big\}yz; \end{aligned}\right\}$$

and for a tube of radius *r* and small thickness *t* the value of P and the maximum values of U and T reduce approximately to

$$P=-W(l-x)y/\pi r^3t$$
$$U_{\text{max.}}=W/\pi rt,\quad T_{\text{max.}}=W/2\pi rt.$$

The greatest value of U is in this case approximately twice its average value, but it is possible that these results for the bending of very thin tubes may be seriously at fault if the tube is not plugged, and if the load is not applied in the manner contemplated in the theory (cf. § 55). In such cases the extensions and contractions of the longitudinal filaments may be practically confined to a small part of the material near the ends of the tube, while the rest of the tube is deformed without stretching.

51. The tangential tractions U, T on the cross-sections are necessarily accompanied by tangential tractions on the longitudinal sections, and on each such section the tangential traction is parallel to the central line; on a vertical section $z=$const. its amount at any point is T, and on a horizontal section $y=$const. its amount at any point is U.

The internal stress at any point is completely determined by the components P, U, T, but these are not *principal stresses* (§ 7). Clebsch has given an elegant geometrical construction for determining the principal stresses at any point when the values of P, U, T are known.

From the point O (fig. 14) draw lines OP, OU, OT, to represent the stresses P, U, T at O, on the cross-section through O, in magnitude, direction and sense, and compound U and T into a resultant represented by OE; the plane EOP is a principal plane of stress at O, and the principal stress at right angles to this plane vanishes. Take M the middle point of OP, and with centre M and radius ME describe a circle cutting the line OP in A and B; then OA and OB represent the magnitudes of the two remaining principal stresses. On AB describe a rectangle ABDC so that DC passes through E; then OC is the direction of the principal stress represented in magnitude by OA, and OD is the direction of the principal stress represented in magnitude by OB.

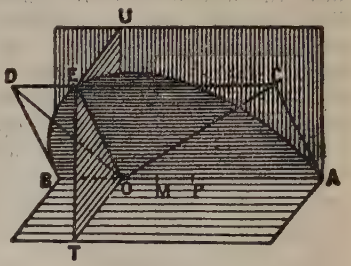

FIG. 14.

52. As regards the strain in the beam, the longitudinal and lateral extensions and contractions depend on the bending moment in the same way as in the simpler problem; but, the bending moment being variable, the anticlastic curvature produced is also variable. In addition to these extensions and contractions there are shearing strains corresponding to the shearing stresses T, U. The shearing strain corresponding to T consists of a relative sliding parallel to the central-line of different longitudinal linear elements combined with a relative sliding in a transverse horizontal direction of elements of different cross-sections; the latter of these is concerned in the production of those displacements by which the variable anticlastic curvature is brought about; to see the effect of the former we may most suitably consider, for the case of an elliptic cross-section, the distortion of the shape of a rectangular portion of a plane of the material which in the natural state was horizontal; all the boundaries of such a portion become parabolas of small curvature, which is variable along the length of the beam, and the particular effect under consideration is the change of the transverse horizontal linear elements from straight lines such as HK to parabolas such as H′K′ (fig. 15); the lines HL and KM are parallel to the central-line, and the figure is drawn for a plane above the neutral plane. When the cross-section is not an ellipse the character of the strain is the same, but the curves are only approximately parabolic.

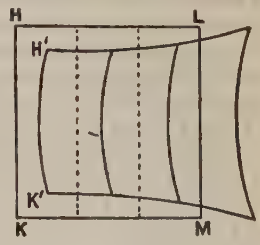

FIG. 15.

The shearing strain corresponding to U is a distortion which has the effect that the straight vertical filaments become curved lines which cut the longitudinal filaments obliquely, and thus the cross-sections do not remain plane, but become curved surfaces, and the tangent plane to any one of these surfaces at the centroid cuts the central line obliquely (fig. 16). The angle between these tangent planes and the central-line is the same at all points of the line; and, if it is denoted by $\frac{1}{2}\pi+s_0$, the value of s_0 is expressible as

$$\frac{\text{shearing stress at centroid}}{\text{rigidity of material}},$$

and it thus depends on the shape of the cross-section; for the elliptic section of § 50 its value is

$$\frac{4W}{E\pi ab}\,\frac{2a^2(1+\sigma)+b^2}{3a^2+b^2};$$

for a circle (with $\sigma=\frac{1}{4}$) this becomes $7W/2E\pi a^2$. The vertical filament through the centroid of any cross-section becomes a cubical parabola, as shown in fig. 16, and the contour lines of the curved surface into which any cross-section is distorted are shown in fig. 17 for a circular section.

53. The deflection of the beam is determined from the equation

curvature of central line = bending moment ÷ flexural rigidity,

and the special conditions at the supported end; there is no alteration of this statement on account of the shears. As regards the special condition at an end which is *encastrée*, or built in, Saint-Venant proposed to assume that the central tangent plane of the cross-section at the end is vertical; with this assumption the tangent to the central line at the end is inclined downwards and makes an angle s_0 with the horizontal (see fig. 18); it is, however, improbable that this condition is exactly realized in practice. In the application of the theory to the experimental determination of Young's modulus, the small angle which the central-line at the support makes with the horizontal is an unknown quantity, to be eliminated by observation of the deflection at two or more points.

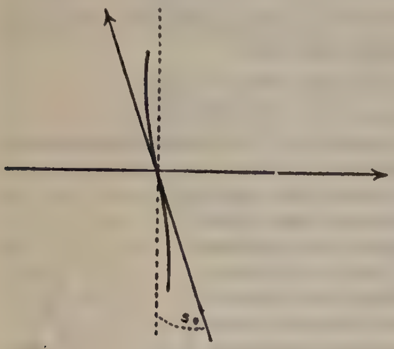

FIG. 16.

54. We may suppose the displacement in a bent beam to be produced by the following operations: (1) the central-line is deflected into its curved form, (2) the cross-sections are rotated about axes through their centroids at right angles to the plane of flexure so as to make angles equal to $\frac{1}{2}\pi+s_0$ with the central-line, (3) each cross-section is distorted in its own plane in such a way that the appropriate variable anticlastic curvature is produced, (4) the cross-sections are further distorted into curved surfaces. The contour lines of fig. 17 show the disturbance from the central tangent plane, not from the original vertical plane.

55. *Practical Application of Saint-Venant's Theory.*—The theory above described is exact provided the forces applied to the loaded end, which have W for resultant, are distributed over the terminal section in a particular way, not likely to be realized in practice; and the application to practical problems depends on a principle due to Saint-Venant, to the effect that, except for comparatively small portions of the beam near to the loaded and fixed ends, the resultant only is effective, and its mode of distribution does not seriously affect the internal strain and stress. In fact, the actual stress is that due to forces with the required resultant distributed in the manner contemplated in the theory, superposed upon that due to a certain distribution of forces on each terminal section which, if applied to a rigid body, would keep it in equilibrium; according to Saint-Venant's principle, the stresses and strains due to such distributions of force are unimportant except near the ends. For this principle to be exactly applicable it is necessary that the length of the beam should be very great compared with any linear dimension of its cross-section; for the practical application it is sufficient that the length should be about ten times the greatest diameter.

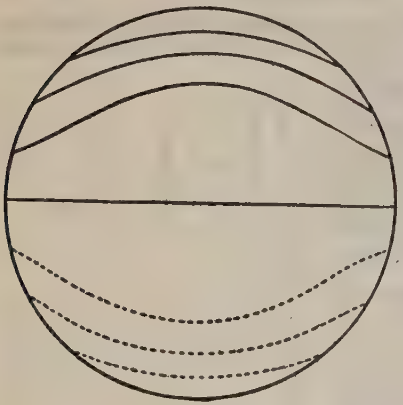

FIG. 17.

56. In recent years the problem of the bending of a beam by loads distributed along its length has been much advanced. It is now practically solved for the case of a load distributed uniformly, or according to any rational algebraic law, and it is also solved for the case where the thickness is small compared with the length and depth, as in a plate girder, and the load is distributed in any way. These solutions are rather complicated and difficult to interpret. The case which has been worked out most fully is that of a transverse load distributed uniformly along the length of the beam. In this case two noteworthy results have been obtained. The first of these is that the central-line in general suffers extension. This result had been found experimentally many years before. In the case of the plate girder loaded uniformly along the top, this extension is just half as great as the extension of the central-line of the same girder when free at the ends, supported along the base, and carrying the same load along the top. The second noteworthy result is that the curvature of the strained central-line is not proportional to the bending moment. Over and above the curvature which would be found from the ordinary relation—

curvature of central-line = bending moment ÷ flexural rigidity,

there is an additional curvature which is the same at all the cross-sections. In ordinary cases, provided the length is large compared with any linear dimension of the cross-section, this additional curvature is small compared with that calculated from the ordinary formula, but it may become important in cases like that of suspension bridges, where a load carried along the middle of the roadway is supported by tensions in rods attached at the sides.

57. When the ordinary relation between the curvature and the bending moment is applied to the calculation of the deflection of *continuous beams* it must not be forgotten that a correction of the kind just mentioned may possibly be requisite. In the usual method of treating the problem such corrections are not considered, and the ordinary relation is made the basis of the theory. In order to apply this relation to the calculation of the deflection, it is necessary to know the bending moment at every point; and, since the pressures of the supports are not among the data of the problem, we require a method of determining the bending moments at the supports either by calculation or in some other way. The calculation of the bending moment can be replaced by a method of graphical construction, due to Mohr, and depending on the two following theorems:—

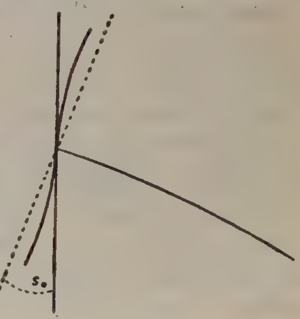

FIG. 18.

(i.) The curve of the central-line of each span of a beam, when the bending moment M is given,[1] is identical with the catenary or funicular curve passing through the ends of the span under a (fictitious) load per unit length of the span equal to M/EI, the horizontal tension in the funicular being unity.

(ii.) The directions of the tangents to this funicular curve at the ends of the span are the same for all statically equivalent systems of (fictitious) load.

When M is known, the magnitude of the resultant shearing stress at any section is dM/dx, where x is measured along the beam.

---

[1] The sign of M is shown by the arrow-heads in fig. 19, for which, with y downwards,

$$EI\frac{d^2y}{dx^2}+M=0.$$

58. Let l be the length of a span of a loaded beam (fig. 19), M_1 and M_2 the bending moments at the ends, M the bending moment at a section distant x from the end (M_1), M′ the bending moment at

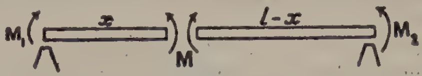

FIG. 19.

the same section when the same span with the same load is simply supported; then M is given by the formula

$$M=M'+M_1\frac{l-x}{l}+M_2\frac{x}{l},$$

and thus a fictitious load statically equivalent to M/EI can be easily found when M′ has been found. If we draw a curve (fig. 20) to pass through the ends of the span, so that its ordinate represents the value of M′/EI, the corresponding fictitious loads are statically equivalent to a single load, of amount represented by the area of the curve, placed at the point of the span vertically above the centre of gravity of this area. If PN is the ordinate of this curve, and if at the ends of the span we erect ordinates in the proper sense to represent M_1/EI and M_2/EI, the bending moment at any point is represented by the length PQ.[1] For a uniformly distributed load the curve of M′ is a parabola $M'=\frac{1}{2}wx(l-x)$, where w is the load per unit of length; and the statically equivalent fictitious load is $\frac{1}{12}wl^3$/EI placed at the middle point G of the span; also the loads statically equivalent to the fictitious loads $M_1(l-x)/l$EI and M_2x/lEI are $\frac{1}{2}M_1l$/EI and $\frac{1}{2}M_2l$/EI placed at the points g, g' of trisection of the span. The funicular polygon for the fictitious loads can thus be drawn, and the direction of the central-line at the supports is determined when the bending moments at the supports are known.

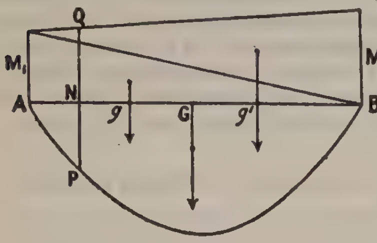

FIG. 20.

59. When there is more than one span the funiculars in question may be drawn for each of the spans, and, if the bending moments at the ends of the extreme spans are known, the intermediate ones can be determined. This determination depends on two considerations: (1) the fictitious loads corresponding to the bending moment at any support are proportional to the lengths of the spans which abut on that support; (2) the sides of two funiculars that end at any support coincide in direction. Fig. 21 illustrates the method for the case of a uniform beam on three supports A, B, C, the ends A and C being freely supported. There will be an unknown bending moment M_0 at B, and the system[2] of fictitious loads is $\frac{1}{12}w\text{AB}^3$/EI at G the middle point of AB, $\frac{1}{12}w\text{BC}^3$/EI at G′ the middle point of BC, $-\frac{1}{2}M_0$AB/EI at g and $-\frac{1}{2}M_0$BC/EI at g', where g and g' are the points of trisection nearer to B of the spans AB, BC. The centre of gravity of the two latter is a fixed point independent of M_0, and the line VK of the figure is the vertical through this point. We draw AD and CE to represent the loads at G and G′ in magnitude; then D and E are fixed points. We construct any triangle UVW whose sides UV, UW pass through D, B, and whose vertices lie on the verticals gU, VK, g'W; the point F where VW meets DB is a fixed point, and the lines EF, DK are the two sides (2, 4) of the required funiculars which do not pass through A, B or C. The remaining sides (1, 3, 5) can then be drawn, and the side 3 necessarily passes through B; for the triangle UVW and the triangle whose sides are 2, 3, 4 are in perspective.

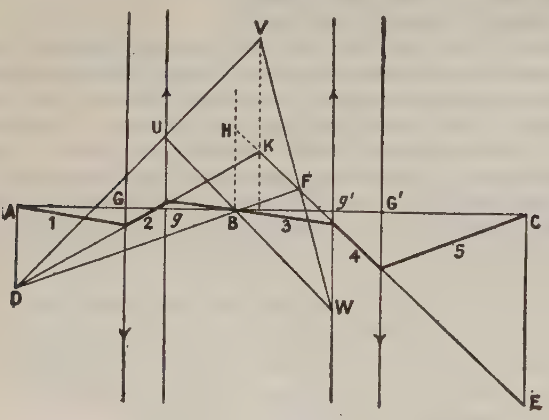

FIG. 21.

The bending moment M_0 is represented in the figure by the vertical line BH where H is on the continuation of the side 4, the scale being given by

$$\frac{\text{BH}}{\text{CE}}=\frac{\frac{1}{2}M_0\text{BC}}{\frac{1}{12}w\text{BC}^3};$$

this appears from the diagrams of forces, fig. 22, in which the oblique lines are marked to correspond to the sides of the funiculars to which they are parallel.

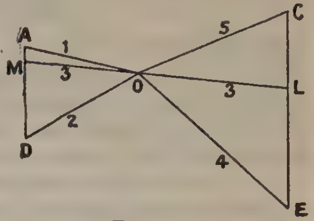

FIG. 22.

In the application of the method to more complicated cases there are two systems of fixed points corresponding to F, by means of which the sides of the funiculars are drawn.

60. *Finite Bending of Thin Rod.*—The equation

curvature = bending moment ÷ flexural rigidity

may also be applied to the problem of the flexure in a principal plane of a very thin rod or wire, for which the curvature need not be small. When the forces that produce the flexure are applied at the ends only, the curve into which the central-line is bent is one of a definite family of curves, to which the name *elastica* has been given, and there is a division of the family into two species according as the external forces are applied directly to the ends or are applied to rigid arms attached to the ends; the curves of the former species are characterized by the presence of inflections at all the points at which they cut the line of action of the applied forces.

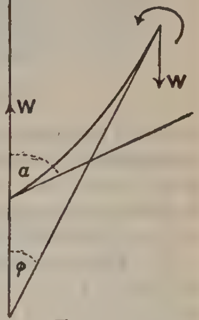

FIG. 23.

We select this case for consideration. The problem of determining the form of the curve (cf. fig. 23) is mathematically identical with the problem of determining the motion of a simple circular pendulum oscillating through a finite angle, as is seen by comparing the differential equation of the curve

$$\text{EI}\frac{d^2\phi}{ds^2}+\text{W}\sin\phi=0$$

with the equation of motion of the pendulum

$$l\frac{d^2\phi}{dt^2}+g\sin\phi=0.$$

The length L of the curve between two inflections corresponds to the time of oscillation of the pendulum from rest to rest, and we thus have

$$\text{L}\sqrt{(\text{W}/\text{EI})}=2\text{K},$$

where K is the real quarter period of elliptic functions of modulus $\sin\frac{1}{2}\alpha$, and α is the angle at which the curve cuts the line of action of the applied forces. Unless the length of the rod exceeds $\pi\sqrt{(\text{EI}/\text{W})}$ it will not bend under the force, but when the length is great enough there may be more than two points of inflection and more than one bay of the curve; for n bays ($n+1$ inflections) the length must exceed $n\pi\sqrt{(\text{EI}/\text{W})}$. Some of the forms of the curve are shown in fig. 24.

For the form d, in which two bays make a figure of eight, we have

$$\text{L}\sqrt{(\text{W}/\text{EI})}=4{\cdot}6,\ \alpha=130°$$

approximately. It is noteworthy that whenever the length and force admit of a sinuous form, such as a or b, with more than two inflections, there is also possible a crossed form, like e, with two inflections only; the latter form is stable and the former unstable.

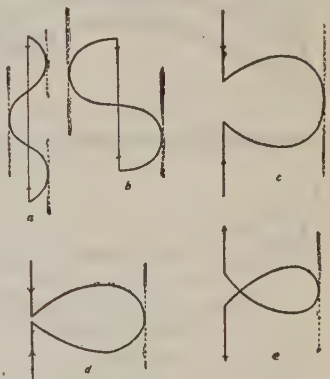

FIG. 24.

61. The particular case of the above for which α is very small is a curve of sines of small amplitude, and the result in this case has been applied to the problem of the buckling of struts under thrust. When the strut, of length L′, is

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[1] The figure is drawn for a case where the bending moment has the same sign throughout.

[2] M_0 is taken to have, as it obviously has, the opposite sense to that shown in fig. 19.

maintained upright at its lower end, and loaded at its upper end, it is simply contracted, unless $L'^2W > \frac{1}{4}\pi^2EI$, for the lower end corresponds to a point at which the tangent is vertical on an elastica for which the line of inflections is also vertical, and thus the length must be half of one bay (fig. 25, *a*). For greater lengths or loads the strut tends to bend or buckle under the load. For a very slight excess of L'^2W above $\frac{1}{4}\pi^2EI$, the theory on which the above discussion is founded, is not quite adequate, as it assumes the central-line of the strut to be free from extension or contraction, and it is probable that bending without extension does not take place when the length or the force exceeds the critical value but slightly. It should be noted also that the formula has no application to short struts, as the theory from which it is derived is founded on the assumption that the length is great compared with the diameter (cf. § 56).

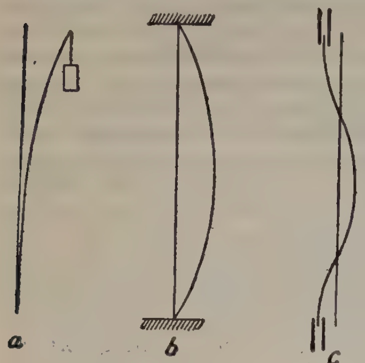

FIG. 25.

The condition of buckling, corresponding to the above, for a long strut, of length L′, when both ends are free to turn is $L'^2W > \pi^2EI$; for the central-line forms a complete bay (fig. 25, *b*); if both ends are maintained in the same vertical line, the condition is $L'^2W > 4\pi^2EI$, the central-line forming a complete bay and two half bays (fig. 25, *c*).

62. In our consideration of flexure it has so far been supposed that the bending takes place in a principal plane. We may remove this restriction by resolving the forces that tend to produce bending into systems of forces acting in the two principal planes. To each plane there corresponds a particular flexural rigidity, and the systems of forces in the two planes give rise to independent systems of stress, strain and displacement, which must be superposed in order to obtain the actual state. Applying this process to the problem of §§ 48-54, and supposing that one principal axis of a cross-section at its centroid makes an angle θ with the vertical, then for any shape of section the neutral surface or locus of unextended fibres cuts the section in a line DD′, which is conjugate to the vertical diameter CP with respect to any ellipse of inertia of the section. The central-line is bent into a plane curve which is not in a vertical plane, but is in a plane through the line CY which is perpendicular to DD′ (fig. 26).

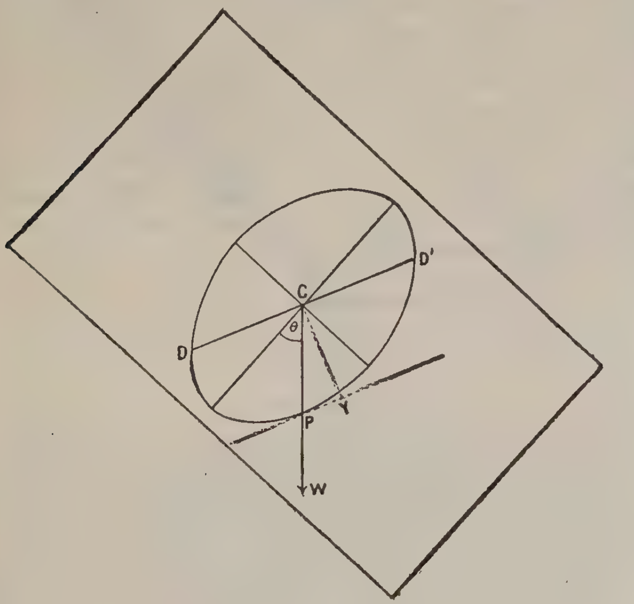

FIG. 26.

63. *Bending and Twisting of Thin Rods.*—When a very thin rod or wire is bent and twisted by applied forces, the forces on any part of it limited by a normal section are balanced by the tractions across the section, and these tractions are statically equivalent to certain forces and couples at the centroid of the section; we shall call them the *stress-resultants* and the *stress-couples.* The stress-couples consist of two flexural couples in the two principal planes, and the torsional couple about the tangent to the central-line. The torsional couple is the product of the torsional rigidity and the twist produced; the torsional rigidity is exactly the same as for a straight rod of the same material and section twisted without bending, as in Saint-Venant's torsion problem (§ 42). The twist τ is connected with the deformation of the wire in this way: if we suppose a very small ring which fits the cross-section of the wire to be provided with a pointer in the direction of one principal axis of the section at its centroid, and to move along the wire with velocity v, the pointer will rotate about the central-line with angular velocity τv. The amount of the flexural couple for either principal plane at any section is the product of the flexural rigidity for that plane, and the resolved part in that plane of the curvature of the central line at the centroid of the section; the resolved part of the curvature along the normal to any plane is obtained by treating the curvature as a vector directed along the normal to the osculating plane and projecting this vector. The flexural couples reduce to a single couple in the osculating plane proportional to the curvature when the two flexural rigidities are equal, and in this case only.

The stress-resultants across any section are tangential forces in the two principal planes, and a tension or thrust along the central-line; when the stress-couples and the applied forces are known these stress-resultants are determinate. The existence, in particular, of the resultant tension or thrust parallel to the central-line does not imply sensible extension or contraction of the central filament, and the tension per unit area of the cross-section to which it would be equivalent is small compared with the tensions and pressures in longitudinal filaments not passing through the centroid of the section; the moments of the latter tensions and pressures constitute the flexural couples.

64. We consider, in particular, the case of a naturally straight spring or rod of circular section, radius c, and of homogeneous isotropic material. The torsional rigidity is $\frac{1}{4}E\pi c^4/(1+\sigma)$; and the flexural rigidity, which is the same for all planes through the central-line, is $\frac{1}{4}E\pi c^4$; we shall denote these by C and A respectively. The rod may be held bent by suitable forces into a curve of double curvature with an amount of twist τ, and then the torsional couple is $C\tau$, and the flexural couple in the osculating plane is A/ρ, where ρ is the radius of circular curvature. Among the curves in which the rod can be held by forces and couples applied at its ends only, one is a circular helix; and then the applied forces and couples are equivalent to a wrench about the axis of the helix.

Let α be the angle and r the radius of the helix, so that ρ is $r \sec^2\alpha$; and let R and K be the force and couple of the wrench (fig. 27).

Then the couple formed by R and an equal and opposite force at any section and the couple K are equivalent to the torsional and flexural couples at the section, and this gives the equations for R and K

$$R = A\frac{\sin\alpha\cos^3\alpha}{r^2} - C\tau\frac{\cos\alpha}{r},$$

$$K = A\frac{\cos^2\alpha}{r} + C\tau\sin\alpha.$$

The thrust across any section is $R\sin\alpha$ parallel to the tangent to the helix, and the shearing stress-resultant is $R\cos\alpha$ at right angles to the osculating plane.

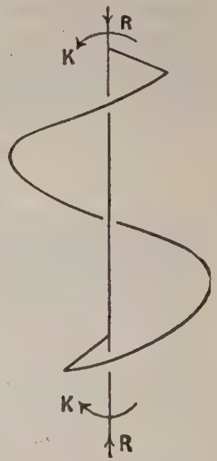

FIG. 27.

When the twist is such that, if the rod were simply unbent, it would also be untwisted, τ is $(\sin\alpha\cos\alpha)/r$, and then, restoring the values of A and C, we have

$$R=\frac{E\pi c^4}{4r^2}\frac{\sigma}{1+\sigma}\sin\alpha\cos^2\alpha,$$

$$K=\frac{E\pi c^4}{4r}\,\frac{1+\sigma\cos^2\alpha}{1+\sigma}\cos\alpha.$$

65. The theory of spiral springs affords an application of these results. The stress-couples called into play when a naturally helical spring (α, r) is held in the form of a helix (α', r'), are equal to the differences between those called into play when a straight rod of the same material and section is held in the first form, and those called into play when it is held in the second form.

Thus the torsional couple is

$$C\left(\frac{\sin\alpha'\cos\alpha'}{r'}-\frac{\sin\alpha\cos\alpha}{r}\right),$$

and the flexural couple is

$$A\left(\frac{\cos^2\alpha'}{r'}-\frac{\cos^2\alpha}{r}\right).$$

The wrench (R, K) along the axis by which the spring can be held in the form (α', r') is given by the equations

$$R=A\frac{\sin\alpha'}{r'}\left(\frac{\cos^2\alpha'}{r'}-\frac{\cos^2\alpha}{r}\right)-C\frac{\cos\alpha'}{r'}\left(\frac{\sin\alpha'\cos\alpha'}{r'}-\frac{\sin\alpha\cos\alpha}{r}\right),$$

$$K=A\cos\alpha'\left(\frac{\cos^2\alpha'}{r'}-\frac{\cos^2\alpha}{r}\right)+C\sin\alpha'\left(\frac{\sin\alpha'\cos\alpha'}{r'}-\frac{\sin\alpha\cos\alpha}{r}\right).$$

When the spring is slightly extended by an axial force F, $=-R$, and there is no couple, so that K vanishes, and α', r' differ very little from α, r, it follows from these equations that the axial elongation, δx, is connected with the axial length x and the force F by the equation

$$F=\frac{E\pi c^4}{4r^2}\,\frac{\sin\alpha}{1+\sigma\cos^2\alpha}\,\frac{\delta x}{x},$$

and that the loaded end is rotated about the axis of the helix through a small angle

$$\frac{4\sigma Fxr\cos\alpha}{E\pi c^4},$$

the sense of the rotation being such that the spring becomes more tightly coiled.

66. A horizontal pointer attached to a vertical spiral spring would be made to rotate by loading the spring, and the angle through which it turns might be used to measure the load, at any rate, when the load is not too great; but a much more sensitive contrivance is the twisted strip devised by W. E. Ayrton and J. Perry. A very thin, narrow rectangular strip of metal is given a permanent twist about its longitudinal middle line, and a pointer is attached to it at right angles to this line. When the strip is subjected to longitudinal tension the pointer rotates through a considerable angle. G. H. Bryan (*Phil. Mag.*, December 1890) has succeeded in constructing a theory of the action of the strip, according to which it is regarded as a strip of *plating* in the form of a right helicoid, which, after extension of the middle line, becomes a portion of a slightly different helicoid; on account of the thinness of the strip, the change of curvature of the surface is considerable, even when the extension is small, and the pointer turns with the generators of the helicoid.

If b stands for the breadth and t for the thickness of the strip, and τ for the permanent twist, the approximate formula for the angle θ through which the strip is untwisted on the application of a load W was found to be

$$\theta=\frac{Wb\tau(1+\sigma)}{2Et^3\left(1+\frac{(1+\sigma)}{30}\frac{b^4\tau^2}{t^2}\right)}.$$

The quantity $b\tau$ which occurs in the formula is the total twist in a length of the strip equal to its breadth, and this will generally be very small; if it is small of the same order as t/b, or a higher order, the formula becomes $\frac{1}{2}Wb\tau(1+\sigma)/Et^3$, with sufficient approximation, and this result appears to be in agreement with observations of the behaviour of such strips.

67. *Thin Plate under Pressure.*—The theory of the deformation of plates, whether plane or curved, is very intricate, partly because of the complexity of the kinematical relations involved. We shall here indicate the nature of the effects produced in a thin plane plate, of isotropic material, which is slightly bent by pressure. This theory should have an application to the stress produced in a ship's plates. In the problem of the cylinder under internal pressure (§ 77 below) the most important stress is the circumferential tension, counteracting the tendency of the circular filaments to expand under the pressure; but in the problem of a plane plate some of the filaments parallel to the plane of the plate are extended and others are contracted, so that the tensions and pressures along them give rise to resultant couples but not always to resultant forces. Whatever forces are applied to bend the plate, these couples are always expressible, at least approximately in terms of the principal curvatures produced in the surface which, before strain, was the middle plane of the plate. The simplest case is that of a rectangular plate, bent by a distribution of couples applied to its edges, so that the middle surface becomes a cylinder of large radius R; the requisite couple per unit of length of the straight edges is of amount C/R, where C is a certain constant; and the requisite couple per unit of length of the circular edges is of amount $C\sigma/R$, the latter being required to resist the tendency to anticlastic curvature (cf. §47). If normal sections of the plate are supposed drawn through the generators and circular sections of the cylinder, the action of the neighbouring portions on any portion so bounded involves flexural couples of the above amounts. When the plate is bent in any manner, the curvature produced at each section of the middle surface may be regarded as arising from the superposition of two cylindrical curvatures; and the flexural couples across normal sections through the lines of curvature, estimated per unit of length of those lines, are $C(1/R_1+\sigma/R_2)$ and $C(1/R_2+\sigma/R_1)$, where R_1 and R_2 are the principal radii of curvature. The value of C for a plate of small thickness $2h$ is $\frac{2}{3}Eh^3/(1-\sigma^2)$. Exactly as in the problem of the beam (§§ 48, 56), the action between neighbouring portions of the plate generally involves shearing stresses across normal sections as well as flexural couples; and the resultants of these stresses are determined by the conditions that, with the flexural couples, they balance the forces applied to bend the plate.

68. To express this theory analytically, let the middle plane of the plate in the unstrained position be taken as the plane of (x, y), and let normal sections at right angles to the axes of x and y be drawn through any point. After strain let w be the displacement of this point in the direction perpendicular to the plane, marked p in fig. 28. If the axes of x and y were parallel to the lines of curvature at the point, the flexural couple acting across the section normal to x (or y) would have the axis of y (or x) for its axis; but when the lines of curvature are inclined to the axes of co-ordinates, the flexural couple across a section normal to either axis has a component about that axis as well as a component about the perpendicular axis. Consider an element ABCD of the section at right angles to the axis of x, contained between two lines near together and perpendicular to the middle plane. The action of the portion of the plate to the right upon the portion to the left, across the element, gives rise to a couple about the middle line (y) of amount, estimated per unit of length of that line, equal to $C\left(\frac{\partial^2 w}{\partial x^2}+\sigma\frac{\partial^2 w}{\partial y^2}\right)$, $=G_1$, say, and to a couple, similarly estimated, about the normal (x) of amount $-C(1-\sigma)\frac{\partial^2 w}{\partial x\partial y}$, $=H$, say. The

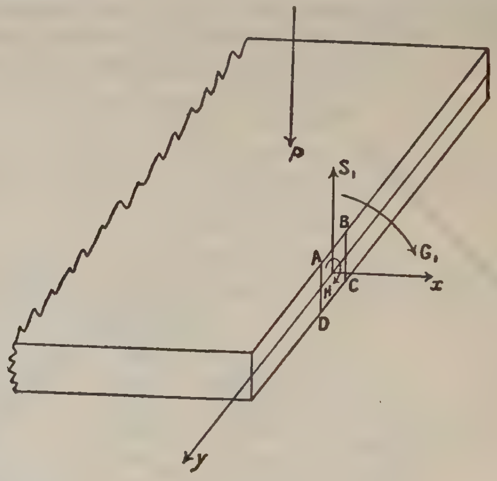

Fig. 28.

corresponding couples on an element of a section at right angles to the axis of y, estimated per unit of length of the axis of x, are of amounts $-C\left(\frac{\partial^2 w}{\partial y^2}+\sigma\frac{\partial^2 w}{\partial x^2}\right)$, $=G_2$ say, and $-H$. The resultant S_1 of the shearing stresses on the element ABCD, estimated as before, is given by the equation $S_1=\frac{\partial G_1}{\partial x}-\frac{\partial H}{\partial y}$ (cf. § 57), and the corresponding resultant S_2 for an element perpendicular to the axis of y is given by the equation $S_2=-\frac{\partial H}{\partial x}-\frac{\partial G_2}{\partial y}$. If the plate is bent by a pressure p per unit of area, the equation of equilibrium is $\frac{\partial S_1}{\partial x}+\frac{\partial S_2}{\partial y}=p$, or, in terms of w,

$$\frac{\partial^4 w}{\partial x^4}+\frac{\partial^4 w}{\partial y^4}+2\frac{\partial^4 w}{\partial x^2\partial y^2}=\frac{p}{C}.$$

This equation, together with the special conditions at the rim, suffices for the determination of w, and then all the quantities here introduced are determined. Further, the most important of the stress-components are those which act across elements of normal sections: the tension in direction x, at a distance z from the middle plane measured in the direction of p, is of amount $-\frac{3Cz}{2h^3}\left(\frac{\partial^2 w}{\partial x^2}+\sigma\frac{\partial^2 w}{\partial y^2}\right)$, and there is a corresponding tension in direction y; the shearing stress consisting of traction parallel to y on planes $x=$const., and traction parallel to x on planes $y=$const., is of amount $\frac{3C(1-\sigma)z}{2h^3}\frac{\partial^2 w}{\partial x\partial y}$; these tensions and shearing stresses are equivalent to two principal tensions, in the directions of the lines of curvature of the surface into which the middle plane is bent, and they give rise to the flexural couples.

69. In the special example of a circular plate, of radius a, supported at the rim, and held bent by a uniform pressure p, the value of w at a point distant r from the axis is

$$\frac{1}{64}\frac{p}{C}(a^2-r^2)\left(\frac{5+\sigma}{1+\sigma}a^2-r^2\right),$$

and the most important of the stress components is the radial tension, of which the amount at any point is $\frac{3}{32}(3+\sigma)pz(a^2-r)/h^3$; the maximum radial tension is about $\frac{1}{3}(a/h)^2p$, and, when the thickness is small compared with the diameter, this is a large multiple of p.

70. *General Theorems.*—Passing now from these questions of flexure and torsion, we consider some results that can be deduced from the general equations of equilibrium of an elastic solid body.

The form of the general expression for the potential energy (§ 27) stored up in the strained body leads, by a general property of quadratic functions, to a reciprocal theorem relating to the effects produced in the body by two different systems of forces, viz.: The whole work done by the forces of the first system, acting over the displacements produced by the forces of the second system, is equal to the whole work done by the forces of the second system, acting over the displacements produced by the forces of the first system. By a suitable choice of the second system of forces, the average values of the component stresses and strains produced by given forces, considered as constituting the first system, can be obtained, even when the distribution of the stress and strain cannot be determined.

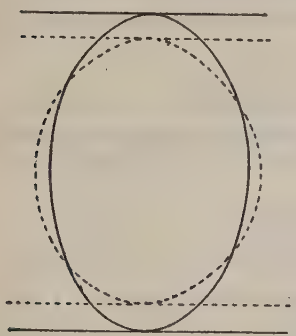

FIG. 29.

Taking for example the problem presented by an isotropic body of any form[1] pressed between two parallel planes distant l apart (fig. 29), and denoting the resultant pressure by p, we find that the diminution of volume $-\delta v$ is given by the equation

$$-\delta v=lp/3k,$$

where k is the modulus of compression, equal to $\frac{1}{3}E/(1-2\sigma)$. Again, take the problem of the changes produced in a heavy body by different ways of supporting it; when the body is suspended from one or more points in a horizontal plane its volume is increased by

$$\delta v=Wh/3k,$$

where W is the weight of the body, and h the depth of its centre of gravity below the plane; when the body is supported by upward vertical pressures at one or more points in a horizontal plane the volume is diminished by

$$-\delta v=Wh'/3k,$$

where h' is the height of the centre of gravity above the plane; if the body is a cylinder, of length l and section A, standing with its base on a smooth horizontal plane, its length is shortened by an amount

$$-\delta l=Wl/2EA;$$

if the same cylinder lies on the plane with its generators horizontal, its length is increased by an amount

$$\delta l=\sigma Wh'/EA.$$

71. In recent years important results have been found by considering the effects produced in an elastic solid by forces applied at isolated points.

Taking the case of a single force F applied at a point in the interior, we may show that the stress at a distance r from the point consists of

(1) a radial pressure of amount

$$\frac{2-\sigma}{1-\sigma}\frac{F}{4\pi}\frac{\cos\theta}{r^2},$$

(2) tension in all directions at right angles to the radius of amount

$$\frac{1-2\sigma}{2(1-\sigma)}\frac{F}{4\pi}\frac{\cos\theta}{r^2},$$

(3) shearing stress consisting of traction acting along the radius dr on the surface of the cone $\theta=$const. and traction acting along the meridian $d\theta$ on the surface of the sphere $r=$const. of amount

$$\frac{1-2\sigma}{2(1-\sigma)}\frac{F}{4\pi}\frac{\sin\theta}{r^2},$$

where θ is the angle between the radius vector r and the line of action of F. The line marked T in fig. 30 shows the direction of the tangential traction on the spherical surface.

Thus the lines of stress are in and perpendicular to the meridian plane, and the direction of one of those in the meridian plane is inclined to the radius vector r at an angle

$$\tfrac{1}{2}\tan^{-1}\left(\frac{2-4\sigma}{5-4\sigma}\tan\theta\right).$$

The corresponding displacement at any point is compounded of a radial displacement of amount

$$\frac{1+\sigma}{2(1-\sigma)}\frac{F}{4\pi E}\frac{\cos\theta}{r}$$

and a displacement parallel to the line of action of F of amount

$$\frac{(3-4\sigma)(1+\sigma)}{2(1-\sigma)}\frac{F}{4\pi E}\frac{1}{r}.$$

The effects of forces applied at different points and in different directions can be obtained by summation, and the effect of continuously distributed forces can be obtained by integration.

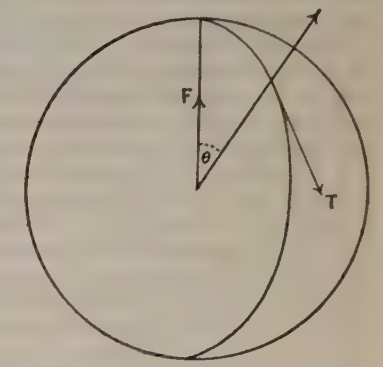

FIG. 30.

72. The stress system considered in § 71 is equivalent, on the plane through the origin at right angles to the line of action of F, to a resultant pressure of magnitude $\frac{1}{2}$F at the origin and a radial traction of amount $\frac{1-2\sigma}{2(1-\sigma)}\frac{F}{4\pi r^2}$, and, by the application of this system of tractions to a solid bounded by a plane, the displacement just described would be produced. There is also another stress system for a solid so bounded which is equivalent, on the same plane, to a resultant pressure at the origin, and a radial traction proportional to $1/r^2$, but these are in the ratio $2\pi:r^{-2}$, instead of being in the ratio $4\pi(1-\sigma):(1-2\sigma)r^{-2}$.

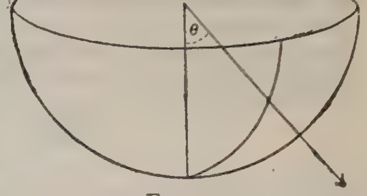

FIG. 31.

The second stress system (see fig. 31) consists of:

(1) radial pressure $F'r^{-2}$,

(2) tension in the meridian plane across the radius vector of amount

$$F'r^{-2}\cos\theta/(1+\cos\theta),$$

(3) tension across the meridian plane of amount

$$F'r^{-2}/(1+\cos\theta),$$

(4) shearing stress as in § 71 of amount

$$F'r^{-2}\sin\theta/(1+\cos\theta),$$

and the stress across the plane boundary consists of a resultant pressure of magnitude $2\pi F'$ and a radial traction of amount $F'r^{-2}$. If then we superpose the component stresses of the last section multiplied by $4(1-\sigma)W/F$, and the component stresses here written down multiplied by $-(1-2\sigma)\ W/2\pi F'$, the stress on the plane boundary will reduce to a single pressure W at the origin. We shall thus obtain the stress system at any point due to such a force applied at one point of the boundary.

---

[1] The line joining the points of contact must be normal to the planes.

In the stress system thus arrived at the traction across any plane parallel to the boundary is directed away from the place where W is supported, and its amount is $3W\cos^2\theta/2\pi r^2$. The corresponding displacement consists of

(1) a horizontal displacement radially outwards from the vertical through the origin of amount

$$\frac{W(1+\sigma)\sin\theta}{2\pi Er}\left(\cos\theta-\frac{1-2\sigma}{1+\cos\theta}\right);$$

(2) a vertical displacement downwards of amount

$$\frac{W(1+\sigma)}{2\pi Er}\{2(1-\sigma)+\cos^2\theta\}.$$

The effects produced by a system ot loads on a solid bounded by a plane can be deduced.

The results for a solid body bounded by an infinite plane may be interpreted as giving the local effects of forces applied to a small part of the surface of a body. The results show that pressure is transmitted into a body from the boundary in such a way that the traction at a point on a section parallel to the boundary is the same at all points of any sphere which touches the boundary at the point of pressure, and that its amount at any point is inversely proportional to the square of the radius of this sphere, while its direction is that of a line drawn from the point of pressure to the point at which the traction is estimated. The transmission of force through a solid body indicated by this result was strikingly demonstrated in an attempt that was made to measure the lunar deflexion of gravity; it was found that the weight of the observer on the floor of the laboratory produced a disturbance of the instrument sufficient to disguise completely the effect which the instrument had been designed to measure (see G. H. Darwin, *The Tides and Kindred Phenomena in the Solar System*, London, 1898).

73. There is a corresponding theory of two-dimensional systems, that is to say, systems in which either the displacement is parallel to a fixed plane, or there is no traction across any plane of a system of parallel planes. This theory shows that, when pressure is applied at a point of the edge of a plate in any direction in the plane of the plate, the stress developed in the plate consists exclusively of radial pressure across any circle having the point of pressure as centre, and the magnitude of this pressure is the same at all points of any circle which touches the edge at the point of pressure, and its amount at any point is inversely proportional to the radius of this circle. This result leads to a number of interesting solutions of problems relating to plane systems; among these may be mentioned the problem of a circular plate strained by any forces applied at its edge.

74. The results stated in § 72 have been applied to give an account of the nature of the actions concerned in the impact of two solid bodies. The dissipation of energy involved in the impact is neglected, and the resultant pressure between the bodies at any instant during the impact is equal to the rate of destruction of momentum of either along the normal to the plane of contact drawn towards the interior of the other. It has been shown that in general the bodies come into contact over a small area bounded by an ellipse, and remain in contact for a time which varies inversely as the fifth root of the initial relative velocity.

For equal spheres of the same material, with $\sigma=\frac{1}{4}$, impinging directly with relative velocity v, the patches that come into contact are circles of radius

$$\left(\frac{45\pi}{256}\right)^{\frac{1}{5}}\left(\frac{v}{V}\right)^{\frac{2}{5}}r,$$

where r is the radius of either, and V the velocity of longitudinal waves in a thin bar of the material. The duration of the impact is approximately

$$(2\cdot9432)\left(\frac{2025\pi^2}{512}\right)^{1/5}\frac{r}{v^{1/5}V^{4/5}}.$$

For two steel spheres of the size of the earth impinging with a velocity of 1 cm. per second the duration of the impact would be about twenty-seven hours. The fact that the duration of impact is, for moderate velocities, a considerable multiple of the time taken by a wave of compression to travel through either of two impinging bodies has been ascertained experimentally, and constitutes the reason for the adequacy of the statical theory here described.

75. *Spheres and Cylinders.*—Simple results can be found for spherical and cylindrical bodies strained by radial forces.

For a sphere of radius a, and of homogeneous isotropic material of density ρ, strained by the mutual gravitation of its parts, the stress at a distance r from the centre consists of

(1) uniform hydrostatic pressure of amount $\frac{1}{10}g\rho a(3-\sigma)/(1-\sigma)$,
(2) radial tension of amount $\frac{1}{10}g\rho(r^2/a)(3-\sigma)/(1-\sigma)$,
(3) uniform tension at right angles to the radius vector of amount

$$\tfrac{1}{10}g\rho(r^2/a)(1+3\sigma)/(1-\sigma),$$

where g is the value of gravity at the surface. The corresponding strains consist of

(1) uniform contraction of all lines of the body of amount

$$\tfrac{1}{30}k^{-1}g\rho a(3-\sigma)/(1-\sigma),$$

(2) radial extension of amount $\frac{1}{10}k^{-1}g\rho(r^2/a)(1+\sigma)/(1-\sigma)$,
(3) extension in any direction at right angles to the radius vector of amount

$$\tfrac{1}{30}k^{-1}g\rho(r^2/a)(1+\sigma)/(1-\sigma),$$

where k is the modulus of compression. The volume is diminished by the fraction $g\rho a/5k$ of itself. The parts of the radii vectores within the sphere $r=a\{(3-\sigma)/(3+3\sigma)\}^{1/2}$ are contracted, and the parts without this sphere are extended. The application of the above results to the state of the interior of the earth involves a neglect of the caution emphasized in § 40, viz. that the strain determined by the solution must be small if the solution is to be accepted. In a body of the size and mass of the earth, and having a resistance to compression and a rigidity equal to those of steel, the radial contraction at the centre, as given by the above solution, would be nearly $\frac{1}{3}$, and the radial extension at the surface nearly $\frac{1}{6}$, and these fractions can by no means be regarded as "small."

76. In a spherical shell of homogeneous isotropic material, of internal radius r_1 and external radius r_0, subjected to pressure p_0 on the outer surface, and p_1 on the inner surface, the stress at any point distant r from the centre consists of

(1) uniform tension in all directions of amount $\dfrac{p_1r_1^3-p_0r_0^3}{r_0^3-r_1^3}$,

(2) radial pressure of amount $\dfrac{p_1-p_0}{r_0^3-r_1^3}\dfrac{r_0^3r_1^3}{r^3}$,

(3) tension in all directions at right angles to the radius vector of amount

$$\frac{1}{2}\frac{p_1-p_0}{r_0^3-r_1^3}\frac{r_0^3r_1^3}{r^3}.$$

The corresponding strains consist of

(1) uniform extension of all lines of the body of amount

$$\frac{1}{3k}\frac{p_1r_1^3-p_0r_0^3}{r_0^3-r_1^3},$$

(2) radial contraction of amount $\dfrac{1}{2\mu}\dfrac{p_1-p_0}{r_0^3-r_1^3}\dfrac{r_0^3r_1^3}{r^3}$,

(3) extension in all directions at right angles to the radius vector of amount

$$\frac{1}{4\mu}\frac{p_1-p_0}{r_0^3-r_1^3}\frac{r_0^3r_1^3}{r^3},$$

where μ is the modulus of rigidity of the material, $=\frac{1}{2}E/(1+\sigma)$. The volume included between the two surfaces of the body is increased by the fraction $\dfrac{p_1r_1^3-p_0r_0^3}{k(r_0^3-r_1^3)}$ of itself, and the volume within the inner surface is increased by the fraction

$$\frac{3(p_1-p_0)}{4\mu}\frac{r_0^3}{r_0^3-r_1^3}+\frac{p_1r_1^3-p_0r_0^3}{k(r_0^3-r_1^3)}$$

of itself. For a shell subject only to internal pressure p the greatest extension is the extension at right angles to the radius at the inner surface, and its amount is

$$\frac{pr_1^3}{r_0^3-r_1^3}\left(\frac{1}{3k}+\frac{1}{4\mu}\frac{r_0^3}{r_1^3}\right);$$

the greatest tension is the transverse tension at the inner surface, and its amount is $p(\frac{1}{2}r_0^3+r_1^3)/(r_0^3-r_1^3)$.

77. In the problem of a cylindrical shell under pressure a complication may arise from the effects of the ends; but when the ends are free from stress the solution is very simple. With notation similar to that in § 76 it can be shown that the stress at a distance r from the axis consists of

(1) uniform tension in all directions at right angles to the axis of amount

$$\frac{p_1r_1^2-p_0r_0^2}{r_0^2-r_1^2},$$

(2) radial pressure of amount $\dfrac{p_1-p_0}{r_0^2-r_1^2}\dfrac{r_0^2r_1^2}{r^2}$,

(3) hoop tension numerically equal to this radial pressure.

The corresponding strains consist of

(1) uniform extension of all lines of the material at right angles to the axis of amount

$$\frac{1-\sigma}{\mathrm{E}}\frac{p_1r_1{}^2-p_0r_0{}^2}{r_0{}^2-r_1{}^2},$$

(2) radial contraction of amount

$$\frac{1+\sigma}{\mathrm{E}}\frac{p_1-p_0}{r_0{}^2-r_1{}^2}\frac{r_0{}^2r_1{}^2}{r^2},$$

(3) extension along the circular filaments numerically equal to this radial contraction,

(4) uniform contraction of the longitudinal filaments of amount

$$\frac{2\sigma}{\mathrm{E}}\frac{p_1r_1{}^2-p_0r_0{}^2}{r_0{}^2-r_1{}^2}.$$

For a shell subject only to internal pressure p the greatest extension is the circumferential extension at the inner surface, and its amount is

$$\frac{p}{\mathrm{E}}\left(\frac{r_0{}^2+r_1{}^2}{r_0{}^2-r_1{}^2}+\sigma\right);$$

the greatest tension is the hoop tension at the inner surface, and its amount is $p(r_0{}^2+r_1{}^2)/(r_0{}^2-r_1{}^2)$.

78. When the ends of the tube, instead of being free, are closed by disks, so that the tube becomes a closed cylindrical vessel, the longitudinal extension is determined by the condition that the resultant longitudinal tension in the walls balances the resultant normal pressure on either end. This condition gives the value of the extension of the longitudinal filaments as

$$(p_1r_1{}^2-p_0r_0{}^2)/3k(r_0{}^2-r_1{}^2),$$

where k is the modulus of compression of the material. The result may be applied to the experimental determination of k, by measuring the increase of length of a tube subjected to internal pressure (A. Mallock, *Proc. R. Soc. London*, lxxiv., 1904, and C. Chree, *ibid.*).

79. The results obtained in § 77 have been applied to gun construction; we may consider that one cylinder is heated so as to slip over another upon which it shrinks by cooling, so that the two form a single body in a condition of initial stress.

We take P as the measure of the pressure between the two, and p for the pressure within the inner cylinder by which the system is afterwards strained, and denote by r' the radius of the common surface. To obtain the stress at any point we superpose the system consisting of radial pressure $p\frac{r_1{}^2}{r^2}\frac{r_0{}^2-r^2}{r_0{}^2-r_1{}^2}$ and hoop tension $p\frac{r_1{}^2}{r^2}\frac{r_0{}^2+r^2}{r_0{}^2-r_1{}^2}$ upon a system which, for the outer cylinder, consists of radial pressure $\mathrm{P}\frac{r'^2}{r^2}\frac{r_0{}^2-r^2}{r_0{}^2-r'^2}$ and hoop tension $\mathrm{P}\frac{r'^2}{r^2}\frac{r_0{}^2+r^2}{r_0{}^2-r'^2}$, and for the inner cylinder consists of radial pressure $\mathrm{P}\frac{r'^2}{r^2}\frac{r^2-r_1{}^2}{r'^2-r_1{}^2}$ and hoop tension $\mathrm{P}\frac{r'^2}{r^2}\frac{r^2+r_1{}^2}{r'^2-r_1{}^2}$. The hoop tension at the inner surface is less than it would be for a tube of equal thickness without initial stress in the ratio

$$1-\frac{\mathrm{P}}{p}\frac{2r'^2}{r_0{}^2+r_1{}^2}\frac{r_0{}^2-r_1{}^2}{r'^2-r_1{}^2}:1.$$

This shows how the strength of the tube is increased by the initial stress. When the initial stress is produced by tightly wound wire, a similar gain of strength accrues.

80. In the problem of determining the distribution of stress and strain in a circular cylinder, rotating about its axis, simple solutions have been obtained which are sufficiently exact for the two special cases of a thin disk and a long shaft.

Suppose that a circular disk of radius a and thickness $2l$, and of density ρ, rotates about its axis with angular velocity ω, and consider the following systems of superposed stresses at any point distant r from the axis and z from the middle plane:

(1) uniform tension in all directions at right angles to the axis of amount $\frac{1}{8}\omega^2\rho a^2(3+\sigma)$,

(2) radial pressure of amount $\frac{1}{8}\omega^2\rho r^2(3+\sigma)$,

(3) pressure along the circular filaments of amount $\frac{1}{8}\omega^2\rho r^2(1+3\sigma)$,

(4) uniform tension in all directions at right angles to the axis of amount $\frac{1}{6}\omega^2\rho(l^2-3z^2)\sigma(1+\sigma)/(1-\sigma)$.

The corresponding strains may be expressed as

(1) uniform extension of all filaments at right angles to the axis of amount

$$\frac{1-\sigma}{\mathrm{E}}\tfrac{1}{8}\omega^2\rho a^2(3+\sigma),$$

(2) radial contraction of amount

$$\frac{1-\sigma^2}{\mathrm{E}}\tfrac{3}{8}\omega^2\rho r^2,$$

(3) contraction along the circular filaments of amount

$$\frac{1-\sigma^2}{\mathrm{E}}\tfrac{1}{8}\omega^2\rho r^2,$$

(4) extension of all filaments at right angles to the axis of amount

$$\frac{1}{\mathrm{E}}\tfrac{1}{6}\omega^2\rho(l^2-3_z{}^2)\sigma(1+\sigma),$$

(5) contraction of the filaments normal to the plane of the disk of amount

$$\frac{2\sigma}{\mathrm{E}}\tfrac{1}{8}\omega^2\rho a^2(3+\sigma)-\frac{\sigma}{\mathrm{E}}\tfrac{1}{2}\omega^2\rho r^2(1+\sigma)+\frac{2\sigma}{\mathrm{E}}\tfrac{1}{6}\omega^2\rho(l^2=3z^2)\sigma\frac{(1+\sigma)}{1-\sigma}.$$

The greatest extension is the circumferential extension near the centre, and its amount is

$$\frac{(3+\sigma)(1-\sigma)}{8\mathrm{E}}\omega^2\rho a^2+\frac{\sigma(1+\sigma)}{6\mathrm{E}}\omega^2\rho l^2.$$

The longitudinal contraction is required to make the plane faces of the disk free from pressure, and the terms in l and z enable us to avoid tangential traction on any cylindrical surface. The system of stresses and strains thus expressed satisfies all the conditions, except that there is a small radial tension on the bounding surface of amount per unit area $\frac{1}{6}\omega^2\rho(l^2-3z^2)\sigma(1+\sigma)/(1-\sigma)$. The resultant of these tensions on any part of the edge of the disk vanishes, and the stress in question is very small in comparison with the other stresses involved when the disk is thin; we may conclude that, for a thin disk, the expressions given represent the actual condition at all points which are not very close to the edge (cf. § 55). The effect to the longitudinal contraction is that the plane faces become slightly concave (fig. 32).

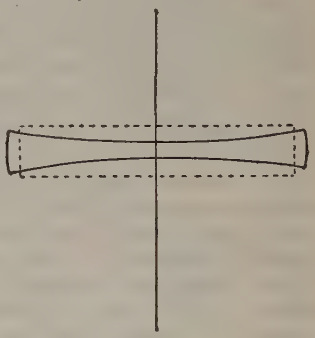

FIG. 32.

81. The corresponding solution for a disk with a circular axle-hole (radius b) will be obtained from that given in the last section by superposing the following system of additional stresses:

(1) radial tension of amount $\frac{1}{8}\omega^2\rho b^2(1-a^2/r^2)(3+\sigma)$,

(2) tension along the circular filaments of amount

$$\tfrac{1}{8}\omega^2\rho b^2(1+a^2/r^2)(3+\sigma).$$

The corresponding additional strains are

(1) radial contraction of amount

$$\frac{3+\sigma}{8\mathrm{E}}\left\{(1+\sigma)\frac{a^2}{r^2}-(1-\sigma)\right\}\omega^2\rho b^2,$$

(2) extension along the circular filaments of amount

$$\frac{3+\sigma}{8\mathrm{E}}\left\{(1+\sigma)\frac{a^2}{r^2}+(1-\sigma)\right\}\omega^2\rho b^2.$$

(3) contraction of the filaments parallel to the axis of amount

$$\frac{\sigma(3+\sigma)}{4\mathrm{E}}\omega^2\rho b^2.$$

Again, the greatest extension is the circumferential extension at the inner surface, and, when the hole is very small, its amount is nearly double what it would be for a complete disk.

82. In the problem of the rotating shaft we have the following stress-system:

(1) radial tension of amount $\frac{1}{8}\omega^2\rho(a^2-r^2)(3-2\sigma)/(1-\sigma)$,

(2) circumferential tension of amount

$$\tfrac{1}{8}\omega^2\rho\{a^2(3-2\sigma)/(1-\sigma)-r^2(1+2\sigma)/(1-\sigma)\},$$

(3) longitudinal tension of amount $\frac{1}{4}\omega^2\rho(a^2-2r^2)\sigma/(1-\sigma)$.

The resultant longitudinal tension at any normal section vanishes, and the radial tension vanishes at the bounding surface; and thus the expressions here given may be taken to represent the actual condition at all points which are not very close to the ends of the shaft. The contraction of the longitudinal filaments is uniform and equal to $\frac{1}{2}\omega^2\rho a^2\sigma/\mathrm{E}$. The greatest extension in the rotating shaft is the circumferential extension close to the axis, and its amount is $\frac{1}{8}\omega^2\rho a^2(3-5\sigma)/\mathrm{E}(1-\sigma)$.

The value of any theory of the strength of long rotating shafts founded on these formulae is diminished by the circumstance that at sufficiently high speeds the shaft may tend to take up a curved form, the straight form being unstable. The shaft is then said to *whirl*. This occurs when the period of rotation of the shaft is very nearly coincident with one of its periods of lateral vibration. The lowest speed at which whirling can take place in a shaft of length l, freely supported at its ends, is given by the formula

$$\omega^2\rho=\tfrac{1}{4}\mathrm{E}a^2(\pi/l)^4.$$

As in § 61, this formula should not be applied unless the length of the shaft is a considerable multiple of its diameter. It implies that whirling is to be expected whenever ω approaches this critical value.

83. When the forces acting upon a spherical or cylindrical body are not radial, the problem becomes more complicated. In the case of the sphere deformed by any forces it has been completely solved, and the solution has been applied by Lord Kelvin and

Sir G. H. Darwin to many interesting questions of cosmical physics. The nature of the stress produced in the interior of the earth by the weight of continents and mountains, the spheroidal figure of a rotating solid planet, the rigidity of the earth, are among the questions which have in this way been attacked. Darwin concluded from his investigation that, to support the weight of the existing continents and mountain ranges, the materials of which the earth is composed must, at great depths (1600 kilometres), have at least the strength of granite. Kelvin concluded from his investigation that the actual heights of the tides in the existing oceans can be accounted for only on the supposition that the interior of the earth is solid, and of rigidity nearly as great as, if not greater than, that of steel.

84. Some interesting problems relating to the strains produced in a cylinder of finite length by forces distributed symmetrically round the axis have been solved. The most important is that of a cylinder crushed between parallel planes in contact with its plane ends. The solution was applied to explain the discrepancies that have been observed in different tests of crushing strength according as the ends of the test specimen are or are not prevented from spreading. It was applied also to explain the fact that in such tests small conical pieces are sometimes cut out at the ends subjected to pressure.

85. *Vibrations and Waves.*—When a solid body is struck, or otherwise suddenly disturbed, it is thrown into a state of vibration. There always exist dissipative forces which tend to destroy the vibratory motion, one cause of the subsidence of the motion being the communication of energy to surrounding bodies. When these dissipative forces are disregarded, it is found that an elastic solid body is capable of vibrating in such a way that the motion of any particle is simple harmonic motion, all the particles completing their oscillations in the same period and being at any instant in the same phase, and the displacement of any selected one in any particular direction bearing a definite ratio to the displacement of an assigned one in an assigned direction. When a body is moving in this way it is said to be *vibrating in a normal mode.* For example, when a tightly stretched string of negligible flexural rigidity, such as a violin string may be taken to be, is fixed at the ends, and vibrates transversely in a normal mode, the displacements of all the particles have the same direction, and their magnitudes are proportional at any instant to the ordinates of a curve of sines. Every body possesses an infinite number of normal modes of vibration, and the *frequencies* (or numbers of vibrations per second) that belong to the different modes form a sequence of increasing numbers. For the string, above referred to, the fundamental tone and the various overtones form an harmonic scale, that is to say, the frequencies of the normal modes of vibration are proportional to the integers 1, 2, 3, . . . In all these modes except the first the string vibrates as if it were divided into a number of equal pieces, each having fixed ends; this number is in each case the integer defining the frequency. In general the normal modes of vibration of a body are distinguished one from another by the number and situation of the surfaces (or other *loci*) at which some characteristic displacement or traction vanishes. The problem of determining the normal modes and frequencies of free vibration of a body of definite size, shape and constitution, is a mathematical problem of a similar character to the problem of determining the state of stress in the body when subjected to given forces. The bodies which have been most studied are strings and thin bars, membranes, thin plates and shells, including bells, spheres and cylinders. Most of the results are of special importance in their bearing upon the theory of sound.

86. The most complete success has attended the efforts of mathematicians to solve the problem of free vibrations for an isotropic sphere. It appears that the modes of vibration fall into two classes: one characterized by the absence of a radial component of displacement, and the other by the absence of a radial component of rotation (§ 14). In each class there is a doubly infinite number of modes. The displacement in any mode is determined in terms of a single spherical harmonic function, so that there are modes of each class corresponding to spherical harmonics of every integral degree; and for each degree there is an infinite number of modes, differing from one another in the number and position of the concentric spherical surfaces at which some characteristic displacement vanishes. The most interesting modes are those in which the sphere becomes slightly spheroidal, being alternately prolate and oblate during the course of a vibration; for these vibrations tend to be set up in a spherical planet by tide-generating forces. In a sphere of the size of the earth, supposed to be incompressible and as rigid as steel, the period of these vibrations is 66 minutes.

87. The theory of free vibrations has an important bearing upon the question of the strength of structures subjected to sudden blows or shocks. The stress and strain developed in a body by sudden applications of force may exceed considerably those which would be produced by a gradual application of the same forces. Hence there arises the general question of *dynamical resistance*, or of the resistance of a body to forces applied so quickly that the inertia of the body comes sensibly into play. In regard to this question we have two chief theoretical results. The first is that the strain produced by a force suddenly applied may be as much as twice the statical strain, that is to say, as the strain which would be produced by the same force when the body is held in equilibrium under its action; the second is that the sudden reversal of the force may produce a strain three times as great as the statical strain. These results point to the importance of specially strengthening the parts of any machine (*e.g.* screw propeller shafts) which are subject to sudden applications or reversals of load. The theoretical limits of twice, or three times, the statical strain are not in general attained. For example, if a thin bar hanging vertically from its upper end is suddenly loaded at its lower end with a weight equal to its own weight, the greatest dynamical strain bears to the greatest statical strain the ratio 1·63:1; when the attached weight is four times the weight of the bar the ratio becomes 1·84:1. The method by which the result just mentioned is reached has recently been applied to the question of the breaking of winding ropes used in mines. It appeared that, in order to bring the results into harmony with the observed facts, the strain in the supports must be taken into account as well as the strain in the rope (J. Perry, *Phil. Mag.*, 1906 (vi.), vol. ii.).

88. The immediate effect of a blow or shock, locally applied to a body, is the generation of a wave which travels through the body from the locality first affected. The question of the propagation of waves through an elastic solid body is historically of very great importance; for the first really successful efforts to construct a theory of elasticity (those of S. D. Poisson, A. L. Cauchy and G. Green) were prompted, at least in part, by Fresnel's theory of the propagation of light by transverse vibrations. For many years the luminiferous medium was identified with the isotropic solid of the theory of elasticity. Poisson showed that a disturbance communicated to the body gives rise to two waves which are propagated through it with different velocities; and Sir G. G. Stokes afterwards showed that the quicker wave is a wave of irrotational dilatation, and the slower wave is a wave of rotational distortion accompanied by no change of volume. The velocities of the two waves in a solid of density ρ are $\sqrt{\{(\lambda+2\mu)/\rho\}}$ and $\sqrt{(\mu/\rho)}$, λ and μ being the constants so denoted in § 26. When the surface of the body is free from traction, the waves on reaching the surface are reflected; and thus after a little time the body would, if there were no dissipative forces, be in a very complex state of motion due to multitudes of waves passing to and fro through it. This state can be expressed as a state of vibration, in which the motions belonging to the various normal modes (§ 85) are superposed, each with an appropriate amplitude and phase. The waves of dilatation and distortion do not, however, give rise to different modes of vibration, as was at one time supposed, but any mode of vibration in general involves both dilatation and rotation. There are exceptional results for solids of revolution; such solids possess normal modes of vibration which involve no dilatation. The existence of a boundary to the solid body has another effect, besides reflexion, upon the propagation of waves. Lord Rayleigh has shown that any disturbance originating at the surface gives rise to waves which travel away over the surface as well as to waves which travel through the interior; and any internal disturbance, on reaching the surface, also gives rise to such superficial waves. The velocity of the superficial waves is a little less than that of the waves of distortion:

$0{\cdot}9554\sqrt{(\mu/\rho)}$ when the material is incompressible $0{\cdot}9194\sqrt{(\mu/\rho)}$ when the Poisson's ratio belonging to the material is $\frac{1}{4}$.

89. These results have an application to the propagation of earthquake shocks (see also EARTHQUAKE). An internal disturbance should, if the earth can be regarded as solid, give rise to three wave-motions: two propagated through the interior of the earth with different velocities, and a third propagated over the surface. The results of seismographic observations have independently led to the recognition of three phases of the recorded vibrations: a set of "preliminary tremors" which are received at different stations at such times as to show that they are transmitted directly through the interior of the earth with a velocity of about 10 km. per second, a second set of preliminary tremors which are received at different stations at such times as to show that they are transmitted directly through the earth with a velocity of about 5 km. per second, and a "main shock," or set of large vibrations, which becomes sensible at different stations at such times as to show that a wave is transmitted over the surface of the earth with a velocity of about 3 km. per second. These results can be interpreted if we assume that the earth is a solid body the greater part of which is practically homogeneous, with high values for the rigidity and the resistance to compression, while the superficial portions have lower values for these quantities. The rigidity of the central portion would be about $(1{\cdot}4)10^{12}$ dynes per square cm., which is considerably greater than that of steel, and the resistance to compression would be about $(3{\cdot}8)10^{12}$ dynes per square cm. which is much greater than that of any known material. The high value of the resistance to compression is not surprising when account is taken of the great pressures, due to gravitation, which must exist in the interior of the earth. The high value of the rigidity can be regarded as a confirmation of Lord Kelvin's estimate founded on tidal observations (§ 83).

90. *Strain produced by Heat.*—The mathematical theory of elasticity as at present developed takes no account of the strain which is produced in a body by unequal heating. It appears to be impossible in the present state of knowledge to form as in § 39 a system of differential equations to determine both the stress and the temperature at any point of a solid body the temperature of which is liable to variation. In the cases of isothermal and adiabatic changes, that is to say, when the body is slowly strained without variation of temperature, and also when the changes are effected so rapidly that there is no gain or loss of heat by any element, the internal energy of the body is sufficiently expressed by the strain-energy-function (§§ 27, 30). Thus states of equilibrium and of rapid vibration can be determined by the theory that has been explained above. In regard to thermal effects we can obtain some indications from general thermodynamic theory. The following passages extracted from the article "Elasticity" contributed to the 9th edition of the *Encyclopaedia Britannica* by Sir W. Thomson (Lord Kelvin) illustrate the nature of these indications:—"From thermodynamic theory it is concluded that cold is produced whenever a solid is strained by opposing, and heat when it is strained by yielding to, any elastic force of its own, the strength of which would diminish if the temperature were raised; but that, on the contrary, heat is produced when a solid is strained against, and cold when it is strained by yielding to, any elastic force of its own, the strength of which would increase if the temperature were raised. When the strain is a condensation or dilatation, uniform in all directions, a fluid may be included in the statement. Hence the following propositions:—

"(1) A cubical compression of any elastic fluid or solid in an ordinary condition causes an evolution of heat; but, on the contrary, a cubical compression produces cold in any substance, solid or fluid, in such an abnormal state that it would contract if heated while kept under constant pressure. Water below its temperature (3·9° Cent.) of maximum density is a familiar instance.

"(2) If a wire already twisted be suddenly twisted further, always, however, within its limits of elasticity, cold will be produced; and if it be allowed suddenly to untwist, heat will be evolved from itself (besides heat generated externally by any work allowed to be wasted, which it does in untwisting). It is assumed that the torsional rigidity of the wire is diminished by an elevation of temperature, as the writer of this article had found it to be for copper, iron, platinum and other metals.

"(3) A spiral spring suddenly drawn out will become lower in temperature, and will rise in temperature when suddenly allowed to draw in. [This result has been experimentally verified by Joule ('Thermodynamic Properties of Solids,' *Phil. Trans.*, 1858) and the amount of the effect found to agree with that calculated, according to the preceding thermodynamic theory, from the amount of the weakening of the spring which he found by experiment.]

"(4) A bar or rod or wire of any substance with or without a weight hung on it, or experiencing any degree of end thrust, to begin with, becomes cooled if suddenly elongated by end pull or by diminution of end thrust, and warmed if suddenly shortened by end thrust or by diminution of end pull; except abnormal cases in which with constant end pull or end thrust elevation of temperature produces shortening; in every such case pull or diminished thrust produces elevation of temperature, thrust or diminished pull lowering of temperature.

"(5) An india-rubber band suddenly drawn out (within its limits of elasticity) becomes warmer; and when allowed to contract, it becomes colder. Any one may easily verify this curious property by placing an india-rubber band in slight contact with the edges of the lips, then suddenly extending it—it becomes very perceptibly warmer: hold it for some time stretched nearly to breaking, and then suddenly allow it to shrink—it becomes quite startlingly colder, the cooling effect being sensible not merely to the lips but to the fingers holding the band. The first published statement of this curious observation is due to J. Gough (*Mem. Lit. Phil. Soc. Manchester*, 2nd series, vol. i. p. 288), quoted by Joule in his paper on 'Thermodynamic Properties of Solids' (cited above). The thermodynamic conclusion from it is that an india-rubber band, stretched by a constant weight of sufficient amount hung on it, must, when heated, pull up the weight, and, when cooled, allow the weight to descend: this Gough, independently of thermodynamic theory, had found to be actually the case. The experiment any one can make with the greatest ease by hanging a few pounds weight on a common india-rubber band, and taking a red-hot coal in a pair of tongs, or a red-hot poker, and moving it up and down close to the band. The way in which the weight rises when the red-hot body is near, and falls when it is removed, is quite startling. Joule experimented on the amount of shrinking per degree of elevation of temperature, with different weights hung on a band of vulcanized india-rubber, and found that they closely agreed with the amounts calculated by Thomson's theory from the heating effects of pull, and cooling effects of ceasing to pull, which he had observed in the same piece of india-rubber."

91. *Initial Stress.*—It has been pointed out above (§ 20) that the "unstressed" state, which serves as a zero of reckoning for strains and stresses is never actually attained, although the strain (measured from this state), which exists in a body to be subjected to experiment, may be very slight. This is the case when the "initial stress," or the stress existing before the experiment, is small in comparison with the stress developed during the experiment, and the limit of linear elasticity (§ 32) is not exceeded. The existence of initial stress has been correlated above with the existence of body forces such as the force of gravity, but it is not necessarily dependent upon such forces. A sheet of metal rolled into a cylinder, and soldered to maintain the tubular shape, must be in a state of considerable initial stress quite apart from the action of gravity. Initial stress is utilized in many manufacturing processes, as, for example, in the construction of ordnance, referred to in § 79, in the winding of golf balls by means of india-rubber in a state of high tension (see the report of the case *The Haskell Golf Ball Company* v. *Hutchinson & Main* in *The Times* of March 1, 1906). In the case of a body of ordinary dimensions it is such internal stress

as this which is especially meant by the phrase "initial stress." Such a body, when in such a state of internal stress, is sometimes described as "self-strained." It would be better described as "self-stressed." The somewhat anomalous behaviour of cast iron has been supposed to be due to the existence within the metal of initial stress. As the metal cools, the outer layers cool more rapidly than the inner, and thus the state of initial stress is produced. When cast iron is tested for tensile strength, it shows at first no sensible range either of perfect elasticity or of linear elasticity; but after it has been loaded and unloaded several times its behaviour begins to be more nearly like that of wrought iron or steel. The first tests probably diminish the initial stress.

92. From a mathematical point of view the existence of initial stress in a body which is "self-stressed" arises from the fact that the equations of equilibrium of a body free from body forces or surface tractions, viz. the equations of the type

$$\frac{\partial X_x}{\partial x}+\frac{\partial X_y}{\partial y}+\frac{\partial Z_x}{\partial z}=0,$$

possess solutions which differ from zero. If, in fact, ϕ_1, ϕ_2, ϕ_3 denote any arbitrary functions of x, y, z, the equations are satisfied by putting

$$X_x=\frac{\partial^2\phi_3}{\partial y^2}+\frac{\partial^2\phi_2}{\partial z},\ldots,Y_z=-\frac{\partial^2\phi_1}{\partial y\partial z},\ldots;$$

and it is clear that the functions ϕ_1, ϕ_2, ϕ_3 can be adjusted in an infinite number of ways so that the bounding surface of the body may be free from traction.

93. Initial stress due to body forces becomes most important in the case of a gravitating planet. Within the earth the stress that arises from the mutual gravitation of the parts is very great. If we assumed the earth to be an elastic solid body with moduluses of elasticity no greater than those of steel, the strain (measured from the unstressed state) which would correspond to the stress would be much too great to be calculated by the ordinary methods of the theory of elasticity (§ 75). We require therefore some other method of taking account of the initial stress. In many investigations, for example those of Lord Kelvin and Sir G. H. Darwin referred to in § 83, the difficulty is turned by assuming that the material may be treated as practically incompressible; but such investigations are to some extent incomplete, so long as the corrections due to a finite, even though high, resistance to compression remain unknown. In other investigations, such as those relating to the propagation of earthquake shocks and to gravitational instability, the possibility of compression is an essential element of the problem. By gravitational instability is meant the tendency of gravitating matter to condense into nuclei when slightly disturbed from a state of uniform diffusion; this tendency has been shown by J. H. Jeans (*Phil. Trans.* A. 201, 1903) to have exerted an important influence upon the course of evolution of the solar system. For the treatment of such questions Lord Rayleigh (*Proc. R. Soc. London*, A. 77, 1906) has advocated a method which amounts to assuming that the initial stress is hydrostatic pressure, and that the actual state of stress is to be obtained by superposing upon this initial stress a stress related to the state of strain (measured from the initial state) by the same formulae as hold for an elastic solid body free from initial stress. The development of this method is likely to lead to results of great interest.

Authorities.—In regard to the analysis requisite to prove the results set forth above, reference may be made to A. E. H. Love, *Treatise on the Mathematical Theory of Elasticity* (2nd ed., Cambridge, 1906), where citations of the original authorities will also be found. The following treatises may be mentioned: Navier, *Résumé des leçons sur l'application de la mécanique* (3rd ed., with notes by Saint-Venant, Paris, 1864); G. Lamé, *Leçons sur la théorie mathématique de l'élasticité des corps solides* (Paris, 1852); A. Clebsch, *Theorie der Elasticität fester Körper* (Leipzig, 1862; French translation with notes by Saint-Venant, Paris, 1883); F. Neumann, *Vorlesungen über die Theorie der Elasticität* (Leipzig, 1885); Thomson and Tait, *Natural Philosophy* (Cambridge, 1879, 1883); Todhunter and Pearson, *History of the Elasticity and Strength of Materials* (Cambridge, 1886–1893). The article "Elasticity" by Sir W. Thomson (Lord Kelvin) in 9th ed. of *Encyc. Brit.* (reprinted in his *Mathematical and Physical Papers*, iii., Cambridge, 1890) is especially valuable, not only for the exposition of the theory and its practical applications, but also for the tables of physical constants which are there given. (A. E. H. L.)

ELATERITE, also termed Elastic Bitumen and Mineral Caoutchouc, a mineral hydrocarbon, which occurs at Castleton in Derbyshire, in the lead mines of Odin and elsewhere. It varies somewhat in consistency, being sometimes soft, elastic and sticky; often closely resembling india-rubber; and occasionally hard and brittle. It is usually dark brown in colour and slightly translucent. A substance of similar physical character is found in the Coorong district of South Australia, and is hence termed coorongite, but Prof. Ralph Tate considers this to be a vegetable product.

ELATERIUM, a drug consisting of a sediment deposited by the juice of the fruit of *Ecballium Elaterium*, the squirting cucumber, a native of the Mediterranean region. The plant, which is a member of the natural order Cucurbitaceae, resembles the vegetable marrow in its growth. The fruit resembles a small cucumber, and when ripe is highly turgid, and separates almost at a touch from the fruit stalk. The end of the stalk forms a stopper, on the removal of which the fluid contents of the fruit, together with the seeds, are squirted through the aperture by the sudden contraction of the wall of the fruit. To prepare the drug the fruit is sliced lengthwise and slightly pressed; the greenish and slightly turbid juice thus obtained is strained and set aside; and the deposit of elaterium formed after a few hours is collected on a linen filter, rapidly drained, and dried on porous tiles at a gentle heat. Elaterium is met with in commerce in light, thin, friable, flat or slightly incurved opaque cakes, of a greyish-green colour, bitter taste and tea-like smell.

The drug is soluble in alcohol, but insoluble in water and ether. The official dose is $\frac{1}{10}$-$\frac{1}{2}$ grain, and the British pharmacopeia directs that the drug is to contain from 20 to 25% of the active principle elaterinum or elaterin. A resin in the natural product aids its action. Elaterin is extracted from elaterium by chloroform and then precipitated by ether. It has the formula $C_{20}H_{28}O_5$. It forms colourless scales which have a bitter taste, but it is highly inadvisable to taste either this substance or elaterium. Its dose is $\frac{1}{40}$-$\frac{1}{10}$ grain, and the British pharmacopeia contains a useful preparation, the Pulvis Elaterini Compositus, which contains one part of the active principle in forty.

The action of this drug resembles that of the saline aperients, but is much more powerful. It is the most active hydragogue purgative known, causing also much depression and violent griping. When injected subcutaneously it is inert, as its action is entirely dependent upon its admixture with the bile. The drug is undoubtedly valuable in cases of dropsy and Bright's disease, and also in cases of cerebral haemorrhage, threatened or present. It must not be used except in urgent cases, and must invariably be employed with the utmost care, especially if the state of the heart be unsatisfactory.

ELBA (Gr. *Αἰθαλία*; Lat. *Ilva*), an island off the W. coast of Italy, belonging to the province of Leghorn, from which it is 45 m. S., and 7 m. S.W. of Piombino, the nearest point of the mainland. Pop. (1901) 25,043 (including Pianosa). It is about 19 m. long, 6½ m. broad, and 140 sq. m. in area; and its highest point is 3340 ft. (Monte Capanne). It forms, like Giglio and Monte Cristo, part of a sunken mountain range extending towards Corsica and Sardinia.

The oldest rocks of Elba consist of schist and serpentine which in the eastern part of the island are overlaid by beds containing Silurian and Devonian fossils. The Permian may be represented, but the Trias is absent, and in general the older Palaeozoic rocks are overlaid directly by the Rhaetic and Lias. The Liassic beds are often metamorphosed and the limestones contain garnet and wollastonite. The next geological formation which is represented is the Eocene, consisting of nummulitic limestone, sandstone and schist. The Miocene and Pliocene are absent. The most remarkable feature in the geology of Elba is the extent of the granitic and ophiolitic eruptions of the Tertiary period. Serpentines, peridotites and diabases are interstratified with the Eocene deposits. The granite, which is intruded through the Eocene beds, is associated with a pegmatite containing tourmaline and cassiterite. The celebrated iron ore of Elba is of

Tertiary age and occurs indifferently in all the older rocks. The deposits are superficial, resulting from the opening out of veins at the surface, and consist chiefly of haematite. These ores were worked by the ancients, but so inefficiently that their spoil-heaps can be smelted again with profit. This process is now gone through on the island itself. The granite was also quarried by the Romans, but is not now much worked.

Parts of the island are fertile, and the cultivation of vines, and the tunny and sardine fishery, also give employment to a part of the population. The capital of the island is Portoferraio—pop. (1901) 5987—in the centre of the N. coast, enclosed by an amphitheatre of lofty mountains, the slopes of which are covered with villas and gardens. This is the best harbour, the ancient *Portus Argous.* The town was built and fortified by Cosimo I. in 1548, who called it Cosmopolis. Above the harbour, between the forts Stella and Falcone, is the palace of Napoleon I., and 4 m. to the S.W. is his villa; while on the N. slope of Monte Capanne is another of his country houses. The other villages in the island are Campo nell' Elba, on the S. near the W. end, Marciana and Marciana Marina on the N. of the island near the W. extremity, Porto Longone, on the E. coast, with picturesque Spanish fortifications, constructed in 1602 by Philip III.; Rio dell' Elba and Rio Marina, both on the E. side of the island, in the mining district. At Le Grotte, between Portoferraio and Rio dell' Elba, and at Capo Castello, on the N.E. of the island, are ruins of Roman date.

Elba was famous for its mines in early times, and the smelting furnaces gave it its Greek name of A' θαλία (" soot island "). In Roman times, and until 1900, however, owing to lack of fuel, the smelting was done on the mainland. In 453 B.C. Elba was devastated by a Syracusan squadron. From the 11th to the 14th century it belonged to Pisa, and in 1399 came under the dukes of Piombino. In 1548 it was ceded by them to Cosimo I. of Florence. In 1596 Porto Longone was taken by Philip III. of Spain, and retained until 1709, when it was ceded to Naples. In 1802 the island was given to France by the peace of Amiens. On Napoleon's deposition, the island was ceded to him with full sovereign rights, and he resided there from the 5th of May 1814 to the 26th of February 1815. After his fall it was restored to Tuscany, and passed with it to Italy in 1860.

See Sir R. Colt Hoare, *A Tour through the Island of Elba* (London, 1814).

ELBE (the *Albis* of the Romans and the *Labe* of the Czechs), a river of Germany, which rises in Bohemia not far from the frontiers of Silesia, on the southern side of the Riesengebirge, at an altitude of about 4600 ft. Of the numerous small streams (Seifen or Flessen as they are named in the district) whose confluent waters compose the infant river, the most important are the Weisswasser, or White Water, and the Elbseifen, which is formed in the same neighbourhood, but at a little lower elevation. After plunging down the 140 ft. of the Elbfall, the latter stream unites with the steep torrential Weisswasser at Mädelstegbaude, at an altitude of 2230 ft., and thereafter the united stream of the Elbe pursues a southerly course, emerging from the mountain glens at Hohenelbe (1495 ft.), and continuing on at a soberer pace to Pardubitz, where it turns sharply to the west, and at Kolin (730 ft.), some 27 m. farther on, bends gradually towards the north-west. A little above Brandeis it picks up the Iser, which, like itself, comes down from the Riesengebirge, and at Melnik it has its stream more than doubled in volume by the Moldau, a river which winds northwards through the heart of Bohemia in a sinuous, trough-like channel carved through the plateaux. Some miles lower down, at Leitmeritz (433 ft.), the waters of the Elbe are tinted by the reddish Eger, a stream which drains the southern slopes of the Erzgebirge. Thus augmented, and swollen into a stream 140 yds. wide, the Elbe carves a path through the basaltic mass of the Mittelgebirge, churning its way through a deep, narrow rocky gorge. Then the river winds through the fantastically sculptured sandstone mountains of the " Saxon Switzerland," washing successively the feet of the lofty Lilienstein (932 ft. above the Elbe), the scene of one of Frederick the Great's military exploits in the Seven Years' War, Königstein (797 ft. above the Elbe), where in times of war Saxony has more than once stored her national purse for security, and the pinnacled rocky wall of the Bastei, towering 650 ft. above the surface of the stream. Shortly after crossing the Bohemian-Saxon frontier, and whilst still struggling through the sandstone defiles, the stream assumes a north-westerly direction, which on the whole it preserves right away to the North Sea. At Pirna the Elbe leaves behind it the stress and turmoil of the Saxon Switzerland, rolls through Dresden, with its noble river terraces, and finally, beyond Meissen, enters on its long journey across the North German plain, touching Torgau, Wittenberg, Magdeburg, Wittenberge, Hamburg, Harburg and Altona on the way, and gathering into itself the waters of the Mulde and Saale from the left, and those of the Schwarze Elster, Havel and Elde from the right. Eight miles above Hamburg the stream divides into the Norder (or Hamburg) Elbe and the Süder (or Harburg) Elbe, which are linked together by several cross-channels, and embrace in their arms the large island of Wilhelmsburg and some smaller ones. But by the time the river reaches Blankenese, 7 m. below Hamburg, all these anastomosing branches have been reunited, and the Elbe, with a width of 4 to 9 m. between bank and bank, travels on between the green marshes of Holstein and Hanover until it becomes merged in the North Sea off Cuxhaven. At Kolin the width is about 100 ft., at the mouth of the Moldau about 300, at Dresden 960, and at Magdeburg over 1000. From Dresden to the sea the river has a total fall of only 280 ft., although the distance is about 430 m. For the 75 m. between Hamburg and the sea the fall is only 3¼ ft. One consequence of this is that the bed of the river just below Hamburg is obstructed by a bar, and still lower down is choked with sandbanks, so that navigation is confined to a relatively narrow channel down the middle of the stream. But unremitting efforts have been made to maintain a sufficient fairway up to Hamburg (*q.v.*). The tide advances as far as Geesthacht, a little more than 100 m. from the sea. The river is navigable as far as Melnik, that is, the confluence of the Moldau, a distance of 525 m., of which 67 are in Bohemia. It total length is 725 m., of which 190 are in Bohemia, 77 in the kingdom of Saxony, and 350 in Prussia, the remaining 108 being in Hamburg and other states of Germany. The area of the drainage basin is estimated at 56,000 sq. m.

Navigation.—Since 1842, but more especially since 1871, improvements have been made in the navigability of the Elbe by all the states which border upon its banks. As a result of these labours there is now in the Bohemian portion of the river a minimum depth of 2 ft. 8 in., whilst from the Bohemian frontier down to Magdeburg the minimum depth is 3 ft., and from Magdeburg to Hamburg, 3 ft. 10 in. In 1896 and 1897 Prussia and Hamburg signed covenants whereby two channels are to be kept open to a depth of 9¾ ft., a width of 656 ft., and a length of 550 yds. between Bunthaus and Ortkathen, just above the bifurcation of the Norder Elbe and the Süder Elbe. In 1869 the maximum burden of the vessels which were able to ply on the upper Elbe was 250 tons; but in 1899 it was increased to 800 tons. The large towns through which the river flows have vied with one another in building harbours, providing shipping accommodation, and furnishing other facilities for the efficient navigation of the Elbe. In this respect the greatest efforts have naturally been made by Hamburg; but Magdeburg, Dresden, Meissen, Riesa, Tetschen, Aussig and other places have all done their relative shares, Magdeburg, for instance, providing a commercial harbour and a winter harbour. In spite, however, of all that has been done, the Elbe remains subject to serious inundations at periodic intervals. Among the worst floods were those of the years 1774, 1799, 1815, 1830, 1845, 1862, 1890 and 1909. The growth of traffic up and down the Elbe has of late years become very considerable. A towing chain, laid in the bed of the river, extends from Hamburg to Aussig, and by this means, as by paddle-tug haulage, large barges are brought from the port of Hamburg into the heart of Bohemia. The fleet of steamers and barges navigating the Elbe is in point of fact greater than on any other German river. In addition to goods thus conveyed, enormous quantities of timber are floated down the Elbe; the weight of the rafts passing the station of Schandau on the Saxon Bohemian frontier amounting in 1901 to 333,000 tons.

A vast amount of traffic is directed to Berlin, by means of the Havel-Spree system of canals, to the Thuringian states and the Prussian province of Saxony, to the kingdom of Saxony and Bohemia, and to the various riverine states and provinces of the lower and middle Elbe. The passenger traffic, which is in the hands of the Sächsisch-Böhmische Dampfschifffahrtsgesellschaft is limited to Bohemia and Saxony, steamers plying up and down the stream from Dresden to Melnik, occasionally continuing the journey up the Moldau to Prague, and down the river as far as Riesa, near the northern frontier of Saxony, and on the average 1½ million passengers are conveyed.

In 1877–1879, and again in 1888–1895, some 100 m. of canal were dug, 5 to 6½ ft. deep and of various widths, for the purpose of connecting the Elbe, through the Havel and the Spree, with the system of the Oder. The most noteworthy of these connexions are the Elbe Canal (14¼ m. long), the Reek Canal (9½ m.), the Rüdersdorfer Gewässer (11½ m.), the Rheinsberger Canal (11¼ m.), and the Sacrow-Paretzer Canal (10 m.), besides which the Spree has been canalized for a distance of 28 m., and the Elbe for a distance of 70 m. Since 1896 great improvements have been made in the Moldau and the Bohemian Elbe, with the view of facilitating communication between Prague and the middle of Bohemia generally on the one hand, and the middle and lower reaches of the Elbe on the other. In the year named a special commission was appointed for the regulation of the Moldau and Elbe between Prague and Aussig, at a cost estimated at about £1,000,000, of which sum two-thirds were to be borne by the Austrian empire and one-third by the kingdom of Bohemia. The regulation is effected by locks and movable dams, the latter so designed that in times of flood or frost they can be dropped flat on the bottom of the river. In 1901 the Austrian government laid before the Reichsrat a canal bill, with proposals for works estimated to take twenty years to complete, and including the construction of a canal between the Oder, starting at Prerau, and the upper Elbe at Pardubitz, and for the canalization of the Elbe from Pardubitz to Melnik (see AUSTRIA: *Waterways*). In 1900 Lübeck was put into direct communication with the Elbe at Lauenburg by the opening of the Elbe-Trave Canal, 42 m. in length, and constructed at a cost of £1,177,700, of which the state of Lübeck contributed £802,700, and the kingdom of Prussia £375,000. The canal has been made 72 ft. wide at the bottom, 105 to 126 ft. wide at the top, has a minimum depth of 8⅙ ft., and is equipped with seven locks, each 262½ ft. long and 39¼ ft. wide. It is thus able to accommodate vessels up to 800 tons burden; and the passage from Lübeck to Lauenburg occupies 18 to 21 hours. In the first year of its being open (June 1900 to June 1901) a total of 115,000 tons passed through the canal.[1] A gigantic project has also been put forward for providing water communication between the Rhine and the Elbe, and so with the Oder, through the heart of Germany. This scheme is known as the Midland Canal. Another canal has been projected for connecting Kiel with the Elbe by means of a canal trained through the Plön Lakes.

Bridges.—The Elbe is crossed by numerous bridges, as at Königgrätz, Pardubitz, Kolin, Leitmeritz, Tetschen, Schandau, Pirna, Dresden, Meissen, Torgau, Wittenberg, Rosslau, Barby, Magdeburg, Rathenow, Wittenberge, Dömitz, Lauenburg, and Hamburg and Harburg. At all these places there are railway bridges, and nearly all, but more especially those in Bohemia, Saxony and the middle course of the river—these last on the main lines between Berlin and the west and south-west of the empire—possess a greater or less strategic value. At Leitmeritz there is an iron trellis bridge, 600 yds long. Dresden has four bridges, and there is a fifth bridge at Loschwitz, about 3 m. above the city. Meissen has a railway bridge, in addition to an old road bridge. Magdeburg is one of the most important railway centres in northern Germany; and the Elbe, besides being bridged—it divides there into three arms—several times for vehicular traffic, is also spanned by two fine railway bridges. At both Hamburg and Harburg, again, there are handsome railway bridges, the one (1868–1873 and 1894) crossing the northern Elbe, and the other (1900) the southern Elbe; and the former arm is also crossed by a fine triple-arched bridge (1888) for vehicular traffic.

Fish.—The river is well stocked with fish, both salt-water and fresh-water species being found in its waters, and several varieties of fresh-water fish in its tributaries. The kinds of greatest economic value are sturgeon, shad, salmon, lampreys, eels, pike and whiting.

Tolls.—In the days of the old German empire no fewer than thirty-five different tolls were levied between Melnik and Hamburg, to say nothing of the special dues and privileged exactions of various riparian owners and political authorities. After these had been *de facto*, though not *de jure*, in abeyance during the period of the Napoleonic wars, a commission of the various Elbe states met and drew up a scheme for their regulation, and the scheme, embodied in the Elbe Navigation Acts, came into force in 1822. By this a definite number of tolls, at fixed rates, was substituted for the often arbitrary tolls which had been exacted previously. Still further relief was afforded in 1844 and in 1850, on the latter occasion by the abolition of all tolls between Melnik and the Saxon frontier. But the number of tolls was only reduced to one, levied at Wittenberge, in 1863, about one year after Hanover was induced to give up the Stade or Brunsbüttel toll in return for a compensation of 2,857,340 thalers. Finally, in 1870, 1,000,000 thalers were paid to Mecklenburg and 85,000 thalers to Anhal, which thereupon abandoned all claims to levy tolls upon the Elbe shipping, and thus navigation on the river became at last entirely free.

History.—The Elbe cannot rival the Rhine in the picturesqueness of the scenery it travels through, nor in the glamour which its romantic and legendary associations exercise over the imagination. But it possesses much to charm the eye in the deep glens of the Riesengebirge, amid which its sources spring, and in the bizarre rock-carving of the Saxon Switzerland. It has been indirectly or directly associated with many stirring events in the history of the German peoples. In its lower course, whatever is worthy of record clusters round the historical vicissitudes of Hamburg—its early prominence as a missionary centre (Ansgar) and as a bulwark against Slav and marauding Northman, its commercial prosperity as a leading member of the Hanseatic League, and its sufferings during the Napoleonic wars, especially at the hands of the ruthless Davoût. The bridge over the river at Dessau recalls the hot assaults of the *condottiere* Ernst von Mansfeld in April 1626, and his repulse by the crafty generalship of Wallenstein. But three years later this imperious leader was checked by the heroic resistance of the " Maiden " fortress of Magdeburg; though two years later still she lost her reputation, and suffered unspeakable horrors at the hands of Tilly's lawless and unlicensed soldiery. Mühlberg, just outside the Saxon frontier, is the place where Charles V. asserted his imperial authority over the Protestant elector of Saxony, John Frederick, the Magnanimous or Unfortunate, in 1547. Dresden, Aussig and Leitmeritz are all reminiscent of the fierce battles of the Hussite wars, and the last named of the Thirty Years' War. But the chief historical associations of the upper (*i.e.* the Saxon and Bohemian) Elbe are those which belong to the Seven Years' War, and the struggle of the great Frederick of Prussia against the power of Austria and her allies. At Pirna (and Lilienstein) in 1756 he caught the entire Saxon army in his fowler's net, after driving back at Lobositz the Austrian forces which were hastening to their asistance; but only nine months later he lost his reputation for " invincibility " by his crushing defeat at Kolin, where the great highway from Vienna to Dresden crosses the Elbe. Not many miles distant, higher up the stream, another decisive battle was fought between the same national antagonists, but with a contrary result, on the memorable 3rd of July 1866.

See M. Buchheister, " Die Elbe u. der Hafen von Hamburg," in *Mitteil. d. Geog. Gesellsch. in Hamburg* (1899), vol. xv. pp. 131-188; V. Kurs, " Die künstlichen Wasserstrassen des deutschen

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[1] See *Der Bau des Elbe-Trave Canals und seine Vorgeschichte* (Lübeck, 1900).

Reichs," in *Geog. Zeitschrift* (1898), pp. 601-617; and (the official) *Der Elbstrom* (1900); B. Weissenborn, *Die Elbzölle und Elbstapelplätze im Mittelalter* (Halle, 1900); Daniel, *Deutschland*; and A. Supan, *Wasserstrassen und Binnenschiffahrt* (Berlin, 1902).

ELBERFELD, a manufacturing town of Germany, in the Prussian Rhine province, on the Wupper, and immediately west of and contiguous to Barmen (*q.v.*). Pop. (1816) 21,710; (1840) 31,514; (1885) 109,218; (1905) 167,382. Elberfeld-Barmen, although administratively separate, practically form a single whole. It winds, a continuous strip of houses and factories, for 9 m. along the deep valley, on both banks of the Wupper, which is crossed by numerous bridges, the engirdling hills crowned with woods. Local intercommunication is provided by an electric tramway line and a novel hanging railway—on the Langen mono-rail system—suspended over the bed of the river, with frequent stations. In the centre of the town are a number of irregular and narrow streets, and the river, polluted by the refuse of dye-works and factories, constitutes a constant eyesore. Yet within recent years great alterations have been effected; in the newer quarters are several handsome streets and public buildings; in the centre many insanitary dwellings have been swept away, and their place occupied by imposing blocks of shops and business premises, and a magnificent new town-hall, erected in a dominant position. Among the most recent improvements must be mentioned the Brausenwerther Platz, flanked by the theatre, the public baths, and the railway station and administrative offices. There are eleven Evangelical and five Roman Catholic churches (noticeable among the latter the Suitbertuskirche), a synagogue, and chapels of various other sects. Among other public buildings may be enumerated the civic hall, the law courts and the old town-hall.

The town is particularly rich in educational, industrial, philanthropic and religious institutions. The schools include the Gymnasium (founded in 1592 by the Protestant community as a Latin school), the Realgymnasium (founded in 1830, for "modern" subjects and Latin), the Oberrealschule and Realschule (founded 1893, the latter wholly "modern"), two girls' high schools, a girls' middle-class school, a large number of popular schools, a mechanics' and polytechnic school, a school of mechanics, an industrial drawing school, a commercial school, and a school for the deaf and dumb. There are also a theatre, an institute of music, a library, a museum, a zoological garden, and numerous scientific societies. The town is the seat of the Berg Bible Society. The majority of the inhabitants are Protestant, with a strong tendency towards Pietism; but the Roman Catholics number upwards of 40,000, forming about one-fourth of the total population. The industries of Elberfeld are on a scale of great magnitude. It is the chief centre in Germany of the cotton, wool, silk and velvet manufactures, and of upholstery, drapery and haberdashery of all descriptions, of printed calicoes, of Turkey-red and other dyes, and of fine chemicals. Leather and rubber goods, gold, silver and aluminium wares, machinery, wall-paper, and stained glass are also among other of its staple products. Commerce is lively and the exports to foreign countries are very considerable. The railway system is well devised to meet the requirements of its rapidly increasing trade. Two main lines of railway traverse the valley; that on the south is the main line from Aix-la-Chapelle, Cologne and Düsseldorf to central Germany and Berlin, that on the north feeds the important towns of the Ruhr valley.

The surroundings of Elberfeld are attractive, and public grounds and walks have been recently opened on the hills around with results eminently beneficial to the health of the population.

In the 12th century the site of Elberfeld was occupied by the castle of the lords of Elverfeld, feudatories of the archbishops of Cologne. The fief passed later into the possession of the counts of Berg. The industrial development of the place started with a colony of bleachers, attracted by the clear waters of the Wupper, who in 1532 were granted the exclusive privilege of bleaching yarn. It was not, however, until 1610 that Elberfeld was raised to the status of a town, and in 1640 was surrounded with walls. In 1760 the manufacture of silk was introduced, and dyeing with Turkey-red in 1780; but it was not till the end of the century that its industries developed into importance under the influence of Napoleon's continental system, which barred out British competition. In 1815 Elberfeld was assigned by the congress of Vienna, with the grand-duchy of Berg, to Prussia, and its prosperity rapidly developed under the Prussian Zollverein.

See Coutelle, *Elberfeld, topographisch-statistische Darstellung* (Elberfeld, 1853); Schell, *Geschichte der Stadt Elberfeld* (1900); A. Shadwell, *Industrial Efficiency* (London, 1906); and Jorde, *Führer durch Elberfeld und seine Umgebung* (1902).

ELBEUF, a town of northern France in the department of Seine-Inférieure, 14 m. S.S.W. of Rouen by the western railway. Pop. (1906) 17,800. Elbeuf, a town of wide, clean streets, with handsome houses and factories, stands on the left bank of the Seine at the foot of hills over which extends the forest of Elbeuf. A tribunal and chamber of commerce, a board of trade-arbitrators, a lycée, a branch of the Bank of France, a school of industry, a school of cloth manufacture and a museum of natural history are among its institutions. The churches of St Étienne and St Jean, both of the Renaissance period with later additions, preserve stained glass of the 16th century. The hôtel-de-ville and the Cercle du Commerce are the chief modern buildings. The town with its suburbs, Orival, Caudebec-lès-Elbeuf, St Aubin and St Pierre, is one of the principal and most ancient seats of the woollen manufacture in France; more than half the inhabitants are directly maintained by the staple industry and numbers more by the auxiliary crafts. As a river-port it has a brisk trade in the produce of the surrounding district as well as in the raw materials of its manufactures, especially in wool from La Plata, Australia and Germany. Two bridges, one of them a suspension-bridge, communicate with St Aubin on the opposite bank of the Seine, and steamboats ply regularly to Rouen.

Elbeuf was, in the 13th century, the centre of an important fief held by the house of Harcourt, but its previous history goes back at least to the early years of the Norman occupation, when it appears under the name of Hollebof. It passed into the hands of the houses of Rieux and Lorraine, and was raised to the rank of a duchy in the peerage of France by Henry III. in favour of Charles of Lorraine (d. 1605), grandson of Claude, duke of Guise, master of the hounds and master of the horse of France. The last duke of Elbeuf was Charles Eugène of Lorraine, prince de Lambesc, who distinguished himself in 1789 by his energy in repressing risings of the people at Paris. He fought in the army of the Bourbons, and later in the service of Austria, and died in 1825.

ELBING, a seaport town of Germany, in the kingdom of Prussia, 49 m. by rail E.S.E. of Danzig, on the Elbing, a small river which flows into the Frische Haff about 5 m. from the town, and is united with the Nogat or eastern arm of the Vistula by means of the Kraffohl canal. Pop. (1905) 55,627. By the Elbing-Oberländischer canal, 110 m. long, constructed in 1845–1860, Lakes Geserich and Drewenz are connected with Lake Drausen, and consequently with the port of Elbing. The old town was formerly surrounded by fortifications, but of these only a few fragments remain. There are several churches, among them the Marienkirche (dating from the 15th century and restored in 1887), a classical school (Gymnasium) founded in 1536, a modern school (Realschule), a public library of over 28,000 volumes, and several charitable institutions. The town-hall (1894) contains a historical museum.

Elbing is a place of rapidly growing industries. At the great Schichau iron-works, which employ thousands of workmen, are built most of the torpedo-boats and destroyers for the German navy, as well as larger craft, locomotives and machinery. In addition to this there are at Elbing important iron foundries, and manufactories of machinery, cigars, lacquer and metal ware, flax and hemp yarn, cotton, linen, organs, &c. There is a considerable trade also in agricultural produce.

The origin of Elbing was a colony of traders from Lübeck and Bremen, which established itself under the protection of a castle of the Teutonic Knights, built in 1237. In 1246 the town acquired "Lübeck rights," *i.e.* the full autonomy conceded by the charter of the emperor Frederick II. in 1226 (see LÜBECK), and it was early admitted to the Hanseatic League. In 1454 the town repudiated the overlordship of the Teutonic Order, and placed itself under the protection of the king of Poland, becoming the seat of a Polish voivode. From this event dates a decline in its prosperity, a decline hastened by the wars of the early 18th century. In 1698, and again in 1703, it was seized by the elector of Brandenburg as security for a debt due to him by the Polish king. It was taken and held to ransom by Charles XII. of Sweden, and in 1710 was captured by the Russians. In 1772, when it fell to Prussia through the first partition of Poland, it was utterly decayed.

See Fuchs, *Gesch. der Stadt Elbing* (Elbing, 1818–1852); Rhode, *Der Elbinger Kreis in topographischer, historischer, und statistischer Hinsicht* (Danzig, 1871); Wernick, *Elbing* (Elbing, 1888).

ELBOW, in anatomy, the articulation of the *humerus*, the bone of the upper arm, and the *ulna* and *radius*, the bones of the forearm (see JOINTS). The word is thus applied to things which are like this joint in shape, such as a sharp bend of a stream or river, an angle in a tube, &c. The word is derived from the O. Eng. *elnboga*, a combination of *eln*, the forearm, and *boga*, a bow or bend. This combination is common to many Teutonic languages, cf. Ger. *Ellbogen*. *Eln* still survives in the name of a linear measure, the "ell," and is derived from the O. Teut. *alina*, cognate with Lat. *ulna* and Gr. ὠλένη, the forearm. The use of the arm as a measure of length is illustrated by the uses of *ulna*, in Latin, cubit, and fathom.

ELBURZ, or ALBURZ (from O. Pers. *Hara-bere-zaiti*, the "High Mountain"), a great chain of mountains in northern Persia, separating the Caspian depression from the Persian highlands, and extending without any break for 650 m. from the western shore of the Caspian Sea to north-eastern Khorasan. According to the direction, or strike, of its principal ranges the Elburz may be divided into three sections: the first 120 m. in length with a direction nearly N. to S., the second 240 m. in length with a direction N.W. to S.E., and the third 290 m. in length striking S.W. to N.E. The first section, which is connected with the system of the Caucasus, and begins west of Lenkoran in 39° N. and 45° E., is known as the Talish range and has several peaks 9000 to 10,000 ft. in height. It runs almost parallel to the western shore of the Caspian, and west of Astara is only 10 or 12 m. distant from the sea. At the point west of Resht, where the direction of the principal range changes to one of N.W. to S.E., the second section of the Elburz begins, and extends from there to beyond Mount Demavend, east of Teheran. South of Resht this section is broken through at almost a right angle by the Safid Rud (White river), and along it runs the principal commercial road between the Caspian and inner Persia, Resht-Kazvin-Teheran. The Elburz then splits into three principal ranges running parallel to one another and connected at many places by secondary ranges and spurs. Many peaks of the ranges in this section have an altitude of 11,000 to 13,000 ft., and the elevation of the passes leading over the ranges varies between 7000 and 10,000 ft. The highest peaks are situated in the still unexplored district of Talikan, N.W. of Teheran, and thence eastwards to beyond Mount Demavend. The part of the Elburz immediately north of Teheran is known as the Kuh i Shimran (mountain of Shimran, from the name of the Shimran district on its southern slopes) and culminates in the Sar i Tochal (12,600 ft.). Beyond it, and between the border of Talikan in the N.W. and Mount Demavend in the N.E., are the ranges Azadbur, Kasil, Kachang, Kendevan, Shahzad, Varzeh, Derbend i Sar and others, with elevations of 12,000 to 13,500 ft., while Demavend towers above them all with its altitude of 19,400 ft. The eastern foot of Demavend is washed by the river Herhaz (called Lar river in its upper course), which there breaks through the Elburz in a S.-N. direction in its course to the Caspian, past the city of Amol. The third section of the Elburz, with its principal ranges striking S.W. to N.E., has a length of about 290 m., and ends some distance beyond Bujnurd in northern Khorasan, where it joins the Ala Dagh range, which has a direction to the S.E., and, continuing with various appellations to northern Afghanistan, unites with the Paropamisus. For about two-thirds of its length—from its beginning to Khush Yailak—the third section consists of three principal ranges connected by lateral ranges and spurs. It also has many peaks over 10,000 ft. in height, and the Nizva mountain on the southern border of the unexplored district of Hazarjirib, north of Semnan, and the Shahkuh, between Shahrud and Astarabad, have an elevation exceeding 13,000 ft. Beyond Khush Yailak (meaning "pleasant summer quarters"), with an elevation of 10,000 ft., are the Kuh i Buhar (8000) and Kuh i Suluk (8000), which latter joins the Ala Dagh (11,000).

The northern slopes of the Elburz and the lowlands which lie between them and the Caspian, and together form the provinces of Gilan, Mazandaran and Astarabad, are covered with dense forest and traversed by hundreds (Persian writers say 1362) of perennial rivers and streams. The breadth of the lowlands between the foot of the hills and the sea is from 2 to 25 m., the greatest breadth being in the meridian of Resht in Gilan, and in the districts of Amol, Sari and Barfurush in Mazandaran. The inner slopes and ranges of the Elburz south of the principal watershed, generally the central one of the three principal ranges which are outside of the fertilizing influence of the moisture brought from the sea, have little or no natural vegetation, and those farthest south are, excepting a few stunted cypresses, completely arid and bare.

"North of the principal watershed forest trees and general verdure refresh the eye. Gurgling water, strips of sward and tall forest trees, backed by green hills, make a scene completely unlike the usual monotony of Persian landscape. The forest scenery much resembles that of England, with fine oaks and greensward. South of the watershed the whole aspect of the landscape is as hideous and disappointing as scenery in Afghanistan. Ridge after ridge of bare hill and curtain behind curtain of serrated mountain, certainly sometimes of charming greys and blues, but still all bare and naked, rugged and arid" (Beresford Lovett, *Proc. R.G.S.*, Feb. 1883).

The higher ranges of the Elburz are snow-capped for the greater part of the year, and some, which are not exposed to the refracted heat from the arid districts of inner Persia, are rarely without snow. Water is plentiful in the Elburz, and situated in well-watered valleys and gorges are innumerable flourishing villages, embosomed in gardens and orchards, with extensive cultivated fields and meadows, and at higher altitudes small plateaus, under snow until March or April, afford cool camping grounds to the nomads of the plains, and luxuriant grazing to their sheep and cattle during the summer. (A. H.-S.)

ELCHE, a town of eastern Spain, in the province of Alicante, on the river Vinalapo. Pop. (1900) 27,308. Elche is the meeting-place of three railways, from Novelda, Alicante and Murcia. It contains no building of high architectural merit, except, perhaps, the collegiate church of Santa Maria, with its lofty blue-tiled dome and fine west doorway. But the costume and physiognomy of the inhabitants, the narrow streets and flat-roofed, whitewashed houses, and more than all, the thousands of palm-trees in its gardens and fields, give the place a strikingly Oriental aspect, and render it unique among the cities of Spain. The cultivation of the palm is indeed the principal occupation; and though the dates are inferior to those of the Barbary States, upwards of 22,500 tons are annually exported. The blanched fronds are also sold in large quantities for the processions of Palm Sunday, and after they have received the blessing of the priest they are regarded throughout Spain as certain defences against lightning. Other thriving local industries include the manufacture of oil, soap, flour, leather, alcohol and esparto grass rugs. The harbour of Elche is Santa Pola (pop. 4100), situated 6 m. E.S.E., where the Vinalapo enters the Mediterranean, after forming the wide lagoon known as the Albufera de Elche.

Elche is usually identified with the Iberian *Helike*, afterwards the Roman colony of *Ilici* or *Illici*. From the 8th century to the 13th it was held by the Moors, who finally failed to recapture it from the Spaniards in 1332.

ELCHINGEN, a village of Germany, in the kingdom of Bavaria, not far from the Danube, 5 m. N.E. from Ulm. Here, on the 14th of October 1805, the Austrians under Laudon were defeated by the French under Ney, who by taking the bridge decided the day and gained for himself the title of duke of Elchingen.

ELDAD BEN MAHLI, also surnamed had-Dani, Abu-Dani, David-had-Dani, or the Danite, Jewish traveller, was the supposed author of a Jewish travel-narrative of the 9th century A.D., which enjoyed great authority in the middle ages, especially on the question of the Lost Ten Tribes. Eldad first set out to visit his Hebrew brethren in Africa and Asia. His vessel was wrecked, and he fell into the hands of cannibals; but he was saved by his leanness, and by the opportune invasion of a neighbouring tribe. After spending four years with his new captors, he was ransomed by a fellow-countryman, a merchant of the tribe of Issachar. He then (according to his highly fabulous narrative) visited the territory of Issachar, in the mountains of Media and Persia; he also describes the abodes of Zabulon, on the "other side" of the Paran Mountains, extending to Armenia and the Euphrates; of Reuben, on another side of the same mountains; of Ephraim and Half Manasseh, in Arabia, not far from Mecca; and of Simeon and the other Half of Manasseh, in Chorazin, six months' journey from Jerusalem. Dan, he declares, sooner than join in Jeroboam's scheme of an Israelite war against Judah, had migrated to Cush, and finally, with the help of Naphthali, Asher and Gad, had founded an independent Jewish kingdom in the Gold Land of Havila, beyond Abyssinia. The tribe of Levi had also been miraculously guided, from near Babylon, to Havila, where they were enclosed and protected by the mystic river Sambation or Sabbation, which on the Sabbath, though calm, was veiled in impenetrable mist, while on other days it ran with a fierce untraversable current of stones and sand.

Apart from these tales, we have the genuine Eldad, a celebrated Jewish traveller and philologist; who flourished *c.* A.D. 830–890; to whom the work above noticed is ascribed; who was a native either of S. Arabia, Palestine or Media; who journeyed in Egypt, Mesopotamia, North Africa, and Spain; who spent several years at Kairawan in Tunis; who died on a visit to Cordova, and whose authority, as to the lost tribes, is supported by a great Hebrew doctor of his own time, Zemaḥ Gaon, the rector of the Academy at Sura (A.D. 889–898). It is possible that a certain relationship exists (as suggested by Epstein and supported by D. H. Müller) between the famous apocryphal *Letter of Prester John* (of *c.* A.D. 1165) and the narrative of Eldad; but the affinity is not close. Eldad is quoted as an authority on linguistic difficulties by the leading medieval Jewish grammarians and lexicographers.

The work ascribed to Eldad is in Hebrew, divided into six chapters, probably abbreviated from the original text. The first edition appeared at Mantua about 1480; the second at Constantinople in 1516; this was reprinted at Venice in 1544 and 1605, and at Jessnitz in 1722. A Latin version by Gilb. Génébrard was published at Paris in 1563, under the title of *Eldad Danius . . . de Judaeis clausis eorumque in Aethiopia . . . imperio*, and was afterwards incorporated in the translator's *Chronologia Hebraeorum* of 1584; a German version appeared at Prague in 1695, and another at Jessnitz in 1723. In 1838 E. Carmoly edited and translated a fuller recension which he had found in a MS. from the library of Eliezer Ben Hasan, forwarded to him by David Zabach of Morocco (see *Relation d'Eldad le Danite*, Paris, 1838). Both forms are printed by Dr Jellinek in his *Bet-ha-Midrasch*, vols. ii. p. 102, &c., and iii. p. 6, &c. (Leipzig, 1853–1855). See also Bartolocci, *Bibliotheca magna Rabbinica*, i. 101-130; Fürst, *Bibliotheca Judaica*, i. 30, &c.; Hirsch Graetz, *Geschichte der Juden* (3rd ed., Leipzig, 1895), v. 239-244; Rossi, *Dizionario degli Ebrei*; Steinschneider, *Cat. librorum Hebraeorum in bibliotheca Bodleiana*, cols. 923-925; Kitto's *Biblical Cyclopaedia* (3rd edition, *sub nomine*); Abr. Epstein, *Eldad ha-Dani* (Pressburg, 1891); D. H. Müller, "Die Recensionen und Versionen des Eldad had-Dani," in *Denkschriften d. Wiener Akad.* (Phil.-Hist. Cl.), vol. xli. (1892), pp. 1-80.

ELDER (Gr. πρεσβύτερος), the name given at different times to a ruler or officer in certain political and ecclesiastical systems of government.

1. The office of elder is in its origin political and is a relic of the old patriarchal system. The unit of primitive society is always the family; the only tie that binds men together is that of kinship. "The eldest male parent," to quote Sir Henry Maine,[1] "is absolutely supreme in his household. His dominion extends to life and death and is as unqualified over his children and their houses as over his slaves." The tribe, which is a later development, is always an aggregate of families or clans, not a collection of individuals. "The union of several clans for common political action," as Robertson Smith says, "was produced by the pressure of practical necessity, and always tended towards dissolution when this practical pressure was withdrawn. The only organization for common action was that the leading men of the clans consulted together in time of need, and their influence led the masses with them. Out of these conferences arose the senates of elders found in the ancient states of Semitic and Aryan antiquity alike."[2] With the development of civilization there came a time when age ceased to be an indispensable condition of leadership. The old title was, however, generally retained, *e.g.* the γέροντες so often mentioned in Homer, the γερουσία of the Dorian states, the *senatus* and the *patres conscripti* of Rome, the sheikh or elder of Arabia, the alderman of an English borough, the *seigneur* (Lat. *senior*) of feudal France.

2. It was through the influence of Judaism that the originally political office of elder passed over into the Christian Church and became ecclesiastical. The Israelites inherited the office from their Semitic ancestors (just as did the Moabites and the Midianites, of whose elders we read in Numbers xxii. 7), and traces of it are found throughout their history. Mention is made in Judges viii. 14 of the elders of Succoth whom "Gideon taught with thorns of the wilderness and with briers." It was to the elders of Israel in Egypt that Moses communicated the plan of Yahweh for the redemption of the people (Exodus iii. 16). During the sojourn in the wilderness the elders were the intermediaries between Moses and the people, and it was out of the ranks of these elders that Moses chose a council of seventy "to bear with him the burden of the people" (Numbers xi. 16). The elders were the governors of the people and the administrators of justice. There are frequent references to their work in the latter capacity in the book of Deuteronomy, especially in relation to the following crimes—the disobedience of sons; slander against a wife; the refusal of levirate marriage; manslaughter; and blood-revenge. Their powers were gradually curtailed by (*a*) the development of the monarchy, to which of course they were in subjection, and which became the court of appeal in questions of law;[3] (*b*) the appointment of special judges, probably chosen from amongst the elders themselves, though their appointment meant the loss of privilege to the general body; (*c*) the rise of the priestly orders, which usurped many of the prerogatives that originally belonged to the elders. But in spite of the rise of new authorities, the elders still retained a large amount of influence. We hear of them frequently in the Persian, Greek and Roman periods. In the New Testament the members of the Sanhedrin in Jerusalem are very frequently termed "elders" or πρεσβύτεροι, and from them the name was taken over by the Church.

3. The name "elder" was probably the first title bestowed upon the officers of the Christian Church—since the word deacon does not occur in connexion with the appointment of the Seven in Acts vi. Its universal adoption is due not only to its currency amongst the Jews, but also to the fact that it was frequently used as the title of magistrates in the cities and villages of Asia Minor. For the history of the office of elder in the early Church and the relation between elders and bishops see PRESBYTER.

4. In modern times the use of the term is almost entirely confined to the Presbyterian church, the officers of which are always called elders. According to the Presbyterian theory of church government there are two classes of elders—"teaching elders," or those specially set apart to the pastoral office, and "ruling elders," who are laymen, chosen generally by the congregation and set apart by ordination to be associated with the pastor in the oversight and government of the church. When

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[1] *Ancient Law*, p. 126.

[2] *Religion of the Semites*, p. 34.

[3] There is a hint at this even in the Pentateuch, "every great matter they shall bring unto thee, but every small matter they shall judge themselves."

the word is used without any qualification it is understood to apply to the latter class alone. For an account of the duties, qualifications and powers of elders in the Presbyterian Church see PRESBYTERIANISM.

See W. R. Smith, *History of the Semites*; H. Maine, *Ancient Law*; E. Schürer, *The Jewish People in the Time of Christ*; J. Wellhausen, *History of Israel and Judah*; G. A. Deissmann, *Bible Studies*, p. 154.

ELDER (O. Eng. *ellarn*; Ger. *Holunder*; Fr. *sureau*), the popular designation of the deciduous shrubs and trees constituting the genus *Sambucus* of the natural order Caprifoliaceae. The Common Elder, *S. nigra*, the bourtree of Scotland, is found in Europe, the north of Africa, Western Asia, the Caucasus, and Southern Siberia; in sheltered spots it attains a height of over 20 ft. The bark is smooth; the shoots are stout and angular, and the leaves glabrous, pinnate, with oval or elliptical leaflets. The flowers, which form dense flat-topped clusters (corymbose cymes), with five main branches, have a cream-coloured, gamopetalous, five-lobed corolla, five stamens, and three sessile stigmas; the berries are purplish-black, globular and three- or four-seeded, and ripen about September. The elder thrives best in moist, well-drained situations, but can be grown in a great diversity of soils. It grows readily from young shoots, which after a year are fit for transplantation. It is found useful for making screen-fences in bleak, exposed situations, and also as a shelter for other shrubs in the outskirts of plantations. By clipping two or three times a year, it may be made close and compact in growth. The young trees furnish a brittle wood, containing much pith; the wood of old trees is white, hard and close-grained, polishes well, and is employed for shoemakers' pegs, combs, skewers, mathematical instruments and turned articles. Young elder twigs deprived of pith have from very early times been in request for making whistles, popguns and other toys.

The elder was known to the ancients for its medicinal properties, and in England the inner bark was formerly administered as a cathartic. The flowers (*sambuci flores*) contain a volatile oil, and serve for the distillation of elder-flower water (*aqua sambuci*), used in confectionery, perfumes and lotions. The leaves of the elder are employed to impart a green colour to fat and oil (*unguentum sambuci foliorum* and *oleum viride*), and the berries for making wine, a common adulterant of port. The leaves and bark emit a sickly odour, believed to be repugnant to insects. Christopher Gullet (*Phil. Trans.*, 1772, lxii. p. 348) recommends that cabbages, turnips, wheat and fruit trees, to preserve them from caterpillars, flies and blight, should be whipped with twigs of young elder. According to German folklore, the hat must be doffed in the presence of the elder-tree; and in certain of the English midland counties a belief was once prevalent that the cross of Christ was made from its wood, which should therefore never be used as fuel, or treated with disrespect (see *Quart. Rev.* cxiv. 233). It was, however, a common medieval tradition, alluded to by Ben Jonson, Shakespeare and other writers, that the elder was the tree on which Judas hanged himself; and on this account, probably, to be crowned with elder was in olden times accounted a disgrace. In Cymbeline (act iv. s. 2) "the stinking elder" is mentioned as a symbol of grief. In Denmark the tree is supposed by the superstitious to be under the protection of the "Elder-mother": its flowers may not be gathered without her leave; its wood must not be employed for any household furniture; and a child sleeping in an elder-wood cradle would certainly be strangled by the Elder-mother.

Several varieties are known in cultivation: *aurea*, golden elder, has golden-yellow leaves; *laciniata*, parsley-leaved elder, has the leaflets cut into fine segments; *rotundifolia* has rounded leaflets; forms also occur with variegated white and yellow leaves, and *virescens* is a variety having white bark and green-coloured berries. The scarlet-berried elder, *S. racemosa*, is the handsomest species of the genus. It is a native of various parts of Europe, growing in Britain to a height of over 15 ft., but often producing no fruit. The dwarf elder or Danewort (supposed to have been introduced into Britain by the Danes), *S. Ebulus*, a common European species, reaches a height of about 6 ft. Its cyme is hairy, has three principal branches, and is smaller than that of *S. nigra*; the flowers are white tipped with pink. All parts of the plant are cathartic and emetic.

ELDON, JOHN SCOTT, 1st EARL OF (1751–1838), lord high chancellor of England, was born at Newcastle on the 4th of June 1751. His grandfather, William Scott of Sandgate, a suburb of Newcastle, was clerk to a "fitter"—a sort of water-carrier and broker of coals. His father, whose name also was William, began life as an apprentice to a fitter, in which service he obtained the freedom of Newcastle, becoming a member of the gild of Hoastmen (coal-fitters); later in life he became a principal in the business, and attained a respectable position as a merchant in Newcastle, accumulating property worth nearly £20,000.

John Scott was educated at the grammar school of his native town. He was not remarkable at school for application to his studies, though his wonderful memory enabled him to make good progress in them; he frequently played truant and was whipped for it, robbed orchards, and indulged in other questionable schoolboy freaks; nor did he always come out of his scrapes with honour and a character for truthfulness. When he had finished his education at the grammar school, his father thought of apprenticing him to his own business, to which an elder brother Henry had already devoted himself; and it was only through the interference of his elder brother William (afterwards Lord Stowell, *q.v.*) who had already obtained a fellowship at University College, Oxford, that it was ultimately resolved that he should continue the prosecution of his studies. Accordingly, in 1766, John Scott entered University College with the view of taking holy orders and obtaining a college living. In the year following he obtained a fellowship, graduated B.A. in 1770, and in 1771 won the prize for the English essay, the only university prize open in his time for general competition.

His wife was the eldest daughter of Aubone Surtees, a Newcastle banker. The Surtees family objected to the match, and attempted to prevent it; but a strong attachment had sprung up between them. On the 18th November 1772 Scott, with the aid of a ladder and an old friend, carried off the lady from her father's house in the Sandhill, across the border to Blackshiels, in Scotland, where they were married. The father of the bridegroom objected not to his son's choice, but to the time he chose to marry; for it was a blight on his son's prospects, depriving him of his fellowship and his chance of church preferment. But while the bride's family refused to hold intercourse with the pair, Mr Scott, like a prudent man and an affectionate father, set himself to make the best of a bad matter, and received them kindly, settling on his son £2000. John returned with his wife to Oxford, and continued to hold his fellowship for what is called the year of grace given after marriage, and added to his income by acting as a private tutor. After a time Mr Surtees was reconciled with his daughter, and made a liberal settlement on her.

John Scott's year of grace closed without any college living falling vacant; and with his fellowship he gave up the church and turned to the study of law. He became a student at the Middle Temple in January 1773. In 1776 he was called to the bar, intending at first to establish himself as an advocate in his native town, a scheme which his early success led him to abandon, and he soon settled to the practice of his profession in London, and on the northern circuit. In the autumn of the year in which he was called to the bar his father died, leaving him a legacy of £1000 over and above the £2000 previously settled on him.

In his second year at the bar his prospects began to brighten. His brother William, who by this time held the Camden professorship of ancient history, and enjoyed an extensive acquaintance with men of eminence in London, was in a position materially to advance his interests. Among his friends was the notorious Andrew Bowes of Gibside, to the patronage of whose house the rise of the Scott family was largely owing. Bowes having contested Newcastle and lost it, presented an election petition against the return of his opponent. Young Scott was retained as junior counsel in the case, and though he lost the petition he did not fail to improve the opportunity which it afforded for displaying his talents. This engagement, in the commencement of his second year at the bar, and the dropping in of occasional fees, must have raised his hopes; and he now abandoned the scheme of becoming a provincial barrister. A year or two of dull drudgery and few fees followed, and he began to be much depressed. But in 1780 we find his prospects suddenly improved, by his appearance in the case of *Ackroyd* v. *Smithson*, which became a leading case settling a rule of law; and young Scott, having lost his point in the inferior court, insisted on arguing it, on appeal, against the opinion of his clients, and carried it before Lord Thurlow, whose favourable consideration he won by his able argument. The same year Bowes again retained him in an election petition; and in the year following Scott greatly increased his reputation by his appearance as leading counsel in the Clitheroe election petition. From this time his success was certain. In 1782 he obtained a silk gown, and was so far cured of his early modesty that he declined accepting the king's counselship if precedence over him were given to his junior, Thomas (afterwards Lord) Erskine, though the latter was the son of a peer and a most accomplished orator. He was now on the high way to fortune. His health, which had hitherto been but indifferent, strengthened with the demands made upon it; his talents, his power of endurance, and his ambition all expanded together. He enjoyed a considerable practice in the northern part of his circuit, before parliamentary committees and at the chancery bar. By 1787 his practice at the equity bar had so far increased that he was obliged to give up the eastern half of his circuit (which embraced six counties) and attend it only at Lancaster.

In 1782 he entered parliament for Lord Weymouth's close borough of Weobley, which Lord Thurlow obtained for him without solicitation. In parliament he gave a general and independent support to Pitt. His first parliamentary speeches were directed against Fox's India Bill. They were unsuccessful. In one he aimed at being brilliant; and becoming merely laboured and pedantic, he was covered with ridicule by Sheridan, from whom he received a lesson which he did not fail to turn to account. In 1788 he was appointed solicitor-general, and was knighted, and at the close of this year he attracted attention by his speeches in support of Pitt's resolutions on the state of the king (George III., who then laboured under a mental malady) and the delegation of his authority. It is said that he drew the Regency Bill, which was introduced in 1789. In 1793 Sir John Scott was promoted to the office of attorney-general, in which it fell to him to conduct the memorable prosecutions for high treason against British sympathizers with French republicanism, —amongst others, against the celebrated Horne Tooke. These prosecutions, in most cases, were no doubt instigated by Sir John Scott, and were the most important proceedings in which he was ever professionally engaged. He has left on record, in his *Anecdote Book*, a defence of his conduct in regard to them. A full account of the principal trials, and of the various legislative measures for repressing the expressions of popular opinion for which he was more or less responsible, will be found in Twiss's *Public and Private Life of the Lord Chancellor Eldon*, and in the *Lives of the Lord Chancellors*, by Lord Campbell.

In 1799 the office of chief justice of the Court of Common Pleas falling vacant, Sir John Scott's claim to it was not overlooked; and after seventeen years' service in the Lower House, he entered the House of Peers as Baron Eldon. In February 1801 the ministry of Pitt was succeeded by that of Addington, and the chief justice now ascended the woolsack. The chancellorship was given to him professedly on account of his notorious anti-Catholic zeal. From the peace of Amiens (1802) till 1804 Lord Eldon appears to have interfered little in politics. In the latter year we find him conducting the negotiations which resulted in the dismissal of Addington and the recall of Pitt to office as prime minister. Lord Eldon was continued in office as chancellor under Pitt; but the new administration was of short duration, for on the 23rd of January 1806 Pitt died, worn out with the anxieties of office, and his ministry was succeeded by a coalition, under Lord Grenville. The death of Fox, who became foreign secretary and leader of the House of Commons, soon, however, broke up the Grenville administration; and in the spring of 1807 Lord Eldon once more, under Lord Liverpool's administration, returned to the woolsack, which, from that time, he continued to occupy for about twenty years, swaying the cabinet, and being in all but name prime minister of England. It was not till April 1827, when the premiership, vacant through the paralysis of Lord Liverpool, fell to Canning, the chief advocate of Roman Catholic emancipation, that Lord Eldon, in the seventy-sixth year of his age, finally resigned the chancellorship. When, after the two short administrations of Canning and Goderich, it fell to the duke of Wellington to construct a cabinet, Lord Eldon expected to be included, if not as chancellor, at least in some important office, but he was overlooked, at which he was much chagrined. Notwithstanding his frequent protests that he did not covet power, but longed for retirement, we find him again, so late as 1835, within three years of his death, in hopes of office under Peel. He spoke in parliament for the last time in July 1834.

In 1821 Lord Eldon had been created Viscount Encombe and earl of Eldon by George IV., whom he managed to conciliate, partly, no doubt, by espousing his cause against his wife, whose advocate he had formerly been, and partly through his reputation for zeal against the Roman Catholics. In the same year his brother William, who from 1798 had filled the office of judge of the High Court of Admiralty, was raised to the peerage under the title of Lord Stowell.

Lord Eldon's wife, his dear "Bessy," his love for whom is a beautiful feature in his life, died before him, on the 28th of June 1831. By nature she was of simple character, and by habits acquired during the early portion of her husband's career almost a recluse. Two of their sons reached maturity—John, who died in 1805, and William Henry John, who died unmarried in 1832. Lord Eldon himself survived almost all his immediate relations. His brother William died in 1836. He himself died in London on the 13th of January 1838, leaving behind him two daughters, Lady Frances Bankes and Lady Elizabeth Repton, and a grandson John (1805–1854), who succeeded him as second earl, the title subsequently passing to the latter's son John (b. 1846).

Lord Eldon was no legislator—his one aim in politics was to keep in office, and maintain things as he found them; and almost the only laws he helped to pass were laws for popular coercion. For nearly forty years he fought against every improvement in law, or in the constitution—calling God to witness, on the smallest proposal of reform, that he foresaw from it the downfall of his country. Without any political principles, properly so called, and without interest in or knowledge of foreign affairs, he maintained himself and his party in power for an unprecedented period by his great tact, and in virtue of his two great political properties—of zeal against every species of reform, and zeal against the Roman Catholics. To pass from his political to his judicial character is to shift to ground on which his greatness is universally acknowledged. His judgments, which have received as much praise for their accuracy as abuse for their clumsiness and uncouthness, fill a small library. But though intimately acquainted with every nook and cranny of the English law, he never carried his studies into foreign fields, from which to enrich our legal literature; and it must be added that against the excellence of his judgments, in too many cases, must be set off the hardships, worse than injustice, that arose from his protracted delays in pronouncing them. A consummate judge and the narrowest of politicians, he was doubt on the bench, and promptness itself in the political arena. For literature, as for art, he had no feeling. What intervals of leisure he enjoyed from the cares of office he filled up with newspapers and the gossip of old cronies. Nor were his intimate associates men of refinement and taste; they were rather good fellows who quietly enjoyed a good bottle and a joke; he uniformly avoided encounters of wit with his equals. He is said to have been parsimonious, and certainly he was quicker to receive than to reciprocate hospitalities; but his mean establishment and mode of life are explained by the retired habits of his wife, and her dislike of company. His manners were very winning and courtly, and in the circle of his immediate relatives he is said to have always been lovable and beloved.

"In his person," says Lord Campbell, "Lord Eldon was about the middle size, his figure light and athletic, his features regular and handsome, his eye bright and full, his smile remarkably benevolent, and his whole appearance prepossessing. The advance of years rather increased than detracted from these personal advantages. As he sat on the judgment-seat, 'the deep thought betrayed in his furrowed brow—the large eyebrows, overhanging eyes that seemed to regard more what was taking place within than around him—his calmness, that would have assumed a character of sternness but for its perfect placidity—his dignity, repose and venerable age, tended at once to win confidence and to inspire respect' (Townsend). He had a voice both sweet and deep-toned, and its effect was not injured by his Northumbrian burr, which, though strong, was entirely free from harshness and vulgarity."

AUTHORITIES.—Horace Twiss, *Life of Lord Chancellor Eldon* (1844); W. E. Surtees, *Sketch of the Lives of Lords Stowell and Eldon* (1846); Lord Campbell, *Lives of the Chancellors*; W. C. Townsend, *Lives of Twelve Eminent Judges* (1846); *Greville Memoirs.*

EL DORADO (Span. "the gilded one"), a name applied, first, to the king or chief priest of a South American tribe who was said to cover himself with gold dust at a yearly religious festival held near Santa Fé de Bogotá; next, to a legendary city called Manoa or Omoa; and lastly, to a mythical country in which gold and precious stones were found in fabulous abundance. The legend, which has never been traced to its ultimate source, had many variants, especially as regards the situation attributed to Manoa. It induced many Spanish explorers to lead expeditions in search of treasure, but all failed. Among the most famous were the expedition undertaken by Diego de Ordaz, whose lieutenant Martinez claimed to have been rescued from shipwreck, conveyed inland, and entertained at Omoa by "El Dorado" himself (1531); and the journeys of Orellana (1540—1541), who passed down the Rio Napo to the valley of the Amazon; that of Philip von Hutten (1541–1545), who led an exploring party from Coro on the coast of Caracas; and of Gonzalo Ximenes de Quesada (1569), who started from Santa Fé de Bogotá. Sir Walter Raleigh, who resumed the search in 1595, described Manoa as a city on Lake Parimá in Guiana. This lake was marked on English and other maps until its existence was disproved by A. von Humboldt (1769–1859). Meanwhile the name of El Dorado came to be used metaphorically of any place where wealth could be rapidly acquired. It was given to a county in California, and to towns and cities in various states. In literature frequent allusion is made to the legend, perhaps the best-known references being those in Milton's *Paradise Lost* (vi. 411) and Voltaire's *Candide* (chs. 18, 19).

See A. F. A. Bandelier, *The Gilded Man, El Dorado* (New York, 1893).

ELDUAYEN, JOSÉ DE, 1st Marquis del Pazo de la Merced (1823–1898), Spanish politician, was born in Madrid on the 22nd of June 1823. He was educated in the capital, took the degree of civil engineer, and as such directed important works in Asturias and Galicia, entered the Cortes in 1856 as deputy for Vigo, and sat in all the parliaments until 1867 as member of the Union Liberal with Marshal O'Donnell. He attacked the Miraflores cabinet in 1864, and became under-secretary of the home office when Canovas was minister in 1865. He was made a councillor of state in 1866, and in 1868 assisted the other members of the Union Liberal in preparing the revolution. In the Cortes of 1872 he took much part in financial debates. He accepted office as member of the last Sagasta cabinet under King Amadeus. On the proclamation of the republic Elduayen very earnestly co-operated in the Alphonsist conspiracy, and endeavoured to induce the military and politicians to work together. He went abroad to meet and accompany the prince after the *pronunciamiento* of Marshal Campos, landed with him at Valencia, was made governor of Madrid, a marquis, grand cross of Charles III., and minister for the colonies in 1878. He accepted the portfolio of foreign affairs in the Canovas cabinet from 1883 to 1885, and was made a life senator. He always prided himself on having been one of the five members of the Cortes of 1870 who voted for Alphonso XII. when that parliament elected Amadeus of Savoy. He died at Madrid on the 24th of June 1898.

ELEANOR OF AQUITAINE (*c.* 1122–1204), wife of the English king Henry II., was the daughter and heiress of Duke William X. of Aquitaine, whom she succeeded in April 1137. In accordance with arrangements made by her father, she at once married Prince Louis, the heir to the French crown, and a month later her husband became king of France under the title of Louis VII. Eleanor bore Louis two daughters but no sons. This was probably the reason why their marriage was annulled by mutual consent in 1151, but contemporary scandal-mongers attributed the separation to the king's jealousy. It was alleged that, while accompanying her husband on the Second Crusade (1146–1149), Eleanor had been unduly familiar with her uncle, Raymond of Antioch. Chronology is against this hypothesis, since Louis and she lived on good terms together for two years after the Crusade. There is still less ground for the supposition that Henry of Anjou, whom she married immediately after the divorce, had been her lover before it. This second marriage, with a youth some years her junior, was purely political. The duchy of Aquitaine required a strong ruler, and the union with Anjou was eminently desirable. Louis, who had hoped that Aquitaine would descend to his daughters, was mortified and alarmed by the Angevin marriage; all the more so when Henry of Anjou succeeded to the English crown in 1154. From this event dates the beginning of the secular strife between England and France which runs like a red thread through medieval history.

Eleanor bore to her second husband five sons and three daughters; John, the youngest of their children, was born in 1167. But her relations with Henry passed gradually through indifference to hatred. Henry was an unfaithful husband, and Eleanor supported her sons in their great rebellion of 1173. Throughout the latter years of the reign she was kept in a sort of honourable confinement. It was during her captivity that Henry formed his connexion with Rosamond Clifford, the Fair Rosamond of romance. Eleanor, therefore, can hardly have been responsible for the death of this rival, and the romance of the poisoned bowl appears to be an invention of the next century.

Under the rule of Richard and John the queen became a political personage of the highest importance. To both her sons the popularity which she enjoyed in Aquitaine was most valuable. But in other directions also she did good service. She helped to frustrate the conspiracy with France which John concocted during Richard's captivity. She afterwards reconciled the king and the prince, thus saving for John the succession which he had forfeited by his misconduct. In 1199 she crushed an Angevin rising in favour of John's nephew, Arthur of Brittany. In 1201 she negotiated a marriage between her grand-daughter, Blanche of Castile, and Louis of France, the grandson of her first husband. It was through her staunch defence of Mirabeau in Poitou that John got possession of his nephew's person. She died on the 1st of April 1204, and was buried at Fontevrault. Although a woman of strong passions and great abilities she is, historically, less important as an individual than as the heiress of Aquitaine, a part of which was, through her second marriage, united to England for some four hundred years.

See the chronicles cited for the reigns of Henry II., Richard I. and John. Also Sir J. H. Ramsay, *Angevin Empire* (London, 1903); K. Norgate, *England under the Angevin Kings* (London, 1887); and A. Strickland, *Lives of the Queens of England*, vol. i. (1841).

(H. W. C. D.)

ELEATIC SCHOOL, a Greek school of philosophy which came into existence towards the end of the 6th century B.C., and ended with Melissus of Samos (fl. *c.* 450 B.C.). It took its name from Elea, a Greek city of lower Italy, the home of its chief exponents, Parmenides and Zeno. Its foundation is often attributed to Xenophanes of Colophon, but, although there is much in his speculations which formed part of the later Eleatic doctrine, it is probably more correct to regard Parmenides as the founder of the school. At all events, it was Parmenides who gave it its fullest development. The main doctrines of the Eleatics were evolved in opposition, on the one hand, to the physical theories of the early physical philosophers who explained all existence in terms of primary matter (see IONIAN SCHOOL), and, on the other hand, to the theory of Heraclitus that all existence may be summed up as perpetual change. As against these theories the Eleatics maintained that the true explanation of things lies in the conception of a universal unity of being. The senses with their changing and inconsistent reports cannot cognize this unity; it is by thought alone that we can pass beyond the false appearances of sense and arrive at the knowledge of being, at the fundamental truth that "the All is One." There can be no creation, for being cannot come from not-being; a thing cannot arise from that which is different from it. The errors of common opinion arise to a great extent from the ambiguous use of the verb "to be," which may imply existence or be merely the copula which connects subject and predicate.

In these main contentions the Eleatic school achieved a real advance, and paved the way to the modern conception of metaphysics. Xenophanes in the middle of the 6th century had made the first great attack on the crude mythology of early Greece, including in his onslaught the whole anthropomorphic system enshrined in the poems of Homer and Hesiod. In the hands of Parmenides this spirit of free thought developed on metaphysical lines. Subsequently, whether from the fact that such bold speculations were obnoxious to the general sense of propriety in Elea, or from the inferiority of its leaders, the school degenerated into verbal disputes as to the possibility of motion, and similar academic trifling. The best work of the school was absorbed in the Platonic metaphysic (see E. Caird, *Evolution of Theology in the Greek Philosophers*, 1904).

See further the articles on XENOPHANES; PARMENIDES; ZENO (of Elea); MELISSUS, with the works there quoted; also the histories of philosophy by Zeller, Gomperz, Windelband, &c.

ELECAMPANE (Med. Lat. *Enula Campana*), a perennial composite plant, the *Inula Helenium* of botanists, which is common in many parts of Britain, and ranges throughout central and southern Europe, and in Asia as far eastwards as the Himalayas. It is a rather rigid herb, the stem of which attains a height of from 3 to 5 ft.; the leaves are large and toothed, the lower ones stalked, the rest embracing the stem; the flowers are yellow, 2 in. broad, and have many rays, each three-notched at the extremity. The root is thick, branching and mucilaginous, and has a warm, bitter taste and a camphoraceous odour. For medicinal purposes it should be procured from plants not more than two or three years old. Besides *inulin*, $C_{12}H_{20}O_{10}$, a body isomeric with starch, the root contains *helenin*, C_6H_8O, a stearoptene, which may be prepared in white acicular crystals, insoluble in water, but freely soluble in alcohol. When freed from the accompanying inula-camphor by repeated crystallization from alcohol, helenin melts at 110° C. By the ancients the root was employed both as a medicine and as a condiment, and in England it was formerly in great repute as an aromatic tonic and stimulant of the secretory organs. "The fresh roots of elecampane preserved with sugar, or made into a syrup or conserve," are recommended by John Parkinson in his *Theatrum Botanicum* as "very effectual to warm a cold and windy stomack, and the pricking and stitches therein or in the sides caused by the Spleene, and to helpe the cough, shortnesse of breath, and wheesing in the Lungs." As a drug, however, the root is now seldom resorted to except in veterinary practice, though it is undoubtedly possessed of antiseptic properties. In France and Switzerland it is used in the manufacture of absinthe.

ELECTION (from Lat. *eligere*, to pick out), the method by which a choice or selection is made by a constituent body (the electors or electorate) of some person to fill a certain office or dignity. The procedure itself is called an election. Election, as a special form of selection, is naturally a loose term covering many subjects; but except in the theological sense (the doctrine of election), as employed by Calvin and others, for the choice by God of His "elect," the legal sense (see ELECTION, *in law*, below), and occasionally as a synonym for personal choice (one's own "election"), it is confined to the selection by the preponderating vote of some properly constituted body of electors of one of two or more candidates, sometimes for admission only to some private social position (as in a club), but more particularly in connexion with public representative positions in political government. It is thus distinguished from arbitrary methods of appointment, either where the right of nominating rests in an individual, or where pure chance (such as selection by lot) dictates the result. The part played by different forms of election in history is alluded to in numerous articles in this work, dealing with various countries and various subjects. It is only necessary here to consider certain important features in the elections, as ordinarily understood, namely, the exercise of the right of voting for political and municipal offices in the United Kingdom and America. See also the articles PARLIAMENT; REPRESENTATION; VOTING; BALLOT, &c., and UNITED STATES: *Political Institutions*. For practical details as to the conduct of political elections in England reference must be made to the various text-books on the subject; the candidate and his election agent require to be on their guard against any false step which might invalidate his return.

Law in the United Kingdom.—Considerable alterations have been made in recent years in the law of Great Britain and Ireland relating to the procedure at parliamentary and municipal elections, and to election petitions.

As regards parliamentary elections (which may be either the "general election," after a dissolution of parliament, or "by-elections," when casual vacancies occur during its continuance), the most important of the amending statutes is the Corrupt and Illegal Practices Act 1883. This act, and the Parliamentary Elections Act 1868, as amended by it, and other enactments dealing with corrupt practices, are temporary acts requiring annual renewal. As regards municipal elections, the Corrupt Practices (Municipal Elections) Act 1872 has been repealed by the Municipal Corporations Act 1882 for England, and by the Local Government (Ireland) Act 1898 for Ireland. The governing enactments for England are now the Municipal Corporations Act 1882, part iv., and the Municipal Elections (Corrupt and Illegal Practices) Act 1884, the latter annually renewable. The provisions of these enactments have been applied with necessary modifications to municipal and other local government elections in Ireland by orders of the Irish Local Government Board made under powers conferred by the Local Government (Ireland) Act 1898. In Scotland the law regulating municipal and other local government elections is now to be found in the Elections (Scotland) (Corrupt and Illegal Practices) Act 1890.

The alterations in the law have been in the direction of greater strictness in regard to the conduct of elections, and increased control in the public interest over the proceedings on election petitions. Various acts and payments which were previously lawful in the absence of any corrupt bargain or motive are now altogether forbidden under the name of "illegal practices" as distinguished from "corrupt practices." Failure on the part of a parliamentary candidate or his election agent to comply with the requirements of the law in any particular is sufficient to invalidate the return (see the articles BRIBERY and CORRUPT PRACTICES). Certain relaxations are, however, allowed in consideration of the difficulty of absolutely avoiding all deviation from the strict rules laid down. Thus, where the judges who try an election petition report that there has been treating, undue influence, or any illegal practice by the candidate or his election agent, but that it was trivial, unimportant and of a limited character, and contrary to the orders and without the sanction or connivance of the candidate or his election agent, and that the candidate and his election agent took all reasonable means for preventing corrupt and illegal practices, and that the election was otherwise free from such practices on their part, the election will not be avoided. The court has also the power to relieve from the consequences of certain innocent contraventions of the law caused by inadvertence or miscalculation.

The inquiry into a disputed parliamentary election was formerly conducted before a committee of the House of Commons, chosen as nearly as possible from both sides of the House for that particular business. The decisions of these tribunals laboured

Election petitions.

under the suspicion of being prompted by party feeling, and by an act of 1868 the jurisdiction was finally transferred to judges of the High Court, notwithstanding the general unwillingness of the bench to accept a class of business which they feared might bring their integrity into dispute. Section 11 of the act ordered, *inter alia*, that the trial of every election petition shall be conducted before a *puisne judge* of one of the common law courts at Westminster and Dublin; that the said courts shall each select a judge to be placed on the rota for the trial of election petitions; that the said judges shall try petitions standing for trial according to seniority or otherwise, as they may agree; that the trial shall take place in the county or borough to which the petition refers, unless the court should think it desirable to hold it elsewhere. The judge shall determine "whether the member whose return is complained of, or any and what other person, was duly returned and elected, or whether the election was void," and shall certify his determination to the speaker. When corrupt practices have been charged the judge shall also report (1) whether any such practice has been committed by or with the knowledge or consent of any candidate, and the nature thereof; (2) the names of persons proved to have been guilty of any corrupt practice; and (3) whether corrupt practices have extensively prevailed at the election. Questions of law were to be referred to the decision of the court of common pleas. On the abolition of that court by the Judicature Act 1873, the jurisdiction was transferred to the common pleas division, and again on the abolition of that division was transferred to the king's bench division, in whom it is now vested. The rota of judges for the trial of election petitions is also supplied by the king's bench division. The trial now takes place before two judges instead of one; and, when necessary, the number of judges on the rota may be increased. Both the judges who try a petition are to sign the certificates to be made to the speaker. If they differ as to the validity of a return, they are to state such difference in their certificate, and the return is to be held good; if they differ as to a report on any other matter, they are to certify their difference and make no report on such matter. The director of public prosecutions attends the trial personally or by representative. It is his duty to watch the proceedings in the public interest, to issue summonses to witnesses whose evidence is desired by the court, and to prosecute before the election court or elsewhere those persons whom he thinks to have been guilty of corrupt or illegal practices at the election in question. If an application is made for leave to withdraw a petition, copies of the affidavits in support are to be delivered to him; and he is entitled to be heard and to call evidence in opposition to such application. Witnesses are not excused from answering criminating questions; but their evidence cannot be used against them in any proceedings except criminal proceedings for perjury in respect of that evidence. If a witness answers truly all questions which he is required by the court to answer, he is entitled to receive a certificate of indemnity, which will save him from all proceedings for any offence under the Corrupt Practices Acts committed by him before the date of the certificate at or in relation to the election, except proceedings to enforce any incapacity incurred by such offence. An application for leave to withdraw a petition must be supported by affidavits from all the parties to the petition and their solicitors, and by the election agents of all of the parties who were candidates at the election. Each of these affidavits is to state that to the best of the deponent's knowledge and belief there has been no agreement and no terms or undertaking made or entered into as to the withdrawal, or, if any agreement has been made, shall state its terms. The applicant and his solicitor are also to state in their affidavits the grounds on which the petition is sought to be withdrawn. If any person makes an agreement for the withdrawal of a petition in consideration of a money payment, or of the promise that the seat shall be vacated or another petition withdrawn, or omits to state in his affidavit that he has made an agreement, lawful or unlawful, for the withdrawal, he is guilty of an indictable misdemeanour. The report of the judges to the speaker is to contain particulars as to illegal practices similar to those previously required as to corrupt practices; and they are to report further whether any candidate has been guilty by his agents of an illegal practice, and whether certificates of indemnity have been given to persons reported guilty of corrupt or illegal practices.

The Corrupt Practices Acts apply, with necessary variations in details, to parliamentary elections in Scotland and Ireland.

The amendments in the law as to municipal elections are generally similar to those which have been made in parliamentary election law. The procedure on trial of petitions is substantially the same, and wherever no other provision is made by the acts or rules the procedure on the trial of parliamentary election petitions is to be followed. Petitions against municipal elections were dealt with in 35 & 36 Vict. c. 60. The election judges appoint a number of barristers, not exceeding five, as commissioners to try such petitions. No barrister can be appointed who is of less than fifteen years' standing, or a member of parliament, or holder of any office of profit (other than that of recorder) under the crown; nor can any barrister try a petition in any borough in which he is recorder or in which he resides, or which is included in his circuit. The barrister sits without a jury. The provisions are generally similar to those relating to parliamentary elections. The petition may allege that the election was avoided as to the borough or ward on the ground of general bribery, &c., or that the election of the person petitioned against was avoided by corrupt practices, or by personal disqualification, or that he had not the majority of lawful votes. The commissioner who tries a petition sends to the High Court a certificate of the result, together with reports as to corrupt and illegal practices, &c., similar to those made to the speaker by the judges who try a parliamentary election petition. The Municipal Elections (Corrupt and Illegal Practices) Act 1884 applied to school board elections subject to certain variations, and has been extended by the Local Government Act 1888 to county council elections, and by the Local Government Act 1894 to elections by parochial electors. The law in Scotland is on the same lines, and extends to all non-parliamentary elections, and, as has been stated, the English statutes have been applied with adaptations to all municipal and local government elections in Ireland.

United States.—Elections are much more frequent in the United States than they are in Great Britain, and they are also more complicated. The terms of elective officers are shorter; and as there are also more offices to be filled, the number of persons to be voted for is necessarily much greater. In the year of a presidential election the citizen may be called upon to vote at one time for all of the following: (1) National candidates—president and vice-president (indirectly through the electoral college) and members of the House of Representatives; (2) state candidates—governor, members of the state legislature, attorney-general, treasurer, &c.; (3) county candidates—sheriff, county judges, district attorney, &c.; (4) municipal or town candidates—mayor, aldermen, selectmen, &c. The number of persons actually voted for may therefore be ten or a dozen, or it may be many more. In addition, the citizen is often called upon to vote yea or nay on questions such as amendments to the state constitutions, granting of licences, and approval or disapproval of new municipal undertakings. As there may be, and generally is, more than one candidate for each office, and as all elections are now, and have been for many years, conducted by ballot, the total number of names to appear on the ballot may be one hundred or may be several hundred. These names are arranged in different ways, according to the laws of the different states. Under the Massachusetts law, which is considered the best by reformers, the names of candidates for each office are arranged alphabetically on a "blanket" ballot, as it is called from its size, and the elector places a mark opposite the names of such candidates as he may wish to vote for. Other states, New York for example, have the blanket system, but the names of the candidates are arranged in party columns. Still other states allow the grouping on one ballot of all the candidates of a single party, and there would be therefore as many separate ballots in such states as there were parties in the field.

The qualifications for voting, while varying in the different states in details, are in their main features the same throughout the Union. A residence in the state is required of from three months to two years. Residence is also necessary, but for a shorter period, in the county, city or town, or voting precinct. A few states require the payment of a poll tax. Some require that the voter shall be able to read and understand the Constitution. This latter qualification has been introduced into several of the Southern states, partly at least to disqualify the ignorant coloured voters. In all, or practically all, the states idiots, convicts and the insane are disqualified; in some states paupers; in some of the Western states the Chinese. In some states women are allowed to vote on certain questions, or for the candidates for certain offices, especially school officials; and in four of the Western states women have the same rights of suffrage as men. The number of those who are qualified to vote, but do not avail themselves of the right, varies greatly in the different states and according to the interest taken in the election. As a general rule, but subject to exceptions, the national elections call out the largest number, the state elections next, and the local elections the smallest number of voters. In an exciting national election between 80 and 90% of the qualified voters actually vote, a proportion considerably greater than in Great Britain or Germany.

The tendency of recent years has been towards a decrease both in the number and in the frequency of elections. A president and vice-president are voted for every fourth year, in the years divisible by four, on the first Tuesday following the first Monday of November. Members of the national House of Representatives are chosen for two years on the even-numbered years. State and local elections take place in accordance with state laws, and may or may not be on the same day as the national elections. Originally the rule was for the states to hold annual elections; in fact, so strongly did the feeling prevail of the need in a democratic country for frequent elections, that the maxim "where annual elections end, tyranny begins," became a political proverb. But opinion gradually changed even in the older or Eastern states, and in 1909 Massachusetts and Rhode Island were the only states in the Union holding annual elections for governor and both houses of the state legislature. In the Western states especially state officers are chosen for longer terms—in the case of the governor often for four years—and the number of elections has correspondingly decreased. Another cause of the decrease in the number of elections is the growing practice of holding all the elections of any year on one and the same day. Before the Civil War Pennsylvania held its state elections several months before the national elections. Ohio and Indiana, until 1885 and 1881 respectively, held their state elections early in October. Maine, Vermont and Arkansas keep to September. The selection of one day in the year for all elections held in that year has resulted in a considerable decrease in the total number.

Another tendency of recent years, but not so pronounced, is to hold local elections in what is known as the "off" year; that is, on the odd-numbered year, when no national election is held. The object of this reform is to encourage independent voting. The average American citizen is only too prone to carry his national political predilections into local elections, and to vote for the local nominees of his party, without regard to the question of fitness of candidates and the fundamental difference of issues involved. This tendency to vote the entire party ticket is the more pronounced because under the system of voting in use in many of the states all the candidates of the party are arranged on one ticket, and it is much easier to vote a straight or unaltered ticket than to change or "scratch" it. Again, the voter, especially the ignorant one, refrains from scratching his ticket, lest in some way he should fail to comply with the technicalities of the law and his vote be lost. On the other hand, if local elections are held on the "off" or odd year, and there be no national or state candidates, the voter feels much more free to select only those candidates whom he considers best qualified for the various offices.

On the important question of the purity of elections it is difficult to speak with precision. In many of the states, especially those with an enlightened public spirit, such as most of the New England states and many of the North-Western, the elections are fairly conducted, there being no intimidation at all, little or no bribery, and an honest count. It can safely be said that through the Union as a whole the tendency of recent years has been decidedly towards greater honesty of elections. This is owing to a number of causes: (1) The selection of a single day for all elections, and the consequent immense number voting on that day. Some years ago, when for instance the Ohio and Indiana elections were held a few weeks before the general election, each party strained every nerve to carry them, for the sake of prestige and the influence on other states. In fact, presidential elections were often felt to turn on the result in these early voting states, and the party managers were none too scrupulous in the means employed to carry them. Bribery has decreased in such states since the change of election day to that of the rest of the country. (2) The enactment in most of the states of the Australian or secret ballot (*q.v.*) laws. These have led to the secrecy of the ballot, and hence to a greater or less extent have prevented intimidation and bribery. (3) Educational or other such test, more particularly in the Southern states, the object of which is to exclude the coloured, and especially the ignorant coloured, voters from the polls. In those southern states in which the coloured vote was large, and still more in those in which it was the majority, it was felt among the whites that intimidation or ballot-box stuffing was justified by the necessity of white supremacy. With the elimination of the coloured vote by educational or other tests the honesty of elections has increased. (4) The enactment of new and more stringent registration laws. Under these laws only those persons are allowed to vote whose names have been placed on the rolls a certain number of days or months before election. These rolls are open to public inspection, and the names may be challenged at the polls, and "colonization" or repeating is therefore almost impossible. (5) The reform of the civil service and the gradual elimination of the vicious principle of "to the victors belong the spoils." With the reform of the civil service elections become less a scramble for office and more a contest of political or economic principle. They bring into the field, therefore, a better class of candidates. (6) The enactment in a number of states of various other laws for the prevention of corrupt practices, for the publication of campaign expenses, and for the prohibition of party workers from coming within a certain specified distance of the polls. In the state of Massachusetts, for instance, an act passed in 1892, and subsequently amended, provides that political committees shall file a full statement, duly sworn to, of all campaign expenditures made by them. The act applies to all public elections except that of town officers, and also covers nominations by caucuses and conventions as well. Apart from his personal expenses such as postage, travelling expenses, &c., a candidate is prohibited from spending anything himself to promote either his nomination or his election, but he is allowed to contribute to the treasury of the political committee. The law places no limit on the amount that these committees may spend. The reform sought by the law is thorough publicity, and not only are details of receipts and expenditures to be published, but the names of contributors and the amount of their contributions. In the state of New York the act which seeks to prevent corrupt practices relies in like manner on the efficacy of publicity, but it is less effective than the Massachusetts law in that it provides simply for the filing by the candidates themselves of sworn statements of their own expenses. There is nothing to prevent their contributing to political committees, and the financial methods and the amounts expended by such committees are not made public. But behind all these causes that have led to more honest elections lies the still greater one of a healthier public spirit. In the reaction following the Civil War all reforms halted. In recent years, however, a new and healthier interest has sprung up in things political; and one result of this improved civic spirit is seen in the various laws for purification of elections. It may now be safely affirmed that in the majority of states the elections are honestly conducted; that intimidation, bribery, stuffing of the ballot boxes or other forms of corruption, when they exist, are owing in large measure to temporary or local causes; and that the tendency of recent years has been towards a decrease in all forms of corruption.

The expenses connected with elections, such as the renting and preparing of the polling-places, the payment of the clerks and other officers who conduct the elections and count the vote, are borne by the community. A candidate therefore is not, as far as the law is concerned, liable to any expense whatever. As a matter of fact he does commonly contribute to the party treasury, though in the case of certain candidates, particularly those for the presidency and for judicial offices, financial contributions are not general. The amount of a candidate's contribution varies greatly, according to the office sought, the state in which he lives, and his private wealth. On one occasion, in a district in New York, a candidate for Congress is credibly believed to have spent at one election $50,000. On the other hand, in a Congressional election in a certain district in Massachusetts, the only expenditure of one of the candidates was for the two-cent stamp placed on his letter of acceptance. No estimate of the average amount expended can be made. It is, however, the conclusion of Mr Bryce, in his *American Commonwealth*, that as a rule a seat in Congress costs the candidate less than a seat for a county division in the House of Commons. (See also BALLOT.)

ELECTION, in English law, the obligation imposed upon a party by courts of equity to choose between two inconsistent or alternative rights or claims in cases where there is a clear intention of the person from whom he derives one that he should not enjoy both. Thus a testator died seized of property in fee simple and in fee tail—he had two daughters, and devised the fee simple property to one and the entailed property to the other; the first one claimed to have her share of the entailed property as coparcener and also to retain the benefit she took under the will. It was held that she was put to her election whether she would take under the will and renounce her claim to the entailed property or take against the will, in which case she must renounce the benefits she took under the will in so far as was necessary to compensate her sister. As the essence of the doctrine is compensation, a person electing against a document does not lose all his rights under it, but the court will sequester so much only of the benefit intended for him as will compensate the persons disappointed by his election. For the same reason it is necessary that there should be a free and disposable fund passing by the instrument from which compensation can be made in the event of election against the will. If, therefore, a man having a special power of appointment appoint the fund equally between two persons, one being an object of the power and the other not an object, no question of election arises, but the appointment to the person not an object is bad.

Election, though generally arising in cases of wills, may also arise in the case of a deed. There is, however, a distinction to be observed. In the case of a will a clear intention on the part of the testator that he meant to dispose of property not his own must be shown, and parol evidence is not admissible as to this. In the case of a deed, however, no such intention need be shown, for if a deed confers a benefit and imposes a liability on the same person he cannot be allowed to accept the one and reject the other, but this must be distinguished from cases where two separate gifts are given to a person, one beneficial and the other onerous. In such a case no question of election arises and he may take the one and reject the other, unless, indeed, there are words used which make the one conditional on the acceptance of the other.

Election is either express, *e.g.* by deed, or implied; in the latter case it is often a question of considerable difficulty whether there has in fact been an election or not; each case must depend upon the particular circumstances, but quite generally it may be said that the person who has elected must have been capable of electing, aware of the existence of the doctrine of election, and have had the opportunity of satisfying himself of the relative value of the properties between which he has elected. In the case of infants the court will sometimes elect after an inquiry as to which course is the most advantageous, or if there is no immediate urgency, will allow the matter to stand over till the infant attains his majority. In the cases of married women and lunatics the courts will exercise the right for them. It sometimes happens that the parties have so dealt with the property that it would be inequitable to disturb it; in such cases the court will not interfere in order to allow of election.

ELECTORAL COMMISSION, in United States history, a commission created to settle the disputed presidential election of 1876. In this election Samuel J. Tilden, the Democratic candidate, received 184 uncontested electoral votes, and Rutherford B. Hayes, the Republican candidate, 163.[1] The states of Florida, Louisiana, Oregon and South Carolina, with a total of 22 votes, each sent in two sets of electoral ballots,[2] and from each of these states except Oregon one set gave the whole vote to Tilden and the other gave the whole vote to Hayes. From Oregon one set of ballots gave the three electoral votes of the state to Hayes; the other gave two votes to Hayes and one to Tilden.

The election of a president is a complex proceeding, the method being indicated partly in the Constitution, and being partly left to Congress and partly to the states. The manner of selecting the electors is left to state law; the electoral ballots are sent to the president of the Senate, who "shall, in the presence of the Senate and House of Representatives, open all certificates, and the votes shall then be counted." Concerning this provision many questions of vital importance arose in 1876: Did the president of the Senate count the votes, the houses being mere witnesses; or did the houses count them, the president's duties being merely ministerial? Did counting imply the determination of what should be counted, or was it a mere arithmetical process; that is, did the Constitution itself afford a method of settling disputed returns, or was this left to legislation by Congress? Might Congress or an officer of the Senate go behind a state's certificate and review the acts of its certifying officials? Might it go further and examine into the choice of electors? And if it had such powers, might it delegate them to a commission? As regards the procedure of Congress, it seems that, although in early years the president of the Senate not only performed or overlooked the electoral count but also exercised discretion in some matters very important in 1876, Congress early began to assert power, and, at least from 1821 onward, controlled the count, claiming complete power. The fact, however, that the Senate in 1876 was controlled by the Republicans and the House by the Democrats, lessened the chances of any harmonious settlement of these questions by Congress. The country seemed on the verge of civil war. Hence it was that by an act of the 29th of January 1877, Congress created the Electoral Commission to pass upon the contested returns, giving it "the same powers, if any" possessed by itself in the premises, the decisions to stand unless rejected by the two houses separately. The commission was composed of five Democratic and five Republican Congressmen, two justices of the Supreme Court of either party, and a fifth justice chosen by these four. As its members of the commission the Senate chose G. F. Edmunds of Vermont, O. P. Morton of Indiana, and F. T. Frelinghuysen of New Jersey (Republicans); and A. G. Thurman of Ohio and T. F. Bayard of Delaware (Democrats). The House chose Henry B. Payne of Ohio, Eppa Hunton of Virginia, and Josiah G. Abbott of Massachusetts (Democrats); and George F. Hoar of Massachusetts and James A. Garfield of Ohio (Republicans). The Republican judges were William Strong and Samuel F. Miller; the Democratic, Nathan Clifford and Stephen J. Field. These four chose as the fifteenth member Justice Joseph P. Bradley, a Republican but the only member not selected avowedly as a partisan. As counsel for the Democratic candidate there appeared before the commission at different times Charles O'Conor of New York, Jeremiah S. Black of Pennsylvania, Lyman Trumbull of Illinois, R. T. Merrick of the District of Columbia, Ashbel Green of New Jersey, Matthew H. Carpenter of Wisconsin, George Hoadley of Ohio, and W. C. Whitney of New York. W. M. Evarts and E. W. Stoughton of New York and Samuel Shellabarger and Stanley Matthews of Ohio appeared regularly in behalf of Mr Hayes.

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[1] The election of a vice-president was, of course, involved also. William A. Wheeler was the Republican candidate, and Thomas A. Hendricks the Democratic.

[2] A second set of electoral ballots had also been sent in from Vermont, where Hayes had received a popular majority vote of 24,000. As these ballots had been transmitted in an irregular manner, the president of the Senate refused to receive them, and was sustained in this action by the upper House.

The popular vote seemed to indicate that Hayes had carried South Carolina and Oregon, and Tilden Florida and Louisiana. It was evident, however, that Hayes could secure the 185 votes necessary to elect only by gaining every disputed ballot. As the choice of Republican electors in Louisiana had been accomplished by the rejection of several thousand Democratic votes by a Republican returning board, the Democrats insisted that the commission should go behind the returns and correct injustice; the Republicans declared that the state's action was final, and that to go behind the returns would be invading its sovereignty. When this matter came before the commission it virtually accepted the Republican contention, ruling that it could not go behind the returns except on the superficial issues of manifest fraud therein or the eligibility of electors to their office under the Constitution; that is, it could not investigate antecedents of fraud or misconduct of state officials in the results certified. All vital questions were settled by the votes of eight Republicans and seven Democrats; and as the Republican Senate would never concur with the Democratic House in overriding the decisions, all the disputed votes were awarded to Mr Hayes, who therefore was declared elected.

The strictly partisan votes of the commission and the adoption by prominent Democrats and Republicans, both within and without the commission, of an attitude toward states-rights principles quite inconsistent with party tenets and tendencies, have given rise to much severe criticism. The Democrats and the country, however, quietly accepted the decision. The judgments underlying it were two: (1) That Congress rightly claimed the power to settle such contests within the limits set; (2) that, as Justice Miller said regarding these limits, the people had never at any time intended to give to Congress the power, by naming the electors, to "decide who are to be the president and vice-president of the United States."

There is no doubt that Mr Tilden was morally entitled to the presidency, and the correction of the Louisiana frauds would certainly have given satisfaction then and increasing satisfaction later, in the retrospect, to the country. The commission might probably have corrected the frauds without exceeding its Congressional precedents. Nevertheless, the principles of its decisions must be recognized by all save ultra-nationalists as truer to the spirit of the Constitution and promising more for the good of the country than would have been the principles necessary to a contrary decision.

By an act of the 3rd of February 1887 the electoral procedure is regulated in great detail. Under this act determination by a state of electoral disputes is conclusive, subject to certain formalities that guarantee definite action and accurate certification. These formalities constitute "regularity," and are in all cases judgable by Congress. When Congress is forced by the lack or evident inconclusiveness of state action, or by conflicting state action, to decide disputes, votes are lost unless both houses concur.

AUTHORITIES.—J. F. Rhodes, *History of the United States*, vol. 7, covering 1872–1877 (New York, 1906); P. L. Haworth, *The Hayes-Tilden disputed Presidential Election of 1876* (Cleveland, 1906); J. W. Burgess, *Political Science Quarterly*, vol. 3 (1888), pp. 633-653, "The Law of the Electoral Count"; and for the sources, Senate Miscellaneous Document No. 5 (vol. 1), and House Miscel. Doc. No. 13 (vol. 2), 44 Congress, 2 Session,—*Count of the Electoral Vote. Proceedings of Congress and Electoral Commission*,—the latter identical with *Congressional Record*, vol. 5, pt. 4, 44 Cong., 2 Session; also about twenty volumes of evidence on the state elections involved. The volume called *The Presidential Counts* (New York, 1877) was compiled by Mr Tilden and his secretary.

ELECTORS (Ger. *Kurfürsten*, from *Küren*, O.H.G. *kiosan*, choose, elect, and *Fürst*, prince), a body of German princes, originally seven in number, with whom rested the election of the German king, from the 13th until the beginning of the 19th century. The German kings, from the time of Henry the Fowler (919–936) till the middle of the 13th century, succeeded to their position partly by heredity, and partly by election. Primitive Germanic practice had emphasized the element of heredity. *Reges ex nobilitate sumunt*: the man whom a German tribe recognized as its king must be in the line of hereditary descent from Woden; and therefore the genealogical trees of early Teutonic kings (as, for instance, in England those of the Kentish and West Saxon sovereigns) are carefully constructed to prove that descent from the god which alone will constitute a proper title for his descendants. Even from the first, however, there had been some opening for election; for the principle of primogeniture was not observed, and there might be several competing candidates, all of the true Woden stock. One of these competing candidates would have to be recognized (as the Anglo-Saxons said, *geceosan*); and to this limited extent Teutonic kings may be termed elective from the very first. In the other nations of western Europe this element of election dwindled, and the principle of heredity alone received legal recognition; in medieval Germany, on the contrary, the principle of heredity, while still exercising an inevitable natural force, sank formally into the background, and legal recognition was finally given to the elective principle. *De facto*, therefore, the principle of heredity exercises in Germany a great influence, an influence never more striking than in the period which follows on the formal recognition of the elective principle, when the Habsburgs (like the Metelli at Rome) *fato imperatores fiunt: de jure*, each monarch owes his accession simply and solely to the vote of an electoral college.

This difference between the German monarchy and the other monarchies of western Europe may be explained by various considerations. Not the least important of these is what seems a pure accident. Whereas the Capetian monarchs, during the three hundred years that followed on the election of Hugh Capet in 987, always left an heir male, and an heir male of full age, the German kings again and again, during the same period, either left a minor to succeed to their throne, or left no issue at all. The principle of heredity began to fail because there were no heirs. Again the strength of tribal feeling in Germany made the monarchy into a prize, which must not be the apanage of any single tribe, but must circulate, as it were, from Franconian to Saxon, from Saxon to Bavarian, from Bavarian to Franconian, from Franconian to Swabian; while the growing power of the baronage, and its habit of erecting anti-kings to emphasize its opposition to the crown (as, for instance, in the reign of Henry IV.), coalesced with and gave new force to the action of tribal feeling. Lastly, the fact that the German kings were also Roman emperors finally and irretrievably consolidated the growing tendency towards the elective principle. The principle of heredity had never held any great sway under the ancient Roman Empire (see under EMPEROR); and the medieval Empire, instituted as it was by the papacy, came definitely under the influence of ecclesiastical prepossessions in favour of election. The church had substituted for that descent from Woden, which had elevated the old pagan kings to their thrones, the conception that the monarch derived his crown from the choice of God, after the manner of Saul; and the theoretical choice of God was readily turned into the actual choice of the church, or, at any rate, of the general body of churchmen. If an ordinary king is thus regarded by the church as essentially elected, much more will the emperor, connected as he is with the church as one of its officers, be held to be also elected; and as a bishop is chosen by the chapter of his diocese, so, it will be thought, must the emperor be chosen by some corresponding body in his empire. Heredity might be tolerated in a mere matter of kingship: the precious trust of imperial power could not be allowed to descend according to the accidents of family succession. To Otto of Freising (*Gesta Frid.* ii. 1) it is already a point of right vindicated for itself by the excellency of the Roman Empire, as a matter of singular prerogative, that it should not descend *per sanguinis propaginem, sed per principum electionem.*

The accessions of Conrad II. (see Wipo, *Vita Cuonradi* c. 1-2), of Lothair II. (see *Narratio de electione Lotharii, M.G.H.. Scriptt.* xii. p. 510), of Conrad III. (see Otto of Freising, *Chronicon*, vii. 22) and of Frederick I. (see Otto of Freising, *Gesta Frid.* ii. 1) had all been marked by an element, more or less pronounced, of election. That element is perhaps most considerable in the case of Lothair, who had no rights of heredity to urge. Here we read of ten princes being selected from the princes of the various duchies, to whose choice the rest promise to assent, and of these ten selecting three candidates, one of whom, Lothair, is finally chosen (apparently by the whole assembly) in a somewhat tumultuary fashion. In this case the electoral assembly would seem to be, in the last resort, the whole diet of all the princes. But a *de facto* pre-eminence in the act of election is already, during the 12th century, enjoyed by the three Rhenish archbishops, probably because of the part they afterwards played at the coronation, and also by the dukes of the great duchies—possibly because of the part they too played, as vested for the time with the great offices of the household, at the coronation feast.[1] Thus at the election of Lothair it is the archbishop of Mainz who conducts the proceedings; and the election is not held to be final until the duke of Bavaria has given his assent. The fact is that, votes being weighed by quality as well as by quantity (see Diet), the votes of the archbishops and dukes, which would first be taken, would of themselves, if unanimous, decide the election. To prevent tumultuary elections, it was well that the election should be left exclusively with these great dignitaries; and this is what, by the middle of the 13th century, had eventually been done.

The chaos of the interregnum from 1198 to 1212 showed the way for the new departure; the chaos of the great interregnum (1250–1273) led to its being finally taken. The decay of the great duchies, and the narrowing of the class of princes into a close corporation, some of whose members were the equals of the old dukes in power, introduced difficulties and doubts into the practice of election which had been used in the 12th century. The contested election of the interregnum of 1198–1212 brought these difficulties and doubts into strong relief. The famous bull of Innocent III. (*Venerabilem*), in which he decided for Otto IV. against Philip of Swabia, on the ground that, though he had fewer votes than Philip, he had a majority of the votes of those *ad quos principaliter spectat electio*, made it almost imperative that there should be some definition of these principal electors. The most famous attempt at such a definition is that of the *Sachsenspiegel*, which was followed, or combated, by many other writers in the first half of the 13th century. Eventually the contested election of 1257 brought light and definition. Here we find seven potentates acting—the same seven whom the Golden Bull recognizes in 1356; and we find these seven described in an official letter to the pope, as *principes vocem in hujusmodi electione habentes, qui sunt septem numero.* The doctrine thus enunciated was at once received. The pope acknowledged it in two bulls (1263); a cardinal, in a commentary on the bull *Venerabilem* of Innocent III., recognized it about the same time; and the erection of statues of the seven electors at Aix-la-Chapelle gave the doctrine a visible and outward expression.

By the date of the election of Rudolph of Habsburg (1273) the seven electors may be regarded as a definite body, with an acknowledged right. But the definition and the acknowledgment were still imperfect. (1) The composition of the electoral body was uncertain in two respects. The duke of Bavaria claimed as his right the electoral vote of the king of Bohemia; and the practice of *partitio* in electoral families tended to raise further difficulties about the exercise of the vote. The Golden Bull of 1356 settled both these questions. Bohemia (of which Charles IV., the author of the Golden Bull, was himself the king) was assigned the electoral vote in preference to Bavaria; and a provision annexing the electoral vote to a definite territory, declaring that territory indivisible, and regulating its descent by the rule of primogeniture instead of partition, swept away the old difficulties which the custom of partition had raised. After 1356 the seven electors are regularly the three Rhenish archbishops, Mainz, Cologne and Trier, and four lay magnates, the palatine of the Rhine, the duke of Saxony, the margrave of Brandenburg, and the king of Bohemia; the three former being vested with the three archchancellorships, and the four latter with the four offices of the royal household (see Household). (2) The rights of the seven electors, in their collective capacity as an electoral college, were a matter of dispute with the papacy. The result of the election, whether made, as at first, by the princes generally or, as after 1257, by the seven electors exclusively, was in itself simply the creation of a German king—an *electio in regem*. But since 962 the German king was also, after coronation by the pope, Roman emperor. Therefore the election had a double result: the man elected was not only *electus in regem*, but also *promovendus ad imperium*. The difficulty was to define the meaning of the term *promovendus*. Was the king elect *inevitably* to become emperor? or did the *promotio* only follow at the discretion of the pope, if he thought the king elect fit for promotion? and if so, to what extent, and according to what standard, did the pope judge of such fitness? Innocent III. had already claimed, in the bull *Venerabilem*, (1) that the electors derived their power of election, so far as it made an emperor, from the Holy See (which had originally "translated" the Empire from the East to the West), and (2) that the papacy had a *jus et auctoritas examinandi personam electam in regem et promovendam ad imperium.* The latter claim he had based on the fact that he anointed, consecrated and crowned the emperor—in other words, that he gave a spiritual office according to spiritual methods, which entitled him to inquire into the fitness of the recipient of that office, as a bishop inquires into the fitness of a candidate for ordination. Innocent had put forward this claim as a ground for deciding between competing candidates: Boniface VIII. pressed the claim against Albert I. in 1298, even though his election was unanimous; while John XXII. exercised it in its harshest form, when in 1324 he excommunicated Louis IV. for using the title and exerting the rights even of king without previous papal confirmation. This action ultimately led to a protest from the electors themselves, whose right of election would have become practically meaningless, if such assumptions had been tolerated. A meeting of the electors (*Kurverein*) at Rense in 1338 declared (and the declaration was reaffirmed by a diet at Frankfort in the same year) that *postquam aliquis eligitur in Imperatorem sive Regem ab Electoribus Imperii concorditer, vel majori parte eorundem, statim ex sola electione est Rex verus et Imperator Romanus censendus . . . nec Papae sive Sedis Apostolicae . . . approbatione . . . indiget.* The doctrine thus positively affirmed at Rense is negatively reaffirmed in the Golden Bull, in which a significant silence is maintained in regard to papal rights. But the doctrine was not in practice followed: Sigismund himself did not venture to dispense with papal approbation.

By the end of the 14th century the position of the electors, both individually and as a corporate body, had become definite and precise. Individually, they were distinguished from all other princes, as we have seen, by the indivisibility of their territories and by the custom of primogeniture which secured that indivisibility; and they were still further distinguished by the fact that their person, like that of the emperor himself, was protected by the law of treason, while their territories were only subject to the jurisdiction of their own courts. They were independent territorial sovereigns; and their position was at once the envy and the ideal of the other princes of Germany. Such had been the policy of Charles IV.; and thus had he, in the Golden Bull, sought to magnify the seven electors, and himself as one of the seven, in his capacity of king of Bohemia, even at the expense of the Empire, and of himself in his capacity of emperor. Powerful as they were, however, in their individual capacity, the electors showed themselves no less powerful as a corporate body. As such a corporate body, they may be considered from three different points of view, and as acting in three different capacities. They are an electoral body, choosing each successive emperor; they are one of the three colleges of the imperial diet (see Diet); and they are also an electoral union (*Kurfürstenverein*), acting as a separate and independent political organ even after the election, and during the reign, of the monarch. It was in this last capacity that they had met at Rense in 1338; and in the same capacity they acted repeatedly during the 15th century. According to the Golden Bull, such meetings were to be annual, and their deliberations were to concern "the safety of the Empire and the world." Annual they never were; but occasionally they became of great importance. In 1424, during the attempt at reform occasioned by the failure of German arms against the Hussites, the *Kurfürstenverein* acted, or at least it claimed to act, as the predominant partner in a duumvirate, in which the unsuccessful Sigismund was relegated to a secondary position. During the long reign of Frederick III.—a reign in which the interests of Austria were cherished, and the welfare of the Empire neglected, by that apathetic yet tenacious emperor—the electors once more attempted, in the year 1453, to erect a new central government in place of the emperor, a government which, if not conducted by themselves directly in their capacity of a *Kurfürstenverein*, should at any rate be under their influence and control. So, they hoped, Germany might be able to make head against that papal aggression, to which Frederick had yielded, and to take a leading part in that crusade against the Turks, which he had neglected. Like the previous attempt at reform during the Hussite wars, the scheme came to nothing; the forces of disunion in Germany were too strong for any central government, whether monarchical and controlled by the emperor, or oligarchical and controlled by the electors. But a final attempt, the most strenuous of all, was made in the reign of Maximilian I., and under the influence of Bertold, elector and archbishop of Mainz. The council of 1500, in which the electors (with the exception of the king of Bohemia) were to have sat, and which would have been under their control, represents the last effective attempt at a real *Reichsregiment*. Inevitably, however, it shipwrecked on the opposition of Maximilian; and though the attempt was again made between 1521 and 1530, the idea of a real central government under the control of the electors perished, and the development of local administration by the circle took its place.

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[1] This is the view of the *Sachsenspiegel*, and also of Albert of Stade (quoted in Schröder, p. 476, n. 27): "Palatinus eligit, quia dapifer est; dux Saxoniae, quia marescalcus," &c. Schröder points out (p. 479, n. 45) that "participation in the coronation feast is an express recognition of the king"; and those who are to discharge their office in the one must have had a prominent voice in the other.

In the course of the 16th century a new right came to be exercised by the electors. As an electoral body (that is to say, in the first of the three capacities distinguished above), they claimed, at the election of Charles V. in 1519 and at subsequent elections, to impose conditions on the elected monarch, and to determine the terms on which he should exercise his office in the course of his reign. This *Wahlcapitulation*, similar to the *Pacta Conventa* which limited the elected kings of Poland, was left by the diet to the discretion of the electors, though after the treaty of Westphalia an attempt was made, with some little success,[1] to turn the capitulation into a matter of legislative enactment by the diet. From this time onwards the only fact of importance in the history of the electors is the change which took place in the composition of their body during the 17th and 18th centuries. From the Golden Bull to the treaty of Westphalia (1356–1648) the composition of the electoral body had remained unchanged. In 1623, however, in the course of the Thirty Years' War, the vote of the count palatine of the Rhine had been transferred to the duke of Bavaria; and at the treaty of Westphalia the vote, with the office of imperial butler which it carried, was left to Bavaria, while an eighth vote, along with the new office of imperial treasurer, was created for the count palatine. In 1708 a ninth vote, along with the office of imperial standard-bearer, was created for Hanover; while finally, in 1778, the vote of Bavaria and the office of imperial butler returned to the counts palatine, as heirs of the duchy, on the extinction of the ducal line, while the new vote created for the Palatinate in 1648, with the office of imperial treasurer, was transferred to Brunswick-Lüneburg (Hanover) in lieu of the one which this house already held. In 1806, on the dissolution of the Holy Roman Empire, the electors ceased to exist.

Literature.—T. Lindner, *Die deutschen Königswahlen und die Entstehung des Kurfürstentums* (1893), and *Der Hergang bei den deutschen Königswahlen* (1899); R. Kirchhöfer, *Zur Entstehung des Kurkollegiums* (1893); W. Maurenbrecher, *Geschichte der deutschen Königswahlen* (1889); and G. Blondel, *Étude sur Frédéric II*, p. 27 sqq. See also J. Bryce, *Holy Roman Empire* (edition of 1904), c. ix.; and R. Schröder, *Lehrbuch der deutschen Rechtsgeschichte*, pp. 471-481 and 819-820. (E. Br.)

ELECTRA ('Ηλέκτρα), "the bright one," in Greek mythology. (1) One of the seven Pleiades, daughter of Atlas and Pleïone. She is closely connected with the old constellation worship and the religion of Samothrace, the chief seat of the Cabeiri (*q.v.*), where she was generally supposed to dwell. By Zeus she was the mother of Dardanus, Iasion (or Eëtion), and Harmonia; but in the Italian tradition, which represented Italy as the original home of the Trojans, Dardanus was her son by a king of Italy named Corythus. After her amour with Zeus, Electra fled to the Palladium as a suppliant, but Athena, enraged that it had been touched by one who was no longer a maiden, flung Electra and the image from heaven to earth, where it was found by Ilus, and taken by him to Ilium; according to another tradition, Electra herself took it to Ilium, and gave it to her son Dardanus (Schol. Eurip. *Phoen.* 1136). In her grief at the destruction of the city she plucked out her hair and was changed into a comet; in another version Electra and her six sisters had been placed among the stars as the Pleiades, and the star which she represented lost its brilliancy after the fall of Troy. Electra's connexion with Samothrace (where she was also called Electryone and Strategis) is shown by the localization of the carrying off of her reputed daughter Harmonia by Cadmus, and by the fact that, according to Athenicon (the author of a work on Samothrace quoted by the scholiast on Apollonius Rhodius i. 917), the Cabeiri were Dardanus and Iasion. The gate Electra at Thebes and the fabulous island Electris were said to have been called after her (Apollodorus iii. 10. 12; Servius on *Aen.* iii. 167, vii. 207, x. 272, *Georg.* i. 138).

(2) Daughter of Agamemnon and Clytaemnestra, sister of Orestes and Iphigeneia. She does not appear in Homer, although according to Xanthus (regarded by some as a fictitious personage), to whom Stesichorus was indebted for much in his *Oresteia*, she was identical with the Homeric Laodice, and was called Electra because she remained so long unmarried ('Α-λέκτρα). She was said to have played an important part in the poem of Stesichorus, and subsequently became a favourite figure in tragedy. After the murder of her father on his return from Troy by her mother and Aegisthus, she saved the life of her brother Orestes by sending him out of the country to Strophius, king of Phanote in Phocis, who had him brought up with his own son Pylades. Electra, cruelly ill-treated by Clytaemnestra and her paramour, never loses hope that her brother will return to avenge his father. When grown up, Orestes, in response to frequent messages from his sister, secretly repairs with Pylades to Argos, where he pretends to be a messenger from Strophius bringing the news of the death of Orestes. Being admitted to the palace, he slays both Aegisthus and Clytaemnestra. According to another story (Hyginus, *Fab.* 122), Electra, having received a false report that Orestes and Pylades had been sacrificed to Artemis in Tauris, went to consult the oracle at Delphi. In the meantime Aletes, the son of Aegisthus, seized the throne of Mycenae. Her arrival at Delphi coincided with that of Orestes and Iphigeneia. The same messenger, who had already communicated the false report of the death of Orestes, informed her that he had been slain by Iphigeneia. Electra in her rage seized a burning brand from the altar, intending to blind her sister; but at the critical moment Orestes appeared, recognition took place, and the brother and sister returned to Mycenae. Aletes was slain by Orestes, and

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[1] See Schröder's *Lehrbuch der deutschen Rechtsgeschichte*, p. 820.

Electra became the wife of Pylades. The story of Electra is the subject of the *Choëphori* of Aeschylus, the *Electra* of Sophocles and the *Electra* of Euripides. It is in the Sophoclean play that Electra is most prominent.

There are many variations in the treatment of the legend, for which, as also for a discussion of the modern plays on the subject by Voltaire and Alfieri, see Jebb's Introduction to his edition of the *Electra* of Sophocles.

ELECTRICAL (or ELECTROSTATIC) **MACHINE,** a machine operating by manual or other power for transforming mechanical work into electric energy in the form of electrostatic charges of opposite sign delivered to separate conductors. Electrostatic machines are of two kinds: (1) Frictional, and (2) Influence machines.

Frictional Machines.—A primitive form of frictional electrical machine was constructed about 1663 by Otto von Guericke (1602–1686). It consisted of a globe of sulphur fixed on an axis and rotated by a winch, and it was electrically excited by the friction of warm hands held against it. Sir Isaac Newton appears to have been the first to use a glass globe instead of sulphur (*Optics*, 8th Query). F. Hawksbee in 1709 also used a revolving glass globe. A metal chain resting on the globe served to collect the charge. Later G. M. Bose (1710–1761), of Wittenberg, added the prime conductor, an insulated tube or cylinder supported on silk strings, and J. H. Winkler (1703–1770), professor of physics at Leipzig, substituted a leather cushion for the hand. Andreas Gordon (1712–1751) of Erfurt, a Scotch Benedictine monk, first used a glass cylinder in place of a sphere. Jesse Ramsden (1735–1800) in 1768 constructed his well-known form of plate electrical machine (fig. 1). A glass plate fixed to a wooden or metal shaft is rotated by a winch. It passes between two rubbers made of leather, and is partly covered with two silk aprons which extend over quadrants of its surface. Just below the places where the aprons terminate, the glass is embraced by two insulated metal forks having the sharp points projecting towards the glass, but not quite touching it. The glass is excited positively by friction with the rubbers, and the charge is drawn off by the action of the points which, when acted upon inductively, discharge negative electricity against it. The insulated conductor to which the points are connected therefore becomes positively electrified. The cushions must be connected to earth to remove the negative electricity which accumulates on them. It was found that the machine acted better if the rubbers were covered with bisulphide of tin or with F. von Kienmayer's amalgam, consisting of one part of zinc, one of tin and two of mercury. The cushions were greased and the amalgam in a state of powder spread over them. Edward Nairne's electrical machine (1787) consisted of a glass cylinder with two insulated conductors, called prime conductors, on glass legs placed near it. One of these carried the leather exacting cushions and the other the collecting metal points, a silk apron extending over the cylinder from the cushion almost to the points. The rubber was smeared with amalgam. The function of the apron is to prevent the escape of electrification from the glass during its passage from the rubber to the collecting points. Nairne's machine could give either positive or negative electricity, the first named being collected from the prime conductor carrying the collecting points and the second from the prime conductor carrying the cushion.

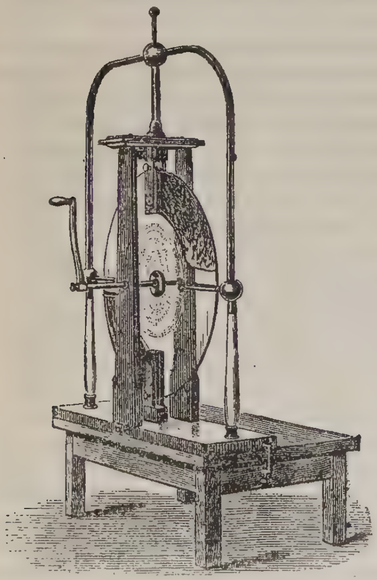
FIG. 1.—Ramsden's electrical machine.

Influence Machines.—Frictional machines are, however, now quite superseded by the second class of instrument mentioned above, namely, influence machines. These operate by electrostatic induction and convert mechanical work into electrostatic energy by the aid of a small initial charge which is continually being replenished or reinforced. The general principle of all the machines described below will be best understood by considering a simple ideal case. Imagine two Leyden jars with large brass knobs, A and B, to stand on the ground (fig. 2). Let one jar be initially charged with positive electricity on its inner coating and the other with negative, and let both have their outsides connected to earth. Imagine two insulated balls A′ and B′ so held that A′ is near A and B′ is near B. Then the positive charge on A induces two charges on A′, viz.: a negative on the side nearest and a positive on the side most removed. Likewise the negative charge on B induces a positive charge on the side of B′ nearest to it and repels negative electricity to the far side. Next let the balls A′ and B′ be connected together for a moment by a wire N called a neutralizing conductor which is subsequently removed. Then A′ will be left negatively electrified and B′ will be left positively electrified. Suppose that A′ and B′ are then made to change places. To do this we shall have to exert energy to remove A′ against the attraction of A and B′ against the attraction of B. Finally let A′ be brought in contact with B and B′ with A. The ball A′ will give up its charge of negative electricity to the Leyden jar B, and the ball B′ will give up its positive charge to the Leyden jar A. This transfer will take place because the inner coatings of the Leyden jars have greater capacity with respect to the earth than the balls. Hence the charges of the jars will be increased. The balls A′ and B′ are then practically discharged, and the above cycle of operations may be repeated. Hence, however small may be the initial charges of the Leyden jars, by a principle of accumulation resembling that of compound interest, they can be increased as above shown to any degree. If this series of operations be made to depend upon the continuous rotation of a winch or handle, the arrangement constitutes an electrostatic influence machine. The principle therefore somewhat resembles that of the self-exciting dynamo.

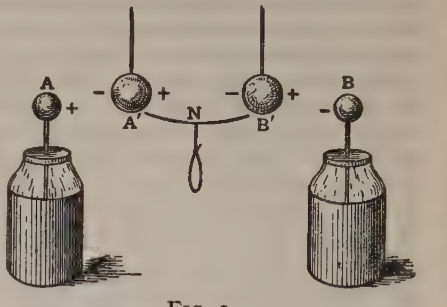

FIG. 2.

The first suggestion for a machine of the above kind seems to have grown out of the invention of Volta's electrophorus. Abraham Bennet, the inventor of the gold leaf electroscope, described a doubler or machine for multiplying electric charges (*Phil. Trans.*, 1787).

Bennet's Doubler.

The principle of this apparatus may be explained thus. Let A and C be two fixed disks, and B a disk which can be brought at will within a very short distance of either A or C. Let us suppose all the plates to be equal, and let the capacities of A and C in presence of B be each equal to p, and the coefficient of induction between A and B, or C and B, be q. Let us also suppose that the plates A and C are so distant from each other that there is no mutual influence, and that p' is the capacity of one of the disks when it stands alone. A small charge Q is communicated to A, and A is insulated, and B, uninsulated, is brought up to it; the charge on B will be $-(q/p)Q$. B is now uninsulated and brought to face C, which is uninsulated; the charge on C will be $(q/p)^2Q$. C is now insulated and connected with A, which is always insulated. B is then brought to face A and uninsulated, so that the charge on A becomes rQ, where

$$r=\frac{p}{p+p'}\left(1+\frac{q^2}{p^2}\right).$$

A is now disconnected from C, and here the first operation ends. It is obvious that at the end of n such operations the charge on A will be r^nQ, so that the charge goes on increasing in geometrical progression. If the distance between the disks could be made infinitely small each time, then the multiplier *r* would be 2, and the charge would be doubled each time. Hence the name of the apparatus.

Nicholson's doubler.

Erasmus Darwin, B. Wilson, G. C. Bohnenberger and J. C. E. Peclet devised various modifications of Bennet's instrument (see S. P. Thompson, "The Influence Machine from 1788 to 1888," *Journ. Soc. Tel. Eng.*, 1888, 17, p. 569). Bennet's doubler appears to have given a suggestion to William Nicholson (*Phil. Trans.*, 1788, p. 403) of "an instrument which by turning a winch produced the two states of electricity without friction or communication with the earth." This "revolving doubler," according to the description of Professor S. P. Thompson (*loc. cit.*), consists of two fixed plates of brass A and C (fig. 3), each two inches in diameter and separately supported on insulating arms in the same plane, so that a third revolving plate B may pass very near them without touching. A brass ball D two inches in diameter is fixed on the end of the axis that carries the plate B, and is loaded within at one side, so as to act as a counterpoise to the revolving plate B. The axis P N is made of varnished glass, and so are the axes that join the three plates with the brass axis N O. The axis N O passes through the brass piece M, which stands on an insulating pillar of glass, and supports the plates A and C. At one extremity of this axis is the ball D, and the other is connected with a rod of glass, N P, upon which is fixed the handle L, and also the piece G H, which is separately insulated. The pins E, F rise out of the back of the fixed plates A and C, at unequal distances from the axis. The piece K is parallel to G H, and both of them are furnished at their ends with small pieces of flexible wire that they may touch the pins E, F in certain points of their revolution. From the brass piece M there stands out a pin I, to touch against a small flexible wire or spring which projects sideways from the rotating plate B when it comes opposite A. The wires are so adjusted by bending that B, at the moment when it is opposite A, communicates with the ball D, and A communicates with C through GH; and half a revolution later C, when B comes opposite to it, communicates with the ball D through the contact of K with F. In all other positions A, B, C and D are completely disconnected from each other. Nicholson thus described the operation of his machine:—

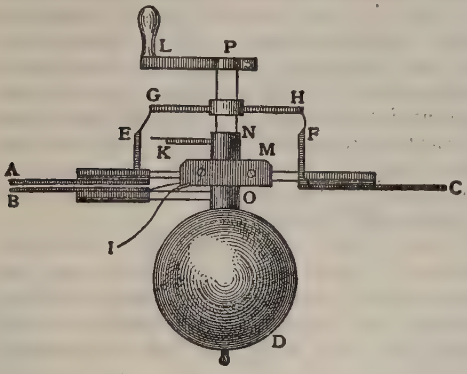

FIG. 3.—Nicholson's Revolving Doubler.

> "When the plates A and B are opposite each other, the two fixed plates A and C may be considered as one mass, and the revolving plate B, together with the ball D, will constitute another mass. All the experiments yet made concur to prove that these two masses will not possess the same electric state. . . . The redundant electricities in the masses under consideration will be unequally distributed; the plate A will have about ninety-nine parts, and the plate C one; and, for the same reason, the revolving plate B will have ninety-nine parts of the opposite electricity, and the ball D one. The rotation, by destroying the contacts, preserves this unequal distribution, and carries B from A to C at the same time that the tail K connects the ball with the plate C. In this situation, the electricity in B acts upon that in C, and produces the contrary state, by virtue of the communication between C and the ball; which last must therefore acquire an electricity of the same kind with that of the revolving plate. But the rotation again destroys the contact and restores B to its first situation opposite A. Here, if we attend to the effect of the whole revolution, we shall find that the electric states of the respective masses have been greatly increased; for the ninety-nine parts in A and B remain, and the one part of electricity in C has been increased so as nearly to compensate ninety-nine parts of the opposite electricity in the revolving plate B, while the communication produced an opposite mutation in the electricity of the ball. A second rotation will, of course, produce a proportional augmentation of these increased quantities; and a continuance of turning will soon bring the intensities to their maximum, which is limited by an explosion between the plates" (*Phil. Trans.*, 1788, p. 405).

Belli's doubler.

Nicholson described also another apparatus, the "spinning condenser," which worked on the same principle. Bennet and Nicholson were followed by T. Cavallo, John Read, Bohnenberger, C. B. Désormes and J. N. P. Hachette and others in the invention of various forms of rotating doubler. A simple and typical form of doubler, devised in 1831 by G. Belli (fig. 4), consisted of two curved metal plates between which revolved a pair of balls carried on an insulating stem. Following the nomenclature usual in connexion with dynamos we may speak of the conductors which carry the initial charges as the field plates, and of the moving conductors on which are induced the charges which are subsequently added to those on the field plates, as the carriers. The wire which connects two armature plates for a moment is the neutralizing conductor. The two curved metal plates constitute the field plates and must have original charges imparted to them of opposite sign. The rotating balls are the carriers, and are connected together for a moment by a wire when in a position to be acted upon inductively by the field plates, thus acquiring charges of opposite sign. The moment after they are separated again. The rotation continuing the ball thus negatively charged is made to give up this charge to that negatively electrified field plate, and the ball positively charged its charge to the positively electrified field plate, by touching little contact springs. In this manner the field plates accumulate charges of opposite sign.

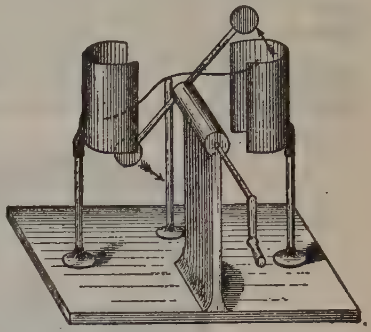

FIG. 4.—Belli's Doubler.

Varley's machine.

Modern types of influence machine may be said to date from 1860 when C. F. Varley patented a type of influence machine which has been the parent of numerous subsequent forms (*Brit. Pat. Spec.* No. 206 of 1860). In it the field plates were sheets of tin-foil attached to a glass plate (fig. 5). In front of them a disk of ebonite or glass, having carriers of metal fixed to its edge, was rotated by a winch. In the course of their rotation two diametrically opposite carriers touched against the ends of a neutralizing conductor so as to form for a moment one conductor, and the moment afterwards these two carriers were insulated, one carrying away a positive charge and the other a negative. Continuing their rotation, the positively charged carrier gave up its positive charge by touching a little knob attached to the positive field plate, and similarly for the negative charge carrier. In this way the charges on the field plates were continually replenished and reinforced. Varley also constructed a multiple form of influence machine having six rotating disks, each having a number of carriers and rotating between field plates. With this apparatus he obtained sparks 6 in. long, the initial source of electrification being a single Daniell cell.

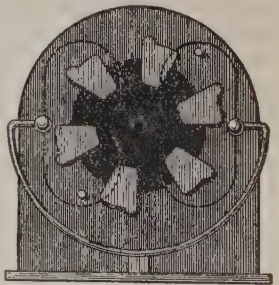

FIG. 5.—Varley's Machine.

Toepler machine.

Varley was followed by A. J. I. Toepler, who in 1865 constructed an influence machine consisting of two disks fixed on the same shaft and rotating in the same direction. Each disk carried two strips of tin-foil extending nearly over a semi-circle, and there were two field plates, one behind each disk; one of the plates was positively and the other negatively electrified. The carriers which were touched under the influence of the positive field plate passed on and gave up a portion of their negative charge to increase that of the negative field plate; in the same way the carriers which were touched under the influence of the negative field plate sent a part of their charge to augment that of the positive field plate. In this apparatus one of the charging rods communicated with one of the field plates, but the other with the neutralizing brush opposite to the other field plate. Hence one of the field plates would always remain charged when a spark was taken at the transmitting terminals.

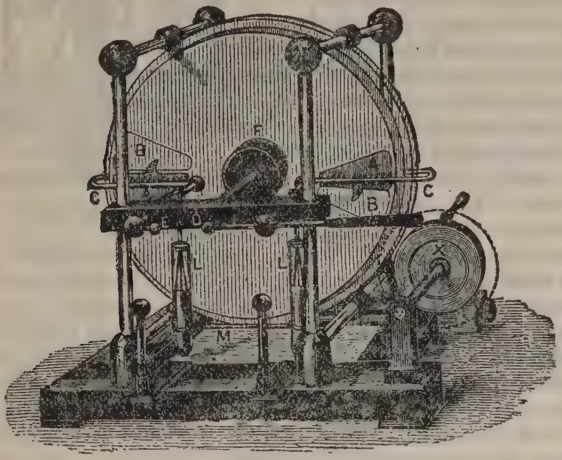

Fig. 6.—Holtz's Machine.

Holtz machine.

Between 1864 and 1880, W. T. B. Holtz constructed and described a large number of influence machines which were for a long time considered the most advanced development of this type of electrostatic machine. In one form the Holtz machine consisted of a glass disk mounted on a horizontal axis F (fig. 6) which could be made to rotate at a considerable speed by a multiplying gear, part of which is seen at X. Close behind this disk was fixed another vertical disk of glass in which were cut two windows B, B. On the side of the fixed disk next the rotating disk were pasted two sectors of paper A, A, with short blunt points attached to them which projected out into the windows on the side away from the rotating disk. On the other side of the rotating disk were placed two metal combs C, C, which consisted of sharp points set in metal rods and were each connected to one of a pair of discharge balls E, D, the distance between which could be varied. To start the machine the balls were brought in contact, one of the paper armatures electrified, say, with positive electricity, and the disk set in motion. Thereupon very shortly a hissing sound was heard and the machine became harder to turn as if the disk were moving through a resisting medium. After that the discharge balls might be separated a little and a continuous series of sparks or brush discharges would take place between them. If two Leyden jars L, L were hung upon the conductors which supported the combs, with their outer coatings put in connexion with one another by M, a series of strong spark discharges passed between the discharge balls. The action of the machine is as follows: Suppose one paper armature to be charged positively, it acts by induction on the right hand comb, causing negative electricity to issue from the comb points upon the glass revolving disk; at the same time the positive electricity passes through the closed discharge circuit to the left comb and issues from its teeth upon the part of the glass disk at the opposite end of the diameter. This positive electricity electrifies the left paper armature by induction, positive electricity issuing from the blunt point upon the side farthest from the rotating disk. The charges thus deposited on the glass disk are carried round so that the upper half is electrified negatively on both sides and the lower half positively on both sides, the sign of the electrification being reversed as the disk passes between the combs and the armature by discharges issuing from them respectively. If it were not for leakage in various ways, the electrification would go on everywhere increasing, but in practice a stationary state is soon attained. Holtz's machine is very uncertain in its action in a moist climate, and has generally to be enclosed in a chamber in which the air is kept artificially dry.

Voss's machine.

Robert Voss, a Berlin instrument maker, in 1880 devised a form of machine in which he claimed that the principles of Toepler and Holtz were combined. On a rotating glass or ebonite disk were placed carriers of tin-foil or metal buttons against which neutralizing brushes touched. This armature plate revolved in front of a field plate carrying two pieces of tin-foil backed up by larger pieces of varnished paper. The studs on the armature plate were charged inductively by being connected for a moment by a neutralizing wire as they passed in front of the field plates, and then gave up their charges partly to renew the field charges and partly to collecting combs connected to discharge balls. In general design and construction, the manner of moving the rotating plate and in the use of the two Leyden jars in connexion with the discharge balls, Voss borrowed his ideas from Holtz.

Wimshurst machine.

All the above described machines, however, have been thrown into the shade by the invention of a greatly improved type of influence machine first constructed by James Wimshurst about 1878. Two glass disks are mounted on two shafts in such a manner that, by means of two belts and pulleys worked from a winch shaft, the disks can be rotated rapidly in opposite directions close to each other (fig. 7). These glass disks carry on them a certain number (not less than 16 or 20) tin-foil carriers which may or may not have brass buttons upon them. The glass plates are well varnished, and the carriers are placed on the outer sides of the two glass plates. As therefore the disks revolve, these carriers travel in opposite directions, coming at intervals in opposition to each other. Each upright bearing carrying the shafts of the revolving disks also carries a neutralizing conductor or wire ending in a little brush of gilt thread. The neutralizing conductors for each disk are placed at right angles to each other. In addition there are collecting combs which occupy an intermediate position and have sharp points projecting inwards, and coming near to but not touching the carriers. These combs on opposite sides are connected respectively to the inner coatings of two Leyden jars whose outer coatings are in connexion with one another.

The operation of the machine is as follows: Let us suppose that one of the studs on the back plate is positively electrified and one at the opposite end of a diameter is negatively electrified, and that at that moment two corresponding studs on the front plate passing opposite to these back studs are momentarily connected together by the neutralizing wire belonging to the front plate. The positive stud on the back plate will act inductively on the front stud and charge it negatively, and similarly for the other stud, and as the rotation continues these charged studs will pass round and give up most of their charge through the combs to the Leyden jars. The moment, however, a pair of studs on the front plate are charged, they act as field plates to studs on the back plate which are passing at the moment, provided these last are connected by the back neutralizing wire. After a few revolutions of the disks half the studs on the front plate at any moment are charged negatively and half positively and the same on the back plate, the neutralizing wires forming the boundary between the positively and negatively charged studs. The diagram in fig. 8, taken by permission from S. P. Thompson's paper (*loc. cit.*), represents a view of the distribution of these charges on the front and back plates respectively. It will be

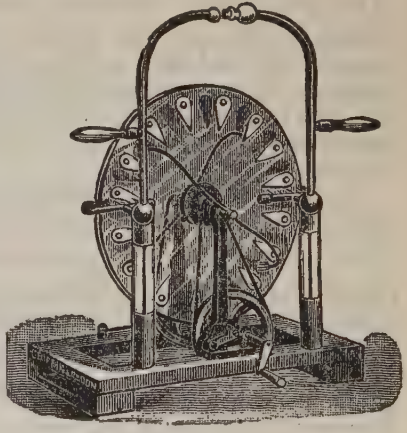
Fig. 7.—Wimshurst's Machine.

seen that each stud is in turn both a field plate and a carrier having a charge induced on it, and then passing on in turn induces further charges on other studs. Wimshurst constructed numerous very powerful machines of this type, some of them with multiple plates, which operate in almost any climate, and rarely fail to charge themselves and deliver a torrent of sparks between the discharge balls whenever the winch is turned. He also devised an alternating current electrical machine in which the discharge balls were alternately positive and negative. Large Wimshurst multiple plate influence machines are often used instead of induction coils for exciting Röntgen ray tubes in medical work. They give very steady illumination on fluorescent screens.

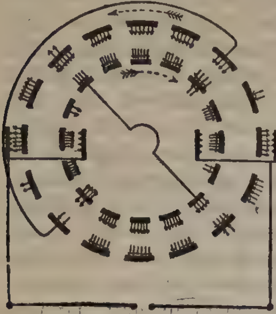

Fig. 8.—Action of the Wimshurst Machine.

In 1900 it was found by F. Tudsbury that if an influence machine is enclosed in a metallic chamber containing compressed air, or better, carbon dioxide, the insulating properties of compressed gases enable a greatly improved effect to be obtained owing to the diminution of the leakage across the plates and from the supports. Hence sparks can be obtained of more than double the length at ordinary atmospheric pressure. In one case a machine with plates 8 in. in diameter which could give sparks 2.5 in. at ordinary pressure gave sparks of 5, 7, and 8 in. as the pressure was raised to 15, 30 and 45 lb above the normal atmosphere.

The action of Lord Kelvin's replenisher (fig. 9) used by him in connexion with his electrometers for maintaining their charge, closely resembles that of Belli's doubler and will be understood from fig. 9. Lord Kelvin also devised an influence machine, commonly called a "mouse mill," for electrifying the ink in connexion with his siphon recorder. It was an electrostatic and electromagnetic machine combined, driven by an electric current and producing in turn electrostatic charges of electricity.

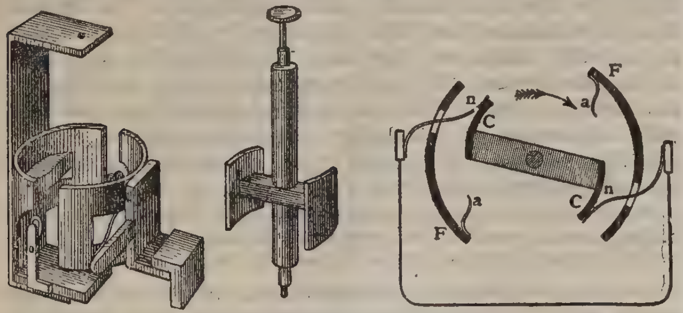

Fig. 9.—Lord Kelvin's Replenisher.

C, C, Metal carriers, fixed to ebonite cross-arm.
F, F, Brass field-plates or conductors.
a, a, Receiving springs.
n, n, Connecting springs or neutralizing brushes.

In connexion with this subject mention must also be made of the water dropping influence machine of the same inventor.[1]

The action and efficiency of influence machines have been investigated by F. Rossetti, A. Righi and F. W. G. Kohlrausch. The electromotive force is practically constant no matter what the velocity of the disks, but according to some observers the internal resistance decreases as the velocity increases. Kohlrausch, using a Holtz machine with a plate 16 in. in diameter, found that the current given by it could only electrolyse acidulated water in 40 hours sufficient to liberate one cubic centimetre of mixed gases. E. E. N. Mascart, A. Roiti, and E. Bouchotte have also examined the efficiency and current producing power of influence machines.

Bibliography.—In addition to S. P. Thompson's valuable paper on influence machines (to which this article is much indebted) and other references given, see J. Clerk Maxwell, *Treatise on Electricity and Magnetism* (2nd ed., Oxford, 1881), vol. i. p. 294; J. D. Everett, *Electricity* (expansion of part iii. of Deschanel's *Natural Philosophy*) (London, 1901), ch. iv. p. 20; A. Winkelmann, *Handbuch der Physik* (Breslau, 1905), vol. iv. pp. 50-58 (contains a large number of references to original papers); J. Gray, *Electrical Influence Machines, their Development and Modern Forms* (London, 1903). (J. A. F.)

ELECTRIC EEL (*Gymnotus electricus*), a member of the family of fishes known as *Gymnotidae*. In spite of their external similarity the *Gymnotidae* have nothing to do with the eels (*Anguilla*). They resemble the latter in the elongation of the body, the large number of vertebrae (240 in *Gymnotus*), and the absence of pelvic fins; but they differ in all the more important characters of internal structure. They are in fact allied to the carps or *Cyprinidae* and the cat-fishes or *Siluridae*. In common with these two families and the *Characinidae* of Africa and South America, the *Gymnotidae* possess the peculiar structures called *ossicula auditus* or Weberian ossicles. These are a chain of small bones belonging to the first four vertebrae, which are much modified, and connecting the air-bladder with the auditory organs. Such an agreement in the structure of so complicated and specialized an apparatus can only be the result of a community of descent of the families possessing it. Accordingly these families are now placed together in a distinct sub-order, the Ostariophysi. The *Gymnotidae* are strongly modified and degraded *Characinidae*. In them the dorsal and caudal fins are very rudimentary or absent, and the anal is very long, extending from the anus, which is under the head or throat, to the end of the body.

Gymnotus is the only genus of the family which possesses electric organs. These extend the whole length of the tail, which is four-fifths of the body. They are modifications of the lateral muscles and are supplied with numerous branches of the spinal nerves. They consist of longitudinal columns, each composed of an immense number of "electric plates." The posterior end of the organ is positive, the anterior negative, and the current passes from the tail to the head. The maximum shock is given when the head and tail of the *Gymnotus* are in contact with different points in the surface of some other animal. *Gymnotus electricus* attains a length of 3 ft. and the thickness of a man's thigh, and frequents the marshes of Brazil and the Guianas, where it is regarded with terror, owing to the formidable electrical apparatus with which it is provided. When this natural battery is discharged in a favourable position, it is sufficiently powerful to stun the largest animal; and according to A. von Humboldt, it has been found necessary to change the line of certain roads passing through the pools frequented by the electric eels. These fish are eaten by the Indians, who, before attempting to capture them, seek to exhaust their electrical power by driving horses into the ponds. By repeated discharges upon these they gradually expend this marvellous force; after which, being defenceless, they become timid, and approach the edge for shelter, when they fall an easy prey to the harpoon. It is only after long rest and abundance of food that the fish is able to resume the use of its subtle weapon. Humboldt's description of this method of capturing the fish has not, however, been verified by recent travellers.

ELECTRICITY. This article is devoted to a general sketch of the history of the development of electrical knowledge on both the theoretical and the practical sides. The two great branches of electrical theory which concern the phenomena of electricity at rest, or "frictional" or "static" electricity, and of electricity in motion, or electric currents, are treated in two separate articles, Electrostatics and Electrokinetics. The phenomena attendant on the passage of electricity through solids, through liquids and through gases, are described in the article Conduction, Electric, and also Electrolysis, and the propagation of electrical vibrations in Electric Waves. The interconnexion of magnetism (which has an article to itself) and electricity is discussed in Electromagnetism, and these manifestations in nature in Atmospheric Electricity; Aurora Polaris and Magnetism, Terrestrial. The general principles of electrical engineering will be found in Electricity Supply, and further details respecting the generation and use of electrical power are given in such articles as Dynamo; Motors, Electric; Transformers; Accumulator; Power Transmission: *Electric*; Traction; Lighting: *Electric*; Electrochemistry and Electrometallurgy. The principles of telegraphy (land, submarine and wireless) and of telephony are discussed in the articles Telegraph and Telephone, and various electrical instruments are treated in separate articles such as Amperemeter; Electrometer; Galvanometer; Voltmeter; Wheatstone's Bridge; Potentiometer; Meter, Electric; Electrophorus; Leyden Jar; &c.

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[1] See Lord Kelvin, *Reprint of Papers on Electrostatics and Magnetism* (1872); "Electrophoric Apparatus and Illustrations of Voltaic Theory," p. 319; "On Electric Machines Founded on Induction and Convection," p. 330; "The Reciprocal Electrophorus," p. 337.

The term "electricity" is applied to denote the physical agency which exhibits itself by effects of attraction and repulsion when particular substances are rubbed or heated, also in certain chemical and physiological actions and in connexion with moving magnets and metallic circuits. The name is derived from the word *electrica*, first used by William Gilbert (1544–1603) in his epoch-making treatise *De magnete, magneticisque corporibus, et de magno magnete tellure*, published in 1600,[1] to denote substances which possess a similar property to amber (=*electrum*, from ἤλεκτρον) of attracting light objects when rubbed. Hence the phenomena came to be collectively called electrical, a term first used by William Barlowe, archdeacon of Salisbury, in 1618, and the study of them, electrical science.

Historical Sketch.

Gilbert was the first to conduct systematic scientific experiments on electrical phenomena. Prior to his date the scanty knowledge possessed by the ancients and enjoyed in the middle ages began and ended with facts said to have been familiar to Thales of Miletus (600 B.C.) and mentioned by Theophrastus (321 B.C.) and Pliny (A.D. 70), namely, that amber, jet and one or two other substances possessed the power, when rubbed, of attracting fragments of straw, leaves or feathers. Starting with careful and accurate observations on facts concerning the mysterious properties of amber and the lodestone, Gilbert laid the foundations of modern electric and magnetic science on the true experimental and inductive basis. The subsequent history of electricity may be divided into four well-marked periods. The first extends from the date of publication of Gilbert's great treatise in 1600 to the invention by Volta of the voltaic pile and the first production of the electric current in 1799. The second dates from Volta's discovery to the discovery by Faraday in 1831 of the induction of electric currents and the creation of currents by the motion of conductors in magnetic fields, which initiated the era of modern electrotechnics. The third covers the period between 1831 and Clerk Maxwell's enunciation of the electromagnetic theory of light in 1865 and the invention of the self-exciting dynamo, which marks another great epoch in the development of the subject; and the fourth comprises the modern development of electric theory and of absolute quantitative measurements, and above all, of the applications of this knowledge in electrical engineering. We shall sketch briefly the historical progress during these various stages, and also the growth of electrical theories of electricity during that time.

First Period.—Gilbert was probably led to study the phenomena of the attraction of iron by the lodestone in consequence of his conversion to the Copernican theory of the earth's motion, and thence proceeded to study the attractions produced by amber. An account of his electrical discoveries is given in the *De magnete*, lib. ii. cap. 2.[2] He invented the *versorium* or electrical needle and proved that innumerable bodies he called *electrica*, when rubbed, can attract the needle of the versorium (see Electroscope). Robert Boyle added many new facts and gave an account of them in his book, *The Origin of Electricity*. He showed that the attraction between the rubbed body and the test object is mutual. Otto von Guericke (1602–1686) constructed the first electrical machine with a revolving ball of sulphur (see Electrical Machine), and noticed that light objects were repelled after being attracted by excited electrics. Sir Isaac Newton substituted a ball of glass for sulphur in the electrical machine and made other not unimportant additions to electrical knowledge. Francis Hawksbee (d. 1713) published in his book *Physico-Mechanical Experiments* (1709), and in several Memoirs in the *Phil. Trans.* about 1707, the results of his electrical inquiries. He showed that light was produced when mercury was shaken up in a glass tube exhausted of its air. Dr Wall observed the spark and crackling sound when warm amber was rubbed, and compared them with thunder and lightning (*Phil. Trans.*, 1708, 26, p. 69). Stephen Gray (1696–1736) noticed in 1720 that electricity could be excited by the friction of hair, silk, wool, paper and other bodies. In 1729 Gray made the important discovery that some bodies were conductors and others non-conductors of electricity. In conjunction with his friend Granville Wheeler (d. 1770), he conveyed the electricity from rubbed glass, a distance of 886 ft., along a string supported on silk threads (*Phil. Trans.*, 1735–1736, 39, pp. 16, 166 and 400). Jean Théophile Desaguliers (1683–1744) announced soon after that electrics were non-conductors, and conductors were non-electrics. C. F. de C. du Fay (1699–1739) made the great discovery that electricity is of two kinds, vitreous and resinous (*Phil. Trans.*, 1733, 38, p. 263), the first being produced when glass, crystal, &c. are rubbed with silk, and the second when resin, amber, silk or paper, &c. are excited by friction with flannel. He also discovered that a body charged with positive or negative electricity repels a body free to move when the latter is charged with electricity of like sign, but attracts it if it is charged with electricity of opposite sign, *i.e.* positive repels positive and negative repels negative, but positive attracts negative. It is to du Fay also that we owe the abolition of the distinction between electrics and non-electrics. He showed that all substances could be electrified by friction, but that to electrify conductors they must be insulated or supported on non-conductors. Various improvements were made in the electrical machine, and thereby experimentalists were provided with the means of generating strong electrification; C. F. Ludolff (1707–1763) of Berlin in 1744 succeeded in igniting ether with the electric spark (*Phil. Trans.*, 1744, 43, p. 167).

For a very full list of the papers and works of these early electrical philosophers, the reader is referred to the bibliography on Electricity in Dr Thomas Young's *Natural Philosophy*, vol. ii. p. 415.

In 1745 the important invention of the Leyden jar or condenser was made by E. G. von Kleist of Kammin, and almost simultaneously by Cunaeus and Pieter van Musschenbroek (1692–1761) of Leiden (see Leyden Jar). Sir William Watson (1715–1787) in England first observed the flash of light when a Leyden jar is discharged, and he and Dr John Bevis (1695–1771) suggested coating the jar inside and outside with tinfoil. Watson carried out elaborate experiments to discover how far the electric discharge of the jar could be conveyed along metallic wires and was able to accomplish it for a distance of 2 m., making the important observation that the electricity appeared to be transmitted instantaneously.

Franklin's Researches.—Benjamin Franklin (1706–1790) was one of the great pioneers of electrical science, and made the ever-memorable experimental identification of lightning and electric spark. He argued that electricity is not created by friction, but merely collected from its state of diffusion through other matter by which it is attracted. He asserted that the glass globe, when rubbed, attracted the electrical fire, and took it from the rubber, the same globe being disposed, when the friction ceases, to give out its electricity to any body which has less. In the case of the charged Leyden jar, he asserted that the inner coating of tinfoil had received more than its ordinary quantity of electricity, and was therefore electrified positively, or plus, while the outer coating of tinfoil having had its ordinary quantity of electricity diminished, was electrified negatively, or minus. Hence the cause of the shock and spark when the jar is discharged, or when the superabundant or plus electricity of the inside is transferred by a conducting body to the defective or minus electricity of the outside. This theory of the Leyden phial Franklin supported very ingeniously by showing that the outside and the inside coating possessed electricities of opposite sign, and that, in charging it, exactly as much electricity is added on one side as is subtracted from the other. The abundant discharge of electricity by points was observed by Franklin is his earliest experiments, and also the power of points to conduct it copiously from an electrified body. Hence he was furnished with a simple method of collecting electricity from other bodies, and he was enabled to perform those remarkable experiments which are chiefly connected with his name. Hawksbee, Wall and J. A. Nollet (1700–1770) had successively suggested the identity of lightning and the electric spark, and of thunder and the snap of the spark. Previously to the year 1750, Franklin drew up a statement, in which he showed that all the general phenomena and effects which were produced by electricity had their counterparts in lightning. After waiting some time for the erection of a spire at Philadelphia, by means of which he hoped to bring down the electricity of a thunderstorm, he conceived the idea of sending up a kite among thunder-clouds. With this view he made a small cross of two small light strips of cedar, the arms being sufficiently long to reach to the four corners of a large thin silk handkerchief when extended. The corners of the handkerchief were tied to the extremities of the cross, and when the body of the kite was thus formed, a tail, loop and string were added to it. The body was made of silk to enable it to bear the violence and wet of a thunderstorm. A very sharp pointed wire was fixed at the top of the upright stick of the cross, so as to rise a foot or more above the wood. A silk ribbon was tied to the end of the twine next the hand, and a key suspended at the junction of the twine and silk. In company with his son, Franklin raised the kite like a common one, in the first thunderstorm, which happened in the month of June 1752. To keep the silk ribbon dry, he stood within a door, taking care that the twine did not touch the frame of the door; and when the thunder-clouds came over the kite he watched the state of the string. A cloud passed without any electrical indications, and he began to despair of success. At last, however, he saw the loose filaments of the twine standing out every way, and he found them to be attracted by the approach of his finger. The suspended key gave a spark on the application of his knuckle, and when the string had become wet with the rain the electricity became abundant. A Leyden jar was charged at the key, and by the electric fire thus obtained spirits were inflamed, and many other experiments performed which had been formerly made by excited electrics. In subsequent trials with another apparatus, he found that the clouds were sometimes positively and sometimes negatively electrified, and so demonstrated the perfect identity of lightning and electricity. Having thus succeeded in drawing the electric fire from the clouds, Franklin conceived the idea of protecting buildings from lightning by erecting on their highest parts pointed iron wires or conductors communicating with the ground. The electricity of a hovering or a passing cloud would thus be carried off slowly and silently; and if the cloud was highly charged, the lightning would strike in preference the elevated conductors.[1] The most important of Franklin's electrical writings are his *Experiments and Observations on Electricity made at Philadelphia*, 1751–1754; his *Letters on Electricity*; and various memoirs and letters in the *Phil. Trans.* from 1756 to 1760.

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[1] Gilbert's work, *On the Magnet, Magnetic Bodies and the Great Magnet, the Earth*, has been translated from the rare folio Latin edition of 1600, but otherwise reproduced in its original form by the chief members of the Gilbert Club of England, with a series of valuable notes by Prof. S. P. Thompson (London, 1900). See also *The Electrician*, February 21, 1902.

[2] See *The Intellectual Rise in Electricity*, ch. x., by Park Benjamin (London, 1895).

About the same time that Franklin was making his kite experiment in America, T. F. Dalibard (1703–1779) and others in France had erected a long iron rod at Marli, and obtained results agreeing with those of Franklin. Similar investigations were pursued by many others, among whom Father G. B. Beccaria (1716–1781) deserves especial mention. John Canton (1718–1772) made the important contribution to knowledge that electricity of either sign could be produced on nearly any body by friction with appropriate substances, and that a rod of glass roughened on one half was excited negatively in the rough part and positively in the smooth part by friction with the same rubber. Canton first suggested the use of an amalgam of mercury and tin for use with glass cylinder electrical machines to improve their action. His most important discovery, however, was that of electrostatic induction, the fact that one electrified body can produce charges of electricity upon another insulated body, and that when this last is touched it is left electrified with a charge of opposite sign to that of the inducing charge (*Phil. Trans.*, 1753–1754). We shall make mention lower down of Canton's contributions to electrical theory. Robert Symmer (d. 1763) showed that quite small differences determined the sign of the electrification that was generated by the friction of two bodies one against the other. Thus wearing a black and a white silk stocking one over the other, he found they were electrified oppositely when rubbed and drawn off, and that such a rubbed silk stocking when deposited in a Leyden jar gave up its electrification to the jar (*Phil. Trans.*, 1759). Ebenezer Kinnersley (1711–1778) of Philadelphia made useful observations on the elongation and fusion of iron wires by electrical discharges (*Phil. Trans.*, 1763). A contemporary of Canton and co-discoverer with him of the facts of electrostatic induction was the Swede, Johann Karl Wilcke (1732–1796), then resident in Germany, who in 1762 published an account of experiments in which a metal plate held above the upper surface of a glass table was subjected to the action of a charge on an electrified metal plate held below the glass (*Kon. Schwedische Akad. Abhandl.*, 1762, 24, p. 213).

Pyro-electricity.—The subject of pyro-electricity, or the power possessed by some minerals of becoming electrified when merely heated, and of exhibiting positive and negative electricity, now began to attract notice. It is possible that the *lyncurium* of the ancients, which according to Theophrastus attracted light bodies, was tourmaline, a mineral found in Ceylon, which had been christened by the Dutch with the name of *aschentrikker*, or the attractor of ashes. In 1717 Louis Lémery exhibited to the Paris Academy of Sciences a stone from Ceylon which attracted light bodies; and Linnaeus in mentioning his experiments gives the stone the name of *lapis electricus*. Giovanni Caraffa, duca di Noja (1715–1768), was led in 1758 to purchase some of the stones called tourmaline in Holland, and, assisted by L. J. M. Daubenton and Michel Adanson, he made a series of experiments with them, a description of which he gave in a letter to G. L. L. Buffon in 1759. The subject, however, had already engaged the attention of the German philosopher, F. U. T. Aepinus, who published an account of them in 1756. Hitherto nothing had been said respecting the necessity of heat to excite the tourmaline; but it was shown by Aepinus that a temperature between 99½° and 212° Fahr. was requisite for the development of its attractive powers. Benjamin Wilson (*Phil. Trans.*, 1763, &c.), J. Priestley, and Canton continued the investigation, but it was reserved for the Abbé Haüy to throw a clear light on this curious branch of the science (*Traité de minéralogie*, 1801). He found that the electricity of the tourmaline decreased rapidly from the summits or poles towards the middle of the crystal, where it was imperceptible; and he discovered that if a tourmaline is broken into any number of fragments, each fragment, when excited, has two opposite poles. Haüy discovered the same property in the Siberian and Brazilian topaz, borate of magnesia, mesotype, prehnite, sphene and calamine. He also found that the polarity which minerals receive from heat has a relation to the secondary forms of their crystals—the tourmaline, for example, having its resinous pole at the summit of the crystal which has three faces. In the other pyro-electric crystals above mentioned, Haüy detected the same deviation from the rules of symmetry in their secondary crystals which occurs in tourmaline. C. P. Brard (1788–1838) discovered that pyro-electricity was a property of axinite; and it was afterwards detected in other minerals. In repeating and extending the experiments of Haüy much later, Sir David Brewster discovered that various artificial salts were pyro-electric, and he mentions the tartrates of potash and soda and tartaric acid as exhibiting this property in a very strong degree. He also made many experiments with the tourmaline when cut into thin slices, and reduced to the finest powder, in which state each particle preserved its pyro-electricity; and he showed that scolezite and mesolite, even when deprived of their water of crystallization and reduced to powder, retain their property of becoming electrical by heat. When this white powder is heated and stirred about by any substance whatever, it collects in masses like new-fallen snow, and adheres to the body with which it is stirred.

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[1] See Sir Oliver Lodge, "Lightning, Lightning Conductors and Lightning Protectors," *Journ. Inst. Elec. Eng.* (1889), 18, p. 386, and the discussion on the subject in the same volume; also the book by the same author on *Lightning Conductors and Lightning Guards* (London, 1892).

For Sir David Brewster's work on pyro-electricity, see *Trans. Roy. Soc. Edin.*, 1845, also *Phil. Mag.*, Dec. 1847. The reader will also find a full discussion on the subject in the *Treatise on Electricity*, by A. de la Rive, translated by C. V. Walker (London, 1856), vol. ii. part v. ch. i.

Animal electricity.—The observation that certain animals could give shocks resembling the shock of a Leyden jar induced a closer examination of these powers. The ancients were acquainted with the benumbing power of the torpedo-fish, but it was not till 1676 that modern naturalists had their attention again drawn to the fact. E. Bancroft was the first person who distinctly suspected that the effects of the torpedo were electrical. In 1773 John Walsh (d. 1795) and Jan Ingenhousz (1730–1799) proved by many curious experiments that the shock of the torpedo was an electrical one (*Phil. Trans.*, 1773–1775); and John Hunter (*id.* 1773, 1775) examined and described the anatomical structure of its electrical organs. A. von Humboldt and Gay-Lussac (*Ann. Chim.*, 1805), and Etienne Geoffroy Saint-Hilaire (*Gilb. Ann.*, 1803) pursued the subject with success; and Henry Cavendish (*Phil. Trans.*, 1776) constructed an artificial torpedo, by which he imitated the actions of the living animal. The subject was also investigated (*Phil. Trans.*, 1812, 1817) by Dr T. J. Todd (1789–1840), Sir Humphry Davy (*id.* 1829), John Davy (*id.* 1832, 1834, 1841) and Faraday (*Exp. Res.*, vol. ii.). The power of giving electric shocks has been discovered also in the *Gymnotus electricus* (electric eel), the *Malapterurus electricus*, the *Trichiurus electricus*, and the *Tetraodon electricus*. The most interesting and the best known of these singular fishes is the *Gymnotus* or Surinam eel. Humboldt gives a very graphic account of the combats which are carried on in South America between the gymnoti and the wild horses in the vicinity of Calabozo.

Cavendish's Researches.—The work of Henry Cavendish (1731–1810) entitles him to a high place in the list of electrical investigators. A considerable part of Cavendish's work was rescued from oblivion in 1879 and placed in an easily accessible form by Professor Clerk Maxwell, who edited the original manuscripts in the possession of the duke of Devonshire.[1] Amongst Cavendish's important contributions were his exact measurements of electrical capacity. The leading idea which distinguishes his work from that of his predecessors was his use of the phrase "degree of electrification" with a clear scientific definition which shows it to be equivalent in meaning to the modern term "electric potential." Cavendish compared the capacity of different bodies with those of conducting spheres of known diameter and states these capacities in "globular inches," a globular inch being the capacity of a sphere 1 in. in diameter. Hence his measurements are all directly comparable with modern electrostatic measurements in which the unit of capacity is that of a sphere 1 centimetre in radius. Cavendish measured the capacity of disks and condensers of various forms, and proved that the capacity of a Leyden pane is proportional to the surface of the tinfoil and inversely as the thickness of the glass. In connexion with this subject he anticipated one of Faraday's greatest discoveries, namely, the effect of the dielectric or insulator upon the capacity of a condenser formed with it, in other words, made the discovery of specific inductive capacity (see *Electrical Researches*, p. 183). He made many measurements of the electric conductivity of different solids and liquids, by comparing the intensity of the electric shock taken through his body and various conductors. He seems in this way to have educated in himself a very precise "electrical sense," making use of his own nervous system as a kind of physiological galvanometer. One of the most important investigations he made in this way was to find out, as he expressed it, "what power of the velocity the resistance is proportional to." Cavendish meant by the term "velocity" what we now call the current, and by "resistance," the electromotive force which maintains the current. By various experiments with liquids in tubes he found this power was nearly unity. This result thus obtained by Cavendish in January 1781, that the current varies in direct proportion to the electromotive force, was really an anticipation of the fundamental law of electric flow, discovered independently by G. S. Ohm in 1827, and since known as Ohm's Law. Cavendish also enunciated in 1776 all the laws of division of electric current between circuits in parallel, although they are generally supposed to have been first given by Sir C. Wheatstone. Another of his great investigations was the determination of the law according to which electric force varies with the distance. Starting from the fact that if an electrified globe, placed within two hemispheres which fit over it without touching, is brought in contact with these hemispheres, it gives up the whole of its charge to them—in other words, that the charge on an electrified body is wholly on the surface—he was able to deduce by most ingenious reasoning the law that electric force varies inversely as the square of the distance. The accuracy of his measurement, by which he established within 2% the above law, was only limited by the sensibility, or rather insensibility, of the pith ball electrometer, which was his only means of detecting the electric charge.[2] In the accuracy of his quantitative measurements and the range of his researches and his combination of mathematical and physical knowledge, Cavendish may not inaptly be described as the Kelvin of the 18th century. Nothing but his curious indifference to the publication of his work prevented him from securing earlier recognition for it.

Coulomb's Work.—Contemporary with Cavendish was C. A. Coulomb (1736–1806), who in France addressed himself to the same kind of exact quantitative work as Cavendish in England. Coulomb has made his name for ever famous by his invention and application of his torsion balance to the experimental verification of the fundamental law of electric attraction, in which, however, he was anticipated by Cavendish, namely, that the force of attraction between two small electrified spherical bodies varies as the product of their charges and inversely as the square of the distance of their centres. Coulomb's work received better publication than Cavendish's at the time of its accomplishment, and provided a basis on which mathematicians could operate. Accordingly the close of the 18th century drew into the arena of electrical investigation on its mathematical side P. S. Laplace, J. B. Biot, and above all, S. D. Poisson. Adopting the hypothesis of two fluids, Coulomb investigated experimentally and theoretically the distribution of electricity on the surface of bodies by means of his proof plane. He determined the law of distribution between two conducting bodies in contact; and measured with his proof plane the density of the electricity at different points of two spheres in contact, and enunciated an important law. He ascertained the distribution of electricity among several spheres (whether equal or unequal) placed in contact in a straight line; and he measured the distribution o electricity on the surface of a cylinder, and its distribution between a sphere and cylinder of different lengths but of the same diameter. His experiments on the dissipation of electricity possess also a high value. He found that the momentary dissipation was proportional to the degree of electrification at the time, and that, when the charge was moderate, its dissipation was not altered in bodies of different kinds or shapes. The temperature and pressure of the atmosphere did not produce any sensible change; but he concluded that the dissipation was nearly proportional to the cube of the quantity of moisture in the air.[1] In examining the dissipation which takes place along imperfectly insulating substances, he found that a thread of gum-lac was the most perfect of all insulators; that it insulated ten times as well as a dry silk thread; and that a silk thread covered with fine sealing-wax insulated as powerfully as gum-lac when it had four times its length. He found also that the dissipation of electricity along insulators was chiefly owing to adhering moisture, but in some measure also to a slight conducting power. For his memoirs see *Mém. de math. et phys. de l'acad. de sc.*, 1785, &c.

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[1] *The Electrical Researches of the Hon. Henry Cavendish 1771–1781*, edited from the original manuscripts by J. Clerk Maxwell, F.R.S. (Cambridge, 1879).

[2] In 1878 Clerk Maxwell repeated Cavendish's experiments with improved apparatus and the employment of a Kelvin quadran electrometer as a means of detecting the absence of charge on the inner conductor after it had been connected to the outer case, and was thus able to show that if the law of electric attraction varie inversely as the *n*th power of the distance, then the exponent must have a value of $2 \pm \frac{1}{21600}$. See Cavendish's *Electrical Researches* p. 419.

Second Period.—We now enter upon the second period of electrical research inaugurated by the epoch-making discovery of Alessandro Volta (1745–1827). L. Galvani had made in 1790 his historic observations on the muscular contraction produced in the bodies of recently killed frogs when an electrical machine was being worked in the same room, and described them in 1791 (*De viribus electricitatis in motu musculari commentarius*, Bologna, 1791). Volta followed up these observations with rare philosophic insight and experimental skill. He showed that all conductors liquid and solid might be divided into two classes which he called respectively conductors of the first and of the second class, the first embracing metals and carbon in its conducting form, and the second class, water, aqueous solutions of various kinds, and generally those now called electrolytes. In the case of conductors of the first class he proved by the use of the condensing electroscope, aided probably by some form of multiplier or doubler, that a difference of potential (see Electrostatics) was created by the mere contact of two such conductors, one of them being positively electrified and the other negatively. Volta showed, however, that if a series of bodies of the first class, such as disks of various metals, are placed in contact, the potential difference between the first and the last is just the same as if they are immediately in contact. There is no accumulation of potential. If, however, pairs of metallic disks, made, say, of zinc and copper, are alternated with disks of cloth wetted with a conductor of the second class, such, for instance, as dilute acid or any electrolyte, then the effect of the feeble potential difference between one pair of copper and zinc disks is added to that of the potential difference between the next pair, and thus by a sufficiently long series of pairs any required difference of potential can be accumulated.

The Voltaic Pile.—This led him about 1799 to devise his famous voltaic pile consisting of disks of copper and zinc or other metals with wet cloth placed between the pairs. Numerous examples of Volta's original piles at one time existed in Italy, and were collected together for an exhibition held at Como in 1899, but were unfortunately destroyed by a disastrous fire on the 8th of July 1899. Volta's description of his pile was communicated in a letter to Sir Joseph Banks, president of the Royal Society of London, on the 20th of March 1800, and was printed in the *Phil. Trans.*, vol. 90, pt. 1, p. 405. It was then found that when the end plates of Volta's pile were connected to an electroscope the leaves diverged either with positive or negative electricity. Volta also gave his pile another form, the *couronne des tasses* (crown of cups), in which connected strips of copper and zinc were used to bridge between cups of water or dilute acid. Volta then proved that all metals could be arranged in an electromotive series such that each became positive when placed in contact with the one next below it in the series. The origin of the electromotive force in the pile has been much discussed, and Volta's discoveries gave rise to one of the historic controversies of science. Volta maintained that the mere contact of metals was sufficient to produce the electrical difference of the end plates of the pile. The discovery that chemical action was involved in the process led to the advancement of the chemical theory of the pile and this was strengthened by the growing insight into the principle of the conservation of energy. In 1851 Lord Kelvin (Sir W. Thomson), by the use of his then newly-invented electrometer, was able to confirm Volta's observations on contact electricity by irrefutable evidence, but the contact theory of the voltaic pile was then placed on a basis consistent with the principle of the conservation of energy. A. A. de la Rive and Faraday were ardent supporters of the chemical theory of the pile, and even at the present time opinions of physicists can hardly be said to be in entire accordance as to the source of the electromotive force in a voltaic couple or pile.[2]

Improvements in the form of the voltaic pile were almost immediately made by W. Cruickshank (1745–1800), Dr W. H. Wollaston and Sir H. Davy, and these, together with other eminent continental chemists, such as A. F. de Fourcroy, L. J. Thénard and J. W. Ritter (1776–1810), ardently prosecuted research with the new instrument. One of the first discoveries made with it was its power to electrolyse or chemically decompose certain solutions. William Nicholson (1753–1815) and Sir Anthony Carlisle (1768–1840) in 1800 constructed a pile of silver and zinc plates, and placing the terminal wires in water noticed the evolution from these wires of bubbles of gas, which they proved to be oxygen and hydrogen. These two gases, as Cavendish and James Watt had shown in 1784, were actually the constituents of water. From that date it was clearly recognized that a fresh implement of great power had been given to the chemist. Large voltaic piles were then constructed by Andrew Crosse (1784–1855) and Sir H. Davy, and improvements initiated by Wollaston and Robert Hare (1781–1858) of Philadelphia. In 1806 Davy communicated to the Royal Society of London a celebrated paper on some "Chemical Agencies of Electricity," and after providing himself at the Royal Institution of London with a battery of several hundred cells, he announced in 1807 his great discovery of the electrolytic decomposition of the alkalis, potash and soda, obtaining therefrom the metals potassium and sodium. In July 1808 Davy laid a request before the managers of the Royal Institution that they would set on foot a subscription for the purchase of a specially large voltaic battery; as a result he was provided with one of 2000 pairs of plates, and the first experiment performed with it was the production of the electric arc light between carbon poles. Davy followed up his initial work with a long and brilliant series of electrochemical investigations described for the most part in the *Phil. Trans.* of the Royal Society.

Magnetic Action of Electric Current.—Noticing an analogy between the polarity of the voltaic pile and that of the magnet, philosophers had long been anxious to discover a relation between the two, but twenty years elapsed after the invention of the pile before Hans Christian Oersted (1777–1851), professor of natural philosophy in the university of Copenhagen, made in 1819 the discovery which has immortalized his name. In the *Annals of Philosophy* (1820, 16, p. 273) is to be found an English translation of Oersted's original Latin essay (entitled "Experiments on the Effect of a Current of Electricity on the Magnetic Needle"), dated the 21st of July 1820, describing his discovery. In it Oersted describes the action he considers is taking place around the conductor joining the extremities of the pile; he speaks of it as the electric conflict, and says: "It is sufficiently evident that the electric conflict is not confined to the conductor, but is dispersed pretty widely in the circumjacent space. We may likewise conclude that this conflict performs circles round the wire, for without this condition it seems impossible that one part of the wire when placed below the magnetic needle should drive its pole to the east, and when placed above it, to the west." Oersted's important discovery was the fact that when a wire joining the end plates of a voltaic pile is held near a pivoted magnet or compass needle, the latter is deflected and places itself more or less transversely to the wire, the direction depending upon whether the wire is above or below the needle, and on the manner in which the copper or zinc ends of the pile are connected to it. It is clear, moreover, that Oersted clearly recognized the existence of what is now called the magnetic field round the conductor. This discovery of Oersted, like that of Volta, stimulated philosophical investigation in a high degree.

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[1] Modern researches have shown that the loss of charge is in fact dependent upon the ionization of the air, and that, provided the atmospheric moisture is prevented from condensing on the insulating supports, water vapour in the air does not *per se* bestow on it conductance for electricity.

[2] Faraday discussed the chemical theory of the pile and arguments in support of it in the 8th and 16th series of his *Experimental Researches on Electricity*. De la Rive reviews the subject in his large *Treatise on Electricity and Magnestism*, vol. ii. ch. iii. The writer made a contribution to the discussion in 1874 in a paper on "The Contact Theory of the Galvanic Cell," *Phil. Mag.*, 1874, 47, p. 401. Sir Oliver Lodge reviewed the whole position in a paper in 1885, "On the Seat of the Electromotive Force in a Voltaic Cell," *Journ. Inst. Elec. Eng.*, 1885, 14, p. 186.

Electrodynamics.—On the 2nd of October 1820, A. M. Ampère presented to the French Academy of Sciences an important memoir,[1] in which he summed up the results of his own and D. F. J. Arago's previous investigations in the new science of electromagnetism, and crowned that labour by the announcement of his great discovery of the dynamical action between conductors conveying the electric currents. Ampère in this paper gave an account of his discovery that conductors conveying electric currents exercise a mutual attraction or repulsion on one another, currents flowing in the same direction in parallel conductors attracting, and those in opposite directions repelling. Respecting this achievement when developed in its experimental and mathematical completeness, Clerk Maxwell says that it was "perfect in form and unassailable in accuracy." By a series of well-chosen experiments Ampère established the laws of this mutual action, and not only explained observed facts by a brilliant train of mathematical analysis, but predicted others subsequently experimentally realized. These investigations led him to the announcement of the fundamental law of action between elements of current, or currents in infinitely short lengths of linear conductors, upon one another at a distance; summed up in compact expression this law states that the action is proportional to the product of the current strengths of the two elements, and the lengths of the two elements, and inversely proportional to the square of the distance between the two elements, and also directly proportional to a function of the angles which the line joining the elements makes with the directions of the two elements respectively. Nothing is more remarkable in the history of discovery than the manner in which Ampère seized upon the right clue which enabled him to disentangle the complicated phenomena of electrodynamics and to deduce them all as a consequence of one simple fundamental law, which occupies in electrodynamics the position of the Newtonian law of gravitation in physical astronomy.

In 1821 Michael Faraday (1791–1867), who was destined later on to do so much for the science of electricity, discovered electromagnetic rotation, having succeeded in causing a wire conveying a voltaic current to rotate continuously round the pole of a permanent magnet.[2] This experiment was repeated in a variety of forms by A. A. De la Rive, Peter Barlow (1776–1862), William Ritchie (1790–1837), William Sturgeon (1783–1850), and others; and Davy (*Phil. Trans.*, 1823) showed that when two wires connected with the pole of a battery were dipped into a cup of mercury placed on the pole of a powerful magnet, the fluid rotated in opposite directions about the two electrodes.

Electromagnetism.—In 1820 Arago (*Ann. Chim. Phys.*, 1820, 15, p. 94) and Davy (*Annals of Philosophy*, 1821) discovered independently the power of the electric current to magnetize iron and steel. Félix Savary (1797–1841) made some very curious observations in 1827 on the magnetization of steel needles placed at different distances from a wire conveying the discharge of a Leyden jar (*Ann. Chim. Phys.*, 1827, 34). W. Sturgeon in 1824 wound a copper wire round a bar of iron bent in the shape of a horseshoe, and passing a voltaic current through the wire showed that the iron became powerfully magnetized as long as the connexion with the pile was maintained (*Trans. Soc. Arts*, 1825). These researches gave us the electromagnet, almost as potent an instrument of research and invention as the pile itself (see ELECTROMAGNETISM).

Ampère had already previously shown that a spiral conductor or solenoid when traversed by an electric current possesses magnetic polarity, and that two such solenoids act upon one another when traversed by electric currents as if they were magnets. Joseph Henry, in the United States, first suggested the construction of what were then called intensity electromagnets, by winding upon a horseshoe-shaped piece of soft iron many superimposed windings of copper wire, insulated by covering it with silk or cotton, and then sending through the coils the current from a voltaic battery. The dependence of the intensity of magnetization on the strength of the current was subsequently investigated (*Pogg. Ann. Phys.*, 1839, 47) by H. F. E. Lenz (1804–1865) and M. H. von Jacobi (1801–1874). J. P. Joule found that magnetization did not increase proportionately with the current, but reached a maximum (*Sturgeon's Annals of Electricity*, 1839, 4). Further investigations on this subject were carried on subsequently by W. E. Weber (1804–1891), J. H. J. Müller (1809–1875), C. J. Dub (1817–1873), G. H. Wiedemann (1826–1899), and others, and in modern times by H. A. Rowland (1848–1901), Shelford Bidwell (b. 1848), John Hopkinson (1849–1898), J. A. Ewing (b. 1855) and many others. Electric magnets of great power were soon constructed in this manner by Sturgeon, Joule, Henry, Faraday and Brewster. Oersted's discovery in 1819 was indeed epoch-making in the degree to which it stimulated other research. It led at once to the construction of the galvanometer as a means of detecting and measuring the electric current in a conductor. In 1820 J. S. C. Schweigger (1779–1857) with his "multiplier" made an advance upon Oersted's discovery, by winding the wire conveying the electric current many times round the pivoted magnetic needle and thus increasing the deflection; and L. Nobili (1784–1835) in 1825 conceived the ingenious idea of neutralizing the directive effect of the earth's magnetism by employing a pair of magnetized steel needles fixed to one axis, but with their magnetic poles pointing in opposite directions. Hence followed the astatic multiplying galvanometer.

Electrodynamic Rotation.—The study of the relation between the magnet and the circuit conveying an electric current then led Arago to the discovery of the "magnetism of rotation." He found that a vibrating magnetic compass needle came to rest sooner when placed over a plate of copper than otherwise, and also that a plate of copper rotating under a suspended magnet tended to drag the magnet in the same direction. The matter was investigated by Charles Babbage, Sir J. F. W. Herschel, Peter Barlow and others, but did not receive a final explanation until after the discovery of electromagnetic induction by Faraday in 1831. Ampère's investigations had led electricians to see that the force acting upon a magnetic pole due to a current in a neighbouring conductor was such as to tend to cause the pole to travel round the conductor. Much ingenuity had, however, to be expended before a method was found of exhibiting such a rotation. Faraday first succeeded by the simple but ingenious device of using a light magnetic needle tethered flexibly to the bottom of a cup containing mercury so that one pole of the magnet was just above the surface of the mercury. On bringing down on to the mercury surface a wire conveying an electric current, and allowing the current to pass through the mercury and out at the bottom, the magnetic pole at once began to rotate round the wire (*Exper. Res.*, 1822, 2, p. 148). Faraday and others then discovered, as already mentioned, means to make the conductor conveying the current rotate round a magnetic pole, and Ampère showed that a magnet could be made to rotate on its own axis when a current was passed through it. The difficulty in this case consisted in discovering means by which the current could be passed through one half of the magnet without passing it through the other half. This, however, was overcome by sending the current out at the centre of the magnet by means of a short length of wire dipping into an annular groove containing mercury. Barlow, Sturgeon and others then showed that a copper disk could be made to rotate between the poles of a horseshoe magnet when a current was passed through the disk from the centre to the circumference, the disk being rendered at the same time freely movable by making a contact with the circumference by means of a mercury trough. These experiments furnished the first elementary forms of electric motor, since it was then seen that rotatory motion could be produced in masses of metal by the mutual action of conductors conveying electric current and magnetic fields. By his discovery of thermoelectricity in 1822 (*Pogg. Ann. Phys.*, 6), T. J. Seebeck (1770–1831) opened up a new region of research (see THERMO-ELECTRICITY). James Cumming (1777–1861) in 1823 (*Annals of Philosophy*, 1823) found that the thermo-electric series varied with the temperature, and J. C. A. Peltier (1785–1845) in 1834 discovered that a current passed across the junction of two metals either generated or absorbed heat.

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[1] "Mémoire sur la théorie mathématique des phénomènes électrodynamiques," *Mémoires de l'institut*, 1820, 6; see also *Ann. de Chim.*, 1820, 15.

[2] See M. Faraday, "On some new Electro-Magnetical Motions and on the Theory of Magnetism," *Quarterly Journal of Science*, 1822, 12, p. 74; or *Experimental Researches on Electricity*, vol. ii. p. 127.

Ohm's Law.—In 1827 Dr G. S. Ohm (1787–1854) rendered a great service to electrical science by his mathematical investigation of the voltaic circuit, and publication of his paper, *Die galvanische Kette mathematisch bearbeitet*. Before his time, ideas on the measurable quantities with which we are concerned in an electric circuit were extremely vague. Ohm introduced the clear idea of current strength as an effect produced by electromotive force acting as a cause in a circuit having resistance as its quality, and showed that the current was directly proportional to the electromotive force and inversely as the resistance. Ohm's law, as it is called, was based upon an analogy with the flow of heat in a circuit, discussed by Fourier. Ohm introduced the definite conception of the distribution along the circuit of "electroscopic force" or tension (*Spannung*), corresponding to the modern term potential. Ohm verified his law by the aid of thermo-electric piles as sources of electromotive force, and Davy, C. S. M. Pouillet (1791–1868), A. C. Becquerel (1788–1878), G. T. Fechner (1801–1887), R. H. A. Kohlrausch (1809–1858) and others laboured at its confirmation. In more recent times, 1876, it was rigorously tested by G. Chrystal (b. 1851) at Clerk Maxwell's instigation (see *Brit. Assoc. Report*, 1876, p. 36), and although at its original enunciation its meaning was not at first fully apprehended, it soon took its place as the expression of the fundamental law of electrokinetics.

Induction of Electric Currents.—In 1831 Faraday began the investigations on electromagnetic induction which proved more fertile in far-reaching practical consequences than any of those which even his genius gave to the world. These advances all centre round his supreme discovery of the induction of electric currents. Fully familiar with the fact that an electric charge upon one conductor could produce a charge of opposite sign upon a neighbouring conductor, Faraday asked himself whether an electric current passing through a conductor could not in any like manner induce an electric current in some neighbouring conductor. His first experiments on this subject were made in the month of November 1825, but it was not until the 29th of August 1831 that he attained success. On that date he had provided himself with an iron ring, over which he had wound two coils of insulated copper wire. One of these coils was connected with the voltaic battery and the other with the galvanometer. He found that at the moment the current in the battery circuit was started or stopped, transitory currents appeared in the galvanometer circuit in opposite directions. In ten days of brilliant investigation, guided by clear insight from the very first into the meaning of the phenomena concerned, he established experimentally the fact that a current may be induced in a conducting circuit simply by the variation in a magnetic field, the lines of force of which are linked with that circuit. The whole of Faraday's investigations on this subject can be summed up in the single statement that if a conducting circuit is placed in a magnetic field, and if either by variation of the field or by movement or variation of the form of the circuit the total magnetic flux linked with the circuit is varied, an electromotive force is set up in that circuit which at any instant is measured by the rate at which the total flux linked with the circuit is changing.

Amongst the memorable achievements of the ten days which Faraday devoted to this investigation was the discovery that a current could be induced in a conducting wire simply by moving it in the neighbourhood of a magnet. One form which this experiment took was that of rotating a copper disk between the poles of a powerful electric magnet. He then found that a conductor, the ends of which were connected respectively with the centre and edge of the disk, was traversed by an electric current. This important fact laid the foundation for all subsequent inventions which finally led to the production of electromagnetic or dynamo-electric machines.

THIRD PERIOD.—With this supremely important discovery of Faraday's we enter upon the third period of electrical research, in which that philosopher himself was the leading figure. He not only collected the facts concerning electromagnetic induction so industriously that nothing of importance remained for future discovery, and embraced them all in one law of exquisite simplicity, but he introduced his famous conception of lines of force which changed entirely the mode of regarding electrical phenomena. The French mathematicians, Coulomb, Biot, Poisson and Ampère, had been content to accept the fact that electric charges or currents in conductors could exert forces on other charges or conductors at a distance without inquiring into the means by which this action at a distance was produced. Faraday's mind, however, revolted against this notion; he felt intuitively that these distance actions must be the result of unseen operations in the interposed medium. Accordingly when he sprinkled iron filings on a card held over a magnet and revealed the curvilinear system of lines of force (see MAGNETISM), he regarded these fragments of iron as simple indicators of a physical state in the space already in existence round the magnet. To him a magnet was not simply a bar of steel; it was the core and origin of a system of lines of magnetic force attached to it and moving with it. Similarly he came to see an electrified body as a centre of a system of lines of electrostatic force. All the space round magnets, currents and electric charges was therefore to Faraday the seat of corresponding lines of magnetic or electric force. He proved by systematic experiments that the electromotive forces set up in conductors by their motions in magnetic fields or by the induction of other currents in the field were due to the secondary conductor *cutting* lines of magnetic force. He invented the term "electrotonic state" to signify the total magnetic flux due to a conductor conveying a current, which was linked with any secondary circuit in the field or even with itself.

Faraday's Researches.—Space compels us to limit our account of the scientific work done by Faraday in the succeeding twenty years, in elucidating electrical phenomena and adding to the knowledge thereon, to the very briefest mention. We must refer the reader for further information to his monumental work entitled *Experimental Researches on Electricity*, in three volumes, reprinted from the *Phil. Trans.* between 1831 and 1851. Faraday divided these researches into various series. The 1st and 2nd concern the discovery of magneto-electric induction already mentioned. The 3rd series (1833) he devoted to discussion of the identity of electricity derived from various sources, frictional, voltaic, animal and thermal, and he proved by rigorous experiments the identity and similarity in properties of the electricity generated by these various methods. The 5th series (1833) is occupied with his electrochemical researches. In the 7th series (1834) he defines a number of new terms, such as electrolyte, electrolysis, anode and cathode, &c., in connexion with electrolytic phenomena, which were immediately adopted into the vocabulary of science. His most important contribution at this date was the invention of the voltameter and his enunciation of the laws of electrolysis. The voltameter provided a means of measuring quantity of electricity, and in the hands of Faraday and his successors became an appliance of fundamental importance. The 8th series is occupied with a discussion of the theory of the voltaic pile, in which Faraday accumulates evidence to prove that the source of the energy of the pile must be chemical. He returns also to this subject in the 16th series. In the 9th series (1834) he announced the discovery of the important property of electric conductors, since called their self-induction or inductance, a discovery in which, however, he was anticipated by Joseph Henry in the United States. The 11th series (1837) deals with electrostatic induction and the statement of the important fact of the specific inductive capacity of insulators or dielectrics. This discovery was made in November 1837 when Faraday had no knowledge of Cavendish's previous researches into this matter. The 19th series (1845) contains an account of his brilliant discovery of the rotation of the plane of polarized light by transparent dielectrics placed in a magnetic field, a relation which established for the first time a practical connexion between the phenomena of electricity and light. The 20th series (1845) contains an account of his researches on the universal action of magnetism and diamagnetic bodies. The 22nd series (1848) is occupied with the discussion of magneto-crystallic force and the abnormal behaviour of various crystals in a magnetic field. In the 25th series (1850) he made known his discovery of the magnetic character of oxygen gas, and the important principle that the terms paramagnetic and diamagnetic are relative. In the 26th series (1850) he returned to a discussion of magnetic lines of force, and illuminated the whole subject of the magnetic circuit by his transcendent insight into the intricate phenomena concerned. In 1855 he brought these researches to a conclusion by a general article on magnetic philosophy, having placed the whole subject of magnetism and electromagnetism on an entirely novel and solid basis. In addition to this he provided the means for studying the phenomena not only qualitatively, but also quantitatively, by the profoundly ingenious instruments he invented for that purpose.

Electrical Measurement.—Faraday's ideas thus pressed upon electricians the necessity for the quantitative measurement of electrical phenomena.[1] It has been already mentioned that Schweigger invented in 1820 the "multiplier," and Nobili in 1825 the astatic galvanometer. C. S. M. Pouillet in 1837 contributed the sine and tangent compass, and W. E. Weber effected great improvements in them and in the construction and use of galvanometers. In 1849 H. von Helmholtz devised a tangent galvanometer with two coils. The measurement of electric resistance then engaged the attention of electricians. By his Memoirs in the *Phil. Trans.* in 1843, Sir Charles Wheatstone gave a great impulse to this study. He invented the rheostat and improved the resistance balance, invented by S. H. Christie (1784–1865) in 1833, and subsequently called the Wheatstone Bridge. (See his *Scientific Papers*, published by the Physical Society of London, p. 129.) Weber about this date invented the electrodynamometer, and applied the mirror and scale method of reading deflections, and in co-operation with C. F. Gauss introduced a system of absolute measurement of electric and magnetic phenomena. In 1846 Weber proceeded with improved apparatus to test Ampère's laws of electrodynamics. In 1845 H. G. Grassmann (1809–1877) published (*Pogg. Ann.* vol. 64) his "Neue Theorie der Electrodynamik," in which he gave an elementary law differing from that of Ampère but leading to the same results for closed circuits. In the same year F. E. Neumann published another law. In 1846 Weber announced his famous hypothesis concerning the connexion of electrostatic and electrodynamic phenomena. The work of Neumann and Weber had been stimulated by that of H. F. E. Lenz (1804–1865), whose researches (*Pogg. Ann.*, 1834, 31; 1835, 34) among other results led him to the statement of the law by means of which the direction of the induced current can be predicted from the theory of Ampère, the rule being that the direction of the induced current is always such that its electrodynamic action tends to oppose the motion which produces it.

Neumann in 1845 did for electromagnetic induction what Ampère did for electrodynamics, basing his researches upon the experimental laws of Lenz. He discovered a function, which has been called the potential of one circuit on another, from which he deduced a theory of induction completely in accordance with experiment. Weber at the same time deduced the mathematical laws of induction from his elementary law of electrical action, and with his improved instruments arrived at accurate verifications of the law of induction, which by this time had been developed mathematically by Neumann and himself. In 1849 G. R. Kirchhoff determined experimentally in a certain case the absolute value of the current induced by one circuit in another, and in the same year Erik Edland (1819–1888) made a series of careful experiments on the induction of electric currents which further established received theories. These labours laid the foundation on which was subsequently erected a complete system for the absolute measurement of electric and magnetic quantities, referring them all to the fundamental units of mass, length and time. Helmholtz gave at the same time a mathematical theory of induced currents and a valuable series of experiments in support of them (*Pogg. Ann.*, 1851). This great investigator and luminous expositor just before that time had published his celebrated essay, *Die Erhaltung der Kraft* ("The Conservation of Energy"), which brought to a focus ideas which had been accumulating in consequence of the work of J. P. Joule, J. R. von Mayer and others, on the transformation of various forms of physical energy, and in particular the mechanical equivalent of heat. Helmholtz brought to bear upon the subject not only the most profound mathematical attainments, but immense experimental skill, and his work in connexion with this subject is classical.

Lord Kelvin's Work.—About 1842 Lord Kelvin (then William Thomson) began that long career of theoretical and practical discovery and invention in electrical science which revolutionized every department of pure and applied electricity. His early contributions to electrostatics and electrometry are to be found described in his *Reprint of Papers on Electrostatics and Magnetism* (1872), and his later work in his collected *Mathematical and Physical Papers*. By his studies in electrostatics, his elegant method of electrical images, his development of the theory of potential and application of the principle of conservation of energy, as well as by his inventions in connexion with electrometry, he laid the foundations of our modern knowledge of electrostatics. His work on the electrodynamic qualities of metals, thermo-electricity, and his contributions to galvanometry, were not less massive and profound. From 1842 onwards to the end of the 19th century, he was one of the great master workers in the field of electrical discovery and research.[2] In 1853 he published a paper "On Transient Electric Currents" (*Phil. Mag.*, 1853 [4], 5, p. 393), in which he applied the principle of the conservation of energy to the discharge of a Leyden jar. He added definiteness to the idea of the self-induction or inductance of an electric circuit, and gave a mathematical expression for the current flowing out of a Leyden jar during its discharge. He confirmed an opinion already previously expressed by Helmholtz and by Henry, that in some circumstances this discharge is oscillatory in nature, consisting of an alternating electric current of high frequency. These theoretical predictions were confirmed and others, subsequently, by the work of B. W. Feddersen (b. 1832), C. A. Paalzow (b. 1823), and it was then seen that the familiar phenomena of the discharge of a Leyden jar provided the means of generating electric oscillations of very high frequency.

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[1] Amongst the most important of Faraday's quantitative researches must be included the ingenious and convincing proofs he provided that the production of any quantity of electricity of one sign is always accompanied by the production of an equal quantity of electricity of the opposite sign. See *Experimental Researches on Electricity*, vol. i. § 1177.

[2] In this connexion the work of George Green (1793–1841) must not be forgotten. Green's *Essay on the Application of Mathematical Analysis to the Theories of Electricity and Magnetism*, published in 1828, contains the first exposition of the theory of potential. An important theorem contained in it is known as Green's theorem, and is of great value.

Telegraphy.—Turning to practical applications of electricity, we may note that electric telegraphy took its rise in 1820, beginning with a suggestion of Ampère immediately after Oersted's discovery. It was established by the work of Weber and Gauss at Göttingen in 1836, and that of C. A. Steinheil (1801–1870) of Munich, Sir W. F. Cooke (1806–1879) and Sir C. Wheatstone in England, Joseph Henry and S. F. B. Morse (1791–1872) in the United States in 1837. In 1845 submarine telegraphy was inaugurated by the laying of an insulated conductor across the English Channel by the brothers Brett, and their temporary success was followed by the laying in 1851 of a permanent Dover-Calais cable by T. R. Crampton. In 1856 the project for an Atlantic submarine cable took shape and the Atlantic Telegraph Company was formed with a capital of £350,000, with Sir Charles Bright as engineer-in-chief and E. O. W. Whitehouse as electrician. The phenomena connected with the propagation of electric signals by underground insulated wires had already engaged the attention of Faraday in 1854, who pointed out the Leyden-jar-like action of an insulated subterranean wire. Scientific and practical questions connected with the possibility of laying an Atlantic submarine cable then began to be discussed, and Lord Kelvin was foremost in developing true scientific knowledge on this subject, and in the invention of appliances for utilizing it. One of his earliest and most useful contributions (in 1858) was the invention of the mirror galvanometer. Abandoning the long and somewhat heavy magnetic needles that had been used up to that date in galvanometers, he attached to the back of a very small mirror made of microscopic glass a fragment of magnetized watch-spring, and suspended the mirror and needle by means of a cocoon fibre in the centre of a coil of insulated wire. By this simple device he provided a means of measuring small electric currents far in advance of anything yet accomplished, and this instrument proved not only most useful in pure scientific researches, but at the same time was of the utmost value in connexion with submarine telegraphy. The history of the initial failures and final success in laying the Atlantic cable has been well told by Mr. Charles Bright (see *The Story of the Atlantic Cable*, London, 1903).[1] The first cable laid in 1857 broke on the 11th of August during laying. The second attempt in 1858 was successful, but the cable completed on the 5th of August 1858 broke down on the 20th of October 1858, after 732 messages had passed through it. The third cable laid in 1865 was lost on the 2nd of August 1865, but in 1866 a final success was attained and the 1865 cable also recovered and completed. Lord Kelvin's mirror galvanometer was first used in receiving signals through the short-lived 1858 cable. In 1867 he invented his beautiful siphon-recorder for receiving and recording the signals through long cables. Later, in conjunction with Prof. Fleeming Jenkin, he devised his automatic curb sender, an appliance for sending signals by means of punched telegraphic paper tape. Lord Kelvin's contributions to the science of exact electric measurement[2] were enormous. His ampere-balances, voltmeters and electrometers, and double bridge, are elsewhere described in detail (see AMPEREMETER; ELECTROMETER, and WHEATSTONE'S BRIDGE).

Dynamo.—The work of Faraday from 1831 to 1851 stimulated and originated an immense mass of scientific research, but at the same time practical inventors had not been slow to perceive that it was capable of purely technical application. Faraday's copper disk rotated between the poles of a magnet, and producing thereby an electric current, became the parent of innumerable machines in which mechanical energy was directly converted into the energy of electric currents. Of these machines, originally called magneto-electric machines, one of the first was devised in 1832 by H. Pixii. It consisted of a fixed horseshoe armature wound over with insulated copper wire in front of which revolved about a vertical axis a horseshoe magnet. Pixii, who invented the split tube commutator for converting the alternating current so produced into a continuous current in the external circuit, was followed by J. Saxton, E. M. Clarke, and many others in the development of the above-described magneto-electric machine. In 1857 E. W. Siemens effected a great improvement by inventing a shuttle armature and improving the shape of the field magnet. Subsequently similar machines with electromagnets were introduced by Henry Wilde (*b.* 1833), Siemens, Wheatstone, W. Ladd and others, and the principle of self-excitation was suggested by Wilde, C. F. Varley (1828–1883), Siemens and Wheatstone (see DYNAMO). These machines about 1866 and 1867 began to be constructed on a commercial scale and were employed in the production of the electric light. The discovery of electric-current induction also led to the production of the induction coil (*q.v.*), improved and brought to its present perfection by W. Sturgeon, E. R. Ritchie, N. J. Callan, H. D. Rühmkorff (1803–1877), A. H. L. Fizeau, and more recently by A. Apps and modern inventors. About the same time Fizeau and J. B. L. Foucault devoted attention to the invention of automatic apparatus for the production of Davy's electric arc (see LIGHTING: *Electric*), and these appliances in conjunction with magneto-electric machines were soon employed in lighthouse work. With the advent of large magneto-electric machines the era of electrotechnics was fairly entered, and this period, which may be said to terminate about 1867 to 1869, was consummated by the theoretical work of Clerk Maxwell.

Maxwell's Researches.—James Clerk Maxwell (1831–1879) entered on his electrical studies with a desire to ascertain if the ideas of Faraday, so different from those of Poisson and the French mathematicians, could be made the foundation of a mathematical method and brought under the power of analysis.[3] Maxwell started with the conception that all electric and magnetic phenomena are due to effects taking place in the dielectric or in the ether if the space be vacuous. The phenomena of light had compelled physicists to postulate a space-filling medium, to which the name ether had been given, and Henry and Faraday had long previously suggested the idea of an electromagnetic medium. The vibrations of this medium constitute the agency called light. Maxwell saw that it was unphilosophical to assume a multiplicity of ethers or media until it had been proved that one would not fulfil all the requirements. He formulated the conception, therefore, of electric charge as consisting in a displacement taking place in the dielectric or electromagnetic medium (see ELECTROSTATICS). Maxwell never committed himself to a precise definition of the physical nature of electric displacement, but considered it as defining that which Faraday had called the polarization in the insulator, or, what is equivalent, the number of lines of electrostatic force passing normally through a unit of area in the dielectric. A second fundamental conception of Maxwell was that the electric displacement whilst it is changing is in effect an electric current, and creates, therefore, magnetic force. The total current at any point in a dielectric must be considered as made up of two parts: first, the true conduction current, if it exists; and second, the rate of change of dielectric displacement. The fundamental fact connecting electric currents and magnetic fields is that the line integral of magnetic force taken once round a conductor conveying an electric current is equal to 4π-times the surface integral of the current density, or to 4π-times the total current flowing through the closed line round which the integral is taken (see ELECTROKINETICS). A second relation connecting magnetic and electric force is based upon Faraday's fundamental law of induction, that the rate of change of the total magnetic flux linked with a conductor is a measure of the electromotive force created in it (see ELECTROKINETICS). Maxwell also introduced in this connexion the notion of the vector potential. Coupling together these ideas he was finally enabled to prove that the propagation of electric and magnetic force takes place through space with a certain velocity determined by the dielectric constant and the magnetic permeability of the medium. To take a simple instance, if we consider an electric current as flowing in a conductor it is, as Oersted discovered, surrounded by closed lines of magnetic force. If we imagine the current in the conductor to be instantaneously reversed in direction, the magnetic force surrounding it would not be instantly reversed everywhere in direction, but the reversal would be propagated outwards through space with a certain velocity which Maxwell showed was inversely as the square root of the product of the magnetic permeability and the dielectric constant or specific inductive capacity of the medium.

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[1] See also his *Submarine Telegraphs* (London, 1898).

[2] The quantitative study of electrical phenomena has been enormously assisted by the establishment of the absolute system of electrical measurement due originally to Gauss and Weber. The British Association for the advancement of science appointed in 1861 a committee on electrical units, which made its first report in 1862 and has existed ever since. In this work Lord Kelvin took a leading part. The popularization of the system was greatly assisted by the publication by Prof. J. D. Everett of *The C.G.S. System of Units* (London, 1891).

[3] The first paper in which Maxwell began to translate Faraday's conceptions into mathematical language was "On Faraday's Lines of Force," read to the Cambridge Philosophical Society on the 10th of December 1855 and the 11th of February 1856. See Maxwell's *Collected Scientific Papers*, i. 155.

These great results were announced by him for the first time in a paper presented in 1864 to the Royal Society of London and printed in the *Phil. Trans.* for 1865, entitled "A Dynamical Theory of the Electromagnetic Field." Maxwell showed in this paper that the velocity of propagation of an electromagnetic impulse through space could also be determined by certain experimental methods which consisted in measuring the same electric quantity, capacity, resistance or potential in two ways. W. E. Weber had already laid the foundations of the absolute system of electric and magnetic measurement, and proved that a quantity of electricity could be measured either by the force it exercises upon another static or stationary quantity of electricity, or magnetically by the force this quantity of electricity exercises upon a magnetic pole when flowing through a neighbouring conductor. The two systems of measurement were called respectively the electrostatic and the electromagnetic systems (see UNITS, PHYSICAL). Maxwell suggested new methods for the determination of this ratio of the electrostatic to the electromagnetic units, and by experiments of great ingenuity was able to show that this ratio, which is also that of the velocity of the propagation of an electromagnetic impulse through space, is identical with that of light. This great fact once ascertained, it became clear that the notion that electric phenomena are affections of the luminiferous ether was no longer a mere speculation but a scientific theory capable of verification. An immediate deduction from Maxwell's theory was that in transparent dielectrics, the dielectric constant or specific inductive capacity should be numerically equal to the square of the refractive index for very long electric waves. At the time when Maxwell developed his theory the dielectric constants of only a few transparent insulators were known and these were for the most part measured with steady or unidirectional electromotive force. The only refractive indices which had been measured were the optical refractive indices of a number of transparent substances. Maxwell made a comparison between the optical refractive index and the dielectric constant of paraffin wax, and the approximation between the numerical values of the square of the first and that of the last was sufficient to show that there was a basis for further work. Maxwell's electric and magnetic ideas were gathered together in a great mathematical treatise on electricity and magnetism which was published in 1873.[1] This book stimulated in a most remarkable degree theoretical and practical research into the phenomena of electricity and magnetism. Experimental methods were devised for the further exact measurements of the electromagnetic velocity and numerous determinations of the dielectric constants of various solids, liquids and gases, and comparisons of these with the corresponding optical refractive indices were conducted. This early work indicated that whilst there were a number of cases in which the square of optical refractive index for long waves and the dielectric constant of the same substance were sufficiently close to afford an apparent confirmation of Maxwell's theory, yet in other cases there were considerable divergencies. L. Boltzmann (1844–1907) made a large number of determinations for solids and for gases, and the dielectric constants of many solid and liquid substances were determined by N. N. Schiller (b. 1848), P. A. Silow (b. 1850), J. Hopkinson and others. The accumulating determinations of the numerical value of the electromagnetic velocity (v) from the earliest made by Lord Kelvin (Sir W. Thomson) with the aid of King and McKichan, or those of Clerk Maxwell, W. E. Ayrton and J. Perry, to more recent ones by J. J. Thomson, F. Himstedt, H. A. Rowland, E. B. Rosa, J. S. H. Pellat and H. A. Abraham, showed it to be very close to the best determinations of the velocity of light (see UNITS PHYSICAL). On the other hand, the divergence in some cases between the square of the optical refractive index and the dielectric constant was very marked. Hence although Maxwell's theory of electrical action when first propounded found many adherents in Great Britain, it did not so much dominate opinion on the continent of Europe.

FOURTH PERIOD.—With the publication of Clerk Maxwell's treatise in 1873, we enter fully upon the fourth and modern period of electrical research. On the technical side the invention of a new form of armature for dynamo electric machines by Z. T. Gramme (1826–1901) inaugurated a departure from which we may date modern electrical engineering. It will be convenient to deal with technical development first.

Technical Development.—As far back as 1841 large magneto-electric machines driven by steam power had been constructed and in 1856 F. H. Holmes had made a magneto machine with multiple permanent magnets which was installed in 1862 in Dungeness lighthouse. Further progress was made in 1867 when H. Wilde introduced the use of electromagnets for the field magnets. In 1860 Dr Antonio Pacinotti invented what is now called the toothed ring winding for armatures and described it in an Italian journal, but it attracted little notice until reinvented in 1870 by Gramme. In this new form of bobbin, the armature consisted of a ring of iron wire wound over with an endless coil of wire and connected to a commutator consisting of copper bars insulated from one another. Gramme dynamos were then soon made on the self-exciting principle. In 1873 at Vienna the fact was discovered that a dynamo machine of the Gramme type could also act as an electric motor and was set in rotation when a current was passed into it from another similar machine Henceforth the electric transmission of power came within the possibilities of engineering.

Electric Lighting.—In 1876, Paul Jablochkov (1847–1894) a Russian officer, passing through Paris, invented his famous electric candle, consisting of two rods of carbon placed side by side and separated from one another by an insulating material This invention in conjunction with an alternating current dynamo provided a new and simple form of electric arc lighting Two years afterwards C. F. Brush, in the United States, produced another efficient form of dynamo and electric arc lamp suitable for working in series (see LIGHTING: *Electric*), and these inventions of Brush and Jablochkov inaugurated commercial arc lighting. The so-called subdivision of electric light by incandescent lighting lamps then engaged attention. E. A. King in 1845 and W. E. Staite in 1848 had made incandescent electric lamps of an elementary form, and T. A. Edison in 1878 again attacked the problem of producing light by the incandescence of platinum. It had by that time become clear that the most suitable material for an incandescent lamp was carbon contained in a good vacuum, and St G. Lane Fox and Sir J. W. Swan in England, and T. A. Edison in the United States, were engaged in struggling with the difficulties of producing a suitable carbon incandescence electric lamp. Edison constructed in 1879 a successful lamp of this type consisting of a vessel wholly of glass containing a carbon filament made by carbonizing paper or some other carbonizable material, the vessel being exhausted and the current led into the filament through platinum wires

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[1] *A Treatise on Electricity and Magnetism* (2 vols.), by James Clerk Maxwell, sometime professor of experimental physics in the university of Cambridge. A second edition was edited by Sir W. D. Niven in 1881 and a third by Prof. Sir J. J. Thomson in 1891.

In 1879 and 1880, Edison in the United States, and Swan in conjunction with C. H. Stearn in England, succeeded in completely solving the practical problems. From and after that date incandescent electric lighting became commercially possible, and was brought to public notice chiefly by an electrical exhibition held at the Crystal Palace, near London, in 1882. Edison, moreover, as well as Lane-Fox, had realized the idea of a public electric supply station, and the former proceeded to establish in Pearl Street, New York, in 1881, the first public electric supply station. A similar station in England was opened in the basement of a house in Holborn Viaduct, London, in March 1882. Edison, with copious ingenuity, devised electric meters, electric mains, lamp fittings and generators complete for the purpose. In 1881 C. A. Faure made an important improvement in the lead secondary battery which G. Planté (1834–1889) had invented in 1859, and storage batteries then began to be developed as commercial appliances by Faure, Swan, J. S. Sellon and many others (see ACCUMULATOR). In 1882, numerous electric lighting companies were formed for the conduct of public and private lighting, but an electric lighting act passed in that year greatly hindered commercial progress in Great Britain. Nevertheless the delay was utilized in the completion of inventions necessary for the safe and economical distribution of electric current for the purpose of electric lighting.

Telephone.—Going back a few years we find the technical applications of electrical invention had developed themselves in other directions. Alexander Graham Bell in 1876 invented the speaking telephone (*q.v.*), and Edison and Elisha Gray in the United States followed almost immediately with other telephonic inventions for electrically transmitting speech. About the same time D. E. Hughes in England invented the microphone. In 1879 telephone exchanges began to be developed in the United States, Great Britain and other countries.

Electric Power.—Following on the discovery in 1873 of the reversible action of the dynamo and its use as a motor, efforts began to be made to apply this knowledge to transmission of power, and S. D. Field, T. A. Edison, Leo Daft, E. M. Bentley and W. H. Knight, F. J. Sprague, C. J. Van Depoele and others between 1880 and 1884 were the pioneers of electric traction. One of the earliest electric tram cars was exhibited by E. W. and W. Siemens in Paris in 1881. In 1883 Lucien Gaulard, following a line of thought opened by Jablochkov, proposed to employ high pressure alternating currents for electric distributions over wide areas by means of transformers. His ideas were improved by Carl Zipernowsky and O. T. Bláthy in Hungary and by S. Z. de Ferranti in England, and the alternating current transformer (see TRANSFORMERS) came into existence. Polyphase alternators were first exhibited at the Frankfort electrical exhibition in 1891, developed as a consequence of scientific researches by Galileo Ferraris (1847–1897), Nikola Tesla, M. O. von Dolivo-Dobrowolsky and C. E. L. Brown, and long distance transmission of electrical power by polyphase electrical currents (see POWER TRANSMISSION: *Electric*) was exhibited in operation at Frankfort in 1891. Meanwhile the early continuous current dynamos devised by Gramme, Siemens and others had been vastly improved in scientific principle and practical construction by the labours of Siemens, J. Hopkinson, R. E. B. Crompton, Elihu Thomson, Rudolf Eickemeyer, Thomas Parker and others, and the theory of the action of the dynamo had been closely studied by J. and E. Hopkinson, G. Kapp, S. P. Thompson, C. P. Steinmetz and J. Swinburne, and great improvements made in the alternating current dynamo by W. M. Mordey, S. Z. de Ferranti and Messrs Ganz of Budapest. Thus in twenty years from the invention of the Gramme dynamo, electrical engineering had developed from small beginnings into a vast industry. The amendment, in 1888, of the Electric Lighting Act of 1882, before long caused a huge development of public electric lighting in Great Britain. By the end of the 19th century every large city in Europe and in North and South America was provided with a public electric supply for the purposes of electric lighting. The various improvements in electric illuminants, such as the Nernst oxide lamp, the tantalum and osmium incandescent lamps, and improved forms of arc lamp, enclosed, inverted and flame arcs, are described under LIGHTING: *Electric.*

Between 1890 and 1900, electric traction advanced rapidly in the United States of America but more slowly in England. In 1902 the success of deep tube electric railways in Great Britain was assured, and in 1904 main line railways began to abandon, at least experimentally, the steam locomotive and substitute for it the electric transmission of power. Long distance electrical transmission had been before that time exemplified in the great scheme of utilizing the falls of Niagara. The first projects were discussed in 1891 and 1892 and completed practically some ten years later. In this scheme large turbines were placed at the bottom of hydraulic fall tubes 150 ft. deep, the turbines being coupled by long shafts with 5000 H.P. alternating current dynamos on the surface. By these electric current was generated and transmitted to towns and factories around, being sent overhead as far as Buffalo, a distance of 18 m. At the end of the 19th century electrochemical industries began to be developed which depended on the possession of cheap electric energy. The production of aluminium in Switzerland and Scotland, carborundum and calcium carbide in the United States, and soda by the Castner-Kellner process, began to be conducted on an immense scale. The early work of Sir W. Siemens on the electric furnace was continued and greatly extended by Henri Moissan and others on its scientific side, and electro-chemistry took its place as one of the most promising departments of technical research and invention. It was stimulated and assisted by improvements in the construction of large dynamos and increased knowledge concerning the control of powerful electric currents.

In the early part of the 20th century the distribution in bulk of electric energy for power purposes in Great Britain began to assume important proportions. It was seen to be uneconomical for each city and town to manufacture its own supply since, owing to the intermittent nature of the demand for current for lighting, the price had to be kept up to 4d. and 6d. per unit. It was found that by the manufacture in bulk, even by steam engines, at primary centres the cost could be considerably reduced, and in numerous districts in England large power stations began to be erected between 1903 and 1905 for the supply of current for power purposes. This involved almost a revolution in the nature of the tools used, and in the methods of working, and may ultimately even greatly affect the factory system and the concentration of population in large towns which was brought about in the early part of the 19th century by the invention of the steam engine.

Development of Electric Theory.

Turning now to the theory of electricity, we may note the equally remarkable progress made in 300 years in scientific insight into the nature of the agency which has so recast the face of human society. There is no need to dwell upon the early crude theories of the action of amber and lodestone. In a true scientific sense no hypothesis was possible, because few facts had been accumulated. The discoveries of Stephen Gray and C. F. de C. du Fay on the conductivity of some bodies for the electric agency and the dual character of electrification gave rise to the first notions of electricity as an imponderable fluid, or non-gravitative subtile matter, of a more refined and penetrating kind than ordinary liquids and gases. Its duplex character, and the fact that the electricity produced by rubbing glass and vitreous substances was different from that produced by rubbing sealing-wax and resinous substances, seemed to necessitate the assumption of two kinds of electric fluid; hence there arose the conception of *positive* and *negative* electricity, and the two-fluid theory came into existence.

Single-fluid Theory.—The study of the phenomena of the Leyden jar and of the fact that the inside and outside coatings possessed opposite electricities, so that in charging the jar as much positive electricity is added to one side as negative to the other, led Franklin about 1750 to suggest a modification called the single fluid theory, in which the two states of electrification were regarded as not the results of two entirely different fluids but of the addition or subtraction of one electric fluid from matter, so that positive electrification was to be looked upon as the result of increase or addition of something to ordinary matter and negative as a subtraction. The positive and negative electrifications of the two coatings of the Leyden jar were therefore to be regarded as the result of a transformation of something called electricity from one coating to the other, by which process a certain measurable quantity became so much less on one side by the same amount by which it became more on the other. A modification of this single fluid theory was put forward by F. U. T. Aepinus which was explained and illustrated in his *Tentamen theoriae electricitatis et magnetismi*, published in St Petersburg in 1759. This theory was founded on the following principles:—(1) the particles of the electric fluid repel each other with a force decreasing as the distance increases; (2) the particles of the electric fluid attract the atoms of all bodies and are attracted by them with a force obeying the same law; (3) the electric fluid exists in the pores of all bodies, and while it moves without any obstruction in conductors such as metals, water, &c., it moves with extreme difficulty in so-called non-conductors such as glass, resin, &c.; (4) electrical phenomena are produced either by the transference of the electric fluid of a body containing more to one containing less, or from its attraction and repulsion when no transference takes place. Electric attractions and repulsions were, however, regarded as differential actions in which the mutual repulsion of the particles of electricity operated, so to speak, in antagonism to the mutual attraction of particles of matter for one another and of particles of electricity for matter. Independently of Aepinus, Henry Cavendish put forward a single-fluid theory of electricity (*Phil. Trans.*, 1771, 61, p. 584), in which he considered it in more precise detail.

Two-fluid Theory.—In the elucidation of electrical phenomena, however, towards the end of the 18th century, a modification of the two-fluid theory seems to have been generally preferred. The notion then formed of the nature of electrification was something as follows:—All bodies were assumed to contain a certain quantity of a so-called neutral fluid made up of equal quantities of positive and negative electricity, which when in this state of combination neutralized one another's properties. The neutral fluid could, however, be divided up or separated into its two constituents, and these could be accumulated on separate conductors or non-conductors. This view followed from the discovery of the facts of electric induction of J. Canton (1753, 1754). When, for instance, a positively electrified body was found to induce upon another insulated conductor a charge of negative electricity on the side nearest to it, and a charge of positive electricity on the side farthest from it, this was explained by saying that the particles of each of the two electric fluids repelled one another but attracted those of the positive fluid. Hence the operation of the positive charge upon the neutral fluid was to draw towards the positive the negative constituent of the neutral charge and repel to the distant parts of the conductor the positive constituent.

C. A. Coulomb experimentally proved that the law of attraction and repulsion of simple electrified bodies was that the force between them varied inversely as the square of the distance and thus gave mathematical definiteness to the two-fluid hypothesis. It was then assumed that each of the two constituents of the neutral fluid had an atomic structure and that the so-called particles of one of the electric fluids, say positive, repelled similar particles with a force varying inversely as a square of the distance and attracted those of the opposite fluid according to the same law. This fact and hypothesis brought electrical phenomena within the domain of mathematical analysis and, as already mentioned, Laplace, Biot, Poisson, G. A. A. Plana (1781–1846), and later Robert Murphy (1806–1843), made them the subject of their investigations on the mode in which electricity distributes itself on conductors when in equilibrium.

Faraday's Views.—The two-fluid theory may be said to have held the field until the time when Faraday began his researches on electricity. After he had educated himself by the study of the phenomena of lines of magnetic force in his discoveries on electromagnetic induction, he applied the same conception to electrostatic phenomena, and thus created the notion of lines of electrostatic force and of the important function of the dielectric or non-conductor in sustaining them. Faraday's notion as to the nature of electrification, therefore, about the middle of the 19th century came to be something as follows:—He considered that the so-called charge of electricity on a conductor was in reality nothing on the conductor or in the conductor itself, but consisted in a state of strain or polarization, or a physical change of some kind in the particles of the dielectric surrounding the conductor, and that it was this physical state in the dielectric which constituted electrification. Since Faraday was well aware that even a good vacuum can act as a dielectric, he recognized that the state he called dielectric polarization could not be wholly dependent upon the presence of gravitative matter, but that there must be an electromagnetic medium of a supermaterial nature. In the 13th series of his *Experimental Researches on Electricity* he discussed the relation of a vacuum to electricity. Furthermore his electrochemical investigations, and particularly his discovery of the important law of electrolysis, that the movement of a certain quantity of electricity through an electrolyte is always accompanied by the transfer of a certain definite quantity of matter from one electrode to another and the liberation at these electrodes of an equivalent weight of the ions, gave foundation for the idea of a definite atomic charge of electricity. In fact, long previously to Faraday's electrochemical researches, Sir H. Davy and J. J. Berzelius early in the 19th century had advanced the hypothesis that chemical combination was due to electric attractions between the electric charges carried by chemical atoms. The notion, however, that electricity is atomic in structure was definitely put forward by Hermann von Helmholtz in a well-known Faraday lecture. Helmholtz says: “If we accept the hypothesis that elementary substances are composed of atoms, we cannot well avoid concluding that electricity also is divided into elementary portions which behave like atoms of electricity.”[1] Clerk Maxwell had already used in 1873 the phrase, “a molecule of electricity.”[2] Towards the end of the third quarter of the 19th century it therefore became clear that electricity, whatever be its nature, was associated with atoms of matter in the form of exact multiples of an indivisible minimum electric charge which may be considered to be “Nature's unit of electricity.” This ultimate unit of electric quantity Professor Johnstone Stoney called an *electron*.[3] The formulation of electrical theory as far as regards operations in space free from matter was immensely assisted by Maxwell's mathematical theory. Oliver Heaviside after 1880 rendered much assistance by reducing Maxwell's mathematical analysis to more compact form and by introducing greater precision into terminology (see his *Electrical Papers*, 1892). This is perhaps the place to refer also to the great services of Lord Rayleigh to electrical science. Succeeding Maxwell as Cavendish professor of physics at Cambridge in 1880, he soon devoted himself especially to the exact redetermination of the practical electrical units in absolute measure. He followed up the early work of the British Association Committee on electrical units by a fresh determination of the ohm in absolute measure, and in conjunction with other work on the electrochemical equivalent of silver and the absolute electromotive force of the Clark cell may be said to have placed exact electrical measurement on a new basis. He also made great additions to the theory of alternating electric currents, and provided fresh appliances for other electrical measurements (see his *Collected Scientific Papers*, Cambridge, 1900).

Electro-optics.—For a long time Faraday's observation on the rotation of the plane of polarized light by heavy glass in a magnetic field remained an isolated fact in electro-optics. Then M. E. Verdet (1824–1860) made a study of the subject and discovered that a solution of ferric perchloride in methyl alcohol rotated the plane of polarization in an opposite direction to heavy glass (*Ann. Chim. Phys.*, 1854, 41, p. 370; 1855, 43, p. 37; *Com. Rend.*, 1854, 39, p. 548). Later A. A. E. E. Kundt prepared metallic films of iron, nickel and cobalt, and obtained powerful negative optical rotation with them (*Wied. Ann.*, 1884, 23, p. 228; 1886, 27, p. 191). John Kerr (1824–1907) discovered that a similar effect was produced when plane polarized light was reflected from the pole of a powerful magnet (*Phil. Mag.*, 1877, [5], 3, p. 321, and 1878, 5, p. 161). Lord Kelvin showed that Faraday's discovery demonstrated that some form of rotation was taking place along lines of magnetic force when passing through a medium.[1] Many observers have given attention to the exact determination of Verdet's constant of rotation for standard substances, *e.g.* Lord Rayleigh for carbon bisulphide,[2] and Sir W. H. Perkin for an immense range of inorganic and organic bodies.[3] Kerr also discovered that when certain homogeneous dielectrics were submitted to electric strain, they became birefringent (*Phil. Mag.*, 1875, 50, pp. 337 and 446). The theory of electro-optics received great attention from Kelvin, Maxwell, Rayleigh, G. F. Fitzgerald, A. Righi and P. K. L. Drude, and experimental contributions from innumerable workers, such as F. T. Trouton, O. J. Lodge and J. L. Howard, and many others.

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[1] H. von Helmholtz, “On the Modern Development of Faraday's Conception of Electricity,” *Journ. Chem. Soc.*, 1881, 39, p. 277.

[2] See Maxwell's *Electricity and Magnetism*, vol. i. p. 350 (2nd ed., 1881).

[3] “On the Physical Units of Nature,” *Phil. Mag.*, 1881, [5], 11, p. 381. Also *Trans. Roy. Soc.* (Dublin, 1891), 4, p. 583.

Electric Waves.—In the decade 1880–1890, the most important advance in electrical physics was, however, that which originated with the astonishing researches of Heinrich Rudolf Hertz (1857–1894). This illustrious investigator was stimulated, by a certain problem brought to his notice by H. von Helmholtz, to undertake investigations which had for their object a demonstration of the truth of Maxwell's principle that a variation in electric displacement was in fact an electric current and had magnetic effects. It is impossible to describe here the details of these elaborate experiments; the reader must be referred to Hertz's own papers,[4] or the English translation of them by Prof. D. E. Jones. Hertz's great discovery was an experimental realization of a suggestion made by G. F. Fitzgerald (1851–1901) in 1883 as to a method of producing electric waves in space. He invented for this purpose a radiator consisting of two metal rods placed in one line, their inner ends being provided with poles nearly touching and their outer ends with metal plates. Such an arrangement constitutes in effect a condenser, and when the two plates respectively are connected to the secondary terminals of an induction coil in operation, the plates are rapidly and alternately charged, and discharged across the spark gap with electrical oscillations (see ELECTROKINETICS). Hertz then devised a wave detecting apparatus called a resonator. This in its simplest form consisted of a ring of wire nearly closed terminating in spark balls very close together, adjustable as to distance by a micrometer screw. He found that when the resonator was placed in certain positions with regard to the oscillator, small sparks were seen between the micrometer balls, and when the oscillator was placed at one end of a room having a sheet of zinc fixed against the wall at the other end, symmetrical positions could be found in the room at which, when the resonator was there placed, either no sparks or else very bright sparks occurred at the poles. These effects, as Hertz showed, indicated the establishment of stationary electric waves in space and the propagation of electric and magnetic force through space with a finite velocity. The other additional phenomena he observed finally contributed an all but conclusive proof of the truth of Maxwell's views. By profoundly ingenious methods Hertz showed that these invisible electric waves could be reflected and refracted like waves of light by mirrors and prisms, and that familiar experiments in optics could be repeated with electric waves which could not affect the eye. Hence there arose a new science of electro-optics, and in all parts of Europe and the United States innumerable investigators took possession of the novel field of research with the greatest delight. O. J. Lodge,[4] A. Righi,[5] J. H. Poincaré,[6] V. F. K. Bjerknes, P. K. L. Drude, J. J. Thomson,[7] John Trowbridge, Max Abraham, and many others, contributed to its elucidation.

In 1892, E. Branly of Paris devised an appliance for detecting these waves which subsequently proved to be of immense importance. He discovered that they had the power of affecting the electric conductivity of materials when in a state of powder, the majority of metallic filings increasing in conductivity. Lodge devised a similar arrangement called a coherer, and E. Rutherford invented a magnetic detector depending on the power of electric oscillations to demagnetize iron or steel. The sum total of all these contributions to electrical knowledge had the effect of establishing Maxwell's principles on a firm basis, but they also led to technical inventions of the very greatest utility. In 1896 G. Marconi applied a modified and improved form of Branly's wave detector in conjunction with a novel form of radiator for the telegraphic transmission of intelligence through space without wires, and he and others developed this new form of telegraphy with the greatest rapidity and success into a startling and most useful means of communicating through space electrically without connecting wires.

Electrolysis.—The study of the transfer of electricity through liquids had meanwhile received much attention. The general facts and laws of electrolysis (*q.v.*) were determined experimentally by Davy and Faraday and confirmed by the researches of J. F. Daniell, R. W. Bunsen and Helmholtz. The modern theory of electrolysis grew up under the hands of R. J. E. Clausius, A. W. Williamson and F. W. G. Kohlrausch, and received a great impetus from the work of Svante Arrhenius, J. H. Van't Hoff, W. Ostwald, H. W. Nernst and many others. The theory of the ionization of salts in solution has raised much discussion amongst chemists, but the general fact is certain that electricity only moves through liquids in association with matter, and simultaneously involves chemical dissociation of molecular groups.

Discharge through Gases.—Many eminent physicists had an instinctive feeling that the study of the passage of electricity through gases would shed much light on the intrinsic nature of electricity. Faraday devoted to a careful examination of the phenomena the XIIIth series of his *Experimental Researches*, and among the older workers in this field must be particularly mentioned J. Plücker, J. W. Hittorf, A. A. de la Rive, J. P. Gassiot, C. F. Varley, and W. Spottiswoode and J. Fletcher Moulton. It has long been known that air and other gases at the pressure of the atmosphere were very perfect insulators, but that when they were rarefied and contained in glass tubes with platinum electrodes sealed through the glass, electricity could be passed through them under sufficient electromotive force and produced a luminous appearance known as the electric glow discharge. The so-called vacuum tubes constructed by H. Geissler (1815–1879) containing air, carbonic acid, hydrogen, &c., under a pressure of one or two millimetres, exhibit beautiful appearances when traversed by the high tension current produced by the secondary circuit of an induction coil. Faraday discovered the existence of a dark space round the negative electrode which is usually known as the "Faraday dark space." De la Rive added much to our knowledge of the subject, and J. Plücker and his disciple J. W. Hittorf examined the phenomena exhibited in so-called high vacua, that is, in exceedingly rarefied gases. C. F. Varley discovered the interesting fact that no current could be sent through the rarefied gas unless a certain minimum potential difference of the electrodes was excited. Sir William Crookes took up in 1872 the study of electric discharge through high vacua, having been led to it by his researches on the radiometer. The particular details of the phenomena observed will be found described in the article Conduction, Electric (§ III.). The main fact discovered by researches of Plücker, Hittorf and Crookes was that in a vacuum tube containing extremely rarefied air or other gas, a luminous discharge takes place from the negative electrode which proceeds in lines normal to the surface of the negative electrode and renders phosphorescent both the glass envelope and other objects placed in the vacuum tube when it falls upon them. Hittorf made in 1869 the discovery that solid objects could cast shadows or intercept this cathode discharge. The cathode discharge henceforth engaged the attention of many physicists. Varley had advanced tentatively the hypothesis that it consisted in an actual projection of electrified matter from the cathode, and Crookes was led by his researches in 1870, 1871 and 1872 to embrace and confirm this hypothesis in a modified form and announce the existence of a fourth state of matter, which he called radiant matter, demonstrating by many beautiful and convincing experiments that there was an actual projection of material substance of some kind possessing inertia from the surface of the cathode. German physicists such as E. Goldstein were inclined to take another view. Sir J. J. Thomson, the successor of Maxwell and Lord Rayleigh in the Cavendish chair of physics in the university of Cambridge, began about the year 1899 a remarkable series of investigations on the cathode discharge, which finally enabled him to make a measurement of the ratio of the electric charge to the mass of the particles of matter projected from the cathode, and to show that this electric charge was identical with the atomic electric charge carried by a hydrogen ion in the act of electrolysis, but that the mass of the cathode particles, or "corpuscles" as he called them, was far less, viz. about $\frac{1}{2000}$th part of the mass of a hydrogen atom.[1] The subject was pursued by Thomson and the Cambridge physicists with great mathematical and experimental ability, and finally the conclusion was reached that in a high vacuum tube the electric charge is carried by particles which have a mass only a fraction, as above mentioned, of that of the hydrogen atom, but which carry a charge equal to the unit electric charge of the hydrogen ion as found by electrochemical researches.[2] P. E. A. Lenard made in 1894 (*Wied. Ann. Phys.*, 51, p. 225) the discovery that these cathode particles or corpuscles could pass through a window of thin sheet aluminium placed in the wall of the vacuum tube and give rise to a class of radiation called the Lenard rays. W. C. Röntgen of Munich made in 1896 his remarkable discovery of the so-called X or Röntgen rays, a class of radiation produced by the impact of the cathode particles against an impervious metallic screen or anticathode placed in the vacuum tube. The study of Röntgen rays was ardently pursued by the principal physicists in Europe during the years 1897 and 1898 and subsequently. The principal property of these Röntgen rays which attracted public attention was their power of passing through many solid bodies and affecting a photographic plate. Hence some substances were opaque to them and others transparent. The astonishing feat of photographing the bones of the living animal within the tissues soon rendered the Röntgen rays indispensable in surgery and directed an army of investigators to their study.

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[1] See Sir W. Thomson, *Proc. Roy. Soc. Lond.*, 1856, 8, p. 152; or Maxwell, *Elect. and Mag.*, vol. ii. p. 831.

[2] See Lord Rayleigh, *Proc. Roy. Soc. Lond.*, 1884, 37, p. 146; Gordon, *Phil. Trans.*, 1877, 167, p. 1; H. Becquerel, *Ann. Chim. Phys.*, 1882, [3], 27, p. 312.

[3] Perkin's Papers are to be found in the *Journ. Chem. Soc. Lond.*, 1884, p. 421; 1886, p. 177; 1888, p. 561; 1889, p. 680; 1891, p. 981; 1892, p. 800; 1893, p. 75.

[4] *The Work of Hertz* (London, 1894).

[5] *L'Ottica delle oscillazioni elettriche* (Bologna, 1897).

[6] *Les Oscillations électriques* (Paris, 1894).

[7] *Recent Researches in Electricity and Magnetism* (Oxford, 1892).

Radioactivity.—One outcome of all this was the discovery by H. Becquerel in 1896 that minerals containing uranium, and particularly the mineral known as pitchblende, had the power of affecting sensitive photographic plates enclosed in a black paper envelope when the mineral was placed on the outside, as well as of discharging a charged electroscope (*Com. Rend.*, 1896, 122, p. 420). This research opened a way of approach to the phenomena of radioactivity, and the history of the steps by which P. Curie and Madame Curie were finally led to the discovery of radium is one of the most fascinating chapters in the history of science. The study of radium and radioactivity (see Radioactivity) led before long to the further remarkable knowledge that these so-called radioactive materials project into surrounding space particles or corpuscles, some of which are identical with those projected from the cathode in a high vacuum tube, together with others of a different nature. The study of radioactivity was pursued with great ability not only by the Curies and A. Debierne, who associated himself with them, in France, but by E. Rutherford and F. Soddy in Canada, and by J. J. Thomson, Sir William Crookes, Sir William Ramsay and others in England.

Electronic Theory.—The final outcome of these investigations was the hypothesis that Thomson's corpuscles or particles composing the cathode discharge in a high vacuum tube must be looked upon as the ultimate constituent of what we call negative electricity; in other words, they are atoms of negative electricity, possessing, however, inertia, and these negative electrons are components at any rate of the chemical atom. Each electron is a point-charge of negative electricity equal to $3\cdot9\times10^{-10}$ of an electrostatic unit or to $1\cdot3\times10^{-20}$ of an electromagnetic unit, and the ratio of its charge to its mass is nearly 2×10^{7} using E.M. units. For the hydrogen atom the ratio of charge to mass as deduced from electrolysis is about 10^{4}. Hence the mass of an electron is $\frac{1}{2000}$th of that of a hydrogen atom. No one has yet been able to isolate positive electrons, or to give a complete demonstration that the whole inertia of matter is only electric inertia due to what may be called the inductance of the electrons. Prof. Sir J. Larmor developed in a series of very able papers (*Phil. Trans.*, 1894, 185; 1895, 186; 1897, 190), and subsequently in his book *Aether and Matter* (1900), a remarkable hypothesis of the structure of the electron or corpuscle, which he regards as simply a strain centre in the aether or electromagnetic medium, a chemical atom being a collection of positive and negative electrons or strain centres in stable orbital motion round their common centre of mass (see Aether). J. J. Thomson also developed this hypothesis in a profoundly interesting manner, and we may therefore summarize very briefly the views held on the nature of electricity and matter at the beginning of the 20th century by saying that the term electricity had come to be regarded, in part at least, as a collective name for electrons, which in turn must be considered as constituents of the chemical atom, furthermore as centres of certain lines of self-locked and permanent strain existing in the universal aether or electromagnetic medium. Atoms of matter are composed of congeries of electrons and the inertia of matter is probably therefore only the inertia of the electromagnetic medium.[1] Electric waves are produced wherever electrons are accelerated or retarded, that is, whenever the velocity of an electron is changed or accelerated positively or negatively. In every solid body there is a continual atomic dissociation, the result of which is that mixed up with the atoms of chemical matter composing them we have a greater or less percentage of free electrons. The operation called an electric current consists in a diffusion or movement of these electrons through matter, and this is controlled by laws of diffusion which are similar to those of the diffusion of liquids or gases. Electromotive force is due to a difference in the density of the electronic population in different or identical conducting bodies, and whilst the electrons can move freely through so-called conductors their motion is much more hindered or restricted in non-conductors. Electric charge consists, therefore, in an excess or deficit of negative electrons in a body. In the hands of H. A. Lorentz, P. K. L. Drude, J. J. Thomson, J. Larmor and many others, the electronic hypothesis of matter and of electricity has been developed in great detail and may be said to represent the outcome of modern researches upon electrical phenomena.

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[1] See J. J. Thomson, *Proc. Roy. Inst. Lond.*, 1897, 15, p. 419; also *Phil. Mag.*, 1899, [5], 48, p. 547.

[2] Later results show that the mass of a hydrogen atom is not far from $1\cdot3\times10^{-24}$ gramme and that the unit atomic charge or natural unit of electricity is $1\cdot3\times10^{-20}$ of an electromagnetic C.G.S. unit. The mass of the electron or corpuscle is $7\cdot0\times10^{-28}$ gramme and its diameter is 3×10^{-13} centimetre. The diameter of a chemical atom is of the order of 10^{-7} centimetre.

See H. A. Lorentz, "The Electron Theory," *Elektrotechnische Zeitschrift*, 1905, 26, p. 584; or *Science Abstracts*, 1905, 8, A, p. 603.

[1] See J. J. Thomson, *Electricity and Matter* (London, 1904).

The reader may be referred for an admirable summary of the theories of electricity prior to the advent of the electronic hypothesis to J. J. Thomson's "Report on Electrical Theories" (*Brit. Assoc. Report*, 1885), in which he divides electrical theories enunciated during the 19th century into four classes, and summarizes the opinions and theories of A. M. Ampère, H. G. Grassman, C. F. Gauss, W. E. Weber, G. F. B. Riemann, R. J. E. Clausius, F. E. Neumann and H. von Helmholtz.

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ELECTRICITY SUPPLY. I. *General Principles.*—The improvements made in the dynamo and electric motor between 1870 and 1880 and also in the details of the arc and incandescent electric lamp towards the close of that decade, induced engineers to turn their attention to the question of the private and public supply of electric current for the purpose of lighting and power. T. A. Edison[1] and St G. Lane Fox[2] were among the first to see the possibilities and advantages of public electric supply, and to devise plans for its practical establishment. If a supply of electric current has to be furnished to a building the option exists in many cases of drawing from a public supply or of generating it by a private plant.

Private Plants.—In spite of a great amount of ingenuity devoted to the development of the primary battery and the thermopile, no means of generation of large currents can compete in economy with the dynamo. Hence a private electric generating plant involves the erection of a dynamo which may be driven either by a steam, gas or oil engine, or by power obtained by means of a turbine from a low or high fall of water. It may be either directly coupled to the motor, or driven by a belt; and it may be either a continuous-current machine or an alternator, and if the latter, either single-phase or polyphase. The convenience of being able to employ storage batteries in connexion with a private-supply system is so great that unless power has to be transmitted long distances, the invariable rule is to employ a continuous-current dynamo. Where space is valuable this is always coupled direct to the motor; and if a steam-engine is employed, an enclosed engine is most cleanly and compact. Where coal or heating gas is available, a gas-engine is exceedingly convenient, since it requires little attention. Where coal gas is not available, a Dowson gas-producer can be employed. The oil-engine has been so improved that it is extensively used in combination with a direct-coupled or belt-driven dynamo and thus forms a favourite and easily-managed plant for private electric lighting. Lead storage cells, however, as at present made, when charged by a steam-driven dynamo deteriorate less rapidly than when an oil-engine is employed, the reason being that the charging current is more irregular in the latter case, since the single cylinder oil-engine only makes an impulse every other revolution. In connexion with the generator, it is almost the invariable custom to put down a secondary battery of storage cells, to enable the supply to be given after the engine has stopped. This is necessary, not only as a security for the continuity of supply, but because otherwise the costs of labour in running the engine night and day become excessive. The storage battery gives its supply automatically, but the dynamo and engine require incessant skilled attendance. If the building to be lighted is at some distance from the engine-house the battery should be placed in the basement of the building, and underground or overhead conductors, to convey the charging current, brought to it from the dynamo.

It is usual, in the case of electric lighting installations, to reckon all lamps in their equivalent number of 8 candle power (c.p.) incandescent lamps. In lighting a private house or building, the first thing to be done is to settle the total number of incandescent lamps and their size, whether 32 c.p., 16 c.p. or 8 c.p. Lamps of 5 c.p. can be used with advantage in small bedrooms and passages. Each candle-power in the case of a carbon filament lamp can be taken as equivalent to 3·5 watts, or the 8 c.p. lamp as equal to 30 watts, the 16 c.p. lamp to 60 watts, and so on. In the case of metallic filament lamps about 1·0 or 1·25 watts. Hence if the equivalent of 100 carbon filament 8 c.p. lamps is required in a building the maximum electric power-supply available must be 3000 watts or 3 kilowatts. The next matter to consider is the pressure of supply. If the battery can be in a position near the building to be lighted, it is best to use 100-volt incandescent lamps and enclosed arc lamps, which can be worked singly off the 100-volt circuit. If, however, the lamps are scattered over a wide area, or in separate buildings somewhat far apart, as in a college or hospital, it may be better to select 200 volts as the supply pressure. Arc lamps can then be worked three in series with added resistance. The third step is to select the size of the dynamo unit and the amount of spare plant. It is desirable that there should be at least three dynamos, two of which are capable of taking the whole of the full load, the third being reserved to replace either of the others when required. The total power to be absorbed by the lamps and motors (if any) being given, together with an allowance for extensions, the size of the dynamos can be settled, and the power of the engines required to drive them determined. A good rule to follow is that the indicated horse-power (I.H.P.) of the engine should be double the dynamo full-load output in kilowatts; that is to say, for a 10-kilowatt dynamo an engine should be capable of giving 20 indicated (not nominal) H.P. From the I.H.P. of the engine, if a steam engine, the size of the boiler required for steam production becomes known. For small plants it is safe to reckon that, including water waste, boiler capacity should be provided equal to evaporating 40 ℔ of water per hour for every I.H.P. of the engine. The locomotive boiler is a convenient form; but where large amounts of steam are required, some modification of the Lancashire boiler or the water-tube boiler is generally adopted. In settling the electromotive force of the dynamo to be employed, attention must be paid to the question of charging secondary cells, if these are used. If a secondary battery is employed in connexion with 100-volt lamps, it is usual to put in 53 or 54 cells. The electromotive force of these cells varies between 2·2 and 1·8 volts as they discharge; hence the above number of cells is sufficient for maintaining the necessary electromotive force. For charging, however, it is necessary to provide 2·5 volts per cell, and the dynamo must therefore have an electromotive force of 135 volts, *plus* any voltage required to overcome the fall of potential in the cable connecting the dynamo with the secondary battery. Supposing this to be 10 volts, it is safe to install dynamos having an electromotive force of 150 volts, since by means of resistance in the field circuits this electromotive force can be lowered to 110 or 115 if it is required at any time to dispense with the battery. The size of the secondary cell will be determined by the nature of the supply to be given after the dynamos have been stopped. It is usual to provide sufficient storage capacity to run all the lamps for three or four hours without assistance from the dynamo.

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[1] British Patent Specification, No. 5306 of 1878, and No. 602 of 1880.

[2] *Ibid.* No. 3988 of 1878.

As an example taken from actual practice, the following figures give the capacity of the plant put down to supply 500 8 c.p. lamps in a hospital. The dynamos were 15-unit machines, having a full-load capacity of 100 amperes at 150 volts, each coupled direct to an engine of 25 H.P.; and a double plant of this description was supplied from two steel locomotive boilers, each capable of evaporating 800 lb of water per hour. One dynamo during the day was used for charging the storage battery of 54 cells; and at night the discharge from the cells, together with the current from one of the dynamos, supplied the lamps until the heaviest part of the load had been taken; after that the current was drawn from the batteries alone. In working such a plant it is necessary to have the means of varying the electromotive force of the dynamo as the charging of the cells proceeds. When they are nearly exhausted, their electromotive force is less than 2 volts; but as the charging proceeds, a counter-electromotive force is gradually built up, and the engineer-in-charge has to raise the voltage of the dynamo in order to maintain a constant charging current. This is effected by having the dynamos designed to give normally the highest E.M.F. required, and then inserting resistance in their field circuits to reduce it as may be necessary. The space and attendance required for an oil-engine plant are much less than for a steam-engine.

Public Supply.—The methods at present in successful operation for public electric supply fall into two broad divisions:—(1) continuous-current systems and (2) alternating-current systems. Continuous-current systems are either low- or high-pressure. In the former the current is generated by dynamos at some pressure less than 500 volts, generally about 460 volts, and is supplied to users at half this pressure by means of a three-wire system (see below) of distribution, with or without the addition of storage batteries.

Low-pressure continuous supply.

The general arrangements of a low-pressure continuous-current town supply station are as follows:—If steam is the motive power selected, it is generated under all the best conditions of economy by a battery of boilers, and supplied to engines which are now almost invariably coupled direct, each to its own dynamo, on one common bedplate; a multipolar dynamo is most usually employed, coupled direct to an enclosed engine. Parsons or Curtis steam turbines (see STEAM-ENGINE) are frequently selected, since experience has shown that the costs of oil and attendance are far less for this type than for the reciprocating engine, whilst the floor space and, therefore, the building cost are greatly reduced. In choosing the size of unit to be adopted, the engineer has need of considerable experience and discretion, and also a full knowledge of the nature of the public demand for electric current. The rule is to choose as large units as possible, consistent with security, because they are proportionately more economical than small ones. The over-all efficiency of a steam dynamo—that is, the ratio between the electrical power output, reckoned say in kilowatts, and the I.H.P. of the engine, reckoned in the same units—is a number which falls rapidly as the load decreases, but at full load may reach some such value as 80 or 85%. It is common to specify the efficiency, as above defined, which must be attained by the plant at full-load, and also the efficiencies at quarter- and half-load which must be reached or exceeded. Hence in the selection of the size of the units the engineer is guided by the consideration that whatever units are in use shall be as nearly as possible fully loaded. If the demand on the station is chiefly for electric lighting, it varies during the hours of the day and night with tolerable regularity. If the output of the station, either in amperes or watts, is represented by the ordinates of a curve, the abscissae of which represent the hours of the day, this load diagram for a supply station with lighting load only, is a curve such as is shown in fig. 1, having a high peak somewhere between 6 and 8 P.M. The area enclosed by this load-diagram compared with the area of the circumscribing rectangle is called the *load-factor* of the station. This varies from day to day during the year, but on the average for a simple lighting load is not generally above 10 or 12%, and may be lower. Thus the total output from the station is only some 10% on an average of that which it would be if the supply were at all times equal to the maximum demand. Roughly speaking, therefore, the total output of an electric supply station, furnishing current chiefly for electric lighting, is at best equal to about two hours' supply during the day at full load. Hence during the greater part of the twenty-four hours a large part of the plant is lying idle. It is usual to provide certain small sets of steam dynamos, called the daylight machines, for supplying the demand during the day and later part of the evening, the remainder of the machines being called into requisition only for a short time. Provision must be made for sufficient reserve of plant, so that the breakdown of one or more sets will not cripple the output of the station.

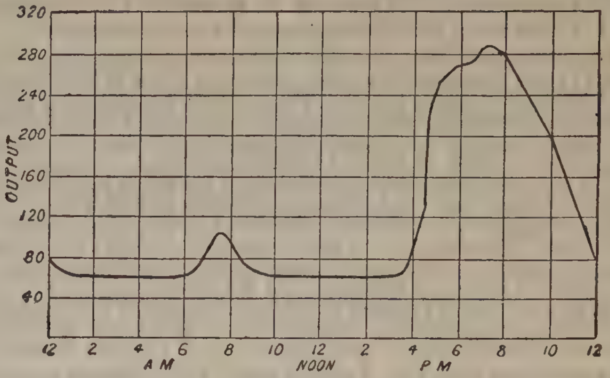


FIG. 1.

Three-wire system.

Assuming current to be supplied at about 460 volts by different and separate steam dynamos, Dy_1, Dy_2 (fig. 2), the machines are connected through proper amperemeters and voltmeters with *omnibus bars*, O_1, O_2, O_3, on a main switchboard, so that any dynamo can be put in connexion or removed. The switchboard is generally divided into three parts—one panel for the connexions of the positive feeders, F_1, with the positive terminals of the generators; one for the negative feeders, F_3, and negative generator terminals; while from the third (or middle-wire panel) proceed an equal number of middle-wire feeders, F_2. These sets of conductors are led out into the district to be supplied with current, and are there connected into a distributing system, consisting of three separate insulated conductors, D_1, D_2, D_3, respectively called the positive, middle and negative distributing mains. The lamps in the houses, H_1, H_2, &c., are connected between the middle and negative, and the middle and positive, mains by smaller supply and service wires. As far as possible the numbers of lamps installed on the two sides of the system are kept equal; but since it is not possible to control the consumption of current, it becomes necessary to provide at the station two small dynamos called the *balancing machines*, B_1, B_2, connected respectively between the middle and positive and the middle and negative omnibus bars. These machines may have their shafts connected together, or they may be driven by separate steam dynamos; their function is to supply the difference in the total current circulating through the whole of the lamps respectively on the two opposite sides of the middle wire. If storage batteries are employed in the station, it is usual to install two complete batteries, S_1, S_2,

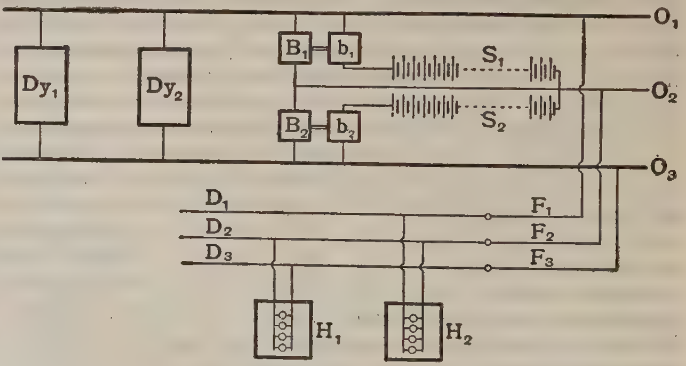
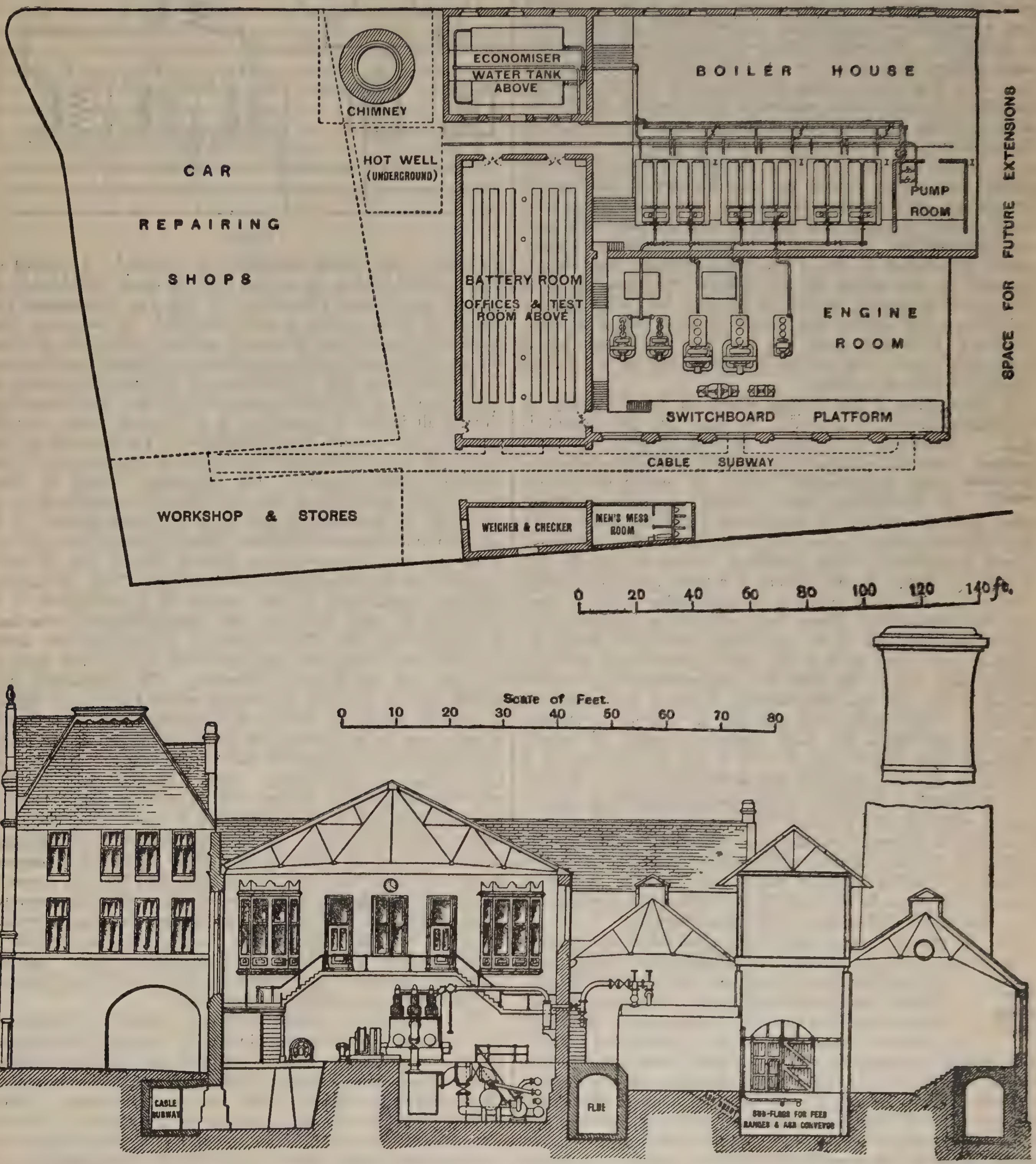


FIG. 2.

which are placed in a separate battery room and connected between the middle omnibus bar and the two outer omnibus bars. The extra electromotive force required to charge these batteries is supplied by two small dynamos b_1, b_2, called *boosters.* It is not unusual to join together the two balancing dynamos and the two boosters on one common bedplate, the shafts being coupled and in line, and to employ the balancing machines as electromotors to drive the boosters as required. By the use of *reversible boosters*, such as those made by the Lancashire Dynamo & Motor Company under the patents of Turnbull & McLeod, having four field windings on the booster magnets (see *The Electrician*, 1904, p. 303), it is possible to adjust the relative duty of the dynamos and battery so that the load on the supply dynamos is always constant. Under these conditions the main engines can be worked all the time at their maximum steam economy and a smaller engine plant employed. If the load in the station rises above the fixed amount, the batteries discharge in parallel with the station dynamos; if it falls below, the batteries are charged and the station dynamos take the external load.

The general arrangements of a low-pressure supply station are shown in figs. 3 and 4. It consists of a boiler-house containing a bank of boilers, either Lancashire or Babcock & Wilcox being generally used (see BOILER), which furnish steam to the engines


ECONOMISER
WATER TANK
ABOVE
BOILER HOUSE
CHIMNEY
HOT WELL
(UNDERGROUND)
CAR
REPAIRING
SHOPS
PUMP
ROOM
SPACE FOR FUTURE EXTENSIONS
BATTERY ROOM
OFFICES & TEST
ROOM ABOVE
ENGINE
ROOM
SWITCHBOARD PLATFORM
CABLE SUBWAY
WORKSHOP & STORES
WEIGHER & CHECKER
MEN'S MESS
ROOM
0 20 40 60 80 100 120 140 ft.
Scale of Feet.
0 10 20 30 40 50 60 70 80
CABLE
SUBWAY
FLUE
SUB-FLOOR FOR FEED
RANGES & ASH CONVEYOR

From *The Electrician.*

FIGS. 3 and 4.—Low-pressure Supply Station.

Generating stations.

and dynamos, provision being made by duplicate steam-pipes or a ring main so that the failure of a single engine or dynamo does not cripple the whole supply. The furnace gases are taken through an economizer (generally Green's) so that they give up their heat to the cold feed water. If condensing water is available the engines are worked condensing, and this is an essential condition of economy when steam turbines are employed. Hence, either a condensing water pond or a cooling tower has to be provided to cool the condensing water and enable it to be used over and over again. Preferably the station should be situated near a river or canal and a railway siding. The steam dynamos are generally arranged in an engine-room so as to be overlooked from a switchboard gallery (fig. 3), from which all the control is carried out. The boiler furnaces are usually stoked by automatic stokers. Owing to the relatively small load factor (say 8 or 10%) of a station giving electric supply for lighting only, the object of every station engineer is to cultivate a demand for electric current for power during the day-time by encouraging the use of electric motors for lifts and other purposes, but above all to create a demand for traction purposes. Hence most urban stations now supply current not only for electric lighting but for running the town tramway system, and this traction load being chiefly a daylight load serves to keep the plant employed and remunerative. It is usual to furnish a continuous current supply for traction at 500 or 600 volts, although some station engineers are advocating the use of higher voltages. In those stations which supply current for traction, but which have a widely scattered lighting load, *double current* dynamos are often employed, furnishing from one and the same armature a continuous current for traction purposes, and an alternating current for lighting purposes.

High-pressure continuous supply.

In some places a high voltage system of electric supply by continuous current is adopted. In this case the current is generated at a pressure of 1000 or 2000 volts, and transmitted from the generating station by conductors, called high-pressure feeders, to certain sub-centres or transformer centres, which are either buildings above ground or cellars or excavations under the ground. In these transformer centres are placed machines, called *continuous-current transformers*, which transform the electric energy and create a secondary electric current at a lower pressure, perhaps 100 or 150 volts, to be supplied by distributing mains to users (see TRANSFORMERS). From these sub-centres insulated conductors are run back to the generating station, by which the engineer can start or stop the continuous-current rotatory transformers, and at the same time inform himself as to their proper action and the electromotive force at the secondary terminals. This system was first put in practice in Oxford, England, and hence has been sometimes called by British engineers "the Oxford system." It is now in operation in a number of places in England, such as Wolverhampton, Walsall, and Shoreditch in London. It has the advantage that in connexion with the low-pressure distributing system secondary batteries can be employed, so that a storage of electric energy is effected. Further, continuous-current arc lamps can be worked in series off the high-pressure mains, that is to say, sets of 20 to 40 arc lamps can be operated for the purpose of street lighting by means of the high-pressure continuous current.

Alternating supply.

The alternating current systems in operation at the present time are the *single-phase* system, with distributing transformers or transformer sub-centres, and the *polyphase* systems, in which the alternating current is transformed down into an alternating current of low pressure, or, by means of rotatory transformers, into a continuous current. The general arrangement of a *single-phase* alternating-current system is as follows: The generating station contains a number of alternators, A_1 A_2 (fig. 5), producing single-phase alternating current, either at 1000, 2000, or sometimes, as at Deptford and other places, 10,000 volts. This current is distributed from the station either at the pressure at which it is generated, or after being transformed up to a higher pressure by the transformer T. The alternators are sometimes worked in parallel; that is to say, all furnish their current to two common omnibus bars on a high-pressure switchboard, and each is switched into circuit at the moment when it is brought into step with the other machines, as shown by some form of *phase-indicator*. In some cases, instead of the high-pressure feeders starting from omnibus bars, each alternator works independently and the feeders are grouped together on the various alternators as required. A number of high-pressure feeders are carried from the main switchboard to various transformer sub-centres or else run throughout the district to which current is to be furnished. If the system laid down is the transformer sub-centre system, then at each of these sub-centres is placed a battery of alternating-current transformers, T_1 T_2 T_3, having their primary circuits all joined in parallel to the terminals of the high-pressure feeders, and their secondary circuits all joined in parallel on a distributing main, suitable switches and cut-outs being interposed. The pressure of the current is then transformed down by these transformers to the required supply pressure. The secondary circuits of these transformers are generally provided with three terminals, so as to supply the low-pressure side on a three-wire system. It is not advisable to connect together directly the secondary circuits of all the different sub-centres, because then a fault or short circuit on one secondary system affects all the others. In banking together transformers in this manner in a sub-station it is necessary to take care that the transformation ratio and secondary drop (see TRANSFORMERS) are exactly the same, otherwise one transformer will take more than its full share of the load and will become overheated. The transformer sub-station system can only be adopted where the area of supply is tolerably compact. Where the consumers lie scattered over a large area, it is necessary to carry the high-pressure mains throughout the area, and to place a separate transformer or transformers in each building. From a financial point of view, this "house-to-house system" of alternating-current supply, generally speaking, is less satisfactory in results than the transformer sub-centre system. In the latter some of the transformers can be switched off, either by hand or by automatic apparatus, during the time when the load is light, and then no power is expended in magnetizing their cores. But with the house-to-house system the whole of the transformers continually remain connected with the high-pressure circuits; hence in the case of supply stations which have only an ordinary electric lighting load, and therefore a load-factor not above 10%, the efficiency of distribution is considerably diminished.

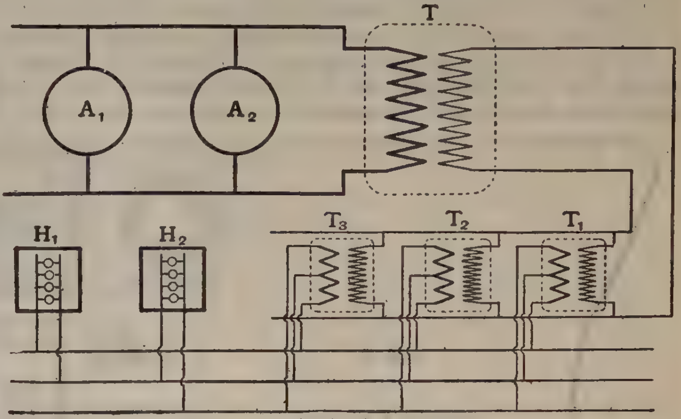


FIG. 5.

The single-phase alternating-current system is defective in that it cannot be readily combined with secondary batteries for the storage of electric energy. Hence in many places preference is now given to the *polyphase system*. In such a system a polyphase alternating current, either two- or three-phase, is transmitted from the generating station at a pressure of 5000 to 10,000 volts, or sometimes higher, and at various sub-stations is transformed down, first by static transformers into an alternating current of lower pressure, say 500 volts, and then by means of rotatory transformers into a continuous current of 500 volts or lower for use for lighting or traction.

In the case of large cities such as London, New York, Chicago, Berlin and Paris the use of small supply stations situated in the interior of the city has gradually given way to the establishment of large supply stations outside the area; in these alternating current is generated on the single or polyphase system at a high voltage and transmitted by underground cables to sub-stations in the city, at which it is transformed down for distribution for private and public electric lighting and for urban electric traction.

Owing to the high relative cost of electric power when generated in small amounts and the great advantages of generating it in proximity to coal mines and waterfalls, the supply of electric power in bulk to small towns and manufacturing districts has become a great feature in modern electrical engineering. In Great Britain, where there is little useful water power but abundance of coal, electric supply stations for supply in bulk have been built in the coal-producing districts of South Wales, the Midlands, the Clyde valley and Yorkshire. In these cases the current is a polyphase current generated at a high voltage, 5000 to 10,000 volts, and sometimes raised again in pressure to 20,000 or 40,000 volts and transmitted by overhead lines to the districts to be supplied. It is there reduced in voltage by transformers and employed as an alternating current, or is used to drive polyphase motors coupled to direct current generators to reproduce the power in continuous current form. It is then distributed for local lighting, street or railway traction, driving motors, and metallurgical or electro-chemical applications. Experience has shown that it is quite feasible to distribute in all directions for 25 miles round a high-pressure generating station, which thus supplies an area of nearly 2000 sq. m. At such stations, employing large turbine engines and alternators, electric power may be generated at a works cost of 0·375d. per kilowatt (K.W.), the coal cost being less than 0·125d. per K.W., and the selling price to large load-factor users not more than 0·5d. per K.W. The average price of supply from the local generating stations in towns and cities is from 3d. to 4d. per unit, electric energy for power and heating being charged at a lower rate than that for lighting only.

Conductors.

We have next to consider the structure and the arrangement of the conductors employed to convey the currents from their place of creation to that of utilization. The conductors themselves for the most part consist of copper having a conductivity of not less than 98% according to Matthiessen's standard. They are distinguished as (1) *External conductors*, which are a part of the public supply and belong to the corporation or company supplying the electricity; (2) *Internal conductors*, or house wiring, forming a part of the structure of the house or building supplied and usually the property of its owner.

External conductors.

The external conductors may be overhead or underground. *Overhead* conductors may consist of bare stranded copper cables carried on porcelain insulators mounted on stout iron or wooden poles. If the current is a high-pressure one, these insulators must be carefully tested, and are preferably of the pattern known as oil insulators. In and near towns it is necessary to employ insulated overhead conductors, generally india-rubber-covered stranded copper cables, suspended by leather loops from steel bearer wires which take the weight. The British Board of Trade have issued elaborate rules for the construction of overhead lines to transmit large electric currents. Where telephone and telegraph wires pass over such overhead electric lighting wires, they have to be protected from falling on the latter by means of guard wires.

By far the largest part, however, of the external electric distribution is now carried out by *underground conductors*, which are either bare or insulated. Bare copper conductors may be carried underground in culverts or chases, air being in this case the insulating material, as in the overhead system. A culvert and covered chase is constructed under the road or side-walk, and properly shaped oak crossbars are placed in it carrying glass or porcelain insulators, on which stranded copper cables, or, preferably, copper strips placed edgeways, are stretched and supported. The advantages of this method of construction are cheapness and the ease with which connexions can be made with service-lines for house supply; the disadvantages are the somewhat large space in which coal-gas leaking out of gas-pipes can accumulate, and the difficulty of keeping the culverts at all times free from rain-water. Moisture has a tendency to collect on the negative insulators, and hence to make a dead earth on the negative side of the main; while unless the culverts are well ventilated, explosions from mixtures of coal-gas and air are liable to occur. Insulated cables are insulated either with a material which is in itself waterproof, or with one which is only waterproof in so far as it is enclosed in a waterproof tube, *e.g.* of lead. Gutta-percha and india-rubber are examples of materials of the former kind. Gutta-percha, although practically everlasting when in darkness and laid under water, as in the case of submarine cables, has not been found satisfactory for use with large systems of electric distribution, although much employed for telephone and telegraph work. Insulated underground external conductors are of three types:—(*a*) *Insulated Cables drawn into Pipes.*—In this system of distribution cast-iron or stoneware pipes, or special stoneware conduits, or conduits made of a material called bitumen concrete, are first laid underground in the street. These contain a number of holes or "ways," and at intervals drawing-in boxes are placed which consist of a brick or cast-iron box having a water-tight lid, by means of which access is gained to a certain section of the conduit. Wires are used to draw in the cables, which are covered with either india-rubber or lead, the copper being insulated by means of paper, impregnated jute, or other similar material. The advantages of a drawing-in system are that spare ways can be left when the conduits are put in, so that at a future time fresh cables can be added without breaking up the roadway. (*b*) *Cables in Bitumen.*—One of the earliest systems of distribution employed by T. A. Edison consisted in fixing two segment-shaped copper conductors in a steel tube, the interspace between the conductors and the tube being filled in with a bitumen compound. A later plan is to lay down an iron trough, in which the cables are supported by wooden bearers at proper distances, and fill in the whole with natural bitumen. This system has been carried out extensively by the Callendar Cable Company. Occasionally concentric lead-covered and armoured cables are laid in this way, and then form an expensive but highly efficient form of insulated conductor. In selecting a system of distribution regard must be paid to the nature of the soil in which the cables are laid. Lead is easily attacked by soft water, although under some conditions it is apparently exceedingly durable, and an atmosphere containing coal-gas is injurious to india-rubber. (*c*) *Armoured Cables.*—In a very extensively used system of distribution armoured cables are employed. In this case the copper conductors, two, three or more in number, may be twisted together or arranged concentrically, and insulated by means of specially prepared jute or paper insulation, overlaid with a continuous tube of lead. Over the lead, but separated by a hemp covering, is put a steel armour consisting of two layers of steel strip, wound in opposite directions and kept in place by an external covering. Such a cable can be laid directly in the ground without any preparation other than the excavation of a simple trench, junction-boxes being inserted at intervals to allow of branch cables being taken off. The armoured cable used is generally of the concentric pattern (fig. 6). It consists of a stranded copper cable composed of a number of wires twisted together and overlaid with an insulating material. Outside this a tubular arrangement of copper wires and a second layer of insulation, and finally a protective covering of lead and steel wires or armour are placed. In some cases three concentric cylindrical conductors are formed by twisting wires or copper strips with insulating material between. In others two or three cables of stranded copper are embedded in insulating material and included in a lead sheath. This last type of cable is usually called a *two-* or *three-core* pattern cable (fig. 7).

The arrangement and nature of the external conductors depends on the system of electric supply in which they are used. In the case of continuous-current supply for incandescent electric lighting and motive power in small units, when the external conductors are laid down on the three-wire system, each main or branch cable in the street consists of a set of three conductors called the positive, middle and negative. Of these triple conductors some run from the supply station to various points in the area of supply without being tapped, and are called the *feeders*; others, called the *distributing mains*, are used for making connexions with the service lines of the consumers, one service line, as already explained, being connected to the middle conductor, and the other to either the positive or the negative one. Since the middle conductor serves to convey only the difference between the currents being used on the two sides of the system, it is smaller in section than the positive and negative ones. In laying out the system great judgment has to be exercised as to the selection of the points of attachment of the feeders to the distributing mains, the object being to keep a constant electric pressure or voltage between the two service-lines in all the houses independently of the varying demand for current. Legally the suppliers are under regulations to keep the supply voltage constant within 4% either way above or below the standard pressure. As a matter of fact very few stations do maintain such good regulation. Hence a considerable variation in the light given by the incandescent lamps is observed, since the candle-power of carbon glow lamps varies as the fifth or sixth power of the voltage of supply, *i.e.* a variation of only 2% in the supply pressure affects the resulting candle-power of the lamps to the extent of 10 or 12%. This variation is, however, less in the case of metallic filament lamps (see LIGHTING: *Electric*). In the service-lines are inserted the meters for measuring the electric energy supplied to the customer (see METER, ELECTRIC).

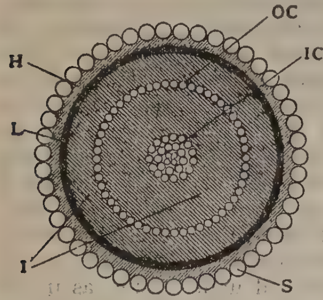


FIG. 6.—Armoured Concentric Cable (Section).

IC, Inner conductor.
OC, Outer conductor.
I, Insulation.
L, Lead sheath.
S, Steel armour.
H, Hemp covering.

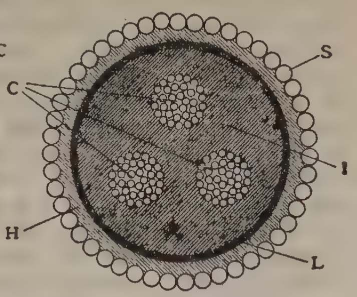


FIG. 7.—Triple Conductor Armoured Cable (Section).

C, Copper conductor.
I, Insulation.
L, Lead sheath.
H, Hemp covering.
S, Steel armour.

In the interior of houses and buildings the conductors generally consist of india-rubber-covered cables laid in wood casing. The copper wire must be tinned and then covered, first with a layer of unvulcanized pure india-rubber, then with a layer of vulcanized rubber, and lastly with one or more layers of protective cotton twist or tape. No conductor of this character employed for interior house-wiring should have a smaller insulation resistance than 300 megohms per mile when tested with a pressure of 600 volts after soaking 24 hours in water. The wood casing should, if placed in damp positions or under plaster, be well varnished with waterproof varnish. As far as possible all joints in the run of the cable should be avoided by the use of the so-called looping-in system, and after the wiring is complete, careful tests for insulation should be made. The Institution of Electrical Engineers of Great Britain have drawn up rules to be followed in interior house-wiring, and the principal Fire Insurance offices, following the lead of the Phoenix Fire Office, of London, have made regulations which, if followed, are a safeguard against bad workmanship and resulting possibility of damage by fire. Where fires having an electric origin have taken place, they have invariably been traced to some breach of these rules. Opinions differ, however, as to the value and security of this method of laying interior conductors in buildings, and two or three alternative systems have been much employed. In one of these, called the *interior conduit* system, highly insulating waterproof and practically fireproof tubes or conduits replace the wooden casing; these, being either of plain insulating material, or covered with brass or steel armour, may be placed under plaster or against walls. They are connected by bends or joint-boxes. The insulated wires being drawn into them, any short circuit or heating of the wire cannot give rise to a fire, as it can only take place in the interior of a non-inflammable tube. A third system of electric light wiring is the safety concentric system, in which concentric conductors are used. The inner one, which is well insulated, consists of a copper-stranded cable. The outer may be a galvanized iron strand, a copper tape or braid, or a brass tube, and is therefore necessarily connected with the earth. A fourth system consists in the employment of twin insulated wires twisted together and sheathed with a lead tube; the conductor thus formed can be fastened by staples against walls, or laid under plaster or floors.

Interior wiring.

The general arrangement for distributing current to the different portions of a building for the purpose of electric lighting is to run up one or more rising mains, from which branches are taken off to distributing boxes on each floor, and from these boxes to carry various branch circuits to the lamps. At the distributing boxes are collected the cut-outs and switches controlling the various circuits. When alternating currents are employed, it is usual to select as a type of conductor either twin-twisted conductor or concentric; and the employment of these types of cable, rather than two separate cables, is essential in any case where there are telephone or telegraph wires in proximity, for otherwise the alternating current would create inductive disturbances in the telephone circuit. The house-wiring also comprises the details of *switches* for controlling the lamps, *cut-outs* or fuses for preventing an excess of current passing, and fixtures or supports for lamps often of an ornamental character. For the details of these, special treatises on electric interior wiring must be consulted.

For further information the reader may be referred to the following books:—C. H. Wordingham, *Central Electrical Stations* (London, 1901); A. Gay and C. Y. Yeaman, *Central Station Electricity Supply* (London, 1906); S. P. Thompson, *Dynamo Electric Machinery* (2 vols., London, 1905); E. Tremlett Carter and T. Davies, *Motive Power and Gearing* (London, 1906); W. C. Clinton, *Electric Wiring* (2nd ed., London, 1906); W. Perren Maycock, *Electric Wiring, Fitting, Switches and Lamps* (London, 1899); D. Salomons, *Electric Light Installations* (London, 1894); Stuart A. Russell, *Electric Light Cables* (London, 1901); F. A. C. Perrine, *Conductors for Electrical Distribution* (London, 1903); E. Rosenberg, W. W. Haldane Gee and C. Kinzbrunner, *Electrical Engineering* (London, 1903); E. C. Metcalfe, *Practical Electric Wiring for Lighting Installations* (London, 1905); F. C. Raphael, *The Wireman's Pocket Book* (London, 1903). (J. A. F.)

History.

II. *Commercial Aspects.*—To enable the public supply enterprises referred to in the foregoing section to be carried out in England, statutory powers became necessary to break up the streets. In the early days a few small stations were established for the supply of electricity within "block" buildings, or by means of overhead wires within restricted areas, but the limitatons proved uneconomical and the installations were for the most part merged into larger undertakings sanctioned by parliamentary powers. In the year 1879 the British government had its attention directed for the first time to electric lighting as a possible subject for legislation, and the consideration of the then existing state of electric lighting was referred to a select committee of the House of Commons. No legislative action, however, was taken at that time. In fact the invention of the incandescent lamp was incomplete—Edison's British master-patent was only filed in Great Britain in November 1879. In 1881 and 1882 electrical exhibitions were held in Paris and at the Crystal Palace, London, where the improved electric incandescent lamp was brought before the general public. In 1882 parliament passed the first Electric Lighting Act, and considerable speculation ensued. The aggregate capital of the companies registered in 1882–1883 to carry out the public supply of electricity in the United Kingdom amounted to £15,000,000, but the onerous conditions of the act deterred investors from proceeding with the enterprise. Not one of the sixty-two provisional orders granted to companies in 1883 under the act was carried out. In 1884 the Board of Trade received only four applications for provisional orders, and during the subsequent four years only one order was granted. Capitalists declined to go on with a business which if successful could be taken away from them by local authorities at the end of twenty-one years upon terms of paying only the then value of the plant, lands and buildings, without regard to past or future profits, goodwill or other considerations. The electrical industry in Great Britain ripened at a time when public opinion was averse to the creation of further monopolies, the general belief being that railway, water and gas companies had in the past received valuable concessions on terms which did not sufficiently safeguard the interests of the community. The great development of industries by means of private enterprise in the early part of the 19th century produced a reaction which in the latter part of the century had the effect of discouraging the creation by private enterprise of undertakings partaking of the nature of monopolies; and at the same time efforts were made to strengthen local and municipal institutions by investing them with wider functions. There were no fixed principles governing the relations between the state or municipal authorities and commercial companies rendering monopoly services. The new conditions imposed on private enterprise for the purpose of safeguarding the interests of the public were very tentative, and a former permanent secretary of the Board of Trade has stated that the efforts made by parliament in these directions have sometimes proved injurious alike to the public and to investors. One of these tentative measures was the Tramways Act 1870, and twelve years later it was followed by the first Electric Lighting Act.

It was several years before parliament recognized the harm that had been done by the passing of the Electric Lighting Act 1882. A select committee of the House of Lords sat in 1886 to consider the question of reform, and as a result the Electric Lighting Act 1888 was passed. This amending act altered the period of purchase from twenty-one to forty-two years, but the terms of purchase were not materially altered in favour of investors. The act, while stipulating for the consent of local authorities to the granting of provisional orders, gives the Board of Trade power in exceptional cases to dispense with the consent, but this power has been used very sparingly. The right of vetoing an undertaking, conferred on local authorities by the Electric Lighting Acts and also by the Tramways Act 1870, has frequently been made use of to exact unduly onerous conditions from promoters, and has been the subject of complaint for years. Although, in the opinion of ministers of the Crown, the exercise of the veto by local authorities has on several occasions led to considerable scandals, no government has so far been able, owing to the very great power possessed by local authorities, to modify the law in this respect. After 1888 electric lighting went ahead in Great Britain for the first time, although other countries where legislation was different had long previously enjoyed its benefits. The developments proceeded along three well-defined lines. In London, where none of the gas undertakings was in the hands of local authorities, many of the districts were allotted to companies, and competition was permitted between two and sometimes three companies. In the provinces the cities and larger towns were held by the municipalities, while the smaller towns, in cases where consents could be obtained, were left to the enterprise of companies. Where consents could not be obtained these towns were for some time left without supply.

Some statistics showing the position of the electricity supply business respectively in 1896 and 1906 are interesting as indicating the progress made and as a means of comparison between these two periods of the state of the industry as a whole. In 1896 thirty-eight companies were at work with an aggregate capital of about £6,000,000, and thirty-three municipalities with electric lighting loans of nearly £2,000,000. The figures for 1906, ten years later, show that 187 electricity supply companies were in operation with a total investment of close on £32,000,000, and 277 municipalities with loans amounting to close on £36,000,000. The average return on the capital invested in the companies at the later period was 5·1 % per annum. In 1896 the average capital expenditure was about £100 per kilowatt of plant installed; and £50 per kilowatt was regarded as a very low record. For 1906 the average capital expenditure per kilowatt installed was about £81. The main divisions of the average expenditure are:—

	1896.	1906.
Land and buildings	22·3 %	17·8 %
Plant and machinery	36·7	36·5
Mains	32·2	35·5
Meters and instruments	4·6	5·7
Provisional orders, &c	3·2	2·8

The load connected, expressed in equivalents of eight candle-power lamps, was 2,000,000 in 1896 and 24,000,000 in 1906. About one-third of this load would be for power purposes and about two-thirds for lighting. The Board of Trade units sold were 30,200,000 in 1896 and 533,600,000 in 1906, and the average prices per unit obtained were 5·7d. and 2·7d. respectively, or a revenue of £717,250 in 1896 and over £6,000,000 in 1906. The working expenses per Board of Trade unit sold, excluding depreciation, sinking fund and interest were as follows:—

	1896.	1906.
Generation and distribution	2·81d.	·99d.
Rent, rates and taxes	·35	·14
Management	·81	·18
Sundries	·10	·02
Total	4·07d.	1·33d.

In 1896 the greatest output at one station was about 5½ million units, while in 1906 the station at Manchester had the largest output of over 40 million units.

The capacity of the plants installed in the United Kingdom in 1906 was:—

	K.W.		
Continuous current	417,000	Provinces	333,000
		London	84,000
Alternating current	132,000	Provinces	83,000
		London	49,000
Continuous current and alternating current combined	480,000	Provinces	366.000
		London	114,000
	1,029,000 k.w.		

Economics.

The economics of electric lighting were at first assumed to be similar to those of gas lighting. Experience, however, soon proved that there were important differences, one being that gas may be stored in gasometers without appreciable loss and the work of production carried on steadily without reference to fluctuations of demand. Electricity cannot be economically stored to the same extent, and for the most part it has to be used as it is generated. The demand for electric light is practically confined to the hours between sunset and midnight, and it rises sharply to a "peak" during this period. Consequently the generating station has to be equipped with plant of sufficient capacity to cope with the maximum load, although the peak does not persist for many minutes—a condition which is very uneconomical both as regards capital expenditure and working costs (see LIGHTING: *Electric*). In order to obviate the unproductiveness of the generating plant during the greater part of the day, electricity supply undertakings sought to develop the "daylight" load. This they did by supplying electricity for traction purposes, but more particularly for industrial power purposes. The difficulties in the way of this line of development, however, were that electric power could not be supplied cheaply enough to compete with steam, hydraulic, gas and other forms of power, unless it was generated on a very large scale, and this large demand could not be developed within the restricted areas for which provisional orders were granted and under the restrictive conditions of these orders in regard to situation of power-house and other matters.

The leading factors which make for economy in electricity supply are the magnitude of the output, the load factor, and the diversity factor, also the situation of the power house, the means of distribution, and the provision of suitable, trustworthy and efficient plant. These factors become more favourable the larger the area and the greater and more varied the demand to be supplied. Generally speaking, as the output increases so the cost per unit diminishes, but the ratio (called the load factor) which the output during any given period bears to the *maximum* possible output during the same period has a very important influence on costs. The ideal condition would be when a power station is working at its normal *maximum* output continuously night and day. This would give a load-factor of 100%, and represents the ultimate ideal towards which the electrical engineer strives by increasing the area of his operations and consequently also the load and the variety of the overlapping demands. It is only by combining a large number of demands which fluctuate at different times—that is by achieving a high diversity factor—that the supplier of electricity can hope to approach the ideal of continuous and steady output. Owing to the dovetailing of miscellaneous demands the actual demand on a power station at any moment is never anything like the aggregate of all the maximum demands. One large station would require a plant of 36,000 k.w. capacity if all the demands came upon the station simultaneously, but the maximum demand on the generating plant is only 15,000 kilowatts. The difference between these two figures may be taken to represent the economy effected by combining a large number of demands on one station. In short, the keynote of progress in cheap electricity is increased and diversified demand combined with concentration of load. The average load-factor of all the British electricity stations in 1907 was 14·5%—a figure which tends to improve.

Several electric power supply companies have been established in the United Kingdom to give practical effect to these principles.

Power companies.

The Electric Lighting Acts, however, do not provide for the establishment of large power companies, and special acts of parliament have had to be promoted to authorize these undertakings. In 1898 several bills were introduced in parliament for these purposes. They were referred to a joint committee of both Houses of Parliament presided over by Lord Cross. The committee concluded that, where sufficient public advantages are shown, powers should be given for the supply of electricity over areas including the districts of several local authorities and involving the use of exceptional plant; that the usual conditions of purchase of the undertakings by the local authorities did not apply to such undertakings; that the period of forty-two years was "none too long" a tenure; and that the terms of purchase should be reconsidered. With regard to the provision of the Electric Lighting Acts which requires that the consent of the local authority should be obtained as a condition precedent to the granting of a provisional order, the committee was of opinion that the local authority should be entitled to be heard by the Board of Trade, but should not have the power of veto. No general legislation took place as a result of these recommendations, but the undermentioned special acts constituting power supply companies were passed.

In 1902 the president of the Board of Trade stated that a bill had been drafted which he thought "would go far to meet all the reasonable objections that had been urged against the present powers by the local authorities." In 1904 the government introduced the Supply of Electricity Bill, which provided for the removal of some of the minor anomalies in the law relating to electricity. The bill passed through all its stages in the House of Lords but was not proceeded with in the House of Commons. In 1905 the bill was again presented to parliament but allowed to lie on the table. In the words of the president of the Board of Trade, there was "difficulty of dealing with this question so long as local authorities took so strong a view as to the power which ought to be reserved to them in connexion with this enterprise." In the official language of the council of the Institution of Electrical Engineers, the development of electrical science in the United Kingdom is in a backward condition as compared with other countries in respect of the practical application to the industrial and social requirements of the nation, notwithstanding that Englishmen have been among the first in inventive genius. The cause of such backwardness is largely due to the conditions under which the electrical industry has been carried on in the country, and especially to the restrictive character of the legislation governing the initiation and development of electrical power and traction undertakings, and to the powers of obstruction granted to local authorities. Eventually The Electric Lighting Act 1909 was passed. This Act provides:—(1) for the granting of provisional orders authorizing any local authority or company to supply electricity in bulk; (2) for the exercise of electric lighting powers by local authorities jointly under provisional order; (3) for the supply of electricity to railways, canals and tramways outside the area of supply with the consent of the Board of Trade; (4) for the compulsory acquisition of land for generating stations by provisional order; (5) for the exemption of agreements for the supply of electricity from stamp duty; and (6) for the amendment of regulations relating to July notices, revision of maximum price, certification of meters, transfer of powers of undertakers, auditors' reports, and other matters.

The first of the Power Bills was promoted in 1898, under which it was proposed to erect a large generating station in the Midlands from which an area of about two thousand square miles would be supplied. Vigorous opposition was organized against the bill by the local authorities and it did not pass. The bill was revived in 1899, but was finally crushed. In 1900 and following years several power bills were successfully promoted, and the following are the areas over which the powers of these acts extend:

In Scotland, (1) the Clyde Valley, (2) the county of Fife, (3) the districts described as "Scottish Central," comprising Linlithgow, Clackmannan, and portions of Dumbarton and Stirling, and (4) the Lothians, which include portions of Midlothian, East Lothian, Peebles and Lanark.

In England there are companies operating in (1) Northumberland, (2) Durham county, (3) Lancashire, (4) South Wales and Carmarthenshire, (5) Derbyshire and Nottinghamshire, (6) Leicestershire and Warwickshire, (7) Yorkshire, (8) Shropshire, Worcestershire and Staffordshire, (9) Somerset, (10) Kent, (11) Cornwall, (12) portions of Gloucestershire, (13) North Wales, (14) North Staffordshire, Derbyshire, Denbighshire and Flintshire, (15) West Cumberland, (16) the Cleveland district, (17) the North Metropolitan district, and (18) the West Metropolitan area. An undertaking which may be included in this category, although it is not a Power Act company, is the Midland Electric Corporation in South Staffordshire. The systems of generation and distribution are generally 10,000 or 11,000 volts three-phase alternating current.

The powers conferred by these acts were much restricted as a result of opposition offered to them. In many cases the larger towns were cut out of the areas of supply altogether, but the general rule was that the power company was prohibited from supplying direct to a power consumer in the area of an authorized distributor without the consent of the latter, subject to appeal to the Board of Trade. Even this restricted power of direct supply was not embodied in all the acts, the power of taking supply in bulk being left only to certain authorized distributors and to authorized users such as railways and tramways. Owing chiefly to the exclusion of large towns and industrial centres from their areas, these power supply companies did not all prove as successful as was expected.

In the case of one of the power companies which has been in a favourable position for the development of its business, the theoretical conclusions in regard to the economy of large production above stated have been amply demonstrated in practice. In 1901, when this company was emerging from the stage of a simple electric lighting company, the total costs per unit were 1·05d. with an output of about 2½ million units per annum. In 1905 the output rose to over 30 million units mostly for power and traction purposes, and the costs fell to 0·56d. per unit.

An interesting phase of the power supply question has arisen in London. Under the general acts it was stipulated that the power-house should be erected within the area of supply, and amalgamation of undertakings was prohibited. After less than a decade of development several of the companies in London found themselves obliged to make considerable additions to their generating plants. But their existing buildings were full to their utmost capacity, and the difficulties of generating cheaply on crowded sites had increased instead of diminished during the interval. Several of the companies had to promote special acts of parliament to obtain relief, but the idea of a general combination was not considered to be within the range of practical politics until 1905, when the Administrative County of London Electric Power Bill was introduced. Compared with other large cities, the consumption of electricity in London is small. The output of electricity in New York for all purposes is 971 million units per annum or 282 units per head of population. The output of electricity in London is only 42 units per head per annum. There are in London twelve local authorities and fourteen companies carrying on electricity supply undertakings. The capital expenditure is £3,127,000 by the local authorities and £12,530,000 by the companies, and their aggregate capacity of plant is 165,000 k.w. The total output is about 160,000,000 units per annum, the total revenue is over £2,000,000, and the gross profit before providing for interest and sinking fund charges is £1,158,000. The general average cost of production is 1·55d. per unit, and the average price per unit sold is 3·16d., but some of the undertakers have already supplied electricity to large power consumers at below 1d. per unit. By generating on a large scale for a wide variety of demands the promoters of the new scheme calculated to be able to offer electrical energy in bulk to electricity supply companies and local authorities at prices substantially below their costs of production at separate stations, and also to provide them and power users with electricity at rates which would compete with other forms of power. The authorized capital was fixed at £6,666,000, and the initial outlay on the first plant of 90,000 k.w., mains, &c., was estimated at £2,000,000. The costs of generation were estimated at 0·15d. per unit, and the total cost at 0·52d. per unit sold. The output by the year 1911 was estimated at 133,500,000 units at an average selling price of 0·7d. per unit, to be reduced to 0·55d. by 1916 when the output was estimated at 600,000,000 units. The bill underwent a searching examination before the House of Lords committee and was passed in an amended form. At the second reading in the House of Commons a strong effort was made to throw it out, but it was allowed to go to committee on the condition—contrary to the general recommendations of the parliamentary committee of 1898—that a purchase clause would be inserted; but amendments were proposed to such an extent that the bill was not reported for third reading until the eve of the prorogation of parliament. In the following year (1906) the Administrative Company's bill was again introduced in parliament, but the London County Council, which had previously adopted an attitude both hostile and negative, also brought forward a similar bill. Among other schemes, one known as the Additional Electric Power Supply Bill was to authorize the transmission of current from St Neots in Hunts. This bill was rejected by the House of Commons because the promoters declined to give precedence to the bill of the London County Council. The latter bill was referred to a hybrid committee with instructions to consider the whole question of London power supply, but it was ultimately rejected. The same result attended a second bill which was promoted by the London County Council in 1907. The question was settled by the London Electric Supply Act 1908, which constitutes the London County Council the purchasing authority (in the place of the local authorities) for the electric supply companies in London. This Act also enabled the Companies and other authorized undertakers to enter into agreements for the exchange of current and the linking-up of stations.

The general supply of electricity is governed primarily by the two acts of parliament passed in 1882 and 1888, which apply to the whole of the United Kingdom. Until 1899 the other statutory provisions relating to electricity supply were incorporated in provisional orders granted by the Board of Trade and confirmed by parliament in respect of each undertaking, but in that year an Electric Lighting Clauses Act was passed by which the clauses previously inserted in each order were standardized. Under these acts the Board of Trade made rules with respect to applications for licences and provisional orders, and regulations for the protection of the public, and of the electric lines and works of the post office, and others, and also drew up a model form for provisional orders.

Legislation and regulations.

Until the passing of the Electric Lighting Acts, wires could be placed wherever permission for doing so could be obtained, but persons breaking up streets even with the consent of the local authority were liable to indictment for nuisance. With regard to overhead wires crossing the streets, the local authorities had no greater power than any member of the public, but a road authority having power to make a contract for lighting the road could authorize others to erect poles and wires for the purpose. A property owner, however, was able to prevent wires from being taken over his property. The act of 1888 made all electric lines or other works for the supply of electricity, not entirely enclosed within buildings or premises in the same occupation, subject to regulations of the Board of Trade. The postmaster-general may also impose conditions for the protection of the post office. Urban authorities, the London County Council, and some other corporations have now powers to make by-laws for prevention of obstruction from posts and overhead wires for telegraph, telephone, lighting or signalling purposes; and electric lighting stations are now subject to the provisions of the Factory Acts.

Parliamentary powers to supply electricity can now be obtained by (A) Special Act, (B) Licence, or (C) Provisional order.

A. *Special Act.*—Prior to the report of Lord Cross's joint committee of 1898 (referred to above), only one special act was passed. The provisions of the Electric Power Acts passed subsequently are not uniform, but the following are some of the usual provisions:—

The company shall not supply electricity for lighting purposes except to authorized undertakers, provided that the energy supplied to any person for power may be used for lighting any premises on which the power is utilized. The company shall not supply energy (except to authorized undertakers) in any area which forms part of the area of supply of any authorized distributors without their consent, such consent not to be unreasonably withheld. The company is bound to supply authorized undertakers upon receiving notice and upon the applicants agreeing to pay for at least seven years an amount sufficient to yield 20% on the outlay (excluding generating plant or wires already installed). Other persons to whom the company is authorized to supply may require it upon terms to be settled, if not agreed, by the Board of Trade. Dividends are usually restricted to 8%, with a provision that the rate may be increased upon the average price charged being reduced. The maximum charges are usually limited to 3d. per unit for any quantity up to 400 hours' supply, and 2d. per unit beyond. No preference is to be shown between consumers in like circumstances. Many provisions of the general Electric Lighting Acts are excluded from these special acts, in particular the clause giving the local authority the right to purchase the undertaking compulsorily.

B. *Licence.*—The only advantages of proceeding by licence are that it can be expeditiously obtained and does not require confirmation by parliament; but some of the provisions usually inserted in provisional orders would be *ultra vires* in a licence, and the Electric Lighting Clauses Act 1899 does not extend to licences. The term of a licence does not exceed seven years, but is renewable. The consent of the local authority is necessary even to an application for a licence. None of the licences that have been granted is now in force.

C. *Provisional Order.*—An intending applicant for a provisional order must serve notice of his intention on every local authority within the proposed area of supply on or before the 1st of July prior to the session in which application is to be made to the Board of Trade. This provision has given rise to much complaint, as it gives the local authorities a long time for bargaining and enables them to supersede the company's application by themselves applying for provisional orders. The Board of Trade generally give preference to the applications of local authorities.

In 1905 the Board of Trade issued a memorandum stating that, in view of the revocation of a large number of provisional orders which had been obtained by local authorities, or in regard to which local authorities had entered into agreements with companies for carrying the orders into effect (which agreements were in many cases *ultra vires* or at least of doubtful validity), it appeared undesirable that a local authority should apply for a provisional order without having a definite intention of exercising the powers, and that in future the Board of Trade would not grant an order to a local authority unless the board were satisfied that the powers would be exercised within a specified period.

Every undertaking authorized by provisional order is subject to the provision of the general act entitling the local authority to purchase compulsorily at the end of forty-two years (or shorter period), or after the expiration of every subsequent period of ten years (unless varied by agreement between the parties with the consent of the Board of Trade), so much of the undertaking as is within the jurisdiction of the purchasing authority upon the terms of paying the then value of all lands, buildings, works, materials and plant, suitable to and used for the purposes of the undertaking; provided that the value of such lands, &c., shall be deemed to be their fair market value at the time of purchase, due regard being had to the nature and then condition and state of repair thereof, and to the circumstance that they are in such positions as to be ready for immediate working, and to the suitability of the same to the purposes of the undertaking, and where a part only of the undertaking is purchased, to any loss occasioned by severance, but without any addition in respect of compulsory purchase or of goodwill, or of any profits which may or might have been or be made from the undertaking or any similar consideration. Subject to this right of purchase by the local authority, a provisional order (but not a licence) may be for such period as the Board of Trade may think proper, but so far no limit has been imposed, and unless purchased by a local authority the powers are held in perpetuity. No monopoly is granted to undertakers, and since 1889 the policy of the Board of Trade has been to sanction two undertakings in the same metropolitan area, preferably using different systems, but to discourage competing schemes within the same area in the provinces. Undertakers must within two years lay mains in certain specified streets. After the first eighteen months they may be required to lay mains in other streets upon conditions specified in the order, and any owner or occupier of premises within 50 yds. of a distributing main may require the undertakers to give a supply to his premises; but the consumer must pay the cost of the lines laid upon his property and of so much outside as exceeds 60 ft. from the main, and he must also contract for two and in some cases for three years' supply. But undertakers are prohibited in making agreements for supply from showing any undue preference. The maximum price in London is 13s. 4d. per quarter for any quantity up to 20 units, and beyond that 8d. per unit, but 11s. 8d. per quarter up to 20 units and 7d. per unit beyond is the more general maximum. The "Bermondsey clause" requires the undertakers (local authority) so to fix their charges (not exceeding the specified maximum) that the revenue shall not be less than the expenditure.

There is no statutory obligation on municipalities to provide for depreciation of electricity supply undertakings, but after providing for all expenses, interest on loans, and sinking fund instalments, the local authority may create a reserve fund until it amounts, with interest, to one-tenth of the aggregate capital expenditure. Any deficiency when not met out of reserve is payable out of the local rates.

The principle on which the Local Government Board sanctions municipal loans for electric lighting undertakings is that the period of the loan shall not exceed the life of the works, and that future ratepayers shall not be unduly burdened. The periods of the loans vary from ten years for accumulators and arc lamps to sixty years for lands. Within the county of London the loans raised by the metropolitan borough councils for electrical purposes are sanctioned by the London County Council, and that body allows a minimum period of twenty years for repayment. Up to 1904–1905, 245 loans had been granted by the council amounting in the aggregate to £4,045,067.

Standardization.

In 1901 the Institution of Civil Engineers appointed a committee to consider the advisability of standardizing various kinds of iron and steel sections. Subsequently the original reference was enlarged, and in 1902 the Institution of Electrical Engineers was invited to co-operate. The treasury, as well as railway companies, manufacturers and others, have made grants to defray the expenses. The committee on electrical plant has ten sub-committees. In August 1904 an interim report was issued by the sub-committee on generators, motors and transformers, dealing with pressures and frequencies, rating of generators and motors, direct-current generators, alternating-current generators, and motors.

In 1903 the specification for British standard tramway rails and fish-plates was issued, and in 1904 a standard specification for tubular tramway poles was issued. A sectional committee was formed in 1904 to correspond with foreign countries with regard to the formation of an electrical international commission to study the question of an international standardization of nomenclature and ratings of electrical apparatus and machinery.

The electrical industry.

The electrical manufacturing branch, which is closely related to the electricity supply and other operating departments of the electrical industry, only dates from about 1880. Since that time it has undergone many vicissitudes. It began with the manufacture of small arc lighting equipments for railway stations, streets and public buildings. When the incandescent lamp became a commercial article, ship-lighting sets and installations for theatres and mansions constituted the major portion of the electrical work. The next step was the organization of house-to-house distribution of electricity from small "central stations," ultimately leading to the comprehensive public supply in large towns, which involved the manufacture of generating and distributing plants of considerable magnitude and complexity. With the advent of electric traction about 1896, special machinery had to be produced, and at a later stage the manufacturer had to solve problems in connexion with bulk supply in large areas and for power purposes. Each of these main departments involved changes in ancillary manufactures, such as cables, switches, transformers, meters, &c., so that the electrical manufacturing industry has been in a constant state of transition. At the beginning of the period referred to Germany and America were following the lead of England in theoretical developments, and for some time Germany obtained electrical machinery from England. Now scarcely any electrical apparatus is exported to Germany, and considerable imports are received by England from that country and America. The explanation is to be found mainly in the fact that the adverse legislation of 1882 had the effect of restricting enterprise, and while British manufacturers were compulsorily inert during periods of impeded growth of the two most important branches of the industry—electric lighting and traction—manufacturers in America and on the continent of Europe, who were in many ways encouraged by their governments, devoted their resources to the establishment of factories and electrical undertakings, and to the development of efficient selling organizations at home and abroad. When after the amendment of the adverse legislation in 1888 a demand for electrical machinery arose in England, the foreign manufacturers were fully organized for trade on a large scale, and were further aided by fiscal conditions to undersell English manufacturers, not only in neutral markets, but even in their own country. Successful manufacture on a large scale is possible only by standardizing the methods of production. English manufacturers were not able to standardize because they had not the necessary output. There had been no repetitive demand, and there was no production on a large scale. Foreign manufacturers, however, were able to standardize by reason of the large uniform demand which existed for their manufactures. Statistics are available showing the extent to which the growth of the electrical manufacturing industry in Great Britain was delayed. Nearly twenty years after the inception of the industry there were only twenty-four manufacturing companies registered in the United Kingdom, having an aggregate subscribed capital of under £7,000,000. But in 1907 there were 292 companies with over £42,000,000 subscribed capital. The cable and incandescent lamp sections show that when the British manufacturers are allowed opportunities they are not slow to take advantage of them. The cable-making branch was established under the more encouraging conditions of the telegraph industry, and the lamp industry was in the early days protected by patents. Other departments not susceptible to foreign competition on account of freightage, such as the manufacture of storage batteries and rolling stock, are also fairly prosperous. In departments where special circumstances offer a prospect of success, the technical skill, commercial enterprise and general efficiency of British manufacturers manifest themselves by positive progress and not merely by the continuance of a struggle against adverse conditions. The normal posture of the British manufacturer of electrical machinery has been described as one of desperate defence of his home trade; that of the foreign manufacturer as one of vigorous attack upon British and other open markets. In considering the position of English manufacturers as compared with their foreign rivals, some regard should be had to the patent laws. One condition of a grant of a patent in most foreign countries is that the patent shall be worked in those countries within a specified period. But a foreign inventor was until 1907 able to secure patent protection in Great Britain without any obligation to manufacture there. The effect of this was to encourage the manufacture of patented apparatus in foreign countries, and to stimulate their exportation to Great Britain in competition with British products. With regard to the electro-chemical industry the progress which has been achieved by other nations, notably Germany, is very marvellous by comparison with the advance made by England, but to state the reasons why this industry has had such extraordinary development in Germany, notwithstanding that many of the fundamental inventions were made in England, would require a statement of the marked differences in the methods by which industrial progress is promoted in the two countries.

There has been very little solidarity among those interested in the commercial development of electricity, and except for the discussion of scientific subjects there has been very little organization with the object of protecting and promoting common interests. (E. Ga.)

ELECTRIC WAVES. § 1. Clerk Maxwell proved that on his theory electro-magnetic disturbances are propagated as a wave motion through the dielectric, while Lord Kelvin in 1853 (*Phil. Mag.* [4] 5, p. 393) proved from electro-magnetic theory that the discharge of a condenser is oscillatory, a result which Feddersen (*Pogg. Ann.* 103, p. 69, &c.) verified by a beautiful series of experiments. The oscillating discharge of a condenser had been inferred by Henry as long ago as 1842 from his experiments on the magnetization produced in needles by the discharge of a condenser. From these two results it follows that electric waves must be passing through the dielectric surrounding a condenser in the act of discharging, but it was not until 1887 that the existence of such waves was demonstrated by direct experiment. This great step was made by Hertz (*Wied. Ann.* 34, pp. 155, 551, 609; *Ausbreitung der elektrischen Kraft*, Leipzig, 1892), whose experiments on this subject form one of the greatest contributions ever made to experimental physics. The difficulty which had stood in the way of the observations of these waves was the absence of any method of detecting electrical and magnetic forces, reversed some millions of times per second, and only lasting for an exceedingly short time. This was removed by Hertz, who showed that such forces would produce small sparks between pieces of metal very nearly in contact, and that these sparks were sufficiently regular to be used to detect electric waves and to investigate their properties. Other and more delicate methods have subsequently been discovered, but the results obtained by Hertz with his detector were of such signal importance, that we shall begin our account of experiments on these waves by a description of some of Hertz's more fundamental experiments.

To produce the waves Hertz used two forms of vibrator. The first is represented in fig. 1. A and B are two zinc plates about 40 cm. square; to these brass rods, C, D, each about 30 cm. long, are soldered, terminating in brass balls E and F. To get good results it is necessary that these balls should be very brightly polished, and as they get roughened by the sparks which pass between them it is necessary to repolish them at short intervals; they should be shaded from light and from sparks, or other source of ultra-violet light. In order to excite the waves, C and D are connected to the two poles of an induction coil; sparks cross the air-gap which becomes a conductor, and the charges on the plates oscillate backwards and forwards like the charges on the coatings of a Leyden jar when it is short-circuited. The object of polishing the balls and screening off light is to get a sudden and sharp discharge; if the balls are rough there will be sharp points from which the charge will gradually leak, and the discharge will not be abrupt enough to start electrical vibrations, as these have an exceedingly short period. From the open form of this vibrator we should expect the radiation to be very large and the rate of decay of the amplitude very rapid. Bjerknes (*Wied. Ann.* 44, p. 74) found that the amplitude fell to $1/e$ of the original value, after a time 4T where T was the period of the electrical vibrations. Thus after a few vibrations the amplitude becomes inappreciable. To detect the waves produced by this vibrator Hertz used a piece of copper wire bent into a circle, the ends being furnished with two balls; or a ball and a point connected by a screw, so that the distance between them admitted of very fine adjustment. The radius of the circle for use with the vibrator just described was 35 cm., and was so chosen that the free period of the detector might be the same as that of the vibrator, and the effects in it increased by resonance. It is evident, however, that with a primary system as greatly damped as the vibrator used by Hertz, we could not expect very marked resonance effects, and as a matter of fact the accurate timing of vibrator and detector in this case is not very important. With electrical vibrators which can maintain a large number of vibrations, resonance effects are very striking, as is beautifully shown by the following experiment due to Lodge (*Nature*, 41, p. 368), whose researches have greatly advanced our knowledge of electric waves. A and C (fig. 2) are two Leyden jars, whose inner and outer coatings are connected by wires, B and D, bent so as to include a considerable area. There is an air-break in the circuit connecting the inside and outside of one of the jars, A, and electrical oscillations are started in A by joining the inside and outside with the terminals of a coil or electrical machine. The circuit in the jar C is provided

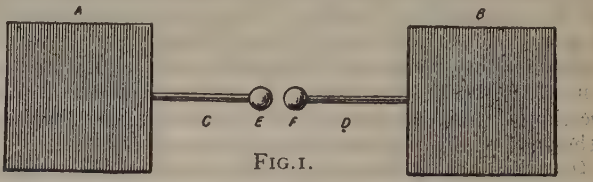


Fig. 1.

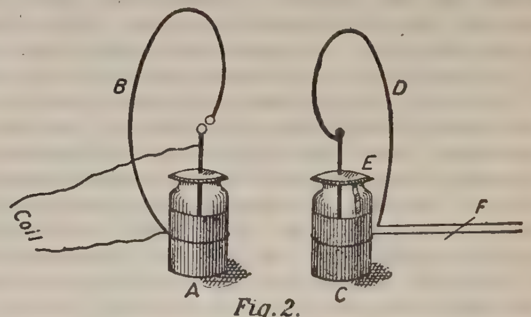


Fig. 2.

with a sliding piece, F, by means of which the self-induction of the discharging circuit, and, therefore, the time of an electrical oscillation of the jar, can be adjusted. The inside and outside of this jar are put almost, but not quite, into electrical contact by means of a piece of tin-foil, E, bent over the lip of the jar. The jars are placed face to face so that the circuits B and D are parallel to each other, and approximately at right angles to the line joining their centres. When the electrical machine is in action sparks pass across the air-break in the circuit in A, and by moving the slider F it is possible to find one position for it in which sparks pass from the inside to the outside of C across the tin-foil, while when the slider is moved a short distance on either side of this position the sparks cease.

Hertz found that when he held his detector in the neighbourhood of the vibrator minute sparks passed between the balls. These sparks were not stopped when a large plate of non-conducting substance, such as the wall of a room, was interposed between the vibrator and detector, but a large plate of very thin metal stopped them completely.

To illustrate the analogy between electric waves and waves of light Hertz found another form of apparatus more convenient. The vibrator consisted of two equal brass cylinders, 12 cm. long and 3 cm. in diameter, placed with their axes coincident, and in the focal line of a large zinc parabolic mirror about 2 m. high, with a focal length of 12·5 cm. The ends of the cylinders nearest each other, between which the sparks passed, were carefully polished. The detector, which was placed in the focal line of an equal parabolic mirror, consisted of two lengths of wire, each having a straight piece about 50 cm. long and a curved piece about 15 cm. long bent round at right angles so as to pass through the back of the mirror. The ends which came through the mirror were connected with a spark micrometer, the sparks being observed from behind the mirror. The mirrors are shown in fig. 3.

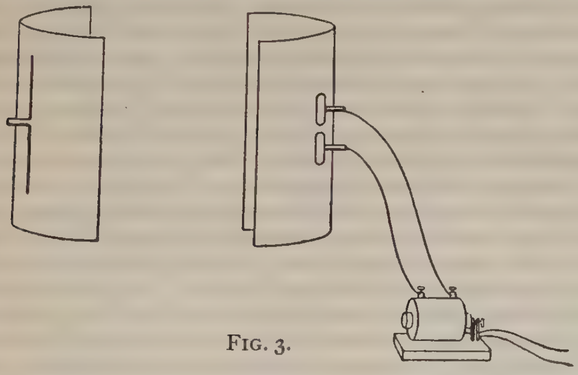


FIG. 3.

§ 2. *Reflection and Refraction.*—To show the reflection of the waves Hertz placed the mirrors side by side, so that their openings looked in the same direction, and their axes converged at a point about 3 m. from the mirrors. No sparks were then observed in the detector when the vibrator was in action. When, however, a large zinc plate about 2 m. square was placed at right angles to the line bisecting the angle between the axes of the mirrors sparks became visible, but disappeared again when the metal plate was twisted through an angle of about 15° to either side. This experiment showed that electric waves are reflected, and that, approximately at any rate, the angle of incidence is equal to the angle of reflection. To show refraction Hertz used a large prism made of hard pitch, about 1·5 m. high, with a slant side of 1·2 m. and an angle of 30°. When the waves from the vibrator passed through this the sparks in the detector were not excited when the axes of the two mirrors were parallel, but appeared when the axis of the mirror containing the detector made a certain angle with the axis of that containing the vibrator. When the system was adjusted for minimum deviation the sparks were most vigorous when the angle between the axes of the mirrors was 22°. This corresponds to an index of refraction of 1·69.

§ 3. *Analogy to a Plate of Tourmaline.*—If a screen be made by winding wire round a large rectangular framework, so that the turns of the wire are parallel to one pair of sides of the frame, and if this screen be interposed between the parabolic mirrors when placed so as to face each other, there will be no sparks in the detector when the turns of the wire are parallel to the focal lines of the mirror; but if the frame is turned through a right angle so that the wires are perpendicular to the focal lines of the mirror the sparks will recommence. If the framework is substituted for the metal plate in the experiment on the reflection of electric waves, sparks will appear in the detector when the wires are parallel to the focal lines of the mirrors, and will disappear when the wires are at right angles to these lines. Thus the framework reflects but does not transmit the waves when the electric force in them is parallel to the wires, while it transmits but does not reflect waves in which the electric force is at right angles to the wires. The wire framework behaves towards the electric waves exactly as a plate of tourmaline does to waves of light. Du Bois and Rubens (*Wied. Ann.* 49, p. 593), by using a framework wound with very fine wire placed very close together, have succeeded in polarizing waves of radiant heat, whose wave length, although longer than that of ordinary light, is very small compared with that of electric waves.

§ 4. *Angle of Polarization.*—When light polarized at right angles to the plane of incidence falls on a refracting substance at an angle $\tan^{-1}\mu$, where μ is the refractive index of the substance, all the light is refracted and none reflected; whereas when light is polarized in the plane of incidence, some of the light is always reflected whatever the angle of incidence. Trouton (*Nature*, 39, p. 391) showed that similar effects take place with electric waves. From a paraffin wall 3 ft. thick, reflection always took place when the electric force in the incident wave was at right angles to the plane of incidence, whereas at a certain angle of incidence there was no reflection when the vibrator was turned, so that the electric force was in the plane of incidence. This shows that on the electromagnetic theory of light the electric force is at right angles to the plane of polarization.

§ 5. *Stationary Electrical Vibrations.*—Hertz (*Wied. Ann.* 34, p. 609) made his experiments on these in a large room about 15 m. long. The vibrator, which was of the type first described, was placed at one end of the room, its plates being parallel to the wall, at the other end a piece of sheet zinc about 4 m. by 2 m. was placed vertically against the wall. The detector—the circular ring previously described—was held so that its plane was parallel to the metal plates of the vibrator, its centre on the line at right angles to the metal plate bisecting at right angles the spark gap of the vibrator, and with the spark gap of the detector parallel to that of the vibrator. The following effects were observed when the detector was moved about. When it was close up to the zinc plate there were no sparks, but they began to pass feebly as soon as it was moved forward a little way from the plate, and increased rapidly in brightness until it was about 1·8 m. from the plate, when they attained their maximum. When its distance was still further increased they diminished in brightness, and vanished again at a distance of about 4 m. from the plate. When the distance was still further increased they reappeared, attained another maximum, and so on. They thus exhibited a remarkable periodicity similar to that which occurs when stationary vibrations are produced by the interference of direct waves with those reflected from a surface placed at right angles to the direction of propagation. Similar periodic alterations in the spark were observed by Hertz when the waves, instead of passing freely through the air and being reflected by a metal plate at the end of the room, were led along wires, as in the arrangement shown in fig. 4. L and K are metal plates placed parallel to the plates of the vibrator, long parallel wires being attached to act as guides to the waves which were reflected from the isolated end. (Hertz used only one

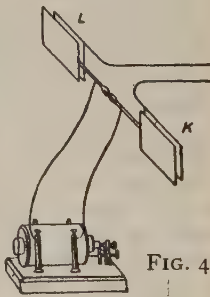


FIG. 4.

plate and one wire, but the double set of plates and wires introduced by Sarasin and De la Rive make the results more definite.) In this case the detector is best placed so that its plane is at right angles to the wires, while the air space is parallel to the plane containing the wires. The sparks instead of vanishing when the detector is at the far end of the wire are a maximum in this position, but wax and wane periodically as the detector is moved along the wires. The most obvious interpretation of these experiments was the one given by Hertz—that there was interference between the direct waves given out by the vibrator and those reflected either from the plate or from the ends of the wire, this interference giving rise to stationary waves. The places where the electric force was a maximum were the places where the sparks were brightest, and the places where the electric force was zero were the places where the sparks vanished. On this explanation the distance between two consecutive places where the sparks vanished would be half the wave length of the waves given out by the vibrator.

Some very interesting experiments made by Sarasin and De la Rive (*Comptes rendus*, 115, p. 489) showed that this explanation could not be the true one, since by using detectors of different sizes they found that the distance between two consecutive places where the sparks vanished depended mainly upon the size of the detector, and very little upon that of the vibrator. With small detectors they found the distance small, with large detectors, large; in fact it is directly proportional to the diameter of the detector. We can see that this result is a consequence of the large damping of the oscillations of the vibrator and the very small damping of those of the detector. Bjerknes showed that the time taken for the amplitude of the vibrations of the vibrator to sink to $1/e$ of their original value was only 4T, while for the detector it was 500T′, when T and T′ are respectively the times of vibration of the vibrator and the detector. The rapid decay of the oscillations of the vibrator will stifle the interference between the direct and the reflected wave, as the amplitude of the direct wave will, since it is emitted later, be much smaller than that of the reflected one, and not able to annul its effects completely; while the well-maintained vibrations of the detector will interfere and produce the effects observed by Sarasin and De la Rive. To see this let us consider the extreme case in which the oscillations of the vibrator are absolutely dead-beat. Here an impulse, starting from the vibrator on its way to the reflector, strikes against the detector and sets it in vibration; it then travels up to the plate and is reflected, the electric force in the impulse being reversed by reflection. After reflection the impulse again strikes the detector, which is still vibrating from the effects of the first impact; if the phase of this vibration is such that the reflected impulse tends to produce a current round the detector in the same direction as that which is circulating from the effects of the first impact, the sparks will be increased, but if the reflected impulse tends to produce a current in the opposite direction the sparks will be diminished. Since the electric force is reversed by reflection, the greatest increase in the sparks will take place when the impulse finds, on its return, the detector in the opposite phase to that in which it left it; that is, if the time which has elapsed between the departure and return of the impulse is equal to an odd multiple of half the time of vibration of the detector. If d is the distance of the detector from the reflector when the sparks are brightest, and V the velocity of propagation of electromagnetic disturbance, then $2d/\mathrm{V} = (2n + 1)(\mathrm{T}'/2)$; where n is an integer and T′ the time of vibration of the detector, the distance between two spark maxima will be $\mathrm{VT}'/2$, and the places where the sparks are a minimum will be midway between the maxima. Sarasin and De la Rive found that when the same detector was used the distance between two spark maxima was the same with the waves through air reflected from a metal plate and with those guided by wires and reflected from the free ends of the wire, the inference being that the velocity of waves along wires is the same as that through the air. This result, which follows from Maxwell's theory, when the wires are not too fine, had been questioned by Hertz on account of some of his experiments on wires.

§ 6. *Detectors.*—The use of a detector with a period of vibration of its own thus tends to make the experiments more complicated, and many other forms of detector have been employed by subsequent experimenters. For example, in place of the sparks in air the luminous discharge through a rarefied gas has been used by Dragoumis, Lecher (who used tubes without electrodes laid across the wires in an arrangement resembling that shown in fig. 7) and Arons. A tube containing neon at a low pressure is especially suitable for this purpose. Zehnder (*Wied. Ann.* 47, p. 777) used an exhausted tube to which an external electromotive force almost but not quite sufficient of itself to produce a discharge was applied; here the additional electromotive force due to the waves was sufficient to start the discharge. Detectors depending on the heat produced by the rapidly alternating currents have been used by Paalzow and Rubens, Rubens and Ritter, and I. Klemenčič. Rubens measured the heat produced by a bolometer arrangement, and Klemenčič used a thermo-electric method for the same purpose; in consequence of the great increase in the sensitiveness of galvanometers these methods are now very frequently resorted to. Boltzmann used an electroscope as a detector. The spark gap consisted of a ball and a point, the ball being connected with the electroscope and the point with a battery of 200 dry cells. When the spark passed the cells charged up the electroscope. Ritter utilized the contraction of a frog's leg as a detector, Lucas and Garrett the explosion produced by the sparks in an explosive mixture of hydrogen and oxygen; while Bjerknes and Franke used the mechanical attraction between oppositely charged conductors. If the two sides of the spark gap are connected with the two pairs of quadrants of a very delicate electrometer, the needle of which is connected with one pair of quadrants, there will be a deflection of the electrometer when the detector is struck by electric waves. A very efficient detector is that invented by E. Rutherford (*Trans. Roy. Soc.* A. 1897, 189, p. 1); it consists of a bundle of fine iron wires magnetized to saturation and placed inside a small magnetizing coil, through which the electric waves cause rapidly alternating currents to pass which demagnetize the soft iron. If the instrument is used to detect waves in air, long straight wires are attached to the ends of the demagnetizing coil to collect the energy from the field; to investigate waves in wires it is sufficient to make a loop or two in the wire and place the magnetized piece of iron inside it. The amount of demagnetization which can be observed by the change in the deflection of a magnetometer placed near the iron, measures the intensity of the electric waves, and very accurate determinations can be made with ease with this apparatus. It is also very delicate, though in this respect it does not equal the detector to be next described, the coherer; Rutherford got indications in 1895 when the vibrator was ¾ of a mile away from the detector, and where the waves had to traverse a thickly populated part of Cambridge. It can also be used to measure the coefficient of damping of the electric waves, for since the wire is initially magnetized to saturation, if the direction of the current when it first begins to flow in the magnetizing coil is such as to tend to increase the magnetization of the wire, it will produce no effect, and it will not be until the current is reversed that the wire will lose some of its magnetization. The effect then gives the measure of the intensity half a period after the commencement of the waves. If the wire is put in the coil the opposite way, *i.e.* so that the magnetic force due to the current begins at once to demagnetize the wire, the demagnetization gives a measure of the initial intensity of the waves. Comparing this result with that obtained when the wires were reversed, we get the coefficient of damping. A very convenient detector of electric waves is the one discovered almost simultaneously by Fessenden (*Electrotech. Zeits.*, 1903, 24, p. 586) and Schlömilch (*ibid.* p. 959). This consists of an electrolytic cell in which one of the electrodes is an exceedingly fine point. The electromotive force in the circuit is small, and there is large polarization in the circuit with only a small current. When the circuit is struck by electric waves there is an increase in the currents due to the depolarization of the circuit. If a galvanometer is in the circuit, the increased deflection of the instrument will indicate the presence of the waves.

§ 7. *Coherers.*—The most sensitive detector of electric waves is the "coherer," although for metrical work it is not so suitable as that just described. It depends upon the fact discovered by Branly (*Comptes rendus*, 111, p. 785; 112, p. 90) that the resistance between loose metallic contacts, such as a pile of iron turnings, diminishes when they are struck by an electric wave. One of the forms made by Lodge (*The Work of Hertz and some of his Successors*, 1894) on this principle consists simply of a glass tube containing iron turnings, in contact with which are wires led into opposite ends of the tube. The arrangement is placed in series with a galvanometer (one of the simplest kind will do) and a battery; when the iron turnings are struck by electric waves their resistance is diminished and the deflection of the galvanometer is increased. Thus the deflection of the galvanometer can be used to indicate the arrival of electric waves. The tube must be tapped between each experiment, and the deflection of the galvanometer brought back to about its original value. This detector is marvellously delicate, but not metrical, the change produced in the resistance depending upon so many things besides the intensity of the waves that the magnitude of the galvanometer deflection is to some extent a matter of chance. Instead of the iron turnings we may use two iron wires, one resting on the other; the resistance of this contact will be altered by the incidence of the waves. To get greater regularity Bose uses, instead of the iron turnings, spiral springs, which are pushed against each other by means of a screw until the most sensitive state is attained. The sensitiveness of the coherer depends on the electromotive force put in the galvanometer circuit. Very sensitive ones can be made by using springs of very fine silver wire coated electrolytically with nickel. Though the impact of electric waves generally produces a diminution of resistance with these loose contacts, yet there are exceptions to the rule. Thus Branly showed that with lead peroxide, PbO_2, there is an increase in resistance. Aschkinass proved the same to be true with copper sulphide, CuS; and Bose showed that with potassium there is an increase of resistance and great power of self-recovery of the original resistance after the waves have ceased. Several theories of this action have been proposed. Branly (*Lumière électrique*, 40, p. 511) thought that the small sparks which certainly pass between adjacent portions of metal clear away layers of oxide or some other kind of non-conducting film, and in this way improve the contact. It would seem that if this theory is true the films must be of a much more refined kind than layers of oxide or dirt, for the coherer effect has been observed with clean non-oxidizable metals. Lodge explains the effect by supposing that the heat produced by the sparks fuses adjacent portions of metal into contact and hence diminishes the resistance; it is from this view of the action that the name coherer is applied to the detector. Auerbeck thought that the effect was a mechanical one due to the electrostatic attractions between the various small pieces of metal. It is probable that some or all of these causes are at work in some cases, but the effects of potassium make us hesitate to accept any of them as the complete explanation. Blanc (*Ann. chim. phys.*, 1905, [8] 6, p. 5), as the result of a long series of experiments, came to the conclusion that coherence is due to pressure. He regarded the outer layers as different from the mass of the metal and having a much greater specific resistance. He supposed that when two pieces of metal are pressed together the molecules diffuse across the surface, modifying the surface layers and increasing their conductivity.

§ 8. *Generators of Electric Waves.*—Bose (*Phil. Mag.* 43, p. 55) designed an instrument which generates electric waves with a length of not more than a centimetre or so, and therefore allows their properties to be demonstrated with apparatus of moderate dimensions. The waves are excited by sparking between two platinum beads carried by jointed electrodes; a platinum sphere is placed between the beads, and the distance between the beads and the sphere can be adjusted by bending the electrodes. The diameter of the sphere is 8 mm., and the wave length of the shortest electrical waves generated is said to be about 6 mm. The beads are connected with the terminals of a small induction coil, which, with the battery to work it and the sparking arrangement, are enclosed in a metal box, the radiation passing out through a metal tube opposite to the spark gap. The ordinary vibrating break of the coil is not used, a single spark made by making and breaking the circuit by means of a button outside the box being employed instead. The detector is one of the spiral spring coherers previously described; it is shielded from external disturbance by being enclosed in a metal box provided with a funnel-shaped opening to admit the radiation. The wires leading from the coherers to the galvanometer are also surrounded by metal tubes to protect them from stray radiation. The radiating apparatus and the receiver are mounted on stands sliding in an optical bench. If a parallel beam of radiation is required, a cylindrical lens of ebonite or sulphur is mounted in a tube fitting on to the radiator tube and stopped by a guide when the spark is at the principal focal line of the lens. For experiments requiring angular measurements a spectrometer circle is mounted on one of the sliding stands, the receiver being carried on a radial arm and pointing to the centre of the circle. The arrangement is represented in fig. 5.

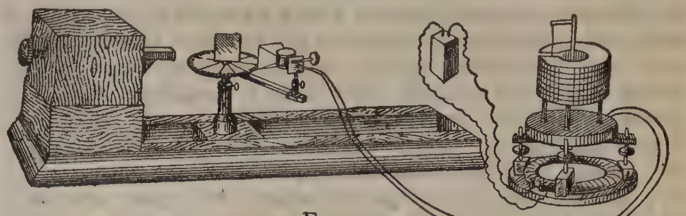


FIG. 5.

With this apparatus the laws of reflection, refraction and polarization can readily be verified, and also the double refraction of crystals, and of bodies possessing a fibrous or laminated structure such as jute or books. (The double refraction of electric waves seems first to have been observed by Righi, and other researches on this subject have been made by Garbasso and Mack.) Bose showed the rotation of the plane of polarization by means of pieces of twisted jute rope; if the pieces were arranged so that their twists were all in one direction and placed in the path of the radiation, they rotated the plane of polarization in a direction depending upon the direction of twist; if they were mixed so that there were as many twisted in one direction as the other, there was no rotation.

A series of experiments showing the complete analogy between electric and light waves is described by Righi in his book *L'Ottica delle oscillazioni elettriche.* Righi's exciter, which is especially convenient when large statical electric machines are used instead of induction coils, is shown in fig. 6. E and F are balls connected with the terminals of the machine, and AB and CD are conductors insulated from each other, the ends B, C, between which the sparks pass, being immersed in vaseline oil. The period of the vibrations given out by the system is adjusted by means of metal plates M and N attached to AB and CD. When the waves are produced by induction coils or by electrical machines the intervals between the emission of different sets of waves occupy by far the largest part of the time. Simon (*Wied. Ann.*, 1898, 64, p. 293; *Phys. Zeit.*, 1901, 2, p. 253), Duddell (*Electrician*, 1900, 46, p. 269) and Poulsen (*Electrotech. Zeits.*, 1906, 27, p. 1070) reduced these intervals very considerably by using the electric arc to excite the waves, and in this way produced electrical waves possessing great energy. In these methods the terminals between which the arc is passing are connected through coils with self-induction L to the plates of a condenser of capacity C. The arc is not steady, but is continually varying. This is especially the case when it passes through hydrogen. These variations excite vibrations with a period $2\pi\sqrt{(LC)}$ in the circuit containing the capacity of the self-induction. By this method Duddell produced waves with a frequency of 40,000. Poulsen, who cooled the terminals of the arc, produced waves with a frequency of 1,000,000, while Stechodro (*Ann. der Phys.* 27, p. 225) claims to have produced waves with three hundred times this frequency, *i.e.* having a wave length of about a metre. When the self-induction

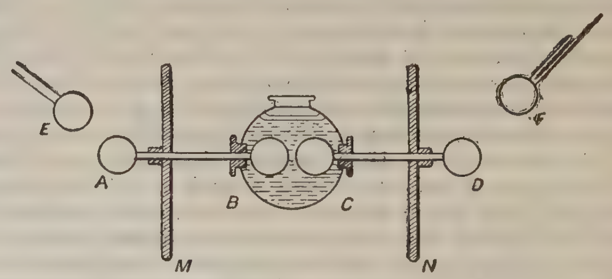


FIG. 6.

and capacity are large so that the frequency comes within the limits of the frequency of audible notes, the system gives out a musical note, and the arrangement is often referred to as the singing arc.

§ 9. *Waves in Wires.*—Many problems on electric waves along wires can readily be investigated by a method due to Lecher (*Wied. Ann.* 41, p. 850), and known as Lecher's bridge, which furnishes us with a means of dealing with waves of a definite and determinable wave-length. In this arrangement (fig. 7) two large plates A and B are, as in Hertz's exciter, connected with the terminals of an induction coil; opposite these and insulated from them are two smaller plates D, E, to which long parallel wires DFH, EGJ are attached. These wires are bridged across by a wire LM, and their farther ends H, J, may be insulated, or connected together, or with the plates of a condenser. To detect the waves in the circuit beyond the bridge, Lecher used an exhausted tube placed across the wires, and Rubens a bolometer, but Rutherford's detector is the most convenient and accurate. If this detector is placed in a fixed position at the end of the circuit, it is found that the deflections of this detector depend greatly upon the position of the bridge LM, rising rapidly to a maximum for some positions, and falling rapidly away when the bridge is displaced. As the bridge is moved from the coil end towards the detector the deflections show periodic variations, such as are represented in fig. 8 when the ordinates represent the deflections of the detector and the abscissae the distance of the bridge from the ends D, E. The maximum deflections of the detector correspond to the positions in which the two circuits DFLMGE, HLMJ (in which the vibrations are but slightly damped) are in resonance. For since the self-induction and resistance of the bridge LM is very small compared with that of the circuit beyond, it follows from the theory of circuits in parallel that only a small part of the current will in general flow round the longer circuit; it is only when the two circuits DFLMGE, HLMJ are in resonance that a considerable current will flow round the latter. Hence when we get a maximum effect in the detector we know that the waves we are dealing with are those corresponding to the free periods of the system HLMJ, so that if we know the free periods of this circuit we know the wave length of the electric waves under consideration. Thus if the ends of the wires H, J are free and have no capacity, the current along them must vanish at H and J, which must be in opposite electric condition. Hence half the wave length must be an odd submultiple of the length of the circuit HLMJ. If H and J are connected together the wave length must be a submultiple of the length of this circuit. When the capacity at the ends is appreciable the wave length of the circuit is determined by a somewhat complex expression. To facilitate the determination of the wave length in such cases, Lecher introduced a second bridge L′M′, and moved this about until the deflection of the detector was a maximum; when this occurs the wave length is one of those corresponding to the closed circuit LMM′L′, and must therefore be a submultiple of the length of the circuit. Lecher showed that if instead of using a single wire LM to form the bridge, he used two parallel wires PQ, LM, placed close together, the currents in the further circuit were hardly appreciably diminished when the main wires were cut between PL and QM. Blondlot used a modification of this apparatus better suited for the production of short waves. In his form (fig. 9) the exciter consists of two semicircular arms connected with the terminals of an induction coil, and the long wires, instead of being connected with the small plates, form a circuit round the exciter.

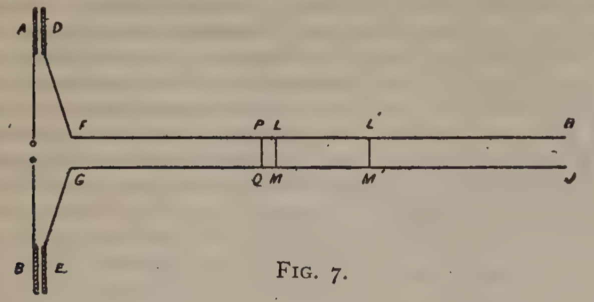


Fig. 7.

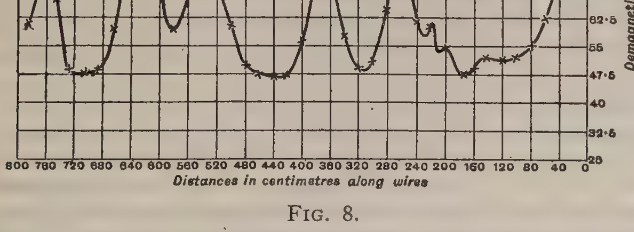


Fig. 8.

As an example of the use of Lecher's arrangement, we may quote Drude's application of the method to find the specific induction capacity of dielectrics under electric oscillations of varying frequency. In this application the ends of the wire are connected to the plates of a condenser, the space between whose plates can be filled with the liquid whose specific inductive capacity is required, and the bridge is moved until the detector at the end of the circuit gives the maximum deflection. Then if λ is the wave length of the waves, λ is the wave length of one of the free vibrations of the system HLMJ; hence if C is the capacity of the condenser at the end in electrostatic measure we have

$$\frac{\cot\frac{2\pi l}{\lambda}}{\frac{2\pi l}{\lambda}}=\frac{C}{C'l}$$

where l is the distance of the condenser from the bridge and C′ is the capacity of unit length of the wire. In the condenser part of the lines of force will pass through air and part through the dielectric; hence C will be of the form C_0+KC_1 where K is the specific inductive capacity of the dielectric. Hence if l is the distance of maximum deflection when the dielectric is replaced by air, l' when filled with a dielectric whose specific inductive capacity is known to be K′, and l'' the distance when filled with the dielectric whose specific inductive capacity is required, we easily see that—

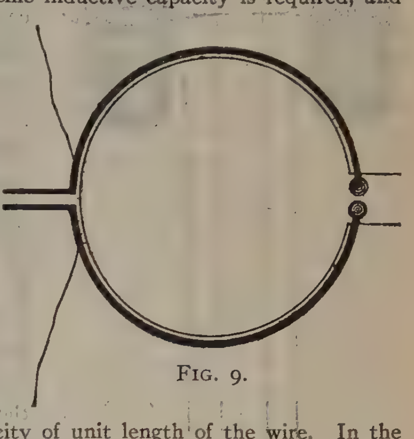


Fig. 9.

$$\frac{\cot\frac{2\pi l}{\lambda}-\cot\frac{2\pi l'}{\lambda}}{\cot\frac{2\pi l}{\lambda}-\cot\frac{2\pi l''}{\lambda}}=\frac{1-K'}{1-K}$$

an equation by means of which K can be determined. It was in this way that Drude investigated the specific inductive capacity with varying frequency, and found a falling off in the specific inductive capacity with increase of frequency when the dielectrics contained the radicle OH. In another method used by him the wires were led through long tanks filled with the liquid whose specific inductive capacity was required; the velocity of propagation of the electric waves along the wires in the tank being the same as the velocity of propagation of an electromagnetic disturbance through the liquid filling the tank, if we find the wave length of the waves along the wires in the tank, due to a vibration of a given frequency, and compare this with the wave lengths corresponding to the same frequency when the wires are surrounded by air, we obtain the velocity of propagation of electromagnetic disturbance through the fluid, and hence the specific inductive capacity of the fluid.

§ 10. *Velocity of Propagation of Electromagnetic Effects through Air.*—The experiments of Sarasin and De la Rive already described (see § 5) have shown that, as theory requires, the velocity of propagation of electric effects through air is the same as along wires. The same result had been arrived at by J. J. Thomson, although from the method he used greater differences between the velocities might have escaped detection than was possible by Sarasin and De la Rive's method. The velocity of waves along wires has been directly determined by Blondlot by two different methods. In the first the detector consisted of two parallel plates about 6 cm. in diameter placed a fraction of a millimetre apart, and forming a condenser whose capacity C was determined in electromagnetic measure by Maxwell's method. The plates were connected by a rectangular circuit whose self-induction L was calculated from the dimensions of the rectangle and the size of the wire. The time of vibration T is equal to $2\pi\sqrt{(LC)}$. (The wave length corresponding to this time is long compared with the length of the circuit, so that the use of this formula is legitimate.) This detector is placed between two parallel wires, and the waves produced by the exciter are reflected from a movable bridge. When this bridge is placed just beyond the detector vigorous sparks are observed, but as the bridge is pushed away a place is reached where the sparks disappear; this place is distance $2/\lambda$ from the detector, when λ is the wave length of the vibration given out by the detector. The sparks again disappear when the distance of the bridge from the detector is $3\lambda/4$. Thus by measuring the distance between two consecutive positions of the bridge at which the sparks disappear λ can be determined, and v, the velocity of propagation, is equal to λ/T. As the means of a number of experiments Blondlot found v to be $3{\cdot}02\times10^{10}$ cm./sec., which, within the errors of experiment, is equal to 3×10^{10} cm./sec., the velocity of light. A second method used by Blondlot, and one which does not involve the calculation of the period, is as follows:—A and A′ (fig. 10) are two equal Leyden jars coated inside and outside with tin-foil. The outer coatings form two separate rings a, a_1; a', a'_1, and the inner coatings are connected with the poles of the induction coil by means of the metal pieces b, b'. The sharply pointed conductors p and p', the points of which are about ½ mm. apart, are connected with the rings of the tin-foil a and a', and two long copper wires pca_1, $p'c'a'_1$, 1029 cm. long, connect these points with the other rings a_1, a_1'. The rings aa', a_1a_1', are connected by wet strings so as to charge up the jars. When a spark passes between b and b', a spark at once passes between pp', and this is followed by another spark when the waves travelling by the paths $a_1\,cp$, $a'_1c'p'$ reach p and p'. The time between the passage of these sparks, which is the time taken by the waves to travel 1029 cm., was observed by means of a rotating mirror, and the velocity measured in 15 experiments varied between $2{\cdot}92\times10^{10}$ and $3{\cdot}03\times10^{10}$ cm./sec., thus agreeing well with that deduced by the preceding method. Other determinations of the velocity of electromagnetic propagation have been made by Lodge and Glazebrook, and by Saunders.

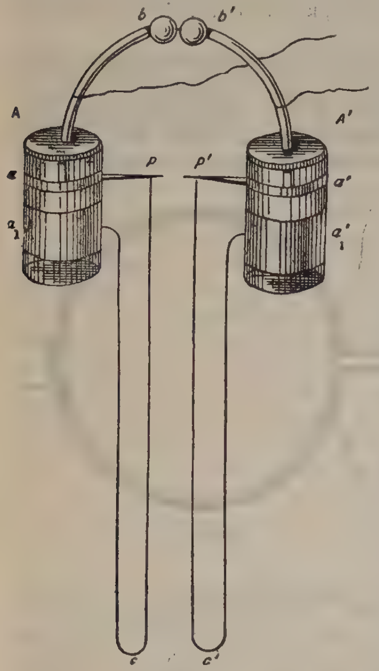


FIG. 10.

On Maxwell's electromagnetic theory the velocity of propagation of electromagnetic disturbances should equal the velocity of light, and also the ratio of the electromagnetic unit of electricity to the electrostatic unit. A large number of determinations of this ratio have been made:—

Observer.	Date.	Ratio $10^{10}\times$.
Klemenčič	1884	3·019 cm./sec.
Himstedt	1888	3·009 cm./sec.
Rowland	1889	2·9815 cm./sec.
Rosa	1889	2·9993 cm./sec.
J. J. Thomson and Searle	1890	2·9955 cm./sec.
Webster	1891	2·987 cm./sec.
Pellat	1891	3·009 cm./sec.
Abraham	1892	2·992 cm./sec.
Hurmuzescu	1895	3·002 cm./sec.
Rosa	1908	2·9963 cm./sec.

The mean of these determinations is $3{\cdot}001\times10^{10}$ cm./sec., while the mean of the last five determinations of the velocity of light in air is given by Himstedt as $3{\cdot}002\times10^{10}$ cm./sec. From these experiments we conclude that the velocity of propagation of an electromagnetic disturbance is equal to the velocity of light, and to the velocity required by Maxwell's theory.

In experimenting with electromagnetic waves it is in general more difficult to measure the period of the oscillations than their wave length. Rutherford used a method by which the period of the vibration can easily be determined; it is based upon the theory of the distribution of alternating currents in two circuits ACB, ADB in parallel. If A and B are respectively the maximum currents in the circuits ACB, ADB, then

$$\frac{A}{B}=\sqrt{\frac{S^2+(N-M)^2p^2}{R^2+(L-M)^2p^2}}$$

when R and S are the resistances, L and N the coefficients of self-induction of the circuits ACB, ADB respectively, M the coefficient of mutual induction between the circuits, and p the frequency of the currents. Rutherford detectors were placed in the two circuits, and the circuits adjusted until they showed that A = B; when this is the case

$$p^2=\frac{R^2-S^2}{N^2-L^2-2M(N-L)}.$$

If we make one of the circuits, ADB, consist of a short length of a high liquid resistance, so that S is large and N small, and the other circuit ACB of a low metallic resistance bent to have considerable self-induction, the preceding equation becomes approximately $p=S/L$, so that when S and L are known p is readily determined. (J. J. T.)

ELECTROCHEMISTRY. The present article deals with processes that involve the electrolysis of aqueous solutions, whilst those in which electricity is used in the manufacture of chemical products at furnace temperatures are treated under ELECTROMETALLURGY, although, strictly speaking, in some cases (*e.g.* calcium carbide and phosphorus manufacture) they are not truly metallurgical in character. For the theory and elemental laws of electro-deposition see ELECTROLYSIS; and for the construction and use of electric generators see DYNAMO and BATTERY: *Electric*. The importance of the subject may be gauged by the fact that all the aluminium, magnesium, sodium, potassium, calcium carbide, carborundum and artificial graphite, now placed on the market, is made by electrical processes, and that the use of such processes for the refining of copper and silver, and in the manufacture of phosphorus, potassium chlorate and bleach, already pressing very heavily on the older non-electrical systems, is every year extending. The convenience also with which the energy of waterfalls can be converted into electric energy has led to the introduction of chemical industries into countries and districts where, owing to the absence of coal, they were previously unknown. Norway and Switzerland have become important producers of chemicals, and pastoral districts such as those in which Niagara or Foyers are situated manufacturing centres. In this way the development of the electrochemical industry is in a marked degree altering the distribution of trade throughout the world.

Electrolytic Refining of Metals.—The principle usually followed in the electrolytic refining of metals is to cast the impure metal into plates, which are exposed as anodes in a suitable solvent, commonly a salt of the metal under treatment. On passing a current of electricity, of which the volume and pressure are adjusted to the conditions of the electrolyte and electrodes, the anode slowly dissolves, leaving the insoluble impurities in the form of a sponge, if the proportion be considerable, but otherwise as a mud or slime which becomes detached from the anode surface and must be prevented from coming into contact with the cathode. The metal to be refined passing into solution is concurrently deposited at the cathode. Soluble impurities which are more electro-negative than the metal under treatment must, if present, be removed by a preliminary process, and the voltage and other conditions must be so selected that none of the more electro-positive metals are co-deposited with the metal to be refined. From these and other considerations it is obvious that (1) the electrolyte must be such as will freely dissolve the metal to be refined; (2) the electrolyte must be able to dissolve the major portion of the anode, otherwise the mass of insoluble matter on the outer layer will prevent access of electrolyte to the core, which will thus escape refining; (3) the electrolyte should, if possible, be incapable of dissolving metals more electro-negative than that to be refined; (4) the proportion of soluble electro-positive impurities must not be excessive, or these substances will accumulate too rapidly in the solution and necessitate its frequent purification; (5) the current density must be so adjusted to the strength of the solution and to other conditions that no relatively electro-positive metal is deposited, and that the cathode deposit is physically suitable for subsequent treatment; (6) the current density should be as high as is consistent with the production of a pure and sound deposit, without undue expense of voltage, so that the operation may be rapid and the "turnover" large; (7) the electrolyte should be as good a conductor of electricity as possible, and should not, ordinarily, be altered chemically by exposure to air; and (8) the use of porous partitions should be avoided, as they increase the resistance and usually require frequent renewal. For details of the practical methods see GOLD; SILVER; COPPER and headings for other metals.

Electrolytic Manufacture of Chemical Products.—When an aqueous solution of the salt of an alkali metal is electrolysed, the metal reacts with the water, as is well known, forming caustic alkali, which dissolves in the solution, and hydrogen, which comes off as a gas. So early as 1851 a patent was taken out by Cooke for the production of caustic alkali without the use of a separate current, by immersing iron and copper plates on opposite sides of a porous (biscuit-ware) partition in a suitable cell, containing a solution of the salt to be electrolysed, at 21°-65° C. (70°-150° F.). The solution of the iron anode was intended to afford the necessary energy. In the same year another patent was granted to C. Watt for a similar process, involving the employment of an externally generated current. When an alkaline chloride, say sodium chloride, is electrolysed with one electrode immersed in a porous cell, while caustic soda is formed at the cathode, chlorine is deposited at the anode. If the latter be insoluble, the gas diffuses into the solution and, when this becomes saturated, escapes into the air. If, however, no porous division be used to prevent the intermingling by diffusion of the anode and cathode solutions, a complicated set of subsidiary reactions takes place. The chlorine reacts with the caustic soda, forming sodium hypochlorite, and this in turn, with an excess of chlorine and at higher temperatures, becomes for the most part converted into chlorate, whilst any simultaneous electrolysis of a hydroxide or water and a chloride (so that hydroxyl and chlorine are simultaneously liberated at the anode) also produces oxygen-chlorine compounds direct. At the same time, the diffusion of these compounds into contact with the cathode leads to a partial reduction to chloride, by the removal of combined oxygen by the instrumentality of the hydrogen there evolved. In proportion as the original chloride is thus reproduced, the efficiency of the process is of course diminished. It is obvious that, with suitable methods and apparatus, the electrolysis of alkaline chlorides may be made to yield chlorine, hypochlorites (bleaching liquors), chlorates or caustic alkali, but that great care must be exercised if any of these products is to be obtained pure and with economy. Many patents have been taken out in this branch of electrochemistry, but it is to be remarked that that granted to C. Watt traversed the whole of the ground. In his process a current was passed through a tank divided into two or three cells by porous partitions, hoods and tubes were arranged to carry off chlorine and hydrogen respectively, and the whole was heated to 120° F. by a steam jacket when caustic alkali was being made. Hypochlorites were made, at ordinary temperatures, and chlorates at higher temperatures, in a cell without a partition in which the cathode was placed horizontally immediately above the anode, to favour the mixing of the ascending chlorine with the descending caustic solution.

The relation between the composition of the electrolyte and the various conditions of current-density, temperature and the like has been studied by F. Oettel (*Zeitschrift f. Elektrochem.*, 1894, vol. i. pp. 354 and 474) in connexion with the production of hypochlorites and chlorates in tanks without diaphragms, by C. Häussermann and W. Naschold (*Chemiker Zeitung*, 1894, vol. xviii. p. 857) for their production in cells with porous diaphragms, and by F. Haber and S. Grinberg (*Zeitschrift f. anorgan. Chem.*, 1898, vol. xvi. pp. 198, 329, 438) in connexion with the electrolysis of hydrochloric acid. Oettel, using a 20% solution of potassium chloride, obtained the best yield of hypochlorite with a high current-density, but as soon as 1½% of bleaching chlorine (as hypochlorite) was present, the formation of chlorate commenced. The yield was at best very low as compared with that theoretically possible. The best yield of chlorate was obtained when from 1 to 4% of caustic potash was present. With high current-density, heating the solution tended to increase the proportion of chlorate to hypochlorite, but as the proportion of water decomposed is then higher, the amount of chlorine produced must be less and the total chlorine efficiency lower. He also traced a connexion between alkalinity, temperature and current-density, and showed that these conditions should be mutually adjusted. With a current-density of 130 to 140 amperes per sq. ft., at 3 volts, passing between platinum electrodes, he attained to a current-efficiency of 52%, and each (British) electrical horse-power hour was equivalent to a production of 1378·5 grains of potassium chlorate. In other words, each pound of chlorate would require an expenditure of nearly 5·1 e.h.p. hours. One of the earliest of the more modern processes was that of E. Hermite, which consisted in the production of bleach-liquors by the electrolysis (according to the 1st edition of the 1884 patent) of magnesium or calcium chloride between platinum anodes carried in wooden frames, and zinc cathodes. The solution, containing hypochlorites and chlorates, was then applied to the bleaching of linen, paper-pulp or the like, the solution being used over and over again. Many modifications have been patented by Hermite, that of 1895 specifying the use of platinum gauze anodes, held in ebonite or other frames. Rotating zinc cathodes were used, with scrapers to prevent the accumulation of a layer of insoluble magnesium compounds, which would otherwise increase the electrical resistance beyond reasonable limits. The same inventor has patented the application of electrolysed chlorides to the purification of starch by the oxidation of less stable organic bodies, to the bleaching of oils, and to the purification of coal gas, spirit and other substances. His system for the disinfection of sewage and similar matter by the electrolysis of chlorides, or of sea-water, has been tried, but for the most part abandoned on the score of expense. Reference may be made to papers written in the early days of the process by C. F. Cross and E. J. Bevan (*Journ. Soc. Chem. Industry*, 1887, vol. vi. p. 170, and 1888, vol. vii. p. 292), and to later papers by P. Schoop (*Zeitschrift f. Elektrochem.*, 1895, vol. ii. pp. 68, 88, 107, 209, 289).

E. Kellner, who in 1886 patented the use of cathode (caustic soda) and anode (chlorine) liquors in the manufacture of cellulose from wood-fibre, and has since evolved many similar processes, has produced an apparatus that has been largely used. It consists of a stoneware tank with a thin sheet of platinum-iridium alloy at either end forming the primary electrodes, and between them a number of glass plates reaching nearly to the bottom, each having a platinum gauze sheet on either side; the two sheets belonging to each plate are in metallic connexion, but insulated from all the others, and form intermediary or bi-polar electrodes. A 10–12% solution of sodium chloride is caused to flow upwards through the apparatus and to overflow into troughs, by which it is conveyed (if necessary through a cooling apparatus) back to the circulating pump. Such a plant has been reported as giving 0·229 gallon of a liquor containing 1% of available chlorine per kilowatt hour, or 0·171 gallon per e.h.p. hour. Kellner has also patented a "bleaching-block," as he terms it, consisting of a frame carrying parallel plates similar in principle to those last described. The block is immersed in the solution to be bleached, and may be lifted in or out as required. O. Knöfler and Gebauer have also a system of bi-polar electrodes, mounted in a frame in appearance resembling a filter-press.

Other Electrochemical Processes.—It is obvious that electrolytic iodine and bromine, and oxygen compounds of these elements, may be produced by methods similar to those applied to chlorides (see Alkali Manufacture and Chlorates), and Kellner and others have patented processes with this end in view. *Hydrogen* and *oxygen* may also be produced electrolytically as gases, and their respective reducing and oxidizing powers at the moment of deposition on the electrode are frequently used in the laboratory, and to some extent industrially, chiefly in the field of organic chemistry. Similarly, the formation of organic halogen products may be effected by electrolytic chlorine, as, for example, in the production of *chloral* by the gradual introduction of alcohol into an anode cell in which the electrolyte is a strong solution of potassium chloride. Again, anode reactions, such as are observed in the electrolysis of the fatty acids, may be utilized, as, for example, when the radical CH_3CO_2—deposited at the anode in the electrolysis of acetic acid—is dissociated, two of the groups react to give one molecule of *ethane*, C_2H_6, and two of carbon dioxide. This, which has long been recognized as a class-reaction, is obviously capable of endless variation. Many electrolytic methods have been proposed for the purification of *sugar*; in some of them soluble anodes are used for a few minutes in weak alkaline solutions, so that the caustic alkali from the cathode reaction may precipitate chemically the hydroxide of the anode metal dissolved in the liquid, the precipitate carrying with it mechanically some of the impurities present, and thus clarifying the solution. In others the current is applied for a longer time to the original sugar-solution with insoluble (*e.g.* carbon) anodes. F. Peters has found that with these methods the best results are obtained when ozone is employed in addition to electrolytic oxygen. Use has been made of electrolysis in *tanning* operations, the current being passed through the tan-liquors containing the hides. The current, by endosmosis, favours the passage of the solution into the hide-substance, and at the same time appears to assist the chemical combinations there occurring; hence a great reduction in the time required for the completion of the process. Many patents have been taken out in this direction, one of the best known being that of Groth, experimented upon by S. Rideal and A. P. Trotter (*Journ. Soc. Chem. Indust.*, 1891, vol. x. p. 425), who employed copper anodes, 4 sq. ft. in area, with current-densities of 0·375 to 1 (ranging in some cases to 7·5) ampere per sq. ft., the best results being obtained with the smaller current-densities. Electrochemical processes are often indirectly used, as for example in the Villon process (*Elec. Rev.*, New York, 1899, vol. xxxv. p. 375) applied in Russia to the manufacture of alcohol, by a series of chemical reactions starting from the production of acetylene by the action of water upon calcium carbide. The production of *ozone* in small quantities during electrolysis, and by the so-called silent discharge, has long been known, and the Siemens induction tube has been developed for use industrially. The Siemens and Halske ozonizer, in form somewhat resembling the old laboratory instrument, is largely used in Germany; working with an alternating current transformed up to 6500 volts, it has been found to give 280 grains or more of ozone per e. h. p. hour. E. Andreoli (whose first British ozone patent was No. 17,426 of 1891) uses flat aluminium plates and points, and working with an alternating current of 3000 volts is said to have obtained 1440 grains per e.h.p. hour. Yarnold's process, using corrugated glass plates coated on one side with gold or other metal leaf, is stated to have yielded as much as 2700 grains per e.h.p. hour. The ozone so prepared has numerous uses, as, for example, in bleaching oils, waxes, fabrics, &c., sterilizing drinking-water, maturing wines, cleansing foul beer-casks, oxidizing oil, and in the manufacture of vanillin.

For further information the following books, among others, may be consulted:—Haber, *Grundriss der technischen Elektrochemie* (München, 1898); Borchers and M'Millan, *Electric Smelting and Refining* (London, 1904); E. D. Peters, *Principles of Copper Smelting* (New York, 1907); F. Peters, *Angewandte Elektrochemie*, vols. ii. and iii. (Leipzig, 1900); Gore, *The Art of Electrolytic Separation of Metals* (London, 1890); Blount, *Practical Electro-Chemistry* (London, 1906); G. Langbein, *Vollständiges Handbuch der galvanischen Metall-Niederschläge* (Leipzig, 1903), Eng. trans. by W. T. Brannt (1909); A. Watt, *Electro-Plating and Electro-Refining of Metals* (London, 1902); W. H. Wahl, *Practical Guide to the Gold and Silver Electroplater, &c.* (Philadelphia, 1883); Wilson, *Stereotyping and Electrotyping* (London); Lunge, *Sulphuric Acid and Alkali*, vol. iii. (London, 1909). Also papers in various technical periodicals. The industrial aspect is treated in a Gartside Report, *Some Electro-Chemical Centres* (Manchester, 1908), by J. N. Pring. (W. G. M.)

ELECTROCUTION (an anomalous derivative from "electro-execution"; syn. "electrothanasia"), the popular name, invented in America, for the infliction of the death penalty on criminals (see Capital Punishment) by passing through the body of the condemned a sufficient current of electricity to cause death. The method was first adopted by the state of New York, a law making this method obligatory having been passed and approved by the governor on the 4th of June 1888. The law provides that there shall be present, in addition to the warden, two physicians, twelve reputable citizens of full age, seven deputy sheriffs, and such ministers, priests or clergymen, not exceeding two, as the criminal may request. A post-mortem examination of the body of the convict is required, and the body, unless claimed by relatives, is interred in the prison cemetery with a sufficient quantity of quicklime to consume it. The law became effective in New York on the 1st of January 1889. The first criminal to be executed by electricity was William Kemmler, on the 6th of August 1890, at Auburn prison. The validity of the New York law had previously been attacked in regard to this case (*Re Kemmler*, 1889; 136 U.S. 436), as providing "a cruel and unusual punishment" and therefore being contrary to the Constitution; but it was sustained in the state courts and finally in the Federal courts. By 1906 about one hundred and fifteen murderers had been successfully executed by electricity in New York state in Sing Sing, Auburn and Dannemora prisons. The method has also been adopted by the states of Ohio (1896), Massachusetts (1898), New Jersey (1906), Virginia (1908) and North Carolina (1910).

The apparatus consists of a stationary engine, an alternating dynamo capable of generating a current at a pressure of 2000 volts, a "death-chair" with adjustable head-rest, binding straps and adjustable electrodes devised by E. F. Davis, the state electrician of New York. The voltmeter, ammeter and switch-board controlling the current are located in the execution-room; the dynamo-room is communicated with by electric signals. Before each execution the entire apparatus is thoroughly tested. When everything is in readiness the criminal is brought in and seats himself in the death-chair. His head, chest, arms and legs are secured by broad straps; one electrode thoroughly moistened with salt-solution is affixed to the head, and another to the calf of one leg, both electrodes being moulded so as to secure good contact. The application of the current is usually as follows: the contact is made with a high voltage (1700-1800 volts) for 5 to 7 seconds, reduced to 200 volts until a half-minute has elapsed; raised to high voltage for 3 to 5 seconds, again reduced to low voltage for 3 to 5 seconds, again reduced to a low voltage until one minute has elapsed, when it is again raised to the high voltage for a few seconds and the contact broken. The ammeter usually shows that from 7 to 10 amperes pass through the criminal's body. A second or even a third brief contact is sometimes made, partly as a precautionary measure, but rather the more completely to abolish reflexes in the dead body. Calculations have shown that by this method of execution from 7 to 10 h. p. of energy are liberated in the criminal's body. The time consumed by the strapping-in process is usually about 45 seconds, and the first contact is made about 70 seconds after the criminal has entered the death-chamber.

When properly performed the effect is painless and instantaneous death. The mechanism of life, circulation and respiration cease with the first contact. Consciousness is blotted out instantly, and the prolonged application of the current ensures permanent derangement of the vital functions beyond recovery. Occasionally the drying of the sponges through undue generation of heat causes desquamation or superficial blistering of the skin at the site of the electrodes. Post-mortem discoloration, or post-mortem lividity, often appears during the first contact. The pupils of the eyes dilate instantly and remain dilated after death.

The post-mortem examination of "electrocuted" criminals reveals a number of interesting phenomena. The temperature of the body rises promptly after death to a very high point. At the site of the leg electrode a temperature of over 128° F. was registered within fifteen minutes in many cases. After the removal of the brain the temperature recorded in the spinal canal was often over 120° F. The development of this high temperature is to be regarded as resulting from the active metabolism of tissues not (somatically) dead within a body where all vital mechanisms have been abolished, there being no circulation to carry off the generated heat. The heart, at first flaccid when exposed soon after death, gradually contracts and assumes a tetanized condition; it empties itself of all blood and takes the form of a heart in systole. The lungs are usually devoid of blood and weigh only 7 or 8 ounces (avoird.) each. The blood is profoundly altered biochemically; it is of a very dark colour and it rarely coagulates. (E. A. S.*)

ELECTROKINETICS, that part of electrical science which is concerned with the properties of electric currents.

Classification of Electric Currents.—Electric currents are classified into (*a*) conduction currents, (*b*) convection currents, (*c*) displacement or dielectric currents. In the case of conduction currents electricity flows or moves through a stationary material body called the conductor. In convection currents electricity is carried from place to place with and on moving material bodies or particles. In dielectric currents there is no continued movement of electricity, but merely a limited displacement through or in the mass of an insulator or dielectric. The path in which an electric current exists is called an electric circuit, and may consist wholly of a conducting body, or partly of a conductor and insulator or dielectric, or wholly of a dielectric. In cases in which the three classes of currents are present together the true current is the sum of each separately. In the case of conduction currents the circuit consists of a conductor immersed in a non-conductor, and may take the form of a thin wire or cylinder, a sheet, surface or solid. Electric conduction currents may take place in space of one, two or three dimensions, but for the most part the circuits we have to consider consist of thin cylindrical wires or tubes of conducting material surrounded with an insulator; hence the case which generally presents itself is that of electric flow in space of one dimension. Self-closed electric currents taking place in a sheet of conductor are called "eddy currents."

Although in ordinary language the current is said to flow in the conductor, yet according to modern views the real pathway of the energy transmitted is the surrounding dielectric, and the so-called conductor or wire merely guides the transmission of energy in a certain direction. The presence of an electric current is recognized by three qualities or powers: (1) by the production of a magnetic field, (2) in the case of conduction currents, by the production of heat in the conductor, and (3) if the conductor is an electrolyte and the current unidirectional, by the occurrence of chemical decomposition in it. An electric current may also be regarded as the result of a movement of electricity across each section of the circuit, and is then measured by the quantity conveyed per unit of time. Hence if dq is the quantity of electricity which flows across any section of the conductor in the element of time dt, the current $i=dq/dt$.

Electric currents may be also classified as constant or variable and as unidirectional or "direct," that is flowing always in the same direction, or "alternating," that is reversing their direction at regular intervals. In the last case the variation of current may follow any particular law. It is called a "periodic current" if the cycle of current values is repeated during a certain time called the periodic time, during which the current reaches a certain maximum value, first in one direction and then in the opposite, and in the intervals between has a zero value at certain instants. The frequency of the periodic current is the number of periods or cycles in one second, and alternating currents are described as low frequency or high frequency, in the latter case having some thousands of periods per second. A periodic current may be represented either by a wave diagram, or by a polar diagram.[1] In the first case we take a straight line to represent the uniform flow of time, and at small equidistant intervals set up perpendiculars above or below the time axis, representing to scale the current at that instant in one direction or the other; the extremities of these ordinates then define a wavy curve which is called the wave form of the current (fig. 1). It is obvious that this curve can only be a single valued curve. In one particular and important case the form of the current curve is a simple harmonic curve or simple sine curve. If T represents the periodic time in which the cycle of current values takes place, whilst n is the frequency or number of periods per second and p stands for $2\pi n$, and i is the value of the current at any instant t, and I its maximum value, then in this case we have $i=\text{I} \sin pt$. Such a current is called a "sine current" or simple periodic current.

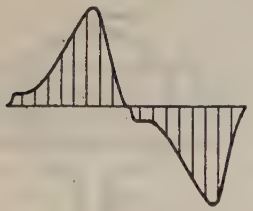


FIG. 1.

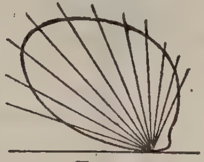


FIG. 2.

In a polar diagram (fig. 2) a number of radial lines are drawn from a point at small equiangular intervals, and on these lines are set off lengths proportional to the current value of a periodic current at corresponding intervals during one complete period represented by four right angles. The extremities of these radii delineate a polar curve. The polar form of a simple sine current is obviously a circle drawn through the origin. As a consequence of Fourier's theorem it follows that any periodic curve having any wave form can be imitated by the superposition of simple sine currents differing in maximum value and in phase.

Definitions of Unit Electric Current.—In electrokinetic investigations we are most commonly limited to the cases of unidirectional continuous and constant currents (C.C. or D.C.), or of simple periodic currents, or alternating currents of sine form (A.C.). A continuous electric current is measured either by the magnetic effect it produces at some point outside its circuit, or by the amount of electrochemical decomposition it can perform in a given time on a selected standard electrolyte. Limiting our consideration to the case of linear currents or currents flowing in thin cylindrical wires, a definition may be given in the first place of the unit electric current in the centimetre, gramme, second (C.G.S.) of electromagnetic measurement (see UNITS, PHYSICAL). H. C. Oersted discovered in 1820 that a straight wire conveying an electric current is surrounded by a magnetic field the lines of which are self-closed lines embracing the electric circuit (see ELECTRICITY and ELECTROMAGNETISM). The unit current in the electromagnetic system of measurement is defined as the current which, flowing in a thin wire bent into the form of a circle of one centimetre in radius, creates a magnetic field having a strength of 2π units at the centre of the circle, and therefore would exert a mechanical force of 2π dynes on a unit magnetic pole placed at that point (see MAGNETISM). Since the length of the circumference of the circle of unit radius is 2π units, this is equivalent to stating that the unit current on the electromagnetic C.G.S. system is a current such that unit length acts on unit magnetic pole with a unit force at a unit of distance. Another definition, called the electrostatic unit of current, is as follows: Let any conductor be charged with electricity and discharged through a thin wire at such a rate that one electrostatic unit of quantity (see ELECTROSTATICS) flows past any section of the wire in one unit of time. The electromagnetic unit of current defined as above is 3×10^{10} times larger than the electrostatic unit.

In the selection of a practical unit of current it was considered that the electromagnetic unit was too large for most purposes, whilst the electrostatic unit was too small; hence a practical unit of current called 1 ampere was selected, intended originally to be 1/10 of the absolute electromagnetic C.G.S. unit of current as above defined. The practical unit of current, called the international ampere, is, however, legally defined at the present time as the continuous unidirectional current which when flowing through a neutral solution of silver nitrate deposits in one second on the cathode or negative pole 0·001118 of a gramme of silver. There is reason to believe that the international unit is smaller by about one part in a thousand, or perhaps by one part in 800, than the theoretical ampere defined as 1/10 part of the absolute electromagnetic unit. A periodic or alternating current is said to have a value of 1 ampere if when passed through a fine wire it produces in the same time the same heat as a unidirectional continuous current of 1 ampere as above electrochemically defined. In the case of a simple periodic alternating current having a simple sine wave form, the maximum value is equal to that of the equiheating continuous current multiplied by $\sqrt{2}$. This equiheating continuous current is called the effective or root-mean-square (R.M.S.) value of the alternating one.

Resistance.—A current flows in a circuit in virtue of an electromotive force (E.M.F.), and the numerical relation between the current and E.M.F. is determined by three qualities of the circuit called respectively, its resistance (R), inductance (L), and capacity (C). If we limit our consideration to the case of continuous unidirectional conduction currents, then the relation between current and E.M.F. is defined by Ohm's law, which states that the numerical value of the current is obtained as the quotient of the electromotive force by a certain constant of the circuit called its resistance, which is a function of the geometrical form of the circuit, of its nature, *i.e.* material, and of its temperature, but is independent of the electromotive force or current. The resistance (R) is measured in units called ohms and the electromotive force in volts (V); hence for a continuous current the value of the current in amperes (A) is obtained as the quotient of the electromotive force acting in the circuit reckoned in volts by the resistance in ohms, or A=V/R. Ohm established his law by a course of reasoning which was similar to that on which J. B. J. Fourier based his investigations on the uniform motion of heat in a conductor. As a matter of fact, however, Ohm's law merely states the direct proportionality of steady current to steady electromotive force in a circuit, and asserts that this ratio is governed by the numerical value of a quality of the conductor, called its resistance, which is independent of the current, provided that a correction is made for the change of temperature produced by the current. Our belief, however, in its universality and accuracy rests upon the close agreement between deductions made from it and observational results, and although it is not derivable from any more fundamental principle, it is yet one of the most certainly ascertained laws of electrokinetics.

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[1] See J. A. Fleming, *The Alternate Current Transformer*, vol. i. p. 519.

Ohm's law not only applies to the circuit as a whole but to any part of it, and provided the part selected does not contain a source of electromotive force it may be expressed as follows:—The difference of potential (P.D.) between any two points of a circuit including a resistance R, but not including any source of electromotive force, is proportional to the product of the resistance and the current i in the element, provided the conductor remains at the same temperature and the current is constant and unidirectional. If the current is varying we have, however, to take into account the electromotive force (E.M.F.) produced by this variation, and the product Ri is then equal to the difference between the observed P.D. and induced E.M.F.

We may otherwise define the resistance of a circuit by saying that it is that physical quality of it in virtue of which energy is dissipated as heat in the circuit when a current flows through it. The power communicated to any electric circuit when a current i is created in it by a continuous unidirectional electromotive force E is equal to Ei, and the energy dissipated as heat in that circuit by the conductor in a small interval of time dt is measured by $Ei\,dt$. Since by Ohm's law $E=Ri$, where R is the resistance of the circuit, it follows that the energy dissipated as heat per unit of time in any circuit is numerically represented by Ri^2, and therefore the resistance is measured by the heat produced per unit of current, provided the current is unvarying.

Inductance.—As soon as we turn our attention, however, to alternating or periodic currents we find ourselves compelled to take into account another quality of the circuit, called its "inductance." This may be defined as that quality in virtue of which energy is stored up in connexion with the circuit in a magnetic form. It can be experimentally shown that a current cannot be created instantaneously in a circuit by any finite electromotive force, and that when once created it cannot be annihilated instantaneously. The circuit possesses a quality analogous to the inertia of matter. If a current i is flowing in a circuit at any moment, the energy stored up in connexion with the circuit is measured by $\frac{1}{2}Li^2$, where L, the inductance of the circuit, is related to the current in the same manner as the quantity called the mass of a body is related to its velocity in the expression for the ordinary kinetic energy, viz. $\frac{1}{2}Mv^2$. The rate at which this conserved energy varies with the current is called the "electrokinetic momentum" of this circuit ($=Li$). Physically interpreted this quantity signifies the number of lines of magnetic flux due to the current itself which are self-linked with its own circuit.

Magnetic Force and Electric Currents.—In the case of every circuit conveying a current there is a certain magnetic force (see MAGNETISM) at external points which can in some instances be calculated. Laplace proved that the magnetic force due to an element of length dS of a circuit conveying a current I at a point P at a distance r from the element is expressed by $IdS \sin\theta/r^2$, where θ is the angle between the direction of the current element and that drawn between the element and the point. This force is in a direction perpendicular to the radius vector and to the plane containing it and the element of current. Hence the determination of the magnetic force due to any circuit is reduced to a summation of the effects due to all the elements of length. For instance, the magnetic force at the centre of a circular circuit of radius r carrying a steady current I is $2\pi I/r$, since all elements are at the same distance from the centre. In the same manner, if we take a point in a line at right angles to the plane of the circle through its centre and at a distance d, the magnetic force along this line is expressed by $2\pi r^2 I/(r^2+d^2)^{\frac{3}{2}}$. Another important case is that of an infinitely long straight current. By summing up the magnetic force due to each element at any point P outside the continuous straight current I, and at a distance d from it, we can show that it is equal to $2I/d$ or is inversely proportional to the distance of the point from the wire. In the above formula the current I is measured in absolute electromagnetic units. If we reckon the current in amperes A, then $I=A/10$.

It is possible to make use of this last formula, coupled with an experimental fact, to prove that the magnetic force due to an element of current varies inversely as the square of the distance. If a flat circular disk is suspended so as to be free to rotate round a straight current which passes through its centre, and two bar magnets are placed on it with their axes in line with the current, it is found that the disk has no tendency to rotate round the current. This proves that the force on each magnetic pole is inversely as its distance from the current. But it can be shown that this law of action of the whole infinitely long straight current is a mathematical consequence of the fact that each element of the current exerts a magnetic force which varies inversely as the square of the distance. If the current flows N times round the circuit instead of once, we have to insert NA/10 in place of I in all the above formulae. The quantity NA is called the "ampere-turns" on the circuit, and it is seen that the magnetic field at any point outside a circuit is proportional to the ampere-turns on it and to a function of its geometrical form and the distance of the point.

There is therefore a distribution of magnetic force in the field of every current-carrying conductor which can be delineated by lines of magnetic force and rendered visible to the eye by iron filings (see MAGNETISM). If a copper wire is passed vertically through a hole in a card on which iron filings are sprinkled, and a strong electric current is sent through the circuit, the filings arrange themselves in concentric circular lines making visible the paths of the lines of magnetic force (fig. 3). In the same manner, by passing a circular wire through a card and sending a strong current through the wire we can employ iron filings to delineate for us the form of the lines of magnetic force (fig. 4).

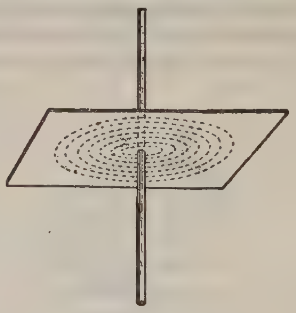
FIG. 3.

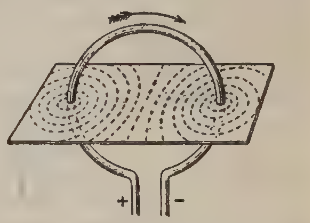

FIG. 4.

In all cases a magnetic pole of strength M, placed in the field of an electric current, is urged along the lines of force with a mechanical force equal to MH, where H is the magnetic force. If then we carry a unit magnetic pole against the direction in which it would naturally move we do *work*. The lines of magnetic force embracing a current-carrying conductor are always loops or endless lines.

The work done in carrying a unit magnetic pole once round a circuit conveying a current is called the "line integral of magnetic force" along that path. If, for instance, we carry a unit pole in a circular path of radius r once round an infinitely long straight filamentary current I, the line integral is $4\pi I$. It is easy to prove that this is a general law, and that if we have any currents flowing in a conductor the line integral of magnetic force taken once round a path linked with the current circuit is 4π times the total current flowing through the circuit. Let us apply this to the case of an endless solenoid. If a copper wire insulated or covered with cotton or silk is twisted round a thin rod so as to make a close spiral, this forms a "solenoid," and if the solenoid is bent round so that its two ends come together we have an endless solenoid. Consider such a solenoid of mean length l and N turns of wire. If it is made endless, the magnetic force H is the same everywhere along the central axis and the line integral along the axis is Hl. If the current is denoted by I, then NI is the total current, and accordingly $4\pi NI = Hl$, or $H = 4\pi NI/l$. For a thin endless solenoid the axial magnetic force is therefore 4π times the current-turns per unit of length. This holds good also for a long straight solenoid provided its length is large compared with its diameter. It can be shown that if insulated wire is wound round a sphere, the turns being all parallel to lines of latitude, the magnetic force in the interior is constant and the lines of force therefore parallel. The magnetic force at a point outside a conductor conveying a current can by various means be measured or compared with some other standard magnetic forces, and it becomes then a means of measuring the current. Instruments called galvanometers and ammeters for the most part operate on this principle.

Thermal Effects of Currents.—J. P. Joule proved that the heat produced by a constant current in a given time in a wire having a constant resistance is proportional to the square of the strength of the current. This is known as Joule's law, and it follows, as already shown, as an immediate consequence of Ohm's law and the fact that the power dissipated electrically in a conductor, when an electromotive force E is applied to its extremities, producing thereby a current I in it, is equal to EI.

If the current is alternating or periodic, the heat produced in any time T is obtained by taking the sum at equidistant intervals of time of all the values of the quantities Ri^2dt, where dt represents a small interval of time and i is the current at that instant. The quantity $T^{-1}\int_0^T i^2dt$ is called the mean-square-value of the variable current, i being the instantaneous value of the current, that is, its value at a particular instant or during a very small interval of time dt. The square root of the above quantity, or

$$\left[T^{-1}\int_0^T i^2dt\right]^{\frac{1}{2}},$$

is called the root-mean-square-value, or the effective value of the current, and is denoted by the letters R.M.S.

Currents have equal heat-producing power in conductors of identical resistance when they have the same R.M.S. values. Hence periodic or alternating currents can be measured as regards their R.M.S. value by ascertaining the continuous current which produces in the same time the same heat in the same conductor as the periodic current considered. Current measuring instruments depending on this fact, called hot-wire ammeters, are in common use, especially for measuring alternating currents. The maximum value of the periodic current can only be determined from the R.M.S. value when we know the wave form of the current. The thermal effects of electric currents in conductors are dependent upon the production of a state of equilibrium between the heat produced electrically in the wire and the causes operative in removing it. If an ordinary round wire is heated by a current it loses heat, (1) by radiation, (2) by air convection or cooling, and (3) by conduction of heat out of the ends of the wire. Generally speaking, the greater part of the heat removal is effected by radiation and convection.

If a round sectioned metallic wire of uniform diameter d and length l made of a material of resistivity ρ has a current of A amperes passed through it, the heat in watts produced in any time t seconds is represented by the value of $4A^2\rho lt/10^9\pi d^2$, where d and l must be measured in centimetres and ρ in absolute C.G.S. electromagnetic units. The factor 10^9 enters because one ohm is 10^9 absolute electromagnetic C.G.S. units (see UNITS, PHYSICAL). If the wire has an emissivity e, by which is meant that e units of heat reckoned in joules or watt-seconds are radiated per second from unit of surface, then the power removed by radiation in the time t is expressed by $\pi dlet$. Hence when thermal equilibrium is established we have $4A^2\rho lt/10^9\pi d^2 = \pi dlet$, or $A^2 = 10^9\pi^2ed^3/4\rho$. If the diameter of the wire is reckoned in mils (1 mil = ·001 in.), and if we take e to have a value 0·1, an emissivity which will generally bring the wire to about 60° C., we can put the above formula in the following forms for circular sectioned copper, iron or platinoid wires, viz.

$$A = \sqrt{d^3/500} \text{ for copper wires}$$
$$A = \sqrt{d^3/4000} \text{ for iron wires}$$
$$A = \sqrt{d^3/5000} \text{ for platinoid wires.}$$

These expressions give the ampere value of the current which will bring bare, straight or loosely coiled wires of d mils in diameter to about 60° C. when the steady state of temperature is reached.

Thus, for instance, a bare straight copper wire 50 mils in diameter (=0·05 in.) will be brought to a steady temperature of about 60° C. if a current of $\sqrt{50^3/500} = \sqrt{250} = 16$ amperes (nearly) is passed through it, whilst a current of $\sqrt{25} = 5$ amperes would bring a platinoid wire to about the same temperature.

A wire has therefore a certain safe current-carrying capacity which is determined by its specific resistance and emissivity, the latter being fixed by its form, surface and surroundings. The emissivity increases with the temperature, else no state of thermal equilibrium could be reached. It has been found experimentally that whilst for fairly thick wires from 8 to 60 mils in diameter the safe current varies approximately as the 1·5th power of the diameter, for fine wires of 1 to 3 mils it varies more nearly as the diameter.

Action of one Current on Another.—The investigations of Ampère in connexion with electric currents are of fundamental importance in electrokinetics. Starting from the discovery of Oersted, Ampère made known the correlative fact that not only is there a mechanical action between a current and a magnet, but that two conductors conveying electric currents exert mechanical forces on each other. Ampère devised ingenious methods of making one portion of a circuit movable so that he might observe effects of attraction or repulsion between this circuit and some other fixed current. He employed for this purpose an astatic circuit B, consisting of a wire bent into a double rectangle round which a current flowed first in one and then in the opposite direction (fig. 5). In this way the circuit was removed from the action of the earth's magnetic field, and yet one portion of it could be submitted to the action of any other circuit C. The astatic circuit was pivoted by suspending it in mercury cups q, p, one of which was in electrical connexion with the tubular support A, and the other with a strong insulated wire passing up it.

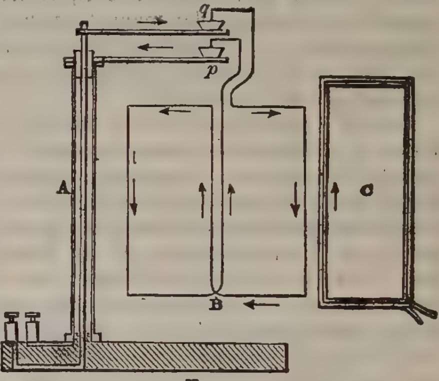

FIG. 5.

Ampère devised certain crucial experiments, and the theory deduced from them is based upon four facts and one assumption.[1] He showed (1) that wire conveying a current bent back on itself produced no action upon a proximate portion of a movable astatic circuit; (2) that if the return wire was bent zig-zag but close to the outgoing straight wire the circuit produced no action on the movable one, showing that the effect of an element of the circuit was proportional to its projected length; (3) that a closed circuit cannot cause motion in an element of another circuit free to move in the direction of its length; and (4) that the action of two circuits on one and the same movable circuit was null if one of the two fixed circuits was n times greater than the other but n times further removed from the movable circuit. From this last experiment by an ingenious line of reasoning he proved that the action of an element of current on another element of current varies inversely as a square of their distance. These experiments enabled him to construct a mathematical expression of the law of action between two elements of conductors conveying currents. They also enabled him to prove that an element of current may be resolved like a force into components in different directions, also that the force produced by any element of the circuit on an element of any other circuit was perpendicular to the line joining the elements and inversely as the square of their distance. Also he showed that this force was an attraction if the currents in the elements were in the same direction, but a repulsion if they were in opposite directions. From these experiments and deductions from them he built up a complete formula for the action of one element of a current of length dS

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[1] See Maxwell, *Electricity and Magnetism*, vol. ii. chap. ii.

of one conductor conveying a current I upon another element dS' of another circuit conveying another current I' the elements being at a distance apart equal to r.

If θ and θ' are the angles the elements make with the line joining them, and ϕ the angle they make with one another, then Ampère's expression for the mechanical force f the elements exert on one another is

$$f=2II'r^{-2}\{\cos\phi-\tfrac{3}{2}\cos\theta\cos\theta'\}dSdS'.$$

This law, together with that of Laplace already mentioned, viz. that the magnetic force due to an element of length dS of a current I at a distance r, the element making an angle θ with the radius vector o is $IdS\sin\theta/r^2$, constitute the fundamental laws of electrokinetics.

Ampère applied these with great mathematical skill to elucidate the mechanical actions of currents on each other, and experimentally confirmed the following deductions: (1) Currents in parallel circuits flowing in the same direction attract each other, but if in opposite directions repel each other. (2) Currents in wires meeting at an angle attract each other more into parallelism if both flow either to or from the angle, but repel each other more widely apart if they are in opposite directions. (3) A current in a small circular conductor exerts a magnetic force in its centre perpendicular to its plane and is in all respects equivalent to a magnetic shell or a thin circular disk of steel so magnetized that one face is a north pole and the other a south pole, the product of the area of the circuit and the current flowing in it determining the magnetic moment of the element. (4) A closely wound spiral current is equivalent as regards external magnetic force to a polar magnet, such a circuit being called a finite solenoid. (5) Two finite solenoid circuits act on each other like two polar magnets, exhibiting actions of attraction or repulsion between their ends.

Ampère's theory was wholly built up on the assumption of action at a distance between elements of conductors conveying the electric currents. Faraday's researches and the discovery of the fact that the insulating medium is the real seat of the operations necessitates a change in the point of view from which we regard the facts discovered by Ampère. Maxwell showed that in any field of magnetic force there is a tension along the lines of force and a pressure at right angles to them; in other words, lines of magnetic force are like stretched elastic threads which tend to contract.[1] If, therefore, two conductors lie parallel and have currents in them in the same direction they are impressed by a certain number of lines of magnetic force which pass round the two conductors, and it is the tendency of these to contract which draws the circuits together. If, however, the currents are in opposite directions then the lateral pressure of the similarly contracted lines of force between them pushes the conductors apart. Practical application of Ampère's discoveries was made by W. E. Weber in inventing the electrodynamometer, and later Lord Kelvin devised ampere balances for the measurement of electric currents based on the attraction between coils conveying electric currents.

Induction of Electric Currents.—Faraday[2] in 1831 made the important discovery of the induction of electric currents (see ELECTRICITY). If two conductors are placed parallel to each other, and a current in one of them, called the primary, started or stopped or changed in strength, every such alteration causes a transitory current to appear in the other circuit, called the secondary. This is due to the fact that as the primary current increases or decreases, its own embracing magnetic field alters, and lines of magnetic force are added to or subtracted from its fields. These lines do not appear instantly in their place at a distance, but are propagated out from the wire with a velocity equal to that of light; hence in their outward progress they cut through the secondary circuit, just as ripples made on the surface of water in a lake by throwing a stone on to it expand and cut through a stick held vertically in the water at a distance from the place of origin of the ripples. Faraday confirmed this view of the phenomena by proving that the mere motion of a wire transversely to the lines of magnetic force of a permanent magnet gave rise to an induced electromotive force in the wire. He embraced all the facts in the single statement that if there be any circuit which by movement in a magnetic field, or by the creation or change in magnetic fields round it, experiences a change in the number of lines of force linked with it, then an electromotive force is set up in that circuit which is proportional at any instant to the rate at which the total magnetic flux linked with it is changing. Hence if Z represents the total number of lines of magnetic force linked with a circuit of N turns, then $-N(dZ/dt)$ represents the electromotive force set up in that circuit. The operation of the induction coil (*q.v.*) and the transformer (*q.v.*) are based on this discovery. Faraday also found that if a copper disk A (fig. 6) is rotated between the poles of a magnet NO so that the disk moves with its plane perpendicular to the lines of magnetic force of the field, it has created in it an electromotive force directed from the centre to the edge or vice versa. The action of the dynamo (*q.v.*) depends on similar processes, viz. the cutting of the lines of magnetic force of a constant field produced by certain magnets by certain moving conductors called armature bars or coils in which an electromotive force is thereby created.

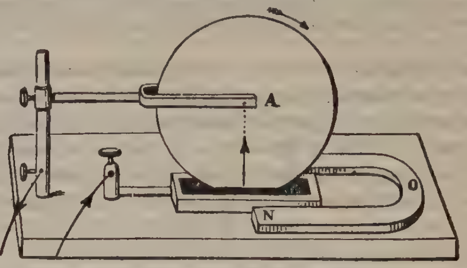

FIG. 6.

In 1834 H. F. E. Lenz enunciated a law which connects together the mechanical actions between electric circuits discovered by Ampère and the induction of electric currents discovered by Faraday. It is as follows: If a constant current flows in a primary circuit P, and if by motion of P a secondary current is created in a neighbouring circuit S, the direction of the secondary current will be such as to oppose the relative motion of the circuits. Starting from this, F. E. Neumann founded a mathematical theory of induced currents, discovering a quantity M, called the "potential of one circuit on another," or generally their "coefficient of mutual inductance." Mathematically M is obtained by taking the sum of all such quantities as $\iint dSdS'\cos\phi/r$, where dS and dS' are the elements of length of the two circuits, r is their distance, and ϕ is the angle which they make with one another; the summation or integration must be extended over every possible pair of elements. If we take pairs of elements in the same circuit, then Neumann's formula gives us the coefficient of self-induction of the circuit or the potential of the circuit on itself. For the results of such calculations on various forms of circuit the reader must be referred to special treatises.

H. von Helmholtz, and later on Lord Kelvin, showed that the facts of induction of electric currents discovered by Faraday could have been predicted from the electrodynamic actions discovered by Ampère assuming the principle of the conservation of energy. Helmholtz takes the case of a circuit of resistance R in which acts an electromotive force due to a battery or thermopile. Let a magnet be in the neighbourhood, and the potential of the magnet on the circuit be V, so that if a current I existed in the circuit the work done on the magnet in the time dt is $I(dV/dt)dt$. The source of electromotive force supplies in the time dt work equal to $EIdt$, and according to Joule's law energy is dissipated equal to RI^2dt. Hence, by the conservation of energy,

$$EIdt=RI^2dt+I(dV/dt)dt.$$

If then $E=O$, we have $I=-(dV/dt)/R$, or there will be a current due to an induced electromotive force expressed by $-dV/dt$. Hence if the magnet moves, it will create a current in the wire provided that such motion changes the potential of the magnet with respect to the circuit. This is the effect discovered by Faraday.[3]

Oscillatory Currents.—In considering the motion of electricity in conductors we find interesting phenomena connected with the discharge of a condenser or Leyden jar (*q.v.*). This problem was first mathematically treated by Lord Kelvin in 1853 (*Phil. Mag.*, 1853, 5, p. 292).

If a conductor of capacity C has its terminals connected by a wire of resistance R and inductance L, it becomes important to consider the subsequent motion of electricity in the wire. If Q is the quantity of electricity in the condenser initially, and q that at any time t after completing the circuit, then the energy stored up in the condenser at that instant is $\frac{1}{2}q^2/C$, and the energy associated with the circuit is $\frac{1}{2}L(dq/dt)^2$, and the rate of dissipation of energy by resistance is $R(dq/dt)^2$, since $dq/dt=i$ is the discharge current. Hence we can construct an equation of energy which expresses the fact that at any instant the power given out by the condenser is partly stored in the circuit and partly dissipated as heat in it. Mathematically this is expressed as follows:—

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[1] See Maxwell, *Electricity and Magnetism*, vol. ii. 642.

[2] *Experimental Researches*, vol. i. ser. 1.

[3] See Maxwell, *Electricity and Magnetism*, vol. ii. § 542, p. 178.

$$-\frac{d}{dt}\left[\frac{1}{2}\frac{q^2}{C}\right]=\frac{d}{dt}\left[\frac{1}{2}L\left(\frac{dq}{dt}\right)^2\right]+R\left(\frac{dq}{dt}\right)^2$$

or

$$\frac{d^2q}{dt^2}+\frac{R}{L}\frac{dq}{dt}+\frac{1}{LC}q=0.$$

The above equation has two solutions according as $R^2/4L^2$ is greater or less than $1/LC$. In the first case the current i in the circuit can be expressed by the equation

$$i=Q\frac{\alpha^2+\beta^2}{2\beta}e^{-\alpha t}(e^{\beta t}-e^{-\beta t}),$$

where $\alpha=R/2L$, $\beta=\sqrt{\frac{R^2}{4L^2}-\frac{1}{LC}}$, Q is the value of q when $t=0$, and e is the base of Napierian logarithms; and in the second case by the equation

$$i=Q\frac{\alpha^2+\beta^2}{\beta}e^{-\alpha t}\sin\beta t$$

where $$\alpha=R/2L,\text{ and }\beta=\sqrt{\frac{1}{LC}-\frac{R^2}{4L^2}}.$$

These expressions show that in the first case the discharge current of the jar is always in the same direction and is a transient unidirectional current. In the second case, however, the current is an oscillatory current gradually decreasing in amplitude, the frequency n of the oscillation being given by the expression

$$n=\frac{1}{2\pi}\sqrt{\frac{1}{LC}-\frac{R^2}{4L^2}}.$$

In those cases in which the resistance of the discharge circuit is very small, the expression for the frequency n and for the time period of oscillation R take the simple forms $n=1, 2\pi\sqrt{LC}$, or $T=1/n=2\pi\sqrt{LC}$.

The above investigation shows that if we construct a circuit consisting of a condenser and inductance placed in series with one another, such circuit has a natural electrical time period of its own in which the electrical charge in it oscillates if disturbed. It may therefore be compared with a pendulum of any kind which when displaced oscillates with a time period depending on its inertia and on its restoring force.

The study of these electrical oscillations received a great impetus after H. R. Hertz showed that when taking place in electric circuits of a certain kind they create electromagnetic waves (see Electric Waves) in the dielectric surrounding the oscillator, and an additional interest was given to them by their application to telegraphy. If a Leyden jar and a circuit of low resistance but some inductance in series with it are connected across the secondary spark gap of an induction coil, then when the coil is set in action we have a series of bright noisy sparks, each of which consists of a train of oscillatory electric discharges from the jar. The condenser becomes charged as the secondary electromotive force of the coil is created at each break of the primary current, and when the potential difference of the condenser coatings reaches a certain value determined by the spark-ball distance a discharge happens. This discharge, however, is not a single movement of electricity in one direction but an oscillatory motion with gradually decreasing amplitude. If the oscillatory spark is photographed on a revolving plate or a rapidly moving film, we have evidence in the photograph that such a spark consists of numerous intermittent sparks gradually becoming feebler. As the coil continues to operate, these trains of electric discharges take place at regular intervals. We can cause a train of electric oscillations in one circuit to induce similar oscillations in a neighbouring circuit, and thus construct an oscillation transformer or high frequency induction coil.

Alternating Currents.—The study of alternating currents of electricity began to attract great attention towards the end of the 19th century by reason of their application in electrotechnics and especially to the transmission of power. A circuit in which a simple periodic alternating current flows is called a single phase circuit. The important difference between such a form of current flow and steady current flow arises from the fact that if the circuit has inductance then the periodic electric current in it is not in step with the terminal potential difference or electromotive force acting in the circuit, but the current lags behind the electromotive force by a certain fraction of the periodic time called the "phase difference." If two alternating currents having a fixed difference in phase flow in two connected separate but related circuits, the two are called a two-phase current. If three or more single-phase currents preserving a fixed difference of phase flow in various parts of a connected circuit, the whole taken together is called a polyphase current. Since an electric current is a vector quantity, that is, has direction as well as magnitude, it can most conveniently be represented by a line denoting its maximum value, and if the alternating current is a simple periodic current then the root-mean-square or effective value of the current is obtained by dividing the maximum value by $\sqrt{2}$. Accordingly when we have an electric circuit or circuits in which there are simple periodic currents we can draw a vector diagram, the lines of which represent the relative magnitudes and phase differences of these currents.

A vector can most conveniently be represented by a symbol such as $a+\iota b$, where a stands for any length of a units measured horizontally and b for a length b units measured vertically, and the smybol ι is a sign of perpendicularity, and equivalent analytically[1] to $\sqrt{-1}$. Accordingly if E represents the periodic electromotive force (maximum value) acting in a circuit of resistance R and inductance L and frequency n, and if the current considered as a vector is represented by I, it is easy to show that a vector equation exists between these quantities as follows:—

$$E=RI+\iota 2\pi nLI.$$

Since the absolute magnitude of a vector $a+\iota b$ is $\sqrt{(a^2+b^2)}$, it follows that considering merely magnitudes of current and electromotive force and denoting them by symbols (E) (I), we have the following equation connecting (I) and (E):—

$$(I)=(E)/\sqrt{R^2+p^2L^2},$$

where p stands for $2\pi n$. If the above equation is compared with the symbolic expression of Ohm's law, it will be seen that the quantity $\sqrt{(R^2+p^2L^2)}$ takes the place of resistance R in the expression of Ohm. This quantity $\sqrt{(R^2+p^2L^2)}$ is called the "impedance" of the alternating circuit. The quantity pL is called the "reactance" of the alternating circuit, and it is therefore obvious that the current in such a circuit lags behind the electromotive force by an angle, called the angle of lag, the tangent of which is pL/R.

Currents in Networks of Conductors.—In dealing with problems connected with electric currents we have to consider the laws which govern the flow of currents in linear conductors (wires), in plane conductors (sheets), and throughout the mass of a material conductor.[2] In the first case consider the collocation of a number of linear conductors, such as rods or wires of metal, joined at their ends to form a *network of conductors*. The network consists of a number of conductors joining certain points and forming meshes. In each conductor a current may exist, and along each conductor there is a fall of potential, or an active electromotive force may be acting in it. Each conductor has a certain resistance. To find the current in each conductor when the individual resistances and electromotive forces are given, proceed as follows:—Consider any one mesh. The sum of all the electromotive forces which exist in the branches bounding that mesh must be equal to the sum of all the products of the resistances into the currents flowing along them, or $\Sigma(E)=\Sigma(C.R.)$. Hence if we consider each mesh as traversed by imaginary currents all circulating in the same direction, the real currents are the sums or differences of these imaginary cyclic currents in each branch. Hence we may assign to each mesh a cycle symbol x, y, z, &c., and form a cycle equation. Write down the cycle symbol for a mesh and prefix as coefficient the sum of all the resistances which bound that cycle, then subtract the cycle symbols of each adjacent cycle, each multiplied by the value of the bounding or common resistances, and equate this sum to the total electromotive force acting round the cycle. Thus if x y z are the cycle currents, and a b c the resistances bounding the mesh x, and b and c those separating it from the meshes y and z, and E an electromotive force in the branch a, then we have formed the cycle equation $x\,(a+b+c)-by-cz=\mathrm{E}$. For each mesh a similar equation may be formed. Hence we have as many linear equations as there are meshes, and we can obtain the solution for each cycle symbol, and therefore for the current in each branch. The solution giving the current in such branch of the network is therefore always in the form of the quotient of two determinants. The solution of the well-known problem of finding the current in the galvanometer circuit of the arrangement of linear conductors called Wheatstone's Bridge is thus easily obtained. For if we call the cycles (see fig. 7) $(x+y)$, y and z, and the resistances P, Q, R, S, G and B, and if E be the electromotive force in the battery circuit, we have the cycle equations

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[1] See W. G. Rhodes, *An Elementary Treatise on Alternating Currents* (London, 1902), chap. vii.

[2] See J. A. Fleming, "Problems on the Distribution of Electric Currents in Networks of Conductors," *Phil. Mag.* (1885), or *Proc. Phys. Soc. Lond.* (1885), 7; also Maxwell, *Electricity and Magnetism* (2nd ed.), vol. i. p. 374, § 280, 282*b*.

$$(\mathrm{P}+\mathrm{G}+\mathrm{R})(x+y)-\mathrm{G}y-\mathrm{R}z=0,$$
$$(\mathrm{Q}+\mathrm{G}+\mathrm{S})y-\mathrm{G}(x+y)-\mathrm{S}z=0,$$
$$(\mathrm{R}+\mathrm{S}+\mathrm{B})z-\mathrm{R}(x+y)-\mathrm{S}y=\mathrm{E}.$$

From these we can easily obtain the solution for $(x+y)-y=x$, which is the current through the galvanometer circuit in the form

$$x=\mathrm{E}(\mathrm{PS}-\mathrm{RQ})\Delta.$$

where Δ is a certain function of P, Q, R, S, B and G.

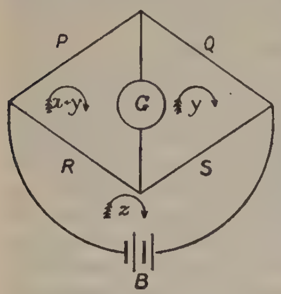

FIG. 7.

Currents in Sheets.—In the case of current flow in plane sheets, we have to consider certain points called sources at which the current flows into the sheet, and certain points called sinks at which it leaves. We may investigate, first, the simple case of one source and one sink in an infinite plane sheet of thickness δ and conductivity k. Take any point P in the plane at distances R and r from the source and sink respectively. The potential V at P is obviously given by

$$\mathrm{V}=\frac{\mathrm{Q}}{2\pi k\delta}\log_e\frac{r_1}{r_2},$$

where Q is the quantity of electricity supplied by the source per second. Hence the equation to the equipotential curve is $r_1r_2=$ a constant.

If we take a point half-way between the sink and the source as the origin of a system of rectangular co-ordinates, and if the distance between sink and source is equal to p, and the line joining them is taken as the axis of x, then the equation to the equipotential line is

$$\frac{y^2+(x+p)^2}{y^2+(x-p)^2}=\text{a constant.}$$

This is the equation of a family of circles having the axis of y for a common radical axis, one set of circles surrounding the sink and another set of circles surrounding the source. In order to discover the form of the stream of current lines we have to determine the orthogonal trajectories to this family of coaxial circles. It is easy to show that the orthogonal trajectory of the system of circles is another system of circles all passing through the sink and the source, and as a corollary of this fact, that the electric resistance of a circular disk of uniform thickness is the same between any two points taken anywhere on its circumference as sink and source. These equipotential lines may be delineated experimentally by attaching the terminals of a battery or batteries to small wires which touch at various places a sheet of tinfoil. Two wires attached to a galvanometer may then be placed on the tinfoil, and one may be kept stationary and the other may be moved about, so that the galvanometer is not traversed by any current. The moving terminal then traces out an equipotential curve. If there are n sinks and sources in a plane conducting sheet, and if r, r', r'' be the distances of any point from the sinks, and t, t', t'' the distances of the sources, then

$$\frac{r\,r'\,r''\;\ldots}{t\,t'\,t''\;\ldots}=\text{a constant,}$$

is the equation to the equipotential lines. The orthogonal trajectories or stream lines have the equation

$$\Sigma(\theta-\theta')=\text{a constant,}$$

where θ and θ' are the angles which the lines drawn from any point in the plane to the sink and corresponding source make with the line joining that sink and source. Generally it may be shown that if there are any number of sinks and sources in an infinite plane-conducting sheet, and if r, θ are the polar co-ordinates of any one, then the equation to the equipotential surfaces is given by the equation

$$\Sigma(\mathrm{A}\log_e r)=\text{a constant,}$$

where A is a constant; and the equation to the stream or current lines is

$$\Sigma(\theta)=\text{a constant.}$$

In the case of electric flow in three dimensions the electric potential must satisfy Laplace's equation, and a solution is therefore found in the form $\Sigma(\mathrm{A}/r)=$ a constant, as the equation to an equipotential surface, where r is the distance of any point on that surface from a source or sink.

Convection Currents.—The subject of convection electric currents has risen to great importance in connexion with modern electrical investigations. The question whether a statically electrified body in motion creates a magnetic field is of fundamental importance. Experiments to settle it were first undertaken in the year 1876 by H. A. Rowland, at a suggestion of H. von Helmholtz.[1] After preliminary experiments, Rowland's first apparatus for testing this hypothesis was constructed, as follows:—An ebonite disk was covered with radial strips of gold-leaf and placed between two other metal plates which acted as screens. The disk was then charged with electricity and set in rapid rotation. It was found to affect a delicately suspended pair of astatic magnetic needles hung in proximity to the disk just as would, by Oersted's rule, a circular electric current coincident with the periphery of the disk. Hence the statically-charged but rotating disk becomes in effect a circular electric current.

The experiments were repeated and confirmed by W. C. Röntgen (*Wied. Ann.*, 1888, 35, p. 264; 1890, 40, p. 93) and by F. Himstedt (*Wied. Ann.*, 1889, 38, p. 560). Later V. Crémieu again repeated them and obtained negative results (*Com. rend.*, 1900, 130, p. 1544, and 131, pp. 578 and 797; 1901, 132, pp. 327 and 1108). They were again very carefully reconducted by H. Pender (*Phil. Mag.*, 1901, 2, p. 179) and by E. P. Adams (*id. ib.*, 285). Pender's work showed beyond any doubt that electric convection does produce a magnetic effect. Adams employed charged copper spheres rotating at a high speed in place of a disk, and was able to prove that the rotation of such spheres produced a magnetic field similar to that due to a circular current and agreeing numerically with the theoretical value. It has been shown by J. J. Thomson (*Phil. Mag.*, 1881, 2, p. 236) and O. Heaviside (*Electrical Papers*, vol. ii. p. 205) that an electrified sphere, moving with a velocity v and carrying a quantity of electricity q, should produce a magnetic force H, at a point at a distance ρ from the centre of the sphere, equal to $qv \sin\theta/\rho^2$, where θ is the angle between the direction of ρ and the motion of the sphere. Adams found the field produced by a known electric charge rotating at a known speed had a strength not very different from that predetermined by the above formula. An observation recorded by R. W. Wood (*Phil. Mag.*, 1902, 2, p. 659) provides a confirmatory fact. He noticed that if carbon-dioxide strongly compressed in a steel bottle is allowed to escape suddenly the cold produced solidifies some part of the gas, and the issuing jet is full of particles of carbon-dioxide snow. These by friction against the nozzle are electrified positively. Wood caused the jet of gas to pass through a glass tube 2·5 mm. in diameter, and found that these particles of electrified snow were blown through it with a velocity of 2000 ft. a second. Moreover, he found that a magnetic needle hung near the tube was deflected as if held near an electric current. Hence the positively electrified particles in motion in the tube create a magnetic field round it.

Nature of an Electric Current.—The question, What is an electric current? is involved in the larger question of the nature of electricity. Modern investigations have shown that negative electricity is identical with the electrons or corpuscles which are components of the chemical atom (see MATTER and ELECTRICITY). Certain lines of argument lead to the conclusion that a solid conductor is not only composed of chemical atoms, but that there is a certain proportion of free electrons present in it, the electronic density or number per unit of volume being determined by the material, its temperature and other physical conditions. If any cause operates to add or remove electrons at one point there is an immediate diffusion of electrons to re-establish equilibrium, and this electronic movement constitutes an electric current. This hypothesis explains the reason for the identity between the laws of diffusion of matter, of heat and of electricity. Electromotive force is then any cause making or tending to make an inequality of electronic density in conductors, and may arise from differences of temperature, *i.e.* thermoelectromotive force

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[1] See *Berl. Acad. Ber.*, 1876, p. 211; also H. A. Rowland and C. T. Hutchinson, "On the Electromagnetic Effect of Convection Currents," *Phil. Mag.*, 1889, 27, p. 445.

(see THERMOELECTRICITY), or from chemical action when part of the circuit is an electrolytic conductor, or from the movement of lines of magnetic force across the conductor.

BIBLIOGRAPHY.—For additional information the reader may be referred to the following books: M. Faraday, *Experimental Researches in Electricity* (3 vols., London, 1839, 1844, 1855); J. Clerk Maxwell, *Electricity and Magnetism* (2 vols., Oxford, 1892); W. Watson and S. H. Burbury, *Mathematical Theory of Electricity and Magnetism*, vol. ii. (Oxford, 1889); E. Mascart and J. Joubert, *A Treatise on Electricity and Magnetism* (2 vols., London, 1883); A. Hay, *Alternating Currents* (London, 1905); W. G. Rhodes, *An Elementary Treatise on Alternating Currents* (London, 1902); D. C. Jackson and J. P. Jackson, *Alternating Currents and Alternating Current Machinery* (1896, new ed. 1903); S. P. Thompson, *Polyphase Electric Currents* (London, 1900); *Dynamo-Electric Machinery*, vol. ii., "Alternating Currents" (London, 1905); E. E. Fournier d'Albe, *The Electron Theory* (London, 1906). (J. A. F.)

ELECTROLIER, a fixture, usually pendent from the ceiling, for holding electric lamps. The word is analogous to chandelier, from which indeed it was formed.

ELECTROLYSIS (formed from Gr. λύειν, to loosen). When the passage of an electric current through a substance is accompanied by definite chemical changes which are independent of the heating effects of the current, the process is known as *electrolysis*, and the substance is called an *electrolyte*. As an example we may take the case of a solution of a salt such as copper sulphate in water, through which an electric current is passed between copper plates. We shall then observe the following phenomena. (1) The bulk of the solution is unaltered, except that its temperature may be raised owing to the usual heating effect which is proportional to the square of the strength of the current. (2) The copper plate by which the current is said to enter the solution, *i.e.* the plate attached to the so-called positive terminal of the battery or other source of current, dissolves away, the copper going into solution as copper sulphate. (3) Copper is deposited on the surface of the other plate, being obtained from the solution. (4) Changes in concentration are produced in the neighbourhood of the two plates or electrodes. In the case we have chosen, the solution becomes stronger near the anode, or electrode at which the current enters, and weaker near the cathode, or electrode at which it leaves the solution. If, instead of using copper electrodes, we take plates of platinum, copper is still deposited on the cathode; but, instead of the anode dissolving, free sulphuric acid appears in the neighbouring solution, and oxygen gas is evolved at the surface of the platinum plate.

With other electrolytes similar phenomena appear, though the primary chemical changes may be masked by secondary actions. Thus, with a dilute solution of sulphuric acid and platinum electrodes, hydrogen gas is evolved at the cathode, while, as the result of a secondary action on the anode, sulphuric acid is there re-formed, and oxygen gas evolved. Again, with the solution of a salt such as sodium chloride, the sodium, which is primarily liberated at the cathode, decomposes the water and evolves hydrogen, while the chlorine may be evolved as such, may dissolve the anode, or may liberate oxygen from the water, according to the nature of the plate and the concentration of the solution.

Early History of Electrolysis.—Alessandro Volta of Pavia discovered the electric battery in the year 1800, and thus placed the means of maintaining a steady electric current in the hands of investigators, who, before that date, had been restricted to the study of the isolated electric charges given by frictional electric machines. Volta's cell consists essentially of two plates of different metals, such as zinc and copper, connected by an electrolyte such as a solution of salt or acid. Immediately on its discovery intense interest was aroused in the new invention, and the chemical effects of electric currents were speedily detected. W. Nicholson and Sir A. Carlisle found that hydrogen and oxygen were evolved at the surfaces of gold and platinum wires connected with the terminals of a battery and dipped in water. The volume of the hydrogen was about double that of the oxygen, and, since this is the ratio in which these elements are combined in water, it was concluded that the process consisted essentially in the decomposition of water. They also noticed that a similar kind of chemical action went on in the battery itself. Soon afterwards, William Cruickshank decomposed the magnesium, sodium and ammonium chlorides, and precipitated silver and copper from their solutions—an observation which led to the process of electroplating. He also found that the liquid round the anode became acid, and that round the cathode alkaline. In 1804 W. Hisinger and J. J. Berzelius stated that neutral salt solutions could be decomposed by electricity, the acid appearing at one pole and the metal at the other. This observation showed that nascent hydrogen was not, as had been supposed, the primary cause of the separation of metals from their solutions, but that the action consisted in a direct decomposition into metal and acid. During the earliest investigation of the subject it was thought that, since hydrogen and oxygen were usually evolved, the electrolysis of solutions of acids and alkalis was to be regarded as a direct decomposition of water. In 1806 Sir Humphry Davy proved that the formation of acid and alkali when water was electrolysed was due to saline impurities in the water. He had shown previously that decomposition of water could be effected although the two poles were placed in separate vessels connected by moistened threads. In 1807 he decomposed potash and soda, previously considered to be elements, by passing the current from a powerful battery through the moistened solids, and thus isolated the metals potassium and sodium.

The electromotive force of Volta's simple cell falls off rapidly when the cell is used, and this phenomenon was shown to be due to the accumulation at the metal plates of the products of chemical changes in the cell itself. This reverse electromotive force of polarization is produced in all electrolytes when the passage of the current changes the nature of the electrodes. In batteries which use acids as the electrolyte, a film of hydrogen tends to be deposited on the copper or platinum electrode; but, to obtain a constant electromotive force, several means were soon devised of preventing the formation of the film. Constant cells may be divided into two groups, according as their action is chemical (as in the bichromate cell, where the hydrogen is converted into water by an oxidizing agent placed in a porous pot round the carbon plate) or electrochemical (as in Daniell's cell, where a copper plate is surrounded by a solution of copper sulphate, and the hydrogen, instead of being liberated, replaces copper, which is deposited on the plate from the solution).

Faraday's Laws.—The first exact quantitative study of electrolytic phenomena was made about 1830 by Michael Faraday (*Experimental Researches*, 1833). When an electric current flows round a circuit, there is no accumulation of electricity anywhere in the circuit, hence the current strength is everywhere the same, and we may picture the current as analogous to the flow of an incompressible fluid. Acting on this view, Faraday set himself to examine the relation between the flow of electricity round the circuit and the amount of chemical decomposition. He passed the current driven by a voltaic battery ZnPt (fig. 1) through two branches containing the two electrolytic cells A and B. The reunited current was then led through another cell C, in which the strength of the current must be the sum of those in the arms A and B. Faraday found that the mass of substance liberated at the electrodes in the cell C was equal to the sum of the masses liberated in the cells A and B. He also found that, for the same current, the amount of chemical action was independent of the size of the electrodes and proportional to the time that the current flowed. Regarding the current as the passage of a certain amount of electricity per second, it will be seen that the results

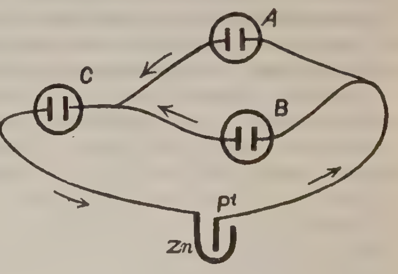

FIG. 1.

of all these experiments may be summed up in the statement that the amount of chemical action is proportional to the quantity of electricity which passes through the cell.

Faraday's next step was to pass the same current through different electrolytes in series. He found that the amounts of the substances liberated in each cell were proportional to the chemical equivalent weights of those substances. Thus, if the current be passed through dilute sulphuric acid between hydrogen electrodes, and through a solution of copper sulphate, it will be found that the mass of hydrogen evolved in the first cell is to the mass of copper deposited in the second as 1 is to 31·8. Now this ratio is the same as that which gives the relative chemical equivalents of hydrogen and copper, for 1 gramme of hydrogen and 31·8 grammes of copper unite chemically with the same weight of any acid radicle such as chlorine or the sulphuric group, SO_4. Faraday examined also the electrolysis of certain fused salts such as lead chloride and silver chloride. Similar relations were found to hold and the amounts of chemical change to be the same for the same electric transfer as in the case of solutions.

We may sum up the chief results of Faraday's work in the statements known as Faraday's laws: The mass of substance liberated from an electrolyte by the passage of a current is proportional (1) to the total quantity of electricity which passes through the electrolyte, and (2) to the chemical equivalent weight of the substance liberated.

Since Faraday's time his laws have been confirmed by modern research, and in favourable cases have been shown to hold good with an accuracy of at least one part in a thousand. The principal object of this more recent research has been the determination of the quantitative amount of chemical change associated with the passage for a given time of a current of strength known in electromagnetic units. It is found that the most accurate and convenient apparatus to use is a platinum bowl filled with a solution of silver nitrate containing about fifteen parts of the salt to one hundred of water. Into the solution dips a silver plate wrapped in filter paper, and the current is passed from the silver plate as anode to the bowl as cathode. The bowl is weighed before and after the passage of the current, and the increase gives the mass of silver deposited. The mean result of the best determinations shows that when a current of one ampere is passed for one second, a mass of silver is deposited equal to 0·001118 gramme. So accurate and convenient is this determination that it is now used conversely as a practical definition of the ampere, which (defined theoretically in terms of magnetic force) is defined practically as the current which in one second deposits 1·118 milligramme of silver.

Taking the chemical equivalent weight of silver, as determined by chemical experiments, to be 107·92, the result described gives as the electrochemical equivalent of an ion of unit chemical equivalent the value $1{\cdot}036\times10^{-5}$. If, as is now usual, we take the equivalent weight of oxygen as our standard and call it 16, the equivalent weight of hydrogen is 1·008, and its electrochemical equivalent is $1{\cdot}044\times10^{-5}$. The electrochemical equivalent of any other substance, whether element or compound, may be found by multiplying its chemical equivalent by $1{\cdot}036\times10^{-5}$. If, instead of the ampere, we take the C.G.S. electromagnetic unit of current, this number becomes $1{\cdot}036\times10^{-4}$.

Chemical Nature of the Ions.—A study of the products of decomposition does not necessarily lead directly to a knowledge of the ions actually employed in carrying the current through the electrolyte. Since the electric forces are active throughout the whole solution, all the ions must come under its influence and therefore move, but their separation from the electrodes is determined by the electromotive force needed to liberate them. Thus, as long as every ion of the solution is present in the layer of liquid next the electrode, the one which responds to the least electromotive force will alone be set free. When the amount of this ion in the surface layer becomes too small to carry all the current across the junction, other ions must also be used, and either they or their secondary products will appear also at the electrode. In aqueous solutions, for instance, a few hydrogen (H) and hydroxyl (OH) ions derived from the water are always present, and will be liberated if the other ions require a higher decomposition voltage and the current be kept so small that hydrogen and hydroxyl ions can be formed fast enough to carry all the current across the junction between solution and electrode.

The issue is also obscured in another way. When the ions are set free at the electrodes, they may unite with the substance of the electrode or with some constituent of the solution to form secondary products. Thus the hydroxyl mentioned above decomposes into water and oxygen, and the chlorine produced by the electrolysis of a chloride may attack the metal of the anode. This leads us to examine more closely the part played by water in the electrolysis of aqueous solutions. Distilled water is a very bad conductor, though, even when great care is taken to remove all dissolved bodies, there is evidence to show that some part of the trace of conductivity remaining is due to the water itself. By careful redistillation F. Kohlrausch has prepared water of which the conductivity compared with that of mercury was only $0{\cdot}40\times10^{-11}$ at 18° C. Even here some little impurity was present, and the conductivity of chemically pure water was estimated by thermodynamic reasoning as $0{\cdot}36\times10^{-11}$ at 18° C. As we shall see later, the conductivity of very dilute salt solutions is proportional to the concentration, so that it is probable that, in most cases, practically all the current is carried by the salt. At the electrodes, however, the small quantity of hydrogen and hydroxyl ions from the water are liberated first in cases where the ions of the salt have a higher decomposition voltage. The water being present in excess, the hydrogen and hydroxyl are re-formed at once and therefore are set free continuously. If the current be so strong that new hydrogen and hydroxyl ions cannot be formed in time, other substances are liberated; in a solution of sulphuric acid a strong current will evolve sulphur dioxide, the more readily as the concentration of the solution is increased. Similar phenomena are seen in the case of a solution of hydrochloric acid. When the solution is weak, hydrogen and oxygen are evolved; but, as the concentration is increased, and the current raised, more and more chlorine is liberated.

An interesting example of secondary action is shown by the common technical process of electroplating with silver from a bath of potassium silver cyanide. Here the ions are potassium and the group $Ag(CN)_2$.[1] Each potassium ion as it reaches the cathode precipitates silver by reacting with the solution in accordance with the chemical equation

$$K+KAg(CN)_2=2KCN+Ag,$$

while the anion $Ag(CN)_2$ dissolves an atom of silver from the anode, and re-forms the complex cyanide $KAg(CN)_2$ by combining with the 2KCN produced in the reaction described in the equation. If the anode consist of platinum, cyanogen gas is evolved thereat from the anion $Ag(CN)_2$, and the platinum becomes covered with the insoluble silver cyanide, AgCN, which soon stops the current. The coating of silver obtained by this process is coherent and homogeneous, while that deposited from a solution of silver nitrate, as the result of the primary action of the current, is crystalline and easily detached.

In the electrolysis of a concentrated solution of sodium acetate, hydrogen is evolved at the cathode and a mixture of ethane and carbon dioxide at the anode. According to H. Jahn,[2] the processes at the anode can be represented by the equations

$$2CH_3{\cdot}COO+H_2O=2CH_3{\cdot}COOH+O$$
$$2CH_3{\cdot}COOH+O=C_2H_6+2CO_2+H_2O.$$

The hydrogen at the cathode is developed by the secondary action

$$2Na+2H_2O=2NaOH+H_2.$$

Many organic compounds can be prepared by taking advantage of secondary actions at the electrodes, such as reduction by the cathodic hydrogen, or oxidation at the anode (see ELECTROCHEMISTRY).

It is possible to distinguish between double salts and salts of compound acids. Thus J. W. Hittorf showed that when a current was passed through a solution of sodium platino-chloride, the platinum appeared at the anode. The salt must therefore be derived from an acid, chloroplatinic acid, H_2PtCl_6, and have the formula Na_2PtCl_6, the ions being Na and $PtCl_6''$, for if it were a double salt it would decompose as a mixture of sodium chloride and platinum chloride and both metals would go to the cathode.

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[1] See Hittorf, *Pogg. Ann.* cvi. 517 (1859).

[2] *Grundriss der Elektrochemie* (1895), p. 292; see also F. Kaufler and C. Herzog, *Ber.*, 1909, 42, p. 3858.

Early Theories of Electrolysis.—The obvious phenomena to be explained by any theory of electrolysis are the liberation of the products of chemical decomposition at the two electrodes while the intervening liquid is unaltered. To explain these facts, Theodor Grotthus (1785–1822) in 1806 put forward an hypothesis which supposed that the opposite chemical constituents of an electrolyte interchanged partners all along the line between the electrodes when a current passed. Thus, if the molecule of a substance in solution is represented by AB, Grotthus considered a chain of AB molecules to exist from one electrode to the other. Under the influence of an applied electric force, he imagined that the B part of the first molecule was liberated at the anode, and that the A part thus isolated united with the B part of the second molecule, which, in its turn, passed on its A to the B of the third molecule. In this manner, the B part of the last molecule of the chain was seized by the A of the last molecule but one, and the A part of the last molecule liberated at the surface of the cathode.

Chemical phenomena throw further light on this question. If two solutions containing the salts AB and CD be mixed, double decomposition is found to occur, the salts AD and CB being formed till a certain part of the first pair of substances is transformed into an equivalent amount of the second pair. The proportions between the four salts AB, CD, AD and CB, which exist finally in solution, are found to be the same whether we begin with the pair AB and CD or with the pair AD and CB. To explain this result, chemists suppose that both changes can occur simultaneously, and that equilibrium results when the rate at which AB and CD are transformed into AD and CB is the same as the rate at which the reverse change goes on. A freedom of interchange is thus indicated between the opposite parts of the molecules of salts in solution, and it follows reasonably that with the solution of a single salt, say sodium chloride, continual interchanges go on between the sodium and chlorine parts of the different molecules.

These views were applied to the theory of electrolysis by R. J. E. Clausius. He pointed out that it followed that the electric forces did not cause the interchanges between the opposite parts of the dissolved molecules but only controlled their direction. Interchanges must be supposed to go on whether a current passes or not, the function of the electric forces in electrolysis being merely to determine in what direction the parts of the molecules shall work their way through the liquid and to effect actual separation of these parts (or their secondary products) at the electrodes. This conclusion is supported also by the evidence supplied by the phenomena of electrolytic conduction (see Conduction, Electric, § II.). If we eliminate the reverse electromotive forces of polarization at the two electrodes, the conduction of electricity through electrolytes is found to conform to Ohm's law; that is, once the polarization is overcome, the current is proportional to the electromotive force applied to the bulk of the liquid. Hence there can be no reverse forces of polarization inside the liquid itself, such forces being confined to the surface of the electrodes. No work is done in separating the parts of the molecules from each other. This result again indicates that the parts of the molecules are effectively separate from each other, the function of the electric forces being merely directive.

Migration of the Ions.—The opposite parts of an electrolyte, which work their way through the liquid under the action of the electric forces, were named by Faraday the ions—the travellers. The changes of concentration which occur in the solution near the two electrodes were referred by W. Hittorf (1853) to the unequal speeds with which he supposed the two opposite ions to travel. It is clear that, when two opposite streams of ions move past each other, equivalent quantities are liberated at the two ends of the system. If the ions move at equal rates, the salt which is decomposed to supply the ions liberated must be taken equally from the neighbourhood of the two electrodes. But if one ion, say the anion, travels faster through the liquid than the other, the end of the solution from which it comes will be more exhausted of salt than the end towards which it goes. If we assume that no other cause is at work, it is easy to prove that, with non-dissolvable electrodes, the ratio of salt lost at the anode to the salt lost at the cathode must be equal to the ratio of the velocity of the cation to the velocity of the anion. This result may be illustrated by fig. 2. The black circles represent one ion and the white circles the other. If the black ions move twice as fast as the white ones, the state of things after the passage of a current will be represented by the lower part of the figure. Here the middle part of the solution is unaltered and the number of ions liberated is the same at either end, but the amount of salt left at one end is less than that at the other. On the right, towards which the faster ion travels, five molecules of salt are left, being a loss of two from the original seven. On the left, towards which the slower ion moves, only three molecules remain—a loss of four. Thus, the ratio of the losses at the two ends is two to one—the same as the ratio of the assumed ionic velocities. It should be noted, however, that another cause would be competent to explain the unequal dilution of the two solutions. If either ion carried with it some of the unaltered salt or some of the solvent, concentration or dilution of the liquid would be produced where the ion was liberated. There is reason to believe that in certain cases such complex ions do exist, and interfere with the results of the differing ionic velocities.

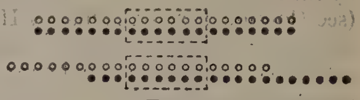

Fig. 2.

Hittorf and many other observers have made experiments to determine the unequal dilution of a solution round the two electrodes when a current passes. Various forms of apparatus have been used, the principle of them all being to secure efficient separation of the two volumes of solution in which the changes occur. In some cases porous diaphragms have been employed; but such diaphragms introduce a new complication, for the liquid as a whole is pushed through them by the action of the current, the phenomenon being known as electric endosmose. Hence experiments without separating diaphragms are to be preferred, and the apparatus may be considered effective when a considerable bulk of intervening solution is left unaltered in composition. It is usual to express the results in terms of what is called the migration constant of the anion, that is, the ratio of the amount of salt lost by the anode vessel to the whole amount lost by both vessels. Thus the statement that the migration constant or transport number for a decinormal solution of copper sulphate is 0·632 implies that of every gramme of copper sulphate lost by a solution containing originally one-tenth of a gramme equivalent per litre when a current is passed through it between platinum electrodes, 0·632 gramme is taken from the cathode vessel and 0·368 gramme from the anode vessel. For certain concentrated solutions the transport number is found to be greater than unity; thus for a normal solution of cadmium iodide its value is 1·12. On the theory that the phenomena are wholly due to unequal ionic velocities this result would mean that the cation like the anion moved against the conventional direction of the current. That a body carrying a positive electric charge should move against the direction of the electric intensity is contrary to all our notions of electric forces, and we are compelled to seek some other explanation. An alternative hypothesis is given by the idea of complex ions. If some of the anions, instead of being simple iodine ions represented chemically by the symbol I, are complex structures formed by the union of iodine with unaltered cadmium iodide—structures represented by some such chemical formula as $I(CdI_2)$, the concentration of the solution round the anode would be increased by the passage of an electric current, and the phenomena observed would be explained. It is found that, in such cases as this, where it seems necessary to imagine the existence of complex ions, the transport number changes rapidly as the concentration of the original solution is changed. Thus, diminishing the concentration of the cadmium iodine solution from normal to one-twentieth normal changes the transport number from 1·12 to 0·64. Hence it is probable that in cases where the transport number keeps constant with changing concentration the hypothesis of complex ions is unnecessary, and we may suppose that the transport number is a true migration constant from which the relative velocities of the two ions may be calculated in the matter suggested by Hittorf and illustrated in fig. 2. This conclusion is confirmed by the results of the direct visual determination of ionic velocities (see Conduction, Electric, § II.), which, in cases where the transport number remains constant, agree with the values calculated from those numbers. Many solutions in which the transport numbers vary at high concentration often become simple at greater dilution. For instance, to take the two solutions to which we have already referred, we have—

Concentration	2·0	1·5	1·0	0·5	0·2	0·1	0·05	0·02	0·01 normal
Copper sulphate transport numbers	0·72	0·714	0·696	0·668	0·643	0·632	0·626	0·62	
Cadmium iodide ,, ,,	1·22	1·18	1·12	1·00	0·83	0·71	0·64	0·59	0·56

It is probable that in both these solutions complex ions exist at fairly high concentrations, but gradually gets less in number and finally disappear as the dilution is increased. In such salts as potassium chloride the ions seem to be simple throughout a wide range of concentration since the transport numbers for the same series of concentrations as those used above run—

Potassium chloride—
0·515, 0·515, 0·514, 0·513, 0·509, 0·508, 0·507, 0·507, 0·506.

The next important step in the theory of the subject was made by F. Kohlrausch in 1879. Kohlrausch formulated a theory of electrolytic conduction based on the idea that, under the action of the electric forces, the oppositely charged ions moved in opposite directions through the liquid, carrying their charges with them. If we eliminate the polarization at the electrodes, it can be shown that an electrolyte possesses a definite electric resistance and therefore a definite conductivity. The conductivity gives us the amount of electricity conveyed per second under a definite electromotive force. On the view of the process of conduction described above, the amount of electricity conveyed per second is measured by the product of the number of ions, known from the concentration of the solution, the charge carried by each of them, and the velocity with which, on the average, they move through the liquid. The concentration is known, and the conductivity can be measured experimentally; thus the average velocity with which the ions move past each other under the existent electromotive force can be estimated. The velocity with which the ions move past each other is equal to the sum of their individual velocities, which can therefore be calculated. Now Hittorf's transport number, in the case of simple salts in moderately dilute solution, gives us the ratio between the two ionic velocities. Hence the absolute velocities of the two ions can be determined, and we can calculate the actual speed with which a certain ion moves through a given liquid under the action of a given potential gradient or electromotive force. The details of the calculation are given in the article Conduction, Electric, § II., where also will be found an account of the methods which have been used to measure the velocities of many ions by direct visual observation. The results go to show that, where the existence of complex ions is not indicated by varying transport numbers, the observed velocities agree with those calculated on Kohlrausch's theory.

Dissociation Theory.—The verification of Kohlrausch's theory of ionic velocity verifies also the view of electrolysis which regards the electric current as due to streams of ions moving in opposite directions through the liquid and carrying their opposite electric charges with them. There remains the question how the necessary migratory freedom of the ions is secured. As we have seen, Grotthus imagined that it was the electric forces which sheared the ions past each other and loosened the chemical bonds holding the opposite parts of each dissolved molecule together. Clausius extended to electrolysis the chemical ideas which looked on the opposite parts of the molecule as always changing partners independently of any electric force, and regarded the function of the current as merely directive. Still, the necessary freedom was supposed to be secured by interchanges of ions between molecules at the instants of molecular collision only; during the rest of the life of the ions they were regarded as linked to each other to form electrically neutral molecules.

In 1887 Svante Arrhenius, professor of physics at Stockholm, put forward a new theory which supposed that the freedom of the opposite ions from each other was not a mere momentary freedom at the instants of molecular collision, but a more or less permanent freedom, the ions moving independently of each other through the liquid. The evidence which led Arrhenius to this conclusion was based on van 't Hoff's work on the osmotic pressure of solutions (see Solution). If a solution, let us say of sugar, be confined in a closed vessel through the walls of which the solvent can pass but the solution cannot, the solvent will enter till a certain equilibrium pressure is reached. This equilibrium pressure is called the osmotic pressure of the solution, and thermodynamic theory shows that, in an ideal case of perfect separation between solvent and solute, it should have the same value as the pressure which a number of molecules equal to the number of solute molecules in the solution would exert if they could exist as a gas in a space equal to the volume of the solution, provided that the space was large enough (*i.e.* the solution dilute enough) for the intermolecular forces between the dissolved particles to be inappreciable. Van 't Hoff pointed out that measurements of osmotic pressure confirmed this value in the case of dilute solutions of cane sugar.

Thermodynamic theory also indicates a connexion between the osmotic pressure of a solution and the depression of its freezing point and its vapour pressure compared with those of the pure solvent. The freezing points and vapour pressures of solutions of sugar are also in conformity with the theoretical numbers. But when we pass to solutions of mineral salts and acids—to solutions of electrolytes in fact—we find that the observed values of the osmotic pressures and of the allied phenomena are greater than the normal values. Arrhenius pointed out that these exceptions would be brought into line if the ions of electrolytes were imagined to be separate entities each capable of producing its own pressure effects just as would an ordinary dissolved molecule.

Two relations are suggested by Arrhenius' theory. (1) In very dilute solutions of simple substances, where only one kind of dissociation is possible and the dissociation of the ions is complete, the number of pressure-producing particles necessary to produce the observed osmotic effects should be equal to the number of ions given by a molecule of the salt as shown by its electrical properties. Thus the osmotic pressure, or the depression of the freezing point of a solution of potassium chloride should, at extreme dilution, be twice the normal value, but of a solution of sulphuric acid three times that value, since the potassium salt contains two ions and the acid three. (2) As the concentration of the solutions increases, the ionization as measured electrically and the dissociation as measured osmotically might decrease more or less together, though, since the thermodynamic theory only holds when the solution is so dilute that the dissolved particles are beyond each other's sphere of action, there is much doubt whether this second relation is valid through any appreciable range of concentration.

At present, measurements of freezing point are more convenient and accurate than those of osmotic pressure, and we may test the validity of Arrhenius' relations by their means. The theoretical value for the depression of the freezing point of a dilute solution per gramme-equivalent of solute per litre is 1·857° C. Completely ionized solutions of salts with two ions should give double this number or 3·714°, while electrolytes with three ions should have a value of 5·57°.

The following results are given by H. B. Loomis for the concentration of 0·01 gramme-molecule of salt to one thousand grammes of water. The salts tabulated are those of which the equivalent conductivity reaches a limiting value indicating that complete ionization is reached as dilution is increased. With such salts alone is a valid comparison possible.

Molecular Depressions of the Freezing Point.

Electrolytes with two Ions.

Potassium chloride	3·60	Nitric acid	3·73
Sodium chloride	3·67	Potassium nitrate	3·46
Potassium hydrate	3·71	Sodium nitrate	3·55
Hydrochloric acid	3·61	Ammonium nitrate	3·58

Electrolytes with three Ions.

Sulphuric acid	4·49	Calcium chloride	5·04
Sodium sulphate	5·09	Magnesium chloride	5·08

At the concentration used by Loomis the electrical conductivity indicates that the ionization is not complete, particularly in the case of the salts with divalent ions in the second list. Allowing for incomplete ionization the general concordance of these numbers with the theoretical ones is very striking.

The measurements of freezing points of solutions at the extreme dilution necessary to secure complete ionization is a matter of great difficulty, and has been overcome only in a research initiated by E. H. Griffiths.[1] Results have been obtained for solutions of sugar, where the experimental number is 1·858, and for potassium chloride, which gives a depression of 3·720. These numbers agree with those indicated by theory, viz. 1·857 and 3·714, with astonishing exactitude. We may take Arrhenius' first relation as established for the case of potassium chloride.

The second relation, as we have seen, is not a strict consequence of theory, and experiments to examine it must be treated as an investigation of the limits within which solutions are dilute within the thermodynamic sense of the word, rather than as a test of the soundness of the theory. It is found that divergence has begun before the concentration has become great enough to enable freezing points to be measured with any ordinary apparatus. The freezing point curve usually lies below the electrical one, but approaches it as dilution is increased.[2]

Returning once more to the consideration of the first relation, which deals with the comparison between the number of ions and the number of pressure-producing particles in dilute solution, one caution is necessary. In simple substances like potassium chloride it seems evident that one kind of dissociation only is possible. The electrical phenomena show that there are two ions to the molecule, and that these ions are electrically charged. Corresponding with this result we find that the freezing point of dilute solutions indicates that two pressure-producing particles per molecule are present. But the converse relation does not necessarily follow. It would be possible for a body in solution to be dissociated into non-electrical parts, which would give osmotic pressure effects twice or three times the normal value, but, being uncharged, would not act as ions and impart electrical conductivity to the solution. L. Kahlenberg (*Jour. Phys. Chem.*, 1901, v. 344, 1902, vi. 43) has found that solutions of diphenylamine in methyl cyanide possess an excess of pressure-producing particles and yet are non-conductors of electricity. It is possible that in complicated organic substances we might have two kinds of dissociation, electrical and non-electrical, occurring simultaneously, while the possibility of the association of molecules accompanied by the electrical dissociation of some of them into new parts should not be overlooked. It should be pointed out that no measurements on osmotic pressures or freezing points can do more than tell us that an excess of particles is present; such experiments can throw no light on the question whether or not those particles are electrically charged. That question can only be answered by examining whether or not the particles move in an electric field.

The dissociation theory was originally suggested by the osmotic pressure relations. But not only has it explained satisfactorily the electrical properties of solutions, but it seems to be the only known hypothesis which is consistent with the experimental relation between the concentration of a solution and its electrical conductivity (see CONDUCTION, ELECTRIC, § II., "Nature of Electrolytes"). It is probable that the electrical effects constitute the strongest arguments in favour of the theory. It is necessary to point out that the dissociated ions of such a body as potassium chloride are not in the same condition as potassium and chlorine in the free state. The ions are associated with very large electric charges, and, whatever their exact relations with those charges may be, it is certain that the energy of a system in such a state must be different from its energy when unelectrified. It is not unlikely, therefore, that even a compound as stable in the solid form as potassium chloride should be thus dissociated when dissolved. Again, water, the best electrolytic solvent known, is also the body of the highest specific inductive capacity (dielectric constant), and this property, to whatever cause it may be due, will reduce the forces between electric charges in the neighbourhood, and may therefore enable two ions to separate.

This view of the nature of electrolytic solutions at once explains many well-known phenomena. Other physical properties of these solutions, such as density, colour, optical rotatory power, &c., like the conductivities, are *additive*, *i.e.* can be calculated by adding together the corresponding properties of the parts. This again suggests that these parts are independent of each other. For instance, the colour of a salt solution is the colour obtained by the superposition of the colours of the ions and the colour of any undissociated salt that may be present. All copper salts in dilute solution are blue, which is therefore the colour of the copper ion. Solid copper chloride is brown or yellow, so that its concentrated solution, which contains both ions and undissociated molecules, is green, but changes to blue as water is added and the ionization becomes complete. A series of equivalent solutions all containing the same coloured ion have absorption spectra which, when photographed, show identical absorption bands of equal intensity.[3] The colour changes shown by many substances which are used as indicators (*q.v.*) of acids or alkalis can be explained in a similar way. Thus para-nitrophenol has colourless molecules, but an intensely yellow negative ion. In neutral, and still more in acid solutions, the dissociation of the indicator is practically nothing, and the liquid is colourless. If an alkali is added, however, a highly dissociated salt of para-nitrophenol is formed, and the yellow colour is at once evident. In other cases, such as that of litmus, both the ion and the undissociated molecule are coloured, but in different ways.

Electrolytes possess the power of coagulating solutions of colloids such as albumen and arsenious sulphide. The mean values of the relative coagulative powers of sulphates of mono-, di-, and tri-valent metals have been shown experimentally to be approximately in the ratios 1 : 35 : 1023. The dissociation theory refers this to the action of electric charges carried by the free ions. If a certain minimum charge must be collected in order to start coagulation, it will need the conjunction of $6n$ monovalent, or $3n$ divalent, to equal the effect of $2n$ trivalent ions. The ratios of the coagulative powers can thus be calculated to be $1 : x : x^2$, and putting $x = 32$ we get 1 : 32 : 1024, a satisfactory agreement with the numbers observed.[4]

The question of the application of the dissociation theory to the case of fused salts remains. While it seems clear that the conduction in this case is carried on by ions similar to those of solutions, since Faraday's laws apply equally to both, it does not follow necessarily that semi-permanent dissociation is the only way to explain the phenomena. The evidence in favour of dissociation in the case of solutions does not apply to fused salts, and it is possible that, in their case, a series of molecular interchanges, somewhat like Grotthus's chain, may represent the mechanism of conduction.

An interesting relation appears when the electrolytic conductivity of solutions is compared with their chemical activity. The readiness and speed with which electrolytes react are in sharp contrast with the difficulty experienced in the case of non-electrolytes. Moreover, a study of the chemical relations of electrolytes indicates that it is always the electrolytic ions that are concerned in their reactions. The tests for a salt, potassium nitrate, for example, are the tests not for KNO_3, but for its ions K and NO_3, and in cases of double decomposition it is always these ions that are exchanged for those of other substances. If an element be present in a compound otherwise than as an ion, it is not interchangeable, and cannot be recognized by the usual tests. Thus neither a chlorate, which contains the ion ClO_3, nor monochloracetic acid, shows the reactions of chlorine, though it is, of course, present in both substances; again, the sulphates do not answer to the usual tests which indicate the presence of sulphur as sulphide. The chemical activity of a substance is a quantity which may be measured by different methods. For some substances it has been shown to be independent of the particular reaction used. It is then possible to assign to each body a specific coefficient of affinity. Arrhenius has pointed out that the coefficient of affinity of an acid is proportional to its electrolytic ionization.

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[1] *Brit. Ass. Rep.*, 1906, Section A, Presidential Address.

[2] See *Theory of Solution*, by W. C. D. Whetham (1902), p. 328.

[3] W. Ostwald, *Zeits. physikal. Chemie*, 1892, vol. ix. p. 579; T. Ewan, *Phil. Mag.* (5), 1892, vol. xxxiii. p. 317; G. D. Liveing, *Cambridge Phil. Trans.*, 1900, vol. xviii. p. 298.

[4] See W. B. Hardy, *Journal of Physiology*, 1899, vol. xxiv. p. 288; and W. C. D. Whetham *Phil. Mag.*, November 1899.

The affinities of acids have been compared in several ways. W. Ostwald (*Lehrbuch der allg. Chemie*, vol. ii., Leipzig, 1893) investigated the relative affinities of acids for potash, soda and ammonia, and proved them to be independent of the base used. The method employed was to measure the changes in volume caused by the action. His results are given in column I. of the following table, the affinity of hydrochloric acid being taken as one hundred. Another method is to allow an acid to act on an insoluble salt, and to measure the quantity which goes into solution. Determinations have been made with calcium oxalate, $CaC_2O_4+H_2O$, which is easily decomposed by acids, oxalic acid and a soluble calcium salt being formed. The affinities of acids relative to that of oxalic acid are thus found, so that the acids can be compared among themselves (column II.). If an aqueous solution of methyl acetate be allowed to stand, a slow decomposition goes on. This is much quickened by the presence of a little dilute acid, though the acid itself remains unchanged. It is found that the influence of different acids on this action is proportional to their specific coefficients of affinity. The results of this method are given in column III. Finally, in column IV. the electrical conductivities of normal solutions of the acids have been tabulated. A better basis of comparison would be the ratio of the actual to the limiting conductivity, but since the conductivity of acids is chiefly due to the mobility of the hydrogen ions, its limiting value is nearly the same for all, and the general result of the comparison would be unchanged.

Acid.	I.	II.	III.	IV.
Hydrochloric	100	100	100	100
Nitric	102	110	92	99·6
Sulphuric	68	67	74	65·1
Formic	4·0	2·5	1·3	1·7
Acetic	1·2	1·0	0·3	0·4
Propionic	1·1	..	0·3	0·3
Monochloracetic	7·2	5·1	4·3	4·9
Dichloracetic	34	18	23·0	25·3
Trichloracetic	82	63	68·2	62·3
Malic	3·0	5·0	1·2	1·3
Tartaric	5·3	6·3	2·3	2·3
Succinic	0·1	0·2	0·5	0·6

It must be remembered that, the solutions not being of quite the same strength, these numbers are not strictly comparable, and that the experimental difficulties involved in the chemical measurements are considerable. Nevertheless, the remarkable general agreement of the numbers in the four columns is quite enough to show the intimate connexion between chemical activity and electrical conductivity. We may take it, then, that only that portion of these bodies is chemically active which is electrolytically active—that ionization is necessary for such chemical activity as we are dealing with here, just as it is necessary for electrolytic conductivity.

The ordinary laws of chemical equilibrium have been applied to the case of the dissociation of a substance into its ions. Let x be the number of molecules which dissociate per second when the number of undissociated molecules in unit volume is unity, then in a dilute solution where the molecules do not interfere with each other, xp is the number when the concentration is p. Recombination can only occur when two ions meet, and since the frequency with which this will happen is, in dilute solution, proportional to the square of the ionic concentration, we shall get for the number of molecules re-formed in one second yq^2 where q is the number of dissociated molecules in one cubic centimetre. When there is equilibrium, $xp=yq^2$. If μ be the molecular conductivity, and μ_∞ its value at infinite dilution, the fractional number of molecules dissociated is μ/μ_∞, which we may write as α. The number of undissociated molecules is then $1-\alpha$, so that if V be the volume of the solution containing 1 gramme-molecule of the dissolved substance, we get

$$q=\alpha/V \text{ and } p=(1-\alpha)/V,$$

hence

$$x(1-\alpha)\ V=y\alpha^2/V^2,$$

and

$$\frac{\alpha^2}{V(1-\alpha)}=\frac{x}{y}=\text{constant}=k.$$

This constant k gives a numerical value for the chemical affinity, and the equation should represent the effect of dilution on the molecular conductivity of binary electrolytes.

In the case of substances like ammonia and acetic acid, where the dissociation is very small, $1-\alpha$ is nearly equal to unity, and only varies slowly with dilution. The equation then becomes $\alpha^2/V=k$, or $\alpha=\sqrt{Vk}$, so that the molecular conductivity is proportional to the square root of the dilution. Ostwald has confirmed the equation by observation on an enormous number of weak acids (*Zeits. physikal. Chemie*, 1888, ii. p. 278; 1889, iii. pp. 170, 241, 369). Thus in the case of cyanacetic acid, while the volume V changed by doubling from 16 to 1024 litres, the values of k were 0·00 (376, 373, 374, 361, 362, 361, 368). The mean values of k for other common acids were—formic, 0·0000214; acetic, 0·0000180; monochloracetic, 0·00155; dichloracetic, 0·051; trichloracetic, 1·21; propionic, 0·0000134. From these numbers we can, by help of the equation, calculate the conductivity of the acids for any dilution. The value of k, however, does not keep constant so satisfactorily in the case of highly dissociated substances, and empirical formulae have been constructed to represent the effect of dilution on them. Thus the values of the expressions $\alpha^2/(1-\alpha\sqrt{V})$ (Rudolphi, *Zeits. physikal. Chemie*, 1895, vol. xvii. p. 385) and $\alpha^3/(1-\alpha)^2V$ (van 't Hoff, *ibid.*, 1895, vol. xviii. p. 300) are found to keep constant as V changes. Van 't Hoff's formula is equivalent to taking the frequency of dissociation as proportional to the square of the concentration of the molecules, and the frequency of recombination as proportional to the cube of the concentration of the ions. An explanation of the failure of the usual dilution law in these cases may be given if we remember that, while the electric forces between bodies like undissociated molecules, each associated with equal and opposite charges, will vary inversely as the fourth power of the distance, the forces between dissociated ions, each carrying one charge only, will be inversely proportional to the square of the distance. The forces between the ions of a strongly dissociated solution will thus be considerable at a dilution which makes forces between undissociated molecules quite insensible, and at the concentrations necessary to test Ostwald's formula an electrolyte will be far from dilute in the thermodynamic sense of the term, which implies no appreciable intermolecular or interionic forces.

When the solutions of two substances are mixed, similar considerations to those given above enable us to calculate the resultant changes in dissociation. (See Arrhenius, *loc. cit.*) The simplest and most important case is that of two electrolytes having one ion in common, such as two acids. It is evident that the undissociated part of each acid must eventually be in equilibrium with the free hydrogen ions, and, if the concentrations are not such as to secure this condition, readjustment must occur. In order that there should be no change in the states of dissociation on mixing, it is necessary, therefore, that the concentration of the hydrogen ions should be the same in each separate solution. Such solutions were called by Arrhenius "isohydric." The two solutions, then, will so act on each other when mixed that they become isohydric. Let us suppose that we have one very active acid like hydrochloric, in which dissociation is nearly complete, another like acetic, in which it is very small. In order that the solutions of these should be isohydric and the concentrations of the hydrogen ions the same, we must have a very large quantity of the feebly dissociated acetic acid, and a very small quantity of the strongly dissociated hydrochloric, and in such proportions alone will equilibrium be possible. This explains the action of a strong acid on the salt of a weak acid. Let us allow dilute sodium acetate to react with dilute hydrochloric acid. Some acetic acid is formed, and this process will go on till the solutions of the two acids are isohydric: that is, till the dissociated hydrogen ions are in equilibrium with both. In order that this should hold, we have seen that a considerable quantity of acetic acid must be present, so that a corresponding amount of the salt will be decomposed, the quantity being greater the less the acid is dissociated. This "replacement" of a "weak" acid by a "strong" one is a matter of common observation in the chemical laboratory. Similar investigations applied to the general case of chemical equilibrium lead to an expression of exactly the same form as that given by C. M. Guldberg and P. Waage, which is universally accepted as an accurate representation of the facts.

The temperature coefficient of conductivity has approximately the same value for most aqueous salt solutions. It decreases both as the temperature is raised and as the concentration is increased, ranging from about 3·5% per degree for extremely dilute solutions (*i.e.* practically pure water) at 0° to about 1·5 for concentrated solutions at 18°. For acids its value is usually rather less than for salts at equivalent concentrations. The influence of temperature on the conductivity of solutions depends on (1) the ionization, and (2) the frictional resistance of the liquid to the passage of the ions, the reciprocal of which is called the ionic fluidity. At extreme dilution, when the ionization is complete, a variation in temperature cannot change its amount. The rise of conductivity with temperature, therefore, shows that the fluidity becomes greater when the solution is heated. As the concentration is increased and un-ionized molecules are formed, a change in temperature begins to affect the ionization as well as the fluidity. But the temperature coefficient of conductivity is now generally less than before; thus the effect of temperature on ionization must be of opposite sign to its effect on fluidity. The ionization of a solution, then, is usually diminished by raising the temperature, the rise in conductivity being due to the greater increase in fluidity. Nevertheless, in certain cases, the temperature coefficient of conductivity becomes negative at high temperatures, a solution of phosphoric acid, for example, reaching a maximum conductivity at 75° C.

The dissociation theory gives an immediate explanation of the fact that, in general, no heat-change occurs when two neutral salt solutions are mixed. Since the salts, both before and after mixture, exist mainly as dissociated ions, it is obvious that large thermal effects can only appear when the state of dissociation of the products is very different from that of the reagents. Let us consider the case of the neutralization of a base by an acid in the light of the dissociation theory. In dilute solution such substances as hydrochloric acid and potash are almost completely dissociated, so that, instead of representing the reaction as

$$\mathrm{HCl+KOH=KCl+H_2O},$$

we must write

$$\overset{+}{\mathrm{H}}+\overset{-}{\mathrm{Cl}}+\overset{+}{\mathrm{K}}+\overset{-}{\mathrm{OH}}=\overset{+}{\mathrm{K}}+\overset{-}{\mathrm{Cl}}+\mathrm{H_2O}.$$

The ions K and Cl suffer no change, but the hydrogen of the acid and the hydroxyl (OH) of the potash unite to form water, which is only very slightly dissociated. The heat liberated, then, is almost exclusively that produced by the formation of water from its ions. An exactly similar process occurs when any strongly dissociated acid acts on any strongly dissociated base, so that in all such cases the heat evolution should be approximately the same. This is fully borne out by the experiments of Julius Thomsen, who found that the heat of neutralization of one gramme-molecule of a strong base by an equivalent quantity of a strong acid was nearly constant, and equal to 13,700 or 13,800 calories. In the case of weaker acids, the dissociation of which is less complete, divergences from this constant value will occur, for some of the molecules have to be separated into their ions. For instance, sulphuric acid, which in the fairly strong solutions used by Thomsen is only about half dissociated, gives a higher value for the heat of neutralization, so that heat must be evolved when it is ionized. The heat of formation of a substance from its ions is, of course, very different from that evolved when it is formed from its elements in the usual way, since the energy associated with an ion is different from that possessed by the atoms of the element in their normal state. We can calculate the heat of formation from its ions for any substance dissolved in a given liquid, from a knowledge of the temperature coefficient of ionization, by means of an application of the well-known thermodynamical process, which also gives the latent heat of evaporation of a liquid when the temperature coefficient of its vapour pressure is known. The heats of formation thus obtained may be either positive or negative, and by using them to supplement the heat of formation of water, Arrhenius calculated the total heats of neutralization of soda by different acids, some of them only slightly dissociated, and found values agreeing well with observation (*Zeits. physikal. Chemie*, 1889, 4, p. 96; and 1892, 9, p. 339).

Voltaic Cells.—When two metallic conductors are placed in an electrolyte, a current will flow through a wire connecting them provided that a difference of any kind exists between the two conductors in the nature either of the metals or of the portions of the electrolyte which surround them. A current can be obtained by the combination of two metals in the same electrolyte, of two metals in different electrolytes, of the same metal in different electrolytes, or of the same metal in solutions of the same electrolyte at different concentrations. In accordance with the principles of energetics (*q.v.*), any change which involves a decrease in the total available energy of the system will tend to occur, and thus the necessary and sufficient condition for the production of electromotive force is that the available energy of the system should decrease when the current flows.

In order that the current should be maintained, and the electromotive force of the cell remain constant during action, it is necessary to ensure that the changes in the cell, chemical or other, which produce the current, should neither destroy the difference between the electrodes, nor coat either electrode with a non-conducting layer through which the current cannot pass. As an example of a fairly constant cell we may take that of Daniell, which consists of the electrical arrangement—zinc | zinc sulphate solution | copper sulphate solution | copper,—the two solutions being usually separated by a pot of porous earthenware. When the zinc and copper plates are connected through a wire, a current flows, the conventionally positive electricity passing from copper to zinc in the wire and from zinc to copper in the cell. Zinc dissolves at the anode, an equal amount of zinc replaces an equivalent amount of copper on the other side of the porous partition, and the same amount of copper is deposited on the cathode. This process involves a decrease in the available energy of the system, for the dissolution of zinc gives out more energy than the separation of copper absorbs. But the internal rearrangements which accompany the production of a current do not cause any change in the original nature of the electrodes, fresh zinc being exposed at the anode, and copper being deposited on copper at the cathode. Thus as long as a moderate current flows, the only variation in the cell is the appearance of zinc sulphate in the liquid on the copper side of the porous wall. In spite of this appearance, however, while the supply of copper is maintained, copper, being more easily separated from the solution than zinc, is deposited alone at the cathode, and the cell remains constant.

It is necessary to observe that the condition for change in a system is that the total available energy of the whole system should be decreased by the change. We must consider what change is allowed by the mechanism of the system, and deal with the sum of all the alterations in energy. Thus in the Daniell cell the dissolution of copper as well as of zinc would increase the loss in available energy. But when zinc dissolves, the zinc ions carry their electric charges with them, and the liquid tends to become positively electrified. The electric forces then soon stop further action unless an equivalent quantity of positive ions are removed from the solution. Hence zinc can only dissolve when some more easily separable substance is present in solution to be removed *pari passu* with the dissolution of zinc. The mechanism of such systems is well illustrated by an experiment devised by W. Ostwald. Plates of platinum and pure or amalgamated zinc are separated by a porous pot, and each surrounded by some of the same solution of a salt of a metal more oxidizable than zinc, such as potassium. When the plates are connected together by means of a wire, no current flows, and no appreciable amount of zinc dissolves, for the dissolution of zinc would involve the separation of potassium and a gain in available energy. If sulphuric acid be added to the vessel containing the zinc, these conditions are unaltered and still no zinc is dissolved. But, on the other hand, if a few drops of acid be placed in the vessel with the platinum, bubbles of hydrogen appear, and a current flows, zinc dissolving at the anode, and hydrogen being liberated at the cathode. In order that positively electrified ions may enter a solution, an equivalent amount of other positive ions must be removed or negative ions be added, and, for the process to occur spontaneously, the possible action at the two electrodes must involve a decrease in the total available energy of the system.

Considered thermodynamically, voltaic cells must be divided into reversible and non-reversible systems. If the slow processes of diffusion be ignored, the Daniell cell already described may be taken as a type of a reversible cell. Let an electromotive force exactly equal to that of the cell be applied to it in the reverse direction. When the applied electromotive force is diminished by an infinitesimal amount, the cell produces a current in the usual direction, and the ordinary chemical changes occur. If the external electromotive force exceed that of the cell by ever so little, a current flows in the opposite direction, and all the former chemical changes are reversed, copper dissolving from the copper plate, while zinc is deposited on the zinc plate. The cell, together with this balancing electromotive force, is thus a reversible system in true equilibrium, and the thermodynamical reasoning applicable to such systems can be used to examine its properties.

Now a well-known relation connects the available energy of a reversible system with the corresponding change in its total internal energy.

The available energy A is the amount of external work obtainable by an infinitesimal, reversible change in the system which occurs at a constant temperature T. If I be the change in the internal energy, the relation referred to gives us the equation

$$A = I + T(dA/dT),$$

where dA/dT denotes the rate of change of the available energy of the system per degree change in temperature. During a small electric transfer through the cell, the external work done is Ee, where E is the electromotive force. If the chemical changes which occur in the cell were allowed to take place in a closed vessel without the performance of electrical or other work, the change in energy would be measured by the heat evolved. Since the final state of the system would be the same as in the actual processes of the cell, the same amount of heat must give a measure of the change in internal energy when the cell is in action. Thus, if L denote the heat corresponding with the chemical changes associated with unit electric transfer, Le will be the heat corresponding with an electric transfer e, and will also be equal to the change in internal energy of the cell. Hence we get the equation

$$Ee = Le + Te(dE/dT) \text{ or } E = L + T(dE/dT),$$

as a particular case of the general thermodynamic equation of available energy. This equation was obtained in different ways by J. Willard Gibbs and H. von Helmholtz.

It will be noticed that when dE/dT is zero, that is, when the electromotive force of the cell does not change with temperature, the electromotive force is measured by the heat of reaction per unit of electrochemical change. The earliest formulation of the subject, due to Lord Kelvin, assumed that this relation was true in all cases, and, calculated in this way, the electromotive force of Daniell's cell, which happens to possess a very small temperature coefficient, was found to agree with observation.

When one gramme of zinc is dissolved in dilute sulphuric acid, 1670 thermal units or calories are evolved. Hence for the electrochemical unit of zinc or 0·003388 gramme, the thermal evolution is 5·66 calories. Similarly, the heat which accompanies the dissolution of one electrochemical unit of copper is 3·00 calories. Thus, the thermal equivalent of the unit of resultant electrochemical change in Daniell's cell is 5·66 − 3·00 = 2·66 calories. The dynamical equivalent of the calorie is $4{\cdot}18 \times 10^7$ ergs or C.G.S. units of work, and therefore the electromotive force of the cell should be $1{\cdot}112 \times 10^8$ C.G.S. units or 1·112 volts—a close agreement with the experimental result of about 1·08 volts. For cells in which the electromotive force varies with temperature, the full equation given by Gibbs and Helmholtz has also been confirmed experimentally.

As stated above, an electromotive force is set up whenever there is a difference of any kind at two electrodes immersed in electrolytes. In ordinary cells the difference is secured by using two dissimilar metals, but an electromotive force exists if two plates of the same metal are placed in solutions of different substances, or of the same substance at different concentrations. In the latter case, the tendency of the metal to dissolve in the more dilute solution is greater than its tendency to dissolve in the more concentrated solution, and thus there is a decrease in available energy when metal dissolves in the dilute solution and separates in equivalent quantity from the concentrated solution. An electromotive force is therefore set up in this direction, and, if we can calculate the change in available energy due to the processes of the cell, we can foretell the value of the electromotive force. Now the effective change produced by the action of the current is the concentration of the more dilute solution by the dissolution of metal in it, and the dilution of the originally stronger solution by the separation of metal from it. We may imagine these changes reversed in two ways. We may evaporate some of the solvent from the solution which has become weaker and thus reconcentrate it, condensing the vapour on the solution which had become stronger. By this reasoning Helmholtz showed how to obtain an expression for the work done. On the other hand, we may imagine the processes due to the electrical transfer to be reversed by an osmotic operation. Solvent may be supposed to be squeezed out from the solution which has become more dilute through a semi-permeable wall, and through another such wall allowed to mix with the solution which in the electrical operation had become more concentrated. Again, we may calculate the osmotic work done, and, if the whole cycle of operations be supposed to occur at the same temperature, the osmotic work must be equal and opposite to the electrical work of the first operation.

The result of the investigation shows that the electrical work Ee is given by the equation

$$Ee = \int_{p_1}^{p_2} v\,dp,$$

where v is the volume of the solution used and p its osmotic pressure. When the solutions may be taken as effectively dilute, so that the gas laws apply to the osmotic pressure, this relation reduces to

$$E = \frac{nrRT}{ey} \log_\epsilon \frac{c_1}{c_2}$$

where n is the number of ions given by one molecule of the salt, r the transport ratio of the anion, R the gas constant, T the absolute temperature, y the total valency of the anions obtained from one molecule, and c_1 and c_2 the concentrations of the two solutions.

If we take as an example a concentration cell in which silver plates are placed in solutions of silver nitrate, one of which is ten times as strong as the other, this equation gives

$$\begin{aligned} E &= 0{\cdot}060 \times 10^8 \text{ C.G.S. units} \\ &= 0{\cdot}060 \text{ volts.} \end{aligned}$$

W. Nernst, to whom this theory is due, determined the electromotive force of this cell experimentally, and found the value 0·055 volt.

The logarithmic formulae for these concentration cells indicate that theoretically their electromotive force can be increased to any extent by diminishing without limit the concentration of the more dilute solution, log c_1/c_2 then becoming very great. This condition may be realized to some extent in a manner that throws light on the general theory of the voltaic cell. Let us consider the arrangement—silver | silver chloride with potassium chloride solution | potassium nitrate solution | silver nitrate solution | silver. Silver chloride is a very insoluble substance, and here the amount in solution is still further reduced by the presence of excess of chlorine ions of the potassium salt. Thus silver, at one end of the cell in contact with many silver ions of the silver nitrate solution, at the other end is in contact with a liquid in which the concentration of those ions is very small indeed. The result is that a high electromotive force is set up, which has been calculated as 0·52 volt, and observed as 0·51 volt. Again, Hittorf has shown that the effect of a cyanide round a copper electrode is to combine with the copper ions. The concentration of the simple copper ions is then so much diminished that the copper plate becomes an anode with regard to zinc. Thus the cell—copper | potassium cyanide solution | potassium sulphate solution—zinc sulphate solution | zinc—gives a current which carries copper into solution and deposits zinc. In a similar way silver could be made to act as anode with respect to cadmium.

It is now evident that the electromotive force of an ordinary chemical cell such as that of Daniell depends on the concentration of the solutions as well as on the nature of the metals. In ordinary cases possible changes in the concentrations only affect the electromotive force by a few parts in a hundred, but, by means such as those indicated above, it is possible to produce such immense differences in the concentrations that the electromotive force of the cell is not only changed appreciably but even reversed in direction. Once more we see that it is the total impending change in the available energy of the system which controls the electromotive force.

Any reversible cell can theoretically be employed as an accumulator, though, in practice, conditions of general convenience are more sought after than thermodynamic efficiency.

The effective electromotive force of the common lead accumulator (*q.v.*) is less than that required to charge it. This drop in the electromotive force has led to the belief that the cell is not reversible. F. Dolezalek, however, has attributed the difference to mechanical hindrances, which prevent the equalization of acid concentration in the neighbourhood of the electrodes, rather than to any essentially irreversible chemical action. The fact that the Gibbs-Helmholtz equation is found to apply also indicates that the lead accumulator is approximately reversible in the thermodynamic sense of the term.

Polarization and Contact Difference of Potential.—If we connect together in series a single Daniell's cell, a galvanometer, and two platinum electrodes dipping into acidulated water, no visible chemical decomposition ensues. At first a considerable current is indicated by the galvanometer; the deflexion soon diminishes, however, and finally becomes very small. If, instead of using a single Daniell's cell, we employ some source of electromotive force which can be varied as we please, and gradually raise its intensity, we shall find that, when it exceeds a certain value, about 1·7 volt, a permanent current of considerable strength flows through the solution, and, after the initial period, shows no signs of decrease. This current is accompanied by chemical decomposition. Now let us disconnect the platinum plates from the battery and join them directly with the galvanometer. A current will flow for a while in the reverse direction; the system of plates and acidulated water through which a current has been passed, acts as an accumulator, and will itself yield a current in return. These phenomena are explained by the existence of a reverse electromotive force at the surface of the platinum plates. Only when the applied electromotive force exceeds this reverse force of polarization, will a permanent steady current pass through the liquid, and visible chemical decomposition proceed. It seems that this reverse electromotive force of polarization is due to the deposit on the electrodes of minute quantities of the products of chemical decomposition. Differences between the two electrodes are thus set up, and, as we have seen above, an electromotive force will therefore exist between them. To pass a steady current in the direction opposite to this electromotive force of polarization, the applied electromotive force E must exceed that of polarization E', and the excess $E-E'$ is the effective electromotive force of the circuit, the current being, in accordance with Ohm's law, proportional to the applied electromotive force and represented by $(E-E')/R$, where R is a constant called the resistance of the circuit.

When we use platinum electrodes in acidulated water, hydrogen and oxygen are evolved. The opposing force of polarization is about 1·7 volt, but, when the plates are disconnected and used as a source of current, the electromotive force they give is only about 1·07 volt. This irreversibility is due to the work required to evolve bubbles of gas at the surface of bright platinum plates. If the plates be covered with a deposit of platinum black, in which the gases are absorbed as fast as they are produced, the minimum decomposition point is 1·07 volt, and the process is reversible. If secondary effects are eliminated, the deposition of metals also is a reversible process; the decomposition voltage is equal to the electromotive force which the metal itself gives when going into solution. The phenomena of polarization are thus seen to be due to the changes of surface produced, and are correlated with the differences of potential which exist at any surface of separation between a metal and an electrolyte.

Many experiments have been made with a view of separating the two potential-differences which must exist in any cell made of two metals and a liquid, and of determining each one individually. If we regard the thermal effect at each junction as a measure of the potential-difference there, as the total thermal effect in the cell undoubtedly is of the sum of its potential-differences, in cases where the temperature coefficient is negligible, the heat evolved on solution of a metal should give the electrical potential-difference at its surface. Hence, if we assume that, in the Daniell's cell, the temperature coefficients are negligible at the individual contacts as well as in the cell as a whole, the sign of the potential-difference ought to be the same at the surface of the zinc as it is at the surface of the copper. Since zinc goes into solution and copper comes out, the electromotive force of the cell will be the difference between the two effects. On the other hand, it is commonly thought that the single potential-differences at the surface of metals and electrolytes have been determined by methods based on the use of the capillary electrometer and on others depending on what is called a dropping electrode, that is, mercury dropping rapidly into an electrolyte and forming a cell with the mercury at rest in the bottom of the vessel. By both these methods the single potential-differences found at the surfaces of the zinc and copper have opposite signs, and the effective electromotive force of a Daniell's cell is the sum of the two effects. Which of these conflicting views represents the truth still remains uncertain.

Diffusion of Electrolytes and Contact Difference of Potential between Liquids.—An application of the theory of ionic velocity due to W. Nernst[1] and M. Planck[2] enables us to calculate the diffusion constant of dissolved electrolytes. According to the molecular theory, diffusion is due to the motion of the molecules of the dissolved substance through the liquid. When the dissolved molecules are uniformly distributed, the osmotic pressure will be the same everywhere throughout the solution, but, if the concentration vary from point to point, the pressure will vary also. There must, then, be a relation between the rate of change of the concentration and the osmotic pressure gradient, and thus we may consider the osmotic pressure gradient as a force driving the solute through a viscous medium. In the case of non-electrolytes and of all non-ionized molecules this analogy completely represents the facts, and the phenomena of diffusion can be deduced from it alone. But the ions of an electrolytic solution can move independently through the liquid, even when no current flows, as the consequences of Ohm's law indicate. The ions will therefore diffuse independently, and the faster ion will travel quicker into pure water in contact with a solution. The ions carry their charges with them, and, as a matter of fact, it is found that water in contact with a solution takes with respect to it a positive or negative potential, according as the positive or negative ion travels the faster. This process will go on until the simultaneous separation of electric charges produces an electrostatic force strong enough to prevent further separation of ions. We can therefore calculate the rate at which the salt as a whole will diffuse by examining the conditions for a steady transfer, in which the ions diffuse at an equal rate, the faster one being restrained and the slower one urged forward by the electric forces. In this manner the diffusion constant can be calculated in absolute units ($HCl=2{\cdot}49$, $HNO_3=2{\cdot}27$, $NaCl=1{\cdot}12$), the unit of time being the day. By experiments on diffusion this constant has been found by Scheffer, and the numbers observed agree with those calculated ($HCl=2{\cdot}30$, $HNO_3=2{\cdot}22$, $NaCl=1{\cdot}11$).

As we have seen above, when a solution is placed in contact with water the water will take a positive or negative potential with regard to the solution, according as the cation or anion has the greater specific velocity, and therefore the greater initial rate of diffusion. The difference of potential between two solutions of a substance at different concentrations can be calculated from the equations used to give the diffusion constants. The results give equations of the same logarithmic form as those obtained in a somewhat different manner in the theory of concentration cells described above, and have been verified by experiment.

The contact differences of potential at the interfaces of metals and electrolytes have been co-ordinated by Nernst with those at the surfaces of separation between different liquids. In contact with a solvent a metal is supposed to possess a definite solution pressure, analogous to the vapour pressure of a liquid. Metal goes into solution in the form of electrified ions. The liquid thus acquires a positive charge, and the metal a negative charge. The electric forces set up tend to prevent further separation, and finally a state of equilibrium is reached, when no more ions can go into solution unless an equivalent number are removed by voltaic action. On the analogy between this case and that of the interface between two solutions, Nernst has arrived at similar logarithmic expressions for the difference of potential, which becomes proportional to log (P_1/P_2) where P_2 is taken to mean the osmotic pressure of the cations in the solution, and P_1 the osmotic pressure of the cations in the substance of the metal itself. On these lines the equations of concentration cells, deduced above on less hypothetical grounds, may be regained.

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[1] *Zeits. physikal. Chem.* 2, p. 613.

[2] *Wied. Ann.*, 1890, 40, p. 561.

Theory of Electrons.—Our views of the nature of the ions of electrolytes have been extended by the application of the ideas of the relations between matter and electricity obtained by the study of electric conduction through gases. The interpretation of the phenomena of gaseous conduction was rendered possible by the knowledge previously acquired of conduction through liquids; the newer subject is now reaching a position whence it can repay its debt to the older.

Sir J. J. Thomson has shown (see CONDUCTION, ELECTRIC, § III.) that the negative ions in certain cases of gaseous conduction are much more mobile than the corresponding positive ions, and possess a mass of about the one-thousandth part of that of a hydrogen atom. These negative particles or corpuscles seem to be the ultimate units of negative electricity, and may be identified with the electrons required by the theories of H. A. Lorentz and Sir J. Larmor. A body containing an excess of these particles is negatively electrified, and is positively electrified if it has parted with some of its normal number. An electric current consists of a moving stream of electrons. In gases the electrons sometimes travel alone, but in liquids they are always attached to matter, and their motion involves the movement of chemical atoms or groups of atoms. An atom with an extra corpuscle is a univalent negative ion, an atom with one corpuscle detached is a univalent positive ion. In metals the electrons can slip from one atom to the next, since a current can pass without chemical action. When a current passes from an electrolyte to a metal, the electron must be detached from the atom it was accompanying and chemical action be manifested at the electrode.

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Some of the more important papers on the subject have been reprinted for Harper's *Series of Scientific Memoirs in Electrolytic Conduction* (1899) and the *Modern Theory of Solution* (1899). Several journals are published specially to deal with physical chemistry, of which electrochemistry forms an important part. Among them may be mentioned the *Zeitschrift für physikalische Chemie* (Leipzig); and the *Journal of Physical Chemistry* (Cornell University). In these periodicals will be found new work on the subject and abstracts of papers which appear in other physical and chemical publications. (W. C. D. W.)

ELECTROMAGNETISM, that branch of physical science which is concerned with the interconnexion of electricity and magnetism, and with the production of magnetism by means of electric currents by devices called electromagnets.

History.—The foundation was laid by the observation first made by Hans Christian Oersted (1777–1851), professor of natural philosophy in Copenhagen, who discovered in 1820 that a wire uniting the poles or terminal plates of a voltaic pile has the property of affecting a magnetic needle[1] (see ELECTRICITY). Oersted carefully ascertained that the nature of the wire itself did not influence the result but saw that it was due to the electric conflict, as he called it, round the wire; or in modern language, to the magnetic force or magnetic flux round the conductor. If a straight wire through which an electric current is flowing is placed above and parallel to a magnetic compass needle, it is found that if the current is flowing in the conductor in a direction from south to north, the north pole of the needle under the conductor deviates to the left hand, whereas if the conductor is placed under the needle, the north pole deviates to the right hand; if the conductor is doubled back over the needle, the effects of the two sides of the loop are added together and the deflection is increased. These results are summed up in the mnemonic rule: *Imagine yourself swimming in the conductor with the current, that is, moving in the direction of the positive electricity, with your face towards the magnetic needle; the north pole will then deviate to your left hand.* The deflection of the magnetic needle can therefore reveal the existence of an electric current in a neighbouring circuit, and this fact was soon utilized in the construction of instruments called galvanometers (*q.v.*).

Immediately after Oersted's discovery was announced, D. F. J. Arago and A. M. Ampère began investigations on the subject of electromagnetism. On the 18th of September 1820, Ampère read a paper before the Academy of Sciences in Paris, in which he announced that the voltaic pile itself affected a magnetic needle as did the uniting wire, and he showed that the effects in both cases were consistent with the theory that electric current was a circulation round a circuit, and equivalent in magnetic effect to a very short magnet with axis placed at right angles to the plane of the circuit. He then propounded his brilliant hypothesis that the magnetization of iron was due to molecular electric currents. This suggested to Arago that wire wound into a helix carrying electric current should magnetize a steel needle placed in the interior. In the *Ann. Chim.* (1820, 15, p. 94), Arago published a paper entitled "Expériences relatives à l'aimantation du fer et de l'acier par l'action du courant voltaïque," announcing that the wire conveying the current, even though of copper, could magnetize steel needles placed across it, and if plunged into iron filings it attracted them. About the same time Sir Humphry Davy sent a communication to Dr W. H. Wollaston, read at the Royal Society on the 16th of November 1820 (reproduced in the *Annals of Philosophy* for August 1821, p. 81), "On the Magnetic Phenomena produced by Electricity," in which he announced his independent discovery of the same fact. With a large battery of 100 pairs of plates at the Royal Institution, he found in October 1820 that the uniting wire became strongly magnetic and that iron filings clung to it; also that steel needles placed across the wire were permanently magnetized. He placed a sheet of glass over the wire and sprinkling iron filings on it saw that they arranged themselves in straight lines at right angles to the wire. He then proved that Leyden jar discharges could produce the same effects. Ampère and Arago then seem to have experimented together and magnetized a steel needle wrapped in paper which was enclosed in a helical wire conveying a current. All these facts were rendered intelligible when it was seen that a wire when conveying an electric current becomes surrounded by a magnetic field. If the wire is a long straight one, the lines of magnetic force are circular and concentric with centres on the wire axis, and if the wire is bent into a circle the lines of magnetic force are endless loops surrounding and linked with the electric circuit. Since a magnetic pole tends to move along a line of magnetic force it was obvious that it should revolve round a wire conveying a current. To exhibit this fact involved, however, much ingenuity. It was first accomplished by Faraday in October 1821 (*Exper. Res.* ii. p. 127). Since the action is reciprocal a current free to move tends to revolve round a magnetic pole. The fact is most easily shown by a small piece of apparatus made as follows: In a glass cylinder (see fig. 1) like a lamp chimney are fitted two corks. Through the bottom one is passed the north end of a bar magnet which projects up above a little mercury lying in the cork. Through the top cork is passed one end of a wire from a battery, and a piece of wire in the cylinder is flexibly connected to it, the lower end of this last piece just touching the mercury. When a current is passed in at the top wire and out at the lower end of the bar magnet, the loose wire revolves round the magnet pole. All text-books on physics contain in their chapters on electromagnetism full accounts of various forms of this experiment.

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[1] In the *Annals of Philosophy* for November 1821 is a long article entitled "Electromagnetism" by Oersted, in which he gives a detailed account of his discovery. He had his thoughts turned to it as far back as 1813, but not until the 20th of July 1820 had he actually made his discovery. He seems to have been arranging a compass needle to observe any deflections during a storm, and placed near it a platinum wire through which a galvanic current was passed.

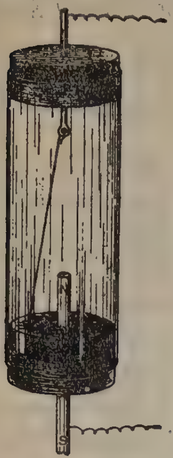
FIG. 1.

In 1825 another important step forward was taken when William Sturgeon (1783–1850) of London produced the electromagnet. It consisted of a horseshoe-shaped bar of soft iron, coated with varnish, on which was wrapped a spiral coil of bare copper wire, the turns not touching each other. When a voltaic current was passed through the wire the iron became a powerful magnet, but on severing the connexion with the battery, the soft iron lost immediately nearly all its magnetism.[1]

At that date Ohm had not announced his law of the electric circuit, and it was a matter of some surprise to investigators to find that Sturgeon's electromagnet could not be operated at a distance through a long circuit of wire with such good results as when close to the battery. Peter Barlow, in January 1825, published in the *Edinburgh Philosophical Journal*, a description of such an experiment made with a view of applying Sturgeon's electromagnet to telegraphy, with results which were unfavourable. Sturgeon's experiments, however, stimulated Joseph Henry (*q.v.*) in the United States, and in 1831 he gave a description of a method of winding electromagnets which at once put a new face upon matters (*Silliman's Journal*, 1831, 19, p. 400). Instead of insulating the iron core, he wrapped the copper wire round with silk and wound in numerous turns and many layers upon the iron horseshoe in such fashion that the current went round the iron always in the same direction. He then found that such an electromagnet wound with a long fine wire, if worked with a battery consisting of a large number of cells in series, could be operated at a considerable distance, and he thus produced what were called at that time *intensity electromagnets*, and which subsequently rendered the electric telegraph a possibility. In fact, Henry established in 1831, in Albany, U.S.A., an electromagnetic telegraph, and in 1835 at Princeton even used an earth return, thereby anticipating the discovery (1838) of C. A. Steinheil (1801–1870) of Munich.

Inventors were then incited to construct powerful electromagnets as tested by the weight they could carry from their armatures. Joseph Henry made a magnet for Yale College, U.S.A., which lifted 3000 ℔ (*Silliman's Journal*, 1831, 20, p. 201), and one for Princeton which lifted 3000 with a very small battery. Amongst others J. P. Joule, ever memorable for his investigations on the mechanical equivalent of heat, gave much attention about 1838–1840 to the construction of electromagnets and succeeded in devising some forms remarkable for their lifting power. One form was constructed by cutting a thick soft iron tube longitudinally into two equal parts. Insulated copper wire was then wound longitudinally over one of both parts (see fig. 2) and a current sent through the wire. In another form two iron disks with teeth at right angles to the disk had insulated wire wound zigzag between the teeth; when a current was sent through the wire, the teeth were so magnetized that they were alternately N. and S. poles. If two such similar disks were placed with teeth of opposite polarity in contact, a very large force was required to detach them, and with a magnet and armature weighing in all 11·575 ℔ Joule found that a weight of 2718 was supported. Joule's papers on this subject will be found in his *Collected Papers* published by the Physical Society of London, and in *Sturgeon's Annals of Electricity*, 1838–1841, vols. 2-6.

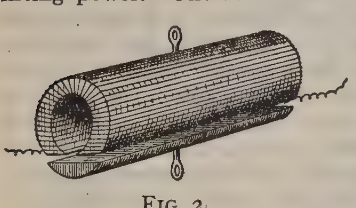
FIG. 2.

The Magnetic Circuit.—The phenomena presented by the electromagnet are interpreted by the aid of the notion of the magnetic circuit. Let us consider a thin circular sectioned ring of iron wire wound over with a solenoid or spiral of insulated copper wire through which a current of electricity can be passed. If the solenoid or wire windings existed alone, a current having a strength A amperes passed through it would create in the interior of the solenoid a magnetic force H, numerically equal to $4\pi/10$ multiplied by the number of windings N on the solenoid, and by the current in amperes A, and divided by the mean length of the solenoid l, or $H = 4\pi AN/10l$. The product AN is called the "ampere-turns" on the solenoid. The product Hl of the magnetic force H and the length l of the magnetic circuit is called the "magnetomotive force" in the magnetic circuit, and from the above formula it is seen that the magnetomotive force denoted by (M.M.F.) is equal to $4\pi\ 10 (= 1{\cdot}25$ nearly) times the ampere-turns (A.N.) on the exciting coil or solenoid. Otherwise (A.N.) = 0·8(M.M.F.). The magnetomotive force is regarded as creating an effect called magnetic flux (Z) in the magnetic circuit, just as electromotive force E.M.F. produces electric current (A) in the electric circuit, and as by Ohm's law (see ELECTROKINETICS) the current varies as the E.M.F. and inversely as a quality of the electric circuit called its "resistance," so in the magnetic circuit the magnetic flux varies as the magnetomotive force and inversely as a quality of the magnetic circuit called its "reluctance." The great difference between the electric circuit and the magnetic circuit lies in the fact that whereas the electric resistance of a solid or liquid conductor is independent of the current and affected only by the temperature, the magnetic reluctance varies with the magnetic flux and cannot be defined except by means of a curve which shows its value for different flux densities. The quotient of the total magnetic flux, Z, in a circuit by the cross section, S, of the circuit is called the mean "flux density," and the reluctance of a magnetic circuit one centimetre long and one square centimetre in cross section is called the "reluctivity" of the material. The relation between reluctivity $\rho = 1/\mu$ magnetic force H, and flux density B, is defined by the equation $H = \rho B$, from which we have $Hl = Z(\rho l/S) =$ M.M.F. acting on the circuit. Again, since the ampere-turns (AN) on the circuit are equal to 0·8 times the M.M.F., we have finally $AN/l = 0{\cdot}8(Z/\mu S)$. This equation tells us the exciting force reckoned in ampere-turns, AN, which must be put on the ring core to create a total magnetic flux Z in it, the ring core having a mean perimeter l and cross section S and reluctivity $\rho = 1/\mu$ corresponding to a flux density Z/S. Hence before we can make use of the equation for practical purposes we need to possess a curve for the particular material showing us the value of the reluctivity corresponding to various values of the possible flux density. The reciprocal of ρ is usually called the "permeability" of the material and denoted by μ. Curves showing the relation of $1/\rho$ and Z S or μ and B, are called "permeability curves." For air and all other non-magnetic matter the permeability has the same value, taken arbitrarily as unity. On the other hand, for iron, nickel and cobalt the permeability may in some cases reach a value of 2000 or 2500 for a value of B = 5000 in C.G.S. measure (see UNITS, PHYSICAL). The process of taking these curves consists in sending a current of known strength through a solenoid of known number of turns wound on a circular iron ring of known dimensions, and observing the time-integral of the secondary current produced in a secondary circuit of known turns and resistance R wound over the iron core N times. The secondary electromotive force is by Faraday's law (see ELECTROKINETICS) equal to the time rate of change of the total flux, or $E = N dZ/dt$. But by Ohm's law $E = R dq/dt$, where q is the quantity of electricity set flowing in the secondary circuit by a change dZ in the co-linked total flux. Hence if 2Q represents this total quantity of electricity set flowing in the secondary circuit by suddenly reversing the direction of the magnetic flux Z in the iron core we must have

$$RQ = NZ \text{ or } Z = RQ/N.$$

The measurement of the total quantity of electricity Q can be made by means of a ballistic galvanometer (*q.v.*), and the resistance R of the secondary circuit includes that of the coil wound on the iron core and the galvanometer as well. In this manner the value of the total flux Z and therefore of Z/S = B or the flux density, can be found for a given magnetizing force H, and this last quantity is determined when we know the magnetizing current in the solenoid and its turns and dimensions. The curve which delineates the relation of H and B is called the magnetization curve for the material in question. For examples of these curves see MAGNETISM.

The fundamental law of the non-homogeneous magnetic circuit traversed by one and the same total magnetic flux Z is that the sum of all the magnetomotive forces acting in the circuit is numerically equal to the product of the factor 0·8, the total flux in the circuit, and the sum of all the reluctances of the various parts of the circuit. If then the circuit consists of materials of different permeability and it is desired to know the ampere-turns required to produce a given total of flux round the circuit, we have to calculate from the magnetization curves of the material of each part the necessary magnetomotive forces and add these forces together. The practical application of this principle to the predetermination of the field windings of dynamo magnets was first made by Drs J. and E. Hopkinson (*Phil. Trans.*, 1886, 177, p. 331).

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[1] See *Trans. Soc. Arts*, 1825, 43, p. 38, in which a figure of Sturgeon's electromagnet is given as well as of other pieces of apparatus for which the Society granted him a premium and a silver medal.

We may illustrate the principles of this predetermination by a simple example. Suppose a ring of iron has a mean diameter of 10 cms. and a cross section of 2 sq. cms., and a transverse cut on air gap made in it 1 mm. wide. Let us inquire the ampere-turns to be put upon the ring to create in it a total flux of 24,000 C.G.S. units. The total length of the iron part of the circuit is $(10\pi - 0\cdot 1)$ cms., and its section is 2 sq. cms., and the flux density in it is to be 12,000. From Table II. below we see that the permeability of pure iron corresponding to a flux density of 12,000 is 2760. Hence the reluctance of the iron circuits is equal to

$$\frac{10\pi - 0\cdot 1}{2760 \times 2} = \frac{220}{38640}\text{C.G.S. units.}$$

The length of the air gap is 0·1 cm., its section 2 sq. cms., and its permeability is unity. Hence the reluctance of the air gap is

$$\frac{0\cdot 1}{1 \times 2} = \frac{1}{20}\text{C.G.S. unit.}$$

Accordingly the magnetomotive force in ampere-turns required to produce the required flux is equal to

$$0\cdot 8(24{,}000)\left(\frac{1}{20} + \frac{220}{38640}\right) = 1070 \text{ nearly.}$$

It follows that the part of the magnetomotive force required to overcome the reluctance of the narrow air gap is about nine times that required for the iron alone.

In the above example we have for simplicity assumed that the flux in passing across the air gap does not spread out at all. In dealing with electromagnet design in dynamo construction we have, however, to take into consideration the spreading as well as the leakage of flux across the circuit (see DYNAMO). It will be seen, therefore, that in order that we may predict the effect of a certain kind of iron or steel when used as the core of an electromagnet, we must be provided with tables or curves showing the reluctivity or permeability corresponding to various flux densities or—which comes to the same thing—with (B, H) curves for the sample.

Iron and Steel for Electromagnetic Machinery.—In connexion with the technical application of electromagnets such as those used in the field magnets of dynamos (*q.v.*), the testing of different kinds of iron and steel for magnetic permeability has therefore become very important. Various instruments called permeameters and hysteresis meters have been designed for this purpose, but much of the work has been done by means of a ballistic galvanometer and test ring as above described. The "hysteresis" of an iron or steel is that quality of it in virtue of which energy is dissipated as heat when the magnetization is reversed or carried through a cycle (see MAGNETISM), and it is generally measured either in ergs per cubic centimetre of metal per cycle of magnetization, or in watts per ℔ per 50 or 100 cycles per second at or corresponding to a certain maximum flux density, say 2500 or 600 C.G.S. units. For the details of various forms of permeameter and hysteresis meter technical books must be consulted.[1]

An immense number of observations have been carried out on the magnetic permeability of different kinds of iron and steel, and in the following tables are given some typical results, mostly from experiments made by J. A. Ewing (see *Proc. Inst. C.E.*, 1896, 126, p. 185) in which the ballistic method was employed to determine the flux density corresponding to various magnetizing forces acting upon samples of iron and steel in the form of rings.

The figures under heading I. are values given in a paper by A. W. S. Pocklington and F. Lydall (*Proc. Roy. Soc.*, 1892–1893, 52, pp. 164 and 228) as the results of a magnetic test of an exceptionally pure iron supplied for the purpose of experiment by Colonel Dyer, of the Elswick Works. The substances other than iron in this sample were stated to be: carbon, *trace*; silicon, *trace*; phosphorus, *none*; sulphur, 0·013%; manganese, 0·1%. The other five specimens, II. to VI., are samples of commercial iron or steel. No. II. is a sample of Low Moor bar iron forged into a ring, annealed and turned. No. III. is a steel forging furnished by Mr R. Jenkins as a sample of forged ingot-metal for dynamo magnets. No. IV. is a steel casting for dynamo magnets, unforged, made by Messrs Edgar Allen & Company by a special pneumatic process under the patents of Mr A. Tropenas. No. V. is also an unforged steel casting for dynamo magnets, made by Messrs Samuel Osborne & Company by the Siemens process. No. VI. is also an unforged steel casting for dynamo magnets, made by Messrs Fried. Krupp, of Essen.

TABLE I.—*Magnetic Flux Density corresponding to various Magnetizing Forces in the case of certain Samples of Iron and Steel (Ewing).*

Magnetizing Force H (C.G.S. Units).	Magnetic Flux Density B (C.G.S. Units).					
	I.	II.	III.	IV.	V.	VI.
5	12,700	10,900	12,300	4,700	9,600	10,900
10	14,980	13,120	14,920	12,250	13,050	13,320
15	15,800	14,010	15,800	14,000	14,600	14,350
20	16,300	14,580	16,280	15,050	15,310	14,950
30	16,950	15,280	16,810	16,200	16,000	15,660
40	17,350	15,760	17,190	16,800	16,510	16,150
50	. .	16,060	17,500	17,140	16,900	16,480
60	. .	16,340	17,750	17,450	17,180	16,780
70	. .	16,580	17,970	17,750	17,400	17,000
80	. .	16,800	18,180	18,040	17,620	17,200
90	. .	17,000	18,390	18,230	17,830	17,400
100	. .	17,200	18,600	18,420	18,030	17,600

It will be seen from the figures and the description of the materials that the steel forgings and castings have a remarkably high permeability under small magnetizing force.

Table II. shows the magnetic qualities of some of these materials as found by Ewing when tested with small magnetizing forces.

TABLE II.—*Magnetic Permeability of Samples of Iron and Steel under Weak Magnetizing Forces.*

Magnetic Flux Density B. (C.G.S. Units).	I. Pure Iron.		III. Steel Forging.		VI. Steel Casting.	
	H	μ	H	μ	H	μ
2,000	0·90	2220	1·38	1450	1·18	1690
4,000	1·40	2850	1·91	2090	1·66	2410
6,000	1·85	3240	2·38	2520	2·15	2790
8,000	2·30	3480	2·92	2740	2·83	2830
10,000	3·10	3220	3·62	2760	4·05	2470
12,000	4·40	2760	4·80	2500	6·65	1810

The numbers I., III. and VI. in the above table refer to the samples mentioned in connexion with Table I.

It is a remarkable fact that certain varieties of low carbon steel (commonly called mild steel) have a higher permeability than even annealed Swedish wrought iron under large magnetizing forces. The term *steel*, however, here used has reference rather to the mode of production than the final chemical nature of the material. In some of the mild-steel castings used for dynamo electromagnets it appears that the total foreign matter, including carbon, manganese and silicon, is not more than 0.3% of the whole, the material being 99.7% pure iron. This valuable magnetic property of steel capable of being cast is, however, of great utility in modern dynamo building, as it enables field magnets of very high permeability to be constructed, which can be fashioned into shape by casting instead of being built up as formerly out of masses of forged wrought iron. The curves in fig. 3 illustrate the manner in which the flux density or, as it is usually called, the magnetization curve of this mild cast steel crosses that of Swedish wrought iron, and enables us to obtain a higher flux density corresponding to a given magnetizing force with the steel than with the iron.

From the same paper by Ewing we extract a number of results relating to permeability tests of thin sheet iron and sheet steel, such as is used in the construction of dynamo armatures and transformer cores.

No. VII. is a specimen of good transformer-plate, 0·301 millimetre thick, rolled from Swedish iron by Messrs Sankey of Bilston. No. VIII. is a specimen of specially thin transformer-plate rolled from scrap iron. No. IX. is a specimen of transformer-plate rolled from ingot-steel. No. X. is a specimen of the wire which was used by J. Swinburne to form the core of his "hedgehog" transformers. Its diameter was 0·602 millimetre. All these samples were tested in the

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[1] See S. P. Thompson, *The Electromagnet* (London, 1891); J. A. Fleming, *A Handbook for the Electrical Laboratory and Testing Room*, vol. 2 (London, 1903); J. A. Ewing, *Magnetic Induction in Iron and other Metals* (London, 1903, 3rd ed.).

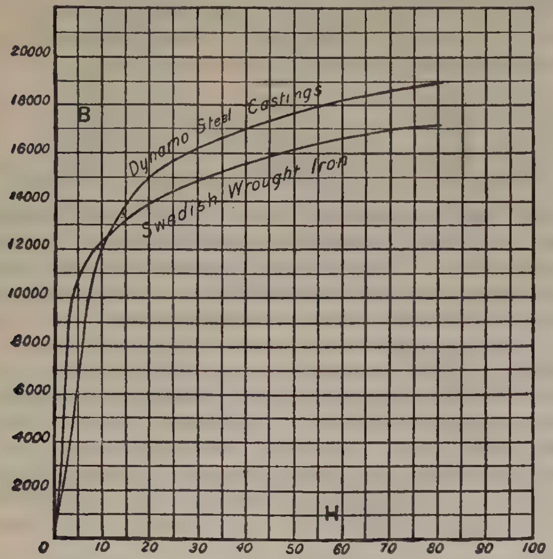

FIG. 3.

form of rings by the ballistic method, the rings of sheet-metal being stamped or turned in the flat. The wire ring No. X. was coiled and annealed after coiling.

TABLE III.—*Permeability Tests of Transformer Plate and Wire.*

Magnetic Flux Density B (C.G.S. Units).	VII. Transformer-plate of Swedish Iron.		VIII. Transformer-plate of Scrap Iron.		IX. Transformer-plate of Steel.		X. Transformer-wire.	
	H	μ	H	μ	H	μ	H	μ
1,000	0·81	1230	1·08	920	0·60	1470	1·71	590
2,000	1·05	1900	1·46	1370	0·90	2230	2·10	950
3,000	1·26	2320	1·77	1690	1·04	2880	2·30	1300
4,000	1·54	2600	2·10	1900	1·19	3360	2·50	1600
5,000	1·82	2750	2·53	1980	1·38	3620	2·70	1850
6,000	2·14	2800	3·04	1970	1·59	3770	2·92	2070
7,000	2·54	2760	3·62	1930	1·89	3700	3·16	2210
8,000	3·09	2590	4·37	1830	2·25	3600	3·43	2330
9,000	3·77	2390	5·3	1700	2·72	3310	3·77	2390
10,000	4·6	2170	6·5	1540	3·33	3000	4·17	2400
11,000	5·7	1930	7·9	1390	4·15	2650	4·70	2340
12,000	7·0	1710	9·8	1220	5·40	2220	5·45	2200
13,000	8·5	1530	11·9	1190	7·1	1830	6·5	2000
14,000	11·0	1270	15·0	930	10·0	1400	8·4	1670
15,000	15·1	990	19·5	770	..	..	11·9	1260
16,000	21·4	750	27·5	580	..	..	21·0	760

Some typical flux-density curves of iron and steel as used in dynamo and transformer building are given in fig. 4.

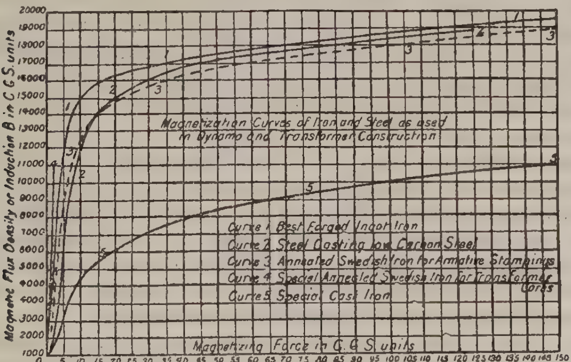

FIG. 4.

The numbers in Table III. well illustrate the fact that the permeability $\mu = B/H$ has a maximum value corresponding to a certain flux density. The tables are also explanatory of the fact that mild steel has gradually replaced iron in the manufacture of dynamo electromagnets and transformer-cores.

Broadly speaking, the materials which are now employed in the manufacture of the cores of electromagnets for technical purposes of various kinds may be said to fall into three classes, namely, forgings, castings and stampings. In some cases the iron or steel core which is to be magnetized is simply a mass of iron hammered or pressed into shape by hydraulic pressure; in other cases it has to be fused and cast; and for certain other purposes it must be rolled first into thin sheets, which are subsequently stamped out into the required forms.

For particular purposes it is necessary to obtain the highest possible magnetic permeability corresponding to a high, or the highest attainable flux density. This is generally the case in the electromagnets which are employed as the field magnets in dynamo machines. It may generally be said that whilst the best wrought iron, such as annealed Low Moor or Swedish iron, is more permeable for low flux densities than steel castings, the cast steel may surpass the wrought metal for high flux density. For most electro-technical purposes the best magnetic results are given by the employment of forged ingot-iron. This material is probably the most permeable throughout the whole scale of attainable flux densities. It is slightly superior to wrought iron, and it only becomes inferior to the highest class of cast steel when the flux density is pressed above 18,000 C.G.S. units (see fig. 5). For flux densities above 13,000 the forged ingot-iron has now practically replaced for electric engineering purposes the Low Moor or Swedish iron. Owing to the method of its production, it might in truth be called a soft steel with a very small percentage of combined carbon. The best description of this material is conveyed by the German term "Flusseisen," but its nearest British equivalent is "ingot-iron." Chemically speaking, the material is for all practical purposes very nearly pure iron. The same may be said of the cast steels now much employed for the production of dynamo magnet cores. The cast steel which is in demand for this purpose has a slightly lower permeability than the ingot-iron for low flux densities, but for flux densities above 16,000 the required result may be more cheaply obtained with a steel casting than with a forging. When high tensile strength is required in addition to considerable magnetic permeability, it has been found advantageous to employ a steel containing 5% of nickel. The rolled sheet iron and sheet steel which is in request for the construction of magnet cores, especially those in which the exciting current is an alternating current, are, generally speaking, produced from Swedish iron. Owing to the mechanical treatment necessary to reduce the material to a thin sheet, the permeability at low flux densities is rather higher than, although at high flux densities it is inferior

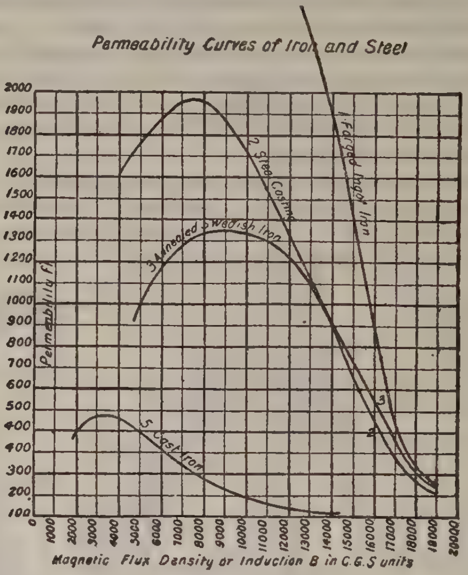

FIG. 5.

to, the same iron and steel when tested in bulk. For most purposes, however, where a laminated iron magnet core is required, the flux density is not pressed up above 6000 units, and it is then more important to secure small hysteresis loss than high permeability. The magnetic permeability of cast iron is much inferior to that of wrought or ingot-iron, or the mild steels taken at the same flux densities.

The following Table IV. gives the flux density and permeability of a typical cast iron taken by J. A. Fleming by the ballistic method:—

Table IV.—*Magnetic Permeability and Magnetization Curve of Cast Iron.*

H	B	μ	H	B	μ	H	B	μ
·19	27	139	8·84	4030	456	44·65	8,071	181
·41	62	150	10·60	4491	424	56·57	8,548	151
1·11	206	176	12·33	4884	396	71·98	9,097	126
2·53	768	303	13·95	5276	378	88·99	9,600	108
3·41	1251	367	15·61	5504	353	106·35	10,066	95
4·45	1898	427	18·21	5829	320	120·60	10,375	86
5·67	2589	456	26·37	6814	258	140·37	10,725	76
7·16	3350	468	36·54	7580	207	152·73	10,985	72

The metal of which the tests are given in Table IV. contained 2% of silicon, 2·85% of total carbon, and 0·5% of manganese. It will be seen that a magnetizing force of about 5 C.G.S. units is sufficient to impart to a wrought-iron ring a flux density of 18,000 C.G.S. units, but the same force hardly produces more than one-tenth of this flux density in cast iron.

The testing of sheet iron and steel for magnetic hysteresis loss has developed into an important factory process, giving as it does a means of ascertaining the suitability of the metal for use in the manufacture of transformers and cores of alternating-current electromagnets.

In Table V. are given the results of hysteresis tests by Ewing on samples of commercial sheet iron and steel. The numbers VII., VIII., IX. and X. refer to the same samples as those for which permeability results are given in Table III.

Table V.—*Hysteresis Loss in Transformer-iron.*

Maximum Flux Density B.	Ergs per Cubic Centimetre per Cycle.				Watts per ℔ at a Frequency of 100.			
	VII. Swedish Iron	VIII. Forged Scrap-iron	IX. Ingot-steel.	X. Soft Iron Wire.	VII.	VIII.	IX.	X.
2000	240	400	215	600	0·141	0·236	0·127	0·356
3000	520	790	430	1150	0·306	0·465	0·253	0·630
4000	830	1220	700	1780	0·490	0·720	0·410	1·050
5000	1190	1710	1000	2640	0·700	1·010	0·590	1·550
6000	1600	2260	1350	3360	0·940	1·330	0·790	1·980
7000	2020	2940	1730	4300	1·200	1·730	1·020	2·530
8000	2510	3710	2150	5300	1·480	2·180	1·270	3·120
9000	3050	4560	2620	6380	1·800	2·680	1·540	3·750

In Table VI. are given the results of a magnetic test of some exceedingly good transformer-sheet rolled from Swedish iron.

Table VI.—*Hysteresis Loss in Strip of Transformer-plate rolled Swedish Iron.*

Maximum Flux Density B.	Ergs per Cubic Centimetre per Cycle.	Watts per ℔ at a Frequency of 100.
2000	220	0·129
3000	410	0·242
4000	640	0·376
5000	910	0·535
6000	1200	0·710
7000	1520	0·890
8000	1900	1·120
9000	2310	1·360

In Table VII. are given some values obtained by Fleming for the hysteresis loss in the sample of cast iron, the permeability test of which is recorded in Table IV.

Table VII.—*Observations on the Magnetic Hysteresis of Cast Iron.*

Loop.	B (max.)	Hysteresis Loss.	
		Ergs per cc. per Cycle.	Watts per ℔ per 100 Cycles per see.
I.	1475	466	·300
II.	2545	1,288	·829
III.	3865	2,997	1·934
IV.	5972	7,397	4·765
V.	8930	13,423	8·658

For most practical purposes the constructor of electromagnetic machinery requires his iron or steel to have some one of the following characteristics. If for dynamo or magnet making, it should have the highest possible permeability at a flux density corresponding to practically maximum magnetization. If for transformer or alternating-current magnet building, it should have the smallest possible hysteresis loss at a maximum flux density of 2500 C.G.S. units during the cycle. If required for permanent magnet making, it should have the highest possible coercivity combined with a high retentivity. Manufacturers of iron and steel are now able to meet these demands in a very remarkable manner by the commercial production of material of a quality which at one time would have been considered a scientific curiosity.

It is usual to specify iron and steel for the first purpose by naming the minimum permeability it should possess corresponding to a flux density of 18,000 C.G.S. units; for the second, by stating the hysteresis loss in watts per ℔ per 100 cycles per second, corresponding to a maximum flux density of 2500 C.G.S. units during the cycle; and for the third, by mentioning the coercive force required to reduce to zero magnetization a sample of the metal in the form of a long bar magnetized to a stated magnetization. In the cyclical reversal of magnetization of iron we have two modes to consider. In the first case, which is that of the core of the alternating transformer, the magnetic force passes through a cycle of values, the iron remaining stationary, and the direction of the magnetic force being always the same. In the other case, that of the dynamo armature core, the direction of the magnetic force in the iron is constantly changing, and at the same time undergoing a change in magnitude.

It has been shown by F. G. Baily (*Proc. Roy. Soc.*, 1896) that if a mass of laminated iron is rotating in a magnetic field which remains constant in direction and magnitude in any one experiment, the hysteresis loss rises to a maximum as the magnitude of the flux density in the iron is increased and then falls away again to nearly zero value. These observations have been confirmed by other observers. The question has been much debated whether the values of the hysteresis loss obtained by these two different methods are identical for magnetic cycles in which the flux density reaches the same maximum value. This question is also connected with another one, namely, whether the hysteresis loss per cycle is or is not a function of the speed with which the cycle is traversed. Early experiments by C. P. Steinmetz and others seemed to show that there was a difference between slow-speed and high-speed hysteresis cycles, but later experiments by J. Hopkinson and by A. Tanakadaté, though not absolutely exhaustive, tend to prove that up to 400 cycles per second the hysteresis loss per cycle is practically unchanged.

Experiments made in 1896 by R. Beattie and R. C. Clinker on magnetic hysteresis in rotating fields were partly directed to determine whether the hysteresis loss at moderate flux densities, such as are employed in transformer work, was the same as that found by measurements made with alternating-current fields on the same iron and steel specimens (see *The Electrician*, 1896, 37, p. 723). These experiments showed that over moderate ranges of induction, such as may be expected in electro-technical work, the hysteresis loss per cycle per cubic centimetre was practically the same when the iron was tested in an alternating field with a periodicity of 100, the field remaining constant in direction, and when the iron was tested in a rotating field giving the same maximum flux density.

With respect to the variation of hysteresis loss in magnetic cycles having different maximum values for the flux density, Steinmetz found that the hysteresis loss (W), as measured by the area of the complete (B, H) cycle and expressed in ergs per centimetre-cube per cycle, varies proportionately to a constant called the *hysteretic constant*, and to the 1·6th power of the maximum flux density (B), or $W=\eta B^{1 \cdot 6}$.

The hysteretic constants (η) for various kinds of iron and steel are given in the table below:—

Metal.	Hysteretic Constant.
Swedish wrought iron, well annealed	·0010 to ·0017
Annealed cast steel of good quality; small percentage of carbon	·0017 to ·0029
Cast Siemens-Martin steel	·0019 to ·0028
Cast ingot-iron	·0021 to ·0026
Cast steel, with higher percentages of carbon, or inferior qualities of wrought iron	·0031 to ·0054

Steinmetz's law, though not strictly true for very low or very high maximum flux densities, is yet a convenient empirical rule for obtaining approximately the hysteresis loss at any one maximum flux density and knowing it at another, provided these values fall within a range varying say from 1 to 9000 C.G.S. units. (See MAGNETISM.)

The standard maximum flux density which is adopted in electro-technical work is 2500, hence in the construction of the cores of alternating-current electromagnets and transformers iron has to be employed having a known hysteretic constant at the standard flux density. It is generally expressed by stating the number of watts per ℔ of metal which would be dissipated for a frequency of 100 cycles, and a maximum flux density (B max.) during the cycle of 2500. In the case of good iron or steel for transformer-core making, it should not exceed 1·25 watt per ℔ per 100 cycles per 2500 B (maximum value).

It has been found that if the sheet iron employed for cores of alternating electromagnets or transformers is heated to a temperature somewhere in the neighbourhood of 200° C. the hysteresis loss is very greatly increased. It was noticed in 1894 by G. W. Partridge that alternating-current transformers which had been in use some time had a very considerably augmented core loss when compared with their initial condition. O. T. Bláthy and W. M. Mordey in 1895 showed that this augmentation in hysteresis loss in iron was due to heating. H. F. Parshall investigated the effect up to moderate temperatures, such as 140° C., and an extensive series of experiments was made in 1898 by S. R. Roget (*Proc. Roy. Soc.*, 1898, 63, p. 258, and 64, p. 150). Roget found that below 40° C. a rise in temperature did not produce any augmentation in the hysteresis loss in iron, but if it is heated to between 40° C. and 135° C. the hysteresis loss increases continuously with time, and this increase is now called "ageing" of the iron. It proceeds more slowly as the temperature is higher. If heated to above 135° C., the hysteresis loss soon attains a maximum, but then begins to decrease. Certain specimens heated to 160° C. were found to have their hysteresis loss doubled in a few days. The effect seems to come to a maximum at about 180° C. or 200° C. Mere lapse of time does not remove the increase, but if the iron is reannealed the augmentation in hysteresis disappears. If the iron is heated to a higher temperature, say between 300° C. and 700° C., Roget found the initial rise of hysteresis happens more quickly, but that the metal soon settles down into a state in which the hysteresis loss has a small but still augmented constant value. The augmentation in value, however, becomes more nearly zero as the temperature approaches 700° C. Brands of steel are now obtainable which do not age in this manner, but these *non-ageing* varieties of steel have not generally such low initial hysteresis values as the "Swedish Iron," commonly considered best for the cores of transformers and alternating-current magnets.

The following conclusions have been reached in the matter:—(1) Iron and mild steel in the annealed state are more liable to change their hysteresis value by heating than when in the harder condition; (2) all changes are removed by re-annealing; (3) the changes thus produced by heating affect not only the amount of the hysteresis loss, but also the form of the lower part of the (B,H) curve.

Forms of Electromagnet.—The form which an electromagnet must take will greatly depend upon the purposes for which it is to be used. A design or form of electromagnet which will be very suitable for some purposes will be useless for others. Supposing it is desired to make an electromagnet which shall be capable of undergoing very rapid changes of strength, it must have such a form that the coercivity of the material is overcome by a self-demagnetizing force. This can be achieved by making the magnet in the form of a short and stout bar rather than a long thin one. It has already been explained that the ends or poles of a polar magnet exert a demagnetizing power upon the mass of the metal in the interior of the bar. If then the electromagnet has the form of a long thin bar, the length of which is several hundred times its diameter, the poles are very far removed from the centre of the bar, and the demagnetizing action will be very feeble; such a long thin electromagnet, although made of very soft iron, retains a considerable amount of magnetism after the magnetizing force is withdrawn. On the other hand, a very thick bar very quickly demagnetizes itself, because no part of the metal is far removed from the action of the free poles. Hence when, as in many telegraphic instruments, a piece of soft iron, called an armature, has to be attracted to the poles of a horseshoe-shaped electromagnet, this armature should be prevented from quite touching the polar surfaces of the magnet. If a soft iron mass does quite touch the poles, then it completes the magnetic circuit and abolishes the free poles, and the magnet is to a very large extent deprived of its self-demagnetizing power. This is the explanation of the well-known fact that after exciting the electromagnet and then stopping the current, it still requires a good pull to detach the "keeper"; but when once the keeper has been detached, the magnetism is found to have nearly disappeared. An excellent form of electromagnet for the production of very powerful fields has been designed by H. du Bois (fig. 6).

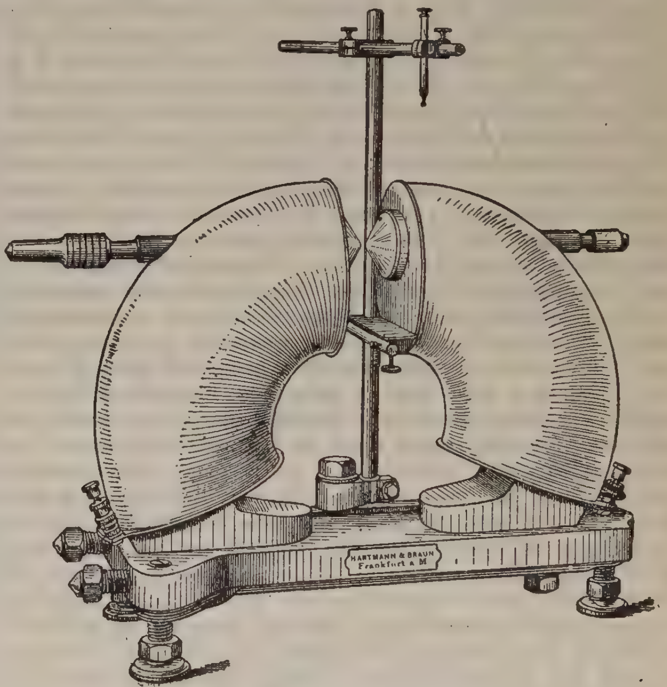

FIG. 6.—Du Bois's Electromagnet.

Various forms of electromagnets used in connexion with dynamo machines are considered in the article DYNAMO, and there is, therefore, no necessity to refer particularly to the numerous different shapes and types employed in electrotechnics.

BIBLIOGRAPHY.—For additional information on the above subject the reader may be referred to the following works and original papers:—

H. du Bois, *The Magnetic Circuit in Theory and Practice*; S. P. Thompson, *The Electromagnet*; J. A. Fleming, *Magnets and Electric Currents*; J. A. Ewing, *Magnetic Induction in Iron and other Metals*; J. A. Fleming, "The Ferromagnetic Properties of Iron and Steel," *Proceedings of Sheffield Society of Engineers and Metallurgists* (Oct. 1897); J. A. Ewing, "The Magnetic Testing of Iron and Steel," *Proc. Inst. Civ. Eng.*, 1896, 126, p. 185; H. F. Parshall, "The Magnetic Data of Iron and Steel," *Proc. Inst. Civ. Eng.*, 1896, 126, p. 220; J. A. Ewing, "The Molecular Theory of Induced Magnetism," *Phil. Mag.*, Sept. 1890; W. M. Mordey, "Slow Changes in the Permeability of Iron," *Proc. Roy. Soc.* 57, p. 224; J. A. Ewing, "Magnetism," James Forrest Lecture, *Proc. Inst. Civ. Eng.* 138; S. P. Thompson, "Electromagnetic Mechanism," *Electrician*, 26, pp. 238, 269, 293; J. A. Ewing, "Experimental Researches in Magnetism," *Phil. Trans.*, 1885, part ii.; Ewing and Klassen, "Magnetic Qualities of Iron," *Proc. Roy. Soc.*, 1893. (J. A. F.)

ELECTROMETALLURGY. The present article, as explained under ELECTROCHEMISTRY, treats only of those processes in which electricity is applied to the production of chemical reactions or molecular changes at furnace temperatures. In many of these the application of heat is necessary to bring the substances used into the liquid state for the purpose of electrolysis, aqueous solutions being unsuitable. Among the earliest experiments in this branch of the subject were those of Sir H. Davy, who in 1807 (*Phil. Trans.*, 1808, p. 1), produced the alkali metals by passing an intense current of electricity from a platinum wire to a platinum dish, through a mass of fused caustic alkali. The action was started in the cold, the alkali being slightly moistened to render it a conductor; then, as the current passed, heat was produced and the alkali fused, the metal being deposited in the liquid condition. Later, A. Matthiessen (*Quarterly Journ. Chem. Soc.* viii. 30) obtained potassium by the electrolysis of a mixture of potassium and calcium chlorides fused over a lamp. There are here foreshadowed two types of electrolytic furnace-operations: (*a*) those in which external heating maintains the electrolyte in the fused condition, and (*b*) those in which a current-density is applied sufficiently high to develop the heat necessary to effect this object unaided. Much of the earlier electrometallurgical work was done with furnaces of the (*a*) type, while nearly all the later developments have been with those of class (*b*). There is a third class of operations, exemplified by the manufacture of calcium carbide, in which electricity is employed solely as a heating agent; these are termed *electrothermal*, as distinguished from *electrolytic*. In certain electrothermal processes (*e.g.* calcium carbide production) the heat from the current is employed in raising mixtures of substances to the temperature at which a desired chemical reaction will take place between them, while in others (*e.g.* the production of graphite from coke or gas-carbon) the heat is applied solely to the production of molecular or physical changes. In ordinary electrolytic work only the continuous current may of course be used, but in electrothermal work an alternating current is equally available.

Electric Furnaces.—Independently of the question of the application of external heating, the furnaces used in electrometallurgy may be broadly classified into (i.) arc furnaces, in which the intense heat of the electric arc is utilized, and (ii.) resistance and incandescence furnaces, in which the heat is generated by an electric current overcoming the resistance of an inferior conductor.

Arc furnaces.

Excepting such experimental arrangements as that of C. M. Despretz (*C.R.*, 1849, 29) for use on a small scale in the laboratory, Pichou in France and J. H. Johnson in England appear, in 1853, to have introduced the earliest practical form of furnace. In these arrangements, which were similar if not identical, the furnace charge was crushed to a fine powder and passed through two or more electric arcs in succession. When used for ore smelting, the reduced metal and the accompanying slag were to be caught, after leaving the arc and while still liquid, in a hearth fired with ordinary fuel. Although this primitive furnace could be made to act, its efficiency was low, and the use of a separate fire was disadvantageous. In 1878 Sir William Siemens patented a form of furnace[1] which is the type of a very large number of those designed by later inventors.

In the best-known form a plumbago crucible was used with a hole cut in the bottom to receive a carbon rod, which was ground in so as to make a tight joint. This rod was connected with the positive pole of the dynamo or electric generator. The crucible was fitted with a cover in which were two holes; one at the side to serve at once as sight-hole and charging door, the other in the centre to allow a second carbon rod to pass freely (without touching) into the interior. This rod was connected with the negative pole of the generator, and was suspended from one arm of a balance-beam, while from the other end of the beam was suspended a vertical hollow iron cylinder, which could be moved into or out of a wire coil or solenoid joined as a shunt across the two carbon rods of the furnace. The solenoid was above the iron cylinder, the supporting rod of which passed through it as a core. When the furnace with this well-known regulating device was to be used, say, for the melting of metals or other conductors of electricity, the fragments of metal were placed in the crucible and the positive electrode was brought near them. Immediately the current passed through the solenoid it caused the iron cylinder to rise, and, by means of its supporting rod, forced the end of the balance beam upwards, so depressing the other end that the negative carbon rod was forced downwards into contact with the metal in the crucible. This action completed the furnace-circuit, and current passed freely from the positive carbon through the fragments of metal to the negative carbon, thereby reducing the current through the shunt. At once the attractive force of the solenoid on the iron cylinder was automatically reduced, and the falling of the latter caused the negative carbon to rise, starting an arc between it and the metal in the crucible. A counterpoise was placed on the solenoid end of the balance beam to act against the attraction of the solenoid, the position of the counterpoise determining the length of the arc in the crucible. Any change in the resistance of the arc, either by lengthening, due to the sinking of the charge in the crucible, or by the burning of the carbon, affected the proportion of current flowing in the two shunt circuits, and so altered the position of the iron cylinder in the solenoid that the length of arc was, within limits, automatically regulated. Were it not for the use of some such device the arc would be liable to constant fluctuation and to frequent extinction. The crucible was surrounded with a bad conductor of heat to minimize loss by radiation. The positive carbon was in some cases replaced by a water-cooled metal tube, or ferrule, closed, of course, at the end inserted in the crucible. Several modifications were proposed, in one of which, intended for the heating of non-conducting substances, the electrodes were passed horizontally through perforations in the upper part of the crucible walls, and the charge in the lower part of the crucible was heated by radiation.

The furnace used by Henri Moissan in his experiments on reactions at high temperatures, on the fusion and volatilization of refractory materials, and on the formation of carbides, silicides and borides of various metals, consisted, in its simplest form, of two superposed blocks of lime or of limestone with a central cavity cut in the lower block, and with a corresponding but much shallower inverted cavity in the upper block, which thus formed the lid of the furnace. Horizontal channels were cut on opposite walls, through which the carbon poles or electrodes were passed into the upper part of the cavity. Such a furnace, to take a current of 4 H.P. (say, of 60 amperes and 50 volts), measured externally about 6 by 6 by 7 in., and the electrodes were about 0·4 in. in diameter, while for a current of 100 H.P. (say, of 746 amperes and 100 volts) it measured about 14 by 12 by 14 in., and the electrodes were about 1·5 in. in diameter. In the latter case the crucible, which was placed in the cavity immediately beneath the arc, was about 3 in. in diameter (internally), and about 3½ in. in height. The fact that energy is being used at so high a rate as 100 H.P. on so small a charge of material sufficiently indicates that the furnace is only used for experimental work, or for the fusion of metals which, like tungsten or chromium, can only be melted at temperatures attainable by electrical means. Moissan succeeded in fusing about ¾ ℔ of either of these metals in 5 or 6 minutes in a furnace similar to that last described. He also arranged an experimental tube-furnace by passing a carbon tube horizontally beneath the arc in the cavity of the lime blocks. When prolonged heating is required at very high temperatures it is found necessary to line the furnace-cavity with alternate layers of magnesia and carbon, taking care that the lamina next to the lime is of magnesia; if this were not done the lime in contact with the carbon crucible would form calcium carbide and would slag down, but magnesia does not yield a carbide in this way. Chaplet has patented a muffle or tube furnace, similar in principle, for use on a larger scale, with a number of electrodes placed above and below the muffle-tube. The arc furnaces now widely used in the manufacture of calcium carbide on a large scale are chiefly developments of the Siemens furnace. But whereas, from its construction, the Siemens furnace was intermittent in operation, necessitating stoppage of the current while the contents of the crucible were poured out, many of the newer forms are specially designed either to minimize the time required in effecting the withdrawal of one charge and the introduction of the next, or to ensure absolute continuity of action, raw material being constantly charged in at the top and the finished substance and by-products (slag, &c.) withdrawn either continuously or at intervals, as sufficient quantity shall have accumulated. In the King furnace, for example, the crucible, or lowest part of the furnace, is made detachable, so that when full it may be removed and an empty crucible substituted. In the United States a revolving furnace is used which is quite continuous in action.

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[1] Cf. Siemens's account of the use of this furnace for experimental purposes in *British Association Report* for 1882.

Incandescence furnaces.

The class of furnaces heated by electrically incandescent materials has been divided by Borchers into two groups: (1) those in which the substance is heated by contact with a substance offering a high resistance to the current passing through it, and (2) those in which the substance to be heated itself affords the resistance to the passage of the current whereby electric energy is converted into heat. Practically the first of these furnaces was that of Despretz, in which the mixture to be heated was placed in a carbon tube rendered incandescent by the passage of a current through its substance from end to end. In 1880 W. Borchers introduced his resistance-furnace, which, in one sense, is the converse of the Despretz apparatus. A thin carbon pencil, forming a bridge between two stout carbon rods, is set in the midst of the mixture to be heated. On passing a current through the carbon the small rod is heated to incandescence, and imparts heat to the surrounding mass. On a larger scale several pencils are used to make the connexions between carbon blocks which form the end walls of the furnace, while the side walls are of fire-brick laid upon one another without mortar. Many of the furnaces now in constant use depend mainly on this principle, a core of granular carbon fragments stamped together in the direct line between the electrodes, as in Acheson's carborundum furnace, being substituted for the carbon pencils. In other cases carbon fragments are mixed throughout the charge, as in E.H. and A.H. Cowles's zinc-smelting retort. In practice, in these furnaces, it is possible for small local arcs to be temporarily set up by the shifting of the charge, and these would contribute to the heating of the mass. In the remaining class of furnace, in which the electrical resistance of the charge itself is utilized, are the continuous-current furnaces, such as are used for the smelting of aluminium, and those alternating-current furnaces, (*e.g.* for the production of calcium carbide) in which a portion of the charge is first actually fused, and then maintained in the molten condition by the current passing through it, while the reaction between further portions of the charge is proceeding.

Uses and advantages.

For ordinary metallurgical work the electric furnace, requiring as it does (excepting where waterfalls or other cheap sources of power are available) the intervention of the boiler and steam-engine, or of the gas or oil engine, with a consequent loss of energy, has not usually proved so economical as an ordinary direct fired furnace. But in some cases in which the current is used for electrolysis and for the production of extremely high temperatures, for which the calorific intensity of ordinary fuel is insufficient, the electric furnace is employed with advantage. The temperature of the electric furnace, whether of the arc or incandescence type, is practically limited to that at which the least easily vaporized material available for electrodes is converted into vapour. This material is carbon, and as its vaporizing point is (estimated at) over 3500° C., and less than 4000° C., the temperature of the electric furnace cannot rise much above 3500° C. (6330° F.); but H. Moissan showed that at this temperature the most stable of mineral combinations are dissociated, and the most refractory elements are converted into vapour, only certain borides, silicides and metallic carbides having been found to resist the action of the heat. It is not necessary that all electric furnaces shall be run at these high temperatures; obviously, those of the incandescence or resistance type may be worked at any convenient temperature below the maximum. The electric furnace has several advantages as compared with some of the ordinary types of furnace, arising from the fact that the heat is generated from within the mass of material operated upon, and (unlike the blast-furnace, which presents the same advantage) without a large volume of gaseous products of combustion and atmospheric nitrogen being passed through it. In ordinary reverberatory and other heating furnaces the burning fuel is without the mass, so that the vessel containing the charge, and other parts of the plant, are raised to a higher temperature than would otherwise be necessary, in order to compensate for losses by radiation, convection and conduction. This advantage is especially observed in some cases in which the charge of the furnace is liable to attack the containing vessel at high temperatures, as it is often possible to maintain the outer walls of the electric furnace relatively cool, and even to keep them lined with a protecting crust of unfused charge. Again, the construction of electric furnaces may often be exceedingly crude and simple; in the carborundum furnace, for example, the outer walls are of loosely piled bricks, and in one type of furnace the charge is simply heaped on the ground around the carbon resistance used for heating, without containing-walls of any kind. There is, however, one (not insuperable) drawback in the use of the electric furnace for the smelting of pure metals. Ordinarily carbon is used as the electrode material, but when carbon comes in contact at high temperatures with any metal that is capable of forming a carbide a certain amount of combination between them is inevitable, and the carbon thus introduced impairs the mechanical properties of the ultimate metallic product. Aluminium, iron, platinum and many other metals may thus take up so much carbon as to become brittle and unforgeable. It is for this reason that Siemens, Borchers and others substituted a hollow water-cooled metal block for the carbon cathode upon which the melted metal rests while in the furnace. Liquid metal coming in contact with such a surface forms a crust of solidified metal over it, and this crust thickens up to a certain point, namely, until the heat from within the furnace just overbalances that lost by conduction through the solidified crust and the cathode material to the flowing water. In such an arrangement, after the first instant, the melted metal in the furnace does not come in contact with the cathode material.

Electrothermal Processes.—In these processes the electric current is used solely to generate heat, either to induce chemical reactions between admixed substances, or to produce a physical (allotropic) modification of a given substance. Borchers predicted that, at the high temperatures available with the electric furnace, every oxide would prove to be reducible by the action of carbon, and this prediction has in most instances been justified. Alumina and lime, for example, which cannot be reduced at ordinary furnace temperatures, readily give up their oxygen to carbon in the electric furnace, and then combine with an excess of carbon to form metallic carbides. In 1885 the brothers Cowles patented a process for the electrothermal reduction of oxidized ores by exposure to an intense current of electricity when admixed with carbon in a retort. Later in that year they patented a process for the reduction of aluminium by carbon, and in 1886 an electric furnace with sliding carbon rods passed through the end walls to the centre of a rectangular furnace. The impossibility of working with just sufficient carbon to reduce the alumina, without using any excess which would be free to form at least so much carbide as would suffice, when diffused through the metal, to render it brittle, practically restricts the use of such processes to the production of aluminium alloys. Aluminium bronze (aluminium and copper) and ferro-aluminium (aluminium and iron) have been made in this way; the latter is the more satisfactory product, because a certain proportion of carbon is expected in an alloy of this character, as in ferromanganese and cast iron, and its presence is not objectionable. The furnace is built of fire-brick, and may measure (internally) 5 ft. in length by 1 ft. 8 in. in width, and 3 ft. in height. Into each end wall is built a short iron tube sloping downwards towards the centre, and through this is passed a bundle of five 3-in. carbon rods, bound together at the outer end by being cast into a head of cast iron for use with iron alloys, or of cast copper for aluminium bronze. This head slides freely in the cast iron tubes, and is connected by a copper rod with one of the terminals of the dynamo supplying the current. The carbons can thus, by the application of suitable mechanism, be withdrawn from or plunged into the furnace at will. In starting the furnace, the bottom is prepared by ramming it with charcoal-powder that has been soaked in milk of lime and dried, so that each particle is coated with a film of lime, which serves to reduce the loss of current by conduction through the lining when the furnace becomes hot. A sheet iron case is then placed within the furnace, and the space between it and the walls rammed with limed charcoal; the interior is filled with fragments of the iron or copper to be alloyed, mixed with alumina and coarse charcoal, broken pieces of carbon being placed in position to connect the electrodes. The iron case is then removed, the whole is covered with charcoal, and a cast iron cover with a central flue is placed above all. The current, either continuous or alternating, is then started, and continued for about 1 to 1½ hours, until the operation is complete, the carbon rods being gradually withdrawn as the action proceeds. In such a furnace a continuous current, for example, of 3000 amperes, at 50 to 60 volts, may be used at first, increasing to 5000 amperes in about half an hour. The reduction is not due to electrolysis, but to the action of carbon on alumina, a part of the carbon in the charge being consumed and evolved as carbon monoxide gas, which burns at the orifice in the cover so long as reduction is taking place. The reduced aluminium alloys itself immediately with the fused globules of metal in its midst, and as the charge becomes reduced the globules of alloy unite until, in the end, they are run out of the tap-hole after the current has been diverted to another furnace. It was found in practice (in 1889) that the expenditure of energy per pound of reduced aluminium was about 23 H.P.-hours, a number considerably in excess of that required at the present time for the production of pure aluminium by the electrolytic process described in the article ALUMINIUM. Calcium carbide, graphite (*q.v.*), phosphorus (*q.v.*) and carborundum (*q.v.*) are now extensively manufactured by the operations outlined above.

Aluminium alloys.

Electrolytic Processes.—The isolation of the metals sodium and potassium by Sir Humphry Davy in 1807 by the electrolysis of the fused hydroxides was one of the earliest applications of the electric current to the extraction of metals. This pioneering work showed little development until about the middle of the 19th century. In 1852 magnesium was isolated electrolytically by R. Bunsen, and this process subsequently received much attention at the hands of Moissan and Borchers. Two years later Bunsen and H. E. Sainte Claire Deville working independently obtained aluminium (*q.v.*) by the electrolysis of the fused double sodium aluminium chloride. Since that date other processes have been devised and the electrolytic processes have entirely replaced the older methods of reduction with sodium. Methods have also been discovered for the electrolytic manufacture of calcium (*q.v.*), which have had the effect of converting a laboratory curiosity into a product of commercial importance. Barium and strontium have also been produced by electrometallurgical methods, but the processes have only a laboratory interest at present. Lead, zinc and other metals have also been reduced in this manner.

For further information the following books, in addition to those mentioned at the end of the article ELECTROCHEMISTRY, may be consulted: Borchers, *Handbuch der Elektrochemie*; *Electric Furnaces* (Eng. trans. by H. G. Solomon, 1908); Moissan, *The Electric Furnace* (1904); J. Escard, *Fours électriques* (1905); *Les Industries électrochimiques* (1907). (W. G. M.)

ELECTROMETER, an instrument for measuring difference of potential, which operates by means of electrostatic force and gives the measurement either in arbitrary or in absolute units (see UNITS, PHYSICAL). In the last case the instrument is called an absolute electrometer. Lord Kelvin has classified electrometers into (1) Repulsion, (2) Attracted disk, and (3) Symmetrical electrometers (see W. Thomson, *Brit. Assoc. Report*, 1867, or *Reprinted Papers on Electrostatics and Magnetization*, p. 261).

Repulsion Electrometers.—The simplest form of repulsion electrometer is W. Henley's pith ball electrometer (*Phil. Trans.*, 1772, 63, p. 359) in which the repulsion of a straw ending in a pith ball from a fixed stem is indicated on a graduated arc (see ELECTROSCOPE). A double pith ball repulsion electrometer was employed by T. Cavallo in 1777.

It may be pointed out that such an arrangement is not merely an arbitrary electrometer, but may become an absolute electrometer within certain rough limits. Let two spherical pith balls of radius r and weight W, covered with gold-leaf so as to be conducting, be suspended by parallel silk threads of length l so as just to touch each other. If then the balls are both charged to a potential V they will repel each other, and the threads will stand out at an angle 2θ, which can be observed on a protractor. Since the electrical repulsion of the balls is equal to $C^2V^2\ 4l^2\sin^2\theta$ dynes, where $C=r$ is the capacity of either ball, and this force is balanced by the restoring force due to their weight, Wg dynes, where g is the acceleration of gravity, it is easy to show that we have

$$V=\frac{2l\sin\theta\sqrt{Wg\tan\theta}}{r}$$

as an expression for their common potential V, provided that the balls are small and their distance sufficiently great not sensibly to disturb the uniformity of electric charge upon them. Observation of θ with measurement of the value of l and r reckoned in centimetres and W in grammes gives us the potential difference of the balls in absolute C.G.S. or electrostatic units. The gold-leaf electroscope invented by Abraham Bennet (see ELECTROSCOPE) can in like manner, by the addition of a scale to observe the divergence of the gold-leaves, be made a repulsion electrometer.

Attracted Disk Electrometers.—A form of attracted disk absolute electrometer was devised by A. Volta. It consisted of a plane conducting plate forming one pan of a balance which was suspended over another insulated plate which could be electrified. The attraction between the two plates was balanced by a weight put in the opposite pan. A similar electric balance was subsequently devised by Sir W. Snow-Harris,[1] one of whose instruments is shown in fig. 1. C is an insulated disk over which is suspended another disk attached to the arm of a balance. A weight is put in the opposite scale pan and a measured charge of electricity is given to the disk C just sufficient to tip over the balance. Snow-Harris found that this charge varied as the square root of the weight in the opposite pan, thus showing that the

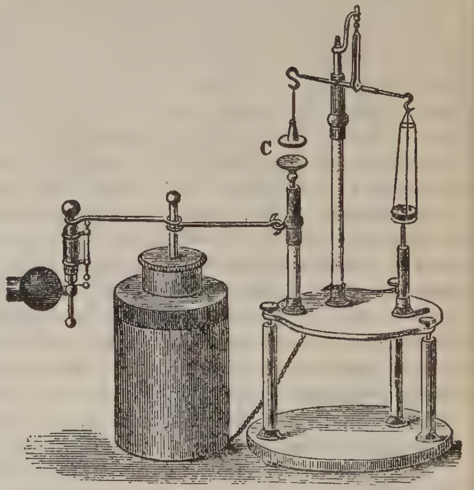

FIG. 1.—Snow-Harris's Disk Electrometer.

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[1] It is probable that an experiment of this kind had been made as far back as 1746 by Daniel Gralath, of Danzig, who has some claims to have suggested the word "electrometer" in connexion with it. See Park Benjamin, *The Intellectual Rise in Electricity* (London, 1895), p. 542.

attraction between the disks at given distance apart varies as the square of their difference of potential.

The most important improvements in connexion with electrometers are due, however, to Lord Kelvin, who introduced the guard plate and used gravity or the torsion of a wire as a means for evaluating the electrical forces.

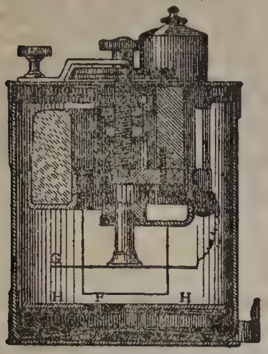

FIG. 2.—Kelvin's Portable Electrometer.

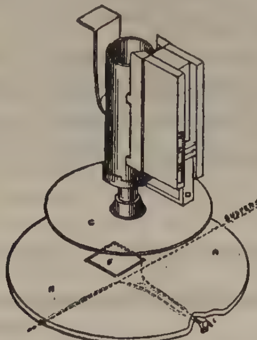
FIG. 3.

His portable electrometer is shown in fig. 2. H H (see fig. 3) is a plane disk of metal called the guard plate, fixed to the inner coating of a small Leyden jar (see fig. 2). At F a square hole is cut out of H H, and into this fits loosely without touching, like a trap door, a square piece of aluminium foil having a projecting tail, which carries at its end a stirrup L, crossed by a fine hair (see fig. 3). The square piece of aluminium is pivoted round a horizontal stretched wire. If then another horizontal disk G is placed over the disk H H and a difference of potential made between G and H H, the movable aluminium trap door F will be attracted by the fixed plate G. Matters are so arranged by giving a torsion to the wire carrying the aluminium disk F that for a certain potential difference between the plates H and G, the movable part F comes into a definite sighted position, which is observed by means of a small lens. The plate G (see fig. 2) is moved up and down, parallel to itself, by means of a screw. In using the instrument the conductor, whose potential is to be tested, is connected to the plate G. Let this potential be denoted by V, and let v be the potential of the guard plate and the aluminium flap. This last potential is maintained constant by guard plate and flap being part of the interior coating of a charged Leyden jar. Since the distribution of electricity may be considered to be constant over the surface S of the attracted disk, the mechanical force f on it is given by the expression,[1]

$$f=\frac{S(V-v)^2}{8\pi d^2},$$

where d is the distance between the two plates. If this distance is varied until the attracted disk comes into a definite sighted position as seen by observing the end of the index through the lens, then since the force f is constant, being due to the torque applied by the wire for a definite angle of twist, it follows that the difference of potential of the two plates varies as their distance. If then two experiments are made, first with the upper plate connected to earth, and secondly, connected to the object being tested, we get an expression for the potential V of this conductor in the form

$$V=A(d'-d),$$

where d and d' are the distances of the fixed and movable plates from one another in the two cases, and A is some constant. We thus find V in terms of the constant and the difference of the two screw readings.

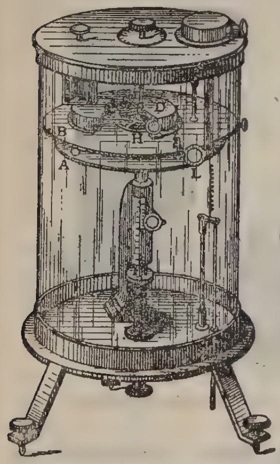

FIG. 4.—Kelvin's Absolute Electrometer.

Lord Kelvin's absolute electrometer (fig. 4) involves the same principle. There is a certain fixed guard disk B having a hole in it which is loosely occupied by an aluminium trap door plate, shielded by D and suspended on springs, so that its surface is parallel with that of the guard plate. Parallel to this is a second movable plate A, the distances between the two being measurable by means of a screw. The movable plate can be drawn down into a definite sighted position when a difference of potential is made between the two plates. This sighted position is such that the surface of the trap door plate is level with that of the guard plate, and is determined by observations made with the lenses H and L. The movable plate can be thus depressed by placing on it a certain standard weight W grammes.

Suppose it is required to measure the difference of potentials V and V' of two conductors. First one and then the other conductor is connected with the electrode of the lower or movable plate, which is moved by the screw until the index attached to the attracted disk shows it to be in the sighted position. Let the screw readings in the two cases be d and d'. If W is the weight required to depress the attracted disk into the same sighted position when the plates are unelectrified and g is the acceleration of gravity, then the difference of potentials of the conductors tested is expressed by the formula

$$V-V'=(d-d')\sqrt{\frac{8\pi gW}{S}},$$

where S denotes the area of the attracted disk.

The difference of potentials is thus determined in terms of a weight, an area and a distance, in absolute C.G.S. measure or electrostatic units.

Symmetrical Electrometers include the dry pile electrometer and Kelvin's quadrant electrometer. The principle underlying these instruments is that we can measure differences of potential by means of the motion of an electrified body in a symmetrical field of electric force. In the dry pile electrometer a single gold-leaf is hung up between two plates which are connected to the opposite terminals of a dry pile so that a certain constant difference of potential exists between these plates. The original inventor of this instrument was T. G. B. Behrens (*Gilb. Ann.*, 1806, 23), but it generally bears the name of J. G. F. von Bohnenberger, who slightly modified its form. G. T. Fechner introduced the important improvement of using only one pile, which he removed from the immediate neighbourhood of the suspended leaf. W. G. Hankel still further improved the dry pile electrometer by giving a slow motion movement to the two plates, and substituted a galvanic battery with a large number of cells for the dry pile, and also employed a divided scale to measure the movements of the gold-leaf (*Pogg. Ann.*, 1858, 103). If the gold-leaf is unelectrified, it is not acted upon by the two plates placed at equal distances on either side of it, but if its potential is raised or lowered it is attracted by one disk and repelled by the other, and the displacement becomes a measure of its potential.

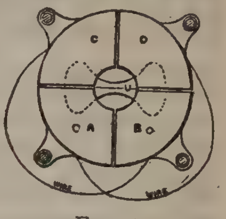

FIG. 5.

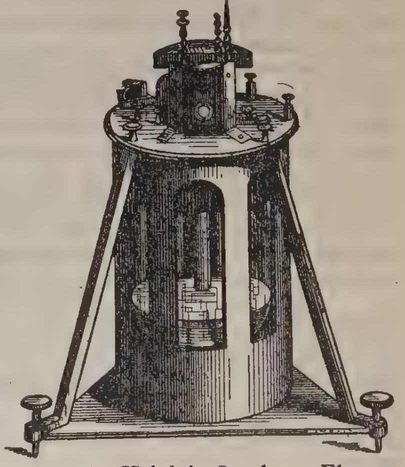
FIG. 6.—Kelvin's Quadrant Electrometer.

A vast improvement in this instrument was made by the invention of the quadrant electrometer by Lord Kelvin, which is the most sensitive form of electrometer yet devised. In this instrument (see fig. 5) a flat paddle-shaped needle of aluminium foil U is supported by a bifilar suspension consisting of two cocoon fibres. This needle is suspended in the interior of a glass vessel partly coated with tin-foil on the outside and inside, forming therefore a Leyden jar (see fig. 6). In the bottom of the vessel is placed some sulphuric acid, and a platinum wire attached to the suspended needle dips into this acid. By giving a charge to this Leyden jar the needle can thus be maintained at a certain constant high potential. The needle is enclosed by a sort of flat box divided into four insulated quadrants A, B, C, D (fig. 5), whence the name. The opposite quadrants are connected together by thin platinum wires. These quadrants are insulated from the needle and from the case, and the two pairs are connected to two electrodes. When the instrument is to be used to determine the potential difference between two conductors, they are connected to the two opposite pairs of quadrants. The needle in its normal position is symmetrically placed with regard to the quadrants, and carries a mirror by means of which its displacement can be observed in the usual manner by reflecting the ray of light from it. If the two quadrants are at different potentials, the needle moves from one quadrant towards the other, and the image of a spot of light on the scale is therefore displaced. Lord Kelvin provided the instrument with two necessary adjuncts, viz. a replenisher or rotating electrophorus (*q.v.*), by means of which the charge of the Leyden jar which forms the enclosing vessel can be increased or diminished, and also a small aluminium balance plate or gauge, which is in principle the same as the attracted disk portable electrometer by means of which the potential of the inner coating of the Leyden jar is preserved at a known value.

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[1] See Maxwell, *Treatise on Electricity and Magnetism* (2nd ed.), i. 308.

According to the mathematical theory of the instrument,[1] if V and V′ are the potentials of the quadrants and v is the potential of the needle, then the torque acting upon the needle to cause rotation is given by the expression,

$$C(V-V')\{v-\tfrac{1}{2}(V+V')\},$$

where C is some constant. If v is very large compared with the mean value of the potentials of the two quadrants, as it usually is, then the above expression indicates that the couple varies as the difference of the potentials between the quadrants.

Dr J. Hopkinson found, however, before 1885, that the above formula does not agree with observed facts (*Proc. Phys. Soc. Lond.*, 1885, 7, p. 7). The formula indicates that the sensibility of the instrument should increase with the charge of the Leyden jar or needle, whereas Hopkinson found that as the potential of the needle was increased by working the replenisher of the jar, the deflection due to three volts difference between the quadrants first increased and then diminished. He found that when the potential of the needle exceeded a certain value, of about 200 volts, for the particular instrument he was using (made by White of Glasgow), the above formula did not hold good. W. E. Ayrton, J. Perry and W. E. Sumpner, who in 1886 had noticed the same fact as Hopkinson, investigated the matter in 1891 (*Proc. Roy. Soc.*, 1891, 50, p. 52; *Phil. Trans.*, 1891, 182, p. 519). Hopkinson had been inclined to attribute the anomaly to an increase in the tension of the bifilar threads, owing to a downward pull on the needle, but they showed that this theory would not account for the discrepancy. They found from observations that the particular quadrant electrometer they used might be made to follow one or other of three distinct laws. If the quadrants were near together there were certain limits between which the potential of the needle might vary without producing more than a small change in the deflection corresponding with the fixed potential difference of the quadrants. For example, when the quadrants were about 2·5 mm. apart and the suspended fibres near together at the top, the deflection produced by a P.D. of 1·45 volts between the quadrants only varied about 11% when the potential of the needle varied from 896 to 3586 volts. When the fibres were far apart at the top a similar flatness was obtained in the curve with the quadrants about 1 mm. apart. In this case the deflection of the needle was practically quite constant when its potential varied from 2152 to 3227 volts. When the quadrants were about 3·9 mm. apart, the deflection for a given P.D. between the quadrants was almost directly proportional to the potential of the needle. In other words, the electrometer nearly obeyed the theoretical law. Lastly, when the quadrants were 4 mm. or more apart, the deflection increased much more rapidly than the potential, so that a maximum sensibility bordering on instability was obtained. Finally, these observers traced the variation to the fact that the wire supporting the aluminium needle as well as the wire which connects the needle with the sulphuric acid in the Leyden jar in the White pattern of Leyden jar is enclosed in a metallic guard tube to screen the wire from external action. In order that the needle may project outside the guard tube, openings are made in its two sides; hence the moment the needle is deflected each half of it becomes unsymmetrically placed relatively to the two metallic pieces which join the upper and lower half of the guard tube. Guided by these experiments, Ayrton, Perry and Sumpner constructed an improved unifilar quadrant electrometer which was not only more sensitive than the White pattern, but fulfilled the theoretical law of working. The bifilar suspension was abandoned, and instead a new form of adjustable magnetic control was adopted. All the working parts of the instrument were supported on the base, so that on removing a glass shade which serves as a Leyden jar they can be got at and adjusted in position. The conclusion to which the above observers came was that any quadrant electrometer made in any manner does not necessarily obey a law of deflection making the deflections proportional to the potential difference of the quadrants, but that an electrometer can be constructed which does fulfil the above law.

The importance of this investigation resides in the fact that an electrometer of the above pattern can be used as a wattmeter (*q.v.*), provided that the deflection of the needle is proportional to the potential difference of the quadrants. This use of the instrument was proposed simultaneously in 1881 by Professors Ayrton and G. F. Fitzgerald and M. A. Potier. Suppose we have an inductive and a non-inductive circuit in series, which is traversed by a periodic current, and that we desire to know the power being absorbed to the inductive circuit. Let v_1, v_2, v_3 be the instantaneous potentials of the two ends and middle of the circuit; let a quadrant electrometer be connected first with the quadrants to the two ends of the inductive circuit and the needle to the far end of the non-inductive circuit, and then secondly with the needle connected to one of the quadrants (see fig. 5). Assuming the electrometer to obey the above-mentioned theoretical law, the first reading is proportional to

$$v_1-v_2\left\{v_3-\frac{v_1+v_2}{2}\right\}$$

and the second to $v_1-v_2\left\{v_2-\frac{v_1+v_2}{2}\right\}$.

The difference of the readings is then proportional to

$$(v_1-v_2)(v_2-v_3).$$

But this last expression is proportional to the instantaneous power taken up in the inductive circuit, and hence the difference of the two readings of the electrometer is proportional to the mean power taken up in the circuit (*Phil. Mag.*, 1891, 32, p. 206). Ayrton and Perry and also P. R. Blondlot and P. Curie afterwards suggested that a single electrometer could be constructed with two pairs of quadrants and a duplicate needle on one stem, so as to make two readings simultaneously and produce a deflection proportional at once to the power being taken up in the inductive circuit.

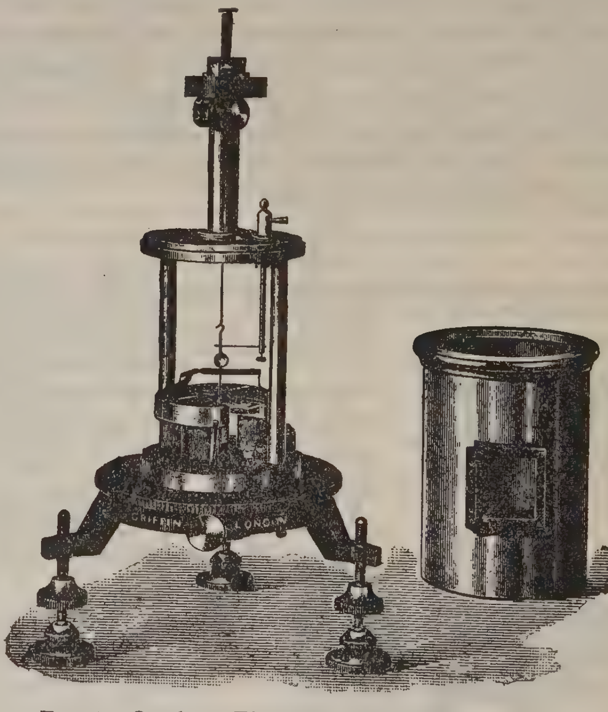

Fig. 7.—Quadrant Electrometer. Dolezalek Pattern.

Quadrant electrometers have also been designed especially for measuring extremely small potential differences. An instrument of this kind has been constructed by Dr. F. Dolezalek (fig. 7). The needle and quadrants are of small size, and the electrostatic capacity is correspondingly small. The quadrants are mounted on pillars of amber which afford a very high insulation. The needle, a piece of paddle-shaped paper thinly coated with silver foil, is suspended by a quartz fibre, its extreme lightness making it possible to use a very feeble controlling force without rendering the period of oscillation unduly great. The resistance offered by the air to a needle of such light construction suffices to render the motion nearly dead-beat. Throughout a wide range the deflections are proportional to the potential difference producing them. The needle is charged to a potential of 50 to 200 volts by means of a dry pile or voltaic battery, or from a lighting circuit. To facilitate the communication of the charge to the needle, the quartz fibre and its attachments are rendered conductive by a thin film of solution of hygroscopic salt such as calcium chloride. The lightness of the needle enables the instrument to be moved without fear of damaging the suspension. The upper end of the quartz fibre is rotated by a torsion head, and a metal cover serves to screen the instrument from stray electrostatic fields. With a quartz fibre 0·009 mm. thick and 60 mm. long, the needle being charged to 110 volts, the period and swing of the needle was 18 seconds. With the scale at a distance of two metres, a deflection of 130 mm. was produced by an electromotive force of 0·1 volt. By using a quartz fibre of about half the above diameter the sensitiveness was much increased. An instrument of this form is valuable in measuring small alternating currents by the fall of potential produced down a known resistance. In the same way it may be employed to measure high potentials by measuring the fall of potential down a fraction of a known non-inductive resistance. In this last case, however, the capacity of the electrometer used must be small, otherwise an error is introduced.[1]

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[1] See Maxwell, *Electricity and Magnetism* (2nd ed., Oxford, 1881), vol i. p. 311.

See, in addition to references already given, A. Gray, *Absolute Measurements in Electricity and Magnetism* (London, 1888), vol. i. p. 254; A. Winkelmann, *Handbuch der Physik* (Breslau, 1905), pp. 58-70, which contains a large number of references to original papers on electrometers. (J. A. F.)

ELECTRON, the name suggested by Dr G. Johnstone Stoney in 1891 for the natural unit of electricity to which he had drawn attention in 1874, and subsequently applied to the ultra-atomic particles carrying negative charges of electricity, of which Professor Sir J. J. Thomson proved in 1897 that the cathode rays consisted. The electrons, which Thomson at first called corpuscles, are point charges of negative electricity, their inertia showing them to have a mass equal to about $\frac{1}{2000}$ that of the hydrogen atom. They are apparently derivable from all kinds of matter, and are believed to be components at any rate of the chemical atom. The electronic theory of the chemical atom supposes, in fact, that atoms are congeries of electrons in rapid orbital motion. The size of the electron is to that of an atom roughly in the ratio of a pin's head to the dome of St Paul's cathedral. The electron is always associated with the unit charge of negative electricity, and it has been suggested that its inertia is wholly electrical. For further details see the articles on ELECTRICITY; MAGNETISM; MATTER; RADIOACTIVITY; CONDUCTION, ELECTRIC; *The Electron Theory*, E. Fournier d'Albe (London, 1907); and the original papers of Dr G. Johnstone Stoney, *Proc. Brit. Ass.* (Belfast, August 1874), "On the Physical Units of Nature," and *Trans. Royal Dublin Society* (1891), 4, p. 583.

ELECTROPHORUS, an instrument invented by Alessandro Volta in 1775, by which mechanical work is transformed into electrostatic charge by the aid of a small initial charge of electricity. The operation depends on the facts of electrostatic induction discovered by John Canton in 1753, and, independently, by J. K. Wilcke in 1762 (see ELECTRICITY). Volta, in a letter to J. Priestley on the 10th of June 1775 (see *Collezione dell' opere*, ed. 1816, vol. i. p. 118), described the invention of a device he called an *elettroforo perpetuo*, based on the fact that a conductor held near an electrified body and touched by the finger was found, when withdrawn, to possess an electric charge of opposite sign to that of the electrified body. His electrophorus in one form consisted of a disk of non-conducting material, such as pitch or resin, placed between two metal sheets, one being provided with an insulating handle. For the pitch or resin may be substituted a sheet of glass, ebonite, indiarubber or any other good dielectric placed upon a metallic sheet, called the sole-plate. To use the apparatus the surface of the dielectric is rubbed with a piece of warm flannel, silk or catskin, so as to electrify it, and the upper metal plate is then placed upon it. Owing to the irregularities in the surfaces of the dielectric and upper plate the two are only in contact at a few points, and owing to the insulating quality of the dielectric its surface electrical charge cannot move over it. It therefore acts inductively upon the upper plate and induces on the adjacent surface an electric charge of opposite sign. Suppose, for instance, that the dielectric is a plate of resin rubbed with catskin, it will then be negatively electrified and will act by induction on the upper plate across the film of air separating the upper resin surface and lower surface of the upper metal plate. If the upper plate is touched with the finger or connected to earth for a moment, a negative charge will escape from the metal plate to earth at that moment. The arrangement thus constitutes a condenser; the upper plate on its under surface carries a charge of positive electricity and the resin plate a charge of negative electricity on its upper surface, the air film between them being the dielectric of the condenser. If, therefore, the upper plate is elevated, mechanical work has to be done to separate the two electric charges. Accordingly on raising the upper plate, the charge on it, in old-fashioned nomenclature, becomes *free* and can be communicated to any other insulated conductor at a lower potential, the upper plate thereby becoming more or less discharged. On placing the upper plate again on the resin and touching it for a moment, the process can be repeated, and so at the expense of mechanical work done in lifting the upper plate against the mutual attraction of two electric charges of opposite sign, an indefinitely large electric charge can be accumulated and given to any other suitable conductor. In course of time, however, the surface charge of the resin becomes dissipated and it then has to be again excited. To avoid the necessity for touching the upper plate every time it is put down on the resin, a metal pin may be brought through the insulator from the sole-plate so that each time that the upper plate is put down on the resin it is automatically connected to earth. We are thus able by a process of merely lifting the upper plate repeatedly to convey a large electrical charge to some conductor starting from the small charge produced by friction on the resin. The above explanation does not take into account the function of the sole-plate, which is important. The sole-plate serves to increase the electrical capacity of the upper plate when placed down upon the resin or excited insulator. Hence when so placed it takes a larger charge. When touched by the finger the upper plate is brought to zero potential. If then the upper plate is lifted by its insulating handle its capacity becomes diminished. Since, however, it carries with it the charge it had when resting on the resin, its potential becomes increased as its capacity becomes less, and it therefore rises to a high potential, and will give a spark if the knuckle is approached to it when it is lifted after having been touched and raised.

The study of Volta's electrophorus at once suggested the performance of these cyclical operations by some form of rotation instead of elevation, and led to the invention of various forms of doubler or multiplier. The instrument was thus the first of a long series of machines for converting mechanical work into electrostatic energy, and the predecessor of the modern type of influence machine (see ELECTRICAL MACHINE). Volta himself devised a double and reciprocal electrophorus and also made mention of the subject of multiplying condensers in a paper published in the *Phil. Trans.* for 1782 (p. 237, and appendix, p. vii.). He states, however, that the use of a condenser in connexion with an electrophorus to make evident and multiply weak charges was due to T. Cavallo (*Phil. Trans.*, 1788).

For further information see S. P. Thompson, "The Influence Machine from 1788 to 1888," *Journ. Inst. Tel. Eng.*, 1888, 17, p. 569. Many references to original papers connected with the electrophorus will be found in A. Winkelmann's *Handbuch der Physik* (Breslau, 1905), vol. iv. p. 48. (J. A. F.)

ELECTROPLATING, the art of depositing metals by the electric current. In the article ELECTROLYSIS it is shown how the passage of an electric current through a solution containing metallic ions involves the deposition of the metal on the cathode. Sometimes the metal is deposited in a pulverulent form, at others as a firm tenacious film, the nature of the deposit being dependent upon the particular metal, the concentration of the solution, the difference of potential between the electrodes, and other experimental conditions. As the durability of the electro-deposited coat on plated wares of all kinds is of the utmost importance, the greatest care must be taken to ensure its complete adhesion. This can only be effected if the surface of the metal on which the deposit is to be made is chemically clean. Grease must be removed by potash, whiting or other means, and tarnish by an acid or potassium cyanide, washing in plenty of water being resorted to after each operation. The vats for depositing may be of enamelled iron, slate, glazed earthenware, glass, lead-lined wood, &c. The current densities and potential differences frequently used for some of the commoner metals are given in the following table, taken from M'Millan's *Treatise on Electrometallurgy*. It must be remembered, however, that variations in conditions modify the electromotive force required for any given process. For example, a rise in temperature of the bath causes an increase in its conductivity, so that a lower E.M.F. will suffice to give the required current density; on the other hand, an abnormally great distance between the electrodes, or a diminution in acidity of an acid bath, or in the strength of the solution used, will increase the resistance, and so require the application of a higher E.M.F.

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[1] See J. A. Fleming, *Handbook for the Electrical Laboratory and Testing Room*, vol. i. p. 448 (London, 1901).

Metal.	Amperes.		Volts between Anode and Cathode.
	Per sq. decimetre of Cathode Surface.	Per sq. in. of Cathode Surface.	
Antimony . . .	0·4-0·5	0·02-0·03	1·0-1·2
Brass . . .	0·5-0·8	0·03-0·05	3·0-4·0
Copper, acid bath .	1·0-1·5	0·065-0·10	0·5-1·5
,, alkaline bath .	0·3-0·5	0·02-0·03	3·0-5·0
Gold	0·1	0·006	0·5-4·0
Iron	0·5	0·03	1·0
Nickel, at first . .	1·4-1·5	0·09-0·10	5·0
,, after . .	0·2-0·3	0·015·0·02	1·5-2·0
,, on zinc . .	0·4	0·025	4·0-5·0
Silver	0·2-0·5	0·015-0·03	0·75-1·0
Zinc	0·3-0·6	0·02-0·04	2·5-3·0

Large objects are suspended in the tanks by hooks or wires, care being taken to shift their position and so avoid wire-marks. Small objects are often heaped together in perforated trays or ladles, the cathode connecting-rod being buried in the midst of them. These require constant shifting because the objects are in contact at many points, and because the top ones shield those below from the depositing action of the current. Hence processes have been patented in which the objects to be plated are suspended in revolving drums between the anodes, the rotation of the drum causing the constant renewal of surfaces and affording a burnishing action at the same time. Care must be taken not to expose goods in the plating-bath to too high a current density, else they may be "burnt"; they must never be exposed one at a time to the full anode surface, with the current flowing in an empty bath, but either one piece at a time should be replaced, or some of the anodes should be transferred temporarily to the place of the cathodes, in order to distribute the current over a sufficient cathode-area. Burnt deposits are dark-coloured, or even pulverulent and useless. The strength of the current may also be regulated by introducing lengths of German silver or iron wire, carbon rod, or other inferior conductors in the path of the current, and a series of such resistances should always be provided close to the tanks. Ammeters to measure the volume, and voltmeters to determine the pressure of current supplied to the baths, should also be provided. Very irregular surfaces may require the use of specially shaped anodes in order that the distance between the electrodes may be fairly uniform, otherwise the portion of the cathode lying nearest to the anode may receive an undue share of the current, and therefore a greater thickness of coat. Supplementary anodes are sometimes used in difficult cases of this kind. Large metallic surfaces (especially external surfaces) are sometimes plated by means of a "doctor," which, in its simplest form, is a brush constantly wetted with the electrolyte, with a wire anode buried amid the hairs or bristles; this brush is painted slowly over the surface of the metal to be coated, which must be connected to the negative terminal of the electrical generator. Under these conditions electrolysis of the solution in the brush takes place. Iron ships' plates have recently been coated with copper in sections (to prevent the adhesion of barnacles), by building up a temporary trough against the side of the ship, making the thoroughly cleansed plate act both as cathode and as one side of the trough. Decorative plating-work in several colours (*e.g.* "parcel-gilding") is effected by painting a portion of an object with a stopping-out (*i.e.* a non-conducting) varnish, such as copal varnish, so that this portion is not coated. The varnish is then removed, a different design stopped out, and another metal deposited. By varying this process, designs in metals of different colours may readily be obtained.

Reference must be made to the textbooks (see ELECTROCHEMISTRY) for a fuller account of the very varied solutions and methods employed for electroplating with silver, gold, copper, iron and nickel. It should be mentioned here, however, that solutions which would deposit their metal on any object by simple immersion should not be generally used for electroplating that object, as the resulting deposit is usually non-adhesive. For this reason the acid copper-bath is not used for iron or zinc objects, a bath containing copper cyanide or oxide dissolved in potassium cyanide being substituted. This solution, being an inferior conductor of electricity, requires a much higher electromotive force to drive the current through it, and is therefore more costly in use. It is, however, commonly employed hot, whereby its resistance is reduced. *Zinc* is commonly deposited by electrolysis on iron or steel goods which would ordinarily be "galvanized," but which for any reason may not conveniently be treated by the method of immersion in fused zinc. The zinc cyanide bath may be used for small objects, but for heavy goods the sulphate bath is employed. Sherard Cowper-Coles patented a process in which, working with a high current density, a lead anode is used, and powdered zinc is kept suspended in the solution to maintain the proportion of zinc in the electrolyte, and so to guard against the gradual acidification of the bath. *Cobalt* is deposited by a method analogous to that used for its sister-metal nickel. *Platinum*, *palladium* and *tin* are occasionally deposited for special purposes. In the deposition of *gold* the colour of the deposit is influenced by the presence of impurities in the solution; when copper is present, some is deposited with the gold, imparting to it a reddish colour, whilst a little silver gives it a greenish shade. Thus so-called coloured-gold deposits may be produced by the judicious introduction of suitable impurities. Even pure gold, it may be noted, is darker or lighter in colour according as a stronger or a weaker current is used. The electro-deposition of *brass*—mainly on iron ware, such as bedstead tubes—is now very widely practised, the bath employed being a mixture of copper, zinc and potassium cyanides, the proportions of which vary according to the character of the brass required, and to the mode of treatment. The colour depends in part upon the proportion of copper and zinc, and in part upon the current density, weaker currents tending to produce a redder or yellower metal. Other alloys may be produced, such as bronze, or German silver, by selecting solutions (usually cyanides) from which the current is able to deposit the constituent metals simultaneously.

Electrolysis has in a few instances been applied to processes of manufacture. For example, Wilde produced copper printing surfaces for calico printing-rollers and the like by immersing rotating iron cylinders as cathodes in a copper bath. Elmore, Dumoulin, Cowper-Coles and others have prepared copper cylinders and plates by depositing copper on rotating mandrels with special arrangements. Others have arranged a means of obtaining high conductivity wire from cathode-copper without fusion, by depositing the metal in the form of a spiral strip on a cylinder, the strip being subsequently drawn down in the usual way; at present, however, the ordinary methods of wire production are found to be cheaper. J. W. Swan (*Journ. Inst. Elec. Eng.*, 1898, vol. xxvii. p. 16) also worked out, but did not proceed with, a process in which a copper wire whilst receiving a deposit of copper was continuously passed through the drawplate, and thus indefinitely extended in length. Cowper-Coles (*Journ. Inst. Elec. Eng.*, 1898, 27, p. 99) very successfully produced true parabolic reflectors for projectors, by depositing copper upon carefully ground and polished glass surfaces rendered conductive by a film of deposited silver.

ELECTROSCOPE, an instrument for detecting differences of electric potential and hence electrification. The earliest form of scientific electroscope was the *versorium* or electrical needle of William Gilbert (1544–1603), the celebrated author of the treatise *De magnete* (see ELECTRICITY). It consisted simply of a light metallic needle balanced on a pivot like a compass needle. Gilbert employed it to prove that numerous other bodies besides amber are susceptible of being electrified by friction.[1] In this case the visible indication consisted in the attraction exerted between the electrified body and the light pivoted needle which was acted upon and electrified by induction. The next improvement was the invention of simple forms of repulsion electroscope. Two similarly electrified bodies repel each other. Benjamin Franklin employed the repulsion of two linen threads, C. F. de C. du Fay, J. Canton, W. Henley and others devised the pith ball, or double straw electroscope (fig. 1). T. Cavallo about 1770 employed two fine silver wires terminating in pith balls suspended in a glass vessel having strips of tin-foil pasted down the sides (fig. 2). The object of the thimble-shaped dome was to keep moisture from the stem from which the pith balls were supported, so that the apparatus could be used in the open air even in the rainy weather. Abraham Bennet (*Phil. Trans.*, 1787, 77, p. 26) invented the modern form of gold-leaf electroscope. Inside a glass shade he fixed to an insulated wire a pair of strips of gold-leaf (fig. 3). The wire terminated in a plate or knob outside the vessel. When an electrified body was held near or in contact with the knob, repulsion of the gold leaves ensued. Volta added the condenser (*Phil. Trans.*, 1782), which greatly increased the power of the instrument. M. Faraday, however, showed long subsequently that to bestow upon the indications of such an electroscope definite meaning it was necessary to place a cylinder of metallic gauze connected to the earth inside the vessel, or better still, to line the glass shade with tin-foil connected to the earth and observe through a hole the indications of the gold leaves (fig. 4). Leaves of aluminium foil may with advantage be substituted for gold-leaf, and a scale is sometimes added to indicate the angular divergence of the leaves.

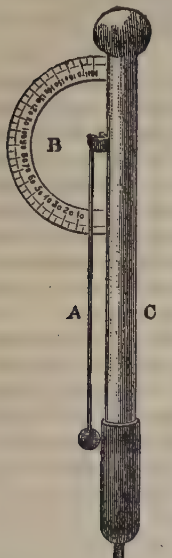

Fig. 1.—Henley's Electroscope.

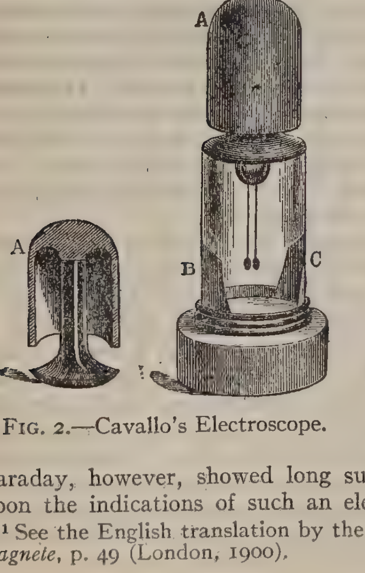

Fig. 2.—Cavallo's Electroscope.

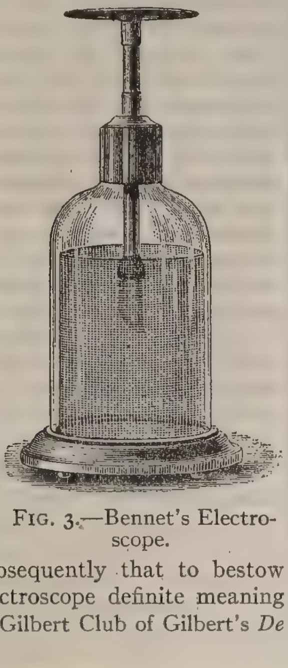

Fig. 3.—Bennet's Electroscope.

The uses of an electroscope are, first, to ascertain if any body is in a state of electrification, and secondly, to indicate the sign of that charge. In connexion with the modern study of radio-activity, the electroscope has become an instrument of great usefulness, far outrivalling the spectroscope in sensibility. Radio-active bodies are chiefly recognized by the power they possess of rendering the air in their neighbourhood conductive; hence the electroscope detects the presence of a radio-active body by losing an electric charge given to it more quickly than it would otherwise do. A third great use of the electroscope is therefore to detect electric conductivity either in the air or in any other body.

To detect electrification it is best to charge the electroscope by induction. If an electrified body is held near the gold-leaf electroscope the leaves diverge with electricity of the same sign as that of the body being tested. If, without removing the electrified body, the plate or knob of the electroscope is touched, the leaves collapse. If the electroscope is insulated once more and the electrified body removed, the leaves again diverge with electricity of the opposite sign to that of the body being tested. The sign of charge is then determined by holding near the electroscope a glass rod rubbed with silk or a sealing-wax rod rubbed with flannel. If the approach of the glass rod causes the leaves in their final state to collapse, then the charge in the rod was positive, but if it causes them to expand still more the charge was negative, and vice versa for the sealing-wax rod. When employing a Volta condensing electroscope, the following is the method of procedure:—The top of the electroscope consists of a flat, smooth plate of lacquered brass on which another plate of brass rests, separated from it by three minute fragments of glass or shellac, or a film of shellac varnish. If the electrified body is touched against the upper plate whilst at the same time the lower plate is put to earth, the condenser formed of the two plates and the film of air or varnish becomes charged with positive electricity on the one plate and negative on the other. On insulating the lower plate and raising the upper plate by the glass handle, the capacity of the condenser formed by the plates is vastly decreased, but since the charge on the lower plate including the gold leaves attached to it remains the same, as the capacity of the system is reduced the potential is raised and therefore the gold leaves diverge widely. Volta made use of such an electroscope in his celebrated experiments (1790–1800) to prove that metals placed in contact with one another are brought to different potentials, in other words to prove the existence of so-called contact electricity. He was assisted to detect the small potential differences then in question by the use of a multiplying condenser or revolving doubler (see ELECTRICAL MACHINE). To employ the electroscope as a means of detecting radio-activity, we have first to test the leakage quality of the electroscope itself. Formerly it was usual to insulate the rod of the electroscope by passing it through a hole in a cork or mass of sulphur fixed in the top of the glass vessel within which the gold leaves were suspended. A further improvement consisted in passing the metal wire to which the gold leaves were attached through a glass tube much wider than the rod, the latter being fixed concentrically in the glass tube by means of solid shellac melted and run in. This insulation, however, is not sufficiently good for an electroscope intended for the detection of radio-activity; for this purpose

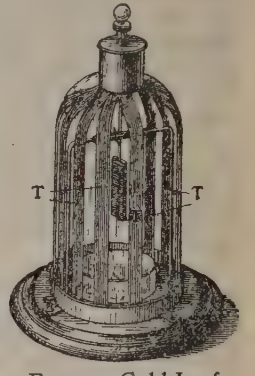

Fig. 4.—Gold-Leaf Electroscope.

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[1] See the English translation by the Gilbert Club of Gilbert's *De magnete*, p. 49 (London, 1900).

it must be such that the leaves will remain for hours or days in a state of steady divergence when an electrical charge has been given to them.

In their researches on radio-activity M. and Mme P. Curie employed an electroscope made as follows:—A metal case (fig. 5), having two holes in its sides, has a vertical brass strip B attached to the inside of the lid by a block of sulphur SS or any other good insulator. Joined to the strip is a transverse wire terminating at one end in a knob C, and at the other end in a condenser plate P′. The strip B carries also a strip of gold-leaf L, and the metal case is connected to earth. If a charge is given to the electroscope, and if any radio-active material is placed on a condenser plate P attached to the outer case, then this substance bestows conductivity on the air between the plates P and P′, and the charge of the electroscope begins to leak away. The collapse of the gold-leaf is observed through an aperture in the case by a miscroscope, and the time taken by the gold-leaf to fall over a certain distance is proportional to the ionizing current, that is, to the intensity of the radio-activity of the substance.

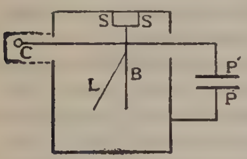

Fig. 5.—Curie's Electroscope.

A very similar form of electroscope was employed by J. P. L. J. Elster and H. F. K. Geitel (fig. 6), and also by C. T. R. Wilson (see *Proc. Roy. Soc.*, 1901, 68, p. 152). A metal box has a metal strip B suspended from a block or insulator by means of a bit of sulphur or amber S, and to it is fastened a strip of gold-leaf L. The electroscope is provided with a charging rod C. In a dry atmosphere sulphur or amber is an early perfect insulator, and hence if the air in the interior of the box is kept dry by calcium chloride, the electroscope will hold its charge for a long time. Any divergence or collapse of the gold-leaf can be viewed by a microscope through an aperture in the side of the case.

Another type of sensitive electroscope is one devised by C. T. R. Wilson (*Proc. Cam. Phil. Soc.*, 1903, 12, part 2). It consists of a metal box placed on a tilting stand (fig. 7). At one end is an insulated plate P kept at a potential of 200 volts or so above the earth by a battery. At the other end is an insulated metal wire having attached to it a thin strip of gold-leaf L. If the plate P is electrified it attracts the strip which stretches out towards it. Before use the strip is for one moment connected to the case, and the arrangement is then tilted until the strip extends at a certain angle. If then the strip of gold-leaf is raised or lowered in potential it moves to or from the plate P, and its movement can be observed by a microscope through a hole in the side of the box. There is a particular angle of tilt of the case which gives a maximum sensitiveness. Wilson found that with the plate electrified to 207 volts and with a tilt of the case of 30°, if the gold-leaf was raised one volt in potential above the case, it moved over 200 divisions of the micrometer scale in the eye-piece of the microscope, 54 divisions being equal to one millimetre. In using the instrument the insulated rod to which the gold-leaf is attached is connected to the conductor, the potential of which is being examined. In the use of all these electroscopic instruments it is essential to bear in mind (as first pointed out by Lord Kelvin) that what a gold-leaf electroscope really indicates is the difference of potential between the gold-leaf and the solid walls enclosing the air space in which they move.[1] If these enclosing walls are made of anything else than perfectly conducting material, then the indications of the instrument may be uncertain and meaningless. As already mentioned, Faraday remedied this defect by coating the inside of the glass vessel in which the gold-leaves were suspended to form an electroscope with tinfoil (see fig. 4). In spite of these admonitions all but a few instrument makers have continued to make the vicious type of instrument consisting of a pair of gold-leaves suspended within a glass shade or bottle, no means being provided for keeping the walls of the vessel continually at zero potential.

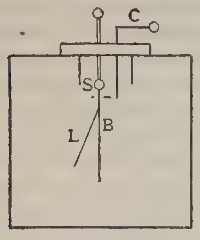

Fig. 6.—Elster and Geitel Electroscope.

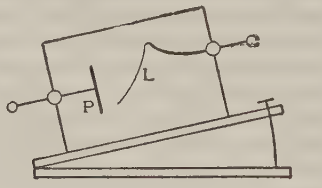

Fig. 7.—Wilson's Electroscope.

See J. Clerk Maxwell, *Treatise on Electricity and Magnetism*, vol. i. p. 300 (2nd ed., Oxford, 1881); H. M. Noad, *A Manual of Electricity*, vol. i. p. 25 (London, 1855); E. Rutherford, *Radio-activity*.

(J. A. F.)

ELECTROSTATICS, the name given to that department of electrical science in which the phenomena of electricity at rest are considered. Besides their ordinary condition all bodies are capable of being thrown into a physical state in which they are said to be electrified or charged with electricity. When in this condition they become sources of electric force, and the space round them in which this force is manifested is called an "electric field" (see Electricity). Electrified bodies exert mechanical forces on each other, creating or tending to create motion, and also induce electric charges on neighbouring surfaces.

The reader possessed of no previous knowledge of electrical phenomena will best appreciate the meaning of the terms employed by the aid of a few simple experiments. For this purpose the following apparatus should be provided:—(1) two small metal tea-trays and some clean dry tumblers, the latter preferably varnished with shellac varnish made with alcohol free from water; (2) two sheets of ebonite rather larger than the tea-trays; (3) a rod of sealing-wax or ebonite and a glass tube, also some pieces of silk and flannel; (4) a few small gilt pith balls suspended by dry silk threads; (5) a gold-leaf electroscope, and, if possible, a simple form of quadrant electrometer (see Electroscope and Electrometer); (6) some brass balls mounted on the ends of ebonite penholders, and a few tin canisters. With the aid of this apparatus, the principal facts of electrostatics can be experimentally verified, as follows:—

Experiment I.—Place one tea-tray bottom side uppermost upon three warm tumblers as legs. Rub the sheet of ebonite vigorously with warm flannel and lay it rubbed side downwards on the top of the tray. Touch the tray with the finger for an instant, and lift up the ebonite without letting the hand touch the tray a second time. The tray is then found to be electrified. If a suspended gilt pith ball is held near it, the ball will first be attracted and then repelled. If small fragments of paper are scattered on the tray and then the other tray held in the hand over them, they will fly up and down rapidly. If the knuckle is approached to the electrified tray, a small spark will be seen, and afterwards the tray will be found to be discharged or unelectrified. If the electrified tray is touched with the sealing-wax or ebonite rod, it will not be discharged, but if touched with a metal wire, the hand, or a damp thread, it is discharged at once. This shows that some bodies are *conductors* and others *non-conductors* or *insulators* of electricity, and that bodies can be electrified by friction and impart their electric charge to other bodies. A charged conductor supported on a non-conductor retains its charge. It is then said to be insulated.

Experiment II.—Arrange two tea-trays, each on dry tumblers as before. Rub the sheet of ebonite with flannel, lay it face downwards on one tray, touch that tray with the finger for a moment and lift up the ebonite sheet, rub it again, and lay it face downwards on the second tray and leave it there. Then take two suspended gilt pith balls and touch them (*a*) both against one tray; they will be found to repel each other; (*b*) touch one against one tray and the other against the other tray, and they will be found to attract each other. This proves the existence of two kinds of electricity, called *positive* and *negative*.

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[1] See Lord Kelvin, "Report on Electrometers and Electrostatic Measurements," *Brit. Assoc. Report* for 1867, or Lord Kelvin's *Reprint of Papers on Electrostatics and Magnetism*, p. 260.

The first tea-tray is positively electrified, and the second negatively. If an insulated brass ball is touched against the first tray and then against the knob or plate of the electroscope, the gold leaves will diverge. If the ball is discharged and touched against the other tray, and then afterwards against the previously charged electroscope, the leaves will collapse. This shows that the two electricities neutralize each other's effect when imparted equally to the same conductor.

Experiment III.—Let one tray be insulated as before, and the electrified sheet of ebonite held over it, but not allowed to touch the tray. If the ebonite is withdrawn without touching the tray, the latter will be found to be unelectrified. If whilst holding the ebonite sheet over the tray the latter is also touched with an insulated brass ball, then this ball when removed and tested with the electroscope will be found to be negatively electrified. The sign of the electrification imparted to the electroscope when so charged—that is, whether positive or negative—can be determined by rubbing the sealing-wax rod with flannel and the glass rod with silk, and approaching them gently to the electroscope one at a time. The sealing-wax so treated is electrified negatively or *resinously*, and the glass with positive or *vitreous* electricity. Hence if the electrified sealing-wax rod makes the leaves collapse, the electroscopic charge is positive, but if the glass rod does the same, the electroscopic charge is negative. Again, if, whilst holding the electrified ebonite over the tray, we touch the latter for a moment and then withdraw the ebonite sheet, the tray will be found to be positively electrified. The electrified ebonite is said to act by "electrostatic induction" on the tray, and creates on it two induced charges, one of positive and the other of negative electricity. The last goes to earth when the tray is touched, and the first remains when the tray is insulated and the ebonite withdrawn.

Experiment IV.—Place a tin canister on a warm tumbler and connect it by a wire with the gold-leaf electroscope. Charge positively a brass ball held on an ebonite stem, and introduce it, without touching, into the canister. The leaves of the electroscope will diverge with positive electricity. Withdraw the ball and the leaves will collapse. Replace the ball again and touch the outside of the canister; the leaves will collapse. If then the ball be withdrawn, the leaves will diverge a second time with negative electrification. If, before withdrawing the ball, after touching the outside of the canister for a moment the ball is touched against the inside of the canister, then on withdrawing it the ball and canister are found to be discharged. This experiment proves that when a charged body acts by induction on an insulated conductor it causes an electrical separation to take place; electricity of opposite sign is drawn to the side nearest the inducing body, and that of like sign is repelled to the remote side, and these quantities are equal in amount.

Seat of the Electric Charge.—So far we have spoken of electric charge as if it resided on the conductors which are electrified. The work of Benjamin Franklin, Henry Cavendish, Michael Faraday and J. Clerk Maxwell demonstrated, however, that all electric charge or electrification of conductors consists simply in the establishment of a physical state in the surrounding insulator or dielectric, which state is variously called *electric strain*, *electric displacement* or *electric polarization*. Under the action of the same or identical electric forces the intensity of this state in various insulators is determined by a quality of them called their *dielectric constant*, *specific inductive capacity* or *inductivity*. In the next place we must notice that electrification is a measurable magnitude and in electrostatics is estimated in terms of a unit called the *electrostatic unit* of electric quantity. In the absolute C.G.S. system this unit quantity is defined as follows:—If we consider a very small electrified spherical conductor, experiment shows that it exerts a repulsive force upon another similar and similarly electrified body. Cavendish and C. A. Coulomb proved that this mechanical force varies inversely as the square of the distance between the centres of the spheres. The unit of mechanical force in the "centimetre, gramme, second" (C.G.S.) system of units is the *dyne*, which is approximately equal to 1/981 part of the weight of one gramme. A very small sphere is said then to possess a charge of one electrostatic unit of quantity, when it repels another similar and similarly electrified body with a force of one dyne, the centres being at a distance of one centimetre, provided that the spheres are *in vacuo* or immersed in some insulator, the dielectric constant of which is taken as unity. If the two small conducting spheres are placed with centres at a distance d centimetres, and immersed in an insulator of dielectric constant K, and carry charges of Q and Q′ electrostatic units respectively, measured as above described, then the mechanical force between them is equal to QQ'/Kd^2 dynes. For constant charges and distances the mechanical force is inversely as the dielectric constant.

Electric Force.—If a small conducting body is charged with Q electrostatic units of electricity, and placed in any electric field at a point where the electric force has a value E, it will be subject to a mechanical force equal to QE dynes, tending to move it in the direction of the resultant electric force. This provides us with a definition of a unit of electric force, for it is the strength of an electric field at that point where a small conductor carrying a unit charge is acted upon by unit mechanical force, assuming the dielectric constant of the surrounding medium to be unity. To avoid unnecessary complications we shall assume this latter condition in all the following discussion, which is equivalent simply to assuming that all our electrical measurements are made in air or *in vacuo*.

Owing to the confusion introduced by the employment of the term force, Maxwell and other writers sometimes use the words *electromotive intensity* instead of electric force. The reader should, however, notice that what is generally called electric force is the analogue in electricity of the so-called acceleration of gravity in mechanics, whilst electrification or quantity of electricity is analogous to mass. If a mass of M grammes be placed in the earth's field at a place where the acceleration of gravity has a value g centimetres per second, then the mechanical force acting on it and pulling it downwards is Mg dynes. In the same manner, if an electrified body carries a positive charge Q electrostatic units and is placed in an electric field at a place where the electric force or electromotive intensity has a value E units, it is urged in the direction of the electric force with a mechanical force equal to QE dynes. We must, however, assume that the charge Q is so small that it does not sensibly disturb the original electric field, and that the dielectric constant of the insulator is unity.

Faraday introduced the important and useful conception of *lines* and *tubes* of electric force. If we consider a very small conductor charged with a unit of positive electricity to be placed in an electric field, it will move or tend to move under the action of the electric force in a certain direction. The path described by it when removed from the action of gravity and all other physical forces is called a line of electric force. We may otherwise define it by saying that a line of electric force is a line so drawn in a field of electric force that its direction coincides at every point with the resultant electric force at that point. Let *any* line drawn in an electric field be divided up into small elements of length. We can take the sum of all the products of the length of each element by the resolved part of the electric force in its direction. This sum, or integral, is called the "line integral of electric force" or the *electromotive force* (E.M.F.) along this line. In some cases the value of this electromotive force between two points or conductors is independent of the precise path selected, and it is then called the *potential difference* (P.D.) of the two points or conductors. We may define the term potential difference otherwise by saying that it is the work done in carrying a small conductor charged with one unit of electricity from one point to the other in a direction opposite to that in which it would move under the electric forces if left to itself.

Electric Potential.—Suppose then that we have a conductor charged with electricity, we may imagine its surface to be divided up into small unequal areas, each of which carries a unit charge of electricity. If we consider lines of electric force to be drawn from the boundaries of these areas, they will cut up the space round the conductor into tubular surfaces called tubes of electric force, and each tube will spring from an area of the conductor carrying a unit electric charge. Hence the charge on the conductor can be measured by the number of unit electric tubes springing from it. In the next place we may consider the charged body to be surrounded by a number of closed surfaces, such that the potential difference between any point on one surface and the earth is the same. These surfaces are called "equipotential" or "level surfaces," and we may so locate them that the potential difference between two adjacent surfaces is one unit of potential; that is, it requires one absolute unit of work (1 erg) to move a small body charged with one unit of electricity from one surface to the next. These enclosing surfaces, therefore, cut up the space into shells of potential, and divide up the tubes of force into electric cells. The surface of a charged conductor is an equipotential surface, because when the electric charge is in equilibrium there is no tendency for electricity to move from one part to the other.

We arbitrarily call the potential of the earth zero, since all potential difference is relative and there is no absolute potential any more than absolute level. We call the difference of potential between a charged conductor and the earth the potential of the conductor. Hence when a body is charged positively its potential is raised above that of the earth, and when negatively it is lowered beneath that of the earth. Potential in a certain sense is to electricity as difference of level is to liquids or difference of temperature to heat. It must be noted, however, that potential is a mere mathematical concept, and has no objective existence like difference of level, nor is it capable *per se* of producing physical changes in bodies, such as those which are brought about by rise of temperature, apart from any question of difference of temperature. There is, however, this similarity between them. Electricity tends to flow from places of high to places of low potential, water to flow down hill, and heat to move from places of high to places of low temperature. Returning to the case of the charged body with the space around it cut up into electric cells by the tubes of force and shells of potential, it is obvious that the number of these cells is represented by the product QV, where Q is the charge and V the potential of the body in electrostatic units. An electrified conductor is a store of energy, and from the definition of potential it is clear that the work done in increasing the charge q of a conductor whose potential is v by a small amount dq, is vdq, and since this added charge increases in turn the potential, it is easy to prove that the work done in charging a conductor with Q units to a potential V units is $\frac{1}{2}$QV units of work. Accordingly the number of electric cells into which the space round is cut up is equal to twice the energy stored up, or each cell contains half a unit of energy. This harmonizes with the fact that the real seat of the energy of electrification is the dielectric or insulator surrounding the charged conductor.[1]

We have next to notice three important facts in electrostatics and some consequences flowing therefrom.

(i) *Electrical Equilibrium and Potential.*—If there be any number of charged conductors in a field, the electrification on them being in equilibrium or at rest, the surface of each conductor is an equipotential surface. For since electricity tends to move between points or conductors at different potentials, if the electricity is at rest on them the potential must be everywhere the same. It follows from this that the electric force at the surface of the conductor has no component along the surface, in other words, the electric force at the bounding surface of the conductor and insulator is everywhere at right angles to it.

By the *surface density* of electrification on a conductor is meant the charge per unit of area, or the number of tubes of electric force which spring from unit area of its surface. Coulomb proved experimentally that the electric force just outside a conductor at any point is proportional to the electric density at that point. It can be shown that the resultant electric force normal to the surface at a point just outside a conductor is equal to $4\pi\sigma$, where σ is the surface density at that point. This is usually called Coulomb's Law.[2]

(ii) *Seat of Charge.*—The charge on an electrified conductor is wholly on the surface, and there is no electric force in the interior of a closed electrified conducting surface which does not contain any other electrified bodies. Faraday proved this experimentally (see *Experimental Researches*, series xi. § 1173) by constructing a large chamber or box of paper covered with tinfoil or thin metal. This was insulated and highly electrified. In the interior no trace of electric charge could be found when tested by electroscopes or other means. Cavendish proved it by enclosing a metal sphere in two hemispheres of thin metal held on insulating supports. If the sphere is charged and then the jacketing hemispheres fitted on it and removed, the sphere is found to be perfectly discharged.[3] Numerous other demonstrations of this fact were given by Faraday. The thinnest possible spherical shell of metal, such as a sphere of insulator coated with gold-leaf, behaves as a conductor for static charge just as if it were a sphere of solid metal. The fact that there is no electric force in the interior of such a closed electrified shell is one of the most certainly ascertained facts in the science of electrostatics, and it enables us to demonstrate at once that particles of electricity attract and repel each other with a force which is inversely as the square of their distance.

We may give in the first place an elementary proof of the converse proposition by the aid of a simple lemma:—

Lemma.—If particles of matter attract one another according to the law of the inverse square the attraction of all sections of a cone for a particle at the vertex is the same. *Definition.*—The solid angle subtended by any surface at a point is measured by the quotient of its apparent surface by the square of its distance from that point. Hence the total solid angle round any point is 4π. The solid angles subtended by all normal sections of a cone at the vertex are therefore equal, and since the attractions of these sections on a particle at the vertex are proportional to their distances from the vertex, they are numerically equal to one another and to the solid angle of the cone.

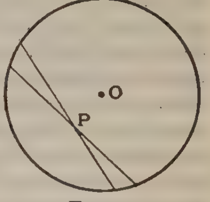

FIG. 1.

Let us then suppose a spherical shell O to be electrified. Select any point P in the interior and let a line drawn through it sweep out a small double cone (see fig. 1). Each cone cuts out an area on the surface equally inclined to the cone axis. The electric density on the sphere being uniform, the quantities of electricity on these areas are proportional to the areas, and if the electric force varies inversely as the square of the distance, the forces exerted by these two surface charges at the point in question are proportional to the solid angle of the little cone. Hence the forces due to the two areas at opposite ends of the chord are equal and opposed.

Hence we see that if the whole surface of the sphere is divided into pairs of elements by cones described through any interior point, the resultant force at that point must consist of the sum of pairs of equal and opposite forces, and is therefore zero. For the proof of the converse proposition we must refer the reader to the *Electrical Researches of the Hon. Henry Cavendish*, p. 419, or to Maxwell's *Treatise on Electricity and Magnetism*, 2nd ed., vol. i. p. 76, where Maxwell gives an elegant proof that if the force in the interior of a closed conductor is zero, the law of the force must be that of the inverse square of the distance.[4] From this fact it follows that we can shield any conductor entirely from external influence by other charged conductors by enclosing it in a metal case. It is not even necessary that this envelope should be of solid metal; a cage made of fine metal wire gauze which permits objects in its interior to be seen will yet be a perfect electrical screen for them. Electroscopes and electrometers, therefore, standing in proximity to electrified bodies can be perfectly shielded from influence by enclosing them in cylinders of metal gauze.

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[1] See Maxwell, *Elementary Treatise on Electricity* (Oxford, 1881), p. 47.

[2] See Maxwell, *Treatise on Electricity and Magnetism* (3rd ed., Oxford, 1892), vol. i. p. 80.

[3] Maxwell, *Ibid.* vol. i. § 74a; also *Electrical Researches of the Hon. Henry Cavendish*, edited by J. Clerk Maxwell (Cambridge, 1879), p. 104.

[4] Laplace (*Mec. Cel.* vol. i. ch. ii.) gave the first direct demonstration that no function of the distance except the inverse square can satisfy the condition that a uniform spherical shell exerts no force on a particle within it.

Even if a charged and insulated conductor, such as an open canister or deep cup, is not perfectly closed, it will be found that a proof-plane consisting of a small disk of gilt paper carried at the end of a rod of gum-lac will not bring away any charge if applied to the deep inside portions. In fact it is curious to note how large an opening may be made in a vessel which yet remains for all electrical purposes "a closed conductor." Maxwell (*Elementary Treatise*, &c., p. 15) ingeniously applied this fact to the insulation of conductors. If we desire to insulate a metal ball to make it hold a charge of electricity, it is usual to do so by attaching it to a handle or stem of glass or ebonite. In this case the electric charge exists at the point where the stem is attached, and there leakage by creeping takes place. If, however, we employ a hollow sphere and let the stem pass through a hole in the side larger than itself, and attach the end to the interior of the sphere, then leakage cannot take place.

Another corollary of the fact that there is no electric force in the interior of a charged conductor is that the potential in the interior is constant and equal to that at the surface. For by the definition of potential it follows that the electric force in any direction at any point is measured by the space rate of change of potential in that direction or $E = \pm dV/dx$. Hence if the force is zero the potential V must be constant.

(iii.) *Association of Positive and Negative Electricities.*—The third leading fact in electrostatics is that positive and negative electricity are always created in equal quantities, and that for every charge, say, of positive electricity on one conductor there must exist on some other bodies an equal total charge of negative electricity. Faraday expressed this fact by saying that no absolute electric charge could be given to matter. If we consider the charge of a conductor to be measured by the number of tubes of electric force which proceed from it, then, since each tube must end on some other conductor, the above statement is equivalent to saying that the charges at each end of a tube of electric force are equal.

The facts may, however, best be understood and demonstrated by considering an experiment due to Faraday, commonly called the ice pail experiment, because he employed for it a pewter ice pail (*Exp. Res.* vol. ii. p. 279, or *Phil. Mag.* 1843, 22). On the plate of a gold-leaf electroscope place a metal canister having a loose lid. Let a metal ball be suspended by a silk thread, and the canister lid so fixed to the thread that when the lid is in place the ball hangs in the centre of the canister. Let the ball and lid be removed by the silk, and let a charge, say, of positive electricity (+ Q) be given to the ball. Let the canister be touched with the finger to discharge it perfectly. Then let the ball be lowered into the canister. It will be found that as it does so the gold-leaves of the electroscope diverge, but collapse again if the ball is withdrawn. If the ball is lowered until the lid is in place, the leaves take a steady deflection. Next let the canister be touched with the finger, the leaves collapse, but diverge again when the ball is withdrawn. A test will show that in this last case the canister is left negatively electrified. If before the ball is withdrawn, after touching the outside of the canister with the finger, the ball is tilted over to make it touch the inside of the canister, then on withdrawing it the canister and ball are found to be perfectly discharged. The explanation is as follows: the charge (+ Q) of positive electricity on the ball creates by induction an equal charge (−Q) on the inside of the canister when placed in it, and repels to the exterior surface of the canister an equal charge (+ Q). On touching the canister this last charge goes to earth. Hence when the ball is touched against the inside of the canister before withdrawing it a second time, the fact that the system is found subsequently to be completely discharged proves that the charge −Q induced on the inside of the canister must be exactly equal to the charge +Q on the ball, and also that the inducing action of the charge +Q on the ball created equal quantities of electricity of opposite sign, one drawn to the inside and the other repelled to the outside of the canister.

Electrical Capacity.—We must next consider the quality of a conductor called its electrical capacity. The potential of a conductor has already been defined as the mechanical work which must be done to bring up a very small body charged with a unit of positive electricity from the earth's surface or other boundary taken as the place of zero potential to the surface of this conductor in question. The mathematical expression for this potential can in some cases be calculated or predetermined.

Potential of a sphere.

Thus, consider a sphere uniformly charged with Q units of positive electricity. It is a fundamental theorem in attractions that a thin spherical shell of matter which attracts according to the law of the inverse square acts on all external points as if it were concentrated at its centre. Hence a sphere having a charge Q repels a unit charge placed at a distance x from its centre with a force Q/x^2 dynes, and therefore the work W in ergs expended in bringing the unit up to that point from an infinite distance is given by the integral

$$W = \int_\infty^x Qx^{-2}dx = Q/x \qquad (1);$$

Capacity of a sphere.

Hence the potential at the surface of the sphere, and therefore the potential of the sphere, is Q/R, where R is the radius of the sphere in centimetres. The quantity of electricity which must be given to the sphere to raise it to unit potential is therefore R electrostatic units. The capacity of a conductor is defined to be the charge required to raise its potential to unity, all other charged conductors being at an infinite distance. This capacity is then a function of the geometrical dimensions of the conductor, and can be mathematically determined in certain cases. Since the potential of a small charge of electricity dQ at a distance r is equal to dQ/r, and since the potential of all parts of a conductor is the same in those cases in which the distribution of surface density of electrification is uniform or symmetrical with respect to some point or axis in the conductor, we can calculate the potential by simply summing up terms like $\sigma dS/r$, where dS is an element of surface, σ the surface density of electricity on it, and r the distance from the symmetrical centre. The capacity is then obtained as the quotient of the whole charge by this potential. Thus the distribution of electricity on a sphere in free space must be uniform, and all parts of the charge are at an equal distance R from the centre. Accordingly the potential *at* the centre is Q/R. But this must be the potential *of* the sphere, since all parts are at the same potential V. Since the capacity C is the ratio of charge to potential, the capacity of the sphere in free space is $Q/V = R$, or is numerically the same as its radius reckoned in centimetres.

Capacity of a thin rod.

We can thus easily calculate the capacity of a long thin wire like a telegraph wire far removed from the earth, as follows: Let $2r$ be the diameter of the wire, l its length, and σ the uniform surface electric density. Then consider a thin annulus of the wire of width dx; the charge on it is equal to $2\pi r\sigma/dx$ units, and the potential V at a point on the axis at a distance x from the annulus due to this elementary charge is

$$V = 2\int_0^{l/2} \frac{2\pi r\sigma}{\sqrt{(r^2+x^2)}}dx = 4\pi r\sigma \left\{ \log_e(\tfrac{1}{2}l + \sqrt{r^2 + \tfrac{1}{4}l^2}) - \log_e r \right\}.$$

If, then, r is small compared with l, we have $V = 4\pi r\sigma \log_e l/r$. But the charge is $Q = 2\pi r\sigma$, and therefore the capacity of the thin wire is given by

$$C = 1/2 \log_e l/r \qquad (2).$$

Potential of an ellipsoid.

A more difficult case is presented by the ellipsoid.[1] We have first to determine the mode in which electricity distributes itself on a conducting ellipsoid in free space. It must be such a distribution that the potential in the interior will be constant, since the electric force must be zero. It is a well-known theorem in attractions that if a shell is made of gravitative matter whose inner and outer surfaces are similar ellipsoids, it exercises no attraction on a particle of matter in its interior.[2] Consider then an ellipsoidal shell the axes of whose bounding surfaces are (a, b, c) and $(a+da)$, $(b+db)$, $(c+dc)$, where $da/a = db\ b = dc/c = \mu$. The potential of such a shell at any internal point is constant, and the equi-potential surfaces for external space are ellipsoids confocal with the ellipsoidal shell. Hence if we distribute electricity over an ellipsoid, so that its density is everywhere proportional to the thickness of a shell formed by describing round the ellipsoid a similar and slightly larger one, that distribution will be in equilibrium and will produce a constant potential throughout the interior. Thus if σ is the surface density, δ the thickness of the shell at any point, and ρ the assumed volume density of the matter of the shell, we have $\sigma=A\delta\rho$. Then the quantity of electricity on any element of surface dS is A times the mass of the corresponding element of the shell; and if Q is the whole quantity of electricity on the ellipsoid, Q = A times the whole mass of the shell. This mass is equal to $4\pi abc\rho\mu$; therefore $Q=A4\pi abc\rho\mu$ and $\delta=\mu p$, where p is the length of the perpendicular let fall from the centre of the ellipsoid on the tangent plane. Hence

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[1] The solution of the problem of determining the distribution on an ellipsoid of a fluid the particles of which repel each other with a force inversely as the nth power of the distance was first given by George Green (see Ferrer's edition of Green's *Collected Papers*, p. 119, 1871).

[2] See Thomson and Tait, *Treatise on Natural Philosophy*, § 519.

$$\sigma=Qp/4\pi abc \qquad (3).$$

Capacity of an ellipsoid.

Accordingly for a given ellipsoid the surface density of free distribution of electricity on it is everywhere proportional to the length of the perpendicular let fall from the centre on the tangent plane at that point. From this we can determine the capacity of the ellipsoid as follows: Let p be the length of the perpendicular from the centre of the ellipsoid, whose equation is $x^2/a^2+y^2/b^2+z^2/c^2=1$ to the tangent plane at x, y, z. Then it can be shown that $1/p^2=x^2/a^4+y^2/b^4+z^2/c^4$ (see Frost's *Solid Geometry*, p. 172). Hence the density σ is given by

$$\sigma=\frac{Q}{4\pi abc}\,\frac{1}{\sqrt{(x^2/a^4+y^2/b^4+z^2/c^4)}},$$

and the potential at the centre of the ellipsoid, and therefore its potential as a whole is given by the expression,

$$V=\int\frac{\sigma dS}{r}=\frac{Q}{4\pi abc}\int\frac{dS}{r\sqrt{(x^2/a^4+y^2/b^4+z^2/c^4)}} \qquad (4).$$

Accordingly the capacity C of the ellipsoid is given by the equation

$$\frac{1}{C}=\frac{1}{4\pi abc}\int\frac{dS}{\sqrt{(x^2+y^2+z^2)}\sqrt{(x^2/a^4+y^2/b^4+z^2/c^4)}} \qquad (5).$$

It has been shown by Professor Chrystal that the above integral may also be presented in the form,[1]

$$\frac{1}{C}=\frac{1}{2}\int_0^\infty\frac{d\lambda}{\sqrt{\{(a^2+\lambda)(b^2+\lambda)(c^2+\lambda)\}}} \qquad (6).$$

The above expressions for the capacity of an ellipsoid of three unequal axes are in general elliptic integrals, but they can be evaluated for the reduced cases when the ellipsoid is one of revolution, and hence in the limit either takes the form of a long rod or of a circular disk.

Thus if the ellipsoid is one of revolution, and ds is an element of arc which sweeps out the element of surface dS, we have

$$dS=2\pi yds=2\pi ydx/\left(\frac{dx}{ds}\right)=2\pi ydx/\left(\frac{py}{b}\right)=\frac{2\pi b^2}{p}dx.$$

Hence, since $\sigma=Qp/4\pi ab^2, \sigma dS=Qdx/2a$.

Accordingly the distribution of electricity is such that equal parallel slices of the ellipsoid of revolution taken normal to the axis of revolution carry equal charges on their curved surface.

The capacity C of the ellipsoid of revolution is therefore given by the expression

$$\frac{1}{C}=\frac{1}{2a}\int\frac{dx}{\sqrt{(x^2+y^2)}} \qquad (7).$$

If the ellipsoid is one of revolution round the major axis a (prolate) and of eccentricity e, then the above formula reduces to

$$\frac{1}{C_1}=\frac{1}{2ae}\log_\epsilon\left(\frac{1+e}{1-e}\right) \qquad (8).$$

Whereas if it is an ellipsoid of revolution round the minor axis b (oblate), we have

$$\frac{1}{C^2}=\frac{\sin^{-1}ae}{ae} \qquad (9).$$

In each case we have $C=a$ when $e=0$, and the ellipsoid thus becomes a sphere.

In the extreme case when $e=1$, the prolate ellipsoid becomes a long thin rod, and then the capacity is given by

$$C_1=a/\log_\epsilon 2a/b \qquad (10),$$

which is identical with the formula (2) already obtained. In the other extreme case the oblate spheroid becomes a circular disk when $e=1$, and then the capacity $C_2=2a/\pi$. This last result shows that the capacity of a thin disk is $2/\pi=1/1{\cdot}571$ of that of a sphere of the same radius. Cavendish (*Elec. Res.* pp. 137 and 347) determined in 1773 experimentally that the capacity of a sphere was 1·541 times that of a disk of the same radius, a truly remarkable result for that date.

Three other cases of practical interest present themselves, viz. the capacity of two concentric spheres, of two coaxial cylinders and of two parallel planes.

Capacity of two concentric spheres.

Consider the case of two concentric spheres, a solid one enclosed in a hollow one. Let R_1 be the radius of the inner sphere, R_2 the inside radius of the outer sphere, and R_2 the outside radius of the outer spherical shell. Let a charge $+Q$ be given to the inner sphere. Then this produces a charge $-Q$ on the inside of the enclosing spherical shell, and a charge $+Q$ on the outside of the shell. Hence the potential V at the centre of the inner sphere is given by $V=Q/R_1-Q/R_2+Q/R_3$. If the outer shell is connected to the earth, the charge $+Q$ on it disappears, and we have the capacity C of the inner sphere given by

$$C=1/R_1-1/R_2=(R_2-R_1)\ R_1R_2 \qquad (11).$$

Such a pair of concentric spheres constitute a condenser (see LEYDEN JAR), and it is obvious that by making R_2 nearly equal to R_1, we may enormously increase the capacity of the inner sphere. Hence the name *condenser*.

Capacity of two coaxial cylinders.

The other case of importance is that of two coaxial cylinders. Let a solid circular sectioned cylinder of radius R_1 be enclosed in a coaxial tube of inner radius R_2. Then when the inner cylinder is at potential V_1 and the outer one kept at potential V_2 the lines of electric force between the cylinders are radial. Hence the electric force E in the interspace varies inversely as the distance from the axis. Accordingly the potential V at any point in the interspace is given by

$$E=-dV/dR=A/R \text{ or } V=-A\int R^{-1}dR, \qquad (12),$$

where R is the distance of the point in the interspace from the axis, and A is a constant. Hence $V_2-V_1=-A\log R_2/R_1$. If we consider a length l of the cylinder, the charge Q on the inner cylinder is $Q=2\pi R_1 l\sigma$, where σ is the surface density, and by Coulomb's law $\sigma=E_1/4\pi$, where $E_1=A/R_1$ is the force at the surface of the inner cylinder.

Accordingly $Q=2\pi R_1 lA/4\pi R_1=Al/2$. If then the outer cylinder be at zero potential the potential V of the inner one is

$$V=A\log(R_2/R_1), \text{ and its capacity } C=l/2\log R_2/R_1.$$

This formula is important in connexion with the capacity of electric cables, which consist of a cylindrical conductor (a wire) enclosed in a conducting sheath. If the dielectric or separating insulator has a constant K, then the capacity becomes K times as great.

Capacity of two parallel planes.

The capacity of two parallel planes can be calculated at once if we neglect the distribution of the lines of force near the edges of the plates, and assume that the only field is the uniform field between the plates. Let V_1 and V_2 be the potentials of the plates, and let a charge Q be given to one of them. If S is the surface of each plate, and d their distance, then the electric force E in the space between them is $E=(V_1-V_2)/d$. But if σ is the surface density, $E=4\pi\sigma$, and $\sigma=Q/S$. Hence we have

$$(V_1-V_2)\ d=4\pi Q/S \text{ or } C=Q/(V_1-V_2)=S/4\pi d \qquad (13).$$

"Edge effect."

In this calculation we neglect altogether the fact that electric force distributed on curved lines exists outside the interspace between the plates, and these lines in fact extend from the back of one plate to that of the other. G. R. Kirchhoff (*Gesammelte Abhandl.* p. 112) has given a full expression for the capacity C of two circular plates of thickness t and radius r placed at any distance d apart in air from which the edge effect can be calculated. Kirchhoff's expression is as follows:—

$$C=\frac{\pi r^2}{4\pi d}+\frac{r}{4\pi d}\left\{d\log_\epsilon\frac{16\pi r(d+t)}{\epsilon d^2}+t\log_\epsilon\frac{d+t}{t}\right\} \qquad (14).$$

In the above formula ϵ is the base of the Napierian logarithms. The first term on the right-hand side of the equation is the expression for the capacity, neglecting the curved edge distribution of electric force, and the other terms take into account, not only the uniform field between the plates, but also the non-uniform field round the edges and beyond the plates.

Guard plates.

In practice we can avoid the difficulty due to irregular distribution of electric force at the edges of the plate by the use of a guard plate as first suggested by Lord Kelvin.[2] If a large plate has a circular hole cut in it, and this is nearly filled up by a circular plate lying in the same plane, and if we place another large plate parallel to the first, then the electric field between this second plate and the small circular plate is nearly uniform; and if S is the area of the small plate and d its distance from the opposed plate, its capacity may be calculated by the simple formula $C=S/4\pi d$. The outer larger plate in which the hole is cut is called the "guard plate," and must be kept at the same potential as the smaller inner or "trap-door plate." The same arrangement can be supplied to a pair of coaxial cylinders. By placing metal plates on either side of a larger sheet of dielectric or insulator we can construct a condenser of relatively large capacity. The instrument known as a Leyden jar (*q.v.*) consists of a glass bottle coated within and without for three parts of the way up with tinfoil.

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[1] See article "Electricity," *Encyclopaedia Britannica* (9th edition), vol. viii. p. 30. The reader is also referred to an article by Lord Kelvin (*Reprint of Papers on Electrostatics and Magnetism*, p. 178), entitled "Determination of the Distribution of Electricity on a Circular Segment of a Plane, or Spherical Conducting Surface under any given Influence," where another equivalent expression is given for the capacity of an ellipsoid.

[2] See Maxwell, *Electricity and Magnetism*, vol. i. pp. 284-305 (3rd ed., 1892).

If we have a number of such condensers we can combine them in "parallel" or in "series." If all the plates on one side are connected together and also those on the other, the condensers are joined in parallel. If C_1, C_2, C_3, &c., are the separate capacities, then $\Sigma(C)=C_1+C_2+C_3+$ &c., is the total capacity in parallel. If the condensers are so joined that the inner coating of one is connected to the outer coating of the next, they are said to be in series. Since then they are all charged with the same quantity of electricity, and the total over all potential difference V is the sum of each of the individual potential differences V_1, V_2, V_3, &c., we have

Systems of condensers.

$$Q=C_1V_1=C_2V_2=C_3V_3=\text{\&c., and } V=V_1+V_2+V_3+\text{\&c.}$$

The resultant capacity is $C=Q/V$, and

$$C=1/(1/C_1+1/C_2+1/C_3+\&c)=1/\Sigma(1/C) \qquad (15).$$

These rules provide means for calculating the resultant capacity when any number of condensers are joined up in any way.

If one condenser is charged, and then joined in parallel with another uncharged condenser, the charge is divided between them in the ratio of their capacities. For if C_1 and C_2 are the capacities and Q_1 and Q_2 are the charges after contact, then Q_1/C_1 and Q_2/C_2 are the potential differences of the coatings and must be equal. Hence $Q_1/C_1=Q_2/C_2$ or $Q_1/Q_2=C_1/C_2$. It is worth noting that if we have a charged sphere we can perfectly discharge it by introducing it into the interior of another hollow insulated conductor and making contact. The small sphere then becomes part of the interior of the other and loses all charge.

Measurement of Capacity.—Numerous methods have been devised for the measurement of the electrical capacity of conductors in those cases in which it cannot be determined by calculation. Such a measurement may be an *absolute* determination or a *relative* one. The dimensions of a capacity in electrostatic measure is a length (see UNITS, PHYSICAL). Thus the capacity of a sphere in electrostatic units (E.S.U.) is the same as the number denoting its radius in centimetres. The unit of electrostatic capacity is therefore that of a sphere of 1 cm. radius.[1] This unit is too small for practical purposes, and hence a unit of capacity 900,000 greater, called a microfarad, is generally employed. Thus for instance the capacity in free space of a sphere 2 metres in diameter would be 100/900,000 = 1/9000 of a microfarad. The electrical capacity of the whole earth considered as a sphere is about 800 microfarads. An absolute measurement of capacity means, therefore, a determination in E.S. units made directly without reference to any other condenser. On the other hand there are numerous methods by which the capacities of condensers may be compared and a relative measurement made in terms of some standard.

Relative determinations.

One well-known comparison method is that of C. V. de Sauty. The two condensers to be compared are connected in the branches of a Wheatstone's Bridge (*q.v.*) and the other two arms completed with variable resistance boxes. These arms are then altered until on raising or depressing the battery key there is no sudden deflection either way of the galvanometer. If R_1 and R_2 are the arms' resistances and C_1 and C_2 the condenser capacities, then when the bridge is balanced we have $R_1:R_2=C_1:C_2$.

Another comparison method much used in submarine cable work is the method of mixtures, originally due to Lord Kelvin and usually called Thomson and Gott's method. It depends on the principle that if two condensers of capacity C_1 and C_2 are respectively charged to potentials V_1 and V_2, and then joined in parallel with terminals of opposite charge together, the resulting potential difference of the two condensers will be V, such that

$$V=\frac{(C_1V_1-C_2V_2)}{(C+C)} \qquad (16);$$

and hence if V is zero we have $C_1:C_2=V_2:V_1$.

The method is carried out by charging the two condensers to be compared at the two sections of a high resistance joining the ends of a battery which is divided into two parts by a movable contact.[2] This contact is shifted until such a point is found by trial that the two condensers charged at the different sections and then joined as above described and tested on a galvanometer show no charge. Various special keys have been invented for performing the electrical operations expeditiously.

A simple method for condenser comparison is to charge the two condensers to the same voltage by a battery and then discharge them successively through a ballistic galvanometer (*q.v.*) and observe the respective "throws" or deflections of the coil or needle. These are proportional to the capacities. For the various precautions necessary in conducting the above tests special treatises on electrical testing must be consulted.

Absolute determinations.

In the absolute determination of capacity we have to measure the ratio of the charge of a condenser to its plate potential difference. One of the best methods for doing this is to charge the condenser by the known voltage of a battery, and then discharge it through a galvanometer and repeat this process rapidly and successively. If a condenser of capacity C is charged to potential V, and discharged n times per second through a galvanometer, this series of intermittent discharges is equivalent to a current nCV. Hence if the galvanometer is calibrated by a potentiometer (*q.v.*) we can determine the value of this current in amperes, and knowing the value of n and V thus determine C. Various forms of commutator have been devised for effecting this charge and discharge rapidly by J. J. Thomson, R. T. Glazebrook, J. A. Fleming and W. C. Clinton and others.[3] One form consists of a tuning-fork electrically maintained in vibration of known period, which closes an electric contact at every vibration and sets another electromagnet in operation, which reverses a switch and moves over one terminal of the condenser from a battery to a galvanometer contact. In another form, a revolving contact is used driven by an electric motor, which consists of an insulating disk having on its surface slips of metal and three wire brushes a, b, c (see fig. 2) pressing against them. The metal slips are so placed that, as the disk revolves, the middle brush, connected to one terminal of the condenser C, is alternately put in conductive connexion with first one and then the other outside brush, which are joined respectively to the battery B and galvanometer G terminals. From the speed of this motor the number of commutations per second can be determined. The above method is especially useful for the determinations of very small capacities of the order of 100 electrostatic units or so and upwards.

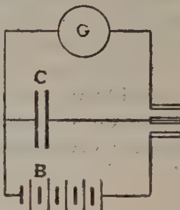

FIG. 2.

Dielectric constant.—Since all electric charge consists in a state of strain or polarization of the dielectric, it is evident that the physical state and chemical composition of the insulator must be of great importance in determining electrical phenomena. Cavendish and subsequently Faraday discovered this fact, and the latter gave the name "specific inductive capacity," or "dielectric constant," to that quality of an insulator which determines the charge taken by a conductor embedded in it when charged to a given potential. The simplest method of determining it numerically is, therefore, that adopted by Faraday.[4]

TABLE I.—*Dielectric Constants* (K) *of Solids* (K *for Air* = 1).

Substance.	K.	Authority.
Glass, double extra dense flint, density 4·5	9·896	J. Hopkinson
Glass, light flint, density 3·2	6·72	,,
Glass, hard crown, density 2·485	6·61	,,
Sulphur	2·24	M. Faraday
	2·88	Coullner
	3·84	L. Boltzmann
	4·0	P. J. Curie
	2·94	P. R. Blondlot
Ebonite	2·05	Rosetti
	3·15	Boltzmann
	2·21	Schiller
	2·86	Elsas
India-rubber, pure brown	2·12	Schiller
India-rubber, vulcanized, grey	2·69	,,
Gutta-percha	2·462	J. E. H. Gordon
Paraffin	1·977	Gibson and Barclay
	2·32	Boltzmann
	2·29	J. Hopkinson
	1·99	Gordon
Shellac	2·95	Wällner
	2·74	Gordon
	3·04	A. A. Winkelmann
Mica	6·64	I. Klemenčič
	8·00	P. J. Curie
	7·98	E. M. L. Bouty
	5·97	Elsas
Quartz—		
along optic axis	4·55	P. J. Curie
perp. to optic axis	4·49	P. J. Curie
Ice at −23°	78·0	Bouty

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[1] It is an interesting fact that Cavendish measured capacity in "globular inches," using as his unit the capacity of a metal ball, 1 in. in diameter. Hence multiplication of his values for capacities by 2·54 reduces them to E.S. units in the C.G.S. system. See *Elec. Res.* p. 347.

[2] For fuller details of these methods of comparison of capacities see J. A. Fleming, *A Handbook for the Electrical Laboratory and Testing Room*, vol. ii. ch. ii. (London, 1903).

[3] See Fleming, *Handbook for the Electrical Laboratory*, vol. ii. p. 130.

[4] Faraday, *Experimental Researches on Electricity*, vol. i. § 1252. For a very complete set of tables of dielectric constants of solids, liquids and gases see A. Winkelmann, *Handbuch der Physik*, vol. iv. pp. 98-148 (Breslau, 1905); also see Landolt and Börnstein's *Tables of Physical Constants* (Berlin, 1894).

He constructed two equal condensers, each consisting of a metal ball enclosed in a hollow metal sphere, and he provided also certain hemispherical shells of shellac, sulphur, glass, resin, &c., which he could so place in one condenser between the ball and enclosing sphere that it formed a condenser with solid dielectric. He then determined the ratio of the capacities of the two condensers, one with air and the other with the solid dielectric. This gave the dielectric constant K of the material. Taking the dielectric constant of air as unity he obtained the following values, for shellac K = 2·0, glass K = 1·76, and sulphur K = 2·24.

Since Faraday's time, by improved methods, but depending essentially upon the same principles, an enormous number of determinations of the dielectric constants of various insulators, solid, liquid and gaseous, have been made (see tables I., II., III. and IV.). There are very considerable differences between the values assigned by different observers, sometimes no doubt due to differences in method, but in most cases unquestionably depending on variations in the quality of the specimens examined. The value of the dielectric constant is greatly affected by the temperature and the frequency of the applied electric force.

Table II.—*Dielectric Constant* (K) *of Liquids.*

Liquid.	K.	Authority.
Water at 17° C.	80·88	F. Heerwagen
„ „ 25° C.	75·7	E. B. Rosa
„ „ 25·3° C.	78·87	Franke
Olive oil	3·16	Hopkinson
Castor oil	4·78	„
Turpentine	2·15	P. A. Silow
„	2·23	Hopkinson
Petroleum	2·072	Silow
„	2·07	Hopkinson
Ethyl alcohol at 25° C.	25·7	Rosa
Ethyl ether	4·57	Doule
„ „	4·8	Bouty
Acetic acid	9·7	Franke

Table III.—*Dielectric Constant of some Bodies at a very low Temperature* (−185° C.) (*Fleming and Dewar*).

Substance.	K at 15° C.	K at −185° C.
Water	80	2·4 to 2·9
Formic acid	62	2·41
Glycerine	56	3·2
Methyl alcohol	34	3·13
Nitrobenzene	32	2·6
Ethyl alcohol	25	3·1
Acetone	21·85	2·62
Ethyl nitrate	17·7	2·73
Amyl alcohol	16	2·14
Aniline	7·5	2·92
Castor oil	4·78	2·19
Ethyl ether	4·25	2·31

The above determinations at low temperature were made with either a steady or a slowly alternating electric force applied a hundred times a second. They show that the dielectric constant of a liquid generally undergoes great reduction in value when the liquid is frozen and reduced to a low temperature.[1]

The dielectric constants of gases have been determined by L. Boltzmann and I. Klemenčič as follows:—

Table IV.—*Dielectric Constants* (K) *of Gases at* 15° *C. and* 760 *mm. Vacuum* = 1.

Gas.	Dielectric Constant K.	√K.	Optical Refractive Index. μ.
Air	1·000590	1·000295	1·000293
Hydrogen	1·000264	1·000132	1·000139
Carbon dioxide	1·000946	1·000475	1·000454
Carbon monoxide	1·000690	1·000345	1·000335
Nitrous oxide	1·000994	1·000497	1·000516
Ethylene	1·001312	1·000656	1·000720
Marsh gas (methane)	1·000944	1·000478	1·000442
Carbon bisulphide	1·002900	1·001450	1·001478
Sulphur dioxide	1·00954	1·004770	1·000703
Ether	1·00744	1·003720	1·00154
Ethyl chloride	1·01552	1·007760	1·001174
Ethyl bromide	1·01546	1·007730	1·00122

In general the dielectric constant is reduced with decrease of temperature towards a certain limiting value it would attain at the absolute zero. This variation, however, is not always linear. In some cases there is a very sudden drop at or below a certain temperature to a much lower value, and above and below the point the temperature variation is small. There is also a large difference in most cases between the value for a steadily applied electric force and a rapidly reversed or intermittent force—in the last case a decrease with increase of frequency. Maxwell (*Elec. and Magn.* vol. ii. § 788) showed that the square root of the dielectric constant should be the same number as the refractive index for waves of the same frequency (see Electric Waves). There are very few substances, however, for which the optical refractive index has the same value as K for steady or slowly varying electric force, on account of the great variation of the value of K with frequency.

There is a close analogy between the variation of dielectric constant of an insulator with electric force frequency and that of the rigidity or stiffness of an elastic body with the frequency of applied mechanical stress. Thus pitch is a soft and yielding body under steady stress, but a bar of pitch if struck gives a musical note, which shows that it vibrates and is therefore stiff or elastic for high frequency stress.

Residual Charges in Dielectrics.—In close connexion with this lies the phenomenon of residual charge in dielectrics.[2] If a glass Leyden jar is charged and then discharged and allowed to stand awhile, a second discharge can be obtained from it, and in like manner a third, and so on. The reappearance of the residual charge is promoted by tapping the glass. It has been shown that this behaviour of dielectrics can be imitated by a mechanical model consisting of a series of perforated pistons placed in a tube of oil with spiral springs between each piston.[3] If the pistons are depressed and then released, and then the upper piston fixed awhile, a second discharge can be obtained from it, and the mechanical stress-strain diagram of the model is closely similar to the discharge curve of a dielectric. R. H. A. Kohlrausch called attention to the close analogy between residual charge and the elastic recovery of strained bodies such as twisted wire or glass threads. If a charged condenser is suddenly discharged and then insulated, the reappearance of a potential difference between its coatings is analogous to the reappearance of a torque in the case of a glass fibre which has been twisted, released suddenly, and then gripped again at the ends.

For further information on the qualities of dielectrics the reader is referred to the following sources:—J. Hopkinson, "On the Residual Charge of the Leyden Jar," *Phil. Trans.*, 1876, 166 [ii.], p. 489, where it is shown that tapping the glass of a Leyden jar permits the reappearance of the residual charge; "On the Residual Charge of the Leyden Jar," *ib.* 167 [ii.], p. 599, containing many valuable observations on the residual charge of Leyden jars; W. E. Ayrton and J. Perry, "A Preliminary Account of the Reduction of Observations on Strained Material, Leyden Jars and Voltameters," *Proc. Roy. Soc.*, 1880, 30, p. 411, showing experiments on residual charge of condensers and a comparison between the behaviour of dielectrics and glass fibres under torsion. In connexion with this paper the reader may also be referred to one by L. Boltzmann, "Zur Theorie der elastischen Nachwirkung," *Wien. Acad. Sitz.-Ber.*, 1874, 70.

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[1] See the following papers by J. A. Fleming and James Dewar on dielectric constants at low temperatures: "On the Dielectric Constant of Liquid Oxygen and Liquid Air," *Proc. Roy. Soc.*, 1897, 60, p. 360; "Note on the Dielectric Constant of Ice and Alcohol at very low Temperatures," *ib.*, 1897, 61, p. 2; "On the Dielectric Constants of Pure Ice, Glycerine, Nitrobenzol and Ethylene Dibromide at and above the Temperature of Liquid Air," *id. ib.* p. 316; "On the Dielectric Constant of Certain Frozen Electrolytes at and above the Temperature of Liquid Air," *id. ib.* p. 299—this paper describes the cone condenser and methods used; "Further Observations on the Dielectric Constants of Frozen Electrolytes at and above the Temperature of Liquid Air," *id. ib.* p. 381; "The Dielectric Constants of Certain Organic Bodies at and below the Temperature of Liquid Air," *id. ib.* p. 358; "On the Dielectric Constants of Metallic Oxides dissolved or suspended in Ice cooled to the Temperature of Liquid Air," *id. ib.* p. 368.

[2] See Faraday, *Experimental Researches*, vol. i. § 1245; R. H. A. Kohlrausch, *Pogg. Ann.*, 1854, 91; see also Maxwell, *Electricity and Magnetism*, vol. i. § 327, who shows that a composite or stratified dielectric composed of layers of materials of different dielectric constants and resistivities would exhibit the property of residual charge.

[3] Fleming and Ashton, "On a Model which imitates the behaviour of Dielectrics," *Phil. Mag.*, 1901 [6], 2, p. 228.

Distribution of Electricity on Conductors.—We now proceed to consider in more detail the laws which govern the distribution of electricity at rest upon conductors. It has been shown above that the potential due to a charge of q units placed on a very small sphere, commonly called a point-charge, at any distance x is q/x. The mathematical importance of this function called the potential is that it is a scalar quantity, and the potential at any point due to any number of point charges q_1, q_2, q_3, &c., distributed in any manner, is the sum of them separately, or

$$q_1/x_1+q_2/x_2+q_3/x_3+\text{\&c.}=\Sigma(q/x)=\text{V} \qquad (17),$$

where x_1, x_2, x_3, &c., are the distances of the respective point charges from the point in question at which the total potential is required. The resultant electric force E at that point is then obtained by differentiating V, since $\text{E}=-d\text{V}/dx$, and E is in the direction in which V diminishes fastest. In any case, therefore, in which we can sum up the elementary potentials at any point we can calculate the resultant electric force at the same point.

We may describe, through all the points in an electric field which have the same potential, surfaces called equipotential surfaces, and these will be everywhere perpendicular or orthogonal to the lines of electric force. Let us assume the field divided up into tubes of electric force as already explained, and these cut normally by equipotential surfaces. We can then establish some important properties of these tubes and surfaces. At each point in the field the electric force can have but one resultant value. Hence the equipotential surfaces cannot cut each other. Let us suppose any other surface described in the electric field so as to cut the closely compacted tubes. At each point on this surface the resultant force has a certain value, and a certain direction inclined at an angle θ to the normal to the selected surface at that point. Let $d\text{S}$ be an element of the surface. Then the quantity $\text{E}\cos\theta d\text{S}$ is the product of the normal component of the force and an element of the surface, and if this is summed up all over the surface we have the total electric flux or induction through the surface, or the surface integral of the normal force mathematically expressed by $\int\text{E}\cos\theta d\text{S}$, provided that the dielectric constant of the medium is unity.

We have then a very important theorem as follows:—If any closed surface be described in an electric field which wholly encloses or wholly excludes electrified bodies, then the total flux through this surface is equal to 4π– times the total quantity of electricity within it.[1] This is commonly called Stokes's theorem. The proof is as follows:—Consider any point-charge E of electricity included in any surface S, S, S (see fig. 3), and describe through it as centre a cone of small solid angle $d\omega$ cutting out of the enclosing surface in two small areas $d\text{S}$ and $d\text{S}'$ at distances x and x'. Then the electric force due to the point charge q at distance x is q/x, and the resolved part normal to the element of surface $d\text{S}$ is $q\cos\theta/x^2$. The normal section of the cone at that point is equal to $d\text{S}\cos\theta$, and the solid angle $d\omega$ is equal to $d\text{S}\cos\theta/x^2$. Hence the flux through $d\text{S}$ is $qd\omega$. Accordingly, since the total solid angle round a point is 4π, it follows that the total flux through the closed surface due to the single point charge q is $4\pi q$, and what is true for one point charge is true for any collection forming a total charge Q of any form. Hence the total electric flux due to a charge Q through an enclosing surface is 4πQ, and therefore is zero through one enclosing no electricity.

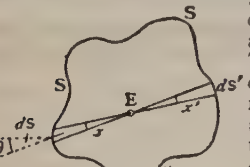

FIG. 3.

Stokes's theorem becomes an obvious truism if applied to an incompressible fluid. Let a *source* of fluid be a point from which an incompressible fluid is emitted in all directions. Close to the source the stream lines will be radial lines. Let a very small sphere be described round the source, and let the strength of the source be defined as the total flow per second through the surface of this small sphere. Then if we have any number of sources enclosed by any surface, the total flow per second through this surface is equal to the total strengths of all the sources. If, however, we defined the strength of the source by the statement that the strength divided by the square of the distance gives the velocity of the liquid at that point, then the total flux through any enclosing surface would be 4π times the strengths of all the sources enclosed. To every proposition in electrostatics there is thus a corresponding one in the hydrokinetic theory of incompressible liquids.

Let us apply the above theorem to the case of a small parallelepipedon or rectangular prism having sides dx, dy, dz respectively, its centre having co-ordinates (x, y, z). Its angular points have then co-ordinates $(x\pm\frac{1}{2}dx,\ y\pm\frac{1}{2}dy,\ z\pm\frac{1}{2}dz)$. Let this rectangular prism be supposed to be wholly filled up with electricity of density ρ; then the total quantity in it is $\rho\, dx\, dy\, dz$. Consider the two faces perpendicular to the x-axis. Let V be the potential at the centre of the prism, then the normal forces on the two faces of area $dy.dx$ are respectively

$$-\left(\frac{d\text{V}}{dx}+\frac{1}{2}\frac{d^2\text{V}}{dx^2}dx\right) \text{ and } \left(\frac{d\text{V}}{dx}-\frac{1}{2}\frac{d^2\text{V}}{dx^2}dx\right),$$

and similar expressions for the normal forces to the other pairs of faces $dx.dy$, $dz.dx$. Hence, multiplying these normal forces by the areas of the corresponding faces, we have the total flux parallel to the x-axis given by $-(d^2\text{V}/dx^2)dx\,dy\,dz$, and similar expressions for the other sides. Hence the total flux is

$$-\left(\frac{d^2\text{V}}{dx^2}+\frac{d^2\text{V}}{dy^2}+\frac{d^2\text{V}}{dz^2}\right)dx\,dy\,dz,$$

and by the previous theorem this must be equal to $4\pi\rho\, dx\, dy\, dz$.

Hence
$$\frac{d^2\text{V}}{dx^2}+\frac{d^2\text{V}}{dy^2}+\frac{d^2\text{V}}{dz^2}+4\pi\rho=0 \qquad (18).$$

This celebrated equation was first given by S. D. Poisson, although previously demonstrated by Laplace for the case when $\rho=0$. It defines the condition which must be fulfilled by the potential at any and every point in an electric field, through which ρ is finite and the electric force continuous. It may be looked upon as an equation to determine ρ when V is given or vice versa. An exactly similar expression holds good in hydrokinetics, provided that for the electric potential we substitute velocity potential, and for the electric force the velocity of the liquid.

The Poisson equation cannot, however, be applied in the above form to a region which is partly within and partly without an electrified conductor, because then the electric force undergoes a sudden change in value from zero to a finite value, in passing outwards through the bounding surface of the conductor. We can, however, obtain another equation called the "surface characteristic equation" as follows:—Suppose a very small area $d\text{S}$ described on a conductor having a surface density of electrification σ. Then let a small, very short cylinder be described of which $d\text{S}$ is a section, and the generating lines are normal to the surface. Let V_1 and V_2 be the potentials at points just outside and inside the surface $d\text{S}$, and let n_1 and n_2 be the normals to the surface $d\text{S}$ drawn outwards and inwards; then $-d\text{V}_1/dn_1$ and $-d\text{V}_2 dn_2$ are the normal components of the force over the ends of the imaginary small cylinder. But the force perpendicular to the curved surface of this cylinder is everywhere zero. Hence the total flux through the surface considered is $-\{(d\text{V}_1/dn_1)+(d\text{V}_2/dn_2)\}d\text{S}$, and this by a previous theorem must be equal to $4\pi\sigma d\text{S}$, or the total included electric quantity. Hence we have the surface characteristic equation,[2]

$$(d\text{V}_1/dn_1)+(d\text{V}_2/dn_2)+4\pi\sigma=0 \qquad (19).$$

Let us apply these theorems to a portion of a tube of electric force. Let the part selected not include any charged surface. Then since the generating lines of the tube are lines of force, the component of the electric force perpendicular to the curved surface of the tube is everywhere zero. But the electric force is normal to the ends of the tube. Hence if $d\text{S}$ and $d\text{S}'$ are the areas of the ends, and $+\text{E}$ and $-\text{E}'$ the oppositely directed electric forces at the ends of the tube, the surface integral of normal force on the flux over the tube is

$$\text{E}d\text{S}-\text{E}'d\text{S}' \qquad (20),$$

and this by the theorem already given is equal to zero, since the tube includes no electricity. Hence the characteristic quality of a tube of electric force is that its section is everywhere inversely as the electric force at that point. A tube so chosen that EdS for one section has a value unity, is called a unit tube, since the product of force and section is then everywhere unity for the same tube.

In the next place apply the surface characteristic equation to any point on a charged conductor at which the surface density is σ. The electric force outward from that point is $-d\text{V}/dn$, where dn is a distance measured along the outwardly drawn normal, and the force within the surface is zero. Hence we have

$$-d\text{V}/dn=4\pi\sigma \text{ or } \sigma=-(1/4\pi)d\text{V}/dn=\text{E}/4\pi.$$

The above is a statement of Coulomb's law, that *the electric force at the surface of a conductor is proportional to the surface density of the charge at that point and equal to 4π times the density.*[3]

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[1] The beginner is often puzzled by the constant appearance of the factor 4π in electrical theorems. It arises from the manner in which the unit quantity of electricity is defined. The electric force due to a point-charge q at a distance r is defined to be q/r^2, and the total flux or induction through the sphere of radius r is therefore $4\pi q$. If, however, the unit point charge were defined to be that which produces a unit of electric flux through a circumscribing spherical surface or the electric force at distance r defined to be $1/4\pi r^2$, many theorems would be enunciated in simpler forms.

[2] See Maxwell, *Electricity and Magnetism*, vol. i. § 78b (2nd ed.).

[3] *Id. ib.* vol. i. § 80. Coulomb proved the proportionality of electric surface force to density, but the above numerical relation $\text{E}=4\pi\sigma$ was first established by Poisson.

If we define the positive direction along a tube of electric force as the direction in which a small body charged with positive electricity would tend to move, we can summarize the above facts in a simple form by saying that, *if we have any closed surface described in any manner in an electric field, the excess of the number of unit tubes which leave the surface over those which enter it is equal to 4π-times the algebraic sum of all the electricity included within the surface.*

Every tube of electric force must therefore begin and end on electrified surfaces of opposite sign, and the quantities of positive and negative electricity on its two ends are equal, since the force E just outside an electrified surface is normal to it and equal to $\sigma/4\pi$, where σ is the surface density; and since we have just proved that for the ends of a tube of force $\mathrm{E}d\mathrm{S}=\mathrm{E}^1d\mathrm{S}'$, it follows that $\sigma d\mathrm{S}=\sigma' d\mathrm{S}'$, or $\mathrm{Q}=\mathrm{Q}'$, where Q and Q′ are the quantities of electricity on the ends of the tube of force. Accordingly, since every tube sent out from a charged conductor must end somewhere on another charge of opposite sign, it follows that the two electricities always exist in equal quantity, and that it is impossible to create any quantity of one kind without creating an equal quantity of the opposite sign.

We have next to consider the energy storage which takes place when electric charge is created, *i.e.* when the dielectric is strained or polarized. Since the potential of a conductor is defined to be the work required to move a unit of positive electricity from the surface of the earth or from an infinite distance from all electricity to the surface of the conductor, it follows that the work done in putting a small charge dq into a conductor at a potential v is $v\,dq$. Let us then suppose that a conductor originally at zero potential has its potential raised by administering to it small successive doses of electricity dq. The first raises its potential to v, the second to v' and so on, and the nth to V. Take any horizontal line and divide it into small elements of length each representing dq, and draw vertical lines representing the potentials v, v', &c., and after each dose. Since the potential rises proportionately to the quantity in the conductor, the ends of these ordinates will lie on a straight line and define a triangle whose base line is a length equal to the total quantity Q and height a length equal to the final potential V. The element of work done in introducing the quantity of electricity dq at a potential v is represented by the element of area of this triangle (see fig. 4), and hence the work done in charging the conductor with quantity Q to final potential V is $\frac{1}{2}\mathrm{QV}$, or since $\mathrm{Q}=\mathrm{CV}$, where C is its capacity, the work done is represented by $\frac{1}{2}\mathrm{CV}^2$ or by $\frac{1}{2}\mathrm{Q}^2/\mathrm{C}$.

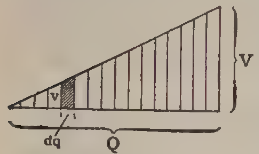

FIG. 4.

If σ is the surface density and $d\mathrm{S}$ an element of surface, then $\int\sigma d\mathrm{S}$ is the whole charge, and hence $\frac{1}{2}\int \mathrm{V}\sigma d\mathrm{S}$ is the expression for the energy of charge of a conductor.

We can deduce a remarkable expression for the energy stored up in an electric field containing electrified bodies as follows:[1] Let V denote the potential at any point in the field. Consider the integral

$$\mathrm{W}=\frac{1}{8\pi}\iiint\left\{\left(\frac{d\mathrm{V}}{dx}\right)^2+\left(\frac{d\mathrm{V}}{dy}\right)^2+\left(\frac{d\mathrm{V}}{dz}\right)^2\right\}dx\,dy\,dz \quad . \; (21)$$

where the integration extends throughout the whole space unoccupied by conductors. We have by partial integration

$$\iiint\left(\frac{d\mathrm{V}}{dx}\right)^2 dx\,dy\,dz=\iint \mathrm{V}\frac{d\mathrm{V}}{dx}dy\,dz-\iiint \mathrm{V}\frac{d^2\mathrm{V}}{dx^2}dx\,dy\,dz,$$

and two similar equations in y and z. Hence

$$\frac{1}{8\pi}\iiint\left\{\left(\frac{d\mathrm{V}}{dx}\right)^2+\left(\frac{d\mathrm{V}}{dy}\right)^2+\left(\frac{d\mathrm{V}}{dz}\right)^2\right\}dx\,dy\,dz=$$
$$\frac{1}{8\pi}\iint \mathrm{V}\frac{d\mathrm{V}}{dn}d\mathrm{S}-\frac{1}{8\pi}\iiint \mathrm{V}\nabla\mathrm{V}\,dx\,dy\,dz \quad . \quad . \; (22)$$

where $d\mathrm{V}/dn$ means differentiation along the normal, and ∇ stands for the operator $\frac{d^2}{dx^2}+\frac{d^2}{dy^2}+\frac{d^2}{dz^2}$. Let E be the resultant electric force at any point in the field. Then bearing in mind that $\sigma=(1/4\pi)d\mathrm{V}/dn$, and $\rho=-(1/4\pi)\nabla\mathrm{V}$, we have finally

$$\frac{1}{8\pi}\iiint \mathrm{E}^2dv=\frac{1}{2}\iint \mathrm{V}\sigma\; d\mathrm{S}+\frac{1}{2}\iiint \mathrm{V}\rho\; dv.$$

The first term on the right hand side expresses the energy of the surface electrification of the conductors in the field, and the second the energy of volume density (if any). Accordingly the term on the left hand side gives us the whole energy in the field.

Suppose that the dielectric has a constant K, then we must multiply both sides by K and the expression for the energy per unit of volume of the field is equivalent to $\frac{1}{2}\mathrm{DE}$ where D is the displacement or polarization in the dielectric.

Furthermore it can be shown by the application of the calculus of variations that the condition for a minimum value of the function W, is that $\nabla\mathrm{V}=0$. Hence that distribution of potential which is necessary to satisfy Laplace's equation is also one which makes the potential energy a minimum and therefore the energy stable. Thus the actual distribution of electricity on the conductor in the field is not merely *a* stable distribution, it is *the only* possible stable distribution.

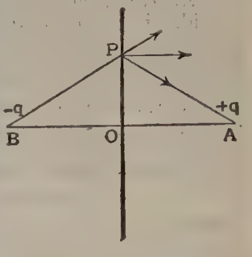

FIG. 5.

Method of Electrical Images.—A very powerful method of attacking problems in electrical distribution was first made known by Lord Kelvin in 1845 and is described as the method of electrical images.[2] By older mathematical methods it had only been possible to predict in a few simple cases the distribution of electricity at rest on conductors of various forms. The notion of an electrical image may be easily grasped by the following illustration: Let there be at A (see fig. 5) a point-charge of positive electricity $+q$ and an infinite conducting plate PO, shown in section, connected to earth and therefore at zero potential. Then the charge at A together with the induced surface charge on the plate makes a certain field of electric force on the left of the plate PO, which is a zero equipotential surface. If we remove the plate, and yet by any means can keep the identical surface occupied by it a plane of zero potential, the boundary conditions will remain the same, and therefore the field of force to the left of PO will remain unaltered. This can be done by placing at B an equal negative point-charge $-q$ in the place which would be occupied by the optical image of A if PO were a mirror, that is, let $-q$ be placed at B, so that the distance BO is equal to the distance AO, whilst AOB is at right angles to PO. Then the potential at any point P in this ideal plane PO is equal to $q/\mathrm{AP}-q/\mathrm{BP}=0$, whilst the resultant force at P due to the two point charges is $2q\mathrm{AO}/\mathrm{AP}^3$, and is parallel to AB or normal to PO. Hence if we remove the charge $-q$ at B and distribute electricity over the surface PO with a surface density σ, according to the Coulomb-Poisson law, $\sigma=q\mathrm{AO}/2\pi\mathrm{AP}^3$, the field of force to the left of PD will fulfil the required boundary conditions, and hence will be the law of distribution of the induced electricity in the case of the actual plate. The point-charge $-q$ at B is called the "electrical image" of the point-charge $+q$ at A.

We find a precisely analogous effect in optics which justifies the term "electrical image." Suppose a room lit by a single candle. There is everywhere a certain illumination due to it. Place across the room a plane mirror. All the space behind the mirror will become dark, and all the space in front of the mirror will acquire an exalted illumination. Whatever this increased illumination may be, it can be precisely imitated by removing the mirror and placing a second lighted candle at the place occupied by the optical image of the first candle in the mirror, that is, as far behind the plane as the first candle was in front. So the potential distribution in the space due to the electric point-charge $+q$ as A together with $-q$ at B is the same as that due to $+q$ at A and the negative induced charge erected on the infinite plane (earthed) metal sheet placed half-way between A and B.

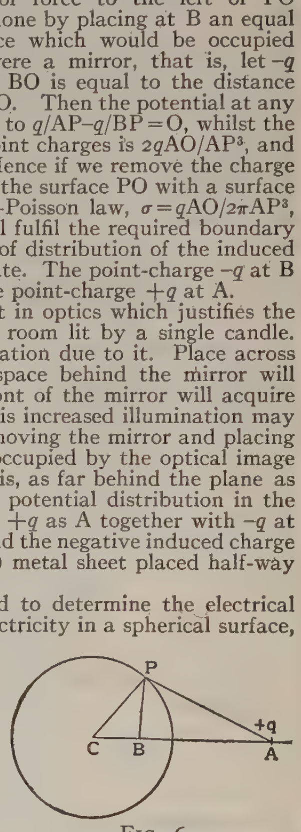

FIG. 6.

The same reasoning can be applied to determine the electrical image of a point-charge of positive electricity in a spherical surface, and therefore the distribution of induced electricity over a metal sphere connected to earth produced by a point-charge near it. Let $+q$ be any positive point-charge placed at a point A outside a sphere (fig. 6) of radius r, and centre at C, and let P be any point on it. Let $\mathrm{CA}=d$. Take a point B in CA such that $\mathrm{CB}\cdot\mathrm{CA}=r^2$, or $\mathrm{CB}=r^2/d$. It is easy then to show that $\mathrm{PA}:\mathrm{PB}=d:r$. If then we put a negative point-charge $-qr/d$ at B, it follows that the spherical surface will be a zero potential surface, for

$$\frac{q}{\mathrm{PA}}-\frac{rq}{d}\cdot\frac{1}{\mathrm{PB}}=0 \quad . \quad . \quad . \; (24).$$

Another equipotential surface is evidently a very small sphere described round A. The resultant force due to these two point-charges must then be in the direction CP, and its value E is the vector sum of the two forces along AP and BP due to the two point-charges. It is not difficult to show that

$$\mathrm{E}=-(d^2-r^2)q/r\mathrm{AP}^3 \quad . \quad . \quad . \; (25),$$

in other words, the force at P is inversely as the cube of the distance from A. Suppose then we remove the negative point-charge, and let the sphere be supposed to become conductive and be connected to earth. If we make a distribution of negative electricity over it, which has a density σ varying according to the law

$$\sigma=-(d^2-r^2)q/4\pi r\mathrm{AP}^3 \quad . \quad . \quad . \; (26),$$

that distribution, together with the point-charge $+q$ at A, will make a distribution of electric force at all points outside the sphere exactly similar to that which would exist if the sphere were removed and a negative point charge $-qr/d$ were placed at B. Hence this charge is the electrical image of the charge $+q$ at A in the spherical surface.

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[1] See Maxwell, *Electricity and Magnetism*, vol. i. § 99a (3rd ed., 1892), where the expression in question is deduced as a corollary of Green's theorem.

[2] See Lord Kelvin's *Papers on Electrostatics and Magnetism*, p. 144.

We may generalize these statements in the following theorem, which is an important deduction from a wider theorem due to G. Green. Suppose that we have any distribution of electricity at rest over conductors, and that we know the potential at all points and consequently the level or equipotential surfaces. Take any equipotential surface enclosing the whole of the electricity, and suppose this to become an actual sheet of metal connected to the earth. It is then a zero potential surface, and every point outside is at zero potential as far as concerns the electric charge on the conductors inside. Then if U is the potential outside the surface due to this electric charge inside alone, and V that due to the opposite charge it induces on the inside of the metal surface, we must have $U+V=O$ or $U=-V$ at all points outside the earthed metal surface. Therefore, whatever may be the distribution of electric force produced by the charges inside taken alone, it can be exactly imitated for all space outside the metal surface if we suppose the inside charge removed and a distribution of electricity of the same sign made over the metal surface such that its density follows the law

$$\sigma = -(1/4\pi)dU/dn \quad . \quad . \quad . \quad (27),$$

where dU/dn is the electric force at that point on the closed equipotential surface considered, due to the original charge alone.

BIBLIOGRAPHY.—For further developments of the subject we must refer the reader to the numerous excellent treatises on electrostatics now available. The student will find it to be a great advantage to read through Faraday's three volumes entitled *Experimental Researches on Electricity*, as soon as he has mastered some modern elementary book giving in compact form a general account of electrical phenomena. For this purpose he may select from the following books: J. Clerk Maxwell, *Elementary Treatise on Electricity* (Oxford, 1881); J. J. Thomson, *Elements of the Mathematical Theory of Electricity and Magnetism* (Cambridge, 1895); J. D. Everett, *Electricity*, founded on part iii. of Deschanel's *Natural Philosophy* (London, 1901); G. C. Foster and A. W. Porter, *Elementary Treatise on Electricity and Magnetism* (London, 1903); S. P. Thompson, *Elementary Lessons on Electricity and Magnetism* (London, 1903).

When these elementary books have been digested, the advanced student may proceed to study the following: J. Clerk Maxwell, *A Treatise on Electricity and Magnetism* (1st ed., Oxford, 1873; 2nd ed. by W. D. Niven, 1881; 3rd ed. by J. J. Thomson, 1892); Joubert and Mascart, *Electricity and Magnetism*, English translation by E. Atkinson (London, 1883); Watson and Burbury, *The Mathematical Theory of Electricity and Magnetism* (Oxford, 1885); A. Gray, *A Treatise on Magnetism and Electricity* (London, 1898). In the collected *Scientific Papers* of Lord Kelvin (3 vols., Cambridge, 1882), of James Clerk Maxwell (2 vols., Cambridge, 1890), and of Lord Rayleigh (4 vols., Cambridge, 1903), the advanced student will find the means for studying the historical development of electrical knowledge as it has been evolved from the minds of some of the master workers of the 19th century. (J. A. F.)

ELECTROTHERAPEUTICS, a general term for the use of electricity in therapeutics, *i.e.* in the alleviation and cure of disease. Before the different forms of medical treatment are dealt with, a few points in connexion with the machines and currents, of special interest to the medical reader, must first be given.

Faradism.—For the battery required either for faradism or galvanism, cells of the Leclanché type are the most satisfactory. Being dry they can be carried in any position, are lighter, and there is no trouble from the erosion of wires and binding screws, such as so often results from wet cells. The best method of producing a smooth current in the secondary coil is for the interruptor hammer to vibrate directly against the iron core of the primary coil. For this it is best that the interruptor be made of a piece of steel spring, as a high rate of interruption can then be maintained, with a fairly smooth current in the secondary coil. This form of interruptor necessitates that the iron core be fixed, and variation in the primary induced current is arranged for by slipping a brass tube more or less over the iron core, thus cutting off the magnetic field from the primary coil. The secondary current (that obtained from the secondary coil) can be varied by keeping the secondary coil permanently fixed over the primary and varying the strength of the primary current. Where, as suggested above, the iron core is fixed, the primary and secondary induced currents will be at their strongest when the brass tube is completely withdrawn. As there is no simple means of measuring the strength of the faradic current, it is best to start with a very weak current, testing it on the muscles of one's own hand until these begin to contract and a definite sensory effect is produced; the current can then be applied to the part, being strengthened only very gradually.

Galvanism.—For treatment by galvanism a large battery is needed, the simplest form being known as a "patient's battery," consisting of a variable number of dry cells arranged in series. The cells used are those of Leclanché, with E.M.F. (or voltage) of 1·5 and an internal resistance of ·3 ohm. Thus the exact strength of the current is known; the number of cells usually employed is 24, and when new give an E.M.F. of about 36 volts. By using the formula $C=\frac{E}{R}$, where E is the voltage of the battery, R the total resistance of battery, electrodes and the patient's skin and tissues, and C the current in amperes, the number of cells required for any particular current can be worked out. The resistance of the patient's skin must be made as low as possible by thoroughly wetting both skin and electrodes with sodium bicarbonate solution, and keeping the electrodes in very close apposition to the skin. A galvanometer is always fitted to the battery, usually of the d'Arsonval type, with a shunt by means of which, on turning a screw, nine-tenths of the inducing current can be short-circuited away, and the solenoid only influenced by one-tenth of the current which is being used on the patient. In districts where electric power is available the continuous current can be used by means of a switchboard. A current of much value for electrotherapeutic purposes is the sinusoidal current, by which is meant an alternating current whose curve of electromotive force, in both positive and negative phase, varies constantly and smoothly in what is known as the sine curve. In those districts supplied by an alternating current, the sinusoidal current can be obtained from the mains by passing it through various transformers, but where the main supply is the direct or constant current, a motor transformer is needed.

Static Electricity.—For treatment by static electricity the Wimshurst type of machine is the one most generally used. A number of electrodes are required; thus for the application of sparks a brass ball and brass roller electrode, for the "breeze" a single point and a multiple point electrode, and another multiple point electrode in the form of a metal cap that can be placed over the patient's head. The polarity of the machine must always be tested, as either knob may become positive or negative, though the polarity rarely changes when once the machine is in action. The oldest method of subjecting a patient to electric influence is that in which static electricity is employed. The patient is insulated on a suitable platform and treated by means of charges and discharges from an electrical machine. The effect is to increase the regularity and frequency of the pulse, raise the blood pressure and increase the action of the skin. The nervous system is quieted, sleep being promoted, the patient often becoming drowsy during the application. If while the patient is being treated a point electrode is brought towards him he feels the sensation of a wind blowing from that point; this is an electric breeze or brush discharge. The breeze is negative if the patient is positively charged and vice versa. The "breeze discharge" treatment is especially valuable in subduing pain of the superficial cutaneous nerves, and also in the treatment of chronic indolent ulcers. Quite recently this form of treatment has been applied with much success to various skin lesions—psoriasis, eczema and pruritus. Static electricity is also utilized for medical purposes by means of "sparks," which are administered with a ball electrode, the result being a sudden muscular contraction at the point of application. The electrode must be rapidly withdrawn before a second spark has time to leap across, as this is a severe form of treatment and must be administered slowly. It is mainly employed for muscular stimulation, and the contractions resulting from spark stimulation can be produced in cases of nerve injury and degeneration, even when the muscles have lost their reaction to faradism. The sensory stimulation of this form of treatment is also strong, and is useful in hysterical anaesthesia and functional paralysis. Where a milder sensory stimulation is required friction can be used, the electrode being in the form of a metal roller which is moved rapidly outside the patient's clothing over the spine or other part to be treated. The clothing must be dry and of wool, and each additional woollen layer intensifies the effect.

Another method of employing electricity at high potential is by the employment of high frequency currents. There are two methods of application: that in which brush discharges are made use of, with undoubtedly good effects in many of the diseases affecting the surface of the body, and that in which the currents of the solenoid are made to traverse the patient directly. The physiological value of the latter method is not certain, though one point of interest in connexion with it is that whereas statical applications raise the blood pressure, high frequency applications lower it. It has been used in the case of old people with arteriosclerosis, and the reduction of blood pressure produced is said to have shown considerable permanence.

The Faradic Current.—G. B. Duchenne was the first physician to make use of the induced current for treatment, and the term "faradization" is supposed to be due to him. But in his day the differences between the two currents available, the primary and the secondary, were not worked out, and they were used somewhat indiscriminately. Nowadays it is generally accepted that the primary current should be used for the stimulation of deep-lying organs, as stomach and intestines, &c., while the secondary current is employed for stimulation of the limb muscles and the cutaneous sensory nerves. The faradic current is also used as a means of diagnosis for neuro-muscular conditions. When the interrupted current is used to stimulate the skin over a motor nerve, all the muscles supplied by that nerve are thrown into rapid tetanic contraction, the contraction both beginning and ceasing sharply and suddenly with the current. This is the mormal reaction of the nerve to faradism. If the muscle be wasted from disuse or some local cause unconnected with its nerve-supply, the contraction is smaller, and both arises and relaxes more slowly. But if the lesion lies in the nerve itself, as in Bell's palsy, the muscles no longer show any response when the nerve is stimulated, and this is known as the reaction of degeneration in the nerve. It is usually preceded by a condition of hyperexcitability. These results are applied to distinguish between functional paralysis and that due to some organic lesion, as in the former case the reaction of faradism will be as brisk as usual. Also at the beginning of most cases of infantile paralysis many more groups of muscles appear to be affected than ultimately prove to be, and faradism enables the physician to distinguish between those groups of muscles that are permanently paralysed owing to the destruction of their trophic centre, and those muscles which are only temporarily inhibited from shock, and which with proper treatment will later regain their full power. In the testing of muscles electrically that point on the skin which on stimulation gives the maximum contraction for that muscle is known as the "motor point" for that muscle. It usually corresponds to the entry of the motor nerve. Faradic treatment may be employed in the weakness and emaciation depending on any long illness, rickets, anaemia, &c. For these cases it is best to use the electric bath, the patient being placed in warm water, and the two electrodes, one at the patient's back and the other at his feet, being connected with the secondary coil. The patient's general metabolism is stimulated, he eats and sleeps better and soon begins to put on weight. This is especially beneficial in severe cases of rickets. In the weakness and emaciation due to neurasthenia, especially in those cases being treated by the Weir Mitchell method (isolation, absolute confinement to bed, massage and overfeeding), a similar faradic bath is a very helpful adjunct. In tabes dorsalis faradic treatment will often diminish the anaesthesia and numbness in the legs, with resulting benefit to the ataxy. Perhaps the most beneficial use of the faradic current is in the treatment of chronic constipation—especially that so frequently met with in young women and due to deficient muscular power of the intestinal walls. In long-standing cases the large intestine becomes permanently dilated, and its muscular fibres so attenuated as to have no power over the intestinal contents. But faradism causes contraction at the point of stimulation, and the peristaltic wave thus started slowly progresses along the bowel. All that is needed is a special electrode for introduction into the bowel and an ordinary roller electrode. The rectal electrode consists of a 6-inch wire bearing at one end a small metal knob and fitted at the other into a metal cup which screws into the handle of the electrode. The only part exposed is the metallic knob; the rest is coated with some insulating material. The patient reclines on a couch on his back, the rectal electrode is connected, and having been vaselined is passed some three inches into the rectum. A current is started with the secondary coil in such a position as to give only an extremely weak current. The roller electrode is then wetted with hot water and applied to the front of the abdomen. At first the patient should feel nothing, but the current should slowly be increased until a faint response is perceptible from the abdominal muscles. This gives the required strength, and the roller electrode, pressed well into the abdominal wall, should very slowly be moved along the course of the large intestine beginning at the right iliac fossa. Thus a combination of massage and faradic current is obtained, and the results are particularly satisfactory. Treatment should be given on alternate days immediately after breakfast, and should be persevered with for six or eight weeks. The patient can be taught to administer it to himself.

The Galvanic, Continuous or Direct Current.—In using the galvanic or direct current the electrode must be covered with padded webbing or some other absorbent material, the metal of the electrode never being allowed to come in contact with the skin. The padding by retaining moisture helps to make good contact, and also helps to guard against burning the skin. But when a continuous current of 3 am. or more is passed for more than 5 min. the electrodes must be raised periodically and the skin inspected. If the current be too strong or applied for too long a time, small blisters are raised which break and are very troublesome to heal. Nor does the patient always feel much pain when this occurs. Also the electrodes must be remoistened every five or six minutes, as they soon become dry, and the skin will then be burnt. It is best to use a solution of sodium bicarbonate. Again, the danger of burning the skin depends on the density of the current per sq. in. of electrode, so that a strong current through a small electrode will burn the skin, whereas the same current through a larger electrode will produce a beneficial effect. If the patient be immersed up to his neck in an electric bath, much stronger currents can be passed without causing either pain or injury, as in this case the whole area of the skin in contact with the water acts as an electrode. In passing the current it must be remembered that the negative electrode or kathode is the more painful of the two, and its action more stimulating than the positive electrode or anode, which is sedative. If a muscle be stimulated over its motor point, it will contract with a sharp twitch and then become quiescent. With normal muscle the KCC (kathodal closure contraction) is stronger than that produced by the closure of the current at the anode ACC (anodal closure contraction). And if the muscle be normal the opening contraction KOC and AOC are not seen. When a galvanic current is passed along a nerve its excitability is increased at the kathode and diminished at the anode. The increased excitability at the kathode is katelectrotonus, and the lowered excitability at the anode anelectrotonus. But since in a patient the electrode cannot be applied directly to the nerve, the lines of force from the electrode pass into the nerve both in an upward and downward direction, and hence there are two poles produced by each electrode. If the current be suddenly reversed, so that what was the anode becomes the kathode, a stonger contraction is obtained than by simply making and breaking the current. To avoid the four poles on the nerve to be tested, it is found most satisfactory to have one electrode placed at some distance, on the back or chest, not on the same limb.

As explained above, when the nerve supplying a muscle is diseased it no longer responds to the faradic current. On further testing this with the galvanic or continuous current it responds, but the contraction is not brisk but begins slowly and relaxes slowly, though the contraction as a whole may be larger than that of a normal muscle. This excessive contraction is known as hyperexcitability to galvanism. This form of contraction is that obtained when the muscle fibre itself is stimulated. Again, whereas in normal muscle KCC>ACC, when the nerve is degenerated KCC=ACC or ACC>KCC. Also in the more severe forms of nerve injury tetanic contractions may be set up in the paralysed muscles, by closure of the current either at the anode or kathode. These charges are known as the reaction of degeneration or R D, and are of great value in diagnosis. They occur only after sudden or acute damage to the nerve cells of the anterior horn of the spinal cord, or to the motor nerve fibres proceeding from these cells. Thus RD is present in infantile paralysis, acute neuritis, &c., but absent in progessive muscular atrophy where the wasting of nerve and muscle takes place extremely slowly. The reaction of degeneration in the nerve is shown by disappearance of reaction to either kind of current, preceded for some days by hyperexcitability to either current. Where the muscle wasting is due to a lesion in the muscle alone, as in ischaemic myositis (usually due to injury from tight bandaging or badly applied splints), no reaction of degeneration is found; the only change is a loss of power in the contraction. If the damage to the anterior horn cells be only very slight, there may only be partial RD, and the prognosis is given according to the extent of RD. From this account it is clear that the greatest value of the continuous current lies in its use in diagnosis. But it is also applied extremely successfully, in combination with massage, to cases of infantile paralysis. Wrist drop from lead poisoning and lead neuritis of all kinds, reflex muscular atrophy and the muscular wasting of hemiplegia, are all benefited by the continuous current; the severe pain of sciatica, and the inflammation of the nerve sheath in these cases, can be arrested more quickly by galvanic treatment than in any other way. Nearly all forms of neuritis, both of the cranial and other nerves, are best treated by the continuous current. The action in all cases is to stimulate the natural tendency to repair, very largely by improving the circulation through the injured parts.

Another effect of an electric current is electrolysis, and the phenomena of electrolytic conduction involve not merely the ionization of the compounds, but also the setting in motion of the ions towards their respective poles. Solutions which conduct electric currents are called electrolytes, and in the case of the human body the electrolyte is the whole mass of the saline constituents in solution throughout the body. When a current is passed through an electrolyte, dissociation into ions takes place, the ions which are freed round the anode being called anions and those which are freed round the kathode being called kations. The anions carry negative charges and are consequently attracted by the positive electricity of the anode. The kations carry positive charges, hence they are repelled by the anode and attracted by the kathode. But a certain number of molecules do not dissociate, and hence in an electrolytic solution there are neutral molecules, anions and kations. The chemical actions, and thus the antiseptic, remedial or toxic effects of electrolytes, are due to the actions of their ions. The phosphides and phosphates may be taken as examples. Some are extremely toxic, while others are quite harmless. But it is to the phosphorus ion that the toxic or therapeutic effect is due. In the phosphates the phosphorus is part of a complex ion possessing quite different properties to those of the phosphorus ion of the phosphides. The strikingly different effects of the sulphates and sulphides are due to similar conditions, as also of many other compounds. There are certain solvents, as alcohol, chloroform, glycerin and vaseline which do not dissociate electrolytes, and consequently the latter become inert when mixed with these solvents. These solutions do not conduct electricity, and hence ionic effects are extremely slow. A vaseline ointment containing 5% of phenol makes a good dressing for an ulcer of the leg, and produces no irritant effect, but a 5% aqueous solution may be both caustic and toxic. Since the toxic or therapeutic action of a solution is due to its ions, the action must be proportional to the number of ions in a given volume, that is, the action of an electrolyte depends on the degree of dissociation. Thus a strong acid is one that is much dissociated, a weak acid one that has undergone but little dissociation and so on. In 1896–1897 it was shown that the bactericidal action of salts varies with their degree of dissociation and therefore depends on the concentration of the active ions. In the medical application of these facts it must be remembered that when an ion is introduced into the body by electrolysis, it is propably forced into the actual cellular constituents of the body, whereas the drug administered by one of the usual methods though circulating in the blood may perhaps never gain access to the cell itself. Hence the different effects that have been recorded between a drug administered by the mouth or subcutaneously and the same administered by electrolysis. Thus a solution of cocaine injected subcutaneously produces quite different effects to that introduced by electrolysis. By the latter method it produces anaesthesia but does not difluse, and the anaesthesia remains strictly limited to the surface covered by the electrode. It would appear that the ion is never introduced into the general circulation but into the cell plasma.

In the technical working of medical electrolysis the most minute precautions are required. The solution of the drug must be made with as pure water as possible, recently distilled. The spongy substance forming the electrode must be free from any trace of electrolytic substances. Hence all materials used must be washed in distilled water. Absorbent cotton answers all requirements and is easily procured. The area of introduction can be exactly circumscribed by cutting a hole in a sheet of adhesive plaster which is applied to the skin and on which the electrolytic electrodes are pressed. The great advantage of electrolytic methods is that it enables general treatment to be replaced by a strictly local treatment, and the cells can be saturated exactly to the degree and depth required. Strong antiseptics and materials that coagulate albumen cannot be introduced locally by ordinary methods, as the skin is impermeable to them, but by electrolysis they can be introduced to the exact depth required. The local effects of the ions depend on the dosage; thus a feeble dose of the ions of zinc stimulates the growth of hair, but a stronger dose produces the death of the tissue. Naturally the different ions produce different effects. Thus the ions of the alkalis and magnesium are caustic, those of the alkaline earthy metals produce actual mortification of the tissue and so on. According to the ion chosen the effect may be caustic in various degrees, antiseptic, coagulating, producing vascular or nervous changes, &c., &c. And again electrolysis can also be used for extracting from the body such ions as are injurious, as uric and oxalic acid from a patient suffering from gout.

One of the latest advances is the treatment of ankylosed joints by the electrolytic method, the electrolyte used being chloride of sodium, and the marvellous results being attributed to the introduction of the chlorine ions. This sclerolytic property of the current is applicable to all parts of the body accessible to the current. Old cases of rheumatic scleritis, entirely unaffected by the routine treatment of salicylates and iodide, have often cleared up entirely under electrolytic treatment. Cases of chronic iritis with adhesions and old pleural adhesions are also suited for this method of procedure. Certain menstrual troubles of women and also endometritis yield rapidly to electrolysis with a zinc anode. Before this method of introduction, the zinc salts, though excellent disinfectants, acted only on the surface in consequence of their coagulating action on the albuminoids, but by the electric current, under the influence of a difference of potential, the zinc iron will penetrate to any desired depth. Cases of rodent ulcer unaffected by all other methods of treatment have been cured by electric kataphoresis with zinc ions, and the method is now being applied to the treatment of inoperable malignant tumours. As very strong currents are required for this latter, the patient has first to be anaesthetized by a general anaesthetic. Another direction in which electric ions are being used is that of the induction of local anaesthesia before minor surgical operations. Cocaine is the drug used, the resulting anaesthesia is absolute, and the operation can be made almost bloodless by the admixture of suprarenal extract.

ELECTROTYPING, an application of the art of electroplating (*q.v.*) to typography (*q.v.*). In copying engraved plates for printing purposes, copper may be deposited upon the original plate, the surface of which is first rendered slightly dirty, by means of a weak solution of wax in turpentine or otherwise, to prevent adhesion. The reversed plate thus produced is then stripped from the first and used as cathode in its turn, with the result that even the finest lines of the original are faithfully reproduced. The electrolyte commonly contains about 1½ ℔ of copper sulphate and ½ ℔ of strong sulphuric acid per gallon, and is worked with a current density of about 10 amperes per sq. ft., which should give a thickness of 0·000563 in. of copper per hour. As time is an object, the conditions alluded to in the article on COPPER as being favourable to the use of high current densities should be studied, bearing in mind that a tough copper deposit of high quality is essential. Moulds for reproducing plates or art-work are often taken in plaster, beeswax mixed with Venice turpentine, fusible metal, or gutta-percha, and the surface being rendered conductive by powdered black-lead, copper is deposited upon it evenly throughout. For statuary, and "undercut" work generally, an elastic mould—of glue and treacle (80 : 20 parts)—may be used; the mould, when set, is waterproofed by immersion in a solution of potassium bichromate followed by exposure to sunlight, or in some other way. The best results, however, are obtained by taking a wax cast from the elastic mould, and then from this a plaster mould, which may be waterproofed with wax, black-leaded, and used as cathode. In art-work of this nature the principal points to be looked to in depositing are the electrical connexions to the cathode, the shape of the anode (to secure uniformity of deposition), the circulation of the electrolyte, and, in some cases, the means for escape of anode oxygen. Silver electrotyping is occasionally resorted to for special purposes.

ELECTRUM, ELECTRON (Gr. ἤλεκτρον, amber), an alloy of gold and silver in use among the ancients, described by Pliny as containing one part of silver to four of gold. The term is also applied in mineralogy to native argentiferous gold containing from 20 to 50% of silver. In both cases the name is derived from the pale yellow colour of electrum, resembling that of amber.

ELEGIT (Lat. for "he has chosen"), in English law, a judicial writ of execution, given by the Statute of Westminster II. (1285), and so called from the words of the writ, that the plaintiff has chosen (*elegit*) this mode of satisfaction. Previously to the Statute of Westminster II., a judgment creditor could only have the profits of lands of a debtor in satisfaction of his judgment, but not the possession of the lands themselves. But this statute provided that henceforth it should be *in the election* of the party having recovered judgment to have a writ of *fieri facias* (*q.v.*) unto the sheriff on lands and goods or else all the chattels of the debtor and the one half of his lands until the judgment be satisfied. Since the Bankruptcy Act 1883 the writ of *elegit* has extended to lands and hereditaments only. (See further EXECUTION.)

ELEGY, a short poem of lamentation or regret, called forth by the decease of a beloved or revered person, or by a general sense of the pathos of mortality. The Greek word ἐλεγεία is of doubtful signification; it is usually interpreted as meaning a mournful or funeral song. But there seems to be no proof that this idea of regret for death entered into the original meaning of ἐλεγεία. The earliest Greek elegies which have come down to us are not funereal, although it is possible that the primitive ἐλεγεία may have been a set of words liturgically used, with music, at a burial. When the elegy appears in surviving Greek literature, we find it dedicated, not to death, but to war and love. Callinus of Ephesus, who flourished in the 7th century, is the earliest elegist of whom we possess fragments. A little later Tyrtaeus was composing his famous elegies in Sparta. Both of these writers were, so far as we know, exclusively warlike and patriotic. On the other hand, the passion of love inspires Mimnermus, whose elegies are the prototypes not only of the later Greek pieces, and of the Latin poems of the school of Tibullus and Propertius, but of a great deal of the formal erotic poetry of modern Europe. In the 6th century B.C., the elegies of Solon were admired; they are mainly lost. But we possess more of the work of Theognis of Megara than of any other archaic elegist, and in it we can observe the characteristics of Greek elegy best. Here the Dorian spirit of chivalry reaches its highest expression, and war is combined with manly love.

The elegy, in its calm movement, seems to have begun to lose currency when the ecstasy of emotion was more successfully interpreted by the various rhythmic and dithyrambic inventions of the Aeolic lyrists. The elegy, however, rose again to the highest level of merit in Alexandrian times. It was reintroduced by Philetas in the 3rd cent. B.C., and was carried to extreme perfection by Callimachus. Other later Greek elegists of high reputation were Asclepiades and Euphorion. But it is curious to notice that all the elegies of these poets were of an amatory nature, and that antiquity styled the funeral dirges of Theocritus, Bion and Moschus—which are to us the types of elegy—not elegies at all, but idylls. When the poets of Rome began their imitative study of Alexandrian models, it was natural that the elegies of writers such as Callimachus should tempt them to immediate imitation. Gallus, whose works are unhappily lost, is known to have produced a great sensation in Rome by publishing his translation of the poems of Euphorion; and he passed on to the composition of erotic elegies of his own, which were the earliest in the Latin language. If we possessed his once-famous *Cytheris*, we should be able to decide the question of how much Propertius, who is now the leading figure among Roman elegists, owed to the example of Gallus. His brilliantly emotional *Cynthia*, with its rich and unexampled employment of that alternation of hexameter and pentameter which had now come to be known as the elegiac measure, seems, however, to have settled the type of Latin elegy. Tibullus is always named in conjunction with Propertius, who was his contemporary, although in their style they were violently contrasted. The sweetness of Tibullus was the object of admiration and constant imitation by the Latin poets of the Renaissance, although Propertius has more austerely pleased a later taste. Finally, Ovid wrote elegies of great variety in subject, but all in the same form, and his dexterous easy metre closed the tradition of elegiac poetry among the ancients. What remains in the decline of Latin literature is all founded on a study of those masters of the Golden Age.

When the Renaissance found its way to England, the word "elegy" was introduced by readers of Ovid and Propertius. But from the beginning of the 16th century, it was used in English, as it has been ever since, to describe a funeral song or lament. One of the earliest poems in English which bears the title of elegy is *The Complaint of Philomene*, which George Gascoigne began in 1562, and printed in 1576. The *Daphnaida* of Spenser (1591) is an elegy in the strict modern sense, namely a poem of regret pronounced at the obsequies of a particular person. In 1579 Puttenham had defined an elegy as being a song "of long lamentation." With the opening of the 17th century the composition of elegies became universal on every occasion of public or private grief. Dr Johnson's definition, "*Elegy*, a short poem without points or turns," is singularly inept and careless. By that time (1755) English literature had produced many great elegies, of which the *Lycidas* of Milton is by far the most illustrious. But even Cowley's on Crashaw, Tickell's on Addison, Pope's on an Unfortunate Lady, those of Quarles, and Dryden, and Donne, should have warned Johnson of his mistake. Since the 18th century the most illustrious examples of elegy in English literature have been the *Adonais* of Shelley (on Keats), the *Thyrsis* of Matthew Arnold (on Clough), and the *Ave atque Vale* of Mr Swinburne (on Baudelaire). It remains for us to mention what is the most celebrated elegy in English, that written by Gray in a Country Churchyard. This, however, belongs to a class apart, as it is not addressed to the memory of any particular person. A writer of small merit, James Hammond (1716–1742), enjoyed a certain success with his *Love Elegies* in which he endeavoured to introduce the erotic elegy as it was written by Ovid and Tibullus. This experiment took no hold of English literature, but was welcomed in France in the amatory works of Parny (1753–1814), in those of Chênedollé (1769–1833), and of Millevoye (1782–1816). The melancholy and sentimental elegies of the last named are the typical examples of this class of poetry in French literature. Lamartine must be included among the elegists, and his famous "Le Lac" is as eminent an elegy in French as Gray's "Country Churchyard" is in English. The elegy has flourished in Portugal, partly because it was cultivated with great success by Camoens, the most illustrious of the Portuguese poets. In Italian, Chiabrera and Filicaia are named among the leading national elegists. In German literature, the notion of elegy as a poem of lamentation does not exist. The famous Roman Elegies of Goethe imitate in form and theme those of Ovid; they are not even plaintive in character.

Elegiac Verse has commonly been adopted by German poets for their elegies, but by English poets never. Schiller defines this kind of verse, which consists of a distich of which the first line is a hexameter and the second a pentameter, in the following pretty illustration:—

> "In the hexameter rises the fountain's silvery column,
> In the pentameter aye falling in melody back."

The word "elegy," in English, is one which is frequently used very incorrectly; it should be remembered that it must be mournful, meditative and short without being ejaculatory. Thus Tennyson's *In Memoriam* is excluded by its length; it may at best be treated as a collection of elegies. Wordsworth's *Lucy*, on the other hand, is a dirge; this is too brief a burst of emotion to be styled an elegy. *Lycidas* and *Adonais* remain the two unapproachable types of what a personal elegy ought to be in English. (E. G.)

ELEMENT (Lat. *elementum*), an ultimate component of anything, hence a fundamental principle. *Elementum* was used in Latin to translate the Greek *στοιχεῖον* (that which stands in a *στοῖχος*, or row), and is a word of obscure origin and etymology. The root of Lat. *alere*, to nourish, has been suggested, thus making it a doublet of *alimentum*, that which supports life; another explanation is that the word represents LMN., the first three letters of the second part of the alphabet, a parallel use to that of ABC. Apart from its application in chemistry, which is treated below, the word is used of the rudiments or *principia* of any science or subject, as in Euclid's *Elements of Geometry*, or in the "beggarly elements" (*τὰ πτωχὰ στοιχεῖα*, of St Paul in Gal. iv. 9); in mathematics, of a fundamental concept involved in an investigation, as the "elements" of a determinant; and in electricity, of a galvanic (or voltaic) "element" in an electric cell (see Battery: *Electric*). In astronomy, "element" is used of any one of the numerical or geometrical data by which the course of a varying phenomenon is computed; it is applied especially to orbital motion and eclipses. The "elements of an orbit" are the six data by which the position of a moving body in its orbit at any time may be determined. The "elements of an eclipse" express and determine the motion of the centre of the shadow-axis, and are the data necessary to compute the phenomena of an eclipse during its whole course, as seen at any place. In architecture the term "element" is applied to the outline of the design of a Decorated window, on which the centres for the tracery are found. These centres will all be found to fall on points which, in some way or other, will be equimultiples of parts of the openings.

Chemical Elements.

Ancient ideas.

Like all other scientific concepts, that of an element has changed its meaning many times in many ways during the development of science. Owing to their very small amount of real chemical knowledge, the generalizations of the ancients were necessarily rather superficial, and could not stand in the face of the increasing development of practical chemistry. Nevertheless we find the concept of an element as "a substance from which all bodies are made or derived" held at the very beginning of occidental philosophy. Thales regarded "water" as the element of all things; his followers accepted his idea of a primordial substance as the basis of all bodies, but they endeavoured to determine some other general element or elements, like "fire" or "spirit," or "love" and "hatred," or "fire," "water," "air" and "earth." We find in this development an exact parallelism to the manner in which scientific ideas generally arise, develop and change. They are created to point out the common part in a variety of observed phenomena, in order to get some leading light in the chaos of events. At first almost any idea will do, if only it promises some comprehensive arrangement of the facts; afterwards, the inconsistencies of the first trial make themselves felt; the first idea is then changed to meet better the new requirements. For a shorter or longer time the facts and ideas may remain in accord, but the uninterrupted increase of empirical knowledge involves sooner or later new fundamental alterations of the general idea, and in this way there is a never-ceasing process of adaptation of the ideas to the facts. As facts are unchangeable by themselves, the adaptation can be only one-sided; the ideas are compelled to change according to the facts. We must therefore educate ourselves to regard the ideas or theories as the changing part of science, and keep ourselves ready to accept even the most fundamental revision of current theories.

The first step in the development of the idea of elements was to recognize that a *single* principle would not prove sufficient to cover the manifoldness of facts. Empedocles therefore conceived a double or binary elementary principle; and Aristotle developed this idea a stage further, stating two sets of binary antagonistic principles, namely "dry-wet" and "hot-cold." The Aristotelian or peripatetic elements, which played such a great rôle in the whole medieval philosophy, are the representatives of the several binary combinations of these fundamental properties, "fire" being hot and dry, "air" hot and wet, "water" cold and wet, "earth" cold and dry. According to the amount of these properties found in any body, these elements were regarded as having taken part in forming this body. Concerning the reason why only these properties were regarded as fundamental, we know nothing. They seem to be taken at random rather than carefully selected; they relate only to the sense of touch, and not to vision or any other sense, possibly because deceptions in the sense of touch were regarded as non-existent, while the other senses were apparently not so trustworthy. At any rate, the Aristotelian elements soon proved to be rather inadequate to meet the requirements of the increasing chemical knowledge; other properties had therefore to be selected to represent the general behaviour of chemical substances, and in this case we find them already much more "chemical" in the modern sense.

Elements of the alchemists.

Among the various substances recognized by the chemists, certain classes or groups readily distinguished themselves. First the metals, by their lustre, their heaviness, and a number of other common properties. According to the general principle of selecting a single substance as a representative of the group, the metallic properties were represented by "mercury." The theoreticians of the middle ages were rather careful to point out that common mercury (the liquid metal of to-day) was not at all to be identified with "philosophical" mercury, the last being simply the *principle* of metallic behaviour. In the same way combustibility was represented by "sulphur," solubility by "salt," and occasionally the chemically indifferent or refractory character by "earth." According to the subsistence and preponderance of these properties in different bodies, these were regarded as containing the corresponding elements; conversely, just as experience teaches the chemist every day that by proper treatment the properties of given bodies may be changed in the most various ways, the observed changes of properties were ascribed to the gain or loss of the corresponding elements. According to this theory, which accounted rather well for a large number of facts, there was no fundamental objection against trying to endow base metals with the properties of the precious ones; to make artificial gold was a task quite similar to the modern problem of, *e.g.* making artificial quinine. The realization that there is a certain natural law preventing such changes is of much later date. It is therefore quite unjust to consider the work of the alchemists, who tried to make artificial gold, as consummate nonsense. *A priori* there was no reason why a change from lead to gold should be less possible than a change from iron to rust; indeed there is no *a priori* reason against it now. But experience has taught us that lead and gold are chemical elements in the modern sense, and that there is a general experimental law that elements are not transformable one into another. So experience taught the alchemists irresistibly that in spite of the manifoldness of chemical changes it is not always possible to change any given substance into another; the possibilities are much more limited, and there is only a certain range of substances to be obtained from a given one. The impossibility of transforming lead or copper into noble metals proved to be only one case out of many, and it was recognized generally that there are certain chemical families whose members are related to one another by their mutual transformability, while it is impossible to bridge the boundaries separating these families.

Work of Robert Boyle.

The man who brought all these experiences and considerations into scientific form was Robert Boyle. He stated as a general principle, that only tangible and ponderable substances should be recognized as elements, an element being a substance from which other substances may be made, but which cannot be separated into different substances. He showed that neither the peripatetic nor the alchemistic elements satisfied this definition. But he was more of a critical than of a synthetical turn of mind; although he established the correct principles, he hesitated to point out what substances, among those known at his time, were to be considered as elements. He only paved the way to the goal by laying the foundations of analytical chemistry, *i.e.* by teaching how to characterize and to distinguish different chemical individuals. Further, by adopting and developing the corpuscular hypothesis of the constitution of the ponderable substances, he foreshadowed, in a way, the law of the conservation of the elements, viz. that no element can be changed into another element; and he considered the compound substances to be made up from small particles or corpuscles of their elements, the latter retaining their essence in all combinations. This hypothesis accounts for the fact that only a limited number of other substances can be made from a given one—namely, only those which contain the elements present in the given substance. But it is characteristic of Boyle's critical mind that he did not shut his eyes against a serious objection to his hypothesis. If the compound substance is made up of parts of the elements, one would expect that the properties of the compound substance would prove to be the sum of the properties of the elements. But this is not the case, and chemical compounds show properties which generally differ very considerably from those of the compounds. On the one hand, the corpuscular hypothesis of Boyle was developed into the atomic hypothesis of Dalton, which was considered at the beginning of the 19th century as the very best representation of chemical facts, while, on the other hand, the difficulty as to the properties of the compounds remained the same as Boyle found it, and has not yet been removed by an appropriate development of the atomic hypothesis. Thus Boyle considered, *e.g.* the metals as elements. However, it is interesting to note that he considered the mutual transformation of the metals as not altogether impossible, and he even tells of a case when gold was transformed into base metal. It is a common psychological fact that a reformer does not generally succeed in being wholly consistent in his reforming ideas; there remains invariably some point where he commits exactly the same fault which he set out to abolish. We shall find the same inconsistency also among other chemical reformers. Even earlier than Boyle, Joachim Jung (1587–1657) of Hamburg developed similar ideas. But as he did not distinguish himself, as Boyle did, by experimental work in science, his views exerted only a limited influence amongst his pupils.

Phlogiston theory.

In the times following Boyle's work we find no remarkable outside development of the theory of elements, but a very important inside one. Analytical chemistry, or the art of distinguishing different chemical substances, was rapidly developing, and the necessary foundation for such a theory was thus laid. We find the discussions about the true elements disappearing from the text-books, or removed to an insignificant corner, while the description of observed chemical changes of different ways of preparing the same substance, as identified by the same properties, and of the methods for recognizing and distinguishing the various substances, take their place. The similarity of certain groups of chemical changes, as, for example, combustion, and the inverse process, reduction, was observed, and thus led to an attempt to shape these most general facts into a common theory. In this way the theory of "phlogiston" was developed by G.E. Stahl, phlogiston being (according to the usual way of regarding general properties as being due to a principle or element) the "principle of combustibility," similar to the "sulphur" of the alchemists. This again must be regarded as quite a legitimate step justified by the knowledge of the time. For experience taught that combustibility could be *transferred* by chemical action, *e.g.* from charcoal to litharge, the latter being changed thereby into combustible metallic lead; and according to Boyle's principle, that only *bodies* should be recognized as chemical elements, phlogiston was considered as a body. From the fact that all leading chemists in the second half of the 18th century used the phlogiston theory and were not hindered by it in making their great discoveries, it is evident that a sufficient amount of truth and usefulness was embodied in this theory. It states indeed quite correctly the mutual relations between oxidation and reduction, as we now call these very general processes, and was erroneous only in regard to one question, which at that time had not aroused much interest, the question of the change of weight during chemical processes.

Lavoisier's reform.

It was only after Isaac Newton's discovery of universal gravitation that weight was considered as a property of paramount interest and importance, and that the question of the changes of weight in chemical reactions became one worth asking. When in due time this question was raised, the fact became evident at once, that combustion means not loss but gain of weight. To be sure of this, it was necessary to know first the chemical and physical properties of gases, and it was just at the same time that this knowledge was developed by Priestley, Scheele and others. Lavoisier was the originator and expounder of the necessary reform. Oxygen was just discovered at that time, and Lavoisier gathered evidence from all sides that the theory of phlogiston had to be turned inside out to fit the new facts.

He realized that the sum total of the weights of all substances concerned within a chemical change is not altered by the change. This principle of the "conservation of weight" led at once to a simple and unmistakable definition of a chemical element. As the weight of a compound substance is the sum of the weights of its elements, the compound necessarily weighs more than any of its elements. An element is therefore a substance which, by being changed into another substance, invariably increases its weight, and never gives rise to substances of less weight. By the help of this criterion Lavoisier composed the first table of chemical elements similar to our modern ones. According to the knowledge of his time he regarded the alkalis as elements, although he remarked that they are rather similar to certain oxides, and therefore may possibly contain oxygen; the truth of this was proved at a later date by Humphry Davy. But the inconsistency of the reformer, already referred to, may be observed with Lavoisier. He included "heat and light" in his list of elements, although he knew that neither of them had weight, and that neither fitted his definition of an element; this atavistic survival was subsequently removed from the table of the elements by Berzelius in the beginning of the 19th century. In this way the question of what substances are to be regarded as chemical elements had been settled satisfactorily in a qualitative way, but it is interesting to realize that the last step in this development, the theory of Lavoisier, was based on quantitative considerations. Such considerations became of paramount interest at once, and led to the concept of the *combining weights of the elements*.

J. B. Richter's work.

The first discoveries in this field were made in the last quarter of the 18th century by J. B. Richter. The point at issue was a rather commonplace one: it was the fact that when two neutral salt solutions were mixed to undergo mutual chemical decomposition and recombination, the resulting liquid was neutral again, *i.e.* it did not contain any excess of acid or base. In other words, if two salts, $A'B'$ and $A''B''$, composed of the acids A' and A'' and the bases B' and B'', undergo mutual decomposition, the amount of the base B' left by the first salt, when its acid A' united with the base B'' to form a new salt $A'B''$, was just enough to make a neutral salt $A''B'$ with the acid A'' left by the second salt. At first sight this looks quite simple and self-evident,—that neutral salts should form neutral ones again and not acid or basic ones,—but if this fact is once stated very serious quantitative inferences may be drawn from it, as Richter showed. For if the symbols A', A'', B', B'' denote at the same time such quantities of the acids and bases as form neutral salts, then if three of these quantities are determined, the fourth may be calculated from the others. This follows from the fact that by decomposing $A'B'$ with just the proper amount of the other salt to form $A'B''$, the remaining quantities B' and A'' exist in exactly the ratio to form a neutral salt $A''B'$. It is possible, therefore, to ascribe to each acid and base a certain relative weight or "combining weight" by which they will combine one with the other to form neutral salts. The same reasoning may be extended to any number of acids and bases.

It is true that Richter did not find out by himself this simplest statement of the law of neutrality which he discovered, but he expressed the same consequence in a rather clumsy way by a table of the combining weights of different bases related to the unit amount of a certain acid, and doing the same thing for the unit weight of every other acid. Then he observed that the numbers in these different tables are proportionate one to another. The same holds good if the corresponding series of the combining weights of acids for unit weights of different bases were tabulated. It was only a little later that a Berlin physicist, G. E. Fischer, united the whole system of Richter's numbers simply into a double table of acids and bases, taking as unit an arbitrarily chosen substance, namely sulphuric acid. The following table by Fischer is therefore the first table of combining weights.

Bases.		*Acids.*	
Alumina	525	Fluoric	427
Magnesia	615	Carbonic	577
Ammoniac	672	Sebacic	706
Lime	793	Muriatic (hydrochloric)	712
Soda	859	Oxalic	755
Strontiane	1329	Phosphoric	979
Potash	1605	Formic	988
Baryte	2222	Sulphuric	1000
		Succinic	1209
		Nitric	1405
		Acetic	1480
		Citric	1683
		Tartaric	1694

It is interesting again to notice how difficult it is for the discoverer of a new truth to find out the most simple and complete statement of his discovery. It looks as if the amount of work needed to get to the top of a new idea is so great that not enough energy remains to clear the very last few steps. It is noteworthy also to observe how difficult it was for the chemists of that time to understand the bearing of Richter's work. Although a summary of his results was published in Berthollet's *Essai de statique chimique*, one of the most renowned chemical books of that time, nobody dared for a long time to take up the scientific treasure laid open for all the world.

John Dalton's atomic theory.

At the beginning of the 19th century the same question was taken up from quite another standpoint. John Dalton, in his investigations of the behaviour of gases, and in order to understand more easily what happened when gases were absorbed by liquids, used the corpuscular hypothesis already mentioned in connexion with Boyle. While he depicted to himself how the corpuscles, or, as he preferred to call them, the "atoms" of the gases, entered the interstices of the atoms of the liquids in which they dissolved, he asked himself: Are the several atoms of the same substance exactly alike, or are there differences as between the grains of sand? Now experience teaches us that it is impossible to separate, for example, a quantity of pure water into two samples of somewhat different properties. When a pure substance is fractionated by partial distillation or partial crystallization or partial change into another substance by chemical means, we find constantly that the residue is not changed in its properties, as it would be if the atoms were slightly different, since in that case *e.g.* the lighter atoms would distil first and leave behind the heavier ones, &c. Therefore we must conclude that all atoms of the same kind are exactly alike in shape and weight. But, if this be so, then all combinations between different atoms must proceed in certain invariable ratios of the weights of the elements, namely by the ratio of the weights of the atoms. Now it is impossible to weigh the atoms directly; but if we determine the ratio of the weights in which oxygen and hydrogen combine to form water, we determine in this way also the relative weight of their atoms. By a proper number of analyses of simple chemical compounds we may determine the ratios between the weights of all elementary atoms, and, selecting one of them as a standard or unit, we may express the weight of all other atoms in terms of this unit. The following table is Dalton's (*Mem. of the Lit. and Phil. Soc. of Manchester* (II.), vol. i. p. 287, 1805).

Table of the Relative Weights of the Ultimate Particles of Gaseous and other Bodies.

Hydrogen	1	Nitrous oxide	13·7
Azot	4·2	Sulphur	14·4
Carbone	4·3	Nitric acid	15·2
Ammonia	5·2	Sulphuretted hydrogen	15·4
Oxygen	5·5	Carbonic acid	15·3
Water	6·5	Alcohol	15·1
Phosphorus	7·2	Sulphureous acid	19·9
Phosphuretted hydrogen	8·2	Sulphuric acid	25·4
Nitrous gas	9·3	Carburetted hydrogen from stagnant water	6·3
Ether	9·6		
Gaseous oxide of carbone	9·8	Olefiant gas	5·3

Dalton at once drew a peculiar inference from this view. If two elements combine in different ratios, one must conclude that different numbers of atoms unite. There must be, therefore, a simple ratio between the quantities of the one element united to the same quantity of the other. Dalton showed at once that the analysis of carbon monoxide and of carbonic acid satisfied this consequence, the quantity of oxygen in the second compound being double the quantity in the first one. A similar relation holds good between marsh gas and olefiant gas (ethylene). This is the "law of multiple proportions" (see Atom). By these considerations Dalton extended the law of combining weights, which Richter had demonstrated only for neutral salts, to all possible chemical compounds. While the scope of the law was enormously extended, its experimental foundation was even smaller than with Richter. Dalton did not concern himself very much with the experimental verification of his ideas, and the first communication of his theory in a paper on the absorption of gases by liquids (1803) attracted as little notice as Richter's discoveries. Even when T. Thomson published Dalton's views in an appendix to his widely read text-book of chemistry, matters did not change very much. It was only by the work of J. J. Berzelius that the enormous importance of Dalton's views was brought to light.

Work of J. J. Berzelius.

Berzelius was at that time busy in developing a trustworthy system of chemical analysis, and for this purpose he investigated the composition of the most important salts. He then went over the work of Richter, and realized that by his law he could check the results of his analyses. He tried it and found the law to hold good in most cases; when it did not, according to his analyses, he found that the error was on his own side and that better analyses fitted Richter's law. Thus he was prepared to understand the importance of Dalton's views and he proceeded at once to test its exactness. The result was the best possible. The law of the combining weights of the atoms, or of the atomic weights, proved to hold good in every case in which it was tested. All chemical combinations between the several elements are therefore regulated by weight according to certain numbers, one for each element, and combinations between the elements occur only in ratios given by these weights or by simple multiples thereof. Consequently Berzelius regarded Dalton's atomic hypothesis as proved by experiment, and became a strong believer in it.

At the same time W. H. Wollaston had discovered independently the law of multiple proportions in the case of neutral and acid salts. He gave up further work when he learned of Dalton's ideas, but afterwards he pointed out that it was necessary to distinguish the *hypothetical* part in Dalton's views from their *empirical* part. The latter is the law of combining weights, or the law that chemical combination occurs only according to certain numbers characteristic for each element. Besides this purely experimental law there is the hypothetical explanation by the assumption of the existence of atoms. As it is not proved that this explanation is the only one possible, the existence of the law is not a proof of the existence of the atoms. He therefore preferred to call the characteristic combining numbers of the elements not "atomic weights" but "chemical equivalents."

Although there were at all times chemists who shared Wollaston's cautious views, the atomic hypothesis found general acceptance because of its ready adaptability to the most diverse chemical facts. In our time it is even rather difficult to separate, as Wollaston did, the empirical part from the hypothetical one, and the concept of the atom penetrates the whole system of chemistry, especially organic chemistry.

If we compare the work of Dalton with that of Richter we find a fundamental difference. Richter's inference as to the existence of combining weights in salts is based solely on an experimental observation, namely, the persistence of neutrality after double decomposition; Dalton's theory, on the contrary, is based on the hypothetical concept of the atom. Now, however favourably one may think of the probability of the existence of atoms, this existence is really not an observed fact, and it is necessary therefore to ask: Does there exist some general fact which may lead directly to the inference of the existence of combining weights of the elements, just as the persistence of neutrality leads to the same consequence as to acids and bases? The answer is in the affirmative, although it took a whole century before this question was put and answered. In a series of rather difficult papers (*Zeits. f. Phys. Chem.* since 1895, and *Annalen der Naturphilosophie* since 1902), Franz Wald (of Kladno, Bohemia) developed his investigations as to the genesis of this general law. Later, W. Ostwald (Faraday lecture, *Trans. Chem. Soc.*, 1904) simplified Wald's reasoning and made it more evident.

The general fact upon which the necessary existence of combining weights of the elements may be based is the shifting character of the boundary between elements and compounds. It has already been pointed out that Lavoisier considered the alkalis and the alkaline earths as elements, because in his time they had not been decomposed. As long as the decomposition had not been effected, these compounds could be considered and treated like elements without mistake, their combining weight being the sum of the combining weights of their (subsequently discovered) elements. This means that compounds enter in reaction with other substances as a whole, just as elements do. In particular, if a compound AB combines with another substance (elementary or compound) C to form a ternary compound ABC, it enters this latter as a whole, leaving behind no residue of A or B. Inversely, if a ternary compound ABC be changed into a binary one AB by taking away the element C, there will not be found any excess of A or B, but both elements will exhibit just the same ratio in the binary as in the ternary compound.

Experimentally this important fact was proved first by Berzelius, who showed that by oxidizing lead sulphide, PbS, to lead sulphate, $PbSO_4$, no excess either of sulphur or lead could be found after oxidation; the same held good with barium sulphite, $BaSO_3$, when converted into barium sulphate, $BaSO_4$. On a much larger scale and with very great accuracy the inverse was proved half a century later by J. S. Stas, who reduced silver chlorate, $AgClO_3$, silver bromate, $AgBrO_3$, and silver iodate, $AgIO_3$, to the corresponding binary compounds, AgCl, AgBr and AgI, and searched in the residue of the reaction for any excess of silver or halogen. As the tests for these substances are among the most sensitive in analytical chemistry, the general law underwent a very severe test indeed. But the result was the same as was found by Berzelius—no excess of one of the elements could be discovered. We may infer, therefore, generally that compounds enter ulterior combinations without change of the ratio of their elements, or that the ratio between different elements in their compounds is the same in binary and ternary (or still more complicated) combinations.

This law involves the existence of general combining weights just in the same way as the law of neutrality with double decomposition of salts involves the law of the combining weights of acids and bases. For if the ratio between A and B is determined, this same ratio must obtain in all ternary and more complicated compounds, containing the same elements. The same is true for any other elements, C, D, E, F, &c., as related to A. But by applying the general law to the ternary compound ABC the same conclusion may be drawn as to the ratio A : C in all compounds containing A and C, or B : C in the corresponding compounds. By reasoning further in the same way, we come to the conclusion that only such compounds are possible which contain elements according to certain ratio-numbers, *i.e.* their combining weight. Any other ratio would violate the law of the integral reaction of compounds.

As to the law of multiple proportions, it may be deduced by a similar reasoning by considering the possible combinations between a compound, *e.g.* AB, and one of its elements, say B. AB and B can combine only according to their combining weights, and therefore the quantity of B combining with AB is equal to the quantity of AB which has combined with A to form AB. The new combination is therefore to be expressed by AB_2. By extending this reasoning in the same way, we get the general conclusion that any compounds must be composed according to the formula $A_mB_nC_p$ . . ., where m, n, p, &c., are integers.

The bearing of these considerations on the atomic hypothesis is not to disprove it, but rather to show that the existence of the law of combining weights, which has been considered for so long as a proof of the truth of this hypothesis, does not necessarily involve such a consequence. Whether atoms may prove to exist or not, the law of combining weights is independent thereof.

Atomic weight determinations.

Two problems arose from the discoveries of Dalton and Berzelius. The first was to determine as exactly as possible the correct numbers of the combining weights. The other results from the fact that the same elements may combine in different ratios. Which of these ratios gives the true ratio of the atomic weights? And which is the multiple one? Both questions have had most ample experimental investigation, and are now answered rather satisfactorily. The first question was a purely technical one; its answer depended upon analytical skill, and Berzelius in his time easily took the lead, his numbers being readily accepted on the continent of Europe. In England there was a certain hesitation at first, owing to Prout's assumption (see below), but when Turner, at the instigation of the British Association for the Advancement of Science, tested Berzelius's numbers and found them entirely in accordance with his own measurements, these numbers were universally accepted. But then a rather large error in one of Berzelius's numbers (for carbon) was discovered in 1841 by Dumas and Stas, and a kind of panic ensued. New determinations of the atomic weights were undertaken from all sides. The result was most satisfactory for Berzelius, for no other important error was discovered, and even Dumas remarked that repeating a determination by Berzelius only meant getting the same result, if one worked properly. In later times more exact measurements, corresponding to the increasing art in analysis, were carried out by various workers, amongst whom J. S. Stas distinguished himself. But even the classical work of Stas proved not to be entirely without error; for every period has its limit in accuracy, which extends slowly as science extends. In recent times American chemists have been especially prominent in work of this kind, and the determinations of E. W. Morley, T. W. Richards and G. P. Baxter rank among the first in this line of investigation.

During this work the question arose naturally: How far does the *exactness* of the law extend? It is well known that most natural laws are only approximations, owing to disturbing causes. Are there disturbing causes also with atomic weights? The answer is that as far as we know there are none. The law is still an exact one. But we must keep in mind that an absolute answer is never possible. Our exactness is in every case limited, and as long as the possible variations lie behind this limit, we cannot tell anything about them. In recent times H. Landolt has doubted and experimentally investigated the law of the conservation of weight.

Landolt's experiments were carried out in vessels of the shape of an inverted U, each branch holding one of the substances to react one on the other. Two vessels were prepared as equal as possible and hung on both sides of a most sensitive balance. Then the difference of weight was determined in the usual way by exchanging both the vessels on the balance. After this set of weighings one of the vessels was inverted and the chemical reaction between the contained substances was performed; then the double weighing was repeated. Finally also the second vessel was inverted and a third set of weighings taken. From blank experiments where the vessels were filled with substances which did not react one on the other, the maximum error was determined to 0·03 milligramme. The reactions experimented with were: silver salts with ferrous sulphate; iron on copper sulphate; gold chloride and ferrous chloride; iodic acid and hydriodic acid; iodine and sodium sulphite; uranyl nitrate and potassium hydrate; chloral hydrate and potassium hydrate; electrolysis of cadmium iodide by an alternating current; solution of ammonium chloride, potassium bromide and uranyl nitrate in water, and precipitation of an aqueous solution of copper sulphate by alcohol. In most of these experiments a slight diminution of weight was observed which exceeded the limit of error distinctly in two cases, viz. silver nitrate with ferrous sulphate and iodic acid with hydriodic acid, the loss of weight amounting from 0·068 to 0·199 mg. with the first and 0·047 to 0·177 mg. with the second reaction on about 50 g. of substance. As each of these reactions had been tried in nine independent experiments, Landolt felt certain that there was no error of observation involved. But when the vessels were covered inside with paraffin wax, no appreciable diminution of weight was observed.

These experiments apparently suggested a small decrease of weight as a consequence of chemical processes. On repeating them, however, and making allowance for the different amounts of water absorbed on the surface of the vessel at the beginning and end of the experiment, Landolt found in 1908 (*Zeit. physik. Chem.* 64, p. 581) that the variations in weight are equally positive and negative, and he concluded that there was no change in weight, at least to the extent of 1 part in 10,000,000.

The periodic arrangement.

There is still another question regarding the numerical values of the atomic weights, namely: Are there relations between the numbers belonging to the several elements? Richter had arranged his combining weights according to their magnitude, and endeavoured to prove that they form a certain mathematical series. He also explained the incompleteness of his series by assuming that certain acids or bases requisite to the filling up of the gaps in the series, were not yet known. He even had the satisfaction that in his time a new base was discovered, which fitted rather well into one of his gaps; but when it turned out afterwards that this new base was only calcium phosphate, this way of reasoning fell into discredit and was resumed only at a much later date.

To obtain a correct table of atomic weights the second question already mentioned, viz. how to select the correct value in the case of multiple proportions, had to be answered. Berzelius was constantly on the look-out for means to distinguish the true atomic weights from their multiples or sub-multiples, but he could not find an unmistakable test. The whole question fell into a terrible disorder, until in the middle of the 19th century S. Cannizzaro showed that by taking together all partial evidences one could get a system of atomic weights consistent in itself and fitting the exigencies of chemical systematics. Then a startling discovery was made by the same method which Richter had tried in vain, by arranging all atomic weights in one series according to their numerical values.

The Periodic Law.—The history of this discovery is rather long. As early as 1817 J. W. Döbereiner of Jena drew attention to the fact that the combining weight of strontium lies midway between those of calcium and barium, and some years later he showed that such "triads" occurred in other cases too. L. Gmelin tried to apply this idea to all elements, but he realized that in many cases more than three elements had to be grouped together. While Ernst Lenssen applied the idea of triads to the whole table of chemical elements, but without any important result, the other idea of grouping more than three elements into series according to their combining weights proved more successful. It was the concept of homologous series just developed in organic chemistry which influenced such considerations. First Max von Pettenkofer in 1850 and then J. B. A. Dumas in 1851 undertook to show that such a series of similar elements could be formed, having nearly constant differences between their combining weights. It is true that this idea in all its simplicity did not hold good extensively enough; so J. P. Cooke and Dumas tried more complicated types of numerical series, but only with a temporary success.

The idea of arranging all elements in a single series in the order of the magnitude of their combining weights, the germ of which is to be found already in J. B. Richter's work, appears first in 1860 in some tables published by Lothar Meyer for his lectures. Independently, A. E. B. de Chancourtois in 1862, J. A. R. Newlands in 1863, and D. I. Mendeléeff in 1869, developed the same idea with the same result, namely, that it is possible to divide this series of all the elements into a certain number of very similar parts. In their papers, which appeared in the same year, 1869, Lothar Meyer and Mendeléeff gave to all these trials the shape now generally adopted. They succeeded in proving beyond all doubt that this series was of a *periodic character*, and could be cut into shorter pieces of similar construction. Here again gaps were present to be filled up by elements to be discovered, and Mendeléeff, who did this, predicted from the general regularity of his table the properties of such unknown elements. In this case fate was more kind than with Richter, and science had the satisfaction of seeing these predictions turn out to be true.

The following table contains this periodic arrangement of the elements according to their atomic weight. By cutting the whole series into pieces of eight elements (or more in several

He 4·0	Li 7·03	Be 9·1	B 11·0	C 12·00	N 14·01	O 16·00	F 19·0	..	..	..
Ne 20	Na 23·00	Mg 24·32	Al 27·1	Si 28·4	P 31·0	S 32·06	Cl 35·45	..	..	..
Ar 39·9	K 39·15	Ca 40·1	Sc 44·1	Ti 48·1	V 51·2	Cr 52·0	Mn 55·0	Fe 55·9,	Ni 58·7,	Co 59·0
..	Cu 63·6	In 65·4	Ga 70	Ge 72·5	As 75·0	Se 79·2	Br 79·96	..	..	..
Kr 83·0	Rb 85·5	Sr 87·6	Y 89·0	Zr 90·6	Cb(Nb) 94	Mo 96·0	..	Ru 101·7,	Rh 103·0,	Pd 106·5
..	Ag 107·93	Cd 112·4	In 115	Sn 119·0	Sb 120·2	Te 127·6	I 126·97	..	..	..
Xe 130·7	Cs 132·9	Ba 137·4	La 138·9	Ce &c. 140	Ta 181	W 184	..	Os 191,	Ir 193·0,	Pt 194·8
..	Au 197·2	Hg 200·0	Tl 204·1	Pb 206·9	Bi 208·0	..	..	..	..	..
..	..	Ra 225	..	Th 232·5	..	U 238·5	..	..	..	..

cases) and arranging these one below another in the alternating way shown in the table, one finds similar elements placed in vertical series whose properties change gradually and with some regularity according to their place in the table. Not only the properties of the uncombined elements obey this rule, but also almost all properties of similar compounds of the elements.

But upon closer investigation it must be confessed that these regularities can be called only rules, and not laws. In the first line one would expect that the steps in the values of the atomic weights should be regular, but it is not so. There are even cases when it is necessary to invert the order of the atomic weights to satisfy the chemical necessities. Thus argon has a larger number than potassium, but must precede it to fit into its proper place. The same is true of tellurium and iodine. It looks as if the real elements were scattered somewhat haphazard on a regular table, or as if some independent factor were active to disturb an existing regularity. It may be that the new facts mentioned above will lead also to an explanation of these irregularities; at present we must recognize them and not try to explain them away. Such considerations have to be kept in mind especially in regard to the very numerous attempts to express the series of combining weights in a mathematical form. In several cases rather surprising agreements were found, but never without exception. It looks as if some very important factor regulating the whole matter is still unknown, and before this has been elucidated no satisfactory treatment of the matter is possible. It seems therefore premature to enter into the details of these speculations.

Transmutation of elements.

In recent times not only our belief in the absolute exactness of the law of the conservation of weight has been shaken, but also our belief in the law of the conservation of the elements. The wonderful substance radium, whose existence has made us to revise quite a number of old and established views, seems to be a fulfilment of the old problem of the alchemists. It is true that by its help lead is not changed into gold, but radium not only changes itself into another element, helium (Ramsay), but seems also to cause other elements to change. Work in this line is of present day origin only and we do not know what new laws will be found to regulate these most unexpected reactions (see RADIOACTIVITY). But we realize once more that no law can be regarded as free from criticism and limitation; in the whole realm of exact sciences there is no such thing as the Absolute.

Prout's assumption.

Another question regarding the values of atomic weights was raised very soon after their first establishment. From the somewhat inexact first determinations William Prout concluded that all atomic weights are multiples of the atomic weight of hydrogen, thus suggesting all other elements to be probably made up from condensed hydrogen. Berzelius found his determinations not at all in accordance with this assumption, and strongly opposed the arbitrary rounding off of the numbers practised by the partisans of Prout's hypothesis. His hypothesis remained alive, although almost every chemist who did *exact* atomic weight determinations, especially Stas, contradicted it severely. Even in our time it seems to have followers, who hope that in some way the existing experimental differences may disappear. But one of the most important and best-known relations, that between *hydrogen* and *oxygen*, is certainly different from the simple ratio 1:16, for it has been determined by a large number of different investigators and by different methods to be undoubtedly lower, namely, 1:15·87. Therefore, if Prout's hypothesis contain an element of truth, by the act of condensation of some simpler substance into the present chemical elements a change of weight also must have occurred, such that the weight of the element did not remain exactly the weight of the simpler substance which changed into it. We have already remarked that such phenomena are not yet known with certainty, but they cannot be regarded as utterly impossible.

International table of atomic weights.

It may here be mentioned that the internationality of science has shown itself active also in the question of atomic weights. These numbers undergo incessantly small variations because of new work done for their determination. To avoid the uncertainty arising from this inevitable state of affairs, an international committee was formed by the co-operation of the leading chemical societies all over the world, and an international table of the most probable values is issued every year. The following table is that for 1910:—

International Atomic Weights, 1910.

Name.	Symbol.	Atomic Weights. 0=16.
Aluminium	Al	27·1
Antimony	Sb	120·2
Argon	Ar	39·9
Arsenic	As	74·96
Barium	Ba	137·37
Beryllium (Glucinum)	Be Gl	9·1
Bismuth	Bi	208·0
Boron	B	11·0
Bromine	Br	79·92
Cadmium	Cd	112·40
Caesium	Cs	132·81
Calcium	Ca	40·09
Carbon	C	12·00
Cerium	Ce	140·25
Chlorine	Cl	35·46
Chromium	Cr	52·0
Cobalt	Co	58·97
Columbium (Niobium)	Cb (Nb)	93·5
Copper	Cu	63·57
Dysprosium	Dy	162·5
Erbium	Er	167·4
Europium	Eu	152·0
Fluorine	F	19·0
Gadolinium	Gd	157·3
Gallium	Ga	69·9
Germanium	Ge	72·5
Gold	Au	197·2
Helium	He	4·0
Hydrogen	H	1·008
Indium	In	114·8
Iodine	I	126·92
Iridium	Ir	193·1
Iron	Fe	55·85
Krypton	Kr	83·0
Lanthanum	La	139·0
Lead	Pb	207·10
Lithium	Li	7·00
Lutecium	Lu	174·0
Magnesium	Mg	24·32
Manganese	Mn	54·93
Mercury	Hg	200·0
Molybdenum	Mo	96·0
Neodymium	Nd	144·3
Neon	Ne	20·0
Nickel	Ni	58·68
Nitrogen	N	14·01
Osmium	Os	190·9
Oxygen	O	16·00
Palladium	Pd	106·7
Phosphorus	P	31·0
Platinum	Pt	195·0
Potassium	K	39·10
Praseodymium	Pr	140·6
Radium	Ra	226·4
Rhodium	Rh	102·9
Rubidium	Rb	85·45
Ruthenium	Ru	101·7
Samarium	Sm	150·4
Scandium	Sc	44·1
Selenium	Se	79·2
Silicon	Si	28·3
Silver	Ag	107·88
Sodium	Na	23·00
Strontium	Sr	87·62
Sulphur	S	32·07
Tantalum	Ta	181·0
Tellurium	Te	127·5
Terbium	Tb	159·2
Thallium	Tl	204·0
Thorium	Th	232·42
Thulium	Tm	168·5
Tin	Sn	119·0
Titanium	Ti	48·1
Tungsten	W	184·0
Uranium	U	238·5
Vanadium	V	51·2
Xenon	Xe	130·7
Ytterbium (Neo-ytterbium)	Yb	172·0
Yttrium	Y	89·0
Zinc	Zn	65·37
Zirconium	Zr	90·6

Concluding remarks.

In the long and manifold development of the concept of the element one idea has remained prominent from the very beginning down to our times: it is the idea of a primordial matter. Since the naive statement of Thales that all things came from water, chemists could never reconcile themselves to the fact of the conservation of the elements. By an experimental investigation which extended over five centuries and more, the impossibility of transmuting one element into another—for example, lead into gold—was demonstrated in the most extended way, and nevertheless this law has so little entered the consciousness of the chemists that it is seldom explicitly stated even in carefully written text-books. On the other side the attempts to reduce the manifoldness of the actual chemical elements to one single primordial matter have never ceased, and the latest development of science seems to endorse such a view. It is therefore necessary to consider this question from a most general standpoint.

In physical science, the chemical elements may be compared with such concepts as *mass*, *momentum*, *quantity of electricity*, *entropy* and such like. While mass and entropy are determined univocally by a unit and a number, quantity of electricity has a unit, a number and a sign, for it can be positive as well as negative. Momentum has a unit, a number and a direction in space. Elements do not have a common unit as the former magnitudes, but every element has its own unit, and there is no transition from one to another. All these magnitudes underlie a law of conservation, but to a very different degree. While mass was considered as absolutely invariable in the classical mechanics, the newer theories of the electrical constitution of matter make mass dependent on the velocity of the moving electron. Momentum also is not entirely conservative because it can be changed by light-pressure. Entropy is known as constantly increasing, remaining constant only in an ideal limiting case. With chemical elements we observe the same thing as with momentum; though till recently considered as conservative, there is now experimental evidence that they do not always show this character.

Generally the laws of the conservation of mass, weight and elements are expressed as the "law of the conservation of matter." But this expression lacks scientific exactness because the term "matter" is generally not defined exactly, and because only the above-named properties of ponderable objects do not change, while all other properties do to a greater or less extent. Considered in the most general way, we may define matter as a complex of gravitational, kinetic and chemical energies, which are found to cling together in the same space. Of these energies the capacity factors, namely, weight, mass and elements, are conservative as described, while the intensity factors, potential, velocity and affinity, may change in wide limits. To explain why we find these energies constantly combined one with another, we only have to think of a mass without gravity or a ponderable body without mass. The first could not remain on earth because every movement would carry it into infinite space, and the second would acquire infinite velocity by the slightest push and would also disappear at once. Therefore only such objects which have both mass and weight can be handled and can be objects of our knowledge. In the same way all other energies come to our knowledge only by being (at least temporarily) associated with this combination of mass and weight. This is the true meaning of the term "matter."

In this line of ideas matter appears not at all as a primary concept, but as a complex one; there is therefore no reason to consider matter as the last term of scientific analysis of chemical facts, and the idea of a primordial matter appears as a survival from the very first beginning of European natural philosophy. The most general concept science has developed to express the variety of experience is *energy*, and in terms of energy (combined with number, magnitudes, time and space) all observed and observable experiences are to be described. (W. O.)

ELEMI, an oleo-resin (Manilla elemi) obtained in the Philippine Islands, probably from *Canarium commune* (nat. ord. Burseraceae), which when fresh and of good quality is a pale yellow granular substance, of honey-like consistency, but which gradually hardens with age. It is soluble in alcohol and ether, and has a spicy taste with a smell like fennel. In the 17th and 18th centuries the term elemi usually denoted an oleo-resin (American or Brazilian elemi) obtained from trees of the genus *Icica* in Brazil, and still earlier it meant oriental or African elemi, derived from *Boswellia Frereana*, which flourishes in the neighbourhood of Cape Gardafui. The word, like the older term *animi*, appears to have been derived from *enhaemon* (Gr. ἔναιμον), the name of a styptic medicine said by Pliny to contain tears exuded by the olive tree of Arabia.

ELEPHANT, the designation of the two existing representatives of the *Proboscidea*, a sub-order of ungulate mammals, and also extended to include their more immediate extinct relatives. As the distinctive characteristics of the sub-order, and also of the single existing genus *Elephas*, are given in the article PROBOSCIDEA, it will suffice to point out how the two existing species are distinguished from one another.

The more specialized of the two species is the Indian or Asiatic elephant, *Elephas maximus*, specially characterized by the extreme complexity of the structure of its molar teeth, which are composed of a great number of tall and thin plates of enamel and dentine, with the intervals filled by cement (see PROBOSCIDEA, fig. 1). The average number of plates of the six successive molar teeth may be expressed by the "ridge-formula" 4, 8, 12, 12, 16, 24. The plates are compressed from before backwards, the anterior and posterior surfaces (as seen in the worn grinding face of the tooth) being nearly parallel. Ears of moderate size. Upper margin of the end of the proboscis developed into a distinct finger-like process, much longer than the lower margins, and the whole trunk uniformly tapering and smooth. Five nails on the fore-feet, and four (occasionally five) on the hind-feet.

The Asiatic elephant inhabits the forest-lands of India, Burma, the Malay Peninsula, Cochin China, Ceylon and Sumatra. Elephants from the last-named islands present some variations from those of the mainland, and have been separated under the names of *E. zeylonicus* and *E. sumatranus*, but they are not more than local races, and the Ceylon animal, which is generally tuskless, may be the typical *E. maximus*, in which case the Indian race will be *E. maximus indicus*. The appearance of the Asiatic elephant is familiar to all. In the wild state it is gregarious, associating in herds of ten, twenty or more individuals, and, though it may under certain circumstances become dangerous, it is generally inoffensive and even timid, fond of shade and solitude and the neighbourhood of water. The height of the male at the shoulder when full grown is usually from 8 to 10 ft., occasionally as much as 11, and possibly even more. The female is somewhat smaller.

The following epitome of the habits of the Asiatic elephants is extracted from *Great and Small Game of India and Tibet*, by R. Lydekker:—

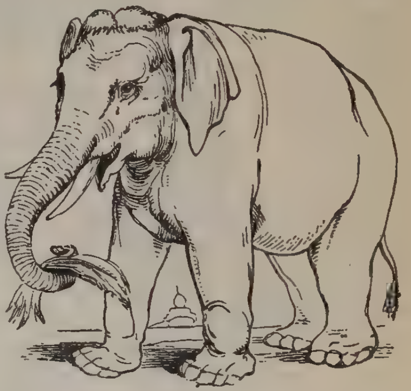


FIG. 1.

Asiatic Elephant (*Elephas maximus*).

"The structure of the teeth is sufficient to indicate that the food consists chiefly of grass, leaves, succulent shoots and fruits; and this has been found by observation to be actually the case. In this respect the Asiatic species differs very widely from its African relative, whose nutriment is largely composed of boughs and roots. Another difference between the two animals is to be found in the great intolerance of the direct rays of the sun displayed by the Asiatic species, which never voluntarily exposes itself to their influence. Consequently, during the hot season in Upper India, and at all times except during the rains in the more southern districts, elephants keep much to the denser parts of the forests. In Southern India they delight in hill-forest, where the undergrowth is largely formed of bamboo, the tender shoots of which form a favourite delicacy; but during the rains they venture out to feed on the open grass tracts. Water is everywhere essential to their well-being; and no animals delight more thoroughly in a bath. Nor are they afraid to venture out of their depth, being excellent swimmers, and able, by means of their trunks, to breathe without difficulty when the entire body is submerged. The herds, which are led by females, appear in general to be family parties; and although commonly restricted to from thirty to fifty, may occasionally include as many as one hundred head. The old bulls are very generally solitary for a considerable portion of the year, but return to the herds during the pairing season. Some 'rogue' elephants—*gunda* of the natives—remain, however, permanently separated from the rest of their kind. All such solitary bulls, as their colloquial name indicates, are of a spiteful disposition; and it appears that with the majority the inducement to live apart is due to their partiality for cultivated crops, into which the more timid females are afraid to venture. 'Must' elephants are males in a condition of—probably sexual—excitement, when an abundant discharge of dark oily matter exudes from two pores in the forehead. In addition to various sounds produced at other times, an elephant when about to charge gives vent to a shrill loud 'trumpet'; and on such occasions rushes on its adversary with its trunk safely rolled up out of danger, endeavouring either to pin him to the ground with its tusks (if a male tusker) or to trample him to death beneath its ponderous knees or feet."

Exact information in regard to the period of gestation of the female is still lacking, the length of the period being given from eighteen to twenty-two months by different authorities. The native idea, which may be true, is that the shorter period occurs in the case of female and the longer in that of male calves. In India elephants seldom breed in captivity, though they do so more frequently in Burma and Siam; the domesticated stock is therefore replenished by fresh captures. Occasionally two calves are produced at a birth, although the normal number is one. Calves suckle with their mouths and not with their trunks. Unlike the African species, the Indian elephant charges with its trunk curled up, and consequently in silence.

As regards their present distribution in India, elephants are found along the foot of the Himalaya as far west as the valley of Dehra-Dun, where the winter temperature falls to a comparatively low point. A favourite haunt used to be the swamp of Azufghur, lying among the sal-forests to the northward of Meerut. In the great tract of forest between the Ganges and Kistna rivers they occur locally as far west as Bilaspur and Mandla; they are met with in the Western Ghats as far north as between latitude 17° and 18°, and are likewise found in the hill-forests of Mysore, as well as still farther south. In this part of the peninsula they ascend the hills to a considerable height, as they do in the Newara Eliya district of Ceylon, where they have been encountered at an elevation of over 7000 ft. There is evidence that about three centuries ago elephants wandered in the forests of Malwa and Nimar, while they survived to a later date in the Chanda district of the Central Provinces. At the comparatively remote epoch when the Deccan was a forest tract, they were probably also met with there, but the swamps of the Bengal Sundarbans appear unsuited to their habits.

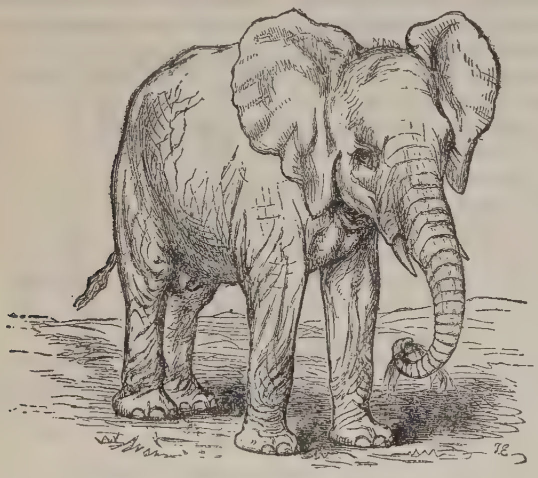


FIG. 2.—Immature African Elephant (*Elephas africanus*).

Of tusks, the three longest specimens on record respectively measure 8 ft. 9 in., 8 ft. 2 in. and 8 ft.; their respective weights being 81, 80 and 90 lb. These are, however, by no means the heaviest—one, whose length is 7 ft. $3\frac{3}{8}$ in., weighing 102 lb; while a second, of which the length is 7 ft. $3\frac{1}{4}$ in., scaled $97\frac{1}{2}$ lb. Of the largest pair in the possession of the British Museum, which belonged to an elephant killed in 1866 by Colonel G. M. Payne in Madras, one tusk measures 6 ft. 8 in. in length, and weighs $77\frac{3}{4}$ lb, the other being somewhat smaller. It should be added that some of these large tusks came from Ceylon; such tuskers being believed to be descended from mainland animals imported into the island. "White" elephants are partial or complete albinos, and are far from uncommon in Burma and Siam. Young Indian elephants are hairy, thus showing affinity with the mammoth.

The African elephant is a very different animal from its Asiatic cousin, both as regards structure and habits; and were it not for the existence of intermediate extinct species, might well be regarded as the representative of a distinct genus. Among its characteristics the following points are noticeable. The molar teeth are of coarse construction, with fewer and larger plates and thicker enamel; the ridge-formula being 3, 6, 7, 7, 8, 10; while the plates are not flattened, but thicker in the middle than at the edges, so that their worn grinding-surfaces are lozenge-shaped. Ears very large. The upper and lower margins of the end of the trunk form two nearly equal prehensile lips. Only three toes on the hind-foot. A very important distinction is to be found in the conformation of the trunk, which, as shown in fig. 2, looks as though composed of a number of segments, gradually decreasing in size from base to tip like the joints of a telescope, instead of tapering gradually and evenly from one extremity to the other. The females have relatively large tusks, which are essential in obtaining their food. Except where exterminated by human agency (and this has been accomplished to a deplorable extent), the African elephant is a native of the wooded districts of the whole of Africa south of the Sahara. It is hunted chiefly for the sake of the ivory of its immense tusks, of which it yields the principal source of supply to the European market, and the desire to obtain which is rapidly leading to the extermination of the species. In size the male African elephant often surpasses the Asiatic species, reaching nearly 12 ft. in some cases. The circumference of the fore-foot is half the height at the shoulder, a circumstance which enables sportsmen to estimate approximately the size of their quarry. A tusk in the British Museum measures 10 ft. 2 in. in length, with a basal girth of 24 in. and a weight of $226\frac{1}{2}$ lb; but a still longer, although lighter, tusk was brought to London in 1905.

Several local races of African elephant have been described, mainly distinguished from one another by the form and size of the ears, shape of the head, &c. The most interesting of these is the pigmy Congo race, *E. africanus pumilio*, named on the evidence of an immature specimen in the possession of C. Hagenbeck, the well-known animal-dealer of Hamburg, in 1905. According to Hagenbeck's estimate, this elephant, which came from the French Congo, was about six years old at the time it came under scientific notice. Moreover, in the opinion of the same observer, it is in no wise an abnormally dwarfed or ill-grown representative of the normal type of African elephant, but a well-developed adolescent animal. In height it stood about the same as a young individual of the ordinary African elephant when about a year and a half old, the vertical measurement at the shoulder being only 4 ft., or merely a foot higher than a new-born Indian elephant. Hagenbeck's estimate of its age was based on the presence of well-developed tusks, and the relative proportion of the fore and hind limbs, which are stated to show considerable differences in the case of the African elephant according to age. Nothing was stated as to the probability of an increase in the stature of the French Congo animal as it grows older; but even if we allow another foot, its height would be considerably less than half that of a large Central African bull of the ordinary elephant.

By Dr Paul Matschie several races of the African elephant have been described, mainly, as already mentioned, on certain differences in the shape of the ear. From the two West African races (*E. a. cyclotis* and *E. a. oxyotis*) the dwarf Congo elephant is stated to be distinguished by the shape of its ear; comparison in at least one instance having been made with an immature animal. The relatively small size of the ear is one of the most distinctive characteristics of the dwarf race. Further, the skin is stated to be much less rough, with fewer cracks, while a more important difference occurs in the trunk, which lacks the transverse ridges so distinctive of the ordinary African elephant, and thereby approximates to the Asiatic species.

If the differences in stature and form are constant, there can be no question as to the right of the dwarf Congo elephant to rank as a well-marked local race; the only point for consideration being whether it should not be called a species. The great interest in connexion with a dwarf West African race of elephant is in relation to the fossil pigmy elephants of the limestone fissures and caves of Malta and Cyprus. Although some of these elephants are believed not to have been larger than donkeys, the height of others may be estimated at from 4 to 5 ft., or practically the same as that of the dwarf Congo race. By their describers, the dwarf European elephants were regarded as distinct species, under the names of *Elephas melitensis*, *E. mnaidriensis* and *E. cypriotes*; but since their molar teeth are essentially miniatures of those of the African elephant, it has been suggested by later observers that these animals are nothing more than dwarf races of the latter. This view may receive some support from the occurrence of a dwarf form of the African elephant in the Congo; and if we regard the latter as a subspecies of *Elephas africanus*, it seems highly probable that a similar position will have to be assigned to the pigmy European fossil elephants. If, on the other hand, the dwarf Congo elephant be regarded as a species, then the Maltese and Cyprian elephants may have to be classed as races of *Elephas pumilio*; or, rather, *E. pumilio* will have to rank as a race of the Maltese species. In this connexion it is of interest to note that, both in the Mediterranean islands and in West Africa, dwarf elephants of the African type are accompanied by pigmy species of hippopotamus, although we have not yet evidence to show that in Africa the two animals occupy actually the same area. Still, the close relationship of the existing Liberian pigmy hippopotamus to the fossil Mediterranean species is significant, in relation to the foregoing observations on the elephant.

It may be added that fossil remains of the African elephant have been obtained from Spain, Sicily, Algeria and Egypt, in strata of the Pleistocene age. Some of the main differences in the habits of the African as distinct from those of the Asiatic elephant have been mentioned under the heading of the latter species. The most important of these are the greater tolerance by the African animal of sunlight, and the hard nature of its food, which consists chiefly of boughs and roots. The latter are dug up with the tusks; the left one being generally employed in this service, and thus becoming much more worn than its fellow. (R. L.*)

ELEPHANTA ISLE (called by the natives *Gharapuri*), a small island between Bombay and the mainland of India, situated about 6 m. from Bombay. It is nearly 5 m. in circumference, and the few inhabitants it contains are employed in the cultivation of rice, and in rearing sheep and poultry for the Bombay market. The island, till within recent times, was almost entirely overgrown with wood; it contains several springs of good water. There are also important quarries of building stone. But it owes its chief celebrity to the mythological excavations and sculptures of Hindu superstition which it contains. Opposite to the landing-place was a colossal statue of an elephant, cracked and mutilated, from which the island received from the Portuguese the name it still bears. The statue was removed in 1864, and may now be seen in the Victoria Gardens, Bombay. At a short distance from this spot is a cave, the entrance to which is nearly 60 ft. wide and 18 high, supported by pillars cut out of the rock; the sides are sculptured into numerous compartments, containing representations of the Hindu deities, but many of the figures have been defaced by the zeal of the Mahommedans and Portuguese. In the centre of the excavations is a remarkable *Trimurti* or bust, formerly thought to represent the Hindu Triad, namely, Brahma the Creator, Vishnu the Preserver, and Siva or Mahadeva the Destroyer, but now held to be a triform representation of Siva alone. The heads are from 4 to 5 ft. in length, and are well cut, and the faces, with the exception of the under lip, are handsome. The head-dresses are curiously ornamented; and one of the figures holds in its hand a cobra, while on the cap are, amongst other symbols, a human skull and an infant. On each side of the Trimurti is a pilaster, the front of which is filled up by a human figure leaning on a dwarf, both much defaced. There is a large compartment to the right, hollowed a little, and covered with a great variety of figures, the largest of which is 16 ft. high, representing the double figure of Siva and Parvati, named Viraj, half male and half female. On the right is Brahma, four-faced, on a lotus—one of the very few representations of this god which now exist in India; and on the left is Vishnu. On the other side of the Trimurti is another compartment with various figures of Siva and Parvati, the most remarkable of which is Siva in his vindictive character, eight-handed, with a collet of skulls round his neck. On the right of the entrance to the cave is a square apartment, supported by eight colossal figures, containing a gigantic symbol of Mahadeva or Siva cut out of the rock. In a ravine connected with the great cave are two other caves, also containing sculptures, which, however, have been much defaced owing to the action of damp and the falling of the rocks; and in another hill is a fourth cave. This interesting retreat of Hindu religious art is said to have been dedicated to Siva, but it contains numerous representations of other Hindu deities. It has, however, for long been a place not so much of worship as of archaeological and artistic interest alike to the European and Hindu traveller. It forms a wonderful monument of antiquity, and must have been a work of incredible labour. Archaeological authorities are of opinion that the cave must have been excavated about the 10th century of the Christian era, if not earlier. The island is much frequented by the British residents of Bombay; and during his tour in India in 1875 King Edward VII., then prince of Wales, was entertained there at a banquet.

ELEPHANTIASIS (*Barbadoes leg*; *Boucnemia*), is a disease dependent on chronic lymphatic obstruction, and characterized by hypertrophy of the skin and subcutaneous tissue. Two distinct forms are known, (1) elephantiasis arabum, due to the development of living parasites, filaria sanguinis hominis (or filaria Bancrofti), and (2) the non-filarial form due to lymphatic obstruction from any other cause whatsoever, as erysipelas, the deposit of tuberculous or cancerous material in the lymphatic glands, phlegmasia dolens (white leg), long-continued eczema, &c. The enlargement is limited to a particular part of the body, generally one, or in rare cases both of the lower limbs, occasionally the scrotum, one of the labiae or the mammary gland; far more rarely the face. An attack is usually ushered in by febrile disturbance (elephantoid fever), the part attacked becoming rapidly swollen, and the skin tense and red as in erysipelas. The subcutaneous tissues become firm, infiltrated and hard, pitting only on considerable pressure. The skin becomes roughened with a network of dilated lymphatics, and vesicles and bullae may form, discharging a chyle-like fluid when broken (lymphorrhoea). In a later stage still the skin may be coarse and wart-like, and there is a great tendency for varicose ulcers to form. At the end of a variable time enlargement ceases to take place, and the disease enters a quiescent state: but recrudescences occur at irregular intervals, always ushered in by elephantoid fever. At the end of some years the attacks of fever cease, and the affected part remains permanently swollen. The only difference in the history of the two forms of the disease lies in the fact that the non-filarial form progresses steadily, until either the underlying condition is cured, or in the case of cancer, &c., brings about a fatal issue. The elephantiasis due to filaria is spread by the agency of mosquitoes, in whose bodies the intermediate stage is passed. The dead mosquito falls upon the water, which thus becomes infected, and hence the ova reach the human stomach. The young worm develops, bores through the gastric mucous membrane and finally becomes lodged in the lymphatics, usually of one or other of the extremities. A large number of embryonic filariae are produced. Some remain in the lymphatic spaces and cause lymphatic obstruction, while others enter the blood stream by night (filaria nocturna), or by day (filaria diurna). It is supposed that a mosquito, biting an infected person, itself becomes infected with the blood it abstracts, and that so a new generation is developed.

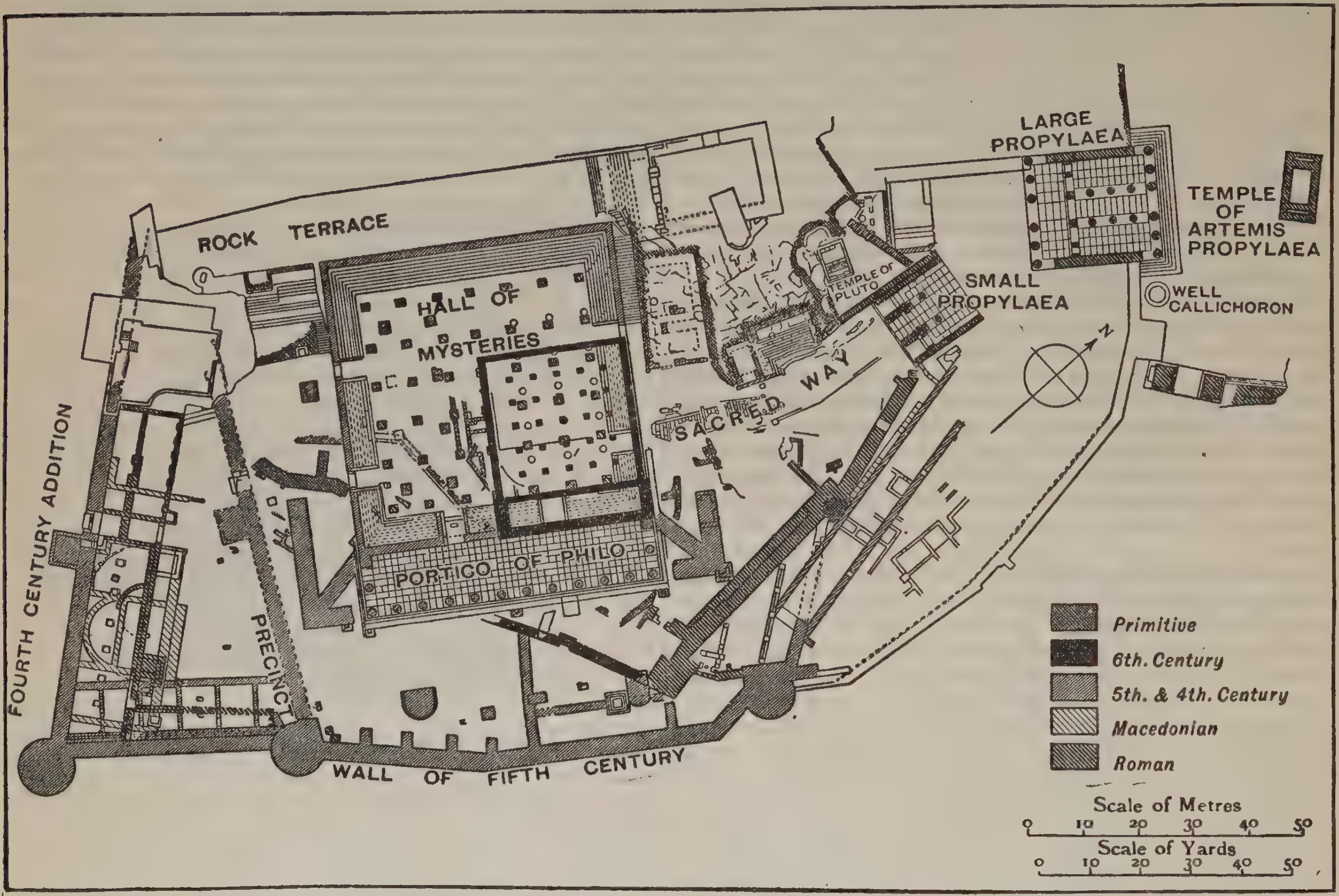
Treatment for this condition is unsatisfactory. Occasionally the dilated lymph trunks can be found, and an operation performed to implant them in some vein (lymphangeioplasty). And in some few other cases artificial lymphatics have been made by introducing sterilized silk thread in the subcutaneous tissues of the affected part, and prolonging it into the normal tissues. This operation has been most successful when performed on elephantoid arms dependent on a late stage of cancerous breast. Elevation of the limb and elastic pressure should always be tried, but often amputation has to be resorted to in the end. The disease is totally different from the so-called elephantiasis graecorum or true leprosy, for which see LEPROSY.

ELEPHANT'S-FOOT, the popular name for the plant *Testudinaria elephantipes*, a native of the Cape of Good Hope. It takes its name from the large tuberous stem, which grows very slowly but often reaches a considerable size, *e.g.* more than 3 yds. in circumference with a height of nearly 3 ft. above ground. It is rich in starch, whence the name Hottentot bread, and is covered on the outside with thick, hard, corky plates. It develops slender, leafy, climbing shoots which die down each season. It is a member of the monocotyledonous order Dioscoreaceae, climbing plants with slender herbaceous or shrubby shoots, to which belong the yam and the British black bryony, *Tamus communis.*

ELETS, a town of Russia, in the government of Orel, 122 m. by rail E.S.E. of Orel, on the railway which connects Riga with Tsaritsyn on the lower Volga. Pop. (1883) 36,680; (1900) 38,239. Owing to its advantageous position Elets has grown rapidly. Its merchants buy large quantities of grain, and numerous flour-mills, many of them driven by steam, prepare flour, which is forwarded to Moscow and Riga. The trade in cattle is very important. Elets has the first grain elevator erected in Russia (1887), a railway school, and important tanneries, foundries for cast iron and copper, tallow-melting works, limekilns and brickworks. The cathedral and two monasteries contain venerated historic relics.

Elets is first mentioned in 1147, when it was a fort of Ryazan. The Turkish Polovtsi or Kumans attacked it in the 12th century, and the Mongols destroyed it during their first invasion (1239) and again in 1305. The Tatars plundered it in 1415 and 1450; and it seems to have been completely abandoned in the latter half of the 15th century. Its development dates from the second half of the 17th century, when it became a centre for the trade with south Russia.

ELEUSIS, an ancient Greek city in Attica about 14 m. N.W. of Athens, occupying the eastern part of a rocky ridge close to the shore opposite the island of Salamis. Its fame is due chiefly to its Mysteries, for which see MYSTERY. Tradition carries back the origin of Eleusis to the highest antiquity. In the earlier period of its history it seems to have been an independent rival of Athens, and it was afterwards reckoned one of the twelve Old Attic cities. A considerable portion of its small territory was occupied by the plains of Thria, noticeable for their fertility, though the hopes of the husbandmen were not unfrequently disappointed by the blight of the south wind. To the west was the Πεδίον 'Ράριον or Rharian Plain, where Demeter is said to have sown the first seeds of corn; and on its confines was the field called Orgas, planted with trees consecrated to Demeter and Persephone. The sacred buildings were destroyed by Alaric in A.D. 396, and it is not certain whether they were restored before the extinction of all pagan rites by Theodosius. The present village on the site is of Albanian origin; it is called Lefsina or Lepsina, officially 'Ελευσίς.



The Site.—Systematic excavations, begun in 1882 by D. Philios for the Greek Archaeological Society, have laid bare the whole of the sacred precinct. It is now possible to trace its boundaries as extended at various periods, and also many successive stages in the history of the Telesterion, or Hall of Initiation. These complete excavations have shown the earlier and partial excavations to have been in some respects deceptive.

In front of the main entrance of the precinct is a large paved area, with the foundations of a temple in it, usually identified as that of Artemis Propylaea; in their present form both area and temple date from Roman times; and on each side of the Great Propylaea are the foundations of a Roman triumphal arch. Just below the steps of the Propylaea, on the left as one enters, there has been discovered, at a lower level than the

Roman pavement, the curb surrounding an early well. This is almost certainly the καλλίχορον φρέαρ mentioned by Pausanias. The Great Propylaea is a structure of Roman imperial date, in close imitation of the Propylaea on the Athenian Acropolis. It is, however, set in a wall of 6th-century work, though repaired in later times. This wall encloses a sort of outer court, of irregular triangular shape. The Small Propylaea is not set exactly opposite to the Great Propylaea, but at an angle to it; an inscription on the architrave records that it was built by Appius Claudius Pulcher, the contemporary of Cicero. It is also set in a later wall that occupies approximately the same position as two earlier ones, which date from the 6th and 5th centuries respectively, and must have indicated the boundary of the inner precinct. From the Small Propylaea a paved road of Roman date leads to one of the doors of the Telesterion. Above the Small Propylaea, partly set beneath the overhanging rock, is the precinct of Pluto; it has a curious natural cleft approached by rock-cut steps. Several inscriptions and other antiquities were found here, including the famous head, now in Athens, usually called Eubouleus, though the evidence for its identification is far from satisfactory. A little farther on is a rock-cut platform, with a well, approached by a broad flight of steps, which probably served for spectators of the sacred procession. Beyond this, close to the side of the Telesterion, are the foundations of a temple on higher ground; it has been conjectured that this was the temple of Demeter, but there is no evidence that such a building existed in historic times, apart from the Telesterion.

The Telesterion, or Hall of Initiation, was a large covered building, about 170 ft. square. It was surrounded on all sides by steps, which must have served as seats for the mystae, while the sacred dramas and processions took place on the floor of the hall: these seats were partly built up, partly cut in the solid rock; in later times they appear to have been cased with marble. There were two doors on each side of the hall, except the north-west, where it is cut out of the solid rock, and a rock terrace at a higher level adjoins it; this terrace may have been the station of those who were not yet admitted to the full initiation. The roof of the hall was carried by rows of columns, which were more than once renewed.

The architectural history of the hall has been traced by Professor W. Dörpfeld with the help of the various foundations that have been brought to light. The earliest building on the site is a small rectangular structure, with walls of polygonal masonry, built of the rock quarried on the spot. This was succeeded by a square hall, almost of the same plan as the later Telesterion, but about a quarter of the size; its eastern corner coincides with that of the later building, and it appears to have had a portico in front like that which, in the later hall, was a later addition. Its roof was carried by columns, of which the bases can still be seen. This building has with great probability been assigned to the time of Peisistratus; it was destroyed by the Persians. Between this event and the erection of the present hall, which must be substantially the one designed by Ictinus in the time of Pericles, there must have been a restoration, of which we may see the remains in a set of round sinkings to carry columns, which occur only in the north-east part of the hall; a set of bases arranged on a different system occur in the south-west part, and it is difficult to see how these two systems could be reconciled unless there were some sort of partition between the two parts of the hall. Both sets were removed to make way for the later columns, of which the bases and some of the drums still remain. These later columns are shown, by inscriptions and other fragments built into their bases, to belong to later Roman times. At the eastern and southern corners of the hall of Ictinus are projecting masses of masonry, which may be the foundation for a portico that was to be added; but perhaps they were only buttresses, intended to resist the thrust of the roof of this huge structure, which rested at its northern and western corners against the solid rock of the hill. On the south-east side the hall is faced with a portico, extending its whole width; the marble pavement of this portico is a most conspicuous feature of Eleusis at the present day. The portico was added to the hall by the architect Philo, under Demetrius of Phalerum, about the end of the 4th century B.C. It was never completed, for the fluting of its columns still remains unfinished.

The Telesterion took up the greater part of the sacred precinct, which seems merely to have served to keep the profane away from the temple. The massive walls and towers of the time of Pericles, which resemble those of a fortress, are quite close in on the south and east; later, probably in the 4th century B.C., the precinct was extended farther to the south, and at its end was erected a building of considerable extent, including a curious apsidal chamber, for which a similar but larger curved structure was substituted in Roman times. This was probably the Bouleuterion. The precinct was full of altars, dedications and inscriptions; and many fragments of sculptures, pottery and other antiquities, from the earliest to the latest days of Greece, have been discovered. It is to be noted that the subterranean passages which some earlier explorers imagined to be connected with the celebration of the mysteries, have proved to be nothing but cisterns or watercourses.

The excavations of Eleusis, and the antiquities found in them, have been published from time to time in the Ἐφημερὶς Ἀρχαιολογική and in the Πρακτικά of the Greek Archaeological Society, especially for 1887 and 1895. See also D. Philios, *Éleusis, ses mystères, ses ruines, et son musée.* Inscriptions have also been published in the *Bulletin de correspondance hellénique.* (E. Gr.)

ELEUTHERIUS, pope from about 175 to 189. Allusions to him are found in the letters of the martyrs of Lyons, cited by Eusebius, and in other documents of the time. The *Liber Pontificalis*, at the beginning of the 6th century, says that he had relations with a British king, Lucius, who was desirous of being converted to Christianity. This tradition—Roman, not British—is an enigma to critics, and, apparently, has no historical foundation. (L. D.*)

ELEUTHEROPOLIS (Gr. Ἐλευθέρα πόλις, "free city"), an ancient city of Palestine, 25 m. from Jerusalem on the road to Gaza, identified by E. Robinson with the modern Beit Jibrīn. This identification is confirmed by Roman milestones in the neighbourhood. It represents the Biblical Mareshah, the ruins of which exist at Tell Sandahannah close by. As Betogabra it is mentioned by Ptolemy; the name Eleutheropolis dates from the Syrian visit of Septimius Severus (A.D. 202). Eusebius in his *Onomasticon* uses it as a central point from which the distances of other towns are measured. It was destroyed in 796, rebuilt by the crusaders in 1134 (their fortress and chapel remain, much ruined). It was finally captured by Bibars, 1244. Beit Jibrīn is in the centre of a district of great archaeological interest. Besides the crusader and other remains in the village itself, the surrounding country possesses many *tells* (mounds) covering the sites of ancient cities. The famous caves of Beit Jibrīn honeycomb the hills all round. These are immense artificial excavations of unknown date. Roman milestones and aqueducts also are found, and close by the now famous tomb of Apollophanes, with wall-paintings of animals and other ornamentation, was discovered in 1902; a description of it will be found in Thiersch and Peters, *The Marissa Tombs*, published by the Palestine Exploration Fund. (R. A. S. M.)

ELEVATORS, Lifts or Hoists, machines for raising or lowering loads, whether of people or material, from one level to another. They are operated by steam, hydraulic or electric power, or, when small and light, by hand. Their construction varies with the magnitude of the work to be performed and the character of the motive power. In private houses, where only small weights, as coal, food, &c., have to be transferred from one floor to another, they usually consist simply of a small counter-balanced platform suspended from the roof or an upper floor by a tackle, the running part of which hangs from top to bottom and can be reached and operated at any level. In buildings where great weights and numbers of people have to be lifted, or a high speed of elevation is demanded, some form of motor is necessary. This is usually, directly or indirectly, a steam-engine or occasionally a gas-engine; sometimes a water-pressure engine is adopted, and it is becoming more and more common to employ an electric motor deriving its energy from the general distribution of the city. Large establishments, hotels or business houses, commonly have their own source of energy, an electric or other power "plant," on the premises.

Construction of elevators.

The hydraulic elevator is the simplest in construction of elevators proper, sometimes consisting merely of a long pipe set deeply in the ground under the cage and containing a correspondingly long plunger, which rises and falls as required and carries the elevator-cage on its upper end (fig. 1). The "stroke" is thus necessarily equal to the height traversed by the cage, with some surplus to keep the plunger steady within its guiding-pipe. The pipe or pump chamber has a length exceeding the maximum rise and fall of the plunger, and must be strong enough to sustain safely the heavy hydraulic pressures needed to raise plunger and cage with load. The power is usually supplied by a steam pump (occasionally by a hydraulic motor), which forces water into the chamber of the great pipe as the elevator rises, a waste-cock drawing off the liquid in the process of lowering the cage. A single handle within the cage generally serves to apply the pressure when raising, and to reduce it when lowering the load. The most common form of hydraulic elevator, for important work and under usual conditions of operation, as in cities, consists of a suspended cage, carried by a tackle, the running part of which

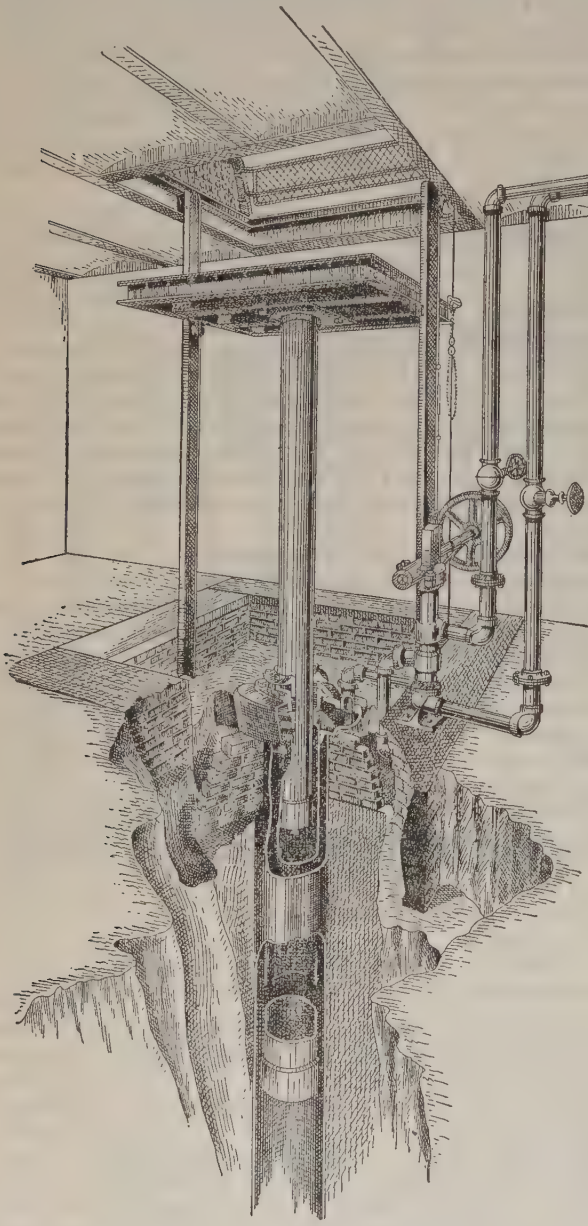


FIG. 1.—The Plunger, or Direct Lift Hydraulic Engine.

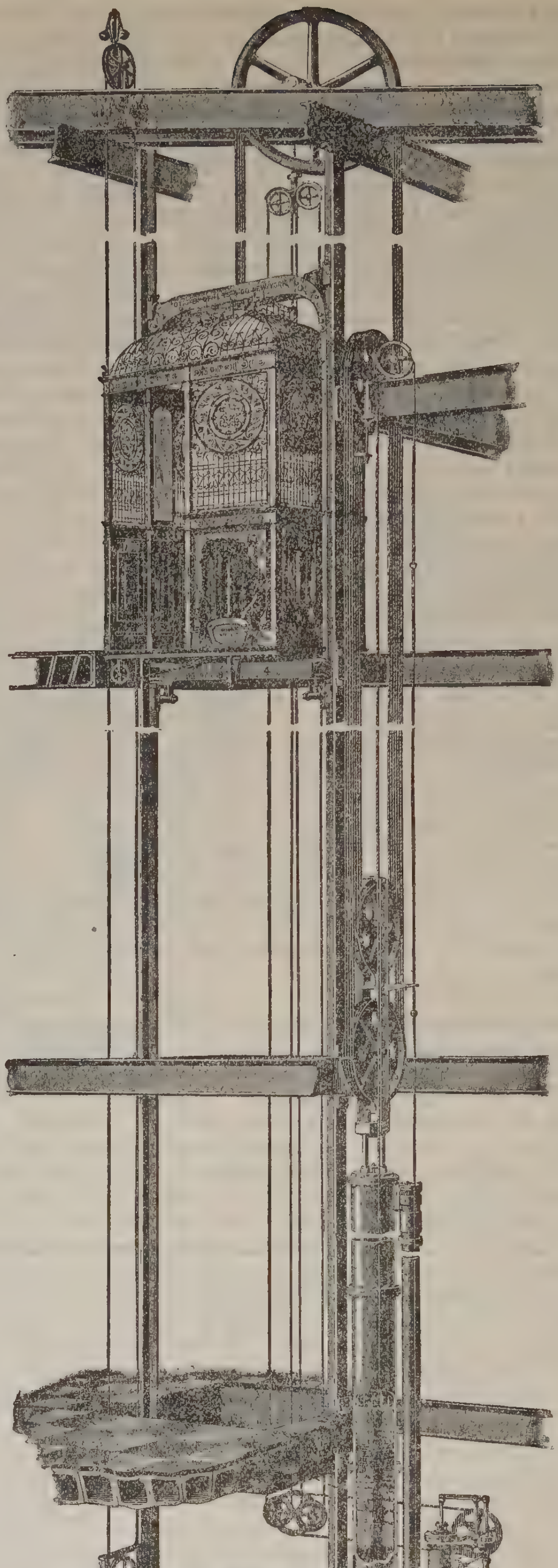


FIG. 2.—The Otis Standard Hydraulic Passenger Lift, with Pilot Valve and Lever-operating Device.

is connected with a set of pulleys at each end of a frame (fig. 2). The rope is made fast at one end, and its intermediate part is carried round first one pulley at the farther end of the frame and then round another at the nearer end, and so on as often as is found advisable in the particular case. The two pulley shafts carrying these two sets of pulleys are made to traverse the frame in such a way as, by their separation, to haul in on the running part, or, by their approximation, to permit the weight of the cage to haul out the rope. By this alternate hauling and "rendering" of the rope the cage is raised and lowered. The use of a number of parallel and independent sets of pulleys and tackles assures safety in case of the breakage of any one, each being strong enough alone to hold the load. The movement of the pair of pulley shafts is effected by a water-pressure engine, actuating the plunger of a pump which is similar to that used in the preceding apparatus, but being relatively of short stroke and large diameter, is more satisfactory in design and construction as well as in operation. Electricity may be applied to elevators of this type by attaching the travelling sheaves to a nut in which works a screwed shaft driven by an electric motor. In other electric lifts the cables which support the cage are wound on a drum which is turned by a motor, the drum being connected to the motor-shaft either by a series of pinions or by a worm-gear. The drum may also be worked by a steam or gas engine. Where the traffic is not very heavy, a form of elevator that requires no attendant is convenient. In this any one wishing to use the lift has merely to press a button placed by the side of the lift-gate on the floor on which he happens to be standing, when the car will come to him; and having entered it he can cause it to travel to any floor he desires by pressing another button inside the car. The motive power in such cases may be either electric or hydraulic, but the control of the switches or valves that govern the action of the apparatus is electric.

Essentials of design, &c.

The history of the elevator is chronologically extensive, but only since 1850 has rapid or important progress been effected. In that year George H. Fox & Co. built an elevator operated by the motion of a vertical screw, the nut on which carried the cage. This device was used in a number of instances, especially in hotels in the large cities, during the succeeding twenty years, and was then generally supplanted by the hydraulic lift of the kind already described as the plunger-lift. With the increased demand for power, speed, safety, convenience of manipulation, and comfort in operation, the inventive ability of the engineer developed the various systems more and more perfectly, and experience gradually showed to what service each type was best adapted and the best construction of each for its peculiar work. Whatever the class, the following are the essentials of design, construction and operation: the elevator must be safe, comfortable, speedy and convenient, must not be too expensive in either first cost or maintenance, and must be absolutely trustworthy. It must not be liable to fracture of any element of the hoisting gear that will permit either the fall of the cage or its projection by an overweighted balance upwards against the top of its shaft. It must be possible to stop it, whether in regular working or in emergency, or when accident occurs, with sufficient promptness, yet without endangering life or property, or even very seriously inconveniencing the passengers. Acceleration and retardation in starting and stopping must be smooth and easy, the stop must be capable of being made precisely where and when intended, and no danger must be incurred by the passengers from contact with running parts of the mechanism or with the walls and doors of the elevator shaft.

These requirements have been fully met in the later forms of elevator commonly employed for passenger service. Usual sizes range from loads of 1000 to 5000 ℔ with speeds of from 80 to 250 ft. a minute unloaded, and 75 to 200 ft. loaded, and a height of travel of from 50 to 200 ft. In some very tall buildings, as the Singer and Metropolitan buildings in New York, elevators have been installed having a maximum speed of 600 ft. a minute, with a rise of over 500 ft. Where electric motors are employed, their speed ranges from 600 and 700 revolutions per minute in the larger to 1000 and 1200 in the smaller sizes, corresponding to from 20 down to 4 or 5 h.p. Two or more counter-weights are employed, and from four to six suspension cables ensure as nearly as possible absolute safety. The electric elevators of the Central London railway are guaranteed to raise 17,000 ℔ 65 ft. in some of its shafts, in 30 secs. from start to stop. Over 100,000 ft. of $\frac{7}{8}$-in. and 17,000 ft. of $\frac{3}{4}$-in. steel rope are required for its 24 shafts, and each rope can carry from 16 to 22 tons without breaking. The steel used in the cables, of which there are four to six for each car and counter-weight, has a tenacity of 85 to 90 tons per sq. in. of section of wire. The maximum pull on each set of rope is assumed to be not over 9500 ℔, the remainder of the load being taken by the counter-balance. Oil "dash-pots" or buffers, into which enter plungers attached to the bottom of the cage, prevent too sudden a stop in case of accident, and safety-clutches with friction adjustments of ample power and fully tested before use give ample insurance against a fall even if all the cables should yield at once—an almost inconceivable contingency. The efficiency, *i.e.* the ratio of work performed to power expended in the same time, was in these elevators found by test to be between 70 and 75 %.

Safety devices.

Safety devices constitute perhaps the most important of the later improvements in elevator construction where passengers are carried. The simplest and, where practicable, most certain of them is the "air-cushion," a chamber into which the cage drops if detached or from any cause allowed to fall too rapidly to the bottom, compression of the air bringing it to rest without shock (fig. 3). This chamber must be perfectly air-tight, except in so far as a purposely arranged clearance around the sides, diminishing downwards and in well-established proportion, is adjusted to permit a "dash-pot" action and to prevent rebound. The air-cushion should be about one-tenth the depth of the elevator shaft; in high buildings it may be a well 20 or 30 ft. deep. The Empire building, in New York, is twenty storeys in height, the total travel of the cage is 287 ft., and the air-cushion is 50 ft. deep, extending from the floor of the third storey to the bottom of the shaft. Sliding doors of great strength, and automatic in action, at the first and second floors, are the only openings. The shaft is tapered for some distance below the third floor, and then carried straight to the bottom. An inlet valve admits air freely as the cage rises, and an adjusted safety-valve provides against excess pressure. A "car," falling freely from the twentieth storey, was checked by this arrangement without injury to a basket of eggs placed on its floor. Other safety devices consist of catches under the floor of the cage, so arranged that they are held out of engagement by the pull on the cables. But if the strain is suddenly relieved, as by breakage of a cable or accident to the engine or motor, they instantly fly into place and, engaging strong side-struts in the shaft, hold the car until it can be once more lifted by its cables. These operate well when the cables part at or near the car, but they are apt to fail if the break occurs on the opposite side of the carrying sheaves at the top of the shaft, since the friction and inertia of the mass of the cables may in that case be sufficient to hold the pawls out of gear either entirely or until the headway is so great as to cause the smashing of all resistances when they do engage.

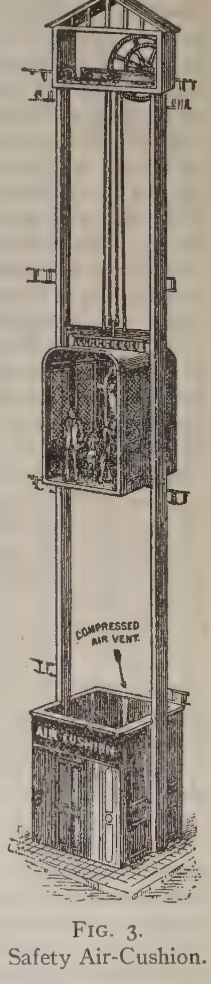


FIG. 3.
Safety Air-Cushion.

Another principle employed in safety arrangements is the action of inertia of parts properly formed and attached. Any dangerous acceleration of the cage causes the inertia of these parts to produce a retardation relative to the car which throws into action a brake or a catch, and thus controls the motion within safe limits or breaks the fall. The hydraulic brake has been used in this apparatus, as have mechanical and pneumatic apparatus. This control of the speed of fall is most commonly secured by the employment of a centrifugal or other governor or regulator. The governor may be on the top of the cage and driven by a stationary rope fixed between the top and bottom of the shafts, or it may be placed at the top of the shaft and driven by a rope travelling with the car. Its action is usually to trip into service a set of spring grips or friction clutches, which, as a rule, grasp the guides of the cage and by their immense pressure and great resultant friction bring the cage to rest within a safe limit of speed, time and distance. A coefficient of friction of about 15% is assumed in their design, and this estimate is confirmed by their operation. Pressures of 10 tons or more are sometimes provided in these grips to ensure the friction required. There are many different forms of safety device of these various classes, each maker having his own. The importance of absolute safety against a fall is so great that the best builders are not satisfied with any one form or principle, but combine provisions against every known danger, and often duplicate such precautions against the most common accidents.

The "travelling staircase," which may be classed among the passenger elevators, usually consists of a staircase so constructed that while the passenger is ascending it the whole structure is also ascending at a predetermined rate, so that the progress made is the sum of the two rates of motion. The system of "treads and risers" is carried on a long endless band of chain sustained by guides holding it in its desired line, and rendering at either end over cylinders or sprockets. The junctions between the stairway and the upper or lower floors are ingeniously arranged so as to avoid danger of injury to the passengers.

Freight elevators have the same general forms as the passenger elevators, but are often vastly larger and more powerful, and are not as a rule fitted up for such heights of lift, or constructed with such elaborate provision for safety or with any special finish. Elevators raising grain, coal, earth and similar materials, such as can be taken up by scooping into a bucket, or can be run into and out of the bucket by gravity, constitute a class by themselves, and are described in the article Conveyors.

The term "grain elevator" is often used to include buildings as well as machinery, and it is not unusual in Europe to hear a flour-mill, with its system of motor machinery, mills, elevator and storage departments, spoken of as an "American elevator" (see Granaries).

ELF (O. Eng. *aelf*; cf. Ger. *Alp*, nightmare), a diminutive supernatural being of Teutonic mythology, usually of a more or less mischievous and malignant character, causing diseases and evil dreams, stealing children and substituting changelings, and thus somewhat different from the Romanic fairy, which usually has less sinister associations. The prehistoric arrowheads and other flint implements were in England early known as "elf-bolts" or "elf-arrows," and were looked on as the weapons of the elves, with which they injured cattle. So too a tangle in the hair was called an "elf-lock," as being caused by the mischief of the elves.

ELGAR, SIR EDWARD (1857–), English musical composer, son of W. H. Elgar, who was for many years organist in the Roman Catholic church of St George at Worcester, was born there on the 2nd of June 1857. His father's connexion with music at Worcester, with the Glee Club and with the Three Choirs Festivals, supplied him with varied opportunities for a musical education, and he learnt to play several instruments. In 1879 he became bandmaster at the county lunatic asylum, and held that post till 1884. He was also a member of an orchestra at Birmingham, and in 1883 an intermezzo by him was played there at a concert. In 1882 he became conductor of the Worcester Amateur Instrumental Society; and in 1885 he succeeded his father as organist at St George's, Worcester. There he wrote a certain amount of church music. In 1889 he moved to London, but finding no encouragement retired to Malvern in 1891; in 1904 he went to live at Hereford, and in 1905 was made professor of music at Birmingham University. To the public generally he was hardly known till his oratorio *The Dream of Gerontius* was performed at Birmingham in 1900, but this was at once received as a new revelation in English music, both at home and by Richard Strauss in Germany, and the composer was made a Mus. Doc. at Cambridge. His experience in writing church music for a Roman Catholic service cannot be overlooked in regard to this and other works by Elgar, who came to be regarded as the representative of a Catholic or neo-Catholic style of religious music, for which an appreciative public was ready in England at the moment, owing to the recent developments in the more artistic and sensuous side of the religious movement. And the same interest attached to his later oratorios, *The Apostles* (1903) and *The Kingdom* (1906). But Elgar's sudden rise into popularity, confirmed by his being knighted in 1904, drew attention to his other productions. In 1896 his *Scenes from the Saga of King Olaf* was recognized by musicians as a fine work, and in the same year his *Scenes from the Bavarian Highlands* and *Lux Christi* were performed; and apart from other important compositions, his song-cycle *Sea-Pictures* was sung at Norwich in 1899 by Clara Butt, and his orchestral *Variations on an original theme* were given at a Richter concert in the same year. In 1901 his popular march "Pomp and Circumstance" was played at a promenade concert, the stirring melody of his song "Land of Hope and Glory" being effectually utilized. It is impossible here to enumerate all Sir Edward Elgar's works, which have excited a good deal of criticism in musical circles without impairing his general recognition as one of the few front-rank English composers of his day; but his most important later production, his first orchestral symphony, produced in 1908 with immediate success, raised his reputation as a composer to an even higher place, as a work of marked power and beauty, developing the symphonic form with the originality of a real master of his art. In 1908 he resigned his professorship at Birmingham University.

ELGIN, a city of Kane county, Illinois, U.S.A., in the N. part of the state, 36 m. N.W. of Chicago. Pop. (1880) 8787; (1890) 17,823; (1900) 22,433, of whom 5419 were foreign-born; (1910 census) 25,976. Elgin is served by the Chicago & North-Western and the Chicago, Milwaukee & St Paul railways, and by interurban electric railways to Chicago, Aurora and Belvidere. The city is the seat of the Northern Illinois hospital for the insane, of the Elgin Academy (chartered 1839; opened 1856), and of St Mary's Academy (Roman Catholic); and has the Gail Borden public library, with 35,000 volumes in 1908. The city has six public parks, Lord's Park containing 112, and Wing Park 121 acres. The city is in a fine dairying region and is an important market for butter. Among Elgin's manufactures are watches and watch-cases, butter and other dairy products, cooperage (especially butter tubs), canned corn, shirts, foundry and machine-shop products, pipe-organs, and caskets and casket trimmings; in 1905 Elgin's total factory product was valued at $9,349,274. The Elgin National Watch factory, and the Borden milk-condensing works, are famous throughout the United States and beyond. The publishing office of the Dunkers, or German Brethren, is at Elgin; and several popular weeklies with large circulations are published here. A permanent settlement was made as early as 1835, and Elgin was chartered as a city in 1854 and was rechartered in 1880.

ELGIN, a royal, municipal and police burgh, and county town of Elginshire, Scotland, situated on the Lossie, 5 m. S. of Lossiemouth its port, on the Moray Firth, and 71¼ m. N.W. of Aberdeen, with stations on the Great North of Scotland and Highland railways. Pop. (1901) 8460. It is a place of very considerable antiquity, was created a royal burgh by Alexander I., and received its charter from Alexander II. in 1234. Edward I. stayed at the castle in 1296 and 1303, and it was to blot out the memory of his visit that the building was destroyed immediately after national independence had been reasserted.

The hill on which it stood was renamed the Ladyhill, and on the scanty ruins of the castle now stands a monument to the 5th duke of Gordon, consisting of a column surmounted by a statue.

The burgh has suffered periodically from fire, notably in 1452, when half of it was burnt by the earl of Huntly. Montrose plundered it twice in 1645. In 1746 Prince Charles Edward spent a few days in Thunderton House. His hostess, Mrs Anderson, an ardent Jacobite, kept the sheets in which he slept, and was buried in them on her death, twenty-five years afterwards. For fifty years after this date the place retained the character and traditions of a sleepy cathedral city, but with the approach of the 19th century it was touched by a more modern spirit. As the result much that was picturesque disappeared, but the prosperity of Elgin was increased, so that now, owing to its pleasant situation in "the Garden of Scotland," its healthy climate, cheap living, and excellent educational facilities, it has become a flourishing community. The centre of interest is the cathedral of Moray, which was founded in 1224, when the church of the Holy Trinity was converted to this use. It was partially burned in 1270 and almost destroyed in 1390 by Alexander Stewart, the Wolf of Badenoch, natural son of Robert II., who had incurred the censure of the Church. In 1402 Alexander, lord of the Isles, set fire to the town, but spared the cathedral for a consideration, in memory of which mercy the Little Cross (so named to distinguish it from the Muckle or Market Cross, restored in 1888) was erected. After these outrages it was practically rebuilt on a scale of grandeur that made it the most magnificent example of church architecture in the north. Its design was that of a Jerusalem cross, with two flanking towers at the east end, two at the west end, and one in the centre, at the intersection of the roofs of the nave and transepts. It measured 282 ft. long from east to west by 120 ft. across the transepts, and consisted of the choir, the gable of which was pierced by two tiers of five lancet windows and the Omega rose window; the north transept, in which the Dunbars were buried, and the south transept, the doorway of which is interesting for its dog's-tooth ornamentation; and the nave of five aisles. The grand entrance was by the richly carved west door, above which was the Alpha window. The central steeple fell in 1506, but was rebuilt, the new tower with its spire reaching a height of 198 ft. By 1538 the edifice was complete in every part. Though the Reformation left it unscathed, it suffered wanton violence from time to time. By order of the privy council the lead was stripped off the roofs in 1567 and sold to Holland to pay the troops; but the ship conveying the spoils foundered in the North Sea. In 1637 the roof-tree of the choir perished during a gale, and three years later the rich timber screen was demolished. The central tower again collapsed in 1711, after which the edifice was allowed to go to ruin. Its stones were carted away, and the churchyard, overgrown with weeds, became the dumping-ground for rubbish. It lay thus scandalously neglected until 1824, when John Shanks, a "drouthy" cobbler, was appointed keeper. By a species of inspiration this man, hitherto a ne'er-do-well, conceived the notion of restoring the place to order. Undismayed, he attacked the mass of litter and with his own hands removed 3000 barrow-loads. When he died in 1841 he had cleared away all the rubbish, disclosed the original plan, and collected a quantity of fragments. A tablet, let into the wall, contains an epitaph by Lord Cockburn, recording Shanks's services to the venerable pile, which has since been entrusted to the custody of the commissioners of woods and forests. The chapter-house, to the north-east of the main structure, suffered least of all the buildings, and contains a 'Prentice pillar, of which a similar story is told to that of the ornate column in Roslin chapel. In the lavatory, or vestibule connecting the chapter-house with the choir, Marjory Anderson, a poor half-crazy creature, a soldier's widow, took up her quarters in 1748. She cradled her son in the piscina and lived on charity. In the course of time the lad joined the army and went to India, where he rose to the rank of major-general and amassed a fortune of £70,000 with which he endowed the Elgin Institution (commonly known as the Anderson Institution) at the east end of High Street, for the education of youth and the support of old age. Within the precincts of the cathedral grounds stood the bishop's palace (now in ruins), the houses of the dean and archdeacon (now North and South Colleges), and the manses of the canons. Other ecclesiastical buildings were the monasteries of Blackfriars (1230) and Greyfriars (1410) and the preceptory of Maisondieu (1240). They also were permitted to fall into decay, but the 3rd marquess of Bute undertook the restoration of the Greyfriars' chapel. The parish church, in the Greek style, was built in 1828. Gray's hospital, at the west end of High Street, was endowed by Dr Alexander Gray (1751–1808), and at the east end stands the Institution, already mentioned, founded by General Andrew Anderson (1746–1822). Other public buildings include the assembly rooms, the town-hall, the museum (in which the antiquities and natural history of the shire are abundantly illustrated), the district asylum, the academy, the county buildings and the court house, the market buildings, the Victoria school of science and art, and Lady Gordon-Cumming's children's home. In 1903 Mr G. A. Cooper presented his native town with a public park of 42 acres, containing lakes representing on a miniature scale the British Isles. Grant Lodge, an old mansion of the Grant family, occupying the south-west corner of the park, was converted into the public library. From the top of Ladyhill the view commands the links of the Lossie and the surrounding country, and a recreation ground is laid out on Lossie Green.

The industries include distilling and brewing, nursery gardening, tanning, saw and flour mills, iron-foundries and manufactures of woollens, tweeds and plaiding, and the quarrying of sandstone. Elgin combines with Banff, Cullen, Inverurie, Kintore and Peterhead to return one member to parliament, and the town is controlled by a council with provost and bailies.

Two miles and a half S. by W. of Elgin stands the church of Birnie, with the exception of the church at Mortlach in Banffshire probably the oldest place of public worship in Scotland still in use. It is not later than 1150 and, with its predecessor, was the cathedral of Moray during the rule of the first four bishops; the fourth bishop, Simon de Toeny, an Englishman, was buried in its precincts in 1184. In the church is preserved an old Celtic altar-bell of hammered iron, known as the "Ronnell bell." Such is the odour of sanctity of this venerable church that there is an old local saying that "to be thrice prayed for in the kirk of Birnie will either mend or end ye." Six miles to the S.W. of Elgin, charmingly situated in a secluded valley encircled by fir-clad heights, lie the picturesque remains of Pluscarden Priory, a Cistercian house founded by Alexander II. in 1230. The ruins, consisting of tower, choir, chapter-house, refectory and other apartments, are nearly hidden from view by their dense coating of ivy and the fine old trees, including many beautiful examples of copper beech, by which they are surrounded. Its last prior, Alexander Dunbar, died in 1560. The *Liber Pluscardensis*, a valuable authority on early Scots history, was compiled in the priory by Maurice Buchanan in 1461. The chronicle comes down to the death of James I. The 3rd marquess of Bute acquired the ruins in 1897.

ELGIN AND KINCARDINE, EARLS OF. THOMAS BRUCE, 7th earl of Elgin (1766–1841), British diplomatist and art collector, was born on the 20th of July 1766, and in 1771 succeeded his brother in the Scottish peerage as the 7th earl of Elgin (cr. 1633), and 11th of Kincardine (cr. 1647). He was educated at Harrow and Westminster, and, after studying for some time at the university of St Andrews, proceeded to the continent, where he studied international law at Paris, and military science in Germany. When his education was completed he entered the army, in which he rose to the rank of general. His chief attention was, however, devoted to diplomacy. In 1792 he was appointed envoy at Brussels, and in 1795 envoy extraordinary at Berlin; and from 1799 to 1802 he was envoy extraordinary at the Porte. It was during his stay at Constantinople that he formed the purpose of removing from Athens the celebrated sculptures now known as the Elgin Marbles. His doing so was censured by some as vandalism, and doubts were also expressed as to the artistic value of many of the marbles; but he vindicated himsel in a pamphlet published in 1810, and entitled *Memorandum on the Subject of the Earl of Elgin's Pursuits in Greece.* In 1816 the collection was purchased by the nation for £36,000, and placed in the British Museum, the outlay incurred by Lord Elgin having been more than £50,000. Lord Elgin was a Scottish representative peer for fifty years. He died at Paris on the 14th of November 1841.

James Bruce, 8th earl of Elgin (1811–1863), British statesman, eldest son of the 7th earl by his second marriage, was born in 1811, and succeeded to the peerage as 8th earl of Elgin and 12th of Kincardine in 1841. He was educated at Eton and at Christ Church, Oxford, where he had as companions and rivals his younger predecessors in the office of governor-general of India, Dalhousie and Canning. He began his official career in 1842 at the age of thirty, as governor of Jamaica. During an administration of four years he succeeded in winning the respect of all classes. He improved the condition of the negroes and conciliated the planters by working through them. In 1846 Lord Grey appointed him governor-general of Canada. Son-in-law of the popular earl of Durham, he was well received by the colonists, and he set himself deliberately to carry out the Durham policy. In this his frank and genial manners aided him powerfully. His assent to the local measure for indemnifying those who had suffered in the troubles of 1837 led the mob of Montreal to pelt his carriage for the rewarding of rebels for rebellion, as Mr Gladstone described it. But long before his eight years' term of service expired he was the most popular man in Canada. His relations with the United States, his hearty support of the self-government and defence of the colony, and his settlement of the free-trade and fishery questions, led to his being raised in 1849 to the British peerage as Baron Elgin.

Soon after his return to England in 1854, Lord Palmerston offered him a seat in the cabinet as chancellor of the duchy of Lancaster, which he declined. But when, in 1856 the seizure of the "Arrow" by Commissioner Yeh plunged England into war with China, he at once accepted the appointment of special envoy with the expedition. On reaching Point de Galle he was met by a force summoned from Bombay to Calcutta by the news of the sepoy mutiny at Meerut on the 11th of May. His first idea, that the somewhat meagre intelligence would justify most energetic action in China, was at once changed when urgent letters from Lord Canning reached him at Singapore, the next port, on the 3rd of June. H.M.S. "Shannon" was at once sent on to Calcutta with the troops destined for China, and Lord Elgin himself followed it, when gloomier letters from India reached him. The arrival of the "Shannon" gave new life to the handful of white men fighting for civilization against fearful odds, and before the reinforcements from England arrived the back of the mutiny had been broken. Nor was the position in China seriously affected by the want of the troops. Lord Elgin sent in his ultimatum to Commissioner Yeh at Canton on the same day, the 12th of December, that he learned the relief of Lucknow, and he soon after sent Yeh a prisoner to Calcutta. By July 1858, after months of Chinese deception, he was able to leave the Gulf of Pechili with the emperor's assent to the Treaty of Tientsin. Subsequently he visited Japan, and obtained less considerable concessions from its government in the Treaty of Yeddo. It is true that the negotiations were confined to the really subordinate Tycoon or Shogun, but that visit proved the beginning of British influence in the most progressive country of Asia. Unfortunately, the Chinese difficulty was not yet at an end. After tedious disputes with the tariff commissioners as to the opium duty, and a visit to the upper waters of the Yang-tzse, Lord Elgin had reached England in May 1859. But when his brother and the allied forces attempted to proceed to Peking with the ratified treaty, they were fired on from the Taku forts at the mouth of the Peiho. The Chinese had resolved to try the fortune of war once more, and Lord Russell again sent out Lord Elgin as ambassador extraordinary to demand an apology for the attack, the execution of the treaty, and an indemnity for the military and naval expenditure. Sir Robert Napier (afterwards Lord Napier of Magdala) and Sir Hope Grant, with the French, so effectually routed the Tatar troops and sacked the Summer Palace that by the 24th of October 1860 a convention was concluded which was "entirely satisfactory to Her Majesty's government." Lord Elgin had not been a month at home when Lord Palmerston selected him to be viceroy and governor-general of India. He had now attained the object of his honourable ambition, after the office had been filled in most critical times by his juniors and old college companions, the marquis of Dalhousie and Earl Canning. He succeeded a statesman who had done much to reorganize the whole administration of India, shattered as it had been by the mutiny. But, as the first viceroy directly appointed by the Crown, and as subject to the secretary of state for India, Lord Elgin at once gave up all Lord Canning had fought for, in the co-ordinate independence, or rather the stimulating responsibility, of the governor-general, which had prevailed from the days of Clive and Warren Hastings. On the other hand, he loyally carried out the wise and equitable policy of his predecessor towards our feudatories with a firmness and a dignity that in the case of Holkar and Udaipur had a good effect. He did his best to check the aggression of the Dutch in Sumatra, which was contrary to treaty, and he supported Dost Mahommed in Kabul until that aged warrior entered the then neutral and disputed territory of Herat. Determined to maintain inviolate the integrity of our own north-west frontier, Lord Elgin assembled a camp of exercise at Lahore, and marched a force to the Peshawar border to punish those branches of the Yusufzai tribe who had violated the engagements of 1858.

It was in the midst of this "little war" that he died. Soon after his arrival at Calcutta, he had projected the usual tour to Simla, to be followed by an inspection of the Punjab and its warlike ring-fence of Pathans. He even contemplated the summoning of the central legislative council at Lahore. After passing the summer of 1863 in the cool retreat of Peterhoff, Simla, Lord Elgin began a march across the hills from Simla to Sialkot by the upper valleys of the Beas, the Ravi and the Chenab, chiefly to decide the two allied questions of tea cultivation and trade routes to Kashgar and Tibet. The climbing up to the Rotung Pass (13,000 ft.) which separates the Beas valley from that of the Chenab, and the crossing of the frail twig bridge across the Chundra torrent, prostrated him by the time he had descended into the smiling English-like Kangra valley. Thence he wrote his last letter to Sir Charles Wood, still full of hope and not free from anxiety as to the Sittana expedition. At the lovely hill station of Dharmsala, "the place of piety," he died of fatty degeneration of heart on the 20th of November 1863.

For his whole career see *Letters and Journals of James, Eighth Earl of Elgin*, edited by Walrond, but corrected by his brother-in-law, Dean Stanley; for the China missions see *Narrative of the Earl of Elgin's Mission to China and Japan*, by Laurence Oliphant, his private secretary; for the brief Indian administration see the *Friend of India* for 1862–1863.

Victor Alexander Bruce, 9th earl of Elgin (1849–), British statesman, was born on the 16th of May 1849, the son of the 8th earl, and was educated at Eton and Balliol College, Oxford. In 1863 he succeeded as 9th earl of Elgin and 13th of Kincardine. A Liberal in politics, he became first commissioner of works (1886), and subsequently viceroy of India (1894–1899). His administration in India was chiefly notable for the frontier risings of 1897–1898. The Afridis broke out into a fanatical revolt and through hesitation on the part of the government were allowed to seize the Khyber Pass, necessitating the Tirah Expedition. After his return to England he was nominated chairman of the royal commission to investigate the conduct of the South African War; and on the formation of Sir Henry Campbell-Bannerman's ministry in December 1905, he became a member of the cabinet as secretary of state for the colonies. In this capacity, though he showed many statesmanlike qualities, he was somewhat overshadowed by his brilliant under-secretary in the Commons, Mr Winston Churchill, whose speeches on colonial affairs were as aggressive as Lord Elgin's were cautious; and when in April 1908, Mr Asquith became prime minister, Lord Elgin retired from the cabinet.

ELGINSHIRE, or MORAY (Gaelic "among the sea-board men"), a northern county of Scotland, bounded N. by the Moray Firth, E. and S.E. by Banffshire, S. and S.W. by Inverness and W. by Nairnshire. It comprises only the eastern portion of the ancient province of Moray, which extended from the Spey to the Beauly and from the Grampians to the sea, embracing an area of about 3900 sq. m. The area of the county is 305,119 acres, or 477 sq. m.

Elginshire is naturally divided into two sections, the level and fertile coast and its hinterland—"the Laigh o' Moray," a tract 30 m. long by from 5 to 12 m. broad—and the hilly country in the south. There are, however, no high mountains. Carn Ruigh (1784 ft.), Larig Hill (1783) and Carn Kitty (1711) are the chief eminences in the south-central district until the ridge of the Cromdale Hills is reached on the Banffshire border, where the highest point is 2329 ft. above the sea. The two most important rivers, the Spey (*q.v.*) and the Findhorn, both have their sources in Inverness-shire. About 50 m. of the course of the Spey are in Elginshire, to which it may be roughly said to serve as the boundary line on the south-east and east. The Findhorn rises in the Monadliadh Mountains which form the watershed for several miles between it and the Spey. Of its total course of nearly 70 m. only the last 12 are in the county, where it separates the woods of Altyre from the Forest of Darnaway, before entering the Moray Firth in a bay on the north-eastern shore to which it has given its name. During the first 7 m. of its flow in Elginshire the stream passes through some of the finest scenery in Scotland. It is liable to sudden risings, and in the memorable Moray floods of August 1829 wrought the greatest havoc. Of other rivers the Lossie rises in the small lakes on the flanks of Carn Kitty and pursues a very winding course of 34 m. till it reaches the Moray Firth; Ballintomb Burn, Rothes Burn and Tulchan Burn are left-hand affluents of the Spey; the Dorbock and Divie, uniting their forces near Dunphail House, join the Findhorn at Relugas; and Muckle Water, a left-hand tributary of the Findhorn, comes from Nairnshire. The Spey and Findhorn are famous for salmon, but some of the smaller streams, too, afford good sport. The lochs are few and unimportant, among them being Loch Spynie, 2½ m. N., and Loch-na-Bo, 4 m. S.E. of Elgin; Loch of Blairs, 2½ m. S. of Forres; Loch Romach, 3 m. S. of Rafford; Loch Dallas, about 4 m. S.W. of Dallas, and Lochindorb in the S.W., 6 m. N.N.W. of Grantown. Loch Spynie was once a lake extending from the Firth to within 2½ m. of Elgin and covering an area of over 2000 acres. Its shores were the haunt of a great variety of birds, and its waters were full of salmon, sea-trout and pike. But early in the 19th century it was resolved to reclaim the land, and the drainage works then undertaken reduced the beautiful loch to a swamp of some 120 acres.

Lochindorb is now the largest lake, being 2 m. in length and fully ½ m. wide. In the upper end, on an island believed to be artificial, stand the ruins of Lochindorb Castle, in the 14th century the stronghold of the Wolf of Badenoch, and afterwards successively the property of the earl of Moray, the Campbells of Cawdor and the earl of Seafield. Sir Thomas Dick Lauder saw at Cawdor Castle a massive iron gate which, according to tradition, Sir Donald Campbell of Cawdor carried on his back from Lochindorb to Cawdor, a distance of 13 m. In the southern half of the county, amongst the hills, are several glens, among them the Glen of Rothes, Glen Lossie, Glen Gheallaidh, Glen Tulchan and Glen Beag. Strathspey, though more of a valley than a glen, is remarkable for its extent and beauty.

Geology.—This county may be divided geologically into two areas, the hilly region to the south being composed of the crystalline schists of the Central Highlands and the fertile plain of Moray being made up of Old Red Sandstone and Triassic strata. In the Cromdale Hills in the south-east of the county the metamorphic series comprises schistose quartzite, quartz-schists, micaceous flagstones and mica-schists, which are granulitic and holocrystalline, the dark laminae in some cases containing heavy residues such as ilmenite and zircon. The greater portion of the metamorphic area west of the Spey consists of granulitic quartz-biotite-granulites and bands of muscovite-biotite-schist belonging to the Moine series of the Geological Survey (see SCOTLAND: *Geology*). In certain areas these are permeated by granitic material in the form of thin strings, knots and veins. Excellent sections of these rocks are exposed in the Findhorn, the Divie and the tributaries of the Spey. Near Grantown there is a group locally developed, comprising crystalline limestone with tremolite, kyanite gneiss, muscovite-biotite-schist and quartzite, the age and relations of which are still uncertain. The general strike of the crystalline schists, save where there are local deflections, is north-east and south-west, and the general dip is to the south-east. Between Lochindorb and Grantown there is a mass of granite belonging to the later intrusions of the Highlands represented by the Cairngorm granite. Within the county there are representatives of the middle and upper divisions of the Old Red Sandstone resting unconformably on the crystalline schists. The strata of the middle or Orcadian series consist of conglomerates, sandstones, shales and clays, with limestone nodules containing fish remains. This sequence is well displayed in the banks of the Spey north of Boat of Bridge and in the Tynet Burn east of Fochabers, the latter being one of the well-known localities for ichthyolites in the middle or Orcadian division. In the Tynet and Gollachie Burn sections, the fish bed is overlaid by conglomerates and red pebbly sandstones, passing upwards into a thin zone of andesite lavas, indicating contemporaneous volcanic action. West of the Tynet Burn and Spey sections there is no trace of the members of the Orcadian division till we reach the Muckle Burn and Lethen Bar in Nairnshire, save the coarse conglomerate filling the ancient hollow of the valley of Rothes which may belong to the middle series. In that direction they are overlapped by the Upper Old Red Sandstone, which in the river Lossie, in the Lochty Burn and the Findhorn rest directly on the metamorphic rocks. Even to the south of the main boundary of the upper division there are small outliers of that series resting on the crystalline schists. Hence there must be a discordance between the Middle and Upper Old Red Sandstone in this county. The strata of the upper division consist of red, grey and yellow false-bedded sandstones with conglomeratic bands, which are well seen in the Findhorn between Sluie and Cothall, where they are associated with a bed of cornstone, all dipping to the N.N.W. at gentle angles. South of Elgin they are exposed in the Lossie and at Scaat Craig, while to the north of that town they extend along the ridge from Bishopmill to Alves. By means of the fish remains, which occur at Scaat Craig, in the Bishopmill quarries, at Alves, in the Findhorn cliffs and in the Whitemyre quarry on the Muckle Burn, the Upper Old Red Sandstone in this county is arranged in two groups, the Alves and Rosebrae. In the area lying to the north of the Upper Old Red Sandstone ridge at Bishopmill and Quarrywood, the strata of Triassic age occur, where they consist of pale grey and yellow sandstones and a peculiar cherty and calcareous band, known as the cherty rock of Stotfield. The sandstones are visible in quarries on the north slope of Quarry Wood, at Findrassie, at Spynie and along the ridge and sea-shore between Burghead and Lossiemouth. They are invested with special interest on account of the remarkable series of reptilian remains obtained from them, comprising *Stagonolepis*, a crocodile allied to the modern caiman in form; *Telerpeton* and *Hyperodapedon*, species of lizards; *Dicynodonts* (*Gordonia* and *Geikia*) and a horned reptile, *Elginia mirabilis* (see SCOTLAND: *Geology*). The palaeontological evidence points to the conclusion that these reptiliferous sandstones must belong in part to the Trias, indeed it is possible that the lower portion may be of Permian age. In the Cutties Hillock quarry west of Elgin these reptiliferous beds rest directly on the sandstones containing *Holoptychius* of Upper Old Red Sandstone age, so that the apparent conformability must be entirely deceptive. Within the area occupied by the Trias west of Stotfield, flagstones appear, charged with fish scales of Upper Old Red age, where they form a low ridge protruding through the younger strata. Both the Upper Old Red and Triassic sandstones have been largely quarried for building purposes. On the shore at Lossiemouth there is a patch of greenish white sandstones yielding fossils characteristic of the Lower Oolite.

The glacial deposits distributed over the fertile plain of Moray and in the upland valleys are of interest. The low grounds were crossed by the ice descending the Moray Firth in an easterly and south-easterly direction, which carried boulders of granite from Strath Nairn and augen gneiss from Easter Ross. In the Elgin district, boulders belonging to the horizons of the Lower and Middle Lias, the Oxford Clay and the Upper Chalk are found both in the glacial deposits and on the surface of the ground. The largest transported mass occurs at Linksfield, where a succession of limestones and shales rests on boulder clay and is covered by it, which from the fossils may be of Rhaetic or Lower Lias age.

Climate and Agriculture.—The climate of the coast is equable and mild, even exotic fruits ripening readily in the open. The uplands are colder and damp. The average temperature in January is 38° F. and in July 58·5°, while for the year the mean is 47° F. The rainfall for the year averages 26 in. Considering its latitude and the extent of its arable land the standard of farming in Elginshire is high. The rich soil of the lowlands is well adapted for wheat, barley and oats. The acreage confined to the glens and straths under barley approximates that under oats. In the uplands, oats is the principal cereal. The breeding of live-stock is profitable, and some of the finest specimens of shorthorned and polled cattle and of crosses between the two are bred. On the larger farms in the Laigh Leicester sheep are kept all the year round, but in the uplands the Blackfaced take their place. Large numbers of horses and pigs are also raised.

Other Industries.—Whisky is the chief product, and the numerous distilleries are usually busy. There are woollen mills at Elgin and elsewhere and chemical works at Forres and Burghead. Owing to the absence of coal what little mineral wealth there is (iron and lead) cannot be remuneratively worked. The sandstone quarries, yielding a building-stone of superior quality, are practically inexhaustible. The plantations mainly consist of larch and fir and, to a smaller extent, of oak. Much timber was once floated down the Spey and other rivers, but, since the increased facilities of carriage afforded by the railways, trees have been felled on a wider scale. Boat-building is carried on at Burghead, Lossiemouth and Kingston—so-called from the fact that a firm from Kingston-on-Hull laid down a yard there in 1784—while at Garmouth the fishing fleet lies up during the winter and is also repaired there. The Firth fisheries are of considerable value. The boats go out from Findhorn, Burghead, Hopeman and Lossiemouth, which are all furnished with safe harbours. Findhorn has been twice vsited by calamities. The first village was overwhelmed by the drifting sands of Culbin, and the second was buried beneath the waves in 1701. Kingston harbour is tidal, exposed, and liable to interruption from a shifting bar. The deep sea fisheries comprise haddock, cod, ling and herring, and the Spey, Findhorn and Lossie yield large quantities of salmon.

The Great North of Scotland railway enters the shire in the S.E. from Craigellachie, whence a branch runs up the Spey to Boat of Garten in Inverness-shire, and in the N.E. from Port Gordon, running in both cases to Elgin, from which a branch line extends to Lossiemouth. The Highland railway traverses the western limits of the shire running almost due north to Forres, whence it turns westward to Nairn and eastward to Elgin. From the county town it runs to Aberdeen via Orbliston and Keith, with a branch to Fochabers from Orbliston.

Population and Government.—The population was 43,471 in 1891 and 44,800 in 1901, when 1865 persons spoke both Gaelic and English, and 2 spoke Gaelic only. The chief towns are Elgin (pop. in 1901, 8460), Forres (4313) and Lossiemouth (3904), to which may be added Rothes (1621), Grantown (1568) and Burghead (1531). In conjunction with Nairnshire the county returns one member to parliament. Elgin and Forres are royal burghs; the municipal and police burghs include Burghead, Elgin, Forres, Grantown, Lossiemouth, and Rothes. Elginshire is included in one sheriffdom with Inverness and Nairn, and there is a resident sheriff-substitute at Elgin. The county is under school-board jurisdiction, several of the schools earning grants for higher education. There are academies at Elgin and Fochabers and science and art and technical schools at Elgin and Grantown. The bulk of the "residue" grant is spent in subsidizing the agricultural department of Aberdeen University and the science schools and art and technical classes in the county.

History.—Moray, in the wider sense, was first peopled by Picts of the Gaelic branch of Celts, of whom relics are found in the stone circle at Viewfield and at many places in Nairnshire. Christianity, introduced under the auspices of Columba (from whose time the site of Burghead church has probably been so occupied), flourished for a period until the Columban church was expelled in 717 by King Nectan. Thereafter the district was given over to internecine strife between the northern and southern Picts, which was ended by the crushing victory of Kenneth MacAlpine in 831, as one result of which the kingdom of Pictavia was superseded by the principality of Moravia. Still, settled order had not yet been secured, for the Norsemen raided the country first under Thorstein and then under two Sigurds. It was in the time of the second Sigurd that the Firth was fixed as the northern boundary of Moray. In spite of such interruptions as the battle of Torfness (Burghead) on the 14th of August 1040, in which Thorfinn, earl of Orkney and Shetland, overthrew a strong force of Scots under King Duncan, the consolidation of the kingdom was being gradually accomplished. After Macbeth ascended the throne the Scandinavians held their hands. Though Macbeth and his *fainéant* successor, "daft" Lulach, were the only kings whom Moray gave to Scotland, the province never lacked for able, if headstrong, men, and it continued to enjoy home rule under its own marmaer, or great steward (the equivalent of *earl*, the title that replaced it), until the dawn of the 12th century, when as an entity it ceased to exist. With a view to breaking up the power of the marmaers David I. and his successors colonized the seaboard with settlers from other parts of the kingdom. Nevertheless, from time to time the clansmen and their chiefs descended from their fastnesses and plundered the Laigh, keeping the people for generations in a state of panic. Meanwhile, the Church had become a civilizing force. In 1107 Alexander had founded the see of Moray and the churches of Birnie, Kinneddar and Spynie were in turn the cathedral of the early bishops, until in 1224 under the episcopate of Andrew of Moray (de Moravia), the church of the Holy Trinity in Elgin was chosen for the cathedral. Another factor that drew men together was the struggle for independence. In his effort to stamp out Scottish nationality Edward I. came as far north as Elgin, where he stayed for four days in July 1296, and whence he issued his writ for the parliament at Berwick. Wallace, however, had no doughtier supporter than Sir Andrew Moray of Bothwell, and Bruce recognized the assistance he had received from the men of the north by erecting Moray into an earldom on the morrow of Bannockburn and bestowing it upon Thomas Randolph (see MORAY, THOMAS RANDOLPH, EARL OF). Henceforward the history of the county resolved itself in the main into matters affecting the power of the Church and the ambitions of the Moray dynasties. The Church accepted the Reformation peacefully if not with gratitude. But there was strife between Covenanters and the adherents of Episcopacy until, prelacy itself being abolished in 1689, the bishopric of Moray came to an end after an existence of 581 years. (For the subsequent history of the earldom, which was successively held by the Randolphs, the Dunbars, the Douglases, the royal Stewarts and an illegitimate branch of the Stewarts, see MURRAY or MORAY, EARLS OF.) Other celebrated Moray families who played a more or less strenuous part in local politics were the Gordons, the Grants and the Duffs. Still, national affairs occasionally evoked interest in Moray. In the civil war Montrose ravaged the villages which stood for the Covenanters, but most of the great lairds shifted in their allegiance, and the mass of the people were quite indifferent to the declining fortunes of the Stewarts. Charles II. landed at Garmouth on the 3rd of July 1650 on his return from his first exile in Holland, but hurried southwards to try the yoke of Presbytery. The fight at Cromdale (May day, 1690) shattered the Jacobite cause, for the efforts in 1715 and 1745 were too spasmodic and half-hearted to affect the loyalty of the district to Hanoverian rule. A few weeks before Culloden Prince Charles Edward stayed in Elgin for some days, and a month afterwards the duke of Cumberland passed through the town at the top of his speed and administered the *coup de grâce* to the Young Pretender on Drummossie Moor.

Twice Elginshire has been the scene of catastrophes without parallel in Scotland. In 1694 the barony of Culbin—a fine estate, with a rent roll in money and kind of £6000 a year, belonging to the Kinnairds, comprising 3600 acres of land, so fertile that it was called the Granary of Moray, a handsome mansion, a church and several houses—was buried under a mass of sand in a storm of extraordinary severity. The sandy waste measures 3 m. in length and 2 in breadth, and the sand, exceedingly fine and light, is constantly shifting and, at rare intervals, exposing traces of the vanished demesne. This wilderness of dome-shaped dunes divided by a loftier ridge lies to the north-west of Forres. The other calamity was the Moray floods of the 2nd and 3rd of

August 1829. The Findhorn rose 50 ft. above the ordinary level, inundating an area of 20 sq. m.; the Divie rose 40 ft., and the Lossie flooded all the low ground around Elgin. The floods tore down bridges and buildings, and obliterated farms and homesteads.

AUTHORITIES.—Lachlan Shaw, *History of the Province of Moray* (Gordon's edition, Glasgow, 1882); *A Survey of the Province of Moray* (Elgin, 1798); W. Rhind, *Sketches of the Past and Present State of Moray* (Edinburgh, 1839); E. Dunbar Dunbar, *Documents relating to the Province of Moray* (Edinburgh, 1895); C. A. Gordon, *History of the House of Gordon* (Aberdeen, 1890); C. Rampini, *History of Moray and Nairn* (Edinburgh, 1897); C. Innes, *Elgin, Past and Present* (Elgin, 1860); J. Macdonald, "Burghead" (*Proceedings of Glasgow Archaeological Soc.*), (1891); Sir T. Dick Lauder, *The Wolf of Badenoch* (Glasgow, 1886); *An Account of the Great Floods of August 1829 in the Province of Moray and Adjoining Districts* (Elgin, 1873).

ELGON, also known as MASAWA, an extinct volcano in British East Africa, cut by 1° N. and 34½° E., forming a vast isolated mass over 40 m. in diameter. The outer slopes are in great measure precipitous on the north, west and south, but fall more gradually to the east. The southern cliffs are remarkable for extensive caves, which have the appearance of water-worn caves on a coast line and have for ages served as habitations for the natives. The higher parts slope gradually upwards to the rim of an old crater, lying somewhat north of the centre of the mass, and measuring some 8 m. in diameter. The highest point of the rim is about 14,100 ft. above the sea. Steep spurs separated by narrow ravines run out from the mountain, affording the most picturesque scenery. The ravines are traversed by a great number of streams, which flow north-west and west to the Nile (through Lake Choga), south and south-east to Victoria Nyanza, and north-east to Lake Rudolf by the Turkwell, the head-stream of which rises within the crater, breaking through a deep cleft in its rim. To the north-west of the mountain a grassy plain, swampy in the rains, falls towards the chain of lakes ending in Choga; towards the north-east the country becomes more arid, while towards the south it is well wooded. The outer slopes are clothed in their upper regions with dense forest formed in part of bamboos, especially towards the south and west, in which directions the rainfall is greater than elsewhere. The lower slopes are exceptionally fertile on the west, and produce bananas in abundance. On the north-west and north the region between 6000 and 7000 ft. possesses a delightful climate, and is well watered by streams of ice-cold water. The district of Save on the north is a halting-place for Arab and Swahili caravans going north. On the west the slopes are densely inhabited by small Bantu-Negro tribes, who style their country Masawa (whence the alternative name for the mountain); but on the south and north there are tribes which seem akin to the Gallas. Of these, the best known are the El-gonyi, from whom the name Elgon has been derived. They formerly lived almost entirely in the caves, but many of them have descended to villages at the foot of the mountain. Elgon was first visited in 1883 by Joseph Thomson, who brought to light the cave-dwellings on the southern face. It was crossed from north to south, and its crater reached, in 1890 by F. J. Jackson and Ernest Gedge, while the first journey round it was made by C. W. Hobley in 1896. (E. HE.)

ELI (Hebrew for "high"? 1 Sam. chaps. i.-iv.), a member of the ancient priesthood founded in Egypt (1 Sam. ii. 27), priest of the temple of Shiloh, the sanctuary of the ark, and also "judge" over Israel. This was an unusual combination of offices, when it is considered that in the history preserved to us he appears in the weakness of extreme old age, unable to control the petulance and rapacity of his sons, Hophni and Phinehas, who disgraced the sanctuary and disgusted the people. While the central authority was thus weakened, the Philistines advanced against Israel, and gained a complete victory in the great battle of Ebenezer, where the ark was taken, and Hophni and Phinehas slain. On hearing the news Eli fell from his seat and died. In a passage not unlike the account of the birth of Benjamin (Gen. xxxv. 16 sqq.), it is added that the wife of Phinehas, overwhelmed at the loss of the ark and of her husband, died in child-birth, naming the babe Ichabod (1 Sam. iv. 19 sqq.). This name, which popular etymology explained by the words "the glory is removed (or, stronger, 'banished') from Israel" (cf. Hos. x. 5), should perhaps be altered from *I-kābōd* (as though "not glory") to Jōchebed (*Yōkebed*, a slight change in the original), the name which tradition also gave to the mother of Moses (*q.v.*). After these events the sanctuary of Shiloh appears to have been destroyed (cf. Jer. vii. 12, xxvi. 6, 9), and the descendants of Eli with the whole of their clan or "father's house" subsequently appear as settled at Nob (1 Sam. xxi. 1, xxii. 11 sqq., cp. xiv. 3), perhaps in the immediate neighbourhood of Jerusalem (Is. x. 32). In the massacre of the clan by Saul, and the subsequent substitution of the survivor Abiathar by Zadok (1 Kings ii. 27, 35), later writers saw the fulfilment of the prophecies of judgment which was said to have been uttered in the days of Eli against his corrupt house (1 Sam. ii. 27 sqq., iii. 11 sqq.).[1]

See further, SAMUEL, BOOKS OF; and on Eli as a descendant of a Levite clan (1 Sam. ii 27 sq.), see LEVITES (§ 3). W. R. S.; S. A. C.)

ELIAS, of Cortona (*c.* 1180–1253), disciple of St Francis of Assisi, was born near Assisi, about 1180, of the working class, but became schoolmaster at Assisi and then notary at Bologna. In 1217 he was the head of the Franciscan mission to the Holy Land, and in 1219 St Francis made him first provincial minister of Syria. When St Francis was recalled from the East in 1220 he brought Elias with him. Elias played a leading part in the early history of the Franciscan order (see FRANCISCANS); Francis made him his vicar general in 1221; and he was the practical acting superior of the order till Francis' death in 1226, and the real superior till the general chapter of 1227. This chapter did not elect him minister general, but that of 1232 did; at the chapter of 1239 he was deposed. During these years he erected the basilica and monastery at Assisi which were entirely his creation—he collected the funds and carried the work through, being himself the builder and even the architect. Elias was a man of extraordinary ability, the friend both of Gregory IX. and of his opponent Frederick II. After his deposition Elias joined the party of the emperor and so incurred excommunication. Frederick sent him as ambassador to Constantinople. He dressed and lived as a Franciscan throughout and a small number of friars adhered to him; for these he built a church and monastery at Cortona. Unavailing efforts were made to bring about his reconciliation with the order and the Church; at last on his death-bed he made his submission to the pope and died in 1253, having received the Sacraments.

The best account of Elias is that by Ed. Lempp, *Frère Élie de Cortone* (1901), who points out the conflict of view, as to the relations between Elias and Francis, between the *Speculum perfectionis* and the *First Life*, by Thomas of Celano; Lempp and Sabatier accept the hostile picture given by the *Speculum perfectionis*. But see further FRANCIS OF ASSISI, SAINT, "Note on Sources," and especially the articles by Goetz, there referred to, in the *Hist. Vierteljahrsschrift*. There is a good article on Elias, but written before the new materials had been produced, in Wetzer und Welte, *Kirchenlexicon* (ed. 2). (E. C. B.)

ELIAS, JOHN (1774–1841), Welsh Nonconformist preacher and reformer, was born on the 2nd of May 1774, in the parish of Abererch, Carnarvonshire. In his youth he came under the influence of the Calvinistic Methodist revival and became a preacher at nineteen. In 1799 he married and settled at Llanfechell in Anglesey, giving up his trade as a weaver to become a small shopkeeper. His fame as a preacher increased, and under the direction of Thomas Charles of Bala he established numerous Sunday schools, and gave and secured considerable Welsh support to the founding of the London Missionary Society, the British and Foreign Bible Society and the Religious Tract Society. On Charles's death in 1814 he became the recognized leader of the Calvinistic Methodist Church, and the story of his life is simply a record of marvellously successful preaching tours. He died on the 8th of June 1841; ten thousand people attended his funeral.

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[1] On the old views relating to the succession of the priests, according to which the high-priesthood was diverted from the line of Eleazar and Phinehas into that of Ithamar, see Robertson Smith, *Old Test. in Jewish Church*, 2nd ed., p. 266.

His eloquence was so remarkable that he was known as "the Welsh Demosthenes." His strength lay in his intense conviction of an intimate connexion between sin and punishment and in his power of dramatic presentation. As an ecclesiastic he was not so successful; he helped to compile his church's Confession of Faith in 1823, and laid great stress on a clause which limited the scope of the atonement to the elect. He was a stout Tory in politics and had many friends among the Anglican clergy; he opposed the movement for Roman Catholic emancipation. Several of his sermons were published in Welsh.

ELIAS LEVITA (1469–1549), Jewish grammarian, was born at Neustadt on the Aisch, a place in Bavaria lying between Nuremberg and Würzburg. He preferred to call himself "Ashkenazi," the German, and bore also the nickname of "Bachur," the youth or student, which latter he gave as title to his Hebrew grammar. Before the end of the 15th century he went to Italy, which thenceforth remained his home. He lived first at Padua, went in 1509, after the capture of this town by the army of the League of Cambrai, to Venice, and finally in 1513 to Rome, where he found a patron in the learned general of the Augustinian Order, the future cardinal Egidio di Viterbo, whom he helped in his study of the Kabbalah, while he himself was inspired by him to literary work. The storming of Rome by the army of the Constable de Bourbon in 1527 compelled Elias to go to Venice, where he was employed as corrector in the printing-house of Daniel Bomberg. In the years 1541 and 1542 he lived at Isny, in Southern Württemberg, where he published several of his writings in the printing-house of the learned pastor Paul Fagius. The last years of his life he spent at Venice, continuously active in spite of ill-health and the weakness of old age. His monument in the graveyard of the Jewish community at Venice boasts of him that "he illuminated the darkness of grammar and turned it into light." The importance of Levita rests both in his numerous writings and in his personal activity. In the remarkable period which saw the rise of the Reformation and gave to the study of the Hebrew Bible and to its language an importance in the history of the world, it was Levita who furthered in an extraordinary manner the study of Hebrew in Christian circles by his activity as a teacher and by his writings. To his pupils especially belong Sebastian Minoter, who translated Levita's grammatical works into Latin, also George de Selve, bishop of Lavaur, the French ambassador in Venice (1536), who was instrumental in obtaining for Levita an invitation from Francis I. to come to Paris, which invitation, however, Levita did not accept. Levita's writings on Hebrew grammar (*Bachur*, a text-book, 1518; *Harkaba*, an explanation, alphabetically arranged, of irregular word-forms; a Table of Paradigms; *Pirke Elijahu*, a description—partly metrical—of phonetics, and other chapters of the grammar, 1520; his earliest work, a Commentary on Moses Kimḥi's Hebrew Grammar, 1508) were by reason of their methodical exposition, their clear articulation, their avoidance of prolixity, especially suited as an introduction to the study of the Hebrew language. Amongst Levita's other writings is the first dictionary of the Targumim (*Meturgeman*, 1541) and the first attempt at a lexicon in which much of the treasure of late Hebrew language was explained (*Tishbi*, explanation of 712 new Hebrew vocables, as a supplement to the dictionaries of David Kimḥi and Nathan b. Yeḥiel, 1542). Scientifically most valuable, and of original importance, are the works of Levita on the *Massora*; his Concordance to the Massora (*Sefer Zikhronot* completed in the second revision 1536), of which hitherto only a small part has been published, and especially his most celebrated book *Massoreth Hamasoreth* (1538), published with English translation by Chr. D. Ginsburg, London, 1867. This was the first attempt to give a systematic account of the contents and history of the Massora. By his criticism of the Massora, and especially by proving that the punctuation of the books of the Hebrew Bible is of late origin, Levita exercised an epoch-making influence. Of his other writings may be mentioned his running commentary on David Kimḥi's Grammar and Dictionary (in the Bomberg editions 1545, 1546), his German translation of the Psalms (1545) and the *Baba-Buch* (more properly *Buovobuch*, a German recension of the Italian novel *Historia di Buovo d' Antona*, 1508).

Of the literature on Levita may be mentioned: Y. Levi, *Elia Levita und seine Leistungen als Grammatiker* (Breslau, 1888); W. Bacher, "E. Levita's wissenschaftliche Leistungen" in *Z. d. D. M. G.* xliii. (1889), p. 206-272. (W. Ba.)

ELIE, a village and watering-place of Fifeshire, Scotland, on the shore of the Firth of Forth. Pop. 687. It is 10 m. due S. of St Andrews, but 20 m. distant by the North British railway, which makes a great bend by following the coast. Though it retains some old houses, and the parish church dates from 1639, Elie is, as a whole, quite modern and is one of the most popular resorts in the county on account of its fine golf links and excellent bathing. The royal burgh of Earlsferry (pop. 317) is situated in the parish of Elie, which it adjoins on the west. Its charter, granted by Malcolm Canmore, having been burned, it was renewed by James VI. The chief structure is the town hall, which is modern but has an ancient steeple. The place derived its name from its use by the earls of Fife as a ferry to the opposite shore of Haddington, 8 m. distant. Macduff's cave near Kincraig Point is believed traditionally to have been that in which the thane took refuge from Macbeth. Two and a half miles north is Balcarres House, belonging to the earl of Crawford, where Lady Anne Barnard (1750–1825) was born.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LÉONCE (1798–1874), French geologist, was born at Canon, in Calvados, on the 25th of September 1798. He was educated at the Lycée Henri IV. where he took the first prize in mathematics and physics; at the École Polytechnique, where he stood first at the exit examination in 1819; and at the École des Mines (1819–1822), where he began to show a decided preference for the science with which his name is associated. In 1823 he was selected along with Dufrénoy by Brochant de Villiers, the professor of geology in the École des Mines, to accompany him on a scientific tour to England and Scotland, in order to inspect the mining and metallurgical establishments of the country, and to study the principles on which Greenough's geological map of England (1820) had been prepared, with a view to the construction of a similar map of France. In 1835 he was appointed professor of geology at the École des Mines, in succession to Brochant de Villiers, whose assistant he had been in the duties of the chair since 1827. He held the office of engineer-in-chief of mines in France from 1833 until 1847, when he was appointed inspector-general; and in 1861 he became vice-president of the Conseil-Général des Mines and a grand officer of the Legion of Honour. His growing scientific reputation secured his election to the membership of the Academy of Berlin, of the Academy of Sciences of France and of the Royal Society of London. By a decree of the president he was made a senator of France in 1852, and on the death of Arago (1853) he was chosen perpetual secretary of the Academy of Sciences. Élie de Beaumont's name is widely known to geologists in connexion with his theory of the origin of mountain ranges, first propounded in a paper read to the Academy of Sciences in 1829, and afterwards elaborated in his *Notice sur le système des montagnes* (3 vols., 1852). According to his view, all mountain ranges parallel to the same great circle of the earth are of strictly contemporaneous origin, and between the great circles a relation of symmetry exists in the form of a pentagonal *réseau*. An elaborate statement and criticism of the theory was given in his anniversary address to the Geological Society of London in 1853 by William Hopkins (*Quart. Journ. Geol. Soc.*). The theory has not found general acceptance, but it proved of great value to geological science, owing to the extensive additions to the knowledge of the structure of mountain ranges which its author made in endeavouring to find facts to support it. Probably, however, the best service Élie de Beaumont rendered to science was in connexion with the geological map of France, in the preparation of which he had the leading share. During this period Élie de Beaumont published many important memoirs on the geology of the country. After his superannuation at the École des Mines he continued to superintend the issue of the detailed maps almost until his death, which occurred at Canon on the 21st of September 1874. His academic lectures for 1843–1844 were published in 2 vols., 1845–1849, under the title *Leçons de géologie pratique*.

A list of his works was published in the *Ann. des Mines*, vol. vii. 1875, p. 259.

ELIJAH (a Hebrew name meaning “Yah[weh] is God”), in the Bible, the greatest and sternest of the Hebrew prophets, makes his appearance in the narrative of the Old Testament with an abruptness not out of keeping with his character and work (1 Kings xvii. 1).[1] The first and most important part of his career lay in the reign of Ahab, *i.e.* during the first half of the 9th century B.C. He is introduced as predicting the drought[2] God was to send upon Israel as a punishment for the apostasy into which Ahab had been led by his heathen wife Jezebel. During the first portion of this period Elijah found a refuge by the brook Cherith, “before the Jordan.” This description leaves it uncertain whether the brook was to the east of Jordan in Elijah's native Gilead, or—less probably—to the west in Samaria. Here he drank of the brook and was fed by ravens, who night and morning brought him bread and flesh.[3] When this had dried up, the prophet betook himself to Zarephath, a Phoenician town near Sidon. At the gate of the town he met the widow to whom he had been sent, gathering sticks for the preparation of what she believed was to be her last meal. She received the prophet with hospitality, sharing with him her all but exhausted store, in faith of his promise in the name of the God of Israel that the supply would not fail so long as the drought lasted. During this period her son died and was miraculously restored to life in answer to the prayers of the prophet (1 Kings xvii. 8-24).

Elijah emerged from his retirement in the third year, when, the famine having reached its worst, Ahab and his minister Obadiah had themselves to search the land for provender for the royal stables. To the latter Elijah suddenly appeared, and announced his intention of showing himself to Ahab. The king met Elijah with the reproach that he was “the troubler of Israel,” which the prophet boldly flung back upon him who had forsaken the commandments of the Lord and followed the Baalim.[4] The retort was accompanied by a challenge—or rather a command—to the king to assemble on Mount Carmel “all Israel” and the four hundred and fifty prophets of Baal. (The four hundred prophets of Asherah have been added later.) From the allusion to an “altar of Jehovah that was broken down” (1 Kings xviii. 30) it has been inferred that Carmel was an ancient sacred place. (On Mount Carmel and Elijah's connexion with it in history and tradition see CARMEL.)

The scene on Carmel is perhaps the grandest in the life of Elijah, or indeed in the whole of the Old Testament. As a typical embodiment for all time of the conflict between superstition and true religion, it is lifted out of the range of mere individual biography into that of spiritual symbolism, and it has accordingly furnished at once a fruitful theme for the religious teacher and a lofty inspiration for the artist. The false prophets were allowed to invoke their god in whatever manner they pleased. The only interruption came in the mocking encouragement of Elijah (1 Kings xviii. 27), a rare instance of grim sarcastic humour occurring in the Bible. Its effect upon the false prophets was to increase their frenzy. The evening came,[5] and the god had made no sign. Elijah now stepped forward with the quiet confidence and dignity that became the prophet and representative of the true God. All Israel is represented symbolically in the twelve stones with which he built the altar; and the water which he poured upon the sacrifice and into the surrounding trench was apparently designed to prevent the suspicion of fraud! In striking contrast to the “vain repetitions” of the false prophets are the simple words with which Elijah makes his prayer to Yahweh. Once only, with the calm assurance of one who knew that his prayer would be answered, he invokes the God of his fathers. The answer comes at once: “The fire of the Lord (Gen. xix. 24, Lev. x. 2) fell and consumed the burnt offering, and the wood, and the stones, and the dust, and licked up the water that was in the trench.” So convincing a sign was irresistible; all the people fell on their faces and acknowledged Yahweh as the true God. This was immediately followed by the destruction of the false prophets, slain by Elijah beside the brook Kishon (xviii. 40). The deed, though not without parallel in the Old Testament history, stamps the peculiarly vindictive character of Elijah's prophetic mission.[6]

On the evening of the day that had witnessed the decisive contest, Elijah proceeded once more to the top of Carmel, and there, with “his face between his knees” (possibly engaged in the prayer referred to in James v. 17 sq.), waited for the long-looked-for blessing. His servant, sent repeatedly to search the sky for signs, returned the seventh time reporting a little cloud arising out of the sea “like a man's hand.” The sky was speedily full of clouds and a great rain was falling when Ahab, to escape the storm, set out in his chariot for Jezreel. As a proof of Elijah's supernatural power, it is stated that the prophet, for some unknown object, ran before the chariot to the entrance of Jezreel, a distance of at least 16 m. On being told what had taken place, Jezebel sent a messenger to Elijah with a vow that ere another day had passed his life would be even as the lives of the prophets of Baal, and the threat was enough to cause him to take to instant flight (xix. 1-3; cp. LXX. in v. 2). The first stage of the journey was to Beersheba, on the southern limits of Judah. Here he left his servant (according to old Jewish tradition, the widow's son of Zarephath, afterwards the prophet Jonah), and proceeded a day's journey into the wilderness. Resting under a solitary broom bush (a kind of *genista*), he gave vent to his disappointment in a prayer for death. By another of those many miraculous interpositions which occur in his history he was twice supplied with food and drink, in the strength of which he journeyed forty days and forty nights until he came to Horeb, where he lodged in a cave.[7] A hole “just large enough for a man's body” (Stanley), immediately below the summit of Jebel Mūsa, is still pointed out by tradition as the cave of Elijah.

If the scene on Carmel is the grandest, that on Horeb is spiritually the most profound in the story of Elijah (xix. 9 sqq.). Not in the strong wind that brake the rocks in pieces, not in the earthquake, not in the fire, but in the still small voice that followed the Lord made himself known. A threefold commission was laid upon him: he was to return to Damascus and anoint Hazael king of Syria; he was to anoint Jehu, the son of Nimshi, as king of Israel in place of Ahab; and as his own successor in the prophetic office he was to anoint Elisha (xix. 15-18).[1]

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[1] The text is uncertain. According to the LXX., he was a native of Tishbeh in Gilead; a more natural reading. Klostermann's conjecture that the original name of his home was Jabesh-Gilead is attractive but unnecessary. His appearance in the narrative, like Melchizedek, “without father, without mother” (Heb. vii. 3), gave rise to various rabbinical traditions, such as that he was Phinehas, the grandson of Aaron, returned to earth, or that he was an angel in human form.

[2] Its duration is vaguely stated; from Luke iv. 25, James v. 17, we learn that it lasted three years and a half; but according to Phoenician tradition (Jos. *Ant.* viii. 13. 2) only one year.

[3] The rationalistic view that the word translated “ravens” should be “Arabians” is improbable. Cheyne's suggestion that the unknown brook Cherith should be placed to the south of Judah agrees with Josephus (*Ant.* viii. 13. 2, “he departed into the southern parts”) and with 1 Kings xix. 3, 8; “Jordan” may refer to another river, if it be not a gloss; see Cheyne, *Ency. Bib.*, *s.v.* “Cherith.”

[4] The sudden introduction of Elijah in xvii. 1 may be accounted for by the supposition that the commencement of the narrative had been omitted by the editor of xvi. 29 sqq. Hence we are not told the cause of Ahab's hostility towards Elijah, nor is the allusion to Jezebel's massacre of the prophets (xviii. 3, 13) explained. It would appear from Obadiah's words in ver. 9 that he himself was in fear of his life. Later tradition supposed he was the captain of 2 Kings i. 13, or that the widow of 2 Kings iv. 1 had been his wife.

[5] The definition of time by the stated oblation (xviii. 29, 36) is very noteworthy (cp. 2 Kings iii. 20).

[6] It is obvious that a purely rationalistic interpretation of the great sign whereby Jahweh manifested himself would be out of place. But there is an interesting parallel in the legend of the kindling of the sacred fire and the igniting of the “thick water” in the time of Nehemiah (2 Macc. i. 18-36). Elsewhere, there were sacred fires kindled by the aid of magical invocations (*e.g.* Hypaepa, Pausanias v. 27. 3).

[7] Yahweh is here supposed to have his seat on the ancient mountain. “It was the God of the Exodus to whom he appealed, the ancient King of Israel in the journeyings through the wilderness.” For the cave, cp. Ex. xxxiii. 22.

Leaving Horeb and proceeding northwards along the desert route to Damascus, Elijah met Elisha engaged at the plough probably near his native place, Abel-meholah, in the valley of the Jordan, and by the symbolical act of casting his mantle upon him, consecrated him to the prophetic office. This was the only command of the three which he fulfilled in person; the other two were carried out by his successor.[2] After the call of Elisha the narrative contains no notice of Elijah for several years, although the LXX., by placing 1 Kings xxi. before ch. xx., proceeds at once to the tragic story of Naboth's vineyard (see Jezebel). He is now the champion of freedom and purity of life, like Nathan when he confronted David for the murder of Uriah. Without any indication of whence or how he came, he again appeared, as usual with startling abruptness, in the vineyard when Ahab entered to take possession of it, and pronounced upon the king and his house that awful doom (1 Kings xxi. 17-24) which, though deferred for a time, was ultimately fulfilled to the letter (see Jehu).

With one more denunciation of the house of Ahab, Elijah's function as a messenger of wrath was fully discharged (2 Kings i.). When Ahaziah, the son of Ahab, having injured himself by falling through a lattice, sent to inquire of Baal-zebub, the god of Ekron, whether he should recover, the prophet was commanded to appear to the messengers and tell them that, for this resort to a false god, the king should die. The effect of his appearance was such that they turned back without attempting to fulfil their errand. Ahaziah despatched a captain with a band of fifty to arrest him. They came upon Elijah seated on "the mount,"—probably Carmel. The imperious terms in which he was summoned to come down were punished by fire from heaven, which descended at the bidding of Elijah and consumed the whole land. A second captain and fifty were despatched, behaved in a similar way, and met the same fate. The leader of a third troop took a humbler tone, sued for mercy, and obtained it. Elijah then went with them to the king, but only to repeat before his face the doom he had already made known to his messengers, which was almost immediately afterwards fulfilled. The spirit, even the style of this narrative, points unmistakably to its being of late origin. It shocks the moral sense with its sanguinary character more than, perhaps, any other Old Testament story.

The only mention of Elijah's name in the book of Chronicles (2 Chronicles xxi. 12-15) is where he is represented as sending a letter of rebuke and denunciation to Jehoram, son of Jehoshaphat, king of Judah. The chronological difficulties which are involved suggest that the floating traditions of this great personality were easily attached to well-known names whether strictly contemporary or not. It was before the death of Jehoshaphat that the last grand scene in Elijah's life occurred (2 Kings ii., see iii. 1). He had taken up his residence with Elisha at one of the prophetic guilds at Gilgal. His approaching end seems to have been known to the guilds at Bethel and Jericho, both of which they visited in their last journey. At the Jordan, Elijah, wrapping his prophet's mantle together, smote the water with it, and so by a last miracle passed over on dry ground. When they had crossed the master desired the disciple to ask some parting blessing. The request for a double portion (*i.e.* probably a first-born's portion, Deut. xxi. 17)[3] of the prophet's spirit Elijah characterized as a hard thing; but he promised to grant it if Elisha should see him when he was taken away. The end is told in words of simple sublimity: "And it came to pass, as they still went on and talked, that, behold, there appeared a chariot of fire, and horses of fire, which parted them both asunder; and Elijah went up by a whirlwind into heaven" (2 Kings ii. 11). It is scarcely necessary to point out, however, that through the figure the narrative evidently means to convey as fact that Elijah passed from earth, not by the gates of death, but by miraculous translation. Such a supernatural close is in perfect harmony with a career into every stage of which the supernatural enters as an essential feature. For whatever explanation may be offered of the miraculous element in Elijah's life, it must obviously be one that accounts not for a few miraculous incidents only, which might be mere excrescences, but for a series of miraculous events so closely connected and so continuous as to form the main thread of the history.

Elijah occupied an altogether peculiar place in later Jewish history and tradition. For the general belief that he should return for the restoration of Israel cf. Mal. iv. 5-6; Matt. xi. 14, xvi. 14; Luke ix. 8; John i. 21, and on the development of the thought see Bousset, *Antichrist, s.v.*, and the *Jewish Encyc.* vol. v. p. 126. In Mahommedan tradition Elijah is the everlasting youthful el-Khidr or el-Khadir.

Elijah is canonized both in the Greek and in the Latin Churches, his festival being kept in both on the 20th July—the date of his ascension in the nineteenth year of Jehoshaphat, according to Cornelius a Lapide. The natural and most reliable estimate of the career of Elijah is that which is based upon a critical examination of the narratives; see, in addition to Robertson Smith, *Prophets of Israel* (2), pp. 75 sqq., Cheyne, *Hallowing of Criticism*, the articles by Addis in *Encyc. Bib.*; and J. Strachan, Hastings' *Dict. Bib.*, H. Gunkel, *Elias*, *Yahve u. Baal* (Tübingen, 1906), the literature to Kings, Books of, and the histories referred to in Jews. There is difference of opinion as to the historical importance of both Elijah and Elisha; for a useful summary of views, as also for fuller bibliographical information, see W. R. Harper, *Amos and Hosea* (*Internat. Crit. Comm.*), pp. xxxiv.-xlix., and article Hebrew Religion.

(W. R. S.; S. A. C.)

ELIJAH WILNA, or Elijah ben Solomon, best known as the Gaon Elijah of Wilna (1720–1797), a noted Talmudist who hovered between the new and the old schools of thought. Orthodox in practice and feeling, his critical treatment of the rabbinic literature prepared the way for the scientific investigations of the 19th century. As a teacher he was one of the first to discriminate between the various strata in rabbinic records; to him was due the revival of interest in the older Midrash (*q.v.*) and in the Palestinian Talmud (*q.v.*), interest in which had been weak for some centuries before his time. He was an ascetic, and was a keen opponent of the emotional mysticism which was known as the new Hassidism.

See S. Schechter's *Studies in Judaism* (London, 1896). His voluminous writings are classified in the *Jewish Encyclopedia*, v. 134.

(I. A.)

ELIOT, CHARLES WILLIAM (1834–   ), American educationalist, the son of Samuel Atkins Eliot (1798–1862), mayor of Boston, representative in Congress, and in 1842–1853 treasurer of Harvard, was born in Boston on the 20th of March 1834. He graduated in 1853 at Harvard College, where he was successively tutor (1854–1858) and assistant professor of chemistry (1858–1863). He studied chemistry and foreign educational methods in Europe in 1863–1865, was professor of analytical chemistry in the newly established Massachusetts Institute of Technology (1865–1869), although absent fourteen months in Europe in 1867–1868; and in 1869 was elected president of Harvard University, a choice remarkable at once for his youth and his being a layman and scientist. With Johns Hopkins University, Harvard, in his presidency, led in the work of efficient graduate schools. Its elective system, which has spread far, although not originated by President Eliot, was thoroughly established by him, and is only one of many radical changes which he championed with great success. The raising of entrance requirements, which led to a corresponding raising of the standards of secondary schools, and the introduction of an element of choice in these entrance requirements, which allowed a limited election of studies to secondary pupils, became national tendencies primarily through President Eliot's potent influence. As chairman of a national Committee of Ten (1890) on secondary school studies, he urged the abandonment of brief disconnected "information" courses, the correlation of subjects taught, the equal rank in college requirements of subjects in which equal time, consecutiveness and concentration were demanded, and a more thorough study of English composition; and to a large degree he secured national sanction for these reforms and their working out by experts into a practicable and applicable system. He laboured to unify the entire educational system, minimize prescription, cast out monotony, and introduce freedom and enthusiasm; and he emphasized the need of special training for special work. He was first to suggest (1894) co-operation by colleges in holding common entrance examinations throughout the country, and it was largely through his efforts that standards were so approximated that this became possible. He contended that secondary schools maintained by public funds should shape their courses for the benefit of students whose education goes no further than such high schools, and not be mere training schools for the universities. His success as administrator and man of affairs and as an educational reformer made him one of the great figures of his time, in whose opinions on any topic the deepest interest was felt throughout the country. In November 1908 he resigned the presidency of Harvard, and retired from the position early in 1909, when he was succeeded by Professor Abbott Lawrence Lowell. In December 1908 he was elected president of the National Civil Service Reform League.

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[1] The theophany is clearly no rebuke to an impatient prophet, nor a lesson that the kingdom of heaven was to be built up by the slow and gentle operation of spiritual forces. It expresses the spirituality of Yahweh in a way that indicates a marked advance in the conception of his nature. See Skinner, *Century Bible*, "Kings," *ad loc.*

[2] The geographical indications imply that in one account the journey to Damascus and the anointing of Hazael and Jehu must have intervened, and were omitted because another account ascribed these acts to Elisha (2 Kings viii. ix.). In the latter we possess a more historical account of the anointing of Jehu, and Robertson Smith observes: "When the history in 1 Kings represents Elijah as personally commissioned to inaugurate [the revolution] by anointing Jehu and Hazael as well as Elisha, we see that the author's design is to gather up the whole contest between Yahweh and Baal in an ideal picture of Elijah and his work" (*Ency. Brit.* (9) art. Kings, vol. xiv. p. 85).

[3] Understood in Eccles. xlviii. 12 (Heb.) to mean that Elisha was *twice as great* as Elijah.

His writings include *The Happy Life* (1896); *Five American Contributions to Civilization, and Other Essays and Addresses* (1897); *Educational Reform, Essays and Addresses 1869–1897* (1898); *More Money for the Public Schools* (1903); *Four American Leaders* (1906), chapters on Franklin, Washington, Channing and Emerson; *University Administration* (1908); and with F. H. Storer, a *Compendious Manual of Qualitative Chemical Analysis* (Boston, 1869; many times reissued and revised). His annual reports as President of Harvard were notable contributions to the literature of education in America, and he delivered numerous public addresses, many of which have been reprinted.

See "President Eliot's Administration," by different hands, a summary of his work at Harvard in 1869–1894, in *The Harvard Graduates' Magazine*, vol. 2, pp. 449-504 (Boston, Mass., 1894); and E. Kuhnemann, *Charles W. Eliot, President of Harvard* (Boston, 1909).

His son, Charles Eliot (1859–1897), graduated at Harvard in 1882, studied landscape architecture at the Bussey Institution of Harvard and in Europe, successfully urged the incorporation of the Massachusetts Trustees of Public Reservations (1891) and of the Metropolitan Park Commission (1892) of Boston, became landscape architect to the Metropolitan Park Commission in 1892, and in 1893, with F. L. Olmsted and J. C. Olmsted, formed the firm of Olmsted, Olmsted & Eliot, which was employed by the Metropolitan Commission. His life was written by his father, *Charles Eliot, Landscape Architect* (Boston, 1902).

ELIOT, GEORGE, the pen-name of the famous English writer, *née* Mary Ann (or Marian) Evans (1819–1880), afterwards Mrs J. W. Cross, born at Arbury Farm, in Warwickshire, on the 22nd of November 1819. Her father, Robert Evans, was the agent of Mr Francis Newdigate, and the first twenty-one years of the great novelist's life were spent on the Arbury estate. She received an ordinary education at respectable schools till the age of seventeen, when her mother's death, and the marriage of her elder sister, called her home in the character of housekeeper. This, though it must have sharpened her sense, already too acute, of responsibility, was an immense advantage to her mind, and, later, to her career, for, delivered from the tiresome routine of lessons and class-work, she was able to work without pedantic interruptions at German, Italian and music, and to follow her unusually good taste in reading. The life, inasmuch as she was a girl still in her teens, was no doubt monotonous, even unhappy. Just as Cardinal Newman felt, with such different results, the sadness and chain of evangelical influences from his boyhood till the end of his days, so Marian Evans was subdued all through her youth by a severe religious training which, while it pinched her mind and crushed her spirit, attracted her idealism by the very hardness of its perfect counsels. It is not surprising to find, therefore, that when Mr Evans moved to Coventry in 1841, and so enlarged the circle of their acquaintance, she became much interested in some new friends, Mr and Mrs Charles Bray and Mr Charles Hennell. Mr Bray had literary taste and wrote works on the *Education of the Feelings*, the *Philosophy of Necessity*, and the like. Mr Hennell had published in 1838 *An Enquiry concerning the Origin of Christianity*. Miss Evans, then twenty-two, absorbed immediately these unexpected, and, at that time, daring habits of thought. So compelling was the atmosphere that it led to a complete change in her opinions. Kind in her affection, she was relentless in argument. She refused to go to church (for some time, at least), wrote painful letters to a former governess—the pious Miss Lewis—and barely avoided an irremediable quarrel with her father, a churchman of the old school. Here was rebellion indeed. But rebels come, for the most part, from the provinces where petty tyranny, exercised by small souls, show the scheme of the universe on the meanest possible scale. George Eliot was never orthodox again; she abandoned, with fierce determination, every creed, and although she passed, later, through various phases, she remained incessantly a rationalist in matters of faith and in all other matters. It is nevertheless true that she wrote admirably about religion and religious persons. She had learnt the evangelical point of view; she knew—none better—the strength of religious motives; vulgar doubts of this fact were as distasteful to her as they were to another eminent writer, to whom she refers in one of her letters (dated 1853) as "a Mr Huxley, who was the centre of interest" at some "agreeable evening." Her books abound in tributes to Christian virtue, and one of her own favourite characters was Dinah Morris in *Adam Bede*.

She undertook, about the beginning of 1844, the translation of Strauss's *Leben Jesu*. This work, published in 1846, was considered scholarly, but it met, in the nature of things, with no popular success. On the death of Mr Evans in 1849, she went abroad for some time, and we hear of no more literary ventures till 1851, when she accepted the assistant-editorship of the *Westminster Review*. For a while she had lodgings at the offices of that publication in the Strand, London. She wrote several notable papers, and became acquainted with many distinguished authors of that period—among them Herbert Spencer, Carlyle, Harriet Martineau, Francis Newman and George Henry Lewes. Her friendship with the last-named led to a closer relationship which she regarded as a marriage. Among the many criticisms passed upon this step (in view of the fact, among other considerations, that Lewes had a wife living at the time), no one has denied her courage in defying the law, or questioned the quality of her tact in a singularly false position. That she felt the deepest affection for Lewes is evident; that we owe the development of her genius to his influence and constant sympathy is all but certain. Yet it is also sure that what she gained from his intimate companionship was heavily paid for in the unceasing consciousness that most people thought her guilty of a grave mistake, and found her written words, with their endorsement of traditional morality, wholly at variance with the circumstances of her private life. Doubts of her suffering in this respect will be at once dismissed after a study of her journal and letters. Stilted and unnatural as these are to a tragic degree, one can read well enough between the lines, and also in the elaborate dedication of each manuscript to "my husband" (in terms of the strongest love), that self-repression, coupled with audacity, does not make for peace. Her sensitiveness to criticism was extreme; a flippant paragraph or an illiterate review with regard to her work actually affected her for days. The whole history of her union with Lewes is a complete illustration of the force of sheer will—in that case partly her own and not inconsiderably his—over a nature essentially unfitted for a bold stand against attacks. At first she and the man whom she had described "as a sort of miniature

Mirabeau in appearance," went abroad to Weimar and Berlin, but they returned to England the same year and settled, after several moves, in lodgings at East Sheen.

In 1854 she published *The Essence of Christianity*, a translation from Feuerbach, a philosopher to whom she had been introduced by Charles Bray. During 1855 she translated Spinoza's *Ethics*, wrote articles for the *Leader*, the *Westminster Review*, and the *Saturday Review*—then a new thing. It was not until the following year that she attempted the writing of fiction, and produced *The Sad Fortunes of the Reverend Amos Barton*—the first of the *Scenes of Clerical Life*. These, published in *Blackwood's Magazine*, were issued in two volumes in 1858. The press in general extended a languid welcome to this work, and although the author received much encouragement from private sources, notably from Charles Dickens, the critics were mostly non-committal, and it was not until the publication of *Adam Bede* in 1859 that enthusiasm was attracted to the quality of the earlier production. *Adam Bede*, in the judgment of many George Eliot's masterpiece, met with a success (in her own words) "triumphantly beyond anything she had dreamed of." In 1860 appeared *The Mill on the Floss*. After the sensational good fortune of *Adam Bede*, the criticism applied to the new novel seems to have been disappointing. We find Miss Evans telling her publisher that "she does not wish to see any newspaper articles." But the book made its way, and prepared an ever-growing army of readers for *Silas Marner* (1861), *Romola* (1862–1863), and *Felix Holt* (1866).

Silas Marner shows a reversion to her early manner—the manner of *Scenes of Clerical Life*. *Romola*, which is what is called an historical novel, owes it vitality not to the portraits of Savonarola or of the heroine, or to its vigorous pictures of Florentine life in the 15th century, but to its superb presentment of the treacherous, handsome Tito Melema, who belongs not to any one period but to every generation. *Felix Holt*, a novel dealing with political questions, is strained by a painfulness too severe for any reader's pleasure. Where other eminent authors have produced mechanical books, or books which were mere repetitions of their most popular effort, she erred only on the side of the ponderous and the distressing. *Felix Holt* is both, and it is the only one of her novels which lacks an unforgettable human note. *The Spanish Gypsy* (1868), a drama in blank verse, received more public response than most compositions of the kind executed by those connected with the drama or with poetry only; and she published in 1874 another volume of verses, *The Legend of Jubal and other Poems*.

Any depression which the author may have felt with regard to the faults found with some of the last-named books was completely cured by the praise bestowed on *Middlemarch* (1872). This profound study of certain types of English character was supreme at the time of its writing, and it remains supreme, of its school, in European literature. Thackeray is brilliant; Tolstoi is vivid to a point where life-likeness overwhelms any consideration of art; Balzac created a whole world; George Eliot did not create, but her exposition of the upper and middle class minds of her day is a masterpiece of scientific psychology. *Daniel Deronda* (1876), a production on the same lines, was less satisfactory. It exhibited the same human insight, the passionate earnestness, the insinuated special pleading for hard cases, the same intellectual strength, but the subject was unwieldy, almost forbidding, and, as a result, the novel, in spite of its distinction, has never been thoroughly liked. The death of Mr Lewes in 1878 was also the death-blow to her artistic vitality. She corrected the proofs of *Theophrastus Such* (a collection of essays), but she wrote no more. About two years later, however, she married Mr J. W. Cross, a gentleman whose friendship was especially congenial to a temperament so abnormally dependent on affectionate understanding as George Eliot's. But she never really recovered from her shock at the loss of George Lewes, and died at 4 Cheyne Walk, Chelsea, on the 22nd of December 1880.

No right estimate of her, whether as a woman, an artist or a philosopher, can be formed without a steady recollection of her infinite capacity for mental suffering, and her need of human support. The statement that there is no sex in genius, is on the face of it, absurd. George Sand, certainly the most independent and dazzling of all women authors, neither felt, nor wrote, nor thought as a man. Saint Teresa, another great writer on a totally different plane, was pre-eminently feminine in every word and idea. George Eliot, less reckless, less romantic than the Frenchwoman, less spiritual than the Spanish saint, was more masculine in style than either; but her outlook was not, for a moment, the man's outlook; her sincerity, with its odd reserves, was not quite the same as a man's sincerity, nor was her humour that genial, broad, unequivocal humour which is peculiarly virile. Hers approximated, curiously enough, to the satire of Jane Austen, both for its irony and its application to little everyday affairs. Men's humour, in its classic manifestations, is on the heroic rather than on the average scale: it is for the uncommon situations, not for the daily tea-table.

Her method of attacking a subject shows the influence of Jane Austen, especially in parts of *Middlemarch*; one can detect also the stronger influence of Mrs Gaskell, of Charlotte Brontë, and of Miss Edgeworth. It was, however, but an influence, and no more than a man writer, anxious to acquire a knowledge of the feminine point of view, might have absorbed from a study of these women novelists. One often hears that she is not artistic; that her characterization is less distinct than Jane Austen's; that she tells more than should be known of her heroes and heroines. But it should be remembered that Jane Austen dealt with familiar domestic types, whereas George Eliot excelled in the presentation of extraordinary souls. One woman drew members of polite society with correct notions, while the other woman depicted social rebels with ideas and ideals. In every one of George Eliot's books, the protagonists, tortured by dreams of perfection, are in revolt against the prudent compromises of the worldly. All through her stories, one hears the clash of "the heroic for earth too high," and the desperate philosophy, disguised it is true, of Omar Khayyam. In her day, Epicureanism had not reached the life of the people, nor passed into the education of the mob. Few dared to confess that the pursuit of pleasure, whether real or imagined, was the aim of mankind. The charm of Jane Austen is the charm of the untroubled and well-to-do materialist, who sees in a rich marriage, a comfortable house, carriages and an assured income the best to strive for; and in a fickle lover of either sex or the loss of money the severest calamities which can befall the human spirit. Jane Austen despised the greater number of her characters: George Eliot suffered with each of hers. Here, perhaps, we find the reason why she is accused of being inartistic. She could not be impersonal.

Again, George Eliot was a little scornful to those of both sexes who had neither special missions nor the consciousness of this deprivation. Men are seldom in favour of missions in any field. She demanded, too strenuously from the very beginning, an aim, more or less altruistic, from every individual; and as she advanced in life this claim became the more imperative, till at last it overpowered her art; and transformed a great delineator of humanity into an eloquent observer with far too many personal prejudices. But she was altogether free from cynicism, bitterness, or the least tendency to pride of intellect. She suffered from bodily weakness the greater part of her life, and, but for an extraordinary mental health—inherited from the fine yeoman stock from which she sprang—it is impossible that she could have retained, at all times, so sane a view of human conduct, or been the least sentimental among women writers of the first rank—the one wholly without morbidity in any disguise. The accumulation of mere book knowledge, as opposed to the friction of a life spent among all sorts and conditions of men, drove George Eliot at last to write as a specialist for specialists: joy was lost in the consuming desire for strict accuracy: her genius became more and more speculative, less and less emotional. The highly trained brain suppressed the impulsive heart,—the heart described with such candour and pathos as Maggie Tulliver's in *The Mill on the Floss*. For this reason—chiefly because philosophy is popularly associated with inactive depression, whereas human nature is held to be eternally exhilarating—her later works have not received so much praise as her earlier productions. But one has only to compare *Romola* or *Daniel Deronda* with the compositions of any author except herself to realize the greatness of her designs, and the astonishing gifts brought to their final accomplishment.

See also the *Life of George Eliot*, edited by J. W. Cross (3 vols., 1885–1887); *George Eliot*, by Sir Leslie Stephen, in the "English Men of Letters" series (1902); by Oscar Browning, "Great Writers" series (1890), with a bibliography by J. P. Anderson; by Mathilde Blind, "Eminent Women" series, a new edition of which also contains a bibliography (Boston, Mass., 1904). (P. M. T. C.)

ELIOT, SIR JOHN (1592–1632), English statesman, son of Richard Eliot, a member of an old Devonshire family lately settled in Cornwall, was born at his father's seat at Port Eliot in Cornwall in 1592. He matriculated at Exeter College, Oxford, on the 4th of December 1607, and leaving the university after a residence of three years he studied law at one of the inns of court. He also spent some months travelling in France, Spain and Italy, in company, for part of the time, with young George Villiers, afterwards duke of Buckingham. He was only twenty-two when he began his parliamentary career as member for St Germans in the "addled parliament" of 1614. In 1618 he was knighted, and next year through the patronage of Buckingham he obtained the appointment of vice-admiral of Devon, with large powers for the defence and control of the commerce of the county. It was not long before the characteristic energy with which he performed the duties in his office involved him in difficulties. After many attempts, in 1623 he succeeded by a clever but dangerous manœuvre in entrapping the famous pirate John Nutt, who had for years infested the southern coast, inflicting immense damage upon English commerce. The issue is noteworthy. The pirate, having a powerful protector at court in Sir George Calvert, the secretary of state, was pardoned; while the vice-admiral, upon charges which could not be substantiated, was flung into the Marshalsea, and detained there nearly four months.

A few weeks after his release Eliot was elected member of parliament for Newport (February 1624). On the 27th of February he delivered his first speech, in which he at once revealed his great powers as an orator, demanding boldly that the liberties and privileges of parliament, repudiated by James I. in the former parliament, should be secured. In the first parliament of Charles I., in 1625, he urged the enforcement of the laws against the Roman Catholics. Meanwhile he had continued the friend and supporter of Buckingham and greatly approved of the war with Spain. Buckingham's incompetence, however, and the bad faith with which both he and the king continued to treat the parliament, alienated Eliot completely from the administration. Distrust of his former friend quickly grew in Eliot's excitable mind to a certainty of his criminal ambition and treason to his country. Returned to the parliament of 1626 as member for St Germans, he found himself, in the absence of other chiefs of the opposition whom the king had secured by nominating them sheriffs, the leader of the House. He immediately demanded an inquiry into the recent disaster at Cadiz. On the 27th of March he made an open and daring attack upon Buckingham and his evil administration. He was not intimidated by the king's threatening intervention on the 29th, and persuaded the House to defer the actual grant of the subsidies and to present a remonstrance to the king, declaring its right to examine the conduct of ministers. On the 8th of May he was one of the managers who carried Buckingham's impeachment to the Lords, and on the 10th he delivered the charges against him, comparing him in the course of his speech to Sejanus. Next day Eliot was sent to the Tower. On the Commons declining to proceed with business as long as Eliot and Sir Dudley Digges (who had been imprisoned with him) were in confinement, they were released, and parliament was dissolved on the 15th of June. Eliot was immediately dismissed from his office of vice-admiral of Devon, and in 1627 he was again imprisoned for refusing to pay a forced loan, but liberated shortly before the assembling of the parliament of 1628, to which he was returned as member for Cornwall. He joined in the resistance now organized to arbitrary taxation, was foremost in the promotion of the Petition of Right, continued his outspoken censure of Buckingham, and after the latter's assassination in August, led the attack in the session of 1629 on the ritualists and Arminians.

In February the great question of the right of the king to levy tonnage and poundage came up for discussion; and on the king ordering an adjournment of parliament, the speaker, Sir John Finch, was held down in the chair while Eliot's resolutions against illegal taxation and innovations in religion were read to the House by Holles (*q.v.*). In consequence, Eliot, with eight other members, was imprisoned on the 4th of March in the Tower. He refused to answer in his examination, relying on his privilege of parliament, and on the 29th of October was removed to the Marshalsea. On the 26th of January he appeared at the bar of the king's bench, with Holles and Valentine, to answer a charge of conspiracy to resist the king's order, and refusing to acknowledge the jurisdiction of the court he was fined £2000 and ordered to be imprisoned during the king's pleasure and till he had made submission. This he steadfastly refused. While some of the prisoners appear to have had certain liberty allowed to them, Eliot's confinement in the Tower was made exceptionally severe. Charles's anger had been from the first directed chiefly against him, not only as his own political antagonist but as the prosecutor and bitter enemy of Buckingham; "an outlawed man," he described him, "desperate in mind and fortune."

Eliot languished in prison for some time, during which he wrote several works, his *Negotium posterorum*, an account of the parliament in 1625; *The Monarchie of Man*, a political treatise; *De jure majestatis, a Political Treatise of Government*; and *An Apology for Socrates*, his own defence. In the spring of 1632 he fell into a decline. In October he petitioned Charles for permission to go into the country, but leave could only be obtained at the price of submission, and was finally refused. He died on the 27th of November 1632. When his son requested permission to move the body to Port Eliot, Charles, whose resentment still survived, returned the curt refusal: "Let Sir John Eliot be buried in the church of that parish where he died." The manner of Eliot's death, not without suspicion of foul play, and as the result of the king's implacability and the severe treatment to which he had been subjected, had more effect, probably, than any other single incident in embittering and precipitating the dispute between king and parliament; and the tragic sacrifice of a man so gifted and patriotic, and actuated originally by no antagonistic feeling against the monarchy or the church, is the surest condemnation of the king's policy and administration. Eliot was essentially a great orator, inspired by enthusiasm and high ideals, which he was able to communicate to his hearers by his eloquence, but, like Chatham afterwards, he had not only the gifts but the failings of the orator, was incapable of well-reasoned and balanced judgment, and, though one of the greatest personalities of the time, was inferior to Pym both as a party leader and as a statesman.

Eliot married Rhadagund, daughter of Richard Gedie of Trebursye in Cornwall, by whom he had five sons, from the youngest of whom Nicholas the present earl of St Germans is descended, and four daughters.

The *Life of Sir J. Eliot*, by J. Forster (1864), is supplemented and corrected by Gardiner's *History of England*, vols. v.-vii., and the article in the *Dict. of Nat. Biog.*, by the same author. Eliot's writings, together with his Letter-Book, have been edited by Dr Grosart.

ELIOT, JOHN (1604–1690), American colonial clergyman, known as the "Apostle to the Indians," was born probably at Widford, Hertfordshire, England, where he was baptized on the 5th of August 1604. He was the son of Bennett Eliot, a middle-class farmer. Little is known of his boyhood and early manhood except that he took his degree of B.A. at Jesus College, Cambridge, in 1622. It seems probable that he entered the ministry of the Established Church, but there is nothing definitely known of him until 1629–1630, when he became an usher or assistant at the school of the Rev. Thomas Hooker, at Little Baddow, near Chelmsford. The influence of Hooker apparently determined him to become a Puritan, but his connexion with the school ceased in 1630, when Laud's persecutions drove Hooker into exile. The realization of the difficulties in the way of a nonconforming clergyman in England undoubtedly determined Eliot to emigrate to America in the autumn of 1631, where he settled first at Boston, assisting for a time at the First Church. In November 1632 he became "teacher" to the church at Roxbury, with which his connexion lasted until his death. There he married Hannah Mulford, who had been betrothed to him in England, and who became his constant helper. In the care of the Roxbury church he was associated with Thomas Welde from 1632 to 1641, with Samuel Danforth (1626–1674) from 1649 to 1674, and with Nehemiah Walter (1663–1750) from 1688 to 1690.

Inspired with the idea of converting the Indians, his first step was to perfect himself in their dialects, which he did by the assistance of a young Indian whom he received into his home. With his aid he translated the Ten Commandments and the Lord's Prayer. He first successfully preached to the Indians in their own tongue at Nonantum (Newton) in October 1646. At the third meeting several Indians declared themselves converted, and were soon followed by many others. Eliot induced the Massachusetts General Court to set aside land for their residence, the same body also voting him £10 to prosecute the work, and directing that two clergymen be annually elected by the clergy as preachers to the Indians. As soon as the success of Eliot's endeavours became known, the necessary funds flowed in upon him from private sources in both Old and New England. In July 1649 parliament incorporated the "Society for the Propagation of the Gospel in New England," which henceforth supported and directed the work inaugurated by Eliot. The first appeal for aid brought contributions of £11,000. In 1651 the Christian Indian town founded by Eliot was removed from Nonantum to Natick, where residences, a meeting-house, and a school-house were erected, and where Eliot preached, when able, once in every two weeks as long as he lived. To this community Eliot applied a plan of government by means of tens, fifties and hundreds, which he subsequently advocated as suitable for all England. Eliot's missionary labours encouraged others to follow in his footsteps. A second town under his direction was established at Ponkapog (Stoughton) in 1654, in which he had the assistance of Daniel Gookin (*c.* 1612–1687). His success was duplicated in Martha's Vineyard and Nantucket by the Mayhews, and by 1674 the unofficial census of the "praying Indians" numbered 4000. King Philip's War (1675–76) was a staggering blow to all missionary enterprise; and although few of the converted Indians proved disloyal, it was some years before adequate support could again be enlisted. Yet at Eliot's death, which occurred at Roxbury on the 21st of May 1690, the missions were at the height of their prosperity, and that the results of his labours were not permanent was due only to the racial traits of the New England tribes.

Of wider influence and more lasting value than his personal labours as a missionary was Eliot's work as a translator of the Bible and various religious works into the Massachusetts dialect of the Algonquian language. The first work completed was the *Catechism*, published in 1653 at Cambridge, Massachusetts, the first book to be printed in the Indian tongue. Several years elapsed before Eliot completed his task of translating the Bible. The New Testament was at last issued in 1661, and the Old Testament followed two years later. The New Testament was bound with it, and thus the whole Bible was completed. To it were added a Catechism and a metrical version of the Psalms. The title of this Bible, now a great rarity, is *Mamussee Wunneetupanatamwe Up-Biblum God naneeswe Nukkone Testament kah wonk Wusku Testament-Ne quoshkinnumuk nashpe Wuttinneumoh Christ noh assoowesit John Eliot*; literally translated, "The Whole Holy His-Bible God, both Old Testament and also New Testament. This turned by the-servant-of-Christ, who is called John Eliot."

This book was printed in 1663 at Cambridge, Mass., by Samuel Green and Marmaduke Johnson, and was the first Bible printed in America. In 1685 appeared a second edition, in the preparation of which Eliot was assisted by the Rev. John Cotton (1640–1699), the younger, of Plymouth, who also had a wide knowledge of the Indian tongue.

Besides his Bible, Eliot published at Cambridge in 1664 a translation of Baxter's *Call to the Unconverted*, and in 1665 an abridged translation of Bishop Bayly's *Practice of Piety*. With the assistance of his sons he completed (1664) his well-known *Indian Grammar Begun*, printed at Cambridge, Massachusetts, in 1666. It was reprinted in vol. ix. of the *Collections of the Massachusetts Historical Society*. *The Indian Primer*, comprising an exposition of the Lord's Prayer and a translation of the *Larger Catechism*, was published at Cambridge in 1669, and was reprinted under the editorial superintendence of Mr John Small of the university of Edinburgh in 1877. In 1671 Eliot printed in English a little volume entitled *Indian Dialogues*, followed in 1672 by his *Logick Primer*, both of which were intended for the instruction of the Indians in English. His last translation was Thomas Shepard's *Sincere Convert*, completed and published by Grindal Rawson in 1689. Eliot's literary activity, however, extended into other fields than that of Indian instruction. He was, with Richard Mather, one of the editors of the *Bay Psalm Book* (1640). Several tracts written wholly or in part by him in the nature of reports to the society which supported his missions were published at various times in England. In 1660 he published a curious treatise on government entitled *The Christian Commonwealth*, in which he found the ideal of government in the ancient Jewish state, and proposed the reorganization of the English government on the basis of a numerical subdivision of the inhabitants. His *Harmony of the Gospels* (1678) was a life of Jesus Christ.

Bibliography.—An account of Eliot's life and work is contained in Williston Walker's *Ten New England Leaders* (New York, 1901). There is a "Life of John Eliot," by Convers Francis, in *Sparks' American Biography*, vol. v. (New York, 1853); another by N. Adams (Boston, 1847); and a sketch in Cotton Mather's *Magnalia* (London, 1702). For a good account of his publications in the Indian language see the chapter on "The Indian Tongue and its Literature," by J. H. Trumbull, in vol. i. of the *Memorial History of Boston* (1882). (W. Wr.)

ELIS, or Eleia, an ancient district of southern Greece, bounded on the N. by Achaea, E. by Arcadia, S. by Messenia, and W. by the Ionian Sea. The local form of the name was Valis, or Valeia, and its meaning, in all probability, "the lowland." In its physical constitution Elis is practically one with Achaea and Arcadia; its mountains are mere offshoots of the Arcadian highlands, and its principal rivers are fed by Arcadian springs. From Erymanthus in the north, Skollis (now known as Mavri and Santameri in different parts of its length) stretches toward the west, and Pholoe along the eastern frontier; in the south a prolongation of Mount Lycaeon bore in ancient times the names of Minthe and Lapithus, which have given place respectively to Alvena and to Kaiapha and Smerna. These mountains are well clothed with vegetation, and present a soft and pleasing appearance in contrast to the picturesque wildness of the parent ranges. They gradually sink towards the west and die off into what was one of the richest alluvial tracts in the Peloponnesus. Except where it is broken by the rocky promontories of Chelonatas (now Chlemutzi) and Ichthys (now Katakolo), the coast lies low, with stretches of sand in the north and lagoons and marshes towards the south. During the summer months communication with the sea being established by means of canals, these lagoons yield a rich harvest of fish to the inhabitants, who at the same time, however, are almost driven from the coast by the swarms of gnats. The district for administrative purposes forms part of the nome of Elis and Achaea (see Greece).

Elis was divided into three districts—Hollow or Lowland Elis (ἡ κοίλη Ἦλις), Pisatis, or the territory of Pisa, and Triphylia, or the country of the three tribes. (1) *Hollow Elis*, the largest and most northern of the three, was watered by the Peneus and its tributary the Ladon, whose united stream forms the modern Gastouni. It included not only the champaign country originally designated by its name, but also the mountainous region of Acrorea, occupied by the offshoots of Erymanthus. Besides the capital city of Elis, it contained Cyllene, an Arcadian settlement on the sea-coast, whose inhabitants worshipped Hermes under the phallic symbol; Pylus, at the junction of the Peneus and the Ladon, which, like so many other places of the same name, claimed to be the city of Nestor, and the fortified frontier town of Lasion, the ruins of which are still visible at Kuti, near the village of Kumani. The district was famous in antiquity for its cattle and horses; and its byssus, supposed to have been introduced by the Phoenicians, was inferior only to that of Palestine. (2) *Pisatis* extended south from Hollow Elis to the right bank of the Alpheus, and was divided into eight departments called after as many towns. Of these Salmone, Heraclea, Cicysion, Dyspontium and Harpina are known—the last being the reputed burial-place of Marmax, the suitor of Hippodamia. From the time of the early investigators it has been disputed whether Pisa, which gave its name to the district, has ever been a city, or was only a fountain or a hill. By far the most important spot in Pisatis was the scene of the great Olympic games, on the northern bank of the Alpheus (see OLYMPIA). (3) *Triphylia* stretches south from the Alpheus to the Neda, which forms the boundary towards Messenia. Of the nine towns mentioned by Polybius, only two attained to any considerable influence—Lepreum and Macistus, which gave the names of Lepreatis and Macistia to the southern and northern halves of Triphylia. The former was the seat of a strongly independent population, and continued to take every opportunity of resisting the supremacy of the Eleans. In the time of Pausanias it was in a very decadent condition, and possessed only a poor brick-built temple of Demeter; but considerable remains of its outer walls are still in existence near the village of Strovitzi, on a part of the Minthe range.

The original inhabitants of Elis were called Caucones and Paroreatae. They are mentioned for the first time in Greek history under the title of Epeians, as setting out for the Trojan War, and they are described by Homer as living in a state of constant hostility with their neighbours the Pylians. At the close of the 11th century B.C. the Dorians invaded the Peloponnesus, and Elis fell to the share of Oxylus and the Aetolians. These people, amalgamating with the Epeians, formed a powerful kingdom in the north of Elis. After this many changes took place in the political distribution of the country, till at length it came to acknowledge only three tribes, each independent of the others. These tribes were the Epeians, Minyae and Eleans. Before the end of the 8th century B.C., however, the Eleans had vanquished both their rivals, and established their supremacy over the whole country. Among the other advantages which they thus gained was the right of celebrating the Olympic games, which had formerly been the prerogative of the Pisatans. The attempts which this people made to recover their lost privilege, during a period of nearly two hundred years, ended at length in the total destruction of their city by the Eleans. From the time of this event (572 B.C.) till the Peloponnesian War, the peace of Elis remained undisturbed. In that great contest Elis sided at first with Sparta; but that power, jealous of the increasing prosperity of its ally, availed itself of the first pretext to pick a quarrel. At the battle of Mantinea (418 B.C.) the Eleans fought against the Spartans, who, as soon as the war came to a close, took vengeance upon them by depriving them of Triphylia and the towns of the Acrorea. The Eleans made no attempt to re-establish their authority over these places, till the star of Thebes rose in the ascendant after the battle of Leuctra (371 B.C.). It is not unlikely that they would have effected their purpose had not the Arcadian confederacy come to the assistance of the Triphylians. In 366 B.C. hostilities broke out between them, and though the Eleans were at first successful, they were soon overpowered, and their capital very nearly fell into the hands of the enemy. Unable to make head against their opponents, they applied for assistance to the Spartans, who invaded Arcadia, and forced the Arcadians to recall their troops from Elis. The general result of this war was the restoration of their territory to the Eleans, who were also again invested with the right of holding the Olympic games. During the Macedonian supremacy in Greece they sided with the victors, but refused to fight against their countrymen. After the death of Alexander they renounced the Macedonian alliance. At a subsequent period they joined the Aetolian League, but persistently refused to identify themselves with the Achaeans. When the whole of Greece fell under the Roman yoke, the sanctity of Olympia secured for the Eleans a certain amount of indulgence. The games still continued to attract to the country large numbers of strangers, until they were finally put down by Theodosius in 394, two years previous to the utter destruction of the country by the Gothic invasion under Alaric. In later times Elis fell successively into the hands of the Franks and the Venetians, under whose rule it recovered to some extent its ancient prosperity. By the latter people the province of Belvedere on the Peneus was called, in consequence of its fertility, "the milch cow of the Morea."

ELIS, the chief city of the ancient Greek district of Elis, was situated on the river Peneus, just where it passes from the mountainous district of Acrorea into the champaign below. According to native tradition, it was originally founded by Oxylus, the leader of the Aetolians, whose statue stood in the market-place. In 471 B.C. it received a great extension by the incorporation (synoecism) of various small hamlets, whose inhabitants took up their abode in the city. Up to this date it only occupied the ridge of the hill now called Kalaskopi, to the south of the Peneus, but afterwards it spread out in several suburbs, and even to the other side of the stream. As all the athletes who intended to take part in the Olympic games were obliged to undergo a month's training in the city, its gymnasiums were among its principal institutions. They were three in number—the "Xystos," with its avenues of plane-trees, its plethrion or wrestling-place, its altars to Heracles, to Eros and Anteros, to Demeter and Kore (Cora), and its cenotaph of Achilles; the "Tetragonon," appropriated to boxing exercises; and the "Maltho," in the interior of which was a hall or council chamber called Lalichmion after its founder. The market-place was of the old-fashioned type, with porticoes at intervals and paths leading between them. It was called the Hippodrome because it was commonly used for exercising horses. Among the other objects of interest were the temple of Artemis Philomirax; the Hellanodicaeon, or office of the Hellanodicae; the Corcyrean Hall, a building in the Dorian style with two façades, built of spoils from Corcyra; a temple of Apollo Acesius; a temple of Silenus; an ancient structure supported on oaken pillars and reputed to be the burial-place of Oxylus; the building where the sixteen women of Elis were wont to weave a robe for the statue of Hera at Olympia; the temple of Aphrodite, with a statue of the goddess by Pheidias as Urania with a tortoise beneath her foot, and by Scopas as Pandemos, riding on a goat; and the shrine of Dionysus, whose festival, the Thyia, was yearly celebrated in the neighbourhood. On the acropolis was a temple of Athena, with a gold and ivory statue by Pheidias. The history of the town is closely identified with that of the country. In 399 B.C. it was occupied by Agis, king of Sparta. The acropolis was fortified in 312 by Telesphorus, the admiral of Antigonus, but it was shortly afterwards dismantled by Philemon, another of his generals. A view of the site is given by Stanhope. It is now called Palaeopolis. No traces of any buildings can be identified, the only remains visible dating from Roman times.

See Pausanias vi. 23-26; J. Spencer Stanhope, *Olympia and Elis* (1824), folio; W. M. Leake, *Morea* (1830); E. Curtius, *Peloponnesus* (1851–1852); Schiller, *Stämme und Staaten Griechenlands*; C. Bursian, *Geographie von Griechenland* (1868–1872); P. Gardner, "The Coins of Elis," in *Num. Chr.* (1879). (E. GR.)

ELIS, PHILOSOPHICAL SCHOOL OF. This school was founded by Phaedo, a pupil of Socrates. It existed for a very short time and was then transferred by Menedemus to Eretria, where it became known as the Eretrian school. Its chief members, beside Phaedo, were Anchipylus, Moschus and Pleistanus (see PHAEDO and MENEDEMUS).

ELISAVETGRAD, a fortress and town of Russia, in the government of Kherson, 296 m. by rail N.E. of Odessa on the Balta-Kremenchug railway, and on the Ingul river, in 48° 31′ N. and 32° 10′ E. The population increased from 23,725 in 1860 to

66,182 in 1900. The town is regularly built, with wide streets, some of them lined with trees, and is a wealthy town, which has become an industrial centre for the region especially on account of its steam flour-mills, in which it is second only to Odessa, its distilleries, mechanical workshops, tobacco and tallow factories and brickworks. It is an important centre for trade in cereals and flour for export, and in sheep, cattle, wool, leather and timber. Five fairs are held annually. It has a military school, a first-class meteorological station and a botanical garden. The town was founded in 1754 and named after the empress Elizabeth. The fortifications are now decayed.

ELISAVETPOL, a government of Russia, Transcaucasia, having the governments of Tiflis and Daghestan on the N., Baku on the E., and Erivan and Tiflis on the W. and Persia on the S. Area, 16,721 sq. m. It includes: (*a*) the southern slope of the main Caucasus range in the north-east, where Bazardyuzi (14,770 ft.) and other peaks rise above the snow-line; (*b*) the arid and unproductive steppes beside the Kura, reaching 1000 ft. of altitude in the west and sinking to 100-200 ft. in the east, where irrigation is necessary; and (*c*) the northern slopes of the Transcaucasian escarpment and portions of the Armenian plateau, which is intersected towards its western boundary, near Lake Gok-cha, by chains of mountains consisting of trachytes and various crystalline rocks, and reaching 12,845 ft. in Mount Kapujikh. Elsewhere the country has the character of a plateau, 7000 to 8000 ft. high, deeply trenched by tributaries of the Aras. All varieties of climate are found from that of the snowclad peaks, Alpine meadows, and stony deserts of the high levels, to that of the hill slopes, clothed with gardens and vineyards, and of the arid Caspian steppes. Thus, at Shusha, on the plateau, at an altitude of 3680 ft., the average temperatures are: year 48°, January 26°, July 66°; annual rainfall, 26·4; while at Elisavetpol, in the valley of the Kura, they are: year 55°, January 32°·2, July 77° and rainfall only 10·3 in. Nearly one-fifth of the surface is under forests.

The population which was 885,379 in 1897 (only 392,124 women; 84,130 urban), and was estimated at 953,300 in 1906, consists chiefly of Tatars (56%) and Armenians (33%). The remainder are Kurds (4·7%), Russians and a few Germans, Jews, Kurins, Udins and Tates. Peasants form the great bulk of the population. Some of the Tatars and the Kurds are nomadic. Wheat, maize, barley, oats and rye are grown, also rice. Cultivation of cotton has begun, but the rearing of silkworms is of old standing, especially at Nukha (1650 tons of cocoons on the average are obtained every year). Nearly 8000 acres are under vines, the yield of wine averaging 82½ million gallons annually. Gardening reaches a high standard of perfection. Liquorice root is obtained to the extent of about 35,000 tons annually. The rearing of live-stock is largely carried on on the steppes. Copper, magnetic iron ore, cobalt and a small quantity of naphtha are extracted, and nearly 10,000 persons are employed in manufacturing industry—copper works and silk-mills. Carpet-weaving is widely spread. Owing to the Transcaucasian railway, which crosses the government, trade, both in the interior and with Persia, is very brisk. The government is divided into eight districts, Elisavetpol, Aresh, Jebrail, Jevanshir, Kazakh, Nukha, Shusha and Zangezur. The only towns, besides the capital, are Nukha (24,811 inhabitants in 1897) and Shusha (25,656).

ELISAVETPOL (formerly *Ganja*, alternative names being KENJEH and KANGA), a town of Russia, capital of the government of the same name, 118 m. by rail S.E. of Tiflis and 3½ m. from the railway, at an altitude of 1446 ft. Pop. (1873) 15,439; (1897) 33,090. It is a very old town, which changed hands between Persians, Khazars and Arabs even in the 7th century, and later fell into the possession of Mongols, Georgians, Persians and Turks successively, until the Russians took it in 1804, when the change of name was made. It is a badly built place, with narrow streets and low-roofed, windowless houses, and is situated in a very unhealthy locality, but has been much improved, a new European quarter having been built on the site of the old fortress (erected by the Turks in 1712–1724). The inhabitants are chiefly Tatars and Armenians, famed for their excellent gardening, and also for silkworm breeding. It has a beautiful mosque, built by Shah Abbas of Persia in 1620; and a renowned "Green Mosque" amidst the ruins of old Ganja, 4 m. distant. The Persian poet, Shah Nizam (Nizam-ed-Din), was born here in 1141, and is said to have been buried (1203) close to the town. The Persians were defeated by the Russians under Paskevich outside this town in 1826.

ELISHA (a Hebrew name meaning "God is deliverance"), in the Bible, the disciple and successor of Elijah, was the son of Shaphat of Abel-meholah in the valley of the Jordan. He was symbolically elected to the prophetic office by Elijah some time during the reign of Ahab (1 Kings xix. 19-21), and he survived until the reign of Joash. His career thus appears to have extended over a period of nearly sixty years. The relation between Elijah and Elisha was of a particularly close kind, but the difference between them is much more striking than the resemblance. Elijah is the prophet of the wilderness, wandering, rugged and austere; Elisha is the prophet of civilized life, of the city and the court, with the dress, manners and appearance of ordinary "grave citizens." Elijah is the messenger of vengeance—sudden, fierce and overwhelming; Elisha is the messenger of mercy and restoration. Elijah's miracles, with few exceptions, are works of wrath and destruction; Elisha's miracles, with but one notable exception, are works of beneficence and healing. Elijah is the "prophet as fire" (Ecclus, xlviii. 1), an abnormal agent working for exceptional ends; Elisha is the "holy man of God which passeth by us continually" (2 Kings iv. 9), mixing in the common life of the people.

It is impossible to draw up a detailed chronology of his life. In most of the events narrated no further indication of time is given than by the words "the king of Israel," the name not being specified. There are some instances in which the order of time is obviously the reverse of the order of narrative, and there are other grounds for concluding that the narrative as we now have it is confused and incomplete. This may serve not only to explain the chronological difficulties, but also to throw some light on the altogether exceptional character of the miraculous element in Elisha's history. On the literary questions, see further KINGS.

Not only are Elisha's miracles very numerous, even more so than those of Elijah, but they stand in a peculiar relation to the man and his work. With all the other prophets the primary function is spiritual teaching; miracles, even though numerous and many of them symbolical like Elisha's, are only accessory. With Elisha, on the other hand, miracles seem the principal function, and the teaching is altogether subsidiary. An explanation of the superabundance of miracles in Elisha's life is suggested by the fact that several of them were merely repetitions or doubles of those of his predecessor. Such were: his first miracle, when, returning across the Jordan, he made a dry path for himself in the same manner as Elijah (2 Kings ii. 14); the increase of the widow's pot of oil (iv. 1-7); and the restoration of the son of the woman of Shunem to life (iv. 18-37). The theory that stories from the earlier life have been imported by mistake into the later, even if tenable, applies only to three of the miracles, and leaves unexplained a much larger number which are not only not repetitions of those of Elijah, but have an entirely opposite character. The healing of the water of Jericho by putting salt in it (ii. 19-22), the provision of water for the army of Jehoshaphat in the arid desert (iii. 6-20), the neutralizing by meal of the poison in the pottage of the famine-stricken sons of the prophets at Jericho (iv. 38-41), the healing of Naaman the Syrian (v. 1-19), and the recovery of the iron axehead that had sunk in the water (vi. 1-7), are all instances of the beneficence which was the general characteristic of Elisha's wonder-working activity in contrast to that of Elijah. Another miracle of the same class, the feeding of a hundred men with twenty loaves so that something was left over (iv. 42-44), deserves mention as the most striking though not the only instance of a resemblance between the work of Elisha and that of Jesus (Matt. xiv. 13-21). The one distinct exception to the general beneficence of Elisha's activity—the destruction of the forty-two children who mocked him as he was going up to Bethel (2 Kings ii. 23-25)—presents an ethical difficulty which is scarcely removed by the suggestion that the narrative has lost some particulars which would have shown the real enormity of the children's offence. We may prefer to imagine that among the homely stories told of him was one which had for its main object the inculcation of respect for one's elders.[1] The leprosy brought upon Gehazi (v. 20-27), though a miracle of judgment, scarcely belongs to the same class as the other; and it will be observed that Gehazi's subsequent relations with the court (viii. 1-6) ignore the disease, a fatal hindrance to intercourse. Further, the healing of Naaman (alluded to in Luke iv. 27) presupposes peaceful relations between Israel and the Syrians, with which, however, contrast ch. vi. The wonder-working power of Elisha is represented as continuing even after his death. As the feeding of the hundred men and the cure of leprosy connect his work with that of Jesus, so the story that a dead man who was cast into his sepulchre was brought to life by the mere contact with his bones (2 Kings xiii. 21, cf. Ecclus. xlviii. 12-14) is the most striking instance of an analogy between his miracles and those recorded of medieval saints. Stanley (*Jewish Church*, 4th ed., ii. 276) in reference to this has remarked that in the life of Elisha alone "in the sacred history the gulf between biblical and ecclesiastical miracles almost disappears."

The place which Elisha filled in contemporary history was one of great influence and importance, and several narratives testify to his great reputation in Israel. On one occasion, when he delivered the army that had been brought out against Moab from a threatened dearth of water (2 Kings iii.),[2] he plainly intimates that, but for his regard to Jehoshaphat, the king of Judah, who was in alliance with Israel, he would not have interfered. Whether he was with the army or was supposed to be living in the desert is left obscure. An interesting touch is the influence of music upon the prophetic mind (*v.* 15). His next signal interference was during the incursions of the Syrians, when he disclosed the plans of the invaders to the "king of Israel" with such effect that they were again and again baffled. When the "king of Syria" was informed that "Elisha, the prophet that is in Israel, telleth the king of Israel the words that thou speakest in thy bed-chamber," he at once sent an army to take him captive in Dothan. At Elisha's prayer his terrified servant beheld an army of horses and chariots of fire surrounding the prophet. At a second prayer the invaders were struck blind, and in this state they were led by Elisha to Samaria, where their sight was restored. Their lives were spared at the command of the prophet, and they returned home so impressed that their incursions thenceforward ceased (vi. 8-23). This is immediately followed by the siege of Samaria by Benhadad which caused a famine of the severest kind. The calamity was imputed by the "king of Israel" to the influence of Elisha, and he ordered the prophet to be immediately put to death. Forewarned of the danger, Elisha ordered the messenger who had been sent to slay him to be detained at the door, and, when, immediately afterwards, the king himself came ("messenger" in vi. 33 should rather be *king*), predicted a great plenty within twenty-four hours. This was fulfilled by the flight of the Syrian army under the circumstances stated in ch. vii. After the episode with regard to the woman of Shunem (viii. 1-6), which is out of its chronological order, Elisha is represented as at Damascus (viii. 7-15). The reverence with which the foreign monarch Benhadad addressed Elisha deserves to be noted as showing the extent of the prophet's influence. In sending to know the issue of his illness, the king caused himself to be styled "*thy son* Benhadad." Equally remarkable is the very ambiguous nature of Elisha's reply (viii. 10).[3] The most important interference of Elisha in the history of his country constituted the fulfilment of the third of the commands laid upon Elijah. The work of anointing Jehu to be king over Israel was performed by deputy (ix. 1-3). During the forty-five years which the chronological scheme allows for the reigns of Jehu and Jehoahaz the narratives contain no notice of Elisha, but from the circumstances of his death (xiii. 14-21) it is clear that he had continued to enjoy the esteem of the dynasty which he had helped to found. Joash, the grandson of Jehu, waited on him on his deathbed, and addressed him in the words which he himself had used to Elijah: "My father, my father, the chariot of Israel and the horsemen thereof" (cf. ii. 12). By the result of a symbolic discharge of arrows he informed the king of his coming success against Syria, and immediately thereafter he died. The explicit statement that he was buried completes the contrast between him and his greater predecessor.

On the narratives, see KINGS. In general those where "the prophet appears as on friendly terms with the king, and possessed of influence at court (*e.g.* 2 Kings iv. 13, vi. 9, vi. 21, compared with xiii. 14), plainly belong to the time of Jehu's dynasty, though they are related before the fall of the house of Omri. We can distinguish portions of an historical narrative which speaks of Elisha in connexion with events of public interest, without making him the central figure, and a series of anecdotes of properly biographical character. . . . In the latter we may distinguish one circle connected with Gilgal, Jericho and the Jordan valley to which Abel-Meholah belongs (iv. 1-7? 38-44, v.? vi. 1-7). Here Elisha appears as the head of the prophetic gilds, having his fixed residence at Gilgal.[4] Another circle, which presupposes the accession of the house of Jehu, places him at Dothan or Carmel, and represents him as a personage of almost superhuman dignity. Here there is an obvious parallelism with the history of Elijah, especially with his ascension (cf. 2 Kings vi. 17 with ii. 11; xiii. 14 with ii. 12); and it is to this group of narratives that the ascension of Elijah forms the introduction" (Robertson Smith, *Ency. Brit.*, 9th ed., art. KINGS, vol. xiv. p. 186). This twofold representation finds a parallel in the narratives of Samuel, whose history and the conditions reflected therein are analogous to the life and times of Elisha.

Elisha is canonized in the Orthodox Eastern Church, his festival being on the 14th of June, under which date his life is entered in the *Acta sanctorum*.

See especially, W. R. Smith, *Prophets of Israel* (Index, *s.v.*); and the literature to ELIJAH; KINGS, BOOKS OF; PROPHET.

(W. R. S.; S. A. C.)

ELISHA BEN ABUYAH (*c.* A.D. 100), a unique figure among the Palestinian Jews of the first Christian century. He was born before the destruction of the Temple (which occurred in A.D. 70) and survived into the 2nd century. It is not easy to decide as to his exact attitude towards Judaism. That he refused to accept the current rabbinical views is certain, though the Talmud cites his legal decisions. Most authorities believe that he was a Gnostic; but while it is certain that he was not a Christian, it is possible that he was simply a Sadducee, and thus an opponent not of Judaism but of Pharisaism. His disciple, the famous Pharisee Meir, remained his steadfast friend, and his efforts to reclaim his former master are among the most pathetic incidents in the Talmud. In later ages Elisha (*aḥer* "the other," as he was named) was regarded as the type of a heretic whose pride of intellect betrayed him into infidelity to law and morals. Without much appropriateness Elisha has been sometimes described as the "Faust of the Talmud." (I. A.)

ELIXIR (from the Arabic *al-iksir*, probably an adaptation of the Gr. ξήριον, a powder used for drying wounds, from ξηρός, dry), in alchemy, the medium which would effect the transmutation of base metals into gold; it probably included all such substances—vapours, liquids, &c.—and had a wider meaning than "philosopher's stone." The same term, more fully *elixir*

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[1] Similarly Elijah enforces respect for the prophetic office in i. 9 sqq. Prof. Kennett points out to the present writer that the epithet "bald-head" may refer to the sign of mourning for Elisha's lost master (cf. Ez. vii. 18, Deut. xiv. 1); "Go up" is perhaps to be taken literally (in reference to Elijah's translation).

[2] The method of obtaining water (*v.* 16 sq.) is that which still gives its name to the Wādi el-Aḥsā ("valley of water pits") at the southern end of the Dead Sea (*Old Test. Jew. Church*, 2nd ed., 147). On the other hand, see Burney, *Heb. Text of Kings*, p. 270.

[3] R. V. marg. is an alteration to remove from Elisha the suggestion of an untruth.

[4] The Gilgal of Elisha is near the Jordan—comp. vi. 1 with iv. 38, שבים לפניו,—and cannot be other than the great sanctuary 2 m. from Jericho, the local holiness of which is still attested in the *Onomastica*. It is true that in 2 Kings ii. 1 Bethel seems to lie between Gilgal and Jericho; but *v.* 25 shows that Gilgal was not originally represented as Elisha's residence in this narrative, which belongs to the Carmel-Dothan series. On the other hand, for the identification with the Gilgal (Jiljilia) S.W. of Shiloh, see G. A. Smith, *Ency. Bib.* (s.v. Gilgal); Burney, *op. cit.*, p. 264; Skinner, *Century Bible*: *Kings*, p. 278.

vitae, elixir of life, was given to the substance which would indefinitely prolong life; it was considered to be closely related to, or even identical with, the substance for transmuting metals. In pharmacy the word was formerly given to a strong extract or tincture, but it is only used now for an aromatic sweet preparation, containing one or more drugs, and in such expressions as "elixir of vitriol," a mixture of sulphuric acid, cinnamon, ginger and alcohol.

ELIZABETH (1533–1603), queen of England and Ireland, born on Sunday the 7th of September 1533, and, like all the Tudors except Henry VII., at Greenwich Palace, was the only surviving child of Henry VIII. by his second queen, Anne Boleyn. With such a mother and with Cranmer as her godfather she represented from her birth the principle of revolt from Rome, but the opponents of that movement attached little importance to her advent into the world. Charles V.'s ambassador, Chapuys, hardly deigned to mention the fact that the king's *amie* had given birth to a daughter, and both her parents were bitterly disappointed with her sex. She was, however, given precedence over Mary, her elder sister by sixteen years, and Mary never forgave the infant's offence. Even this dubious advantage only lasted three years until her mother was beheaded, and by a much more serious freak on Henry's part "divorced." Elizabeth has been censured for having made no effort in later years to clear her mother's memory; but no vindication of Anne's character could have rehabilitated Elizabeth's legitimacy. Her mother was not "divorced" for her alleged adultery, because that crime was no ground for divorce by Roman or English canon law. The marriage was declared invalid *ab initio* either on the ground of Anne's precontract with Lord Percy or more probably on the ground of the affinity established between Henry and Anne by Henry's previous relations with Mary Boleyn.

Elizabeth thus lost all hereditary title to the throne, and her early years of childhood can hardly have been happier than Mary's. Nor was her legitimacy ever legally established; but after Jane Seymour's death, when Henry seemed likely to have no further issue, she was by act of parliament placed next in order of the succession after Edward and Mary and their issue; and this statutory arrangement was confirmed by the will which Henry VIII. was empowered by statute to make. Queen Catherine Parr introduced some humanity into Henry's household, and Edward and Elizabeth were well and happily educated together, principally at old Hatfield House, which is now the marquess of Salisbury's stables. They were there when Henry's death called Edward VI. away to greater dignities, and Elizabeth was left in the care of Catherine Parr, who married in indecent haste Thomas, Lord Seymour, brother of the protector Somerset. This unprincipled adventurer, even before Catherine's death in September 1548, paid indelicate attentions to Elizabeth. Any attempt to marry her without the council's leave would have been treason on his part and would have deprived Elizabeth of her contingent right to the succession. Accordingly, when Seymour's other misbehaviour led to his arrest, his relations with Elizabeth were made the subject of a very trying investigation, which gave Elizabeth her first lessons in the feminine arts of self-defence. She proved equal to the occasion, partly because she was in all probability innocent of anything worse than a qualified acquiescence in Seymour's improprieties and a girlish admiration for his handsome face. He or his tragic fate may have touched a deeper chord, but it was carefully concealed; and although in later years Elizabeth seems to have cherished his memory, and certainly showed no love for his brother's children, at the time she only showed resentment at the indignities inflicted on herself.

For the rest of Edward's reign Elizabeth's life was less tempestuous. She hardly rivalled Lady Jane Grey as the ideal Puritan maiden, but she swam with the stream, and was regarded as a foil to her stubborn Catholic sister. She thus avoided the enmity and the still more dangerous favour of Northumberland; and some unknown history lies behind the duke's preference of the Lady Jane to Elizabeth as his son's wife and his own puppet for the throne. She thus escaped shipwreck in his crazy vessel, and rode by Mary's side in triumph into London on the failure of the plot. For a time she was safe enough; she would not renounce her Protestantism until Catholicism had been made the law of the land, but she followed Gardiner's advice to her father when he said it was better that he should make the law his will than try to make his will the law. As a presumptive ruler of England she was, like Cecil, and for that matter the future archbishop Parker also, too shrewd to commit herself to passive or active resistance to the law; and they merely anticipated Hobbes in holding that the individual committed no sin in subordinating his conscience to the will of the state, for the responsibility for the law was not his but the state's. Their position was well enough understood in those days; it was known that they were heretics at heart, and that when their turn came they would once more overthrow Catholicism and expect a similar submission from the Catholics.

It was not so much Elizabeth's religion as her nearness to the throne and the circumstances of her birth that endangered her life in Mary's reign. While Mary was popular Elizabeth was safe; but as soon as the Spanish marriage project had turned away English hearts Elizabeth inevitably became the centre of plots and the hope of the plotters. Had not Lady Jane still been alive to take off the edge of Mary's indignation and suspicion Elizabeth might have paid forfeit for Wyat's rebellion with her life instead of imprisonment. She may have had interviews with French agents who helped to foment the insurrection; but she was strong and wary enough to avoid Henry II.'s, as she had avoided Northumberland's, toils; for even in case of success she would have been the French king's puppet, placed on the throne, if at all, merely to keep it warm for Henry's prospective daughter-in-law, Mary Stuart. This did not make Mary Tudor any more friendly, and, although the story that Elizabeth favoured Courtenay and that Mary was jealous is a ridiculous fiction, the Spaniards cried loud and long for Elizabeth's execution. She was sent to the Tower in March 1554, but few Englishmen were fanatic enough to want a Tudor beheaded. The great nobles, the Howards, and Gardiner would not hear of such a proposal; and all the efforts of the court throughout Mary's reign failed to induce parliament to listen to the suggestion that Elizabeth should be deprived of her legal right to the succession. After two months in the Tower she was transferred to Sir Henry Bedingfield's charge at Woodstock, and at Christmas, when the realm had been reconciled to Rome and Mary was expecting issue, Elizabeth was once more received at court. In the autumn of 1555 she went down to Hatfield, where she spent most of the rest of Mary's reign, enjoying the lessons of Ascham and Baldassare Castiglione, and planting trees which still survive.

She had only to bide her time while Mary made straight her successor's path by uprooting whatever affection the English people had for the Catholic faith, Roman jurisdiction and Spanish control. The Protestant martyrs and Calais between them removed all the alternatives to an insular national English policy in church and in state; and no sovereign was better qualified to lead such a cause than the queen who ascended the throne amid universal, and the Spaniards thought indecent, rejoicings at Mary's death on the 17th of November 1558. "Mere English" she boasted of being, and after Englishmen's recent experience there was no surer title to popular favour. No sovereign since Harold had been so purely English in blood; her nearest foreign ancestor was Catherine of France, the widow of Henry V., and no English king or queen was more superbly insular in character or in policy. She was the unmistakable child of the age so far as Englishmen shared in its characteristics, for with her English aims she combined some Italian methods and ideas. "An Englishman Italianate," ran the current jingle, "is a devil incarnate," and Elizabeth was well versed in Italian scholarship and statecraft. Italians, especially Bernardino Ochino, had given her religious instruction, and the Italians who rejected Catholicism usually adopted far more advanced forms of heresy than Lutheranism, Zwinglianism, or even Calvinism. Elizabeth herself patronized Giacomo Acontio, who thought dogma a "stratagema Satanae," and her last favourite, Essex was accused of being the ringleader of "a damnable crew of atheists." A Spanish ambassador early in the reign thought that Elizabeth's own religion was equally negative, though she told him she agreed with nearly everything in the Augsburg Confession. She was probably not at liberty to say what she really thought, but she made up by saying a great many things which she did not mean. It is clear enough that, although, like her father, she was fond of ritual, she was absolutely devoid of the religious temperament, and that her ecclesiastical preferences were dictated by political considerations. She was sincere enough in her dislike of Roman jurisdiction and of Calvinism; a daughter of Anne Boleyn could have little affection for a system which made her a bastard, and all monarchs agreed at heart with James I.'s aphorism about "no bishop, no king." It was convenient, too, to profess Lutheran sympathies, for Lutheranism was now an established, monarchical and comparatively respectable religion, very different from the Calvinism against which monarchs directed the Counter-reformation from political motives. Lutheran dogma, however, had few adherents in England, though its political theory coincided with that of Anglicanism in the 16th century. The compromise that resulted from these conflicting forces suited Elizabeth very well; she had little dislike of Catholics who repudiated the papacy, but she was forced to rely mainly on Protestants, and had little respect for any form of ecclesiastical self-government. She valued uniformity in religion, not as a safeguard against heresy, but as a guarantee of the unity of the state. She respected the bishops only as supporters of her throne; and, although the well-known letter beginning "Proud Prelate" is an 18th-century forgery, it is hardly a travesty of Elizabeth's attitude.

The outlines of her foreign policy are sketched elsewhere (see English History), and her courtships were diplomatic. Contemporary gossip, which was probably justified, said that she was debarred from matrimony by a physical defect; and her cry when she heard that Mary queen of Scots had given birth to a son is the most womanly thing recorded of Elizabeth. Her features were as handsome as Mary's, but she had little fascination, and in spite of her many suitors no man lost his head over Elizabeth as men did over Mary. She was far too masculine in mind and temperament, and her extravagant addiction to the outward trappings of femininity was probably due to the absence or atrophy of deeper feminine instincts. In the same way the impossibility of marriage made her all the freer with her flirtations, and she carried some of them to lengths that scandalized a public unconscious of Elizabeth's security. She had every reason to keep them in the dark, and to convince other courts that she could and would marry if the provocation were sufficient. She could not marry Philip II., but she held out hopes to more than one of his Austrian cousins whenever France or Mary Stuart seemed to threaten; and later she encouraged two French princes when Philip had lost patience with Elizabeth and made Mary Stuart his protégée. Her other suitors were less important, except Leicester, who appealed to the least intellectual side of Elizabeth and was always a cause of distraction in her policy and her ministers.

Elizabeth was terribly handicapped by having no heirs of her body and no obvious English successor. She could not afford to recognize Mary's claim, for that would have been to alienate the Protestants, double the number of Catholics, and, in her own phrase, to spread a winding-sheet before her eyes; for all would have turned to the rising sun. Mary was dangerous enough as it was, and no one would willingly make his rival his heir. Elizabeth could hardly be expected to go out of her way and ask parliament to repeal its own acts for Mary's sake; probably it would have refused. Nor was it personal enmity on Elizabeth's part that brought Mary to the block. Parliament had long been ferociously demanding Mary's execution, not because she was guilty but because she was dangerous to the public peace. She alone could have given the Spanish Armada any real chance of success; and as the prospect of invasion loomed larger on the horizon, fiercer grew the popular determination to remove the only possible centre of a domestic rising, without which the external attack was bound to be a failure. Elizabeth resisted the demand, not from compassion or qualms of conscience, but because she dreaded the responsibility for Mary's death. She wished Paulet would manage the business on his own account, and when at last her signature was extorted she made a scapegoat of her secretary Davison who had the warrant executed.

The other great difficulty, apart from the succession, with which Elizabeth had to deal arose from the exuberant aggressiveness of England, which she could not, and perhaps did not want to, repress. Religion was not really the cause of her external dangers, for the time had passed for crusades, and no foreign power seriously contemplated an armed invasion of England for religion's sake. But no state could long tolerate the affronts which English seamen offered Spain. The common view that the British Empire has been won by purely defensive action is not tenable, and from the beginning of her reign Englishmen had taken the offensive, partly from religious but also from other motives. They were determined to break up the Spanish monopoly in the new world, and in the pursuit of this endeavour they were led to challenge Spain in the old. For nearly thirty years Philip put up with the capture of his treasure-ships, the raiding of his colonies and the open assistance rendered to his rebels. Only when he had reached the conclusion that his power would never be secure in the Netherlands or the New World until England was conquered, did he despatch the Spanish Armada. Elizabeth delayed the breach as long as she could, probably because she knew that war meant taxation, and that taxation was the most prolific parent of revolt.

With the defeat of the Spanish Armada Elizabeth's work was done, and during the last fifteen years of her reign she got more out of touch with her people. That period was one of gradual transition to the conditions of Stuart times; during it practically every claim was put forward that was made under the first two Stuarts either on behalf of parliament or the prerogative, and Elizabeth's attitude towards the Puritans was hardly distinguishable from James I.'s. But her past was in her favour, and so were her sex and her Tudor tact, which checked the growth of discontent and made Essex's rebellion a ridiculous fiasco. He was the last and the most wilful but perhaps the best of her favourites, and his tragic fate deepened the gloom of her closing years. The loneliness of a queen who had no husband or children and no relatives to mention must at all times have been oppressive; it grew desolating in old age after the deaths of Leicester, Walsingham, Burghley and Essex, and Elizabeth died, the last of her race, on the 24th of March 1603.

Bishop Creighton's *Queen Elizabeth* (1896) is the best biography; there are others by E. S. Beesly (*Twelve English Statesmen*, 1892); Lucy Aikin, *Memoirs of the Court of Queen Elizabeth* (1818); and T. Wright, *Queen Elizabeth and her Times* (1838). See also A. Jessopp's article in the *Dict. Nat. Biog.* (A. F. P.)

ELIZABETH [PETROVNA] (1709–1762), Empress of Russia, the daughter of Peter the Great and Martha Skovronskaya, born at Kolomenskoye, near Moscow, on the 18th of December 1709. Even as a child her parts were good, if not brilliant, but unfortunately her education was both imperfect and desultory. Her father had no leisure to devote to her training, and her mother was too illiterate to superintend her studies. She had a French governess, however, and at a later day picked up some Italian, German and Swedish, and could converse in these languages with more fluency than accuracy. From her earliest years she delighted every one by her extraordinary beauty and vivacity. It was Peter's intention to marry his second daughter to the young French king Louis XV., but the pride of the Bourbons revolted against any such alliance. Other connubial speculations foundered on the personal dislike of the princess for the various suitors proposed to her, so that on the death of her mother (May 1727) and the departure to Holstein of her beloved sister Anne, her only remaining near relation, the princess found herself at the age of eighteen practically her own mistress. So long as Menshikov remained in power, she was treated with liberality and distinction by the government of Peter II., but the Dolgorukis, who supplanted Menshikov and hated the memory of Peter the Great, practically banished Peter's daughter from court. Elizabeth had inherited her father's sensual temperament and, being free from all control, abandoned herself to her appetites without reserve. While still in her teens, she made a lover of Alexius Shubin, a sergeant in the Semenovsky Guards, and after his banishment to Siberia, minus his tongue, by order of the empress Anne, consoled herself with a handsome young Cossack, Alexius Razumovski, who, there is good reason to believe, subsequently became her husband. During the reign of her cousin Anne (1730–1740), Elizabeth effaced herself as much as possible; but under the regency of Anne Leopoldovna the course of events compelled the indolent but by no means incapable beauty to overthrow the existing government. The idea seems to have been first suggested to her by the French ambassador, La Chétardie, who was plotting to destroy the Austrian influence then dominant at the Russian court. It is a mistake to suppose, however, that La Chétardie took a leading part in the revolution which placed the daughter of Peter the Great on the Russian throne. As a matter of fact, beyond lending the tsesarevna 2000 ducats, instead of the 15,000 she demanded of him, he took no part whatever in the actual *coup d'état* which was as great a surprise to him as to every one else. The merit and glory of that singular affair belong to Elizabeth alone. The fear of being imprisoned in a convent for the rest of her life was the determining cause of her irresistible outburst of energy. At midnight on the 6th of December 1741, with a few personal friends, including her physician, Armand Lestocq, her chamberlain, Michael Ilarionvich Vorontsov, her future husband, Alexius Razumovski, and Alexander and Peter Shuvalov, two of the gentlemen of her household, she drove to the barracks of the Preobrazhensky Guards, enlisted their sympathies by a stirring speech, and led them to the Winter Palace, where the regent was reposing in absolute security. Having on the way thither had all the ministers arrested, she seized the regent and her children in their beds, and summoned all the notables, civil and ecclesiastical, to her presence. So swiftly and noiselessly indeed had the whole revolution proceeded that as late as eight o'clock the next morning very few people in the city were aware of it. Thus, at the age of three-and-thirty, this naturally indolent and self-indulgent woman, with little knowledge and no experience of affairs, suddenly found herself at the head of a great empire at one of the most critical periods of its existence. Fortunately for herself, and for Russia, Elizabeth Petrovna, with all her shortcomings, had inherited some of her father's genius for government. Her usually keen judgment and her diplomatic tact again and again recall Peter the Great. What in her sometimes seemed irresolution and procrastination, was, most often, a wise suspense of judgment under exceptionally difficult circumstances; and to this may be added that she was ever ready to sacrifice the prejudices of the woman to the duty of the sovereign.

After abolishing the cabinet council system in favour during the rule of the two Annes, and reconstituting the senate as it had been under Peter the Great,—with the chiefs of the departments of state, all of them now Russians again, as *ex-officio* members under the presidency of the sovereign,—the first care of the new empress was to compose her quarrel with Sweden. On the 23rd of January 1743, direct negotiations between the two powers were opened at Åbo, and on the 7th of August 1743 Sweden ceded to Russia all the southern part of Finland east of the river Kymmene, which thus became the boundary between the two states, including the fortresses of Villmanstrand and Fredrikshamn. This triumphant issue was mainly due to the diplomatic ability of the new vice chancellor, Alexius Bestuzhev-Ryumin (*q.v.*), whom Elizabeth, much as she disliked him personally, had wisely placed at the head of foreign affairs immediately after her accession. He represented the anti-Franco-Prussian portion of her council, and his object was to bring about an Anglo-Austro-Russian alliance which, at that time, was undoubtedly Russia's proper system. Hence the reiterated attempts of Frederick the Great and Louis XV. to get rid of Bestuzhev, which made the Russian court during the earlier years of Elizabeth's reign the centre of a tangle of intrigue impossible to unravel by those who do not possess the clue to it (see BESTUZHEV-RYUMIN, ALEXIUS). Ultimately, however, the minister, strong in the support of Elizabeth, prevailed, and his faultless diplomacy, backed by the despatch of an auxiliary Russian corps of 30,000 men to the Rhine, greatly accelerated the peace negotiations which led to the treaty of Aix-la-Chapelle (October 18, 1748). By sheer tenacity of purpose, Bestuzhev had extricated his country from the Swedish imbroglio; reconciled his imperial mistress with the courts of Vienna and London, her natural allies; enabled Russia to assert herself effectually in Poland, Turkey and Sweden, and isolated the restless king of Prussia by environing him with hostile alliances. But all this would have been impossible but for the steady support of Elizabeth, who trusted him implicitly, despite the insinuations of the chancellor's innumerable enemies, most of whom were her personal friends.

The great event of Elizabeth's later years was the Seven Years' War. Elizabeth rightly regarded the treaty of Westminster (January 16, 1756, whereby Great Britain and Prussia agreed to unite their forces to oppose the entry into, or the passage through, Germany of the troops of every foreign power) as utterly subversive of the previous conventions between Great Britain and Russia. A by no means unwarrantable fear of the king of Prussia, who was "to be reduced within proper limits," so that "he might be no longer a danger to the empire," induced Elizabeth to accede to the treaty of Versailles, in other words the Franco-Austrian league against Prussia, and on the 17th of May 1757 the Russian army, 85,000 strong, advanced against Königsberg. Neither the serious illness of the empress, which began with a fainting-fit at Tsarskoe Selo (September 19, 1757), nor the fall of Bestuzhev (February 21, 1758), nor the cabals and intrigues of the various foreign powers at St Petersburg, interfered with the progress of the war, and the crushing defeat of Kunersdorf (August 12, 1759) at last brought Frederick to the verge of ruin. From that day forth he despaired of success, though he was saved for the moment by the jealousies of the Russian and Austrian commanders, which ruined the military plans of the allies. On the other hand, it is not too much to say that, from the end of 1759 to the end of 1761, the unshakable firmness of the Russian empress was the one constraining political force which held together the heterogeneous, incessantly jarring elements of the anti-Prussian combination. From the Russian point of view, Elizabeth's greatness as a statesman consists in her steady appreciation of Russian interests, and her determination to promote them at all hazards. She insisted throughout that the king of Prussia must be rendered harmless to his neighbours for the future, and that the only way to bring this about was to reduce him to the rank of an elector. Frederick himself was quite alive to his danger. "I am at the end of my resources," he wrote at the beginning of 1760, "the continuance of this war means for me utter ruin. Things may drag on perhaps till July, but then a catastrophe *must* come." On the 21st of May 1760 a fresh convention was signed between Russia and Austria, a secret clause of which, never communicated to the court of Versailles, guaranteed East Prussia to Russia, as an indemnity for war expenses. The failure of the campaign of 1760, so far as Russia and France were concerned, induced the court of Versailles, on the evening of the 22nd of January 1761, to present to the court of St Petersburg a despatch to the effect that the king of France by reason of the condition of his dominions absolutely desired peace. On the following day the Austrian ambassador, Esterhazy, presented a despatch of a similar tenor from his court. The Russian empress's reply was delivered to the two ambassadors on the 12th of February. It was inspired by the most uncompromising hostility towards the king of Prussia. Elizabeth would not consent to any pacific overtures until the original object of the league had been accomplished. Simultaneously, Elizabeth caused to be conveyed to Louis XV. a confidential letter in which she proposed the signature of a new treaty of alliance of a more comprehensive and explicit nature than the preceding treaties between the two powers, without the knowledge of Austria. Elizabeth's object in this mysterious negotiation seems to have been to reconcile France and Great Britain, in return for which signal service France was to throw all her forces into the German war. This project, which lacked neither ability nor audacity, foundered upon Louis XV.'s invincible jealousy of the growth of Russian influence in eastern Europe and his fear of offending the Porte. It was finally arranged by the allies that their envoys at Paris should fix the date for the assembling of a peace congress, and that, in the meantime, the war against Prussia should be vigorously prosecuted. The campaign of 1761 was almost as abortive as the campaign of 1760. Frederick acted on the defensive with consummate skill, and the capture of the Prussian fortress of Kolberg on Christmas day O.S. 1761, by Rumyantsev, was the sole Russian success. Frederick, however, was now at the last gasp. On the 6th of January 1762, he wrote to Finkenstein, "We ought now to think of preserving for my nephew, by way of negotiation, whatever fragments of my territory we can save from the avidity of my enemies," which means, if words mean anything, that he was resolved to seek a soldier's death on the first opportunity. A fortnight later he wrote to Prince Ferdinand of Brunswick, "The sky begins to clear. Courage, my dear fellow. I have received the news of a great event." The great event which snatched him from destruction was the death of the Russian empress (January 5, 1762).

See Robert Nisbet Bain, *The Daughter of Peter the Great* (London, 1899); Sergyei Solovev, *History of Russia* (Rus.), vols. xx.-xxii. (St Petersburg, 1857–1877); *Politische Correspondenz Friedrichs des Grossen*, vols. i.-xxi. (Berlin, 1879, &c.); Colonel Masslowski, *Der siebenjährige Krieg nach russischer Darstellung* (Berlin, 1888–1893); Kazinsierz Waliszewski, *La Dernière des Romanov* (Paris, 1902). (R. N. B.)

ELIZABETH [AMÉLIE EUGÉNIE] (1837–1898), consort of Francis Joseph, emperor of Austria and king of Hungary, was the daughter of Duke Maximilian Joseph of Bavaria and Louisa Wilhelmina, daughter of Maximilian I. of Bavaria, and was born on the 24th of December 1837 at the castle of Possenhofen on Lake Starnberg. She inherited the quick intelligence and artistic taste displayed in general by members of the Wittelsbach royal house, and her education was the reverse of conventional. She accompanied her eccentric father on his hunting expeditions, becoming an expert rider and climber, visiting the peasants in their huts and sharing in rustic pleasures. The emperor of Austria, Francis Joseph, met the Bavarian ducal family at Ischl in August 1853, and immediately fell in love with Elizabeth, then a girl of sixteen, and reported to be the most beautiful princess in Europe. The marriage took place in Vienna on the 24th of April 1854. In the early days of her married life she frequently came into collision with Viennese prejudice. Her attempts to modify court etiquette, and her extreme fondness for horsemanship and frequent visits to the imperial riding school, scandalized Austrian society, while her predilection for Hungary and for everything Hungarian offended German sentiment. There is no doubt that her influence helped the establishment of the *Ausgleich* with Hungary, but outside Hungarian affairs the empress took small part in politics. She first visited Hungary in 1857, and ten years later was crowned queen. Her popularity with the Hungarians remained unchanged throughout her life; and the castle of Gödöllö, presented as a coronation gift, was one of her favourite residences. Elizabeth was one of the most charitable of royal ladies, and her popularity with her Austrian subjects was more than restored by her assiduous care for the wounded in the campaign of 1866. Besides her public benefactions she constantly exercised personal and private charity. Her eldest daughter died in infancy; Gisela (b. 1856) married the Prince Leopold of Bavaria; and her youngest daughter Marie Valerie (b. 1868) married the Archduke Franz Salvator. The tragic death of her only son, the crown prince Rudolph, in 1889, was a shock from which she never really recovered. She was also deeply affected by the suicide of her cousin Louis II. of Bavaria, and again by the fate of her sister Sophia, duchess of Alençon, who perished in the fire of the Paris charity bazaar in 1897. The empress had shown signs of lung disease in 1861, when she spent some months in Madeira; but she was able to resume her outdoor sports, and for some years before 1882, when she had to give up riding, was a frequent visitor on English and Irish hunting fields. In her later years her dislike of publicity increased. Much of her time was spent in travel or at the Achilleion, the palace she had built in the Greek style in Corfu. She was walking from her hotel at Geneva to the steamer when she was stabbed by the anarchist Luigi Luccheni, on the 10th of September 1898, and died of the wound within a few hours. This aimless and dastardly crime completed the list of misfortunes of the Austrian house, and aroused intense indignation throughout Europe.

See A. de Burgh, *Elizabeth, Empress of Austria; a Memoir* (London, 1898); E. Friedmann and J. Paves, *Kaiserin Elisabeth* (Berlin, 1898); and the anonymous *Martyrdom of an Empress* (1899), containing a quantity of court gossip.

ELIZABETH (1596–1662), consort of Frederick V., elector palatine and titular king of Bohemia, was the eldest daughter of James I. of Great Britain and of Anne of Denmark, and was born at Falkland Castle in Fifeshire in August 1596. She was entrusted to the care of the earl of Linlithgow, and after the departure of the royal family to England, to the countess of Kildare, subsequently residing with Lord and Lady Harington at Combe Abbey in Warwickshire. In November 1605 the Gunpowder Plot conspirators formed a plan to seize her person and proclaim her queen after the explosion, in consequence of which she was removed by Lord Harington to Coventry. In 1608 she appeared at court, where her beauty soon attracted admiration and became the theme of the poets, her suitors including the dauphin, Maurice, prince of Orange, Gustavus Adolphus, Philip III. of Spain, and Frederick V., the elector palatine. A union with the last-named was finally arranged, in spite of the queen's opposition, in order to strengthen the alliance with the Protestant powers in Germany, and the marriage took place on the 14th of February 1613 midst great rejoicing and festivities. The prince and princess entered Heidelberg on the 17th of June, and Elizabeth, by means of her English annuity, enjoyed five years of pleasure and of extravagant gaiety to which the small German court was totally unaccustomed. On the 26th of August 1618, Frederick, as a leading Protestant prince, was chosen king by the Bohemians, who deposed the emperor Ferdinand, then archduke of Styria. There is no evidence to show that his acceptance was instigated by the princess or that she had any influence in her husband's political career. She accompanied Frederick to Prague in October 1619, and was crowned on the 7th of November. Here her unrestrainable high spirits and levity gave great offence to the citizens. On the approach of misfortune, however, she showed great courage and fortitude. She left Prague on the 8th of November 1620, after the fatal battle of the White Hill, for Küstrin, travelling thence to Berlin and Wolfenbüttel, finally with Frederick taking refuge at the Hague with Prince Maurice of Orange. The help sought from James came only in the shape of useless embassies and negotiations; the two Palatinates were soon occupied by the Spaniards and the duke of Bavaria; and the romantic attachment and services of Duke Christian of Brunswick, of the 1st earl of Craven, and of other chivalrous young champions who were inspired by the beauty and grace of the "Queen of Hearts," as Elizabeth was now called, availed nothing. Her residence was at Rhenen near Arnheim, where she received many English visitors and endeavoured to maintain her spirits and fortitude, with straitened means and in spite of frequent disappointments. The victories of Gustavus Adolphus secured no permanent advantage, and his death at Lützen was followed by that of the elector at Mainz on the 29th of November 1632. Subsequent attempts of the princess to reinstate her son in his dominions were unsuccessful, and it was not till the peace of Westphalia in 1648 that he regained a portion of them, the Rhenish Palatinate. Meanwhile, Elizabeth's position in Holland grew more and more unsatisfactory. The payment of her English annuity of £12,000 ceased after the outbreak of the troubles with the parliament; the death of Charles I. in 1649 put an end to all hopes from that quarter; and the pension allowed her by the house of Orange ceased in 1650. Her children, in consequence of disputes, abandoned her, and her eldest son Charles Louis refused her a home in his restored electorate. Nor did Charles II. at his restoration show any desire to receive her in England. Parliament voted her £20,000 in 1660 for the payment of her debts, but Elizabeth did not receive the money, and on the 19th of May 1661 she left the Hague for England, in spite of the king's attempts to hinder her journey, receiving no official welcome on her arrival in London and being lodged at Lord Craven's house in Drury Lane. Charles, however, subsequently granted her a pension and treated her with kindness. On the 8th of February 1662 she removed to Leicester House in Leicester Fields, and died shortly afterwards on the 13th of the same month, being buried in Westminster Abbey. Her beauty, grace and vivacity exercised a great charm over her contemporaries, the enthusiasm for her, however, being probably not merely personal but one inspired also by her misfortunes and by the fact that these misfortunes were incurred in defence of the Protestant cause; later, as the ancestress of the Protestant Hanoverian dynasty, she obtained a conspicuous place in English history. She had thirteen children—Frederick Henry, drowned at sea in 1629; Charles Louis, elector palatine, whose daughter married Philip, duke of Orleans, and became the ancestress of the elder and Roman Catholic branch of the royal family of England; Elizabeth, abbess and friend of Descartes; Prince Rupert and Prince Maurice, who died unmarried; Louisa, abbess; Edward, who married Anne de Gonzaga, "princesse palatine," and had children; Henrietta Maria, who married Count Sigismund Ragotzki but died childless; Philip and Charlotte, who died childless; Sophia, who married Ernest Augustus, elector of Hanover, and was mother of George I. of England; and two others who died young.

Bibliography.—See the article in *Dict. of Nat. Biography* and authorities there collected; *Five Stuart Princesses*, ed. by R. S. Rait (1902); *Briefe der Elizabeth Stuart . . . an . . . den Kurfürsten Carl Ludwig von der Pfalz*, by A. Wendland (Bibliothek des literarischen Vereins, 228, Stuttgart, 1902); "Elizabeth Stuart," by J. O. Opel, in Sybel's *Historische Zeitschrift*, xxiii. 289; *Thomason Tracts* (Brit. Mus.), E., 138 (14), 122 (12), 118 (40), 119 (18). Important material regarding the princess exists in the MSS. of the earl of Craven, at Combe Abbey.

ELIZABETH [PAULINE ELIZABETH OTTILIE LOUISE] (1843–), consort of King Charles I. (*q.v.*) of Rumania, widely known by her literary name of "Carmen Sylva," was born on the 29th of December 1843. She was the daughter of Prince Hermann of Neuwied. She first met the future king of Rumania at Berlin in 1861, and was married to him on the 15th of November 1869. Her only child, a daughter, died in 1874. In the Russo-Turkish War of 1877–1878 she devoted herself to the care of the wounded, and founded the Order of Elizabeth (a gold cross on a blue ribbon) to reward distinguished service in such work. She fostered the higher education of women in Rumania, and established societies for various charitable objects. Early distinguished by her excellence as a pianist, organist and singer, she also showed considerable ability in painting and illuminating; but a lively poetic imagination led her to the path of literature, and more especially to poetry, folk-lore and ballads. In addition to numerous original works she put into literary form many of the legends current among the Rumanian peasantry.

"Carmen Sylva" wrote with facility in German, Rumanian, French and English. A few of her voluminous writings, which include poems, plays, novels, short stories, essays, collections of aphorisms, &c., may be singled out for special mention. Her earliest publications were *Sappho* and *Hammerstein*, two poems which appeared at Leipzig in 1880. In 1888 she received the Prix Botta, a prize awarded triennially by the French Academy, for her volume of prose aphorisms *Les Pensées d'une reine* (Paris, 1882), a German version of which is entitled *Vom Amboss* (Bonn, 1890). *Cuvinte Sufletesci*, religious meditations in Rumanian (Bucharest, 1888), was also translated into German (Bonn, 1890), under the name of *Seelen-Gespräche*. Several of the works of "Carmen Sylva" were written in collaboration with Mite Kremnitz, one of her maids of honour, who was born at Greifswald in 1857, and married Dr Kremnitz of Bucharest; these were published between 1881 and 1888, in some cases under the pseudonyms *Dito et Idem*, and includes the novel *Aus zwei Welten* (Leipzig, 1884), *Anna Boleyn* (Bonn, 1886), a tragedy, *In der Irre* (Bonn, 1888), a collection of short stories, &c. *Edleen Vaughan, or Paths of Peril*, a novel (London, 1894), and *Sweet Hours*, poems (London, 1904), were written in English. Among the translations made by "Carmen Sylva" are German versions of Pierre Loti's romance *Pêcheur d'Islande*, and of Paul de St Victor's dramatic criticisms *Les Deux Masques* (Paris, 1881–1884); and in particular *The Bard of the Dimbovitza*, a fine English version by "Carmen Sylva" and Alma Strettell of Helène Vacarescu's collection of Rumanian folk-songs, &c., entitled *Lieder aus dem Dimbovitzathal* (Bonn, 1889). *The Bard of the Dimbovitza* was first published in 1891, and was soon reissued and expanded. Translations from the original works of "Carmen Sylva" have appeared in all the principal languages of Europe and in Armenian.

See Rumania: *History*; also M. Kremnitz, *Carmen Sylva—eine Biographie* (Leipzig, 1903); and, for a full bibliography, G. Bengescu, *Carmen Sylva—bibliographie et extraits de ses œuvres* (Paris, 1904).

ELIZABETH (1635–1650), English princess, second daughter of Charles I., was born on the 28th of December 1635 at St James's Palace. On the outbreak of the Civil War and the departure of the king from London, while the two elder princes accompanied their father, the princess and the infant duke of Gloucester were left under the care of the parliament. In October 1642 Elizabeth sent a letter to the House of Lords begging that her old attendants might not be removed. In July 1644 the royal children were sent to Sir John Danvers at Chelsea, and in 1645 to the earl and countess of Northumberland. After the final defeat of the king they were joined in 1646 by James, and during 1647 paid several visits to the king at Caversham, near Reading, and Hampton Court, but were again separated by Charles's imprisonment at Carisbrooke Castle. On the 21st of April 1648 James was persuaded to escape by Elizabeth, who declared that were she a boy she would not long remain in confinement. The last sad meeting between Charles and his two children, at which the princess was overcome with grief, and of which she wrote a short and touching account, took place on the 29th of January 1649, the day before his execution. In June she was entrusted to the care of the earl and countess of Leicester at Penshurst, but in 1650, upon the landing of Charles II. in Scotland, the parliament ordered the royal children to be taken for security to Carisbrooke Castle. The princess fell ill from a wetting almost immediately upon her arrival, and died of fever on the 8th of September. She was buried in St Thomas's church at Newport, Isle of Wight, where the initials "E.S." alone marked her grave till 1856, when a monument was erected to her memory by Queen Victoria. The princess's sorrowful career and early death have attracted general interest and sympathy. She was said to have acquired considerable proficiency in Greek, Hebrew and Latin, as well as in Italian and French, and several books were dedicated to her, including the translation of the *Electra* of Sophocles by Christopher Wase in 1649. Her mild nature and gentleness towards her father's enemies gained her the name of "Temperance."

See *Lives of the Princesses of England*, by M. A. E. Green (1855), vol. vi.; *Notes and Queries*, 7th ser., ix. 444, x. 15.

ELIZABETH [Élisabeth Philippine Marie Hélène of France] (1764–1794), commonly called Madame Elizabeth, daughter of Louis the Dauphin and Marie Josephine of Saxony, and sister of Louis XVI., was born at Versailles on the 3rd of May 1764. Left an orphan at the age of three, she was brought up by Madame de Mackau, and had a residence at Montreuil, where she gave many proofs of her benevolent character. She refused all offers of marriage so that she might remain by the side of her brother, whom she loved passionately. At the outset of the Revolution she foresaw the gravity of events, and refused to leave the king, whom she accompanied in his flight on the 20th of June 1792, and with whom she was arrested at Varennes.

She was present at the Legislative Assembly when Louis was suspended, and was imprisoned in the Temple with the royal family. By the execution of the king and the removal of Marie Antoinette to the Conciergerie, Madame Elizabeth was deprived of her companions in the Temple prison, and on the 9th of May 1794 she was herself transferred to the Conciergerie, and haled before the revolutionary tribunal. Accused of assisting the king's flight, of supplying *émigrés* with funds, and of encouraging the resistance of the royal troops on the 10th of August 1792, she was condemned to death, and executed on the 10th of May 1794. Like her brother, she had all the domestic virtues, and, as was to be expected of a sister of Louis XVI., she was in favour of absolutist principles. Hers was one of the most touching tragedies of the Revolution; she perished because she was the sister of the king.

The *Mémoires de Madame Élisabeth* (Paris, 1858), by F. de Barghon and Fort-Rion, are of doubtful authenticity; and the collection of letters and documents published in 1865 by F. Feuillet de Conches must be used with caution (see the bibliographical note to the article MARIE ANTOINETTE). See le Comte A. F. C. Ferrand, *Éloge historique de Madame Élisabeth* (1814, containing 94 letters; 2nd ed., 1861, containing additional letters, but correspondence mutilated); Du Fresne de Beaucourt, *Étude sur Madame Élisabeth* (Paris, 1864); A. de Beauchesne, *Vie de Madame Élisabeth* (1869); La comtesse d'Armaillé, *Madame Élisabeth* (Paris, 1886); Madame d'Arvor, *Madame Élisabeth* (Paris, 1898); and Hon. Mrs Maxwell-Scott, *Madame Elizabeth of France* (1908).

ELIZABETH, SAINT (1207–1231), daughter of Andrew II., king of Hungary (d. 1235), by his first wife, Gertrude of Andechs-Meran (d. 1213), was born in Pressburg in 1207. At four years of age she was betrothed to Louis IV., landgrave of Thuringia, and conducted to the Wartburg, near Eisenach, to be educated under the direction of his parents. In spite of her decidedly worldly surroundings at the Thuringian court, she evinced from the first an aversion from even the most innocent pleasures, and stimulated by the example of her mother's sister, St Hedwig, wife of Henry VI., duke of Silesia-Breslau, devoted her whole time to religion and to works of charity. She was married at the age of fourteen, and acquired such influence over her husband that he adopted her point of view and zealously assisted her in all her charitable endeavours. According to the legend, much celebrated in German art, Louis at first desired to curtail her excessive charities, and forbade her unbounded gifts to the poor. One day, returning from hunting, he met his wife descending from the Wartburg with a heavy bundle filled with bread. He sternly bade her open it; she did so, and he saw nothing but a mass of red roses. The miracle completed his conversion. On the death of Louis "the Saint" in 1227, Elizabeth was deprived of the regency by his brother, Henry Raspe IV. (d. 1247), on the pretext that she was wasting the estates by her alms; and with her three infant children she was driven from her home without being allowed to carry with her even the barest necessaries of life. She lived for some time in great hardship, but ultimately her maternal uncle, Egbert, bishop of Bamberg, offered her an asylum in a house adjoining his palace. Through the intercession of some of the principal barons, the regency was again offered her, and her son Hermann was declared heir to the landgraviate; but renouncing all power, and making use of her wealth only for charitable purposes, she preferred to live in seclusion at Marburg under the direction of her confessor, the bigoted persecutor Conrad of Marburg. There she spent the remainder of her days in penances of unusual severity, and in ministrations to the sick, especially those afflicted with the most loathsome diseases. She died at Marburg on the 19th of November 1231, and four years afterwards was canonized by Gregory IX. on account of the frequent miracles reported to have been performed at her tomb.

The exhibition in the Royal Academy of P. H. Calderon's picture, "St Elizabeth of Hungary's Great Act of Renunciation," now in the Tate Gallery in London, roused considerable protest among Catholics. The saint is represented as kneeling nude before the altar, in the presence of her confessor and a couple of nuns. The passage this is intended to illustrate is in Lib. iv. § 1 of Dietrich of Apolda's *Vita*, which relates how, on a certain Good Friday, she went into a chapel and, in the presence of some Franciscan brothers, laid her hands on the bare altar, renounced her own will, her parents, children, relations, and all pomps of this kind (*hujus modi*) in imitation of Christ; and stripped herself utterly naked (*omnino se exuit et nudavit*) in order to follow Him naked, in the steps of poverty. A literal interpretation of this passage is not impossible; for ecstatic mystics of all ages have indulged in a like κενώσις, and Conrad, who revelled in inflicting religious tortures, was quite capable of imposing this crowning humiliation upon his gentle victim. It is far more probable, however, that the passage is not to be taken literally.

Lives of St Elizabeth were written by Theodoricus (Dietrich) of Apolda (b. 1228), Caesarius of Heisterbach (d. *c* 1240), Conrad of Marburg and others (see Potthast, *Bibl. Hist. Med. Aev.* p. 1284). A metrical life in German exists by Johann Rothe (d. *c.* 1440), chaplain to the Landgravine Anne of Thuringia (Potthast, p. 985). *L'Histoire de Sainte Élisabeth de Hongrie*, by Montalembert, was published at Paris in 1836. Her life has also supplied the materials for a dramatic poem by Charles Kingsley, entitled the "Saint's Tragedy." The edition of this in vol. xvi. of the *Life and Works of Charles Kingsley* (London, 1902) has valuable notes, with many extracts from the original sources.

ELIZABETH, a city and the county-seat of Union county, New Jersey, U.S.A., on Elizabeth river, Newark Bay, and Arthur Kill, 10 m. S.W. of Jersey City. Pop. (1890) 37,764; (1900) 52,130, of whom 14,770 were foreign-born and 1139 were negroes; (1910 census) 73,409. It is served by the Pennsylvania, the Lehigh Valley and the Central of New Jersey railways. The site is level and the streets are broad and shaded. There are many residences of New York business men, and several historic buildings, including Liberty Hall, the mansion of William Livingston, first governor of the state; Boxwood Hall (now used as a home for aged women), the former home of Elias Boudinot; the old brick mansion of Jonathan Belcher (1681–1757), governor of the province from 1747 to 1757; the First Presbyterian Church; and the house occupied at different times by General Winfield Scott. The city has several parks, the Union county court house (1905), a public library and several charitable institutions. Elizabethport, that part of the city on Staten Island Sound, about 2 m. S.E. of the centre of Elizabeth, has a port open to vessels of 300 tons; it is an outlet of the Pennsylvania coal fields and is thus one of the most important coal shipping depots in the United States. Here, too, are a plant (covering more than 800 acres) of the Standard Oil Company and a large establishment for the manufacture of the "Singer" sewing machine—according to the U.S. census the largest manufactory of sewing machines in the world—employing more than 6000 workmen in 1905; among the other manufactures of Elizabeth are foundry and machine shop products (value in 1905, $3,887,139), wire, oil (value in 1905, $2,387,656), refined and smelted copper, the output of railway repair shops, edge tools and lager beer. The value of the manufactured products was $10,489,364 in 1890; $22,861,375 (factory product) in 1900; and $29,300,801 (factory product) in 1905.

Elizabeth was settled in 1665 by a company from Long Island for whom the land had been purchased from the Indians and a grant had been obtained from Richard Nicolls as agent for the duke of York. But about the same time the duke conveyed the entire province to John, Lord Berkeley, and Sir George Carteret, and these two conflicting grants gave rise to a long-continued controversy (see NEW JERSEY). The town was named in honour of Elizabeth, wife of Sir George Carteret, and was first known as Elizabethtown. From 1665 to 1686 it was the seat of government of the province, and the legislature sat here occasionally until 1790. In the home of the Rev. Jonathan Dickinson (1688–1747), its first president, the first sessions of the College of New Jersey (now Princeton University) were held in 1747, but immediately afterwards the college removed to Newark. In December 1776 and twice in June 1780 the British entered Elizabeth and made it a base of operations, but on each occasion they were soon driven out. Elizabeth became a "free town and borough" in 1739; the borough charter was confirmed by the legislature in 1789 and repealed in 1790, and Elizabeth was chartered as a city in 1855.

See E. F. Hatfield, *History of Elizabeth, New Jersey* (New York, 1868).

ELIZABETHAN STYLE, in architecture, the term given to the early Renaissance style in England, which flourished chiefly during the reign of Queen Elizabeth; it followed the Tudor style, and was succeeded in the beginning of the 16th century by the purer Italian style introduced by Inigo Jones. It responds to the Cinque-Cento period in Italy, the François I. style in France, and the Plateresque or Silversmith's style in Spain. During the reigns of Henry VIII. and Edward VI. many Italian artists came over, who carried out various decorative features at Hampton Court; Layer Marney, Suffolk (1522–1525); Sutton Place, Surrey (1529); Nonsuch Palace and elsewhere. Later in the century Flemish craftsmen succeeded the Italians, and the Royal Exchange in London (1566–1570) is one of the first important buildings designed by Henri de Paschen, an architect from Antwerp. Longford Castle, Wollaton, Hatfield, Blickling, Audley End, and Charterhouse (London) all show the style introduced by Flemish workmen.

ELIZABETH CITY, a town, port of entry and the county-seat of Pasquotank county, North Carolina, U.S.A., on the Pasquotank river, at the head of navigation, 46 m. S. by E. of Norfolk, Virginia. Pop. (1890) 3251; (1900) 6348 (3164 negroes); (1910) 8412. It is served by the Norfolk & Southern, and the Suffolk & Carolina railways, and is on the Dismal Swamp and Albemarle & Chesapeake canals. Elizabeth City is a winter meeting-place for hunters. It is the seat of a state normal school for negroes and of the Atlantic Collegiate Institute, is a trucking centre, has shipyards, and has a large wholesale trade in clothing, groceries and general merchandise; from it are shipped considerable quantities of fish, cotton and lumber. The town is the port of entry of the Albemarle customs district, but its foreign trade is unimportant. Among its manufactures are cotton goods, iron, lumber, nets and twine, bricks, and carriages and wagons. The oyster fisheries in the vicinity are of considerable importance. Elizabeth City was settled in 1793, and was first incorporated in the same year.

ELK, or MOOSE, the largest of all the deer tribe, distinguished from other members of the *Cervidae* by the form of the antlers of the males. These arise as cylindrical beams projecting on each side at right angles to the middle line of the skull, which after a short distance divide in a fork-like manner. The lower prong of this fork may be either simple, or divided into two or three tines, with some flattening. In the East Siberian elk (*Alces machlis bedfordiae*) the posterior division of the main fork divides into three tines, with no distinct flattening. In the common elk (*A. machlis* or *A. alces*), on the other hand, this branch usually expands into a broad palmation, with one large tine at the base, and a number of smaller snags on the free border; there is, however, a phase of the Scandinavian elk in which the antlers are simpler, and recall those of the East Siberian race. The palmation appears to be more marked in the North American race (*A. m. americanus*) than in the typical Scandinavian elk. The largest of all is the Alaskan race (*A. m. gigas*), which is said to stand 8 ft. in height, with a span of 6 ft. across the antlers. The great length of the legs gives a decidedly ungainly appearance to the elk. The muzzle is long and fleshy, with only a very small triangular naked patch below the nostrils; and the males have a peculiar sac, known as the bell, hanging from the neck. From the shortness of their necks, elks are unable to graze, and their chief food consists of young shoots and leaves of willow and birch. In North America during the winter one male and several females form a "moose-yard" in the forest, which they keep open by trampling the snow. Although generally timid, the males become very bold during the breeding season, when the females utter a loud call; and at such times they fight both with their antlers and their hoofs. The usual pace is a shambling trot, but when pressed elks break into a gallop. The female gives birth to one or two young at a time, which are not spotted. In America the elk is known as the moose, and the former name is transferred to the wapiti deer. (R. L.*)

ELKHART, a city of Elkhart county, Indiana, U.S.A., at the confluence of the Elkhart and St Joseph rivers, about 100 m. E. of Chicago. Pop. (1890) 11,360; (1900) 15,184, of whom 1353 were foreign-born; (1910 census) 19,282. Elkhart is at the junction of the western division with the main line of the Lake Shore & Michigan Southern railway, and is served by the Cleveland, Cincinnati, Chicago & St Louis, and the Northern Indiana railways (the latter electric). It is attractively situated and has fine business and public buildings, including a Carnegie library and the Clark hospital, with which a nurses' training school is connected. It has also several parks, including the beautiful Island Park and McNaughton Park, the latter the annual meeting-place of the St Joseph Valley Chautauqua. A valuable water-power is utilized for manufacturing purposes. There are extensive railway-car shops and iron and brass foundries, and the manufactures include band instruments, furniture, telephone supplies, electric transformers, bridges, paper, flour, starch, rubber goods, acetylene gas machines, printing presses, drugs and carriages. The total value of the factory product was $4,345,466 in 1905, an increase of 10·5% since 1900. At Elkhart is the main publishing house of the Mennonite Church in America, two weekly periodicals being issued, one in English, *The Herald of Truth*, and one in German, the *Mennonitische Rundschau*. The first settlement was made here about 1834; and Elkhart was chartered as a city in 1875.

ELKINGTON, GEORGE RICHARDS (1801–1865), founder of the electroplating industry in England, was born in Birmingham on the 17th of October 1801, the son of a spectacle manufacturer. Apprenticed to his uncles, silver platers in Birmingham, he became, on their death, sole proprietor of the business, but subsequently took his cousin, Henry Elkington, into partnership. The science of electrometallurgy was then in its infancy, but the Elkingtons were quick to recognize its possibilities. They had already taken out certain patents for the application of electricity to metals when, in 1840, John Wright, a Birmingham surgeon, discovered the valuable properties of a solution of cyanide of silver in cyanide of potassium for electroplating purposes. The Elkingtons purchased and patented Wright's process, subsequently acquiring the rights of other processes and improvements. Large new works for electroplating and electrogilding were opened in Birmingham in 1841, and in the following year Josiah Mason became a partner in the firm. George Richards Elkington died on the 22nd of September 1865, and Henry Elkington on the 26th of October 1852.

ELLA, or ÆLLA, the name of three Anglo-Saxon kings.

ELLA (d. *c.* 514), king of the South Saxons and founder of the kingdom of Sussex, was a Saxon ealdorman, who landed near Arundel in Sussex with his three sons in 477. Defeating the Britons, who were driven into the forest of Andredsweald, Ella and his followers established themselves along the south coast, although their progress was slow and difficult. However, in 491, strengthened by the arrival of fresh bands of immigrants, they captured the Roman city of Anderida and "slew all that were therein." Ella, who is reckoned as the first Bretwalda, then became king of the South Saxons, and, when he died about 514, he was succeeded by his son Cissa.

ELLA (d. 588), king of the Deirans, was the son of an ealdorman named Iffa, and became the first king of Deira when, in 559, the Deirans separated themselves from the neighbouring kingdom of Bernicia. The English slaves, who aroused the interest of Pope Gregory I. at Rome, were subjects of Ella, and on this occasion the pope, punning the name of their king, suggested that "Alleluia" should be sung in his land. When Ella died in 588 Deira was conquered by Bernicia. One of his sons was Edwin, afterwards king of the Northumbrians.

ELLA (d. 867), king of the Northumbrians, became king about 862 on the deposition of Osbert, although he was not of royal birth. Afterwards he became reconciled with Osbert, and together they attacked the Danes, who had invaded Northumbria, and drove them into York. Rallying, however, the Danes defeated the Northumbrians, and in the encounter both Ella and Osbert were slain. In certain legends Ella is represented as having brought about the Danish invasion of Northumbria by cruel and unjust actions.

See *The Anglo-Saxon Chronicle*, edited by C. Plummer (Oxford, 1892–1899); Bede, *Historiae ecclesiasticae*, edited by C. Plummer (Oxford, 1896); Henry of Huntingdon, *Historia Anglorum*, edited by T. Arnold, Rolls Series (London, 1879); Asser, *De rebus gestis Aelfredi*, edited by W. H. Stevenson (Oxford, 1904); J. R. Green, *The Making of England* (London, 1897), and the *Dictionary of National Biography*, vol. i. (London, 1895).

ELLAND, an urban district in the Elland parliamentary division of Yorkshire, England, on the Calder, 2½ m. S. of Halifax by the Lancashire & Yorkshire railway. Pop. (1901) 10,412. The church of St Mary is Decorated and Perpendicular. Cotton-mills, woollen-factories, ironworks, flagstone quarries at Elland Edge, and fire-clay works employ the industrial population. Elland Hall, though almost rebuilt, retains the recollection of a remarkable family feud between the Ellands and the Beaumonts of Crosland Hall, the site of which may be traced in the vicinity. A nephew of Sir John Elland, in 1342, met death at the hands of a relative of the Beaumonts upon whom Sir John took vengeance, as also upon the heads of the allied houses of Lockwood and Quarmby. The children of these families were educated in the hope of avenging their parents, and after many years succeeded in doing so, cutting off Sir John Elland and his heir.

ELLENBOROUGH, EDWARD LAW, 1ST BARON (1750–1818), English judge, was born on the 16th of November 1750, at Great Salkeld, in Cumberland, of which place his father, Edmund Law (1703–1787), afterwards bishop of Carlisle, was at the time rector. Educated at the Charterhouse and at Peterhouse, Cambridge, he passed as third wrangler, and was soon afterwards elected to a fellowship at Trinity. In spite of his father's strong wish that he should take orders, he chose the legal profession, and on quitting the university was entered at Lincoln's Inn. After spending five years as a special pleader under the bar, he was called to the bar in 1780. He chose the northern circuit, and in a very short time obtained a lucrative practice and a high reputation. In 1787 he was appointed principal counsel for Warren Hastings in the celebrated impeachment trial before the House of Lords, and the ability with which he conducted the defence was universally recognized. He had begun his political career as a Whig, but, like many others, he saw in the French Revolution a reason for changing sides, and became a supporter of Pitt. On the formation of the Addington ministry in 1801, he was appointed attorney-general and shortly afterwards was returned to the House of Commons as member for Newtown in the Isle of Wight. In 1802 he succeeded Lord Kenyon as chief justice of the king's bench. On being raised to the bench he was created a peer, taking his title from the village of Ellenborough in Cumberland, where his maternal ancestors had long held a small patrimony. In 1806, on the formation of Lord Grenville's ministry "of all the talents," Lord Ellenborough declined the offer of the great seal, but accepted a seat in the cabinet. His doing so while he retained the chief justiceship was much criticized at the time, and, though not without precedent, was open to such obvious objections on constitutional grounds that the experiment has not since been repeated. As a judge he had grave faults, though his decisions displayed profound legal knowledge, and in mercantile law especially were reckoned of high authority. He was harsh and overbearing to counsel, and in the political trials which were so frequent in his time showed an unmistakable bias against the accused. In the trial of William Hone (*q.v.*) for blasphemy in 1817, Ellenborough directed the jury to find a verdict of guilty, and their acquittal of the prisoner is generally said to have hastened his death. He resigned his judicial office in November 1818, and died on the 13th of December following.

Ellenborough was succeeded as 2nd baron by his eldest son, Edward, afterwards earl of Ellenborough; another son was Charles Ewan Law (1792–1850), recorder of London and member of parliament for Cambridge University from 1835 until his death in August 1850.

Three of Ellenborough's brothers attained some degree of fame. These were John Law (1745–1810), bishop of Elphin; Thomas Law (1759–1834), who settled in the United States in 1793, and married, as his second wife, Anne, a granddaughter of Martha Washington; and George Henry Law (1761–1845), bishop of Chester and of Bath and Wells. The connexion of the Law family with the English Church was kept up by George Henry's sons, three of whom took orders. Two of these were Henry Law (1797–1884), dean of Gloucester, and James Thomas Law (1790–1876), chancellor of the diocese of Lichfield.

ELLENBOROUGH, EDWARD LAW, EARL OF (1790–1871), the eldest son of the 1st Lord Ellenborough, was born on the 8th of September 1790. He was educated at Eton and St John's College, Cambridge. He represented the subsequently disfranchised borough of St Michael's, Cornwall, in the House of Commons, until the death of his father in 1818 gave him a seat in the House of Lords. He was twice married; his only child died young; his second wife was divorced by act of parliament in 1830.

In the Wellington administration of 1828 Ellenborough was made lord privy seal; he took a considerable share in the business of the foreign office, as an unofficial assistant to Wellington, who was a great admirer of his talents. He aimed at succeeding Lord Dudley at the foreign office, but was forced to content himself with the presidency of the board of control, which he retained until the fall of the ministry in 1830. Ellenborough was an active administrator, and took a lively interest in questions of Indian policy. The revision of the company's charter was approaching, and he held that the government of India should be transferred directly to the crown. He was impressed with the growing importance of a knowledge of central Asia, in the event of a Russian advance towards the Indian frontier, and despatched Burnes on an exploring mission to that district. Ellenborough subsequently returned to the board of control in Peel's first and second administrations. He had only held office for a month on the third occasion when he was appointed by the court of directors to succeed Lord Auckland as governor-general of India. His Indian administration of two and a half years, or half the usual term of service, was from first to last a subject of hostile criticism. His own letters sent monthly to the queen, and his correspondence with the duke of Wellington, published in 1874, afford material for an intelligent and impartial judgment of his meteoric career. The events chiefly in dispute are his policy towards Afghanistan and the army and captives there, his conquest of Sind, and his campaign in Gwalior.

Ellenborough went to India in order "to restore peace to Asia," but the whole term of his office was occupied in war. On his arrival there the news that greeted him was that of the massacre of Kabul, and the sieges of Ghazni and Jalalabad, while the sepoys of Madras were on the verge of open mutiny. In his proclamation of the 15th of March 1842, as in his memorandum for the queen dated the 18th, he stated with characteristic clearness and eloquence the duty of first inflicting some signal and decisive blow on the Afghans, and then leaving them to govern themselves under the sovereign of their own choice. Unhappily, when he left his council for upper India, and learned the trifling failure of General England, he instructed Pollock and Nott, who were advancing triumphantly with their avenging columns to rescue the British captives, to fall back. The army proved true to the governor-general's earlier proclamation rather than to his later fears; the hostages were rescued, the scene of Sir Alexander Burnes's murder in the heart of Kabul was burned down. Dost Mahommed was quietly dismissed from a prison in Calcutta to the throne in the Bala Hissar, and Ellenborough presided over the painting of the elephants for an unprecedented military spectacle at Ferozepur, on the south bank of the Sutlej. But this was not the only piece of theatrical display which capped with ridicule the horrors and the follies of these four years in Afghanistan. When Sultan Mahmud, in 1024, sacked the Hindu temple of Somnath on the north-west coast of India, he carried off, with the treasures, the richly studded sandal-wood gates of the fane, and set them up in his capital of Ghazni. The Mahommedan puppet of the English, Shah Shuja, had been asked, when ruler of Afghanistan, to restore them to India; and what he had failed to do the Christian ruler of opposing Mahommedans and Hindus resolved to effect in the most solemn and public manner. In vain had Major (afterwards Sir Henry) Rawlinson proved that they were only reproductions of the original gates, to which the Ghazni moulvies clung merely as a source of offerings from the faithful who visited the old conqueror's tomb. In vain did the Hindu sepoys show the most chilling indifference to the belauded restoration. Ellenborough could not resist the temptation to copy Napoleon's magniloquent proclamation under the pyramids. The fraudulent folding doors were conveyed on a triumphal car to the fort of Agra, where they were found to be made not of sandalwood but of deal. That Somnath proclamation (immortalized in a speech by Macaulay) was the first step towards its author's recall.

Hardly had Ellenborough issued his medal with the legend "Pax Asiae Restituta" when he was at war with the amirs of Sind. The tributary amirs had on the whole been faithful, for Major (afterwards Sir James) Outram controlled them. But he had reported the opposition of a few, and Ellenborough ordered an inquiry. His instructions were admirable, in equity as well as energy, and if Outram had been left to carry them out all would have been well. But the duty was entrusted to Sir Charles Napier, with full political as well as military powers. And to add to the evil, Mir Ali Morad intrigued with both sides so effectually that he betrayed the amirs on the one hand, while he deluded Sir Charles Napier to their destruction on the other. Ellenborough was led on till events were beyond his control, and his own just and merciful instructions were forgotten. Sir Charles Napier made more than one confession like this: "We have no right to seize Sind, yet we shall do so, and a very advantageous, useful and humane piece of rascality it will be." The battles of Meeanee and Hyderabad followed; and the Indus became a British river from Karachi to Multan.

Sind had hardly been disposed of when troubles arose on both sides of the governor-general, who was then at Agra. On the north the disordered kingdom of the Sikhs was threatening the frontier. In Gwalior to the south, the feudatory Mahratta state, there were a large mutinous army, a Ranee only twelve years of age, an adopted chief of eight, and factions in the council of ministers. These conditions brought Gwalior to the verge of civil war. Ellenborough reviewed the danger in the minute of the 1st of November 1845, and told Sir Hugh Gough to advance. Further treachery and military licence rendered the battles of Maharajpur and Punniar, fought on the same day, inevitable though they were, a surprise to the combatants. The treaty that followed was as merciful as it was wise. The pacification of Gwalior also had its effect beyond the Sutlej, where anarchy was restrained for yet another year, and the work of civilization was left to Ellenborough's two successors. But by this time the patience of the directors was exhausted. They had no control over Ellenborough's policy; his despatches to them were haughty and disrespectful; and in June 1844 they exercised their power of recalling him.

On his return to England Ellenborough was created an earl and received the thanks of parliament; but his administration speedily became the theme of hostile debates, though it was successfully vindicated by Peel and Wellington. When Peel's cabinet was reconstituted in 1846 Ellenborough became first lord of the admiralty. In 1858 he took office under Lord Derby as president of the board of control, for the fourth time. It was then his congenial task to draft the new scheme for the government of India which the mutiny had rendered necessary. But his old fault of impetuosity again proved his stumbling-block. He wrote a caustic despatch censuring Lord Canning for the Oudh proclamation, and allowed it to be published in *The Times* without consulting his colleagues, who disavowed his action in this respect. General disapprobation was excited; votes of censure were announced in both Houses; and, to save the cabinet, Ellenborough resigned.

But for this act of rashness he might have enjoyed the task of carrying into effect the home constitution for the government of India which he sketched in his evidence before the select committee of the House of Commons on Indian territories on the 8th of June 1852. Paying off his old score against the East India Company, he then advocated the abolition of the court of directors as a governing body, the opening of the civil service to the army, the transference of the government to the crown, and the appointment of a council to advise the minister who should take the place of the president of the board of control. These suggestions of 1852 were carried out by his successor Lord Stanley, afterwards earl of Derby, in 1858, so closely even in details, that Lord Ellenborough must be pronounced the author, for good or evil, of the present home constitution of the government of India. Though acknowledged to be one of the foremost orators in the House of Lords, and taking a frequent part in debate, Ellenborough never held office again. He died at his seat, Southam House, near Cheltenham, on the 22nd of December 1871, when the barony reverted to his nephew Charles Edmund Law (1820–1890), the earldom becoming extinct.

See *History of the Indian Administration* (Bentley, 1874), edited by Lord Colchester; *Minutes of Evidence taken before the Select Committee on Indian Territories* (June 1852); volume i. of the *Calcutta Review*; the *Friend of India*, during the years 1842–1845; and John Hope, *The House of Scindea: A Sketch* (Longmans, 1863). The numerous books by and against Sir Charles Napier, on the conquest of Sind, should be consulted.

ELLERY, WILLIAM (1727–1820), American politician, a signer of the Declaration of Independence, was born in Newport, Rhode Island, on the 22nd of December 1727. He graduated from Harvard in 1747, engaged in trade, studied law, and was admitted to the bar in 1770. He was a member of the Rhode Island committee of safety in 1775–1776, and was a delegate in Congress in 1776–1781 and again in 1783–1785. Just after his first election to Congress, he was placed on the important marine committee, and he was made a member of the board of admiralty when it was established in 1779. In April 1786 he was elected commissioner of the continental loan office for the state of Rhode Island and from 1790 until his death at Newport, on the 15th of February 1820, he was collector of the customs for the district of Newport.

See Edward T. Channing, "Life of William Ellery," in vol. 6 of Jared Sparks's *American Biography* (Boston and London, 1836).

ELLESMERE, FRANCIS EGERTON, 1st Earl of (1800–1857), born in London on the 1st of January 1800, was the second son of the 1st duke of Sutherland. He was known by his patronymic as Lord Francis Leveson Gower until 1833, when he assumed the surname of Egerton alone, having succeeded on the death of his father to the estates which the latter inherited from the duke of Bridgewater. Educated at Eton and at Christ Church, Oxford, he entered parliament soon after attaining his majority as member for the pocket borough of Bletchingly in Surrey. He afterwards sat for Sutherlandshire and for South Lancashire, which he represented when he was elevated to the peerage as earl of Ellesmere and Viscount Brackley in 1846. In politics he was a moderate Conservative of independent views, as was shown by his supporting the proposal for establishing the university of London, by his making and carrying a motion for the endowment of the Roman Catholic clergy in Ireland, and by his advocating free trade long before Sir Robert Peel yielded on the question. Appointed a lord of the treasury in 1827, he held the post of chief secretary for Ireland from 1828 till July 1830, when he became secretary-at-war for a short time. His claims to remembrance are founded chiefly on his services to literature and the fine arts. Before he was twenty he printed for private circulation a volume of poems, which he followed up after a short interval by the publication of a translation of Goethe's *Faust*, one of the earliest that appeared in England, with some translations of German lyrics and a few original poems. In 1839 he visited the Mediterranean and the Holy Land. His impressions of travel were recorded in his very agreeably written *Mediterranean Sketches* (1843), and in the notes to a poem entitled *The Pilgrimage*. He published several other works in prose and verse, all displaying a fine literary taste. His literary reputation secured for him the position of rector of Aberdeen University in 1841. Lord Ellesmere was a munificent and yet discriminating patron of artists. To the splendid collection of pictures which he inherited from his great-uncle, the 3rd duke of Bridgewater, he made numerous additions, and he built a noble gallery to which the public were allowed free access. Lord Ellesmere served as president of the Royal Geographical Society and as president of the Royal Asiatic Society, and he was a trustee of the National Gallery. He died on the 18th of February 1857. He was succeeded by his son (1823–1862) as 2nd earl, and his grandson (b. 1847) as 3rd earl.

ELLESMERE, a market town in the Oswestry parliamentary division of Shropshire, England, on the main line of the Cambrian railway, 182 m. N.W. from London. Pop. of urban district (1901) 1945. It is prettily situated on the west shore of the mere or small lake from which it takes its name, while in the neighbourhood are other sheets of water, as Blake Mere, Cole Mere, White Mere, Newton Mere and Crose Mere. The church of St Mary is of various styles from Norman onward, but was partly rebuilt in 1848. The site of the castle is occupied by pleasure gardens, commanding an extensive view from high ground. The town hall contains a library and a natural history collection. The college is a large boys' school. The town is an important agricultural centre. Ellesmere canal, a famous work of Thomas Telford, connects the Severn with the Mersey, crossing the Vale of Llangollen by an immense aqueduct, 336 yds. long and 127 ft. high.

The manor of Ellesmere (*Ellesmeles*) belonged before the Conquest to Earl Edwin of Mercia, and was granted by William the Conqueror to Roger, earl of Shrewsbury, whose son, Robert de Belesme, forfeited it in 1112 for treason against Henry I. In 1177 Henry II. gave it with his sister in marriage to David, son of Owen, prince of North Wales, after whose death it was retained by King John, who in 1206 granted it to his daughter Joan on her marriage with Llewellyn, prince of North Wales; it was finally surrendered to Henry III. by David, son of Llewellyn, about 1240. Ellesmere owed its early importance to its position on the Welsh borders and to its castle, which was in ruins, however, in 1349. While Ellesmere was in the hands of Joan, lady of Wales, she granted to the borough all the free customs of Breteuil. The town was governed by a bailiff appointed by a jury at one of the court leets of the lord of the manor, until a local board was formed in 1859. In 1221 Henry III. granted Llewellyn, prince of Wales, a market on Thursdays in Ellesmere. The inquisition taken in 1383 after the death of Roger le Straunge (Lord Strange), lord of Ellesmere, shows that he also held two fairs there on the feasts of St Martin and the Nativity of the Virgin Mary. By 1597 the market had been discontinued on account of the plague by which many of the inhabitants had died, and the queen granted that Sir Edward Kynaston, Kt., and thirteen others might hold a market every Thursday and a fair on the 3rd of November. Since 1792 both have been discontinued. The commerce of Ellesmere has always been chiefly agricultural.

ELLICE (LAGOON) ISLANDS, an archipelago of the Pacific Ocean, lying between 5° and 11° S. and about 178° E., nearly midway between Fiji and Gilbert. It is under British protection, being annexed in 1892. It comprises a large number of low coralline islands and atolls, which are disposed in nine clusters extending over a distance of about 400 m. in the direction from N.W. to S.E. Their total area is 14 sq. m. and the population is about 2400. The chief groups, all yielding coco-nuts, pandanus fruit and yams, are Funafuti or Ellice, Nukulailai or Mitchell, Nurakita or Sophia, Nukufetau or De Peyster, Nui or Egg, Nanomana or Hudson, and Niutao or Lynx. Nearly all the natives are Christians, Protestant missions having been long established in several of the islands. Those of Nui speak the language of the Gilbert islanders, and have a tradition that they came some generations ago from that group. All the others are of Samoan speech, and their tradition that they came thirty generations back from Samoa is supported by recent research. They have an ancient spear which they believe was brought from Samoa, and they actually name the valley from which their ancestors started. A missionary visiting the Samoan valley found there a tradition of a party who put to sea never to return, and he also found the wood of which the staff was made growing plentifully in the district. Borings and soundings taken at Funafuti in 1897 indicate almost beyond doubt that the whole of this Polynesian region is an area of comparatively recent subsidence.

See *Geographical Journal*, passim; and *Atoll of Funafuti: Borings into a Coral Reef* (Report of Coral Reef Committee of Royal Society, London, 1904).

ELLICHPUR, or ILLICHPUR, a town of India in the Amraoti district of Berar. Pop. (1901) 26,082. It is first mentioned authentically in the 13th century as "one of the famous cities of the Deccan." Though tributary to the Mahommedans after 1294, it remained under Hindu administration till 1318, when it came directly under the Mahommedans. It was afterwards capital of the province of Berar at intervals until the Mogul occupation, when the seat of the provincial governor was moved to Balapur. The town retains many relics of the nawabs of Berar. It has ginning factories and a considerable trade in cotton and forest produce. It is connected by good roads with Amraoti and Chikalda. It was formerly the headquarters of the district of Ellichpur, which had an area of 2605 sq. m. and a population in 1901 of 297,403. This district, however, was merged in that of Amraoti in 1905. The civil station of Paratwada, 2 m. from the town of Ellichpur, contains the principal public buildings.

ELLIOTSON, JOHN (1791–1868), English physician, was born at Southwark, London, on the 29th of October 1791. He studied medicine first at Edinburgh and then at Cambridge, in both which places he took the degree of M.D., and subsequently in London at St Thomas's and Guy's hospitals. In 1831 he was elected professor of the principles and practice of physic in London University, and in 1834 he became physician to University College hospital. He was a student of phrenology and mesmerism, and his interest in the latter eventually brought him into collision with the medical committee of the hospital, a circumstance which led him, in December 1838, to resign the offices held by him there and at the university. But he continued the practice of mesmerism, holding séances in his home and editing a magazine, *The Zoist*, devoted to the subject, and in 1849 he founded a mesmeric hospital. He died in London on the 29th of July 1868. Elliotson was one of the first teachers in London to appreciate the value of clinical lecturing, and one of the earliest among British physicians to advocate the employment of the stethoscope. He wrote a translation of Blumenbach's *Institutiones Physiologicae* (1817); *Cases of the Hydrocyanic or Prussic Acid* (1820); *Lectures on Diseases of the Heart* (1830); *Principles and Practice of Medicine* (1839); *Human Physiology* (1840); and *Surgical Operations in the Mesmeric State without Pain* (1843). He was the author of numerous papers in the *Transactions* of the Medico-Chirurgical Society, of which he was at one time president; and he was also a fellow both of the Royal College of Physicians and Royal Society, and founder and president of the Phrenological Society. W. M. Thackeray's *Pendennis* was dedicated to him.

ELLIOTT, EBENEZER (1781–1849), English poet, the "corn-law rhymer," was born at Masborough, near Rotherham, Yorkshire, on the 17th of March 1781. His father, who was an extreme Calvinist and a strong radical, was engaged in the iron trade. Young Ebenezer, although one of a large family, had a solitary and rather morbid childhood. He was sent to various schools, but was generally regarded as a dunce, and when he was sixteen years of age he entered his father's foundry, working for seven years with no wages beyond a little pocket money. In a fragment of autobiography printed in the *Athenaeum* (12th of January 1850) he says that he was entirely self-taught, and attributes his poetic development to long country walks undertaken in search of wild flowers, and to a collection of books, including the works of Young, Barrow, Shenstone and Milton, bequeathed to his father by a poor clergyman. At seventeen he wrote his *Vernal Walk* in imitation of Thomson. His earlier volumes of poems, dealing with romantic themes, received little but unfriendly comment. The faults of *Night*, the earliest of these, are pointed out in a long and friendly letter (30th of January 1819) from Robert Southey to the author.

Elliott's wife brought him some money, which was invested in his father's share of the iron foundry. But the affairs of the firm were then in a desperate condition, and money difficulties hastened his father's death. Elliott lost all his money, and when he was forty years old began business again in Sheffield on a small borrowed capital. He attributed his father's pecuniary losses and his own to the operation of the corn laws. He took an active part in the Chartist agitation, but withdrew his support when the agitation for the repeal of the corn laws was removed from the Chartist programme. The fervour of his political convictions effected a change in the style and tenor of his verse. The *Corn-Law Rhymes* (3rd ed., 1831), inspired by a fierce hatred of injustice, are vigorous, simple and full of vivid description. In 1833–1835 he published *The Splendid Village*; *Corn-Law Rhymes, and other Poems* (3 vols.), which included "The Village Patriarch" (1829), "The Ranter," an unsuccessful drama, "Keronah," and other pieces. He contributed verses from time to time to *Tait's Magazine* and to the *Sheffield and Rotherham Independent*. In the meantime he had been successful in business, but he remained the sturdy champion of the poor. In 1837 he again lost a great deal of money. This misfortune was also ascribed to the corn laws. He retired in 1841 with a small fortune and settled at Great Houghton, near Barnsley, where he died on the 1st of December 1849. In 1850 appeared two volumes of *More Prose and Verse by the Corn-Law Rhymer*. Elliott lives by his determined opposition to the "bread-tax," as he called it, and his poems on the subject are saved from the common fate of political poetry by their transparent sincerity and passionate earnestness.

An article by Thomas Carlyle in the *Edinburgh Review* (July 1832) is the best criticism on Elliott. Carlyle was attracted by Elliott's homely sincerity and genuine power, though he had small opinion of his political philosophy, and lamented his lack of humour and of the sense of proportion. He thought his poetry too imitative, detecting not only the truthful severity of Crabbe, but a "slight bravura dash of the fair tuneful Hemans." His descriptions of his native county reveal close observation and a vivid perception of natural beauty.

See an obituary notice in the *Gentleman's Magazine* (Feb. 1850). Two biographies were published in 1850, one by his son-in-law, John Watkins, and another by "January Searle" (G. S. Phillips). A new edition of his works by his son, Edwin Elliott, appeared in 1876.

ELLIPSE (adapted from Gr. ἔλλειψις, a deficiency, ἐλλείπειν, to fall behind), in mathematics, a conic section, having the form of a closed oval. It admits of several definitions framed according to the aspect from which the curve is considered. *In solido*, *i.e.* as a section of a cone or cylinder, it may be defined, after Menaechmus, as the perpendicular section of an "acute-angled" cone; or, after Apollonius of Perga, as the section of any cone by a plane at a less inclination to the base than a generator; or as an oblique section of a right cylinder. Definitions *in plano* are generally more useful; of these the most important are: (1) the ellipse is the conic section which has its eccentricity less than unity: this involves the notion of one directrix and one focus; (2) the ellipse is the locus of a point the sum of whose distances from two fixed points is constant: this involves the notion of two foci. Other geometrical definitions are: it is the oblique projection of a circle; the polar reciprocal of a circle for a point within it; and the conic which intersects the line at infinity in two imaginary points. Analytically it is defined by an equation of the second degree of which the highest terms represent two imaginary lines. The curve has important mechanical relations, in particular it is the orbit of a particle moving under the influence of a central force which varies inversely as the square of the distance of the particle; this is the gravitational law of force, and the curve consequently represents the orbits of the planets if only an individual planet and the sun be considered; the other planets, however, disturb this orbit (see MECHANICS).

The relation of the ellipse to the other conic sections is treated in the articles CONIC SECTION and GEOMETRY; in this article a summary of the properties of the curve will be given.

To investigate the form of the curve use may be made of the definition: the ellipse is the locus of a point which moves so that the ratio of its distance from a fixed point (the *focus*) to its distance from a straight line (the *directrix*) is constant and is less than unity. This ratio is termed the *eccentricity*, and will be denoted by e. Let KX (fig. 1) be the directrix, S the focus, and X the foot of the perpendicular from S to KX. If SX be divided at A so that SA/AX $=e$, then A is a point on the curve. SX may be also divided externally at A′, so that SA′/A′X $=e$, since e is less than unity; the points A and A′ are the *vertices*, and the line AA′ the *major axis* of the curve. It is obvious that the curve is symmetrical about AA′. If AA′ be bisected at C, and the line BCB′ be drawn perpendicular to AA′, then it is readily seen that the curve is symmetrical about this line also; since if we take S′ on AA′ so that S′A′ = SA, and a line K′X′ parallel to KX such that AX = A′X′, then the same curve will be described if we regard K′X′ and S′ as the given directrix and focus, the eccentricity remaining the same. If B and B′ be points on the curve, BB′ is the *minor axis* and C the *centre* of the curve.

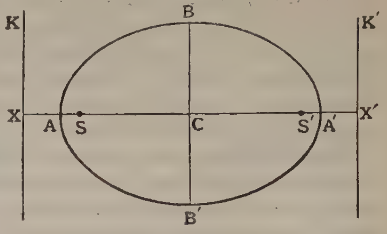

FIG. 1.

Metrical relations between the axes, eccentricity, distance between the foci, and between these quantities and the co-ordinates of points on the curve (referred to the axes and the centre), and focal distances are readily obtained by the methods of geometrical conics or analytically. The semi-major axis is generally denoted by a, and the semi-minor axis by b, and we have the relation $b^2=a^2(1-e^2)$. Also $a^2=$ CS.CX, *i.e.* the square on the semi-major axis equals the rectangle contained by the distances of the focus and directrix from the centre; and $2a=$ SP+S′P, where P is any point on the curve, *i.e.* the sum of the focal distances of any point on the curve equals the major axis. The most important relation between the co-ordinates of a point on an ellipse is: if N be the foot of the perpendicular from a point P, then the square on PN bears a constant ratio to the product of the segments AN, NA′ of the major axis, this ratio being the square of the ratio of the minor to the major axis; symbolically $\mathrm{PN}^2=\mathrm{AN}.\mathrm{NA}'(\mathrm{CB}/\mathrm{CA})^2$. From this or otherwise it is readily deduced that the ordinates of an ellipse and of the circle described on the major axis are in the ratio of the minor to the major axis. This circle is termed the *auxiliary circle*.

Of the properties of a tangent it may be noticed that the tangent at any point is equally inclined to the focal distances of that point; that the feet of the perpendiculars from the foci on any tangent always lie on the auxiliary circle, and the product of these perpendiculars is constant, and equal to the product of the distances of a focus from the two vertices. From any point without the curve two, and only two, tangents can be drawn; if OP, OP′ be two tangents from O, and S, S′ the foci, then the angles OSP, OSP′ are equal and also SOP, S′OP′. If the tangents be at right angles, then the locus of the point is a circle having the same centre as the ellipse; this is named the *director circle*.

The middle points of a system of parallel chords is a straight line, and the tangent at the point where this line meets the curve is parallel to the chords. The straight line and the line through the centre parallel to the chords are named *conjugate diameters*; each bisects the chords parallel to the other. An important metrical property of conjugate diameters is the sum of their squares equals the sum of the squares of the major and minor axis.

In analytical geometry, the equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents an ellipse when $ab>h^2$; if the centre of the curve be the origin, the equation is $a^1x^2+2h^1xy+b^1y^2=\mathrm{C}^1$, and if in addition a pair of conjugate diameters are the axes, the equation is further simplified to $\mathrm{A}x^2+\mathrm{B}y^2=\mathrm{C}$. The simplest form is $x^2/a^2+y^2/b^2=1$, in which the centre is the origin and the major and minor axes the axes of co-ordinates. It is obvious that the co-ordinates of any point on an ellipse may be expressed in terms of a single parameter, the abscissa being $a\cos\phi$, and the ordinate $b\sin\phi$, since on eliminating ϕ between $x=a\cos\phi$ and $y=b\sin\phi$ we obtain the equation to the ellipse. The angle ϕ is termed the *eccentric angle*, and is geometrically represented as the angle between the axis of x (the major axis of the ellipse) and the radius of a point on the auxiliary circle which has the same abscissa as the point on the ellipse.

The equation to the tangent at θ is $x\cos\theta/a+y\sin\theta/b=1$, and to the normal $ax/\cos\theta-by/\sin\theta=a^2-b^2$.

The area of the ellipse is πab, where a, b are the semi-axes; this result may be deduced by regarding the ellipse as the orthogonal projection of a circle, or by means of the calculus. The perimeter can only be expressed as a series, the analytical evaluation leading to an integral termed *elliptic* (see FUNCTION, ii. *Complex*). There are several approximation formulae:—$\mathrm{S}=\pi(a+b)$ makes the perimeter about 1/200th too small; $s=\pi\sqrt{(a^2+b^2)}$ about 1/200th too great; $2s=\pi(a+b)+\pi\sqrt{(a^2+b^2)}$ is within 1/30,000 of the truth.

An ellipse can generally be described to satisfy any five conditions. If five points be given, Pascal's theorem affords a solution; if five tangents, Brianchon's theorem is employed. The principle of involution solves such constructions as: given four tangents and one point, three tangents and two points, &c. If a tangent and its point of contact be given, it is only necessary to remember that a double point on the curve is given. A focus or directrix is equal to two conditions; hence such problems as: given a focus and three points; a focus, two points and one tangent; and a focus, one point and two tangents are soluble (very conveniently by employing the principle of reciprocation). Of practical importance are the following constructions:—(1) Given the axes; (2) given the major axis and the foci; (3) given the focus, eccentricity and directrix; (4) to construct an ellipse (approximately) by means of circular arcs.

(1) If the axes be given, we may avail ourselves of several constructions. (*a*) Let AA′, BB′ be the axes intersecting at right angles in a point C. Take a strip of paper or rule and mark off from a point P, distances P*a* and P*b* equal respectively to CA and CB. If now the strip be moved so that the point *a* is always on the minor axis, and the point *b* on the major axis, the point P describes the ellipse. This is known as the *trammel* construction.

(*b*) Let AA′, BB′ be the axes as before; describe on each as diameter a circle. Draw any number of radii of the two circles, and from the points of intersection with the major circle draw lines parallel to the minor axis, and from the points of intersection with the minor circle draw lines parallel to the major axis. The intersections of the lines drawn from corresponding points are points on the ellipse.

(2) If the major axis and foci be given, there is a convenient mechanical construction based on the property that the sum of the focal distances of any point is constant and equal to the major axis. Let AA′ be the axis and S, S′ the foci. Take a piece of thread of length AA′, and fix it at its extremities by means of pins at the foci. The thread is now stretched taut by a pencil, and the pencil moved; the curve traced out is the desired ellipse.

(3) If the directrix, focus and eccentricity be given, we may employ the general method for constructing a conic. Let S (fig. 2) be the focus, KX the directrix, X being the foot of the perpendicular from S to the directrix. Divide SX internally at A and externally at A′, so that the ratios SA/AX and SA′/A′X are each equal to the eccentricity. Then A, A′ are the vertices of the curve. Take any point R on the directrix, and draw the lines RAM, RSN; draw SL so that the angle LSN = angle NSA′. Let P be the intersection of the line SL with the line RAM, then it can be readily shown that P is a point on the ellipse. For, draw through P a line parallel to AA′, intersecting the directrix in Q and the line RSN in T. Then since XS and QT are parallel and are intersected by the lines RK, RM, RN, we have SA/AX = TP/PQ = SP/PQ, since the angle PST = angle PTS. By varying the position of R other points can be found, and, since the curve is symmetrical about both the major and minor axes, it is obvious that any point may be reflected in both the axes, thus giving 3 additional points.

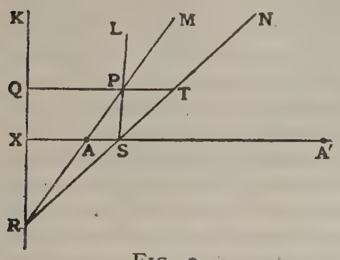

Fig. 2.

(4) If the axes be given, the curve can be approximately constructed by circular arcs in the following manner:—Let AA′, BB′ be the axes; determine D the intersection of lines through B and A parallel to the major and minor axes respectively. Bisect AD at E and join EB. Then the intersection of EB and DB′ determines a point P on the (true) curve. Bisect the chord PB at G, and draw through G a line perpendicular to PB, intersecting BB′ in O. An arc with centre O and radius OB forms part of a curve. Let this arc on the reverse side to P intersect a line through O parallel to the major axis in a point H. Then HA^1 will cut the circular arc in J. Let JO intersect the major axis in O_1. Then with centre O_1 and radius OJ, $=OA^1$, describe an arc. By reflecting the two arcs thus described over the centre the ellipse is approximately described.

ELLIPSOID, a quadric surface whose sections are ellipses. Analytically, it has for its equation $x^2/a^2+y^2/b^2+z^2/c^2=1$, a, b, c being its axes; the name is also given to the solid contained by this surface (see Geometry: *Analytical*). The solids and surfaces of revolution of the ellipse are sometimes termed ellipsoids, but it is advisable to use the name spheroid (*q.v.*).

The ellipsoid appears in the mathematical investigation of physical properties of media in which the particular property varies in three directions within the media; such properties are the elasticity, giving rise to the strain ellipsoid, thermal expansion, ellipsoid of expansion, thermal conduction, refractive index (see Crystallography), &c. In mechanics, the ellipsoid of gyration or inertia is such that the perpendicular from the centre to a tangent plane is equal to the radius of gyration of the given body about the perpendicular as axis; the "momental ellipsoid," also termed the "inverse ellipsoid of inertia" or Poinsot's ellipsoid, has the perpendicular inversely proportional to the radius of gyration; the "equimomental ellipsoid" is such that its moments of inertia about all axes are the same as those of a given body. (See Mechanics.)

ELLIPTICITY, in astronomy, deviation from a circular or spherical form; applied to the elliptic orbits of heavenly bodies, or the spheroidal form of such bodies. (See also Compression.)

ELLIS (originally Sharpe), **ALEXANDER JOHN** (1814–1890), English philologist, mathematician, musician and writer on phonetics, was born at Hoxton on the 14th of June 1814. He was educated at Shrewsbury, Eton, and Trinity College, Cambridge, and took his degree in high mathematical honours. He was connected with many learned societies as member or president, and was governor of University College, London. He was the first in England to reduce the study of phonetics to a science. His most important work, to which the greater part of his life was devoted, is *On Early English Pronunciation, with special reference to Shakespeare and Chaucer* (1869–1889), in five parts, which he intended to supplement by a sixth, containing an abstract of the whole, an account of the views and criticisms of other inquirers in the same field, and a complete index, but ill-health prevented him from carrying out his intention. He had long been associated with Isaac Pitman in his attempts to reform English spelling, and published *A Plea for Phonotypy and Phonography* (1845) and *A Plea for Phonetic Spelling* (1848); and contributed the articles on "Phonetics" and "Speech-sounds" to the 9th edition of the *Ency. Brit.* He translated (with considerable additions) Helmholtz's *Sensations of Tone as a physiological Basis for the Theory of Music* (2nd ed., 1885); and was the author of several smaller works on music, chiefly in connexion with his favourite subject phonetics. He died in London on the 28th of October 1890.

ELLIS, GEORGE (1753–1815), English author, was born in London in 1753. Educated at Westminster school and at Trinity College, Cambridge, he began his literary career by some satirical verses on Bath society published in 1777, and *Poetical Tales*, by "Sir Gregory Gander," in 1778. He contributed to the *Rolliad* and the *Probationary Odes* political satires directed against Pitt's administration. He was employed in diplomatic business at the Hague in 1784; and in 1797 he accompanied Lord Malmesbury to Lille as secretary to the embassy. On his return he was introduced to Pitt, and the episode of the *Rolliad*, which had not been forgotten, was explained. He found continued scope for his powers as a political caricaturist in the columns of the *Anti-Jacobin*, a weekly paper which he founded in connexion with George Canning and William Gifford. For some years before the *Anti-Jacobin* was started Ellis had been working in the congenial field of Early English literature, in which he was one of the first to arouse interest. The first edition of his *Specimens of the Early English Poets* appeared in 1790; and this was followed by *Specimens of Early English Metrical Romances* (1805). He also edited Gregory Lewis Way's translation of select *Fabliaux* in 1796. Ellis was an intimate friend of Sir Walter Scott, who styled him "the first converser I ever saw," and dedicated to him the fifth canto of *Marmion.* Some of the correspondence between them is to be found in Lockhart's *Life.* He died on the 10th of April 1815. The monument erected to his memory in the parish church of Gunning Hill, Berks, bears a fine inscription by Canning.

ELLIS, SIR HENRY (1777–1869), English antiquary, was born in London on the 29th of November 1777. He was educated at Merchant Taylors' school, and at St John's College, Oxford, of which he was elected a fellow. After having held for a few months a sub-librarianship in the Bodleian, he was in 1800 appointed to a similar post in the British Museum. In 1827 he became chief librarian, and held that post until 1856, when he resigned on account of advancing age. In 1832 William IV. made him a knight of Hanover, and in the following year he received an English knighthood. He died on the 15th of January 1869. Sir Henry Ellis's life was one of very considerable literary activity. His first work of importance was the preparation of a new edition of Brand's *Popular Antiquities*, which appeared in 1813. In 1816 he was selected by the commissioners of public records to write the introduction to Domesday Book, a task which he discharged with much learning, though several of his views have not stood the test of later criticism. His *Original Letters Illustrative of English History* (first series, 1824; second series, 1827; third series, 1846) are compiled chiefly from manuscripts in the British Museum and the State Paper Office, and have been of considerable service to historical writers. To the Library of Entertaining Knowledge he contributed four volumes on the Elgin and Townley Marbles. Sir Henry was for many years a director and joint-secretary of the Society of Antiquaries.

ELLIS, ROBINSON (1834–), English classical scholar, was born at Barming, near Maidstone, on the 5th of September 1834. He was educated at Elizabeth College, Guernsey, Rugby, and Balliol College, Oxford. In 1858 he became fellow of Trinity College, Oxford, and in 1870 professor of Latin at University College, London. In 1876 he returned to Oxford, where from 1883 to 1893 he held the university readership in Latin. In 1893 he succeeded Henry Nettleship as professor. His chief work has been on Catullus, whom he began to study in 1859. His first *Commentary on Catullus* (1876) aroused great interest, and called forth a flood of criticism. In 1889 appeared a second and enlarged edition, which placed its author in the first rank of authorities on Catullus. Professor Ellis quotes largely from the early Italian commentators, maintaining that the land where the Renaissance originated had done more for scholarship than is commonly recognized. He has supplemented his critical work by a translation (1871, dedicated to Tennyson) of the poems in the metres of the originals. Another author to whom Professor Ellis has devoted many years' study is Manilius, the astrological poet. In 1891 he published *Noctes Manilianae*, a series of dissertations on the *Astronomica*, with emendations. He has also treated Avianus, Velleius Paterculus and the Christian poet Orientius, whom he edited for the Vienna *Corpus Scriptorum Ecclesiasticorum*. He edited the *Ibis* of Ovid, the *Aetna* of the younger Lucilius, and contributed to the *Anecdota Oxoniensia* various unedited Bodleian and other manuscripts. In 1907 he published *Appendix Vergiliana* (an edition of the minor poems); in 1908 *The Annalist Licinianus*.

ELLIS, WILLIAM (1794–1872), English Nonconformist missionary, was born in London on the 29th of August 1794. His boyhood and youth were spent at Wisbeach, where he worked as a market-gardener. In 1814 he offered himself to the London Missionary Society, and was accepted. During a year's training he acquired some knowledge of theology and of various practical arts, such as printing and bookbinding. He sailed for the South Sea Islands in January 1816, and remained in Polynesia, occupying various stations in succession, until 1824, when he was compelled to return home on account of the state of his wife's health. Though the period of his residence in the islands was thus comparatively short, his labours were very fruitful, contributing perhaps as much as those of any other missionary to bring about the extraordinary improvement in the religious, moral and social condition of the Pacific Archipelago that took place during the 19th century. Besides promoting the spiritual object of his mission, he introduced many other aids to the improvement of the condition of the people. His gardening experience enabled him successfully to acclimatize many species of tropical fruits and plants, and he set up and worked the first printing press in the South Seas. Returning home by way of the United States, where he advocated his work, Ellis was for some years employed as a travelling agent of the London Missionary Society, and in 1832 was appointed foreign secretary to the society, an office which he held for seven years. In 1837 he married his second wife, Sarah Stickney, a writer and teacher of some note in her generation. In 1841 he went to live at Hoddesdon, Herts, and ministered to a small Congregational church there. On behalf of the London Missionary Society he paid three visits to Madagascar (1853–1857), inquiring into the prospects for resuming the work that had been suspended by Queen Ranavolona's hostility. A further visit was paid in 1863. Ellis wrote accounts of all his travels, and Southey's praise (in the *Quarterly Review*) of his *Polynesian Researches* (2 vols., 1829) finds many echoes. He was a fearless, upright and tactful man, and a keen observer of nature. He died on the 25th of June 1872.

ELLISTON, ROBERT WILLIAM (1774–1831), English actor, was born in London on the 7th of April 1774, the son of a watchmaker. He was educated at St Paul's school, but ran away from home and made his first appearance on the stage as Tressel in *Richard III.* at Bath in 1791. Here he was later seen as Romeo, and in other leading parts, both comic and tragic, and he repeated his successes in London from 1796. He acted at Drury Lane from 1804 to 1809, and again from 1812; and from 1819 he was the lessee of the house, presenting Kean, Mme Vestris and Macready. Ill-health and misfortune culminated in his bankruptcy in 1826, when he made his last appearance at Drury Lane as Falstaff. But as lessee of the Surrey theatre he acted almost up to his death, which was hastened by intemperance. Leigh Hunt compared him favourably with Garrick; Byron thought him inimitable in high comedy; Macready praised his versatility. Elliston was the author of *The Venetian Outlaw* (1805), and, with Francis Godolphin Waldron, of *No Prelude* (1803), in both of which plays he appeared.

ELLORA, a village of India in the native state of Hyderabad, near the city of Daulatabad, famous for its rock temples, which are among the finest in India. They are first mentioned by Ma'sudi, the Arabic geographer of the 10th century, but merely as a celebrated place of pilgrimage. The caves differ from those of Ajanta in consequence of their being excavated in the sloping sides of a hill and not in a nearly perpendicular cliff. They extend along the face of the hill for a mile and a quarter, and are divided into three distinct series, the Buddhist, the Brahmanical and the Jain, and are arranged almost chronologically. The most splendid of the whole series is the Kailas, a perfect Dravidian temple, complete in all its parts, characterized by Fergusson as one of the most wonderful and interesting monuments of architectural art in India. It is not a mere interior chamber cut in the rock, but is a model of a complete temple such as might have been erected on the plain. In other words, the rock has been cut away externally as well as internally. First the great sunken court measuring 276 ft. by 154 ft. was hewn out of the solid trap-rock of the hillside, leaving the rock mass of the temple wholly detached in a cloistered court like a colossal boulder, save that a rock bridge once connected the upper storey of the temple with the upper row of galleried chambers surrounding three sides of the court. Colossal elephants and obelisks stand on either side of the open mandapam, or pavilion, containing the sacred bull; and beyond rises the monolithic Dravidian temple to Siva, 90 ft. in height, hollowed into vestibule, chamber and image-cells, all lavishly carved. Time and earthquakes have weathered and broken away bits of the great monument, and Moslem zealots strove to destroy the carved figures, but these defects are hardly noticed. The temple was built by Krishna I., Rashtrakuta, king of Malkhed in 760–783.

ELLORE, a town of British India, in the Kistna district of Madras, on the East Coast railway, 303 m. from Madras. Pop. (1901) 33,521. The two canal systems of the Godavari and the Kistna deltas meet here. There are manufactures of cotton and saltpetre, and an important Church of England high school. Ellore was formerly a military station, and the capital of the Northern Circars. At Pedda Vegi to the north of it are extensive ruins, which are believed to be remains of the Buddhist kingdom of Vengi. From these the Mahommedans, after their conquest of the district in 1470, obtained material for building a fort at Ellore.

ELLSWORTH, OLIVER (1745–1807), American statesman and jurist, was born at Windsor, Connecticut, on the 29th of April 1745. He studied at Yale and Princeton, graduating from the latter in 1766, studied theology for a year, then law, and began to practise at Hartford in 1771. He was state's attorney for Hartford county from 1777 to 1785, and achieved extraordinary success at the bar, amassing what was for his day a large fortune. From 1773 to 1775 he represented the town of Windsor in the general assembly of Connecticut, and in the latter year became a member of the important commission known as the "Pay Table," which supervised the colony's expenditures for military purposes during the War of Independence. In 1779 he again sat in the assembly, this time representing Hartford. From 1777 to 1783 he was a member of the Continental Congress, and in this body he served on three important committees, the marine committee, the board of treasury, and the committee of appeals, the predecessors respectively of the navy and treasury departments and the Supreme Court under the Federal Constitution. From 1780 to 1785 he was a member of the governor's council of Connecticut, which, with the lower house before 1784 and alone from 1784 to 1807, constituted a supreme court of errors; and from 1785 to 1789 he was a judge of the state superior court. In 1787, with Roger Sherman and William Samuel Johnson (1727–1819), he was one of Connecticut's delegates to the constitutional convention at Philadelphia, in which his services were numerous and important. In particular, when disagreement seemed inevitable on the question of representation, he, with Roger Sherman, proposed what is known as the "Connecticut Compromise," by which the Federal legislature was made to consist of two houses, the upper having equal representation from each state, the lower being chosen on the basis of population. Ellsworth also made a determined stand against a national paper currency. Being compelled to leave the convention before its adjournment, he did not sign the instrument, but used his influence to secure its ratification by his native state. From 1789 to 1796 he was one of the first senators from Connecticut under the new Constitution. In the senate he was looked upon as President Washington's personal spokesman and as the leader of the Administration party. His most important service to his country was without a doubt in connexion with the establishment of the Federal judiciary. As chairman of the committee having the matter in charge, he drafted the bill by the enactment of which the system of Federal courts, almost as it is to-day, was established. He also took a leading part in the senate in securing the passage of laws for funding the national debt, assuming the state debts and establishing a United States bank. It was Ellsworth who suggested to Washington the sending of John Jay to England to negotiate a new treaty with Great Britain, and he probably did more than any other man to induce the senate, despite widespread and violent opposition, to ratify that treaty when negotiated. By President Washington's appointment he became chief justice of the Supreme Court of the United States in March 1796, and in 1799 President John Adams sent him, with William Vans Murray (1762–1803) and William R. Davie (1756–1820), to negotiate a new treaty with France. It was largely through the influence of Ellsworth, who took the principal part in the negotiations, that Napoleon consented to a convention, of the 30th of September 1800, which secured for citizens of the United States their ships captured by France but not yet condemned as prizes, provided for freedom of commerce between the two nations, stipulated that "free ships shall give a freedom to goods," and contained provisions favourable to neutral commerce. While he was abroad, failing health compelled him (1800) to resign the chief-justiceship, and after some months in England he returned to America in 1801. In 1803 he was again elected to the governor's council, and in 1807, on the reorganization of the Connecticut judiciary, was appointed chief justice of the new Supreme Court. He never took office, however, but died at his home in Windsor on the 27th of November 1807.

See W. G. Brown's *Oliver Ellsworth* (New York, 1905), an excellent biography. There is also an appreciative account of Ellsworth's life and work in H. C. Lodge's *A Fighting Frigate, and Other Essays and Addresses* (New York, 1902), which contains in an appendix an interesting letter by Senator George F. Hoar concerning Ellsworth's work in the constitutional convention.

ELLSWORTH, a city, port of entry and the county seat of Hancock county, Maine, U.S.A., at the head of navigation on the Union river (and about 3¾ m. from its mouth), about 30 m. S.E. of Bangor. Pop. (1890) 4804; (1900) 4297 (189 foreign-born); (1910) 3549. It is served by the Maine Central railway. The fall of the river, about 85 ft. in 2 m., furnishes good water-power, and the city has various manufactures, including lumber, shoes, woollens, sails, carriages and foundry and machine shop products, besides a large lumber trade. Shipbuilding was formerly important. There is a large United States fish hatchery here. The city is the port of entry for the Frenchman's Bay customs district, but its foreign trade is unimportant. Ellsworth was first settled in 1763 and for some time was called New Bowdoin; but when it was incorporated as a town in 1800 the present name was adopted in honour of Oliver Ellsworth. A city charter was secured in 1869.

ELLWANGEN, a town of Germany in the kingdom of Württemberg, on the Jagst, 12 m. S.S.E. from Crailsheim on the railway to Goldshöfe. Pop. 5000. It is romantically situated between two hills, one crowned by the castle of Hohen-Ellwangen, built in 1354 and now used as an agricultural college, and the other, the Schönenberg, by the pilgrimage church of Our Lady of Loreto, in the Jesuit style of architecture. The town possesses one Evangelical and five Roman Catholic churches, among the latter the Stiftskirche, the old abbey church, a Romanesque building dating from 1124, and the Gothic St Wolfgangskirche. The classical and modern schools (Gymnasium and Realschule) occupy the buildings of a suppressed Jesuit college. The industries include the making of parchment covers, of envelopes, of wooden hafts and handles for tools, &c., and tanneries. There are also a wool-market and a horse-market, the latter famous in Germany.

The Benedictine abbey of Ellwangen is said to have been founded in 764 by Herulf, bishop of Langres; there is, however, no record of it before 814. In 1460 the abbey was converted, with the consent of Pope Pius II., into a *Ritterstift* (college or institution for noble pensioners) under a secular provost, who, in 1555, was raised to the dignity of a prince of the Empire. The provostship was secularized in 1803 and its territories were assigned to Württemberg. The town of Ellwangen, which grew up round the abbey and received the status of a town about the middle of the 14th century, was until 1803 the capital of the provostship.

See Seckler, *Beschreibung der gefürsteten Probstei Ellwangen* (Stuttgart, 1864); *Beschreibung des Oberamts Ellwangen*, published by the statistical bureau (Landesamt) at Ellwangen (1888). For a list of the abbots and provosts see Stokvis, *Manuel d'histoire* (Leiden, 1890–1893), iii. p. 242.

ELLWOOD, THOMAS (1639–1714), English author, was born at Crowell, in Oxfordshire, in 1639. He is chiefly celebrated for his connexion with Milton, and the principal facts of his life are related in a very interesting autobiography, which contains much information as to his intercourse with the poet. While he was still young his father removed to London, where Thomas became acquainted with a Quaker family named Pennington, and was led to join the Society of Friends, a connexion which subjected him to much persecution. It was through the Penningtons that he was introduced in 1662 to Milton in the capacity of Latin reader. He spent nearly every afternoon in the poet's house in Jewin Street, until the intercourse was interrupted by an illness which compelled him to go to the country. After a period of imprisonment in the old Bridewell prison and in Newgate for Quakerism, Ellwood resumed his visits to Milton, who was now residing at a house his friend had taken for him at Chalfont St Giles. In 1665 Ellwood was again arrested and imprisoned in Aylesbury gaol. When he visited Milton after his release the poet gave him the manuscript of the *Paradise Lost* to read. On returning the manuscript Ellwood said, "Thou hast said much here of Paradise lost; but what hast thou to say of Paradise found?" and when Milton long afterwards in London showed him *Paradise Regained*, it was with the remark, "This is owing to you, for you put it into my head at Chalfont." Ellwood was the friend of Fox and Penn, and was the author of several polemical works in defence of the Quaker position, of which *Forgery no Christianity* (1674) and *The Foundation of Tithes Shaken* (1678) deserve mention. His *Sacred Histories of the Old and New Testaments* appeared in 1705 and 1709. He also published some volumes of poems, among them a *Davideis* in five books. He died on the 1st of March 1714.

The History of the Life of Thomas Ellwood: written by his own hand (1714) has been many times reprinted.

ELM, the popular name for the trees and shrubs constituting the genus *Ulmus*, of the natural order Ulmaceae. The genus contains fifteen or sixteen species widely distributed throughout the north temperate zone, with the exception of western North America, and extending southwards as far as Mexico in the New and the Sikkim Himalayas in the Old World.

The common elm, *U. campestris*, a doubtful native of England, is found throughout a great part of Europe, in North Africa and in Asia Minor, whence it ranges as far east as north Asia and Japan. It grows in woods and hedge-rows, especially in the southern portion of Britain, and on almost all soils, but thrives best on a rich loam, in open, low-lying, moderately moist situations, attaining a height of 60 to 100, and in some few cases as much as 130 or 150 ft. The branches are numerous and spreading, and often pendulous at the extremities; the bark is rugged; the leaves are alternate, ovate, rough, doubly serrate, and, as in other species of *Ulmus*, unequal at the base. The flowers are small, hermaphrodite, numerous, in purplish-brown tufts, and each with a fringed basal bract; the bell-shaped calyx is often four-toothed and surrounds four free stamens; the pistil bears two spreading hairy styles. They appear before the leaves in March and April. The seed-vessels are green, membranous, one-seeded and deeply cleft. Unlike the wych elm, the common elm rarely perfects its seed in England, where it is propagated by means of root suckers from old trees, or preferably by layers from stools. In the first ten years of its growth it ordinarily reaches a height of 25 to 30 ft. The wood, at first brownish white, becomes, with growth, of a brown colour having a greenish shade. It is close-grained, free from knots, without apparent medullary rays, and is hard and tough, but will not take a polish. All parts of the trunk, including the sapwood, are available in carpentry. By drying, the wood loses over 60% of its weight, and has then a specific gravity of 0·588. It has considerable transverse strength, does not crack when once seasoned, and is remarkably durable under water, or if kept quite dry; though it decays rapidly on exposure to the weather, which in ten to eighteen months causes the bark to fall off, and gives to the wood a yellowish colour—a sign of deterioration in quality. To prevent shrinking and warping it may be preserved in water or mud, but it is best worked up soon after felling. Analyses of the ash of the wood have given a percentage of 47·8% of lime, 21·9% of potash, and 13·7% of soda. In summer, elm trees often exude an alkaline gummy substance, which by the action of the air becomes the brown insoluble body termed *ulmin*. Elm wood is used for keels and bilge-planks, the blocks and dead-eyes of rigging, and ships' pumps, for coffins, wheels, furniture, carved and turned articles, and for general carpenters' work; and previous to the common employment of cast iron was much in request for waterpipes. The inner bark of the elm is made into bast mats and ropes. It contains mucilage, with a little tannic acid, and was formerly much employed for the preparation of an antiscorbutic decoction, now obsolete. The bark of *Ulmus fulva*, the slippery or red elm of the United States and Canada, serves the North American Indians for the same purpose, and also as a vulnerary. The leaves as well as the young shoots of elms have been found a suitable food for live stock. For ornamental purposes elm trees are frequently planted, and in avenues, as at the park of Stratfieldsaye, in Hampshire, are highly effective. They were first used in France for the adornment of public walks in the reign of Francis I. In Italy, as in ancient times, it is still customary to train the vine upon the elm—a practice to which frequent allusion has been made by the poets. The cork-barked elm, *U. campestris*, var. *suberosa*, is distinguished chiefly by the thick deeply fissured bark with which its branches are covered. There are numerous cultivated forms differing in size and shape of leaf, and manner of growth.

The Scotch or wych elm, *U. montana*, is indigenous to Britain and is the common elm of the northern portion of the island; it usually attains a height of about 50 ft., but among tall-growing trees may reach 120 ft. It has drooping branches and a smoother and thinner bark, larger and more tapering leaves, and a far less deeply notched seed-vessel than *U. campestris*. The wood, though more porous than in that species, is a tough and hard material when properly seasoned, and, being very flexible when steamed, is well adapted for boat-building. Branches of the wych elm were formerly manufactured into bows, and if forked were employed as divining-rods. The weeping elm, the most ornamental member of the genus, is a variety of this species. The Dutch or sand elm is a tree very similar to the wych elm, but produces inferior timber. The American or white elm, *U. americana*, is a hardy and very handsome species, of which the old tree on Boston (Mass.) Common was a representative. This tree is supposed to have been in existence before the settlement of Boston, and at the time of its destruction by the storm of the 15th of February 1876 measured 22 ft. in circumference.

ELMACIN (Elmakin or Elmacinus), **GEORGE** (*c.* 1223–1274), author of a history of the Saracens, which extends from the time of Mahomet to the year 1118 of our era. He was a Christian of Egypt, where he was born; is known in the east as Ibn-Amid; and after holding an official position under the sultans of Egypt, died at Damascus. His history is principally occupied with the affairs of the Saracen empire, but it contains passages which relate to the Eastern Christians. It was published in Arabic and Latin at Leiden in 1625. The Latin version is a translation by Erpenius, under the title, *Historia saracenica*, and from this a French translation was made by Wattier as *L'Histoire mahométane* (Paris, 1657).

ELMALI ("apple-town"), a small town of Asia Minor in the vilayet of Konia, the present administrative centre of the ancient Lycia, but not itself corresponding to any known ancient city. It lies about 25 m. inland, at the head of a long upland valley (5000 ft.) inhabited by direct descendants of the ancient Lycians, who have preserved a distinctive facial type, noticeable at once in the town population. There are about fifty Greek families, the rest of the population (4000) being Moslem. The district is agricultural and has no manufactures of importance.

ELMES, HARVEY LONSDALE (1813–1847), British architect, son of James Elmes (*q.v.*), was born at Chichester in 1813. After serving some time in his father's office, and under a surveyor at Bedford and an architect at Bath, he became partner with his father in 1835, and in the following year he was successful among 86 competitors for a design for St George's Hall, Liverpool. The foundation stone of this building was laid on the 28th of June 1838, but, Elmes being successful in a competition for the Assize Courts in the same city, it was finally decided to include the hall and courts in a single building. In accordance with this idea, Elmes prepared a fresh design, and the work of erection commenced in 1841. He superintended its progress till 1847, when from failing health he was compelled to delegate his duties to Charles Robert Cockerell, and leave for Jamaica, where he died of consumption on the 26th of November 1847.

ELMES, JAMES (1782–1862), British architect, civil engineer, and writer on the arts, was born in London on the 15th of October 1782. He was educated at Merchant Taylors' school, and, after studying building under his father, and architecture under George Gibson, became a student at the Royal Academy, where he gained the silver medal in 1804. He designed a large number of buildings in the metropolis, and was surveyor and civil engineer to the port of London, but is best known as a writer on the arts. In 1809 he became vice-president of the Royal Architectural Society, but this office, as well as that of surveyor of the port of London, he was compelled through partial loss of sight to resign in 1828. He died at Greenwich on the 2nd of April 1862. His publications were:—*Sir Christopher Wren and his Times* (1823); *Lectures on Architecture* (1823); *The Arts and Artists* (1825); *General and Biographical Dictionary of the Fine Arts* (1826); *Treatise on Architectural Jurisprudence* (1827), and *Thomas Clarkson: a Monograph* (1854).

ELMHAM, THOMAS (d. *c.* 1420), English chronicler, was probably born at North Elmham in Norfolk. He became a Benedictine monk at Canterbury, and then joining the Cluniacs was prior of Lenton Abbey, near Nottingham; he was chaplain to Henry V., whom he accompanied to France in 1415, being present at Agincourt. Elmham wrote a history of the monastery of St Augustine at Canterbury, which has been edited by C. Hardwick for the Rolls Series (1858); and a *Liber metricus de Henrico V.*, edited by C. A. Cole in the *Memorials of Henry V.* (1858). It is very probable that Elmham wrote the famous *Gesta Henrici Quinti*, which is the best authority for the life of Henry V. from his accession to 1416. This work, often referred to as the "chaplain's life," and thought by some to have been written by Jean de Bordin, has been published for the English Historical Society by B. Williams (1850). Elmham, however, did not write the *Vita et Gesta Henrici V.*, which was attributed to him by T. Hearne and others.

See C. L. Kingsford, *Henry V.* (1901).

ELMINA, a town on the Gold Coast, British West Africa, in 5° 4′ N., 1° 20′ W. and about 8 m. W. of Cape Coast. Pop. about 4000. Facing the Atlantic on a rocky peninsula is Fort St George, considered the finest fort on the Guinea coast. It is built square with high walls, and has accommodation for 200 soldiers. On the land side were formerly two moats, cut in the rock on which the castle stands. The castle is the residence of the commissioner of the district and other officials. The houses in the native quarter are mostly built of stone, that material being plentiful in the vicinity.

Elmina is the earliest European settlement on the Gold Coast, and was visited by the Portuguese in 1481. Christopher Columbus is believed to have been one of the officers who took part in this voyage. The Portuguese at once began to build the castle now known as Fort St George, but it was not completed till eighty years afterwards. Another defensive work is Fort St Jago, built in 1666, which is behind the town and at some distance from the coast. (In the latter half of the 19th century it was converted into a prison.) Elmina was captured by the Dutch in 1637, and ceded to them by treaty in 1640. They made it the chief port for the produce of Ashanti. With the other Dutch possessions on the Guinea coast, it was transferred to Great Britain in April 1872. The king of Ashanti, claiming to be ground landlord, objected to its transfer, and the result was the Ashanti war of 1873–1874. For many years the greatest output of gold from this coast came from Elmina. The annual export is said to have been nearly £3,000,000 in the early years of the 18th century, but the figure is probably exaggerated. Since 1900 the bulk of the export trade in gold has been transferred to Sekondi (*q.v.*). Prempeh, the ex-king of Ashanti, was detained in the castle (1896) until his removal to the Seychelles. (See ASHANTI: *History*, and GOLD COAST: *History*.)

ELMIRA, a city and the county-seat of Chemung county, New York, U.S.A., 100 m. S.E. of Rochester, on the Chemung river, about 850 ft. above sea-level. Pop. (1890) 30,893; (1900) 35,672, of whom 5511 were foreign-born (1988 Irish and 1208 German); (1910 census) 37,176. It is served by the Erie, the Pennsylvania, the Delaware, Lackawanna & Western, the Lehigh Valley, and the Tioga Division railways, the last of which connects it with the Pennsylvania coalfields 48 m. away. The city is attractively situated on both sides of the river, and has a fine water-supply and park system, among the parks being Eldridge, Rorick's Glen, Riverside, Brand, Diven, Grove, Maple Avenue and Wisner; in the last-named is a statue of Thomas K. Beecher by J. S. Hartley. The city contains a Federal building, a state armoury, the Chemung county court house and other county buildings, the Elmira orphans' home, the Steele memorial library, home for the aged, the Arnot-Ogden memorial hospital, the Elmira free academy, and the Railway-Commerical training school. Here, also, is Elmira College (Presbyterian) for women, founded in 1855. This institution, chartered in 1852 as Auburn Female University and then situated in Auburn, was rechartered in 1855 as the Elmira Female College; it was established largely through the influence and persistent efforts of the Rev. Samuel Robbins Brown (1810–1880) and his associates, notably Simeon Benjamin of Elmira, who gave generously to the newly founded college, and was the first distinctively collegiate institution for women in the United States, and the first, apparently, to grant degrees to women. The most widely known institution in the city is the Elmira reformatory, a state prison for first offenders between the ages of sixteen and thirty, on a system of general indeterminate sentences. Authorized by the state legislature in 1866 and opened in 1876 under the direction of Zebulon Reed Brockway (b. 1827), it was the first institution of the sort and has served as a model for many similar institutions both in the United States and in other countries (see JUVENILE OFFENDERS). Elmira is an important railway centre, with large repair shops, and has also extensive manufactories (value of production in 1900, $8,558,786, of which $6,596,603 was produced under the "factory system"; in 1905, under the "factory system," $6,984,095), including boot and shoe factories, a large factory for fire-extinguishing apparatus, iron and steel bridge works, steel rolling mills, large valve works, steel plate mills, knitting mills, furniture, glass and boiler factories, breweries and silk mills. Near the site of Elmira occurred on the 29th of August 1779 the battle of Newtown, in which General John Sullivan decisively defeated a force of Indians and Tories under Sir John Johnson and Joseph Brant. There were some settlers here at the close of the War of Independence, but no permanent settlement was made until 1788. The village was incorporated as Newtown in 1815, and was reincorporated as Elmira in 1828. A city charter was secured in 1864. In 1861 a state military camp was established here, and in 1864–1865 there was a prison camp here for Confederate soldiers.

ELMSHORN, a town of Germany, in the Prussian province of Schleswig-Holstein, on the Krückau, 19 m. by rail N.W. from Altona. Pop. (1905) 13,640. Its industries include weaving, dyeing, brewing, iron-founding and the manufacture of leather goods, boots and shoes and machines. There is a considerable shipping trade.

ELMSLEY, PETER (1773–1825), English classical scholar. He was educated at Westminster and Christ Church, Oxford, and having inherited a fortune from his uncle, a well-known bookseller, devoted himself to the study of classical authors and manuscripts. In 1798 he was appointed to the chapelry of Little Horkesley in Essex, which he held till his death. He travelled extensively in France and Italy, and spent the winter of 1818 in examining the MSS. in the Laurentian library at Florence. In 1819 he was commissioned, with Sir Humphry Davy, to decipher the papyri found at Herculaneum, but the results proved insignificant. In 1823 he was appointed principal of St Alban's Hall, Oxford, and Camden professor of ancient history. He died in Oxford on the 8th of March 1825. Elmsley was a man of most extensive learning and European reputation, and was considered to be the best ecclesiastical scholar in England. But it is chiefly by his collation of the MSS. of the Greek tragedians and his critical labours on the restoration of their text that he will be remembered. He edited the *Acharnians* of Aristophanes, and several of the plays and scholia of Sophocles and Euripides. He was the first to recognize the importance of the Laurentian MS. (see Sandys, *Hist. of Class. Schol.* iii. (1908).

ELNE, a town of south-western France in the department of Pyrénées-Orientales, 10 m. S.S.E. of Perpignan by rail. Pop. (1906) 3026. The hill on which it stands, once washed by the sea, which is now over 3 m. distant, commands a fine view over the plain of Roussillon. From the 6th century till 1602 the town was the seat of a bishopric, which was transferred to Perpignan. The cathedral of St Eulalie, a Romanesque building completed about the beginning of the 12th century, has a beautiful cloister in the same style, with interesting sculptures and three early Christian sarcophagi. Remains of the ancient ramparts flanked by towers are still to be seen. Silk-worm cultivation is carried on. Elne, the ancient *Illiberis*, was named *Helena* by the emperor Constantine in memory of his mother. Hannibal encamped under its walls on his march to Rome in 218 B.C. The emperor Constans was assassinated there in A.D. 350. The town several times sustained siege and capture between its occupation by the Moors in the 8th century and its capitulation in 1641 to the troops of Louis XIII.

EL OBEID, chief town of the mudiria (province) of Kordofan, Anglo-Egyptian Sudan, and 230 m. S.W. by S. of Khartum in a direct line. Pop. (1905) about 10,000. It is situated about 2000 ft. above the sea, at the northern foot of Jebel Kordofan, in 13° 11′ N. and 30° 14′ E. It is an important trade centre, the chief articles of commerce being gum, ivory, cattle and ostrich feathers. A considerable part of the trade of Darfur with Egypt passes through El Obeid.

El Obeid, which appears to be a place of considerable antiquity and the ancient capital of the country, was garrisoned by the Egyptians on their conquest of Kordofan in 1821. In September 1882 the town was assaulted by the troops of the mahdi, who, being repulsed, laid siege to the place, which capitulated on the 17th of January 1883. During the Mahdia the city was destroyed and deserted, and when Kordofan passed, in 1899, into the possession of the Anglo-Egyptian authorities nothing was left of El Obeid but a part of the old government offices. A new town was laid out in squares, the mudiria repaired and barracks built. (See KORDOFAN, and SUDAN: *Anglo-Egyptian.*)

ELOI [ELIGIUS], **SAINT** (588–659), apostle of the Belgians and Frisians, was born at Cadillac, near Limoges, in 588. Having at an early age shown artistic talent he was placed by his parents with the master of the mint at Limoges, where he made rapid progress in goldsmith's work. He became coiner to Clotaire II., king of the Franks, and treasurer to his successor Dagobert. Both kings entrusted him with important works, among which were the composition of the bas-reliefs which ornament the tomb of St Germain, bishop of Paris, and the execution (for Clotaire) of two chairs of gold, adorned with jewels, which at that time were reckoned *chefs-d'œuvre.* Though he was amassing great wealth, Eloi acquired a distaste for a worldly life, and resolved to become a priest. At first he retired to a monastery, but in 640 was raised to the bishopric of Noyon. He made frequent missionary excursions to the pagans of the Low Countries, and also founded a great many monasteries and churches. He died on the 1st of December 659. A mass of legend has gathered round the life of St Eloi, who as the patron saint of goldsmiths is still very popular.

His life was written by his friend and contemporary St Ouen (Audoenus); French translations of the *Vita S. Eligii auctore Audoeno* were published by L. de Montigny (Paris, 1626), by C. Barthélemy in *Études hist., litt. et art.* (*ib.* 1847), and by Parenty, with notes (2nd ed., *ib.* 1870). For bibliography see Potthast, *Bibliotheca hist. med. aevi* (Berlin, 1896), s.v. "Vita S. Eligii Noviomensis," and Ulysse Chevalier, *Rép. des sources hist., Bio-bibl.* (Paris, 1894), s. "Eloi."

ELONGATION, strictly "lengthening"; in astronomy, the apparent angular distance of a heavenly body from its centre of motion, as seen from the earth; designating especially the angular distance of the planet Mercury or Venus from the sun, or the apparent angle between a satellite and its primary. The greatest elongation of Venus is about 45°; that of Mercury generally ranges between 18° and 27°.

EL PASO, a city, port of entry, and the county-seat of El Paso county, Texas, U.S.A., on the E. bank of the Rio Grande, in the extreme W. part of the state, at an altitude of 3710 ft. Pop. (1880) 736; (1890) 10,338; (1900) 15,906, of whom 6309 were foreign-born and 466 were negroes; (1910 census) 39,279. Many of the inhabitants are of Mexican descent. El Paso is an important railway centre and is served by the following railways: the Atchison, Topeka & Santa Fé, of which it is the S. terminus; the El Paso & South-Western, which connects with the Chicago, Rock Island & El Paso (of the Rock Island system); the Galveston, Harrisburg & San Antonio, of which it is the W. terminus; the Mexican Central, of which it is the N. terminus; the Texas & Pacific, of which it is the W. terminus; a branch of the Southern Pacific, of which it is the E. terminus; and the short Rio Grande, Sierra Madre & Pacific, of which it is the N. terminus. The city is regularly laid out on level bottom lands, stretching to the table-lands and slopes to the N.E. and N.W. of the city. Opposite, on the W. bank of the river, is the Mexican town of Ciudad Juarez (until 1885 known as Paso del Norte), with which El Paso is connected by bridges and by electric railway. The climate is mild, warm and dry, El Paso being well known as a health resort, particularly for sufferers from pulmonary complaints. Among the city's public buildings are a handsome Federal building, a county court house, a city hall, a Y.M.C.A. building, a public library, a sanatorium for consumptives, and the Hotel Dieu, a hospital maintained by Roman Catholics. El Paso is the seat of St Joseph's Academy and of the El Paso Military Institute. Three miles E. of the city limits is Fort Bliss, a U.S. military post, with a reservation of about 2 sq. m. El Paso's situation on the Mexican frontier gives it a large trade with Mexico; it is the port of entry of the Paso del Norte customs district, one of the larger Mexican border districts, and in 1908 its imports were valued at $2,677,784 and its exports at $5,661,901. Wheat, boots and shoes, mining machinery, cement, lime, lumber, beer, and denatured alcohol are among the varied exports; the principal imports are ore, sugar, cigars, oranges, drawn work and Mexican curios. El Paso has extensive manufactories, especially railway car shops, which in 1905 employed 34·5% of the factory wage-earners. Just outside the city limits are important lead smelting works, to which are brought ores for treatment from western Texas, northern Mexico, New Mexico and Arizona. Among the city's manufactures are cement, denatured alcohol, ether, varnish, clothing and canned goods. The value of the city's total factory product in 1905 was $2,377,813, 96% greater than that in 1900. El Paso lies in a fertile agricultural valley, and in 1908 the erection of an immense dam was begun near Engle, New Mexico (100 m. above El Paso), by the U.S. government, to store the flood waters of the Rio Grande for irrigating this area. Before the Mexican War, following which the first United States settlement was made, the site of El Paso was known as Ponce de Leon Ranch, the land being owned by the Ponce de Leon family. El Paso was first chartered as a city in 1873, and in 1907 adopted the commission form of government.

ELPHINSTONE, MOUNTSTUART (1779–1859), Indian statesman and historian, fourth son of the 11th Baron Elphinstone in the peerage of Scotland, was born in 1779. Having received an appointment in the civil service of the East India Company, of which one of his uncles was a director, he reached Calcutta in the beginning of 1796. After filling several subordinate posts, he was appointed in 1801 assistant to the British resident at Poona, at the court of the peshwa, the most powerful of the Mahratta princes. Here he obtained his first opportunity of distinction, being attached in the capacity of diplomatist to the mission of Sir Arthur Wellesley to the Mahrattas. When, on the failure of negotiations, war broke out, Elphinstone, though a civilian, acted as virtual aide-de-camp to General Wellesley. He was present at the battle of Assaye, and displayed such courage and knowledge of tactics throughout the whole campaign that Wellesley told him he had mistaken his profession, and that he ought to have been a soldier. In 1804, when the war closed, he was appointed British resident at Nagpur. Here, the times being uneventful and his duties light, he occupied much of his leisure in reading classical and general literature, and acquired those studious habits which clung to him throughout life. In 1808 he was appointed the first British envoy to the court of Kabul, with the object of securing a friendly alliance with the Afghans; but this proved of little value, because Shah Shuja was driven from the throne by his brother before it could be ratified. The most valuable permanent result of the embassy was the literary fruit it bore several years afterwards in Elphinstone's great work on Kabul. After spending about a year in Calcutta arranging the report of his mission, Elphinstone was appointed in 1811 to the important and difficult post of resident at Poona. The difficulty arose from the general complication of Mahratta politics, and especially from the weak and treacherous character of the peshwa, which Elphinstone rightly read from the first. While the mask of friendship was kept up Elphinstone carried out the only suitable policy, that of vigilant quiescence, with admirable tact and patience; when in 1817 the mask was thrown aside and the peshwa ventured to declare war, the English resident proved for the second time the truth of Wellesley's assertion that he was born a soldier. Though his own account of his share in the campaign is characteristically modest, one can gather from it that the success of the British troops was chiefly owing to his assuming the command at an important crisis during the battle of Kirkee.

The peshwa being driven from his throne, his territories were annexed to the British dominions, and Elphinstone was nominated commissioner to administer them. He discharged the responsible task with rare judgment and ability. In 1819 he was appointed lieutenant-governor of Bombay and held this post till 1827, his principal achievement being the compilation of the "Elphinstone code." He may fairly be regarded as the founder of the system of state education in India, and he probably did more than any other Indian administrator to further every likely scheme for the promotion of native education. His connexion with the Bombay presidency was appropriately commemorated in the endowment of the Elphinstone College by the native communities, and in the erection of a marble statue by the European inhabitants.

Returning to England in 1829, after an interval of two years' travel, Elphinstone retained in his retirement and enfeebled health an important influence on public affairs. He twice refused the offer of the governor-generalship of India. Long before his return he had made his reputation as an author by his *Account of the Kingdom of Cabul and its Dependencies in Persia and India* (1815). Soon after his arrival in England he commenced the preparation of a work of wider scope, a history of India, which was published in 1841. It embraces the Hindu and Mahommedan periods, and is still a work of high authority. He died on the 20th of November 1859.

See J. S. Cotton, *Mountstuart Elphinstone* ("Rulers of India" series), (1892); T. E. Colebrooke, *Life of Mountstuart Elphinstone* (1884); and G. W. Forrest, *Official Writings of Mountstuart Elphinstone* (1884).

ELPHINSTONE, WILLIAM (1431–1514), Scottish statesman and prelate, founder of the university of Aberdeen, was born in Glasgow, and educated at the university of his native city, taking the degree of M.A. in 1452. After practising for a short time as a lawyer in the church courts, he was ordained priest, becoming rector of St Michael's church, Trongate, Glasgow, in 1465. Four years later he went to continue his studies at the university of Paris, where he became reader in canon law, and then, proceeding to Orleans, became lecturer in the university there. Before 1474 he had returned to Scotland, and was made rector of the university, and official of the see of Glasgow. Further promotion followed, but soon more important duties were entrusted to Elphinstone, who was made bishop of Ross in 1481. He was a member of the Scots parliament, and was sent by King James III. on diplomatic errands to Louis XI. of France, and to Edward IV. of England; in 1483 he was appointed bishop of Aberdeen, although his consecration was delayed for four years; and he was sent on missions to England, both before and after the death of Richard III. in 1485. Although he attended the meetings of parliament with great regularity he did not neglect his episcopal duties, and the fabric of the cathedral of Aberdeen owes much to his care. Early in 1488 the bishop was made lord high chancellor, but on the king's death in the following June he vacated this office, and retired to Aberdeen. As a diplomatist of repute, however, his services were quickly required by the new king, James IV., in whose interests he visited the kings of England and France, and the German king, Maximilian I. Having been made keeper of the privy seal in 1492, and having arranged a dispute between the Scotch and the Dutch, the bishop's concluding years were mainly spent in the foundation of the university of Aberdeen. The papal bull for this purpose was obtained in 1494, and the royal charter which made old Aberdeen the seat of a university is dated 1498. A small endowment was provided by the king, and the university, modelled on that of Paris and intended principally to be a school of law, soon became the most famous and popular of the Scots seats of learning, a result which was largely due to the wide experience and ripe wisdom of Elphinstone and of his friend, Hector Boece, the first rector. The building of the college of the Holy Virgin in Nativity, now King's College, was completed in 1506, and the bishop also rebuilt the choir of his cathedral, and built a bridge over the Dee. Continuing to participate in public affairs he opposed the policy of hostility towards England which led to the disaster at Flodden in September 1513, and died in Edinburgh on the 25th of October 1514. Elphinstone was partly responsible for the introduction of printing into Scotland, and for the production of the *Breviarium Aberdonense*. He may have written some of the lives in this collection, and gathered together materials concerning the history of Scotland; but he did not, as some have thought, continue the *Scotichronicon*, nor did he write the *Lives of Scottish Saints*.

See Hector Boece, *Murthlacensium et Aberdonensium episcoporum vitae*, edited and translated by J. Moir (Aberdeen, 1894); *Fasti Aberdonenses*, edited by C. Innes (Aberdeen, 1854); and A. Gardyne, *Theatre of Scottish Worthies and Lyf of W. Elphinston*, edited by D. Laing (Aberdeen, 1878).

EL RENO, a city and the county-seat of Canadian county, Oklahoma, U.S.A., on the N. fork of the Canadian river, about 26 m. W. of Oklahoma City. Pop. (1890) 285; (1900) 3383; (1907) 5370 (401 were of negro descent and 7 were Indians); (1910) 7872. It is served by the Chicago, Rock Island & Pacific, the Choctaw, Oklahoma & Gulf (owned by the Chicago, Rock Island & Pacific), and the St Louis, El Reno & Western railways, the last extending from El Reno to Guthrie. El Reno lies on the rolling prairie lands, about 1360 ft. above the sea, in an Indian corn, wheat, oats and cotton-producing and dairying region, and has a large grain elevator, a cotton compress, and various manufacturing establishments, among the products being flour, canned goods and crockery. El Reno has a Carnegie library, and within the city's limits is Bellamy's Lake (180 acres), a favourite resort. Near the city is a Government boarding school for the Indians of the Cheyenne and the Arapahoe Reservation. Fort Reno, a U.S. military post, was established near El Reno in 1876, and in 1908 became a supply depot of the quartermaster's department under the name of "Fort Reno Remount Depot." The first settlement here, apart from the fort, was made in the autumn of 1889; in 1892 El Reno received a city charter.

ELSFLETH, a maritime town of Germany, in the grand-duchy of Oldenburg, in a fertile district at the confluence of the Hunte with the Weser, on the railway Hude-Nordenham. Pop. 2000. It has an Evangelical church, a school of navigation, a harbour and docks. It has considerable trade in corn and timber and is one of the centres of the North Sea herring fishery.

ELSINORE (Dan. *Helsingör*), a seaport of Denmark in the *amt* (county) of Frederiksborg, on the east coast of the island of Zealand, 28 m. N. of Copenhagen by rail. Pop. (1901) 13,902. It stands at the narrowest part of the Sound, opposite the Swedish town of Helsingborg, 3 m. distant. Communication is maintained by means of a steam ferry. Its harbour admits vessels of 20 ft. draught, and the roadstead affords excellent anchorage. There are shipbuilding yards, with foundry, engineering shops, &c.; the chief export is agricultural produce; imports, iron, coal, cereals and yarn. Helsingör received town-privileges in 1425. In 1522 it was taken and burnt by Lübeck, but in 1535 was retaken by Christian II. It is celebrated as the Elsinore of Shakespeare's tragedy of *Hamlet*, and was the birthplace of Saxo Grammaticus, from whose history the story of Hamlet is derived. A pile of rocks surrounded by trees is shown as the grave of Hamlet, and Ophelia's brook is also pointed out, but both are, of course, inventions. On a tongue of land east of the town stands the castle of Kronberg or Kronenberg, a magnificent, solid and venerable Gothic structure built by Frederick II. towards the end of the 16th century, and extensively restored by Christian IV. after a fire in 1637. It was taken by the Swedes in 1658, but its possession was again given up to the Danes in 1660. From its turrets, one of which serves as a lighthouse, there are fine views of the straits and of the neighbouring countries. The Flag Battery is the "platform before the castle" where the ghost appears in *Hamlet*. Within it the principal object of interest is the apartment in which Matilda, queen of Christian VII. and sister of George III. of England, was imprisoned before she was taken to Hanover. The chapel contains fine wood-carving of the 17th century. North-west of the town is Marienlyst, originally a royal château, but now a seaside resort.

ELSSLER, FANNY (1810–1884), Austrian dancer, was born in Vienna on the 23rd of June 1810. From her earliest years she was trained for the ballet, and made her appearance at the Kärntner-Thor theatre in Vienna before she was seven. She almost invariably danced with her sister Theresa, who was two years her senior; and, after some years' experience together in Vienna, the two went in 1827 to Naples. Their success there—to which Fanny contributed more largely than her sister, who used to efface herself in order to heighten the effect of Fanny's more brilliant powers—led to an engagement in Berlin in 1830. This was the beginning of a series of triumphs for Fanny's personal beauty and skill in dancing. After captivating all hearts in Berlin and Vienna, and inspiring the aged statesman Friedrich von Gentz (*q.v.*) with a remarkable passion, she paid a visit to London, where she received much kindness at the hands of Mr and Mrs Grote, who practically adopted the little girl who was born three months after the mother's arrival in England. In September 1834 Fanny Elssler appeared at the Opera in Paris, a step to which she looked forward with much misgiving on account of Taglioni's supremacy on that stage. The result, however, was another triumph for her, and the temporary eclipse of Taglioni, who, although the finer artist of the two, could not for the moment compete with the newcomer's personal fascination. It was conspicuously in her performance of the Spanish *cachuca* that Fanny Elssler outshone all rivals. In 1840 she sailed with her sister for New York, and after two years' unmixed success they returned to Europe, where during the following five years Fanny appeared in Germany, Austria, France, England and Russia. In 1845, having amassed a fortune, she retired from the stage and settled near Hamburg. A few years later her sister Theresa contracted a morganatic marriage with Prince Adalbert of Prussia, and was ennobled under the title of Baroness von Barnim. Fanny Elssler died at Vienna on the 27th of November 1884. Theresa was left a widow in 1873, and died on the 19th of November 1878.

ELSTER, the name of two rivers of Germany. (1) The Schwarze (Black) Elster rises in the Lausitz range, on the southern border of Saxony, flows N. and N.W., and after a course of 112 m. enters the Elbe a little above Wittenberg. It is a sluggish stream, winding its way through sandy soil and frequently along a divided channel. (2) The Weisse (White) Elster rises in the north-western corner of Bohemia, a little north of Eger, cuts through the Vogtland in a deep and picturesque valley, passing Plauen, Greiz, Gera and Zeitz on its way north to Leipzig, just below which city it receives its most important tributary, the Pleisse. At Leipzig it divides, the main stream turning north-west and entering the Saale from the right a little above Halle; the other arm, the Luppe, flowing parallel to the main stream and south of it enters the Saale below Merseburg. Total length, 121 m.; total descent, 1286 ft.

ELSTER, a spa and inland watering-place of Germany, in the kingdom of Saxony, on the Weisse Elster, close to the Bohemian frontier on the railway Plauen-Eger, and 20 m. S. of the former. It has some industries of lace-making and weaving, and a population of about 2000, in addition to visitors. The mineral springs, saline-chalybeate, specific in cases of nervous disorders and feminine ailments, have been lately supplemented by baths of various kinds, and these, together with the natural attractions of the place as a climatic health resort, have combined to make it a fashionable watering-place during the summer season. The number of visitors amounts annually to about 10,000.

See Flechsig, *Bad Elster* (Leipzig, 1884).

ELSWICK, a ward of the city of Newcastle-upon-Tyne, England, in the western part of the borough, bordering the river Tyne. The name is well known in connexion with the great ordnance and naval works of Sir W. G. Armstrong, Mitchell & Co. Elswick Park, attached to the old mansion of the same name, is now a public recreation ground.

EL TEB, a halting-place in the Anglo-Egyptian Sudan near the coast of the Red Sea, 9 m. S.W. of the port of Trinkitat on the road to Tokar. At El Teb, on the 4th of February 1884, a heterogeneous force under General Valentine Baker, marching to the relief of the Egyptian garrison of Tokar, was completely routed by the Mahdists (see EGYPT: *Military Operations*).

ELTON, CHARLES ISAAC (1839–1900), English lawyer and antiquary, was born at Southampton on the 6th of December 1839. Educated at Cheltenham and Balliol College, Oxford, he was elected a fellow of Queen's College in 1862. He was called to the bar at Lincoln's Inn in 1865. His remarkable knowledge of old real property law and custom helped him to an extensive conveyancing practice and he took silk in 1885. He sat in the House of Commons for West Somerset in 1884–1885 and from 1886 to 1892. In 1869 he succeeded to his uncle's property of Whitestaunton, near Chard, in Somerset. During the later years of his life he retired to a great extent from legal practice, and devoted much of his time to literary work. He died at Whitestaunton on the 23rd of April 1900. Elton's principal works were *The Tenures of Kent* (1867); *Treatise on Commons and Waste Lands* (1868); *Law of Copyholds* (1874); *Origins of English History* (1882); *Custom and Tenant Right* (1882).

ELTVILLE (ELFELD), a town of Germany, in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, 5 m. S.W. from Wiesbaden, on the railway Frankfort-on-Main-Cologne, and with a branch to Schlangenbad. Pop. 3700. It has a Roman Catholic and a Protestant church, ruins of a feudal castle, a Latin school, and a monument to Gutenberg. It has a considerable trade in the wines of the district and two manufactories of sparkling wines. Eltville (originally *Adeldvile*, Lat. *Altavilla*) is first mentioned in a record of the year 882. It was given by the emperor Otto I. to the archbishops of Mainz, who often resided here. It received town rights in 1331 and was a place of importance during the middle ages. In 1465 Gutenberg set up his press at Eltville, under the patronage of Archbishop Adolphus of Nassau, shortly afterwards handing over its use to the brothers Heinrich and Nikolaus Bechtermünz. Several costly early examples of printed books issued by this press survive, the earliest being the *Vocabularium Latino-Teutonicum*, first printed in 1467.

ELTZ, a small river of Germany, a left bank tributary of the Mosel. It rises in the Eifel range, and, after a course of 5 m., joins the latter river at Moselkern. Just above its confluence stands the romantic castle of Eltz, crowning a rocky summit 900 ft. high, and famous as being one of the best preserved medieval strongholds of Germany. It is the ancestral seat of the counts of Eltz and contains numerous antiquities.

See Roth, *Geschichte der Herren und Grafen zu Eltz* (2 vols., Mainz, 1889–1890).

ELVAS, an episcopal city and frontier fortress of Portugal, in the district of Portalegre and formerly included in the province of Alemtejo; 170 m. E. of Lisbon, and 10 m. W. of the Spanish fortress of Badajoz, by the Madrid-Badajoz-Lisbon railway. Pop. (1900) 13,981. Elvas is finely situated on a hill 5 m. N.W. of the river Guadiana. It is defended by seven bastions and the two forts of Santa Luzia and Nossa Senhora da Graça. Its late Gothic cathedral, which has also many traces of Moorish influence in its architecture, dates from the reign of Emmanuel I. (1495–1521). A fine aqueduct, 4 m. long, supplies the city with pure water; it was begun early in the 15th century and completed in 1622. For some distance it includes four tiers of superimposed arches, with a total height of 120 ft. The surrounding lowlands are very fertile, and Elvas is celebrated for its excellent olives and plums, the last-named being exported, either fresh or dried, in large quantities. Brandy is distilled and pottery manufactured in the city. The fortress of Campo Maior, 10 m. N.E., is famous for its siege by the French and relief by the British under Marshal Beresford in 1811—an exploit commemorated in a ballad by Sir Walter Scott.

Elvas is the Roman *Alpesa* or *Helvas*, the Moorish *Balesh*, the Spanish *Yelves*. It was wrested from the Moors by Alphonso VIII. of Castile in 1166; but was temporarily recaptured before its final occupation by the Portuguese in 1226. In 1570 it became an episcopal see. From 1642 until modern times it was the chief frontier fortress S. of the Tagus; and it twice withstood sieges by the Spanish, in 1658 and 1711. The French under Marshal Junot took it in March 1808, but evacuated it in August, after the conclusion of the convention of Cintra (see Peninsular War).

ELVEY, SIR GEORGE JOB (1816–1893), English organist and composer, was born at Canterbury on the 27th of March 1816. He was a chorister at Canterbury cathedral under Highmore Skeats, the organist. Subsequently he became a pupil of his elder brother, Stephen, and then studied at the Royal Academy of Music under Cipriani Potter and Dr Crotch. In 1834 he gained the Gresham prize medal for his anthem, "Bow down thine ear," and in 1835 was appointed organist of St George's chapel, Windsor, a post he filled for 47 years, retiring in 1882. He took the degree of Mus. B. at Oxford in 1838, and in 1840 that of Mus.D. Anthems of his were commissioned for the Three Choirs Festivals of 1853 and 1857, and in 1871 he received the honour of knighthood. He died at Windlesham in Surrey on the 9th of December 1893. His works, which are nearly all for the Church, include two oratorios, a great number of anthems and services, and some pieces for the organ. A memoir of him, by his widow, was published in 1894.

ELVIRA, SYNOD OF, an ecclesiastical synod held in Spain, the date of which cannot be determined with exactness. The solution of the question hinges upon the interpretation of the canons, that is, upon whether they are to be taken as reflecting a recent, or as pointing to an imminent, persecution. Thus some argue for a date between 300 and 303, *i.e.* before the Diocletian persecution; others for a date between 303 and 314, after the persecution, but before the synod of Arles; still others for a date between the synod of Arles and the council of Nicaea, 325. Mansi, Hardouin, Hefele and Dale are in substantial agreement upon 305 or 306, and this is probably the closest approximation possible in the present state of the evidence. The place of meeting, Elvira, was not far from the modern Granada, if not, as Dale thinks, actually identical with it. There the nineteen bishops and twenty-four presbyters, from all parts of Spain, but chiefly from the south, assembled, probably at the instigation of Hosius of Cordova, but under the presidency of Felix of Accis, with a view to restoring order and discipline in the church. The eighty-one canons which were adopted reflect with considerable fulness the internal life and external relations of the Spanish Church of the 4th century. The social environment of Christians may be inferred from the canons prohibiting marriage and other intercourse with Jews, pagans and heretics, closing the offices of *flamen* and *duumvir* to Christians, forbidding all contact with idolatry and likewise participation in pagan festivals and public games. The state of morals is mirrored in the canons denouncing prevalent vices. The canons respecting the clergy exhibit the clergy as already a special class with peculiar privileges, a more exacting moral standard, heavier penalties for delinquency. The bishop has acquired control of the sacraments, presbyters and deacons acting only under his orders; the episcopate appears as a unit, bishops being bound to respect one another's disciplinary decrees. Worthy of special note are canon 33, enjoining celibacy upon all clerics and all who minister at the altar (the most ancient canon of celibacy); canon 36, forbidding pictures in churches; canon 38, permitting lay baptism under certain conditions; and canon 53, forbidding one bishop to restore a person excommunicated by another.

See Mansi ii. pp. 1-406; Hardouin i. pp. 247-258; Hefele (2nd ed.) i. pp. 148 sqq. (English translation, i. pp. 131 sqq.); Dale, *The Synod of Elvira* (London, 1882); and Hennecke, in Herzog-Hauck, *Realencyklopädie* (3rd ed.), s.v. "Elvira," especially bibliography. (T. F. C.)

EL WAD, a town in the Algerian Sahara, 125 m. in a straight line S.S.E. of Biskra, and 190 m. W. by S. of Gabes. Pop. (1906) 7586. El Wad is one of the most interesting places in Algeria. It is surrounded by huge hollows containing noble palm groves; and beyond these on every side stretches the limitless desert with its great billows of sand, the encroachments of which on the oasis are only held at bay by ceaseless toil. The town itself consists of a mass of one-storeyed stone houses, each surmounted by a little dome, clustering round the market-place with its mosque and minaret. By an exception rare in Saharan settlements, there are no defensive works save the fort containing the government offices, which the French have built on the south side of the town. The inhabitants are of two distinct tribes, one, the Aduan, of Berber stock, the other a branch of the Sha'ambah Arabs. El Wad possesses a curious currency known as *flous*, consisting of obsolete copper coins of Algerian and Tunisian dynasties. Seven flous are regarded as equal to the French five-centime piece.

El Wad oasis is one of a group known collectively as the Suf. Five miles N.W. is Kuinine (pop. 3541) and 6 m. farther N.W. Guemar (pop. 6885), an ancient fortified town noted for its manufacture of carpets. Linen weaving is carried on extensively in the Suf. Administratively El Wad is the capital of an annexe to the territory of Tuggurt.

ELWOOD, a city of Madison county, Indiana, U.S.A., on Duck Creek, about 38 m. N.E. of Indianapolis. Pop. (1880) 751; (1890) 2284; (1900) 12,950 (1386 foreign-born); (1910) 11,028. Elwood is served by the Lake Erie & Western and the Pittsburg, Cincinnati, Chicago & St Louis railways, and by an interurban electric line. Its rapid growth in population and as a manufacturing centre was due largely to its situation in the natural gas region; the failure of the gas supply in 1903 caused a decrease in manufacturing, but the city gradually adjusted itself to new conditions. It has large tin plate mills, iron and steel foundries, saw and planing mills, wooden-ware and furniture factories, bottling works and lamp-chimney factories, flour mills and packing houses. In 1905 the value of the city's factory product was $6,111,083; in 1900 it was $9,433,513; the glass product was valued at $223,766 in 1905, and at $1,011,803 in 1900. There are extensive brick-yards in the vicinity, and the surrounding agricultural country furnishes large supplies of grain, live-stock, poultry and produce, for which Elwood is the shipping centre. The site was first settled under the name of Quincy; the present name was adopted in 1869; and in 1891 Elwood received a city charter.

ELY, RICHARD THEODORE (1854–   ), American economist, was born at Ripley, New York, on the 13th of April 1854. Educated at Columbia and Heidelberg universities, he held the professorship of economics at Johns Hopkins University from 1881 to 1892, and was subsequently professor of economics at Wisconsin University. Professor Ely took an active part in the formation of the American Economic Association, was secretary from 1885 to 1892 and president from 1899 to 1901. He published a useful *Introduction to Political Economy* (1889); *Outlines of Economics* (1893); *The Labour Movement in America* (1883); *Problems of To-day* (1888); *Social Aspects of Christianity* (1889); *Socialism and Social Reform* (1894); *Monopolies and Trusts* (1900), and *Studies in the Evolution of Industrial Society* (1903).

ELY, a cathedral city and market-town, in the Newmarket parliamentary division of Cambridgeshire, England, 16 m. N.N.E. of Cambridge by the Great Eastern railway. Pop. of urban district (1901) 7713. It stands on a considerable eminence on the west (left) bank of the Ouse, in the Isle of Ely, which rises above the surrounding fens. Thus its situation, before the great drainage operations of the 17th century, was practically insular. The magnificent cathedral, towering above the town, is a landmark far over the wide surrounding level. The soil in the vicinity is fertile and market-gardening is carried on, fruit and vegetables (especially asparagus) being sent to the London markets. The town has a considerable manufacture of tobacco pipes and earthenware, and there are in the neighbourhood mills for the preparation of oil from flax, hemp and coleseed. Besides the cathedral Ely has in St Mary's church, lying almost under the shadow of the greater building, a fine structure ranging in style from Norman to Perpendicular, but in the main Early English. The sessions house and corn exchange are the principal public buildings. The grammar school, founded by Henry VIII. in 1541, occupies (together with other buildings) the room over the gateway of the monastery, known as the Porta, and the chapel built by Prior John de Cranden (1321–1341) is restored to use as a school chapel. A theological college was founded in 1876 and opened in 1881.

The foundation of the present cathedral was laid by its first Norman abbot, Simeon, in 1083. But the reputation of Ely had been established long before Etheldreda (Æthelthryth), daughter of Anna, king of East Anglia, was married to Ecgfrith, king of Northumbria, against her will, as she had vowed herself wholly to a religious life. Her husband opposed himself to her vow, but with the help of Wilfrid, archbishop of York, she took the veil, and found refuge from her husband in the marsh-girt Isle of Ely. Here she founded a religious house, in all probability a mixed community, in 673, becoming its first abbess, and giving the whole Isle of Ely to the foundation. In 870 the monastery was destroyed by the Danes, as were also the neighbouring foundations at Soham, Thorney, Crowland and Peterborough, and it remained in ruins till 970, when Æthelwold, bishop of Winchester, founded a new Benedictine monastery here. King Edgar in 970 endowed the monks with the former possessions of the convent and also granted them the secular causes of two hundreds within and of five hundreds without the marshes, all charges belonging to the king in secular disputes in all their lands and every fourth penny of public revenue in the province of Grantecestre. The wealth and importance of Ely rose, and its abbots held the post of chancellors of the king's court alternately with the abbots of Glastonbury and of St Augustine's, Canterbury. But Ely again became a scene of contest in the desperate final struggle against William the Conqueror of which Hereward "the Wake" was the hero. Finally, in 1071, the monks agreed to surrender the Isle of Ely to the king on condition of the confirmation of all the possessions and privileges, held by them in the time of Edward the Confessor. Abbot Simeon (1081–1094), who now began the reconstruction of the church, was related to William and brother to Walkelin, first Norman bishop of Winchester. Under Abbot Richard (1100–1107) the translation from the Saxon church of the bodies of St Etheldreda and of the two abbesses who had followed her, and their enshrinement in the new edifice, took place; and it was due to the honour in which the memory of the foundresses was held that Ely maintained the position of dignity which it kept henceforth until the dissolution of the monasteries. The feast of St Etheldreda, or St Awdrey as she was generally called, was the occasion every year for a large fair here, at which "trifling objects" were sold to pilgrims by way of souvenirs; whence the word "tawdrey," a contraction of St Awdrey. In 1109 the Isle of Ely, most of Cambridgeshire, and the abbeys of Thorney and Cetricht were separated from the diocese of Lincoln, and converted into a new diocese, Ely being the seat of the bishopric, and after the dissolution of the monasteries Henry VIII. converted the conventual church into a cathedral (1541). The diocese is extensive. It covers nearly the whole of Cambridgeshire, Huntingdonshire and Bedfordshire, part of Suffolk, and small portions of Essex, Norfolk, Northamptonshire, Hertfordshire and Buckinghamshire.

The cathedral is a cruciform structure, 537 ft. long and 190 ft. across the great transepts (exterior measurements). A relic of the Saxon foundation is preserved in the cross of St Osyth (*c.* 670), and a pre-Norman window is kept in the triforium, having been dug up near the cathedral. Of the work of the first two Norman abbots all that remains is the early Norman lower storey of the main transept. The foundations of Abbot Simeon's apse were discovered below the present choir. The nave, which is Norman throughout, is 208 ft. in length, 72 ft. 9 in. to the top of the walls, and 77 ft. 3 in. broad, including the aisles. The upper parts of the western tower and the transept were begun by Bishop Geoffrey Ridel (d. 1189), and continued by his successor William Longchamp, chancellor of England. The tower, which is 215 ft. high, is surmounted by a Decorated octagon with partly detached side turrets, and underwent alteration and strengthening in the Perpendicular period. The north-western transept wing is in ruins; it is not known when it fell. The Galilee, or western porch, by which the cathedral is entered, is the work of Bishop Eustace (d. 1215), and is a perfect example of Early English style. In 1322 the Norman central tower, erected by Abbot Simeon, fell. Alan of Walsingham, sacrist of the church, designed its restoration in the form of the present octagon, a beautiful and unique conception. Instead of the ordinary four-arched central crossing, an octagon is formed at the crossing, the arches of the nave aisles and choir aisles being set obliquely. Both without and within, the octagon is the principal feature in the unusual general appearance of the cathedral, which gives it a peculiar eminence among English churches. The octagon was completed in 1328, and upon the ribbed vaulting of wood above it rose the lofty lantern, octagonal also, with its angles set opposite those of the octagon below. The total height of the structure is 170 ft. 7 in. Alan of Walsingham was further employed by Bishop John of Hotham (d. 1337) as architect of the Lady chapel, a beautiful example of Decorated work, which served from 1566 onward as a parish church. Of the seven bays of the choir the four easternmost, as well as the two beyond forming the retrochoir, were built by Bishop Hugh of Northwold (d. 1254). The three western bays were destroyed by the fall of the tower in 1321, and were rebuilt by Alan of Walsingham. The earlier portion is a superb example of Early English work, while the later is perhaps the best example of pure Decorated in England. The wooden canopies of the choir stalls are Decorated (1337) and very elaborate. The Perpendicular style is represented by windows and certain other details, including supporting arches to the western tower. There are also some splendid chantry chapels and tombs in this style—the chapels of Bishop John Alcock (d. 1500) and Bishop Nicolas West (d. 1534), in the north and south choir aisles respectively, are completely covered with the most delicate ornamentation; while the tomb of Bishop Richard Redman (d. 1505) has a remarkably beautiful canopy. Among earlier monuments the canopied tomb of Bishop William de Luda (1290–1298) and the finely-carved effigy of Bishop Northwold (1254) are notable. Between 1845 and 1884 the cathedral underwent restoration under the direction of Sir Gilbert Scott. The work included the erection of the modern reredos and choir-screen, both designed by Scott, and the painting of the nave roof by Styleman le Strange (d. 1862), who was succeeded by Gambier Parry. Parry also richly ornamented the octagon and lantern in the style of the 14th century.

Remains of the monastic buildings are fragmentary but numerous. Mention has been made of the Ely "Porta" or gateway (1396), which is occupied by the grammar school, and of Prior John de Cranden's beautiful little Decorated chapel. But many of the remains, the bulk of which are incorporated in the deanery and canons' and other residences to the south of the cathedral, are of much earlier date. Thus the fine early Norman undercroft of the prior's hall is probably of the time of Abbot Simeon. Another notable fragment is the transitional Norman chancel of the infirmary chapel. The remnants of the cloisters show a reconstruction in the 15th century, but the prior's and monks' doorways from the cloisters into the cathedral are highly decorated late Norman. The bishop's palace to the west of the cathedral has towers erected by Bishop Alcock at the close of the 15th century. In the muniment room of the chapter is preserved, among many ancient documents of great interest, the *liber Eliensis*, a history of the monastery by the monk known as Thomas of Ely (d. *c.* 1174), of which the first part, which extends to the year 960, contains a life of St Etheldreda, while the second is continued to the year 1107.

Ely, which according to Bede (*Hist. eccl.* iv. 19) derives its name from the quantity of eels in the waters about it (A.S. *æl*, eel, *-ig*, island), was a borough by prescription at least as early as the reign of William the Conqueror. It owed its importance entirely to the monastery, and for a long time the abbot and afterwards the bishop had almost absolute power in the town. The bailiff who governed the town was chosen by the bishop until 1850, when a local board was appointed. Richard I.

granted the bishop of Ely a fair there, and in 1319–1320 John of Hotham, a later bishop, received licence to hold a fair on the vigil and day of Ascension and for twenty days following. The markets are claimed by an undated charter by the bishop, who also continues to hold the fairs. In 1295 Ely sent two members to parliament, but has never been represented since.

See C. W. Stubbs, *Ely Cathedral* (London, 1897); *Victoria County History, Cambridgeshire.*

ELYOT, SIR THOMAS (*c.* 1490–1546), English diplomatist and scholar. His father, Sir Richard Elyot (d. 1522), who held considerable estates in Wiltshire, was made (1503) serjeant-at-law and attorney-general to the queen consort, and soon afterwards was commissioned to act as justice of assize on the western circuit, becoming in 1513 judge of common pleas. Thomas was the son of his first marriage with Alice Fynderne, but neither the date nor place of his birth is accurately known. Anthony à Wood claimed him as an *alumnus* of St Mary Hall, Oxford, while C. H. Cooper in the *Athenae Cantabrigienses* put in a claim for Jesus College, Cambridge. Elyot himself says in the preface to his *Dictionary* that he was educated under the paternal roof, and was from the age of twelve his own tutor. He supplies, in the introduction to his *Castell of Helth*, a list of the authors he had read in philosophy and medicine, adding that a "worshipful physician" read to him Galen and some other authors. In 1511 he accompanied his father on the western circuit as clerk to the assize, and he held this position until 1528. In addition to his father's lands in Wiltshire and Oxfordshire he inherited in 1523 the Cambridge estates of his cousin, Thomas Fynderne. His title was disputed, but Wolsey decided in his favour, and also made him clerk of the privy council. Elyot, in a letter addressed to Thomas Cromwell, says that he never received the emoluments of this office, while the barren honour of knighthood conferred on him when he was displaced in 1530 merely put him to further expense. In that year he sat on the commission appointed to inquire into the Cambridgeshire estates of his former patron, Cardinal Wolsey. He married Margaret Barrow, who is described (Stapleton, *Vita Thomae Mori*, p. 59, ed. 1558) as a student in the "school" of Sir Thomas More.

In 1531 he produced the *Boke named the Governour*, dedicated to King Henry VIII. The work advanced him in the king's favour, and in the close of the year he received instructions to proceed to the court of the emperor Charles V. to induce him to take a more favourable view of Henry's projected divorce from Catherine of Aragon. With this was combined another commission, on which one of the king's agents, Stephen Vaughan, was already engaged. He was, if possible, to apprehend William Tyndale. It is probable that Elyot was suspected, as Vaughan certainly was, of lukewarmness in carrying out the king's wishes, but this has not prevented his being much abused by Protestant writers. As ambassador Elyot had been involved in ruinous expense, and on his return he wrote to Thomas Cromwell, begging to be excused from serving as sheriff of Cambridgeshire and Huntingdonshire, on the score of his poverty. The request was not granted. He was one of the commissioners in the inquiry instituted by Cromwell prior to the suppression of the monasteries, but he did not obtain any share of the spoils. There is little doubt that his known friendship for Thomas More militated against his chances of success, for in a letter addressed to Cromwell he admitted his friendship for More, but protested that he rated higher his duty to the king. William Roper, in his *Life* of More, says that Elyot was on a second embassy to Charles V., in the winter of 1535–1536, when he received at Naples the news of More's execution. He had been kept in the dark by his own government, but heard the news from the emperor. The story of an earlier embassy to Rome (1532), mentioned by Burnet, rests on a late endorsement of instructions dated from that year, which cannot be regarded as authoritative. In 1542 he represented the borough of Cambridge in parliament. He had purchased from Cromwell the manor of Carleton in Cambridgeshire, where he died on the 26th of March 1546.

Sir Thomas Elyot received little reward for his services to the state, but his scholarship and his books were held in high esteem by his contemporaries. The *Boke named the Governour* was printed by Thomas Berthelet (1531, 1534, 1536, 1544, &c.). It is a treatise on moral philosophy, intended to direct the education of those destined to fill high positions, and to inculcate those moral principles which alone could fit them for the performance of their duties. The subject was a favourite one in the 16th century, and the book, which contained many citations from classical authors, was very popular. Elyot expressly acknowledges his obligations to Erasmus's *Institutio Principis Christiani*; but he makes no reference to the *De regno et regis institutione* of Francesco Patrizzi (d. 1494), bishop of Gaeta, on which his work was undoubtedly modelled. As a prose writer, Elyot enriched the English language with many new words. In 1534 he published *The Castell of Helth*, a popular treatise on medicine, intended to place a scientific knowledge of the art within the reach of those unacquainted with Greek. This work, though scoffed at by the faculty, was appreciated by the general public, and speedily went through many editions. His Latin *Dictionary*, the earliest comprehensive dictionary of the language, was completed in 1538. The copy of the first edition in the British Museum contains an autograph letter from Elyot to Thomas Cromwell, to whom it originally belonged. It was edited and enlarged in 1548 by Thomas Cooper, bishop of Winchester, who called it *Bibliotheca Eliotae*, and it formed the basis in 1565 of Cooper's *Thesaurus linguae Romanae et Britannicae.*

Elyot's translations include:—The *Doctrinal of Princes* (1534), from Isocrates; *Cyprianus, A Swete and Devoute Sermon of Holy Saynt Ciprian of the Mortalitie of Man* (1534); *Rules of a Christian Life* (1534), from Pico della Mirandola; *The Education or Bringing up of Children* (*c.* 1535), from Plutarch; and *Howe one may take Profite of his Enymes* (1535), from the same author is generally attributed to him. He also wrote: *The Knowledge which maketh a Wise Man* and *Pasquyll the Playne* (1533); *The Bankette of Sapience* (1534), a collection of moral sayings; *Preservative agaynste Deth* (1545), which contains many quotations from the Fathers; *Defence of Good Women* (1545). His *Image of Governance, compiled of the Actes and Sentences notable of the most noble Emperor Alexander Severus* (1540) professed to be a translation from a Greek MS. of the emperor's secretary Encolpius (or Eucolpius, as Elyot calls him), which had been lent him by a gentleman of Naples, called Pudericus, who asked to have it back before the translation was complete. In these circumstances Elyot, as he asserts in his preface, supplied the other maxims from different sources. He was violently assailed by Humphrey Hody and later by William Wotton for putting forward a pseudo-translation; but Mr H. H. S. Croft has discovered that there was a Neapolitan gentleman at that time bearing the name of Poderico, or, Latinized, Pudericus, with whom Elyot may well have been acquainted. Roger Ascham mentions his *De rebus memorabilibus Angliae*; and Webbe quotes a few lines of a lost translation of the *Ars poëtica* of Horace.

A learned edition of the *Governour* (2 vols., 1880), by H. H. S. Croft, contains, besides copious notes, a valuable glossary of 16th century English words.

ELYRIA, a city and the county-seat of Lorain county, Ohio, U.S.A., on the Black river, 8 m. from Lake Erie, and about 25 m. W.S.W. of Cleveland. Pop. (1890) 5611; (1900) 8791, of whom 1397 were foreign-born; (1910 census) 14,825. It is served by the Baltimore & Ohio, and the Lake Shore & Michigan Southern railways. Elyria is about 720 ft. above sea-level, and lies at the junction of the two forks of the Black river, each of which falls about 50 ft. here, furnishing water-power. Among the city's manufactures are oxide of tin and other chemicals, iron and steel, leather goods, automobiles and bicycles, electrical and telephone supplies, butted tubing, gas engines, screws and bolts, silk, lace and hosiery. In 1905 the city's factory products were valued at $2,933,450—140·2% more than their value in 1900. Flagging, building-stones and grindstones, taken from quarries in the vicinity (known as the Berea Grit quarries), are shipped from Elyria in large quantities. Elyria was founded about 1819 by Heman Ely, in whose honour it was named; it was selected as the site for the county seat in 1823, and was chartered as a city in 1892.

ELYSIUM, in Greek mythology, the Elysian fields, the abode of the righteous after their removal from earth. In Homer (*Od.* iv. 563) this region is a plain at the farthest end of the earth on the banks of the river Oceanus, where the fair-haired

Rhadamanthys rules, and where the people are vexed by neither snow nor storm, heat nor cold, the air being always tempered by the zephyr wafted from the ocean. It is no dwelling of the dead nor part of the lower world, but distinguished heroes are translated thither without dying, to live a life of perfect happiness. In Hesiod (*W. and D.* 166) the same description is given of the Islands of the Blessed under the rule of Cronus, which yield three harvests yearly. Here, according to Pindar, Rhadamanthys sits by the side of his father Cronus and administers judgment (*Ol.* ii. 61, *Frag.* 95). All who have successfully gone through a triple probation on earth are admitted to share these blessings. In later accounts (*Aeneid*, vi. 541) Elysium was regarded as part of the underworld, the home of the righteous dead adjudged worthy of it by the tribunal of Minos, Rhadamanthys and Aeacus. Those who had lived evil lives were thrust down into Tartarus, where they suffered endless torments.

ELZE, KARL (1821–1889), German scholar and Shakespearian critic, was born at Dessau on the 22nd of May 1821. Having studied (1839–1843) classical philology, and modern, but especially English, literature at the university of Leipzig, he was a master for a time in the Gymnasium (classical school) at Dessau, and in 1875 was appointed extraordinary, and in 1876 ordinary, professor of English philology at the university of Halle, in which city he died on the 21st of January 1889. Elze began his literary career with the *Englischer Liederschatz* (1851), an anthology of English lyrics, edited for a while a critical periodical *Atlantis*, and in 1857 published an edition of Shakespeare's *Hamlet* with critical notes. He also edited Chapman's *Alphonsus* (1867) and wrote biographies of Walter Scott, Byron and Shakespeare; *Abhandlungen zu Shakespeare* (English translation by D. Schmitz, as *Essays on Shakespeare*, London, 1874), and the excellent treatise, *Notes on Elizabethan Dramatists with conjectural emendations of the text* (3 vols., Halle, 1880–1886, new ed. 1889).

ELZEVIR, the name of a celebrated family of Dutch printers belonging to the 17th century. The original name of the family was Elsevier, or Elzevier, and their French editions mostly retain this name; but in their Latin editions, which are the more numerous, the name is spelt Elzeverius, which was gradually corrupted in English into Elzevir as a generic term for their books. The family originally came from Louvain, and there Louis, who first made the name Elzevir famous, was born in 1540. He learned the business of a bookbinder, and having been compelled in 1580, on account of his Protestantism and his adherence to the cause of the insurgent provinces, to leave his native country, he established himself as bookbinder and bookseller in Leiden. His *Eutropius*, which appeared in 1592, was long regarded as the earliest Elzevir, but the first is now known to be *Drusii Ebraicarum quaestionum ac responsionum libri duo*, which was produced in 1583. In all he published about 150 works. He died on the 4th of February 1617. Of his five sons, Matthieu, Louis, Gilles, Joost and Bonaventure, who all adopted their father's profession, Bonaventure, who was born in 1583, is the most celebrated. He began business as a printer in 1608, and in 1626 took into partnership Abraham, a son of Matthieu, born at Leiden in 1592. Abraham died on the 14th of August 1652, and Bonaventure about a month afterwards. The fame of the Elzevir editions rests chiefly on the works issued by this firm. Their Greek and Hebrew impressions are considered inferior to those of the Aldi and the Estiennes, but their small editions in 12mo, 16mo and 24mo, for elegance of design, neatness, clearness and regularity of type, and beauty of paper, cannot be surpassed. Especially may be mentioned the two editions of the New Testament in Greek (Ἡ *καινὴ διαθήκη*, *Novum Testamentum*, &c.), published in 1624 and 1633, of which the latter is the more beautiful and the more sought after; the *Psalterium Davidis*, 1653; *Virgilii opera*, 1636; *Terentii comediae*, 1635; but the works which gave their press its chief celebrity are their collection of French authors on history and politics in 24mo, known under the name of the *Petites Républiques*, and their series of Latin, French and Italian classics in small 12mo. Jean, son of Abraham, born in 1622, had since 1647 been in partnership with his father and uncle, and when they died Daniel, son of Bonaventure, born in 1626, joined him. Their partnership did not last more than two years, and after its dissolution Jean carried on the business alone till his death in 1661. In 1654 Daniel joined his cousin Louis (the third of that name and son of the second Louis), who was born in 1604, and had established a printing press at Amsterdam in 1638. From 1655 to 1666 they published a series of Latin classics in 8vo, *cum notis variorum*; *Cicero* in 4to; the *Etymologicon linguae Latinae*; and a magnificent *Corpus juris civilis* in folio, 2 vols., 1663. Louis died in 1670, and Daniel in 1680. Besides Bonaventure, another son of Matthieu, Isaac, born in 1593, established a printing press at Leiden, where he carried on business from 1616 to 1625; but none of his editions attained much fame. The last representatives of the Elzevir printers were Peter, grandson of Joost, who from 1667 to 1675 was a bookseller at Utrecht, and printed seven or eight volumes of little consequence; and Abraham, son of the first Abraham, who from 1681 to 1712 was university printer at Leiden.

Some of the Elzevir editions bear no other typographical mark than simply the words *Apud Elzeverios*, or *Ex officina Elseveriana*, under the *rubrique* of the town. But the majority bear one of their special devices, four of which are recognized as in common use. Louis Elzevir, the founder of the family, usually adopted the arms of the United Provinces, an eagle on a cippus holding in its claws a sheaf of seven arrows, with the motto *Concordia res parvae crescunt.* About 1620 the Leiden Elzevirs adopted a new device, known as "the solitary," and consisting of an elm tree, a fruitful vine and a man alone, with a motto *Non solus.* They also used another device, a palm tree with the motto, *Assurgo pressa.* The Elzevirs of Amsterdam used for their principal device a figure of Minerva with owl, shield and olive tree, and the motto, *Ne extra oleas.* The earliest productions of the Elzevir press are marked with an angel bearing a book and a scythe, and various other devices occur at different times. When the Elzevirs did not wish to put their name to their works they generally marked them with a sphere, but of course the mere fact that a work printed in the 17th century bears this mark is no proof that it is theirs. The total number of works of all kinds which came from the presses of the Elzevirs is given by Willems as 1608; there were also many forgeries.

See "Notice de la collection d'auteurs latins, français, et italiens, imprimée de format petit en 12, par les Elsévier," in Brunet's *Manuel du libraire* (Paris, 1820); A. de Reume, *Recherches historiques, généalogiques, et bibliographiques sur les Elsévier* (Brussels, 1847); Paul Dupont, *Histoire de l'imprimerie*, in two vols. (Paris, 1854); Pieters, *Annales de l'imprimerie Elsévirienne* (2nd ed., Ghent, 1858); Walther, *Les Els éveriennes de la bibliothèque impériale de St-Pétersbourg* (St Petersburg, 1864); Alphonse Willems, *Les Elzévier* (Brussels, 1880), with a history of the Elzevir family and their printing establishments, a chronological list and detailed description of all words printed by them, their various typographical marks, and a plate illustrating the types used by them; Kelchner, *Catalogus librorum officinae Elsevirianae* (Paris, 1880); Frick, *Die Elzevirschen Republiken* (Halle, 1892); Berghman, *Études sur la bibliographie Elzévirienne* (Stockholm, 1885), and *Nouvelles études, &c.* (*ib.* 1897).

EMANATION (Lat. *emanatio*, from *e*-, out, *manare*, to flow), in philosophy and theology, the name of one of the three chief theories of existence, *i.e.* of the relation between God and men—the One and the Many, the Universal and the Particular. This theory has been propounded in many forms, but the central idea is that the universe of individuals consists of the involuntary "outpourings" of the ultimate divine essence. That essence is not only all-inclusive, but absolutely perfect, while the "emanated" individuals degenerate in proportion to the degree of their distance from the essence. The existence of evil in opposition to the perfect goodness of God, as thus explained, need not be attributed to God's agency, inasmuch as the whole emanation-process is governed by necessary—as it were mechanical—laws, which may be compared to those of the physical universe. The doctrine of emanation is thus to be distinguished from the cosmogonic theory of Judaism and Christianity, which explains human existence as due to a single creative act of a moral agent. The God of Judaism and

Christianity is essentially a *person* in close *personal* relation to his creatures; emanation is the denial of personality both for God and for man. The emanation theory is to be contrasted, on the other hand, with the theory of evolution. The two theories are alike in so far as both recognize the existence of individuals as due to a necessary process of differentiation and a scale of existence. They differ, however, fundamentally in this respect, that, whereas evolution regards the process as from the indeterminate lower towards the determinate higher, emanation regards it as from the highest to the indefinitely lower.

There is considerable superficial similarity between evolution and emanation, especially in their formal statements. The process of evolution from the indeterminate to the determinate is often expressed as a progress from the universal to the particular. Thus the primordial matter assumed by the early Greek physicists may be said to be the universal substance out of which particular things arise. The doctrine of emanation also regards the world as a process of particularization. Yet the resemblance is more apparent than real. The universal is, as Herbert Spencer remarked, a subjective idea, and the general forms, existing *ante res*, which play so prominent a part in Greek and medieval philosophy, do not in the least correspond to the homogeneous matter of the physical evolutionists. The one process is a logical operation, the other a physical. The theory of emanation, which had its source in certain moral and religious ideas, aims first of all at explaining the origin of mental or spiritual existence as an effluence from the divine and absolute spirit. In the next place, it seeks to account for the general laws of the world, for the universal forms of existence, as ideas which emanate from the Deity. By some it was developed into a complete philosophy of the world, in which matter itself is viewed as the lowest emanation from the absolute. In this form it stands in sharp antithesis to the doctrine of evolution, both because the former views the world of particular things and events as essentially unreal and illusory, and because the latter, so far as it goes, looks on matter as eternal, and seeks to explain the general forms of things as we perceive them by help of simpler assumptions. In certain theories known as doctrines of emanation, only mental existence is referred to the absolute source, while matter is viewed as eternal and distinct from the divine nature. In this form the doctrine of emanation approaches certain forms of the evolution theory (see Evolution).

The doctrine of emanation is correctly described as of oriental origin. It appears in various forms in Indian philosophy, and is the characteristically oriental element in syncretic systems like Neoplatonism and Gnosticism. None the less it is easy to find it in embryo in the speculations of the essentially European philosophers of Greece. Plato, whose philosophy was strongly opposed to the evolution theory, distinctly inclines to the emanation idea in his doctrine that each particular thing is what it is in virtue of a pre-existent idea, and that the particulars are the lowest in the scale of existence, at the head of, or above, which is the idea of the good. The view of Xenocrates is based on the same ideas. Or again, we may compare the Stoic doctrine of ἀπόρροιαι (literally "emanations") from the divine essence. It is, however, only in the last eclectic period of Greek philosophy that the emanation doctrine was definitely established in the doctrines, *e.g.* Plotinus.

See especially articles Evolution, Neoplatonism, Gnosticism.

EMANUEL I. [Portuguese *Manoel*] (1469–1521), fourteenth king of Portugal, surnamed the Happy, knight of the Garter and of the Golden Fleece, was the son of Duke Ferdinand of Vizeu and of Beatrice of Beja, grandchildren of John I. of Portugal. He was born at Alcochete on the 3rd of May 1469, or, according to Barbosa Machado, on the 1st of June. His early education was directed by a Sicilian named Cataldo. In 1495 he became king in succession to his cousin John II. In 1497 he married Isabella, daughter of Ferdinand and Isabella of Castile, who had previously been married to Alphonso, the heir of John II. She died in the next year in giving birth to a son named Miguel, who until his death two years later was considered heir to the entire Iberian Peninsula. Emanuel's next wife was Maria, another daughter of Ferdinand and Isabella, whom he married in 1500. Two of their children, John and Henry, later became kings of Portugal. Maria died in 1516, and in 1518 her niece Leonora, a sister of the emperor Charles V., became Emanuel's third wife. Emanuel's reign is noteworthy for the continuance of the Portuguese discoveries and the extension of their chain of trading-posts, Vasco da Gama's opening an all-sea route to India, Cabral's landing in Brazil, Corte-Real's voyage to Labrador, the exploration of the Indian seas and the opening of commercial relations with Persia and China, bringing Portugal international prominence, colonial pre-eminence and a hitherto unparalleled degree of national prosperity. His intense religious zeal variously manifested itself in his persecutions of the Jews, whom at the beginning of his reign he had been disposed to tolerate, his strenuous endeavours to promote an international crusade against the Turks, his eager missionary enterprise throughout his new possessions, and his erection of twenty-six monasteries and two cathedrals, including the stately monastic church of the Jeronymos at Belem (see Lisbon). His jealously despotic character was accentuated by the enormous increase the Indies furnished to his personal wealth, and exemplified in his assumption of new titles and in a magnificent embassy to Pope Leo X. He died at Lisbon on the 13th of December 1521.

The best authorities for the history of Emanuel's reign are the contemporary 16th-century *Chronica d'el Rei D. Manoel*, by Damião de Goes, and *De rebus Emanuelis*, by J. Osorio. *El Rei D. Manoel*, by M. B. Branco (Lisbon, 1888), is a valuable but ill-arranged biography. See also the *Ordenações do S. R. D. Manoel* (Coimbra University Press, 1797). For further bibliography see Barbosa Machado, *Bibliographica Lusitana*, vol. iii. pp. 161-166.

EMBALMING (Gr. *βάλσαμον*, balsam; Ger. *Einbalsamiren*; Fr. *embaumement*), the art of preparing dead bodies, chiefly by the use of medicaments, in order to preserve them from putrefaction and the attacks of insects. The ancient Egyptians carried the art to great perfection, and embalmed not only human beings, but cats, crocodiles, ichneumons, and other sacred animals. It was at one time suggested that the origin of embalming in Egypt was to be traced to a want of fuel for the purpose of cremation, to the inadvisability or at some times impossibility of burial in a soil annually disturbed by the inundation of the Nile, and to the necessity, for sanitary reasons, of preventing the decomposition of the bodies of the dead when placed in open sepulchres. As, however, the corpses of the embalmed must have constituted but a small proportion of the aggregate mass of animal matter daily to be disposed of, the above explanation would in any case be far from satisfactory; and there is no doubt (see Mummy) that embalming originated in the idea of preserving the body for a future life. According to W. H. Prescott, it was a belief in a resurrection of the body that led the ancient Peruvians to preserve the air-dried corpses of their dead with so much solicitude (see *Conquest of Peru*, bk. i. chap. iii.). And J. C. Prichard (*Egyptian Mythology*, p. 200) properly compared the Egyptian practice with the views which rendered "the Greeks and Romans so anxious to perform the usual rites of sepulture to their departed warriors, namely, . . . that these solemnities expedited the journey of the soul to the appointed region, where it was to receive judgment for its former deeds, and to have its future doom fixed accordingly." It has been supposed by some that the discovery of the preservation of bodies interred in saline soils may have been the immediate origin of embalming in Egypt. In that country certain classes of the community were specially appointed for the practice of the art. Joseph, we are told in Gen. l. 2, "commanded his servants the physicians to embalm his father."

Herodotus (ii. 86) gives an account of three of the methods of embalming followed by the Egyptians. The most expensive of these, which cost a talent of silver (£243: 15s.), was as follows. The brains were in part removed through the nostrils by means of a bent iron implement, and in part by the injection of drugs. The intestines having been drawn out through an incision in the left side, the abdomen was cleansed with palm-wine, and filled with myrrh, cassia and other materials, and the opening was sewed up. This done, the body was steeped seventy days in a solution of litron or natron.[1] Diodorus (i. 91) relates that the cutter (παρασχίστης) appointed to make the incision in the flank for the removal of the intestines, as soon as he had performed his office, was pursued with stones and curses by those about him, it being held by the Egyptians a destestable thing to commit any violence or inflict a wound on the body. After the steeping, the body was washed, and handed over to the swathers, a peculiar class of the lowest order of priests, called by Plutarch *cholchytae*, by whom it was bandaged in gummed cloth; it was then ready for the coffin. Mummies thus prepared were considered to represent Osiris. In another method of embalming, costing twenty-two minae (about £90), the abdomen was injected with "cedar-tree pitch" (κεδρία), which, as it would seem from Pliny (*Nat. Hist.* xvi. 21), was the liquid distillate of the pitch-pine. This is stated by Herodotus to have had a corrosive and solvent action on the viscera. After injection the body was steeped a certain number of days in natron; the contents of the abdomen were allowed to escape; and the process was then complete. The preparation of the bodies of the poorest consisted simply in placing them in natron for seventy days, after a previous rinsing of the abdomen with "syrmaea." The material principally used in the costlier modes of embalming appears to have been asphalt; wax was more rarely employed. In some cases embalming seems to have been effected by immersing the body in a bath of molten bitumen. Tanning also was resorted to. Occasionally the viscera, after treatment, were in part or wholly replaced in the body, together with wax figures of the four genii of Amenti. More commonly they were embalmed in a mixture of sand and asphalt, and buried in vases, or *canopi*, placed near the mummy, the abdomen being filled with chips and sawdust of cedar and a small quantity of natron. In one jar were placed the stomach and large intestine; in another, the small intestines; in a third, the lungs and heart; in a fourth, the gall-bladder and liver. Porphyry (*De abstinentia*, iv. 10) mentions a custom of enclosing the intestines in a box and consigning them to the Nile, after a prayer uttered by one of the embalmers, but his statement is regarded by Sir J. G. Wilkinson as unworthy of belief. The body of Nero's wife Poppaea, contrary to the usage of the Romans, was not burnt, but as customary among other nations with the bodies of potentates, was honoured with embalmment (see Tacitus, *Ann.* xvi. 6). The body of Alexander the Great is said to have been embalmed with honey (Statius, *Silv.* iii. 2. 117), and the same material was used to preserve the corpse of Agesipolis I. during its conveyance to Sparta for burial. Herodotus states (iii. 24) that the Ethiopians, in embalming, dried the body, rubbed it with gypsum (or chalk), and, having painted it, placed it in a block of some transparent substance. The Guanches, the aborigines of the Canaries, employed a mode of embalming similar to that of the Egyptians, filling the hollow caused by the removal of the viscera with salt and an absorbent vegetable powder (see Bory de Saint Vincent, *Essais sur les Îles Fortunées*, 1803, p. 495). Embalming was still in vogue among the Egyptians in the time of St Augustine, who says that they termed mummies *gabbarae* (*Serm.* 120, cap. 12).

In modern times numerous methods of embalming have been practised. Dr Frederick Ruysch of Amsterdam (1665–1717) is said to have utilized alcohol for this purpose. By William Hunter essential oils, alcohol, cinnabar, camphor, saltpetre and pitch or rosin were employed, and the final desiccation of the body was effected by means of roasted gypsum placed in its coffin. J. P. Boudet (1778–1849) embalmed with tan, salt, asphalt and Peruvian bark, camphor, cinnamon and other aromatics and corrosive sublimate. The last-mentioned drug, chloride and sulphate of zinc, acetate and sulphate of alumina, and creasote and carbolic acid have all been recommended by various modern embalmers.

See MUMMY; Louis Penicher, *Traité des embaumements* (Paris, 1669); S. Blancard, *Anatomia reformata, et de balsamatione nova methodus* (Lugd. Bat., 1695); Thomas Greenhill, *The Art of Embalming* (London, 1705); J. N. Marjolin, *Manuel d'anatomie* (Paris, 1810); Pettigrew, *History of Mummies* (London, 1834); Gannal, *Traité d'embaumements* (Paris, 1838; 2nd ed., 1841); Magnus, *Das Einbalsamiren der Leichen* (Brunsw., 1839); Sucquet, *Embaumement* (Paris, 1872); Lessley, *Embalming* (Toledo, Ohio, 1884); Myers, *Textbook of Embalming* (Springfield, Ohio, 1900); Rawlinson, *Herodotus*, vol. ii. p. 141; G. Elliot Smith, *A Contribution to the Study of Mummification in Egypt* (Cairo, 1906).

EMBANKMENT, in engineering, a mound of earth or stone, usually narrow in comparison with its length, artificially raised above the prevailing level of the ground. Embankments serve for two main classes of purpose. On the one hand, they are used to preserve the level of railways, canals and roads, in cases where a valley or piece of low-lying ground has to be crossed. On the other, they are employed to stop or limit the flow of water, either constituting the retaining wells of reservoirs constructed in connexion with water-supply schemes, or protecting low-lying tracts of land from river floods or the encroachments of the sea. The word embankment has thus come to be used for the mass of material, faced and supported by a stone wall and protected by a parapet, placed along the banks of a river where it passes through a city, whether to guard against floods or to gain additional space. Such is the Thames Embankment in London, which carries a broad roadway, while under it runs the Underground railway. In this sense an embankment is distinguished from a quay, though the mechanical construction may be the same, the latter word being confined to places where ships are loaded and unloaded, thus differing from the French *quai*, which is used both of embankments and quays, *e.g.* the *Quais* along the Seine at Paris.

EMBARGO (a Spanish word meaning "stoppage"), in international law, the detention by a state of vessels within its ports as a measure of public, as distinguished from private, utility. In practice it serves as a mode of coercing a weaker state. In the middle ages war, being regarded as a complete rupture between belligerent states, operated as a suspension of all respect for the person and property of private citizens; an article of Magna Carta (1215) provided that ". . . if there shall be found any such merchants in our land in the beginning of a war, they shall be attached, without damage to their bodies or goods, until it may be known unto us, or our Chief Justiciary, how our merchants are treated who happen to be in the country which is at war with us; and if ours be safe there, theirs shall be safe in our lands" (art. 48).

Embargoes in anticipation of war have long since fallen into disuse, and it is now customary on the outbreak of war for the belligerents even to grant a respite to the enemy's trading vessels to leave their ports at the outbreak of war, so that neither ship nor cargo is any longer exposed to embargo. This has been confirmed in one of the Hague Conventions of 1907 (convention relative to the status of enemy merchant ships at the outbreak of hostilities, Oct. 18, 1907), which provides that "when a merchant ship belonging to one of the belligerent powers is at the commencement of hostilities in an enemy port, *it is desirable* that it should be allowed to depart freely, either immediately, or after a reasonable number of days of grace, and to proceed, after being furnished with a pass, direct to its port of destination, or any other port indicated" (art. 1). The next article of the same convention limits the option apparently granted by the use of the word "desirable," providing that "a merchant ship unable, owing to circumstances of *force majeure*, to leave the enemy port within the period contemplated (in the previous article), or which was not allowed to leave, *cannot* be confiscated. The belligerent may only detain it, without compensation, but subject to the obligation of restoring it after the war, or requisition it on payment of compensation" (art. 2). (T. BA.)

EMBASSY, the office of an ambassador, or, more generally, the mission on which an ambassador of one power is sent to another, or the body of official personages attached to such a mission, whether temporary or permanent. Hence "embassy" is often quite loosely used of any mission, diplomatic or otherwise. The word is also used of the official residence of an ambassador. "Embassy" was originally "ambassy," the form used in the 17th century, but by the time of Johnson considered quite obsolete. "Ambassy" is from the O. Fr. *ambassée*, derived through such forms as the Port. *ambassada*, Ital. *ambasciata* from a lost Med. Lat. *ambactiata*, *ambactiare*, to go on a mission. (See further Ambassador, Exterritoriality and Diplomacy.)

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[1] Neutral carbonate of sodium, Na_2CO_3, found at the natron lakes in the Libyan desert, and at El Hegs, in Upper Egypt.

EMBER DAYS and **EMBER WEEKS,** the four seasons set apart by the Western Church for special prayer and fasting, and the ordination of clergy, known in the medieval Church as *quatuor tempora*, or *jejunia quatuor temporum*. The Ember weeks are the complete weeks next following Holy Cross day (September 14), St Lucy's day (December 13), the first Sunday in Lent and Whitsun day. The Wednesdays, Fridays and Saturdays of these weeks are the Ember days distinctively, the following Sundays being the days of ordination. These dates are given in the following memorial distich with a frank indifference to quantity and metre—

"Vult Crux, Lucia, Cinis, Charismata dia
Quod det vota pia quarta sequens feria."

The word has been derived from the A.S. *ymb-ren*, a circuit or revolution (from *ymb*, around, and *rennen*, to run); or by process of agglutination and phonetic decay, exemplified by the Ger. *quatember*, Dutch *quatertemper* and Dan. *kvatember*, from the Lat. *quatuor tempora*. The occurrence of the Anglo-Saxon compounds *ymbren-tid*, *ymbren-wucan*, *ymbren-fæstan*, *ymbren-dagas* for Ember tide, weeks, fasts, days, favours the former derivation, which is also confirmed by the use of the word *imbren* in the acts of the council of Ænham, A.D. 1009 (" jejunia quatuor tempora quae *imbren* vocant "). It corresponds also with Pope Leo the Great's definition, " jejunia ecclesiastica per totius anni circulum distributa."

The observance of the Ember days is confined to the Western Church, and had its origin as an ecclesiastical ordinance in Rome. They were probably at first merely the fasts preparatory to the three great festivals of Christmas, Easter and Pentecost. A fourth was subsequently added, for the sake of symmetry, to make them correspond with the four seasons, and they became known as the *jejunium vernum*, *aestivum*, *autumnale* and *hiemale*, so that, to quote Pope Leo's words, " the law of abstinence might apply to every season of the year." An earlier mention of these fasts, as four in number—the first known—is in the writings of Philastrius, bishop of Brescia, in the middle of the 4th century. He also connects them with the great Christian festivals (*De haeres.* 119). In Leo's time, A.D. 440–461, Wednesday, Friday and Saturday were already the days of special observance. From Rome the Ember days gradually spread through the whole of Western Christendom. Uniformity of practice, however, was of somewhat slow growth. Neither in Gaul nor Spain do they seem to have been generally recognized much before the 8th century. Their introduction into Britain appears to have been earlier, dating from Augustine, A.D. 597, acting under the authority of Gregory the Great. The general period of the four fasts being roughly fixed, the precise date appears to have varied considerably, and in some cases to have lost its connexion with the festivals altogether. The *Ordo Romanus* fixes the spring fast in the first week of March (then the first month); the summer fast in the second week of June; the autumnal fast in the third week of September; and the winter fast in the complete week next before Christmas eve. Other regulations prevailed in different countries, until the inconveniences arising from the want of uniformity led to the rule now observed being laid down under Pope Urban II. as the law of the church, in the councils of Piacenza and Clermont, A.D. 1095.

The present rule which fixes the ordination of clergy in the Ember weeks cannot be traced farther back than the time of Pope Gelasius, A.D. 492–496. In the early ages of the church ordinations took place at any season of the year whenever necessity required. Gelasius is stated by ritual writers to have been the first who limited them to these particular times, the special solemnity of the season being in all probability the cause of the selection. The rule once introduced commended itself to the mind of the church, and its observance spread. We find it laid down in the pontificate of Archbishop Ecgbert of York, A.D. 732–766, and referred to as a canonical rule in a capitulary of Charlemagne, and it was finally established as a law of the church in the pontificate of Gregory VII., *c.* 1085.

Authorities.—Muratori, *Dissert. de jejun. quat. temp.*, c. vii., anecdot. tom. ii. p. 262; Bingham, *Antiq. of the Christ. Church*, bk. iv. ch. vi. § 6, bk. xxi. ch. ii. §§ 1-7; Binterin, *Denkwürdigkeiten*, vol. v. part 2, pp. 133 ff.; Augusti, *Handbuch der christlich. Archäol.* vol. i. p. 465, iii. p. 486. (E. V.)

EMBEZZLEMENT (A.-Fr. *embesilement*, from *beseler* or *besillier*, to destroy), in English law, a peculiar form of theft, which is distinguished from the ordinary crime in two points:—(1) It is committed by a person who is in the position of clerk or servant to the owner of the property stolen; and (2) the property when stolen is in the possession of such clerk or servant. The definition of embezzlement as a special form of theft arose out of the difficulties caused by the legal doctrine that to constitute larceny the property must be taken out of the possession of the owner. Servants and others were thus able to steal with impunity goods entrusted to them by their masters. A statute of Henry VIII. (1529) was passed to meet this case; and it enacted that it should be felony in servants to convert to their own use caskets, jewels, money, goods or chattels delivered to them by their masters. " This act," says Sir J. F. Stephen (*General View of the Criminal Law of England*), " assisted by certain subtleties according to which the possession of the servant was taken under particular circumstances to be the possession of the master, so that the servant by converting the goods to his own use took them out of his own possession *qua* servant (which was his master's possession) and put them into his own possession *qua* thief (which was a felony), was considered sufficient for practical purposes for more than 200 years." In 1799 a clerk who had converted to his own use a cheque paid across the counter to him by a customer of his master was held to be not guilty of felony; and in the same year an act was passed, which, meeting the difficulty in such cases, enacted that if any clerk or servant, or any person employed as clerk or servant, should, by virtue of such employment, receive or take into his possession any money, bonds, bills, &c., for or in the name or on account of his employers, and should fraudulently embezzle the same, every such offender should be deemed to have stolen the same. The same definition is substantially repeated in a Consolidation Act passed in 1827. Numberless difficulties of interpretation arose under these acts, *e.g.* as to the meaning of " clerk or servant," as to the difference between theft and embezzlement, &c.

The law now in force, or the Larceny Act 1861, defines the offence thus (section 68):—" Whosoever, being a clerk or servant, or being employed for the purpose or in the capacity of a clerk or servant, shall fraudulently embezzle any chattel, money or valuable security which shall be delivered to or received or taken into possession by him for or in the name or on the account of his master or employer, or any part thereof, shall be deemed to have feloniously stolen the same from his master or employer, although such chattel, money or security was not received into the possession of such master or employer otherwise than by the actual possession of his clerk, servant or other person so employed, and being convicted thereof shall be liable, at the discretion of the court, to be kept in penal servitude for any time not exceeding fourteen years, and not less than three years," or imprisonment with or without hard labour for not more than two years. To constitute the offence thus described three things must concur:—(1) The offender must be a clerk or servant; (2) he must receive into his possession some chattel on behalf of his master; and (3) he must fraudulently embezzle the same. A clerk or servant has been defined to be a person bound either by an express contract of service or by conduct implying such a contract to obey the orders and submit to the control of his master in the transaction of the business which it is his duty as such clerk or servant to transact. (Stephen's *Digest of the Criminal Law*, Art. 309.)

The Larceny Act 1901, amending sections 75 and 76 of the Larceny Act 1861, also describes similar offences on the part of persons, not being clerks or servants, to which the name embezzlement is not uncommonly applied. The act makes the offence of fraudulently misappropriating property entrusted to a person by another, or received by him on behalf of another a misdemeanour punishable by penal servitude for a term not exceeding seven years, or to imprisonment, with or without hard labour, for a term not exceeding two years. So also trustees fraudulently disposing of trust property, and directors of companies fraudulently appropriating the company's property or keeping fraudulent accounts, or wilfully destroying books or publishing fraudulent statements, are misdemeanants punishable in the same way.

In the United States the law of embezzlement is founded mainly on the English statute passed in 1799, but the statutes of most states are so framed that larceny includes embezzlement. The latter is sometimes denominated statutory larceny. The punishment varies in the different states, otherwise there is little substantive difference in the laws of the two countries.

Statutes have been passed in some states providing that one indicted for larceny may be convicted of embezzlement. But it is doubtful whether such statutes are valid where the constitution of the state provides that the accused must be informed of the nature and cause of the accusation against him. (See also LARCENY.)

EMBLEM (Gr. ἔμβλημα, something put in or inserted, from ἐμβάλλειν, to throw in), a word originally applied in Greek and Latin (*emblema*) to a raised or inlaid ornament on vases and other vessels, &c., and also to mosaic or tessellated work. It is in English confined to a symbolical representation of some object, particularly when used as a badge or heraldic device.

EMBLEMENTS (from O. Fr. *emblavence de bled*, *i.e.* corn sprung up above ground), a term applied in English law to the corn and other crops of the earth which are produced annually, not spontaneously, but by labour and industry. Emblements belong therefore to the class of *fructus industriales*, or "industrial growing crops" (Sale of Goods Act 1893, § 62). They include not only corn and grain of all kinds, but everything of an artificial and annual profit that is produced by labour and manuring, *e.g.* hemp, flax, hops, potatoes, artificial grasses like clover, but not fruit growing on trees, which come under the general rule *quicquid plantatur solo, solo cedit*. Emblements are included within the definition of goods in s. 62 of the Sale of Goods Act 1893. Where an estate of uncertain duration terminates unexpectedly by the death of the tenant, or some other event due to no fault of his own, the law gives to the personal representative the profits of crops of this nature as compensation for the tilling, manuring and sowing of the land. If the estate, although of uncertain duration, is determined by the tenant's own acts, the right to emblements does not arise. The right to emblements has become of no importance in England since 1851, when it was provided by the Landlord and Tenant Act 1851 (s. 1) that any tenant at rack-rent, whose lease was determined by the death or cesser of the estate, of a landlord entitled only for his life, or for any other uncertain interest, shall, instead of emblements, be entitled to hold the lands until the expiration of the current year of his tenancy. The right to emblements still exists, however, in favour of (*a*) a tenant not within the Landlord and Tenant Act 1851, whose estate determines by an event which could not be foreseen, (*b*) the executor, as against the heir of the owner in fee of land in his own occupation, (*c*) an execution creditor under a writ directing seizure of goods and chattels. A person entitled to emblements may enter upon the lands after the determination of the tenancy for the purpose of cutting and carrying away the crops. Emblements are liable to distress by the landlord for arrears of rent, or rent during the period of holding on under the act of 1851 (the Distress for Rent Act 1737; see Bullen on *Distress*, 4th ed., 1893).

The term "emblements" is unknown in *Scots law*, but the heir or representative of a life-rent tenant, a liferenter of lands, has an analogous right to reap the crop (on paying a proportion of the rent) and a right to recompense for labour in tilling the ground. The Landlord and Tenant Act 1851 (s. 1) was in force in *Ireland* till 1860, when it was replaced by the Land Act 18 which gave to the tenant an almost identical right to embleme (s. 34).

In the *United States* the English common law of emblements been generally preserved. In North Carolina there has be legislation on the lines of the English Landlord and Tenant 1851. In some states the tenant is entitled to compensati also from the person succeeding to the possession.

Under the French Code Civil, the outgoing tenant is entitled convenient housing for the consumption of his fodder and for harvests remaining to be got in (art. 1777). The same rule is force in Belgium (Code Civil, art. 1777); and in Holland (Civil Co art. 1635) and Spain (art. 1578). Similar rights are secured to tenant under the German Civil Code (arts. 592 et seq.). Fren law is in force in Mauritius. The common law of England and Landlord and Tenant Act 1851 (14 & 15 Vict., c. 25, s. 1) are force in many of the British colonies acquired by settlement other colonies they have been recognized by statute (*e.g.* Victo Landlord and Tenant Act 1890, No. 1108, ss. 45-48: Tasma Landlord and Tenant Act 1874, 38 Vict. No. 12).

AUTHORITIES.—English Law: Fawcett on the *Law of Landl and Tenant* (3rd ed., London, 1905); Foà, *Landlord and Ten* (4th ed., London, 1907). Scots Law: Bell's *Principles* (10th e Edinburgh, 1899). Irish Law: Noland and Kanes, *Statutes relat to the Law of Landlord and Tenant in Ireland* (10th ed.), by Ke (Dublin, 1898). American Law: Stimson, *American Statute L* (Boston, 1886); Bouvier, *Law Dictionary*, ed. by Rawle (Bost and London, 1897); *Ruling Cases* (London and Boston, 1894–190 tit. "Emblements" (American Notes). (A. W. R.)

EMBOSSING, the art of producing raised portions or patte on the surface of metal, leather, textile fabrics, cardboard, pa and similar substances. Strictly speaking, the term is applica only to raised impressions produced by means of engraved d or plates brought forcibly to bear on the material to be emboss by various means, according to the nature of the substa acted on. Thus raised patterns produced by carving, chiselli casting and chasing or hammering are excluded from the ra of embossed work. Embossing supplies a convenient and peditious medium for producing elegant ornamental effects many distinct industries; and especially in its relations to pa and cardboard its applications are varied and important. Cres monograms, addresses, &c., are embossed on paper and envelo from dies set in small handscrew presses, a force or counter- being prepared in leather faced with a coating of gutta-perc The dies to be used for plain embossing are generally cut dee than those intended to be used with colours. Colour emboss is done in two ways—the first and ordinary kind that in which ink is applied to the raised portion of the design. The col in this case is spread on the die with a brush and the wh surface is carefully cleaned, leaving only ink in the depress parts of the engraving. In the second variety—called cam embossing—the colour is applied to the flat parts of the desi by means of a small printing roller, and the letters or design relief is left uncoloured. In embossing large ornamental desig engraved plates or electrotypes therefrom are employed, force or counterpart being composed of mill-board faced w gutta-percha. In working these, powerful screw-presses, principle like coining or medal-striking presses, are employ Embossing is also most extensively practised for ornamen purposes in the art of bookbinding. The blocked ornaments cloth covers for books, and the blocking or imitation tooling the cheaper kinds of leather work, are effected by means powerful embossing or arming presses. (See BOOK-BINDIN For impressing embossed patterns on wall-papers, textiles various kinds, and felt, cylinders of copper, engraved with patterns to be raised, are employed, and these are mounted calender frames, in which they press against rollers hav a yielding surface, or so constructed that depressions in engraved cylinders fit into corresponding elevations in th against which they press. The operations of embossing a colour printing are also sometimes effected together in a modifi tion of the ordinary cylinder printing machine used in cali printing, in which it is only necessary to introduce suita engraved cylinders. For many purposes the embossing roll must be maintained at a high temperature while in operati and they are heated either by steam, by gas jets, or by

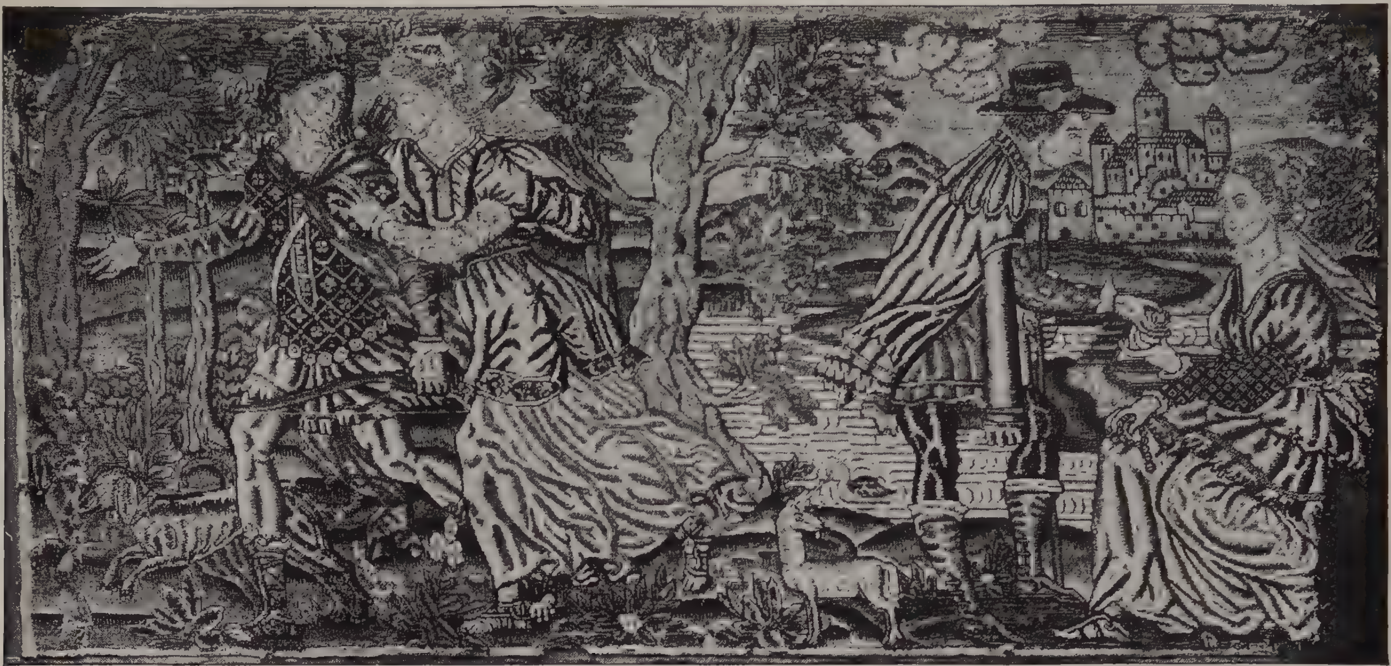

Fig. 6.—PANEL OF PETIT-POINT EMBROIDERY, WITH A REPRESENTATION OF COURTLY FIGURES IN A LANDSCAPE. English work of the end of the reign of Queen Elizabeth. Scale: $\frac{1}{6}$th.

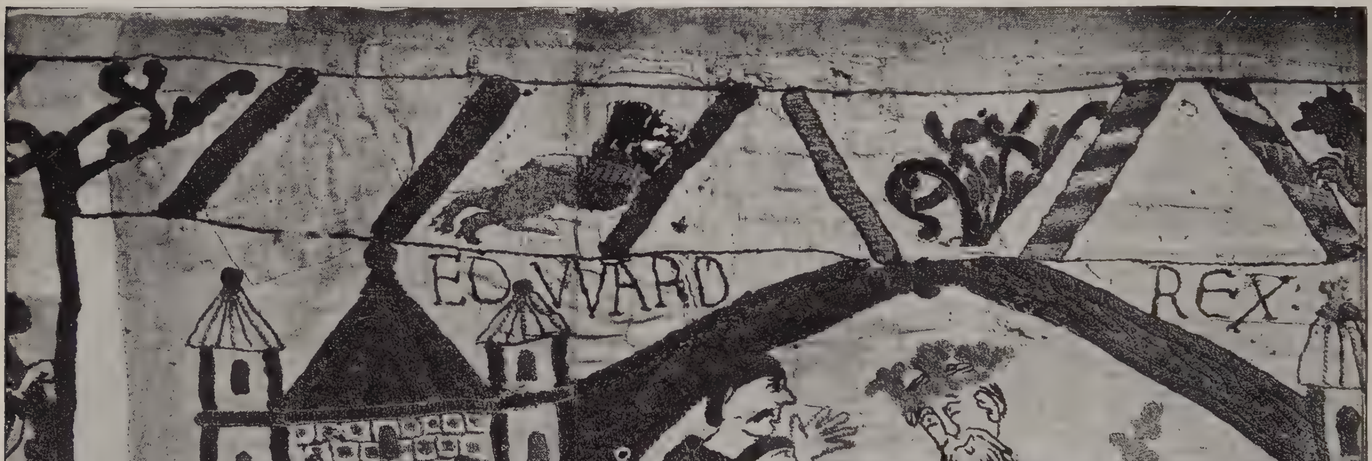

Fig. 7.—PORTION OF THE "BAYEUX TAPESTRY," A BAND OF EMBROIDERY WITH THE STORY OF THE NORMAN CONQUEST OF ENGLAND. In the museum at Bayeux, 11th century work. Scale: $\frac{1}{4}$th.

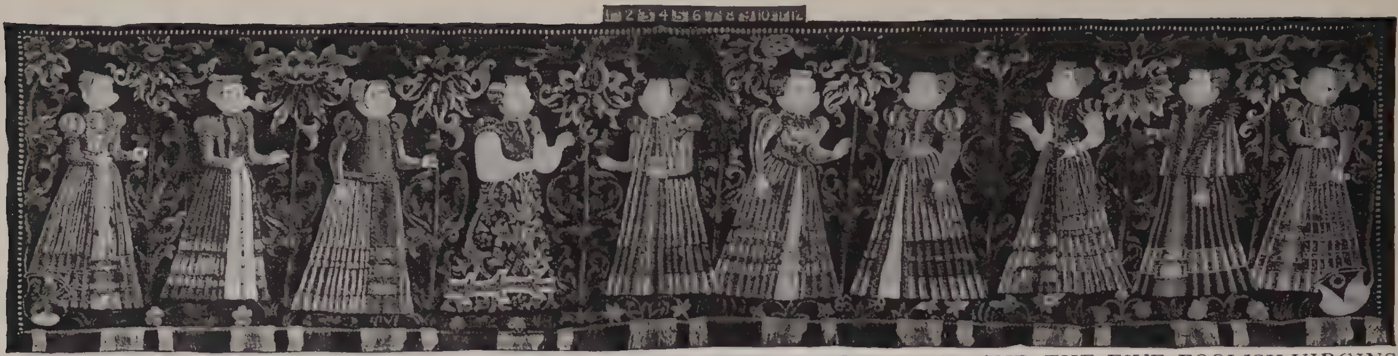

FIG. 8.—HANGING OF WOOLLEN CLOTH, EMBROIDERED WITH THE FIVE WISE AND THE FIVE FOOLISH VIRGINS.
German work, dated 1598. Scale: $\frac{1}{10}$th.

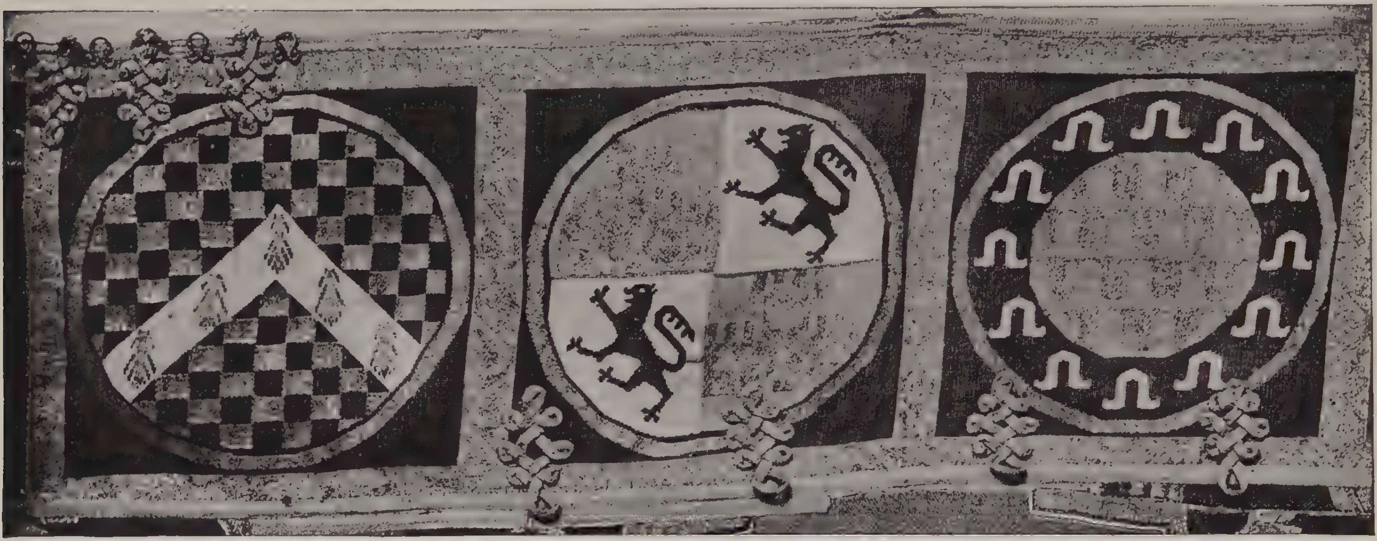

FIG. 9.—PORTION OF THE ORPHREY OF THE "SYON COPE," EMBROIDERED WITH SHIELDS OF ARMS.
The cope, formerly in the monastery of Syon near Isleworth, is now in the Victoria and Albert Museum.
English work of the 13th century. Scale: $\frac{5}{16}$ths.

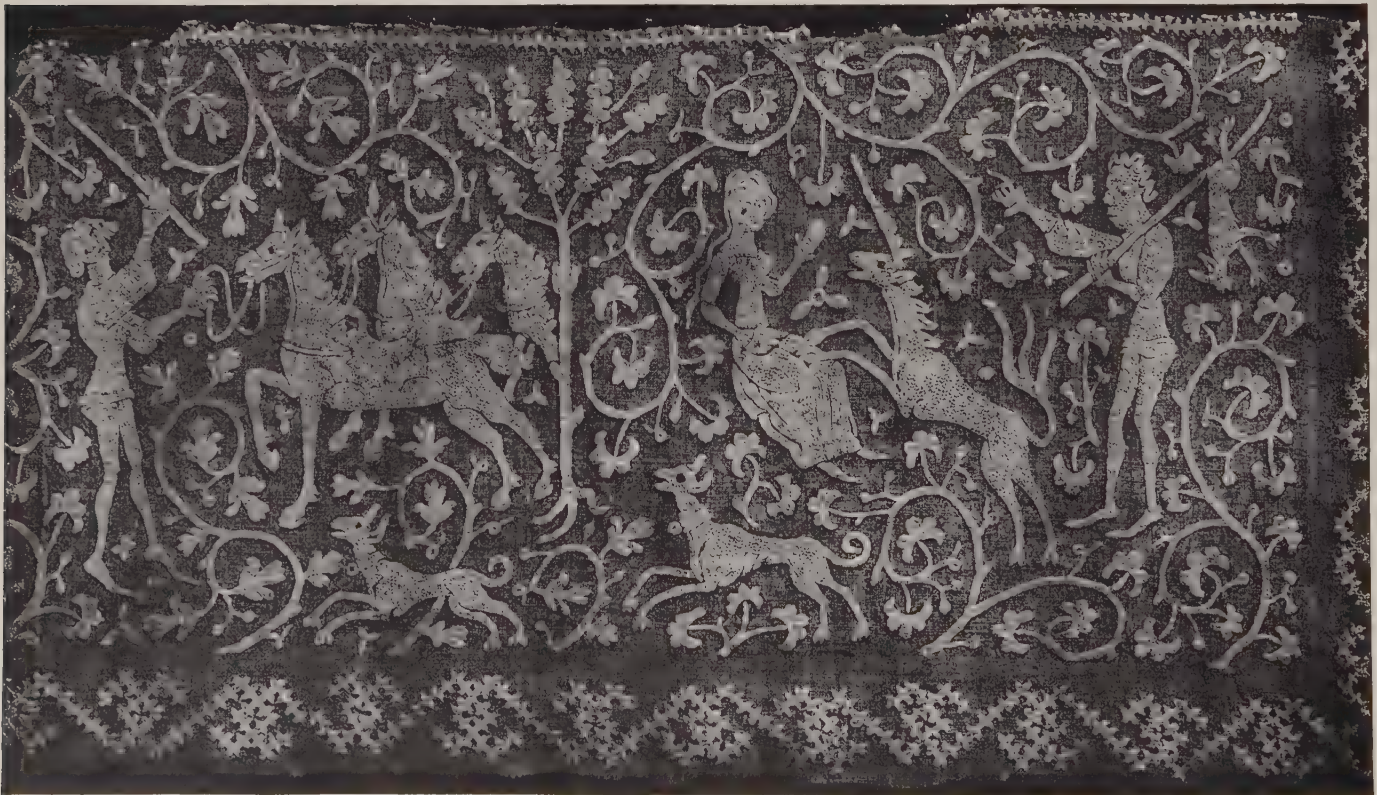

FIG. 10.—PORTION OF A BAND OF LOOSE LINEN, EMBROIDERED IN WHITE THREAD WITH FIGURES AND ANIMALS.
German work of the later part of the 14th century. Scale: $\frac{2}{7}$ths.

introduction of red-hot irons within them. The stamped or struck ornaments in sheet metal, used especially in connexion with the brass and Britannia-metal trades, are obtained by a process of embossing—hard steel dies with forces or counterparts of soft metal being used in their production. A kind of embossed ornament is formed on the surface of soft wood by first compressing and consequently sinking the parts intended to be embossed, then planing the whole surface level, after which, when the wood is placed in water, the previously depressed portion swells up and rises to its original level. Thus an embossed pattern is produced which may be subsequently sharpened and finished by the ordinary process of carving (see CHASING and REPOUSSÉ).

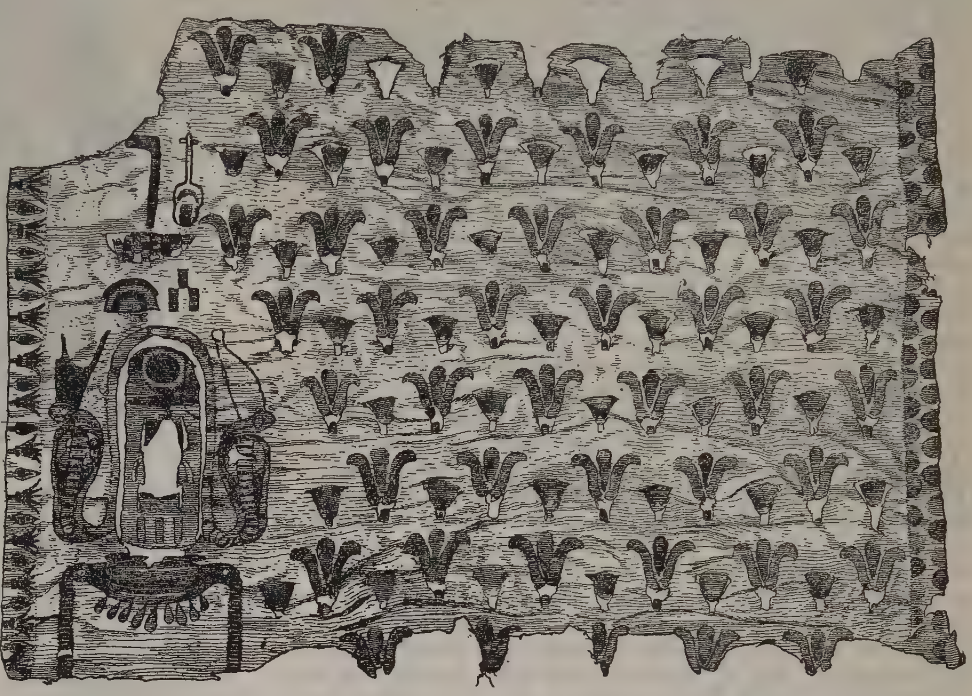

FIG. 1.—Fragment of a linen robe, found in the tomb of Tethmosis (Thothmes) IV. at Thebes, and now in the Cairo Museum. The cartouche has the name of Amenophis (Amenhotep) II. (*c.* 15th century B.C.).

EMBRACERY (from the O. Fr. *embraseour*, an embracer, *i.e.* one who excites or instigates, literally one who sets on fire, from *embraser*, to kindle a fire; "embrace," *i.e.* to hold or clasp in the arms, is from O. Fr. *embracer*, Lat. *in* and *bracchia*, arms), in law, the attempting to influence a juryman corruptly to give his verdict in favour of one side or the other in a trial, by promise, persuasions, entreaties, money, entertainments and the like. It is an offence both at common law and by statute, and punishable by fine and imprisonment. As a statutory offence it dates back to 1360. The offence is complete, whether any verdict has been given or not, and whether the verdict is in accordance with the weight of evidence or otherwise. The person making the attempt, and any juryman who consents, are equally punishable. The false verdict of a jury, whether occasioned by embracery or otherwise, was formerly considered criminal, and jurors were severely punished, being proceeded against by writ of attaint (*q.v.*). The Juries Act of 1825, in abolishing writs of attaint, made a special exemption as regards jurors guilty of embracery (§ 61). Prosecution for the offence has been so extremely rare that when a case occurred in 1891 (*R.* v. *Baker*, 113, Cent. Crim. Ct. Sess. Pap. 374) it was stated that no precedent could be found for the indictment. The defendant was fined £200, afterwards reduced to £100.

EMBRASURE, in architecture, the opening in a battlement between the two raised solid portions or merlons, sometimes called a crenelle (see BATTLEMENT, CRENELLE); also the splay of a window.

EMBROIDERY (M.E. *embrouderie*, from O. Fr. *embroder*, Mod. Fr. *broder*), the ornamentation of textile fabrics and other materials with needlework. The beginnings of the art of embroidery probably date back to a very primitive stage in the history of all peoples, since plain stitching must have been one of the earliest attainments of mankind, and from that it is but a short step to decorative needlework of some kind. The discovery of needles among the relics of Swiss lake-dwellings shows that their primitive inhabitants were at least acquainted with the art of stitching.

In concerning ourselves solely with those periods of which examples survive, we must pass over a wide gap and begin with the anciently-civilized land of Egypt. The sandy soil and dry climate of that country have led to the preservation of woven stuffs and embroideries of unique historic interest. The principal, and by far the earliest, known pieces which have a bearing on the present subject, found in 1903 in the tomb of Tethmosis (Thoutmôsis, or Thothmes) IV. at Thebes, are now in the Cairo Museum. There are three fragments, entirely of linen, inwrought with patterns in blue, red, green and black (fig. 1). A kind of tapestry method is used, the patterns being wrought upon the warp threads of the ground, instead of upon the finished web or woven material. Such a process, generally supplemented, as in this case, by a few stitches of fine needlework, was still in common use at a far later time. The largest of the three fragments at Cairo bears, in addition to rows of lotus flowers and papyrus inflorescences, a cartouche containing the name of Amenophis (Amenhotep) II. (*c.* 15th century B.C.); another is inwrought with the name of Tethmosis III. (*c.* 16th century B.C.).[1]

No other embroidered stuffs which can be assigned to so early a date have hitherto come to light in the Nile valley (nor indeed elsewhere), and the student who wishes to gain a fuller knowledge of the textile patterns of the ancient Egyptians must be referred to the wall-paintings and sculptured reliefs which have been preserved in considerable numbers.

From the ancient civilizations of Babylon and Assyria no fragments of embroidery, nor even of woven stuffs, have come down to us. The fine series of wall-reliefs from Nineveh in the British Museum give some idea of the geometrical and floral patterns and diapers which adorned the robes of the ancient Assyrians. The discovery of the ruins of the palace of Darius I. (521–485 B.C.) at Susa in 1885 has thrown some light upon the textile art of the ancient Persians. They evidently owed much to the nations whom they had supplanted. The famous relief from this palace (now in the Louvre) represents a procession of archers, wearing long robes covered with small diaper patterns, perhaps of embroidery.

The exact significance of the words used in the book of Exodus in describing the robes of Aaron (ch. xxviii.) and the hangings and ornaments of the Tabernacle (ch. xxvi.) cannot be determined, and the "broidered work" of the prophecy of Ezekiel (ch. xxvii.) at a later time is also of uncertain meaning. It seems likely that much of this ancient work was of the tapestry class, such as we have found in the early fragments from Thebes.

The methods of the ancient Greek embroiderer, or "variegator" (ποικιλτής) to whom woven garments were submitted for enrichment, can only be conjectured. The *peplos* or woven cloth made every fifth year to cover or shade the statue of Athena in the Parthenon at Athens, and carried at the Panathenaic festival,[1] was ornamented with the battles of the gods and giants. The late Dr J. H. Middleton thought that very possibly most of the elaborate work upon these *peploi* was done by the needle. That true embroidery, in the modern sense—the decoration by means of the needle of a finished woven material—was practised among the ancient Greeks, has been demonstrated by the finding of some textile fragments in graves in the Crimea; these are now in the Hermitage at St Petersburg. One of them, of purple woollen material, from a tomb assigned to the 4th century B.C., is embroidered in wools of different colours with a man on horseback, honeysuckle ornament and tendrils. Another woollen piece, attributed to the following century, has a stem and arrow-head leaves worked in gold thread.[2]

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[1] See H. Carter and P. E. Newberry, *Cat. gén. des ant. égypt. du musée du Caire* (1904), pl. i. and xxviii. A remarkable piece of Egyptian needlework, the funeral tent of Queen Isi em Kheb (XXIst Dynasty), was discovered at Deir el Bahri some years ago. It is described as a mosaic of leatherwork—pieces of gazelle hide of several colours, stitched together (see Villiers Stuart, *The Funeral Tent of an Egyptian Queen*, 1882).

In turning to ancient Rome, it is well first briefly to notice Pliny's account of the craft (*Nat. Hist.* viii.), as recording the views current in Rome at his time (1st century A.D.). After relating that Homer mentions embroidered garments (*pictas vestes*), he states that the Phrygians first used the needle for embroidered robes, which were thence called Phrygionian (*Phrygioniae*), and that Attalic garments were named from Attalus II., king of Pergamum (159–138 B.C.), the inventor of the art of embroidering in gold. He further relates that Babylon gave the name to embroideries of divers colours, for the production of which that city was famous. By the Romans the art was designated as "painting with the needle" (*acu pingere*), a term used by Virgil in speaking of the decoration of robes, by Ovid (who describes it as an art taught by Minerva), and by Roman writers generally when referring to embroidery.[3] It is to be regretted that no examples have been discovered in the neighbourhood of the Roman capital. For embroideries made under Roman influence we must again look to Egypt. They formed the decoration of garments[4] and mummy-wrappings from the cemeteries in Upper and Middle Egypt, which have been so extensively rifled of late years. Those of Roman type date approximately from the first five centuries of the Christian era. The earliest represent human figures, animals, birds, geometrical and interlacing ornaments, vases, fruit, flowers and foliage (especially the vine). They are generally done in purple wool and undyed linen thread by the tapestry process employed in Egypt at least fifteen centuries earlier, as we have seen; most of the patterns have had the lines more clearly marked out by the ordinary method of needlework. Towards the end of this period a greater choice of colours is seen, and Christian symbols appear. At this time examples worked entirely upon the finished web are found (fig. 2). The transition is easy from such work to the veritable "needle-paintings," representing scenes from the gospels, produced in Egypt shortly after (fig. 3). Such embroideries are evidently akin to those mentioned by Bishop Asterius (330–410), who describes the garments worn by effeminate Christians as painted like the walls of their houses.[5]

From the time of Justinian (527–565) onwards for some centuries, the art of Europe, embroidery with the rest, was dominated by that of the Byzantine empire. To trace the progress of the highly conventionalized Byzantine style, becoming more rigid and stereotyped as time passes, belongs to the general history of art, and such a task cannot be attempted here. Perhaps the most remarkable example of all which have survived to illustrate the work of the Byzantine embroiderers is the blue silk robe known as the dalmatic of Charlemagne or of Leo III., in the sacristy of St Peter's at Rome (fig. 4). According to the present consensus of opinion it belongs to a later time than either of those dignitaries, dating most probably from the 12th century.[6] In front is represented Christ enthroned as Judge of the world, a youthful but majestic figure; on the back is the Transfiguration. These, as well as the minor subjects, are explained by Greek inscriptions. The wide influence of Byzantine art gradually died out after the Latin sack of Constantinople in the year 1204, although the style lingered, and lingers still, in certain localities, notably at Mount Athos.

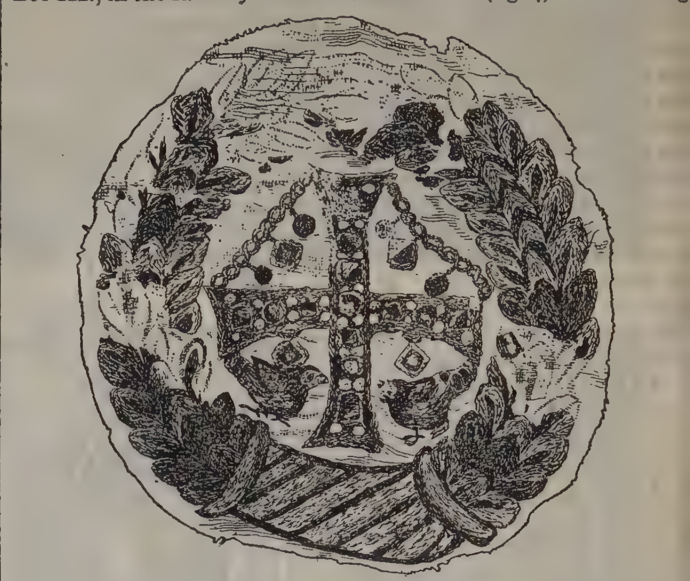

FIG. 2.—Embroidered panel from a linen garment, with a jewelled cross and two birds within a wreath. Found in a cemetery at Akhmîm, Upper Egypt. Egypto-Roman work of the 4th or 5th century A.D.

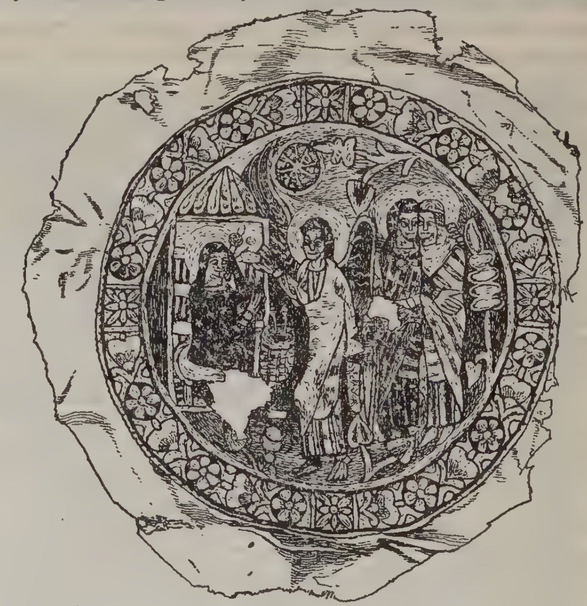

FIG. 3.—Embroidered panel from a linen garment, with a representation of the Annunciation and the Salutation. Found in a cemetery in Egypt. Coptic work of the 6th or 7th century A.D.

Palermo in Sicily succeeded Byzantium as the capital of the arts in Europe, although its ascendancy was of brief duration. Under the Norman kings of Sicily the style was strongly oriental, consequent upon the earlier occupation of the island by the Saracens, and upon the employment of Saracenic craftsmen by the Normans. The magnificent red silk mantle at Vienna, embroidered in gold thread with a date-palm and two lions springing upon camels, and enriched with pearls and enamel plaques, bears round the edge an Arabic inscription, recording that it was made in the royal factory of the capital of Sicily (Palermo) in the year 528 (=A.D. 1134). At that time Roger, the first Norman king, was on the throne. Another of the imperial coronation-robes—a linen alb with gold embroidery—is also at Vienna.[1] An inscription in Latin and Arabic states that it was made in the year 1181, under the reign of William II. (Norman king of Sicily, 1166–1189).

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[1] The procession at this festival is represented upon the frieze of the Parthenon.

[2] See *Compte rendu de la Comm. Imp. Arch.*, 1878–1879 (St Petersburg), pl. iii. and v.

[3] For an account of the conditions under which Greek and Roman embroiderers worked, see Alan S. Cole, "Some Aspects of Ancient and Modern Embroidery," *Journal of the Society of Arts*, vol. liii., 1905, pp. 958, 959.

[4] Chiefly tunics with vertical bands (*clavi*) and medallions (*orbiculae*), and an ample outer robe or cloak.

[5] The Adoration of the Magi is represented upon the lower border of the long robe worn by the empress Theodora (wife of Justinian) in the mosaic in the church of S. Vitale at Ravenna.

[6] Writers have assigned different dates to this vestment: Lady Alford, *Needlework as Art* (earlier than the 13th century); F. Bock, *Die Kleinodien* (12th century); S. Boisserée, *Über die Kaiser-Dalmatica in der St Peterskirche zu Rom* (12th or first half of 13th century); A. S. Cole, *Cantor Lectures at Society of Arts, 1905* (possibly of 9th century); Lord Lindsay, *Christian Art* (12th or early 13th century); A. Venturi, *Storia dell' arte* (10th or 11th century); T. Braun, *Liturg. Gewandung*, p. 305 and note (late 14th or early 15th century).

From about that time distinct national styles began to develop in different places. In tracing the progress of the embroiderer's art during the middle ages we must rely mainly upon the many fine examples of ecclesiastical work which have been preserved. The costumes of men and women, as well as curtains and hangings and such articles of domestic use, were often richly adorned with embroidery. These have mostly perished; while the careful preservation and comparatively infrequent use of the vestments and other objects devoted to the service of the church have given us tangible evidence of the attainments of the medieval embroiderer. Much of this work was produced in convents, but old documents show that in monasteries also were to be found men known for their skill in needlework. Other names, both of men and women, are recorded, showing that the craft was by no means exclusively confined to monastic foundations. Gilds of embroiderers existed far back in medieval times.

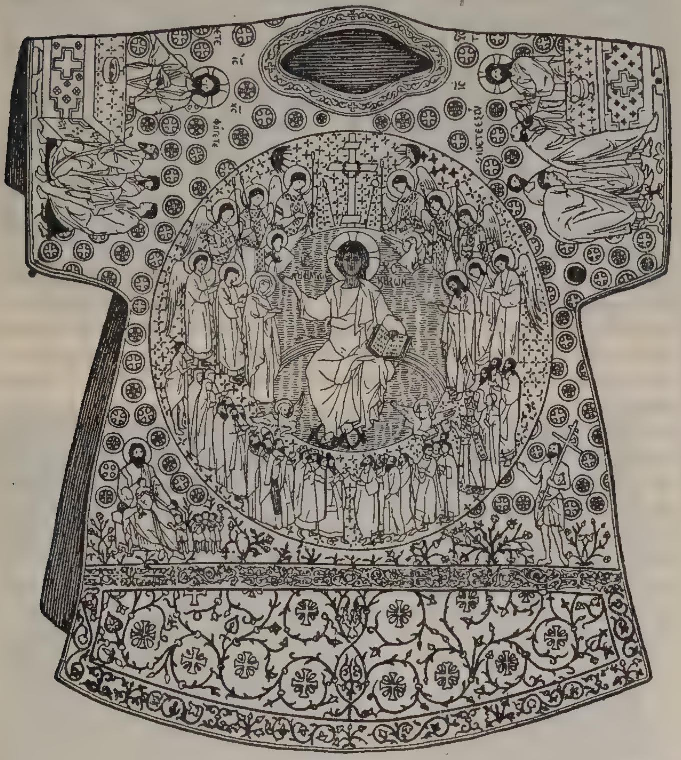

Fig. 4.—Embroidered robe known as the "Dalmatic of Charlemagne," or of Leo III., preserved in the sacristy of St Peter's at Rome. Byzantine work, probably of the 12th century.

In England the craft has been a favourite employment for many centuries, and persons of all ranks have occupied their spare hours at needlework. Some embroidered fragments, found in 1826–1827 in the tomb of St Cuthbert at Durham, and now kept in the cathedral library, were worked, chiefly in gold thread, by order of Ælfflæda, queen of Edward the Elder, for Fridestan, bishop of Winchester, early in the 10th century. In the later part of the following century the "Bayeux tapestry" was produced—a work of unique importance (Plate I. fig. 7). It is a band of linen, more than 230 ft. long, embroidered in coloured wools with the story of the Norman conquest of England. (See Bayeux Tapestry.)

Some fragments of metallic embroidery on silk, of the 12th and 13th centuries, may be seen in the library of Worcester cathedral. They were removed from the coffins of two bishops, William de Blois (1218–1236) and Walter de Cantelupe (1236–1266). A fragment of gold embroidery from the tomb of the latter bishop is preserved in the Victoria and Albert Museum at South Kensington, and others are in the British Museum. In the 13th century English embroidery was famous throughout western Europe, and many embroidered objects are described in inventories of that time as being *de opere anglicano.* During that century, and the early part of the next, English work was at its best. The most famous example is the "Syon cope" at South Kensington, belonging to the latter half of the 13th century (see Cope, Plate I. fig. 2). It represents the coronation of the Virgin, the Crucifixion, the archangel Michael transfixing the dragon, the death and burial of the Virgin, our Lord meeting Mary Magdalene in the garden, the Apostles and the hierarchies of angels. The broad orphrey is embroidered with a series of heraldic shields (Plate II. fig. 9). Other embroideries of the period are at Steeple Aston, Chesterfield (Col. Butler-Bowden), Victoria and Albert and British museums, Rome (St John Lateran), Bologna, Pienza, Anagni, Ascoli, St Bertrand de Comminges, Lyons museum, Madrid (archaeological museum), Toledo and Vich.

During the course of the 14th and 15th centuries embroideries produced in England were not equal to the earlier work. Towards the end of the latter century, and until the dissolution of the monasteries in the next, much ecclesiastical embroidery of effective design was done, and many examples are still to be seen in churches throughout the country. In the Tudor period the costumes of the wealthy were often richly adorned with needlework. The portraits of King Henry VIII., Queen Elizabeth and their courtiers show how magnificent was the embroidery used for such purposes. Many examples, especially of the latter reign, worked with very effective and beautiful floral patterns, have come down to these times. A kind of embroidery known as "black work," done in black silk on linen, was popular during the same reign. A tunic embroidered for Queen Elizabeth, with devices copied from contemporary woodcuts, is an excellent example of this work. It now belongs to the Viscount Falkland. Another class of work, popular at the same time, was closely worked in wools and silks on open-mesh material like canvas, which was entirely covered by the embroidery. Figures in rich costume were often introduced (Plate I. fig. 6). This method was much practised in France, and the term applied to it in that country, "*au petit point*," has become generally used. Throughout the 17th and 18th centuries embroidery in England, though sometimes lacking in good taste, maintained generally a high standard, and that done to-day, based on the study of old examples, need not fear comparison with any modern work. During these three centuries bold floral patterns for hangings, curtains and coverlets have been usual (Plate III. fig. 13), but smaller works, such as samplers, covers of work-boxes, and pictorial and landscape subjects (fig. 5), have been produced in large numbers. In the 18th century gentlemen's coats and waistcoats and ladies' dresses were extensively embroidered.

In France, embroidery, like all the arts practised by that nation, has been characterized by much grace and beauty, and many good specimens belonging to different periods are known. The vestments associated with the name of St Thomas of Canterbury at Sens may be either of French or English work (12th century). To the later part of the following century belongs a band of embroidery, representing the coronation of the Virgin, the Adoration of the Magi, the presentation in the Temple, and other subjects beneath Gothic arches, preserved in the Hôtel-Dieu at Château Thierry. The mitre of Jean de Marigny, archbishop of Rouen (1347–1351), in the museum at Évreux, embroidered with figures of St Peter and St Eloy, may be regarded as representative of 14th-century work. An altar-frontal with the Annunciation embroidered in silks and gold and silver upon a blue silk damask ground, now in the museum at Lille, is a very beautiful example of Franco-Flemish art in the second half of the 15th century. It was originally in the church at Noyelles-lez-Seclin. An embroidery more characteristically French, and belonging to the same century, is in the museum at Chartres. It is a triptych, having in the middle a *pietà*, on the left wing St John the Evangelist, and on the right St Catherine of Alexandria. Each leaf has a canopy of architecture represented in perspective. In the 16th century an effective style of embroidery was practised in France; the pattern is generally a graceful combination of floral and scroll forms, cut out of velvet, satin or silk, and applied to a thick woollen cloth. Later work, chiefly of a floral character, has served for the decoration of costumes, ecclesiastical vestments, curtains and hangings, and the seats and backs of chairs.

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[1] Both are illustrated in F. Bock, *Die Kleinodien.*

Under the rule of the dukes of Burgundy in the 15th century art in the southern provinces of the Netherlands prospered greatly, and able artists were found to meet the wishes of those munificent rulers. The local schools of painting, which flourished under their patronage, appear to have very considerably influenced the embroiderers' art. Great care and pains were given to reproduce as accurately as possible the painted cartoon or picture which served as the model. The heads are individualized, and the folds of the draperies are laboriously worked out in detail. The masonry of buildings, the veinings of marble, and the architectural enrichments are often represented with careful fidelity, and landscape backgrounds are shown in every detail. As in the case of the tapestries of the Netherlands—the finest which the world has seen—there can be no doubt that patrons of art and donors, when requiring embroideries to be made, secured the services of eminent painters for the designs. There are many examples of such careful work. A set of vestments known as the *ornement de la Toison d'Or*, now in the Hof-museum at Vienna, is embroidered in the most minute manner with sacred subjects and figures of saints and angels. The stiff disposal of many of these figures, within flattened hexagons arranged in zones, is not pleasing, but the needlework is most remarkable for skill and carefulness. They are of 15th-century work. A cope belonging to the second half of that century was given to the cathedral of Tournay by Guillaume Fillatre, abbot of St Bertin at St Omer, and bishop of Tournay (d. 1473). It is now in the museum there. Upon the orphreys and hood are represented the seven Works of Mercy. The body of the cope, of plain red velvet, is powdered with stags' heads and martlets (the heraldic bearings of the bishop); between the antlers of the stags is worked in each case the initial letter of the bishop's name, and the morse is embroidered with his arms. Some panels of embroidery, once decorating an altar in the abbey of Grimbergen, and now at Brussels, illustrate the best class of Flemish needlework in the 16th century. The scenes are taken from the Gospel: the marriage at Cana, Christ in the house of the Pharisee, Christ in the house of Zacchaeus, the Last Supper, and the supper at Emmaus. In the museum at Bern there are some embroideries of great historic and artistic interest, found in the tent of Charles the Bold, duke of Burgundy, after his defeat at Granson in 1476. They include some armorial panels and two tabards or heralds' coats. A tabard of the following century, with the royal arms of Spain in applied work, and most probably of Flemish origin, is preserved in the archaeological museum at Ghent.

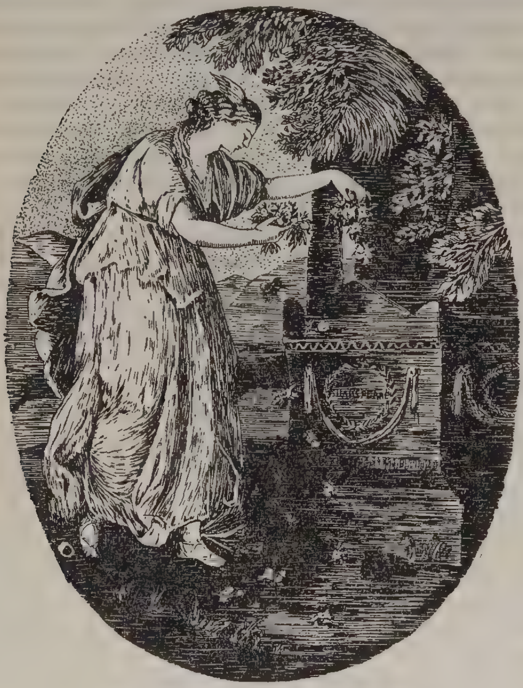

FIG. 5.—Oval picture in silk embroidery: Fame scattering Flowers over Shakespeare's Tomb. English work of the 18th century.

The later art of Holland was largely influenced by the Dutch conquests in the East Indies at the end of the 16th century, and the subsequent founding of the Dutch East India Company. Embroideries were among the articles produced in the East under Dutch influence for exportation to Holland.

Much embroidery for ecclesiastical purposes has been executed in Belgium of late years. It follows medieval models, but is lacking in the qualities which make those of so much importance in the history of the art.

There is perhaps little worthy of special notice in Italy before the beginning of the 14th century, but the embroideries produced at that time show great skill and are very beautiful. The names of two Florentine embroiderers of the 14th century—both men—have come down to us, inscribed upon their handiwork. A fine frontal for an altar, very delicately worked in gold and silver and silks of many colours, is preserved in the archaeological museum at Florence. The subject in the middle is the coronation of the Virgin; on either side is an arcade with figures of apostles and saints. The embroiderer's name is worked under the central subject: *Jacobus Cambi de Florētia me fecit MCCCXXXVIII.* The other example is in the basilica at Manresa in Spain. It also is an altar-frontal, worked in silk and gold upon an embroidered gold ground. There is a large central panel representing the Crucifixion, with nine scenes from the Gospel on each side. The embroidered inscription is as follows: *Geri Lapi rachamatore me fecit in Florentia.* It is of 14th-century work. An embroidered orphrey in the Victoria and Albert Museum belongs to the early part of the same century. It represents the Annunciation, the coronation of the Virgin and figures of apostles and saints beneath arches. In the spandrels are the orders of angels with their names in Italian. In the best period of Italian art successful painters did not disdain to design for embroidery. Francesco Squarcione (1394–1474), the founder of the Paduan school of painting, and master of Mantegna, is called in a document of the year 1423 a tailor and embroiderer (*sartor et recamator*). It is recorded that Antonio del Pollaiuolo painted cartoons which were carried out in embroidery,[1] and Pierino del Vaga, according to Vasari, did likewise. In the 16th and 17th centuries large numbers of towels and linen covers were embroidered in red, green or brown silk with borders of floral patterns, sometimes (especially in the southern provinces) combined with figure subjects and bird and animal forms (Plate IV. fig. 15). Another type of embroidery popular at the same time, both in Italy and Spain, is known as appliqué (or applied) work. The pattern is cut out and applied to a bright-coloured ground, frequently of velvet, as in the example illustrated (Plate III. fig. 14). The later embroidery of Sicily follows that of the mainland. A remarkable coverlet, quilted and padded with wool so as to throw the design into relief, is shown to be of Sicilian origin by the inscriptions which it bears

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[1] Some embroideries from vestments, designed by Pollaiuolo, are still preserved in the Museo dell' Opera del Duomo, Florence.

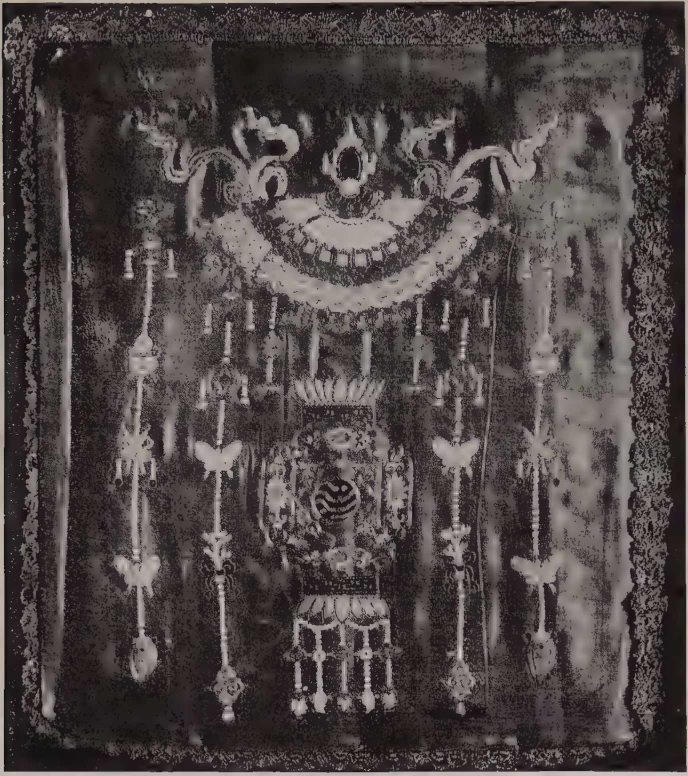

FIG. 11.—SILK PANEL, EMBROIDERED WITH A HANGING LANTERN.

Chinese work of the 17th or 18th century. Scale: $\frac{1}{4}$th.

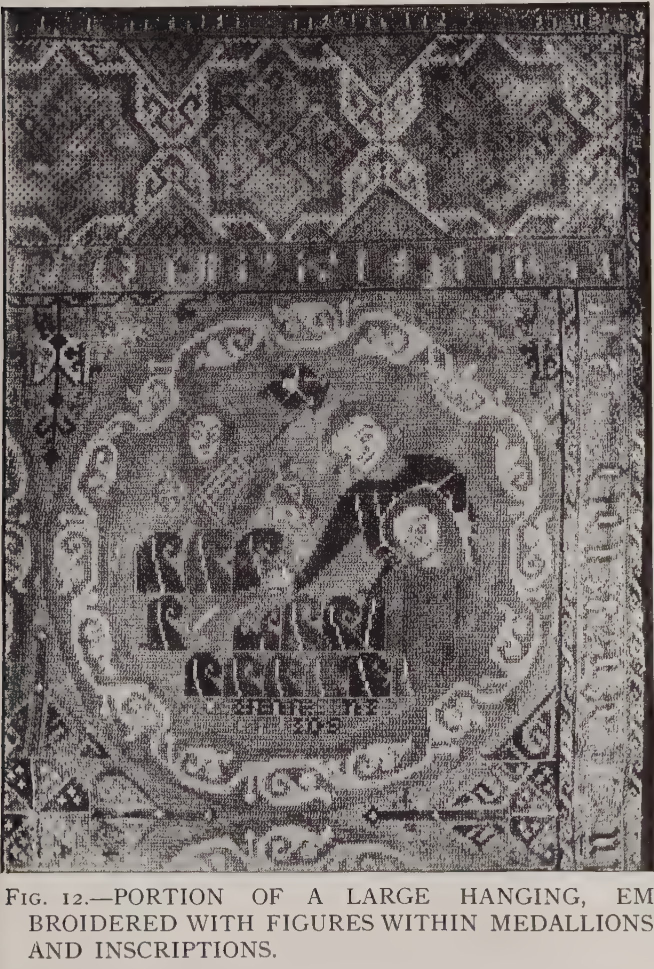

FIG. 12.—PORTION OF A LARGE HANGING, EMBROIDERED WITH FIGURES WITHIN MEDALLIONS, AND INSCRIPTIONS.

From a church in Iceland, probably 17th century. Scale: $\frac{1}{8}$th.

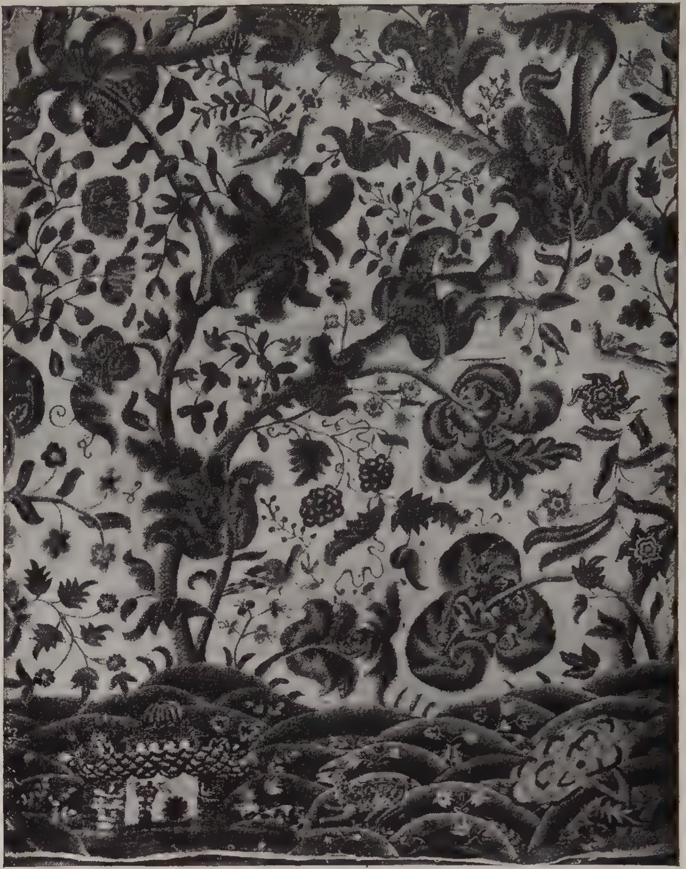

FIG. 13.—PORTION OF A BED-HANGING, EMBROIDERED WITH FLOWERING TREES GROWING FROM MOUNDS.

English work of the later part of the 17th century. Scale: $\frac{1}{12}$th.

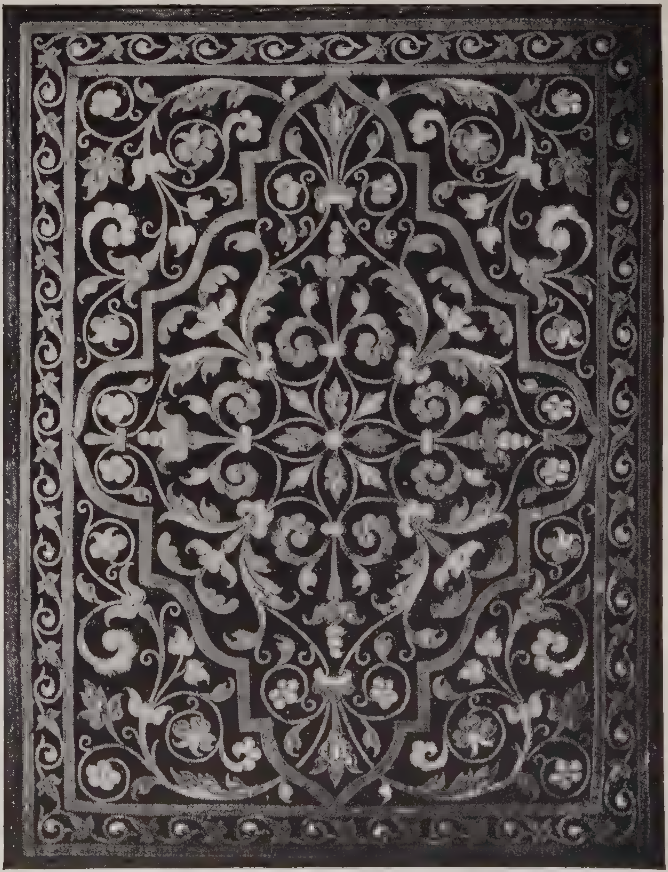

FIG. 14.—APPAREL FOR A DALMATIC OF GREEN VELVET, EMBROIDERED WITH AN APPLIQUÉ PATTERN.

Italian work of the 16th century. Scale: $\frac{1}{4}$th.

EMBROIDERY

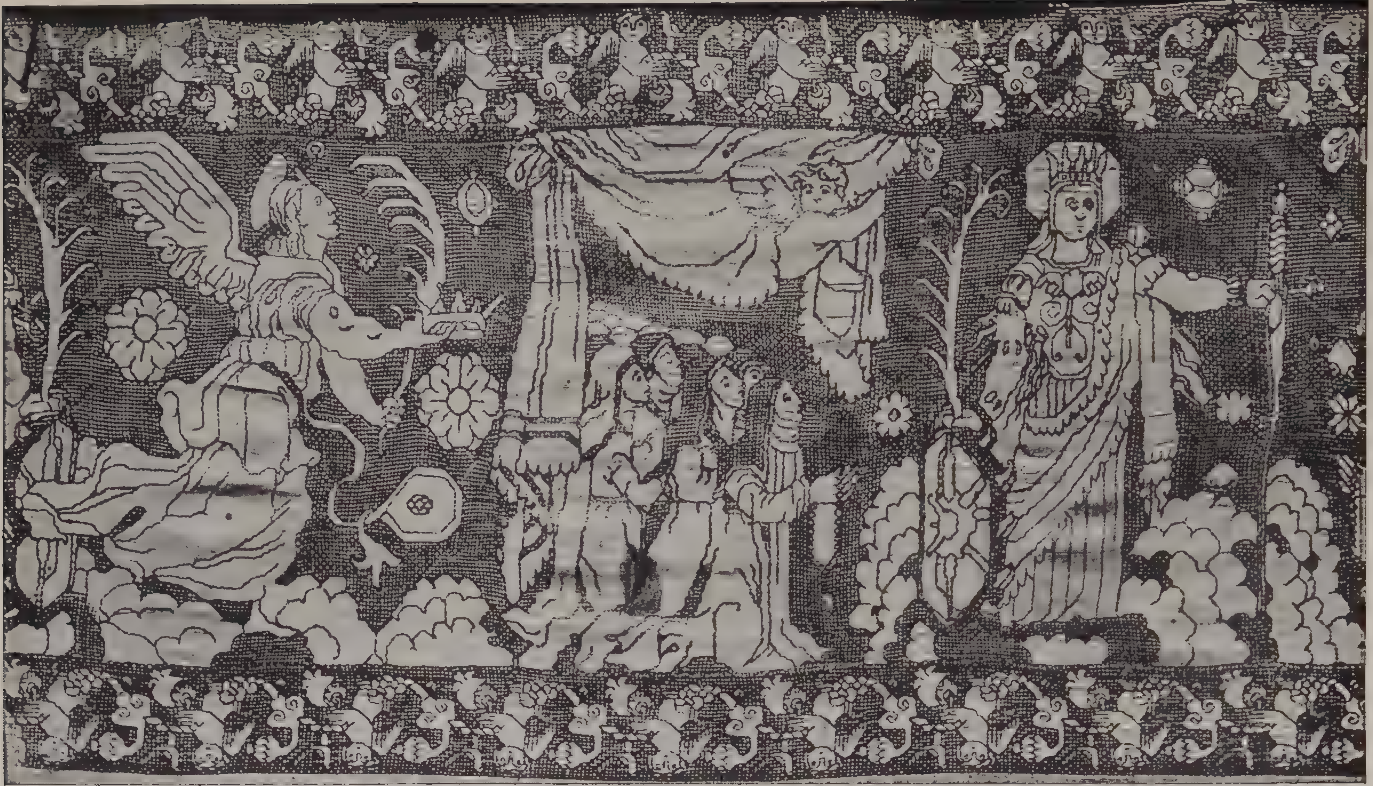

FIG. 15.—PORTION OF THE BORDER OF A LINEN COVER, EMBROIDERED WITH A FIGURE OF ST CATHERINE OF ALEXANDRIA AND KNEELING VOTARIES. Italian work of the 16th century. Scale: $\frac{2}{5}$ths.

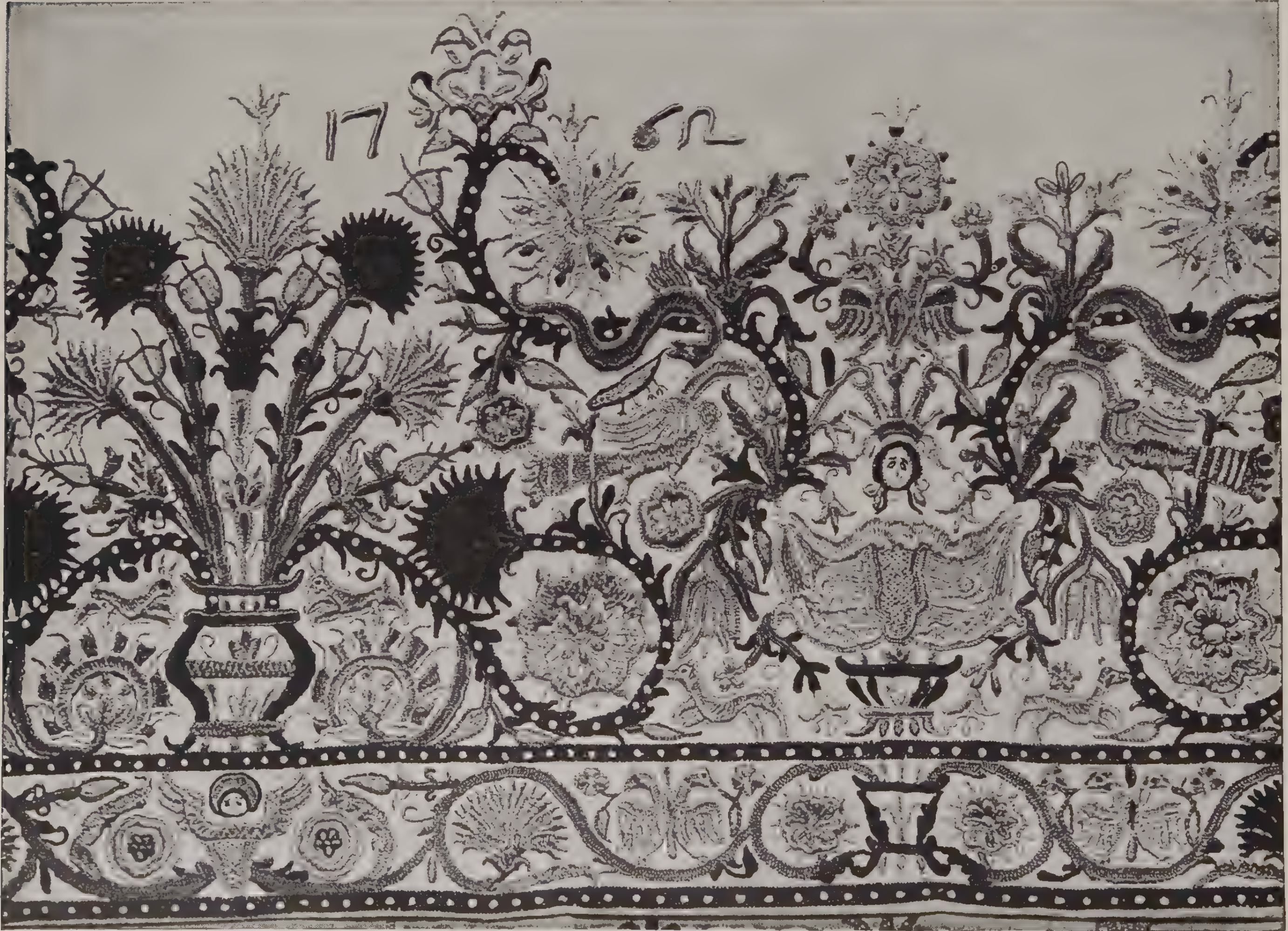

FIG. 16.—LINEN BORDER, EMBROIDERED WITH DEBASED FIGURES, BIRDS AND ANIMALS AMID FLOWERS. Cretan work, dated 1762. Scale: $\frac{4}{9}$ths.

(Plate VI. fig. 18). It represents scenes from the story of Tristan, agreeing in the main part with the *novella* entitled "La Tavola Rotonda o l'istoria di Tristano." The quilt dates from the end of the 14th century. Many pattern-books for embroidery and lace were published in Italy in the 16th and 17th centuries.[1]

In the greater part of the Spanish peninsula art was for many centuries dominated by the Arabs, who overran the country in the 8th century, and were not finally subdued until the end of the 15th. Hispano-Moorish embroideries of the medieval period usually have interlacing patterns combined with Arabic inscriptions. In the 15th and 16th centuries Italian influence becomes evident. Later the effects of the Spanish conquests in Asia are seen. Eastern influence is, however, stronger in the case of the Portuguese, who seized Goa, on the west coast of the Indian peninsula, early in the 16th century, and during the whole of that century held the monopoly of the eastern trade. Many large embroideries were produced in the Indies, showing eastern floral patterns mingled with representations of Europeans, ships and coats of arms. Embroideries done in Portugal in the 16th and 17th centuries strongly reflect the influence of oriental patterns.

German embroidery of the 12th and 13th centuries adheres closely to the traditions of Byzantine art. A peculiarity of much medieval German work is a tendency to treat the draperies of the figures as flat surfaces to be covered with diaper patterns, showing no folds. A cope from Hildesheim cathedral, now in the Victoria and Albert Museum, is a typical illustration of such work, dating from the end of the 13th century. It is embroidered in silk upon linen with the martyrdom of apostles and saints. Other specimens of embroidery in this manner may be seen at Halberstadt. An altar-frontal from Rupertsburg (Bingen), belonging to the earlier years of the 13th century, is now in the Brussels museum. It is of purple silk, embroidered with Christ in majesty and figures of saints. It was no doubt made in the time of Siegfried, archbishop of Mainz (1201–1230), who is represented upon it. A type of medieval German embroidery is done in white linen thread on a loose linen ground—a sort of darning-work (Plate II. fig. 10). Earlier specimens of this work are often diversified by using a variety of stitches tending to form diaper patterns. The use of long scrolling bands with inscriptions explaining the subjects represented is more usual in German work than in that of any other country. In the 15th century much fine embroidery was produced in the neighbourhood of Cologne. Later German work shows a preference for bold floral patterns, sometimes mingled with heraldry; the larger examples are often worked in wool on a woollen cloth ground (Plate II. fig. 8). The embroidery of the northern nations (Denmark, Scandinavia, Iceland) was later in development than that of the southern peoples. Figure subjects evidently belonging to as late a period as the 17th century are still disposed in formal rows of circles, and accompanied by primitive ornamental forms (Plate III. fig. 12). A remarkable early embroidered fabric covers the relics of St Knud (Canute, king of Denmark, 1080–1086) in his shrine in the church dedicated to him at Odense. It is apparently contemporary work. The pattern consists of displayed eagles within oval compartments, in blue on a red ground.

In Greece and the islands of the eastern Mediterranean embroidery has been much employed for the decoration of costumes, portières and bed-curtains. Large numbers have been acquired in Crete (Plate IV. fig. 16), and patterns of a distinctive character are also found in Rhodes, Cos, Patmos and other islands. Some examples show traces of the influence of the Venetian trading settlements in the archipelago in the 16th and 17th centuries. Among the Turks a great development of the arts followed upon the conquest of Asia Minor and the Byzantine territory in Europe. Their embroideries show a preference for floral forms—chiefly roses, tulips, carnations and hyacinths—which are treated with great decorative skill.

The use of embroidery in Asia—especially in India, China, Turkestan and Persia—dates back to very early times. The conservatism of all these peoples renders the date of surviving examples often difficult to establish, but the greater number of such embroideries now to be seen in Europe are certainly of no great age.

India has produced vast quantities of embroideries of varying excellence. The fine woollen shawls of Kashmir are widely famed; their first production is supposed to date back to a remote period. The somewhat gaudy effect of many Indian embroideries is at times intensified by the addition of beetles' wings, tinsel or fragments of looking-glass. China is the original home of the silkworm, and the textile arts there reached an advanced stage at a date long before that of any equally skilful work in Europe. Embroideries worked there are generally in silk threads on a ground of the same material. Such work is largely used for various articles of costume, and for coverlets, screens, banners, chair-covers and table-hangings. The ornaments upon the robes especially are prescribed according to the rank of the wearer. The designs include elaborate landscapes with buildings and figures, dragons, birds, animals, symbolic devices, and especially flowers (Plate III. fig. 11). Dr Bushell states that the stuff to be embroidered is first stretched upon a frame, on pivots, and that pattern-books with woodcuts have been published for the workers' guidance. A kind of embroidery exported in large quantities from Canton to Europe rivals painting in the variety and gradation of its colours, and in the smoothness and regularity of its surface.

Embroidery in Japan resembles in many ways that of China, the country which probably supplied its first models. As a general rule, Japanese work is more pictorial and fanciful than that of China, and the stitching is looser. It frequently happens that the brush has been used to add to the variety of the embroidered work, and in other cases the needle has been an accessory upon a fabric already ornamented with printing or painting. Japanese work is characterized generally by bold and broad treatment, and especial skill is shown in the representation of landscapes—figures, rocks, waterfalls, animals, birds, trees, flowers and clouds being each rendered by a few lines. More elaborate are the large temple hangings, the pattern being frequently thrown into relief, and completely covering the ground material.

Embroidery in Persia has been used to a great extent for the decoration of carpets, for prayer or for use at the bath (Plate V. fig. 17). Robes, hangings, curtains, tablecovers and portières are also embroidered. A preference is shown for floral patterns, but the Mahommedans of Persia had no scruples about introducing the forms of men and animals—the former engaged in hawking or hunting, or feasting in gardens. Panels embroidered with close diagonal bands of flowers were made into loose trousers for women, now obsolete. The embroidered shawls of Kerman are widely celebrated. Hangings and covers of cloth patchwork have been embroidered in many parts of Persia, more particularly at Resht and Ispahan.

In Turkestan, and especially at Bokhara, excellent embroideries have been, and are, produced, some patterns being of a bold floral type, and others conventionalized into hooked and serrated outlines. The work is most usually in bright-coloured silks, red predominating, on a linen material.

In North Africa the embroidery of Morocco and Algeria deserves notice; the former inclines more to geometrical forms and the latter to patterns of a floral character.

Bibliography.—Lady Alford, *Needlework as Art* (London, 1886); Mrs M. Barber, *Some Drawings of Ancient Embroidery* (*ib.*, 1880); P. Blanchet, *Tissus antiques et du haut moyen-âge* (Paris, 1897); F. Bock, *Die Kleinodien des Heiligen Römischen Reiches Deutscher Nation* (Vienna, 1864); M. Charles, *Les Broderies et les dentelles* (Paris, 1905); Mrs Christie, *Embroidery and Tapestry Weaving* (London, 1906); A. S. Cole, C.B., "Some Aspects of Ancient and Modern Embroidery" (*Soc. of Arts Journal*, liii., 1905, pp. 956-973); R. Cox, *L'Art de décorer les tissus* (Paris, Lyons, 1900); L. F. Day, *Art in Needlework* (London, 1900); A. Dolby, *Church Embroidery*

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[1] Others, sometimes with the same illustrations, appeared in France and Germany, and no doubt forwarded the general tendency towards Italian models at the time. A few pattern-books were also published in England.

(*ib.*, 1867), and *Church Vestments* (*ib.*, 1868); M. Dreger, *Künstlerische Entwicklung der Weberei und Stickerei* (Vienna, 1904); Madame I. Errera, *Collection de broderies anciennes* (Brussels, 1905); L. de Farcy, *La Broderie* (Paris, 1890); R. Forrer, *Die Gräber und Textilfunde von Achmim-Panopolis* (Strassburg, 1891); F. R. Fowke, *The Bayeux Tapestry* (London, 1898); Rev. C. H. Hartshorne, *On English Medieval Embroidery* (*ib.*, 1848); M. B. Huish, *Samplers and Tapestry Embroideries* (*ib.*, 1900); A. F. Kendrick, *English Embroidery* (*ib.*, 1905); *English Embroidery executed prior to the Middle of the 16th Century* (Burlington Fine Arts Club Exhibition, 1905, introduction by A. F. Kendrick); E. Lefebure, *Embroideries and Lace*, translated by A. S. Cole, C.B. (London, 1888); F. Marshall, *Old English Embroidery* (*ib.*, 1894); E. M. Rogge, *Moderne Kunst-Nadelarbeiten* (Amsterdam, 1905); South Kensington Museum, *Catalogue of Special Loan Exhibition of Decorative Art Needlework* (1874); W. G. P. Townshend, *Embroidery* (London, 1899). For further examples of ecclesiastical embroidery see the articles CHASUBLE, COPE, DALMATIC and MITRE. (A. F. K.; A. S. C.)

EMBRUN, a town in the department of the Hautes Alpes in S.E. France. It is built at a height of 2854 ft. on a plateau that rises above the right bank of the Durance. It is 27½ m. by rail from Briançon and 24 m. from Gap. Its ramparts were demolished in 1884. In 1906 the communal pop. (including the garrison) was 3752. Besides the Tour Brune (11th century) and the old archiepiscopal palace, now occupied by government offices, barracks, &c., the chief object of interest in Embrun is its splendid cathedral church, which dates from the second half of the 12th century. Above its side door, called the *Réal*, there existed till 1585 (when it was destroyed by the Huguenots) a fresco, probably painted in the 13th century, representing the Madonna: this was the object of a celebrated pilgrimage for many centuries. Louis XI. habitually wore on his hat a leaden image of this Madonna, for which he had a very great veneration, since between 1440 and 1461, during the lifetime of his father, he had been the dauphin, and as such ruler of this province.

Embrun was the *Eburodunum* or *Ebredunum* of the Romans, and the chief town of the province of the Maritime Alps. The episcopal see was founded in the 4th century, and became an archbishopric about 800. In 1147 the archbishops obtained from the emperor Conrad III. very extensive temporal rights, and the rank of princes of the Holy Roman Empire. In 1232 the county of the Embrunais passed by marriage to the dauphins of Viennois. In 1791 the archiepiscopal see was suppressed, the region being then transferred to the diocese of Gap, so that the once metropolitan cathedral church is now simply a parish church. The town was sacked in 1585 by the Huguenots and in 1692 by the duke of Savoy. Henri Arnaud (1641–1721), the Waldensian pastor and general, was born at Embrun.

See A. Albert, *Histoire du diocèse d'Embrun* (2 vols., Embrun, 1783); M. Fornier, *Histoire générale des Alpes Maritimes ou Cottiennes et particulière de leur métropolitaine Embrun* (written 1626–1643), published by the Abbé Paul Guillaume (3 vols., Paris and Gap, 1890–1891); A. Fabre, *Recherches historiques sur le pèlerinage des rois de France à N. D. d'Embrun* (Grenoble, 1859); A. Sauret, *Essai historique sur la ville d'Embrun* (Gap, 1860). (W. A. B. C.)

EMBRYOLOGY. The word embryo is derived from the Gr. *ἔμβρυον*, which signified the fruit of the womb before birth. In its strict sense, therefore, embryology is the study of the intrauterine young or embryo, and can only be pursued in those animals in which the offspring are retained in the uterus of the mother until they have acquired, or nearly acquired, the form of the parent. As a matter of fact, however, the word has a much wider application than would be gathered from its derivation. All animals above the Protozoa undergo at the beginning of their existence rapid growth and considerable changes of form and structure. During these changes, which constitute the development of the animal, the young organism may be incapable of leading a free life and obtaining its own food. In such cases it is either contained in the body of the parent or it is protruded and lies quiescent within the egg membranes; or it may be capable of leading an independent life, possessing in a functional condition all the organs necessary for the maintenance of its existence. In the former case the young organism is called an *embryo*,[1] in the latter a *larva*. It might thus be concluded that embryology would exclude the study of larvae, in which the whole or the greater part of the development takes place outside the parent and outside the egg. But this is not the case; embryology includes not only a study of embryos as just defined, but also a study of larvae. In this way the scope of the subject is still further widened. As long as embryology confines its attention to embryos, it is easy to fix its limits, at any rate in the higher animals. The domain of embryology ceases in the case of viviparous animals at birth, in the case of oviparous animals at hatching; it ceases as soon as the young form acquires the power of existing when separated from the parent, or when removed from the protection of the egg membranes. But as soon as post-embryonic developmental changes are admitted within the scope of the subject, it becomes on close consideration difficult to limit its range. It must include all the developmental processes which take place as a result of sexual reproduction. A man at birth, when he ceases to be an embryo, has still many changes besides those of simple growth to pass through. The same remark applies to a young frog at the metamorphosis. A chick even, which can run about and feed almost immediately after hatching, possesses a plumage very different from that of the full-grown bird; a starfish at the metamorphosis is in many of its features quite different from the form with which we are familiar. It might be attempted to meet this difficulty by limiting embryology to a study of all those changes which occur in the organism before the attainment of the adult state. But this merely shifts the difficulty to another quarter, and makes it necessary to define what is meant by the adult state. At first sight this may seem easy, and no doubt it is not difficult when man and the higher animals alone are in question, for in these the adult state may be defined comparatively sharply as the stage of sexual maturity. After that period, though changes in the organism still continue, they are retrogressive changes, and as such might fairly be excluded from any account of development, which clearly implies progression, not retrogression. But, as so often happens in the study of organisms, formulae which apply quite satisfactorily to one group require modifications when others are considered. Does sexual maturity always mark the attainment of the adult state? Is the Axolotl adult when it acquires its reproductive organs? Can a larval Ctenophore, which acquires functional reproductive glands and still possesses the power of passing into the form ordinarily described as adult in that group, be considered to have reached the end of its development? Or—to take the case of those animals, such as *Amphioxus*, *Balanoglossus*, and many segmented worms in which important developmental processes occur, *e.g.* formation of new gill slits, of gonadial sacs, or even of whole segments of the body, long after the power of reproduction has been acquired—how is the attainment of the adult state to be defined, for it is clear that in them the attainment of sexual maturity does not correspond with the end of growth and development? If, then, embryology is to be regarded as including not only the study of embryos, but also that of larvae, *i.e.* if it includes the study of the whole developmental history of the individual—and it is impossible to treat the subject rationally unless it is so regarded—it becomes exceeding difficult to fix any definite limit to the period of life with which embryology concerns itself. The beginning of this period can be fixed, but not the end, unless it be the end of life itself, *i.e.* death. The science of embryology, then, is the science of individual development, and includes within its purview all those changes of form and structure, whether embryonic, larval or post-larval, which characterize the life of the individual. The beginning of this period is precise and definite—it is the completion of the fertilization of the ovum, in which the life of the individual has its start. The end, on the other hand, is vague and cannot be precisely defined, unless it be death, in which case the period of life with which embryology concerns itself is coincident with the life of the individual. To use the words of Huxley ("Cell Theory," *Collected Works*, vol. i. p. 267): "Development, therefore, and life are, strictly speaking, one thing, though we are accustomed to limit the former to the progressive half of life merely, and to

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[1] In the mammalia the word *foetus* is often employed in the same signification as embryo; it is especially applied to the embryo in the later stages of uterine development.

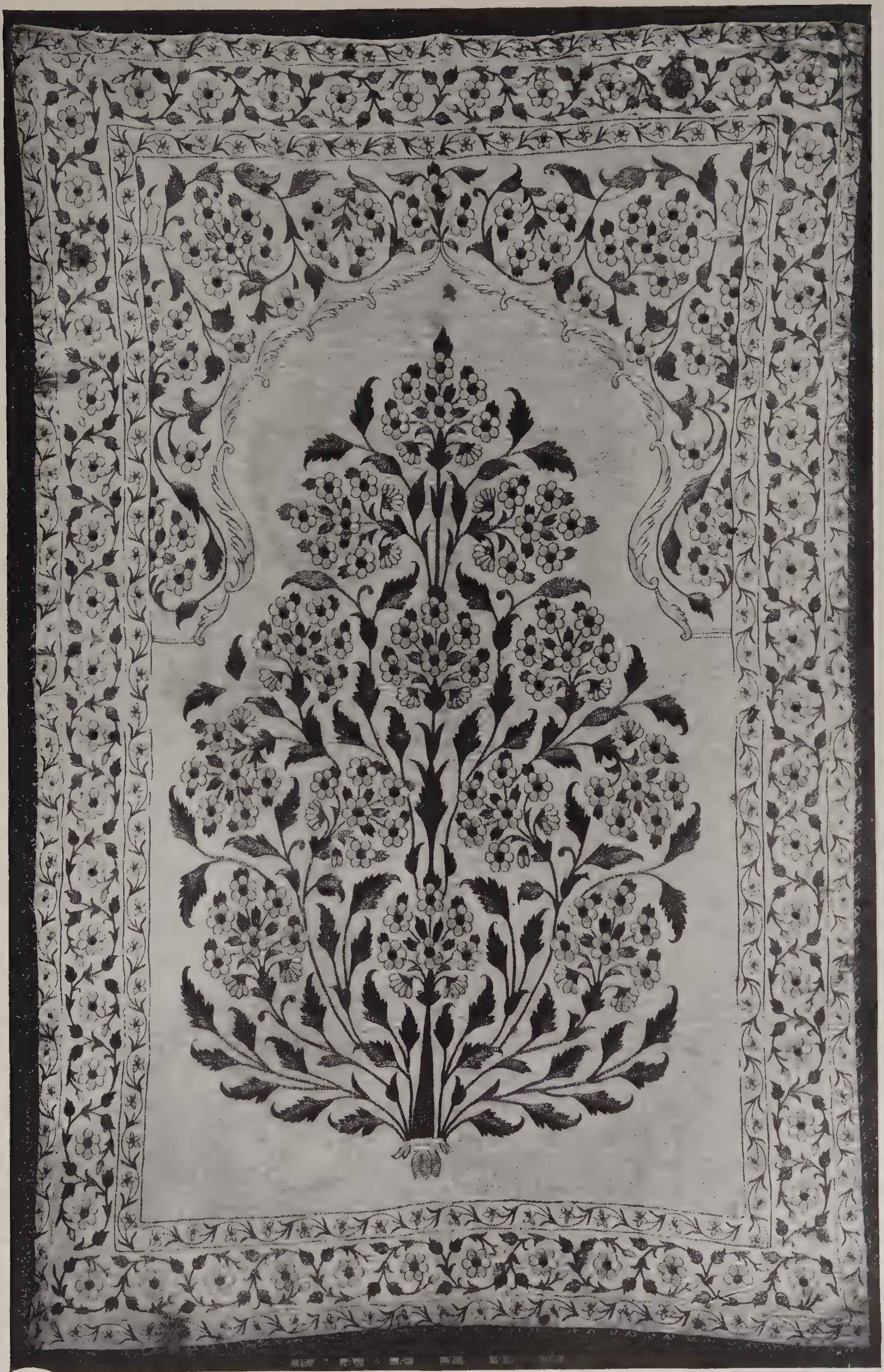

FIG. 17.—LINEN PRAYER CARPET, QUILTED AND EMBROIDERED IN CHAIN STITCH WITH COLOURED SILKS, CHIEFLY WHITE, YELLOW, GREEN AND RED

The border consists of a wide band set between two narrow ones, each with a waved continuous stem with blossoms in the wavings. Similar floral scrolling and leafy stem ornament fills the space beyond the pointed shape at the upper end, which is edged with acanthus leaf devices. The main ground below the niche or pointed shape is a blossoming plant, with balanced bunches of flowers between which are leaves, formally arranged in a pointed oval shape. Persian work, 18th century, 4 ft. 6 in. × 2 ft. 11 in. (Victoria and Albert Museum.)

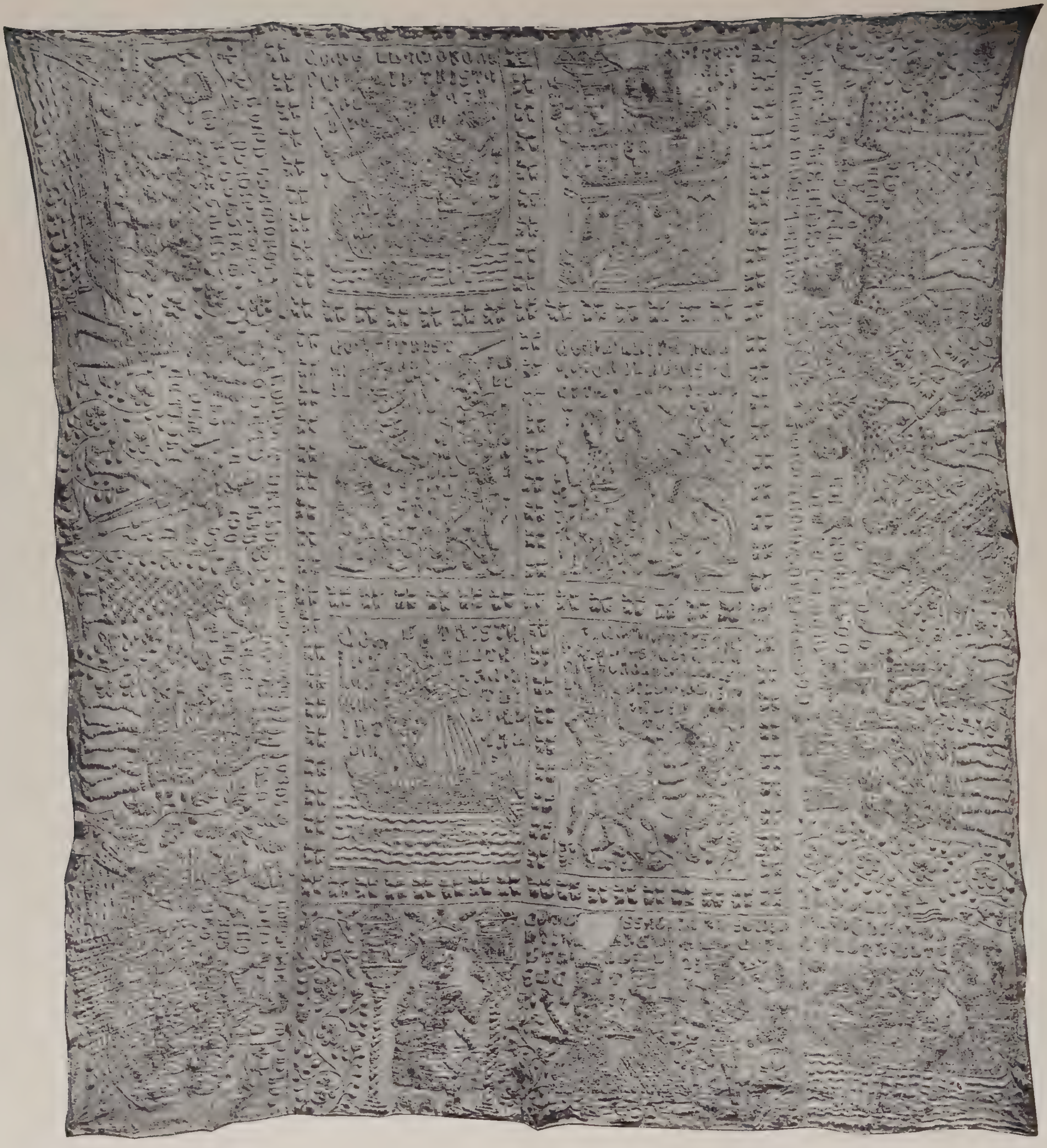

FIG. 18.—PART OF A SICILIAN COVERLET, OF THE END OF THE 14TH CENTURY.

It is of white linen, quilted and padded in wool so as to throw the design into relief. The scenes represented, taken from the Story of Tristan, with inscriptions in the Sicilian dialect, are as follows:—(1) COMU : LU AMOROLDU FA BANDIRI: LU OSTI: IN CORNUUALGIA (How the Morold made the host to go to Cornwall); (2) COMU: LU RRE: LANGUIS: CUMANDA: CHI UAIA: LO OSTI: CORNUAGLIA (How King Languis ordered that the host should go to Cornwall; (3) COMU: LU RRE: LANGUIS: MANDA: PER LU TRABUTU IN CORNUALIA (How King Languis sent to Cornwall for the tribute); (4) COMU: (li m) ISSAGIERI: so UINNTI: AL RRE: MARCU: PER LU TRIBUTU DI SECTI ANNI (How the ambassadors are come to King Mark for the tribute of seven years); (5) COMU: LU AMOROLDU UAI: IN CORNUUALGIA (How the Morold comes to Cornwall); (6) COMU: LU AMOROLDU: FA SULDARI: LA GENTI (How the Morold made the people pay); (7) COMU: T(RISTAINU): DAI: LU GUANTU ALLU AMOROLDU DELA BACTAGLIA (How Tristan gives the glove of battle to the Morold); (8) COMU: LU AMOROLDU: E UINUTU: IN CORNUUALGIA: CUM XXXX GALEI: (How the Morold is come to Cornwall with forty galleys); (9) COMU TRISTAINU BUCTA: LA UARCA: ARRETU: INTU: ALLU MARU (How Tristan struck his boat behind him into the sea); (10) COMU: TRISTAINU: ASPECTA: LU AMOROLDU: ALLA ISOLA DI LU MARU: SANSA UINTURA (How Tristan awaits the Morold on the isle Sanza Ventura in the sea); (11) COMU: TRISTAINU FERIU LU AMOROLLDU IN TESTA (How Tristan wounded the Morold in the head); (12) COMU: LU INNA (?) DELU AMOROLDU: ASPECTTAUA LU PATRUNU (How the Morold's page (?) awaited his master); (13) COMU LU AMORODU FERIU: TRISTAINU A TRADIMANTU (How the Morold wounded Tristan by treachery); (14) . . . SITA: IN AIRLANDIA (. . . in Ireland).

speak of the retrogressive half as decay, considering an imaginary resting-point between the two as the adult or perfect state."

Reproduction.

There are two kinds of reproduction, the sexual and the asexual. The sexual method has for its results an increase of the number of kinds of individual or organism, whereas the asexual affords an increase in the number of individuals of the same kind. If the asexual method of reproduction alone existed, there would, so far as our knowledge at present extends, be no increase in the number of kinds of organism: no new individuality could arise. The first establishment of a new kind of individual by the sexual process is effected in a very similar manner in all Metazoa. The parent produces by a process of unequal fission, which takes place at a part of the body called the reproductive gland, a small living organism called the reproductive cell. There are always two kinds of reproductive cells, and these are generally produced by different animals called the male and female respectively (when they are produced by the same animal it is said to be hermaphrodite). The reproductive cell produced by the male is called the spermatozoon, and that produced by the female, the ovum. These two organisms agree in being small uninucleated masses of protoplasm, but differ considerably in form. They are without the organs of nutrition, &c., which characterize their parents, but the ovum nearly always possesses, stored up within its protoplasm, a greater or less quantity of vitelline matter or food-yolk, while the spermatozoon possesses in almost all cases the power of locomotion. The object with which these two minute and simple organisms are produced is to fuse with one another and give rise to one resultant uninucleated (for the nuclei fuse) organism or cell, which is called the *zygote*. This process of fusion between the two kinds of reproductive cells, which are termed *gametes*, is called conjugation: it is the process which is sometimes spoken of as the fertilization of the ovum, and its result is the establishment of a new individual. This new individual at first is simply a uninucleated mass of living matter, which always contains a certain amount of food-yolk, and is generally bounded by a delicate cuticular membrane called the vitelline membrane. In form the newly established zygote resembles the female gamete or ovum—so much so, indeed, that it is frequently called the ovum; but it must be clearly understood that although the bulk of its matter has been derived from the ovum, it consists of ovum and spermatozoon, and, as shown by its subsequent behaviour, the spermatozoon has quite as much to do with determining its vital properties as the ovum.

To the unaided eye the main difference between the newly formed zygotes of different species of animals is that of bulk, and this is due to the amount of food-yolk held in suspension in the protoplasm. The ovum of the fowl is 30 mm. in diameter, that of the frog 1·75 mm., while the ova of the rabbit and *Amphioxus* have a diameter of ·1 mm. The food-yolk is deposited in the ovum as a result of the vital activity of its protoplasm, while the ovum is still a part of the ovary of the parent. It is an inert substance which is used as food later on by the developing embryo, and it acts as a dilutant of the living matter of the ovum. It has a profound influence on the subsequent developmental process. The newly formed zygotes of different species of animals have undoubtedly, as stated above, a certain family resemblance to one another; but however great this superficial resemblance may be, the differences must be most profound, and this fact becomes at once obvious when the properties of these remarkable masses of matter are closely investigated.

Causes of development.

As in the case of so many other forms of matter, the more important properties of the zygote do not become apparent until it is submitted to the action of external forces. These forces constitute the external conditions of existence, and the properties which are called forth by their action are called the acquired characters of the organism. The investigation of these properties, particularly of those which are called forth in the early stages of the process, constitutes the science of Embryology. With regard to the manifestation of these properties, certain points must be clearly understood at the outset:—(1) If the zygote is withheld from the appropriate external influences, *e.g.* if a plant-seed be kept in a box free from moisture or at a low temperature, no properties are evolved, and the zygote remains apparently unchanged; (2) the acquisition of the properties which constitutes the growth and development of the organism proceeds in a perfectly definite sequence, which, so far as is known, cannot be altered; (3) just as the features of the growing organism change under the continued action of the external conditions, so the external conditions themselves must change as the organism is progressively evolved. With regard to this last change, it may be said generally that it is usually, if not always, effected by the organism itself, making use of the properties which it has acquired at earlier stages of its growth, and acting in response to the external conditions. There is, to use a phrase of Mr Herbert Spencer, a continuous adjustment between the external and internal relations. For every organism a certain succession of conditions is necessary if the complete and normal evolution of properties is to take place. Within certain limits, these conditions may vary without interfering with the normal evolution of the properties, though such variations are generally responded to by slight but unimportant variation of the properties (variation of acquired characters). But if the variation of the conditions is too great, the evolved properties become abnormal, and are of such a nature as to preclude the normal evolution of the organism; in other words, the action of the conditions upon the organism is injurious, causing abortions and, ultimately, death. For many organisms the conditions of existence are well known for all stages of life, and can be easily imitated, so that they can be reared artificially and kept alive and made to breed in confinement—*e.g.* the common fowl. But in a large number of cases it is not possible, through ignorance of the proper conditions, or on account of the difficulty of imitating them, to make the organism evolve all its properties. For instance, there are many marine larvae which have never been reared beyond a certain point, and there are some organisms which, even when nearly full-grown—a stage of life at which it is generally most easy to ascertain and imitate the natural conditions—will not live, or at any rate will not breed, in captivity. Of late years some naturalists have largely occupied themselves with experimental observation of the effects on certain organisms of marked and definite changes of the conditions, and the name of Developmental Mechanics (or *Physiology of Development*) has been applied to this branch of study (see below).

Gametogeny.

In normal fertilization, as a rule, only one spermatozoon fuses with the ovum. It has been observed in some eggs that a membrane, formed round the ovum immediately after the entrance of the spermatozoon, prevents the entrance of others. If more than one spermatozoon enters, a corresponding number of male pronuclei are formed, and the subsequent development, if it takes place at all, is abnormal and soon ceases. An egg by ill-treatment (influence of chloroform, carbonic acid, &c.) can be made to take more than one spermatozoon. In some animals it appears that several spermatozoa may normally enter the ovum (some Arthropoda, Selachians, Amphibians and Mammals), but of these only one forms a male pronucleus (see below), the rest being absorbed. Gametogeny is the name applied to the formation of the gametes, *i.e.* of the ova and spermatozoa. The cells of the reproductive glands are the germ cells (*oögonia*, *spermatogonia*). They undergo division and give rise to the progametes, which in the case of the female are sometimes called *oöcytes*, in the case of the male *spermatocytes*. The oöcytes are more familiarly called the ovarian ova. The nucleus of the oöcyte is called the germinal vesicle. The oöcyte (progamete) gives rise by division to the ovum or true gamete, the nucleus of which is called the *female pronucleus*. As a general rule the oöcyte divides unequally twice, giving rise to two small cells called polar bodies, and to the ovum. The first formed polar body frequently divides when the oöcyte undergoes its second and final division, so that there are three polar bodies as well as the ovum resulting from the division of the oöcyte or progamete. Sometimes the ovum arises from the oöcyte by one division only, and there is only one polar body (*e.g.* mouse, Sobotta, *Arch. f. mikr. Anat.*, 1895, p. 15). The polar bodies are oval, but as a rule they are so small as to be incapable of fertilization. They may therefore be regarded as abortive ova. In one case, however (see Francotte, *Bull. Acad. Belg.* (3), xxxiii., 1897, p. 278), the first formed polar body is nearly as large as the ovum, and is sometimes fertilized and develops. The spermatogonia are the cells of the testis; these produce by division the spermatocytes (progametes), which divide and give rise to the spermatids. In most cases which have been investigated the divisions by which the spermatids arise from the spermatocytes are two in number, so that each spermatocyte gives origin to four spermatids. Each spermatid becomes a functional spermatozoon or male gamete. The gametogeny of the male therefore closely resembles that of the female, differing from it only in the fact that all the four products of the progamete become functional gametes, whereas in the female only one, the ovum, becomes functional, the other three (polar bodies) being abortive. In the spermatogenesis of the bee, however, the spermatocyte only divides once, giving rise to a small polar-body-like structure and one spermatid (Meves, *Anat. Anzeiger*, 24, 1904, pp. 29-32). The nucleus of the male gamete is not called the male pronucleus, as would be expected, that term being reserved for the second nucleus which appears in the ovum after fertilization. As this is in all probability derived entirely from the nucleus of the spermatozoon, we should be almost justified in calling the nucleus of the spermatozoon the male pronucleus. In most forms in which the formation of the gametes from the progamete has been accurately followed, and in which the progamete of both sexes divides twice in forming the gametes, the division of the nucleus presents certain peculiarities. In the first place, between the first division and the second it does not enter into the resting state, but immediately proceeds to the second division. In the second place, the number of chromosomes which appear in the final divisions of the progametes and assist in constituting the nuclei of the gametes is half the number which go to constitute the new nuclei in the ordinary nuclear divisions of the animal. The number of chromosomes of the nucleus of the gamete is therefore reduced, and the divisions by which the gametes arise from the progametes are called reducing (*maiotic*) divisions. It is not certain, however, that this phenomenon is of universal occurrence, or has the significance which is ordinarily attributed to it. In the parthenogenetic ova of certain insects, *e.g. Rhodites rosae* (Henking), *Nematus lacteus* (Doncaster, *Quart. Journal Mic. Science*, 49, 1906, pp. 561-589), reduction does not occur, though two polar bodies are formed.

Fertilization.

As soon as the spermatozoon has conjugated with the ovum, a second nucleus appears in the ovum. This is undoubtedly derived from the spermatozoon, possibly from its nucleus only, and is called the male pronucleus. It possesses in the adjacent protoplasm a well-marked centrosome. The general rule appears to be that the female pronucleus is without a centrosome, and that no centrosome appears in the female in the divisions by which the gamete arises from the progamete. If this is true, the centrosome of the zygote nucleus must be entirely derived from that of the male pronucleus. This accounts for the fact, which has been often observed, that the female pronucleus is not surrounded by protoplasmic radiations, whereas such radiations are present round the male pronucleus in its approach to the female. In the mouse the subsequent events are as follow:—Both pronuclei assume the resting form, the chromatin being distributed over the nuclear network, and the nuclei come to lie side by side in the centre of the egg. A long loop of chromatin then appears in each nucleus and divides up into twelve pieces, the chromosomes. The centrosome now divides, the membranes of both nuclei disappear, and a spindle is formed. The twenty-four chromosomes arrange themselves at the centre of this spindle and split longitudinally, so that forty-eight chromosomes are formed. Twenty-four of these, twelve male and twelve female, as it is supposed, travel to each pole of the spindle and assist in giving rise to the two nuclei. At the next nuclear division twenty-four chromosomes appear in each nucleus, each of which divides longitudinally; and so in all subsequent divisions. The fusion of the two pronuclei is sometimes effected in a manner slightly different from that described for the mouse. In *Echinus*, for instance, the two pronuclei fuse, and the spindle and chromosomes are formed from the zygote nucleus, whereas in the mouse the two pronuclei retain their distinctness during the formation of the chromosomes. There appears, however, to be some variation in this respect: cases have been observed in the mouse in which fusion of the pronuclei occurs before the separation of the chromosomes.

Parthenogenesis.

Parthenogenesis, or development of the female gamete without fertilization, is known to occur in many groups of the animal kingdom. Attempts have been made to connect this phenomenon with peculiarities in the gametogeny. For instance, it has been said that parthenogenetic ova form only one polar body. But, as we have seen, this is sometimes the case in eggs which are fertilized, and parthenogenetic ova are known which form two polar bodies, *e.g.* ova of the honey-bee which produce drones (*Morph. Jahrb.* xv., 1889, p. 85), ova of *Rotifera* which produce males (*Zool. Anzeiger*, xx., 1897, p. 455), ova of some saw-flies and gall flies which produce females (L. Doncaster, *Quart. Journ. Mic. Sc.*, 49, 1906, pp. 561-589). Again it has been asserted that in parthenogenetic eggs the polar bodies are not extruded from the ovum; in such cases, though the nucleus divides, those of its products which would in other cases be extruded in polar bodies remain in the protoplasm of the ovum. But this is not a universal rule, for in some cases of parthenogenesis polar bodies are extruded in the usual way (*Aphis*, some Lepidoptera), and in some fertilized eggs the polar bodies are retained in the ovum.

It is quite probable that parthenogenesis is more common than has been supposed, and it appears that there is some evidence to show that ova, which in normal conditions are incapable of developing without fertilization, may yet develop if subjected to an altered environment. For instance, it has been asserted that the addition of a certain quantity of chloride of magnesium and other substances to sea-water will cause the unfertilized ova of certain marine animals (*Arbacia*, *Chaetopterus*) to develop (J. Loeb, *American Journal of Physiology*, ix., 1901, p. 423); and according to M. Y. Delage (*Comptes rendus*, 135, 1902. Nos 15 and 16) such development may occur after the formation of polar bodies, the chromosomes undergoing reduction and the full number being regained in the segmenting stage. These experiments, if authenticated, suggest that ova have the power of development, but are not able to exercise it in their normal surroundings. There is reason to believe that the same assertion may be made of spermatozoa. Phenomena of the nature of parthenogenesis have never been observed in the male gamete, but it has been suggested by A. Giard (*Cinquantenaire de la Soc. de Biol.*, 1900) that the phenomenon of the so-called fertilization of an enucleated ovum which has been described by T. Boveri and Delage in various eggs, and which results in development up to the larval form (*merogony*), is in reality a case in which the male gamete, unable to undergo development in ordinary circumstances on account of its small size and specialization of structure has obtained a nutritive environment which enables it to display its latent power of development. Moreover, A. M. Giard suggests that in some cases of apparently normal fertilization one of the pronuclei may degenerate, the resultant embryo being the product of one pronucleus only. In this way he explains certain cases of hybridization in which the paternal (rarely the maternal) type is exclusively reproduced. For instance, in the batrachiate Amphibia, Héron Royer succeeded in 1883 in rearing, out of a vast number of attempts, a few hybrids between a female *Pelobates fuscus* and a male *Rana fusca*; the product was a *Rana fusca*. He also crossed a female *Bufo vulgaris* with a male *Bufo calamita*; in the few cases which reached maturity the product was obviously a *Bufo calamita*. Finally, H. E. Ziegler (*Arch. f. Ent.-Mech.*, 1898, p. 249) divided the just-fertilized ovum of a sea-urchin in such a way that each half had one pronucleus; the half with the male pronucleus segmented and formed a blastula, the other degenerated. It is said that in a few species of animals males do not occur, and that parthenogenesis is the sole means of reproduction (a species of Ostracoda among Crustacea; species of Tenthredinidae, Cynipidae and Coccidae among Insecta); this is the thelytoky of K. T. E. von Siebold. The number of species in which males are unknown is constantly decreasing, and it is quite possible that the phenomenon does not exist. Parthenogenesis, however, is undoubtedly of frequent occurrence, and is of four kinds, namely, (1) that in which males alone are produced, *e.g.* honey-bees (*arrhenotoky*); (2) that in which females only are produced (*thelytoky*), as in some saw-flies; (3) that in which both sexes are produced (*deuterotoky*), as in some saw-flies; (4) that in which there is an alternation of sexual and parthenogenetic generations, as in Aphidae, many Cynipidae, &c. It would appear that "parthenogenesis does not favour the production of one sex more than another, but it is clear that it decidedly favours the production of a brood that is entirely of one sex, but which sex that is differs according to circumstances" (D. Sharp, *Cambridge Natural History*, "Insects," pt. i. p. 498). In some Insecta and Crustacea exceptional parthenogenesis occurs: a certain proportion of the eggs laid are capable of undergoing either the whole or a part of development parthenogenetically, *e.g. Bombyx mori*, &c. (A. Brauer, *Arch. f. mikr. Anat.*, 1893; consult also E. Maupas on parthenogenesis of Rotifera, *Comp. rend.*, 1889–1891, and R. Lauterborn, *Biol. Centralblatt*, xviii., 1898, p. 173).

Determination of sex.

The question of the determination of sex may be alluded to here. Is sex determined at the act of conjugation of the two gametes? Is it, in other words, an unalterable property of the zygote, a genetic character? Or does it depend upon the conditions to which the zygote is subjected in its development? In other words, is it an acquired character? It is impossible in the present state of knowledge to answer these questions satisfactorily, but the balance of evidence appears to favour the view that sex is an unalterable, inborn character. Thus those twins which are believed to come from a split zygote are always of the same sex, members of the same litter which have been submitted to exactly similar conditions are of different sexes, and all attempts to determine the sex of offspring in the higher animals by treatment have failed. On the other hand, the male bee is a portion of a female zygote—the queen-bee. The same remark applies to the male Rotifer, in which the zygote always gives rise to a female, from which the male arises parthenogenetically, but in these cases it does not appear that the production of males is in any way affected by external conditions (see R. C. Punnett, *Proc. Royal Soc.*, 78 B, 1906, p. 223). It is said that in human societies the number of males born increases after wars and famines, but this, if true, is probably due to an affection of the gametes and not of the young zygote. For a review of the whole subject see L. Cuénot, *Bull. sci. France et Belgique*, xxxii., 1899, pp. 462-535.

The first change the zygote undergoes in all animals is what is generally called the segmentation or cleavage of the ovum. This consists essentially of the division of the nucleus into a number of nuclei, around which the protoplasm sooner or later

Cleavage.

becomes arranged in the manner ordinarily spoken of as cellular. This division of the nucleus is effected by the process called binary fission; that is to say, it first divides into two, then each of these divides simultaneously again into two, giving four nuclei; each of these after a pause again simultaneously divides into two. So the process continues for some time until the ovum becomes possessed of a large number of nuclei, all of which have proceeded from the original nucleus by a series of binary fissions. This division of the nucleus, which constitutes the essential part of the cleavage of the ovum, continues through the whole of life, but it is only in the earliest period that it is distinguished by a distinct name and used to characterize a stage of development. The nuclear division of cleavage is usually at first a rhythmical process; all the nuclei divide simultaneously, and periods of nuclear activity alternate with periods of rest. Nuclear divisions may be said to be of three kinds, according to the accompanying changes in the surrounding protoplasm: (1) accompanied by no visible change, *e.g.* the multinucleated Protozoon *Actinosphaerium*; (2) accompanied by a rearrangement of the protoplasm around each nucleus, but not by its division into two separate masses, *e.g.* the division which results in the formation of a colony of Protozoa; (3) accompanied by the division of the protoplasm into two parts, so that two distinct cells result, *e.g.* the divisions by which the free wandering leucocytes are produced, the reproduction of uninuclear Protozoa, &c. In the cleavage of the ovum the first two of these methods of division are found, but probably not the third. At one time it was thought that the nuclear divisions of cleavage were always of the third kind, and the result of cleavage was supposed to be a mass of isolated cells, which became reunited in the subsequent development to give rise to the later connexion between the tissues which were known to exist. But in 1885 it was noticed that in the ovum of *Peripatus capensis* (A. Sedgwick, *Quart. Journ. Mic. Science*, xxv., 1885, p. 449) the extranuclear protoplasm did not divide in the cleavage of the ovum, but merely became rearranged round the increasing nuclei; the continuity of the protoplasm was not broken, but persisted into the later stages of growth, and gave rise to the tissue-connexions which undoubtedly exist in the adult. This discovery was of some importance, because it rendered intelligible the unity of the embryo so far as its developmental processes are concerned, the maintenance of this unity being somewhat surprising on the previous view. On further inquiry and examination it was found that the ova of many other animals presented a cleavage essentially similar to that of *Peripatus*. Indeed, it was found that the nuclear divisions of cleavage were of the first two kinds just described. In some eggs, *e.g.* the Alcyonaria, the first nuclear divisions are effected on the first plan, *i.e.* they take place without at first producing any visible effect upon the protoplasm of the egg. But in the later stages of cleavage the protoplasm becomes arranged around each nucleus and related to it as to a centre. In the majority of eggs, however, the protoplasm, though not undergoing complete cleavage, becomes rearranged round each nucleus as these are formed. The best and clearest instance of this is afforded by many Arthropodan eggs, in which the nucleus of the just-formed zygote takes up a central position, where it undergoes its first division, subsequent divisions taking place entirely within the egg and not in any way affecting its exterior. The result is to give rise to a nucleated network or foam-work of protoplasm, ramifying through the yolk-particles and containing these in its meshes.

In other Arthropodan eggs the cleavage is on the so-called centrolecithal type, in which the dividing nuclei pass to the cortex of the ovum, and the surface of the ovum becomes indented with grooves corresponding to each nucleus. In this kind of cleavage all the so-called segments are continuous with the central undivided yolk-mass. It sometimes happens that in Arthropods the egg breaks up into masses, which cannot be said to have the value of cells, as they are frequently without nuclei. In other eggs, characterized by a considerable amount of yolk, *e.g.* the ova of Cephalopoda, and of the Vertebrata with much yolk, the first nucleus takes up an eccentric position in a small patch of protoplasm which is comparatively free from yolk-particles. This patch is the germinal disc, and the nuclear divisions are confined to it and to the transitional region, where it merges into the denser yolk which makes up the bulk of the egg. At the close of segmentation the germinal disc consists of a number of nuclei, each surrounded by its own mass of protoplasm, which is, however, not separated from the protoplasm round the neighbouring nuclei, as was formerly supposed, but is continuous at the points of contact. In this manner the germinal disc has beecome converted into the blastoderm, which consists of a small watch-glass-shaped mass of so-called cells resting on, but continuous with, the large yolk-mass. It is characteristic of this kind of ovum that there is always a row of nuclei, called the yolk-nuclei, placed in the denser yolk immediately adjacent to the blastoderm. These nuclei are continually undergoing division, one of the products of division, together with a little of the sparse yolk protoplasm, passing into the blastoderm to reinforce it (so-called formative cells). The other product of the dividing yolk-nuclei remains in the yolk, in readiness for the next division. In this manner nucleated masses of protoplasm are continually being added to the periphery of the blastoderm and assisting in its growth. But it must be borne in mind that all the nucleated masses of which the blastoderm consists are in continuity with each other and with the sparse protoplasmic reticulum of the subjacent yolk.

In the great majority of eggs, then, the nuclear division of cleavage is not accompanied by a complete division of the ovum into separate cells, but only by a rearrangement of the protoplasm, which produces, indeed, the so-called cellular arrangement, and an appearance only of separate cells. But there still remain to be mentioned those small eggs in which the amount of yolk is inconsiderable, and in which division of the nuclei does appear to be accompanied by a complete division of the surrounding protoplasm into separate unconnected cells—ova of many Annelida, Mollusca, Echinoderma, &c., and of Mammalia amongst Vertebrata. In the case of these also (G. F. Andrews, *Zool. Bulletin*, ii., 1898) it has been shown that the apparently separate spheres are connected by a number of fine anastomosing threads of a hyaline protoplasm, which are not easy to detect and are readily destroyed by the action of reagents. It is therefore probable that the divisions of the nuclei in cleavage are in no case accompanied by complete division of the surrounding protoplasm, and the organism in the cleavage stage is a continuous whole, as it is in all the other stages of its existence.

Division of embryo.

Of late years a great number of experiments have been made to discover the effects of dividing the embryo during its cleavage, and of destroying certain portions of it. These experiments have been made with the object of testing the view, held by some authorities, that certain segments are already set apart in cleavage to give rise to certain adult organs, so that if they were destroyed the organs in question could not be developed. The results obtained have not borne out this view. Speaking generally, it may be said that they have been different according to the stage at which the separation was effected and the conditions under which the experiment was carried out. If the experiment be made at a sufficiently early stage, each part, if not too small, will develop into a normal, though small, embryo. In some cases the embryo remained imperfect for a certain time after the experiment, but the loss is eventually made good by regeneration. (For a summary of the work done on this subject see R. S. Bergh, *Zool. Centralblatt*, vii., 1900, p. 1.)

The layer theory.

The end of cleavage is marked by the commencement of the differentiation of the organs. The first differentiation is the formation of the layers. These are three in number, being called respectively the ectoderm, endoderm and mesoderm, or, in embryos in which at their first appearance they lie like sheets one above the other, the epiblast, hypoblast and mesoblast. The layers are sometimes spoken of as the primary organs, and their importance lies in the fact that they are supposed to be generally homologous throughout the series of the Metazoa. This view, which is based partly on their origin and partly on their fate, had great influence on the science of comparative anatomy during the last thirty years of the 19th century, for the homology of the layers being admitted, they afforded a kind of final court of appeal in determining questions of doubtful homologies between adult organs. Great importance was therefore attached to them by embryologists, and both their mode of development and the part which they play in forming the adult organs were examined with the greatest care. It is very unusual for all the layers to be established at the same time. As a general rule the ectoderm and endoderm, which may be called the primary layers, come first, and later the mesoderm is developed from one or other of them. There are two main methods in which the first two are differentiated—invagination and delamination. The former is generally found in small eggs, in which the embryo at the close of cleavage assumes the form of a sphere, having a fluid or gelatinous material in its centre, and bounded externally by a thin layer of protoplasm, in which all the nuclei are contained. Such a sphere is called a blastosphere, and may be regarded as a spherical mass of protoplasm, of which the central portion is so much vacuolated that it seems to consist entirely of fluid. The central part of the blastosphere is called the segmentation cavity or blastocoel. The blastosphere soon gives rise, by the invagination of one part of its wall upon the other, and a consequent obliteration of the segmentation cavity, to a double-walled cup with a wide opening, which, however, soon becomes narrowed to a small pore. This cup-stage is called the gastrula stage; the outer wall of the gastrula is the ectoderm, and its inner the endoderm; while its cavity is the enteron, and the opening to the exterior the blastopore. Origin of the primary layers by delamination occurs universally in eggs with large yolks (Cephalopoda and many Vertebrata), and occasionally in others. In it cleavage gives rise to a solid mass, which divides by delamination into two layers, the ectoderm and endoderm. The main difference between the two methods of development lies in the fact that in the first of them the endoderm at its first origin shows the relations which it possesses in the adult, namely, of forming the epithelial wall of the enteric space, whereas in the second method the endoderm is at first a solid mass, in which the enteric space makes its appearance later by excavation. In the delaminate method the enteric space is at first without a blastopore, and sometimes it never acquires this opening, but a blastopore is frequently formed, and the two-layered gastrula stage is reached, though by a very different route from that taken in the formation of the invaginate gastrula. According to the layer-theory, these two layers are homologous throughout the series of Metazoa; their limits can always be accurately defined, they give rise to the same organs in all cases, and the adult organs (excluding the mesodermal organs) can be traced back to one or other of them with absolute precision. Thus the ectoderm gives rise to the epidermis, to the nervous system, and to the lining of the stomodaeum and proctodaeum, if such parts of the alimentary canal are present. The endoderm, on the other hand, gives rise to the lining of the enteron, and of the glands which open into it.

So far as these two layers are concerned, and excluding the mesoderm, it would appear that the layer-theory does apply in a very remarkable manner to the whole of the Metazoa. But even here, when the actual facts are closely scanned, there are found to be difficulties, which appear to indicate that the theory may not perhaps be such an infallible guide as it seems at first sight. Leaving out of consideration the case of the Mammalia, in which the differentiation of the segmented ovum is not into ectoderm and endoderm, and the case of the sponges, the most important of these difficulties concern the stomodaeum and proctodaeum. The best case to examine is that of *Peripatus capensis*, in which the blastopore is at first a long slit, and gives rise to both the mouth and the anus of the adult. Here there is always found at the lips of the blastopore, and extending for a short distance inwards as enteric lining, a certain amount of tissue, which by its characters must be regarded as ectoderm. Now, in the closure of the blastopore between the mouth and anus, this tissue, which at the mouth and anus develops into the lining of the stomodaeum and proctodaeum, is left inside, and actually gives rise to the median ventral epithelium of the alimentary canal. Hence the development of *Peripatus capensis* suggests the conclusion, if we strictly apply the layer-theory, that a considerable portion of the true mesenteron is lined by ectoderm, and is not homologous with the corresponding portion of the mesenteron of other animals—a conclusion which will on all hands be admitted to be absurd. The difficulties in the application of the layer-theory become vastly greater when the origin and fate of the mesoderm is considered. **Mesoderm.** The mesoderm is, if we may judge from the number of organs which are derived from it, much the most important of the three layers. It generally arises later than the others, and in its very origin presents difficulties to the theory, which are much increased when we consider its history. It is generally, though not always, developed from the endoderm, either as hollow outgrowths containing prolongations of the enteric cavity, which become the coelom, or as solid proliferations. But in some groups the mesoderm is actually laid down in cleavage, and is present at the end of that process. In others it is entirely derived from the ectoderm (*Peripatus capensis*). In yet others it is partly derived from endoderm and partly from ectoderm (primitive streak of amniotic Vertebrates). Finally, in whatever manner the first rudiments are developed, it frequently receives considerable reinforcements from one of the primary layers. For instance, the structure known as the nerve crest of the vertebrate embryo is not, as was formerly supposed, exclusively concerned with the formation of the spinal nerves and ganglia, but contributes largely to the mesoderm of the axial region of the body. This is particularly clearly seen in the case of the anterior part of the head of Elasmobranch and probably of other vertebrate embryos, where all the mesoderm present is derived from the anterior part of the neural crest (*Quart. Journ. Mic. Science*, xxxvii. p. 92).

The layer-theory, then, will not bear critical examination. It is clear, both from their origin and history, that the layers or masses of cells called ectoderm, endoderm and mesoderm have not the same value in different animals; indeed, it is misleading to speak of three layers. At the most we can only speak of two, for the mesoderm is formed after the others, has a composite origin, and has no more claim to be considered an embryonic layer than has the rudiment of the central nervous system, which in some animals, indeed, appears as soon as the mesoderm. Arguments as to homology, based on derivation or non-derivation from the same embryonic layer, have therefore in themselves but little value.

It has frequently been asserted that the reproductive cells are marked off at a very early stage of the development (*Sagitta*, certain Crustacea, *Scorpio*). Recently it has been asserted that in *Ascaris* (T. Boveri, *Kuppfer's Festschrift*, 1899, p. 383) the reproductive cells are set apart after the first cleavage, and that they can be traced by certain peculiarities of their nuclei into the adult reproductive glands.

It has been already stated that the mesoderm is a composite tissue. This fact is frequently conspicuous at its first establishment. **Mesenchyme.** In many Coelomata it is present under two forms from the beginning. One of these is epithelial in character, while the other has the form of a network of protoplasm, with nuclei at the nodes. The former is called simply epithelial mesoderm, the latter mesenchyme. Sometimes the epithelial mesoderm is the first formed, and what little mesenchyme there is is developed from it (*Amphioxus*, *Balanoglossus*, &c.). Sometimes the mesenchyme is the first to arise, the epithelial mesoderm developing from it (most, if not all, Vertebrates). Finally, it sometimes happens that these two kinds of tissue arise separately from one or other of the primary layers (Echinodermata). As already hinted, in *Balanoglossus* and *Amphioxus* the whole of the mesoderm of the body is at first in an epithelial condition, being developed as an outgrowth of the gut-wall. In *Peripatus capensis* also, and possibly in other Arthropods, it has at first an intermediate form, being derived from a primitive streak and not from the gut-wall, but it rapidly assumes an epithelial structure, from which all the mesodermal tissues are developed. In Annelids the bulk of the mesoderm has at first a modified epithelial form similar to that of Arthropods, but it is formed, not from a primitive streak, but from some peculiar cells produced in cleavage, called pole-cells. In Annelids with trochosphere larvae a certain amount of mesenchyme is formed at an earlier stage and gives rise to the muscular bands of the young larva. In Echinodermata a certain amount of mesenchyme appears before the epithelial mesoderm, which is formed later as gut-diverticula. In these forms the mesenchyme is said to arise as wandering amoeboid cells, which are budded into the blastocoel by the endoderm just before and during its invagination, but the writer has reason to believe that this account of it does not quite describe what happens. It would seem to be more probable that the mesenchyme arises in these forms, as it certainly does in the case of the later-formed mesenchyme of the Vertebrate embryo, as a protoplasmic outflow from its tissue of origin, passing at first along the line of pre-existent protoplasmic strands which traverse the blastocoel, and sending out at the same time processes which branch and anastomose with neighbouring processes (see E. W. MacBride, *Proc. Camb. Phil. Soc.*, 1896, p. 153). In the Vertebrata the whole of the mesoderm has at first the mesenchyme form. Afterwards, when the body-cavity split appears, the bulk of it assumes a kind of modified epithelial condition, which later on yields, by a process of outflow very similar in its character to what has been supposed to occur in the Echinoderm blastula, a considerable mesenchyme of the reticulate character. Mesenchyme is the tissue which in Vertebrate embryology has frequently been called embryonic connective tissue. This name is no doubt due to the fact that it was supposed to consist of isolated stellate cells. It is, however, in no sense of the word connective tissue, because it gives rise to many organs having nothing whatever to do with connective tissue. For instance, in Vertebrata this tissue gives rise to nervous tissue, blood-vessels, renal tubules, smooth muscular fibres, and other structures, as well as to connective and skeletal tissues. The Vertebrata, indeed, are remarkable for the fact that the epithelial tissues of the so-called mesoderm, *e.g.* the epithelial lining of the body-cavity, and of the renal tubules and urogenital tracts, all pass through the mesenchymatous condition, whereas in *Amphioxus*, *Balanoglossus* and presumably *Sagitta* and the Brachiopoda, all the mesodermal tissues pass through the epithelial condition, most of the mesodermal tissues of the adult retaining this condition permanently. As has been implied in the above account, mesenchyme is usually formed from epithelial mesoderm or from endoderm, or from tissue destined to form endoderm. It is also sometimes formed from ectoderm, as in the Vertebrata at the nerve crest and other places. In some Coelenterata also it appears certain that the ectoderm does furnish tissue of a mesenchymatous nature which passes into the jelly, but this phenomenon takes place comparatively late in life, at any rate after the embryonic period. In this connexion it may be interesting to point out that in many Coelenterates all the tissues of the body retain throughout life the epithelial condition, nothing comparable to mesenchyme ever being formed.

Continuity of the layers.

Finally, before leaving this branch of the subject, the fact that the three germinal layers are continuous with one another, and not isolated masses of tissue, may be emphasized. Indeed, an embryo may be defined as a multinucleated protoplasmic mass, in which the protoplasm at any surface—whether internal or external—is in the form of a relatively dense layer, while that in the interior is much vacuolated and reduced to a more or less sparse reticulum, the nuclei either being exclusively found in the surface protoplasm, or if the embryo has any bulk and the internal reticulum is at all well developed, at the nodes of the internal reticulum as well.

Mouth and anus.

The origin of some of the more important organs may now be considered. It is a remarkable fact that the mouth and anus develop in the most diverse ways in different groups, but as a rule either one or both of them can be traced into relation with the blastopore, the history of which must therefore be examined. In most, if not all, the great groups of the animal kingdom, *e.g.* in Coelenterata, Annelida, Mollusca, Vertebrata, and in Arthropoda, the blastopore or its representative is placed on the neural surface of the body, and, as will be shown later on, within the limits of the central nerve rudiment. Here it undergoes the most diverse fate, even in members of the same group. For instance, in *Peripatus capensis* it extends as a slit along the ventral surface, which closes up in the middle, but remains open at the two ends as the permanent mouth and anus. In other Arthropods, though full details have not yet in all cases been worked out, the following general statement may be made:—A blastopore (certain Crustacea) or its representative is formed on the neural surface of the embryo and always becomes closed, the mouth and anus arising as independent perforations later. Here no one would doubt the homology of the mouth and anus throughout the group; yet within the limits of a single genus—*Peripatus*—they show the most diverse modes of development. In Annelids the blastopore sometimes becomes the mouth (most Chaetopoda); sometimes it becomes the anus (*Serpula*); sometimes it closes up, giving rise to neither, though in this case it may assume the form of a long slit along the ventral surface before disappearing. In Mollusca its fate presents the same variations as in Annelida. Now in these groups no zoologist would deny the homology of the mouth and anus in the different forms, and yet how very different is their history even in closely allied animals. How are these apparently diverse facts to be reconciled? The only satisfactory explanation which has been offered (Sedgwick, *Quart. J. Mic. Science*, xxiv., 1884, p. 43) is that the blastopore is homologous in all the groups mentioned, and is the representative of the original single opening into the enteric cavity, such as at present characterizes the Coelenterata. From it the mouth and anus have been derived, as is indicated by its history in *Peripatus capensis*, and by the variability in its behaviour in closely allied forms; such variability in its subsequent history is due to its specialization as a larval organ, as a result of which it has lost its capacity to give rise to both mouth and anus, and sometimes to either.

That the blastopore does become specialized as a larval organ is obvious in those cases in which it becomes transformed into the single opening with which some larvae are, for a time at least, alone provided, *e.g.* *Pilidium*, Echinoderm larvae, &c., and that larval characters have been the principal causes of the form of embryonic characters, strong reason to believe will be adduced later on. In the Vertebrata the behaviour of the blastopore (anus of Rusconi) is also variable in a very remarkable manner. As a rule it is slit-like in form and closes completely, but in most cases one portion of it remains open longer than the rest, as the neurenteric canal. In a few forms (*e.g.* Newt, *Lepidosiren*, &c.) the very hindermost portion of the slit-like blastopore remains permanently open as the anus, and from such cases it can be shown that the neurenteric aperture (when present) is derived from a portion of the blastopore just anterior to its hindermost end. The words "hindermost" and "anterior" are used on the assumption that the whole blastopore has retained its dorsal position; as a matter of fact the hindermost part of it—the part which persists or reopens as the anus—loses this position in the course of development and becomes shifted on to the ventral surface. This is clearly seen in *Lepidosiren* (Kerr, *Phil. Trans.* cxcii., 1900), in Elasmobranchii, and in Amniota (primitive streak). Moreover, in *Lepidosiren*, and possibly in some other forms, the anus, *i.e.* the hind end of the blastopore, is at first contained within the medullary plate and bounded behind by the medullary folds. Later the portions of the medullary plate in the neighbourhood of the anus completely atrophy, and this relation is lost. This extension of the hind end of the blastopore on to the ventral surface, and atrophy of the portion of the medullary plate in relation with it, is a highly important phenomenon, and one to which attention will be again called when the relation of the mouth to the blastopore is being considered. The remarkable fact about the Vertebrata, a feature which that group shares in common with all other Chordata (*Amphioxus*, Tunicata, Enteropneusta) and with the Echinodermata, is that the mouth has never been traced into relation with the blastopore. For this reason, among others, it has been held by some zoologists that the mouth of the Vertebrata is not homologous with the mouth of such groups as the Annelida, Arthropoda and Mollusca. But, as has been explained above, in face of the extraordinary variability in the history of the mouth and anus in these groups, this view cannot be regarded as in any way established. On the contrary, there are distinct reasons for thinking that the Vertebrate mouth is a derivate of the blastopore. In the first place, in Elasmobranchii (Sedgwick, *Quart. Journ. Mic. Sci.* xxxiii., 1892, p. 559), and in a less conspicuous form in other vertebrate groups, the mouth has at first a slit-like form, extending from the anterior end of the central nerve-tube backwards along the ventral surface of the anterior part of the embryo. This slit-like rudiment, recalling as it does the form which the blastopore assumes in so many groups and in many Vertebrata, does suggest the view that possibly the mouth of the Vertebrata may in reality be derived from a portion of an originally long slit-like neural blastopore, which has become extended anteriorly on to the ventral surface and has lost its original relation to the nerve rudiment, as has undoubtedly happened with the posterior part, which persists as the anus.

Central nervous system.

Of the other organs which develop from the two primary layers it is only possible to notice here the central nervous system. This in almost all animals develops from the ectoderm. In Cephalopods among Mollusca—the development of which is remarkable from the almost complete absence of features which are supposed to have an ancestral significance—and in one or two other forms, it has been said to develop from the mesoderm; but apart from these exceptional and perhaps doubtful cases, the central nervous system of all embryos arises as thickenings of the ectoderm, and in the groups above mentioned, namely, Annelida, Mollusca, Arthropoda and Vertebrata, and probably others, from the ectoderm of the blastoporal surface of the body. This surface generally becomes the ventral surface, but in Vertebrata it becomes the dorsal. These thickened tracts of ectoderm in *Peripatus* and a few other forms can be clearly seen to surround the blastopore. This relation is retained in the adult in *Peripatus*, some Mollusca and some Nemertines, in which the main lateral nerve cords are united behind the anus as well as in front of the mouth; in other forms it cannot always be demonstrated, but it can, as in the case of the Vertebrata just referred to, always be inferred; only, in the Invertebrate groups the part of the nerve rudiment which has to be inferred is the posterior part behind the blastopore, whereas in Vertebrata it is the anterior part, namely, that in front of the blastopore, assuming that the mouth is a blastoporal derivate.

In the Echinodermata, Enteropneusta and one or two other groups, it is not possible, in the present state of knowledge, to bring the mouth into relation with the blastopore, nor can the blastopore be shown to be a perforation of the neural surface. For the Echinoderms, at any rate, this fact loses some of the importance which might at first sight be attributed to it when the remarkable organization of the adult and the sharp contrast which exists between it and the larva is remembered. In some Annelids the central nervous system remains throughout life as part of the outer epidermis, but as a general rule it becomes separated from the epidermis and embedded in the mesodermal tissues. The mode in which this separation is effected varies according to the form and structure of the central nervous system. In the Vertebrata, in which this organ has the form of a tube extending along the dorsal surface of the body, it arises as a groove of the medullary plate, which becomes constricted into a canal. The wall of this canal consists of ectoderm, which at an earlier stage formed part of the outer surface of the body, but which after invagination thickens, to give rise to the epithelial lining of the canal and to the nervous tissue which forms the bulk of the canal wall. The fact that the blastopore remains open at the hind end of the medullary plate explains to a certain extent the peculiar relation which always exists in the embryo between the hind end of the neural and alimentary canals. This communication between the hind end of the neural tube and the gut is one of the most remarkable and constant features of the Vertebrate embryo. As has been pointed out, it is not altogether unintelligible when we remember the relation of the blastopore to the medullary plate of the earlier stage, but to give a complete explanation of it is, and probably always will be, impossible. It is no doubt the impress of some remarkable larval condition of the blastopore of a stage of evolution now long past.

In *Ceratodus* the open part of the blastopore is enclosed by the medullary folds, as in *Lepidosiren*, and probably persists as the anus, the portion of the folds around the anus undergoing atrophy (Semon, *Zool. Forschungsreisen in Australien*, 1893, Bd. i. p. 39). In Urodeles the blastopore persists as anus, so far as is known, but the relation to the medullary folds has not been noticed. The same may be said of *Petromyzon* (A. E. Shipley, *Quart. Journ. Mic. Sci.* xxviii., 1887).

Cranial flexure.

The nerve tube of the Vertebrata at a certain early stage of the embryo becomes bent ventralwards in its anterior portion, in such a manner that the anterior end, which is represented in the adult by the infundibulum, comes to project backwards beneath the mid-brain. This bend, which is called the cranial flexure, takes place through the mid-brain, so that the hind-brain is unaffected by it. The cranial flexure is not, however, confined to the brain: the anterior end of the notochord, which at first extends almost to the front end of the nerve tube (this extension, which is quite obvious in the young embryo of Elasmobranchs, becomes masked in the later stages by the extraordinary modifications which the parts undergo), is also affected by it. Moreover, it affects even other parts, as may be seen by the oblique, almost antero-posterior, direction of the anterior gill slits as compared with the transverse direction of those behind. No satisfactory explanation has ever been offered of the cranial flexure. It is found in all Vertebrates, and is effected at an early stage of the development. In the later stages and in the adult it ceases to be noticeable, on account of an alteration of the relative sizes of parts of the brain. This is due almost entirely to the enormous growth of the cerebral vesicle, which is an outgrowth of the dorsal wall of the fore-brain just short of its anterior end. The anterior end of the fore-brain remains relatively small throughout life as the infundibulum, and the junction of this part of the fore-brain with the part which is so largely developed, as the rudiment of the cerebrum, is marked by the attachment of the optic chiasma. The optic nerve, indeed, is morphologically the first cranial nerve, the olfactory being the second; both are attached to what is morphologically the dorsal side of the nerve tube. The morphological anterior end of the central nerve tube is the point of the infundibulum which is in contact with the pituitary body. While on the subject of the cranial flexure, it may be pointed out that there is a similar downward curve of the hind end of the nervous axis, which leads into the hind end of the enteron. If it be supposed that originally there was a communication between the infundibulum and pituitary body, then the ventral flexure found at both ends of the nerve axis would originally have had the same result, namely, of placing the neural and alimentary canals in communication. Moreover, the mouth would have had much the same relation to this imaginary anterior neurenteric canal that the anus has to the actual posterior one.

In *Amphioxus* and the Tunicata the early development of the central nervous system is very much like that of the Vertebrata, but the later stages are simpler, being without the cranial flexure. The Tunicata are remarkable for the fact that the nervous system, though at first hollow, becomes quite solid in the adult. In *Balanoglossus* the central nervous system is in part tubular, the canal being open at each end. It arises, however, by delamination from the ectoderm, the tube being a secondary acquisition. This is probably due to a shortening of development, for the same feature is found in some Vertebrata (Teleostei, *Lepidosteus*, &c.), where the central canal is secondarily hollowed out in the solid keel-like mass which is separated from the ectoderm. Parts of the central nervous system arise by invagination in other groups; for instance, the cerebral ganglia of *Dentalium* are formed from the walls of two invaginations of ectoderm, which eventually disappear at the anterior end of the body (A. Kowalevsky, *Ann. Mus. Hist. Nat. Marseilles*, "Zoology," vol. i.). In *Peripatus* the cerebral ganglia arise in a similar way, but in this case the cavities of the invagination become separated from the skin and persist as two hollow appendages on the lower side of the cerebral ganglia. In other Arthropods the cerebral ganglia arise in a similar way, but the invaginations disappear in the adult. In Nemertines the cerebral ganglia contain a cavity which communicates with the exterior by a narrow canal. Finally, in certain Echinodermata the ventral part of the central nervous system arises by the invagination of a linear streak of ectoderm, the cavity of the invagination persisting as the epineural canal.

Peripheral nervous system.

Although the central nervous system is almost always developed from the ectoderm of the embryo, the same cannot be said of the peripheral nerve trunks. These structures arise from the mesoblastic reticulum already described (Sedgwick, *Quart. Journ. Mic. Sci.* xxxvii. 92). Inasmuch as this reticulum is perfectly continuous with the precisely similar though denser tissue in the ectoderm and endoderm, it may well be that a portion of the nerve trunks should be described as being ectodermal and endodermal in origin, though the bulk of them are undoubtedly formed from that portion of the reticulum commonly described as mesoblastic. But, however that may be, the tissue from which the great nerve trunks are developed is continuous on all sides with a similar tissue which pervades all the organs of the body, and in which the nuclei of these organs are contained.

In the early stages of development this tissue is very sparse and not easily seen. It would appear, indeed, that it is of a very delicate texture and readily destroyed by reagents. It is for this reason that the layers of the Vertebrate embryo are commonly represented as being quite isolated from one another, and that the medullary canal is nearly always represented as being completely isolated at certain stages from the surrounding tissues. In reality the layers are all connected together by this delicate tissue—in a sparse form, it is true —which not only extends between them, but also in a denser and more distinct form pervades them. In the germinal layers themselves, and in the organs developing from them, this tissue is in the young stages almost entirely obscured by the densely packed nuclei which it contains. For instance, in the wall of the medullary canal in the Vertebrate embryo, in the splanchnic and somatic layers of mesoderm of the same embryo, and in the developing nerve cords of the *Peripatus* embryo, the nuclei are at first so densely crowded together that it is almost impossible to see the protoplasmic framework in which they rest, but as development proceeds this extranuclear tissue becomes more largely developed, and the nuclei are forced apart, so that it becomes visible and receives various names according to its position. In the wall of the medullary canal of the Vertebrate embryo, on the outside of which it becomes especially conspicuous in certain places, and on the dorsal side of the developing nerve cords of the *Peripatus* embryo, it constitutes the white matter of the developing nerve cord; in the mesoblastic tissue outside, where it at the same time becomes more conspicuous (Sedgwick, "Monograph of the Development of *Peripatus capensis*," *Studies from the Morph. Lab. of the University of Cambridge*, iv., 1889, p. 131), it forms the looser network of the mesoblastic reticulum; and connecting the two, in place of the few and delicate strands of this tissue of the former stage, there are at certain places well-marked cords of a relatively dense texture, with the meshes of the reticulum elongated in the direction of the cord. This latter structure is an incipient nerve trunk. It can be traced outwards into the mesoblastic reticulum, from the strands of which it is indeed developed, and with which it is continuous not only at its free end, but also along its whole course. In this way the nerve trunks are developed—by a gathering up, so to speak, of the fibres of the reticulum into bundles. These bundles are generally marked by the possession of nuclei, especially in their cortical parts, which become no doubt the nuclei of the nerve sheath, and, in the neighbourhood of the ganglia, of nerve cells. From this account of the early development of the nerves, it is apparent that they are in their origin continuous with all the other tissues of the body, with that of the central nervous system and with that which becomes transformed into muscular tissue and connective and epithelial tissues. All these tissues are developed from the general reticulum, which in the young embryo can be seen to pervade the whole body, not being confined to the mesoderm, but extending between the nuclei of the ectoderm and endoderm, and forming the extra-nuclear, so-called cellular, protoplasm of those layers. Moreover, it must be remarked that in the stages of the embryo with which we are here concerned the so-called cellular constitution of the tissues, which is such a marked feature of the older embryo and adult, has not been arrived at. It is true, indications of it may be seen in some of the earlier-formed epithelia, but of nerve cells, muscular cells, and many kinds of gland cells no distinct signs are yet visible. This remark particularly applies to nerve cells, which do not make their appearance until a much later stage—not, indeed, until some time after the principal nerve trunks and ganglia are indicated as tracts of pale fibrous substance and aggregations of nuclei respectively.

The embryos of Elasmobranchs—particularly of *Scyllium*—are the best objects in which to study the development of nerves. In many embryos it is difficult to make out what happens, because the various parts of the body remain so close together that the process is obscured, and the loosening of the mesoblastic nuclei is deferred until after the nerves have begun to be differentiated. The process may also be traced in the embryos of *Peripatus*, where the main features are essentially similar to those above described (*op. cit.* p. 131). The development of the motor nerves has been worked out in *Lepidosiren* by J. Graham Kerr (*Trans. Roy. Soc. of Edinburgh*, 41, 1904. p. 119).

To sum up, the development of nerves is not, as has been recently urged, an outgrowth of cell processes from certain cells, but is a differentiation of a substance which was already in position, and from which all other organs of the body have been and are developed. It frequently happens that the young nerve tracts can be seen sooner near the central organ than elsewhere, but it is doubtful if any importance can be attached to this fact, since it is not constantly observed. For instance, in the case of the third nerve of *Scyllium* the differentiation appears to take place earliest near the ciliary ganglion, and to proceed from that point to the base of the mid-brain.

Coelom.

There are two main methods in which new organs are developed. In the one, which indicates the possibility of physiological continuity, the organ arises by the direct modification of a portion of a pre-existing organ; the development of the central nervous system of the Vertebrata from a groove in the embryonic ectoderm may be taken as an example of this method. In the other method there is no continuity which can be in any way interpreted as physiological; a centre of growth appears in one of the parts of the embryo, and gives rise to a mass of tissue which gradually shapes itself into the required organ. The development of the central nervous system in Teleosteans and in other similar exceptional cases may be mentioned as an example of the second plan. Such a centre of growth is frequently called a blastema, and consists of a mass of closely packed nuclei which have arisen by the growth-activity of the nuclei in the neighbourhood. The coelom, an organ which is found in the so-called coelomate animals, and which in the adult is usually divided up more or less completely into three parts, namely, body-cavity, renal organs, generative glands, presents in different animals both these methods of development. In certain animals it develops by the direct modification of a part of the primitive enteron, while in others it arises by the gradual shaping of a mass of tissue which consists of a compact mass of nuclei derived by nuclear proliferation from one or more of the pre-existing tissues of the body. Inasmuch as the first rudiment of the coelom nearly always makes its appearance at an early stage, when the ectoderm and endoderm are almost the only tissues present, and as it then bulks relatively very large and frequently contains within itself the potential centres of growth of other organs, *e.g.* mesenchymal organs (see above), it has come to be regarded by embryologists as being the forerunner of all the so-called mesodermal organs of the body, and has been dignified with the somewhat mysterious rank which attaches to the conception of a germinal layer. Its prominence and importance at an early stage led embryologists, as has already been explained, to overlook the fact that although some of the centres of growth for the formation of other non-coelomic mesodermal organs and tissues may be contained within it, all are not so contained, and that there are centres of mesodermal growth still left in the ectoderm and endoderm after its establishment. If these considerations, and others like them, are correct, it would seem to follow that the conception implied by the word mesoderm has no objective existence, that the tissue of the embryo called mesoderm, though sometimes mainly the rudiment of the coelom, is often much more than this, and contains within itself the rudiment of many, sometimes of all, of the organs appertaining to the mesenchyme. In thus containing within itself the potential centres of growth of other organs and tissues which are commonly ranked as mesodermal, it is not different from the rudiments of the two other organs already formed, namely, the ectoderm and endoderm; for these contain within themselves centres of growth for the production of so-called mesodermal tissues, as witness the nerve-crest of Vertebrata, the growing-point of the pronephric duct, and the formation of blood-vessels from the hypoblast described for some members of the same group.

In Echinodermata, *Amphioxus*, Enteropneusta, and a few other groups, the coelom develops from a portion or portions of the primitive enteron, which eventually becomes separated from the rest and forms a variable number of closed sacs lying between the gut and the ectoderm. The number of these sacs varies in different animals, but the evidence at present available seems to show that the maximum number is five—an unpaired one in front and two pairs behind—and, further, that if a less number of sacs is actually separated from the enteron, the rule is for these sacs so to divide up that they give rise to five sacs arranged in the manner indicated. The Enteropneusta present us with the clearest case of the separation of five sacs from the primitive enteron (W. Bateson, *Quart. Journ. Mic. Sci.* xxiv., 1884). In *Amphioxus*, according to the important researches of E. W. MacBride (*Quart. Journ. Mic. Sci.* xl. 589), it appears that a similar process occurs, though it is complicated by the fact that the sacs of the posterior pair become divided up at an early stage into many pairs. In *Phoronis* there are indications of the same phenomenon (A. T. Masterman, *Quart. Journ. Mic. Sci.* xliii. 375). In the Chaetognatha a single sac only is separated from the enteron, but soon becomes divided up. In the Brachiopoda one pair of sacs is separated from the enteron, but our knowledge of their later history is not sufficient to enable us to say whether they divide up into the typically arranged five sacs. In Echinodermata the number of sacs separated from the enteron varies from one to three; but though the history of these shows considerable differences, there are reasons to believe that the typical final arrangement is one unpaired and two paired sacs. But however many sacs may arise from the primitive enteron, and however these sacs may ultimately divide up and arrange themselves, the important point of development common to all these animals, about which there can be no dispute, is that the coelom is a direct differentiation of a portion of the enteron.

In the majority of the Coelomata the coelomic rudiment does not arise by the simple differentiation of a pre-existing organ, and there is considerable variation in its method of formation. Speaking generally, it may be said to arise by the differentiation of a blastema (see above), which develops at an early stage as a nuclear proliferation from one or more growth-centres in one or both of the primary layers. It appears in this tissue as a sac or as a series of sacs, which become transformed into the body-cavity (except in the Arthropoda), into the renal organs (with the possible exception, again, of some Arthropoda), and into the reproductive glands. In metamerically segmented animals the appearance of the cavities of these sacs is synchronous with, and indeed determines, the appearance of metameric segmentation. In all segmented animals in which the mesoderm (coelomic rudiment) appears as a continuous sheet or band of tissue on each side of the body, the coelomic cavity makes its first appearance not as a continuous space on each side, which later becomes divided up into the structures called mesoblastic somites, but as a series of paired spaces round which the coelomic tissue arranges itself in an epithelial manner. In the Vertebrata, it is true, the ventral portion of the coelom appears at first as a continuous space, at any rate behind the region of the two anterior pairs of somites, but in the dorsal portion the coelomic cavity is developed in the usual way, the coelomic tissue becoming transformed into the muscle plates and rudimentary renal tubules of the later stages. With regard to this ventral portion of the coelom in Vertebrata, it is to be noticed that the cavity in it never becomes divided up, but always remains continuous, forming the perivisceral portion of the coelom. The probable explanation of this peculiarity in the development of the Vertebrate coelom, as compared with that of *Amphioxus* and other segmented animals, is that the segmented stage of the ventral portion of the coelom is omitted. This explanation derives some support from the fact that even in animals in which the coelom is at its first appearance wholly segmented, it frequently happens that in the adult the perivisceral portion of it is unsegmented, *i.e.* it loses during development the segmentation which it at first possesses. This happens in many Annelida and in *Amphioxus*. The lesson, then, which the early history of the coelom in segmented animals teaches is, that however the coelomic cavity first makes its appearance, whether by evaginations from the primitive enteron, or by the hollowing out of a solid blastema-like tissue which has developed from one or both of the primary layers, it is in its first origin segmented, and forms the basis on which the segments of the adult are moulded. In Arthropoda the origin of the coelom is similar to that of Annelids, but its history is not completely known in any group, with the exception of *Peripatus*. In this genus it develops no perivisceral portion, as in other groups, but gives rise solely to the nephridia and to the reproductive organs. It is probable, though not certainly proved, that the history of the coelom in other Arthropods is essentially similar to that of *Peripatus*, allowance being made for the fact that the nephridial portion does not attain full development in those forms which are without nephridia in the adult.

With regard to the development of the vascular system, little can be said here, except that it appears to arise from the spaces of the mesoblastic reticulum. When this reticulum is sparse or so delicate as to give way in manipulation, these spaces appear to be represented by a continuous space which in the earliest stages of development is frequently spoken of as the blastocoel or segmentation cavity. They acquire special epithelial walls, and form the main trunks and network of smaller vessels found in animals with a canalicular vascular system, or the large sinus-like spaces characteristic of animals with a haemocoelic body-cavity.

Transient embryonic organs.

The existence of a phase at the beginning of life during which a young animal acquires its equipment by a process of growth of the germ is of course intelligible enough; such a phase is seen in the formation of buds, and in the sexual reproduction of both animals and plants. The remarkable point is that while in most cases this embryonic growth is a direct and simple process—*e.g.* animal and plant buds, embryonic development of plant seeds—in many cases of sexual reproduction of animals it is not direct, and the embryonic phase shows stages of structure which seem to possess a meaning other than that of being merely phases of growth. The fact that these stages of structure through which the embryo passes sometimes present for a short time features which are permanent in other members of the same group, adds very largely to the interest of the phenomenon and necessitates its careful examination. This may be divided into two heads: (1) in relation to embryos, (2) in relation to larvae. So far as embryos are concerned, we shall limit ourselves mainly to a consideration of the Vertebrata, because in them are found most instances of that remarkable phenomenon, the temporary assumption by certain organs of the embryo of stages of structure which are permanent in other members of the same group. As is well known, the embryos of the higher Vertebrata possess in the structure of the pharynx and of the heart and vascular system certain features—namely, paired pharyngeal apertures, a simple tubular heart, and a single ventral aorta giving off right and left a number of branches which pass between the pharyngeal apertures—which permanently characterize those organs in fishes. The skeleton, largely bony in the adult, passes through a stage in which it is entirely without bone, and consists mainly of cartilage—the form which it permanently possesses in certain fishes. Further, the Vertebrate embryo possesses for a time a notochord, a segmented muscular system, a continuity between the pericardium and the posterior part of the perivisceral cavity—all features which characterize certain groups of Pisces in the adult state. Instances of this kind might be multiplied, for the work of anatomists and embryologists has of late years been largely devoted to adding to them. Examples of embryonic characters which are not found in the adults of other Vertebrates are the following:—At a certain stage of development the central nervous system has the form of a groove in the skin, there is a communication at the hind end of the body between the neural and alimentary canals, the mouth aperture has at first the form of an elongated slit, the growing end of the Wolffian duct is in some groups continuous with the ectoderm, and the retina is at one stage a portion of the wall of the medullary canal. In the embryos of the lower Vertebrates many other instances of the same interesting character might be mentioned; for instance, the presence of a coelomic sac close to the eye, of another in the jaw, and of a third near the ear (Elasmobranchs), the opening of the Müllerian duct into the front end of the Wolffian duct, and the presence of an aperture of communication between the muscle-plate coelom and the nephridial coelom.

Recapitulation theory.

The interest attaching to these remarkable facts is much increased by the explanation which has been given of them. That explanation, which is a deduction from the theory of evolution, is to the effect that the peculiar embryonic structures and relations just mentioned are due to the retention by the embryo of features which, once possessed by the adult ancestor, have been lost in the course of evolution. This explanation, which at once suggests itself when we are dealing with structures actually present in adult members of other groups, does not so obviously apply to those features which are found in no adult animal whatsoever. Nevertheless it has been extended to them, because they are of a nature which it is not impossible to suppose might have existed in a working animal. Now this explanation, which, it will be observed, can only be entertained on the assumption that the evolution theory is true, has been still further extended by embryologists in a remarkable and frequently unjustifiable manner, and has been applied to all embryonic processes, finally leading to the so-called recapitulation theory, which asserts that embryonic history is a shortened recapitulation of ancestral history, or, to use the language of modern zoology, that the *ontogeny* or development of the individual contains an abbreviated record of the *phylogeny* or development of the race. A theory so important and far-reaching as this requires very careful examination. When we come to look for the facts upon which it is based, we find that they are non-existent, for the ancestors of all living animals are dead, and we have no means of knowing what they were like. It is true there are fossil remains of animals which have lived, but these are so imperfect as to be practically useless for the present requirements. Moreover, if they were perfectly preserved, there would be no evidence to show that they were ancestors of the animals now living. They might have been animals which have become extinct and left no descendants. Thus the explanation ordinarily given of the embryonic structures referred to is purely a deduction from the evolution theory. Indeed, it is even less than this, for all that can be said is something of this kind: if the evolution theory is true, then it in conceivable that the reason why the embryo of a bird passes through a stage in which its pharynx presents some resemblance to that of a fish is that a remote ancestor of the bird possessed a pharynx with lateral apertures such as are at present found in fishes.

But the explanation is sometimes pushed even further, and it is said that these pharyngeal apertures of the ancestral bird had the same respiratory function as the corresponding structures in modern fishes. That this is going too far a little reflection will show. For if it be admitted that all so-called vestigial structures had once the same function as the homologous structures when fully developed in other animals, it becomes necessary to admit that male mammals must once have had fully developed mammary glands and suckled the young, that female mammals formerly were provided with a functional penis, and that in species in which the females have a trace of the secondary sexual characters of the male the latter were once common to both sexes. The second and more extended form of the explanation plainly introduces a considerable amount of contentious matter, and it will be advisable, in the first instance, at any rate, to confine ourselves to a critical examination of the less ambitious conception. This explanation obviously implies the view that in the course of evolution the tendency has been for structures to persist in the embryo after they have been lost in the adult. Is there any justification for this view? It is clearly impossible to get any direct evidence, because, as explained above, we have no knowledge of the ancestors of living animals; but if we assume the evolution theory to be true, there is a certain amount of indirect evidence which is distinctly opposed to the view. As is well known, living birds are without teeth, but it is generally assumed that their edentulous condition has been comparatively recently acquired, and that they are descended from animals which, at a time not very remote from the present, possessed teeth. Considering the resemblance of birds to other terrestrial vertebrates, and the fact that extinct birds, not greatly differing from birds now living, are known to have had teeth, it must be allowed that there is some warrant for the assumption. Yet in no single case has it been certainly shown that any trace of teeth has been developed in the embryo. The same remark applies to a large number of similar cases; for instance, the reduced digits of the bird's hand and foot and the limbs of snakes. Moreover, organs which are supposed to have become recently reduced and functionless in the adult are also reduced in the embryo; for instance, digits 3 and 4 of the horse's foot, the hind limbs of whales (G. A. Guldberg and F. Nansen, "On the Development and Structure of Whales," *Bergen Museum*, 1894), the spiracle of Elasmobranchii. In fact, considerations of this kind distinctly point to the view that any tendency to the reduction or enlargement of an organ in the adult is shared approximately to the same extent by the embryo. But there are undoubtedly some, though not many, cases in which organs which were presumably present in an ancestral adult have persisted in the embryo of the modern form. As an instance may be mentioned the presence in whale-bone whales of imperfectly formed teeth, which are absorbed comparatively early in foetal life (Julin, *Arch. biologie*, i., 1880, p. 75).

It therefore becomes necessary to inquire why in some cases an organ is retained by the embryo after its loss by the adult, whereas in other cases it dwindles and presumably disappears simultaneously in the embryo and the adult. The whole question is examined and discussed by the present writer in the *Quarterly Journal of Microscopical Science*, xxxvi., 1894, p. 35, and the conclusions there reached are as follows:—A disappearing adult organ is not retained in a relatively greater development by an organism in the earlier stages of its individual growth unless it is of functional importance to the young form. In cases in which the whole development is embryonic this rarely happens, because the conditions of embryonic life are so different from free life that functional embryonic organs are usually organs *sui generis*, *e.g.* the placenta, amnion, &c., which cannot be traced to a modification of organs previously present in the adult. It does, however, appear to have happened sometimes, and as an instance of it may be mentioned the *ductus arteriosus* of the Sauropsidan and Mammalian embryo. On the other hand, when there is a considerable period of larval life, it does appear that there is a strong case for thinking that organs which have been lost by the adult may be retained and made use of by the larva. The best-known example that can be given of this is the tadpole of the frog. Here we find organs, viz. gills and gill-slits, which are universally regarded as having been attributes of all terrestrial Vertebrata in an earlier and aquatic condition, and we also notice that their retention is due to their being useful on account of the supposed ancient conditions of life having been retained. Many other instances, more or less plausible, of a like retention of ancestral features by larvae might be mentioned, and it must be conceded that there are strong reasons for supposing that larvae often retain traces, more or less complete, of ancestral stages of structure. But this admission does not carry with it any obligation to accept the widely prevalent view that larval history can in any way be regarded as a recapitulation of ancestral history. Far from it, for larvae in retaining some ancestral features are in no way different from adults; they only differ from adults in the features which they have retained. Both larvae and adults retain ancestral features, and both have been modified by an adaptation to their respective conditions of life which has ever been becoming more perfect.

The conclusion, then, has been reached, that whereas larvae frequently retain traces of ancestral stages of adult structure, embryos will rarely do so; and we are confronted again with the question, How are we to account for the presence in the embryo of numerous functionless organs which cannot be explained otherwise than as having been inherited from a previous condition in which they were functional? The answer is that the only organs of this kind which have been retained are organs which have been retained by the larvae of the ancestors after they have been lost by the adult, and have become in this way impressed upon the development. As an illustration taken from current natural history of the manner in which larval characters are in actual process of becoming embryonic may be mentioned the case of the viviparous salamander (*Salamander atra*), in which the gills, &c., are all developed but never used, the animal being born without them. In other and closely allied species of salamander there is a considerable period of larval life in which the gills and gill-slits are functional, but in this species the larval stage, for the existence of which there was a distinct reason, viz. the entirely aquatic habits of life in the young state, has become at one stroke embryonic by its simple absorption into the embryonic period. The view, then, that embryonic development is essentially a recapitulation of ancestral history must be given up; it contains only a few references to ancestral history, namely, those which have been preserved probably in a much modified form by previous larvae.

Law of v. Baer.

We must now pass to the consideration of another supposed law of embryology—the so-called law of v. Baer. This generalization is usually stated as follows:—Embryos of different species of the same group are more alike than adults, and the resemblances are greater the younger the embryo examined. Great importance has been attached to this generalization by embryologists and naturalists, and it is very widely accepted. Nevertheless, it is open to serious criticism. If it were true, we should expect to find that embryos of closely similar species would be indistinguishable, but this is notoriously not the case. On the contrary, they often differ more than do the adults, in support of which statement the embryos of the different species of *Peripatus* may be referred to. The generalization undoubtedly had its origin in the fact that there is what may be called a family resemblance between embryos, but this resemblance, which is by no means exact, is purely superficial, and does not extend to anatomical detail. On the contrary, it may be fairly argued that in some cases embryos of widely dissimilar members of the same group present anatomical differences of a higher morphological value than do the adults (see Sedgwick, *loc. cit.*), and, as stated above the embryos of closely allied animals are distinguishable at all stages of development, though the distinguishing features are not the same as those which distinguish the adults. To say that the development of the organism and of its component parts is a progress from the simple to the complex is to state a truism, but to state that it is also a progress from the general to the special is to go altogether beyond the facts. The bipinnaria larva of an echinoderm, the trochosphere larva of an annelid, the blastodermic vesicle of a mammal are all as highly specialized as their respective adults, but the specialization is for a different purpose, and of a different kind to that which characterizes the adult.

History of embryology.

In its scientific and systematic form embryology may be considered as having only taken birth within the last century, although the germ from which it sprung was already formed nearly half a century earlier. The ancients, it is true, as we see by the writings of Aristotle and Galen, pursued the subject with interest, and the indefatigable Greek naturalist and philosopher had even made continued series of observations on the progressive stages of development in the incubated egg, and on the reproduction of various animals; but although, after the revival of learning, various anatomists and physiologists from time to time made contributions to the knowledge of the foetal structure in its larger organs, yet from the minuteness of the observations required for embryological research, it was not till the microscope came into use for the investigation of organic structure that any intimate knowledge was attained of the nature of organogenesis. It is not to be wondered at, therefore, that during a long period, in this as in other branches of physical inquiry, vague speculations took the place of direct observation and more solid information. This is apparent in most of the works treating of generation during the 16th and part of the 17th centuries.[1]

Harvey was the first to give, in the middle of the latter century, a new life and direction to investigation of this subject, by his discovery of the connexion between the cicatricula of the yolk and the rudiments of the chick, and by his faithful description of the successive stages of development as observed in the incubated egg, as well as of the progress of gestation in some Mammalia. He had also the merit of fixing the attention of physiologists upon general laws of development as deduced from actual observation of the phenomena, by the enunciation of two important propositions, viz.—(1) that all animals are produced out of ova, and (2) that the organs of the embryo arise by new formation, or *epigenesis*, and not by mere enlargement out of a pre-existing invisible condition (*Exercitationes de generatione animalium*, Amstelodami, 1651). Harvey's observations, however, were aided only by the use of magnifying glasses (perspecillae), probably of no great power, and he saw nothing of the earliest appearances of the embryo in the first thirty-six hours, and believed the blood and the heart to be the parts first formed.

The influence of the work of Harvey, and of the successful application of the microscope to embryological investigation, was soon afterwards apparent in the admirable researches of Malpighi of Bologna, as evinced by his communications to the Royal Society of London in 1672, "De ovo incubato," and "De formatione pulli," and more especially in his delineations of some of the earlier phenomena of development, in which, as in many other parts of minute anatomy, he partially or wholly anticipated discoveries, the full development of which has only been accomplished in the present century. Malpighi traced the origin of the embryo almost to its very commencement in the formation of the cerebro-spinal groove within the cicatricula, which he removed from the opaque mass of the yolk; and he only erred in supposing the embryonal rudiments to have pre-existed as such in the egg, in consequence, apparently, of his having employed for observation, in very warm weather, eggs which, though he believed them to be unincubated, had in reality undergone some of the earlier developmental changes.

The works of Walter Needham (1667), Regnier de Graaf (1673), Swammerdam (1685), Vallisneri (1689)—following upon those of Harvey—all contain important contributions to the knowledge of our subject, as tending to show the similarity in the mode of production from ova in a variety of animals with that previously best known in birds. The observations more especially of de Graaf, Nicolas Steno and J. van Horne gave much greater precision to the knowledge of the connexion between the origin of the ovum of quadrupeds and the vesicles of the ovary now termed Graafian, which de Graaf showed always burst and discharged their contents on the occurrence of pregnancy.

These observations bring us to the period of Boerhaave and Albinus in the earlier part of the 18th century, and in the succeeding years to that of Haller, whose vast erudition and varied and accurate original observations threw light upon the entire process of reproduction in animals, and brought its history into a more systematic and intelligible form. A considerable part of the seventh and the whole of the eighth volumes of Haller's great work, the *Elementa physiologiae*, published at successive times from 1757 to 1766, are occupied with the general view of the function of generation, while his special contributions to embryology are contained in his *Deux mémoires sur la formation du cœur dans le poulet* and *Deux mémoires sur la formation des os*, both published at Lausanne in 1758, and republished in an extended and altered form, together with his "Observations on the early condition of the Embryo in Quadrupeds," made along with Kühlemann, in the *Opera minora* (1762–1768). Though originally educated as a believer in the doctrine of "preformation" by his teacher Boerhaave, Haller was soon led to abandon that view in favour of "epigenesis" or new formation, as may be seen in various parts of his works published before the middle of the century; see especially a long note explanatory of the grounds of his change of opinion in his edition of Boerhaave's *Praelectiones academicae*, vol. v. part 2, p. 497 (1744), and his *Primae lineae physiologiae* (1747). But some years later, and after having been engaged in observing the phenomena of development in the incubated egg, he again changed his views, and during the remainder of his life was a keen opponent of the system of epigenesis, and a defender and exponent of the theory of "evolution," as it was then named—a theory very different from that now bearing the name, and which implied belief in the pre-existence of the organs of the embryo in the germ, according to the theory of encasement (*emboîtement*) or inclusion supported by Leibnitz and Bonnet. (See the interesting work of Bonnet, *Considérations sur les corps organisés*, Amsterdam, 1762, for an account of his own views and those of Haller.)

It was reserved for Caspar Frederick Wolff (1733–1794), a German by birth, but naturalized afterwards in Russia, to bring forward observations which, though almost entirely neglected for a long time after their publication, and in some measure discredited under the influence of Haller's authority, were sixty years later acknowledged to have established the theory of epigenesis upon the secure basis of ascertained facts, and to have laid the first foundation of the morphological science of embryology. Wolff's work, entitled *Theoria generationis*, first published as an inaugural Dissertation at Berlin in 1759, was republished with additions in German at Berlin in 1764, and again in Latin at Halle in 1774. Wolff also wrote a "Memoir on the Development of the Intestine" in *Nov. comment. acad. Petropol.*, 1768 and 1769. But it was not till the latter work was translated into German by J. F. Meckel, and appeared in his *Archiv* for 1812, that Wolff's peculiar merits as the founder of modern embryology came to be known or fully appreciated.

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[1] It may be proper to mention, as authors of this period who made special researches on the development of the embryo—(1) Volcher Coiter of Groningen, who, along with Aldrovandus of Bologna, made a series of observations on the formation of the chick, day by day, in the incubated egg, which were described in a work published in 1573, and (2) Hieronymus Fabricius (ab Aquapendente), who, in his work *De formato foetu*, first published at Padua in 1600, gave an interesting account, illustrated by many fine engravings, of uterogestation and the foetus of a number of quadrupeds and other animals, and in a posthumous work entitled *De formatione ovi et pulli*, edited by J. Prevost and published at Padua in 1621, described and illustrated by engravings the daily changes of the egg in incubation. It is enough, however, to say that Fabricius was entirely ignorant of the earlier phenomena of development which occur in the first two or three days, and even of the source of the embryonic rudiments, which he conceived to spring, not from the yolk or true ovum, but from the chalazae or twisted, deepest part of the white. The cicatricula he looked upon as merely the vestige of the pedicle by which the yolk had previously been attached to the ovary.

The special novelty of Wolff's discoveries consisted **mainly** in this, that he showed that the germinal part of the bird's egg forms a layer of united granules or organized particles (cells of the modern histologist), presenting at first no semblance of the form or structure of the future embryo, but gradually converted by various morphological changes in the formative material, which are all capable of being traced by observation, into the several rudimentary organs and systems of the embryo. The earlier form of the embryo he delineated with accuracy; the actual mode of formation he traced in more than one organ, as for example in the alimentary canal, and he was the discoverer of several new and important embryological facts, as in the instance of the primordial kidneys, which have thus been named the Wolffian bodies. Wolff further showed that the growing parts of plants owe their origin to organized particles or cells, so that he was led to the great generalization that the processes of embryonic formation and of adult growth and nutrition are all of a like nature in both plants and animals. No advance, however, was made upon the basis of Wolff's discoveries till the year 1817, when the researches of C. H. Pander on the development of the chick gave a fuller and more exact view of the phenomena less clearly indicated by Wolff, and laid down with greater precision a plan of the formation of parts in the embryo of birds, which may be regarded as the foundation of the views of all subsequent embryologists.

But although the minuter investigation of the nature and true theory of the process of embryonic development was thus held in abeyance for more than half a century, the interval was not unproductive of observations having an important bearing on the knowledge of the anatomy of the foetus and the function of reproduction. The great work of William Hunter on the human gravid uterus, containing unequalled pictorial illustrations of its subject from the pencil of Rymsdyk and other artists, was published in 1775;[1] and during a large part of the same period numerous communications to the *Memoirs* of the Royal Society testified to the activity and genius of his brother, John Hunter, in the investigation of various parts of comparative embryology. But it is mainly in his rich museum, and in the manuscripts and drawings which he left, and which have been in part described and published in the catalogue of his wonderful collection, that we obtain any adequate idea of the unexampled industry and wide scope of research of that great anatomist and physiologist.

As belonging to a somewhat later period, but still before the time when the more strict investigation of embryological phenomena was resumed by Pander, there fall to be noticed, as indicative of the rapid progress that was making, the experiments of L. Spallanzani, 1789; the researches of J. H. von Autenrieth, 1797, and of Soemmering, 1799, on the human foetus; the observations of Senff on the formation of the skeleton, 1801; those of L. Oken and D. G. Kieser on the intestine and other organs, 1806; Oken's remarkable work on the bones of the head, 1807 (with the views promulgated in which Goethe's name is also intimately connected); J. F. Meckel's numerous and valuable contributions to embryology and comparative anatomy, extending over a long series of years; and F. Tiedemann's classical work on the development of the brain, 1816.

The observations of the Russian naturalist, Christian Heinrich Pander (1794–1865), were made at the instance and under the immediate supervision of Prof. Döllinger at Würzburg, and we learn from von Baer's autobiography that he, being an early friend of Pander's, and knowing his qualifications for the task, had pointed him out to Döllinger as well fitted to carry out the investigation of development which that professor was desirous of having accomplished. Pander's inaugural dissertation was entitled *Historia metamorphoseos quam ovum incubatum prioribus quinque diebus subit* (Virceburgi, 1817); and it was also published in German under the title of *Beiträge zur Entwickelungsgeschichte des Hühnchens im Eie* (Würzburg, 1817). The beautiful plates illustrating the latter work were executed by the elder E. J. d'Alton, well known for his skill in scientific observation, delineation and engraving.

Pander observed the germinal membrane or *blastoderm*, as he for the first time called it, of the fowl's egg to acquire three layers of organized substance in the earlier period of incubation. These he named respectively the serous or outer, the vascular or middle, and the mucous or inner layers; and he traced with great skill and care the origin of the principal rudimentary organs and systems from each of these layers, pointing out shortly, but much more distinctly than Wolff had done, the actual nature of the changes occurring in the process of development.

Karl Ernest von Baer (*q.v.*), the greatest of modern embryologists, was, as already remarked, the early friend of Pander, and, at the time when the latter was engaged in his researches at Würzburg, was associated with Döllinger as prosector, and engaged with him in the study of comparative anatomy. He witnessed, therefore, though he did not actually take part in, Pander's researches; and the latter having afterwards abandoned the inquiry, von Baer took it up for himself in the year 1819, when he had obtained an appointment in the university of Königsberg, where he was the colleague of Burdach and Rathke, both of whom were able coadjutors in the investigation of the subject of his choice. (See v. Baer's interesting autobiography, published on his retirement from St Petersburg to Dorpat in 1864.)

Von Baer's observations were carried on at various times from 1819 to 1826 and 1827, when he published the first results in a description of the development of the chick in the first edition of Burdach's *Physiology*.

It was at this time that von Baer made the important discovery of the ovarian ovum of mammals and of man, totally unknown before his time, and was thus able to prove as matter of exact observation what had only been surmised previously, viz. the entire similarity in the mode of origin of these animals with others lower in the scale. (*Epistola de ovi mammalium et hominis genesi*, Lipsiae, 1827. See also the interesting commentary on or supplement to the *Epistola* in Heusinger's *Journal*, and the translation in Breschet's *Répertoire*, Paris, 1829.)

In 1829 von Baer published the first part of his great work, entitled *Beobachtungen und Reflexionen über die Entwickelungsgeschichte der Thiere*, the second part of which, still leaving the work incomplete, did not appear till 1838. In this work, distinguished by the fulness, richness and extreme accuracy of the observations and descriptions, as well as by the breadth and soundness of the general views on embryology and allied branches of biology which it presents, he gave a detailed account not only of the whole progress of development of the chick as observed day by day during the incubation of the egg, but he also described what was known, and what he himself had investigated by numerous and varied observations, of the whole course of formation of the young in other vertebrate animals. His work is in fact a system of comparative embryology, replete with new discoveries in almost every part.

Von Baer's account of the layers of the blastoderm differs somewhat from that of Pander, and appears to be more consistent with the further researches which have lately been made than was at one time supposed, in this respect, that he distinguished from a very early period two primitive or fundamental layers, viz. the animal or upper, and the vegetative or lower, from each of which, in connexion with two intermediate layers derived from them, the fundamental organs and systems of the embryo are derived:—the animal layer, with its derivative, supplying the dermal, neural, osseous and muscular; the vegetative layer, with its derivative, the vascular and mucous (intestinal) systems. He laid down the general morphological principle that the fundamental organs have essentially the shape of tubular cavities, as appears in the first form of the central organ of the nervous system, in the two muscular and osseous tubes which form the walls of the body, and in the intestinal canal; and he followed out with admirable clearness the steps by which from these fundamental systems the other organs arise secondarily, such as the organs of sense, the glands, lungs, heart, vascular glands, Wolffian bodies, kidneys and generative organs.

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[1] Along with the work of W. Hunter must be mentioned a large collection of unpublished observations by Dr James Douglas, which are preserved in the Hunterian Museum of Glasgow University.

To complete von Baer's system there was mainly wanting a more minute knowledge of the intimate structure of the elementary tissues, but this had not yet been acquired by biologists, and it remained for Theodor Schwann of Liége in 1839, along with whom should be mentioned those who, like Robert Brown and M. J. Schleiden, prepared the way for his great discovery, to point out the uniformity in histological structure of the simpler forms of plants and animals, the nature of the organized animal and vegetable cell, the cellular constitution of the primitive ovum of animals, and the derivation of the various tissues, complex as well as simple, from the transformation or, as it is now called, differentiation of simple cellular elements,—discoveries which have exercised a powerful and lasting influence on the whole progress of biological knowledge in our time, and have contributed in an eminent degree to promote the advance of embryology itself.

To K. B. Reichert of Berlin more particularly is due the first application of the newer histological views to the explanation of the phenomena of development, 1840. To him and to R. A. von Kölliker and R. Virchow is due the ascertainment of the general principle that there is no free-cell formation in embryonic development and growth, but that all organs are derived from the multiplication, combination and transformation of cells, and that all cells giving rise to organs are the descendants or progeny of previously existing cells, and that these may be traced back to the original cell or cell-substance of the ovum.

It may be that modern research has somewhat modified the views taken by biologists of the statements of Schwann as to the constitution of the organized cell, especially as regards its simplest or most elementary form, and has indicated more exactly the nature of the protoplasmic material which constitutes its living basis; but it has not caused any very wide departure from the general principles enunciated by that physiologist. Schwann's treatise, entitled *Microscopical Researches into the Accordance in the Structure and Growths of Animals and Plants*, was published in German at Berlin in 1839, and was translated into English by Henry Smith, and printed for the Sydenham Society in 1847, along with a translation of Schleiden's memoir, "Contributions to Phytogenesis," which originally appeared in 1838 in Müller's *Archiv* for that year, and which had also been published in English in Taylor and Francis's *Scientific Memoirs*, vol. ii. part vi.

Among the newer observations of the same period which contributed to a more exact knowledge of the structure of the ovum itself may be mentioned—first the discovery of the germinal vesicle, or nucleus, in the germ-disk of birds by J. E. von Purkinje (*Symbolae ad ovi avium historiam ante incubationem*, Vratislaviae, 1825, and republished at Leipzig in 1830); second, von Baer's discovery of the mammiferous ovum in 1827, already referred to; third, the discovery of the germinal vesicle of mammals by J. V. Coste in 1834, and its independent observation by Wharton Jones in 1835; and fourth, the observation in the same year by Rudolph Wagner of the germinal macula or nucleus. Coste's discovery of the germinal vesicle of Mammalia was first communicated to the public in the *Comptes rendus* of the French Academy for 1833, and was more fully described in the *Recherches sur la génération des mammifères*, by Delpech and Coste (Paris, 1834). Thomas Wharton Jones's observations, made in the autumn of 1834, without a knowledge of Coste's communication, were presented to the Royal Society in 1835. This discovery was also confirmed and extended by G. G. Valentin and Bernardt, as recorded by the latter in his work *Symb. ad ovi mammal. hist. ante praegnationem*. Rudolph Wagner's observations first appeared in his *Textbook of Comparative Anatomy*, published at Leipzig in 1834–1835, and in Müller's *Archiv* for the latter year. His more extended researches are described in his work *Prodromus hist. generationis hominis atque animalium* (Leipzig, 1836), and in a memoir inserted in the *Trans. of the Roy. Bavarian Acad. of Sciences* (Munich, 1837).

The two decades of years from 1820 to 1840 were peculiarly fertile in contributions to the anatomy of the foetus and the progress of embryological knowledge. The researches of Prévost and Dumas on the ova and primary stages of development of Batrachia, birds and mammals, made as early as 1824, deserve especial notice as important steps in advance, both in the discovery of the process of yolk segmentation in the batrachian ovum, and in their having shown almost with the force of demonstration, previous to the discovery of the mammiferous ovarian ovum by von Baer, that that body must exist as a minute spherule in the Graafian follicle of the ovary, although they did not actually succeed in bringing the ova clearly under observation.

The works of Pockels (1825), of Seiler (1831), of G. Breschet (1832), of A. A. L. M. Velpeau (1833), of T. L. W. Bischoff (1834)—all bearing upon human embryology; the researches of Coste in comparative embryology in 1834, already referred to, and those published by the same author in 1837; the publication of Johannes Müller's great work on physiology, and Rudolph Wagner's smaller text-book, in both of which the subject of embryology received a very full treatment, together with the excellent *Manual of the Development of the Foetus*, by Valentin, in 1835, the first separate and systematic work on the whole subject, now secured to embryology its permanent place among the biological sciences on the Continent; while in this country attention was drawn to the subject by the memoirs of Allen Thomson (1831), Th. Wharton Jones (1835–1838) and Martin Barry (1839–1840).

Among the more remarkable special discoveries which belong to the period now referred to, a few may be mentioned, as, for example, that of the chorda dorsalis by von Baer, a most important one, which may be regarded as the key to the whole of vertebral morphology; the phenomenon of yolk segmentation, now known to be universal among animals, but which was only first carefully observed in Batrachia by Prévost and Dumas (though previously casually noticed by Swammerdam), and was soon afterwards followed out by Rusconi and von Baer in fishes; the discovery of the branchial clefts, plates and vascular arches in the embryos of the higher abranchiate animals by H. Rathke in 1825–1827; the able investigation of the transformations of these arches by Reichert in 1837; and the researches on the origin and development of the urinary and generative organs by Johannes Müller in 1829–1830.

On entering the fifth decade of the 19th century, the number of original contributions and systematic treatises becomes so great as to render the attempt to enumerate even a selection of the more important of them quite unsuitable to the limits of the present article. We must be satisfied, therefore, with a reference to one or two which seem to stand out with greater prominence than the rest as landmarks in the progress of embryological discovery. Among these may first be mentioned the researches of Theodor L. W. von Bischoff, formerly of Giessen and later of Munich, on the development of the ovum in Mammalia, in which a series of the most laborious, minute and accurate observations furnished a greatly novel and very full history of the formative process in several animals of that class. These researches are contained in four memoirs, treating separately of the development of the rabbit, the dog, the guinea-pig and the roe-deer, and appeared in succession in the years 1842, 1845, 1852 and 1854.

Next may be mentioned the great work of Coste, entitled *Histoire gén. et particul. du développement des animaux*, of which, however, only four fasciculi appeared between the years 1847 and 1859, leaving the work incomplete. In this work, in the large folio form, beautiful representations are given of the author's valuable observations on human embryology, and on that of various mammals, birds and fishes, and of the author's discovery in 1847 of the process of partial yolk segmentation in the germinal disk of the fowl's egg during its descent through the oviduct, and his observations on the same phenomenon in fishes and mammals.

The development of reptiles received important elucidation from the researches of Rathke, in his history of the development of serpents, published at Königsberg in 1839, and in a similar work on the turtle in 1848, as well as in a later one on the crocodile in 1866, along with which may be associated the observations of H. J. Clark on the "Embryology of the Turtle," published in Agassiz's *Contributions to Natural History, &c.*, 1857.

The phenomena of yolk segmentation, to which reference has more than once been made, and to which later researches give more and more importance in connexion with the fundamental phenomena of development, received great elucidation during this period, first from the observations of C. T. E. von Siebold and those of Bagge on the complete yolk segmentation of the egg in nematoid worms in 1841, and more fully by the observations of Kölliker in the same animals in 1843. The nature of partial segmentation of the yolk was first made known by Kölliker in his work on the development of the Cephalopoda in 1844, and, as has already been mentioned, the phenomena were observed by Coste in the eggs of birds. The latter observations have since been confirmed by those of Oellacher, Götte and Kölliker. Further researches in a vast number of animals give every reason to believe that the phenomenon of segmentation is in some shape or other the invariable precursor of embryonic formation.

The first considerable work on the development of a division of the invertebrates was that of Maurice Herold of Marburg on spiders, *De generatione aranearum ex ovo*, published at Marburg in 1824, in which the whole phenomena of the formative processes in that animal are described with remarkable clearness and completeness. A few years later an important series of contributions to the history of the development of invertebrate animals appeared in the second volume of Burdach's work on *Physiology*, of which the first edition was published in 1828, and in this the history of the development of the Entozoa was the production of Ch. Theod. von Siebold, and that of most of the other invertebrates was compiled by H. Rathke from the results of his own observations and those of others. These memoirs, together with others subsequently published by Rathke, notably that *Über die Bildung und Entwickelungsgeschichte d. Flusskrebses* (Leipzig, 1829), in which an attempt is made to extend the doctrine of the derivation of the organs from the germinal layers to the invertebrata, entitle him to be regarded as the founder of invertebrate embryology.

A large body of facts having by this time been ascertained with respect to the more obvious processes of development, a further attempt to refer the phenomena of organogenesis to morphological and histological principles became desirable. More especially was the need felt to point out with greater minuteness and accuracy the relation in which the origin of the fundamental organs of the embryo stands to the layers of the blastoderm; and this we find accomplished with signal success in the researches of R. Remak on the development of the chick and frog, published between the years 1850 and 1855.

Starting from Pander's discovery of the trilaminate blastoderm, Remak worked out the development of the chick in the light of the cell-theory of Schleiden and Schwann. He observed the division of the middle layer into two by a split which subsequently gives rise to the body-cavity (pleuro-peritoneal space) of the adult; and traced the principal organs which came from these two layers (*Hautfaserblatt* and *Darmfaserblatt*) respectively. In this manner the foundations of the germ-layer theory were established in their modern form.

A great step forward was made in 1859 by T. H. Huxley, who compared the serous and mucous layers of Pander with the ectoderm and endoderm of the Coelenterata. But in spite of this comparison it was generally held that germinal layers similar to those of the vertebrata were not found in invertebrate animals, and it was not until the publication in 1871 of Kowalewsky's researches (see below) that the germinal layer theory was applied to the embryos of all the Metazoa. But the year 1859 will be for ever memorable in the history of science as the year of the publication of the *Origin of Species*. If the enunciation of the cell-theory may be said to have marked a first from a second period in the history of embryology, the publication of Darwin's great idea ushered in a third. Whereas hitherto the facts of anatomy and development were loosely held together by the theory of types which owed its origin and maintenance to Cuvier, L. Agassiz, J. Müller and R. Owen, they were now combined into one organic whole by the theory of descent and by the hypothesis of recapitulation which was deduced from that theory. First clearly enunciated by Johann Müller in his well-known work *Für Darwin* published in 1864 (rendered in England as *Facts for Darwin*, 1869), the view that a knowledge of embryonic and larval histories would lay bare the secrets of race history and enable the course of evolution to be traced and so lead to the discovery of the natural system of classification, gave a powerful stimulus to embryological research. The first fruits of this impetus were gathered by Alexander Agassiz, A. Kowalewsky and E. Metschnikoff. Agassiz, in his memoir on the *Embryology of the Starfish* published in 1864, showed that the body-cavity in Echinodermata arises as a differentiation of the enteron of the larva and so laid the foundations of our present knowledge of the coelom. This discovery was confirmed in 1869 by Metschnikoff ("Studien üb. d. Entwick. d. Echinodermen u. Nemertinen," *Mém. Ac. Pétersbourg* (7), 41, 1869), and extended by him to Tornaria, the larva of *Balanoglossus* in 1870 ("Untersuchungen üb. d. Metamorphose einiger Seethiere," *Zeit. f. wiss. Zoologie*, 20, 1870). In 1871 Kowalewsky in his classical memoir, entitled "Embryologische Studien an Würmern und Arthropoden" (*Mém. Acad. Pétersbourg* (7), 16, 1871), proved the same fact for Sagitta and added immensely to our knowledge of the early stages of development of the Invertebrata. These memoirs formed the basis on which subsequent workers took their stand. Amongst the most important of these was F. M. Balfour (1851–1882). Led to the study of embryology by his teacher, M. Foster, in association with whom he published in 1874 the *Elements of Embryology*, Balfour was one of the first to take advantage of the facilities for research offered by Dr. A. Dohrn's Zoological Station at Naples which has since become so celebrated. Here he did the work which was subsequently published in 1878 in his *Monograph of the Development of Elasmobranch Fishes*, and which constituted the most important addition to vertebrate morphology since the days of Johannes Müller. This was followed in 1879 and 1881 by the publication of his *Treatise on Comparative Embryology*, the first work in which the facts of the rapidly growing science were clearly and philosophically put together, and the greatest. The influence of Balfour's work on embryology was immense and is still felt. He was an active worker in every department of it, and there are few groups of the animal kingdom on which he has not left the impress of his genius.

In the period under consideration the output of embryological work has been enormous. No group of the animal kingdom has escaped exhaustive examination, and no effort has been spared to obtain the embryos of isolated and out of the way forms, the development of which might have a bearing upon important questions of phylogeny and classification. Of this work it is impossible to speak in detail in this summary. It is only possible to call attention to some of its more important features, to mention the more important advances, and to refer to some of the more striking memoirs.

Marine zoological stations have been established, expeditions have been sent to distant countries, and the methods of investigation have been greatly improved. Since Anton Dohrn founded the Stazione Zoologica at Naples in 1872, observatories for the study of marine organisms have been established in most countries. Of journeys which have been made to distant countries and which have resulted in important contributions to embryology, may be mentioned the expedition (1884–1886) of the cousins Sarasin to Ceylon (development of Gymnophiona), of E. Selenka to Brazil and the East Indies (development of Marsupials, Primates and other mammals, 1877, 1889, 1892), of A. A. W. Hubrecht to the East Indies (1890, development of *Tarsius*), of W. H. Caldwell to Australia (1883–1884, discovery of the nature of the ovum and oviposition of *Echidna* and of *Ceratodus*), of A. Sedgwick to the Cape (1883, development of *Peripatus*), of J. Graham Kerr to Paraguay (1896, development of *Lepidosiren*), of R. Semon to Australia and the Malay Archipelago (1891–1893, development of Monotremata, Marsupialia), and of J. S. Budgett to Africa (1898, 1900, 1901, 1903, development of *Polypterus*).

In methods, while great improvements have been made in the processes of hardening and staining embryos, the principal advance has been the introduction in 1883 by W. H. Caldwell in his work on the development of *Phoronis* of the method of making tape-worm like strings of sections as a result of which the process of mounting in order all the sections obtained from an embryo was much facilitated, and the use of an automatic microtome rendered possible. The method of Golgi for the investigation of the nervous system, introduced in 1875, must also be mentioned here.

The word "coelom" (*q.v.*) was introduced into zoology by E. Haeckel in 1872 (*Kalkschwämme*, p. 468) as a convenient term for the body-cavity (pleuroperitoneal). The word was generally adopted, and was applied alike to the blood-containing body-cavity of Arthropods and to the body-cavity of Vertebrata and segmented worms, in which there is no blood. In 1875 Huxley (*Quarterly Journ. of Mic. Science*, 15, p. 53), relying on the researches of Agassiz, Metschnikoff and Kowalewsky above mentioned, put forward the idea that according to their development three kinds of body-cavity ought to be distinguished: (1) the enterocoelic which arises from enteric diverticula, (2) the schizocoelic which develops as a split in the embryonic mesoblast, and (3) the epicoelic which was enclosed by folds of the skin and lined by ectoderm (*e.g.* atrial cavity of Tunicates, &c.). This suggestion was of great importance, because it led the embryologists of the day (Balfour, the brothers Hertwig, Lankester and others) to discuss the question as to whether there was not more than one kind of body-cavity. The Hertwigs (*Coelomtheorie*, Jena, 1881) distinguished two kinds, the enterocoel and the pseudocoel. The former, to which they limited the use of the word coelom, and which is developed directly or indirectly from the enteron, is found in Annelida, Arthropoda, Echinodermata, Chordata, &c. The latter they regarded as something quite different from the coelom and as arising by a split in what they called for the first time mesenchyme; the mesenchyme being the non-epithelial mesoderm, which they described as consisting of amoeboid cells, but which we now know to consist of a continuous reticulum. The next step was made by E. Ray Lankester, who in 1884 (*Zoologischer Anzeiger*) showed that the pericardium of Mollusca does not contain blood, and therein differs from the rest of the body-cavity which does contain blood, but no suggestion is made that the blood-containing space is not coelomic. In fact it was generally held by the anatomists of the day that the coelom and the vascular system were different parts of the same primitive organ, though separate from it in the adult except in Arthropoda and Mollusca. In the Mollusca, it is true, the pericardial part of the coelom was held to be separate from the vascular, and the Hertwigs had reached the correct conception that the pericardium of these animals was alone true coelom, the vascular part being pseudocoel. This was the state of morphological opinion until 1886, when it was shown (*Proc. Cambridge Phil. Soc.*, 6, 1886, p. 27) (1) that the coelom of *Peripatus* gives rise to the nephridia and generative glands only, and to no other part of the body-cavity of the adult, (2) that the nephridia of the adult do not open as had been supposed into the body-cavity, (3) that the body-cavity is entirely formed of the blood-containing space, the coelom having no perivisceral portion. These results were extended by the same author (*Quart. Journ. Mic. Sci.*, 27, 1887, pp. 486-540) to other Arthropods and to the Mollusca, and the modern theory of the coelom was finally established. An increased precision was given to the conception of coelom by the discovery in 1880 (*Quart. Journ. Mic. Sci.*, 20, p. 164) that the nephridia of Elasmobranchs are a direct differentiation of a portion of it. In 1886 this was extended to *Peripatus* (*Proc. Camb. Phil. Soc.*, 6, p. 27) and doubtless holds universally.

In 1864 it was suggested by V. Hensen (Virchow's *Archiv*, 31) that the rudiments of nerve-fibres are present from the beginning of development as persistent remains of connexions between the incompletely separated cells of the segmented ovum. This suggestion fell to the ground because it was held by embryologists that the cleavage of the ovum resulted in the formation of completely separate cells, and that the connexions between the adult cells were secondary. In 1886 it was shown (*Quarterly Journ. Mic. Sci.*, 26, p. 182) that in *Peripatus Capensis* the cells of the segmenting ovum do not separate from one another, but remain connected by a loose protoplasmic network. This discovery has since been extended to other ova, even to the small so-called holoblastic ova, and a basis of fact was found for Hensen's suggestion as to the embryonic origin of nerves (*Quart. Journn. Mic. Sci.*, 33, 1892, pp. 581-584). An extension and further application of the new views as to the cell-theory and the embryonic origin of nerves thus necessitated was made in 1894 (*Quart. Journ. Mic. Sci.*, 37, p. 87), and in 1904 J. Graham Kerr showed that the motor nerves in the dipnoan fish Lepidosiren arise in an essentially similar manner (*Trans. Roy. Society of Edinburgh*, 41, p. 119).

In 1883 Elie Metschnikoff published his researches on the intracellular digestion of invertebrates (*Arbeiten a. d. zoologischen Inst. Wien*, 5; and *Biologisches Centralblatt*, 3, p. 560); these formed the basis of his theory of inflammation and phagocytosis, which has had such an important influence on pathology. As he himself has told us, he was led to make these investigations by his precedent researches on the development of sponges and other invertebrates. To quote his own words: "Having long studied the problem of the germinal layers in the animal series, I sought to give some idea of their origin and significance. The part played by the ectoderm and endoderm appeared quite clear, and the former might reasonably be regarded as the cutaneous investment of primitive multicellular animals, while the latter might be regarded as their organ of digestion. The discovery of intracellular digestion in many of the lower animals led me to regard this phenomenon as characteristic of those ancestral animals from which might be derived all the known types of the animal kingdom (excepting, of course, the Protozoa). The origin and part played by the mesoderm appeared the most obscure. Thus certain embryologists supposed that this layer corresponded to the reproductive organs of primitive animals: others regarded it as the prototype of the organs of locomotion. My embryological and physiological studies on sponges led me to the conclusion that the mesoderm must function in the hypothetically primitive animals as a mass of digestive cells, in all points similar to those of the endoderm. This hypothesis necessarily attracted my attention to the power of seizing foreign corpuscles possessed by the mesodermic cells" (*Immunity in Infective Diseases*, English translation, Cambridge, 1905).

The branch of embryology which concerns itself with the study of the origin, history and conjugation of the individuals (gametes) which are concerned in the reproduction of the species has made great advances. These began in 1875 and following years with a careful examination of the behaviour of the germinal vesicle in the maturation and fertilization of the ovum. The history of the polar bodies, the origin of the female pronucleus, the presence in the ovum of a second nucleus, the male pronucleus, which gave rise to the first segmentation nucleus by fusion with the female pronucleus, were discovered (E. van Beneden, O. Bütschli, O. Hertwig, H. Fol), and in 1876 O. Hertwig (*Morphologisches Jahrbuch*, 3, 1876) for the first time observed the entrance of a spermatozoon into the egg and the formation of the male pronucleus from it. The centrosome was discovered by W. Flemming in 1875 in the egg of the fresh-water mussel, and independently in 1876 by E. van Beneden in Dicyemids. In 1883 came E. van Beneden's celebrated discovery (*Arch.*

Biologie, 4) of the reduction of the number of chromosomes in the nucleus of both male and female gametes, and of the fact that the male and female pronuclei contribute the same number of chromosomes to the zygote-nucleus. He also showed that the gametogenesis in the male is a similar process to that in the female, and paved the way for the acceptation of the view (due to Bütschli) that polar bodies are aborted female gametes. These discoveries were extended and completed by subsequent workers, among whom may be mentioned E. van Beneden, J. B. Carnoy, G. Platner, T. Boveri, O. Hertwig, A. Brauer. The subject is still being actively pursued, and hopes are entertained that some relation may be found between the behaviour of the chromosomes and the facts of heredity.

Since 1874 (W. His, *Unsere Körperform und das physiologische Problem ihrer Entstehung*) a new branch of embryology, which concerns itself with the physiology of development, has arisen (experimental embryology). The principal workers in this field have been W. Roux, who in 1894 founded the *Archiv für Entwickelungsmechanik der Organismen*, T. Boveri and Y. Delage who discovered and elucidated the phenomenon of merogony, J. Loeb who discovered artificial parthenogenesis, O. and R. Hertwig, H. Driesch, C. Herbst, E. Maupas, A. Weismann, T. H. Morgan, C. B. Davenport (*Experimental Morphology*, 2 vols., 1899) and many others.

In the elucidation of remarkable life-histories we may point in the first place to the work of A. Kowalewsky on the development of the Tunicata ("Entwickelungsgeschichte d. einfachen Ascidien," *Mém. Acad. Pétersbourg* (7), 10, 1866, and *Arch. f. Mic. Anatomie*, 7, 1871), in which was demonstrated for the first time the vertebrate relationship of the Tunicata (possession of a notochord, method of development of the central nervous system) and which led to the establishment of the group Chordata. We may also mention the work of Y. Delage in the metamorphosis of *Sacculina* (*Arch. zool. exp.* (2) 2, 1884), A. Giard (*Comptes rendus*, 123, 1896, p. 836) and of A. Malaquin on *Monstrilla* (*Arch. zool. exp.* (3), 9, p. 81, 1901), of Delage (*Comptes rendus*, 103, 1886, p. 698) and Grassi and Calandruccio (*Rend. Acc. Lincei* (5), 6, 1897, p. 43), on the development of the eels, and of P. Pergande on the life-history of the Aphidae (*Bull. U.S. Dep. Agric. Ent.*, technical series, 9, 1901). The work of C. Grobben (*Arbeiten zool. Inst. Wien*, 4, 1882) and of B. Uljanin ("Die Arten der Gattung Doliolum," *Fauna u. Flora des Golfes von Neapel*, 1884) on the extraordinary life-history and migration of the buds in *Doliolum* must also be mentioned. In pure embryological morphology we have had Heymons' elucidation of the Arthropod head, the work of Hatschek on Annelid and other larvae, the works of H. Bury and of E. W. MacBride which have marked a distinct advance in our knowledge of the development of Echinodermata, of K. Mitsukuri, who has founded since 1882 an important school of embryology in Japan, on the early development of Chelonia and Aves, of A. Brauer and G. C. Price on the development of vertebrate excretory organs, of Th. W. Bischoff, E. van Beneden, E. Selenka, A. A. W. Hubrecht, R. Bonnet, F. Keibel and R. Assheton on the development of mammals, of A. A. W. Hubrecht and E. Selenka on the early development and placentation of the Primates, of J. Graham Kerr and of J. S. Budgett on the development of Dipnoan and Ganoid fishes, of A. Kowalewsky, B. Hatschek, A. Willey and E. W. MacBride on the development of Amphioxus, of B. Dean on the development of Bdellostoma, of A. Götte on the development of Amphibia, of H. Strahl and L. Will on the early development of reptiles, of T. H. Huxley, C. Gegenbaur and W. K. Parker on the development of the vertebrate skeleton, of van Wijhe on the segmentation of the vertebrate head, by which the modern theory of head-segmentation, previously adumbrated by Balfour, was first established, of Leche and Röse on the development of mammalian dentitions. We may also specially notice W. Bateson's work on the development of *Balanoglossus* and his inclusion of this genus among the Chordata (1884), the discovery by J. P. Hill of a placenta in the marsupial genus *Perameles* (1895), the work of P. Marchal (1904) on the asexual increase by fission of the early embryos of certain parasitic Hymenoptera (so called germinogony), a phenomenon which had been long ago shown to occur in *Lumbricus trapezoides* by N. Kleinenberg (1879) and by S. F. Harmer in Polyzoa (1893). The work on cell-lineage which has been so actively pursued in America may be mentioned here. It has consisted mainly of an extension of the early work of A. Kowalewsky and B. Hatschek on the formation of the layers, being a more minute and detailed examination of the origin of the embryonic tissues.

The most important text-books and summaries which have appeared in this period have been Korschelt and Heider's *Lehrbuch der vergleichenden Entwickelungsgeschichte der wirbellosen Tiere* (1890–1902), C. S. Minot's *Human Embryology* (1892), and the *Handbuch der vergleichenden und experimentellen Entwickelungslehre der Wirbeltiere*, edited by O. Hertwig (1901, et seq.). See also K. E. von Baer, *Über Entwicklungsgeschichte der Tiere* (Königsberg, 1828, 1837); F. M. Balfour, *A Monograph on the Development of Elasmobranch Fishes* (London, 1878); *A Treatise on Comparative Embryology*, vols. i. and ii. (London, 1885) (still the most important work on Vertebrate Embryology); M. Duval, *Atlas d'Embryologie* (Paris, 1889); M. Foster and F. M. Balfour, *Elements of Embryology* (London, 1883); O. Hertwig, *Lehrbuch der Entwicklungsgeschichte des Menschen u. der Wirbeltiere* (6th ed., Jena, 1898); A. Kölliker, *Entwicklungsgeschichte des Menschen u. der höheren Tiere* (Leipzig, 1879); A. M. Marshall, *Vertebrate Embryology* (London, 1893).

(A. Se.*)

Physiology of Development

Physiology of Development [in German, *Entwicklungsmechanik* (W. Roux), *Entwicklungsphysiologie* (H. Driesch), *physiologische Morphologie* (J. Loeb)] is, in the broadest meaning of the word, the experimental science of morphogenesis, *i.e.* of the laws that govern morphological differentiation. In this sense it embraces the study of regeneration and variation, and would, as a whole, best be called rational morphology. Here we shall treat of the Physiology of Development in a narrower sense, as the study of the laws that govern the development of the adult organism from the egg, Regeneration and Variation and Selection forming the subjects of special articles.

After the work done by W. His, A. Goette and E. F. W. Pflüger, who gave a sort of general outline and orientation of the subject, the first to study developmental problems properly in a systematical way, and with full conviction of their great importance, was Wilhelm Roux. This observer, having found by a full analysis of the facts of "development" that the first special problem to be worked out was the question when and where the first differentiation appeared, got as his main result that, when one of the two first blastomeres (cleavage cells) of the frog's egg was killed, the living one developed into a typical half-embryo, *i.e.* an embryo that was either the right or the left part of a whole one. From that Roux concluded that the first cleavage plane determined already the median plane of the adult; and that the basis of all differentiation was given by an unequal division of the nuclear substances during karyokinesis, a result that was also attained on a purely theoretical basis by A. Weismann. Hans Driesch repeated Roux's fundamental experiment with a different method on the sea-urchin's egg, with a result that was absolutely contrary to that of Roux: the isolated blastomere cleaved like half the egg, but it resulted in a whole blastula and a whole embryo, which differed from a normal one only in its small size. Driesch's result was obtained in somewhat the same manner by E. B. Wilson with the egg of Amphioxus, by Zoja with the egg of Medusae, &c. It thus became very probable that an inequality of nuclear division could not be the basis of differentiation. The following experiments were still more fatal to the theories of Roux and of Weismann. Driesch found that even when the first eight or sixteen cells of the cleaving egg of the sea-urchin were brought into quite abnormal positions with regard to one another, still a quite normal embryo was developed; Driesch and T. H. Morgan discovered jointly that in the Ctenophore egg one isolated blastomere developed into a half-embryo, but that the same was the case if a portion of protoplasm was cut off from the fertilized egg not yet in cleavage; last, but not of least importance, in the case of the frog's egg which had been Roux's actual subject of experiment, conditions were discovered by O. Schultze and O. Hertwig under which one of the two first blastomeres of this egg developed into a whole embryo of half size. This result was made still more decisive by Morgan, who showed that it was quite in the power of the experimenter to get either a half-embryo or a whole one of half size, the latter dependent only upon giving to the blastomere the opportunity for a rearrangement of its matter by turning it over.

Thus we may say that the general result of the introductory series of experiments in the physiology of development is the following:—In many forms, *e.g.* Echinoderms, Amphioxus, Ascidians, Fishes and Medusae, the potentiality (*prospective Potenz*—Driesch) of all the blastomeres of the segmented egg is the same, *i.e.* each of them may play any or every part in the future development; the prospective value (*prosp. Bedeutung*—D.) of each blastomere depends upon, or is a function of, its position in the whole of the segmented egg; we can term the "whole" of the egg after cleavage an "aequipotential system" (Driesch). But though aequipotential, the whole of the segmented egg is nevertheless not devoid of orientation or direction; the general law of causality compels us to assume a general orientation of the smallest parts of the egg, even in cases where we are not able to see it. It has been experimentally proved that external stimuli (light, heat, pressure, &c.) are not responsible for the first differentiation of organs in the embryo; thus, should the segmented egg be absolutely equal in itself, it would be incomprehensible that the first organs should be formed at one special point of it and not at another. Besides this general argument, we see a sort of orientation in the typical forms of the polar or bilateral cleavage stages.

Differentiation, therefore, depends on a primary, *i.e.* innate, orientation of the egg's plasma in those forms, the segmented eggs of which represent aequipotential systems; this orientation is capable of a sort of regulation or restoration after disturbances of any sort; in the egg of the Ctenophora such a regulation is not possible, and in the frog's egg it is facultative, *i.e.* possible under certain conditions, but impossible under others. Should this interpretation be right, the difference between the eggs of different animals would not be so great as it seemed at first: differences with regard to the potentialities of the blastomeres would only be differences with regard to the capability of regulation or restoration of the egg's protoplasm.

The foundation of physiological embryology being laid, we now can shortly deal with the whole series of special problems offered to us by a general analysis of that science, but at present worked out only to a very small extent.

We may ask the following questions:—What are the general conditions of development? On what general factors does it depend? How do the different organs of the partly developed embryo stand with regard to their future fate? What are the stimuli (*Reize*) effecting differentiation? What is to be said about the specific character of the different formative effects? And as the most important question of all: Are all the problems offered to us in the physiology of development to be solved with the aid of the laws known hitherto in science, or do we want specifically new "vitalistic" factors?

Conditions of differentiation.

Energy in different forms is required for development, and is provided by the surrounding medium. Light, though of no influence on the cleavage (Driesch), has a great effect on later stages of development, and is also necessary for the formation of polyps in Eudendrium (J. Loeb). That a certain temperature is necessary for ontogeny has long been known; this was carefully studied by O. Hertwig, as was also the influence of heat on the rate of development. Oxygen is also wanted, either from a certain stage of development or from the very beginning of it, though very nearly related forms differ in this respect (Loeb). The great influence of osmotic pressure on growth was studied by J. Loeb, C. Herbst and C. H. Davenport. In all these cases energy may be necessary for development in general, or a specific form of energy may be necessary for the formation of a specific organ; it is clear that, especially in the latter case, energy is shown to be a proper factor for morphogenesis. Besides energy, a certain chemical condition of the medium, whether offered by the water in which the egg lives or (especially in later stages) by the food, is of great importance for normal ontogeny; the only careful study in this respect was carried out by Herbst for the development of the egg of Echinids. This investigator has shown that all salts of the sea water are of great importance for development, and most of them specifically and typically; for instance, calcium is absolutely necessary for holding together the embryonic cells, and without calcium all cells will fall apart, though they do not die, but live to develop further.

What we have dealt with may be called external factors of development; as to their complement, the internal factors, it is clear that every elementary factor of general physiology may be regarded as one of them. Chemical metamorphosis plays, of course, a great part in differentiation, especially in the form of secretions; but very little has been carefully studied in this respect. Movement of living matter, whether of cells or of intracellular substance, is another important factor (O. Bütschli, F. Dreyer, L. Rhumbler.) Cell-division is another, its differences in direction, rate and quantity being of great importance for differentiation. We know very little about it; a so-called law of O. Hertwig, that a cell would divide at right angles to its longest diameter, though experimentally stated in some cases, does not hold for all, and the only thing we can say is, that the unknown primary organization of the egg is here responsible. (Compare the papers on "cell-lineage" of E. B. Wilson, F. R. Lillie, H. S. Jennings, O. Zurstrassen and others.) Of the inner factors of ontogeny there is another category that may be called physical, that already spoken of being physiological. The most important of these is the capillarity of the cell surfaces. Berthold was the first to call attention to its role in the arrangement of cell composites, and afterwards the matter was more carefully studied by Dreyer, Driesch, and especially W. Roux, with the result that the arrangement of cells follows the principle of surfaces *minimae areae* (Plateau) as much as is reconcilable with the conditions of the system.

Potentialities of embryonic cells.

It has already been shown that in many cases the embryo after cleavage, *i.e.* the blastula, is an "aequipotential system." It was shown that in the egg of Echinids there existed such an absolute lack of determination of the cleavage cells that (*a*) the cells may be put in quite abnormal positions with reference to one another without disturbing development; (*b*) a quarter blastomere gives a quite normal little pluteus, even a sixteenth yields a gastrula; (*c*) two eggs may fuse in the early blastula stage, giving one single normal embryo of double size. Our next question concerns the distribution of potentiality, when the embryo is developed further than the blastula stage. In this case it has been shown that the potentialities of the different embryonic organs are different: that, for instance, in Echinoderms or Amphibians the ectoderm, when isolated, is not able to form endoderm, and so on (Driesch, D. Barfurth); but it has been shown at the same time that the ectoderm in itself, the intestine in itself of Echinoderms (Driesch), the medullary plate in itself of Triton (H. Spemann), is as aequipotential as was the blastula: that any part whatever of these organs may be taken away without disturbing the development of the rest into a normal and proportional embryonic part, except for its smaller size.

Formative stimuli.

If the single phases of differentiation are to be regarded as effects, we must ask for the causes, or stimuli, of these effects. For a full account of the subject we refer to Herbst, by whom also the whole botanical literature, much more important than the zoological, is critically reviewed. We have already seen that when the blastula represents an aequipotential system, there must be some sort of primary organization of the egg, recoverable after disturbances, that directs and localizes the formation of the first embryonic organs; we do not know much about this organization. Directive stimuli (*Richtungsreize*) play a great role in ontogeny; Herbst has analysed many cases where their existence is probable. They have been experimentally proved in two cases. The chromatic cells of the yolk sac of Fundulus are attracted by the oxygen of the arteriae (Loeb); the mesenchyme cells of Echinus are attracted by some specific parts of the ectoderm, for they move towards them also when removed from their original positions to any point of the blastocoel by shaking (Driesch). Many directive stimuli might be discovered by a careful study of grafting experiments, such as have been made by Born, Joest, Harrison and others, but at present these experiments have not been carried out far enough to get exact results.

Formative stimuli in a narrower meaning of the word, *i.e.* stimuli affecting the origin of embryonic organs, have long been known in botany; in zoology we know (especially from Loeb) a good deal about the influence of light, gravitation, contact, &c., on the formation of organs in hydroids, but these forms are very plant-like in many respects; as to free-living animals, Herbst proved that the formation of the arms of the pluteus larva depends on the existence of the calcareous tetrahedra, and made in other cases (lens of vertebrate eye, nerves and muscles, &c.) the existence of formative stimuli very probable. Many of the facts generally known as functional adaptation (*functionelle Anpassung*—Roux) in botany and zoology may also belong to this category, *i.e.* be the effects of some external stimulus, but they are far from having been analysed in a satisfactory manner. That the structure of parts of the vertebrate skeleton is always in relation to their function, even under abnormal conditions, is well known; what is the real "cause" of differentiation in this case is difficult to say.

Specific characters.

It is obvious that we cannot answer the question why the different ontogenetic effects are just what they are. Developmental physiology takes the specific nature of form for granted, and it may be left for a really rational theory of the evolution of species in the future to answer the problem of species, as far as it is answerable at all. What we intend to do here is only to say in a few words wherein consists the specific character of embryonic organs. That embryonic parts are specific or typical in regard to their protoplasm is obvious, and is well proved by the fact that the different parts of the embryo react differently to the same chemical or other reagents (Herbst, Loeb). That they may be typical also in regard to their nuclei was shown by Boveri for the generative cells of Ascaris; we are not able at present to say anything definite about the importance of this fact. The specific nature of an embryonic organ consists to a high degree in the number of cells composing it; it was shown for many cases that this number, and also the size of cells, is constant under constant conditions, and that under inconstant conditions the number is variable, the size constant; for instance, embryos which have developed from one of the two first blastomeres show only half the normal number of cells in their organs (Morgan, Driesch).

Self-differentiation.

We have learnt that the successive steps of embryonic development are to be regarded as effects, caused by stimuli, which partly exist in the embryo itself. But it must be noted that not every part of the embryo is dependent on every other one, but that there exists a great independence of the parts, to a varying degree in every case. This partial independence has been called self-differentiation (*Selbstdifferenzierung*) by Roux, and is certainly a characteristic feature of ontogeny. At the same time it must not be forgotten that the word is only relative, and that it only expresses our recognition of a negation.

For instance, we know that the ectoderm of Echinus may develop further if the endoderm is taken away; in other words, that it develops by self-differentiation in regard to the endoderm, that its differentiation is not dependent on the endoderm; but it would be obviously more important to know the factors on which this differentiation is actually dependent than to know one factor on which it is not. The same is true for all other experiments on "self-differentiation," whether analytical (Loeb, Schaper, Driesch) or not (grafting experiments, Born, Joest, &c.).

Vitalism.

Can we understand differentiation by means of the laws of natural phenomena offered to us by physics and chemistry? Most people would say yes, though not yet. Driesch has tried to show that we are absolutely not able to understand development, at any rate one part of it, *i.e.* the localization of the various successive steps of differentiation. But it is impossible to give any idea of this argument in a few words, and we can only say here that it is based on the experiments upon isolated blastomeres, &c., and on an analysis of the character of aequipotential systems. In this way physiology of development would lead us straight on into vitalism.

References.—An account of the subject, with full literature, is given by H. Driesch, *Resultate und Probleme der Entwicklungsphysiologie der Tiere in Ergebnissen der Anat. u. Entw.-Gesch.* (1899). Other works are: C. H. Davenport, *Experimental Morphology* (New York, 1897–1899); Y. Delage, *La Structure du protoplasma*, &c. (1895); Driesch, *Mathem. mech. Betrachtung morpholog. Probleme* (Jena, 1891); *Entwicklungsmechan. Studien* (1891–1893); *Analytische Theorie d. organ. Entw.* (Leipzig, 1894); *Studien über d. Regulationsvermögen* (1897–1900), &c.; C. Herbst, "Über die Bedeutung d. Reizphysiologie für die kausale Auffassung von Vorgängen i. d. tier. Ontogenese," *Biolog. Centralblatt*, vols. xiv. u. xv. (Leipzig, 1894). Many papers on influence of salts on development in *Arch. f. Entw.-Mech.*; O. Hertwig, Papers in *Arch. f. mikr. Anat.*, "Die Zelle und die Gewebe," ii. (Jena, 1897); W. His, *Unsere Körperform* (Leipzig, 1875); J. Loeb, *Untersuch. z. physiol. Morph.* (Würzburg, 1891–1892). Papers in *Arch. f. Entw.-Mech.* and Pflüger's *Archiv*; T. H. Morgan, *The Development of the Frog's Egg* (New York, 1897); Papers in *Arch. f. Entw.-Mech.*; Roux, *Gesammelte Abhandlungen* (Leipzig, 1895); Papers in *Arch. f. Entw.-Mech.*; A. Weismann, *Das Keimplasma* (Jena, 1892); E. B. Wilson, papers in *Journ. Morph.*, "The Cell in Development and Inheritance" (New York, 1896).

(H. A. E. D.)

EMDEN, a maritime town of Germany, in the Prussian province of Hanover, near the mouth of the Ems, 49 m. N.W. from Oldenburg by rail. Pop. (1885) 14,019; (1905) 20,754. The Ems once flowed beneath its walls, but is now 2 m. distant, and connected with the town by a broad and deep canal, divided into the inner (or dock) harbour and the outer (or "free port") harbour. The latter is ¾ m. in length, has a breadth of nearly 400 ft., and since the construction of the Ems-Jade and Dortmund-Ems canals, has been deepened to 38 ft., thus allowing the largest sea-going vessels to approach its wharves. The town is intersected by canals (crossed by numerous bridges), which bring it into communication with most of the towns in East Friesland, of which it is the commercial capital. The waterways which traverse and surround it and the character of its numerous gabled medieval houses give it the appearance of an old Dutch, rather than of a German, town. Of its churches the most noteworthy are the Reformed "Great Church" (Grosse Kirche), a large Gothic building completed in 1455, containing the tomb of Enno II. (d. 1540), count of East Friesland; the Gasthauskirche, formerly the church of a Franciscan friary founded in 1317; and the Neue Kirche (1643–1647). Of its secular buildings, the Rathaus (town-hall), built in 1574–1576, on the model of that of Antwerp, with a lofty tower, and containing an interesting collection of arms and armour, is particularly remarkable. There are numerous educational institutions, including classical and modern schools, and schools of commerce, navigation and telegraphy. The town has two interesting museums. Emden is the seat of an active trade in agricultural produce and live-stock, horses, timber, coal, tea and wine. The deep-sea fishing industry of the town is important, the fishing fleet in 1902 numbering 67 vessels. Machinery, cement, cordage, wire ropes, tobacco, leather, &c. are manufactured. Emden is also of importance as the station of the submarine cables connecting Germany with England, North America and Spain. It has a regular steamboat service with Borkum and Norderney.

Emden (Emuden, Emetha) is first mentioned in the 12th century, when it was the capital of the Eemsgo (Emsgau, or county of the Ems), one of the three hereditary countships into which East Friesland had been divided by the emperor. In 1252 the countship was sold to the bishops of Münster; but their rule soon became little more than nominal, and in Emden itself the family of Abdena, the episcopal provosts and castellans, established their practical independence. Towards the end of the 14th century the town gained a considerable trade owing to the permission given by the provost to the pirates known as "Viktualienbrüder" to make it their market, after they had been driven out of Gothland by the Teutonic Order. In 1402, after the defeat of the pirates off Heligoland by the fleet of Hamburg, Emden was besieged, but it was not reduced by Hamburg, with the aid of Edzard Cirksena of Greetsyl, until 1431. The town was held jointly by its captors till 1453, when Hamburg sold its rights to Ulrich Cirksena, created count of East Friesland by the emperor Frederick III. in 1454. In 1544 the Reformation was introduced, and in the following years numerous Protestant refugees from the Low Countries found their way to the town. In 1595 Emden became a free imperial city under the protection of Holland, and was occupied by a Dutch garrison until 1744 when, with East Friesland, it was transferred to Prussia. In 1810 Emden became the chief town of the French department of Ems Oriental; in 1815 it was assigned to Hanover, and in 1866 was annexed with that kingdom by Prussia.

See Fürbringer, *Die Stadt Emden in Gegenwart und Vergangenheit* (Emden, 1892).

EMERALD, a bright green variety of beryl, much valued as a gem-stone. The word comes indirectly from the Gr. σμάραγδος (Arabic *zumurrud*), but this seems to have been a name vaguely given to a number of stones having little in common except a green colour. Pliny's "smaragdus" undoubtedly included several distinct species. Much confusion has arisen with respect to the "emerald" of the Scriptures. The Hebrew word *nōphek*, rendered emerald in the Authorized Version, probably meant the carbuncle: it is indeed translated ἄνθραξ in the Septuagint, and a marginal reading in the Revised Version gives carbuncle. On the other hand, the word *bāreqath*, rendered σμάραγδος in the LXX., appears in the A.V. as carbuncle, with the alternative reading of emerald in the R.V. It may have referred to the true emerald, but Flinders Petrie suggests that it meant rock-crystal.

The properties of emerald are mostly the same as those described under Beryl. The crystals often show simply the hexagonal prism and basal plane. The prisms cleave, though imperfectly, at right angles to the geometrical axis; and hexagonal slices were formerly worn in the East. Compared with most gems, the emerald is rather soft, its hardness (7·5) being but slightly above that of quartz. The specific gravity is low, varying slightly in stones from different localities, but being for the Muzo emerald about 2·67. The refractive and dispersive powers are not high, so that the cut stones display little brilliancy or "fire." The emerald is dichroic, giving in the dichroscope a bluish-green and a yellowish-green image. The magnificent colour which gives extraordinary value to this gem, is probably due to chromium. F. Wöhler found 0·186% of Cr_2O_3 in the emerald of Muzo,—a proportion which, though small, is sufficient to impart an emerald-green colour to glass. The stone loses colour when strongly heated, and M. Lewy suggested that the colour was due to an organic pigment. Greville Williams showed that emeralds lost about 9% of their weight on fusion, the specific gravity being reduced to about 2·4.

The ancients appear to have obtained the emerald from Upper Egypt, where it is said to have been worked as early as 1650 B.C. It is known that Greek miners were at work in the time of Alexander the Great, and in later times the mines yielded their gems to Cleopatra. Remains of extensive workings were discovered in the northern Etbai by the French traveller, F. Cailliaud, in 1817, and the mines were re-opened for a short time under Mehemet Ali. "Cleopatra's Mines" are situated in Jebel Sikait and Jebel Zabara near the Red Sea coast east of Assuan. They were visited in 1891 by E. A. Floyer, and the Sikait workings were explored in 1900 by D. A. MacAlister and others. The Egyptian emeralds occur in mica-schist and talc-schist.

On the Spanish conquest of South America vast quantities of emeralds were taken from the Peruvians, but the exact locality which yielded the stones was never discovered. The only South American emeralds now known occur near Bogotà, the capital of Colombia. The most famous mine is at Muzo, but workings are known also at Coscuez and Somondoco. The emerald occurs in nests of calcite in a black bituminous limestone containing ammonites of Lower Cretaceous age. The mineral is associated with quartz, dolomite, pyrites, and the rare mineral called "parisite"—a fluo-carbonate of the cerium metals, occurring in brownish-yellow hexagonal crystals, and named after J. J. Paris, who worked the emeralds. It has been suggested that the Colombian emerald is not in its original matrix. The fine stones are called *cañutillos* and the inferior ones *morallion*.

In 1830 emeralds were accidentally discovered in the Ural Mountains. At the present time they are worked on the river Takovaya, about 60 m. N.E. of Ekaterinburg, where they occur in mica-schist, associated with aquamarine, alexandrite, phenacite, &c. Emerald is found also in mica-schist in the Habachthal, in the Salzburg Alps, and in granite at Eidsvold in Norway. Emerald has been worked in a vein of pegmatite, piercing slaty rocks, near Emmaville, in New South Wales. The crystals occurred in association with topaz, fluorspar and cassiterite; but they were mostly of rather pale colour. In the United States, emerald has occasionally been found, and fine crystals have been obtained from the workings for hiddenite at Stonypoint, Alexander county, N.C.

Many virtues were formerly ascribed to the emerald. When worn, it was held to be a preservative against epilepsy, it cured dysentery, it assisted women in childbirth, it drove away evil spirits, and preserved the chastity of the wearer. Administered internally it was reputed to have great medicinal value. In consequence of its refreshing green colour it was naturally said to be good for the eyesight.

The stone known as "Oriental emerald" is a green corundum. Lithia emerald is the mineral called hiddenite; Uralian emerald is a name given to demantoid; Brazilian emerald is merely green tourmaline; evening emerald is the peridot; pyro-emerald is fluorspar which phosphoresces with a green glow when heated; and "mother of emerald" is generally a green quartz or perhaps in some cases a green felspar.

See Aquamarine, Beryl. (F. W. R.*)

ÉMERIC-DAVID, TOUSSAINT-BERNARD (1755–1839), French archaeologist and writer on art, was born at Aix, in Provence, on the 20th of August 1755. He was destined for the legal profession, and having gone in 1775 to Paris to complete his legal education, he acquired there a taste for art which influenced his whole future career, and he went to Italy, where he continued his art studies. He soon returned, however, to his native village, and followed for some time the profession of an advocate; but in 1787 he succeeded his uncle Antoine David as printer to the parlement. He was elected mayor of Aix in 1791; and although he speedily resigned his office, he was in 1793 threatened with arrest, and had for some time to adopt a vagrant life. When danger was past he returned to Aix, sold his printing business, and engaged in general commercial pursuits; but he was not long in renouncing these also, in order to devote himself exclusively to literature and art. From 1809 to 1814, under the Empire, he represented his department in the Lower House (*Corps législatif*); in 1814 he voted for the downfall of Napoleon; in 1815 he retired into private life, and in 1816 he was elected a member of the Institute. He died in Paris on the 2nd of April 1839. Émeric-David was placed in 1825 on the commission appointed to continue *L'Histoire littéraire de la France*. His principal works are *Recherches sur l'art statuaire, considéré chez les anciens et les modernes* (Paris, 1805), a work which obtained the prize of the Institute; *Suite d'études calquées et dessinées d'après cinq tableaux de Raphaël* (Paris, 1818–1821), in 6 vols. fol.; *Jupiter, ou recherches sur ce dieu, sur son culte*, &c. (Paris, 1833), 2 vols. 8vo, illustrated; and *Vulcain* (Paris, 1837).

EMERITUS (Lat. from *emereri*, to serve out one's time, to earn thoroughly), a term used of Roman soldiers and public officials who had earned their discharge from the service, a veteran, and hence applied, in modern times, to a university professor (*professor emeritus*) who has vacated his chair, on account of long service, age or infirmity, and, in the Presbyterian church, to a minister who has for like reason given up his charge.

EMERSON, RALPH WALDO (1803–1882), American poet and essayist, was born in Boston, Massachusetts, on the 25th of May 1803. Seven of his ancestors were ministers of New England churches. Among them were some of those men of mark who made the backbone of the American character: the sturdy Puritan, Peter Bulkeley, sometime rector of Odell in Bedfordshire, and afterward pastor of the church in the wilderness at Concord, New Hampshire; the zealous evangelist, Father Samuel Moody of Agamenticus in Maine, who pursued graceless sinners even into the alehouse; Joseph Emerson of Malden, "a heroic scholar," who prayed every night that no descendant of his might ever be rich; and William Emerson of Concord, Mass., the patriot preacher, who died while serving in the army of the Revolution. Sprung from such stock, Emerson inherited qualities of self-reliance, love of liberty, strenuous virtue, sincerity, sobriety and fearless loyalty to ideals. The form of his ideals was modified by the metamorphic glow of Transcendentalism which passed through the region of Boston in the second quarter of the 19th century. But the spirit in which Emerson conceived the laws of life, reverenced them and lived them out, was the Puritan spirit, elevated, enlarged and beautified by the poetic temperament.

His father was the Rev. William Emerson, minister of the First Church (Unitarian) in Boston. Ralph Waldo was the fourth child in a family of eight, of whom at least three gave evidence of extraordinary mental powers. He was brought up in an atmosphere of hard work, of moral discipline, and (after his father's death in 1811) of that wholesome self-sacrifice which is a condition of life for those who are poor in money and rich in spirit. His aunt, Miss Mary Moody Emerson, a brilliant old maid, an eccentric saint, was a potent factor in his education. Loving him, believing in his powers, passionately desiring for him a successful career, but clinging with both hands to the old forms of faith from which he floated away, this solitary, intense woman did as much as any one to form, by action and reaction, the mind and character of the young Emerson. In 1817 he entered Harvard College, and graduated in 1821. In scholarship he ranked about the middle of his class. In literature and oratory he was more distinguished, receiving a Boylston prize for declamation, and two Bowdoin prizes for dissertations, the first essay being on "The Character of Socrates" and the second on "The Present State of Ethical Philosophy"—both rather dull, formal, didactic productions. He was fond of reading and of writing verse, and was chosen as the poet for class-day. His cheerful serenity of manner, his tranquil mirthfulness, and the steady charm of his personality made him a favourite with his fellows, in spite of a certain reserve. His literary taste was conventional, including the standard British writers, with a preference for Shakespeare among the poets, Berkeley among the philosophers, and Montaigne (in Cotton's translation) among the essayists. His particular admiration among the college professors was the stately rhetorician, Edward Everett; and this predilection had much to do with his early ambition to be a professor of rhetoric and elocution.

Immediately after graduation he became an assistant in his brother William's school for young ladies in Boston, and continued teaching, with much inward reluctance and discomfort, for three years. The routine was distasteful; he despised the superficial details which claimed so much of his time. The bonds of conventionalism were silently dissolving in the rising glow of his poetic nature. Independence, sincerity, reality, grew more and more necessary to him. His aunt urged him to seek retirement, self-reliance, friendship with nature; to be no longer "the nursling of surrounding circumstances," but to prepare a celestial abode for the muse. The passion for spiritual leadership stirred within him. The ministry seemed to offer the fairest field for its satisfaction. In 1825 he entered the divinity school at Cambridge, to prepare himself for the Unitarian pulpit. His course was much interrupted by ill-health. His studies were irregular, and far more philosophical and literary than theological.

In October 1826 he was "approbated to preach" by the Middlesex Association of Ministers. The same year a threatened consumption compelled him to take a long journey in the south. Returning in 1827, he continued his studies, preached as a candidate in various churches, and improved in health. In 1829 he married a beautiful but delicate young woman, Miss Ellen Tucker of Concord, and was installed as associate minister of the Second Church (Unitarian) in Boston. The retirement of his senior colleague soon left him the sole pastor. Emerson's early sermons were simple, direct, unconventional. He dealt freely with the things of the spirit. There was a homely elevation in his discourses, a natural freshness in his piety, a quiet enthusiasm in his manner, that charmed thoughtful hearers. Early in 1832 he lost his wife, a sorrow that deeply depressed him in health and spirits. Following his passion for independence and sincerity, he arrived at the conviction that the Lord's Supper was not intended by Christ to be a permanent sacrament. To him, at least, it had become an outgrown form. He was willing to continue the service only if the use of the elements should be dropped and the rite made simply an act of spiritual remembrance. Setting forth these views, candidly and calmly, in a sermon, he found his congregation, not unnaturally, reluctant to agree with him, and therefore retired, not without some disappointment, from the pastoral office. He never again took charge of a parish; but he continued to preach, as opportunity offered, until 1847. In fact, he was always a preacher, though of a singular order. His supreme task was to befriend and guide the inner life of man.

The strongest influences in his development about this time were the liberating philosophy of Coleridge, the mystical visions of Swedenborg, the intimate poetry of Wordsworth, and the stimulating essays of Carlyle. On Christmas Day 1832 he took passage in a sailing vessel for the Mediterranean. He travelled through Italy, visited Paris, spent two months in Scotland and England, and saw the four men whom he most desired to see—Landor, Coleridge, Carlyle and Wordsworth. "The comfort of meeting such men of genius as these," he wrote, "is that they talk sincerely." But he adds that he found all four of them, in different degrees, deficient in insight into religious truth. His visit to Carlyle, in the lonely farm-house at Craigenputtock, was the memorable beginning of a lifelong friendship. Emerson published Carlyle's first books in America. Carlyle introduced Emerson's Essays into England. The two men were bound together by a mutual respect deeper than a sympathy of tastes, and a community of spirit stronger than a similarity of opinions. Emerson was a sweet-tempered Carlyle, living in the sunshine. Carlyle was a militant Emerson, moving amid thunderclouds. The things that each most admired in the other were self-reliance, directness, moral courage. A passage in Emerson's Diary, written on his homeward voyage, strikes the keynote of his remaining life. "A man contains all that is needful to his government within himself. . . . All real good or evil that can befall him must be from himself. . . . There is a correspondence between the human soul and everything that exists in the world; more properly, everything that is known to man. Instead of studying things without, the principles of them all may be penetrated into within him. . . . The purpose of life seems to be to acquaint man with himself. . . . The highest revelation is that God is in every man." Here is the essence of that intuitional philosophy, commonly called Transcendentalism. Emerson disclaimed allegiance to that philosophy. He called it "the saturnalia, or excess of faith." His practical common sense recoiled from the amazing conclusions which were drawn from it by many of its more eccentric advocates. His independence revolted against being bound to any scheme or system of doctrine, however nebulous. He said: "I wish to say what I feel and think to-day, with the proviso that to-morrow perhaps I shall contradict it all." But this very wish commits him to the doctrine of the inner light. All through his life he navigated the Transcendental sea, piloted by a clear moral sense, warned off the rocks by the saving grace of humour, and kept from capsizing by a good ballast of New England prudence.

After his return from England in 1833 he went to live with his mother at the old manse in Concord, Mass., and began his career as a lecturer in Boston. His first discourses were delivered before the Society of Natural History and the Mechanics' Institute. They were chiefly on scientific subjects, approached in a poetic spirit. In the autumn of 1835 he married Miss Lydia Jackson of Plymouth, having previously purchased a spacious old house and garden at Concord. There he spent the remainder of his life, a devoted husband, a wise and tender father, a careful householder, a virtuous villager, a friendly neighbour, and, spite of all his disclaimers, the central and luminous figure among the

Transcendentalists. The doctrine which in others seemed to produce all sorts of extravagances—communistic experiments at Brook Farm and Fruitlands, weird schemes of political reform, long hair on men and short hair on women—in his sane, well-balanced nature served only to lend an ideal charm to the familiar outline of a plain, orderly New England life. Some mild departures from established routine he tranquilly tested and as tranquilly abandoned. He tried vegetarianism for a while, but gave it up when he found that it did him no particular good. An attempt to illustrate household equality by having the servants sit at table with the rest of the family was frustrated by the dislike of his two sensible domestics for such an inconvenient arrangement. His theory that manual labour should form part of the scholar's life was checked by the personal discovery that hard labour in the fields meant poor work in the study. "The writer shall not dig," was his practical conclusion. Intellectual independence was what he chiefly desired; and this, he found, could be attained in a manner of living not outwardly different from that of the average college professor or country minister. And yet it was to this property-holding, debt-paying, law-abiding, well-dressed, courteous-mannered citizen of Concord that the ardent and enthusiastic turned as the prophet of the new idealism. The influence of other Transcendental teachers, Dr Hedge, Dr Ripley, Bronson Alcott, Orestes Brownson, Theodore Parker, Margaret Fuller, Henry Thoreau, Jones Very, was narrow and parochial compared with that of Emerson. Something in his imperturbable, kindly presence, his angelic look, his musical voice, his commanding style of thought and speech, announced him as the possessor of the great secret which many were seeking—the secret of a freer, deeper, more harmonious life. More and more, as his fame spread, those who "would live in the spirit" came to listen to the voice, and to sit at the feet, of the Sage of Concord.

It was on the lecture-platform that he found his power and won his fame. The courses of lectures that he delivered at the Masonic Temple in Boston, during the winters of 1835 and 1836, on "Great Men," "English Literature," and "The Philosophy of History," were well attended and admired. They were followed by two discourses which commanded for him immediate recognition, part friendly and part hostile, as a new and potent personality. His Phi Beta Kappa oration at Harvard College in August 1837, on "The American Scholar," was an eloquent appeal for independence, sincerity, realism, in the intellectual life of America. His address before the graduating class of the divinity school at Cambridge, in 1838, was an impassioned protest against what he called "the defects of historical Christianity" (its undue reliance upon the personal authority of Jesus, and its failure to explore the moral nature of man as the fountain of established teaching), and a daring plea for absolute self-reliance and a new inspiration of religion. "In the soul," he said, "let redemption be sought. Wherever a man comes, there comes revolution. The old is for slaves. Go alone. Refuse the good models, even those which are sacred in the imagination of men. Cast conformity behind you, and acquaint men at first hand with Deity." In this address Emerson laid his hand on the sensitive point of Unitarianism, which rejected the divinity of Jesus, but held fast to his supreme authority. A blaze of controversy sprang up at once. Conservatives attacked him; Radicals defended him. Emerson made no reply. But amid this somewhat fierce illumination he went forward steadily as a public lecturer. It was not his negations that made him popular; it was the eloquence with which he presented the positive side of his doctrine. Whatever the titles of his discourses, "Literary Ethics," "Man the Reformer," "The Present Age," "The Method of Nature," "Representative Men," "The Conduct of Life," their theme was always the same, namely, "the infinitude of the private man." Those who thought him astray on the subject of religion listened to him with delight when he poetized the commonplaces of art, politics, literature or the household. His utterance was Delphic, inspirational. There was magic in his elocution. The simplicity and symmetry of his sentences, the modulations of his thrilling voice, the radiance of his fine face, even his slight hesitations and pauses over his manuscript, lent a strange charm to his speech. For more than a generation he went about the country lecturing in cities, towns and villages, before learned societies, rustic lyceums and colleges; and there was no man on the platform in America who excelled him in distinction, in authority, or in stimulating eloquence.

In 1847 Emerson visited Great Britain for the second time, was welcomed by Carlyle, lectured to appreciative audiences in Manchester, Liverpool, Edinburgh and London, made many new friends among the best English people, paid a brief visit to Paris, and returned home in July 1848. "I leave England," he wrote, "with increased respect for the Englishman. His stuff or substance seems to be the best in the world. I forgive him all his pride. My respect is the more generous that I have no sympathy with him, only an admiration." The impressions of this journey were embodied in a book called *English Traits*, published in 1856. It might be called "English Traits and American Confessions," for nowhere does Emerson's Americanism come out more strongly. But the America that he loved and admired was the ideal, the potential America. For the actual conditions of social and political life in his own time he had a fine scorn. He was an intellectual Brahmin. His principles were democratic, his tastes aristocratic. He did not like crowds, streets, hotels—"the people who fill them oppress me with their excessive civility." Humanity was his hero. He loved man, but he was not fond of men. He had grave doubts about universal suffrage. He took a sincere interest in social and political reform, but towards specific "reforms" his attitude was somewhat remote and visionary. On the subject of temperance he held aloof from the intemperate methods of the violent prohibitionists. He was a believer in woman's rights, but he was lukewarm towards conventions in favour of woman suffrage. Even in regard to slavery he had serious hesitations about the ways of the abolitionists, and for a long time refused to be identified with them. But as the irrepressible conflict drew to a head Emerson's hesitation vanished. He said in 1856, "I think we must get rid of slavery, or we must get rid of freedom." With the outbreak of the Civil War he became an ardent and powerful advocate of the cause of the Union. James Russell Lowell said, "To him more than to all other causes did the young martyrs of our Civil War owe the sustaining strength of thoughtful heroism that is so touching in every record of their lives."

Emerson the essayist was a condensation of Emerson the lecturer. His prose works, with the exception of the slender volume entitled *Nature* (1836), were collected and arranged from the manuscripts of his lectures. His method of writing was characteristic. He planted a subject in his mind, and waited for thoughts and illustrations to come to it, as birds or insects to a plant or flower. When an idea appeared, he followed it, "as a boy might hunt a butterfly"; when it was captured he pinned it in his "Thought-book." The writings of other men he used more for stimulus than for guidance. He said that books were for the scholar's idle times. "I value them," he said, "to make my top spin." His favourite reading was poetry and mystical philosophy: Shakespeare, Dante, George Herbert, Goethe, Berkeley, Coleridge, Swedenborg, Jakob Boehme, Plato, the new Platonists, and the religious books of the East (in translation). Next to these he valued books of biography and anecdote: Plutarch, Grimm, St Simon, Varnhagen von Ense. He had some odd dislikes, and could find nothing in Aristophanes, Cervantes, Shelley, Scott, Miss Austen, Dickens. Novels he seldom read. He was a follower of none, an original borrower from all. His illustrations were drawn from near and far. The zodiac of Denderah; the Savoyards who carved their pine-forests into toys; the naked Derar, horsed on an idea, charging a troop of Roman cavalry; the long, austere Pythagorean lustrum of silence; Napoleon on the deck of the "Bellerophon," observing the drill of the English soldiers; the Egyptian doctrine that every man has two pairs of eyes; Empedocles and his shoe; the horizontal stratification of the earth; a soft mushroom pushing its way through the hard ground,—all these allusions and a thousand more are found in the same volume. On his pages, close beside the Parthenon, the Sphinx, St Paul's, Etna and Vesuvius, you will find the White Mountains, Monadnock, Agiocochook, Katahdin, the pickerel-weed in bloom, the wild geese honking through the sky, the chick-a-dee braving the snow, Wall Street and State Street, cotton-mills, railroads and Quincy granite. For an abstract thinker he was strangely in love with the concrete facts of life. Idealism in him assumed the form of a vivid illumination of the real. From the pages of his teeming note-books he took the material for his lectures, arranging and rearranging it under such titles as Nature, School, Home, Genius, Beauty and Manners, Self-Possession, Duty, The Superlative, Truth, The Anglo-Saxon, The Young American. When the lectures had served their purpose he rearranged the material in essays and published them. Thus appeared in succession the following volumes: *Essays* (First Series) (1841); *Essays* (Second Series) (1844); *Representative Men* (1850); *English Traits* (1856); *The Conduct of Life* (1860); *Society and Solitude* (1870); *Letters and Social Aims* (1876). Besides these, many other lectures were printed in separate form and in various combinations.

Emerson's style is brilliant, epigrammatic, gem-like; clear in sentences, obscure in paragraphs. He was a sporadic observer. He saw by flashes. He said, "I do not know what arguments mean in reference to any expression of a thought." The coherence of his writing lies in his personality. His work is fused by a steady glow of optimism. Yet he states this optimism moderately. "The genius which preserves and guides the human race indicates itself by a small excess of good, a small balance in brute facts always favourable to the side of reason."

His verse, though in form inferior to his prose, was perhaps a truer expression of his genius. He said, "I am born a poet"; and again, writing to Carlyle, he called himself "half a bard." He had "the vision," but not "the faculty divine" which translates the vision into music. In his two volumes of verse (*Poems*, 1846; *May Day and other Pieces*, 1867) there are many passages of beautiful insight and profound feeling, some lines of surprising splendour, and a few poems, like "The Rhodora," "The Snow-storm," "Ode to Beauty," "Terminus," "The Concord Ode," and the marvellous "Threnody" on the death of his first-born boy, of beauty unmarred and penetrating truth. But the total value of his poetical work is discounted by the imperfection of metrical form, the presence of incongruous images, the predominance of the intellectual over the emotional element, and the lack of flow. It is the material of poetry not thoroughly worked out. But the genius from which it came—the swift faculty of perception, the lofty imagination, the idealizing spirit enamoured of reality—was the secret source of all Emerson's greatness as a speaker and as a writer. Whatever verdict time may pass upon the bulk of his poetry, Emerson himself must be recognized as an original and true poet of a high order.

His latter years were passed in peaceful honour at Concord. In 1866 Harvard College conferred upon him the degree of LL.D., and in 1867 he was elected an overseer. In 1870 he delivered a course of lectures before the university on "The Natural History of the Intellect." In 1872 his house was burned down, and was rebuilt by popular subscription. In the same year he went on his third foreign journey, going as far as Egypt. About this time began a failure in his powers, especially in his memory. But his character remained serene and unshaken in dignity. Steadily, tranquilly, cheerfully, he finished the voyage of life.

> "I trim myself to the storm of time,
> I man the rudder, reef the sail,
> Obey the voice at eve obeyed at prime:
> 'Lowly faithful, banish fear,
> Right onward drive unharmed;
> The port, well worth the cruise, is near,
> And every wave is charmed.'"

Emerson died on the 27th of April 1882, and his body was laid to rest in the peaceful cemetery of Sleepy Hollow, in a grove on the edge of the village of Concord.

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EMERSON, WILLIAM (1701–1782), English mathematician, was born on the 14th of May 1701 at Hurworth, near Darlington, where his father, Dudley Emerson, also a mathematician, taught a school. Unsuccessful as a teacher he devoted himself entirely to studious retirement, and published many works which are singularly free from errata. In mechanics he never advanced a proposition which he had not previously tested in practice, nor published an invention without first proving its effects by a model. He was skilled in the science of music, the theory of sounds, and the ancient and modern scales; but he never attained any excellence as a performer. He died on the 20th of May 1782 at his native village. Emerson was eccentric and indeed clownish, but he possessed remarkable independence of character and intellectual energy. The boldness with which he expressed his opinions on religious subjects led to his being charged with scepticism, but for this there was no foundation.

Emerson's works include *The Doctrine of Fluxions* (1748); *The Projection of the Sphere, Orthographic, Stereographic and Gnomical* (1749); *The Elements of Trigonometry* (1749); *The Principles of Mechanics* (1754); *A Treatise of Navigation* (1755); *A Treatise of Algebra*, in two books (1765); *The Arithmetic of Infinites, and the Differential Method, illustrated by Examples* (1767); *Mechanics, or the Doctrine of Motion* (1769); *The Elements of Optics*, in four books (1768); *A System of Astronomy* (1769); *The Laws of Centripetal and Centrifugal Force* (1769); *The Mathematical Principles of Geography* (1770); *Tracts* (1770); *Cyclomathesis, or an Easy Introduction to the several branches of the Mathematics* (1770), in ten vols.; *A Short Comment on Sir Isaac Newton's Principia*; to which is added, *A Defence of Sir Isaac against the objections that have been made to several parts of his works* (1770); *A Miscellaneous Treatise containing several Mathematical Subjects* (1776).

EMERY (Ger. *Smirgel*), an impure variety of corundum, much used as an abrasive agent. It was known to the Greeks under the name of *σμύρις* or *σμίρις*, which is defined by Dioscorides as a stone used in gem-engraving. The Hebrew word *shamir* (related to the Egyptian *asmir*), where translated in our versions of the Old Testament "adamant" and "diamond," probably signified the emery-stone or corundum.

Emery occurs as a granular or massive, dark-coloured, dense substance, having much the appearance of an iron-ore. Its specific gravity varies with its composition from 3·7 to 4·3. Under the microscope, it is seen to be a mechanical aggregate of corundum, usually in grains or minute crystals of a bluish colour, with magnetite, which also is granular and crystalline. Other iron oxides, like haematite and limonite, may be present as alteration-products of the magnetite. Some of the alumina and iron oxide may occasionally be chemically combined, so as to form an iron spinel, or hercynite. In addition to these minerals emery sometimes contains quartz, mica, tourmaline, cassiterite, &c. Indeed emery may be regarded as a rock rather than a definite mineral species.

The hardness of emery is about 8, whereas that of pure corundum is 9. The "abrasive power," or "effective hardness," of emery is by no means proportional to the amount of alumina which it contains, but seems rather to depend on its physical condition. Thus, taking the effective hardness of sapphire as 100, Dr J. Lawrence Smith found that the emery of Samos with 70·10% of alumina had a corresponding hardness of 56; that of Naxos, with 68·53 of Al_2O_3, a hardness of 46; and that of Gumach with 77·82 of Al_2O_3, a hardness of 47.

Emery has been worked from a very remote period in the Isle of Naxos, one of the Cyclades, whence the stone was called *naxium* by Pliny and other Roman writers. The mineral occurs as loose blocks and as lenticular masses or irregular beds in granular limestone, associated with crystalline schists. The Naxos emery has been described by Professor G. Tschermak. From a chemical analysis of a sample it has been calculated that the emery contained 52·4% of corundum, 32·1 of magnetite, 11·5 of tourmaline, 2 of muscovite and 2 of margarite.

Important deposits of corundum were discovered in Asia Minor by J. Lawrence Smith, when investigating Turkish mineral resources about 1847. The chief sources of emery there are Gumach Dagh, a mountain about 12 m. E. of Ephesus; Kula, near Ala-shehr; and the mines in the hills between Thyra and Cosbonnar, south of Smyrna. The occurrence is similar to that in Naxos. The emery is found as detached blocks in a reddish soil, and as rounded masses embedded in a crystalline limestone associated with mica-schist, gneiss and granite. The proportion of corundum in this emery is said to vary from 37 to 57%. Emery is worked at several localities in the United States, especially near Chester, in Hampden county, Mass., where it is associated with peridotites. The corundum and magnetite are regarded by Dr J. H. Pratt as basic segregations from an igneous magma. The deposits were discovered by H. S. Lucas in 1864.

The hardness and toughness of emery render it difficult to work, but it may be extracted from the rock by blasting in holes bored with diamond drills. In the East fire-setting is employed. The emery after being broken up is carefully picked by hand, and then ground or stamped, and separated into grades by wire sieves. The higher grades are prepared by washing and eleutriation, the finest being known as "flour of emery." A very fine emery dust is collected in the stamping room, where it is deposited after floating in the air. The fine powder is used by lapidaries and plate-glass manufacturers. Emery-wheels are made by consolidating the powdered mineral with an agglutinating medium like shellac or silicate of soda or vulcanized india-rubber. Such wheels are not only used by dentists and lapidaries but are employed on a large scale in mechanical workshops for grinding, shaping and polishing steel. Emery-sticks, emery-cloth and emery-paper are made by coating the several materials with powdered emery mixed with glue, or other adhesive media. (See CORUNDUM.) (F. W. R.*)

EMETICS (from Gr. ἐμετικός, causing vomit), the term given to substances which are administered for the purpose of producing vomiting. It is customary to divide emetics into two classes, those which produce their effect by acting on the vomiting centre in the medulla, and those which act directly on the stomach itself. There is considerable confusion in the nomenclature of these two divisions, but all are agreed in calling the former class central emetics, and the latter gastric. The gastric emetics in common use are alum, ammonium carbonate, zinc sulphate, sodium chloride (common salt), mustard and warm water. Copper sulphate has been purposely omitted from this list, since unless it produces vomiting very shortly after administration, being itself a violent gastro-intestinal irritant, some other emetic must promptly be administered. The central emetics are apomorphine, tartar emetic, ipecacuanha, senega and squill. Of these tartar emetic and ipecacuanha come under both heads: when taken by the mouth they act as gastric emetics before absorption into the blood, and later produce a further and more vigorous effect by stimulation of the medullary centre. It must be remembered, however, that, valuable though these drugs are, their action is accompanied by so much depression, they should never be administered except under medical advice.

Emetics have two main uses: that of emptying the stomach, especially in cases of poisoning, and that of expelling the contents of the air passages, more especially in children before they have learnt or have the strength to expectorate. Where a physician is in attendance, the first of these uses is nearly always replaced by lavage of the stomach, whereby any subsequent depression is avoided. Emetics still have their place, however, in the treatment of bronchitis, laryngitis and diphtheria in children, as they aid in the expulsion of the morbid products. Occasionally also they are administered when a foreign body has got into the larynx. Their use is contra-indicated in the case of anyone suffering from aneurism, hernia or arterio-sclerosis, or where there is any tendency to haemorrhage.

EMEU, evidently from the Port. *Ema*,[1] a name which has in turn been applied to each of the earlier-known forms of Ratite birds, but has finally settled upon that which inhabits Australia, though, up to the close of the 18th century, it was given by most authors to the bird now commonly called cassowary—this last word being a corrupted form of the Malayan *Suwari* (see Crawfurd, *Gramm. and Dict. Malay Language*, ii. pp. 178 and 25), apparently first printed as *Casoaris* by Bontius in 1658 (*Hist. nat. et med. Ind. Orient.* p. 71).

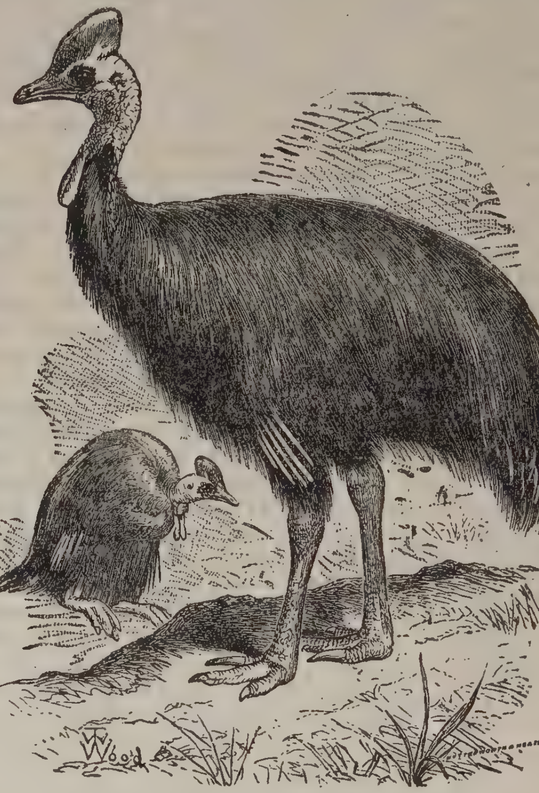

FIG. 1.—Ceram Cassowary.[2]

The cassowaries (*Casuariidae*) and emeus (*Dromaeidae*)—as the latter name is now used—have much structural resemblance, and form the order *Megistanes*,[3] which is peculiar to the Australian Region. Huxley showed (*Proc. Zool. Soc.*, 1867, pp. 422, 423, that they agree in differing from the other *Ratitae* in many important characters; one of the most obvious of them is that each contour-feather appears to be double, its *hyporachis*, or aftershaft, being as long as the main shaft—a feature noticed in the case of either form so soon as examples were brought to Europe. The external distinctions of the two families are, however, equally plain. The cassowaries, when adult, bear a horny helmet on their head; they have some part of the neck bare, generally more or less ornamented with caruncles, and the claw of the inner toe is remarkably elongated. The emeus have no helmet, their head is feathered, their neck has no caruncles, and their inner toes bear a claw of no singular character.

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[1] By Moraes (1796) and Sousa (1830) the word is said to be from the Arabic *Na'āma* or *Na'ēma*, an ostrich (*Struthio camelus*); but no additional evidence in support of the assertion is given by Dozy in 1869 (*Glossaire des mots espagnols et portugais dérivés de l'arabe*, 2nd ed., p. 260). According to Gesner in 1555 (lib. iii. p. 709), it was the Portuguese name of the crane (*Grus communis*), and had been transferred with the qualifying addition of "*di Gei*" (*i.e.* ground-crane) to the ostrich. This statement is confirmed by Aldrovandus (lib. ix. cap. 2). Subsequently, but in what order can scarcely now be determined, the name was naturally enough used for the ostrich-like birds inhabiting the lands discovered by the Portuguese, both in the Old and in the New World. The last of these are now known as rheas, and the preceding as cassowaries.

[2] The figures are taken, by permission, from Messrs Mosenthal and Harting's *Ostriches and Ostrich Farming* (Trübner & Co., 1877).

[3] *Ann. and Mag. Nat. Hist.* ser. 4, xx. p. 500.

The type of the *Casuariidae* is the species named by Linnaeus *Struthio casuarius* and by John Latham *Casuarius emeu*. Vieillot subsequently called it *C. galeatus*, and his epithet has been very commonly adopted by writers, to the exclusion of the older specific appellation. It seems to be peculiar to the island of Ceram, and was made known to naturalists, as we learn from Clusius, in 1597, by the first Dutch expedition to the East Indies, when an example was brought from Banda, whither it had doubtless been conveyed from its native island. It was said to have been called by the inhabitants "Emeu," or "Ema," but this name they must have had from the earlier Portuguese navigators.[1] Since that time examples have been continually imported into Europe, so that it has become one of the best-known members of the subclass *Ratitae*. For a long time its glossy, but coarse and hair-like, black plumage, its lofty helmet, the gaudily-coloured caruncles of its neck, and the four or five barbless quills which represent its wing-feathers, made it appear unique among birds. But in 1857 Dr George Bennett certified the existence of a second and perfectly distinct species of cassowary, an inhabitant of New Britain, where it was known to the natives as the *Mooruk*, and in his honour it was named by John Gould *C. bennetti*. Several examples were soon after received in England, and these confirmed the view of it already taken. A considerable number of other species of the genus have since been described from various localities in the same subregion. Conspicuous among them from its large size and lofty helmet is the *C. australis*, from the northern parts of Australia. Its existence indeed had been ascertained, by T. S. Wall, in 1854, but the specimen obtained by that unfortunate explorer was lost, and it was not until 1867 that an example was submitted to competent naturalists.

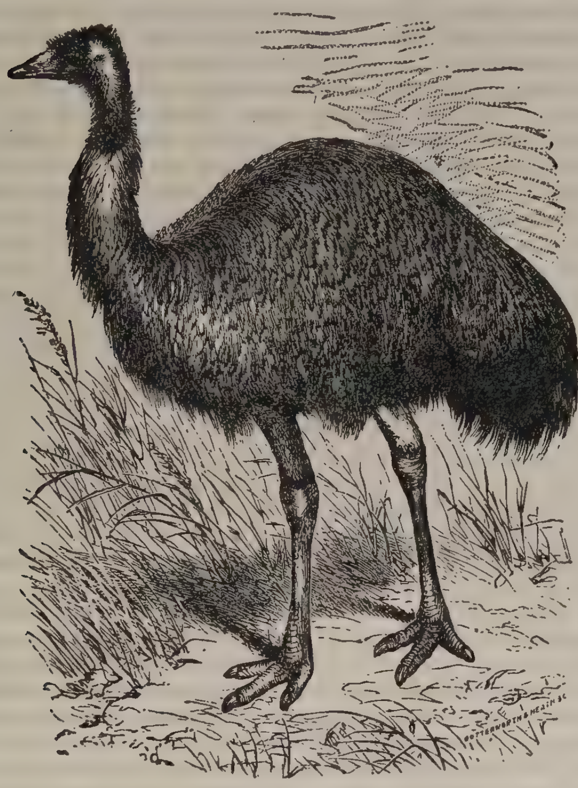

FIG. 2.—Emeu.

Not much seems to be known of the habits of any of the cassowaries in a state of nature. Though the old species occurs rather plentifully over the whole of the interior of Ceram, A. R. Wallace was unable to obtain or even to see an example. They all appear to bear captivity well, and the hens in confinement frequently lay their dark-green and rough-shelled eggs, which, according to the custom of the *Ratitae*, are incubated by the cocks. The nestling plumage is mottled (*Proc. Zool. Soc.*, 1863, pl. xlii.), and when about half-grown they are clothed in dishevelled feathers of a deep tawny colour.

Of the emeus (as the word is now restricted) the best known is the *Casuarius novae-hollandiae* of John Latham, made by Vieillot the type of his genus *Dromaeus*,[2] whence the name of the family (*Dromaeidae*) is taken. This bird immediately after the colonization of New South Wales (in 1788) was found to inhabit the south-eastern portion of Australia, where, according to John Hunter (*Hist. Journ.*, &c., pp. 409, 413), the natives call it *Maracry*, *Marryang* or *Maroang*; but it has now been so hunted down that not an example remains at large in the districts that have been fully settled. It is said to have existed also on the islands of Bass Straits and in Tasmania, but it has been exterminated in both, without, so far as is known, any ornithologist having had the opportunity of determining whether the race inhabiting those localities was specifically identical with that of the mainland or distinct. Next to the ostrich the largest of existing birds, the common emeu is an inhabitant of the more open country, feeding on fruits, roots and herbage, and generally keeping in small companies. The nest is a shallow pit scraped in the ground, and from nine to thirteen eggs, in colour varying from a bluish-green to a dark bottle-green, are laid therein. These are hatched by the cock-bird, the period of incubation lasting from 70 to 80 days. The young at birth are striped longitudinally with dark markings on a light ground. A remarkable structure in *Dromaeus* is a singular opening in the front of the windpipe, communicating with a tracheal pouch. This has attracted the attention of several anatomists, and has been well described by Dr Murie (*Proc. Zool. Soc.*, 1867, pp. 405-415). Various conjectures have been made as to its function, the most probable of which seems to be that it is an organ of sound in the breeding-season, at which time the hen-bird has long been known to utter a remarkably loud booming note. Due convenience being afforded to it, the emeu thrives well, and readily propagates its kind in Europe. Like other Ratite birds it will take to the water, and examples have been seen voluntarily swimming a wide river. (A. N.)

EMIGRATION (from Lat. *emigrare*; *e*, *ex*, out of, and *migrare*, to depart), the movement of population out of one country into another (see MIGRATION).

EMILIA, a territorial division (*compartimento*) of Italy, bounded by Venetia and Lombardy on the N., Liguria on the W., Tuscany on the S., the Marches on the S.E., and the Adriatic Sea on the E. It has an area of 7967 sq. m., and a population of 2,477,690 (1901), embracing eight provinces, as follows:—(1) Bologna (pop. 529,612; 61 communes); (2) Ferrara (270,558; 16 communes); (3) Forli (283,996; 41 communes); (4) Modena (323,598; 45 communes); (5) Parma (303, 694; 50 communes); (6) Piacenza (250,491; 47 communes); (7) Ravenna (234,656; 18 communes); (8) Reggio nell' Emilia (281,085; 43 communes). In these provinces the chief towns, with communal populations, are as follows:—

(1) Bologna (147,898), Imola (33,144), Budrio (17,077), S. Giovanni in Persiceto (15,978), Castelfranco (13,484), Castel

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[1] It is known that the Portuguese preceded the Dutch in their voyages to the East, and it is almost certain that the latter were assisted by pilots of the former nation, whose names for places and various natural objects would be imparted to their employers (see DODO).

[2] The obvious misprint of *Dromeicus* in this author's work (*Analyse*, &c., p. 54) was foolishly followed by many naturalists, forgetful that he corrected it a few pages farther on (p. 70) to *Dromaius*—the properly latinized form of which is *Dromaeus*.

S. Pietro (13,426), Medicina (12,575), Molinella (12,081), Crevalcore (11,408).

(2) Ferrara (86,675), Copparo (39,222), Argenta (20,474), Portomaggiore (20,141), Cento (19,078), Bondeno (15,682), Comacchio (10,745).

(3) Forlì (43,321), Rimini (43,595), Cesena (42,509).

(4) Modena (63,012), Carpi (22,876), Mirandola (13,721), Finale nell' Emilia (12,896), Pavullo nel Frignano (12,034).

(5) Parma (48,523), Borgo S. Donnino (12,019).

(6) Piacenza (35,647).

(7) Ravenna (63,364), Faenza (39,757), Lugo (27,244), Bagnacavallo (15,176), Brisighella (13,815), Alfonsine (10,369).

(8) Reggio nell' Emilia (58,993), Correggio (14,445), Guastalla (11,091).

The northern portion of Emilia is entirely formed by a great plain stretching from the Via Aemilia to the Po; its highest point is not more than 200 ft. above sea-level, while along the E. coast are the lagoons at the mouth of the Po and those called the Valli di Comacchio to the S. of them, and to the S. again the plain round Ravenna (10 ft.), which continues as far as Rimini, where the mountains come down to the coast.

Immediately to the S.E. of the Via Aemilia the mountains begin to rise, culminating in the central chain of the Ligurian and Tuscan Apennines. The boundary of Emilia follows the highest summits of the chain in the provinces of Parma, Reggio and Modena, passing over the Monte Bue (5915 ft.) and the Monte Cimone (7103 ft.), while in the provinces of Bologna and Forlì it keeps somewhat lower along the N.E. slopes of the chain. With the exception of the Po, the main rivers of Emilia descend from this portion of the Apennines, the majority of them being tributaries of the Po; the Trebbia (which rises in the province of Genoa), Taro, Secchia and Panaro are the most important. Even the Reno, Ronco and Montone, which now flow directly into the Adriatic, were, in Roman times, tributaries of the Po, and the Savio and Rubicone seem to be the only streams of any importance from these slopes of the Tuscan Apennines which ran directly into the sea in Roman times (see APENNINES).

Railway communication in the plain of Emilia is unattended by engineering difficulties (except for the bridging of rivers) and is mainly afforded by the line from Piacenza to Rimini. This, as far as Bologna, forms part of the main route from Milan to Florence and Rome, while beyond Rimini it follows the S.E. coast of Italy past Ancona as far as Brindisi and Lecce. The description follows this main line in a S.E. direction. Piacenza, being immediately S. of a bridge over the Po, is an important centre; a line runs to the W. to Voghera, through which it communicates with the lines of W. Lombardy and Piedmont, and immediately N. of the Po a line goes off to Cremona. A new bridge over the Po carries a direct line from Cremona to Borgo S. Donnino. From Parma starts a main line, followed by expresses from Milan to Rome, which crosses the Apennines to Spezia (and Sarzana, for Pisa and Rome), tunnelling under the pass of La Cisa, while in a N. and N.E. direction lines run to Brescia and Suzzara. From Reggio branch lines run to Guastalla, Carpi and Sassuolo, there being also a line from Sassuolo to Modena. At Modena the main line to Verona through Suzzara and Mantua diverges to the N.; there is also a branch N.N.E. to Mirandola, and another S. to Vignola. Bologna is, however, the most important railway centre; besides the line S. to Pistoia and Florence over the Apennines and the line S.E. to Rimini, Ancona and Brindisi, there is the main line N.N.E. to Ferrara, Padua and Venice, and there are branches to Budrio and Portomaggiore to the N.E., and to S. Felice sul Panaro and Poggio Rusco to the N., which connect the main lines of the district.

At Castel Bolognese, 5 m. N.W. of Faenza, a branch goes off to Lugo, whence there are connexions with Budrio, Lavezzola (on the line between Ravenna and Ferrara) and Ravenna, and at Faenza a line, not traversed by express trains, goes across the Apennines to Florence. Rimini is connected by a direct line with Ravenna and Ferrara; and Ferrara, besides the main line S.S.W. to Bologna and N. by E. to Padua, has a branch to Poggio Rusco, which goes on to Suzzara, a station on the main line between Modena and Verona. There are also many steam tramways in the flatter part of the province, the fertility and agricultural activity of which are considerable. The main products of the plain are cereals, wine, and, in the marshy districts near the Po, rice; the system prevailing is that of the mezzadria—half the produce to the owner and half to the cultivator. The ancient Roman divisions of the fields are still preserved in some places. There are also considerable pastures, and cheese is produced, especially Parmesan. Flax, hemp and silk-worms are also cultivated, and a considerable quantity of poultry kept. The hill districts produce cereals, vines, olives and fruit; while on the mountains are considerable chestnut and other forests, and extensive summer pastures, the flocks going in part to the Maremma in summer, and in part to the pastures of the plain of the Emilia.

The name Emilia comes from the Via Aemilia (*q.v.*), the Roman road from Ariminum to Placentia, which traversed the entire district from S.E. to N.W., its line being closely followed by the modern railway. The name was transferred to the district (which formed the eighth Augustan region of Italy) as early as the time of Martial, in popular usage (*Epigr.* vi. 85. 5), and in the 2nd and 3rd centuries it is frequently named as a district under imperial judges (*iuridici*), generally in combination with Flaminia or Liguria and Tuscia. The district of Ravenna was, as a rule, from the 3rd to the 5th century, not treated as part of Aemilia, the chief town of the latter being Placentia. In the 4th century Aemilia and Liguria were joined to form a consular province; after that Aemilia stood alone, Ravenna being sometimes temporarily added to it. The boundaries of the ancient district correspond approximately with those of the modern.

In the Byzantine period Ravenna became the seat of an exarch; and after the Lombards had for two centuries attempted to subdue the Pentapolis (Ravenna, Bologna, Forlì, Faenza, Rimini), Pippin took these cities from Aistulf and gave them, with the March of Ancona, to the papacy in 755, to which, under the name of Romagna, they continued to belong. At first, however, the archbishop of Ravenna was in reality supreme. The other chief cities of Emilia—Ferrara, Modena, Reggio, Parma, Piacenza—were, on the other hand, independent, and in the period of the communal independence of the individual towns of Italy each of the chief cities of Emilia, whether belonging to Romagna or not, had a history of its own; and, notwithstanding the feuds of Guelphs and Ghibellines, prospered considerably. The study of Roman law, especially at Bologna, acquired great importance. The imperial influence kept the papal power in check. Nicholas III. obtained control of the Romagna in 1278, but the papal dominion almost fell during the Avignon period, and was only maintained by the efforts of Cardinal Albornoz, a Spaniard sent to Italy by Innocent VI. in 1353. Even so, however, the papal supremacy was little more than a name; and this state of things only ceased when Caesar Borgia, the natural son of Alexander VI., crushed most of the petty princes of Romagna, intending to found there a dynasty of his own; but on the death of Alexander VI. it was his successors in the papacy who carried on and profited by what Caesar Borgia had begun. The towns were thenceforth subject to the church and administered by cardinal legates. Ferrara and Comacchio remained under the house of Este until the death of Alphonso II. in 1597, when they were claimed by Pope Clement VIII. as vacant fiefs. Modena and Reggio, which had formed part of the Ferrara duchy, were thenceforth a separate duchy under a branch of the house of Este, which was descended from a natural son of Alphonso I. Carpi and Mirandola were small principalities, the former of which passed to the house of Este in 1525, in which year Charles V. expelled the Pio family, while the last of the Pico dynasty of Mirandola, Francesco Maria, having sided with the French in the war of Spanish Succession, was deprived of his duchy in 1709 by the emperor Joseph I., who sold it to the house of Este in 1710. Parma and Piacenza were at first under the Farnese, Pope Paul III. having placed his natural son Pier Luigi there in 1545, and then, after the extinction of the family in 1731, under a secondary branch of the Bourbons of Spain. In 1796–1814, Emilia was first incorporated in the Italian republic and then in the Napoleonic Italian kingdom; after 1815 there was a return to the *status quo ante*, Romagna returning to the papacy and its ecclesiastical government, the duchy of Parma being given to Marie Louise, wife of the deposed Napoleon, and Modena to the archduke Francis of Austria, the heir of the last Este. In Romagna and Modena the government was oppressive, arbitrary, corrupt and unprogressive, while in Parma things were better. In 1821 and 1831 there were unsuccessful attempts at revolt in Emilia, which were sternly and cruelly repressed; chronic discontent continued and the people joined again in the movement of 1848–1849, which was crushed by Austrian troops. In 1859 the struggle for independence was finally successful, Emilia passing to the Italian kingdom almost without resistance.

EMINENCE (Lat. *eminentia*), a title of honour now confined to the cardinals of the Church of Rome. It was originally given as a complimentary title to emperors, kings, and then to less conspicuous persons. The Roman empire of the 4th century adopted from the "vanity of the East the forms and ceremonies of ostentatious greatness." Gibbon includes in the "profusion of epithets" by which "the purity of the Latin language was debased," and which were lavished on "the principal officers of the empire," "your Sincerity, your Gravity, your Excellency, your Eminence, your sublime and wonderful Magnitude, your illustrious and magnificent Highness." From the *notitia dignitatum* it passed into the Latin of the middle ages as a flattering epithet, and was applied in the church and by the popes to the dignified clergy at large, and sometimes as a pure form of civility to churchmen of modest rank. On the 10th of June 1630, Urban VIII. confined the use of the titles *Eminentiae* and *Eminentissimi* to the cardinals, to imperial electors, and to the master of the Hospital of St John of Jerusalem (order of the Knights of Malta). Since the dissolution of the Holy Roman Empire, and the entire change, if not actual destruction, of the order of St John, the title "eminence" has become strictly confined to the cardinals. Before 1630 the members of the Sacred College were "Illustrissimi" and "Reverendissimi." It is, therefore, not correct to speak of a cardinal who lived before that time as "his Eminence."

See du Cange, *Glossarium mediae et infimae latinitatis* (Niort and London, 1884), s.v. "Eminentia."

EMINENT DOMAIN (Lat. *eminens*, rising high above surrounding objects; and *dominium*, domain), a term applied in law to the sovereign right of a state to appropriate private property to public uses, whether the owner consents or not. It is repeatedly employed by Grotius (*e.g. De jure belli*, bk. iii. c. 20, s. 7), Bynkershoek (*Quaest. jur. pub.* bk. 2, c. 15), and Puffendorf (*De jure naturae et gentium*, bk. i. c. 1, s. 19),—the two latter, however, preferring the word *imperium* to *dominium*; and by other Dutch jurists. But in modern times it is chiefly in the United States of America that the doctrine of eminent domain has received its application, and it is chiefly to American law that the following remarks refer (see also the article Compensation). Eminent domain is distinguishable alike from the *police power*, by which restrictions are imposed on private property in the public interest, *e.g.* in connexion with the liquor traffic or public health (see *re Haff* (1904), 197 U.S. 488); from the *power of taxation*, by which the owner of private property is compelled to contribute a portion of it for public purposes; and from the *war-power*, involving the destruction of private property in the course of military operations. The police power fetters rights of property; eminent domain takes them away. The power of taxation is analogous to eminent domain as regards the purposes to which the contribution of the taxpayer is to be applied. But, unlike eminent domain, it does not necessarily involve a taking of specific property for those purposes. The destruction of property in military operations—or in the discharge by Government of other duties in cases of necessity, *e.g.* in order to check the progress of a fire in a city—clearly cannot be said to be an exercise of the power of eminent domain. The question whether the element of compensation is necessarily involved in the idea of eminent domain has in modern times aroused much controversy. According to one school of thought (see Lewis, *Eminent Domain*, s. 10), this question must be answered in the negative. According to a second, whose view has the support of the civilians (see Randolph, *Eminent Domain*, s. 227; Mills, *Eminent Domain*, s. 1) compensation is an inherent attribute of the power. An intermediate view is advocated by Professor Thayer (*Cases on Constitutional Law*, vol. 1, 953), according to which eminent domain springs from the necessities of government, while the obligation to reimburse rests upon the natural right of individuals. The right to compensation is thus not a component part of the power to take, but arises at the same time and the latter cannot exist without it. The relation between the two is that of substance and shadow. The matter is not, however, of great practical importance, for the Federal Constitution prohibits the exercise of the power "without just compensation" (5th Amendment), while in most of the states the State constitution or other legislation has imposed upon it a similar limitation: and the tendency of modern judicial decisions is in favour of the view that the absence of such a limitation will make an enactment so far unconstitutional and invalid.

In order to justify the exercise of the power of eminent domain, the purposes to which the property taken is to be applied must be "public," *i.e.* primarily public, and not primarily of private interest and merely incidentally beneficial to the public (*Madisonville Traction Co.* v. *Mining Co.*, 1904, 196 U.S. 239). Subject to this definition, the term "public" receives a wide interpretation. All kinds of property may be taken; and the procedure indicated by the different legislatures must be followed. Any contravention of this rule would involve a breach of the 5th Amendment of the Federal Constitution, which provides that "no person . . . shall be . . . deprived of . . . property, without due process of law." It may be added that if the performance of a covenant is rendered impossible by an act of eminent domain the covenantor is excused.

In *English law*, the only exact analogue to the doctrine of eminent domain is to be found in the prerogative right of the crown to enter upon the lands of subjects or to interfere with their enjoyment for the defence of the realm (see *A. G.* v. *Tomline*; 1879; 12 Ch. D. 214). No attempt is made to exercise this prerogative, and lands are acquired for state purposes by statute usually framed on or incorporating the Lands Clauses Acts (see Compensation). The French *Code Civil* secures compensation to the owner of property in cases of *expropriation pour cause d'utilité publique* (art. 545), and there is similar provision in Belgium (Const. Law, art. II.), Holland (Fundamental Law, art. 147), Spain (Civil Code, art. 349, and Law of 3rd May, 1841), and most other European states. It has been held in France that the right to compensation does not arise under art. 545 of the Code Civil where only a *servitude d'utilité publique* is created on a private individual's land.

In addition to the authorities cited in the text, see Lewis, *Eminent Domain* (2nd ed., Chicago, 1900); Mills, *Eminent Domain* (2nd ed., St Louis, 1888); Randolph, *Eminent Domain in the United States* (Boston, 1894). (A. W. R.)

EMINESCU, MICHAIL (1849–1889), the greatest Rumanian poet of the 19th century, was born on the 20th of December in Ipateshti near Botoshani, in the north of Moldavia. He was of Turco-Tatar origin, and his surname was originally Emin; this was changed to Eminovich and finally to the Rumanian form Eminescu. He was educated for a time in Czernowitz, and then entered the civil service. In 1864 he resumed his studies in Transylvania, but soon joined a roving theatrical company where he played in turn the rôles of actor, prompter and stage-manager. After a few years he went to Vienna, Jena and Berlin, where he attended lectures, especially on philosophy. In 1874 he was appointed school inspector and librarian at the university of Jassy, but was soon turned out through the change of government, and took charge, as editor in chief, of the Conservative paper *Timpul* (Times). In 1883 he had the first attack of the insanity hereditary in his family, and in 1889 he died in a private institution in Bucharest. In 1870 his great poetical talent was revealed by two contributions to the *Convorbiri literare*, the organ of the Junimist party in Jassy; these were the poems "Venera şi Madona" and "Epigonii." Other poems followed and soon established his claim to be the first among the modern poets of his country. He was thoroughly acquainted with the chronicles of the past, had a complete mastery of the Rumanian language, and was a lover and admirer of Rumanian popular poetry. Influenced by these studies and by the philosophy of Schopenhauer, he introduced a new spirit into Rumanian poetry. Mystically inclined and himself of a melancholy disposition, he lived in the glory of the medieval Rumanian past; stifled by the artificiality of the world around him, he rebelled against the conventionality of society and his surroundings. In inimitable language he denounced the vileness of the present and painted in glowing pictures the heroism of the past; he also surprised nature in its primitive beauty, and he gave expression to stirring emotions in lyrics couched in the language and metre of popular poetry. He further proved himself an unsurpassed master in satire. Over all his poetry hangs a cloud of sadness, the sense of coming doom. Simplicity of language, masterly handling of rhyme and verse, deep thought and plastic expression made Eminescu the creator of a school of poetry which dominated the thought of Rumania and the expression of Rumanian writers and poets at the end of the 19th century and the beginning of the 20th.

Five editions of his collected poems appeared after 1890. Some of them were translated into German by "Carmen Sylva" and Mite Kremnitz, and others have also been translated into several other languages. Eminescu also wrote two short novels, real poems in prose (Jassy, 1890). (M. G.)

EMIN PASHA [Eduard Schnitzer] (1840–1892), German traveller, administrator and naturalist, was the son of Ludwig Schnitzer, a merchant of Oppeln in Silesia, and was born in Oppeln on the 28th of March 1840. He was educated at the universities of Breslau, Berlin and Königsberg, and took the degree of M.D. at Berlin. He displayed an early predilection for zoology and ornithology, and in later life became a skilled and enthusiastic collector, particularly of African plants and birds. When he was four-and-twenty he determined to seek his fortunes abroad, and made his way to Turkey, where, after practising medicine on his own account for a short time, he was appointed (in 1865) quarantine medical officer at Antivari. The duties of the post were not heavy, and allowed him leisure for a diligent study of Turkish, Arabic and Persian. From 1870 to 1874 he was in the service of the governor of northern Albania, had adopted a Turkish name (though not that by which he afterwards became so widely known), and was practically naturalized as a Turk.

After a visit home in 1875 he went to Cairo, and then to Khartum, in the hope of an opportunity for travelling in the interior of Africa. This came to him in the following year, when General Charles George Gordon, who had recently succeeded Sir Samuel Baker as governor of the equatorial provinces of Egypt, invited Schnitzer, who was now known as "Emin Effendi," to join him at Lado on the upper Nile. Although nominally Gordon's medical officer, Emin was soon entrusted with political missions of some importance to Uganda and Unyoro. In these he acquitted himself so well that when, in 1878, Gordon's successor at Lado was deprived of his office on account of malpractices (Gordon himself having been made governor-general of the Sudan), Emin was chosen to fill the post of governor of the Equatorial Province (*i.e.* the old equatorial provinces minus the Bahr-el-Ghazal) and given the title of "bey." He proved an energetic and enterprising governor; indeed, his enterprise on more than one occasion brought him into conflict with Gordon, who eventually decided to remove Emin to Suakin. Before the change could be effected, however, Gordon resigned his post in the Sudan, and his successor revoked the order.

The next three or four years were employed by Emin in various journeys through his province, and in the initiation of schemes for its development, until in 1882, on his return from a visit to Khartum, he became aware that the Mahdist rising, which had originated in Kordofan, was spreading southward. The effect of the rising was, of course, more markedly felt in Emin's province after the abandonment of the Sudan by the Egyptian government in 1884. He was obliged to give up several of his stations in face of the Mahdist advance, and ultimately to retire from Lado, which had been his capital, to Wadelai. This last step followed upon his receipt of a letter fom Nubar Pasha, informing him that it was impossible for the Egyptian government to send him help, and that he must stay in his province or retire towards the coast as best he could. Emin (who about this time was raised to the rank of pasha) had some thoughts of a retreat to Zanzibar, but decided to remain where he was and endeavour to hold his own. To this end he carried on protracted negotiations with neighbouring native potentates. When, in 1887, (Sir) H. M. Stanley's expedition was on its way to relieve him, it is clear from Emin's diary that he had no wish to leave his province, even if relieved. He had done good work there, and established a position which he believed himself able to maintain. He hoped, however, that the presence of Stanley's force, when it came, would strengthen his position; but the condition of the relieving party, when it arrived in April 1888, did not seem to Emin to promise this. Stanley's proposal to Emin, as stated in the latter's diary, was that Emin should either remain as governor-general on behalf of the king of the Belgians, or establish himself on Victoria Nyanza on behalf of a group of English merchants who wished to start an enterprise in Africa on the model of the East India Company. After much hesitation, and prompted by a growing disaffection amongst the natives (owing, as he maintained, to his loss of prestige after the arrival of Stanley's force), Emin decided to accompany Stanley to the coast, where the expedition arrived in December 1889. Unfortunately, on the evening of a reception dinner given in his honour, Emin met with an accident which resulted in fracture of the skull. Careful nursing gradually restored him to health, and on his convalescence he resolutely maintained his decision to remain in Africa, and, if possible, to work there in future on behalf of the German government. The seal was definitely set upon this decision by his formal engagement on behalf of his native country, early in 1890. Preparations for a new expedition into the interior were set on foot, and meanwhile Emin was honoured in various ways by learned societies in Germany and elsewhere.

The object of the new expedition was (to quote Emin's instructions) "to secure on behalf of Germany the territories situated south of and along Victoria Nyanza up to Albert Nyanza," and to "make known to the population there that they were placed under German supremacy and protection, and to break or undermine Arab influence as far as possible." The force, which was well equipped, started at the end of April 1890. But before it had penetrated far inland the political reasons for sending the expedition vanished with the signature, on the 1st of July 1890, of the Anglo-German agreement defining the spheres of influence of the two nations, an agreement which excluded the Albert Nyanza region from the German sphere. For a time things went well enough with the expedition; Emin occupied the important town of Tabora on the route from the coast to Tanganyika and established the post of Bukoba on Victoria Nyanza, but by degrees ill-fortune clouded its prospects. Difficulties on the route; dissensions between Emin and the authorities in German East Africa, and misunderstandings on the part of both; epidemics of disease in Emin's force, followed by a growing spirit of mutiny among his native followers; an illness of a painful nature which attacked him—all these gradually undermined Emin's courage, and his diaries at the close of 1891 reflect a gloomy and almost hopeless spirit. In May that year he had crossed into the Congo State by the south shore of Albert Edward Nyanza, and many months were spent on the borders of the great Congo Forest and in the Undusuma country south-west of Albert Nyanza, breaking ground new to Europeans.

In December 1891 he sent off his companion, Dr Stuhlmann, with the bulk of the caravan, on the way back to the east coast. Emin remained behind with the sick, and with a very reduced following left the lake district in March 1892 for the Congo river. On reaching Ipoto on the Ituri he came within the region of the Arab slave raiders and ivory hunters, in whose company he at times travelled. These gentry were incensed against Emin for the energetic way in which he had dealt with their comrades while in German territory, and against Europeans generally by the campaign for their suppression begun by the Congo State. At the instigation of one of these Arabs Emin was murdered on the 23rd or 24th of October 1892 at Kinena, a place about 80 m. E.S.E. of Stanley Falls.

See *Emin Pasha, his Life and Work*, by Georg Schweitzer, with introduction by R. W. Felkin (2 vols., London, 1898); *Emin Pasha in Central Africa* (London, 1888), a collection of Emin's papers contributed to scientific journals; and *Mit Emin Pascha ins Herz von Afrika* (Berlin, 1894), by Dr Franz Stuhlmann. Major G. Casati (1838–1902), an Italian officer who spent several years with Emin, and accompanied him and Stanley to the coast, narrated his experiences in *Dieci anni in Equatoria* (English edition, *Ten Years in Equatoria and the Return with Emin Pasha*, London, 1891).

EMLYN, THOMAS (1663–1741), English nonconformist divine, was born at Stamford, Lincolnshire. He served as chaplain to the presbyterian Letitia, countess of Donegal, and then to Sir Robert Rich, afterwards (1691) becoming colleague to Joseph Boyse, presbyterian minister in Dublin. From this office he was virtually dismissed on his own confession of unitarianism, and for publishing *An Humble Inquiry into the Scripture Account of Jesus Christ* (1702) was sentenced to a year's imprisonment and a fine of £1000. Thanks to the intervention of Boyse he was released in 1705 on payment of £90. He is said to have been the first English preacher definitely to describe himself as "unitarian," and writes in his diary, "I thank God that He did not call me to this lot of suffering till I had arrived at maturity of judgment and firmness of resolution, and that He did not desert me when my friends did. He never let me be so cast down as to renounce the truth or to waver in my faith." Of Christ he writes, "We may regard with fervent gratitude so great a benefactor, but our esteem and rational love must ascend higher and not rest till it centre in his God and ours." Emlyn preached a good deal in Paul's Alley, Barbican, in his later years, and died in London in 1741.

EMMANUEL, or IMMANUEL, a Hebrew symbolical proper name, meaning "God (is) with us." When in 734–733 B.C. Ahaz, king of Judah, alarmed at the preparations made against him by the Syro-Ephraimitish alliance, was inclined to seek aid from Tiglath-pileser of Assyria, the prophet Isaiah endeavoured to allay his fear by telling him that the danger would pass away, and as a sign from Yahweh that this should be so, any young woman who should within the year bear a son, might call his name Immanuel in token of the divine protection accorded to Judah. For before the infant should come to even the immature intelligence of childhood the lands of the foe would be laid waste (Isaiah vii. 14–16). For other interpretations, especially as regards the mother, see *Ency. Bib.* col. 2162-3, and the commentaries. In the post-exilic period the historical meaning of the passage was forgotten, and a new significance was given to it in accordance with the gradually developing eschatological doctrine. This new interpretation finds expression in Matt. i. 23, where the name is applied to Jesus as the Messiah. At the close of Isaiah viii. 8 for "of thy land, O Immanuel," we should probably read "of the land, for God is with us." The three passages quoted are the only instances where this word occurs in Scripture; it is frequent in hymns and devotional literature as a title of Jesus Christ.

EMMANUEL PHILIBERT (1528–1580), duke of Savoy, son of Charles III. and Beatrice of Portugal, one of the most renowned princes of the later Renaissance, was born on the 8th of July 1528. Charles, after trying in vain to remain neutral in the wars between France and the emperor Charles V., had been forced to side with the latter, whereupon his duchy was overrun with foreign soldiery and became the battlefield of the rival armies. Prince Emmanuel took service with the emperor in 1545 and distinguished himself in Germany, France and the Low Countries. On the death of his father in 1553 he succeeded to the title, little more than an empty one, and continued in the emperor's service. Having been refused the command of the imperial troops in Piedmont, he tried in vain to negotiate a separate peace with France; but in 1556 France and Spain concluded a five years' truce, by which each was to retain what it then occupied. This would have been the end of Savoy, but within a year the two powers were again at war. The chief events of the campaign were the successful resistance of Cuneo, held for the duke by Count Luserna, and the victory of St Quentin (1557), won by Emmanuel Philibert himself against the French. At last in 1558 the powers agreed to an armistice, and in 1559 the peace of Cateau-Cambrésis was made, by which Emmanuel regained his duchy, but on onerous terms, for France was to occupy several Piedmontese fortresses, including Turin and Pinerolo, for not more than three years, and a marriage was arranged between the duke and Margaret, duchess of Berry, sister of the French king; while Spain was to garrison Asti and Vercelli (afterwards exchanged for Santhià) until France evacuated the above-mentioned fortresses. The duke's marriage took place in Paris a few months later; and after the French evacuation he re-entered his dominions amidst the rejoicings of the people. The condition of Piedmont at that time was deplorable; for wars, the exactions and devastations of the foreign soldiery, and religious antagonism between Catholics and Protestants had wrought terrible havoc. "Uncultivated," wrote the Venetian ambassador, quoted by E. Ricotti, "no citizens in the cities, neither man nor beast in the fields, all the land forest-clad and wild; one sees no houses, for most of them are burnt, and of nearly all the castles only the walls are visible; of the inhabitants, once so numerous, some have died of the plague or of hunger, some by the sword, and some have fled elsewhere preferring to beg their bread abroad rather than support misery at home which is worse than death." There was no army, the administration was chaotic, and the finances were in a hopeless state. The duke set to work to put his house in order, and inaugurated a series of useful reforms, ably assisted by his minister, Niccolò Balbo. But progress was slow, and was accompanied by measures which abolished the states general, the last survival of feudal liberties. Savoy, following the tendency of the other states of Europe at that time, became thenceforth an absolute monarchy, but without that transformation the achievement of complete independence from foreign powers would have been impossible.

One of the first questions with which he had to deal was the religious difficulty. The inhabitants of the Pellice and Chisone valleys had long professed a primitive form of Christianity which the orthodox regarded as heretical, and had been subject to numerous persecutions in consequence (see WALDENSES). At the time of the Reformation they had gone over to Protestantism, and during the wars of the 16th century the new religion made great progress in Piedmont. The duke as a devout Catholic desired to purge the state of heresy, and initiated repressive measures against the Waldenses, but after some severe and not very successful fighting he ended by allowing them a measure of religious liberty in those valleys (1561). At the pope's instigation he recommenced persecution some years later, but his duchess and some German princes pleaded successfully in favour of the Protestants. He next turned his attention to getting rid of the French garrisons; the negotiations proved long and troublesome, but in December 1562 the French departed on payment of 100,000 scudi, retaining only Pinerolo and Savigliano, and Turin became the capital once more. There remained the Bernese, who had occupied some of the duke's territories in Savoy and Vaud, and in Geneva, over which he claimed certain rights. With Bern he made a compromise, regaining Gex, the Chablais, and the Genevois, on condition that Protestantism should be tolerated there, but he renounced Vaud and some other districts (1566). Disagreements with the Valais were settled in a similar way in 1569; but the Genevans refused to recognize Savoyard suzerainty. Emmanuel reformed the currency, reorganized justice, prepared the way for the emancipation of the serfs, raised the standing army to 25,000 men, and fortified the frontiers, ostensibly against Huguenot raids, but in reality from fear of France. On the death of Charles IX. of France in 1574 the new king, Henry III., passed through Piedmont on his way from Poland; Emmanuel gave him a magnificent reception, and obtained from him a promise that Pinerolo and Savigliano should be evacuated, which was carried out at the end of the year. Philip of Spain was likewise induced to evacuate Asti and Santhià in 1575. Thus, after being more or less under foreign occupation for 39 years, the duchy was at last free. The duke rounded off his dominions by the purchase of Tenda and Oneglia, which increased his seaboard, and the last years of his life were spent in fruitless negotiations to obtain Monferrato, held by the Gonzagas under Spanish protection, and Saluzzo, which was a French fief. He died on the 30th of August 1580, and was succeeded by his son Charles Emmanuel I. As a statesman Emmanuel Philibert was able, business-like and energetic; but he has been criticized for his duplicity, although in this respect he was no worse than most other European princes, whose ends were far more questionable. He was autocratic, but just and very patriotic. During his reign the duchy, which had been more than half French, became predominantly Italian. By diplomacy, which, although he was a capable and brave soldier, he preferred to war, he succeeded in freeing his country, and converting it from a ruined and divided land into a respectable independent power of the second rank, and, after Venice, the best-governed state in Italy.

The most accurate biography of Emmanuel Philibert is contained in E. Ricotti's *Storia della monarchia Piemontese*, vol. ii. (Florence, 1861), which is well done and based on documents; cf. Claretta's *La Successione di Emanuele Filiberto* (Turin, 1884).

EMMAUS, the name of two places in Palestine.

1. A village mentioned by Luke (xxiv. 13), without any indication of direction, as being 60 stadia (almost 7 m.), or according to some MSS.[1] 160 stadia, from Jerusalem. Its identification is a matter of mere guesswork: it has been sought at (*a*) Emmaus-Nicopolis (see 2 below), distant 176 stadia from Jerusalem; (*b*) Kuryet el-ʻEnab, distant 66 stadia, on the carriage road to Jaffa; (*c*) Kulonieh, distant 36 stadia, on the same road; (*d*) el-Kubeibeh, distant 63 stadia, on the Roman road to Lydda; (*e*) ʻUrtas, distant 60 stadia; and (*f*) Khurbet el-Khamasa, distant 86 stadia, on the Roman road to Eleutheropolis. Of these, el-Kubeibeh or ʻUrtas seems the most probable, though many favour Kulonieh because of its nearness to Bet Mizza, in which name there is similarity with Emmaus, and because of a reading (30 stadia) in Josephus.

2. Emmaus-Nicopolis, now ʻAmwās, a town on the maritime plain, and a place of importance during the Maccabaean and Jewish wars. Near it Judas Maccabaeus defeated Gorgias in 164 B.C., and Vespasian established a fortified camp in A.D. 69. It was afterwards rebuilt and named Nicopolis, and became an episcopal see. It was also noted for a healing spring.

EMMENDINGEN, a town of Germany, in the grand-duchy of Baden, close to the Black Forest, on the Elz and the main line of railway Mannheim-Constance. Pop. 6200. It has a Protestant church with a fine spire, a Roman Catholic church, a handsome town-hall, an old castle (now a hospital), once the residence of the counts of Hochberg, spinning mills, tanneries and manufactures of photographic instruments, paper, machinery and cigars. There is also a considerable trade in timber and cattle. Here the author Johann Georg Schlosser (1739–1799), the husband of Goethe's sister Cornelia (who died in 1777 and is interred in the old graveyard), was *Oberamtmann* (bailiff) for a few years.

Emmendingen was formerly the seat of the counts of Hochberg, a cadet branch of the margraves of Baden. In 1418 it received market rights from the emperor, and in 1590 was raised to the status of a town, and walled, by Margrave Jacob III.

EMMERICH (the ancient *Embrica*), a town of Germany, in the Prussian Rhine province, on the right bank of the Rhine and the railway from Cologne to Amsterdam, 5 m. N.E. of Cleves. Pop. (1905) 12,578. It has a considerable shipping trade, and manufactories of tobacco and cigars, chocolate, margarine, oil, chemicals, brushes, vinegar, soap, guano and perfumery. There are also iron foundries and machine factories. The old minster church, built in the middle of the 11th century, contains some fine choir stalls.

Emmerich, formerly called Embrika and Emrik, originally a Roman colony, is mentioned in records so early as the 7th century. St Willibrord founded a monastery and church here. In 1233 the place came into the possession of the dukes of Gelderland and received the status of a town in 1247. In 1371 it fell to the duchy of Cleves, and passed with it in 1609 to Brandenburg. The town joined the Hanseatic League in 1407. In 1794 it was bombarded by the French under General Vandamme, and in 1806 it was assigned to the grand-duchy of Berg. It passed into the possession of Prussia in 1815.

See A. Dederich, *Annalen der Stadt Emmerich* (Emmerich, 1867).

EMMET, ROBERT (1778–1803), Irish rebel, youngest son of Robert Emmet, physician to the lord-lieutenant of Ireland, was born in Dublin in 1778, and entered Trinity College in October 1793, where he had a distinguished academic career, showing special aptitude for mathematics and chemistry, and acquiring a reputation as an orator. Without taking a degree he removed his name from the college books in April 1798, as a protest against the inquisitorial examination of the political views of the students conducted by Lord Clare as chancellor of the university. Thus cut off from entering a learned profession, he turned towards political intrigue, being already to some extent in the secrets of the United Irishmen, of whom his elder brother Thomas Addis Emmet (see below) was one of the most prominent. In April 1799 a warrant was issued for his arrest, but was not executed; and in 1800 and the following year he travelled on the continent of Europe, where he entered into relations with the leaders of the United Irishmen, exiled since the rebellion of 1798, who were planning a fresh outbreak in Ireland in expectation of support from France. Emmet went to Paris in October 1802, where he had an interview with Bonaparte which convinced him that the peace of Amiens would be of short duration and that a French invasion of England might be looked for in August 1803. The councils of the conspirators were weakened by divided opinions as to the ultimate aim of their policy; and no clearly thought-out scheme of operations appears to have been arrived at when Emmet left Paris for Ireland in October 1802. Those in his confidence afterwards denied that Emmet was himself the originator of the plan on which he acted; and several of the ablest of the United Irishmen held aloof, believing the project to be impracticable. Among the latter was Lord Cloncurry, at one time on the executive of the United Irishmen, with whom Emmet dined the night before he left Paris, and to whom he spoke of his plans with intense enthusiasm and excitement. Emmet's lack of discretion was shown by his revealing his intentions in detail to an Englishman named Lawrence, resident near Honfleur, with whom he sought shelter when travelling on foot on his way to Ireland. Arriving in Dublin at the end of October he received information to the effect that seventeen counties were ready to take up arms if a successful effort were made in Dublin. For some time he remained concealed in his father's house near Miltown, making his preparations. A large number of pikes were collected and stored in Dublin during the spring of 1803, but fire-arms and ammunition were not plentiful.

The probability of a French invasion in August was increased by the renewal of the war in May, Emmet's brother Thomas being then in Paris in communication with Talleyrand and Bonaparte. But a discovery by the government of concealed arms, and an explosion at one of Emmet's depôts in Patrick Street on the 16th of July, necessitated immediate action, and the 23rd of that month was accordingly fixed for the projected rising. An elaborate plan of operations, which he described in detail in a letter to his brother after his arrest, had been prepared by Emmet, the leading feature of which was a simultaneous attack on the castle, the Pigeon House and the artillery barracks at Island bridge; while bodies of insurgents from the neighbouring counties were to march on the capital. But the whole scheme miscarried. Some of Emmet's bolder proposals, such as a plan for capturing the commander-in-chief, were vetoed by the timidity of his associates, none of whom were men of any ability. On the 23rd of July all was confusion at the depôts, and the leaders were divided as to the course to be pursued; orders were not obeyed; a trusted messenger despatched for arms absconded with the money committed to him to pay for them; treachery, quite unsuspected by Emmet, honeycombed the conspiracy; the Wicklow contingent failed to appear; the Kildare men turned back on hearing that the rising had been postponed; a signal expected by a contingent at the Broadstone was never given. In this hopeless state of affairs a false report reached Emmet at one of his depôts at nine o'clock in the evening that the military were approaching. Without taking any step to verify it, Emmet put on a green and white uniform and placed himself at the head of some eighty men, who marched towards the castle, being joined in the streets by a second body of about equal strength. None of these insurgents had any discipline, and many of them were drunk. Lord Kilwarden, proceeding to a hastily summoned meeting of the privy council, was dragged from his carriage by this rabble and murdered, together with his nephew Richard Wolfe; his daughter who accompanied him being conveyed to safety by Emmet himself. Emmet, now seeing that the rising had become a mere street brawl, made his escape; a detachment of soldiers quickly dispersed his followers.

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[1] Including Codex ℵ. But this distance is too great for the conditions of Luke's narrative and the reading (160) is evidently an attempt to harmonize with the traditional identification of Emmaus-Nicopolis held by Eusebius and Jerome. For a curious reading in three old Latin MSS. which makes Emmaus the name of the second traveller on the journey, see *Expos. Times*, xiii. 429, 477, 561.

After hiding for some days in the Wicklow mountains Emmet repaired to the house of a Mrs Palmer at Harold's Cross, in order to be near the residence of John Philpot Curran (*q.v.*), to whose daughter Sarah he had for some time been secretly attached, and with whom he had carried on a voluminous correspondence, afterwards seized by the authorities at her father's house. Attempting without success to persuade this lady to fly with him to America, Emmet lingered in the neighbourhood till the 25th of August, when he was apprehended by Major H. C. Sirr, the same officer who had captured Lord Edward Fitzgerald in 1798. At his trial he was defended and betrayed by the infamous Leonard MacNally (*q.v.*), and was convicted of treason; and after delivering an eloquent speech from the dock, was hanged on the 20th of September 1803.

By the universal testimony of his friends, Robert Emmet was a youth of modest character, pure motives and winning personality. But he was entirely lacking in practical statesmanship. Brought up in a revolutionary atmosphere, his enthusiasm was uncontrolled by judgment. Thomas Moore, who warmly eulogizes Emmet, with whom he was a student at Trinity College, records that one day when he was playing on the piano the melody "Let Erin remember," Emmet started up exclaiming passionately, "Oh, that I were at the head of 20,000 men marching to that air!" He had no knowledge of the world or of men; he trusted every one with child-like simplicity; except personal courage he had none of the qualities essential to leadership in such an enterprise as armed rebellion. The romance of his love affair with Sarah Curran—who afterwards married Robert Henry Sturgeon, an officer distinguished in the Peninsular War—has cast a glamour over the memory of Robert Emmet; and it inspired Thomas Moore's well-known songs, "She is far from the land where her young hero sleeps," and "Oh, breathe not his name"; it is also the subject of Washington Irving's "The Broken Heart." Emmet was short and slight in figure; his face was marked by smallpox, and he was described in 1803 for the purpose of identification as being "of an ugly, sour countenance and dirty brown complexion." A few poems by Emmet of little merit are appended to Madden's biography.

See R. R. Madden, *The United Irishmen, their Lives and Times* (2nd ed. 4 vols., Dublin, 1858–1860); Charles Phillips, *Recollections of Curran and Some of his Contemporaries* (2nd ed., London, 1822); Henry Grattan, *Memoirs of the Life and Times of the Right Hon. H. Grattan* (5 vols., London, 1839–1846); W. H. Maxwell, *History of the Irish Rebellion in 1798; with Memoirs of the Union and Emmet's Insurrection in 1803* (London, 1845); W. H. Curran, *Life of J. P. Curran* (2 vols., Edinburgh, 1822); Thomas Moore, *Life and Death of Lord Edward Fitzgerald* (2 vols. 3rd ed., London, 1832); and *Memoirs, Journals and Correspondence of Thomas Moore*, edited by Lord John Russell (8 vols., London, 1853–1856). (R. J. M.)

EMMET, THOMAS ADDIS (1764–1827), Irish lawyer and politician, second son of Robert Emmet, physician to the lord-lieutenant of Ireland, and elder brother of Robert Emmet (*q.v.*), the rebel, was born at Cork on the 24th of April 1764, and was educated at Trinity College, Dublin, and at Edinburgh University, where he studied medicine and was a pupil of Dugald Stewart in philosophy. After visiting the chief medical schools on the continent, he returned to Ireland in 1788; but the sudden death of his elder brother, Christopher Temple Emmet (1761–1788), a barrister of some distinction, induced him to follow the advice of Sir James Mackintosh to forsake medicine for the law as a profession. He was called to the Irish bar in 1790, and quickly obtained a practice, principally as counsel for prisoners charged with political offences, and became the legal adviser of the leading United Irishmen. When the Dublin corporation issued a declaration of Protestant ascendancy in 1792, the counter-manifesto of the United Irishmen was drawn up by Emmet; and in 1795 he took the oath of the society in open court, becoming secretary in the same year and a member of the executive in 1797. Although Grattan had a profound contempt for Emmet's political understanding, describing him as a quack in politics who set up his own crude notions as settled rules, Emmet was among the more prudent of the United Irishmen on the eve of the rebellion. It was only when convinced that parliamentary reform and Catholic emancipation were not to be obtained by constitutional methods, that he reluctantly engaged in treasonable conspiracy; and in opposition to bolder spirits like Lord Edward Fitzgerald, he discountenanced the taking up of arms until help should be obtained from France. Though not among those taken at the house of Oliver Bond on the 12th of March 1798 (see FITZGERALD, LORD EDWARD), he was arrested about the same time, and he was one of the leaders who after the rebellion were imprisoned at Fort George till 1802. Being then released, he went to Brussels, where he was visited by his brother Robert in October of that year; and he was in the secrets of those who were preparing for a fresh rising in Ireland in conjunction with French aid. After the failure of Robert Emmet's rising in July 1803, the news of which reached him in Paris, where he was in communication with Bonaparte, he emigrated to the United States. Joining the New York bar he obtained a lucrative practice and in 1812–13 was attorney-general of New York; his abilities and success being such that Judge Story declared him to be "by universal consent in the first rank of American advocates." He died while conducting a case in court on the 14th of November 1827. Thomas Emmet married, in 1791, Jane, daughter of the Rev. John Patten, of Clonmel.

See authorities under EMMET, ROBERT; also Alfred Webb, *Compendium of Irish Biography* (Dublin, 1878); C. S. Haynes, *Memoirs of Thomas Addis Emmet* (London, 1829); Theobald Wolfe Tone, *Memoirs*, edited by W. T. W. Tone (2 vols., London, 1827); W. E. H. Lecky, *Hist. of Ireland in the Eighteenth Century*, vol. iv. (Cabinet edition, 5 vols., London, 1892). (R. J. M.)

EMMETT, DANIEL DECATUR (1815–1904), American song-writer, was born at Mount Vernon, Ohio. He started the "negro minstrel" performances, which from 1842 onwards became so popular in America and England, and he composed a number of songs which had a great temporary vogue. He is remembered particularly as the writer of the famous Southern war-song "Dixie," which he composed in 1859.

EMMITSBURG, a town in Frederick county, Maryland, U.S.A., 61 m. by rail W. by N. of Baltimore, and 1½ m. S. of the northern boundary of the state. Pop. (1900) 849; (1910) 1054. It is served by the Emmitsburg railway (7 m. long) to Rocky Ridge on the Western Maryland railway. The town is in a picturesque region on the eastern slope of the Blue Ridge Mountains. Two miles S.W. is Mount St. Mary's College (Roman Catholic), founded in 1808 by the Rev. John du Bois (1764–1842)—its president until 1826, when he became bishop of New York—and chartered by the state in 1830. The Ecclesiastical Seminary of the college has been a great training school, and has been called the "Nursery of Bishops"; among its graduates have been Bishop Hughes, Cardinal McCloskey and Archbishop Corrigan. In 1908 the college had 25 instructors and 350 students, of whom 57 were in the Ecclesiastical Seminary, and 61 in the Minim Department. Half a mile S. of the town is St Joseph's College and Academy (incorporated in 1816), for young women, which is conducted by the Sisters of Charity—this order was introduced into the United States at Emmitsburg by Mrs Elizabeth Ann Seton in 1809. The first settlement at Emmitsburg was made about 1773. It was at first called "Silver Fancy," and then for a time was known as "Poplar Fields"; but in 1786 the present name was adopted in honour of William Emmitt, one of the original settlers. The town was incorporated in 1824.

EMMIUS, UBBO (1547–1625), Dutch historian and geographer, was born at Gretha in East Friesland on the 5th of December 1547. After studying at Rostock, he spent two years in Geneva, where he became intimate with Theodore Beza; and returning to the Netherlands was appointed the principal of a college at Norden, a position which he lost in 1587 because, as a Calvinist, he would not subscribe to the confession of Augsburg. Subsequently he was head of a college at Leer, and in 1594 became rector of the college at Groningen, and when in 1614 this college became a university he was chosen principal and professor of history and Greek, and by his wise guidance and his learning speedily raised the new university to a position of eminence. He was on friendly terms with Louis, count of Nassau; corresponded with many of the learned men of his time; and died at Groningen on the 9th of December 1625. He was twice married, and left a son and a daughter. The chief works of Emmius are: *Rerum Frisicarum historiae decades*, in six parts, a complete edition of which was published at Leiden in 1616; *Opus chronologicum* (Groningen, 1619); *Vetus Graecia illustrata* (Leiden, 1626); and *Historia temporis nostri*, which was first published at Groningen in 1732. An account of his life, written by Nicholas Mulerius, was published, with the lives of other professors of Groningen, at Groningen in 1638.

See N. G. van Kampen, *Geschiedenis der letteren en wetenschappen in de Nederlanden* (The Hague, 1821–1826).

EMMONS, EBENEZER (1800–1863), American geologist, was born at Middlefield, Massachusetts, on the 16th of May 1800. He studied medicine at Albany, and after taking his degree practised for some years in Berkshire county. His interest in geology was kindled in early life, and in 1824 he had assisted Prof. Chester Dewey (1784–1867) in preparing a geological map of Berkshire county, in which the first attempt was made to classify the rocks of the Taconic area. While thus giving much of his time to natural science, undertaking professional work in natural history and geology in Williams College, he also accepted the professorship of chemistry and afterwards of obstetrics in the Albany Medical College. The chief work of his life was, however, in geology, and he has been designated by Jules Marcou as "the founder of American palaeozoic stratigraphy, and the first discoverer of the primordial fauna in any country." In 1836 he became attached to the Geological Survey of the State of New York, and after lengthened study he grouped the local strata (1842) into the Taconic and overlying New York systems. The latter system was subdivided into several groups that were by no means well defined. Emmons had previously described the Potsdam sandstone (1838), and this was placed at the base of the New York system. It is now regarded as Upper Cambrian. In 1844 Emmons for the first time obtained fossils in his Taconic system: a notable discovery because the species obtained were found to differ from all then-known Palaeozoic fossils, and they were regarded as representing the primordial group. Marcou was thus led to advocate that the term Taconic be generally adopted in place of Cambrian. Nevertheless the Taconic fauna of Emmons has proved to include only the lower part of Sedgwick's Cambrian. Considerable discussion has taken place on the question of the Taconic system, and whether the term should be adopted; and the general opinion has been adverse. Emmons made contributions on agriculture and geology to a series of volumes on the natural history of New York. He also issued a work entitled *American Geology; containing a statement of the principles of the Science, with full illustrations of the characteristic American Fossils* (1855–1857). From 1851 to 1860 he was state geologist of North Carolina. He died at Brunswick, North Carolina, on the 1st of October 1863.

See the *Biographical Notice of Ebenezer Emmons*, by J. Marcou; *Amer. Geologist*, vol. vii. (Jan., 1891), p. 1 (with portrait and list of publications).

EMMONS, NATHANAEL (1745–1840), American theologian, was born at East Haddam, Connecticut, on the 20th of April 1745. He graduated at Yale in 1767, studied theology under the Rev. John Smalley (1734–1820) at Berlin, Connecticut, and was licensed to preach in 1769. After preaching four years in New York and New Hampshire, he became, in April 1773, pastor of the Second church at Franklin (until 1778 a part of Wrentham, Massachusetts), of which he remained in charge until May 1827, when failing health compelled his relinquishment of active ministerial cares. He lived, however, for many years thereafter, dying of old age at Franklin on the 23rd of September 1840. It was as a theologian that Dr Emmons was best known, and for half a century probably no clergyman in New England exerted so wide an influence. He developed an original system of divinity, somewhat on the structural plan of that of Samuel Hopkins, and, in Emmons's own belief, contained in and evolved from Hopkinsianism. While by no means abandoning the tenets of the old Calvinistic faith, he came to be looked upon as the chief representative of what was then known as the "new school" of theologians. His system declared that holiness and sin are free voluntary exercises; that men act freely under the divine agency; that the slightest transgression deserves eternal punishment; that it is through God's mere grace that the penitent believer is pardoned and justified; that, in spite of total depravity, sinners ought to repent; and that regeneration is active, not passive, with the believer. Emmonsism was spread and perpetuated by more than a hundred clergymen, whom he personally trained. Politically, he was an ardent patriot during the War of Independence, and a strong Federalist afterwards, several of his political discourses attracting wide attention. He was a founder and the first president of the Massachusetts Missionary Society, and was influential in the establishment of Andover Theological Seminary. More than two hundred of his sermons and addresses were published during his lifetime. His *Works* were published in 6 vols. (Boston, 1842; new edition, 1861).

See also the *Memoir*, by Dr E. A. Park (Andover, 1861).

EMPEDOCLES (*c.* 490–430 B.C.), Greek philosopher and statesman, was born at Agrigentum (Acragas, Girgenti) in Sicily of a distinguished family, then at the height of its glory. His grandfather Empedocles was victorious in the Olympian chariot race in 496; in 470 his father Meto was largely instrumental in the overthrow of the tyrant Thrasydaeus. We know almost nothing of his life. The numerous legends which have grown up round his name yield very little that can fairly be regarded as authentic. It seems that he carried on the democratic tradition of his house by helping to overthrow an oligarchic government which succeeded the tyranny in Agrigentum, and was invited by the citizens to become their king. That he refused the honour may have been due to a real enthusiasm for free institutions or to the prudential recognition of the peril which in those turbulent times surrounded the royal dignity. Ultimately a change in the balance of parties compelled him to leave the city, and he died in the Peloponnese of the results of an accident in 430.

Of his poem on nature (*φύσις*) there are left about 400 lines in unequal fragments out of the original 5000; of the hymns of purification (*καθαρμοί*) less than 100 verses remain; of the other works, improbably assigned to him, nothing is known. His grand but obscure hexameters, after the example of Parmenides, delighted Lucretius. Aristotle, it is said, called him the father of rhetoric. But it was as at once statesman, prophet, physicist, physician and reformer that he most impressed the popular imagination. To his contemporaries, as to himself, he seemed more than a mere man. The Sicilians honoured his august aspect as he moved amongst them with purple robes and golden girdle, with long hair bound by a Delphic garland, and brazen sandals on his feet, and with a retinue of slaves behind him. Stories were told of the ingenuity and generosity by which he had made the marshes round Selinus salubrious, of the grotesque device by which he laid the winds that ruined the harvests of Agrigentum, and of the almost miraculous restoration to life of a woman who had long lain in a death-like trance. Legends stranger still told of his disappearance from among men. Empedocles, according to one story, was one midnight, after a feast held in his honour, called away in a blaze of glory to the gods; according to another, he had only thrown himself into the crater of Etna, in the hope that men, finding no traces of his end, would suppose him translated to heaven. But his hopes were cheated by the volcano, which cast forth his brazen sandals and betrayed his secret (Diog. Laërt. viii. 67). The people of Agrigentum have never ceased to honour his name, and even in modern times he has been celebrated by followers of Mazzini as the democrat of antiquity *par excellence*.

As his history is uncertain, so his doctrines are hard to put together. He does not belong to any one definite school. While, on one hand, he combines much that had been suggested by Parmenides, Pythagoras and the Ionic schools, he has germs of truth that Plato and Aristotle afterwards developed; he is at once a firm believer in Orphic mysteries, and a scientific thinker, precursor of the physical scientists. There are, according to Empedocles, four ultimate elements, four primal divinities, of which are made all structures in the world—fire, air, water, earth. These four elements are eternally brought into union, and eternally parted from each other, by two divine beings or powers, love and hatred—an attractive and a repulsive force which the ordinary eye can see working amongst men, but which really pervade the whole world. According to the different proportions in which these four indestructible and unchangeable matters are combined with each other is the difference of the organic structure produced; *e.g.* flesh and blood are made of equal (in weight but not in volume) parts of all four elements, whereas bones are one-half fire, one-fourth earth, and one-fourth water. It is in the aggregation and segregation of elements thus arising that Empedocles, like the atomists, finds the real process which corresponds to what is popularly termed growth, increase or decrease. Nothing new comes or can come into being; the only change that can occur is a change in the juxtaposition of element with element.

Empedocles apparently regarded love (φιλότης) and discord (νεῖκος) as alternately holding the empire over things,—neither, however, being ever quite absent. As the best and original state, he seems to have conceived a period when love was predominant, and all the elements formed one great sphere or globe. Since that period discord had gained more sway; and the actual world was full of contrasts and oppositions, due to the combined action of both principles. His theory attempted to explain the separation of elements, the formation of earth and sea, of sun and moon, of atmosphere. But the most interesting and most matured part of his views dealt with the first origin of plants and animals, and with the physiology of man. As the elements (his deities) entered into combinations, there appeared quaint results—heads without necks, arms without shoulders. Then as these fragmentary structures met, there were seen horned heads on human bodies, bodies of oxen with men's heads, and figures of double sex. But most of these products of natural forces disappeared as suddenly as they arose; only in those rare cases where the several parts were found adapted to each other, and casual member fitted into casual member, did the complex structures thus formed last. Thus from spontaneous aggregations of casual aggregates, which suited each other as if this had been intended, did the organic universe originally spring. Soon various influences reduced the creatures of double sex to a male and a female, and the world was replenished with organic life. It is impossible not to see in this theory a crude anticipation of the "survival of the fittest" theory of modern evolutionists.

As man, animal and plant are composed of the same elements in different proportions, there is an identity of nature in them all. They all have sense and understanding; in man, however, and especially in the blood at his heart, mind has its peculiar seat. But mind is always dependent upon the body, and varies with its changing constitution. Hence the precepts of morality are with Empedocles largely dietetic.

Knowledge is explained by the principle that the several elements in the things outside us are perceived by the corresponding elements in ourselves. We know only in so far as we have within us a nature cognate to the object of knowledge. Like is known by like. The whole body is full of pores, and hence respiration takes place over the whole frame. But in the organs of sense these pores are specially adapted to receive the effluxes which are continually rising from bodies around us; and in this way perception is somewhat obscurely explained. The theory, however unsatisfactory as an explanation, has one great merit, that it recognizes between the eye, for instance, and the object seen an intermediate something. Certain particles go forth from the eye to meet similar particles given forth from the object, and the resultant contact constitutes vision. This idea contains within it the germ of the modern idea of the subjectivity of sense-given data; perception is not merely a passive reflection of external objects.

It is not easy to harmonize these quasi-scientific theories with the theory of transmigration of souls which Empedocles seems to expound. Probably the doctrine that the divinity (δαίμων) passes from element to element, nowhere finding a home, is a mystical way of teaching the continued identity of the principles which are at the bottom of every phase of development from inorganic nature to man. At the top of the scale are the prophet and the physician, those who have best learned the secret of life; they are next to the divine. One law, an identity of elements, pervades all nature; existence is one from end to end; the plant and the animal are links in a chain where man is a link too; and even the distinction between male and female is transcended. The beasts are kindred with man; he who eats their flesh is not much better than a cannibal.

Looking at the opposition between these and the ordinary opinions, we are not surprised that Empedocles notes the limitation and narrowness of human perceptions. We see, he says, but a part, and fancy that we have grasped the whole. But the senses cannot lead to truth; thought and reflection must look at the thing on every side. It is the business of a philosopher, while he lays bare the fundamental difference of elements, to display the identity that subsists between what seem unconnected parts of the universe.

See Diog. Laërt. viii. 51-77; Sext. Empiric. *Adv. math.* vii. 123; Simplicius, *Phys.* f. 24, f. 76. For text Simon Karsten, "Empedoclis Agrigenti carminum reliquiae," in *Reliq. phil. vet.* (Amsterdam, 1838); F. W. A. Mullach, *Fragmenta philosophorum Graecorum*, vol. i.; H. Stein, *Empedoclis Agrigenti fragmenta* (Bonn, 1882); H. Ritter and L. Preller, *Historia philosophiae* (4th ed., Gotha, 1869), chap. iii. *ad fin.*; A. Fairbanks, *The First Philosophers of Greece* (1898). Verse translation, W. E. Leonard (1908). For criticism E. Zeller, *Phil. der Griechen* (Eng. trans. S. F. Alleyne, 2 vols., London, 1881); A. W. Benn, *Greek Philosophers* (1882); J. A. Symonds, *Studies of the Greek Poets* (3rd ed., 1893), vol. i. chap. 7; C. B. Renouvier, *Manuel de philosophie ancienne* (Paris, 1844); T. Gomperz, *Greek Thinkers*, vol. i. (Eng. trans. L. Magnus, 1901); W. Windelband, *Hist. of Phil.* (Eng. trans. 1895); many articles in periodicals (see Baldwin's *Dict. of Philos.* vol. iii. p. 190).

(W. W.; X.)

EMPEROR (Fr. *empereur*, from the Lat. *imperator*), a title formerly borne by the sovereigns of the Roman empire (see EMPIRE), and since their time, partly by derivation, partly by imitation, used by a variety of other sovereigns. Under the Republic, the term *imperator* applied in theory to any magistrate vested with *imperium*; but in practice it was only used of a magistrate who was acting abroad (*militiae*) and was thus in command of troops. The term *imperator* was the natural and regular designation employed by his troops in addressing such a magistrate; but it was more particularly and specially employed by them to salute him after a victory; and when he had been thus saluted he could use the title of *imperator* in public till the day of his triumph at Rome, after which it would lapse along with his *imperium*. The senate itself might, in the later Republic, invite a victorious general to assume the title; and in these two customs—the salutation of the troops, and the invitation of the senate—we see in the germ the two methods by which under the Empire the *princeps* was designated; while in the military connotation attaching to the name even under the Republic we can detect in advance the military character by which the emperor and the Empire were afterwards distinguished. Julius Caesar was the first who used the title continuously (from 58 B.C. to his death in 44 B.C.), as well *domi* as *militiae*; and his nephew Augustus took a further step when he made the term imperator a *praenomen*, a practice which after the time of Nero becomes regular. But apart from this amalgamation of the term with his regular name, and the private right to its use which that bestowed, every emperor had an additional and double right to the title on public grounds, possessed as he was of an *imperium infinitum majus*, and commanding as he did all the troops of the Empire. From the latter point of view—as *generalissimo* of the forces of Rome, he had the right to the insignia of the commander (the laurel wreath and the fasces), and to the protection of a bodyguard, the *praetoriani*. This public title of imperator was normally conferred by the senate; and an emperor normally dates his reign from the day of his salutation by the senate. But the troops were also regarded as still retaining the right of saluting an *imperator*; and there were emperors who regarded themselves as created by such salutation and dated their reigns accordingly. The military associations of the term thus resulted, only too often, in making the emperor the nominee of a turbulent soldiery.

Augustus had been designated (not indeed officially, but none the less regularly) as *princeps*—the first citizen or foremost man of the state. The designation suited the early years of the Empire, in which a dyarchy of *princeps* and senate had been maintained. But by the 2nd century the dyarchy is passing into a monarchy: the title of princeps recedes, and the title of imperator comes into prominence to designate not merely the possessor of a certain *imperium*, or the general of troops, but the simple monarch in the fulness of his power as head of the state. From the days of Diocletian one finds occasionally two emperors, but not, at any rate in theory, two Empires; the two emperors are the dual sovereigns of a single realm. But from the time of Arcadius and Honorius (A.D. 395) there are in reality (though not in theory) two Empires as well as two emperors, one of the East and one of the West. When Greek became the sole language of the East Roman Empire, *imperator* was rendered sometimes by βασιλεύς and sometimes by αὐτοκράτωρ, the former word being the usual designation of a sovereign, the latter specially denoting that despotic power which the *imperator* held, and being in fact the official translation of *imperator*. Justinian uses αὐτοκράτωρ as his formal title, and βασιλεύς as the popular term.

On the revival of the Roman empire in the West by Charlemagne in 800, the title (at first in the form *imperator*, or *imperator Augustus*, afterwards *Romanorum imperator Augustus*) was taken by him and by his Frankish, Italian and German successors, heads of the Holy Roman Empire, down to the abdication of the emperor Francis II. in 1806. The doctrine had, however, grown up in the earlier middle ages (about the time of the emperor Henry II., 1002–1024) that although the emperor was chosen in Germany (at first by the nation, afterwards by a small body of electors), and entitled from the moment of his election to be crowned in Rome by the pope, he could not use the title of emperor until that coronation had actually taken place. The German sovereign, therefore, though he exercised, as soon as chosen, full imperial powers both in Germany and Italy, called himself merely "king of the Romans" (*Romanorum rex semper Augustus*) until he had received the sacred crown in the sacred city. In 1508 Maximilian I., being refused a passage to Rome by the Venetians, obtained from Pope Julius II. a bull permitting him to style himself emperor elect (*imperator electus*, erwählter Kaiser). This title was taken by Ferdinand I. (1558) and all succeeding emperors, immediately upon their coronation in Germany; and it was until 1806 their strict legal designation, and was always employed by them in proclamations and other official documents. The term "elect" was, however, omitted even in formal documents when the sovereign was addressed or was spoken of in the third person.

In medieval times the emperor, conceived as vicegerent of God and co-regent with the pope in government of the Christian people committed to his charge, might almost be regarded as an ecclesiastical officer. Not only was his function regarded as consisting in the defence and extension of true religion; he was himself arrayed in ecclesiastical vestments at his coronation; he was ordained a subdeacon; and assisting the pope in the celebration of the Eucharist, he communicated in both kinds as a clerk. The same sort of ecclesiastical character came also to be attached to the tsars[1] of Russia, who—especially in their relations with the Orthodox Eastern Church—may vindicate for themselves (though the sultans of Turkey have disputed the claim) the succession to the East Roman emperors (see EMPIRE). But the title of emperor was also used in the middle ages, and is still used, in a loose and vague sense, without any ecclesiastical connotation or hint of connexion with Rome (the two attributes which should properly distinguish an emperor), and merely in order to designate a non-European ruler with a large extent of territory. It was thus applied, and is still applied, to the rulers of China and Japan; it was attributed to the Mogul sovereigns of India; and since 1876 it has been used by British monarchs in their capacity of sovereigns of India (*Kaiser-i-Hind*).[2]

Since the French Revolution and during the course of the 19th century the term emperor has had an eventful history. In 1804 Napoleon took the title of "Emperor of the French," and posed as the reviver of the Empire of Charlemagne. Afraid that Napoleon would next proceed to deprive him of his title of Holy Roman Emperor, Francis II. first took the step, in 1804, of investing himself with a new title, that of "Hereditary Emperor of Austria," and then, in 1806, proceeded to the further step of abdicating his old historical title and dissolving the Holy Roman Empire. Thus the old and true sense of the term emperor—the sense in which it was connected with the church in the present and with Rome in the past—finally perished; and the term became partly an apanage of Bonapartism (Louis Napoleon resuscitated it as Napoleon III. in 1853), and partly a personal title of the Habsburgs as rulers of their various family territories. In 1870, however, a new and most important use of the title was begun, when the union of Germany was achieved, and the Prussian king, who became the head of united Germany, received in that capacity the title of German Emperor. Here the title of emperor designates the president of a federal state; and here the Holy Roman emperor of the 17th and 18th centuries, the president of a loose confederation of German states, may be said to have found his successor. But the term has been widely and loosely used in the course of the 19th century. It was the style from 1821 to 1889 of the princes of the house of Braganza who ruled in Brazil; it has been assumed by usurpers in Haiti, and in Mexico it was borne by Augustin Iturbide in 1822 and 1823, and by the ill-fated Archduke Maximilian of Austria from 1864 to 1867. It can hardly, therefore, be said to have any definite descriptive force at the present time, such as it had in the middle ages. So far as it has any such force in Europe, it may be said partly to be connected with Bonapartism, and to denote a popular but military dictatorship, partly to be connected with the federal idea, and to denote a precedence over other kings possessed by a ruler standing at the head of a composite state which may embrace kings among its members. It is in this latter sense that it is used of Germany, and of Britain in respect of India; it is in something approaching this latter sense that it may be said to be used of Austria.

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[1] The word *Tsar*, like the German *Kaiser*, is derived from Caesar (see TSAR). Peter the Great introduced the use of the style "Imperator," and the official designation is now "Emperor of all the Russias, Tsar of Poland, and Grand Duke of Finland," though the term tsar is still popularly used in Russia.

[2] For the titles of βασιλεύς, *imperator Augustus*, &c., applied in the 10th century to the Anglo-Saxon kings, see EMPIRE (note). The claim to the style of emperor, as a badge of equal rank, played a considerable part in the diplomatic relations between the Sultan and certain European sovereigns. Thus, at a time when this style (*Padishah*) was refused by the Sultan to the tsars of Russia, and even to the Holy Roman Emperor himself, it was allowed to the French kings, who in diplomatic correspondence and treaties with Turkey called themselves "emperor of France" (*empereur de France*).—[ED.].

See J. Selden, *Titles of Honour* (1672); J. Bryce, *Holy Roman Empire* (London, 1904); and Sir E. Colebrooke, "On Imperial and Other Titles" in the *Journal of the Royal Asiatic Society* (1877). See also the articles on "Imperator" and "Princeps" in Smith's *Dictionary of Greek and Roman Antiquities* (1890). (E. Br.)

EMPHYSEMA (Gr. ἐμφυσᾶν to inflate) is a word vaguely meaning the abnormal presence of air in certain parts of the body. At the present day, however, there are two conditions to which it refers, "pulmonary emphysema" (and the word pulmonary is often omitted) and "surgical emphysema." Of pulmonary emphysema there are two forms, true vesicular and interstitial (or interlobular). Vesicular emphysema signifies that there is an enlargement of air-vesicles, resulting either from their excessive distension, from destruction of the septa, or from both causes combined (see Respiratory System). In interstitial emphysema the air is infiltrated into the connective tissue beneath the pleura and between the pulmonary air-cells.

The former variety is by far the more common, and appears to be capable of being produced by various causes, the chief of which are the following:—

1. Where a portion of the lung has become wasted, or its vesicular structure permanently obliterated by disease, without corresponding falling in of the chest wall, the neighbouring air-vesicles or some of them undergo dilatation to fill the vacuum (vicarious emphysema).

2. In some cases of bronchitis, where numbers of the smaller bronchial tubes become obstructed, the air in the pulmonary vesicles remains imprisoned, the force of expiration being insufficient to expel it; while, on the other hand, the stronger force of inspiration being adequate to overcome the resistance, the air-cells tend to become more and more distended, and permanent alterations in their structure, including emphysema, are the result (inspiratory theory).

3. Emphysema also arises from exertion involving violent expiratory efforts, during which the glottis is constricted, as in paroxysms of coughing, in straining, and in lifting heavy weights (expiratory theory). Whooping-cough is well known as the exciting cause of emphysema in many persons.

4. Another view, known as the nutritive theory, maintains that emphysema depends essentially on a primary nutritive change in the walls of the air-vesicles. Thus these are impaired in their resisting power, and are far more likely to become distended by any force acting on them from within.

5. Again in certain cases the cartilages of the chest become hypertrophied and rigid, thus causing a primary chronic enlargement, and the lungs become emphysematous in order to fill up the increased space (Freund's theory).

In whatever manner produced, this disease gives rise to important morbid changes in the affected portions of the lungs, especially the loss of the natural elasticity of the air-cells, and likewise the destruction of many of the pulmonary capillary blood-vessels, and the diminution of aerating surface for the blood. As a consequence an increased strain is thrown on the right ventricle with a consequent dilatation leading on to heart failure and all its attendant troubles. The chief symptom in this complaint is shortness of breath, more or less constant but greatly aggravated by exertion, and by attacks of bronchitis, to which persons suffering from emphysema appear to be specially liable. The respiration is of similar character to that already described in the case of asthma. In severe forms of the disease the patient comes to acquire a peculiar puffy or bloated appearance, and the configuration of the chest is altered, assuming the character known as the *barrel-shaped* or *emphysematous* chest.

The main element in the treatment of emphysema consists in attention to the general condition of the health, and in the avoidance of all causes likely to aggravate the disease or induce its complications. Compressed air baths and expiration into rarefied air may be useful. During attacks of urgent dyspnoea and lividity, with engorgement of veins, the patient should be repeatedly bled until relief is obtained. Interstitial emphysema arising from the rupture of air-cells in the immediate neighbourhood of the pleura may occur as a complication of the vesicular form, or separately as the result of some sudden expulsive effort, such as a fit of coughing, or, as has frequently happened, in parturition. Gangrene or post-mortem decomposition may lead to the presence of air in the interstitial tissue of the lung. Occasionally the air infiltrates the cellular tissue of the posterior mediastinum, and thence comes to distend the integument of the whole surface of the body (surgical emphysema). Surgical emphysema signifies the effusion of air into the general connective tissues of the body. The commonest causes are a wound of some air-passage, or a penetrating wound of the chest wall without injury to the lung. It may, however, occur in any situation of the body and in many other ways. Its severity varies from very slight cases where only a little crepitation may be felt under the skin, to extreme cases where the whole body is blown up and death is imminent from impeded respiration and failure of the action of the heart. In the milder cases no treatment is necessary as the air gradually becomes absorbed, but in the more severe cases incisions must be made in the swollen cellular tissues to allow the air to escape.

EMPIRE, a term now used to denote a state of large size and also (as a rule) of composite character, often, but not necessarily, ruled by an emperor—a state which may be a federation, like the German empire, or a unitary state, like the Russian, or even, like the British empire, a loose commonwealth of free states united to a number of subordinate dependencies. For many centuries the writers of the Church, basing themselves on the Apocalyptic writings, conceived of a cycle of four empires, generally explained—though there was no absolute unanimity with regard to the members of the cycle—as the Assyrian, the Persian, the Macedonian and the Roman. But in reality the conception of Empire, like the term itself (Lat. *imperium*), is of Roman origin. The empire of Alexander had indeed in some ways anticipated the empire of Rome. "In his later years," Professor Bury writes, "Alexander formed the notion of an empire, both European and Asiatic, in which the Asiatics should not be dominated by the European invaders, but Europeans and Asiatics alike should be ruled on an equality by a monarch, indifferent to the distinction of Greek and barbarian, and looked upon as their own king by Persians as well as by Macedonians." The contemporary Cynic philosophy of cosmopolitanism harmonized with this notion, as Stoicism did later with the practice of the Roman empire; and Alexander, like Diocletian and Constantine, accustomed a Western people to the forms of an Oriental court, while, like the earlier Caesars, he claimed and received the recognition of his own divinity. But when he died in 323, his empire, which had barely lasted ten years, died with him; and it was divided among Diadochi who, if in some other respects (for instance, the Hellenization of the East) they were heirs of their master's policy, were destitute of the imperial conception. The work of Alexander was rather that of the forerunner than the founder. He prepared the way for the world-empire of Rome; he made possible the rise of a universal religion. And these are the two factors which, throughout the middle ages, went together to make the thing which men called Empire.

The Roman empire.

At Rome the term *imperium* signified generally, in its earlier use, the sovereignty of the state over the individual, a sovereignty which the Romans had disengaged with singular clearness from all other kinds of authority. Each of the higher magistrates of the Roman people was vested, by a *lex curiata* (for power was distinctly conceived as resident in, and delegated by, the community), with an *imperium* both civil and military, which varied in degree with the magnitude of his office. In the later days of the Republic such *imperium* was enjoyed, partly in Rome by the resident consuls and praetors, partly in the provinces by the various proconsuls or propraetors. There was thus a certain *morcellement* of *imperium*, delegated as it was by the people to a number of magistrates: the coming of the Empire meant the reintegration of this *imperium*, and its unification, by a gradual process, in the hands of the *princeps*, or emperor. The means by which this process was achieved had already been anticipated under the Republic. Already in the days of Pompey it had been found convenient to grant to an extraordinary officer an *imperium aequum* or *majus* over a large area, and that officer thus received powers, within that area, equal to, or greater than, the powers of the provincial governors. This precedent was followed by Augustus in the year 27 B.C., when he acquired for himself sole *imperium* in a certain number of provinces (the imperial provinces), and an *infinitum imperium majus* in the remaining provinces (which were termed senatorial). As a result, Augustus enjoyed an *imperium* coextensive indeed with the whole of the Roman world, but concurrent, in part of that world, with the *imperium* of the senatorial proconsuls; and the early Empire may thus be described as a dyarchy. But the distinction between imperial and senatorial provinces finally disappeared; by the time of Constantine the emperor enjoyed sole *imperium*, and an absolute monarchy had been established. We shall not, however, fully understand the significance of the Roman empire, unless we realize the importance of its military aspect. All the soldiers of Rome had from the first to swear *in verba Caesaris Augusti*; and thus the whole of the Roman army was his army, regiments of which he might indeed lend, but of which he was sole *Imperator* (see under EMPEROR). Thus regarded as a permanent commander-in-chief, the emperor enjoyed the privileges, and suffered from the weaknesses, of his position. He had the power of the sword behind him; but he became more and more liable to be deposed, and to be replaced by a new commander, at the will of those who bore the sword in his service.

Development under Diocletian and Constantine.

The period which is marked by the reigns of Diocletian and Constantine (A.D. 284–337) marks a great transformation in the character of the Empire. The old dyarchy, under which the emperor might still be regarded as an official of the *respublica Romana*, passed into a new monarchy, in which all political power became, as it were, the private property of the monarch. There was now no distinction of provinces; and the old public *aerarium* became merely a municipal treasury, while the *fiscus* of the emperor became the exchequer of the Empire. The officers of the imperial *praetorium*, or bodyguard, are now the great officers of state; his private council becomes the public consistory, or supreme court of appeal; and the *comites* of his court are the administrators of his empire. "All is in him, and all comes from him," as our own year-books say of the medieval king; his household, for instance, is not only a household, but also an administration. On the other hand, this unification seems to be accompanied by a new bifurcation. The exigencies of frontier defence had long been drawing the Empire towards the troubled East; and this tendency reached its culmination when a new Rome arose by the Bosporus, and Constantinople became the centre of what seemed a second Empire in the East (A.D. 324). Particularly after the division of the Empire between Arcadius and Honorius in 395 does this bifurcation appear to be marked; and one naturally speaks of the two Empires of the West and the East. Yet it cannot be too much emphasized that in reality such language is utterly inexact. The Roman empire was, and always continued to be, ideally one and indivisible. There were two emperors, but one Empire—two persons, but one power. The point is of great importance for the understanding of the whole of the middle ages: there only is, and can be, one Empire, which may indeed, for convenience, be ruled conjointly by two emperors, resident, again for convenience, in two separate capitals. And, as a matter of fact, not only did the residence of an emperor in the East not spell bifurcation, it actually fostered the tendency towards unification. It helped forward the transformation of the Empire into an absolute and quasi-Asiatic monarchy, under which all its subjects fell into a single level of loyal submission: it helped to give the emperor a gorgeous court, marked by all the ceremony and the servility of the East.[1] The deification of the emperor himself dates from the days of Augustus; by the time of Constantine it has infected the court and the government. Each emperor, again, had from the first enjoyed the sacrosanct position which was attached to the tribunate; but now his palace, his chamber, his charities, his letters, are all "sacred," and one might almost speak in advance of a "Holy Roman Empire."

Division of the Empire.

Influence of Christianity.

But there is one factor, the greatest of all, which still remains to be added, before we have counted the sum of the forces that made the world think in terms of empire for centuries to come; and that is the reception of Christianity into the Roman empire by Constantine. That reception added a new sanction to the existence of the Empire and the position of the emperor. The Empire, already one and indivisible in its aspect of a political society, was welded still more firmly together when it was informed and permeated by a common Christianity, and unified by the force of a spiritual bond. The Empire was now the Church; it was now indeed indestructible, for, if it perished as an empire, it would live as a church. But the Church made it certain that it would not perish, even as an empire, for many centuries to come. On the one hand the Church thought in terms of empire and taught the millions of its disciples (including the barbarians themselves) to think in the same terms. No other political conception—no conception of a πόλις or of a nation—was any longer possible. When the Church gained its hold of the Roman world, the Empire, as it has been well said, was already "not only a government, but a fashion of conceiving the world": it had stood for three centuries, and no man could think of any other form of political association. Moreover, the gospel of St Paul—that there is *one* Church, whereof Christ is the Head, and we are all members—could not but reinforce for the Christian the conception of a necessary political unity of all the world under a single head. *Una Chiesa in uno Stato*—such, then, was the theory of the Church. But not only did the Church perpetuate the conception of empire by making it a part of its own theory of the world: it perpetuated that conception equally by materializing it in its own organization of itself. Growing up under the shadow of the Empire, the Church too became an empire, as the Empire had become a church. As it took over something of the old pagan ceremonial, so it took over much of the old secular organization. The pope borrowed his title of *pontifex maximus* from the emperor: what is far more, he made himself gradually, and in the course of centuries, the Caesar and Imperator of the Church. The offices and the dioceses of the Church are parallel to the offices and dioceses of the Diocletian empire: the whole spirit of orderly hierarchy and regular organization, which breathes in the Roman Church, is the heritage of ancient Rome. The Donation of Constantine is a forgery; but it expresses a great truth when it represents Constantine as giving to the pope the imperial palace and insignia, and to the clergy the ornaments of the imperial army (see DONATION OF CONSTANTINE).

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[1] Bryce points out, with much subtlety and truth, that the rise of a second Rome in the East not only helped to perpetuate the Empire by providing a new centre which would take the place of Rome when Rome fell, but also tended to make it more universal; "for, having lost its local centre, it subsisted no longer by historic right only, but, so to speak, naturally, as a part of an order of things which a change in external conditions seemed incapable of disturbing" (*Holy Roman Empire*, p. 8 of the edition of 1904).

Barbarian invasions.

Upon this world, informed by these ideas, there finally descended, in the 5th century, the avalanche of barbaric invasion. Its impact seemed to split the Empire into fragmentary kingdoms; yet it left the universal Church intact, and with it the conception of empire. With that conception, indeed, the barbarians had already been for centuries familiar: service in Roman armies, and settlement in Roman territories, had made the Roman empire for them, as much as for the civilized provincial, part of the order of the world. One of the barbarian invaders, Odoacer (Odovakar), might seem, in 476, to have swept away the Empire from the West, when he commanded the abdication of Romulus Augustulus; and the date 476 has indeed been generally emphasized as marking "the fall of the Western empire." Other invaders, again, men like the Frank Clovis or the great Ostrogoth Theodoric, might seem, in succeeding years, to have completed the work of Odoacer, and to have shattered the sorry scheme of the later Empire, by remoulding it into national kingdoms. *De facto*, there is some truth in such a view: *de jure*, there is none.[1] All that Odoacer did was to abolish one of the two joint rulers of the indivisible Empire, and to make the remaining ruler at Constantinople sole emperor from the Bosporus to the pillars of Hercules. He abolished the dual sovereignty which had been inaugurated by Diocletian, and returned to the unity of the Empire in the days of Marcus Aurelius. He did not abolish the Roman empire in the West: he only abolished its separate ruler, and, leaving the Empire itself subsisting, under the sway (nominal, it is true, but none the less acknowledged) of the emperor resident at Constantinople, he claimed to act as his vicar, under the name of patrician, in the administration of the Italian provinces.[2] As Odoacer thus fitted himself into the scheme of empire, so did both Clovis and Theodoric. They do not claim to be emperors (that was reserved for Charlemagne): they claim to be the vicars and lieutenants of the Empire. Theodoric spoke of himself to Zeno as *imperio vestro famulans*; he left justice and administration in Roman hands, and maintained two annual consuls in Rome. Clovis received the title of consul from Anastasius; the Visigothic kings of Spain (like the kings of the savage Lombards) styled themselves Flavii, and permitted the cities of their eastern coast to send tribute to Constantinople. Yet it must be admitted that, as a matter of fact, this adhesion of the new barbaric kings to the Empire was little more than a form. The Empire maintained its ideal unity by treating them as its vicars; but they themselves were forming separate and independent kingdoms within its borders. The Italy of the Ostrogoths cannot have belonged, in any real sense, to the Empire; otherwise Justinian would never have needed to attempt its reconquest. And in the 7th and 8th centuries the form of adhesion itself decayed: the emperor was retiring upon the Greek world of the East, and the German conquerors, settled within their kingdoms, lost the width of outlook of their old migratory days.

The Church and the Empire.

Growing divergence between East and West. The popes.

It is here that the action of the Church becomes of supreme importance. The Church had not ceased to believe in the continuous life of the Empire. The Fathers had taught that when the cycle of empires was finally ended by the disappearance of the empire of Rome, the days of Antichrist would dawn; and, since Antichrist was not yet come, the Church believed that the Empire still lived, and would continue to live till his coming. Meanwhile the Eastern emperor, ever since Justinian's reconquest of Italy, had been able to maintain his hold on the centre of Italy; and Rome itself, the seat of the head of the Church, still ranked as one of the cities under his sway. The imperialist theory of the Church found its satisfaction in this connexion of its head with Constantinople; and as long as this connexion continued to satisfy the Church, there was little prospect of any change. For many years after their invasion of 568, the pressure which the Lombards maintained on central Italy, from their kingdom in the valley of the Po, kept the popes steadily faithful to the emperor of the East and his representative in Italy, the exarch of Ravenna. But it was not in the nature of things that such fidelity should continue unimpaired. The development of the East and the West could not but proceed along constantly diverging lines, until the point was reached when their connexion must snap. On the one hand, the development of the West set towards the increase of the powers of the bishop of Rome until he reached a height at which subjection to the emperor at Constantinople became impossible. Residence in Rome, the old seat of empire, had in itself given him a great prestige; and to this prestige St Gregory (pope from 590 to 604) had added in a number of ways. He was one of the Fathers of the Church, and turned its theology into the channels in which it was to flow for centuries; he had acquired for his church the great spiritual colony of England by the mission of St Augustine; he had been the protector of Italy against the Lombards. As the popes thus became more and more spiritual emperors of the West, they found themselves less and less able to remain the subjects of the lay emperor of the East. Meanwhile the emperors of the East were led to interfere in ecclesiastical affairs in a manner which the popes and the Western Church refused to tolerate. Brought into contact with the pure monotheism of Mahommedanism, Leo the Isaurian (718–741) was stimulated into a crusade against image-worship, in order to remove from the Christian Church the charge of idolatry. The West clung to its images: the popes revolted against his decrees; and the breach rapidly became irreparable. As the hold of the Eastern emperor on central Italy began to be shaken, the popes may have begun to cherish the hope of becoming their successors and of founding a temporal dominion; and that hope can only have contributed to the final dissolution of their connexion with the Eastern empire.

Thus, in the course of the 8th century, the Empire, *as represented by the emperors at Constantinople*, had begun to fade utterly out of the West. It had been forgotten by lay sovereigns; it was being abandoned by the pope, who had been its chosen apostle. But it did not follow that, because the Eastern emperor ceased to be the representative of the Empire for the West, the conception of Empire itself therefore perished. The popes only abandoned the representative; they did not abandon the conception. If they had abandoned the conception, they would have abandoned the idea that there was an order of the world; they would have committed themselves to a belief in the coming of Antichrist. The conception of the world as a single Empire-Church remained: what had to be discovered was a new representative of one of the two sides of that conception. For a brief time, it would seem, the pope himself cherished the idea of becoming, in his own person, the successor of the ancient Caesars in their own old capital. By the aid of the Frankish kings, he had been able to stop the Lombards from acquiring the succession to the derelict territories of the Eastern emperor in Italy (from which their last exarch had fled overseas in 752), and he had become the temporal sovereign of those territories. Successor to the Eastern emperor in central Italy, why should he not also become his successor as representative of the Empire—all the more, since he was the head of the Church, which was coextensive with the Empire? Some such hope seems to inspire the Donation of Constantine, a document forged between 754 and 774, in which Constantine is represented as having conferred on Silvester I. the imperial palace and insignia, and therewith *omnes Italiae seu occidentalium regionum provincias loca et civitates*. But the hope, if it ever was cherished,

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[1] The *de facto* importance of the event of 476 can only be seen in the light of later events, and it was not therefore noticed by contemporaries. Marcellinus is the only contemporary who remarks on its importance, cf. *Marcellini Chronicon* (*Mon. Germ. Hist.*, *Chronica minora*. ii. 91), *Hesperium Romanae gentis imperium . . . cum hoc Augustulo periit . . . Gothorum dehinc regibus Romam tenentibus.*

[2] A passage in Malchus, a Byzantine historian (quoted by Bryce, *Holy Roman Empire*, p. 25, note *u*, in the edition of 1904), expresses this truth exactly. The envoys sent to Zeno by Odoacer urge ὡς ἰδίας μὲν αὐτοῖς βασιλείας οὐ δέοι κοινὸς δὲ ἀποχρήσει μόνος ὢν αὐτοκράτωρ ἐπ' ἀμφοτέροις τοῖς πέρασι. The envoys then suggest the name of Odoacer, as one able to manage their affairs, and ask Zeno to give him, *as an officer of the Empire*, the title of Patricius and the administration of Italy.

Coronation of Charlemagne as emperor of the West.

proved to be futile. The popes had not the material force at their command which would have made them adequate to the position. The strong arm of the Frankish kings had alone delivered them from the Lombards: the same strong arm, they found, was needed to deliver them from the wild nobility of their own city. So they turned to the power which was strong enough to undertake the task which they could not themselves attempt, and they invited the Frankish king to become the representative of the imperial conception they cherished.[1] In the year 800 central Italy ceased to date its documents by the regnal years of the Eastern emperors; for Charlemagne was crowned emperor in their stead.

The king of the Franks was well fitted for the position which he was chosen to fill. He was king of a stock which had been from the first Athanasian, and had never been tainted, like most of the Germanic tribes, by the adoption of Arian tenets. His grandfather, Charles Martel, had saved Europe from the danger of a Mahommedan conquest by his victory at Poitiers (732); his father, Pippin the Short, had helped the English missionary Boniface to achieve the conversion of Germany. The popes themselves had turned to the Frankish kings for support again and again in the course of the 8th century. Gregory III., involved in bitter hostilities with the iconoclastic reformers of the East, appealed to Charles Martel for aid, and even offered the king, it is said, the titles of consul and patrician. Zacharias pronounced the deposition of the last of the Merovingians, and gave to Pippin the title of king (751); while his successor, Stephen II., hard pressed by the Lombards, who were eager to replace the Eastern emperors in the possession of central Italy, not only asked and received the aid of the new king, but also acquired, in virtue of Pippin's donation (754), the disputed exarchate itself. Thus was laid the foundation of the States of the Church; and the grateful pope rewarded the donation by the gift of the title of *patricius Romanorum*, which conferred on its recipient the duty and the privilege of protecting the Roman Church, along with some undefined measure of authority in Rome itself.[2] Finally, in 773, Pope Adrian I. had to appeal to Charles, the successor of Pippin, against the aggressions of the last of the Lombard kings; and in 774 Charles conquered the Lombard kingdom, and himself assumed its iron crown. Thus by the end of the 8th century the Frankish king stood on the very steps of the imperial throne. He ruled a realm which extended from the Pyrenees to the Harz, and from Hamburg to Rome—a realm which might be regarded as in itself a *de facto* empire. He bore the title of *patricius*, and he had shown that he did not bear it in vain by his vigorous defence of the papacy in 774. Here there stood, ready to hand, a natural representative of the conception of Empire; and Leo III., finding that he needed the aid of Charlemagne to maintain himself against his own Romans, finally took the decisive step of crowning him emperor, as he knelt in prayer at St Peter's, on Christmas Day, 800.

Theory of the Carolingian empire.

The coronation of Charlemagne in 800 marks the coalescence into a single unity of two facts, or rather, more strictly speaking, of a fact and a theory. The fact is German and secular: it is the wide *de facto* empire, which the Frankish sword had conquered, and Frankish policy had organized as a single whole. The theory is Latin and ecclesiastical: it is a theory of the necessary political unity of the world, and its necessary representation in the person of an emperor—a theory half springing from the unity of the old Roman empire, and half derived from the unity of the Christian Church as conceived in the New Testament. If we seek for the force which caused this fact and this theory to coalesce in the Carolingian empire, we can only answer—the papacy. The idea of Empire was in the Church; and the head of the Church translated this idea into fact. If, however, we seek to conceive the event of 800 from a political or legal point of view, and to determine the residence of the right of constituting an emperor, we at once drift into the fogs of centuries of controversy. Three answers are possible from three points of view; and all have their truth, according to the point of view. From the ecclesiastical point of view, the right resides with the pope. This theory was not promulgated (indeed no theory was promulgated) until the struggles of Papacy and Empire in the course of the middle ages; but by the time of Innocent III. it is becoming an established doctrine that a *translatio Imperii* took place in 800, whereby the pope transferred the Roman empire from the Greeks to the Germans in the person of the magnificent Charles.[3] One can only say that, as a matter of fact, the popes ceased to recognize the Eastern emperors, and recognized Charles instead, in the year 800; that, again, this recognition alone made Charles emperor, as nothing else could have done; but that no question arose, at the time, of any right of the pope to give the Empire to Charlemagne, for the simple reason that neither of the actors was acting or thinking in a legal spirit. If we now turn to study the point of view of the civil lawyer, animated by such a spirit, and basing himself on the code of Justinian, we shall find that an emperor must derive his institution and power from a *lex regia* passed by the *populus Romanus*; and such a view, strictly interpreted, will lead us to the conclusion that the citizens of Rome had given the crown to Charlemagne in 800, and continued to bestow it on successive emperors afterwards. There is indeed some speech, in the contemporary accounts of Charlemagne's coronation, of the presence of "ancients among the Romans" and of "the faithful people"; but they are merely present to witness or applaud, and the conception of the Roman people as the source of Empire is one that was only championed, at a far later date, by antiquarian idealists like Arnold of Brescia and Cola di Rienzi. The *faex Romuli*, a population of lodging-house keepers, living upon pilgrims to the papal court, could hardly be conceived, except by an ardent imagination, as heir to the *Quirites* of the past. Finally, from the point of view of the German tribesman, we must admit that the Empire was something which, once received by his king (no matter how), descended in the royal family as an heirloom; or to which (when the kingship became elective) a title was conferred, along with the kingship, by the vote of electors.[4]

But apart from these questions of origin, two difficulties have still to be faced with regard to the nature and position of the Carolingian empire. Did Charlemagne and his successors enter into a new relation with their subjects, in virtue of their coronation? And what was the nature of the relation between the new emperor now established in the West and the old emperor still reigning in the East? It is true that Charlemagne exacted a new oath of allegiance from his subjects after his coronation, and again that he had a revision of all the laws of his dominions made in 802. But the revision did not amount to much in bulk: what there was contained little that was Roman; and, on the whole, it hardly seems probable that Charlemagne entered into any new relation with his subjects. The relation of his empire to the empire in the East is a more difficult and important problem. In 797 the empress Irene had deposed and blinded her son, Constantine VI., and usurped his throne. Now it would seem that Charlemagne, whose thoughts

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[1] According to the view here followed, the Church was the ark in which the conception of Empire was saved during the dark ages between 600 and 800. Some influence should perhaps also be assigned to Roman law, which continued to be administered during these centuries, especially in the towns, and maintained the imperial tradition. But the influence of the Church is the essential fact.

[2] In the 5th century the title *patricius* came to attach particularly to the head of the Roman army (*magister utriusque militiae*) to men like Aetius and Ricimer, who made and unmade emperors (cf. Mommsen, *Gesammelte Schriften*, iv. 537, 545 sqq.). Later it had been borne by the Greek exarchs of Ravenna. The concession to Pippin of this great title makes him military head of the Western empire, in the sense in which the title was used in the 5th century; it makes him representative of the Empire for Italy, in the sense in which it had been used of the exarchs.

[3] See the famous bull *Venerabilem* (*Corp. Jur. Canon.* Decr. Greg. i. 6, c. 34).

[4] Even on this view, an imperial coronation at the hands of the pope was necessary to complete the title; but this was regarded by the Germans (though not by the pope) as a form which necessarily followed.

Relations of the Carolingian to the Eastern empire.

were already set on Empire, hoped to depose and succeed Irene, and thus to become sole representative of the conception of Empire, both for the East and for the West. Suddenly there came, in 800, his own coronation as emperor, an act apparently unpremeditated at the moment, taking him by surprise, as one gathers from Einhard's *Vita Karoli*, and interrupting his plans. It left him representative of the Empire for the West only, confronting another representative in the East. Such a position he did not desire: there had been a single Empire vested in a single person since 476, and he desired that there should still continue to be a single Empire, vested only in his own person. He now sought to achieve this unity by a proposal of marriage to Irene. The proposal failed, and he had to content himself with a recognition of his imperial title by the two successors of the empress. This did not, however, mean (at any rate in the issue) that henceforth there were to be two conjoint rulers, amicably ruling as colleagues a single Empire, in the manner of Arcadius and Honorius. The dual government of a single Empire established by Diocletian had finally vanished in 476; and the unity of the Empire was now conceived, as it had been conceived before the days of Diocletian, to demand a single representative. Henceforth there were two rulers, one at Aix-la-Chapelle and one at Constantinople, each claiming, whatever temporary concessions he might make, to be the sole ruler and representative of the Roman empire. On the one hand, the Western emperors held that, upon the deposition of Constantine VI., Charlemagne had succeeded him, after a slight interval, in the government of the whole Empire, both in the East and in the West; on the other hand, the Eastern emperors, in spite of their grudging recognition of Charlemagne at the moment, regarded themselves as the only lawful successors of Constantine VI., and viewed the Carolings and their later successors as upstarts and usurpers, with no right to their imperial pretensions. Henceforth two halves confronted one another, each claiming to be the whole; two finite bodies touched, and each yet claimed to be infinite.

Character of the Carolingian empire.

If, as has been suggested, Charlemagne did not enter into any fundamentally new relations with his subjects after his coronation, it follows that the results of his coronation, in the sphere of policy and administration, cannot have been considerable. The Empire added a new sanction to a policy and administration already developed. Charlemagne had already showed himself *episcopus episcoporum*, anxious not only to suppress heresy and supervise the clergy within his borders, but also to extend true Christianity without them even before the year when his imperial coronation gave him a new title to supreme governorship in all cases ecclesiastical. He had already organized his empire on a new uniform system of counties, and the *missi dominici* were already at work to superintend the action of the counts, even before the *renovatio imperii Romani* came to suggest such uniformity and centralization. Charlemagne had a new title; but his subjects still obeyed the king of the Franks, and lived by Frankish law, in the old fashion. In their eyes, and in the eyes of Charlemagne's own descendants, the Empire was something appendant to the kingship of the Franks, which made that kingship unique among others, but did not radically alter its character. True, the kingship might be divided among brothers by the old Germanic custom of partition, while the Empire must inhere in one person; but that was the one difference, and the one difficulty, which might easily be solved by attaching the name of emperor to the eldest brother. Such was the conception of the Carolings: such was not, however, the conception of the Church. To the popes the Empire was a solemn office, to which the kings of the Franks might most naturally be called, in view of their power and the traditions of their house, but which by no means remained in their hands as a personal property. By thus seeking to dissociate the Empire from any indissoluble connexion with the Carolingian house, the popes were able to save it. Civil wars raged among the descendants of Charlemagne: partitions recurred: the Empire was finally dissolved, in the sense that the old realm of Charlemagne fell asunder, in 888. But the Empire, as an office, did not perish. During the 9th century the popes had insisted, as each emperor died, that the new emperor needed coronation at their hands; and they had thus kept alive the conception of the Empire as an office to which they invited, if they did not appoint, each successive emperor. The quarrels of the Carolingian house helped them to make good their claim. John VIII. was able to select Charles the Bald in preference to other claimants in 875; and before the end of his pontificate he could write that "he who is to be ordained by us to the Empire must be by us first and foremost invited and elected." Thus was the unity of the Empire preserved, and the conception of a united Empire continued, in spite of the eventual dissolution of the realm of Charlemagne. When the Carolingian emperors disappeared, Benedict IV. could crown Louis of Provence (901) and John X. could invite to the vacant throne an Italian potentate like Berengar of Friuli (915); and even when Berengar died in 924, and the Empire was vacant of an emperor, they could hold, and hold with truth, that the Empire was not dead, but only suspended, until such time as they should invite a new ruler to assume the office.

Break-up of the Carolingian empire.

Attitude of the papacy.

The German kingdom and the empire.

Various causes had contributed to the dissolution of the realm of Charlemagne. Partitions had split it; feudalism had begun to honeycomb it; incessant wars had destroyed its core, the fighting Franks of Austrasia. But, above all, the rise of divisions within the realm, which, whether animated by the spirit of nationality or no, were ultimately destined to develop into nations, had silently undermined the structure of Pippin and Charlemagne. Already in 842 the oath of Strassburg shows us one Caroling king swearing in French and another in German: already in 870 the partition of Mersen shows us the kings of France and Germany dividing the middle kingdom which lay between the two countries by the linguistic frontier of the Meuse and Moselle. The year 888 is the birth-year of modern Europe. France, Germany, Italy, stood distinct as three separate units, with Burgundy and Lorraine as debatable lands, as they were destined to remain for centuries to come. If the conception of Empire was still to survive, the pope must ultimately invite the ruler of the strongest of these three units to assume the imperial crown; and this was what happened when in 962 Pope John XII. invited Otto I. of Germany to renew once more the Roman Empire. As the imperial strength of the whole Frankish tribe had given them the Empire in 800, so did the national strength of the East Frankish kingdom, now resting indeed on a Saxon rather than a Frankish basis, bring the Empire to its ruler in 962. The centre of political gravity had already been shifting to the east of the Rhine in the course of the 9th century. While the Northmen had carried their arms along the rivers and into the heart of France, Louis the German had consolidated his kingdom in a long reign of sixty years (817-876); and at the end of the 9th century two kings of Germany had already worn the imperial crown. Early in the 10th century the kingship of Germany had come to the vigorous Saxon dukes (919); and strong in their Saxon basis Henry I. and his son Otto had built a realm which, disunited as it was, was far more compact than that which the Carolings of the West ruled from Laon. Henry I. had thought in his later years of going to Rome for the imperial crown: under Otto I. the imperial idea becomes manifest. On the one hand, he established a semi-imperial position in the West: by 946 Louis IV. d'Outremer is his protégé, and it is his arms which maintain the young Conrad of Burgundy on his throne. On the other hand, he showed, by his policy towards the German Church, that he was the true heir of the Carolingian traditions. He made churchmen his ministers; he established missionary bishoprics on the Elbe which should spread Christianity among the Wends; and his dearest project was a new archbishopric of Magdeburg. The one thing needful was that he should, like Charlemagne, acquire the throne of Italy; and the dissolute condition of that country during the first half of the

The Holy Roman Empire.

10th century made its acquisition not only possible, but almost imperative. Begun in 952, the acquisition was completed ten years later; and all the conditions were now present for Otto's assumption of the imperial throne. He was crowned by John XII. on Candlemas Day 962, and thus was begun the Holy Roman Empire, which lasted henceforth with a continuous life until 1806.[1]

The Empire and feudalism.

The same ideas underlay the new empire which had underlain that of Charlemagne, strengthened and reinforced by the fact that they had already found a visible expression before in that earlier empire. Historically, there was the tradition of the old Roman empire, preserved by the Church as an idea, and preserved in the Church, and its imperial organization, as an actual fact. Ecclesiastically, there was the Pauline conception of a single Christian Church, one in subjection to Christ as its Head, and needing (so men still thought) a secular counterpart of its indivisible unity.[2] To these two sanctions philosophy later added a third; and the doctrine of Realism, that the one universal is the true abiding substance—the doctrine which pervades the *De monarchia* of Dante,—reinforced the feeling which demanded that Europe should be conceived as a single political unity. But if the Holy Roman empire of the German nation has the old foundations, it is none the less a thing *sui generis*. Externally, it meant far less than the empire of Charlemagne; it meant simply a union of Germany and northern Italy (to which, after 1032, one must also add Burgundy, though the addition is in reality nominal) under a single rule. Historians of the 19th century, during the years in which the modern German empire was in travail, disputed sorely on the advantages of this union; but whatever its advantages or disadvantages, the fact remains that the union of Teutonic Germany and Latin Italy was, from an external point of view, the essential fact in the structure of the medieval Empire. Internally, again, the Empire of the Ottos and their successors was new and unprecedented. If Latin imperialism had been combined with Frankish tribalism in the Empire of Charlemagne, it now met and blended with feudalism. The Holy Roman emperor of the middle ages, as Frederick I. proudly told the Roman envoys, found his senate in the diet of the German baronage, his *equites* in the ranks of the German knights. Feudalism, indeed, came in time to invade the very conception of Empire itself. The emperors began to believe that their position of emperor made them feudal overlords of other kings and princes; and they came to be regarded as the topmost summit of the feudal pyramid, from whom kings held their kingdoms, while they themselves held directly of God. In this way the old conception of the world as a single political society entered upon a new phase: but the translation of that conception into feudal terms, which might have made Diocletian gasp, only gave it the greater hold on the feudal society of the middle ages. Yet in one way the feudal conception was a source of weakness to the Empire; for the popes, from the middle of the 12th century onwards, began to claim for themselves a feudal overlordship of the world, and to regard the emperor as the chief of their vassals. The theory of the *Translatio* buttressed their claim to be overlords of the Empire; and the emperors found that their very duty to defend the Papacy turned them into its vassals—for was not the *advocatus* who defended the lands of an abbey or church its tenant by feudal service, and might not analogy extend the feudal relation to the imperial advocate himself?

The Empire and the Papacy.

The relation of the Empire to the Papacy is indeed the cardinal fact in its history for the three centuries which followed the coronation of Otto I. (962–1250). For a century (962–1076) the relation was one of amity. The pope and the emperor stood as co-ordinate sovereigns, ruling together the commonwealth of Europe.[3] If either stood before the other, the emperor stood before the pope. The Romans had sworn to Otto I. that they would never elect or ordain a pope without his consent; and the rights over papal elections conceived to belong to the office of *patricius*, which they generally held, enabled the emperors, upon occasion, to nominate the pope of their choice. The partnership of Otto III., son of a Byzantine princess, and his nominee Silvester II. (already distinguished as Gerbert, *scholasticus* of the chapter school of Reims) forms a remarkable page in the annals of Empire and Papacy. Otto, once the pupil of Silvester in classical studies, and taught by his mother the traditions of the Byzantine empire, dreamed of renewing the Empire of Constantine, with Rome itself for its centre; and this antiquarian idealism (which Arnold of Brescia and Cola di Rienzi were afterwards, though with some difference of aim, to share) was encouraged in his pupil by the pope. Tradition afterwards ascribed to the two the first project of a crusade, and the institution of the seven electors: in truth their faces were turned to the past rather than to the future, and they sought not to create, but to renovate. The dream of restoring the age of Constantine passed with the premature death of Otto; and after the death of Silvester II. the papacy was degraded into an appendage of the Tusculan family. From that degradation the Church was rescued by Henry III. (the second emperor of the new Salian house, which reigned from 1024 to 1125), when in 1046 he caused the deposition of three competing popes, and afterwards filled the papal chair with his own nominees; but it was rescued more effectually by itself, when in 1059 the celebrated bull *In nomine Domini* of Nicholas II. reserved the right of electing the popes to the college of cardinals (see CONCLAVE). A new era of the Papacy begins with the decree, and that era found its exponent in Hildebrand. If under Henry III. the Empire stands in many respects at its zenith, and the emperor nominates to the Papacy, it sinks, under Henry IV., almost to the nadir of its fortunes, and a pope attempts, with no little success, to fight and defeat an emperor.

The investiture contest.

The rise of the Papacy, which the action of Henry III. in 1046 had helped to begin, and the bull of 1059 had greatly promoted, was ultimately due to an ecclesiastical revival, which goes by the name of the Cluniac movement. The aim of that movement was to separate the Church from the world, and thus to make it independent of the laity and the lay power; and it sought to realize its aim first by the prohibition of clerical marriage and simony, and ultimately by the prohibition of lay investiture. A decree of Gregory VII. in 1075 forbade emperor, king or prince to "presume to give investiture of bishoprics," under pain of excommunication; and Henry IV., contravening the decree, fell under the penalty, and the War of Investitures began (1076–1122). Whether or no Henry humiliated himself at Canossa (and the opinion of German historians now inclines to regard the traditional account as exaggerated) the Empire certainly suffered in his reign a great loss of prestige. The emperor lost his hold over Germany, where the aid of the pope strengthened the hands of the discontented nobility: he lost his hold over Italy, where the Lombard towns gradually acquired municipal independence, and the donation of the Countess Matilda gave the popes the germ of a new and stronger *dominium temporale*. The First Crusade came, and the emperor, its natural leader, could not lead it; while the centre of learning and civilization, in the course of the fifty years' War of Investitures, gradually shifted to France. The struggle was finally ended by a compromise—the Concordat of Worms—in 1122; but the Papacy, which had fought the long War of Investitures and inspired the First Crusade, was a far greater power than it had been at the beginning of the struggle, and the emperor, shaken in his hold on Germany and Italy, had lost both power and prestige (see INVESTITURE). It is significant that a theory of the feudal subjection of the emperor to the pope, foreshadowed in the pontificate of Innocent II., and definitely enounced by the envoys of Adrian IV. at the diet of Besançon in 1157, now begins to arise. The popes, who had called the emperors to be heads of the European commonwealth in 800 and again in 962, begin to vindicate that headship for themselves. Gregory VII. had already claimed that the pope stood to the emperor, as the sun to the moon; and gradually the old coordination disappeared in a new subordination of the Empire to the papal *plenitudo potestatis*. The claim of ecclesiastical independence of the middle of the 11th century was rapidly becoming a claim of ecclesiastical supremacy in the middle of the 12th: the imperial claim to nominate popes, which had lasted till 1059, was turning into the papal claim to nominate emperors. Yet at this very time a new period of splendour dawned for the Empire; and the rule of the three Hohenstaufen emperors, Frederick I., Henry VI. and Frederick II. (1152–1250), marks the period of its history which attracts most sympathy and admiration.

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[1] It is a curious fact that imperial titles (*imperator* and *basileus*) are used in the Anglo-Saxon diplomata of the 10th century. Edred, for instance (946–955) is "imperator," "cyning and casere totius Britanniae," "basileus Anglorum hujusque insulae barbarorum": Edgar is "totius Albionis imperator Augustus" (cf. Stubbs, *Const. Hist.* i. c. vii. § 71). These titles partly show the turgidity of English Latinity in the 10th century, partly indicate the quasi-imperial position held by the Wessex kings after the reconquest of the Danelaw. But there seems to be no real ground for Freeman's view (*Norman Conquest*, i. 548 sqq.), that England was regarded as a third Empire, side by side with the other Empires of West and East Europe. That the titles were assumed in order to repudiate possible claims of the Western Empire to the overlordship of England is disproved by the fact that they are assumed at a time when there is no Western emperor. The assumption of an imperial style by Henry VIII., which is mentioned below, is explained by the Reformation, and does not mean any recurrence to a forgotten Anglo-Saxon style.

[2] It is in virtue of this aspect that the Empire is holy. The term *sacrum imperium* seems to have been first used about the time of Frederick I., when the emperors were anxious to magnify the sanctity of their office in answer to papal opposition. The emperor himself (see under EMPEROR) was always regarded, and at his coronation treated, as a *persona ecclesiastica*.

[3] The emperor claimed suzerainty over the greater part of Europe at various dates. Hungary and Poland, France and Spain, the Scandinavian peninsula, the British Isles, were all claimed for the Empire at different times (see Bryce, *Holy Roman Empire*, c. xii.). The "effective" empire, if indeed it may be called effective, embraced only Germany, Burgundy and the *regnum Italiae* (the old Lombard kingdom in the valley of the Po).

The Hohenstaufen emperors.

Frederick I. regained a new strength in Germany, partly because he united in his veins the blood of the two great contending families, the Welfs and the Waiblingens; partly because he had acquired large patrimonial possessions in Swabia, which took the place of the last Saxon demesne; partly because he had a greater control over the German episcopate than his predecessors had enjoyed for many years past. At the same time the revival of interest in the study of Roman law gave the emperor, as source and centre of that law, a new dignity and prestige, particularly in Italy, the home and hearth of the revival. Confident in this new strength, he attempted to vindicate his claims on Italy, and sought, by uniting the two under his sway, to inspire with new life the old Ottonian Empire. He failed to crush Lombard municipal independence: defeated at Legnano in 1176, he had to recognize his defeat at the treaty of Constance in 1183. He failed to acquire control over the Papacy: a new struggle of Empire and Papacy, begun in the pontificate of Adrian IV. on the question of control over Rome, and continued in the pontificate of Alexander III., because Frederick recognized an anti-pope, ended in the emperor's recognition of his defeat at Venice in 1177. The one success was the acquisition of the Norman kingdom for Henry VI., who was married to its heiress, Constance. But the one success of Frederick's Italian policy proved the ruin of his house in the reign of his grandson Frederick II. On the one hand, the possession of Sicily induced Frederick II. to neglect Germany; and by two documents, one of 1220 and one of 1231, he practically abdicated his sovereign powers to the German princes in order to conciliate their support for his Italian policy. On the other hand, the possession of Sicily involved him in the third great struggle of Empire and Papacy. Strong in his Sicilian kingdom in the south, and seeking, like his grandfather, to establish his power in Lombardy, Frederick practically aimed at the unification of Italy, a policy which threatened to engulf the States of the Church and to reduce the Papacy to impotence. The popes excommunicated the emperor: they aided the Lombard towns to maintain their independence; finally, after Frederick's death (1250), they summoned Charles of Anjou into Sicily to exterminate his house. By 1268 he had done his work, and the medieval Empire was practically at an end. When Rudolph of Habsburg succeeded in 1273, he was only the head of a federation of princes in Germany, while in Italy he abandoned all claims over the centre and south, and only retained titular rights in the Lombard plain.

Overthrow of the Empire in Italy.

Thus ended the first great chapter in the history of the Holy Roman Empire which Otto had founded in 962. In those three centuries the great fact had been its relation to the Papacy: in the last two of those three centuries the relation had been one of enmity. The basis of the enmity had been the papal claim to supreme headship of Latin Christianity, and to an independent temporal demesne in Italy as the condition of that headship. Because they desired supreme headship, the popes had sought to reduce the emperor's headship to something lower than, and dependent upon, their own—to a mere fief held of St Peter: because they desired a temporal demesne, they had sought to expel him from Italy, since any imperial hold on Italy threatened their independence. They had succeeded in defeating the Empire, but they had also destroyed the Papacy; for the French aid which they had invoked against the Hohenstaufen developed, within fifty years of the fall of that house, into French control, and the captivity at Avignon (1308–1378) was the logical result of the final victory of Charles of Anjou at Tagliacozzo. The struggle seemed to have ended in nothing but the exhaustion of both combatants. Yet in many respects it had in reality made for progress. It had set men thinking of the respective limits of church and state, as the many *libelli de lite imperatorum et pontificum* show; and from that thought had issued a new conception of the state, as existing in its own right and supreme in its own sphere, a conception which is the necessary basis of the modern nation-state. If it had dislocated Germany into a number of territorial principalities, it had produced a college of electors to represent the cause of unity: if it had helped to prevent the unification of Italy, and had left to Italy the fatal legacy of Guelph and Ghibelline feuds, it had equally helped to produce Italian municipal independence.

The Empire from the election of Rudolph of Habsburg, 1273.

A new chapter of the history of the Empire fills the three centuries from 1273 to 1556—from the accession of Rudolph of Habsburg to the abdication of Charles V. Italy was now lost: the Empire had now no peculiar connexion with Rome, and far less touch with the Papacy. A new Germany had risen. The extinction of several royal stocks and the nomination of anti-kings in the course of civil wars had made the monarchy elective, and raised to the side of the emperor a college of electors (see ELECTORS), which appears as definitely established soon after 1250. With Italy lost, and Germany thus transmuted, why should the Empire have still continued to exist? In the first place, it continued to exist because the Germans still found a king necessary and because, the German king having been called for three centuries emperor, it seemed necessary that he should still continue to bear the name. In this sense the Empire existed as the presidency of a Germanic confederation, and as something analogous to the modern German empire, with the one great difference that the Hohenzollerns now derive from Prussia a strength which enables them to make their imperial position a reality, while no Luxemburg or Habsburg was able to make his imperial position otherwise than honorary and nominal. In the second place, it continued to exist because the conception of the unity of western Europe still lingered, and was still conceived to need an exponent. In this sense the Empire existed as a presidency, still more honorary and still more nominal, of the nations of western Europe. In both capacities the emperor existed to a great extent because he was a legal necessity—because, in Germany, he was necessary for the investiture of princes with their principalities, and because, in Europe, he was necessary, as the source of all rights, to bestow crowns upon would-be kings, or to act as the head of the great orders of chivalry, or to give patents to notaries. With the history of the Empire regarded as a German confederation we are not here concerned. The reigns of the Habsburg, Luxemburg and

Wittelsbach emperors belong to the history of Germany. Yet two of these emperors, Henry VII. and Louis IV., should not pass without notice, the one for his own sake, the other for the sake of his adherents, and both because, by interfering in Italy, and coming into conflict with the Papacy, they brought once more into prominence the European aspect of the Empire.

Henry VII., the contemporary and the hero of Dante, descended into Italy in 1310, partly because he had no power and no occupation in Germany, partly because he was deeply imbued with the sense of his imperial dignity. Coming as a peacemaker and mediator, he was driven by Guelph opposition into a Ghibelline rôle; and he came into conflict with Clement V., the first of the Avignonese popes, who under the pressure of France attempted to enforce upon Henry a recognition of his feudal subjection. Henry asserted his independence: he claimed Rome for his capital, and the lordship of the world for his right; but, just as a struggle seemed impending, he died, in 1313. During the reign of his successor, Louis IV., the struggle came. Louis had been excommunicated by John XXII. in 1324 for acting as emperor before he had received papal recognition. None the less, in 1328, he came to Rome for his coronation. He had gathered round him strange allies; on the one hand, the more advanced Franciscans, apostles of the cause of clerical disendowment, and inimical to a wealthy papacy; on the other hand, jurists like Marsilius of Padua and John of Jandun, who brought to the cause of Louis the spirit and the doctrines which had already been used in the struggle between Boniface VIII. and Philip IV. of France. Marsilius in particular, in a treatise called the *Defensor Pacis*, insisted on the majesty of the lay state, and even on its superiority to the Church. Perhaps it was Marsilius, learned as he was in Roman law, and remembering the *lex regia* by which the Roman people had of old conferred its power on the emperor, who suggested to Louis the policy, which he followed, of receiving the imperial crown by the decree and at the hands of the Roman people. The policy was remarkable: Louis embraced an alliance which Frederick Barbarossa had spurned, and recognized the medieval Romans as the source of imperial power. Not less remarkable was the new attitude of the German electors, who for the first time supported an emperor against the pope, because they now felt menaced in their own electoral rights; and the one permanent result which finally flowed from the struggle was the enunciation and definition of the rights and privileges of the electors in the Golden Bull of 1356 (see Golden Bull).

The Empire and the rise of the idea of national states.

In this struggle with the Papacy the Empire had shown something of its old universal aspect. It had come into connexion with Italy, and into close connexion with Rome: it had enlisted in defence of its rights at once an Italian like Marsilius and an Englishman like Ockham. The same universal aspect appeared once more in the age of the conciliar movement, at the beginning of the 15th century. One of the essential duties of the emperor, as defender of the Church, was to help the assembling and the deliberations of general councils of the Church. This was the duty discharged by Sigismund, when he forced John XXIII. to summon a council at Constance in 1414, and sought, though in vain, to guide its deliberations. The journey which Sigismund undertook in the interests of the council (1415–1417) is particularly noteworthy. He sought to make peace throughout western Europe, acting as international arbitrator—in virtue of his presidency of western Europe—between England and France, between Burgundians and Armagnacs; but he failed in his aim, and when he returned to the council, it was only to witness the defeat of the party of reform which he championed. National feeling and national antipathies proved too strong for Sigismund's attempt to revive the medieval empire for the purposes of international arbitration: the same feeling, the same antipathies, made inevitable the failure of the council itself, in which western Europe had sought to meet once more as a single religious commonwealth. Early in the 15th century, therefore, the conception of the unity of western Europe, as a single Empire-Church, was already waning in both its aspects. The unity of the Church Universal was dissolving, and the conception of the nation-church arising (as the separate concordats granted by Martin V. to the different nations prove); while the unity of the Empire was proved a dream, by the powerlessness of the emperor in the face of the struggle of England and France.

Influence of the Reformation.

Renaissance and Reformation combined to complete the fall which the failure of Sigismund to guide the conciliar movement had already foreshadowed. The Renaissance, revolting against the medievalism of the *studium* and not sparing even the *sacerdotium* of the middle ages, had little respect for the medieval *imperium*; and, going back to pure Latin and original Greek, it went back beyond even the classical empire to find its ideals and inspirations. But it is the coming of the Reformation, and with it of the nation-church, which finally marks the epoch at which the last vestige of the old conception of the political unity of the world disappears before the nation-state. Externally indeed it seemed, at the time of the Reformation, as if the old Empire had been revived in the person of Charles V., who owned territories as vast as those of Charlemagne. But Charles's dominions were a dynastic agglomeration, knit together by no vivifying conception; and, though Charles was a champion of the one Catholic Church against the Reformation, he did not in any way seek to revive the power of the medieval empire. Meanwhile the reforming monarchs, while they cast off the Roman Church, cast off with it the Roman empire. Henry VIII. declared himself free, not only of the pope, but of all other foreign power; not only so, but as he sought to take the place of the pope with regard to his own church, so he sought to take the place of the emperor with regard to his kingdom, and spoke of his "imperial" crown, a style which recurs in later Tudor reigns.[1] The conception of one Empire passed out of Europe, or, if it remained, it remained only in an honorary precedence accorded by other sovereigns to the king of Germany, who still entitled himself emperor. In Germany itself the honorary presidency which the emperor enjoyed over the princes came to mean still less than before, when religious differences divided the country, and the principle of *cujus regio ejus religio* accentuated the local autonomy of the prince. When Charles abdicated in 1556, the change which the accession of Rudolph of Habsburg had already marked was complete: there was no empire except in Germany, and in Germany the Empire was nothing more than a convenient legal conception. The Reformation, by sweeping away the spiritual unity of western Christendom, had swept away any real conception of its political unity, and with that conception it had swept away the Empire; while it had also, by splitting Germany into two religious camps, and making the emperor at the most the head of a religious faction, dissipated the last vestiges of a real Empire in the country which had, since 962, been its peculiar home.

The Empire as a German confederation.

From 1556 to 1806 the Empire means a loose federation of the different princes of Germany, lay and ecclesiastical, under the presidency, elective in theory but hereditary in practice, of the house of Habsburg. It is an empire much in the same sense as the modern German empire, with a diet somewhat analogous to the modern Bundesrat, and a cumbrous imperial chamber for purposes of justice, hardly at all analogous to the highly organized system of federal justice which prevails in Germany to-day. The dissolution of the Holy Roman Empire into this loose federation had already been anticipated by the concessions made to the princes by Frederick II. in 1220 and 1231; but the final organization of Germany on federal lines was only attained in the treaty of Westphalia of 1648. The attempt of Ferdinand II., in the course of the Thirty Years' War, to assert a practically monarchical authority over the princes of Germany, only led to the regular vindication by the princes of their own monarchical authority. The emperor, who had tried in the 15th century to be the international authority of all Europe, now sank to the position of less than inter-state arbitrator in Germany. That the Empire and the emperor were retained at all, when the princes became so many independent sovereigns, was due partly to a lingering sense of quasi-national sentiment for a *magni nominis umbra*, partly to the need of some authority which should combine in one whole principalities of very different sizes and strengths, and should protect the weak from the strong, and all from France. But this authority only found its *symbol* in the emperor. Such real federal authority as there was remained with the diet, a congress of sovereign princes through their accredited representatives; and the emperor's sole rights, as emperor, were those of granting titles and confirming tolls. The Habsburgs, emperors in each successive generation, never pursued an imperial, but always a dynastic policy; and they were perfectly ready to sacrifice to the aggrandizement of their house the honour of the Empire, as when they ceded Lorraine to France in return for Tuscany (1735).

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[1] Cf. the Act 25 Henry VIII. c. 22, § 1: "the lawful kings and emperors of this realm."

End of the Holy Roman Empire.

It needed the cataclysm of the French Revolution finally to overthrow the Empire. Throughout the 18th century it lasted, a thing of long-winded protocols and never-ending lawsuits, "neither Holy, nor Roman, nor an Empire." But with Napoleon came its destroyer. As far back as the end of the 13th century, French kings had been scheming to annex the title or at any rate absorb the territories of the Empire: at the beginning of the 19th century the annexation of the title by Napoleon seemed very imminent. Posing as the New Charlemagne ("because, like Charlemagne, I unite the crown of France to that of the Lombards, and my Empire marches with the East"), he resolved in 1806, during the dissolution and recomposition of Germany which followed the peace of Lunéville, to oust Francis II. from his title, and to make the Holy Roman Empire part and parcel of the "Napoleonic idea." He was anticipated, however, by the prompt action of the proud Habsburg, who was equally resolved that no other should wear the crown which he himself was powerless to defend, and accordingly, on the 6th of August 1806, Francis resigned the imperial dignity. So perished the Empire. Out of its ashes sprang the Austrian Empire, for Francis, in 1804, partly to counter Napoleon's assumption of the title of Emperor of the French, partly to prepare for the impending dissolution of the old Empire, had assumed the title of "Hereditary Emperor of Austria." And in yet more recent times the German empire may be regarded, in a still more real sense than Austria, as the descendant and representative of the old Empire of the German nation.

General Influence of the Empire.

What had been the results of the Holy Roman Empire, in the course of its long history, upon Germany and upon Europe? It has been a *vexata quaestio* among German historians, whether or no the Empire ruined Germany. Some have argued that it diverted the attention of the German kings from their own country to Italy, and that, by bringing them into conflict with the popes, and by thus strengthening the hands of their rebellious baronage with a papal alliance, it prevented the development of a national German monarchy, such as other sovereigns of western Europe were able to found. Others again have emphasized the racial division of Saxon and Frank, of High German and Low German, as the great cause of the failure of Germany to grow into a united national whole, and have sought to ascribe to the influence of the Empire such unity as was achieved; while they have attributed the learning, the trade, the pre-eminence of medieval Germany to the Italian connexion and the prestige which the Empire brought. It is difficult to pronounce on either side; but one feels that the old localism and individualism which characterized the early German, and had never, on German soil, been combined with and counteracted by a large measure of Roman population and Roman civilization, as they were in Gaul and Spain, would in any case have continued to divide and disturb Germany till late in her history, even if the Empire had never come to reside within her borders. Of the larger question of the influence of the Empire on Europe we can here only say that it worked for good. An Empire which represented, as a Holy Empire, the unity of all the faithful as one body in their secular, no less than in their religious life—an Empire which, again, as a Roman Empire, represented with an unbroken continuity the order of Roman administration and law—such an empire could not but make for the betterment of the world. It was not an empire resting on force, a military empire; it was not, as in modern times empires have sometimes been, an autocracy warranted and stamped by the plébiscite of the mob. It was an empire resting neither on the sword nor on the ballot-box, but on two great ideas, taught by the clergy and received by the laity, that all believers in Christ form one body politic, and that the one model and type for the organization of that body is to be found in the past of Rome. It was indeed the weakness of the Empire that its roots were only the thoughts of men; for the lack of material force, from which it always suffered, hindered it from doing work it might well have done—the work, for instance, of international arbitration. Yet, on the other hand, it was the strength and glory of the Empire that it lived, all through the middle ages, an unconquerable idea of the mind of man. Because it was a being of their thought, it stirred men to reflection: the Empire, particularly in its clash with the Papacy, produced a political consciousness and a political speculation reflected for us in the many *libelli de lite imperatorum et pontificum*, and in the pages of Dante and Marsilius of Padua. Roman, it perpetuated the greatest monument of Roman thought—that ordered scheme of law, which either became, as in England, the model for the building of a native system, or, as in Germany from the end of the 15th century onwards, was received in its integrity and administered in the courts. Holy, it fortified and consolidated Christian thought, by giving a visible expression to the kingdom of God upon earth; and not only so, but it maintained, however imperfectly, some idea of international obligation, and some conception of a commonwealth of Europe.[1]

The Holy Roman Empire of western Europe had in its own day a contemporary and a rival—that east Roman empire of which we have already spoken. From Arcadius to John Palaeologus, from A.D. 395 to 1453, the Roman empire was continued at Constantinople—not as a theory and an idea, but as a simple and daily reality of politics and administration. In one sense the East Roman Empire was more lineally and really Roman than the West: it was absolutely continuous from ancient times. In another sense the Western Empire was the most Roman; for its capital—in theory at least—was Rome itself, and the Roman Church stood by its side, while Constantinople was Hellenic and even Oriental. Between the two Empires there was fixed an impassable gulf; and they were divided by deep differences of thought and temper, which appeared most particularly in the sphere of religion, and expressed themselves in the cleavage between the Catholic and the Orthodox Churches. Yet, as when Rome fell, the Catholic Church survived, and ultimately found for itself a new Empire of the West, so, when Constantinople fell, the Orthodox Church continued its life, and found for itself a new Empire of the East—the Empire of Russia. Under Ivan the Great (1462–1505) Moscow became the metropolis of Orthodoxy; Byzantine law influenced his code; and he took for his cognizance the double-headed eagle. Ivan the Terrible, his grandson, finally assumed in 1547 the title of Tsar; and henceforth the Russian emperor is, in theory and very largely in fact, the successor of the old East Roman emperor,[2] the head of the Orthodox Church, with the mission of vengeance on Islam for the fall of Constantinople.

Modern Empires.

In the 19th century the word "empire" has had a large and important bearing in politics. In France it has been the apanage of the Bonapartes, and has meant a centralized system of government by an efficient Caesar, resting immediately on the people, and annihilating the powers of the people's representatives. Under Napoleon I. this conception had a Carolingian colour: under Napoleon III. there is less of

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[1] The Papacy, consistent to the last, formally protested at the Congress of Vienna in 1815 against the failure of the Powers to restore the Holy Roman Empire, the "centre of political unity" (Ed.).

[2] The Turks, occupying Constantinople, have also claimed to be the heirs of the old emperors of Constantinople; and their sultans have styled themselves *Keisar-i-Rûm*.

Carolingianism, and more of Caesarism—more of a popular dictatorship. While in modern France Empire has meant autocracy instead of representative government, in Germany it has meant a greater national unity and a federal government in the place of a confederation. The modern German empire is at once like and unlike the old Holy Roman Empire. It is unlike the old medieval Empire; for it has no connexion with the Catholic Church, and no relation to Rome. But it is like the Holy Roman Empire of the 17th and 18th centuries—for it represents a federation, but a more real and more unitary federation, of the several states of Germany. The likeness is perhaps more striking than the dissimilarity; and in virtue of this likeness, and because the memory of the old German *Kaiserzeit* was a driving force in 1870, we may speak of the modern German empire as the successor of the old Holy Roman Empire, if we remember that we are speaking of that Empire in its last two centuries of existence. The modern "Empire of Austria," on the other hand, does not connote an empire in the sense of a federation, but is a convenient designation for the sum of the territories ruled by a single sovereign under various titles (king of Bohemia, archduke of Austria, &c.) and unified in a single political system.[1] The title of Emperor was assumed, as we have seen, through an historical accident; and, though the Habsburgs of to-day are personally the lineal descendants of the old Holy Roman emperors, they do not in any way possess an empire that represents the old Holy Empire. In England, of recent years, the term "Empire" and the conception of imperialism have become prominent and crucial. To Englishmen to-day, as to Germans before 1870, the term and the conception stand for the greater unity and definitely federal government of a number of separate states. For the German, indeed, Empire has meant, in great measure, the strengthening of a loose federal institution by the addition of a common personal superior: to us it means the turning of a loose union of separate states already under a common personal superior—the King—into a federal commonwealth living under some common federal institutions. But the aim is much the same; it is the integration of a people under a single scheme which shall be consistent with a large measure of political autonomy. We speak of imperial federation; and indeed our modern imperialism is closely allied to federalism. Yet we do well to cling to the term empire rather than federation; for the one term emphasizes the whole and its unity, the other the part and its independence. This imperialism, which is federalism viewed as making for a single whole, is very different from that Bonapartist imperialism, which means autocracy; for its essence is free co-ordination, and the self-government of each co-ordinated part. The British Empire (*q.v.*) is, in a sense, an aspiration rather than a reality, a thought rather than a fact; but, just for that reason, it is like the old Empire of which we have spoken; and though it be neither Roman nor Holy, yet it has, like its prototype, one law, if not the law of Rome—one faith, if not in matters of religion, at any rate in the field of political and social ideals.

AUTHORITIES.—See, in the first place, J. Bryce, *Holy Roman Empire* (1904 edition); J. von Döllinger, article on "The Empire of Charles the Great" (in *Essays on Historical and Literary Subjects*, translated by Margaret Warre, 1894); H. Fisher, *The Medieval Empire* (1898); E. Gibbon, *The Decline and Fall of the Roman Empire*, edited by J. B. Bury. It would be impossible to refer to all the books bearing on the article, but one may select (i.) for the period down to 476, Stuart Jones, *The Roman Empire* (1908), an excellent brief sketch; H. Schiller, *Geschichte der römischen Kaiserzeit* (1883–1888); O. Seeck, *Geschichte des Untergangs der antiken Welt* (Band I., Berlin, 1897–1898, Band II., 1901) (a remarkable and stimulating book); and the two excellent articles on "Imperium" and "Princeps" in Smith's *Dictionary of Greek and Roman Antiquities* (1890); (ii.) for the period from 476 down to 888, T. Hodgkin, *Italy and her Invaders* (1880–1900); F. Gregorovius, *Geschichte der Stadt Rom im Mittelalter* (1886–1894; Eng. trans., London, 1894–1900); E. Lavisse, *Histoire de France*, II. i. (1901); J. B. Bury, *History of the Later Roman Empire* (1889); (iii.) for the Holy Roman Empire of the German nation, W. von Giesebrecht, *Geschichte der deutschen Kaiserzeit* (1881–1890); J. Zeller, *Histoire d'Allemagne* (1872–1891); R. L. Poole, *Illustrations of Medieval Thought* (1884); S. Riezler, *Die literarischen Widersacher der Päpste sur Zeit Ludwigs des Baiers* (1874); J. Jannsen, *Geschichte des deutschen Volkes seit dem Ausgang des Mittelalters* (1885–1894); L. von Ranke, *Deutsche Geschichte im Zeitalter der Reformation* (1839–1847), and *Zur deutschen Geschichte. Vom Religionsfrieden bis zum dreissigjährigen Krieg* (1869); and T. Carlyle, *Frederick the Great* (1872–1873). On the fall of the Roman Empire and the transition to the modern German Empire see Sir J. R. Seeley, *Life and Times of Stein* (1878); H. von Treitschke, *Deutsche Geschichte* (1879–1894); and H. von Sybel, *Die Begründung des deutschen Reichs* (1890–1894, Eng. trans., *The Founding of the Germ. Emp.*, New York, 1890–1891). For institutional history, see R. Schröder, *Lehrbuch der deutschen Rechtsgeschichte* (1894). On the influence of the Holy Roman Empire upon the history of Germany, see J. Ficker, *Das deutsche Kaiserreich* (1861), and *Deutsches Königtum und Kaisertum* (1862); and H. von Sybel, *Die deutsche Nation und das Kaiserreich* (1861). (E. BR.)

EMPIRICISM (from Gr. ἔμπειρος, skilled in, from πεῖρα, experiment), in philosophy, the theory that all knowledge is derived from sense-given data. It is opposed to all forms of intuitionalism, and holds that the mind is originally an absolute blank (*tabula rasa*), on which, as it were, sense-given impressions are mechanically recorded, without any action on the part of the mind. The process by which the mind is thus stored consists of an infinity of individual impressions. The frequent or invariable recurrence of similar series of events gives birth in the mind to what are wrongly called "laws"; in fact, these "laws" are merely statements of experience gathered together by association, and have no other kind of validity. In other words from the empirical standpoint the statement of such a "law" does not contain the word "must"; it merely asserts that such and such series have been invariably observed. In this theory there can strictly be no "causation"; one thing is observed to succeed another, but observations cannot assert that it is "caused" by that thing; it is *post hoc*, but not *propter hoc*. The idea of *necessary* connexion is a purely mental idea, an a priori conception, in which observation of empirical data takes no part; empiricism in ethics likewise does away with the idea of the absolute authority of the moral law as conceived by the intuitionalists. The moral law is merely a collection of rules of conduct based on an infinite number of special cases in which the convenience of society or its rulers has subordinated the inclination of individuals. The fundamental objection to empiricism is that it fails to give an accurate explanation of experience; individual impressions as such are momentary, and their connexion into a body of coherent knowledge presupposes mental action distinct from mere receptivity. Empiricism was characteristic of all early speculation in Greece. During the middle ages the empiric spirit was in abeyance, but it revived from the time of Francis Bacon and was systematized especially in the English philosophers, Locke, Hume, the two Mills, Bentham and the associationist school generally.

See ASSOCIATION OF IDEAS; METAPHYSICS; PSYCHOLOGY; LOGIC; besides the biographies of the empirical philosophers.

In medicine, the term is applied to a school of physicians who, in the time of Celsus and Galen, advocated accurate observation of the phenomena of health and disease in the belief that only by the collection of a vast mass of instances would a true science of medicine be attained. This point of view was carried to extremes by those who discarded all real study, and based their treatment on rules of thumb. Hence the modern sense of empirical as applied to the guess work of an untrained quack or charlatan.

EMPLOYERS' LIABILITY, and WORKMEN'S COMPENSATION.[2] The law of England as to the liability of employers in respect of personal injuries to their servants is regulated partly by the common law and partly by statute; but by the Employers' Liability Act 1880, such exceptions have been grafted upon the common law, and by the Workmen's Compensation Act 1906, principles so alien to the common law have been applied to most employments that it is impossible now to present any view of this branch of the law as a logical whole. All that can be done is to state the nature of the liability at common law.

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[1] This does not, of course, apply to Hungary, which since 1867 has not formed part of the Austrian empire and is ruled by the head of the house of Habsburg not as emperor, but as king of Hungary.

[2] "Employ" comes through Fr. from Lat. *implicare*, to enfold, Late Lat. to direct upon something.

the extension of it effected by the Employers' Liability Act 1880, and the new liabilities introduced by later acts.

Common law.

At common law the liability of a master is of a very limited character. There is, of course, nothing to prevent a master and servant from providing by special contract in any way they please for their mutual rights in cases of personal injury to the servant. In such cases the liability will depend upon the terms of the special contract. But apart from any special agreement, it may be broadly stated that a master is liable to his servants only for injuries caused by his own negligence. Injuries to a servant may arise from accident, from the nature of the service, or from negligence; and this negligence may be of the master, of another servant of the master, or of a stranger. If the injury is purely accidental the loss lies where it falls. If it arises from the nature of the service, the servant must bear it himself; he has undertaken a service to which certain risks are necessarily incident; if he is injured thereby, it is the fortune of war, and no one can be made responsible. If the injury is caused by the negligence of a stranger, the servant has his ordinary remedy against the wrong-doer or any one who is responsible as a principal for the conduct of the wrong-doer. If it is caused by the negligence of a fellow-servant, he likewise has his ordinary remedy against the actual wrong-doer; but, by virtue of what is known as the doctrine of common employment, he cannot at common law make the master liable as a principal. The only case (independently of modern legislation: *see below*) in which he can recover damages from the master is where the injury has been caused by negligence of the master himself. A master is negligent if he fails to exercise that skill and care which, in the circumstances of the particular employment, are used by employers of ordinary skill and carefulness. If he himself takes part in the work, he must act with such skill and care as may reasonably be demanded of one who takes upon himself to do work of that kind. If he entrusts the work to other servants, he must be careful in their selection, and must not negligently employ persons who are incompetent. He must take proper care so to arrange the system of work that his servants are not exposed to unnecessary danger. If tools or machinery are used, he must take proper care to provide such as are fit and proper for the work, and must either himself see that they are maintained in a fit condition or employ competent servants to do so for him. If he is bound by statute to take precautions for the safety of his servants, he must himself see that that obligation is discharged. For breach of any of these duties a master is liable to his servant who is injured thereby, but his liability extends no further.

Common employment.

That his obligations to a servant are so much less than to a stranger is chiefly due to the doctrine of common employment. As a rule a master is responsible for the negligence of his servant acting in the course of his employment; but, from about the middle of the 19th century, it became firmly rooted in the law that this principle did not apply where the person injured was himself a servant of the master and engaged in a common employment with the servant guilty of the negligence. In effect this rule protects a master as against his servant from the consequences of negligence on the part of any other of his servants; to this there is no qualification except that, for the rule to apply, both the injured and the negligent servant must be acting in pursuance of a common employment. They must both be working for a common object though not necessarily upon the same work.

It is not easy to define precisely what constitutes a common employment in this sense, and there is peculiarly little judicial authority as to the limit at which work for the same employer ceases to be work in a common employment. It does not depend on difference in grade; all engaged in one business, from the manager to the apprentice, are within the rule. It does not depend on difference in work, if the work each is doing is part of one larger operation; all the servants of a railway company, whether employed on the trains, or at the stations, or on the line, are in a common employment. It does not necessarily depend on difference of locality; a servant who packs goods at the factory and a servant who unpacks them in the shop may well be in a common employment. On the other hand, it is not enough that the two servants are working for the same employer, if there is nothing in common between them except that they are making money for the same man; apart from special circumstances, the crews of two ships owned by the same company are probably not in common employment while navigating their respective ships. The test in each case must be derived from the view, invented by the courts, upon which the doctrine was based, namely, that the servant by entering upon the service consented to run all the risks incidental to it, including the risk of negligence on the part of fellow-servants; if the relation between the two servants is such that the safety of the one may, in the ordinary course of things, be affected by the negligence of the other, that negligence must be taken to be one of the risks of the employment assented to by the servant, and both are engaged in a common employment. In ninety-nine cases out of a hundred it will be found that the doctrine is applicable, and the master protected from liability. It is thus seen that, in general, no action will lie against a master at the suit of his servant, unless the servant can prove personal negligence on the part of the master causing injury to the servant. And in such action the master may avail himself of those defences which he has against a stranger. He may rely upon contributory negligence, and show that the servant was himself negligent, and that, notwithstanding the negligence of the master, the injury was proximately caused by the negligence of the servant. Or (except in cases where the injury results from a breach of a statutory duty) he may prove such facts as establish the defence expressed in the maxim, *volenti non fit injuria*; that is, he may prove that the injured servant knew and appreciated the particular risk he was running, and incurred it voluntarily with full understanding of its nature. Mere knowledge on the part of the servant, or even his continuing to work with knowledge, does not necessarily establish this defence; it must be knowledge of such a kind and in such circumstances that it can be inferred that the servant contracted to take the risk upon himself. The action at common law is subject to the general rule that personal actions die with the person; except so far as the remedy for money loss caused by death by negligence has been preserved in favour of a husband or wife and certain near relatives, under Lord Campbell's Act (Fatal Accidents Act 1846).

The act of 1880.

Such was the law up to 1880. So long as industry was conducted on a small scale, and the master worked with his men, or was himself the manager, its hardship was perhaps little felt; his personal negligence could in many cases be established. But with the development of the factory system, and the ever-growing expansion of the scale on which all industries were conducted, it became increasingly difficult to bring home individual responsibility to the employer. As industry passed largely into the control of corporations, difficulty became almost impossibility. The employer was not liable to a servant for the negligence of a fellow-servant, and therefore, in most cases of injury, was not liable at all. It is not surprising that the condition of things thus brought about, partly by the growth of modern industry and partly by the decisions of the courts, caused grave dissatisfaction. The justice of the doctrine of common employment was vigorously called in question. In the result the Employers' Liability Act 1880 was passed. The effect of this act is to destroy the defence of common employment in certain specified cases. It does not abolish the doctrine altogether, nor, on the other hand, does it impose upon the master any new standard of duty which does not exist as regards strangers. All that it does is to place the servant, in certain cases, in the position of a stranger, making the master liable for the negligence of his servants notwithstanding the fact that they are in common employment with the servant injured. It is still necessary under the act, as at common law, to prove negligence, and the master may still rely upon the defences of contributory negligence and *volenti non fit injuria*. But under the act he cannot, as against the workmen who come within it and in the cases to which it applies, set up the defence that the negligence complained of was the negligence of a servant in a common employment. The act does not apply to all servants. It does not apply to domestic or menial servants, or to seamen, or to any except railway servants and "any person who, being a labourer, servant in husbandry, journeyman, artificer, handicraftsman, miner, or otherwise engaged in *manual* labour . . . has entered into or works under a contract with an employer, whether the contract be oral or in writing, and be a contract of service or a contract personally to execute any work or labour." Whether a servant, not being one of those specially named, is within the act depends on whether manual labour is the real and substantial employment, or whether it is merely incidental thereto; thus a carman who handles the goods he carries may be within the act, but a tramcar driver or an omnibus conductor is not. The act does not make the master liable for the negligence of all his servants, but, speaking generally, only for the negligent discharge of their duties by such as are entrusted with the supervision of machinery and plant, or with superintendence, or the power of giving orders, with the addition, in the case of a railway, of the negligence of those who are given the charge or control of signals, points, locomotive engines or trains. The cases dealt with by the act are five in number; in the first and fourth the words are wide enough to include negligence of the employer himself, for which, as has been seen, he is liable at common law. In such instances the workman has an alternative remedy either at common law or under the act, but in all other respects the rights given by the act are new, being limitations upon the defence of common employment, and can be enforced only under the act.

The first case is where the injury is caused by reason of any defect in the condition of the ways, works, machinery or plant connected with or used in the business of the employer, provided that such defect arises from, or has not been discovered or remedied owing to the negligence of the employer, or of some person in the service of the employer and entrusted by him with the duty of seeing that the ways, works, machinery or plant are in proper condition. The second case is where the injury is caused by reason of the negligence of any person in the service of the employer who has any superintendence entrusted to him (that is, a person whose sole or principal duty is that of superintendence, and who is not ordinarily engaged in manual labour) whilst in the exercise of such superintendence. The third case is where the injury is caused by reason of the negligence of any person in the service of the employer to whose orders or directions the workman at the time of the injury is bound to conform and does conform, where such injury results from his so conforming. The fourth case is where the injury is caused by reason of the act or omission of any person in the service of the employer done or made in obedience to the rules or by-laws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf, provided that the injury results from some impropriety or defect in such rules, by-laws or instructions. The fifth case is where the injury is caused by reason of the negligence of any person in the service of the employer who has the charge or control of any signal, points, locomotive engine or train upon a railway.

In all these cases it is provided that the employer shall not be liable if it can be shown that the workman knew of the defect or negligence which caused his injury, and failed within a reasonable time to give, or cause to be given, information thereof to the employer or some person superior to himself in the service of the employer, unless he was aware that the employer or such superior already knew of the said defect or negligence. It was inevitable that these provisions should call for judicial interpretation, and a considerable body of authority has grown up about the act. Where general words are used, it must always occur that, between the cases which are obviously within and those which are obviously without the words, there are many on the border line. Thus, under the act, the courts have been called upon to determine the precise meaning of "way," "works," "machinery," "plant," and to say what is precisely meant by a "defect" in the condition of each of them. They have had to say what is included in "railway" and in "train," what is meant by having "charge" or "control," and to what extent one whose principal duty is superintendence may participate in manual labour without losing his character of superintendent, and what is the precise meaning of negligence in superintendence. These are only illustrations of many points of detail which, having called for judicial interpretation, will be found fully dealt with in the text-books on the subject. A workman who, being within the act, is injured by such negligence of a fellow-servant as is included in one or other of the five cases mentioned above, has against his employer the remedies which the act gives him. These are not necessarily the same as those which a stranger would have in the like circumstances; the amount of compensation is not left at large for a jury to determine, but is limited to an amount not exceeding such sum as may be found to be equivalent to the estimated earnings, during the three years preceding the injury, of a person in the same grade employed during those years in the like employment and in the district in which the workman is employed at the time of the injury. Moreover, the right to recover is hedged about with technicalities which are unknown at the common law; proceedings must be taken in the county court, within a strictly limited time, and are maintainable only if certain elaborate provisions as to notice of injury have been complied with. Where the injury causes death the action is maintainable for the benefit of the like persons as are entitled under Lord Campbell's act in an action at common law.

The law continued in this condition up to 1897. In the majority of cases of injury to a servant, the doctrine of common employment still protected the master; and where, under the Employers' Liability Act, it failed to do so, the liability was of a limited character and often, owing to technicalities of procedure, difficult to enforce. Moreover, there is nothing in the act to prevent master and servant from entering into any special contract they please; and in many trades it became a common practice for contracts to be made wholly excluding the operation of the act. In 1893 an attempt was made to alter the law by a total abolition of the defence of common employment, so as to make a master as liable to a servant as to a stranger for the negligence of any of his servants acting in the course of their employment, and at the same time to prohibit any agreements to forego the rights so given to the servant. The bill did not become law, and no further change was made until, in 1897, parliament took the first step in what has been a complete revolution in the law of employers' liability. Up to that year, as has been seen, the foundation of a master's liability was negligence, either of the master himself, or, in certain cases, of his servants. But by the Workmen's Compensation Act 1897, a new principle was introduced, whereby certain servants in certain employments were given a right to compensation for injuries, wholly irrespective of any consideration of negligence or contributory negligence. As regards such servants in such employments the master was in effect made an insurer against accidental injuries. The act was confessedly tentative and partial; it dealt only with selected industries, and even within these industries was not of universal application. But where it did apply, it gave a right to a limited compensation in every case of injury by accident arising out of and in the course of the employment, whether that accident had been brought about by negligence or not, and whether the injured servant had or had not contributed to it by his own negligence.

Acts of 1897 to 1906.

The act applied only to employment on, or in, or about certain localities where, at the same time, the employer was what the act called an "undertaker," that is, the person whose business was there being carried on. If we wanted to know whether a workman was within the act, we had to ask, first, was he employed on, or in, or about a railway, or a factory, or a mine, or a quarry, or an engineering shop, or a building of the kind mentioned in the act; secondly, was he employed by one who was, in relation to that railway, &c., the undertaker as defined by the act; and thirdly, was he at the time of the accident at work on, or in, or about that railway, &c. Unless these three conditions were fulfilled the employment was not within the act.

The employments to which the act applied comprised railways, factories (which included docks, warehouses and steam laundries), mines, engineering works and most kinds of buildings. "Workman" included every person engaged in an employment to which the act applied, whether by manual labour or otherwise, and whether his agreement was one of service or apprenticeship or otherwise, expressed or implied, oral or in writing.

By the Workmen's Compensation Act 1900, the benefits of the act of 1897 were extended to agricultural labourers.

The Workmen's Compensation Act 1906 (which came into force on the 1st of July 1907) extended the right of compensation for injuries practically to all persons in service, and also introduced many provisions not contained in the acts of 1897 and 1900 (repealed). It does not apply to persons in the naval or military service of the crown (s. 9), or persons employed otherwise than by way of manual labour whose remuneration exceeds two hundred and fifty pounds a year, or persons whose employment is of a casual nature, and who are employed otherwise than for the purposes of the employer's trade or business, or members of a police force, or out-workers, or members of the employer's family dwelling in his house. But it expressely applies to seamen.

Conditions of claim.

To entitle a workman engaged in an employment to which the act applies to compensation all the following conditions must be fulfilled: (1) There must be personal injury by accident. This will exclude injury wilfully inflicted, unless the injury results in death or serious and permanent disablement, but the act introduces a new provision by making the suspension or disablement from work or death caused by certain industrial diseases "accidents" within the meaning of the act. The industrial diseases specified in the 3rd schedule of the act were anthrax, ankylostomiasis, and lead, mercury, phosphorus and arsenic poisoning or their sequelae. But § 8 of the act authorized the secretary of state to make orders from time to time including other industrial diseases, and such orders have embraced glass workers' cataract, telegraphists' cramp, eczematous ulceration of the skin produced by dust or liquid, ulceration of the mucous membrane of the nose or mouth produced by dust, &c. To render the employer liable the workman must either obtain a certificate of disablement or be suspended or die by reason of the disease. If the disease has been contracted by a gradual process, all the employers who have employed the workman during the previous twelve months in the employment to which the disease was due are liable to contribute a share of the compensation to the employer primarily liable. (2) The accident must arise out of and in the course of the employment. In each case it will have to be determined whether the workman was at the time of the accident in the course of his employment, and whether the accident arose out of the employment. It will have to be considered when and where the particular employment began and ended. Other difficulties have arisen and will frequently arise when the workman at the time of the accident is doing something which is no part of the work he is employed to do. So far as the decisions have gone, they indicate that if what the workman is doing is no act of service, but merely for his own pleasure, or if he is improperly meddling with that which is no part of his work, the accident does not arise out of and in the course of his employment; but if, while on his master's work, he upon an emergency acts in his master's interest, though what he does is no part of the work he is employed to do, the accident does arise out of and in the course of his employment. (3) The injury must be such as disables the workman for a period of at least one week from earning full wages at the work at which he was employed. (4) Notice of the accident must be given as soon as practicable after the happening thereof, and before the workman has voluntarily left the employment in which he was injured; and the claim for compensation (by which is meant notice that he claims compensation under the act addressed by the workman to the employer) must be made within six months from the occurrence of the accident or, in case of death, from the time of death. Want of notice of the accident or defects in it are not to be a bar to proceedings, if occasioned by mistake or other reasonable cause, and the employer is not prejudiced thereby. But want of notice of a claim for compensation is a bar to proceedings, unless the employer by his conduct has estopped himself from relying upon it. (5) An injured workman must, if so required by the employer, submit himself to medical examination.

When these conditions are fulfilled, an employer who is within the act has no answer unless he can prove that the injury arose from the serious and wilful misconduct of the workman. The precise effect of these terms is not clear; but mere negligence is not within them.

Where the injury causes death, the right to compensation belongs to the workman's "dependents"; that is, such of the members of the workman's family as were at the time of the death wholly or in part dependent upon the earnings of the workman for their maintenance. "Members of a family" means wife or husband, father, mother, grandfather, grandmother, step-father, step-mother, son, daughter, grandson, granddaughter, step-son, step-daughter, brother, sister, half brother, half-sister. The act of 1906 makes also a very remarkable departure in including illegitimate relations in the direct line among "dependents," for where a workman, being the parent or grandparent of an illegitimate child, leaves such a child dependent upon his earnings, or, being an illegitimate child, leaves a parent or grandparent so dependent upon his earnings, such child or parent is to be included in the "members of a family."

Amount.

Under the act compensation is for loss of wages only, and is, as has been said, based upon the actual previous earnings of the injured workman in the employment of the employers for whom he is working at the time of the injury. In case of death, if the workman leaves dependents who were wholly dependent on his earnings, the amount recovered is a sum equal to his earnings in the employment of the same employer during the three years next preceding the injury, or the sum of £150, whichever is the larger, but not exceeding £300; if the period of his employment by the same employer has been less than three years, then the amount of his earnings during the three years is to be deemed to be 156 times his average weekly earnings during the period of his actual employment under the said employer. If the workman leaves only dependents who were not wholly dependent, the amount recovered is such sum as may be reasonable and proportionate to the injury to them, but not exceeding the amount payable in the previous case. If the workman leaves no dependents, the amount recoverable is the reasonable expenses of his medical attendance and burial, not exceeding £10. In case of total or partial incapacity for work resulting from the injury, what is recovered is a weekly payment during the incapacity after the second week not exceeding 50% of the workman's average weekly earnings during the previous twelve months, if he has been so long employed, but if not, then for any less period during which he has been in the continuous employment of the same employer; such weekly payment is not to exceed £1—and in fixing it regard is to be had to the difference between the amount of his average weekly earnings before the accident and the average amount which he is able to earn after the accident. Any payments, not being wages, made by the employer in respect of the injury must also be taken into account. The weekly payment may from time to time be reviewed at the request of either party, upon evidence of a change in the circumstances since the award was made, and after six months may be redeemed by the employer by payment of a lump sum. A workman is within the act although at the time of the injury he has been in the employment for less than two weeks, and although there are no actual earnings from the same employer upon which a weekly average can be computed. But how are the average weekly earnings which he would have earned from the same employer to be estimated? The question must be determined as one of fact by reference to all the circumstances of the particular case. Suppose the workman to be engaged at six shillings a day and injured on the first day. If it can be inferred that he would have remained in such employment for a whole week, his average weekly earnings from the same employer may be taken at thirty shillings. If it can be inferred that he would have worked one day and no more, his average weekly earnings from the same employer may be taken at six shillings.

All questions as to liability or otherwise under the act, if not settled by agreement, are referred to arbitration in accordance with a scheme prescribed by the act. Contracting out is not permitted, save in one event: where a scheme of compensation, benefit or insurance for the workmen of an employer has been certified by the Registrar of Friendly Societies to be not less favourable to the workmen and their dependents than the provisions of the act, and that where the scheme provides for contributions by the workmen, it confers benefits at least equal to those contributions, in addition to the benefits to which the workmen would have been entitled under the act, and that a majority (to be ascertained by ballot) of the workmen to whom the scheme is applicable are in favour of it, the employer may contract with any of his workmen that the provisions of the scheme shall be substituted for the act; such certificate may not be for more than five years, and may in certain circumstances be revoked. The act does not touch the workman's rights at common law or under the Employers' Liability Act, but the workman, if more than one remedy is open to him, can enforce only one. When the circumstances create a legal liability in some other person, *e.g.* where the injury is caused by the negligence of a sub-contractor or of a stranger, in such cases the employer, if required to pay compensation under the act, is entitled to be indemnified by such other person.

Under the Factory Acts, offences, when they result in death or bodily injury to health, may be punished by fine not exceeding £100, and the whole or any part of such fine may be applied for the benefit of the injured person or his family, or otherwise as the secretary of state determines. Similar provisions occur in the Mines Acts. Any sum so applied must be taken into account in estimating compensation under the Employers' Liability and Workmen's Compensation Acts.

Germany.

Law in Other Countries.—In *Germany* (*q.v.*) there is a system of compulsory state insurance against accidents to workmen. The law dates from 1884, being amended from time to time (1885, 1886, 1887, 1900, 1903) to embrace different classes of employment. Occupations are grouped into (1) industry; (2) agriculture; (3) building; (4) marine, to all of which one general law, with variations necessary to the particular occupation in question, is applicable. There are also special provisions for prisoners and government officials. Practically every kind of working-man is thus included, with the exception of domestic servants and artisans or labourers working on their own account. All workmen and officials whose salary does not exceed £150 a year come within the law. No compensation is payable where an accident is caused through a person's own gross carelessness, and where an accident has been contributed to by a criminal act or intentional wrongdoing the compensation may be refused or only partially allowed. With these exceptions, compensation for injury is payable in case of injury so long as the injured is unfit to work; in case of total incapacity an allowance is made equal to two-thirds of the injured person's annual earnings, in case of partial incapacity, in proportion to the degree that his wage-earning capacity has been affected. In case of death the compensation is either burial money or an allowance to the family varying in amount from 20 to 60% of the annual earnings according to circumstances. The provision of compensation for accidents falls entirely upon employers, and in order to lighten the burden thus falling upon them, and at the same time to guard against the possible insolvency of an individual employer, associations or self-administering bodies of employers have been formed—usually all the employers of each particular branch of industry in a district. These associations fix the amount of compensation after each accident, and at the end of the year assess the amount upon the individual employers. There is an appeal from the association to an arbitration court, and in particularly complicated cases there may be a further appeal to the imperial insurance department. No allowance is paid until after the lapse of thirteen weeks from the accident, and in the meantime the injured person is supported from a sick fund to which the employers contribute one-third, the employee contributing two-thirds. In Germany quite twelve millions of workpeople are insured; in 1905 a sum of nearly eight millions sterling was paid for accidents, and a million and a half to the families of those killed in accidents.

Austria.

In *Austria* the compulsory insurance of workmen was provided for by a law of 1887, with subsequent amendments. Briefly, nearly every class of industrial worker is included under the Austrian law, which is administered by special territorial insurance institutions, each of them embracing particular classes of industries or workers. The institutions are managed by committees, one-third of the members of each committee being chosen by the minister of the interior, one-third by the employers and one-third by the workers. Compensation is payable, in case of accidents, on a scale proportionate to the injured person's wages during the preceding year. In case of death, a certain sum is paid for funeral expenses, an annuity to the widow, if one is left, equal to 20% of the deceased's annual wages—if the widow remarries, she receives a lump sum equal to three annual payments in liquidation of the annuity—an annuity to each legitimate child equal to 15%, or, if the child has no mother, equal to 20% of the father's wages; an annuity to the father or mother, if dependent on the deceased for support, equal to 20% of the annual wages. As in the English act of 1906 illegitimate children are recognized by being granted an annuity in the case of the death of a father equal to 10% of his wages. In no case can the total amount of the annuities exceed 50% of the deceased's annual wages. Where the accident has resulted in total incapacity, the workman receives an annuity equal to 60% of his wages. No allowance is paid until after the fourth week, during which time the injured is supported by the sick-insurance institutions. The provision for the system is raised by contributions to the extent of nine-tenths by the employers and one-tenth by the workers, deducted from their wages. Instead of the German method by which an annual payment equal to the amount disbursed is required from each employer, he is required to provide the full amount necessary for the complete payment of the pension, this amount being placed to the credit of a special insurance fund.

France.

In *France* a system of compulsory state insurance against accidents was created by a law of 1898. The principal feature in the French law is the attempt to meet the possible insolvency of the employer by the establishment of a special guarantee fund, created by a small addition to the "business tax" (*contribution des patentes*), and, in the case of the mining industry, by a small tax on mines.

Norway.

Norway, by a law of 1894, amended in 1897 and 1899, adopted a system of compulsory insurance modelled to a great extent on the German system. Instead, however, of a trade association as in Germany, or a district insurance association as in Austria, there is a government insurance office, in which employers have to insure their workmen.

Denmark.

In *Denmark* a law was passed in 1897 rendering employers personally liable for the amount of compensation for accidents, but employers may relieve themselves of this liability by insuring workmen in an assurance association approved of by the minister of the interior. This course, however, is discretionary with employers.

Italy.

In *Italy*, although many attempts were made between 1889 and 1898 to introduce a system of compulsory insurance, it was not until the latter year that the principle was adopted. There is a National Bank for the Insurance of Working men against Accident (*Cassa Nazionale di Assicurazione per gli infortuni degli operaji sul lavoro*), created under a law of 1883. It has special privileges, such as exemption from taxation and the employment of the branch offices of the state post-office savings bank as local offices. Under the law of 1898 there is a primary obligation on the employer to insure his workmen with the National Bank, but he may, if he prefers, insure with other societies approved by government. Employers employing about five hundred workmen may, instead of insuring, establish a fund for the payment of not less than the statutory compensation, subject to giving adequate security for the sufficiency of the fund. Exemption from compulsory insurance is granted to employers who have established a mutual insurance association, which must comply with certain prescribed conditions. Railway companies, also, are exempt, if they have relief funds which conform with the provisions of the act.

Spain.

In *Spain* an act of the 30th of January 1900, adopted the principle of the personal responsibility of the employer for accidents to workmen other than those due to *vis major*. The act also lays down regulations for preventing accidents in dangerous trades, and releases the employer from personal liability on effecting adequate insurance of his workmen with an approved insurance company.

Holland has adopted the principle of compulsory insurance by a law of the 2nd of January 1901. An employer has to pay the necessary premium to the State Insurance Office, or by depositing adequate security with the State Office he may undertake the payment of the prescribed compensation himself. Or he may transfer his liability to an insurance company, provided the company deposit adequate security with the State Office. The State Insurance Office is under the management of directors appointed by the crown, and decides on all questions as to compensation; there is also a "Supervisory Board" of the State Office with joint representation of employers and workmen. There is an appeal from the State Office to Councils of Appeal, and from them to a National Board of Appeal.

Holland.

Greece.

Greece has a law of the 21st of February 1901, providing for compensation for accidents causing incapacity of more than four days' duration to workmen in mines, quarries and smelting works. The employer is exclusively liable for such compensation and for medical expenses during the first three months; after that time he is liable for one-half, the other half being borne by a miners' provident fund, supported by certain taxes on the properties affected, fines, &c.

Sweden.

By a law of the 5th of July 1901, *Sweden* adopted the principle of the personal liability of the employer for industrial accidents. The employer can, however, insure himself against liability in the Royal Insurance Institute. Compensation bcomes payable after the expiration of sixty days from the date of the accident.

Russia.

Russia has a law which came into force on the 1st of January 1904. Under this law employers in certain specified industries are bound to indemnify workers for incapacity of more than three days' duration due to injury arising out of their work. Employers are exempt from liability by insuring their workmen in insurance companies whose terms are not less favourable than those laid down by the law.

Belgium.

Belgium passed a law dealing with industrial accidents on the 24th of December 1903. It adopts the principle of the personal liability of the employer in certain specified trades or industries. There is a power of extension to such other undertakings as may be declared dangerous by the Commission on Labour Accidents. Employers may exempt themselves from their liability by contracting for the payment of compensation by an insurance company approved by the government or by the National Savings and Pension Fund. Where an employer does not so contract, he must (with certain exemptions) contribute to a special insurance fund. The law of 1903 also established a permanent Commission on Labour Accidents.

Switzerland.

Switzerland in 1899 adopted a law providing for accident insurance, but it was defeated on referendum in May 1900.

United States.

In the *United States* the law mainly depends on the doctrine of common employment, and the extent to which this doctrine is applied varies considerably in the different states, more particularly as to who are and who are not to be regarded as fellow-servants. The tendency, however, has been to increase the liability of the employer for the negligence of a fellow-servant, and in the case of employment on railways many states have passed laws either modifying or abrogating the doctrine. Colorado, by a law of 1901, has entirely abrogated it; and Alabama, Massachusetts and New York have laws generally similar to the English act of 1880. But the greatest departure, due to the initiative of President Roosevelt, has been the passing by the Federal Congress of the laws of April 22 and May 30, 1908, one giving damages to injured employees of interstate carriers by railroad, and common carriers by railroad in Territories, the District of Columbia, the Canal Zone and other territory governed by Congress, and the other giving regular wages for not more than one year to injured employees of the U.S. government in arsenals, navy yards, construction work on rivers, harbours and fortifications, hazardous work in connexion with the Panama Canal or Reclamation Service, and in government manufacturing establishments. These national laws, which were intended to serve as an example to the states, specifically provided for employers' liability and for the non-recognition of the doctrine of common employment.

Most of the British colonial states have adopted the principle of the English Workmen's Compensation Act of 1897, and the various colonial acts are closely modelled on the English act, with more or less important variations in detail. The New Zealand Act was passed in 1900, and amended in 1901, 1902, 1903 and 1905. The act of 1905 (No. 50) fixes the minimum compensation for total *or partial* disablement at £1 a week when the worker's previous remuneration was not less than 30s. a week. South Australia passed a Workmen's Compensation Act in 1900 and Western Australia one in 1902. New South Wales passed one in 1905, and British Columbia in 1902.

British Colonies.

EMPOLI, a town of Tuscany, Italy, in the province of Florence, from which it is 20 m. W. by S. by rail. Pop. (1901) 7005 (town); 20,301 (commune). It is situated 89 ft. above sea-level, to the S. of the Arno. The principal church, the Collegiata, or Pieve di S. Andrea, founded in 1093, still preserves the lower part of the original arcaded façade in black, white and coloured marble. The works of art which it once contained are most of them preserved in a gallery close by. Some of the other churches contain interesting works of art. The principal square is surrounded by old houses with arcades. The painter Jacopo Chimenti (Jacopo da Empoli), 1554–1640, was born here. Empoli is on the main railway line from Florence to Pisa, and is the point of divergence of a line to Siena.

EMPORIA, a city and the county-seat of Lyon county, Kansas, U.S.A., on the Neosho river, about 60 m. S.W. of Topeka. Pop. (1890) 7551; (1900) 8223, of whom 686 were foreign-born and 663 were negroes; (1910 U.S. census) 9058. It is served by the Atchison, Topeka & Santa Fé, and the Missouri, Kansas & Texas railways. The city has a Carnegie library, and is the seat of the state normal school and of the College of Emporia (Presbyterian; 1883). Emporia's industrial interests are mainly centred in commerce with the surrounding farming region; but there are small flour mills, machine shops, foundries and other manufacturing establishments,—in 1905 the value of the factory product was $571,601. The municipality owns and operates the water-works and the electric-lighting plant. Emporia was settled in 1856 and was chartered as a city in 1870. The Emporia *Gazette*, established in 1890, was purchased in 1894 by William Allen White (b. 1868), a native of Emporia, who took over the editorship and made a great stir in 1896 by his editorial entitled "What's the matter with Kansas?"; he also wrote several volumes of excellent short stories, particularly *The Court of Boyville* (1889), *Stratagems and Spoils* (1901) and *In Our Town* (1906).

EMPORIUM (a Latin adaptation of the Gr. ἐμπόριον, from ἐν, in, and stem of πορεύεσθαι, to travel for purpose of trade) a trade-centre such as a commercial city, to which buyers and dealers resort for transaction of business from all parts of the world. The word is often applied to a large shop.

EMPSON, SIR RICHARD (d. 1510), minister of Henry VII., king of England, was a son of Peter Empson, an influential inhabitant of Towcester. Educated as a lawyer he soon attained considerable success in his profession, and in 1491 was one of the members of parliament for Northamptonshire and speaker of the House of Commons. Early in the reign of Henry VII. he became associated with Edmund Dudley (*q.v.*) in carrying out the king's rigorous and arbitrary system of taxation, and in consequence he became very unpopular. Retaining the royal favour, however, he was made a knight in 1504, and was soon high steward of the university of Cambridge, and chancellor of the duchy of Lancaster; but his official career ended with Henry's death in April 1509. Thrown into prison by order of the new king, Henry VIII., he was charged, like Dudley, with the crime of constructive treason, and was convicted at Northampton in October 1509. His attainder by the parliament followed, and he was beheaded on the 17th or 18th of August 1510. Empson left, so far as is known, a family of two sons and four daughters, and about 1513 his estates were restored to his elder son, Thomas.

See Francis Bacon, *History of Henry VII.*, edited by J. R. Lumby (Cambridge, 1881); and J. S. Brewer, *The Reign of Henry VIII.*, edited by J. Gairdner (London, 1884).

EMPYEMA (from Gr. ἐν, within, and πῦον, pus), a term in medicine applied to an accumulation of purulent fluid within the cavity of the pleura (see Lung: *Surgery*).

EMPYREAN (from the Med. Lat. *empyreus*, an adaptation of the Gr. ἔρπυρος, in or on the fire, πῦρ), the place in the highest heaven, which in ancient cosmologies was supposed to be occupied by the element of fire. It was thus used as a name for the firmament, and in Christian literature for the dwelling-place of God and the blessed, and as the source of light. The word is used both as a substantive and as an adjective. Having the same Greek origin are the scientific words "empyreuma" and "empyreumatic," applied to the characteristic smell of burning or charring vegetable or animal matter.

EMS, a river of Germany, rising on the south slope of the Teutoburger Wald, at an altitude of 358 ft., and flowing generally north-west and north through Westphalia and Hanover to the east side of the Dollart, immediately south of Emden. After passing through the Dollart the navigable stream bifurcates, the eastern Ems going to the east, and the western Ems to the west, of the island of Borkum to the North Sea. Length, 200 m.

Between 1892 and 1899 the river was canalized along its right bank for a distance of 43 m. At the same time, and as part of the same general plan, a canal, the Dortmund-Ems Canal, was dug to connect the river (from Münster) with Herne in the Westphalian coal-field. At Henrichenburg a branch from Herne (5 m. long) connects with another branch from Dortmund (10½ m. long). Another branch, from Olfen (north of Dortmund), connects with Duisburg, and so with the Rhine. There is, however, a difference in elevation of 46 ft. between the two branches first named, and vessels are transferred from the one to the other by means of a huge lift. The canal, which was constructed to carry small steamers and boats up to 220 ft. in length and 750 tons burden, measures 169 m. in length, of which 108½ m. were actually dug, and cost altogether £3,728,750. The surface width throughout is 98½ ft., the bottom width 59 ft., and the depth 8⅛ ft.

See Victor Kurs, "Die künstlichen Wasserstrassen des deutschen Reichs," in *Geog. Zeitschrift* (1898), pp. 601-617 and 665-694; and *Deutsche Rundschau f. Geog. und Stat.* (1898), pp. 130-131.

EMS, a town and watering-place of Germany, in the Prussian province of Hesse-Nassau, romantically situated on both banks of the Lahn, in a valley surrounded by wooded mountains and vine-clad hills, 11 m. E. from Coblenz on the railway to Cassel and Berlin. Pop. 6500. It has two Evangelical, a Roman Catholic, an English and a Russian church. There is some mining industry (silver and lead). Ems is one of the most delightful and fashionable watering-places of Europe. Its waters—hot alkaline springs about twenty in number—are used both for drinking and bathing, and are efficacious in chronic nervous disorders, feminine complaints and affections of the liver and respiratory organs. On the right bank of the river lies the Kursaal with pretty gardens. A stone let into the promenade close by marks the spot where, on the 13th of July 1870, King William of Prussia had the famous interview with the French ambassador Count Benedetti (*q.v.*) which resulted in the war of 1870–1871. A funicular railway runs up to the Malberg (1000 ft.), where is a sanatorium and whence extensive views are obtained over the Rhine valley. Ems is largely frequented in the summer months by visitors from all parts of the world—the numbers amounting to about 11,000 annually—and many handsome villas have been erected for their accommodation. In August 1786 Ems was the scene of the conference of the delegates of the four German archbishops, known as the congress of Ems, which issued (August 25) in the famous joint pronouncement, known as the Punctation of Ems, against the interference of the papacy in the affairs of the Catholic Church in Germany (see Febronianism).

See Vogler, *Ems, seine Heilquellen, Kureinrichtungen*, &c. (Ems, 1888); and Hess, *Zur Geschichte der Stadt Ems* (Ems, 1895).

EMSER, JEROME, or Hieronymus (1477–1527), antagonist of Luther, was born of a good family at Ulm on the 20th of March 1477. He studied Greek at Tübingen and jurisprudence at Basel, and after acting for three years as chaplain and secretary to Raymond Peraudi, cardinal of Gurk, he began lecturing on classics in 1504 at Erfurt, where Luther may have been among his audience. In the same year he became secretary to Duke George of Albertine Saxony, who, unlike his cousin Frederick the Wise, the elector of Ernestine Saxony, remained the stanchest defender of Roman Catholicism among the princes of northern Germany. Duke George at this time was bent on securing the canonization of Bishop Benno of Meissen, and at his instance Emser travelled through Saxony and Bohemia in search of materials for a life of Benno, which he subsequently published in German and Latin. In pursuit of the same object he made an unsuccessful visit to Rome in 1510. Meanwhile he had also been lecturing on classics at Leipzig, but gradually turned his attention to theology and canon law. A prebend at Dresden (1509) and another at Meissen, which he obtained through Duke George's influence, gave him means and leisure to pursue his studies.

At first Emser was on the side of the reformers, but like his patron he desired a practical reformation of the clergy without any doctrinal breach with the past or the church; and his liberal sympathies were mainly humanistic, like those of Erasmus and others who parted company with Luther after 1519. As late as that year Luther referred to him as "Emser noster," but the disputation at Leipzig in that year completed the breach between them. Emser warned his Bohemian friends against Luther, and Luther retorted with an attack on Emser which outdid in scurrility all his polemical writings. Emser, who was further embittered by an attack of the Leipzig students, imitated Luther's violence, and asserted that Luther's whole crusade originated in nothing more than enmity to the Dominicans. Luther's reply was to burn Emser's books along with Leo X.'s bull of excommunication.

Emser next, in 1521, published an attack on Luther's "Appeal to the German Nobility," and eight works followed from his pen in the controversy, in which he defended the Roman doctrine of the Mass and the primacy of the pope. At Duke George's instance he prepared, in 1523, a German translation of Henry VIII.'s "Assertio Septem Sacramentorum contra Lutherum," and criticized Luther's "New Testament." He also entered into a controversy with Zwingli. He took an active part in organizing a reformed Roman Catholic Church in Germany, and in 1527 published a German version of the New Testament as a counterblast to Luther's. He died on the 8th of November in that year and was buried at Dresden.

Emser was a vigorous controversialist, and next to Eck the most eminent of the German divines who stood by the old church. But he was hardly a great scholar; the errors he detected in Luther's New Testament were for the most part legitimate variations from the Vulgate, and his own version is merely Luther's adapted to Vulgate requirements.

Bibliography.—Waldau, *Nachricht von Hieronymus Emsers Leben und Schriften* (Anspach, 1783); Kawerau, *Hieronymus Emser* (Halle, 1898); *Akten und Briefe zur Kirchenpolitik Herzog Georgs von Sachsen* (Leipzig, 1905); *Allgemeine deutsche Biographie*, vi. 96-98 (1877). All histories of the Reformation in Germany contain notices of Emser; see especially Friedensburg, *Beiträge zum Briefwechsel der katholischen Gelehrten Deutschlands im Reformationszeitalter.* (A. F. P.)

ENAMEL (formerly "amel," derived through the Fr. *amail*, *esmal*, *esmail*, from a Latin word *smaltum*, first found in a 9th-century life of Leo IV.), a term, strictly speaking, given to the hard vitreous compound, which is "fused" upon the surface of metallic objects either for the purpose of decoration or utility. This compound is a form of glass made of silica, minium and potash, which is stained by the chemical combination of various metallic oxides whilst in a melted condition in the crucible. This strict application of the term was widened to signify the metal object coated with enamel, so that to-day the term "an enamel" generally implies a work of art in enamel upon metal. The composition of the substance enamel which is used upon metal does not vary to any great extent from the enamels employed upon pottery and faience. But they differ in this respect, that the pottery enamel is usually applied to the "biscuit" surface of the ware in a raw state; that is, the compound has not been previously "run down" or vitrified in the crucible by heat, as is the case with enamelling upon metal, although, in most of the enamelled iron advertisement tablets, the enamel is in the raw state and is treated in a similar manner to that employed upon pottery.

Examination of the enamels upon brick of the Assyrians shows that they were applied unvitrified. It was upon pottery and brick that the ancient Egyptians and Assyrians achieved their greatest work in enamelling. For as yet no work of such magnificence as the great enamelled walls of the palace of Rameses III. at Tell el-Yehudia in the Delta of the Nile, or the palace of Nimrod in Babylon, has been discovered upon metal of any kind. But there were gold ornaments and jewelry enamelled of noble design in opaque turquoise, cobalt, emerald green and purple, some of which can be seen at the British Museum and the Louvre. An example is shown in Plate I. fig. 3.

In the subsequent Greek and Roman civilizations enamel was also applied to articles of personal adornment. Many pieces of jewelry, exquisite in workmanship, have been found. But a greater application was made of it by the Greek sculptors in the 4th and 5th centuries B.C. For we find, in many instances, that not only were the eyes made of enamel—which (artistically speaking) is a somewhat doubtful manner of employing it,—as in the fine bronze head found at Anticythera (Cerigotto) in 1902, but in the colossal figure of Zeus for the temple at Olympia made by Pheidias the gold drapery was gorgeously enamelled with figures and flowers. This wonderful work by the greatest sculptor the world has ever seen was destroyed, as so many priceless works of art in enamel have been: doubtless on account of the precious metal upon which they were made. It was in all probability the crowning triumph of a long series of essays in this material. The art of ancient Rome lacked the inspiration of Greece, being mainly confined to copying Greek forms and style, and in the case of enamelling it did not depart from this attitude. But the Roman and Etruscan glass has many beautiful qualities of form and colour that do not seem entirely borrowed, and the enamel work upon them so far as we can discern is of graceful design and rich colour. No doubt, were it not, as has been remarked, for the fact that enamelling was generally done upon gold and silver, there would still be many works to testify to the art of that period. Such as there are, however, show a rare appreciation of enamel as a beautiful material. With the decline of this civilization the art of enamelling probably died out. For it has ever been one of those exquisite arts which exist only under the sunshine of an opulent luxurious time or sheltered from the rude winds of a poorer age by the affluence of patrons. The next time we hear of it is in an oft-quoted passage (*c.* A.D. 240) from the writings of the great sophist Philostratus, who says (*Icones*, i. 28):—"It is said that the barbarians in the ocean pour these colours into bronze moulds, that the colours become as hard as stone, preserving the designs,"—a more or less inaccurate description of the process of *champlevé*. This has been understood (from an interpretation given to a passage in the commentary on it by Olearius) to refer to the Celts of the British Islands. It also goes to prove that enamelling was not practised at this day in Greece. We have no British enamels to show so early as this, but belonging to a later period, from the 6th to the 9th century, a number of the finest gold and bronze ornaments, horse trappings, shields, fibulae and ciboria have been discovered of Celtic and Saxon make. The Saxon work has nothing to show so exquisitely wrought as that found in Ireland, where one or two pieces are to be seen now in the Dublin Museum, notably the Ardagh chalice and some gold brooches. In the chalice the enamel is of a minute inlaid character, and appears to have been made first in the form of a multi-colour bead, which was fused to the surface of its setting, and then polished down. Many of the pieces seem to have been made after this fashion, which does not speak very highly of the technical knowledge of enamelling, but it is none the less true enamelling of an elementary character. The shield at the British Museum has an inlay of red enamel which is remarkable in its quality. For centuries such a fine opaque red has not been discovered. An example of Irish work is shown in Plate II. fig. 10.

From Ireland the art was transferred to Byzantium, which is to be seen by the close resemblance of method, style, design and colour. The style and design changed in course of time, but the craft remained. It was at Byzantium that it flourished for several centuries.

The finest work we know of belonging to this period is the Pala d'Oro at St Mark's, Venice, believed to have been brought from Constantinople to Venice about 1105. This magnificent altar-piece is in *cloisonné* enamel. A typical example is the ciborium and chalice belonging to the South Kensington loan collection. The design entirely covers the whole of the surface in one rich mass composed of circular or vesica-shaped medallions filled with sacred subjects and foliated scrolls. These are engraved and enamelled, and the metal bands of the scrolls and figures are engraved and gilt. The characteristic quality of the colour scheme is that it is composed almost wholly of primaries. Red, blue and yellow predominate, with a little white and black. Occasionally the secondaries, green and purple, are used, but through the whole period of Byzantine enamelling there is a total absence of what to-day is termed "subtle colouring." The arrangement of the enamels is also distinct, in that the divisions of the colours are not always made by the cloison, but are frequently laid in side by side without the adjoining colours mingling or running together whilst being melted. For instance, in a leaf pattern or in the drapery, the dress may be cobalt, heightened with turquoise or green. Thus it is interesting to observe that the artist employed the metal dividing lines frequently for the sake of aesthetic result, and was not much hampered by technical difficulties. This was the rule when opaque enamels were used. It is also worthy of remark that these opaque enamels differ from those in common use to-day, in that they are not nearly so opaque. This quality, together with a dull, instead of a highly polished surface, gives a much softer appearance to the enamels. Again, the whole tone of the enamels is darker and richer. Many examples of Byzantine work (see fig. 1.) are to be seen in the public and private art collections throughout Europe. They are principally upon ecclesiastical objects, missal covers, croziers, chalices, ciboria, pyx, candlesticks, crosses and tabernacles. In most instances the enamels are made in separate little plates rudely fastened with nails, screws or rivets to a metal or wooden foundation. Theophilus, a monk of the 13th century, describes the process of enamelling as it was understood by the Byzantines of his time, which probably differed but little from earlier methods. The design and drawing of the figures in Byzantine enamels is similar to the mosaic and carving. The figures are treated entirely as decorations, with scarcely ever the least semblance of expression, although here and there an intention of piety or sorrow is to be descried through the awkward postures in which they

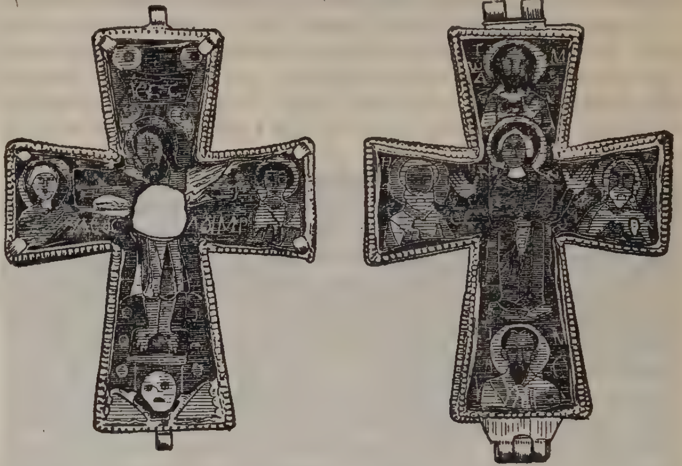


FIG. 1.—Byzantine Cloisonné Cross (*c.* 11th century) (South Kensington Museum).

are placed. In spite of this, the sense of decorative design, the simplicity of conception, the strength of the general character, and the richness of the colour, places this period as one of the finest which the art of enamelling has seen, and it leads us to lay stress upon the principle that the simplest methods in design and manipulation attain a higher end than those which are elaborate and intricate. It might be asserted with truth that this style never arrived at the degree of delicacy and refinement of later styles. But the refinement was often at the expense of higher qualities.

The next great application of these kinds of enamelling was at Cologne, for there we find not only the renowned work of Nicolas of Verdun, the altar front at Klosterneuberg, which consists of fifty plates in *champlevé* enamel, but in that Rhenish province there are many shrines of magnificent conception. From here the secrets of the craft were taken to Limoges, where the greatest activity was displayed, as numerous examples are found throughout England, France and Spain, which no doubt were made there (see Plate I. fig. 6.) But no new method or distinct advance is to be noticed, during these successive revivals at Byzantium, Cologne or Limoges, and it is to early 14th-century Italy that we owe one of the most beautiful developments, that of the process subsequently called *basse-taille*, which signifies a low-cut relief upon which transparent enamel is fused.

In this process enamelling passed from a decorative to a fine art. For it demanded the highest knowledge of an artist with the consummate skill of both sculptor and enameller. Witness the superb gold cup, called the King's Cup, now in the British Museum, and the silver cup at King's Lynn. The first is in an excellent state of preservation, as it is upon gold, but the latter, like most of the ancient enamelling upon silver, has lost most of its enamel. This was due—as the present writer believes after much experiment—to the impurity of the silver employed. The King's Cup is one of the finest works in enamelling extant. It consists of a gold cup and cover, hammered out of pure gold; and around the bowl, base and cover there are bands of figures, illustrating the scenes from the life of St Agnes. The hands and faces are of pale jasper, which over the carved gold gives a beautiful flesh tone. The draperies are in most resplendent ruby, sapphire, emerald, ivory, black and orange. The stem was subsequently altered by an additional piece inserted and enamelled with Tudor roses. It is a work of the 13th century, and belonged to Jean, duc de Berry, who gave it to his nephew, Charles VI. of France, in 1391. It afterwards came into the possession of the kings of England, from Henry VI. to James I., who gave it to Don Juan Velasco, constable of Castile. It was purchased by subscription with the aid of the treasury for the British Museum.

Other well-known pieces are the silver horn in the possession of the marquess of Aylesbury, and the crozier of William of Wykeham at New College, Oxford. The discovery about the same time of the process called *plique-à-jour* forms another most interesting and beautiful development. Owing to the difficulty of its manufacture and its extreme fragility there are very few examples left. One of the finest specimens is now at the Victoria and Albert Museum, South Kensington. It is in the form of two bands of emerald green enamel which decorate a silver beaker. They are in the form of little stained glass windows, the cloisons forming (as it were) the leads. These fine cloisons and shapes are most correct in form, and the whole piece shows a perfection of craftsmanship rarely equalled.

The end of the 15th century saw a development in enamelling which was not only remarkable, but revolutionary in its method. For until then the whole theory of enamelling had been that it relied upon the enclosing edges of the metal or the cloison to hold it to the metal ground and in part to preserve it in the shape of the pattern, much in the same way as a setting holds a stone or a jewel. All the enamel before this date had been sunk into cells or cloisons. Two discoveries were made; first, that enamels could be made which require no enclosing ribbon of metal, but that merely the enamel should be fused on both sides of the metal object; secondly, that after an enamel had been fused to a surface of metal, another could be superimposed and fused to the first layer without any danger of separation from each or from the metal ground. It is true that such processes had been employed upon glass on which enamel had been applied, as well as upon pottery; and it is probably due to the influence of a knowledge of both enamelling upon metal and upon glass or pottery that the discovery was made.

In most of these enamel paintings the subject was laid on with a white enamel upon a dark ground. The white was modulated; so that possessing a slight degree of translucency, it was grey in the thin parts and white in the thick. Thus was obtained a certain amount of light and shade. This gave the process called *grisaille.* But strange to say, it was not until a later period that this was practised alone, and then the modelling of the figures and draperies became very elaborate. At first it was only done in a slight degree, just sufficiently to give expression and to add to the richness of the form. For the enamellers were thinking of a plate upon which to put their wonderful colours, and not only of form. The painting in white was therefore invariably coloured with enamels. Probably the earliest painter in enamel was Nardon Pénicaud, many of whose works (one of them, dated 1503, is in the Cluny Museum) have been preserved with great care. He had many followers, the most distinguished of whom was Léonard Limosin (*i.e.* of Limoges). He excelled in portraiture. Examples of his work (between 1532 and 1574) are to be found in most of the larger public and private collections. Léonard Limosin and his Limoges contemporaries were very largely addicted to the employment of foil, which became too largely used, thus spoiling their otherwise fine serious work.

The family of Jean Pénicaud, Jean Court de Vigier, Pierre Raymond and Pierre Courteys were all great names of artists who excelled in the *grisaille* process. *Grisaille* is similar to *pâte-sur-pâte* in pottery, and depends for its attractive quality entirely upon form and composition. No comparison should be made with enamels in colour, for they occupy a different category—similar to cameo.

The casket shown in Plate II. fig. 9 is by Jean Pénicaud. It is a fine example of the enamelling in this style, very beautiful in colour. The hands and faces are in opaque white enamel; the draperies, garlands and flowers are in transparent green, turquoise blue, purple and cobalt over foil. The background is in transparent violet over white enamel ground, which is *semé* with gold stars. The draperies are also heightened with gold.

One of the most marvellous pieces of brilliant craft is the missal cover (Plate I. fig. 5) at the South Kensington Museum, said to have belonged to Henrietta Maria, queen of Charles I. The subjects are the "Creation of Adam and Eve" and the "Fountain of Youth." It is about 4 in. by 7 when opened out. The enamel is encrusted upon the figures, ornament and flowers which are beaten up in pure gold into high relief. The extraordinary minuteness and skill of handling, and the extreme brilliancy of the enamels, which are as brilliant to-day as on the day they were made, together form one of the unique specimens of art craftsmanship of the world. To the subdued taste of to-day, however, the effect is tawdry. The conception and design are also alike unworthy of the execution.

Since the Assyrian and Egyptian civilizations, there has been a succession of luxurious developments followed by lapses into the decline and death of the art of enamelling upon metals. In each revival there has been something added to that which was known and practised before. The last revival took place five hundred years ago, accompanying the rebirth of learning and the arts; but after flourishing for over a century, the art gradually fell into disuse, and remained so until the recent revival and further development. The development consists, first, in the more complete knowledge of the technical processes, following upon the great advances which science has made; and secondly, in a finer and more subtly artistic treatment of them. The advance in technical knowledge comprises greater facility and perfection in the production of the substance enamel,

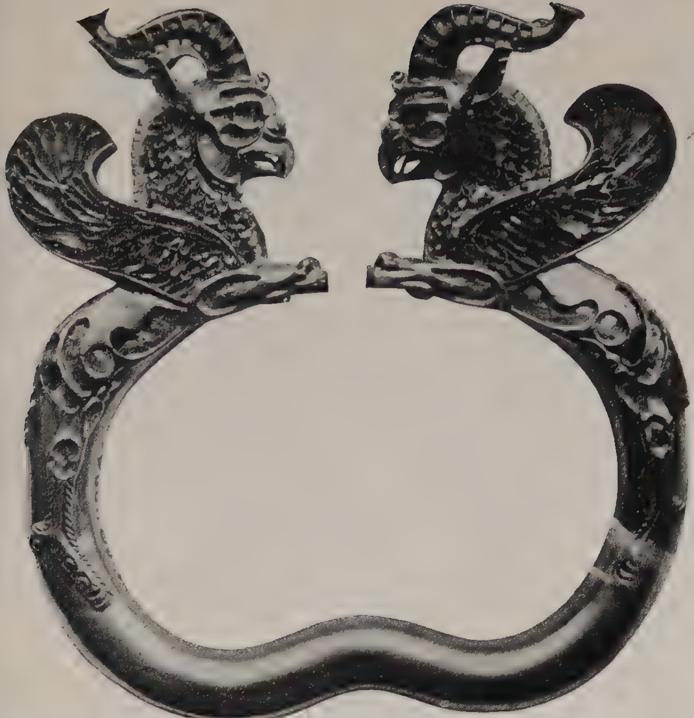


Fig. 3.—GRAECO-BACTRIAN GOLD AMULET, SHOWING THE GOLD STRIP FOR SETTING STONES, WHICH EXEMPLIFIES THE MANNER IN WHICH THE CLOISONS ARE SOLDERED FOR CLOISONNÉ.

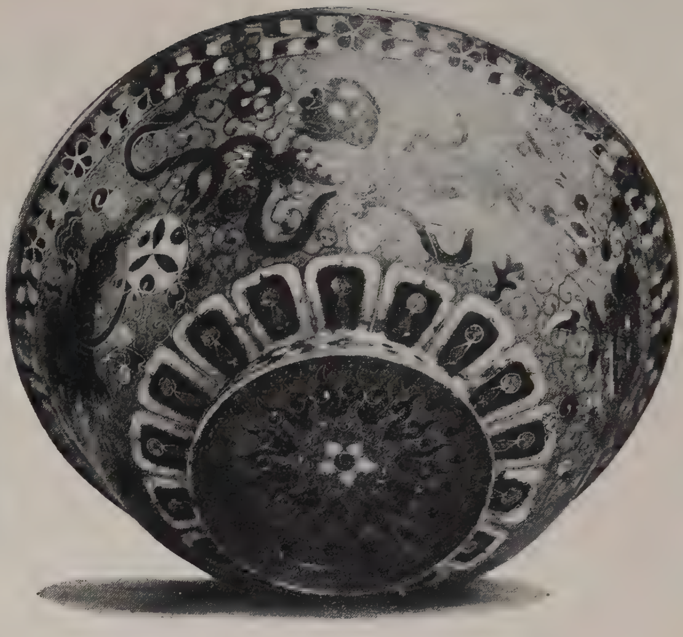


Fig. 4.—CHINESE CLOISONNE BOWL.

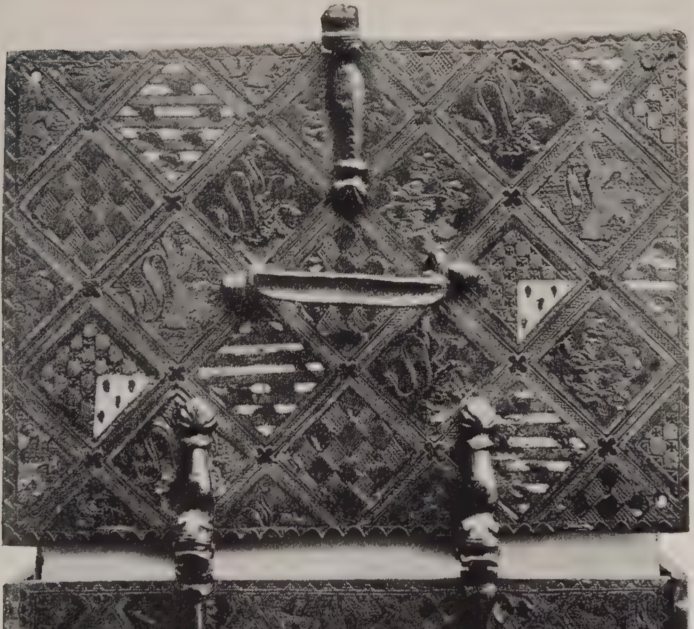


Fig. 6.—BOX IN COPPER PARTLY ENAMELLED IN OPAQUE ENAMELS CHAMPLEVÉ WITH COATS OF ARMS. (13th century, English or German. South Kensington Museum.)

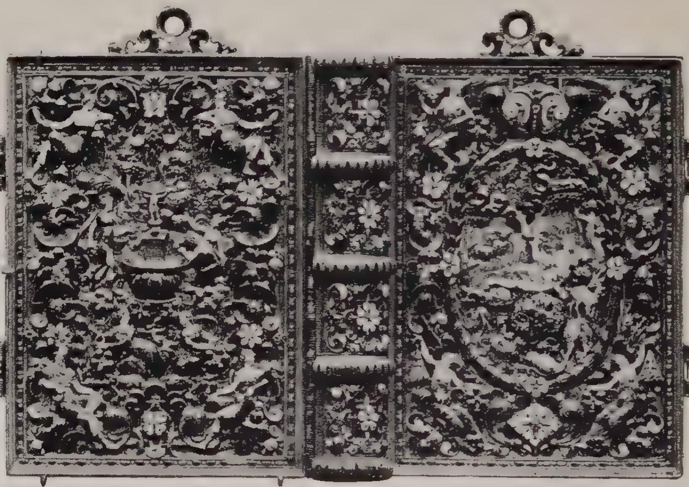


Fig. 5.—MISSAL COVER, ENCRUSTED ENAMEL.

(French, 17th century. Debased style.)

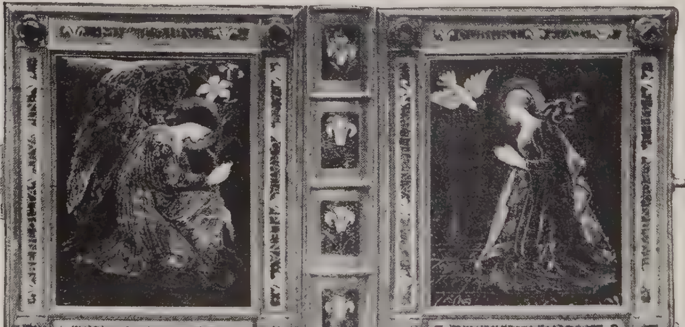


Fig. 7.—PRAYER-BOOK COVER IN ENAMEL AND SILVER GILT, SET WITH RUBIES AND EMERALDS, BY ALEXANDER FISHER. (Size, closed, 4 × 3 in.)

ENAMELS

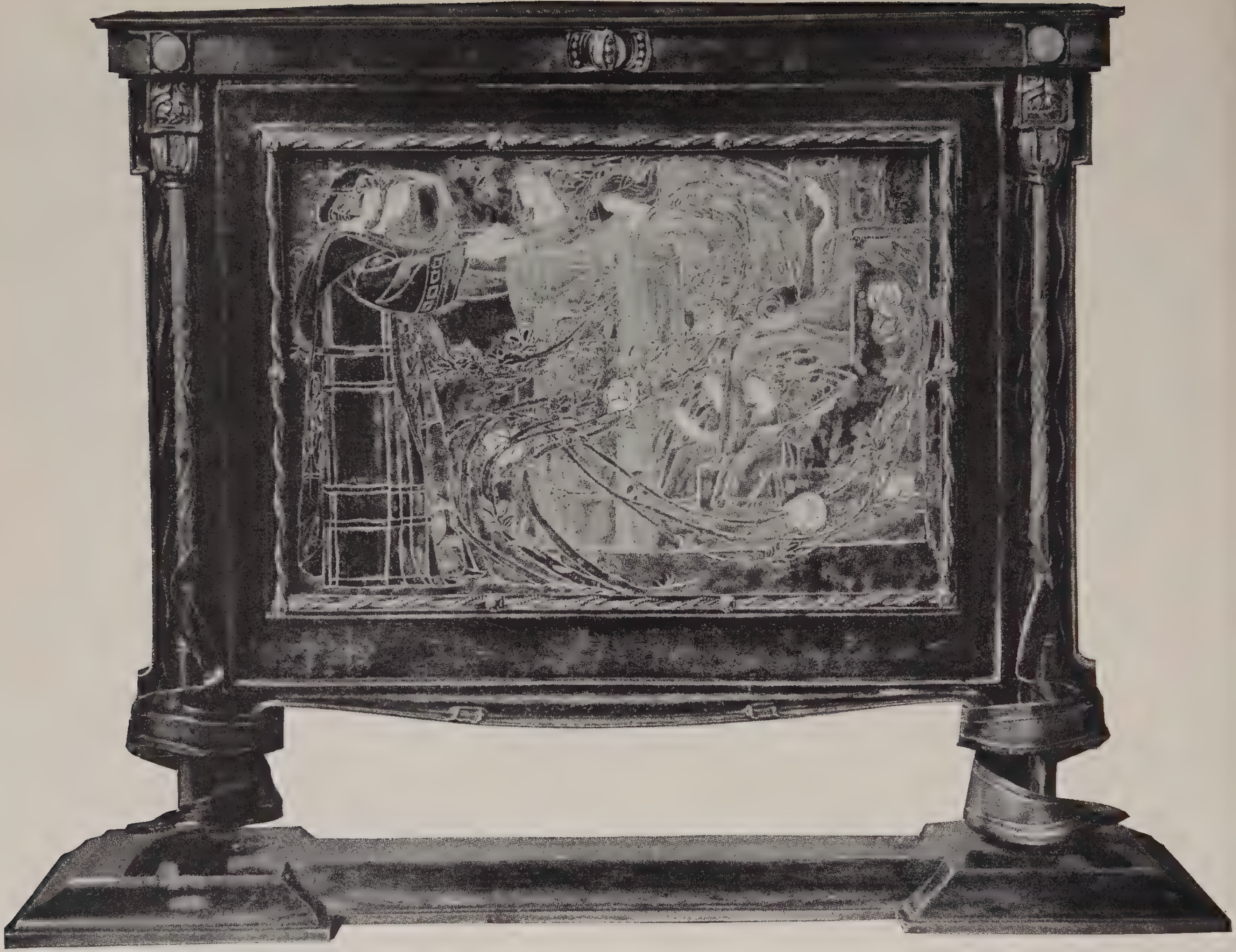


FIG. 8.—OVERMANTEL ($24 \times 18\frac{1}{2}$ in.) IN CHAMPLEVÉ ENAMEL ON SILVER. SUBJECT: THE GARDEN OF THE SOUL. BY ALEXANDER FISHER.

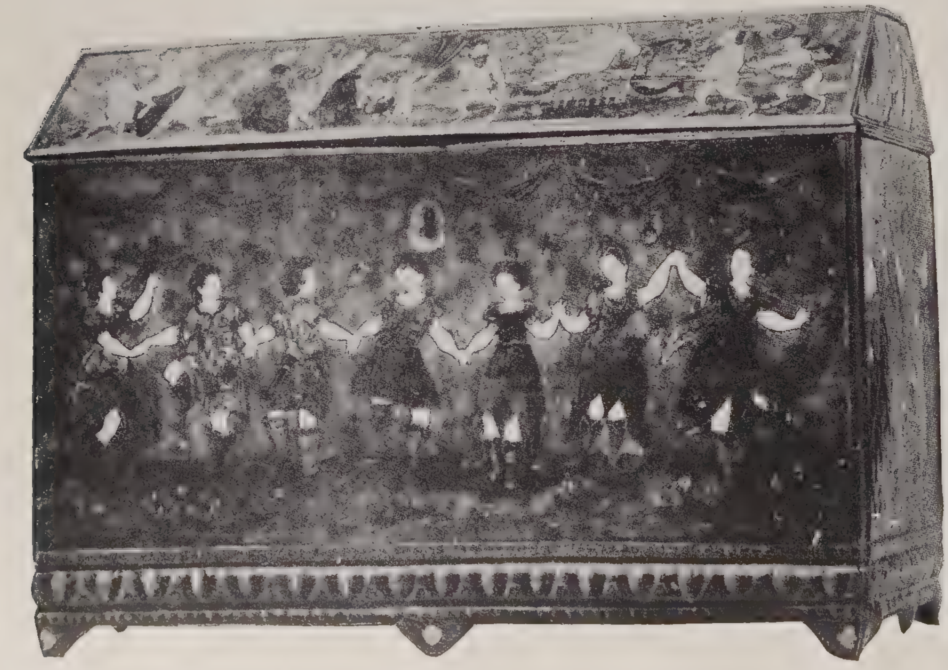


FIG. 9.—PAINTED ENAMEL CASKET BY JEAN PÉNICAUD. (16th century.)

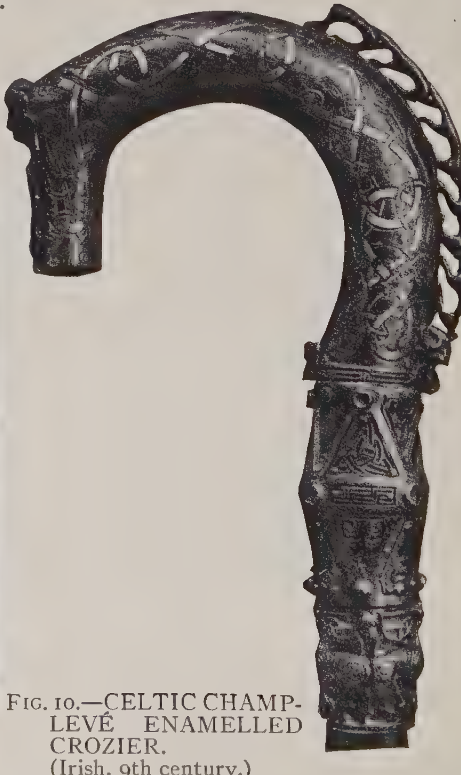


FIG. 10.—CELTIC CHAMPLEVÉ ENAMELLED CROZIER. (Irish, 9th century.)

and its subsequent application to metal surfaces; more intimate knowledge of metals and their alloys to which it is applied, and greater ease in obtaining them from the metalliferous ores and reducing them to suitable dimensions and surfaces. For instance, it is now a simple matter to obtain perfectly pure copper by means of electricity. Again, formerly a flat sheet of metal was obtained by hammering, which involved an infinite amount of hard labour, whereas it is accomplished to-day with ease by means of flatting and rolling mills: *i.e.* after the metal has been obtained from the ore in the form of an ingot, it is stretched equally to any degree of thinness by steel rollers. Further, the furnaces have been greatly improved by the introduction of gas and electricity as the heating power, instead of the wood or charcoal employed.

In the manufacture of the substance enamel a much greater advance has been made, for whereas the colours, and consequently the schemes of colour, were extremely limited, we now possess an infinite gradation in the colours, as well as the transparency and opacity, the hardness and softness of enamels. There are only two colours which cannot yet be obtained; these are opaque vermilion and lemon yellow in a vitrified state. Many of the colours we now employ were not known by enamellers such as Léonard Limosin. Our enamels are also perfect in purity, brilliancy and durability, qualities which are largely due to the perfect knowledge of the proportion of parts composing an enamel and their complete combination. It is this complete combination, together with the absence of any destructible matter, which gives the enamel its lasting quality.

The base of enamel is a clear, colourless, transparent vitreous compound called flux, which is composed of silica, minium and potash. This flux or base—termed *fondant* in France—is coloured by the addition of oxides of metals while in a state of fusion, which stain the flux throughout its mass. Enamels are either hard or soft, according to the proportion of the silica to the other parts in its composition. They are termed hard when the temperature required to fuse them is very high. The harder the enamel the less liable is it to be affected by atmospheric agencies, which in soft enamels produce a decomposition of the surface first and ultimately of the whole enamel. It is therefore advisable to use hard enamels in all cases. This involves the employment of pure—or almost pure—metals for the plates, which are in most respects the best to receive and retain the enamel. For if there is an excess of alloy, either the metal will possibly melt before the enamel is fused or afterwards they will part company. To the inferior quality of old silver may be attributed the fact that in all cases the enamel has flown off it; if it has not yet wholly disappeared it will scale off in time. It is therefore essential that metals should be pure and the enamels hard. It is also noteworthy that enamels composed of a great amount of soda or potash, as compared with those wherein red lead is in greater proportion, are more liable to crack and have less cohesion to the metals. It is better not to use silver as a base, although it is capable of reflecting a higher and more brilliant white light than any other metal. Fine gold and pure copper as thin as possible are the best metals upon which to enamel. If silver is to be used, it should be fine silver, treated in the methods called *champlevé* and *cloisonné*.

The brilliancy of the substance enamel depends upon the perfect combination and proportion of its component parts. The intimacy of the combination depends upon an equal temperature being maintained throughout its fusion in the crucible. For this purpose it is better to obtain a flux which has been already fused and most carefully prepared, and afterwards to add the colouring oxides, which stain it dark or light according to the amount of oxide introduced. Many of the enamels are changed in colour by the difference of the proportion of the parts composing the flux, rather than by the change of the oxides. For instance, turquoise blue is obtained from the black oxide of copper by using a comparatively large proportion of carbonate of soda, and a yellow green from the same oxide by increasing the proportionate amount of the red lead. All transparent enamels are made opaque by the addition of calx, which is a mixture of tin and lead calcined. White enamel is made by the addition of stannic and arsenious acids to the flux. The amount of acid regulates the density or opacity of the enamel.

To elucidate the development which has occurred, it will be necessary to describe some of the processes. After the enamel has been procured in the lump, the next stage in the process, common to all methods of enamelling, is to pulverize it. To do this properly the enamel must first be placed in an agate mortar and covered with water; next, with a wooden mallet a number of sharp blows must be given to a pestle held vertically over the enamel, to break it; then holding the mortar firmly in the left hand, the pestle must be rotated with the right, with as much pressure as possible on the enamel, grinding it until the particles are reduced to a fine grain. The powder is then subjected to a series of washings in distilled water, until all the floury particles are removed. After this the metal is cleaned by immersion in acid and water. For copper, nitric acid is used; for silver, sulphuric, and for gold hydrochloric acid. All trace of acid is then removed, first by scratching with a brush and water, and finally by drying in warm oak sawdust. After this the pulverized enamel is carefully and evenly spread over those parts of the metal designed to receive it, in sufficient thickness just to cover them and no more. The piece is then dried in front of the furnace, and when dry is placed gently on a fire-clay or iron *planche*, and introduced carefully into the muffle of the furnace, which is heated to a bright pale red. It is now attentively watched until the enamel shines all over, when it is withdrawn from the furnace. The firing of enamel, unlike that of glass or pottery, takes only a few minutes, and in nearly all processes no annealing is required.

The following are the different modes of enamelling: *champlevé*, *cloisonné*, *basse-taille*, *plique-à-jour*, *painted enamel*, *encrusted*, and *miniature-painted*. These processes were known at successive periods of ancient art in the order in which they are named. To-day they are known in their entirety. Each has been largely developed and improved. No new method has been discovered, although variations have been introduced into all. The most important are those connected with painted enamels, encrusted enamels and *plique-à-jour*.

Champlevé enamelling is done by cutting away troughs or cells in the plate, leaving a metal line raised between them, which forms the outline of the design. In these cells the pulverized enamel is laid and then fused; afterwards it is filed with a corundum file, then smoothed with a pumice stone and polished by means of crocus powder and rouge. An example is shown in Plate II. fig. 8.

In *cloisonné enamel*, upon a metal plate or shape, thin metal strips are bent to the outline of the pattern, then fixed by silver solder or by the enamel itself. These strips form a raised outline, giving cells as in the case of *champlevé*. The rest of the process is identical with that of *champlevé* enamelling. An example is shown in Plate I. fig. 4.

The *basse-taille* process is also a combination of metal work in the form of engraving, carving and enamelling. The metal, either silver or gold, is engraved with a design, and then carved into a bas-relief (below the general surface of the metal like an Egyptian bas-relief) so that when the enamel is fused it is level with the uncarved parts of the design enamel, and the design shows through the transparent enamel.

Painted enamels are different from any of these processes both in method and in result. The metal in this case is either copper, silver or gold, but usually copper. It is cut with shears into a plate of the size required, and slightly domed with a burnisher or hammer, after which it is cleaned by acid and water. Then the enamel is laid equally over the whole surface both back and front, and afterwards "fired." The first coat of enamel being fixed, the design is carried out, first by laying it in white enamel or any other which is opaque and most advantageous for subsequent coloration.

In the case of a *grisaille painted enamel* the white is mixed with water or turpentine, or spike oil of lavender, or essential oil of petroleum (according to the taste of the artist) and the white is painted thickly in the light parts and thinly in the grey ones, whereby a slight sense of relief is obtained and a great degree of light and shade.

In *coloured painted enamels* the white is coloured by transparent enamels spread over the *grisaille* treatment, parts of which when fired are heightened by touches of gold, usually painted in lines. Other parts can be made more brilliant by the use of foil, over which the transparent enamels are placed and then fired. An example is shown in Plate I. fig. 7.

Enamels by the *plique-à-jour* method might be best described as *translucent cloisonné* enamels; for they are similar to *cloisonné*, except that the ground upon which they are fired is removed, thus making them transparent like stained glass.

Two new processes have been the subject of the present writer's study and experiment for several years, which he has lately brought to fruition. The first is an inlay of transparent enamels similar to *plique-à-jour* without cloisons to divide the colours. For if enamels do not run together whilst in a melted state, as is seen in the case of painted and *basse-taille* enamels, there should be no necessity for it in this process. The result is a clear transparent subject in colour. The other process consists of a coloured enamel relief. It resembles the della Robbia relief, with this important difference, that the colour of the enamel by its nature permeates the whole depth of the relief, whereas in the della Robbia ware it is only on the surface. It also has a fresco surface, instead of one highly glazed. The quality of the enamel is as rare and unlike anything else as it is beautiful. It is in point of fact the only coloured sculpture in which the whole of its parts are one solid homogeneous mass, and through which the colour is one with the substance and is not applied. The process consists of the shapes of the various parts of the relief being selected for the different enamels, and these enamels melted together, in the mould of the relief, which is finished with lapidary's tools.

Miniature enamel painting is not true enamelling, for after the white enamel is fired upon the gold plate, the colours used are not vitreous compounds—not enamels in fact—as is the case in any other form of metal enamelling; but they are either raw oxides or other forms of metal, with a little flux added, not combined. These colours are painted on the white enamel, and afterwards made to adhere to the surface by partially fusing the enamel, which when in a state of partial fusion becomes viscous.

There are many of these so-called enamels to-day, which are much easier of accomplishment than the true enamel, but they possess none of the beautiful quality of the latter. It is most apparent when parts of a work are true enamels and parts are done in the manner described above. These enamel paintings on enamel are afterwards coated over with a transparent flux, which gives them a surface of enamel. Many are done in this way for the market.

All these methods were used formerly, before the present revival; but they were not so completely understood or carried so far as they are to-day. Nor were the whole methods practised by any artist as they are now. The greatest advance has been in painted enamels. This process requires that both sides of the metal plate shall be covered with enamel; for this reason the plate is made convex on the top, so that the concave side does not touch the *planche* on which it is supported for firing, but rests on its edges throughout. There are several reasons why these plates are *bombé*, the principal one being that in the firing they resist the tendency to warp and curl up at the edges as a flat thin plate would do. Further, the enamel having been fused to both sides is not so liable to crack or to splint in subsequent firings. This is most important, for otherwise the white which is placed on afterwards would be a network of cracks. The manner of firing has also to do with this, but not nearly so much as the preliminary care and mechanical perfection with which a plate is prepared. Nearly all the old enamels are seen to be cracked in the white if minutely examined. To obviate this the following points must be observed: The plate must be of an excellent quality of metal, equal in thickness throughout, and perfectly regular in shape. It must be arched equally from end to end. The first coat of enamel must be of a perfectly regular equal thickness on both sides, entirely covering the plate. Whatever the medium employed in painting the white on to the enamel, it must be completely evaporated before the plate is placed in the furnace. The furnace must be heated to a bright red heat, and the *planche* must be red-hot before being taken out for the enamel to be placed upon it, and then quickly returned to the furnace and the muffle door shut tight so as to allow no draught of cool air to enter it. Then as soon as it has begun to fuse, which if a small piece, it would do in a minute or so, the muffle door is slightly opened to afford a view of it. As soon as it shines all over its surface, it is withdrawn from the muffle.

The method of laying a white upon the enamel ground is a matter of individual taste, so far as the medium is concerned. By some, pure distilled water is preferred to any other liquid for mixing the enamel. Otherwise, turpentine and the fat oil of turpentine, as well as spike oil of lavender. The oil mixture takes longer to dry, and thus gives a greater chance for modelling into fine shades than the water. But it has several drawbacks. Firstly, there is the difficulty of drying the oil out—a process which takes some time and increases the risk of cracking in the drying process; and secondly, the enamel is not so fresh and clear after it is fired as when pure water has been employed. Besides there is a great difference in the result; the water involves a quick, decided, direct touch and method, which carries with it its own charm. The oil medium, besides giving an effect of laborious rounded stippled surfaces, is apt partly to reduce the enamel, thus giving it a dull surface. The coloration of the white is comparatively simple and is done by transparent enamels finely ground and evenly spread over the white after the latter has been fused. The only danger to be avoided is that of over-firing, which is produced by too great heat of a prolonged duration of firing, which causes the stannic and arsenious acids in the white to volatilize.

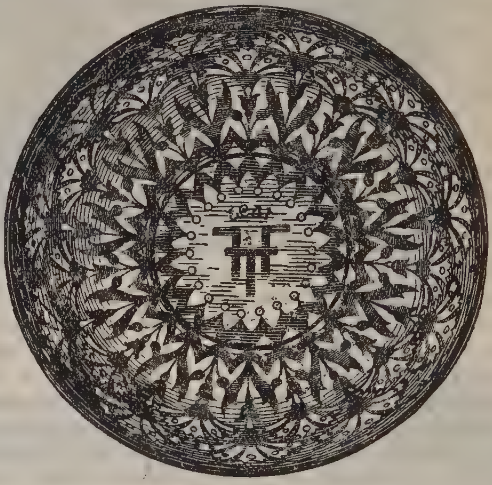


FIG. 2.—Modern French plique-à-jour bowl, by Fernand Thesmar.

Plique-à-jour enamelling is done in the same way as *cloisonné* enamelling, except that the wires or strips of metal which enclose the enamel are not soldered to the metal base, but are soldered to each other only. Then these are simply placed upon a sheet of platinum, copper, silver, gold or hard brass, which, after the enamel is fused and sufficiently annealed and cooled, is easily removed. For small pieces of *plique-à-jour* there is no necessity to apply any metallic base, as the particles of enamel quickly fuse, become viscous, and when drawn out set quite hard. Neither is there any need for annealing, as would be the case in larger work. For an example, see fig. 2.

Commercially there has lately been an activity in enamels such as has never before occurred. This has been the case throughout Europe, Japan and the United States of America. In London there has been a demand for a cheap form of gaudy coloured enamel, fused into sunk spaces of metal obtained by stamping with a steel die; this has been applied to small objects of cheap jewelry, in the form of brooches, bracelets and the like. There has also been a great demand for enamel watch-cases and small pendants, done mainly by hand, of a better class of work. Many of these have been produced in Birmingham, Berlin, Paris and London. In Paris copies of pictures in black and white enamel, with a little gold paint in the draperies and background, have been manufactured in very large quantities and sometimes of great dimensions. Another curious demand, followed by as astonishing a production, is that of the imitations (a harder name for which is "forgeries") of old enamels, made with much skill, giving all the technical excellence of the originals, even to the cracks and scratches incidental to age. These are duly signed, and will deceive the most expert. They are copies of enamels by Nardon and Jean Pénicaud, Léonard Limosin, Pierre Raymond, Courtois and others. The same artificers also produce copies of old Chinese *cloisonné* and *champlevé* enamels, as well as old Battersea enamel snuff-boxes, patch-boxes, and indeed every kind of enamelling formerly practised. It is advisable for the collector never to purchase any piece of enamelling as the work of an old master without having a pedigree extending at least over forty years. From Japan there has been a continuous flow of *cloisonné* enamelled vases, boxes and plates, either entirely covered with enamel or applied in parts. Compared with this enormous output, only a few small pieces of jewelry have come from Jaipur and other towns in India. There has also been a great quantity of *plique-à-jour* enamelling manufactured in Russia, Norway and Sweden. And finally, it has been used in an unprecedented manner in large pieces upon iron and copper for purposes of advertisement.

Amongst the chief workers in the modern revival of this art are Claudius Popelin, Alfred Meyer, Paul Grandhomme, Fernand Thesmar, Hubert von Herkomer and Alexander Fisher. The work of Claudius Popelin is characterized by good technical skill, correctness, and a careful copying of the work of the old masters. Consequently it suffers from a lack of invention and individuality. His work was devoted to the rendering of mythological subjects and fanciful portraits of historical people. Alfred Meyer and Grandhomme are both accomplished and careful enamellers; the former is a painter enameller and the author of a book dealing technically with enamelling. Grandhomme paints mythological subjects and portraits in a very tender manner, with considerably more artistic feeling than either Meyer or Popelin. There is a specimen of his work in the Luxemburg Museum. Fernand Thesmar is the great reviver of *plique-à-jour* enamelling in France. Specimens of his work are possessed by the art museums throughout Europe, and one is to be seen in the Victoria and Albert Museum, London. They are principally valued on account of their perfect technical achievement. Lucien Falize was an employer of artists and craftsmen, and to him we are indebted for the production of specimens of *basse-taille* enamel upon silver and gold, as well as for a book reviewing the revival of the art in France, bearing particularly on the work of Claudius Popelin. Until within recent years there was a clear division between the art and the crafts in the system of producing art objects. The artist was one person and the workman another. It is now acknowledged that the artist must also be the craftsman, especially in the higher branches of enamelling. M. Falize initiated the production of a gold cup which was enamelled in the *basse-taille* manner. The band of figures was designed by Olivier Merson, the painter, and carved by a metal carver and enamelled by an enameller, both able craftsmen employed by M. Falize. Other pieces of enamelling in *champlevé* and *cloisonné* were also produced under his supervision and on this system; therefore lacking the one quality which would make them complete as an expression of artistic emotion by the artist's own hands. M. René Lalique is among the jewellers who have applied enamelling to their work in a peculiarly technically perfect manner. In England, Professor Hubert von Herkomer has produced painted enamels of considerable dimensions, aiming at the execution of pictures in enamel, such as have been generally regarded as peculiar to the province of oil or water-colour painting. Among numerous works is a large shield, into which plaques of enamel are inserted, as well as several portraits, one of which, made in several pieces, is 6 ft. high—a portrait of the emperor William II. of Germany. The present writer rediscovered the making of many enamels, the secrets of which had been jealously guarded. He has worked in all these processes, developing them from the art side, and helping to make enamelling not only a decorative adjunct to metal-work, but raising it to a fine art. His work may be seen in the Victoria and Albert Museum, and Brussels Museum. Others who have been enamelling with success in various branches, and who have shown individuality in their work, are Mr John Eyre, Mrs Nelson Dawson, Miss Hart.

LITERATURE.—Among older books on enamelling, apart from the works of Neri and Benvenuto Cellini, are J.-P. Ferrand, *L'Art du feu, ou de peindre en émail* (1721); Labarte, *Recherches sur la peinture en émail* (Paris, 1856); Marquis de Laborde, *Notice des émaux du Louvre* (Paris, 1852); Reboulleau, *Nouveau manuel complet de la peinture en verre, sur porcelaine et sur émail* (ed. by Magnier, Paris, 1866); Claudius Popelin, *L'Émail des peintres* (Paris, 1866); Emil Molinier, *Dictionnaire des émailleurs* (1885). Among useful recent books are H. Cunynghame's *Art of Enamelling on Metals* (1906); L. Falize, *Claudius Popelin et la renaissance des émaux peints*; L. Dalpayrat, *Limoges Enamels*; Alexander Fisher, *The Art of Enamelling upon Metal* (1906, "The Studio," London). (A. FI.*).

ENCAENIA, a festival commemorating a dedication, in Greek *τὰ ἐγκαίνια* (*καινός*, new), particularly used of the anniversary of the dedication of a church (see DEDICATION). The term is also used at the university of Oxford of the annual Commemoration, held in June, of founders and benefactors (see OXFORD).

ENCAUSTIC PAINTING. The name *encaustic* (from the Greek for "burnt in") is applied to paintings executed with vehicles in which wax is the chief ingredient. The term was appropriately applied to the ancient methods of painting in wax, because these required heat to effect them. Wax may be used as a vehicle for painting without heat being requisite; nevertheless the ancient term *encaustic* has been retained, and is indiscriminately applied to all methods of painting in wax. The durability of wax, and its power of resisting the effects of the atmosphere, were well known to the Greeks, who used it for the protection of their sculptures. As a vehicle for painting it was commonly employed by them and by the Romans and Egyptians; but in recent times it has met with only a limited application. Of modern encaustic paintings those by Schnorr in the Residenz at Munich are the most important. Modern paintings in wax, in their chromatic range and in their general effect, occupy a middle place between those executed in oil and in fresco. Wax painting is not so easy as oil, but presents fewer technical difficulties than fresco.

Ancient authors often make mention of *encaustic*, which, if it had been described by the word *inurere*, to burn in, one might have supposed to have been a species of enamel painting. But the expressions "incausto pingere," "pictura encaustica," "ceris pingere," "pictura inurere," used by Pliny and other ancient writers, make it clear that some other species of painting is meant. Pliny distinguishes three species of encaustic painting. In the first they used a stylus, and painted either on ivory or on polished wood, previously saturated with some certain colour; the point of the stylus or stigma served for this operation, and its broad or blade end cleared off the small filaments which arose from the outlines made by the stylus in the wax preparation. In the second method it appears that the wax colours, being prepared beforehand, and formed into small cylinders for use, were smoothly spread by the spatula after the outlines were determined, and thus the picture was proceeded with and finished. By the side of the painter stood a brazier which was used to heat the spatula and probably the prepared colours. This is the method which was probably used by the painters who decorated the houses of Herculaneum and of Pompeii, as artists practising this method of painting are depicted in the decorations. The third method was by painting by a brush dipped into wax liquefied by heat; the colours so applied attained considerable hardness, and could not be damaged either by the heat of the sun or by the effects of sea-water. It was thus that ships were decorated; and this kind of encaustic was therefore styled "ship-painting."

About the year 1749 Count Caylus and J. J. Bachelier, a painter, made some experiments in encaustic painting, and the count undertook to explain an obscure passage in Pliny, supposed to be the following (xxxv. 39):—"Ceris pingere ac picturam inurere quis primus excogitaverit non constat. Quidam Aristidis inventum putant, postea consummatum a Praxitele; sed aliquanto vetustiores encausticae picturae exstitere, ut Polygnoti et Nicanoris et Arcesilai Pariorum. Lysippus quoque Aeginae picturae suae inscripsit ἐνέκαυσεν, quod profecto non fecisset nisi encaustica inventa." There are other passages in Pliny bearing upon this subject, in one of which (xxi. 49) he gives an account of the preparation of "Punica cera." The nature of this Punic wax, which was the essential ingredient of the ancient painting in encaustic, has not been definitely ascertained. The chevalier Lorgna, who investigated the subject in a small but valuable tract, asserts that the *nitron* which Pliny mentions is not the nitre of the moderns, but the *natron* of the ancients, viz. the native salt which is found crystallized in Egypt and other hot countries in sands surrounding lakes of salt water. This substance the Carthaginians, according to Pliny, used in preparing their wax, and hence the name Punic seems to be derived. Lorgna made a number of experiments with this salt, using from three to twenty parts of white melted wax with one of natron. He held the mixture in an iron vessel over a slow fire, stirring it gently with a wooden spatula, till the mass assumed the consistency of butter and the colour of milk. He then removed it from the fire, and put it in the shade in the open air to harden. The wax being cooled liquefied in water, and a milky emulsion resulted from it like that which could be made with the best Venetian soap.

Experiments, it is said, were made with this wax in painting in encaustic in the apartments of the Count Giovanni Battista Gasola by the Italian painter Antonio Paccheri, who dissolved the Punic wax when it was not so much hardened as to require to be "igni resoluta," as expressed by Pliny, with pure water slightly infused with gum-arabic, instead of sarcocolla, mentioned by Pliny. He afterwards mixed the colours with this wax so liquefied as he would have done with oil, and proceeded to paint in the same manner; nor were the colours seen to run or alter in the least; and the mixture was so flexible that the pencil ran smoother than it would have done with oil. The painting being dry, he treated it with caustic, and rubbed it with linen cloths, by which the colours acquired peculiar vivacity and brightness.

About the year 1755 further experiments were made by Count Caylus and several French artists. One method was to melt wax with oil of turpentine as a vehicle for the colours. It is well known that wax may be dissolved in spirit and used as a medium, but it dries too quickly to allow of perfect blending, and would by the evaporation of the spirit be prejudicial to the artist's health. Another method suggested about this time, and one which seems to tally very well with Pliny's description, is the following. Melt the wax with strong solution of salt of tartar, and let the colours be ground up in it. Place the picture when finished before the fire till by degrees the wax melts, swells, and is bloated up upon the picture; the picture is then gradually removed from the fire, and the colours, without being injuriously affected by the operation of the fire, become unalterable, spirits of wine having been burnt upon them without doing the least harm. Count Caylus's method was different, and much simpler: (1) the cloth or wood designed for the picture is waxed over, by rubbing it simply with a piece of beeswax; (2) the colours are mixed up with pure water; but as these colours will not adhere to the wax, the whole ground must be rubbed over with chalk or whiting before the colour is applied; and (3) when the picture is dry it is put near the fire, whereby the wax is melted and absorbs the colours. It must be allowed that nothing could well be simpler than this process, and it was thought that this kind of painting would be capable of withstanding the weather and of lasting longer than oil painting. This kind of painting has not the gloss of oil painting, so that the picture may be seen in any light, a quality of the very first importance in all methods of mural painting. The colours too, when so secured, are firm, and will bear washing, and have a property which is perhaps more important still, viz. that exposure to smoke and foul vapours merely leaves a deposit on the surface without injuring the work. The "encausto pingendi" of the ancients could not have been enamelling, as the word "inurere," taken in its rigorous sense, might at first lead one to suppose, nor could it have been painting produced in the same manner as encaustic tiles or encaustic tesserae; but that it must have been something akin to the count's process would appear from the words of Pliny already quoted, "Ceris pingere ac picturam inurere."

Werner of Neustadt found the following process very effectual in making wax soluble in water. For each pound of white wax he took twenty-four ounces of potash, which he dissolved in two pints of water, warming it gently. In this ley he boiled the wax, cut into litle bits, for half an hour, after which he removed it from the fire and allowed it to cool. The wax floated on the surface of the liquor in the form of a white saponaceous matter; and this being triturated with water produced a sort of emulsion, which he called wax milk, or encaustic wax. This preparation may be mixed with all kinds of colours, and consequently can be applied in a single operation.

Mrs Hooker of Rottingdean, at the end of the 18th century, made many experiments to establish a method of painting in wax, and received a gold palette from the Society of Arts for her investigations in this branch of art. Her account is printed in the tenth volume of the Society's Transactions (1792), under the name of Miss Emma Jane Greenland.

See also Lorgna, *Un Discorso sulla cera punica*; Pittore Vicenzo Requeno, *Saggi sul ristabilimento dell' antica arte de' Greci e Romani* (Parma, 1787); *Phil. Trans.* vol. xlix. part 2; Muntz on *Encaustic Painting*; W. Cave Thomas, *Methods of Mural Decoration* (London, 1869); Cros and Henry, *L'Encaustique*, &c. (1884); Donner von Richter, *Über Technisches in der Malerei der Alten* (1885). (W. C. T.)

ENCEINTE (Lat. *in*, within, *cinctus*, girdled; to be distinguished from the word meaning "pregnant," from *in*, not, and *cinctus*, *i.e.* with girdle loosened), a French term used technically in fortification for the inner ring of fortifications surrounding a town. Strictly the term was applied to the continuous line of bastions and curtains forming the "body of the place," this last expression being often used as synonymous with *enceinte*. The outworks, however, close to the enceinte were not considered as forming part of it. In modern fortification the enceinte is usually simply the innermost continuous line of fortifications. In architecture generally an enceinte is the close or precinct of a cathedral, abbey, castle, &c.

ENCINA, JUAN DEL (1469–*c.*1533), often called the founder of the Spanish drama, was born in 1469 near Salamanca probably at Encinas. On leaving the university of Salamanca he became a member of the household of the second duke of Alva. In 1492 the poet entertained his patron with a dramatic piece, the *Triunfo de la fama*, written to commemorate the fall of Granada. In 1496 he published his *Cancionero*, a collection of dramatic and lyrical poems. Some years afterwards he visited Rome, attracted the attention of Alexander VI. by his skill in music, and was appointed choirmaster. About 1518 Encina took orders, and made a pilgrimage to Jerusalem, where he said his first mass. Since 1509 he had held a lay canonry at Malaga; in 1519 he was appointed prior of Leon and is said to have died at Salamanca about 1533. His *Cancionero* is preceded by a prose treatise (*Arte de trobar*) on the condition of the poetic art in Spain. His fourteen dramatic pieces mark the transition from the purely ecclesiastical to the secular stage. The *Aucto del Repelón* and the *Égloga de Fileno* dramatize the adventures of shepherds; the latter, like *Plácida y Vitoriano*, is strongly influenced by the *Celestina*. The intrinsic interest of Encina's plays is slight, but they are important from the historical point of view, for the lay pieces form a new departure, and the devout eclogues prepare the way for the *autos* of the 17th century. Moreover, Encina's lyrical poems are remarkable for their intense sincerity and devout grace.

Bibliography.—*Teatro completo de Juan del Encina* (Madrid, 1893), edited by F. Asenjo Barbieri; *Cancionero musical de los siglos XV y XVI* (Madrid, 1894), edited by F. Asenjo Barbieri; R. Mitjana, *Sobre Juan del Encina, músico y poeta* (Málaga, 1895); M. Menendez y Pelayo, *Antologia de poetas liricos castellanos* (Madrid, 1890–1903), vol. vii.

ENCKE, JOHANN FRANZ (1791–1865), German astronomer, was born at Hamburg on the 23rd of September 1791. Matriculating at the university of Göttingen in 1811, he began by devoting himself to astronomy under Carl Friedrich Gauss; but he enlisted in the Hanseatic Legion for the campaign of 1813–14, and became lieutenant of artillery in the Prussian service in 1815. Having returned to Göttingen in 1816, he was at once appointed by Benhardt von Lindenau his assistant in the observatory of Seeberg near Gotha. There he completed his investigation of the comet of 1680, for which the Cotta prize was awarded to him in 1817; he correctly assigned a period of 71 years to the comet of 1812; and discovered the swift circulation of the remarkable comet which bears his name (see Comet). Eight masterly treatises on its movements were published by him in the Berlin *Abhandlungen* (1829–1859). From a fresh discussion of the transits of Venus in 1761 and 1769 he deduced (1822–1824) a solar parallax of 8″·57, long accepted as authoritative. In 1822 he became director of the Seeberg observatory, and in 1825 was promoted to a corresponding position at Berlin, where a new observatory, built under his superintendence, was inaugurated in 1835. He directed the preparation of the star-maps of the Berlin academy 1830–1859, edited from 1830 and greatly improved the *Astronomisches Jahrbuch*, and issued four volumes of the *Astronomische Beobachtungen* of the Berlin observatory (1840–1857). Much labour was bestowed by him upon facilitating the computation of the movements of the asteroids. With this end in view he expounded to the Berlin academy in 1849 a mode of determining an elliptic orbit from three observations, and communicated to that body in 1851 a new method of calculating planetary perturbations by means of rectangular coordinates (republished in W. Ostwald's *Klassiker der exacten Wissenschaften*, No. 141, 1903). Encke visited England in 1840. Incipient brain-disease compelled him to withdraw from official life in November 1863, and he died at Spandau on the 26th of August 1865. He contributed extensively to the periodical literature of astronomy, and was twice, in 1823 and 1830, the recipient of the Royal Astronomical Society's gold medal.

See *Johann Franz Encke, sein Leben und Wirken*, von Dr C. Bruhns (Leipzig, 1869), to which a list of his writings is appended. Also, *Month. Notices Roy. Astr. Society*, xxvi. 129; *V.J.S. Astr. Gesellschaft*, iv. 227; *Berlin. Abhandlungen* (1866), i., G. Hagen; *Sitzungsberichte*, Munich Acad. (1866), i. p. 395, &c. (A. M. C.)

ENCLAVE (a French word from *enclaver*, to enclose), a term signifying a country or, more commonly, an outlying portion of a country, entirely surrounded by the territories of a foreign or other power, such as the detached portions of Prussia, Saxony, &c., enclosed in the Thuringian States. (From the point of view of the states possessing such detached portions of territory these become "exclaves.") "Enclave" is, however, generally used in a looser sense to describe a colony or other territory of a state, which, while possessing a seaboard, is entirely surrounded landward by the possession of some other power; or, if inland territory, nearly though not entirely so enclosed, *e.g.* the Lado Enclave in equatorial Africa.

ENCOIGNURE, in furniture, literally the angle, or return, formed by the junction of two walls. The word is now chiefly used to designate a small armoire, commode, cabinet or cupboard made to fit a corner; a *chaise encoignure* is called in English a three-cornered chair. In its origin the thing, like the word, is French, and the delightful Louis Quinze or Louis Seize *encoignure* in lacquer or in mahogany elaborately mounted in gilded bronze is not the least alluring piece of the great period of French furniture. It was made in a vast variety of forms so far as the front was concerned; in other respects it was strictly limited by its destination. As a rule these delicate and dainty receptacles were in pairs and placed in opposite angles; more often than not the top was formed of a slab of coloured marble.

ENCYCLICAL (from Late Lat. *encyclicus*, for *encyclius* = Gr. ἐγκύκλιος, from ἐν and κύκλος, "a circle"), an ecclesiastical epistle intended for general circulation, now almost exclusively used of such letters issued by the pope. The forms *encyclica* and *encyclic* are sometimes, but more rarely, used. The old adjectival use of the word in the sense of "general" (encircling) is now obsolete, though it survives in the term "encyclopaedia."

ENCYCLOPAEDIA. The Greeks seem to have understood by encyclopaedia (ἐγκυκλοπαιδεία, or ἐγκύκλιος παιδεία) instruction in the whole circle (ἐν κυκλῷ) or complete system of learning—education in arts and sciences. Thus Pliny, in the preface to his *Natural History*, says that his book treated of all the subjects of the encyclopaedia of the Greeks, "Jam omnia attingenda quae Graeci τῆς ἐγκυκλοπαιδείας vocant." Quintilian (*Inst. Orat.* i. 10) directs that before boys are placed under the rhetorician they should be instructed in the other arts, "ut efficiatur orbis ille doctrinae quam Graeci ἐγκυκλοπαιδείαν vocant." Galen (*De victus ratione in morbis acutis*, c. 11) speaks of those who are not educated ἐν τῇ ἐγκυκλοπαιδείᾳ. In these passages of Pliny and Quintilian, however, from one or both of which the modern use of the word seems to have been taken, ἐγκύκλιος παιδεία is now read, and this seems to have been the usual expression. Vitruvius (lib. vi. praef.) calls the encyclios or ἐγκύκλιος παιδεία of the Greeks "doctrinarum omnium disciplina," instruction in all branches of learning. Strabo (lib. iv. cap. 10) speaks of philosophy καὶ τὴν ἄλλην παιδείαν ἐγκύκλιον. Tzetzes (*Chiliades*, xi. 527), quoting from Porphyry's *Lives of the Philosophers*, says that ἐγκύκλια μαθήματα was the circle of grammar, rhetoric, philosophy and the four arts under it, arithmetic, music, geometry and astronomy. Zonaras explains it as grammar, poetry, rhetoric, philosophy, mathematics and simply every art and science (ἁπλῶς πᾶσα τέχνη καὶ ἐπιστήμη), because sophists go through them as through a circle. The idea seems to be a complete course of instruction in all parts of knowledge. An epic poem was called cyclic when it contained the whole mythology; and among physicians κύκλῳ θεραπεύειν, *cyclo curare* (Vegetius, *De arte veterinaria*, ii. 5, 6), meant a cure effected by a regular and prescribed course of diet and medicine (see Wower, *De polymathia*, c. 24, § 14).

The word encyclopaedia was probably first used in English by Sir Thomas Elyot. "In an oratour is required to be a heape of all maner of lernyng: whiche of some is called the worlde of science, of other the circle of doctrine, whiche is in one worde of greke Encyclopedia" (*The Governour*, bk. i. chap. xiii.). In his Latin dictionary, 1538, he explains "Encyclios et Encyclia, the cykle or course of all doctrines," and "Encyclopedia, that lernynge whiche comprehendeth all lyberall science and studies." The term does not seem to have been used as the title of a book by the ancients or in the middle ages. The edition of the works of Joachimus Fortius Ringelbergius, printed at Basel in 1541, is called on the title-page *Lucubrationes vel potius absolutissima* κυκλοπαιδεια. Paulus Scalichius de Lika, an Hungarian count, wrote *Encyclopaediae seu orbis disciplinarum epistemon* (Basileae, 1599, 4to). Alsted published in 1608 *Encyclopaedia cursus philosophici*, and afterwards expanded this into his great work, noticed below, calling it without any limitation *Encyclopaedia*, because it treats of everything that can be learned by man in this life. This is now the most usual sense in which the word encyclopaedia is used—a book treating of all the various kinds of knowledge. The form "cyclopaedia" is not merely without any appearance of classical authority, but is etymologically less definite, complete and correct. For as Cyropaedia means "the instruction of Cyrus," so cyclopaedia may mean "instruction of a circle." Vossius says, "Cyclopaedia is sometimes found, but the best writers say encyclopaedia" (*De vitiis sermonis*, 1645, p. 402). Gesner says, "κύκλος est *circulus*, quae figura est simplicissima et perfectissima simul: nam incipi potest ubicunque in illa et ubicunque cohaeret. *Cyclopaedia* itaque significat omnem doctrinarum scientiam inter se cohaerere; *Encyclopaedia* est institutio in illo circulo." (*Isagoge*, 1774, i. 40).

In a more restricted sense, encyclopaedia means a system or classification of the various branches of knowledge, a subject on which many books have been published, especially in Germany, as Schmid's *Allgemeine Encyklopädie und Methodologie der Wissenschaften* (Jena, 1810, 4to, 241 pages). In this sense the *Novum Organum* of Bacon has often been called an encyclopaedia. But it is "a grammar only of the sciences: a cyclopaedia is not a grammar, but a dictionary; and to confuse the meanings of grammar and dictionary is to lose the benefit of a distinction which it is fortunate that terms have been coined to convey" (*Quarterly Review*, cxiii. 354). Fortunius Licetus, an Italian physician, entitled several of his dissertations on Roman altars and other antiquities encyclopaedias (as, for instance, *Encyclopaedia ad Aram mysticam Nonarii*, Pataviae, 1631, 4to), because in composing them he borrowed the aid of all the sciences. The *Encyclopaedia moralis* of Marcellinus de Pise (Paris, 1646, fol., 4 vols.) is a series of sermons. Encyclopaedia is often used to mean a book which is, or professes to be, a complete or very full collection or treatise relating to some particular subject, as Blaine's work, *The Encyclopaedia of Rural Sports* (London, 1852); *The Encyclopaedia of Wit* (London, 1803); *The Vocal Encyclopaedia* (London, 1807, 16mo), a collection of songs, catches, &c. The word is frequently used for an alphabetical dictionary treating fully of some science or subject, as Murray, *Encyclopaedia of Geography* (London, 1834); Lefebvre Laboulaye, *Encyclopédie technologique: Dictionnaire des arts et manufactures* (Paris, 1845–1847). Whether under the name of "dictionary" or "encyclopaedia" large numbers of this class of reference-work have been published. These are essentially encyclopaedic, being *subject books* and not *word-books*. The important books of this character are referred to in the articles dealing with the respective subjects, but the following may be mentioned here: the *Jewish Encyclopedia*, in 12 vols. (1901), a descriptive record of the history, religion, literature and customs of the Jewish people from the earliest times; the *Encyclopaedia of Sport*, 2 vols. (1897–1898); Holtzendorff's *Encyklopädie der Rechtswissenschaft* (1870; an edition in 2 vols., 1904); the *Dictionary of Political Economy*, edited by R. H. Inglis Palgrave, 3 vols. (1894; reprinted 1901); the *Encyclopaedia Biblica*, edited by T. K. Cheyne and J. Sutherland Black, 4 vols. (1899–1903); the *Dictionary of the Bible*, edited by James Hastings, 4 vols., with a supplementary volume (1904); an interesting series is the *Répertoire général du commerce*, dealing with the foreign trade of France, of which one part, the *Encyclopaedia of Trade between the United States of America and France*, with a preface by M. Gabriel Hanotaux, appeared, in French and English, in 1904.

The great Chinese encyclopaedias are referred to in the article on CHINESE LITERATURE. It will be sufficient to mention here the *Wên hien t'ung k'ao*, compiled by Ma Twa-lin in the 14th century, the encyclopaedia ordered to be compiled by the Emperor Yung-loh in the 15th century, and the *Ku Kin t'u shu thi ch'êng* prepared for the Emperor K'ang-hi (d. 1721), in 5020 volumes. A copy of this enormous work, bound in some 700 volumes, is in the British Museum.

The most ancient encyclopaedia extant is Pliny's *Natural History* in 37 books (including the preface) and 2493 chapters, which may be thus described generally:—book 1, preface; book 2, cosmography, astronomy and meteorology; books 3 to 6, geography; books 7 to 11, zoology, including man, and the invention of the arts; books 12 to 19, botany; books 20 to 32, medicines, vegetable and animal remedies, medical authors and magic; books 33 to 37, metals, fine arts, mineralogy and mineral remedies. Pliny, who died A.D. 79, was not a naturalist, a physician or an artist, and collected his work in his leisure intervals while engaged in public affairs. He says it contains 20,000 facts (too small a number by half, says Lemaire), collected from 2000 books by 100 authors. Hardouin has given a list of 464 authors quoted by him. His work was a very high authority in the middle ages, and 43 editions of it were printed before 1536.

Martianus Minneus Felix Capella, an African, wrote (early in the 5th cent.), in verse and prose, a sort of encyclopaedia, which is important from having been regarded in the middle ages as a model storehouse of learning, and used in the schools, where the scholars had to learn the verses by heart, as a text-book of high-class education in the arts. It is sometimes entitled *Satyra*, or *Satyricon*, but is usually known as *De nuptiis Philologiae et Mercurii*, though this title is sometimes confined to the first two books, a rather confused allegory ending with the apotheosis of Philologia and the celebration of her marriage in the milky way, where Apollo presents to her the seven liberal arts, who, in the succeeding seven books, describe their respective branches of knowledge, namely, grammar, dialectics (divided into metaphysics and logic), rhetoric, geometry (geography, with some single geometrical propositions), arithmetic (chiefly the properties of numbers), astronomy and music (including poetry). The style is that of an African of the 5th century, full of grandiloquence, metaphors and strange words. He seldom mentions his authorities, and sometimes quotes authors whom he does not even seem to have read. His work was frequently copied in the middle ages by ignorant transcribers, and was eight times printed from 1499 to 1599. The best annotated edition is by Kopp (Frankfort, 1836, 4to), and the most convenient and the best text is that of Eysserhardt (Lipsiae, 1866, 8vo).

Isidore, bishop of Seville from 600 to 630, wrote *Etymologiarum libri XX.* (often also entitled his *Origines*) at the request of his friend Braulio, bishop of Saragossa, who after Isidore's death divided the work into books, as it was left unfinished, and divided only into titles.

The tenth book is an alphabet of 625 Latin words, not belonging to his other subjects, with their explanations as known to him, and often with their etymologies, frequently very absurd. The other books contain 448 chapters, and are:—1, grammar (Latin); 2, rhetoric and dialectics; 3, the four mathematical disciplines—arithmetic, geometry, music and astronomy; 4, medicine; 5, laws and times (chronology), with a short chronicle ending in 627; 6, ecclesiastical books and offices; 7, God, angels and the orders of the faithful; 8, the church and sects; 9, languages, society and relationships; 11, man and portents; 12, animals, in eight classes, namely, pecora et jumenta, beasts, small animals (including spiders, crickets and ants), serpents, worms, fishes, birds and small winged creatures, chiefly insects; 13, the world and its parts; 14, the earth and its parts, containing chapters on Asia, Europe and Libya, that is, Africa; 15, buildings, fields and their measures; 16, stones (of which one is echo) and metals; 17, de rebus rusticis; 18, war and games; 19, ships, buildings and garments; 20, provisions, domestic and rustic instruments.

Isidore appears to have known Hebrew and Greek, and to have been familiar with the Latin classical poets, but he is a mere collector, and his derivations given all through the work are not unfrequently absurd, and, unless when very obvious, will not bear criticism. He seldom mentions his authorities except when he quotes the poets or historians. Yet his work was a great one for the time, and for many centuries was a much valued authority and a rich source of material for other works, and he had a high reputation for learning both in his own time and in subsequent ages. His *Etymologies* were often imitated, quoted and copied. MSS. are very numerous; Antonio (whose editor, Bayer, saw nearly 40) says, "plures passimque reperiuntur in bibliothecarum angulis." This work was printed nine times before 1529.

Hrabanus Maurus, whose family name was Magnentius, was educated in the abbey of Fulda, ordained deacon in 802 ("Annales Francorum" in Bouquet, *Historiens de la France*, v. 66), sent to the school of St Martin of Tours, then directed by Alcuin, where he seems to have learned Greek, and is said by Trithemius to have been taught Hebrew, Syriac and Chaldee by Theophilus an Ephesian. In his *Commentaries on Joshua* (lib. ii. c. 5) he speaks of having resided at Sidon. He returned to Fulda and taught the school there. He became abbot of Fulda in 822, resigned in April 842, was ordained archbishop of Mainz on the 26th of July 847, and died on the 4th of February 856. He compiled an encyclopaedia *De universo* (also called in some MSS. *De universali natura*, *De natura rerum*, and *De origine rerum*) in 22 books and 325 chapters. It is chiefly a rearrangement of

Isidore's *Etymologies*, omitting the first four books, half of the fifth and the tenth (the seven liberal arts, law, medicine and the alphabet of words), and copying the rest, beginning with the seventh book, verbally, though with great omissions, and adding (according to Ritter, *Geschichte der Philosophie*, vii. 193, from Alcuin, Augustine or some other accessible source) the meanings given in the Bible to the subject matter of the chapter; while things not mentioned in Scripture, especially such as belong to classical antiquity, are omitted, so that his work seems to be formed of two alternating parts. His arrangement of beginning with God and the angels long prevailed in methodical encyclopaedias. His last six books follow very closely the order of the last five of Isidore, from which they are taken. His omissions are characteristic of the diminished literary activity and more contracted knowledge of his time. His work was presented to Louis the German, king of Bavaria, at Hersfeld in October 847, and was printed in 1473, fol., probably at Venice, and again at Strassburg by Mentelin about 1472–1475, fol., 334 pages.

Michael Constantine Psellus, the younger, wrote *Διδασκαλία παντοδαπή*, dedicated to the emperor Michael Ducas, who reigned 1071–1078. It was printed by Fabricius in his *Bibliotheca Graeca* (1712), vol. v., in 186 pages 4to and 193 chapters, each containing a question and answer. Beginning with divinity, it goes on through natural history and astronomy, and ends with chapters on excessive hunger, and why flesh hung from a fig-tree becomes tender. As collation with a Turin MS. showed that 35 chapters were wanting, Harles has omitted the text in his edition of Fabricius, and gives only the titles of the chapters (x. 84–88).

The author of the most famous encyclopaedia of the middle ages was Vincent (*q.v.*) of Beauvais (*c.* 1190–*c.* 1264), whose work *Bibliotheca mundi* or *Speculum majus*—divided, as we have it, into four parts, *Speculum naturale*, *Speculum doctrinale*, *Speculum morale* (this part should be ascribed to a later hand), and *Speculum historiale*—was the great compendium of mid-13th century knowledge. Vincent of Beauvais preserved several works of the middle ages and gives extracts from many lost classics and valuable readings of others, and did more than any other medieval writer to awaken a taste for classical literature. Fabricius (*Bibl. Graeca*, 1728, xiv. pp. 107-125) has given a list of 328 authors, Hebrew, Arabic, Greek and Latin, quoted in the *Speculum naturale.* To these should be added about 100 more for the *doctrinale* and *historiale*. As Vincent did not know Greek or Arabic, he used Latin translations. This work is dealt with separately in the article on VINCENT OF BEAUVAIS.

Brunetto Latini of Florence (born 1230, died 1294), the master of Dante and Guido Cavalcanti, while an exile in France between 1260 and 1267, wrote in French *Li Livres dou Tresor*, in 3 books and 413 chapters. Book i. contains the origin of the world, the history of the Bible and of the foundation of governments, astronomy, geography, and lastly natural history, taken from Aristotle, Pliny, and the old French Bestiaries. The first part of Book ii., on morality, is from the *Ethics* of Aristotle, which Brunetto had translated into Italian. The second part is little more than a copy of the well-known collection of extracts from ancient and modern moralists, called the *Moralities of the Philosophers*, of which there are many MSS. in prose and verse. Book iii., on politics, begins with a treatise on rhetoric, chiefly from Cicero *De inventione*, with many extracts from other writers and Brunetto's remarks. The last part, the most original and interesting of all, treats of the government of the Italian republics of the time. Like many of his contemporaries, Brunetto revised his work, so that there are two editions, the second made after his return from exile. MSS. are singularly numerous, and exist in all the dialects then used in France. Others were written in Italy. It was translated into Italian in the latter part of the 13th century by Bono Giamboni, and was printed at Trevigi, 1474, fol., Venice, 1528 and 1533. The *Tesoro* of Brunetto must not be confounded with his *Tesoretto*, an Italian poem of 2937 short lines. Napoleon I. had intended to have the French text of the *Tesoro* printed with commentaries, and appointed a commission for the purpose. It was at last published in the *Collection des documents inédits* (Paris, 1863, 4to, 772 pages), edited by Chabaille from 42 MSS.

Bartholomew de Glanville, an English Franciscan friar, wrote about 1360 a most popular work, *De proprietatibus rerum*, in 19 books and 1230 chapters.

Book 1 relates to God; 2, angels; 3, the soul; 4, the substance of the body; 5, anatomy; 6, ages; 7, diseases; 8, the heavens (astronomy and astrology); 9, time; 10, matter and form; 11, air; 12, birds (including insects, 38 names, Aquila to Vespertilio); 13, water (with fishes); 14, the earth (42 mountains, Ararath to Ziph); 15, provinces (171 countries, Asia to Zeugia); 16, precious stones (including coral, pearl, salt, 104 names, Arena to Zinguttes); 17, trees and herbs (197, Arbor to Zucarum); 18, animals (114, Aries to Vipera); 19, colours, scents, flavours and liquors, with a list of 36 eggs (Aspis to Vultur). Some editions add book 20, accidents of things, that is, numbers, measures, weights and sounds. The Paris edition of 1574 has a book on bees.

There were 15 editions before 1500. An English translation was completed 11th February 1398 by John Trevisa, and printed by Wynkyn de Worde, Westminster, 1495? fol.; London, 1533, fol.; and with considerable additions by Stephen Batman, a physician, London, 1582, fol. It was translated into French by Jehan Corbichon at the command of Charles V. of France, and printed 14 times from 1482 to 1556. A Dutch translation was printed in 1479, and again at Haarlem, 1485, fol.; and a Spanish translation by Padre Vincente de Burgos, Tholosa, 1494, fol.

Pierre Bersuire (Berchorius), a Benedictine, prior of the abbey of St Eloi in Paris, where he died in 1362, wrote a kind of encyclopaedia, chiefly relating to divinity, in three parts:—*Reductorium morale super totam Bibliam*, 428 *moralitates* in 34 books on the Bible from Genesis to Apocalypse; *Reductorium morale de proprietatibus rerum*, in 14 books and 958 chapters, a methodical encyclopaedia or system of nature on the plan of Bartholomew de Glanville, and chiefly taken from him (Berchorius places animals next after fishes in books 9 and 10, and adopts as natural classes *volatilia*, *natatilia* and *gressibilia*); *Dictionarius*, an alphabetical dictionary of 3514 words used in the Bible with moral expositions, occupying in the last edition 1558 folio pages. The first part was printed 11 times from 1474 to 1515, and the third 4 times. The three parts were printed together as *Petri Berchorii opera omnia* (an incorrect title, for he wrote much besides), Moguntiae, 1609, fol., 3 vols., 2719 pages; Coloniae Agrippinae, 1631, fol., 3 vols.; *ib.* 1730–1731, fol., 6 vols., 2570 pages.

A very popular small encyclopaedia, *Margarita philosophica*, in 12 books, divided into 26 tractates and 573 chapters, was written by Georg Reisch, a German, prior of the Carthusians of Freiburg, and confessor of the emperor Maximilian I. Books 1-7 treat of the seven liberal arts; 8, 9, principles and origin of natural things; 10, 11, the soul, vegetative, sensitive and intellectual; 12, moral philosophy. The first edition, Heidelberg, 1496, 4to, was followed by 8 others to 1535. An Italian translation by the astronomer Giovanno Paolo Gallucci was published at Venice in 1594, 1138 small quarto pages, of which 343 consist of additional tracts appended by the translator.

Raphael Maffei, called Volaterranus, being a native of Volterra, where he was born in 1451 and died 5th January 1522, wrote *Commentarii Urbani* (Rome, 1506, fol., in 38 books), so called because written at Rome. This encyclopaedia, printed eight times up to 1603, is remarkable for the great importance given to geography, and also to biography, a subject not included in previous encyclopaedias. Indeed, the book is formed of three nearly equal parts,—geographia, 11 books; anthropologia (biography), 11 books; and philologia, 15 books. The books are not divided into short chapters in the ancient manner, like those of its predecessors. The edition of 1603 contains 814 folio pages. The first book consists of the table of contents and a classed index; books 2-12, geography; 13-23, lives of illustrious men, the popes occupying book 22, and the emperors book 23; 24-27, animals and plants; 28, metals, gems, stones, houses and other inanimate things; 34, de scientiis cyclicis (grammar and rhetoric); 35, de scientiis mathematicis, arithmetic, geometry, optica, catoptrica, astronomy and astrology; 36-38, Aristotelica (on the works of Aristotle).

Giorgio Valla, born about 1430 at Placentia, and therefore called Placentinus, died at Venice in 1499 while lecturing on the immortality of the soul. Aldus published his work, edited by his son Giovanni Pietro Valla, *De expetendis et fugiendis rebus*, Venetiis, 1501, fol. 2 vols.

It contains 49 books and 2119 chapters. Book 1 is introductory, on knowledge, philosophy and mathematics, considered generally (he divides everything to be sought or avoided into three kinds—those which are in the mind, in the body by nature or habit, and thirdly, external, coming from without); books 2-4, arithmetic; 5-9, music; 10-15, geometry, including Euclid and mechanics—book 15 being in three long chapters—de spiritualibus, that is, pneumatics and hydraulics, de catoptricis, and de optice; 16-19, astrology (with the structure and use of the astrolabe); 20-23, physics (including metaphysics); 24-30, medicine; 31-34, grammar; 35-37, dialectics; 38, poetry; 39, 40, rhetoric; 41, moral philosophy; 42-44, economics; 45, politics; 46-48, de corporis commodis et incommodis, on the good and evil of the body (and soul); 49, de rebus externis, as glory, grandeur, &c.

Antonio Zara, born 1574, made bishop of Petina in Istria 1600, finished on the 17th of January 1614 a work published as *Anatomia ingeniorum et scientiarum*, Venetiis, 1615, 4to, 664 pages, in four sections and 54 membra. The first section, on the dignity and excellence of man, in 16 membra, considers him in all his bodily and mental aspects. The first membrum describes his structure and his soul, and in the latter part contains the author's preface, the deeds of his ancestors, an account of himself, and the dedication of his book to Ferdinand, archduke of Austria. Four membra treat of the discovery of character by chiromancy, physiognomy, dreams and astrology. The second section treats of 16 sciences of the imagination—writing, magic, poetry, oratory, courtiership (aulicitas), theoretical and mystic arithmetic, geometry, architecture, optics, cosmography, astrology, practical medicine, war, government. The third section treats of 8 sciences of intellect—logic, physics, metaphysics, theoretical medicine, ethics, practical jurisprudence, judicature, theoretical theology. The fourth section treats of 12 sciences of memory—grammar, practical arithmetic, human history, sacred canons, practical theology, sacred history, and lastly the creation and the final catastrophe. The book, now very rare, is well arranged, with a copious index, and is full of curious learning.

Johann Heinrich Alsted, born 1588, died 1638, published *Encyclopaedia septem tomis distincta*, Herbornae Nassoviorum, 1630, fol. 7 vols., 2543 pages of very small type. It is in 35 books, divided into 7 classes, preceded by 48 synoptical tables of the whole, and followed by an index of 119 pages.

I. Praecognita disciplinarum, 4 books, hexilogia, technologia, archelogia, didactica, that is, on intellectual habits and on the classification, origin and study of the arts. II. Philology, 6 books, lexica, grammar, rhetoric, logic, oratory and poetry; book 5, lexica, contains dictionaries explained in Latin of 1076 Hebrew, 842 Syriac, 1934 Arabic, 1923 Greek and 2092 Latin words, and also nomenclator technologiae, &c., a classified vocabulary of terms used in the arts and sciences, in Latin, Greek and Hebrew, filling 34 pages; book 6 contains Hebrew, Aramaic, Greek, Latin and German grammars; book 10, poetica, contains a list of 61 Rotwelsch words. III. Theoretic philosophy, 10 books:—book 11, metaphysics; 12, pneumatics (on spirits); 13, physics; 14, arithmetic; 15, geometry; 16, cosmography; 17, uranometria (astronomy and astrology); 18, geography (with maps of the Old World, eastern Mediterranean, and Palestine under the Old and New Testaments, and a plate of Noah's ark); 19, optics; 20, music. IV. Practical philosophy, 4 books:—21, ethics; 22, economics (on relationships); 23, politics, with florilegium politicum, 119 pages of extracts from historians, philosophers and orators; 24, scholastics (on education, with a florilegium of 25 pages). V. The three superior faculties:—25, theology; 26, jurisprudence; 27, medicine (ending with the rules of the Salernian school). VI. Mechanical arts in general:—book 28, mathematical mechanical arts; book 29, agriculture, gardening, care of animals, baking, brewing, preparing medicines, metallurgy (with mining); book 30, physical mechanical arts—printing, dialling, &c. Under paedutica (games) is Vida's Latin poem on chess, and one by Leuschner on the ludus Lorzius. VII. Farragines disciplinarum, 5 books:—31, mnemonics; 32, history; 33, chronology; 34, architecture; 35, quodlibetica, miscellaneous arts, as magic, cabbala, alchemy, magnetism, &c., with others apparently distinguished and named by himself, as, paradoxologia, the art of explaining paradoxes; dipnosophistica, the art of philosophizing while feasting; cyclognomica, the art of conversing well de quovis scibili; tabacologia, the nature, use and abuse of tobacco, &c.—in all 35 articles in this book.

Alsted's encyclopaedia was received with very great applause, and was highly valued. Lami (*Entretiens*, 1684, p. 188) thought it almost the only encyclopaedia which did not deserve to be despised. Alsted's learning was very various, and his reading was very extensive and diversified. He gives few references, and Thomasius charges him with plagiarism, as he often copies literally without any acknowledgment. He wrote not long before the appearance of encyclopaedias in modern languages superseded his own and other Latin books, and but a short time before the alphabetical arrangement began to prevail over the methodical. His book was reprinted, Lugduni, 1649, fol. 4 vols., 2608 pages.

Jean de Magnon, historiographer to the king of France, undertook to write an encyclopaedia in French heroic verse, which was to fill ten volumes of 20,000 lines each, and to render libraries merely a useless ornament. But he did not live to finish it, as he was killed at night by robbers on the Pont Neuf in Paris, in April 1662. The part he left was printed as *La Science universelle*, Paris, 1663, fol., 348 pages,—10 books containing about 11,000 lines. They begin with the nature of God, and end with the history of the fall of man. His verses, say Chaudon and Delandine, are perhaps the most nerveless, incorrect, obscure and flat in French poetry; yet the author had been the friend of Molière, and had acted with him in comedy.

Louis Moréri (born on the 25th of March 1643 at Bargemont, in the diocese of Fréjus, died on the 10th of July 1680 at Paris) wrote a dictionary of history, genealogy and biography, *Le Grand Dictionnaire historique, ou le mêlange curieux de l'histoire sacrée et profane*, Lyons, 1674, fol. He began a second edition on a larger scale, published at Lyons in 1681, in two volumes folio; the sixth edition was edited by Jean le Clerc, Amsterdam, 1691, fol. 4 vols.; the twentieth and last edition, Paris, 1759, fol. 10 vols. Moréri's dictionary, still very useful, was of great value and importance, although not the first of the kind. It superseded the very inferior compilation of Juigné-Broissinière, *Dictionnaire théologique, historique, poëtique, cosmographique, et chronologique*, Paris, 1644, 4to; Rouen, 1668, &c.,—a translation, with additions, of the *Dictionarium historicum, geographicum, et poëticum* of Charles Estienne, published in 1553, 4to, and often afterwards. As such a work was much wanted, Juigné's book went through twelve editions in less than thirty years, notwithstanding its want of criticism, errors, anachronisms. defects and inferior style.

Johann Jacob Hofmann (born on the 11th of September 1635, died on the 10th of March 1706), son of a schoolmaster at Basel, which he is said never to have left, and where he was professor of Greek and History, wrote *Lexicon universale historico-geographico-chronologico-poëtico-philologicum*, Basileae, 1677, fol. 2 vols., 1823 pages, a dictionary of history, biography, geography, genealogies of princely families, chronology, mythology and philology. At the end is Nomenclator Μιξόγλωττος, an index of names of places, people, &c., in many languages, carefully collected, and explained in Latin, filling 110 pages; with an index of subjects not forming separate articles, occupying 34 pages. In 1683 he published a continuation in 2 vols. fol., 2293 pages, containing, besides additions to the subjects given in his lexicon, the history of animals, plants, stones, metals, elements, stars, and especially of man and his affairs, arts, honours, laws, magic, music, rites and a vast number of other subjects. In 1698 he published a second edition, Lugduni Batavorum, fol. 4 vols., 3742 pages, incorporating the continuation with additions. From the great extent of his plan, many articles, especially in history, are superficial and faulty.

Étienne Chauvin was born at Nismes on the 18th of April 1640. He fled to Rotterdam on the revocation of the edict of Nantes, and in 1688 supplied Bayle's place in his lectures on philosophy. In 1695 he was invited by the elector of Brandenburg to go as professor of philosophy to Berlin, where he became the representative of the Cartesian philosophy, and died on the

6th of April 1725. He wrote *Lexicon rationale, sive thesaurus philosophicus ordine alphabetico digestus*, Rotterdami, 1692, fol., 746 pages and 30 plates. An improved and enlarged edition was printed as *Lexicon philosophicum secundis curis*, Leovardiae, 1713, large folio, 725 pages and 30 plates. This great work may be considered as a dictionary of the Cartesian philosophy, and was very much used by Brucker and other earlier historians of philosophy. It is written in a very dry and scholastic style, and seldom names authorities.

The great dictionary of French, begun by the French Academy on the 7th of February 1639, excluded all words especially belonging to science and the arts. But the success of the rival dictionary of Furetière, which, as its title-page, as well as that of the *Essais* published in 1684, conspicuously announced, professed to give "les termes de toutes les Sciences et des Arts," induced Thomas Corneille, a member of the Academy, to compile *Le Dictionnaire des arts et des sciences*, which the Academy published with the first edition of their dictionary, Paris, 1694, folio, as a supplement in two volumes containing 1236 pages. It was reprinted at Amsterdam, 1696, fol. 2 vols., and at Paris in 1720, and again in 1732, revised by Fontenelle. A long series of dictionaries of arts and sciences have followed Corneille in placing in their titles the arts before the sciences, which he probably did merely in order to differ from Furetière. Corneille professed to quote no author whom he had not consulted; to take plants from Dioscorides and Matthiolus, medicine from Ettmüller, chemistry from a MS. of Perrault, and architecture, painting and sculpture from Félibien; and to give an abridged history of animals, birds and fishes, and an account of all religious and military orders and their statutes, heresiarchs and heresies, and dignities and charges ancient and modern.

Pierre Bayle (born on the 18th of November 1647, died on the 28th of December 1706) wrote a very important and valuable work, *Dictionnaire historique et critique*, Rotterdam, 1697, fol. 2 vols. His design was to make a dictionary of the errors and omissions of Moréri and others, but he was much embarrassed by the numerous editions and supplements of Moréri. A second edition with an additional volume appeared at Amsterdam in 1702, fol. 3 vols. The fourth edition, Rotterdam, 1720, fol. 4 vols., was much enlarged from his manuscripts, and was edited by Prosper Marchand. It contains 3132 pages besides tables, &c. The ninth edition was published at Basel, 1741, fol. 10 vols. It was translated into English from the second edition, London, 1709, fol. 4 vols., with some slight additions and corrections by the author; and again from the fifth edition of 1730 by Birch and Lockman, London, 1734–1740, fol. 5 vols. J. G. de Chaufepié published *Nouveau Dictionnaire historique*, Amsterdam, 1750–1756, fol. 4 vols., as a supplement to Bayle. It chiefly consists of the articles added by the English translators with many corrections and additions, and about 500 new articles added by himself, and contains in all about 1400 articles. Prosper Marchand, editor of the fourth edition, left at his death on the 14th of January 1756 materials for a supplementary *Dictionnaire historique*, La Haye, 1758, fol. 2 vols., 891 pages, 136 articles. It had occupied his leisure moments for forty years. Much of his work was written on small scraps of paper, sometimes 20 in half a page and no larger than a nail, in such small characters that not only the editor but the printer had to use powerful magnifiers. Bayle's dictionary was also translated into German, Leipzig, 1741–1744, fol. 4 vols., with a preface by J. C. Gottsched. It is still a work of great importance and value.

Vincenzo Maria Coronelli, a Franciscan friar, who was born in Venice about 1650, made cosmographer to the republic in 1685, became general of his order in 1702, and was found dead at his study table on the 9th of December 1718, began in 1701 to publish a general alphabetical encyclopaedia, written in Italian, at which he had been working for thirty years, *Biblioteca universale sacro-profana*. It was to explain more than 300,000 words, to include history and biography as well as all other subjects, and to extend to 45 volumes folio. Volumes 1-39 were to contain the dictionary A to Z; 40, 41, the supplement; 42, retractations and corrections; 43, universal index; 44, index divided into matters; 45, index in various languages. But seven volumes only were published, Venezia, 1701–1706, fol., 5609 pages, A to Caque. The first six volumes have each an index of from 28 to 48 pages (in all 224 pages) of subjects, whether forming articles or incidental. The articles in each are numbered, and amount to 30,269 in the six volumes, which complete the letter B. On an average 3 pages contain 22 articles. Each volume is dedicated to a different patron—the pope, the doge, the king of Spain, &c. This work is remarkable for the extent and completeness of its plan, and for being the first great alphabetical encyclopaedia, as well as for being written in a modern language, but it was hastily written and very incorrect. Never, perhaps, says Tiraboschi (*Storia della letteratura italiana*, viii. 546), was there so quick a writer; he composed a folio volume as easily as others would a page, but he never perfected his works, and what we have of this book will not induce us to regret the want of the remainder.

The first alphabetical encyclopaedia written in English was the work of a London clergyman, John Harris (born about 1667, elected first secretary of the Royal Society on the 30th of November 1709, died on the 7th of September 1719), *Lexicon technicum, or an universal English Dictionary of Arts and Sciences*, London, 1704, fol., 1220 pages, 4 plates, with many diagrams and figures printed in the text. Like many subsequent English encyclopaedias the pages are not numbered. It professes not merely to explain the terms used in the arts and sciences, but the arts and sciences themselves. The author complains that he found much less help from previous dictionaries than one would suppose, that Chauvin is full of obsolete school terms, and Corneille gives only bare explanations of terms, which often relate only to simple ideas and common things. He omits theology, antiquity, biography and poetry; gives only technical history, geography and chronology; and in logic, metaphysics, ethics, grammar and rhetoric, merely explains the terms used. In mathematics and anatomy he professes to be very full, but says that the catalogues and places of the stars are very imperfect, as Flamsteed refused to assist him. In botany he gave from Ray, Morrison and Tournefort "a pretty exact botanick lexicon, which was what we really wanted before," with an account of all the "kinds and subalternate species of plants, and their specific differences" on Ray's method. He gave a table of fossils from Dr Woodward, professor of medicine in Gresham College, and took great pains to describe the parts of a ship accurately and particularly, going often on board himself for the purpose. In law he abridged from the best writers what he thought necessary. He meant to have given at the end an alphabet for each art and science, and some more plates of anatomy and ships, "but the undertaker could not afford it at the price." A review of his work, extending to the unusual length of four pages, appeared in the *Philosophical Transactions*, 1704, p. 1699. This volume was reprinted in 1708. A second volume of 1419 pages and 4 plates appeared in 1710, with a list of about 1300 subscribers. Great part of it consisted of mathematical and astronomical tables, as he intended his work to serve as a small mathematical library. He was allowed by Sir Isaac Newton to print his treatise on acids. He gives a table of logarithms to seven figures of decimals (44 pages), and one of sines, tangents and secants (120 pages), a list of books filling two pages, and an index of the articles in both volumes under 26 heads, filling 50 pages. The longest lists are law (1700 articles), chyrurgery, anatomy, geometry, fortification, botany and music. The mathematical and physical part is considered very able. He often mentions his authorities, and gives lists of books on particular subjects, as botany and chronology. His dictionary was long very popular. The fifth edition was published in 1736, fol. 2 vols. A supplement, including no new subjects, appeared in 1744, London, fol., 996 pages, 6 plates. It was intended to rival Ephraim Chambers's work (see below), but, being considered a bookseller's speculation, was not well received.

Johann Hübner, rector of the Johanneum in Hamburg, born on the 17th of March 1668, wrote prefaces to two dictionaries written in German, which bore his name, and were long popular.

The first was *Reales Staats Zeitungs- und Conversations-Lexicon*, Leipzig, 1704, 8vo; second edition, 1706, 947 pages; at the end a register of arms, and indexes of Latin and French words; fifth edition, 1711; fifteenth edition 1735, 1119 pages. The thirty-first edition was edited and enlarged by F. A. Rüder, and published by Brockhaus, Leipzig, 1824–1828, 8vo, 4 vols., 3088 pages. It was translated into Hungarian by Fejer, Pesten, 1816, 8vo, 5 vols., 2958 pages. The second, published as a supplement, was *Curieuses und reales Natur- Kunst- Berg- Gewerb- und Handlungs-Lexicon*, Leipzig, 1712, 8vo, 788 pages, frequently reprinted to 1792. The first relates to the political state of the world, as religion, orders, states, rivers, towns, castles, mountains, genealogy, war, ships; the second to nature, science, art and commerce. They were the work of many authors, of whom Paul Jacob Marpurger, a celebrated and voluminous writer on trade and commerce, born at Nuremberg on the 27th of June 1656, was an extensive contributor, and is the only one named by Hübner.

Johann Theodor Jablonski, who was born at Danzig on the 15th of December 1654, appointed secretary to the newly founded Prussian Academy in 1700, when he went to Berlin, where he died on the 28th of April 1731, published *Allgemeines Lexicon der Künste und Wissenschaften*, Leipzig, 1721, 4to, a short but excellent encyclopaedia still valued in Germany. It does not include theology, history, geography, biography and genealogy. He not only names his authorities, but gives a list of their works. A new edition in 1748 was increased one-third to 1508 pages. An improved edition, Königsberg and Leipzig, 1767, 4to, 2 vols., 1852 pages, was edited by J. J. Schwabe, public teacher of philosophy at Leipzig.

Ephraim Chambers (*q.v.*) published his *Cyclopaedia; or an Universal Dictionary of Art and Sciences, containing an Explication of the Terms and an Account of the Things Signified thereby in the several Arts, Liberal and Mechanical, and the several Sciences, Human and Divine*, London, 1728, fol. 2 vols. The dedication to the king is dated October 15, 1727. Chambers endeavoured to connect the scattered articles relating to each subject by a system of references, and to consider "the several matters, not only in themselves, but relatively, or as they respect each other; both to treat them as so many wholes and as so many parts of some greater whole." Under each article he refers to the subject to which it belongs, and also to its subordinate parts; thus Copyhold has a reference to Tenure, of which it is a particular kind, and other references to Rolls, Custom, Manor, Fine, Charterland and Freehold. In his preface he gives an "analysis of the divisions of knowledge," 47 in number, with classed lists of the articles belonging to each, intended to serve as table of contents and also as a rubric or directory indicating the order in which the articles should be read. But it does so very imperfectly, as the lists are curtailed by many *et caeteras*; thus 19 occur in a list of 119 articles under Anatomy, which has nearly 2200 articles in Rees's index. He omits etymologies unless "they appeared of some significance"; he gives only one grammatical form of each word, unless peculiar ideas are arbitrarily attached to different forms, as *precipitate*, *precipitant*, *precipitation*, when each has an article; and he omits complex ideas generally known, and thus "gets free of a vast load of plebeian words." His work, he says, is a collection, not the produce of one man's wit, for that would go but a little way, but of the whole commonwealth of learning. "Nobody that fell in my way has been spared, antient or modern, foreign nor domestic, Christian or Jew nor heathen." To the subjects given by Harris he adds theology, metaphysics, ethics, politics, logic, grammar, rhetoric and poetry, but excludes history, biography, genealogy, geography and chronology, except their technical parts. A second edition appeared in 1738, fol. 2 vols., 2466 pages, "retouched and amended in a thousand places." A few articles are added and some others enlarged, but he was prevented from doing more because "the booksellers were alarmed with a bill in parliament containing a clause to oblige the publishers of all improved editions of books to print their improvements separately." The bill after passing the Commons was unexpectedly thrown out by the Lords; but fearing that it might be revived, the booksellers thought it best to retreat though more than twenty sheets had been printed. Five other editions were published in London, 1739 to 1751–1752, besides one in Dublin, 1742, all in 2 vols. fol. An Italian translation, Venezia, 1748–1749, 4to, 9 vols., was the first complete Italian encyclopaedia. When Chambers was in France in 1739 he rejected very favourable proposals to publish an edition there dedicated to Louis XV. His work was judiciously, honestly and carefully done, and long maintained its popularity. But it had many defects and omissions, as he was well aware; and at his death, on the 15th of May 1740, he had collected and arranged materials for seven new volumes. John Lewis Scott was employed by the booksellers to select such articles as were fit for the press and to supply others. He is said to have done this very efficiently until appointed sub-preceptor to the prince of Wales and Prince Edward. His task was entrusted to Dr (afterwards called Sir John) Hill, who performed it very hastily, and with characteristic carelessness and self-sufficiency, copying freely from his own writings. The *Supplement* was published in London, 1753, fol. 2 vols., 3307 pages and 12 plates. As Hill was a botanist, the botanical part, which had been very defective in the *Cyclopaedia*, was the best.

Abraham Rees (1743–1825), a famous Nonconformist minister, published a revised and enlarged edition, "with the supplement and modern improvements incorporated in one alphabet," London, 1778–1788, fol. 2 vols., 5010 pages (but not paginated), 159 plates. It was published in 418 numbers at 6d. each. Rees says that he has added more than 4400 new articles. At the end he gives an index of articles, classed under 100 heads, numbering about 57,000 and filling 80 pages. The heads, with 39 cross references, are arranged alphabetically. Subsequently there were reprints.

One of the largest and most comprehensive encyclopaedias was undertaken and in a great measure completed by Johann Heinrich Zedler, a bookseller of Leipzig, who was born at Breslau 7th January 1706, made a Prussian commerzienrath in 1731, and died at Leipzig in 1760,—*Grosses vollständiges Universal Lexicon Aller Wissenschaften und Künste welche bishero durch menschlichen Verstand und Witz erfunden und verbessert worden*, Halle and Leipzig, 1732–1750, fol. 64 vols., 64,309 pages; and *Nöthige Supplemente*, ib. 1751–1754, vols. i. to iv., A to Caq, 3016 pages. The columns, two in a page, are numbered, varying from 1356 in vol. li. to 2588 in vol. xlix. Each volume has a dedication, with a portrait. The first nine are the emperor, the kings of Prussia and Poland, the empress of Russia, and the kings of England, France, Poland, Denmark and Sweden. The dedications, of which two are in verse, and all are signed by Zedler, amount to 459 pages. The supplement has no dedications or portraits. The preface to the first volume of the work is by Johann Peter von Ludewig, chancellor of the university of Halle (born 15th August 1690, died 6th September 1743). Nine editors were employed, whom Ludewig compares to the nine muses; and the whole of each subject was entrusted to the same person, that all its parts might be uniformly treated. Carl Günther Ludovici (born at Leipzig 7th August 1707, public teacher of philosophy there from 1734, died 3rd July 1778) edited the work from vol. xix., beginning the letter M, and published in 1739, to the end, and also the supplement. The work was published by subscription. Johann Heinrich Wolff, an eminent merchant and shopkeeper in Leipzig, born there on the 29th of April 1690, came to Zedler's assistance by advancing the funds for expenses and becoming answerable for the subscriptions, and spared no cost that the work might be complete. Zedler very truly says, in his preface to vol. xviii., that his *Universal Lexicon* was a work such as no time and no nation could show, and both in its plan and execution it is much more comprehensive and complete than any previous encyclopaedia. Colleges, says Ludewig, where all sciences are taught and studied, are on that account called *universities*, and their teaching is called *studium universale*; but the *Universal Lexicon* contains not only what they teach in theology, jurisprudence, medicine, philosophy, history, mathematics, &c., but also many other things belonging to courts, chanceries, hunting, forests, war and peace, and to artists, artizans, housekeepers and merchants not thought of in colleges. Its plan embraces not only history, geography and biography, but also genealogy, topography, and from vol. xviii., published in 1738, lives of illustrious living persons. Zedler inquires why death alone should make a deserving man capable of having his services and worthy deeds made known to the world in print. The lives of the dead, he says, are to be found in books, but those of the living are not to be met with anywhere, and would often be more useful if known. In consequence of this preface, many lives and genealogies were sent to him for publication. Cross references generally give not only the article referred to, but also the volume and column, and, when necessary, such brief information as may distinguish the word referred to from others similar but of different meaning. Lists of authorities, often long, exact and valuable are frequently appended to the articles. This work, which is well and carefully compiled, and very trustworthy, is still a most valuable book of reference on many subjects, especially topography, genealogy and biography. The genealogies and family histories are excellent, and many particulars are given of the lives and works of authors not easily found elsewhere.

A work on a new plan was published by Dennis de Coetlogon, a Frenchman naturalized in England, who styled himself "Knight of St Lazare, M.D., and member of the Royal Academy of Angers"—*An Universal History of Arts and Sciences*, London, 1745, fol. 2 vols., 2529 pages, 33 plates and 161 articles arranged alphabetically. He "endeavours to render each treatise as complete as possible, avoiding above all things needless repetitions, and never puzzling the reader with the least reference." Theology is divided into several treatises; Philosophy into Ethicks, Logick and Metaphysick, each under its letter; and Physick is subdivided into Anatomy, Botany, Geography, Geometry, &c. Military Art is divided into Army, Fortification, Gunnery. The royal licence is dated 13th March 1740–1741; the dedication is to the duke of Gisors, the pages are numbered, there is an appendix of 35 pages of astronomical tables, and the two indexes, one to each volume, fill 69 pages, and contain about 9000 subjects. The type is large and the style diffuse, but the subject matter is sometimes curious. The author says that his work is the only one of the kind, and that he wrote out with his own hand every line, even the index. But notwithstanding the novelty of his plan, his work does not seem ever to have been popular.

Gianfrancesco Pivati, born at Padua in 1689, died at Venice in 1764, secretary of the Academy of Sciences at Venice, who had published in 1744 a 4to volume containing a *Dizionario universale*, wrote *Nuovo dizionario scientifico e curioso sacro-profano*, Venezia, 1746–1751, fol. 10 vols., 7791 pages, 597 plates. It is a general encyclopaedia, including geography, but not history or biography. He gives frequent references to his authorities and much curious information. His preliminary discourse (80 pages) contains a history of the several sciences from mathematics to geography. The book was published by subscription, and at the end of the last volume is a *Catalogo dei Signori Associati*, 252 in number, who took 266 copies. It is also remarkable for the number of its plates, which are engraved on copper. In each volume they are placed together at the end, and are preceded by an explanatory index of subjects referring to the plates and to the articles they illustrate.

One of the greatest and most remarkable literary enterprises of the 18th century, the famous French *Encyclopédie*, originated in a French translation of Ephraim Chambers's *Cyclopaedia*, begun in 1743 and finished in 1745 by John Mills, an Englishman resident in France, assisted by Gottfried Sellius, a very learned native of Danzig, who, after being a professor at Halle and Göttingen, and residing in Holland, had settled in Paris. They applied to Lebreton, the king's printer, to publish the work, to fulfil the formalities required by French law, with which, as foreigners, they were not acquainted, and to solicit a royal privilege. This he obtained, but in his own name alone. Mills complained so loudly and bitterly of this deception that Lebreton had to acknowledge formally that the privilege belonged *en toute propriété* to John Mills. But, as he again took care not to acquaint Mills with the necessary legal formalities, this title soon became invalid. Mills then agreed to grant him part of his privilege, and in May 1745 the work was announced as *Encyclopédie ou dictionnaire universel des arts et des sciences*, folio, four volumes of 250 to 260 sheets each, with a fifth of at least 120 plates, and a vocabulary or list of articles in French, Latin, German, Italian and Spanish, with other lists for each language explained in French, so that foreigners might easily find any article wanted. It was to be published by subscription at 135 livres, but for large paper copies 200 livres, the first volume to be delivered in June 1746, and the two last at the end of 1748. The subscription list, which was considerable, closed on the 31st of December 1745. Mills demanded an account, which Lebreton, who had again omitted certain formalities, insultingly refused. Mills brought an action against him, but before it was decided Lebreton procured the revocation of the privilege as informal, and obtained another for himself dated the 21st of January 1746. Thus, for unwittingly contravening regulations with which his unscrupulous publisher ought to have made him acquainted, Mills was despoiled of the work he had both planned and executed, and had to return to England. Jean Paul de Gua de Malves, professor of philosophy in the college of France (born at Carcassonne in 1713, died on the 15th of June 1785), was then engaged as editor merely to correct errors and add new discoveries. But he proposed a thorough revision, and obtained the assistance of many learned men and artists, among whom Desessarts names Louis, Condillac, d'Alembert and Diderot. But the publishers did not think his reputation high enough to ensure success, withheld their confidence, and often opposed his plans as too expensive. Tired at last of disputes, and too easily offended, de Gua resigned the editorship. The publishers, who had already made heavy advances, offered it to Diderot, who was probably recommended to them by his very well received *Dictionnaire universel de medicine*, Paris, 1746–1748, fol. 6 vols., published by Briasson, David and Durand, with notes and additions by Julien Busson, doctor regent of the faculty of medicine of Paris. It was a translation, made with the assistance of Eidous and Toussaint, of the celebrated work of Dr Robert James, inventor of the fever powders, *A Medicinal Dictionary*, London, 1743–1745, fol. 3 vols., 3275 pages and 98 plates, comprising a history of drugs, with chemistry, botany and natural history so far as they relate to medicine, and with an historical preface of 99 pages (in the translation 136). The proposed work was to have been similar in character. De Gua's papers were handed over to Diderot in great confusion. He soon persuaded the publishers to undertake a far more original and comprehensive work. His friend d'Alembert undertook to edit the mathematics. Other subjects were allotted to 21 contributors, each of whom received the articles on this subject in Mills' translation to serve as a basis for his work. But they were in most cases so badly composed and translated, so full of errors and omissions, that they were not used. The contributions were to be finished in three months, but none was ready in time, except Music by Rousseau, which he admits was hastily and badly done. Diderot was imprisoned at Vincennes, on the 29th of July 1749, for his *Lettre sur les aveugles*. He was closely confined for 28 days, and was then for three months and ten days a prisoner on parole in the castle. This did not stop the printing, though it caused delay. The prospectus by Diderot appeared in November 1750. The work, was to form 8 vols. fol., with at least 600 plates. The first volume was published in July 1751, and delivered to the subscribers in August. The second appeared in January 1752. An *arrêt* of the council, 9th of February, suppressed both volumes as injurious to the king's authority and to religion. Malesherbes, director-general of the Librairie, stopped the issue of volume ii., 9th of February, and on the 21st went with a *lettre de cachet* to Lebreton's to seize the plates and the MSS., but did not find, says Barbier, even those of volume iii., as they had been taken to his own house by Diderot and one of the publishers. The Jesuits tried to continue the work, but in vain. It was less easy, says Grimm, than to ruin philosophers. The *Dictionnaire de Trévoux* pronounced the completion of the *Encyclopédie* impossible, and the project ridiculous (5th edition, 1752, iii. 750). The government had to request the editors to resume the work as one honourable to the nation. The marquis d'Argenson writes, 7th of May 1752, that Mme de Pompadour had been urging them to proceed, and at the end of June he reports them as again at work. Volume iii., rather improved by the delay, appeared in October 1753; and volume vii., completing G, in November 1757. The clamours against the work soon recommenced. D'Alembert retired in January 1758, weary of sermons, satires and intolerant and absurd censors. The parlement of Paris, by an *arrêt*, 23rd of January 1759, stopped the sale and distribution of the *Encyclopédie*, Helvetius's *De l'Esprit*, and six other books; and by an *arrêt*, 6th February, ordered them all to be burnt, but referred the *Encyclopédie* for examination to a commission of nine. An *arrêt du conseil*, 7th of March, revoked the privilege of 1746, and stopped the printing. Volume viii. was then in the press. Malesherbes warned Diderot that he would have his papers seized next day; and when Diderot said he could not make a selection, or find a place of safety at such short notice, Malesherbes said, "Send them to me, they will not look for them there." This, according to Mme de Vandeul, Diderot's daughter, was done with perfect success. In the article Pardonner Diderot refers to these persecutions, and says, "In the space of some months we have seen our honour, fortune, liberty and life imperilled." Malesherbes, Choiseul and Mme de Pompadour protected the work; Diderot obtained private permission to go on printing, but with a strict charge not to publish any part until the whole was finished. The Jesuits were condemned by the parlement of Paris in 1762, and by the king in November 1764. Volume i. of plates appeared in 1762, and volumes viii. to xvii., ten volumes of text, 9408 pages, completing the work, with the 4th volume of plates in 1765, when there were 4250 subscribers. The work circulated freely in the provinces and in foreign countries, and was secretly distributed in Paris and Versailles. The general assembly of the clergy, on the 20th of June 1765, approved articles in which it was condemned, and on the 27th of September adopted a *mémoire* to be presented to the king. They were forbidden to publish their acts which favoured the Jesuits, but Lebreton was required to give a list of his subscribers, and was put into the Bastille for eight days in 1766. A royal order was sent to the subscribers to deliver their copies to the lieutenant of police. Voltaire in 1774 relates that, at a *petit souper* of the king at Trianon, there was a debate on the composition of gunpowder. Mme de Pompadour said she did not know how her rouge or her silk stockings were made. The duc de la Vallière regretted that the king had confiscated their encyclopaedias, which could decide everything. The king said he had been told that the work was most dangerous, but as he wished to judge for himself, he sent for a copy. Three servants with difficulty brought in the 21 volumes. The company found everything they looked for, and the king allowed the confiscated copies to be returned. Mme de Pompadour died on the 15th of April 1764. Lebreton had half of the property in the work, and Durand, David and Briasson had the rest. Lebreton, who had the largest printing office in Paris, employed 50 workmen in printing the last ten volumes. He had the articles set in type exactly as the authors sent them in, and when Diderot had corrected the last proof of each sheet, he and his foreman, hastily, secretly and by night, unknown to his partners in the work, cut out whatever seemed to them daring, or likely to give offence, mutilated most of the best articles without any regard to the consecutiveness of what was left, and burnt the manuscript as they proceeded. The printing of the work was nearly finished when Diderot, having to consult one of his great philosophical articles in the letter S, found it entirely mutilated. He was confounded, says Grimm, at discovering the atrocity of the printer; all the best articles were in the same confusion. This discovery put him into a state of frenzy and despair from rage and grief. His daughter never heard him speak coolly on the subject, and after twenty years it still made him angry. He believed that every one knew as well as he did what was wanting in each article, but in fact the mutilation was not perceived even by the authors, and for many years was known to few persons. Diderot at first refused to correct the remaining proofs, or to do more than write the explanations of the plates. He required, according to Mme de Vandeul, that a copy, now at St Petersburg with his library, should be printed with columns in which all was restored. The mutilations began as far back as the article Intendant. But how far, says Rosenkranz, this murderous, incredible and infamous operation was carried cannot now be exactly ascertained. Diderot's articles, not including those on arts and trades, were reprinted in Naigeon's edition (Paris, 1821, 8vo, 22 vols.). They fill 4132 pages, and number 1139, of which 601 were written for the last ten volumes. They are on very many subjects, but principally on grammar, history, morality, philosophy, literature and metaphysics. As a contributor, his special department of the work was philosophy, and arts and trades. He passed whole days in workshops, and began by examining a machine carefully, then he had it taken to pieces and put together again, then he watched it at work, and lastly worked it himself. He thus learned to use such complicated machines as the stocking and cut velvet looms. He at first received 1200 livres a year as editor, but afterwards 2500 livres a volume, besides a final sum of 20,000 livres. Although after his engagement he did not suffer from poverty as he had done before, he was obliged to sell his library in order to provide for his daughter. De Jaucourt spared neither time, trouble nor expense in perfecting the work, for which he received nothing, and he employed several secretaries at it for ten years. To pay them he had to sell his house in Paris, which Lebreton bought with the profits derived from De Jaucourt's work. All the publishers made large fortunes; their expenses amounted to 1,158,000 livres and their profits to 2,162,000. D'Alembert's "Discours Preliminaire," 45 pages, written in 1750, prefixed to the first volume, and delivered before the French Academy on his reception on the 19th of December 1754, consists of a systematic arrangement of the various branches of knowledge, and an account of their progress since their revival. His system, chiefly taken from Bacon, divides them into three classes, under memory, reason and imagination. Arts and trades are placed under natural history, superstition and magic under science de Dieu, and orthography and heraldry under logic. The literary world is divided into three corresponding classes —*érudits*, *philosophes* and *beaux esprits*. As in Ephraim Chambers's *Cyclopaedia*, history and biography were excluded, except incidentally; thus Aristotle's life is given in the article Aristotelisme. The science to which an article belongs is generally named at the beginning of it, references are given to other articles, and the authors' names are marked by initials, of which lists are given in the earlier volumes, but sometimes their names are subscribed in full. Articles by Diderot have no mark, and those inserted by him as editor have an asterisk prefixed. Among the contributors were Voltaire, Euler, Marmontel, Montesquieu, D'Anville, D'Holbach and Turgot, the leader of the new school of economists which made its first appearance in the pages of the *Encyclopédie*. Louis wrote the surgery, Daubenton natural history, Eidous heraldry and art, Toussaint jurisprudence, and Condamine articles on South America.

No encyclopaedia perhaps has been of such political importance, or has occupied so conspicuous a place in the civil and literary history of its century. It sought not only to give information, but to guide opinion. It was, as Rosenkranz says (*Diderot*, i. 157), theistic and heretical. It was opposed to the church, then all-powerful in France, and it treated dogma historically. It was, as Desnoiresterres says (*Voltaire*, v. 164), a war machine; as it progressed, its attacks both on the church and the still more despotic government, as well as on Christianity itself, became bolder and more undisguised, and it was met by opposition and persecution unparalleled in the history of encyclopaedias. Its execution is very unequal, and its articles of very different value. It was not constructed on a regular plan, or subjected to sufficient supervision; articles were sent in by the contributors, and not seen by the editors until they were in type. In each subject there are some excellent articles, but others are very inferior or altogether omitted, and references are often given to articles which do not exist. Thus marine is said to be more than three-fourths deficient; and in geography errors and omissions abound—even capitals and sovereign states are overlooked, while villages are given as towns, and towns are described which never existed. The style is too generally loose, digressive and inexact; dates are seldom given; and discursiveness, verbosity and dogmatism are frequent faults. Voltaire was constantly demanding truth, brevity and method, and said it was built half of marble and half of wood. D'Alembert compared it to a harlequin's coat, in which there is some good stuff but too many rags. Diderot was dissatisfied with it as a whole; much of it was compiled in haste; and carelessly written articles and incompetent contributors were admitted for want of money to pay good writers. Zedler's *Universal Lexicon* is on the whole much more useful for reference than its far more brilliant successor. The permanent value of encyclopaedias depends on the proportion of exact and precise facts they contain and on their systematic regularity.

The first edition of the *Encyclopédie*, in 17 vols. folio, 16,288 pages, was imitated by a counterfeit edition printed at Geneva as the volumes appeared in Paris. Eleven folio volumes of plates were published at Paris (1762 to 1772), containing 2888 plates and 923 pages of explanation, &c. A supplement was printed at Amsterdam and Paris (1776–1777), fol. 5 vols., 3874 pages, with 224 plates. History was introduced at the wish of the public, but only "the general features which mark epochs in the annals of the world." The astronomy was by Delalande, mathematics by Condorcet, tables by Bernouilli, natural history by Adanson, anatomy and physiology by Haller. Daubenton, Condamine, Marmontel and other old contributors wrote many articles, and several were taken from foreign editions. A very full and elaborate index of the articles and subjects of the 33 volumes was printed at Amsterdam in 1780, fol. 2 vols. 1852 pages. It was made by Pierre Mouchon, who was born at Geneva on the 30th of July 1735, consecrated minister on the 18th of August 1758, pastor of the French church at Basel 1766, elected a pastor in Geneva on the 6th of March 1788, principal of the college there 22nd of April 1791, died on the 20th of August 1797. This *Table analytique*, which took him five years to make, was undertaken for the publishers Cramer and De Tournes, who gave him 800 louis for it. Though very exact and full, he designedly omits the attacks on Christianity. This index was rendered more useful and indispensable by the very diffuse and digressive style of the work, and by the vast number of its articles. A complete copy of the first edition of the *Encyclopédie* consists of 35 vols. fol., printed 1751–1780, containing 23,135 pages and 3132 plates. It was written by about 160 contributors. About 1761 Panckoucke and other publishers in Paris proposed a new and revised edition, and bought the plates for 250,000 livres. But, as Diderot indignantly refused to edit what he considered a fraud on the subscribers to the as yet unfinished work, they began simply to reprint the work, promising supplementary volumes. When three volumes were printed the whole was seized in 1770 by the government at the complaint of the clergy, and was lodged in the Bastille. The plan of a second French edition was laid aside then, to be revived twenty years later in a very different form. Foreign editions of the *Encyclopédie* are numerous, and it is difficult to enumerate them correctly. One, with notes by Ottavio Diodati, Dr Sebastiano Paoli and Carlo Giuliani, appeared at Lucca (1758–1771), fol. 17 vols. of text and 10 of plates. Though it was very much expurgated, all engaged in it were excommunicated by the pope in 1759. An attempt made at Siena to publish an Italian translation failed. An addition by the abbé Serafini and Dr Gonnella (Livourne, 1770), &c., fol. 33 vols., returned a profit of 60,000 piastres, and was protected by Leopold II., who secured the pope's silence. Other editions are Genève, Cramer (1772–1776), a facsimile reprint. Genève, Pellet (1777–1779), 4to, 36 vols. of text and 3 of plates, with 6 vols. of Mouchon's index (Lyon, 1780), 4to; Genève et Neufchâtel, Pellet (1778–1779), 4to, 36 vols. of text and 3 of plates; Lausanne (1778–1781), 36 vols. 4to, or 72 octavo, of text and 3 of plates (1779–1780); Lausanne et Bern, chez les Sociétés Typographiques (1780–1782), 36 vols. 8vo of text and 3 vols. 4to of plates (1782). These four editions have the supplement incorporated. Fortuné Barthelemy de Felice, an Italian monk, born at Rome on the 24th of August 1723, who had been professor at Rome and Naples, and had become a Protestant, printed a very incorrect though successful edition (Yverdun, 1770–1780) 4to, 42 vols. of text, 5 of supplement and 10 of plates. It professed to be a new work, standing in the same relationship to the *Encyclopédie* as that did to Chambers's, which is far from being the case. Sir Joseph Ayloffe issued proposals, 14th December 1751, for an English translation of the *Encyclopédie*, to be finished by Christmas 1756, in 10 vols. 4to, with at least 600 plates. No. 1 appeared in January 1752, but met with little success. Several selections of articles and extracts have been published under the title of *L'Esprit de l'Encyclopédie*. The last was by Hennequin (Paris, 1822–1823), 8vo, 15 vols. An English selection is *Select Essays from the Encyclopedy* (London, 1773), 8vo. The articles of most of the principal contributors have been reprinted in the editions of their respective works. Voltaire wrote 8 vols. 8vo of a kind of fragmentary supplement, *Questions sur l'Encyclopédie*, frequently printed, and usually included in editions of his works, together with his contributions to the *Encyclopédie* and his *Dictionnaire philosophique*. Several special dictionaries have been formed from the *Encyclopédie*, as the *Dictionnaire portatif des arts et métiers* (Paris, 1766), 8vo, 2 vols. about 1300 pages, by Philippe Macquer, brother of the author of the *Dict. de chimie*. An enlarged edition by the abbé Jaubert (Paris, 1773), 5 vols. 8vo, 3017 pages, was much valued and often reprinted. The books attacking and defending the *Encyclopédie* are very many. No original work of the 18th century, says Lanfrey, has been more depreciated, ridiculed and calumniated. It has been called chaos, nothingness, the Tower of Babel, a work of disorder and destruction, the gospel of Satan and even the ruins of Palmyra.

The *Encyclopaedia Britannica*, "by a society of gentlemen in Scotland, printed in Edinburgh for A. Bell and C. Macfarquhar, and sold by Colin Macfarquhar at his printing office in Nicolson Street," was completed in 1771 in 3 volumes 4to, containing 2670 pages, and 160 copperplates engraved by Andrew Bell. It was published in numbers, of which the two first were issued in December 1768, "price 6d. each, or 8d on a finer paper," and was to be completed in 100 weekly numbers. It was compiled, as the title-page says, on a new plan. The different sciences and arts were "digested into distinct treatises or systems," of which there are 45 with cross headings, that is, titles printed across the page, and about 30 other articles more than three pages long. The longest are "Anatomy," 166 pages, and "Surgery," 238 pages. "The various technical terms, &c., are explained as they occur in the order of the alphabet." "Instead of dismembering the sciences, by attempting to treat them intelligibly under a multitude of technical terms, they have digested the principles of every science in the form of systems or distinct treatises, and explained the terms as they occur in the order of the alphabet, with references to the sciences to which they belong." This plan, as the compilers say, differs from that of all the previous dictionaries of arts and sciences. Its merit and novelty consist in the combination of De Coetlogon's plan with that in common use,—on the one hand keeping important subjects together, and on the other facilitating reference by numerous separate articles. It is doubtful to whom the credit of this plan is due. The editor, William Smellie, a printer (born in 1740, died on the 24th of June 1795), afterwards secretary and superintendent of natural history to the Society of Scottish Antiquaries, is said by his biographer to have devised the plan and written or compiled all the chief articles; and he prints, but without date, part of a letter written and signed by Andrew Bell by which he was engaged in the work:—"Sir, As we are engaged in publishing a dictionary of the arts and sciences, and as you have informed us that there are fifteen capital sciences which you will undertake for and write up the subdivisions and detached parts of these conform to your plan, and likewise to prepare the whole work for the press, &c., &c., we hereby agree to allow you £200 for your trouble, &c." Prof. Macvey Napier says that Smellie "was more likely to have suggested that great improvement than any of his known coadjutors." Archibald Constable, who was interested in the work from 1788, and was afterwards intimately acquainted with Bell, says Colin Macfarquhar was the actual projector of the *Encyclopaedia*, and the editor of the two first editions, while Smellie was merely "a contributor for hire" (*Memoirs*, ii. 311). Dr Gleig, in his preface to the third edition, says: "The idea had been conceived by him (Colin Macfarquhar) and his friend Mr Andrew Bell, engraver. By whom these gentlemen were assisted in digesting the plan which attracted to that work so much public attention, or whether they had any assistance, are questions in which our readers cannot be interested." Macfarquhar, according to Constable, was a person of excellent taste and very general knowledge, though at starting he had little or no capital, and was obliged to associate Bell, then the principal engraver in Edinburgh, as a partner in his undertaking.

The second edition was begun in 1776, and was published in numbers, of which the first was issued on the 21st of June 1777, and the last, No. 181, on the 18th of September 1784, forming 10 vols. 4to, dated 1778 to 1783, and containing 8595 pages and 340 plates. The pagination is continuous, ending with page 9200, but 295 pages are inserted in various places, and page 7099 is followed by 8000. The number and length of the articles were much increased, 72 have cross headings, and more than 150 others may be classed as long articles. At the end is an appendix ("Abatement" to "Wood") of 200 pages, containing, under the heading Botanical Table, a list of the 931 genera included in the 58 natural orders of Linnaeus, and followed by a list of 526 books, said to have been the principal authorities used. All the maps are placed together under the article "Geography" (195 pages). Most of the long articles have numbered marginal titles; "Scotland," 84 pages, has 837. "Medicine," 309 pages, and "Pharmacy" have each an index. The plan of the work was enlarged by the addition of history and biography, which encyclopaedias in general had long omitted. "From the time of the second edition of this work, every cyclopaedia of note, in England and elsewhere, has been a cyclopaedia, not solely of arts and sciences, but of the whole wide circle of general learning and miscellaneous information" (*Quarterly Review*, cxiii. 362). Smellie was applied to by Bell to edit the second edition, and to take a share of one-third in the work; but he refused, because the other persons concerned in it, at the suggestion of "a very distinguished nobleman of very high rank" (said by Professor Napier to have been the duke of Buccleuch), insisted upon the introduction of a system of general biography which he considered inconsistent with the character of a dictionary of arts and sciences. James Tytler, M.A., seems to have been selected as the next most eligible compiler. His father, a man of extensive knowledge, was 53 years minister of Fearn in Forfarshire, and died in 1785. Tytler (outlawed by the High Court of Justiciary, 7th of January 1793, buried at Salem in Massachusetts on the 11th of January 1804, aged fifty-eight) "wrote," says Watt, "many of the scientific treatises and histories, and almost all the minor articles" (*Bibliotheca Brit.*).

After about a year's preparation, the third edition was announced in 1787; the first number was published early in 1788, and the first volume in October 1788. There were to be 300 weekly numbers, price 1s. each, forming 30 parts at 10s. 6d. each, and 15 volumes, with 360 plates. It was completed in 1797 in 18 vols. 4to, containing 14,579 pages and 542 plates. Among the multifarious articles represented in the frontispiece, which was required by the traditional fashion of the period, is a balloon. The maps are, as in subsequent editions, distributed among the articles relating to the respective countries. It was edited by Colin Macfarquhar as far as the article "Mysteries" (by Dr Doig, vol. xii.), when he died, on the 2nd of April 1793, in his forty-eighth year, "worn out," says Constable, "by fatigue and anxiety of mind." His children's trustees and Andrew Bell requested George Gleig of Stirling (consecrated on the 30th of October 1808 assistant and successor to the bishop of Brechin), who had written about twelve articles, to edit the rest of the work; "and for the time, and the limited sum allowed him for the reward of contributors, his part in the work was considered very well done" (Constable, ii. 312). Professor Robison was induced by Gleig to become a contributor. He first revised the article "Optics," and then wrote a series of articles on natural philosophy, which attracted great attention and were long highly esteemed by scientific men. The sub-editors were James Walker (Primus Scotiae Episcopus 27th of May 1837, died on the 5th of March 1841, aged seventy) until 1795, then James Thomson, succeeded in November 1796 by his brother Thomas, afterwards professor of chemistry at Glasgow, who remained connected with the *Encyclopaedia* until 1800. According to Kerr (*Smellie's Life*, i. 364-365), 10,000 copies were printed, and the profit to the proprietors was £42,000, besides the payments for their respective work in the conduct of the publication as tradesmen,—Bell as engraver of all the plates, and Macfarquhar as sole printer. According to Constable (*Memoirs*, ii. 312), the impression was begun at 5000 copies, and concluded with a sale of 13,000. James Hunter, "an active bookseller of no character," who had a shop in Middle Row, Holborn, sold the book to the trade, and on his failure Thomson Bonar, a wine merchant, who had married Bell's daughter, became the seller of the book. He quarrelled with his father-in-law, who would not see him for ten years before his death in 1809. When the edition was completed, the copyright and remaining books were sold in order to wind up the concern, and "the whole was purchased by Bell, who gave £13 a copy, sold all the complete copies to the trade, printed up the odd volumes, and thus kept the work in the market for several years" (Constable, ii. 312).

The supplement of the third edition, printed for Thomson Bonar, and edited by Gleig, was published in 1801 in 2 vols. 4to, containing 1624 pages and 50 copperplates engraved by D. Lizars. In the dedication to the king, dated Stirling, 10th December 1800, Dr Gleig says: "The French *Encyclopédie* had been accused, and justly accused, of having disseminated far and wide the seeds of anarchy and atheism. If the *Encyclopaedia Britannica* shall in any degree counteract the tendency of that pestiferous work, even these two volumes will not be wholly unworthy of your Majesty's attention." Professor Robison added 19 articles to the series he had begun when the third edition was so far advanced. Professor Playfair assisted in "Mathematics." Dr Thomas Thomson wrote "Chemistry," "Mineralogy" and other articles, in which the use of symbols was for the first time introduced into chemistry; and these articles formed the first outline of his *System of Chemistry*, published at Edinburgh in 1802, 8vo, 4 vols.; the sixth edition, 1821.

The fourth edition, printed for Andrew Bell, was begun in 1800 or 1801, and finished in 1810 in 20 vols. 4to, containing 16,033 pages, with 581 plates engraved by Bell. The dedication to the king, signed Andrew Bell, is dated Lauristoun, Edinburgh, 1809. The preface is that of the third edition with the necessary alterations and additions in the latter part. No articles were reprinted from the supplement, as Bell had not the copyright. Professor Wallace's articles on mathematics were much valued, and raised the scientific character of the work. Dr Thomas Thomson declined the editorship, and recommended Dr James Millar, afterwards editor of the *Encyclopaedia Edinensis* (died on the 13th of July 1827). He was fond of natural history and a good chemist, but, according to Constable, slow and dilatory and not well qualified. Andrew Bell died on the 10th of June 1809, aged eighty-three, "leaving," says Constable, "two sets of trustees, one literary to make the money, the other legal to lay it out after it was made." The edition began with 1250 copies and concluded at 4000, of which two-thirds passed through the hands of Constable's firm. Early in 1804 Andrew Bell had offered Constable and his partner Hunter the copyright of the work, printing materials, &c., and all that was then printed of the fourth edition, for £20,000. This offer was in agitation in March 1804, when the two partners were in London. On the 5th of May 1804, after Lord Jeffrey's arrival in Edinburgh, as he relates to Francis Horner, they entrusted him with a design, on which he found that most of his friends had embarked with great eagerness, "for publishing an entire new encyclopaedia upon an improved plan. Stewart, I understand, is to lend his name, and to write the preliminary discourse, besides other articles. Playfair is to superintend the mathematical department, and Robison the natural philosophy. Thomas Thomson is extremely zealous in the cause. W. Scott has embraced it with great affection. . . . The authors are to be paid at least as well as reviewers, and are to retain the copyright of their articles for separate publication if they think proper" (Cockburn, *Life of Lord Jeffrey*, 1852, ii. 90). It was then, perhaps, that Constable gave £100 to Bonar for the copyright of the supplement.

The fifth edition was begun immediately after the fourth as a mere reprint. "The management of the edition, or rather mismanagement, went on under the *lawyer trustees* for several years, and at last the whole property was again brought to the market by public sale. There were about 1800 copies printed of the five first volumes, which formed one lot, the copyright formed another lot, and so on. The whole was purchased by myself and in my name for between £13,000 and £14,000, and it was said by the wise booksellers of Edinburgh and others that I had completely ruined myself and all connected with me by a purchase to such an enormous amount; this was early in 1812" (Constable, ii. 314). Bonar, who lived next door to the printing office, thought he could conduct the book, and had resolved on the purchase. Having a good deal of money, he seemed to Constable a formidable rival, whose alliance was to be secured. After "sundry interviews" it was agreed that Constable should buy the copyright in his own name, and that Bonar should have one-third, and also one-third of the copyright of the supplement, for which he gave £200. Dr James Millar corrected and revised the last 15 volumes. The preface is dated the 1st of December 1814. The printing was superintended by Bonar, who died on the 26th of July 1814. His trustees were repaid his advances on the work, about £6000, and the copyright was valued at £11,000, of which they received one-third, Constable adding £500, as the book had been so extremely successful. It was published in 20 vols., 16,017 pages, 582 plates, price £36, and dated 1817.

Soon after the purchase of the copyright, Constable began to prepare for the publication of a supplement, to be of four or, at the very utmost, five volumes. "The first article arranged for was one on 'Chemistry' by Sir Humphry Davy, but he went abroad [in October 1813] and I released him from his engagement, and employed Mr Brande; the second article was Mr Stewart's Dissertation, for which I agreed to pay him £1000, leaving the extent of it to himself, but with this understanding, that it was not to be under ten sheets, and might extend to twenty" (Constable, ii. 318). Dugald Stewart, in a letter to Constable, the 15th of November 1812, though he declines to engage to execute any of his own suggestions, recommends that four discourses should "stand in front," forming "a general map of the various departments of human knowledge," similar to "the excellent discourse prefixed by D'Alembert to the French *Encyclopédie*," together with historical sketches of the progress since Bacon's time of modern discoveries in metaphysical, moral and political philosophy," in mathematics and physics, in chemistry, and in zoology, botany and mineralogy. He would only promise to undertake the general map and the first historical sketch, if his health and other engagements permitted, after the second volume of his *Philosophy of the Human Mind* (published in 1813) had gone to press. For the second he recommended Playfair, for chemistry Sir Humphry Davy. He received £1000 for the first part of his dissertation (166 pages), and £700 for the second (257 pages), the right of publication being limited to the Supplement and *Encyclopaedia*. Constable next contracted with Professor Playfair for a dissertation "to be equal in length or not to Mr Stewart's, for £250; but a short time afterwards I felt that to pay one eminent individual £1000 because he would not take less would be quite unfair, and I wrote to the worthy Professor that I had fixed his payment at £500." Constable gave him £500 for the first part (127 pages), and would have given as much for the second (90 pages) if it had been as long. His next object was to find out the greatest defects in the book, and he gave Professor Leslie £200 and Graham Dalyell £100 for looking over it. He then wrote out a prospectus and submitted it in print to Stewart, "but the cautious philosopher referred" him to Playfair, who "returned it next day very greatly improved." For this Constable sent him six dozen of very fine old sherry, only feeling regret that he had nothing better to offer. He at first intended to have two editors, "one for the strictly literary and the other for the scientific department." He applied to Dr Thomas Brown, who "preferred writing trash of poetry to useful and lucrative employment." At last he fixed on Mr Macvey Napier (born 1777), whom he had known from 1798, and who "had been a hard student, and at college laid a good foundation for his future career, though more perhaps in general information than in what would be, strictly speaking, called scholarship; this, however, does not fit him the less for his present task." Constable, in a letter dated the 11th of June 1813, offered him £300 before the first part went to press, £150 on the completion at press of each of the eight half volumes, £500 if the work was reprinted or extended beyond 7000 copies and £200 for incidental expenses. "In this way the composition of the four volumes, including the introductory dissertations, will amount to considerably more than £9000." In a postscript the certain payment is characteristically increased to £1575, the contingent to £735, and the allowance for incidental expenses to £300 (Constable, ii. 326). Napier went to London, and obtained the co-operation of many literary men. The supplement was published in half-volume parts from December 1816 to April 1824. It formed six volumes 4to, containing 4933 pages, 125 plates, 9 maps, three dissertations and 669 articles, of which a list is given at the end. The first dissertation, on the "progress of metaphysical, ethical and political philosophy," was by Stewart, who completed his plan only in respect to metaphysics. He had thought it would be easy to adapt the intellectual map or general survey of human knowledge, sketched by Bacon and improved by D'Alembert, to the advanced state of the sciences, while its unrivalled authority would have softened criticism. But on closer examination he found the logical views on which this systematic arrangement was based essentially erroneous; and, doubting whether the time had come for a successful repetition of this bold experiment, he forebore to substitute a new scheme of his own. Sir James Mackintosh characterized this discourse as "the most splendid of Mr. Stewart's works, a composition which no other living writer of English prose has equalled" (*Edinburgh Review*, xxvii. 191, September 1816). The second dissertation, "On the progress of mathematics and physics," was by Playfair, who died 19th July 1819, when he had only finished the period of Newton and Leibnitz. The third, by Professor Brande, "On the progress of chemistry from the early middle ages to 1800," was the only one completed. These historical dissertations were admirable and delightful compositions, and important and interesting additions to the *Encyclopaedia*; but it is difficult to see why they should form a separate department distinct from the general alphabet. The preface, dated March 1824, begins with an account of the more important previous encyclopaedias, relates the history of this to the sixth edition, describes the preparation for the supplement and gives an "outline of the contents," and mentions under each great division of knowledge the principal articles and their authors' names, often with remarks on the characters of both. Among the distinguished contributors were Leslie, Playfair, Ivory, Sir John Barrow, Tredgold, Jeffrey, John Bird Sumner, Blanco White, Hamilton Smith and Hazlitt. Sir Walter Scott, to gratify his generous friend Constable, laid aside *Waverley*, which he was completing for publication, and in April and May 1814 wrote "Chivalry." He also wrote "Drama" in November 1818, and "Romance" in the summer of 1823. As it seemed to the editor that encyclopaedias had previously attended little to political philosophy, he wrote "Balance of Power," and procured from James Mill "Banks for Savings," "Education," "Law of Nations," "Liberty of the Press," and other articles, which, reprinted cheaply, had a wide circulation. M'Culloch wrote "Corn Laws," "Interest," "Money," "Political Economy," &c. Mr Ricardo wrote "Commerce" and "Funding System," and Professor Malthus, in his article "Population," gave a comprehensive summary of the facts and reasonings on which his theory rested. In the article "Egypt" Dr Thomas Young "first gave to the public an extended view of the results of his successful interpretation of the hieroglyphic characters on the stone of Rosetta," with a vocabulary of 221 words in English, Coptic, Hieroglyphic and Enchorial, engraved on four plates. There were about 160 biographies, chiefly of persons who had died within the preceding 30 years. Constable "wished short biographical notices of the first founders of this great work, but they were, in the opinion of my editor, too insignificant to entitle them to the rank which such separate notice, it was supposed, would have given them as literary men, although his own consequence in the world had its origin in their exertions" (*Memoirs*, ii. 326). It is to be regretted that this wish was not carried out, as was done in the latter volumes of Zedler. Arago wrote "Double Refraction" and "Polarization of Light," a note to which mentions his name as author. Playfair wrote "Aepinus," and "Physical Astronomy." Biot wrote "Electricity" and "Pendulum." He "gave his assistance with alacrity," though his articles had to be translated. Signatures, on the plan of the *Encyclopédie*, were annexed to each article, the list forming a triple alphabet, A to XXX, with the full names of the 72 contributors arranged apparently in the order of their first occurrence. At the end of vol. vi. are Addenda and Corrigenda, including "Interpolation," by Leslie, and "Polarization of Light," by Arago.

The sixth edition, "revised, corrected and improved," appeared in half-volume parts, price 16s. in boards, vol. xx. part ii. completing the work in May 1823. Constable, thinking it not wise to reprint so large a book year after year without correction, in 1820 selected Mr Charles Maclaren (1782–1866), as editor. "His attention was chiefly directed to the historical and geographical articles. He was to keep the press going, and have the whole completed in three years." He wrote "America," "Greece," "Troy," &c. Many of the large articles as "Agriculture," "Chemistry," "Conchology," were new or nearly so; and references were given to the supplement. A new edition in 25 vols. was contemplated, not to be announced till a certain time after the supplement was finished; but Constable's house stopped payment on the 19th of January 1826, and his copyrights were sold by auction. Those of the *Encyclopaedia* were bought by contract, on the 16th of July 1828, for £6150, by Thomas Allan, proprietor of the *Caledonian Mercury*, Adam Black, Abram Thomson, bookbinder, and Alexander Wight, banker, who, with the trustee of Constable's estate, had previously begun the seventh edition. Not many years later Mr Black purchased all the shares and became sole proprietor.

The seventh edition, 21 vols. 4to (with an index of 187 pages, compiled by Robert Cox), containing 17,101 pages and 506 plates, edited by Macvey Napier, assisted by James Browne, LL.D., was begun in 1827, and published from March 1830 to January 1842. It was reset throughout and stereotyped. Mathematical diagrams were printed in the text from woodcuts. The first half of the preface was nearly that of the supplement. The list of signatures, containing 167 names, consists of four alphabets with additions, and differs altogether from that in the supplement: many names are omitted, the order is changed and 103 are added. A list follows of over 300 articles, without signatures, by 87 writers. The dissertations—1st, Stewart's, 289 pages; 2nd, "Ethics" (136 pages), by Sir James Mackintosh, whose death prevented the addition of "Political Philosophy"; 3rd, Playfair's, 139 pages; 4th, its continuation by Sir John Leslie, 100 pages—and their index of 30 pages, fill vol. i. As they did not include Greek philosophy, "Aristotle," "Plato" and "Socrates" were supplied by Dr Hampden, afterwards bishop of Hereford. Among the numerous contributors of eminence, mention may be made of Sir David Brewster, Prof. Phillips, Prof. Spalding, John Hill Burton, Thomas De Quincey, Patrick Fraser Tytler, Capt. Basil Hall, Sir Thomas Dick Lauder, Antonio Panizzi, John Scott Russell and Robert Stephenson. Zoology was divided into 11 chief articles, "Mammalia," "Ornithology," "Reptilia," "Ichthyology," "Mollusca," "Crustacea," "Arachnides," "Entomology," "Helminthology," "Zoophytes," and "Animalcule"—all by James Wilson.

The eighth edition, 1853–1860, 4to, 21 vols. (and index of 239 pages, 1861), containing 17,957 pages and 402 plates, with many woodcuts, was edited by Dr Thomas Stewart Traill, professor of medical jurisprudence in Edinburgh University. The dissertations were reprinted, with one on the "Rise, Progress and Corruptions of Christianity" (97 pages), by Archbishop Whately, and a continuation of Leslie's to 1850, by Professor James David Forbes, 198 pages, the work of nearly three years, called by himself his "magnum opus" (*Life*, pp. 361, 366). Lord Macaulay, Charles Kingsley, Isaac Taylor, Hepworth Dixon, Robert Chambers, Rev. Charles Merivale, Rev. F. W. Farrar, Sir John Richardson, Dr Scoresby, Dr Hooker, Henry Austin Layard, Edw. B. Eastwick, John Crawfurd, Augustus Petermann, Baron Bunsen, Sir John Herschel, Dr Lankester, Professors Owen, Rankine, William Thomson, Aytoun, Blackie, Daniel Wilson and Jukes, were some of the many eminent new contributors found among the 344 authors, of whom an alphabetical list is given, with a key to the signatures. In the preface a list of 279 articles by 189 writers, classed under 15 heads, is given. This edition was not wholly reset like the seventh, but many long articles were retained almost or entirely intact.

The publication of the ninth edition (A. & C. Black) was commenced in January 1875, under the editorship of Thomas Spencer Baynes until 1880, and subsequently of W. Robertson Smith, and completed in 1889, 24 vols., with index. This great edition retained a certain amount of the valuable material in the eighth, but was substantially a new work; and it was universally acknowledged to stand in the forefront of the scholarship of its time. Its contributors included the most distinguished men of letters and of science. In 1898 a reprint, sold at about half the original price, and on the plan of payment by instalments, was issued by *The Times* of London; and in 1902, under the joint editorship of Sir Donald Mackenzie Wallace, President Arthur T. Hadley of Yale University, and Hugh Chisholm, eleven supplementary volumes were published, forming, with the 24 vols. of the ninth edition, a tenth edition of 35 volumes. These included a volume of maps, and an elaborate index (vol. 35) to the whole edition, comprising some 600,000 entries. In May 1903 a start was made with the preparation of the 11th edition, under the general editorship of Hugh Chisholm, with W. Alison Phillips as chief assistant-editor, and a staff of editorial assistants, the whole work of organization being conducted up to December 1909 from *The Times* office. Arrangements were then made by which the copyright and control of the *Encyclopaedia Britannica* passed to Cambridge University, for the publication at the University Press in 1910–1911 of the 29 volumes (one being Index) of the 11th edition, a distinctive feature of this issue being the appearance of the whole series of volumes practically at the same time.

A new and enlarged edition of the *Encyclopédie* arranged as a system of separate dictionaries, and entitled *Encyclopédie méthodique ou par ordre de matières*, was undertaken by Charles Joseph Panckoucke, a publisher of Paris (born at Lille on the 26th of November 1736, died on the 19th of December 1798). His privilege was dated the 20th of June 1780. The articles belonging to different subjects would readily form distinct dictionaries, although, having been constructed for an alphabetical plan, they seemed unsuited for any system wholly methodical. Two copies of the book and its supplement were cut up into articles, which were sorted into subjects. The division adopted was: 1, mathematics; 2 physics; 3, medicine; 4, anatomy and physiology; 5, surgery; 6, chemistry, metallurgy and pharmacy; 7, agriculture; 8, natural history of animals, in six parts; 9, botany; 10, minerals; 11, physical geography; 12, ancient and modern geography; 13, antiquities; 14, history; 15, theology; 16, philosophy; 17, metaphysics, logic and morality; 18, grammar and literature; 19, law; 20, finance; 21, political economy; 22, commerce; 23, marine; 24, art militaire; 25, beaux arts; 26, arts et métiers—all forming distinct dictionaries entrusted to different editors. The first object of each editor was to exclude all articles belonging to other subjects, and to take care that those of a doubtful nature should not be omitted by all. In some words (such as air, which belonged equally to chemistry, physics and medicine) the methodical arrangement has the unexpected effect of breaking up the single article into several widely separated. Each dictionary was to have an introduction and a classified table of the principal articles. History and its minor parts, as inscriptions, fables, medals, were to be included. Theology, which was neither complete, exact nor orthodox, was to be by the abbé Bergier, confessor to Monsieur. The whole work was to be completed and connected together by a Vocabulaire Universel, 1 vol. 4to, with references to all the places where each word occurred, and a very exact history of the *Encyclopédie* and its editions by Panckoucke. The prospectus, issued early in 1782, proposed three editions—84 vols. 8vo, 43 vols. 4to with 3 columns to a page, and 53 vols. 4to of about 100 sheets with 2 columns to a page, each edition having 7 vols. 4to of 250 to 300 plates each. The subscription was to be 672 livres from the 15th of March to July 1782, then 751, and 888 after April 1783. It was to be issued in livraisons of 2 vols. each, the first (jurisprudence, vol. i., literature, vol. i.) to appear in July 1782, and the whole to be finished in 1787. The number of subscribers, 4072, was so great that the subscription list of 672 livres was closed on the 30th of April. Twenty-five printing offices were employed, and in November 1782 the 1st livraison (jurisprudence, vol. i., and half vol. each of arts et métiers and histoire naturelle) was issued. A Spanish prospectus was sent out, and obtained 330 Spanish subscribers, with the inquisitor-general at their head. The complaints of the subscribers and his own heavy advances, over 150,000 livres, induced Panckoucke, in November 1788, to appeal to the authors to finish the work. Those *en retard* made new contracts, giving their word of honour to put their parts to press in 1788, and to continue them without interruption, so that Panckoucke hoped to finish the whole, including the vocabulary (4 or 5 vols.), in 1792. Whole sciences, as architecture, engineering, hunting, police, games, &c., had been overlooked in the prospectus; a new division was made in 44 parts, to contain 51 dictionaries and about 124 vols. Permission was obtained on the 27th of February 1789, to receive subscriptions for the separate dictionaries. Two thousand subscribers were lost by the Revolution. The 50th livraison appeared on the 23rd of July 1792, when all the dictionaries eventually published had been begun except seven—jeux familiers and mathématiques, physics, art oratoire, physical geography, chasses and pêches; and 18 were finished,—mathematics, games, surgery, ancient and modern geography, history, theology, logic, grammar, jurisprudence, finance, political economy, commerce, marine, arts militaires, arts académiques, arts et métiers, encyclopediana. Supplements were added to military art in 1797, and to history in 1807, but not to any of the other 16, though required for most long before 1832. The publication was continued by Henri Agasse, Panckoucke's son-in-law, from 1794 to 1813, and then by Mme Agasse, his widow, to 1832, when it was completed in 102 livraisons or 337 parts, forming 166½ vols. of text, and 51 parts containing 6439 plates. The letterpress issued with the plates amounts to 5458 pages, making with the text 124,210 pages. To save expense the plates belonging to architecture were not published. Pharmacy (separated from chemistry), minerals, education, ponts et chaussées had been announced but were not published, neither was the Vocabulaire Universel, the key and index to the whole work, so that it is difficult to carry out any research or to find all the articles on any subject. The original parts have been so often subdivided, and have been so added to by other dictionaries, supplements and appendices, that, without going into great detail, an exact account cannot be given of the work, which contains 88 alphabets, with 83 indexes, and 166 introductions, discourses, prefaces, &c. Many dictionaries have a classed index of articles; that of économie politique is very excellent, giving the contents of each article, so that any passage can be found easily. The largest dictionaries are medicine, 13 vols., 10,330 pages; zoology, 7 dictionaries, 13,645 pages, 1206 plates; botany, 12,002 pages, 1000 plates (34 only of cryptogamic plants); geography, 3 dictionaries and 2 atlases, 9090 pages, 193 maps and plates; jurisprudence (with police and municipalities), 10 vols., 7607 pages. Anatomy, 4 vols., 2866 pages, is not a dictionary but a series of systematic treatises. Assemblée Nationale was to be in three parts,—(1) the history of the Revolution, (2) debates, and (3) laws and decrees. Only vol. ii., debates, appeared, 1792, 804 pages, Absens to Aurillac. Ten volumes of a Spanish translation with a vol. of plates were published at Madrid to 1806—viz. historia natural, i. ii.; grammatica, i.; arte militar, i., ii.; geografia, i.-iii.; fabricas, i., ii., plates, vol. i. A French edition was printed at Padua, with the plates, says Peignot, very carefully engraved. Probably no more unmanageable body of dictionaries has ever been published except Migne's *Encyclopédie théologique*, Paris, 1844–1875, 4to, 168 vols., 101 dictionaries, 119,059 pages.

No work of reference has been more useful and successful, or more frequently copied, imitated and translated, than that known as the *Conversations Lexikon* of Brockhaus. It was begun as *Conversations Lexikon mit vorzüglicher Rücksicht auf die gegenwärtigen Zeiten*, Leipzig, 1796 to 1808, 8vo, 6 vols., 2762 pages, by Dr Gotthelf Renatus Löbel (born on the 1st of April 1767 at Thalwitz near Wurzen in Saxony, died on the 14th of February 1799), who intended to supersede Hübner, and included geography, history, and in part biography, besides mythology, philosophy, natural history, &c. Vols. i.-iv. (A to R) appeared 1796 to 1800, vol. v. in 1806. Friedrich Arnold Brockhaus (*q.v.*) bought the work with its copyright on the 25th of October 1808, for 1800 thalers from the printer, who seems to have got it in payment of his bill. The editor, Christian Wilhelm Franke, by contract dated the 16th of November, was to finish vol. vi. by the 5th of December, and the already projected supplement, 2 vols., by Michaelmas 1809, for 8 thalers a printed sheet. No penalty was specified, but, says his grandson, Brockhaus was to learn that such contracts, whether under penalty or not, are not kept, for the supplement was finished only in 1811. Brockhaus issued a new impression as *Conversations Lexikon oder kurzgefasstes Handwörterbuch*, &c., 1809–1811, and on removing to Altenburg in 1811 began himself to edit the 2nd edition (1812–1819, 10 vols.), and, when vol. iv. was published, the 3rd (1814–1819). He carried on both editions together until 1817, when he removed to Leipzig, and began the 4th edition as *Allgemeine deutsche Real-encyclopädie für die gebildeten Stände. Conversations Lexikon.* This title was, in the 14th edition, changed to that of *Brockhaus' Konversations Lexicon.* The 5th edition was at once begun, and was finished in eighteen months. Dr Ludwig Hain assisted in editing the 4th and 5th editions until he left Leipzig in April 1820, when Professor F. C. Hasse took his place. The 12,000 copies of the 5th edition being exhausted while vol. x. was at press, a 2nd unaltered impression of 10,000 was required in 1820 and a 3rd of 10,000 in 1822. The 6th edition, 10 vols., was begun in September 1822. Brockhaus died in 1823, and his two eldest sons, Friedrich and Heinrich, who carried on the business for the heirs and became sole possessors in 1829, finished the edition with Hasse's assistance in September 1823. The 7th edition (1827–1829, 12 vols., 10,489 pages, 13,000 copies, 2nd impression 14,000) was edited by Hasse. The 8th edition (1833–1836, 12 vols., 10,689 pages, 31,000 copies to 1842), begun in the autumn of 1832, ended May 1837, was edited by Dr Karl August Espe (born February 1804, died in the Irrenanstalt at Stötteritz near Leipzig on the 24th of November 1850) with the aid of many learned and distinguished writers. A general index, Universal Register, 242 pages, was added in 1839. The 9th edition (1843–1847, 15 vols., 11,470 pages, over 30,000 copies) was edited by Dr Espe. The 10th edition (1851–1855, 12,564 pages) was also in 15 vols., for convenience in reference, and was edited by Dr August Kurtzel aided by Oskar Pilz. Friedrich Brockhaus had retired in 1849; Dr Heinrich Edward, the elder son of Heinrich, made partner in 1854, assisted in this edition, and Heinrich Rudolf, the younger son, partner since 1863, in the 11th (1864–1868, 15 vols. of 60 sheets, 13,366 pages).

Kurtzel died on the 24th of April 1871, and Pilz was sole editor until March 1872, when Dr Gustav Stockmann joined, who was alone from April until joined by Dr Karl Wippermann in October. Besides the Universal Register of 136 pages and about 50,000 articles, each volume has an index. The supplement, 2 vols, 1764 pages, was begun in February 1871, and finished in April 1873. The 12th edition, begun in 1875, was completed in 1879 in 15 vols., the 13th edition (1882–1887), in 16 vols., and the 14th (1901–1903) in 16 vols. with a supplementary volume in 1904. The *Conversations Lexicon* is intended, not for scientific use, but to promote general mental improvement by giving the results of research and discovery in a simple and popular form without extended details. The articles, often too brief, are very excellent and trustworthy, especially on German subjects, give references to the best books, and include biographies of living men.

One of the best German encyclopaedias is that of Meyer, *Neues Konversations-Lexicon.* The first edition, in 37 vols., was published in 1839–1852. The later editions, following closely the arrangement of Brockhaus, are the 4th (1885–1890, 17 vols.), the 5th (1894–1898, 18 vols.), and the 6th (begun in 1902).

The most copious German encyclopaedia is Ersch and Gruber's *Allgemeine Encyklopädie der Wissenschaften und Künste*, Leipzig. It was designed and begun in 1813 by Professor Johann Samuel Ersch (born at Gross Glogau on the 23rd of June 1766, chief librarian at Halle, died on the 16th of January 1828) to satisfy the wants of Germans, only in part supplied by foreign works. It was stopped by the war until 1816, when Professor Hufeland (born at Danzig on the 19th of October 1760) joined, but he died on the 25th of November 1817 while the specimen part was at press. The editors of the different sections at various times have been some of the best-known men of learning in Germany, including J. G. Gruber, M. H. E. Meier, Hermann Brockhaus, W. Müller and A. G. Hoffmann of Jena.

The work is divided into three sections (1) A-G, of which 99 vols. had appeared by 1905, (2) H-N, 43 vols., (3) O-Z, 25 vols. All articles bear the authors' names, and those not ready in time were placed at the end of their letter. The longest in the work is Griechenland, vols. 80-87, 3668 pages, with a table of contents. It began to appear after vol. 73 (Götze to Gondouin), and hence does not come in its proper place, which is in vol. 91. Gross Britannien contains 700 pages, and Indien by Benfey 356.

The *Encyclopaedia Metropolitana* (London, 1845, 4to, 28 vols., issued in 59 parts in 1817–1845, 22,426 pages, 565 plates) professed to give sciences and systematic arts entire and in their natural sequence, as shown in the introductory treatise on method by S. T. Coleridge. "The plan was the proposal of the poet Coleridge, and it had at least enough of a poetical character to be eminently unpractical" (*Quarterly Review*, cxiii., 379). However defective the plan, the excellence of many of the treatises by Archbishop Whately, Sir John Herschel, Professors Barlow, Peacock, de Morgan, &c., is undoubted. It is in four divisions, the last only being alphabetical:—I. *Pure Sciences*, 2 vols., 1813 pages, 16 plates, 28 treatises, includes grammar, law and theology; II. *Mixed and Applied Sciences*, 8 vols., 5391 pages, 437 plates, 42 treatises, including fine arts, useful arts, natural history and its "application," the medical sciences; III. *History and Biography*, 5 vols., 4458 pages, 7 maps, containing biography (135 essays) chronologically arranged (to Thomas Aquinas in vol. 3), and interspersed with (210) chapters on history (to 1815), as the most philosophical, interesting and natural form (but modern lives were so many that the plan broke down, and a division of biography, to be in 2 vols., was announced but not published); IV. *Miscellaneous*, 12 vols., 10,338 pages, 105 plates, including geography, a dictionary of English (the first form of Richardson's) and descriptive natural history. The index, 364 pages, contains about 9000 articles. A re-issue in 38 vols. 4to, was announced in 1849. Of a second edition 42 vols. 8vo, 14,744 pages, belonging to divisions i. to iii., were published in 1849–1858.

The very excellent and useful *English Cyclopaedia* (London, 1854–1862, 4to, 23 vols., 12,117 pages; supplements, 1869–1873, 4 vols., 2858 pages), conducted by Charles Knight, based on the *Penny Cyclopaedia* (London, 1833–1846, 4to, 29 vols., 15,625 pages), of which he had the copyright, is in four divisions all alphabetical, and evidently very unequal as classes:—1, geography; 2, natural history; 3, biography (with 703 lives of living persons); 4, arts and sciences. The synoptical index, 168 pages, has four columns on a page, one for each division, so that the order is alphabetical and yet the words are classed.

Chambers's Encyclopaedia (Edinburgh, W. & R. Chambers), 1860–1868, 8vo, 10 vols., 8283 pages, edited in part by the publishers, but under the charge of Dr Andrew Findlater as "acting editor" throughout, was founded on the 10th edition of *Brockhaus*. A revised edition appeared in 1874, 8320 pages. In the list of 126 contributors were J.H. Burton, Emmanuel Deutsch, Professor Goldstücker, &c. The index of matters not having special articles contained about 1500 headings. The articles were generally excellent, more especially on Jewish literature, folk-lore and practical science; but, as in *Brockhaus*, the scope of the work did not allow extended treatment. A further revision took place, and in 1888–1892 an entirely new edition was published, in 10 vols., still further new editions being issued in 1895 and in 1901.

An excellent brief compilation, the *Harmsworth Encyclopaedia* (1905), was published in 40 fortnightly parts (sevenpence each) in England, and as *Nelson's Encyclopaedia* (revised) in 12 vols. (1906) in America. It was originally prepared for Messrs Nelson of Edinburgh and for the Carmelite Press, London.

In the United States various encyclopaedias have been published, but without rivalling there the *Encyclopædia Britannica*, the 9th edition of which was extensively pirated. Several American Supplements were also issued.

The *New American Cyclopaedia*, New York (Appleton & Co.), 1858–1863, 16 vols., 12,752 pages, was the work of the editors, George Ripley and Charles Anderson Dana, and 364 contributors, chiefly American. A supplementary work, the *American Annual Cyclopaedia*, a yearly 8vo vol. of about 800 pages and 250 articles, was started in 1861, but ceased in 1902. In a new edition, the *American Cyclopaedia*, 1873–1876, 8vo, 16 vols., 13,484 pages, by the same editors, 4 associate editors, 31 revisers and a librarian, each article passed through the hands of 6 or 8 revisers.

Other American encyclopaedias are Alvin J. Johnson's *New Universal Cyclopaedia*, 1875–1877, in 4 vols., a new edition of which (excellently planned) was published in 8 vols., 1893–1895, under the name of *Johnson's Universal Cyclopaedia*; the *Encyclopaedia Americana*, edited by Francis Lieber, which appeared in 1839–1847 in 14 vols.; a new work under the same title, published in 1903–1904 in 16 vols.; the *International Cyclopaedia*, first published in 1884 (revised in 1891, 1894 and 1898), and superseded in 1902 (revised, 1906) by the *New International Encyclopaedia* in 17 vols.

In Europe a great impetus was given to the compilation of encyclopaedias by the appearance of Brockhaus' *Conversations-Lexicon* (see above), which, as a begetter of these works, must rank, in the 19th century, with the *Cyclopaedia* of Ephraim Chambers in the 18th. The following, although in no sense an exhaustive list, may be here mentioned. In France, *Le Grand Dictionnaire universel du XIX^e^ siècle*, of Pierre Larousse (15 vols., 1866–1876), with supplementary volumes in 1877, 1887 and 1890; the *Nouveau Larousse illustré, dictionnaire universel encyclopédique* (7 vols., 1901–1904), (this is in no way a re-issue or an abridgment of *Le Grand Dictionnaire* of Pierre Larousse); *La Grande Encyclopédie, inventaire raisonné des sciences, des lettres, et des arts*, in 31 vols. (1886–1903). In Italy, the *Nuova Enciclopedia Italiana* (14 vols., 1841–1851, and in 25 vols., 1875–1888). In Spain, the *Diccionario enciclopedico Hispano-Americano de litteratura, ciencias y artes*, published at Barcelona (25 vols., 1877–1899). The Russian encyclopaedia, *Russkiy Entsiklopedicheskiy Slovar* (41 vols., 1905, 2 supplementary vols., 1908) was begun in 1890 as a Russian version of Brockhaus' *Conversations-Lexicon*, but has become a monumental encyclopaedia, to which all the best Russian men of science and letters have contributed. Elaborate encyclopaedias have also appeared in the Polish, Hungarian, Bohemian and Rumanian languages. Of Scandinavian encyclopaedias there have been re-issues of the *Nordësk Conversations-Lexicon*, first published in 1858–1863, and of the *Svenskt Conversations-Lexicon*, first published in 1845–1851.

ENDECOTT, JOHN (*c.* 1588–1665), English colonial governor in America, was born probably at Dorchester, Dorsetshire, England, about 1588. Little is known of him before 1628, when he was one of the six "joint adventurers" who purchased from the Plymouth Company a strip of land about 60 m. wide along the Massachusetts coast and extending westward to the Pacific Ocean. By his associates Endecott was entrusted with the responsibility of leading the first colonists to the region, and with some sixty persons proceeded to Naumkeag (later Salem) where Roger Conant, a seceder from the colony at Plymouth, had begun a settlement two years earlier. Endecott experienced some trouble with the previous settlers and with Thomas Morton's settlement at "Merry Mount" (Mount Wollaston, now Quincy), where, in accordance with his strict Puritanical tenets, he cut down the maypole and dispersed the merrymakers. He was the local governor of the Massachusetts Bay Colony from the 30th of April 1629 to the 12th of June 1630, when John Winthrop, who had succeeded Matthew Cradock as governor of the company on the 20th of October 1629, brought the charter to Salem and became governor of the colony as well as of the company. In the years immediately following he continued to take a prominent part in the affairs of the colony, serving as an assistant and as a military commissioner, and commanding, although with little success, an expedition against the Pequots in 1636. At Salem he was a member of the congregation of Roger Williams, whom he resolutely defended in his trouble with the New England clerical hierarchy, and excited by Williams's teachings, cut the cross of St George from the English flag in token of his hatred of all symbols of Romanism. He was deputy-governor in 1641–1644, and governor in 1644–1645, and served also as sergeant-major-general (commander-in-chief) of the militia and as one of the commissioners of the United Colonies of New England, of which in 1658 he was president. On the death of John Winthrop in 1649 he became governor, and by annual re-elections served continuously until his death, with the exception of two years (1650–1651 and 1654–1655), when he was deputy-governor. Under his authority the colony of Massachusetts Bay made rapid progress, and except in the matter of religious intolerance—he showed great bigotry and harshness, particularly towards the Quakers—his rule was just and praiseworthy. Of him Edward Eggleston says: "A strange mixture of rashness, pious zeal, genial manners, hot temper, and harsh bigotry, his extravagances supply the condiment of humour to a very serious history—it is perhaps the principal debt posterity owes him." He died on the 15th of March 1665.

See C. M. Endicott, *Memoirs of John Endecott* (Salem, 1847), and a "Memoir of John Endecott" in *Antiquarian Papers* of the American Antiquarian Society (Worcester, Mass., 1879).

A lineal descendant, WILLIAM CROWNINSHIELD ENDICOTT (1826–1900), graduated at Harvard in 1847, was a justice of the Massachusetts supreme court in 1873–1882, and was secretary of war in President Cleveland's cabinet from 1885 to 1889. His daughter, Mary Crowninshield Endicott, was married to the English statesman Mr Joseph Chamberlain in 1888.

ENDIVE, *Cichorium Endivia*, an annual esculent plant of the natural order Compositae, commonly reputed to have been introduced into Europe from the East Indies, but, according to some authorities, more probably indigenous to Egypt. It has been cultivated in England for more than three hundred years, and is mentioned by John Gerarde in his *Herbal* (1597). There are numerous varieties of the endive, forming two groups, namely, the curled or narrow-leaved (var. *crispa*), and the Batavian or broad-leaved (var. *latifolia*), the leaves of which are not curled. The former varieties are those most used for salads, the latter being grown chiefly for culinary purposes. The plant requires a light, rich and dry soil, in an unshaded situation. In the climate of England sowing for the main crop should begin about the second or third week in June; but for plants required to be used young it may be as early as the latter half of April, and for winter crops up to the middle of August. The seed should be finely spread in drills 4 in. asunder, and then lightly covered. After reaching an inch in height the young plants are thinned; and when about a month old they may be placed out at distances of 12 or 15 in., in drills 3 in. in depth, care being taken in removing them from the seed-bed to disturb their roots as little as possible. The Batavian require more room than the curled-leaved varieties. Transplantation, where early crops are required, has been found inadvisable. Rapidity of growth is promoted by the application of liquid manures. The bleaching of endive, in order to prevent the development of the natural bitter taste of the leaves, and to improve their appearance, is begun about three months after the sowing, and is best effected either by tying the outer leaves around the inner, or, as in damp seasons, by the use of the bleaching-pot. The bleaching may be completed in ten days or so in summer, but in winter it takes three or four weeks. For late crops, protection from frost is requisite; and to secure fine winter endive, it has been recommended to take up the full-grown plants in November, and to place them under shelter, in a soil of moderately dry sand or of half-decayed peat earth. Where forcing-houses are employed, endive may be sown in January, so as to procure by the end of the following month plants ready for use.

ENDOEUS, an early sculptor, who worked at Athens in the middle of the 6th century B.C. We are told that he made an image of Athena dedicated by Callias the contemporary of Pisistratus at Athens about 564 B.C. An inscription bearing his name has been found at Athens, written in Ionian dialect. The tradition which made him a pupil of Daedalus is apparently misleading, since Daedalus had no connexion with Ionic art.

ENDOGAMY (Gr. ἔνδον, within, and γάμος, marriage), marriage within the tribe or community, the term adopted to express the custom compelling those of a tribe to marry among themselves. Endogamy was probably characteristic of the very early stages of social organization (see FAMILY), and is to-day found only among races low in the scale of civilization. As a custom it is believed to have been preceded in most lands by the far more general rule of Exogamy (*q.v.*). Lord Avebury (*Origin of Civilisation*, p. 154) points out that "there is not the opposition between exogamy and endogamy which Mr McLennan supposed." Some races which are endogamous as regards the tribe are exogamous as regards the gens. Thus the Abors, Kochs, Hos and other peoples of India, are forbidden to marry out of the tribe; but the tribe itself is divided into "keelis" or clans, and no man is allowed to take as wife a girl of his own "keeli." Endogamy must have in most cases arisen from racial pride, and a contempt, either well or ill founded, for the surrounding peoples.

Among the Ahtena of Alaska, though the tribes are extremely militant and constantly at war, the captured women are never made wives, but are used as slaves. Endogamy also prevails among tribes of Central America. With the Yerkalas of southern India a custom prevails by which the first two daughters of a family may be claimed by the maternal uncle as wives for his sons. The value of a wife is fixed at twenty pagodas (a 16th-century Indian coin equivalent to about five shillings), and should the uncle forgo his claim he is entitled to share in the price paid for his nieces. Among some of the Karen tribes marriages between near relatives are usual. The Douignaks, a branch of the Chukmas, seem to have practised endogamy; and they "abandoned the parent stem during the chiefship of Janubrix Khan about 1782. The reason of this split was a disagreement on the subject of marriages. The chief passed an order that the Douignaks should intermarry with the tribe in general. This was contrary to an ancient custom and caused discontent and eventually a break in the tribe" (Lewin's *Hill Tracts of Chittagong*, p. 65). This is interesting as being one of the few cases in which evidence of a change in this respect is available. The Kalangs of Java are endogamous, and every man must first prove his common descent before he can enter a family. The Manchu Tatars prohibit those who have the same family names from marrying. Among the Bedouins "a man has an exclusive right to the hand of his cousin." Hottentots seldom marry out of their own kraal, and David Livingstone quotes other examples. Endogamy seems to have existed in the Sandwich Islands and in New Zealand. A community of Javans near Surabaya, on the Teugger Hills, numbering about 1200 persons, distributed in about forty villages, and still following the ancient Hindu religion, is endogamous. Good examples of what biologists call "in-and-in breeding" are to be found in various fishing villages in Great Britain, such as Itchinferry, near Southampton, Portland Island, Bentham in Yorkshire, Mousehole and Newlyn in Mountsbay, Cornwall, Boulmer near Alnwick (where almost all the inhabitants are called Stephenson, Stanton or Stewart), Burnmouth, Ross and (to some extent) Eyemouth in Berwickshire, Boyndie in Banffshire, Rathen in Aberdeenshire, Buckhaven in Fifeshire, Portmahomack and Balnabruach in Eastern Ross. In France may be mentioned the commune of Batz, near Le Broisic in Loire-Inférieur, many of the central cantons of Brétagne, and the singular society called Foréatines—supposed to be of Irish descent—living between St Arnaud and Bourges. Many other European examples might be mentioned, such as the Marans of Auvergne, a race of Spanish converted Jews accused of introducing syphilis into France; the Burins and Sermoyers, chiefly cattle-breeders, scattered over the department of Ain and especially in the arrondissement of Bourg-en-Bresse; the Vaquéros, shepherds in the Asturias Mountains; and the Jewish Chuetas of Majorca.

See Gilbert Malcolm Sproat's *Scenes and Studies of Savage Life*; Westermarck's *History of Human Marriage* (1894); Lord Avebury's *Origin of Civilisation* (1902); J. F. McLennan's *Primitive Marriage* (1865).

ENDOR, an ancient town of Palestine, chiefly memorable as the abode of the sorceress whom Saul consulted on the eve of the battle of Gilboa, in which he perished (1 Sam. xxviii. 5-25). According to a psalmist (Ps. lxxxiii. 9) it was the scene of the rout of Jabin and Sisera. Although situated in the territory of the tribe of Issachar, it was assigned to Manasseh. In the time of Eusebius and Jerome Endor existed as a large village 5 m. south of Mount Tabor; there is still a poor village of the same name on the slope of Jebel Dahi, near which are numerous caves.

For a description of the locality see Stanley, *Sinai and Palestine*, p. 337.

ENDOSPORA, a natural group or class of the Sporozoa, consisting of the orders Myxosporidia, Actinomyxidia, Sarcosporidia and Haplosporidia, together with various insufficiently-known forms (Sero- and Exosporidia), regarded at present as Sporozoa *incertae sedis*. The distinguishing feature of the group is that the spore-mother-cells (pansporoblasts) arise in the interior of the body of the parent-individual; in other words, sporulation is endogenous. Another very general character—though not so universal—is that the adult trophozoite possesses more than one nucleus, usually many (*i.e.* it is multinucleate). In the majority of forms, though apparently not in all (*e.g.* certain Microsporidia), sporulation goes on coincidently with growth and trophic life. With regard to the origin of the group, the probability is greatly in favour of a Rhizopod ancestry. The entire absence, at any known period, of a flagellate or even gregariniform phase; on the other hand, the amoeboid nature of the trophozoites in very many cases together with the formation of pseudopodia; and, lastly, the simple endogenous spore-formation characteristic of the primitive forms,—are all points which support this view, and exclude any hypothesis of a Flagellate origin, such as, on the contrary, is probably the case in the Ectospora (*q.v.*).

1. Order **Myxosporidia.** The Myxosporidia, or, more correctly, the dense masses formed by their spores, were well known to the earlier zoological observers. The parasites in fishes were called by Müller "fish-psorosperms," a name which has stuck to them ever since, although, as is evident from the meaning of the term ("mange-seed"), Müller had little idea of the true nature of the bodies. Other examples, infesting silkworms, have also long been known as "Pèbrine-corpuscles," from the ravaging disease which they produce in those caterpillars in France, in connexion with which Pasteur did such valuable work. The foundation of our present morphological and biological knowledge of the order was well laid by the admirable researches of Thèlohan in 1895. In spite, however, of the contributions of numerous workers since then (*e.g.* Doflein, Cohn, Stempell and others), there are still one or two very important points, such as the occurrence of sexual conjugation, upon which light is required.

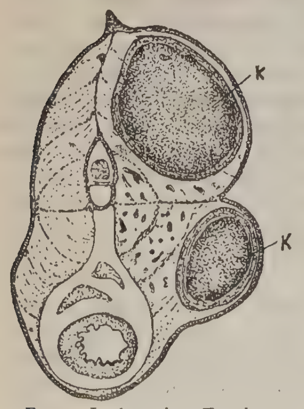
Occurrence and habitat.

Although pre-eminently parasites of fishes, Myxosporidia also occur, in a few cases, in other Vertebrates (frogs and reptiles); no instance of their presence in a warm-blooded Vertebrate has, however, yet been described. One suborder (the Microsporidia or Cryptocystes) is pretty equally distributed between fishes on the one hand and Invertebrates—chiefly, but not exclusively, Arthropods—on the other. The parasites are frequently the cause of severe and fatal illness in their hosts, and devastating epidemics of myxosporidiosis have often been reported (*e.g.* among carp and barbel in continental rivers, due to a *Myxobolus*, and among crayfish in France, to *Thelohania*).

The seat of the invasion and the mode of parasitism are extremely varied. Practically any organ or tissue may be attacked, excepting, apparently, the testis and cartilage and bone. In one instance at least (that of *Nosema bombycis* of the silkworm) the parasites penetrate into the ova, so that true hereditary infection occurs, the progeny being born with the disease. The parasites may be either free in some lumen, such as that of the gall bladder or urinary bladder (not of the alimentary canal, or the body-cavity itself), when they are known as *coelozoic* forms; or in intimate relation with some tissue, intracellular while young but becoming intercellular in the adult phase (*histozoic* forms); or entirely intracellular (*cytozoic* forms). Among the histozoic and cytozoic types, moreover, two well-defined conditions, *concentration* and *diffuse infiltration*, occur. In the former, the parasitic zone is strictly limited, and well-marked cysts are formed; in the latter, the infection spreads throughout the neighbouring tissue, and the parasitic development becomes inextricably commingled with the host's cells. Sometimes, as shown by Woodcock (**45**), there may be an attempt on the part of the host's tissue to circumscribe and check the growth of these parasitic areas, which results in the formation of *pseudocysts*, quite different in character from true cysts.

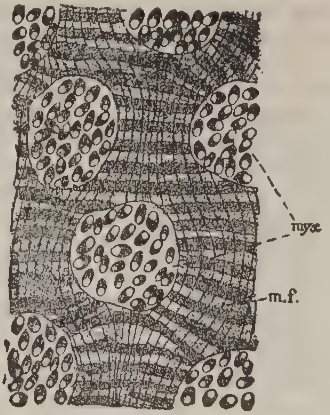
Morphology.

The most noticeable feature about the Myxosporidian trophozoite is its amoeboid and Rhizopod-like character. Pseudopodia of various kinds, from long slender ones (fig. 3, B) to short blunt lobose ones, are of general occurrence, being most easily observed, of course, in the free-living forms. The pseudopodia serve chiefly for movement and attachment, and never, it should be noted, for the injection of solid food-particles, as in the case of *Amoebae*. The general protoplasm is divisible into ectoplasm and endoplasm. The former is a clear, finely-granular layer, of which the pseudopodia are mainly constituted (fig. 3, A). In one or two instances (*e.g. Myxidium lieberkühnii*) the ectoplasm shows a vertical striation, and in the older trophozoites breaks down partially, appearing like a fur of delicate, non-motile filaments. A somewhat similar modification is found in *Myxocystis*. The endoplasm is more fluid, and contains numerous inclusions of a granular nature, as well as vacuoles of varying size. In the endoplasm are lodged the nuclei, of which in an adult trophozoite there may be very many; they are all derived by multiplication from the single nucleus with which the young individuals begin life, the number increasing as growth proceeds.



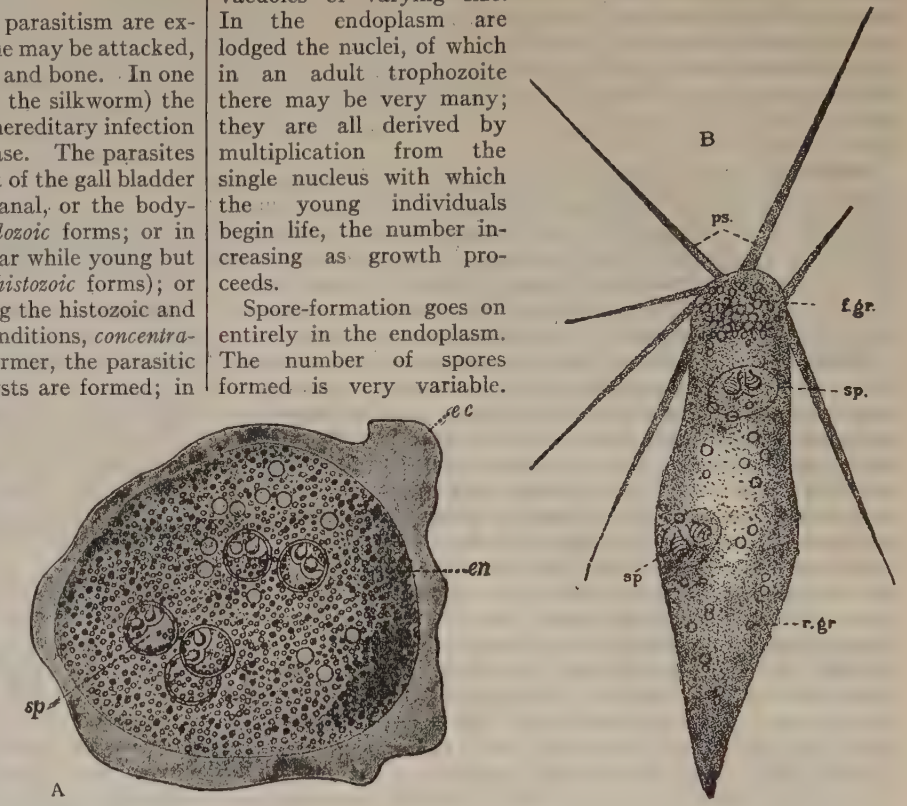
From Lankester's *Treatise on Zoology*, vol. Protozoa, from Wasielewski, after Thélohan.

FIG. 1.—Transverse section of a stickle-back (*Gasterosteus aculeatus*), showing two cysts of *Glugea anomala*, Moniez (*kk*), in the body musculature on the right side.



From Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 2.—Portion of a section through a muscle fibre of *Cottus scorpius* invaded by *Pleistophora typicalis*, Gurley.
m.f, Muscle fibrils, retaining their striation.
myx, Cysts of the parasite, lying between the fibrils.



From Wasielewski, *Sporozoenkunde*.

FIG. 3.—A. Trophozoite of *Sphaerospora divergens*, Thél. (par. *Blennius* and *Crenilabrus*), × 750. *ec*, Ectoplasm; *en*, endoplasm; *sp*, spores, each with four pole capsules.
From Lankester's *Treatise on Zoology*, vol. Protozoa.

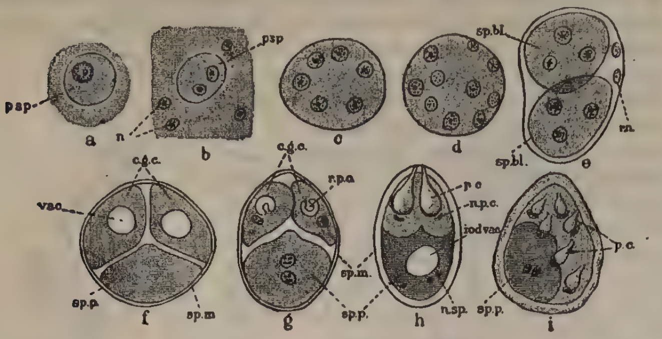
B. Spore-bearing trophozoite of *Leptotheca agilis*, Thél. (par. *Trygon* and *Scorpaena*), × 750. *ps*, Pseudopodia localized at the anterior end; *f.gr*, fatty granules similarly localized; *r.gr*, refringent granules; *sp*, spores, two in number.

Spore-formation; multiplicative processes.

Spore-formation goes on entirely in the endoplasm. The number of spores formed is very variable. It may be as low as two (as in free-living forms, *e.g. Leptotheca*), in which case a large amount of trophic protoplasm is unconverted into spores; or, on the other hand, the number of spores may be very great (as in tissue-parasites), practically the whole of the parent-body being thus used up. The sporont may or may not encyst at the commencement of sporulation. In the free-living forms there is no cyst-membrane secreted; but in certain *Glugeidae*, on the other hand, the ectoplasm becomes altered into a firm, enclosing layer, the *ectorind*, which forms a thick cyst-wall (fig. 5). The process of sporulation begins by the segregation of small quantities of endoplasm around certain of the nuclei, to form little, rounded bodies, the *pansporoblasts*. There may be either very many or only few pansporoblasts developed; in some cases, indeed, there is only one, the sporont either itself becoming a pansporoblast (certain *Microsporidia*), or giving rise to a solitary one (*Ceratomyxidae*). The pansporoblast constituted, nuclear multiplication goes on preparatory to the formation of sporoblasts, which in their turn become spores (see figs. 4 and 5). Not all the nuclei thus formed, however, are made use of. In the *Phaenocystes* there are always two sporoblasts developed in each pansporoblast; in the *Cryptocystes* there may be from one to several. Around each sporoblast a spore-membrane is secreted, which usually has the form of two valves. It has recently been shown by Léger and Hesse (**29***b*) that, in many Phaenocystes at any rate, each of these valves is formed by a definite nucleated portion of the sporoblast.

The spores themselves vary greatly in size and shape (figs. 7 and 8). They may be as small as 1·5 μ by 1μ (as in a species of *Nosema*), or as large as 100 μ by 12 μ (as in *Ceratomyxa*). A conspicuous feature in the structure of a fully-developed spore is the polar-capsules, of which there may be either 1, 2, or 4 to each. In the

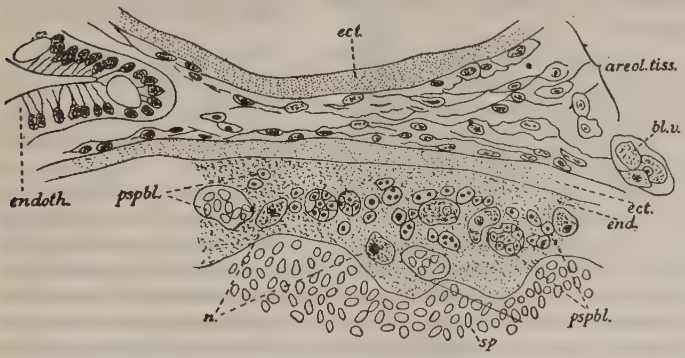
Phaenocystes the polar-capsules are visible in the fresh condition, but not in the Cryptocystes. The polar-capsule is an organella which recalls the nematocyst of a Hydrozoan, containing a spirally-coiled filament, often of great length, which is shot out on the application of a suitable stimulus. Normally, as was ingeniously shown by Thélohan (**43**), the digestive juices of the fresh host serve this purpose, but various artificial means may suffice. The function of the everted filament is probably to secure the attachment of the spore to the epithelium of the new host. In the Phaenocystes, in connexion with each polar-capsule, a small nuclear body can be generally made out; these two little nuclei are those of the two "capsulogenous" areas of the protoplasm of the pansporoblast, which formed the capsules. The sporoplasm, representing the sporozoite, is always single. Nevertheless, in the Phaenocystes it is invariably binuclear; and, in the Microsporidia, the nucleus, at first single, gives rise later to four nuclei, two of which are regarded by Stempell (**42**) as corresponding to those of two polar-capsules (of which only one is developed in the spore), the remaining two representing germ-nuclei. Hence it is possible that the Myxosporidian sporoplasm really consists of two, incompletely-divided (sister) germs. Moreover, it is supposed by some that these two nuclei fuse together later, this act representing a sexual conjugation; since the earliest known phases of young trophozoites (amoebulae) have been described as uninuclear.



From Lankester's *Treatise on Zoology*, vol. Protozoa, after Thélohan.

FIG. 4.—Stages in spore-formation. All the figures are from *Myxobolus ellipsoides*, except *a* and *f*, which are from *M. pfeifferi*.

a, Differentiation of the pansporoblast (*p.sp*).
b, Pansporoblast with two nuclei.
c and *d*, Pansporoblasts with six and ten nuclei respectively; in *d*, four of the nuclei are degenerating.
e, Pansporoblast segmented into two definitive sporoblasts, each with three nuclei. In the next four figures the definitive sporoblast, or the spore produced from it, is alone figured.
f, Definitive sporoblast segmented into three masses, the capsulogenous cells (*c.g.c*) and the sporoplasm (*sp.p*), within an envelope, the spore membrane (*sp.m*).
g, More advanced stage.
h, Spore completely developed, with two polar capsules and sporoplasm containing an iodinophilous vacuole.
i, Abnormal spore containing six polar capsules.
n, Nuclei.
sp.bl, Definitive sporoblast.
r.n, Residuary nuclei.
vac, Vacuole.
r.p.c, Rudiment of *p.c*, polar capsule.
n.p.c, Nuclei of polar capsules.
iod.vac, Iodinophilous vacuole.
n.sp, Nuclei of sporoplasm.

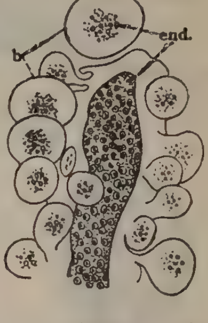


From Woodcock, *Proc. and Trans. of the Liverpool Biological Society*, 1904.

FIG. 5.—Part of the periphery of a cyst of *Glugea stephani*, in the intestinal wall of the plaice, showing sporoblast and spore-formation.

ect, Ectorind.
end, Endoplasm.
endoth, Fold of the mucous membrane, normal in character.
p.sp.bl, Various stages in the development of the pansporoblasts.
sp, Ripe spores, filling the greater part of the cyst.
n, Large (vegetative) nuclei.

In addition to spore-formation, two or three modes of endogenous reproduction, serving for auto-infection, have been made known. One, termed by Doflein *plasmotomy*, consists either in the division of the (multinucleate) trophozoite into two, by more or less equal fission (simple plasmotomy), or in the budding-off, from the parent trophozoite, of several portions (example: *Myxidium lieberkühnii*, fig. 6). A variety of this method has been described by Stempell (**40**) in the case of the young trophozoites (meronts) of *Thelohania mülleri*, which may divide into two while still uninuclear; and by rapid successive divisions chains of meronts may be formed, the different individuals being incompletely separated. Another method, which is probably chiefly responsible for the rapid spread of tissue-parasites and cell-parasites (such as *Myxobolidae* and *Glugeidae*) through their host's tissue in the condition of diffuse infiltration, consists in multiple nuclear division, and the liberation of amoebulae while the parasite is yet quite young and possesses only few nuclei. As Woodcock has pointed out in considering the case of *Glugea stephani*, it is very probable that this "multiplicative reproduction," in diffuse infiltration, is to be looked upon as a separation of the pansporoblast-rudiments as daughter-individuals; *i.e.* that the pansporoblasts are, in certain circumstances, capable of independent existence as little sporonts. A further stage in this direction of evolution is seen, according to Stempell, in *Thelohania*, *Pleistophora* and other types where the whole individual becomes one reproductive organella; such forms are to be considered as examples of a phylogenetic individualization of the pansporoblasts, which now exist as solitary sporonts. An extreme case of this "reduction of the individual" is found, apparently in the genus *Nosema*, as lately characterized by Perez (**34**), where vast numbers of minute entirely independent sporonts (pansporoblasts) are produced, each of which gives rise to only a single spore.



From Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 6.—Formation of buds by multiple plasmotomy in *Myxidium lieberkühnii*, Bütschli (par. *Esox* and *Lota*) after Cohn.

b, Buds.
end, Endoplasm; the clear outer portion represents the ectoplasm.

The Myxosporidia are divided into two suborders, the Phaenocystes and the Cryptocystes. Some authors have of late years separated these two divisions and raised each to the rank of a distinct order, considering that they are not more closely related to each other than to other Endosporan orders. We think this is a mistake; and it is very interesting to find that Léger and Hesse (1908) have described (**29***a*) a new genus of Phaenocystes, *Coccomyxa*, which represents a type intermediate between these two suborders, and shows that they are closely connected.

Classification.

Suborder 1: *Phaenocystes*, Gurley. Spores relatively large, with generally two or four polar-capsules, visible in the fresh condition. There are nearly always two spores formed in each pansporoblast.

Section (*a*): *Disporea*. Only two spores (*i.e.* one pansporoblast) produced in each individual trophozoite. The greatest length of the spore is at right angles to the plane of the suture.

One family, *Ceratomyxidae*, including two genera, *Ceratomyxa* (fig. 3, B) and *Leptotheca*, typically "free" parasites, mostly from the gall bladders of fishes. The valves of the spore in the former genus are prolonged into hollow cones. The type-species of this genus is *C. sphaerulosa*, from *Mustelus* and *Galeus*; that of *Leptotheca* is *L. agilis*, from *Trygon*.

Section (*b*): *Polysporea*. More than two spores, generally very many, are produced typically by each individual trophozoite. The greatest length of the spore is usually in the sutural plane.

Family, *Myxidiidae*. Spores with two polar-capsules, and without an iodinophilous vacuole in the sporoplasm. Mostly "free" parasites. Gen. *Sphaerospora.* Four or five species are known, from the kidneys or gall bladder of fishes (fig. 3, A). One, *S. elegans*, is interesting in that it affords a transition between the two sections, being disporous. Gen. *Myxidium*; spores elongated and fusiform, with a polar capsule at each extremity. The best-known species is *M. lieberkühnii*, from the urinary bladder of the pike. One or two species occur in reptiles. Other genera are *Sphaeromyxa*, *Cystodiscus*, *Myxosoma* and *Myxoproteus*.

Family, *Chloromyxidae.* Spores with four polar capsules and no iodinophilous vacuole. One genus, *Chloromyxum*, of which several species are known; the type being *C. leydigi*, from the gall bladder of various Elasmobranchs (fig. 7, B).

Family, *Myxobolidae.* Spores with two polar-capsules (exceptionally one), and with a characteristic iodinophilous vacuole in the sporoplasm. Typically tissue parasites of Teleosteans, often very dangerous. Genus *Myxobolus.* Spores oval or rounded, without a tail-like process. Very many species are known, which are grouped into three subsections: (*a*) forms with only one polar-capsule, such as *M. piriformis*, of the tench; (*b*) forms with two unequal capsules, *e.g. M. dispar* from *Cyprinus* and *Leuciscus*; and (*c*) the great majority of species with two equal polar-capsules, including *M. mülleri*, the type-species, from different fish, *M. cyprini* and *M. pfeifferi*, the cause of deadly disease in carp and barbel respectively and others. Other genera are *Henneguya* and *Hoferellus*, differing from *Myxobolus* in having, respectively, one or two tail-like processes to the spore. *Lentospora*, according to Plehn (**37**), lacks an iodinophilous vacuole.

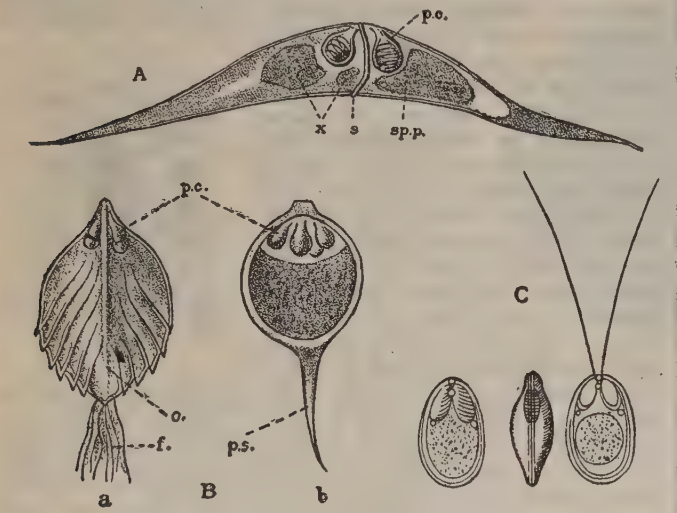


Fig. 7.—A. Spore of *Ceratomyxa sphaerulosa*, Thél. (par. *Mustelus* and *Galeus*), ×750, after Thélohan. *sp.p*, Sporoplasm; *p.c*, polar capsules; *s*, suture; *x*, "irregular, pale masses, of undetermined origin."

From Lankester's *Treatise on Zoology*, vol. Protozoa.

B. Spores of *Chloromyxidae*, after Thélohan. *a*, *Chloromyxum leydigi*, Ming., seen from the sutural aspect, ×2250; *b*, *C. caudatum*, Thél., ×1900. *p.c*, Polar capsules; *s*, suture; *f*, filaments; *p.s*, tail-like process of the spore envelope.

From Wasielewski's *Sporozoenkunde.*

C. Spores of *Myxobolus ellipsoides*, Thél. The spores on the left and right are lying with the sutural plane horizontal, that in the middle with the sutural plane vertical.

Family *Coccomyxidae.* The pansporoblasts produce (probably) only one spore. Spore oval, large (14 μ by 5·5 μ), with a single very large polar-capsule. Sporoplasm with no vacuole. Single genus *Coccomyxa*, with the characters of the family. One species, *C. morovi*, Léger and Hesse, from the gall bladder of the sardine. The spore greatly resembles a Cryptocystid spore.

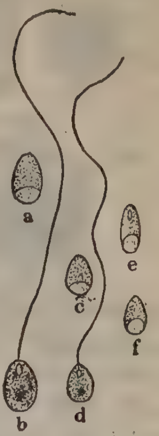
Suborder 2: *Cryptocystes*, Gurley (=*Microsporidia*, Balbiani). Spores minute, usually pear-shaped, with only one polar-capsule, which is visible only after treatment with reagents. The number of spores formed in each pansporoblast varies greatly in different forms.

Section (*a*): *Polysporogenea.* The trophozoite produces numerous pansporoblasts, each of which gives rise to many spores. Genus *Glugea*, with numerous species, of which the best-known is *G. anomala*, from the stickleback (fig. 1). The genus *Myxocystis*, which has been shown by Hesse (**24**) to be a true Microsporidian, is placed by Perez in this section, but this is a little premature, as Hesse does not describe the exact character of the sporulation, *i.e.* with regard to the number of pansporoblasts and the spores they produce.

Section (*b*): *Oligosporogenea.* The trophozoite becomes itself the (single) pansporoblast. In *Pleistophora*, the pansporoblast produces many spores; *P. typicalis*, from the muscles of various fishes (fig. 2), is the type-species. In *Thelohania*, eight spores are formed; the different species are parasitic in Crustacea. In *Gurleya*, parasitic in *Daphnia*, only four are formed; and, lastly, in *Nosema* (exs. *N. pulvis*, from *Carcinus*, and, most likely, *N. bombycis*, of the silkworm), each pansporoblast produces only a single spore.

2. Order—**Actinomyxidia.** This order comprises a peculiar group of parasites, first described by A. Stolc in 1899, which are restricted to Oligochaete worms of the family *Tubificidae.* Most forms attack the intestinal wall, often destroying its epithelium over considerable areas; but one genus, *Sphaeractinomyxon*, inhabits the body-cavity of its host. The researches of Caullery and Mesnil (**10-12**) and of Léger (**28** and **29**) have shown that the parasites exhibit the typical features of the Endospora, and the spores possess the characteristic polar-capsules of the Myxosporidian spore, but differ therefrom by their more complicated structure.

The growth and development of an Actinomyxidian have been recently worked out by Caullery and Mesnil in the case of *Sphaeractinomyxon stolci.* A noteworthy point is the differentiation of an external (covering) cellular layer, which affords, perhaps, the nearest approach to distinct tissue-formation known among Protozoa. This envelope is formed soon after nuclear multiplication of the young trophozoite has begun, and is constituted by two nuclei and a thin, peripheral layer of cytoplasm. It remains binuclear throughout the entire period of development, and serves as a delicate cyst-membrane. The multiplication of the internal nuclei is accompanied by a corresponding division of the cytoplasm; so that instead of a multinucleate or plasmodial condition, distinct uninucleate cellules are formed, up to sixteen in number. These cellules, as a matter of fact, are sexual elements or gametes; and eight of them can be distinguished from the other eight by slight differences in the nuclei. The gametes unite in couples, each couple being most probably composed of dissimilar members: in other words, conjugation is slightly anisogamous. Each of these eight copulae gives rise to a spore.

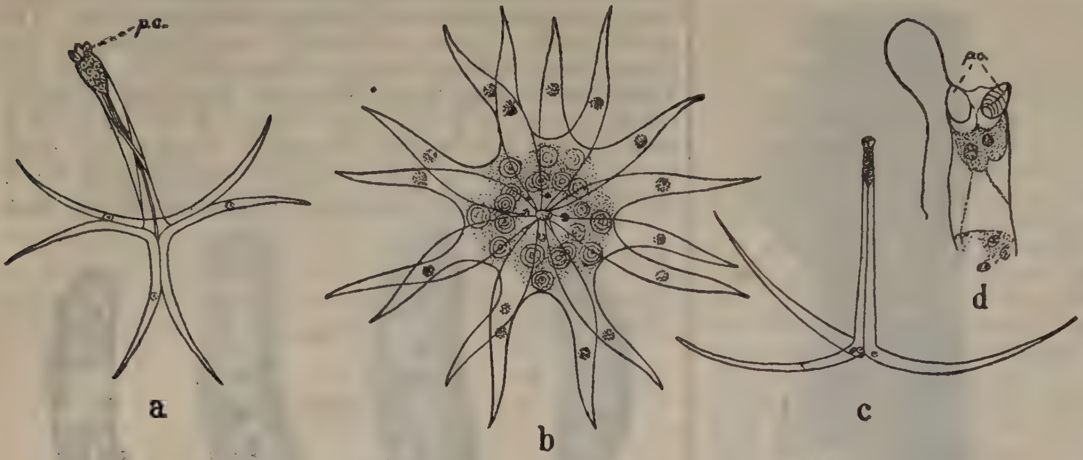


From Lankester's *Treatise on Zoology*, vol. Protozoa.

Fig. 8.—Spores of various *Glugeidae*, × 1500 (after Thélohan).
a and *b*, *Pleistophora typicalis*, Gurley; *a* in the fresh condition, *b* after treatment with iodine water, causing extrusion of the filament.
c and *d*, *Thelohania octospora*, Henneguy; *c* fresh, *d* treated with ether.
e, *Glugea depressa*, Thél., fresh.
f, *G. acuta*, Thél.

As the name of the order implies, there are always eight spores formed. These differ from other Endosporan spores in having invariably a ternary symmetry and constitution (fig. 9). The wall of the spore is composed of three valves, each formed from an enveloping cell, and three capsular cells, placed at the upper or anterior pole, and containing each a polar-capsule, visible in the fresh condition. The valves are usually prolonged into processes or appendages, whose form and arrangement characterize the genus; but in *Sphaeractinomyxon* the spore is spherical and lacks processes. The sporoplasm may be either a plasmodial mass, with numerous nuclei, or may form a certain number of uninuclear sporozoites. A remarkable feature in the development of the spore is that the germinal tissue (sporoplasm) arises separate from and outside the cellules which give rise to the spore-wall; later, when the envelopes are nearly developed, the sporoplasm penetrates into the spore.

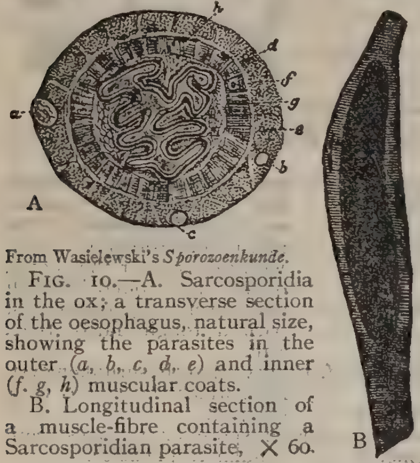
Four genera have been made known. (1) *Hexactinomyxon*, Stolc. Spores having the form of an anchor with six arms; sporoplasm plasmodial, situate near the anterior pole of the spore. One sp. *H. psammoryctis*, from *Psammoryctes.* (2) *Triactinomyxon*, St. Spores having the form of an anchor with three arms; distinct sporozoites, disposed near the anterior pole. *T. ignotum*, with eight spores, from *Tubifex tubifex*, and also from an unspecified Tubificid; another sp., unnamed, with 32 sporozoites, also from *T. t.* (3) *Synactinomyxon*, St. Spores united to one another, each having two aliform appendages; sporoplasm plasmodial. One sp., *S. tubificis*, from *T. rivulorum.* (4) *Sphaeractinomyxon*, C. and M. Spores spherical, without aliform prolongations; sporoplasm gives rise to very many sporozoites, occupying the whole spore. One sp., *S. stolci*, from *Clitellio* and *Hemitubifex*.



From Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 9.—Spores of Actinomyxidia (after Stolc).
a, *Hexactinomyxon psammoryctis* (par. *Psammoryctes barbatus*).
b, *Synactinomyxon tubificis* (par. *Tubifex rivulorum*); the mass of united spores.
c, *Triactinomyxon ignotum* (par. *Clitellio*, sp.).
d, Upper portion of *Hexactinomyxon*, showing two of the three polar capsules, one with filament discharged.

3. Order—**Sarcosporidia.** With the exception of one or two forms occurring in reptiles, these parasites are always found in warm-blooded Vertebrates, usually Mammals. They are of common occurrence in domestic animals, such as pigs, sheep, horses and (sometimes) cattle. A Sarcosporidian has also been described from man. The characteristic habitat is the striped muscle, generally of the oesophagus (fig. 10, A) and heart, but in acute cases the parasites overrun the general musculature. When this occurs, as often happens in mice, the result is usually fatal. Unless, however, the organisms thus spread throughout the body, the host does not appear to suffer any serious consequences. In addition to the effects produced by the general disturbance to the tissues, the attacked animals have apparently to contend—at any rate in the case of *Sarcocystis tenella* in the sheep—with a poison secreted by the parasite. For Laveran and Mesnil (**27**) have isolated a toxine from this form, which they have termed sarcocystin.

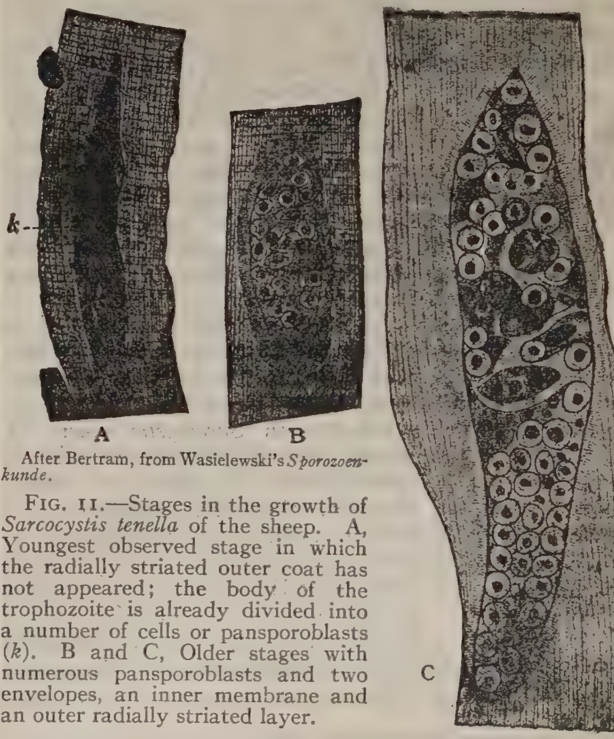


From Wasielewski's *Sporozoenkunde*.

FIG. 10.—A. Sarcosporidia in the ox; a transverse section of the oesophagus, natural size, showing the parasites in the outer (*a, b, c, d, e*) and inner (*f, g, h*) muscular coats.
B. Longitudinal section of a muscle-fibre containing a Sarcosporidian parasite, × 60.

In the early stages of growth, a Sarcosporidian appears as an elongated whitish body lodged in the substance of a muscle-fibre; this phase has long been known as a "Miescher's tube," or *Miescheria*. The youngest trophozoites that have been yet observed (by Bertram, **1**) were multinucleate (fig. 11, A), but there is no reason to doubt that they begin life in a uninuclear condition. The protoplasm is limited by a delicate cuticle. With growth, organellae corresponding to the Myxosporidian pansporoblasts are formed by the segregation internally of little uninuclear spheres of protoplasm. At the same time, a thick striated envelope is developed around the parasite, which later comes to look like a fur of fine filaments. The probable explanation of this feature (given by Vuillemin, **44**) is that it is due to the partial breaking down of a stiff, vertically (or radially) striated external layer (fig. 12, A), such as is seen in *Myxidium lieberkühnii*. Immediately internal to this is a thin, homogeneous membrane, which sends numerous partitions or septa inwards; these divide up the endoplasm into somewhat angular chambers or alveoli (fig. 12). In each chamber is a pansporoblast, which divides up to produce many spores; hence the spores formed from different pansporoblasts are kept more or less separate. The pansporoblasts originate, in a growing Sarcosporidian, at the two poles of the body, where the peripheral endoplasm with its nuclei is chiefly aggregated. More internally, spore-formation is in progress; and in the centre, pansporoblasts full of ripe spores are found.

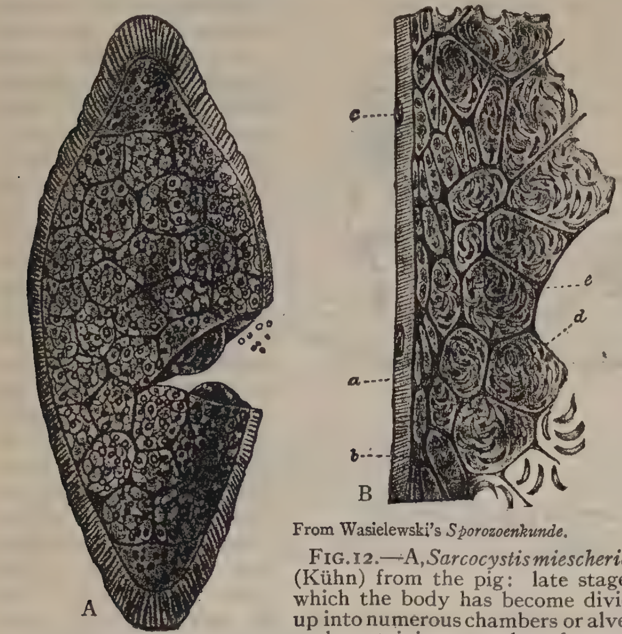
By this time the parasite has greatly distended the muscle-fibre in which it has hitherto lain, absorbing, with its growth, practically all the contractile-substance, until it is surrounded only by the sarcolemma and sarcoplasm. It next passes into the adjacent connective-tissue, and in this phase has been distinguished from *Miescheria* as *Balbiania*, under the impression that the two forms were quite distinct. In the later stages, the parasite may become more rounded, and a cyst may be secreted around it by the host's tissue. In these older forms, the most centrally placed spores degenerate and die, having become over-ripe and stale.



After Bertram, from Wasielewski's *Sporozoenkunde*.

FIG. 11.—Stages in the growth of *Sarcocystis tenella* of the sheep. A, Youngest observed stage in which the radially striated outer coat has not appeared; the body of the trophozoite is already divided into a number of cells or pansporoblasts (*k*). B and C, Older stages with numerous pansporoblasts and two envelopes, an inner membrane and an outer radially striated layer.

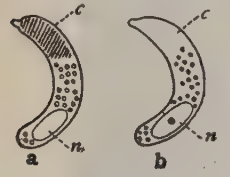
With regard to the spores themselves and what becomes of them, our knowledge is defective. Two kinds of reproductive germ have been described, termed respectively *gymnospores* (so-called sporozoites, "Rainey's corpuscles") and *chlamydospores*, or simply spores. It seems probable that the former serve for endogenous or auto-infection, and the latter for infecting fresh hosts. Unfortunately, however, both kinds of germ are not yet known in the case of any one species. The gymnospores, which are the more commonly found (*e.g.* in *S. muris*, *S. miescheriana* of the pig, and other forms), are small sickle-shaped or reniform bodies which are more or less amoeboid, and capable of active movement at certain temperatures. They appear to be naked, and consist of finely granular protoplasm, containing a single nucleus and one or two vacuoles. The chlamydospores, or true spores, occur in *S. tenella* of sheep (fig. 13), and have been described by Laveran and Mesnil (**26**). They also are falciform, but one extremity is rounded, the other pointed. There is a very thin, delicate membrane, most unlike a typical, resistant spore-wall; and the spores themselves are extremely fragile and easily acted upon and deformed by reagents, even by distilled water. The rounded end of the spore contains a large nucleus, while at the other end is an oval, clear space, which, in the fresh condition, shows a distinct spiral striation. The exact significance of this structure has been much debated. In position and appearance it recalls the polar-capsule of a Myxosporidian spore. The proof of this interpretation would be the expulsion of a filament on suitably stimulating the spore; while, however, some investigators have asserted that such a filament is extruded, this cannot be regarded as at all certain. Hence it is still doubtful whether this striated body really corresponds to a polar-capsule.



From Wasielewski's *Sporozoenkunde.*

FIG. 12.—A, *Sarcocystis miescheriana* (Kühn) from the pig: late stage in which the body has become divided up into numerous chambers or alveoli, each containing a number of germs.

B, *Sarcocystis* of the ox: section of a stage similar to fig. 12. *a*, Substance of muscle-fibre; *b*, envelope of parasite; *c*, nuclei of the muscle; *d*, parasitic germs (gymnospores); *e*, walls of the alveoli. In the peripheral alveoli are seen immature germs.



(After Laveran and Mesnil, from Lankester's *Treatise on Zoology*, vol. Protozoa.)

FIG. 13.—Spores of *Sarcocystis tenella*, Raill., from the sheep.

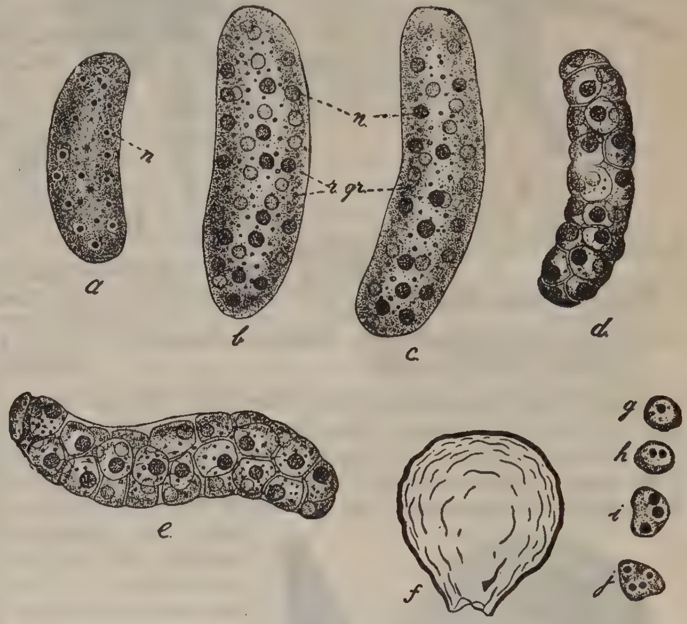
a, Spore in the fresh condition, showing a clear nucleus (*n*) and a striated body or capsule (*c*).

b, Stained spore; the nucleus (*n*) shows a central karyosome; the striations of the polar capsule (*c*) are not visible.

Nothing whatever is known as to the natural means by which infection with Sarcosporidia is brought about. Smith (**39**) showed that mice can be infected with *Sarcocystis muris* by simply feeding them on the flesh of infected mice. It is not very likely, however, that this represents the natural mode, even in the case of mice; and it certainly cannot do so in the case of Herbivora. The difficulty in the way is the delicacy of the spores, which seem totally unfitted to withstand external conditions. It may be that some alternative (intermediate) host is concerned in dispersal; but this has yet to be ascertained.

All known Sarcosporidia are included in a single genus *Sarcocystis*, Lank. (= *Miescheria* + *Balbiania*, Blanchard.) Some of the principal species are: *S. miescheriana*, from pigs; *S. tenella*, from sheep; *S. bertrami*, from horses; *S. blanchardi*, from Bovines; *S. muris*, from mice; *S. platydactyli*, from the gecko; and lastly, *S. lindemanni*, described from man.

4. Order—**Haplosporidia.** The Sporozoa included in this order are characterized by the general simplicity of their development, and by the undifferentiated character of their spores. The order includes a good many forms, whose arrangement and classification have been recently undertaken by Caullery and Mesnil (**15**), to whom, indeed, most of our knowledge relating to the Haplosporidia is due. The habitat of the parasites is sufficiently varied; Rotifers, Crustacea, Annelids and fishes furnishing most of the hosts. A recent addition to the list of Protozoa causing injury to man, a Haplosporidian, has been described by Minchin and Fantham (**29d**), who have termed the parasite *Rhinosporidium*, from its habitat in the nasal septum, where it produces pedunculate tumours.



From Minchin, in Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 14.—*Bertramia Asperospora* (Fritsch) from the body-cavity of *Brachionus.* ×1040.

a, Young form with opaque, evenly-granulated protoplasm and few refringent granules; the nuclei (*n*) are small, and appear to be surrounded each by a clear space.

b and *c*, Full-grown specimens with large nuclei and clearer protoplasm, containing numerous refringent granules (*r.gr.*).

d and *e*, Morula stages, derived from *b* and *c* by division of the body into segments centred round the nuclei, each cell so formed being a spore. Between the spores a certain amount of intercellular substance or residual protoplasm is left, in which the refringent granules seem to be embedded. The morula may break up forthwith and scatter the spores, or may first round itself off and form a spherical cyst with a tough, fairly thick wall.

f, Empty, slightly shrunken cyst, from which the spores have escaped.

g, Free spore or youngest unicellular trophozoite.

h, *i*, *j*, Commencing growth of the trophozoite, with multiplication of the nuclei, which results ultimately in forms such as *a* and *b*.

Bertramia, a well-known parasite of the body-cavity of Rotifers, will serve very well to give a general idea of the life-cycle so far as it has yet been made out (fig. 14). The trophozoite begins life as a small, rounded uninucleate corpuscle, which as it grows, becomes multinucleate. The multinuclear body generally assumes a definite shape, often that of a sausage. Later, the protoplasm becomes segregated around each of the nuclei, giving the parasite a mulberry-like aspect; hence this stage is frequently known as a morula. The uninuclear cellules thus formed are the spores, which are ultimately liberated by the break-up of the parent body. Each is of quite simple, undifferentiated structure, possesses a large, easily-visible nucleus, and gives rise in due course to another young trophozoite. In some instances, as described by

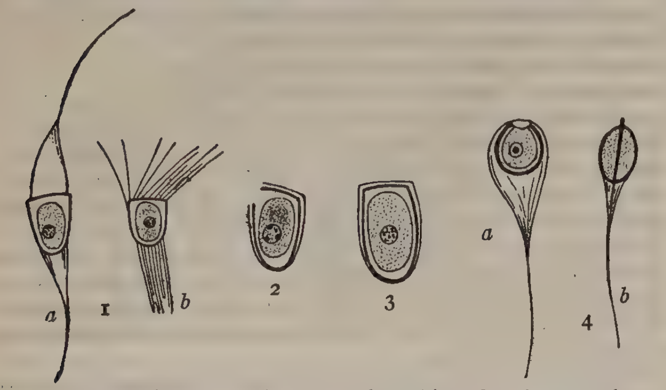
Minchin, the sporulating parasite becomes rounded off and forms a protective cyst, doubtless for the protection of the spores during dissemination.

In some forms (*e.g. Haplosporidium* and *Rhinosporidium*) the spore-mother-cells, instead of becoming each a single spore, as in *Bertramia*, give rise to several, four in the first case, many in the latter. Sometimes, again, the spore, while preserving the essentially simple character of the sporoplasm, may be enclosed in a spore-case; this may have the form of a little box with a lid or operculum, as in some species of *Haplosporidium*, or may possess a long process or tail, as in *Urosporidium* (fig. 15).

The *Haplosporidia* are divided by Caullery and Mesnil into three families, *Haplosporidiidae*, *Bertramiidae* and *Coelosporidiidae*; one or two genera are also included whose exact position is doubtful.

(*a*) *Haplosporidiidae*: 3 genera, *Haplosporidium*, type-species *H. heterocirri*; *Urosporidium*, with one sp., *U. fuliginosum*; all parasitic in various Annelids; and *Anurosporidium*, with the species *A. pelseneeri*, from the sporocysts of a Trematode, parasitic on *Donax*.

(*b*) *Bertramiidae*: 2 genera, *Bertramia*, with *B. capitellae* from an Annelid and *B. asperospora*, the Rotiferan parasite above described; and *Ichthyosporidium*, with *I. gasterophilum* and *I. phymogenes*, parasitic in various fish.



From Caullery and Mesnil, *Archives de zoologie expérimentale*, vol. 4, 1905, by permission of Schleicher Frères et Cie, Paris.

FIG. 15.—Spores of various Haplosporidia.

1, *Haplosporidium heterocirri:*
a, on liberation;
b, after being in sea-water.
2, *H. scolopli.*
3, *H. vejdovskii.*
4, *Urosporidium fuliginosum:*
a, surface-view;
b, side-view. ×1000.

(*c*) *Coelosporidiiae*: genera *Coelosporidium*, type-species *C. chydoriclola*; and *Polycaryum*, type-species *P. branchiopodianum*. These forms are parasitic in small Crustacea. The genus *Blastulidium* is referred, doubtfully, by Caullery and Mesnil to this family; but certain phases of this organism seem to indicate rather a vegetable nature.

The genus *Rhinosporidium* should probably be placed in a distinct family. The only species so far described is *R. kinealyi* from the nasal septum of man, to which reference has above been made. Another form, *Neurosporidium cephalodisci*, agreeing in some respects with *Rhinosporidium*, has been described by Ridewood and Fantham (**37a**) from the nervous system of *Cephalodiscus*.

A parasite whose affinities are doubtful, but which is regarded by Caullery and Mesnil as allied to the Haplosporidia, is the curious parasite originally described by Schewiakoff as "endoparasitic tubes" of *Cyclops*; it has been named by Caullery and Mesnil, *Scheviakovella*. This organism is remarkable in one or two ways: it possesses a contractile vacuole; the amoeboid trophozoites tend to form plasmodia; and the spores, of the usual simple type, may apparently divide by binary fission.

5. There remain, lastly, certain forms, which are conveniently grouped together as "Sporozoa *incertae sedis*," either for the reason that it is impossible to place them in any of the well-defined orders, or because their life-cycle is at present too insufficiently known. Serosporidia is the name given by Pfeiffer to certain minute parasites of the body-cavity of Crustacea; they include *Serosporidium*, *Blanchardina* and *Botellus*. *Lymphosporidium*, a form with distributed nucleus, causing virulent epidemics among brook-trout, is considered by Calkins (3) to be suitably placed here. Another parasite of lymphatic spaces and channels is the remarkable *Lymphocystis*, described by Woodcock (**46**), from plaice and flounders, which in some respects rather recalls a Gregarine. The group Exosporidia was founded by Perrier to include a peculiar organism, ectoparasitic on Arthropods, to which the name of *Amoebidium* had been given by Cienkowsky. It has recently been shown, however, that this organism is most probably an Alga. Another genus, *Exosporidium*, described by Sand (**38**), is placed at present in this group. For details of the structure of these forms and others like *Siedleckia*, *Toxosporidium*, *Chitonicium* *Joyeuxella* and *Metschnikovella*, a comprehensive treatise on the Sporozoa, such as that of Minchin, should be consulted.

To complete this article, it will be sufficient to mention various enigmatical bodies, associated with different diseases, which are regarded by their describers as Protozoa. Among such is the "*Histosporidium carcinomatosum*" of Feinberg, which he finds in cancerous growths. *Cytoryctes*, the name given to "Guarnieri's bodies" in small-pox and vaccinia, has been recently investigated by Calkins (**3a**), who has described a complex life-cycle for the alleged parasite. Other workers, however, such as Siegel, give a quite different account of these bodies, and, moreover, find similar ones in scarlet-fever, syphilis, &c.; while yet others (*e.g.* Prowazek) deny that they are parasitic organisms at all.

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ENDYMION, in Greek mythology, son of Aëthlius and king of Elis. He was loved by Selene, goddess of the moon, by whom he had fifty daughters, supposed to represent the fifty moons of the Olympian festal cycle. In other versions, Endymion was a beautiful youth, a shepherd or hunter whom Selene visited every night while he lay asleep in a cave on Mount Latmus in Caria (Pausanias v. 1; Ovid, *Ars am.* iii. 83). Zeus left him free to choose anything he might desire, and he chose an everlasting sleep, in which he might remain youthful for ever (Apollodorus i. 7). According to others, Endymion's eternal sleep was a punishment inflicted by Zeus upon him because he ventured to fall in love with Hera, when he was admitted to the society of the Olympian gods (Schol. Theocritus iii. 49). The usual form of the legend, however, represents Endymion as having been put to sleep by Selene herself in order that she might enjoy his society undisturbed (Cicero, *Tusc. disp.* i. 38). Some see in Endymion the sun, setting opposite to the rising moon, the Latmian cave being the cave of forgetfulness, into which the sun plunges beneath the sea; others regard him as the personification of sleep or death (see Mayor on Juvenal x. 318).

ENERGETICS. The most fundamental result attained by the progress of physical science in the 19th century was the definite enunciation and development of the doctrine of energy, which is now paramount both in mechanics and in thermodynamics. For a discussion of the elementary ideas underlying this conception see the separate heading ENERGY.

Ever since physical speculation began in the atomic theories of the Greeks, its main problem has been that of unravelling the nature of the underlying correlation which binds together the various natural agencies. But it is only in recent times that scientific investigation has definitely established that there is a quantitative relation of simple equivalence between them, whereby each is expressible in terms of heat or mechanical power; that there is a certain measurable quantity associated with each type of physical activity which is always numerically identical with a corresponding quantity belonging to the new type into which it is transformed, so that the energy, as it is called, is conserved in unaltered amount. The main obstacle in the way of an earlier recognition and development of this principle had been the doctrine of caloric, which was suggested by the principles and practice of calorimetry, and taught that heat is a substance that can be transferred from one body to another, but cannot be created or destroyed, though it may become latent. So long as this idea maintained itself, there was no possible compensation for the destruction of mechanical power by friction; it appeared that mechanical effect had there definitely been lost. The idea that heat is itself convertible into power, and is in fact energy of motion of the minute invisible parts of bodies, had been held by Newton and in a vaguer sense by Bacon, and indeed long before their time; but it dropped out of the ordinary creed of science in the following century. It held a place, like many other anticipations of subsequent discovery, in the system of Natural Philosophy of Thomas Young (1804); and the discrepancies attending current explanations on the caloric theory were insisted on, about the same time, by Count Rumford and Sir H. Davy. But it was not till the actual experiments of Joule verified the same exact equivalence between heat produced and mechanical energy destroyed, by whatever process that was accomplished, that the idea of caloric had to be definitely abandoned. Some time previously R. Mayer, physician, of Heilbronn, had founded a weighty theoretical argument on the production of mechanical power in the animal system from the food consumed; he had, moreover, even calculated the value of a unit of heat, in terms of its equivalent in power, from the data afforded by Regnault's determinations of the specific heats of air at constant pressure and at constant volume, the former being the greater on Mayer's hypothesis (of which his calculation in fact constituted the verification) solely on account of the power required for the work of expansion of the gas against the surrounding constant pressure. About the same time Helmholtz, in his early memoir on the Conservation of Energy, constructed a cumulative argument by tracing the ramifications of the principle of conservation of energy throughout the whole range of physical science.

Mechanical and Thermal Energy.—The amount of energy, defined in this sense by convertibility with mechanical work, which is contained in a material system, must be a function of its physical state and chemical constitution and of its temperature. The change in this amount, arising from a given transformation in the system, is usually measured by degrading the energy that leaves the system into heat; for it is always possible to do this, while the conversion of heat back again into other forms of energy is impossible without assistance, taking the form of compensating degradation elsewhere. We may adopt the provisional view which is the basis of abstract physics, that all these other forms of energy are in their essence mechanical, that is, arise from the motion or strain of material or ethereal media; then their distinction from heat will lie in the fact that these motions or strains are simply co-ordinated, so that they can be traced and controlled or manipulated in detail, while the thermal energy subsists in irregular motions of the molecules or smallest portions of matter, which we cannot trace on account of the bluntness of our sensual perceptions, but can only measure as regards total amount.

Historical: Abstract Dynamics.—Even in the case of a purely mechanical system, capable only of a finite number of definite types of disturbance, the principle of the conservation of energy is very far from giving a complete account of its motions; it forms only one among the equations that are required to determine their course. In its application to the kinetics of invariable systems, after the time of Newton, the principle was emphasized as fundamental by Leibnitz, was then improved and generalized by the Bernoullis and by Euler, and was ultimately expressed in its widest form by Lagrange. It is recorded by Helmholtz that it was largely his acquaintance in early years with the works of those mathematical physicists of the previous century, who had formulated and generalized the principle as a help towards the theoretical dynamics of complex systems of masses, that started him on the track of extending the principle throughout the whole range of natural phenomena. On the other hand, the ascertained validity of this extension to new types of phenomena, such as those of electrodynamics, now forms a main foundation of our belief in a mechanical basis for these sciences.

In the hands of Lagrange the mathematical expression for the manner in which the energy is connected with the geometrical constitution of the material system became a sufficient basis for a complete knowledge of its dynamical phenomena. So far as statics was concerned, this doctrine took its rise as far back as Galileo, who recognized in the simpler cases that the work expended in the steady driving of a frictionless mechanical system is equal to its output. The expression of this fact was generalized in a brief statement by Newton in the *Principia*, and more in detail by the Bernoullis, until, in the analytical guise of the so-called principle of "virtual velocities" or virtual work, it finally became the basis of Lagrange's general formulation of dynamics. In its application to kinetics a purely physical principle, also indicated by Newton, but developed long after with masterly applications by d'Alembert, that the reactions of the infinitesimal parts of the system against the accelerations of their motions statically equilibrate the forces applied to the system as a whole, was required in order to form a sufficient basis, and one which Lagrange soon afterwards condensed into the single relation of Least Action. As a matter of history, however, the complete formulation of the subject of abstract dynamics actually arose (in 1758) from Lagrange's precise demonstration of the principle of Least Action for a particle, and its immediate extension, on the basis of his new Calculus of Variations, to a system of connected particles such as might be taken as a representation of any material system; but here too the same physical as distinct from mechanical considerations come into play as in d'Alembert's principle. (See DYNAMICS: *Analytical.*)

It is in the cases of systems whose state is changing so slowly that reactions arising from changing motions can be neglected, that the conditions are by far the simplest. In such systems, whether stationary or in a state of steady motion, the energy depends on the configuration alone, and its mathematical expression can be determined from measurement of the work required for a sufficient number of simple transformations; once it is thus found, all the statical relations of the system are implicitly determined along with it, and the results of all other transformations can be predicted. The general development of such relations is conveniently classed as a separate branch of physics under the name *Energetics*, first invented by W. J. M. Rankine; but the essential limitations of this method have not always been observed. As regards statical change, the complete specification of a mechanical system is involved in its geometrical configuration and the function expressing its mechanical energy in terms thereof. Systems which have statical energy-functions of the same analytical form behave in corresponding ways, and can serve as models or representations of one another.

Extension to Thermal and Chemical Systems.—This dominant position of the principle of energy, in ordinary statical problems, has in recent times been extended to transformations involving change of physical state or chemical constitution as well as change of geometrical configuration. In this wider field we cannot assert that mechanical (or available) energy is never lost, for it may be degraded into thermal energy; but we can use the principle that on the other hand it can never spontaneously increase. If this were not so, cyclic processes might theoretically be arranged which would continue to supply mechanical power so long as energy of any kind remained in the system; whereas the irregular and uncontrollable character of the molecular motions and strains which constitute thermal energy, in combination with the vast number of the molecules, must place an effectual bar on their unlimited co-ordination. To establish a doctrine of *energetics* that shall form a sufficient foundation for a theory of the trend of chemical and physical change, we have, therefore, to impart precision to this motion of available energy.

Carnot's Principle: Entropy.—The whole subject is involved in the new principle contributed to theoretical physics by Sadi Carnot in 1824, in which the far-reaching modern conception of cyclic processes was first scientifically developed. It was shown by Carnot, on the basis of certain axioms, whose theoretical foundations were subsequently corrected and strengthened by Clausius and Lord Kelvin, that a reversible mechanical process, working in a cycle by means of thermal transfers, which takes heat, say H_1, into the material system at a given temperature T_1, and delivers the part of it not utilized, say H_2, at a lower given temperature T_2, is more efficient, considered as a working engine, than any other such process, operating between the same two temperatures but not reversible, could be. This relation of inequality involves a definite law of equality, that the mechanical efficiencies of all reversible cyclic processes are the same, whatever be the nature of their operation or the material substances involved in them; that in fact the efficiency is a function solely of the two temperatures at which the cyclically working system takes in and gives out heat. These considerations constitute a fundamental general principle to which all possible slow reversible processes, so far as they concern matter in bulk, must conform in all their stages; its application is almost coextensive with the scope of general physics, the special kinetic theories in which inertia is involved, being excepted. (See THERMODYNAMICS.) If the working system is an ideal gas-engine, in which a perfect gas (known from experience to be a possible state of matter) is passed through the cycle, and if temperature is measured from the absolute zero by the expansion of this gas, then simple direct calculation on the basis of the laws of ideal gases shows that $H_1/T_1=H_2/T_2$; and as by the conservation of energy the work done is H_1-H_2, it follows that the efficiency, measured as the ratio of the work done to the supply of heat, is $1-T_2/T_1$. If we change the sign of H_1 and thus consider heat as positive when it is restored to the system as is H_2, the fundamental equation becomes $H_1/T_1+H_2/T_2=0$; and as any complex reversible working system may be considered as compounded in various ways of chains of elementary systems of this type, *whose effects are additive*, the general proposition follows, that in any reversible complete cyclic change which involves the taking in of heat by the system of which the amount is δH, when its temperature ranges between T_r and $T_r+\delta T$, the equation $\Sigma\delta H_r/T_r-0$ holds good. Moreover, if the changes are not reversible, the proportion of the heat supply that is utilized for mechanical work will be smaller, so that more heat will be restored to the system, and $\Sigma\delta H_r/T_r$ or, as it may be expressed, $\int dH/T$, must have a larger value, and must thus be positive. The first statement involves further, that for all reversible paths of change of the system from one state C to another state D, the value of $\int dH/T$ must be the same, because any one of these paths and any other one reversed would form a cycle; whereas for any irreversible path of change between the same states this integral must have a greater value (and so exceed the difference of entropies at the ends of the path). The definite quantity represented by this integral for a reversible path was introduced by Clausius in 1854 (also adumbrated by Kelvin's investigations about the same time), and was named afterwards by him the increase of the *entropy* of the system in passing from the state C to the state D. This increase, being thus the same for the unlimited number of possible reversible paths involving independent variation of all its finite co-ordinates, along which the system can pass, can depend only on the terminal states. The entropy belonging to a given state is therefore a function of that state alone, irrespective of the manner in which it has been reached; and this is the justification of the assignment to it of a special name, connoting a property of the system depending on its actual condition and not on its previous history. Every reversible change in an isolated system thus maintains the entropy of that system unaltered; no possible spontaneous change can involve decrease of the entropy; while any defect of reversibility, arising from diffusion of matter or motion in the system, necessarily leads to increase of entropy. For a physical or chemical system only those changes are spontaneously possible which would lead to increase of the entropy; if the entropy is already a maximum for the given total energy, and so incapable of further continuous increase under the conditions imposed upon the system, there must be stable equilibrium.

This definite quantity belonging to a material system, its entropy ϕ, is thus concomitant with its energy E, which is also a definite function of its actual state by the law of conservation of energy; these, along with its temperature T, and the various co-ordinates expressing its geometrical configuration and its physical and chemical constitution, are the quantities with which the thermodynamics of the system deals. That branch of science develops the consequences involved in just two principles: (i.) that the energy of every isolated system is constant, and (ii.) that its entropy can never diminish; any complication that may be involved arises from complexity in the systems to which these two laws have to be applied.

The General Thermodynamic Equation.—When any physical or chemical system undergoes an infinitesimal change of state, we have $\delta E=\delta H+\delta U$, where δH is the energy that has been acquired *as heat* from sources extraneous to the system during the change, and δU is the energy that has been imparted by reversible agencies such as mechanical or electric work. It is, however, not usually possible to discriminate permanently between heat acquired and work imparted, for (unless for isothermal transformations) neither δH nor δU is the exact differential of a function of the constitution of the system and so independent of its previous history, although their sum δE is such; but we can utilize the fact that δH is equal to $T\delta\phi$ where $\delta\phi$ is such, as has just been seen. Thus E and ϕ represent properties of the system which, along with temperature, pressure and other independent data specifying its constitution, must form the variables of an analytical exposition. We have, therefore, to substitute $T\delta\phi$ for δH; also the *change* of internal energy is determined by the change of constitution, involving a differential relation of type

$$\delta U = -p\delta v + \delta W + \mu_1\delta m_1 + \mu_2\delta m_2 + \ldots . + \mu_n\delta m_n,$$

when the system consists of an intimate mixture (solution) of masses $m_1, m_2, \ldots m_n$ of given constituents, which differ physically or chemically but may be partially transformable into each other by chemical or physical action during the changes under consideration, the whole being of volume v and under extraneous pressure p, while W is potential energy arising from physical forces such as those of gravity, capillarity, &c. The variables $m_1, m_2, \ldots\ldots m_n$ may not be all independent; for example, if the system were chloride of ammonium gas existing along with its gaseous products of dissociation, hydrochloric acid and ammonia, only one of the three masses would be independently variable. The sufficient number of these variables (independent components) together with two other variables, which may be v and T, or v and ϕ, specifies and determines the state of the system, considered as matter in bulk, at each instant. It is usual to include δW in $\mu_1\delta m_1 + \ldots$; in all cases where this is possible the single equation

$$\delta E = T\delta\phi - p\delta v + \mu_1\delta m_1 + \mu_2\delta m_2 + \ldots . + \mu_n\delta m_n \quad . \quad . \quad . \quad (1)$$

thus expresses the complete variation of the energy-function E arising from change of state; and when the part involving the n constitutive differentials has been expressed in terms of the number of them that are really independent, this equation by itself becomes the unique expression of *all* the thermodynamic relations of the system. These are in fact the various relations ensuring that the right-hand side is an exact differential, and are of the type of reciprocal relations such as $d\mu_r/d\phi = dT/dm_r$.

The condition that the state of the system be one of stable equilibrium is that $\delta\phi$, the variation of entropy, be negative for all formally imaginable infinitesimal transformations which make δE vanish; for as $\delta\phi$ cannot actually be negative for any spontaneous variation, none of these transformations can then occur. From the form of the equation, this condition is the same as that $\delta E - T\delta\phi$ must be positive for *all possible* variations of state of the system as above defined in terms of co-ordinates representing its constitution in bulk, without restriction.

We can change one of the independent variables expressing the state of the system from ϕ to T by subtracting $\delta(\phi T)$ from both sides of the equation of variation: then

$$\delta(E - T\phi) = -\phi\delta T - p\delta v + \mu_1\delta m_1 + \ldots . + \mu_n\delta m_n.$$

It follows that for *isothermal* changes, *i.e.* those for which δT is maintained null by an environment at constant temperature, the condition of stable equilibrium is that the function $E - T\phi$ shall be a minimum. If the system is subject to an external pressure p, which as well as the temperature is imposed constant from without and thus incapable of variation through internal changes, the condition of stable equilibrium is similarly that $E - T\phi + pv$ shall be a minimum.

A chemical system maintained at constant temperature by communication of heat from its environment may thus have several states of stable equilibrium corresponding to different minima of the function here considered, just as there may be several minima of elevation on a landscape, one at the bottom of each depression; in fact, this analogy, when extended to space of n dimensions, exactly fits the case. If the system is sufficiently disturbed, for example, by electric shock, it may pass over (explosively) from a higher to a lower minimum, but never (without compensation from outside) in the opposite direction. The former passage, moreover, is often effected by introducing a new substance into the system; sometimes that substance is recovered unaltered at the end of the process, and then its action is said to be purely *catalytic*; its presence modifies the form of the function $E - T\phi$ so as to obliterate the ridge between the two equilibrium states in the graphical representation.

There are systems in which the equilibrium states are but very slightly dependent on temperature and pressure within wide limits, outside which reaction takes place. Thus while there are cases in which a state of mobile dissociation exists in the system which changes continuously as a function of these variables, there are others in which change does not sensibly occur at all until a certain *temperature of reaction* is attained, after which it proceeds very rapidly owing to the heat developed, and the system soon becomes sensibly permanent in a transformed phase by completion of the reaction. In some cases of this latter type the cause of the delay in starting lies possibly in passive resistance to change, of the nature of viscosity or friction, which is competent to convert an unstable mechanical equilibrium into a moderately stable one; but in most such reactions there seems to be no exact equilibrium at any temperature, short of the ultimate state of dissipated energy in which the reaction is completed, although the velocity of reaction is found to diminish exponentially with change of temperature, and thus becomes insignificant at a small interval from the temperature of pronounced activity.

Free Energy.—The quantity $E - T\phi$ thus plays the same fundamental part in the thermal statics of general chemical systems at uniform temperature that the potential energy plays in the statics of mechanical systems of unchanging constitution. It is a function of the geometrical co-ordinates, the physical and chemical constitution, and the temperature of the system, which determines the conditions of stable equilibrium *at each temperature*; it is, in fact, the potential energy generalized so as to include temperature, and thus be a single function relating to each temperature but at the same time affording a basis of connexion between the properties of the system at different temperatures. It has been called the *free energy* of the system by Helmholtz, for it is the part of the energy whose variation is connected with changes in the bodily structure of the system represented by the variables $m_1, m_2, \ldots m_n$, and not with the irregular molecular motions represented by heat, so that it can take part freely in physical transformations. Yet this holds good only subject to the condition that the temperature is not varied; it has been seen above that for the more general variation neither δH nor δU is an exact differential, and no line of separation can be drawn between thermal and mechanical energies.

The study of the evolution of ideas in this, the most abstract branch of modern mathematical physics, is rendered difficult in the manner of most purely philosophical subjects by the variety of terminology, much of it only partially appropriate, that has been employed to express the fundamental principles by different investigators and at different stages of the development. Attentive examination will show, what is indeed hardly surprising, that the principles of the theory of free energy of Gibbs and Helmholtz had been already grasped and exemplified by Lord Kelvin in the very early days of the subject (see the paper "On the Thermoelastic and Thermomagnetic Properties of Matter, Part I." *Quarterly Journal of Mathematics*, No. 1, April 1855; reprinted in *Phil. Mag.*, January 1878, and in *Math. and Phys. Papers*, vol. i. pp. 291, seq.). Thus the striking new advance contained in the more modern work of J. Willard Gibbs (1875-1877) and of Helmholtz (1882) was rather the sustained general application of these ideas to chemical systems, such as the galvanic cell and dissociating gaseous systems, and in general fashion to heterogeneous concomitant phases. The fundamental paper of Kelvin connecting the electromotive force of the cell with the energy of chemical transformation is of date 1851, some years before the distinction between free energy and total energy had definitely crystallized out; and, possibly satisfied with the approximate exactness of his imperfect formula when applied to a Daniell's cell (*infra*), and deterred by absence of experimental data, he did not return to the subject. In 1852 he briefly announced (*Proc. Roy. Soc. Edin.*) the principle of the dissipation of mechanical (or available) energy, including the necessity of compensation elsewhere when restoration occurs, in the form that "any restoration of mechanical energy, without more than an equivalent of dissipation, is impossible"—probably even in vital activity; but a sufficient specification of available energy (cf. *infra*) was not then developed. In the paper above referred to, where this was done, and illustrated by full application to solid elastic systems, the total energy is represented by e and is named "the intrinsic energy," the energy taken in during an isothermal transformation is represented by e, of which H is taken in as heat, while the remainder, the change of free (or mechanical or available) energy of the system is the unnamed quantity denoted by the symbol w, which is "the work done by the applied forces" at uniform temperature. It is pointed out that it is w and not e that is the potential energy-function for isothermal change, of which the form can be determined directly by dynamical and physical experiment, and from which alone the criteria of equilibrium and stress are to be derived—simply for the reason that for all *reversible* paths at constant temperature between the same terminal configurations, there must, by Carnot's principle, be the same gain or loss of heat. And a system of formulae are given (5) to (11)—*Ex. gr.* $e=w-t\frac{dw}{dt}+\mathrm{J}\int s\,dt$ for finding the total energy e for any temperature t when w and the thermal capacity s of the system, in a standard state, have thus been ascertained, and another for establishing connexion between the form of w for one temperature and its form for adjacent temperatures—which are identical with those developed by Helmholtz long afterwards, in 1882, except that the entropy appears only as an unnamed integral. The progress of physical science is formally identified with the exploration of this function w for physical systems, with continually increasing exactness and range—except where pure kinetic considerations prevail, in which cases the wider Hamiltonian dynamical formulation is fundamental. Another aspect of the matter will be developed below.

A somewhat different procedure, in terms of entropy as fundamental, has been adopted and developed by Planck. In an isolated system the trend of change must be in the direction which increases the entropy ϕ, by Clausius' form of the principle. But in experiment it is a system at constant temperature rather than an adiabatic one that usually is involved; this can be attained formally by including in the isolated system (cf. *infra*) a source of heat at that temperature and of unlimited capacity, when the energy of the original system increases by $\delta\mathrm{E}$ this source must give up heat of amount $\delta\mathrm{E}$, and its entropy therefore diminishes $\delta\mathrm{E}/\mathrm{T}$. Thus for the original system maintained at constant temperature T it is $\delta\phi-\delta\mathrm{E}/\mathrm{T}$ that must always be positive in spontaneous change, which is the same criterion as was reached above. Reference may also be made to H. A. Lorentz's *Collected Scientific Papers*, part i.

A striking anticipation, almost contemporaneous, of Gibbs's thermodynamic potential theory (*infra*) was made by Clerk Maxwell in connexion with the discussion of Andrews's experiments on the critical temperature of mixed gases, in a letter published in Sir G. G. Stokes's *Scientific Correspondence* (vol. ii. p. 34).

Available Energy.—The same quantity ϕ, which Clausius named the entropy, arose in various ways in the early development of the subject, in the train of ideas of Rankine and Kelvin relating to the expression of the *available energy* A of the material system. Suppose there were accessible an auxiliary system containing an *unlimited* quantity of heat at absolute temperature T_0, forming a condenser into which heat can be discharged from the working system, or from which it may be recovered at that temperature: we proceed to find how much of the heat of our system is available for transformation into mechanical work, in a process which reduces the whole system to the temperature of this condenser. Provided the process of reduction is performed reversibly, it is immaterial, by Carnot's principle, in what manner it is effected: thus in following it out in detail we can consider each elementary quantity of heat $\delta\mathrm{H}$ removed from the system as set aside at its actual temperature between T and $\mathrm{T}+\delta\mathrm{T}$ for the production of mechanical work $\delta\mathrm{W}$ and the residue of it $\delta\mathrm{H}_0$ as directly discharged into the condenser at T_0. The principle of Carnot gives $\delta\mathrm{H}/\mathrm{T}=\delta\mathrm{H}_0/\mathrm{T}_0$, so that the portion of the heat $\delta\mathrm{H}$ that is not available for work is $\delta\mathrm{H}_0$, equal to $\mathrm{T}_0\delta\mathrm{H}/\mathrm{T}$. In the whole process the part not available in connexion with the condenser at T_0 is therefore $\mathrm{T}_0\int d\mathrm{H}/\mathrm{T}$. This quantity must be the same whatever reversible process is employed: thus, for example, we may first transform the system reversibly from the state C to the state D, and then from the state D to the final state of uniform temperature T_0. It follows that the value of $\mathrm{T}_0\int d\mathrm{H}/\mathrm{T}$, representing the heat degraded, is the same along all reversible paths of transformation from the state C to the state D; so that the function $\int d\mathrm{H}/\mathrm{T}$ is the excess of a definite quantity ϕ connected with the system in the former state as compared with the latter.

It is usual to change the law of sign of $\delta\mathrm{H}$ so that gain of heat by the system is reckoned positive; then, relative to a condenser of unlimited capacity at T_0, the state C contains more mechanically *available energy* than the state D by the amount $\mathrm{E}_\mathrm{C}-\mathrm{E}_\mathrm{D}+\mathrm{T}_0\int d\mathrm{H}/\mathrm{T}$, that is, by $\mathrm{E}_\mathrm{C}-\mathrm{E}_\mathrm{D}-\mathrm{T}_0(\phi_\mathrm{C}-\phi_\mathrm{D})$. In this way the existence of an entropy function with a definite value for each state of the system is again seen to be the direct analytical equivalent of Carnot's axiom that no process can be more efficient than a reversible process between the same initial and final states. The name *motivity* of a system was proposed by Lord Kelvin in 1879 for this conception of available energy. It is here specified as relative to a condenser of unlimited capacity at an assigned temperature T_0: some such specification is necessary to the definition; in fact, if T_0 were the absolute zero, all the energy would be mechanically available.

But we can obtain an intrinsically different and self-contained comparison of the available energies in a system in two different states at different temperatures, by ascertaining how much energy would be dissipated in each in a reduction to the *same* standard state of the system itself, at a standard temperature T_0. We have only to reverse the operation, and change back this standard state to each of the others in turn. This will involve abstractions of heat $\delta\mathrm{H}_0$ from the various portions of the system in the standard state, and returns of $\delta\mathrm{H}$ to the state at T_0; if this return were $\delta\mathrm{H}_0\mathrm{T}/\mathrm{T}_0$ instead of $\delta\mathrm{H}$, there would be no loss of availability in the direct process; hence there is actual dissipation $\delta\mathrm{H}-\delta\mathrm{H}_0\mathrm{T}/\mathrm{T}_0$, that is $\mathrm{T}\,(\delta\phi-\delta\phi_0)$. On passing from state 1 to state 2 through this standard state 0 the difference of these dissipations will represent the energy of the system that has become unavailable. Thus in this sense $\mathrm{E}-\mathrm{T}\phi+\mathrm{T}\phi_0+\text{const.}$ represents for each state the amount of energy that is available; but instead of implying an unlimited source of heat at the standard temperature T_0, it implies that there is no extraneous source. The available energy thus defined differs from $\mathrm{E}-\mathrm{T}\phi$, the *free energy* of Helmholtz, or the *work function of the applied forces* of Kelvin, which involves no reference to any standard state, by a simple linear function of the temperature alone which is immaterial as regards its applications.

The determination of the available mechanical energy arising from differences of temperature between the parts of the same system is a more complex problem, because it involves a determination of the common temperature to which reversible processes will ultimately reduce them; for the simple case in which no changes of state occur the solution was given by Lord Kelvin in 1853, in connexion with the above train of ideas (cf. Tait's *Thermodynamics*, §179). In the present exposition the system is sensibly in equilibrium at each stage, so that its temperature T is always uniform throughout; isolated portions at different temperatures would be treated as different systems.

Thermodynamic Potentials.—We have now to develop the relations involved in the general equation (1) of thermodynamics. Suppose the material system includes two coexistent states or phases, with opportunity for free interchange of constituents—for example, a salt solution and the aqueous vapour in equilibrium with it. Then in equilibrium a slight transfer δm of the water-substance of mass m_r constituting the vapour, into the water-substance of mass m_s existing in the solution, should not produce any alteration of the first order in $\delta\mathrm{E}-\mathrm{T}\delta\phi$; therefore μ_r must be equal to μ_s. The quantity μ_r is called by Willard Gibbs the potential of the corresponding substance of mass m_r; it may be defined as its marginal available energy per unit mass at the given temperature. If then a system involves in this way coexistent phases which remain permanently separate, the potentials of any constituent must be the same in all of them in which that constituent exists, for otherwise it would tend to pass from the phases in which its potential is higher to those in which it is lower. If the constituent is non-existent in any phase, its potential when in that phase would have to be higher than in the others in which it is actually present; but as the potential increases logarithmically when the density of the constituent is indefinitely diminished, this condition is automatically satisfied —or, more strictly, the constitutent cannot be entirely absent, but the presence of the merest trace will suffice to satisfy the condition of equality of potential. When the action of the force of gravity is taken into account, the potential of each constituent must include the gravitational potential gh; in the equilibrium state the total potential of each constituent, including this part, must be the same throughout all parts of the system into which it is freely mobile. An example is Dalton's law of the independent distributions of the gases in the atmosphere, if it were in a state of rest. A similar statement applies to other forms of mechanical potential energy arising from actions at a distance.

When a slight constitutive change occurs in a galvanic element at given temperature, producing available energy of electric current, in a reversible manner and isothermally, at the expense of chemical energy, it is the free energy of the system $\text{E}-\text{T}\phi$, not its total intrinsic energy, whose value must be conserved during the process. Thus the electromotive force is equal to the change of this free energy per electrochemical equivalent of reaction in the cell. This proposition, developed by Gibbs and later by Helmholtz, modifies the earlier one of Kelvin—which tacitly assumed all the energy of reaction to be available—except in the cases such as that of a Daniell's cell, in which the magnitude of the electromotive force does not depend sensibly on the temperature.

The effects produced on electromotive forces by difference of concentrations in dilute solutions can thus be accounted for and traced out, from the knowledge of the form of the free energy for such cases; as also the effects of pressure in the case of gas batteries. The free energy does not sensibly depend on whether the substance is solid or fused—for the two states are in equilibrium at the temperature of fusion—though the total energy differs in these two cases by the heat of fusion; for this reason, as Gibbs pointed out, voltaic potential-differences are the same for the fused as for the solid state of the substances concerned.

Relations involving Constitution only.—The potential of a component in a given solution can depend only on the temperature and pressure of the solution, and the densities of the various components, including itself; as no distance-actions are usually involved in chemical physics, it will not depend on the aggregate masses present. The example above mentioned, of two coexistent phases liquid and vapour, indicates that there may thus be relations between the constitutions of the phases present in a chemical system which do not involve their total masses. These are developed in a very direct manner in Willard Gibbs's original procedure. In so far as attractions at a distance (a uniform force such as gravity being excepted) and capillary actions at the interfaces between the phases are inoperative, the fundamental equation (1) can be integrated. Increasing the volume k times, and all the masses to the same extent—in fact, placing alongside each other k identical systems at the same temperature and pressure—will increase ϕ and E in the same ratio k; thus E must be a homogeneous function of the first degree of the independent variables ϕ, v, m_1, . . ., m_n, and therefore by Euler's theorem relating to such functions

$$\text{E}=\text{T}\phi-pv+\mu_1 m_1+\ldots\ldots+\mu_n m_n.$$

This integral equation merely expresses the additive character of the energies and entropies of adjacent portions of the system at uniform temperature, and thus depends only on the absence of sensible physical action directly across finite distances. If we form from it the expression for the complete differential δE, and subtract (1), there remains the relation

$$0=\phi\delta\text{T}-v\delta p+m_1\delta\mu_1+\ldots\ldots+m_n\delta\mu_n. \quad (2)$$

This implies that in each phase the change of pressure depends on and is determined by the changes in T, μ_1, . . . μ_n alone; as we know beforehand that a physical property like pressure is an analytical function of the state of the system, it is therefore a function of these $n+1$ quantities. When they are all independently variable, the densities of the various constituents and of the entropy in the phase are expressed by the partial fluxions of p with respect to them: thus

$$\frac{\phi}{v}=\frac{dp}{d\text{T}}, \quad \frac{m_r}{v}=\frac{dp}{d\mu_r}.$$

But when, as in the case above referred to of chloride of ammonium gas existing partially dissociated along with its constituents, the masses are not independent, necessary linear relations, furnished by the laws of definite combining proportions, subsist between the partial fluxions, and the form of the function which expresses p is thus restricted, in a manner which is easily expressible in each special case.

This proposition that the pressure in any phase is a function of the temperature and of the potentials of the independent constituents, thus appears as a consequence of Carnot's axiom combined with the energy principle and the absence of effective actions at a distance. It shows that at a given temperature and pressure the potentials are not all independent, that there is a necessary relation connecting them. This is the *equation of state* or constitution of the phase, whose existence forms one mode of expression of Carnot's principle, and in which all the properties of the phase are involved and can thence be derived by simple differentiation.

The Phase Rule.—When the material system contains only a single phase, the number of independent variations, in addition to change of temperature and pressure, that can spontaneously occur in its constitution is thus one less than the number of its independent constituents. But where several phases coexist in contact in the same system, the number of possible independent variations may be much smaller. The present independent variables μ_1, . . ., μ_n are specially appropriate in this problem, because each of them has the same value in all the phases. Now each phase has its own characteristic equation, giving a relation between δp, δT, and $\delta\mu_1$, . . . $\delta\mu_n$, or such of the latter as are independent; if r phases coexist, there are r such relations; hence the number of possible independent variations, including those of v and T, is reduced to $m-r+2$, where m is the number of independently variable chemical constituents which the system contains. This number of degrees of constitutive freedom cannot be negative; therefore the number of possible phases that can coexist alongside each other cannot exceed $m+2$. If $m+2$ phases actually coexist, there is no variable quantity in the system, thus the temperature and pressure and constitutions of the phases are all determined; such is the triple point at which ice, water and vapour exist in presence of each other. If there are $m+1$ coexistent phases, the system can vary in one respect only; for example, at any temperature of water-substance different from the triple point two phases only, say liquid and vapour, or liquid and solid, coexist, and the pressure is definite, as also are the densities and potentials of the components. Finally, when but one phase, say water, is present, both pressure and temperature can vary independently. The first example illustrates the case of systems, physical or chemical, in which there is only one possible state of equilibrium, forming a point of transition between different constitutions; in the second type each temperature has its own completely determined state of equilibrium; in other cases the constitution in the equilibrium state is indeterminate as regards the corresponding number of degrees of freedom. By aid of this phase rule of Gibbs the number of different chemical substances actually interacting in a given complex system can be determined from observation of the degree of spontaneous variation which it exhibits; the rule thus lies at the foundation of the modern subject of chemical equilibrium and continuous chemical change in mixtures or alloys, and in this connexion it has been widely applied and developed in the experimental investigations of Roozeboom and van 't Hoff and other physical chemists, mainly of the Dutch school.

Extent to which the Theory can be practically developed.—It is only in systems in which the number of independent variables is small that the forms of the various potentials,—or the form of the fundamental characteristic equation expressing the energy of the system in terms of its entropy and constitution, or the pressure in terms of the temperature and the potentials, which includes them all,—can be readily approximated to by experimental determinations. Even in the case of the simple system water-vapour, which is fundamental for the theory of the steam-engine, this has not yet been completely accomplished. The general theory is thus largely confined, as above, to defining the restrictions on the degree of variability of a complex chemical system which the principle of Carnot imposes. The tracing out of these general relations of continuity of state is much facilitated by geometrical diagrams, such as James Thomson first introduced in order to exhibit and explain Andrews' results as to the range of coexistent phases in carbonic acid. Gibbs's earliest thermodynamic surface had for its co-ordinates volume, entropy and energy; it was constructed to scale by Maxwell for water-substance, and is fully explained in later editions of the *Theory of Heat* (1875); it forms a relief map which, by simple inspection, reveals the course of the transformations of water, with the corresponding mechanical and thermal changes, in its three coexistent states of solid, liquid and gas. In the general case, when the substance has more than one independently variable constituent, there are more than three variables to be represented; but Gibbs has shown the utility of surfaces representing, for instance, the entropy in terms of the constitutive variables when temperature and pressure are maintained constant. Such graphical methods are now of fundamental importance in connexion with the phase rule, for the experimental exploration of the trend of the changes of constitution of complex mixtures with interacting components, which arise as the physical conditions are altered, as, for example in modern metallurgy, in the theory of alloys. The study of the phenomena of condensation in a mixture of two gases or vapours, initiated by Andrews and developed in this manner by van der Waals and his pupils, forms a case in point (see CONDENSATION OF GASES).

Dilute Components: Perfect Gases and Dilute Solutions.—There are, however, two simple limiting cases, in which the theory can be completed by a determination of the functions involved in it, which throw much light on the phenomena of actual systems not far removed trom these ideal limits. They are the cases of mixtures of perfect gases, and of very dilute solutions.

If, following Gibbs, we apply his equation (2) expressing the pressure in terms of the temperature and the potentials, to a very dilute solution of substances $m_2, m_3, \dots m_n$ in a solvent substance m_1, and vary the co-ordinate m_r alone, p and T remaining unvaried, we have in the equilibrium state

$$m_r\frac{d\mu_r}{dm_r}+m_1\frac{d\mu_1}{dm_r}+\dots+m_n\frac{d\mu_n}{dm_r}=0,$$

in which every m except m_1 is very small, while $d\mu_1/dm_r$ is presumably finite. As the second term is thus finite, this requires that the total potential of each component m_r, which is $m_r d\mu_r/dm_r$, shall be finite, say k_r, in the limit when m_r is null. Thus for very small concentrations the potential μ_r of a dilute component must be of the form $k_r \log m_r/v$, being proportional to the logarithm of the density of that component; it thus tends logarithmically to an infinite value at evanescent concentrations, showing that removal of the last traces of any impurity would demand infinite proportionate expenditure of available energy, and is therefore practically impossible with finite intensities of force. It should be noted, however, that this argument applies only to fluid phrases, for in the case of deposition of a solid m_r is not uniformly distributed throughout the phase; thus it remains possible for the growth of a crystal at its surface in aqueous solution to extrude all the water except such as is in some form of chemical combination.

The precise value of this logarithmic expression for the potential can be readily determined for the case of a perfect gas from its characteristic properties, and can be thence extended to other dilute forms of matter. We have $pv=\mathrm{R}/m.\mathrm{T}$ for unit mass of the gas, where m is the molecular weight, being 2 for hydrogen, and R is a constant equal to 82×10^6 in C.G.S. dynamical units, or 2 calories approximately in thermal energy units, which is the same for all gases because they have all the same number of molecules per unit volume. The increment of heat received by the unit mass of the gas is $\delta\mathrm{H}=p\delta v+\kappa\delta\mathrm{T}$, κ being thus the specific heat at constant volume, which can be a function only of the temperature. Thus

$$\phi=\int d\mathrm{H}/\mathrm{T}=\mathrm{R}/m.\log v+\int\kappa\mathrm{T}^{-1}d\mathrm{T};$$

and the available energy A per unit mass is $\mathrm{E}-\mathrm{T}\phi+\mathrm{T}\phi_0$ where $\mathrm{E}=\epsilon+\int\kappa d\mathrm{T}$, the integral being for a standard state, and ϵ being intrinsic energy of chemical constitution; so that

$$\mathrm{A}=\epsilon+\phi_0\mathrm{T}+\int\kappa d\mathrm{T}-\mathrm{T}\int\kappa\mathrm{T}^{-1}d\mathrm{T}-\mathrm{R}/m.\mathrm{T}\log v.$$

If there are ν molecules in the unit mass, and N per unit volume, we have $m\nu=\mathrm{N}mv$, each being $2\nu'$, where ν' is the number of molecules per unit mass in hydrogen; thus the free energy per molecule is $a'+\mathrm{R}'\mathrm{T}\log b\mathrm{N}$, where $b=m/2\nu'$, $\mathrm{R}'=\mathrm{R}/2\nu'$, and a' is a function of T alone. It is customary to avoid introducing the unknown molecular constant ν' by working with the available energy per "gramme-molecule," that is, for a number of grammes expressed by the molecular weight of the substance; this is a constant multiple of the available energy per molecule, and is $a+\mathrm{RT}\log\rho$, ρ being the density equal to $b\mathrm{N}$ where $b=m/2\nu'$. This formula may now be extended by simple summation to a mixture of gases, on the ground of Dalton's experimental principle that each of the components behaves in presence of the others as it would do in a vacuum. The components are, in fact, actually separable wholly or partially in reversible ways which may be combined into cycles, for example, either (i.) by diffusion through a porous partition, taking account of the work of the pressures, or (ii.) by utilizing the modified constitution towards the top of a long column of the mixture arising from the action of gravity, or (iii.) by reversible absorption of a single component.

If we employ in place of available energy the form of characteristic equation which gives the pressure in terms of the temperature and potentials, the pressure of the mixture is expressed as the sum of those belonging to its components: this equation was made by Gibbs the basis of his analytical theory of gas mixtures, which he tested by its application to the only data then available, those of the equilibrium of dissociation of nitrogen peroxide ($2\mathrm{NO}_2 \rightleftarrows \mathrm{N}_2\mathrm{O}_4$) vapour.

Van 't Hoff's Osmotic Principle: Theoretical Explanation.—We proceed to examine how far the same formulae as hold for gases apply to the available energy of matter in solution which is so dilute that each molecule of the dissolved substance, though possibly the centre of a complex of molecules of the solvent, is for nearly all the time beyond the sphere of direct influence of the other molecules of the dissolved substance. The available energy is a function only of the co-ordinates of the matter in bulk and the temperature; its change on further dilution, with which alone we are concerned in the transformations of dilute solutions, can depend only on the further separation of these molecular complexes in space that is thereby produced, as no one of them is in itself altered. The change is therefore a function only of the number N of the dissolved molecules per unit volume, and of the temperature, and is, per molecule, expressible in a form entirely independent of their constitution and of that of the medium in which they are dissolved. This suggests that the expression for the change on dilution is the same as the known one for a gas, in which the same molecules would exist free and in the main outside each other's spheres of influence; which confirms and is verified by the experimental principle of van 't Hoff, that osmotic pressure obeys the laws of gaseous pressure with identically the same physical constants as those of gases. It can be held, in fact, that this suggestion does not fall short of a demonstration, on the basis of Carnot's principle, and independent of special molecular theory, that in all cases where the molecules of a component, whether it be of a gas or of a solution, are outside each other's spheres of influence, the available energy, so far as regards dilution, must have a common form, and the physical constants must therefore be the known gas-constants. The customary exposition derives this principle, by an argument involving cycles, from Henry's law of solution of gases; it is sensibly restricted to such solutes as appear concomitantly in the free gaseous state, but theoretically it becomes general when it is remembered that no solute can be absolutely non-volatile.

Source of the Idea of Temperature.—The single new element that thermodynamics introduces into the ordinary dynamical specification of a material system is temperature. This conception is akin to that of potential, except that it is given to us directly by our sense of heat. But if that were not so, we could still demonstrate, on the basis of Carnot's principle, that there is a definite function of the state of a body which must be the same for all of a series of connected bodies, when thermal equilibrium has become established so that there is no tendency for heat to flow from one to another. For we can by mere geometrical displacement change the order of the bodies so as to bring different ones into direct contact. If this disturbed the thermal equilibrium, we could construct cyclic processes to take advantage of the resulting flow of heat to do mechanical work, and such processes might be carried on without limit. Thus it is proved that if a body A is in temperature-equilibrium with B, and B with C, then A must be in equilibrium with C directly. This argument can be applied, by aid of adiabatic partitions, even when the bodies are in a field of force so that mechanical work is required to change their geometrical arrangement; it was in fact employed by Maxwell to extend from the case of a gas to that of any other system the proposition that the temperature is the same all along a vertical column in equilibrium under gravity.

It had been shown from the kinetic theory by Maxwell that in a gas-column the mean kinetic energy of the molecules is the same at all heights. If the only test of equality of temperature consisted in bringing the bodies into contact, this would be rather a proof that thermal temperature is of the same physical nature in all parts of the field of force; but temperature can also be equalized across a distance by radiation, so that this law for gases is itself already necessitated by Carnot's general principle, and merely confirmed or verified by the special gas-theory. But without introducing into the argument the existence of radiation, the uniformity of temperature throughout all phases in equilibrium is necessitated by the doctrine of energetics alone, as otherwise, for example, the raising of a quantity of gas to the top of the gravitational column in an adiabatic enclosure together with the lowering of an equal mass to the bottom would be a source of power, capable of unlimited repetition.

Laws of Chemical Equilibrium based on Available Energy.—The complete theory of chemical and physical equilibrium in gaseous mixtures and in very dilute solutions may readily be developed in terms of available energy (cf. *Phil. Trans.*, 1897, A, pp. 266-280), which forms perhaps the most vivid and most direct procedure. The available energy per molecule of any kind, in a mixture of perfect gases in which there are N molecules of that kind per unit volume, has been found to be $a'+\mathrm{R'T}\log b\mathrm{N}$ where R′ is the universal physical constant connected with R above. This expression represents the marginal increase of available energy due to the introduction of one more molecule of that kind into the system as actually constituted. The same formula also applies, by what has already been stated, to substances in dilute solution in any given solvent. In any isolated system in a mobile state of reaction or of internal dissociation, the condition of chemical equilibrium is that the available energy at constant temperature is a minimum, therefore that it is stationary, and slight change arising from fresh reaction would not sensibly alter it. Suppose that this reaction, per molecule affected by it, is equivalent to introducing n_1 molecules of type N_1, n_2 of type N_2, &c., into the system, $n_1, n_2, \ldots$ being the numbers of molecules of the different types that take part in the reaction, as shown by its chemical equation, reckoned positive when they appear, negative when they disappear. Then in the state of equilibrium

$$n_1(a'_1+\mathrm{R'T}\log b_1\mathrm{N}_1)+n_2(a'_2+\mathrm{R'T}\log b_2\mathrm{N}_2)+\ldots,$$

must vanish. Therefore $\mathrm{N}_1{}^{n_1}\mathrm{N}_2{}^{n_2}\ldots$ must be equal to K, a function of the temperature alone. This law, originally based by Guldberg and Waage on direct statistics of molecular interaction, expresses for each temperature the relation connecting the densities of the interacting substances, in dilution comparable as regards density with the perfect gaseous state, when the reaction has come to the state of mobile equilibrium.

All properties of any system, including the heat of reaction, are expressible in terms of its available energy A, equal to $\mathrm{E}-\mathrm{T}\phi+\phi_0\mathrm{T}$. Thus as the constitution of the system changes with the temperature, we have

$$\frac{d\mathrm{A}}{d\mathrm{T}}=\frac{d\mathrm{E}}{d\mathrm{T}}-\mathrm{T}\frac{d\phi}{d\mathrm{T}}-(\phi-\phi_0)$$

where

$$\delta\mathrm{E}=\delta\mathrm{H}+\delta\mathrm{W},\ \delta\mathrm{H}=\mathrm{T}\delta\phi,$$

$\delta\mathrm{H}$ being heat and $\delta\mathrm{W}$ mechanical and chemical energy imparted to the system at constant temperature; hence

$$\frac{d(\mathrm{A}-\mathrm{W})}{d\mathrm{T}}=-(\phi-\phi_0),\ \text{so that}\ \mathrm{A}=\mathrm{E}+\mathrm{T}\frac{d(\mathrm{A}-\mathrm{W})}{d\mathrm{T}},$$

which is equivalent to

$$\mathrm{E}-\mathrm{W}=-\mathrm{T}^2\frac{d}{d\mathrm{T}}\left(\frac{\mathrm{A}-\mathrm{W}}{\mathrm{T}}\right).$$

This general formula, applied differentially, expresses the heat $\delta\mathrm{E}-\delta\mathrm{W}$ absorbed by a reaction in terms of $\delta\mathrm{A}$, the change produced by it in the available energy of the system, and of $\delta\mathrm{W}$, the mechanical and electrical work done on the system during its progress.

In the problem of reaction in gaseous systems or in very dilute solution, the change of available energy per molecule of reaction has just been found to be

$$\delta\mathrm{A}=\delta\mathrm{A}_0+\mathrm{R'T}\log\mathrm{K'},\ \text{where}\ \mathrm{K'}=b_1{}^{n_1}b_2{}^{n_2}\ldots\mathrm{K};$$

thus, when the reaction is spontaneous without requiring external work, the heat absorbed per molecule of reaction is

$$-\mathrm{T}^2\frac{d}{d\mathrm{T}}\frac{\delta\mathrm{A}_0}{\mathrm{T}},\ \text{or}\ -\mathrm{R'T}^2\frac{d}{d\mathrm{T}}\log\mathrm{K}.$$

This formula has been utilized by van 't Hoff to determine, in terms of the heat of reaction, the displacement of equilibrium in various systems arising from change of temperature; for K, equal to $\mathrm{N}_1{}^{n_1}\mathrm{N}_2{}^{n_2}\ldots$, is the reaction-parameter through which alone the temperature affects the law of chemical equilibrium in dilute systems.

Interfacial Phenomena: Liquid Films.—The characteristic equation hitherto developed refers to the state of an element of mass in the interior of a homogeneous substance: it does not apply to matter in the neighbourhood of the transition between two adjacent phases. A remarkable analysis has been developed by J. W. Gibbs in which the present methods concerning matter in bulk are extended to the phenomena at such an interface, without the introduction of any molecular theory; it forms the thermodynamic completion of Gauss's mechanical theory of capillarity, based on the early form of the principle of total energy. The validity of the fundamental doctrine of available energy, so far as regards all mechanical actions in bulk such as surface tensions, is postulated, even when applied to interfacial layers so thin as to be beyond our means of measurement; the argument from perpetual motions being available here also, as soon as we have experimentally ascertained that the said tensions are definite physical properties of the state of the interface and not merely accidental phenomena. The procedure will then consist in assuming a definite excess of energy, of entropy, and of the masses of the various components, each per unit surface, at the interface, the potential of each component being of necessity, in equilibrium, the same as it is in the adjacent masses. The interfacial transition layer thus provides in a sense a new surface-phase coexistent with those on each side of it, and having its own characteristic equation. It is only the extent of the interface and not its curvatures that need enter into this relation, because any slight influence of the latter can be eliminated from the equation by slightly displacing the position of the surface which is taken to represent the interface geometrically. By an argument similar to one given above, it is shown that one of the forms of the characteristic equation is a relation expressing the surface tension as a function of the temperature and the potentials of the various components present on the two sides of the interface; and from the differentiation of this the surface densities of the superficial distributions of these components (as above defined) can be obtained. The conditions that a specified new phase may become developed when two other given ones are brought into contact, *i.e.* that a chemical reaction may start at the interface, are thence formally expressed in terms of the surface tensions of the three transition layers and the pressures in the three phases. In the case of a thin soap-film, sudden extension of any part reduces the interfacial density of each component at each surface of the film, and so alters the surface tension, which requires time to recover by the very slow diffusion of dissolved material from other parts of the thin film; the system being stable, this change must be an increase of tension, and constitutes a species of elasticity in the film. Thus in a vertical film the surface tension must be greater in the higher parts, as they have to sustain the weight of the lower parts; the upper parts, in fact, stretch until the superficial densities of the components there situated are reduced to the amounts that correspond to the tension required for this purpose. Such a film could not therefore consist of pure water. But there is a limit to these processes: if the film becomes so thin that there is no water in bulk between its surfaces, the tensions cannot adjust themselves in this slow way by migration of components from one part of the film to another; if the film can survive at all after it has become of molecular thickness, it must be as a definite molecular structure all across its thickness. Of such type are the black spots that break out in soap-films (suggested by Gibbs and proved by the measures of Reinold and Rücker): the spots increase in size because their tension is less than that of the surrounding film, but their indefinite increase is presumably stopped in practice by some clogging or viscous agency at their boundary.

Transition to Molecular Theory.—The subject of energetics, based on the doctrine of available energy, deals with matter in bulk and is not concerned with its molecular constitution, which it is expressly designed to eliminate from the problem. This analysis of the phenomena of surface tension shows how far the principle of negation of perpetual motions can carry us, into regions which at first sight might be classed as molecular. But, as in other cases, it is limited to pointing out the general scheme of relations within which the phenomena can have their play. There is now a considerable body of knowledge correlating surface tension with chemical constitution, especially to a certain extent with the numerical density of the distribution of molecules; thus R. Eötvös has shown that a law of proportionality exists for wide classes of substances between the temperature-gradient of the surface tension and the density of the molecules over the surface layer, which varies as the two-thirds power of the number per unit volume (see CHEMISTRY: *Physical*). This takes us into the sphere of molecular science, where at present we have only such indications largely derived from experiment, if we except the mere notion of inter-atomic forces of unknown character on which the older theories of capillarity, those of Laplace and Poisson, were constructed.

In other topics the same restrictions on the scope of the simple statical theory of energy appear. From the ascertained behaviour in certain respects of gaseous media we are able to construct their characteristic equation, and correlate their remaining relations by means of its consequences. Part of the experimental knowledge required for this purpose is the values of the gas-constants, which prove to be the same for all nearly perfect gases. The doctrine of energetics by itself can give no clue as to why this should be so; it can only construct a scheme for each simple or complex medium on the basis of its own experimentally determined characteristic equation. The explanation of uniformities in the intrinsic constitutions of various media belongs to molecular theory, which is a distinct and in the main more complex and more speculative department of knowledge. When we proceed further and find, with van 't Hoff, that these same universal gas-constants reappear in the relations of very dilute solutions, our demand for an explanation such as can only be provided by molecular theory (as *supra*) is intensely stimulated. But except in respects such as these the doctrine of energetics gives a complete synthesis of the course and relations of the chemical reactions of matter in bulk, from which we can eliminate atomism altogether by restating the merely numerical atomic theory of Dalton as a principle of equivalent combining proportions. Of recent years there has been a considerable school of chemists who insist on this procedure as a purification of their science from the hypothetical ideas as to atoms and molecules, in terms of which its experimental facts have come to be expressed. A complete system of doctrine can be developed in this manner, but its scope will be limited. It makes use of one principle of correlation, the doctrine of available energy, and discards another such principle, the atomic theory. Nor can it be said that the one principle is really more certain and definite than the other. This may be illustrated by what has sometimes by German writers been called Gibbs's paradox: the energy that is available for mechanical effect in the inter-diffusion of given volumes of two gases depends only on these volumes and their pressures, and is independent of what the gases are; if the gases differed only infinitesimally in constitution it would still be the same, and the question arises where we are to stop, for we cannot suppose the inter-diffusion of two identical gases to be a source of power. This then looks like a real failure, or rather limitation, of the principle; and there are other such, that can only be satisfactorily explained by aid of the complementary doctrine of molecular theory. That theory, in fact, shows that the more nearly identical the gases are, the slower will be the process of inter-diffusion, so that the mechanical energy will indeed be available, but only after a time that becomes indefinitely prolonged. It is a case in which the simple doctrine of energetics becomes inadequate before the limit is reached. The phenomena of highly rarefied gases provide other cases. And in fact the only reason hitherto thought of for the invariable tendency of available energy to diminish, is that it represents the general principle that in the kinetic play of a vast assemblage of independent molecules individually beyond our control, the normal tendency is for the regularities to diminish and the motions to become less correlated: short of some such reason, it is an unexplained empirical principle. In the special departments of dynamical physics on the other hand, the molecular theory, there dynamical and therefore much more difficult and less definite, is an indispensable part of the framework of science; and even experimental chemistry now leans more and more on new physical methods and instruments. Without molecular theory the clue which has developed into spectrum analysis, bringing with it stellar chemistry and a new physical astronomy, would not have been available; nor would the laws of diffusion and conduction in gases have attained more than an empirical form; nor would it have been possible to weave the phenomena of electrodynamics and radiation into an entirely rational theory.

The doctrine of available energy, as the expression of thermodynamic theory, is directly implied in Carnot's *Essai* of 1824, and constitutes, in fact, its main theme; it took a fresh start, in the light of fuller experimental knowledge regarding the nature of heat, in the early memoirs of Rankine and Lord Kelvin, which may be found in their Collected Scientific Papers; a subsequent exposition occurs in Maxwell's *Theory of Heat*; its most familiar form of statement is Lord Kelvin's principle of the dissipation of available energy. Its principles were very early applied by James Thomson to a physico-chemical problem, that of the influence of stress on the growth of crystals in their mother liquor. The "thermodynamic function" introduced by Rankine into its development is the same as the "entropy" of the material system, independently defined by Clausius about the same time. Clausius's form of the principle, that in an adiabatic system the entropy tends continually to increase, has been placed by Professor Willard Gibbs, of Yale University, at the foundation of his magnificent but complex and difficult development of the theory. His monumental memoir "On the Equilibrium of Heterogeneous Substances," first published in *Trans. Connecticut Academy* (1876–1878), made a clean sweep of the subject; and workers in the modern experimental science of physical chemistry have returned to it again and again to find their empirical principles forecasted in the light of pure theory, and to derive fresh inspiration for new departures. As specially preparatory to Gibbs's general discussion may be mentioned Lord Rayleigh's memoir on the thermodynamics of gaseous diffusion (*Phil. Mag.*, 1876), which was expounded by Maxwell in the 9th edition of the *Ency. Brit.* (art. DIFFUSION). The fundamental importance of the doctrine of dissipation of energy for the theory of chemical reaction had already been insisted on in general terms by Rayleigh; subsequent to, but independently of, Gibbs's work it had been elaborated by von Helmholtz (*Gesamm. Abhandl.* ii. and iii.) in connexion with the thermodynamics of voltaic cells, and more particularly in the calculation of the free or available energy of solutions from data of vapour-pressure, with a view to the application to the theory of concentration cells, therein also coming close to the doctrine of osmotic pressure. This form of the general theory has here been traced back substantially to Lord Kelvin under date 1855. Expositions and developments on various lines will be found in papers by Riecke and by Planck in

Annalen der Physik between 1890 and 1900, in the course of a memoir by Larmor, *Phil. Trans.*, 1897, A, in Voigt's *Compendium der Physik* and his more recent *Thermodynamik*, in Planck's *Vorlesungen über Thermodynamik*, in Duhem's elaborate *Traité de mécanique chimique* and *Le Potential thermodynamique*, in Whetham's *Theory of Solution* and in Bryan's *Thermodynamics*. Numerous applications to special problems are expounded in van 't Hoff's *Lectures on Theoretical and Physical Chemistry*.

The theory of energetics, which puts a diminishing limit on the amount of energy available for mechanical purposes, is closely implicated in the discovery of natural radioactive substances by H. Becquerel, and their isolation in the very potent form of radium salts by M. and Mme Curie. The slow degradation of radium has been found by the latter to be concomitant with an evolution of heat, in amount enormous compared with other chemical changes. This heat has been shown by E. Rutherford to be about what must be due to the stoppage of the α and β particles, which are emitted from the substance with velocities almost of the same scale as that of light. If they struck an ideal rigid target, their lost kinetic energy must all be sent away as radiation; but when they become entangled among the molecules of actual matter, it will, to a large extent, be shared among them as heat, with availability reduced accordingly. In any case the particles that escape into the surrounding space are so few and their velocity so uniform that we can, to some extent, treat their energy as directly available mechanically, in contradistinction to the energy of individual molecules of a gas (cf. Maxwell's "demons"), *e.g.* for driving a vane, as in Crookes's experiment with the cathode rays. Indeed, on account of the high velocity of projection of the particles from a radium salt, the actions concerned would find their equilibrium at such enormously high temperatures that any influence of actually available differences of temperature is not sensibly a feature of the phenomena. Such actions, however, like explosive actions in general, are beyond our powers of actual *direct* measurement as regards the degradation of availability of the energy. It has been pointed out by Rutherford, R. J. Strutt and others, that the energy of degradation of even a very minute admixture of *active* radium would entirely dominate and mask all other cosmical modes of transformation of energy; for example, it far outweighs that arising from the exhaustion of gravitational energy, which has been shown by Helmholtz and Kelvin to be an ample source for all the activities of our cosmical system, and to be itself far greater than the energy of any ordinary chemical rearrangements consequent on a fall of temperature: a circumstance that makes the existence and properties of this substance under settled cosmic conditions still more anomalous (see RADIOACTIVITY). Theoretically it is possible to obtain unlimited concentration of availability of energy at the expense of an equivalent amount of degradation spread over a wider field; the potency of electric furnaces, which have recently opened up a new department of chemistry, and are limited only by the refractoriness of the materials of which they are constituted, forms a case in point. In radium we have the very remarkable phenomenon of far higher concentration occurring naturally in very minute permanent amounts, so that merely chemical sifting is needed to produce its aggregation. Even in pitchblende only one molecule in 10^9 seems to be of radium, renewable, however, when lost, by internal transformation.

The energetics of RADIATION is treated under that heading. See also THERMODYNAMICS. (J. L.*)

ENERGICI, or ENERGUMENS (Gr. "possessed by a spirit"), the name given in the early Church to those suffering from different forms of insanity, who were popularly supposed to be under the control of some indwelling spirit other than their own. Among primitive races everywhere disease is explained in this way, and its removal supposed to be effected by priestly prayers and incantations. They were sometimes called χειμαζόμενοι, as being "tossed by the waves" of uncontrollable impulse. Persons afflicted in this way were restricted from entering the church, but might share the shelter of the porch with lepers and persons of offensive life (Hefele, *Conciliengeschichte*, vol. i. § 16). After the prayers, if quiet, they might come in to receive the bishop's blessing (*Apost. Const.* viii. 6, 7, 32) and listen to the sermon. They were daily fed and prayed over by the exorcists, and, in case of recovery, after a fast of from 20 to 40 days, were admitted to the eucharist, and their names and cures entered in the church records.

A note on the New Testament use of the word ἐνεργεῖν and its cognates will be found in J. A. Robinson's edition of *The Epistle to the Ephesians*, pp. 241-247; an excursus on "The Conflict with Demons" in A. Harnack, *The Expansion of Christianity*, i. 152-180. Cf. EXORCISM.

ENERGY (from the Gr. ἐνέργεια; ἐν, in, ἔργον, work), in physical science, a term which may be defined as accumulated mechanical work, which, however, may be only partially available for use. A bent spring possesses energy, for it is capable of doing work in returning to its natural form; a charge of gunpowder possesses energy, for it is capable of doing work in exploding; a Leyden jar charged with electricity possesses energy, for it is capable of doing work in being discharged. The motions of bodies, or of the ultimate parts of bodies, also involve energy, for stopping them would be a source of work.

All kinds of energy are ultimately measured in terms of work. If we raise 1 lb of matter through a foot we do a certain amount of work against the earth's attraction; if we raise 2 lb through the same height we do twice this amount of work, and so on. Also, the work done in raising 1 lb through 2 ft. will be double of that done in raising it 1 ft. Thus we recognize that the work done varies as the resistance overcome and the distance through which it is overcome conjointly.

Now, we may select any definite quantity of work we please as our unit, as, for example, the work done in lifting a pound a foot high from the sea-level in the latitude of London, which is the unit of work generally adopted by British engineers, and is called the "foot-pound." The most appropriate unit for scientific purposes is one which depends only on the fundamental units of length, mass and time, and is hence called an absolute unit. Such a unit is independent of gravity or of any other quantity which varies with the locality. Taking the centimetre, gramme and second as our fundamental units, the most convenient unit of force is that which, acting on a gramme for a second, produces in it a velocity of a centimetre per second; this is called a Dyne. The unit of work is that which is required to overcome a resistance of a dyne over a centimetre, and is called an Erg. In the latitude of Paris the dyne is equal to the weight of about $\frac{1}{981}$ of a gramme, and the erg is the amount of work required to raise $\frac{1}{981}$ of a gramme vertically through one centimetre.

Energy is the capacity for doing work. The unit of energy should therefore be the same as that of work, and the centimetre-gramme-second (C.G.S.) unit of energy is the erg.

The forms of energy which are most readily recognized are of course those in which the energy can be most directly employed in doing mechanical work; and it is manifest that masses of matter which are large enough to be seen and handled are more readily dealt with mechanically than are smaller masses. Hence when useful work can be obtained from a system by simply connecting visible portions of it by a train of mechanism, such energy is more readily recognized than is that which would compel us to control the behaviour of molecules before we could transform it into useful work. This leads up to the fundamental distinction, introduced by Lord Kelvin, between "available energy," which we can turn to mechanical effect, and "diffuse energy," which is useless for that purpose.

The conception of work and of energy was originally derived from observation of purely mechanical phenomena, that is to say, phenomena in which the relative positions and motions of visible portions of matter were all that were taken into consideration. Hence it is not surprising that, in those more subtle forms in which energy cannot be readily or completely converted into work, the universality of the principle of energy, its conservation, as regards amount, should for a long while have escaped recognition after it had become familiar in pure dynamics.

If a pound weight be suspended by a string passing over pulley, in descending through 10 ft. it is capable of raising nearly a pound weight attached to the other end of the string, through the same height, and thus can do nearly 10 foot-pounds of work. The smoother we make the pulley the more nearly does the amount of useful work which the weight is capable of doing approach 10 foot-pounds, and if we take into account the work done against the friction of the pulley, we may say that the work done by the descending weight is 10 foot-pounds, and hence when the weight is in its elevated position we have at disposal 10 foot-pounds more energy than when it is in the lower position. It should be noticed, however, that this energy is possessed by the system consisting of the earth and pound together, in virtue of their separation, and that neither could do work without the other to attract it. The system consisting of the earth and the pound therefore possesses an amount of energy which depends on the relative positions of its two parts, on account of the latent physical connexion existing between them. In most mechanical systems the working stresses acting between the parts can be determined when the relative positions of all the parts are known; and the energy which a system possesses in virtue of the relative positions of its parts, or its *configuration*, is classified as "potential energy," to distinguish it from energy of motion which we shall presently consider. The word potential does not imply that this energy is not real; it exists in potentiality only in the sense that it is stored away in some latent manner; but it can be drawn upon without limit for mechanical work.

It is a fundamental result in dynamics that, if a body be projected vertically upwards *in vacuo*, with a velocity of v centimetres per second, it will rise to a height of $v^2/2g$ centimetres, where g represents the numerical value of the acceleration produced by gravity in centimetre-second units. Now, if m represent the mass of the body in grammes its weight will be mg dynes, for it will require a force of mg dynes to produce in it the acceleration denoted by g. Hence the work done in raising the mass will be represented by $mg \cdot v^2/2g$; that is, $\frac{1}{2}mv^2$ *ergs*. Now, whatever be the direction in which a body is moving, a frictionless constraint, like a string attached to the body, can cause its velocity to be changed into the vertical direction without any change taking place in the magnitude of the velocity. Thus it is merely in virtue of the velocity that the mass is capable of rising against the resistance of gravity, and hence we recognize that on account of its motion the body possessed $\frac{1}{2}mv^2$ units of energy. Energy of motion is usually called "kinetic energy."

A simple example of the transformation of kinetic energy into potential energy, and vice versa, is afforded by the pendulum. When at the limits of its swing, the pendulum is for an instant at rest, and all the energy of the oscillation is static or potential. When passing through its position of equilibrium, since gravity can do no more work upon it without changing its fixed point of support, all the energy of oscillation is kinetic. At intermediate positions the energy is partly kinetic and partly potential.

Available kinetic energy is possessed by a system of two or more bodies in virtue of the relative motion of its parts. Since our conception of velocity is essentially relative, it is plain that any property possessed by a body in virtue of its motion can be effectively possessed by it only in relation to those bodies with respect to which it is moving. If a body whose mass is m grammes be moving with a velocity of v centimetres per second relative to the earth, the available kinetic energy possessed by the system is $\frac{1}{2}mv^2$ ergs if m be small relative to the earth. But if we consider two bodies each of mass m and one of them moving with velocity v relative to the other, only $\frac{1}{4}mv^2$ units of work is available from this system alone. Thus the estimation of kinetic energy is intimately affected by the choice of our base of measurement.

When the stresses acting between the parts of a system depend *only* on the relative positions of those parts, the sum of the kinetic energy and potential energy of the system is always the same, provided the system be not acted upon by anything outside it. Such a system is called "conservative," and is well illustrated by the swinging pendulum above referred to. But there are stresses which depend on the relative *motion* of the visible bodies between which they appear to act. When work is done against these forces no full equivalent of potential energy may be produced; this applies especially to frictional forces, for if the motion of the system be reversed the forces will be also reversed and will still oppose the motion. It was long believed that work done against such forces was lost, and it was not till the 19th century that the energy thus transformed was traced; the conservation of energy has become the master-key to unlock the connexions in inanimate nature.

It was pointed out by Thomson (Lord Kelvin) and P. G. Tait that Newton had divined the principle of the conservation of energy, so far as it belongs purely to mechanics. But what became of the work done against friction and such non-conservative forces remained obscure, while the chemical doctrine that heat was an indestructible substance afterwards led to the idea that it was lost. There was, however, even before Newton's time, more than a suspicion that heat was a form of energy. Francis Bacon expressed his conviction that heat consists of a kind of motion or "brisk agitation" of the particles of matter. In the *Novum Organum*, after giving a long list of the sources of heat, he says: "From these examples, taken collectively as well as singly, the nature whose limit is heat appears to be motion. . . . It must not be thought that heat generates motion or motion heat (though in some respects this is true), but the very essence of heat, or the substantial self of heat, is motion and nothing else."

After Newton's time the first vigorous effort to restore the universality of the doctrine of energy was made by Benjamin Thompson, Count Rumford, and was published in the *Phil. Trans.* for 1798. Rumford was engaged in superintending the boring of cannon in the military arsenal at Munich, and was struck by the amount of heat produced by the action of the boring bar upon the brass castings. In order to see whether the heat came out of the chips he compared the capacity for heat of the chips abraded by the boring bar with that of an equal quantity of the metal cut from the block by a fine saw, and obtained the same result in the two cases, from which he concluded that "the heat produced could not possibly have been furnished at the expense of the latent heat of the metallic chips."

Rumford then turned up a hollow cylinder which was cast in one piece with a brass six-pounder, and having reduced the connexion between the cylinder and cannon to a narrow neck of metal, he caused a blunt borer to press against the hollow of the cylinder with a force equal to the weight of about 10,000 ℔, while the casting was made to rotate in a lathe. By this means the mean temperature of the brass was raised through about 70° Fahr., while the amount of metal abraded was only 837 grains. In order to be sure that the heat was not due to the action of the air upon the newly exposed metallic surface, the cylinder and the end of the boring bar were immersed in 18·77 ℔. of water contained in an oak box. The temperature of the water at the commencement of the experiment was 60° Fahr., and after two horses had turned the lathe for 2½ hours the water boiled. Taking into account the heat absorbed by the box and the metal, Rumford calculated that the heat developed was sufficient to raise 26·58 ℔ of water from the freezing to the boiling point, and in this calculation the heat lost by radiation and conduction was neglected. Since one horse was capable of doing the work required, Rumford remarked that one horse can generate heat as rapidly as nine wax candles burning in the ordinary manner.

Finally, Rumford reviewed all the sources from which the heat might have been supposed to be derived, and concluded that it was simply produced by the friction, and that the supply was inexhaustible. "It is hardly necessary to add," he remarks, "that anything which any insulated body or system of bodies can continue to furnish *without limitation* cannot possibly be *a material substance*; and it appears to me to be extremely difficult, if not quite impossible, to form any distinct idea of anything capable of being excited and communicated in the manner that heat was excited and communicated in these experiments, except it be *motion*."

About the same time Davy showed that two pieces of ice could be melted by rubbing them together in a vacuum, although everything surrounding them was at a temperature below the freezing point. He did not, however, infer that since the heat could not have been supplied by the ice, for ice absorbs heat in melting, this experiment afforded conclusive proof against the substantial nature of heat.

Though we may allow that the results obtained by Rumford and Davy demonstrate satisfactorily that heat is in some way due to motion, yet they do not tell us to what particular dynamical quantity heat corresponds. For example, does the heat generated by friction vary as the friction and the time during which it acts, or is it proportional to the friction and the distance through which the rubbing bodies are displaced—that is, to the work done against friction—or does it involve any other conditions? If it can be shown that, however the duration and all other conditions of the experiment may be varied, the same amount of heat can in the end be always produced when the same amount of *energy* is expended, then, and only then, can we infer that heat is a form of energy, and that the energy consumed has been really transformed into heat. This was left for J. P. Joule to achieve; his experiments conclusively prove that heat and energy are of the same nature, and that all other forms of energy can be transformed into an equivalent amount of heat.

The quantity of energy which, if entirely converted into heat, is capable of raising the temperature of the unit mass of water from 0° C. to 1° C. is called the mechanical equivalent of heat. One of the first who took in hand the determination of the mechanical equivalent of heat was Marc. Séguin, a nephew of J. M. Montgolfier. He argued that, if heat be energy, then, when it is employed in doing work, as in a steam-engine, some of the heat must itself be consumed in the operation. Hence he inferred that the amount of heat given up to the condenser of an engine when the engine is doing work must be less than when the same amount of steam is blown through the engine without doing any work. Séguin was unable to verify this experimentally, but in 1857 G. A. Hirn succeeded, not only in showing that such a difference exists, but in measuring it, and hence determining a tolerably approximate value of the mechanical equivalent of heat. In 1839 Séguin endeavoured to determine the mechanical equivalent of heat from the loss of heat suffered by steam in expanding, *assuming* that the whole of the heat so lost was consumed in doing external work against the pressure to which the steam was exposed. This assumption, however, cannot be justified, because it neglected to take account of work which might possibly have to be done *within the steam itself* during the expansion.

In 1842 R. Mayer, a physician at Heilbronn, published an attempt to determine the mechanical equivalent of heat from the heat produced when air is compressed. Mayer made an assumption the converse of that of Séguin, asserting that the whole of the work done in compressing the air was converted into heat, and neglecting the possibility of heat being consumed in doing work within the air itself or being produced by the transformation of internal potential energy. Joule afterwards proved (see below) that Mayer's assumption was in accordance with fact, so that his method was a sound one as far as experiment was concerned; and it was only on account of the values of the specific heats of air at constant pressure and at constant volume employed by him being very inexact that the value of the mechanical equivalent of heat obtained by Mayer was very far from the truth.

Passing over L. A. Colding, who in 1843 presented to the Royal Society of Copenhagen a paper entitled "Theses concerning Force," which clearly stated the "principle of the perpetuity of energy," and who also performed a series of experiments for the purpose of determining the heat developed by the compression of various bodies, which entitle him to be mentioned among the founders of the modern theory of energy, we come to Dr James Prescott Joule of Manchester, to whom we are indebted more than to any other for the establishment of the principle of the conservation of energy on the broad basis on which it has since stood. The best-known of Joule's experiments was that in which a brass paddle consisting of eight arms rotated in a cylindrical vessel of water containing four fixed vanes, which allowed the passage of the arms of the paddle but prevented the water from rotating as a whole. The paddle was driven by weights, and the temperature of the water was observed by thermometers which could indicate $\frac{1}{200}$th of a degree Fahrenheit. Special experiments were made to determine the work done against resistances outside the vessel of water, which amounted to about ·006 of the whole, and corrections were made for the loss of heat by radiation, the buoyancy of the air affecting the descending weights, and the energy dissipated when the weights struck the floor with a finite velocity. From these experiments Joule obtained 72·692 foot-pounds in the latitude of Manchester as equivalent to the amount of heat required to raise 1 lb of water through 1° Fahr, from the freezing point. Adopting the centigrade scale, this gives 1390·846 foot-pounds.

With an apparatus similar to the above, but smaller, made of iron and filled with mercury, Joule obtained results varying from 772·814 foot-pounds when driving weights of about 58 lb were employed to 775·352 foot-pounds when the driving weights were only about 19½ lb. By causing two conical surfaces of cast-iron immersed in mercury and contained in an iron vessel to rub against one another when pressed together by a lever, Joule obtained 776·045 foot-pounds for the mechanical equivalent of heat when the heavy weights were used, and 774·93 foot-pounds with the small driving weights. In this experiment a great noise was produced, corresponding to a loss of energy, and Joule endeavoured to determine the amount of energy necessary to produce an equal amount of sound from the string of a violoncello and to apply a corresponding correction.

The close agreement between the results at least indicates that "the amount of heat produced by friction is proportional to the work done and independent of the nature of the rubbing surfaces." Joule inferred from them that the mechanical equivalent of heat is probably about 772 foot-pounds, or, employing the centigrade scale, about 1390 foot-pounds.

Previous to determining the mechanical equivalent of heat by the most accurate experimental method at his command, Joule established a series of cases in which the production of one kind of energy was accompanied by a disappearance of some other form. In 1840 he showed that when an electric current was produced by means of a dynamo-magneto-electric machine the heat generated in the conductor, when no external work was done by the current, was the same as if the energy employed in producing the current had been converted into heat by friction, thus showing that electric currents conform to the principle of the conservation of energy, since energy can neither be created nor destroyed by them. He also determined a roughly approximate value for the mechanical equivalent of heat from the results of these experiments. Extending his investigations to the currents produced by batteries, he found that the total voltaic heat generated in any circuit was proportional to the number of electrochemical equivalents electrolysed in each cell multiplied by the electromotive force of the battery. Now, we know that the number of electrochemical equivalents electrolysed is proportional to the whole amount of electricity which passed through the circuit, and the product of this by the electromotive force of the battery is the work done by the latter, so that in this case also Joule showed that the heat generated was proportional to the work done.

In 1844 and 1845 Joule published a series of researches on the compression and expansion of air. A metal vessel was placed in a calorimeter and air forced into it, the amount of energy expended in compressing the air being measured. Assuming that the whole of the energy was converted into heat, when the air was subjected to a pressure of 21·5 atmospheres Joule obtained for the mechanical equivalent of heat about 824·8 foot-pounds, and when a pressure of only 10·5 atmospheres was employed the result was 796·9 foot-pounds.

In the next experiment the air was compressed as before, and then allowed to escape through a long lead tube immersed in the water of a calorimeter, and finally collected in a bell jar. The amount of heat absorbed by the air could thus be measured, while the work done by it in expanding could be readily calculated. In allowing the air to expand from a pressure of 21 atmospheres to that of 1 atmosphere the value of the mechanical equivalent of heat obtained was 821·89 foot-pounds. Between 10 atmospheres and 1 it was 815·875 foot-pounds, and between 23 and 14 atmospheres 761·74 foot-pounds.

But, unlike Mayer and Séguin, Joule was not content with assuming that when air is compressed or allowed to expand the heat generated or absorbed is the equivalent of the work done and of that only, no change being made in the internal energy of the air itself when the temperature is kept constant. To test this two vessels similar to that used in the last experiment were placed in the same calorimeter and connected by a tube with a stop-cock. One contained air at a pressure of 22 atmospheres, while the other was exhausted. On opening the stop-cock no work was done by the expanding air against external forces, since it expanded into a vacuum, and it was found that no heat was generated or absorbed. This showed that Mayer's assumption was true. On repeating the experiment when the two vessels were placed in different calorimeters, it was found that heat was absorbed by the vessel containing the compressed air, while an equal quantity of heat was produced in the calorimeter containing the exhausted vessel. The heat absorbed was consumed in giving motion to the issuing stream of air, and was reproduced by the impact of the particles on the sides of the exhausted vessel. The subsequent researches of Dr Joule and Lord Kelvin (*Phil. Trans.*, 1853, p. 357, 1854, p. 321, and 1862, p. 579) showed that the statement that no *internal work* is done when a gas expands or contracts is not quite true, but the amount is very small in the cases of those gases which, like oxygen, hydrogen and nitrogen, can only be liquefied by intense cold and pressure.

For a long time the final result deduced by Joule by these varied and careful investigations was accepted as the standard value of the mechanical equivalent of heat. Recent determinations by H. A. Rowland and others, necessitated by modern requirements, have shown that it is in error, but by less than 1%. The writings of Joule, which thus occupy the place of honour in the practical establishment of the conservation of energy, have been collected into two volumes published by the Physical Society of London. On the theoretical side the greatest stimulus came from the publication in 1847, without knowledge of Mayer or Joule, of Helmholtz's great memoir, *Über die Erhaltung der Kraft*, followed immediately (1848–1852) by the establishment of the science of thermodynamics (*q.v.*), mainly by R. Clausius and Lord Kelvin on the basis of "Carnot's principle" (1824), modified in expression so as to be consistent with the conservation of energy (see ENERGETICS).

Though we can convert the whole of the energy possessed by any mechanical system into heat, it is not in our power to perform the inverse operation, and to utilize the whole of the heat in doing mechanical work. Thus we see that different forms of energy are not equally valuable for conversion into work. The ratio of the portion of the energy of a system which can under given conditions be converted into mechanical work to the whole amount of energy operated upon may be called the "availability" of the energy. If a system be removed from all communication with anything outside of itself, the whole amount of energy possessed by it will remain constant, but will of its own accord tend to undergo such transformations as will diminish its availability. This general law, known as the principle of the "dissipation of energy," was first adequately pointed out by Lord Kelvin in 1852; and was applied by him to some of the principal problems of cosmical physics. Though controlling all phenomena of which we have any experience, the principle of the dissipation of energy rests on a very different foundation from that of the conservation of energy; for while we may conceive of no means of circumventing the latter principle, it seems that the actions of intelligent beings are subject to the former only in consequence of the rudeness of the machinery which they have at their disposal for controlling the behaviour of those ultimate portions of matter, in virtue of the motions or positions of which the energy with which they have to deal exists. If we have a weight capable of falling through a certain distance, we can employ the mutual forces of the system consisting of the earth and weight to do an amount of useful work which is less than the full amount of potential energy possessed by the system only in consequence of the friction of the constraints, so that the limit of availability in this case is determined only by the friction which is unavoidable. Here we have to deal with a transformation with which we can grapple, and which can be controlled for our purposes. If, on the other hand, we have to deal with a system of molecules of whose motions in the aggregate we become conscious only by indirect means, while we know absolutely nothing either of the motions or positions of any individual molecule, it is obvious that we cannot grasp single molecules and control their movements so as to derive the full amount of work from the system. All we can do in such cases is to place the system under certain conditions of transformation, and be content with the amount of work which it is, as it were, willing to render up under those conditions. Thus the principle of Carnot involves the conclusion that a greater proportion of the heat possessed by a body at a high temperature can be converted into work than in the case of an equal quantity of heat possessed by a body at a low temperature, so that the availability of heat increases with the temperature.

Clerk Maxwell supposed two compartments, A and B, to be filled with gas at the same temperature, and to be separated by an ideal, infinitely thin partition containing a number of exceedingly small trap-doors, each of which could be opened or closed without any expenditure of energy. An intelligent creature, or "demon," possessed of unlimited powers of vision, is placed in charge of each door, with instructions to open the door whenever a particle in A comes towards it with more than a certain velocity V, and to keep it closed against all particles in A moving with less than this velocity, but, on the other hand, to open the door whenever a particle in B approaches it with less than a certain velocity *v*, which is not greater than V, and to keep it closed against all particles in B moving with a greater velocity than this. By continuing this process every unit of mass which enters B will carry with it more energy than each unit which leaves B, and hence the temperature of the gas in B will be raised and that of the gas in A lowered, while no heat is lost and no energy expended; so that by the application of intelligence alone a portion of gas of uniform pressure and temperature may be sifted into two parts, in which both the temperature and the pressure are different, and from which, therefore, work can be obtained at the expense of heat. This shows that the principle of the dissipation of energy has control over the actions of those agents only whose faculties are too gross to enable them to grapple individually with the minute portions of matter which are the seat of energy.

In 1875 Lord Rayleigh published an investigation on "the work which may be gained during the mixing of gases." In the preface he states the position that "whenever, then, two gases are allowed to mix without the performance of work, there is dissipation of energy, and an opportunity of doing work at the expense of low temperature heat has been for ever lost." He shows that the amount of work obtainable is equal to that which can be done by the first gas in expanding into the space occupied by the second (supposed vacuous) together with that done by the second in expanding into the space occupied by the first. In the experiment imagined by Lord Rayleigh a porous diaphragm takes the place of the partition and trap-doors imagined by Clerk Maxwell, and the molecules sort themselves automatically on account of the difference in their average velocities for the two gases. When the pressure on one side of the diaphragm thus becomes greater than that on the other, work may be done at the expense of heat in pushing the diaphragm, and the operation carried on with continual gain of work until the gases are uniformly diffused. There is this difference, however, between this experiment and the operation imagined by Maxwell, that when the gases have diffused the experiment cannot be repeated; and it is no more contrary to the dissipation of energy than is the fact that work may be derived at the expense of heat when a gas expands into a vacuum, for the working substance is not finally restored to its original condition; while Maxwell's "demons" may operate without limit.

In such experiments the molecular energy of a gas is converted into work only in virtue of the molecules being separated into classes in which their velocities are different, and these classes then allowed to act upon one another through the intervention of a suitable heat-engine. This sorting can occur spontaneously to a limited extent; while if we could carry it out as far as we pleased we might transform the whole of the heat of a body into work. The theoretical availability of heat is limited only by our power of bringing those particles whose motions constitute heat in bodies to rest relatively to one another; and we have precisely similar practical limits to the availability of the energy due to the motion of visible and tangible bodies, though theoretically we can then trace all the stages.

If a battery of electromotive force E maintain a current C in a conductor, and no other electromotive force exist in the circuit, the whole of the work done will be converted into heat, and the amount of work done per second will be EC. If R denote the resistance of the whole circuit, $E = CR$, and the heat generated per second is C^2R. If the current drive an electromagnetic engine, the reaction of the engine will produce an electromotive force opposing the current. Suppose the current to be thus reduced to C'. Then the work done by the battery per second will be EC' or $CC'R$, while the heat generated per second will be C'^2R, so that we have the difference $(C-C')C'R$ for the energy consumed in driving the engine. The ratio of this to the whole work done by the battery is $(C-C')/C$, so that the efficiency is increased by diminishing C'. If we could drive the engine so fast as to reduce C' to zero, the whole of the energy of the battery would be available, no heat being produced in the wires, but the horse-power of the engine would be indefinitely small. The reason why the whole of the energy of the current is not available is that heat must always be generated in a wire in which a finite current is flowing, so that, in the case of a battery in which the whole of the energy of chemical affinity is employed in producing a current, the availability of the energy is limited only on account of the resistance of the conductors, and may be increased by diminishing this resistance. The availability of the energy of electrical separation in a charged Leyden jar is also limited only by the resistance of conductors, in virtue of which an amount of heat is necessarily produced, which is greater the less the time occupied in discharging the jar. The availability of the energy of magnetization is limited by the coercive force of the magnetized material, in virtue of which any change in the intensity of magnetization is accompanied by the production of heat.

In all cases there is a general tendency for other forms of energy to be transformed into heat on account of the friction of rough surfaces, the resistance of conductors, or similar causes, and thus to lose availability. In some cases, as when heat is converted into the kinetic energy of moving machinery or the potential energy of raised weights, there is an ascent of energy from the less available form of heat to the more available form of mechanical energy, but in all cases this is accompanied by the transfer of other heat from a body at a high temperature to one at a lower temperature, thus losing availability to an extent that more than compensates for the rise.

It is practically important to consider the rate at which energy may be transformed into useful work, or the horse-power of the agent. It generally happens that to obtain the greatest possible amount of work from a given supply of energy, and to obtain it at the greatest rate, are conflicting interests. We have seen that the *efficiency* of an electromagnetic engine is greatest when the current is indefinitely small, and then the rate at which it works is also indefinitely small. M. H. von Jacobi showed that for a given electromotive force in the battery the horse-power is greatest when the current is reduced to one-half of what it would be if the engine were at rest. A similar condition obtains in the steam-engine, in which a great rate of working necessitates the dissipation of a large amount of energy. (W. G.; J. L.*)

ENFANTIN, BARTHÉLEMY PROSPER (1796–1864), French social reformer, one of the founders of Saint-Simonism, was born at Paris on the 8th of February 1796. He was the son of a banker of Dauphiny, and after receiving his early education at a lyceum, was sent in 1813 to the École Polytechnique. In March 1814 he was one of the band of students who, on the heights of Montmartre and Saint-Chaumont, attempted resistance to the armies of the allies then engaged in the investment of Paris. In consequence of this outbreak of patriotic enthusiasm, the school was soon after closed by Louis XVIII., and the young student was compelled to seek some other career instead of that of the soldier. He first engaged himself to a country wine merchant, for whom he travelled in Germany, Russia and the Netherlands. In 1821 he entered a banking-house newly established at St Petersburg, but returned two years later to Paris, where he was appointed cashier to the Caisse Hypothécaire. At the same time he became a member of the secret society of the Carbonari. In 1825 a new turn was given to his thoughts and his life by the friendship which he formed with Olinde Rodriguez, who introduced him to Saint-Simon. He embraced the new doctrines with ardour, and by 1829 had become one of the acknowledged heads of the sect (see SAINT-SIMON).

After the Revolution of 1830 Enfantin resigned his office of cashier, and devoted himself wholly to his cause. Besides contributing to the *Globe* newspaper, he made appeals to the people by systematic preaching, and organized centres of action in some of the principal cities of France. The headquarters in Paris were removed from the modest rooms in the Rue Taranne, and established in large halls near the Boulevard Italien. Enfantin and Bazard (*q.v.*) were proclaimed "Pères Suprêmes." This union of the supreme fathers, however, was only nominal. A divergence was already manifest, which rapidly increased to serious difference and dissension. Bazard had devoted himself to political reform, Enfantin to social and moral change; Bazard was organizer and governor, Enfantin was teacher and consoler; the former attracted reverence, the latter love. A hopeless antagonism arose between them, which was widened by Enfantin's announcement of his theory of the relation of man and woman, which would substitute for the "tyranny of marriage" a system of "free love." Bazard now separated from his colleague, and in his withdrawal was followed by all those whose chief aim was philosophical and political. Enfantin thus became sole "father," and the few who were chiefly attracted by his religious pretensions and aims still adhered to him. New converts joined them, and Enfantin assumed that his followers in France numbered 40,000. He wore on his breast a badge with his title of "Père," was spoken of by his preachers as "the living law," declared, and probably believed, himself to be the chosen of God, and sent out emissaries in a quest of a woman predestined to be the "female Messiah," and the mother of a new Saviour. The quest was very costly and altogether fruitless. No such woman was discoverable. Meanwhile believers in Enfantin and his new religion were multiplying in all parts of Europe. His extravagances and success at length brought down upon him the hand of the law. Public morality was in peril, and in May 1832 the halls of the new sect were closed by the government, and the father, with some of his followers, appeared before the tribunals. He now retired to his estate at Menilmontant, near Paris, where with forty disciples, all of them men, he continued to carry out his socialistic views. In August of the same year he was again arrested; and on his appearance in court he desired his defence to be undertaken by two women who were with him, alleging that the matter was of special concern to women. This was of course refused. The trial occupied two days and resulted in a verdict of guilty, and a sentence of imprisonment for a year with a small fine.

This prosecution finally discredited the new society. Enfantin was released in a few months, and then, accompanied by some of his followers, he went to Egypt. He stayed there two years, and might have entered the service of the viceroy if he would have professed himself, as a few of his friends did, a Mahommedan. On his return to France, a sadder and practically a wiser man, he settled down to very prosaic work. He became first a postmaster near Lyons, and in 1841 was appointed, through the influence of some of his friends who had risen to posts of power, member of a scientific commission on Algeria, which led him to engage in researches concerning North Africa and colonization in general.

in 1845 he was appointed a director of the Paris & Lyons railway. Three years later he established, in conjunction with Duveyrier, a daily journal, entitled *Le Crédit*, which was discontinued in 1850. He was afterwards attached to the administration of the railway from Lyons to the Mediterranean. Father Enfantin held fast by his ideal to the end, but he had renounced the hope of giving it a local habitation and a name in the degenerate obstinate world. His personal influence over those who associated with him was immense. "He was a man of a noble presence, with finely formed and expressive features. He was gentle and insinuating in manner, and possessed a calm, graceful and winning delivery" (*Gent. Mag.*, Jan. 1865). His evident sincerity, his genuine enthusiasm, gave him his marvellous ascendancy. Not a few of his disciples ranked afterwards amongst the most distinguished men of France. He died suddenly at Paris on the 1st of September 1864.

Amongst his works are—*Doctrine de Saint-Simon* (written in conjunction with several of his followers), published in 1830, and several times republished; *Économie politique et politique Saint-Simonienne* (1831); *Correspondance politique* (1835–1840); *Corresp. philos. et religieuse* (1843–1845); and *La Vie éternelle passée, présente, future* (1861). A large number of articles by his hand appeared in *Le Producteur, L'Organisateur, Le Globe*, and other periodicals. He also wrote in 1832 *Le Livre nouveau*, intended as a substitute for the Christian Scriptures, but it was not published.

See G. Weill, *L'École Saint-Simonienne, son histoire, son influence, jusqu' à nos jours* (Paris, 1896).

ENFIDAVILLE [*Dar-el-Bey*], a town of Tunisia, on the railway between Tunis and Susa, 30 m. N.E. of the last-named place and 5 m. inland from the Gulf of Hammamet. Enfidaville is the chief settlement on the Enfida estate, a property of over 300,000 acres in the Sahel district of Tunisia, forming a rectangle between the towns of Hammamet, Susa, Kairawan and Zaghwan. On this estate, devoted to the cultivation of cereals, olives, vines and to pasturage, are colonies of Europeans and natives. At Enfidaville, where was, as its native name indicates, a palace of the beys of Tunis, there is a large horse-breeding establishment and a much-frequented weekly market. About 5 m. N. of Enfidaville is Henshir Fraga (anc. *Uppenna*), where are ruins of a large fortress and of a church in which were found mosaics with epitaphs of various bishops and martyrs.

The Enfida estate was granted by the bey Mahommed-es-Sadok to his chief minister Khaireddin Pasha (*q.v.*) in return for the confirmation by the sultan of Turkey in 1871, through the instrumentality of the pasha, of the right of succession to the beylik of members of Es-Sadok's family. When, some years later, Khaireddin left Tunisia for Constantinople he sold the estate to a Marseilles company, which resold it to the Société Franco-africaine.

ENFIELD, a township of Hartford county, Connecticut, U.S.A., in the N. part of the state, on the E. bank of the Connecticut river, 20 m. N. of Hartford. It has an area of 35 sq. m., with three villages—Thompsonville, Hazardville and Enfield. Pop. (1890) 7199; (1900) 6699 (1812 foreign-born); (1910) 9719. Its principal manufactures are gunpowder, carpets, brick, cotton press machinery, and coffin hardware. In Enfield and its vicinity much tobacco is grown. First settled in 1679, Enfield was a part of the township of Springfield, Massachusetts, until 1683, when it was made a separate township; in 1749 it became a part of Connecticut. At a town meeting on the 11th of July 1774 it was resolved that "a firm and inviolable union of our colonies is absolutely necessary for the defence of our civil rights," and that "the most effectual measures to defeat the machinations of the enemies of His Majesty's government and the liberties of America is to break off all commercial intercourse with Great Britain and the West Indies until these oppressive acts for raising a revenue in America are repealed." A Shaker community was established in the township in 1781, at what is now called Shaker Station.

See Francis Olcutt Allen, *History of Enfield* (Lancaster, Pa., 1900).

ENFIELD, a market town in the Enfield parliamentary division of Middlesex, England, 11 m. N. of London Bridge, on the Great Northern and Great Eastern railways. Pop. of urban district, (1891) 31,536, (1901) 42,738. It is picturesquely situated on the western slope of the Lea valley, with a considerable extension towards the river, mainly consisting of artisans' dwellings (Churchbury, Ponder's End, and Enfield Highway on the Old North Road). Great numbers of villas occupied by those whose work lies in London have grown up; and many of the inhabitants are employed in the Royal Small Arms factory at Enfield Lock. The church of St Andrew is mainly Perpendicular, but has Early English portions; it contains several ancient monuments and brasses, and flanks the market-place, with its modern cross. Enfield Palace fronts the High Street; it retains portions of the building of Edward VI., but has been greatly altered. The grammer school, near the church, was founded in 1557. The New River flows through the parish, and Sir Hugh Myddleton, its projector, was for some time resident here. Middleton House, named after him, is one of several fine mansions in the vicinity. Of these, Forty Hall, in splendidly timbered grounds, is from the designs of Inigo Jones; and a former mansion occupying the site of White Webbs House was suspected as the scene of the hatching of Gunpowder Plot. The parish is of great extent (12,653 acres).

An Anglo-Saxon derivation, signifying "forest clearing," is indicated for the name. Enfield Chase was a royal preserve, disafforested in 1777. The principal manor of Enfield, which was held by Asgar, Edward the Confessor's master of horse, was in the hands of the Norman baron Geoffrey de Mandeville at the time of Domesday, and belonged to the Bohun family in the 12th and 13th centuries. It came, by succession and marriage, into the possession of the crown under Henry IV., and was included in the duchy of Lancaster. There were, however, seven other manors, and of these one, Worcesters, came to the crown in the time of Henry VIII., whose children resided at the manor-house, Elsynge Hall. Edward VI., settling both manors upon the princess Elizabeth, rebuilt Enfield Palace for her. She was a frequent resident here not only before but after her accession to the throne. About 1664 the palace was occupied as a school by Robert Uvedale (1642–1722), who was also an eminent horticulturist, planted the magnificent cedar still standing in the palace grounds, and formed a herbarium now in the Sloane collection at the British Museum. The town received grants of markets from Edward I. and James I.

ENFILADE (a French word, from *enfiler*, to thread, and so to pass through from end to end), a military term used to express the direction of fire along an enemy's line, or parapet. This species of fire is most demoralizing and destructive, since, from its direction, very few guns or rifles can be brought to bear to meet it. If any considerable body of men changes front, it immediately lays itself open to enfilade from the enemy whom it originally faced. Against entrenchments, or the parapets of fortifications, enfilade is still more effective, as the enemy is deprived of the protection given by his works and is no better covered than if he were in the open. Banks of earth, built perpendicular to the line of defence (called *traverses*), are usually employed to protect parapets or trenches against enfilade.

ENGADINE (Ger. *Engadin*; Ital. *Engadina*; Ladin, *Engiadina*), the name of the upper or Swiss portion of the valley of the Inn, which forms part of the Swiss canton of the Grisons. Its length by carriage road from the Maloja plateau (5935 ft.) at its south-western end to Martinsbruck (3406 ft.) at its north-eastern extremity is about 59 m. It is to be noted that up to and including St Moritz (6037 ft., the highest) all the villages (save Sils-Baseglia) at its south-western end are higher than the Maloja plateau itself. The uppermost portion of the valley contains several lakes, which, as one descends, gradually diminish in size, those of Sils, Silvaplana and St Moritz. But both the Maloja plateau and the south-western half of the lake of Sils belong to the commune of Stampa in the Val Bregaglia, and are included in the Bregaglia administrative district, so that, from a political point of view, Sils is the first village that is included in the Engadine. The rest of the Engadine forms the districts of the Upper Engadine with eleven communes, and of the Inn (*i.e.* the Lower Engadine), subdivided into the Ob Tasna, Remüs, and Unter Tasna circles, and containing twelve communes.

In 1900 the total population of the Engadine was 11,712, of whom 5429 were in the Upper Engadine and 6283 in the Lower Engadine. In point of religion 8594 were Protestants (4923 in the Lower Engadine and 3671 in the Upper Engadine), and 3086 Romanists (1728 in the Upper Engadine and 1358 in the Lower Engadine), while there were 12 Jews in the Upper Engadine and 2 in the Lower Engadine: in the Upper Engadine the majority in each commune was Protestant (the Romanists strongest in St Moritz), as also in the case of the Lower Engadine, save Tarasp and Samnaun, where the Romanists prevail. In point of language 7609 inhabitants (5010 in the Lower Engadine and 2599 in the Upper Engadine) spoke the curious Ladin dialect (a survival of a primitive Romance tongue), and 2221 German (1265 in the Upper Engadine and 956 in the Lower Engadine). The capital of the Upper Engadine is Samaden (967 inhabitants), and that of the Lower Engadine, Schuls (1117 inhabitants). In 1908 there were no railways in the Engadine, save about 8 m. (from the mouth of the tunnel past Bevers and Samaden to St Moritz village) of the railway pierced (1898–1902) beneath (5987 ft.) the Albula Pass (7595 ft.), which now affords the easiest means of access from Coire to St Moritz (56 m.); but many railways in and to the Engadine have been planned. The valley is reached by many passes (over which excellent carriage roads were constructed 1820–1872). The Maloja (5935 ft.) is the route from Chiavenna and the Lake of Como to the Upper Engadine, which is also reached from Coire by the Julier (7504 ft.) and the Albula Passes (7595 ft.) as well as from Tirano in the Valtellina by the Bernina Pass (7645 ft.). On the other hand, the Lower Engadine is accessible from Davos over the Flüela Pass (7838 ft.) and from Mals at the head of the Adige valley (or the Vintschgau) by the Ofen Pass (7071 ft.), while from Martinsbruck, the last Swiss village, a carriage road leads up to Nauders (5 m.), whence it is 27 m. by road down the Inn valley to Landeck on the Arlberg railway, or 17½ m. over the Reschen Scheideck Pass (4902 ft.) to Mals in the Vintschgau.

The Upper Engadine consists of a long, straight, nearly level trough of 26 m., varying from a mile to half a mile in breadth, through which flows the Inn. On the south-east this trough is limited by the lofty glacier-clad Bernina group (culminating in the Piz Bernina, 13,304 ft.) and the range rising between the Inn valley and that of Livigno to the south-east, while on the north-west the boundary is the extensive Albula group (culminating in Piz Kesch, 11,228 ft.). The Lower Engadine is far more picturesque and romantic than the Upper Engadine, the Inn valley being here much narrower and the fall greater. On its north-west rises the last bit of the Albula group (culminating in Piz Vadret, 10,584 ft.), and on the north the Silvretta group (culminating in Piz Linard, 11,201 ft.), while to the east and south are the ranges on either side of the Ofen Pass (culminating in Piz Sesvenna, 10,568 ft.). In the Upper Engadine the villages are on the floor of the valley, but in the Lower Engadine many are perched high above the bed of the river on terraces, and are cut off from each other by deep ravines.

The Upper Engadine is far better known to foreign visitors than the Lower Engadine, and is consequently much richer and more prosperous. The mineral waters of St Moritz (*q.v.*) were known and employed in the 16th century, and long formed the great attraction of the region. But about the middle of the 19th century the Upper Engadine came into fashion as a great "air-cure," and now Maloja, Sils, Silvaplana, Campfer and St Moritz are all well known; those who desire to explore the glaciers of the Bernina group mostly resort to Pontresina, on the Flatzbach, the stream descending from the Bernina Pass. Yet, owing to its great elevation, the scenery of the Upper Engadine has a bleak, northern aspect. Pines and larches alone flourish, garden vegetables are grown only in sunny spots, and there is no tillage. The Alpine flora is very rich and varied. But snow falls even in August, and the climate is well described in the proverb, "nine months winter, and three months cold weather." The villages are built entirely of stone (as also in the Lower Engadine), chiefly to guard against destructive fires that were formerly frequent in this narrow, wind-swept valley. The wealth of the inhabitants consists in their hay meadows and pastures. The lower pastures support large herds of cows, while the higher are let out (in both parts of the valley) to Bergamasque shepherds, who come thither every summer with their flocks. In the Lower Engadine the chief attraction is formed by the mineral springs at Schuls below Tarasp, which are much frequented during the summer. The wild gorge of Finstermünz separates the last Swiss village, Martinsbruck, from the first Tirolese village, Pfunds, the gorge being passable only on foot, while the carriage road makes a great detour by way of Nauders, so that the two villages named are 13 m. by road from each other. The earliest full description of the country by an English traveller is that by Archdeacon W. Coxe, in *Travels in Switzerland* (London, 1789).

The Upper Engadine is not mentioned in authentic documents till 1139, the bishop of Coire being then the great lord, and, from the 13th century, having as his bailiffs the family of Planta, the original seat of which was at Zuz. The valley obtained its freedom from both in 1486 (Planta) and in 1526, when the temporal powers of the bishop were abolished. In 1367 it (as well as the bishop's vassals in the Lower Engadine) joined the newly founded League of God's House or *Gotteshausbund* (see GRISONS), one of the 3 Raetian Leagues, which lasted till 1799–1801, when the whole Engadine became part of Canton Raetia of the Helvetic Republic, which, in 1803, altered its name to that of Grisons or Graubünden, and then first entered the Swiss Confederation. In the Upper Engadine the "Referendum" existed as between the different villages composing a bailiwick (*Hochgericht*). The history of the Lower Engadine is for long quite different. Though always comprised in the diocese of Coire, it formed from the early 9th century onwards (with the Vintschgau) a separate county, which was gradually absorbed in that which, later, took the name of the county of Tirol. The limit between the Upper Engadine and the Tirolese Lower Engadine was definitively fixed in 1282 at the Punt' Ota (the high bridge) just above Brail, and mentioned in 1139 already. In 1363 Tirol came into the possession of the Habsburgers, who were troublesome neighbours both to the Upper Engadine and to the League of God's House. Their power was stemmed in 1499 at the battle of the Calven gorge (above Mals), though it was only in 1652 that the Lower Engadine bought up the remaining rights of the Habsburgers. But the castle of Tarasp (acquired by them in 1464) was excepted: the lordship was given by them in 1687 to the Dietrichstein family, and held by it till 1801, when Austria ceded it to France, which, in 1803, handed it over to the Swiss Confederation, by which it was incorporated in 1809 with the Canton of the Grisons. This long connexion with Tirol accounts for the fact that Tarasp is still mainly Romanist, while the lonely Swiss valley of Samnaun (above Martinsbruck) has given up its Protestantism and its Ladin speech owing to communications with Tirol being easier than with Switzerland. The bears in the bear pit at Bern come from the forests in the lower Spöl valley, above Zernez, in the Lower Engadine, on the way to the Ofen Pass. The upper Spöl valley (Livigno) is Italian (see VALTELLINA).

AUTHORITIES.—M. Caviezel, *Das Oberengadin*, 7th edition (Coire; 1896); C. Decurtius, *Rätoromanische Chrestomathie*, vols. v.-ix. (Erlangen, 1899–1908), deals with the two divisions of the Engadine from the 16th century to modern times; Mrs H. Freshfield, *A Summer Tour in the Grisons and the Italian Valleys of the Bernina* (London, 1862); E. Imhof, *Itinerarium des S.A.C. für die Albulagruppe* (Bern, 1893), and *Itinerarium des S.A.C. für die Silvretta- und Ofenpassgruppe* (Mountains of the Lower Engadine) (Bern, 1898); E. Lechner, *Das Oberengadin in der Vergangenheit und Gegenwart* (Leipzig, 1900); A. Lorria and E. A. Martel, *Le Massif de la Bernina* (complete monograph on the Upper Engadine, with full bibliography) (Zürich, 1894); P. C. von Planta, *Die Currätischen Herrschaften in der Feudalzeit* (Bern, 1881); Z. and E. Pallioppi, *Dizionari dels Idioms Romauntschs d'Engiadina ota e bassa, &c.* (Samaden, 1895); F. de B. Strickland, *The Engadine*, 2nd edition (London and Samaden, 1891); J. Ulrich, *Rätoromanische Chrestomathie*, vol. ii. (Halle, 1882). (W. A. B. C.)

ENGAGED COLUMN, in architecture, a form of column, sometimes defined as semi or three-quarter detached according to its projection; the term implies that the column is partly attached to a pier or wall. It is rarely found in Greek work, and then only in exceptional cases, but it exists in profusion in Roman architecture. In the temples it is attached to the cella walls, repeating the columns of the peristyle, and in the theatres and amphitheatres, where they subdivided the arched openings: in all these cases engaged columns are utilized as a decorative feature, and as a rule the same proportions are maintained as if they had been isolated columns. In Romanesque work the classic proportions are no longer adhered to; the engaged column, attached to the piers, has always a special function to perform, either to support subsidiary arches, or, raised to the vault, to carry its transverse or diagonal ribs. The same constructional object is followed in the earlier Gothic styles, in which they become merged into the mouldings. Being virtually always ready made, so far as their design is concerned, they were much affected by the Italian revivalists.

ENGEL, ERNST (1821–1896), German political economist and statistician, was born in Dresden on the 21st of March 1821. He studied at the famous mining academy of Freiberg, in Saxony, and on completing his curriculum travelled in Germany and France. Immediately after the revolution of 1848 he was attached to the royal commission in Saxony appointed to determine the relations between trade and labour. In 1850 he was directed by the government to assist in the organization of the German Industrial Exhibition of Leipzig (the first of its kind). The success which crowned his efforts was so great that in 1854 he was induced to enter the government service, as chief of the newly instituted statistical department. He retired, however, from the office in 1858. He founded at Dresden the first Mortgage Insurance Society (Hypotheken-Versicherungsgesellschaft), and as a result of the success of his work was summoned in 1860 to Berlin as director of the statistical department, in succession to Karl Friedrich Wilhelm Dieterici (1790–1859). In his new office he made himself a name of world-wide reputation. Raised to the rank of *Geheimer Regierungsrat*, he retired in 1882 and lived henceforward in Radebeul near Dresden, where he died on the 8th of December 1896. Engel was a voluminous writer on the subjects with which his name is connected, but his statistical papers are mostly published in the periodicals which he himself established, viz. *Preuss. Statistik* (in 1861); *Zeitschrift des Statistischen Bureaus*, and *Zeitschrift des Statistichen Bureaus des Königreichs Sachsen.*

ENGEL, JOHANN JAKOB (1741–1802), German author, was born at Parchim, in Mecklenburg, on the 11th of September 1741. He studied theology at Rostock and Bützow, and philosophy at Leipzig, where he took his doctor's degree. In 1776 he was appointed professor of moral philosophy and belles-lettres in the Joachimstal gymnasium at Berlin, and a few years later he became tutor to the crown prince of Prussia, afterwards Frederick William III. The lessons which he gave his royal pupil in ethics and politics were published in 1798 under the title *Fürstenspiegel*, and are a favourable specimen of his powers as a popular philosophical writer. In 1787 he was admitted a member of the Academy of Sciences of Berlin, and in the same year he became director of the royal theatre, an office he resigned in 1794. He died on the 28th of June 1802.

Besides numerous dramas, some of which had a considerable success, Engel wrote several valuable books on aesthetic subjects. His *Anfangsgründe einer Theorie der Dichtungsarten* (1783) showed fine taste and acute critical faculty if it lacked imagination and poetic insight. The same excellences and the same defects were apparent in his *Ideen zu einer Mimik* (1785), written in the form of letters. His most popular work was *Der Philosoph für die Welt* (1775), which consists chiefly of dialogues on men and morals, written from the utilitarian standpoint of the philosophy of the day. His last work, a romance entitled *Herr Lorenz Stark* (1795), achieved a great success, by virtue of the marked individuality of its characters and its appeal to middle-class sentiment.

Engel's *Sämtliche Schriften* were published in 12 volumes at Berlin in 1801–1806; a new edition appeared at Frankfort in 1851. See K. Schröder, *Johann Jakob Engel* (Vortrag) (1897).

ENGELBERG, an Alpine village and valley in central Switzerland, much frequented by visitors in summer and to some extent in winter. It is 14 m. by electric railway from Stansstad, on the Lake of Lucerne, past Stans. The village (3343 ft.) is in a mountain basin, shut in on all sides by lofty mountains (the highest is the Titlis, 10,627 ft. in the south-east), so that it is often hot in summer. It communicates by the Surenen Pass (7563 ft.) with Wassen, on the St Gotthard railway, and by the Joch Pass (7267 ft.) past the favourite summer resort of the Engstlen Alp (6034 ft.), with Meiringen in the Bernese Oberland. The village has clustered round the great Benedictine monastery which gives its name to the valley, from the legend that its site was fixed by angels, so that the spot was named "Mons Angelorum." The monastery was founded about 1120 and still survives, though the buildings date only from the early 18th century. Its library suffered much at the hands of the French in 1798. From 1462 onwards it was under the protectorate of Lucerne, Schwyz, Unterwalden and Uri. In 1798 the abbot lost all his temporal powers, and his domains were annexed to the Obwalden division of Unterwalden, but in 1803 were transferred to the Nidwalden division. However, in 1816, in consequence of the desperate resistance made by the Nidwalden men to the new Federal Pact of 1815, they were punished by the fresh transfer of the valley to Obwalden, part of which it still forms. As the pastures forming the upper portion of the Engelberg valley have for ages belonged to Uri, the actual valley itself is politically isolated between Uri and Nidwalden. The monastery is still directly dependent on the pope. In 1900 the valley had 1973 inhabitants, practically all German-speaking and Romanists. (W. A. B. C.)

ENGELBRECHTSDATTER, DORTHE (1634–1716), Norwegian poet, was born at Bergen on the 16th of January 1634; her father, Engelbrecht Jörgensen, was originally rector of the high school in that city, and afterwards dean of the cathedral. In 1652 she married Ambrosius Hardenbech, a theological writer famous for his flowery funeral sermons, who succeeded her father at the cathedral in 1659. They had five sons and four daughters. In 1678 her first volume appeared, *Sjaelens aandelige Sangoffer* ("The Soul's Spiritual Offering of Song") published at Copenhagen. This volume of hymns and devotional pieces, very modestly brought out, had an unparalleled success. The fortunate poetess was invited to Denmark, and on her arrival at Copenhagen was presented at Court. She was also introduced to Thomas Kingo, the father of Danish poetry, and the two greeted one another with improvised couplets, which have been preserved, and of which the poetess's reply is incomparably the neater. In 1683 her husband died, and before 1698 she had buried all her nine children. In the midst of her troubles appeared her second work, the *Taareoffer* ("Sacrifice of Tears"), which is a continuous religious poem in four books. This was combined with the *Sangoffer*, and no fewer than three editions of the united works were published before her death, and many after it. In 1698 she brought out a third volume of sacred verse, *Et kristeligt Valet fra Verden* ("A Christian Farewell to the World"), a very tame production. She died on the 19th of February 1716. The first verses of Dorthe Engelbrechtsdatter are the best; her *Sangoffer* was dedicated to Jesus, the *Taareoffer* to Queen Charlotte Amalia; this is significant of her changed position in the eyes of the world.

ENGELHARDT, JOHANN GEORG VEIT (1791–1855), German theologian, was born at Neustadt-on-the-Aisch on the 12th of November 1791, and was educated at Erlangen, where he afterwards taught in the gymnasium (1817), and became professor of theology in the university (1821). His two great works were a *Handbuch der Kirchengeschichte* in 4 vols. (1833–1834), and a *Dogmengeschichte* in 2 vols. (1839). He died at Erlangen on the 13th of September 1855.

ENGHIEN, LOUIS ANTOINE HENRI DE BOURBON CONDÉ, Duc d' (1772–1804), was the only son of Henri Louis Joseph, prince of Condé, and of Louise Marie Thérèse Mathilde, sister of the duke of Orleans (Philippe Égalité), and was born at Chantilly on the 2nd of August 1772. He was educated privately by the abbé Millot, and received a military training from the commodore de Virieux. He early showed the warlike spirit of the house of Condé, and began his military career in 1788. On the outbreak of the French Revolution he "emigrated" with very many of the nobles a few days after the fall of the Bastille, and remained in exile, seeking to raise forces for the invasion of France and the restoration of the old monarchy. In 1792, on the outbreak of war, he held a command in the force of *émigrés* (styled the "French royal army") which shared in the duke of Brunswick's unsuccessful invasion of France. He continued to serve under his father and grandfather in what was known as the Condé army, and on several occasions distinguished himself by his bravery and ardour in the vanguard. On the dissolution of that force after the peace of Lunéville (February 1801) he married privately the princess Charlotte, niece of Cardinal de Rohan, and took up his residence at Ettenheim in Baden, near the Rhine. Early in the year 1804 Napoleon, then First Consul of France, heard news which seemed to connect the young duke with the Cadoudal-Pichegru conspiracy then being tracked by the French police. The news ran that the duke was in company with Dumouriez and made secret journeys into France. This was false; the acquaintance was Thuméry, a harmless old man, and the duke had no dealings with Cadoudal or Pichegru. Napoleon gave orders for the seizure of the duke. French mounted gendarmes crossed the Rhine secretly, surrounded his house and brought him to Strassburg (15th of March 1804), and thence to the castle of Vincennes, near Paris. There a commission of French colonels was hastily gathered to try him. Meanwhile Napoleon had found out the true facts of the case, and the ground of the accusation was hastily changed. The duke was now charged chiefly with bearing arms against France in the late war, and with intending to take part in the new coalition then proposed against France. The colonels hastily and most informally drew up the act of condemnation, being incited thereto by orders from Savary (*q.v.*), who had come charged with instructions. Savary intervened to prevent all chance of an interview between the condemned and the First Consul; and the duke was shot in the moat of the castle, near a grave which had already been prepared. With him ended the house of Condé. In 1816 the bones were exhumed and placed in the chapel of the castle. It is now known that Josephine and Mme de Rémusat had begged Napoleon for mercy towards the duke; but nothing would bend his will. The blame which the apologists of the emperor have thrown on Talleyrand or Savary is undeserved. On his way to St Helena and at Longwood he asserted that, in the same circumstances, he would do the same again; he inserted a similar declaration in his will.

See H. Welschinger, *Le Duc d'Enghien 1772–1804* (Paris, 1888); A. Nougaret de Fayet, *Recherches historiques sur le procès et la condamnation du duc d'Enghien*, 2 vols. (Paris, 1844); Comte A. Boulay de la Meurthe, *Les Dernières Années du duc d'Enghien 1801–1804* (Paris, 1886). For documents see *La Catastrophe du duc d'Enghien* in the edition of *Mémoires* edited by M. F. Barrière, also the edition of the duke's letters, &c., by Count Boulay de la Meurthe (tome i., Paris, 1904; tome ii., 1908). (J. Hl. R.)

ENGHIEN, a town in the province of Hainaut, Belgium, lying south of Grammont. Pop. (1904) 4541. It is the centre of considerable lace, linen and cotton industries. There is a fine park outside the town belonging to the duke of Arenberg, whose ancestor, Charles de Ligne, bought it from Henry IV. in 1607, but the château in which the duke of Arenberg of the 18th century entertained Voltaire no longer exists. Curiously enough the cottage, a stone building, built by the same duke for Jean Jacques Rousseau, still stands in the park, while the ducal residence was burnt down by the *sans-culottes.* A fine pavilion or kiosk, named de l'Étoile, has also survived. The great Condé was given, for a victory gained near this place, the right to use the style of Enghien among his subsidiary titles.

ENGINE (Lat. *ingenium*), a term which in the time of Chaucer had the meaning of "natural talent" or "ability," corresponding to the Latin from which it is derived (cf. "A man hath sapiences thre, Memorie, engin, and intellect also," *Second Nun's Tale*, 339); in this sense it is now obsolete. It also denoted a mechanical tool or contrivance, and especially a weapon of war; this use may be compared with that of *ingenium* in classical Latin to mean a clever idea or device, and in later Latin, as in Tertullian, for a warlike instrument or machine. In the 19th century it came to have, when employed alone, a specific reference to the steam-engine (*q.v.*), but it is also used of other prime movers such as the air-engine, gas-engine and oil-engine (*qq.v.*).

ENGINEERING, a term for the action of the verb "to engineer," which in its early uses referred specially to the operations of those who constructed engines of war and executed works intended to serve military purposes. Such military engineers were long the only ones to whom the title was applied. But about the middle of the 18th century there began to arise a new class of engineers who concerned themselves with works which, though they might be in some cases, as in the making of roads, of the same character as those undertaken by military engineers, were neither exclusively military in purpose nor executed by soldiers, and those men by way of distinction came to be known as civil engineers. No better definition of their aims and functions can be given than that which is contained in the charter (dated 1828) of the Institution of Civil Engineers (London), where civil engineering is described as the "art of directing the great sources of power in nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation and docks for internal intercourse and exchange, and in the construction of ports, harbours, moles, breakwaters and lighthouses, and in the art of navigation by artificial power for the purposes of commerce, and in the construction and adaptation of machinery, and in the drainage of cities and towns." Wide as is this enumeration, the practice of a civil engineer in the earlier part of the 19th century might cover many or even most of the subjects it contains. But gradually specialization set in. Perhaps the first branch to be recognized as separate was *mechanical* engineering, which is concerned with steam-engines, machine tools, mill-work and moving machinery in general, and it was soon followed by *mining* engineering, which deals with the location and working of coal, ore and other minerals. Subsequently numerous other more or less strictly defined groups and subdivisions came into existence, such as *naval architecture* dealing with the design of ships, *marine* engineering with the engines for propelling steamers, *sanitary* engineering with water-supply and disposal of sewage and other refuse, *gas* engineering with the manufacture and distribution of illuminating gas, and *chemical* engineering with the design and erection of the plant required for the manufacture of such chemical products as alkali, acids and dyes, and for the working of a wide range of industrial processes. The last great new branch is *electrical* engineering, which touches on the older branches at so many points that it has been said that all engineers must be electricians.

ENGINEERS, MILITARY. From the earliest times engineers have been employed both in the field of war and on field defences. In modern times, however, the application of numerous scientific and engineering devices to warfare has resulted in the creation of many minor branches of military engineering, some of them almost rivalling in importance their primary duty of fortification and siegecraft, such as the field telegraph, the balloon service, nearly all demolitions, the building of pontoon and other bridges, and the construction and working of military roads, railways, piers, &c. All these branches requiring special knowledge, the modern tendency is to divide a corps of engineers in accordance with such requirements. The "field companies" and "fortress companies" of the R.E. represent the traditional tactical application of their arm to works of offence and defence in field and siege warfare. The balloon, telegraph, and other branches, also organized on a permanent footing, represent the modern application of scientific aids in warfare. (See Fortification and Siegecraft; Tactics; Infantry, &c.)

History.—It is difficult to distinguish between military and civil engineers in the earlier ages of modern history, for all engineers acted as builders of castles and defensible strongholds, as well as manufacturers and directors of engines of war with which to attack or defend them. The annals of fortification show professors, artists, &c., as well as soldiers and architects, as designers and builders of innumerable systems of fortification. By the middle of the 13th century there was in England an organized body of skilled workmen employed under a "chief engineer." At the siege of Calais in 1347 this corps consisted of masons, carpenters, smiths, tentmakers, miners, armourers, gunners and artillerymen. At the siege of Harfleur in 1415 the chief engineer was designated Master of the King's Works, Guns and Ordnance, and the corps under him numbered 500 men, including 21 foot-archers. Headquarters of engineers existed at the Tower of London before 1350, and a century later developed into the Office of Ordnance (afterwards the Board of Ordnance), whose duty was to administer all matters connected with fortifications, artillery and ordnance stores.

Henry VIII. employed many engineers (of whom Sir Richard Lee is the best known) in constructing coast defences from Penzance to the Thames and thence to Berwick-on-Tweed, and in strengthening the fortresses of Calais and Guînes in France. He also added to the organization a body of pioneers under trench-masters and a master trenchmaster. Charles II. increased the peace establishment of engineers and formed a separate one for Ireland, with a chief engineer who was also surveyor-general of the King's Works. In both countries only a small permanent establishment was maintained, a special ordnance train being enrolled in war-time for each expedition and disbanded on its termination. The commander of an ordnance train was frequently, but not necessarily, an engineer, but there was always a chief engineer of each train. At Blenheim (1704) Marlborough's ordnance train was commanded by Holcroft Blood, a distinguished engineer. But after the rebellion of 1715 it was decided to separate the artillery from the engineers, and the royal warrant of 26th May 1716 established two companies of artillery as a separate regiment, and an engineer corps composed of 1 chief engineer, 3 directors, 6 engineers-in-ordinary, 6 engineers extraordinary, 6 sub-engineers and 6 practitioner engineers.

Until the 14th of May 1757 officers of engineers frequently held, in addition to their military rank in the corps of engineers, commissions in foot regiments; but on and after that date all engineer officers were gazetted to army as well as engineer rank—the chief engineer as colonel of foot, directors as lieutenant-colonel, and so forth down to practitioners as ensigns. On the 18th of November 1782 engineer grades, except that of chief engineer, were abolished, and the establishment was fixed at 1 chief engineer and colonel, 6 colonels commandant, 6 lieutenant-colonels, 9 captains, 9 captain lieutenants (afterwards second captains), 22 first lieutenants, and 22 second lieutenants. Ten years later a small invalid corps was formed. In 1787 the designation "Royal" was conferred upon the engineers, and its precedence settled to be on the right of the army, with the royal artillery.

In 1802 the title of chief engineer was changed to inspector-general of fortifications. From this time to the conclusion of the Crimean War various augmentations took place, consequent on the increasing and widely extending duties thrown upon the officers. These, in addition to ordinary military duties, comprised the construction and maintenance of fortifications, barrack and ordnance store buildings, and all engineering services connected with them. The cadastral survey of the United Kingdom (called the "Ordnance Survey") had been entrusted to the engineers as far back as 1784, and absorbed many officers in its execution.

In 1772 the formation at Gibraltar of "The Company of Soldier Artificers," officered by Royal Engineers, was authorized, and a second company was added soon afterwards. In 1787 by royal warrant "The Corps of Royal Military Artificers" was established at home, consisting of six companies, with which the Gibraltar companies were amalgamated. In 1806 this corps was doubled, and in 1811 increased to 32 companies. In 1813 its title was changed to "The Royal Sappers and Miners." In 1856, at the close of the Crimean War, it was incorporated with "The Corps of Royal Engineers," by whom it had always been officered. At that date the corps numbered about 340 officers and 4000 non-commissioned officers and men, in 1 troop and 32 companies.

In 1770 the East India Company reorganized the engineer corps of the three presidencies, composed of officers only. Native corps of sappers or pioneers were formed later, and officered principally by engineers. The officers of engineers were employed in peace-time on the public works of the country, their services when required being placed at the disposal of the military authorities. The Indian Engineers have not only distinguished themselves in the operations of war, but have left monuments of engineering skill in the irrigation works, railways, surveys, roads, bridges, public buildings and defences of the country. When Indian administration was transferred to the crown (1862) the Indian Engineers became "Royal," so that there now exists but one corps, the Royal Engineers. This is composed of about 1000 officers and 7700 warrant and non-commissioned officers and men. Of the officers some 220 are attached to units, about 400 employed either at home or in the colonies on engineering duties in military commands, on the staff, or on special duty, and about 370 on the Indian establishment. The supreme technical control of the Royal Engineers is exercised from the War Office. See also UNITED KINGDOM; ARMY.

The history of the French engineers shows a somewhat similar line of development. Originally selected officers of infantry were given brevets as engineers, and these men performed military and also civil duties for the king's service by the aid of companies of workmen enlisted and discharged from time to time. Vauban (*q.v.*) was the founder of the famous *corps de Génie* (1690). Its members were selected officers and civilians, employed in all branches of military and naval services, and it soon achieved its European reputation as the first school of fortification and siege-craft. It received a special uniform in 1732. About 1755 it was for a time merged in the artillery. In 1766 the title of *Génie* was conferred upon the officers, and the same name (*troupes de Génie*) was given to the previously existing companies of sappers and miners in 1801.

In the United States the separate Corps of Engineers (since 1794 there had been a Corps of Artillerists and Engineers) was organized in 1802, starting with a small body stationed at West Point, which in 1838 and 1846 was gradually increased, and in 1861 given three additional companies. In 1866 they were formed into a battalion and stationed at Willets Point, N.Y. In 1901 they were reorganized in three battalions, with a total strength of 1282. The U.S. Engineer School, formerly at Willets Point, was transferred in 1901 to Washington. Until 1866 the military academy at West Point was under the supervision of the Corps of Engineers, but from that time its direction was thrown open; but the highest branch at West Point is still regarded as that of the engineers. The Corps of Engineers has done a great deal of highly important work in the United States, notably in building forts, and improving rivers and harbours for navigation.

See Maj.-Gen. R. W. Porter, *Hist. of the Corps of Royal Engineers* (Chatham, 1889); C. Lecomte, *Les Ingénieurs militaires de la France* (Paris, 1903); H. Frobenius, *Geschichte der K. preuss. Ingenieur- und Pioneer-Korps* (Berlin, 1906).

ENGIS, a cave on the banks of the Meuse near Liége, Belgium, where in 1832 Dr P. C. Schmerling found human remains in deposits belonging to the Quaternary period. Bones of the cave-bear, mammoth, rhinoceros and hyena were discovered in association with parts of a man's skeleton and a human skull. This, known as "the Engis Skull," gave rise to much discussion among anthropologists, since it has characteristics of both high and low development, the forehead, low and narrow, indicating slight intelligence, while the abnormally large brain cavity contradicts this conclusion. Of it Huxley wrote: "There is no mark of degradation about any part of its structure. It is a fair average human skull, which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage." Dr Schmerling concluded that the human remains were those of man who had been contemporary with the extinct mammals. As, however, fragments of coarse pottery were found in the cave which bore other evidence of having been used by neolithic man, by whom the cave-floor and its contents might have been disturbed and mixed, his arguments have not been regarded as conclusive. There is, however, no doubt as to the great age of the Engis Skull. Discoveries of a like nature were made by Dr Schmerling in the neighbourhood in the caves of Engihoul, Chokier and others.

See P. C. Schmerling, *Recherches sur les ossements découverts dans les cavernes de la province Liège* (1833); Huxley, *Man's Place in Nature*, p. 156; Lord Avebury, *Prehistoric Times*, p. 317 (1900).

ENGLAND. Geographical usage confines to the southern part of the island of Great Britain the name commonly given to the great insular power of western Europe.[1] In this restricted sense the present article deals with England, the predominant partner in the United Kingdom of Great Britain and Ireland, both as containing the seat of government and in respect of extent, population and wealth.

I. TOPOGRAPHY.

England extends from the mouth of the Tweed in 55° 46′ N. to Lizard Point in 49° 57′ 30″ N., in a roughly triangular form. The base of the triangle runs from the South Foreland to Land's End W. by S., a distance of 316 m. in a straight line, but 545 m. following the larger curves of the coast. The east coast runs N.N.W. from the South Foreland to Berwick, a distance of 348 m., or, following the coast, 640 m. The west coast runs N.N.E. from Land's End to the head of Solway Firth, a distance of 354 m., or following the much-indented coast, 1225 m. The total length of the coast-line may be put down as 2350 m.,[2] out of which 515 m. belong to the western principality of Wales.[3] The most easterly point is at Lowestoft, 1° 46′ E., the most westerly is Land's End, in 5° 43′ W. The coasts are nowhere washed directly by the ocean, except in the extreme south-west; the south coast faces the English Channel, which is bounded on the southern side by the coast of France, the two shores converging from 100 m. apart at the Lizard to 21 at Dover. The east coast faces the shallow North Sea, which widens from the point where it joins the Channel to 375 m. off the mouth of the Tweed, the opposite shores being occupied in succession by France, Belgium, Holland, Germany and Denmark. The west coast faces the Irish Sea, with a width varying from 45 to 130 m.

Counties.	Area Statute Acres.	Population. 1901.
Bedfordshire	298,494	171,240
Berkshire	462,208	256,509
Buckinghamshire	475,682	195,764
Cambridgeshire	549,723	190,682
Cheshire	657,783	815,099
Cornwall	868,220	322,334
Cumberland	973,086	266,933
Derbyshire	658,885	620,322
Devonshire	1,667,154	661,314
Dorsetshire	632,270	202,936
Durham	649,352	1,187,361
Essex	986,975	1,085,771
Gloucestershire	795,709	634,729
Hampshire	1,039,031	797,634
Herefordshire	537,363	114,380
Hertfordshire	406,157	250,152
Huntingdonshire	234,218	57,771
Kent	995,014	1,348,841
Lancashire	1,203,365	4,406,409
Leicestershire	527,123	434,019
Lincolnshire	1,693,550	498,847
Middlesex	181,320	3,585,323
Monmouthshire	341,688	292,317
Norfolk	1,308,439	460,120
Northamptonshire	641,992	338,088
Northumberland	1,291,530	603,498
Nottinghamshire	539,756	514,578
Oxfordshire	483,626	181,120
Rutland	97,273	19,709
Shropshire	859,516	239,324
Somersetshire	1,043,409	508,256
Staffordshire	749,602	1,234,506
Suffolk	952,710	384,293
Surrey	485,122	2,012,744
Sussex	933,887	605,202
Warwickshire	577,462	897,835
Westmorland	503,160	64,303
Wiltshire	879,943	273,869
Worcestershire	480,560	488,338
Yorkshire	3,882,328	3,584,762
Total	32,544,685	30,807,232

The area of England and Wales is 37,327,479 acres or 58,324 sq. m. (England, 50,851 sq. m.), and the population on this area in 1901 was 32,527,843 (England, 30,807,232). The principal territorial divisions of England, as of Wales, Scotland and Ireland, are the counties, of which England comprises 40. Their boundaries are not as a rule determined by the physical features of the land; but localities are habitually defined by the use of their names. A list of the English counties (excluding Wales) is given in the table above.[4]

Hills.—As an introduction to the discussion of the natural regions into which England is divided (Section II.), and for the sake of comparison of altitudes, size of rivers and similar details, the salient geographical features may be briefly summarized. The short land-frontier of England with Scotland (its length is only 100 m.) is in great measure a physical boundary, as considerable lengths of it are formed on the east side by the river Tweed, and on the west by Kershope Burn, Liddel Water, and the river Sark; while for the rest it follows pretty closely the summit of the Cheviot Hills, whose highest point is the Cheviot (2676 ft.). A narrow but well-marked pass or depression, known as the Tyne Gap, is taken to separate the Cheviot system from the Pennine Chain, which is properly to be described as a wide tract of hill-country, extending through two degrees of latitude, on an axis from N. by W. to S. by E. The highest point is Cross Fell (2930 ft.). On the north-west side of the Pennine system, marked off from it by the upper valleys of the rivers Eden and Lune, lies the circular hill-tract whose narrow valleys, radiating from its centre somewhat like wheel-spokes, contain the beautiful lakes which give it the celebrated name of the Lake District. In this tract is found the highest land in England, Scafell Pike reaching 3210 ft. East of the Pennines, isolated on three sides by lowlands and on the fourth side by the North Sea, lie the high moors of the North Riding of Yorkshire, with the Cleveland Hills, and, to the south, the Yorkshire Wolds of the East Riding. Neither of these systems has any great elevation; the moors, towards their north-western edge, reaching an extreme of 1489 ft. in Urra Moor. The tableland called the Peak of Derbyshire, in the south of the Pennine system, is 2088 ft. in extreme height, but south of this system an elevation of 2000 ft. is not found anywhere in England save at a few points on the south Welsh border and in Dartmoor, in the south-west. Wales, on the other hand, projecting into the western sea between Liverpool Bay and the estuary of the Dee on the north, and the Bristol Channel on the south, is practically all mountainous, and has in Snowdon, in the north-west, a higher summit than any in England—3560 ft. But the midlands, the west, and the south of England, in spite of an absence of great elevation, contain no plains of such extent as might make for monotony. The land, generally undulating, is further diversified with hills arranged in groups or ranges, a common characteristic of which is a bold face on the one hand and a long gentle slope, with narrow valleys deeply penetrating, on the other. Southward from the Pennines there may be mentioned, in the midlands, the small elevated tract of Charnwood Forest (Bardon Hill, 912 ft.) in Leicestershire, and Cannock Chase (775 ft.) and the Clent Hills (928 ft.), respectively north and south of the great manufacturing district of Birmingham and Wolverhampton. Of the western counties, the southern half of Shropshire, Herefordshire and Monmouthshire are generally hilly. Among the Shropshire Hills may be mentioned the isolated Wrekin (1335 ft.), Long Mynd (1674 ft.) and the Clee Hills (Brown Clee, 1805 ft.). The long ridge of the Black Mountain reaches an extreme height of 2310 ft. on the Welsh border of Herefordshire. The Malvern Hills on the other side of the county, which, owing to their almost isolated position among lowlands, appear a far more prominent feature, reach only 1395 ft. In western Monmouthshire, again belonging to the south Welsh system, there are such heights as Sugar Loaf (1955 ft.) and Coity (1905 ft.).

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[1] The general questions capable of a single treatment for England, Scotland and Ireland are considered under UNITED KINGDOM.

[2] Measurements made on a map on the scale of 12½ m. to 1 in., the coast being assumed to run up estuaries until the breadth became 1 m., and no bays or headlands of less than 1 m. across being reckoned. The coast-line of Anglesea and the Isle of Wight, but of no other islands, is included.

[3] A separate topographical notice is given under the heading WALES, but the consideration of certain points affecting Wales as linked with England is essential in this article.

[4] The figures given here are for the ancient or geographical counties. Section IX., on *Territorial Divisions*, indicates the departures from the ancient county boundaries made for certain purposes of administration. Each county is treated in a separate article in the topographical, geological, economical and historical aspects. Further topographical details are given in separate articles on the more important hill-systems, rivers, &c.

In the south midlands of England there are two main ranges of hills, with axes roughly parallel. The western range is the Cotteswold Hills of Gloucestershire and the counties adjacent on the east running S.W. and N.E. Its highest point is Cleeve Cloud (1134 ft.). The uplands of Northamptonshire continue this range north-eastward, decreasing in elevation. The eastern range, beginning in Wiltshire, runs E.N.E. as the White Horse Hills (856 ft. at the highest point), and after the interruption caused by the gap or narrow valley by which the river Thames penetrates the hills near Goring, continues N.E. as the Chiltern Hills (850 ft.). The East Anglian ridge continues the line E.N.E., gradually decreasing in altitude. In the south-east of England, the North and South Downs are both well-defined ranges, but are characterized by a number of breaches through which rivers penetrate, on the one hand to the Thames or the North Sea and on the other to the English Channel. Leith Hill in the North Downs reaches 965 ft., and Butser Hill in the South Downs 889 ft.; Blackdown and Hindhead, two almost isolated masses of high ground lying between the two ranges of the Downs towards their western extremity, are respectively 918 and 895 ft. in height. In the north of Hampshire along its boundary with Surrey and Berkshire, in the southern half of Wiltshire (where rises the upland of Salisbury Plain), in Dorsetshire, and the south of Somersetshire, the hills may be said to run in a series of connected groups. They cannot be defined as a single range, nor are they named, as a rule, according to the groups into which they fall, but the general title of the Western Downs is applied to them. One point only in all these groups exceeds 1000 ft. in altitude, namely, Inkpen Beacon (1011 ft.) in the extreme south-west of Berkshire, but heights above 900 ft. are not infrequent. In the northern part of Somersetshire, two ranges, short but well defined, lie respectively east and west of a low plain which slopes to the Bristol Channel. These are the Mendips (Black Down, 1068 ft.) and the Quantocks (Will's Neck, 1261 ft.). The Blackdown Hills, in south-western Somersetshire and eastern Devonshire, reach 1035 ft. in Staple Hill in the first-named county. In western Somersetshire and north Devonshire the elevated mass of Exmoor reaches 1707 ft. in Dunkery Beacon; and in south Devonshire the highest land in southern England is found in the similar mass of Dartmoor (High Willhays, 2039 ft.). The westward prolongation of the great south-western promontory of England, occupied by the county of Cornwall, continues as a rugged ridge broken by a succession of depressions, and exceeds a height of 800 ft., nearly as far as the point where it falls to the ocean in the cliffs of Land's End.

Lowlands.—The localities of the more extensive lowlands of England may now be indicated in their relation to the principal hill-systems, and in this connexion the names of some of the more important rivers will occur. In the extreme north-west is the so-called Solway Plain, of no great extent, but clearly defined between the northern foothills of the Lake District and the shore of Solway Firth. In Lancashire a flat coastal strip occurs between the western front of the Pennine Chain and the Irish Sea, and, widening southward, extends into Cheshire and comprises the lower valleys of the Mersey and the Dee. In the preceding review of the English hill-systems it may have been observed that eastern England hardly enters into consideration. The reason now becomes clear. From Yorkshire to the flat indented sea-coast north of the Thames estuary, east of the Pennines and the slight hills indicated as the Northampton uplands, and in part demarcated southward by the East Anglian ridge in Huntingdonshire, Cambridgeshire and Suffolk, the land, although divided between a succession of river-systems, varies so little in level as to be capable of consideration as a single plain. Its character, however, varies in different parts. The Fens, the flat open levels in the lower basins of the Witham, Welland, Nene and Great Ouse, only kept from their former marshy conditions by an extensive system of artificial drainage, and the similar levels round the head of the Humber estuary, differ completely in appearance from the higher and firmer parts of the plain. The coast-land north of the mouth of the Thames is a low plain; and on the south coast somewhat similar tracts are found in Romney Marsh, and about the shallow inlets (Portsmouth Harbour and others) which open from Spithead. The vales of Kent and Sussex are rich undulating lowlands within the area of the Weald, separated by the Forest Ridges, and enclosed by the North and South Downs. In the south-west there is a fairly extensive lowland in south Devonshire watered by the Exe in its lower course. But the most remarkable plain is that in Somersetshire, enclosed by the Mendips, the Western Downs, Blackdown Hills and the Quantocks and entered by the Parrett and other streams. The midlands, owing to the comparatively slight elevation of the land, are capable of geographical consideration as a plain. But it is not a plain in the sense of that of East Anglia. There is no quite level tract of great extent, excepting perhaps the fertile and beautiful district watered by the lower Severn and its tributary the Upper or Warwickshire Avon, overlooked by the Cotteswolds on the one hand and the Malvern and other hills on the other.

Coast.—The coast-line of England is deeply indented by a succession of large inlets, particularly on the east and west. Thus, from north to south there are, on the east coast, the mouths of the Tyne and the Tees, the Humber estuary, the Wash (which receives the waters of the Witham, Welland, Nene and Great Ouse), the Orwell-Stour, Blackwater and Thames-Medway estuaries. On the west there are Solway Firth, Morecambe Bay, the estuaries of the Mersey and Dee, Cardigan Bay of the Welsh coast, and the Bristol Channel and Severn estuary. In this way the land is so deeply penetrated by the water that no part is more than 75 m. from the sea. Thus Buckingham appears to be the most inland town in England, being 75 m. from the estuaries of the Severn, Thames and Wash; Coleshill, near Birmingham, is also almost exactly 75 m. from the Mersey, Severn and Wash.

The east and south coasts show considerable stretches of uniform uninflected coast-line, and except for the Farne Islands and Holy Island in the extreme north, the flat islands formed by ramifications of the estuaries on the Essex and north Kent coasts, and the Isle of Wight in the south, they are without islands. The west coast, on the other hand, including both shores of the great south-western promontory, is minutely fretted into capes and bays, headlands and inlets of every size, and an island-group lies off each of the more prominent headlands from Land's End northward. The formation of the coast varies from low, shifting banks of shingle or sand to majestic cliffs, and its character in different localities has been foreshadowed in the previous consideration of the hill-systems and lowlands. Thus in the north-east the coast is generally of no great elevation, but the foothills of the Cheviot and Pennine systems approach it closely. On the Yorkshire coast the Cleveland Hills and the high moors are cut off on the seaward side in magnificent cliffs, which reach the greatest elevation of sea-cliffs on the English coast (666 ft.). The Yorkshire Wolds similarly terminate seaward in the noble promontory of Flamborough Head. From this point as far south as the North Foreland of Kent the coast, like the land, is almost wholly low, though there are slight cliffs at some points, as along the coasts of Norfolk and Suffolk, on which the sea constantly encroaches. On the south coast a succession of cliffs and low shores may be correlated with the main physical features of the land. Thus in succession there are the famous white cliffs about Dover, terminating the North Downs, the low coast of Romney Marsh, projecting seaward in Dungeness, the cliffs above Hastings, terminating an offshoot of the Forest Ridges, the low shore between Hastings and Eastbourne, to which succeeds the lofty Beachy Head, terminating the South Downs. A flat coast follows as far as Selsey Bill and Spithead, but the south coast of the Isle of Wight shows a succession of splendid cliffs. The shallow inlet of Poole Bay is followed by the eminence of St Alban's Head, and thereafter, right round the south-western promontory of England, the cliff-bound coast, with its bays and inlets closely beset with hills, predominates over the low shore-line, exhibits a remarkable series of different forms, and provides the finest scenery of its kind in England. The shores of the Severn estuary are low, but the Welsh coast, sharing the general character of the land, is more or less elevated throughout, though none of the higher mountain-masses directly approaches the sea. Low shores correspond to the plains of Cheshire, Lancashire and the Solway, while the intervening coast is of no great elevation, as only the foothills of the Lake District approach it with a gradual slope.

A great extent of the English coast is constantly undergoing visible alteration, the sea in some instances receding from the land, and in others gaining upon it. The whole of Romney Marsh, in Kent and Sussex, formerly constituted an arm of the sea, where vessels rode in deep water, carrying produce to ports no longer in existence. Lydd and Romney, though maritime still in name, retaining some of the ancient privileges of the Cinque Ports, have become, through changes in the coast-line, small inland towns; and the same has been the fate of Rye, Winchelsea, and other places in that district. Again, the Isle of Thanet, in the north-eastern corner of Kent, has practically ceased to be an island. The wide estuary of the sea separating it from the mainland, through which ships sailed from the English Channel into the Thames, using it as the shortest route from the south to London, has entirely disappeared, leaving only a flat lowland traversed by branches of the river Stour to mark its former existence. The sea is encroaching over a considerable extent of coast-line on the North Sea as well as on the English Channel. Ravenspur, once an important town of Yorkshire, where Bolingbroke, afterwards Henry IV., landed in 1399, is now submerged; and Dunwich and other ancient ports in East Anglia have met with the same fate. The process of destruction, slow in some places, is so rapid in others that it can be traced even from month to month—the incessant work of the waves washing away the soft strata at the base of the cliffs and leaving the summits unsupported. Many cliffs of the east coast, from the Humber to the mouth of the Thames, are suffering from this destructive action, and instances also occur on the south coast. A royal commission on Coast Erosion was appointed to inquire into this question in 1906 (see *Report*, 1907 sqq.).

Rivers.	Length Miles.	Drainage Area sq. m.
1. North-east—		
Tweed[1]	97	1870
Tyne	80	1130
Wear	60	458
Tees	85	708
2. East—		
Humber system[2]	..	9293
Witham	80	1079
Welland	70	760
Nene	90	1077
Ouse (Great)	160	2607
Yare	60	880
Stour (Suffolk-Essex)	60	407
Thames[3]	209	5924
3. South—		
Stour (Kent)	40	370
Rother	32	312
Arun	43	370
Avon (Hampshire)	60	1132
Exe	55	584
Tamar	58	384
4. Bristol Channel (south-west)—		
Torridge	45	336
Taw	48	455
Parrett	37	562
Severn[4] [5]	210	6850
Usk[5]	70	540
5. North-west—		
(*a*) Cheshire-Lancashire—		
Dee[5]	70	813
Mersey[6]	70	1596
Ribble	65	585
(*b*) Solway—		
Eden	70	1300

Except along the centre of the Irish Sea, at one point off the Tweed and one between Devon and Normandy, the depth of water between England and the nearest land nowhere exceeds 50 fathoms.

Rivers.—The variations in length of the general slope of the land towards successive natural divisions of the coast may be illustrated by a comparative table of the mileage and drainage areas of the principal English rivers. The mileage does not take account of the lesser sinuosities of rivers.

With the exception of those in the Lake District (*q.v.*) the lakes of England are few and insignificant. A number of small meres occur in a defined area in Cheshire. (O. J. R. H.)

II. Physical Geography

The object of this section is to give a physical description of England and Wales according to natural regions, which usually follow the geology of the country very closely; although the relationship of configuration and geology is not so simple or so clearly marked as in Scotland.

The land is highest in the west and north, where the rocks also are oldest, most disturbed, and hardest, and the land surface gradually sinks towards the east and south, where the rocks become successively less disturbed, more recent, and softer. The study of the scenery of England and Wales as a whole, or the study of orographical and geological maps of the country, allows a broad distinction to be drawn between the types of land-forms in the west and in the east. This distinction is essential, and applies to all the conditions of which geography takes account. The contrasted districts are separated by an intermediate area, which softens the transition between them, and may be described separately.

The Western Division is composed entirely of Archaean and Palaeozoic rocks, embracing the whole range from pre-Cambrian up to Carboniferous. The outcrops of these rocks succeed each other in order of age in roughly concentric belts, with the Archaean mass of the island of Anglesey as a centre, but the arrangement in detail is much disturbed and often very irregular. Contemporary igneous outbursts are extremely common in some of the ancient formations, and add, by their resistance to atmospheric erosion, to the extreme ruggedness of the scenery. The hills and uplands of ancient rocks do not form regular ranges, but rise like islands in four distinct groups from a plain of New Red Sandstone (Permian and Triassic), which separates them from each other and from the newer rocks of the Eastern Division. Each of the uplands is a centre for the dispersal of streams; but with only one prominent exception (the Humber) these reach the sea without crossing into the Eastern Division of the country.

The Eastern Division, lying to the east of the zone of New Red Sandstone, may be defined on the west by a slightly curved line drawn from the estuary of the Tees through Leicester and Stratford-on-Avon to the estuary of the Severn, and thence through Glastonbury to Sidmouth. It is built up of nearly uniform sheets of Mesozoic rock, the various beds of the Jurassic lying above the New Red Sandstone (Triassic), and dipping south-eastward under the successive beds of the Cretaceous system. In exactly the same way the whole of the south-east of the island appears to have been covered uniformly with gently dipping beds of Tertiary sands and clays, beneath which the Cretaceous strata dipped. At some period subsequent to this deposition there was a movement of elevation, which appears to have thrown the whole mass of rocks into a fold along an anticlinal axis running west and east, which was flanked to north and south by synclinal hollows. In these hollows the Tertiary rocks were protected from erosion, and remain to form the London and the Hampshire Basins respectively, while on the anticlinal axis the whole of the Tertiary and the upper Cretaceous strata have been dissected away, and a complex and beautiful configuration has been impressed on the district of the Weald. The general character of the landscape in the Eastern Division is a succession of steep escarpments formed by the edges of the outcropping beds of harder rock, and long gentle slopes or plains on the dip-slopes, or on the softer layers; clay and hard rock alternating throughout the series.

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[1] Partly belonging to Scotland.

[2] The principal members of the Humber-system are the Ouse of Yorkshire (121 m. long from the source of the Swale or Ure) and the Trent (170 m.), *qq.v.* for their numerous important tributaries.

[3] Including the Medway (680 sq. m.) in the drainage area.

[4] Including the Wye (1609 sq. m.) and the Lower Avon (891 sq. m.) in the drainage area.

[5] These rivers have their earlier courses in Wales, and flow at first to some point of east. Of wholly Welsh rivers only the Towy and the Teifi are comparable in length and drainage area with the smaller rivers in the above list (see WALES).

[6] From the source of its headstream the Goyt.

The contrast between the lower grounds of the Western and the Eastern Divisions is masked in many places by the general covering of the surface with glacial drift, which is usually a stiff clay composed on the whole of the detritus of the rocks upon which it rests, though containing fragments of rocks which have been transported from a considerable distance. This boulder clay covers almost all the low ground north of the Thames Basin, its southern margin fading away into washed sands and gravels.

The history of the origin of the land-forms of England, as far as they have been deduced from geological studies, is exceedingly complicated. The fact that every known geological formation (except the Miocene) is represented, proves of itself how long the history has been, and how multifarious the changes. It must suffice to say that the separation of Ireland from England was a comparatively recent episode, while the severance of the land-connexion between England and the continent by the formation of the Strait of Dover is still more recent and probably occurred with the human period.

The western division.

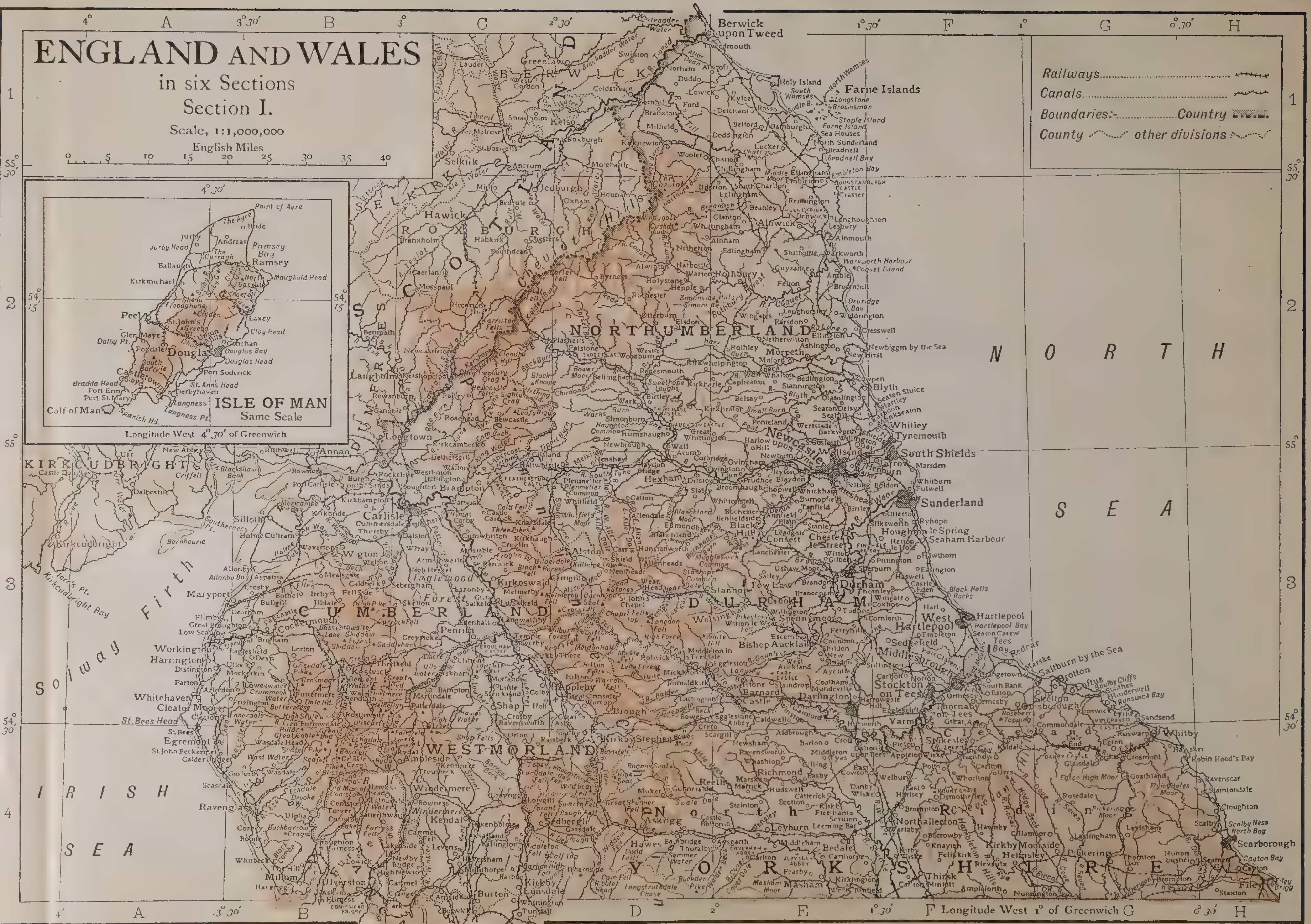
Natural Divisions.—The four prominent groups of high land rising from the plain of the Red Rocks are: (1) the *Lake District*, bounded by the Solway Firth, Morecambe Bay and the valleys of the Eden and the Lune; (2) the *Pennine Region*, which stretches from the Scottish border to the centre of England, running south; (3) *Wales*, occupying the peninsula between the Mersey and the Bristol Channel, and extending beyond the political boundaries of the principality to include Shropshire and Hereford; and (4) the peninsula of *Cornwall and Devon*. They are all similar in the great features of their land-forms, which have been impressed upon them by the prolonged action of atmospheric denudation rather than by the original order and arrangement of the rocks; but each group has its own geological character, which has imparted something of a distinctive individuality to the scenery. Taken as a whole, the Western Division depends for its prosperity on mineral products and manufactures rather than on farming; and the staple of the farmers is live-stock rather than agriculture. The people of the more rugged and remoter groups of this division are by race survivors of the early Celtic stock, which, being driven by successive invaders from the open and fertile country of the Eastern Division, found refuges in the less inviting but more easily defended lands of the west. Even where, as in the Pennine region and the Lake District, the people have been completely assimilated with the Teutonic stock, they retain a typical character, marked by independence of opinion approaching stubbornness, and by great determination and enterprise.

Lake District.—The Lake District occupies the counties of Cumberland, Westmorland and North Lancashire. It forms a roughly circular highland area, the drainage lines of which radiate outward from the centre in a series of narrow valleys, the upper parts of which cut deeply into the mountains, and the lower widen into the surrounding plain. Sheets of standing water are still numerous, and formerly almost every valley contained a single long narrow lake-basin; but some of these have been subdivided, drained or filled up by natural processes. The existing lakes include Windermere and Coniston, draining south; Wastwater, draining south-west, Ennerdale water, Buttermere and Crummock water (the two latter, originally one lake, are now divided by a lateral delta), draining north-west; Derwent water and Bassenthwaite water (which were probably originally one lake), and Thirlmere, draining north; Ullswater and Haweswater, draining north-east. There are, besides, numerous mountain tarns of small size, most of them in hollows barred by the glacial drift which covers a great part of the district. The central and most picturesque part of the district is formed of great masses of volcanic ashes and tuffs, with intrusions of basalts and granite, all of Ordovician (Lower Silurian) age. Scafell and Scafell Pike (3162 and 3210 ft.), at the head of Wastwater, and Helvellyn (3118), at the head of Ullswater, are the loftiest amongst many summits the grandeur of whose outlines is not to be estimated by their moderate height. Sedimentary rocks of the same age form a belt to the north, and include Skiddaw (3054 ft.); while to the south a belt of Silurian rocks, thickly covered with boulder clay, forms the finely wooded valleys of Coniston and Windermere. Round these central masses of early Palaeozoic rocks there is a broken ring of Carboniferous Limestone, and several patches of Coal Measures, while the New Red Sandstone appears as a boundary belt outside the greater part of the district. Where the Coal Measures reach the sea at Whitehaven, there are coal-mines, and the hematite of the Carboniferous Limestones has given rise to the active ironworks of Barrow-in-Furness, now the largest town in the district. Except in the towns of the outer border, the Lake District is very thinly peopled; and from the economic point of view, the remarkable beauty of its scenery, attracting numerous residents and tourists, is the most valuable of its resources. The very heavy rainfall of the district, which is the wettest in England, has led to the utilization of Thirlmere as a reservoir for the water supply of Manchester, over 80 m. distant.

Pennine Region.—The Pennine Region, the centre of which forms the so-called Pennine Chain, occupies the country from the Eden valley to the North Sea in the north, and from the lower Tees, Yorkshire Ouse and Trent, nearly to the Irish Sea, in the south. It includes the whole of Northumberland and Durham, the West Riding of Yorkshire, most of Lancashire and Derbyshire, the north of Staffordshire and the west of Nottinghamshire. The region is entirely composed of Carboniferous rocks, the system which transcends all others in the value of its economic minerals. The coal and iron have made parts of the region the busiest manufacturing districts, and the centres of densest population, in the country, or even in the world. The whole region may be looked upon as formed by an arch or anticline of Carboniferous strata, the axis of which runs north and south; the centre has been worn away by erosion, so that the Coal Measures have been removed, and the underlying Millstone Grit and Carboniferous Limestone exposed to the influences which form scenery. On both sides of the arch, east and west, the Coal Measures remain intact, forming outcrops which disappear towards the sea under the more recent strata of Permian or Triassic age. The northern part of the western side of the anticline is broken off by a great fault in the valley of the Eden, and the scarp thus formed is rendered more abrupt by the presence of a sheet of intrusive basalt. Seen from the valley, this straight line of lofty heights, culminating in Crossfell, presents the nearest approach in England to the appearance of a mountain range. In the north the Pennine region is joined to the Southern Uplands of Scotland by the Cheviot Hills, a mass of granite and Old Red Sandstone; and the northern part is largely traversed by dykes of contemporary volcanic or intrusive rock. The most striking of these dykes is the Great Whin Sill, which crosses the country from a short distance south of Durham almost to the source of the Tees, near Crossfell. The elevated land is divided into three masses by depressions, which furnish ready means of communication between east and west. The South Tyne and Irthing valleys cut off the Cheviots on the north from the Crossfell section, which is also marked off on the south by the valleys of the Aire and Ribble from the Kinder Scout or Peak section. The numerous streams of the region carry off the rainfall down long valleys or dales to the east and the south, and by shorter and steeper valleys to the west. The dales are separated from each other by high uplands, which for the most part are heathery moorland or, at best, hill pastures. The agriculture of the region is confined to the bottoms of the dales, and is of small importance. Crossfell and the neighbouring hills are formed from masses of Carboniferous Limestone, which received its popular name of Mountain Limestone from this fact. Farther south, such summits as High Seat, Whernside, Bow Fell, Penyghent and many others, all over 2000 ft. in height, are capped by portions of the grits and sandstones, which rest upon the limestone. The belt of Millstone Grit south of the Aire, lying between the great coal-fields of the West Riding and Lancashire, has a lower elevation, and forms grassy uplands and dales; but farther south, the finest scenery of the whole region occurs in the limestones of Derbyshire, in which the range terminates. The rugged beauty of the south-running valleys, and especially of Dovedale, is enhanced by the rich woods which still clothe the slopes. There are remarkable features underground as well as on the surface, the caverns and subterranean streams of Yorkshire and Derbyshire being amongst the deepest that have yet been explored. Compared with the rugged and picturesque scenery of the Lower Carboniferous rocks, that of the Coal Measures is, as a rule, featureless and monotonous. The coal-fields on the eastern side, from the Tyne nearly to the Trent, are sharply marked off on the east by the outcrop of Permian dolomite or Magnesian limestone, which forms a low terrace dipping towards the east under more recent rocks, and in many places giving rise to an escarpment facing westward towards the gentle slope of the Pennine dales. To the west and south the Coal Measures dip gently under the New Red Sandstone, to reappear at several points through the Triassic plain. The clear water of the upland becks and the plentiful supply of water-power led to the founding of small paper-mills in remote valleys before the days of steam, and some of these primitive establishments still exist. The prosperity and great population of the Pennine region date from the discovery that pit-coal could smelt iron as well as charcoal; and this source of power once discovered, the people bred in the dales developed a remarkable genius for mechanical invention and commercial enterprise, which revolutionized the economic life of the world and changed England from an agricultural to an industrial country. The staple industry of the district in ancient times was sheep-rearing, and the villages in nearly all the dales carried on a small manufacture of woollen cloth. The introduction of cotton caused the woollen manufactures on the western side to be superseded by the working up of the imported raw material; but woollen manufactures, themselves carried on now almost entirely with imported raw material, have continued to employ the energies of the inhabitants of the east. Some quiet market-towns, such as Skipton and Keighley, remain, but most of them have developed by manufactures into great centres of population, lying, as a rule, at the junction of thickly peopled valleys, and separated from one another by the empty uplands. Such are Leeds, Bradford, Sheffield, Huddersfield and Halifax on the great and densely peopled West Riding coal-field, which lies on the eastern slope of the Pennines. The iron ores of the Coal Measures have given rise to great manufactures of steel, from cutlery to machinery and armour-plates. High on the barren crest of the Pennines, where the rocks yield no mineral wealth, except it be medicinal waters, Harrogate, Buxton and Matlock are types of health resorts, prosperous from their pure air and fine scenery. Across the moors, on the western side of the anticline, the vast and dense population of the Lancashire coal-field is crowded in the manufacturing towns surrounding the great commercial centre, Manchester, which itself stands on the edge of the Triassic plain. Ashton, Oldham, Rochdale, Bury, Bolton and Wigan form a nearly confluent semicircle of great towns, their prosperity founded on the underlying coal and iron, maintained by imported cotton. The Lancashire coal-field, and the portion of the bounding plain between it and the seaport of Liverpool, contain a population greater than that borne by any equal area in the country, the county of London and its surroundings not excepted. In the south-west of the Pennine region the coal-field of North Staffordshire supports the group of small but active towns known collectively from the staple of their trade as "The Potteries." On the north-east the great coal-field of Northumberland and Durham, traversed midway by the Tyne, supports the manufactures of Newcastle and its satellite towns, and leaves a great surplus for export from the Tyne ports.

Wales.—The low island of Anglesey, which is built up of the fundamental Archaean rocks, is important as a link in the main line of communication with Ireland, because it is separated from the mainland by a channel narrow enough to be bridged, and lies not far out of the straight line joining London and Dublin. The mainland of Wales rises into three main highlands, the mountain groups of North, Mid and South Wales, connected together by land over 1000 ft. in elevation in most places, but separated by valleys affording easy highways. The streams of the southern and western slopes are short and many, flowing directly to the Bristol Channel and the Irish Sea; but the no less numerous streams of the eastern slopes gather themselves into three river systems, and reach the sea as the Dee, the Severn and the Wye. The mountain group of *North Wales* is the largest and loftiest; its scenery resembles that of the Scottish Highlands because of the juxtaposition of ancient Palaeozoic rocks—Cambrian and Ordovician, often altered into slate—and contemporaneous volcanic outbursts and igneous intrusions. Here rises the peak of Snowdon (3560 ft.), the culminating point of South Britain, and near it half a dozen summits exceed 3000 ft., while Cader Idris, farther south, though slightly lower, presents a singularly imposing outline. The mild winter climate has fringed the coast with seaside resorts, the rugged heights attract tourists in summer, and the vast masses of slate have given rise to the largest slate quarries in the world. The heavy rainfall of the upper valleys unfits them for agriculture, and the farms are poor. There are several lakes: that of Bala being the largest, except the old lake of Vyrnwy, reconstituted artificially to store the rainfall for the water-supply of Liverpool, 68 m. distant. The Vyrnwy is tributary to the Severn; but north of it the streams gather into the Dee, and flow eventually northward. *Mid Wales* is built up, for the most part, of Silurian or Ordovician rocks, practically free from igneous intrusions except in the south-west. There the resistance of a series of igneous dykes gives prominence to the Pembroke peninsula, in which the fine fjord-like harbour of Milford Haven lies far out towards the Atlantic. The coast north of Pembroke and Merioneth has been worked into the grand sweep of Cardigan Bay, its surface carved into gently rounded hills, green with rich grass, which sweep downward into wide rounded valleys. Plinlimmon (2468 ft.) is the highest of the hills, and forms a sort of hydrographic centre for the group, as from its eastern base the Severn and the Wye take their rise—the former describing a wide curve to east and south, the latter forming a chord to the arc in its southward course. Mid Wales is mainly a pastoral country, and very thinly peopled. A group of artificial lakes, one of them exceeded in area only by Windermere, has been formed in the valley of the Elan, a tributary of the Wye, for the supply of water to Birmingham. The group of heights of *South Wales*, running on the whole from west to east, marks the outcrops of the Old Red Sandstone and Carboniferous strata which lie within a vast syncline of the Silurian rocks. The Brecon Beacons of Old Red Sandstone are the highest (2907 ft.), but the Black Mountain bears a number of picturesque summits carved out of Millstone Grit and Carboniferous Limestone, which rise frequently over 2000 ft. Throughout Hereford, and in part of Monmouthshire, the Old Red Sandstone sinks to a great undulating plain, traversed by the exquisite windings of the Wye, and forming some of the richest pasture and fruit lands of England. This plain formed an easy passage from south to north, and since the time of the Romans was a strategical line of the greatest importance, a fact which has left its traces on the present distribution of towns. Around the western and northern edge of the Old Red Sandstone plain the underlying Silurian rocks (and even the Cambrian and Archaean in places) have been bent up so that their edges form hills of singular abruptness and beauty. Of these are the Malvern Hills, east of Hereford, and in particular the hills of Shropshire. Wenlock Edge, running from south-west to north-east, is an escarpment of Silurian limestone, while the broad upland of Long Mynd, nearly parallel to it on the north, is a mass of Archaean rock. The Wrekin, the Caradoc and Cardington Hills are isolated outbursts of pre-Cambrian volcanic rocks. The outer rim of the Welsh area contains a broken series of coal-fields, where patches of Carboniferous strata come to the surface on the edge of the New Red Sandstone plain. Such are the coal-fields of Flint in the north, the Forest of Wyre and the Forest of Dean, close to the Severn, on the east. The great coal-field on the south is a perfect example of a synclinal basin, the Millstone Grit and Carboniferous Limestone which underlie the Coal Measures appearing all round the margin. This coal-field occupies practically the whole of Glamorgan and part of Monmouth, and its surface slopes from the Black Mountain and Brecon Beacons to the sea as a gently inclined plateau, scored by deep valleys draining south. Each chief valley has a railway connecting a string of mining villages, and converging seaward to the busy ports of Newport, Cardiff and Barry (a town created on a sandy island by the excavation of a great dock to form an outlet for the mines). In the north of the field, where the limestone crops out and supplies the necessary flux, Merthyr Tydfil has become great through iron-smelting; and in the west Swansea is the chief centre in the world for copper and tin smelting. The unity and ruggedness of the highlands of Wales have proved sufficient to isolate the people from those of the rest of South Britain, and to preserve a purely Celtic race, still very largely of Celtic speech.

Cornwall and Devon.—The peninsula of Cornwall and Devon may be looked upon as formed from a synclinal trough of Devonian rocks, which appear as plateaus on the north and south, while the centre is occupied by Lower Carboniferous strata at a lower level. The northern coast, bordering the Bristol Channel, is steep, with picturesque cliffs and deep bays or short valleys running into the high land, each occupied by a little seaside town or village. The plateau culminates in the barren heathy upland of Exmoor, which slopes gently southward from a general elevation of 1600 ft., and is almost without inhabitants. The Carboniferous rocks of the centre form a soil which produces rich pasture under the heavy rainfall and remarkably mild and equable temperature, forming a great cattle-raising district. The Devonian strata on the south do not form such lofty elevations as those on the north, and are in consequence, like the plain of Hereford, very fertile and peculiarly adapted for fruit-growing and cider-making. The remarkable features of the scenery of South Devon and Cornwall are due to a narrow band of Archaean rock which appears in the south of the peninsulas terminating in Lizard Head and Start Point, and to huge masses of granite and other eruptive rocks which form a series of great bosses and dykes. The largest granite boss gives relief to the wild upland of Dartmoor, culminating in High Willhays and Yes Tor. The clay resulting from the weathering of the Dartmoor granite has formed marshes and peat bogs, and the desolation of the district has been emphasized by the establishment in its midst of a great convict prison, and in its northern portion of a range for artillery practice. The Tamar flows from north to south on the Devonian plain, which lies between Dartmoor on the east and the similar granitic boss of Bodmin Moor (where Brown Willy rises to 1345 ft.) on the west. There are several smaller granite bosses, of which the mass of Land's End is the most important. Most of the Lizard peninsula, the only part of England stretching south of 50° N., is a mass of serpentine. The great variety of the rocks which meet the sea along the south of Cornwall and Devon has led to the formation of a singularly picturesque coast—the headlands being carved from the hardest igneous rocks, the bays cut back in the softer Devonian strata. The fjord-like inlets of Falmouth, Plymouth and Dartmouth are splendid natural harbours, which would have developed great commercial ports but for their remoteness from the centres of commerce and manufactures. China clay from the decomposing granites; tin and copper ore, once abounding at the contacts between the granite and the rocks it pierced, were the former staples of wealth, and the mining largely accounts for the exceptional density of population in Cornwall. Fishing has always been important, the numerous good harbours giving security to fishing-boats; and the fact that this coast is the mildest and almost the sunniest, though by no means the driest, part of Great Britain has led to the establishment of many health



ENGLAND AND WALES
in six Sections
Section I.
Scale, 1:1,000,000

English Miles
0 5 10 15 20 25 30 35 40
Railways
Canals
Boundaries:- Country
County other divisions
ISLE OF MAN
Same Scale
Longitude West 4° 30′ of Greenwich
Longitude West 1° of Greenwich
A
B
C
D
E
F
G
H
1
2
3
4
4°
3° 30′
3°
2° 30′
2°
1° 30′
1°
0° 30′
55° 30′
55°
54° 30′
54° 15′
NORTH SEA
IRISH SEA
Solway Firth
NORTHUMBERLAND
CUMBERLAND
WESTMORLAND
DURHAM
YORKSHIRE
North Riding
LANCASHIRE
BERWICK
ROXBURGH
SELKIRK
DUMFRIES
KIRKCUDBRIGHT
SCOTLAND
Cheviot Hills
Berwick upon Tweed
Farne Islands
Holy Island
Newcastle upon Tyne
South Shields
Tynemouth
Sunderland
Durham
Hartlepool
West Hartlepool
Stockton on Tees
Middlesbrough
Darlington
Whitby
Scarborough
Filey
Carlisle
Kendal
Keswick
Penrith
Whitehaven
Workington
Maryport
Hexham
Alnwick
Morpeth
Douglas
Ramsey
Peel
Castletown
Calf of Man
Point of Ayre
Hawick
Kelso
Jedburgh
Kirkcudbright
Annan

Continuation South, Section 2.

Emery Walker sc.

resorts, of which Torquay is the chief. The old Cornish language of the Celtic stock became extinct only in the 18th century, and the Cornish character remains as a heritage of the time when the land had leisure to mould the life and the habits of the man. Projecting farthest of all England into the Atlantic, it is not surprising that the West country has supplied a large proportion of the great naval commanders in British history, and of the crews of the navy.

The midland plain.

Between the separate uplands there extends a plain of Permian and Triassic rocks, which may conveniently be considered as an intermediate zone between the two main divisions. To the eye it forms an almost continuous plain with the belt of Lias clays, which is the outer border of the Eastern Division; for although a low escarpment marks the line of junction, and seems to influence the direction of the main rivers, there is only one plain so far as regards free movement over its surface and the construction of canals, roads and railways. The plain usually forms a distinct border along the landward margins of the uplands of more ancient rock, though to the east of the Cornwall-Devon peninsula it is not very clear, and its continuity in other places is broken by inliers of the more ancient rocks, which everywhere underlie it. One such outcrop of Carboniferous Limestone in the south forms the Mendip Hills; another of the Coal Measures increases the importance of Bristol, where it stands at the head of navigation on the southern Avon. In the north-west a tongue of the Red rocks forms the Eden valley, separating the Lake District from the Pennine Chain, with Carlisle as its central town. Farther south, these rocks form the low coastal belt of Lancashire, edged with the longest stretches of blown sand in England, and dotted here and there with pleasure towns, like Blackpool and Southport. The plain sweeps round south of the Lancashire coal-field, forms the valley of the Mersey from Stockport to the sea, and farther south in Cheshire the salt-bearing beds of the Keuper marls give rise to a characteristic industry. The plain extends through Staffordshire and Worcester, forming the lower valley of the Severn. The greater part of Manchester, all Liverpool and Birkenhead, and innumerable busy towns of medium size, which in other parts of England would rank as great centres of population, stand on this soil. Its flat surface and low level facilitate the construction of railways and canals, which form a closer network over it than in other parts of the country. The great junction of Crewe, where railways from south-east, south-west, east, west and north converge, is thus explained. South of the Pennines, the Red rocks extend eastward in a great sweep through the south of Derbyshire, Warwick, the west of Leicestershire, and the east of Nottingham, their margin being approximately marked by the Avon, flowing south-west, and the Soar and Trent, flowing north-east. South and east of these streams the very similar country is on the Lias clay. Several small coal-fields rise through the Red rocks—the largest, between Stafford and Birmingham, forms the famous "Black Country," with Wolverhampton and Dudley as centres, where the manufacture of iron has preserved a historic continuity, for the great Forest of Arden supplied charcoal until the new fuel from the pits took its place. This coal-field, ministering to the multifarious metal manufactures of Birmingham, constitutes the centre of the Midlands. Smaller patches of the Coal Measures appear near Tamworth and Burton, while deep shafts have been sunk in many places through the overlying Triassic strata to the coal below, thus extending the mining and manufacturing area beyond the actual outcrop of the Coal Measures. A few small outcrops occur where still more ancient strata have been raised to the surface, as, for instance, in Charnwood Forest, where the Archaean rocks, with intrusions of granite, create a patch of highland scenery in the very heart of the English plain; and in the Lickey Hills, near Birmingham, where the prominent features are due to volcanic rocks of very ancient date. The "Waterstones," or Lower Keuper Sandstones,—forming gentle elevations above the softer marls, and usually charged with an abundant supply of water, which can be reached by wells,—form the site of many towns, such as Birmingham, Warwick and Lichfield, and of very numerous villages. The plain as a whole is fertile and undulating, rich in woods and richer in pasture: the very heart of rural England. Cattle-grazing is the chief farm industry in the west, sheep and horse-rearing in the east; the prevalence of the prefix "Market" in the names of the rural towns is noticeable in this respect. The manufacture of woollen and leather goods is a natural result of the raising of live stock; Leicester, Coventry and Nottingham are manufacturing towns of the region. The historic castles, the sites of ancient battles, and the innumerable mansions of the wealthy, combine to give to central England a certain aesthetic interest which the more purely manufacturing districts of the west and north fail to inspire. The midland plain curves northward between the outcrop of the Dolomite on the west and the Oolitic heights on the east. It sinks lowest where the estuary of the Humber gathers in its main tributaries, and the greater part of the surface is covered with recent alluvial deposits. The Trent runs north in the southern half of this plain, the Ouse runs south through the northern half, which is known as the Vale of York, lying low between the Pennine heights on the west and the Yorkshire moors on the east. Where the plain reaches the sea, the soft rocks are cut back into the estuary of the Tees, and there Middlesbrough stands at the base of the Moors. The quiet beauty of the rural country in the south, where the barren Bunter pebble-beds have never invited agriculture, and where considerable vestiges of the old woodland still remain in and near Sherwood Forest, has attracted so many seats of the landed aristocracy as to earn for that part the familiar name of "the Dukeries." The central position of York in the north made it the capital of Roman Britain in ancient times, and an important railway junction in our own.

The eastern division.

Five natural regions may be distinguished in the Eastern Division of England, by no means so sharply marked off as those of the west, but nevertheless quite clearly characterized. The first is the Jurassic Belt, sweeping along the border of the Triassic plain from the south coast at the mouth of the Exe to the east coast at the mouth of the Tees. This is closely followed on the south-east by the Chalk country, occupying the whole of the rest of England except where the Tertiary Basins of London and Hampshire cover it, where the depression of the Fenland carries it out of sight, and where the lower rocks of the Weald break through it. Thus the Chalk appears to run in four diverging fingers from the centre or palm on Salisbury Plain, other formations lying wedge-like between them. Various lines of reasoning unite in proving that the Mesozoic rocks of the south rest upon a mass of Palaeozoic rocks, which lies at no very great depth beneath the surface of the anticlinal axis running from the Bristol Channel to the Strait of Dover. The theoretical conclusion has been confirmed by the discovery of Coal Measures, with workable coal seams, at Dover at a depth of 2000 ft. below the surface.

The Eastern Division is built up of parallel strata, the edges of the harder rocks forming escarpments, the sheets of clay forming plains; and on this account similar features are repeated in each of the successive geological formations. The rivers exhibit a remarkably close relation to the geological structure, and thus contrast with the rivers of the Western Division. There are two main classes of river-course—those flowing down the dip-slopes at right angles to the strike, and cutting through opposed escarpments by deep valleys, and those following the line of strike along a bed of easily eroded rock. A third class of streams, tributary to the second, flows down the steep face of the escarpments. By the study of the adjustment of these rivers to their valleys, and of the relation of the valleys to the general structure, Professor W. M. Davis has elaborated a theory of river classification, and a scheme of the origin of surface-features which is attractive in its simplicity. The Thames is the one great river of the division, rising on the Jurassic Belt, crossing the Chalk country, and finishing its course in the Tertiary London Basin, towards which, in its prevailing west-to-east direction, it draws its tributaries from north and south. The other rivers are shorter, and flow either to the North Sea on the east, or to the English Channel on the south. With the exception of the Humber, they all rise and pursue their whole course within the limits of the Eastern Division itself.

The Eastern Division is the richest part of England agriculturally, it is the part most accessible to trade with the Continent, and that least adapted for providing refuges for small bodies of men in conflict with powerful invaders. Hence the latest of the conquerors, the Saxon and other Germanic tribes, obtained an easy mastery, and spread over the whole country, holding their own against marauding Northmen, except on the northern part of the east coast; and even after the political conquest by the Normans, continuing to form the great mass of the population, though influenced not a little by the fresh blood and new ideas they had assimilated. The present population is so distributed as to show remarkable dependence on the physical features. The chalk and limestone plateaus are usually almost without inhabitants, and the villages of these districts occur grouped together in long strings, either in drift-floored valleys in the calcareous plateaus, or along the exposure of some favoured stratum at their base. In almost every case the plain along the foot of an escarpment bears a line of villages and small towns, and on a good map of density of population the lines of the geological map may be readily discerned.

The Jurassic Belt.—The Jurassic belt is occupied by the counties of Gloucester, Oxford, Buckingham, Bedford, Northampton, Huntingdon, Rutland, Lincoln and the North Riding of Yorkshire. The rocks of the belt may be divided into two main groups: the Lias beds, which come next to the Triassic plain, and the Oolitic beds. Each group is made up of an alternation of soft marls or clays and hard limestones or sandstones. The low escarpments of the harder beds of the Lias are the real, though often scarcely perceptible, boundary between the Triassic plain and the Jurassic belt. They run along the right bank of the Trent in its northward course to the Humber, and similarly direct the course of the Avon southward to the Severn. The great feature of the region is the long line of the Oolitic escarpment, formed in different places by the edges of different beds of rock. The escarpment runs north from Portland Island on the English Channel, curves north-eastward as the Cotteswold Hills, rising abruptly from the Severn plain to heights of over 1000 ft.; it sinks to insignificance in the Midland counties, is again clearly marked in Lincolnshire, and rises in the North Yorkshire moors to its maximum height of over 1500 ft. Steep towards the west, where it overlooks the low Lias plain as the Oolitic escarpment, the land falls very gently in slopes of Oxford Clay towards the Cretaceous escarpments on the south and east. Throughout its whole extent it yields valuable building-stone, and in the Yorkshire moors the great abundance of iron ore has created the prosperity of Middlesbrough, on the plain below. The Lias plain is rich grazing country, the Oxford Clay forms valuable agricultural land, yielding heavy crops of wheat. The towns of the belt are comparatively small, not one attains a population of 75,000, and the favourite site is on the Lias plain below the great escarpment. They are for the most part typical rural market-towns, the manufactures, where such exist, being usually of agricultural machinery, or woollen and leather goods. Bath, Gloucester, Oxford, Northampton, Bedford, Rugby, Lincoln and Scarborough are amongst the chief. North of the gap in the low escarpment in which the town of Lincoln centres, a close fringe of villages borders the escarpment on the west; and throughout the belt the alternations of clay and hard rock are reflected in the grouping of population.

The Chalk Country.—The dominating surface-feature formed by the Cretaceous rocks is the Chalk escarpment, the northern edge of the great sheet of chalk that once spread continuously over the whole south-east. It appears as a series of rounded hills of no great elevation, running in a curve from the mouth of the Axe to Flamborough Head, roughly parallel with the Oolitic escarpment. Successive portions of this line of heights are known as the Western Downs, the White Horse Hills, the Chiltern Hills, the East Anglian Ridge, the Lincolnshire Wolds and the Yorkshire Wolds. The rivers from the gentle southern slopes of the Oolitic heights pass by deep valleys through the Chalk escarpments, and flow on to the Tertiary plains within. The typical scenery of the Chalk country is unrelieved by small streams of running water; the hills rise into rounded downs, often capped with fine clumps of beech, and usually covered with thin turf, affording pasture for sheep. The chalk, when exposed on the surface, is an excellent foundation for roads, and the lines of many of the Roman "streets" were probably determined by this fact. The Chalk country extends over part of Dorset, most of Wiltshire, a considerable portion of Hampshire and Oxfordshire, most of Hertfordshire and Cambridgeshire, the west of Norfolk and Suffolk, the east of Lincolnshire, and the East Riding of Yorkshire. From the upland of Salisbury Plain, which corresponds to the axis of the anticline marking the centre of the double fold into which the strata of the south of England have been thrown, the great Chalk escarpment runs north-eastward; fingers of Chalk run eastward one each side of the Weald, forming the North and South Downs, while the southern edge of the Chalk sheet appears from beneath the Tertiary strata at several places on the south coast, and especially in the Isle of Wight. Flamborough Head, the South Foreland, Beachy Head and the Needles are examples of the fine scenery into which chalk weathers where it fronts the sea, and these white cliffs gave to the island its early name of Albion. The Chalk is everywhere very thinly peopled, except where it is thickly covered with boulder clay, and so becomes fertile, or where it is scored by drift-filled valleys, in which the small towns and villages are dotted along the high roads. The thickest covering of drift is found in the Holderness district of Yorkshire, where, from the chalk cliffs of Flamborough Head to the sandspit of Spurn Point, the whole coast is formed of boulder-clay resting on chalk. Of the few towns in the Chalk country, the interest of which is largely historical or scholastic, Salisbury, Winchester, Marlborough and Cambridge are the most distinguished. Reading flourishes from its position on the edge of the London Tertiary Basin, Croydon is a suburb of London, and Hull, though on the Chalk, derives its importance from the Humber estuary, which cuts through the Chalk and the Jurassic belts, to drain the Triassic plain and the Pennine region. The narrow strip of Greensands appearing from beneath the Chalk escarpment on its northern side is crowded with small towns and villages on account of the plentiful water-supply. The distinction between the low grounds of the Jurassic belt and the Chalk country is not always very apparent on the surface, and from the historic point of view it is important to recognize the individuality of the Eastern plain which extends from the Vale of York across the Humber and the Wash into Essex. The Eastern plain thus includes a portion of the Triassic plain in the north, a portion of the Jurassic and Chalk belts in the middle, and a portion of the Tertiary plain of the London Basin in the south.

The Fenland.—The continuity of the belts of Chalk and of the Middle and Upper Oolites in the Eastern Plain is broken by the shallow depression of the Wash and the Fenland. The Fenland comprises a strip of Norfolk, a considerable part of Cambridgeshire, and the Holland district of Lincoln. Formerly a great inlet with vague borders of lagoons and marshes, the Fenland has been reclaimed partly by natural processes, partly by engineering works patiently continued for centuries. The whole district is flat and low, for the most part within 15 ft. of sea-level; the seaward edge in many places is below the level of high tide, and is protected by dykes as in Holland, while straight canals and ditches carry the sluggish drainage from the land. The soil is composed for the most part of silt and peat. A few small elevations of gravel, or of underlying formations, rise above the level of 25 ft.; these were in former times islands, and now they form the sites of the infrequent villages. Boston and King's Lynn are memorials of the maritime importance of the Wash in the days of small ships. The numerous ancient churches and the cathedrals of Ely and Peterborough bear witness to the share taken by religious communities in the reclamation and cultivation of the land.

The Weald.—The dissection of the great east and west anticline in the south-east of England has resulted in a remarkable piece of country, occupying the east of Hampshire and practically the whole of Sussex, Surrey and Kent, in which each geological stratum produces its own type of scenery, and exercises its own specific influence on every natural distribution. The sheet of Chalk shows its cut edges in the escarpments facing the centre of the Weald, and surrounding it in an oval ring, the eastern end of which is broken by the Strait of Dover, so that its completion must be sought in France. From the crest of the escarpment, all round on south, west and north, the dip-slope of the Chalk forms a gentle descent outwards, the escarpment a very steep slope inwards. The cut edges of the escarpment forming the Hog's Back and North Downs on the north, and the South Downs on the south, meet the sea in the fine promontories of the South Foreland and Beachy Head. The Downs are almost without population, waterless and grass-covered, with patches of beech wood. Their only important towns are on the coast, *e.g.* Brighton, Eastbourne, Dover, Chatham, or in the gaps where rivers from the centre pierce the Chalk ring, as at Guildford, Rochester, Canterbury, Lewes and Arundel. Within the Chalk ring, and at the base of the steep escarpment, there is a low terrace of the Upper Greensand, seldom so much as a mile in width, but in most places crowded with villages scarcely more than a mile apart, and ranged like beads on a necklace. Within the Upper Greensand an equally narrow ring of Gault is exposed, its stiff clay forming level plains of grazing pasture, without villages, and with few farmhouses even; and from beneath it the successive beds of the Lower Greensand rise towards the centre, forming a wider belt, and reaching a considerable height before breaking off in a fine escarpment, the crest of which is in several points higher than the outer ring of Chalk. Leith Hill and Hindhead are parts of this edge in the west, where the exposure is widest. Several towns have originated in the gaps of the Lower Greensand escarpment which are continuous with those through the Chalk: such are Dorking, Reigate, Maidstone and Ashford. Folkestone and Pevensey stand where the two ends of the broken ring meet the sea. It is largely a region of oak and pine trees, in contrast to the beech of the Chalk Downs. The Lower Greensand escarpment looks inwards in its turn over the wide plain of Weald Clay, along which the Medway flows in the north, and which forms a fertile soil, well cultivated, and particularly rich in hops and wheat. The primitive forests have been largely cleared, the primitive marshes have all been drained, and now the Weald Clay district is fairly well peopled and sprinkled with villages. From the middle of this plain the core of Lower Cretaceous sandstones known as the Hastings Beds emerges steeply, and reaches in the centre an elevation of 796 ft. at Crowborough Beacon. It is on the whole a region with few streams, and a considerable portion of the ancient woodland still remains in Ashdown Forest. The greater part of the Forest Ridges is almost without inhabitants. Towns are found only round the edge bordering the Weald Clay, such as Tonbridge, Tunbridge Wells and Horsham; and along the line where it is cut off by the sea, *e.g.* Hastings and St Leonards. The broad low tongue of Romney Marsh running out to Dungeness is a product of shore-building by the Channel tides, attached to the Wealden area, but not essentially part of it.

The London Basin.—The London Basin occupies a triangular depression in the Chalk which is filled up with clays and gravels of Tertiary and later age. It extends from the eastern extremity of Wiltshire in a widening triangle to the sea, which it meets along an irregular line from Deal to Cromer. It thus occupies parts of Wiltshire, Hampshire, Surrey, Kent, Berkshire, Hertfordshire, the whole of Middlesex, the county of London and Essex, and the eastern edge of Suffolk and Norfolk. The scenery is quiet in its character, but the gravel hills are often prominent features, as at Harrow and in the northern suburbs of London; the country is now mainly under grass or occupied with market and nursery gardens, and many parts, of which Epping Forest is a fine example, are still densely wooded, the oak being the prevailing tree. The coast is everywhere low and deeply indented by ragged and shallow estuaries, that of the Thames being the largest. Shallow lagoons formed along the lower courses of the rivers of Norfolk have given to that part of the country the name of the Broads, a district of low and nearly level land. Apart from the huge area of urban and suburban London, the London Basin has few large towns. Norwich and Ipswich, Yarmouth, Lowestoft, Harwich and Colchester may be mentioned in the north-eastern part, all depending for their prosperity on agriculture or on the sea; and a fringe of summer resorts on the low coast has arisen on account of the bracing climate. Reading and Windsor lie in the western portion, beyond the suburban sphere of London. The Bagshot Beds in the west form infertile tracts of sandy soil, covered with heath and pine, where space is available for the great camps and military training-grounds round Aldershot, and for the extensive cemeteries at Woking. The London Clay in the east is more fertile and crowded with villages, while the East Anglian portion of the basin consists of the more recent Pliocene sands and gravels, which mix with the boulder clay to form the best wheat-growing soil in the country.

The Hampshire Basin.—The Hampshire Basin forms a triangle with Dorchester, Salisbury and Worthing near the angles, and the rim of Chalk to the south appears in broken fragments in the Isle of Purbeck, the Isle of Wight, and to the east of Bognor. On the infertile Bagshot Beds the large area of the New Forest remains untilled under its ancient oaks. The London Clay of the east is more fertile, but the greatness of this district lies in its coast-line, which is deeply indented, like that of the London Basin. Southampton and Portsmouth have gained importance through their fine natural harbours, improved by engineering works and fortifications; Bournemouth and Bognor, from their favourable position in the sunniest belt of the country, as health resorts.

Communications.—The configuration of England, while sufficiently pronounced to allow of the division of the country into natural regions, is not strongly enough marked to exercise any very great influence upon lines of communication. The navigable rivers are all connected by barge-canals, even across the Pennine Chain. Although the waterways are much neglected, compared with those of France or of Germany, they might still be very useful if they were enlarged and improved and if free competition with railways could be secured. The main roads laid out as arteries of intercommunication by the Romans, suffered to fall into neglect, and revived in the coaching days of the beginning of the 19th century, fell into a second period of comparative neglect when the railway system was completed; but they have recovered a very large share of their old importance in consequence of the development of motor-traffic. Following the Roman roads, the high roads of the Eastern Division very frequently run along the crests of ridges or escarpments; but in the Western Division they are, as a rule, forced by the more commanding relief of the country to keep to the river valleys and cross the rougher districts through the dales and passes. The railways themselves, radiating from the great centres of population, and especially from London, are only in a few instances much affected by configuration. The Pennine Chain has always separated the traffic from south to north into an east coast route through the Vale of York, and a west coast route by the Lancashire plain. The Midland railway, running through the high and rugged country between the two, was the last to be constructed. The most notable bridges over navigable water affording continuous routes are those across Menai Strait, the Tyne at Newcastle, the Severn at Severn Bridge and the Manchester Ship Canal. It is more usual to tunnel under such channels, and the numerous Thames tunnels, the Mersey tunnel between Liverpool and Birkenhead, and the Severn tunnel, the longest in the British Islands (4½ m.), on the routes from London to South Wales, and from Bristol to the north of England, are all important. The Humber estuary is neither bridged nor tunnelled below Goole.

Density of Population.—The present distribution of population over England and Wales shows a dense concentration at all large seaports, in the neighbourhood of London, and on the coal-fields where manufactures are carried on. Agricultural areas are very thinly peopled; purely pastoral districts can hardly be said to have any settled population at all. There are very few dwellings situated at a higher level than 1000 ft., and on the lower ground the Chalk and the Oolitic limestones, where they crop out on the surface, are extremely thinly peopled, and so as a rule are areas of alluvial deposits and the Tertiary sands. But, on the other hand, the broad clay plains of all formations, the Cretaceous sandstones, and the Triassic plain, are peopled more densely than any other district without mineral wealth or sea trade.

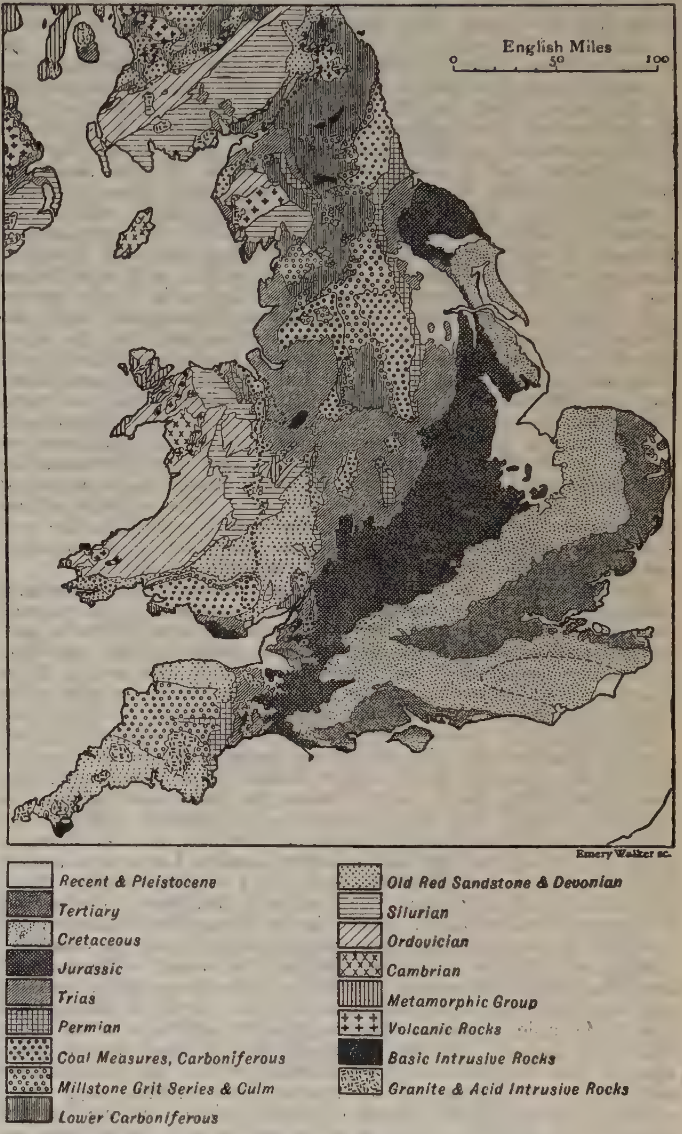
Political Divisions.—In the partition of England and Wales into counties, physical features play but a small part. The forty ancient counties, remnants of various historical groupings and partings, are occasionally bounded by rivers. Thus the Thames divides counties along nearly its whole length, forming the southern boundary of four and the northern boundary of three. Essex and Suffolk, Suffolk and Norfolk, Cornwall and Devon, Durham and Yorkshire, Lancashire and Cheshire, are all separated by rivers, while rivers form some part of the boundaries of almost every county. Still, it is noteworthy that the Severn and Trent nowhere form continuous county boundaries. Watersheds are rarely used as boundaries for any distance; but, although slightly overlapping the watershed on all sides, Yorkshire is very nearly coincident with the basin of the Ouse. The boundaries of the parishes, the fundamental units of English political geography, are very often either rivers or watersheds, and they frequently show a close relation to the strike of the geological strata. The hundreds, or groups of parishes, necessarily share their boundaries, and groups of hundreds are often aggregated to form larger subdivisions of counties. A wider grouping according to natural characteristics may now be recognized only in the cases of Wales, East Anglia, Wessex and such less definite groups as the Home Counties around London or the Midlands around Birmingham. Configuration is only one out of many conditions modifying distributions, and its effects on England as a whole appear to be suggestive rather than determinative.

(H. R. M.)

III. GEOLOGY

For an area so small, England is peculiarly rich in geological interest. This is due in some degree to the energy of the early British geologists, whose work profoundly influenced all subsequent thought in the science, as may be seen by the general acceptation of so many of the English stratigraphical terms; but the natural conditions were such as to call forth and to stimulate this energy in an unusual way. Almost every one of the principal geological formations may be studied in England with comparative ease.

If we lay aside for the moment all the minor irregularities, we find, upon examination of a geological map of England, two structural features of outstanding importance. (1) The first is the great anticline of the Pennine Hills which dominates the northern half of England from the Scottish border to Derby. Its central core of Lower Carboniferous rock is broadly displayed towards the north, while southward it contracts; on either side lie the younger rocks, the coal-fields, the Permian strata and the Triassic formations, the last-named, while sweeping round the southern extremity of the Carboniferous axis of the uplift from its eastern and western flanks, spread out in a large sheet over the midland counties. (2) The second striking feature is the regular succession of Jurassic and Cretaceous rocks which crop out in almost unbroken lines from the coast of Dorsetshire, whither they appear to converge, to the Cleveland Hills and the Yorkshire coast. Lying upon the Cretaceous rocks in the S.E. of England are the two Tertiary basins of London and Hampshire, separated by the dissected anticline of the Weald.



The older rocks in England occupy relatively small areas. Pre-Cambrian rocks are represented by the gneisses of Primrose Hill and schists of Rushton in Shropshire; by the gneisses forming the core of the Malvern Hills, and by the ancient volcanic and other rocks of the Wrekin, Charnwood Forest and Nuneaton. The slates of the Long Mynd, on the Shropshire border, belong to this system. Cambrian strata appear in Shropshire in the form of sandstones and quartzites; in the Malvern Hills they are black shales, while in the

Lake District they are represented by the Skiddaw slates. Next in point of age comes the Ordovician system, which is well developed upon the Shropshire border and in the Lake District. In the same two areas we find the Silurian rocks, shales and limestones with grits and flags. In N. and S. Devon are the Devonian limestones, grits and shales; the corresponding Old Red Sandstone type of the system (marls and sandstones) being exposed over a large part of Herefordshire, stretching also into Shropshire and Monmouth. Next in order of succession comes the Carboniferous system, with shales and limestones in the lower members, grits, sandstones and shales—the Millstone Grit series—in the middle of the system, followed by the Coal Measures—a great series of shales with coal, sandstones and ironstone at the top. This important system occupies a large area in England. The limestones and shales are well exposed in Derbyshire, Yorkshire, Northumberland, the Mendip Hills and at Clifton. The Millstone Grit series is prominent in Lancashire, Derbyshire, N. Staffordshire, Yorkshire and in the Forest of Dean. The Coal Measures rest upon the Millstone Grits in most places, generally in synclinal basins. On the eastern side of the Pennine range are the conterminous coal-fields of Yorkshire, Derbyshire and Nottinghamshire, and the coal-field of Durham and Northumberland; on the western side are the Whitehaven, Burnley, S. Lancashire and N. Staffordshire coal-fields. Farther south are the S. Staffordshire, Warwickshire, Coalbrook Dale, Forest of Wyre, Forest of Dean and Bristol and Somerset coal-fields; while much concealed coal lies under younger formations in the south-east of England, as has been proved at Dover. A large part of N. Devon is occupied by the Culm shales, limestones and grits of Carboniferous age. The principal development of Permian rocks is the narrow strip which extends from Nottingham to Tynemouth; here the Magnesian limestone is the characteristic feature. On the other side of the Pennine Hills we find the Penrith sandstone of the Vale of Eden and the Brockram beds of the Lake District. Red sandstones and conglomerates of this age constitute some of the red rocks which form the picturesque scenery about Dawlish and Teignmouth.

The Triassic rocks, red sandstones, marls and conglomerates cover a broad area in the Midlands in Worcestershire, Warwickshire and Leicestershire, whence they may be followed south-westward through Somerset to the coast at Sidmouth, and northward, round either flank of the Pennine Hills, through Nottinghamshire and Yorkshire to Middlesbrough on the one hand, and upon the other through Staffordshire, Cheshire and Lancashire to Carlisle.

The outcrop of the Lias, mainly clay with thin limestones and ironstones, runs in an almost continuous band across the country from Lyme Regis, through Bath, Cheltenham, near Leicester, and Lincoln to Redcar in Yorkshire. Closely following the same line are the alternating clays and limestones of the Oolitic series. Next in order come the Greensands and Gault, which lie at the base of the Chalk escarpment, between that formation and the Oolites. The Chalk occupies all the remaining portion of the south-east of England, save the Wealden area, and extends northward as far as Flamborough in Yorkshire, forming the Yorkshire Wolds, the Lincolnshire Wolds, the Chiltern Hills, the N. and S. Downs, the Dorsetshire heights and Salisbury Plain. But in the eastern and southern counties the Chalk is covered by younger deposits of Tertiary age; the Pliocene Crags of Norfolk and Suffolk, the Lower London Tertiaries (London Clay, Woolwich and Reading Beds, &c.) of the London Basin comprising parts of Essex, Hertfordshire, Middlesex, Bucks and Berks, and northern Kent. Again, in the Hampshire Basin and Isle of Wight, Eocene and Oligocene formations rest upon the Chalk.

When we attempt to decipher the physical history of the country from the complicated record afforded by the stratigraphical palimpsest, we are checked at the outset by the dearth of information from being able to picture the geographical condition in the older Palaeozoic periods. All we can say is, that in those remote times what is now England had no existence; its site was occupied by seas which were tenanted by marine invertebrates, long since extinct. As for the boundaries of these ancient seas, we can say nothing with certainty, but it is of interest to note the evidence we possess of still older land conditions, such as we have in the old rocks of Shropshire, &c. In the Devonian period it is clear that an elevatory movement had set in towards the north, which gave rise to the formation of inland lakes and narrow estuaries in which the Old Red Sandstone rocks were formed, while in the south of England lay the sea with a vigorous coral fauna. This condition led up to the Carboniferous period, which began with fairly open sea over the south and north of England, but in the centre there rose an elevated land mass from which much of the Millstone Grit was derived; other land lay towards the north. Slowly this sea shallowed, giving rise to the alternating estuarine marine and freshwater deposits of the Coal Measures. Continual elevation of the land brought about the close of the coal-forming period and great changes ensued. Desert conditions, with confined inland seas, marked the Permian and Triassic periods. It was about this time that the Pennine Hills, the Lake District mountain mass, and the Mendip Hills were being most vigorously uplifted, while the granite masses of Cornwall and Devon were perhaps being injected into the Carboniferous and Devonian rocks. From this period, more or less of the Pennine ridge has always remained above the sea, along with much of Cornwall and parts of Devonshire.

In early Jurassic times the sea probably again occupied most of England with the exception of the above-mentioned areas, the Lake District and eastern part of the London Basin; Wales, too, and much of Scotland were land. Elevation gradually caused more land to appear in later Jurassic and early Cretaceous times when a river system, now entirely obliterated, drained into the Purbeck estuary and Wealden lake; but a subsequent depression led to the wide extension of the Chalk sea. By the beginning of the Eocene period we find the sea limited to the S.E. of England, where the London Clay, &c., were being laid down. It was not until quite late in Tertiary time that these islands began to assume anything like their present form. In the earlier part of the Pleistocene period, England and Ireland were still incompletely severed, and the combined activity of certain extinct rivers and the sea had not yet cut through the land connexion with the continent. The last well-marked lowering of the land took place in the Pleistocene period, when it was accompanied by glacial conditions, through which the greater part of northern England and the Midlands was covered by ice; a state of things which led directly and indirectly to the deposition of those extensive boulder clays, sands and gravels which obscure so much of the older surface of the country in all but the southern counties.

Throughout the whole period of its geological history, volcanic activity has found expression with varying degrees of intensity along what is now the western side of the island, with the exception that in the Mesozoic era this activity was in abeyance. We may note the pre-Cambrian lavas and tuffs of the Wrekin district in Shropshire and the somewhat later volcanic rocks of Charnwood; the porphyrites, andesites, tuffs and rhyolites of the Borrowdale volcanic centre, erupted in the Ordovician period, and the Silurian granites of the same region. The volcanic outbursts which followed became feebler in the Devonian and Carboniferous periods and ceased with the Permian. When again the volcanic forces became active, it was in the early Tertiary era; the evidences for this lie outside the English border.

The principal directions of crust movement in England are: (1) north and south, by which the Pennine folds and faults, and the Malvern Hills have been produced; (2) east and west, by which the folds of the Weald and the Mendip Hills, and those of Devonshire have been formed. Another less important direction is N.W. and S.E., as in the Charnwood folding.

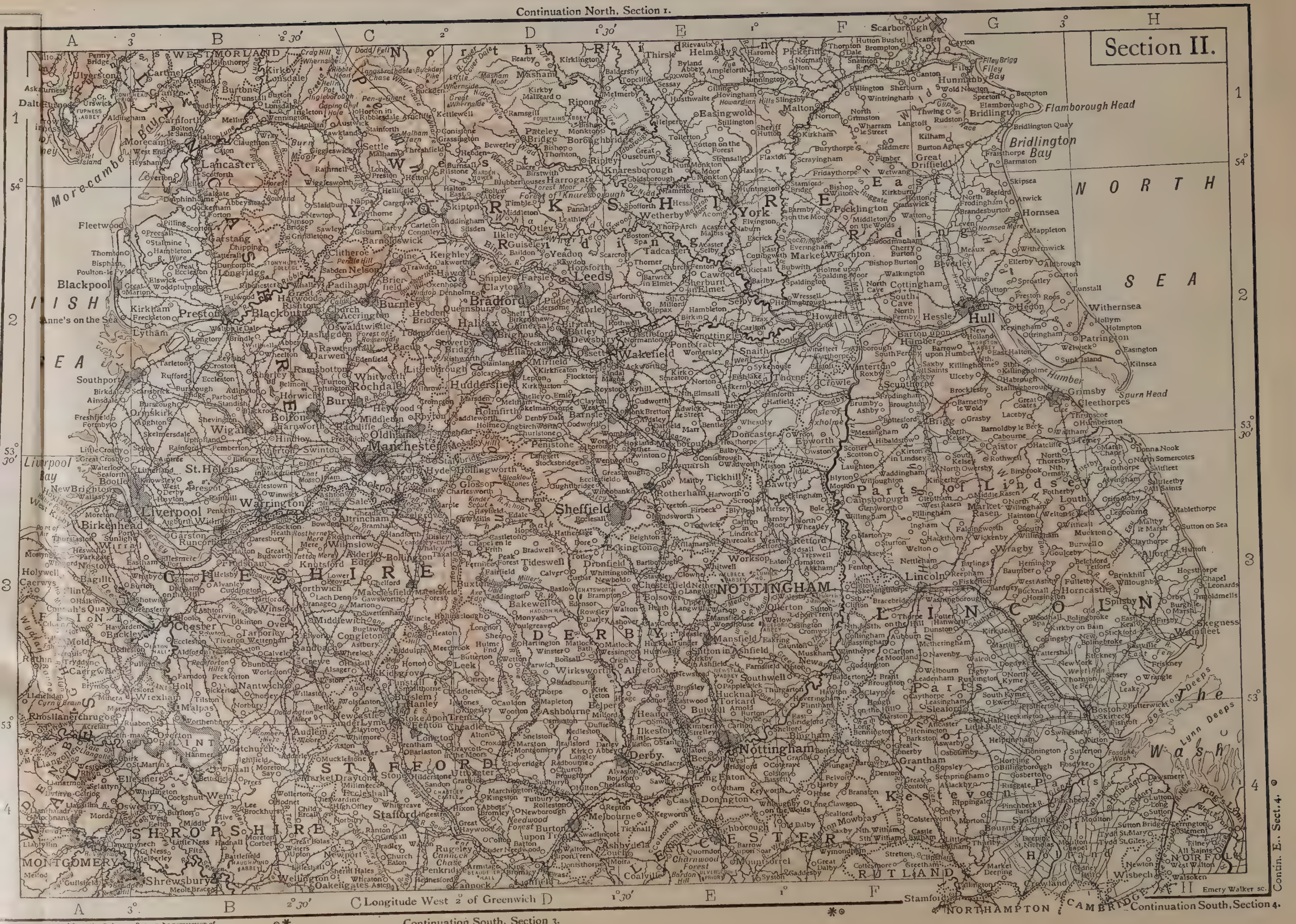
Further details of the geology are given under the heads of the counties. (J. A. H.)

IV. Climate

Climate.

Temperature.—The mean annual temperature of the whole of England and Wales (reduced to sea-level) is about 50° F., varying from something over 52° in the Scilly Isles to something under 48° at the mouth of the Tweed. The mean annual temperature diminishes very regularly from south-west to north-east, the west coast being warmer than the east, so that the mean temperature at the mouth of the Mersey is as high as that at the mouth of the Thames. During the coldest month of the year (January) the mean temperature of all England is about 40°. The influence of the western ocean is very strongly marked, the temperature falling steadily from west to east. Thus while the temperature in the west of Cornwall is 44°, the temperature on the east coast from north of the Humber to the Thames is under 38°, the coldest winters being experienced in the Fenland. In the hottest month (July) the mean temperature of England and Wales is about 61·5°, and the westerly wind then exercises a cooling effect, the greatest heat being found in the Thames basin immediately around London, where the mean temperature of the month exceeds 64°: the mean temperature along the south coast is 62°, and that at the mouth of the Tweed a little under 59°. In the centre of the country along a line drawn from London to Carlisle the mean temperature in July is found to diminish gradually at an average rate of 1° per 60 m. The coasts are cooler than the centre of the country, but the west coast is much cooler than the east, modified continental conditions prevailing over the North Sea. The natural effect of the heating of the air in summer and the cooling of the air in winter by contact with the land is largely masked in England on account of the strength of the prevailing south-westerly wind carrying oceanic influence into the heart of the country. This effect is well seen in the way in which the wind blowing directly up the Severn estuary is directed along the edges of the Oolitic escarpment north-eastward, thus displacing the centre of cold in winter to the east coast, and the centre of heat in summer to the lower Thames, from the position which both centres would occupy, if calms prevailed, in a belt running from Birmingham to Buckingham. As to how far the narrow portion of the North Sea modifies the influence of the European continent, there seems reason to believe that the prevailing winds blowing up the English Channel carry oceanic conditions some distance inland, along those parts of the continent nearest to England. The Mersey estuary, being partly sheltered by Ireland and North Wales, does not serve as an inlet for modifying influences to the same extent as the Bristol Channel; and as the wind entering by it blows squarely against the slope of the Pennine Chain, it does not much affect the climate of the midland plain.

Winds.—The average barometric pressure over England is about


Continuation North, Section 1.
Section II.
NORTH SEA
IRISH SEA
YORKSHIRE
LANCASHIRE
CHESHIRE
DERBY
NOTTINGHAM
LINCOLN
STAFFORD
SHROPSHIRE
LEICESTER
RUTLAND
NORTHAMPTON
CAMBRIDGE
NORFOLK
FLINT
WESTMORLAND
MONTGOMERY
Liverpool
Manchester
Leeds
Bradford
Sheffield
Hull
York
Nottingham
Derby
Lincoln
Flamborough Head
Bridlington Bay
Spurn Head
The Wash
Morecambe Bay
Liverpool Bay
Longitude West 2° of Greenwich
Continuation South, Section 3.
Continuation South, Section 4.
Contin. E., Sect. 4.
Emery Walker sc.

Information embodied from the Ordnance Survey, by permission of the Controller of H.M. Stationery Office.

29·94 in., and normally diminishes from south-west to north-east at all seasons, the mean pressure on the south coast being 29·97 and that on the northern border 29·88. The pressure at any given latitude is normally highest in the centre of the country and on the east coast, and lowest on the west coast. The direction of the mean annual isobars shows that the normal wind in all parts of England and Wales must be from the south-west on the west coast, curving gradually until in the centre of the country, and on the east coast it is westerly, without a southerly component. The normal seasonal march of pressure-change produces a maximum gradient in December and January, and a minimum gradient in April; but for every month in the year the mean gradient is for winds from southerly and westerly quarters. In April the gradient is so slight that any temporary fall of pressure to the south of England or any temporary rise of pressure to the north, which would suffice in other months merely to reduce the velocity of the south-westerly wind, is sufficient in that month to reverse the gradient and produce an east wind over the whole country. The liability to east wind in spring is one of the most marked features of the English climate, the effect being naturally most felt on the east coast. The southerly component in the wind is as a rule most marked in the winter months, the westerly component predominating in summer. The west end of a town receives the wind as it blows in fresh from the country at all seasons, and consequently the west end of an English town is with few exceptions the residential quarter, while smoke-producing industries are usually relegated to the east end.

Storms.—On account of the great frequency of cyclonic disturbances passing in from the Atlantic, the average conditions of wind over the British Islands give no idea of the frequency of change in direction and force. The chief paths of depressions are from south-west to north-east across England; one track runs across the south-east and eastern counties, and is that followed by a large proportion of the summer and autumn storms, thereby perhaps helping to explain the peculiar liability of the east of England to damage from hail accompanying thunderstorms. A second track crosses central England, entering by the Severn estuary and leaving by the Humber or the Wash; while a third crosses the north of England from the neighbourhood of Morecambe Bay to the Tyne. While these are tracks frequently followed by the centres of barometric depressions, individual cyclones may and do cross the country in all directions, though very rarely indeed from east to west or from north to south.

Rainfall.—The rainfall of England, being largely due to passing cyclones, can hardly be expected to show a very close relation to the physical features of the country, yet looked at in a general way the relation between prevailing winds and orographic structure is not obscure. The western or mountainous division is the wettest at all seasons, each orographic group forming a centre of heavy precipitation. There are few places in the Western Division where the rainfall is less than 35 in., while in Wales, the Cornwall-Devon peninsula, the Lake District and the southern part of the Pennine Region the precipitation exceeds 40 in., and in Wales and the Lake District considerable areas have a rainfall of over 60 in. In the Eastern Division, on the other hand, an annual rainfall exceeding 30 in. is rare, and in the low ground about the mouth of the Thames estuary and around the Wash the mean annual rainfall is less than 25 in. In the Western Division and along the south coast the driest month is usually April or May, while in the Eastern Division it is February or March. The wettest month for most parts of England is October, the most noticeable exception being in East Anglia, where, on account of the frequency of summer thunderstorms, July is the month in which most rain falls, although October is not far behind. In the Western Division there is a tendency for the annual maximum of rainfall to occur later than October. It may be stated generally that the Western Division is mild and wet in winter, and cool and less wet in summer; while the Eastern Division is cold and dry in winter and spring, and hot and less dry in summer and autumn. The south coast occupies an intermediate position between the two as regards climate. Attention has been called to the fact that the bare rocks and steep gradients which are common in the Western Division allow of the heavy rainfall running off the surface rapidly, while the flat and often clayey lands of the Eastern Division retain the scantier rainfall in the soil for a longer time, so that for agricultural purposes the effect of the rainfall is not very dissimilar throughout the country.

Sunshine.—The distribution of sunshine is not yet fully investigated, but it appears that the sunniest part is the extreme south coast, where alone the total number of hours of bright sunshine reaches an average of more than 1600 per annum. The north-east, including the Pennine Region and the whole of Yorkshire, has less than 1300 hours of sunshine, and a portion of North Wales is equally cloudy. Although little more than a guess, 1375 hours may be put down as approximately the average duration of bright sunshine for England as a whole, which may be compared with 2600 hours for Italy, and probably about 1200 hours for Norway.

For the purpose of forecasting the weather, the meteorological office divides England into six districts, which are known as England N.E., Midland Counties, England East, London and Channel, England N.W. and North Wales, and England S.W. and South Wales. (H. R. M.)

V. English Place-Names

English place-names are of diverse origin and often extremely corrupt in their modern form, so that the real etymology of the names can often be discovered only by a careful comparison of the modern form with such ancient forms as are to be found in charters, ancient histories, and other early documents. By the aid of these a certain amount of work has been done in the subject, but it is still largely an unworked field. The most satisfactory method of characterizing English place-nomenclature is to deal with it historically and chronologically, showing the influence of the successive nations who have borne sway in this island. The Celtic influence is to be found scattered evenly up and down the country so far as names of rivers and mountains are concerned; in names of towns it is chiefly confined to the west. Roman influence is slight but evenly distributed. English influence is all-pervading, though in the northern and north-midland counties this influence has been encroached upon by Scandinavian influence. Norman influence is not confined to any particular district.

Celtic.—Though scattered notices of towns, cities and rivers in Britain are to be found in various early Roman writers, it is not till the time of Ptolemy (2nd century), who constructed a map of the island, and of the itinerary of Antonine (beginning of the 3rd century) that we have much information as to the cities and towns of Britain. We there learn that the following place-names are ultimately of Celtic origin:—Brougham, Catterick, York, Lincoln (*Lindum*), Manchester (*Mancunium*), Doncaster (*Danum*), Wroxeter (*Viroconium*), Lichfield (*Letocetum*), Gloucester (*Glevum*), Cirencester (*Corinium*), Colchester (*Camulodunum*), London, Reculver, Richborough (*Rutupiae*), Dover, Lymne, Isle of Wight, Dorchester (*Durnovaria*), Sarum, Exeter (*Isca*), Brancaster (*Branodunum*), Thanet. We also have the names of the following rivers:—Eden, Dee, Trent, Yare, Colne, Thames, Kennet, Churne, Exe, Severn, Tamar. Gildas, writing in the 6th century, speaks of the twenty-eight cities of the Britons. Nennius' *Historia Britonum* gives what purports to be a list of these cities. Of these, excluding Welsh ones, we may with some certainty identify Canterbury (*Caint*), Caerleon-on-Usk, Leicester (*Lerion*), Penzelwood, Carlisle, Colchester, Grantchester (*Granth*), London, Worcester (*Guveirangon*), Doncaster (*Daun*), Wroxeter (*Guoricon*), Chester (*Legion*—this is Roman), Lichfield (*Licitcsith*) and Gloucester (*Gloui*). Others less certain are Preston-on-Humber and Manchester (*Manchguid*).

In modern place-names the suffix *don* often goes back to the Celtic *dun*, a hill, *e.g.* Bredon, Everdon, but the suffix was still a living one in Saxon times. Of river-names the vast majority are Celtic (possible exceptions will be named later), and the same is true of mountains and hills. The forests of Wyre, Elmet and Sel (wood), and the districts of the Wrekin and the Peak are probably Celtic.

Roman.—We do not owe entire place-names to Roman influence, with the exception of a few such as Chester, Chester-le-Street (L. *strata* [*via*], a road) and Caistor, but Roman influence is to be found in many names compounded of Celtic and Roman elements. The chief of these is the element *chester*—(L. *castrum*, a fort), *e.g.* Ebchester, Silchester, Grantchester. Porchester is entirely Latin, but may not have been formed till Saxon times. The form *caster* is found in the north and east, under Scandinavian influence, *e.g.* Tadcaster, Lancaster; and in the south-west and in the midlands we have a group of towns with the form *cester*:—Bicester, Gloucester, Cirencester, Worcester, Alcester, Leicester, Towcester. Exeter, Wroxeter and perhaps Uttoxeter show the suffix in slightly different form. In names like Chesterton, Chesterford, Chesterholm, Woodchester, the second element shows that the names are of later English or Scandinavian formation. In Lincoln we have a compound of the Celtic *Lindum* and the Latin *colonia*.

Saxon.—The chief suffixes of Saxon origin to be found in English place-names are as follows (some of them being also used independently): *-burgh*, *-borough*, *-bury* (O.E. *burh*, fortified town), *e.g.* Burgh, Bamborough, Aylesbury, Bury; *-bourne*, *-borne*, *-burn* (O.E. *burne*, *-a*, a stream), *e.g.* Ashbourne, Sherborne, Sockburn; *-bridge*, *e.g.* Weybridge, Bridge; *-church*, *e.g.* Pucklechurch; *-den*, *-dean* (O.E. *denu*, a valley), *e.g.* Gaddesden, Rottingdean; *-down*, *-don*, *-ton* (O.E. *dūn* [Celtic], a hill), *e.g.* Huntingdon, Seckington, Edington; *-ey*, *-ea*, *-y* (O.E. *īg*, an island), *e.g.* Thorney, Mersea, Ely; *-fleet* (O.E. *fleot*, an estuary) *e.g.* Benfleet; *-field*, *e.g.* Lichfield; *-ford*, *e.g.* Bradford; *-ham* (O.E. *hām*, a home, and *hamm*, an enclosure); these are not distinguished in modern English, *e.g.* Bosham, Ham; *-hall* (O.E. *healh*, a corner), *e.g.* Riccall, Tettenhall; *-head*, *e.g.* Gateshead; *-hill*, *e.g.* Tickhill; *-hurst* (O.E. *hyrst*, copse, wood), *e.g.* Deerhurst; *-ing* (patronymic suffix, plural form in O.E.), *e.g.* Basing, Reading; *-leigh*, *-ley*, *-lea* (O.E. *lēah*, meadow), *e.g.* Leigh, Stoneleigh, Whalley; *-lade* (O.E. *lād*, path, course), *e.g.* Cricklade; *-land*, *e.g.* Crowland; *-lock* (O.E. *loca*, enclosure), *e.g.* Porlock; *-minster* (O.E. *mynster*, L. *monasterium*), *e.g.* Axminster, Minster; *-mouth*, *e.g.* Exmouth; *-port* (O.E. *port*, market-town, a word of Latin origin), *e.g.* Bridport; *-sted, -stead* (O. E. *stede*, a place), *e.g.* Stansted, Wanstead; *-stone, -ston, e.g.* Beverstone, Sherston; *-staple* (O.E. *stapol*, foundation), *e.g.* Barnstaple; *-stow* (O.E. *stow*, place), *e.g.* Stow, Chepstow, Bristol (earlier Bristow); *-tree, -try, e.g.* Coventry, Elstree, Seasalter; *-ton* (O.E. *tūn*, enclosure), *e.g.* Milton; *-wark* (O.E. *geweorc*, fortification), *e.g.* Southwark; *-well, e.g.* Bakewell; *-wich, -wick* (O.E. *wic*, a dwelling), *e.g.* Norwich, Swanage (O.E. Swanawic), Warwick; *-worth, -worthy* (O.E. *weorth, weorthig*, an enclosure), *e.g.* Polesworth, Holsworthy.

Of river names the Blackwater, Witham, Ashburne, Swift, Washburn, Loxly, Wythburn, Eamont are perhaps English and so also may be the Waveney in Suffolk.

Scandinavian.—The following suffixes are Scandinavian in origin, some of them being also used independently: *-beck* (O.N. *bekkr*, stream), *e.g.* Starbeck, Troutbeck; *-by* (O.N. *byr*, town), *e.g.* Whitby; *-dale* (O.N. *dalr*), *e.g.* Swaledale; *-car(r), -ker* (O.N. *kiǫrr*, marshy ground), *e.g.* Redcar, The Carrs, Muker; *-fell* (O.N. *fjäll*, mountain), *e.g.* Scafell; *-force, -foss* (O.N. *fors*, waterfall), High Force, Wilberfoss; *-garth* (O.N. *garðr*, enclosure), *e.g.* Hoggarths; *-gill* (O.N. *gil*, a deep narrow glen), *e.g.* Skelgill, Dungeon Ghyll; *-holm(e)* (O.N. *hólmr*, island), *e.g.* Axholme, Durham (earlier Dunholm); *keld* (O.N. *kelda*, well, spring), *e.g.* Threlkeld, Keld; *-lund* (O.N. *lundr*, grove), *e.g.* Snelland, Timberland, Lound; *-how* (O.N. *haugr*, hill), *e.g.* Greenhow; *-scale* (O.N. *skále*, hut, shed), *e.g.* Seascale; *-skew* (O.N. *skógr*, forest), *e.g.* Litherskew; *-thorpe* (O.N. *þorp*, village), *e.g.* Thorpe, Osgathorp; *-thwaite* (O.N. *þveit*, a piece of land), *e.g.* Rosthwaite; *-toft* (O.N. *topt*, a green knoll), *e.g.* Toft, Langtoft; *-with* (O.N. *viðr*, a wood), *e.g.* Blawith, Stowiths.

Tarn (a mountain pool), grain and sike (mountain streams) are also Scandinavian terms.

Norman.—Norman influence has not been very great in English place-nomenclature. The number of places with pure French names is extremely limited; a few such are Beaulieu, Belvoir, Beauchief, Beaudesert, Beaufort, Beaumont, also Theydon *Bois*, War-*boys*. Norman influence is marked more strongly in certain compound place-names, where one of the elements often represents the name of the original Norman tenant or holder, *e.g.* Thorpe *Mandeville, Helion* Bumstead, Higham *Ferrers*, Swaffham *Bulbeck*, Stoke *Gifford*, Shepton *Mallet*; similarly names like Lyme *Regis*, *King's* Sutton, *Monks'* Kirby, Zeal *Monachorum*, Milton *Abbas*, *Bishop's* Waltham, *Prior's* Dean, Huish *Episcopi* date from feudal times. Gallicized forms are also to be found in a few forms like Kirkby-le-Soken, Chapel-en-le-Frith, Alsop-en-le-Dale, Barnoldby-le-Beck. Ecclesiastical influence is to be found in such names as Aldwinkle St Peter, Barford St Martin, Belchamp St Paul, the name of the saint being the name either of the saint to whom the church at that place was dedicated or the patron-saint of the monastery or abbey to whom lands in that district belonged. (A. Mw.)

VI. POPULATION

Until the beginning of the 19th century there existed no other knowledge of the actual area and population of the country but what was given in the vaguest estimates. But there can be little doubt that the population of England and Wales increased very slowly for centuries, owing largely to want of intercommunication, which led to famines, more or less severe—it being a common occurrence that, while one county, with a good harvest, was enjoying abundance, the people of the adjoining one were starving. The interpretation of certain figures given in the Domesday Survey (which do not cover certain parts of modern England nor take account of the ecclesiastical population) is a matter of widely divergent opinion; but a total population of one million and a half has been accepted by many for the close of the 11th century. In 1377 the levying of a poll-tax provides partial figures from which a total of two to two-and-a-half millions has been deduced, but again divergent views have been expressed as to how far the number was still affected by the Black Death of 1348–1349. It is calculated, on the basis of registers of births and deaths, that the population of England and Wales numbered 5,475,000 in 1700, and 6,467,000 in 1750. From the later part of the 18th century a stronger tendency to increase set in, and at the taking of the first census, in 1801, it was ascertained that the population numbered 8,892,536, being—if the former estimates were approximately correct—an increase of very nearly 2½ millions in little over fifty years. This rate of increase was not only continued, but came to be greatly exceeded.

Since the first census of 1801, regular enumerations of the people of England and Wales have been taken every ten years. The results of these enumerations are published in separate volumes for each county, in a volume of summary tables, and in a general report. In the summaries England and Wales are treated as one, and this treatment is followed here. The following table gives the total numbers of the population of England and Wales at each census, together with the absolute increase, and growth per cent, during each decennial period:—

Dates of Enumeration.	Population.	Increase at each Census.	Decennial Rate of Increase per Cent.
1801, March 10th .	8,892,536	..	..
1811, May 27th .	10,164,256	1,271,720	14·00
1821, May 28th .	12,000,236	1,835,980	18·06
1831, May 30th .	13,896,797	1,896,561	15·80
1841, June 7th .	15,914,148	2,017,351	14·27
1851, March 31st .	17,927,609	2,013,461	12·65
1861, April 8th .	20,066,224	2,138,615	11·90
1871, April 3rd .	22,712,266	2,646,042	13·21
1881, April 4th .	25,974,439	3,262,173	14·36
1891, April 6th .	29,002,525	3,028,086	11·65
1901, April 1st .	32,527,843	3,525,318	12·17

Allowing for a rate of increase equivalent to that which obtained between 1891 and 1901, the estimated population was 34,152,977 in 1905, and 36,169,150 in 1910.

Distribution.—A detailed map of the distribution of population in England and Wales[1] shows certain well-defined areas of very dense population. First for consideration, though not in geographical extent, stands the area round London, in Middlesex, Surrey, Kent, Essex and Hertfordshire. A great proportion of this population is purely residential, that is to say, its working members do not practise their professions at home or close to home, but in the metropolis, travelling a considerable distance between their residences and their offices. Just as London, in spite of its manifold industrial interests, is hardly to be termed a manufacturing centre, so the populous district surrounding it is not to be termed an industrial district in the sense in which that term is applied to the remaining regions of dense population which fall for consideration here. London gained its paramount importance from its favourable geographical position in respect of the rest of England on the one hand and the Continent on the other, and the populous district of the "home counties" owes its existence to that importance; whereas other populous districts have generally grown up at the point where some source of natural wealth, as coal or iron, lay to hand. The great populous area which covers south Lancashire and the West Riding of Yorkshire, and extends beyond them into Cheshire, Derbyshire, Staffordshire and Nottinghamshire, is not in reality a unit. The whole of the lowland in the south of Lancashire has almost the appearance of one vast town, whereas among the hills of the Pennine Chain the population crowds the valleys on either flank and leaves in the high-lying centre some of the largest tracts of practically uninhabited country in England. Moreover, the industries in different parts of this area (for it is strictly an industrial area) differ completely, as will be observed later, though coal-mining is common to all. The other most extensive centres of dense population are the coal-mining or manufacturing districts of Northumberland and Durham, of the midlands (parts of Warwickshire, Worcestershire and Leicestershire), and of South Wales and Monmouthshire; and it is in these districts, and others smaller, but of similar character, that the greatest increase of population has been recorded, since the extensive development of

Counties.	Increase per cent.	
	1871–1891.	1891–1901.
Middlesex .	47·42	45·11
Essex .	31·54	39·60
Glamorganshire (S. Wales) .	30·72	25·10
Surrey .	25·03	24·78
Northumberland .	14·42	19·19
Worcestershire .	12·12	18·49
Nottinghamshire .	19·30	18·09
Durham .	21·67	16·62
Leicestershire .	17·43	16·46
Kent .	13·15	15·95
Hampshire .	12·73	15·33
Monmouthshire .	12·08	14·97
Yorkshire (E. Riding) .	14·31	13·49
Northamptonshire .	11·40	13·27
Warwickshire .	12·78	12·95
Staffordshire .	12·15	12·92
Derbyshire .	15·52	12·81
Yorkshire (W. Riding) .	15·36	12·70
Cheshire .	14·62	12·56
Lancashire .	17·92	12·05
Hertfordshire .	5·08	10·91

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[1] As in Bartholomew's *Survey Atlas of England and Wales* (1903).

their resources during the 19th century. Thus the preceding counties[1] showed an increase, under normal conditions, exceeding 10% during the ten years 1891–1901, the percentage of increase in 1871–1891 being given for comparison.

It will be observed that three of the home counties occur in the first four in the above list. It is interesting to note, in this connexion, that the increase of population diminished steadily, in the three decades under notice, within the area covered by the administrative county of London, which is only the central part of urban London (compare the population table of the great urban districts, below). This was 17·44% in 1871–1881, 10·39 in 1881–1891, and 7·3 in 1891–1901. This illustrates the constant tendency for the residential districts of a city to radiate away from its centre, which appears, though in a modified degree, in the case of all the great English cities.

During the period 1891–1901 five English and five Welsh counties showed a decrease per cent in the population. The English counties were:—

	Decrease or Increase(+).		Decrease. 1891–1901.
	1871–1881.	1881–1891.	
Huntingdonshire . . .	8·29	5·51	7·04
Rutland	1·55	3·73	5·59
Westmorland	1·25	+2·96	2·73
Oxfordshire	+1·27	+3·64	1·70
Herefordshire	3·26	4·02	1·62

Urban and rural districts.

The Welsh counties were Montgomeryshire, Cardiganshire, Flintshire, Merionethshire and Brecknockshire, the first-named showing the highest decrease, 5·08%, in 1891–1901. These counties are principally agricultural, and it is in agricultural districts elsewhere that the increase of population is slightest. But in 1871–1881 a decrease was found in the case of fifteen counties in all, and in 1881–1891 in the case of thirteen, whereas in 1891–1901, although Radnorshire, which returned a decrease previously, now returned an abnormal increase owing to the temporary employment of workmen on the construction of the Birmingham waterworks, the number fell to 10, and the average percentage also fell. This suggested some tendency to return to a state of equilibrium as between urban and rural districts. This is in a measure borne out by the movement of population in the districts classed as purely rural in 1901. In these there was an increase per cent of 14·2 in 1811–1821, which fell off to 2·8 in 1841–1851. A decrease then set in and grew from 0·2 in 1851–1861 to 0·67 in 1881–1891, but in 1891–1901 an increase, 1·95, was once more recorded. But the drain on the rural population continued heavy, for in the same purely rural area, which had a population in 1901 of 1,330,319, the excess of births over deaths was 150,437, but the actual increase of population was only 25,492, leaving a heavy loss (9·6%) to be accounted for by migration, the term used in this connexion in the general report of the Census to include movement of population to any new locality, home or foreign.

Housing.—The total area of England and Wales covered by urban districts (a term which coincides pretty nearly with that of towns, which bears no technical meaning in England) was 3,848,987 acres, and contained a population of 25,058,355 in 1901, the increase in the decade 1891–1901 being 15·2%. The number of inhabited houses in the whole country in 1901, namely 6,260,852, may be compared with the numbers in 1801 (1,575,923) and 1851 (3,278,039); it gives an average of 5·2 persons to each house. This average has decreased with some regularity from a *maximum* of 5·75 in 1821, but there is no certain evidence on which to affirm or deny that the average cubic capacity of dwelling-houses has been maintained. The urban population averaged 5·4 persons to a house, but varied greatly in different towns. Thus, an average below 4·4 is quoted for Rochdale, Halifax, Huddersfield, Yarmouth, Bradford and Stockport, while the average for London was 7·93, and for Gateshead, Newcastle-upon-Tyne and South Shields, in the northern industrial district of the Tyne, and for Devonport, the average exceeded 8. The average of persons to a house in rural districts was 4·6.

Vital Statistics.—"The increase or decrease of population is governed by two factors: (1) the balance between births and deaths, and (2) the balance between immigration and emigration."[2] The following table is therefore given to show (1) the percentage of increase by births and decrease by deaths in each decade from 1851, and (2) the difference at the close of each decade (*i.e.* in the later year mentioned in each line) between the population which would have followed upon the natural increase unaffected by migration and the population as actually enumerated. In the case of (2) the actual population has always been exceeded by the estimate based on natural increase, and this demonstrates an excess of emigration over immigration.

Year.	Percentage of		Excess of Estimated over Enumerated Population.
	Increase by Births.	Decrease by Deaths.	
1851–1861	36·19	23·58	122,111
1861–1871	37·56	23·98	78,968
1871–1881	37·89	22·80	164,307
1881–1891	34·24	20·27	601,389
1891–1901	31·57	19·18	68,330

The proportion of males to females is 1000 to 1068, this being a higher proportion of females than any recorded in the 19th century, during which the lowest proportion of females was 1036 in 1821. The proportion rose at each census from 1851. But on the other hand 1000 male children were born against only 965 female, on an average in 1891–1901. This excess of male births, which is usual, has been ascertained to find its equilibrium, through a higher rate of infant mortality among the males, about the tenth year of life, and is finally changed by perilous male occupations and other causes, including the stronger tendency of males to emigration. The proportion of females varies much in different localities, being highest in such districts as London and the home counties, which are residential, and in which, therefore, many domestic servants are enumerated; and Somersetshire, Bedfordshire and other seats of industries which especially occupy women (*e.g.* the straw-plaiting of the county last named). It is lowest, naturally, in the mining districts, as Glamorgan, Monmouth, Durham, Northumberland; but an exception may be noted in the case of Cornwall, where a high proportion of females is attributed to the emigration of miners consequent upon the relative decrease in importance of the tin-mines. In 1901 the proportion of females to males in urban districts was 1086 to 1000, and in rural districts 1011 to 1000.

The proportion of married adults (aged twenty and upwards) was found to decrease from 1881 to 1901, being 630 per thousand

Urban Districts of England and Wales with Population exceeding 80,000 (1901).

	Population.		Increase per cent.
	1891.	1901.	
London[3]	4,228,317	4,536,541	7·3
Liverpool	629,548	684,958	8·8
Manchester	505,368	543,872	7·6
Birmingham	478,113	522,204	9·2
Leeds	367,505	428,968	16·7
Sheffield	324,243	380,793	17·4
Bristol	289,280	328,945	13·7
Bradford	265,728	279,767	5·3
West Ham[4]	204,903	267,358	30·5
Hull	200,472	240,259	19·8
Nottingham . . .	213,877	239,743	12·1
Salford	198,139	220,957	11·5
Newcastle-upon-Tyne .	186,300	215,328	15·6
Leicester	174,624	211,579	21·2
Portsmouth	159,278	188,133	18·1
Bolton	146,487	168,215	14·8
Cardiff (Wales) . . .	128,915	164,333	27·5
Sunderland	131,686	146,077	10·9
Oldham	131,463	137,246	4·4
Croydon[4]	102,695	133,895	30·4
Blackburn	120,064	127,626	6·3
Brighton	115,873	123,478	6·6
Willesden[4]	61,265	114,811	87·4
Rhondda (Wales) . .	88,351	113,735	28·7
Preston	107,573	112,989	5·0
Norwich	100,970	111,733	10·7
Birkenhead	99,857	110,915	11·1
Gateshead	85,692	109,888	28·2
Plymouth	88,931	107,636	21·0
Derby	94,146	105,912	12·5
Halifax	97,714	104,936	7·4
Southampton . . .	82,126	104,824	27·6
Tottenham[4]	71,343	102,541	43·7
Leyton[4]	63,106	98,912	56·7
South Shields . . .	78,391	97,263	24·1
Burnley	87,016	97,043	11·5
East Ham[4]	32,712	96,018	193·5
Walthamstow[4] . . .	46,346	95,131	105·3
Huddersfield	95,420	95,047	0·4 decr.
Swansea (Wales) . .	91,034	94,537	3·8
Wolverhampton . .	82,662	94,187	13·9
Middlesborough . .	75,532	91,302	20·9
Northampton . . .	75,075	87,021	15·9
Walsall	71,789	86,430	20·4
St Helens	72,413	84,410	16·6
Rochdale	76,161	83,114	9·1

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[1] The figures are for Registration Counties (see classification of *Territorial Divisions*, below).

[2] Census of England and Wales, 1901; General Report, p. 15.

[3] Administrative county.

[4] These districts, administratively distinct, belong topographically to Greater London.

in the former and 604·5 in the latter year. The marriage-rate per thousand has ranged since 1841 from 14·2 in 1886 to 17·6 in 1873, and is evidently closely associated with the general prosperity of the country, for in the latter year the value of the total imports and exports per head of the population of the United Kingdom was at its highest, and in the former year at its lowest. The five years 1895–1899 exhibited a remarkable sequence illustrative of this:—

Years.	Marriage-Rate.	Value, Exports and Imports.		
		£	s.	d.
1895	15·0	17	19	3
1896	15·8	18	14	1
1897	16·0	18	14	3
1898	16·3	19	0	5
1899	16·5	20	1	8

The marriage-rate declined, subsequently to the year last quoted in this table, to 15·6 in 1903. (O. J. R. H.)

Religion.—In attempting to give a concise account of the religious conditions of England we are confronted from the outset with the absence of any trustworthy statistics. A religious census, such as is customary in other countries, has not been taken since 1851; nor is it probable that such a census would be any true indication of the actual religious beliefs of the population. Still less satisfactory, from this standpoint, is the attempt to compile statistics of religious belief from the registrar-general's report on the number of marriages celebrated in the places of worship of the various denominations; for among those who are practically attached to no religious body, and even some Nonconformists, a prejudice survives in favour of having their marriages celebrated and their funerals conducted by the clergy of the Established Church. Nor is the test of "sittings" provided by the various denominations, nor even the number of their communicants, a trustworthy test of the relative number of their adherents. In Wales, for instance, the rivalry of the sects has multiplied chapel accommodation out of all proportion to the population; while everywhere it happens that churches, at one time crowded every Sunday, have been emptied by the shifting of population or other causes. As for the test of communicancy, it is untrustworthy because the insistence on communion as the pledge of membership varies with the different denominations and even with different sections of opinion within those denominations. Any statistics of this nature, then, however useful they may be as a general indication, must not be treated as conclusive.

The Church of England.

Whatever disputes there may be as to the relative strength of the various churches and sects, there can be no questioning the fact that the dominant religion in England is Protestant Christianity. Protestantism, indeed, since the Act of Settlement in 1689, has been of the essence of the Constitution, the sovereign forfeiting his or her crown *ipso facto* by acknowledging the authority of the pope, by accepting "the Romish religion," or by marrying a Roman Catholic; and though of late years efforts have been made to modify or to abrogate this provision, the fact that such efforts have met with widespread opposition shows that it still represents the general attitude of the British nation. Protestantism, however, is a generic term which in England covers a great variety of opinions, and a large number of rival religious organizations. The state church, the Church of England as by law established, represents the tradition of a time when church and state were regarded as two aspects of one divinely ordered organism. In law every subject of the state is also a member of the Established Church, and can lay claim to its ministrations so long as he or she obeys the ecclesiastical law, which is also the law of the state. No Englishman, whatever his opinions, can be excommunicated without due process of law. The Church of England is thus theoretically coextensive with the English nation, each unit of which is legally assumed to belong to it unless proof be brought to the contrary. To state the theory is, however, to risk giving an entirely false impression of the facts. In practice the Church of England is no longer regarded as coextensive with the state; nor is nonconformity any longer, as it once was, an offence against the law. Since the abolition of the Test Acts and the emancipation of the Catholics no Englishman has suffered any civil disability owing to his religion[1]; and the progress of democracy has given to the great so-called "Free Churches" a political power that rivals that of the Established Church. In the matter of the estimation of their relative strength the main grievance of the Nonconformists is that the law classes as members of the Church of England that enormous floating population which is really conscious of no ecclesiastical allegiance at all.

The Church of England, both in constitution and doctrine, represents in general the mean between Roman Catholicism on the one hand and the more advanced forms of Protestantism on the other (see EPISCOPACY). Though its doctrine was reformed in the 16th century and the spiritual supremacy of the pope was repudiated, the continuity of its organic life was not interrupted, and historically as well as legally it is the same church as that established before the Reformation. The ecclesiastical system is episcopal, the whole of England (including for this purpose Wales) being divided into two provinces, Canterbury and York, and 37 bishoprics (including the primatial sees of Canterbury and York). These again are subdivided into 14,080 parishes (1901), the smallest ecclesiastical units, which are grouped for certain administrative purposes into 810 rural deaneries. The sovereign is by law the supreme governor of the church, both in things spiritual and temporal, and he has the right to nominate to vacant sees. In the case of sees of old foundation this is done by means of the *congé d'élire* (*q.v.*), in that of others by letters patent.[2] The bishops hold their temporalities as baronies, for which they do homage in the ancient form, and are spiritual peers of parliament. Only 26, however, have the right to seats in the House of Lords, of whom five—viz. the two archbishops and the bishops of London, Durham and Winchester—always sit, the others taking their seats in order of seniority of consecration. Under the bishops the affairs of the dioceses are managed by archdeacons (*q.v.*) and rural deans (see ARCHPRIEST and DEAN). The cathedral churches are governed by chapters consisting of a dean, canons and prebendaries (see CATHEDRAL). The deaneries are in the gift of the crown, canonries and prebends sometimes in that of the crown, sometimes in that of the bishops. The parish clergy, with a few rare exceptions (when they are elected by the ratepayers), are appointed by patronage. The right of presentation to some 8500 benefices or "livings" is in the hands of private persons; the right is regarded in law as property and is, under certain restrictions for the avoidance of gross simony, saleable (see ADVOWSON). The patronage of the remaining benefices belongs in the main to the crown, the bishops and cathedral chapters, the lord chancellor, and the universities of Oxford and Cambridge.

In spite of the fact that the Church of England is collectively one of the wealthiest in Christendom, a large proportion of the "livings" are extremely poor. To understand this and other anomalies it is necessary to bear in mind that the church is not, like the established Protestant churches of Germany, an elaborately organized state department, nor is it a single corporation with power to regulate its internal polity. It is a conglomeration of corporations. Even the incumbent of a parish is in law a "corporation sole," his benefice a freehold; and until the establishment in 1836, by act of parliament, of the Ecclesiastical Commissioners (*q.v.*) nothing could be done to adjust the inequalities in the emoluments of the clergy resulting from the natural rise and fall of the value of property in various parts of the country. Even more extraordinary is the effect of the singular constitution of the church on its discipline. An incumbent, once inducted, can only be disturbed by complicated and extremely costly processes of law; in effect, except in cases of gross

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[1] Certain great offices of state are closed to Roman Catholics.

[2] The actual selection of the bishops is in practice in the hands of the prime minister for the time being. This formerly led to purely political appointments; but it is usual now to select clergymen approved by public opinion.

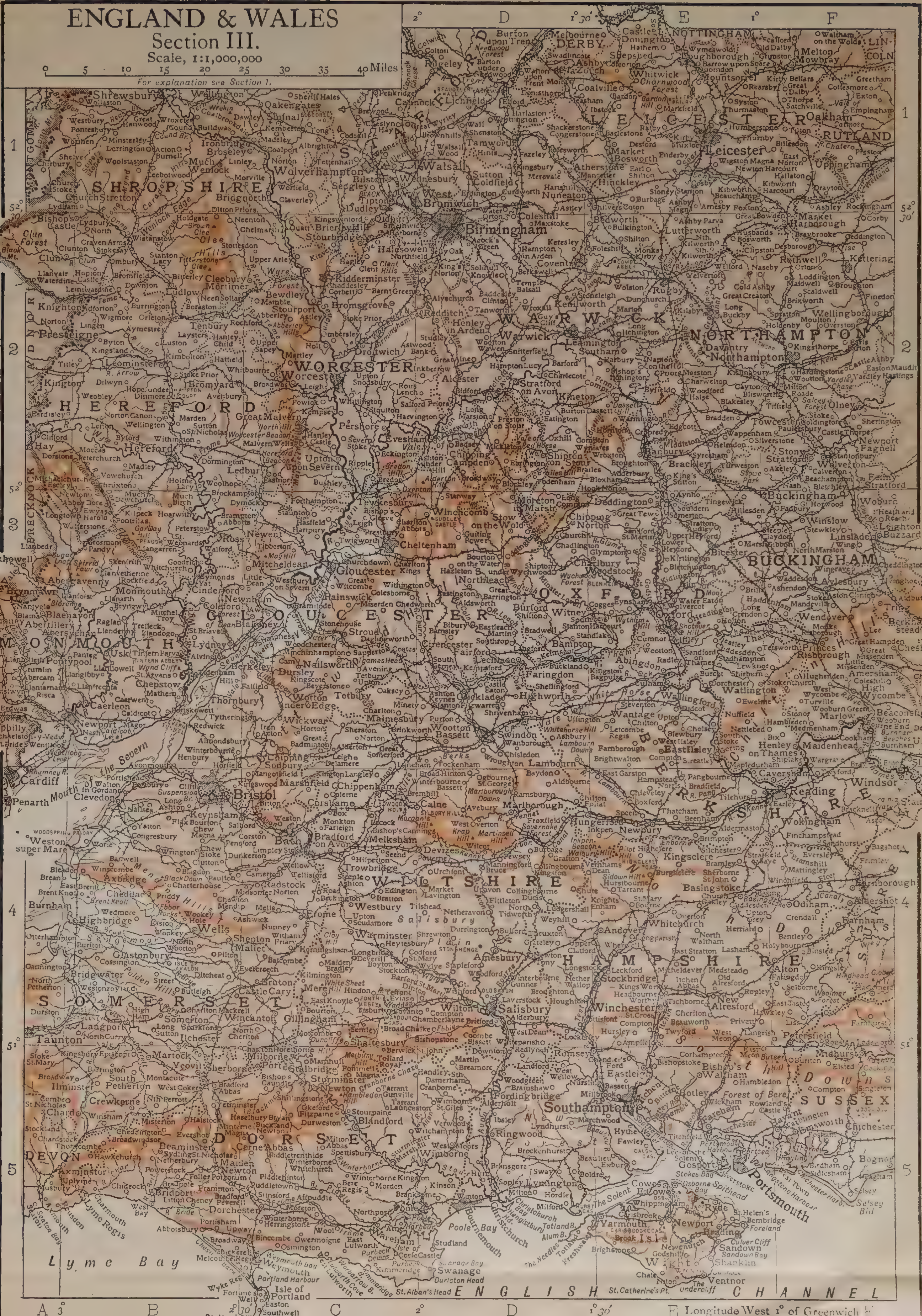
Continuation North, Section 2.

ENGLAND & WALES

Section III.

Scale, 1:1,000,000

For explanation see Section 1.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LEICESTER
RUTLAND
NORTHAMPTON
BUCKINGHAM
OXFORD
GLOUCESTER
MONMOUTH
BERKSHIRE
WILTSHIRE
SOMERSET
DORSET
HAMPSHIRE
SUSSEX
DEVON
BRECKNOCK
RADNOR
MONTGOMERY
DERBY
NOTTINGHAM
LINCOLN
Shrewsbury
Wolverhampton
Birmingham
Coventry
Leicester
Northampton
Worcester
Hereford
Gloucester
Cheltenham
Oxford
Reading
Windsor
Bristol
Bath
Cardiff
Newport
Salisbury
Winchester
Southampton
Portsmouth
Dorchester
Weymouth
Taunton
Wells
Swindon
Newbury
Basingstoke
Isle of Wight
Isle of Portland
Lyme Bay
ENGLISH CHANNEL
Mouth of the Severn
Salisbury Plain
Cotswold Hills
Mendip Hills
Poole Bay
The Solent
Spithead

Continuation West, Section 5.

Continuation West, Section 6.

Continuation East, Section 4.

Continuation East, Section 4.

misconduct, he is only checked—so far as ecclesiastical order is concerned—by his oath of canonical obedience to the "godly" monitions of his bishop; and, since these monitions are difficult and costly to enforce, while their "godliness" may be a matter of opinion, an incumbent is practically himself the interpreter of the law as applied to the doctrine and ritual of his particular church. The result has been the development within the Established Church of a most startling diversity of doctrine and ritual practice, varying from what closely resembles that of the Church of Rome to the broadest Liberalism and the extremest evangelical Protestantism. This broad comprehensiveness, which to outsiders looks like ecclesiastical anarchy, is the characteristic note of the Church of England; it may be, and has been, defended as consonant with Christian charity and suited to the genius of a people not remarkable for logical consistency; but it makes it all the more difficult to say what the religion of Englishmen actually is, even within the English Church.

The following is a list of the archiepiscopal and episcopal sees of England and Wales—the latter arranged in alphabetical order,—with date of their establishment and amount of emoluments:—

	Year of Foundation.	Annual Emoluments.
Province of Canterbury—		
Canterbury (archbishopric)	597	£15,000
Bangor	c. 550	4,200
Bath and Wells	1139	5,000
Birmingham	1904	3,500
Bristol	1897[1]	3,000
Chichester	1075	4,200
Ely	1109	5,500
Exeter	1050	4,200
Gloucester	1541	4,300
Hereford	676	4,200
Lichfield	669	4,200
Lincoln	1067	4,500
Llandaff	c. 550	4,200
London	605	10,000
Norwich	1094	4,500
Oxford	1542	5,000
Peterborough	1541	4,500
Rochester	604	3,800
St Albans	1877	3,200
St Asaph	c. 550	4,200
St David's	c. 550	4,500
Salisbury	1075	5,000
Southwark	1904	3,000
Southwell	1884	3,500
Truro	1876	3,000
Winchester	c. 650	6,500
Worcester	c. 680	4,200
Province of York—		
York (archbishopric)	625	10,000
Carlisle	1133	4,500
Chester	1541	4,200
Durham	995	7,000
Liverpool	1880	4,200
Manchester	1847	4,200
Newcastle	1882	3,500
Ripon	1836	4,200
Sodor and Man	1154	1,500
Wakefield	1888	3,000

[1] Modern refoundation.

The following are suffragan or assistant bishoprics (the names of the dioceses to which each belongs being given in brackets): Dover, Croydon (Canterbury), Beverley, Hull, Sheffield (York), Stepney, Islington, Kensington (London), Jarrow (Durham), Guildford, Southampton, Dorking (Winchester), Barrow-in-Furness (Carlisle), Crediton (Exeter), Grantham (Lincoln), Burnley (Manchester), Thetford, Ipswich (Norwich), Reading (Oxford), Leicester (Peterborough), Richmond, Knaresborough (Ripon), Colchester, Barking (St Albans), Swansea (St. David's), Woolwich, Kingston-on-Thames (Southwark), Derby (Southwell), St Germans (Truro). See also ENGLAND, CHURCH OF; ANGLICAN COMMUNION; ECCLESIASTICAL JURISDICTION; VESTMENTS; MASS.

	Sittings.	Communicants.	Ministers (Pastoral).	Local Preachers.	Sunday Scholars.
Baptists[1]	1,421,742	424,741	2134	5,748	590,321
Congregationalists (1907)	1,801,447	498,953	3197	5,603	729,347
Presbyterian Church of England[2]	173,047	85,755	323	..	98,258
Society of Friends	..	17,442	..	..	62,347
Moravians	10,000	2,999	34	..	4,542
Wesleyan Methodists[3]	2,500,000	620,350	2658	20,119	1,039,437
Primitive Methodists[1]	1,017,690	205,407	1101	15,963	477,114
United Methodist Church[4]	738,840	158,095	833	5,577	315,993
Wesleyan Reform Union	47,435	8,717	19	508	23,008
Independent Methodists	33,000	9,732	..	375	28,387
Welsh Calvinistic Methodist	472,089	185,935	900	361	187,484
Countess of Huntingdon's Connexion	12,347	2,469	26	..	3,040
Reformed Episcopal Church	6,000	1,090	28	..	2,600
Free Church of England	8,140	1,352	24	..	4,196

Other Protestant communions.

The number of "denominations" by whom buildings were certified for worship up to 1895 was 293 (see list in *Whitaker's Almanack*, 1896, p. 252), but in many instances such "denominations" consisted of two or three congregations only, in some cases of a single congregation. The more important nonconformist churches are fully dealt with under their several headings. The above table, however, based on that in the *Statesman's Year-Book* for 1908, and giving the comparative statistics of the chief nonconformist churches, may be useful for purposes of comparison. It may be prefaced by stating that, according to returns made in 1905, the Church of England provided sitting accommodation in parish and other churches for 7,177,144 people; had an estimated number of 2,053,455 communicants, 206,873 Sunday-school teachers, and 2,538,240 Sunday scholars. There were 14,029 incumbents (rectors, vicars, and perpetual curates), 7500 curates, *i.e.* assistant clergy, and some 4000 clergy on the non-active list.

Besides the bodies enumerated in the table there are other churches concerning which similar statistics are lacking, but which, in several cases, have large numbers of adherents. The Unitarians are an important body with (1908) 350 ministers and 345 places of worship. Most numerous, probably, are the adherents of the Salvation Army, which with a semi-military organization has in Great Britain alone over 60,000 officers, and "barracks," *i.e.* preaching stations, in almost every town. The Brethren, generally known, from their place of origin, as the Plymouth Brethren, have "rooms" and adherents throughout England; the Catholic Apostolic Church ("Irvingites") have some 80 churches; the New Jerusalem Church (Swedenborgians) had (1908) 75 "societies"; the Christian Scientists, the Christadelphians, the British Israelites and similar societies, such as the New and Latter House of Israel, the Seventh Day Baptists, deserve mention. The Latter Day Saints (Mormons) had (1908) 82 churches in Great Britain.

Roman Catholics.

Roman Catholicism in England has shown a tendency to advance, especially among the upper and upper-middle classes. The published lists of "converts" are, however, no safe index to actual progress; for no equivalent statistics are available for "leakage" in the opposite direction. The membership of the Roman Catholic Church in England is estimated at about 2,200,000. But though the growth of the church relatively to the population has not been particularly startling, there can be no doubt that, since the restoration of the Roman Catholic hierarchy in 1851, its general political and religious influence has enormously increased. A notable feature in this has been the great development of monastic institutions, due in large measure to the settlement in England of the congregations expelled from France. The Roman Catholic Church in England is organized in 15 dioceses, which are united in a single province under the primacy of the archbishop of Westminster. In December 1907 there were 1736 Roman Catholic churches and stations, and the number of the clergy was returned at 3524 (see ROMAN CATHOLIC CHURCH).

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[1] In 1906.

[2] There are in addition some thousands of Presbyterians unconnected with the church, including members of the Church of Scotland.

[3] Great Britain and Ireland, 1906.

[4] On September 17, 1907, the United Methodist Free Churches, the Methodist New Connexion, and the Bible Christians were united under the name of the United Methodist Church.

Jews.

The Jews in Great Britain, chiefly found in London and other great towns, number (1907) about 196,000 and have some 200 synagogues; at the head of their organization is a chief Rabbi resident in London.

Finally it may be mentioned that a small number of Englishmen, chiefly resident in Liverpool and London, have embraced Islam; they have a mosque at Liverpool. Various foreign churches which have numbers of adherents settled in England have also branch churches and organizations in the country, notably the Orthodox Eastern Church,—with a considerable number of adherents in London, Liverpool and Manchester,—the Lutheran, and the Armenian churches. (W. A. P.)

VII. COMMUNICATIONS

Roads.—In England and Wales the high-roads, or roads on which wheeled vehicles can travel, are of two classes: (1) the main roads, or great arteries along which the main vehicular traffic of the country passes; and (2) ordinary highways, which are by-roads serving only local areas. The length of the main roads is about 22,000 m., and that of ordinary highways about 96,000. The highways of England, the old coaching roads, are among the best in the world, being generally of a beautiful smoothness and well maintained; they vary, naturally, in different districts, but in many even the local roads are superior to some main roads in other countries. The supersession of the stage coach by the railway took a vast amount of traffic away from the main roads, but their proper maintenance did not materially suffer; and a larger accession of traffic took place subsequently on the development of the cycle and the motor-vehicle.

The system of road-building by private enterprise, the undertakers being rewarded by tolls levied from vehicles, persons or animals using the roads, was established in England in 1663, when an act of Charles II. authorized the taking of such tolls at "turnpikes" in Hertfordshire and Cambridgeshire. A century later, in 1767, the authorization was extended over the whole kingdom by an act of George III. In its fulness the system lasted just sixty years, for the first breach in it was made by an act of George IV., in 1827, by which the chief turnpikes in London were abolished. Further acts followed in the same direction, leading to the gradual extinction, by due compensation of the persons interested, of the old system, the maintenance of the roads being vested in "turnpike trusts and highway boards," empowered to levy local rates. The last turnpike trust ceased to exist on the 5th of November 1895, and the final accounts in connexion with its debt were closed in 1898–1899. Toll-gates are now met with only at certain bridges, where the right to levy tolls is statutory or by prescription. By the Local Government Act of 1888 the duty of maintaining main roads was imposed on the county councils, but these bodies were enabled to make arrangements with the respective highway authorities for their repair. Under the Local Government Act of 1894 the duties of all the highway authorities were transferred to the rural district councils on or before the 31st of March 1899.

It was not until the close of the 18th century, when the period of road-building activity already indicated set in, that English roads were redeemed from an extraordinarily bad condition. The roads were until then, as a rule, merely tracks, deeply worn by ages of traffic into the semblance of ditches, and, under adverse weather conditions, impassable. Travellers also had the risk of assault by robbers and highwaymen. As early as 1285 a law provided for the cutting down of trees and bushes on either side of highways, so as to deprive lawless men of cover. Instances of legislation as regards the upkeep of roads are recorded from time to time after this date, but (to take a single illustration) even in the middle of the 18th century the journey from the village, as it was then, of Paddington to London by stage occupied from 2½ to 3 hours. But from 1784 to 1792 upwards of 300 acts were passed dealing with the construction of new roads and bridges.

Railways.—The history and development of railways in England, their birthplace, and in Ireland and Scotland, with illustrative statistics, are considered under the heading UNITED KINGDOM. The following list indicates the year of foundation, termini, chief offices and geographical sphere of the chief railways of England and Wales.

1. *Railways with Termini in London.*

(*a*) NORTHERN.

Great Northern (1846).—Terminus and offices, King's Cross. Main line—Peterborough, Grantham, Newark, Doncaster; forming, with the North-Eastern and North British lines, the "East Coast" route to Scotland. Serving also the West Riding of Yorkshire, Lincolnshire, Nottingham and other towns of the midlands, and Manchester (by running powers over the Great Central metals). This company has so extensive a system of running powers over other railways, and of lines held jointly with other companies, that few of its more important express trains from London complete their journeys entirely on the company's own lines.

Midland (1844, an amalgamation of the former North Midland, Midland Counties, Birmingham & Derby, and other lines).—Terminus, St Pancras; offices, Derby. Main line—Bedford, Leicester, Sheffield, Leeds and Carlisle, affording the "Midland" route to Scotland. Serving also Nottingham, Derby, and the principal towns of the midlands and West Riding, and Manchester. West and North line from Bristol, Gloucester and Birmingham to Leicester and Derby. Also an Irish section, the Belfast and Northern Counties system being acquired in 1903. Docks at Heysham, Lancashire; and steamship services to Belfast, &c.

London & North-Western (1846, an amalgamation of the London & Birmingham, Grand Junction, and Manchester & Birmingham lines).—Terminus and offices, Euston. Main line—Rugby, Crewe, Warrington, Preston, Carlisle; forming, with the Caledonian system, the "West Coast" route to Scotland. Serves also Manchester, Liverpool and all parts of the north-west, North Wales, Birmingham and the neighbouring midland towns, and by joint-lines, the South Welsh coal-fields. Maintains docks at Garston on the Mersey, a steamship traffic with Dublin and Greenore from Holyhead, and, jointly with the Lancashire & Yorkshire Company, a service to Belfast, &c., from Fleetwood.

Great Central (1846; until 1897, when an extension to London was undertaken, called the Manchester, Sheffield & Lincolnshire).—Terminus, Marylebone; offices, Manchester. Main line—Rugby, Nottingham, Leicester, Sheffield, Manchester. The former main line runs from Manchester and Sheffield east to Retford, thence serving Grimsby and Hull, with branches to Lincoln, &c. The main line reached from London by joining the line of the Metropolitan railway near Aylesbury and following it to Harrow. Subsequently an alternative route out of London was constructed between Neasden and Northolt, where it joins another line, of the Great Western railway, from Acton, and continues as a line held jointly by the two companies through Beaconsfield and High Wycombe. Here it absorbs the old Great Western line as far as Prince's Risborough, and continues thence to Grendon Underwood, effecting a junction with the original main line of the Great Central system. This line was opened for passenger traffic in April 1906. The Great Central company owns docks at Grimsby.

(*b*) EASTERN.

Great Eastern (1862).—Terminus and offices, Liverpool Street. Serving Essex, Suffolk, Cambridgeshire, Norfolk. Joint-line with Great Northern from March to Lincoln and Doncaster. Passenger steamship services from Harwich to the Hook of Holland, Antwerp, Rotterdam, &c.

London, Tilbury & Southend (1852).—Terminus and offices, Fenchurch Street. Serving places on the Essex shore of the Thames estuary, terminating at Shoeburyness.

(*c*) WESTERN.

Great Western (1835, London to Bristol).—Terminus and offices, Paddington. Main line—Reading, Didcot, Swindon, Bath, Bristol, Taunton, Exeter, Plymouth, Penzance. Numerous additional main lines—Reading to Newbury, Weymouth and the west, a new line opened in 1906 between Castle Cary and Langport effecting a great reduction in mileage between London and Exeter and places beyond; Didcot, Oxford, Birmingham, Shrewsbury, Chester with connexions northward, and to North Wales; Oxford to Worcester, and Swindon to Gloucester and the west of England; South Welsh system (through route from London via Wootton Bassett or via Bristol, and the Severn tunnel), Newport, Cardiff, Swansea, Milford. Steamship services to the Channel Islands from Weymouth to Waterford, Ireland from Milford, and to Rosslare, Ireland, from Fishguard, the route last named being opened in 1906. The line constructed jointly with the Great Central company (as detailed in the description above) was extended in 1910 from Ashendon to Aynho, to form a short route to the great centres north of Oxford.

London & South-Western (1839, incorporating the London & Southampton railway of 1835).—Terminus and offices, Waterloo. Main line—Woking, Basingstoke, Salisbury, Yeovil, Exeter, Plymouth; Woking, Guildford and Portsmouth; Basingstoke, Winchester, Southampton, Bournemouth, &c. Extensive connexions in Surrey, Hampshire and the south-west, as far as North Cornwall. This company owns the great docks at Southampton, and maintains passenger services from that port to the Channel Islands, Havre, St Malo and Cherbourg.

(*d*) SOUTHERN.

London, Brighton & South Coast (1846).—Termini, Victoria and London Bridge. Serving all the coast stations from Hastings to Portsmouth, with various lines in eastern Surrey and in Sussex. Maintains a service of passenger steamers between Newhaven and Dieppe.

South Eastern & Chatham (under a managing committee, 1899, of the South-Eastern company, 1836, and the London, Chatham & Dover company, 1853).—Termini—Victoria, Charing Cross, Holborn Viaduct, Cannon Street. Offices, London Bridge Station. Various lines chiefly in Kent. Steamship services between Folkestone and Boulogne, Dover and Calais, &c.

2. *Provincial Railways.*

The two most important railway companies not possessing lines to London are the North-Eastern and the Lancashire & Yorkshire.

North Eastern (1854, amalgamating a number of systems).—Offices, York. Main line—Leeds, Normanton and York to Darlington, Durham, Newcastle and Berwick-on-Tweed. Connecting with the Great Northern between Doncaster and York, and with the North British at Berwick, it forms part of the "East Coast" route to Scotland. Serving all ports and coast stations from Hull to Berwick, also Carlisle, &c. Owning extensive docks at Hull, Middlesbrough, South Shields, the Hartlepools, Blyth, &c.

Lancashire & Yorkshire (1847, an amalgamation of a number of local systems).—Offices, Manchester. Main line—Manchester, Rochdale, Tormorden, Wakefield and Normanton, with branches to Halifax, Bradford, Leeds, Huddersfield and other centres of the West Riding. Extensive system in south Lancashire, connecting Manchester with Preston and Fleetwood (where the docks and steamship services to Ireland are worked jointly with the London & North-Western company), Southport, Liverpool, &c.

Among further provincial systems there should be mentioned:—

Cambrian.—Offices, Oswestry. Whitchurch, Oswestry, Welshpool to Barmouth and Pwllheli, Aberystwyth, &c.

Cheshire Lines, worked by a committee representative of the Great Central, Great Northern and Midland Companies, and affording important connexions between the lines of these systems and south Lancashire and Cheshire (Godley, Stockport, Warrington, Liverpool; Manchester and Liverpool; Manchester and Liverpool to Southport; Godley and Manchester to Northwich and Chester, &c.).

Furness.—Offices, Barrow-in-Furness. Carnforth, Barrow, Whitehaven, with branches to Coniston, Windermere (Lakeside), &c. Docks at Barrow.

North Staffordshire.—Offices, Stoke-upon-Trent. Crewe and the Potteries, Macclesfield, &c., to Uttoxeter and Derby.

Cross-Country Connexions.—While London is naturally the principal focal point of the English railway system, the development of through connexions between the chief lines by way of the metropolis is very small. Some through trains are provided between the North-Western and the London, Brighton & South Coast lines via Willesden Junction, Addison Road and Clapham Junction; and a through connexion by way of Ludgate Hill has been arranged between main line trains of the South-Western and the Great Northern railways, but otherwise passengers travelling through London have generally to make their own way from one terminus to another. Certain cross-country routes, however, are provided to connect the systems of some of the companies, among which the following may be noticed.

(1) Through connexions with the continental services from Harwich, and with Yarmouth and other towns of the East coast, are provided from Yorkshire, Lancashire, &c., by way of the Great Northern and Great Eastern Joint line from Doncaster and Lincoln to March.

(2) Through connexions between the systems of the South-Eastern & Chatham and the Great Western companies are provided via Reading.

(3) Through connexions between the systems of the Great Central and the Great Western companies are provided by the line connecting Woodford and Banbury.

(4) Through connexions between the Midland and the South-Western systems are provided (*a*) by the Midland and South-Western Junction line connecting Cheltenham on the north-and-west line of the Midland with Andover Junction on the South-Western line; and (*b*) by the Somerset & Dorset line, connecting the same lines between Bath, Templecombe and Bournemouth.

(5) The line from Shrewsbury to Craven Arms and Hereford, giving connexion between the north and the south-west, and Wales, is worked by the North-Western and Great Western companies.

Canals and rivers.

Inland Navigation.—The English system of inland navigation is confined principally to the following districts: South Lancashire, the West Riding of Yorkshire, the Midlands, especially about Birmingham, the Fen district and the Thames basin (especially the lower part). All these districts are interconnected. The condition of inland navigation, as a whole, is not satisfactory. The Fossdyke in Lincolnshire, connecting the river Trent at Torksey with the Witham near Lincoln, and now belonging to the Great Northern and Great Eastern joint railways, is usually indicated as the earliest extant canal in England, inasmuch as it was constructed by the Romans for the purpose of drainage or water-supply, and must have been used for navigation at an early period. But the history of canal-building in England is usually dated from about 1760, and from the construction, at the instance of Francis, Duke of Bridgewater, of the Bridgewater canal in South Lancashire, now belonging to the Manchester Ship Canal Company. The activity in canal-building which prevailed during the later years of the 18th century was, in a measure, an earlier counterpart of the first period of railway development, which, proceeding subsequently along systematized lines not applied to canal-construction, and providing obvious advantages in respect of speed, caused railways to withdraw much traffic from canals. Some canals and river navigations have consequently become derelict, or are only maintained with difficulty and in imperfect condition. The inland navigation system suffers from a want of uniformity in the size of locks, depth of water, width of channels and other arrangements, so that direct intercommunication between one canal and another is often impossible in consequence; moreover, although the canals, like railways, are owned by many separate bodies, hardly any provision has been made, as it has in the case of railways, for such facilities as the working of through traffic over various systems at an inclusive charge. Lastly, the railway companies themselves have acquired control of about 30% of the total mileage of canals in England and Wales, and in many cases this has had a prejudicial effect on the prosperity of canals. Notwithstanding these disabilities, there has been in modern times a new development in the trade of some canals, born of a realization that for certain classes of goods water-transport is cheaper than the swifter rail-transport. Various proposals have been made for the establishment of a single control over all inland waterways.

The lower or estuarine courses of some of the English rivers as the Thames, Tyne, Humber, Mersey and Bristol Avon, are among the most important waterways in the world, as giving access for sea-borne traffic to great ports. From the Mersey the Manchester Ship Canal runs to Manchester. The manufacturing districts of South Lancashire and the West Riding of Yorkshire are traversed and connected by several canals following transverse valleys of the Pennine Chain. The main line of the Aire and Calder navigation runs from Goole by Castleford to Leeds, whence the Leeds and Liverpool canal, running by Burnley and Blackburn, completes the connexion between the Humber and the Mersey. Other canals are numerous, among which may be mentioned the Sheffield and South Yorkshire, connecting Sheffield with the Trent. The Trent itself affords an extensive navigation, from which, at Derwent mouth, the Trent and Mersey Canal runs near Burton and Stafford, and through the Potteries, to the Bridgewater Canal and so to the Mersey. This canal is owned by the North Staffordshire railway company. The river Weaver, a tributary of the Mersey, affords a waterway of importance to the salt-producing towns of Cheshire. The system of the Shropshire Union railways and canal company, which is connected by lease with the London & North-Western railway company, carries considerable traffic, especially in the neighbourhood of Ellesmere Port. In the Black Country and neighbourhood the numerous ramifications of the Birmingham Canal navigations bear a large mineral traffic. This system is connected with the rivers Severn and Trent and the canal system of the country at large, and is controlled by the London & North-Western company. The principal line of navigation from the Thames northward to the midlands is that of the Grand Junction, which runs from Brentford, is connected through London with the port of London by the Regent's Canal, and follows closely the main line of the North-Western railway. It connects with the Oxford Canal at Braunston in Northamptonshire, and through this with canals to Birmingham and the midlands, and continues to Leicester. Both the Severn up to Stourport and the Thames up to Oxford have a fair traffic, but the Thames and Severn Canal is not much used. There is some traffic on the navigable drainage cuts and rivers of the Fens, but beyond these, in a broad consideration of the waterways of England from the point of view of their commercial importance, it is unnecessary to go.

See H. R. De Salis, *Bradshaw's Canals and Navigable Rivers of England and Wales* (London, 1904); *Report* of Royal Commission on Canals (London, 1909).

Oversea Communications.—The chief ports for continental passenger traffic are as follows:—

Harwich to Amsterdam, Antwerp, Hamburg, Hook of Holland, Rotterdam (Great Eastern railway); to Copenhagen and Esbjerg (Royal Danish mail route).

Queenborough to Flushing (Zeeland Steamship company).

Dover to Calais (South-Eastern & Chatham railway); to Ostend (Belgian Royal mail steamers).

Folkestone to Boulogne (South Eastern & Chatham railway).

Newhaven to Dieppe (London, Brighton & South Coast railway).

Southampton to Cherbourg, Havre, St Malo (South-Western railway).

The chief ports for trans-Atlantic traffic are Liverpool and Southampton, and special trains are worked in connexion with the steamers to and from London. The great development of harbour accommodation at Dover early in the 20th century brought trans-Atlantic traffic to this port also. Southampton and Liverpool are the two greatest English ports for all oceanic passenger traffic; but London has also a large traffic, both to European and to foreign ports. The passenger traffic to the Norwegian ports, always very heavy in summer, is carried on chiefly from Hull and Newcastle.

VIII. INDUSTRIES

Agriculture.—In the agricultural returns for Great Britain, issued annually by the government, the area of England (apart from Wales) has been divided into two sections, "arable" and "grass," corresponding with a former division into "corn counties" and "grazing counties," except that Leicestershire is included not in the "grass" but in the "arable" section. Most of the eastern part of England is "arable," while the western and northern part is "grass," the boundary between the sections being the western limit of Hampshire, Berkshire, Oxfordshire, Warwickshire, Leicestershire, Nottinghamshire, and of the East Riding of Yorkshire.

The division is thus as follows:—

Grass Counties.	*Arable Counties.*
Northumberland.	Yorkshire, East Riding.
Cumberland.	Lincolnshire.
Durham.	Nottingham.
Yorkshire, North and West Ridings.	Rutland.
Westmorland.	Huntingdonshire.
Lancashire.	Warwickshire.
Cheshire.	Leicestershire.
Derbyshire.	Northamptonshire.
Staffordshire.	Cambridgeshire.
Shropshire.	Norfolk.
Worcestershire.	Suffolk.
Herefordshire.	Bedfordshire.
Monmouthshire.	Buckinghamshire.
Gloucestershire.	Oxfordshire.
Wiltshire.	Berkshire.
Dorsetshire.	Hampshire.
Somersetshire.	Hertfordshire.
Devonshire.	Essex.
Cornwall.	Middlesex.
	Surrey.
	Kent.
	Sussex.

The average area under cultivation of all the counties is about ·76 of the whole area. The counties having the greatest area under cultivation (ranging up to about nine-tenths of the whole) may be taken to be—Leicestershire, the East Riding of Yorkshire, Lincolnshire, Huntingdonshire, Rutland, Northamptonshire, Bedfordshire and Cambridgeshire. Those with the smallest proportional cultivated area are Westmorland, Middlesex, Northumberland, Surrey, Cumberland, the North and West Ridings of Yorkshire, Lancashire, Durham and Cornwall. Geographical considerations govern these conditions to a very great extent; thus the counties first indicated lie almost entirely within the area of the low-lying and fertile Eastern Plain, while the smallest areas of cultivation are found in the counties covering the Pennine hill-system, with its high-lying uncultivated moors. In the case of Cornwall and Cumberland the physical conditions are similar to these; but in that of Middlesex and Surrey the existence of large urban areas belonging or adjacent to London must be taken into account. These also affect the proportion of cultivated areas in the other home counties. The presence of a widespread urban population must also be remembered in the case of Lancashire and the West Riding of Yorkshire.

Distribution of crops.

The geographical distribution of the principal crops, &c., may now be followed. The grain crops grown in England consist almost exclusively of wheat, barley and oats. Lincolnshire, Norfolk, Suffolk, Essex, Cambridgeshire and the East Riding of Yorkshire are especially productive in all these; the North and West Ridings of Yorkshire produce a notable quantity of barley and oats; and the oat-crops in the following counties deserve mention—Devonshire, Hampshire, Lancashire, Cumberland, Cornwall, Cheshire and Sussex. There is no county, however, in which the single crop of wheat or barley stands pre-eminently above others, and in the case of the upland counties of Cumberland, Westmorland and Derbyshire, the metropolitan county of Middlesex, and Monmouthshire, these crops are quite insignificant. In proportion to their area, the counties specially productive of wheat are Cambridgeshire, Huntingdonshire, Hertfordshire, Bedfordshire and Essex; and of barley, Norfolk, Suffolk and the East Riding of Yorkshire. In fruit-growing, Kent takes the first place, but a good quantity is grown in Cambridgeshire, Norfolk and Essex, in Worcestershire and other western counties, where, as in Herefordshire, Somerset and Devon, the apple is especially cultivated and cider is largely produced. Kent is again pre-eminent in the growth of hops; indeed this practice and that of fruit-growing give the scenery of the county a strongly individual character. Hop-growing extends from Kent into the neighbouring parts of Sussex and Surrey, where, however, it is much less important; it is also practised to a considerable degree in a group of counties of the midlands and west—Herefordshire, Worcestershire, Gloucestershire and Shropshire. Market-gardening is carried on most extensively on suitable lands in the neighbourhood of the great areas of urban population; thus the open land remaining in Middlesex is largely devoted to this industry. From the Channel and Scilly Islands, vegetables, especially seasonable vegetables, and also flowers which, owing to the peculiar climatic conditions of these islands, come early to perfection, are imported to the London market. Considering the crops not hitherto specified, it may be indicated that turnips and swedes form the chief green crops in most districts; potatoes, mangels, beans and peas are also commonly grown. Beyond the three chief grain crops, only a little rye is grown. The cultivation of flax is almost extinct, but it is practised in a few districts, such as the East and West Ridings of Yorkshire.

Live stock.

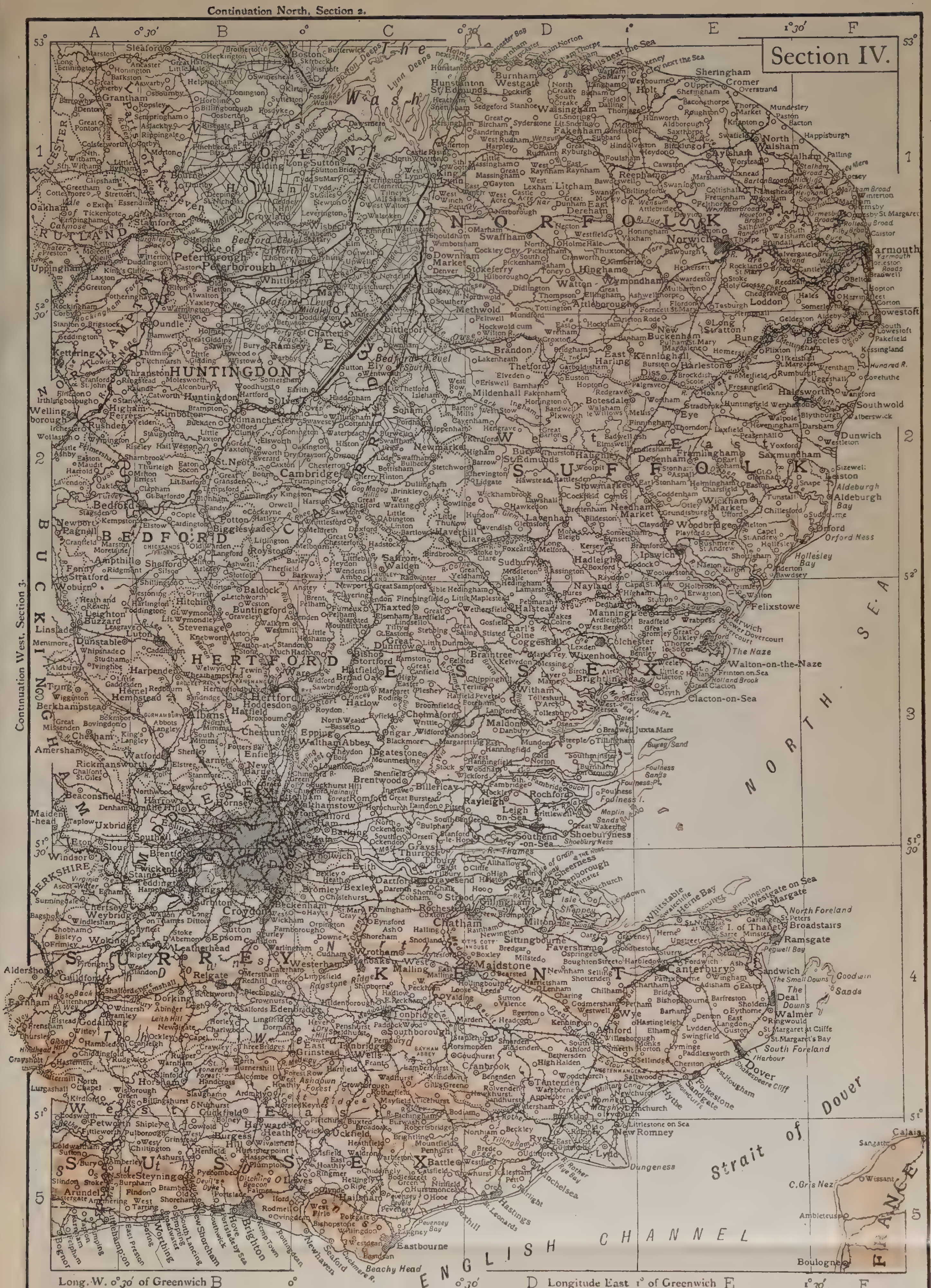
The counties in which the greatest proportion of the land is devoted to permanent pasture may be judged roughly from the list of "grass counties" already given. Derbyshire, Leicestershire, the midland counties generally, and Somersetshire, have the highest proportion, and the counties of the East Anglian seaboard the lowest. But with lands thus classified heath, moor and hill pastures are not included; and the greatest areas of these are naturally found in the counties of the Pennines and the Lake District, especially in Northumberland, Cumberland, Westmorland and the North and West Ridings of Yorkshire. There is also plenty of hill-pasture in the south-western counties (from Hampshire and Berkshire westward), especially in Devonshire, Cornwall and Somersetshire, and also in Monmouthshire and along the Welsh marches, on the Cotteswold Hills, &c. In all these localities sheep are extensively reared, especially in Northumberland, but on the other hand in Lincolnshire the numbers of sheep are roughly equal to those in the northern county. Other counties in which the numbers are especially large are Devonshire, Kent, Cumberland and the North and West Ridings of Yorkshire. Cattle are reared in great numbers in Lincolnshire, Lancashire and the West Riding of Yorkshire, Devonshire, Somersetshire and Cornwall; but the numbers of both cattle and sheep are in no English county (save Middlesex) to be regarded as insignificant. Pigs are bred most extensively in Suffolk, Norfolk and Lincolnshire and in Somersetshire.

Woodlands.

It is often asserted that the scenery of rural England is of its kind unrivalled. Except in open lands like the Fens, the peculiarly rich appearance of the country is due to the closely-divided fields with their high, luxuriant hedges, and especially to the profuse growth of trees. There is not, however, any large continuous forested tract. Certain areas still bear the name of forest where there is now none; the term here possesses an historical significance, in many cases indicating former royal game-preserves. Great areas of England were once under forest. The clearing of land for agricultural purposes, the use of wood for the prosecution of the industries of an increasing population, and other causes, have led to the gradual disforesting of large tracts. There are still, however, some small well-defined woodland areas. The New Forest in Hampshire, the Forest of Dean in Gloucestershire, and Epping Forest, which is preserved as a public recreation-ground by the City of London, are the most notable instances. The counties comprising the greatest proportional amount of woodland fall into two distinct groups—Hampshire, Surrey, Sussex and Kent, with Berkshire and Buckinghamshire; Monmouth, Herefordshire and Gloucestershire. Cambridgeshire, lying almost wholly within the area of the Fens, has the smallest proportional area of woodland of any English county.

The number of persons engaged in agriculture in England and Wales was found by the census of 1901 to be 1,192,167; the total showing a steady decrease (*e.g.* from 1,352,389 in 1881), which is especially marked in the case of females. But the decrease lies mainly in the number of agricultural labourers; the number of farmers is not notably affected, and the increasing substitution of machinery for manual labour must be taken into consideration. The average size of holdings in England may be taken approximately as 66 acres, the average in 1903 being 66·1, whereas in 1895 it was 65·3

(See also the article AGRICULTURE.)


Continuation North, Section 2.
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Continuation West, Section 3.
A B C D E F
1 2 3 4 5
53° 52° 30' 52° 51° 30' 51°
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The Wash
LINCOLN
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NORFOLK
SUFFOLK
EAST
WEST
ELY
CAMBRIDGE
BEDFORD
BUCKINGHAM
HERTFORD
ESSEX
MIDDLESEX
LONDON
BERKSHIRE
SURREY
KENT
WEST SUSSEX
EAST SUSSEX
NORTH SEA
Strait of Dover
ENGLISH CHANNEL
FRANCE
Long. W. 0°30' of Greenwich B
Longitude East 1° of Greenwich F

Sea fisheries.

Fisheries.—All the seas round Britain are rich in fish, and there are important fishing stations at intervals on all the English coasts, but those on the east coast are by far the most numerous. On an estimate of weight and value of the fish landed, Grimsby at the mouth of the Humber in Lincolnshire, stands pre-eminent as a fishing port. For example, the fish landed there in 1903 were of nearly four times the value of those landed at Hull, which was the second in order of all the English stations. Next in importance stand Lowestoft, Yarmouth and North Shields, Boston and Scarborough, and, among a large number of minor fishing stations, Hartlepool and Ramsgate. Great quantities of fish are also landed at the riverside market of Billingsgate in London, but the conditions here are exceptional, the landings being effected by carrier steamers, plying from certain of the fishing fleets, and not taking part in the actual process of fishing. On the south coast Newlyn ranks in the same category with Boston; at Plymouth considerable catches are landed; and Brixham ranks alongside the last ports named on the east coast. The chief fishing centres of the English Channel are thus seen to belong to the coast of Devonshire and Cornwall. On the west coast the Welsh port of Milford takes the first place, while Swansea and Cardiff have a considerable fishing industry, surpassed, however, by that of Fleetwood in Lancashire. Liverpool also ranks among the more important centres. As a comparison of the production of the east, south and west coast fisheries, an average may be taken of the annual catches recorded over a term of years. In the ten years 1894–1903 this average was 6,985,588 cwt. for the east coast stations, 669,759 cwt. for those of the south coast, and 884,932 for those of the west (including the Welsh stations).

Distinctions may be drawn, as will be seen, between the nature and methods of the fisheries on the various coasts, and the relative prosperity of the industry from year to year cannot be considered as a whole. Thus in the period considered the recorded maximum weight of fish landed at the east coast ports was 9,539,114 cwt. in 1903 (the value being returned as £5,721,105); whereas on the south coast it was 736,599 cwt. in 1899, and on the west 1,117,164 cwt. in 1898. Considered as a whole, the individual fish, by far the most important in the English fisheries, is the herring, for which Yarmouth and Lowestoft are the chief ports. The next in order are haddock, cod and plaice, and the east coast fisheries return the greatest bulk of these also. But whereas the south coast has the advantage over the west in the herring and plaice fisheries, the reverse is the case in the haddock and cod fisheries, haddock, in particular, being landed in very small quantities at the south coast ports. Mackerel, however, are landed principally at the southern ports, and the pilchard is taken almost solely off the south-western coast. A fish of special importance to the west coast fisheries is the hake. Among shell-fish, crabs and oysters are taken principally off the east coast; the oyster beds in the shallow water off the north Kent and Essex coasts, as at Whitstable and Colchester, being famous. Lobsters are landed in greatest number on the south coast.

The number of vessels of every sort employed in fishing was returned in 1903 as 9721, and the number of persons employed as 41,539, of whom 34,071 were regular fishermen. The development of the steam trawling-vessel is illustrated by the increase in numbers of these vessels from 480 in 1893 to 1135 in 1903. They belong chiefly to North Shields, Hull, Grimsby, Yarmouth and Lowestoft. There are a considerable number on the west coast, but very few on the south. These vessels have a wide range of operations, pursuing their work as far as the Faeroe Islands and Iceland on the one hand, and the Bay of Biscay and the Portuguese coast on the other.

Fresh-water fisheries.

The English freshwater fisheries are not of great commercial importance, nor, from the point of view of sport, are the salmon and trout fisheries as a whole of equal importance with those of Scotland, Ireland or Wales. The English salmon and trout fisheries may be geographically classified thus: (1) *North-western division*, Rivers Eden, Derwent, Lune, Ribble; (2) *North-eastern*, Coquet, Tyne, Wear, Tees, &c.; (3) *Western*, Dee, Usk, Wye, Severn; (4) *South-western*, Taw, Torridge, Camel, Tamar, Dart, Exe, Teign, &c.; (5) *Southern*, Avon and Stour (Christchurch) and the Itchin and other famous trout streams of Hampshire. The rivers of the midlands and east are of little importance to salmon-fishers, though the Trent carries a few, and in modern times attempts have been made to rehabilitate the Thames as a salmon river. The trout-fishing in the upper Thames and many of its tributaries (such as the Kennet, Colne and Lea) is famous. But many of the midland, eastern and south-eastern rivers, the Norfolk Broads, &c., are noted for their coarse fish.

Mining.—Although the conditions of mining have, naturally, undergone a revolutionary development in comparatively modern times, yet some indications of England's mineral wealth are found at various periods of early history. The exploitation of tin in the south-west is commonly referred back to the time of the Phoenician sea-traders, and in the first half of the 13th century England supplied Europe with this metal. At a later period tin and lead were regarded as the English minerals of highest commercial value; whereas to-day both, but especially lead, have fallen far from this position. The Roman working of lead and iron has been clearly traced in many districts, as has that of salt in Cheshire. The subsequent development of the iron industry is full of interest, as, while extending vastly, it has entirely lapsed in certain districts. However long before it may have been known to a few, the use of coal for smelting iron did not become general till the later part of the 18th century, and down to that time, iron-working was confined to districts where timber was available for the supply of the smelting medium, charcoal. Thus the industry centred chiefly upon the Weald (Sussex and Kent), the Forest of Dean in Gloucestershire, and the Birmingham district; but from the first district named it afterwards wholly departed, following the development of the coal-fields. These have, in some cases, a record from a fairly early date; thus, an indication of the Northumberland coal-supply occurs in a charter of 1234, and the Yorkshire coal-field is first mentioned early in the following century. But how little this source of wealth was developed appears from an estimate of the total production of coal, which gives in 1700 only 2,612,000 tons, and, in 1800, 10,080,000 tons, against the returned total (for the United Kingdom) of 225,181,300 tons in 1900.

The chief minerals raised in England, as stated in the annual home office report on mines and quarries, appear in order of value, thus: coal, iron ore, clay and shale, sandstone, limestone, igneous rocks, salt, tin ore. Coal surpasses all the other minerals to such an extent that, taking the year 1903 as a type, when the total value of the mineral output was very nearly £70,000,000, that of coal is found to approach £61,000,000.

Coal-fields.

The position of the various principal coal-fields has been indicated in dealing with the physical geography of England, but the grouping of the fields adopted in the official report may be given here, together with an indication of the counties covered by each, and the percentage of coal to the total bulk raised in each county. These figures are furnished as a general demonstration of the geographical distribution of the industry, but are based on the returns for 1903.

Coal-fields.	Counties.	Percentage.
Northern	Durham	22·37
	Northumberland	7·48
Yorkshire, &c.	Yorkshire (West Riding)[1]	17·76
	Derbyshire	9·40
	Nottinghamshire	5·41
Lancashire and Cheshire	Lancashire	15·26
	Cheshire	0·25
Midland[2]	Leicestershire	1·31
	Shropshire	0·50
	Staffordshire	8·10
	Warwickshire	2·12
	Worcestershire	0·44
Small detached	Cumberland	1·37
	Gloucestershire[3]	0·87
	Somersetshire	0·62
	Westmorland	0·07
	Yorkshire (North Riding)[1]	..
	Monmouthshire[4]	6·67

The coal-fields on the eastern flank of the Pennines, therefore, namely, the Northern and the Yorkshire, are seen to be by far the most important in England. The carrying trade in coal is naturally very extensive, and may be considered here. The principal ports for the shipping of coal for export, set down in order of the amount shipped, also fall very nearly into topographical groups, thus:—Newcastle, South Shields and Blyth in the Northern District; Newport in Monmouthshire; Sunderland in the Northern District, Hull, Grimsby and Goole on the Humber, which forms the eastern outlet of the Yorkshire coal-fields; Hartlepool, in the Northern District, and Liverpool. The tonnage annually shipped ranges from about 4½ millions of tons in the case of Newcastle to some half a million in the case of Liverpool; but the export trade of Cardiff in South Wales far surpasses that of any English port, being more than three times that of Newcastle in 1903. The coastwise carrying trade is also important, the bulk being shared about equally by Sunderland, Newcastle, South Shields and Cardiff, while Liverpool has also a large share. Of the whole amount of coal received coastwise at English and Welsh ports (about 13½ million tons), London received considerably over one-half (nearly 8 million tons in 1903). The railways having the heaviest coal traffic are the North-Eastern, which monopolizes the traffic of Northumberland and Durham; the Midland, commanding the Derbyshire, Yorkshire and East Midland traffic, and some of the Welsh; the London & North Western, whose principal sources are the Lancashire, Staffordshire and South Welsh districts; the Great Western and the Taff Vale (South Welsh), with the Great Central, Lancashire & Yorkshire and Great Northern systems.

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[1] The figure 17·76 is the percentage for the whole of Yorkshire.

[2] The West Midlands (Shropshire, &c.) include the coal-fields of Shrewsbury, Leebotwood, Coalbrookdale, the Clee Hills and the Forest of Wyre.

[3] The Forest of Dean coal-field is in Gloucestershire.

[4] The coal-field of Monmouthshire belongs properly to, and in the Report is classified with, the great coal-field of South Wales.

In the face of railway competition, several of the canals maintain a fair traffic in coal, for which they are eminently suitable—the system of the Birmingham navigation, the Aire and Calder navigation of Yorkshire, and the Leeds and Liverpool navigation have the largest shares in this trade.

Iron.

The richest iron-mining district in England and in the United Kingdom is the Cleveland district of the North Riding of Yorkshire. It produces over two-fifths of the total amount of ore raised in the Kingdom, and not much less than one-half of that raised in England. The richness of the ore (about 30% of metal) is by no means so great as the red haematite ore found in Cumberland and north Lancashire (Furness district, &c.). Here the percentage is over 50, but the ore, though the richest found in the kingdom, is less plentiful, about 1½ million tons being raised in 1903 as against more than 5½ millions in Cleveland. There is also a considerable working of brown iron ore at various points in Lincolnshire, Northamptonshire and Leicestershire; with further workings of less importance in Staffordshire and several other districts. The total amount of ore raised in England is about 12½ million tons, but it is not so high, in some iron-fields, as formerly. Some of the lesser deposits have been worked out, and even in the rich Furness fields it has been found difficult to pursue the ore. The import of ore (the bulk coming from Spain) has consequently increased, and the ports where the principal import trade is carried on are those which form the principal outlets of the iron-working districts of Cleveland and Furness, namely Middlesbrough and Barrow-in-Furness.

The geographical distribution of the remaining more important English minerals may be passed in quicker review. Of the metals, the production of copper is a lapsing industry, confined to Cornwall. For the production of lead the principal counties are Derbyshire, Durham and Stanhope, but the industry is not extensive, and is confined to a few places in each county. Quarrying for limestone, clay and sandstone is general in most parts. For limestone the principal localities are in Durham, Derbyshire and Yorkshire, while for chalk-quarrying Kent is pre-eminent among a group of south-eastern counties, including Hampshire, Sussex and Surrey, with Essex. Fireclay is largely raised from coal-mines, while, among special clays, there is a considerable production of china and potter's clays in Cornwall, Devonshire and Dorsetshire. As regards igneous rocks, the Charnwood Forest quarries of Leicestershire, and those of Cornwall, are particularly noted for their granite. Slate is worked in Cornwall and Devon, and also in Lancashire and Cumberland, where, in the Lake District, there are several large quarries. Salt, obtained principally from brine but also as rock-salt, is an important object of industry in Cheshire, the output from that county and Staffordshire exceeding a million tons annually. In Worcestershire, Durham and Yorkshire salt is also produced from brine.

The total number of persons in any way occupied in connexion with mines and quarries in England and Wales in 1901 was 805,185; the number being found to increase rapidly, as from 528,474 in 1881. Coal-mines alone occupied 643,654, and to development in this direction the total increase is chiefly due. The number of ironstone and other mines decreased in the period noticed from 55,907 to 31,606.

Manufacturing Industries.—There are of course a great number of important industries which have a general distribution throughout the country, being more or less fully developed here or there in accordance with the requirements of each locality. But in specifying the principal industries of any county, it is natural to consider those which have an influence more than local on its prosperity. In England, then, two broad classes of industry may be taken up for primary consideration—the textile and the metal. Long after textile and other industries had been flourishing in the leading states of the continent, in the Netherlands, Flanders and France, England remained, as a whole, an agricultural and pastoral country, content to export her riches in wool, and to import them again, greatly enhanced in value, as clothing. It is not to be understood that there were no manufacturing industries whatever. Rough cloth, for example, was manufactured for home consumption. But from Norman times the introduction of foreign artisans, capable of establishing industries which should produce goods fit for distant sale, occupied the attention of successive rulers. Thus the plantation of Flemish weavers in East Anglia, especially at the towns of Worstead (to which is attributed the derivation of the term worsted) and Norwich, dates from the 12th century. The industry, changing locality, like many others, in sympathy with the changes in modern conditions, has long been practically extinct in this district. Then, when religious persecution drove many of the industrial population of the west of Europe away from the homes of their birth, they liberally repaid English hospitality by establishing their own arts in the country, and teaching them to the inhabitants. Thus religious liberty formed part of the foundation of England's industrial greatness. Then came the material agent, machinery propelled by steam. The invention of the steam engine, following quickly upon that of the carding machine, the spinning jenny, and other ingenious machinery employed in textile manufactures, gave an extraordinary impulse to their development, and, with them, that of kindred branches of industry. At the basis of all of them was England's wealth in coal. The vast development of industries in England during the 19th century may be further correlated with certain events in the general history of the time. Insular England was not affected by the disturbing influences of the Napoleonic period in any such degree as was continental Europe. Such conditions carried on the work of British inventors in helping to develop industries so strongly that manufacturers were able to take full advantage of the opportunities offered by the American Civil War (in spite of the temporary disability it entailed upon the cotton industry) and by the Franco-German War. These wars tended to paralyse industries in the countries affected, which were thus forced to English markets to buy manufactured commodities. That England, not possessing the raw material, became the seat of the cotton manufacture, was owing to the ingenuity of her inventors. It was not till the later part of the 18th century, when a series of inventions, unparalleled in the annals of industry, followed each other in quick succession, that the cotton manufacture took real root in the country, gradually eclipsing that of other European nations, although a linen manufacture in Lancashire had acquired some prominence as early as the 16th century. But though the superior excellence of their machinery enabled Englishmen to start in the race of competition, it was the discovery of the new motive power, drawn from coal, which made them win the race. In 1815 the total quantity of raw cotton imported into the United Kingdom was not more than 99 millions of pounds, which amount had increased to 152 millions of pounds in 1820, and rose further to 229 millions in 1825, so that there was considerably more than a doubling of the imports in ten years.

Textiles.

The geographical analysis of the cotton industry in England is simple. It belongs almost entirely to south Lancashire—to Manchester and the great industrial towns in its neighbourhood. The industry has extended into the adjacent parts of Cheshire, the West Riding of Yorkshire and Derbyshire. The immediate neighbourhood of a coal-supply influenced the geographical settlement of this industry, like others; and the importance to the manufacture of a moist climate, such as is found on the western slope of the Pennines (in contradistinction to the eastern), must also be considered. The excess of the demand of the factories over the supply of raw material has become a remarkable feature of the industry in modern times.

The distribution of the woollen industries peculiarly illustrates the changes which have taken place since the early establishment of manufacturing industries in England. It has been seen how completely the industry has forsaken East Anglia. Similarly, this industry was of early importance along the line of the Cotteswold Hills, from Chipping Camden to Stroud and beyond, as also in some towns of Devonshire and Cornwall, but though it survives in the neighbourhood of Stroud, the importance of this district is far surpassed by that of the West Riding of Yorkshire, where the woollen industry stands pre-eminent among the many which, as already indicated, have concentrated there. As the cotton industry has in some degree extended from Lancashire into the West Riding, so has the woollen from the West Riding into a few Lancastrian towns, such as Rochdale. Among other textile industries attaching to definite localities may be mentioned the silk manufacture of eastern Staffordshire and Cheshire, as at Congleton and Macclesfield; and the hosiery and lace manufactures of Nottinghamshire, Derbyshire and Leicestershire.

Metal-working.

The metal-working industries also follow a geographical distribution, mainly governed by the incidence of the coal-fields, as well as by that of the chief districts for the production of iron-ore already indicated, such as the Cleveland and Durham and the Furness districts. But the district most intimately connected with every branch of this industry, from engineering and the manufacture of tools, &c., to working in the precious metals, is the "Black Country" and Birmingham district of Staffordshire, Warwickshire and Worcestershire. Apart from this district, large quantities of iron and steel are produced in the manufacturing areas of Lancashire and the West Riding of Yorkshire, and here, as in the Black Country, are found certain centres especially noted for the production of an individual class of goods, such as Sheffield for its cutlery. There is, further, a large engineering industry in the London district; and important manufactures of agricultural implements are found at many towns of East Anglia and in other agricultural localities. Birmingham and Coventry may be specially mentioned as centres of the motor and cycle building industry. The establishment of their engineering and other workshops at certain centres by the great railway companies has important bearing on the concentration of urban population. For example, by this means the London & North Western and the Great Western companies have created large towns in Crewe and Swindon respectively.

Certain other important industries may be localized. Thus, the manufacture of china and pottery, although widespread, is primarily identified with Staffordshire, where an area comprising Stoke and a number of contiguous towns actually bears the name of the Potteries (*q.v.*). Derby has a similar fame, while the manufacture of glass, important in Leeds and elsewhere in the West Riding of Yorkshire, and in the London district, centres peculiarly upon a single town in South Lancashire—St Helens. Finally, the bootmakers of Northamptonshire (at Wellingborough, Rushden, &c.), and the straw-plaiters of Bedfordshire (at Luton and Dunstable), deserve mention among localized industrial communities.

Occupations of the People.—The occupations of the people may be so considered as to afford a conception of the relative extent of the industries already noticed, and their importance in relation to other occupations. The figures to be given are those of the census of 1901, and embrace males and females of 10 years of age and upwards. The textile manufactures occupied a total of 994,668 persons, of which the cotton industry occupied 529,131. A high proportion of female labour is characteristic of each branch of this industry, the number of females employed being about half as many again as that of males (the proportion was 1·47 to 1 in 1901). The metal industries of every sort occupied 1,116,202; out of which those employed in engineering (including the building of all sorts of vehicles) numbered 741,346. Of the other broad classes of industry already indicated, the manufacture of boots and shoes occupied 229,257, and the pottery and glass manufactures 90,193. For the rest, the numbers of persons occupied in agriculture has been quoted as 1,192,167; and of those occupied in mining as 805,185. Among occupations not already detailed, those of the male population include transport of every sort (1,094,301), building and other works of construction (1,042,864), manufacture of articles of human consumption, lodging, &c. (774,291), commerce, banking, &c. (530,685), domestic service, &c. (304,195), professional occupations (311,618). The service of government in every branch occupied 171,687. Female workers were occupied to the number of 1,664,381 in domestic service generally. Tailoring and the textile clothing industries and trade generally occupied 602,881; teaching 172,873; nursing and other work in institutions 104,036; and the civil service, clerkships and similar occupations 82,635.

IX. TERRITORIAL DIVISIONS, &c.

For various administrative and other purposes England and Wales have been divided, at different times from the Saxon period onwards, into a series of divisions, whose boundaries have been adjusted as each purpose demanded, without much attempt to establish uniformity. Therefore, although the methods of local government are detailed below (Section X.), and other administrative arrangements are described under the various headings dealing with each subject, it is desirable to give here, for ease of reference and distinction, a schedule of the various areas into which England and Wales are divided. The areas here given, excepting the Poor Law Union, are those utilized in the Census Returns (see the General Report, 1901).

England and Wales; Areas.

	County (ancient or geographical).	
Parliamentary Areas	Division. Borough.	
Administrative Areas	Administrative County.	
	County Borough. Municipal Borough. Urban District (other than borough)	(City, town)
	Rural District. Civil Parish. Poor Law Union.	
Judicial Areas	County Court Circuit. County Court District. Petty Sessional Division.	
Ecclesiastical Areas	Province. Diocese. Parish.	
Registration Areas	Division. County. District. Subdistrict.	

The ancient counties were superseded for most practical purposes by the administrative counties created by the Local Government Act of 1888. The ancient division, however, besides being maintained in general speech and usage, forms the basis on which the system of distribution of parliamentary representation now in force was constructed. The Redistribution of Seats Act 1885 made a new division of the country into county and borough constituencies. All the English counties, with the exception of Rutland, are divided into two or more constituencies, each returning one member, the number of English county parliamentary areas being 234. In Wales eight smaller or less populous counties form each one parliamentary constituency, while the four larger are divided, the number of Welsh county parliamentary areas being 19. The number of county areas for parliamentary purposes in England and Wales is thus 253, and the total number of their representatives is the same. Outside the county constituencies are the parliamentary boroughs. Of these there are 135 in England, one of them, Monmouth district, being made up of three contributory boroughs, while many are divided into several constituencies, the number of borough parliamentary areas in England being 205, of which 61 are in the metropolis. Of the 205 borough constituencies, 184 return each one member, and 21 return each two members, so that the total number of English borough members is 226. Besides the county and borough members there are in England five university members, namely, two for Oxford, two for Cambridge and one for London. In Wales there are 10 borough parliamentary areas, all of which, except Merthyr Tydfil and Swansea town division, consist of groups of several contributory boroughs. Each Welsh borough constituency returns one member, except Merthyr Tydfil, which returns two, so that there are eleven Welsh borough members.

The administrative counties, created in 1888, number 62, each having a county council. They sometimes coincide in area with the ancient counties of the same name, but generally differ, in a greater or less degree, for the following reasons—(1) in some cases an ancient county comprises (approximately) two or more administrative counties, in the formation of which names of some ancient divisions were preserved, thus:—

Ancient County.	*Administrative County.*
Cambridgeshire	Cambridge. Isle of Ely.
Hampshire	Southampton. Isle of Wight.
Lincolnshire	Parts of Holland. Parts of Kesteven. Parts of Lindsey.
Northamptonshire	Northampton. Soke of Peterborough.
Suffolk	East Suffolk. West Suffolk.
Sussex	East Sussex. West Sussex.
Yorkshire	East Riding. North Riding. West Riding.

The Scilly Islands, which form part of the ancient county of Cornwall, without being ranked as an administrative county, are provided with a county council and have separate administration. (2) The administrative county of London has an area taken entirely from the counties of Middlesex, Kent and Surrey. (3) All boroughs which on June 1, 1888, had a population of not less than 50,000, boroughs which were already counties having a population of not less than 20,000, and a few others, were formed into separate administrative areas, with the name of county boroughs. Of these there were originally 61, but their number subsequently increased. (4) Provision was made by the act of 1888 for including entirely within one administrative county each of such urban districts as were situated in more than one ancient county.

The various urban and rural districts are described below (Section X.). The *Civil Parish* is defined (Poor Law Amendment Act 1866) as "a place for which a separate poor-rate is or can be made," but the parish council has local administrative functions beyond the administration of the poor law. The civil parish has become more or less divorced in relationship from the *Ecclesiastical Parish* (a division which probably served in early times for administrative purposes also), owing to successive independent alterations in the boundaries of both (see PARISH). *Poor-law unions* are groups of parishes for the local administration of the Poor Laws. Within the unions the local poor-law authorities are the *Board of Guardians*. In rural districts the functions of these boards are, under the Local Government Act of 1894, performed by the district councils, and in other places their constitution is similar to that of the urban and district councils (see POOR LAW).

Registration districts are generally, but not invariably, co-extensive with unions of the same name. These districts are divided into sub-districts, within which the births and deaths are registered by registrars appointed for that purpose. *Registration counties* are groups of registration districts, and their boundaries differ more or less from those both of the ancient and the administrative counties. In England and Wales there are eleven registration divisions, consisting of groups of registration counties (see REGISTRATION). (O. J. R. H.)

X. LOCAL GOVERNMENT

The Reform Act of 1832 was the real starting-point for the overhauling of English local government. For centuries before, from the reign of Edward III., under a number of statutes and commissions, the administrative work in the counties had been in the hands of the country gentlemen and the clergy, acting as justices of the peace, and sitting in petty sessions and quarter sessions. Each civil or "poor law" parish was governed by the vestry and the overseers of the poor, dating from the Poor Law of 1601; the vestry, which dealt with general affairs, being presided over by the rector, and having the churchwardens as its chief officials. In 1782 Gilbert's Act introduced the grouping of parishes for poor law purposes, and boards of guardians appointed by the justices of the peace. The municipal boroughs (246 in England and Wales in 1832) were governed by mayor, aldermen, councillors and a close body of burgesses or freemen, a narrow oligarchy. Reform began with the Poor Law Amendment Act of 1834, grouping the parishes into Unions, making the boards of guardians mainly elective, and creating a central poor law board in London. The Municipal Corporations Act followed in 1835, giving all ratepayers the local franchise. And as a result of the failure of the Public Health Board established in 1848, the royal commission of 1869–1871 led to the establishment in 1871 of the Local Government Board as a central supervising body. Meanwhile, the school boards resulting from the Education Act of 1870 brought local government also into the educational system; and the Public Health Act of 1875 put further duties on the local authorities. By 1888 a new state of chaos had grown up as the result of the multiplication of bodies, and the new Redistribution Act of 1885 paved the way for a further reorganization of local matters by the Local Government Act of 1888, followed by that of 1894. In London, which required separate treatment, a similar process had been going on. The Metropolis Management Act of 1855 established (outside the city) two classes of parishes—the first class with vestries of their own, the second class grouped under district boards elected by the component vestries; and the Metropolitan Board of Works (abolished in 1888), elected by the vestries and the district boards, was made the central authority.

In 1867 the Metropolitan Asylums Board took over its work from the metropolitan boards of guardians. See further CHARITY AND CHARITIES, PUBLIC HEALTH, EDUCATION, JUSTICE OF THE PEACE, VESTRY, &c.

The system of local government now existing in England (see also the article LOCAL GOVERNMENT) may be said to have been founded in 1888, when the Local Government Act of that year was passed. Since then the entire system of the government of districts and parishes has been reorganized with due regard to the preceding legislation. The largest area of local government is the county; next to that the sanitary district, urban or rural, including under this head municipal boroughs, all of which are urban districts. The parish is, speaking generally, the smallest area, though, as will hereafter be seen, part of a parish may be a separate area for certain purposes; and there may be united districts or parishes for certain purposes. It will be convenient to follow this order in the present article. But before doing so, it should be pointed out that all local bodies in England are to some extent subject to the control of central authorities, such as the privy council, the home office, the Board of Agriculture, the Board of Trade, the Board of Education or the Local Government Board.

The county and the county council.

The Administrative County.—The administrative county includes all places within its area, with two important exceptions. The first of these consists of the county borough. The second is the quarter sessions borough, which forms part of the county for certain specified purposes only. But the county includes all other places, such as liberties and franchises, which before 1888 were exempt from contribution to county rate. For each administrative county a county council is elected. For purposes of election the entire county is divided into divisions corresponding to the wards of a municipal borough, and one councillor is elected for each electoral division.

County council elections.

The electors are the county electors, *i.e.* in a borough the persons enrolled as burgesses, and in the rest of the county the persons who are registered as county electors, *i.e.* those persons who possess in a county the same qualification as burgesses must have in a borough, and are registered.

The qualification of a burgess or county elector is substantially the occupation of rated property within the borough or county, residence during a qualifying period of twelve months within the borough or county, and payment of rates for the qualifying property. A person so qualified is entitled to be enrolled as a burgess, or registered as a county elector (as the case may be), unless he is alien, has during the qualifying period received union or parochial relief or other alms, or is disentitled under some act of parliament such as the Corrupt Practices Act, the Felony Act, &c. The lists of burgesses and county electors are prepared annually by the overseers of each parish in the borough or county, and are revised by the revising barrister at courts holden by him for the purpose in September or October of each year. When revised they are sent to the town clerk of the borough, or to the clerk of the peace of the county, as the case may be, by whom they are printed. The lists are conclusive of the right to vote at an election, although on election petition involving a scrutiny the vote of a person disqualified by law may be struck off, notwithstanding the inclusion of his name in a list of voters.

The qualification of a county councillor is similar to that required of a councillor in a municipal borough, with some modifications. A person may be qualified in any one of the following ways: viz. by being (1) enrolled as a county elector, and possessed of a property qualification consisting of the possession of real or personal property to the amount of £1000 in a county having four or more divisions, or of £500 in any other county, *or* the being rated to the poor rate on an annual value of £30 in a county having four or more divisions, or of £15 in any other county; (2) enrolled in the non-resident list, and possessed of the same property qualification (the non-resident list contains the names of persons who are qualified for enrolment in all respects save residence in the county or within 7 m. thereof, and are actually resident beyond the 7 m. and within 15 m.); (3) entitled to elect to the office of county councillor (for this qualification no property qualification is required, but the office of a councillor elected on this qualification only becomes vacant if for six months he ceases to reside within the county); (4) a peer owning property in the county; (5) registered as a parliamentary voter in respect of the ownership of property in the county. Clerks in holy orders and ministers of religion are not disqualified as they are for being borough councillors, but in other respects the persons disqualified to be elected for a county are the same as those disqualified to be elected for a borough. Such disqualifications include the holding of any office or place of profit under the council other than the office of chairman, and the being concerned or interested in any contract or employment with, by or on behalf of the council. Women, other than married women, are eligible.

County councillors are elected for a term of three years, and at the end of that time they retire together. The ordinary day of election is the 8th March, or some day between the 1st and 8th March fixed by the council. Candidates are nominated in writing by a nomination paper signed by a proposer and seconder, and subscribed by eight other assenting county electors of the division; and in the event of there being more valid nominations than vacancies a poll has to be taken in the manner prescribed by the Ballot Act 1872. Corrupt and illegal practices at the election are forbidden by a statute passed in the year 1894, which imposes heavy penalties and disqualifications for the offences which it creates. These offences include not only treating, undue influence, bribery and personation, but certain others, of which the following are the chief. Payment on account of the conveyance of electors to or from the poll; payment for any committee room in excess of a prescribed number; the incurring of expenses in and about the election beyond a certain maximum; employing, for the conveyance of electors to or from the poll, hackney carriages or carriages kept for hire; payments for bands, flags, cockades, &c.; employing for payment persons at the election beyond the prescribed number; printing and publishing bills, placards or posters which do not disclose the name and address of the printer or publisher; using as committee rooms or for meetings any licensed premises, or any premises where food or drink is ordinarily sold for consumption on the premises, or any club premises where intoxicating liquor is supplied to members. In the event of an illegal practice, payment, employment or hiring, committed or done inadvertently, relief may be given by the High Court, or by an election court, if the validity of the election is questioned on petition; but unless such relief is given (and it will be observed that it cannot be given for a *corrupt* as distinguished from an illegal practice), an infringement of the act may void the election altogether. The validity of the election may be questioned by election petition. Indeed, this is the only method when it is sought to set aside the election on any of the usual grounds, such as corrupt or illegal practices, or the disqualification of the candidate at the date of election. Election petitions against county councillors and members of other local bodies (borough councillors, urban and rural district councillors, members of school boards and boards of guardians) are classed together as municipal election petitions, and are heard in the same way, by a commissioner who must be a barrister of not less than fifteen years' standing. The petition is tried in open court at some place within the county, the expenses of the court being provided in the first instance by the Treasury, and repaid out of the county rates, except in so far as the court may order them to be paid by either of the parties. If a candidate is unseated a casual vacancy is created which has to be filled by a new election. A county councillor is required to accept office by making and subscribing a declaration in the prescribed form that he will duly and faithfully perform the duties of the office, and that he possesses the necessary qualification. The declaration may be made at any time within three months after notice of election. If the councillor does not make it within that time, he is liable to a fine the amount of which, if not determined by bye-law of the council, is £25 in the case of an alderman or councillor, and £50 in the case of the chairman. Exemption may, however, be claimed on the ground of age, physical or mental incapacity, previous service, or payment of the fine within five years, or on the ground that the claimant was nominated without his consent. If during his term of office a member of the council becomes bankrupt, or compounds with his creditors, or is (except in case of illness) continuously absent from the county, being chairman for more than two months, or being alderman or councillor for more than six months, his office becomes vacant by declaration of the council. In the case of disqualification by absence, the same fines are payable as upon non-acceptance of office, and the same liability arises on resignation. Acting without making the declaration, or without being qualified at the time of making the declaration, or after ceasing to be qualified, or after becoming disqualified, involves liability to a fine not exceeding £50, recoverable by action.

Chairman, &c.

The councillors who have been elected come into office on the 8th March in the year of election. The first quarterly meeting of the newly-elected council is held on the 16th or on such other day within ten days after the 8th as the county council may fix. The first business at that meeting is the election of the chairman, whose office corresponds to that of the mayor in a borough. He is elected for the ensuing year, and holds office until his successor has accepted office. The chairman must be a fit person, elected by the council from their own body or from persons qualified to be councillors. He may receive such remuneration as the council think reasonable. He is by virtue of his office a justice of the peace for the county. Having elected the chairman, the meeting proceeds to the election of aldermen, whose number is one-third of the number of councillors, except in London, where the number is one-sixth. An alderman must be a councillor or a person qualified to be a councillor. If a councillor is elected he vacates his office of councillor, and thus creates a casual vacancy in the council. In every third year one-half of the whole number of aldermen go out of office, and their places are filled by election, which is conducted by means of voting papers. It will be observed, therefore, that while a county councillor holds office for three years, a county alderman holds office for six. The council may also appoint a vice-chairman who holds office during the term of office of the chairman; in London the council have power to appoint a paid deputy chairman.

Officers.

It may be convenient at this point to refer to the officers of the county council. Of these, the chief are the clerk, the treasurer, and the surveyor. Before 1888 the clerk of the peace was appointed in a county by the *custos rotulorum*. He held office for life during good conduct, and had power to act by a sufficient deputy. Under the act of 1888 existing clerks of the peace became clerks of the councils of their counties, holding office by the same tenure as formerly, except in the county of London, where the offices were separated. Thereafter a new appointment to the offices of clerk of the peace and clerk of the county council was to be made by the standing joint-committee, at whose pleasure he is to hold office. The same committee appoint the deputy-clerk, and fix the salaries of both officers. The clerk of the peace was formerly paid by fees which were fixed by quarter sessions, but he is now generally, if not in every case, paid by salary, the fees received by him being paid into the county fund. The county council may also employ such other officers and servants as they may think necessary.

Business.

Subject to a few special provisions in the Local Government Act of 1888, the business of the county council is regulated by the provisions laid down in the Municipal Corporations Act 1882, with regard to borough councils. There are four quarterly meetings in every year, the dates of which may be fixed by the council, with the exception of that which must be held on the 16th March or some day within ten days after the 8th of March as already noticed when treating of elections. Meetings are convened by notices sent to members stating the time and place of the meeting and the business to be transacted. The chairman, or in his absence the vice-chairman, or in the absence of both an alderman or councillor appointed by the meeting, presides. All questions are determined by the votes of the majority of those present and voting, and in case of equality of votes the chairman has a casting vote. Minutes of the proceedings are taken, and if signed by the chairman at the same or the next meeting of the council are evidence of the proceedings. In all other respects the business of the council is regulated by standing orders which the council are authorized to make. Very full power is given to appoint committees, which may be either general or special, and to them may be delegated, with or without restrictions or conditions, any of their powers or duties except that of raising money by rate or loan. Power is also given to appoint joint-committees with other county councils in matters in which the two councils are jointly interested, but a joint-committee so appointed must not be confounded with the standing joint-committee of the county council and the quarter sessions, which is a distinct statutory body and is elsewhere referred to. The finance committee is also a body with distinct duties.

Relation of county to boroughs.

In order to appreciate some of the points relating to the finance of a county council, it is necessary to indicate the relations between an administrative county and the boroughs which are locally situated within it. The act of 1888 created a new division of boroughs into three classes; of these the first is the county borough. A certain number of boroughs which either had a population of not less than 50,000, or were counties of themselves, were made counties independent of the county council and free from the payment of county rate. In such boroughs the borough council have, in addition to their powers under the Municipal Corporations Act 1882, all the powers of a county council under the Local Government Act. They are independent of the county council, and their only relation is that in some instances they pay a contribution to the county, *e.g.* for the cost of assizes where there is no separate assize for the borough. The boroughs thus constituted county boroughs enumerated in the schedule to the Local Government Act 1888 numbered sixty-one, but additional ones are created from time to time.

The larger quarter sessions boroughs, *i.e.* those which had, according to the census of 1881, a population exceeding 10,000, form part of the county, and are subject to the control of the county council, but only for certain special purposes. The reason for this is that while in counties the powers and duties under various acts were entrusted to the county authority, in boroughs they were exercised by the borough councils. In the class of boroughs now under consideration these powers and duties are retained by the borough council; the county council exercise no jurisdiction within the borough in respect of them, and the borough is not rated in respect of them to the county rate. The acts referred to include those relating to the diseases of animals, destructive insects, explosives, fish conservancy, gas meters, margarine, police, reformatory and industrial schools, riot (damages), sale of food and drugs, weights and measures. But for certain purposes these boroughs are part of the county and rateable to county rate, *e.g.* main roads, cost of assizes and sessions, and in certain cases pauper lunatics. The county councillors elected for one of these boroughs may not vote on any matter involving expenditure on account of which the borough is not assessed to county rate.

The third class of boroughs comprises those which have a separate court of quarter sessions, but had according to the census of 1881 a population of less than 10,000. All such boroughs form part of the county for the purposes of pauper lunatics, analysts, reformatory and industrial schools, fish conservancy, explosives, and, of course, the purposes for which the larger quarter sessions boroughs also form part of the county, such as main roads, and are assessed to county rate accordingly. And in a borough, whether a quarter sessions borough or not, which had in 1881 a population of less than 10,000, all the powers which the borough council formerly possessed as to police, analysts, diseases of animals, gas meters, and weights and measures cease and are transferred to the county council, the boroughs becoming in fact part of the area of the county for these purposes.

It will be seen, therefore, that for some purposes, called in the act general county purposes, the entire county, including all boroughs other than county boroughs, is assessed to the county rate; while for others, called special county purposes, certain boroughs are now assessed. This explanation is necessary in order to appreciate what has now to be said about county finance. But before leaving the consideration of the area of the county it may be added that all liberties and franchises are now merged in the county and subject to the jurisdiction of the county council.

Finance.

The county council is a body corporate with power to hold lands. Its revenues are derived from various sources which will presently be mentioned, but all receipts have to be carried to the county fund, either to the general county account if applicable to general county purposes, or to the special county account if applicable to special county purposes. The county council may, with the consent of the Local Government Board, borrow money on the security of the county fund or any of its revenues, for consolidating the debts of the county; purchasing land or buildings; any permanent work or other thing, the cost of which ought to be spread over a term of years; making advances in aid of the emigration or colonization of inhabitants of the county; and any purpose for which quarter sessions or the county council are authorized by any act to borrow. If, however, the total debt of the council will, with the amount proposed to be borrowed, exceed one-tenth of the annual rateable value of the property in the county, the money cannot be borrowed unless under a provisional order made by the Local Government Board and confirmed by parliament. The period for which a loan is made is fixed by the county council with the consent of the Local Government Board, but may not exceed thirty years, and the mode of repayment may be by equal yearly or half-yearly instalments of principal or of principal and interest combined, or by means of a sinking fund invested and applied in accordance with the Local Government Acts. The loans authorized may be raised by debentures or annuity certificates under these acts, or by the issue of county stock, and in some cases by mortgage.

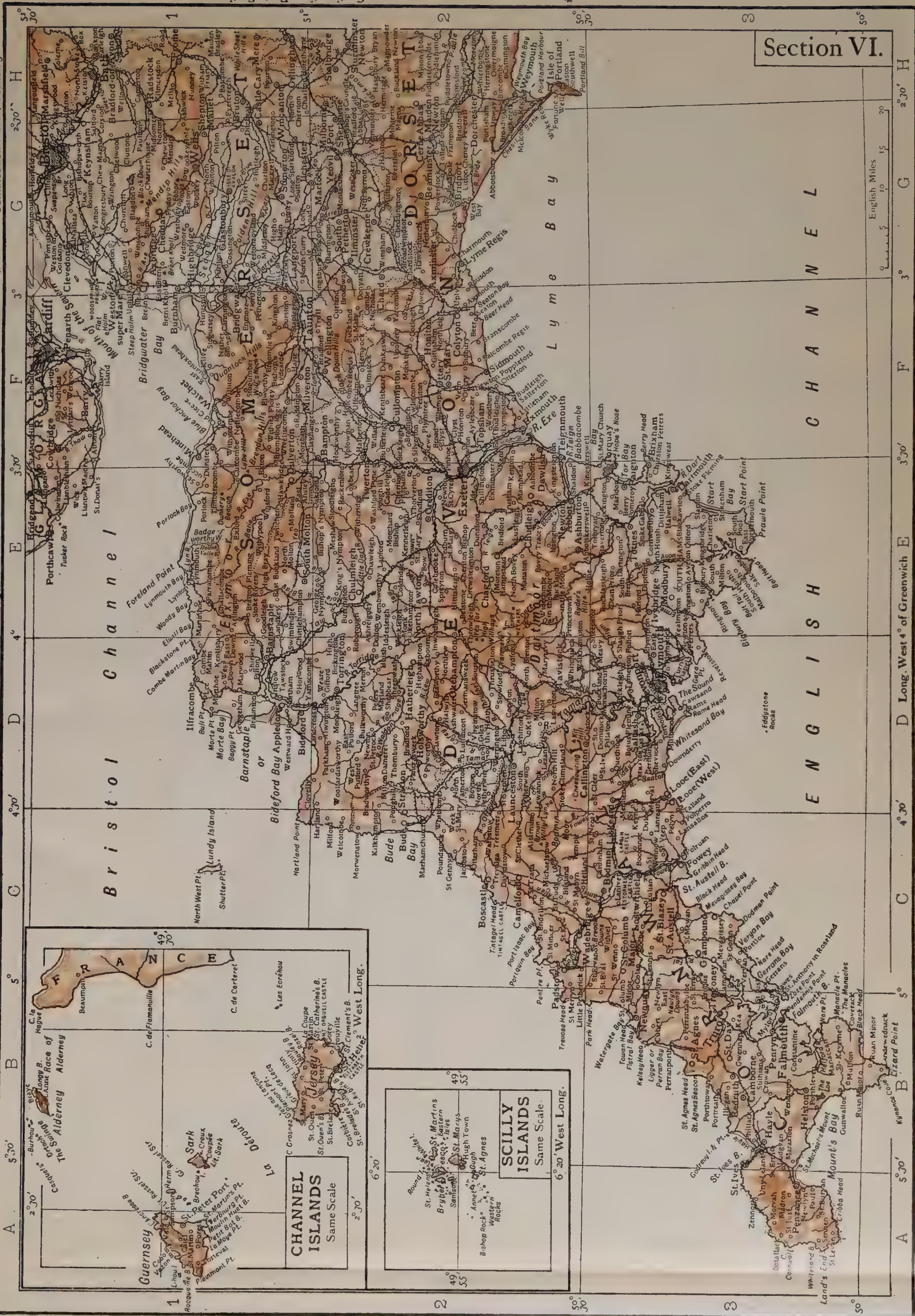
The county council must appoint a finance committee for regulating and controlling the finance of the county, and the council cannot make any order for the payment of money out of the county fund save on the recommendation of that committee. Moreover, the order for payment of any sum must be made in pursuance of an order of the council signed by three members of the finance committee present at the meeting of the council, and countersigned by the clerk. The order is directed to the county treasurer, by whom authorized payments are then made.

The accounts of the receipts and expenditure of the county council are made up for the twelve months ending the 31st March in each year, and are audited by a district auditor. The form in which the accounts must be made up is prescribed by the Local Government Board. The auditor is a district auditor appointed by the Local Government Board under the District Auditors Act 1879, and in respect of the audit the council is charged with a stamp duty, the amount of which depends on the total of the expenditure comprised in the financial statement. Before each audit the auditor gives notice of the time and place appointed, and the council publish the appointment by advertisement. A copy of the accounts has to be deposited for public inspection for seven days before the audit. The auditor has the fullest powers of investigation; he may require the production of any books or papers, and he may require the attendance before him of any person accountable. Any owner of property or ratepayer may attend the audit and object to the accounts, and either on such objection or on his own motion the auditor may disallow any payment and surcharge the amount on the persons who made or authorized it. Against any allowance or surcharge appeal lies to the High Court if the question involved is one of law, or to the Local Government Board, who have jurisdiction to remit a surcharge if, in the circumstances, it appears to them to be fair and equitable to do so. It will be seen that this is really an effective audit.

Revenue of county council.

The sources of revenue of the council are the exchequer contribution, income from property and fees, and rates. Before 1888 large grants of money had been made annually to local authorities in aid of local taxation. Such grants represented a contribution out of taxation for the most part arising out of property other than real property, while local taxation fell on real property alone. By the act of 1888 it was provided that for the future such annual grants should cease, and that other payments should be made instead thereof. The commissioners of Inland Revenue pay into the Bank of England, to an account called "the local taxation account," the sums ascertained to be the proceeds of the duties collected by them in each county on what are called local taxation licences, which include licences for the sale of intoxicating liquor, licences on dogs, guns, establishment licences, &c. The amount so ascertained to have been collected in each county is paid under direction of the Local Government Board to the council of that county. The commissioners of Inland Revenue also pay into the same account a sum equal to 1½% on the net value of personal property in respect of which estate duty is paid. Under the Local Taxation (Customs and Excise) Act 1890, certain duties imposed on spirits and beer (often referred to as "whisky money") are also to be paid to "the local taxation account." The sums so paid in respect of the duties last above mentioned, and in respect of the estate duty and spirits and beer additional duties, are distributed among the several counties in proportion to the share which the Local Government Board certify to have been received by each county during the financial year ending the 31st March 1888, out of the grants theretofore made out of the exchequer in aid of local rates. The payments so made out of "the local taxation account" to a county council are paid to the county fund, and carried to a separate account called "the Exchequer contribution account." The money standing to the credit of this account is applied: (i.) in paying any costs incurred in respect thereof or otherwise chargeable thereon; (ii.) in payment of the sums required by the Local Government Act 1888 to be paid in substitution for local grants; (iii.) in payment of the new grant to be made by the county council in respect of the costs of union officers; and (iv.) in repaying to "the general county account" of the county fund the costs on account of general county purposes for which the whole area of the county (including boroughs other than county boroughs) is liable to be assessed to county contribution. Elaborate provision is made for the distribution of the surplus (if any), with a view to securing a due share being paid to the quarter sessions boroughs.

The payments which the county council have to make in substitution for the local grants formerly made out of Imperial funds include payments for or towards the remuneration of the teachers in poor-law schools and public vaccinators; school fees paid for children sent from a workhouse to a public elementary school; half of the salaries of the medical officer of health and the inspector of nuisances of district councils; the remuneration of registrars for births and deaths; the maintenance of pauper lunatics; half of the cost of the pay and clothing of the police of the county, and of each borough maintaining a separate police force. In addition to the grants above mentioned, the county council is required to grant to the guardians of every poor-law union wholly or partly in their county an annual sum for the costs of the officers of the union and of district schools to which the union contributes. Another source is the income of any property belonging to the council, but the amount of this is usually small. The third source of revenue consists of the fees received by the different officers of the county councils or of the joint-committee. For example, fees received by the clerk of the peace, inspectors of weights and measures, and the like. These fees are paid into the county fund, and carried either to "the general county account" or, if they have been received in respect of some matter for which part only of the county is assessed, then to the special account to which the rates levied for that purpose are carried. The remaining source of income of a county council is the county rate, the manner of levying which is hereafter stated.


Section VI.
Continuation North, Section 5.
Continuation North, Section 3.
Continuation East, Section 3.
Bristol Channel
English Channel
Lyme Bay
Bridgwater Bay
Barnstaple or Bideford Bay
Mount's Bay
Start Bay
Somerset
Dorset
Devon
Cornwall
Glamorgan
Exmoor
Dartmoor
Quantock Hills
Mendip Hills
Lundy Island
Eddystone Rocks
Bristol
Cardiff
Bath
Exeter
Plymouth
Taunton
Truro
Penzance
Falmouth
Weymouth
Barnstaple
Land's End
Lizard Point
Start Point
Portland Bill
Long. West 4° of Greenwich
English Miles 0 5 10 15 20
Channel Islands Same Scale
Alderney
Guernsey
Sark
Jersey
France
St. Peter Port
St. Helier
2° West Long.
Scilly Islands Same Scale
St. Marys
Hugh Town
St. Agnes
St. Martins
6°20' West Long.
Emery Walker sc.
Information embodied from the Ordnance Survey, by permission of the Controller of H.M. Stationery Office.

Powers transferred from quarter sessions.

Of the powers and duties of county councils, it may be convenient to treat of these first, in so far as they are transferred to or conferred on them by the Local Government Act 1888, under which they were created, and afterwards in so far as they have been conferred by subsequent legislation. Before the passing of the Local Government Act 1888, the only form of county government in England was that of the justices in quarter sessions (*q.v.*). Quarter sessions were originally a judicial body, but being the only body having jurisdiction over the county as a whole, certain powers were conferred and certain duties imposed upon them with reference to various matters of county government from time to time. The principal object of the act of 1888 was to transfer these powers and duties from the quarter sessions to the new representative body—the county council; and it may be said that substantially the whole of the administrative business of quarter sessions was thus transferred.

The subjects of such transfer include (i.) the making, assessing and levying of county, police, hundred and all rates, and the application and expenditure thereof, and the making of orders for the payment of sums payable out of any such rate, or out of the county stock or county fund, and the preparation and revision of the basis or standard for the county rate. With regard to the county rate, a few words of description may be sufficient here. The council appoint a committee called a county rate committee, who from time to time prepare a basis or standard for county rate, that is to say, they fix the amount at which each parish in the county shall contribute its quota to the county rate. As a general rule the poor-law valuations are followed, but this is not universally the case, some county councils adopting the assessment to income tax, schedule A, and others forming an independent valuation of their own. The overseers of any parish aggrieved by the basis may appeal against it to quarter sessions, and it is to be noticed that this appeal is not interfered with, the transfer of the duties of justices relating only to administrative and not to judicial business. When a contribution is required from county rate, the county council assess the amount payable by each parish according to the basis previously made, and send their precept to the guardians of the unions comprising the several parishes in the county, the guardians in their turn requiring the overseers of each parish to provide the necessary quota of that parish out of the poor rate, and the sum thus raised goes into the county fund. The police rate is made for the purpose of defraying the expenses of the county police. It is made on the same basis as the county rate, and is levied with it. The hundred rate is seldom made, though in some counties it may be made for purposes of main roads and bridges chargeable to the hundred as distinguished from the county at large; (ii.) the borrowing of money; (iii.) the passing of the accounts of, and the discharge of the county treasurer; (iv.) shire halls, county halls, assize courts, the judges' lodgings, lock-up houses, court houses, justices' rooms, police stations and county buildings, works and property; (v.) the licensing under any general act of houses and other places for music or for dancing, and the granting of licences under the Racecourses Licensing Act 1879; (vi.) the provision, enlargement, maintenance and management and visitation of, and other dealing with, asylums for pauper lunatics; (vii.) the establishment and maintenance of, and the contribution to, reformatory and industrial schools; (viii.) bridges and roads repairable with bridges, and any powers vested by the Highways and Locomotives Amendment Act 1878 in the county authority. It may be observed that bridges have always been at common law repairable by the county, although, with regard to bridges erected since the year 1805, these are not to be deemed to be county bridges repairable by the county unless they have been erected under the direction or to the satisfaction of the county surveyor. The common-law liability to repair a bridge extends also to the road or approaches for a distance of 300 ft. on each side of the bridge. Of the powers vested in the county authority under the Highway Act 1878, the most important are those relating to main roads, which are specially noticed hereafter; (ix.) the tables of fees to be taken by and the costs to be allowed to any inspector, analyst or person holding any office in the county other than the clerk of the peace and the clerks of the justices; (x.) the appointment, removal and determination of salaries of the county treasurer, the county surveyor, the public analysts, any officer under the Explosives Act 1875, and any officers whose remuneration is paid out of the county rate, other than the clerk of the peace and the clerks of the justices; (xi.) the salary of any coroner whose salary is payable out of the county rate, the fees, allowances and disbursements allowed to be paid by any such coroner, and the division of the county into coroners' districts and the assignments of such districts; (xii.) the division of the county into polling districts for the purposes of parliamentary elections, the appointment of the places of election, the places of holding courts for the revision of the lists of voters, and the costs of, and other matters to be done for the registration of parliamentary voters; (xiii.) the execution as local authority of the acts relating to contagious diseases of animals, to destructive insects, to fish conservancy, to wild birds, to weights and measures, and to gas meters, and of the Local Stamp Act 1869; (xiv.) any matters arising under the Riot (Damages) Act 1886. Under this act compensation is payable out of the police rate to any person whose property has been injured, stolen or destroyed by rioters; (xv.) the registration of rules of scientific societies, the registration of charitable gifts, the certifying and recording of places of religious worship, the confirmation and record of the rules of loan societies. These duties are imposed under various statutes.

In addition to the business of quarter sessions thus transferred, there was also transferred to the county council certain business of the justices of the county out of session, that is to say, in petty or special sessions. This business consists of the licensing of houses or places for the public performance of stage plays, and the execution, as local authority, of the Explosives Act 1875. Power was given by the act to the Local Government Board to provide, by means of a provisional order, for transferring to county councils any of the powers and duties of the various central authorities which have been already referred to; but although such an order was at one time prepared, it has never been confirmed, and nothing has been done in that direction.

Police.

Apart from the business thus transferred to county councils, the act itself has conferred further powers or imposed further duties with reference to a variety of other matters, some of which must be noticed. But before passing to them it is necessary here to call attention to one important subject of county government which has not been wholly transferred to the county council, namely, the police. It was matter of considerable discussion before the passing of the act whether the police should remain under the control of the justices, or be transferred wholly to the control of the county council. Eventually a middle course was taken. The powers, duties and liabilities of the quarter sessions and justices out of session with respect to the county police were vested in the quarter sessions and the county council jointly, and are now exercised through the standing joint-committee of the two bodies. That committee consists of an equal number of members of the county council and of justices appointed by the quarter sessions, the number being arranged between the two bodies or fixed by the secretary of state. The committee are also charged with the duties of appointing or removing the clerk of the peace, and they have jurisdiction in matters relating to justices' clerks, the provision of accommodation for quarter sessions or justices out of session, and the like, and their expenses are paid by the county council out of the county fund. The standing joint-committee have power to divide their county into police districts, and, when required by order in council, are obliged to do so. In such a case, while the general expenditure in respect of the entire police force is defrayed by the county at large, the local expenditure, *i.e.* the cost of pay, clothing and such other expenses as the joint-committee may direct, is defrayed at the cost of the particular district for which it is incurred (see also POLICE).

County coroners.

Among the powers and duties given to county councils by the Local Government Act 1888, the first to be mentioned, following the order in the act itself, is that of the appointment of county coroners. The duties of a coroner are limited to the holding of inquiries into cases of death from causes suspected to be other than natural, and to a few miscellaneous duties of comparatively rare occurrence, such as the holding of inquiries relating to treasure trove, and acting instead of the sheriff on inquiries under the Lands Clauses Act, &c., when that officer is interested and thereby disabled from holding such inquiries. (For the history of the office of coroner, which is a very ancient one, see that title.) The county council may appoint any fit person, not being a county alderman or county councillor, to fill the office, and in the case of a county divided into coroners' districts, may assign him a district. It has been decided, however, that the power hereby conferred does not extend to the appointment of a coroner for a liberty or other franchise who would not under the old law have been appointed by the freeholders. It may be mentioned that though a coroner may have a district assigned to him, he is nevertheless a coroner for the entire county throughout which he has jurisdiction.

Main roads.

It was provided by the Highway Act 1878 that every road which was disturnpiked after the 31st of December 1870 should be deemed to be a main road, the expenses of the repair and maintenance of which were to be contributed as to one-half thereof by the justices in quarter sessions, then the county authority. By another section of the same act it was provided that where any highway in a county was a medium of communication between great towns, or a thoroughfare to a railway station, or otherwise such that it ought to be declared a main road, the county authority might declare it to be a main road, and thereupon one-half the expense of its maintenance would fall upon the county at large. Once a road became a main road it could only cease to be such by order of the Local Government Board. As already stated, the powers of the quarter sessions under the act of 1878 were transferred to the county council under the Local Government Act of 1888, and that body alone has now power to declare a road to be a main road. But the act of 1888 made some important changes in the law relating to the maintenance of main roads. It declared that thereafter not only the half but the whole cost of maintenance should be borne by the county. Provision is made for the control of main roads in urban districts being retained by the urban district council. In urban districts where such control has not been claimed, and in rural districts, the county council may either maintain the main roads themselves or allow or require the district councils to do so. The county council must in any case make a payment towards the costs incurred by the district council, and if any difference arises as to the amount of it, it has to be settled by the Local Government Board. In Lancashire the cost of main roads falls upon the hundred, as distinguished from the county at large, special provision being made to that effect. Special provision has also been made for the highways in the Isle of Wight and in South Wales, where the roads were formerly regulated by special acts, and not by the ordinary Highway Acts.

Rivers pollution prevention.

The county council have the same power as a sanitary authority to enforce the provisions of the Rivers Pollution Prevention Acts in relation to so much of any stream as passes through or by any part of their county. Under these acts a sanitary authority is authorized to take proceedings to restrain interference with the due flow of a stream or the pollution of its waters by throwing into it the solid refuse of any manufactory or quarry, or any rubbish or cinders, or any other waste or any putrid solid matter. They may also take proceedings in respect of the pollution of a stream by any solid or liquid sewage matter. They have the same powers with respect to manufacturing and mining pollutions, subject to certain restrictions, one of which is that proceedings are not to be taken without the consent of the Local Government Board. The county council may not only themselves institute proceedings under the acts, but they may contribute to the costs of any prosecution under the acts instituted by any other county or district council. The Local Government Board is further empowered by provisional order to constitute a joint-committee representing all the administrative counties through or by which a river passes, and confer on such committee all or any of the powers of a sanitary authority under the acts.

Parliamentary and legal costs.

A county council has the same power of opposing bills in parliament and of prosecuting or defending any legal proceedings necessary for the promotion or protection of the interests of the inhabitants of a county as are conferred on the council of a municipal borough by the Borough Funds Act 1872, with this difference, that in order to enable them to oppose a bill in parliament at the cost of the county rate, it is not necessary to obtain the consent of the owners and ratepayers within the county. The power thus conferred is limited to opposing bills. The council are not authorized to promote any bill, and although they frequently do so, they incur the risk that if the bill should not pass the members of the council will be surcharged personally with the costs incurred if they attempt to charge them to the county rate. Of course if the bill passes, it usually contains a clause enabling the costs of promotion to be paid out of the county rate. It must not be supposed, however, that the county council have no power to institute or defend legal proceedings or oppose bills save such as is expressly conferred upon them by the Local Government Act. In this respect they are in the same position as all other local authorities, with respect to whom it has been laid down that they may without any express power in that behalf use the funds at their disposal for protecting themselves against any attack made upon their existence as a corporate body or upon any of their powers or privileges.

By-laws.

The county council have also the same powers as a borough council of making by-laws for the good government of the county and for the suppression of nuisances not already punishable under the general law. This power has been largely acted upon throughout England, and the courts of law have on several occasions decided that such by-laws should be benevolently interpreted, and that in matters which directly arise and concern the people of the county, who have the right to choose those whom they think best fitted to represent them, such representatives may be trusted to understand their own requirements. Such by-laws will therefore be upheld, unless it is clear that they are uncertain, repugnant to the general law of the land, or manifestly unreasonable. It may be mentioned that, while by-laws relating to the good government of the county have to be confirmed by the secretary of state, those which relate to the suppression of nuisances have to be confirmed by the Local Government Board. Such confirmation, however, though necessary to enable the council to enforce them, does not itself confer upon them any validity in point of law.

Medical officers.

The county council have power to appoint and pay one or more medical officers of health, who are not to hold any other appointment or engage in private practice without the express written consent of the council. The council may make arrangements whereby any district council or councils may have the services of the county medical officer on payment of a contribution towards his salary, and while such arrangement is in force the duty of the district council to appoint a medical officer is to be deemed to have been satisfied. Every medical officer, whether of a county or district, must now be legally qualified for the practice of medicine, surgery and midwifery. Besides this, in the case of a county, or of any district or combination of districts of which the population exceeds 50,000, the medical officer must also have a diploma in public health, unless he has during the three consecutive years before 1892 been medical officer of a district or combination having a population of more than 20,000, or has before the passing of the act been for three years a medical officer or inspector of the Local Government Board.

Alterations of local areas.

The only other powers and duties of a county council arising under the Local Government Act itself which it is necessary to notice are those relating to alterations of local areas. It may be convenient here to state that certain alterations of areas can only be effected through the medium of the Local Government Board after local inquiry. These cases include the alteration of the boundary of any county or borough, the union of a county borough with a county, the union of any counties or boroughs or the division of any county, the making of a borough into a county borough. In these cases the order of the Local Government Board is provisional only, and must be confirmed by parliament. The powers of a county council to make orders for the alteration of local areas are as follows: When a county council is satisfied that a prima facie case is made out as respects any county district not a borough, or as respects any parish, for a proposal for all or any of the things hereafter mentioned, they may hold a local inquiry after giving such notice in the locality and to such public departments as may be prescribed from time to time by the orders of the Local Government Board. The things referred to include the alteration of the boundary of the district or parish; the division or union thereof with any other district or districts, parish or parishes; the conversion of a rural district or part thereof into an urban district or vice versa. In these cases, after the local inquiry above referred to has been held, the county council, being satisfied that the proposal is desirable, may make an order for the same accordingly. The order has to be submitted to the Local Government Board, and that board must hold a local inquiry in order to determine whether the order should be confirmed or not, if the council of any district affected by it, or one-sixth of the total number of electors in the district or parish to which it relates, petition against it. The Local Government Board have power to modify the terms of the order whether it is petitioned against or not, but if there is no petition, they are bound to confirm, subject only to such modifications. Very large powers are conferred upon county councils for the purpose of giving full effect to orders made by them under these provisions. A considerable extension of the same powers was made by the Local Government Act 1894, which practically required every council to take into consideration the areas of sanitary districts and parishes within the entire administrative county, and to see that a parish did not extend into more than one sanitary district; to provide for the division of a district which did extend into more than one district into separate parishes, so that for the future the parish should not be in more than one county district; and to provide for every parish and rural sanitary district being within one county. An enormous number of orders under the act of 1894 was made by county councils, and, speaking generally, it will now be found that no parish extends into more than one county or county district. Other powers and duties of the county council under the act of 1894 will be noticed hereafter.

Of the statutes affecting county councils passed subsequent to 1888 mention need only be made of the chief.

Education.

Previous to the Education Act 1902, county councils had certain optional powers under the Technical Instruction Acts to supply or aid the supply of technical or manual instruction. Their duties in respect to education were, however, much enlarged by the act of 1902. That act abolished the old school boards and school attendance committees, and substituted a single authority for all kinds of schools and for all kinds of education. The county council or the council of a county borough is now in every case the local education authority, except that non-county boroughs with a population of over 10,000, and urban districts with a population of over 20,000, may be the local education authorities for elementary education only, but they may relinquish their powers in favour of the county council. For higher education county councils and county boroughs are the sole education authorities, except that non-county boroughs and urban councils are given a concurrent power of levying a rate for higher education not exceeding 1d. in the £. Under the act, an education committee must be established by all authorities. The majority of the members of the committee are appointed by the council, usually out of their own body, and the remainder are appointed by the council on the nomination or recommendation of other bodies. Some of the members of the committee must be women. All matters relating to the exercise of the powers of the education authority (except those of rating and borrowing) must be referred to the committee, and before exercising any of their powers the council must (except in cases of emergency) receive and consider the report of the education committee with respect to the matter in question. As to higher education the local education authority must consider the educational needs of their area and take such steps as seem to them desirable, after consultation with the Board of Education, to supply or aid the supply of education other than elementary, and to promote the general co-ordination of all forms of education. For this purpose they are authorized to levy a rate not exceeding 2d.

in the £, except with the consent of the Local Government Board. They must also devote to the same purpose the sums received by them in respect of the residue of the English share of the local taxation (customs and excise) duties already referred to. See further EDUCATION and TECHNICAL EDUCATION.

Midwives.

Under the Midwives Act 1902, every council of a county or county borough is the local supervising authority over midwives within its area. The duty of the local supervising authority is to exercise general supervision over all midwives practising within their area in accordance with rules laid down in the act; to investigate charges of malpractices, negligence or misconduct on the part of a midwife, and if a prima facie case be established, to report it to the Central Midwives Board; to suspend a midwife from practice if necessary to prevent the spread of infection; to report to the central board the name of any midwife convicted of an offence; once a year (in January) to supply the central board with the names and addresses of all midwives practising within their area and to keep a roll of the names, accessible at all reasonable times for public inspection; to report at once the death of any midwife or change in name and address. The local supervising authority may delegate their powers to a committee appointed by them, women being eligible to serve on it. A county council may delegate its powers under the act to a district council.

Lunatics.

Part of the business transferred from quarter sessions to the council was that which related to pauper lunatics, but the whole subject of lunacy was consolidated by an act of the year 1890, which again has been amended by a later act. The councils of all administrative counties and county boroughs and the councils of a few specified quarter sessions boroughs, which before 1890 were independent areas for purposes of the Lunacy Acts, are local authorities for the purposes of the Lunacy Acts, and each of them is under an obligation to provide asylum accommodation for pauper lunatics. This accommodation may be provided by one council or by a combination of two or more, and such council or combination may provide one or more asylums. The county council exercise their powers through a visiting committee, consisting of not less than seven members, or, in the case of a combination, of a number of members appointed by each council in agreed proportions. In the case of a combination the expenses are defrayed by the several councils in such proportion as they may agree upon, and the proportion may be fixed with reference to either the accommodation required by each council or the population of the district. A county borough may also, instead of providing an asylum of its own, contract with the visiting committee of any asylum to receive the pauper lunatics from the borough. Private patients may be accommodated in the asylums provided by a county council, and received upon terms fixed by the visiting committee. The expenses of lunatic asylums are defrayed in the following manner: The guardians from whose union a lunatic is sent have to pay a fixed weekly sum, which may not exceed 14s. a week. A larger charge is made for lunatics received from unions outside the county, as these do not, of course, contribute anything towards the provision or up-keep of the asylum itself. In addition to the payments by guardians, there is a contribution of 4s. a week from "the exchequer contribution account" already mentioned, and the remaining expenses are defrayed out of the county rate.

Allotments.

Under the Allotments Acts 1887 to 1907, it is the duty of a county council to ascertain the extent to which there is a demand for allotments in the urban districts and parishes in the county, or would be a demand if suitable land were available, and the extent to which it is reasonably practicable, having regard to the provisions of the acts, to satisfy any such demand, and to co-operate with authorities, associations or persons best qualified to assist, and to take such steps as may be necessary. The powers of the Local Government Board under the Allotments Acts were transferred by the act of 1907 to the Board of Agriculture and Fisheries, and by the same act the powers and duties of rural district councils were transferred to parish councils. The county council under these acts has compulsory powers of purchase or hire if they are unable to acquire land by agreement and on reasonable terms. If an objection is made to an order for compulsory purchase or hire, the order will not be confirmed by the Board of Agriculture until after a local inquiry has been held. If the Board of Agriculture is satisfied, after holding a local inquiry, that a county council have failed to fulfil their obligations as to allotments, the board may transfer all and any of the powers of the county council to the Small Holdings Commissioners.

Small holdings.

By the Small Holdings and Allotments Act 1907, Small Holdings Commissioners are appointed by the Board of Agriculture to ascertain the extent of the demand for small holdings, and confer with county councils as to how best to provide them. Local authorities are required to furnish information and give assistance to the commissioners, who report to the board. If the board, after considering the report, consider it desirable, they require the county council concerned to prepare a scheme for the provision of small holdings; if the county council decline to prepare a scheme, the board may direct the commissioners to do so. A county council may also prepare a scheme on its own initiative. When a scheme has been confirmed, the county council must carry out the obligations imposed on it within a prescribed time; if they make default the board may direct the commissioners to assume all the powers of the county council, and the county council must repay to the board the expenses the commissioners may incur. A county council may delegate, by arrangement, to the council of any borough or urban district in the county their powers in respect of the act. A small holding is defined by the act as one which exceeds 1 acre, but must not exceed 50 acres or £50 annual value. Every county council must establish a small holdings and allotments committee, to which must be referred all matters relating to the exercise and performance by the council of their powers and duties as to small holdings and allotments.

Hospitals.

Under the Isolation Hospitals Acts 1893 and 1901, a county council may provide for the establishment of isolation hospitals for the reception of patients suffering from infectious diseases on the application of any local authority within the county, or on the report of the medical officer of the county that hospital accommodation is necessary and has not been provided, or it may take over hospitals already provided by a local authority. The council by their order constitute a hospital district and form a committee for its administration. The committee have power to purchase land, erect a hospital, provide all necessary appliances, and generally administer a hospital for the purposes above mentioned.

Parish councils.

The powers and duties of a county council under the Local Government Act 1894 are numerous and varied, and the chief of them are mentioned hereafter in connexion with parish councils. The county council may establish a parish council in a parish which has a population of less than 300, and may group small parishes under a common parish council; in every case they fix the number of members of the parish council. They may authorize the borrowing of money by a parish council, and they may lend money to a parish council. They may hear complaints by a parish council that a district council has failed to provide sufficient sewerage or water-supply, or has failed to enforce the provisions of the Public Health Acts in their district, and on such complaint they may transfer to themselves and exercise the powers of the defaulting council, or they may appoint a person to perform those duties. They may make orders for the custody and preservation of public books, writings, papers and documents belonging to a parish. They may divide a parish into wards for purposes of elections or of parish meetings. They may authorize district councils to aid persons in maintaining rights of common. They may, on the petition of a district council, transfer to themselves the powers of a district council who have refused or failed to take the necessary proceedings to assert public rights of way or protect roadside wastes. They may dispense with the disqualification of a parish or district councillor arising only by reason of his being a shareholder in a water company or similar company contracting with the council, and, as has above been stated, they have large powers of altering the boundaries of parishes.

Diseases of animals.

Among the powers and duties of quarter sessions transferred to county councils were those arising under the acts relating to contagious diseases of animals. These acts were consolidated and amended by a statute of 1894, and the county council remain the local authority for the execution of that act in counties.

Light railways.

Under the Light Railways Act 1896 a county council may be authorized by order of the light railway commissioners to construct and work or contract for the construction or working of a light railway, lend money to a light railway company, or join any other council in these matters.

Miscellaneous.

Among other statutes conferring powers or imposing duties upon county councils, mention may be made of such acts as those relating to sea fisheries regulation, open spaces, police superannuation, railway and canal traffic, shop hours, weights and measures, fertilizing and feeding stuffs, wild birds' protection, land transfer, locomotives on highways and the acquisition of small dwellings. Sufficient has been said to indicate that the legislature from time to time recognizes the important position of the county council as an administrative body, and is continually extending its functions.

The municipal borough and the borough council.

The Urban District.—A municipal borough is a place which has been incorporated by royal charter. In the year 1835 the Municipal Corporations Act was passed, which made provision for the constitution and government of certain boroughs which were enumerated in a schedule. That act was from time to time amended, until in 1882 by an act of that year the whole of the earlier acts were repealed and consolidated. A few ancient corporations which were not enumerated in the schedule to the act of 1835 continued to exist after that year, but by an act of 1883 all of these, save such as should obtain charters before 1886, were abolished, the result being that all boroughs are now subject to the act of 1882. A place is still created a borough by royal charter on the petition of the inhabitants, and when that is done the provisions of the act of 1882 are applied to it by the charter itself. The charter also fixes the number of councillors, the boundaries of the wards (if any), and assigns the number of councillors to each ward, and provides generally for the time and manner in which the act of 1882 is first to come into operation. The charter is supplemented by a scheme which makes provision for the transfer to the new borough council of the powers and duties of existing authorities, and generally for the bringing into operation of the act of 1882. If the scheme is opposed by the prescribed proportion (one-twentieth) of the owners and ratepayers of the proposed new borough, it has to be confirmed by parliament. The governing body in a borough is the council elected by the burgesses.

Officers.

The qualification of a burgess has been incidentally mentioned in connexion with that of a county elector, and need not be further noticed. A borough councillor must be qualified in the same manner as a county councillor, and he is disqualified in the same way, with this addition, that a peer or ownership voter is not qualified as such, and that a person is disqualified for being a borough councillor if he is in holy orders or is the regular minister of a Dissenting congregation. Women, other than married women, are eligible. Borough councillors are elected for a term of three years, one-third of the whole number going out of office in each year, and if the borough is divided into wards, these are so arranged that the number of councillors for each ward shall be three or a multiple of three. The ordinary day of election is the 1st of November. At an election for the whole borough the returning officer is the mayor; at a ward election he is an alderman assigned for that purpose by the council. The nomination and election of candidates and the procedure at the election are the same as have already been described in the case of the election of county councillors. The law as to corrupt and illegal practices at the election is also similar, and the election may be questioned by petition in exactly the same way. A borough councillor must, within five days after notice of his election, make a declaration of acceptance of office under a penalty, in the case of an alderman or councillor of £50, and in the case of a mayor of £100, or such other sums as the council may by by-law determine. A councillor may be disqualified in the same way as a county councillor, by bankruptcy or composition with creditors, or continuous absence from the borough (except in case of illness). In short it may be said that as the provisions relating to the election of borough councillors were merely extended to county councillors by the Local Government Act of 1888 with a few modifications, these provisions, as already stated when dealing with county councils, apply generally to the election of borough councillors. After the annual election on the 1st of November the first quarterly meeting of the council is held on the 9th, and at that meeting the mayor and aldermen are elected. The election of the mayor and aldermen is again the same as has already been described in connexion with the election of the chairman and aldermen of a county council. The officers of a borough council are the town clerk and the treasurer, but the council have power to appoint such other officers as they think necessary. All these officers receive such remuneration as the council from time to time think fit, and hold office during pleasure. The provisions with respect to the transaction of the business of the council are also the same in the case of a borough as in that of a county council.

Finance audit.

The entire income of the borough council is paid into the borough fund, and that fund is charged with certain payments, which are specifically set out in the 5th schedule to the act of 1882. These include the remuneration of the mayor, recorder and officers of the borough, overseers' expenses, the expenses of the administration of justice in the borough, the payment of the borough coroner, police expenses and the like. An order of the council for the payment of money out of the borough fund must be signed by three members of the council and countersigned by the town clerk, and any such order may be removed into the king's bench division of the High Court of Justice by writ of *certiorari*, and may be wholly or partly disallowed or confirmed on the hearing. This is really the only way in which the validity of a payment by a borough council can be questioned, for, as will be seen hereafter, the audit in the borough is not an effective one. The borough fund is derived, in the first instance, from the property of the corporation. If the income from such property is insufficient for the purposes to which it is applicable, as usually is the case, it has to be supplemented by a borough rate, which may be a separate rate made by the council or may be levied through the overseers as part of the poor rate by means of a precept addressed to them. In the event of the borough fund being more than sufficient to meet the demands upon it without recourse to a borough rate, any surplus may be applied in payment of any expenses of the council as a sanitary authority or in improving the borough or any part thereof by drainage, enlargement of streets or otherwise. The borough treasurer is required to make up his accounts half-yearly, and to submit them, with the necessary vouchers and papers, to the borough auditors. These auditors are three in number—two of them elected annually by the burgesses. An elective auditor must be qualified to be a councillor, but may not be a member of the council. The third auditor is appointed by the mayor and is called the mayor's auditor. The auditors so appointed are charged with the duty of auditing the accounts of the treasurer, but they have no power of disallowance or surcharge, and their audit is therefore quite ineffective.

Jurisdiction of justices; quarter sessions.

Where a borough has not a separate court of quarter sessions, but has a separate commission of the peace, the justices of the county in which the borough is situate have a concurrent jurisdiction with the borough justices in all matters arising within the borough. Where, however, the borough has a court of quarter sessions, the county justices have no jurisdiction within the borough. In all cases, whether the borough has quarter sessions or a separate commission or not, the mayor, by virtue of his office, is a justice for the borough, and continues to be such justice during the year next after he ceases to be mayor. He takes precedence over all justices in and for the borough, and is entitled to take the chair at all meetings at which he is present by virtue of his office of mayor. A separate commission of the peace may be granted to a borough on the petition of the council. A borough justice is required to take the oaths of allegiance and the judicial oaths before acting; he must while acting reside in or within 7 m. of the borough, or occupy a house, warehouse or other property in the borough; but he need not be a burgess nor have the qualification by estate required of a county justice. Where the borough has a separate commission, the borough justices have power to appoint a clerk, who is now paid by salary, the fees and costs pertaining to his office being paid into the borough fund, out of which his salary is paid. The council may by petition obtain the appointment of a stipendiary magistrate for the borough. The crown may also on petition of the council grant a separate court of quarter sessions for the borough, and in that event a recorder has to be appointed by the crown. He must be a barrister of not less than five years' standing, and he holds office during good behaviour; he receives a yearly salary. The recorder sits as sole judge of the court of quarter sessions of the borough. He has all the powers of a court of quarter sessions in a county, including the power to hear appeals from the borough justices; but to this there are a few exceptions, notably the power to grant licences for the sale of intoxicating liquor. The grant of a separate court of quarter sessions also involves the appointment by the council of a clerk of the peace for the borough. It should be added that the grant of a court of quarter sessions to any borough other than a county borough after the passing of the Local Government Act 1888, does not affect the powers, duties or liabilities of the county council as regards that borough, nor exempt the parishes in the borough from being assessed to county rate for any purposes to which such parishes were previously liable to be assessed.

Sheriff, coroner.

When a borough is a county of itself the council appoint a sheriff on the 9th of November in every year. And where the borough has a separate court of quarter sessions the council appoint a fit and proper person, not an alderman or councillor, to be the borough coroner, who holds office during good behaviour. If the borough has a civil court the recorder, if there is one, is judge of it. If there is no recorder, the judge of the court is an officer of the borough appointed under the charter.

Power to acquire land.

The provisions of the Municipal Corporations Act 1882 relate chiefly to the constitution of the municipal corporation. It does not itself confer many powers or impose many duties upon the council as a body. It does, however, enable a municipal corporation to acquire corporate land and buildings, the buildings including a town hall, council house, justices' room, police stations and cells, sessions house, judges' lodgings, polling stations and the like. The council may borrow money for the erection of such buildings; they may acquire and hold land in mortmain by virtue of their charter, or with the consent of the Local Government Board. Corporate land cannot be alienated without the consent of the same board. The council may convert corporate land, with the approval of the Local Government Board, into sites for workmen's dwellings.

Borough bridges.

Another duty imposed upon a borough council by the act of 1882 is the maintenance of bridges within the borough which are not repairable by the county in which the borough is locally situate. It may here be mentioned that a city or borough which is a county of itself is liable at common law to repair all public bridges within its limits. In a borough which is not a county of itself the inhabitants are only liable to repair bridges within the borough by immemorial usage or custom.

By-laws.

Of the other powers possessed by the council of a borough under the act of 1882, one of the most important is the power to make by-laws for the good rule and government of the borough, and for the prevention and suppression of nuisances not already punishable in summary manner by virtue of an act in force throughout the borough. It will be observed that these by-laws are of two classes. The former do not come into force until the expiration of forty days after a copy of them has been sent to the secretary of state, during which forty days the sovereign in council may disallow any by-law or part thereof. The latter require to be confirmed by the Local Government Board.

Under the act of 1882 every municipal borough might have its own separate police force. As has already been stated when dealing with county councils, boroughs having a population of less than 10,000 according to the census of 1881 can no longer have a

Police.

separate police force. But for some time before that year it had become the rule not to grant to any new borough with a population of less than 20,000 a separate police force. The subject of police is separately treated in the *Encyclopaedia Britannica*, and it is not necessary to supplement what is there stated. Under an act of 1893 the borough police may, in addition to their ordinary duties, be employed to discharge the duties of a fire brigade.

The district and the district council.

The powers and duties of a borough council in the Municipal Corporations Act do not arise or exist to any great extent under that act. In a few cases, those namely of county boroughs, the councils have the powers of county councils. In the quarter sessions boroughs other than county boroughs they have some only of these powers. But in every case the council of the borough have the powers and duties of an urban district council, and, except where they derive their authority from local acts, it may be said that their principal powers and duties consist of those which they exercise or perform as an urban council. These will now be considered.

Before the year 1848 there was not outside the municipal boroughs any system of district government in England. It is true that in some populous places which were not corporate boroughs local acts of parliament had been passed appointing improvement commissioners for the government of these places. In many boroughs similar acts had been obtained conferring various powers relating to sanitary matters, streets and highways and the like. But there was no general system, nor was there, save by special legislation, any means by which sanitary districts could be constituted. In the year 1848 the first Public Health Act was passed. It provided for the formation of local boards in boroughs and populous places, such places outside boroughs being termed local government districts. In boroughs the town council were generally appointed the local board for purposes of the act. It was not, however, until 1872 that a general system of sanitary districts was adopted. By the Public Health Act of that year the whole country was mapped out into urban and rural sanitary districts, and that system has been maintained until the present time, with some important changes introduced by the Public Health Acts 1875 to 1907, and the Local Government Act 1894.

Constitution of district councils.

United districts.

Port sanitary authority.

Powers of urban and rural councils compared.

The whole of England and Wales is divided into districts, which are either urban or rural. Urban districts include boroughs and places which were formerly under the jurisdiction of local boards or improvement commissioners. The power to constitute new urban districts is now conferred upon county councils, as already stated. There is a concurrent power in the Local Government Board under the Public Health Act 1875, but that power is now rarely exercised, and new urban districts are in practice created only by orders of county councils made under the Local Government Act 1888, section 57. Rural districts were first created in 1872. Before that time there was practically no sanitary authority outside the urban district, for although the vestry of a parish had in some cases power to make sewers and had also some other sanitary powers, there was no authority for such a district as now corresponds to a rural district. There were, indeed, highway boards and burial boards which had powers for special purposes, but district authority in the sense in which it is now understood there was none. Before the year 1894 the rural district consisted of the area of the poor-law union, exclusive of any urban district which might be within it, and the guardians of the poor were the rural sanitary authority. Since 1894 this has been changed. By the Local Government Act of that year the guardians ceased to be the rural sanitary authority. The union was preserved as the rural sanitary district, with this qualification, that if it extended into more than one county it was divided so that no rural district should extend into more than one county. Rural district councillors are elected for each parish in the rural district, and they become by virtue of their office guardians of the poor for the union comprising the district, so that there is now no election of guardians in a rural district. Guardians are still elected as such for urban districts, but the rural district council have ceased to be the same body as the guardians and are now wholly distinct. A district councillor, whether urban or rural, holds office for a term of three years. One-third of the whole council retire in each year, the annual elections being held in March, but there may be a simultaneous retirement of the whole council in every third year if the county council at the instance of the district council so order. The qualification and disqualification of district councillors, whether urban or rural, now depend upon the Local Government Act 1894. Property qualification is abolished. Any person may be elected who is either a parochial elector of some parish within the district or has during the whole of the twelve months preceding his election resided in the district, and no person is disqualified by sex or marriage. The electors both in urban and rural districts are the body called the parochial electors. These are practically the persons whose names appear in the parliamentary register or in the local government register as being entitled to vote at elections for members of parliament or county or parish councillors as the case may be. The election takes place subject to rules made by the Local Government Board, these rules being largely founded upon adaptations of the Municipal Corporations Act 1882. The election is by ballot on the same lines as those prescribed for a municipal election, and the Corrupt Practices Act, the provisions of which have been referred to when dealing with county councils, applies to the elections of district councils. The provisions with reference to election petitions, the grounds upon which they may be presented and the procedure upon them, are the same in every respect as have already been mentioned when dealing with county councils. It may be convenient here to state that the Local Government Board has power to unite any number of districts or parts of districts into what is called a united district for certain special purposes such as water-supply, sewerage or the like. This is done by means of a provisional order made by the board and confirmed by parliament. In such a united district the governing body is a joint board constituted in manner provided by the order, and it has under the order such of the powers of a district council as are necessary for the purposes for which the united district is created. Thus a joint sewerage board would generally be invested by the order with all the powers of a district council relating to the provision and control of sewers and the disposal of sewage. It may also be convenient here to mention another special kind of district authority, that is, a port sanitary authority. It is also constituted by order of the Local Government Board, and it may include one or more sanitary districts or parts of districts abutting upon a port. In this case also the authority consists of such members and is elected in such manner as the order determines, and it has such of the powers of an ordinary district council as the order may confer upon it. These relate for the most part to nuisances and infectious disease, having special reference to ships. It has been thought convenient to deal here with district councils, whether urban or rural, together, but the powers of the former are much more extensive than those of the latter, and as the consideration of the subject proceeds it will be necessary to indicate what powers and duties are conferred or imposed upon urban district councils only. It must be pointed out, however, that when the necessity arises for conferring upon a rural district council any of the powers exercisable only by an urban district council, that can be done by means of an order of the Local Government Board. The necessity for this provision arises because it sometimes happens that in a district otherwise rural there are some centres of population, hardly large enough to be constituted urban districts, which nevertheless require the same control as an urban district.

Business and offices.

A district council may from time to time make regulations with respect to summoning, notice, place, management and adjournment of their meetings, and generally with respect to the transaction and management of their business. Three members must be present to constitute a quorum. At the annual meeting, which is held as soon as convenient after the 15th April in each year, a chairman for the succeeding year has to be appointed. He presides at all meetings, and in his absence another member appointed by the meeting takes his place. Questions are determined by the majority present and voting, the chairman having the casting vote. Minutes are taken and, if signed at the meeting or the next ensuing meeting, are made evidence. The officers of the council consist of a clerk, a medical officer, a surveyor, one or more inspectors of nuisances and a treasurer. Of these all but the medical officer of health and inspectors of nuisances hold office at pleasure and receive such remuneration as the council may determine. If the urban district is a borough, the town clerk and borough treasurer fulfil the same office for purposes of the Public Health Acts. The salaries of the medical officer of health and inspectors of nuisances are, as to one moiety thereof, paid out of "the exchequer contribution account" by the county council, if they are appointed in accordance with the requirements of the Local Government Board as to qualification, appointment, duties, salary and tenure of office. The orders of the Local Government Board as to these matters are set out in the *Statutory Rules and Orders*. District councils may also employ such other officers and servants as may be necessary and proper for the fulfilment of their duties. Officers and servants are prohibited from being concerned or interested in any bargain or contract made with their council, and from receiving under cover of their office or employment any fee or reward whatsoever other than their proper salaries, wages and allowances, under penalty of being rendered incapable of holding office under any district council, and of a pecuniary penalty of £50. There are some exceptions to this provision somewhat similar to those already mentioned with respect to the disqualification of members of the council. It may be mentioned here that by an act, called the Public Bodies' Corrupt Practices Act 1889, severe penalties are imposed alike upon members and officers of public bodies for corruption in office.

Committees.

A district council may appoint committees consisting wholly or partly of members of their own body for the exercise of any powers which in their opinion can properly be exercised by such committees. Such committees do not, however, hold office beyond the next annual meeting of the council, and their acts must be submitted to the council for their approval. If they are appointed for any purposes of the Public Health or Highway Acts, the council may authorize them to institute any proceedings or do any act which the council might have instituted or done, other than the raising of any loan or the making of any rate or contract. A rural district council may delegate their entire powers in any parish to a parochial committee. Such committee may consist wholly of members of their own body or of members of the parish council, or partly of members of both. Such a committee may be subject to any regulations and restrictions imposed upon it by the rural district council.

Public Health Acts.

In dealing with the powers and duties of district councils it will be convenient to treat of these first as they arise under the Public Health Acts, and afterwards as they arise under other statutes. In so far as such powers and duties are common to urban and rural district councils alike they will be referred to as appertaining to district councils. When reference is made to any power or duty of an urban council it is to be understood that the rural council have no such power or duty unless conferred or imposed upon them by order of the Local Government Board. And it must be borne in mind that in a borough the borough council is the urban district council.

Sewerage and drainage.

The district council are required to cause to be made such sewers as may be necessary for effectually draining their district. This duty may be enforced by the Local Government Board on complaint made to them that the council have failed in performing it, and in the case of a rural district by the county council on complaint of the parish council. All sewers, whether made by the council, by their predecessors, or by private persons, vest in the district council, that is to say, become their property, with some exceptions, of which the principal is sewers made by a person for his own profit. The owner or occupier of any premises is entitled as of right to cause his drain to be connected with any sewer, on condition only of his giving notice and complying with the regulations of the council as to the mode in which the communication is to be made, and subject to the control of any person appointed by the council to superintend the work. Moreover, the owner or occupier of premises without the district has the same right, subject only to such terms and conditions as may be agreed or, in case of dispute, settled by justices or by arbitration. If a house does not possess a sufficient drain, the occupier may be required to provide one, and to cause it to discharge into a sewer if there is one within 100 ft. of the house, otherwise into a cesspool, as the council may direct. In the case of new houses, these may not be built or occupied in an urban district without their being first provided with sufficient drains as the council may require; and in an urban district it is forbidden to cause any building to be newly erected over a sewer without the consent of the council. For the purpose of sewage disposal a district council may construct any works and contract for the use or purchase or lease of any land, buildings, engines, materials or apparatus, and contract to supply for a period not exceeding twenty-five years any person with sewage. It may be pointed out here that these expressions are defined by the act, the effect of the definitions being shortly that a drain is a conduit for the drainage of one building or of several within the same curtilage, while a sewer comprises every kind of drain except that which is covered by the definition of a drain as above stated. The result has been that district councils frequently find themselves in the position of being responsible for the repair and condition of drains which, by reason of having been laid for more than one house, are sewers vested in and repairable by them. An attempt was made to remedy this state of things by the Public Health Amendment Act 1890, section 19, but the remedy so provided was very partial, and may be said to be confined to the case where two or more houses belonging to different owners are drained into a common drain laid under private land, and ultimately discharging into a sewer in a road or street.

Sanitary accommodation for houses.

Removal of refuse.

The district council are charged with the duty of enforcing the provision of proper sanitary accommodation (water-closets, privies, ashpits, &c.) for all dwelling-houses, new or old, and for factories, and the maintenance of such conveniences in proper condition. The urban council have power to provide and maintain and make provision for the regulation of urinals, water-closets, earth-closets, privies, ashpits and other similar conveniences for public accommodation. In the event of a complaint being made to a district council that any drain, closet, privy, ashpit or cesspool is a nuisance or injurious to health, the council may empower their surveyor to enter and examine the premises, and, if the complaint is well founded, they may require the owner to do the necessary works. The district council are not bound to undertake the removal of house refuse from premises, or the cleansing of closets, privies, ashpits and cesspools. They may, however, undertake these duties, and, if the Local Government Board require, they must do so. An urban council and a rural council, if invested with the requisite power by the Local Government Board, may, and when required by order of that board must, provide for the proper cleansing of streets, and may also provide for the proper watering of streets. When they have undertaken, or are required to perform these duties, a penalty is imposed upon them for neglect. If they do not undertake these duties, they may make by-laws imposing on the occupiers of premises the duty of cleansing footways and pavements, the removal of house refuse, and the cleansing of earth-closets, privies, ashpits and cesspools; and an urban council may also make by-laws for the prevention of nuisances arising from snow, filth, dust, ashes and rubbish, and for the prevention of the keeping of animals on any premises so as to be injurious to health. The keeping of swine in a dwelling-house, or so as to be a nuisance, is made an offence punishable by a penalty in an urban district, as also is the suffering of any waste or stagnant water to remain in any cellar, or within any dwelling-house after notice, and the allowing of the contents of any closet, privy or cesspool to overflow or soak therefrom. Provision is also made for enforcing the removal of accumulations of manure, dung, soil or filth from any premises in an urban district, and for the periodical removal of manure or other refuse from mews, stables or other premises.

Water-supply.

With regard to water-supply, district councils have extensive powers. They may provide their district or any part of it with a supply of water proper and sufficient for public and private purposes, and for this purpose they may construct and maintain waterworks, dig wells, take on lease or hire any waterworks, purchase waterworks or water, or right to take or convey water either within or without their district, and any rights, powers and privileges of any water company, and contract with any person for the supply of water. They may not, however, commence to construct waterworks within the limits of supply of any water company empowered by act of parliament or provisional order to supply water without giving notice to the company, and not even then so long as the company are able and willing to supply the necessary water. Any dispute as to whether the company are able and willing has to be settled by arbitration. Where the council do supply water, they have the same powers of carrying mains under streets or through private lands as they have with respect to the laying of sewers, as already mentioned. They can charge water rents which depend upon agreements with consumers, or they may charge water rates assessed on the net annual value of the premises supplied. It is to be observed that they are not bound to charge for a supply of water at all, unless they are required to do so in an urban district by at least ten persons, rated to the poor rate, or in a parish in a rural district by at least five persons so rated in the parish. Even then the amount of the rate is left to the council, any deficiency in the cost of the water, in so far as it is not defrayed out of water rates or rents, being borne in an urban district by the general district rate, and in a rural district by the separate sanitary rates made for the parish or contributory place supplied. For the purpose of enabling them to supply water, most of the provisions of the Waterworks Clauses Acts are incorporated with the Public Health Act, and are made available for the district council. They are empowered to supply water by measure if they think fit, and may charge a rent for water-meters. The power of the district council to supply water is strictly limited to their own district, but they may, with the sanction of the Local Government Board, supply water to the council of an adjoining district on such terms as may be agreed upon, or as, in case of dispute, may be settled by arbitration. If any house is without a sufficient supply, and it appears that a supply can be furnished at a reasonable cost, as defined in the Public Health Act and the Public Health Water Act 1878, the owner may be required to provide the supply, and, if he fails, the council may themselves provide the supply and charge the owner with the cost. All public sources of water-supply such as streams, pumps, wells, reservoirs, conduits, aqueducts and works used for the gratuitous supply of water to the inhabitants of the district are vested in the council, who may cause all such works to be maintained and plentifully supplied with pure and wholesome water for the gratuitous use of the inhabitants, but not for sale by them. The council may supply water to public baths or wash-houses, or for trade or manufacturing purposes. In the case of the former the supply may be gratuitous. In the latter case it is to be on terms agreed between the parties. The urban council are required to cause fire-plugs, and all necessary works, machinery and assistance for securing a supply of water in case of fire, to be provided and maintained, and for this purpose they may enter into an agreement with any water company or person. Provision is made for preventing the pollution of water by gas refuse and enabling a district council, with the sanction of the attorney-general, to take any proceedings they may think fit for preventing the pollution of any stream in their district by sewage. The district council are also empowered to obtain an order of justices directing the closing of any well, tank or cistern, public or private, or any public pump the water from which is likely to be used for drinking or domestic purposes, or for manufacturing drinks for the use of man, if such water is found to be so polluted as to be injurious to health.

Power is given to prohibit the use as dwellings of any cellars, vaults or underground rooms built or occupied after 1875, and with regard to such cellars as were occupied as dwellings before 1875,

Cellar dwellings.

the continued occupation of these is also forbidden unless they comply with certain stringent requirements as to the height of the rooms, height of the ceilings above the surface of the street, open areas in front, effectual drainage, sanitary conveniences appurtenant to the cellars, and the provision of fireplaces.

Common lodging-houses.

District councils are required to keep a register of the common lodging-houses in their district. No person is allowed to keep a common lodging-house unless he is registered, and a house may not be registered until it has been inspected and approved for the purpose by an officer of the council. Further, the council may refuse to register a keeper unless they are satisfied of his character and of his fitness for the position. The council are empowered to make by-laws for fixing the number of lodgers and separating the sexes therein, promoting cleanliness and ventilation, giving of notices and taking precautions in case of any infectious disease, and generally for the well-ordering of such houses. The keepers of common lodging-houses are required to limewash their walls and ceilings in the months of April and October in every year, and if paupers or vagrants are received to lodge, they may be required to report as to the persons who have resorted thereto. They must give notice of any infectious disease to the medical officer of health and to the poor-law relieving officer, and they must give free access for inspection. There is no definition of the expression "common lodging-house" in the Public Health Acts, and at one time the courts decided that shelters for the destitute kept by charitable persons were not common lodging-houses. That idea is now exploded, and the acts apply to charitable institutions which receive persons of the class ordinarily received into common lodging-houses.

Houses let in lodgings.

By-laws may also be made relating to houses let in lodgings which are not common lodging-houses. These by-laws are in practice limited to those inhabited by the poorer classes, although the act imposes no such restriction.

Nuisances.

The Public Health Acts 1875 to 1907 contain elaborate provisions for dealing with nuisances. Those which are dealt with summarily are thus enumerated:—(1) any premises in such a state as to be a nuisance or injurious to health; (2) any pool, ditch, gutter, watercourse, privy, urinal, cesspool, drain or ashpit so foul or in such a state as to be injurious to health; (3) any animal so kept as to be a nuisance or injurious to health; (4) any accumulation or deposit which is a nuisance or injurious to health; (5) any house or part of a house so overcrowded as to be dangerous or injurious to the health of the inmates, whether or not members of the same family; (6) any factory, workshop or workplace not already under the operation of any general act for the regulation of factories or bakehouses not kept in a cleanly state or not ventilated in such a manner as to render harmless as far as practicable any gases, vapours, dust or other impurities generated in the course of the work carried on therein that are a nuisance or injurious to health, or so overcrowded while work is carried on as to be dangerous or injurious to the health of those employed therein; (7) any fireplace or furnace which does not as far as practicable consume the smoke arising from the combustible used therein, and which is used for working engines by steam or in any mill, factory, dye-house, brewery, bakehouse or gas work, or in any manufacturing or trade process whatsoever; and (8) any chimney not being the chimney of a private dwelling-house sending forth black smoke in such quantity as to be a nuisance. The nuisances above enumerated are said to be nuisances liable to be dealt with summarily. It is the duty of every district council to inspect their district with a view to the discovery of any such nuisances. In the event of such discovery by them or of information given to them of the existence of any such nuisance, the district council are required to serve a notice requiring the abatement of the nuisance on the person by whose act, default or sufferance it arises or continues, or if such person cannot be found, on the owner or occupier of the premises at which the nuisance arises. The notice must require the abatement of the nuisance within a specified time, and must prescribe the works which in the opinion of the council are necessary to be done. If the nuisance arises from the absence or defective construction of any structural convenience, or if there is no occupier of the premises, the notice must be served upon the owner. If the person who causes the nuisance cannot be found, and it is clear that the nuisance does not arise or continue by the act, default or sufferance of the owner or occupier of the premises, the local authority may themselves abate the nuisance without further order. If the person on whom the notice is served objects to give effect to it, he may be summoned before justices, and the justices may make an order upon him to abate the nuisance, or prohibiting the recurrence of the nuisance if this is likely, and directing the execution of the necessary works. If the nuisance is such as to render a dwelling-house unfit for human habitation, the justices may close it until it is rendered fit for that purpose. Disobedience under the order of justices involves a penalty and a daily penalty for every day during which default continues. Private persons may complain to justices in respect of nuisances by which they are personally aggrieved, and if the district council make default in doing their duty, the Local Government Board may authorize any officer of police to institute any necessary proceedings at the cost of the defaulting council. The district council may, if in their opinion proceedings before justices afford an inadequate remedy, take proceedings in the high court, but in that case, if the nuisance is of a public nature, they must proceed by action in the name of the attorney-general. The provisions as to nuisances are extended to ships by an act of 1885.

It is forbidden to establish within an urban district without the consent of the council any offensive trade, business or manufacture. With regard to any offensive trade which has been established or may be consented to in any urban district, if it is verified by the medical officer or any two legally qualified medical practitioners, or by any ten inhabitants of the district, to be a nuisance or injurious to health, the urban district council are required to take proceedings before magistrates with a view to the abatement of the nuisance complained of.

Unsound meat.

Any medical officer or inspector of nuisances may inspect any meat, &c., exposed for sale or deposited in any place for the purpose of sale or of preparation for sale and intended for the food of man. This power of inspection is, in districts where the Public Health Act 1890 has been adopted, extended to all articles intended for the food of man. If upon such inspection the meat, &c., appears to be diseased, unsound or unwholesome, it may be taken before a justice for the purpose of being condemned, and the person to whom the meat, &c., belongs or in whose possession it was found is liable to a penalty or, in the discretion of the justices, to imprisonment for three months without the option of a fine.

Infectious diseases.

The Public Health Acts contain important provisions relating to infectious disease. Any person who knows he is suffering from an infectious disease must not carry on any trade or business unless he can do so without risk of spreading the disease. Local authorities may require premises to be cleansed and disinfected; they may order the destruction of bedding, clothing or other articles which have been exposed to infection; they may provide proper places for the disinfection of infected articles free of charge; they may provide ambulances, &c In the case of a person found suffering from infectious disease who has not proper lodging or accommodation, or is lodging in a room occupied by more than one family, or is on board any ship or vessel, such person may by means of a justice's order be removed to a hospital; a local authority may pay the expenses of a person in a hospital or, if necessary, provide nursing attendance; any person exposing himself or any other in his charge while suffering from infectious disease, or exposing infected bedding, clothing or the like, is made liable to a penalty. Owners and drivers of public conveyances must not knowingly convey any person suffering from infectious disease, and if any person suffering from such a disease is conveyed in any public vehicle the owner or driver as soon as it comes to his knowledge must give notice to the medical officer. It is also forbidden to let houses or rooms in which infected persons have been lodging, or to make false statements to persons negotiating for the hire of such rooms. An act was passed in the year 1890, called the Infectious Diseases Prevention Act. When adopted it enabled an urban or district council to obtain the inspection of dairies where these were suspected to be the cause of infectious disease, with a view to prohibiting the supply of milk from such dairies if the fact were established. The act of 1907 extended the provisions of the act of 1890. It enables a local authority to require dairymen to furnish a complete list of sources of supply if the medical officer certifies that any person is suffering from infectious disease which he has reason to suspect is attributable to milk supplied within his district. It also compels dairymen to notify infectious diseases existing among their servants. The act of 1890 also forbids the keeping for more than forty-eight hours of the body of a person who has died of infectious disease in a room used at the time as a dwelling-place, sleeping-place or workshop. It provides for the bodies of persons dying of infectious diseases in a hospital being removed only for burial, and gives power to justices in certain cases to order bodies to be buried. The diseases to which the act applies are smallpox, cholera, membranous croup, erysipelas, scarlatina or scarlet fever, typhus, typhoid, enteric, relapsing, continued or puerperal fever, and any other infectious disease to which the act has been applied by the local authority of the district in the prescribed manner. The most important provision, however, relating to infectious disease is that contained in the Infectious Disease Notification Act 1889. That was originally an adoptive act, but it is now extended to all districts in England and Wales. It requires the notification to the medical officer of health of the district of every case in which a person is suffering from one of the diseases above mentioned. The duty of notification is imposed upon the head of the family, and also upon the medical practitioner who may be in attendance on the patient. The medical attendant is entitled to receive in respect of each notification a fee of 2s. 6d. if the case occurs in his private practice, and of 1s. if the case occurs in his practice as medical officer of any public body or institution. These fees are paid by the urban or rural district council as the case may be. The provisions as to notification are applied to every ship, vessel, boat, tent, van, shed or similar structure used for human habitation in like manner as nearly as may be as if it were a building. Exception is made, however, in the case of a ship, vessel or boat belonging to a foreign government. It is not too much to say that this act has been one of the most effectual means of preventing the spread of infectious disease in modern times.

Hospitals. The district council are empowered to provide hospitals or temporary places for the reception of the sick. They may build them, contract for the use of them, agree for the reception of the sick inhabitants of their district into an existing hospital, or combine with any other district council in providing a common hospital. As has already been mentioned when dealing with county councils, if a district council make default in providing hospital accommodation, the county council may put in operation the Isolation Hospitals Act. The power given to provide hospitals must be exercised so as not to create a nuisance, and much litigation has taken place in respect of the providing of hospitals for smallpox. Up to the present time, however, the courts have refused to accept as a principle that a smallpox hospital is necessarily a source of danger to the neighbourhood, and for the most part applications for injunction on that ground have failed.

Epidemics. Where any part of the country appears to be threatened with or is affected by any formidable epidemic, endemic or infectious disease, the Local Government Board may make regulations for the speedy interment of the dead, house-to-house visitation, the provision of medical aid and accommodation, the promotion of cleansing, ventilation and disinfection, and the guarding against the spread of disease. Such regulations are made and enforced by the district councils. The provisions of the Public Health Acts relating to infectious disease are for the most part extended to ships by an act of the year 1885.

Mortuaries. District councils may, and if required by the Local Government Board, must provide mortuaries, and they may make by-laws with respect to the management and charges for the use of the same. Where the body of a person who has died of an infectious disease is retained in a room where persons live or sleep, or the retention of any dead body may endanger health, any justice on the certificate of a medical practitioner may order the removal of a body to a mortuary and direct the body to be buried within a time limited by the friends of the deceased or in their default by the relieving officer. A district council may also provide and maintain a proper place (otherwise than at a workhouse or at a mortuary) for the reception of dead bodies during the time required to conduct any *post mortem* examination ordered by a coroner.

Cemeteries. Under an act of 1879 the district council have power to provide and maintain a cemetery either within or without their district, and they may purchase or accept a donation of land for that purpose. The provisions of the Cemeteries Clauses Act 1847 apply to a cemetery thus provided. These cannot all be referred to here, but it may be noted that no part of the cemetery need be consecrated, but that if any part is, such part is to be defined by suitable marks, and a chapel in connexion with the Established Church must be erected in it. A chaplain must also be appointed to officiate at burials in the consecrated portion. The power to provide a cemetery under the act under consideration must not be confounded with that of providing a burial ground under the Burial Acts. These acts will be mentioned later in connexion with the powers of parish councils, for in general they are adopted for a parish, part of a parish or combination of parishes, and are administered by a burial board, except where that body has been superseded by a parish council or joint committee. It may be mentioned, however, that under the Local Government Act 1894, where a burial board district is wholly in an urban district, the urban council may resolve that the powers, duties and liabilities of the burial board shall be transferred to the council, and thereupon the burial board may cease to exist. And it is provided by the same act that the Burial Acts shall not hereafter be adopted in any urban parish without the approval of the urban council. The distinction between a burial ground provided under the Burial Acts and a cemetery provided under the act of 1879 is important in many ways, of which one only need be mentioned here—the expenses under the Burial Acts are paid out of the poor rate, while the expenses under the act of 1879 are paid in an urban district out of the general district rate, the incidence of which differs materially from that of the poor rate, as will be seen hereafter.

Highways. In an urban district the urban council have always had all the powers and duties of a surveyor of highways under the Highway Acts. But before 1894 a rural district council had no power or duty in respect of highways except in a few cases where, by virtue of a provision in the Highway Act 1878, the rural sanitary authority of a district coincident in area with a highway district were empowered to exercise all the powers of a a highway board. Except in these cases the highway authority in a parish was the surveyor of highways, elected annually by the inhabitants in vestry, or in a highway district consisting of a number of parishes united by order of quarter sessions, the highway board composed of waywardens representing the several parishes. By the Local Government Act 1894, there were transferred to the district council of every rural district all the powers, duties and liabilities of every highway authority, surveyor or highway board within their district, and the former highway authorities ceased to exist. The highway authority in every district, rural as well as urban, is therefore the district council. Of the chief duties of a district council with regard to highways, the first and most obvious is the duty to repair. This duty was formerly enforceable by indictment of the inhabitants of the parish, but it is not quite clear whether this procedure is applicable, now that the liability to repair is transferred to a council representing a wider area. Under the Highway Acts it is enforceable by summary proceedings before justices and by orders of the county council, but in either case, if the liability to repair is disputed, that question has to be decided on indictment preferred against the highway authority alleged to be in default. In a rural district any parish council may complain to the county council that the district council have made default in keeping any highway in repair, and the county council may thereupon transfer to themselves and execute the powers of the district council at the cost of the latter body, or they may make an order requiring the district council to perform their duty, or they may appoint some person to do so at the cost of the district council. It is important to observe, however, that an action does not lie against a district council in respect of the failure to repair a highway even at the suit of a person who has thereby been injured. The reason assigned for this doctrine is that the council as highway surveyor stand in the same position as the inhabitants of the parish, against whom such an action would not lie. The district council are, however, liable for any injury caused through negligence on the part of their officers or servants in carrying out the work of repair.

Streets. But while rural as well as urban district councils have the powers and duties of surveyors of highways, the provisions of the Public Health Acts relating to streets apply only in urban districts, except in so far as the Local Government Board may by order have conferred urban powers upon a rural district council. These provisions have now to be referred to. It may be convenient to state that the expression "street" is here used in a sense much wider than its ordinary meaning. It is defined by the act to include any highway and any public bridge (not being a county bridge), and any road, lane, footway, square, court, alley or passage, whether a thoroughfare or not. For certain purposes streets as thus defined are divided into two classes, viz. those which are and those which are not highways repairable by the inhabitants at large. But it has to be borne in mind that it is not every highway that is repairable by the inhabitants at large. Before the year 1836 as soon as a way was dedicated to public use and the public had by user signified their acceptance of it, it became without more notice repairable by the parish. Therefore every highway—whether carriage-way, driftway, bridleway or footway—which can be shown to have been in use before 1836, is presumably repairable by the inhabitants at large, the only exceptions being such highways as are repairable by private persons or corporate bodies *ratione clausurae, ratione tenurae,* or by prescription. But in the year 1836, when the Highway Act 1835 came into operation, the law was altered. It was possible, just as formerly, to dedicate a way to the use of the public, and it thereupon became a highway to all intents and purposes. But mere dedication did not make the way repairable by the public. That result was not to follow unless certain stringent requirements were fulfilled. When it is shown, therefore, that a highway has been dedicated after 1836, it is not repairable by the inhabitants at large unless it can be shown that these provisions have been complied with, or that it has been declared to be repairable under provisions of the Public Health Acts presently to be mentioned. (There was also power given to justices, by the Highway Act 1862, to declare a private road or occupation road in a highway district to be a public highway repairable by the parish; but this power does not appear to have been acted upon to any extent.)

All streets being highways repairable by the inhabitants at large within an urban district, are vested in and under the control of the urban council. After much litigation it has now been established that this provision does not give the council an absolute property in the soil of the street, but merely such a qualified property in the surfaces as enables them to exercise control. The urban council are required from time to time to cause all such streets to be made up and repaired as occasion may require, and they are empowered to raise, lower or alter the soil of the street, and to place and keep in repair fences and posts for the safety of foot-passengers. The other class of streets consists of those which are not highways repairable by the inhabitants at large. Under the Public Health Act 1875 such streets may be dealt with in manner following:—If any such street or part thereof is not sewered, levelled, paved, metalled, flagged, channelled, made good or lighted to the satisfaction of the council, the council may cause it to be made up at the expense of the owners of premises fronting the street in proportion to their several frontages. When all or any of the works aforesaid have been executed in the street, and the council are of opinion that the street ought to become a highway repairable by the inhabitants at large, they may by notice to be fixed up in the street declare it to be a highway repairable by the inhabitants at large, and the declaration will be effective unless, within one month after the notice has been put up, the majority of the owners in the street object thereto. An alternative procedure has been provided by the Private Street Works Act, which may be adopted by any urban council. One important point of difference is that under the latter act the council may resolve that the expenses shall be apportioned among the owners not merely according to frontage, but according to the greater or less degree of benefit to be derived by any premises from the works.

Where a house or building in a street is taken down to be rebuilt, the urban district council may prescribe the line to which it is to be rebuilt, paying compensation to the building owner for any damage which he may sustain consequent upon the requirement. Save to this extent, no power is given by the general law to a district council to prescribe a building line. But under an act of 1888 it is provided that it shall not be lawful in any urban district without the consent of the urban authority to erect or bring forward any house or building in any street or any part of such house or building beyond the front main wall of the house or building on either side thereof in the same street.

The control exercised by an urban district council over streets and buildings is to a very large extent exercised through by-laws which they are empowered to make for various purposes relating to the laying out and formation of new streets, the erection and construction of new buildings, the provision of sufficient air-space about buildings to secure a free circulation of air, and the provision of suitable and sufficient sanitary conveniences. The manner in which such by-laws are made and confirmed will be hereafter noticed. In general, the by-laws require plans of new streets to be submitted to the council, and they are required to approve or disapprove of these plans within a month. They cannot disapprove of a plan unless it contravenes the provisions of some statute or by-law; but if a person builds otherwise than according to an approved plan he does so at the risk of having his work pulled down or destroyed. Among the miscellaneous powers of an urban council with respect to streets may be mentioned the power to widen or improve, and certain powers incorporated from the Towns Improvement Clauses Act 1847, with respect to naming streets, numbering houses, improving the line of streets, removing obstructions, providing protection in respect of ruinous or dangerous buildings, and requiring precautions to be taken during the construction and repair of sewers, streets and houses. An urban council may also provide for the lighting of any street in their district, and may contract with any person or company for that purpose. If there is no company having statutory powers of supply within their district, they may themselves undertake the supply of gas, and they may purchase the undertaking of any gas company within their district.

Public parks.

An urban council may acquire and maintain lands for the purpose of being used as public walks or pleasure-grounds, and may support or contribute to the support of such walks or grounds if provided by any other person. They may also contribute to the cost of laying out, planting or improvement of lands provided for this purpose by any person, in their own district or outside that district, if it appears that the walks or grounds could eventually be used by the inhabitants of that district. An urban council may also provide public clocks or pay for the reasonable cost of repairing and maintaining any public clocks in the district, though not vested in them.

Markets and slaughter-houses.

Where an urban council are the council of a borough, and in other cases with the consent of the owners and ratepayers of the district, they may provide market accommodation for their district. They may not, however, establish any market so as to interfere with any market already established in the district under a franchise or charter. For purposes of markets certain provisions of the Markets and Fairs Clauses Act 1847 are incorporated with the Public Health Act. The only one of these that need be noticed is that which provides that after the market is opened for public use every person, other than a licensed hawker, who shall sell or expose for sale in any place within the district, except in his own dwelling-place or shop, any articles in respect of which tolls are authorized to be taken shall be liable to a penalty. The tolls which may be taken by an urban council must be approved by the Local Government Board; and any by-laws which they make for the regulation of the market must be confirmed by the same body. An urban council may also provide slaughter-houses and make by-laws with respect to the management and charges for the use of them. Where they do not provide slaughter-houses, all previously existing slaughter-houses have to be registered and new ones licensed; and no person may lawfully use a slaughter-house which is not either registered or licensed. Licences may be suspended by justices in the event of their being used contrary to the provisions of the act or of the by-laws, and on a second conviction the licence may be revoked. On a conviction of selling or exposing for sale, or having in his possession or on his premises unsound meat, the court may also revoke the licence.

Hackney carriages, &c.

Certain police regulations contained in the Town Police Clauses Act 1847 are by virtue of the Public Health Act 1875 in force in all urban districts. These relate to obstructions and nuisances in streets, fires, places of public resort, hackney carriages and public bathing. An urban council may also license proprietors, drivers and conductors of horses, ponies, mules or asses standing for hiring in the district in the same way as in the case of hackney carriages, and they may also license pleasure boats and vessels, and the boatmen or persons in charge thereof, and they may make by-laws for all these purposes.

Contracts, purchase of lands.

Every district council may enter into such contracts as are necessary for carrying into execution the various purposes of the Public Health Acts. A district council being a corporation, the general law applies in the case of a rural council that they must contract under their common seal, the exception to this rule including the doing of acts very frequently recurring or too insignificant to be worth the trouble of affixing the common seal. In the case of an urban council certain stringent regulations are laid down. A contract made by an urban council, whereof the value and amount exceed £50, must be under seal, and certain other formalities must be observed, some of which are imperative; for example, the taking of sureties from the contractor, and the making provision for penalties to be paid by him in case the terms of the contract are not observed. Every local authority may also, for purposes of the act, purchase or take on lease, sell or exchange, any lands. Such lands as are not required for the purpose for which they were purchased must, unless the Local Government Board otherwise direct, be sold. Powers of compulsory purchase of lands are also given under the Lands Clauses Acts, but before these can be put in operation certain conditions must be observed. The Local Government Board must make inquiry into the propriety of allowing the lands to be taken, and the power to acquire the lands compulsorily can only be conferred by means of a provisional order confirmed by parliament.

By-laws.

With regard to the by-laws which district councils may make for many purposes, the subjects of which have been already from time to time mentioned, it is only necessary to state that these require to be confirmed by the Local Government Board. Such confirmation does not, however, give validity to a by-law which cannot be justified by the provisions of the act, and many by-laws which have been so confirmed have been held to be invalid under the general law as being uncertain, unreasonable or repugnant to the law of the realm. For the guidance of local authorities, the Local Government Board have from time to time issued model series of by-laws dealing with the various subjects for which by-laws may be made, and these are for the most part followed throughout England and Wales.

Finance.

As a general rule, all the expenses of carrying into execution the Public Health Acts in an urban district fall upon a fund which is called the general district fund, and that fund is provided by means of a rate called the general district rate. To this there are some exceptions. First, in the case of boroughs where from the time of the first adoption of the Sanitary Acts these expenses have been paid out of the borough rate, the expenses continue to be so paid; and in an urban district which was formerly subject to an Improvement Act, the expenses may be payable out of the improvement rate authorized by that act. The general rule, however, prevails over by far the greater part of England and Wales. The general district rate is made and levied on the occupiers of all kinds of property for the time being assessable to any rate for the relief of the poor, subject to a few exceptions and conditions. Of these the first is that the owner may be rated instead of the occupier, at the option of the urban authority, where the value of the premises is under £10, where the premises are let to weekly or monthly tenants, or where the premises are let in separate apartments, or the rents become payable or are collected at any shorter period than quarterly. When the owner is rated he must be assessed upon a certain proportion only of the net annual value of the premises. The owners or occupiers of certain specified properties are assessed in respect of the same in the proportion of one-fourth part only of the net annual value thereof. These properties include tithes, tithe commutation rent charge, land used as arable, meadow or pasture ground only, or as woodlands, market gardens or nursery grounds, orchards, allotments, any land covered with water such as the reservoir of a waterworks company, or used only as a canal or towing-path of the same, or as a railway constructed under the powers of any Act of Parliament for public conveyance. The reason for these partial exemptions apparently is that sanitary arrangements are made chiefly for the benefit of houses and buildings, while the properties just enumerated do not receive the same amount of benefit. The only other point to be noticed in this connexion is that an urban council may divide their district into parts for all or any of the purposes of the act, rating each part separately for those purposes. The expenses of highways in an urban district fall as a rule upon the general district rate, but under certain conditions, which need not be here set out, a separate highway rate may have to be levied. The urban council have extensive powers of amending the rate, and the rate is collected in such manner as the urban authority may appoint.

The expenses of a rural district council are of two kinds. Of these the first is called general expenses, and it includes the expense of the establishment and officers of the council, of disinfection, providing of conveyance for infected persons, and the expenses of highways. These expenses are payable out of a common fund which is raised out of the poor rate of the several parishes in the district, according to the rateable value of each. Special expenses include the expenses of the construction and maintenance and cleansing of sewers, providing water-supply, and all other expenses incurred or payable in respect of a parish or contributory place within the district determined by order of the Local Government

Board to be special expenses. The expression "contributory place" means a place other than a parish chargeable with special expenses. For the most part it has reference only to what is called a special drainage district, that is to say, a district formed out of one or more parishes or parts of parishes for the purpose of the provision of a common water-supply, or scheme of sewerage, or the like, and in the event of such a district including part only of a parish, the remaining portion would, so far as the special expenses for which the district was created are concerned, be a separate contributory place. These special expenses are chargeable to each parish or contributory place, and they are defrayed by means of special sanitary rates, such rates being raised on all property assessed to the relief of the poor, but with the same exemptions of certain properties as have been mentioned under the head of general district rate in urban districts.

Borrowing powers.

District councils are empowered to borrow with the sanction of the Local Government Board, subject to certain restrictions and regulations. The money must be borrowed for permanent works, the expenses of which ought in the opinion of the Local Government Board to be spread over a term of years which must not exceed sixty. The sums borrowed must not exceed, with the outstanding loans, the amount of the assessable value for two years of the district for which the money is borrowed; and if the sum borrowed would, with the outstanding loans, exceed the assessable value for one year, the sanction of the Local Government Board may not be given except after local inquiry. The money may be repaid by equal instalments of principal, or of principal and interest, or by means of a sinking fund.

Audit.

Where the urban council are the council of a borough, their accounts as urban council are made up and audited in the same ineffective manner as has already been mentioned in the case of the accounts of the council under the Municipal Corporations Act, but each of the borough auditors receives remuneration for auditing the accounts of the council as urban district council. Where the urban council are not the council of a borough, the accounts are made up annually, and audited by the district auditor in the same effective manner as has already been mentioned in the case of the accounts of a county council. The accounts of a rural district council are made up half-yearly and are audited in the same way.

Proceedings against district councils.

The Public Authorities Protection Act 1893 was passed to repeal the numerous provisions contained in many acts of parliament, whereby, before legal proceedings could be taken against a public body, notice of action had to be given and the proceedings commenced within a certain limited time. The act applies to all public authorities, including, of course, district councils, and it provides in effect that where any action or legal proceeding is taken against a council for any act done in pursuance or execution, or intended execution, of an act of parliament, or of any public duty or authority, the action must be commenced within six months next after the act, neglect or default complained of, or in the case of a continuance of injury or damage, within six months next after the ceasing thereof. And it provides further that, in the event of the judgment of the court being given in favour of the council, the council shall be entitled to recover their costs taxed as between solicitor and client. Notice of action is abolished in every case.

Housing of the working classes.

Among other acts which are either incorporated with the Public Health Acts or have been passed subsequently to them, one of the most important is the Housing of the Working Classes Act 1890. It contains three distinct parts. Under the first an urban district council may, by means of a scheme, acquire, rearrange and reconstruct an area which has been proved to be insanitary. The scheme has to be confirmed by the Local Government Board, and carried out by means of a provisional order. The second part of the act deals with unhealthy dwelling-houses, and requires the urban district council to take steps for the closing of any dwelling-houses within their district which are unfit for human habitation. The third part of the act deals with what is called in the act working-class lodging-houses. But the expression is a little misleading, for it includes separate houses or cottages for the working classes, whether containing one or several tenements, and the expression "cottage" may include a garden of not more than half an acre, provided that the estimated annual value of such garden shall not exceed £3. This part of the act may be adopted by a rural district council, but an urban district council can carry it into execution without formal adoption. Land may be acquired for erecting lodging-houses as above defined, and these, when erected, may be managed and let by the council.

Baths and wash-houses.

The urban district council may adopt the provisions of the Baths and Washhouses Acts, and thereunder provide public baths, wash-houses, open bathing-places, covered swimming baths, which they may close in the winter months and use as gymnasia.

Tramways.

Under the Tramways Act 1870 the urban district council may obtain from the Board of Trade a provisional order authorizing the construction of tramways in their district by themselves. Any private persons, and any corporation or company may, with the consent of the council, obtain the like authority, but the Board of Trade have power in certain cases to dispense with the consent of the local authority. Where the order is obtained by a person or body other than the district council, the council may purchase the undertaking at the end of twenty-one years after the tramways have been constructed or at the expiration of every subsequent period of seven years, and the terms of purchase are that the person or company must sell the undertaking upon payment of the then value, exclusive of any allowance for past or future profits of the undertaking, or any compensation for compulsory sale or other consideration whatsoever of the tramway, and all lands, buildings, works, materials and plant suitable to and used for the purposes of the undertaking. It should be observed, however, that although the local authority may themselves construct, and may acquire from the original promoters a system of tramways, they may not themselves work them without special authority of the legislature, and must in general let the working of the undertaking to some person or company.

Bills in Parliament and legal proceedings.

Under the Borough Funds Act 1872 the urban district council may, if in their judgment it is expedient, promote or oppose any local and personal bill or bills in parliament, or may prosecute or defend any legal proceedings necessary for the promotion or protection of the interests of the district, and may charge the costs incurred in so doing to the rates under their control. The power to incur parliamentary costs, however, is subject to several important restrictions. The resolution to promote or oppose the bill must in the first instance have been carried by an absolute majority of the whole number of the council at a meeting convened by special notice, and afterwards confirmed by the like majority. The resolution must have been published in newspapers circulated in the district, and must have received the consent of the Local Government Board or of a secretary of state, if the matter is one within his jurisdiction; and further, the expenses must not be incurred unless the promotion or opposition has been assented to by the owners and ratepayers of the district assembled at a meeting convened for the purpose of considering the matter, and if necessary, signified by a poll. Moreover, the expenses must, before they can be charged to the rates, be examined and allowed by some person authorized by a secretary of state or the Local Government Board, as the case may be.

Under the Pawnbrokers Act 1872 the licences to pawnbrokers, which were formerly granted by justices, are now granted by district councils.

Adulteration.

Under the Sale of Food and Drugs Acts certain important duties devolve upon medical officers and inspectors of nuisances who are officers of district councils. But for the most part the acts do not impose upon district councils themselves any special powers or duties, although, as a matter of fact, prosecutions for offences are usually undertaken by the district councils, and the expenses of the execution of the acts are paid out of their funds. In quarter sessions boroughs, however, where the council have the duty of appointing a public analyst, they are under an obligation to put the acts in force from time to time, as occasion may arise. The acts themselves must be consulted for the procedure, beginning with the taking of samples and ending with the conviction of an offender.

Rivers pollution.

The powers and duties of a district council under the Rivers Pollution Prevention Act 1876 have been incidentally noticed when dealing with county councils, whose powers under the acts are precisely the same.

Electric lighting.

Under the Electric Lighting Acts the Board of Trade may license any district council to supply electricity, or may grant to them a provisional order for the same purpose. A similar licence or order may be granted to a private person or company to supply electricity within the district of a district council, but in that case the consent of the district council must be given, unless the Board of Trade, for special reasons, dispense with such consent. These licences are now rarely applied for or granted, and the provisions which were formerly contained in the provisional orders have now been consolidated by the Electric Lighting Clauses Act 1899, the effect of which will be to make provisional orders uniform for the future. It is now almost the exception, at least in urban districts, to find a district council which has not obtained a provisional order under these acts, and for the most part the undertakings of local authorities in the way of supplying electricity have been very prosperous.

Allotments.

Under the Allotment Acts district councils were empowered to provide allotments for the labouring population of their district, if they were satisfied that there was a demand for allotments, that these could not be obtained at a reasonable rent by voluntary arrangement, and that the land could be let at such a price as would not involve a loss to the council. The district council might acquire land, let it and regulate it, and they might provide common pasture. These powers were, by an act of 1907, transferred to parish councils.

Public libraries.

The urban district council execute the Public Libraries Acts for their district, and the rate for the expenses of the acts, which may not exceed 1d. in the £, is in a borough in the nature of a borough rate, and in any other urban district in the nature of a general district rate. Under the acts not only public libraries, but also public museums, schools for science, art galleries and schools for art, with the necessary buildings, furniture, fittings and conveniences, may be provided for the inhabitants of the district. Land may be acquired, and money borrowed, for the purposes of the acts.

A great number of other statutes confer powers or impose duties upon district councils, such as the acts relating to town gardens, agricultural gangs, fairs, petroleum, infant life protection, commons, open spaces, canal boats, factories and workshops, margarine, sale of horse-flesh and shop hours.

The parish and the parish council.

Before the passing of the Local Government Act 1894 there was really nothing in the form of local government for a parish. It is true that the inhabitants in vestry had certain powers. They could adopt various acts, which will be more particularly referred to hereafter, and they could appoint the persons who were to carry these acts into execution. They elected the churchwardens and overseers, the highway surveyor, if the parish was a separate unit for highway purposes, and the waywardens if it was included in a highway district. But there was nothing in the nature of a representative body exercising any powers of government in the parish regarded as a separate area. Under the act of 1894 this was changed. In every rural parish, that is to say, in every parish which is not included within an urban district, there is a parish meeting, which consists of the parochial electors of the parish. As already stated, these are the persons whose names are on the parliamentary and local government registers. If the parish has a population exceeding 300, a parish council must be elected. If it has a population of 100 or upwards, the county council are bound to make an order for the election of a parish council if the parish meeting so resolves. Where there is no parish council, as will be seen hereafter, the various powers conferred upon a council are exercised by the parish meeting itself. Two or more parishes may be grouped together under a common parish council by order of the county council if the parish meetings of each parish consent. An annual parish meeting in every rural parish must be held on the 25th day of March or within seven days before or after that date; and if there is no parish council, there must be at least one other parish meeting in the year. At the annual parish meeting the parish council, if there is one, is elected, and the members of the council, who originally held office for one year only, now, under a subsequent act, hold office for three years. Any person who is a parochial elector, or who has for twelve months preceding the election resided in the parish, or within 3 m. thereof, may be elected parish councillor, and the number of councillors is to be fixed from time to time by the county council, not being less than five nor more than fifteen. Women, whether married or single, are eligible.

The council are elected in manner provided by the rules of the Local Government Board. The rules now in force will be found in the *Statutory Rules and Orders*. They are very similar to those which are in force with reference to the elections of district councils, which have already been noticed. If a poll is demanded, it must be taken under the Ballot Act, as applied by the rules, and for all practical purposes it may be taken that the election proceeds in the same manner as that of a district council. The parish council elects a chairman annually. He may be one of their own number, or some other person qualified to be a parish councillor. The council is a body corporate, may hold land in mortmain, and can appoint committees for its own parish or jointly with any other parish council.

Powers to appoint overseers.

Among the powers conferred upon a parish council are those of appointing overseers and of appointing and revoking the appointment of assistant overseers. Churchwardens are no longer overseers, and the parish council may appoint as overseers a number of persons equal to the number formerly appointed as overseers and churchwardens. It may be useful to mention here that for purposes of the administration of the poor law, overseers no longer act, their duties in that respect having been superseded by the guardians. They remain, however, the rating authority so far as regards the poor rate and nearly all other rates, the exceptions being the general district rate in an urban district and the borough rate in a borough, made by the town council. They still have power to give relief to poor persons in case of sudden and urgent necessity, but their principal duty is that of rating authority, and they are bound to make out the lists for their parishes of jurors and electors. No payment is made to them. The office is compulsory, but certain persons are privileged from being elected to it. The assistant overseer, who was formerly nominated by the inhabitants and vestry and then formally appointed by justices, is now, as has been stated, appointed by the parish council. He holds office at pleasure, and receives such remuneration as the council fix, and he performs all the duties of an overseer, or such of them as may be prescribed by the terms of his appointment. There may be in a parish a collector of rates appointed by the guardians. In that event, an assistant overseer cannot be appointed to perform the duties of collector of rates, but, on the other hand, the parish council may invest the collector with any of the powers of an overseer. The parish council may appoint a clerk, who may be either one of their own number without payment, or the assistant overseer, rate collector or some other fit person, with remuneration.

Powers and duties of parish councils.

Among the duties transferred to parish councils may be mentioned the provision of parish books and of a vestry room or parochial office, parish chest, fire engine or fire escape, the holding or management of parish property, other than property relating to affairs of the church or held for an ecclesiastical charity, the holding or management of village greens or of allotments, the appointment of trustees of parochial charities other than ecclesiastical charities in certain cases, and certain limited powers with reference to the supply of water to the parish, the removal of nuisances, and the acquisition of rights of way which are beneficial to the inhabitants.

Lighting and Watching Act.

Baths and Wash-houses Acts.

Burial Acts.

Among the most important of the matters which concern a rural parish is the administration of what are commonly called the adoptive acts. These include the Lighting and Watching Act, the Baths and Washhouses Acts, the Burial Acts, the Public Improvement Act and the Public Libraries Acts. The Lighting and Watching Act was formerly adopted for a parish, or part of a parish, by the inhabitants in vestry, who elected lighting inspectors, of whom one-third went out of office in every year. The inspectors took the necessary steps for having the parish lighted (the provisions as to watching having been obsolete for many years), and the expenses of lighting were raised by the overseers upon an order issued to them by the inspectors. The owners and occupiers of houses, buildings and property, other than land, pay a rate in the £ three times greater than that at which the owners and occupiers of land are rated and pay for the purposes of the act. Now this act, like the other adoptive acts, can only be adopted by the parish meeting, and where adopted for part only of a parish, must be adopted by a parish meeting held for that part. After the adoption of the act it is carried into execution by the parish council, if there is one, and if not, by the parish meeting, and the expenses are raised in the same manner as heretofore. The Baths and Washhouses Acts have already been referred to in dealing with district councils, and it is sufficient to say that they are now adopted and administered in a rural parish in the manner pointed out with reference to the Lighting and Watching Act. The same may be said of the Burial Acts, but these are sufficiently important to require special notice. These acts contain provisions whereby burials may be prohibited in urban districts, and churchyards or burial grounds already existing may be closed when full. Formerly, when the acts had been adopted by the vestry, it was necessary to appoint a burial board to carry the acts into execution and provide and manage burial grounds. Now, in a rural parish which is coextensive with an area for which the acts have been adopted, the burial board is abolished and the acts are administered by the parish council; and the acts cannot be adopted in a rural parish save by the parish meeting. If the area under a burial board in 1894 was partly in a rural parish and partly in an urban district, the burial board was superseded, and the powers of the board are exercised by a joint committee appointed partly by the urban district council and partly by the parish council, or parish meeting, as the case may be. In a rural parish where there is no parish council, though the acts are adopted by the parish meeting, it is still necessary to elect the burial board, and that board will be elected by the parish meeting. The distinction between a burial ground under the Burial Acts and a cemetery provided under the Public Health Acts has already been noticed. A burial ground, properly so called, has to be divided into consecrated and unconsecrated portions, and the former really takes the place of the parish churchyard; and the incumbent of the parish church, the clerk, and the sexton continue to receive the same fees upon burials in the consecrated portion as they would have done in the parish churchyard. It has been mentioned that a portion of the burial ground must be left unconsecrated. But this is subject to one important exception, that the parish meeting may unanimously resolve that the whole of the burial ground shall be consecrated. In that case, however, the parish council may, within ten years thereafter, determine that a separate unconsecrated burial ground shall also be provided for the parish. The expenses of the execution of the Burial Acts are provided by the overseers out of the poor rate upon the certificate of the body entrusted with the execution of them. In the event of the acts being adopted for a portion only of a rural parish, the burial board, or the parish meeting, may by resolution transfer all the powers of the board to the parish council.

Public Improvement Act.

The Public Improvement Act, when adopted, enables a parish council to purchase or lease, or accept gifts of land for the purpose of forming public walks, exercise or play grounds, and to provide for the expense by means of a parish improvement rate. Before any such rate is imposed, however, a sum in amount not less than at least half of the estimated cost of the proposed improvement must have been raised by private subscription or donation, and the rate must not exceed sixpence in the £.

Public Libraries Acts.

The Public Libraries Acts enable the authority adopting them to provide public libraries, museums, schools for science, art galleries and schools for art. The expenses in a rural parish are defrayed by means of a rate raised with, and as part of, the poor rate, with a qualification to the effect that agricultural land, market gardens and nursery grounds are to be assessed to the rate at one-third only of their rateable value.

Finance: expenses of parish council.

The expenses of a parish council may not, without the consent of a parish meeting, exceed the amount of a rate of threepence in the £ for the financial year; but with the consent of the parish meeting the limit may be increased to sixpence, exclusive of expenses under the adoptive acts. If it is necessary to borrow, the consent of the parish meeting and of the county council must be obtained. The expenses are payable out of the poor rate by the overseers on the precept of the parish council.

One of the most important powers conferred upon a parish council is that which enables them to prevent stoppage or diversion of any public right of way without their consent and without the approval of the parish meeting. The council may also complain to the county council that the district council have failed to sewer their parish or provide a proper water-supply, or generally to enforce the provisions of the Burial Acts; and upon such complaint, if ascertained to be well founded, the county council may transfer to themselves the powers and duties of the district council, or may appoint a competent person to perform such powers and duties. In a parish which is not sufficiently large to have a parish council, most of the powers and duties conferred or imposed on the parish council are exercised by the parish meeting. It may be convenient here to add that where, under the Local Government Act 1894, the powers of a parish council are not already possessed by an urban district council, the Local Government Board may by order confer such powers on the urban council. This has been done almost universally, as far as regards the power to appoint overseers and assistant overseers, and in many cases urban councils have also obtained powers to appoint trustees of parochial charities.

General observations.

The foregoing is a sketch of the scheme of local government carried out in England and Wales. No attempt has been made to deal with poor law (*q.v.*) or education (*q.v.*). The local administration of justice devolving upon the justices in quarter or petty sessions is hardly a matter of local government, although in one important respect, that, namely, of the licensing of premises for the sale of intoxicating liquors, it may be thought that the duties of justices fall within the scope of local government. It will be seen that the scheme, as at present existing, has for its object the simplification of local government by the abolition of unnecessary independent authorities, and that this has been carried out almost completely, the principal exception being that in some cases burial boards still exist which have not been superseded either by urban district councils or by parish councils or parish meetings. There are also some matters of local administration arising under what are called commissions of sewers. These exist for the purpose of regulating drainage, and providing defence against water in fen lands or lands subject to floods from rivers or tidal waters. The commissioners derive their authority from the Sewers Commission Acts, which date from the time of Henry VIII., from the Land Drainage Act 1861, and from various local acts. It is unnecessary, however, to consider in any detail the powers exercised by commissioners of sewers in the few areas under their control.

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Early in the 20th century the *Victoria History of the Counties of England* (dedicated to Queen Victoria) began to appear; its volumes deal with each county from every aspect—natural history, prehistoric and historic antiquities, ethnography, history, economic conditions, topography and sport being dealt with by authorities in all branches.

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ENGLAND, THE CHURCH OF. The Church of England claims to be a branch of the Catholic and Apostolic Church; it is episcopal in its essence and administration, and is established by law in that the state recognizes it as the national church of the English people, an integral part of the constitution of the realm. It existed, in name and in fact, as the church of the English people centuries before that people became a united nation, and, in spite of changes in doctrine and ritual, it remains the same church that was planted in England at the end of the 6th century. From it the various tribes which had conquered the land received a bond of union, and in it they beheld a pattern of a single organized government administered by local officers, to which they gradually attained in their secular polity. In England, then, the state is in a sense the child of the church. The doctrines of the English Church may be gathered from its Book of Common Prayer (see PRAYER, BOOK OF COMMON) as finally revised in 1661, with the form of ordaining and consecrating bishops, priests and deacons, with the exception of the services for certain days which were abrogated in 1859; from the XXXIX Articles (see CREEDS), published with royal authority in 1571; and from the First and Second Books of Homilies of 1549 and 1562 respectively, which are declared in Article XXXV. to contain sound doctrine.

Christianity in Roman Britain.

The British church.

Precursors.—Christianity reached Britain during the 3rd century, and perhaps earlier, probably from Gaul. An early tradition records the death of a martyr Alban at Verulamium, the present St Albans. A fully grown British Church existed in the 4th century: bishops of London, York and Lincoln attended the council of Arles in 314; the church assented to the council of Nicaea in 325, and some of its bishops were present at the council of Rimini in 359. The church held the Catholic faith. Britons made pilgrimages, to Rome and to Palestine, and some joined the monks who gathered round St Martin, bishop of Tours. Among these was Ninian, who preached to the southern Picts, and about 400 built a church of stone on Wigton Bay; its whiteness struck the people and their name for it is commemorated in the modern name Whithorn. From northern Britain, St Patrick (see PATRICK, ST) went to accomplish his work as the apostle of Ireland. Early in the 5th century Britain was infected by the heresy of Pelagius, himself a Briton by birth, but in 429 Germanus, bishop of Auxerre, and Lupus, bishop of Troyes, recalled the church to orthodoxy and, according to tradition, led their converts to victory, the "Hallelujah victory," over the Picts and Scots. When the Britons were hard pressed by Saxon invaders large bodies of them found shelter in western Armorica, in a lesser Britain, which gave its name to Brittany. A British Church was founded there, and bishops, scholars and recluses of either Britain seem constantly to have visited the other. The Saxon invasion cut off Britain from communication with Rome; and the British Church having no share in the progressive life of the Roman Church, differences gradually arose between them. The organization of the British Church was monastic, its bishops being members, usually abbots, of monasteries, and not strictly diocesan, for the monasteries to which the clergy were attached had a tribal character. The monastic communities were large, Bangor numbered 2000 monks. From Gildas, a British monk, who wrote about 550, we gather that the bishops were rich and powerful and claimed apostolical succession; that though governed by synods the church lacked discipline; that simony was rife, and that bishops and clergy were neglectful. He evidently draws too dark a picture, for religious activity was not extinct. Gildas himself and others preached in Ireland, and from them the Scots, the dominant people of Ireland, received a ritual. The organization of the Scotic Church in Ireland was similar to that of the British Church. Its monastic settlements or schools were many and large, and were the abodes of learning. Bishops dwelt in them and were reverenced for their office, but each was subject to the direction of the abbot and convent. In 565 (?) St Columba, the founder and head of several Scotic monasteries, left Ireland and founded a monastery in Hii or Iona, which afforded gospel teaching to the Scots of Dalriada and the northern Picts, and later did a great work in evangelizing many of the Teutonic conquerors of Britain. By 602 the British Church, in common with the Irish Scots, followed practices which differed from the Roman use as it then was; it kept Easter at a different date; its clergy wore a different tonsure, and there was some defect in its baptismal rite. The conquerors of Britain—Saxons, Angles and Jutes—were heathens; the Britons gradually retreated before them to Wales, and to western and northern districts, or dwelt among them either as slaves or as outlaws hiding in swamps and forests, and they made no attempts to evangelize the conquering race.

Foundation of the English church.

About 587 a Roman abbot, Gregory, afterwards Pope Gregory the Great, is said to have seen some English boys exposed for sale in Rome and asked of what people they were, of what kingdom and who was their king. They were "Angli," he was told, of Deira, the modern Yorkshire, and their king was Ælle. "Not 'Angli,'" said he, struck with the beauty of the fair-haired boys, "but 'angeli' (angels), fleeing from wrath (*de ira*), and Ælle's people must sing Alleluia." He wished himself to go as a missionary to the English, but was prevented. After he became pope he sent a mission to England headed by Augustine. The way was prepared, for Æthelberht, king of Kent, had married a Christian, a Frankish princess Berhta, and allowed her to worship the true God. She brought with her a bishop who ministered to her in St Martin's church outside Canterbury, but evidently made no effort to spread the faith. Augustine and his band landed probably at Ebbsfleet in 597. They were well received by Æthelberht, who was converted and baptized. On the 16th of November Augustine was consecrated by the archbishop of Arles to be the archbishop of the English, and by Christmas had baptized 10,000 Kentish men. Thus the fathers of the English Church were Pope Gregory and St Augustine. Augustine restored a church of the Roman times at Canterbury to be the church of his see. The mission was reinforced from Rome; and Gregory sent directions for the rule of the infant church. There were to be two archbishops, at London and York; London, however, was not fully Christianized for some years, and the primatial see remained at Canterbury. Augustine held two conferences with British bishops; he bade them give up their peculiar usages, conform to the Roman ritual, and join him in evangelizing the English. His haughtiness is said to have offended them; they refused, and the English Church owes nothing to its British predecessor. The mission prospered, and bishops were consecrated for Rochester, and for London for the East Saxons. After Augustine and Æthelberht died a short religious reaction took place in Kent, and the East Saxons apostatized. In 627 Edwin, king of Northumbria, who had married a daughter of Æthelberht, was converted and baptized with his nobles by Paulinus, who became the first bishop of York. As Edwin's kingdom extended from the Humber to the Forth and included the Trent valley, while he exercised superiority over all the other English kingdoms, except Kent, his conversion promised well for the church, but he was slain and his kingdom overrun by Penda, the heathen king of Mercia, the central part of England. Penda's victories endangered the cause of Christianity. The Roman mission was dying out. Kent and East Anglia, which was evangelized by Felix, a Burgundian bishop sent from Canterbury, were settled in the faith. Though Bernicia, the northern part of Northumbria, was little affected by the gospel, and after Edwin's death heathenism became dominant in his kingdom, Christianity did not die out in Northumbria. The East Saxons had heard the gospel, and in 634 the conversion of the West Saxons was begun by Birinus, an Italian missionary. Central England and the South Saxons, however, were wholly untouched by Christianity.

The work of the Romans was taken up by Scotic missionaries. Oswald, under whom the Northumbrian power revived, had lived as an exile among the Scots, and asked them for a bishop to teach his people. Aidan was sent to him by the monks of Iona in 635, and fixed his see in Lindisfarne, or Holy Island, where he founded a monastery. Saintly, zealous and supported by Oswald's influence, he brought Northumbria generally to accept the gospel. The conversion of the Middle Angles and Mercians, and the reconversion of the East Saxons, were also achieved by Scots or by disciples of the Scotic mission. After Aidan's death in 651 the differences between the Roman and Scotic usages, and specially that concerning the date of Easter, led to bitter feelings, were inconvenient in practice, and must have hindered the church in its warfare against heathenism. Oswio, who reigned over both the Northumbrian kingdoms, was, like his brother Oswald, a disciple of the Scots, his son and his queen, the daughter of Edwin, held to the Roman usages, and these usages were maintained by Wilfrid, who on his return from Rome in 658 was appointed abbot of Ripon. By Oswio's command a conference between the two parties was held at the present Whitby in 664. Oswio decided in favour of the Roman usages. This was the end of the Scotic mission. The Scots left Lindisfarne, and their disciples generally adopted the Roman usages. The Scots were admirable missionaries, holy and self-devoted, and building partly on Roman foundations and elsewhere breaking new ground, they and their English disciples, as Ceadda (St Chad), bishop of the Mercians, and Cuthbert, bishop of Lindisfarne, who were by no means inferior to their teachers, almost completed the conversion of the country. But they practised an excessive asceticism and were apt to abandon their work in order to live as hermits. Great as were the benefits which the English derived from their teaching, its cessation was not altogether a loss, for the church was passing beyond the stage of mission teaching and needed organization, and that it could not have received from the Scots.

Organization of the English Church.

Its organization like its foundation came from Rome. An archbishop-designate who was sent to Rome for consecration having died there, Pope Vitalian in 668 consecrated Theodore of Tarsus as archbishop of Canterbury. The Scots had no diocesan system, and the English bishoprics were vast in extent, followed the lines of the kingdoms and varied with their fortunes. The church had no system of government nor means of legislation. Theodore united it in obedience to himself, instituted national synods and subdivided the over-large bishoprics. At his death, in 690, the English dominions were divided into fourteen dioceses. Wilfrid, who had become bishop of Northumbria, resisted the division of his diocese and appealed to the pope. He was imprisoned by the Northumbrian king and was exiled. While in exile he converted the South Saxons, and their conversion led to that of the Isle of Wight, then subject to them, in 686, which completed the evangelization of the English. After long strife Wilfrid, who was supported by Rome, regained a part of his former diocese. Theodore also gave the church learning by establishing a school at Canterbury, where many gained knowledge of the Scriptures, of Latin and Greek, and other religious and secular subjects. In the north learning was promoted by Benedict Biscop in the sister monasteries which he founded at Wearmouth and Jarrow. There Bede (*q.v.*) received the learning which he imparted to others. In the year of Bede's death, 735, one of his disciples, Ecgbert, bishop of York, became the first archbishop of York, Gregory III. giving him the *pallium*, a vestment which conferred archiepiscopal authority. He established a school or university at York, to which scholars came from the continent. His work as a teacher was carried on by Alcuin, who later brought learning to the court and Frankish dominions of Charlemagne. The infant church, following the example of the Irish Scots, showed much missionary zeal, and English missionaries founded an organized church in Frisia and laboured on the lower Rhine; two who attempted to preach in the old Saxon land were martyred. Most famous of all, Winfrid, or St Boniface, the apostle of Germany, preached to the Frisians, Hessians and Thuringians, founded bishoprics and monasteries, became the first archbishop of Mainz, and in 754 was martyred in Frisia. He had many English helpers, some became bishops, and some were ladies, as Thecla, abbess of Kitzingen, and Lioba, abbess of Bischofsheim. After his death, Willehad laboured in Frisia, and later, at the bidding of Charlemagne, among the Saxons, and became the first bishop of Bremen. Religion, learning, arts, such as transcription and illumination, flourished in English monasteries. Yet heathen customs and beliefs lingered on among the people, and in Bede's time there were many pseudo-monasteries where men and women made monasticism a cloak for idleness and vice. In the latter part of the 8th century Mercia became the predominant kingdom under Offa, and he determined to have an archbishop of his own. By his contrivance two legates from Adrian I. held a council at Chelsea in 787 in which Lichfield was declared an archbishopric, and seven of the twelve suffragan bishoprics of Canterbury were apportioned to it. In 802, however, Leo III. restored Canterbury to its rights and the Lichfield archbishopric was abolished.

The rise of Wessex to power seems to have been aided by a good understanding between Ecgbert and the church, and his successors employed bishops as their ministers. Æthelred, who was specially under ecclesiastical influence, went on a pilgrimage to Rome, and before his departure made large grants for pious uses. His donation, though not the origin of tithes in England, illustrates the idea of the sacredness of the tenth of income on which laws enforcing the payment of tithes were founded. His pilgrimage was probably undertaken in the hope of averting the attacks of the pagan Danes. Their invasions fell heavily on the church; priests were slaughtered and churches sacked and burnt. Learning disappeared in Northumbria, and things were little better in the south. Bishops fought and fell in battle, the clergy lived as laymen, the monasteries were held by married canons, heathen superstitions and immorality prevailed among the laity. Besides bringing the Danish settlers in East Anglia to profess Christianity in 878, Alfred set himself to improve the religious and intellectual condition of his own people (see ALFRED). The gradual reconquest of middle and northern England by his successors was accompanied by the conversion of the Danish population. A revival of religion was effected by churchmen inspired by the reformed monasticism of France and Flanders, by Odo, archbishop of Canterbury, Oswald, archbishop of York, and Dunstan (see DUNSTAN), who introduced from abroad the strict life of the new Benedictinism. King Edgar promoted the monastic reform, and by his authority Bishop Æthelwold of Winchester turned canons out of the monasteries and put monks in their place. Dunstan sought to reform the church by ecclesiastical and secular legislation, forbidding immorality among laymen, insisting on the duties of the clergy, and compelling the payment of tithes and other church dues. After Edgar's death an anti-monastic movement, chiefly in Mercia, nearly ended in civil war. In this strife, which was connected with politics, the victory on the whole lay with the monks' party, and in many cathedral churches the chapters remained monastic. The renewed energy of the church was manifested by councils, canonical legislation and books of sermons. In the homilies of Abbot Ælfric, written for Archbishop Sigeric, stress is laid on the purely spiritual presence of Christ in the Eucharist, but his words do not indicate, as some have believed, that the English Church was not in accord with Rome. The ecclesiastical revival was short-lived. Renewed Danish invasions, in the course of which Archbishop Alphege was martyred in 1012, and a decline in national character, injuriously affected the church and, though in the reign of Canute it was outwardly prosperous, spirituality and learning decreased. Bishoprics and abbacies were rewards of service to the king, the bishops were worldly-minded, plurality was frequent, and simony not unknown. Edward the Confessor promoted foreign ecclesiastics; the connexion with Rome was strengthened, and in 1062 the first legates since the days of Offa were sent to England by Alexander II. A political conflict led to the banishment of Robert, the Norman archbishop of Canterbury. An Englishman Stigand received his see, but was excommunicated at Rome, and was regarded even in England as schismatical. When William of Normandy planned his invasion of England, Alexander II., by the advice of Hildebrand, afterwards Gregory VII., moved doubtless by this schism and by the desire to bring the English Church under the influence of the Cluniac revival and into closer relation with Rome, gave the duke a consecrated banner, and the Norman invasion had something of the character of a holy war.

Later Anglo-Saxon times.

Norman times.

Before the Norman Conquest the church had relapsed into deadness: English bishops were political partisans, the clergy were married, and discipline and asceticism, then the recognized condition of holiness, were extinct. The Conqueror's relations with Rome ensured a reform; for the papacy was instinct with the Cluniac spirit. In 1070 papal legates were received and held a council by which Stigand was deposed. Lanfranc, abbot of Bec, was appointed archbishop of Canterbury and worked harmoniously with the king in bringing the English Church up to the level of the church in Normandy. Many native bishops and abbots were deposed, and the Norman prelates who succeeded them were generally of good character, strict disciplinarians, and men of grander ideas. A council of 1075 decreed the removal of bishops' sees from villages to towns, as on the continent; the see of Sherborne, for example, was removed to Old Sarum, and that of Selsey to Chichester, and many churches statelier than of old were built in the Norman style which the Confessor had already adopted for his church at Westminster. In another council priests and deacons were thenceforward forbidden to marry. William and Lanfranc also worked on Hildebrandine lines in separating ecclesiastical from civil administration. Ecclesiastical affairs were regulated in church councils held at the same time as the king's councils. Bishops and archdeacons were no longer to exercise their spiritual jurisdiction in secular courts, as had been the custom, but in ecclesiastical courts and according to canon law. The king, however, ruled church as well as state; Gregory granted him control over episcopal elections, he invested bishops with the crozier and they held their temporalities of him, and he allowed no councils to meet and no business to be done without his licence. Gregory claimed homage from him; but while the king promised the payment of Peter's pence and such obedience as his English predecessors had rendered, he refused homage; he allowed no papal letters to enter the kingdom without his leave, and when an anti-pope was set up, he and Lanfranc treated the question as to which pope should be acknowledged in England as one to be decided by the crown. The Conquest brought the church into closer connexion with Rome and gave it a share in the religious and intellectual life of the continent; it stimulated and purified English monasticism, and it led to the organization of the church as a body with legislative and administrative powers distinct from those of the state. The relations established by the Conqueror between the crown, the church and the pope, its head and supreme judge, worked well as long as the king and the primate were agreed, but were so complex that trouble necessarily arose when they disagreed. William Rufus tried to feudalize the church, to bring its officers and lands under feudal law; he kept bishoprics and abbacies vacant and confiscated their revenues. He quarrelled with Anselm (*q.v.*) who succeeded Lanfranc. Anselm while at Rome heard the investiture of prelates by laymen denounced, and he maintained the papal decree against Henry I. Bishops were vassals of the king, holding lands of him, as well as officers of the church. How were they to be appointed? Who should invest them with the symbols of their office? To whom was their homage due? (see INVESTITURE). These questions which agitated western Europe were settled as regards England by a compromise: Henry surrendered investiture and kept the right to homage. The substantial gain lay with the crown, for, while elections were theoretically free, the king retained his power over them. Though Henry in some degree checked the exercise of papal authority in England, appeals to Rome without his sanction were frequent towards the end of his reign. Stephen obtained the recognition of his title from Innocent II., and was upheld by the church until he violently attacked three bishops who had been Henry's ministers. The clergy then transferred their allegiance to Matilda. His later quarrel with the papacy, then under the influence of St Bernard, added to his embarrassments and strengthened the Angevin cause.

The Angevin kings.

During Stephen's reign the church grew more powerful than was for the good either of the state or itself. Its courts encroached on the sphere of the lay courts, and further claimed exclusive criminal jurisdiction over all clerks whether in holy or minor orders, with the result that criminous clerks, though degraded by a spiritual court, escaped temporal punishment. Henry II., finding ecclesiastical privileges an obstacle to administrative reform, demanded that the bishops should agree to observe the ancient customs of the realm. These customs were, he asserted, expressed in certain constitutions to which he required their assent at a council at Clarendon in 1164. In spirit they generally maintained the rights of the crown as they existed under the Conqueror. One provided that clerks convicted of temporal crime in a spiritual court and degraded should be sentenced by a lay court and punished as laymen. Archbishop Becket (see BECKET) agreed, repented and refused his assent. The king tried to ruin him by unjust demands; he appealed to Rome and fled to France. A long quarrel ensued, and in 1170 Henry was forced to be reconciled to Becket. The archbishop's murder consequent on the king's hasty words shocked Christendom, and Henry did penance publicly. By agreement with the pope he renounced the Constitutions, but the encroachments of the church courts were slightly checked, and the king's decisive influence on episcopal elections and some other advantages were secured. The church in Wales had become one with the English Church by the voluntary submission of its bishops to the see of Canterbury in 1192 and later. The Irish Church remained distinct, though the conquest of Ireland, which was sanctioned by the English pope Adrian IV. (Nicholas Breakspear), brought it into the same relations with the crown as the English Church and into conformity with it. Under the guidance of ecclesiastics employed as royal ministers, the church supported the crown until, in 1206, Innocent III. refused to confirm the election of a bishop nominated by King John to Canterbury; and representatives of the monks of Christ Church, in whom lay the right of election, being at his court, the pope bade them elect Stephen Langton whom he consecrated as archbishop. John refused to receive Langton and seized the estates of Christ Church. Innocent laid England under an interdict in 1208; the king confiscated the property of the clergy, banished bishops and kept sees vacant. Papal envoys excommunicated him and declared him deposed in 1211. Surrounded by enemies, he made his peace with the pope in 1213, swore fealty to him before his envoy, acknowledged that he held his kingdom of the Roman see, and promised a yearly tribute for England and Ireland. Finally he surrendered his crown to a legate and received it back from him. The banished clergy returned and an agreement was made as to their losses. Langton guided the barons in their demands on the king which were expressed in Magna Carta. The first clause provided, as charters of Henry I. and Stephen had already provided, that the English Church should be "free," adding that it should have freedom of election, which John had promised in 1214. As John's suzerain, Innocent annulled the charter, suspended Langton, and excommunicated the barons in arms against the king. On John's death, Gualo, legate of Honorius III., with the help of the earl marshal, secured the throne for Henry III., and he and his successor Pandulf, as representatives of the young king's suzerain, largely directed English affairs until 1221, when Pandulf's departure restored Langton to his rightful position as head in England of the church. Reforms in discipline and clerical work were inculcated by provincial legislation, and two legates, Otho in 1237 and Ottoboni in 1268, promulgated in councils constitutions which were a fundamental part of the canon law in England. Religious life was quickened by the coming of the friars (see FRIARS). Parochial organization was strengthened by the institution of vicars in benefices held by religious bodies, which was regulated and enforced by the bishops. It was a time of intellectual activity, in character rather cosmopolitan than national. English clerks studied philosophy and theology at Paris or law at Bologna; some remained abroad and were famous as scholars, others like Archbishops Langton, and Edmund Rich, and Bishop Grosseteste returned to be rulers of the church, and others like Roger Bacon to continue their studies in England. The schools of Oxford, however, had already attained repute, and Cambridge began to be known as a place of study. The spirit of the age found expression in art, and English Gothic architecture, though originally, like the learning of the time, imported from France, took a line of its own and reached its climax at this period. Henry's gratitude for the benefits which in his early years he received from Rome was shown later in subservience to papal demands. Gregory IX., and still more Innocent IV., sorely in need of money to prosecute their struggle with the imperial house, laid grievous taxes on the English clergy, supported the king in making heavy demands upon them, and violated the rights of patrons by appointing to benefices by "provisions" often in favour of foreigners. Churchmen, and prominently Grosseteste, the learned and holy bishop of Lincoln, while recognizing the pope as the divinely appointed source of all ecclesiastical jurisdiction, were driven to resist papal orders which they held to be contrary to apostolic precepts. Their remonstrances were seldom effectual, and the state of the national church was noted by the Provisions of Oxford in 1258 as part of the general misgovernment which the baronial opposition sought to remedy. The alliance between the crown and the papacy in this reign diminished the liberties of the church.

13th and 14th centuries.

Edward I., who was a strong king, checked an attempt to magnify the spiritual authority by the writ *Circumspecte agatis*, which defined the sphere of the ecclesiastical courts, put a restraint on religious endowments by the Statute of Mortmain, and desiring that every estate in the realm should have a share in public burdens and counsels, caused the beneficed clergy to be summoned to send proctors to parliament. The clergy preferred to make their grants in their own convocations, and so lost the position offered to them. For some years clerical taxation by the crown was carried on with the good-will of the papacy; it was not oppressive for unbeneficed clergy and incomes below ten marks were exempt, and in theory the clergy were celibate. Papal demands, however, were additional burdens. In 1296 Boniface VIII., by his bull *Clericis laicos*, forbade the clergy to grant money to lay princes, and Edward's request for a clerical subsidy was in 1297 refused by convocation led by Archbishop Winchelsea. The king thereupon outlawed the clergy. The northern province yielded, the southern held out longer; but finally the clergy made their peace severally, each paying his share, and the royal victory was complete. Winchelsea joined the baronial opposition which forced Edward to grant the "Confirmation of the Charters." Edward procured his disgrace from Clement V., and in return allowed Clement to exact so much from the church that the doings of the papal agents provoked an indignant remonstrance from parliament in 1307. With that exception the king's dealings with the church were statesmanlike. He employed clerical ministers and paid them by church preferments, but his nominations to bishoprics did not always receive papal confirmation which had become recognized as essential. His weak son Edward II. yielded readily to papal demands. The majority of the bishops of the reign, and specially those engaged in politics, were unworthy men; religion was at a low ebb; plurality and non-residence were common. By the constitution *Execrabilis* John XXII. ordered that all cures held in plurality save one should be vacated, and, which was not so well, "reserved" all benefices so vacated for his own appointment. As the residence of the popes at Avignon from 1308 to 1377 brought them under French influence, Englishmen during the war with France were specially displeased that large sums should be drawn from the kingdom for them and that they should exercise patronage there. In the reign of Edward III. the popes, though appointing to bishoprics by provision, did not give them to foreigners, but they appointed foreigners, enemies of England, to lesser preferments, deaneries and prebends. In 1351 the Statute of Provisors declared provisions unlawful. Capitular elections, however, remained mere forms; the king nominated, and the popes provided, and took advantage of their claim to appoint to sees vacant by translation. Papal interference in suits concerning temporalities was checked by a law of 1353 (the first statute of *Praemunire*), which made punishable by outlawry and forfeiture the carrying before a foreign tribunal of causes cognizable by English courts. This measure was extended in 1365, and in 1393 by the great statute of *Praemunire*. Indignant at the law of 1365, Urban V. demanded payment of the tribute promised by John, which was then thirty-three years in arrear, but parliament repudiated the claim. The Black Death disorganized the church by thinning the ranks of the clergy, who did their duty manfully during the plague. In the diocese of Norwich, for example, 800 parishes lost their incumbents in 1349, 83 of them twice over (Jessopp). Large though insufficient numbers were instituted to benefices and unfit persons received holy orders. The value of livings decreased and many lay vacant. Some incumbents deserted their parishes to take stipendiary work in towns or secular employments, and unbeneficed clergy demanded higher stipends. Greediness infected the church in common with society at large. Yet Chaucer's ideal parish priest must have represented a familiar type, so that we may believe that much good work was here and there unobtrusively done by the clergy. Prominent among abuses were the sale of pardons, and the extortions of the ecclesiastical courts; their decrees were enforced by excommunication, and on a writ issued to the sheriff an excommunicated person would be imprisoned until he satisfied the demands of the church. The state needed money and attacks were made in parliament on the wealth of the church. Already, in 1340, Edward III., who quarrelled with Archbishop Stratford on political grounds, had appointed lay ministers, and in 1371 William of Wykeham, bishop of Winchester, and other clerical ministers were turned out of office and succeeded by laymen. A political crisis in 1376 was followed by a struggle between the bishops and John of Gaunt, duke of Lancaster, the head of the anticlerical party, who allied himself with John Wycliffe (*q.v.*). He was unpopular, and when the bishops cited Wycliffe before them in St Paul's, the duke's conduct provoked a riot and the proceedings ended abruptly. Wycliffe held that the church was corrupted by wealth; that only those in grace had a right to God's gifts, and that temporal power belonged only to laymen and not to popes nor priests. Later he attacked the papacy itself, which in 1378 was distracted by the great schism; by 1380 he condemned pilgrimages, secret confession and masses for the dead. While holding the presence of Christ in the Eucharist, he denied a change of substance in the elements, arguing that accidents or qualities, such as form and colour, could not exist without substance. He taught that Holy Scripture was the only source of religious truth, to the exclusion of church authority and tradition, and he and his followers made the first complete English version of the Bible. His opinions were spread by the poor priests whom he sent out to preach and by his English tracts. That his teaching had any direct effect on the insurrection of 1381, though commonly believed, appears to be an unfounded idea; many priests were concerned in the rising, and specially the mendicant orders, Wycliffe's bitter enemies, but the motives of the insurrection were essentially secular (Oman, *The Great Revolt of 1381*). The reaction which followed extended to religion, and Wycliffe's doctrines were condemned by a church council in 1382. Nevertheless he died in peace. He had many disciples, especially in Oxford and in industrial centres. The Lollards, as his followers were called, had supporters in parliament and among people of high rank in the court of Richard II., and the king's marriage to Anne of Bohemia brought about the importation of Wycliffe's writings into Bohemia, where they had a strong influence on the religious movement led by Hus. At first the bishops were not inclined to persecute, and the earlier Lollards mostly recanted under pressure, but their number increased.

The 15th century.

With the accession of the Lancastrian house the crown allied itself with the church, and the bishops adopted a repressive policy towards the Lollards. By the canon law obstinate heretics were to be burnt by the secular power, and though England had hitherto been almost free from heresy, one or two burnings had taken place in accordance with that law. In 1401 a statute, *De heretico comburendo*, ordered that heretics convicted in a spiritual court should be committed to the secular arm and publicly burned, and, while this statute was pending, one Sawtre was burned as a relapsed heretic. Henry V. was zealous for orthodoxy and the persecution of Lollards increased; in 1414 Sir John Oldcastle, Lord Cobham, who had been condemned as a heretic, escaped and made an insurrection; he was taken in 1417 and hanged and burned. Lollardism was connected with an insurrection in 1431; it then ceased to have any political importance, but it kept its hold in certain towns and districts on the lower classes; many Lollards were forced to recant and others suffered martyrdom. The church was in an unsatisfactory state. As regards the papacy, the crown generally maintained the position taken up in the previous century, but its policy was fitful, and the custom of allowing bishops who were made cardinals to retain their sees strengthened papal influence. The bishops were largely engaged in secular business; there was much plurality, and cathedral and collegiate churches were frequently left to inferior officers whose lives were unclerical. The clergy were numerous and drawn from all classes, and humble birth did not debar a man from attaining the highest positions in the church. Candidates for holy orders were still examined, but clerical education seems to have declined. Preaching was rare, partly from neglectfulness and partly because, in 1401, in order to prevent the spread of heresy, priests were forbidden to preach without a licence. While the marriage of the clergy was checked, irregular and temporary connexions were lightly condoned. Discipline generally was lax, and exhortations against field-sports, tavern haunting and other unclerical habits seem to have had little effect. Monasticism had declined. Papal indulgences and relics were hawked about chiefly by friars, though these practices were discountenanced by the bishops. On the other hand, all education was carried on by the clergy, and religion entered largely into the daily life of the people, into their gild-meetings, church-ales, mystery-plays and holidays, as well as into the great events of family life—baptisms, marriages and deaths. Many stately churches were built in the prevailing Perpendicular style, often by efforts in which all classes shared, and many hamlet chapels supplemented the mother church in scattered parishes. The revival of classical learning scarcely affected the church at large. Greek learning was regarded with suspicion by many churchmen, but the English humanists were orthodox. The movement had little to do with the coming religious conflicts, which indeed killed it, save that it awoke in some learned men like Sir Thomas More a desire for ecclesiastical, though not doctrinal, reform, and led many to study the New Testament of which Erasmus published a Greek text and Latin paraphrases.

The Reformation era.

During the earlier years of the 16th century Lollardism still existed among the lower classes in towns, and was rife here and there in country districts. Persecution went on and martyrdoms are recorded. The old grievances concerning ecclesiastical exactions remained unabated and were further strengthened by an ill-founded rumour that Richard Hunne, a Londoner who had refused to pay a mortuary, was imprisoned for heresy in the Lollards' tower, and was found hanged in his cell in 1514, had been murdered. Lutheranism affected England chiefly through the surreptitious importation of Tyndale's New Testament and heretical books. In 1521 Henry VIII. wrote a book against Luther in which he maintained the papal authority, and was rewarded by Leo X. with the title of Defender of the Faith. Henry, however, whose will was to himself as the oracles of God, finding that the pope opposed his intended divorce from Catherine of Aragon, determined to allow no supremacy in his realm save his own. He carried out his ecclesiastical policy by parliamentary help. Parliament was packed, and was skilfully managed; and he had on his side the popular impatience of ecclesiastical abuses, a new feeling of national pride which would brook no foreign interference, the old desire of the laity to lighten their own burdens by the wealth of the church, and a growing inclination to question or reject sacerdotal authority. He used these advantages to forward his policy, and when he met with opposition, enforced his will as a despot. The parliament of 1529 lasted until 1536; it broke the bonds of Rome, established royal supremacy over the English Church, and effected a redistribution of national wealth at the expense of the spirituality. It began by acts abolishing ecclesiastical exactions, such as excessive mortuaries and fees for probate, and by prohibiting pluralities except in stated cases, application to Rome for licence to evade the act being made penal. Henry having crushed his minister Cardinal Wolsey, archbishop of York, declared the whole body of the clergy involved in a *praemunire* by their submission to Wolsey's legatine authority, and ordered the convocation to purchase pardon by a large payment, and by acknowledging him as "Protector and Supreme Head of the English Church and Clergy." After much debate, the acknowledgment was made in 1531, with the qualification "so far as the law of Christ allows." A "supplication" against clerical jurisdiction and legislation by convocation was obtained from the Commons in 1532, and Henry received from convocation the "submission of the clergy," surrendering its legislative power except on royal licence, and consenting to a revision of the canon law by commissioners to be appointed by the king. A bill for conditionally withholding the payment of *annates*, or first-fruits, to Rome was passed, and Henry took advantage of the fear of the Roman court lest it should lose these payments, to obtain without the usual fees bulls promoting Cranmer to the see of Canterbury in 1533, and thus was enabled to gain his divorce. Cranmer pronounced his marriage to Catherine null, and declared him lawfully married to Anne Boleyn. Clement VII. retorted by excommunicating the king, but for that Henry cared not. Appeals to Rome were forbidden by statute, and the council ordained that the pope should thenceforth only be spoken of as bishop of Rome, as not having authority in England. In 1534 the restraint of annates was confirmed by law, all payments to Rome were forbidden, and it was enacted that, on receiving royal licence to elect, cathedral chapters must elect bishops nominated by the king. The papal power was extirpated by statute, parliament at the same time declaring that neither the king nor kingdom would vary from the "Catholic faith of Christendom." The submission of the clergy was made law. Appeals from the archbishops' courts were to be to the king in chancery, and were to be heard by commissioners, whence arose the Court of Delegates as the court of final appeal in ecclesiastical cases. The first-fruits and tenths of benefices were given to the king, and his title as "Supreme Head in earth of the Church of England" was declared by parliament without the qualification added by convocation. Fisher, bishop of Rochester, and Sir Thomas More, lately chancellor, the two most eminent Englishmen, were beheaded in 1535 on an accusation of attempting to deprive the king of this title, and some Carthusian monks suffered a more cruel martyrdom in the same cause. Meanwhile New Testaments were burnt, and heretics, or reformers, forced to abjure or, remaining steadfast, were sent to the stake, for though the heresy law of Henry IV. was repealed, heresy was still punishable by death, and persecution was not abated. By breaking the bonds of Rome Henry did not give the church freedom; he substituted a single despotism for the dual authority which pope and king had previously exercised over it. In 1535 Cromwell, the king's vicar-general, began a visitation of the monasteries. The reports (*comperta*) of his commissioners having been delivered to the king and communicated to parliament in 1536, parliament declared the smaller monasteries corrupt, and granted the king all of less value than £200 a year. A rebellion in Lincolnshire and another in the north, the formidable Pilgrimage of Grace, followed. The suppression of the greater houses was effected gradually, surrenders were obtained by pressure, and three abbots who were reluctant to give up the possessions of their convents for confiscation were hanged. Monastic shrines and treasuries were sacked and the spoil sent to the king, to whom parliament granted all the houses, their lands and possessions. Of the enormous wealth thus gained Henry spent a part on national defence, a little on the foundation of the bishoprics of Westminster, dissolved in 1550, Bristol, Chester, Gloucester, Oxford and Peterborough, and gave the lands to men either useful to or favoured by himself, or sold them to rich purchasers. In 1536 he dictated the belief and ceremonial of the church by issuing Ten Articles which were subscribed by convocation. This first formulary of the English Church as separate from Rome did not contravene Catholic doctrine, though it showed the influence of Lutheran models. Another exposition of Anglican doctrine was made in the *Institution of a Christian Man* or "Bishops' book," in some respects more likely to satisfy those attached to the tenets of Rome, in others, as in the distinct repudiation of purgatory and the declaration that salvation depended solely on the merits of Christ, showing an advance. It was published in 1537 with Henry's sanction but not by authority. In that year licence was granted for the sale of a translation of the Bible, and in 1538 another version called Matthew's Bible, was ordered to be kept in all churches (see

Bible). Pilgrimages were suppressed and images used for worship destroyed. Denial of the king's supremacy, denial of the corporal presence in the Eucharist, and insults to Catholic rites were alike punished by cruel death. The publication abroad of the king's excommunication rendered an assertion of orthodoxy advisable for political reasons, and in 1539 came the Act of the Six Articles attaching extreme penalties to deviations from Catholic doctrines. The backward swing of the pendulum continued; Cromwell was beheaded and three reforming preachers were burnt in 1540. Prosecutions for heresy under the act were fitful: four gospellers were burnt in London in 1546, of whom the celebrated Anne Askew was one. Cranmer, however, did not lose the king's favour. A fresh attempt to define doctrine was made in the *Necessary Doctrine and Erudition of a Christian Man*, the "King's Book," published by authority in 1543, which, while repudiating the pope, was a declaration of Catholic orthodoxy. A *Primer*, or private prayer-book, of which parts were in English, as the litany composed by Cranmer, and virtually the same as at present, was issued in 1546, and further liturgical change seemed probable when Henry died in 1547.

Henry, while changing many things in the church, would not allow any deviation in essentials from the religion of Catholic Europe, which was not then so dogmatically defined as it was later by the council of Trent. Edward VI. was a child, and the Protector Somerset and the council favoured further changes, which were carried out with Cranmer's help. They issued a book of *Homilies* and a set of injunctions which were enforced by a royal visitation. Pictures and much painted glass were destroyed in churches, frescoed walls were whitewashed, and in 1548, the removal of all images was decreed. Parliament ordered that bishops should be appointed by letters patent and hold their courts in the king's name. An act of the last reign granting the king all chantries and gilds was enlarged and enforced with cruel injustice to the poor. On the petition of convocation parliament allowed the marriage of priests; and it further ordered that the laity should receive the cup in communion. A communion book was issued by the council in English, the Latin mass being retained for a time. Many German reformers came to England, were favoured by the council, and gained influence over Cranmer. The first Book of Common Prayer was authorized by an Act of Uniformity in 1549; it retained much from old service books, but the communion office is Lutheran in character. It excited discontent, and a serious insurrection broke out in the West, the insurgents demanding the revival of the Act of the Six Articles and the withdrawal of the new service as "like a Christmas game." After Somerset's fall the government rapidly pushed forward reformation. A new *Ordinal* issued with parliamentary approval in 1550 was significant of the change in sacramental doctrine, and the four minor orders disappeared. Altars were destroyed and tables substituted. Five bishops, Bonner of London, Gardiner of Winchester, and Heath of Worcester, then already in prison, and two others, were deprived; and the Lady Mary, who would not give up the mass, was harshly treated. The reformers were not tolerant; for a woman was burnt for Arianism in 1550 and a male Anabaptist in 1551. Under the influence of foreign reformers, who took a lower view of the Eucharist than the Lutheran divines, Cranmer soon advanced beyond the prayer-book of 1549. A second prayer-book, departing further from the old order, appeared in 1552, and without being accepted by convocation was enforced by another Act of Uniformity, and in 1553 a catechism and forty-two articles of religion were authorized by Edward for subscription by the clergy, though not laid before convocation. A revision of the canon law in accordance with the act for "submission of the clergy" was at last undertaken in 1551, but the only result was a document entitled *Reformatio legum ecclesiasticarum*, which never received authority. Edward died in 1553. Apart from matters of faith, the church had fared ill under a royal supremacy exercised by self-seeking nobles in the name of the boy-king. Convocation lost all authority and bishops were treated as state officials liable to deprivation for disobedience to the council. Means of worship were diminished, and the poor were shamefully wronged by the suppression of chantries, gilds and holy days; even the few sheep of the poor brethren of a gild were seized to swell a sum which from 1550 was largely diverted from public purposes to private gain. Churches were despoiled of their plate; the old bishops were forced, the new more easily persuaded, to give up lands belonging to their sees, and rich men grew richer by robbing God.

When Mary succeeded her brother, the deprived bishops were restored, some reforming bishops were imprisoned, and Cranmer, who was implicated in the plot on behalf of Lady Jane Grey, was attainted of treason. As regards doctrine, religious practices and papal supremacy, Mary was set on bringing back her realm to the position existing before her father's quarrel with Rome. Her first parliament repealed the ecclesiastical legislation of Edward's reign, and convocation formally accepted transubstantiation. Seven bishops were deprived in 1554, four of them as married, and about a fifth of the beneficed clergy, though some received other benefices after putting away their wives. Apparently Mary at first believed that her authority would be accepted in religious matters; but she met with opposition, partly provocative, for Wyat's rebellion consequent on her intended marriage to Philip of Spain was closely connected with religion, and more largely passive in the noble resolution of those who chose martyrdom rather than denial of their faith. To the nation at large, though not averse from the old doctrines and practices of the church, a return to the Roman obedience was distasteful. Nevertheless, Cardinal Pole was received as legate, and the title of Supreme Head of the Church having been dropped, a parliament carefully packed, and the fears of the rich appeased by the assurance that they would not have to surrender the monastic lands, he absolved the nation in parliament and reunited it to the Church of Rome on November 30, 1554, the clergy being absolved in convocation. Parliament repealed all acts against the Roman see since the twentieth year of Henry VIII. The heresy laws were revived, and a horrible persecution of those who refused to disown the doctrines of the prayer-book began in 1555, and lasted during the remainder of the reign. Nearly 300 persons were burned to death as heretics in these four years, among them being five bishops: Hooper of Gloucester, Ferrar of St David's, Ridley of London, and Latimer (until 1539) of Worcester in 1555, and Archbishop Cranmer in 1556. The chief responsibility for these horrors rests with the queen; the bishops who examined the accused were less zealous than she desired. The most prominent among them in persecution was Bonner of London. The exiles for religion were received at Frankfort, Strassburg and Zürich. At Frankfort a party among them objected to the ceremonies retained in the prayer-book, and, encouraged by Calvin and by Knox, who came to them from Geneva, quarrelled with those who desired to keep the book unchanged. Mary died in 1558. Her reign arrested the rapid spoliation of the church and possibly prevented the adoption of doctrines which would have destroyed its apostolic character; the persecution by which it was disgraced strengthened the hold of the reformed religion on the people and made another acceptance of Roman supremacy for ever impossible.

Elizabethan settlement.

Elizabeth's accession was hailed with pleasure; she was known to dislike her sister's ecclesiastical policy, and a change was expected. An Act of Supremacy restored to the crown the authority over the church held by Henry VIII., and provided for its exercise by commissioners, whence came the court of High Commission nominated by the crown, as a high ecclesiastical court; but Elizabeth rejected the title of Supreme Head, and used that of Supreme Governor, as "over all persons and in all cases within her dominions supreme." An Act of Uniformity prescribed the use of the prayer-book of 1552 in a revised form which raised the level of its doctrine, and injunctions enforced by a royal visitation re-established the reformed order. All the Marian bishops save two refused the oath of supremacy and were deprived, and eight were imprisoned. Of the clergy generally few refused it; for only some 200 were deprived for religion during the first six years of the reign. Bishops for the vacant sees were nominated by the crown and elected by their chapters as in Henry's reign; Matthew Parker was canonically consecrated archbishop of Canterbury. The orthodoxy of the church was vindicated by Bishop Jewel's *Apologia ecclesiae Anglicanae*. Adherents to Rome vainly tried to obtain papal sanction for attending the church services, and were forced either to disobey the pope or become "recusants"; many were fined, and those who attended mass were imprisoned. Meanwhile a party, soon known as Puritans, rebelled against church order; the exiles who had come under Genevan influence objecting on their return to vestments and ceremonies enjoined by the prayer-book. There was much nonconformity in the church which the queen ordered the bishops to correct. Parker, though averse to violent measures, insisted on obedience to his "Advertisements" of 1566, which, though not formally authorized by the queen, expressed her will, and became held as authoritative, and some of the refractory were punished. A company engaged in irregular worship was discovered in London in 1567 and a few persons were imprisoned by the magistrate. Active opposition to the government was stirred up by Pius V., and in 1569 a rebellion in the north, where the old religion was strong, was aided by papal money and encouraged by hopes of Spanish intervention. In 1570 Pius published a bull excommunicating and deposing the queen. Thenceforward recusants had to choose between loyalty to the queen and loyalty to the pope. They lay under suspicion, and severe penal laws were enacted against Romish practices. About 1579 many seminary priests and Jesuits came over to England as missionaries; some actively engaged in treason, all were legally traitors. The country was threatened with foreign invasion, plots against the government were detected, and the queen's life was held to be endangered. The council hunted down these priests and their abettors, and many were executed, martyrs to the doctrine of the pope's power of deposition. The number put to death in this reign under the penal laws was 187. The papal policy defeated itself; a large number of the old religion while retaining their faith chose to be loyal to the queen rather than lend themselves to the designs of her enemies. From 1571 recusants can no longer be reckoned as nonconforming members of the English Church: the law recognized them as separate from it. The church's doctrine was defined in the catechism of 1570, and in the revised articles of religion which appeared as the XXXIX. Articles in 1571, and its law by a body of canons published with authority in 1576, the attempt at codification made in the *Reformatio legum* having been laid aside.

The Nonconformists.

From 1574 the Protestant Nonconformists strove to introduce Presbyterianism. Cause for grievance existed in the state of the church which had suffered from the late violent changes. Elizabeth plundered it, and laymen who owned the rectories formerly held by monasteries followed her example; bishoprics were impoverished by the queen and parish cures by her subjects, and the reform of abuses was checked by self-interest. As bishops, along with some able men, Elizabeth chose others of an inferior stamp who consented to the plunder of their sees and whom she could use to report on recusants and harry nonconformists. Separation, or Independency, began about 1578 with the followers of Robert Browne, who repudiated the queen's ecclesiastical authority; two Brownists were executed in 1583. The nonconformists remained in the church and continued their efforts to subvert its episcopal system. Elizabeth, though personally little influenced by religion, understood the political value of the church, and would allow no slackness in enforcing conformity. Archbishop Grindal was sequestrated for defending "prophesyings," or meetings of the Puritan clergy for religious exercises. The House of Commons, in which there was a Puritan element, repeatedly attempted to discuss church questions and was sharply silenced by the queen, who would not allow any interference in ecclesiastical matters. Whitgift, who succeeded Grindal in 1583, though kind-hearted, was strict in his administration of the law. Violent attacks were made upon the bishops in the Martin Marprelate tracts printed by a secret press; their author is unknown, but some who were probably connected with them were executed for publishing seditious libels. Whitgift's firmness met with success. During the last years of the reign the movement towards Presbyterianism was checked and nonconformity was less prominent. The church regained a measure of orderliness and vigour; its claims on allegiance were advocated by eminent divines and expounded in the stately pages of Hooker. The queen, who had so vigorously ordered ecclesiastical affairs, died in 1603.

The Puritan rebellion.

On the accession of James I. the Puritans expressed their desire for ecclesiastical change in the Millenary Petition which purported to come from 1000 clergy; their requests were moderate, a sign of the success of Whitgift's policy, but some could not have been granted without causing widespread dissatisfaction. At a conference between divines of the two parties at Hampton Court in 1604, James roughly decided against the Puritans. Some small alterations were made in the prayer-book, and a new version of the Bible was undertaken, which appeared in 1611 as the "authorized version." In 1604 convocation framed a code of canons which received royal authorization. Refusal to obey them was punished with deprivation, and, according to S. R. Gardiner, about 300 clergy were deprived, though a 17th century writer (Peter Heylyn) puts the number at 49 only, which W. H. Frere (*History of the English Church, 1558–1625*, p. 321) thinks more credible. Conformity could still be enforced, but before long the Puritan party grew in strength partly from religious and partly from political causes. They would not admit any authority in religion that was not based on the scriptures; their opponents maintained that the church had authority to ordain ceremonies not contrary to the scriptures. In doctrine the Puritans remained faithful to the Calvinism in which most Englishmen of the day had been brought up; they called the high churchmen Arminians, and asserted that they were inclined to Rome. The Commons became increasingly Puritan; they were strongly Protestant and demanded the enforcement of the laws against recusants, who suffered much, specially after the Gunpowder Plot of 1605, though they were sometimes shielded by the king. The Commons regarded ecclesiastical jurisdiction with dislike, specially the Court of High Commission, which had developed from the ecclesiastical commissions of Elizabeth and was hated as a means of coercion based on prerogative. The bishops derived their support from the king, and the church in return supported the king's claim to absolutism and divine right. It suffered heavily from this alliance. As men saw the church on the side of absolutism, Puritanism grew strong both among the country gentry, who were largely represented in the Commons, and among the nation at large, and the church lost ground through the king's political errors. A restoration of order and decency in worship and the introduction of more ceremonial begun in James's reign were carried on by Laud (*q.v.*) under Charles I. Laud aimed at silencing disputes about doctrine and enforcing outward uniformity; the Puritans hated ceremonial and wished to make every one accept their doctrines. Many of the reforms introduced by Laud after he became archbishop in 1633 were needful, but they offended the Puritans and were enforced in a harsh and tyrannical manner, for he lacked wisdom and sympathy. Under his rule nonconforming clergy were deprived and sometimes imprisoned. The cruel punishments inflicted by the Court of Star Chamber of which he was a member, the unpopularity of the High Commission Court, his own harsh dealing, and the part which he took in politics as a confidential adviser of the king, combined to bring odium upon him and upon the ecclesiastical system which he represented. The church was weak, for the Laudian system was disliked by the nation. A storm of discontent with the course of affairs both in church and state gathered. In 1640 Charles, after dissolving parliament, prolonged the session of convocation, which issued canons magnifying the royal authority and imposing the so-called "*et cetera* oath" against innovations on all clergy, graduates and others. The Long Parliament voted the canons illegal; Laud was imprisoned, and in 1642 the bishops were excluded from parliament. The civil war began in 1642; in 1643 a bill was passed for the taking away of episcopacy, in 1645 Laud was beheaded, and parliament abolished the prayer-book and accepted the Presbyterian directory, and from 1646 Presbyterianism was the legal form of church government. Many, perhaps 2000, clergy were deprived; some were imprisoned and otherwise maltreated, though a fifth of their former revenues was assigned to the dispossessed. The king, who was beheaded in 1649, might have extricated himself from his difficulties if he had consented to the overthrow of episcopacy, and may therefore be held a martyr to the church's cause. The victory of the army over the parliament secured England against the tyranny of Presbyterianism, but did not better the condition of the episcopal clergy; the toleration insisted on by the Independents did not extend to "prelacy." Churchmen, however, occasionally enjoyed the ministrations of their own clergy in private houses, and though their worship was sometimes disturbed they were not seriously persecuted for engaging in it. Non-delinquent or non-sequestrated private patronage and the obligation of tithes were retained. Community of suffering and the execution of Charles I. brought the royalist country gentry into sympathy with the clergy, and at the Restoration the church had the hold upon the affection of the laity which it lacked under the Laudian rule.

The Restoration period.

On the king's restoration the survivors of the ejected clergy quietly regained their benefices. The Presbyterians helped to bring back the king and looked for a reward. Charles II. promised them a limited episcopacy and other concessions, but his plan was rejected by the Commons. A conference at the Savoy between leading Presbyterians and churchmen in 1661 was ineffectual, and a revision of the prayer-book by convocation further discontented nonconformists. The parliament of 1661 was violently anti-Puritan, and in 1662 passed an Act of Uniformity providing that all ministers not episcopally ordained or refusing to conform should be deprived on St. Bartholomew's day, the 14th of August following. About 2000 ministers are said to have been ejected, and in 1665 ejected ministers were forbidden to come within five miles of their former cures. Though some bishops and clergy showed kindness to the ejected, churchmen generally approved of this oppressive legislation; they could not forget the wrongs inflicted on their church by the once triumphant Puritans. Nonconformist worship was made punishable by fine and imprisonment, and on the third offence by transportation. In 1672 Charles, who had secretly promised the French king openly to profess Roman Catholicism, issued a Declaration of Indulgence which applied both to Romanists and Protestant Nonconformists, but parliament compelled him to withdraw it, and, in 1673, passed a Test Act making reception of the holy communion and a denial of transubstantiation necessary qualifications for public office. Later, when the dissenters found friends among the party in parliament opposed to the crown, the church supported the king, and the doctrine of passive obedience was generally accepted by the clergy. The church was popular, and among the great preachers and theologians who adorned it in the Caroline period were Jeremy Taylor, Pearson, Bull, Barrow, South and Stillingfleet. The lower clergy were mostly poor, and their social position was consequently often humble, but the pictures of clerical humiliation after 1660 are generally overcoloured; the assertion that they commonly married servants or cast-off mistresses of their patrons has been disproved, and it is certain that men of good family entered holy orders. In accordance with an agreement between Archbishop Sheldon and Lord Chancellor Clarendon, the clergy ceased to tax themselves in convocation, and from 1665 have been taxed by parliament. James II., though a Romanist, promised to protect the church, and the clergy were on his side in the rebellion of the duke of Monmouth, who was supported by dissenters. The church and the nation, however, were strongly Protestant and were soon alarmed by his efforts to Romanize the country. James dispensed with the law by prerogative and appointed Romanists to offices in defiance of the Test Act. In 1688 he ordered that his declaration for liberty of conscience, issued in the interest of Romanism, should be read in all churches. His order was almost universally disobeyed. Archbishop Sancroft and six bishops who remonstrated against it were brought to trial, and were acquitted to the extreme delight of the nation. James's attack on the church cost him his crown.

Revolution period.

Sancroft and eight bishops would not belie their belief in the doctrines of divine right and passive obedience by swearing allegiance to William and Mary, and the archbishop, five bishops and over 400 clergy were deprived. Certain of these nonjuring bishops consecrated others and a schism ensued. The loss to the church was heavy; for among the nonjurors were many men of holy lives and eminent learning, and the fact that some suffered for conscience' sake seemed a reproach on the rest of the clergy. After 1715 the secession became unimportant. Protestantism was secured from further royal attack by the Bill of Rights; and in 1701 the Act of Succession provided that all future sovereigns should be members of the Church of England. That the king's title rested on a parliamentary decision was destructive of the clerical theory of divine right, and encouraged Erastianism, then specially dangerous to the church; for William, a Dutch Presbyterian, gave bishoprics to men personally worthy, but more desirous of union with other Protestant bodies than jealous for the principles of their own church. A bill for union was rejected in the Commons, where the church party had a majority, though one for toleration of Protestant dissenters became law. William, anxious for concessions to dissenters, appointed a committee of convocation for altering the liturgy, canons and ecclesiastical courts, but the Tory party in the lower house of convocation was strong and the scheme was abortive. A long controversy began between the two houses: the bishops were mostly Whigs with latitudinarian tendencies, the lower clergy Tories and high churchmen. During most of the reign convocation was suspended and the church was governed by royal injunctions, a system injurious to its welfare. It had been the bulwark of the nation against Romanism under James II., and the affection of the nation enabled it to preserve its distinctive character amid dangers of an opposite kind under William III. Its religious life was active; associations for worship and the reformation of manners led to more frequent services, the establishment of schools for poor children, and the foundation of the Society for Promoting Christian Knowledge (S.P.C.K.) and for the Propagation of the Gospel in Foreign Parts (S.P.G.). This activity and the discord between the two houses of convocation continued during Anne's reign. Anne was a strong churchwoman, and under her the church reached its highest point of popularity and influence. Its supposed interests were used by the Tories for political ends. Hence the Occasional Conformity Act, to prevent evasion of the Test Act, and a tyrannical Schism Act, both repealed in 1718, belong rather to the history of parties than to that of the church. So, too, does the case of Dr Sacheverell, who was prosecuted for a violently Tory sermon. His trial, in 1710, caused much excitement; mobs shouted for "High Church and Dr Sacheverell," and the lightness of his sentence was hailed as a Tory victory. Queen Anne is gratefully remembered by the church for her "Bounty," which gave it the first-fruits and tenths (see ANNATES and QUEEN ANNE'S BOUNTY).

The 18th century.

With the accession of the Hanoverian line the church entered on a period of feeble life and inaction: many church fabrics were neglected; daily services were discontinued; holy days were disregarded; Holy Communion was infrequent; the poor were little cared for; and though the church remained popular, the clergy were lazy and held in contempt. In accepting the settlement of the crown the clergy generally sacrificed conviction to expediency, and their character suffered. Promotion largely depended on a profession of Whig principles: the church was regarded as subservient to the state; its historic position and claims were ignored, and it was treated by politicians as though its principal function was to support the government. This change was accelerated by the silencing of convocation. A sermon by Hoadly, bishop of Bangor, impugned the existence of a visible church, and the "Bangorian controversy" which ensued threatened to end in the condemnation of his opinions by convocation, or at least by the lower house. As this would have weakened the government, convocation was prorogued, letters of business were withheld, and from 1717 until 1852 convocation, the church's constitutional organ of reform, existed only in name. Walpole during his long ministry, from 1721 to 1742, discouraged activity in the church lest it should become troublesome to his government. Preferment was shamelessly sought after even by pious men, and was begged and bestowed on the ground of political services. In this the clergy, apart from the sacredness of clerical office, were neither better nor worse than the laity; in morality and decency they were better even at the lowest point of their decline, about the middle of the century. While the church was inactive in practical work, it showed vigour in the intellectual defence of Christianity. Controversies of earlier origin with assailants of the faith were ably maintained by, among others, Daniel Waterland, William Law, a nonjuror, Bishop Butler, whose *Analogy* appeared in 1736, and Bishop Berkeley. A revival of spirituality and energy at last set in. Its origin has been traced to Law's *Serious Call*, published in 1728. Law's teaching was actively carried out by John Wesley (*q.v.*), a clergyman who from 1739 devoted himself to evangelization. Though his preaching awoke much religious feeling, specially among the lower classes, the excitement which attended it led to a horror of religious enthusiasm, and his methods irritated the parochial clergy. Some of them seconded his efforts, but far more regarded them with violent and often unworthily expressed dislike. While he urged his followers to adhere to the church, he could not himself work in subordination to discipline; the Methodist organization which he founded was independent of the church's system and soon drifted into separation. Nevertheless, he did much to bring about a revival of life in the church. Several clergy became his allies, and some preached in Lady Huntingdon's chapels before her secession. These were among the fathers of the Evangelical party: they differed from the Methodists in not forming an organization, remaining in the church, working on the parochial system, and generally holding Calvinistic doctrine, being so far nearer to Whitfield than to Wesley, though Calvinism gradually ceased to be a mark of the party. The Evangelicals soon grew in number, and their influence for good was extensive. They laid stress on the depravity of human nature, and on the importance of conscious conversion, giving prominence to the necessity of personal salvation rather than of incorporation with, and abiding in, the church of the redeemed. Prominent among their early leaders after they became distinct from the Methodists were William Romaine, Henry Venn and John Newton. Bishop Porteus of London sympathized with them, Lord Dartmouth was a liberal patron, and Cowper's poetry spread their doctrines in quarters where sermons might have failed to attract. Religion was also forwarded in the church by the example of George III. During his reign the progress of toleration, though slow and fitful, greatly advanced both as regards Roman Catholics and Protestant dissenters. The spirit of rationalism, which had been manifested earlier in attacks on revelation, appeared in a movement against subscription to the Articles demanded of the clergy and others which was defeated in parliament in 1772. The alarm consequent on the French Revolution checked the progress of toleration and was temporarily fatal to free-thinking; it strengthened the position of the church, which was regarded as a bulwark of society against the spread of revolutionary doctrines; and this caused the Evangelicals to draw off more completely from the Methodists. The church was active: the Sunday-school movement, begun in 1780, flourished; the crusade against the slave-trade was vigorously supported by Evangelicals; and the Church Missionary Society (C.M.S.), a distinctly Evangelical organization, was founded. Excellent as were the results of the revival generally, the Evangelicals had defects which tended to weaken the church. Some characteristics of their teaching were repellent to the young; they were deficient in theological learning, and often in learning of any kind; they took a low view of the church, regarding it as the offspring of the Protestant reformation; they expounded the Bible without reference to the church's teaching, and paid little heed to the church's directions. Dissent consequently grew stronger. By the Act of Union with Ireland the Churches of England and Ireland were united from the 1st of January 1801, and the continuance of the united church was declared an essential part of the union. No provision, however, was made giving the Irish clergy a place in convocation, which was evidently held unlikely to revive. The union of the churches was dissolved in 1871 by an act of 1869 for disestablishing the Irish Church.

The Oxford Movement.

Apart from the Evangelical revival, religion was advanced in the church. In 1811 the education of the poor was provided for on church principles by the National Society; the Church Building Society was founded in 1818; and the colonial episcopate was started by the establishment of bishoprics in Calcutta in 1814, and in Jamaica and Barbados in 1824. Yet reforms were urgently needed. In 1813, out of about 10,800 benefices, 6311 are said to have been without resident incumbents (*The Black Book*, p. 34); the value of some great offices was enormous, while many of the parochial clergy were wretchedly poor. The repeal of the Test Act, long practically inoperative, in 1828, and Catholic emancipation in 1829, mark a change in the relations of church and state; and the Reform Bill of 1832 transferred political power from a class which generally supported the church to classes in which dissent was strong. The national zeal for reform was directed towards the church, not always in a friendly spirit. Yet wholesome changes were effected by legislation: dioceses were rearranged and two new bishoprics founded at Manchester and Ripon, the bishopric of Bristol, however, being suppressed; plurality and non-residence were abolished; tithes were commuted, and the Ecclesiastical Commission, which has effected reforms in respect of endowments, was permanently established in 1836. Some changes and proposals alarmed churchmen, specially as legislation for the church proceeded from parliament, while convocation remained silenced. Latitudinarian opinions revived, and the church was regarded merely as a human institution. Among the clergy generally ritual observance was neglected and rubrical directions disobeyed. A few churchmen, including Keble and Newman, set themselves to revive church feeling, and Oxford became the centre of a new movement. The publication of Keble's *Christian Year* prepared its way, and its aims were declared in his assize sermon at Oxford on "National Apostasy" in 1833. Its promoters urged their views in *Tracts for the Times*, and were strengthened by the adhesion of Pusey. Hence they were nicknamed Tractarians or Puseyites. Their cardinal doctrine was that the Church of England was a part of the visible Holy Catholic Church and had unbroken connexion with the primitive church; they inculcated high views of the sacraments, and emphasized points of agreement with those branches of the Catholic Church which claim apostolic succession. Their party grew in spite of the opposition of low and broad churchmen, who, specially on the publication of Tract XC. by Newman in 1841, declared that its teaching was Romanizing. In 1845 Newman and several others seceded to Rome. Newman's apostasy was a severe blow to the church, though permanent injury was averted by the steadfastness of Pusey. The Oxford movement was wrecked, but its effect survived both in the new high church party and in the church at large. As a body the clergy rated more highly the responsibilities and dignity of their profession, and became more zealous in the performance of its duties and more ecclesiastically minded. High churchmen carried out rubrical directions, and after a while began to introduce changes into the performance of divine service which had not been adopted by the early leaders of the party, were deprecated by many bishops, and excited opposition.

In 1833 the supreme jurisdiction of the Court of Delegates was transferred to the judicial committee of the privy council. Before this court came an appeal by a clerk named Gorham,

The church and the law courts.

whom the bishop of Exeter refused to institute to a benefice because he denied unconditional regeneration in baptism, and in 1850 the court decided in the appellant's favour. The decision was followed by some secessions to Rome, and high churchmen were dissatisfied that spiritual questions should be decided by a secular court. The "papal aggression" of that year, by which Pius IX. appeared to claim authority in England, roused violent popular indignation which was used against the high church party. However, it afforded an argument for the revival of convocation, and, chiefly owing to the exertions of Bishop Wilberforce of Oxford, convocation again met in 1852 (see CONVOCATION). Meanwhile broad church opinions were gaining ground to some extent owing to a reaction from the Oxford movement. Among the clergy the broad church party was comparatively small, but it included some men of mark. In 1860 appeared *Essays and Reviews*, a volume of essays by seven authors, of whom six were in orders. The book as a whole had a rationalistic tendency and was condemned by convocation: two of the essayists were suspended by the Court of Arches, but its judgment was reversed by the judicial committee. Crude attacks on the authority of the Scriptures and the position of the English Church with respect to it having been published by Colenso, bishop of Natal, he was deposed by his metropolitan, Bishop Gray of Cape Town, in 1863, but the judicial committee decided that the bishop of Cape Town had no coercive jurisdiction over Natal. Convocation declared Colenso's books erroneous, abstaining in face of this judgment from acknowledging as valid the excommunication which Bishop Gray pronounced against him. It followed from the decision of the council that the English Church in a self-governing colony is a voluntary association. Opposition to the dogmatic principle in the church was maintained. Some practices introduced by clergy desirous of bringing the services of the church to a higher level came before the judicial committee in the case of *Westerton* v. *Liddell* in 1857, with a result encouraging to the ritualists, as they then began to be called. An increase in ritual usages, such as eucharistic vestments, altar lights and incense, followed. In 1859–1860 disgraceful riots took place at St George's-in-the-East, London, where an advanced ritual was used. In 1860 the English Church Union was formed mainly to uphold high church doctrine and ritual, and assist clergy prosecuted for either cause, and in 1865 the Church Association, mainly to put down such doctrine and ritual by prosecution. A royal commission appointed in 1867 recommended that facilities should be granted for enabling parishioners aggrieved by ritual to gain redress, and in 1870 that a revised lectionary and a shortened form of service should be provided. A new lectionary was approved by the two convocations and enacted, and convocation having received letters of business in 1872 and 1874 drew up a shortened form of prayer which was also enacted, but the commission had no further direct results. Between 1867 and 1871 two decisions of the judicial committee were adverse to the ritualists, and by exciting dislike to the court among high churchmen indirectly led to an increase in ritual usages. Among those who adopted them were many self-devoted men; their practices, which they believed to be incumbent on them, were condemned as illegal, yet they saw the rubrics daily disregarded with impunity by others who trod the easy path of neglect. In 1873 a declaration against sacramental confession received the assent of the bishops, and in 1874 Archbishop Tait of Canterbury introduced a bill for enforcing the law on the ritualist clergy; it was transformed in committee, and was enacted as the Public Worship Regulation Act. It provided for the appointment of a new judge in place of the old ecclesiastical judges, the officials principal, of the two provinces. Litigation increased, the only check on prosecutions being the right of the bishop to veto proceedings, and in 1878–1881 four clergymen were imprisoned for disobedience to the orders of courts against whose jurisdiction they protested. In consequence of the scandal raised by this mode of dealing with spiritual causes, a royal commission on ecclesiastical courts was appointed in 1881, but its report in 1883 led to no results, and the bishops strove to mend matters by exercising their veto. Advanced and illegal usages became more frequent. Proceedings in respect of illegal ritual having been instituted against Bishop King of Lincoln, the archbishop of Canterbury (Benson) personally heard and decided the case in 1890, and his judgment was upheld by the judicial committee (see LINCOLN JUDGMENT). The spiritual character of the tribunal and the authority of the judgment which sanctioned certain usages and condemned others, had a quieting effect. Increase in ritualism, however, caused agitation in 1898, and in 1899 and 1900 the two archbishops, Temple of Canterbury and Maclagan of York, delivered "opinions" condemning the use of incense and processional lights, and the reservation of the consecrated elements. Finding himself unable to put down illegal practices, Bishop Creighton of London adopted a policy of compromise which was followed by other bishops, and encouraged illegality. Disregard of law both in excess and defect of ritual being common, a royal commission on ecclesiastical discipline was appointed in 1904. The commissioners presented a unanimous report in 1906, its chief recommendations being, briefly, that practices significant of doctrines repugnant to those of the English Church should be extirpated; that the convocations should prepare a new ornaments rubric, and frame modifications in the conduct of divine service; that the diocesan and provincial courts and the court of final appeal should be reformed in accordance with the recommendations of 1883, the last to consist of a permanent body of lay judges who on all doubtful questions touching the doctrine or use of the church should be bound by the decision of an episcopal assembly; that the Public Worship Regulation Act should be repealed, and the bishops' power of veto abolished.

Present life.

Since the Oxford movement the church has developed wonderful energy. Yet it is beset with difficulties and dangers both from within and without. Within, besides difficulties as regards ritual, it has to contend against rationalism, which has been stimulated by scientific discoveries and speculations, and far more by Biblical criticism. While this criticism has been used by many as a means to a fuller comprehension of divine revelation, much of it is simply destructive, and has led to ill-considered expressions of opinion adverse to the doctrine of the church. From without, the church has been threatened with disestablishment both wholly and as regards the dioceses within the Welsh counties; and the education of the poor, which from early days depended on its care, has largely been taken out of its hands (see EDUCATION). The amount contributed by the church to elementary education, including the maintenance of Sunday schools, in 1907–8 was £576,012. During the last sixty years the church has strengthened its hold on the loyalty of the nation by its increased efficiency. Its bishops are laborious and active. Since 1876 the home episcopate has been increased by the creation of the dioceses of Truro, St Albans, Liverpool, Newcastle, Southwell, Wakefield, Bristol, Southwark and Birmingham, so that there are now (1910) thirty-seven diocesan bishops, aided by twenty-eight suffragan and eight assistant bishops, and a further subdivision of dioceses is contemplated. At no other time probably have the clergy been so industrious. As a rule they are far better instructed in theology than forty years ago, but they have not advanced in secular learning. Changes in the university system have contributed to draw off able young men to other professions which offer greater worldly advantages. The poverty of many of the clergy stands in strong contrast to the wealth around them. Of 14,242 benefices 4704 are said to be below £200 a year net value. The value of £100 tithe rent charge has sunk (1909) to £69 : 18 : 5¼, the average value since the Commutation Act of 1836 being £94 : 3 : 2¾. The number of assistant clergy is (1910) about 7500, in spite of the hardships often attending clerical life, the supply of men being kept up. The Queen Victoria Clergy Fund and other voluntary associations and various educational institutions have been founded to relieve clerical distress. In the church at home there is much energy in numberless directions: cathedral churches have become centres of religious activity, and in parish churches the administration of the Holy Communion and weekday services are frequent. Many of the laity co-operate in church work and liberally support it. During the years 1898–1907 598 churches were built or rebuilt, and during twenty-four years, 1884–1907, the voluntary offerings for church building were £27,612,709, and for endowments and parsonages £6,116,592, yet church extension fails to keep pace with the increase of the population. Evangelistic efforts, the relief of the sick and poor, and the inculcation of temperance are zealously carried on. Good work is done by twenty-six sisterhoods and several institutions of deaconesses, and one or two communities of celibate clergy. In the British colonies and India the episcopate consists (1909) of seven archbishops with two coadjutors; there are also seventy diocesan bishops, and in other parts of the world thirty missionary bishops. The S.P.G. has 847 ordained ministers, including thirty chaplains in Europe, besides many female missionaries; the C.M.S. has 793 ordained ministers, and many other missionaries of both sexes; the Zenana Missionary Society has a staff of 1288; other church societies for foreign missions are vigorous, and the S.P.C.K. in addition to its work at home spends large sums in furthering the church abroad. The benefits arising from conference have increasingly been valued since the revival of convocation. Appreciation of the importance of lay support and counsel has led to the institution of two voluntary elective assemblies called Houses of Laymen, one for each province, and in 1905 an association of the four houses of convocation and the two lay assemblies was formed with the name of the Representative Church Council. During the last forty years diocesan conferences, in which the laity are represented, have become universal, while ruridecanal and other meetings of a like kind are general. An annual church congress, established in 1861, held its forty-ninth meeting in 1909. Of wider importance are the Lambeth conferences, held since 1878 at intervals of ten years, to which the bishops of the English Church and the churches in communion with it are invited, and meet under the presidency of the archbishop of Canterbury. The first of these conferences, which illustrate the dignity of the see founded by St Augustine and now the head of a vast quasi-patriarchate, was held under the presidency of Archbishop Longley in 1867 (see Lambeth Conferences and Anglican Communion).

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ENGLEFIELD, SIR FRANCIS (*c.* 1520–1596), English Roman Catholic politician, born probably about 1520, was the eldest son of Sir Thomas Englefield of Englefield, Berkshire, justice of the common pleas. His mother was Elizabeth, daughter of Sir Robert Throckmorton, one of the well-known Catholic family of Coughton, Warwickshire. Francis, who succeeded his father in 1537, was too young to have taken any part in the opposition to the abolition of the Roman jurisdiction and dissolution of the monasteries; and he acquiesced in these measures to the extent of taking the oath of royal supremacy, serving as sheriff of Berkshire and Oxfordshire in 1546–1547, and accepting in 1545 a grant of the manor of Tilehurst, which had belonged to Reading Abbey. He was even knighted at the coronation of Edward VI. in February 1547. But the progress of the Reformation during that reign alienated him, and he attached his fortunes to the cause of the princess Mary, whose service he entered before 1551. In August of that year he was sent to the Tower for permitting Mass to be celebrated in Mary's household. He was released in the following March, and permitted to resume his duties in Mary's service. But in February 1553 he was again summoned before the privy council, and may have been in confinement at the crisis of July; perhaps he was only released on Mary's triumph, for his name does not appear among those who exerted themselves on her behalf before the middle of August. He was then sworn a member of the privy council like many others who owed their promotion to their loyalty rather than to their political abilities. Their numbers swelled the privy council and sadly impaired its efficiency; but Mary resisted the various attempts to get rid of them because she liked staunch friends, and regarded them as a salutary check upon the abler but less scrupulous members who had served Edward VI. as well as herself. Englefield sat as M.P. for Berkshire in all Mary's parliaments except that of April 1554, but received no higher political office than the lucrative mastership of the court of wards.

He was an ardent believer in persecution, was present at Hooper's trial, sought Ascham's ruin, and naturally lost his office and his seat on the privy council at Elizabeth's succession. He retired to the continent before May 1559, and from that time until his death was an active participant in all schemes for the restoration of Roman Catholicism. At first his ideas took such comparatively mild forms as inducing the pope to send a legate to persuade Elizabeth to return to the fold; but gradually they grew more violent and treasonable, until Englefield became the close confidant of Cardinal Allen, Parsons and the "jesuited" Catholics, who advocated forcible intervention by Spain and the succession of the infanta; in 1585 Englefield thought that Mary's succession, peaceful or other, would not be satisfactory unless it were owing to Spanish support and she were dependent on Philip. Englefield lived first at Rome, then in the Low Countries, and finally at Valladolid. He was blind for the last twenty years of his life, and received a pension of six hundred crowns from Philip. He had been outlawed in 1564 and his estates sequestered, but they were not forfeited until 1585, when an act of attainder was passed against Englefield. Even then some legal difficulties stood in the way of their appropriation by the crown, for Englefield, obviously with an eye to this contingency, had conditionally settled them on his nephew Francis. The long arguments on the point are given in Coke's *Reports*, and a further act was passed in 1592 confirming the forfeiture to the crown. The nephew, however, eventually recovered some of the family estates, and was created a baronet in 1612. His uncle was alive in September 1596, but apparently died at Valladolid about the end of that year. His tomb there used to be shown to visitors as that of an eminent man.

See *Dict. of Nat. Biog.* xvii. 372-374; but additional light has been thrown on Englefield's career since the date of that article by the publication of the Spanish and Venetian Calendars, the Hatfield MSS., the Acts of the Privy Council, and the Letters and Papers of Henry VIII. (A. F. P.)

ENGLEHEART, GEORGE (1752–1829), English miniature painter, the great rival of Richard Cosway, was born at Kew in October 1752, and received his artistic training first under George Barret, R.A., and then under Sir Joshua Reynolds. He started on his own account in 1773, and exhibited in that year at the Royal Academy. He continued the active pursuit of his profession down to 1813, when he retired, and his fee-book, still in existence, records the names of his sitters, and the amount paid for each portrait, proving that he painted 4853 miniatures during that period of thirty-nine years, and that his professional income for many years exceeded £1200 a year. During the greater part of his life he resided in Hertford Street, Mayfair, where he lived till he retired. He died at Blackheath in 1829, and was buried at Kew.

He painted George III. twenty-five times, and had a very extensive circle of patrons, comprising nearly all the important persons connected with the court. He made careful copies in miniature of many of the famous paintings executed by Sir Joshua Reynolds, and in some cases these constitute the only information we possess respecting portraits by Sir Joshua that are now missing. His fee-book, colours, appliances and a large collection of his miniatures still remain in the possession of his descendants.

His nephew, JOHN COX DILLMAN ENGLEHEART (1784–1862), also a miniature painter, entered George Engleheart's studio when he was but fourteen years of age. He first exhibited at the Royal Academy in 1801, and sent in altogether 157 works. He was a man of substantial means, and in his time a very popular painter, but his health broke down when he was forty-four years old, and he had to relinquish the pursuit of his profession. He lived at Tunbridge Wells for some years and died there in 1862.

See *George Engleheart,* by G. C. Williamson and H. L. D. Engleheart (1902). (G. C. W.)

ENGLEWOOD, a city of Bergen county, New Jersey, U.S.A., near the Hudson river, 14 m. N. by E. of Jersey City. Pop. (1900) 6253, of whom 1548 were foreign-born and 386 negroes; (1905) 7922; (1910) 9924. It is served by a branch of the Erie railway, and by an electric line connecting with a ferry (at Fort Lee) to New York. Englewood is primarily a residential suburb of New York. The site rises terrace above terrace from the marshes in the valley of the Hackensack to the top of the palisades overlooking the Hudson, from which Englewood is separated by the borough of Englewood Cliffs (pop. in 1905, 266). There are several fine residences, a hospital, a public library and the Dwight school for girls (1859). The site of Englewood was for a long time a part of "English Neighbourhood," and was known as Liberty Pole; but until 1859, when the place was laid out, there were only a few houses here, one of which was the "Liberty Pole Tavern." In 1871 Englewood was set off from the township of Hackensack and was incorporated as a separate township, and in 1896 it was chartered as a city; but the act under which it was chartered was declared unconstitutional, and in 1899 Englewood was rechartered as a city by a special act of the state legislature.

ENGLISH CHANNEL (commonly called "The Channel"; Fr. *La Manche*, "the sleeve"), the narrow sea separating England from France. If its entrance be taken to lie between Ushant and the Scilly Isles, its extreme breadth (between those points) is about 100 m., and its length about 350. At the Strait of Dover, its breadth decreases to 20 m. Along both coasts of the Channel, cliffs and lowland alternate, and the geological affinities between successive opposite stretches are well marked, as between the Devonian and granitic rocks of Cornwall and Brittany, the Jurassic of Portland and Calvados, and the Cretaceous of the Pays de Caux and the Isle of Wight and the Sussex coast, as well as either shore of the Strait of Dover. The English Channel is of comparatively recent geological formation. The land-connexion between England and the continent was not finally severed until the latter part of the Pleistocene period. The Channel covers what was previously a wide valley, and may be described now as a headless gulf. The action of waves and currents, both destructive and constructive, is well seen at many points; thus Shakespeare Cliff at Dover is said to have been cut back more than a mile during the Christian era, and the cliffs of Grisnez have similarly receded. Of the opposite process notable examples are the building of the pebbly beaches of Chesil Bank and near Tréguier in Côtes du Nord, and the promontory of Dungeness. The total drainage area of the English rivers flowing into the Channel is about 8000 sq. m.; of the French rivers, including as they do the Seine, it is about 41,000 sq. m.

From the Strait of Dover the bottom slopes fairly regularly down to the western entrance of the Channel, the average depths ranging from 20 to 30 fathoms in the Strait to 60 fathoms at the entrance. An exception to this condition, however, is found in Hurd's Deep, a narrow depression about 70 m. long, lying north and north-west of the Channel Islands, and at its nearest point to them only 5 m. distant from their outlying rocks, the Casquets. Towards its eastern end Hurd's Deep has an extreme depth of 94 fathoms, and in it are found steeper slopes from shoal to deep water than elsewhere within the Channel. Nearing the entrance to the Channel from the Atlantic, the 100 fathoms line may be taken to mark the edge of soundings. Beyond this depth the bottom falls away rapidly. The 100 fathoms line is laid down about 180 m. W. to 120 m. S.W. of the Scilly Isles, and 80 m. W. of Ushant. Within it there are considerable irregularities of the bottom; thus a succession of narrow ridges running N.E. and S.W. occurs west of the Scillies, while only 4 m. N.W. of Ushant there is a small depression in which a depth of 105 fathoms has been found. As a general rule the slope from the English coast to the deepest parts of the Channel is more regular than that from the French coast, and for that reason, and in consideration of the greater dangers to navigation towards the French shore, the fairway is taken to lie between 12 and 24 m. from the principal promontories of the English shore, as far up-channel as Beachy Head. These promontories (the Lizard, Start Point, Portland Bill, St Alban's Head, St Catherine's Point of the Isle of Wight, Selsey Bill, Beachy Head, Dungeness, the South Foreland) demarcate a series of bays roughly of sickle-shape, the shores of which run north and south, or nearly so, at their western sides, turn eastward somewhat abruptly at their heads, and then trend more gently towards the south-east. On the French coast the arrangement is similar but reversed; Capes Grisnez, Antifer and La Hague, and the Pointe du Sillon demarcating a series of bays (larger than those on the English coast) whose shores run north and south on the eastern side, and have a gentler trend westward from the head.

The configuration of the coasts is perhaps the chief cause of the peculiarities of tides in the Channel. From the entrance as far as Portland Bill the time of high water is found to be progressively later in passing from west to east, being influenced by the oceanic tidal stream from the west under conditions which are on the whole normal. But eastward of a line between Portland Bill and the Gulf of St Malo these conditions are changed and great irregularities are observed. On the English coast between Portland Bill and Selsey a double tide is found. At Portland this double tide corresponds approximately with the time of low water in the regular tidal progression, and the result is the occurrence of two periods of low water, separated by a slight rise known locally as "gulder." But farther east the double tide corresponds more nearly with the time of high water, and in consequence either the effect is produced of a prolonged period of high water, or there are actually two periods of high water, as at Southampton. Various causes apparently contribute to this phenomenon. The configuration of the coast line is such as to present at intervals barriers to the regular movement of the tidal wave (west to east), so that reflex waves (east to west) are set up. In the extreme case at Southampton the tidal effect is carried from the outer Channel first by way of the Solent, the strait west of the Isle of Wight, and later by way of Spithead, the eastern strait. Finally the effect of the tidal stream entering the Channel through the Strait of Dover from the North Sea must be considered. The set of this stream towards the Strait of Dover from the east corresponds in time with that of the Channel stream (*i.e.* the stream within an area defined by Start Point, the Casquets, Beachy Head and the mouth of the Somme) towards the strait from the west; the set of the two streams away from the strait also corresponds, and consequently they alternately meet and separate. The area in which the meeting and separation take place lies between Beachy Head and the North Foreland, the mouth of the Somme and Dunkirk. Within this area, therefore, a stream is formed, known as the intermediate stream, which, running at first with the Channel stream and then with the North Sea stream, changes its direction throughout its length almost simultaneously, and is never slack. Under these conditions, the time of high water eastward of Selsey Bill as far as Dover is almost the same at all points, though somewhat earlier at the east than at the west of this stretch of coast. The configuration of the French coast causes a very strong tidal flow in the Gulf of St Malo, with an extreme range at spring tides of 42 ft. at St Germain, compared with a range of 12 ft. at Exmouth and 7 ft. at Portland. In the neighbourhood of Beer Head and Portland and Weymouth Roads the streams are found to form vortices with only a slight movement. On the eastern (Selsey-Dover) section of the English coast the *maximum* range of tide is found at Hastings, with a decrease both eastward and westward of this point.

Westerly winds are most prevalent in the Channel. The total number of gales recorded in the period 1871–1885 was 190, of which 104 were south-westerly. Gales are most frequent from October to January (November during the above period had more than any other month, with an average of 2·1), and most rare from May to July. It appears that gales are generally more violent and prolonged when coincident with spring tides than with neaps. The winds have naturally a powerful effect on the tidal streams and currents, the latter being in these seas simply movements of the water set up by gales, which may themselves be far distant. Thus under the influence of westerly winds prevailing west of the Iberian Peninsula a current may be set up from the Bay of Biscay across the entrance of the Channel; this is called Rennell's current. Fogs and thick weather are common in the Channel, and occur at all seasons of the year. Observations during the period 1876–1890 at Dover, Hurst Castle and the Scilly Isles showed that at the two first stations fogs most frequently accompany anticyclonic conditions in winter, but at the Scilly Isles they are much more common in summer than in winter, and accompany winds of moderate strength more frequently than in the case of the up-Channel stations.

(O. J. R. H.)

Salinity and Temperature.—The waters of the English Channel are derived partly from the west and partly from the English and French rivers, and all observations tend to show that there is a slow and almost continuous current through it from west to east. The western supply comes from two sources, one of which, the more important, is the relatively salt and warm water of the Bay of Biscay, which enters from the south-west and has a salinity sometimes reaching 35·6 pro mille (parts of salt per thousand by weight); the other consists of a southerly current from the Irish Channel, and is colder and has a salinity of 35·0 to 35·2 pro mille. As the water passes eastwards it mixes with the fresher coastal water, so that the salinities generally rise from the shore to the central line, and from east to west, though south of Scilly Islands there is often a fall due to the influence of the Irish Channel. The mean annual salinity decreases from between 35·4 and 35·5 pro mille in the western entrance to 35·2 pro mille at the Strait of Dover on the central axis, and to about 34·7 pro mille under the Isle of Wight and off the Bay of the Seine. The English Channel may be divided into two areas by a line drawn from Start Point to Guernsey and the Gulf of St Malo. In the eastern area the water is thoroughly mixed owing to the action of the strong tidal currents and its comparatively small depth, and salinities and temperatures are therefore generally the same from surface to bottom; while westward of this line there is often a strongly marked division into layers of different salinity and temperature, especially in summer and autumn, when the fresher water of the Irish Channel is found overlying the salt water of the Bay of Biscay. The salinity of the English Channel undergoes an annual change, being highest in winter and spring and lowest in summer, and this change is better marked in the eastern area, where the mean deviation from the annual mean reaches 0·3 pro mille, than it is farther west with a mean deviation of 0·1 pro mille. There is also reason to believe that there is a regular change with a two-year period, years of high maximum and low minimum alternating with years of low maximum and high minimum. Variations of long period or unperiodic also occur, which are probably, and in one case (1905) almost certainly, due to changes taking place some months earlier far out in the Atlantic Ocean.

The mean annual *surface* temperature increases from between 11° C. and 11·5° C. at the Strait of Dover to over 12° C. at the western entrance.[1] The yearly range in the eastern area is considerable, reaching 11° C. off the Isle of Wight and 10° C. in the Strait of Dover; westward it gradually decreases to 5° C. a short distance north-west of Ushant. The mean maximum temperature, over 16° C., is found under the English coast from Start Point to the Strait of Dover about the 1st of September and off the French coast eastward of Cape la Hague about eleven days later. In the western area the maximum temperature is about 15° C. and occurs between September 1 and 11. The mean minimum surface temperature is between 5° C. and 6° C. at the eastern end, and increases to over 9° C. off the coast of Brittany. Owing to the thorough mixing of the water in the eastern area the temperatures are here generally the same at all depths, and the description of the surface conditions applies equally to the bottom. In the western entrance, on the other hand, the bottom temperature is often much lower than on the surface; the range here is also much less, about 3° C., and the maximum is not reached till about the 1st of October, or from three weeks to a month later than on the surface.

A detailed account of the mean conditions in the English Channel will be found in *Rap. et procès-verbaux*, vol. vi., and *Bulletin supplémentaire* (1908) of the Conseil Permanent International pour l'Exploration de la Mer (Copenhagen). (D. J. M.)

Cross-Channel Communication.—An immense amount of time and thought has been expended in the elaboration of schemes to provide unbroken railway communication between Great Britain and the continent of Europe and enable passengers and goods to be conveyed across the Channel without the delay and expense involved by transhipping them into and out of ordinary steamers. These schemes have taken three main forms: (1) tunnels, either made through the ground under the sea, or consisting of built-up structures resting upon the sea bed; (2) bridges, either elevated high above the sea-level so as to admit of the unimpeded passage of ships under them, or submerged below the surface; and (3) train ferries, or vessels capable of conveying a train of railway vehicles with their loads. A tunnel was first proposed at the very beginning of the 19th century by a French mining engineer named Mathieu, whose scheme was for a time favourably regarded by Napoleon, but it was first put on a practical basis more than fifty years later by J. A. Thomé de Gamond (1807–1876), whose plans were submitted to the French emperor in 1856. This engineer had begun to work at the problem of cross-Channel communication twenty years previously, and had considered the possibility of a submerged tunnel or tube resting on the sea-level, of steam ferries plying between huge piers thrown out from both coasts, and of a bridge, for which he prepared five different plans. He again brought forward his scheme for a tunnel, in a modified form, in 1867, and exhibited his plans in the Universal Exhibition of that year. About the same time an English engineer, William Lowe, of Wrexham, was also working at the idea of a tunnel. Geological investigation convinced him that between Fanhole, a point half a mile west of the South Foreland light, and Sangatte on the French coast, 4 m. W. of Calais, the Dover grey chalk was continuous from side to side, and he considered that this stratum, owing to its comparative freedom from water and the general absence of cracks and fissures, offered exceptional advantages for a tunnel. He and Thomé de Gamond joined forces, and their plans were adopted by an international committee whose object was to popularize the idea of a tunnel both in England and France. Its engineers on the English side were Lowe, Sir James Brunlees and Sir John Hawkshaw, the last of whom in 1866 had made trial borings at St Margaret's and near Sangatte; and on the French side Thomé de Gamond, Paulin Talabot and Michael Chevalier. In 1868 they reported that there was a reasonable prospect of completing the tunnel in ten or twelve years at a cost not exceeding ten millions sterling. They admitted, however, that there was some risk of an influx of the sea, but pointed out that this risk could be determined by driving preliminary driftways, as suggested by Lowe, and for this purpose asked for financial aid from the imperial treasury. A commission of inquiry then appointed by the French ministry of public works reported favourably on the plans, though it declined to recommend a grant of money; but the further progress of the scheme was interrupted by the outbreak of the Franco-German war.

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[1] 50° F. = 10° C.; 60·8° F. = 16° C.

The tunnel was by no means the only plan in evidence at this period for securing continuous railway communication between England and France. An iron tube, resting on the bottom of the sea, had been proposed by Tessier de Mottray in 1803, and had again been considered by Thomé de Gamond in 1833; but after 1850 projects of this kind might almost be counted by the dozen. Some of the structures were to be of iron, others of concrete or masonry, and some were to be floated a moderate distance below the surface. One of the most carefully worked out plans was that of J. F. Bateman and J. Revy, who proposed to construct a continuous tube, 13 ft. in internal diameter, of iron rings each 10 ft. long, each ring being built out from the completed portion of the tube by means of a horizontal chamber or bell, which slid telescopically over the last few rings previously put in place, and was moved forward by hydraulic power. About the same time Zerah Colburn produced plans for a tube constructed of 1000 ft. sections, which were to be built in dry dock and then successively attached by a ball and socket joint to the completed portion, the whole being raised from the bottom and dragged out to sea, by the aid of a large number of ships, as each section was attached and launched. Thomas Page, again, the builder of Westminster Bridge, proposed to place eight conical steel shafts at intervals across the Strait of Dover, and to connect them by long sections of tube lowered from the surface, the whole structure being covered with concrete when finished. No attempt was made to put any of these plans into execution, and the same was true of several bridge schemes propounded about the same time; in one of these, spans one-half or three-quarters of a mile in length were contemplated, while another required 190 towers, 500 ft. apart and rising 500 ft. above the water-level, which obviously would have constituted an intolerable nuisance to navigation. The case, however, was different with a train ferry which was vigorously advocated by Sir John Fowler. His proposal was to employ steamers 450 ft. long, with a beam of 57 ft. and a speed of 20 knots, having railway lines laid down on their decks on and off which railway vehicles could be run directly at each side of the strait. Dover was to be the English port, while on the French coast a new harbour was to be formed at Audresselles, between Calais and Boulogne. This plan in 1872 received the sanction of the House of Commons, but was rejected in the House of Lords by the casting vote of the chairman of the committee. According to another similar ferry scheme, which was worked out by Admiral Dupuy de Lôme in 1870, a new maritime station was to be constructed at Calais, so far off the shore that it would command deep water at every state of the tide, and connected with the French railways by a bridge.

After the conclusion of the Franco-Prussian War, negotiations concerning the tunnel were resumed between the French and British governments, and in 1872 the latter intimated that it had "no objection in principle." After some further communications between the two governments in 1874, settling the basis on which the enterprise should be allowed to proceed, a joint commission was appointed to arrange details relating to jurisdiction, the right of blocking the tunnel, &c., and this commission's report was accepted as a basis of agreement between the governments. In 1875 the Channel Tunnel Company obtained an act authorizing it to undertake certain preliminary works at St Margaret's Bay. In the same year the French Submarine Railway Company obtained a concession, with the obligation to spend a minimum of 2,000,000 francs in making investigations; in fact it took over 3000 samples from the bottom of the sea in the strait, and made over 7000 soundings, and also sunk a shaft at Sangatte and started a heading. The English company did not do so much, for it failed to raise the money it required and its powers expired in 1880. Moreover, it was not the only company in the field, and its programme was not universally accepted as the best possible. Some authorities, such as Sir Joseph Prestwich, doubted whether the tunnel should be attempted in the chalk because of the likelihood of fissures being encountered while others who thought the chalk suitable were dissatisfied with the actual plans and formed a rival "Anglo-French Submarine Railway Company." In 1882 another tunnel company made its appearance. In 1874 the South Eastern Railway Company had obtained powers to sink experimental shafts on its property between Dover and Folkestone, and in 1881 to acquire lands, including the beach and foreshore, in that area in connexion with a Channel tunnel. These powers resulted, in 1882, in the formation of the Submarine Continental Railway Company which in that year sought parliamentary sanction for a tunnel, starting from a point west of Dover, at Shakespeare's Cliff; and at the same time the resuscitated Channel Tunnel Company applied for powers to make one from Fanhole, instead of St Margaret's Bay as in its former scheme. The whole question of the tunnel was then widely discussed and considered by various committees, the last of which—a joint select committee of the Lords and Commons—in 1883 expressed the opinion by a majority that it was "inexpedient that parliamentary sanction should be given to a submarine communication between England and France." This decision for the time being disposed of the question of making a tunnel, and though Sir Edward Watkin, one of its most prominent advocates, brought bill after bill before parliament to authorize experimental works in connexion with it, all were rejected. In 1882 the government interfered with the operations then in progress, and they were ultimately discontinued. They included a driftway 7 ft. in diameter which was driven for a distance of about 2300 yds. eastwards under the sea at an inclination of 1 in 72 from the bottom of a shaft sunk to a depth of 164 ft. in the chalk marl at Shakespeare's Cliff.

About this time the Channel Bridge and Railway Company took in hand the design of a bridge, the preliminary plans for which were exhibited in the Paris Exhibition of 1889. The terminal points were Folkestone and Cap Grisnez, and for the sake of facilitating the laying of the pier foundations it was proposed to take the bridge over the Varne and Colbart shoals. The main girders were to be nearly 59 yds. above the sea-level, the railway itself being more than 20 ft. higher still, and the spans were to vary in length between 540 and 108 yds. As the result of a survey of the sea bottom made in 1890, a modification in the line of the bridge was adopted, and it was taken direct from Cap Blancnez to the South Foreland. It was found that in this way an excellent bottom would be obtained for the foundations, and the length of the bridge would be 3 m. less, the number of piers, by employing spans of 434 and 542 yds. alternately, being reduced to 72. The cost of this structure was estimated at £28,320,000, exclusive of interest on capital during the period of construction, which was put at seven years. The same company also worked out plans for a moving chariot or platform, capable of holding a railway train and supported by long legs on a submerged causeway or track constructed of steel or armoured concrete 45 or 50 ft. below low-water level. No attempt has been made actually to carry out either this project or that of a bridge.

In 1905 the question of establishing a train ferry from Dover across the Channel was brought forward by the Intercontinental Railway Company, and in the following year the Channel Ferry (Dover) Act was passed authorizing the work. About the same period the Channel Tunnel Company, which had amalgamated with the Submarine Railway Company, awoke to activity and started a campaign in favour of its scheme; but the bill which it promoted was opposed by the government and accordingly was withdrawn in March 1907.

See *Blue-book, Correspondence respecting the proposed Channel Tunnel*, Commercial No. 6 (1875); *Blue-book, Correspondence with reference to the proposed Construction of a Channel Tunnel*, C. 3358 (1882); *Blue-book, Report from the Joint Select Committee of the House of Lords and House of Commons on the Channel Tunnel* (1883); F. J. Bramwell, "The Making and Working of a Channel Tunnel," *Proc. Roy. Inst.*, May 1882; Tylden Wright, "The Channel Tunnel," *North of England Inst. Min. and Mech. Eng.* vol. 33 (1882); W. Boyd Dawkins, "The Channel Tunnel," *Manchester Geol. Soc.*, May 1882, and *Brit. Assoc. Rep.* (1882, 1899); E. de Rodakowski, *The Channel Ferry* (London, 1905). (H. M. R.)

ENGLISH FINANCE. The history of the English fiscal system affords the best example known of continuous financial development, in respect both of institutions and methods. Though certain great periods of change can be readily noticed, yet from the time of the Norman Conquest to the beginning of the 20th century the line of connexion is substantially unbroken. Perhaps the most revolutionary changes occurred in the 17th century, as the outcome of the Civil War, and, later on, the revolution of 1688. But even in this case there was no real breach of continuity. It is, therefore, possible to trace the normal growth and expansion of British finance as one of the aspects of the nation's history.

The primitive financial institutions of England centre round the king's household, or, in other words, the royal economy precedes the national one. Revenue dues collected by the king's agents, rents, or rather returns of produce, from land, and special levies for emergencies form the elements of the royal income, which gradually acquired greater regularity and consistency. There is, however, little or no evidence of any effective financial organization until we approach the 11th century. The influence exercised from Normandy, which so powerfully affected the English rulers at this time, tended towards the creation of records of revenue claims and also of a central treasury.

With the union of England and Normandy under the same head the idea of settled administrative methods was definitely fixed and became of special importance in the field of finance. The systematizing spirit, so characteristic of both the Norman and Angevin kings, produced the great institution of the exchequer (*q.v.*) with its judicial and administrative sides, and its elaborate forms of account and control. Even before this organization was developed the Domesday Survey (see DOMESDAY BOOK)—now recognized as having a purely fiscal object (in Maitland's words "a tax book, a geld book")—shows the movement towards careful observation of the sources of revenue. It is clear that William I. initiated a policy which was followed by his successors, in spite of the serious difficulties of the period of anarchy during Stephen's nominal reign. The obscure question as to the real origin of the special contrivances employed by the exchequer is, strictly speaking, irrelevant to the financial inquirer, who may be content to hold that, granting the existence of some Old English analogies, the system, as it appears in the 12th century, was a peculiar product of the conceptions as to fiscal organization formed by Norman subtlety. It is the manner in which this institution held together and focused the revenues and expenditure of the kingdom that has to be considered. The picture presented by the "Dialogue of the Exchequer" (*c.* 1176) is that of a comprehensive system which secured the receipt of the royal income, and provided a thorough audit of the accounts by employing processes adapted to the circumstances of the time. It is, in fact, through the description of financial institutions that it is possible to ascertain the forms of revenue possessed by the crown. The ingenuity expended on the administrative machinery of the exchequer had as its aim the increase of the king's resources, an object in which the official class of churchmen and lawyers was deeply interested.

In order to understand the character of English finance in the middle ages it is absolutely essential to bear constantly in mind the identification of the king with the state. Though feudalism (*q.v.*) was, in one of its aspects, a powerful instrument for division of political authority, it, nevertheless, in the particular form in which the Conqueror introduced it into England, enabled the fiscal rights of the crown to be established in a more definite shape than was possible under the older condition. For, in the first place, the actual property of the crown was more carefully administered as each royal manor came under the system of accounting. Again, the various claims or dues of the king took more decidedly the feudal type and received stricter legal definition. Further, the higher judicial organization assisted the expansion of court fees; while, above all, the increased authority of the state made the casual receipts (for such they were) from trade more profitable.

In a broad view the sources of revenue fall under the following heads:—(1) The royal estates which were distributed over England, derived in part from the possessions of the old English kings, but increased by the confiscations that followed the events of the Conqueror's reign, as well as by the doctrine that unowned land was the king's (*terra regis*). Over fourteen hundred manors appear in Domesday as royal property. The forests, placed under special laws, yielded little revenue, except in the form of penalties on offenders. The rural tenants, who at first paid their rents in produce, gradually commuted them into money payments. As the royal demesne was favourable for the growth of towns the rents derived from urban tenants became a valuable part of the yield from the demesne; this, later, took the shape of a payment from the town as a unit (the *firma burgi*), a method which secured to the burghers freedom from the exactions of the sheriff and which was purchased by special payments. (2) The feudal rights. These included the claim to military service; the three regular aids and the payments of relief at succession to a fief, as also the profits on wardships and marriages. Escheats and forfeitures completed the list. The yield from this source varied with the power of the king and was kept within bounds by the resistance of the tenants as shown in the provisions of Magna Carta. (3) The administration of justice was a lucrative prerogative of the crown. Suitors had to pay for securing the hearing of their cases in addition to the fees for writs, and both amercements and compositions increased the receipts under this head. (4) Two special classes contributed to the royal exchequer. As a great deal of the wealth of the country was in the hands of the church the opportunities afforded by the vacancies of sees, abbacies and priories were utilized for the purpose of securing the profits of these offices during the time in which there was no occupant; and this term was frequently prolonged by the king's action or inaction. The Jews, until their expulsion, were an even more profitable class to the revenue. Being under the absolute control of the crown, they could be taxed at pleasure, either by taking a percentage of their property (*e.g.* in one case one-fourth), or by levies for alleged offences. The existence of a separate exchequer for the Jews is an indication of their fiscal value. (5) Direct taxation formed an extraordinary or occasional head of revenue. The Danegeld was succeeded by the carucage, and the commutation of military service introduced the scutage, but these forms were of little immediate importance, though very significant for the future course of development. (6) Lastly come the dues claimed at the ports, which contain in germ the customs system of later times, though they rather resemble the harbour charges of modern ports and were very trivial in amount.

The history of the English financial system consists largely in the exhibition of the different fortunes of these several component parts of the exchequer receipts; for it must be remembered that the sheriff was bound to account to that tribunal for all that he should have received, and by this agency the local contributions passed into the king's possession for the service of the state. During the century and a half that lay between the Conquest and the granting of the Great Charter the account given above holds good. The character of the ruler affected the vigour of the fiscal, as well as the general, administration. Henry I. and Henry II. secured much better results than Stephen or John; but the collection of the rent and profits of the royal manors and the feudal and other dues continued as the mainstay of revenue. Indications of change are, however, to be found. Thus the substitution of the "carucage" or plough tax for the "Danegeld" marks an advance towards direct taxation of land through its produce, and the introduction of "scutage" is not only further evidence of the same tendency, but also a step in the development of "money economy" in place of the earlier "natural economy" or system of payments in kind. The special levies or "tallages" imposed at times of need on the towns in the king's demesne appear to have been a doubtful exercise of the royal prerogative, but scientifically they belong to the same class as the Danegeld and scutage. Perhaps the most important advance made in this period is the beginning of taxation of movables, first applied in the Saladin tithe of 1189 and, later, expanded into a general system.

In the reign of John (1199–1216) the loss of Normandy and the concession of the barons' demands by the issue of Magna Carta rendered financial readjustments inevitable. During the long reign of Henry III. the struggle to maintain the privileges granted by the Charter acted on the fiscal system by checking the arbitrary use of tallages, and as a consequence, encouraging the regular assessment of the tax on movables, which was becoming more prominent. The fruitful idea that it was necessary to obtain the consent of the payers of taxes before the imposition operated powerfully in favour of the establishment of bodies representing the several estates. It is through the reaction of constitutional on fiscal development that the transition from feudal to parliamentary taxation in its earlier form is made.

Almost at the opening of the age of parliamentary taxation one of the older sources of revenue ceased. The pressure of popular opinion forced Edward I. to decree the expulsion of the Jews (1290), though he naturally desired to retain such profitable subjects. It is, indeed, probable that, owing to the exactions practised on them, the Jewish usurers had become less serviceable to the exchequer; while it is certain that the general resources of the kingdom had so increased as to make their contribution relatively much smaller. The first effects of the representative influence in the fiscal domain are the abandonment of the tallages on towns and the decline of scutage as a mode of levy. The tax on movables was framed in a more systematic way. Instead of distinct charges on different classes, or variations in proportion of levy from one-fourth to one-fortieth, the policy of imposing a tax of one-tenth on the towns and one-fifteenth on the counties was adopted. Greater strictness in assessment was sought by the appointment of commissioners for each county, supplied with special instructions as to taxable goods and exemptions. This method continued in force for the tax on movables from 1290 till 1334, though in some cases the proportions imposed on the towns and counties were varied (*e.g.* an eighth and a fifth were granted in 1297, and a tenth and a sixth in 1322). A more general influence was the growing national economy which led to greater activity on the part of the king as administrator, and which also increased the need of the state for revenue. Though the doctrine that "The king should live of his own" was generally accepted as a constitutional maxim, the force of events was making it obsolete. From being an infrequent and uncertain kind of taxation the direct tax on movables, which was practically absorbing the older forms, became usual and regular. Under medieval conditions the collection of a general property tax (for such, in fact, was the nature of "the tenth and fifteenth") presented serious difficulties. Each locality gained by keeping its assessment down to the lowest point, while the borough authorities were naturally not eager to enforce the charge on their fellow-citizens. England in the 14th century was not ripe for a system that has been found hard to make effective in more advanced societies. Hence, from 1334 onward, the method of "apportionment" was employed, *i.e.* the tenth and fifteenth was taken as affording a definite sum measured by the yield on the ancient valuation. As this gave, in the aggregate, between £38,000 and £39,000, "the tenth and fifteenth" became for the future "practically a fiscal expression for a sum of about £39,000"; the total to be divided or "apportioned" between the several counties, cities and boroughs according to their former payments. This settlement, which remained in force for centuries and affected all the later direct taxes, had the great advantages of certainty and adaptability. The inhabitants of any particular town knew their total liability and could distribute it amongst themselves in the manner most convenient to them. From the royal standpoint also the arrangement was satisfactory, for the "tenth and fifteenth" could be multiplied (*e.g.* in 1352 three "tenths and fifteenths" were voted for three years), and supplied a stable revenue for the service of the kingdom. To the parliament the power of regulating the policy of the crown by the bestowal or refusal of grants was naturally agreeable. Thus, all sections of the nation united in support of the system established in 1334, just before the opening of the Hundred Years' War, in connexion with which it was particularly serviceable.

Akin to the tax that has just been described, at least in its nature as a direct impost, is the poll or capitation tax. Financial pressure at the close of Edward III.'s reign (1377) led to the adoption of a tax of fourpence per head on all persons in the kingdom (mendicants and persons under fourteen years being excepted). This "tallage of groats," which seems to be derived by analogy from the hearth money for Peter's pence, was followed by the graduated poll taxes of 1379 and 1380. In the former the scale ranged from ten marks (£6:13:4) imposed on the royal dukes and the viscounts, through six marks on earls, bishops and abbots, and three on barons, down to the groat or fourpence payable by all persons over sixteen years of age. Such a form of taxation approximated—as Adam Smith saw—to an income tax, but it proved to be unproductive, only half of the estimated yield of £50,000 being obtained. The tax of 1380 varied within narrower limits; from twenty shillings to fourpence (or sixty groats to three), with the proviso that "the strong should aid the weak." But this particular tax is chiefly memorable as the occasion—whatever may have been the real causes—of the great "Peasants' Revolt" of 1381. This unlucky association sealed the fate of the poll tax as a fiscal expedient. It was abandoned, with one exception, for nearly three hundred years; and its occasional employment in the 17th century did not result in its permanent revival. Apart from special circumstances it is plain that the "tenth and fifteenth" was better suited than the poll tax for the purpose of English finance. The machinery for collection was ready to hand for the former, while special agents had to gather the latter, even from the poorest classes. In fact, the episode of the poll taxes may be regarded as an attempt—fortunately unsuccessful—to relieve the propertied classes at the expense of the peasants and poorer burghers. Failure in this respect helped in the maintenance of the settlement of direct taxation devised in 1334.

Parallel with the evolution of direct taxation, but decidedly lagging behind, is the progress of indirect taxation. As already mentioned, the right of levying dues on goods entering or leaving English ports belonged from very early times to the king. Whether this power was, in its origin, due to the protection afforded to traders and thus a kind of insurance, or the result of the royal prerogative of pre-emption is immaterial for finance. What is established is that the "prisage" of wine or levy of one cask in ten, and the taking of one-tenth or one-fifteenth of other commodities was in force. Attempts to impose additional dues were forbidden by an important article (41) of the Great Charter which recognized "the ancient and just customs." One of the earliest effects of parliamentary influence is manifested in the establishment of duties on wool, woolfells and leather by Edward I.'s first parliament. After some efforts by the king to gather increased duties, the "Confirmation of the Charters"

(1297) forbade any increases on the amounts fixed in 1275, which were henceforth known as the ancient customs. Another attempt was made to obtain a higher scale of duties by arrangement with the merchants. The foreign traders consented to the royal proposals, which comprised duties on wine, wool, hides and wax, as well as a general tax of 1¼% on all imports and exports. Thus, in addition to the old customs of half a mark (6s. 8d.) per sack of wool and on each three hundred woolfells, and one mark (13s. 4d.) per last or load of leather, the foreign merchants paid an extra duty (or surtax) of 50% and also 2s. on the tun of wine—the so-called "butlerage." The privileges granted in the Carta Mercatoria (1303) were probably the consideration for accepting these enhanced dues. The English merchants, however, for the time, successfully resisted the application in their case of the higher charges, and consequently remained under the old prisage of wine. In spite of parliamentary opposition, on the ground that they amounted to an infringement of the Great Charter, the new customs were maintained in force. After being suspended in 1311 they were revived in 1322, confirmed by royal authority in 1328, and finally sanctioned by parliament in the Statute of the Staple (1353). They became a part of the permanent crown revenue from the ports, and, with the old customs, were the basis for further development.

Just as the old direct taxes were first supplemented by, and then absorbed in, the general taxation of movables, so the customs, in the strict sense, were followed by the subsidies or parliamentary grants. One great source of English wealth in the 14th century was the export of the peculiarly fine wool of the country, and the political circumstances of Edward III.'s time suggested the manipulation of the trade in this commodity for purposes of policy as well as revenue. Sometimes, in order to influence the towns of Flanders, the export of wool was absolutely prohibited; at others, export duties of varying amounts were imposed on wool, skins and leather. In the early years of the reign these arrangements were settled by agreement with the merchants. The subsidies of this class began in 1340 and henceforward were frequently granted, though complaints were very often made. Thus, in 1348 the Commons objected to the subsidy of an export duty of £2 per sack on wool on the ground that it was really a tax on the landowners, who received a lower price for their wool in consequence of the duty. Bargains between the king and the merchants were forbidden, and this species of taxation was brought under parliamentary control by statutes passed in 1362 and 1371. Along with the special duties on wool there was an increase of the imposts on wine and general goods. By agreement with the merchants a charge of 2s. per tun on wine and 2½% on goods was levied in 1347. Between 1371 and 1376 these dues were established as parliamentary grants under the names of "Tunnage" and "Poundage," leaving the older dues intact.

One class or "estate" occupied a peculiar position. The clergy still claimed the privilege of self-taxation, and therefore it was convocation, not parliament, that voted the tenths imposed on clerical property. In some instances much heavier charges (*e.g.* in 1296 one-third) were decreed by the king, but the taxation of the clergy declined in productiveness during the 14th century. By the close of the reign of Richard II. the results of the transition from feudalism to a parliamentary constitution were practically complete. In respect to finance the most important of these were: (1) The disappearance or reduction to unimportance of the feudal dues. The fact that this change occurred at, relatively speaking, so early a date is of special significance for English development. (2) The royal demesne, though it had not suffered the losses that the grants of later times inflicted on it, had also lost some of its value as a source of revenue. (3) In compensation the direct taxation of property had become a ready means of supplying the growing requirements of the administration, and the mode of levy had been reduced to a well-recognized form, unsatisfactory experiments—such as the poll tax—being withdrawn. (4) The growth of import and export duties through the "old" and "new" customs and the subsidies furnished a large part of the requisite funds. In fact, in the course of a little over three hundred years the constituent parts of the public income had, without any violent change, been completely altered in relative value and in organization.

The period of the Lancastrian kings, extending over two-thirds of the 15th century (1399–1471), is noticeable for various experiments in the system of direct taxation. The standard tax—"the tenth and fifteenth"—failed to suit the changed conditions. In consequence of the decay of some of the towns allowances had to be made to them, amounting to over 15% (£6000), which, with other deductions, lowered the yield from a "tenth and fifteenth" to £31,000. As a supplement a land tax, affecting only the large owners, was voted at the rate of 5% in 1404, and repeated with wider scope, but at the lower rate of 1⅔%, in 1411. A house tax made its appearance in 1428. Taxes on knight's fees and other freeholds were also tried, while in 1435 and 1450 the graduated income tax was employed. The minimum rate, 2½%, applied to incomes under £100 (or under £20 in the tax of 1450), and rose to 10% on the higher incomes. These devices are evidence of the demand for larger revenue, and also of the increasing unfitness of the existing direct taxation. It may be added that they indicate a disposition to adopt foreign models, particularly the methods of taxation in use in France and Italy. As to indirect taxation the receipts seem at first to have declined, and the subsidies were only granted for fixed terms (the victory of Agincourt gained a life grant to Henry V.). After the establishment of Edward IV. on the throne, the idea of a "tenth," in the literal sense, was taken up and voted (1472) by the two houses as a special military provision; but it failed to bring in the required revenue, and the king had to fall back on grants of the old-established form. Extra taxes on aliens were levied under both Lancastrian and Yorkist rulers with little profit. The most original contribution of Edward IV. to fiscal policy was the "benevolence" (*q.v.*) or payment by wealthy subjects of sums requested by the king. Voluntary in form, these payments were, in fact, compulsory, and became in later times one of the great grievances against which parliament had to struggle.

Broader issues in finance marked the course of the Tudor period, and these were connected with the general history of the time. The era of national monarchies had arrived, necessitating the maintenance of greater military and naval forces, as well as more costly machinery of administration. External policy was affected by the set of ideas that developed into mercantilism (see MERCANTILE SYSTEM); but so also was fiscal policy. Finance reflected the actions of the personal rule that was the characteristic of the 16th century. Within the period, however, some decided contrasts are to be found. Prudence, carried to parsimony with Henry VII., is followed by lavish prodigality in the case of Henry VIII. Elizabeth, again, presents in her reign a very different financial policy from that of either her father or her grandfather. The desire for a vigorous foreign policy, the hope of encouraging native industry, and the sentiment of retaliation against the trade regulations of other countries are found to interfere with the aim—strictly followed in earlier times—of obtaining the largest possible yield. All the different parts of the public economy were regarded as existing only in order to be utilized for the furtherance of national power. It is this more complex character in policy, coupled with the new influences, that the discovery of America, the Renaissance and the Reformation brought into operation, which gives special interest to the financial problems of the 16th century.

Taking in order the great heads of public income placed at the disposal of the sovereign, it appears that the first head of the old receipts—the crown lands—had been from time to time diminished by grants to the king's relatives and favourites, but had also gained through resumptions and forfeitures. On the whole, the loss and gain down to the close of the 14th century was probably balanced. The revenue was, however, inelastic, and declined in relative importance. It has been said that "it was in the 15th century that the great impoverishment of the crown estate began." The Lancastrian kings (especially Henry VI.) lost most of the lands attached to the crown through pressure of expenditure and the wholesale plunder of officials.

Though the civil wars of the 15th century brought in many forfeited estates the grants of Edward IV. kept down the increase. But the chief opportunity for aggrandizement was afforded by the dissolution of the monasteries and gilds under Henry VIII. The great mass of property that passed into the royal possession in this way was in part assigned to nobles and officials, while most of the remainder was distributed in the reigns of his children. The dwindling importance of the public revenue from land and rent charges is as noticeable under the Tudors as in earlier times. In like manner the feudal dues had fallen into a very subordinate place notwithstanding the attempts made on particular occasions to enforce them with greater rigour. The force of personal monarchy exercised by the Tudors, depending as it did on popular support, tended to encourage the collection of dues which had a legal ground in preference to taxation of the community. Of similar character was the employment of the old right of purveyance (*q.v.*), in restraint of which a series of statutes had been passed.

Whatever possibilities of obtaining some additional revenue from the crown lands or prerogative rights may have existed in the 16th century, and these were slight, all the political and social conditions tended more and more to make the need of taxation as the principal financial resource imperative. Amongst the cases of increased calls for funds to maintain the machinery of state, the rise of prices, due to increased supplies of the precious metals, must be included as one of the chief, and its effect extends into the 17th century. It was under this influence that the old forms of revenue became less profitable and that fresh developments were necessitated.

Direct taxation still retained in one of its branches the pattern set in the reign of Edward III. "Tenths and fifteenths" continued to be voted, and for some time all attempts to introduce new methods failed. In 1488 a military grant framed on the model of the abortive tax of 1472 yielded only a little over one-third of the estimate (£27,000 out of £75,000), and the unsatisfactory result prevented further experiments on the part of Henry VII. The foreign policy of Henry VIII.—particularly his French expedition—with its attendant outlay, accounts for the graduated capitation tax of 1513, which was even less in accordance with anticipation than the tax of 1488 (it yielded only £50,000 instead of £160,000). But these failures cleared the way for a more effective form of direct impost, which appeared in the "subsidy" or general tax on land and goods. The first case of this tax (1514) was a modest one—2½%; it, however, soon took on a typical form, so that the subsidy came to mean a charge of 4s. in the pound on land and 2s. 8d. in the pound on goods, a scale evidently devised with reference to the older tenth and fifteenth, which was henceforth put in a subordinate position. The subsidy became the established mode of grant under both Tudors and Stuarts, though by degrees it underwent a change similar to that experienced by its predecessor. The taxing statutes made elaborate provisions for the assessment and collection of the tax in order to secure a full return. Old habits proved too strong and the subsidy "slipped into the same kind of groove as that of the fifteenth and tenth, and became, in practice, a grant of a sum of money of about the same amount as the yield of the last preceding subsidy" (Dowell). The consequence was that each subsidy came, in the middle of the 16th century, to be a sum of £100,000, and at its close only £80,000. The parallel vote of the clergy in convocation (which after 1533 had to be confirmed in parliament) amounted to £20,000. The usual parliamentary proceeding was to vote so many "tenths and fifteenths" and so many subsidies, *e.g.* Elizabeth's first parliament voted her "two fifteenths and tenths and a subsidy," or, taking the usual values, £160,000. At times of crisis such as the arrival of the Armada the votes were enlarged by granting more tenths and fifteenths and subsidies. The history of the subsidy is instructive as to the tendencies of direct taxation in all countries. The assessment becomes inelastic and approximates to a fixed sum. As the subsidy follows the course of the later medieval taxation, so it is the undesigned model of the later land and property tax.

In the history of the port duties under the Tudors the first point for notice is the life grant to each of the sovereigns of the subsidies on wool, hides and leather, together with tunnage at 3s. and poundage at 5%; thus, with the hereditary customs, supplying a considerable revenue for the crown's use. No better indication of the increased power and popularity of the monarchy could be found. The contrast with the suspicious and grudging attitude of the Plantagenet and Lancastrian parliaments is significant of the change in national sentiment. A duty on malmsey (1490) had a retaliatory rather than a fiscal aim, being directed against the Venetians who had imposed restrictions on English trade. In several later cases wine became liable to extra duties, chiefly applied to French trade in further pursuance of the policy of retaliation. Restrictions on import and export as well as the hostile measures against foreign merchants were matters of economic policy rather than finance, but they had the indirect effect of increasing the control exercised at the ports. The loss of Calais (1558) dislocated the system of the staple and cut off one centre of customs revenue; and it was also probably the cause of an important change in the mode of valuing goods for duty. For the declaration on oath of the merchant a fixed valuation was substituted and set forth in a book of rates, the first of its class (1558). Following this reform came more stringent regulations against smuggling and fraud on the part of officials. All through the Tudor period the cost of collection was unduly high. For the first six years of Elizabeth it has been estimated at one-sixth of the gross receipts.

Just as in the 14th century the subsidy had followed the "old" and "new" customs, so in the 16th the "impositions" levied by royal prerogative formed a supplement to the parliamentary subsidy; but the principal employment of this expedient occurs in the next century. Another significant indication of the future course of indirect taxation was furnished by the grants of monopolies to inventors, producers and traders. These privileges, when they affected important commodities, operated in the same way as taxes farmed out to collectors, and, though the profit to the crown was small, they enhanced prices and excited discontent. The wisdom of Elizabeth (or her ministers) was shown in the promise of redress after the hostile debate of 1601.

From one point of view it may fairly be said that the great struggle of the Stuart kings with the parliament centred round financial issues. It is, at all events, beyond dispute that questions of taxation were the chosen ground of conflict. Taking the period from the accession of James I. to the opening of the Civil War (1603–42) it appears that the legal basis of indirect taxation was tested for the port duties in the "Great Case of Impositions" (known as Bates' case, see BATES, JOHN), while that of direct taxation was considered in the even more famous "Ship Money" case (for ever associated with the name of Hampden). In parliament the debates deal with impositions, monopolies, the grounds for voting subsidies, and the proper application of the funds granted; in fact, with nearly all the financial questions of the time. Notwithstanding these difficulties and disputes the financial system shows evident signs of expansion and adaptation to the needs of the state.

The direct grants of the parliaments of James I. far exceeded those of earlier periods (in 1606 six "fifteenths and tenths," three lay and four clerical subsidies), but the efforts to extend the other sources of revenue by the exercise of the prerogative naturally reacted on this spirit of liberality. The last "fifteenth and tenth" was voted in 1624, from which date this old-established form disappears, and the subsidy alone is used. In spite of Charles I.'s high-handed policy five subsidies were voted after the Petition of Right had been accepted, and even the Long Parliament made similar grants. Almost at the outbreak of the Civil War it also gave the king a graduated capitation tax. Other modes of direct taxation were used without parliamentary sanction. The collection of the antiquated feudal dues was enforced through the special courts (particularly the Star Chamber) with a rigour long unknown; James had tried the French device of a "tariff of honors." Both kings employed the "benevolence" until the Petition of Right made such a levy illegal. But by far the most serious innovation was the collection of the "ship money," a course forced on Charles by his determination not to meet the representatives of the nation. The writs "embodied the ultimate expression of the ingenuity of the king's advisers in the invention of means to enable him to rule without a parliament." The first writs secured over £100,000, and were followed by five further issues (1634–1639) bringing in an average return of £200,000 or about three lay subsidies. Like the "benevolence," the ship money was declared to be illegal (1641).

The contest respecting monopolies, settled by Elizabeth's withdrawal, was revived under James I., and had to be finally closed by the Statute of Monopolies (1624), declaring such grants to be utterly void. Certain exceptions (as in the case of the soap-boilers) permitted the raising of revenue by what was in fact a rudimentary excise, and plans for a general excise were discussed, especially as a substitute for the feudal dues, though they were not reduced to practice. In the earlier 17th century the customs show a steady increase. From £127,000 in 1604 they rose to nearly £500,000 in 1641. This fourfold increase was due in part to the growth of English trade, but it was also influenced by the adoption of new "Books of rates" in 1608 and 1635, fixing higher valuations, and by the inclusion of new commodities with definite duties. Wine, currants (the subject of controversy in Bates' case) and tobacco are particularly noticeable. Sugar also appears as a contributory. An interesting development was the adoption on a larger scale of the "farming" system, an evident imitation from France. A distinction was made between the "great," the "petty" and the "sugar" farms, and opportunities for gain were afforded to the officials. On the constitutional side the life grant of subsidies, made in accordance with Tudor usage to James, was temporarily withheld from Charles, a restriction which his own overbearing policy led the parliament to maintain. Practically, the whole customs revenue between 1628 and 1640 was raised by the use of the prerogative without any parliamentary sanction. The Tunnage and Poundage Act of 1641 pronounced definitely against the legality of any extra parliamentary customs and thus closed another of the constitutional problems of finance.

In the progress from the Conquest to the crisis of the Great Rebellion there is noticeable a practically complete shifting of the classes of revenue. The king had ceased "to live of his own"; the royal demesne and the prerogative rights included in feudalism had become very subordinate. The direct taxation of property and income, and the indirect taxation on imported or exported commodities became the principal forms of receipt.

In the long course of English financial history the nearest approach to the new departure and an abandonment of old devices is found at the time of the Civil War and Commonwealth. The actual outlines of the now existing system made their appearances, while the older portions of the revenue—particularly the survivals of feudalism—are eliminated. Thus the Civil War and the Interregnum (1642–60) may be regarded as marking a watershed in the financial history of the country. At the beginning of the struggle both sides had to rely on voluntary contributions. Plate and ornaments were melted down and useful commodities were furnished by the adherents of the king and by those of the parliament. As holding possession of London and the central organization the parliament voted subsidies and a poll tax. Such imports could hardly be levied with success and new forms became necessary. The direct taxation took the shape of a "monthly assessment" which was fixed from time to time, and which was collected under strict regulations, in marked contrast to the lax management of the former subsidies. As the amount for each district was fixed, the systematic collection secured "the more equitable adjustment of the burden of the tax as regards the various taxpayers" without hardship to the community. In spite of its origin, the "assessment" was the model for later taxation of property. The yield of this tax—exceeding for the whole period £32,000,000—is a proof of its importance. Minor contrivances, *e.g.* the "weekly meal" tax, indicate the financial difficulties of the parliament, but are otherwise unimportant. Owing to its control of the sea and the principal ports the parliament was able to command the customs revenue; and in this case also it remodelled the duties, abolishing the wool subsidy and readjusting the general customs by a new book of rates. A more extensive tariff was adopted in 1656, and various restrictions in harmony with the mercantilist ideas of the time were enforced. Thus French wines, silk and wool were excluded from 1649 to 1656. Far more revolutionary in its effects was the introduction of the excise or inland duties on goods—a step which Elizabeth, James I. and Charles I. had hesitated to take. Beginning (1643) with duties on ale, beer and spirits, it was soon extended to meat, salt and various textiles. Meat and domestic salt were relieved in 1647, and the taxation became definitely established under the administration of commissioners appointed for the purpose. Powers to let out the collection to farmers were granted, and a bid for both excise and customs amounted in 1657 to £1,100,000. Confiscations of church lands and those belonging to royalists, feudal charges and special collections helped to make up the total of £83,000,000 raised during the nineteen years of this revolutionary period. Another mark of change was the removal of the exchequer to Oxford, leaving, however, the real fiscal machinery at the disposal of the committees that directed the affairs of the parliament. Under Cromwell the exchequer was re-established (1654) in a form suited for the changes in the finances, the office of treasurer being placed in the hands of commissioners.

A complete reconstruction of the revenue system became necessary at the Restoration. The feudal tenures and dues, with the prerogative rights of purveyance and pre-emption, which had been abolished by order of the parliament, could not be restored. Their removal was confirmed, and the new revenues that had been developed were resorted to as a substitute. Careful inquiry showed that just before the Civil War the king's annual revenue had reached nearly £900,000. The needs of the restored monarchy were estimated at £1,200,000 per annum, and the loyal spirit of the commons provided sources of revenue deemed sufficient for this amount. An hereditary excise on beer and ale was voted as a compensation for the loss of the feudal dues, and temporary excises on spirits, vinegar, coffee, chocolate and tea were added. All differences of "old" and "new" customs and subsidies had disappeared under the Commonwealth. The general or "great statute" (1660) provided a scale of duties—5% on imports and exports, with special duties on wines and woollen cloths—accompanied by a new book of rates. A house tax, levied after the French pattern, on each hearth, was introduced in 1662 and became established. Poll taxes were used as an extraordinary resource, as were the last subsidies, voted in 1663, and then for ever abandoned. Licences on retailers and fees on law proceedings were further aids to the revenue, which, in the later years of Charles II. and in the short reign of his successor, was with difficulty kept up to the level of the increasing expenditure. The Commonwealth assessments were revived on several occasions, and indirect taxation was made more rigorous by the imposition of extra duties on brandy, tobacco and sugar, as also on French linens and silks. A very important development was the placing of the customs (1670) and the excise (1683) in the hands of special commissioners, instead of the system of farming them out to private collectors. The approach to modern conditions is further evidenced by the greater care in the administration. Amongst expert officials Dudley North (*q.v.*), as commissioner of customs, was the most distinguished. In this period, too, the beginning of the public debt as in the appropriation of the bankers' deposits may be found.

The Revolution of 1688 may be regarded both on its constitutional and financial sides as the completion of the work of the Long Parliament. In the latter respect its chief effects were: (1) the transfer of the administration of the finances from the king's nominees to officials under parliamentary control, (2) the consequent application of the revenue to the purposes designated by parliamentary appropriation, (3) the rapid expansion of the various kinds of revenue, particularly the indirect taxes, (4) the rise and growth of the national debt, combined with the creation of an effective banking system. The greater part of the 18th century was occupied with the working out of these results.

The government of William III. had to face the expenses of a great war and to allay discontent at home. As a preliminary step to the necessary settlement of the revenue a return was prepared, showing the tax receipts at over £1,800,000 and the peace expenditure at about £1,100,000. Parliament accepted the view that £1,200,000 per annum would suffice for the ordinary requirements of the kingdom. It, further, introduced the system of the Civil List (*q.v.*) and assigned £600,000 for the fixed payments placed under that head, leaving the remainder to be appropriated for the other needs of the state. As the "hearth money" had proved to be a very unpopular charge, it was, in spite of its yield (£170,000), given up. The temporary excise duties were voted for "their majesties' lives" and the customs for a limited term. These branches of revenue were altogether insufficient to meet the pressure of the war outlay, and in consequence new heads of taxation—or old ones revived—came into use. A series of poll and capitation taxes were imposed between 1689 and 1698, but were after that date abandoned for the same reason as that for the repeal of the hearth money. The monthly assessment was tried in 1688; then came an income tax followed by "twelve months'" assessments in 1690 and 1691. The way was thus prepared for the property tax of 1692, imposing a rate of 4s. in the pound on real estate, offices and personal property. The old difficulties of securing returns made the tax chiefly one on land. It was under the name of "the land tax" that it was generally known. The 4s. rate brought in £1,922,712, a return which declined in the following years. To meet this a fixed quota of nearly half a million (a 1s. rate) was adopted in 1697, the amount to be apportioned in specified sums to the several counties and towns. The framework of the tax remained without substantial change till 1798, the time of Pitt's redemption scheme. In 1696 houses were taxed 2s. each, with higher rates for extra windows. The beginning of the "window tax," licences on pedlars, and a temporary tax on the stocks of companies complete the imposts of this kind. Stamp duties—imitated from Holland—were adopted in 1694 and extended in 1698: they mark the beginnings of the modern duties on transactions and the "death duties." Large additions were made to the excise. Breweries and distilleries were placed under charge, and such important commodities as salt, coal, malt, leather and glass were included in the list of taxable articles, but the two last mentioned were soon relieved for the time. The customs rates were also increased. In 1698 the general 5% duty was raised by the new subsidy to 10%. French goods became liable to surtaxes, first of 25%, afterwards of 50%; those of other countries had to pay similar charges of smaller amount. Spirits, wines, tea and coffee were taxed at special rates. How great was the expansion of the fiscal system may be best realized from the fact that during the comparatively short reign of William III. (1689–1702) the land tax produced £19,200,000, the customs £13,296,000, and the excise £13,650,000, or altogether £46,000,000. In the last year of the reign, the opening one of the 18th century, the returns from these taxes respectively were: land tax (at 2s.), £990,000, customs £1,540,000, excise £986,000, or a total exceeding three and a half millions. The removal of the regular export duties in respect of (*a*) domestic woollen manufactures, (*b*) corn, was the only alleviation of taxation, and in both cases it was due to special reasons of policy.

Quite as remarkable as the growth of revenue is the sudden appearance of the use of public loans. In earlier periods a ruler had accumulated treasure (Henry VII. left £1,800,000) or had pledged "his jewels or the customs or occasionally the persons of his friends for the payment" of his borrowings. Edward III.'s dealings with the Florentine bankers are well known; but it was only after the Revolution that the two conditions essential for a permanent public debt were realized, viz.: (1) the responsibility of the government to the people, and (2) an effective market for floating capital. At the close of the war in 1697 a debt of £21,500,000 had been incurred, over £16,000,000 of which remained due at William III.'s death. Connected with the public debt is the foundation of the Bank of England (see Banks and Banking), which more and more became the agent for dealing with the state revenue and expenditure; though the exchequer continued to exist until 1834 as a real, even if antiquated institution.

Thus it is clear that by the end of the 17th century the new influences which date from the Civil War had brought into being all the elements of the modern financial system. Expenditure, revenue, borrowing to meet deficiencies are all, in a sense, developed into their present-day form. Increase in amount and some refinements in procedure, combined with improved views of public policy, are the only changes that occur later on.

Regarded broadly, the 18th and 19th centuries exhibit several distinct periods with definite financial aspects. In the ninety years from the death of William III. (1702) to the outbreak of the Revolutionary War with France (1793) there are four serious wars, covering nearly thirty-five years. There is the long peace administration of Walpole, and there are the shorter intervals of rest following each of the contests. From the beginning of the war with the French Republic to the year of Waterloo there is a nearly unbroken war time of over twenty years. The forty years' peace is closed by the Crimean War (1854–56); and another forty years of peace ends with the South African War (1899–1902). During this time the older mercantilism passes into protectionism; and this, again, gives way before the gradual adoption of the free trade policy. At each time of war, taxation (particularly in the indirect form) and debt increase. Financial reform is connected with the maintenance of peace. Among the great financial ministers Walpole, the younger Pitt, Peel and Gladstone are conspicuous; while Huskisson's services in the kindred field of economic policy deserve special notice in their financial bearing.

By taking the several great heads of revenue in order it is comparatively easy to understand the nature of the progress made in subsequent years. (1) The land tax, established on a definite basis in 1692, was the great 18th century form of direct taxation. Varying in rate from 1s. (as in 1731) to 4s. (as in most war years), it was converted by Pitt in 1798 into a redeemable charge on the lands of each parish, and by this process has sunk from the amount of £1,911,000 in 1798 to £730,000 in 1907–1908. The great increase in other heads had impaired the value of the land tax as a fiscal support. (2) Parallel with the movement of the land tax but showing much more rapid growth was the excise of the 18th century. Most of the articles of common consumption were permanently taxed. Soap, salt, candles and leather are described by Adam Smith as taxed, and that taxation is unreservedly condemned by him. In 1739 the excise duties brought in £3,000,000. By 1792 they had risen to £10,000,000. Their continued expansion was due both to the wider area covered and to the increased consuming power of the country. (3) The customs were equally serviceable, and in their case the increased duties were even more considerable. The general 10% of 1698 became 15% in 1704, a fourth 5% was imposed in 1748, and in 1759 the general duties were raised to 25%. Coincidently with this general extension of the customs duties special articles such as tea were subjected to increased duties. The American War of Independence brought about a further general increase of 10%, together with special extra duties on tobacco and sugar. In 1784 the customs revenue came to over £3,000,000. Two circumstances account for this slower growth. (1) The extreme rigour of the duties and prohibitions, aimed chiefly against French trade; and (2) the absence of care in estimating the point of maximum productiveness for each duty. Swift's famous saying that "in the arithmetic of the customs two and two sometimes made only one" is well exemplified in England at this time. The smuggler did a great deal of the foreign trade of the country. Efforts at reform were not, however, altogether wanting. Walpole succeeded in carrying several useful adjustments. He abolished the general duties on exports and also several of those on imported raw materials such as silk, beaver, indigo and colonial timber. His most ambitious scheme—that for the warehousing of wine and tobacco in order to relieve exporters—failed, in consequence of the popular belief that it was the forerunner of a general excise. Walpole's treatment of the land tax, which he kept down to the lowest figure (1s.), and his earlier funding plan deserve notice. His determination to preserve peace assisted his fiscal reforms. Pitt's administration from 1783 to 1792 marks another great period of improvement. The consolidation of the customs laws (1787), the reduction of the tea duty to nearly one-tenth of its former amount, the conclusion of a liberal commercial treaty with France, and the attempted trade arrangement with Ireland, tend to show that "Pitt would have anticipated many of the free trade measures of later years if it had been his lot to enjoy ten more years of peaceful administration." One of the financial problems which excited the interest and even the alarm of the students of public affairs was the rapid increase of the public debt. Each war caused a great addition to the burden; the intervals of peace showed very little diminution in it. From sixteen millions in 1702, the debt rose to £53,000,000 at the treaty of Utrecht (1713). In 1748 it reached £78,000,000, at the close of the Seven Years' War it was £137,000,000, and when the American colonies had established their independence it exceeded £238,000,000. Apprehensions of national bankruptcy led to the adoption of the device of a sinking fund, and in this case Pitt's usual sagacity seems to have failed him. The influence of R. Price's theory induced the policy of assigning special sums for debt reduction, without regard to the fundamental condition of maintaining a real surplus.

The revolutionary and Napoleonic wars mark an important stage in English finance. The national resources were strained to the utmost, and the "whip and spur" of taxation was used on all classes of the community. In the earlier years of the struggle the expedient of borrowing enabled the government to avoid the more oppressive forms of charge; but as time went on every possible expedient was brought into play. One class of taxes had been organized during peace—the "assessed taxes" on houses, carriages, servants, horses, plate, &c. These duties were raised by several steps of 10% each until, in 1798, their total charge was increased threefold (for richer persons four- or fivefold) under the plan of a "triple assessment." The comparative failure of this scheme (which did not bring in the estimated yield of £4,500,000) prepared the way for the most important development of the tax system—the introduction of the income-tax in 1798. Though a development of the triple assessment, the income-tax was also connected with the permanent settlement of the land tax as a redeemable charge. It is possible to trace the progress of direct taxation from the scutage of Norman days through "the tenth and fifteenth," the Tudor "subsidies," the Commonwealth "monthly assessments," and the 18th century land tax, to the income-tax as applied by Pitt, and, after an interval of disuse, revived by Peel (1842). The immediate yield of the income-tax was rather less than was expected (£6,000,000 out of £7,500,000); but by alteration of the mode of assessment from that of a general declaration to returns under the several schedules, the tax became, first at 5%, afterwards at 10%, the most valuable part of the revenue. In 1815 it contributed 22% of the total receipts (*i.e.* £14,600,000 out of £67,000,000). If employed at the beginning of the war, it would probably have obviated most of the financial difficulties of the government. The window tax, which continued all through the 18th century, had been supplemented in the American War by a tax on inhabited houses (one of Adam Smith's many suggestions), a group to which the assessment taxes were naturally joined. During the 18th century the probate duty had been gradually raised, and in 1780 the legacy duty was introduced; but these charges were moderate in character and did not affect land. Though the direct and quasi-direct taxes had been so largely increased, their growth was eclipsed by that of the excise and customs. With each succeeding year of war new articles for duties were detected and the rates of old taxes raised. The maxim, said to have guided the financiers of another country—"Wherever you see an object, tax it"—would fairly express the guiding policy of the English system of the early 19th century. Eatables, liquors, the materials of industry, manufactures, and the transactions of commerce had in nearly all their forms to pay toll. To take examples:—salt paid 15s. per bushel; sugar 30s. per cwt.; beer 10s. per barrel (with 4s. 5d. per bushel on malt and a duty on hops); tea 96% *ad valorem.* Timber, cotton, raw silk, hemp and bar iron were taxed, so were leather, soap, glass, candles, paper and starch. In spite of the need of revenue, many of the customs duties were framed on the protective system and thereby gave little returns; *e.g.* the import duty on salt in 1815 produced £547, as against £1,616,124 from excise; pill-boxes brought in 18s. 10d., saltpetre 2d., with 1d. for the war duties. The course of the war taxation was marked by varied experiments. Duties were raised, lowered, raised again, or given some new form in the effort to find additional revenue. Some duties, *e.g.* that on gloves, were abandoned as unproductive; but the conclusion is irresistible that the financial system suffered from over-complication and absence of principle. In the period of his peace administration Pitt was prepared to follow the teaching of *The Wealth of Nations.* The strain of a gigantic war forced him and his successors to employ whatever heads of taxation were likely to bring in funds without violating popular prejudices. Along with taxation, debt increased. For the first ten years the addition to it averaged £27,000,000 per annum, bringing the total to over £500,000,000. By the close of the war period in 1815 the total reached over £875,000,000, or a somewhat smaller annual increase—a result due to the adoption of more effective tax forms, and particularly the income tax. The progress of English trade was another contributing agency towards securing higher revenue. The import of articles such as tea advanced with the growing population; so that the tea duty of 96% yielded in 1815 no less than £3,591,000. It is, however, true that by the year just mentioned the tax system had reached its limit. Further extension (except by direct confiscation of property) was hardly possible. The war closed victoriously at the moment when its prolongation seemed unendurable.

A particular aspect of the English financial system is its relation to the organization of the finance of territories connected with the English crown. The exchequer may be plausibly held to have been derived from Normandy, and wherever territory came under English rule the methods familiar at home seem to have been adopted. With the loss of the French possessions the older cases of the kind disappeared. Ireland, however, had its own exchequer, and Scotland remained a distinct kingdom. The 18th century introduced a remarkable change. One of the aims of the union with Scotland was to secure freedom of commerce throughout Great Britain, and the two revenue systems were amalgamated. Scotland was assigned a very moderate share of the land tax (under one-fortieth), and was exempted from certain stamp duties. The attempt to apply selected forms of taxation—custom duties (1764), stamp duties (1765), and finally the effort to collect the tea duty (1773)—to the American colonies are indications of a movement towards what would now be called "imperialist" finance. The complete plan of federation for the British empire, outlined by Adam Smith, is avowedly actuated by financial considerations. Notwithstanding the failure of this movement in the case of the colonies, the close of the century saw it successful in respect to Ireland, though separate financial departments were retained till after the close of the Napoleonic War and some fiscal differences still remain. By the consolidation of the English and Irish exchequers and the passage from war to peace, the years between 1815 and 1820 may be said to mark a distinct step in the financial development of the country. The connected change in the Bank of England by the resumption of specie payments supports this view. Moreover, the political conditions in their influence on finance were undergoing a revolution. The landed interest, though powerful at the moment, had henceforth to face the rivalry of the wealthy manufacturing communities of the north of England, and it may be added that the influence of theoretic discussion was likely to be felt in the treatment of the financial policy of the nation. Canons as to the proper system of administration, taxation and borrowing come to be noticed by statesmen and officials.

These influences may be followed out in their working by observing the chief lines of adjustment and modification that followed the conclusion of peace. Relieved from the extraordinary outlay of the preceding years, the government felt bound to propose reductions. With commendable prudence it was resolved to retain the income-tax at 5% (one-half of the former rate), and to join with this reduction the removal of some war duties on malt and spirits. Popular feeling against direct taxation was so strong that the income-tax had to be surrendered *in toto*, a course which seriously embarrassed the finances of the following years. For over twenty-five years the income-tax remained in abeyance, to the great detriment of the revenue system. Its revival by Peel (1842), intended as a temporary expedient, proved its services as a permanent tax: it has continued and expanded considerably since. Both the excise and customs at the close of the war were marked by some of the worst defects of a vicious kind of taxation. The former had the evil effect of restricting the progress of industry and hampering invention. The raw materials and the auxiliary substances of industry were in many cases raised in price. The duties on salt and glass specially illustrated the bad results of the excise. New processes were hindered and routine made compulsory. The customs duties were still more restrictive of trade; as they practically excluded foreign manufactures, and were both costly and in many instances unproductive of revenue. As G. R. Porter has shown, the really profitable customs taxes were few in number. Less than a score of articles contributed more than nineteen-twentieths of the revenue from import duties. The duties on transactions, levied chiefly by stamps, were ill-graded and lacking in comprehensiveness. From the standpoint of equity the ground for criticism was equally plain. The great weight of taxation fell on the poorer classes. The owners of land escaped giving any return for the property that they held under the state, and other persons were not taxed in proportion to their abilities, which had been long recognized as the proper criterion.

The grievance as to distribution has been modified, if not removed, by the great development of (1) the income-tax, (2) the "death" or inheritance duties. Beginning at the rate of 7d. per pound (1842–1854), the income-tax was raised to 1s. 4d. for the Crimean War, and then continued at varying rates; reduced to 2d. in 1874, it rose to 5d., then in 1894 to 8d., and by 1909 appeared to be fixed as a minimum at 1s., or 5% on income from property. The yield per penny on the £ has risen almost uninterruptedly. From £710,000 in 1842, it now exceeds £2,800,000, though the exemptions and abatements are much more extensive. In fact, all incomes of £3 per week are absolutely free (£160 per annum is the precise exemption limit), and an income of £400 derived from personal exertion pays less than 5½d. per pound, or 2¼%. The great productiveness of the tax is equally remarkable. From £5,600,000 in 1843 (with a rate of 7d.) the return rose to £32,380,000 in 1907–1908, having been at the maximum of £38,800,000 in 1902–1903, with a tax rate of 6¼%. The income-tax thus supplies about one-fifth of the total revenue, or one-fourth of that obtained by taxation. Several fundamental questions of finance are connected with the taxation of income and have been dealt with by English practice. Small incomes claim lenient treatment, and, as mentioned above, this leniency means in England complete freedom. Again, earned incomes appear to represent lower ability to pay than unearned ones. Long refused on practical grounds (as by Gladstone and Lowe), the concession of an abatement of 25% on earned incomes of £2000 and under was granted in 1907. The question whether savings should be exempt from taxation as income has (with the exception of life insurance premiums) been decided in the negative. Allowances for depreciation and cost of repairs are partially recognized. Far more important than these special problems is the general one of increased tax rates on large incomes. Up to 1908–1909 the tax above the abatement limit of £700 remained strictly proportional; but opinion showed a decided tendency in favour of extra rates or a "super tax" on incomes above an assigned amount (*e.g.* £5000), and this was included in the budget of 1909–1910 (see INCOME-TAX).

In close relation with the income-tax is the estate duty, with its adjuncts of Legacy and Succession Duties. After Pitt's failure to carry the succession duty in 1796, no change was made till Gladstone's introduction in 1853 of a duty on land and settled property parallel to the legacy duty on free personality. Apart from certain minor alterations, the really vital change was the extension in 1894 of the old Probate Duty into a comprehensive impost (entitled the Estate Duty) applicable to all the possessions of a deceased person. This "Inheritance Tax"—to give it its scientific title—operates as a complementary property tax, and is thus an addition to the contribution from incomes derived from large properties. By graduation the charges on large estates in 1908–1909 (before the proposal for further increase in 1909–1910) came to 10% on £1,000,000, and reached the maximum of 15% at £3,500,000. From the several forms of the "Inheritance Taxes" the national revenue gained £14,500,000, with 4½ millions as a supplementary yield for local finance. The immense expansion of direct taxation is evident on comparing 1840 with 1908. In the former year the Probate and legacy duties brought in about one million; the other direct taxes, even including the "House duty," did not raise the total to £3,000,000. In 1908 the direct taxation of property and income supplied £51,500,000, or one-third of the total receipts as against less than one-twentieth in 1840.

But though this wider employment of direct taxation—a characteristic of European finance generally—reduced the *relative* position of the taxation of commodities, there was a growth in the absolute amount obtained from this category of duties. There were also considerable alterations, the result of changes in the views respecting fiscal policy. At the close of the Great War the excise duties were at first retained, and even in some cases increased. After some years reforms began. The following articles amongst others were freed from charge: salt (1825); leather and candles (1830); glass (1845); soap (1853); and paper (1860). The guiding principles were: (1) the removal of raw materials from the list of goods liable to excise, (2) the limitation of the excise to a small number of productive articles, with (3) the placing of the greater part (practically nearly the whole) of this form of taxation on alcoholic drinks. Apart from breweries and distilleries, the excise had little field for its work. The large revenue of £35,700,000 in 1907–1908 was derived one-half from spirits (£17,700,000), over one-third from beer, while most of the remainder was obtained from business taxation in the form of licences, the raising of which was one of the features of the budget in 1909. As a feeder of the revenue the excise might be regarded as equal to the income-tax, but less to be relied on in times of depression. Valuable as were the reforms of the excise after 1820, they were insignificant as compared with the changes in the customs. The particular circumstances of English political life have led to perhaps undue emphasis being placed on this particular branch of financial development. Between 1820 and 1860 the customs system was transformed from a highly complicated arrangement of duties, pressing with severity on nearly all foreign imports, into a simple and easily understood set of charges on certain specially selected commodities. All favours or preferences to home or colonial producers disappeared. Expressed in financial terms, all duties were imposed "for revenue only," and estimated in reference to their productiveness. An assimilation between the excise and customs rates necessarily followed. The stages of the development under the guidance of (1) Huskisson, (2) Peel, and (3) Gladstone are commonly regarded as part of the movement for Free Trade; but the financial working of the alteration is understood only by remembering that the duties removed by "tens" or by "hundreds" were quite trivial in yield, and did not involve any serious loss to the revenue. Perhaps the most remarkable feature of the English customs of the 19th century was the steadiness of the receipts. In spite of trade depressions, commercial crises and sweeping changes in rates, the annual revenue in the period 1815–1900 only varied between £19,000,000 and £24,000,000; though, on balance, duties amounting to £30,000,000 were remitted. The potential resources of this branch of revenue were made evident in the rapid rise of the yield by the new taxation imposed for the South African War (1899–1902). In consequence of this increase the customs became equal to the excise in return, and, combined, they collected over £60,000,000 annually from the consumption of commodities. They accordingly afforded a counterpoise to the burden put on income and property, or, more accurately speaking, they obtained due, or somewhat more than due, contribution from the smaller incomes, particularly those of the working class.

The exemption of raw materials and food; the absence of duties on imported, as on home manufactures; the selection of a small number of articles for duty; the rather rigorous treatment of spirits and tobacco, were the salient marks of the English fiscal system which grew up in the 19th century. The part of the system most criticised was the very narrow list of dutiable articles. Why, it was asked, should a choice be made of certain objects for the purpose of imposing heavy taxation on them? The answer has been that they were taken as typical of consumption in general and were easily supervised for taxation. Moreover, the sumptuary element is introduced by the policy of putting exceptionally heavy duties on spirits and tobacco, with lighter charges on the less expensive wines and beers. Facility of collection and distribution of taxation over a larger class appear to be the grounds for the inclusion of the tea and coffee duties, which are further supported by the need for obtaining a contribution of, roughly speaking, over half the tax revenue by duties on commodities. The last consideration led, at the beginning of the 20th century, to the sugar tax and the temporary duties on imported corn and exported coal.

As a support to the great divisions of income-tax, Death Duties, Excise and Customs, the stamps, fees and miscellaneous taxes are of decided service. A return of £9,000,000 was secured by stamp duties.

In recent years the so-called "non-tax" revenue largely increased, owing to the extension of the postal and telegraphic services. The real gain is not so great, as out of gross receipts of £22,000,000 over £17,500,000 is absorbed in expenses, while the carriage of ordinary letters seems to be the only profitable part of these services. Crown lands and rights (such as vintage charges) are of even less financial value.

One cardinal principle of the greatest English finance ministers has been the avoidance of deficits or undue surpluses. Gladstone's inheritance of doctrine from Peel "was to estimate expenditure liberally, to estimate revenue carefully, to make each year pay its own expenses, and to take care that your charge is not greater than your income." This method of treatment requires that taxation shall be productive in yield, and that it shall be so elastic as to admit of expansion, a function specially assigned to the income-tax. It may also be said to involve due care in the treatment of the national resources. The reaction of ill-chosen taxes on industry is a hindrance to their productiveness and their growth.

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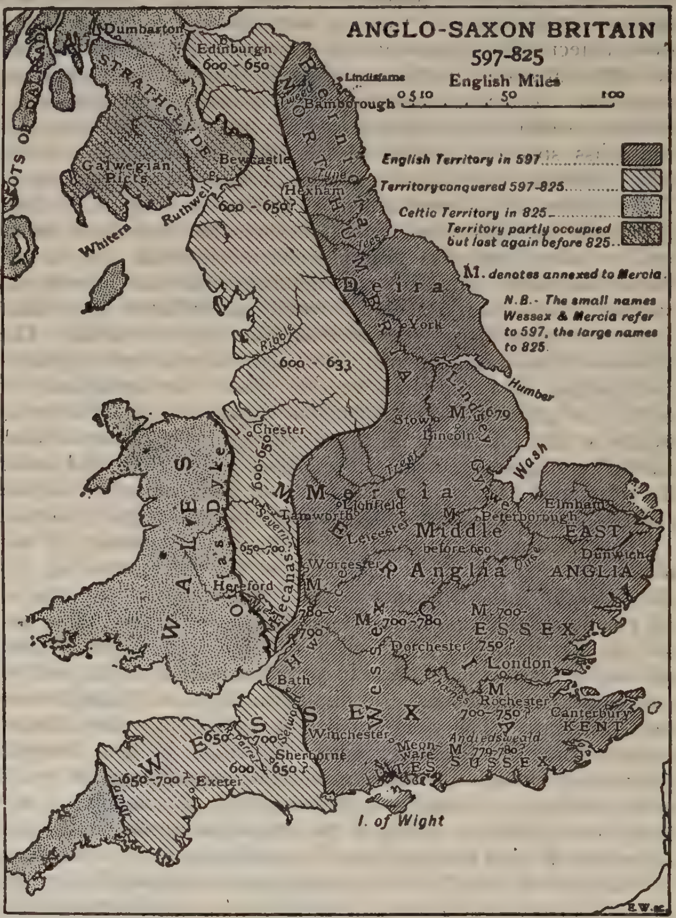
(C. F. B.)

ENGLISH HISTORY.—The general account of English history which follows should be supplemented for the earlier period by the article Britain. See also Scotland, Ireland, Wales.

I. From the Landing of Augustine to the Norman Conquest (600–1066)

With the coming of Augustine to Kent the darkness which for nearly two centuries had enwrapped the history of Britain begins to clear away. From the days of Honorius to those of Gregory the Great the line of vision of the annalists of the continent was bounded by the Channel. As to what was going on beyond it, we have but a few casual gleams of light, just enough to make the darkness visible, from writers such as the author of the life of St Germanus, Prosper Tiro, Procopius, and Gregory of Tours. These notices do not, for the most part, square particularly well with the fragmentary British narrative that can be patched together from Gildas's "lamentable book," or the confused story of Nennius. Nor again do these British sources fit in happily with the English annals constructed long centuries after by King Alfred's scribes in the first edition of the *Anglo-Saxon Chronicle*. But from the date when the long-lost communication between Britain and Rome was once more resumed, the history of the island becomes clear and fairly continuous. The gaps are neither broader nor more obscure than those which may be found in the contemporary annals of the other kingdoms of Europe. The stream of history in this period is narrow and turbid throughout the West. Quite as much is known of the doings of the English as of those of the Visigoths of Spain, the Lombards, or the later Merovingians. The 7th century was the darkest of all the "dark ages," and England is particularly fortunate in possessing the *Ecclesiastica historia* of Bede, which, though its author was primarily interested in things religious, yet contains a copious chronicle of things secular. No Western author, since the death of Gregory of Tours, wrote on such a scale, or with such vigour and insight.


ANGLO-SAXON BRITAIN
597-825
English Miles
0 5 10 50 100
English Territory in 597
Territory conquered 597-825
Celtic Territory in 825
Territory partly occupied but lost again before 825
M. denotes annexed to Mercia
N.B.- The small names Wessex & Mercia refer to 597, the large names to 825.
Dumbarton
Edinburgh
600 - 650
Lindisfarne
Bamborough
Tweed
STRATHCLYDE
Galwegian Picts
Bewcastle
Hexham
Tyne
Ruthwell
Whitern
600 - 650?
Tees
Deira
York
Ribble
600 - 633
Humber
Lindsey
M. 679
Stow
Lincoln
Wash
Chester
600-650
WALES
Offa's Dyke
Trent
Mercia
Lichfield
Tamworth
Leicester
Peterborough
Elmham
Middle Anglia
before 650
EAST ANGLIA
Dunwich
Ouse
Severn
650-700
Hecanas
Worcester
M.
Hereford
780-
700
Hwicce
M. 700-780
M. 700-
ESSEX
Dorchester 750?
London
Thames
M.
Rochester
700-750?
Canterbury
KENT
Bath
Selwood
WESSEX
650-700
Winchester
Meon-ware
Andredsweald
M. 770-780
SUSSEX
Sherborne
600-650?
Parret
Exeter
650-700
Tamar
I. of Wight
E.W.&c.

Conversion of England.

The conversion of England to Christianity took, from first to last, some ninety years (A.D. 597 to 686), though during the last thirty the ancestral heathenism was only lingering on in remote corners of the land. The original missionary impulse came from Rome, and Augustine is rightly regarded as the evangelist of the English; yet only a comparatively small part of the nation owed its Christianity directly to the mission sent out by Pope Gregory. Wessex was won over by an independent adventurer, the Frank Birinus, who had no connexion with the earlier arrivals in Kent. The great kingdom of Northumbria, though its first Christian monarch Edwin was converted by Paulinus, a disciple of Augustine, relapsed into heathenism after his death. It was finally evangelized from quite another quarter, by Irish missionaries brought by King Oswald from Columba's monastery of Iona. The church that they founded struck root, as that of Paulinus and Edwin had failed to do, and was not wrecked even by Oswald's death in battle at the hands of Penda the Mercian, the one strong champion of heathenism that England produced. Moreover, Penda was no sooner dead, smitten down by Oswald's brother Oswio at the battle of the Winwaed (A.D. 655), than his whole kingdom eagerly accepted Christianity, and received missionaries, Irish and Northumbrian, from the victorious Oswio. It is clear that, unlike their king, the Mercians had no profound enthusiasm for the old gods. Essex, which had received its first bishop from Augustine's hands but had relapsed into heathenism after a few years, also owed its ultimate conversion to a Northumbrian preacher, Cedd, whom Oswio lent to King Sigeberht after the latter had visited his court and been baptized, hard by the Roman wall, in 653.

Yet even in those English regions where the missionaries from Iona were the founders of the Church, the representatives of Rome were to be its organizers. In 664 the Northumbrian king Oswio, at the synod of Whitby, declared his adhesion to the Roman connexion, whether it was that he saw political advantage therein, or whether he realized the failings and weaknesses of the Celtic church, and preferred the more orderly methods of her rival. Five years later there arrived from Rome the great organizer, Archbishop Theodore of Tarsus, who bound the hitherto isolated churches of the English kingdoms into a well-compacted whole, wherein the tribal bishops paid obedience to the metropolitan at Canterbury, and met him frequently in national councils and synods. England gained a spiritual unity long ere she attained a political unity, for in these meetings, which were often attended by kings as well as by prelates, Northumbrian, West Saxon and Mercian first learnt to work together as brothers.

The English church.

In a few years the English church became the pride of Western Christendom. Not merely did it produce the great band of missionaries who converted heathen Germany—Willibrord, Suidbert, Boniface and the rest—but it excelled the other national churches in learning and culture. It is but necessary to mention Bede and Alcuin. The first, as has been already said, was the one true historian who wrote during the dark time of the 7th–8th centuries; the second became the pride of the court of Charles the Great for his unrivalled scholarship. At the coming of Augustine England had been a barbarous country; a century and a half later she was more than abreast of the civilization of the rest of Europe.

Formation of the kingdoms.

But the progress toward national unity was still a slow one. The period when the English kingdoms began to enter into the commonwealth of Christendom, by receiving the missionaries sent out from Rome or from Iona, practically coincides with the period in which the occupation of central Britain was completed, and the kingdoms of the conquerors assumed their final size and shape. Æthelfrith, the last heathen among the Northumbrian kings, cut off the Britons of the North from those of the West, by winning the battle of Chester (A.D. 613), and occupying the land about the mouths of the Mersey and the Dee. Cenwalh, the last monarch who ascended the throne of Wessex unbaptized, carried the boundaries of that kingdom into Mid-Somersetshire, where they halted for a long space. Penda, the last heathen king of Mercia, determined the size and strength of that state, by absorbing into it the territories of the other Anglian kingdoms of the Midlands, and probably also by carrying forward its western border beyond the Severn. By the time when the smallest and most barbarous of the Saxon states—Sussex—accepted Christianity in the year 686, the political geography of England had reached a stage from which it was not to vary in any marked degree for some 200 years. Indeed, there was nothing accomplished in the way of further encroachment on the Celt after 686, save Ine's and Cuthred's extension of Wessex into the valleys of the Tone and the Exe, and Offa's slight expansion of the Mercian frontier beyond the Severn, marked by his famous dyke. The conquests of the Northumbrian kings in Cumbria were ephemeral; what Oswio won was lost after the death of Ecgfrith.

The "Bretwaldas."

That the conversion of the English to Christianity had anything to do with their slackening from the work of conquest it would be wrong to assert. Though their wars with the Welsh were not conducted with such ferocious cruelty as of old, and though (as the laws of Ine show) the Celtic inhabitants of newly-won districts were no longer exterminated, but received as the king's subjects, yet the hatred between Welsh and English did not cease because both were now Christians. The westward advance of the invaders would have continued, if only there had remained to attract them lands as desirable as those they had already won. But the mountains of Wales and the moors of Cornwall and Cumbria did not greatly tempt the settler. Moreover, the English states, which had seldom turned their swords against each other in the 5th or the 6th centuries, were engaged during the 7th and the 8th in those endless struggles for supremacy which seem so purposeless, because the hegemony which a king of energy and genius won for his kingdom always disappeared with his death. The "Bretwaldaship," as the English seem to have called it, was the most ephemeral of dignities. This was but natural: conquest can only be enforced by the extermination of the conquered, or by their consent to amalgamate with the conquerors, or by the garrisoning of the land that has been subdued by settlers or by military posts. None of these courses were possible to a king of the 7th or 8th centuries: even in their heathen days the English were not wont to massacre their beaten kinsmen as they massacred the unfortunate Celt. After their conversion to Christianity the idea of exterminating other English tribes grew even more impossible. On the other hand, local particularism was so strong that the conquered would not, at first, consent to give up their natural independence and merge themselves in the victors. Such amalgamations became possible after a time, when many of the local royal lines died out, and unifying influences, of which a common Christianity was the most powerful, sapped the strength of tribal pride. But it is not till the 9th century that we find this phenomenon growing general. A kingdom like Kent or East Anglia, even after long subjection to a powerful overlord, rose and reasserted its independence immediately on hearing of his death. His successor had to attempt a new conquest, if he felt himself strong enough. To garrison a district that had been overrun was impossible: the military force of an English king consisted of his military household of *gesiths*, backed by the general levy of the tribe. The strength of Mercia or Northumbria might be mustered for a single battle, but could not supply a standing army to hold down the vanquished. The victorious king had to be content with tribute and obedience, which would cease when he died, or was beaten by a competitor for the position of Bretwalda.

Supremacy of Northumbria.

In the ceaseless strife between the old English kingdoms, therefore, it was the personality of the king which was the main factor in determining the hegemony of one state over another. If in the 7th century the successive great Northumbrians—Edwin, Oswald, Oswio and Ecgfrith—were reckoned the chief monarchs of England, and exercised a widespread influence over the southern realms, yet each had to win his supremacy by his own sword; and when Edwin and Oswald fell before the savage heathen Penda, and Ecgfrith was cut off by the Picts, there was a gap of anarchy

Supremacy of Mercia.

before another king asserted his superior power. The same phenomenon was seen with regard to the Mercian kings of the 8th century; the long reigns of the two conquerors Æthelbald and Offa covered eighty years (716–796), and it might have been supposed that after such a term of supremacy Mercia would have remained permanently at the head of the English kingdoms. It was not so, Æthelbald in his old age lost his hegemony at the battle of Burford (752), and was murdered a few years after by his own people. Offa had to win back by long wars what his kinsman had lost; he became so powerful that we find the pope calling him *Rex Anglorum*, as if he were the only king in the island. He annexed Kent and East Anglia, overawed Northumbria and Wessex, both hopelessly faction-ridden at the time, was treated almost as an equal by the emperor Charles the Great, and died still at the height of his power. Yet the moment that he was dead all his vassals revolted; his successors could never recover all that was lost. Kent once more became a kingdom, and two successive Mercian sovereigns, Beornwulf and Ludica, fell in battle while vainly trying to recover Offa's supremacy over East Anglia and Wessex.

Supremacy of Wessex.

The ablest king in England in the generation that followed Offa was Ecgbert of Wessex, who had long been an exile abroad, and served for thirteen years as one of the captains of Charles the Great. He beat Beornwulf of Mercia at Ellandune (A.D. 823), permanently annexed Kent, to whose crown he had a claim by descent, in 829 received the homage of all the other English kings, and was for the remainder of his life reckoned as "Bretwalda." But it is wrong to call him, as some have done, "the first monarch of all England." His power was no greater than that of Oswio or Offa had been, and the supremacy might perhaps have tarried with Wessex no longer than it had tarried with Northumbria or Mercia if it had not chanced that the Danish raids were now beginning. For these invasions, paradoxical as it may seem, were the greatest efficient cause in the welding together of England. They seemed about to rend the land in twain, but they really cured the English of their desperate particularism, and drove all the tribes to take as their common rulers the one great line of native kings which survived the Danish storm, and maintained itself for four generations of desperate fighting against the invaders. On the continent the main effect of the viking invasions was to dash the empire of Charles the Great into fragments, and to aid in producing the numberless petty states of feudal Europe. In this island they did much to help the transformation of the mere Bretwaldaship of Ecgbert into the monarchy of all England.

Danish invasions.

Already ere Ecgbert ascended the throne of Kent the new enemy had made his first tentative appearance on the British shore. It was in the reign of Beorhtric, Ecgbert's predecessor, that the pirates of the famous "three ships from Heretheland" had appeared on the coast of Dorset, and slain the sheriff "who would fain have known what manner of men they might be." A few years later another band appeared, rising unexpectedly from the sea to sack the famous Northumbrian monastery of Lindisfarne (793). After that their visits came fast and furious on the shore-line of every English kingdom, and by the end of Ecgbert's reign it was they, and not his former Welsh and Mercian enemies, who were the old monarch's main source of trouble. But he brought his Bretwaldaship to a good end by inflicting a crushing defeat on them at Hingston Down, hard by the Tamar, probably in 836, and died ere the year was out, leaving the ever-growing problem to his son Æthelwulf.

Influence of viking sea-power.

The cause of the sudden outpouring of the Scandinavian deluge upon the lands of Christendom at this particular date is one of the puzzles of history. So far as memory ran, the peoples beyond the North Sea had been seafaring races addicted to piracy. Even Tacitus mentions their fleets. Yet since the 5th century they had been restricting their operations to their own shores, and are barely heard of in the chronicles of their southern neighbours. It seems most probable that the actual cause of their sudden activity was the conquest of the Saxons by Charles the Great, and his subsequent advance into the peninsula of Denmark. The emperor seemed to be threatening the independence of the North, and in terror and resentment the Scandinavian peoples turned first to strike at the encroaching Frank, and soon after to assail the other Christian kingdoms which lay behind, or on the flank of, the Empire. But their offensive action proved so successful and so profitable that, after a short time, the whole manhood of Denmark and Norway took to the pirate life. Never since history first began to be recorded was there such a supreme example of the potentialities of sea-power. Civilized Europe had been caught at a moment when it was completely destitute of a war-navy; the Franks had never been maritime in their tastes, the English seemed to have forgotten their ancient seafaring habits. Though their ancestors had been pirates as fierce as the vikings of the 9th century, and though some of their later kings had led naval armaments—Edwin had annexed for a moment Man and Anglesea, and Ecgfrith had cruelly ravaged part of Ireland—yet by the year 800 they appear to have ceased to be a seafaring race. Perhaps the long predominance of Mercia, an essentially inland state, had something to do with the fact. At any rate England was as helpless as the Empire when first the Danish and Norwegian galleys began to cross the North Sea, and to beat down both sides of Britain seeking for prey. The number of the invaders was not at first very great; their fleets were not national armaments gathered by great kings, but squadrons of a few vessels collected by some active and enterprising adventurer. Their original tactics were merely to land suddenly near some thriving seaport, or rich monastery, to sack it, and to take to the water again before the local militia could turn out in force against them. But such raids proved so profitable that the vikings soon began to take greater things in hand; they began to ally themselves in confederacies: two, six or a dozen "sea-kings" would join their forces for something more than a desultory raid. With fifty or a hundred ships they would fall upon some unhappy region, harry it for many miles inland, and offer battle to the landsfolk unless the latter came out in overpowering force. And as their crews were trained warriors chosen for their high spirit, contending with a raw militia fresh from the plough, they were generally successful. If the odds were too great they could always retire to their ships, put to sea, and resume their predatory operations on some other coast three hundred miles away. As long as their enemies were unprovided with a navy they were safe from pursuit and annihilation. The only chance against them was that, if caught too far from the base-fort where they had run their galleys ashore, they might find their communication with the sea cut off, and be forced to fight for their lives surrounded by an infuriated countryside. But in the earlier years of their struggles with Christendom the vikings seldom suffered a complete disaster; they were often beaten but seldom annihilated. Ere long they grew so bold that they would stay ashore for months, braving the forces of a whole kingdom, and sheltering themselves in great palisaded camps on peninsulas or islands when the enemy pressed them too hard. On well-guarded strongholds like Thanet or Sheppey in England, Noirmoutier at the Loire mouth, or the Isle of Walcheren, they defied the local magnates to evict them. Finally they took to wintering on the coast of England or the Empire, a preliminary to actual settlement and conquest. (See VIKING.)

Progress of Danish conquest.

King Ecgbert died long ere the invaders had reached this stage of insolence. Æthelwulf, his weak and kindly son, would undoubtedly have lost the titular supremacy of Wessex over the other English kingdoms if there had been in Mercia or Northumbria a strong king with leisure to concentrate his thoughts on domestic wars. But the vikings were now showering such blows on the northern states that their unhappy monarchs could think of nothing but self-defence. They slew Redulf—king of Northumbria—in 844, took London in 851, despite all the efforts of Burgred of Mercia, and forced that sovereign to make repeated appeals for help to Æthelwulf as his overlord. For though Wessex had its full share of Danish attacks it met them with a vigour that was not seen in the other realms. The defence was often, if not always, successful; and once at least (at Aclea in 851) Æthelwulf exterminated a whole Danish army with "the greatest slaughter among the heathen host that had been heard of down to that day," as the Anglo-Saxon chronicler is careful to record. But though he might ward off blows from his own realm, he was helpless to aid Mercia or East Anglia, and still more the distant Northumbria.

It was not, however, till after Æthelwulf's death that the attack of the vikings developed its full strength. The fifteen years (856–871) that were covered by the reigns of his three shortlived sons, Æthelbald, Æthelbert and Æthelred, were the most miserable that England was to see. Assembling in greater and ever greater confederacies, the Danes fell upon the northern kingdoms, no longer merely to harry but to conquer and occupy them. A league of many sea-kings which called itself the "great army" slew the last two sovereigns of Northumbria and stormed York in 867. Some of the victors settled down there to lord it over the half-exterminated English population. The rest continued their advance southward. East Anglia was conquered in 870; its last king, Edmund, having been defeated and taken prisoner, the vikings shot him to death with arrows because he would not worship their gods. His realm was annexed and partly settled by the conquerors. The fate of Mercia was hardly better: its king, Burgred, by constant payment of tribute, bought off the invaders for a space, but the eastern half of his realm was reduced to a wilderness.

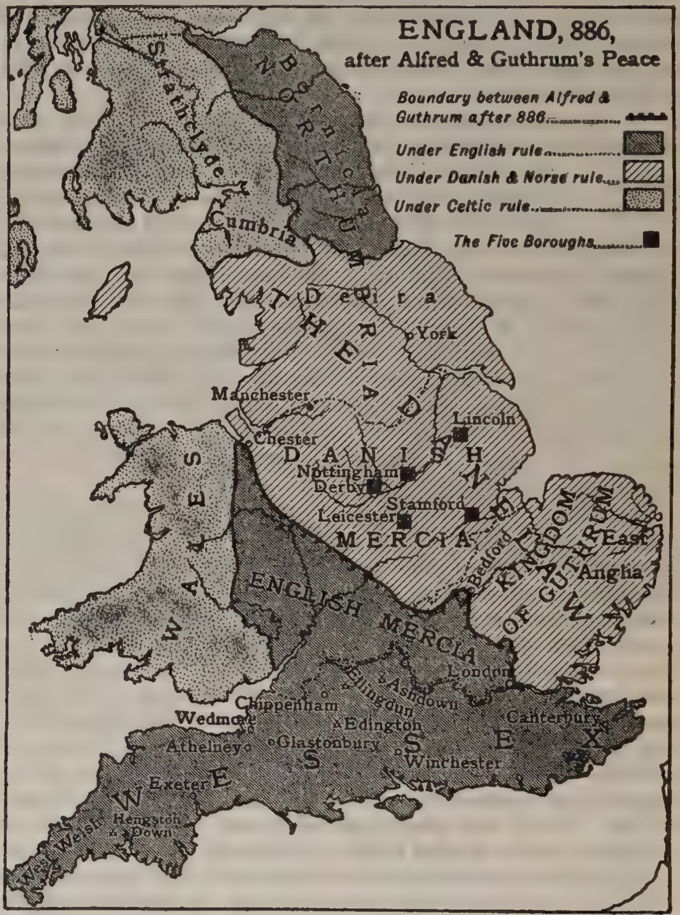
Practically masters of all that lay north of Thames, the "great army" next moved against Wessex, the only quarter where a vigorous resistance was still maintained against them, though its capital, Winchester, had been sacked in 864. Under two kings named Halfdan and Bacsceg, and six earls, they seized Reading and began to harry Berkshire, Surrey and Hampshire. King Æthelred, the third son of Æthelwulf, came out against them, with his young brother Alfred and all the levies of Wessex. In the year 871 these two gallant kinsmen fought no less than six pitched battles against the invaders. Some were victories—notably the fight of Ashdown, where Alfred first won his name as a soldier—but the English failed to capture the fortified camps of the vikings at Reading, and were finally beaten at Marten ("Maeretun") near Bedwyn, where Æthelred was mortally wounded.

Alfred the Great.

He left young sons, but the men of Wessex crowned Alfred king, because they needed a grown man to lead them in their desperate campaigning. Yet his reign opened inauspiciously: defeated near Wilton, he offered in despair to pay the vikings to depart. He must have known, from the experience of Mercian, Northumbrian and Frankish kings, that such blackmail only bought a short respite, but the condition of his realm was such that even a moderate time for reorganization might prove valuable. The enemy had suffered so much in the "year of the six battles" that they held off for some space from Wessex, seeking easier prey on the continent and in northern England. In 874 they harried Mercia so cruelly that King Burgred fled in despair to Rome; the victors divided up his realm, taking the eastern half for themselves, and establishing in it a confederacy, whose jarls occupied the "five boroughs" of Stamford, Lincoln, Derby, Nottingham and Leicester. But the western half they handed over to "an unwise thegn named Ceolwulf," who bought for a short space the precarious title of king by paying great tribute.

Alfred employed the four years of peace, which he had bought in 871, in the endeavour to strengthen his realm against the inevitable return of the raiders. His wisdom was shown by the fact that he concentrated his attention on the one device which must evidently prove effective for defence, if only he were given time to perfect it—the building of a national navy. He began to lay down galleys and "long ships," and hired "pirates"—renegade vikings no doubt—to train crews for him and to teach his men seamanship. The scheme, however, was only partly completed when in 876 three Danish kings entered Wessex and resumed the war. But Alfred blockaded them first in Wareham and then in Exeter. The fleet which was coming to carry them off, or to bring them reinforcements, fought an indecisive engagement with the English ships, and was wrecked immediately after on the cliffs of the Isle of Purbeck, where more than 100 galleys and all their crews perished. On hearing of this disaster the vikings in Exeter surrendered the place on being granted a free departure.

Yet within a few months of this successful campaign Alfred was attacked at midwinter by the main Danish army under King Guthrum. He was apparently taken by surprise by an assault at such an unusual time of the year, and was forced to escape with his military household to the isle of Athelney among the marshes of the Parrett. The invaders harried Wiltshire and Hampshire at their leisure, and vainly thought that Wessex was at last subdued. But with the spring the English rallied: a Danish force was cut to pieces before Easter by the men of Devonshire. A few weeks later Alfred had issued from Athelney, had collected a large army in Selwood, and went out to meet the enemy in the open field. He beat them at Edington in Wiltshire, blockaded them in their great camp at Chippenham, and in fourteen days starved them into surrender. The terms were that they should give hostages, that they should depart for ever from Wessex, and that their king Guthrum should do homage to Alfred as overlord, and submit to be baptized, with thirty of his chiefs. Not only were all these conditions punctually fulfilled, but (what is more astonishing) the Danes had been so thoroughly cured of any desire to try their luck against the great king that they left him practically unmolested for fourteen years (878–892). King Guthrum settled down as a Christian sovereign in East Anglia, with the bulk of the host that had capitulated at Chippenham. Of the rest of the invaders one section established a petty kingdom in Yorkshire, but those in the Midlands were subject to no common sovereign but lived in a loose confederacy under the jarls of the "Five Boroughs" already named above. The boundary between English and Danes established by the peace of 878 is not perfectly ascertainable, but a document of



a few years later, called "Alfred and Guthrum's frith," gives the border as lying from Thames northward up the Lea to its source, then across to Bedford, and then along the Ouse to Watling Street, the old Roman road from London to Chester. This gave King Alfred London and Middlesex, most of Hertfordshire and Bedfordshire, and the larger half of Mercia—lands that had never before been an integral part of Wessex, though they had some time been tributary to her kings. They were now taken inside the realm and governed by the ealdorman Æthelred, the king's son-in-law. The Mercians gladly mingled with the West Saxons, and abandoned all memories of ancient independence. Twenty years of schooling under the hand of the Dane had taught them to forget old particularism.

Alfred's enlarged kingdom was far more powerful than any one of the three new Danish states which lay beyond the Lea and Watling Street: it was to be seen, ere another generation was out, that it was stronger than all three together. But Alfred was not to see the happy day when York and Lincoln, Colchester and Leicester, were to become mere shire-capitals in the realm of United England.

The fourteen years of comparative peace which he now enjoyed were devoted to perfecting the military organization of his enlarged kingdom. His fleet was reconstructed: in 882 he went out with it in person and destroyed a small piratical squadron: in 885 we hear of it coasting all along Danish East Anglia. But his navy was not yet strong enough to hold off all raids: it was not till the very end of his reign that he perfected it by building "long ships that were nigh twice as large as those of the heathen; some had 60 oars, some more; and they were both steadier and swifter and lighter than the others, and were shaped neither after the Frisian nor after the Danish fashion, but as it seemed to himself that they would be most handy." This great war fleet he left as a legacy to his son, but he himself in his later campaigns had only its first beginnings at his disposal.

Alfred's reforms.

His military reforms were no less important. Warned by the failures of the English against Danish entrenched camps, he introduced the long-neglected art of fortification, and built many "burhs"—stockaded fortresses on mounds by the waterside—wherein dwelt permanent garrisons of military settlers. It would seem that the system by which he maintained them was that he assigned to each a region of which the inhabitants were responsible for its manning and its sustentation. The landowners had either to build a house within it for their own inhabiting, or to provide that a competent substitute dwelt there to represent them. These "burh-ware," or garrison-men, are repeatedly mentioned in Alfred's later years. The old national levy of the "fyrd" was made somewhat more serviceable by an ordinance which divided it into two halves, one of which must take the field when the other was dismissed. But it would seem that the king paid even more attention to another military reform—the increase of the number of the professional fighting class, the thegnhood as it was now called. All the wealthier men, both in the countryside and in the towns, were required to take up the duties as well as the privileges of membership of the military household of the king. They became "of thegn-right worthy" by receiving, really or nominally, a place in the royal hall, with the obligation to take the field whenever their master raised his banner. The document which defines their duties and privileges sets forth that "every ceorl who throve so that he had fully five hides of land, and a helm, and a mail-shirt, and a sword ornamented with gold, was to be reckoned gesithcund." A second draft allowed the man who had the military equipment complete, but not fully the five hides of land, to slip into the list, and also "the merchant who has fared thrice over the high seas at his own expense." How far the details of the scheme are Alfred's own, how far they were developed by his son Edward the Elder, it is unfortunately impossible to say. But there is small doubt that the system was working to some extent in the later wars of the great king, and that his successes were largely due to the fact that his army contained a larger nucleus of fully armed warriors than those of his predecessors.

Military reforms were only one section of the work of King Alfred during the central years of his reign. It was then that he set afoot his numerous schemes for the restoration of the learning and culture of England which had sunk so low during the long years of disaster which had preceded his accession. How he gathered scholars from the continent, Wales and Ireland; how he collected the old heroic poems of the nation, how he himself translated books from the Latin tongue, started schools, and set his scribes to write up the *Anglo-Saxon Chronicle*, is told elsewhere, as are his mechanical inventions, his buildings, and his dealings with missionaries and explorers (see ALFRED).

The test of the efficiency of his work was that it held firm when, in his later years, the Danish storm once more began to beat against the shores of Wessex. In the years 892–896 Alfred was assailed from many sides at once by viking fleets, of which the most important was that led by the great freebooter Hasting. Moreover, the settled Danes of eastern England broke their oaths and gave the invaders assistance. Yet the king held his own, with perfect success if not with ease. The enemy was checked, beaten off, followed up rapidly whenever he changed his base of operation, and hunted repeatedly all across England. The campaigning ranged from Appledore in Kent to Exeter, from Chester to Shoeburyness; but wherever the invaders transferred themselves, either the king, or his son Edward, or his son-in-law Ethelred, the ealdorman of Mercia, was promptly at hand with a competent army. The camps of the Danes were stormed, their fleet was destroyed in the river Lea in 895, and at last the remnant broke up and dispersed, some to seek easier plunder in France, others to settle down among their kinsmen in Northumbria or East Anglia.

Alfred survived for four years after his final triumph in 896, to complete the organization of his fleet and to repair the damages done by the last four years of constant fighting. He died on the 26th of October 900, leaving Wessex well armed for the continuance of the struggle, and the inhabitants of the "Danelagh" much broken in spirit. They saw that it would never be in their power to subdue all England. Within a few years they were to realize that it was more probable that the English kings would subdue them.

Edward the Elder.

The house of Wessex continued to supply a race of hard-fighting and capable monarchs, who went on with Alfred's work. His son, Edward the Elder, and his three grandsons, Æthelstan, Edmund and Edred, devoted themselves for fifty-five years (A.D. 900–955) to the task of conquering the Danelagh, and ended by making England into a single unified kingdom, not by admitting the conquered to homage and tribute, in the old style of the 7th century, but by their complete absorption. The process was not so hard as might be thought; when once the Danes had settled down, had brought over wives from their native land or taken them from among their English vassals, had built themselves farmsteads and accumulated flocks and herds, they lost their old advantage in contending with the English. Their strength had been their mobility and their undisputed command of the sea. But now they had possessions of their own to defend, and could not raid at large in Wessex or Mercia without exposing their homes to similar molestation. Moreover, the fleet which Alfred had built, and which his successors kept up, disputed their mastery of the sea, and ended by achieving a clear superiority over them. Unity of plan and unity of command was also on the side of the English. The inhabitants of the three sections of the Danelagh were at best leagued in a many-headed confederacy. Their opponents were led by kings whose orders were punctually obeyed from Shrewsbury to Dover and from London to Exeter. It must also be remembered that in the greater part of the land which they possessed the Danes were but a small minority of the population. After their first fury was spent they no longer exterminated the conquered, but had been content to make the Mercians and Deirans their subjects, to take the best of the land, and exact tribute for the rest. Only in Lincolnshire, East Yorkshire and parts of Nottinghamshire and Leicestershire do they seem to have settled thickly and formed a preponderating element in the countryside. In the rest of the Midlands and in East Anglia they were only a governing oligarchy of scanty numbers. Everywhere there was an English lower class which welcomed the advent of the conquering kings of Wessex and the fall of the Danish jarls.

Edward the Elder spent twenty-five laborious years first in repelling and repaying Danish raids, then in setting to work to subdue the raiders. He worked forward into the Danelagh, building *burhs* as he advanced, to hold down each district that he won. He was helped by his brother-in-law, the Mercian ealdorman Æthelred, and, after the death of that magnate, by his warlike sister Æthelflæd, the ealdorman's widow, who was continued in her husband's place. While Edward, with London as his base, pushed forward into the eastern counties, his sister, starting from Warwick and Stafford, encroached on the Danelagh along the line of the Trent. The last Danish king of East Anglia was slain in battle in 918, and his realm annexed. Æthelflæd won Derby and Leicester, while her brother reduced Stamford and Nottingham. Finally, in 921, not only was the whole land south of the Humber subdued, but the Yorkshire Danes, the Welsh, and even—it is said—the remote Scots of the North, did homage to Edward and became his men.

Æthelstan.

In 925 Edward was succeeded by his eldest son Æthelstan, who completed the reduction of the Danelagh by driving out Guthfrith, the Danish king of York, and annexing his realm. But this first conquest of the region beyond Humber had to be repeated over and over again; time after time the Danes rebelled and proclaimed a new king, aided sometimes by bands of their kinsmen from Ireland or Norway, sometimes by the Scots and Strathclyde Welsh. Æthelstan's greatest and best-remembered achievement was his decisive victory in 937 at Brunanburh—an unknown spot, probably by the Solway Firth or the Ribble—over a great confederacy of rebel Danes of Yorkshire, Irish Danes from Dublin, the Scottish king, Constantine, and Eugenius, king of Strathclyde. Yet even after such a triumph Æthelstan had to set up a Danish under-king in Yorkshire, apparently despairing of holding it down as a shire governed by a mere ealdorman. But its overlordship he never lost, and since he also maintained the supremacy which his father had won over the Welsh and Scots, it was not without reason that he called himself on his coins and in his charters *Rex totius Britanniae.* Occasionally he even used the title *Basileus*, as if he claimed a quasi-imperial position.

Edmund: Edred.

The trampling out of the last embers of Danish particularism in the North was reserved for Æthelstan's brothers and successors, Edmund and Edred (940–955), who put down several risings of the Yorkshiremen, one of which was aided by a rebellion of the Midland Danes of the Five Boroughs. But the untiring perseverance of the house of Alfred was at last rewarded by success. After the expulsion of the last rebel king of York, Eric Haraldson, by Edred in 948, we cease to hear of trouble in the North. When next there was rebellion in that quarter it was in favour of a Wessex prince, not of a Danish adventurer, and had no sinister national significance. The descendants of the vikings were easily incorporated in the English race, all the more so because of the wise policy of the conquering kings, who readily employed and often promoted to high station men of Danish descent who showed themselves loyal—and this not only in the secular but in spiritual offices. In 942 Oda, a full-blooded Dane, was made archbishop of Canterbury. The Danelagh became a group of earldoms, ruled by officials who were as often of Danish as of English descent.

It is notable that when, after Edred's death, there was civil strife, owing to the quarrel of his nephew Edwy with some of his kinsmen, ministers and bishops, the rebels, who included the majority of the Mercians and Northumbrians, set up as their pretender to the throne not a Dane but Edwy's younger brother Edgar, who ruled for a short time north of Thames, and became sole monarch on the death of his unfortunate kinsman.

Edgar.

The reign of Edgar (959–975) saw the culmination of the power of the house of Alfred. It was untroubled by rebellion or by foreign invasions, so that the king won the honourable title of *Rex Pacificus.* The minor sovereigns of Britain owned him as overlord, as they had owned his grandfather Edward and his uncle Æthelstan. It was long remembered "how all the kings of this island, both the Welsh and the Scots, eight kings, came to him once upon a time on one day and all bowed to his governance." The eight were Kenneth of Scotland, Malcolm of Strathclyde, Maccus of Man, and five Welsh kings. There is fair authority for the well-known legend that, after this meeting at Chester, he was rowed in his barge down the Dee by these potentates, such a crew as never was seen before or after, and afterwards exclaimed that those who followed him might now truly boast that they were kings of all Britain.

Edgar's chief counsellor was the famous archbishop Dunstan, to whom no small part of the glory of his reign has been ascribed. This great prelate was an ecclesiastical reformer—a leader in a movement for the general purification of morals, and especially for the repressing of simony and evil-living among the clergy—a great builder of churches, and a stringent enforcer of the rules of the monastic life. But he was also a busy statesman; he probably had a share in the considerable body of legislation which was enacted in Edgar's reign, and is said to have encouraged him in his policy of treating Dane and Englishman with exact equality, and of investing the one no less than the other with the highest offices in church and state.

Edgar's life was too short for the welfare of his people—he was only in his thirty-third year when he died in 975, and his sons were young boys. The hand of a strong man was still needed to keep the peace in the newly-constituted realm of all England, and the evils of a minority were not long in showing themselves. One section of the magnates had possession of the thirteen-year-old king Edward, and used his name to cover their ambitions. The other was led by his step-mother Ælfthryth, who was set on pushing the claims of her son, the child Æthelred. After much factious strife, and many stormy meetings of the Witan, Edward was murdered at Corfe in 978 by some thegns of the party of the queen-dowager. The crime provoked universal indignation, but since there was no other prince of the house of Alfred available, the magnates were forced to place Æthelred on the throne: he was only in his eleventh year, and was at least personally innocent of complicity in his brother's death.

Æthelred the Unready.

With the accession of Æthelred, the "Redeless," as he was afterwards called from his inability to discern good counsel from evil, and the consistent incapacity of his policy, an evil time began. The retirement from public life of Edgar's old minister Dunstan was the first event of the new reign, and no man of capacity came forward to take his place. The factions which had prevailed during the reign of Edward "the Martyr" seem to have continued to rage during his brother's minority, yet Æthelred's earliest years were his least disastrous. It was hoped that when he came to man's estate things would improve, but the reverse was the case. The first personal action recorded of him is an unjust harrying of the goods of his own subjects, when he besieged Rochester because he had quarrelled with its bishop over certain lands, and was bribed to depart with 100 pounds of silver. Yet from 978 to 991 no irreparable harm came to England; the machinery for government and defence which his ancestors had established seemed fairly competent to defend the realm even under a wayward and incapable king. Two or three small descents of vikings are recorded, but the ravaging was purely local, and the invader soon departed. No trouble occurred in the Danelagh, where the old tendency of the inhabitants to take sides with their pagan kinsmen from over the sea appears to have completely vanished. But the vikings had apparently learnt by small experiments that England was no longer guarded as she had been in the days of Alfred or Æthelstan, and in 991 the first serious invasion of Æthelred's reign took place. A large fleet came ashore in Essex, and, after a hard fight with the ealdorman Brihtnoth at Maldon, slew him and began to ravage the district north of the Thames.

Danish invasions.

Instead of making a desperate attempt to drive them off, the king bribed them to depart with 10,000 pounds of silver, accepting it is said this cowardly advice from archbishop Sigeric. The fatal precedent soon bore fruit: the invaders came back in larger numbers, headed by Olaf Tryggveson, the celebrated adventurer who afterwards made himself king of Norway, and who was already a pretender to its throne. He was helped by Sweyn, king of Denmark, and the two together laid siege to London in 994, but were beaten off by the citizens. Nevertheless Æthelred for a second time stooped to pay tribute, and bought the departure of Dane and Norwegian with 16,000 pounds of silver. There was a precarious interval of peace for three years after, but in 997 began a series of invasions led by Sweyn which lasted for seventeen years, and at last ended in the complete subjection of England and the flight of Æthelred to Normandy. It should be noted that the invader during this period was no mere adventurer, but king of all Denmark, and, after Olaf Tryggveson's death in 1000, king of Norway also. His power was something far greater than that of the Guthrums and Anlafs of an earlier generation, and—in the end of his life at least—he was aiming at political conquest, and not either at mere plunder or at finding new settlements for his followers. But if the strength of the invader was greater than that of his predecessors, Æthelred also was far better equipped for war than his ancestors of the 9th century. He owned, and he sometimes used—but always to little profit—a large fleet, while all England instead of the mere realm of Wessex was at his back. Any one of the great princes of the house of Egbert who had reigned from 871 to 975, would have fought a winning fight with such resources, and it took nearly twenty years of Æthelred's tried incapacity to lose the game. He did, however, succeed in undoing all the work of his ancestors, partly by his own slackness and sloth, partly by his choice of corrupt and treacherous ministers. For the two ealdormen whom he delighted to honour and placed at the head of his armies, Ælfric and Eadric Streona, are accused, the one of persistent cowardice, the other of underhand intrigue with the Danes. Some of the local magnates made a desperate defence of their own regions, especially Ulfkytel of East Anglia, a Dane by descent; but the central government was at fault. Æthelred's army was always at the wrong place—"if the enemy were east then was the *fyrd* held west, and if they were north then was our force held south." When Æthelred did appear it was more often to pay a bribe to the invaders than to fight. Indeed the *Danegeld*, the tax which he raised to furnish tribute to the invaders, became a regular institution: on six occasions at least Æthelred bought a few months of peace by sums ranging from 10,000 to 48,000 pounds of silver.

Canute.

At last in the winter of 1013–1014, more as it would seem from sheer disgust at their king's cowardice and incompetence than because further resistance was impossible, the English gave up the struggle and acknowledged Sweyn as king. First Northumbria, then Wessex, then London yielded, and Æthelred was forced to fly over seas to Richard, duke of Normandy, whose sister he had married as his second wife. But Sweyn survived his triumph little over a month; he died suddenly at Gainsborough on the 3rd of February 1014. The Danes hailed his son Canute, a lad of eighteen, as king, but many of the English, though they had submitted to a hard-handed conqueror like Sweyn, were not prepared to be handed over like slaves to his untried successor. There was a general rising, the old king was brought over from Normandy, and Canute was driven out for a moment by force of arms. He returned next year with a greater army to hear soon after of Æthelred's death (1016). The witan chose Edmund "Ironside," the late king's eldest son, to succeed him, and as he was a hard-fighting prince of that normal type of his house to which his father had been such a disgraceful exception, it seemed probable that the Danes might be beaten off. But Æthelred's favourite Eadric Streona adhered to Canute, fearing to lose the office and power that he had enjoyed for so long under Æthelred, and prevailed on the magnates of part of Wessex and Mercia to follow his example. For a moment the curious phenomenon was seen of Canute reigning in Wessex, while Edmund was making head against him with the aid of the Anglo-Danes of the "Five Boroughs" and Northumbria. There followed a year of desperate struggle: the two young kings fought five pitched battles, fortune seemed to favour Edmund, and the traitor Eadric submitted to him with all Wessex. But the last engagement, at Assandun (Ashingdon) in Essex went against the English, mainly because Eadric again betrayed the national cause and deserted to the enemy.

Edmund was so hard hit by this last disaster that he offered to divide the realm with Canute; they met on the isle of Alney near Gloucester, and agreed that the son of Æthelred should keep Wessex and all the South, London and East Anglia, while the Dane should have Northumbria, the "five boroughs" and Eadric's Mercian earldom. But ere the year was out Edmund died: secretly murdered, according to some authorities, by the infamous Eadric. The witan of Wessex made no attempt to set on the throne either one of the younger sons of Æthelred by his Norman wife, or the infant heir of Edmund, but chose Canute as king, preferring to reunite England by submission to the stranger rather than to continue the disastrous war.

They were wise in so doing, though their motive may have been despair rather than long-sighted policy. Canute became more of an Englishman than a Dane: he spent more of his time in his island realm than in his native Denmark. He paid off and sent home the great army with whose aid he had won the English crown, retaining only a small bodyguard of "house-carls" and trusting to the loyalty of his new subjects. There was no confiscation of lands for the benefit of intrusive Danish settlers. On the contrary Canute had more English than Danish courtiers and ministers about his person, and sent many Englishmen as bishops and some even as royal officers to Denmark. It is strange to find that—whether from policy or from affection—he married King Æthelred's young widow Emma of Normandy, though she was somewhat older than himself—so that his son King Harthacnut and that son's successor Edward the Confessor, the heir of the line of Wessex, were half-brothers. It might have been thought likely that the son of the pagan Sweyn would have turned out a mere hard-fighting viking. But Canute developed into a great administrator and a friend of learning and culture. Occasionally he committed a harsh and tyrannical act. Though he need not be blamed for making a prompt end of the traitor Eadric Streona and of Uhtred, the turbulent earl of Northumbria, at the commencement of his reign, there are other and less justifiable deeds of blood to be laid to his account. But they were but few; for the most part his administration was just and wise as well as strong and intelligent.

As long as he lived England was the centre of a great Northern empire, for Canute reconquered Norway, which had lapsed into independence after his father's death, and extended his power into the Baltic. Moreover, all the so-called Scandinavian colonists in the Northern Isles and Ireland owned him as overlord. So did the Scottish king Malcolm, and the princes of Wales and Strathclyde. The one weak point in his policy that can be detected is that he left in the hands of Malcolm the Bernician district of Lothian, which the Scot had conquered during the anarchy that followed the death of Æthelred. The battle of Carham (1018) had given this land to the Scots, and Canute consented to draw the border line of England at the Tweed instead of at the Firth of Forth, when Malcolm did him homage. Strangely enough it was this cession of a Northumbrian earldom to the Northern king that ultimately made Scotland an English-speaking country. For the Scottish kings, deserting their native Highlands, took to dwelling at Edinburgh among their new subjects, and first the court and afterwards the whole of their Lowland subjects were gradually assimilated to the Northumbrian nucleus which formed both the most fertile and the most civilized portion of their enlarged realm.

The fact that England recovered with marvellous rapidity from the evil effects of Æthelred's disastrous reign, and achieved great wealth and prosperity under Canute, would seem to show that the ravages of Sweyn, widespread and ruthless though they had been, had yet fallen short of the devastating completeness of those of the earlier vikings. He had been more set on exacting tribute than on perpetrating wanton massacres. A few years of peace and wise administration seem to have restored the realm to a satisfactory condition. A considerable mass of his legislation has survived to show Canute's care for law and order.

Canute died in 1035, aged not more than forty or forty-one. The crown was disputed between his two sons, the half-brothers Harold and Harthacnut; it was doubtful whether the birth of the elder prince was legitimate, and Queen Emma strove to get her own son Harthacnut preferred to him. In Denmark the younger claimant was acknowledged by the whole people, but in England the Mercian and Northumbrian earls chose Harold as king, and Wessex only fell to Harthacnut. Both the young kings were cruel, dissolute and wayward, most unworthy sons of a wise father. It was to the great profit of England that they died within two years of each other, the elder in 1040, the younger in 1042.

Edward the Confessor.

On Harthacnut's death he was succeeded not by any Danish prince but by his half-brother Edward, the elder son of Æthelred and Emma, whom he had entertained at his court, and had apparently designated as his heir, for he had no offspring. There was an end of the empire of Canute, for Denmark fell to the great king's nephew, Sweyn Estrithson, and Norway had thrown off the Danish yoke. Engaged in wars with each other, Dane and Norseman had no leisure to think of reconquering England. Hence Edward's accession took place without any friction. He reigned, but did not rule, for twenty-four years, though he was well on in middle age before he was crowned. Of all the descendants of Alfred he was the only one who lived to see his sixtieth birthday—the house of Wessex were a short-lived race. In character he differed from all his ancestors—he had Alfred's piety without his capacity, and Æthelred's weakness without his vices. The mildest of men, a crowned monk, who let slip the reins of government from his hands while he busied himself in prayer and church building, he lowered the kingly power to a depth to which it had never sunk before in England. His sole positive quality, over and above his piety, was a love for his mother's kin, the Normans. He had spent his whole life from 1013 to 1040 as an exile at the court of Rouen, and was far more of a Norman than an Englishman. It was but natural, therefore, that he should invite his continental relatives and the friends of his youth to share in his late-coming prosperity. But when he filled his court with them, made them earls and bishops, and appointed one of them, Robert of Jumièges, to the archbishopric of Canterbury, his undisguised preference for strangers gave no small offence to his English subjects. In the main, however, the king's personal likes and dislikes mattered little to the realm, since he had a comparatively small share in its governance. He was habitually overruled and dominated by his earls, of whom three, Leofric, Godwine and Siward—all old servants of Canute—had far more power than their master. Holding respectively the great earldoms of West Mercia, Wessex and Northumbria, they reigned almost like petty sovereigns in their domains, and there seemed some chance that England might fall apart into semi-independent feudal states, just as France had done in the preceding century. The rivalries and intrigues of these three magnates constitute the main part of the domestic politics of Edward's reign. Godwine, whose daughter had wedded the king, was the most forcible and ambitious of the three, but his pre-eminence provoked a general league against him and in 1051 he was cast out of the kingdom with his sons. In the next year he returned in arms, raised Wessex in revolt, and compelled the king to in-law him again, to restore his earldom, and to dismiss with ignominy the Norman favourites who were hunted over seas. The old earl died in 1053, but was succeeded in power by his son Harold, who for thirteen years maintained an unbroken mastery over the king, and ruled England almost with the power of a regent. There seems little doubt that he aspired to be Edward's successor: there was no direct heir to the crown, and the nearest of kin was an infant, Edgar, the great-nephew of the reigning sovereign and grandson of Edmund Ironside. England's experience of minors on the throne had been unhappy—Edwy and Æthelred the Redeless were warnings rather than examples. Moreover, Harold had before his eye as a precedent the displacement of the effete Carolingian line in France, by the new house of Robert the Strong and Hugh Capet, seventy years before. He prepared for the crisis that must come at the death of Edward the Confessor by bestowing the governance of several earldoms upon his brothers. Unfortunately for him, however, the eldest of them, Tostig, proved the greatest hindrance to his plans, provoking wrath and opposition wherever he went by his high-handedness and cruelty.

Harold.

Harold's governance of the realm seems to have been on the whole successful. He put down the Scottish usurper Macbeth with the swords of a Northumbrian army, and restored Malcolm III. to the throne of that kingdom (1055–1058). He led an army into the heart of Wales to punish the raids of King Griffith ap Llewelyn, and harried the Welsh so bitterly that they put their leader to death, and renewed their homage to the English crown (1063). He won enthusiastic devotion from the men of Wessex and the South, but in Northumbria and Mercia he was less liked. His experiment in taking the rule of these earldoms out of the hands of the descendants of Siward and Leofric proved so unsuccessful that he had to resign himself to undoing it. Ultimately one of Leofric's grandsons, Edwin, was left as earl of Mercia, and the other, Morcar, became earl of Northumbria instead of Harold's unpopular brother Tostig. It was on this fact that the fortune of England was to turn, for in the hour of crisis Harold was to be betrayed by the lords of the Midlands and the North.

Origin of the Norman Conquest.

Somewhere about the end of his period of ascendancy, perhaps in 1064, Harold was sailing in the Channel when his ship was driven ashore by a tempest near the mouth of the Somme. He fell into the hands of William the Bastard, duke of Normandy, King Edward's cousin and best-loved relative. The duke brought him to Rouen, and kept him in a kind of honourable captivity till he had extorted a strange pledge from him. William alleged that his cousin had promised to make him his heir, and to recommend him to the witan as king of England. He demanded that Harold should swear to aid him in the project. Fearing for his personal safety, the earl gave the required oath, and sailed home a perjured man, for he had assuredly no intention of keeping the promise that had been extorted from him. Within two years King Edward expired (Jan. 5, 1066) after having recommended Harold as his successor to the thegns and bishops who stood about his deathbed. The witan chose the earl as king without any show of doubt, though the assent of the Mercian and Northumbrian earls must have been half-hearted. Not a word was said in favour of the claim of the child Edgar, the heir of the house of Alfred, nothing (of course) for the preposterous claim of William of Normandy. Harold accepted the crown without a moment's hesitation, and at once prepared to defend it, for he was aware that the Norman would fight to gain his purpose. He endeavoured to conciliate Edwin and Morcar by marrying their sister Ealdgyth, and trusted that he had bought their loyal support. When the spring came round it was known that William had begun to collect a great fleet and army. Aware that the resources of his own duchy were inadequate to the conquest of England, he sent all over Europe to hire mercenaries, promising every knight who would join him broad lands beyond the Channel in the event of victory. He gathered beneath his banner thousands of adventurers not only from France, Brittany and Flanders, but even from distant regions such as Aragon, Apulia and Germany. The native Normans were but a third part of his host, and he himself commanded rather as director of a great joint-stock venture than as the feudal chief of his own duchy. He also obtained the blessing of Pope Alexander II. for his enterprise, partly on the plea that Harold was a perjurer, partly because Stigand, the archbishop of Canterbury, had acknowledged the late anti-pope Benedict.

All through the summer Harold held a fleet concentrated under the lee of the Isle of Wight, waiting to intercept William's armament, while the fyrd of Wessex was ready to support him if the enemy should succeed in making a landing. By September the provisions were spent, and the ships were growing unseaworthy. Very reluctantly the king bade them go round to London to refit and revictual themselves. William meanwhile had been unable to sail, because for many weeks the wind had been unfavourable. If it had set from the south the fortune of England would have been settled by a sea-fight. At this moment came a sudden and incalculable diversion; Harold's turbulent brother Tostig, banished for his crimes in 1065, was seeking revenge. He had persuaded Harold Hardrada, king of Norway, almost the last of the great viking adventurers, to take him as guide for a raid on England. They ran into the Humber with a great fleet, beat the earls Edwin and Morcar in battle, and captured York. Abandoning his watch on the south coast Harold of England flew northward to meet the invaders; he surprised them at Stamford Bridge, slew both the Norse king and the rebel earl, and almost exterminated their army (Sept. 25? 1066). But while he was absent from the Channel the wind turned, and William of Normandy put to sea. The English fleet and the English army were both absent, and the Normans came safely to shore on the 28th of September. Harold had to turn hastily southward to meet them. On the 13th of October his host was arrayed on the hill of Senlac, 7 miles from the duke's camp at Hastings. The ranks of his thegnhood and house-carles had been thinned by the slaughter of Stamford Bridge, and their place was but indifferently supplied by the hasty levies of London, Wessex and the Home Counties. Edwin and Morcar, who should have been at his side with their Mercians and Northumbrians, were still far away—probably from treachery, slackness and jealousy.

Next morning (October 14) William marched out from Hastings and attacked the English host, which stood at bay in a solid mass of spear and axemen behind a slight breastwork on the hillside. After six hours of desperate fighting the victory fell to the duke, who skilfully alternated the use of archers and cavalry against the unwieldy English phalanx. (See HASTINGS: *Battle of.*) The disaster was complete, Harold himself was slain, his two brothers had fallen with him, not even the wreck of an army escaped. There was no one to rally the English in the name of the house of Godwine. The witan met and hastily saluted the child Edgar Ætheling as king. But the earls Edwin and Morcar refused to fight for him, and when William appeared in front of the gates of London they were opened almost without resistance. He was elected king in the old English fashion by the surviving magnates, and crowned on Christmas Day 1066.

II. THE NORMAN AND ANGEVIN MONARCHY (1066–1199)

William the Conqueror.

When William of Normandy was crowned at Westminster by Archbishop Aldred of York and acknowledged as king by the witan, it is certain that few Englishmen understood the full importance of the occasion. It is probable that most men recalled the election of Canute, and supposed that the accession of the one alien sovereign would have no more permanent effect on the realm than that of the other. The rule of the Danish king and his two short-lived sons had caused no break in the social or constitutional history of England. Canute had become an Englishman, had accepted all the old institutions of the nation, had dismissed his host of vikings, and had ruled like a native king and for the most part with native ministers. Within twenty years of his accession the disasters and calamities which had preceded his triumph had been forgotten, and the national life was running quietly in its old channels. But the accession of William the Bastard meant something very different. Canute had been an impressionable lad of eighteen or nineteen when he was crowned; he was ready and eager to learn and to forget. He had found himself confronted in England with a higher civilization and a more advanced social organization than those which he had known in his boyhood, and he accepted them with alacrity, feeling that he was thereby getting advantage. With William the Norman all was different: he was a man well on in middle age, too old to adapt himself easily to new surroundings, even if he had been willing to do so. He never even learnt the language of his English subjects, the first step to comprehending their needs and their views. Moreover, unlike his Danish predecessor, he looked down upon the English from the plane of a higher civilization; the Normans regarded the conquered nation as barbarous and boorish. The difference in customs and culture between the dwellers on the two sides of the Channel was sufficient to make this possible; though it is hard to discern any adequate justification for the Norman attitude. Probably the bar of language was the most prominent cause of estrangement. In five generations the viking settlers of Normandy had not only completely forgotten their old Scandinavian tongue, but had come to look upon those who spoke the kindred English idiom not only as aliens but as inferiors. For three centuries French remained the court speech, and the mark of civilization and gentility.

Progress of Norman settlement.

Despite all this the Conquest would not have had its actual results if William, like Canute, had been able to dismiss his conquering army, and to refrain from a general policy of confiscation. But he had won his crown not as duke of Normandy, but as the head of a band of cosmopolitan adventurers, who had to be rewarded with land in England. Some few received their pay in hard cash, and went off to other wars; but the large majority, Breton and Angevin, French and Fleming, no less than Norman, wanted land. William could only provide it by a wholesale confiscation of the estates of all the thegnhood who had followed the house of Godwine. Almost his first act was to seize on these lands, and to distribute them among his followers. In the regions of the South, which had supplied the army that fell at Hastings, at least four-fifths of the soil passed to new masters. The dispossessed heirs of the old owners had either to sink to the condition of peasants, or to throw themselves upon the world and seek new homes. The friction and hatred thus caused were bitter and long enduring. And this same system of confiscation was gradually extended to the rest of England. At first the English landowners who had not actually served in Harold's host were permitted to "buy back their lands," by paying a heavy fine to the new king and doing him homage. What would have happened supposing that England had made no further stir, and had not vexed William by rebellion, it is impossible to say. But, as a matter of fact, during the first few years of his reign one district after another took up arms and endeavoured to cast out the stranger. As it became gradually evident that William's whole system of government was to be on new and distasteful lines, the English of the Midlands, the North and the West all went into rebellion. The risings were sporadic, ill-organized, badly led, for each section of the realm fought for its own hand. In some parts the insurrections were in favour of the sons of Harold, in others Edgar Ætheling was acclaimed as king: and while the unwise earls Edwin and Morcar fought for their own hand, the Anglo-Danes of the East sent for Sweyn, king of Denmark, who proved of small help, for he abode but a short space in England, and went off after sacking the great abbey of Peterborough and committing other outrages. The rebels cut up several Norman garrisons, and gave King William much trouble for some years, but they could never face him in battle. Their last stronghold, the marsh-fortress of Ely, surrendered in 1071, and not long after their most stubborn chief, Hereward "the Wake," the leader of the fenmen, laid down his arms and became King William's man (see HEREWARD).

The only result of the long series of insurrections was to provoke the king to a cruelty which he had not at first shown, and to give him an excuse for confiscating and dividing among his foreign knights and barons the immense majority of the estates of the English thegnhood. William could be pitiless when provoked; to punish the men of the North for persistent rebellion and the destruction of his garrison at York, he harried the whole countryside from the Aire to the Tees with such remorseless ferocity that it did not recover its ancient prosperity for centuries. The population was absolutely exterminated, and the great Domesday survey, made nearly twenty years later, shows the greater part of Yorkshire as "waste." This act was exceptional only in its extent: the king was as cruel on a smaller scale elsewhere, and not contented with the liberal use of the axe and the rope was wont to inflict his favourite punishments of blinding and mutilation on a most reckless scale.

The net result of the king's revenge on the rebellious English was that by 1075 the old governing class had almost entirely disappeared, and that their lands, from the Channel to the Tweed, had everywhere been distributed to new holders. To a great extent the same horde of continental adventurers who had obtained the first batch of grants in Wessex and Kent were also the recipients of the later confiscations, so that their newly acquired estates were scattered all over England. Many of them came to own land in ten or a dozen counties remote from each other, a fact which was of the greatest importance in determining the character of English feudalism. While abroad the great vassals of the crown generally held their property in compact blocks, in England their power was weakened by the dispersion of their lands. This tendency was assisted by the fact that even when the king, as was his custom, transferred to a Norman the estates of an English landowner just as they stood, those estates were already for the most part not conterminous. Even before the Conquest the lands of the magnates were to a large extent held in scattered units, not in solid patches. Only in two cases did William establish lordships of compact strength, and these were created for the special purpose of guarding the turbulent Welsh March. The "palatine" earls of Chester and Shrewsbury were not only endowed with special powers and rights of jurisdiction, but were almost the only tenants-in-chief within their respective shires. These rare exceptions prove the general rule: William probably foresaw the dangers of such accumulation of territory in private hands. He made a complete end of the old English system by which great earls ruled many shires: there were to be no Godwines or Leofrics under the Norman rule. This particular feudal danger was avoided: where earls were created, and they were but few, their authority was usually restricted to a single shire.

Feudalism.

It remains to speak of the most important change which William's rearrangements made in the polity of England. It is of course untrue to say—as was so often done by early historians—that he "introduced the feudal system into England." In some aspects feudalism was already in the land before he arrived: in others it may be said that it was never introduced at all. He did not introduce the practice by which the small man commended himself to the great man, and in return for his protection divested himself of the full ownership of his own land, and became a customary tenant in what later ages called a "manor." That system was already in full operation in England before the Conquest. In some districts the wholly free small landowner had already disappeared, though in the regions which had formed the Danelagh he was still to be found in large numbers. Nor did William introduce the system of great earldoms, passing from father to son, which gave over-great subjects a hereditary grip on the countryside. On the contrary, as has been already said, he did much to check that tendency, which had already developed in England.

What he really did do was to reconstruct society on the essentially feudal theory that the land was a gift from the king, held on conditions of homage and military service. The duties which under the old system were national obligations resting on the individual as a citizen, he made into duties depending on the relation between the king as supreme landowner and the subject as tenant of the land. Military service and the paying of the feudal taxes—aids, reliefs, &c.—are incidents of the bargain between the crown and the grantee to whom land has been given. That grantee, the tenant-in-chief, has the right to demand from his sub-tenants, to whom he has given out fractions of his estate, the same dues that the king exacts from himself. As at least four-fifths of the land of England had fallen into the king's hands between 1066 and 1074, and had been actually regranted to new owners—foreigners to whom the feudal system was the only conceivable organization of political existence—the change was not only easy but natural. The few surviving English landholders had to fall into line with the newcomers. England, in short, was reorganized into a state of the continental type, but one differing from France or Germany in that the crown had not lost so many of its regalities as abroad, and that even the greater earls had less power than the ordinary continental tenant-in-chief.

The English people became aware of this transformation in the "theory of the state" mainly through the fact that the new tenants-in-chief, bringing with them the ideas in which they had been reared, failed to comprehend the rather complicated status of the rural population on this side of the Channel. To the French or Norman knight all peasants on his manor seemed to be villeins, and he failed to understand the distinction between freemen who had personally commended themselves to his English predecessor but still owned their land, and the mass of ordinary servile tenants. There can be no doubt that the first effect of the Conquest was that the upper strata of the agricultural classes lost the comparative independence which they had hitherto enjoyed, and were in many cases depressed to the level of their inferiors. The number of freemen began to decrease, from the encroachments of the landowner, and continued to dwindle for many years: even in districts where Domesday Book shows them surviving in considerable numbers, it is clear that a generation or two later they had largely disappeared, and became merged in the villein class.

Domesday.

In this sense, therefore, England was turned into a feudal state by the results of the work of William the Conqueror. But it would be wrong to assert that all traces of the ancient social organization of the realm were swept away. The old Saxon customs were not forgotten, though they might in many cases be twisted to fit new surroundings. Indeed William and his successors not infrequently caused them to be collected and put on record. The famous Domesday Book (*q.v.*) of 1086 is in its essential nature an inquiry into the state of England at the moment of the Conquest, compiled in order that the king may have a full knowledge of the rights that he possesses as the heir of King Edward. Being primarily intended to facilitate the levy of taxation, it dwells more on the details of the actual wealth and resources of the country in 1066 and 1086, and less on the laws and customs that governed the distribution of that wealth, than could have been wished. But it is nevertheless a monument of the permanence of the old English institutions, even after the ownership of four-fifths of the soil has been changed. The king inquires into the state of things in 1066 because it is on that state of things that his rights of taxation depend. He does not claim to have rearranged the whole realm on a new basis, or to be levying his revenue on a new assessment made at his own pleasure. Nor is it in the sphere of taxation alone that William's organization of the realm stands on the old English customs. In the military sphere, though his normal army is the feudal force composed of the tenants-in-chief and the knights whom they have enfeoffed, he retains the power to call out the *fyrd*, the old national *levée en masse*, without regard to whether its members are freemen or villeins of some lord. And in judicial matters the higher rights of royal justice remain intact, except in the few cases where special privileges have been granted to one or two palatine earls. The villein must sue in his lord's manorial courts, but he is also subject to the royal courts of hundred and shire. The machinery of the local courts survives for the most part intact.

Position of the Church.

William's dealings with the Church of England were no less important than his dealings with social organization. In the earlier years of his reign he set himself to get rid of the whole of the upper hierarchy, in order to replace them by Normans. In 1070 Archbishop Stigand was deposed as having been uncanonically chosen, and six or seven other bishops after him. All the vacancies, as well as those which kept occurring during the next few years, were immediately filled up with foreigners. By the time that William had been ten years on the throne there were only three English bishops left. At his death there was only one—the saintly Wulfstan of Worcester. The same process was carried out with regard to abbacies, and indeed with all important places of ecclesiastical preferment. By 1080 the English Church was officered entirely by aliens. Just as with the lay landholders, the change of *personnel* made a vast difference, not so much in the legal position of the new-comers as in the way in which they regarded their office. The outlook of a Norman bishop was as unlike that of his English predecessor as that of a Norman baron. The English Church had got out of touch with the ideals and the spiritual movements of the other Western churches. In especial the great monastic revival which had started from the abbey of Cluny and spread all over France, Italy and Germany had hardly touched this island. The continental churchmen of the 11th century were brimming over with ascetic zeal and militant energy, while the majority of the English hierarchy were slack and easy-going. The typical faults of the dark ages, pluralism, simony, lax observation of the clerical rules, contented ignorance, worldliness in every aspect, were all too prevalent in England. There can be no doubt that the greater part of William's nominees were better men than those who preceded them; his great archbishop, Lanfranc, though a busy statesman, was also an energetic reformer and a man of holy life. Osmund, Remigius and others of the first post-Conquest bishops have left a good name behind them. The condition of the church alike in the matter of spiritual zeal, of hard work and of learning was much improved. But there was a danger behind this revival; for the reformers of the 11th century, in their zeal for establishing the Kingdom of God on earth, were not content with raising the moral and intellectual standards prevailing in Christendom, but sought to bring the whole scheme of life under the church, by asserting the absolute supremacy of the spiritual over the temporal power, wherever the two came in contact or overlapped. The result, since the feudal and ecclesiastical systems had become closely interwoven, and the frontier between the religious and secular spheres must ever be vague and undefined, was the conflict between the spiritual and temporal powers which, for two centuries to come, was to tear Europe into warring factions (see the articles CHURCH HISTORY; PAPACY; INVESTITURE). The Norman Conquest of England was contemporaneous with the supreme influence of the greatest exponent of the theory of ecclesiastical supremacy, the archdeacon Hildebrand, who in 1073 mounted the papal throne as Gregory VII. (*q.v.*). William, despite all his personal faults, was a sincerely pious man, but it could not be expected that he would acquiesce in these new developments of the religious reformation which he had done his best to forward. Hence we find a divided purpose in the policy which he pursued with regard to church affairs. He endeavoured to keep on the best terms with the papacy: he welcomed legates and frequently consulted the pope on purely spiritual matters. He even took the hazardous step of separating ecclesiastical courts and lay courts, giving the church leave to establish separate tribunals of her own, a right which she had never possessed in Saxon England. The spiritual jurisdiction of the bishop had hitherto been exercised in the ordinary national courts, with lay assessors frequently taking part in the proceedings, and mixing their dooms with the clergy's canonical decisions. William in 1076 granted the church a completely independent set of courts, a step which his successors were to regret for many a generation.

At the same time, however, he was not blind to the possibilities of papal interference in domestic matters, and of the danger of conflict between the crown and the recently-strengthened clerical order. To guard against them he laid down three general rules: (1) that no one should be recognized as pope in England till he had himself taken cognizance of the papal election, and that no papal letters should be brought into the realm without his leave; (2) that no decisions of the English ecclesiastical synods should be held valid till he had examined and sanctioned them; (3) that none of his barons or ministers should be excommunicated unless he approved of such punishment being inflicted on them. These rules seem to argue a deeply rooted distrust of the possible encroachments of the papacy on the power of the state. The question of ecclesiastic patronage, which was to be the source of the first great quarrel between the crown and the church in the next generation, is not touched upon. William retained in his own hands the choice of bishops and abbots, and Alexander II. and Gregory VII. seem to have made no objection to his doing so, in spite of the claim that free election was the only canonical way of filling vacancies. The Conqueror was allowed for his lifetime to do as he pleased, since he was recognized as a true friend of the church. But the question was only deferred and not settled.

William's later reign.

The political history of William's later years is unimportant; his main energy was absorbed in the task of holding down and organizing his new kingdom. His rather precarious conquest of the county of Maine, his long quarrels with Philip I. of France, who suborned against him his undutiful and rebellious eldest son Robert, his negotiation with Flanders and Germany, deserve no more than a mention. It is more necessary to point out that he reasserted on at least one occasion (when King Malcolm Canmore did him homage) the old suzerainty of the English kings over Scotland. He also began that encroachment on the borders of Wales which was to continue with small interruptions for the next two centuries. The advance was begun by his great vassals, the earls of Chester, Shrewsbury and Hereford, all of whom occupied new districts on the edge of the mountains of Powys and Gwynedd. William himself led an expedition as far as St. Davids in 1081, and founded Cardiff Castle to mark the boundary of his realm north of the Bristol Channel.

Perhaps the most noteworthy event of the second portion of the Conqueror's reign was a rebellion which, though it made no head and was easily suppressed, marks the commencement of that feudal danger which was to be the constant trouble of the English kings for the next three generations. Two of the greatest of his foreign magnates, Roger, earl of Hereford, and Ralph, earl of Norfolk, rose against him in 1075, with no better cause than personal grievances and ambitions. He put them down with ease; the one was imprisoned for life, the other driven into exile, while Waltheof, the last of the English earls, who had dabbled in a hesitating way in this plot, was executed. There was never any serious danger, but the fact that under the new régime baronial rebellion was possible, despite of all William's advantages over other feudal kings, and despite of the fact that the rebels were hardly yet settled firmly into their new estates, had a sinister import for the future of England. With the new monarchy there had come into England the anarchic spirit of continental feudalism. If such a man as the Conqueror did not overawe it, what was to be expected in the reigns of his successors? William had introduced into his new realm alike the barons, with their personal ambition, and the clerics of the school of Hildebrand, with their intense jealousy for the rights of the church. The tale of the dealings of his descendants with these two classes of opponents constitutes the greater part of English history for a full century.

William Rufus.

William died at Rouen on the 7th of September 1087; on his death-bed he expressed his wish that Normandy should pass to his elder son, Robert, in spite of all his rebellions, but gave his second son William (known by the nickname of Rufus) the crown of England, and sent him thither with commendatory letters to archbishop Lanfranc and his other ministers. There was at first no sign of opposition to the will of the late king, and William Rufus was crowned within three weeks of his father's decease. But the results of the Conquest had made it hard to tear England and Normandy apart. Almost every baron in the duchy was now the possessor of a smaller or a greater grant of lands in the kingdom, and the possibility of serving two masters was as small in 1087 as at any other period of the world's history. By dividing his two states between his sons the Conqueror undid his own work, and left to his subjects the certainty of civil war. For the brothers Robert and William were, and always had been, enemies, and every intriguing baron had before him the tempting prospect of aggrandizing himself, by making his allegiance to one of the brothers serve as an excuse for betraying the other. Robert was thriftless, volatile and easy-going, a good knight but a most incompetent sovereign. These very facts commended him to the more turbulent section of the baronage; if he succeeded to the whole of the Conqueror's heritage they would have every opportunity of enjoying freedom from all governance. William's private character was detestable: he was cruel, lascivious, greedy of gain, a habitual breaker of oaths and promises, ungrateful and irreligious. But he was cunning, strong-handed and energetic; clearly the "Red King" would be an undesirable master to those who loved feudal anarchy. Hence every turbulent baron in England soon came to the conclusion that Robert was the sovereign whom his heart desired.

The greater part of the reign of William II. was taken up with his fight against the feudal danger. Before he had been six months on the throne he was attacked by a league comprising more than half the baronage, and headed by his uncles, bishop Odo of Bayeux and Robert of Mortain. They used the name of the duke of Normandy and had secured his promise to cross the Channel for their assistance. A less capable and unscrupulous king than Rufus might have been swept away, for the rising burst out simultaneously in nearly every corner of the realm. But he made head against it with the aid of mercenary bands, the loyal minority of the barons, and the shire-levies of his English subjects. When he summoned out the fyrd they came in great force to his aid, not so much because they trusted in the promises of good governance and reduced taxation which he made, but because they saw that a horde of greedy barons would be worse to serve than a single king, however hard and selfish he might be. With their assistance William fought down the rebels, expelled his uncle Odo and several other leaders from the realm, confiscated a certain amount of estates, and then pardoned the remainder of the rebels. Such mercy, as he was to discover, was misplaced. In 1095 the same body of barons made a second and a more formidable rising, headed by the earls of Shrewsbury, Eu and Northumberland. It was put down with the same decisive energy that William had shown in 1088, and this time he was merciless; he blinded and mutilated William of Eu, shut up Mowbray of Northumberland for life in a monastery, and hanged many men of lesser rank. Of the other rebels some were deprived of their English estates altogether, others restored to part of them after paying crushing fines. This second feudal rebellion was only a distraction to William from his war with his brother Robert, which continued intermittently all through the earlier years of his reign. It was raging from 1088 to 1091, and again from 1093 to 1096, when Robert tired of the losing game, pawned his duchy to his brother and went off on the First Crusade. Down to this moment William's position had been somewhat precarious; with the Norman war generally on hand, feudal rebellion always imminent, and Scottish invasions occasionally to be repelled, he had no easy life. But he fought through his troubles, conquered Cumberland from the Scots (1092), in dealing with his domestic enemies used cunning where force failed, and generally got his will in the end. His rule was expensive, and he made himself hated by every class of his subjects, baronage, clergy and people alike, by his ingenious and oppressive taxation. His chosen instrument, a clerical lawyer named Ranulf Flambard (*q.v.*), whom he presently made bishop of Durham, was shameless in his methods of twisting feudal or national law to the detriment of the taxpayer. William supported him in every device, however unjust, with a cynical frankness which was the distinguishing trait of his character; for he loved to display openly all the vices and meannesses which most men take care to disguise. In dealing with the baronage Ranulf and his master extorted excessive and arbitrary "reliefs" whenever land passed in succession to heirs. When the church was a landholder their conduct was even more unwarrantable; every clerk installed in a new preferment was forced to pay a large sum down—which in that age was considered a clear case of simony by all conscientious men. But in addition the king kept all wealthy posts, such as bishoprics and abbacies, vacant for years at a time and appropriated the revenue meanwhile.

Anselm.

This policy, when pursued with regard to the archbishopric of Canterbury, brought on Rufus the most troublesome of his quarrels. When the wise primate Lanfranc, his father's friend, died in 1089, he made no appointment till 1093, extracting meanwhile great plunder from the see. In a moment of sickness, when his conscience was for a space troubling him or his will was weak, he nominated the saintly Anselm (*q.v.*) to the archbishopric. When enthroned the new primate refused to make the enormous gift which the king expected from every recipient of preferment. Soon after he began to press for leave to hold a national synod, and when it was denied him, spoke out boldly on the personal vices as well as the immoral policy of the king. From this time William and Anselm became open enemies. They fought first upon the question of acknowledging Urban II. as pope—for the king, taking advantage of the fact that there was an antipope in existence, refused to allow that there was any certain and legitimate head of the Western church at the moment. Then, after William had reluctantly yielded on this point, the far more important question of lay investitures cropped up. The council of Clermont (Nov. 1095) had just issued its famous decree to the effect that bishops must be chosen by free election, and not invested with their spiritual insignia or enfeoffed with their estates by the hands of a secular prince. Anselm felt himself obliged to accept this decision, and refused to accept his own pallium from William when Urban sent it across the sea by the hands of a legate. The king replied by harrying him on charges of having failed in his feudal obligation to provide well-equipped knights for a Welsh expedition, and imposed ruinous fines on him. It was even said that his life was threatened, and he fled to Rome in 1097, not to return till his adversary was dead. There was much to be said for the theory of the king as to the relations between church and state; he was indeed only carrying on in a harsh form his father's old policy. But the fact that he was a tyrant and an evil-liver, while Anselm was a saint, so much influenced public opinion that William was universally regarded as in the wrong, and the sympathy of the laity no less than the clergy was with the archbishop. For the remaining three years of his life the Red King was considered to be in a state of reprobation and at open strife with righteousness.

Yet so far as secular affairs went William seemed prosperous enough. Since his brother had pawned the duchy of Normandy to him, so that he reigned at Rouen no less than at London, the danger of rebellion was almost removed. His foreign policy was successful: he installed a nominee of his own, Edgar, the son of Malcolm Canmore, on the throne of Scotland (1097); he reconquered Maine, which his brother Robert had lost; he made successful war upon King Philip of France. His barons subdued much of South Wales, though his own expeditions into North Wales, which he had designed to conquer and annex, had a less fortunate ending. He dreamed, we are told, of attacking Ireland, even of crowning himself king at Paris. But on the 2nd of August 1100 he was suddenly cut off in the midst of his sins. While hunting with some of his godless companions in the New Forest, he was struck by an arrow, unskilfully shot by one of the party. The knight Walter Tyrrell, who was persistently accused of being the author of his master's death, as persistently denied his responsibility for it; and whether the arrow was his or no, it was not alleged that malice guided it. William's favourites had all to lose by his death.

Succession of Henry I.

The king's death was unexpected: he was only in his fortieth year, and men's minds had not even begun to ponder over the question of who would succeed him. The crown of England was left vacant for the boldest kinsman to snatch at, if he dared. William had two surviving brothers, beside several nephews. Robert's claim seemed the more likely to succeed, for not only was he the elder, but England was full of barons who desired his accession, and had already taken up arms for him in 1087 or 1095. But he was far away—being at the moment on his return journey from Jerusalem—while on the spot was his brother Henry, an ambitious prince, whose previous efforts to secure himself a territorial endowment had failed more from ill-luck than from want of enterprise or ability. Seeing his opportunity, Henry left his brother's body unburied, rode straight off to Winchester with a handful of companions, and seized the royal treasure. This and his ready tongue were the main arguments by which he convinced the few magnates present, and persuaded them to back him, despite the protests of some supporters of Robert. There was hardly the semblance of an election, and the earl of Warwick and the chancellor William Giffard were almost the only persons of importance on the spot. But Henry, once hailed as king, rode hard for London and persuaded bishop Maurice to crown him without delay at Westminster, since the primate Anselm was absent beyond seas. He certainly lost no time: Rufus was shot on Thursday, the 2nd of August—his successor was crowned on Sunday the 5th of August! The realm heard almost by the same messengers that it had lost one king and that it had gained another.

Henry at once issued a proclamation and charter promising the redress of all the grievances with which his brother had afflicted his feudal tenants, the clergy and the whole nation. He would keep the ancient laws of King Edward, as amended by his father the Conqueror, and give all men good justice. These promises he observed more faithfully than Norman kings were wont to do; if the pledge was not redeemed in every detail, he yet kept England free from anarchy, abandoned the arbitrary and unjust taxation of his brother, and set up a government that worked by rule and order, not by the fits and starts of tyrannical caprice. He was a man of a cold and hard disposition, but full of practical wisdom, and conscious that his precarious claim to the crown must be secured by winning the confidence of his subjects. Almost the first and quite the wisest of his inspirations was to wed a princess of the old English line—Edith,[1] the niece of Edgar Ætheling, the child of his sister Margaret of Scotland and Malcolm Canmore. The match, though his Norman barons sneered at it, gave him the hearts of all his English subjects, who supported him with enthusiasm, and not merely (as had been the case with Rufus) because they saw that a strong king would oppress them less than a factious and turbulent baronage. Henry won much applause at the same time by filling up all the bishoprics and abbacies which his brother had kept so long vacant, by inviting the exiled Anselm to return to England, and by imprisoning William's odious minister Ranulf Flambard. He had just time to create a favourable impression by his first proceedings, when his brother Robert, who had returned from Palestine and resumed possession of Normandy, landed at Portsmouth to claim the crown and to rouse his partisans among the English baronage. Henry bought him off, before the would-be rebels had time to join him, by promising him an annual tribute of 3000 marks and surrendering to him all his estates in Normandy (1101). His policy seemed tame and cautious, but was entirely justifiable, for within a few months of Robert's departure the inevitable feudal rebellion broke out. If the duke and his army had been on the spot to support it, things might have gone hardly with the king. The rising was led by Robert of Belesme, earl of Shrewsbury, a petty tyrant of the most ruffianly type, the terror of the Welsh marches. He was backed by his kinsmen and many other barons, but proved unable to stand before the king, who was loyally supported by the English shire levies. After taking the strong castles of Arundel, Tickhill, Bridgnorth and Shrewsbury, Henry forced the rebels to submit. He confiscated their estates and drove them out of the realm; they fled for the most part to Normandy, to spur on duke Robert to make another bid for the English crown. From the broad lands which they forfeited Henry made haste to reward his own servants, new men who owed all to him and served him faithfully. From them he chose the sheriffs, castellans and councillors through whom he administered the realm during the rest of his long reign.

This minor official nobility was the strength of the crown, and was sharply divided in spirit and ambition from the older feudal aristocracy which descended from the original adventurers who had followed William the Conqueror. Yet the latter still remained strong enough to constitute a danger to the crown whenever it should fall to a king less wary and resolute than Henry himself.

Henry was by nature more of an administrator and organizer than of a fighting man. He was a competent soldier, but his wish was rather to be a strong king at home than a great conqueror abroad. Nevertheless he was driven by the logic of events to attack Normandy, for as long as his brother reigned there, and as long as many English barons retained great holdings on both sides of the Channel and were subjects of the duke as well as of the king, intrigues and plots never ceased. The Norman war ended in the battle of Tenchebrai (Sept. 28, 1106), where Duke Robert was taken prisoner. His brother shut him up in honourable confinement for the rest of his life, though otherwise he was not ill-treated. For the rest of his reign Henry was ruler of all the old dominions of the Conqueror, and none of his subjects could cloak disloyalty by the pretence of owing a divided allegiance to two masters. With this he was content, and made no great effort to extend his dominions farther; his desire was to reign as a true king in England and Normandy, rather than to build up a loosely compacted empire around them.

Henry's difficulties with the church.

Throughout the time of Henry's Norman war, he was engaged in a tiresome controversy with the primate on the question of lay investitures, the continuation of the struggle which had begun in his brother's reign. Every English king for five generations had to face the danger from the church, no less than the danger from the barons. Anselm had come back from Rome confirmed in the theories for which he had contended with Rufus—nay, taught to extend them to a further extreme. He now maintained not only that it was a sin that kings should invest prelates with their spiritual insignia, the pallium, the staff, the ring, but claimed that no clerk ought to do homage to the king for the lands of his benefice, though he himself seven years before had not scrupled to make his oath to his earlier master. He now refused to swear allegiance to the new monarch, though he had recalled him and had restored him to the possession of his see. He also refused to consecrate Henry's nominees to certain bishoprics and abbacies on the ground that they had not been chosen by free election by their chapters or their monks. The king was loath to take up the quarrel, for he highly respected the archbishop; yet he was still more loath to surrender the ancient claims and privileges of the crown. Anselm was equally reluctant to force matters to an open breach, yet would not shift from his position. There followed an interminable series of arguments, interrupted by truces, till at last Anselm, at the king's suggestion, went to Rome to see if the pope could arrange some *modus vivendi*. Paschal II. for some time refused to withdraw from his fixed theory of the relation of church and state, and Anselm, in despair, preferred to remain abroad rather than to press matters to the rupture that seemed the only logical issue of the controversy. But in 1107 the pope consented to a compromise, which satisfied the king, and yet was acceptable to the church. Bishops and abbots were for the future to be canonically elected by the clergy, and were no longer to receive the ring and staff from lay hands. But they were to do homage to the king for their lands, and since they thus acknowledged him as their temporal lord Henry was content. Moreover, he retained in practice, if not in theory, his power to nominate to the vacant offices; chapters and monasteries seldom dared to resist the pressure which the sovereign could bring to bear upon them in favour of the candidate whom he had selected. The arrangement was satisfactory, and served as the model for the similar compromise arrived at between Pope Calixtus II. and the emperor Henry V. fifteen years later.

From 1107 onward Henry was freed from both the dangers which had threatened him in his earlier years, and was free to develop his policy as he pleased. He had yet twenty-eight years to reign, for he survived to the age of sixty-seven, an age unparalleled by any of his predecessors, and by all his successors till Edward I.

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[1] As the name Edith (Eadgyth) sounded uncouth to Norman ears, she assumed the continental name Maheut or Mahelt (Eng. Mahald, later Mold and Maud), in Latin Matildis or Matilda. Sir J. H. Ramsay, *Foundations of England*, ii. 235. (Ed.)

Constitutional machinery.

It is to Henry, aided by his great justiciar, Roger, bishop of Salisbury, that England owed the institution of the machinery of government by which it was to be ruled during the earlier middle ages. This may be described as a primitive kind of bureaucracy, which gradually developed into a much more complicated system of courts and offices. Around the sovereign was his *Curia Regis* or body of councillors, of whom the most important were the justiciar, the chancellor and the treasurer, though the feudal officers, the constable and marshal, were also to be found there. The bulk of the council, however, was composed of knights and clerks selected by the king for their administrative or financial ability. The Curia, besides advising the king on ordinary matters of state, had two special functions. It sat, or certain members of it sat, under the presidency of the king or the justiciar, as the supreme court of justice of the realm. In this capacity it tried the suits of tenants-in-chief, and all appeals from the local courts. But Henry, not contented with this, adopted the custom of sending forth certain members of the Curia throughout the realm at intervals, to sit in the shire court, along with or in place of the sheriff, and to hear and judge all the cases of which the court had cognizance. From these itinerant commissioners (justices in eyre) descend the modern justices of assize. The sheriff, the original president of the shire court, was gradually extruded by them from all important business.

But there were other developments of the Curia. The justiciar, chancellor and treasurer sat with certain other members of the council as the court of exchequer, not only to receive and audit the accounts of the royal revenue, but to give legal decisions on all questions connected with finance. Twice in every year the sheriffs and other royal officials came up to the exchequer court, which originally sat at Winchester, with their bags of money and their sheaves of accounts. Their figures were subjected to a severe scrutiny, and the law was laid down on all points in which the interests of the sheriff and the king, or the sheriff and the taxpayer, came into conflict. In this way the exchequer grew into a law court of primary importance, instead of remaining merely a court of receipt. Though its members were originally the same men who sat in the Curia Regis, the character of the question to be tried settled the capacity in which they should sit, and two separate courts were evolved. (See EXCHEQUER.)

Under the superintendence of the Curia Regis and the exchequer, the sheriff still remained the king's factotum in local affairs. He led the shire-levies, collected the royal revenues both feudal and non-feudal, and presided in the shire-court as judge, till in the course of years his functions in that sphere were gradually taken over by the itinerant justices. On his fidelity the king had to rely both for military aid in times of baronial revolt and for the collection of the money which formed the sinews of war. Hence the position was one of the highest importance, and Henry's new nobility, the men of ability whom he selected and promoted, found their special occupation in holding the office of sheriff. It was they who had to see that the shire court, and in minor affairs the hundred court, did not allow cases to slip away into the jurisdiction of the feudal courts of the baronage.

Henry I. must count not merely as the father of the English bureaucracy, but as a fosterer of the municipal independence of the towns. He gave charters of a very liberal character to many places, and in especial to London, where the citizens were allowed to choose their own sheriff, and to deal directly with the exchequer in matters of revenue. He even farmed out to them the charge of the taxes of the whole shire of Middlesex, outside the city walls. Such a grant was exceptional—though Lincoln also seems to have been granted the privilege of dealing directly with the exchequer. But in many other smaller towns the first grants—the smaller beginnings of autonomy—may be traced back to this period (see BOROUGH).

Though Henry was an autocrat, and governed through bureaucratic officials who were entirely under his hand, yet a reign of law and order such as his was indirectly favourable to the growth of constitutional liberty. It was equally favourable to the growth of national unity: it was in his time that Norman and English began to melt together: intermarriage in all classes became common, and only thirty years after his death a contemporary writer could remark that it was hard for any man to call himself either Norman or English, so much had blood been intermingled.

It is unnecessary to go into the very uninteresting and unimportant history of Henry's later years. A long war with France, prosecuted without much energy, led to no results, for the French king's attempts to stir up rebellions in the name of William the Clito (*q.v.*), the son of Duke Robert, came to an end with that prince's death in 1129. But the extension of the English borders in South Wales by the conquests of the lords marcher as far as Pembroke and Cardigan deserves a word of notice.

Henry's heir.

The question of the succession was the main thing which occupied the mind of the king and the whole nation in Henry's later years. It had a real interest for every man in an age when any doubt as to the heir meant the outbreak of civil war such as had occurred at the death of the Conqueror and of Rufus. There was now a problem of some difficulty to be solved. Henry's only son William had been drowned at sea in 1120. He had no other child born in wedlock save a daughter, Matilda, who married the emperor Henry V., but had no issue by him. On the emperor's decease she wedded as her second husband Geoffrey of Anjou (1127), to whom during her father's last years she bore two sons. But the succession of a woman to the crown was as unfamiliar to English as to Norman ideas, nor did it seem natural to either to place a young child on the throne. Moreover, Matilda's husband Geoffrey was unpopular among the Normans; the Angevins had been the chief enemies of the duchy for several generations, and the idea that one of them might become its practical ruler was deeply resented. The old king, as was but natural, had determined that his daughter should be his successor; he made the great council do homage to her in 1126, and always kept her before the eyes of his people as his destined heir. But though he had forced or cajoled every leading man in England and Normandy to take his oath to serve her, he must have been conscious that there was a large chance that such pledges would be forgotten at his death. The prejudice against a female heir was strong, and there were too many turbulent magnates to whom the anarchy that would follow a disputed succession presented temptations which could not be resisted.

Matilda, and Stephen.

Henry died suddenly on the 25th of November 1135, while he was on a visit to his duchy of Normandy. The moment that his death was reported the futility of oaths became apparent. A majority of the Norman barons appealed to Theobald, count of Blois, son of the Conqueror's daughter Adela, to be their duke, and to save them from the yoke of the hated Angevin. His supporters and those of Matilda were soon at blows all along the frontier of Normandy. Meanwhile in England another pretender had appeared. Stephen, count of Boulogne, the younger brother of Theobald, had landed at Dover within a few days of Henry's death, determined to make a snatch at the crown, though he had been one of the first who had taken the oath to his cousin a few years before. The citizens of London welcomed him, but he was not secure of his success till by a swift swoop on Winchester he obtained possession of the royal treasure—an all-important factor in a crisis, as Henry I. had shown in 1100. At Winchester he was acknowledged as king by the bishop, his own brother Henry of Blois, and by the great justiciar, Roger, bishop of Salisbury, and the archbishop, William of Corbeil. The allegiance of these prelates was bought by an unwise promise to grant all the demands of the church party, which his predecessor had denied, or conceded only in part. He would permit free election to all benefices, and free legislation by ecclesiastical synods, and would surrender any claims of the royal courts to have jurisdiction over clerks or the property of clerks. It then remained necessary to buy the baronage, of which only a few members had as yet committed themselves to his side. It was done by grants of lands and privileges, the first instalment of a never-ending crop of ruinous concessions which Stephen continued to make from the day of his accession down to the day of his death.

The pretender was crowned at Westminster on the 22nd of December 1135—less than a month after his uncle's death. No one yet openly withstood him, but he was well aware that his position was precarious, and that the claims of Matilda would be brought forward ere long by the section of the baronage which had not yet got from him all they desired. Meanwhile, however, he was encouraged to persevere by the fact that his brother Theobald had withdrawn his claim to the duchy of Normandy, and retired in his favour. For a space he was to be duke as well as king; but this meant merely that he would have two wars, not one, in hand ere long. Matilda's adherents were already in the field in Normandy; in England their rising was only delayed for a few months.

Civil war.

Stephen, though he had shown some enterprise and capacity in his successful snatch at the crown, was a man far below his three predecessors on the throne in the matter of perseverance and foresight. He was a good fighter, a liberal giver, and a faithful friend, but he lacked wisdom, caution and the power to organize. Starting his career as a perjurer, it is curious that he was singularly slow to suspect perjury in others; he was the most systematically betrayed of all English kings, because he was the least suspicious, and the most ready to buy off and to forgive rebels. His troubles began in 1136, when sporadic rebellions, raised in the name of Matilda, began to appear; they grew steadily worse, though Stephen showed no lack of energy, posting about his realm with a band of mercenary knights whenever trouble broke out. But in 1138 the crisis came; the baronage had tried the capacity of their new master and found him wanting. The outbreak was now widespread and systematic—caused not by the turbulence of a few wild spirits, but by the deliberate conspiracy of all who saw their advantage in anarchy. Matilda had a few genuine partisans, such as her half-brother Robert, earl of Gloucester, the illegitimate son of Henry I., but the large majority of those who took arms in her name were ready to sell their allegiance to either candidate in return for lands, or grants of rank or privilege. A long list of doubly and triply forsworn nobles, led by Geoffrey de Mandeville, Aubrey de Vere and Ralph of Chester, made the balance of war sway alternately from side to side, as they transferred themselves to the camp of the highest bidder. It is hard to trace any meaning in the civil war—it was not a contest between the principle of hereditary succession and the principle of elective kingship, as might be supposed. It was rather, if some explanation must be found for it, a strife between the kingly power and feudal anarchy. Unfortunately for England the kingly power was in the hands of an incapable holder, and feudal anarchy found a plausible mask by adopting the disguise of loyalty to the rightful heiress.

The civil war was not Stephen's only trouble; foreign invasion was added. David I., king of Scotland, was the uncle of Matilda, and used her wrongs as the plea for thrice invading northern England, which he ravaged with great cruelty. His most formidable raid was checked by the Yorkshire shire levies, at the battle of the Standard (Aug. 22, 1138). Yet in the following year he had to be bought off by the grant of all Northumberland (save Newcastle and Bamborough) to his son Earl Henry. Carlisle and Cumberland were already in his hands. Some years later the Scottish prince also got possession of the great "Honour of Lancaster." It was not Stephen's fault that the boundary of England did not permanently recede from the Tweed and the Solway to the Tyne and the Ribble.

But the affairs of the North attracted little attention while the civil war was at its height in the South. In 1139 Stephen had wrought himself fatal damage by quarrelling with the ecclesiastical bureaucrats, the kinsmen and allies of Roger of Salisbury, who had been among his earliest adherents. Jealous of their power and their arrogance, and doubting their loyalty, he imprisoned them and confiscated their lands. This threw the whole church party on to the side of Matilda; even Henry, bishop of Winchester, the king's own brother, disowned him and passed over to the other side. Moreover, the whole machinery of local government in the realm fell out of gear, when the experienced ministers who were wont to control it were removed from power.

Matilda had landed in England in the winter of 1139–1140; for a year her partisans made steady progress against the king, and on the 2nd of February 1141 Stephen was defeated and taken prisoner at the battle of Lincoln. All England, save the county of Kent and a few isolated castles elsewhere, submitted to Matilda. She was hailed as a sovereign by a great assembly at Winchester, over which Stephen's own brother Bishop Henry presided (April 7, 1141) and entered London in triumph in June. It is doubtful whether she would have obtained complete possession of the realm if she had played her cards well, for there were too many powerful personages who were interested in the perpetuation of the civil war. But she certainly did her best to ruin her own chances by showing an unwise arrogance, and a determination to resume at once all the powers that her father had possessed. When she annulled all the royal acts of the last six years, declared charters forfeited and lands confiscated, and began to raise heavy and arbitrary taxes, she made the partisans of Stephen desperate, and estranged many of her own supporters. A sudden rising of the citizens drove her out of London, while she was making preparations for her coronation. The party of the imprisoned king rallied under the wise guidance of his wife Matilda of Boulogne and his brother Henry, and many other of the late deserters adhered to it. Their army drove the lately triumphant party out of Winchester, and captured its military chief, Robert, earl of Gloucester. So much was his loss felt that his sister exchanged him a few months later for King Stephen.

After this the war went on interminably, without complete advantage to either side, Stephen for the most part dominating the eastern and Matilda the western shires. It was the zenith of the power of the baronial anarchists, who moved from camp to camp with shameless rapidity, wresting from one or other of the two rival sovereigns some royal castle, or some dangerous grant of financial or judicial rights, at each change of allegiance. The kingdom was in the desperate state described in the last melancholy pages of the *Anglo-Saxon Chronicle*, when life and property were nowhere safe from the objectless ferocity of feudal tyrants—when "every shire was full of castles and every castle filled with devils and evil men," and the people murmured that "Christ and his saints slept."

Such was England's fate till 1153, when Matilda had retired from the strife in favour of her son, Henry of Anjou, and Stephen was grown an old man, and had just lost his heir, Eustace, to whom he had desired to pass on the crown. Both parties were exhausted, both were sick of the incessant treachery of their more unscrupulous barons, and at last they came to the compromise of Wallingford (October 1153), by which it was agreed that Stephen should reign for the remainder of his life, but that on his death the crown should pass to Henry. Both sides promised to lay down their arms, to dismiss their mercenaries, and to acquiesce in the destruction of unlicensed castles, of which it is said, with no very great exaggeration, that there were at the moment over 1000 in the realm. Henry then returned to Normandy, of which his mother had been in possession since 1145 while Stephen turned his small remaining strength to the weary task of endeavouring to restore the foundations of law and order But he had accomplished little when he died in October 1154 The task of reconstruction was to be left to Henry of Anjou: his predecessor was only remembered as an example of the evil that may be done by a weak man who has been reckless enough to seize a throne which he is incapable of defending. England has had many worse kings, but never one who wrought her more harm. If his successor had been like him, feudal anarchy migh have become as permanent in England as in Poland.

Henry II.

Fortunately the young king to whom Stephen's battered crown now fell was energetic and capable, if somewhat self-willed and hasty. He was inferior in caution and self-control to his grandfather Henry I., though he resembled him in his love of strong and systematic governance. From the point of view of his English subjects his main achievement was that he restored in almost every detail the well-organized bureaucracy which his ancestor had created, and with it the law and order that had disappeared during Stephen's unhappy reign. But there was this essential difference between the position of the two Henries, that the elder aspired to be no more than king of England and duke of Normandy, while the younger strove all his life for an imperial position in western Europe. Such an ambition was almost forced upon him by the consequences of his descent and his marriage. Besides his grandfather's Anglo-Norman inheritance, he had received from his father Geoffrey the counties of Anjou and Touraine, and the predominance in the valley of the Lower Loire. But it was his marriage to Eleanor of Aquitaine, two years before his accession to the English throne, which gave him the right to dream of greatness such as his Norman forbears had never enjoyed. This lady, the divorced wife of Louis VII. of France, brought to her second husband the whole of the lands from Poitou to the Pyrenees, the accumulated gains of many warlike ancestors. In wealth and fighting strength the duchy of Aquitaine was a full third of France. Added to Anjou and Normandy it made a realm far more important than England. Hence it came that Henry's ambitions and interests were continental more than English. Unlike his grandfather he dwelt for the greater part of his time beyond seas. It must be remembered, too, that his youth had been spent abroad, and that England only came to him when he was already a grown man. The concerns of his island realm were a matter of high importance to him, but only formed a part of his cares. Essentially he was an Angevin, neither a Norman nor an Englishman, and his primary ambition was to make the house of Anjou supreme in France. Nor did this seem impossible; he owned a far broader and wealthier domain beyond the Channel than did his nominal suzerain King Louis VII., and—what was of more importance—he far excelled that prince both in vigour and in capacity.

On succeeding to the English crown, however, he came over at once to take possession of the realm, and abode there for over a year, displaying the most restless energy in setting to rights the governance of the realm. He expelled all Stephen's mercenaries, took back into his hands the royal lands and castles which his predecessor had granted away, and destroyed hundreds of the "adulterine" castles which the barons and knights had built without leave during the years of the anarchy. Hardly a single magnate dared to oppose him—Bridgnorth, now a castle of the Mortimers, was the only place which he had to take by force. His next care was to restore the bureaucracy by which Henry I. had been wont to govern. He handed over the exchequer to Nigel, bishop of Ely, the nephew of the old justiciar Roger of Salisbury, and the heir of his traditions. His chancellor was a young clerk, Thomas Becket, who was recommended to him by archbishop Theobald as the most capable official in the realm. A short experience of his work convinced the king that his merits had not been exaggerated. He proved a zealous and capable minister, and such a strong exponent of the claims of the crown that no one could have foreseen the later developments by which he was to become their greatest enemy.

The machine of government was beginning to work in a satisfactory fashion, and the realm was already settling down into order, when Henry was called abroad by a rebellion raised in Anjou by his brother Geoffrey—the first of the innumerable dynastic troubles abroad which continued throughout his reign to distract his attention from his duties as an English king. He did not return for fifteen months; but when he did reappear it was to complete the work which he had begun in 1155, to extort from the greater barons the last of the royal fortresses which still remained in their hands, and to restore the northern boundaries of the realm. Malcolm IV., the young king of Scotland, was compelled to give up the earldoms of Northumberland and Cumberland, which his father Henry had received from Stephen. He received instead only the earldom of Huntingdon, too far from the border to be a dangerous possession, to which he had a hereditary right as descending from Earl Waltheof. He did homage to the king of England, and actually followed him with a great retinue on his next continental expedition. In the same year (1157) Henry made an expedition into North Wales, and forced its prince Owen to become his vassal, not without some fighting, in which the English army received several sharp checks at the commencement of the campaign.

Yet once more Henry's stay on the English side of the Channel was but for a year. In 1158 he again departed to plunge into schemes of continental conquest. This time it was an attempt to annex the great county of Toulouse, and so to carry the borders of Aquitaine to the Mediterranean, which distracted him. Naturally Louis of France was unwilling to see his great vassal striding all across his realm, and did what he could to hinder him. Into the endless skirmishes and negotiations which followed the raising of the question of Toulouse it would be fruitless to enter. Henry did not achieve his purpose, indeed he seems to have failed to use his strength to its best advantage, and allowed himself to be bought off by a futile marriage treaty by which his eldest son was to marry the French king's daughter (1160). This was to be but the first of many disappointments in this direction; there was apparently some fatal scruple, both in Henry's own mind and in that of his continental subjects, as to pressing their suzerain too hard. But it must also be remembered that a feudal army was an inefficient weapon for long wars, and that the mercenaries, by whom alone it could be replaced, were both expensive and untrustworthy. Henry developed as far as he was able the system of "scutage" (*q.v.*) which his grandfather had apparently invented; by this the vassal compounded for his forty days' personal service by paying money, with which the king could hire professional soldiers. But even with this help he could never keep a large enough army together.

Quarrel with the church.

Meanwhile England, though somewhat heavily taxed, was at least enjoying quiet and strong governance. There is every sign that Henry's early years were a time of returning prosperity. But there was also much friction between the crown and its subjects. The more turbulent part of the baronage, looking back to the boisterous times of Stephen with regret, was reserving itself for a favourable opportunity. The danger of feudal rebellion was not yet past, as was to be shown ten years later. The towns did not find Henry an easy master. He took away from London some of the exceptional privileges which his grandfather had granted, such as the free election of sheriffs of Middlesex, and the right of farming the shire at a fixed rent. He asserted his power to raise "tallages"—arbitrary taxation—from the citizens on occasion. Yet he left the foundations of municipal liberty untouched, and he was fairly liberal in granting charters which contained moderate privileges to smaller towns. His most difficult task, however, was to come to a settlement with the Church. The lavish grants of Stephen had made an end of the old authority which the Conqueror and Henry I. had exercised over the clergy. Their successor was well aware of the fact, and was resolved to put back the clock, so far as it was in his power. It was not, however, on the old problems of free election, of lay investiture, that his quarrel with the clerical body broke out, but on the comparatively new question of the conflicting claims of ecclesiastical and secular courts. The separate tribunals of the church, whose erection William I. had favoured, had been developing in power ever since, and had begun to encroach on the sphere of the courts of the state. This was more than ever the case since Stephen had formally granted them jurisdiction over all suits concerning clerics and clerical property. During the first few years of his reign Henry had already been in collision with the ecclesiastical authorities over several such cases; he had chafed at seeing two clerks accused of murder and blackmailing claimed by and acquitted in the church courts; and most of all at the frequency of unlicensed appeals to Rome—a flagrant breach of one of the three rules laid down by William the Conqueror. Being comparatively at leisure after the pacification with France, he resolved to turn his whole attention to the arrangement of a new *modus vivendi* with the church. As a preliminary move he appointed his able chancellor Thomas Becket to the archbishopric of Canterbury, which fell vacant in 1162. This was the greatest mistake of his reign. Becket was one of those men who, without being either hypocrites or consciously ambitious, live only to magnify their office. While chancellor he was the most zealous servant of the crown, and had seemed rather secular than clerical in his habits and his outlook on life. But no sooner had he been promoted to the archbishopric than he put away his former manners, became the most formal and austere of men, and set himself to be the champion of the church party in all its claims, reasonable or unreasonable, against the state. The king's astonishment was even greater than his indignation when he saw the late chancellor setting himself to oppose him in all things. Their first quarrel was about a proposed change in some details of taxation, which seems to have had no specially ecclesiastical bearing at all. But Becket vehemently opposed it, and got so much support when the great council met at Woodstock that Henry withdrew his schemes. This was only a preliminary skirmish; the main battle opened in the following year, when the king, quite aware that he must for the future look on Thomas as his enemy, brought forward the famous *Constitutions of Clarendon*, of which the main purport was to assert the jurisdiction of the state over clerical offenders by a rather complicated procedure, while other clauses provided that appeals to Rome must not be made without the king's leave, that suits about land or the presentation to benefices, in which clerics were concerned, should be tried before the royal courts, and that bishops should not quit the realm unless they had obtained permission to do so from the king (see CLARENDON, CONSTITUTIONS OF). Somewhat to the king's surprise, Becket yielded for a moment to his pressure, and declared his assent to the constitutions. But he had no sooner left the court than he proclaimed that he had grievously sinned in giving way, suspended himself from his archiepiscopal functions, and wrote to the pope to beg for pardon and absolution. He then made a clandestine attempt to escape from the realm, but was detected on the seashore and forced to return.

Becket.

Incensed with Becket for his repudiation of his original submission, Henry proceeded to open a campaign of lawsuits against him, in order to force him to plead in secular courts. He also took the very mean step of declaring that he should call him to account for all the moneys that had passed through his hands when he was chancellor, though Becket had been given a quittance for them when he resigned the office more than two years before. The business came up at the council of Northampton (October 1164), when the archbishop was tried for refusing to recognize the jurisdiction of the king's courts, and declared to have forfeited his movable goods. The sentence was passed by the lay members of the Curia Regis alone, the bishops having been forbidden to sit, and threatened with excommunication if they did so, by the accused primate. When Becket was visited by the justiciar who came to rehearse the judgment, he started to his feet, refused to listen to a word, declared his repudiation of all lay courts and left the hall. That same night he made a second attempt to escape from England and this time succeeded in getting off to Flanders. From thence he fled to the court of the pope, where he received less support than he had expected. Alexander III. privately approved of all that he had done, and regarded him as the champion of the Church, but he did not wish to quarrel with King Henry. He had lately been driven from Rome by the emperor Frederick I., who had installed an antipope in his place, and had been forced to retire to France. If he sided with Becket and thundered against his persecutor, there was small doubt that the king of England would adhere to the schism. Accordingly he endeavoured to temporize and to avoid a rupture, to the archbishop's great disgust. But since he also declared the Constitutions of Clarendon uncanonical and invalid, Henry was equally offended, and opened negotiations with the emperor and the antipope. This conduct forced Alexander's hand, and he gave Becket leave to excommunicate his enemies. The exile, who had taken refuge in a French abbey, placed the justiciar and six other of the king's chief councillors under the ban of the Church, and intimated that he should add Henry himself to the list unless he showed speedy signs of repentance (April 1166).

Thus the quarrel had come to a head. Church and State were at open war. Henry soon found that Becket's threats had more effect than he liked. Many of the English clergy were naturally on the side of the primate in a dispute which touched their loyalty to the Church and their class feeling. Several bishops declared to the king that, since his ministers had been duly excommunicated, they did not see how they could avoid regarding them as men placed outside the pale of Christendom. Fortunately the pope interfered for a moment to lighten the friction; being threatened with a new invasion by the emperor Frederick, he suspended the sentences and sent legates to patch up a peace. They failed, for neither the king nor the archbishop would give way. At this juncture Henry was desirous of getting his eldest son and namesake crowned as his colleague, the best mode that he could devise for avoiding the dangers of a disputed succession at his death. He induced the archbishop of York, assisted by the bishops of London and Salisbury, to perform the ceremony. This was a clear invasion of the ancient rights of the primate, and Becket took it more to heart than any other of his grievances.

Yet the next move in the struggle was a hollow reconciliation between the combatants—a most inexplicable act on both sides. The king offered to allow Becket to return from exile, and to restore him to his possessions, without exacting from him any promise of submission, or even a pledge that he would not reopen the dispute on his return. Apparently he had made a wrong interpretation of the primate's mental attitude, and thought him desirous of a truce, if not ready for a compromise. He had wholly misjudged the situation; Becket made neither promises nor threats, but three weeks after he reached Canterbury publicly excommunicated the bishops of London and Salisbury for the part that they had taken in the coronation of the young king, and suspended from their functions the other prelates who had been present at the ceremony. He then proceeded to excommunicate a number of his minor lay enemies.

Becket's murder.

The news was carried overseas to Henry, who was then in Normandy. It roused one of the fits of wild rage to which he was not unfrequently liable; he burst out into ejaculations of wrath, and cursed "the cowardly idle servants who suffered their master to be made the laughing-stock of a low-born priest." Among those who stood about him were four knights, some of whom had personal grudges against Becket, and all of whom were reckless ruffians, who were eager to win their master's favour by fair means or foul. They crossed the Channel with astonishing speed; two days after the king's outburst they stood before Becket at Canterbury and threatened him with death unless he should remove the excommunications and submit to his master. The archbishop answered with words as scornful as their own, and took his way to the minster to attend vespers. The knights went out to seek their weapons, and when armed followed him into the north transept, where they fell upon him and brutally slew him with many sword-strokes (December 29, 1170). Thomas had been given time to fly, and his followers had endeavoured to persuade him to do so. It seems that he deliberately courted martyrdom, anxious apparently that his death should deal the king the bitterest blow that it was in his power to inflict (see BECKET).

Its results.

Nothing could have put Henry in such an evil plight; the whole world held him responsible for the murder, and he was forced to buy pardon for it by surrendering many of the advantages over the Church which he had hoped to gain by enforcing the Constitutions of Clarendon. Especially the immunity of clerical offenders from the jurisdiction of lay courts had to be conceded; for the rest of the middle ages the clerk guilty of theft or assault, riot or murder, could plead his orders, and escape from the harsh justice of the king's officers to the milder penalties of the bishop's tribunal. "Benefit of clergy" became an intolerable anomaly, all the more so because the privilege was extended in practice not only to all persons actually in minor orders, but to all who claimed them; any criminal who could read had a fair chance of being reckoned a clerk. Another concession which Henry was forced to make was that the appeals to Rome of litigants in ecclesiastical suits should be freely permitted, provided that they made an oath that they were not contemplating any wrong to the English crown or the English church, a sufficiently easy condition. Such appeals became, and remained, innumerable and vexatious. Pope Alexander also extorted from the king a pledge that he would relinquish any customs prejudicial to the rights of the Church which had been introduced since his accession. To the pope this meant that the Constitutions of Clarendon were disavowed; to the king, who maintained that they were in the main a mere restatement of the customs of William I., it bore no such general interpretation. The points were fought out in detail, and not settled for many years. Practically it became the rule to regard suits regarding land, or presentations to benefices, as pertaining to the king's court, while those regarding probate, marriage and divorce fell to the ecclesiastical tribunal. The question of election to bishoprics and abbacies went back to the stage which it had reached in the time of Henry I.; the choice was made in canonical form, by the chapters or the monasteries, but the king's recommendation was a primary factor in that choice. When the electors disregarded it, as was sometimes the case, there was friction; a weak king was sometimes overruled; a strong one generally got his way in the end.

Becket's death, then, gave a qualified triumph to the church party, and he was rightly regarded as the successful champion of his caste. Hence they held his death in grateful remembrance; the pope canonized him in 1173, and more churches were dedicated to him during the next two centuries than to any other English saint. In the eyes of most men his martyrdom had put the king so much in the wrong that the obstinacy and provocative conduct which had brought it about passed out of memory. His life of ostentatious austerity, and the courage with which he met his death, had caused all his faults to be forgotten. Henry himself felt so much the invidious position in which he was placed that even after making his submission to the pope's legates at Avranches in 1172, he thought it necessary to do penance before Becket's tomb in 1174, on which occasion he allowed himself to be publicly scourged by the monks of Canterbury, who inflicted on him three cuts apiece.

Between the outbreak of the king's quarrel with Becket at the council of Woodstock and the compromise of Avranches no less than ten years had elapsed—the best years of Henry's manhood. During this period his struggle with the Church had been but one of his distractions. His policy of imperial aggrandisement had been in progress. In 1163 he had completed the conquest of South Wales; the marcher lords were now in possession of the greater part of the land; the surviving Welsh princes did homage for the rest. In 1166 Henry got practical possession of the duchy of Brittany, the only remaining large district of western France which was not already in his hands. Conan, the last prince of the old Breton house, recognized him as his lord, and gave the hand of his heiress Constance to Geoffrey, the king's third son. When the count died in 1171 Henry did not transfer the administration of the land to the young pair, who were still but children, but retained it for himself, and clung to it jealously long after his son came of age. Intermittent wars with France during these years were of small importance; Henry never pushed his suzerain to extremity. But the Angevin dominions were extended in a new direction, where no English king had yet made his power felt.

Conquest of Ireland.

The distressful island of Ireland was at this moment enjoying the anarchy which had reigned therein since the dawn of history. Its state had grown even more unhappy than before since the Danish invasions of the 10th century, which had not welded the native kingdoms into unity by pressure from without—as had been the case in England—but had simply complicated affairs, by setting up two or three alien principalities on the coastline. As in England, the vikings had destroyed much of the old civilization; but they had neither succeeded in occupying the whole country nor had they been absorbed by the natives. The state of the island was much like that of England in the days of the Heptarchy: occasionally a "High King" succeeded in forcing his rivals into a precarious submission; more usually there was not even a pretence of a central authority in the island, and the annals of objectless tribal wars formed its sole history. King Henry's eyes had been fixed on the faction-ridden land since the first years of his reign. As early as 1155 he had asked and obtained the approval of Pope Adrian IV., the only Englishman who ever sat upon the papal throne, for a scheme for the conquest of Ireland. The Holy See had always regarded with distaste the existence in the West of a nation who repudiated the Roman obedience, and lived in schismatical independence, under local ecclesiastical customs which dated back to the 5th century, and had never been brought into line with those of the rest of Christendom. Hence it was natural to sanction an invasion which might bring the Irish within the fold. But Henry made no endeavour for many years to utilize the papal grant of Ireland, which seems to have been made under the preposterous "Donation of Constantine," the forged document which gave the bishop of Rome authority over all islands. It was conveniently forgotten that Ireland had never been in the Roman empire, and so had not even been Constantine's to give away.

Not till 1168, thirteen years after the agreement with Pope Adrian, did the interference of the English king in Ireland actually begin. Even then he did not take the conquest in hand himself, but merely sanctioned a private adventure of some of his subjects. Dermot MacMorrough, king of Leinster, an unquiet Irish prince who for good reasons had been expelled by his neighbours, came to Henry's court in Normandy, proffering his allegiance in return for restoration to his lost dominions. The quarrel with Becket, and the French war, were both distracting the English king at the moment. He could not spare attention for the matter, but gave Dermot leave to enlist auxiliaries among the turbulent barons of the South Welsh Marches. The Irish exile enlisted first the services of Maurice Fitzgerald and Robert Fitzstephen, two half-brothers, both noted fighting men, and afterwards those of Richard de Clare, earl of Pembroke, an ambitious and impecunious magnate of broken fortunes. The two barons were promised lands, the earl a greater bribe—the hand of Dermot's only daughter Eva and the inheritance of the kingdom of Leinster. Fitzgerald and Fitzstephen crossed to Ireland in 1169 with a mere handful of followers. But they achieved victories of an almost incredible completeness over Dermot's enemies. The undisciplined hordes of the king of Ossory and the Danes of Wexford could not stand before the Anglo-Norman tactics—the charge of the knights and the arrow-flight of the archers, skilfully combined by the adventurous invaders. Dermot was triumphant, and sent for more auxiliaries, aspiring to evict Roderic O'Connor of Connaught from the precarious throne of High King of Ireland. In 1170 the earl of Pembroke came over with a larger force, celebrated his marriage with Dermot's daughter, and commenced a series of conquests. He took Waterford and Dublin from the Danes, and scattered the hosts of the native princes. Early in the next spring Dermot died, and Earl Richard, in virtue of his marriage, claimed the kingship of Leinster. He held his own, despite the assaults of a great army gathered by Roderic the High King, and of a viking fleet which came to help the conquered jarls of Waterford and Dublin. At this moment King Henry thought it necessary to interfere; if he let more time slip away, Earl Richard would become a powerful king and forget his English allegiance. Accordingly, with a large army at his back, he landed at Waterford in 1171 and marched on Dublin. Richard did him homage for Leinster, engaging to hold it as a palatine earldom, and not to claim the name or rights of a king. The other adventurers followed his example, as did, after an interval, most of the native Irish princes. Only Roderic of Connaught held aloof in his western solitudes, asserting his independence. The clergy, almost without a murmur, submitted themselves to the Roman Church.

Such was the first conquest of Ireland, a conquest too facile to be secure. Four years later it appeared to be completed by the submission of the king of Connaught, who did homage like the rest of the island chiefs. But their oaths were as easily broken as made, and the real subjection of the island was not to be completed for 400 years. What happened was that the Anglo-Norman invaders pushed gradually west, occupying the best of the land and holding it down by castles, but leaving the profitless bogs and mountains to the local princes. The king's writ only ran in and about Dublin and a few other harbour fortresses. Inland, the intruding barons and the Irish chiefs fought perpetually, with varying fortunes. The conquest hardly touched central and western Ulster, and left half Connaught unsubdued: even in the immediate vicinity of Dublin the tribes of the Wicklow Hills were never properly tamed. The English conquest was incomplete; it failed to introduce either unity or strong governance. After a century and a half it began to recede rather than to advance. Many of the districts which had been overrun in the time of the Angevin kings were lost; many of the Anglo-Norman families intermarried with and became absorbed by the Irish; they grew as careless of their allegiance to the crown as any of the native chiefs. The "Lordship of Ireland" was never a reality till the times of the Tudors. But as long as Henry II. lived this could not have been foreseen. The first generation of the conquerors pushed their advance with such vigour that it seemed likely that they would complete the adventure. (See IRELAND: *History*.)

Rebellion of Henry's sons.

It was in 1173, the year after his return from Ireland and his submission to the papal legates at Avranches, that King Henry became involved in the first of a series of troubles which were to pursue him for the rest of his life—the rebellions of his graceless sons. His wife Eleanor of Aquitaine had borne him many children. Henry, the eldest surviving son, had already been crowned in 1170 as his father's colleague and successor; not only he, but Richard the second, and Geoffrey the third son, were now old enough to chafe against the restraints imposed upon them by an imperious and strong-willed father. The old king very naturally preferred to keep his dominions united under his own immediate government, but he had designated his eldest son as his successor in England and Normandy, while Richard was to have his mother's heritage of Aquitaine, and Geoffrey's wife's dowry, the duchy of Brittany, was due to him, now that he had reached the verge of manhood. The princes were shamelessly eager to enter on their inheritance, the king was loath to understand that by conferring a titular sovereignty on his sons he had given them a sort of right to expect some share of real power. Their grudge against their father was sedulously fostered by their mother Eleanor, a clever and revengeful woman, who could never forgive her husband for keeping her in the background in political matters and insulting her by his frequent amours. Her old subjects in Aquitaine were secretly encouraged by her to follow her son Richard against his father, whom the barons of the south always regarded as an alien and an intruder. The Bretons were equally willing to rise in the name of Geoffrey and Constance against the guardian who was keeping their prince too long waiting for his inheritance. In England the younger Henry had built himself up a party among the more turbulent section of the baronage, who remembered with regret and longing the carnival of licence which their fathers had enjoyed under King Stephen. Secret agreements had also been made with the kings of France and Scotland, who were eager to take advantage of the troubles which were about to break out.

In 1173 the plot was complete, and Henry's three elder sons all took arms against him, collecting Norman, Breton and Gascon rebels in great numbers, and being backed by a French army. At the same moment the king of Scots invaded Northumberland, and the earls of Norfolk, Chester and Leicester rose in the name of the younger Henry. This was in all essentials a feudal rebellion of the old type. The English barons were simply desirous of getting rid of the strong and effective governance of the king, and the alleged wrongs of his sons were an empty excuse. For precisely the same reason all classes in England, save the more turbulent section of the baronage, remained faithful to the elder king. The bureaucracy, the minor landholders, the towns, and the clergy refused to join in the rising, and lent their aid for its suppression, because they were unwilling to see anarchy recommence. Hence, though the rebellious princes made head for a time against their father abroad, the insurrection of their partisans in England was suppressed without much difficulty. The justiciar, Richard de Lucy, routed the army of the earl of Leicester at Fornham in Suffolk, the castles of the rebel earls were subdued one after another, and William of Scotland was surprised and captured by a force of northern loyalists while he was besieging Alnwick (1173–1174). The war lingered on for a space on the continent; but Henry raised the siege of Rouen, which was being attacked by his eldest son and the king of France, captured most of Richard's castles in Poitou, and then received the submission of his undutiful children. Showing considerable magnanimity, he promised to grant to each of them half the revenues of the lands in which they were his destined heirs, and a certain number of castles to hold as their own. Their allies fared less well; the rebel earls were subjected to heavy fines, and their strongholds were demolished. The king of Scots was forced to buy his liberty by doing homage to Henry for the whole of his kingdom. Queen Eleanor, whom her husband regarded as responsible for the whole rebellion, was placed in a sort of honourable captivity, or retirement, and denied her royal state.

Henry appeared completely triumphant; but the fourteen years which he had yet to live were for the most part to be times of trouble and frustrated hopes. He was growing old; the indomitable energy of his early career was beginning to slacken; his dreams of extended empire were vanishing. In the last period of his life he was more set on defending what he already enjoyed, and perfecting the details of administration in his realms, than on taking new adventures in hand. Probably the consciousness that his dominions would be broken up among his sons after his death had a disheartening effect upon him. At any rate his later years bear a considerable resemblance to the corresponding period of his grandfather's reign. The machinery of government which the one had sketched out the other completed. Under Henry II. the circuits of the itinerant justices became regular instead of intermittent; the judicial functions of the Curia Regis were delegated to a permanent committee of that body which took form as the court of king's bench (*Curia Regis in Banco*). The sheriffs were kept very tightly in hand, and under incessant supervision; once in 1170 nearly the whole body of them were dismissed for misuse of their office. The shire levies which had served the king so well against the feudal rebels of 1173 were reorganized, with uniformity of weapons and armour, by the *Assize of Arms* of 1181. There was also a considerable amount of new legislation with the object of protecting the minor subjects of the crown, and the system of trial by jurors was advanced to the detriment of the absurd old practices of trial by ordeal and trial by wager of battle. The 13th-century jury was a rough and primitive institution, which acted at once as accuser, witness and judge—but it was at any rate preferable to the chances of the red-hot iron, or the club of the duellist.

The best proof that King Henry's orderly if autocratic régime was appreciated at its true value by his English subjects, is that when the second series of rebellions raised by his undutiful sons began in 1182, there was no stir whatever in England, though in Normandy, Brittany and Aquitaine the barons rose in full force to support the young princes, whose success would mean the triumph of particularism and the destruction of the Angevin empire. Among the many troubles which broke down King Henry's strong will and great bodily vigour in those unhappy years, rebellion in England was not one. For this reason he was almost constantly abroad, leaving the administration of the one loyal section of his realm to his great justiciar. Hence the story of the unnatural war between father and sons has no part in English history. It is but necessary to note that the younger Henry died in 1183, that Geoffrey perished by accident at a tournament in 1186, and that in 1189, when the old king's strength finally gave out, it was Richard who was leading the rebellion, to which John, the youngest and least worthy of the four undutiful sons, was giving secret countenance. It was the discovery of the treachery of this one child whom he had deemed faithful, and loved over well, that broke Henry's heart. "Let things go as they will; I have nothing to care for in the world now," he murmured on his death-bed, and turned his face to the wall to breathe his last.

Richard I.

The death of the younger Henry had made Richard heir to all his father's lands from the Tweed to the Bidassoa save Brittany, which had fallen to Arthur, the infant son of the unlucky Geoffrey. John, the new king's only surviving brother, had been declared "Lord of Ireland" by his father in 1185, but Henry had been forced to remove him for persistent misconduct, and had left him nothing more than a titular sovereignty in the newly conquered island. In this Richard confirmed him at his accession, and gave him a more tangible endowment by allowing him to marry Isabella, the heiress of the earldom of Gloucester, and by bestowing on him the honour of Lancaster and the shires of Derby, Devon, Cornwall and Somerset. The gift was over-liberal and the recipient was thankless; but John was distinctly treated as a vassal, not granted the position of an independent sovereign.

Of all the medieval kings of England, Richard I. (known as Cœur de Lion) cared least for his realm on the English side of the Channel, and spent least time within it. Though he chanced to have been born in Oxford, he was far more of a foreigner than his father; his soul was that of a south French baron, not that of an English king. Indeed he looked upon England more as a rich area for taxation than as the centre of a possible empire. His ambitions were continental: so far as he had a policy at all it was Angevin—he would gladly have increased his dominions on the side of the upper Loire and Garonne, and was set on keeping in check the young king of France, Philip Augustus, though the latter had been his ally during his long struggle with his father. Naturally the policy of Richard as a newly crowned king was bound to differ from that which he had pursued as a rebellious prince. As regards his personal character he has been described, not without truth, as a typical man of his time and nothing more. He was at heart a chivalrous adventurer delighting in war for war's sake; he was not destitute of a conscience—his undutiful conduct to his father sat heavily on his soul when that father was once dead; he had a strong sense of knightly honour and a certain magnanimity of soul in times of crisis; but he was harsh, thriftless, often cruel, generally lacking in firmness and continuity of purpose, always careless of his subjects' welfare when it interfered with his pleasure or his ambitions of the moment. If he had stayed long in England he would have made himself hated; but he was nearly always absent; it was only as a reckless and spasmodic extorter of taxation, not as a personal tyrant, that he was known on the English side of the Channel.

The Crusade.

At the opening of his reign Richard had one all-engrossing desire; he was set on going forth to the Crusade for the recovery of Jerusalem which had been proclaimed in 1187, partly from chivalrous instincts, partly as a penance for his misconduct to his father. He visited England in 1189 only in order to be crowned, and to raise as much money for the expedition as he could procure. He obtained enormous sums, by the most unwise and iniquitous expedients, mainly by selling to any buyer that he could find valuable pieces of crown property, high offices and dangerous rights and privileges. The king of Scotland bought for 15,000 marks a release from the homage to the English crown which had been imposed upon him by Henry II. The chancellorship, one of the two chief offices in the realm, was sold to William Longchamp, bishop of Ely, for £3000, though he was well known as a tactless, arrogant and incapable person. The earldom of Northumberland, with palatine rights, was bought by Hugh Puiset, bishop of Durham. Countless other instances of unwise bargains could be quoted. Having raised every penny that he could procure by legal or illegal means, Richard crossed the Channel, and embarked at Marseilles with a great army on the 7th of August 1190. The only security which he had for the safety of his dominions in his absence was that his most dangerous neighbour, the king of France, was also setting out on the Crusade, and that his brother John, whose shifty and treacherous character gave sure promise of trouble, enjoyed a well-merited unpopularity both in England and in the continental dominions of the crown.

Richard's crusading exploits have no connexion with the history of England. He showed himself a good knight and a capable general—the capture of Acre and the victory of Arsuf were highly to his credit as a soldier. But he quarrelled with all the other princes of the Crusade, and showed himself as lacking in tact and diplomatic ability as he was full of military capacity. The king of France departed in wrath, to raise trouble at home; the army gradually melted away, the prospect of recovering Jerusalem disappeared, and finally Richard must be reckoned fortunate in that he obtained from Sultan Saladin a peace, by which the coastland of Palestine was preserved for the Christians, while the Holy City and the inland was sacrificed (Sept. 2, 1192). While returning to his dominions by the way of the Adriatic, the king was shipwrecked, and found himself obliged to enter the dominions of Leopold, duke of Austria, a prince whom he had offended at Acre during the Crusade. Though he disguised himelf, he was detected by his old enemy and imprisoned. The duke then sold him to the emperor Henry VI., who found pretexts for forcing him to buy his freedom by the promise of a ransom of 150,000 marks. It was not till February 1194 that he got loose, after paying a considerable instalment of this vast sum. The main bulk of it, as was to be expected, was never made over; indeed it could not have been raised, as Richard was well aware. But, once free, he had no scruple in cheating the imperial brigand of his blackmail.

John's treachery.

For five years Richard was away from his dominions as a crusader or a captive. There was plenty of trouble during his absence, but less than might have been expected. The strong governance set up by Henry II. proved competent to maintain itself, even when Richard's ministers were tactless and his brother treacherous. A generation before it is certain that England would have been convulsed by a great feudal rising when such an opportunity was granted to the barons. Nothing of the kind happened between 1190 and 1194. The chancellor William Longchamp made himself odious by his vanity and autocratic behaviour, and was overthrown in 1191 by a general rising, which was headed by Prince John, and approved by Walter, archbishop of Rouen, whom Richard had sent to England with a commission to assume the justiciarship if William should prove impossible as an administrator. Longchamp fled to the continent, and John then hoped to seize on supreme power, even perhaps to grasp the crown. But he was bitterly disappointed to find that he could gather few supporters; the justiciar and the bureaucrats of the Curia Regis would give him no assistance; they worked on honestly in the name of the absent king. Among the baronage hardly a man would commit himself to treason. In vain John hired foreign mercenaries, garrisoned his castles, and leagued himself with the king of France when the latter returned from the Crusade. It was only the news of his brother's captivity in Austria which gave the intriguing prince a transient hope of success. Boldly asserting that Richard would never be seen alive again he went to France, and did homage to King Philip for Normandy and Aquitaine, as if they were already his own. Then he crossed to England with a band of mercenaries, and seized Windsor and Wallingford castles. But no one rose to aid him, and his garrisons were soon being besieged by loyal levies, headed by the justiciar and by Hubert Walter, the newly elected archbishop of Canterbury.

At the same time King Philip's invasion of Normandy was repulsed by the barons of the duchy. Richard's faithful ministers, despite of all their distractions, succeeded in raising the first instalment of his ransom by grinding taxation—a fourth part of the revenue of all lay persons, a tithe from ecclesiastical land, was raised, and in addition much church plate was seized, though the officials who exacted it were themselves prelates. John and Philip wrote to the emperor to beg him to detain his captive at all costs, but Henry VI. pocketed the ransom money and set Richard free. He reached England in March 1194, just in time to receive the surrender of the last two castles which were holding out in his treacherous brother's name. With astonishing, and indeed misplaced, magnanimity, Richard pardoned his brother, when he made a grovelling submission, and restored him to his lordship of Ireland and to a great part of his English lands.

The king abode for no more than three months in England; he got himself recrowned at Winchester, apparently to wipe out the stain of his German captivity and of an enforced homage which the emperor had extorted from him. Then he raised a heavy tax from his already impoverished subjects, sold a number of official posts and departed to France—never to return, though he had still five years to live. He left behind Archbishop Hubert Walter as justiciar, a faithful if a somewhat high-handed minister.

Richard's one ruling passion was now to punish Philip of France for his unfriendly conduct during his absence. He plunged into a war with this clever and shifty prince, which lasted—with certain short breaks of truces and treaties—till his death. He wasted his considerable military talents in a series of skirmishes and sieges which had no great results, and after spending countless treasures and harrying many regions, perished obscurely by a wound from a cross-bow-bolt, received while beleaguering Châlus, a castle of a rebellious lord of Aquitaine, the viscount of Limoges (April 6, 1199).

English constitutional development.

During these years of petty strife England was only reminded at intervals of her king's existence by his intermittent demands for money, which his ministers did their best to satisfy. The machine of government continued to work without his supervision. It has been observed that, from one point of view, England's worst kings have been her best; that is to say, a sovereign like Richard, who persistently neglected his duties, was unconsciously the foster father of constitutional liberty. For his ministers, bureaucrats of an orderly frame of mind, devised for their own convenience rules and customs which became permanent, and could be cited against those later kings who interfered more actively in the details of domestic governance. We may trace back some small beginnings of a constitution to the time of Henry II.—himself an absentee though not on the scale of his son. But the ten years of Richard's reign were much more fruitful in the growth of institutions which were destined to curb the power of the crown. His justiciars, and especially Hubert Walter, were responsible for several innovations which were to have far-spreading results. The most important was an extension of the use of juries into the province of taxation. When the government employs committees chosen by the taxpayers to estimate and assess the details of taxation, it will find it hard to go back to arbitrary exactions. Such a practice had been first seen when Henry II., in his last year, allowed the celebrated "Saladin Tithe" for the service of the crusade to be assessed by local jurors. In Richard's reign the practice became regular. In especial when England was measured out anew for the great carucage of 1197—a tax on every ploughland which replaced the rough calculation of Domesday Book—knights elected by the shires shared in all the calculations then made for the new impost. Another constitutional advance was that which substituted "coroners," knights chosen by the county court, for the king's old factotum the sheriff in the duty of holding the "pleas of the crown," *i.e.* in making the preliminary investigations into such offences as riot, murder or injury to the king's rights or property. The sheriff's natural impulse was to indict every man from whom money could be got; the new coroners were influenced by other motives than financial rapacity, and so were much more likely to deal equitably with accusations. The towns also profited in no small degree from Richard's absence and impecuniosity. One of the most important charters to London, that which granted the city the right of constituting itself a "commune" and choosing itself a mayor, goes back to October 1191, the troubled month of Longchamp's expulsion from England. It was given by Prince John and the ministers, who were then supporting him against the arrogant chancellor, to secure the adherence of London. Richard on his return seems to have allowed it to stand. Lincoln was also given the right of electing its own magistrates in 1194, and many smaller places owe grants of more or less of municipal privilege to Hubert Walter acting in the name of the absent king. The English nation began to have some conception of a régime of fixed custom, in which its rights depended on some other source than the sovereign's personal caprice. The times, it may be remembered, were not unprosperous. There had been no serious civil war since the baronial rising of 1173. Prince John's turbulence had only affected the neighbourhood of a few royal castles. Despite of the frequent and heavy demands for money for the king's service, wealth seems to have been increasing, and prosperity to have been widespread. Strong and regular governance had on the whole prevailed ever since Henry II. triumphed over baronial anarchy.

III. The Struggle for Constitutional Liberty (1199–1337)

Accession of John.

Richard's queen, Berengaria of Navarre, had borne him no children. At the moment of his premature death his nearest kinsmen were his worthless brother John, and the boy Arthur of Brittany, the heir of Geoffrey, the third son of Henry II. On his death-bed the king had designated John as his successor, holding apparently that a bad ruler who was at least a grown man was preferable to a child. John's claim prevailed both in Normandy and in England, though in each, as we are told, there were those who considered it a doubtful point whether an elder brother's son had not a better right than a younger brother. But the ministers recognized John, and the baronage and nation acquiesced, though with little enthusiasm. In the lands farther south, however, matters went otherwise. The dowager duchess Constance of Brittany raised her son's claim, and sent an army into Anjou, and all down the Loire many of the nobles adhered to his cause. The king of France announced that he should support them, and allowed Arthur to do him homage for Anjou, Maine and Touraine. There would have been trouble in Aquitaine also, if the aged Queen Eleanor had not asserted her own primary and indefeasible right to her ancestral duchy, and then declared that she transferred it to her best loved son John. Most of her subjects accepted her decision, and Arthur's faction made no head in this quarter.

It seemed for a space as if the new king would succeed in retaining the whole of his brother's inheritance, for King Philip very meanly allowed himself to be bought off by the cession of the county of Evreux, and, when his troops were withdrawn, the Angevin rebels were beaten down, and the duchess of Brittany had to ask for peace for her son. But it had not long been granted, when John proceeded to throw away his advantage by acts of reckless impolicy. Though cunning, he was destitute alike of foresight and of self-control; he could never discern the way in which his conduct would be judged by other men, because he lacked even the rudiments of a conscience. Ere he had been many months on the throne he divorced his wife, Isabella of Gloucester, alleging that their marriage had been illegal because they were within the prohibited degrees. This act offended the English barons, but in choosing a new queen John gave much greater offence abroad; he carried off Isabella of Angoulême from her affianced husband, Hugh of Lusignan, the son of the count of la Marche, his greatest vassal in northern Aquitaine, and married her despite the precontract. This seems to have been an amorous freak, not the result of any deep-laid policy. Roused by the insult the Lusignans took arms, and a great part of the barons of Poitou joined them. They appealed for aid to Philip of France, who judged it opportune to intervene once

War with Philip Augustus.

Loss of Normandy.

more. He summoned John to appear before him as suzerain, to answer the complaints of his Poitevin subjects, and when he failed to plead declared war on him and declared his dominions escheated to the French crown for non-fulfilment of his feudal allegiance. He enlisted Arthur of Brittany in his cause by recognizing him once more as the rightful owner of all John's continental fiefs save Normandy, which he intended to take for himself. Philip then entered Normandy, while Arthur led a Breton force into Anjou and Poitou to aid the Lusignans. The fortune of war at first turned in favour of the English king. He surprised his nephew while he was besieging the castle of Mirebeau in Poitou, where the old Queen Eleanor was residing. The young duke and most of his chief supporters were taken prisoners (August 1, 1202). Instead of using his advantage aright, John put Arthur in secret confinement, and after some months caused him to be murdered. He is said also to have starved to death twenty-two knights of Poitou who had been among his captives. The assassination of his nearest kinsman, a mere boy of sixteen, was as unwise as it was cruel. It estranged from the king the hearts of all his French subjects, who were already sufficiently disgusted by many minor acts of brutality, as well as by incessant arbitrary taxation and by the reckless ravages in which John's mercenary troops had been indulging. The French armies met with little or no resistance when they invaded Normandy, Anjou and Poitou. John sat inert at Rouen, pretending to take his misfortunes lightly, and boasting that "what was easily lost could be as easily won back." Meanwhile Philip Augustus conquered all western Normandy, without having to fight a battle. The great castle of Château Gaillard, which guards the Lower Seine, was the only place which made a strenuous resistance. It was finally taken by assault, despite of the efforts of the gallant castellan, Roger de Lacy, constable of Chester, who had made head against the besiegers for six months (September 1203–March 1204) without receiving any assistance from his master. John finally absconded to England in December 1203; he failed to return with an army of relief, as he had promised, and before the summer of 1204 was over, Caen, Bayeux and Rouen, the last places that held out for him, had been forced to open their gates. The Norman barons had refused to strike a blow for John, and the cities had shown but a very passive and precarious loyalty to him. He had made himself so well hated by his cruelty and vices that the Normans, forgetting their old hatred of France, had acquiesced in the conquest. Two ties alone had for the last century held the duchy to the English connexion: the one was that many Norman baronial families held lands on this side of the Channel; the second was the national pride which looked upon England as a conquered appendage of Normandy. But the first had grown weaker as the custom arose of dividing family estates between brothers, on the principle that one should take the Norman, the other the English parts of a paternal heritage. By John's time there were comparatively few landholders whose interests were fairly divided between the duchy and the kingdom. Such as survived had now to choose between losing the one or the other section of their lands; those whose holding was mainly Norman adhered to Philip; those who had more land in England sacrificed their transmarine estates. For each of the two kings declared the property of the barons who did not support him confiscated to the crown. As to the old Norman theory that England was a conquered land, it had gradually ceased to exist as an operative force, under kings who, like Henry II. or Richard I., were neither Norman nor English in feeling, but Angevin. John did not, and could not, appeal as a Norman prince to Norman patriotism.

Loss of Anjou, Touraine and Poitou.

The successes of Philip Augustus did not cease with the conquest of Normandy. His armies pushed forward in the south also; Anjou, Touraine and nearly all Poitou submitted to him. Only Guienne and southern Aquitaine held out for King John, partly because they preferred a weak and distant master to such a strenuous and grasping prince as King Philip, partly because they were far more alien in blood and language to their French neighbours than were Normans or Angevins. The Gascons were practically a separate nationality, and the house of Capet had no ancient connexion with them. The kings of England were yet to reign at Bordeaux and Bayonne for two hundred and fifty years. But the connexion with Gascony meant little compared with the now vanished connexion with Normandy. Henry I. or Henry II. could run over to his continental dominions in a day or two days; Dieppe and Harfleur were close to Portsmouth and Hastings. It was a different thing for John and his successors to undertake the long voyage to Bordeaux, around the stormy headlands of Brittany and across the Bay of Biscay. Visits to their continental dominions had to be few and far between; they were long, costly and dangerous when a French fleet—a thing never seen before Philip Augustus conquered Normandy—might be roaming in the Channel. The kings of England became perforce much more home-keeping sovereigns after 1204.

It was certainly not a boon for England that her present sovereign was destined to remain within her borders for the greater part of his remaining years. To know John well was to loathe him, as every contemporary chronicle bears witness. The two years that followed the loss of Normandy were a time of growing discontent and incessant disputes about taxation. The king kept collecting scutages and tallages, yet barons and towns complained that nothing seemed to be done with the money he collected. At last, however, in 1206, the king did make an expedition to Poitou, and recovered some of its southern borders. Yet, with his usual inconsequence, he did not follow up his success, but made a two years' truce with Philip of France on the basis of *uti possidetis*—which left Normandy and all the territories on and about the Loire in the hands of the conqueror.

Quarrel with the Papacy.

It is probable that this pacification was the result of a new quarrel which John had just taken up with a new enemy—the Papacy. The dispute on the question of free election, which was to range over all the central years of his reign, had just begun. In the end of 1205 Hubert Walter, archbishop of Canterbury, had died. The king announced his intention of procuring the election of John de Gray, bishop of Norwich, as his successor; but, though his purpose was well known, the chapter (*i.e.* the monks of Christ Church, Canterbury) met secretly and elected their sub-prior Reginald as archbishop. They sent him to Rome at once, to receive confirmation from Pope Innocent III., whom they knew to be a zealous champion of the rights of the Church. But John descended upon them in great wrath, and by threats compelled them to hold a second meeting, and to elect his nominee Gray, in whose name application for confirmation was also made to the pope. Innocent, however, seeing a splendid chance of asserting his authority, declared both the elections that had taken place invalid, the first because it had been clandestine, the second because it had been held under *force majeure*, and proceeded to nominate a friend of his own—Cardinal Stephen Langton, an Englishman of proved capacity and blameless life, then resident in Rome. He was far the worthiest of the three candidates, but it was an intolerable invasion of the rights of the English crown and the English Church that an archbishop should be foisted on them in this fashion. The representatives of the chapter who had been sent to Rome were persuaded or compelled to elect him in the pope's presence (Dec. 1206).

King John was furious, and not without good reason; he refused to accept Langton, whom he declared (quite unjustly) to be a secret friend of Philip of France, and sequestrated the lands of the monks of Canterbury. On this the pope threatened to lay an interdict on himself and his realm. The king replied by issuing a proclamation to the effect that he would outlaw any clerk who should accept the validity of such an interdict and would confiscate his lands. Despising such threats Innocent carried out his threat, and put England under the ban of the Church on the 23rd of March 1208.

In obedience to the pope's orders the large majority of the English clergy closed their churches, and suspended the ordinary course of the services and celebration of the sacraments. Baptism and extreme unction only were continued, lest souls should be lost; and marriages were permitted but not inside the walls of churches. Foreseeing the wrath of the king against all who obeyed the mandate from Rome, the larger number of the bishops and many others of the higher clergy fled overseas to escape the storm. Those who were bold enough to remain behind had much to endure. John, openly rejoicing at the plunder that lay before him, declared the temporalities of all who had accepted the interdict, whether they had exiled themselves or no, to be confiscated. His treasury was soon so well filled that he could dispense with ordinary taxation. He also outlawed the whole body of the clergy, save the timid remnant who promised to disregard the papal commands.

Character of John's rule.

Nothing proves more conclusively the strength of the Angevin monarchy, and the decreasing power of feudalism, than that an unpopular king like John could maintain his strife with the pope, and suppress the discontents of his subjects, for nearly five years before the inevitable explosion came. Probably his long immunity was due in the main to the capacity of his strong-handed justiciar Geoffrey Fitz-Peter; the king hated him bitterly, but generally took his advice. The crash only came when Geoffrey died in 1213; his ungrateful master only expressed joy. "Now by God's feet am I for the first time king of England," he exclaimed, when the news reached him. He proceeded to fill the vacancy with a mere Poitevin adventurer, Peter des Roches, whom he had made bishop of Winchester some time before. Indeed John's few trusted confidants were nearly all foreigners, such men as the mercenary captains Gerard of Athies and Engelhart of Cigogné, whom he made sheriffs and castellans to the discontent of all Englishmen. He spent all his money in maintaining bands of hired *Brabançons* and *routiers*, by whose aid he for some time succeeded in terrorizing the countryside. There were a few preliminary outbreaks of rebellion, which were suppressed with vigour and punished with horrible cruelty. John starved to death the wife and son of William de Braose, the first baron who took arms against him, and hanged in a row twenty-eight young boys, hostages for the fidelity of their fathers, Welsh princes who had dabbled in treason. Such acts provoked rage as well as fear, yet the measure of John's iniquities was not full till 1212. Indeed for some time his persistent prosperity provoked the indignant surprise of those who believed him to be under a curse. If his renewed war with Philip of France was generally unsuccessful, yet at home he held his own. The most astounding instance of his success is that in 1210 he found leisure for a hasty expedition to Ireland, where he compelled rebellious barons to do homage, and received the submission of more than twenty of the local kinglets. It is strange that he came back to find England undisturbed behind him.

John does homage to the pope.

His long-deserved humiliation only began in the winter of 1212–1213, when Innocent III., finding him so utterly callous as to the interdict, took the further step of declaring him deposed from the throne for contumacy, and handing over the execution of the penalty to the king of France. This act provoked a certain amount of indignation in England, and in the spring of 1213 the king was able to collect a large army on Barham Down to resist the threatened French invasion. Yet so many of his subjects were discontented that he dared not trust himself to the chances of war, and, when the fleet of King Philip was ready to sail, he surprised the world by making a sudden and grovelling submission to the pope. Not only did he agree to receive Stephen Langton as archbishop, to restore all the exiled clergy to their benefices, and to pay them handsome compensation for all their losses during the last five years, but he took the strange and ignominious step of declaring that he ceded his whole kingdom to the pope, to hold as his vassal. He formally resigned his crown into the hands of the legate Cardinal Pandulf, and took it back as the pope's vassal, engaging at the same time to pay a tribute of 1000 marks a year for England and Ireland. This was felt to be a humiliating transaction by many of John's subjects, though to others the joy at reconciliation with the Church caused all else to be forgotten. The political effect of the device was all that John had desired. His new suzerain took him under his protection, and forbade Philip of France to proceed with his projected invasion, though ships and men were all ready (May 1213). John's safety, however, was secured in a more practical way when his bastard brother, William Longsword, earl of Salisbury, made a descent on the port of Damme and burnt or sunk a whole squadron of the French transports. After this John's spirits rose, and he talked of crossing the seas himself to recover Normandy and Anjou. But he soon found that his subjects were not inclined to follow him; they were resigned to the loss of the Angevin heritage, whose union with England brought no profit to them, however much it might interest their king. The barons expressed their wish for a peace with France, and when summoned to produce their feudal contingents pleaded poverty, and raised a rather shallow theory to the effect that their services could not be asked for wars beyond seas—against which there were conclusive precedents in the reigns of Henry I. and Henry II. But any plea can be raised against an unpopular king. John found himself obliged to turn back, since hardly a man save his mercenaries had rallied to his standard at Portsmouth. In great anger and indignation he marched off towards the north, with his hired soldiery, swearing to punish the barons who had taken the lead in the "strike" which had defeated his purpose. But the outbreak of war was to be deferred for a space. Archbishop Langton, who on assuming possession of his see had shown at once that he was a patriotic English statesman, and not the mere delegate of the pope, besought his master to hold back, and, when he refused, threatened to renew the excommunication which had so lately been removed. The old justiciar Geoffrey Fitz-Peter, now on his death-bed, had also refused to pronounce sentence on the defaulters. John hesitated, and meanwhile his enemies began to organize their resistance.

Opposition of the barons.

A great landmark in the constitutional history of England was reached when Langton assembled the leading barons, rehearsed to them the charter issued by Henry I. on his accession, and pointed out to them the rights and liberties therein promised by the crown to the nation. For the future they agreed to take this document as their programme of demands. It was the first of the many occasions in English history when the demand for reform took the shape of a reference back to old precedents, and now (as on all subsequent occasions) the party which opposed the crown read back into the ancient grants which they quoted a good deal more than had been actually conceded in them. To Langton and the barons the charter of Henry I. seemed to cover all the customs and practices which had grown up under the rule of the bureaucracy which had served Henry II. and Richard I. A correct historical perspective could hardly be expected from men whose constitutional knowledge only ran back as far as the memory of themselves and their fathers. The Great Charter of 1215 was a commentary on, rather than a reproduction of, the old accession pledges of Henry I.

Alliance against France.

Meanwhile John, leaving his barons to discuss and formulate their grievances, pushed on with a great scheme of foreign alliances, by which he hoped to crush Philip of France, even though the aid of the feudal levies of England was denied him. He leagued himself with his nephew the emperor Otto IV. (his sister's son), and the counts of Flanders and Boulogne, with many other princes of the Netherlands. Their plan was that John should land in Poitou and distract the attention of the French by a raid up the Loire, while the emperor and his vassals should secretly mobilize a great army in Brabant and make a sudden dash at Paris. The scheme was not destitute of practical ability, and if it had been duly carried out would have placed France in such a crisis of danger as she has seldom known. It was not John's fault that the campaign failed. He sent the earl of Salisbury with some of his mercenaries to join the confederates in Flanders, while he sailed with the main body of them to La Rochelle, whence he marched northward, devastating the land before him. Philip came out

Battle of Bouvines.

to meet him with the whole levy of France (April 1214), and Paris would have been left exposed if Otto and his Netherland vassals had struck promptly in. But the emperor was late, and by the time that he was approaching the French frontier Philip Augustus had discovered that John's invasion was but a feint, executed by an army too weak to do much harm. Leaving a small containing force on the Loire in face of the English king, Philip hurried to the north with his main army, and on the 27th of July 1214 inflicted a crushing defeat on the emperor and his allies at Bouvines near Lille. This was the greatest victory of the French medieval monarchy. It broke up the Anglo-German alliance, and gave the conqueror undisturbed possession of all that he had won from the Angevin house and his other enemies.

Magna Carta.

Indirectly Bouvines was almost as important in the history of England as in that of France. John returned to England foiled, and in great anger; he resolved to give up the French war, secured a truce with King Philip by abandoning his attempt to reconquer his lost lands on the Loire, and turned to attack the recalcitrant subjects who had refused to join him in his late campaign beyond the Channel. Matters soon came to a head: on hearing that the king was mobilizing his mercenary bands, the barons met at Bury St Edmunds, and leagued themselves by an oath to obtain from the king a confirmation of the charter of Henry I. (November 1214). At the New Year they sent him a formal ultimatum, to which he would not assent, though he opened up futile negotiation with them through the channel of the archbishop, who did not take an open part in the rising. At Easter, nothing having been yet obtained from the king, an army headed by five earls, forty barons, and Giles Braose, bishop of Hereford, mustered at Stamford and marched on London. Their captain was Robert FitzWalter, whom they had named "marshal of the army of God and Holy Church." When they reached the capital its gates were thrown open to them, and the mayor and citizens adhered to their cause (May 17). The king, who had tried to turn them back by taking the cross and declaring himself a crusader, and by making loud appeals for the arbitration of the pope, was forced to retire to Windsor. He found that he had no supporters save a handful of courtiers and officials and the leaders of his mercenary bands; wherefore in despair he accepted the terms forced upon him by the insurgents. On the 15th of June 1215 he sealed at Runnymede, close to Windsor, the famous *Magna Carta*, in face of a vast assembly among which he had hardly a single friend. It is a long document of 63 clauses, in which Archbishop Langton and a committee of the barons had endeavoured to recapitulate all their grievances, and to obtain redress for them. Some of the clauses are unimportant concessions to individuals, or deal with matters of trifling importance—such as the celebrated weirs or "kiddles" on Thames and Medway, or the expulsion of the condottieri chiefs Gerard d'Athies and Engelhart de Cigogné. But many of them are matters of primary importance in the constitutional history of England. The Great Charter must not, however, be overrated as an expression of general constitutional rights; to a large extent it is a mere recapitulation of the claims of the baronage, and gives redress for their feudal grievances in the matters of aids, reliefs, wardships, &c., its object being the repression of arbitrary exactions by the king on his tenants-in-chief. One section, that which provides against the further encroachments of the king's courts on the private manorial courts of the landowners, might even be regarded as retrograde in character from the point of view of administrative efficacy. But it is most noteworthy that the barons, while providing for the abolition of abuses which affect themselves, show an unselfish and patriotic spirit in laying down the rule that all the concessions which the king makes to them shall also be extended by themselves to their own sub-tenants. The clauses dealing with the general governance of the realm are also as enlightened as could be expected from the character of the committee which drafted the charter. There is to be no taxation without the consent of the Great Council of the Realm—which is to consist of all barons, who are to be summoned by individual units, and of all smaller tenants-in-chief, who are to be called not by separate letters, but by a general notice published by the sheriff. It has been pointed out that this provides no representation for sub-tenants or the rest of the nation, so that we are still far from the ideal of a representative parliament. John himself had gone a step farther on the road towards that ideal when in 1213 he had summoned four "discreet men" from every shire to a council at Oxford, which (as it appears) was never held. But this would seem to have been a vain bid for popularity with the middle classes, which had no result at the time, and the barons preferred to keep things in their own hands, and to abide by ancient precedents. It was to be some forty years later that the first appearance of elected shire representatives at the Great Council took place. In 1215 the control of the subjects over the crown in the matter of taxation is reserved entirely for the tenants-in-chief, great and small.

There is less qualified praise to be bestowed on the clauses of Magna Carta which deal with justice. The royal courts are no longer to attend the king's person—a vexatious practice when sovereigns were always on the move, and litigants and witnesses had to follow them from manor to manor—but are to be fixed at Westminster. General rules of indisputable equity are fixed for the conduct of the courts—no man is to be tried or punished more than once for the same offence; no one is to be arrested and kept in prison without trial; all arrested persons are to be sent before the courts within a reasonable time, and to be tried by a jury of their peers. Fines imposed on unsuccessful litigants are to be calculated according to the measure of their offence, and are not to be arbitrary penalties raised or lowered at the king's good pleasure according to the sum that he imagined that the offender could be induced to pay. No foreigners or other persons ignorant of the laws of England are to be entrusted with judicial or administrative offices.

There is only a single clause dealing with the grievances of the English Church, although Archbishop Langton had been the principal adviser in the drafting of the whole document. This clause, "that the English church shall be free," was, however, sufficiently broad to cover all demands. The reason that Langton did not descend to details was that the king had already conceded the right of free canonical election and the other claims of the clerical order in a separate charter, so that there was no need to discuss them at length.

The special clauses for the benefit of the city of London were undoubtedly inserted as a tribute of gratitude on the part of the barons for the readiness which the citizens had shown in adhering to their cause. There are other sections for the benefit of the commons in general, such as that which gives merchants full right of leaving or entering the realm with their goods on payment of the fixed ancient custom dues. But these clauses are less numerous than might have been expected—the framers of the document were, after all, barons and not burghers.

The most surprising part of the Great Charter to modern eyes is its sixty-first paragraph, that which openly states doubts as to the king's intention to abide by his promise, and appoints a committee of twenty-five guardians of the charter (twenty-four barons and the mayor of London), who are to coerce their master, by force of arms if necessary, to observe every one of its clauses. The twenty-five were to hear and decide upon any claims and complaints preferred against the king, and to keep up their numbers by co-optation, so that it would seem that the barons intended to keep a permanent watch upon the crown. The clause seems unnecessarily harsh and violent in its wording; but it must be remembered that John's character was well known, and that it was useless to stand on forms of politeness when dealing with him. It seems certain that the drafters of the charter were honest in their intentions, and did not purpose to set up a feudal oligarchy in the place of a royal autocracy. They were only insisting on the maintenance of what they believed to be the ancient and laudable customs of the realm.

That the barons were right to suspect John is sufficiently shown by his subsequent conduct. His pretence of keeping his promise lasted less than two months; by August 1215 he was already secretly collecting money and hiring more mercenaries. He wrote to Rome to beg the pope to annul the charter, stating that all his troubles had come upon him in consequence of his dutiful conduct to the Holy See. He also stated that he had taken the cross as a crusader, but could not sail to Palestine as long as his subjects were putting him in restraint. Innocent III. at once took the hint; in September Archbishop Langton was suspended for disobedience to papal commands, and the charter was declared uncanonical, null and void. The "troublers of the king and kingdom" were declared excommunicate.

Langton departed at once to Rome, to endeavour to turn the heart of his former patron, a task in which he utterly failed. ***Civil War.*** Many of the clergy who had hitherto supported the baronial cause drew back in dismay at the pope's attitude. But the laymen were resolute, and prepared for open war, which broke out in October 1215. The king, who had already gathered in many mercenaries, gained the first advantage by capturing Rochester Castle before the army of the barons was assembled. So formidable did he appear to them for the moment that they took the deplorable step of inviting the foreign foe to join in the struggle. Declaring John deposed because he had broken his oath to observe the charter, they offered the crown to Louis of France, the son of King Philip, because he had married John's niece Blanche of Castile and could assert in her right a claim to the throne. This was a most unhappy inspiration, and drove into neutrality or even into the king's camp many who had previously inclined to the party of reform. But John did his best to disgust his followers by adopting the policy of carrying out fierce and purposeless raids of devastation all through the countryside, while refusing to face his enemies in a pitched battle. He bore himself like a captain of banditti rather than a king in his own country. Presently, when the French prince came over with a considerable army to join the insurgent barons, he retired northward, leaving London and the home counties to his rival. In all the south country only Dover and Windsor castles held out for him. His sole success was that he raised the siege of Lincoln by driving off a detachment of the baronial army which was besieging it. ***Death of John.*** Soon after, while marching from Lynn towards Wisbeach, he was surprised by the tide in the fords of the Wash and lost part of his army and all his baggage and treasure. Next day he fell ill of rage and vexation of spirit, contracted a dysenteric ailment, and died a week later at Newark (Oct. 19, 1216). It was the best service that he could do his kingdom. Owing to the unwise and unpatriotic conduct of the barons in summoning over Louis of France to their aid, John had become in some sort the representative of national independence. Yet he was so frankly impossible as a ruler that, save the earls of Pembroke and Chester, all his English followers had left him, and he had no one to back him but the papal legate Gualo and a band of foreign mercenaries. When once he was dead, and his heritage fell to his nine-year-old son Henry III., whom none could make responsible for his father's doings, the whole aspect of affairs was changed.

Henry III. The aged William Marshal, earl of Pembroke, by far the most important and respectable personage who had adhered to John's cause, assumed the position of regent. He at once offered in the name of the young king pardon and oblivion of offences to all the insurgent barons. At the same time he reissued the Great Charter, containing all the important concessions which John had made at Runnymede, save that which gave the control of taxation to the tenants-in-chief. Despite this and certain other smaller omissions, it was a document which would satisfy most subjects of the crown, if only it were faithfully observed. The youth of the king and the good reputation of the earl marshal were a sufficient guarantee that, for some years at any rate, an honest attempt would be made to redeem the pledge. Very soon the barons began to return to their allegiance, or at least to slacken in their support of Louis, who had given much offence by his openly displayed distrust of his partisans and his undisguised preference for his French followers. The papal influence was at the same time employed in the cause of King Henry, and Philip of France was forced to abandon open support of his son, though he naturally continued to give him secret help and to send him succours of men and money.

Battle of Lincoln. The fortune of war, however, did not turn without a battle. At Lincoln, on the 20th of May 1217, the marshal completely defeated an Anglo-French army commanded by the count of Perche and the earls of Winchester and Hereford. The former was slain, the other two taken prisoners, with more than 300 knights and barons. This was the death-blow to the cause of Louis of France; when it was followed up by the defeat in the Dover Straits of a fleet which was bringing him reinforcements (Aug. 17), he despaired of success and asked for terms. By the treaty of Lambeth (Sept. 11, 1217) he secured an amnesty for all his followers and an indemnity of 10,000 marks for himself. Less than a month later he quitted England; the victorious royalists celebrated his departure by a second reissue of the Great Charter, which contained some new clauses favourable to the baronial interest.

After the departure of Prince Louis and his foreigners the earl marshal had to take up much the same task that had fallen to Henry II. in 1154. Now, as at the death of Stephen, the realm was full of "adulterine castles," of bands of robbers who had cloaked their plundering under the pretence of loyal service to the king or the French prince, and of local magnates who had usurped the prerogatives of royalty, each in his own district. It was some years before peace and order were restored in the realm, and the aged Pembroke died in 1219 before his work was completed. After his decease the conduct of the government passed into the hands of the justiciar Hubert de Burgh, and the papal legate Pandulf, to whom the marshal had specially recommended the young king. Their worst enemies were those who during the civil war had been their best friends, the mercenary captains and upstart knights whom John had made sheriffs and castellans. From 1219 to 1224 de Burgh was constantly occupied in evicting the old loyalists from castles which they had seized or offices which they had disgraced. In several cases it was necessary to mobilize an army against a recalcitrant magnate. The most troublesome of them was Falkes de Breauté, the most famous of King John's foreign *condottieri*, whose minions held Bedford castle against the justiciar and the whole shire levy of eastern England for nearly two months in 1224. The castle was taken and eighty men-at-arms hanged on its surrender, but Falkes escaped with his life and fled to France. It was not till this severe lesson had been inflicted on the faction of disorder that the pacification of England could be considered complete.

The fifty-six years' reign of Henry III. forms one of the periods during which the mere chronicle of events may seem tedious and trivial, yet the movement of national life and constitutional progress was very important. Except during the stirring epoch 1258–1265 there was little that was dramatic or striking in the events of the reign. Yet the England of 1272 was widely different from the England of 1216. The futile and thriftless yet busy and self-important king was one of those sovereigns who irritate their subjects into opposition by injudicious activity. He was not a ruffian or a tyrant like his father, and had indeed not a few of the domestic virtues. But he was constitutionally incapable of keeping a promise or paying a debt. Not being strong-handed or capable, he could never face criticism nor suppress discontent by force, as a king of the type of Henry I. or Henry II. would have done. He generally gave way when pressed, without attempting an appeal to arms; he would then swear an oath to observe the Great Charter, and be detected in violating it again within a few months. His greatest fault in the eyes of his subjects was his love of foreigners; since John had lost Normandy the English baronage had become as national in spirit as the commons. The old Anglo-Norman houses had forgotten the tradition of their origin, and now formed but a small section of the aristocracy; the newer families, sprung from the officials of the first two Henries, had always been English in spirit.

Unfortunately for himself the third Henry inherited the continental cosmopolitanism of his Angevin ancestors, and found himself confronted with a nation which was growing ever more and more insular in its ideals. He had all the ambitions of his grandfather Henry II.; his dreams were of shattering the newly-formed kingdom of France, the creation of Philip Augustus, and of recovering all the lost lands of his forefathers on the Seine and Loire. Occasionally his views grew yet wider—he would knit up alliances all over Christendom and dominate the West. Nothing could have been wilder and more unpractical than the scheme on which he set his heart in 1255–1257, a plan for conquering Naples and Sicily for his second son. Moreover it was a great hindrance to him that he was a consistent friend and supporter of the papacy. He had never forgotten the services of the legates Pandulf and Gualo to himself and his father, and was always ready to lend his aid to the political schemes of the popes, even when it was difficult to see that any English interests were involved in them. His designs, which were always shifting from point to point of the continent, did not appeal in the least to his subjects, who took little interest in Poitou or Touraine, and none whatever in Italy. After the troubled times which had lasted from 1214 to 1224 they desired nothing more than peace, quietness and good governance. They had no wish to furnish their master with taxation for French wars, or to follow his banner to distant Aquitaine. But most of all did they dislike his practice of flooding England with strangers from beyond seas, for whom offices and endowments had to be found. The moment that he had got rid of the honest and capable old justiciar Hubert de Burgh, who had pacified the country during his minority, and set the machinery of government once more in regular order, Henry gave himself over to fostering horde after horde of foreign favourites. There was first his Poitevin chancellor, Peter des Roches, bishop of Winchester, with a numerous band of his relations and dependents. As a sample of the king's methods it may be mentioned that he once made over nineteen of the thirty-five sheriffdoms, within a fortnight, to Peter of Rivaux, a nephew of the chancellor. Des Roches was driven from office after two years (1234), and his friends and relatives fell with him. But they were only the earliest of the king's alien favourites; quite as greedy were the second family of his mother, Isabella of Angoulême, who after King John's death had married her old betrothed, Hugh of Lusignan. Henry secured great English marriages for three of them, and made the fourth, Aymer, bishop of Winchester. Their kinsmen and dependents were equally welcomed. Even more numerous and no less expensive to the realm were the Provençal and Savoyard relatives of Henry's queen, Eleanor of Provence. The king made one of her uncles, Boniface of Savoy, archbishop of Canterbury—it was three years before he deigned to come over to take up the post, and then he was discovered to be illiterate and unclerical in his habits, an unworthy successor for Langton and Edmund of Abingdon, the great primates who went before him. Peter of Savoy, another uncle, was perhaps the most shameless of all the beggars for the king's bounty; not only was he made earl of Richmond, but his debts were repeatedly paid and great sums were given him to help his continental adventures.

King Henry's personal rule lasted from 1232, the year in which he deprived Hubert de Burgh of his justiciarship and confiscated most of his lands, down to 1258. It was thriftless, arbitrary, and lacking in continuity of policy, yet not tyrannical or cruel. If he had been a worse man he would have been put under control long before by his irritated subjects. All through these twenty-six years he was being opposed and criticised by a party which embraced the wisest and most patriotic section of the baronage and the hierarchy. It numbered among its leaders the good archbishop, Edmund of Abingdon, and Robert Grosseteste, the active and learned bishop of Lincoln; it was not infrequently aided by the king's brother Richard, earl of Cornwall, who did not share Henry's blind admiration for his foreign relatives. But it only found its permanent guiding spirit somewhat late in the reign, when Simon de Montfort, earl of Leicester, became the habitual mouthpiece of the grievances of the nation. The great earl had, oddly enough, commenced his career as one of the king's foreign favourites. He was the grandson of Amicia, countess of Leicester, but his father, Simon the Elder, a magnate whose French interests were greater than his English, had adhered to the cause of Philip Augustus in the days of King John and the Leicester estates had been confiscated. Simon, reared as a Frenchman, came over in 1230 to petition for their restoration. He not only obtained it, but to the great indignation of the English baronage married the king's sister Eleanor in 1238. For some time he was in high favour with his brother-in-law, and was looked upon by the English as no better than Aymer de Valence or Peter of Savoy. But he quarrelled with the fickle king, and adhered ere long to the party of opposition. A long experience of his character and actions convinced barons and commons alike that he was a just and sincere man, a friend of good governance, and an honest opponent of arbitrary and unconstitutional rule. He had become such a thorough Englishman in his views and prejudices, that by 1250 he was esteemed the natural exponent of all the wrongs of the realm. He was austere and religious; many of his closest friends were among the more saintly of the national clergy. By the end of his life the man who had started as the king's unpopular minion was known as "Earl Simon the Righteous," and had become the respected leader of the national opposition to his royal brother-in-law.

Simon de Montfort.

Condition of England under Henry III.

Though Henry's taxes were vexatious and never-ending, though his subservience to the pope and his flighty interference in foreign politics were ever irritating the magnates and the people, and though outbreaks of turbulence were not unknown during his long period of personal rule, it would yet be a mistake to regard the central years of the 13th century as an unprosperous period for England. Indeed it would be more correct to regard the period as one of steady national development in wealth, culture and unity. The towns were growing fast, and extending their municipal liberties; the necessities of John and the facile carelessness of Henry led to the grant of innumerable charters and privileges. As was to be seen again during the first period of the reign of Charles I., political irritation is not incompatible either with increasing material prosperity or with great intellectual development. The king's futile activity led to ever more frequent gatherings of the Great Council, in which the theory of the constitution was gradually hammered out by countless debates between the sovereign and his subjects. Every time that Henry confirmed the Great Charter, the fact that England was already a limited monarchy became more evident. It is curious to find that—like his father John—he himself contributed unconsciously to advances towards representative government. John's writ of 1213, bidding "discreet men" from each shire to present themselves at Oxford, found its parallel in another writ of 1253 which bids four knightly delegates from each county to appear along with the tenants-in-chief, for the purpose of discussing the king's needs. When county members begin to present themselves along with the barons at the national assembly, the conception of parliament is already reached. And indeed we may note that the precise word "parliament" first appears in the chroniclers and in official documents about the middle of Henry's reign. By its end the term is universally acknowledged and employed.

Beginnings of parliament.

Intellectual life.

We may discern during these same years a great intellectual activity. This was the time of rapid development in the universities, where not only were the scholastic philosophy and systematic theology eagerly studied, but figures appear like that of the great Roger Bacon, a scientific researcher of the first rank, whose discoveries in optics and chemistry caused his contemporaries to suspect him of magical arts. His teaching at Oxford in 1250–1257 fell precisely into the years of the worst misgovernance of Henry III. It was the same with law, an essentially 13th-century study; it was just in this age that the conception of law as something not depending on the pleasure of the king, nor compiled from mere collected ancestral customs, but existing as a logical entity, became generally prevalent. The feeling is thoroughly well expressed by the partisan of Montfort who wrote in his jingling Latin verse:—

> "Dicitur vulgariter 'ut rex vult lex vadit':
> Veritas vult aliter: nam lex stat, rex cadit."

Law has become something greater than, and independent of, royal caprice. The great lawyers of the day, of whom Bracton is the most celebrated name, were spinning theories of its origin and development, studying Roman precedents, and turning the medley of half-understood Saxon and Norman customs into a system.

Religious life: the friars.

Intellectual growth was accompanied by great religious activity; it is no longer merely on the old questions of dispute between church and state that men were straining their minds. The reign of Henry III. saw the invasion of England by the friars, originally the moral reformers of their day, who preached the superiority of the missionary life over the merely contemplative life of the old religious orders, and came, preaching holy poverty, to minister to souls neglected by worldly incumbents and political prelates (see MENDICANT MOVEMENT). The mendicants, Dominican and Franciscan, took rapid root in England; the number of friaries erected in the reign of Henry III. is astounding. For two generations they seem to have absorbed into their ranks all the most active and energetic of those who felt a clerical vocation. It is most noteworthy that they were joined by thinkers such as Grosseteste, Adam Marsh, Roger Bacon, Duns Scotus and William of Ockham. Still more striking is the fact that the friars threw themselves energetically into the cause of political reform, and that several of their leading brothers were the close friends and counsellors of Simon de Montfort.

Literature and art.

Architecture and art generally were making rapid strides during this stirring time. The lofty Early English style had now completely superseded the more heavy and sombre Norman, and it was precisely during the years of the maladministration of Henry III. that some of the most splendid of the English cathedrals, Salisbury (1220–1258) and Wells (1230–1239), were built. The king himself, when rearing the new Westminster Abbey over the grave of Edward the Confessor, spent for once some of his money on a worthy object. It may be noted that he showed a special reverence for the old English royal saint, and christened his eldest son after him; while his second bore the name of Edmund, the East Anglian martyr. These were the first occasions on which princes of the Angevin house received names that were not drawn from the common continental stock, but recalled the days before the Conquest. The reappearance of these old English names bears witness to the fact that the vernacular was reasserting itself. Though French was still the language of the court and of law, a new literature was already growing up in the native tongue, with such works as Layamon's *Brut* and the *Ormulum* as its first fruits. Henry III. himself on rare occasions used English for a state document.

All these facts make it sufficiently clear that England was irritated rather than crushed by Henry's irregular taxation and thriftless expenditure. The nation was growing and prospering, despite of its master's maladministration of its resources. On several occasions when he endeavoured to commit parliaments to back his bills and endorse his policy, they refused to help him, and left him to face his debts as best he might. This was especially the case with the insane contract which he made with Pope Innocent IV. in 1254, when he bound the realm of England to find 140,000 marks to equip an army for the conquest of Naples and Sicily. Henry lacked the energy to attempt to take by force what he could not obtain by persuasion, and preferred to break his bargain with the pope rather than to risk the chance of civil war at home.

Public discontent.

The Provisions of Oxford.

It was over this Sicilian scheme, the crowning folly of the king, that public opinion at last grew so hot that the intermittent criticism and grumbling of the baronage and the nation passed into vigorous and masterful action. At the "Mad Parliament," which met at Oxford, 1258, the barons informed their master that his misgovernment had grown so hopeless that they were resolved to put him under constitutional restraints. They appointed a committee of twenty-four, in which Simon de Montfort was the leading spirit, and entrusted it with the duty, not only of formulating lists of grievances, but of seeing that they were redressed. Henry found that he had practically no supporters save his unpopular foreign relatives and favourites, and yielded perforce. To keep him in bounds the celebrated "Provisions of Oxford" were framed. They provided that he was to do nothing without the consent of a permanent council of fifteen barons and bishops, and that all his finances were to be controlled by another committee of twenty-four persons. All aliens were to be expelled from the realm, and even the king's household was to be "reformed" by his self-constituted guardians. The inevitable oath to observe honestly all the conditions of the Great Charter of 1215 was, as usual, extorted from him with special formalities. Though Montfort and the barons voiced the public discontent, the constitution which they thus imposed on the king had nothing popular about it. The royal functions of which Henry was stripped were to be exercised by a series of baronial committees. The arrangement was too cumbersome, for there was nothing which would be called a central executive; the three bodies (two of twenty-four members each, the third of fifteen) were interdependent, and none of them possessed efficient control over the others. It was small wonder that the constitution established by the Provisions of Oxford was found unworkable. They were not even popular—the small landholders and subtenants discovered that their interests had not been sufficiently regarded, and lent themselves to an agitation against the provisional government, which was got up by Edward, the king's eldest son, who now appeared prominently in history for the first time. To conciliate them the barons allowed the "Provisions of Westminster" to be enacted in 1259, in which the power of feudal courts was considerably restricted, and many classes of suit were transferred to the royal tribunals, a sufficient proof that the king's judges did not share in the odium which appertained to their master, and were regarded as honest and impartial.

The limited monarchy established by the Provisions of Oxford lasted only three years. Seeing the barons quarrelling among themselves, and Montfort accused of ambition and overweening masterfulness by many of his colleagues, the king took heart. Copying the example of his father in 1215, he obtained from the pope a bull, which declared the new constitution irregular and illegal, and absolved him from his oath to abide by it. He then began to recall his foreign friends and relatives, and to assemble mercenaries. De Montfort answered by raising an army, arresting prominent aliens, and seizing the lands which the king had given them. Henry thereupon, finding his forces too weak to face the earl, took refuge in the Tower of London and proposed an arbitration. He offered to submit his case to Louis IX., the saintly king of France, whose virtues were known and respected all over Europe, if the baronial party would do the same. An appeal to the pope they would have laughed to scorn; but the confidence felt in the probity of the French king was so great that Montfort advised his friends to accede to the proposal. This was an unwise step. Louis was a saint, but he was also an autocratic king, and had no knowledge of the constitutional customs of England. Having heard the claims of the king and the barons, he issued the mise of Amiens (Jan. 23, 1264), so called from the city at which he dated it, a document which stated that King Henry ought to abide by the terms of Magna Carta, to which he had so often given his assent, but that the Provisions of Oxford were wholly invalid and derogatory to the royal dignity. "We ordain," he wrote, "that the king shall have full power and free jurisdiction over his realm, as in the days before the said Provisions." The pope shortly afterwards confirmed the French king's award.

Simon de Montfort and his friends were put in an awkward position by this decision, to which they had so unwisely committed themselves. But they did not hesitate to declare that they must repudiate the mise. Simon declared that it would be a worse perjury to abandon his oath to keep the Provisions of Oxford than his oath to abide by the French king's award. He took arms again at the head of the Londoners and his personal adherents and allies. But many of the barons stood neutral, not seeing how they could refuse to accept the arbitration they had courted, while a number not inconsiderable joined the king, deciding that Leicester had passed the limits of reasonable loyalty, and that their first duty was to the crown.

The barons' war: battle of Lewes.

Hence it came to pass that in the campaign of 1264 Simon was supported by a minority only of the baronial class, and the king's army was the larger. The fortune of war inclined at first in favour of the royalists, who captured Northampton and Nottingham. But when it came to open battle, the military skill of the earl sufficed to compensate for the inferiority of his numbers. At Lewes, on the 14th of May, he inflicted a crushing defeat on the king's army. Henry himself, his brother Richard of Cornwall, and many hundreds of his chief supporters were taken prisoners. His son Prince Edward, who had been victorious on his own flank of the battle, and had not been caught in the rout, gave himself up next morning, wishing to share his father's fate, and not to prolong a civil war which seemed to have become hopeless.

Montfort's parliament.

On the day that followed his victory Leicester extorted from the captive king the document called the "mise of Lewes," in which Henry promised to abide by all the terms of the Provisions of Oxford, as well as to uphold the Great Charter and the old customs of the realm. Montfort was determined to put his master under political tutelage for the rest of his life. He summoned a parliament, in which four knights elected by each shire were present, to establish the new constitution. It appointed Simon, with his closest allies, the young earl of Gloucester and the bishop of Chichester, as electors who were to choose a privy council for the king and to fill up all offices of state. The king was to exercise no act of sovereignty save by the consent of the councillors, of whom three were to follow his person wherever he went. This was a far simpler constitution than that framed at Oxford in 1258, but it was even more liable to criticism. For if the "Provisions" had established a government by baronial committees, the parliament of 1264 created one which was a mere party administration. For the victorious faction, naturally but unwisely, took all power for themselves, and filled every sheriffdom, castellany and judicial office with their own firm friends. Simon's care to commit the commons to his cause by summoning them to his parliament did not suffice to disguise the fact that the government which he had set up was not representative of the whole nation. He himself was too much like a dictator; even his own followers complained that he was over-masterful, and the most important of them, the young earl of Gloucester, was gradually estranged from him by finding his requests often refused and his aims crossed by the old earl's action. The new government lasted less than two years, and was slowly losing prestige all the time. Its first failure was in the repression of the surviving royalists. Isolated castles in several districts held out in the king's name, and the whole March of Wales was never properly subdued. When Simon turned the native Welsh prince Llewelyn against the marcher barons, he gave great offence; he was accused of sacrificing Englishmen to a foreign enemy. The new régime did not give England the peace which it had promised; its enemies maintained that it did not even give the good governance of which Simon had made so many promises. It certainly appears that some of his followers, and notably his three reckless sons, had given good cause for offence by high-handed and selfish acts. Much indignation was provoked by the sight of the king kept continually in ward by his privy councillors and treated with systematic neglect; but the treatment of his son was even more resented. Edward, though he had given little cause of offence, and had behaved admirably in refusing to continue the civil war, was deprived of his earldom of Chester, and put under the same restraint as his father. There was no good reason for treating him so harshly, and his state was much pitied.

Montfort attempted to strengthen his position, and to show his confidence in the commons, by summoning to his second and last parliament, that of 1265, a new element—two citizens from each city and two burgesses from each borough in the realm. It must be confessed that his object was probably not to introduce a great constitutional improvement, and to make parliament more representative, but rather to compensate for the great gaps upon the baronial benches by showing a multitude of lesser adherents, for the towns were his firm supporters. The actual proceedings of this particular assembly had no great importance.

Battle of Evesham.

Two months later Prince Edward escaped from his confinement, and fled to the earl of Gloucester, who now declared himself a royalist. They raised an army, which seized the fords of the Severn, in order to prevent de Montfort—who was then at Hereford with the captive king—from getting back to London or the Midlands. The earl, who could only raise a trifling force in the Marches, where the barons were all his enemies, failed in several attempts to force a passage eastward. But his friends raised a considerable host, which marched under his son Simon the Younger and the earl of Oxford, to fall on the rear of the royalists. Prince Edward now displayed skilful generalship—hastily turning backward he surprised and scattered the army of relief at Kenilworth (Aug. 1); he was then free to deal with the earl, who had at last succeeded in passing the Severn during his absence. On the 4th of August he beset Montfort's little force with five-fold numbers, and absolutely exterminated it at Evesham. Simon fought most gallantly, and was left dead on the field along with his eldest son Henry, his justiciar Hugh Despenser, and the flower of his party. The king fell into the hands of his son's followers, and was once more free.

It might have been expected that the victorious party would now introduce a policy of reaction and autocratic government. But the king was old and broken by his late misfortunes: his son the prince was wise beyond his years, and Gloucester and many other of the present supporters of the crown had originally been friends of reform, and had not abandoned their old views. They had deserted Montfort because he was autocratic and masterful, not because they had altogether disapproved of his policy. Hence we find Gloucester insisting that the remnant of the vanquished party should not be subjected to over heavy punishment, and even making an armed demonstration, in the spring of 1267, to demand the re-enactment of the Provisions of Oxford. Ultimately the troubles of the realm were ended by the Dictum of Kenilworth (Oct. 31, 1266) and the Statute of Marlborough (Nov. 1267). The former allowed nearly all of Montfort's faction to obtain amnesty and regain their estates on the payment of heavy fines; only Simon's own Leicester estates and those of Ferrers, earl of Derby, were confiscated. The latter established a form of constitution in which many, if not all, of the innovations of the Provisions of Oxford were embodied. The only unsatisfactory part of the pacification was that Llewelyn of Wales, who had ravaged the whole March while he was Montfort's ally, was allowed to keep a broad region (the greater part of the modern shire of Denbigh) which he had won back from its English holders. His power in a more indirect fashion extended itself over much of Mid-Wales. The line of the March was distinctly moved backward by the treaty of 1267.

Death of Henry III.

King Henry survived his restoration to nominal, if not to actual, authority for seven years. He was now too feeble to indulge in any of his former freaks of foreign policy, and allowed the realm to be governed under his son's eye by veteran bureaucrats, who kept to the old customs of the land. Everything settled down so peacefully that when the prince took the cross, and went off to the Crusades in 1270, no trouble followed. Edward was still absent in Palestine when his father died, on the 16th of November 1272. For the first time in English history there was no form of election of the new king, whose accession was quietly acknowledged by the officials and the nation. It was nearly two years after his father's death that he reached England, yet absolutely no trouble had occurred during his absence. He had taken advantage of his leisurely journey home to pacify the turbulent Gascony, and to visit Paris and make a treaty with King Philip III. by which the frontiers of his duchy of Aquitaine were rectified, to some slight extent, in his favour. He, of course, did homage for the holding, as his father had done before him.

Edward I.

The reign which began with this unwonted quietness was perhaps the most important epoch of all English medieval history in the way of the definition and settlement of the constitution. Edward I. was a remarkable figure, by far the ablest of all the kings of the house of Plantagenet. He understood the problem that was before him, the construction of a working constitution from the old ancestral customs of the English monarchy plus the newer ideas that had been embodied in the Great Charter, the Provisions of Oxford, and the scanty legislation of Simon de Montfort. Edward loved royal power, but he was wise in his generation, and saw that he could best secure the loyalty of his subjects by assenting to so many of the new constitutional restraints as were compatible with his own practical control of the policy of the realm. He was prepared to refer all important matters to his parliament, and (as we shall see) he improved the shape of that body by reintroducing into it the borough members who had appeared for the first time in Montfort's assembly of 1265. He would have liked to make parliament, no doubt, a mere meeting for the voting of taxation with the smallest possible friction. But he fully realized that this dream was impossible, and was wise enough to give way, whenever opposition grew too strong and bitter. He had not fought through the civil wars of 1263–66 without learning his lesson. There was a point beyond which it was unwise to provoke the baronage or the commons, and, unlike his flighty and thriftless father, he knew where that point came. The constitutional quarrels of his reign were conducted with decency and order, because the king knew his own limitations, and because his subjects trusted to his wisdom and moderation in times of crisis. Edward indeed was a man worthy of respect, if not of affection. His private life was grave and seemly, his court did not sin by luxury or extravagance. His chosen ministers were wise and experienced officials, whom no man could call favourites or accuse of maladministration. He was sincerely religious, self-restrained and courteous, though occasionally, under provocation, he could burst out into a royal rage. He was a good master and a firm friend. Moreover, he had a genuine regard for the sanctity of a promise, the one thing in which his father had been most wanting. It is true that sometimes he kept his oaths or carried out his pledges with the literal punctuality of a lawyer, rather than with the chivalrous generosity of a knight. But at any rate he always endeavoured to discharge an obligation, even if he sometimes interpreted it by the strict letter of the law and not with liberality. A conscientious man according to his lights, he took as his device the motto *Pactum serva*, "keep troth," which was afterwards inscribed on his tomb, and did his best to live up to it. Naturally he expected the same accuracy from other men, and when he did not meet it he could be harsh and unrelenting in the punishment that he inflicted. To sum up his character it must be added that he was a very great soldier. The headlong courage which he showed at Lewes, his first battle, was soon tempered by caution, and already in 1265 he had shown that he could plan a campaign with skill. In his later military career he was the first general who showed on a large scale how the national English weapon, the bow, could win fights when properly combined with the charge of the mailed cavalry. He inaugurated the tactics by which his grandson and great-grandson were to win epoch-making victories abroad.

Edward's reign lasted for thirty-five years, and was equally important in constitutional development and in imperial policy. The first period of it, 1272–1290, may be defined as mainly notable for his great series of legislative enactments and his conquest of Wales. The second, 1290–1307, contains his long and ultimately unsuccessful attempt to incorporate Scotland into his realm, and his quarrels with his parliament.

Constitutional changes. Statutes of Westminster and Gloucester.

The changes made by Edward in constitutional law by his great series of statutes commenced very soon after his return to his kingdom in 1274. We may trace in all of them the same purpose of strengthening the power of the crown by judicious and orderly definition of its privileges. The great enactments start with the First Statute of Westminster (1275), a measure directed to the improvement of administrative details, which was accompanied by a grant to the king of a permanent customs-revenue on imports and exports, which soon became more valuable to the royal exchequer than the old feudal taxes on land. In 1278 followed the Statute of Gloucester, an act empowering the king to make inquiry as to the right by which old royal estates, or exceptional franchises which infringed on the royal prerogative of justice or taxation, had passed into the hands of their present owners. This inquest was made by the writ *Quo Warranto*, by which each landholder was invited to show the charter or warrant in which his claims rested. The baronage were angry and suspicious, for many of their customary rights rested on immemorial and unchartered antiquity, while others were usurpations from the weakness of John or Henry III. They showed signs of an intention to make open resistance; but to their surprise the king contented himself with making complete lists of all franchises then existing, and did no more; this being his method of preventing the growth of any further trespasses on his prerogative.

Statute of Mortmain.

Edward's next move was against clerical encroachments. In 1279 he compelled Archbishop Peckham to withdraw some legislation made in a synod called without the royal permission—a breach of one of the three great canons of William the Conqueror. Then he took the offensive himself, by persuading his parliament to pass the Statute of Mortmain (de religiosis). This was an act to prevent the further accumulation of landed property in the "dead hand" of religious persons and communities. The more land the church acquired, the less feudal taxation came into the royal exchequer. For undying corporations paid the king neither "reliefs" (death duties) nor fees on wardship and marriage, and their property would never escheat to the crown for want of an heir. The Statute of Mortmain forbade any man to alienate land to the church without royal licence. It was very acceptable to the baronage, who had suffered, on a smaller scale, the same grievance as the king, for when their subtenants transferred estates to the church, they (like their masters) suffered a permanent loss of feudal revenue. A distinct check in the hitherto steady growth of clerical endowments began from this time, though licences in mortmain were by no means impossible to obtain.

Second Statute of Westminster.

The great group of statutes that date from Edward's earlier years ends with the legislative enactments of 1285, the Second Statute of Westminster and the Statute of Winchester. The former contains the clause *De Donis Conditionalibus*, a notable landmark in the history of English law, since it favoured the system of entailing estates. Hitherto life-owners of land, holding as subtenants, had possessed large powers of alienating it, to the detriment of their superior lords, who would otherwise have recovered it, when their vassals died heirless, as an "escheat." This custom was primarily harmful to the king—the greatest territorial magnate and the one most prone to distribute rewards in land to his servants. But it was also prejudicial to all tenants-in-chief. By *De Donis* the tenant for life was prevented from selling his estate, which could only pass to his lawful heir; if he had none, it fell back to his feudal superior. Five years later this legislation was supplemented by the statute *Quia Emptores*, equally beneficial to king and barons, which provided that subtenants should not be allowed to make over land to other persons, retaining the nominal possession and feudal rights over it, but should be compelled to sell it out and out, so that their successor in title stood to the overlord exactly as the seller had done. Hitherto they had been wont to dispose of the whole or parts of their estates while maintaining their feudal rights over it, so that the ultimate landlord could not deal directly with the new occupant, whose reliefs, wardship, &c., fell to the intermediate holder who had sold away the land. The main result of this was that, when a baron parted with any one of his estates, the acquirer became a tenant-in-chief directly dependent on the king, instead of being left a vassal of the person who had passed over the land to him. Subinfeudation came to a complete stop, and whenever great family estates broke up the king obtained new tenants-in-chief. The number of persons holding immediately of the crown began at once to multiply by leaps and bounds. As the process of the partition of lands continued, the fractions grew smaller and smaller, and many of the tenants-in-chief were ere long very small and unimportant persons. These, of course, would not form part of the baronial interest, and could not be distinguished from any other subjects of the crown.

Statute of Winchester.

The Statute of Winchester, the other great legislative act of 1285, was mainly concerned with the keeping of the peace of the realm. It revised the arming and organization of the national militia, the lineal descendent of the old *fyrd*, and provided a useful police force for the repression of disorder and robbery by the reorganization of *watch and ward*. This was, of course, one more device for strengthening the power of the crown.

Welsh wars.

In the intervals of the legislation which formed the main feature of the first half of his reign, Edward was often distracted by external matters. He was, on the whole, on very good terms with his first cousin, Philip III. of France; the trouble did not come from this direction, though there was the usual crop of feudal rebellions in Gascony. Nor did Edward's relations with the more remote states of the continent lead to any important results, though he had many treaties and alliances in hand. It was with Wales that his most troublesome relations occurred. Llewelyn-ap-Gruffydd, the old ally of de Montfort, had come with profit out of the civil wars of 1263–66, and having won much land and more influence during the evil days of Henry III., was reluctant to see that his time of prosperity had come to an end, now that a king of a very different character sat on the English throne.

Conquest of Wales.

Friction had begun the moment that Edward returned to his kingdom from the crusade. Llewelyn would not deign to appear before him to render the customary homage due from Wales to the English crown, but sent a series of futile excuses lasting over three years. In 1277, however, the king grew tired of waiting, invaded the principality and drove his recalcitrant vassal up into the fastnesses of Snowdon, where famine compelled him to surrender as winter was beginning. Llewelyn was pardoned, but deprived of all the lands he had gained during the days of the civil war, and restricted to his old North Welsh dominions. He remained quiescent for five years, but busied himself in knitting up secret alliances with the Welsh of the South, who were resenting the introduction of English laws and customs by the strong-handed king. In 1282 there was a sudden and well-planned rising, which extended from the gates of Chester to those of Carmarthen; several castles were captured by the insurgents, and Edward had to come to the rescue of the lords-marchers at the head of a very large army. After much checkered fighting Llewelyn was slain at the skirmish of Orewyn Bridge near Builth on the 11th of December 1282. On his death the southern rebels submitted, but David his brother continued the struggle for three months longer in the Snowdon district, till his last bands were scattered and he himself taken prisoner. Edward beheaded him at Shrewsbury as a traitor, having the excuse that David had submitted once before, had been endowed with lands in the Marches, and had nevertheless joined his brother in rebellion. After this the king abode for more than a year in Wales, organizing the newly conquered principality into a group of counties, and founding many castles, with dependent towns, within its limits. The "statute of Wales," issued at Rhuddlan in 1284, provided for the introduction of English law into the country, though a certain amount of Celtic customs was allowed to survive. For the next two centuries and a half the lands west of Dee and Wye were divided between the new counties, forming the "principality" of Wales, and the "marches" where the old feudal franchises continued, till the marcher-lordships gradually fell by forfeiture or marriage to the crown. Edward's grip on the land was strong, and it had need to be so, for in 1287 and 1294–1295 there were desperate and widespread revolts, which were only checked by the existence of the new castles, and subdued by the concentration of large royal armies. In 1301 the king's eldest surviving son Edward, who had been born at Carnarvon in 1284, was created "prince of Wales," and invested with the principality, which henceforth became the regular appanage of the heirs of the English crown. This device was apparently intended to soothe Welsh national pride, by reviving in form, if not in reality, the separate existence of the old Cymric state. For four generations the land was comparatively quiet, but the great rebellion of Owen Glendower in the reign of Henry IV. was to show how far the spirit of particularism was from extinction.

Expulsion of the Jews.

Some two years after his long sojourn in Wales Edward made an even longer stay in a more remote corner of his dominions. Gascony being, as usual, out of hand, he crossed to Bordeaux in 1286, and abode in Guienne for no less than three years, reducing the duchy to such order as it had never known before, settling all disputed border questions with the new king of France, Philip IV., founding many new towns, and issuing many useful statutes and ordinances. He returned suddenly in 1289, called home by complaints that reached him as to the administration of justice by his officials, who were slighting the authority of his cousin Edmund of Cornwall, whom he had left behind as regent. He dismissed almost the whole bench of judges, and made other changes among his ministers. At the same time he fell fiercely upon the great lords of the Welsh Marches, who had been indulging in private wars; when they returned to their evil practice he imprisoned the chief offenders, the earls of Hereford and Gloucester, forfeited their estates, and only gave them back when they had paid vast fines (1291). Another act of this period was Edward's celebrated expulsion of the Jews from England (1290). This was the continuation of a policy which he had already carried out in Guienne. It would seem that his reasons were partly religious, but partly economic. No earlier king could have afforded to drive forth a race who had been so useful to the crown as bankers and money-lenders; but by the end of the 13th century the financial monopoly of the Jews had been broken by the great Italian banking firms, whom Edward had been already employing during his Welsh wars. Finding them no less accommodating than their rivals, he gratified the prejudices of his subjects and himself by forcing the Hebrews to quit England. The Italians in a few years became as unpopular as their predecessors in the trade of usury, their practices being the same, if their creed was not.

Edward I. and Scotland.

Meanwhile in the same year that saw the expulsion of the Jews, King Edward's good fortune began to wane, with the rise of the Scottish question, which was to overshadow the latter half of his reign. Alexander III., the last male in direct descent of the old Scottish royal house, had died in 1286. His heiress was his only living descendant, a little girl, the child of his deceased daughter Margaret and Eric, king of Norway. After much discussion, for both the Scottish nobles and the Norse king were somewhat suspicious, Edward had succeeded in obtaining from them a promise that the young queen should marry his heir, Edward of Carnarvon. This wedlock would have led to a permanent union of the English and Scottish crowns, but not to an absorption of the lesser in the greater state, for the rights of Scotland were carefully guarded in the marriage-treaty. But the scheme was wrecked by the premature death of the bride, who expired by the way, while being brought over from Norway to her own kingdom, owing to privations and fatigue suffered on a tempestuous voyage.

She had no near relatives, and more than a dozen Scottish or Anglo-Scottish nobles, distantly related to the royal line, put in a claim to the crown, or at least to a part of the royal heritage. The board of six regents, who had been ruling Scotland for the young queen, seeing their own power at an end and civil war likely to break out, begged Edward of England to arbitrate between the claimants. The history of the next twenty years turned on the legal point whether the arbitrator acted—as he himself contended—in the capacity of suzerain, or—as the Scots maintained—in that of a neighbour of acknowledged wisdom and repute, invited to settle a domestic problem. This question of the relations between the English and the Scottish crowns had been raised a dozen times between the days of Edward the Elder and those of Henry III. There was no denying the fact that the northern kings had repeatedly done homage to their greater neighbours. But, save during the years when William the Lion, after his captivity, had owned himself the vassal of Henry II. for all his dominions, there was considerable uncertainty as to the exact scope of the allegiance which had been demanded and given. And William's complete submission had apparently been cancelled, when Richard I. sold him in 1190 a release from the terms of the treaty of Falaise. Since that date Alexander II. and Alexander III. had repeatedly owned themselves vassals to the English crown, and had even sat in English parliaments. But it was possible for patriotic Scots to contend that they had done so only in their capacity as English barons—for they held much land south of Tweed—and to point to the similarity of their position to that of the English king when he did homage for his duchy of Guienne at Paris, without thereby admitting any suzerainty of the French crown over England or Ireland. On the last occasion when Alexander III. had owned himself the vassal of Edward I., there had been considerable fencing on both sides as to the form of the oath, and, as neither sovereign at the moment had wished to push matters to a rupture, the words used had been intentionally vague, and both parties had kept their private interpretations to themselves. But now, when Edward met the Scottish magnates, who had asked for his services as arbitrator, he demanded that they should acknowledge that he was acting as suzerain and overlord of the whole kingdom of Scotland. After some delay, and with manifest reluctance, the Scots complied; their hand was forced by the fact that most of the claimants to the crown had hastened to make the acknowledgment, each hoping thereby to prejudice the English king in his own favour.

This submission having been made, Edward acted with honesty and fairness, handing over the adjudication to a body of eighty Scottish and twenty-four English barons, knights and bishops. These commissioners, after ample discussion and taking of evidence, adjudged the crown to John Baliol, the grandson of the eldest daughter of Earl David, younger brother of William the Lion. They ruled out the claim of Robert Bruce, the son of David's second daughter, who had raised the plea that his descent was superior because he was a generation nearer than Baliol to their common ancestor. This theory of affinity had been well known in the 12th century, and had been urged in favour of King John when he was contending with his nephew Arthur. But by 1291 it had gone out of favour, and the Scottish barons had no hesitation in declaring Baliol their rightful king. Edward at once gave him seizin of Scotland, and handed over to him the royal castles, which had been placed in his hands as a pledge during the arbitration. In return Baliol did him homage as overlord of the whole kingdom of Scotland.

This, unfortunately, turned out to be the beginning, not the end, of troubles. Edward was determined to exact all the ordinary feudal rights of an overlord—whatever might have been the former relations of the English and Scottish crowns. The Scots, on the other hand, were resolved not to allow of the introduction of usages which had not prevailed in earlier times, and to keep the tie as vague and loose as possible. Before Baliol had been many months on the throne there was grave friction on the question of legal appeals. Scottish litigants defeated in the local courts began to appeal to the courts of Westminster, just as Gascon litigants were wont to appeal from Bordeaux to Paris. King John and his baronage, relying on the fact that such evocation of cases to a superior court had never before been known, refused to allow that it was valid. King Edward insisted that by common feudal usage it was perfectly regular, and announced his intention of permitting it. Grave friction had already begun when external events precipitated an open rupture between the king of England and his new vassal.

Edward I. and Philip IV.

Philip III. of France, who had always pursued a friendly policy with his cousin of England, had died in 1285, and had been succeeded by his son Philip IV., a prince of a very different type, the most able and unscrupulous of all the dynasty of Capet. In 1294 he played a most dishonourable trick upon King Edward. There had been some irregular and piratical fighting at sea between English and Norman sailors, in which the latter had been worsted. When called to account for the doings of his subjects, as well as for certain disputes in Gascony, the English king promised redress, and, on the suggestion of Philip, surrendered, as a formal act of apology, the six chief fortresses of Guienne, which were to be restored when reparation had been made. Having garrisoned the places, Philip suddenly changed his line, refused to continue the negotiations, and declared the whole duchy forfeited. Edward was forced into war, after having been tricked out of his strongholds. Just after his first succours had sailed for the Gironde, the great Welsh rebellion of 1294 broke out, and the king was compelled to turn aside to repress it. This he accomplished in the next spring, but meanwhile hardly a foothold remained to him in Gascony. He was then preparing to cross the Channel in person, when Scottish affairs began to become threatening. King John declared himself unable to restrain the indignation of his subjects at the attempt to enforce English suzerainty over Scotland, and in July 1295 leagued himself with Philip of France, and expelled from his realm the chief supporters of the English alliance. Finding himself involved in two wars at once, Edward made an earnest appeal to his subjects to rise to the occasion and "because that which touches all should be approved of all" summoned the celebrated "model parliament" of November 1295, which exactly copied in its constitution Montfort's parliament of 1265, members from all cities and boroughs being summoned along with the knights of the shires, and the inferior clergy being also represented by their proctors. This system henceforth became the normal one, and the English parliament assumed its regular form, though the differentiation of the two houses was not fully completed till the next century. Edward was voted liberal grants by the laity, though the clergy gave less than he had hoped; but enough money was obtained to fit out two armies, one destined for the invasion of Scotland, the other for that of Gascony.

The "model parliament" of 1295.

Invasion of Scotland.

The French expedition, which was led by the king's brother Edmund, earl of Lancaster, failed to recover Gascony, and came to an ignominious end. But Edward's own army achieved complete success in Scotland. Berwick was stormed, the Scottish army was routed at Dunbar (April 27), Edinburgh and Stirling were easily captured, and at last John Baliol, deserted by most of his adherents, surrendered at Brechin. Edward pursued his triumphant march as far as Aberdeen and Elgin, without meeting further resistance. He then summoned a parliament at Berwick, and announced to the assembled Scots that he had determined to depose King John, and to assume the crown himself. The ease with which he had subdued the realm misled him; he fancied that the slack resistance, which was mainly due to the incapacity and unpopularity of Baliol, implied the indifference of the Scots to the idea of annexation. The alacrity with which the greater part of the baronage flocked in to do him homage confirmed him in the mistaken notion. He appointed John, earl Warenne, lieutenant of the realm, with Hugh Cressingham, an English clerk, as treasurer, but left nearly all the minor offices in Scottish hands, and announced that Scottish law should be administered

He then returned to England, and began to make preparations for a great expedition to France in 1297.

Disputes with the clergy and baronage.

His plan was something more ambitious than a mere attempt to recover Bordeaux; succours were to go to Gascony, but he himself and the main army were to invade France from the north with the aid of the count of Flanders. Much money was, of course, needed for the double expedition, and in raising it Edward became involved in two desperate constitutional disputes. Though the barons and the commons voted a liberal grant at the parliament of Bury (Nov. 1296) the clergy would give nothing. This was owing to a bull—the celebrated *Clericis Laicos*, recently issued by the arrogant and contentious pope Boniface VIII., which forbade the clergy to submit to any taxation by secular princes. Robert Winchelsea, the archbishop of Canterbury, an enthusiastic exponent of clerical rights and grievances, declared himself in conscience bound to obey the pontiff, and persuaded the representatives of the Church in the parliament to refuse supplies. The king, indignant that an attempt should be made to exempt the vast ecclesiastical lands from taxation at a time of national crisis, sequestrated the estates of the see of Canterbury, and copied John's conduct in 1208 by outlawing the whole body of the clergy. Winchelsea in return excommunicated all those who refused to recognize the authority of the pope's bull.

Scarcely was this quarrel developed when Edward found himself involved in an equally hot dispute with the commons and the baronage. In his eagerness to collect the sinews of war he had issued orders for the levy of a heavy customs duty on wool, the main export of the land, and in some cases laid hands on the wool itself, which lay ready for shipping, though this had not been granted him by the late parliament. The "maltolt"—or illegal tax—as his subjects called it, provoked the anger of the whole body of merchants in England. At the same time the barons, headed by the earls of Norfolk and Hereford, raised the old grievance about feudal service beyond seas, which had been so prominent in the time of King John. Norfolk, who had been designated to lead the expedition to Guienne, declared that though he was ready to follow his master to Flanders in his capacity of marshal, he would not be drafted off to Gascony against his own will. Hereford and a number of other barons gave him hearty support.

Harassed by these domestic troubles, the king could not carry out his intention of sailing for Flanders in the spring, and spent the greater part of the campaigning season in wrangles with his subjects. He was obliged to come to a compromise. If the clergy would give him a voluntary gift, which was in no way to be considered a tax, he agreed to inlaw them. They did so, and even Winchelsea, after a time, was reconciled to his master. As to the barons, the king took the important constitutional step of conceding that he would not ask them to serve abroad as a feudal obligation, but would pay them for their services, if they would oblige him by joining his banner. Even then Norfolk and Hereford refused to sail; but the greater part of the minor magnates consented to serve as stipendiaries. The commons were conciliated by a promise that the wool which the royal officers had seized should be paid for, when a balance was forthcoming in the exchequer.

Insurrection in Scotland. Wallace.

By these means Edward succeeded at last in collecting a considerable army, and sailed for Flanders at the end of August. But he was hardly gone when dreadful news reached him from Scotland. An insurrection, to which no great importance was attached at first, had broken out in the summer. Its first leader was none of the great barons, but a Renfrewshire knight, Sir William Wallace; but ere long more important persons, including Robert Bruce, earl of Carrick (grandson of Robert Bruce of Annandale, one of the competitors for the crown of Scotland), and the bishop of Glasgow, were found to be in communication with the rebels. Earl Warenne, the king's lieutenant in Scotland, mustered his forces to put down the rising. On the 11th of September 1297 he attempted to force the passage of the Forth at Stirling Bridge, and was completely beaten by Wallace, who allowed half the English army to pass the river and then descended upon it and annihilated it, while Warenne looked on helplessly from the other bank. Almost the whole of Scotland rose in arms on hearing of this victory, but the barons showed less zeal than the commons, owing to their jealousy of Wallace. Warenne retired to Berwick and besought his master for aid.

Edward, who was just commencing an autumn campaign in Flanders which was to lead to no results, sent home orders to summon a parliament, which should raise men and money for the Scottish war. It was called, and made a liberal grant for that purpose, but Archbishop Winchelsea and the earls of Norfolk and Hereford took advantage of their master's needs, and of his absence, to assert themselves. Taking up the position of defenders of the constitution, they induced the parliament to couple its grants of money with the condition that the king should not only confirm Magna Carta—as had been so often done before—but give a specific promise that no "maltolts," or other taxes not legally granted him, should be raised for the future. Edward received the petition at Ghent, and made the required oath. The document to which he gave his assent, the *Confirmatio Cartarum* (less accurately called the statute *De Tallagio non concedendo*) marked a distinct advance beyond the theories of Magna Carta; for the latter had been drawn up before England possessed a parliament, and had placed the control of taxation in the hands of the old feudal council of tenants-in-chief, while the *Confirmatio* gave it to the assembly, far more national and representative, which had now superseded the Great Council as the mouthpiece of the whole people of the realm.

The "Confirmatio Cartarum."

The Scottish revolt had become so formidable that Edward was compelled to abandon his unfruitful Flemish campaign; he patched up an unsatisfactory truce with the king of France, which left four-fifths of his lost Gascon lands in the power of the enemy, and returned to England in the spring of 1298. In July he invaded Scotland at the head of a formidable army of 15,000 men, and on the 22nd of that month brought Wallace to action on the moors above Falkirk. The steady Scottish infantry held their own for some time against the charge of the English men-at-arms. But when Edward brought forward his archers to aid his cavalry, as William I. had done at Hastings, Wallace's columns broke up, and a dreadful slaughter followed. The impression made on the Scots was so great that for some years they refused to engage in another pitched battle. But the immediate consequences were not all that might have been expected. Edward was able to occupy many towns and castles, but the broken bands of the insurgents lurked in the hills and forests, and the countryside as a whole remained unsubdued. Wallace went to France to seek aid from King Philip, and his place was taken by John Comyn, lord of Badenoch, a nephew of Baliol, who was a more acceptable leader to the Scottish nobles than the vanquished knight of Falkirk. Edward was detained in the south for a year, partly by negotiations with France, partly by a renewed quarrel with his parliament, and during his absence Comyn recovered Stirling and most of the other places which had received English garrisons. It was not till 1300 that the king was able to resume the invasion of Scotland, with an army raised by grants of money that he had only bought by humiliating concessions to the will of his parliament, formulated in the *Articuli super cartas* which were drawn up in the March of that year. Even then he only succeeded in recovering some border holds, and the succeeding campaign of 1301 only took him as far as Linlithgow. But in the following year his position was suddenly changed by unexpected events abroad; the king of France became involved in a desperate quarrel with the pope, and at the same moment his army received a crushing defeat before Courtrai at the hands of the Flemings. To free himself for these new struggles Philip made up his mind to conclude peace with England, even at the cost of sacrificing his conquests in Gascony. Bordeaux had already revolted from him, and he gave up the rest of his ill-gotten gains of 1294 by the treaty of Paris (May 20, 1303).

Edward again invades Scotland, 1303.

Now that he had only a single war upon his hands Edward's position was entirely changed. There was no more need to conciliate the magnates nor the parliament. His displeasure fell mainly on the archbishop and the earl of Norfolk, who had so long led the opposition. Winchelsea was put in disgrace, and ultimately exiled. Norfolk, who was childless, was forced to sign a grant by which his lands went to the king after his death—a harsh and illegal proceeding, for he had collateral heirs. But the Scots, as was natural, bore the brunt of the king's wrath. In June 1303, a month after the peace of Paris, he advanced from Roxburgh, determined to make a systematic conquest of the realm, and not to return till it was ended. He kept up his campaign throughout the winter, reduced every fortress that held out, and carried his arms as far as Aberdeen and Elgin. In February 1304 the regent Comyn and most of the Scottish baronage submitted, on the promise that they should retain their lands on doing homage. Wallace, who had returned from France, kept up a guerilla warfare in the hills for a year more, but was captured in July 1305, and sent to London to be executed as a traitor. Even before his capture it seemed that Scotland was thoroughly tamed, and was destined to share the fate of Wales.

Edward's arrangements for the administration of the conquered kingdom were wise and liberal, if only the national spirit of the Scots could have tolerated them. The Scottish parliament was to continue, though representatives from beyond Tweed were also to be sent to the English parliament. The sheriffdoms and most of the ministerial posts were left in the hands of Scots, though the supreme executive authority was put in the hands of John of Brittany, earl of Richmond, the king's nephew. The land seemed for a time to be settling down, and indeed the baronage were to such a large extent English in both blood and feeling, that there was no insuperable difficulty in conciliating them. A considerable fraction of them adhered consistently to the English cause from this time forth, and ultimately lost their lands for refusing to follow the rest of the nation in the next insurrection.

But the delusion that Scotland had been finally subdued was to last only for a year, although in 1305 Edward seemed to have accomplished his task, and stood triumphant, with the northern realm at his feet, his domestic foes humbled, and France and the papacy defeated. His last short interval of peaceful rule was distinguished by the passing of the Statute of Trailbaston in the parliament of 1305. This was a measure for the repression of local riots, empowering justices in every shire to suppress clubmen (*trailbastons*), gangs of marauders who had been rendering the roads unsafe.

Robert Bruce.

In the first month of 1306, however, the weary Scottish war broke out again, with the appearance of a new insurgent chief. Robert Bruce, earl of Carrick, grandson of the claimant to the throne of 1292, had hitherto pursued a shifty policy, wavering between submission and opposition to the English invader. He had been in arms more than once, but had finally adhered to the pacification of 1304, and was now entirely trusted by the king. But he was secretly plotting rebellion, disgusted (as it would seem) that Edward had not transferred the crown of Scotland to the line of Bruce when the house of Baliol was found wanting. Though he found himself certain of a considerable amount of support, he yet could see that there would be no general rising in his favour, for many of the magnates refused to help in making king a baron whom they regarded as no more important than one of themselves. But the insurrection was precipitated by an unpremeditated outrage. Bruce was conferring at Dumfries with John Comyn, the late regent, whom he was endeavouring to tempt into his plots, on the 10th of January 1306. An angry altercation followed, for Comyn would have nothing to do with the scheme, and Bruce and his followers finally slew him before the altar of a church into which he had fled. After this crime, which combined the disgrace of sacrilege with that of murder under tryst, Bruce was forced to take arms at once, though his preparations were incomplete. He raised his banner, and was hastily crowned at Scone on the 25th of March; by that time the rising had burst out in many shires of Scotland, but it was neither unanimous nor complete. Edward by no means despaired of crushing it, and had raised a large army, when he was smitten with an illness which prevented him from crossing the border. But his troops, under Aymer de Valence, earl of Pembroke, pressed north, and surprised and routed Bruce at Methven near Perth. The pretender's brother Nigel and many of his chief supporters were taken prisoners, and he himself escaped with a handful of followers and took refuge in the Western islands. Edward ordered young Nigel Bruce and many other captives to be executed; for he was provoked to great wrath by the rebellion of a magnate who had given him every assurance of loyalty. He intended to follow de Valence to Scotland, and to complete the suppression of the rising in person. But this proved beyond his strength; he struggled as far as the border in July, but could not shake off his disease, and was forced to linger, a broken invalid, in the neighbourhood of Carlisle for many months. Meanwhile his lieutenants failed to follow up with energy the victory gained at Methven, and in the next spring Bruce reappeared in the Lowlands, gathered new levies, and inflicted a defeat on de Valence at Loudoun Hill. Roused to anger King Edward rose from his bed, mounted his horse, and started for Scotland. But after struggling on for a few miles he fell by the way, and died at Burgh-on-Sands, just inside the English border, on the 7th of July 1307.

Character of Edward I.'s rule.

Despite the chequered fortunes of his later years the reign of Edward had been a time of progress and prosperity for England. He had given his realm good and strong governance; according to his lights he had striven to keep faith and to observe his coronation oath. He had on more than one occasion quarrelled with his subjects, but matters had never been pushed to an open rupture. The king knew how to yield, and even opponents like Winchelsea and the earls of Norfolk and Hereford respected him too much to drive him to an extremity. The nation, however much it might murmur, would never have been willing to rebel against a sovereign whose only fault was that he occasionally pressed his prerogative too far. Edward's rule was seldom or never oppressive, the seizure of the merchants' wool in 1297 was the only one of his acts which caused really fierce and widespread indignation. For his other arbitrary proceedings he had some show of legal justification in every case. It would have been absurd to declare that his rule was tyrannical or his policy disastrous. The realm was on the whole contented and even flourishing. Population was steadily increasing, and with it commerce; the intellectual activity which had marked the reign of Henry III. was still alive; architecture, religious and military, was in its prime. He was himself a great builder, and many of the perfected castles of that concentric style, which later ages have called the "Edwardian type," were of his own planning. In ecclesiastical architecture his reign represents the early flower of the "Decorated" order, perhaps the most beautiful of all the developments of English art. In many respects the reign may be regarded as the culmination and crowning point of the middle ages. It certainly gave a promise of greatness and steady progress which the 14th century was far from justifying.

Edward II.

With the great king's death a sudden change for the worse was at once visible. The individual character of the reigning king was still the main factor in political history, and Edward II. was in every respect a contrast to his father. He was incorrigibly frivolous, idle and apathetic; his father had given him much stern schooling, but this seems only to have inspired him with a deeply rooted dislike for official work of any kind. He has been well described as "the first king since the Conquest who was not a man of business." Even Stephen and Henry III. had been active and bustling princes, though their actions were misguided and inconsequent. But Edward II. hated all kingly duties; he detested war, but he detested even more the routine work of administration. He was most at his ease in low company, his favourite diversion was gambling, his best trait a love for farming and the mechanical arts of the smith and the gardener.

Piers Gaveston.

His first acts on coming to the throne caused patriotic Englishmen to despair. His father, on his deathbed, had made him swear to conduct the Scottish expedition to its end. But he marched no further than Dumfries, and then turned back, on the vain pretext that he must conduct his parent's funeral in person. Leaving Bruce to gather fresh strength and to commence the tedious process of reducing the numerous English garrisons in Scotland, he betook himself to London, and was not seen on the border again for more than three years. He then dismissed all his father's old ministers, and replaced them by creatures of his own, for the most part persons of complete incompetence. But his most offensive act was to promote to the position of chief councillor of the crown, and disperser of the royal favours, a clever but vain and ostentatious Gascon knight, one Piers Gaveston, who had been the companion of his boyhood, and had been banished by Edward I. for encouraging him in his follies and frivolity. Piers was given the royal title of earl of Cornwall, and married to the king's niece; when Edward went over to France to do homage for Gascony, he even made his friend regent during his absence, in preference to any of his kinsmen. It was his regular habit to refer those who came to him on matters of state to "his good brother Piers," and to refuse to discuss them in person.

Baronial opposition.

It was of course impossible that the nation or the baronage should accept such a preposterous régime, and Edward was soon involved in a lively struggle with his subjects. Of the leaders of opposition in his father's reign both Hereford and Norfolk were now dead. But Archbishop Winchelsea had returned from exile in a belligerent mood, and the place of Norfolk and Hereford was taken by an ambitious prince of the royal house, Thomas, earl of Lancaster, the son of the younger brother of Edward I. Thomas was selfish and incompetent, but violent and self-assertive, and for some years was able to pose successfully as a patriot simply because he set himself to oppose every act of the unpopular king. He had several powerful baronial allies—the earls of Warwick, Pembroke and Warenne, with Humphrey Bohun of Hereford, who had succeeded to his father's politics, though he had married the king's own sister.

Progress of Bruce in Scotland.

The annals of the early years of Edward II. are mainly filled by contemporary chroniclers with details of the miserable strife between the king and his barons on the question of Gaveston's unconstitutional position. But the really important feature of the time was the gradual reconquest of Scotland by Robert Bruce, during the continuance of the domestic strife in England. Edward I. had laid such a firm grip on the northern realm that it required many years to undo his work. A very large proportion of the Scottish nobility regarded Bruce as a usurper who had opened his career with murder and sacrilege, and either openly opposed him or denied him help. His resources were small, and it was only by constant effort, often chequered by failures, that he gradually fought down his local adversaries, and reduced the English garrisons one by one. Dumbarton and Linlithgow were only mastered in 1312. Perth did not finally fall into his hands till 1313; Edinburgh, Roxburgh and Stirling were still holding out in 1314. During all this time the English king only once went north of the Border—in 1311—and then with a very small army, for Lancaster and his friends had refused to join his banner. Yet even under such conditions Bruce had to retire to the mountains, and to allow the invaders to range unopposed through Lothian and Fife, and even beyond the Tay. With ordinary capacity and perseverance Edward II. might have mastered his enemy; indeed the Comyns and Umfravilles and other loyalist barons of Scotland would have carried out the business for him, if only he had given them adequate support. But he spent what small energy he possessed in a wretched strife of chicanery and broken promises with Thomas of Lancaster and his party, dismissing and recalling Gaveston according to the exigencies of the moment, while he let the Scottish war shift for itself. It must be confessed that the conduct of his adversaries was almost as contemptible and unpatriotic. They refused to aid in the war, as if it was the king's private affair and not that of the nation. And repeatedly, when they had Edward at their mercy and might have dictated what terms they pleased to him, they failed to rise to the situation. This was especially the case in 1311, when the king had completely submitted in face of their armed demonstrations. Instead of introducing any general scheme of reform they contented themselves with putting him under the tutelage of twenty-one "lords ordainers," a baronial committee like that which had been appointed by the Provisions of Oxford, fifty years back. Edward was not to levy an army, appoint an official, raise a tax, or quit the realm without their leave. He had also to swear an obedience to a long string of constitutional limitations of his power, and to promise to remove many practical grievances of administration. But there were two great faults in the proceedings of Thomas of Lancaster and his friends. The first was that they ignored the rights of the commons—save indeed that they got their ordinances confirmed by parliament—and put all power into the hands of a council which represented nothing but the baronial interest. The second, and more fatal, was that this council of "ordainers," when installed in office, showed energy in nothing save in persecuting the friends of Edward and Gaveston; it neglected the general welfare of the realm, and in particular made no effort whatever to end the Scottish war. It was clearly their duty either to make peace with Robert Bruce, or to exert themselves to crush him; but they would do neither.

The "Lords Ordainers."

Battle of Bannockburn.

Gaveston's unhappy career came to an end in 1312. After he had been twice exiled, and had been twice recalled by the king, he was besieged in Scarborough and captured by the earl of Pembroke. He was being conducted to London to be tried in parliament, when his two greatest enemies, Thomas of Lancaster and Guy, earl of Warwick, took him out of the hands of his escort, and beheaded him by the wayside without any legal authority or justification. The unhappy king was compelled to promise to forget and forgive this offence, and was then restored to a certain amount of freedom and power; the barons believed that when freed from the influence of Gaveston he would prove a less unsatisfactory sovereign. The experiment did not turn out happily. Bruce having at last made an almost complete end of the English garrisons within his realm, laid siege to Stirling, the last and strongest of them all, in the spring of 1313. Compelled by the pressure of public opinion to attempt its relief, Edward crossed the border in June 1314, with an army of 20,000 foot and 4000 men-at-arms. He found Bruce prepared to dispute his advance on the hillside of Bannockburn, 2 m. in front of Stirling, in a strong position with a stream in front and his flanks covered by rows of pitfalls, dug to discomfit the English cavalry. The Scots, as at Falkirk, were ranged in solid clumps of pikemen above the burn, with only a small reserve of horse. The English king, forgetting his father's experiences, endeavoured to ride down the enemy by headlong frontal charges of his men-at-arms, and made practically no attempt to use his archery to advantage. After several attacks had been beaten off with heavy loss, the English host recoiled in disorder and broke up—the king, who had kept in the rear all day, was one of the first to move off. The flower of his knights had fallen, including his nephew, the earl of Gloucester, who was the only one of the great magnates of the realm who had shown loyalty to him during the last six years. The Scots also made many prisoners; the disaster was complete, and the wrecks of the beaten army dispersed before reaching the border. Bruce followed them up, and spent the autumn in ravaging Northumberland and Cumberland.

Thomas, earl of Lancaster.

Thomas of Lancaster, who had refused to join in the late campaign, took advantage of its results to place the king once more in complete tutelage. His household was dismissed, he was bidden to live as best he could on an allowance of £10 a day, and all his ministers and officials were changed. For more than three years Lancaster practically reigned in his cousin's name; it was soon found that the realm got no profit thereby, for Earl Thomas, though neither so apathetic nor so frivolous as Edward, was not a whit more competent to conduct either war or domestic administration. The Scots swept everything before them, ravaging the north at their will, and capturing Berwick. They even made a great expedition to Ireland, where Bruce's brother Edward was proclaimed king by the rebellious Celtic septs, and rode across the whole island, exterminating the Anglo-Irish population in many districts (1315–1317). But the colonists rallied, and cut to pieces a great Irish army at Athenry (1316), while in the next year Roger Mortimer, a hard-handed baron of the Welsh march, crossed with reinforcements and drove back Edward Bruce into the north. Resuming his advance after a space, the rebel king was routed and slain at Dundalk (Oct. 14, 1318) and the insurrection died out. But it had had the permanent result of weakening the king's grip on the north and west of Ireland, where the Englishry had been almost exterminated. From this time forth until the reign of Henry VIII. the limit of the country in full subjection to the crown was always shrinking, and the Irish chiefs of the inland continued to pay less and less attention to orders issued from Dublin or London.

Though the Scottish expedition to Ireland had been beaten off, this was not in the least to be ascribed to the credit of Lancaster, who was showing the grossest incompetence as an administrator. He could neither protect the Border, nor even prevent private civil wars from breaking out, not only on the Welsh marches (where they had always been common), but even in the heart of England. The most extraordinary symptom of the time was a civic revolt at Bristol (1316), where the townsfolk expelled the royal judges, and actually stood a siege before they would submit. Such revolts of great towns were normal in Germany or Italy, but almost unknown on this side of the Channel. All this unrest might well be ascribed to Lancaster's want of ability, but he had also to bear—with less justice—the discontent caused by two years of famine and pestilence. In August 1318 he was removed from power by a league formed by Pembroke, Warenne, Arundel and others of the lords ordainers, who put a new council in power, and showed themselves somewhat less hostile to the king than Earl Thomas had been. Edward was allowed to raise an army for the siege of Berwick, and was lying before its walls, when the Scots, turning his flank, made a fierce foray into Yorkshire, and routed the shire-levy under Archbishop Melton at the battle of Myton. This so disheartened the king and the council that controlled him that they concluded a two years truce with Robert of Scotland, thus for the first time acknowledging him as a regular enemy and no mere rebel (1319).

The Despensers.

The time of comparative quiet that followed was utilized by the king in an attempt to win back some of his lost authority. For a short space Edward showed more capacity and energy than he had ever been supposed to possess. Probably this was due entirely to the fact that he had come under the influence of two able men who had won his confidence and had promised him revenge for the murdered Gaveston. These were the two Hugh Despensers, father and son; the elder was an ambitious baron who hated Lancaster, the younger had been made Edward's chamberlain in 1318 and had become his secret councillor and constant companion. Finding that the king was ready to back them in all their enterprises, the Despensers resolved to take the fearful risk of snatching at supreme power by using their master's name to oust the barons who were now directing affairs from their position. The task was the more easy because Lancaster was at open discord with the men who had supplanted him, so that the baronial party was divided; while the mishaps of the last six years had convinced the nation that other rulers could be as incompetent and as unlucky as the king. Indeed, there was a decided reaction in Edward's favour, since Lancaster and his friends had been tried and found wanting. Moreover, the Despensers felt that they had a great advantage over Gaveston in that they were native-born barons of ancient ancestry and good estate: the younger Hugh, indeed, through his marriage with the sister of the earl of Gloucester who fell at Bannockburn, was one of the greatest landowners on the Welsh border: they could not be styled upstarts or adventurers. Edward's growing confidence in the Despensers at last provoked the notice and jealousy of the dominant party. The barons brought up many armed retainers to the parliament of 1321, and forced the king to dismiss and to condemn them to exile. But their discomfiture was only to last a few months; in the following October a wanton outrage and assault on the person and retinue of Edward's queen, Isabella of France, by the retainers of Lord Badlesmere, one of Pembroke's associates, provoked universal reprobation. The king made it an excuse for gathering an army to besiege Badlesmere's castle at Leeds; he took it and hanged the garrison. He then declared the Despensers pardoned, and invited them to return to England. On this Thomas of Lancaster and the more resolute of his associates took arms, but the majority both of the baronage and of the commons remained quiescent, public opinion being rather with than against the king. The rebels displayed great indecision, and Lancaster proved such a bad general that he was finally driven into the north and beaten at the battle of Boroughbridge (March 16, 1322), where his chief associate, the earl of Hereford, was slain. Next day he surrendered, with the wreck of his host. But the king, who showed himself unexpectedly vindictive, beheaded him at once; three other peers, Badlesmere, Clifford and Mowbray, were subsequently executed, with a score of knights.

Execution of Lancaster.

Such severity was most impolitic, and Lancaster was ere long hailed as a saint and a martyr. But for the moment the king seemed triumphant; he called a parliament which revoked the "ordinances" of 1311, and replaced the Despensers in power. For the remaining four years of his reign they were omnipotent; but able and unscrupulous as they were, they could not solve the problem of successful governance. To their misfortune the Scottish war once more recommenced, King Robert having refused to continue the truce. The fortune of Edward II. now hung on the chance that he might be able to maintain the struggle with success; he raised a large army and invaded Lothian, but Bruce refused a pitched battle, and drove him off with loss by devastating the countryside around him. Thereupon Edward, to the deep humiliation of the people, sued for another cessation of hostilities, and obtained it by conceding all that Robert asked, save the formal acknowledgment of his kingly title. But peace did not suffice to end Edward's troubles; he dropped back into his usual apathy, and the Despensers showed themselves so harsh and greedy that the general indignation only required a new leader in order to take once more the form of open insurrection. The end came in an unexpected fashion. Edward had quarrelled with his wife Isabella, who complained that he made her the "handmaid of the Despensers," and excluded her from her proper place and honour. Yet in 1325 he was unwise enough to send her over to France on an embassy to her brother Charles IV., and to allow his eldest son Edward, prince of Wales, to follow her to Paris. Having the boy in her power, and being surrounded by the exiles of Lancaster's faction, she set herself to plot against her husband, and opened up communications with the discontented in England. It was in vain that Edward besought her to return and to restore him his son; she came back at last, but at the head of an army commanded by Roger, Lord Mortimer, the most prominent survivor of the party of Earl Thomas, with whom she had formed an adulterous connexion which they for some time succeeded in keeping secret.

Rebellion of Queen Isabella and Mortimer.

Deposition and murder of Edward II.

When she landed with her son in Essex in September 1326, she was at once joined by Henry of Lancaster, the heir of Earl Thomas, and most of the baronage of the eastern counties. Even the king's half-brother, the earl of Norfolk, rallied to her banner. Edward and the Despensers, after trying in vain to raise an army, fled into the west. They were all caught by their pursuers; the two Despensers were executed—the one at Bristol, the other at Hereford. Several more of Edward's scanty band of friends—the earl of Arundel and the bishop of Exeter and others—were also slain. Their unhappy master was forced to abdicate on the 20th of January 1327, his fourteen-year old son being proclaimed king in his stead. He was allowed to survive in close prison some eight months longer, but when his robust constitution defied all attempts to kill him by privations, he was murdered by the orders of the queen and Mortimer at Berkeley Castle on the 21st of September.

Regency of Isabella and Mortimer.

The three years regency of Isabella, during the minority of Edward III., formed a disgraceful episode in the history of England. She was as much the tool of Mortimer as her husband had been the tool of the Despensers, and their relations became gradually evident to the whole nation. All posts of dignity and emolument were kept for their personal adherents, and a new and formidable dignity was conferred on Mortimer himself, when he was made both justiciar of the principality of Wales, and also earl of March, in which lay both his own broad lands and the estates of Despenser and Arundel, which he had shamelessly appropriated. It is surprising that the adulterous pair succeeded in maintaining themselves in power for so long, since the ignominy of the situation was evident. They were even able to quell the first attempt at a reaction, by seizing and beheading Edmund, earl of Kent, the late king's half-brother, who was betrayed while organizing a plot for their destruction. The one politic act of Mortimer's administration, the conclusion of a permanent peace with Scotland by acknowledging Bruce as king (1328), was not one which made him more popular. The people called it "the shameful peace of Northampton," and firmly believed that he had been bribed by the Scots.

Edward III.

Yet Isabella and her paramour held on to power for two years after the peace, and were only overthrown by a blow from an unexpected quarter. When the young king had reached the age of eighteen he began to understand the disgraceful nature of his own situation. Having secured promise of aid from Henry of Lancaster, his cousin, and other barons, he executed a *coup de main*, and seized Mortimer in his chamber at midnight. The queen was also put under guard till a parliament could be called. It met, and at the king's demand passed sentence on the earl for the murder of Edward II. and other crimes. He was hanged at Tyburn (Nov. 1330); the queen suffered nothing worse than complete exclusion from power, and lived for more than twenty years in retirement on the manors of her dowry.

Edward III., who thus commenced his reign ere he was out of his boyhood, was, as might have been foretold from his prompt action against Mortimer, a prince of great vigour and enterprise. He showed none of his father's weakness and much of his grandfather's capacity. He fell short of Edward I. in steadiness of character and organizing power, but possessed all his military capacity and his love of work. Unfortunately for England his ambition was to be the mirror of chivalry rather than a model administrator. He took up and abandoned great enterprises with equal levity; he was reckless in the spending of money; and in times of trouble he was careless of constitutional precedent, and apt to push his prerogative to extremes. Yet like Edward I. he was popular with his subjects, who pardoned him much in consideration of his knightly virtues, his courage, his ready courtesy and his love of adventure. In most respects he was a perfect exponent of the ideals and foibles of his age, and when he broke a promise or repudiated a debt he was but displaying the less satisfactory side of the habitual morality of the 14th century the chivalry of which was often deficient in the less showy virtues. With all his faults Edward during his prime was a capable and vigorous ruler; and it was not without reason that not England only but all western Europe looked up to him as the greatest king of his generation.

Edward III. invades Scotland.

His early years were specially fortunate, as his rule contrasted in the most favourable way with that of his infamous mother and his contemptible father. The ministers whom he substituted for the creatures of Mortimer were capable, if not talented administrators. He did much to restore the internal peace of the realm, and put down the local disorders which had been endemic for the last twenty years. Moreover, when the war with Scotland recommenced he gave the English a taste of victory such as they had not enjoyed since Falkirk. Robert Bruce was now dead and his throne was occupied by the young David II., whose factious nobles were occupied in civil strife when, in 1332, a pretender made a snatch at the Scottish throne. This was Edward, the son of John Baliol, an adventurous baron who collected all the "disinherited" Scots lords, the members of the old English faction who had been expelled by Bruce, and invaded the realm at their head. He beat the regent Mar at the battle of Dupplin, seized Perth and Edinburgh, and crowned himself at Scone. But knowing that his seat was precarious he did homage to the English king, and made him all the promises that his father had given to Edward I. The temptation was too great for the young king to refuse; he accepted the homage, and offered the aid of his arms. It was soon required, for Baliol was ere long expelled from Scotland. Edward won the battle of Halidon Hill (July 19, 1333)—where he displayed considerable tactical skill—captured Berwick, and reconquered a considerable portion of Scotland for his vassal. Unfortunately for himself he made the mistake of requiring too much from Baliol—forcing him to cede Lothian, Tweeddale and the larger part of Galloway, and to promise a tribute. These terms so irritated the Scots, who had shown signs of submission up to this moment, that they refused to accept the pretender, and kept up a long guerilla warfare which ended in his final expulsion. But the fighting was all on Scottish ground, and Edward repeatedly made incursions, showy if not effective, into the very heart of the northern realm; on one occasion he reached Inverness unopposed. He held Perth till 1339, Edinburgh till 1341, and was actually in possession of much Scottish territory when his attention was called off from this minor war to the greater question of the struggle with France. Meanwhile he had acquired no small military reputation, had collected a large body of professional soldiers whose experience was to be invaluable to him in the continental war, and had taught his army the new tactics which were to win Creçy and Poitiers. For the devices employed against the Scottish "schiltrons" of pikemen at Dupplin and Halidon, were the same as those which won all the great battles of the Hundred Years' War—the combination of archery, not with cavalry (the old system of Hastings and Falkirk), but with dismounted men-at-arms. The nation, meanwhile prosperous, not vexed by overmuch taxation, and proud of its young king, was ready and willing to follow him into any adventure that he might indicate.

IV. The Hundred Years' War (1337–1453)

Causes of the Hundred Years' War.

Wars between England and France had been many, since William the Conqueror first linked their fortunes together by adding his English kingdom to his Norman duchy. They were bound to recur as long as the kings who ruled on this side of the Channel were possessed of continental dominions, which lay as near, or nearer, to their hearts than their insular realm. While the kingdom of France was weak, monarchs like Henry II. and Richard I. might dream of extending their transmarine possessions to the detriment of their suzerain at Paris. When France had grown strong, under Philip Augustus, the house of Plantagenet still retained a broad territory in Gascony and Guienne, and the house of Capet could not but covet the possession of the largest surviving feudal appanage which marred the solidarity of their kingdom. There had been a long interval of peace in the 13th century, because Henry III. of England was weak, and Louis IX. of France an idealist, much more set on forwarding the welfare of Christendom than the expansion of France. But the inevitable struggle had recommenced with the accession of the unscrupulous Philip IV. Its cause was simple; France was incomplete as long as the English king ruled at Bordeaux and Bayonne, and far up the valleys of the Garonne and the Adour. From 1293 onward Philip and his sons had been striving to make an end of the power of the Plantagenets in Aquitaine, sometimes by the simple argument of war, more frequently by the insidious process of encroaching on ducal rights, summoning litigants to Paris, and encouraging local magnates and cities alike to play off their allegiance to their suzerain against that to their immediate lord. Both in the time of Edward II. and in that of his son active violence had several times been called in to aid legal chicanery. Fortunately for the duke of Guienne the majority of his subjects had no desire to become Frenchmen; the Gascons felt no national sympathy with their neighbours of the north, and the towns in especial were linked to England by close ties of commerce, and had no wish whatever to break off their allegiance to the house of Plantagenet. The English rule, if often weak, had never proved tyrannical, and they had a great dread of French taxes and French officialism. But there were always individuals, more numerous among the noblesse than among the citizens, whose private interests impelled them to seek the aid of France.

The root of the Hundred Years' War, now just about to commence, must be sought in the affairs of Guienne, and not in any of the other causes which complicated and obscured the outbreak of hostilities. These, however, were sufficiently important in themselves. The most obvious was the aid which Philip VI. had given to the exiled David Bruce, when he was driven out of Scotland by Edward and his ally Baliol. The English king replied by welcoming and harbouring Robert of Artois, a cousin whom Philip VI. had expelled from France. He also made alliances with several of the dukes and counts of the Netherlands, and with the emperor Louis the Bavarian, obviously with the intention of raising trouble for France on her northern and eastern frontiers.

Beginning of the war.

It was Philip, however, who actually began the war, by declaring Guienne and the other continental dominions of Edward III. forfeited to the French crown, and sending out a fleet which ravaged the south coast of England in 1337. In return Edward raised a claim to the throne of France, not that he had any serious intention of pressing it —for throughout his reign he always showed himself ready to barter it away in return for sufficient territorial gains—but because such a claim was in several ways a useful asset to him both in war and in diplomacy. It was first turned to account when the Flemings, who had scruples about opposing their liege lord the king of France, found it convenient to discover that, since Edward was the real king and not Philip, their allegiance was due in the same direction whither their commercial interests drew them. Led by the great demagogue dictator, Jacob van Artevelde, they became the mainstay of the English party in the Netherlands.

Edward III. and the French crown.

Edward's claim—such as it was—rested on the assertion that his mother, Isabella, was nearer of kin to her brother Charles IV., the last king of the main line of the house of Capet, than was Charles's cousin Philip of Valois. The French lawyers ruled that heiresses could not succeed to the crown themselves, but Edward pleaded that they could nevertheless transmit their right to their sons. He found it convenient to forget that the elder brother of Charles IV., King Louis X., had left a daughter, whose son, the king of Navarre, had on this theory a title preferable to his own. This prince, he said, had not been born at the time of his grandfather's death, and so lost any rights that might have passed to him had he been alive at that time. A far more fatal bar to Edward's claim than the existence of Charles of Navarre was the fact that the peers of France, when summoned to decide the succession question nine years before, had decided that Philip of Valois had the sole valid claim to the crown, and that Edward had then done homage to him for Guienne. If he pleaded that in 1328 he had been the mere tool of his mother and Mortimer, he could be reminded of the unfortunate fact that in 1331, after he had crushed Mortimer, and taken the power into his own hands, he had deliberately renewed his oath to King Philip.

Edward's claim to the French crown embittered the strife in a most unnecessary fashion. It was an appeal to every discontented French vassal to become a traitor under a plausible show of loyalty, and from first to last many such persons utilized it. It also gave Edward an excuse for treating every loyal Frenchman as guilty of treason, and, to his shame, he did not always refrain from employing such a discreditable device. Yet, as has been already said, he showed his consciousness of the fallacy of his claim by offering to barter it again and again during the course of the war for land or money. But he finally passed on the wretched fiction as a heritage of his descendants, to cause untold woes in the 15th century. It is seldom in the world's history that a hollow legal device such as this has had such long enduring and deplorable results.

Battle of Sluys.

In the commencement of his continental war Edward took little profit either from his assumption of the French royal title, or from the lengthy list of princes of the Low Countries whom he enrolled beneath his banner. His two land-campaigns of 1339 and 1340 led to no victories or conquests, but cost enormous sums of money. The Netherland allies brought large contingents and took high pay from the king, but they showed neither energy nor enthusiasm in his cause. When Philip of Valois refused battle in the open, and confined his operations to defending fortified towns, or stockading himself in entranched camps, the allies drifted off, leaving the king with his English troops in force too small to accomplish anything. The sole achievement of the early years of the war which was of any profit to Edward or his realm was the great naval triumph of Sluys (June 24, 1340), which gave the English the command of the sea for the next twenty years. The French king had built or hired an enormous fleet, and with it threatened to invade England. Seeing that he could do nothing on land while his communications with the Low Countries were endangered by the existence of this armada, Edward levied every ship that was to be found, and brought the enemy to action in the Flemish harbour of Sluys. After a day of desperate hand to hand fighting—for the vessels grappled and the whole matter was settled by boarding—the French fleet was annihilated. Henceforth England was safe from coast raids, could conduct her commerce with Flanders without danger, and could strike without difficulty at any point of the French littoral. But it was not for some years that Edward utilized the advantage that Sluys had given him. As long as he persevered in the attempt to conduct the invasion of the northern frontier of France he achieved nothing.

Financial crisis. Trial of Archbishop Stratford.

Such schemes were finally abandoned simply because the king discovered that his allies were worthless and that his money was all spent. On his return from Flanders in 1340 he became involved in an angry controversy with his ministers, whom he accused, quite unjustly, of wasting his revenue and wrecking his campaign thereby. He imprisoned some of them, and wished to try his late chancellor, Archbishop Stratford, for embezzlement, in the court of the exchequer. But the primate contended very vigorously for the right to be tried before his peers, and since the king could get no subsidies from his parliament till he acknowledged the justice of this claim, he was forced to concede it. Stratford was acquitted—the king's thriftlessness and not the chancellor's maladministration had emptied the treasury. Edward drifted on along the path to financial ruin till he actually went bankrupt in 1345, when he repudiated his debts, and ruined several great Italian banking houses, who had been unwise enough to continue lending him money to the last. The Flemings were also hard hit by this collapse of the king's credit, and very naturally lost their enthusiasm for the English alliance. Van Artevelde, its chief advocate, was murdered by his own townsmen in this same year.

War in Brittany.

The second act of the Hundred Years' War, after King Edward had abandoned in despair his idea of invading France from the side of the Netherlands, was fought out in another quarter—the duchy of Brittany. Here a war of succession had broken out in which (oddly enough) Edward took up the cause of the pretender who had male descent, while Philip supported the one who represented a female line—each thus backing the theory of heritage by which his rival claimed the throne of France. By espousing the cause of John of Montfort Edward obtained a good foothold on the flank of France, for many of the Breton fortresses were put into his hands. But he failed to win any decisive advantage thereby over King Philip. It was not till 1346, when he adopted the new policy of trusting nothing to allies, and striking at the heart of France with a purely English army, that Edward found the fortune of war turning in his favour.

Edward invades France.

Battle of Creçy.

Capture of Calais.

In this year he landed in Normandy, where the English banner had not been seen since the days of King John, and executed a destructive raid through the duchy, and up the Seine, till he almost reached the gates of Paris. This brought out the king of France against him, with a mighty host, before which Edward retreated northward, apparently intending to retire to Flanders. But after crossing the Somme he halted at Creçy, near Abbeville, and offered battle to the pursuing enemy. He fought relying on the tactics which had been tried against the Scots at Dupplin and Halidon Hill, drawing up his army with masses of dismounted men-at-arms flanked on either side by archery. This array proved as effective against the disorderly charges of the French noblesse as it had been against the heavy columns of the Scottish pikemen. Fourteen times the squadrons of King Philip came back to the charge; but mowed down by the arrow-shower, they seldom could get to handstrokes with the English knights, and at last rode off the field in disorder. This astonishing victory over fourfold numbers was no mere chivalrous feat of arms, it had the solid result of giving the victors a foothold in northern France. For Edward took his army to beleaguer Calais, and after blockading it for nearly a year forced it to surrender. King Philip, after his experience at Creçy, refused to fight again in order to raise the siege. From henceforth the English possessed a secure landing-place in northern France, at the most convenient point possible, immediately opposite Dover. They held it for over two hundred years, to their own inestimable advantage in every recurring war.

Battle of Neville's Cross.

The years 1345–1347 saw the zenith of King Edward's prosperity; in them fell not only his own triumphs at Creçy and Calais, but a victory at Auberoche in Périgord won by his cousin Henry of Lancaster, which restored many long-lost regions of Guienne to the English suzerainty (Oct. 21, 1345), and another and more famous battle in the far north. At Neville's Cross, near Durham, the lords of the Border defeated and captured David Bruce, king of Scotland (Oct. 17, 1346). The loss of their king and the destruction of a fine army took the heart out of the resistance of the Scots, who for many years to come could give their French allies little assistance.

Truce with France.

The Black Death.

In 1347 Edward made a short truce with King Philip: even after his late victories he felt his strength much strained, his treasury being empty, and his army exhausted by the year-long siege of Calais. But he would have returned to the struggle without delay had it not been for the dreadful calamity of the "Black Death," which fell upon France and England, as upon all Europe, in the years 1348–1349. The disease, on which the 14th century bestowed this name, was the bubonic plague, still familiar in the East. After devastating western Asia, it reached the Mediterranean ports of Europe in 1347, and spread across the continent in a few months. It was said that in France, Italy and England a third of the population perished, and though this estimate may be somewhat exaggerated, local records of unimpeachable accuracy show that it cannot be very far from the truth. The bishop's registers of the diocese of Norwich show that many parishes had three and some four successive vicars admitted in eighteen months. In the manor rolls it is not uncommon to find whole families swept away, so that no heir can be detected to their holdings. Among the monastic orders, whose crowded common life seems to have been particularly favourable to the spread of the plague, there were cases where a whole community, from the abbot down to the novices, perished. The upper classes are said to have suffered less than the poor; but the king's daughter Joan and two archbishops of Canterbury were among the victims. The long continuance of the visitation, which as a rule took six or nine months to work out its virulence in any particular spot, seems to have cowed and demoralized society. Though it first spread from the ports of Bristol and Weymouth in the summer of 1348, it had not finished its destruction in northern England till 1350, and only spread into Scotland in the summer of that year.

Economic and social effects of the Black Death.

When the worst of the plague was over, and panic had died down, it was found that the social conditions of England had been considerably affected by the visitation. The condition of the realm had been stable and prosperous during the earlier years of Edward III., the drain on its resources caused by heavy war-taxation having been more than compensated by the increased wealth that arose from growing commerce and developing industries. The victory of Sluys, which gave England the command of the seas, had been a great landmark in the economic no less than in the naval history of this island. But the basis of society was shaken by the Black Death; the kingdom was still essentially an agricultural community, worked on the manorial system; and the sudden disappearance of a third of the labouring hands by which that system had been maintained threw everything into disorder. The landowners found thousands of the crofts on which their villeins had been wont to dwell vacant, and could not fill them with new tenants. Even if they exacted the full rigour of service from the survivors, they could not get their broad demesne lands properly tilled. The landless labourers, who might have been hired to supply the deficiency, were so reduced in numbers that they could command, if free competition prevailed, double and triple rates of payment, compared with their earnings in the days before the plague. Hence there arose, almost at once, a bitter strife between the lords of manors and the labouring class, both landholding and landless. The lords wished to exact all possible services from the former, and to pay only the old two or three pence a day to the latter. The villeins, as hard hit as their masters, resented the tightening of old duties, which in some cases had already been commuted for small money rents during the prosperous years preceding the plague. The landless men formed combinations, disputed with the landlords, and asked and often got twice as much as the old rates, despite of the murmurings of the employer.

The Statute of Labourers.

After a short experience of these difficulties the king and council, whose sympathies were naturally with the landholders, issued an ordinance forbidding workmen of any kind to demand more than they had been wont to receive before 1348. This was followed up by the famous Statute of Labourers of 1351, which fixed rates for all wages practically identical with those of the times before the Black Death. Those workmen who refused to accept them were to be imprisoned, while employers who went behind the backs of their fellows and secretly paid higher sums were to be punished by heavy fines. Later additions to the statute were devised to terrorize the labourer, by adding stripes and branding to his punishment, if he still remained recalcitrant or absconded. And landowners were empowered to seize all vagrant able-bodied men, and to compel them to work at the statutory wages. As some compensation for the low pay of the workmen, parliament tried to bring down the price of commodities to their former level, for (like labour) all manufactured articles had gone up immensely in value.

Thirty years of friction followed, while the parliament and the ruling classes tried in a spasmodic way to enforce the statute, and the peasantry strove to evade it. It proved impossible to carry out the scheme; the labourers were too many and too cunning to be crushed. If driven over hard they absconded to the towns, where hands were needed as much as in the countryside, or migrated to districts where the statute was laxly administered. Gradually the landowners discovered that the only practical way out of their difficulties was to give up the old custom of working the manorial demesne by the forced labour of their villeins, and to cut it up into farms which were rented out to free tenants, and cultivated by them. In the course of two generations the "farmers" who paid rent for these holdings became more and more numerous, and demesne land tilled by villein-service grew more and more rare. But enough old-fashioned landlords remained to keep up the struggle with the peasants to the end of the 14th century and beyond, and the number of times that the Statute of Labourers was re-enacted and recast was enormous. Nevertheless the struggle turned gradually to the advantage of the labourer, and ended in the creation of the sturdy and prosperous farming yeomanry who were the strength of the realm for several centuries to come.

Renewal of the war with France.

Battle of Poitiers.

One immediate consequence of the "Black Death" was the renewal of the truce between England and France by repeated agreements which lasted from 1347 to 1355. During this interval Philip of France died, in 1350, and was succeeded by his son John. The war did not entirely cease, but became local and spasmodic. In Brittany the factions which supported the two claimants to the ducal title were so embittered that they never laid down their arms. In 1351 the French noblesse of Picardy, apparently without their master's knowledge or consent, made an attempt to surprise Calais, which was beaten off with some difficulty by King Edward in person. There was also constant bickering on the borders of Guienne. But the main forces on both sides were not brought into action till the series of truces ran out in 1355. From that time onward the English took the offensive with great vigour. Edward, prince of Wales, ravaged Languedoc as far as the Mediterranean, while his younger brother John of Gaunt, duke of Lancaster, executed a less ambitious raid in Picardy and Artois. In the south this campaign marked real progress, not mere objectless plunder, for it was followed by the reconquest of great districts in Périgord and the Agenais, which had been lost to England since the 13th century. A similar double invasion of France led to even greater results in the following year, 1356. While Lancaster landed in Normandy, and with the aid of local rebels occupied the greater part of the peninsula of the Côtentin, the prince of Wales accomplished greater things on the borders of Aquitaine. After executing a great circular sweep through Périgord, Limousin and Berry, he was returning to Bordeaux laden with plunder, when he was intercepted by the king of France near Poitiers. The battle that followed was the most astonishing of all the English victories during the Hundred Years' War. The odds against the prince were far heavier than those of Creçy, but by taking up a strong position and using the national tactics which combined the use of archery and dismounted men-at-arms, the younger Edward not merely beat off his assailants in a long defensive fight, but finally charged out upon them, scattered them, and took King John prisoner (Sept. 19, 1356).

The English ravage France.

Peace of Brétigny.

This fortunate capture put an enormous advantage in the hands of the English; for John, a facile and selfish prince, was ready to buy his freedom by almost any concessions. He signed two successive treaties which gave such advantageous terms to Edward III. that the dauphin Charles, who was acting as regent, and the French states-general refused to confirm them. This drove the English king to put still further pressure on the enemy; in 1359 he led out from Calais the largest English army that had been seen during the war, devastated all northern France as far as Reims and the borders of Burgundy, and then—continuing the campaign through the heart of the winter—presented himself before the gates of Paris and ravaged the Île de France. This brought the regent Charles and his counsellors to the verge of despair; they yielded, and on the 8th of May 1360, signed an agreement at Brétigny near Chartres, by which nearly all King Edward's demands were granted. These preliminaries were ratified by the definitive peace of Calais (Oct. 24, 1360), which brought the first stage of the Hundred Years' War to an end.

By this treaty King Edward formally gave up his claim to the French throne, which he had always intended to use merely as an asset for barter, and was to receive in return not only a sum of 3,000,000 gold crowns for King John's personal ransom, but an immense cession of territory which—in southern France at least—almost restored the old boundaries of the time of Henry II. The duchy of Aquitaine was reconstructed, so as to include not only the lands that Edward had inherited, and his recent conquests, but all Poitou, Limousin, Angoumois, Quercy, Rouergue and Saintonge—a full half of France south of the Loire. This vast duchy the English king bestowed not long after on his son Edward, the victor of Poitiers, who reigned there as a vassal-sovereign, owing homage to England but administering his possessions in his own right. In northern France, Calais and the county of Guînes, and also the isolated county of Ponthieu, the inheritance of the wife of Edward I., were ceded to the English crown. All these regions, it must be noted, were to be held for the future free of any homage or acknowledgment of allegiance to an overlord, "in perpetuity, and in the manner in which the kings of France had held them." There was to be an end to the power of the courts of Paris to harass the duke of Aquitaine, by using the rights of the suzerain to interfere with the vassal's subjects. It was hoped that for the future the insidious legal warfare which had been used with such effect by the French kings would be effectually prevented.

Submission of David of Scotland.

To complete the picture of the triumph of Edward III. at this, the culminating point of his reign, it must be mentioned that some time before the peace of Calais he had made terms with Scotland. David Bruce was to cede Roxburgh and Berwick, but to keep the rest of his dominions on condition of paying a ransom of 100,000 marks. This sum could never be raised, and Edward always had it in his power to bring pressure to bear on the king of Scots by demanding the instalments, which were always in arrear. David gave no further trouble; indeed he became so friendly to England that he offered to proclaim Lionel of Clarence, Edward's second son, as his heir, and would have done so but for the vigorous opposition of his parliament.

Economic progress in England.

The English people had expected that a sort of Golden Age would follow the conclusion of the peace with Scotland and France. Freed from the war-taxes which had vexed them for the last twenty years, they would be able to repair the ravages of the Black Death, and to develop the commercial advantages which had been won at Sluys, and secured by the dominion of the seas which they had held ever since. In some respects this expectation was not deceived; the years that followed 1360 seem to have been prosperous at home, despite the continued friction arising from the Statute of Labourers. The towns would seem to have fared better than the countryside, partly indeed at its expense, for the discontented peasantry migrated in large numbers to the centres of population where newly-developed manufactures were calling for more hands. The weaving industry, introduced into the eastern counties by the king's invitation to Flemish settlers, was making England something more than a mere producer of raw material for export. The seaports soon recovered from their losses in the Black Death, and English shipping was beginning to appear in the distant seas of Portugal and the Baltic. Nothing illustrates the growth of English wealth better than the fact that the kingdom had, till the time of Edward III., contrived to conduct all its commerce with a currency of small silver, but that within thirty years of his introduction of a gold coinage in 1343, the English "noble" was being struck in enormous quantities. It invaded all the markets of western Europe, and became the prototype of the gold issues of the Netherlands, Scotland, and even parts of Germany. It is in the latter years of Edward III. that we find the first forerunners of that class of English merchant princes who were to be such a marked feature in the succeeding reigns. The Poles of Hull, whose descendants rose in three generations to ducal rank, were the earliest specimens of their class. The poet Chaucer may serve as a humbler example of the rise of the burgher class—the son of a vintner, he became the father of a knight, and the ancestor, through female descents, of many baronial families. The second half of the 14th century is the first period in English history in which we can detect a distinct rise in the importance of the commercial as opposed to the landed interest. The latter, hard hit by the manorial difficulties that followed the plague of 1348–1349, found their rents stationary or even diminishing, while the price of the commodities from which the former made their wealth had permanently risen. As to intellectual vigour, the age that produced two minds of such marked originality in different spheres as Wycliffe and Chaucer must not be despised, even if it failed to carry out all the promise of the 13th century.

English rule in France.

For a few years after the peace of 1360 the political influence of Edward III. in western Europe seemed to be supreme. France, prostrated by the results of the English raids, by peasant revolts, and municipal and baronial turbulence, did not begin to recover strength till the thriftless king John had died (1364) and had been succeeded by his capable if unchivalrous son Charles V. Yet the state of the English dominions on the continent was not satisfactory; in building up the vast duchy of Aquitaine Edward had made a radical mistake. Instead of contenting himself with creating a homogeneous Gascon state, which might have grown together into a solid unit, he had annexed broad regions which had been for a century and a half united to France, and had been entirely assimilated to her. From the first Poitou, Quercy, Rouergue and the Limousin chafed beneath the English yoke; the noblesse in especial found the comparatively orderly and constitutional governance to which they were subjected most intolerable. They waited for the first opportunity to revolt, and meanwhile murmured against every act of their duke, the prince of Wales, though he did his best to behave as a gracious sovereign.

The Black Prince in Spain.

The younger Edward ended by losing his health and his wealth in an unnecessary war beyond the Pyrenees. He was persuaded by the exiled Peter the Cruel, king of Castile, to restore him to the throne which he had forfeited by his misgovernment. In 1367 he gathered a great army, entered Castile, defeated the usurper Henry of Trastamara at the battle of Najera, and restored his ally. But Peter, when once re-established as king, forgot his obligations and left the prince burdened with the whole expense of the campaign. Edward left Spain with a discontented and unpaid army, and had himself contracted the seeds of a disease which was to leave him an invalid for the rest of his life. To pay his debts he was obliged to resort to heavy taxation in Aquitaine, which gave his discontented subjects in Poitou and the other outlying districts an excuse for the rebellion that they had been for some time meditating. In 1368 his greatest vassals, the counts of Armagnac, Périgord and Comminges, displayed their disloyalty by appealing to the king of France as their suzerain against the legality of Edward's imposts. The French overlordship had been formally abolished by the treaty of 1360, so this appeal amounted to open rebellion. And when Charles V. accepted it, and cited Edward to appear before his parlement to answer the complaints of the counts, he was challenging England to renewed war. He found a preposterous excuse for repudiating the treaty by which he was bound, by declaring that some details had been omitted in its formal ratification.

Renewal of the war with France.

The Hundred Years' War, therefore, broke out again in 1369, after an interval of nine years. Edward III. assumed once more the title of king of France, while Charles V., in the usual style, declared that the whole duchy of Aquitaine had been forfeited for treason and rebellion on the part of its present holder. The second period of war, which was to last till the death of the English king, and for some years after, was destined to prove wholly disastrous to England. All the conditions had changed since 1360. Edward, though only in his fifty-seventh year, was entering into a premature and decrepit old age, in which he became the prey of unworthy favourites, male and female. The men of the 14th century, who commanded armies and executed *coups d'état* at eighteen, were often worn out by sixty. The guidance of the war should have fallen into the hands of his eldest son, the victor of Poitiers and Najera, but the younger Edward had never recovered from the fatigues of his Spanish campaign; his disease having developed into a form of dropsy, he had become a confirmed invalid and could no longer take the field. The charge of the military operations of the English armies had passed to John of Gaunt, duke of Lancaster, the king's younger son, a prince far inferior in capacity to his father and brother. Though not destitute of good impulses Lancaster was hasty, improvident and obstinate; he was unfortunate in his choice of friends, for he allied himself to all his father's unscrupulous dependents. He was destitute of military skill, and wrecked army after army by attempting hard tasks at inappropriate times and by mistaken methods. Despite of all checks and disasters he remained active, self-confident and ambitious, and, since he had acquired a complete control over his father, he had ample opportunity to mismanage the political and military affairs of England.

Character of the war.

Lancaster's strategy, in the early years of the renewed war, consisted mainly of attempts to wear down the force of France by devastating raids; he hoped to provoke the enemy to battle by striking at the heart of his realm, but never achieved his purpose. Warned by the disasters of Creçy and Poitiers, Charles V. and his great captain Bertrand du Guesclin would never commit themselves to an engagement in the open field. They let the English invaders pass by, garrisoning the towns but abandoning the countryside. Since Lancaster, in his great circular raids, had never the leisure to sit down to a siege—generally a matter of long months in the 14th century—he repeatedly crossed France leaving a train of ruined villages behind him, but having accomplished nothing else save the exhaustion of his own army. For the French always followed him at a cautious distance, cutting off his stragglers, and restricting the area of his ravages by keeping flying columns all around his path. But while the duke was executing useless marches across France, the outlying lands of Aquitaine were falling away, one after the other, to the enemy. The limit of the territory which still remained loyal was ever shrinking, and what was once lost was hardly ever regained. Almost the only reconquest made was that of the city of Limoges, which was stormed in September 1370 by the troops of the Black Prince, who rose from his sick-bed to strike his last blow at the rebels. His success did almost as much harm as good to his cause, for the deliberate sack of the city was carried out with such ruthless severity that it roused wild wrath rather than terror in the neighbouring regions. Next spring the prince returned to England, feeling himself physically unable to administer or defend his duchy any longer.

English reverses.

The greater part of Poitou, Quercy and Rouergue had been lost, and the English cause was everywhere losing ground, when a new danger was developed. Since Sluys the enemy had never disputed the command of the seas; but in 1372 a Spanish fleet joined the French, and destroyed off La Rochelle a squadron which was bringing reinforcements for Guienne. The disaster was the direct result of the campaign of Najera—for Henry of Trastamara, who had long since dethroned and slain his brother Peter the Cruel, remained a consistent foe of England. From this date onward Franco-Spanish fleets were perpetually to be met not only in the Bay of Biscay but in the Channel; they made the voyage to Bordeaux unsafe, and often executed descents on the shores of Kent, Sussex, Devon and Cornwall. It was to no effect that, in the year after the battle of La Rochelle, Lancaster carried out the last, the most expensive, and the most fruitless of his great raids across France. He marched from Calais to Bordeaux, inflicted great misery on Picardy, Champagne and Berry, and left half his army dead by the way.

This did not prevent Bertrand du Guesclin from expelling from his dominions John of Brittany, the one ally whom King Edward possessed in France, or from pursuing a consistent career of petty conquest in the heart of Aquitaine. By 1374 little was left of the great possessions which the English had held beyond the Channel save Calais, and the coast slip from Bordeaux to Bayonne, which formed the only loyal part of the duchy of Guienne. Next year King Edward sued for peace—he failed to obtain it, finding the French terms too hard for acceptance—

but a truce at least was signed at Bruges (Jan. 1375) which endured till a few weeks before his death.

Domestic strife.

Agitation against the Church.

Wycliffe.

These two last years of Edward's reign were filled with an episode of domestic strife, which had considerable constitutional importance. The nation ascribed the series of disasters which had filled the space from 1369 to 1375 entirely to the maladministration of Lancaster and the king's favourites, failing to see that it was largely due to the mere fact that England was not strong enough to hold down Aquitaine, when France was administered by a capable king and served by a great general. Hence there arose, both in and out of parliament, a violent agitation for the removal of Lancaster from power, and the punishment of the favourites, who were believed, with complete justification, to be misusing the royal name for their own private profit. Among the leaders of this agitation were the clerical ministers whom John of Gaunt had expelled from office in 1371, and chiefly William of Wykeham, bishop of Winchester, the late chancellor; they were helped by Edmund Mortimer, earl of March, a personal enemy of Lancaster, and could count on the assistance of the prince of Wales when he was well enough to take a part in politics. The greater part of the House of Commons was on their side, and on the whole they may be regarded as the party of constitutional protest against maladministration. But there was another movement on foot at the same time, which cut across this political agitation in the most bewildering fashion. Protests against the corruption of the Church and the interference of the papacy in national affairs had always been rife in England. At this moment they were more prevalent than ever, largely in consequence of the way in which the popes at Avignon had made themselves the allies and tools of the kings of France. The Statutes of Praemunire and Provisors had been passed a few years before (1351–1365) to check papal pretensions. There was a strong anti-clerical party, whose practical aim was to fill the coffers of the state by large measures of disendowment and confiscations of Church property. The intellectual head of this party at the time was John Wycliffe, a famous Oxford teacher, and for some time master of Balliol College. In his lectures and sermons he was always laying stress on the unsatisfactory state of the national church and the infamous corruption of the papacy. The doctrine which first made him famous, and commended him to all members of the anti-clerical faction, was that unworthy holders of spiritual endowments ought to be dispossessed of them, because "dominion" should depend on "grace." Churchmen, small and great, as he held, had been corrupted, because they had fallen away from the early Christian idea of apostolic poverty. Instead of discharging their proper functions, bishops and abbots had become statesmen or wealthy barons, and took no interest in anything save politics. The monasteries, with their vast possessions, had become corporations of landlords, instead of associations for prayer and good works. The papacy, with its secular ambitions, and its insatiable greed for money, was the worst abuse of all. A bad pope, and most popes were bad, was the true Antichrist, since he was always overruling the divine law of the scriptures by his human ordinances. Every man, as Wycliffe taught—using the feudal analogies of contemporary society—is God's tenant-in-chief, directly responsible for his acts to his overlord; the pope is always thrusting himself in between, like a mesne-tenant, and destroying the touch between God and man by his interference. Sometimes his commands are merely presumptuous; sometimes—as when, for example, he preaches crusades against Christians for purely secular reasons—they are the most horrible form of blasphemy. Wycliffe at a later period of his life developed views on doctrinal matters, not connected with his original thesis about the relations between Church and State, and foreshadowed most of the leading tenets of the reformers of the 16th century. But in 1376–1377 he was known merely as the outspoken critic of the "Caesarean clergy" and the papacy. He had a following of enthusiastic disciples at Oxford, and scattered adherents both among the burghers and the knighthood, the nucleus of the party that afterwards became famous as the Lollards. But they had not yet differentiated themselves from the body of those who were merely anti-clerical, without being committed to any theories of religious reform.

John of Gaunt and Wycliffe.

Since Wycliffe was, above all things, the enemy of the political clergy of high estate, and since those clergy were precisely the leaders of the attack upon John of Gaunt, it came to pass that hatred of a common foe drew the duke and the doctor together for a space. There was a strange alliance between the advocate of clerical reform, and the practical exponent of secular misgovernment. The only point on which they were agreed was that it would be highly desirable to strip the Church of most of her endowments, in order to fill the exchequer of the state. Lancaster hoped to use Wycliffe as his mouthpiece against his enemies; Wycliffe hoped to see Lancaster disendowing bishops and monasteries and defying the pope. Hence the attempt of the political bishops to get Wycliffe condemned as a heretic became inextricably mixed with the attempt of the constitutional party, to which the bishops belonged, to evict the duke from his position of first councillor to the king and director of the policy of the realm.

The "Good Parliament."

Overthrow of the king's favourites.

Constitutional reforms.

The struggle began in the parliament of 1376, called by the anti-Lancastrian party the "Good Parliament." Headed by the earl of March, William Courtenay, bishop of London, and Sir Peter de la Mare, the daring speaker of the House of Commons, the duke's enemies began their campaign by accusing the king's ministers and favourites of corruption. Here they were on safe ground, for the misdeeds of Lord Latimer—the king's chamberlain, Lord Neville—his steward, Richard Lyons—his financial agent, and Alice Perrers—his greedy and shameless mistress, had been so flagrant that it was hard for Lancaster to defend them. In face of the evidence brought forward the old king and his son had to abandon their friends to the angry parliament. Latimer and Lyons were condemned to imprisonment and forfeiture of their goods, Alice Perrers was banished from court. Encouraged by this victory, the parliament passed on to constitutional reforms, forced on the king a council of twelve peers nominated by themselves, who were to exercise over him much the same control that the lords ordainers had held over his father, and compelled him to assent to a long list of petitions which, if properly carried out, would have removed most of the practical grievances of the nation. Having so done they dispersed, not guessing that Lancester had yielded so easily because he was set on undoing their work the moment that they were gone.

John of Gaunt re-establishes the royal power.

Death of the Black Prince.

This, however, was the case; after the shortest of intervals the duke executed something like a *coup d'état*. In his father's name he released Latimer and Lyons, dismissed the council of twelve, imprisoned Peter de la Mare, sequestrated the temporalities of Bishop Wykeham, and sent the earl of March out of the realm. Alice Perrers took possession again of the king, and all his corrupt courtiers came back to him. A royal edict declared the statutes of the "Good Parliament" null and void. Lancaster would never have dared to defy public opinion and challenge the constitutional party to a life-and-death struggle in this fashion, had it not been that his brother the prince of Wales had died while the "Good Parliament" was sitting; thus the opposition had been deprived of their strongest support. The prince's heir was a mere child, Richard of Bordeaux, aged only nine. It was feared by some that Duke John might carry his ambitions so far as to aim at the throne—he could do what he pleased with his doting father, and flaws might have been picked in the marriage of the Black Prince and his wife Joan of Kent, who were cousins, and therefore within the "prohibited degrees." As a matter of fact Lancaster was a more honest man than his enemies suspected; he hastened to acknowledge his little nephew's rights, acknowledged him as prince of Wales, and introduced him as his grandfather's heir before the parliament of January 1377.

The character of this body was a proof of the great strength of the royal name and power even in days when parliamentary institutions had been long in existence, and were supposed to act as a check on the crown. To legalize his arbitrary acts Duke John dared to summon the estates together, after he had issued stringent orders to the sheriffs to exclude his enemies and return his friends when the members for the Commons were chosen. He obtained a house of the complexion that he desired, and having a strong following among the peers actually succeeded in undoing all the work of 1376. No sign of trouble or rebellion followed, the opposition being destitute of a fighting leader. March had left the realm; Bishop Wykeham showed an unworthy subservience by suing for pardon through the mediation of Alice Perrers. Only Bishop Courtenay refused to be terrorized; he chose this moment to open a campaign against the duke's ally, John Wycliffe, who was arraigned for heresy before the ecclesiastical courts. His trial, however, ended in a scandalous fiasco. Lancaster and his friend Lord Percy came to St Paul's, and so insulted and browbeat the bishop, that the proceedings degenerated into a riot, and reached no conclusion (Feb. 19). Courtenay dared not recommence them, and Lancaster ruled as he pleased till his father, five months later, died. Deserted by his worthless courtiers and plundered on his deathbed by his greedy mistress, the victor of Sluys and Creçy sank into an unhonoured grave. It was a relief to the nation that he was gone. Yet there was a general feeling that chaos might follow. If Lancaster should justify the malevolent rumours that were afloat by making a snatch at the crown, the last state of the realm might be worse than the first.

Death of Edward III.

Duke John, however, was a better man than his enemies supposed. He was loyal to the crown according to his lights, and showed a chivalrous self-denial that had hardly been expected from him. He saluted his little nephew as king without a moment's hesitation, though he was aware that with the commencement of a new reign his own dictatorship had come to an end. The princess of Wales, in whose hands the young Richard II. was placed, had never been his friend, and was surrounded by adherents of her deceased husband, who belonged to the constitutional party. Disarmed, however, by the duke's frank submission they wisely resolved not to push him to extremes, and the first council which was appointed to act for the new monarch was a sort of "coalition ministry" in which Lancaster's followers as well as his foes were represented. For that very reason it was lacking in strength and unity of purpose, and proved lamentably incapable of dealing with the problems of the moment.

Richard II.

Of these the most pressing was the renewal of the French war; the truce had expired a few weeks before the death of Edward III., and the new reign began with a series of military disasters. The French fleet landed in great force in Sussex, burnt Rye and Hastings and routed the shire levies. Simultaneously the seneschal of Aquitaine was defeated in battle, and Bergerac, the last great town in the inland which remained in English hands, was captured by the duke of Anjou.

The French war.

The first parliament of Richard II. met in October under the most gloomy auspices. It showed its temper by taking up the work of the "Good Parliament." Lancaster's adherents were turned out of the council; the persons condemned in 1376 were declared incapable of serving in it; Alice Perrers was sentenced to banishment and forfeiture, and the little king was made to repudiate the declaration whereby his uncle had quashed the statutes of 1376 by declaring that "no act of parliament can be repealed save with parliament's consent." John of Gaunt bowed before the storm, retired to his estates, and for some time took little part in affairs of state.

First parliament of Richard. Reforms.

Unfortunately the new government proved wholly unable either to conduct the struggle with France successfully or to pluck up courage to make a humiliating peace—the only wise course before them. The nation was too proud to accept defeat, and persevered in the unhappy attempt to reverse the fortunes of war. An almost unbroken series of petty disasters marked the first three years of King Richard. The worst was the failure of the last great devastating raid which the English launched against France. Thomas of Woodstock, the youngest son of Edward III., took a powerful army to Calais, and marched through Picardy and Champagne, past Orleans, and finally to Rennes in Brittany, but accomplished nothing save the ruin of his own troops and the wasting of a vast sum of money. Meanwhile taxation was heavy, the whole nation was seething with discontent, and—what was worst—no way was visible out of the miserable situation; ministers and councillors were repeatedly displaced, but their successors always proved equally incompetent to find a remedy.

This period of murmuring and misery culminated in the Great Revolt of 1381, a phenomenon whose origins must be sought in the most complicated causes, but whose outbreak was due in the main to a general feeling that the realm was being misgoverned, and that some one must be made responsible for its maladministration. It was actually provoked by the unwise and unjust poll-tax of one shilling a head on all adult persons, voted by the parliament of Northampton in November 1380. The last poll-tax had been carefully graduated on a sliding scale so as to press lightly on the poorest classes; in this one a shilling for each person had to be exacted from every township, though it was provided that "the strong should help the weak" to a certain extent. But in hundreds of villages there were no "strong" residents, and the poorest cottager had to pay his three groats. The peasantry defended themselves by the simple device of understating the numbers of their families; the returns made it appear that the adult population of England had gone down from 1,355,000 to 896,000 since the poll-tax of 1379. Thereupon the government sent out commissioners to revise the returns and exact the missing shillings. Their appearance led to a series of widespread and preconcerted riots, which soon spread over all England from the Wash to the Channel, and in a few days developed into a formidable rebellion. The poll-tax was no more than the spark which fired the mine; it merely provided a good general grievance on which all malcontents could unite. In the districts which took arms two main causes of insurrection may be differentiated; the first and the most widespread was the discontent of the rural population with the landowners and the Statute of Labourers. Their aim was to abolish all villein-service, and to wring from their lords the commutation of all manorial customs and obligations for a small rent—fourpence an acre was generally the sum suggested. But there was a simultaneous outbreak in many urban districts. In Winchester, London, St Albans, Canterbury, Bury, Beverley, Scarborough and many other places the rioting was as violent as in the countryside. Here the object of the insurgents was in most cases to break down the local oligarchy, who engrossed all municipal office and oppressed the meaner citizens; but in less numerous instances their end was to win charters from lords (almost always ecclesiastical lords) who had hitherto refused to grant them. But it must not be forgotten that there was also a tinge of purely political discontent about the rising; the insurgents everywhere proclaimed their intention to destroy "traitors," of whom the most generally condemned were the chancellor, Archbishop Sudbury, and the treasurer, Sir Robert Hailes, the two persons most responsible for the levy of the poll-tax. Often the rebels added the name of John of Gaunt to the list, looking upon him as the person ultimately responsible for the mismanagement of the war and the misgovernment of the realm. It must be added that though the leaders of the revolt were for the most part local demagogues, the creatures of the moment, there were among them a few fanatics like the "mad priest of Kent," John Ball, who had long preached socialist doctrines from the old text:

The Great Revolt of 1381.

"When Adam delved and Eve span
Who was then the gentleman?"

and clamoured for the abolition of all differences of rank, status and property. Though many clerics were found among the rebels, it does not seem that any of them were Wycliffites, or that the reformer's teaching had played any part in exciting the peasantry at this time. No contemporary authority ascribes the rising to the Lollards.

Wat Tyler.

The riots had begun, almost simultaneously in Kent and Essex: from thence they spread through East Anglia and the home counties. In the west and north there were only isolated and sporadic outbreaks, confined to a few turbulent towns. In the countryside the insurrection was accompanied by wholesale burnings of manor-rolls, the hunting down of unpopular bailiffs and landlords, and a special crusade against the commissioners of the poll-tax and the justices who had been enforcing the Statute of Labourers. There was more arson and blackmailing than murder, though some prominent persons perished, such as the judge, Sir John Cavendish, and the prior of Bury. In many regions the rising was purely disorderly and destitute of organization. This was not, however, the case in Kent and London. The mob which had gathered at Maidstone and Canterbury marched on the capital many thousands strong, headed by a local demagogue named Wat Tyler, whom they had chosen as their captain; his most prominent lieutenant was the preacher John Ball. They announced their intention of executing all "traitors," seizing the person of the king, and setting up a new government for the realm. The royal council and ministers showed grievous incapacity and cowardice—they made no attempt to raise an army, and opened negotiations with the rebels. While these were in progress the malcontent party in London, headed by three aldermen, opened the gates of the city to Tyler and his horde. They poured in, and, joined by the London mob, sacked John of Gaunt's palace of the Savoy, the Temple, and many other buildings, while the ministers took refuge with the young king in the Tower. It was well known that not only the capital and the neighbouring counties but all eastern England was ablaze, and the council in despair sent out the young king to parley with Tyler at Mile End. The rebels at first demanded no more than that Richard should declare villeinage abolished, and that all feudal dues and services should be commuted for a rent of fourpence an acre. This was readily conceded, and charters were drawn up to that effect and sealed by the king. But, while the meeting was still going on, Tyler went off to the Tower with a part of his horde, entered the fortress unopposed, and murdered the unhappy chancellor, Archbishop Sudbury, the treasurer, and several victims more. This was only the beginning of massacre. Instead of dispersing with their charters, as did many of the peasants, Tyler and his confederates ran riot through London, burning houses and slaying lawyers, officials, foreign merchants and other unpopular persons. This had the effect of frightening the propertied classes in the city, who had hitherto observed a timid neutrality, and turned public opinion against the insurgents. Next day the rebel leaders again invited the king to a conference, in the open space of Smithfield, and laid before him a programme very different from that propounded at Mile End. Tyler demanded that all differences of rank and status should cease, that all church lands should be confiscated and divided up among the laity, that the game laws should be abolished, and that "no lord should any longer hold lordship except civilly." Apparently he was set on provoking a refusal, and thus getting an excuse for seizing the person of the king. But matters went otherwise than he had expected; when he waxed unmannerly, and unsheathed his dagger to strike one of the royal retinue who had dared to answer him back, the mayor of London, William Walworth, drew his cutlass and cut him down. The mob strung their bows, and were about to shoot down the king and his suite. But Richard—who showed astounding nerve and presence of mind for a lad of fourteen—cantered up to them shouting that he would be their chief and captain and would give them their rights. The conference was continued, but, while it was in progress, the mayor brought up the whole civic militia of London, who had taken arms when they saw that the triumph of the rebels meant anarchy, and rescued the king out of the hands of the mob. Seeing such a formidable body of armed men opposed to them, the insurgents dispersed—without their reckless and ready-witted captain they were helpless (June 15, 1381).

Suppression of the rising.

This was the turning-point of the rebellion; within a few days the council had collected a considerable army, which marched through Essex scattering such rebel bands as still held together. Kent was pacified at the same time; and Henry Despenser, the warlike bishop of Norwich, made a separate campaign against the East Anglian insurgents, defeating them at the skirmish of North Walsham, and hanging the local leader Geoffrey Lister, who had declared himself "king of the commons" (June 25, 1381). After this there was nothing remaining save to punish the leaders of the revolt; a good many scores of them were hanged, though the vengeance exacted does not seem to have been greater than was justified by the numerous murders and burnings of which they had been guilty; the fanatic Ball was, of course, among the first to suffer. On the 30th of August the rough methods of martial law were suspended, and on the 14th of December the king issued an amnesty to all save certain leaders who had hitherto escaped capture. A parliament had been called in November; it voted that all the charters given by the king at Mile End were null and void, no manumissions or grants of privileges could have been valid without the consent of the estates of the realm, "and for their own parts they would never consent to such, of their own free will nor otherwise, even to save themselves from sudden death."

Decline of the manorial system.

The rebellion, therefore, had failed either to abolish villeinage in the countryside or to end municipal oligarchy in the towns, and many lords took the opportunity of the time of reaction in order to revindicate old claims over their bondsmen. Nevertheless serfdom continued to decline all through the latter years of the 14th century, and was growing obsolete in the 15th. This, however, was the result not of the great revolt of 1381, but of economic causes working out their inevitable progress. The manorial system was already doomed, and the rent-paying tenant farmers, who had begun to appear after the Black Death, gradually superseded the villeins as the normal type of peasantry during the two generations that followed the outbreak that is generally known as "Wat Tyler's rebellion."

Wycliffe and the Lollards.

King Richard, though he had shown such courage and ready resources at Smithfield, was still only a lad of fourteen. For three years more he was under the control of tutors and governors appointed by his council. Their rule was incompetent, but the chief danger to the realm had passed away when both Charles V. of France and his great captain Du Guesclin died in 1380. The new king at Paris was a young boy, whose councils were swayed by a knot of quarrelsome and selfish uncles; the vigour of the attack on England began to slacken. Nevertheless there was no change in the fortune of war, which continued to be disastrous, if on a smaller scale than before. The chief domestic event of the time was the attack of the clerical party on Wycliffe and his followers. The reformer had begun to develop dogmatic views, in addition to his old theories about the relations of Church and State. When he proceeded to deny the doctrine of transubstantiation, to assert the all-sufficiency of the Scriptures as a rule of life, to denounce saint-worship, pilgrimages, and indulgences, and to declare the pope to be Antichrist, he frightened his old supporter John of Gaunt and the politicians of the anti-clerical clique. They ceased to support him, and his followers became a sect rather than a political party. He and his disciples were expelled from Oxford, and ere long the bishops began to arrest and try them for heresy. Wycliffe himself, strange to say, was not molested. He survived to publish his translation of the Bible and to die in peace in December 1383. But his followers were being hunted, and imprisoned or forced to recant, all through the later years of Richard II. Yet they continued to multiply, and exercised at times considerable influence; though they had few supporters among the baronage, yet among the lesser gentry and still more among the burgher class and in the universities they were strong. It was not till the next reign, when the bishops succeeded in calling in the crown to their aid, and passed the statute *De heretico comburendo*, that Lollardy ceased to flourish.

Richard's personal rule.

Impeachment of the king's "favourites."

The "lords appellant."

Execution of the king's friends.

King Richard meanwhile had grown to man's estate, and had resolved to take the reins of power into his own hands. He was wayward, high-spirited and self-confident. He wished to restore the royal powers which had slipped into the hands of the council and parliament during his minority, and had small doubts of his capacity to restore it. His chosen instruments were two men whom his enemies called his "favourites," though it was absurd to apply the name either to an elderly statesman like Michael de la Pole, who was made chancellor in 1384, or to Robert de Vere, earl of Oxford, a young noble of the oldest lineage, who was the king's other confidant. Neither of them was an upstart, and both, the one from his experience and the other from his high station, were persons who might legitimately aspire to a place among the advisers of the king. But Richard was tactless; he openly flouted his two uncles, John of Gaunt and Thomas of Woodstock, and took no pains to conciliate either the baronage or the commons. His autocratic airs and his ostentatious preference for his confidants—of whom he made the one earl of Suffolk and the other marquess of Dublin—provoked both lords and commons. Pole was impeached on a groundless charge of corruption and condemned, but Richard at once pardoned him and restored him to favour. De Vere was banished to Ireland, but at his master's desire omitted to leave the realm. The contemptuous disregard for the will of parliament which the king displayed brought on him a worse fate than he deserved. His youngest uncle, Thomas of Woodstock, duke of Gloucester, was a designing and ambitious prince who saw his own advantage in embittering the strife between Richard and his parliament. John of Gaunt having departed to Spain, where he was stirring up civil strife in the name of his wife, the heiress of Peter the Cruel, Gloucester put himself at the head of the opposition. Playing the part of the demagogue, and exaggerating all his nephew's petulant acts and sayings, he declared the constitution in danger, and took arms at the head of a party of peers, the earls of Warwick, Arundel and Nottingham, and Henry, earl of Derby, the son of John of Gaunt, who called themselves the lords appellant, because they were ready to "appeal" Richard's councillors of treason. Public opinion was against the king, and the small army which his confidant De Vere raised under the royal banner was easily scattered by Gloucester's forces at the rout of Radcot Bridge (Dec. 20, 1387). Oxford and Suffolk succeeded in escaping to France, but the king and the rest of his adherents fell into the hands of the lords appellant. They threatened for a moment to depose him, but finally placed him under the control of a council and ministers chosen by themselves, and to put him in a proper state of terror, executed Lord Beauchamp, the judge, Sir Robert Tressilian, and six or seven more of his chief friends. This was a piece of gratuitous cruelty, for the king, though wayward and unwise, had done nothing to justify such treatment.

Richard rules constitutionally.

Peace with France.

To the surprise of the nation Richard took his humiliation quietly. But he was merely biding his time; he had sworn revenge in his heart, but he was ready to wait long for it. For the next nine years he appeared an unexceptionable sovereign, anxious only to conciliate the nation and parliament. He got rid of the ministers imposed upon him by the lords appellant, but replaced them by Bishop Wykeham and other old statesmen against whom no objection could be raised. He disarmed Gloucester by making a close alliance with his elder uncle John of Gaunt, who had been absent in Spain during the troubles of 1387–1388, and was displeased at the violent doings of his brother. His rule was mild and moderate, and he succeeded at last in freeing himself from the incubus of the French war—the source of most of the evils of the time, for it was the heavy taxation required to feed this struggle which embittered all the domestic politics of the realm. After two long truces, which filled the years 1390–1395, a definitive peace was at last concluded, by which the English king kept Calais and the coast-strip of Guienne, from Bordeaux to Bayonne, which had never been lost to the enemy. To confirm the peace, he married Isabella, the young daughter of Charles VI. (Nov. 1396); he had lost his first wife, the excellent Anne of Bohemia, two years before.

Richard reduces Ireland to obedience.

His revenge on Gloucester and the lords appellant.

Banishment of Bolingbroke and Norfolk.

The king seemed firmly seated on his throne—so much so that in 1395 he had found leisure for a long expedition to Ireland, which none of his ancestors had visited since King John. He compelled all the native princes to do him homage, and exercised the royal authority in such a firm manner as had never before been known in the island. But those who looked forward to quiet and prosperous times both for Ireland and for England were destined to be undeceived. In 1397 Richard carried out an extraordinary and unexpected *coup d'état*, which he had evidently premeditated for many years. Having lived down his unpopularity, and made himself many powerful friends, he resolved to take his long-deferred revenge on Gloucester and the other lords appellant. He trumped up a vain story that his uncle was once more conspiring against him, arrested him, and sent him over to Calais, where he was secretly murdered in prison. At the same time Gloucester's two chief confederates of 1387, the earls of Arundel and Warwick, were tried and sentenced to death: the former was actually executed, the latter imprisoned for life. The other two lords appellant, Mowbray, duke of Norfolk,[1] and Henry of Bolingbroke, the son of John of Gaunt, were dealt with a year later. Richard pretended to hold them among his best friends, but in 1398 induced Bolingbroke to accuse Norfolk of treasonable language. Mowbray denied it, and challenged his accuser to a judicial duel. When they were actually facing each other in the lists at Coventry, the king forbade them to fight, and announced that he banished them both—Henry for six years, Norfolk for life.

Arbitrary rule of Richard.

Having thus completed his vengeance on those who had slain his friends ten years before—their respective punishments were judiciously adapted to their several responsibilities in that matter—Richard began to behave in an arbitrary and unconstitutional fashion. He evidently thought that no one would dare to lift a hand against him after the examples that he had just made. This might have been so, if he had continued to rule as cautiously as during the time when he was nursing his scheme of revenge. But now his brain seemed to be turned by success—indeed his wild language at times seemed to argue that he was not wholly sane. He declared that all pardons issued since 1387 were invalid, and imposed heavy fines on persons, and even on whole shires, that had given the lords appellant aid. He made huge forced loans, and employed recklessly the abuse of purveyance. He browbeat the judges on the bench, and kept many persons under arrest for indefinite periods without a trial. But the act which provoked the nation most was that he terrified the parliament which met at Shrewsbury in 1398 into voting away its powers to a small committee of ten persons, all creatures of his own. This body he used as his instrument of government, treating its assent as equivalent to that of a whole parliament in session. There seemed to be an end to the constitutional liberties of England.

Second expedition to Ireland.

Such violence, however, speedily brought its own punishment. In 1399 Richard sailed over to Ireland to put down a revolt of the native princes, who had defeated and slain the earl of March, his cousin and their lord-lieutenant. While he was absent Henry of Bolingbroke landed at Ravenspur with a small body of exiles and mercenaries. He pretended that he had merely come to claim the estates and title of his father John of Gaunt, who had died a few months before. The adventurer was at once joined by the

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[1] The Nottingham of 1387, who had been promoted to the higher title.

Henry of Bolingbroke lands in England.

Flight of Richard.

Surrender and abdication of Richard.

earl of Northumberland and all the lords of the north; the army which was called out against him refused to fight, and joined his banner, and in a few days he was master of all England (July 1399). King Richard, hurrying back from Ireland, landed at Milford Haven just in time to learn that the levies raised in his name had dispersed or joined the enemy. He still had with him a considerable force, and might have tried the fortune of war with some prospect of success. But his conduct seemed dictated by absolute infatuation; he might have fought, or he might have fled to his father-in-law in France, if he judged his troops untrustworthy. Instead of taking either course, he deserted his army by night, and fled into the Welsh mountains, apparently with the intention of collecting fresh adherents from North Wales and Cheshire, the only regions where he was popular. But Bolingbroke had already seized Chester, and was marching against him at the head of such a large army that the countryside refused to stir. After skulking for three weeks in the hills, Richard surrendered to his cousin at Flint, on the 19th of August 1399, having previously stipulated that if he consented to abdicate his life should be spared, his adherents pardoned, and an honourable livelihood assured to him. This surrender put the crown to his career of folly. He should have known that Henry would never feel safe while he survived, and that no oaths could be trusted in such circumstances. At all costs he should have endeavoured to escape abroad, a course that was still in his power.

Accession of Henry IV.

Richard carried out his part of the bargain; he executed a deed of abdication in which he owned himself "insufficient and useless." It was read to a parliament summoned in his name on the 30th of September, and the throne was declared vacant. There was small doubt as to the personality of his successor; possession is nine points of the law, and Henry of Bolingbroke for the moment had the whole nation at his back. His hereditary title indeed was imperfect; though he was the eldest descendant of Edward III. in the male line after Richard, yet there was a whole family which stood between him and the crown. From Lionel of Clarence, the second son of Edward III. (John of Gaunt was only the third) descended the house of March, and the late king had proclaimed that Edmund of March would be his heir if he should die childless. Fortunately for Bolingbroke the young earl was only six years of age; not a voice was raised in his favour in parliament. When Henry stood forward and claimed the vacant throne by right of conquest and also by right of descent, no one gainsaid him. Lords and commons voted that they would have him for their king, and he was duly crowned on the 13th of October 1399. No faith was kept with the unhappy Richard; he was placed in close and secret confinement, and denied the ordinary comforts of life. Moreover the adherents for whose safety he had stipulated were at once impeached of treason.

Position of the new king.

Henry of Lancaster came to the throne, for all intents and purposes as an elective king; he had to depend for the future on his ability to conciliate and satisfy the baronage and the commons by his governance. For by his usurpation he had sanctioned the theory that kings can be deposed for incapacity and maladministration. If he himself should become unpopular, all the arguments that he had employed against Richard might be turned against himself. The prospect was not reassuring; his revenue was small, and parliament would certainly murmur if he tried to increase it. The late king was not without partisans and admirers. There was a considerable chance that the French king might declare war—nominally to avenge his son-in-law, really to win Calais and Bordeaux. Of the partisans who had placed Henry on the throne many were greedy, and some were wholly unreasonable. But he trusted to his tact and his energy, and cheerfully undertook the task of ruling as a constitutional king—the friend of the parliament that had placed him on the throne.

Rebellion of the earls.

Murder of Richard.

The problem proved more weary and exhausting than he had suspected. From the very first his reign was a time of war, foreign and domestic, of murmuring, and of humiliating shifts and devices. Henry commenced his career by granting the adherents of Richard II. their lives, after they had been first declared guilty of treason and had been deprived of the titles, lands and endowments given them by the late king. Their reply to this very modified show of mercy was to engage in a desperate conspiracy against him. If they had waited till his popularity had waned, they might have had some chance of success, but in anger and resentment they struck too soon. The earls of Kent and Huntingdon, close kinsmen of Richard on his mother's side, the earl of Salisbury—a noted Lollard—and the lords Despenser and Lumley took arms at midwinter (Jan. 4, 1400) and attempted to seize the king at Windsor. They captured the castle, but Henry escaped, raised the levies of London against them, and beat them into the west. Kent and Salisbury were slain at Cirencester, the others captured and executed with many of their followers. Their rebellion sealed the fate of the master in whose cause they had risen. Henry and his counsellors were determined that there should be no further use made of the name of the "lawful king," and Richard was deliberately murdered by privation—insufficient clothing, food and warmth—in his dungeon at Pontefract Castle (Feb. 17, 1400). It is impossible not to pity his fate. He had been wayward, unwise and occasionally revengeful; but his provocation had been great, and if few tyrants have used more violent and offensive language, few have committed such a small list of actual crimes. It was a curious commentary on Henry's policy, that Richard, even when dead, did not cease to give him trouble. Rumour got abroad, owing to the secrecy of his end, that he was not really dead, and an impostor long lived at the Scottish court who claimed to be the missing king, and was recognized as Richard by many malcontents who wished to be deceived.

Welsh rising under Owen Glendower.

The rising of the earls was only the first and the least dangerous of the trials of Henry IV. Only a few months after their death a rebellion of a far more formidable sort broke out in Wales—where Richard II. had been popular, and the house of March, his natural heirs, held large estates. The leader was a gentleman named Owen Glendower, who had the blood of the ancient kings of Gwynedd in his veins. Originally he had taken to the hills as a mere outlaw, in consequence of a quarrel with one of the marcher barons; but after many small successes he began to be recognized as a national leader by his countrymen, and proclaimed himself prince of Wales. The king marched against him in person in 1400 and 1401, but Glendower showed himself a master of guerrilla warfare; he refused battle, and defied pursuit in his mountains, till the stores of the English army were exhausted and Henry was forced to retire. His prestige as a general was shaken, and his treasury exhausted by these fruitless irregular campaigns.

Discontent of the commons.

Statute De heretico comburendo.

Meanwhile worse troubles were to come. The commons were beginning to murmur at the king's administration; they had obtained neither the peace nor the diminished taxation which they had been promised. Moreover, among some classes at least, he had won desperate hatred by his policy in matters of religion. One of his chief supporters in 1399 had been Archbishop Arundel, an old enemy of Richard II. and brother to the earl who had been beheaded in 1397. Arundel was determined to extirpate the Lollards, and used his influence on the king to induce him to frame and pass through parliament the detestable statute *De heretico comburendo*, which recognized death by burning at the stake as the penalty of heresy, and bound the civil authorities to arrest, hand over to the church courts, and receive back for execution, all contumacious Lollards. Henry himself does not seem to have been particularly enthusiastic for persecution, but in order to keep the church party on his side he was forced to sanction it. The burnings began with that of William Sawtré, a London vicar, on the 2nd of

March 1401; they continued intermittently throughout the reign. The victims were nearly all clergy or citizens; the king shrank from touching the Lollards of higher rank, and even employed in his service some who were notoriously tainted with heresy.

War with Scotland.

Battle of Homildon Hill.

Conspiracy of Northumberland with Glendower.

External troubles continued to multiply during Henry's earlier years. The Scots had declared war, and there was every sign that the French would soon follow suit, for the king's failure to crush Glendower had destroyed his reputation for capacity. The rebel achieved his greatest success in June 1402, when he surprised and routed the whole levy of the marcher lords at Bryn G'las, between Pilleth and Knighton, capturing (among many other prisoners) Sir Edmund Mortimer, the uncle and guardian of the young earl of March, whom all malcontents regarded as the rightful monarch of England. A few months after the king's fortune seemed to take a turn for the better, when the Scots were defeated at Homildon Hill by the earl of Northumberland and his son Henry Percy, the celebrated "Hotspur." But this victory was to be the prelude to new dangers: half the nobility of Scotland had been captured in the battle, and Northumberland intended to fill his coffers with their ransoms; but the king looked upon them as state prisoners and announced his intention of taking them out of the earl's hands. Northumberland was a greedy and unscrupulous Border chief, who regarded himself as entitled to exact whatever he chose from his master, because he had been the first to join him at his landing in 1399, and had lent him a consistent support ever since. He had been amply rewarded by grants of land and money, but was not yet satisfied. In indignation at the first refusal that he had met, the earl conspired with Glendower to raise rebellion in the name of the rightful heirs of King Richard, the house of March. The third party in the plot was Sir Edmund Mortimer, Glendower's captive, who was easily persuaded to join a movement for the aggrandizement of his own family. He married Owen's daughter, and became his trusted lieutenant. Northumberland also enlisted the services of his chief Scottish prisoner, the earl of Douglas, who promised him aid from beyond Tweed.

Insurrection in the north and west.

Defeat of the rebels at Shrewsbury.

In July 1403 came the crisis of King Henry's reign; while Glendower burst into South Wales, and overran the whole countryside as far as Cardiff and Carmarthen, the Percies raised their banner in the North. The old earl set himself to subdue Yorkshire; his son Hotspur and the earl of Douglas marched south and opened communication with the Welsh. All Cheshire, a district always faithful to the name of Richard II., rose in their favour, and they were joined by Hotspur's uncle, the earl of Worcester. They then advanced towards Shrewsbury, where they hoped that Glendower might meet them. But long ere the Welsh could appear, King Henry was on the spot; he brought the rebels to action at Hately Field, just outside the gates of Shrewsbury, and inflicted on them a complete defeat, in which his young son Henry of Monmouth first won his reputation as a fighting man. Hotspur was slain, Worcester taken and beheaded, Douglas desperately wounded (July 23, 1403). On receiving this disastrous news the earl of Northumberland sued for pardon; the king was unwise enough to grant it, merely punishing him by fining him and taking all his castles out of his hands.

War with France renewed.

Parliament assumes control of the finances.

By winning the battle of Shrewsbury Henry IV. had saved his crown, but his troubles were yet far from an end. The long-expected breach with France had at last come to pass; the duke of Orleans, without any declaration of war, had entered Guienne, while a French fleet attacked the south-west of England, and burnt Plymouth. Even more menacing to the king's prosperity was the news that another squadron had appeared off the coast of Wales, and landed stores and succours for Glendower, who had now conquered the whole principality save a few isolated fortresses. The drain of money to meet this combination of foreign war and domestic rebellion was more than the king's exchequer could meet. He was driven into unconstitutional ways of raising money, which recalled all the misdoings of his predecessor. Hence came a series of rancorous quarrels with his parliaments, which grew more disloyal and clamorous at every new session. The cry was raised that the taxes were heavy not because of the French or Welsh wars, but because Henry lavished his money on favourites and unworthy dependents. He was forced to bow before the storm, though the charge had small foundation: the greater part of his household was dismissed, and the war-taxes were paid not to his treasurer but to a financial committee appointed by parliament.

Rising of 1405 in the North.

It was not till 1405 that the worst of Henry's troubles came to an end. This year saw the last of the convulsions that threatened to overturn him,—a rising in the North headed by the old earl of Northumberland, by Richard Scrope, archbishop of York, and by Thomas Mowbray the earl marshal. It might have proved even more dangerous than the rebellion of 1403, if Henry's unscrupulous general Ralph, earl of Westmorland, had not lured Scrope and Mowbray to a conference, and then arrested them under circumstances of the vilest treachery. He handed them over to the king, who beheaded them both outside the gate of York, without any proper trial before their peers. Northumberland thereupon fled to Scotland without further fighting. He remained in exile till January 1408, when he made a final attempt to raise rebellion in the North, and was defeated and slain at the battle of Bramham Moor.

Suppression of the Welsh rising.

Long before this last-named fight Henry's fortunes had begun to mend. Glendower was at last checked by the untiring energy of the king's eldest son, Henry of Monmouth, who had been given charge of the Welsh war. Even when French aid was sent him, the rebel chief proved unable to maintain his grip on South Wales. He was beaten out of it in 1406, and Aberystwyth Castle, where his garrison made a desperate defence for two years, became the southern limit of his dominions. In the end of 1408 Prince Henry captured this place, and six weeks later Harlech, the greatest stronghold of the rebels, where Sir Edmund Mortimer, Owen's son-in-law and most trusted captain, held out till he died of starvation. From this time onwards the Welsh rebellion gradually died down, till Owen relapsed into the position from which he had started, that of a guerrilla chief maintaining a predatory warfare in the mountains. From 1409 onward he ceased to be a public danger to the realm, yet so great was his cunning and activity that he was never caught, and died still maintaining a hopeless rebellion so late as 1416.

End of the French and Scottish wars.

The French war died down about the same time that the Welsh rebellion became insignificant. Louis of Orleans, the head of the French war party, was murdered by his cousin John, duke of Burgundy, in November 1407, and after his death the French turned from the struggle with England to indulge in furious civil wars. Calais, Bordeaux and Bayonne still remained safe under the English banner. The Scottish war had ended even earlier. Prince James, the heir of Robert III., had been captured at sea in 1406. The duke of Albany, who became regent when Robert died, had no wish to see his nephew return, and concluded a corrupt agreement with the king of England, by which he undertook to keep Scotland out of the strife, if Henry would prevent the rightful heir from returning to claim his own.[1] Hence Albany and his son ruled at Edinburgh for seventeen years, while James was detained in an honourable captivity at Windsor.

Illness of the king. Faction in the court.

From 1408 till his death in 1413 Henry was freed from all the dangers which had beset his earlier years. But he got small enjoyment from the crown which no longer tottered on his brow. Soon after his execution of Archbishop Scrope he had been smitten with a painful disorder, which his enemies declared to be the punishment inflicted on him by heaven for the prelate's death. It grew gradually worse, and developed into what his contemporaries called leprosy—a loathsome skin disease accompanied by bouts of fever, which sometimes kept him bedridden for months at a time. From 1409 onwards he became a mere invalid, only able to assert himself in rare intervals of convalescence. The domestic politics of the realm during his last five years were nothing more than a struggle between two court factions who desired to use his name. The one was headed by his son Henry, prince of Wales, and his half-brothers John, Henry and Thomas Beaufort, the base-born but legitimized children of John of Gaunt. The other was under the direction of Archbishop Arundel, the king's earliest ally, who had already twice served him as chancellor, and had the whole church party at his back. Arundel was backed by Thomas duke of Clarence, the king's second son, who was an enemy of the Beauforts, and not on the best terms with his own elder brother, the prince of Wales. The fluctuating influence of each party with the king was marked by the passing of the chancellorship from Arundel to Henry Beaufort and back again during the five years of Henry's illness. The rivalry between them was purely personal; both were prepared to go on with the "Lancastrian experiment," the attempt to govern the realm in a constitutional fashion by an alliance between the king and the parliament; both were eager persecutors of the Lollards; both were eager to make profit for England by interfering in the civil wars of the Orleanists and Burgundians which were now devastating France.

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[1] Mr Andrew Lang takes a different view of the character of Albany and his attitude in this matter. See *Hist. of Scotland*, i. 289, and the article SCOTLAND: *History*.—ED.

Prince Hal.

The prince of Wales, it is clear, gave much umbrage to his father by his eagerness to direct the policy of the crown ere yet it had fallen to him by inheritance. The king suspected, and with good reason, that his son wished him to abdicate, and resented the idea. It seems that a plot with such an object was actually on foot, and that the younger Henry gave it up in a moment of better feeling, when he realized the evil impression that the unfilial act would make upon the nation. At this time the prince gave small promise of developing into the model monarch that he afterwards became. There was no doubt of his military ability, which had been fully demonstrated in the long Welsh wars, but he is reputed to have shown himself arrogant, contentious and over-given to loose-living. There were many, Archbishop Arundel among them, who looked forward with apprehension to his accession to the throne.

English expedition to France.

The two parties in the council of Henry IV. were agreed that it would be profitable to intervene in the wars of France, but they differed as to the side which offered the most advantages. Hence came action which seemed inconsistent, if not immoral; in 1411, under the prince's influence, an English contingent joined the Burgundians and helped them to raise the siege of Paris. In 1412, by Arundel's advice, a second army under the duke of Clarence crossed the Channel to co-operate with the Orleanists. But the French factions, wise for once, made peace at the time of Clarence's expedition, and paid him 210,000 gold crowns to leave the country! The only result of the two expeditions was to give the English soldiery a poor opinion of French military capacity, and a notion that money was easily to be got from the distracted realm beyond the narrow seas.

Accession of Henry V.

On the 20th of March 1413, King Henry's long illness at last reached a fatal issue, and his eldest son ascended the throne. The new king had everything in his favour; his father had borne the odium of usurpation and fought down the forces of anarchy. The memory of Richard II. had been forgotten; the young earl of March had grown up into the most harmless and unenterprising of men, and the nation seemed satisfied with the new dynasty, whose first sovereign had shown himself, under much provocation, the most moderate and accommodating of constitutional monarchs.

His character.

Henry V. on his accession bade farewell to the faults of his youth. He seems to have felt a genuine regret for the unfilial conduct which had vexed his father's last years, and showed a careful determination to turn over a new leaf and give his enemies no scope for criticism. From the first he showed a sober and grave bearing; he reconciled himself to all his enemies, gave up his youthful follies, and became a model king according to the ideas of his day. There is no doubt that he had a strong sense of moral responsibility, and that he was sincerely pious. But his piety inspired him to redouble the persecution of the unfortunate Lollards, whom his father had harried only in an intermittent fashion; and his sense of moral responsibility did not prevent him from taking the utmost advantage of the civil wars of his unhappy neighbours of France.

Persecution of the Lollards.

Rising under Oldcastle.

The first notable event of Henry's reign was his assault upon the Lollards. His father had spared their lay chiefs, and contented himself with burning preachers or tradesmen. Henry arrested John Oldcastle, Lord Cobham, their leading politician, and had him tried and condemned to the stake. But Oldcastle escaped from the Tower before the day fixed for his execution, and framed a wild plot for slaying or deposing his persecutor. He planned to gather the Lollards of London and the Home Counties under arms, and to seize the person of the king—a scheme as wild as the design of Guy Fawkes or the Fifth Monarchy Men in later generations, for the sectaries were not strong enough to coerce the whole nation. Henry received early notice of the plot, and nipped it in the bud, scattering Oldcastle's levies in St Giles' Fields (Jan. 10, 1414) and hanging most of his lieutenants. But their reckless leader escaped, and for three years led the life of an outlaw, till in 1417 he was finally captured, still in arms, and sent to the stake.

Henry V. and France.

This danger having passed, Henry set himself to take advantage of the troubles of France. He threatened to invade that realm unless the Orleans faction, who had for the moment possession of the person of the mad king Charles VI., should restore to him all that Edward III. had owned in 1360, with Anjou and Normandy in addition. The demand was absurd and exorbitant and was refused, though the French government offered him the hand of their king's daughter Catherine with a dowry of 800,000 crowns and the districts of Quercy and Périgord—sufficiently handsome terms. When he began to collect a fleet and an army, they added to the offer the Limousin and other regions; but Henry was determined to pick his quarrel, and declared war in an impudent and hypocritical manifesto, in which he declared that he was driven into strife against his will. The fact was that he had secured the promise of the neutrality or the co-operation of the Burgundian faction, and thought that he could crush the Orleanists with ease.

Henry invades France.

Battle of Agincourt.

He sailed for France in August 1415, with an army compact and well-equipped, but not very numerous. On the eve of his departure he detected and quelled a plot as wild and futile as that of Oldcastle. The conspirators were his cousin, Richard, earl of Cambridge, Lord Scrope, and Sir Thomas Grey, a kinsman of the Percies. They had planned to raise a rebellion in the name of the earl of March, in whose cause Wales and the North were to have been called to arms. But March himself refused to stir, and betrayed them to the king, who promptly beheaded them, and set sail five days later. He landed near the mouth of the Seine, and commenced his campaign by besieging and capturing Harfleur, which the Orleanists made no attempt to succour. But such a large number of his troops perished in the trenches by a pestilential disorder, that he found himself too weak to march on Paris, and took his way to Calais across Picardy, hoping, as it seems, to lure the French to battle by exposing his small army to attack. The plan was hazardous, for the Orleanists turned out in great numbers and almost cut him off in the marshes of the Somme. When he had struggled across them, and was half-way to Calais, the enemy beset him in the fields of Agincourt (Oct. 25, 1415). Here Henry vindicated his military reputation by winning a victory even more surprising than those of Creçy, and Poitiers, for he was outnumbered in an even greater proportion than the two Edwards had been in 1346 and 1356,

Effect of the battle.

and had to take the offensive instead of being attacked in a strong position. The heavily armoured French noblesse, embogged in miry meadows, proved helpless before the lightly equipped English archery. The slaughter in their ranks was terrible, and the young duke of Orleans, the head of the predominant faction of the moment, was taken prisoner with many great nobles. However, so exhausted was the victorious army that Henry merely led it back to Calais, without attempting anything more in this year. The sole tangible asset of the campaign was the possession of Harfleur, the gate of Normandy, a second Calais in its advantages when future invasions were taken in hand. The moral effects were more important. The Orleanist party was shaken in its power; the rival Burgundian faction became more inclined to commit itself to the English cause, and the terror of the English arms weighed heavily upon both.

England and the council of Constance.

It was not till the next year but one that Henry renewed his invasion of France—the intervening space was spent in negotiations with Burgundy, and with the emperor Sigismund, whose aid the king secured in return for help in putting an end to the scandalous "great schism" which had been rending the Western Church for so many years. The English deputation lent their aid to Sigismund at the council of Constance, when Christendom was at last reunited under a single head, though all the reforms which were to have accompanied the reunion were postponed, and ultimately avoided altogether, by the restored papacy.

Henry's second invasion of France.

Conquest of Normandy.

Triumph of the Burgundians.

Henry takes Rouen.

Murder of John of Burgundy.

In July 1417 Henry began his second invasion of France, and landed at the mouth of the Seine with a powerful army of 17,000 men. He had resolved to adopt a plan of campaign very different from those which Edward III. or the Black Prince had been wont to pursue, having in view nothing more than the steady and gradual conquest of the province of Normandy. This he was able to accomplish without any interference from the government at Paris, for the constable Armagnac, who had succeeded the captive Orleans at the head of the anti-Burgundian party, had no troops to spare. He was engaged in a separate campaign with Henry's ally John the Fearless, and left Normandy to shift for itself. One after another all the towns of the duchy were reduced, save Rouen, the siege of which, as the hardest task, King Henry postponed till the rest of the countryside was in his hands. He sat down to besiege it in 1418, and was detained before its walls for many months, for the citizens made an admirable defence. Meanwhile a change had taken place in the domestic politics of France; the Burgundians seized Paris in May 1418; the constable Armagnac and many of his partisans were massacred, and John the Fearless got possession of the person of the mad Charles VI., and became the responsible ruler of France. He had then to choose between buying off his English allies by great concessions, or taking up the position of champion of French interests. He selected the latter rôle, broke with Henry, and tried to relieve Rouen. But all his efforts were foiled, and the Norman capital surrendered, completely starved out, on the 19th of January 1419. On this Burgundy resolved to open negotiations with Henry; he wished to free his hands for an attack on his domestic enemies, who had rallied beyond the Loire under the leadership of the dauphin Charles—from whom the party, previously known first as Orleanists and then as Armagnacs, gets for the future the name of the "Dauphinois." The English king, however, seeing the manifest advantage of his position, tried to drive too hard a bargain; he demanded the old boundaries of 1360, with his new conquest of Normandy, the hand of the princess Catherine, and a great sum of ready money. Burgundy dared not concede so much, under pain of alienating all his more patriotic supporters. He broke off the conference of Meulan, and tried to patch up a peace with the dauphin, in order to unite all Frenchmen against the foreign invader. This laudable intention was wrecked by the treachery of the young heir to the French throne; on the bridge of Montereau Charles deliberately murdered the suppliant duke, as he knelt to do homage, thinking thereby that he would make an end of the Burgundian party (Sept. 9, 1419).

The Burgundians acknowledge Henry as heir of France.

Treaty of Troyes.

This abominable deed gave northern France for twenty years to an English master. The young duke of Burgundy, Philip the Good, and his supporters in Paris and the north, were so incensed with the dauphin's cruel treachery that they resolved that he should never inherit his father's crown. They proffered peace to King Henry, and offered to recognize his preposterous[1] claim to the French throne, on condition that he should marry the princess Catherine and guarantee the constitutional liberties of the realm. The insane Charles VI. should keep nominal possession of the royal title till his death, but meanwhile the Burgundians would do homage to Henry as "heir of France." These terms were welcomed by the English king, and ratified at the treaty of Troyes (May 21, 1420). Henry married the princess Catherine, received the oaths of Duke Philip and his partisans, and started forth to conquer the Dauphinois at the head of an army of which half was composed of Burgundian levies. Paris, Picardy, Champagne, and indeed the greater part of France north of the Loire, acknowledged him as their sovereign.

Death of Henry V.

Henry had only two years longer to live; they were spent in incessant and successful campaigning against the partisans of his brother-in-law, the dauphin Charles; by a long series of sieges the partisans of that worthless prince were evicted from all their northern strongholds. They fought long and bitterly, nor was this to be marvelled at, for Henry had a custom of executing as traitors all who withstood him, and those who had once defied him did well to fight to the last gasp, in order to avoid the block or the halter. In the longest and most desperate of these sieges, that of Meaux (Oct. 1421–March 1422), the king contracted a dysenteric ailment which he could never shake off. He survived for a few months, but died, worn out by his incessant campaigning, on the 31st of August 1422, leaving the crown of England and the heirship of France to his only child Henry of Windsor, an infant less than two years old.

Effects of his conquests.

Few sovereigns in history have accomplished such a disastrous life's work as this much-admired prince. If he had not been a soldier of the first ability and a diplomatist of the most unscrupulous sort, he could never have advanced so far towards his ill-chosen goal, the conquest of France. His genius and the dauphin's murderous act of folly at Montereau conspired to make the incredible almost possible. Indeed, if Henry had lived five years longer, he would probably have carried his arms to the Mediterranean, and have united France and England in uneasy union for some short space of time. It is clear that they could not have been held together after his death, for none but a king of exceptional powers could have resisted their natural impulse to break apart. As it was, Henry had accomplished just enough to tempt his countrymen to persevere for nearly thirty years in the endeavour to complete the task he had begun. France was ruined for a generation, England was exhausted by her effort, and (what was worse) her governing classes learnt in the long and pitiless war lessons of demoralization which were to bear fruit in the ensuing struggle of the two Roses. It is a strange fact that Henry, though he was in many respects a conscientious man, with a strong sense of responsibility, and a sincere piety, was so blind to the unrighteousness of his own actions that he died asserting that "neither ambition nor vainglory had led him into France, but a genuine desire to assert a righteous claim, which he desired his heirs to prosecute to the bitter end."

The guardianship of the infant Henry VI. fell to his two uncles, John of Bedford and Humphrey of Gloucester, the two

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[1] The peculiar absurdity of Henry's claim to be king of France was that if, on the original English claim as set forth by Edward III., heirship through females counted, then the earl of March was entitled to the French throne. A vote of the English parliament superseding March's claim in favour of that of Henry IV. could obviously have no legal effect in France.

Henry VI.

surviving brothers of the late king. Bedford became regent in France, and took over the heritage of the war, in which he was vigorously aided by the young Philip of Burgundy, whose sister he soon after married. Almost his first duty was to bury the insane Charles VI., who only survived his son-in-law for a few months, and to proclaim his little nephew king of France under the name of Henry II. Gloucester, however, had personal charge of the child, who was to be reared in England; he had also hoped to become protector of the realm, and to use the position for his own private interests, for he was a selfish and ambitious prince. But the council refused to let him assume the full powers of a regent, and bound him with many checks and restrictions, because they were well aware of his character. The tiresome and monotonous domestic history of England during the next twenty years consisted of little else than quarrels between Gloucester and the lords of the council, of whom the chief was the duke's half-uncle Henry Beaufort, bishop of Winchester, the last to survive of all the sons of John of Gaunt. The duke and the bishop were both unscrupulous; but the churchman, with all his faults, was a patriotic statesman, while Gloucester cared far more for his own private ends than for the welfare of the realm.

Bedford's rule in France.

Humphrey of Gloucester.

While these two well-matched antagonists were wrangling in England, Bedford, a capable general and a wise administrator, was doing his best to carry out the task which the dying Henry V. had laid upon him, by crushing the dauphin, or Charles VII. as he now called himself since his father's death. As long as the Burgundian party lent the regent their aid, the limits of the land still unsubdued continued to shrink, though the process was slow. Two considerable victories, Cravant (1423) and Verneuil (1424), marked the early years of Bedford's campaigning; at each, it may be noted, a very large proportion of his army was composed of Burgundian auxiliaries. But after a time their assistance began to be given less freely; this was due to the selfish intrigues of Humphrey of Gloucester, who, regardless of the general policy of England, had quarrelled with Philip the Good. He had married Jacoba (Jacquelaine), countess of Hainaut and Holland, a cousin of the Burgundian duke, who coveted and hoped to secure her lands. Pressing her claims, Gloucester came to open blows with Philip in Flanders and Hainaut (1424). In his anger the Burgundian ceased to support Bedford, and would have joined Charles VII. if revenge on the murderers of his father had not still remained his dominant passion. But Gloucester's attempt to seize Hainaut failed, and Philip, when he had got possession of his cousin's person and estates, allowed himself to be pacified by Bedford, who could prove that he had no part in his brother's late intrigues.

Siege of Orleans.

This quarrel having been appeased, the advance against the territories of Charles VII. was resumed. It went slowly on, till in 1428 the tide of war reached the walls of Orleans, now the only place north of the Loire which remained unsubdued. The siege was long; but after the last army which the Dauphinois could raise had been beaten at the battle of Rouvray (Feb. 1429) it seemed that the end was near. Charles VII. was in such a state of despair after this last check, that he was actually taking into consideration a flight to Italy or Spain, and the abandonment of the struggle. He had shown himself so incapable and apathetic that his followers were sick of fighting for such a despicable master.

Joan of Arc.

From this depth of despair the party which, with all its faults, represented the national sentiment of France was rescued by the astonishing exploits of Joan of Arc. Charles and his counsellors had no great confidence in the mission of this prophetess and champion, when she presented herself to them, promising to relieve Orleans and turn back the English. But all expedients are worth trying in the hour of ruin, and seeing that Joan was disinterested and sincere, and that her preaching exercised a marked influence over the people and the soldiery, Charles allowed her to march with the last levies that he put into the field for the relief of Orleans. From that moment the fortune of war turned; the presence of the prophetess with the French troops had an immediate and incalculable effect. Under the belief that they were now led by a messenger from heaven, the Dauphinois fought with a fiery courage that they had never before displayed. Their movements were skilfully directed—whether by Joan's generalship or that of her captains it boots not to inquire—and after the first successes which she achieved, in entering Orleans and capturing some of the besiegers' forts around it, the English became panic-stricken. They were cowed, as they said, "by that disciple and limb of the fiend called La Pucelle, that used false enchantments and sorcery." Suffolk, their commander, raised the siege, and sent to Bedford for reinforcements; but as he retreated he was set upon by the victorious army, and captured with most of his men at Jargeau and Beaugency (June 1429). The succours which were coming to his aid from Paris were defeated by the Maid at Patay a few days later, and for the most part destroyed.

Coronation of Charles VII. at Reims.

The regent Bedford was now in a desperate position. His field army had been destroyed, and on all sides the provinces which had long lain inert beneath the English yoke were beginning to stir. When Joan led forth the French king to crown him at Reims, all the towns of Champagne opened their gates to her one after another. A large reinforcement received from England only just enabled Bedford to save Paris and some of the fortresses of the Île de France. The rest revolted at the sight of the Maid's white banner. If Joan had been well supported by her master and his counsellors, it is probable that she might have completed her mission by expelling the English from France. But, despite all that she had done, Charles VII. and his favourites had a profound disbelief in her inspiration, and generally thwarted her plans. After an ill-concerted attack on Paris, in which Joan was wounded, the French army broke up for the winter. They had shaken the grip of the English on the north, and reconquered a vast stretch of territory, but they had failed by their own fault to achieve complete success. Nevertheless the crucial point of the war had passed; after 1429 the Burgundian party began to slacken in its support of the English cause, and to pass over piecemeal to the national side. This was but natural: the partisans who could remember nothing but the foul deed of Montereau were yearly growing fewer, and it was clear that Charles VII., personally despicable though he might be, represented the cause of French nationality.

Capture and execution of Joan.

The natural drift of circumstances was not stayed even by the disastrous end of the career of Joan of Arc in 1430. The king's ministers had refused to take her counsels or to entrust her with another army, but she went forth with a small force of volunteers to relieve the important fortress of Compiègne. The place was saved, but in a sortie she was captured by the Burgundians, who sold her for 10,000 francs to Bedford. The regent handed her over for punishment as a sorceress to the French clergy of his own party. After a long trial, carried out with elaborate formality and great unfairness, the unhappy Joan was found guilty of proclaiming as divine visions what were delusions of the evil one, or of her own vain imagination, and when she persisted in maintaining their reality she was declared a relapsed heretic, and burnt at Rouen on the 30th of May 1431. Charles VII. took little interest in her fate, which he might easily have prevented by threatening to retaliate on the numerous English prisoners who were in his power. Seldom had a good cause such an unworthy figurehead as that callous and apathetic prince.

Philip of Burgundy joins Charles. Treaty of Arras.

The movement which Joan had set on foot was in no way crushed by her execution. For the next four years the limits of the English occupation continued to recede. It was to no profit that Bedford brought over the young Henry VI. and had him crowned at Paris, in order to appeal to the loyalty of his French partisans by means of the king's forlorn youth and simplicity. Yet by endless feats of skilful generalship the regent continued to maintain a hold on Paris and on Normandy. The fatal blow was administered by Philip of Burgundy, who, tired of maintaining a failing cause, consented at last to forget his father's murder, and to be reconciled to Charles VII. Their alliance was celebrated by the treaty of Arras (Sept. 6, 1435), at which the English were offered peace and the retention of Normandy and Guienne if they would evacuate Paris and the rest of France. They would have been wise to accept the agreement; but with obstinate and misplaced courage they refused to acknowledge Charles as king of France, or to give up to him the capital.

Death of Bedford. English defeats.

Bedford, worn out by long campaigning, died at Rouen on the 14th of September 1435, just before the results of the treaty of Arras began to make themselves felt. With him died the best hope of the English party in France, for he had been well loved by the Burgundians, and many had adhered to the cause of Henry VI. solely because of their personal attachment to him. No worthy successor could be found—England had many hard-handed soldiers but no more statesmen of Bedford's calibre. It was no wonder that Paris was lost within six months of the regent's death, Normandy invaded, and Calais beleaguered by an army headed by England's new enemy, Philip of Burgundy. But the council, still backed by the nation, refused to give up the game; Burgundy was beaten off from Calais, and the young duke of York, the heir of the Mortimers, took the command at Rouen, and recovered much of what had been lost on the Norman side.

Truce with France.

The next eight years of the war were in some respects the most astonishing period of its interminable length. The English fought out the losing game with a wonderful obstinacy. Though every town that they held was eager to revolt, and though they were hopelessly outnumbered in every quarter, they kept a tight grip on the greater part of Normandy, and on their old domain in the Bordelais and about Bayonne. They lost nearly all their outlying possessions, but still made head against the generals of Charles VII. in these two regions. The leaders of this period of the war were the duke of York, and the aged Lord Talbot, afterwards earl of Shrewsbury. The struggle only ceased in 1444, when the English council, in which a peace party had at last been formed, concluded a two-year truce with King Charles, which they hoped to turn into a permanent treaty, on the condition that their king should retain what he held in Normandy and Guienne, but sign away his claim to the French crown, and relinquish the few places outside the two duchies which were still in his power—terms very similar to those rejected at Arras nine years before—but there was now much less to give up. To mark the reconciliation of the two powers Henry VI. was betrothed to the French king's niece, Margaret of Anjou. The two years' truce was repeatedly prorogued, and lasted till 1449, but no definitive treaty was ever concluded, owing to the bad faith with which both parties kept their promises.

Supremacy of the Beauforts in England.

Character of Henry VI.

The government in England was now in the hands of the faction which Bishop Beaufort had originally led, for after long struggles the churchman had at last crushed his nephew Humphrey. In 1441 the duchess of Gloucester had been arrested and charged with practising sorcery against the health of the young king—apparently not without justification. She was tried and condemned to imprisonment for life; her guilt was visited on her husband, on whose behalf she was acting, for if Henry had died his uncle would have come to the throne. For some years he was constrained to take a minor part in politics, only emerging occasionally to make violent and unwise protests against peace with France. The bishop now ruled, with his nephew Edmund Beaufort, duke of Somerset, and William de la Pole, earl of Suffolk, as his chief instruments. As he grew older he let the power slip into their hands, as it was they who were mainly responsible for the truce of 1444. King Henry, though he had reached the age of 23 at the time of his marriage, counted for nothing. He was a pious young man, simple to the verge of imbecility; a little later he developed actual insanity, the heritage of his grandfather Charles VI. He showed a blind confidence in Suffolk and Somerset, who were wholly unworthy of it, for both were tricky and unscrupulous politicians. His wife Margaret of Anjou, though she possessed all the fire and energy which her husband lacked, was equally devoted to these two ministers, and soon came to share their unpopularity.

Death of Humphrey of Gloucester and Henry Beaufort.

The truce with France had offended the natural pride of the nation, which still refused to own itself beaten. The evacuation of the French fortresses in Maine and elsewhere, which was the price paid for the suspension of arms, was bitterly resented. Indeed the garrisons had to be threatened with the use of force before they would quit their strongholds. A violent clamour was raised against Suffolk and Somerset, and Humphrey of Gloucester emerged from his retirement to head the agitation. This led to his death; he was arrested by the order of the queen and the ministers at the parliament of Bury. Five days later he died suddenly in prison, probably by foul play, though it was given out that he had been carried off by a paralytic stroke. His estates were confiscated, and distributed among the friends of Suffolk and the queen. Six weeks later the aged Bishop Beaufort followed him to the grave—he had no share in Gloucester's fate, having long before made over his power and the leadership of his party to his nephew Edmund of Somerset (1447).

Renewal of the war with France.

Loss of Normandy.

The truce with France lasted for two years after the death of Duke Humphrey, and came to an end partly owing to the eagerness of the French to push their advantages, but much more from the treachery and bad faith of Suffolk and Somerset, who gave the enemy an admirable *casus belli*. By their weakness, or perhaps with their secret connivance, the English garrisons of Normandy carried out plundering raids of the most impudent sort on French territory. When summoned to punish the offenders, and to make monetary compensation, Suffolk and Somerset shuffled and prevaricated, but gave no satisfaction. Thereupon the French king once more declared war (July 1449) and invaded Normandy. Somerset was in command; he showed hopeless incapacity and timidity, and in a few months the duchy which had been so long held by the swords of Bedford, York and Shrewsbury was hopelessly lost. The final blow came when a small army of relief sent over from England was absolutely exterminated by the French at the battle of Formigny (April 15, 1450). Somerset, who had retired into Caen, surrendered two months later after a feeble defence, and the English power in northern France came to an end.

Jack Cade's Rebellion.

Even before this final disaster the indignation felt against Suffolk and Somerset had raised violent disturbances at home. Suffolk was impeached on many charges, true and false; it was unfair to accuse him of treason, but quite just to lay double-dealing and bad faith to his charge. The king tried to save him from the block by banishing him before he could be tried. But while he was sailing to Flanders his ship was intercepted by some London vessels, which were on the look-out for him, and he was deliberately murdered. The instigators of the act were never discovered. But, though Suffolk was gone, Somerset yet survived, and their partisans still engrossed the confidence of the king. To clear out the government, and punish those responsible for the late disasters, the commons of Kent rose in insurrection under a captain who called himself John Mortimer, though his real name seems to have been John Cade. He was a soldier of fortune who had served in the French wars, and claimed to be in the confidence of the duke of York, the person to whom the eyes of all who hated Somerset and the present régime were now directed.

Cade was not a social reformer, like his predecessor Wat Tyler, with whom he has often been compared, but a politician. Though he called himself "John Amend-all," and promised to put down abuses of every kind, the main part of the programme which he issued was intended to appeal to national sentiment, not to class feeling. Whether he was the tool of other and more highly placed malcontents, or whether he was simply a ready-witted adventurer playing his own game, it is hard to determine. His first success was marvellous; he defeated the king's troops, made a triumphant entry into London and held the city for two days. He seized and beheaded Lord Saye, the treasurer, and several other unpopular persons, and might have continued his dictatorship for some time if the Kentish mob that followed him had not fallen to general pillage and arson. This led to the same results that had been seen in Tyler's day. The propertied classes in London took arms to suppress anarchy, and beat the insurgents out of the city. Cade, striving to keep up the rising outside the walls, was killed in a skirmish a month later, and his bands dispersed.

Richard, duke of York, heads the opposition.

But the troubles of England were only just beginning; the protest against the misgovernment of Somerset and the rest of the confidants of the king and queen was now taken up by a more important personage than the adventurer Cade. Richard, duke of York, the heir to the claims of the house of Mortimer—his mother was the sister of the last earl of March—now placed himself at the head of the opposition. He had plausible grounds for doing so; though he had distinguished himself in the French wars, and was, since the death of Humphrey of Gloucester, the first prince of the blood royal, he had been ignored and flouted by the king's ministers, who had sent him into a kind of honourable banishment as lord-lieutenant of Ireland, and had forbidden him to re-enter the realm. When, in defiance of this mandate, he came home and announced his intention of impeaching Somerset, he took the first step which was to lead to the Wars of the Roses.

Battle of Castillon. Loss of Guienne.

Yet he was a cautious and in the main a well-intentioned prince, and the extreme moderation of his original demands seems to prove that he did not at first aim at the crown. He merely required that Somerset and his friends should be dismissed from office and made to answer for their misgovernment. Though he backed his demands by armed demonstration—twice calling out his friends and retainers to support his policy—he carefully refrained for five long years from actual violence. Indeed in 1452 he consented to abandon his protests, and to lend his aid to the other party for a great national object, the recovery of Guienne. For in the previous year Charles VII. had dealt with Bordeaux and Bayonne as he had already dealt with Normandy, and had met with no better resistance while completing the conquest. Six months' experience of French rule, however, had revealed to the Bordelais how much they had lost when they surrendered. Their old loyalty to the house of Plantagenet burst once more into flame; they rose in arms and called for aid to England. For a moment the quarrel of York and Somerset was suspended, and the last English army that crossed the seas during the Hundred Years' War landed in Guienne, joined the insurgents, and for a time swept all before it. But there seemed to be a curse on whatever Henry VI. and Somerset took in hand. On the 17th of July 1453 the veteran earl of Shrewsbury and the greater part of his Anglo-Gascon host were cut to pieces at the hard-fought battle of Castillon. Bordeaux, though left to defend itself, held out for eighty days after Talbot's defeat and death, and then made its final submission to the French. The long struggle was over, and England now retained nothing of her old transmarine possessions save Calais and the Channel Islands. The ambition of Henry V. had finally cost her the long-loyal Guienne, as well as all the ephemeral conquests of his own sword.

The last crowning disaster of the administration of the favourites of Henry VI. put an end to the chance that a way out of domestic strife might be found in the vigorous prosecution of the French war. For the next twenty years the battles of England were to be fought on her own soil, and between her own sons. It was a righteous punishment for her interference in the unnatural strife of Orleanists and Burgundians that the struggle between York and Lancaster was to be as bitter and as bloody as that between the two French factions.

V. The Wars of the Roses (1453–1497)

The Wars of the Roses have been ascribed to many different causes by different historians. To some their origin is mainly constitutional. Henry VI., it is argued, had broken the tacit compact which the house of Lancaster had made with the nation; instead of committing the administration of the realm to ministers chosen for him by, or at least approved by, his parliament, he persisted in retaining in office persons like Suffolk and Somerset, who had forfeited the confidence of the people by their many failures in war and diplomacy, and were suspected of something worse than incapacity. They might not be so personally odious as the favourites of Edward II. or of Henry III., but they were even more dangerous to the state, because they were not foreign adventurers but great English peers. In spite of the warnings given by the assault on Suffolk in 1450, by Jack Cade's insurrection, and by the first armed demonstrations of Richard of York in 1450 and 1452, the king persisted in keeping his friends in office, and they had to be removed by the familiar and forcible methods that had been applied in earlier ages by the lords ordainers or the lords appellant. Undoubtedly there is much truth in this view of the situation; if Henry VI., or perhaps we should rather say, if his queen Margaret of Anjou, had been content to accept ministries in which the friends of Richard of York were fairly represented, it is probable that he might have died a king, and have transmitted his crown to his natural heir. But this explanation of the Wars of the Roses is not complete; it accounts for their outbreak, but not for their long continuance.

Origin of the Wars of the Roses.

Claims of the duke of York to the crown.

Birth of Edward, prince of Wales.

Queen Margaret.

According to another school the real key to the problem is simply the question of the succession to the crown. If the wedlock of Henry VI. and Margaret of Anjou had been fruitful during the first few years after their marriage, no one would have raised the question of a change of dynasty. But when they remained childless for seven years, and strong suspicion arose that there was a project on foot to declare the Beauforts heirs to the throne, the claim of Richard of York, as the representative of the houses of Clarence and March, was raised by those who viewed the possible accession of the incapable and unpopular Somerset with terror and dislike. When once the claims of York had been displayed and stated by his imprudent partisan, Thomas Yonge, in the parliament of 1451, there was no possibility of hiding the fact that in the strict legitimate line of succession he had a better claim than the reigning king. He disavowed any pretensions to the crown for nine years; it was only in 1460 that he set forth his title with his own mouth. But his friends and followers were not so discreet; hence when a son was at last born to Henry and Margaret, in 1453, the succession question was already in the air and could no longer be ignored. If the claim of York was superior to that of Lancaster in the eyes of a considerable part of the nation, it was no longer possible to consider the problem solved by the birth of a direct heir to the actual occupant of the throne. Though Duke Richard behaved in the most correct fashion, acknowledged the infant Edward as prince of Wales, and made no attempt to assert dynastic claims during his two regencies in 1454 and 1455–1456, yet the queen and her partisans already looked upon him as a pretender to the throne. It is this fact which accounts for the growing bitterness of the Yorkist and Lancastrian parties during the last years of Henry VI. Margaret believed herself to be defending the rights of her son against a would-be usurper. Duke Richard, on the other hand, considered himself as wrongfully oppressed, and excluded from his legitimate position as a prince of the blood and a chief councillor of the crown. Nor can there be any doubt that the queen took every opportunity of showing her suspicion of him, and deliberately kept him and his friends from sharing in the administration of the realm. This might have been more tolerable if the Lancastrian party had shown any governing power; but both while Somerset was their leader, down to his death in the first battle of St Albans, and while in 1456–1459 Exeter, Wiltshire, Shrewsbury and Beaumont were the queen's trusted agents, the condition of England was deplorable. As a contemporary chronicler wrote, "the realm was out of all good governance—as it has been many days before:

Condition of the country.

the king was simple, and led by covetous councillors, and owed more than he was worth. His debts increased daily, but payment was there none, for all the manors and possessions that pertained to the crown he had given away, so that he had almost nought to live on. For these misgovernances the hearts of the people were turned from them that had the land in rule, and their blessing was turned to cursing. The officers of the realm, and especially the earl of Wiltshire the treasurer, for to enrich himself plundered poor people and disinherited rightful heirs, and did many wrongs. The queen was defamed, that he that was called the prince was not the king's son, but a bastard gotten in adultery." When it is added that the Lancastrian party avoided holding a parliament for three years, because they dared not face it, and that the French were allowed to sack Fowey, Sandwich and other places because there was no English fleet in existence, it is not wonderful that many men thought that the cup of the iniquities of the house of Lancaster was full. In the military classes it was felt that the honour of the realm was lost; in mercantile circles it was thought that the continuance for a few years more of such government would make an end of English trade. Some excuse must be found for getting rid of the queen and her friends, and the doubtful legitimacy of the Lancastrian claim to the crown afforded such an excuse. Hence came the curious paradox, that the party which started as the advocates of the rights of parliament against the incapable ministers appointed by the crown, ended by challenging the right of parliament, exercised in 1399, to depose a legitimate king and substitute for him another member of the royal house. For Richard of York in 1460 and Edward IV. in 1461 put in their claim to the throne, not as the elect of the nation, but as the possessors of a divine hereditary right to the succession, there having been no true king of England since the death of Richard II. Hence Edward assumed the royal title in March 1461, was crowned in June, but called no parliament till November. When it met, it acknowledged him as king, but made no pretence of creating or electing him to be sovereign.

Motives of the contending parties.

But putting aside the constitutional aspects of the Wars of the Roses, it is necessary to point out that they had another aspect. From one point of view they were little more than a great faction fight between two alliances of over-powerful barons. Though the Lancastrians made much play with the watchword of loyalty to the crown, and though the Yorkists never forgot to speak of the need for strong and wise governance, and the welfare of the realm, yet personal and family enmities had in many cases more effect in determining their action than a zeal for King Henry's rights or for the prosperity of England. It is true that some classes were undoubtedly influenced in their choice of sides mainly by the general causes spoken of above; the citizens of London and the other great towns (for example) inclined to the Yorkist faction simply because they saw that under the Lancastrian rule the foreign trade of England was being ruined, and insufficient security was given for life and property. But the leading men among the baronage were undoubtedly swayed by ambition and resentment, by family ties and family feuds, far more than by enlightened statesmanship or zeal for the king or the commonweal. It would be going too far to seek the origin of the Yorkist party—as some have done—in the old enmity of the houses of March, Norfolk and Salisbury against Henry IV. But it is not so fantastic to ascribe its birth to the personal hatred that existed between Richard of York and Edmund of Somerset, to the old family grudge (going back to 1405) between the Percies and the Nevilles, to the marriage alliance that bound the houses of York and Neville together, and to other less well-remembered quarrels or blood-ties among the lesser baronage. As an example of how such motives worked, it may suffice to quote the case of those old enemies, the Bonvilles and Courtenays, in the west country. While Lord Bonville supported the queen, the house of Courtenay were staunch Yorkists, and the earl of Devon joined in the armed demonstration of Duke Richard in 1452. But when the earl changed his politics and fought on the Lancastrian side at St Albans in 1455, the baron at once became a strenuous adherent of the duke, adhered firmly to the white rose and died by the axe for its cause.

The baronial party. The Nevilles.

Richard of York, in short, was not merely the head of a constitutional opposition to misgovernment by the queen's friends, nor was he merely a legitimist claimant to the crown, he was also the head of a powerful baronial league, of which the most prominent members were his kinsmen, the Nevilles, Mowbrays and Bourchiers. The Nevilles alone, enriched with the ancient estates of the Beauchamps and Montagus, and with five of their name in the House of Lords, were a sufficient nucleus for a faction. They were headed by the two most capable politicians and soldiers then alive in England, the two Richards, father and son, who held the earldoms of Salisbury and Warwick, and were respectively brother-in-law and nephew to York. It must be remembered that a baron of 1450 was not strong merely by reason of the spears and bows of his household and his tenantry, like a baron of the 13th century. The pernicious practice of "livery and maintenance" was now at its zenith; all over England in times of stress the knighthood and gentry were wont to pledge themselves, by sealed bonds of indenture, to follow the magnate whom they thought best able to protect them. They mounted his badge, and joined his banner when strife broke out, in return for his championship of their private interests and his promise to "maintain" them against all their enemies. A soldier and statesman of the ability and ambition of Richard of Warwick counted hundreds of such adherents, scattered over twenty shires. The system had spread so far that the majority of the smaller tenants-in-chief, and even many of the lesser barons, were the sworn followers of an insignificant number of the greater lords. An alliance of half-a-dozen of these over-powerful subjects was a serious danger to the crown. For the king could no longer count on raising a national army against them; he could only call out the adherents of the lords of his own party. The factions were fairly balanced, for if the majority of the baronage were, on the whole, Lancastrian, the greatest houses stood by the cause of York.

Attitude of Richard of York.

Suppression of York's rebellion. Executions and confiscations.

The earl of Warwick defeats the Lancastrians at Northampton.

Despite all this, there was still, when the wars began, a very strong feeling in favour of compromise and moderation. For this there can be no doubt that Richard of York was mainly responsible. When he was twice placed in power, during the two protectorates which followed Henry's two long fits of insanity in 1454 and 1455–1456, he carefully avoided any oppression of his enemies, though he naturally took care to put his own friends in office. Most of all did he show his sincere wish for peace by twice laying down the protectorate when the king was restored to sanity. He was undoubtedly goaded into his last rebellion of 1459 by the queen's undisguised preparations for attacking him. Yet because he struck first, without waiting for a definite *casus belli*, public opinion declared so much against him that half his followers refused to rally to his banner. The revulsion only came when the queen, victorious after the rout of Ludford, applied to the vanquished Yorkists those penalties of confiscation and attainder which Duke Richard had always refused to employ in his day of power. After the harsh doings at the parliament of Coventry (1459), and the commencement of political executions by the sending of Roger Neville and his fellows to the scaffold, the trend of public opinion veered round, and Margaret and her friends were rightly held responsible for the embittered nature of the strife. Hence came the marvellous success of the Yorkist counterstroke in June 1460, when the exiled Warwick, landing in Kent with a mere handful of men, was suddenly joined by the whole of the south of England and the citizens of London, and inflicted a crushing defeat on the Lancastrians at Northampton before he had been fifteen days on shore (July 10, 1460). The growing rancour of the struggle was marked by the fact that the Yorkists, after Northampton, showed themselves by no means so merciful and scrupulous as in their earlier days. Retaliatory executions began, though on a small scale, and when York reached London he at last began to talk of his rights to the crown, and to propose the deposition of Henry VI. Yet moderation was still so far prevalent in the ranks of his adherents that they refused to follow him to such lengths. Warwick and the other leading men of the party dictated a compromise, by which Henry was to reign for the term of his natural life, but Duke Richard was to be recognized as his heir and to succeed him on the throne. They had obviously borrowed the expedient from the terms of the treaty of Troyes. But the act of parliament which embodied it did not formally disinherit the reigning king's son, as the treaty of Troyes had done, but merely ignored his existence.

Richard of York declared heir to the throne.

It would have been well for England if this agreement had held, and the crown had passed peaceably to the house of York, after the comparatively short and bloodless struggle which had just ended. But Duke Richard had forgotten to reckon with the fierce and unscrupulous energy of Queen Margaret, when she was at bay in defence of her son's rights. Marching with a trifling force to expel her from the north, he was surprised and slain at Wakefield (Dec. 30, 1460). But it was not his death that was the main misfortune, but the fact that in the battle the Lancastrians gave no quarter to small or great, and that after it they put to death York's brother-in-law Salisbury and other prisoners. The heads of the duke and the earl were set up over the gates of York. This ferocity was repeated when Margaret and her northern host beat Warwick at the second battle of St Albans (Feb. 17, 1461), where they had the good fortune to recover possession of the person of King Henry. Lord Bonville and the other captives of rank were beheaded next morning.

Battle of Wakefield. Richard slain.

Battle of St Albans.

After this it was but natural that the struggle became a mere record of massacres and executions. The Yorkists proclaimed Edward, Duke Richard's heir, king of England; they took no further heed of the claims of King Henry, declared their leader the true successor of Richard II., and stigmatized the whole period of the Lancastrian rule as a mere usurpation. They adopted a strict legitimist theory of the descent of the crown, and denied the right of parliament to deal with the succession. This was the first step in the direction of absolute monarchy which England had seen since the short months of King Richard's tyranny in 1397–1399. It was but the first of many encroachments of the new dynasty upon the liberties that had been enjoyed by the nation under the house of Lancaster.

Edward, earl of March, proclaimed as Edward IV.

The revenge taken by the new king and his cousin Richard of Warwick for the slaughter at Wakefield and St Albans was prompt and dreadful. They were now well supported by the whole of southern England; for not only had the queen's ferocity shocked the nation, but the reckless plundering of her northern moss-troopers in the home counties had roused the peasantry and townsfolk to an interest in the struggle which they had never before displayed. Up to this moment the civil war had been conducted like a great faction fight; the barons and their liveried retainers had been wont to seek some convenient heath or hill and there to fight out their quarrel with the minimum of damage to the countryside. The deliberate harrying of the Midlands by Margaret's northern levies was a new departure, and one bitterly resented. The house of Lancaster could never for the future count on an adherent south of Trent or east of Chiltern. The Yorkist army that marched in pursuit of the raiders, and won the bloody field of Towton under Warwick's guidance, gave no quarter. Not only was the slaughter in that battle and the pursuit more cruel than anything that had been seen since the day of Evesham, but the executions that followed were ruthless. Ere Edward turned south he had beheaded two earls—Devon and Wiltshire—and forty-two knights, and had hanged many prisoners of lesser estate. The Yorkist parliament of November 1461 carried on the work by attainting 133 persons, ranging from Henry VI. and Queen Margaret down through the peerage and the knighthood to the clerks and household retainers of the late king. All the estates of the Lancastrian lords, living or dead, were confiscated, and their blood was declared corrupted. This brought into the king's hands such a mass of plunder as no one had handled since William the Conqueror. Edward IV. could not only reward his adherents with it, so as to create a whole new court noblesse, but had enough over to fill his exchequer for many years, and to enable him to dispense with parliamentary grants of money for an unexampled period. Between 1461 and 1465 he only asked for £37,000 from the nation—and won no small popularity thereby. For, in their joy at being quit of taxation, men forgot that they were losing the lever by which their fathers had been wont to move the crown to constitutional concessions.

Changed character of the war.

Battle of Towton.

Ruthless reprisals of the Yorkists.

Personal rule of Edward IV.

After Towton peace prevailed south of the Tyne and east of the Severn, for it was only in Northumberland and in Wales that the survivors of the Lancastrian faction succeeded in keeping the war alive. King Edward, as indolent and pleasure-loving in times of ease as he was active and ruthless in times of stress and battle, set himself to enjoy life, handing over the suppression of the rebels to his ambitious and untiring cousin Richard of Warwick. The annals of the few contemporary chroniclers are so entirely devoted to the bickerings in the extreme north and west, that it is necessary to insist on the fact that from 1461 onwards the civil war was purely local, and nine-tenths of the realm enjoyed what passed for peace in the 15th century. The campaigns of 1462–63–64, though full of incident and bloodshed, were not of first-rate political importance. The cause of Lancaster had been lost at Towton, and all that Queen Margaret succeeded in accomplishing was to keep Northumberland in revolt, mainly by means of French and Scottish succours. Her last English partisans, attainted men who had lost their lands and lived with the shadow of the axe ever before them, fought bitterly enough. But the obstinate and hard-handed Warwick beat them down again and again, and the old Lancastrian party was almost exterminated when the last of its chiefs went to the block in the series of wholesale executions that followed the battle of Hexham (May 15, 1464). A year later Henry VI. himself fell into the hands of his enemies, as he lurked in Lancashire, and with his consignment to the Tower the dynastic question seemed finally solved in favour of the house of York.

Civil war in the north and west.

Battle of Hexham. Imprisonment of Henry VI.

The first ten years of the reign of Edward IV. fall into two parts, the dividing point being the avowal of the king's marriage to Elizabeth Woodville in November 1464. During the first of these periods Edward reigned but Warwick governed; he was not only the fighting man, but the statesman and diplomatist of the Yorkist party, and enjoyed a complete ascendancy over his young master, who long preferred thriftless ease to the toils of personal monarchy. Warwick represented the better side of the victorious cause; he was no mere factious king-maker, and his later nickname of "the last of the barons" by no means expresses his character or his position. He was strong, not so much by reason of his vast estates and his numerous retainers, as by reason of the confidence which the greater part of the nation placed in him. He never forgot that the Yorkist party had started as the advocates of sound and strong administration, and the mandatories of the popular will against the queen's incapable and corrupt ministers. "He ever had the goodwill of the people because he knew how to give them fair words, and always spoke not of himself but of the augmentation and good governance of the kingdom, for which he would spend his life; and thus he had the goodwill of England, so that in all the land he was the lord who was held in most esteem and faith and credence." As long as he remained supreme, parliaments were regularly held, and the house of York appeared to be keeping its bargain with the nation. His policy was sound; peace with France, the rehabilitation of the dwindling foreign trade of England, and the

Richard Neville, earl of Warwick.

maintenance of law and justice by strong-handed governance were his main aims.

But Warwick was one of those ministers who love to do everything for themselves, and chafe at masters and colleagues who presume to check or to criticise their actions. He was surrounded and supported, moreover, by a group of brothers and cousins, to whom he gave most of his confidence, and most of the preferment that came to his hands. England has always chafed against a family oligarchy, however well it may do its work. The Yorkist magnates who did not belong to the clan of the Nevilles were not unnaturally jealous of that house, and Edward IV. himself gradually came to realize the ignominious position of a king who is managed and overruled by a strong-willed and arbitrary minister.

Edward IV. marries Elizabeth Woodville.

Breach between Warwick and the king.

His first sign of revolt was his secret marriage to Elizabeth Woodville, a lady of decidedly Lancastrian connexions, for her father and her first husband were both members of the defeated faction. Warwick was at the moment suing for the hand of Louis XI.'s sister-in-law in his master's name, and had to back out of his negotiations in a sudden and somewhat ridiculous fashion. His pride was hurt, but for two years more there was no open breach between him and his master, though their estrangement grew more and more marked when Edward continued to heap titles and estates on his wife's numerous relatives, and to conclude for them marriage alliances with all the great Yorkist families who were not of the Neville connexion. In this way he built up for himself a personal following within the Yorkist party; but the relative strength of this faction and of that which still looked upon Warwick as the true representative of the cause had yet to be tried. The king had in his favour the prestige of the royal name, and a popularity won by his easy-going affability and his liberal gifts. The earl had his established reputation for disinterested devotion to the welfare of the realm, and his brilliant record as a soldier and statesman. In districts as far apart as Kent and Yorkshire, his word counted for a good deal more than that of his sovereign.

Warwick organizes a rebellion.

Rising of "Robin of Redesdale."

Unhappily for England and for himself, Warwick's loyalty was not sufficient to restrain his ambition and his resentment. He felt the ingratitude of the king, whom he had made, so bitterly that he stooped ere long to intrigue and treason. Edward in 1467 openly broke with him by dismissing his brother George Neville from the chancellorship, by repudiating a treaty with France which the earl had just negotiated, and by concluding an alliance with Burgundy against which he had always protested. Warwick enlisted in his cause the king's younger brother George of Clarence, who desired to marry his daughter and heiress Isabella Neville, and with the aid of this unscrupulous but unstable young man began to organize rebellion. His first experiment in treason was the so-called "rising of Robin of Redesdale," which was ostensibly an armed protest by the gentry and commons of Yorkshire against the maladministration of the realm by the king's favourites—his wife's relatives, and the courtiers whom he had lately promoted to high rank and office. The rebellion was headed by well-known adherents of the earl, and the nickname of "Robin of Redesdale" seems to have covered the personality of his kinsman Sir John Conyers. When the rising was well started Warwick declared his sympathy with the aims of the insurgents, wedded his daughter to Clarence despite the king's prohibition of the match, and raised a force at Calais with which he landed in Kent.

Battle of Edgecott. Edward a prisoner.

Execution of the queen's relatives.

But his plot was already successful before he reached the scene of operations. The Yorkshire rebels beat the royalist army at the battle of Edgecott (July 6, 1469). A few days later Edward himself was captured at Olney and put into the earl's hands. Many of his chief supporters, including the queen's father, Lord Rivers, and her brother, John Woodville, as well as the newly-created earls of Pembroke and Devon, were put to death with Warwick's connivance, if not by his direct orders. The king was confined for some weeks in the great Neville stronghold of Middleham Castle, but presently released on conditions, being compelled to accept new ministers nominated by Warwick. The earl supposed that his cousin's spirit was broken and that he would give no further trouble. In this he erred grievously. Edward vowed revenge for his slaughtered favourites, and waited his opportunity. Warwick had lost credit by using such underhand methods in his attack on his master, and had not taken sufficient care to conciliate public opinion when he reconstructed the government. His conduct had destroyed his old reputation for disinterestedness and honesty.

King Edward drives Warwick into exile.

In March 1470 the king seized the first chance of avenging himself. Some unimportant riots had broken out in Lincolnshire, originating probably in mere local quarrels, but possibly in Lancastrian intrigues. To suppress this rising the king gathered a great force, carefully calling in to his banner all the peers who were offended with Warwick or, at any rate, did not belong to his family alliance. Having scattered the Lincolnshire bands, he suddenly turned upon Warwick with his army, and caught him wholly unprepared. The earl and his son-in-law Clarence were hunted out of the realm before they could collect their partisans, and fled to France; Edward seemed for the first time to be master in his own realm.

Warwick takes up the cause of Henry VI.

He lands in England.

King Edward in exile.

But the Wars of the Roses had one more phase to come. Warwick's name was still a power in the land, and his expulsion had been so sudden that he had not been given an opportunity of trying his strength. His old enmity for the house of Lancaster was completely swallowed up in his new grudge against the king that he had made. He opened negotiations with the exiled Queen Margaret, and offered to place his sword at her disposition for the purpose of overthrowing King Edward and restoring King Henry. The queen had much difficulty in forcing herself to come to terms with the man who had been the bane of her cause, but finally, was induced by Louis XI. to conclude a bargain. Warwick married his younger daughter to her son Edward, prince of Wales, as a pledge of his good faith, and swore allegiance to King Henry in the cathedral of Angers. He then set himself to stir up the Yorkshire adherents of the house of Neville to distract the attention of Edward IV. When the king had gone northward to attack them, the earl landed at Dartmouth (Sept. 1470) with a small force partly composed of Lancastrian exiles, partly of his own men. His appearance had the effect on which he had calculated. Devon rose in the Lancastrian interest; Kent, where the earl's name had always been popular, took arms a few days later; and London opened its gates. King Edward, hurrying south to oppose the invader, found his army melting away from his banner, and hastily took ship at Lynn and fled to Holland. He found a refuge with his brother-in-law and ally Charles the Bold, the great duke of Burgundy.

Restoration of Henry VI.

Edward returns to England.

King Henry was released and replaced on the throne, and for six months Warwick ruled England as his lieutenant. But there was bitterness and mistrust between the old Lancastrian faction and the Nevilles, and Queen Margaret refused to cross to England or to trust her son in the king-maker's hands. Her partisans doubted his sincerity, while many of the Yorkists who had hitherto followed Warwick in blind admiration found it impossible to reconcile themselves to the new régime. The duke of Clarence in particular, discontented at the triumph of Lancaster, betrayed his father-in-law, and opened secret negotiations with his exiled brother. Encouraged by the news of the dissensions among his enemies, Edward IV. resolved to try his fortune once more, and landed near Hull on the 15th of March 1471 with a body of mercenaries lent him by the duke of Burgundy. The campaign that followed was most creditable to Edward's generalship, but must have been fatal to him if Warwick had been honestly supported by his

Battle of Barnet. Death of Warwick.

lieutenants. But the duke of Clarence betrayed to his brother the army which he had gathered in King Henry's name, and many of the Lancastrians were slow to join the earl, from their distrust of his loyalty. Edward, dashing through the midst of the slowly gathering levies of his opponents, seized London, and two days later defeated and slew Warwick at the battle of Barnet (April 13, 1471).

Battle of Tewkesbury. Death of Edward, prince of Wales.

Capture of Queen Margaret and murder of Henry VI.

On that same day Queen Margaret and her son landed at Weymouth, only to hear that the earl was dead and his army scattered. But she refused to consider the struggle ended, and gathered the Lancastrians of the west for a final rally. On the fatal day of Tewkesbury (May 3, 1471) her army was beaten, her son was slain in the flight, and the greater part of her chief captains were taken prisoner. She herself was captured next day. The victorious Edward sent to the block the last Beaufort duke of Somerset, and nearly all the other captains of rank, whether Lancastrians or followers of Warwick. He then moved to London, which was being threatened by Kentish levies raised in Warwick's name, delivered the city, and next day caused the unhappy Henry VI. to be murdered in the Tower (May 21, 1471).

Edward IV.

The descendants of Henry IV. were now extinct, and the succession question seemed settled for ever. No one dreamed of raising against King Edward the claims of the remoter heirs of John of Gaunt—the young earl of Richmond, who represented the Beauforts by a female descent, or the king of Portugal, the grandson of Gaunt's eldest daughter. Edward was now king indeed, with no over-powerful cousin at his elbow to curb his will. He had, moreover, at his disposal plunder almost as valuable as that which he had divided up in 1461—the estates of the great Neville clan and their adherents. A great career seemed open before him; he had proved himself a fine soldier and an unscrupulous diplomatist; he was in the very prime of life, having not yet attained his thirty-first year. He might have devoted himself to foreign politics and have rivalled the exploits of Edward III. or Henry V.—for the state of the continent was all in his favour—or might have set himself to organize an absolute monarchy on the ruins of the parliament and the baronage. For the successive attainders of the Lancastrians and the Nevilles had swept away many of the older noble families, and Edward's house of peers consisted for the main part of new men, his own partisans promoted for good service, who had not the grip on the land that their predecessors had possessed.

Character of the reign.

Murder of the duke of Clarence.

But Edward either failed to see his opportunity or refused to take it. He did not plunge headlong into the wars of Louis XI. and Charles of Burgundy, nor did he attempt to recast the institutions of the realm. He settled down into inglorious ease, varied at long intervals by outbursts of spasmodic tyranny. It would seem that the key to his conduct was that he hated the hard work without which a despotic king cannot hope to assert his personality, and preferred leisure and vicious self-indulgence. In many ways the later years of his reign were marked with all the signs of absolutism. Between 1475 and 1483 he called only one single parliament, and that was summoned not to give him advice, or raise him money, but purely and solely to attaint his brother of Clarence, whom he had resolved to destroy. The duke's fate (Feb. 17, 1478) need provoke no sympathy, he was a detestable intriguer, and had given his brother just offence by a series of deeds of high-handed violence and by perpetual cavilling. But he had committed no act of real treason since his long-pardoned alliance with Warwick, and was not in any way dangerous; so that when the king caused him to be attainted, and then privately murdered in the Tower, there was little justification for the fratricide.

Fiscal policy.

Edward was a thrifty king; he was indeed the only medieval monarch of England who succeeded in keeping free of debt and made his revenue suffice for his expenses. But his methods of filling his purse were often unconstitutional and sometimes ignominious. When the resources drawn from confiscations were exhausted, he raised "benevolences"—forced gifts extracted from men of wealth by the unspoken threat of the royal displeasure—instead of applying to parliament for new taxes. But his most profitable source of revenue was drawn from abroad. Having allied himself with his brother-in-law Charles of Burgundy against the king of France, he led an army into Picardy in 1475, and then by the treaty of Picquigny sold peace to Louis XI. for 75,000 gold crowns down, and an annual pension (or tribute as he preferred to call it) of 50,000 crowns more. It was regularly paid up to the last year of his reign. Charles the Bold, whom he had thus deliberately deserted in the middle of their joint campaign, used the strongest language about this mean act of treachery, and with good cause. But the king cared not when his pockets were full. Another device of Edward for filling his exchequer was a very stringent enforcement of justice; small infractions of the laws being made the excuse for exorbitant fines. This was a trick which Henry VII. was to turn to still greater effect. In defence of both it may be pleaded that after the anarchy of the Wars of the Roses a strong hand was needed to restore security for life and property, and that it was better that penalties should be over-heavy rather than that there should be no penalties at all. Another appreciable source of revenue to Edward was his private commercial ventures. He owned many ships, and traded with great profit to himself abroad, because he could promise, as a king, advantages to foreign buyers and sellers with which no mere merchant could compete.

During the last period of Edward's rule England might have been described as a despotism, if only the king had cared to be a despot. But except on rare occasions he allowed his power to be disguised under the old machinery of the medieval monarchy, and made no parade of his autocracy. Much was pardoned by the nation to one who gave them comparatively efficient and rather cheap government, and who was personally easy of access, affable and humorous. It is with little justification that he has been called the "founder of the new monarchy," and the spiritual ancestor of the Tudor despotism. Another king in his place might have merited such titles, but Edward was too careless, too unsystematic, too lazy, and too fond of self-indulgence to make a real tyrant. He preferred to be a man of pleasure and leisure, only awaking now and then to perpetrate some act of arbitrary cruelty.

Condition of the country.

England was not unprosperous under him. The lowest point of her fortunes had been reached under the administration of Margaret of Anjou, during the weary years that preceded the outbreak of the civil wars in 1459. At that time the government had been bankrupt, foreign trade had almost disappeared, the French and pirates of all nations had possession of the Channel, and the nation had lost heart, because there seemed no way out of the trouble save domestic strife, to which all looked forward with dismay. The actual war proved less disastrous than had been expected. It fell heavily upon the baronage and their retainers, but passed lightly, for the most part, over the heads of the middle classes. The Yorkists courted the approval of public opinion by their careful avoidance of pillage and requisitions; and the Lancastrians, though less scrupulous, only once launched out into general raiding and devastation, during the advance of the queen's army to St Albans in the early months of 1461. As a rule the towns suffered little or nothing—they submitted to the king of the moment, and were always spared by the victors. It is one of the most curious features of these wars that no town ever stood a siege, though there were several long and arduous sieges of baronial castles, such as Harlech, Alnwick and Bamborough. Warwick, with his policy of conciliation for the masses and hard blows for the magnates, was mainly responsible for this moderation. In battle he was wont to bid his followers spare the commons in the pursuit, and to smite only the knights and nobles. Towton, where the Yorkist army was infuriated by the harrying of the Midlands by their enemies in the preceding

Commercial development.

campaign, was the only fight that ended in a general massacre. There were, of course, many local feuds and riots which led to the destruction of property; well-known instances are the private war about Caister Castle between the duke of Norfolk and the Pastons, and the "battle of Nibley Green," near Bristol, between the Berkeleys and the Talbots. But on the whole there was no ruinous devastation of the land. Prosperity seems to have revived early during the rule of York; Warwick had cleared the seas of pirates, and both he and King Edward were great patrons of commerce, though the earl's policy was to encourage trade with France, while his master wished to knit up the old alliance with Flanders by adhering to the cause of Charles of Burgundy. Edward did much in his later years to develop interchange of commodities with the Baltic, making treaties with the Hanseatic League which displeased the merchants of London, because of the advantageous terms granted to the foreigner. The east coast ports seem to have thriven under his rule, but Bristol was not less prosperous. On the one side, developing the great salt-fish trade, her vessels were encompassing Iceland, and feeling their way towards the Banks of the West; on the other they were beginning to feel their way into the Mediterranean. The famous William Canynges, the patriarch of Bristol merchants, possessed 2500 tons of shipping, including some ships of 900 tons, and traded in every sea. Yet we still find complaints that too much merchandize reached and left England in foreign bottoms, and King Edward's treaty with the Hansa was censured mainly for this reason. Internal commerce was evidently developing in a satisfactory style, despite of the wars; in especial raw wool was going out of England in less bulk than of old, because cloth woven at home was becoming the staple export. The woollen manufactures which had begun in the eastern counties in the 14th century were now spreading all over the land, taking root especially in Somersetshire, Yorkshire and some districts of the Midlands. Coventry, the centre of a local woollen and dyeing industry, was probably the inland town which grew most rapidly during the 15th century. Yet there was still a large export of wool to Flanders, and the long pack-trains of the Cotswold flockmasters still wound eastward to the sea for the benefit of the merchants of the staple and the continental manufacturer.

Manufactures and wool trade.

State of the rural population.

As regards domestic agriculture, it has been often stated that the 15th century was the golden age of the English peasant, and that his prosperity was little affected either by the unhappy French wars of Henry VI. or by the Wars of the Roses. There is certainly very little evidence of any general discontent among the rural population, such as had prevailed in the times of Edward III. or Richard II. Insurrections that passed as popular, like the risings of Jack Cade and Robin of Redesdale, produced manifestos that spoke of political grievances but hardly mentioned economic ones. There is a bare mention of the Statute of Labourers in Jack Cade's ably drafted chapter of complaints. It would seem that the manorial grudges between landowner and peasant, which had been so fierce in the 14th century, had died down as the lords abandoned the old system of working their demesne by villein labour. They were now for the most part letting out the soil to tenant-farmers at a moderate rent, and the large class of yeomanry created by this movement seem to have been prosperous. The less popular device of turning old manorial arable land into sheep-runs was also known, but does not yet seem to have grown so common as to provoke the popular discontents which were to prevail under the Tudors. Probably such labour as was thrown out of work by this tendency was easily absorbed by the growing needs of the towns. Some murmurs are heard about "enclosures," but they are incidental and not widely spread.

Architecture.

One of the best tests of the prosperity of England under the Yorkist rule seems to be the immense amount of building that was on hand. Despite the needs of civil war, it was not on castles that the builders' energy was spent; the government discouraged fortresses in private hands, and the dwellings of the new nobility of Edward IV. were rather splendid manor-houses, with some slight external protection of moat and gatehouse, than old-fashioned castles. But the church-building of the time is enormous and magnificent. A very large proportion of the great Perpendicular churches of England date back to this age, and in the cathedrals also much work was going on.

Religious condition of the country.

Material prosperity does not imply spiritual development, and it must be confessed that from the intellectual and moral point of view 15th-century England presents an unpleasing picture. The Wycliffite movement, the one phenomenon which at the beginning of the century seemed to give some promise of better things, had died down under persecution. It lingered on in a subterranean fashion among a small class in the universities and the minor clergy, and had some adherents among the townsfolk and even among the peasantry. But the Lollards were a feeble and helpless minority; they no longer produced writers, organizers or missionaries. They continued to be burnt, or more frequently to make forced recantations, under the Yorkist rule, though the list of trials is not a long one. Little can be gathered concerning them from chronicles or official records. We only know that they continued to exist, and occasionally produced a martyr. But the governing powers were not fanatics, bent on seeking out victims; the spirit of Henry V. and Archbishop Arundel was dead. The life of the church seems, indeed, to have been in a more stagnant and torpid condition in this age than at any other period of English history. The great prelates from Cardinal Beaufort down to Archbishops Bourchier and Rotherham, and Bishop John Russell—trusted supporters of the Yorkist dynasty—were mere politicians with nothing spiritual about them. Occasionally they appear in odious positions. Rotherham was the ready tool of Edward IV. in the judicial murder of Clarence. Russell became the obsequious chancellor of Richard III. Bourchier made himself responsible in 1483 for the taking of the little duke of York from his mother's arms in order to place him in the power of his murderous uncle. It is difficult to find a single bishop in the whole period who was respected for his piety or virtue. The best of them were capable statesmen, the worst were mean time-servers. Few of the higher clergy were such patrons of learning as many prelates of earlier ages. William Grey of Ely and James Goldwell of Norwich did something for scholars, and there was one bishop in the period who came to sad grief through an intellectual activity which was rare among his contemporaries. This was the eccentric Reginald Pecock of Chichester, who, while setting himself to confute Lollard controversialists, lapsed into heresy by setting "reason" above "authority." He taught that the organization and many of the dogmas of the medieval church should be justified by an appeal to private judgment and the moral law, rather than to the scriptures, the councils, or the fathers. For taking up this dangerous line of defence, and admitting his doubts about several received articles of faith, he was attacked by the Yorkist archbishop Bourchier in 1457, compelled to do penance, and shut up in a monastery for the rest of his life. He seems to have had no school of followers, and his doctrines died with him.

The monasteries.

In nothing is the general stagnation of the church in the later 15th century shown better than by the gradual cessation of the monastic chronicles. The stream of narrative was still flowing strongly in 1400; by 1485 it has run dry, even St Albans, the mother of historians, produced no annalist after Whethamstede, whose story ceases early in the Wars of the Roses. The only monastic chronicler who went on writing for a few years after the extinction of the house of York was the "Croyland continuator." For the last two-thirds of the century the various "London chronicles," the work of laymen, are much more important than anything which was produced in the religious houses. The regular clergy indeed seem to have been sunk in intellectual torpor. Their numbers were falling off, their zeal was gone; there is little good to be said of them save that they were still in some cases endowing

England with splendid architectural decorations. But even in the wealthier abbeys we find traces of thriftless administration, idleness, self-indulgence and occasionally grave moral scandals. The parochial clergy were probably in a healthier condition; but the old abuses of pluralism and non-residence were as rampant as ever, and though their work may have been in many cases honourably carried out, it is certain that energy and intelligence were at a low ebb.

Moral decay of the nation.

The "Paston Letters."

Influence of the Italian Renaissance.

The moral faults of the church only reflected those of the nation. It was a hard and selfish generation which witnessed the Wars of the Roses and the dictatorship of Edward IV. The iniquitous French war, thirty years of plunder and demoralization, had corrupted the minds of the governing classes before the civil strife began. Afterwards the constant and easy changes of allegiance, as one faction or the other was in the ascendant, the wholesale confiscations and attainders, the never-ending executions, the sudden prosperity of adventurers, the premium on time-serving and intrigue, sufficed to make the whole nation cynical and sordid. The claim of the Yorkists to represent constitutional opposition to misgovernment became a mere hypocrisy. The claim of the Lancastrians to represent loyalty soon grew almost as hollow. Edward IV. with his combination of vicious self-indulgence and spasmodic cruelty was no unfit representative of his age. The *Paston Letters*, that unique collection of the private correspondence of a typical family of *nouveaux riches*, thriftless, pushing, unscrupulous, give us the true picture of the time. All that can be said in favour of the Yorkists is that they restored a certain measure of national prosperity, and that their leaders had one redeeming virtue in their addiction to literature. The learning which had died out in monasteries began to flourish again in the corrupt soil of the court. Most of Edward's favourites had literary tastes. His constable Tiptoft, the "butcher earl" of Worcester, was a figure who might have stepped out of the Italian Renaissance. A graduate of Pavia, a learned lawyer, who translated Caesar and Cicero, composed works both in Latin and English, and habitually impaled his victims, he was a man of a type hitherto unknown in England. Antony, Lord Rivers, the queen's brother, was a mere adventurer, but a poet of some merit, and a great patron of Caxton. Hastings, the Bourchiers, and other of the king's friends were minor patrons of literature. It is curious to find that Caxton, an honest man, and an enthusiast as to the future of the art of printing, which he had introduced into England, waxes enthusiastic as to the merits of the intelligent but unscrupulous peers who took an interest in his endeavours. Of the detestable Tiptoft he writes that "there flowered in virtue and cunning none like him among the lords of the temporalty in science and moral virtue"! And this is no time-serving praise of a patron, but disinterested tribute to a man who had perished long before on the scaffold.

Death of Edward IV.

Richard, duke of Gloucester.

The uneventful latter half of the reign of Edward IV. ended with his death at the age of forty-one on the 9th of April 1483. He had ruined a splendid constitution by the combination of sloth and evil living, and during his last years had been sinking slowly into his grave, unable to take the field or to discharge the more laborious duties of royalty. Since Clarence's death he had been gradually falling into the habit of transferring the conduct of great matters of state to his active and hard-working youngest brother, Richard, duke of Gloucester, who had served him well and faithfully ever since he first took the field at Barnet. Gloucester passed as a staid and religious prince, and if there was blood on his hands, the same could be said of every statesman of his time. His sudden plunge into crime and usurpation after his brother's death was wholly unexpected by the nation. Indeed it was his previous reputation for loyalty and moderation which made his scandalous *coup d'état* of 1483 possible. No prince with a sinister reputation would have had the chance of executing the series of crimes which placed him on the throne. But when Richard declared that he was the victim of plots and intrigues, and was striking down his enemies only to defend his own life and honour, he was for some time believed.

Gloucester proclaims himself protector.

At the moment of King Edward's death his elder son by Elizabeth Woodville, Edward, prince of Wales, was twelve; his younger son Richard, duke of York, was nine. It was clear that there would be a long minority, and that the only possible claimants for the regency were the queen and Richard of Gloucester. Elizabeth was personally unpopular, and the rapacity and insolence of her family was well known. Hence when Richard of Gloucester seized on the person of the young king, and imprisoned Lord Rivers and Sir Richard Grey, the queen's brother and son, on the pretence that they were conspiring against him, his action was regarded with equanimity by the people. Nor did the fact that the duke took the title of "protector and defender of the realm" cause any surprise. Suspicions only became rife after Richard had seized and beheaded without any trial, Lord Hastings, the late king's most familiar friend, and had arrested at the same moment the archbishop of York, Morton, bishop of Ely, and Lord Stanley, all persons of unimpeachable loyalty to the house of Edward IV. It was not plausible to accuse such persons of plotting with the queen to overthrow the protector, and public opinion began to turn against Gloucester. Nevertheless he went on recklessly with his design, having already enlisted the support of a party of the greater peers, who were ready to follow him to any length of treason. These confidants, the duke of Buckingham, the lords Howard and Lovel, and a few more, must have known from an early date that he was aiming at the crown, though it is improbable that they suspected that his plan involved the murder of the rightful heirs as well as mere usurpation.

Richard III. crowned.

On the 16th of June, Richard, using the aged archbishop Bourchier as his tool, got the little duke of York out of his mother's hands, and sent him to join his brother in the Tower. A few days later, having packed London with his own armed retainers and those of Buckingham and his other confidants, he openly put forward his pretensions to the throne. Edward IV., as he asserted, had been privately contracted to Lady Eleanor Talbot before he ever met Queen Elizabeth. His children therefore were bastards, the offspring of a bigamous union. As to the son and daughter of the duke of Clarence, their blood had been corrupted by their father's attainder, and they could not be reckoned as heirs to the crown. He himself, therefore, was the legitimate successor of Edward IV. This preposterous theory was set forth by Buckingham, first to the mayor and corporation of London, and next day to an assembly of the estates of the realm held in St Paul's. Cowed by the show of armed force, and remembering the fate of Hastings, the two assemblies received the claim with silence which gave consent. Richard, after a hypocritical show of reluctance, allowed himself to be saluted as king, and was crowned on the 6th of July 1483. Before the coronation ceremony he had issued orders for the execution of the queen's relatives, who had been in prison since the beginning of May. He paid his adherents lavishly for their support, making Lord Howard duke of Norfolk, and giving Buckingham enormous grants of estates and offices.

Murder of the princes.

Having accomplished his *coup d'état* Richard started for a royal progress through the Midlands, and a few days after his departure sent back secret orders to London for the murder of his two nephews in the Tower. There is no reason to doubt that they were secretly smothered on or about the 15th of July by his agent Sir James Tyrrell, or that the bones found buried under a staircase in the fortress two hundred years after belonged to the two unhappy lads. But the business was kept dark at the time, and it was long before any one could assert with certainty that they were dead or alive. Richard never published any statement as to their end, though some easy tale of a fever, a conflagration, or an accident might have served him better than the mere silence that he employed. For while many persons believed that the princes still existed there was room for all manner of impostures and false rumours.

Buckingham's rebellion.

The usurper's reign was from the first a troubled one. Less than three months after his coronation the first insurrection broke out; it was headed—strangely enough—by the duke of Buckingham, who seems to have been shocked by the murder of the princes; he must have been one of the few who had certain information of the crime. He did not take arms in his own cause, though after the house of York the house of Buckingham had the best claim to the throne, as representing Thomas of Woodstock, the youngest son of Edward III. His plan was to unite the causes of York and Lancaster by wedding the Lady Elizabeth, the eldest sister of the murdered princes, to Henry Tudor, earl of Richmond, a young exile who represented the very doubtful claim of the Beauforts to the Lancastrian heritage. Henry was the son of Margaret Beaufort, the daughter of John, first duke of Somerset, and the niece of Edmund, second duke, who fell at St Albans. All her male kinsmen had been exterminated in the Wars of the Roses.

Execution of Buckingham.

This promising scheme was to be supported by a rising of those Yorkists who rejected the usurpation of Richard III., and by the landing on the south coast of Henry of Richmond with a body of Lancastrian exiles and foreign mercenaries. But good organization was wanting, and chance fought for the king. A number of scattered risings in the south were put down by Richard's troops, while Buckingham, who had raised his banner in Wales, was prevented from bringing aid by a week of extraordinary rains which made the Severn impassable. Finding that the rest of the plan had miscarried, Buckingham's retainers melted away from him, and he was forced to fly. A few days later he was betrayed, handed over to the king, and beheaded (Nov. 2, 1483). Meanwhile Richmond's little fleet was dispersed by the same storms that scattered Buckingham's army, and he was forced to return to Brittany without having landed in England.

Here King Richard's luck ended. Though he called a parliament early in 1484, and made all manner of gracious promises of good governance, he felt that his position was insecure. The nation was profoundly disgusted with his unscrupulous policy, and the greater part of the leaders of the late insurrection had escaped abroad and were weaving new plots. Early in the spring he lost his only son and heir, Edward, prince of Wales, and the question of the succession to the crown was opened from a new point of view. After some hesitation Richard named his nephew John de la Pole, earl of Lincoln, a son of his sister, as his heir. But he also bethought him of another and a most repulsive plan for strengthening his position. His queen, Anne Neville, the daughter of the kingmaker, was on her death-bed. With indecent haste he began to devise a scheme for marrying his niece Elizabeth, whose brothers he had murdered but a year before. Knowledge of this scheme is said to have shortened the life of the unfortunate Anne, and many did not scruple to say that her husband had made away with her.

Henry of Richmond lands at Milford.

When the queen was dead, and some rumours of the king's intentions got abroad, the public indignation was so great that Richard's councillors had to warn him to disavow the projected marriage, if he wished to retain a single adherent. He yielded, and made public complaint that he had been slandered—which few believed. Meanwhile the conspirators of 1483 were busy in organizing another plan of invasion. This time it was successfully carried out, and the earl of Richmond landed at Milford Haven with many exiles, both Yorkists and Lancastrians, and 1000 mercenaries lent him by the princess regent of France. The Welsh joined him in great numbers, not forgetting that by his Tudor descent he was their own kinsman, and when he reached Shrewsbury English adherents also began to flock in to his banner, for the whole country was seething with discontent, and Richard III. had but few loyal adherents. When the rivals met at Bosworth Field (Aug. 22, 1485) the king's army was far the larger, but the greater part of it was determined not to fight. When battle was joined some left the field and many joined the pretender. Richard, however, refused to fly, and was slain, fighting to the last, along with the duke of Norfolk and a few other of his more desperate partisans. The slaughter was small, for treason, not the sword, had settled the day. The battered crown which had fallen from Richard's helmet was set on the victor's head by Lord Stanley, the chief of the Yorkist peers who had joined his standard, and his army hailed him by the new title of Henry VII.

Battle of Bosworth.

Henry VII.

No monarch of England since William the Conqueror, not excluding Stephen and Henry IV., could show such a poor title to the throne as the first of the Tudor kings. His claim to represent the house of Lancaster was of the weakest—when Henry IV. had assented to the legitimating of his brothers the Beauforts, he had attached a clause to the act, to provide that they were given every right save that of counting in the line of succession to the throne. The true heir to the house of John of Gaunt should have been sought among the descendants of his eldest legitimate daughter, not among those of his base-born sons. The earl of Richmond had been selected by the conspirators as their figure-head mainly because he was known as a young man of ability, and because he was unmarried and could therefore take to wife the princess Elizabeth, and so absorb the Yorkist claim in his own. This had been the essential part of the bargain, and Henry was ready to carry it out, but he insisted that he should first be recognized as king in his own right, lest it might be held that he ruled merely as his destined wife's consort. He was careful to hold his first parliament and get his title acknowledged before he married the princess. When he had done so, he had the triple claim by conquest, by election and by inheritance, safely united. Yet his position was even then insecure; the vicissitudes of the last thirty years had shaken the old prestige of the name of king, and a weaker and less capable man than Henry Tudor might have failed to retain the crown that he had won. There were plenty of possible pretenders in existence; the earl of Lincoln, whom Richard III. had recognized as his heir, was still alive; the two children of the duke of Clarence might be made the tools of conspirators; and there was a widespread doubt as to whether the sons of Edward IV. had actually died in the Tower. The secrecy with which their uncle had carried out their murder was destined to be a sore hindrance to his successor.

Early years of the reign.

Insurrections and plots.

Bosworth Field is often treated as the last act of the Wars of the Roses. This is an error; they were protracted for twelve years after the accession of Henry VII., and did not really end till the time of Blackheath Field and the siege of Exeter (1497). The position of the first Tudor king is misconceived if his early years are regarded as a time of strong governance and well-established order. On the contrary he was in continual danger, and was striving with all the resources of a ready and untiring mind to rebuild foundations that were absolutely rotten. Phenomena like the Cornish revolt (which recalls Cade's insurrection) and the Yorkshire rising of 1489, which began with the death of the earl of Northumberland, show that at any moment whole counties might take arms in sheer lawlessness, or for some local grievance. Loyalty was such an uncertain thing that the king might call out great levies yet be forced to doubt whether they would fight for him—at Stoke Field it seems that a large part of Henry's army misbehaved, much as that of Richard III. had done at Bosworth. The demoralization brought about by the evil years between 1453 and 1483 could not be lived down in a day—any sort of treason was possible to the generation that had seen the career of Warwick and the usurpation of Gloucester. The survivors of that time were capable of taking arms for any cause that offered a chance of unreasonable profit, and no one's loyalty could be trusted. Did not Sir William Stanley, the best paid of those who betrayed Richard III., afterwards lose his head for a deliberate plot to betray Henry VII.? The various attempts that were made to overturn the new dynasty seem contemptible to the historian of the 20th century. They were not so contemptible at the time, because England and Ireland were full of adventurers who were ready to back any cause, and who looked on the king of the moment as no more than a successful member of their own class—a base-born Welshman who had been lucky enough to become the figurehead of the movement that had overturned an unpopular usurper. The organizing spirits of the early troubles of the reign of Henry VII. were irreconcilable Yorkists who had suffered by the change of dynasty; but their hopes of success rested less on their own strength than on the not ill-founded notion that England would tire of any ruler who had to raise taxes and reward his partisans. The position bore a curious resemblance to that of the early years of Henry IV., a king who, like Henry VII., had to vindicate a doubtful elective title to the throne by miracles of cunning and activity. The later representative of the house of Lancaster was fortunate, however, in having less formidable enemies than the earlier; the power of the baronage had been shaken by the Wars of the Roses no less than the power of the crown; so many old estates had passed rapidly from hand to hand, so many old titles were represented by upstarts destitute of local influence, that the feudal danger had become far less. Risings like that of the Percies in 1403 were not the things which the seventh Henry had to fear. He was lucky too in having no adversary of genius of the type of Owen Glendower. Welsh national spirit indeed was enlisted on his own side. Yet leaderless seditions and the plots of obvious impostors sufficed to make his throne tremble, and a ruler less resolute, less wary, and less unscrupulous might have been overthrown.

Lambert Simnel.

The first of the king's troubles was an abortive rising in the north riding of Yorkshire, the only district where Richard III. seems to have enjoyed personal popularity. It was led by Lord Lovel, Richard's chamberlain and admiral; but the insurgents dispersed when Henry marched against them with a large force (1486), and Lovel took refuge in Flanders with Margaret of York, the widow of Charles the Bold of Burgundy, whose dower towns were the refuge of all English exiles, and whose coffers were always open to subsidize plots against her niece's husband. Under the auspices of this rancorous princess the second conspiracy was hatched in the following year (1487). Its leaders were Lovel and John, earl of Lincoln, whom Richard III. had designated as his heir. But the Yorkist banner was to be raised, not in the name of Lincoln, but in that of the boy Edward of Clarence, then a prisoner in the Tower. His absence and captivity might seem a fatal hindrance, but the conspirators had prepared a " double " who was to take his name till he could be released. This was a lad named Lambert Simnel, the son of an Oxford organ-maker, who bore a personal resemblance to the young captive. The conspirators seem to have argued that Henry VII. would not proceed to murder the real Edward, but would rather exhibit him to prove the imposition; if he took the more drastic alternative Lincoln could fall back on his own claim to the crown.

Battle of Stoke.

In May 1487 Lincoln and Lovel landed in Ireland accompanied by other exiles and 2000 German mercenaries. The cause of York was popular in the Pale, and the Anglo-Irish barons seem to have conceived the notion that Henry VII. was likely to prove too strong and capable a king to suit their convenience. The invading army was welcomed by almost all the lords, and the spurious Clarence was crowned at Dublin by the name of Edward VI. A few weeks later Lincoln had recruited his army with 4000 or 5000 Irish adventurers under Thomas Fitzgerald, son of the earl of Kildare, and had taken ship for England. He landed in Lancashire, and pushed forward, hoping to gather the English Yorkists to his aid. But few had joined him when King Henry brought him to action at Stoke, near Newark, on the 17th of July. Despite the doubtful conduct of part of the royal army, and the fierce resistance of the Germans and Irish, the rebel army was routed. Lincoln and Fitzgerald were slain; Lovel disappeared in the rout; the young impostor Simnel was taken prisoner. Henry treated him with politic contempt, and made him a cook boy in his kitchen. He lived for many years after in the royal household. The Irish lords were pardoned on renewing their oaths of fealty; the king did not wish to entangle himself in costly campaigns beyond St George's Channel till he had made his position in England more stable.

Foreign alliances.

Treaty of Étaples.

The Yorkist cause was crushed for four years, till it was raised again by Margaret of Burgundy, with an imposture even more preposterous than that of Lambert Simnel. In the intervening space, however, while Henry VII. was comparatively undisturbed by domestic rebellion, he found opportunity for a first tentative experiment at interfering in European politics. He allied himself with Ferdinand and Isabella of Spain and with Maximilian of Austria, who was ruling the Netherlands in behalf of his young son, Philip, the heir of the Burgundian inheritance, for the purpose of preventing France from annexing Brittany, the last great fief of the crown which had not yet been absorbed into the Valois royal domain. This struggle, the only continental war in which the first of the Tudors risked his fortunes, was not prosecuted with any great energy, and came to a necessary end when Anne, duchess of Brittany, in whose behalf it was being waged, disappointed her allies by marrying Charles VIII. of her own freewill (Dec. 1491). Henry very wisely proceeded to get out of the war on the best terms possible, and, to the disgust of Maximilian, sold peace to the French king for 600,000 crowns, as well as an additional sum representing arrears of the pension which Louis XI. had been bound to pay to Edward IV. This treaty of Étaples was, in short, a repetition of Edward's treaty of Picquigny, equally profitable and less disgraceful, for Maximilian of Austria, whom Henry thus abandoned, had given more cause of offence than had Charles of Burgundy in 1475. Domestic malcontents did not scruple to hint that the king, like his father-in-law before him, had made war on France, not with any hope of renewing the glories of Creçy or Agincourt, still less with any design of helping his allies, but purely to get first grants from his parliament, and then a war indemnity from his enemies. In any case he was wise to make peace. France was now too strong for England, and both Maximilian and Ferdinand of Spain were selfish and shifty allies. Moreover, it was known that the one dominating desire of Charles VIII. was to conquer Italy, and it was clear that his ambitions in that direction were not likely to prove dangerous to England.

Yorkist plots. Perkin Warbeck.

In the year of the treaty of Étaples the Yorkist conspiracies began once more to thicken, and Henry was fortunate to escape with profit from the French war before his domestic troubles recommenced. Ever since 1483 it had been rumoured that one or both of the sons of Edward IV. had escaped, not having been murdered in the Tower. Of this widespread belief the plotters now took advantage; they held that much more could be accomplished with such a claim than by using that of the unfortunate Edward of Clarence, whose chances were so severely handicapped by his being still the prisoner of Henry VII. The scheme for producing a false Plantagenet was first renewed in Ireland, where Simnel's imposture had been so easily taken up a few years before. The tool selected was one Perkin Warbeck, a handsome youth of seventeen or eighteen, the son of a citizen of Tournai, who had lived for some time in London, where Perkin had actually been born. There is a bare possibility that the young adventurer may have been an illegitimate son of Edward IV.; his likeness to the late king was much noticed. When he declared himself to be Richard of York, he obtained some support in Ireland from the earl of Desmond and other lords; but he did not risk open rebellion till he had visited Flanders, and had been acknowledged as her undoubted nephew by Duchess Margaret. Maximilian of Austria also took up his cause, as a happy means of revenging himself on Henry VII. for the treaty of Étaples. There can be small doubt that both the duchess and the German King (Maximilian had succeeded to his father's crown in 1493) were perfectly well aware that they were aiding a manifest fraud. But they made much of Perkin, who followed the imperial court for two years, while his patron was intriguing with English malcontents. The emissaries from Flanders got many promises of assistance, and a formidable rising might have taken place had not Henry VII. been well served by his spies. But in the winter of 1494–1495 the traitors were themselves betrayed, and a large number of arrests were made, including not only Lord Fitzwalter and a number of well-known knights of Yorkist families, but Sir William Stanley, the king's chamberlain, who had been rewarded with enormous gifts for his good service at Bosworth, and was reckoned one of the chief supports of the throne. Stanley and several others were beheaded, the rest hanged or imprisoned. This vigorous action on the part of the king seems to have cowed all Warbeck's supporters on English soil. But the pretender nevertheless sailed from Flanders in July 1495 with a following of 2000 exiles and German mercenaries. He attempted to land at Deal, but his vanguard was destroyed by Kentish levies, and he drew off and made for Ireland. Suspecting that this would be his goal, King Henry had been doing his best to strengthen his hold on the Pale, whither he had sent his capable servant Sir Edward Poynings as lord deputy. Already before Warbeck's arrival Poynings had arrested the earl of Kildare, Simnel's old supporter, cowed some of the Irish by military force, and bought over others by promises of subsidies and pensions. But his best-remembered achievement was that he had induced the Irish parliament to pass the ordinances known as "Poynings' Law," by which it acknowledged that it could pass no legislation which had not been approved by the king and his council, and agreed that all statutes passed by the English parliament should be in force in Ireland. That such terms could be imposed shows the strength of Poynings' arm, and his vigour was equally evident when Warbeck came ashore in Munster in July 1495. Few joined the impostor save the earl of Desmond, and he was repulsed from Waterford, and dared not face the army which the lord deputy put into the field against him. Thereupon, abandoning his Irish schemes, Warbeck sailed to Scotland, whose young king James IV. had just been seduced by the emperor Maximilian into declaring war on England. He promised the Scottish king Berwick and 50,000 crowns in return for the aid of an army. James took the offer, gave him the hand of his kinswoman Catherine Gordon, daughter of the earl of Huntly, and took him forth for a raid into Northumberland (1496). But a pretender backed by Scottish spears did not appeal to the sympathies of the English borderers. The expedition fell flat; not a man joined the banner of the white rose, and James became aware that he had set forth on a fool's errand. But Warbeck soon found other allies of a most unexpected sort. The heavy taxation granted by the English parliament for the Scottish war had provoked discontent and rioting in the south-western counties. In Cornwall especially the disorders grew to such a pitch that local demagogues called out several thousand men to resist the tax-collectors, and finally raised open rebellion, proposing to march on London and compel the king to dismiss his ministers. These spiritual heirs of Jack Cade were Flammock, a lawyer of Bodmin, and a farrier named Michael Joseph. Whether they had any communication with Warbeck it is impossible to say; there is no proof of such a connexion, but their acts served him well. A Cornish army marched straight on London, picking up some supporters in Devon and Somerset on their way, including a discontented baron, Lord Audley, whom they made their captain.

Cornish rebellion.

So precarious was the hold of Henry VII. on the throne that he was in great danger from this outbreak of mere local turbulence. The rebels swept over five counties unopposed, and were only stopped and beaten in a hard fight on Blackheath, when they had reached the gates of London. Audley, the farrier and the lawyer were all captured and executed (June 18, 1497). But the crisis was not yet at an end. Warbeck, hearing of the rising, but not of its suppression, had left Scotland, and appeared in Devonshire in August. He rallied the wrecks of the west country rebels, and presently appeared before the gates of Exeter with nearly 8000 men. But the citizens held out against him, and presently the approach of the royal army was reported. The pretender led off his horde to meet the relieving force, but when he reached Taunton he found that his followers were so dispirited that disaster was certain. Thereupon he absconded by night, and took sanctuary in the abbey of Beaulieu. He offered to confess his imposture if he were promised his life, and the king accepted the terms. First at Taunton and again at Westminster, Perkin publicly recited a long narrative of his real parentage, his frauds and his adventures. He was then consigned to not over strict confinement in the Tower, and might have fared no worse than Lambert Simnel if he had possessed his soul in patience. But in the next year he corrupted his warders, broke out from his prison, and tried to escape beyond seas. He was captured, but the king again spared his life, though he was placed for the future in a dungeon "where he could see neither moon nor sun." Even this did not tame the impostor's mercurial temperament. In 1499 he again planned an escape, which was to be shared by another prisoner, the unfortunate Edward of Clarence, earl of Warwick, whose cell was in the storey above his own. But there were traitors among the Tower officials whom they suborned to help them, and the king was warned of the plot. He allowed it to proceed to the verge of execution, and then arrested both the false and the true Plantagenet. Evidence of a suspicious character was produced to show that they had planned rebellion as well as mere escape, and both were put to death with some of their accomplices. Warbeck deserved all that he reaped, but the unlucky Clarence's fate estranged many hearts from the king. The simple and weakly young man, who had spent fifteen of his twenty-five years in confinement, had, in all probability, done no more than scheme for an escape from his dungeon. But as the true male heir of the house of Plantagenet he was too dangerous to be allowed to survive.

Battle of Blackheath.

Execution of Warbeck and Edward of Clarence.

The turbulent portion of the reign of Henry VII. came to an end with Blackheath Field and the siege of Exeter. From that time forward the Tudor dynasty was no longer in serious danger; there were still some abortive plots, but none that had any prospect of winning popular support. The chances of Warbeck and Clarence had vanished long before they went to the scaffold. The Yorkist claim, after Clarence's death, might be supposed to have passed to his cousin Edmund, earl of Suffolk, the younger brother of that John, earl of Lincoln, who had been declared heir to the crown by Richard III., and had fallen at Stoke field. Fully conscious of the danger of his position, Suffolk fled to the continent, and lived for many years as a pensioner of the emperor Maximilian. Apparently he dabbled in treason; it is at any rate certain that in 1501 King Henry executed some, and imprisoned others, of his relatives and retainers. But his plots, such as they were, seem to have been futile. There was no substratum of popular discontent left in England on which a dangerous insurrection might be built up. It was to be forty years before another outbreak of turbulence against the crown was to break forth.

Establishment of the Tudor dynasty.

VI. The Tudor Despotism and the Beginnings of the Reformation (1497–1528)

The last twelve years of the reign of Henry VII. present in most respects a complete contrast to the earlier period, 1485–1497. There were no more rebellions, and—as we have already seen—no more plots that caused any serious danger. Nor did the king indulge his unruly subjects in foreign wars, though he was constantly engaged in negotiations with France, Scotland, Spain and the emperor, which from time to time took awkward turns. But Henry was determined to win all that he could by diplomacy, and not by force of arms. His cautious, but often unscrupulous, dealings with the rival continental powers had two main ends: the first was to keep his own position safe by playing off France against the Empire and Spain; the second was to get commercial advantages by dangling his alliance before each power in turn. Flanders was still the greatest customer of England, and it was therefore necessary above all things to keep on good terms with the archduke Philip, the son of Maximilian, who on coming of age had taken over the rule of the Netherlands from his father.

Commercial treaties.

The king's great triumphs were the conclusion of the *Intercursus Magnus* of 1496 and the *Intercursus Malus* (so called by the Flemings, not by the English) of 1506. The former provided for a renewal of the old commercial alliance with the house of Burgundy, on the same terms under which it had existed in the time of Edward IV.; the rupture which had taken place during the years when Maximilian was backing Perkin Warbeck had been equally injurious to both parties. The *Malus Intercursus* on the other hand gave England some privileges which she had not before enjoyed—exemption from local tolls in Antwerp and Holland, and a licence for English merchants to sell cloth retail as well as wholesale—a concession which hit the Netherland small traders and middlemen very hard. Another great commercial advantage secured by Henry VII. for his subjects was an increased share of the trade to the Scandinavian countries. The old treaties of Edward IV. with the Hanseatic League had left the Germans still in control of the northern seas. Nearly all the Baltic goods, and most of those from Denmark and Norway, had been reaching London or Hull in foreign bottoms. Henry allied himself with John of Denmark, who was chafing under the monopoly of the Hansa, and obtained the most ample grants of free trade in his realms. The Germans murmured, but the English shipping in eastern and northern waters continued to multiply. Much the same policy was pursued in the Mediterranean. Southern goods hitherto had come to Southampton or Sandwich invariably in Venetian carracks, which took back in return English wool and metals. Henry concluded a treaty with Florence, by which that republic undertook to receive his ships in its harbours and to allow them to purchase all eastern goods that they might require. From this time forward the Venetian monopoly ceased, and the visits of English merchant vessels to the Mediterranean became frequent and regular.

English navigators.

Nor was it in dealing with old lines of trade alone that Henry Tudor showed himself the watchful guardian of the interests of his subjects. He must take his share of credit for the encouragement of the exploration of the seas of the Far West. The British traders had already pushed far into the Atlantic before Columbus discovered America; fired by the success of the great navigator they continued their adventures, hoping like him to discover a short "north-west passage" to Cathay and Japan. With a charter from the king giving him leave to set up the English banner on all the lands he might discover, the Bristol Genoese trader John Cabot successfully passed the great sea in 1497, and discovered Newfoundland and its rich fishing stations. Henry rewarded him with a pension of £20 a year, and encouraged him to further exploration, in which he discovered all the American coast-line from Labrador to the mouth of the Delaware—a great heritage for England, but one not destined to be taken up for colonization till more than a century had passed.

Foreign policy of Henry VII.

Henry's services to English commerce were undoubtedly of far more importance to the nation than all the tortuous details of his foreign policy. His chicanery need not, however, be censured over much, for the princes with whom he had to deal, and notably Ferdinand and Maximilian, were as insincere and selfish as himself. Few diplomatic hagglings have been so long and so sordid as that between England and Spain over the marriage treaty which gave the hand of Catherine of Aragon first to Henry's eldest son Arthur, and then, on his premature death in 1502, to his second son Henry. The English king no doubt imagined that he had secured a good bargain, as he had kept the princess's dowry, and yet never gave Ferdinand any practical assistance in war or peace. It is interesting to find that he had for some time at the end of his reign a second Spanish marriage in view; his wife Elizabeth of York having died in 1503, he seriously proposed himself as a suitor for Joanna of Castile, the elder sister of Catherine, and the widow of the archduke Philip, though she was known to be insane. Apparently he hoped thereby to gain vantage ground for an interference in Spanish politics, which would have been most offensive to Ferdinand. Nothing came of the project, which contrasts strangely with the greater part of Henry's sober and cautious schemes.

Marriage of James IV. of Scotland and Margaret Tudor.

On the other hand a third project of marriage alliance which Henry carried out in 1503 was destined to be consummated, and to have momentous, though long-deferred, results. This was the giving of the hand of his daughter Margaret to James IV. of Scotland. Thereby he bought quiet on the Border and alliance with Scotland for no more than some ten years. But—as it chanced—the issue of this alliance was destined to unite the English and the Scottish crowns, when the male line of the Tudors died out, and Henry, quite unintentionally, had his share in bringing about the consummation, by peaceful means, of that end which Edward I. had sought for so long to win by the strong hand.

Character of Henry's internal rule.

All the foreign politics of the reign of Henry VII. have small importance compared with his work within the realm. The true monument of his ability was that he left England tamed and orderly, with an obedient people and a full exchequer, though he had taken it over wellnigh in a state of anarchy. The mere suppression of insurrections like those of Simnel and Warbeck was a small part of his task. The harder part was to recreate a spirit of order and subordination among a nation accustomed to long civil strife. His instruments were ministers of ability chosen from the clergy and the gentry—he seems to have been equally averse to trusting the baronage at the one end of the social scale, or mere upstarts at the other, and it is notable that no one during his reign can be called a court favourite. The best-known names among his servants were his great chancellor, Archbishop Morton, Foxe, bishop of Winchester, Sir Reginald Bray, and the lawyers Empson and Dudley. These two last bore the brunt of the unpopularity of the financial policy of the king during the latter half of his reign, when the vice of avarice seems to have grown upon him beyond all reason. But Henry was such a hard-working monarch, and so familiar with all the details of administration, that his ministers cannot be said to have had any independent authority, or to have directed their master's course of action.

The Star Chamber.

The machinery employed by the first of the Tudors for the suppression of domestic disorder is well known. The most important item added by him to the administrative machinery of the realm was the famous Star Chamber, which was licensed by the parliament of 1487. It consisted of a small committee of ministers, privy councillors and judges, which sat to deal with offences that seemed to lie outside the scope of the common law, or more frequently with the misdoings of men who were so powerful that the local courts could not be trusted to execute justice upon them, such as great landowners, sheriffs and other royal officials, or turbulent individuals who were the terror of their native districts. The need for a strong central court directly inspired by the king, which could administer justice without respect of persons, was so great, that the constitutional danger of establishing an autocratic judicial committee, untrammelled by the ordinary rules of law, escaped notice at the time. It was not till much later that the nation came to look upon the Star Chamber as the special engine of royal tyranny and to loathe its name. In 1500 it was for the common profit of the realm that there should exist such a court, which could reduce even the most powerful offender to order.

Suppression of livery and maintenance.

One of the most notable parts of the king's policy was his long-continued and successful assault on the abuse of "livery and maintenance," which had been at its height during the Wars of the Roses. We have seen the part which it had taken in strengthening the influence of those who were already too powerful, and weakening the ordinary operation of the law. Henry put it down with a strong hand, forbidding all liveries entirely, save for the mere domestic retainers of each magnate. His determination to end the system was well shown by the fact that he heavily fined even the earl of Oxford, the companion of his exile, the victor of Bosworth, and the most notoriously loyal peer in the realm, for an ostentatious violation of the statute. Where Oxford was punished, no less favoured person could hope to escape. By the end of the reign the little hosts of badged adherents which had formed the nucleus for the armies of the Wars of the Roses had ceased to exist.

Personal rule.

Edward IV., as has been already remarked, had many of the opportunities of the autocrat, if only he had cared to use them; but his sloth and self-indulgence stood in the way. Henry VII., the most laborious and systematic of men, turned them to account. He formed his personal opinion on every problem of administration and intervened himself in every detail. In many respects he was his own prime minister, and nothing was done without his knowledge and consent. A consistent policy may be detected in all his acts—that of gathering all the machinery of government into his own hands. Under the later Plantagenets and the Lancastrian kings the great check on the power of the crown had been that financial difficulties were continually compelling the sovereign to summon parliaments. The estates had interfered perpetually in all the details of governance, by means of the power of the purse. Edward IV., first among English sovereigns, had been able to dispense with parliaments for periods of many years, because he did not need their grants save at long intervals. Henry was in the same position; by strict economy, by the use of foreign subsidies, by the automatic growth of his revenues during a time of peace and returning prosperity, by confiscation and forfeitures, he built himself up a financial position which rendered it unnecessary for him to make frequent appeals to parliament. Not the least fertile of his expedients was that regular exploitation of the law as a source of revenue, which had already been seen in the time of his father-in-law. This part of Henry's policy is connected with the name of his two extortionate "fiscal judges" Empson and Dudley, who "turned law and justice into rapine" by their minute inquisition into all technical breaches of legality, and the nice fashion in which they adapted the fine to the wealth of the misdemeanant, without any reference to his moral guilt or any regard for extenuating circumstances. The king must take the responsibility for their unjust doings; it was his coffers which mainly profited by their chicane. In his later years he fell into the vice of hoarding money for its own sake; so necessary was it to his policy that he should be free, as far as possible, from the need for applying to parliament for money, that he became morbidly anxious to have great hoards in readiness for any possible day of financial stress. At his death he is said to have had £1,800,000 in hard cash laid by. Hence it is not strange to find that he was able to dispense with parliaments in a fashion that would have seemed incredible to a 14th-century king. In his whole reign he only asked them five times for grants of taxation, and three of the five requests were made during the first seven years of his reign. In the eyes of many men parliament lost the main reason for its existence when it ceased to be the habitual provider of funds for the ordinary expenses of the realm. Those who had a better conception of its proper functions could see that it had at any rate been stripped of its chief power when the king no longer required its subsidies. There are traces of a want of public interest in its proceedings, very different from the anxiety with which they used to be followed in Plantagenet and Lancastrian times. Legislation, which only incidentally affects him, is very much less exciting to the ordinary citizen than taxation, which aims directly at his pocket. It is at any rate clear that during the latter years of his reign, when the time of impostures and rebellions had ended, Henry was able to dispense with parliaments to a great extent, and incurred no unpopularity by doing so. Indeed he was accepted by the English people as the benefactor who had delivered them from anarchy; and if they murmured at his love of hoarding, and cursed his inquisitors Empson and Dudley, they had no wish to change the Tudor rule, and were far from regarding the times of the "Lancastrian experiment" as a lost golden age. The present king might be unscrupulous and avaricious, but he was cautious, intelligent and economical; no one would have wished to recall the régime of that "crowned saint" Henry VI.

Henry VIII.

Nevertheless when the first of the Tudors died, on the 21st of April 1509, there were few who regretted him. He was not a monarch to rouse enthusiasm, while much was expected from his brilliant, clever and handsome son Henry VIII., whose magnificent presence and manly vigour recalled the early prime of Edward IV. Some years later England realized that its new king had inherited not only the physical beauty and strength of his grandfather, but also every one of his faults, with the sole exception of his tendency to sloth. Henry VIII. indeed may be said, to sum up his character in brief, to have combined his father's brains with his grandfather's passions. Edward IV. was selfish and cruel, but failed to become a tyrant because he lacked the energy for continuous work. Henry VII. was unscrupulous and untiring, but so cautious and wary that he avoided violent action and dangerous risks. Their descendant had neither Edward's sloth nor Henry's moderation; he was capable of going to almost any lengths in pursuit of the gratification of his ambition, his passions, his resentment or his simple love of self-assertion. Yet, however far he might go on the road to tyranny, Henry had sufficient cunning, versatility and power of cool reflection, to know precisely when he had reached the edge of the impossible. He had his father's faculty for gauging public opinion, and estimating dangers, and though his more venturous temperament led him to press on far beyond the point at which the seventh Henry would have halted, he always stopped short on the hither side of the gulf. It was the most marvellous proof of his ability that he died on his throne after nearly forty years of autocratic rule, during which he had roused more enmities and done more to change the face of the realm than any of the kings that were before him.

But it was long before the nation could estimate all the features of the magnificent but sinister figure which was to dominate England from 1509 to 1547. At his accession Henry VIII. was only eighteen years of age, and, if his character was already formed, it was only the attractive side of it that was yet visible. His personal beauty, his keen intelligence, his scholarship, his love of music and the arts, his kingly ambition, were all obvious enough. His selfishness, his cruelty, his ingratitude, his fierce hatred of criticism and opposition, his sensuality, had yet to be discovered by his subjects. A suspicious observer might have detected something ominous in the first act of his reign—the arrest and attainder of his father's unpopular ministers, Empson and Dudley, whose heads he flung to the people in order to win a moment's applause. Whatever their faults, they had served the house of Tudor well, and it was a grotesque perversion of justice to send them to the scaffold on a charge of high treason. A similar piece of cruelty was the execution, some time later, of the earl of Suffolk, who had been languishing long years in the Tower; he was destroyed not for any new plots, but simply for his Yorkist descent. But in Henry's earlier years such acts were still unusual; it was not till he had grown older, and had learnt how much the nation would endure, that judicial murder became part of his established policy.

Continental projects of Henry VIII.

Henry's first outburst of self-assertion took the form of reversing his father's thrifty and peaceful policy, by plunging into the midst of the continental wars from which England had been held back by his cautious parent. The adventure was wholly unnecessary, and also unprofitable. But while France was engaged in the "Holy War" against the pope, Venice, the emperor, and Ferdinand of Spain, Henry renewed the old claims of the Plantagenets, and hoped, if not to win back the position of Edward III., at least to recover the duchy of Aquitaine, or some parts of it. He lent an army to Ferdinand for the invasion of Gascony, and landed himself at Calais with 25,000 men, to beat up the northern border of France. Little good came of his efforts. The Spanish king gave no assistance, and the northern campaign, though it included the brilliant battle of the Spurs (August 16th, 1513), accomplished nothing more than the capture of Tournai and Thérouanne. It was soon borne in upon

Treaty of Étaples.

King Henry that France, even when engaged with other enemies, was too strong to be overrun in the old style. Moreover, his allies were giving him no aid, though they had eagerly accepted his great subsidies. With a sudden revulsion of feeling Henry offered peace to France, which King Louis XII. gladly bought, agreeing to renew the old pension or tribute that Henry VII. had received by the treaty of Étaples. Their reconciliation and alliance were sealed by the marriage of the French king to Henry's favourite sister Mary, who was the bridegroom's junior by more than thirty years. Their wedlock and the Anglo-French alliance lasted only till the next year, when Louis died, and Mary secretly espoused an old admirer, Charles Brandon, afterwards duke of Suffolk, King Henry's greatest friend and confidant.

War with Scotland. Battle of Flodden.

While the French war was still in progress there had been heavy fighting on the Scottish border. James IV., reverting to the traditionary policy of his ancestors, had taken the opportunity of attacking England while her king and his army were over-seas. He suffered a disaster which recalls that of David II. at Neville's Cross—a fight which had taken place under precisely similar political conditions. After taking a few Northumbrian castles, James was brought to action at Flodden Field by the earl of Surrey (September 9th, 1513). After a desperate fight lasting the greater part of a day, the Scots were outmanœuvred and surrounded. James IV.—who had refused to quit the field—was slain in the forefront of the battle, with the greater part of his nobles; with him fell also some 10,000 or 12,000 of his men. Scotland, with her military power brought low, and an infant king on the throne, was a negligible quantity in international politics for some years. The queen dowager, Margaret Tudor, aided by a party that favoured peace and alliance with England, was strong enough to balance the faction under the duke of Albany which wished for perpetual war and asked for aid from France.

Thomas Wolsey.

With the peace of 1514 ended the first period of King Henry's reign. He was now no longer a boy, but a man of twenty-three, with his character fully developed; he had gradually got rid of his father's old councillors, and had chosen for himself a minister as ambitious and energetic as himself, the celebrated Thomas Wolsey, whom he had just made archbishop of York, and who obtained the rank of cardinal from the pope in the succeeding year. Wolsey was the last of the great clerical ministers of the middle ages, and by no means the worst. Like so many of his predecessors he had risen from the lower middle classes, through the royal road of the church; he had served Henry VII.'s old councillor Foxe, bishop of Winchester, as secretary, and from his household had passed into that of his master. He had been an admirable servant to both, full of zeal, intelligence and energy, and not too much burdened with scruples. The young king found in him an instrument well fitted to his hand, a man fearless, ingenious, and devoted to the furtherance of the power of the crown, by which alone he had reached his present position of authority. For fourteen years he was his master's chief minister—the person responsible in the nation's eyes for all the more unpopular assertions of the royal prerogative, and for all the heavy taxation and despotic acts which Henry's policy required. It mattered little to Henry that the cardinal was arrogant, tactless and ostentatious; indeed it suited his purpose that Wolsey should be saddled by public opinion with all the blame that ought to have been laid on his own shoulders. It was convenient that the old nobility should detest the upstart, and that the commons should imagine him to be the person responsible for the demands for money required for the royal wars. As long as his minister served his purposes and could execute his behests Henry gave him a free hand, and supported him against all his enemies. It was believed at the time, and is still sometimes maintained by historians, that Wolsey laid down schemes of policy and persuaded his master to adopt them; but the truth would appear to be that Henry was in no wise dominated by the cardinal, but imposed on him his own wishes, merely leaving matters of detail to be settled by his minister. Things indifferent might be trusted to him, but the main lines of English diplomacy and foreign policy show rather the influence of the king's personal desires of the moment than that of a statesman seeking national ends.

It has often been alleged that Henry, under the guidance of Wolsey, followed a consistent scheme for aggrandizing England, by making her the state which kept the balance of power of Europe in her hands. And it is pointed out that during the years of the cardinal's ascendancy the alliance of England was sought in turn by the great princes of the continent, and proved the make-weight in the scales. This is but a superficial view of the situation. Henry, if much courted, was much deceived by his contemporaries. They borrowed his money and his armies, but fed him with vain promises and illusory treaties. He and his minister were alternately gulled by France and by the emperor, and the net result of all their activity was bankruptcy and discontent at home and ever-frustrated hopes abroad. It is hard to build up a reputation for statecraft for either Henry or Wolsey on the sum total of English political achievement during their collaboration.

Henry VIII. and the rivalry of Francis I. and Charles V.

During the first few years of the cardinal's ascendancy the elder race of European sovereigns, the kings with whom Henry VII. had been wont to haggle, disappeared one after the other. Louis of France died in 1515, Ferdinand of Aragon in 1516, the emperor Maximilian—the last survivor of his generation—in 1519. Louis was succeeded by the active, warlike and shifty Francis I.; the heritage of both Ferdinand and Maximilian—his maternal and paternal grandfathers—fell to Charles of Habsburg, who already possessed the Netherlands in his father's right and Castile in that of his mother. The enmity of the house of Valois and the house of Habsburg, which had first appeared in the wars of Charles VIII. and Maximilian, took a far more bitter shape under Francis I. and Charles V., two young princes who were rivals from their youth. Their wars were almost perpetual, their peaces never honestly carried out. Their powers were very equally balanced; if Charles owned broader lands than Francis, they were more scattered and in some cases less loyal. The solid and wealthy realm of France proved able to make head against Spain and the Netherlands, even when they were backed by the emperor's German vassals. Charles was also distracted by many stabs in the back from the Ottoman Turks, who were just beginning their attack on Christendom along the line of the Danube. To each of the combatants it seemed that the English alliance would turn the scale in his own favour. Henry was much courted, and wooed with promises of lands to be won from the other side by his ally of the moment. But neither Charles nor Francis wished him to be a real gainer, and he himself was a most untrustworthy friend, for he was quite ready to turn against his ally if he seemed to be growing too powerful, and threatened to dominate all Europe; the complete success of either party would mean that England would sink once more into a second-rate power. How faithless and insincere was Henry's policy may be gauged from the fact that in 1520, after all the pageantry of the "Field of the Cloth of Gold" and his vows of undying friendship for Francis, he met Charles a few weeks later at Gravelines, and concluded with him a treaty which pledged England to a defensive alliance against the king's "good brother" of France. Such things happened not once nor twice during the years of Wolsey's ministry. It was hardly to be wondered at, therefore, if Henry's allies regularly endeavoured to cheat him out of his share of their joint profits. What use was there in rewarding a friend who might become an enemy to-morrow? The greatest deception of all was in 1522, when Charles V., who had made the extraordinary promise that he would get Wolsey made pope, and lend Henry an army to conquer northern France, failed to redeem his word in both respects. He caused his own old tutor, Adrian of Utrecht, to be crowned with the papal tiara, and left the English to invade Picardy entirely unassisted. But this was only one of many such disappointments.

Failure of Henry's diplomacy.

Beginnings of parliamentary resistance.

The result of some twelve years of abortive alliances and ill-kept treaties was that Henry had obtained no single one of the advantages which he had coveted, and that he had lavished untold wealth and many English lives upon phantom schemes which crumbled between his fingers. His subjects had already begun to murmur; the early parliaments of his reign had been passive and complaisant; but by 1523 the Commons had been goaded into resistance. They granted only half the subsidies asked from them, pleading that three summers more of such taxation as the cardinal demanded for his master would leave the realm drained of its last penny, and reduced to fall back on primitive forms of barter, "clothes for victuals and bread for cheese," out of mere want of coin. Fortunately for the king his subjects laid all the blame upon his mouthpiece the cardinal, instead of placing it where it was due. On Wolsey's back also was saddled the most iniquitous of Henry's acts of tyranny against individuals—the judicial murder of the duke of Buckingham, the highest head among the English nobility. For some hasty words, amplified by the doubtful evidence of treacherous retainers, together with a foolish charge of dabbling with astrologers, the heir of the royal line of Thomas of Woodstock had been tried and executed with scandalous haste. His only real crime was that, commenting on the lack of male heirs to the crown—for after many years of wedlock with Catherine of Aragon Henry's sole issue was one sickly daughter—he had been foolish enough to remark that if anything should happen to the king he himself was close in succession to the crown. The cardinal bore the blame, because he and Buckingham had notoriously disliked each other; but the deed had really been of the king's own contriving. He was roused to implacable wrath by anyone who dared to speak on the forbidden topic of the succession question.

Execution of the duke of Buckingham.

Question of the king's divorce.

In the later years of Wolsey's ascendancy, nevertheless, that same question was the subject of many anxious thoughts. From Henry's own mind it was never long absent; he yearned for a male heir, and he was growing tired of his wife Catherine, who was some years older than himself, had few personal attractions, and was growing somewhat of an invalid. Somewhere about the end of 1526 those who were in the king's intimate confidence began to be aware that he was meditating a divorce—a thing not lightly to be taken in hand, for the queen was the aunt of the emperor Charles V., who would be vastly offended at such a proposal. But Henry's doubts had been marvellously stimulated by the fact that he had become enamoured of another lady—the beautiful, ambitious and cunning Anne Boleyn, a niece of the duke of Norfolk, who had no intention of becoming merely the king's mistress, but aspired to be his consort.

England and the Reformation.

The question of the king's divorce soon became inextricably confused with another problem, whose first beginnings go back to a slightly earlier date. What was to be the attitude of England towards the Reformation? It was now nearly ten years since Martin Luther had posted up his famous theses on the church door at Wittenberg, and since he had testified to his faith before the diet of Worms. All Germany was now convulsed with the first throes of the revolt against the papacy, and the echoes of the new theological disputes were being heard in England. King Henry himself in 1521 had deigned to write an abusive pamphlet against Luther, for which he had been awarded the magnificent title of *Fidei Defensor* by that cultured sceptic Pope Leo X. About the same time we begin to read of orders issued by the bishops for the discovery and burning of all Lutheran books—a clear sign that they were reaching England in appreciable quantities. Hitherto it had been only the works of Wycliffe that had merited this attention on the part of inquisitors. In the Wycliffite remnant, often persecuted but never exterminated, there already existed in England the nucleus of a Protestant party. All through the reign of Henry VII. and the early years of Henry VIII. the intermittent burning of "heretics," and their far more frequent recantations, had borne witness to the fact that the sect still lingered on. The Wycliffites were a feeble folk, compelled to subterraneous ways, and destitute of learned leaders or powerful supporters. But they survived to see Luther's day, and to merge themselves in one body with the first English travelling scholars and merchants who brought back from the continent the doctrines of the German Reformation. The origins of a Protestant party, who were not mere Wycliffites, but had been first interested in dogmatic controversy by coming upon the works of Luther, can be traced back to the year 1521 and to the university of Cambridge. There a knot of scholars, some of whom were to perish early at the stake, while others were destined to become the leaders of the English Reformation, came together and encouraged each other to test the received doctrines of contemporary orthodoxy by searching the Scriptures and the works of the Fathers. The sect spread in a few years to London, Oxford and other centres of intellectual life, but for many years its followers were not numerous; like the old Lollardy, Protestantism took root only in certain places and among certain classes—notably the lesser clergy and the merchants of the great towns.

King Henry and those who wished to please him professed as great a hatred and contempt for the new purveyors of German doctrines as for the belated disciples of Wycliffe. But there was another movement, whose origins went back for many centuries, which they were far from discouraging, and were prepared to utilize when it suited their convenience. This was the purely political feeling against the tyranny of the papacy, and the abuses of the national church, which in early ages had given supporters to William the Conqueror and Henry II., which had dictated the statutes of Mortmain and of Praemunire. Little had been heard of the old anti-clerical party in England since the time of Henry IV.; it had apparently been identified in the eyes of the orthodox with that Lollardy with which it had for a time allied itself, and had shared in its discredit. But it had always continued to exist, and in the early years of Henry VIII. had been showing unmistakable signs of vitality. The papacy of the Renaissance was a fair mark for criticism. It was not hard to attack the system under which Rodrigo Borgia wore the tiara, while Girolamo Savonarola went to the stake; or in which Julius II. exploited the name of Christianity to serve his territorial policy in Italy, and Leo X. hawked his indulgences round Europe to raise funds which would enable him to gratify his artistic tastes. At no period had the official hierarchy of the Western Church been more out of touch with common righteousness and piety. Moreover, they were sinning under the eyes of a laity which was far more intelligent and educated, more able to think and judge for itself, less the slave of immemorial tradition, than the old public of the middle ages. In Italy the Renaissance might be purely concerned with things intellectual or artistic, and seem to have little or no touch with things moral. Beyond the Alps it was otherwise; among the Teutonic nations at least the revolt against the scholastic philosophy, the rout of the obscurantists, the eager pursuit of Hellenic culture, had a religious aspect. The same generation which refused to take thrice-translated and thrice-garbled screeds from Aristotle as the sum of human knowledge, and went back to the original Greek, was also studying the Old and New Testaments in their original tongues, and drawing from them conclusions as unfavourable to the intelligence as to the scholarship of the orthodox medieval divines. Such a discovery as that which showed that the "False Decretals," on which so much of the power of the papacy rested, were mere 9th-century forgeries struck deep at the roots of the whole traditional relation between church and state.

The first English scholars of the Renaissance, like Erasmus on the continent, did not see the logical outcome of their own discoveries, nor realize that the campaign against obscurantism would develop into a campaign against Roman orthodoxy. Sir Thomas More, the greatest of them, was actually driven into reaction by the violence of Protestant controversialists, and the fear that the new doctrines would rend the church in twain. He became himself a persecutor, and a writer of abusive pamphlets unworthy of the author of the *Utopia*. But to the younger generation the irreconcilability of modern scholarship and medieval formulae of faith became more and more evident. One after another all the cardinal doctrines were challenged by writers who were generally acute, and almost invariably vituperative. For the controversies of the Reformation were conducted by both sides, from kings and prelates down to gutter pamphleteers, in language of the most unseemly violence.

But, as has been already said, the scholars and theologians had less influence in the beginning of the English Reformation than the mere lay politicians, whose anti-clerical tendencies chanced to fit in with King Henry's convenience when he quarrelled with the papacy. It is well to note that the first attacks of parliament on the church date back to two years before Luther published his famous theses. The contention began in 1515 with the fierce assault by the Commons on the old abuse of benefit of clergy, and the immunity of clerical criminals from due punishment for secular crimes—a question as old as the times of Henry II. and Becket. But the discussion spread in later years from this particular point into a general criticism of the church and its relations to the state, embracing local grievances as well as the questions which turned on the dealings of the papacy with the crown. The old complaints which had been raised against the Church of England in the days of Edward I. or Richard II. had lost none of their force in 1526. The higher clergy were more than ever immersed in affairs of state, "Caesarean" as Wycliffe would have called them. It was only necessary to point to the great cardinal himself, and to ask how far his spiritual duties at York were properly discharged while he was acting as the king's prime minister. The cases of Foxe and Morton were much the same; the former passed for a well-meaning man, yet had been practically absent from his diocese for twenty years. Pluralism, nepotism, simony and all the other ancient abuses were more rampant than ever. The monasteries had ceased to be even the nurseries of literature; their chronicles had run dry, and secular priests or laymen had taken up the pens that the monks had dropped. They were wealthier than ever, yet did little to justify their existence; indeed the spirit of the age was so much set against them that they found it hard to keep up the numbers of their inmates. Truculent pamphleteers like Simon Fish, who wrote *Beggars' Supplication*, were already demanding "that these sturdy boobies should be set abroad into the world, to get wives of their own, and earn their living by the sweat of their brows, according to the commandment of God; so might the king be better obeyed, matrimony be better kept, the gospel better preached, and none should rob the poor of his alms." It must be added that monastic scandals were not rare; though the majority of the houses were decently ordered, yet the unexceptionable testimony of archiepiscopal and episcopal visitations shows that in the years just before the Reformation there was a certain number of them where chastity of life and honesty of administration were equally unknown. But above all things the church was being criticized as an *imperium in imperio*, a privileged body not amenable to ordinary jurisdiction, and subservient to a foreign lord—the pope. And it was true that, much as English churchmen might grumble at papal exactions, they were generally ready as a body to support the pope against the crown; the traditions of the medieval church made it impossible for them to do otherwise. That there would in any case have been a new outbreak of anti-clerical and anti-papal agitation in England, under the influence of the Protestant impulse started by Luther in Germany, is certain. But two special causes gave its particular colour to the opening of the English Reformation; the one was that the king fell out with the papacy on the question of his divorce. The other was that the nation at this moment was chafing bitterly against a clerical minister, whom it (very unjustly) made responsible for the exorbitant taxation which it was enduring, in consequence of the king's useless and unsuccessful foreign wars. The irony of the situation lay in the facts that Henry was, so far as dogmatic views were concerned, a perfectly orthodox prince; he had a considerable knowledge of the old theological literature, as he had shown in his pamphlet against Luther, and though he was ready to repress clerical immunities and privileges that were inconvenient to the crown, he had no sympathy whatever with the doctrinal side of the new revolt against the system of the medieval church. Moreover, Wolsey, whose fall was to synchronize with the commencement of the reforming movement, was if anything more in sympathy with change than was his master. He was an enlightened patron of the new learning, and was inclined to take vigorous measures in hand for the pruning away of the abuses of the church. It is significant that his great college at Oxford—"Cardinal's College" as he designed to call it, "Christ Church" as it is named to-day—was endowed with the revenues of some score of small monasteries which he had suppressed on the ground that they were useless or ill-conducted. His master turned the lesson to account a few years later; but Henry's wholesale destruction of religious houses was carried out not in the interests of learning, but mainly in those of the royal exchequer. (C. W. C. O.)

VII. The Reformation and the Age of Elizabeth (1528–1603)

Fall of Wolsey.

Wolsey did not fall through any opposition to reform; nor was he opposed to the idea of a divorce. Indeed, both in France and Spain he was credited with the authorship of the project. But he differed from Henry on the question of Catherine's successor. Wolsey desired a French marriage to consummate the breach upon which he was now bent with the emperor; and war, in fact, was precipitated with Spain in 1528. This is said to have been done without Henry's consent; he certainly wished to avoid war with Charles V., and peace was made after six months of passive hostility. Nor did Henry want a French princess; his affections were fixed for the time on Anne Boleyn, and she was the hope of the anti-clerical party. The crisis was brought to a head by the failure of Wolsey's plan to obtain a divorce. Originally it had been suggested that the ecclesiastical courts in England were competent without recourse to Rome. Wolsey deprecated this procedure, and application was made to Clement VII. Wolsey relied upon his French and Italian allies to exert the necessary powers of persuasion; and in 1528 a French army crossed the Alps, marched through Italy and threatened to drive Charles V. out of Naples. Clement was in a position to listen to Henry's prayer; and Campeggio was commissioned with Wolsey to hear the suit and grant the divorce.

Question of the divorce.

No sooner had Campeggio started than the fortunes of war changed. The French were driven out of Naples, and the Imperialists again dominated Rome; the Church, wrote Clement to Campeggio, was completely in the power of Charles V. The cardinal, therefore, must on no account pronounce against Charles's aunt; if he could not persuade Henry and Catherine to agree on a mutual separation, he must simply pass the time and come to no conclusion. Hence it was June 1529 before the court got to work at all, and then its proceedings were only preparatory to an adjournment and revocation of the suit to Rome in August. Clement VII. had, in his own words, made up his mind to live and die an imperialist; the last remnants of the French army in Italy had been routed, and the pope had perforce concluded the treaty of Barcelona, a sort of family compact between himself and Charles, whereby he undertook to protect Charles's aunt, and the emperor to support the Medici dynasty in Florence. This peace was amplified at the treaty of Cambrai (August 1529) into a general European pacification in which England had no voice. So far had it fallen since 1521.

In every direction Wolsey had failed, and his failure involved the triumph of the forces which he had opposed. The fate of the papal system in England was bound up with his personal fortunes. It was he and he alone who had kept parliament at arm's length and the enemies of the church at bay. He had interested the king, and to some extent the nation, in a spirited foreign policy, had diverted their attention from domestic questions, and had staved off that parliamentary attack on the church which had been threatened fifteen years before. Now he was doomed, and both Campeggio and Cardinal du Bellay were able to send their governments accurate outlines of the future policy of Henry VIII. The church was to be robbed of its wealth, its power and its privileges, and the papal jurisdiction was to be abolished. In October Wolsey was deprived of the great seal, and surrendered many of his ecclesiastical preferments, though he was allowed to retain his archbishopric of York which he now visited for the first time. The first lay ministry since Edward the Confessor's time came into office; Sir Thomas More became lord chancellor, and Anne Boleyn's father lord privy seal; the only prominent cleric who remained in office was Stephen Gardiner, who succeeded Wolsey as bishop of Winchester.

Attack on the church in parliament.

Henry VIII. marries Anne Boleyn.

The Act of Supremacy.

Parliament met in November 1529 and passed many acts against clerical exactions, mortuaries, probate dues and pluralities, which evoked a passionate protest from Bishop Fisher: "Now, with the Commons," he cried in the House of Lords, "is nothing but 'Down with the Church.'" During 1530 Henry's agents were busy abroad making that appeal on the divorce to the universities which Cranmer had suggested. In 1531 the clergy in convocation, terrified by the charge of *praemunire* brought against them for recognizing Wolsey's legatine authority, paid Henry a hundred and eighteen thousand pounds and recognized him as supreme head of the church so far as the law of Christ would allow. The details of this surrender were worked out by king and Commons in 1532; but Gardiner and More secured the rejection by the Lords of the bill in which they were embodied, and it was not till 1533, when More had ceased to be chancellor and Gardiner to be secretary, that a parliamentary statute annihilated the independent legislative authority of the church. An act was, however, passed in 1532 empowering the king, if he thought fit, to stop the payment of annates to Rome. Henry suspended his consent in order to induce the pope to grant Cranmer his bulls as archbishop of Canterbury where he succeeded Warham late in 1532. The stratagem was successful, and Henry cast off all disguise. The act of annates was confirmed; another prohibiting appeals to Rome and providing for the appointment of bishops without recourse to the papacy was passed; and Cranmer declared Henry's marriage with Catherine null and void and that with Anne Boleyn, which had taken place about January 25, 1533, valid. Anne was crowned in June, and on the 7th of September the future Queen Elizabeth was born. At length in 1534 Clement VII. concluded the case at Rome, pronouncing in favour of Catherine's marriage, and drawing up a bull of excommunication against Henry and his abettors. But he did not venture to publish it; public opinion in England, while hostile to the divorce, was not in favour of the clergy or the pope, and the rivalry between Charles V. and Francis I. was too bitter to permit of joint, or even isolated, action against Henry. Charles was only too anxious to avoid the duty of carrying out the pope's commands, and a year later he was once more involved in war with France. Henry was able to deal roughly with such manifestations as Elizabeth Barton's visions, and in the autumn of 1534 to obtain from parliament the Act of Supremacy which transferred to him the juridical, though not the spiritual, powers of the pope. No penalties were attached to this act, but another passed in the same session made it treason to attempt to deprive the king of any of his titles, of which supreme head of the church was one, being incorporated in the royal style by letters patent of January 1535. Fisher and More were executed on this charge; they had been imprisoned in the previous year for objecting to take the form of oath to the succession as vested in Anne Boleyn's children which the commissioners prescribed. But their lives could only be forfeit on the supposition that they sought to deprive the king of his royal supremacy. Many of the friars observant of Greenwich and monks of the Charterhouse were involved in a similar fate, but there was no general resistance, and Henry, now inspired or helped by Thomas Cromwell, was able to proceed with the next step in the Reformation, the dissolution of the monasteries.

Dissolution of the monasteries.

It was Cecil's opinion twenty-five years later that, but for the dissolution, the cause of the Reformation could not have succeeded. Such a reason could hardly be avowed, and justification had to be sought in the condition of the monasteries themselves. The action of Wolsey and other bishops before 1529, the report of a commission of cardinals appointed by Paul III. in 1535, the subsequent experience of other, even Catholic, countries give collateral support to the conclusions of the visitors appointed by Cromwell, although they were dictated by a desire not to deal out impartial justice, but to find reasons for a policy already adopted in principle. That they exaggerated the evils of monastic life hardly admits of doubt; but even a Henry VIII. and a Thomas Cromwell would not have dared to attack, or succeeded in destroying, the monasteries had they retained their original purity and influence. As it was their doubtful reputation and financial embarrassments enabled Henry to offer them as a gigantic bribe to the upper classes of the laity, and the Reformation parliament met for its last session early in 1536 to give effect to the reports of the visitors and to the king's and their own desires.

Execution of Queen Anne Boleyn.

But it had barely been dissolved in April when it became necessary to call another. In January the death of Catherine had rejoiced the hearts of Henry and Anne Boleyn, but Anne's happiness was short-lived. Two miscarriages and the failure to produce the requisite male heir linked her in Henry's mind and in misfortune to Catherine; unlike Catherine she was unpopular and not above suspicion. The story of her tragedy is still one of the most horrible and mysterious pages in English history. It is certain that Henry was tired and wanted to get rid of her; but if she were innocent, why were charges brought against her which were not brought against Catherine of Aragon and Anne of Cleves? and why were four other victims sacrificed when one would have been enough? The peers a year before could acquit Lord Dacre; would they have condemned the queen without some show of evidence? and unless there was suspicious evidence, her daughter was inhuman in making no effort subsequently to clear her mother's character. However that may be, Anne was not only condemned and executed, but her marriage was declared invalid and her daughter a bastard. Parliament was required to establish the succession on the new basis of Henry's new queen, Jane Seymour. It also empowered the king to leave the crown by will if he had no legitimate issue; but the illegitimate son, the duke of Richmond, in whose favour this provision is said to have been conceived, died shortly afterwards.

The Pilgrimage of Grace.

Fortunately for Henry, Queen Jane roused no domestic or foreign animosities; Charles V. and Francis I. were at war; and the pope's and Pole's attempt to profit by the Pilgrimage of Grace came too late to produce any effect except the ruin of Pole's family. The two risings of 1536 in Lincolnshire and Yorkshire were provoked partly by the dissolution of the monasteries, partly by the collection of a subsidy and fears of fresh taxation on births, marriages and burials, and partly by the protestantizing Ten Articles of 1536 and Cromwell's *Injunctions*. They were conservative demonstrations in favour of a restoration of the old order by means of a change of ministry, but not a change of dynasty. The Lincolnshire rising was over before the middle of October; the more serious revolt in Yorkshire under Aske lasted through the winter. Henry's lieutenants were compelled to temporize and make concessions. Aske was invited to come to London and hoodwinked by Henry into believing that the king was really bent on restoration and reform. But an impatient outburst of the insurgents and a foolish attempt to seize Hull and Scarborough gave Henry an excuse for repudiating the concessions made in his name. He could afford to do so because England south of the Trent remained stauncher to him than England north of it did to the Pilgrimage. Aske and other leaders were tried and executed, and summary vengeance was wreaked on the northern counties, especially on the monasteries. The one satisfactory outcome was the establishment of the Council of the North, which gave the shires between the Border and the Trent a stronger and more efficient government than they had ever had before.

The "Six Articles."

Fall of Thomas Cromwell.

Probably the Pilgrimage had some effect in moderating Henry's progress. The monasteries did not benefit and in 1538–1539 the greater were involved in the fate which had already overtaken the less. But no further advances were made towards Protestantism after the publication and authorization of the " Great " Bible in English. The Lutheran divines who came to England in 1538 with a project for a theological union were rebuffed; the parliament elected in 1539 was Catholic, and only the reforming bishops in the House of Lords offered any resistance to the Six Articles which reaffirmed the chief points in Catholic doctrine and practice. The alliance between pope, emperor and French king induced Henry to acquiesce in Cromwell's scheme for a political understanding with Cleves and the Schmalkaldic League, which might threaten Charles V.'s position in Germany and the Netherlands, but could not be of much direct advantage to England. Cromwell rashly sought to wed Henry to this policy, proposed Anne of Cleves as a bride for Henry, now once more a widower, and represented the marriage as England's sole protection against a Catholic league. Henry put his neck under the yoke, but soon discovered that there was no necessity; for Charles and Francis were already beginning to quarrel and had no thought of a joint attack on England. The discovery was fatal to Cromwell; after a severe struggle in the council he was abandoned to his enemies, attainted of treason and executed. Anne's marriage was declared null, and Henry found a fifth queen in Catherine Howard, a niece of Norfolk, a protégée of Gardiner, and a friend of the Catholic church.

Nevertheless there was no reversal of what had been done, only a check to the rate of progress. Cranmer remained archbishop and compiled an English Litany, while Catherine Howard soon ceased to be queen; charges of loose conduct, which in her case at any rate were not instigated by the king, were made against her and she was brought to the block; she was succeeded by Catherine Parr, a mild patron of the new learning. The Six Articles were only fitfully put in execution, especially in 1543 and 1546; all the plots against Cranmer failed; and before he died Henry was even considering the advisability of further steps in the religious reformation, apart from mere spoliation like the confiscation of the chantry lands.

Policy in Ireland and Scotland.

But Scotland, Ireland and foreign affairs concerned him most. Something substantial was achieved in Ireland; the papal sovereignty was abolished and Henry received from the Irish parliament the title of king instead of lord of Ireland. The process was begun of converting Irish chieftains into English peers which eventually divorced the Irish people from their natural leaders; and principles of English law and government were spread beyond the Pale. In Scotland Henry was less fortunate. He failed to win over James V. to his anti-papal policy, revived the feudal claim to suzerainty, won the battle of Solway Moss (1542), and then after James's death bribed and threatened the Scots estates into concluding a treaty of marriage between their infant queen and Henry's son. The church in Scotland led by Beaton, and the French party led by James V.'s widow, Mary of Guise, soon reversed this decision, and Hertford's heavy hand was (1544) laid on Edinburgh in revenge. France was at the root of the evil, and Henry was thus induced once more to join Charles V. in war (1543). The joint invasion of 1544 led to the capture of Boulogne, but the emperor made peace in order to deal with the Lutherans and left Henry at war with France. The French attempted to retaliate in 1545, and burnt some villages in the Isle of Wight and on the coast of Sussex. But their expedition was a failure, and peace was made in 1546, by which Henry undertook to restore Boulogne in eight years' time on payment of eight hundred thousand crowns. Scotland was not included in the pacification, and when Henry died (January 28, 1547) he was busy preparing to renew his attempt on Scotland's independence.

Edward VI.

He left a council of sixteen to rule during his son's minority. The balance of parties which had existed since Cromwell's fall had been destroyed in the last months of the reign by the attainder of Norfolk and his son Surrey, and the exclusion of Gardiner and Thirlby from the council of regency. Men of the new learning prevailed, and Hertford (later duke of Somerset), as uncle to Edward VI., was made protector of the realm and governor of the king's person. He soon succeeded in removing the trammels imposed upon his authority, and made himself king in everything but name. He used his arbitrary power to modify the despotic system of the Tudors; all treason laws since Edward III., all heresy laws, all restrictions upon the publication of the Scriptures were removed in the first parliament of the reign, and various securities for liberty were enacted. The administration of the sacrament of the altar in both elements was permitted, the Catholic interpretation of the mass was rendered optional, images were removed, and English was introduced into nearly the whole of the church service. In the following session (1548–1549) the first Act of Uniformity authorized the first Book of Common Prayer. It met with strenuous resistance in Devon and in Cornwall, where rebellions added to the thickening troubles of the protector.

Progress of the Reformation.

Administration of the protector Somerset.

His administration was singularly unsuccessful. In 1547 he won the great but barren victory of Pinkie Cleugh over the Scots, and attempted to push on the marriage and union by a mixture of conciliation and coercion. He made genuine and considerable concessions to Scottish feeling, guaranteeing autonomy and freedom of trade, and suggesting that the two realms should adopt the indifferent style of the empire of Great Britain. But he also seized Haddington in 1548, held by force the greater part of the Lowlands, and, when Mary was transported to France, revived the old feudal claims which he had dropped in 1547. France was, as ever, the backbone of the Scots resistance; men and money poured into Edinburgh to assist Mary of Guise and the French faction. The protector's offer to restore Boulogne could not purchase French acquiescence in the union of England and Scotland; and the bickerings on the borders in France and open fighting in Scotland led the French to declare war on England in August 1549. They were encouraged by dissensions in England. Somerset's own brother, Thomas Seymour, jealous of the protector, intrigued against the government; he sought to secure the hand of Elizabeth, the favour of Edward VI. and the support of the Suffolk line, secretly married Catherine Parr, and abused his office as lord high admiral to make friends with pirates and other enemies of order. Foes of the family, such as Warwick and Southampton, saw in his factious conduct the means of ruining both the brothers. Seymour was brought to the block, and the weak consent of the protector seriously damaged him in the public eye. His notorious sympathy with the peasantry further alienated the official classes and landed gentry, and his campaign against enclosures brought him into conflict with the strongest forces of the time. The remedial measures which he favoured failed; and the rising of Ket in Norfolk and others less important in nearly all the counties of England, made Somerset's position impossible. Bedford and Herbert suppressed the rebellion in the west, Warwick that in Norfolk (July–August 1549). They then combined with the majority of the council and the discontented Catholics to remove the protector from office and imprison him in the Tower (October).

Administration of the duke of Northumberland.

The Catholics hoped for reaction, the restoration of the mass, and the release of Gardiner and Bonner, who had been imprisoned for resistance to the protector's ecclesiastical policy. But Warwick meant to rely on the Protestant extremists; by January 1550 the Catholics had been expelled from the council, and the pace of the Reformation increased instead of diminishing. Peace was made with France by the surrender of Boulogne and abandonment of the policy of union with Scotland (March 1550); and the approach of war between France and the emperor, coupled with the rising of the princes in Germany, relieved Warwick from foreign apprehensions and gave him a free hand at home. Gardiner, Bonner, Heath, Day and Tunstall were one by one deprived of their sees; a new ordinal simplified the ritual of ordination, and a second Act of Uniformity and Book of Common Prayer (1552) repudiated the Catholic interpretation which had been placed on the first and imposed a stricter conformity to the Protestant faith. All impediments to clerical marriage were removed, altars and organs were taken down, old service books destroyed and painted windows broken; it was even proposed to explain away the kneeling at the sacrament. The liberal measures of the protector were repealed, and new treasons were enacted; Somerset himself, who had been released and restored to the council in 1550, became an obstacle in Warwick's path, and was removed by means of a bogus plot, being executed in January 1552; while Warwick had himself made duke of Northumberland, his friend Dorset duke of Suffolk, and Herbert earl of Pembroke.

Establishment of Protestantism.

But his ambition and violence made him deeply unpopular, and the failing health of Edward VI. opened up a serious prospect for Northumberland. He was only safe so long as he controlled the government, and prevented the administration of justice, and the knowledge that not only power but life was at stake drove him into a desperate plot for the retention of both. He could trade upon Edward's precocious hatred of Mary's religion, he could rely upon French fears of her Spanish inclinations, and the success which had attended his schemes in England deluded him into a belief that he could supplant the Tudor with a Dudley dynasty. His son Guilford Dudley was hastily married to Lady Jane Grey, the eldest granddaughter of Henry VIII.'s younger sister Mary. Henry's two daughters, Mary and Elizabeth, the descendants of his elder sister Margaret, and Lady Jane's mother, the duchess of Suffolk, were all to be passed over, and the succession was to be vested in Lady Jane and her heirs male. Edward was persuaded that he could devise the crown by will, the council and the judges were browbeaten into acquiescence, and three days after Edward's death (July 6, 1553), Lady Jane Grey was proclaimed queen in London. Northumberland had miscalculated the temper of the nation, and failed to kidnap Mary. She gathered her forces in Norfolk and Suffolk, Northumberland rode out from London to oppose her, but defection dogged his steps, and even in London Mary was proclaimed queen behind his back by his fellow-conspirators. Mary entered London amid unparalleled popular rejoicings, and Northumberland was sent to a well-deserved death on the scaffold.

Queen Mary. Restoration of the old religion.

Mary was determined from the first to restore papalism as well as Catholicism, but she had to go slowly. The papacy had few friends in England, and even Charles V., on whom Mary chiefly relied for guidance, was not eager to see the papal jurisdiction restored. He wanted England to be first firmly tied to the Habsburg interests by Mary's marriage with Philip. Nor was it generally anticipated that Mary would do more than restore religion as it had been left by her father. She did not attempt anything further in 1553 than the repeal of Edward VI.'s legislation and the accomplishment of the Spanish marriage. The latter project provoked fierce resistance; various risings were planned for the opening months of 1554, and Wyat's nearly proved successful. Only his arrogance and procrastination and Mary's own courage saved her throne. But the failure of this protest enabled Mary to carry through the Spanish marriage, which was consummated in July; and in the ensuing parliament (Oct.–Jan. 1554–1555) all anti-papal legislation was repealed; Pole was received as legate; the realm was reconciled to Rome; and, although the holders of abbey lands were carefully protected against attempts at restitution, the church was empowered to work its will with regard to heresy. The Lollard statutes were revived, and between February 1555 and November 1558 some three hundred Protestants were burnt at the stake. They began with John Rogers and Rowland Taylor, and Bishops Ferrar of St Davids and Hooper of Gloucester. Ridley and Latimer were not burnt until October 1555, and Cranmer not till March 1556. London, Essex, Hertfordshire, East Anglia, Kent and Sussex provided nearly all the victims; only one was burnt north of the Trent, and only one south-west of Wiltshire. But in the Protestant districts neither age nor sex was spared; even the dead were dug up and burnt. The result was to turn the hearts of Mary's people from herself, her church and her creed. Other causes helped to convert their enthusiastic loyalty into bitter hatred. The Spanish marriage was a failure from every point of view. In spite of Mary's repeated delusions, she bore no child, and both parliament and people resisted every attempt to deprive Elizabeth of her right to the succession. Philip did all he could to conciliate English affections, but they would not have Spanish control at any price. They knew that his blandishments were dictated by ulterior designs, and that the absorption of England in the Habsburg empire was his ultimate aim. As it was, the Spanish connexion checked England's aspirations; her adventurers were warned off the Spanish Main, and even trade with the colonies of Philip's ally Portugal was prohibited. They had to content themselves with the Arctic Ocean and Muscovy; and they soon found themselves at war in Philip's interests. Philip himself refused to declare war on Scotland on England's behalf, but he induced Mary to declare war on France on his own (1557). The glory of the war fell to the Spaniards at St Quentin (1557) and Gravelines (1558), but the shame to England by the loss of Calais (Jan. 1558). Ten months later Mary died (Nov. 17), deserted by her husband and broken-hearted at the loss of Calais and her failure to win English hearts back to Rome.

Unpopularity of the Spanish marriage. Philip II.

Accession of Elizabeth. English national struggle with Spain.

The Spanish and Venetian ambassadors in London were shocked at what they regarded as the indecent rejoicings over Elizabeth's accession. The nation, indeed, breathed a new life. Papal control of its ecclesiastical, and of Spanish control of its foreign policy ceased, and it had a queen who gloried in being "mere English." There was really no possible rival sovereign, and no possible alternative policy. The English were tugging at the chain and Elizabeth had to follow; her efforts throughout were aimed at checking the pace at which her people wanted to go. She could not have married Philip had she wished to, and she could not have kept her sea-dogs off the Spanish Main. They were willing to take all the risks and relieve her of all responsibility; they filled her coffers with Spanish gold which they plundered as pirates, knowing that they might be hanged if caught; and they fought Elizabeth's enemies in France and in the Netherlands as irregulars, taking their chance of being shot if taken prisoners. While Elizabeth nursed prosperity in peace, her subjects sapped the strength of England's rivals by attacks which were none the less damaging because they escaped the name of war.

Triumph of the new religion. The Act of Uniformity.

It required all Elizabeth's finesse to run with the hare and hunt with the hounds; but she was, as Henry III. of France said, *la plus fine femme du monde*, and she was ably seconded by Cecil who had already proved himself an adept in the art of taking cover. Nevertheless, English policy in their hands was essentially aggressive. It could not be otherwise if England was to emerge from the slough in which Mary had left it. The first step was to assert the principle of England for the English; the queen would have no foreign husband, though she found suitors useful as well as attractive. Spanish counsels were applauded and neglected, and the Spaniards soon departed. Elizabeth was glad of Philip's support at the negotiations for peace at Cateau Cambrésis (1559), but she took care to assert the independence of her diplomacy and of England's interests. At home the church was made once more English. All foreign jurisdiction was repudiated, and under the style "supreme governor" Elizabeth reclaimed nearly all the power which Henry VIII. had exercised as "supreme head." The Act of Uniformity (1559) restored with a few modifications the second prayer-book of

Edward VI. The bishops almost unanimously refused to conform, and a clean sweep was made of the episcopal bench. An eminently safe and scholarly archbishop was found in Matthew Parker, who had not made himself notorious by resistance to authority even under Mary. The lower clergy were more amenable; the two hundred who alone are said to have been ejected should perhaps be multiplied by five; but even so they were not one in seven, and these seven were clergy who had been promoted in Mary's reign, or who had stood the celibate and other tests of 1553–1554. Into the balance must be thrown the hundreds, if not thousands, of zealots who had fled abroad and returned in 1558–1559. The net result was that a few years later the lower house of convocation only rejected by one vote a very puritanical petition against vestments and other "popish dregs."

Elizabeth and Scotland.

Struggle against the Spanish dominion at sea.

The next step was to expand the principle of England for the English into that of Britain for the British, and Knox's reformation in 1559–1560 provided an opportunity for its application. By timely and daring intervention in Scotland Elizabeth procured the expulsion of the French bag and baggage from North Britain, and that French avenue to England was closed for ever. The logic of this plan was not applied to Ireland; there it was to be Ireland for the English for many a generation yet to come; and so Ireland remained Achilles' heel, the vulnerable part of the United Kingdom. The Protestant religion was forced upon the Irish in a foreign tongue and garb and at the point of foreign pikes; and national sentiment supported the ancient faith and the ancient habits in resistance to the Saxon innovations. In other directions the expansion of England, the third stage in the development of Elizabeth's policy, was more successful. The attractions of the Spanish Main converted the seafaring folk of south-west England into hardy Protestants, who could on conscientious as well as other grounds contest a papal allocation of new worlds to Spain and Portugal. Their monopoly was broken up by Hawkins, Drake, Frobisher, Raleigh, and scores of others who recognized no peace beyond the line; and although, as far as actual colonies went, the results of Elizabeth's reign were singularly meagre, the idea had taken root and the ground had been prepared. In every direction English influence penetrated, and Englishmen before 1603 might be found in every quarter of the globe, following Drake's lead into the Pacific, painfully breaking the ice in search of a north-east or a north-west passage, hunting for slaves in the wilds of Africa, journeying in caravans across the steppes of Russia into central Asia, bargaining with the Turks on the shores of the Golden Horn, or with the Greeks in the Levant, laying the foundations of the East India Company, or of the colonies of Virginia and Newfoundland.

Mary, queen of Scots.

This expansion was mainly at the expense of Spain; but at first Spain was regarded as Elizabeth's friend, not France. France had a rival candidate for Elizabeth's throne in Mary Stuart, the wife of the dauphin who soon (1559) became king as Francis II.; and Spanish favour was sought to neutralize this threat. Fortunately for Elizabeth, Francis died in 1560, and the French government passed into the hands of Catherine de' Medici, who had no cause to love her daughter-in-law and the Guises. France, too, was soon paralysed by the wars of religion which Elizabeth judiciously fomented with anything but religious motives. Mary Stuart returned to Scotland with nothing but her brains and her charms on which to rely in her struggle with her people and her rival. She was well equipped in both respects, but human passions spoilt her chance; her heart turned her head. Elizabeth's head was stronger and she had no heart at all. When Mary married Darnley she had the ball at her feet; the pair had the best claims to the English succession and enjoyed the united affections of the Catholics. But they soon ceased to love one another, and could not control their jealousies. There followed rapidly the murders of Rizzio and Darnley, the Bothwell marriage, Mary's defeat, captivity, and flight into England (1568). It was a difficult problem for Elizabeth to solve; to let Mary go to France was presenting a good deal more than a pawn to her enemies; to restore her by force to her Scottish throne might have been heroic, but it certainly was not politics; to hand her over to her Scottish foes was too mean even for Elizabeth; and to keep her in England was to nurse a spark in a powder-magazine. Mary was detained in the hope that the spark might be carefully isolated.

Rebellion of 1569 and excommunication of Elizabeth.

Plots against Elizabeth.

Relations with France and Spain.

But there was too much inflammable material about. The duke of Norfolk was a Protestant, but his convictions were weaker than his ambition, and he fell a victim to Mary's unseen charms. The Catholic north of England was to rise under the earls of Westmorland and Northumberland, who objected to Elizabeth's seizure of their mines and jurisdictions as well as to her proscription of their faith; and the pope was to assist with a bull of deposition. Norfolk, however, played the coward; the bull came nearly a year too late, and the rebellion of the earls (1569) was easily crushed. But the conspiracies did not end, and Spain began to take a hand. Elizabeth, partly in revenge for the treatment of Hawkins and Drake at San Juan de Ulloa, seized some Spanish treasure on its way to the Netherlands (Dec. 1569). Alva's operations were fatally handicapped by this disaster, but Philip was too much involved in the Netherlands to declare war on England. But his friendship for Elizabeth had received a shock, and henceforth his finger may be traced in most of the plots against her, of which the Ridolfi conspiracy was the first. It cost Norfolk his head and Mary more of her scanty liberty. Elizabeth also began to look to France, and in 1572, by the treaty of Blois, France instead of Spain became England's ally, while Philip constituted himself as Mary's patron. The massacre of St Bartholomew placed a severe strain upon the new alliance, but was not fatal to it. A series of prolonged but hollow marriage negotiations between Elizabeth and first Anjou (afterwards Henry III.) and then Alençon (afterwards duke of Anjou) served to keep up appearances. But the friendship was never warm; Elizabeth's relations with the Huguenots on the one hand and her fear of French designs on the Netherlands on the other prevented much cordiality. But the alliance stood in the way of a Franco-Spanish agreement, limited Elizabeth's sympathy with the French Protestants, and enabled her to give more countenance than she otherwise might have done to the Dutch.

The Jesuit missions.

Execution of Mary, queen of Scots, 1587.

Gradually Philip grew more hostile under provocation; slowly he came to the conclusion that he could never subdue the Dutch or check English attacks on the Spanish Main without a conquest of England. Simultaneously the counter-Reformation began its attacks; the "Jesuit invasion" took place in 1580, and Campion went to the block. A papal and Spanish attempt upon Ireland in the same year was foiled at Smerwick. But more important was Philip's acquisition of the throne of Portugal with its harbours, its colonies and its marine. This for the first time gave him a real command of the sea, and at least doubled the chances of a successful attack upon England. But Philip's mind moved slowly and only on provocation. It took a year or two to satisfy him that Portugal was really his; not until 1583 was the fleet of the pretender Don Antonio destroyed in the Azores. The victor, Santa Cruz, then suggested an armada against England, but the English Catholics could not be brought into line with a Spanish invasion. The various attempts to square James VI. of Scotland had not been successful, and events in the Netherlands and in France disturbed Philip's calculations. But his purpose was now probably fixed. After the murder of William the Silent (1584) Elizabeth sided more openly with the Dutch; the Spanish ambassador Mendoza was expelled from England for his intrigues with Elizabeth's enemies (1586); and on the discovery of Babington's plot Elizabeth yielded to the demand of her parliament and her ministers for Mary's execution (1587); her death removed the only possible centre for a Catholic rebellion in case of a Spanish attack. It also removed Philip's last doubts;

The Great Armada, 1588.

Mary had left him her claims to the English throne, and he might, now that she was out of his path, hope to treat England like Portugal. Drake's "singeing of Philip's beard" in Cadiz harbour in 1587 delayed the expedition for a year, and a storm again postponed it in the early summer of 1588. At length the armada sailed in July under the incompetent duke of Medina Sidonia; its object was to secure command of the narrow seas and facilitate the transport of Parma's army from the Netherlands to England. But Philip after his twenty years' experience in the Netherlands can hardly have hoped to conquer a bigger and richer country with scantier means and forces. He relied in fact upon a domestic explosion, and the armada was only to be the torch. This miscalculation made it a hopeless enterprise from the first. Scarcely an English Catholic would have raised a finger in Philip's favour; and when he could not subdue the two provinces of Holland and Zeeland, it is absurd to suppose that he could have simultaneously subdued them and England as well. English armies were not perhaps very efficient, but they were as good as the material with which William of Orange began his task. Philip, however, was never given the opportunity. His armada was severely handled in a week's fighting on its way up the Channel, and was driven off the English ports into the German Ocean; there a south-west gale drove it far from its rendezvous, and completed the havoc which the English ships had begun. A miserable remnant alone escaped destruction in its perilous flight round the north and west of Scotland.

The defeat of the armada was the beginning and not the end of the war; and there were moments between 1588 and 1603 when England was more seriously alarmed than in 1588. The Spaniards seized Calais in 1596; at another time they threatened England from Brest, and the "invisible" armada of 1599 created a greater panic than the "invincible" armada of 1588. It was not till the very end of the reign that what was in some ways the most dangerous of Spanish aggressions was foiled at Kinsale. Nor were the English counter-attacks very happy; the attempt on Portugal in 1589 under Drake and Norris proved a complete failure. The raid on Cadiz under Essex and Raleigh in 1596 was attended with better results, but the "Islands" voyage to the Azores in 1597 was a very partial success. Still it was now a war upon more or less equal terms, and there was little more likelihood that it would end with England's than with Spain's loss of national independence. The subjection of the Netherlands was now almost out of the question, and although Elizabeth's help had not enabled the Protestant cause to win in France, Henry IV. built up a national monarchy which would be quite as effectual a bar to the ambitions of Spain.

Last years of Elizabeth.

Elizabeth had in fact safely piloted England through the struggle to assert its national independence in religion and politics and its claim to a share in the new inheritance which had been opened up for the nations of Europe; and the passionate loyalty which had supported her as the embodiment of England's aspirations somewhat cooled in her declining years. She herself grew more cautious and conservative than ever, and was regarded as an obstacle by the hotheads in war and religion. She sided with the "scribes," Burghley and Sir Robert Cecil, against the men of war, Essex and Raleigh; and she abetted Whitgift's rigorous persecution of the Puritans whose discontent with her *via media* was rancorously expressed in the Martin Marprelate tracts. Essex's folly and failure to crush Hugh O'Neill's rebellion (1599), the most serious effort made in the reign to throw off the English yoke in Ireland, involved him in treason and brought him to the block. Parliament was beginning to quarrel with the royal prerogative, particularly when expressed in the grant of monopolies, and even Mountjoy's success in Ireland (1602–1603) failed to revive popular enthusiasm for the dying queen. Strange as it may seem, the accession of James I. was hailed as heralding a new and gladder age by Shakespeare, and minor writers (March 24, 1603). (A. F. P.)

VIII. The Stuart Monarchy, the Great Rebellion and the Restoration (1603–1689)

James I. 1603–1625.

The defeat of the Spanish armada in 1588 had been the final victory gained on behalf of the independence of the English church and state. The fifteen years which followed had been years of successful war; but they had been also years during which the nation had been preparing itself to conform its institutions to the new circumstances in which it found itself in consequence of the great victory. When James arrived from Scotland to occupy the throne of Elizabeth he found a general desire for change. Especially there was a feeling that there might be some relaxation in the ecclesiastical arrangements. Roman Catholics and Puritans alike wished for a modification of the laws which bore hardly on them. James at first relaxed the penalties under which the Roman Catholics suffered, then he grew frightened by the increase of their numbers and reimposed the penalties. The gunpowder plot (1605) was the result, followed by a sharper persecution than ever (see Gunpowder Plot).

The Puritans were invited to a conference with the king at Hampton Court (1604). They no longer asked, as many of them had asked in the beginning of Elizabeth's reign, to substitute the presbyterian discipline for the episcopal government. All they demanded was to be allowed permission, whilst remaining as ministers in the church, to omit the usage of certain ceremonies to which they objected. It was the opinion of Bacon that it would be wise to grant their request. James thought otherwise, and attempted to carry out the Elizabethan conformity more strictly than it had been carried out in his predecessor's reign.

James I. and the Commons.

In 1604 the Commons agreed with Bacon. They declared that they were no Puritans themselves, but that, with such a dearth of able ministers, it was not well to lose the services of any one who was capable of preaching the gospel. By his refusal to entertain their views James placed himself in opposition to the Commons in a matter which touched their deeper feelings. As a necessary consequence every dispute on questions of smaller weight assumed an exaggerated importance. The king had received a scanty revenue with his crown, and he spent freely what little he had. As the Commons offered grudging supplies, the necessity under which he was of filling up the annual deficit led him to an action by which a grave constitutional question was raised.

From the time of Richard II. to the reign of Mary no attempt had been made to raise duties on exports and imports without consent of parliament. But Mary had, under a specious pretext, recommenced to a slight extent the evil practice, and Elizabeth had gone a little further in the same direction. In 1606 a merchant named John Bates (*q.v.*) resisted the payment of an imposition—as duties levied by the sole authority of the crown were then called. The case was argued in the court of exchequer, and was there decided in favour of the crown. Shortly afterwards new impositions were set to the amount of £70,000 a year. When parliament met in 1610 the whole subject was discussed, and it was conclusively shown that, if the barons of the exchequer had been right in any sense, it was only in that narrow technical sense which is of no value at all. A compromise attempted broke down, and the difficulty was left to plague the next generation. The king was always able to assert that the judges were on his side, and it was as yet an acknowledged principle of the constitution that parliament could not change the law without the express consent of the crown, even if, which was not the case in this matter, the Lords had sided with the Commons. James's attempt to obtain further supplies from the Commons by opening a bargain for the surrender of some of his old feudal prerogatives, such as wardship and marriage, which had no longer any real meaning except as a means of obtaining money in an oppressive way, broke down, and early in 1611 he dissolved his first parliament in anger. A second parliament, summoned in 1614, met with the same fate after a session of a few weeks.

The dissolution of this second parliament was followed by a short imprisonment of some of the more active members, and by a demand made through England for a benevolence to make up the deficiency which parliament had neglected to meet. The court represented that, as no compulsion was used, there was nothing illegal in this proceeding. But as the names of those who refused to pay were taken down, it cannot be said that there was no indirect pressure.

Attempted union with Scotland.

The most important result of the breach with the parliament of 1614, however, was the resolution taken by James to seek refuge from his financial and other troubles in a close alliance with the king of Spain. His own accession had done much to improve the position of England in its relation with the continental powers. Scotland was no longer available as a possible enemy to England, and though an attempt to bind the union between the two nations by freedom of commercial intercourse had been wrecked upon the jealousy of the English Commons (1607), a legal decision had granted the status of national subjects to all persons born in Scotland after the king's accession in England. Ireland, too, had been thoroughly overpowered at the end of Elizabeth's reign, and the flight of the earls of Tyrone and Tyrconnel in 1607 had been followed by the settlement of English and Scottish colonists in Ulster, a measure which, in the way in which it was undertaken, sowed the seeds of future evils, but undoubtedly conduced to increase the immediate strength of the English government in Ireland.

The colonization of Ulster.

The Spanish alliance.

Without fear of danger at home, therefore, James, who as king of Scotland had taken no part in Elizabeth's quarrel with Philip II., not only suspended hostilities immediately on his accession, and signed a peace in the following year, but looked favourably on the project of a Spanish marriage alliance, so that the chief Protestant and the chief Catholic powers might join together to impose peace on Europe, in the place of those hideous religious wars by which the last century had been disfigured. In 1611 circumstances had disgusted him with his new ally, but in 1614 he courted him again, not only on grounds of general policy, but because he hoped that the large portion which would accompany the hand of an infanta would go far to fill the empty treasury.

In this way the Spanish alliance, unpopular in itself, was formed to liberate the king from the shackles imposed on him by the English constitution. Its unpopularity, great from the beginning, became greater when Raleigh's execution (1618) caused the government to appear before the world as truckling to Spain. The obloquy under which James laboured increased when the Thirty Years' War broke out (1618), and when his daughter Elizabeth, whose husband, the elector palatine, was the unhappy claimant to the Bohemian crown (1619), stood forth as the lovely symbol of the deserted Protestantism of Europe. Yet it was not entirely in pity for German Protestants that the heart of Englishmen beat. Men felt that their own security was at stake. The prospect of a Spanish infanta as the bride of the future king of England filled them with suspicious terrors. In Elizabeth's time the danger, if not entirely external, did not come from the government itself. Now the favour shown to the Roman Catholics by the king opened up a source of mischief which was to some extent real, if it was to a still greater extent imaginary. Whether the danger were real or imaginary, the consequence of the distrust resulting from the suspicion was the reawakening of the slumbering demand for fresh persecution of the Roman Catholics, a demand which made a complete reconciliation between the crown and the Lower House a matter of the greatest difficulty.

Parliament and the monopolies.

In 1621 the third parliament of James was summoned to provide money for the war in defence of his son-in-law's inheritance, the Palatinate, which he now proposed to undertake. But it soon appeared that he was not prepared immediately to come to blows, and the Commons, voting a small sum as a token of their loyalty, passed to other matters. Indolent in his temper, James had been in the habit of leaving his patronage in the hands of a confidential favourite, and that position was now filled by George Villiers, marquess and afterwards duke of Buckingham. The natural consequence was that men who paid court to him were promoted, and those who kept at a distance from him had no notice taken of their merits. Further, a system of granting monopolies and other privileges had again sprung up. Many of these grants embodied some scheme which was intended to serve the interests of the public, and many actions which appear startling to us were covered by the extreme protectionist theories then in vogue. But abuses of every kind had clustered round them, and in many cases the profits had gone into the pockets of hangers-on of the court, whilst officials had given their assistance to the grantors even beyond their legal powers. James was driven by the outcry raised to abandon these monopolies, and an act of Parliament in 1624 placed the future grant of protections to new inventions under the safeguard of the judges.

Fall of Bacon.

The attack on the monopolies was followed by charges brought by the Commons before the Lords against persons implicated in carrying them into execution, and subsequently against Lord Chancellor Bacon as guilty of corruption. The sentence passed by the Lords vindicated the right of parliament to punish officials who had enjoyed the favour of the crown, which had fallen into disuse since the accession of the house of York. There was no open contest between parliament and king in this matter. But the initiative of demanding justice had passed from the crown to the Commons. It is impossible to overestimate the effect of these proceedings on the position of parliament. The crown could never again be regarded as the sum of the governmental system.

When the Commons met after the summer adjournment a new constitutional question was raised. The king was at last determined to find troops for the defence of the Palatinate, and asked the Commons for money to pay them. They in turn petitioned the crown to abandon the Spanish alliance, which they regarded as the source of all the mischief. James told them that they had no right to discuss business on which he had not asked their opinion. They declared that they were privileged to discuss any matter relating to the commonwealth which they chose to take in hand, and embodied their opinion in a protest, which they entered on their journals. The king tore the protest out of the book and dissolved parliament.

Then followed a fresh call for a benevolence, this time more sparingly answered than before. A year of fruitless diplomacy failed to save the Palatinate from total loss. The ill-considered journey to Madrid, in which Prince Charles, accompanied by Buckingham, hoped to wring from the Spanish statesmen a promise to restore the Palatinate in compliment for his marriage with the infanta, ended also in total failure. In the autumn of 1623 Charles returned to England without a wife, and without hope of regaining the Palatinate with Spanish aid.

The French alliance.

He came back resolved to take vengeance upon Spain. The parliament elected in 1624 was ready to second him. It voted some supplies on the understanding that, when the king had matured his plans for carrying on the war, it should come together in the autumn to vote the necessary subsidies. It never met again. Charles had promised that, if he married a Roman Catholic, he would grant no toleration to the English Catholics in consideration of the marriage. In the autumn he had engaged himself to marry Henrietta Maria, the sister of the king of France, and had bound himself to grant the very conditions which he had declared to the Commons that he never would concede. Hence it was that he did not venture to recommend his father to summon parliament till the marriage was over. But though there was but little money to dispose of, he and Buckingham, who, now that James was sick and infirm, were the real leaders of the government, could not endure to abstain from the prosecution of the war. Early in 1625 an expedition, under Count Mansfeld, was sent to Holland that it might ultimately cut its way to the Palatinate. Left without pay and without supplies, the men perished by thousands, and when James died in March the new king had to meet his first parliament burthened by a broken promise and a disastrous failure.

When parliament met (1625) the Commons at first contented themselves with voting a sum of money far too small to carry on the extensive military and naval operations in which Charles had embarked. When the king explained his necessities, they intimated that they had no confidence in Buckingham, and asked that, before they granted further supply, the king would name counsellors whom they could trust to advise him on its employment. Charles at once dissolved parliament. He knew that the demand for ministerial responsibility would in the end involve his own responsibility, and, believing as he did that Buckingham's arrangements had been merely unlucky, he declined to sacrifice the minister whom he trusted.

Charles I. 1625-1649.

Charles and Buckingham did their best to win back popularity by strenuous exertion. They attempted to found a great Protestant alliance on the continent, and they sent a great expedition to Cadiz. The Protestant alliance and the expedition to Cadiz ended in equal failure. The second parliament of the reign (1626) impeached Buckingham for crimes against the state. As Charles would not dismiss him simply because the Commons were dissatisfied with him as a minister, they fell back on charging him with criminal designs. Once more Charles dissolved parliament to save Buckingham. Then came fresh enterprises and fresh failures. A fleet under Lord Willoughby (afterwards earl of Lindsey) was almost ruined by a storm. The king of Denmark, trusting to supplies from England which never came, was defeated at Lutter. A new war in addition to the Spanish war, broke out with France. A great expedition to Ré, under Buckingham's command (1627), intended to succour the Huguenots of La Rochelle against their sovereign, ended in disaster. In order to enable himself to meet expenditure on so vast a scale, Charles had levied a forced loan from his subjects. Men of high rank in society who refused to pay were imprisoned. Soldiers were billeted by force in private houses, and military officers executed martial law on civilians. When the imprisoned gentlemen appealed to the king's bench for a writ of *habeas corpus*, it appeared that no cause of committal had been assigned, and the judges therefore refused to liberate them. Still Charles believed it possible to carry on the war, and especially to send relief to La Rochelle, now strictly blockaded by the forces of the French crown. In order to find the means for this object he summoned his third parliament (1628). The Commons at once proceeded to draw a line which should cut off the possibility of a repetition of the injuries of which they complained. Charles was willing to surrender his claims to billet soldiers by force, to order the execution of martial law in time of peace, and to exact forced loans, benevolences, or any kind of taxation, without consent of parliament; but he protested against the demand that he should surrender the right to imprison without showing cause. It was argued on his behalf that in case of a great conspiracy it would be necessary to trust the crown with unusual powers to enable it to preserve the peace. The Commons, who knew that the crown had used the powers which it claimed, not against conspirators, but against the commonwealth itself, refused to listen to the argument, and insisted on the acceptance of the whole Petition of Right, in which they demanded redress for all their grievances. The king at last gave his consent to it, as he could obtain money in no other way. In after times, when any real danger occurred which needed a suspension of the ordinary safeguards of liberty, a remedy was found in the suspension of the law by act of parliament; such a remedy, however, only became possible when king and parliament were on good terms of agreement with one another.

The Petition of Right.

That time was as yet far distant. The House of Commons brought fresh charges against Buckingham, whose murder soon after the prorogation removed one subject of dispute. But when they met again (1629) they had two quarrels left over from the preceding session. About a third part of the king's revenue was derived from customs duties which had for many generations been granted by parliament to each sovereign for life. Charles held that this grant was little more than a matter of form, whilst the Commons held that it was a matter of right. But for the other dispute the difficulty would probably have been got over. The strong Protestantism of Elizabeth's reign had assumed a distinctly Calvinistic form, and the country gentlemen who formed the majority of the House of Commons were resolutely determined that no other theology than that of Calvin should be taught in England. In the last few years a reaction against it had arisen especially in the universities, and those who adopted an unpopular creed, and who at the same time showed tendencies to a more ceremonial form of worship, naturally fell back on the support of the crown. Charles, who might reasonably have exerted himself to secure a fair liberty for all opinions, promoted these unpopular divines to bishoprics and livings, and the divines in turn exalted the royal prerogative above parliamentary rights. He now proposed that both sides should keep silence on the points in dispute. The Commons rejected his scheme, and prepared to call in question the most obnoxious of the clergy. In this irritated temper they took up the question of tonnage and poundage, and instead of confining themselves to the great public question, they called to the bar some custom-house officers who happened to have seized the goods of one of their members. Charles declared that the seizure had taken place by his orders. When they refused to accept the excuse, he dissolved parliament, but not before a tumult took place in the House, and the speaker was forcibly held down in his chair whilst resolutions hostile to the government were put to the vote.

Crown and parliament.

For eleven years no parliament met again. The extreme action of the Lower House was not supported by the people, and the king had the opportunity, if he chose to use it, of putting himself right with the nation after no long delay. But he never understood that power only attends sympathetic leadership. He contented himself with putting himself technically in the right, and with resting his case on the favourable decisions of the judges. Under any circumstances, neither the training nor the position of judges is such as to make them fit to be the final arbiters of political disputes. They are accustomed to declare what the law is, not what it ought to be. These judges, moreover, were not in the position to be impartial. They had been selected by the king, and were liable to be deprived of their office when he saw fit. In the course of Charles's reign two chief justices and one chief baron were dismissed or suspended. Besides the ordinary judges there were the extraordinary tribunals, the court of high commission nominated by the crown to punish ecclesiastical offenders, and the court of star chamber, composed of the privy councillors and the chief justices, and therefore also nominated by the crown, to inflict fine, imprisonment, and even corporal mutilation on lay offenders. Those who rose up in any way against the established order were sharply punished.

The harsh treatment of individuals only calls forth resistance when constitutional morality has sunk deeply into the popular mind. The ignoring of the feelings and prejudices of large classes has a deeper effect. Charles's foreign policy, and his pretentious claim to the sovereignty of the British seas, demanded the support of a fleet, which might indeed be turned to good purpose in offering a counterpoise to the growing navies of France and Holland. The increasing estrangement between him and the nation made him averse from the natural remedy of a parliament, and he reverted to the absolute practices of the middle ages, in order that he might strain them far beyond the warrant of precedent to levy a tax under the name of ship-money, first on the port towns and then on the whole of England. Payment was resisted by John Hampden, a Buckinghamshire squire; but the judges declared that the king was in the right (1638). Yet the arguments used by Hampden's lawyers sunk deeply into the popular mind, and almost every man in England who was called on to pay the tax looked upon the king as a wrong-doer under the forms of law.

Ship-money.

In his ecclesiastical policy Charles was equally out of touch with the feelings of his people. He shared to the full his father's dislike and distrust of the Puritans, and he supported with the whole weight of the crown the attempt of William Laud (*q.v.*), since 1633 archbishop of Canterbury, to enforce conformity to the ritual prescribed by the Prayer Book. **The Church.** At the same time offence was given to the Puritans by an order that every clergyman should read the Declaration of Sports, in which the king directed that no one should be prevented from dancing or shooting at the butts on Sunday afternoon. Many of the clergy were suspended or deprived, many emigrated to Holland or New England, and of those who remained a large part bore the yoke with feelings of ill-concealed dissatisfaction. Suspicion was easily aroused that a deep plot existed, of which Laud was believed to be the centre, for carrying the nation over to the Church of Rome, a suspicion which seemed to be converted into a certainty when it was known that Panzani and Conn, two agents of the pope, had access to Charles, and that in 1637 there was a sudden accession to the number of converts to the Roman Catholic Church amongst the lords and ladies of the court.

Charles and Scotland.

In the summer of 1638 Charles had long ceased to reign in the affections of his subjects. But their traditionary loyalty had not yet failed, and if he had not called on them for fresh exertions, it is possible that the coming revolution would have been long delayed. Men were ready to shout applause in honour of Puritan martyrs like Prynne, Burton and Bastwick, whose ears were cut off in 1637, or in honour of the lawyers who argued such a case as that of Hampden. But no signs of active resistance had yet appeared. Unluckily for Charles, he was likely to stand in need of the active co-operation of Englishmen. He had attempted to force a new Prayer Book upon the Scottish nation. A riot at Edinburgh in 1637 quickly led to national resistance, and when in November 1638 the general assembly at Glasgow set Charles's orders at defiance, he was compelled to choose between tame submission and immediate war. In 1639 he gathered an English force, and marched towards the border. But English laymen, though asked to supply the money which he needed for the support of his army, deliberately kept it in their pockets, and the contributions of the clergy and of official persons were not sufficient to enable him to keep his troops long in the field. The king, therefore, thought it best to agree to terms of pacification. Misunderstandings broke out as to the interpretation of the treaty, and Charles having discovered that the Scots were intriguing with France, fancied that England, in hatred of its ancient foe, would now be ready to rally to his standard. After an interval of eleven years, in April 1640 he once more called a parliament.

The Short Parliament, as it was called, demanded redress of grievances, the abandonment of the claim to levy ship-money, and a complete change in the ecclesiastical system. **The Short Parliament.** Charles thought that it would not be worth while even to conquer Scotland on such terms, and dissolved parliament. A fresh war with Scotland followed. Wentworth, now earl of Strafford, became the leading adviser of the king. With all the energy of his disposition he threw himself into Charles's plans, and left no stone unturned to furnish the new expedition with supplies and money. But no skilfulness of a commander can avail when soldiers are determined not to fight. **The Scottish Invasion.** The Scots crossed the Tweed, and Charles's army was well pleased to fly before them. In a short time the whole of Northumberland and Durham were in the hands of the invaders. Charles was obliged to leave these two counties in their hands as a pledge for the payment of their expenses; and he was also obliged to summon parliament to grant him the supplies which he needed for that object.

When the Long Parliament met in November 1640 it was in a position in which no parliament had been before. **The Long Parliament.** Though nominally the Houses did not command a single soldier, they had in reality the whole Scottish army at their back. By refusing supplies they would put it out of the king's power to fulfil his engagements to that army, and it would immediately pursue its onward march to claim its rights. Hence there was scarcely anything which the king could venture to deny the Commons. Under Pym's leadership, they began by asking the head of Strafford. **Attainder of Strafford.** Nominally he was accused of a number of acts of oppression in the north of England and in Ireland. His real offence lay in his attempt to make the king absolute, and in the design with which he was credited of intending to bring over an Irish army to crush the liberties of England. If he had been a man of moderate abilities he might have escaped. But the Commons feared his commanding genius too much to let him go free. They began with an impeachment. Difficulties arose, and the impeachment was turned into a bill of attainder. The king abandoned his minister, and the execution of Strafford left Charles without a single man of supreme ability on his side. Then came rapidly a succession of blows at the supports by which the Tudor monarchy had been upheld. The courts of star chamber and high commission and the council of the north were abolished. The raising of tonnage and poundage without a parliamentary grant was declared illegal. The judges who had given obnoxious decisions were called to answer for their fault and were taught that they were responsible to the House of Commons as well as the king. Finally a bill was passed providing that the existing House should not be dissolved without its own consent.

It was clearly a revolutionary position which the House had assumed. But it was assumed because it was impossible to expect that a king who had ruled as Charles had ruled could take up a new position as the exponent of the feelings which were represented in the Commons. As long as Charles lived he could not be otherwise than an object of suspicion; and yet if he were dethroned there was no one available to fill his place. There arose therefore two parties in the House, one ready to trust the king, the other disinclined to put any confidence in him at all. The division was the sharper because it coincided with a difference in matters of religion. Scarcely any one wished to see the Laudian ceremonies upheld. But the members who favoured the king, and who formed a considerable minority, wished to see a certain liberty of religious thought, together with a return under a modified Episcopacy to the forms of worship which prevailed before Laud had taken the church in hand. The other side, which had the majority by a few votes, wished to see the Puritan creed prevail in all its strictness, and were favourable to the establishment of the Presbyterian discipline. The king by his unwise action threw power into the hands of his opponents. He listened with tolerable calmness to their Grand Remonstrance, but his attempt to seize the five members whom he accused of high treason made a good understanding impossible. The Scottish army had been paid off some months before, and civil war was the only means of deciding the quarrel.

At first the fortune of war wavered. Edgehill was a drawn battle (1642), and the campaign of 1643, though it was on the whole favourable to the king, gave no decisive results. **The civil war.** Before the year was at an end parliament invited a new Scottish army to intervene in England. As an inducement, the Solemn League and Covenant was signed by all Parliamentarian Englishmen, the terms of which were interpreted by the Scots to bind England to submit to Presbyterianism, though the most important clauses had been purposely left vague, so as to afford a loophole of escape. The battle of Marston Moor, with the defeat of the Royalist forces in the north, was the result. **Presbyterians and Independents.** But the battle did not improve the position of the Scots. They had been repulsed, and the victory was justly ascribed to the English contingent. The composition of that contingent was such as to have a special political significance. Its leader was Oliver Cromwell. It was formed by men who were fierce Puritan enthusiasts, and who for the very reason that the intensity of their religion separated them from the mass of their countrymen, had learnt to uphold with all the energy of zeal the doctrine that neither church nor state had a right to interfere with the forms of worship which each congregation might select for itself (see CONGREGATIONALISM and CROMWELL, OLIVER). The principle advocated by the army, and opposed by the Scots and the majority of the House of Commons, was liberty of sectarian association. Some years earlier, under the dominion of Laud, another principle had been proclaimed by Chillingworth and Hales, that of liberty of thought within the unity of the church. Both these movements conduced to the ultimate establishment of toleration, but for the present the Independents were to have their way.

The second civil war.

Execution of the king.

The Presbyterian leaders, Essex and Manchester, were not successful leaders. The army was remodelled after Cromwell's pattern, and the king was finally crushed at Naseby (1645). The next year (1646) he surrendered to the Scots. Then followed two years of fruitless negotiation, in which after the Scots abandoned the king to the English parliament, the army took him out of the hands of the parliament, whilst each in turn tried to find some basis of arrangement on which he might reign without ruling. Such a basis could not be found, and when Charles stirred up a fresh civil war and a Scottish invasion (1648) the leaders of the army vowed that, if victory was theirs, they would bring him to justice. To do this it was necessary to drive out a large number of the members of the House of Commons by what was known as Pride's Purge, and to obtain from the mutilated Commons the dismissal of the House of Lords, and the establishment of a high court of justice, before which the king was brought to trial and sentenced to death. He was beheaded on a scaffold outside the windows of Whitehall (1649).[1]

The Commonwealth.

Cromwell's protectorate.

The government set up was a government by the committees of a council of state nominally supporting themselves on the House of Commons, though the members who still retained their places were so few that the council of state was sufficiently numerous to form a majority in the House. During eleven years the nation passed through many vicissitudes in its forms of government. These forms take no place in the gradual development of English institutions, and have never been referred to as affording precedents to be followed. To the student of political science, however, they have a special interest of their own, as they show that when men had shaken themselves loose from the chain of habit and prejudice, and had set themselves to build up a political shelter under which to dwell, they were irresistibly attracted by that which was permanent in the old constitutional forms of which the special development had of late years been so disastrous. After Cromwell had suppressed resistance in Ireland (1649), had conquered Scotland (1650), and had overthrown the son of the late king, the future Charles II., at Worcester (1651), the value of government by an assembly was tested and found wanting. After Cromwell had expelled the remains of the Long Parliament (1653), and had set up another assembly of nominated members, that second experiment was found equally wanting. It was necessary to have recourse to one head of the executive government, controlling and directing its actions. Cromwell occupied this position as lord protector. He did all that was in his power to do to prevent his authority from degenerating into tyranny. He summoned two parliaments, of only one House, and with the consent of the second parliament he erected a second House, so that he might have some means of checking the Lower House without constantly coming into personal collision with its authority. As far as form went, the constitution in 1658, so far as it differed from the Stuart constitution, differed for the better. But it suffered from one fatal defect. It was based on the rule of the sword. The only substitute for traditional authority is the clearly expressed expression of the national will, and it is impossible to doubt that if the national will had been expressed it would have swept away Cromwell and all his system. The majority of the upper and middle classes, which had united together against Laud, was now reunited against Cromwell. The Puritans themselves were but a minority, and of that minority considerable numbers disliked the free liberty accorded to the sects. Whilst the worship of the Church of England was proscribed, every illiterate or frenzied enthusiast was allowed to harangue at his pleasure. Those who cared little for religion felt insulted when they saw a government with which they had no sympathy ruling by means of an army which they dreaded and detested. Cromwell did his best to avert a social revolution, and to direct the energies of his supporters into the channels of merely political change. But he could not prevent, and it cannot be said that he wished to prevent, the rise of men of ability from positions of social inferiority. The nation had striven against the arbitrary government of the king; but it was not prepared to shake off the predominance of that widely spreading aristocracy which, under the name of country gentlemen, had rooted itself too deeply to be easily passed by. Cromwell's rule was covered with military glory, and there can be no doubt that he honestly applied himself to solve domestic difficulties as well. But he reaped the reward of those who strive for something better than the generation in which they live is able to appreciate. His own faults and errors were remembered against him. He tried in vain to establish constitutional government and religious toleration (see CROMWELL, OLIVER). When he died (1658) there remained branded on the national mind two strong impressions which it took more than a century to obliterate—the dread of the domination of a standing army, and abhorrence of the very name of religious zeal.

The anarchy.

The eighteen months which followed deepened the impression thus formed. The army had appeared a hard master when it lent its strength to a wise and sagacious rule. It was worse when it undertook to rule in its own name, to set up and pull down parliaments and governments. The only choice left to the nation seemed to be one between military tyranny and military anarchy. Therefore it was that when Monk advanced from Scotland and declared for a free parliament, there was little doubt that the new parliament would recall the exiled king, and seek to build again on the old foundations.

The Restoration.

The Restoration was effected by a coalition between the Cavaliers, or followers of Charles I., and the Presbyterians who had originally opposed him. It was only after the nature of a great reaction that the latter should for a time be swamped by the former. The Long Parliament of the Restoration met in 1661, and the Act of Uniformity entirely excluded all idea of reform in the Puritan direction, and ordered the expulsion from their benefices of all clergymen who refused to express approval of the whole of the Book of Common Prayer (1662). A previous statute, the Corporation Act (1661), ordered that all members of corporations should renounce the Covenant and the doctrine that subjects might in any case rightfully use force against their king, and should receive the sacrament after the forms of the Church of England. The object for which Laud had striven, the compulsory imposition of uniformity, thus became part of the law of the land.

Herein lay the novelty of the system of the Restoration. The system of Laud and the system of Cromwell had both been imposed by a minority which had possessed itself of the powers of government. The new uniformity was imposed by parliament, and parliament had the nation behind it. For the first time, therefore, all those who objected to the established religion sought, not to alter its forms to suit themselves, but to gain permission to worship in separate congregations. Ultimately, the dissenters, as they began to be called, would obtain their object. As soon as it became clear to the mass of the nation that the dissenters were in a decided minority, there would be no reason to fear the utmost they could do even if the present liberty of worship and teaching were conceded to them. For the present, however, they were feared out of all proportion to their numbers. They counted amongst them the old soldiers of the Protectorate, and though that army had been dissolved, it always seemed possible that it might spring to arms once more. A bitter experience had taught men that a hundred of Oliver's Ironsides might easily chase a thousand Cavaliers; and as long as this danger was believed to exist, every effort would be made to keep dissent from spreading. Hence the Conventicle Act (1664) imposed penalties on those taking part in religious meetings in private houses, and the Five Mile Act (1665) forbade an expelled clergyman to come within five miles of a corporate borough, the very place where he was most likely to secure adherence, unless he would swear his adhesion to the doctrine of non-resistance.

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[1] The events of the reign of Charles I. are treated in greater detail in the articles CHARLES I., King of Great Britain and Ireland; STRAFFORD; HAMPDEN; PYM; GREAT REBELLION; CROMWELL, &c.

Doctrine of non-resistance.

The doctrine of non-resistance was evidently that by which, at this time, the loyal subject was distinguished from those whom he stigmatized as disloyal. Yet even the most loyal found that, if it was wrong to take up arms against the king, it might be right to oppose him in other ways. Even the Cavaliers did not wish to see Charles II. an absolute sovereign. They wished to reconstruct the system which had been violently interrupted by the events of the autumn of 1641, and to found government on the co-operation between king and parliament, without defining to themselves what was to be done if the king's conduct became insufferable. Openly, indeed, Charles II. did not force them to reconsider their position. He did not thrust members of the Commons into prison, or issue writs for ship-money. He laid no claim to taxation which had not been granted by parliament. But he was extravagant and self-indulgent, and he wanted more money than they were willing to supply. A war with the Dutch broke out, and there were strong suspicions that Charles applied money voted for the fleet to the maintenance of a vicious and luxurious court. Against the vice and luxury, indeed, little objection was likely to be brought. The over-haste of the Puritans to drill England into ways of morality and virtue had thrown at least the upper classes into a slough of revelry and baseness. But if the vice did not appear objectionable the expense did, and a new chapter in the financial history of the government was opened when the Commons, having previously gained control over taxation, proceeded to vindicate their right to control expenditure.

The first Dutch war.

The Commons aim at control over expenditure.

As far, indeed, as taxation was concerned, the Long Parliament had not left its successor much to do. The abolition of feudal tenures and purveyance had long been demanded, and the conclusion of an arrangement which had been mooted in the reign of James I. is only notable as affording one instance out of many of the tendency of a single class to shift burdens off its own shoulders. The predominant landowners preferred the grant of an excise, which would be taken out of all pockets, to a land-tax which would exclusively be felt by those who were relieved by the abolition of the tenures. The question of expenditure was constantly telling on the relations between the king and the House of Commons. After the Puritan army had been disbanded, the king resolved to keep on foot a petty force of 5000 men, and he had much difficulty in providing for it out of a revenue which had not been intended by those who voted it to be used for such a purpose. Then came the Dutch war, bringing with it a suspicion that some at least of the money given for paying sailors and fitting out ships was employed by Charles on very different objects. The Commons accordingly, in 1665, succeeded in enforcing, on precedents derived from the reigns of Richard II. and Henry IV., the right of appropriating the supplies granted to special objects; and with more difficulty they obtained, in 1666, the appointment of a commission empowered to investigate irregularities in the issue of moneys. Such measures were the complement of the control over taxation which they had previously gained, and as far as their power of supervision went, it constituted them and not the king the directors of the course of government. If this result was not immediately felt, it was because the king had a large certain revenue voted to him for life, so that, for the present at least, it was only his extraordinary expenses which could be brought under parliamentary control. Nor did even the renewal of parliamentary impeachment, which ended in the banishment of Lord Chancellor Clarendon (1667), bring on any direct collision with the king. If the Commons wished to be rid of him because he upheld the prerogative, the king was equally desirous to be rid of him because he looked coldly on the looseness of the royal morals.

Charles II. and Louis XIV.

The great motive power of the later politics of the reign was to be found beyond the Channel. To the men of the days of Charles II., Louis XIV. of France was what Philip II. of Spain had been to the men of the days of Elizabeth. Gradually, in foreign policy, the commercial emulation with the Dutch, which found vent in one war in the time of the Commonwealth, and in two wars in the time of Charles II., gave way to a dread, rising into hatred, of the arrogant potentate who, at the head of the mightiest army in Europe, treated with contempt all rights which came into collision with his own wishes. Louis XIV., moreover, though prepared to quarrel with the pope in the matter of his own authority over the Gallican Church, was a bigoted upholder of Catholic orthodoxy, and Protestants saw in his political ambitions a menace to their religion. In the case of England there seemed a special danger to Protestantism; for whatever religious sympathies Charles II. possessed were with the Roman Catholic faith, and in his annoyance at the interference of the Commons with his expenditure he was not ashamed to stoop to become the pensioner of the French king. In 1670 the secret treaty of Dover was signed. Charles was to receive from Louis £200,000 a year and the aid of 6000 French troops to enable him to declare himself a convert, and to obtain special advantages for his religion, whilst he was also to place the forces of England at Louis's disposal for his purposes of aggression on the continent of Europe.

Second Dutch war, and declaration of indulgence.

Charles had no difficulty in stirring up the commercial jealousy of England so as to bring about a second Dutch war (1672). The next year, unwilling to face the dangers of his larger plan, he issued a declaration of indulgence, which, by a single act of the prerogative, suspended all penal laws against Roman Catholics and dissenters alike. To the country gentlemen who constituted the cavalier parliament, and who had long been drifting into opposition to the crown, this was intolerable. The predominance of the Church of England was the prime article of their political creed; they dreaded the Roman Catholics; they hated and despised the dissenters. Under any circumstances an indulgence would have been most distasteful to them. But the growing belief that the whole scheme was merely intended to serve the purposes of the Roman Catholics converted their dislike into deadly opposition. Yet the parliament resolved to base its opposition upon constitutional grounds. The right claimed by the king to suspend the laws was questioned, and his claim to special authority in ecclesiastical matters was treated with contempt. The king gave way and withdrew his declaration. But no solemn act of parliament declared it to be illegal, and in due course of time it would be heard of again.

The Test Act.

The Commons followed up their blow by passing the Test Act, making the reception of the sacrament according to the forms of the Church of England, and the renunciation of the doctrine of transubstantiation, a necessary qualification for office. At once it appeared what a hold the members of the obnoxious church had had upon the administration of the state. The lord high admiral, the lord treasurer, and a secretary of state refused to take the test. The lord high admiral was the heir to the throne, the king's brother, the duke of York.

Danby's ministry.

Charles, as usual, bent before the storm. In Danby (see LEEDS, 1ST DUKE OF) he found a minister whose views answered precisely to the views of the existing House of Commons. Like the Commons, Danby wished to silence both Roman Catholics and dissenters. Like the Commons, too, he wished to embark on a foreign policy hostile to France. But he served a master who regarded Louis less as a possible adversary than as a possible paymaster. Sometimes Danby was allowed to do as he liked, and the marriage of the duke of York's eldest daughter Mary to her cousin the prince of Orange was the most lasting result of his administration. More often he was obliged to follow where Charles led, and Charles was constantly ready to sell the neutrality of England for large sums of French gold. At last one of these negotiations was detected, and Danby, who was supposed to be the author instead of the unwilling instrument of the intrigue, was impeached. In order to save his minister, Charles dissolved parliament (1678). He could not have chosen a more unlucky time for his own quiet.

The Popish plot.

The strong feeling against the Roman Catholics had been quickened into a flame by a great imposture. The inventors of the so-called popish plot charged the leading English Roman Catholics with a design to murder the king. Judges and juries alike were maddened with excitement, and listened greedily to the lies which poured forth from the lips of profligate informers. Innocent blood was shed in abundance.

The Exclusion Bill.

The excitement had its root in the uneasy feeling caused by the knowledge that the heir to the throne was a Roman Catholic. Three parliaments were summoned and dissolved. In each parliament the main question at issue between the Commons and the crown was the Exclusion Bill, by which the Commons sought to deprive the duke of York of his inheritance; and it was notorious that the leaders of the movement wished the crown to descend to the king's illegitimate son, the duke of Monmouth.

Whigs and Tories.

The principles by which the Commons were guided in these parliaments were very different from those which had prevailed in the first parliament of the Restoration. Those principles, to which that party adhered which about this time became known as the Tory party, had been formed under the influence of the terror caused by militant Puritanism. In the state the Tory inherited the ideas of Clarendon, and, without being at all ready to abandon the claims of parliaments, nevertheless somewhat inconsistently spoke of the king as ruling by a divine and indefeasible title, and wielding a power which it was both impious and unconstitutional to resist by force. In the church he inherited the ideas of Laud, and saw in the maintenance of the Act of Uniformity the safeguard of religion. But the hold of these opinions on the nation had been weakened with the cessation of the causes which had produced them. In 1680 twenty years had passed since the Puritan army had been disbanded. Many of Cromwell's soldiers had died, and most of them were growing old. The dissenters had shown no signs of engaging in plots or conspiracies. They were known to be only a comparatively small minority of the population, and though they had been cruelly persecuted, they had suffered without a thought of resistance. Dread of the dissenters, therefore, had become a mere chimaera, which only those could entertain whose minds were influenced by prejudice. On the other hand, dread of the Roman Catholics was a living force. Unless the law were altered a Roman Catholic would be on the throne, wielding all the resources of the prerogative, and probably supported by all the resources of the king of France. Hence the leading principle of the Whigs, as the predominant party was now called, was in the state to seek for the highest national authority in parliament rather than in the king, and in the church to adopt the rational theology of Chillingworth and Hales, whilst looking to the dissenters as allies against the Roman Catholics, who were the enemies of both.

Tory reaction.

Events were to show that it was a wise provision which led the Whigs to seek to exclude the duke of York from the throne. But their plan suffered under two faults, the conjunction of which was ruinous to them for the time. In the first place, their choice of Monmouth as the heir was infelicitous. Not only was he under the stain of illegitimacy, but his succession excluded the future succession of Mary, whose husband, the prince of Orange, was the hope of Protestant Europe. In the second place, drastic remedies are never generally acceptable when the evil to be remedied is still in the future. When, in the third of the short parliaments held at Oxford the Whigs rode armed into the city, the nation decided that the future danger of a Roman Catholic succession was incomparably less than the immediate danger of another civil war. Loyal addresses poured in to the king. For the four remaining years of his reign he ruled without summoning any parliament. Whigs were brought before prejudiced juries and partial judges. Their blood flowed on the scaffold. The charter of the city of London was confiscated. The reign of the Tories was unquestioned. Yet it was not quite what the reign of the Cavaliers had been in 1660. The violence of the Restoration had been directed primarily against Puritanism, and only against certain forms of government so far as they allowed Puritans to gain the upper hand. The violence of the Tories was directed against rebellion and disorder, and only against dissenters so far as they were believed to be the fomenters of disorder. Religious hatred had less part in the action of the ruling party, and even from its worst actions a wise man might have predicted that the day of toleration was not so far off as it seemed.

James II., 1685–1688.

The accession of James II. (1685) put the views of the opponents of the Exclusion Bill to the test. A new parliament was elected, almost entirely composed of decided Tories. A rebellion in Scotland, headed by the earl of Argyll, and a rebellion in England, headed by the duke of Monmouth, were easily suppressed. But the inherent difficulties of the king's position were not thereby overcome. It would have been hard, in days in which religious questions occupied so large a space in the field of politics, for a Roman Catholic sovereign to rule successfully over a Protestant nation. James set himself to make it, in his case, impossible. It may be that he did not consciously present to himself any object other than fair treatment for his co-religionists. On the one hand, however, he alienated even reasonable opponents by offering no guarantees that equality so gained would not be converted into superiority by the aid of his own military force and of the assistance of the French king; whilst on the other hand he relied, even more strongly than his father had done, on the technical legality which exalted the prerogative in defiance of the spirit of the law. He began by making use of the necessity of resisting Monmouth to increase his army, under the pretext of the danger of a repetition of the late rebellion; and in the regiments thus levied he appointed many Roman Catholic officers who had refused to comply with the Test Act. Rather than submit to the gentlest remonstrance, he prorogued parliament, and proceeded to obtain from the court of king's bench a judgment in favour of his right to dispense with all penalties due by law, in the same way that his grandfather had appealed to the judges in the matter of the post-nati. But not only was the question put by James II. of far wider import than the question put by James I., but he deprived the court to which he applied of all moral authority by previously turning out of office the judges who were likely to disagree with him, and by appointing new ones who were likely to agree with him. A court of high commission of doubtful legality was subsequently erected (1686) to deprive or suspend clergymen who made themselves obnoxious to the court, whilst James appointed Roman Catholics to the headship of certain colleges at Oxford. The legal support given him by judges of his own selection was fortified by the military support of an army collected at Hounslow Heath; and a Roman Catholic, the earl of Tyrconnel, was sent as lord-deputy to Ireland (1687) to organize a Roman Catholic army on which the king might fall back if his English forces proved insufficient for his purpose.

James's declaration of indulgence.

Thus fortified, James issued a declaration of indulgence (1687) granting full religious liberty to all his subjects. The belief, that the grant of liberty to all religions was only intended to serve as a cloak for the ascendancy of one, was so strong that the measure roused the opposition of all those who objected to see the king's will substituted for the law, even if they wished to see the Protestant dissenters tolerated. In spite of this opposition, the king thought it possible to obtain a parliamentary sanction for his declaration. The parliament to which he intended to appeal was, however, to be as different a body from the parliament which met in the first year of his reign as the bench of judges which had approved of the dispensing power had been different from the bench which existed at his accession. A large number of the borough members were in those days returned by the corporations, and

Trial of the seven bishops.

the corporations were accordingly changed. But so thoroughly was the spirit of the country roused, that many even of the new corporations were set against James's declaration, and he had therefore to abandon for a time the hope of seeing it accepted even by a packed House of Commons. All, however, that he could do to give it force he did. He ordered the clergy to read it in all pulpits (1688). Seven bishops, who presented a petition asking him to relieve the clergy from the burthen of proclaiming what they believed to be illegal, were brought to trial for publishing a seditious libel. Their acquittal by a jury was the first serious blow to the system adopted by the king.

Revolution of 1688.

Another event which seemed likely to consolidate his power was in reality the signal of his ruin. The queen bore him a son. There was thus no longer a strong probability that the king would be succeeded at no great distance of time by a Protestant heir. Popular incredulity expressed itself in the assertion that, as James had attempted to gain his ends by means of a packed bench of judges and a packed House of Commons, he had now capped the series of falsifications by the production of a supposititious heir. The leaders of both parties combined to invite the prince of Orange to come to the rescue of the religion and laws of England. He landed on the 5th of November at Brixham. Before he could reach London every class of English society had declared in his favour. James was deserted even by his army. He fled to France, and a convention parliament, summoned without the royal writ, declared that his flight was equivalent to abdication, and offered the crown in joint sovereignty to William and Mary (1689).

IX. THE REVOLUTION AND THE AGE OF ANNE (1689–1714)

William III. and Mary II., 1689.

The Revolution, as it was called, was more than a mere change of sovereigns. It finally transferred the ultimate decision in the state from the king to parliament. What parliament had been in the 15th century with the House of Lords predominating, that parliament was to be again in the end of the 17th century with the House of Commons predominating. That House of Commons was far from resting on a wide basis of popular suffrage. The county voters were the freeholders; but in the towns, with some important exceptions, the electors were the richer inhabitants who formed the corporations of the boroughs, or a body of select householders more or less under the control of some neighbouring landowner. A House so chosen was an aristocratic body, but it was aristocratic in a far wider sense than the House of Lords was aristocratic. The trading and legal classes found their representation there by the side of the great owners of land. The House drew its strength from its position as a true representative of the effective strength of the nation in its social and economical organization.

Such was the body which firmly grasped the control over every branch of the administration. Limiting in the Bill of Rights the powers assumed by the crown, the Commons declared that the king could not keep a standing army in time of peace without consent of parliament; and they made that consent effectual, as far as legislation could go, by passing a Mutiny Act year by year for twelve months only, so as to prevent the crown from exercising military discipline without their authority. Behind these legal contrivances stood the fact that the army was organized in the same way as the nation was organized, being officered by gentlemen who had no desire to overthrow a constitution through which the class from which they sprung controlled the government. Strengthened by the cessation of any fear of military violence, the Commons placed the crown in financial dependence on themselves by granting a large part of the revenue only for a limited term of years, and by putting strictly in force their right of appropriating that revenue to special branches of expenditure.

Causes in favour of liberty.

Such a revolution might have ended in the substitution of the despotism of a class for the despotism of a man. Many causes combined to prevent this result. The landowners, who formed the majority of the House, were not elected directly, as was the case with the nobility of the French states-general, by their own class, but by electors who, though generally loyal to them, would have broken off from them if they had attempted to make themselves masters of their fellow citizens. No less important was the almost absolute independence of the judges, begun at the beginning of the reign, by the grant of office to them during good behaviour instead of during the king's pleasure, and finally secured by the clause in the Act of Settlement in 1701, which protected them against dismissal except on the joint address of both Houses of Parliament. Such an improvement, however, finds its full counterpart in another great step already taken. The more representative a government becomes, the more necessary it is for the well-being of the nation that the expression of individual thought should be free in every direction. If it is not so, the government is inclined to proscribe unpopular opinion, and to forget that new opinions by which the greatest benefits are likely to be conferred are certain at first to be entertained by a very few, and are quite certain to be unpopular as soon as they come into collision with the opinions of the majority. In the middle ages the benefits of the liberation of thought from state control had been secured by the antagonism between church and state. The Tudor sovereigns had rightfully asserted the principle that in a well-ordered nation only one supreme power can be allowed to exist; but in so doing they had enslaved religion. It was fortunate that, just at the moment when parliamentary control was established over the state, circumstances should have arisen which made the majority ready to restore to the individual conscience that supremacy over religion which the medieval ecclesiastics had claimed for the corporation of the universal church. Dissenters had, in the main, stood shoulder to shoulder with churchmen in rejecting the suspicious benefits of James, and both gratitude and policy forbade the thought of replacing them under the heavy yoke which had been imposed on them at the Restoration. The exact mode in which relief should be afforded was still an open question. The idea prevalent with the more liberal minds amongst the clergy was that of comprehension—that is to say, of so modifying the prayers and ceremonies of the church as to enable the dissenters cheerfully to enter in. The scheme was one which had approved itself to minds of the highest order—to Sir Thomas More, to Bacon, to Hales and to Jeremy Taylor. It is one which, as long as beliefs are not very divergent, keeps up a sense of brotherhood overruling the diversity of opinion. It broke down, as it always will break down in practice, whenever the difference of belief is so strongly felt as to seek earnestly to embody itself in diversity of outward practice. The greater part of the clergy of the church felt that to surrender their accustomed formularies was to surrender somewhat of the belief which those formularies signified, while the dissenting clergy were equally reluctant to adopt the common prayer book even in a modified form. Hence the Toleration Act, which guaranteed the right of separate assemblies for worship outside the pale of the church, though it embodied the principles of Cromwell and Milton, and not those of Chillingworth and Hales, was carried without difficulty, whilst the proposed scheme of comprehension never had a chance of success (1689). The choice was one which posterity can heartily approve. However wide the limits of toleration be drawn, there will always be those who will be left outside. By religious liberty those inside gain as much as those who are without. From the moment of the passing of the Toleration Act, no Protestant in England performed any act of worship except by his own free and deliberate choice. The literary spokesman of the new system was Locke. His *Letters concerning Toleration* laid down the principle which had been maintained by Cromwell, with a wider application than was possible in days when the state was in the hands of a mere minority only able to maintain itself in power by constant and suspicious vigilance.

The Toleration Act.

One measure remained to place the dissenters in the position of full membership of the state. The Test Act excluded them from office. But the memory of the high-handed proceedings of Puritan rulers was still too recent to allow Englishmen to run the risk of a reimposition of their yoke, and this feeling, fanciful as it was, was sufficient to keep the Test Act in force for years to come.

Liberty of the press.

The complement of the Toleration Act was the abolition of the censorship of the press (1695). The ideas of the author of the *Areopagitica* had at last prevailed. The attempt to fix certain opinions on the nation which were pleasing to those in power was abandoned by king and parliament alike. The nation, or at least so much of it as cared to read books or pamphlets on political subjects, was acknowledged to be the supreme judge, which must therefore be allowed to listen to what counsellors it pleased.

This new position of the nation made itself felt in various ways. It was William's merit that, fond as he was of power, he recognized the fact that he could not rule except so far as he carried the goodwill of the nation with him. No doubt he was helped to an intelligent perception of the new situation by the fact that, as a foreigner, he cared far more for carrying on war successfully against France than for influencing the domestic legislation of a country which was not his own, and by the knowledge that the conduct of the struggle which lasted till he was able to treat with France on equal terms at Ryswick (1697) was fairly trusted to his hands. Nevertheless these years of war called for the united action of a national government, and in seeking to gain this support for himself, he hit upon an expedient which opened a new era in constitutional politics.

Beginning of cabinet government.

The supremacy of the House of Commons would have been an evil of no common magnitude, if it had made government impossible. Yet this was precisely what it threatened to do. Sometimes the dominant party in the House pressed with unscrupulous rancour upon its opponents. Sometimes the majority shifted from side to side as the House was influenced by passing gusts of passion or sympathy, so that, as it was said at the time, no man could foretell one day what the House would be pleased to do on the next. Against the first of these dangers William was to a great extent able to guard by the exercise of his right of dissolution, so as to appeal to the constituencies, which did not always share in the the passions of their representatives. But the second danger could not be met in this way. The only cure for waywardness is responsibility, and not only was this precisely what the Commons had not learned to feel, but it was that which it was impossible to make them feel directly. A body composed of several hundred members cannot carry on government with the requisite steadiness of action and clearness of insight. Such work can only fitly be entrusted to a few, and whenever difficult circumstances arise it is necessary that the action of those few be kept in harmony by the predominance of one. The scheme on which William hit, by the advice of the earl of Sunderland, was that which has since been known as cabinet government. He selected as his ministers the leading members of the two Houses who had the confidence of the majority of the House of Commons. In this way, the majority felt an interest in supporting the men who embodied their own opinions, and fell in turn under the influence of those who held them with greater prudence or ability than fell to the lot of the average members of the House. All that William doubtless intended was to acquire a ready instrument to enable him to carry on the war with success. In reality he had refounded, on a new basis, the government of England. His own personal qualities were such that he was able to dominate over any set of ministers; but the time would come when there would be a sovereign of inferior powers. Then the body of ministers would step into his place. The old rude arrangements of the middle ages had provided by frequent depositions that an inefficient sovereign should cease to rule, and those arrangements had been imitated in the cases of Charles I. and James II. Still the claim to rule had, at least from the time of Henry III., been derived from hereditary descent, and the interruption, however frequently it might occur, had been regarded as something abnormal, only to be applied where there was an absolute necessity to prevent the wielder of executive authority from setting at defiance the determined purpose of the nation. After the Revolution not only had the king's title been so changed as to make him more directly than ever dependent on the nation, but he now called into existence a body which derived its own strength from its conformity with the wishes of the representatives of the nation.

For the moment it seemed to be but a temporary expedient. When the war came to an end, the Whig party which had sustained William in his struggle with France split up. The dominant feeling of the House of Commons was no longer the desire to support the crown against a foreign enemy, but to make government as cheap as possible, leaving future dangers to the chances of the future. William had not so understood the new invention of a united ministry as binding him to take into his service a united ministry of men whom he regarded as fools and knaves. He allowed the Commons to reduce the army to a skeleton, to question his actions, and to treat him as if he were a cipher. But it was only by slow degrees that he was brought to acknowledge the necessity of choosing his ministers from amongst the men who had done these things.

The Spanish succession.

The time came when he needed again the support of the nation. The death of Charles II., the heirless king of the huge Spanish monarchy, had long been expected. Since the peace of Ryswick, William and Louis XIV. had come to terms by two successive partition treaties for a division of those vast territories in such a way that the whole of them should not fall into the hands of a near relation either of the king of France or of the emperor, the head of the house of Austria. When the king of Spain actually died in 1700, William seemed to have no authority in England whatever; and Louis was therefore encouraged to break his engagements, and to accept the whole of the Spanish inheritance for his grandson, who became Philip V. of Spain. William saw clearly that such predominance of France in Europe would lead to the development of pretensions unbearable to other states. But the House of Commons did not see it, even when the Dutch garrisons were driven by French troops out of the posts in the Spanish Netherlands which they had occupied for many years (1701).

The Act of Settlement.

William had prudently done all that he could to conciliate the Tory majority. In the preceding year (1700) he had given office to a Tory ministry, and he now (1701) gave his assent to the Act of Settlement, which secured the succession of the crown to the electress Sophia of Hanover, daughter of James I.'s daughter Elizabeth, to the exclusion of all Roman Catholic claimants, though it imposed several fresh restrictions on the prerogative. William was indeed wise in keeping his feelings under control. The country sympathized with him more than the Commons did, and when the House imprisoned the gentlemen deputed by the freeholders of Kent to present a petition asking that its loyal addresses might be turned into bills of supply, it simply advertised its weakness to the whole country.

The Grand Alliance.

The reception of this Kentish petition was but a foretaste of the discrepancy between the Commons and the nation, which was to prove the marked feature of the middle of the century now opening. For the present the House was ready to give way. It requested the king to enter into alliance with the Dutch. William went yet further in the direction in which he was urged. He formed an alliance with the emperor, as well as with the Netherlands, to prevent the union of the crowns of France and Spain, and to compel France to evacuate the Netherlands. An unexpected event came to give him all the strength he needed. James II. died, and Louis acknowledged his son as the rightful king of England. Englishmen of both parties were stung to indignation by the insult. William dissolved parliament, and the new House of Commons, Tory as it was by a small majority, was eager to support the king. It voted men and money according to his wishes. England was to be the soul of the Grand Alliance against France. But before a blow was struck William was thrown from his horse. He died on the 8th of March 1702. "The man," as Burke said of him, "was dead, but the Grand Alliance survived in which King William lived and reigned."

Queen Anne, 1702-1714.

Upon the accession of Anne, war was at once begun. The Grand Alliance became, as William would have wished, a league to wrest the whole of the Spanish dominions from Philip, in favour of the Austrian archduke Charles. It found a chief of supreme military and diplomatic genius in the duke of Marlborough. His victory at Blenheim (1704) drove the French out of Germany. His victory of Ramillies (1706) drove them out of the Netherlands. In Spain, Gibraltar was captured by Rooke (1704) and Barcelona by Peterborough (1705). Prince Eugene relieved Turin from a French siege, and followed up the blow by driving the besiegers out of Italy.

The influence of Marlborough at home was the result partly of the prestige of his victories, partly of the dominating influence of his strong-minded duchess ("Mrs Freeman") over the queen (see ANNE, queen of England). The duke cared little for home politics in themselves; but he had his own ends, both public and private, to serve, and at first gave his support to the Tories, whose church policy was regarded with favour by the queen. Their efforts were directed towards the restriction of the Toleration Act within narrow limits. Many dissenters had evaded the Test Act by partaking of the communion in a church, though they subsequently attended their own chapels. An Occasional Conformity Bill, imposing penalties on those who adopted this practice, twice passed the Commons (1702, 1703), but was rejected by the House of Lords, in which the Whig element predominated. The church was served in a nobler manner in 1704 by the abandonment of first-fruits and tenths by the queen for the purpose of raising the pittances of the poorer clergy (see QUEEN ANNE'S BOUNTY). In 1707 a piece of legislation of the highest value was carried to a successful end. The Act of Union, passed in the parliaments of England and Scotland, joined the legislatures of the two kingdoms and the nations themselves in an indissoluble bond.

Union with Scotland.

United Whig ministry.

The ministry in office at the time of the passing of the Act of Union had suffered important changes since the commencement of the reign. The Tories had never been as earnest in the prosecution of the war as the Whigs; and Marlborough, who cared above all things for the furtherance of the war, gradually replaced Tories by Whigs in the ministry. His intention was doubtless to conciliate both parties by admitting them both to a share of power; but the Whigs were determined to have all or none, and in 1708 a purely Whig ministry was formed to support the war as the first purely Whig ministry had supported it in the reign of William. The years of its power were the years of the victories of Oudenarde (1708) and of Malplaquet (1709), bringing with them the entire ruin of the military power of Louis XIV.

Such successes, if they were not embraced in the spirit of moderation, boded no good to the Whigs. It was known that even before the last battle Louis had been ready to abandon the cause of his grandson, and that his offers had been rejected because he would not consent to join the allies in turning him out of Spain. A belief spread in England that Marlborough wished the endless prolongation of the war for his own selfish ends. Spain was far away, and, if the Netherlands were safe, enough had been done for the interests of England. The Whigs were charged with refusing to make peace when an honourable and satisfactory peace was not beyond their reach.

As soon as the demand for a vigorous prosecution of the war relaxed, the Whigs could but rely on their domestic policy, in which they were strongest in the eyes of posterity but weakest in the eyes of contemporaries. It was known that they looked for the principle on which the queen's throne rested to the national act of the Revolution, rather than to the birth of the sovereign as the daughter of James II., whilst popular feeling preferred, however inconsistently, to attach itself to some fragment of hereditary right. What was of greater consequence was, that it was known that they were the friends of the dissenters, and that their leaders, if they could have had their way, would not only have maintained the Toleration Act, but would also have repealed the Test Act. In 1709 a sermon preached by Dr Sacheverell (*q.v.*) denounced toleration and the right of resistance in tones worthy of the first days of the Restoration. Foolish as the sermon was, it was but the reflection of folly which was widely spread amongst the rude and less educated classes. The Whig leaders unwisely took up the challenge and impeached Sacheverell. The Lords condemned the man, but they condemned him to an easy sentence. His trial was the signal for riot. Dissenting chapels were sacked to the cry of High Church and Sacheverell. The queen, who had personal reasons for disliking the Whigs, dismissed them from office (1710), and a Tory House of Commons was elected amidst the excitement to support the Tory ministry of Harley and St John.

Tory ministry.

Peace of Utrecht.

After some hesitation the new ministry made peace with France, and the treaty of Utrecht (1713), stipulating for the permanent separation of the crowns of France and Spain, and assigning Milan, Naples and the Spanish Netherlands to the Austrian claimant, accomplished all that could reasonably be desired, though the abandonment to the vengeance of the Spanish government of her Catalan allies, and the base desertion of her continental confederates on the very field of action, brought dishonour on the good name of England. The Commons gladly welcomed the cessation of the war. The approval of the Lords had been secured by the creation of twelve Tory peers. In home politics the new ministry was in danger of being carried away by its more violent supporters. St John, now Viscount Bolingbroke, with unscrupulous audacity placed himself at their head. The Occasional Conformity Bill was at last carried (1711). To it was added the Schism Act (1714), forbidding dissenters to keep schools or engage in tuition. Bolingbroke went still farther. He engaged in an intrigue for bringing over the Pretender to succeed the queen upon her death. This wild conduct alienated the moderate Tories, who, much as they wished to see the throne occupied by the heir of the ancient line, could not bring themselves to consent to its occupation by a Roman Catholic prince. Such men, therefore, when Anne died (1714) joined the Whigs in proclaiming the elector of Hanover king as George I.

Occasional Conformity Act and the Schism Act.

X. THE HANOVERIAN KINGS (1714–1793)

Accession of the House of Hanover.

The accession of George I. brought with it the predominance of the Whigs. They had on their side the royal power, the greater part of the aristocracy, the dissenters and the higher trading and commercial classes. The Tories appealed to the dislike of dissenters prevalent amongst the country gentlemen and the country clergy, and to the jealousy felt by the agricultural classes towards those who enriched themselves by trade. Such a feeling, if it was aroused by irritating legislation, might very probably turn to the advantage of the exiled house, especially as the majority of Englishmen were to be found on the Tory side. It was therefore advisable that government should content itself with as little action as possible, in order to give time for old habits to wear themselves out. The landing of the Pretender in Scotland (1715), and the defeat of a portion of his army which had advanced to Preston—a defeat which was the consequence of the apathy of his English supporters, and which was followed by the complete suppression of the rebellion—gave increased strength to the Whig government. But they were reluctant to face an immediate dissolution, and the Septennial Act was passed (1716) to extend to seven years the duration of parliaments, which had been fixed at three years by the Triennial Act of William and Mary. Under General Stanhope an effort was made to draw legislation in a more liberal direction. The Occasional Conformity Act and the Schism Act were repealed (1719); but the majorities on the side of the government were unusually small, and Stanhope, who would willingly have repealed the

Repeal of Occasional Conformity Act and Schism Act.

Test Act so far as it related to dissenters, was compelled to abandon the project as entirely impracticable. The Peerage Bill, introduced at the same time to limit the royal power of creating peers, was happily thrown out in the Commons. It was proposed, partly from a desire to guard the Lords against such a sudden increase of their numbers as had been forced on them when the treaty of Utrecht was under discussion, and partly to secure the Whigs in office against any change in the royal councils in a succeeding reign. It was in fact conceived by men who valued the immediate victory of their principles more than they trusted to the general good sense of the nation. The Lords were at this time, as a matter of fact, not merely wealthier but wiser than the Commons; and it is no wonder that, in days when the Commons, by passing the Septennial Act, had shown their distrust of their own constituents, the peers should show, by the Peerage Bill, their distrust of that House which was elected by those constituencies. Nevertheless, the remedy was worse than the disease, for it would have established a close oligarchy, bound sooner or later to come into conflict with the will of the nation, and only to be overthrown by a violent alteration of the constitution.

Walpole's ministry.

The excitement following on the bursting of the South Sea Bubble (*q.v.*), and the death or ruin of the leading ministers, brought Sir Robert Walpole to the front (1721). As a man of business when men of business were few in the House of Commons, he was eminently fit to manage the affairs of the country. But he owed his long continuance in office especially to his sagacity. He clearly saw, what Stanhope had failed to see, that the mass of the nation was not fitted as yet to interest itself wisely in affairs of government, and that therefore the rule must be kept in the hands of the upper classes. But he was too sensible to adopt the coarse expedient which had commended itself to Stanhope, and he preferred humouring the masses to contradicting them.

The struggle of the preceding century had left its mark in every direction on the national development. Out of the reaction against Puritanism had come a widely-spread relaxation of morals, and also, as far as the educated class was concerned, an eagerness for the discussion of all social and religious problems. The fierce excitement of political life had quickened thought, and the most anciently received doctrines were held of little worth until they were brought to the test of reason. It was a time when the pen was more powerful than the sword, when a secretary of state would treat with condescension a witty pamphleteer, and when such a pamphleteer might hope, not in vain, to become a secretary of state.

It was in this world of reason and literature that the Whigs of the Peerage Bill moved. Walpole perceived that there was another world which understood none of these things. With cynical insight he discovered that a great government cannot rest on a clique, however distinguished. If the mass of the nation was not conscious of political wants, it was conscious of material wants. The merchant needed protection for his trade; the voters gladly welcomed election days as bringing guineas to their pockets. Members of parliament were ready to sell their votes for places, for pensions, for actual money. The system was not new, as Danby is credited with the discovery that a vote in the House of Commons might be purchased. But with Walpole it reached its height.

Such a system was possible because the House of Commons was not really accountable to its constituents. The votes of its members were not published, and still less were their speeches made known. Such a silence could only be maintained around the House when there was little interest in its proceedings. The great questions of religion and taxation which had agitated the country under the Stuarts were now fairly settled. To reawaken those questions in any shape would be dangerous. Walpole took good care never to repeat the mistake of the Sacheverell trial. When on one occasion he was led into the proposal of an unpopular excise he at once drew back. England in his days was growing rich. Englishmen were bluff and independent, in their ways often coarse and unmannerly. Their life was the life depicted on the canvas of Hogarth and the pages of Fielding. All high imagination, all devotion to the public weal, seemed laid asleep. But the political instinct was not dead, and it would one day express itself for better ends than an agitation against an excise bill or an outcry for a popular war. A government could no longer employ its powers for direct oppression. In his own house and in his own conscience, every Englishman, as far as the government was concerned, was the master of his destiny. By and by the idea would dawn on the nation that anarchy is as productive of evil as tyranny, and that a government which omits to regulate or control allows the strong to oppress the weak, and the rich to oppress the poor.

George II. 1727–1760.

Walpole's administration lasted long enough to give room for some feeble expression of this feeling. When George I. was succeeded by George II. (1727), Walpole remained in power. His eagerness for the possession of that power which he desired to use for his country's good, together with the incapacity of two kings born and bred in a foreign country to take a leading part in English affairs, completed the change which had been effected when William first entrusted the conduct of government to a united cabinet. There was now for the first time a prime minister in England, a person who was himself a subject imposing harmonious action on the cabinet. The change was so gradually and silently effected that it is difficult to realize its full importance. So far, indeed, as it only came about through the incapacity of the first two kings of the house of Hanover, it might be undone, and was in fact to a great extent undone by a more active successor. But so far as it was the result of general tendencies, it could never be obliterated. In the ministries in which Somers and Montagu on the one hand and Harley and St John on the other had taken part, there was no prime minister except so far as one member of the administration dominated over his colleagues by the force of character and intelligence. In the reign of George III., even North and Addington were universally acknowledged by that title, though they had little claim to the independence of action of a Walpole or a Pitt.

The change was, in fact, one of the most important of those by which the English constitution has been altered from an hereditary monarchy with a parliamentary regulative agency to a parliamentary government with an hereditary regulative agency. In Walpole's time the forms of the constitution had become, in all essential particulars, what they are now. What was wanting was a national force behind them to set them to their proper work.

The Opposition.

The growing opposition which finally drove Walpole from power was not entirely without a nobler element than could be furnished by personal rivalry, or ignorant distrust of commercial and financial success. It was well that complaints that a great country ought not to be governed by patronage and bribery should be raised, although, as subsequent experience showed, the causes which rendered corruption inevitable were not to be removed by the expulsion of Walpole from office. But for one error, indeed, it is probable that Walpole's rule would have been still further prolonged.

War with Spain.

In 1739 a popular excitement arose for a declaration of war against Spain. Walpole believed that war to be certainly unjust, and likely to be disastrous. He had, however, been so accustomed to give way to popular pressure that he did not perceive the difference between a wise and timely determination to leave a right action undone in the face of insuperable difficulties, and an unwise and cowardly determination to do that which he believed to be wrong and imprudent. If he had now resigned rather than demean himself by acting against his conscience, it is by no means unlikely that he would have been recalled to power before many years were over. As it was, the failures of the war recoiled on his own head, and in 1742 his long ministry came to an end.

After a short interval a successor was found in Henry Pelham. All the ordinary arts of corruption which Walpole had practised were continued, and to them were added arts of corruption

Ministry of Henry Pelham.

which Walpole had disdained to practise. He at least understood that there were certain principles in accordance with which he wished to conduct public affairs, and he had driven colleague after colleague out of office rather than allow them to distract his method of government. Pelham and his brother, the Thomas Pelham, duke of Newcastle, had no principles of government whatever. They offered place to every man of parliamentary skill or influence. There was no opposition, because the ministers never attempted to do anything which would arouse opposition, and because they were ready to do anything called for by any one who had power enough to make himself dangerous; and in 1743 they embarked on a useless war with France in order to please the king, who saw in every commotion on the continent of Europe some danger to his beloved Hanover.

The Rebellion of 1745.

At most times in the history of England such a ministry would have been driven from office by the outcry of an offended people. In the days of the Pelhams, government was regarded as lying too far outside the all-important private interests of the community to make it worth while to make any effort to rescue it from the degradation into which it had fallen; yet the Pelhams had not been long in power before this serene belief that the country could get on very well without a government in any real sense of the word was put to the test. In 1745 Charles Edward, the son of the Pretender, landed in Scotland. He was followed by many of the Highland clans, always ready to draw the sword against the constituted authorities of the Lowlands; and even in the Lowlands, and especially in Edinburgh, he found adherents, who still felt the sting inflicted by the suppression of the national independence of Scotland. The British army was in as chaotic a condition as the British government, and Charles Edward inflicted a complete defeat on a force which met him at Prestonpans. Before the end of the year the victor, at the head of 5000 men, had advanced to Derby. But he found no support in England, and the mere numbers brought against him compelled him to retreat, to find defeat at Culloden in the following year (1746). The war on the continent had been waged with indifferent success. The victory of Dettingen (1743) and the glorious defeat of Fontenoy (1745) had achieved no objects worthy of English intervention, and the peace of Aix-la-Chapelle put an end in 1748 to hostilities which should never have been begun. The government pursued its inglorious career as long as Henry Pelham lived. He had at least some share in the financial ability of Walpole, and it was not till he died in 1754 that the real difficulties of a system which was based on the avoidance of difficulties had fairly to be faced.

Moral and religious atmosphere.

Wesley and Whitefield.

The change which was needed was not any mere re-adjustment of the political machine. Those who cared for religion or morality had forgotten that man is an imaginative and emotional being. Defenders of Christianity and of deism alike appealed to the reason alone. Enthusiasm was treated as a folly or a crime, and earnestness of every kind was branded with the name of enthusiasm. The higher order of minds dwelt with preference upon the beneficent wisdom of the Creator. The lower order of minds treated religion as a kind of life assurance against the inconvenience of eternal death. Upon such a system as this human nature was certain to revenge itself. The preaching of Wesley and Whitefield appealed direct to the emotions, with its doctrine of "conversion," and called upon each individual not to understand, or to admire, or to act, but vividly to realize the love and mercy of God. In all this there was nothing new. What was new was that Wesley added an organization, Methodism (*q.v.*), in which each of his followers unfolded to one another the secrets of their heart, and became accountable to his fellows. Large as the numbers of the Methodists ultimately became, their influence is not to be measured by their numbers. The double want of the age, the want of spiritual earnestness and the want of organized coherence, would find satisfaction in many ways which would have seemed strange to Wesley, but which were, nevertheless, a continuance of the work which he began.

Ministry of Newcastle.

Ministry of Pitt and Newcastle.

As far as government was concerned, when Henry Pelham died (1754) the lowest depth of baseness seemed to have been reached. The duke of Newcastle, who succeeded his brother, looked on the work of corruption with absolute pleasure, and regarded genius and ability as an awkward interruption of that happy arrangement which made men subservient to flattery and money. Whilst he was in the very act of trying to drive from office all men who were possessed of any sort of ideas, he was surprised by a great war. In America, the French settlers in Canada and the English settlers on the Atlantic coast were falling to blows for the possession of the vast territories drained by the Ohio and its tributaries. In India, Frenchmen and Englishmen had striven during the last war for authority over the native states round Pondicherry and Madras, and the conflict threatened to break out anew. When war began in earnest, and the reality of danger came home to Englishmen by the capture of Minorca (1756), there arose a demand for a more capable government than any which Newcastle could offer. Terrified by the storm of obloquy which he aroused, he fled from office. A government was formed, of which the soul was William Pitt. Pitt was, in some sort, to the political life of Englishmen what Wesley was to their religious life. He brought no new political ideas into their minds, but he ruled them by the force of his character and the example of his purity. His weapons were trust and confidence. He appealed to the patriotism of his fellow-countrymen, to their imaginative love for the national greatness, and he did not appeal in vain. He perceived instinctively that a large number, even of those who took greedily the bribes of Walpole and the Pelhams, took them, not because they loved money better than their country, but because they had no conception that their country had any need of them at all. It was a truth, but it was not the whole truth. The great Whig families rallied under Newcastle and drove Pitt from office (1757). But if Pitt could not govern without Newcastle's corruption, neither could Newcastle govern without Pitt's energy. At last a compromise was effected, and Newcastle undertook the work of bribing, whilst Pitt undertook the work of governing (see CHATHAM, WILLIAM PITT, 1ST EARL OF).

The Seven Years' War.

The war which had already broken out, the Seven Years' War (1756–1763), was not confined to England alone. By the side of the duel between France and England, a war was going on upon the continent of Europe, in which Austria—with its allies, France, Russia and the German princes—had fallen upon the new kingdom of Prussia and its sovereign Frederick II. England and Prussia therefore necessarily formed an alliance. Different as the two governments were, they were both alike in recognizing, in part at least, the conditions of progress. Even in Pitt's day England, however imperfectly, rested its strength on the popular will. Even in Frederick's day Prussia was ruled by administrators selected for their special knowledge. Neither France nor Austria had any conception of the necessity of fulfilling these requirements. Hence the strength of England and of Prussia. The war seemed to be a mere struggle for territory. There was no feeling in either Pitt or Frederick, such as there was in the men who contended half a century later against Napoleon, that they were fighting the battles of the civilized world. There was something repulsive as well in the enthusiastic nationalism of Pitt as in the cynical nationalism of Frederick. Pitt's sole object was to exalt England to a position in which she would fear no rival. But in so doing he exalted that which, in spite of all that had happened, best deserved to be exalted. The habits of individual energy fused together by the inspiration of patriotism conquered Canada. The unintelligent over-regulation of the French government could not maintain the colonies which had been founded in happier times. In 1758 Louisburg was taken, and the mouth of the St Lawrence guarded against France. In 1759 Quebec fell before Wolfe, who died at the moment of victory. In the same year the naval victories of Lagos and Quiberon Bay established the supremacy of the British at sea. The battle of Plassey (1757) had laid Bengal at the feet of Clive; and Coote's victory at Wandiwash (1760) led to the final ruin of the relics of French authority in southern India. When George II. died (1760) England was the first maritime and colonial power in the world (see Seven Years' War; Canada: *History*; India: *History*).

George III., 1760–1820.

Pitt's resignation.

In George III. the king once more became an important factor in English politics. From his childhood he had been trained by his mother and his instructors to regard the breaking down of the power of the great families as the task of his life. In this he was walking in the same direction as Pitt. If the two men could have worked together, England might have been spared many misfortunes. Unhappily, the king could not understand Pitt's higher qualities, his bold confidence in the popular feeling, and his contempt for corruption and intrigue. And yet the king's authority was indispensable to Pitt, if he was to carry on his conflict against the great families with success. When the war came to an end, as it must come to an end sooner or later, Pitt's special predominance, derived as it was from his power of breathing a martial spirit into the fleets and armies of England, would come to an end too. Only the king, with his hold upon the traditional instincts of loyalty and the force of his still unimpaired prerogative, could, in ordinary times, hold head against the wealthy and influential aristocracy. Unfortunately, George III. was not wise enough to deal with the difficulty in a high-minded fashion. With a well-intentioned but narrow mind, he had nothing in him to strike the imagination of his subjects. He met influence with influence, corruption with corruption, intrigue with intrigue. Unhappily, too, his earliest relations with Pitt involved a dispute on a point on which he was right and Pitt was wrong. In 1761 Pitt resigned office, because neither the king nor the cabinet were willing to declare war against Spain in the midst of the war with France. As the war with Spain was inevitable, and as, when it broke out in the following year (1762), it was followed by triumphs for which Pitt had prepared the way, the prescience of the great war-minister appeared to be fully established. But it was his love of war, not his skill in carrying it on, which was really in question. He would be satisfied with nothing short of the absolute ruin of France. He would have given England that dangerous position of supremacy which was gained for France by Louis XIV. in the 17th century, and by Napoleon in the 19th century. He would have made his country still more haughty and arrogant than it was, till other nations rose against it, as they have three times risen against France, rather than submit to the intolerable yoke. It was a happy thing for England that peace was signed (1763).

Bute and Grenville.

Even as it was, a spirit of contemptuous disregard of the rights of others had been roused, which would not be easily allayed. The king's premature attempt to secure a prime minister of his own choosing in Lord Bute (1761) came to an end through the minister's incapacity (1763). George Grenville, who followed him, kept the king in leading strings in reliance upon his parliamentary majority. Something, no doubt, had been accomplished by the incorruptibility of Pitt. The practice of bribing members of parliament by actual presents in money came to an end, though the practice of bribing them by place and pension long continued. The arrogance which Pitt displayed towards foreign nations was displayed by Grenville towards classes of the population of the British dominions. It was enough for him to establish a right. He never put himself in the position of those who were to suffer by its being put in force.

The American colonies.

The first to suffer from Grenville's conception of his duty were the American colonies. The mercantile system, which had sprung up in Spain in the 16th century, held that colonies were to be entirely prohibited from trading, except with the mother country. Every European country had adopted this view, and the acquisition of fresh colonial dominions by England, at the peace of 1763, had been made not so much through lust of empire as through love of trade. Of all English colonies, the American were the most populous and important. Their proximity to the Spanish colonies in the West Indies had naturally led to a contraband trade. To this trade Grenville put a stop, as far as lay in his power. Obnoxious as this measure was in America, the colonists had acknowledged the principle on which it was founded too long to make it easy to resist it. Another step of Grenville's met with more open opposition. Even with all the experience of the century which followed, the relations between a mother country and her colonies are not easy to arrange. If the burthen of defence is to be borne in common, it can hardly be left to the mother country to declare war, and to exact the necessary taxation, without the consent of the colonies. If, on the other hand, it is to be borne by the mother country alone, she may well complain that she is left to bear more than her due share of the weight. The latter alternative forced itself upon the attention of Grenville. The British parliament, he held, was the supreme legislature, and, as such, was entitled to raise taxes in America to support the military forces needed for the defence of America. The act (1765) imposing a stamp tax on the American colonies was the result.

The Rockingham ministry.

As might have been expected, the Americans resisted. For them, the question was precisely that which Hampden had fought out in the case of ship-money. As far as they were concerned, the British parliament had stepped into the position of Charles I. If Grenville had remained in office he would probably have persisted in his resolution. He was driven from his post by the king's resolve no longer to submit to his insolence, and a new ministry was formed under the marquess of Rockingham, composed of some of those leaders of the Whig aristocracy who had not followed the Grenville ministry. They were well-intentioned, but weak, and without political ability; and the king regarded them with distrust, only qualified by his abhorrence of the ministry which they superseded.

The Declaratory Act and repeal of Stamp Act.

As soon as the bad news came from America, the ministry was placed between two recommendations. Grenville, on the one hand, advised that the tax should be enforced. Pitt, on the other, declared that the British parliament had absolutely no right to tax America, though he held that it had the right to regulate, or in other words to tax, the commerce of America for the benefit of the British merchant and manufacturer. Between the two the government took a middle course. It obtained from parliament a total repeal of the Stamp Act, but it also passed a Declaratory Act, claiming for the British parliament the supreme power over the colonies in matters of taxation, as well as in matters of legislation.

Burke's political theory.

It is possible that the course thus adopted was chosen simply because it was a middle course. But it was probably suggested by Edmund Burke, who was then Lord Rockingham's private secretary, but who for some time to come was to furnish thought to the party to which he attached himself. Burke carried into the world of theory those politics of expediency of which Walpole had been the practical originator. He held that questions of abstract right had no place in politics. It was therefore as absurd to argue with Pitt that England had a right to regulate commerce, as it was to argue with Grenville that England had a right to levy taxes. All that could be said was, that it was expedient in a widespread empire that the power of final decision should be lodged somewhere, and that it was also expedient not to use that power in such a way as to irritate those whom it was the truest wisdom to conciliate.

Arguments of Pitt and Burke.

The weak side of this view was the weak side of all Burke's political philosophy. Like all great innovators, he was intensely conservative where he was not an advocate of change. With new views on every subject relating to the exercise of power, he shrank even from entertaining the slightest question relating to the distribution of power. He recommended to the British parliament the most self-denying wisdom, but he could not see that in its relation to the colonies the British parliament was so constituted as to make it entirely unprepared to be either wise or self-denying. It is true that if he had thought out the matter in this direction, he would have been led further than he or any other man in England or America was at that time prepared to go. If the British parliament was unfit to legislate for America, and if, as was undoubtedly the case, it was impossible to create a representative body which was fit to legislate, it would follow that the American colonies could only be fairly governed as practically independent states, though they might possibly remain, like the great colonies of our own day, in a position of alliance rather than of dependence. It was because the issues opened led to changes so far greater than the wisest statesman then perceived, that Pitt's solution, logically untenable as it was, was preferable to Burke's. Pitt would have given bad reasons for going a step in the right direction. Burke gave excellent reasons why those who were certain to go wrong should have the power to go right.

Ministry of Lord Chatham.

Scarcely were the measures relating to America passed when the king turned out the ministry. The new ministry was formed by Pitt, who was created earl of Chatham (1766), on the principle of bringing together men who had shaken themselves loose from any of the different Whig cliques. Whatever chance the plan had of succeeding was at an end when Chatham's mind temporarily gave way under stress of disease (1767). Charles Townshend, a brilliant, headstrong man, led parliament in the way which had been prepared by the Declaratory Act, and laid duties on tea and other articles of commerce entering the ports of America.

Wilkes and "The North Briton."

It was impossible that the position thus claimed by the British parliament towards America should affect America alone. The habit of obtaining money otherwise than by the consent of those who are required to pay it would be certain to make parliament careless of the feelings and interests of that great majority of the population at home, which was unrepresented in parliament. The resistance of America to the taxation imposed was therefore not without benefit to the people of the mother country. Already there were signs of a readiness in parliament to treat even the constituencies with contempt. In 1763, in the days of the Grenville ministry, John Wilkes, a profligate and scurrilous writer, had been arrested on a general warrant—that is to say, a warrant in which the name of no individual was mentioned—as the author of an alleged libel on the king, contained in No. 45 of *The North Briton.* He was a member of parliament, and as such was declared by Chief Justice Pratt to be privileged against arrest. In 1768 he was elected member for Middlesex. The House of Commons expelled him. He was again elected, and again expelled. The third time, the Commons gave the seat to which Wilkes was a third time chosen to Colonel Luttrell, who was far down in the poll. Wilkes thus became the representative of a great constitutional principle, the principle that the electors have a right to choose their representatives without restriction, save by the regulations of the law.

For the present the contention of the American colonists and of the defenders of Wilkes at home was confined within the compass of the law. Yet in both cases it might easily pass beyond that compass, and might rest itself upon an appeal to the duty of governments to modify the law, and to enlarge the basis of their authority, when law and authority have become too narrow.

Lord North's ministry.

As regards America, though Townshend died, the government persisted in his policy. As resistance grew stronger in America, the king urged the use of compulsion. If he had not the wisdom of the country on his side, he had its prejudices. The arrogant spirit of Englishmen made them comtemptuous towards the colonists, and the desire to thrust taxation upon others than themselves made the new colonial legislation popular. In 1770 the king made Lord North prime minister. He had won the object on which he had set his heart. A new Tory party had sprung up, not distinguished, like the Tories of Queen Anne's reign, by a special ecclesiastical policy, but by their acceptance of the king's claim to nominate ministers, and so to predominate in the ministry himself.

Unhappily the opposition, united in the desire to conciliate America, was divided on questions of home policy. Chatham would have met the new danger by parliamentary reform, giving increased voting power to the freeholders of the counties. Burke from principle, and his noble patrons mainly from lower motives, were opposed to any such change. As Burke had wished the British parliament to be supreme over the colonies, in confidence that this supremacy would not be abused, so he wished the great landowning connexion resting on the rotten boroughs to rule over the unrepresented people, in confidence that this power would not be abused. Amid these distractions the king had an easy game to play. He had all the patronage of the government in his hands, and beyond the circle which was influenced by gifts of patronage, he could appeal to the ignorance and self-seeking of the nation, with which, though he knew it not, he was himself in the closest sympathy.

The American War of Independence.

No wonder resistance grew more vigorous in America. In 1773 the inhabitants of Boston threw ship-loads of tea into the harbour rather than pay the obnoxious duty. In 1774 the Boston Port Bill deprived Boston of its commercial rights, whilst the Massachusetts Government Bill took away from that colony the ordinary political liberties of Englishmen. The first skirmish of the inevitable war was fought at Lexington in 1775. In 1776 the thirteen colonies united in the continental congress issued their Declaration of Independence. England put forth all its strength to beat down resistance; but the task, which seemed easy at a distance, proved impossible. It might have been so even had the war been conducted on the British side with greater military skill and with more insight into the conditions of the struggle, which was essentially a civil contest between men of the same race. But the initial difficulties of the vast field of operations were greatly increased by the want of skill of the British leaders in adapting themselves to new conditions, while even loyalist sentiment was shocked by the employment of German mercenaries and Red Indian savages against men of English blood. Even so, the issue of the struggle was for long doubtful, and there were moments when it might have ended by a policy of wise concession; but the Americans, though reduced at times to desperate straits, had the advantage of fighting in their own country, and above all they found in George Washington a leader after the model of the English country gentleman who had upheld the standard of liberty against the Stuarts, and worthy of the great cause for which they fought. In 1777 a British army under Burgoyne capitulated at Saratoga; and early in 1778 France, eager to revenge the disasters of the Seven Years' War, formed an alliance with the revolted colonies as free and independent states, and was soon joined by Spain.

Chatham, who was ready to make any concession to America short of independence, and especially of independence at the dictation of France, died in 1778. The war was continued for some years with varying results; but in 1781 the capitulation of a second British army under Cornwallis at Yorktown was a decisive blow, which brought home to the minds of the dullest the assurance that the conquest of America was an impossibility.

Before this event happened there had been a great change in public feeling in England. The increasing weight of taxation gave rise in 1780 to a great meeting of the freeholders of Yorkshire, which in turn gave the signal for a general agitation for the reduction of unnecessary expense in the government. To this desire Burke gave expression in his bill for economical reform, though he was unable to carry it in the teeth of interested opposition. The movement in favour of economy was necessarily also a movement in favour of peace; and when the surrender of Yorktown was known (1782), Lord North at once resigned office.

The second Rockingham ministry.

The new ministry formed under Lord Rockingham comprised not only his own immediate followers, of whom the most prominent was Charles Fox, but the followers of Chatham, of whom Lord Shelburne was the acknowledged leader. A treaty of peace acknowledging the independence of the United States of America was at once set on foot; and the negotiation with France was rendered easy by the defeat of a French fleet by Rodney, and by the failure of the combined forces of France and Spain to take Gibraltar.

Already the ministry on which such great hopes had been placed had broken up. Rockingham died in July 1782. The two sections of which the government was composed had different aims. The Rockingham section, which now looked up to Fox, rested on aristocratic connexion and influence; the Shelburne section was anxious to gain popular support by active reforms, and to gain over the king to their side. Judging by past experience, the combination might well seem hopeless, and honourable men like Fox might easily regard it with suspicion. But Fox's allies took good care that their name should not be associated with the idea of improvement. They pruned Burke's Economical Reform Bill till it left as many abuses as it suppressed; and though the bill prohibited the grant of pensions above £300, they hastily gave away pensions of much larger value to their own friends before the bill had received the royal assent. They also opposed a bill for parliamentary reform brought in by young William Pitt. When the king chose Shelburne as prime minister, they refused to follow him, and put forward the incompetent duke of Portland as their candidate for the office. The struggle was thus renewed on the old ground of the king's right to select his ministers. But while the king now put forward a minister notoriously able and competent to the task, his opponents put forward a man whose only claim to office was the possession of large estates. They forced their way back to power by means as unscrupulous as their claim to it was unjustifiable. They formed a coalition with Lord North, whose politics and character they had denounced for years. The coalition, as soon as the peace with America and France had been signed (1783), drove Shelburne from office. The duke of Portland became the nominal head of the government, Fox and North its real leaders.

The coalition.

Such a ministry could not afford to make a single blunder. The king detested it, and the assumption by the Whig houses of a right to nominate the head of the government without reference to the national interests, could never be popular. The blunder was soon committed. Burke, hating wrong and injustice with a bitter hatred, had descried in the government of British India by the East India Company a disgrace to the English name. For many of the actions of that government no honourable man can think of uttering a word of defence. The helpless natives were oppressed and robbed by the company and its servants in every possible way. Burke drew up a bill, which was adopted by the coalition government, for taking all authority in India out of the hands of the company, and even placing the company's management of its own commercial affairs under control. The governing and controlling body was naturally to be a council appointed at home. The question of the nomination of this council at once drew the whole question within the domain of party politics. The whole patronage of India would be in its hands, and, as parliament was then constituted, the balance of parties might be more seriously affected by the distribution of that patronage than it would be now. When, therefore, it was understood that the government bill meant the council to be named in the bill for four years, or, in other words, to be named by the coalition ministry, it was generally regarded as an unblushing attempt to turn a measure for the good government of India into a measure for securing the ministry in office. The bill of course passed the Commons. When it came before the Lords, it was thrown out in consequence of a message from the king, that he would regard any one who voted for it as his enemy.

The India Bill.

The contest had thus become one between the influence of the crown and the influence of the great houses. Constitutional historians, who treat the question as one of merely theoretical politics, leave out of consideration this essential element of the situation, and forget that, if it was wrong for the king to influence the Lords by his message, it was equally wrong for the ministry to acquire for themselves fresh patronage with which to influence the Commons. But there was now, what there had not been in the time of Walpole and the Pelhams, a public opinion ready to throw its weight on one side or the other. The county members still formed the most independent portion of the representation, and there were many possessors of rotten boroughs, who were ready to agree with the county members rather than with the great landowners. In choosing Pitt, the young son of Chatham, for his prime minister, as soon as he had dismissed the coalition, George III. gave assurance that he wished his counsels to be directed by integrity and ability. After a struggle of many weeks, parliament was dissolved (1784), and the new House of Commons was prepared to support the king's minister by a large majority.

Ministry of the younger Pitt.

As far as names go, the change effected placed the new Tory party in office for an almost uninterrupted period of forty-six years. It so happened, however, that after the first eight years of that period had passed by, circumstances occurred which effected so great a change in the composition and character of that party as to render any statement to this effect entirely illusive. During eight years, however, Pitt's ministry was not merely a Tory ministry resting on the choice of the king, but a Liberal ministry resting on national support and upon advanced political knowledge.

The nation which Pitt had behind him was very different from the populace which had assailed Walpole's Excise Bill, or had shouted for Wilkes and liberty. At the beginning of the century the intellect of thoughtful Englishmen had applied itself to speculative problems of religion and philosophy. In the middle of the century it applied itself to practical problems affecting the employment of industry. In 1776 Adam Smith published the *Wealth of Nations*. Already in 1762 the work of Brindley, the Bridgewater canal, the first joint of a network of inland water communication, was opened. In 1767 Hargreaves produced the spinning-jenny; Arkwright's spinning machine was exhibited in 1768; Crompton's mule was finished in 1779; Cartwright hit upon the idea of the power-loom in 1784, though it was not brought into profitable use till 1801. The Staffordshire potteries had been flourishing under Wedgwood since 1763, and the improved steam-engine was brought into shape by Watt in 1768. During these years the duke of Bedford, Coke of Norfolk, and Robert Bakewell were busy in the improvement of stock and agriculture.

Material progress.

The increase of wealth and prosperity caused by these changes went far to produce a large class of the population entirely outside the associations of the landowning class, but with sufficient intelligence to appreciate the advantages of a government carried on without regard to the personal interests and rivalries of the aristocracy. The mode in which that increase of wealth was effected was even more decisive on the ultimate destinies of the country. The substitution of the organization of hereditary monarchy for the organization of wealth and station would ultimately have led to evils as great as those which it superseded. It was only tolerable as a stepping-stone to the organization of intelligence. The larger the numbers admitted to influence the affairs of state, the more necessary is it that they respect the powers of intellect. It would be foolish to institute a comparison between an Arkwright or a Crompton and a Locke or a Newton. But it is certain that for one man who could appreciate the importance of the treatise *On the Human Understanding* or the theory of gravitation, there were thousands who could understand the value of the water-frame, or the power-loom. The habit of looking with reverence upon mental power was fostered in no slight measure by the industrial development of the second half of the 18th century.

The supremacy of intelligence in the political world was, for the time, represented in Pitt. In 1784 he passed an India Bill, which left the commerce and all except the highest patronage of India in the hands of the East India Company, but which erected a department of the home government, named the board of control, to compel the company to carry out such political measures as the government saw fit. A bill for parliamentary reform was, however, thrown out by the opposition of his own supporters in parliament, whilst outside parliament there was no general desire for a change in a system which for the present produced such excellent fruits.

Pitt's India Bill.

Still more excellent was his plan of legislation for Ireland. Irishmen had taken advantage of the weakness of England during the American War to enforce upon the ministry of the day, in 1780 and 1782, an abandonment of all claim on the part of the English government and the English judges to interfere in any way with Irish affairs. From 1782, therefore, there were two independent legislatures within the British Isles—the one sitting at Westminster and the other sitting in Dublin. With these political changes Fox professed himself to be content. Pitt, whose mind was open to wider considerations, proposed to throw open commerce to both nations by removing all the restrictions placed on the trade of Ireland with England and with the rest of the world. The opposition of the English parliament was only removed by concessions continuing some important restrictions upon Irish exports, and by giving the English parliament the right of initiation in all measures relating to the regulation of the trade which was to be common to both nations. The Irish parliament took umbrage at the superiority claimed by England, and threw out the measure as an insult, though, even as it stood, it was undeniably in favour of Ireland. The lesson of the incompatibility of two coordinate legislatures was not thrown away upon Pitt.

In 1786 the commercial treaty with France opened that country to English trade, and was the first result of the theories laid down by Adam Smith ten years previously. The first attack upon the horrors of the slave-trade was made in 1788; and in the same year, in the debates on the Regency Bill caused by the king's insanity, Pitt defended against Fox the right of parliament to make provision for the exercise of the powers of the crown when the wearer was permanently or temporarily disabled from exercising his authority.

When the king recovered, he went to St Paul's to return thanks on the 23rd of April 1789. The enthusiasm with which he was greeted showed how completely he had the nation on his side. All the hopes of liberal reformers were now with him. All the hopes of moral and religious men were on his side as well. The seed sown by Wesley had grown to be a great tree. A spirit of thoughtfulness in religious matters and of moral energy was growing in the nation, and the king was endeared to his subjects, as much by his domestic virtues as by his support of the great minister who acted in his name. The happy prospect was soon to be overclouded. On the 4th of May, eleven days after the appearance of George III. at St Paul's, the French states-general met at Versailles.

The French Revolution; English feeling.

By the great mass of intelligent Englishmen the change was greeted with enthusiasm. It is seldom that one nation understands the tendencies and difficulties of another; and the mere fact that power was being transferred from an absolute monarch to a representative assembly led superficial observers to imagine that they were witnessing a mere repetition of the victory of the English parliament over the Stuart kings. In fact, that which was passing in France was of a totally different nature from the English struggle of the 17th century. In England, the conflict had been carried on for the purpose of limiting the power of the king. In France, it was begun in order to sweep away an aristocracy in church and state which had become barbarously oppressive. The French Revolution was not, therefore, a conflict for the reform of the political organization of the state, but one for the reorganization of the whole structure of society; and in proportion as it turned away from the path which English ignorance had marked out for it, Englishmen turned away from it in disgust. As they did not understand the aims of the French Revolutionists, they were unable to make that excuse for even so much of their conduct as admits of excuse. Three men, Fox, Burke and Pitt, however, represented three varieties of opinion into which the nation was very unequally divided.

Fox, generous and trustful towards the movements of large masses of men, had very little intellectual grasp of the questions at issue in France. He treated the struggle as one simply for the establishment of free institutions; and when at last the crimes of the leaders became patent to the world, he contented himself with lamenting the unfortunate fact, and fell back on the argument that though England could not sympathize with the French tyrants, there was no reason why she should go to war with them.

Burke, on the other hand, while he failed to understand the full tendency of the Revolution for good as well as for evil, understood it far better than any Englishman of that day understood it. He saw that its main aim was equality, not liberty, and that not only would the French nation be ready, in pursuit of equality, to welcome any tyranny which would serve its purpose, but would be the more prone to acts of tyranny over individuals. This would arise from the remodelling of institutions, with the object of giving immediate effect to the will of the masses, which was especially liable to be counterfeited by designing and unscrupulous agitators. There is no doubt that in all this Burke was in the right, as he was in his denunciation of the mischief certain to follow when a nation tries to start afresh, and to blot out all past progress in the light of simple reason, which is often most fallible when it believes itself to be most infallible. Where he went wrong was in his ignorance of the special circumstances of the French nation, and his consequent blindness to the fact that the historical method of gradual progress was impossible where institutions had become so utterly bad as they were in France, and that consequently the system of starting afresh, to which he reasonably objected, was to the French a matter not of choice but of necessity. Nor did he see that the passion for equality, like every great passion, justified itself, and that the problem was, not how to obtain liberty in defiance of it, but how so to guide it as to obtain liberty by it and through it.

Burke did not content himself with pointing out speculatively the evils which he foreboded for the French. He perceived clearly that the effect of the new French principles could no more be confined to French territory than the principles of Protestantism in the 16th century could be confined to Saxony. He knew well that the appeal to abstract reason and the hatred of aristocracy would spread over Europe like a flood, and, as he was in the habit of considering whatever was most opposed to the object of his dislike to be wholly excellent, he called for a crusade of all established governments against the anarchical principles of dissolution which had broken loose in France.

Pitt occupied ground apart from either Fox or Burke. He had neither Fox's sympathy for popular movements, nor Burke's intellectual appreciation of the immediate tendencies of the Revolution. Hence, whilst he pronounced against any active interference with France, he was an advocate of peace, not because he saw more than Fox or Burke, but because he saw less. He fancied that France would be so totally occupied with its own troubles that it would cease for a long time to be dangerous to other nations.

Beginning of the revolutionary wars.

This view was soon to be stultified by the effect of the coalition against France in 1792 of Prussia and Austria. The proclamation of the allies calling on the French to restore the royal authority was answered by a passionate outburst of defiance. The king himself was suspected of complicity with the invaders of his country, and the rising of the 10th of August was followed by the proclamation of the republic and by the awful "September massacres" of helpless prisoners, guilty of no crime but noble birth, and therefore presumably of attachment to the old régime, and treason towards the new. This passionate attachment to the Revolution, which in France displayed itself in a carnival of insane suspicion and cruelty, inspired on the frontiers an astonishing patriotic resistance. Before the end of the year the invasion was repulsed, and the ragged armies of the Revolution had overrun Savoy and the Austrian Netherlands, and were threatening the aristocratic Dutch republic

Very few governments in Europe were so rooted in the affections of their people as to be able to look without terror on the challenge thus thrown out to them. The English government was one of those very few. No mere despotism was here exercised by the king. No broad impassable line here divided

Change of feeling in England.

the aristocracy from the people. The work of former generations of Englishmen had been too well done to call for that breach of historical continuity which was a dire necessity in France. There was much need of reform. There was no need of a revolution. The whole of the upper and middle classes, with few exceptions, clung together in a fierce spirit of resistance; and the mass of the lower classes, especially in the country, were too well off to wish for change. The spirit of resistance to revolution quickly developed into a spirit of resistance to reform, and those who continued to advocate changes, more or less after the French model, were treated as the enemies of mankind. A fierce hatred of France and of all that attached itself to France became the predominating spirit of the nation.

Division of the Whig party.

Such a change in the national mind could not but affect the constitution of the Whig party. The reasoning of Burke would, in itself, have done little to effect its disruption. But the great landowners, who contributed so strong an element in it, composed the very class which had most to fear from the principles of the Revolution. The old questions which had divided them from the king and Pitt in 1783 had dwindled into nothing before the appalling question of the immediate present. They made themselves the leaders of the war party, and they knew that that party comprised almost the whole of the parliamentary classes.

What could Pitt do but surrender? The whole of the intellectual basis of his foreign policy was swept away when it became evident that the continental war would bring with it an accession of French territory. He did not abandon his opinions. His opinions rather abandoned him. A wider intelligence might have held that, let France gain what territorial aggrandizement it might upon the continent of Europe, it was impossible to resist such changes until the opponents of France had so purified themselves as to obtain a hold upon the moral feelings of mankind. Pitt could not take this view; perhaps no man in his day could be fairly expected to take it. He did not indeed declare war against France; but he sought to set a limit to her conquests in the winter, though he had not sought to set a limit to the conquests of the allied sovereigns in the preceding summer. He treated with supercilious contempt the National Convention, which had dethroned the king and proclaimed a republic. Above all, he took up a declaration by the Convention, that they would give help to all peoples struggling for liberty against their respective governments, as a challenge to England. The horror caused in England by the trial and execution of Louis XVI. completed the estrangement between the two countries, and though the declaration of war came from France (1793), it had been in great part brought about by the bearing of England and its government. (S. R. G.)

XI. THE REVOLUTIONARY EPOCH, THE REACTION, AND THE TRIUMPH OF REFORM (1793–1837)

The government and the "revolutionary" agitation.

In appearance the great Whig landowners gave their support to Pitt, and in 1794 some of their leaders, the duke of Portland, Lord Fitzwilliam, and Windham, entered the cabinet to serve under him. In reality it was Pitt who had surrendered. The ministry and the party by which it was supported might call themselves Tory still; but the great reforming policy of 1784 was at an end, and the government, unconscious of its own strength, conceived its main function to be at all costs to preserve the constitution, which it believed to be in danger of being overwhelmed by the rising tide of revolutionary feeling. That this belief was idle it is now easy enough to see; at the time this was not so obvious. Thomas Paine's *Rights of Man*, published in 1791, a brilliant and bitter attack on the British constitution from the Jacobin point of view, sold by tens of thousands. Revolutionary societies with high-sounding names were established, of which the most conspicuous were the Revolution Society, the Society for Constitutional Information, the London Corresponding Society, and the Friends of the People. Of these, indeed, only the two last were directly due to the example of France. The Revolution Society, founded to commemorate the revolution of 1688, had long carried on a respectable existence under the patronage of cabinet ministers; the Society for Constitutional Information, of which Pitt himself had been a member, was founded in 1780 to advocate parliamentary reform; both had, however, developed under the influence of the events in France in a revolutionary direction. The London Corresponding Society, composed mainly of working-men, was the direct outcome of the excitement caused by the developments of the French Revolution. Its leaders were obscure and usually illiterate men, who delighted to propound their theories for the universal reformation of society and the state in rhetoric of which the characteristic phrases were borrowed from the tribune of the Jacobin Club. Later generations have learned by repeated experience that the eloquence of Hyde Park orators is not the voice of England; there were some even then—among those not immediately responsible for keeping order—who urged the government "to trust the people";[1] but with the object-lesson of France before them it is not altogether surprising that ministers refused to believe in the harmlessness of societies, which not only kept up a fraternal correspondence with the National Convention and the Jacobin Club, but, by attempting to establish throughout the country a network of affiliated clubs, were apparently aiming at setting up in Great Britain the Jacobin idea of popular control.

The danger, of course, was absurdly exaggerated; as indeed was proved by the very popularity of the repressive measures to which the government thought it necessary to resort, and which gave to the vapourings of a few knots of agitators the dignity of a widespread conspiracy for the overthrow of the constitution. On the 1st of December 1792 a proclamation was issued calling out the militia on the ground that a dangerous spirit of tumult and disorder had been excited by evil-disposed persons, acting in concert with persons in foreign parts, and this statement was repeated in the king's speech at the opening of parliament on the 13th. In spite of the protests of Sheridan and other members of the opposition, a campaign of press and other prosecutions now began which threatened to extinguish the most cherished right of Englishmen—liberty of speech. The country was flooded with government spies and informers, whose efforts were seconded by such voluntary societies as the Association for preserving Liberty and Property against Republicans and Levellers, founded by John Reeves, the historian of English law. No one was safe from these zealous and too often credulous defenders of the established order; and a few indiscreet words spoken in a coffee house were enough to bring imprisonment and ruin, as in the case of John Frost, a respectable attorney, condemned for sedition in March 1793. In Scotland the panic, and the consequent cruelty, were worse than in England. The meeting at Edinburgh of a "convention of delegates of the associated friends of the people," at which some foolish and exaggerated language was used, was followed by the trial of Thomas Muir, a talented young advocate whose brilliant defence did not save him from a sentence of fourteen years' transportation (August 30, 1793), while seven years' transportation was the punishment of the Rev. T. Fyshe Palmer for circulating an address from "a society of the friends of liberty to their fellow-citizens" in favour of a reform of the House of Commons. These sentences and the proceedings which led up to them, though attacked with bitter eloquence by Sheridan and Fox, were confirmed by a large majority in parliament.

It was not, however, till late in the session of 1794 that ministers laid before parliament any evidence of seditious practices. In May certain leaders of democratic societies were arrested and their papers seized, and on the 13th a king's message directed the books of certain corresponding societies to be laid before both Houses. The committee of the House of Commons at once reported that there was evidence of a conspiracy to supersede the House of Commons by a national convention, and Pitt proposed and carried a bill suspending the Habeas Corpus Act. This was followed by further reports of the committees of both Houses, presenting evidence of the secret manufacture of arms and of other proceedings calculated to endanger the public peace. A series of state prosecutions followed. The trials of Robert Watt and David Downie for high treason (August and September 1794) actually revealed a treasonable plot on the part of a few obscure individuals at Edinburgh, who were found in the possession of no less than fifty-seven pikes of home manufacture, wherewith to overthrow the British government. The execution of Watt gave to this trial a note of tragedy which was absent from that of certain members of the Corresponding Society, accused of conspiring to murder the king by means of a poisoned arrow shot from an air-gun. The ridicule that greeted the revelation of the "Pop-gun Plot" marked the beginning of a reaction that found a more serious expression in the trials of Thomas Hardy, John Horne Tooke and John Thelwall (October and November 1794). The prisoners were accused of high treason, their chief offence consisting in their attempt to assemble a general convention of the people, ostensibly for the purpose of obtaining parliamentary reform, but really—as the prosecution urged—for subverting the constitution. This latter charge, though proved to the satisfaction of the committees of both Houses of Parliament, broke down under the cross-examination of the government witnesses by the counsel for the defence, and could indeed only have been substantiated by a dangerous stretching of the doctrine of constructive treason. Happily the jury refused to convict, and its verdict saved the nation from the disgrace of meting out the extreme penalty of high treason to an attempt to hold a public meeting for the redress of grievances.

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[1] The position of the Corresponding Society was greatly strengthened by the establishment of the Friends of the People by Erskine and Grey.

The common sense of a British jury had preserved, in spite of parliament and ministry, that free right of meeting which was to be one of the strongest instruments of future reform. The government, however, saw little reason in the events of the following months for reversing their coercive policy. The year 1795 was one of great suffering and great popular unrest; for the effect of the war upon industry was now beginning to be felt, and the distress had been aggravated by two bad harvests. The sudden determination of those in power, who had hitherto advocated reform, to stereotype the existing system, closed the avenues of hope to those who had expected an improvement of their lot from constitutional changes, and the disaffected temper of the populace that resulted was taken advantage of by the London Corresponding Society, emboldened by its triumph in the courts, to organize open and really dangerous demonstrations, such as the vast mass meeting at Copenhagen House on the 26th of October. On the 29th of October the king, on his way to open parliament, was attacked by an angry mob shouting, "Give us bread," "No Pitt," "No war," "No famine,"; and the glass panels of his state coach were smashed to pieces.

The result of these demonstrations was the introduction in the House of Lords, on the 4th of November, of the Treasonable Practices Bill, the main principle of which was that it modified the law of treason by dispensing with the necessity for the proof of an overt act in order to secure conviction; and in the House of Commons, on the 10th, of the Seditious Meetings Bill, which seriously limited the right of public meeting, making all meetings of over fifty persons, as well as all political debates and lectures, subject to the previous consent and active supervision of the magistrates. In spite of the strenuous resistance of the opposition, led by Fox, and of numerous meetings of protest held outside the walls of parliament, both bills passed into law by enormous majorities. The inevitable result followed. The London Corresponding Society and other political clubs, deprived of the right of public meeting, became secret societies pledged to the overthrow of the existing system by any means. United Englishmen and United Scotsmen plotted with United Irishmen for a French invasion, and sedition was fomented in the army and the navy. Their baneful activities were exposed in the inquiries that followed the Irish rebellion of 1798, and the result was the Corresponding Societies Bill, introduced by Pitt on the 19th of April 1799, which completed the series of repressive measures and practically suspended the popular constitution of England. The right of public meeting, of free speech, of the free press had alike ceased for the time to exist.

The Revolutionary War.

The justification of the government in all this was the life and death struggle in which Great Britain was engaged with the power of republican France in Europe. Yet Pitt's conduct of the war, so far as the continent was concerned, had hitherto led to nothing but failure after failure. In 1794, in spite of the presence of an English army under the duke of York, the Austrian Netherlands had been finally conquered and annexed to the French republic; in 1795 the Dutch republic was affiliated to that of France, and the peace of Basel between Prussia and the French republic left Austria to continue the war alone with the aid of British subsidies. On the sea Great Britain had been more successful, Howe's victory of the 1st of June 1794 being the first of the long series of defeats inflicted on the French navy, while in 1795 a beginning was made of the vast expansion of the British Empire by the capture of Ceylon and the Cape of Good Hope from the Dutch (see French Revolutionary Wars). The war, however, had become so expensive, and its results were evidently so small, that there was a growing feeling in England in favour of peace, especially as the Reign of Terror had come to an end in 1794, and a regular government, the Directory, had been appointed in 1795. At last Pitt was forced to yield to the popular clamour, and in 1796 Lord Malmesbury was sent to France to treat for peace. The negotiation, however, was at once broken off by his demand that France should abandon the Netherlands.

Hoche's expedition to Ireland.

The French government, assured now of the assistance of Spain and Holland, and freed of the danger from La Vendée, now determined to attempt the invasion of Ireland. On the 16th of December a fleet of 17 battle-ships, 13 frigates and 15 smaller vessels set sail from Brest, carrying an expeditionary force of some 13,000 men under General Hoche. The British fleet, under Lord Bridport, was wintering at Spithead; and before it could put to sea the French had slipped past. Before it reached the coast of Ireland, however, the French fleet had already suffered serious losses, owing partly to the attacks of British frigate detachments, partly to the bad seamanship of the French crews and the rottenness of the ships. Only a part of the fleet succeeded in reaching Bantry Bay on the 20th of December, and of these a large number were scattered by a storm on the 23rd. Hoche himself, with the French admiral, had been driven far to the westward in an effort to avoid capture; the attempt of Grouchy, in his absence, to land a force was defeated by the weather, and by the end of the month the whole expedition was in full retreat for Brest. A French diversion on the coast of Pembroke was even less successful; a force of 1500 men, under Colonel Tate, an American adventurer, landed in Cardigan Bay on the 22nd of February 1797, but was at once surrounded by the local militia and surrendered without a blow.

Mutinies at Spithead and the Nore.

A more serious attempt was now made to renew the enterprise by means of a junction of the French, Spanish and Dutch fleets. The victory of Jervis over the Spanish fleet at St Vincent on the 14th of February postponed the imminence of the danger; but this again became acute owing to the general disaffection in the fleet, which in April and May found vent in the serious mutinies at Spithead and the Nore. The mutiny at Spithead, which was due solely to the intolerable conditions under which the seamen served at the time, was ended on the 17th of May by concessions: an increase of pay, the removal of officers who had abused their power of discipline, and the promise of a general free pardon. More serious was the outbreak at the Nore. The disaffection had spread practically to the whole of Admiral Duncan's fleet, and by the beginning of June the mutineers were blockading the Thames with no less than 26 vessels. The demands of the seamen were more extensive than at Spithead; their resistance was better organized; and they were suspected, though without reason, of harbouring revolutionary designs. The return of the Channel fleet to its duty emboldened the admiralty to refuse any concessions, and the vigorous measures of repression taken proved effective. One by one the mutinous crews surrendered; and the arrest of the ringleader, Richard Parker, on board the "Sandwich," on the 14th of June, brought the affair to an end.[1]

Battle of Camperdown.

The seamen regained their reputation, and those who had been imprisoned their liberty, by Duncan's victory over the Dutch fleet at Camperdown (October 11), by which the immediate danger was averted. Though the French attempt at a concerted invasion had failed, however, the Directory did not abandon the enterprise, and commissioned Bonaparte to draw up fresh plans.

At the close of the year 1797 the position of Great Britain was indeed sufficiently alarming. On the 18th of April, during the very crisis of the mutiny at Spithead, Austria had signed with Bonaparte the humiliating terms of the preliminary peace of Leoben, which six months later were embodied in the treaty of Campo Formio (October 17). On the 10th of August Portugal had concluded a treaty with the French Republic; and Great Britain was left without an ally in Europe. The mutiny at the Nore, the threat of rebellion in Ireland, the alarming fall in consols, argued strongly against continuing the war single-handed, and in July Lord Malmesbury had been sent to Lille to open fresh negotiations with the plenipotentiaries of France. The negotiations broke down on the refusal of England to restore the Cape of Good Hope to the Dutch. But though forced, in spite of misgivings, to continue the struggle, the British government in one very important respect was now in a far better position to do so. For though Great Britain was now isolated and her policy in Europe advertised as a failure, the temper of the British people was less inclined to peace in 1798 than it had been three years before. The early enthusiasm of the disfranchised classes for French principles had cooled with the later developments of the Revolution; the attempted invasions had roused the national spirit; and in the public imagination the sinister figure of Bonaparte, the rapacious conqueror, was beginning to loom large to the exclusion of lesser issues. Henceforth, in spite of press prosecutions and trials for political libel, the government was supported by public opinion in its vigorous prosecution of the war.

The Act of Union with Ireland.

If the danger of French invasion was a reality, it was so mainly owing to the deplorable condition of Ireland, where the natural disaffection of the Roman Catholic majority of the population—deprived of political and many social rights, and exposed to the insults and oppression of a Protestant minority corrupted by centuries of ascendancy—invited the intervention of a foreign enemy. The full measure of the intolerable conditions prevailing in the country was revealed by the horrors of the rebellion of 1798, and after this had been suppressed Pitt decided that the only way to deal with the situation was to establish a union between Great Britain and Ireland, similar to that which had proved so successful in the case of England and Scotland. He saw that to establish peace in Ireland the Roman Catholics would have to be enfranchised; he realized that to enfranchise them in a separated Ireland would be to subject the proud Protestant minority to an impossible domination, and to establish not peace but war. The Union, then, was in his view the necessary preliminary to Catholic emancipation, which was at the same time the reward held out to the majority of the Irish people for the surrender of their national quasi-independence. It was a bribe little likely to appeal to the Protestant minority which constituted the Irish parliament, and to them other inducements had to be offered if the scheme was to be carried through. These inducements were not all corrupt. Those members who stood out were, indeed, bought by a lavish distribution of money and coronets; but the advantages to Ireland which might reasonably be expected from the Union were many and obvious; and if all the promises held out by the promoters of the measure have even now not been realized, the fault is not theirs. The Act of Union was placed on the statute-book in 1800; Catholic emancipation was to have been accomplished in the following session, the first of the united parliament. But Pitt's policy broke on the stubborn obstinacy of George III., who believed himself bound by his coronation oath to resist any concession to the enemies of the Established Church. The disadvantage of the possession of too strait a conscience in politics was never more dismally illustrated. To the Irish people it was the first breach of faith in connexion with the Union, and threw them into opposition to a settlement into which they believed themselves to have been drawn under false pretences. Pitt, realizing this, had no option but to resign.

Resignation of Pitt.

Bonaparte breaks up the coalition.

The resignation of the great minister who had so long held the reins of power coincided with a critical situation in Europe. The isolation of Bonaparte in Egypt, as the result of Nelson's victory of the Nile (1798), had enabled the allies to recover some of the ground lost to France. But this had merely increased Bonaparte's prestige, and on his return in 1799 he found no difficulty in making himself master of France by the *coup d'état* of the 18th Brumaire. The campaign of Marengo followed (1800) and the peace of Lunéville, which not only once more isolated Great Britain, but raised up against her new enemies, to the list of whom she added by using her command of the sea to enforce the right of search in order to seize enemies' goods in neutral vessels. Russia joined with Sweden and Denmark, all hitherto friendly powers, in resistance to this claim.

Addington ministry.

Such was the position when Addington became prime minister. He was a man of weak character and narrow intellect, whose main claim to succeed Pitt was that he shared to the full the Protestant prejudices of king and people. His tenure of power was, indeed, marked by British successes abroad; by Nelson's victory at Copenhagen, which broke up the northern alliance, and by Abercromby's victory at Alexandria, which forced the French to evacuate Egypt; but these had been prepared by the previous administration. Addington's real work was the peace of Amiens (1802), an experimental peace, as the king called it, to see if the First Consul could be contented to restrain himself within the very wide limits by which his authority in Europe was still circumscribed.

The peace of Amiens.

Renewal of the war.

In a few months Great Britain was made aware that the experiment would not succeed. Interference and annexation became the standing policy of the new French government; and Britain, discovering how little intention Bonaparte had of carrying out the spirit of the treaty, refused to abandon Malta, as she had engaged to do by the terms of peace. The war began again, no longer a war against revolutionary principles and their propaganda, but against the boundless ambitions of a military conqueror. This time the British nation was all but unanimous in resistance. This time its resistance would be sooner or later supported by all that was healthy in Europe. The news that Bonaparte was making preparations on a vast scale for the invasion of England roused a stubborn spirit of resistance in the country. Volunteers were enrolled, and the coast was dotted with Martello towers, many of which yet remain as monuments of the time when the "army of England" was encamped on the heights near Boulogne within sight of the English cliffs. To meet so great a crisis Addington was not the man. He had been ceaselessly assailed, in and out of parliament, by the trenchant criticism, and often unmannerly wit, of "Pitt's friends," among whom George Canning was now conspicuous. Pitt himself had remained silent; but in view of the seriousness of the crisis and of a threatened illness of the king, which would have necessitated a regency and—in view of the prince of Wales's dislike for him—his own permanent exclusion from office, he now put himself forward once more. The government majorities in the House now rapidly dwindled; on the 26th of April 1804, Addington resigned; and Pitt, after his attempt to form a national coalition ministry had broken

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[1] A vivid account of the mutiny and its causes is given in Captain Marryat's *King's Own*.

Pitt returns to office.

down on the king's refusal to admit Fox, became head of a government constructed on a narrow Tory basis. Of the members of the late government Lord Eldon, the duke of Portland, Lord Westmorland, Lord Castlereagh and Lord Hawkesbury retained office, the latter surrendering the foreign office to Lord Harrowby and going to the home office. Dundas, now Lord Melville, became first lord of the admiralty, and the cabinet further included Lord Camden, Lord Mulgrave and the duke of Montrose. Canning, Huskisson and Perceval were given subordinate offices.

Battle of Trafalgar.

Austerlitz.

Save for the commanding personality of Pitt, the new government was scarcely stronger than that which it had replaced. It had to face the same Whig opposition, led by Fox, who scoffed at the French peril, and reinforced by Addington and his friends; and the whole burden of meeting this opposition fell upon Pitt; for Castlereagh, the only other member of the cabinet in the House of Commons, was of little use in debate. Nevertheless, fresh vigour was infused into the conduct of the war. The Additional Forces Act, passed in the teeth of a strenuous opposition, introduced the principle of a modified system of compulsion to supplement the deficiencies of the army and reserve, while the navy was largely increased. Abroad, Pitt's whole energies were directed to forming a fresh coalition against Bonaparte, who, on the 14th of May 1804, had proclaimed himself emperor of the French; but it was a year before Russia signed with Great Britain the treaty of St Petersburg (April 11, 1805), and the accession to the coalition of Austria, Sweden and Naples was not obtained till the following September. In the following month (October 21) Nelson's crowning victory at Trafalgar over the allied fleets of France and Spain relieved England of the dread of invasion. It served, however, to precipitate the crisis on the continent of Europe; the great army assembled at Boulogne was turned eastwards; by the capitulation of Ulm (October 19) Austria lost a large part of her forces; and the last news that reached Pitt on his death-bed was that of the ruin of all his hopes by the crushing victory of Napoleon over the Russians and Austrians at Austerlitz (December 2).

Death of Pitt.

"Ministry of all the Talents."

Abolition of the slave-trade.

Pitt died on the 23rd of January, and the refusal of Lord Hawkesbury to assume the premiership forced the king to summon Lord Grenville, and to agree to the inclusion of Fox in the cabinet as secretary for foreign affairs. Several members of Pitt's administration were admitted to this "Ministry of all the Talents," including Addington (now Lord Sidmouth), who had rejoined the ministry in December 1804 and again resigned, owing to a disagreement with Pitt as to the charges against Lord Melville (*q.v.*) in July 1805. The new ministry remained in office for a year, a disastrous year which saw the culmination of Napoleon's power: the crushing of Prussia in the campaign of Jena, the formation of the Confederation of the Rhine and the end of the Holy Roman Empire. In the conduct of the war the British government had displayed little skill, frittering away its forces on distant expeditions, instead of concentrating them in support of Prussia or Russia, and the chief title to fame of the Ministry of all the Talents is that it secured the passing of the bill for the abolition of the slave-trade (March 25, 1807).

Catholic question.

The death of Fox (September 13, 1806) deprived the ministry of its strongest member, and in the following March it fell on the old question of concessions to the Roman Catholics. True to his principles, Fox had done his best to negotiate terms of peace with Napoleon; but the breakdown of the attempt had persuaded even the Whigs that an arrangement was impossible, and in view of this fact Grenville thought it his duty to advise the king that the disabilities of Roman Catholics and dissenters in the matter of serving in the army and navy should be removed, in order that all sections of the nation might be united in face of the enemy. The situation, moreover, was in the highest degree anomalous; for by an act passed in 1793 Roman Catholics might hold commissions in the army in Ireland up to the rank of colonel, and this right had not been extended to England, though by the Act of Union the armies had become one. The king, however, was not to be moved from his position; and he was supported in this attitude not only by public opinion, but by a section of the ministry itself, of which Sidmouth made himself the mouthpiece. The demand of George III. that ministers should undertake never again to approach him on the subject of concessions to the Catholics was rejected by Grenville, rightly, as unconstitutional, and on the 18th of March 1807 he resigned.

Portland ministry.

The continental system.

The Orders in Council.

War with America.

The new ministry, under the nominal headship of the valetudinarian duke of Portland, included Perceval as chancellor of the exchequer, Canning as foreign secretary and Castlereagh as secretary for war and the colonies. It had given the undertaking demanded by the king; those of its members who, like Canning, were in favour of Catholic emancipation, arguing that, in view of greater and more pressing questions, it was useless to insist in a matter which could never be settled so long as the old king lived. Of more importance to Great Britain, for the time being, than any constitutional issues, was the life-and-death struggle with Napoleon, which had now entered on a new phase. Defeated at sea, but master now of the greater part of the continent of Europe, the French emperor planned to bring Great Britain to terms by ruining her commerce with the vast territories under his influence. In November 1806 he issued from Berlin the famous decree prohibiting the importation of British goods and excluding from the harbours under his control even neutral ships that had touched at British ports. The British government replied by the famous Orders in Council of 1807, which declared all vessels trading with France liable to seizure, and that all such vessels clearing from France must touch at a British port to pay customs duties. To this Napoleon responded with the Milan decree (December 17), forbidding neutrals to trade in any articles imported from the British dominions. The effects of these measures were destined to be far-reaching. The Revolution had made war on princes and privilege, and the common people had in general gained wherever the Napoleonic régime had been substituted for their effete despotisms; but the "Continental System" was felt as an oppression in every humble household, suddenly deprived of the little imported luxuries, such as sugar and coffee, which custom had made necessaries; and from this time date the beginnings of that popular revolt against Napoleon that was to culminate in the War of Liberation. Great Britain, too, was to suffer from her own retaliatory policy. The Americans had taken advantage of the war to draw into their own hands a large part of the British carrying trade, a process greatly encouraged by the establishment of the Continental System. This brought them into conflict with the British acting under the Orders in Council, and the consequent ill-feeling culminated in the war of 1812.

Treaty of Tilsit.

French invasion of Spain and Portugal.

It was not only the completion of the Continental System, however, that made the year 1807 a fateful one for Great Britain. On the 7th of July the young emperor Alexander I. of Russia, fascinated by Napoleon's genius and bribed by the offer of a partition of the world, concluded the treaty of Tilsit, which not only brought Russia into the Continental System, but substituted for a coalition against France a formidable coalition against England. A scheme for wresting from the British the command of the sea was only defeated by Canning's action in ordering the English fleet to capture the Danish navy, though Denmark was still nominally a friendly power (see CANNING, GEORGE). Meanwhile, in order to complete the ring fence round Europe against British commerce, Napoleon had ordered Junot to invade Portugal; Lisbon was occupied by the French, and the Portuguese royal family migrated to Brazil. In the following year Napoleon seized the royal family of Spain, and gave the crown, which Charles VI. resigned on behalf of himself and his heir, to his brother Joseph, king of Naples. The revolt of the Spanish people that followed was the first of the national uprisings against his rule by which Napoleon was destined to be overthrown. In England it was greeted with immense popular enthusiasm, and the government, without realizing the full import of the step it was taking, sent an expedition to the Peninsula. It disembarked, under the command of Sir Arthur Wellesley, at Figueras on the 1st of August.

Peninsular War.

It was the beginning of the Peninsular War, which was destined not to end until, in 1814, the British troops crossed the Pyrenees into France, while the Allies were pressing over the Rhine. The political and military events on the continent of Europe do not, however, belong strictly to English history, though they profoundly affected its development, and they are dealt with elsewhere (see EUROPE: *History*; NAPOLEON; NAPOLEONIC CAMPAIGNS; PENINSULAR WAR; WATERLOO CAMPAIGN).

The war, while it lasted, was of course the main preoccupation of British ministers and of the British people. It entailed enormous sacrifices, which led to corresponding discontents; and differences as to its conduct produced frequent friction within the government itself.

Walcheren expedition. Cabinet crisis.

A cabinet crisis was the result of the outcome of the unfortunate Walcheren expedition of 1809. It had been Castlereagh's conception and, had it been as well executed as it was conceived, it might have dealt a fatal blow at Napoleon's hopes of recovering his power at sea, by destroying his great naval establishments at Antwerp. It failed, and it became the subject of angry dispute between Canning and Castlereagh, a dispute embittered by personal rivalry and the friction due to the ill-defined relations of the foreign secretary to the secretary for war; the quarrel culminated in a duel, and in the resignation of both ministers (see LONDONDERRY, 2ND MARQUESS OF, and CANNING, GEORGE).

Perceval ministry.

The duke of Portland resigned at the same time, and in the reconstruction of the ministry, under Perceval as premier, Lord Wellesley became foreign secretary, while Lord Liverpool, with Palmerston as his under-secretary, succeeded Castlereagh at the war office. The most conspicuous member of this government was Wellesley, whose main object in taking office was to second his brother's efforts in the Peninsula. In this he was, however, only partially successful, owing to the incapacity of his colleagues to realize the unique importance of the operations in Spain.

The regency.

In November 1810 the old king's mind gave way, and on the 11th of February 1811, an act of parliament bestowed the regency, under certain restrictions, upon the prince of Wales. The prince had been on intimate terms with the Whig leaders, and it was assumed that his accession to power would mean a change of government. He had, however, been offended by their attitude on the question of the restriction of his authority as regent, and he continued Perceval in office. A year later, the king's insanity being proved incurable, the regency was definitively established (February 1812). Lord Wellesley took advantage of the reconstruction of the cabinet to resign a position in which he had not been given a free hand, and his post of foreign secretary was offered to Canning. Canning, however, refused to serve with Castlereagh as minister of war, and the latter received the foreign office, which he was to hold till his death in 1822. A month later, on the 11th of May, Perceval was assassinated in the lobby of the House of Commons, and Lord Liverpool became the head of a government that was to last till 1827.

The period covered by the Liverpool administration was a fateful one in the history of Europe.

Liverpool ministry.

The year 1812 saw Napoleon's invasion of Russia, and the disastrous retreat from Moscow. In the following year Wellington's victory at Vitoria signalled the ruin of the French cause in Spain; while Prussia threw off the yoke of France, and Austria, realizing after cautious delay her chance of retrieving the humiliations of 1809, joined the alliance, and in concert with Russia and the other German powers overthrew Napoleon at Leipzig. The invasion of France followed in 1814, the abdication of Napoleon, the restoration of the Bourbons and the assembling of the congress of Vienna. The following year saw the return of Napoleon from Elba, the close of the congress of Vienna, and the campaign that ended with the battle of Waterloo. The succeeding period, after so much storm and stress, might seem dull and unprofitable; but it witnessed the instructive experiment of the government of Europe by a concert of the great powers, and the first victory of the new principle of nationality in the insurrection of the Greeks. The share taken by Great Britain in all this, for which Castlereagh pre-eminently must take the praise or blame, is outlined in the article on the history of Europe (*q.v.*).

Foreign policy of Castlereagh.

Here it must suffice to point out how closely the development of foreign affairs was interwoven with that of home politics. The great war, so long as it lasted, was the supreme affair of moment; the supreme interest when it was over was to prevent its recurrence. For above all the world needed peace, in order to recover from the exhaustion of the revolutionary epoch; and this peace, bought at so great a cost, could be preserved only by the honest co-operation of Great Britain in the great international alliance based on "the treaties." This explains Castlereagh's policy at home and abroad. He was grossly attacked by the Opposition in parliament and by irresponsible critics, of the type of Byron, outside; historians, bred in the atmosphere of mid-Victorian Liberalism, have re-echoed the cry against him and the government of which he was the most distinguished member; but history has largely justified his attitude. He was no friend of arbitrary government; but he judged it better that "oppressed nationalities" and "persecuted Liberals" should suffer than that Europe should be again plunged into war. He was hated in his day as the arch-opponent of reform, yet the triumph of the reform movement would have been impossible but for the peace his policy secured.

To say this is not to say that the attitude of the Tory government towards the great issues of home politics was wholly, or even mainly, inspired by a far-sighted wisdom.

Character of the Tory party.

It had departed widely from the Toryism of Pitt's younger years, which had sought to base itself on popular support, as opposed to the aristocratic exclusiveness of the Whigs. It conceived itself as the trustee of a system of government which, however theoretically imperfect, alone of the governments of Europe had survived the storms of the Revolution intact. To tamper with a constitution that had so proved its quality seemed not so much a sacrilege as a folly. The rigid conservatism that resulted from this attitude served, indeed, a useful purpose in giving weight to Castlereagh's counsels in the European concert; for Metternich at least, wholly occupied with "propping up mouldering institutions," could not have worked harmoniously with a minister suspected of an itch for reform. At home, however, it undoubtedly tended to provoke that very revolution which it was intended to prevent. This was due not so much to the notorious corruption of the representative system as to the fact that it represented social and economic conditions that were rapidly passing away.

Parliament and the industrial revolution.

Both Houses of Parliament were in the main assemblies of aristocrats and landowners; but agriculture was ceasing to be the characteristic industry of the country and the old semi-feudal relations of life were in process of rapid dissolution. The invention of machinery and the concentration of the working population in manufacturing centres had all but destroyed the old village industries, and great populations were growing up outside the traditional restraints of the old system of class dependence. The distress inevitable in connexion with such an industrial revolution was increased by the immense burden of the war and by the high protective policy of the parliament, which restricted trade and deliberately increased the price of food in the interests of the agricultural classes. Between 1811 and 1814 bands of so-called "Luddites," starving operatives out of work, scoured the country, smashing machinery—the immediate cause of their misfortunes—and committing every sort of outrage. The fault of the government lay, not in taking vigorous measures for the suppression of these disorders, but in remaining obstinately blind to the true causes that had produced them.

Corn Laws and Enclosure Acts.

Repressive legislation.

Ministers saw in the Luddite organization only another conspiracy against the state; and, so far from seeking means for removing the grievances that underlay popular disaffection, the activity of parliament, inspired by the narrowest class interests, only tended to increase them. The price of food, already raised by the war, was still further increased by successive Corn Laws, and the artificial value thus given to arable land led to the passing of Enclosure Bills, under which the country people were deprived of their common rights with very inadequate compensation, and life in the village communities was made more and more difficult. In the circumstances it is not surprising that the spirit of unrest grew apace. In 1815 the passing of a new Corn Law, forbidding the importation of corn so long as the price for home-grown wheat was under 80s. the quarter, led to riots in London. An attack made on the prince regent at the opening of parliament on the 28th of January 1817 led to an inquiry, which revealed the existence of an elaborate organization for the overthrow of the existing order. The repressive measures of 1795 and 1799 were now revived and extended, and a bill suspending the Habeas Corpus Act for a year was passed through both Houses by a large majority. On the 27th of March Lord Sidmouth opened the government campaign against the press by issuing a circular to the lords-lieutenants, directing them to instruct the justices of the peace to issue warrants for the arrest of any person charged on oath with publishing blasphemous or seditious libels. The legality of this suggestion was more than doubtful, but it was none the less acted on, and a series of press prosecutions followed, some—as in the case of the bookseller William Hone—on grounds so trivial that juries refused to convict. William Cobbett, the most influential of the reform leaders, in order to avoid arbitrary imprisonment, "deprived of pen, ink and paper," suspended the *Political Register* and sailed for America. A disturbance that was almost an armed insurrection, which broke out in Derbyshire in June of this year, seemed to justify the severity of the government; it was suppressed without great difficulty, and three of the ringleaders were executed.

Agitation for reform.

The "Manchester Massacre."

It was, however, in 1819 that the conflict between the government and the new popular forces culminated. Distress was acute; and in the manufacturing towns mass meetings were held to discuss a remedy, which, under the guidance of political agitators, was discovered in universal suffrage and annual parliaments. The right to return members to parliament was claimed for all communities; and since this right was unconstitutionally withheld, unrepresented towns were invited to exercise it in anticipation of its formal concession. At Birmingham, accordingly, Sir Charles Wolseley was duly elected "legislatorial attorney and representative" of the town. Manchester followed suit; but the meeting arranged for the 9th of August was declared illegal by the magistrates, on the strength of a royal proclamation against seditious meetings issued on the 30th of July. Another meeting was accordingly summoned for the undoubtedly legal purpose of petitioning parliament in favour of reform. On the appointed day (August 16) thousands poured in from the surrounding districts. These men had been previously drilled, for the purpose, as their own leaders asserted, of enabling the vast assemblage to be conducted in an orderly manner; for the purpose, as the magistrates suspected, of preparing them for an armed insurrection. An attempt was made by a party of yeomanry to arrest a popular agitator, Henry Hunt; the angry mob surged round the horsemen, who found themselves powerless; the Riot Act was read, and the 15th Hussars charged the crowd with drawn swords. The meeting rapidly broke up, but not before six had been killed and many injured. The "Manchester Massacre" gave an immense impetus to the movement in favour of reform. The employment of soldiers to suppress liberty of speech stirred up the resentment of Englishmen as nothing else could have done, and this resentment was increased by the conviction that the government was engaged with the "Holy Alliance" in an unholy conspiracy against liberty everywhere. The true tendency of Castlereagh's foreign policy was not understood, nor had he any of the popular arts which would have enabled Canning to carry public opinion with him in cases where a frank explanation was impossible. The Liberals could see no more than that he appeared to be committed to international engagements, the logical outcome of which might be—as an orator of the Opposition put it—that Cossacks would be encamped in Hyde Park for the purpose of overawing the House of Commons.

The "Six Acts."

The dangerous agitation that gave expression to this state of feeling was met by the government in the session of November 1819 by the passing of the famous Six Acts. The first of these deprived the defendant of the right of traversing, but directed that he should be brought to trial within a year; the second increased the penalties for seditious libel; the third imposed the newspaper stamp duty on all pamphlets and the like containing news; the fourth (Seditious Meetings Act) once more greatly curtailed the liberty of public meetings; the fifth forbade the training of persons in the use of arms; the sixth empowered magistrates to search for and seize arms.

Accession of George IV.

The apparent necessity for the passing of these exceptional measures was increased by the imminent death of the old king, the tragic close of whose long reign had won for him a measure of popular sympathy which was wholly lacking in the case of the prince regent. On the 23rd of February 1820 George III. died, and the regent became king as George IV. This was the signal for an outburst of popular discontent with the existing order of a far more ominous character than any that had preceded it. The king was generally loathed, not so much for his vices—which would have been, in this case as in others, condoned in a more popular monarch—but for the notorious meanness and selfishness of his character. Of these qualities he took the occasion of his accession to make a fresh display. He had long been separated from his wife, Caroline of Brunswick; he now refused her the title of queen consort, forbade the mention of her name in the liturgy, and persuaded the government to promote an inquiry in parliament into her conduct, with a view to a divorce. Whatever grounds there may have been for this action, popular sympathy was wholly with Queen Caroline, who became the centre round which all the forces of discontent rallied. The failure of the Bill of Pains and Penalties against the queen, which was dropped after it had passed its third reading in the Lords by a majority of only seven, was greeted as a great popular triumph. The part played by the government in this unsavoury affair had discredited them even in the eyes of the classes whose fear of revolution had hitherto made them supporters of the established system; and the movement for reform received a new stimulus.

Beginnings of reform.

The Tory government itself realized the necessity for some concessions to the growing public sentiment. In 1821 a small advance was made. The reform bill (equal electoral districts) introduced by Lambton (afterwards Lord Durham) was thrown out; but the corrupt borough of Grampound in Cornwall was disfranchised and the seats transferred to the county of York. Even more significant was the change in the cabinet, which was strengthened by the admission of some of the more conservative section of the Opposition, Lord Sidmouth retiring and Robert Peel becoming home secretary. A bill for the removal of Catholic disabilities, too, was carried in the Commons, though rejected in the Lords; and the appointment of Lord Wellesley, an advocate of the Catholic claims, to the lord-lieutenancy of Ireland marked yet another stage in the settlement of a question which, more than anything else at that time, kept Ireland and Irishmen in a state of chronic discontent and agitation.

It is not without significance that this modification of the policy of the Tory government at home coincided with a modification of its relations with the European powers. The tendency of Metternich's system had long been growing distasteful to Castlereagh, who had consistently protested against the attempt to constitute the Grand Alliance general police of Europe and

George Canning.

had specially protested against the Carlsbad Decrees (*q.v.*). The first steps towards the inevitable breach with the reactionary powers had already been taken before Castlereagh's tragic death on the eve of the congress of Verona brought George Canning into office as the executor of his policy. With Canning, foe of the Revolution and all its works though he was, the old liberal Toryism of Pitt's younger days seemed once more to emerge. It might have emerged in any case; but Canning, with his brilliant popular gifts and his frank appeal to popular support, gave it a revivifying stimulus which it would never have received from an aristocrat of the type of Castlereagh.

Changed tendency of British policy.

The new spirit was most conspicuous in foreign affairs; in the protest of Great Britain against the action of the continental powers at Verona (see Verona, Congress of), in the recognition of the South American republics, and later in the sympathetic attitude of the government towards the insurrection in Greece. This policy had been foreshadowed in the instructions drawn up by Castlereagh for his own guidance at Verona; but Canning succeeded in giving it a popular and national colour and thus removing from the government all suspicion of sympathy with the reactionary spirit of the "Holy Alliance." In home affairs, too, the government made tentative advances in a Liberal direction. In January 1823 Vansittart was succeeded as chancellor of the exchequer by Robinson (afterwards Lord Goderich), and Huskisson became president of the Board of Trade. The term of office of the latter was marked by the first tentative efforts to modify the high protective system by which British trade was hampered, especially by the Reciprocity of Duties Act (1823), a modification of the Navigation Acts, by which British and foreign shipping were placed on an equal footing, while the right to impose restrictive duties on ships of powers refusing to reciprocate was retained. In spite, however, of the improvement in trade that ultimately resulted from these measures, there was great depression; in 1825 there was a financial crisis that caused widespread ruin, and in 1826 the misery of the labouring poor led to renewed riots and machinery smashing. It became increasingly clear that a drastic alteration in the existing system was absolutely inevitable. As to this necessity, however, the ministry was in fact hopelessly divided. The government was one of compromise, in which even so burning a question as Catholic emancipation had been left open. Among its members were some—like the lord chancellor Eldon, the duke of Wellington, and the premier, Lord Liverpool, himself—whose Toryism was of the type crystallized under the influence of the Revolution, adamant against change. Such progressive measures as it had passed had been passed in the teeth of its own nominal supporters, even of its own members. In 1826 Lord Palmerston, himself a member of the government, wrote: "On the Catholic question, on the principles of commerce, on the corn laws, on the settlement of the currency, on the laws relating to trade in money, on colonial slavery, on the game laws . . . ; on all these questions, and everything like them, the government will find support from the Whigs and resistance from their self-denominated friends." It was, in fact, only the personal influence of Liverpool that held the ministry together, and when, on the 17th of February 1827, he was seized with an apoplectic fit, a crisis was inevitable.

Catholic Emancipation and Corn Laws.

The crisis, indeed, arose before the nominal expiration of the Liverpool administration. Two questions were, in the view of Canning and his supporters, of supreme importance—Catholic emancipation and the reform of the Corn Laws. The first of these had assumed a new urgency since the formation in 1823 of the Catholic Association, which under the brilliant leadership of Daniel O'Connell established in Ireland a national organization that threatened the very basis of the government. In March 1826 Sir Francis Burdett had brought in a Catholic Relief Bill, which, passed in the Commons, was thrown out by the Lords. A year later Burdett's motion that the affairs of Ireland required immediate attention, though supported by Canning, was rejected in the Commons. A bill modifying the Corn Laws, introduced by Canning and Huskisson, passed the House of Commons on the 12th of April 1827, but was rejected by the Lords.

Canning ministry.

Wellington ministry.

Catholic emancipation passed.

Revolution of 1830.

Meanwhile (April 10) Canning had become prime minister, his appointment being followed by the resignation of all the most conspicuous members of the Liverpool administration: Wellington, Eldon, Melville, Bathurst, Westmorland and Peel, the latter of whom resigned on account of his opposition to Catholic emancipation. The new government had perforce to rely on the Whigs, who took their seats on the government side of the House, Lord Lansdowne being included in the cabinet. Before this coalition could be completed, however, Canning died (August 8). The short-lived Goderich administration followed; and in January 1828 the king, weary of the effort to arrange a coalition, summoned the duke of Wellington to office as head of a purely Tory cabinet. Yet the logic of facts was too strong even for the stubborn spirit of the Iron Duke. In May 1828, on the initiative of Lord John Russell, the Test and Corporation Acts were repealed; in the same session a Corn Bill, differing but little from those that Wellington had hitherto opposed, was passed; and finally, after a strenuous agitation which culminated in the election of O'Connell for Clare, and in spite of the obstinate resistance of King George IV., the Catholic Emancipation Bill was passed (April 10, 1829) by a large majority. On the 26th of June 1830 the king died, exactly a month before the outbreak of the revolution in Paris that hurled Charles X. from the throne and led to the establishment of the Liberal Monarchy under Louis Philippe; a revolution that was to exert a strong influence on the movement for reform in England.

William IV.

Whig ministry under Lord Grey.

The great Reform Bill.

King William IV. ascended the throne at a critical moment in the history of the English constitution. Everywhere misery and discontent were apparent, manifesting themselves in riots against machinery, in rick-burning on a large scale, and in the formation of trades unions which tended to develop into organized armies of sedition. All the elements of violent revolution were present. Nor was there anything in the character of the new king greatly calculated to restore the damaged prestige of the crown; for, if he lacked the evil qualities that had caused George IV. to be loathed as well as despised, he lacked also the sense of personal dignity that had been the saving grace of George, while he shared the conservative and Protestant prejudices of his predecessors. Reform was now inevitable. The Wellington ministry, hated by the Liberals, denounced even by the Tories as traitorous for the few concessions made, resigned on the 16th of November; and the Whigs at last came into office under Lord Grey, the ministry also including a few of the more Liberal Tories. Lord Durham, perhaps the most influential leader of the reform movement, became privy seal, Althorp chancellor of the exchequer, Palmerston foreign secretary, Melbourne home secretary, Goderich colonial secretary. Lord John Russell, as paymaster-general, and Stanley (afterwards Lord Derby), as secretary for Ireland, held office outside the cabinet. With the actual House of Commons, however, the government was powerless to effect its purpose. Though it succeeded in carrying the second reading of the Reform Bill (March 21, 1831), it was defeated in committee, and appealed to the country. The result was a great governmental majority, and the bill passed the Commons in September. Its rejection by the Lords on the 8th of October was the signal for dangerous rioting; and in spite of the opposition of the king, the bill was once more passed by the Commons (December 12). A violent agitation marked the recess. On the 14th of April 1832 the bill was read a second time in the Lords, but on the 7th of May was again rejected, whereupon the government resigned. The attempt of Wellington, at the king's instance, to form a ministry failed; of all the Tory obstructionists he alone had the courage to face the popular rage. On the 15th Lord Grey was in office again; the demand was made for a sufficient creation of peers to swamp the House of Lords; the king, now thoroughly alarmed, used his influence to persuade the peers to yield, and on the 4th of June the great Reform Bill became law. Thus was England spared the crisis of a bloody revolution, and proof given to the world that her ancient constitution was sufficiently elastic to expand with the needs of the times.

The effect of the Reform Bill, which abolished fifty-six "rotten" boroughs, and by reducing the representation of others set free 143 seats, which were in part conferred on the new industrial centres, was to transfer a large share of political power from the landed aristocracy to the middle classes. Yet the opposition of the Tories had not been wholly inspired by the desire to maintain the political predominance of a class. Canning, who had the best reason for knowing, defended the unreformed system on the ground that its very anomalies opened a variety of paths by which talent could make its way into parliament, and thus produced an assembly far more widely representative than could be expected from a more uniform and logical system. This argument, which the effect of progressive extensions of the franchise on the intellectual level of parliament has certainly not tended to weaken, was however far outweighed—as Canning himself would have come to see—by the advantage of reconciling with the old constitution the new forces which were destined during the century to transform the social organization of the country. Nor, in spite of the drastic character of the Reform Bill, did it in effect constitute a revolution. The 143 seats set free were divided equally between the towns and the counties; and in the counties the landowning aristocracy was still supreme. In the towns the new £10 household franchise secured a democratic constituency; in the counties the inclusion of tenants at will (of £50 annual rent), as well as of copyholders and leaseholders, only tended to increase the influence of the landlords. There was as yet no secret ballot to set the voter free.

The result was apparent in the course of the next few years. The first reformed parliament, which met on the 29th of January 1833, consisted in the main of Whigs, with a sprinkling of Radicals and a compact body of Liberal Tories under Sir Robert Peel. Its great work was the act emancipating the slaves in the British colonies (August 30). Other burning questions were the condition of Ireland, the scandal of the established church there, the misery of the poor in England. In all these matters the House showed little enough of the revolutionary temper; so little, indeed, that in March Lord Durham resigned. To the Whig leaders the church was all but as sacrosanct as to the Tories, the very foundation of the constitution, not to be touched save at imminent risk to the state; the most they would adventure was to remedy a few of the more glaring abuses of an establishment imposed on an unwilling population. As for O'Connell's agitation for the repeal of the Union, that met with but scant sympathy in parliament; on the 27th of May 1834 his repeal motion was rejected by a large majority.

Melbourne ministry.

In July the Grey ministry resigned, and on the 16th Lord Melbourne became prime minister. His short tenure of office is memorable for the passing of the bill for the reform of the Poor Law (August). The reckless system of outdoor relief, which had pauperized whole neighbourhoods, was abolished, and the system of unions and workhouses established (see Poor Law). An attempt to divert some of the revenues of the Irish Church led in the autumn to serious differences of opinion in the cabinet; the king, as tenacious as his father of the exact obligations of his coronation oath, dismissed the ministry, and called the Tories to office under Sir Robert Peel and the duke of Wellington. Thus, within three years of the passing of the Reform Bill, the party which had most strenuously opposed it was again in office. Scarcely less striking testimony to the constitutional temper of the English was given by the new attitude of the party under the new conditions. In the "Tamworth manifesto" of January 1835 Peel proclaimed the principles which were henceforth to guide the party, no longer Tory, but "Conservative." The Reform Bill and its consequences were frankly accepted; further reforms were promised, especially in the matter of the municipal corporations and of the disabilities of the dissenters. The new parliament, however, which met on the 19th of February, was not favourable to the ministry, which fell on the 8th of April. Lord Melbourne once more came into office, and the Municipal Corporations Act of the 7th of September was the work of a Liberal government. This was the last measure of first-rate importance passed before the death of King William, which occurred on the 20th of June 1837.

The "Conservative" party.

It is impossible to exaggerate the importance, not only for England but for the world at large, of the epoch which culminated in the passing of the Reform Bill of 1832. All Europe, whether Liberal or reactionary, was watching the constitutional struggle with strained attention; the principles of monarchy and of constitutional liberty were alike at stake. To foreign observers it seemed impossible that the British monarchy could survive. Baron Brunnow, the Russian ambassador in London, sent home to the emperor Nicholas I. the most pessimistic reports. According to Brunnow, King William, by using his influence to secure the passage of the Reform Bill, had "cast his crown into the gutter"; the throne might endure for his lifetime, but the next heir was a young and inexperienced girl, and, even were the princess Victoria ever to mount the throne—which was unlikely—she would be speedily swept off it again by the rising tide of republicanism. The course of the next reign was destined speedily to convince even Nicholas I. of the baselessness of these fears, and to present to all Europe the exemplar of a progressive state, in which the principles of traditional authority and democratic liberty combined for the common good. (W. A. P.)

XII. The Reign of Victoria (1837–1901)

Queen Victoria's accession.

The death of William IV., on the 20th of June 1837, placed on the throne of England a young princess, who was destined to reign for a longer period than any of her predecessors. The new queen, the only daughter of the duke of Kent, the fourth son of George III., had just attained her majority. Educated in comparative seclusion, her character and her person were unfamiliar to her future subjects, who were a little weary of the extravagances and eccentricities of her immediate predecessors. Her accession gave them a new interest in the house of Hanover. And their loyalty, which would in any case have been excited by the accession of a young and inexperienced girl to the throne of the greatest empire in the world, was stimulated by her conduct and appearance. She displayed from the first a dignity and good sense which won the affection of the multitude who merely saw her in public, and the confidence of the advisers who were admitted into her presence.

The ministry experienced immediate benefit from the change. The Whigs, who had governed England since 1830, under Lord Grey and Lord Melbourne, were suffering from the reaction which is the inevitable consequence of revolution. The country which, in half-a-dozen years, had seen a radical reform of parliament, a no less radical reform of municipal corporations, the abolition of slavery, and the reconstruction of the poor laws, was longing for a period of political repose. The alliance, or understanding, between the Whigs and the Irish was increasing the distrust of the English people in the ministry, and Lord Melbourne's government, in the first half of 1837, seemed doomed to perish. The accession of the queen gave it a new lease of power. The election, indeed, which followed her accession did not materially alter the composition of the House of Commons. But the popularity of the queen was extended to her government. Taper's suggestion in *Coningsby* that the Conservatives should go to the country with the cry, "Our young queen and our old institutions," expressed, in an epigram, a prevalent idea. But the institution which derived most immediate benefit from the new sovereign was the old Whig ministry.

The difficulties of the ministry, nevertheless, were great. In the preceding years it had carried most of the reforms which were demanded in Great Britain; but it had failed to

Lord Melbourne's difficulties.

obtain the assent of the House of Lords to its Irish measures. It had desired (1) to follow up the reform of English corporations by a corresponding reform of Irish municipalities; (2) to convert the tithes, payable to the Irish Church, into a rent charge, and to appropriate its surplus revenues to other purposes; (3) to deal with the chronic distress of the Irish people by extending to Ireland the principles of the English poor law. In the year which succeeded the accession of the queen it accomplished two of these objects. It passed an Irish poor law and a measure commuting tithes in Ireland into a rent charge. The first of these measures was carried in opposition to the views of the Irish, who thought that it imposed an intolerable burden on Irish property. The second was only carried on the government consenting to drop the appropriation clause, on which Lord Melbourne's administration had virtually been founded.

It was not, however, in domestic politics alone that the ministry was hampered. In the months which immediately followed the queen's accession news reached England of disturbances, or even insurrection in Canada. The rising was easily put down; but the condition of the colony was so grave that the ministry decided to suspend the constitution of lower Canada for three years, and to send out Lord Durham with almost dictatorial powers. Lord Durham's conduct was, unfortunately, marked by indiscretions which led to his resignation; but before leaving the colony he drew up a report on its condition and on its future, which practically became a text-book for his successors, and has influenced the government of British colonies ever since. Nor was Canada the only great colony which was seething with discontent. In Jamaica the planters, who had sullenly accepted the abolition of slavery, were irritated by the passage of an act of parliament intended to remedy some grave abuses in the management of the prisons of the island. The colonial House of Assembly denounced this act as a violation of its rights, and determined to desist from its legislative functions. The governor dissolved the assembly, but the new house, elected in its place, reaffirmed the decision of its predecessor; and the British ministry, in face of the crisis, asked parliament in 1839 for authority to suspend the constitution of the island for five years. The bill introduced for this purpose placed the Whig ministry in a position of some embarrassment. The advocates of popular government, they were inviting parliament, for a second time, to suspend representative institutions in an important colony. Supported by only small and dwindling majorities, they saw that it was hopeless to carry the measure, and they decided on placing their resignations in the queen's hands. The queen naturally sent for Sir Robert Peel, who undertook to form a government. In the course of the negotiations, however, he stated that it would be necessary to make certain changes in the household, which contained some great ladies closely connected with the leaders of the Whig party. The queen shrank from separating herself from ladies who had surrounded her since she came to the throne, and Sir Robert thereupon declined the task of forming a ministry. Technically he was justified in adopting this course, but people generally felt that there was some hardship in compelling a young queen to separate herself from her companions and friends, and they consequently approved the decision of Lord Melbourne to support the queen in her refusal, and to resume office. The Whigs returned to place, but they could not be said to return to power. They did not even venture to renew the original Jamaica Bill. They substituted for it a modified proposal which they were unable to carry. They were obviously indebted for office to the favour of the queen, and not to the support of parliament.

The bedchamber question.

Penny postage.

Yet the session of 1839 was not without important results. After a long struggle, in which ministers narrowly escaped defeat in the Commons, and in the course of which they suffered severe rebuffs in the Lords, they succeeded in laying the foundation of the English system of national education. In the same session they were forced against their will to adopt a reform, which had been recommended by Rowland Hill, and to confer on the nation the benefit of a uniform penny postage. No member of the cabinet foresaw the consequences of this reform. The postmaster-general, Lord Lichfield, in opposing it, declared that, if the revenue of his office was to be maintained, the correspondence of the country, on which postage was paid, must be increased from 42,000,000 to 480,000,000 letters a year, and he contended that there were neither people to write, nor machinery to deal with, so prodigious a mass of letters. He would have been astonished to hear that, before the end of the century, his office had to deal with more than 3,000,000,000 postal packets a year, and that the net profit which it paid into the exchequer was to be more than double what it received in 1839.

Fiscal policy.

In 1840 the ministry was not much more successful than it had proved in 1839. After years of conflict it succeeded indeed in placing on the statute book a measure dealing with Irish municipalities. But its success was purchased by concessions to the Lords, which deprived the measure of much of its original merit. The closing years of the Whig administration were largely occupied with the financial difficulties of the country. The first three years of the queen's reign were memorable for a constantly deficient revenue. The deficit amounted to £1,400,000 in 1837, to £400,000 in 1838, and to £1,457,000 in 1839. Baring, the chancellor of the exchequer, endeavoured to terminate this deficiency by a general increase of taxation, but this device proved a disastrous failure. The deficit rose to £1,842,000 in 1840. It was obvious that the old expedient of increasing taxation had failed, and that some new method had to be substituted for it. This new method Baring tried to discover in altering the differential duties on timber and sugar, and substituting a fixed duty of 8s. per quarter for the sliding duties hitherto payable on wheat. By these alterations he expected to secure a large increase of revenue, and at the same time to maintain a sufficient degree of protection for colonial produce. The Conservatives, who believed in protection, at once attacked the proposed alteration of the sugar duties. They were reinforced by many Liberals, who cared very little for protection, but a great deal about the abolition of slavery, and consequently objected to reducing the duties on foreign or slave-grown sugar. This combination of interests proved too strong for Baring and his proposal was rejected. As ministers, however, did not resign on their defeat, Sir Robert Peel followed up his victory by moving a vote of want of confidence, and this motion was carried in an exceptionally full house by 312 votes to 311.

Sir R. Peel forms a ministry.

Before abandoning the struggle, the Whigs decided on appealing from the House of Commons to the country. The general election which ensued largely increased the strength of the Conservative party. On the meeting of the new parliament in August 1841, votes of want of confidence in the government were proposed and carried in both houses; the Whigs were compelled to resign office, and the queen again charged Sir Robert Peel with the task of forming a government. If the queen had remained unmarried, it is possible that the friction which had arisen in 1839 might have recurred in 1841. In February 1840, however, Her Majesty had married her cousin, Prince Albert of Saxe-Coburg-Gotha. She was, therefore, no longer dependent on the Whig ladies, to whose presence in her court she had attached so much importance in 1839. By the management of the prince—who later in the reign was known as the prince consort—the great ladies of the household voluntarily tendered their resignations; and every obstacle to the formation of the new government was in this way removed.

Thus the Whigs retired from the offices which, except for a brief interval in 1834–1835, they had held for eleven years. During the earlier years of their administration they had succeeded in carrying many memorable reforms: during the later years their weakness in the House of Commons had prevented their passing any considerable measures. But, if they had failed in this respect, Lord Melbourne had rendered conspicuous service to the queen. Enjoying her full confidence, consulted by her on every occasion, he had always used his influence for the public good; and perhaps those who look back now with so much satisfaction at the queen's conduct during a reign of unexampled length, imperfectly appreciate the debt which in this respect is owed to her first prime minister. The closing years of the Whig government were marked by external complications. A controversy on the boundary of Canada and the United States was provoking increasing bitterness on both sides of the Atlantic. The intervention of Lord Palmerston in Syria, which resulted in a great military success at Acre, was embittering the relations between France and England, while the unfortunate expedition to Afghanistan, which the Whigs had approved, was already producing embarrassment, and was about to result in disaster. Serious, however, as were the complications which surrounded British policy in Europe, in the East, and in America, the country, in August 1841, paid more attention to what a great writer called the "condition of England" question. There had never been a period in British history when distress and crime had been so general. There had hardly ever been a period when food had been so dear, when wages had been so low, when poverty had been so widespread, and the condition of the lower orders so depraved and so hopeless, as in the early years of the queen's reign. The condition of the people had prompted the formation of two great associations. The Chartists derived their name from the charter which set out their demands. The rejection of a monster petition which they presented to parliament in 1839 led to a formidable riot in Birmingham, and to a projected march from South Wales on London, in which twenty persons were shot dead at Newport. Another organization, in one sense even more formidable than the Chartist, was agitating at the same time for the repeal of the corn laws, and was known as the Anti-Corn Law League. It had already secured the services of two men, Cobden and Bright, who, one by clear reasoning, the other by fervid eloquence, were destined to make a profound impression on all classes of the people.

Budget reforms.

The new government had, therefore, to deal with a position of almost unexampled difficulty. The people were apparently sinking into deeper poverty and misery year after year. As an outward and visible sign of the inward distress, the state was no longer able to pay its way. It was estimated that the deficit, which had amounted to £1,842,000 in 1840, would reach £2,334,000 in 1841. It is the signal merit of Sir Robert Peel that he terminated this era of private distress and public deficits. He accomplished this task partly by economical administration—for no minister ever valued economy more—and partly by a reform of the financial system, effected in three great budgets. In the budget of 1842 Sir Robert Peel terminated the deficit by reviving the income tax. The proceeds of the tax, which was fixed at 7d. in the £, and was granted in the first instance for three years, were more than sufficient to secure this object. Sir Robert used the surplus to reform the whole customs tariff. The duties on raw materials, he proposed, should never exceed 5%, the duties on partly manufactured articles 12%, and the duties on manufactured articles 20% of their value. At the same time he reduced the duties on stage coaches, on foreign and colonial coffee, on foreign and colonial timber, and repealed the export duties on British manufactures. The success of this budget in stimulating consumption and in promoting trade induced Sir Robert Peel to follow it up in 1845 with an even more remarkable proposal. Instead of allowing the income tax to expire, he induced parliament to continue it for a further period, and with the resources which were thus placed at his disposal he purged the tariff of various small duties which produced little revenue, and had been imposed for purposes of protection. He swept away all the duties on British exports; he repealed the duties on glass, on cotton wool, and still further reduced the duties on foreign and colonial sugar. This budget was a much greater step towards free trade than the budget of 1842. The chief object in his third budget in 1846—the reduction of the duty on corn to 1s. a quarter—was necessitated by causes which will be immediately referred to. But it will be convenient at once to refer to its other features. Sir Robert Peel told the house that, in his previous budgets, he had given the manufacturers of the country free access to the raw materials which they used. He was entitled in return to call upon them to relinquish the protection which they enjoyed. He decided, therefore, to reduce the protective duties on cotton, woollen, silk, metal and other goods, as well as on raw materials still liable to heavy taxation, such as timber and tallow. As the policy of 1842 and 1845 had proved unquestionably successful in stimulating trade, he proposed to extend it to agriculture. He reduced the duties on the raw materials which the farmers used, such as seed and maize, and in return he called on them to give up the duties on cattle and meat, to reduce largely the duties on butter, cheese and hops, and to diminish the duty on corn by gradual stages to 1s. a quarter. In making these changes Sir Robert Peel avowed that it was his object to make the country a cheap one to live in. There is no doubt that they were followed by a remarkable development of British trade. In the twenty-seven years from 1815 to 1842 the export trade of Great Britain diminished from £49,600,000 to £47,280,000; while in the twenty-seven years which succeeded 1842 it increased from £47,280,000 to nearly £190,000,000. These figures are a simple and enduring monument to the minister's memory. It is fair to add that the whole increase was not due to free trade. It was partly attributable to the remarkable development of communications which marked this period.

Two other financial measures of great importance were accomplished in Sir Robert Peel's ministry. In 1844 some £250,000,000 of the national debt still bore an interest of 3½%. The improvement in the credit of the country enabled the government to reduce the interest on the stock to 3¼% for the succeeding ten years, and to 3% afterwards. This conversion, which effected an immediate saving of £625,000, and an ultimate saving of £1,250,000 a year, was by far the most important measure which had hitherto been applied to the debt; and no operation on the same scale was attempted for more than forty years. In the same year the necessity of renewing the charter of the Bank of England afforded Sir Robert Peel an opportunity of reforming the currency. He separated the issue department from the banking department of the bank, and decided that in future it should only be at liberty to issue notes against (1) the debt of £14,000,000 due to it from the government, and (2) any bullion actually in its coffers. Few measures of the past century have been the subject of more controversy than this famous act, and at one time its repeated suspension in periods of financial crises seemed to suggest the necessity of its amendment. But opinion on the whole has vindicated its wisdom, and it has survived all the attacks which have been made upon it.

Ireland.

The administration of Sir Robert Peel is also remarkable for its Irish policy. The Irish, under O'Connell, had constantly supported the Whig ministry of Lord Melbourne. But their alliance, or understanding, with the Whigs had not procured them all the results which they had expected from it. The two great Whig measures, dealing with the church and the municipalities, had only been passed after years of controversy, and in a shape which deprived them of many expected advantages. Hence arose a notion in Ireland that nothing was to be expected from a British parliament, and hence began a movement for the repeal of the union which had been accomplished in 1801. This agitation, which smouldered during the reign of the Whig ministry, was rapidly revived when Sir Robert Peel entered upon office. The Irish contributed large sums, which were known as repeal rent, to the cause, and they held monster meetings in various parts of Ireland to stimulate the demand for repeal. The ministry met this campaign by coercive legislation regulating the use of arms, by quartering large bodies of troops in Ireland, and by prohibiting a great meeting at Clontarf, the scene of Brian Boru's victory, in the immediate neighbourhood of Dublin. They further decided in 1843 to place O'Connell and some of the leading agitators on their trial for conspiracy and sedition. O'Connell was tried before a jury chosen from a defective panel, was convicted on an indictment which contained many counts, and the court passed sentence without distinguishing between these counts.

Free trade.

These irregularities induced the House of Lords to reverse the judgment, and its reversal did much to prevent mischief. O'Connell's illness, which resulted in his death in 1847, tended also to establish peace. Sir Robert Peel wisely endeavoured to stifle agitation by making considerable concessions to Irish sentiment. He increased the grant which was made to the Roman Catholic College at Maynooth; he established three colleges in the north, south and west of Ireland for the undenominational education of the middle classes; he appointed a commission—the Devon commission, as it was called, from the name of the nobleman who presided over it—to investigate the conditions on which Irish land was held; and, after the report of the commission, he introduced, though he failed to carry, a measure for remedying some of the grievances of the Irish tenants. These wise concessions might possibly have had some effect in pacifying Ireland, if, in the autumn of 1845, they had not been forgotten in the presence of a disaster which suddenly fell on that unhappy country. The potato, which was the sole food of at least half the people of an overcrowded island, failed, and a famine of unprecedented proportions was obviously imminent. Sir Robert Peel, whose original views on protection had been rapidly yielding to the arguments afforded by the success of his own budgets, concluded that it was impossible to provide for the necessities of Ireland without suspending the corn laws; and that, if they were once suspended, it would be equally impossible to restore them. He failed, however, to convince two prominent members of his cabinet—Lord Stanley and the duke of Buccleuch—that protection must be finally abandoned, and considering it hopeless to persevere with a disunited cabinet he resigned office. On Sir Robert's resignation the queen sent for Lord John Russell, who had led the Liberal party in the House of Commons with conspicuous ability for more than ten years, and charged him with the task of forming a new ministry. Differences, which it proved impossible to remove, between two prominent Whigs—Lord Palmerston and Lord Grey—made the task impracticable, and after an interval Sir Robert Peel consented to resume power. Sir Robert Peel was probably aware that his fall had been only postponed. In the four years and a half during which his ministry had lasted he had done much to estrange his party. They said, with some truth, that, whether his measures were right or wrong, they were opposed to the principles which he had been placed in power to support. The general election of 1841 had been mainly fought on the rival policies of protection and free trade. The country had decided for protection, and Sir R. Peel had done more than all his predecessors to give it free trade. The Conservative party, moreover, was closely allied with the church, and Sir Robert had offended the church by giving an increased endowment to Maynooth, and by establishing undenominational colleges—"godless colleges" as they were called—in Ireland. The Conservatives were, therefore, sullenly discontented with the conduct of their leader. They were lashed into positive fury by the proposal which he was now making to abolish the corn laws. Lord George Bentinck, who, in his youth, had been private secretary to Canning, but who in his maturer years had devoted more time to the turf than to politics, placed himself at their head. He was assisted by a remarkable man—Benjamin Disraeli—who joined great abilities to great ambition, and who, embittered by Sir Robert Peel's neglect to appoint him to office, had already displayed his animosity to the minister. The policy on which Sir Robert Peel resolved facilitated attack. For the minister thought it necessary, while providing against famine by repealing the corn laws, to ensure the preservation of order by a new coercion bill. The financial bill and the coercion bill were both pressed forward, and each gave opportunities for discussion and, what was then new in parliament, for obstruction. At last, on the very night on which the fiscal proposals of the ministers were accepted by the Lords, the coercion bill was defeated in the Commons by a combination of Whigs, radicals and protectionists; and Sir R. Peel, worn out with a protracted struggle, placed his resignation in the queen's hands.

Peel's foreign policy.

Thus fell the great minister, who perhaps had conferred more benefits on his country than any of his predecessors. The external policy of his ministry had been almost as remarkable as its domestic programme. When he accepted office the country was on the eve of a great disaster in India; it was engaged in a serious dispute with the United States; and its relations with France were so strained that the two great countries of western Europe seemed unlikely to be able to settle their differences without war. In the earlier years of his administration the disaster in Afghanistan was repaired in a successful campaign; and Lord Ellenborough, who was sent over to replace Lord Auckland as governor-general, increased the dominion and responsibilities of the East India Company by the unscrupulous but brilliant policy which led to the conquest of Sind. The disputes with the United States were satisfactorily composed; and not only were the differences with France terminated, but a perfect understanding was formed between the two countries, under which Guizot, the prime minister of France, and Lord Aberdeen, the foreign minister of England, agreed to compromise all minor questions for the sake of securing the paramount object of peace. The good understanding was so complete that a disagreeable incident in the Sandwich Islands, in which the injudicious conduct of a French agent very nearly precipitated hostilities, was amicably settled; and the ministry had the satisfaction of knowing that, if their policy had produced prosperity at home, it had also maintained peace abroad.

The Spanish marriages.

On Sir R. Peel's resignation the queen again sent for Lord John Russell. The difficulties which had prevented his forming a ministry in the previous year were satisfactorily arranged, and Lord Palmerston accepted the seals of the foreign office, while Lord Grey was sent to the colonial office. The history of the succeeding years was destined, however, to prove that Lord Grey had had solid reasons for objecting to Lord Palmerston's return to his old post; for, whatever judgment may ultimately be formed on Lord Palmerston's foreign policy, there can be little doubt that it did not tend to the maintenance of peace. The first occasion on which danger was threatened arose immediately after the installation of the new ministry on the question of the Spanish marriages. The queen of Spain, Isabella, was a young girl still in her teens; the heir to the throne was her younger sister, the infanta Fernanda. Diplomacy had long been occupied with the marriages of these children; and Lord Aberdeen had virtually accepted the principle, which the French government had laid down, that a husband for the queen should be found among the descendants of Philip V., and that her sister's marriage to the duc de Montpensier—a son of Louis Philippe—should not be celebrated till the queen was married and had issue. While agreeing to this compromise, Lord Aberdeen declared that he regarded the Spanish marriages as a Spanish, and not as a European question, and that, if it proved impossible to find a suitable consort for the queen among the descendants of Philip V., Spain must be free to choose a prince for her throne elsewhere. The available descendants of Philip V. were the two sons of Don Francis, the younger brother of Don Carlos, and of these the French government was in favour of the elder, while the British government preferred the younger brother. Lord Palmerston strongly objected to the prince whom the French government supported; and, almost immediately after acceding to office, he wrote a despatch in which he enumerated the various candidates for the queen of Spain's hand, including Prince Leopold of Saxe-Coburg, a near relation of the prince consort, among the number. Louis Philippe regarded this despatch as a departure from the principle on which he had agreed with Lord Aberdeen, and at once hurried on the simultaneous marriages of the queen with the French candidate, and of her sister with the duc de Montpensier. His action broke up the *entente cordiale* which had been established between Guizot and Lord Aberdeen.

The second occasion on which Lord Palmerston's vigorous diplomacy excited alarm arose out of the revolution which broke out almost universally in Europe in 1848. A rising in Hungary was suppressed by Austria with Russian assistance, and after its suppression many leading Hungarians took refuge in Turkish territory. Austria and Russia addressed demands to the Porte for their surrender. Lord Palmerston determined to support the Porte in its refusal to give up these exiles, and actually sent the British fleet to the Dardanelles with this object. His success raised the credit of Great Britain and his own reputation. The presence of the British fleet, however, at the Dardanelles suggested to him the possibility of settling another long-standing controversy. For years British subjects settled in Greece had raised complaints against the Greek government. In particular Don Pacifico, a Jew, but a native of Gibraltar, complained that, at a riot, in which his house had been attacked, he had lost jewels, furniture and papers which he alleged to be worth more than £30,000. As Lord Palmerston was unable by correspondence to induce the Greek government to settle claims of this character, he determined to enforce them; and by his orders a large number of Greek vessels were seized and detained by the British fleet. The French government tendered its good offices to compose the dispute, and an arrangement was actually arrived at between Lord Palmerston and the French minister in London. Unfortunately, before its terms reached Greece, the British minister at Athens had ordered the resumption of hostilities, and had compelled the Greek government to submit to more humiliating conditions. News of this settlement excited the strongest feelings both in Paris and London. In Paris, Prince Louis Napoleon, who had acceded to the presidency of the French republic, decided on recalling his representative from the British court. In London the Lords passed a vote of censure on Lord Palmerston's proceedings; and the Commons only sustained the minister by adopting a resolution approving in general terms the principles on which the foreign policy of the country had been conducted.

Don Pacifico.

Palmerston dismissed.

In pursuing the vigorous policy which characterized his tenure of the foreign office, Lord Palmerston frequently omitted to consult his colleagues in the cabinet, the prime minister, or the queen. In the course of 1849 Her Majesty formally complained to Lord John Russell that important despatches were sent off without her knowledge; and an arrangement was made under which Lord Palmerston undertook to submit every despatch to the queen through the prime minister. In 1850, after the Don Pacifico debate, the queen repeated these commands in a much stronger memorandum. But Lord Palmerston, though all confidence between himself and the court was destroyed, continued in office. In the autumn of 1851 the queen was much annoyed at hearing that he had received a deputation at the foreign office, which had waited on him to express sympathy with the Hungarian refugees, and to denounce the conduct of "the despots and tyrants" of Russia and Austria, and that he had, in his reply, expressed his gratification at the demonstration. If the queen had had her way, Lord Palmerston would have been removed from the foreign office after this incident. A few days later the *coup d'état* in Paris led to another dispute. The cabinet decided to do nothing that could wear the appearance of interference in the internal affairs of France; but Lord Palmerston, in conversation with the French minister in London, took upon himself to approve the bold and decisive step taken by the president. The ministry naturally refused to tolerate this conduct, and Lord Palmerston was summarily removed from his office.

The removal of Lord Palmerston led almost directly to the fall of the Whig government. Before relating, however, the exact occurrences which produced its defeat, it is necessary to retrace our steps and describe the policy which it had pursued in internal matters during the six years in which it had been in power. Throughout that period the Irish famine had been its chief anxiety and difficulty. Sir Robert Peel had attempted to deal with it (1) by purchasing large quantities of Indian corn, which he had retailed at low prices in Ireland, and (2) by enabling the grand juries to employ the people on public works, which were to be paid out of moneys advanced by the state, one-half being ultimately repayable by the locality. These measures were not entirely successful. It was found, in practice, that the sale of Indian corn at low prices by the government checked the efforts of private individuals to supply food; and that the offer of comparatively easy work to the poor at the cost of the public, prevented their seeking harder private work either in Ireland or in Great Britain. The new government, with this experience before it, decided on trusting to private enterprise to supply the necessary food, and on throwing the whole cost of the works which the locality might undertake on local funds. If the famine had been less severe, this policy might possibly have succeeded. Universal want, however, paralysed every one. The people, destitute of other means of livelihood, crowded to the relief works. In the beginning of 1847 nearly 750,000 persons—or nearly one person out of every ten in Ireland—were so employed. With such vast multitudes to relieve, it proved impracticable to exact the labour which was required as a test of destitution. The roads, which it was decided to make, were blocked by the labourers employed upon them, and by the stones, which the labourers were supposed to crush for their repair. In the presence of this difficulty the government decided, early in 1847, gradually to discontinue the relief works, and to substitute for them relief committees charged with the task of feeding the people. At one time no less than 3,000,000 persons—more than one-third of the entire population of Ireland—were supported by these committees. At the same time it decided on adopting two measures of a more permanent character. The poor law of 1838 had made no provision for the relief of the poor outside the workhouse, and outdoor relief was sanctioned by an act of 1847. Irish landlords complained that their properties, ruined by the famine, and encumbered by the extravagances of their predecessors, could not bear the cost of this new poor law; and the ministry introduced and carried a measure enabling the embarrassed owners of life estates to sell their property and discharge their liabilities. It is the constant misfortune of Ireland that the measures intended for her relief aggravate her distress. The encumbered estates act, though it substituted a solvent for an insolvent proprietary, placed the Irish tenants at the mercy of landlords of whom they had no previous knowledge, who were frequently absentees, who bought the land as a matter of business, and who dealt with it on business principles by raising the rent. The new poor law, by throwing the maintenance of the poor on the soil, encouraged landlords to extricate themselves from their responsibilities by evicting their tenants. Evictions were made on a scale which elicited from Sir Robert Peel an expression of the deepest abhorrence. The unfortunate persons driven from their holdings and forced to seek a refuge in the towns, in England, or—when they could afford it—in the United States, carried with them everywhere the seeds of disease, the constant handmaid of famine.

Irish famine.

Famine, mortality and emigration left their mark on Ireland. In four years, from 1845 to 1849, its population decreased from 8,295,000 to 7,256,000, or by more than a million persons; and the decline which took place at that time went on to the end of the century. The population of Ireland in 1901 had decreased to 4,457,000 souls. This fact is the more remarkable, because Ireland is almost the only portion of the British empire, or indeed of the civilized world, where such a circumstance has occurred. We must go to countries like the Asiatic provinces of Turkey, devastated by Ottoman rule, to find such a diminution in the numbers of the people as was seen in Ireland during the last half of the 19th century. It was probably inevitable that the distress of Ireland should have been followed by a renewal of Irish outrages. A terrible series of agrarian crimes was committed in the autumn of 1847; and the ministry felt compelled, in consequence, to strengthen its hands by a new measure of coercion, and by suspending the Habeas Corpus Act in Ireland. The latter measure at once brought to a crisis the so-called rebellion of 1848, for his share in which Smith O'Brien, an Irish member of parliament, was convicted of high treason. The government, however, did not venture to carry out the grim sentence which the law still applied

Rebellion of 1848.

to traitors, and introduced an act enabling it to commute the death penalty to transportation. The "insurrection" had from the first proved abortive. With Smith O'Brien's transportation it practically terminated.

Chartism.

In the meanwhile the difficulties which the government was experiencing from the Irish famine had been aggravated by a grave commercial crisis in England. In the autumn of 1847 a series of failures in the great commercial centres created a panic in the city of London, which forced consols down to 78, and induced the government to take upon itself the responsibility of suspending the Bank Charter Act. That step, enabling the directors of the Bank of England to issue notes unsecured by bullion, had the effect of gradually restoring confidence. But a grave commercial crisis of this character is often attended with other than financial consequences. The stringency of the money market increases the distress of the industrial classes by diminishing the demand for work; and, when labour suffers, political agitation flourishes. Early in 1848, moreover, revolutions on the continent produced a natural craving for changes at home. Louis Philippe was driven out of Paris, the emperor of Austria was driven out of Vienna, the Austrian soldiery had to withdraw from Milan, and even in Berlin the crown had to make terms with the people. While thrones were falling or tottering in every country in Europe, it was inevitable that excitement and agitation should prevail in Great Britain. The Chartists, reviving the machinery which they had endeavoured to employ in 1839, decided on preparing a monster petition to parliament, which was to be escorted to Westminster by a monster procession. Their preparations excited general alarm, and on the invitation of the government no less than 170,000 special constables were sworn in to protect life and property against a rabble. By the judicious arrangements, however, which were made by the duke of Wellington, the peace of the metropolis was secured. The Chartists were induced to abandon the procession which had caused so much alarm, and the monster petition was carried in a cab to the House of Commons. There it was mercilessly picked to pieces by a select committee. It was found that, instead of containing nearly 6,000,000 signatures, as its originators had boasted, less than 2,000,000 names were attached to it. Some of the names, moreover, were obviously fictitious, or even absurd. The exposure of these facts turned the whole thing into ridicule, and gave parliament an excuse for postponing measures of organic reform which might otherwise have been brought forward.

Navigation Acts.

If the ministry thus abstained from pressing forward a large scheme of political reform, it succeeded in carrying two measures of the highest commercial and social importance. In 1849 it supplemented the free trade policy, which Sir Robert Peel had developed, by the repeal of the Navigation Acts. Briefly stated, these acts, which had been originated during the Protectorate of Cromwell, and continued after the Restoration, reserved the whole coasting trade of the country for British vessels and British seamen, and much of the foreign trade for British vessels, commanded and chiefly manned by British subjects. The acts, therefore, were in the strictest sense protective, but they were also designed to increase the strength of Great Britain at sea, by maintaining large numbers of British seamen. They had been defended by Adam Smith on the ground that defence was "of much more importance than opulence," and by the same reasoning they had been described by John Stuart Mill as, "though economically disadvantageous, politically expedient." The acts, however, threw a grave burden on British trade and British shipowners. Their provisions by restricting competition naturally tended to raise freights, and by restricting employment made it difficult for shipowners to man their vessels. Accordingly the government wisely determined on their repeal; and one of the last and greatest battles between Free Trade and Protection was fought over the question. The second reading of the government bill was carried in the House of Lords by a majority of only ten: it would not have been carried at all if the government had not secured a much larger number of proxies than their opponents could obtain.

Ten Hours Bill.

If the repeal of the Navigation Acts constituted a measure of the highest commercial importance, the passage of the Ten Hours Bill in 1847 marked the first great advance in factory legislation. Something, indeed, had already been done to remedy the evils arising from the employment of women and very young children in factories and mines. In 1833 Lord Ashley, better known as Lord Shaftesbury, had carried the first important Factory Act. In 1842 he had succeeded, with the help of the striking report of a royal commission, in inducing parliament to prohibit the employment of women and of boys under ten years of age in mines. And in 1843 Sir James Graham, who was home secretary in Sir Robert Peel's administration, had been compelled by the pressure of public opinion to introduce a measure providing for the education of children employed in factories, and for limiting the hours of work of children and young persons. The educational clauses of this bill were obviously framed in the interests of the Church of England, and raised a heated controversy which led to the abandonment of the measure; and in the following year Sir James Graham introduced a new bill dealing with the labour question alone. Briefly stated, his proposal was that no child under nine years of age should be employed in a factory, and that no young person under eighteen should be employed for more than twelve hours a day. This measure gave rise to the famous controversy on the ten hours clause, which commenced in 1844 and was protracted till 1847. Lord Ashley and the factory reformers contended, on the one hand, that ten hours were long enough for any person to work; their opponents maintained, on the contrary, that the adoption of the clause would injure the working-classes by lowering the rate of wages, and ruin the manufacturers by exposing them to foreign competition. In 1847 the reform was at last adopted. It is a remarkable fact that it was carried against the views of the leading statesmen on both sides of the House. It was the triumph of common sense over official arguments.

Death of Peel.

During the first four years of Lord John Russell's government, his administration had never enjoyed any very large measure of popular support, but it had been partly sustained by the advocacy of Sir Robert Peel. The differences which estranged Sir Robert from his old supporters were far greater than those which separated him from the Whigs, and the latter were therefore constantly able to rely on his assistance. In the summer of 1850, however, a lamentable accident—a fall from his horse—deprived the country of the services of its great statesman. His death naturally affected the position of parties. The small remnant of able men, indeed, who had been associated with him in his famous administration, still maintained an attitude of neutrality. But the bulk of the Conservative party rallied under the lead of Lord Stanley (afterwards Derby) in the House of Lords, and gradually submitted to, rather than accepted, the lead of Disraeli in the House of Commons.

Oxford movement.

In the autumn which succeeded Sir Robert Peel's death, an event which had not been foreseen agitated the country and produced a crisis. During the years which had succeeded the Reform Bill a great religious movement had influenced politics both in England and Scotland. In England, a body of eminent men at Oxford—of whom J. H., afterwards Cardinal, Newman was the chief, but who numbered among their leaders Hurrell Froude, the brother of the historian, and Keble, the author of the *Christian Year*—endeavoured to prove that the doctrines of the Church of England were identical with those of the primitive Catholic Church, and that every Catholic doctrine might be held by those who were within its pale. This view was explained in a remarkable series of tracts, which gave their authors the name of Tractarians. The most famous of these, and the last of the series, Tract XC., was published three years after the queen's accession to the throne. In Scotland, the Presbyterian Church—mainly under the guidance of Dr Chalmers, one of the most eloquent preachers of the century—was simultaneously engaged in a contest with the state on the subject of ecclesiastical patronage. Both movements had this in common, that they indicated a revival of religious energy, and aimed at vindicating the authority of the church, and resisting the interference of the state in church matters. The Scottish movement led to the disruption of the Church of Scotland and the formation of the Free Church in 1843. The Tractarian movement was ultimately terminated by the secession of Newman and many of his associates from the Church of England, and their admission to the Church of Rome. These secessions raised a feeling of alarm throughout England. The people, thoroughly Protestant, were excited by the proofs—which they thought were afforded—that the real object of the Tractarians was to reconcile England with Rome; and practices which are now regarded as venial or even praiseworthy—such as the wearing of the surplice in the pulpit, and the institution of the weekly offertory—were denounced because they were instituted by the Tractarians, and were regarded as insidious devices to lead the country Romewards. The sympathies of the Whigs, and especially of the Whig prime minister, Lord John Russell, were with the people; and Lord John displayed his dislike to the Romanizing tendencies of the Tractarians by appointing Renn Dickson Hampden—whose views had been formally condemned by the Hebdomadal Board at Oxford—to the bishopric of Hereford. The High Church party endeavoured to oppose the appointment at every stage; but their attempts exposed them to a serious defeat. The courts held that, though the appointment of a bishop by the crown required confirmation in the archbishop's court, the confirmation was a purely ministerial act which could not be refused. The effort which the High Church party had made to resist Dr Hampden's appointment had thus resulted in showing conclusively that authority resided in the crown, and not in the archbishop. It so happened that about the same time this view was confirmed by another judicial decision. The lord chancellor presented the Rev. G. C. Gorham to a living in Devonshire; and Dr Phillpotts, the bishop of Exeter, declined to institute him, on the ground that he held heretical views on the subject of baptism. The court of arches upheld the bishop's decision. The finding of the court, however, was reversed by the privy council, and its judgment dealt a new blow at the Tractarian party. For it again showed that authority—even in doctrine—resided in the crown and not in the church. Within a few months of this famous decision the pope—perhaps encouraged by the activity and despondency of the High Church party—issued a brief "for re-establishing and extending the Catholic faith in England," and proceeded to divide England and Wales into twelve sees. One of them—Westminster—was made an archbishopric, and the new dignity was conferred on Nicholas Patrick Stephen Wiseman, who was almost immediately afterwards created cardinal. The publication of this brief caused much excitement throughout the country, which was fanned by a letter from the prime minister to the bishop of Durham, condemning the brief as "insolent and insidious" and "inconsistent with the queen's supremacy, with the rights of our bishops and clergy, and with the spiritual independence of the nation." Somewhat unnecessarily the prime minister went on to condemn the clergymen of the Church of England who had subscribed the Thirty-nine Articles, "who have been the most forward in leading their own flocks, step by step, to the very edge of the precipice."

Ecclesiastical Titles Bill.

In accordance with the promise of Lord John Russell's letter, the ministry, at the opening of the session of 1851, introduced a measure forbidding the assumption of territorial titles by the priests and bishops of the Roman Catholic Church, declaring all gifts made to them and all acts done by them under these titles null and void, and forfeiting to the crown all property bequeathed to them. The bill naturally encountered opposition from many Liberals, while it failed to excite any enthusiasm among Conservatives, who thought its remedies inadequate. In the middle of the debates upon it the government was defeated on another question—a proposal to reduce the county franchise—and, feeling that it could no longer rely on the support of the House of Commons, tendered its resignation. But Lord Stanley, whom the queen entrusted with the duty of forming a new administration, was compelled to decline the task, and Lord John resumed office. Mild as the original Ecclesiastical Titles Bill had been thought, the new edition of it, which was introduced after the restoration of the Whigs to power, was still milder. Though, after protracted debates, it at last became law, it satisfied nobody. Its provisions, as was soon found, could be easily evaded, and the bill, which had caused so much excitement, and had nearly precipitated the fall of a ministry, remained a dead letter. The government, in fact, was experiencing the truth that, if a defeated ministry may be occasionally restored to place, it cannot be restored to power. The dismissal of Lord Palmerston from the foreign office in 1851 further increased the embarrassments of the government. In February 1852 it was defeated on a proposal to revive the militia, and resigned.

French scare.

The circumstances which directly led to the defeat of the Whigs were, in one sense, a consequence of the revolutionary wave which had swept over Europe in 1848. The fall of Louis Philippe in that year created a panic in Great Britain. Men thought that the unsettled state of France made war probable, and they were alarmed at the defenceless condition of England. Lord Palmerston, speaking in 1845, had declared that "steam had bridged the Channel"; and the duke of Wellington had addressed a letter to Sir John Burgoyne, in which he had demonstrated that the country was not in a position to resist an invading force. The panic was so great that the ministry felt it necessary to make exceptional provisions for allaying it. Lord John Russell decided on asking parliament to sanction increased armaments, and to raise the income tax to 1s. in the pound in order to pay for them. The occasion deserves to be recollected as one on which a prime minister, who was not also chancellor of the exchequer, has himself proposed the budget of the year. But it was still more memorable because the remedy which Lord John proposed at once destroyed the panic which had suggested it. A certain increase of the income tax to a shilling seemed a much more serious calamity than the uncertain prospect of a possible invasion. The estimates were recast, the budget was withdrawn, and the nation was content to dispense with any addition to its military and naval strength. Events in France, in the meanwhile, moved with railway speed. Louis Napoleon became president of the French Republic: in 1852 he became emperor of the French. The new emperor, indeed, took pains to reassure a troubled continent that "the empire was peace." The people insisted on believing—and, as the event proved, rightly—that the empire was war. Notwithstanding the success of the Great Exhibition of 1851, which was supposed to inaugurate a new reign of peace, the panic, which had been temporarily allayed in 1848, revived at the close of 1851, and the government endeavoured to allay it by reconstituting the militia. There were two possible expedients. An act of 1757 had placed under the direct authority of the crown a militia composed of men selected in each parish by ballot, liable to be called out for active service, and to be placed under military law. But the act had been supplemented by a series of statutes passed between 1808 and 1812, which had provided a local militia, raised, like the regular militia, by ballot, but, unlike the latter, only liable for service for the suppression of riots, or in the event of imminent invasion. Lord John Russell's government, forced to do something by the state of public opinion, but anxious—from the experience of 1848—to make that something moderate, decided on reviving the local militia. Lord Palmerston at once suggested that the regular and not the local militia should be revived; and, in a small house of only 265 members, he succeeded in carrying a resolution to that effect. He had, in this way, what he called his "tit for tat" with Lord John; and the queen, accepting her minister's resignation, sent for Lord Derby—for Lord Stanley had now succeeded to this title—and charged him with the task of forming a ministry.

The government which Lord Derby succeeded in forming was composed almost exclusively of the men who had rebelled against Sir Robert Peel in 1845. It was led in the House of

Lord Derby.

Commons by the brilliant, but somewhat unscrupulous statesman who had headed the revolt. With the exception of Lord Derby and one other man, its members had no experience of high office; and it had no chance of commanding a majority of the House of Commons in the existing parliament. It owed its position to the divisions of its opponents. Profiting by their experience, it succeeded in framing and passing a measure reconstituting the regular militia, which obtained general approval. It is perhaps worth observing that it maintained the machinery of a ballot, but reserved it only in case experience should prove that it was necessary. Voluntary enlistment under the new Militia Bill was to be the rule: compulsory service was only to be resorted to if voluntary enlistment should fail. This success, to a certain extent, strengthened the position of the new ministry. It was obvious, however, that its stability would ultimately be determined by its financial policy. Composed of the men who had resisted the free trade measures of the previous decade, its fate depended on its attitude towards free trade. In forming his administration Lord Derby had found it necessary to declare that, though he was still in favour of a tax on corn, he should take no steps in this direction till the country had received an opportunity of expressing its opinion. His leader in the House of Commons went much further, and declared that the time had gone by for reverting to protection. The view which Disraeli thus propounded in defiance of his previous opinions was confirmed by the electors on the dissolution of parliament. Though the new government obtained some increased strength from the result of the polls, the country, it was evident, had no intention of abandoning the policy of free trade, which by this time, it was clear, had conferred substantial benefits on all classes. When the new parliament met in the autumn of 1852, it was at once plain that the issue would be determined on the rival merits of the old and the new financial systems. Disraeli courted the decision by at once bringing forward the budget, which custom, and perhaps convenience, would have justified him in postponing till the following spring. His proposal—in which he avowedly threw over his friends on the ground that "he had greater subjects to consider than the triumph of obsolete opinions"—was, in effect, an attempt to conciliate his old supporters by a policy of doles, and to find the means for doing so by the increased taxation of the middle classes. He offered to relieve the shipping interest by transferring some of the cost of lighting the coasts to the Consolidated Fund; the West India interest by sanctioning the refining of sugar in bond; and the landed classes by reducing the malt tax by one-half, and by repealing the old war duty on hops. He suggested that the cost of these measures should be defrayed by extending the income tax to Ireland to industrial incomes of £100 and to permanent incomes of £50 a year, as well as by doubling the house tax, and extending it to all £10 householders. The weight, therefore, of these measures was either purposely or unintentionally thrown mainly on persons living in houses worth from £10 to £20 a year, or on persons in receipt of incomes from £50 to £150 a year. This defect in the budget was exposed in a great speech by Gladstone, which did much to ensure the defeat of the scheme and the fall of the ministry.

Coalition, 1853.

On the resignation of Lord Derby, the queen, anxious to terminate a period of weak governments, decided on endeavouring to combine in one cabinet the chiefs of the Whig party and the followers of Sir Robert Peel. With this view she sent both for Lord Aberdeen, who had held the foreign office under Sir Robert, and for Lord Lansdowne, who was the Nestor of the Whigs; and with Lord Lansdowne's concurrence charged Lord Aberdeen with the task of forming a government. In the new ministry Lord Aberdeen became first lord of the treasury, Gladstone chancellor of the exchequer, Lord John Russell foreign minister—though he was almost immediately replaced in the foreign office by Lord Clarendon, and himself assumed the presidency of the council. Lord Palmerston went to the home office. One other appointment must also be mentioned. The secretary of state for the colonies was also at that time secretary of state for war. No one in 1852, however, regarded that office as of material importance, and it was entrusted by Lord Aberdeen to an amiable and conscientious nobleman, the duke of Newcastle.

Budget of 1853.

The first session of the Aberdeen administration will be chiefly recollected for the remarkable budget which Gladstone brought forward. It constituted a worthy supplement to the measures of 1842, 1845 and 1846. Gladstone swept away the duty on one great necessary of life—soap; he repealed the duties on 123 other articles; he reduced the duties on 133 others, among them that on tea; and he found means for paying for these reforms and for the gradual reduction and ultimate abolition of the income tax, which had become very unpopular, by (1) extending the tax to incomes of £100 a year; (2) an increase of the spirit duties; and (3) applying the death duties to real property, and to property passing by settlement. There can be little doubt that this great proposal was one of the most striking which had ever been brought forward in the House of Commons; there can also, unhappily, be no doubt that its promises and intentions were frustrated by events which proved too strong for its author. For Gladstone, in framing his budget, had contemplated a continuance of peace, and the country was, unhappily, already drifting into war.

The holy places.

For some years an obscure quarrel had been conducted at Constantinople about the custody of the holy places at Jerusalem. France, relying on a treaty concluded in the first half of the 18th century, claimed the guardianship of these places for the Latin Church. But the rights which the Latin Church had thus obtained had practically fallen into disuse, while the Greek branch of the Christian Church had occupied and repaired the shrines which the Latins had neglected. In the years which preceded 1853, however, France had shown more activity in asserting her claims; and the new emperor of the French, anxious to conciliate the church which had supported his elevation to the throne, had a keen interest in upholding them. If, for reasons of policy, the emperor had grounds for his action, he had personal motives for thwarting the tsar of Russia; for the latter potentate had been foolish enough, in recognizing the second empire, to address its sovereign as "Mon Cher Ami," instead of, in the customary language of sovereigns, as "Monsieur Mon Frère." Thus, at the close of 1852, and in the beginning of 1853, Russia and France were both addressing opposite and irreconcilable demands to the Porte, and France was already talking of sending her fleet to the Dardanelles, while Russia was placing an army corps on active service and despatching Prince Menshikov on a special mission to Constantinople. So far the quarrel which had occurred at the Porte was obviously one in which Great Britain had no concern. The Aberdeen ministry, however, thought it desirable that it should be represented in the crisis by a strong man at Constantinople; and it selected Lord Stratford de Redcliffe for the post, which he had filled in former years with marked ability. Whatever merits Lord Stratford possessed—and he stands out in current diplomacy as the one strong man whom England had abroad—there was no doubt that he had this disqualification: the emperor Nicholas had refused some years before to receive him as ambassador at St Petersburg, and Lord Stratford had resented, and never forgiven, the discourtesy of this refusal. Lord Stratford soon discovered that Prince Menshikov was the bearer of larger demands, and that he was requiring the Porte to agree to a treaty acknowledging the right of Russia to protect the Greek Church throughout the Turkish dominions. By Lord Stratford's advice the Porte—while making the requisite concession respecting the holy places—refused to grant the new demand; and Prince Menshikov thereupon withdrew from Constantinople.

The rejection of Prince Menshikov's ultimatum was followed by momentous consequences. Russia—or rather her tsar—resolved on the occupation of the Danubian principalities; the British ministry—though the quarrel did not directly concern Great Britain—sent a fleet to the Dardanelles and placed it under Lord Stratford's orders. Diplomacy, however, made a fresh attempt to terminate the dispute, and in July 1853 a note was agreed upon by the four neutral powers, France, Great Britain, Austria and Prussia, which it was decided to present to Constantinople and St Petersburg. This note, the adoption of which would have ensured peace, was accepted at St Petersburg; at Constantinople it was, unfortunately, rejected, mainly on Lord Stratford's advice, and in opposition to his instructions from home. Instead, however, of insisting on the adoption of the note to which it had agreed, Lord Aberdeen's ministry recommended the tsar to accept some amendments to it suggested by Lord Stratford, which it was disposed to regard as unimportant. It then discovered, however, that the tsar attached a meaning to the original note differing from that which it had itself applied to it, and in conjunction with France it thereupon ceased to recommend the Vienna note—as it was called—for acceptance. This decision separated the two western powers from Austria and Prussia, who were disposed to think that Russia had done all that could have been required of her in accepting the note which the four powers had agreed upon.

It was obvious that the control of the situation was passing from the hands of the cabinet at home into those of Lord Stratford at Constantinople. The ambassador, in fact, had the great advantage that he knew his own mind; the cabinet laboured under the fatal disadvantage that it had, collectively, no mind. Its chief, Lord Aberdeen, was dominated by a desire to preserve peace; but he had not the requisite force to control the stronger men who were nominally serving under him. Lord John Russell was a little sore at his own treatment by his party. He thought that he had a claim to the first place in the ministry, and he did not, in consequence, give the full support to Lord Aberdeen which the latter had a right to expect from him. Lord Palmerston, on the other hand, had no personal grudge to nurture, but he was convinced that the first duty of England was to support Turkey and to resist Russia. He represented in the cabinet the views which Lord Stratford was enforcing at Constantinople, and step by step Lord Stratford, thus supported, drove the country nearer and nearer to war.

Crimean War.

In October the Porte, encouraged by the presence of the British fleet in the Bosporus, took the bold step of summoning the Russians to evacuate the principalities. Following up this demand the Turkish troops attacked the Russian army, and inflicted on it one or two sharp defeats. The Russians retaliated by loosing their squadron from Sevastopol, and on the 30th of November it attacked and destroyed the Turkish fleet at Sinope. The massacre of Sinope—as it was rather inaccurately called in Great Britain, for it is difficult to deny that it was a legitimate act of a belligerent power—created an almost irresistible demand for war among the British people. Yielding to popular opinion, the British ministry assented to a suggestion of the French emperor that the fleets of the allied powers should enter the Black Sea and "invite" every Russian vessel to return to Sevastopol. The decision was taken at an unfortunate hour. Diplomatists, pursuing their labours at Vienna, had succeeded in drawing up a fresh note which they thought might prove acceptable both at St Petersburg and at Constantinople. This note was presented almost at the moment the tsar learned that the French and British fleets had entered the Black Sea, and the Russian government, instead of considering it, withdrew its ministers from London and Paris; the French and British ambassadors were thereupon withdrawn from St Petersburg. An ultimatum was soon afterwards addressed to Russia requiring her to evacuate the principalities, and war began. In deciding on war the British government relied on the capacity of its fleet, which was entrusted to the command of Sir Charles Napier, to strike a great blow in the Baltic. The fleet was despatched with extraordinary rejoicings, and amidst loud and confident expressions of its certain triumph. As a matter of fact it did very little. In the south of Europe, however, the Turkish armies on the Danube, strengthened by the advice of British officers, were more successful. The Russians were forced to retire, and the principalities were evacuated. A prudent administration might possibly have succeeded in stopping the war at this point. But the temper of the country was by this time excited, and it was loudly demanding something more than a preliminary success. It was resolved to invade the Crimea and attack the great arsenal, Sevastopol, whence the Russian fleet had sailed to Sinope, and in September 1854 the allied armies landed in the Crimea. On the 20th the Russian army, strongly posted on the banks of the Alma, was completely defeated, and it is almost certain that, if the victory had been at once followed up, Sevastopol would have fallen. The commanders of the allied armies, however, hesitated to throw themselves against the forts erected to the north of the town, and decided on the hazardous task of marching round Sevastopol and attacking it from the south. The movement was successfully carried out, but the Allies again hesitated to attempt an immediate assault. The Russians, who were advised by Colonel Todleben, the only military man who attained a great reputation in the war, thus gained time to strengthen their position by earthworks; and the Allies found themselves forced, with scanty preparations, to undertake a regular siege against an enemy whose force was numerically superior to their own. In the early days of the siege, indeed, the allied armies were twice in great peril. A formidable attack on the 25th October on the British position at Balaklava led to a series of encounters which displayed the bravery of British troops, but did not enhance the reputation of British commanders. A still more formidable sortie on the 5th of November was with difficulty repulsed at Inkerman. And the Russians soon afterwards found, in the climate of the country, a powerful ally. The allied armies, imperfectly organized, and badly equipped for such a campaign, suffered severely from the hardships of a Crimean winter. The whole expedition seemed likely to melt away from want and disease.

Palmerston's ministry.

The terrible condition of the army, vividly described in the letters which the war correspondents of the newspapers sent home, aroused strong feelings of indignation in Great Britain. When parliament met Roebuck gave notice that he would move for a committee of inquiry. Lord John Russell—who had already vainly urged in the cabinet that the duke of Newcastle should be superseded, and the conduct of the war entrusted to a stronger minister— resigned office. His resignation was followed by the defeat of the government, and Lord Aberdeen, thus driven from power, was succeeded by Lord Palmerston. In selecting him for the post, the queen undoubtedly placed her seal on the wish of the country to carry out the war to the bitter end. But it so happened that the formation of a new ministry was accompanied by a fresh effort to make terms of peace. Before the change of administration a conference had been decided on, and Lord Palmerston entrusted its management to Lord John Russell. While the latter was on his way to Vienna an event occurred which seemed at first to facilitate his task. The tsar, worn out with disappointment, suddenly died, and was succeeded by his son Alexander. Unfortunately the conference failed, and the war went on for another year. In September 1855 the allied troops succeeded in obtaining possession of the southern side of Sevastopol, and the emperor of the French, satisfied with this partial success, or alarmed at the expense of the war, decided on withdrawing from the struggle. The attitude of Napoleon made the conclusion of peace only a question of time. In the beginning of 1856 a congress to discuss the terms was assembled at Paris; in February hostilities were suspended; and in April a treaty was concluded. The peace set back the boundaries of Russia from the Danube to the Pruth; it secured the free navigation of the first of these rivers; it opened the Black Sea to the commercial navies of the world, closing it to vessels of war, and forbidding the establishment of arsenals upon its shores. The last condition, to which Great Britain attached most importance, endured for about fourteen years. Peace without this provision could undoubtedly have been secured at Vienna, and the prolongation of the war from 1855 to 1856 only resulted in securing this arrangement for a little more than one decade.

The Crimean War left other legacies behind it. The British government had for some time regarded with anxiety the gradual encroachments of Russia in central Asia. Russian

Wars with Persia and China.

diplomacy was exerting an increasing influence in Persia, and the latter had always coveted the city of Herat, which was popularly regarded as the gate of India. In 1856 the Persian government, believing that England had her hands fully occupied in the Crimea, seized Herat, and, in consequence, a fresh war—in which a British army under Sir James Outram rapidly secured a victory—broke out. The campaign, entered upon when parliament was not in session, was unpopular in the country. A grave constitutional question, which was ultimately settled by legislation, was raised as to the right of the government to undertake military operations beyond the boundaries of India without the consent of parliament. But the incidents of the Persian war were soon forgotten in the presence of a still graver crisis; for in the following year, 1857, the country suddenly found itself involved in war with China, and face to face with one of the greatest dangers which it has ever encountered—the mutiny of the sepoy army in India. The Chinese war arose from the seizure by the Chinese authorities of a small vessel, the "Arrow" commanded by a British subject, and at one time holding a licence (which, however, had expired at the time of the seizure) from the British superintendent at Hongkong, and the detention of her crew on the charge of piracy. Sir John Bowring, who represented Great Britain in China, failing to secure the reparation and apology which he demanded, directed the British admiral to bombard Canton. Lord Palmerston's cabinet decided to approve and support Sir John Bowring's vigorous action. Cobden, however, brought forward a motion in the House of Commons condemning these high-handed proceedings. He succeeded in securing the co-operation of his own friends, of Lord John Russell, and of other independent Liberals, as well as of the Conservative party, and in inflicting a signal defeat on the government. Lord Palmerston at once appealed from the House to the country. The constituencies, imperfectly acquainted with the technical issues involved in the dispute, rallied to the minister, who was upholding British interests. Lord Palmerston obtained a decisive victory, and returned to power apparently in irresistible strength. Lord Elgin had already been sent to China with a considerable force to support the demand for redress. On his way thither he learned that the British in India were reduced to the last extremities by the mutiny of the native army in Bengal, and, on the application of Lord Canning, the governor-general, he decided on diverting the troops, intended to bring the Chinese to reason, to the more pressing duty of saving India for the British crown.

Indian mutiny.

During the years which had followed the accession of the queen, the territories and responsibilities of the East India Company had been considerably enlarged by the annexation of Sind by Lord Ellenborough, the conquest of the Punjab after two desperate military campaigns under Lord Dalhousie, the conquest of Pegu, and the annexation of Oudh. These great additions to the empire had naturally imposed an increased strain on the Indian troops, while the British garrison, instead of being augmented, had been depleted to meet the necessities of the Russian war. Several circumstances, moreover, tended to propagate disaffection in the Indian army. Indian troops operating outside the Company's dominions were granted increased allowances, but these were automatically reduced when conquest brought the provinces in which they were serving within the British pale. The Sepoys again had an ineradicable dislike to serve beyond the sea, and the invasion of Pegu necessitated their transport by water to the seat of war. Finally, the invention of a new rifle led to the introduction of a cartridge which, though it was officially denied at the moment, was in fact lubricated with a mixture of cow's fat and lard. The Sepoys thought that their caste would be destroyed if they touched the fat of the sacred cow or unclean pig; they were even persuaded that the British government wished to destroy their caste in order to facilitate their conversion to Christianity. Isolated mutinies in Bengal were succeeded by much more serious events at Cawnpore in Oudh, and at Meerut in the North-West Provinces. From Meerut the mutineers, after some acts of outrage and murder, moved on Delhi, the capital of the old Mogul empire, which became the headquarters of the mutiny. In Oudh the native regiments placed themselves under a Mahratta chief, Nana Sahib, by whose orders the British in Cawnpore, including the women and children, were foully murdered. In the summer of 1857 these events seemed to imperil British rule in India. In the autumn the courage of the troops and the arrival of reinforcements gradually restored the British cause. Delhi, after a memorable siege, was at last taken by a brilliant assault. Lucknow, where a small British garrison was besieged in the residency, was twice relieved, once temporarily by Sir James Outram and General Havelock, and afterwards permanently by Sir Colin Campbell, who had been sent out from England to take the chief command. Subsequent military operations broke up the remnants of the revolt, and in the beginning of 1858 the authority of the queen was restored throughout India. The mutiny, however, had impressed its lesson on the British people, and, as the first consequence, it was decided to transfer the government from the old East India Company to the crown. Lord Palmerston's administration was defeated on another issue before it succeeded in carrying the measure which it introduced for the purpose, though Lord Derby's second ministry, which succeeded it, was compelled to frame its proposals on somewhat similar lines. The home government of India was entrusted to a secretary of state, with a council to assist him; and though the numbers of the council have been reduced, the form of government which was then established has endured.

Orsini.

The cause which led to the second fall of Lord Palmerston was in one sense unexpected. Some Italian refugees living in London, of whom Orsini was the chief, formed a design to assassinate the emperor of the French. On the evening of 14th January 1858, while the emperor, accompanied by the empress, was driving to the opera, these men threw some bombs under his carriage. The brutal attempt happily failed. Neither the emperor nor the empress was injured by the explosion, but the carriage in which they were driving was wrecked, and a large number of persons who happened to be in the street at the time were either killed or wounded. This horrible outrage naturally created indignation in France, and it unfortunately became plain that the conspiracy had been hatched in England, and that the bombs had been manufactured in Birmingham. On these facts becoming known, Count Walewski, the chief of the French foreign office, who was united by ties of blood to the emperor, called on the British government to provide against the danger to which France was exposed. "Ought the right of asylum to protect such a state of things?" he asked. "Is hospitality due to assassins? Ought the British legislature to continue to favour their designs and their plans? And can it continue to shelter persons who by these flagrant acts place themselves beyond the pale of common rights?" Lord Clarendon, the head of the British foreign office, told the French ambassador, who read him this despatch, that "no consideration on earth would induce the British parliament to pass a measure for the extradition of political refugees," but he added that it was a question whether the law was as complete and as stringent as it should be, and he stated that the government had already referred the whole subject to the law officers of the crown for their consideration. Having made these remarks, however, he judged it wise to refrain from giving any formal reply to Count Walewski's despatch, and contented himself with privately communicating to the British ambassador in Paris the difficulties of the British government. After receiving the opinion of the law officers the cabinet decided to introduce a bill into parliament increasing in England the punishment for a conspiracy to commit a felony either within or without the United Kingdom. The first reading of this bill was passed by a considerable majority. But, before the bill came on for a second reading, the language which was being used in France created strong resentment in England. The regiments of the French army sent addresses to the emperor congratulating him on his escape and violently denouncing the British people. Some of these addresses, which were published in the *Moniteur*, spoke of London as "an assassins' den," and invited the emperor to give his troops the order to destroy it. Such language did not make it easier to alter the law in the manner desired by the government. The House of Commons, reflecting the spirit of the country, blamed Lord Clarendon for neglecting to answer Count Walewski's despatch, and blamed Lord Palmerston for introducing a bill at French dictation. The feeling was so strong that, when the Conspiracy Bill came on for a second reading, an amendment hostile to the government was carried, and Lord Palmerston at once resigned.

Lord Derby's second ministry.

For a second time Lord Derby undertook the difficult task of carrying on the work of government without the support of a majority of the House of Commons. If the Liberal party had been united his attempt would have failed immediately. In 1858, however, the Liberal party had no cohesion. The wave of popularity which had carried Lord Palmerston to victory in 1857 had lost its strength. The Radicals, who were slowly recovering the influence they had lost during the Crimean War, regarded even a Conservative government as preferable to his return to power, while many Liberals desired to entrust the fortunes of their party to the guidance of their former chief, Lord John Russell. It was obvious to most men that the dissensions thus visible in the Liberal ranks could be more easily healed in the cold shade of the opposition benches than in the warmer sunlight of office. And therefore, though no one had much confidence in Lord Derby, or in the stability of his second administration, every one was disposed to acquiesce in its temporary occupation of office.

Jews in parliament.

Ministries which exist by sufferance are necessarily compelled to adapt their measures to the wishes of those who permit them to continue in power. The second ministry of Lord Derby experienced the truth of this rule. For some years a controversy had been conducted in the legislature in reference to the admission of the Jews to parliament. This dispute had been raised in 1847 into a question of practical moment by the election of Baron Lionel Nathan Rothschild as representative of the City of London, and its importance had been emphasized in 1851 by the return of another Jew, Alderman Salomons, for another constituency. The Liberal party generally in the House of Commons was in favour of such a modification of the oaths as would enable the Jews so elected to take their seats. The bulk of the Conservative party, on the contrary, and the House of Lords, were strenuously opposed to the change. Early in 1858 the House of Commons, by an increased majority, passed a bill amending the oaths imposed by law on members of both Houses, and directing the omission of the words "on the true faith of a Christian" from the oath of abjuration when it was taken by a Jew. If the Conservatives had remained in opposition there can be little doubt that this bill would have shared the fate of its predecessors and have been rejected by the Lords. The lord chancellor, indeed, in speaking upon the clause relieving the Jews, expressed a hope that the peers would not hesitate to pronounce that our "Lord is king, be the people never so impatient." But some Conservative peers realized the inconvenience of maintaining a conflict between the two Houses when the Conservatives were in power; and Lord Lucan, who had commanded the cavalry in the Crimea, suggested as a compromise that either House should be authorized by resolution to determine the form of oath to be administered to its members. This solution was reluctantly accepted by Lord Derby, and Baron Rothschild was thus enabled to take the seat from which he had been so long excluded. Eight years afterwards parliament was induced to take a fresh step in advance. It imposed a new oath from which the words which disqualified the Jews were omitted. The door of the House of Lords was thus thrown open, and in 1885 Baron Nathan Mayer Rothschild, raised to the peerage, was enabled to take his seat in the upper chamber.

Reform Bill, 1859.

This question was not the only one on which a Conservative government, without a majority at its back, was compelled to make concessions. For some years past a growing disposition had been displayed among the more earnest Liberals to extend the provisions of the Reform Act of 1832. Lord John Russell's ministry had been defeated in 1851 on a proposal of Locke King to place £10 householders in counties on the same footing as regards the franchise as £10 householders in towns, and Lord John himself in 1854 had actually introduced a new Reform Bill. After the general election of 1857 the demand for reform increased, and, in accepting office in 1858, Lord Derby thought it necessary to declare that, though he had maintained in opposition that the settlement of 1832, with all its anomalies, afforded adequate representation to all classes, the promises of previous governments and the expectations of the people imposed on him the duty of bringing forward legislation on the subject. The scheme which Lord Derby's government adopted was peculiar. Its chief proposal was the extension of the county franchise to £10 householders. But it also proposed that persons possessing a 40s. freehold in a borough should in future have a vote in the borough in which their property was situated, and not in the county. The bill also conferred the franchise on holders of a certain amount of stock, on depositors in savings banks, on graduates of universities, and on other persons qualified by position or education. The defect of the bill was that it did nothing to meet the only real need of reform—the enfranchisement of a certain proportion of the working classes. On the contrary, in this respect it perpetuated the settlement of 1832. The £10 householder was still to furnish the bulk of the electorate, and the ordinary working man could not afford to pay £10 a year for his house. While the larger proposals of the bill were thus open to grave objection, its subsidiary features provoked ridicule. The suggestions that votes should be conferred on graduates and stockholders were laughed at as "fancy franchises." The bill, moreover, was not brought forward with the authority of a united cabinet. Two members of the government—Spencer Walpole and Henley—declined to be responsible for its provisions, and placed their resignations in Lord Derby's hands. In Walpole's judgment the bill was objectionable because it afforded no reasonable basis for a stable settlement. There was nothing in a £10 franchise which was capable of permanent defence, and if it was at once applied to counties as well as boroughs it would sooner or later be certain to be extended. He himself advocated with some force that it would be wiser and more popular to fix the county franchise at £20 and the borough franchise at £6 rateable value; and he contended that such a settlement could be defended on the old principle that taxation and representation should go together, for £20 was the minimum rent at which the house tax commenced, and a rateable value of £6 was the point at which the householder could not compound to pay his rates through his landlord. Weakened by the defection of two of its more important members, the government had little chance of obtaining the acceptance of its scheme. An amendment by Lord John Russell, condemning its main provisions, was adopted in an unusually full house by a substantial majority, and the cabinet had no alternative but to resign or dissolve. It chose the latter course. The general election, which almost immediately took place, increased to some extent the strength of the Conservative party. For the first time since their secession from Sir Robert Peel the Conservatives commanded more than three hundred votes in the House of Commons, but this increased strength was not sufficient to ensure them a majority. When the new parliament assembled, Lord Hartington, the eldest son of the duke of Devonshire, was put forward to propose a direct vote of want of confidence in the administration. It was carried by 323 votes to 310, and the second Derby administration came to an end.

Palmerston's second ministry.

It was plain that the House of Commons had withdrawn its support from Lord Derby, but it was not clear that any other leading politician would be able to form a government. The jealousies between Lord John Russell and Lord Palmerston still existed; the more extreme men, who were identified with the policy of Cobden and Bright, had little confidence in either of these statesmen; and it was still uncertain whether the able group who had been the friends of Sir Robert Peel would finally gravitate to the Conservative or to the Liberal camp. The queen, on the advice of Lord Derby, endeavoured to solve the first of these difficulties by sending for Lord Granville, who led the Liberal party in the Lords, and authorizing him to form a government which should combine, as far as possible, all the more prominent Liberals. The attempt, however, failed, and the queen thereupon fell back upon Lord Palmerston. Lord John Russell agreed to accept office as foreign minister; Gladstone consented to take the chancellorship of the exchequer. Cobden was offered, but declined, the presidency of the Board of Trade; and the post which he refused was conferred on a prominent free trader, who had associated himself with Cobden's fortunes, Milner Gibson. Thus Lord Palmerston had succeeded in combining in one ministry the various representatives of political progress. He had secured the support of the Peelites, who had left him after the fall of Lord Aberdeen in 1855, and of the free traders, who had done so much to defeat him in 1857 and 1858. His new administration was accordingly based on a broader bottom, and contained greater elements of strength than his former cabinet. And the country was requiring more stable government. The first three ministries of the queen had endured from the spring of 1835 to the spring of 1852, or for very nearly seventeen years; but the next seven years had seen the formation and dissolution of no less than four cabinets. It was felt that these frequent changes were unfortunate for the country, and every one was glad to welcome the advent of a government which seemed to promise greater permanence. That promise was fulfilled. The administration which Lord Palmerston succeeded in forming in 1859 endured till his death in 1865, and with slight modifications, under its second chief Lord John (afterwards Earl) Russell, till the summer of 1866. It had thus a longer life than any cabinet which had governed England since the first Reform Act. But it owed its lasting character to the benevolence of its opponents rather than to the enthusiasm of its supporters. The Conservatives learned to regard the veteran statesman, who had combined all sections of Liberals under his banner, as the most powerful champion of Conservative principles; a virtual truce of parties was established during his continuance in office; and, for the most part of his ministry, a tacit understanding existed that the minister, on his side, should pursue a Conservative policy, and that the Conservatives, on theirs, should abstain from any real attempt to oust him from power. Lord John Russell, indeed, was too earnest in his desire for reform to abstain from one serious effort to accomplish it. Early in 1860 he proposed, with the sanction of the cabinet, a measure providing for the extension of the county franchise to £10 householders, of the borough franchise to £6 householders, and for a moderate redistribution of seats. But the country, being in enjoyment of considerable prosperity, paid only a languid attention to the scheme; its indifference was reflected in the House; the Conservatives were encouraged in their opposition by the lack of interest which the new bill excited, and the almost unconcealed dislike of the prime minister to its provisions. The bill, thus steadily opposed and half-heartedly supported, made only slow progress; and at last it was withdrawn by its author. He did not again attempt during Lord Palmerston's life to reintroduce the subject. Absorbed in the work of the foreign office, which at this time was abnormally active, he refrained from pressing home the arguments for internal reform.

Gladstone's budgets.

In one important department, however, the ministry departed from the Conservative policy it pursued in other matters. Gladstone signalized his return to the exchequer by introducing a series of budgets which excited keen opposition at the time, but in the result largely added to the prosperity of the country. The first of these great budgets, in 1860, was partly inspired by the necessity of adapting the fiscal system to meet the requirements of a commercial treaty which, mainly through Cobden's exertions, had been concluded with the emperor of the French. The treaty bound France to reduce her duties on English coal and iron, and on many manufactured articles; while, in return, Great Britain undertook to sweep away the duties on all manufactured goods, and largely to reduce those on French wines. But Gladstone was not content with these great alterations, which involved a loss of nearly £1,200,000 a year to the exchequer; he voluntarily undertook to sacrifice another million on what he called a supplemental measure of customs reform. He proposed to repeal the duties on paper, by which means he hoped to increase the opportunities of providing cheap literature for the people. The budget of 1860 produced a protracted controversy. The French treaty excited more criticism than enthusiasm on both sides of the Channel. In France the manufacturers complained that they would be unable to stand against the competition of English goods. In England many people thought that Great Britain was wasting her resources and risking her supremacy by giving the French increased facilities for taking her iron, coal and machinery, and that no adequate advantage could result from the greater consumption of cheap claret. But the criticism which the French treaty aroused was drowned in the clamour which was created by the proposed repeal of the paper duties. The manufacture of paper was declared to be a struggling industry, which would be destroyed by the withdrawal of protection. The dissemination of cheap literature and the multiplication of cheap newspapers could not compensate the nation for the ruin of an important trade. If money could be spared, moreover, for the remission of taxation, the paper duties were much less oppressive than those on some other articles. The tax on tea, for example, which had been raised during the late war to no less than 1s. 5d. a ℔, was much more injurious; and it would be far wiser—so it was contended—to reduce the duty on tea than to abandon the duties on paper. Notwithstanding the opposition which the Paper Duties Bill undoubtedly excited, the proposal was carried in the Commons; it was, however, thrown out in the Lords, and its rejection led to a crisis which seemed at one time to threaten the good relations between the two houses of parliament. It was argued that if the Lords had the right to reject a measure remitting existing duties, they had in effect the right of imposing taxation, since there was no material difference between the adoption of a new tax and the continuance of an old one which the Commons had determined to repeal. Lord Palmerston, however, with some tact postponed the controversy for the time by obtaining the appointment of a committee to search for precedents; and, after the report of the committee, he moved a series of resolutions affirming the right of the Commons to grant aids and supplies as their exclusive privilege, stating that the occasional rejection of financial measures by the Lords had always been regarded with peculiar jealousy, but declaring that the Commons had the remedy in their own hands by so framing bills of supply as to secure their acceptance. In accordance with this suggestion the Commons in the following year again resolved to repeal the paper duties; but, instead of embodying their decision in a separate bill, they included it in the same measure which dealt with all the financial arrangements of the year, and thus threw on the Lords the responsibility of either accepting the proposal, or of paralysing the whole machinery of administration by depriving the crown of the supplies which were required for the public services. The Lords were not prepared to risk this result, and they accordingly accepted a reform which they could no longer resist, and the bill became law. In order to enable him to accomplish these great changes, Gladstone temporarily raised the income tax, which he found at 9d. in the £, to 10d. But the result of his reforms was so marked that he was speedily able to reduce it. The revenue increased by leaps and bounds, and the income tax was gradually reduced till it stood at 4d. in the closing years of the administration. During the same period the duty on tea was reduced from 1s. 5d. to 6d. a ℔; and the national debt was diminished from rather more than £800,000,000 to rather less than £780,000,000, the charge for the debt declining, mainly through the falling in of the long annuities, by some £2,600,000 a year. With the possible exception of Sir Robert Peel's term of office, no previous period of British history had been memorable for a series of more remarkable financial reforms. Their success redeemed the character of the administration. The

Paper duties repealed.

Liberals, who complained that their leaders were pursuing a Conservative policy, could at least console themselves by the reflection that the chancellor of the exchequer was introducing satisfactory budgets. The language, moreover, which Gladstone was holding on other subjects encouraged the more advanced Liberals to expect that he would ultimately place himself at the head of the party of progress. This expectation was the more remarkable because Gladstone was the representative in the cabinet of the old Conservative party which Sir Robert Peel had led to victory. As lately as 1858 he had reluctantly refused to serve under Lord Derby; he was still a member of the Carlton Club; he sat for the university of Oxford; and on many questions he displayed a constant sympathy with Conservative traditions. Yet, on all the chief domestic questions which came before parliament in Lord Palmerston's second administration, Gladstone almost invariably took a more Liberal view than his chief. It was understood, indeed, that the relations between the two men were not always harmonious; that Lord Palmerston disapproved the resolute conduct of Gladstone, and that Gladstone deplored the Conservative tendencies of Lord Palmerston. It was believed that Gladstone on more than one occasion desired to escape from a position which he disliked by resigning office, and that the resignation was only averted through a consciousness that the ministry could not afford to lose its most eloquent member.

While on domestic matters, other than those affecting finance, the Liberal ministry was pursuing a Conservative policy, its members were actively engaged on, and the attention of the public was keenly directed to, affairs abroad. For the period was one of foreign unrest, and the wars which were then waged have left an enduring mark on the map of the world, and have affected the position of the Anglo-Saxon race for all time. In the far East, the operations which it had been decided to undertake in China were necessarily postponed on account of the diversion of the forces, intended to exact redress at Peking, to the suppression of mutiny in India. It was only late in 1858 that Lord Elgin and Baron Gros, the French plenipotentiary (for France joined England in securing simultaneous redress of grievances of her own), were enabled to obtain suitable reparation. It was arranged that the treaty, which was then provisionally concluded at Tientsin, should be ratified at Peking in the following year; and in June 1859 Mr (afterwards Sir Frederick) Bruce, Lord Elgin's brother, who had been appointed plenipotentiary, attempted to proceed up the Peiho with the object of securing its ratification. The allied squadron, however, was stopped by the forts at the mouth of the Peiho, which fired on the vessels; a landing party, which was disembarked to storm the forts, met with a disastrous check, and the squadron had to retire with an acknowledged loss of three gunboats and 400 men. This reverse necessitated fresh operations, and in 1860 Lord Elgin and Baron Gros were directed to return to China, and, at the head of an adequate force, were instructed to exact an apology for the attack on the allied fleets, the ratification and execution of the treaty of Tientsin, and the payment of an indemnity for the expenses of the war. The weakness of the Chinese empire was not appreciated at that time; the unfortunate incident on the Peiho in the previous summer had created an exaggerated impression of the strength of the Chinese arms, and some natural anxiety was felt for the success of the expedition. But the allied armies met with no serious resistance. The Chinese, indeed, endeavoured to delay their progress by negotiation rather than by force; and they succeeded in treacherously arresting some distinguished persons who had been sent into the Chinese lines to negotiate. But by the middle of October the Chinese army was decisively defeated; Peking was occupied; those British and French prisoners who had not succumbed to the hardships of their confinement were liberated. Lord Elgin determined on teaching the rulers of China a lesson by the destruction of the summer palace; and the Chinese government was compelled to submit to the terms of the Allies, and to ratify the treaty of Tientsin. There is no doubt that these operations helped to open the Chinese markets to British trade; but incidentally, by regulating the emigration of Chinese coolies, they had the unforeseen effect of exposing the industrial markets of the world to the serious competition of "cheap yellow" labour. A distinguished foreign statesman observed that Lord Palmerston had made a mistake. He thought that he had opened China to Europe; instead, he had let out the Chinese. It was perhaps a happier result of the war that it tended to the continuance of the Anglo-French alliance. French and British troops had again co-operated in a joint enterprise, and had shared the dangers and successes of a campaign.

China war, 1859-60.

Unification of Italy.

War was not confined to China. In the beginning of 1859 diplomatists were alarmed at the language addressed by the emperor of the French to the Austrian ambassador at Paris, which seemed to breathe the menace of a rupture. Notwithstanding the exertions which Great Britain made to avert hostilities, the provocation of Count Cavour induced Austria to declare war against Piedmont, and Napoleon thereupon moved to the support of his ally, promising to free Italy from the Alps to the Adriatic. As a matter of fact, the attitude of northern Germany, which was massing troops on the Rhine, and the defenceless condition of France, which was drained of soldiers for the Italian campaign, induced the emperor to halt before he had carried out his purpose, and terms of peace were hastily concerted at Villafranca, and were afterwards confirmed at Zurich, by which Lombardy was given to Piedmont, while Austria was left in possession of Venice and the Quadrilateral, and central Italy was restored to its former rulers. The refusal of the Italians to take back the Austrian grand dukes made the execution of these arrangements impracticable. Napoleon, indeed, used his influence to carry them into effect; but Lord John Russell, who was now in charge of the British foreign office, and who had Lord Palmerston and Gladstone on his side in the cabinet, gave a vigorous support to the claim of the Italians that their country should be allowed to regulate her own affairs. The French emperor had ultimately to yield to the determination of the inhabitants of central Italy, when it was backed by the arguments of the British foreign office, and Tuscany, Modena, Parma, as well as a portion of the states of the Church, were united to Piedmont. There was no doubt that through the whole of the negotiations the Italians were largely indebted to the labours of Lord John Russell. They recognized that they owed more to the moral support of England than to the armed assistance of France. The French emperor, moreover, took a step which lost him the sympathy of many Italians. Before the war he had arranged with Count Cavour that France should receive, as the price of her aid, the duchy of Savoy and the county of Nice. After Villafranca, the emperor, frankly recognizing that he had only half kept his promise, consented to waive his claim to these provinces. But, when he found himself unable to resist the annexation of central Italy to Piedmont, he reverted to the old arrangement. The formation of a strong Piedmontese kingdom, with the spoliation of the papal dominion, was unpopular in France; and he thought—perhaps naturally—that he must have something to show his people in return for sacrifices which had cost him the lives of 50,000 French soldiers, and concessions which the whole Catholic party in France resented. Count Cavour consented to pay the price which Napoleon thus exacted, and the frontier of France was accordingly extended to the Alps. But it is very doubtful whether Napoleon did not lose more than he gained by this addition to his territory. It certainly cost him the active friendship of Great Britain. The Anglo-French alliance had been already strained by the language of the French colonels in 1858 and the Franco-Austrian War of 1859; it never fully recovered from the shock which it received by the evidence, which the annexation of Savoy and Nice gave, of the ambition of the French emperor. The British people gave way to what Cobden called the last of the three panics. Lord Palmerston proposed and carried the provision of a large sum of money for the fortification of the coasts; and the volunteer movement, which had its origin in 1859, received a remarkable stimulus in 1860. In this year the course of events in Italy emphasized the differences between the policy of Great Britain and that of France. Garibaldi, with a thousand followers, made his famous descent on the coast of Sicily. After making himself master of that island, he crossed over to the mainland, drove the king of Naples out of his capital, and forced him to take refuge in Gaeta. In France these events were regarded with dismay. The emperor wished to stop Garibaldi's passage across the strait, and stationed his fleet at Gaeta to protect the king of Naples. Lord John Russell, on the contrary, welcomed Garibaldi's success with enthusiasm. He declined to intervene in the affairs of Italy by confining the great liberator to Sicily; he protested against the presence of the French fleet at Gaeta; and when other foreign nations denounced the conduct of Piedmont, he defended it by quoting Vattel and citing the example of William III. When, finally, Italian troops entered the dominions of the pope, France withdrew her ambassador from the court of Turin, and England under Lord John Russell's advice at once recognized the new kingdom of Italy.

Schleswig-Holstein question.

In these great events—for the union of Italy was the greatest fact which had been accomplished in Europe since the fall of the first Napoleon—the British ministry had undoubtedly acquired credit. It was everywhere felt that the new kingdom owed much to the moral support which had been steadily and consistently given to it by Great Britain. Soon afterwards, however, in the autumn of 1863, the death of the king of Denmark led to a new revolution in the north of Europe, in which Lord Palmerston's government displayed less resolution, and lost much of the prestige which it had acquired by its Italian policy. The duchies of Schleswig and Holstein had been for centuries united to the kingdom of Denmark by the golden link of the crown; in other respects they had been organically kept distinct, while one of them—Holstein—was a member of the German confederation. The succession to the crown of Denmark, however, was different from that in the duchies. In Denmark the crown could descend, as it descends in Great Britain, through females. In the duchies the descent was confined to the male line; and, as Frederick VII., who ascended the Danish throne in 1848, had no direct issue, the next heir to the crown of Denmark under this rule was Prince Christian of Glücksburg, afterwards king; the next heir to the duchies being the duke of Augustenburg. In 1850 an arrangement had been made to prevent the separation of the duchies from the kingdom. As a result of a conference held in London, the duke of Augustenburg was induced to renounce his claim on the receipt of a large sum of money. Most of the great powers of Europe were parties to this plan. But the German confederation was not represented at the conference, and was not therefore committed to its conclusions. During the reign of Frederick VII. the Danish government endeavoured to cement the alliance between the duchies and the kingdom, and specially to separate the interests of Schleswig, which was largely Danish in its sympathies, from those of Holstein, which was almost exclusively German. With this object, in the last year of his life, Frederick VII. granted Holstein autonomous institutions, and bound Schleswig more closely to the Danish monarchy. The new king Christian IX. confirmed this arrangement. The German diet at Frankfort at once protested against it. Following up words with acts, it decided on occupying Holstein, and it delegated the duty of carrying out its order to Hanover and Saxony. While this federal execution was taking place, the duke of Augustenburg—regardless of the arrangements to which he had consented—delegated his rights in the duchies to his son, who formally claimed the succession. So far the situation, which was serious enough, had been largely dependent on the action of Germany. In the closing days of 1863 it passed mainly into the control of the two chief German powers. In Prussia Bismarck had lately become prime minister, and was animated by ambitious projects for his country's aggrandizement. Austria, afraid of losing her influence in Germany, followed the lead of Prussia, and the two powers required Denmark to cancel the arrangements which Frederick VII. had made, and which Christian IX. had confirmed, threatening in case of refusal to follow up the occupation of Holstein by that of Schleswig. As the Danes gave only a provisional assent to the demand, Prussian and Austrian troops entered Schleswig. These events created much excitement in England. The great majority of the British people, who imperfectly understood the merits of the case, were unanimous in their desire to support Denmark by arms. Their wish had been accentuated by the circumstance that the marriage in the previous spring of the prince of Wales to the daughter of the new king of Denmark had given them an almost personal interest in the struggle. Lord Palmerston had publicly expressed the views of the people by declaring that, if Denmark were attacked, her assailants would not have to deal with Denmark alone. The language of the public press and of Englishmen visiting Denmark confirmed the impression which the words of the prime minister had produced; and there is unfortunately no doubt that Denmark was encouraged to resist her powerful opponents by the belief, which she was thus almost authorized in entertaining, that she could reckon in the hour of her danger on the active assistance of the United Kingdom. If Lord Palmerston had been supported by his cabinet, or if he had been a younger man, he might possibly, in 1864, have made good the words which he had rashly uttered in 1863. But the queen, who, it is fair to add, understood the movement which was tending to German unity much better than most of her advisers, was averse from war. A large section of the cabinet shared the queen's hesitation, and Lord Palmerston—with the weight of nearly eighty summers upon him—was not strong enough to enforce his will against both his sovereign and his colleagues. He made some attempt to ascertain whether the emperor of the French would support him if he went to war. But he found that the emperor had not much fancy for a struggle which would have restored Holstein to Denmark; and that, if he went to war at all, his chief object would be the liberation of Venice and the rectification of his own frontiers. Even Lord Palmerston shrank from entering on a campaign which would have involved all Europe in conflagration and would have unsettled the boundaries of most continental nations; and the British government endeavoured thenceforward to stop hostilities by referring the question immediately in dispute to a conference in London. The labours of the conference proved abortive. Its members were unable to agree upon any methods of settlements, and the war went on. Denmark, naturally unable to grapple with her powerful antagonists, was forced to yield, and the two duchies which were the subject of dispute were taken from her.

The full consequences of this struggle were not visible at the time. It was impossible to foresee that it was the first step which was to carry Prussia forward, under her ambitious minister, to a position of acknowledged supremacy on the continent. But the results to Great Britain were plain enough. She had been mighty in words and weak in deeds. It was no doubt open to her to contend, as perhaps most wise people consider, that the cause of Denmark was not of sufficient importance to justify her in going to war. But it was not open to her to encourage a weak power to resist and then desert her in the hour of her necessity. Lord Palmerston should not have used the language which he employed in 1863 if he had not decided that his brave words would be followed by brave action. His conduct lowered the prestige of Great Britain at least as much as his Italian policy had raised it. Continental statesmen thenceforward assumed that Great Britain, however much she might protest, would not resort to arms, and the influence of England suffered, as it was bound to suffer, in consequence.

American civil war.

Meanwhile, in this period of warfare, another struggle was being fought out on a still greater scale in North America. The election of Abraham Lincoln to the presidency of the United States emphasized the fact that the majority of the inhabitants of the Northern States were opposed to the further spread of slavery; and, in the beginning of 1861, several of the Southern States formally seceded from the union. A steamer sent by the Federal government with reinforcements to Fort Sumter was fired upon, and both parties made preparations for the civil war which was apparently inevitable. On the one side the Confederate States—as the seceding states were called—were animated by a resolution to protect their property. On the other side the "conscience" of the North was excited by a passionate desire to wipe out the blot of slavery. Thus both parties were affected by some of the most powerful considerations which can influence mankind, while the North were further actuated by the natural incentive to preserve the union, which was threatened with disruption. The progress of the great struggle was watched with painful attention in England. The most important manufacturing interest in England was paralysed by the loss of the raw cotton, which was obtained almost exclusively from the United States, and tens of thousands of workpeople were thrown out of employment. The distress which resulted naturally created a strong feeling in favour of intervention, which might terminate the war and open the Southern ports to British commerce; and the initial successes which the Confederates secured seemed to afford some justification for such a proceeding. In the course of 1862 indeed, when the Confederate armies had secured many victories, Gladstone, speaking at Newcastle, used the famous expression that President Jefferson Davis had "made a nation"; and Lord Palmerston's language in the House of Commons—while opposing a motion for the recognition of the South—induced the impression that his thoughts were tending in the same direction as Mr Gladstone's. The emperor Napoleon, in July of the same year, confidentially asked the British minister whether the moment had not come for recognizing the South; and in the following September Lord Palmerston was himself disposed in concert with France to offer to mediate on the basis of separation. Soon afterwards, however, the growing exhaustion of the South improved the prospects of the Northern States: an increasing number of persons in Great Britain objected to interfere in the interests of slavery; and the combatants were allowed to fight out their quarrel without the interference of Europe.

The "Trent" incident.

At the beginning of the war, Lord John Russell (who was made a peer as Earl Russell in 1861) acknowledged the Southern States as belligerents. His decision caused some ill-feeling at Washington; but it was inevitable. For the North had proclaimed a blockade of the Southern ports; and it would have been both inconvenient and unfair if Lord Russell had decided to recognize the blockade and had refused to acknowledge the belligerent rights of the Southern States. Lord Russell's decision, however, seemed to indicate some latent sympathy for the Southern cause; and the irritation which was felt in the North was increased by the news that the Southern States were accrediting two gentlemen to represent them at Paris and at London. These emissaries, Messrs Mason and Slidell, succeeded in running the blockade and in reaching Cuba, where they embarked on the "Trent," a British mail steamer sailing for England. On her passage home the "Trent" was stopped by the Federal steamer "San Jacinto"; she was boarded, and Messrs Mason and Slidell were arrested. There was no doubt that the captain of the "San Jacinto" had acted irregularly. While he had the right to stop the "Trent," examine the mails, and, if he found despatches for the enemy among them, carry the vessel into an American port for adjudication, he had no authority to board the vessel and arrest two of her passengers. "The British government," to use its own language, "could not allow such an affront to the national honour to pass without due reparation." They decided on sending what practically amounted to an ultimatum to the Federal government, calling upon it to liberate the prisoners and to make a suitable apology. The presentation of this ultimatum, which was accompanied by the despatch of troops to Canada, was very nearly provoking war with the United States. If, indeed, the ultimatum had been presented in the form in which it was originally framed, war might have ensued. But at the prince consort's suggestion its language was considerably modified, and the responsibility for the outrage was thrown on the officer who committed it, and not on the government of the Republic. It ought not to be forgotten that this important modification was the last service rendered to his adopted country by the prince consort before his fatal illness. He died before the answer to the despatch was received; and his death deprived the queen of an adviser who had stood by her side since the earlier days of her reign, and who, by his prudence and conduct, had done much to raise the tone of the court and the influence of the crown. Happily for the future of the world, the government of the United States felt itself able to accept the despatch which had been thus addressed to it, and to give the reparation which was demanded; and the danger of war between the two great branches of the Anglo-Saxon race was averted. But, in the following summer, a new event excited fresh animosities, and aroused a controversy which endured for the best part of ten years.

The "Alabama."

The Confederates, naturally anxious to harass the commerce of their enemies, endeavoured from the commencement of hostilities to purchase armed cruisers from builders of neutral nations. In June 1862 the American minister in London drew Lord Russell's attention to the fact that a vessel, lately launched at Messrs Laird's yard at Birkenhead, was obviously intended to be employed as a Confederate cruiser. The solicitor to the commissioners of customs, however, considered that no facts had been revealed to authorize the detention of the vessel, and this opinion was reported in July to the American minister, Charles Francis Adams. He thereupon supplied the government with additional facts, and at the same time furnished them with the opinion of an eminent English lawyer, R. P. Collier (afterwards Lord Monkswell), to the effect that "it would be difficult to make out a stronger case of infringement of the Foreign Enlistment Act, which if not enforced on this occasion is little better than a dead letter." These facts and this opinion were at once sent to the law officers. They reached the queen's advocate on Saturday the 26th of July; but, by an unfortunate mischance, the queen's advocate had just been wholly incapacitated by a distressing illness; and the papers, in consequence, did not reach the attorney- and solicitor-general till the evening of the following Monday, when they at once advised the government to detain the vessel. Lord Russell thereupon sent orders to Liverpool for her detention. In the meanwhile the vessel—probably aware of the necessity for haste—had put to sea, and had commenced the career which made her famous as the "Alabama." Ministers might even then have taken steps to stop the vessel by directing her detention in any British port to which she resorted for supplies. The cabinet, however, shrank from this course. The "Alabama" was allowed to prey on Federal commerce, and undoubtedly inflicted a vast amount of injury on the trade of the United States. In the autumn of 1862 Adams demanded redress for the injuries which had thus been sustained, and this demand was repeated for many years in stronger and stronger language. At last, in 1871, long after Lord Palmerston's death and Lord Russell's retirement, a joint commission was appointed to examine into the many cases of dispute which had arisen between the United States and Great Britain. The commissioners agreed upon three rules by which they thought neutrals should in future be bound, and recommended that they should be given a retrospective effect. They decided also that the claims which had arisen out of the depredations of the "Alabama" should be referred to arbitration. In the course of 1872 the arbitrators met at Geneva. Their finding was adverse to Great Britain, which was condemned to pay a large sum of money—more than £3,000,000—as compensation. A period of exceptional prosperity, which largely increased the revenue, enabled a chancellor of the exchequer to boast that the country had drunk itself out of the "Alabama" difficulty.

Lord Russell's second ministry.

In October 1865 Lord Palmerston's rule, which had been characterized by six years of political inaction at home and by constant disturbance abroad, was terminated by his death. The ministry, which had suffered many losses from death during its duration, was temporarily reconstructed under Lord Russell; and the new minister at once decided to put an end to the period of internal stagnation, which had lasted so long, by the introduction of a new Reform Bill. Accordingly, in March 1866 Gladstone, who now led the House of Commons, introduced a measure which proposed to extend the county franchise to £14 and the borough franchise to £7 householders. The bill did not create much enthusiasm among Liberals, and it was naturally opposed by the Conservatives, who were reinforced by a large section of moderate Liberals, nicknamed, in consequence of a phrase in one of Bright's speeches, Adullamites. After many debates, in which the Commons showed little disposition to give the ministry any effective support, an amendment was carried by Lord Dunkellin, the eldest son of Lord Clanricarde, basing the borough franchise on rating instead of rental. The cabinet, recognizing from the division that the control of the House had passed out of its hands, resigned office, and the queen was compelled to entrust Lord Derby with the task of forming a new administration.

Lord Derby's third ministry.

For the third time in his career Lord Derby undertook the formidable task of conducting the government of the country with only a minority of the House of Commons to support him. The moment at which he made this third attempt was one of unusual anxiety. Abroad, the almost simultaneous outbreak of war between Prussia and Austria was destined to affect the whole aspect of continental politics. At home, a terrible murrain had fallen on the cattle, inflicting ruin on the agricultural interest; a grave commercial crisis was creating alarm in the city of London, and, in its consequences, injuring the interests of labour; while the working classes, at last roused from their long indifference, and angry at the rejection of Lord Russell's bill, were assembling in their tens of thousands to demand reform. The cabinet determined to prohibit a meeting which the Reform League decided to hold in Hyde Park on the 23rd of July, and closed the gates of the park on the people. But the mob, converging on the park in thousands, surged round the railings, which a little inquiry might have shown were too weak to resist any real pressure. Either accidentally or intentionally, the railings were overturned in one place, and the people, perceiving their opportunity, at once threw them down round the whole circuit of the park. Few acts in Queen Victoria's reign were attended with greater consequences. For the riot in Hyde Park led almost directly to a new Reform Act, and to the transfer of power from the middle classes to the masses of the people.

Reform, 1867.

Yet, though the new government found it necessary to introduce a Reform Bill, a wide difference of opinion existed in the cabinet as to the form which the measure should take. Several of its members were in favour of assimilating the borough franchise to that in force in municipal elections, and practically conferring a vote on every householder who had three years' residence in the constituency. General Peel, however—Sir Robert Peel's brother—who held the seals of the war office, objected to this extension; and the cabinet ultimately decided on evading the difficulty by bringing forward a series of resolutions on which a scheme of reform might ultimately be based. Their success in 1858, in dealing with the government of India in this way, commended the decision to the acceptance of the cabinet. But it was soon apparent that the House of Commons required a definite scheme, and that it would not seriously consider a set of abstract resolutions which committed no one to any distinct plan. Hence on the 23rd of February 1867 the cabinet decided on withdrawing its resolutions and reverting to its original bill. On the following day Lord Cranborne—better known afterwards as Lord Salisbury—discovered that the bill had more democratic tendencies than he had originally supposed, and refused to be a party to it. On Monday, the 25th, the cabinet again met to consider the new difficulty which had thus arisen; and it decided (as was said afterwards by Sir John Pakington) in ten minutes to substitute for the scheme a mild measure extending the borough franchise to houses rated at £6 a year, and conferring the county franchise on £20 householders. The bill, it was soon obvious, would be acceptable to no one; and the government again fell back on its original proposal. Three members of the cabinet, however, Lord Cranborne, Lord Carnarvon and General Peel, refused to be parties to the measure, and resigned office, the government being necessarily weakened by these defections. In the large scheme which the cabinet had now adopted, the borough franchise was conferred on all householders rated to the relief of the poor, who had for two years occupied the houses which gave them the qualification; the county franchise was given to the occupiers of all houses rated at £15 a year or upwards. But it was proposed that these extensions should be accompanied by an educational franchise, and a franchise conferred on persons who had paid twenty shillings in assessed taxes or income tax; the tax-payers who had gained a vote in this way being given a second vote in respect of the property which they occupied. In the course of the discussion on the bill in the House of Commons, the securities on which its authors had relied to enable them to stem the tide of democracy were, chiefly through Gladstone's exertions, swept away. The dual vote was abandoned, direct payment of rates was surrendered, the county franchise was extended to £12 householders, and the redistribution of seats was largely increased. The bill, in the shape in which it had been introduced, had been surrounded with safeguards to property. With their loss it involved a great radical change, which placed the working classes of the country in the position of predominance which the middle classes had occupied since 1832.

Disraeli prime minister.

The passage of the bill necessitated a dissolution of parliament; but it had to be postponed to enable parliament to supplement the English Reform Act of 1867 with measures applicable to Scotland and Ireland, and to give time for settling the boundaries of the new constituencies which had been created. This delay gave the Conservatives another year of office. But the first place in the cabinet passed in 1868 from Lord Derby to his lieutenant, Disraeli. The change added interest to political life. Thenceforward, for the next thirteen years, the chief places in the two great parties in the state were filled by the two men, Gladstone and Disraeli, who were unquestionably the ablest representatives of their respective followers. But the situation was also remarkable because power thus definitely passed from men who, without exception, had been born in the 18th century, and had all held cabinet offices before 1832, to men who had been born in the 19th century, and had only risen to cabinet rank in the 'forties and the 'fifties. It was also interesting to reflect that Gladstone had begun life as a Conservative, and had only gradually moved to the ranks of the Liberal party; while Disraeli had fought his first election under the auspices of O'Connell and Hume, had won his spurs by his attacks on Sir Robert Peel, and had been only reluctantly adopted by the Conservatives as their leader in the House of Commons.

Irish Church.

The struggle commenced in 1868 on an Irish question. During the previous years considerable attention had been paid to a secret conspiracy in Ireland and among the Irish in America. The Fenians, as they were called, actually attempted insurrection in Ireland, and an invasion of Canada from the United States. At the beginning of 1866 Lord Russell's government thought itself compelled to suspend the Habeas Corpus Act in Ireland; and in 1867 Lord Derby's government was confronted in the spring by a plot to seize Chester Castle, and in the autumn by an attack on a prison van at Manchester containing Fenian prisoners, and by an atrocious attempt to blow up Clerkenwell prison. Conservative politicians deduced from these circumstances the necessity of applying firm government to Ireland. Liberal statesmen, on the contrary, desired to extirpate rebellion by remedying the grievances of which Ireland still complained. Chief among these was the fact that the Established Church in Ireland was the church of only a minority of the people. In March 1868 John Francis Maguire, an Irish Catholic, asked the House of Commons to resolve itself into a committee to take into immediate consideration the affairs of Ireland. Gladstone, in the course of the debate, declared that in his opinion the time had come when the Irish Church, as a political institution, should cease; and he followed up his declaration by a series of resolutions, which were accepted by considerable majorities, pledging the House to its disestablishment. Disraeli, recognizing the full significance of this decision, announced that, as soon as the necessary preparations could be made, the government would appeal from the House to the country. Parliament was dissolved at the end of July, but the general election did not take place till the end of the following November. The future of the Irish Church naturally formed one of the chief subjects which occupied the attention of the electors, but the issue was largely determined by wider considerations. The country, after the long political truce which had been maintained by Lord Palmerston, was again ranged in two hostile camps, animated by opposing views. It was virtually asked to decide in 1868 whether it would put its trust in Liberal or Conservative, in Gladstone or Disraeli. By an overwhelming majority it threw its lot in favour of Gladstone; and Disraeli, without even venturing to meet parliament, took the unusual course of at once placing his resignation in the queen's hands.

Abyssinian war.

The Conservative government, which thus fell, will be chiefly recollected for its remarkable concession to democratic principles by the passage of the Reform Act of 1867; but it deserves perhaps a word of praise for its conduct of a distant and unusual war. The emperor of Abyssinia had, for some time, detained some Englishmen prisoners in his country; and the government, unable to obtain redress in other ways, decided on sending an army to release them. The expedition, entrusted to Sir Robert Napier, afterwards Lord Napier of Magdala, was fitted out at great expense, and was rewarded with complete success. The prisoners were released, and the Abyssinian monarch committed suicide. Disraeli—whose oriental imagination was excited by the triumph—incurred some ridicule by his bombastic declaration that "the standard of St George was hoisted upon the mountains of Rasselas." But the ministry could at least claim that the war had been waged to rescue Englishmen from captivity, that it had been conducted with skill, and that it had accomplished its object. The events of the Abyssinian war, however, were forgotten in the great political revolution which had swept the Conservatives from office and placed Gladstone in power. His government was destined to endure for more than five years. During that period it experienced the alternate prosperity and decline which nearly forty years before had been the lot of the Whigs after the passage of the first Reform Act. During its first two sessions it accomplished greater changes in legislation than had been attempted by any ministry since that of Lord Grey. In its three last sessions it was destined to sink into gradual disrepute; and it was ultimately swept away by a wave of popular reaction, as remarkable as that which had borne it into power.

Gladstone's first ministry.

Irish land.

Elementary education.

It was generally understood that Gladstone intended to deal with three great Irish grievances—"the three branches of the upas tree"—the religious, agricultural and educational grievances. The session of 1869 was devoted to the first of these subjects. Gladstone introduced a bill disconnecting the Irish Church from the state, establishing a synod for its government, and—after leaving it in possession of its churches and its parsonages, and making ample provision for the life-interest of its existing clergy—devoting the bulk of its property to the relief of distress in Ireland. The bill was carried by large majorities through the House of Commons; and the feeling of the country was so strong that the Lords did not venture on its rejection. They satisfied themselves with engrafting on it a series of amendments which, on the whole, secured rather more liberal terms of compensation for existing interests. Some of these amendments were adopted by Gladstone; a compromise was effected in respect of the others; and the bill, which had practically occupied the whole session, and had perhaps involved higher constructive skill than any measure passed in the previous half-century, became law. Having dealt with the Irish Church in 1869, Gladstone turned to the more complicated question of Irish land. So far back as the 'forties Sir R. Peel had appointed a commission, known from its chairman as the Devon commission, which had recommended that the Irish tenant, in the event of disturbance, should receive some compensation for certain specified improvements which he had made in his holding. Parliament neglected to give effect to these recommendations; in a country where agriculture was the chief or almost only occupation, the tenant remained at his landlord's mercy. In 1870 Gladstone proposed to give the tenant a pecuniary interest in improvements, suitable to the holding, which he had made either before or after the passing of the act. He proposed also that, in cases of eviction, the smaller tenantry should receive compensation for disturbance. The larger tenantry, who were supposed to be able to look after their own interests, were entirely debarred, and tenants enjoying leases were excluded from claiming compensation, except for tillages, buildings and reclamation of lands. A special court, it was further provided, should be instituted to carry out the provisions of the bill. Large and radical as the measure was, reversing many of the accepted principles of legislation by giving the tenant a *quasi*-partnership with the landlord in his holding, no serious opposition was made to it in either House of Parliament. Its details, indeed, were abundantly criticized, but its principles were hardly disputed, and it became law without any substantial alteration of its original provisions. In two sessions two branches of the upas tree had been summarily cut off. But parliament in 1870 was not solely occupied with the wrongs of Irish tenantry. In the same year Forster, as vice-president of the council, succeeded in carrying the great measure which for the first time made education compulsory. In devising his scheme, Forster endeavoured to utilize, as far as possible, the educational machinery which had been voluntarily provided by various religious organizations. He gave the institutions, which had been thus established, the full benefit of the assistance which the government was prepared to afford to board schools, on their adopting a conscience clause under which the religious susceptibilities of the parents of children were protected. This provision led to many debates, and produced the first symptoms of disruption in the Liberal party. The Nonconformists contended that no such aid should be given to any school which was not conducted on undenominational principles. Supported by the bulk of the Conservative party, Forster was enabled to defeat the dissenters. But the victory which he secured was, in one sense, dearly purchased. The first breach in the Liberal ranks had been made; and the government, after 1870, never again commanded the same united support which had enabled it to pursue its victorious career in the first two sessions of its existence.

Black Sea neutrality.

Towards the close of the session of 1870 other events, for which the government had no direct responsibility, introduced new difficulties. War unexpectedly broke out between France and Prussia. The French empire fell; the German armies marched on Paris; and the Russian government, at Count Bismarck's instigation, took advantage of the collapse of France to repudiate the clause in the treaty of 1856 which neutralized the Black Sea. Lord Granville, who had succeeded Lord Clarendon at the foreign office, protested against this proceeding. But it was everywhere felt that his mere protest was not likely to affect the result; and the government at last consented to accept a suggestion made by Count Bismarck, and to take part in a conference to discuss the Russian proposal. Though this device enabled them to say that they had not yielded to the Russian demand, it was obvious that they entered the conference with the foregone conclusion of conceding the Russian claim. The attitude which the government thus chose to adopt was perhaps inevitable in the circumstances, but it confirmed the impression, which the abandonment of the cause of Denmark had produced in 1864, that Great Britain was not prepared to maintain its principles by going to war. The weakness of the British foreign office was emphasized by its consenting, almost at the same moment, to allow the claims of the United States, for the depredations of the "Alabama," to be settled under a rule only agreed upon in 1871. Most Englishmen now appreciate the wisdom of a concession which has gained for them the friendship of the United States. But in 1871 the country resented the manner in which Lord Granville had acted. Whatever credit the government might have derived from its domestic measures, it was discredited, or it was thought to be, by its foreign policy. In these circumstances legislation in 1871 was not marked with the success which had attended the government in previous sessions. The government succeeded in terminating a long controversy by abolishing ecclesiastical tests at universities. But the Lords ventured to reject a measure for the introduction of the ballot at elections, and refused to proceed with a bill for the abolition of purchase in the army. The result of these decisions was indeed remarkable. In the one case, the Lords in 1872 found it necessary to give way, and to pass the Ballot Bill, which they had rejected in 1871. In the other, Gladstone decided on abolishing, by the direct authority of the crown, the system which the Lords refused to do away with by legislation. But his high-handed proceeding, though it forced the Lords to reconsider their decision, strained the allegiance of many of his supporters, and still further impaired the popularity of his administration. Most men felt that it would have been permissible for him, at the commencement of the session, to have used the queen's authority to terminate the purchase system; but they considered that, as he had not taken this course, it was not open to him to reverse the decision of the legislature by resorting to the prerogative. Two appointments, one to a judicial office, the other to an ecclesiastical preferment, in which Gladstone, about the same time, showed more disposition to obey the letter than the spirit of the law, confirmed the impression which the abolition of purchase had made. Great reforming ministers would do well to recollect that the success of even liberal measures may be dearly purchased by the resort to what are regarded as unconstitutional expedients.

Army purchase.

1872-1874.

In the following years the embarrassments of the government were further increased. In 1872 Bruce, the home secretary, succeeded in passing a measure of licensing reform. But the abstainers condemned the bill as inadequate; the publicans denounced it as oppressive; and the whole strength of the licensed victuallers was thenceforward arrayed against the ministry. In 1873 Gladstone attempted to complete his great Irish measures by conferring on Ireland the advantage of a university which would be equally acceptable to Protestants and Roman Catholics. But his proposal again failed to satisfy those in whose interests it was proposed. The second reading of the bill was rejected by a small majority, and Gladstone resigned; but, as Disraeli could not form a government, he resumed office. The power of the great minister was, however, spent; his ministry was hopelessly discredited. History, in fact, was repeating itself. The ministry was suffering, as Lord Grey's government had suffered nearly forty years before, from the effect of its own successes. It had accomplished more than any of its supporters had expected, but in doing so it had harassed many interests and excited much opposition. Gladstone endeavoured to meet the storm by a rearrangement of his crew. Bruce, who had offended the licensed victuallers, was removed from the home office, and made a peer and president of the council. Lowe, who had incurred unpopularity by his fiscal measures, and especially by an abortive suggestion for the taxation of matches, was transferred from the exchequer to the home office, and Gladstone himself assumed the duties of chancellor of the exchequer. He thereby created a difficulty for himself which he had not foreseen. Up to 1867 a minister leaving one office and accepting another vacated his seat; after 1867 a transfer from one post to another did not necessitate a fresh election. But Gladstone in 1873 had taken a course which had not been contemplated in 1867. He had not been transferred from one office to another. He had accepted a new in addition to his old office. It was, to say the least, uncertain whether his action in this respect had, or had not, vacated his seat. It would be unfair to suggest that the inconvenient difficulty with which he was thus confronted determined his policy, though he was probably insensibly influenced by it. However this may be, on the eve of the session of 1874 he suddenly decided to dissolve parliament and to appeal to the country. He announced his decision in an address to his constituents, in which, among other financial reforms, he promised to repeal the income tax. The course which Gladstone took, and the bait which he held out to the electors, were generally condemned. The country, wearied of the ministry and of its measures, almost everywhere supported the Conservative candidates. Disraeli found himself restored to power at the head of an overwhelming majority, and the great minister who, five years before, had achieved so marked a triumph temporarily withdrew from the leadership of the party with whose aid he had accomplished such important results. His ministry had been essentially one of peace, yet its closing days were memorable for one little war in which a great soldier increased a reputation already high. Sir Garnet Wolseley triumphed over the difficulties which the climate of the west coast of Africa imposes on Europeans, and brought a troublesome contest with the Ashantis to a successful conclusion.

Disraeli's second ministry.

The history of Disraeli's second administration affords an exact reverse to that of Gladstone's first cabinet. In legislation the ministry attempted little and accomplished less. They did something to meet the wishes of the publicans, whose discontent had contributed largely to Gladstone's defeat, by amending some of the provisions of Bruce's licensing bill; they supported and succeeded in passing a measure, brought in by the primate, to restrain some of the irregularities which the Ritualists were introducing into public worship; and they were compelled by the violent insistence of Plimsoll to pass an act to protect the lives of merchant seamen. Disraeli's government, however, will be chiefly remembered for its foreign policy. Years before he had propounded in *Tancred* the theory that England should aim at eastern empire. Circumstances in his second term of office enabled him to translate his theory into practice. In 1875 the country was suddenly startled at hearing that it had acquired a new position and assumed new responsibilities in Egypt by the purchase of the shares which the khedive of Egypt held in the Suez Canal. In the following spring a new surprise was afforded by the introduction of a measure authorizing the queen to assume the title of empress of India. But these significant actions were almost forgotten in the presence of a new crisis; for in 1876 misgovernment in Turkey had produced its natural results, and the European provinces of the Porte were in a state of armed insurrection. In the presence of a grave danger, Count Andrassy, the Austrian minister, drew up a note which was afterwards known by his name, declaring that the Porte had failed to carry into effect the promises of reform which she had made, and that some combined action on the part of Europe was necessary to compel her to do so. The note was accepted by the three continental empires, but Great Britain refused in the first instance to assent to it, and only ultimately consented at the desire of the Porte, whose statesmen seem to have imagined that the nominal co-operation of England would have the effect of restraining the action of other powers. Turkey accepted the note and renewed the promises of reform, which she had so often made, and which meant so little. The three northern powers thereupon agreed upon what was known as the Berlin Memorandum, in which they demanded an armistice, and proposed to watch over the completion of the reforms which the Porte had promised. The British government refused to be a party to this memorandum, which in consequence became abortive. The insurrection increased in intensity. The sultan Abdul Aziz, thought unequal to the crisis, was hastily deposed; he was either murdered or led to commit suicide; and insurrection in Bulgaria was stamped out by massacre. The story of the "Bulgarian atrocities" was published in Great Britain in the summer of 1876. Disraeli characteristically dismissed it as "coffee-house babble," but official investigation proved the substantial accuracy of the reports which had reached England. The people regarded these events with horror. Gladstone, emerging from his retirement, denounced the conduct of the

Bulgarian "atrocities."

Turks. In a phrase which became famous he declared that the only remedy for the European provinces of the Porte was to turn out the Ottoman government "bag and baggage." All England was at once arrayed into two camps. One party was led by Disraeli, who was supposed to represent the traditional policy of England of maintaining the rule of the Turk at all hazards; the other, inspired by the example of Gladstone, was resolved at all costs to terminate oppression, but was at the same time distrusted as indirectly assisting the ambitious views by which the Eastern policy of Russia had always been animated. The crisis soon became intense. In June 1876 Servia and Montenegro declared war against Turkey. In a few months Servia was hopelessly beaten. Through the insistence of Russia an armistice was agreed upon; and Lord Beaconsfield—for Disraeli had now been raised to the peerage—endeavoured to utilize the breathing space by organizing a conference of the great powers at Constantinople, which was attended on behalf of Great Britain by Lord Salisbury. The Constantinople conference proved abortive, and in the beginning of 1877 Russia declared war. For some time, however, her success was hardly equal to her expectations. The Turks, entrenched at Plevna, delayed the Russian advance; and it was only towards the close of 1877 that Plevna at last fell and Turkish resistance collapsed. With its downfall the war party in England, which was led by the prime minister, increased in violence. From the refrain of a song, sung night after night at a London music hall, its members became known as Jingoes. The government ordered the British fleet to pass the Dardanelles and go up to Constantinople; and though the order was subsequently withdrawn, it asked for and obtained a grant of £6,000,000 for naval and military purposes. When news came that the Russian armies had reached Adrianople, that they had concluded some arrangement with the Turks, and that they were pressing forward towards Constantinople, the fleet was again directed to pass the Dardanelles. Soon afterwards the government decided to call out the reserves and to bring a contingent of Indian troops to the Mediterranean. Lord Derby,[1] who was at the foreign office, thereupon retired from the ministry, and was succeeded by Lord Salisbury. Lord Derby's resignation was everywhere regarded as a proof that Great Britain was on the verge of war. Happily this did not occur. At Prince Bismarck's suggestion Russia consented to refer the treaty which she had concluded at San Stefano to a congress of the great powers; and the congress, at which Great Britain was represented by Lord Beaconsfield and Lord Salisbury, succeeded in substituting for the treaty of San Stefano the treaty of Berlin. The one great advantage derived from it was the tacit acknowledgment by Russia that Europe could alone alter arrangements which Europe had made. In every other sense it is doubtful whether the provisions of the treaty of Berlin were more favourable than those of the treaty of San Stefano. On Lord Beaconsfield's return, however, he claimed for Lord Salisbury and himself that they had brought back "peace with honour," and the country accepted with wild delight the phrase, without taking much trouble to analyse its justice.

Berlin treaty.

If Lord Beaconsfield had dissolved parliament immediately after his return from Berlin, it is possible that the wave of popularity which had been raised by his success would have borne him forward to a fresh victory in the constituencies. His omission to do so gave the country time to meditate on the consequences of his policy. One result soon became perceptible. Differences with Russia produced their inevitable consequences in fresh complications on the Indian frontier. The Russian government, confronted with a quarrel with Great Britain in eastern Europe, endeavoured to create difficulties in Afghanistan. A Russian envoy was sent to Kabul, where Shere Ali, who had succeeded his father Dost Mahommed in 1863, was amir; and the British government, alarmed at this new embarrassment, decided on sending a mission to the Afghan capital. The mission was stopped on the frontier by an agent of Shere Ali, who declined to allow it to proceed. The British government refused to put up with an affront of this kind, and their envoy, supported by an army, continued his advance. Afghanistan was again invaded. Kabul and Kandahar were occupied; and Shere Ali was forced to fly, and soon afterwards died. His successor, Yakub Khan, came to the British camp and signed, in May 1879, the treaty of Gandamak. Under the terms of this treaty the Indian government undertook to pay the new amir a subsidy of £60,000 a year; and Yakub Khan consented to receive a British mission at Kabul, and to cede some territory in the Himalayas which the military advisers of Lord Beaconsfield considered necessary to make the frontier more "scientific." This apparent success was soon followed by disastrous news. The deplorable events of 1841 were re-enacted in 1879. The new envoy reached Kabul, but was soon afterwards murdered. A British army was again sent into Afghanistan, and Kabul was again occupied. Yakub Khan, who had been made amir in 1879, was deposed, and Abdur Rahman Khan was selected as his successor. The British did not assert their superiority without much fighting and some serious reverses. Their victory was at last assured by the excellent strategy of Sir Donald Stewart and Sir Frederick (afterwards Lord) Roberts. But before the final victory was gained Lord Beaconsfield had fallen. His policy had brought Great Britain to the verge of disaster in Afghanistan: the credit of reasserting the superiority of British arms was deferred till his successors had taken office.

Afghan wars.

It was not only in Afghanistan that the new imperial policy which Lord Beaconsfield had done so much to encourage was straining the resources of the empire. In South Africa a still more serious difficulty was already commencing. At the time at which Lord Beaconsfield's administration began, British territory in South Africa was practically confined to Cape Colony and Natal. Years before, in 1852 and 1854 respectively, the British government, at that time a little weary of the responsibilities of colonial rule, had recognized the independence of the two Dutch republics, the Transvaal and the Orange Free State. Powerful native tribes occupied the territory to the north of Natal and the east of the Transvaal. War broke out between the Transvaal Republic and one of the most powerful of these native chieftains, Sikukuni; and the Transvaal was worsted in the struggle. Weary of the condition of anarchy which existed in the republic, many inhabitants of the Transvaal were ready to welcome its annexation to Great Britain—a proposal favoured by the colonial secretary, Lord Carnarvon, who wished to federate the South African states, after the manner in which the North American colonies had become by confederation the Dominion of Canada. Sir Theophilus Shepstone, who was sent to inquire into the proposal, mistook the opinion of a party for the verdict of the republic, and declared (April 1877) the Transvaal a part of the British Empire. His policy entailed far more serious consequences than the mission to Afghanistan. The first was a war with the Zulus, the most powerful and warlike of the South African natives, who under their ruler, Cetewayo, had organized a formidable army. A dispute had been going on for some time about the possession of a strip of territory which some British arbitrators had awarded to the Zulu king. Sir Bartle Frere, who had won distinction in India, and was sent out by Lord Beaconsfield's government to the Cape, kept back the award; and, though he ultimately communicated it to Cetewayo, thought it desirable to demand the disbandment of the Zulu army. In the war which ensued, the British troops who invaded Zulu territory met with a severe reverse; and, though the disaster was ultimately retrieved by Lord Chelmsford, the war involved heavy expenditure and brought little credit to the British army, while one unfortunate incident, the death of Prince Napoleon, who had obtained leave to serve with the British troops, and was surprised by the Zulus while reconnoitring, created a deep and unfortunate impression. Imperialism, which had been excited by Lord Beaconsfield's policy in 1878, and by the prospect of a war with a great European power, fell into discredit when it degenerated into a fresh expedition into

Zulu War.

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[1] Edward Henry Stanley, 15th earl of Derby, son of the 14th earl and former prime minister.

Afghanistan, and an inglorious war with a savage African tribe. A period of distress at home increased the discontent which Lord Beaconsfield's external policy was exciting; and, when parliament was at last dissolved in 1880, it seemed no longer certain that the country would endorse the policy of the minister, who only a short time before had acquired such popularity. Gladstone, emerging from his retirement, practically placed himself again at the head of the Liberal party. In a series of speeches in Midlothian, where he offered himself for election, he denounced the whole policy which Lord Beaconsfield had pursued. His impassioned eloquence did much more than influence his own election. His speeches decided the contest throughout the kingdom. The Liberals secured an even more surprising success than that which had rewarded the Conservatives six years before. For the first time in the queen's reign, a solid Liberal majority, independent of all extraneous Irish support, was returned, and Gladstone resumed in triumph his old position as prime minister.

Gladstone's second ministry.

The new minister had been swept into power on a wave of popular favour, but he inherited from his predecessors difficulties in almost every quarter of the world; and his own language had perhaps tended to increase them. He was committed to a reversal of Lord Beaconsfield's policy; and, in politics, it is never easy, and perhaps rarely wise, suddenly and violently to change a system. In one quarter of the world the new minister achieved much success. The war in Afghanistan, which had begun with disaster, was creditably concluded. A better understanding was gradually established with Russia; and, before the ministry went out, steps had been taken which led to the delimitation of the Russian and Afghan frontier. In South Africa, however, a very different result ensued. Gladstone, before he accepted office, had denounced the policy of annexing the Transvaal; his language was so strong that he was charged with encouraging the Boers to maintain their independence by force; his example had naturally been imitated by some of his followers at the general election; and, when he resumed power, he found himself in the difficult dilemma of either maintaining an arrangement which he had declared to be unwise, or of yielding to a demand which the Boers were already threatening to support in arms. The events of the first year of his administration added to his difficulty. Before its close the Boers seized Heidelberg and established a republic; they destroyed a detachment of British troops at Bronkhorst Spruit; and they surrounded and attacked the British garrisons in the Transvaal. Troops were of course sent from England to maintain the British cause; and Sir George Colley, who enjoyed a high reputation and had experience in South African warfare, was made governor of Natal, and entrusted with the military command. The events which immediately followed will not be easily forgotten. Wholly miscalculating the strength of the Boers, Sir George Colley, at the end of January 1881, attacked them at Laing's Nek, in the north of Natal, and was repulsed with heavy loss. Some ten days afterwards he fought another action on the Ingogo, and was again forced to retire. On the 26th February, with some 600 men, he occupied a high hill, known as Majuba, which, he thought, dominated the Boer position. The following day the Boers attacked the hill, overwhelmed its defenders, and Sir George Colley was himself killed in the disastrous contest on the summit. News of these occurrences was received with dismay in England. It was, no doubt, possible to say a good deal for Gladstone's indignant denunciation of his predecessor's policy in annexing the Transvaal; it would have been equally possible to advance many reasons for reversing the measures of Lord Beaconsfield's cabinet, and for conceding independence to the Transvaal in 1880. But the great majority of persons considered that, whatever arguments might have been urged for concession in 1880, when British troops had suffered no reverses, nothing could be said for concession in 1881, when their arms had been tarnished by a humiliating disaster. Great countries can afford to be generous in the hour of victory; but they cannot yield, without loss of credit, in the hour of defeat. Unfortunately this reasoning was not suited to Gladstone's temperament. The justice or injustice of the British cause seemed to him a much more important matter than the vindication of military honour; and he could not bring himself to acknowledge that Majuba had altered the situation, and that the terms which he had made up his mind to concede before the battle could not be safely granted till military reputation was restored. The retrocession of the Transvaal was decided upon, though it was provided that the country should remain under the suzerainty of the queen. Even this great concession did not satisfy the ambition of the Boers, who were naturally elated by their victories. Three years later some Transvaal deputies, with their president, Kruger, came to London and saw Lord Derby, the secretary of state for the colonies. Lord Derby consented to a new convention, from which any verbal reference to suzerainty was excluded; and the South African republic was made independent, subject only to the condition that it should conclude no treaties with foreign powers without the approval of the crown. (For the details and disputes concerning the terms of this convention the reader is referred to the articles TRANSVAAL and SUZERAINTY.)

Boer War, 1881.

Bradlaugh

Gladstone's government declined in popularity from the date of the earliest of these concessions. Gladstone, in fact, had succeeded in doing what Lord Beaconsfield had failed to accomplish. Annoyance at his foreign policy had rekindled the imperialism which the embarrassments created by Lord Beaconsfield had done so much to damp down. And, if things were going badly with the new government abroad, matters were not progressing smoothly at home. At the general election of 1880, the borough of Northampton, which of late years has shown an unwavering preference for Liberals of an advanced type, returned as its members Henry Labouchere and Charles Bradlaugh. Bradlaugh, who had attained some notoriety for an aggressive atheism, claimed the right to make an affirmation of allegiance instead of taking the customary oath, which he declared was, in his eyes, a meaningless form. The speaker, instead of deciding the question, submitted it to the judgment of the House, and it was ultimately referred to a select committee, which reported against Bradlaugh's claim. Bradlaugh, on hearing the decision of the committee, presented himself at the bar and offered to take the oath. It was objected that, as he had publicly declared that the words of the oath had no clear meaning for him, he could not be permitted to take it; and after some wrangling the matter was referred to a fresh committee, which supported the view that Bradlaugh could not be allowed to be sworn, but recommended that he should be permitted to make the affirmation at his own risk. The House refused to accept the recommendation of this committee when a bill was introduced to give effect to it. This decision naturally enlarged the question before it. For, while hitherto the debate had turned on the technical points whether an affirmation could be substituted for an oath, or whether a person who had declared that an oath had no meaning for him could properly be sworn, the end at which Bradlaugh's opponents were thenceforward aiming was the imposition of a new religious test—the belief in a God—on members of the House of Commons. The controversy, which thus began, continued through the parliament of 1880, and led to many violent scenes, which lowered the dignity of the House. It was quietly terminated, in the parliament of 1886, by the firm action of a new speaker. Mr Peel, who had been elected to the chair in 1884, decided that neither the speaker nor any other member had the right to intervene to prevent a member from taking the oath if he was willing to take it. Parliament subsequently, by a new act, permitted affirmations to be used, and thenceforward religion, or the absence of religion, was no disqualification for a seat in the House of Commons. The atheist, like the Roman Catholic and the Jew, could sit and vote.

The Bradlaugh question was not the only difficulty with which the new government was confronted. Ireland was again attracting the attention of politicians. The Fenian movement had practically expired; some annual motions for the introduction of Home Rule, made with all the decorum of parliamentary usage, had been regularly defeated. But the Irish were placing themselves under new leaders and adopting new methods. During the Conservative government of 1874, the Irish members had endeavoured to arrest attention by organized obstruction. Their efforts had increased the difficulties of government and taxed the endurance of parliament. These tactics were destined to be raised to a fine art by Parnell, who succeeded to the head of the Irish party about the time of the formation of Gladstone's government. It was Parnell's determination to make legislation impracticable, and parliament unendurable, till Irish grievances were redressed. It was his evident belief that by pursuing such tactics he could force the House of Commons to concede the legislation which he desired. The Irish members were not satisfied with the legislation which parliament had passed in 1869–1870. The land act of 1870 had given the tenant no security in the case of eviction for non-payment of rent; and the tenant whose rent was too high or had been raised was at the mercy of his landlord. It so happened that some bad harvests had temporarily increased the difficulties of the tenantry, and there was no doubt that large numbers of evictions were taking place in Ireland. In these circumstances, the Irish contended that the relief which the act of 1870 had afforded should be extended, and that, till such legislation could be devised, a temporary measure should be passed giving the tenant compensation for disturbance. Gladstone admitted the force of this reasoning, and a bill was introduced to give effect to it. Passed by the Commons, it was thrown out towards the end of the session by the Lords; and the government acquiesced—perhaps could do nothing but acquiesce—in this decision. In Ireland, however, the rejection of the measure was attended with disastrous results. Outrages increased, obnoxious landlords and agents were "boycotted"—the name of the first gentleman exposed to this treatment adding a new word to the language; and Forster, who had accepted the office of chief secretary, thought it necessary, in the presence of outrage and intimidation, to adopt stringent measures for enforcing order. A measure was passed on his initiation, in 1881, authorizing him to arrest and detain suspected persons; and many well-known Irishmen, including Parnell himself and other members of parliament, were thrown into prison. It was an odd commentary on parliamentary government that a Liberal ministry should be in power, and that Irish members should be in prison; and early in 1882 Gladstone determined to liberate the prisoners on terms. The new policy—represented by what was known as the Kilmainham Treaty—led to the resignation of the viceroy, Lord Cowper, and of Forster, and the appointment of Lord Spencer and Lord Frederick Cavendish as their successors. On the 6th of May 1882 Lord Spencer made his entry into Dublin, and on the evening of the same day Lord Frederick, unwisely allowed to walk home alone with Burke, the under-secretary to the Irish government, was murdered with his companion in Phoenix Park. This gross outrage led to fresh measures of coercion. The disclosure, soon afterwards, of a conspiracy to resort to dynamite still further alienated the sympathies of the Liberal party from the Irish nation. Gladstone might fairly plead that he had done much, that he had risked much, for Ireland, and that Ireland was making him a poor return for his services.

Parnell.

In the meanwhile another difficulty was further embarrassing a harassed government. The necessities of the khedive of Egypt had been only temporarily relieved by the sale to Lord Beaconsfield's government of the Suez Canal shares. Egyptian finance, in the interests of the bondholders, had been placed under the dual control of England and France. The new arrangement naturally produced some native resentment, and Arabi Pasha placed himself at the head of a movement which was intended to rid Egypt of foreign interference. His preparations eventually led to the bombardment of Alexandria by the British fleet, and still later to the invasion of Egypt by a British army under Sir Garnet, afterwards Lord Wolseley, and to the battle of Tell-el-Kebir, after which Arabi was defeated and taken prisoner. The bombardment of Alexandria led to the immediate resignation of Bright, whose presence in the cabinet had been of importance to the government; the occupation of Egypt broke up the dual control, and made Great Britain responsible for Egyptian administration. The effects of British rule were, in one sense, remarkable. The introduction of good government increased the prosperity of the people, and restored confidence in Egyptian finance. At the same time it provoked the animosity of the French, who were naturally jealous of the increase of British influence on the Nile, and it also threw new responsibilities on the British nation. For south of Egypt lay the great territory of the Sudan, which to some extent commands the Nile, and which had been added to the Egyptian dominions at various periods between 1820 and 1875. In 1881 a fanatic sheikh—known as the mahdi—had headed an insurrection against the khedive's authority; and towards the close of 1883 an Egyptian army under an Englishman, Colonel Hicks, was annihilated by the mahdi's followers. The insurrection increased the responsibilities which intervention had imposed on England, and an expedition was sent to Suakin to guard the littoral of the Red Sea; while, at the beginning of 1884, General Gordon—whose services in China had gained him a high reputation, and who had had previous experience in the Sudan—was sent to Khartum to report on the condition of affairs. These decisions led to momentous results. The British expedition to Suakin was engaged in a series of battles with Osman Digna, the mahdi's lieutenant; while General Gordon, after alternate reverses and successes, was isolated at Khartum. Anxious as Gladstone's ministry was to restrict the sphere of its responsibilities, it was compelled to send an expedition to relieve General Gordon; and Lord Wolseley, who was appointed to the command, decided on moving up the Nile to his relief. The expedition proved much more difficult than Lord Wolseley had anticipated. And before it reached its goal, Khartum was forced to surrender, and General Gordon and his few faithful followers were murdered (January 1885). General Gordon's death inflicted a fatal blow on the Liberal government. It was thought that the general, whose singular devotion to duty made him a popular hero, had been allowed to assume an impossible task; had been feebly supported; and that the measures for his relief had been unduly postponed and at last only reluctantly undertaken. The ministry ultimately experienced defeat on a side issue. The budget, which Childers brought forward as chancellor of the exchequer, was attacked by the Conservative party; and an amendment proposed by Sir Michael Hicks-Beach, condemning an increase in the duties on spirits and beer, was adopted by a small majority. Gladstone resigned office, and Lord Salisbury, who, after Lord Beaconsfield's death, had succeeded to the lead of the Conservative party, was instructed to form a new administration.

Egypt.

Gordon.

It was obvious that the new government, as its first duty, would be compelled to dissolve the parliament that had been elected when Gladstone was enjoying the popularity which he had lost so rapidly in office. But it so happened that it was no longer possible to appeal to the old constituencies. For, in 1884, Gladstone had introduced a new Reform Bill; and, though its passage had been arrested by the Lords, unofficial communications between the leaders of both parties had resulted in a compromise which had led to the adoption of a large and comprehensive Reform Act. By this measure, household franchise was extended to the counties. But counties and boroughs were broken up into a number of small constituencies, for the most part returning only one member each; while the necessity of increasing the relative weight of Great Britain, and the reluctance to inflict disfranchisement on Ireland, led to an increase in the numbers of the House of Commons from 658 to 670 members. This radical reconstruction of the electorate necessarily made the result of the elections doubtful. As a matter of fact, the new parliament comprised 334 Liberals, 250 Conservatives and 86 Irish Nationalists. It was plain beyond the possibility of doubt that the future depended on the course which the Irish Nationalists might adopt. It they threw in their lot with Gladstone, Lord Salisbury's

Reform Act, 1884.

government was evidently doomed. If, on the contrary, they joined the Conservatives, they could make a Liberal administration impracticable.

Home Rule.

In the autumn of 1885 it was doubtful what course the Irish Nationalists would take. It was generally understood that Lord Carnarvon, who had been made viceroy of Ireland, had been in communication with Parnell; that Lord Salisbury was aware of the interviews which had taken place; and it was whispered that Lord Carnarvon was in favour of granting some sort of administrative autonomy to Ireland. Whatever opinion Lord Carnarvon may have formed—and his precise view is uncertain—a greater man than he had suddenly arrived at a similar conclusion. In his election speeches Gladstone had insisted on the necessity of the country returning a Liberal majority which could act independently of the Irish vote; and the result of the general election had left the Irish the virtual arbiters of the political situation. In these circumstances Gladstone arrived at a momentous decision. He recognized that the system under which Ireland had been governed in the past had failed to win the allegiance of her people; and he decided that it was wise and safe to entrust her with a large measure of self-government. It was perhaps characteristic of Gladstone, though it was unquestionably unfortunate, that, in determining on this radical change of policy, he consulted few, if any, of his previous colleagues. On the meeting of the new parliament Lord Salisbury's government was defeated on an amendment to the address, demanding facilities for agricultural labourers to obtain small holdings for gardens and pasture—the policy, in short, which was described as "three acres and a cow." Lord Salisbury resigned, and Gladstone resumed power. The attitude, however, which Gladstone was understood to be taking on the subject of Home Rule threw many difficulties in his way. Lord Hartington, and others of his former colleagues, declined to join his administration; Mr Chamberlain, who, in the first instance, accepted office, retired almost at once from the ministry; and Bright, whose eloquence and past services gave him a unique position in the House, threw in his lot in opposition to Home Rule. A split in the Liberal party thus began, which was destined to endure; and Gladstone found his difficulties increased by the defection of the men on whom he had hitherto largely relied. He persevered, however, in the task which he had set himself, and introduced a measure endowing Ireland with a parliament, and excluding the Irish members from Westminster. He was defeated, and appealed from the House which had refused to support him to the country. For the first time in the queen's reign two general elections occurred within twelve months. The country showed no more disposition than the House of Commons to approve the course which the minister was taking. A large majority of the members of the new parliament were pledged to resist Home Rule. Gladstone, bowing at once to the verdict of the people, resigned office, and Lord Salisbury returned to power.

Unionism.

The new cabinet, which was formed to resist Home Rule, did not succeed in combining all the opponents to this measure. The secessionists from the Liberal party—the Liberal Unionists, as they were called—held aloof from it; and Lord Salisbury was forced to form his cabinet out of his immediate followers. The most picturesque appointment was that of Lord Randolph Churchill, who was made chancellor of the exchequer and leader of the House of Commons. But before many months were over, Lord Randolph—unable to secure acceptance of a policy of financial retrenchment—resigned office, and Lord Salisbury was forced to reconstruct his ministry. Though he again failed to obtain the co-operation of the Liberal Unionists, one of the more prominent of them—Goschen—accepted the seals of the Exchequer. W. H. Smith moved from the war office to the treasury, and became leader of the House of Commons; while Lord Salisbury himself returned to the foreign office, which the dramatically sudden death of Lord Iddesleigh, better known as Sir Stafford Northcote, vacated. These arrangements lasted till 1891, when, on Smith's death, the treasury and the lead of the Commons were entrusted to Lord Salisbury's nephew, Mr Arthur Balfour, who had made a great reputation as chief secretary for Ireland.

Nationalist split.

The ministry of 1886, which endured till 1892, gave to London a county council; introduced representative government into every English county; and made elementary education free throughout England. The alliance with the Liberal Unionists was, in fact, compelling the Conservative government to promote measures which were not wholly consistent with the stricter Conservative traditions, or wishes. In other respects, the legislative achievements of the government were not great; and the time of parliament was largely occupied in devising rules for the conduct of its business, which the obstructive attitude of the Irish members made necessary, and in discussing the charges brought against the Nationalist party by *The Times*, of complicity in the Phoenix Park murders. Under the new rules, the sittings of the House on ordinary days were made to commence at 3 P.M., and opposed business was automatically interrupted at midnight, while for the first time a power was given to the majority in a House of a certain size to conclude debate by what was known as the closure. Notwithstanding these new rules obstructive tactics continued to prevail; and, in the course of the parliament, many members were suspended for disorderly conduct. The hostility of the Irish members was perhaps increased by some natural indignation at the charges brought against Parnell. *The Times*, in April 1887, printed the facsimile of a letter purporting to be signed by Parnell, in which he declared that he had no other course open to him but to denounce the Phoenix Park murders, but that, while he regretted "the accident" of Lord Frederick Cavendish's death, he could not "refuse to admit that Burke got no more than his deserts." The publication of this letter, and later of other similar documents, naturally created a great sensation; and the government ultimately appointed a special commission of three judges to inquire into the charges and allegations that were made. In the course of the inquiry it was proved that the letters had emanated from a man named Pigott, who had at one time been associated with the Irish Nationalist movement, but who for some time past had earned a precarious living by writing begging and threatening letters. Pigott, subjected to severe cross-examination by Sir Charles Russell (afterwards Lord Russell of Killowen), broke down, fled from justice and committed suicide. His flight practically settled the question; and an inquiry, which many people had thought at its inception would brand Parnell as a criminal, raised him to an influence which he had never enjoyed before. But in the same year which witnessed his triumph, he was doomed to fall. He was made co-respondent in a divorce suit brought by Captain O'Shea—another Irishman—for the dissolution of his marriage; and the disclosures made at the trial induced Gladstone, who was supported by the Nonconformists generally throughout the United Kingdom, to request Parnell to withdraw from the leadership of the Irish party. Parnell refused to comply with this request, and the Irish party was shattered into fragments by his decision. Parnell himself did not long survive the disruption of the party which he had done so much to create. The exertions which he made to retrieve his waning influence proved too much for his strength, and in the autumn of 1891 he died suddenly at Brighton. Parnell's death radically altered the political situation. At the general elections of 1885 and 1886 the existence of a strong, united Irish party had exercised a dominating influence. As the parliament of 1886 was drawing to a close, the dissensions among the Irish members, and the loss of their great leader, were visibly sapping the strength of the Nationalists. At the general election of 1892 Home Rule was still the prominent subject before the electors. But the English Liberals were already a little weary of allies who were quarrelling among themselves, and whose disputes were introducing a new factor into politics. The political struggle virtually turned not on measures, but on men. Gladstone's great age, and the marvellous powers which he displayed at a time when most men seek the repose of retirement, were the chief causes which affected the results. His influence enabled him to secure a small Liberal majority. But it was noticed that the majority depended on Scottish, Irish and Welsh votes, and that England—the "predominant partner," as it was subsequently called by Lord Rosebery—returned a majority of members pledged to resist any attempt to dissolve the union between the three kingdoms.

Home Rule Bill, 1893.

On the meeting of the new parliament Lord Salisbury's government was defeated on a vote of want of confidence, and for a fourth time Gladstone became prime minister. In the session of 1893 he again introduced a Home Rule Bill. But the measure of 1893 differed in many respects from that of 1886. In particular, the Irish were no longer to be excluded from the imperial parliament at Westminster. The bill which was thus brought forward was actually passed by the Commons. It was, however, rejected by the Lords. The dissensions among the Irish themselves, and the hostility which English constituents were displaying to the proposal, emboldened the Peers to arrive at this decision. Some doubt was felt as to the course which Gladstone would take in this crisis. Many persons thought that he should at once have appealed to the country, and have endeavoured to obtain a distinct mandate from the constituencies to introduce a new Home Rule Bill. Other persons imagined that he should have followed the precedent which had been set by Lord Grey in 1831, and, after a short prorogation, have reintroduced his measure in a new session. As a matter of fact, Gladstone adopted neither of these courses. The government decided not to take up the gauntlet thrown down by the Peers, but to proceed with the rest of their political programme. With this object an autumn session was held, and the Parish Councils Act, introduced by Mr Fowler (afterwards Lord Wolverhampton), was passed, after important amendments, which had been introduced into it in the House of Lords, had been reluctantly accepted by Gladstone. On the other hand, an Employers' Liability Bill, introduced by Mr Asquith, the home secretary, was ultimately dropped by Gladstone after passing all stages in the House of Commons, rather than that an amendment of the Peers, allowing "contracting out," should be accepted.

Lord Rosebery.

Before, however, the session had quite run out (3rd March 1894), Gladstone, who had now completed his eighty-fourth year, laid down a load which his increasing years made it impossible for him to sustain (see the article GLADSTONE). He was succeeded by Lord Rosebery, whose abilities and attainments had raised him to a high place in the Liberal counsels. Lord Rosebery did not succeed in popularizing the Home Rule proposal which Gladstone had failed to carry. He declared, indeed, that success was not attainable till England was converted to its expediency. He hinted that success would not even then be assured until something was done to reform the constitution of the House of Lords. But if, on the one hand, he refused to introduce a new Home Rule Bill, he hesitated, on the other, to court defeat by any attempt to reform the Lords. His government, in these circumstances, while it failed to conciliate its opponents, excited no enthusiasm among its supporters. It was generally understod, moreover, that a large section of the Liberal party resented Lord Rosebery's appointment to the first place in the ministry, and thought that the lead should have been conferred on Sir W. Harcourt. It was an open secret that these differences in the party were reflected in the cabinet, and that the relations between Lord Rosebery and Sir W. Harcourt were too strained to ensure either the harmonious working or the stability of the administration. In these circumstances the fall of the ministry was only a question of time. It occurred—as often happens in parliament—on a minor issue which no one had foreseen. Attention was drawn in the House of Commons to the insufficient supply of cordite provided by the war office, and the House—notwithstanding the assurance of the war minister (Sir Henry Campbell-Bannerman) that the supply was adequate—placed the government in a minority. Lord Rosebery resigned office, and Lord Salisbury for the third time became prime minister. the duke of Devonshire. Mr Chamberlain and other Liberal Unionists joining the government. Parliament was dissolved, and a new parliament, in which the Unionists obtained an overwhelming majority, was returned.

The government of 1892–1895, which was successively led by Gladstone and Lord Rosebery, will, on the whole, be remembered for its failures. Yet it passed two measures which have exercised a wide influence. The Parish Councils Act introduced electoral institutions into the government of every parish, and in 1894 Sir W. Harcourt, as chancellor of the exchequer, availed himself of the opportunity, which a large addition to the navy invited, to reconstruct the death duties. He swept away in doing so many of the advantages which the owner of real estate and the life tenant of settled property had previously enjoyed, and drove home a principle which Goschen had tentatively introduced a few years before by increasing the rate of the duty with the amount of the estate. Rich men, out of their superfluities, were thenceforward to pay more than poor men out of their necessities.

The two jubilees.

The Unionist government which came into power in 1895 lasted, with certain changes of *personnel*, till 1905, with a break caused by the dissolution of 1900. History may hereafter conclude that the most significant circumstance of the earlier period is to be found in the demonstration of loyalty and affection to which the sixtieth anniversary of Queen Victoria's accession led in 1897. Ten years before, her jubilee had been the occasion of enthusiastic rejoicings, and the queen's progress through London to a service of thanksgiving at Westminster had impressed the imagination of her subjects and proved the affection of her people. But the rejoicings of 1887 were forgotten amid the more striking demonstrations ten years later. It was seen then that the queen, by her conduct and character, had gained a popularity which has had no parallel in history, and had won a place in the hearts of her subjects which perhaps no other monarch had ever previously enjoyed. There was no doubt that, if the opinion of the English-speaking races throughout the world could have been tested by a plebiscite, an overwhelming majority would have declared that the fittest person for the rule of the British empire was the gracious and kindly lady who for sixty years, in sorrow and in joy, had so worthily discharged the duties of her high position. This remarkable demonstration was not confined to the British empire alone. In every portion of the globe the sixtieth anniversary of the queen's reign excited interest; in every country the queen's name was mentioned with affection and respect; while the people of the United States vied with the subjects of the British empire in praise of the queen's character and in expressions of regard for her person. Only a year or two before, an obscure dispute on the boundary of British Venezuela had brought the United States and Great Britain within sight of a quarrel. The jubilee showed conclusively that, whatever politicians might say, the ties of blood and kinship, which united the two peoples, were too close to be severed by either for some trifling cause; that the wisest heads in both nations were aware of the advantages which must arise from the closer union of the Anglo-Saxon races; and that the true interests of both countries lay in their mutual friendship. A war in which the United States was subsequently engaged with Spain cemented this feeling. The government and the people of the United States recognized the advantage which they derived from the goodwill of Great Britain in the hour of their necessity, and the two nations drew together as no other two nations had perhaps ever been drawn together before.

If the jubilee was a proof of the closer union of the many sections of the British empire, and of their warm attachment to their sovereign, it also gave expression to the "imperialism" which was becoming a dominant factor in British politics. Few people realized the mighty change which in this respect had been effected in thought and feeling. Forty years before, the most prominent English statesmen had regarded with anxiety the huge responsibilities of a world-wide empire. In 1897 the whole tendency of thought and opinion was to enlarge the burden of which the preceding generation had been weary. The extension of British influence, the protection of British interests, were almost universally advocated; and the few statesmen who repeated in the 'nineties the sentiments which would have been generally accepted in the 'sixties, were regarded as "Little Englanders." It is important to note the consequences which these new ideas produced in Africa. Both in the north and in the south of this great and imperfectly explored continent, memories still clung which were ungrateful to imperialism. In the north, the murder of Gordon was still unavenged; and the vast territory known as the Sudan had escaped from the control of Egypt. In the south, war with the Transvaal had been concluded by a British defeat; and the Dutch were elated, the English irritated, at the recollection of Majuba. In 1896 Lord Salisbury's government decided on extending the Anglo-Egyptian rule over the Sudan, and an expedition was sent from Egypt under the command of Sir Herbert (afterwards Lord) Kitchener to Khartum. Few military expeditions have been more elaborately organized, or have achieved a more brilliant success. The conquest of the country was achieved in three separate campaigns in successive years. In September 1898 the Sudanese forces were decisively beaten, with great slaughter, in the immediate neighbourhood of Omdurman; and Khartum became thenceforward the capital of the new province, which was placed under Lord Kitchener's rule.

Omdurman, Fashoda.

Soon after this decisive success, it was found that a French expedition under Major Marchand had reached the upper Nile and had hoisted the French flag at Fashoda. It was obvious that the French could not be allowed to remain at a spot which the khedive of Egypt claimed as Egyptian territory; and after some negotiation, and some irritation, the French were withdrawn. In South Africa still more important events were in the meanwhile progressing. Ever since the independence of the South African Republic had been virtually conceded by the convention of 1884, unhappy differences had prevailed between the Dutch and British residents in the Transvaal. The discovery of gold at Johannesburg and elsewhere in 1885–1886 had led to a large immigration of British and other colonists. Johannesburg had grown into a great and prosperous city. The foreign population of the Transvaal, which was chiefly English, became in a few years more numerous than the Boers themselves, and they complained that they were deprived of all political rights, that they were subjected to unfair taxation, and that they were hampered in their industry and unjustly treated by the Dutch courts and Dutch officials. Failing to obtain redress, at the end of 1895 certain persons among them made preparations for a revolution. Dr Jameson, the administrator of Rhodesia, accompanied by some British officers, actually invaded the Transvaal. His force, utterly inadequate for the purpose, was stopped by the Boers, and he and his fellow-officers were taken prisoners.

Jameson Raid.

There was no doubt that this raid on the territory of a friendly state was totally unjustifiable. Unfortunately, Dr Jameson's original plans had been framed at the instance of Cecil Rhodes, the prime minister at the Cape, and many persons thought that they ought to have been suspected by the colonial office in London. England at any rate would have had no valid ground of complaint if the leaders of a buccaneering force had been summarily dealt with by the Transvaal authorities. The president of the republic, Kruger, however, handed over his prisoners to the British authorities, and parliament instituted an inquiry by a select committee into the circumstances of the raid. The inquiry was terminated somewhat abruptly. The committee acquitted the colonial office of any knowledge of the plot; but a good many suspicions remained unanswered. The chief actors in the raid were tried under the Foreign Enlistment Act, found guilty, and subsequently released after short terms of imprisonment. Rhodes himself was not removed from the privy council, as his more extreme accusers demanded; but he had to abandon his career in Cape politics for a time, and confine his energies to the development of Rhodesia, which had been added to the empire through his instrumentality in 1888–1889.

In consequence of these proceedings, the Transvaal authorities at once set to work to accumulate armaments, and they succeeded in procuring vast quantities of artillery and military stores. The British government would undoubtedly have been entitled to insist that these armaments should cease. It was obvious that they could only be directed against Great Britain; and no nation is bound to allow another people to prepare great armaments to be employed against itself. The criminal folly of the raid prevented the British government from making this demand. It could not say that the Transvaal government had no cause for alarm when British officers had attempted an invasion of its territory, and had been treated rather as heroes than as criminals at home. Ignorant of the strength of Great Britain, and elated by the recollection of their previous successes, the Boers themselves believed that a new struggle might give them predominance in South Africa. The knowledge that a large portion of the population of Cape Colony was of Dutch extraction, and that public men at the Cape sympathized with them in their aspirations, increased their confidence. In the meantime, while the Boers were silently and steadily continuing their military preparations, the British settlers at Johannesburg—the Uitlanders, as they were called—continued to demand consideration for their grievances. In the spring of 1899, Sir Alfred Milner, governor of the Cape, met President Kruger at Bloemfontein, the capital of the Orange Free State, and endeavoured to accomplish that result by negotiation.

Boer War, 1899.

He thought, at the time, that if the Uitlanders were given the franchise and a fair proportion of influence in the legislature, other difficulties might be left to settle themselves. The negotiations thus commenced unfortunately failed. The discussion, which had originally turned on the franchise, was enlarged by the introduction of the question of suzerainty or supremacy; and at last, in the beginning of October, when the rains of an African spring were causing the grass to grow on which the Boer armies were largely dependent for forage, the Boers declared war and invaded Natal. The British government had not been altogether happy in its conduct of the preceding negotiations. It was certainly unhappy in its preparations for the struggle. It made the great mistake of underrating the strength of its enemy; it suffered its agents to commit the strategical blunder of locking up the few troops it had in an untenable position in the north of Natal. It was not surprising, in such circumstances, that the earlier months of the war should have been memorable for a series of exasperating reverses. These reverses, however, were redeemed by the valour of the British troops, the spirit of the British nation, and the enthusiasm which induced the great autonomous colonies of the empire to send men to support the cause of the mother country. The gradual arrival of reinforcements, and the appointment of a soldier of genius—Lord Roberts—to the supreme command, changed the military situation; and, before the summer of 1900 was concluded, the places which had been besieged by the Boers—Kimberley, Ladysmith and Mafeking—had been successively relieved; the capitals of the Orange Free State and of the Transvaal had been occupied; and the two republics, which had rashly declared war against the British empire, had been formally annexed.

The close of 1900.

The defeat and dispersal of the Boer armies, and the apparent collapse of Boer resistance, induced a hope that the war was over; and the government seized the opportunity in 1900 to terminate the parliament, which had already endured for more than five years. The election was conducted with unusual bitterness; but the constituencies practically affirmed the policy of the government by maintaining, almost unimpaired, the large majority which the Unionists had secured in 1895. Unfortunately, the expectations which had been formed at the time of the dissolution were disappointed. The same circumstances which had emboldened the Boers to declare war in the autumn of 1899, induced them to renew a guerilla warfare in the autumn of 1900—the approach of an African summer supplying the Boers with the grass on which they were dependent for feeding their hardy horses. Guerilla bands suddenly appeared in different parts of the Orange River Colony and of the Transvaal. They interrupted the communications of the British armies; they won isolated victories over British detachments; they even invaded Cape Colony. Thus the last year of the century closed in disappointment and gloom. The serious losses which the war entailed, the heavy expenses which it involved, and the large force which it absorbed, filled thoughtful men with anxiety.

The death of the queen.

No one felt more sincerely for the sufferings of her soldiers, and no one regretted more truly the useless prolongation of the struggle, than the venerable lady who occupied the throne. She had herself lost a grandson (Prince Christian Victor) in South Africa; and sorrow and anxiety perhaps told even on a constitution so unusually strong as hers. About the middle of January 1901 it was known that she was seriously ill; on the 22nd she died. The death of the queen thus occurred immediately after the close of the century over so long a period of which her reign had extended.

The queen's own life is dealt with elsewhere (see VICTORIA, QUEEN), but the Victorian era is deeply marked in English history. During her reign the people of Great Britain doubled their number; but the accumulated wealth of the country increased at least threefold, and its trade sixfold. All classes shared the prevalent prosperity. Notwithstanding the increase of population, the roll of paupers at the end of the reign, compared with the same roll at the beginning, stood as 2 stands to 3; the criminals as 1 to 2. The expansion abroad was still more remarkable. There were not 200,000 white persons in Australasia when the queen came to the throne; there were nearly 5,000,000 when she died. The great Australian colonies were almost created in her reign; two of them—Victoria and Queensland—owe their name to her; they all received those autonomous institutions, under which their prosperity has been built up, during its continuance. Expansion and progress were not confined to Australasia. The opening months of the queen's reign were marked by rebellion in Canada. The close of it saw Canada one of the most loyal portions of the Empire. In Africa, the advance of the red line which marks the bounds of British dominion was even more rapid; while in India the Punjab, Sind, Oudh and Burma were some of the acquisitions added to the British empire while the queen was on the throne. When she died one square mile in four of the land in the world was under the British flag, and at least one person out of every five persons alive was a subject of the queen.

Material progress was largely facilitated by industry and invention. The first railways had been made, the first steamship had been built, before the queen came to the throne. But, so far as railways are concerned, none of the great trunk lines had been constructed in 1837; the whole capital authorized to be spent on railway construction did not exceed £55,000,000; and, five years after the reign had begun, there were only 18,000,000 passengers. The paid-up capital of British railways in 1901 exceeded £1,100,000,000; the passengers, not including season ticket-holders, also numbered 1,100,000,000; and the sum annually spent in working the lines considerably exceeded the whole capital authorized to be spent on their construction in 1837. The progress of the commercial marine was still more noteworthy. In 1837 the entire commercial navy comprised 2,800,000 tons, of which less than 100,000 tons were moved by steam. At the end of the reign the tonnage of British merchant vessels had reached 13,700,000 tons, of which more than 11,000,000 tons were moved by steam. At the beginning of the reign it was supposed to be impossible to build a steamer which could either cross the Atlantic, or face the monsoon in the Red Sea. The development of steam navigation since then had made Australia much more accessible than America was in 1837, and had brought New York, for all practical purposes, nearer to London than Aberdeen was at the commencement of the reign. Electricity had even a greater effect on communication than steam on locomotion; and electricity, as a practical invention, had its origin in the reign. The first experimental telegraph line was only erected in the year in which Queen Victoria came to the throne. Submarine telegraphy, which had done so much to knit the empire together, was not perfected for many years afterwards; and long ocean cables were almost entirely constructed in the last half of the reign. (S. W.)

Reign of Edward VII.

On the death of Queen Victoria, the prince of Wales succeeded to the throne, with the title of Edward VII. (*q.v.*). The coronation fixed for June in the following year was at the last moment stopped by the king's illness with appendicitis, but he recovered marvellously from the operation and the ceremony took place in August. His excellent health and activity in succeeding years struck every one with astonishment. The Boer War had at last been brought to an end in May 1902 (see TRANSVAAL), and the king had the satisfaction of seeing South Africa settle down and eventually receive self-government. The political history of his reign, which ended with his death in May 1910, is dealt with in detail in separate biographical and other articles in this work (see especially those on Lord Salisbury, Mr A. J. Balfour, Mr J. Chamberlain, Lord Rosebery, Sir H. Campbell-Bannerman, Mr H. H. Asquith, Mr D. Lloyd George, and on the history of the various portions of the British Empire); and in this place only a summary need be given. The king himself (see EDWARD VII.), who nobly earned the title of Edward the Peacemaker, played no small part in the domestic and international politics of these years; and contemporary publicists, who had become accustomed to Victorian traditions, gradually realized that, within the limits of the constitutional monarchy, there was much more scope for the initiative of a masculine sovereign in public life than had been supposed by the generation which grew up after the death of his father in 1862. Edward VII. made the Crown throughout all classes of society a popular power which it had not been in England for long ages. And while the growing rivalry between England and Germany, in international relations, was continually threatening danger, his influence in cementing British friendship on all other sides was of the most marked description. His sudden death was felt, not only throughout the empire but throughout the world, with even more poignant emotion than that of Queen Victoria herself, for his personality had been much more in the forefront.

The Crisis of 1910.

The end of his reign coincided with a domestic constitutional crisis, to which party politics had been working up more and more acutely for several years. The Tariff Reform propaganda of Mr Chamberlain (*q.v.*) in 1903 convulsed the Conservative party, and the long period of Unionist domination came to an end in November 1905. Mr Balfour (*q.v.*), who became prime minister in 1902 on Lord Salisbury's retirement, resigned, and was succeeded by Sir H. Campbell-Bannerman (*q.v.*), as head of the Liberal party; and the general election of January 1906 resulted in an overwhelming victory for the Liberals and their allies, the Labour party (now a powerful force in politics) and the Irish Nationalists. Just before Sir H. Campbell-Bannerman's death in April 1908 he was succeeded as prime minister by Mr Asquith, a leader of far higher personal ability though with less hold on the affections of his party. The Liberals had long arrears to make up in their political programme, and their supremacy in the House of Commons was an encouragement to assert their views in legislation. In several directions, and notably in administration, they carried their policy into effect; but the House of Lords (see PARLIAMENT) was an obvious stumbling-block to some of their more important Bills, and the Unionist control of that House speedily made itself felt, first in wrecking the Education Bill of 1906, then in throwing out the Licensing Bill of 1908, and finally (see LLOYD GEORGE, D.) in forcing a dissolution by the rejection of the budget of 1909, with its novel proposals for the increased taxation of land and licensed houses. The Unionist party in the country had, meanwhile, been recovering from the Tariff Reform divisions of 1903, and was once more solid under Mr Balfour in favour of its new and imperial policy; but the campaign against the House of Lords started by Mr Lloyd George and the Liberal leaders, who put in the forefront the necessity of obtaining statutory guarantees for the passing into law of measures deliberately adopted by the elected Chamber, resulted in the return of Mr Asquith's government to office at the election of January 1910. The Unionists came back equal in numbers to the Liberals, but the latter could also count on the Labour party and the Irish Nationalists; and the battle was fully arrayed for a frontal attack on the powers of the Second Chamber when the king's death in May upset all calculations. This unthought-of complication seemed to act like the letting of blood in an apoplectic patient.

Accession of George V.

The prince of Wales became king as George V. (*q.v.*), and a temporary truce was called; and the reign began with a serious attempt between the leaders of the two great parties, by private conference, to see whether compromise was not possible (see PARLIAMENT). Apart from the parliamentary crisis, really hingeing on the difficulty of discovering a means by which the real will of the people should be carried out without actually making the House of Commons autocratically omnipotent, but also without allowing the House of Lords to obstruct a Liberal government merely as the organ of the Tory party, the new king succeeded to a noble heritage. The monarchy itself was popular, the country was prosperous and in good relations with the world, except for the increasing naval rivalry with Germany, and the consciousness of imperial solidarity had made extraordinary progress among all the dominions. However the domestic problems in the United Kingdom might be solved, the future of the greatness of the English throne lay with its headship of an empire, loyal to the core, over which the sun never sets. (H. CH.)

XIII.—SOURCES AND WRITERS OF ENGLISH HISTORY

The attempt here made to combine a bibliography of English history with some account of the progress of English historical writing is beset with some difficulty. The evidential value of what a writer says is quite distinct from the literary art with which he says it; the real sources of history are not the works of historians, but records and documents written with no desire to further any literary purpose. Domesday Book is unique as a source of medieval history, but it does not count in the development of English historical writing. That is quite a secondary consideration; for there was much English history before any Englishman could write; and even after he could write, his compositions constitute a minor part of the evidence.

Our earliest information about the land and its people is derived from geological, ethnological and archaeological studies, from the remains in British barrows and caves, Roman roads, walls and villas, coins, place-names and inscriptions. The writings of Caesar and Tacitus, and a few scattered notices in other Roman authors, supplement this evidence. But the scientific accuracy of Tacitus' *Germania* is not beyond dispute, and that light fails centuries before the Anglo-Saxon conquest of Great Britain. The history of that conquest itself is mainly inferential; there is the *flebilis narratio* of Gildas, vague and rhetorical, moral rather than historical in motive, and written more than a century after the conquest had begun, and the narrative of the Welsh Nennius, who wrote two and a half centuries after Gildas, and makes no critical distinction between the deeds of dragons and those of Anglo-Saxons. The Anglo-Saxons themselves could not write until Christian missionaries had reintroduced the art at the end of the 6th century, and history was not by any means the first purpose to which they applied it. It was first used to compile written statements of customs and dooms which were their nearest approach to law, and these codes and charters are the earliest written materials for Anglo-Saxon history. The remarkable outburst of literary culture in Northumbria during the 7th and 8th centuries produced a real historian in Bede; Bede, however, knows little or nothing of English history between 450 and 596, and he is valuable only for the 7th and early part of the 8th centuries. Almost contemporary is the *Vita Wilfridi* by Eddius, but more valuable are the letters we possess of Boniface and Alcuin. The famous Anglo-Saxon Chronicle was probably started under the influence of Alfred the Great towards the end of the 9th century. Its chronology is often one, two or three years wrong even when it seems to be a contemporary authority, and the value of its evidence on the conquest and the first two centuries after it is very uncertain. But from Ecgbert's reign onwards it supplies a good deal of apparently trustworthy information. For Alfred himself we have also Asser's biography and the *Annals of St Neots*, a very imaginative compilation, while most of the stories which have made Alfred's name a household word are fabulous. Even the Chronicle becomes meagre a few years after Alfred's death, and its value depends largely upon the ballads which it incorporates; nor is it materially supplemented by the lives of St Dunstan, for hagiologists have never treated historical accuracy as a matter of moment; and our knowledge of the last century of Anglo-Saxon history is derived mainly from Anglo-Norman writers who wrote after the Norman Conquest. Some collateral light on the Danish conquest of England is thrown by the *Heimskringla* and other materials collected in Vigfusson and Powell's *Corpus Poeticum Boreale*, and for the reign of Canute and his sons there is the contemporary *Encomium Emmae*, which is a dishonest panegyric on the widow of Æthelred and Canute. For Edward the Confessor there is an almost equally biased biography.

For the Norman Conquest itself strictly contemporary evidence is extremely scanty, and historians have exhausted their own and their readers' patience in disputing the precise significance of some phrases about the battle of Hastings used by Wace, a Norman poet who wrote nearly a century after the battle. One version of the Anglo-Saxon Chronicle goes down to 1079 and another to 1154, but their notices of current events are brief and meagre. The Bayeux tapestry affords, however, valuable contemporary evidence, and there are some facts related by eye-witnesses in the works of William of Poitiers and William of Jumièges. A generation of copious chroniclers was, moreover, springing up, and among them were Florence of Worcester, Henry of Huntingdon, Simeon of Durham and William of Malmesbury. Their ambition was almost invariably to write the history of the world, and they generally begin with the Creation. They only become original and contemporary authorities towards the end of their appointed tasks, and the bulk of their work is borrowed from their predecessors. Frequently they embody materials which would otherwise have perished, but their transcription is marred by an amount of conscious or unconscious falsification which seriously impairs their value. All the above-mentioned writers lived in the half-century immediately following the Norman Conquest, but their critical acumen and their literary art vary considerably. William of Malmesbury, Eadmer and Ordericus Vitalis attain a higher historical standard than had yet been reached in England by any one, with the possible exception of Bede. They are not mere annalists; they practise an art and cultivate a style; history has become to them a form of literature. They have also their philosophy and interpretation of history. It is mainly a theological conception, blind to economic influences, and attaching excessive importance to the effects of the individual action of emperors and popes, kings and cardinals. Even their characters are painted in different colours according to their action on quite irrelevant questions, as, for instance, their benefactions to the monastery, to which the historian happens to belong, or to rival houses; and the character once determined by such considerations, history is made to point the moral of their fortunes, or their fate. It is regarded as the record of moral judgments and the proof of orthodox doctrine, and it is long before ecclesiastical historians expel the sermon from their text.

The line of monastic historians stretches out to the close of the middle ages. Most of the great monasteries had their official annalists, who produced such works as the Annals of Tewkesbury, Gloucester, Burton, Waverley, Dunstable, Bermondsey, Oseney, Winchester (see *Annales Monastici*, 5 vols., ed. Luard, and other volumes in the Rolls series). Some of them are mainly local chronicles; others are almost national histories. In particular, St Albans developed a remarkable school of historians extending over nearly three centuries to the death of Whethamstede in 1465 (see *Chronica Monasterii S. Albani*, Rolls series, 7 vols., ed. Riley). Only a few of the 235 volumes published under the direction of the master of the Rolls, and called the Rolls series, can here be mentioned. Other medieval writers have been edited for the earlier English Historical Society; some of them have been re-edited without being superseded in the Rolls series. For the reign of Stephen we have the anonymous *Gesta Stephani* in addition to the writers already mentioned, several of whom continue into Stephen's reign. For Henry II. we have William of Newburgh, who reaches the highest point attained by historical composition in the 12th century; the so-called Benedict of Peterborough's *Gesta Henrici*, which Stubbs tentatively and without sufficient authority ascribed to Richard Fitznigel; Robert of Torigni; and seven volumes of "Materials for the History of Thomas Becket," which contain some of the best and worst samples of hagiological history. For Richard and John the chronicles of Roger of Hoveden, Ralph de Diceto (Diss), Gervase of Canterbury, Ralph of Coggeshall, and a later continuation of Hoveden, known under the name of Walter of Coventry, are the best narrative authorities.

With the accession of Henry III., Roger of Wendover, the first of the St Albans school whose writings are extant, becomes our chief authority. He was re-edited and continued after 1236 by Matthew Paris, the greatest of medieval historians. His work, which goes down to 1259, is picturesque, vivid, and marked by considerable breadth of view and independence of judgment. The story is carried on by a series of jejune compilations known as the *Flores historiarum* (ed. Luard). Better authorities for Edward I. are Rishanger, Trokelowe and Blaneforde, Wykes, Walter of Hemingburgh, Nicholas Trevet, Oxnead and Bartholomew Cotton, and others contained in Stubbs's *Chronicles of Edward I. and Edward II.* In the 14th century there is a significant deterioration in the monastic chroniclers, and their place is taken by the works of secular clergy like Adam Murimuth, Geoffrey the Baker, Robert of Avesbury, Henry Knighton and the anonymous author of the *Eulogium historiarum.* Monastic history is represented by Higden's voluminous *Polychronicon*, which succeeds the *Flores historiarum.* A brief revival of the St Albans school towards the end of the century is seen in the *Chronicon Angliae* and the works of T. Walsingham, which continue into the reign of Henry V. For Richard II. we have also Malverne and the Monk of Evesham; for the early Lancastrians, Capgrave, Elmham, Otterbourne, Adam of Usk; and for Henry VI., Amundesham, Whethamstede, William of Worcester and John Hardyng, as well as a number of anonymous briefer chronicles, edited, though not in the Rolls series, by J. Gairdner, C. L. Kingsford, N. H. Nicolas and J. S. Davies.

These are the principal English historical writers for the middle ages; but as the connexion between England and the continent grew closer, and international relations developed, an increasing amount of light is thrown on English history by foreign writers. Of these authorities one of the earliest is the *Histoire des ducs de Normandie et des rois d'Angleterre* (ed. Michel); briefer are the *Chronique de l'Anonyme de Béthune* and the *Histoire de Guillaume le Maréchal.* A large number of French and Flemish chronicles illustrate the history of the Hundred Years' War, by far the most important being Froissart (best edition by Luce, though Lettenhove's is bigger). Next come Jehan le Bel, Waurin's *Recueil*, Monstrelet, Chastellain, Juvenal des Ursins, and more limited works such as Créton's *Chronique de la traison et mort de Richard II.*

Chronicles, however, grow less important as sources of history as time goes on. Their value is always dependent upon the absence of the more satisfactory materials known as records, and these records gradually become more copious and complete. They develop with the government, of whose activity and policy they are the real test and evidence. Perhaps the most important thing in history is the evolution of government, the development of consciousness and a will on the part of the state. This will is expressed in records; and, as the state progresses from infancy through the stage of tutelage under the church to its modern "omnicompetence," so its will is expressed in an ever widening and differentiating series of records. The first need of a government is finance; the earliest organized machinery for exerting its will is the exchequer; and the earliest great record in English history is Domesday Book. It is followed by a series of exchequer records, called the Pipe Rolls, which begin in the reign of Henry I.; and dating from that of Henry II. is the *Dialogus de scaccario*, which explains in none too lucid language the intricate working of the exchequer system. It was Henry II. who gave the greatest impetus to the development of the machinery for expressing the will of the state. He began with finance and went on to justice, recognizing that *justitia magnum emolumentum*, the administration of justice was a great source of revenue. So national courts of law are added to the national exchequer, and by the end of the 12th century legal records become an even more important source of history than financial documents. The judicial system is described by Glanvill at the end of the 12th, and by Bracton and Fleta in the 13th century (for the exchequer see the *Testa de Nevill* and the *Red Book of the Exchequer*). During that period the Curia Regis threw off three offshoots—the courts of exchequer, king's bench and common pleas; and records of their judicial proceedings survive in the Plea Rolls and Year Books, some of which have been edited for the Rolls series, the Selden and other societies. Numerous other classes of legal and administrative records gradually develop, the Patent and Close Rolls (first calendared by the Record Commission, and subsequently treated more adequately under the direction of the deputy keeper of the Records), Charters (which were first grants to individuals, then to collective groups, monasteries or boroughs, then to classes, and finally expanded—as in Magna Carta—into grants to the whole nation), Escheats, Feet of Fines, Inquisitiones post mortem, Inquisitiones ad quod damnum, Placita de Quo Warranto, and others for which the reader is referred to S. R. Scargill-Bird's *Guide to the Principal Classes of Documents preserved in the Record Office* (3rd ed., 1908). Every branch of administration comes to be represented in records almost as soon as it is developed. The evolution of the army which won Creçy and Poitiers is accompanied by the accumulation of a mass of indentures and other military documents, the value of which has been illustrated in Dr Morris's *Welsh Wars of Edward I.* and George Wrottesley's *Creçy and Calais from the Public Records.* The growth of naval organization is reflected in the *Black Book of the Admiralty*; the growth of taxation in the *Liber custumarum* and *Subsidy Rolls*; the rise of parliament in the *Parliamentary Writs* (ed. Palgrave), in the *Rotuli parliamentorum*, in the *Official Return of Members of Parliament*, and in the *Statutes of the Realm*; that of Convocation in David Wilkins's *Concilia.* The register of the privy council does not begin until later in the 14th century, and then is broken off between the middle of the 15th and 1539.

Local as well as central government begets records as it grows. From the *Extenta manerii* of the 12th century we get to the *Manorial Rolls* of the 13th, when also we have *Hundred Rolls*, records of forest courts, of courts leet and of coroners' courts, and a variety of municipal documents, for which the reader is referred to Dr C. Gross's *Bibliography of British Municipal History* and to Mrs J. R. Green's more popular *Town Life in the Fifteenth Century.* The municipal records of London, its hustings court and city companies, are too multifarious to describe; some classes of these documents have been exemplified in the works of Dr R. R. Sharpe. Ecclesiastical records are represented by the episcopal registers (for the most part still unpublished), monastic cartularies, and other documents rendered comparatively scarce by the spoliation of the monasteries, and scattered proceedings of ecclesiastical courts. (See also the article RECORD.)

Documents, other than records strictly so called, begin to grow with the habit of correspondence and the necessity of communication. A few letters survive from the time of the Norman kings, but the earliest collection of English royal letters is the *Letters of Henry III.* (Rolls series). Contemporary are the *Letters of Grosseteste*, and a little later come the *Letters of Archbishop Peckham* and Raine's *Letters from Northern Registers* (all in the Rolls series). Private correspondence appeared earlier in the voluminous epistles of Peter of Blois, archdeacon of Bath (ed. Giles). This is a somewhat intermittent source of history until we come to the 15th century, when the well-known *Paston*

Letters (ed. Gairdner) begin a stream which never fails thereafter and soon becomes a torrent. The most important series of official correspondence is the *Papal Letters*, calendared from 1198 to 1404 in 4 vols. (ed. Bliss, Johnson and Twemlow). Subsidiary sources are the *Political Songs* (ed. Wright), treatises like those of John of Salisbury, Gerald of Wales, and, later, Wycliffe's works, Netter's *Fasciculi Zizaniorum*, Gascoigne's *Loci e libro veritatum*, Pecock's *Repressor*, and the literary writings of Chaucer, Langland, Gower, Richard Rolle and others.

During the 15th century the transition, which marks the change from medieval to modern history, affects also the character of historical sources and historical writing. In the first place, history ceases to be the exclusive province of the church; monastic chronicles shrink to a trickle and then dry up; the last of their kind in England is the *Greyfriars Chronicle* (Camden Society), which ends in 1554. Their place is taken by the city chronicle compiled by middle-class laymen, just as the Renaissance was not a revival of clerical learning, but the expression of new intellectual demands on the part of the laity. Secondly, the definite disappearance of the medieval ideas of a cosmopolitan world and the emergence of national states begat diplomacy, and with it an ever-swelling mass of diplomatic material. Diplomacy had hitherto been occasional and intermittent, and embassies rare; now we get resident ambassadors carrying on a regular correspondence (see DIPLOMACY). The mercantile interests of Venice made it the pioneer in this direction, though its representatives abroad were at first commercial rather than diplomatic agents. The *Calendar of Venetian State Papers* goes back to the 14th century, but does not become copious till the reign of Henry VII., when also the Spanish Calendar begins. Resident French ambassadors in England only begin in the 16th century, and later still those from the emperor, the German and Italian states other than Venice. In the third place, the development of the new monarchy involved an enormous extension of the activity of the central government, and therefore a corresponding expansion in the records of its energy.

The political records of this energy are the State Papers, a class of document which soon dwarfs all others, and renders chroniclers, historians and the like almost negligible quantities as sources of history; but in another way their value is enhanced, for these hundreds of thousands of documents provide a test of the accuracy of modern historians which is imperfect in the case of medieval chroniclers and almost non-existent in that of ancient writers. These state papers are either "foreign" or "domestic," that is to say, the correspondence of the English government with its agents abroad, or at home. There is also the correspondence of foreign ambassadors resident in England with their governments. This last class of documents exists in England mainly in the form of transcripts from the originals in foreign archives, which have been made for the purpose of the Venetian and Spanish Calendars of state papers. The Venetian Calendar had by 1909 been carried well into the 17th century; the Spanish (which includes transcripts from the Habsburg archives at Vienna, Brussels and Simancas) covered only the reigns of Henry VII. and VIII. and Queen Elizabeth. No attempt had yet been made to calendar the French correspondence in a similar way, though the French Foreign Office published some fragmentary collections, such as the *Correspondance de MM. de Castillon et de Marillac* and that of Odet de Selve. There are other collections too numerous to enumerate, such as Lettenhove's edition of Philip II.'s correspondence relating to the Netherlands, Diegerick and Müller's, Teulet's and Albéri's collections, the French *Documents inédits* and the Spanish *Documentos ineditos*, all containing state papers relating to England's foreign policy in the 16th century. The Scottish and Irish state papers are calendared in separate series and without much system. Thus for Scottish affairs there are four series, the Border Papers, the Hamilton Papers, Thorp's Calendar, and, more recent and complete, Bain's Calendar. For Ireland, besides the regular Irish state papers, there are the Carew Papers, almost as important. Anarchy, indeed, pervades the whole method of publication. For the reign of Henry VII. we have, besides the Venetian and Spanish Calendars, only three volumes—Gairdner's *Letters and Papers of Richard III. and Henry VII.* and Campbell's *Materials* (2 vols., Rolls series). Then with the reign of Henry VIII. begins the magnificent and monumental *Letters and Papers of Henry VIII.*, the one modern series for which the Record Office deserves unstinted praise. This is not limited to state papers, domestic and foreign, nor to documents in the Record Office; it calendars private letters, grants, &c., extant in the British Museum and elsewhere. It extends to 21 volumes, each volume consisting of two or more parts, and some parts (as in vol. iv.) containing over a thousand pages; it comprises at least fifty thousand documents. Its value, however, varies; the earlier volumes are not so full as the later, the documents are not so well calendared, and some classes are excluded from earlier, which appear in the later, volumes.

After 1547 a different plan is adopted, though not consistently followed. Only state papers are calendared, and as a rule only those in the Record Office; and the domestic are separated from the foreign. The great fault is the neglect of the vast quantities of state papers in the British Museum. The Domestic Calendar (the first volume of which is very inadequate) extended in 1909 in a series of more than seventy volumes nearly to the end of the 17th century; the mass of MSS. calendared therein may be gathered from the fact that for the reign of Elizabeth the Domestic state papers fill over three hundred MS. volumes. The Foreign Calendar had only got to 1582, but it occupied sixteen printed volumes against one of the Domestic Calendar. For the masses of MSS. uncalendared in the British Museum there is no guide except the imperfect indexes to the Cotton, Harleian, Lansdowne, Additional and other collections. Hardly less important than the calendars are the reports of the Historical Manuscripts Commission and the appendices thereto, which extend to over a hundred volumes; twelve are occupied by Lord Salisbury's 16th-century MSS. at Hatfield House. The dispersion of these state papers is due to the fact that they were in those days treated not as the property of the state, but as the private property of individual secretaries.

State papers represent only one side of the activity of the central government. The register of the privy council, extending with some lacunae from 1539 to 1604, has been printed in thirty-two volumes. The *Rotuli parliamentorum* end with Henry VII., but in 1509 begin the journals of the House of Lords, and in 1547 the journals of the House of Commons. These are supplemented by private diaries of members of parliament, several of which were used in D'Ewes's *Journals*. Legal history can now be followed in a continuous series of law reports, beginning with Keilway, Staunford and Dyer, and going on with Coke and many others; documentary records of various courts are exemplified in the *Select Cases* from the star chamber, the court of requests and admiralty courts, published by the Selden Society; and there are voluminous records of the courts of augmentations, first-fruits, wards and liveries in the Record Office. For Ireland, besides the state papers, there are the Calendars of Patents and of Fiants, and for Scotland the Exchequer Rolls and Registers of the Privy Council and of the Great Seal, both extending to many volumes.

Unofficial sources multiply with equal rapidity, but it is impossible to enumerate the collections of private letters, &c., only a few of which have been published. The chronicles, which in the 15th century are usually meagre productions like Warkworth's (Camden Society), get fuller, especially those emanating from London. Fabyan is succeeded by Hall, an indispensable authority for Henry VIII., and Hall by Grafton. Other useful books are Wriothesley's *Chronicle* and Machyn's *Diary*, and they have numerous successors; some of their works have been edited for the Camden Society, which now takes the place of the Rolls series. The most important are Holinshed, Stow and Camden; and gradually, with Speed and Bacon, the chronicle develops into the history, and early in the 17th century we get such works as Lord Herbert's *Reign of Henry VIII.*, Hayward's *Edward VI.*, and, on the ecclesiastical side, Heylyn, Fuller, Burnet and Collier's histories of the church and

Reformation. Foxe, who died in 1587, included a vast and generally accurate collection of documents in his *Acts and Monuments*, popularized as the *Book of Martyrs*, though his own contributions have to be discounted as much as those of Sanders, Parsons and other Roman Catholic controversialists. Two other great collections are the Parker Society's publications (56 vols.), which contain besides the works of the reformers a considerable number of their letters, and Strype's works (26 vols.). The naval epic of the period is Hakluyt's *Navigations*, re-edited in 12 vols. in 1902, and continued in Purchas's *Pilgrims*.

In the 17th century the domestic and foreign state papers eclipse other sources almost more completely than in the 16th. The colonial state papers now become important and extensive, those relating to America and the West Indies being most numerous (18 vols. to 1700). Parliamentary records naturally expand, and the journals of both Houses become more detailed. Parliamentary diarists like D'Ewes, Burton and Walter Yonge, only a fragment of whose shorthand notes in the British Museum has been published (Camden Society), elucidate the bare official statements; and from 1660 the series of parliamentary debates is fairly complete, though not so full or authoritative as it becomes with Hansard in the 19th century. Social diarists of great value appear after the Restoration in Pepys, Evelyn, Reresby, Narcissus Luttrell and Swift (*Journal to Stella*), and political writing grows more important as a source of history, whether it takes the form of Bacon's (ed. Spedding) or Milton's treatises, or of satires like Dryden's and political pamphlets like Halifax's and then Swift's, Defoe's and Steele's. Clarendon's *Great Rebellion* and Burnet's *History of My Own Time* are the first modern attempts at contemporary history, as distinct from chronicles and annals, in England, although it is difficult to exclude the work of Matthew Paris from the category. The innumerable tracts and newsletters are a valuable source for the Civil Wars and Commonwealth period (see J. B. Williams, *A History of English Journalism*, 1909), while Thurloe's, Clarendon's and Nalson's collections of state papers deserve a mention apart from the Domestic Calendar. There is a still more monumental collection—the Carte Papers—on Irish affairs in the Bodleian Library, where also the Tanner MSS. and other collections have only been very partially worked. The volumes of the Historical MSS. Commission are of great value for the later Stuart period, notably the House of Lords MSS.

For the 18th century the only calendars are the Home Office Papers and the Treasury Books and Papers, the further specialization of government having made it necessary to differentiate domestic state papers into several classes. But it need hardly be said that the bulk of correspondence in the Record Office does not diminish. Outside its walls the most important single collection is perhaps the duke of Newcastle's papers among the Additional MSS. in the British Museum; the Stuart papers at Windsor, Mr Fortescue's at Dropmore, Lord Charlemont's (Irish affairs), Lord Dartmouth's (American affairs) and Lord Carlisle's, all calendared by the Historical MSS. Commission, are also valuable. Chatham's correspondence with colonial governors has been published (2 vols., 1906), as have the *Grenville Papers*, *Bedford Correspondence*, Malmesbury's *Diaries*, Auckland's *Journals and Correspondence*, Grafton's *Correspondence*, Lord North's *Correspondence with George III.*, and other correspondence in *The Memoirs of Rockingham*, and the duke of Buckingham's *Court and Cabinets of George III.* Mention should also be made of Gower's *Despatches*, the *Cornwallis Correspondence*, Rose's *Correspondence* and Lord Colchester's *Correspondence*. Of special interest is the series of naval records, despatches to and from naval commanders, proceedings of courts-martial, and logs in the Record Office which have never been properly utilized.

Among unofficial sources the most characteristic of the 18th century are letters, memoirs and periodical literature. Horace Walpole's *Letters* (Clarendon Press, 16 vols.) are the best comment on the history of the period; his *Memoirs* are not so good, though they are superior to Wraxall, who succeeds him. Periodical literature becomes regular in the reign of Queen Anne, chiefly in the form of journals like the *Spectator*; but several daily newspapers, including *The Times*, were founded during the century. *The Craftsman* provided a vehicle for Bolingbroke's attacks on Walpole, while the *Gentleman's Magazine* and *Annual Register* begin a more serious and prolonged career. Both contain occasional state papers, and not very trustworthy reports of parliamentary proceedings. The publication of debates was not authorized till the last quarter of the century; parliamentary papers begin earlier, but only slowly attain their present portentous dimensions. Political writing is at its best from Halifax to Cobbett, and its three greatest names are perhaps Swift, "Junius" and Burke, though Steele, Defoe, Bolingbroke and Dr Johnson are not far behind, while Canning's contributions to the *Anti-Jacobin* and Gillray's caricatures require mention.

The sources for 19th-century history are somewhat similar to those for the 18th. Diaries continue in the *Creevey Papers*, Greville's Diary, and lesser but not less voluminous writers like Sir M. E. Grant-Duff. The most important series of letters is Queen Victoria's (ed. Lord Esher and A. C. Benson, 1908), and the correspondence of most of her prime ministers and many of her other advisers has been partially published. Of political biographies there is no end. The great bulk of material, however, consists of blue-books, Hansard's *Parliamentary Debates*, and newspapers—which are better as indirect than direct evidence. The real truth is not of course revealed at once, and many episodes in 19th-century history are still shrouded by official secrecy. In this respect English governments are more cautious or reactionary than many of those on the continent of Europe, and access to official documents is denied when it is granted elsewhere; even the lapse of a century is not considered a sufficient salve for susceptibilities which might be wounded by the whole truth.

Meanwhile the 19th century witnessed a great development in historical writing. In the middle ages the stimulus to write was mainly of a moral or ecclesiastical nature, though the patriotic impulse which had suggested the Anglo-Saxon Chronicle was perhaps never entirely absent, and the ecclesiastical motive often degenerated into a desire to glorify, sometimes even by forgery, not merely the church as a whole, but the particular monastery to which the writer belonged. As nationalism developed, the patriotic motive supplanted the ecclesiastical, and stress is laid on the "famous" history of England. Insular self-glorification was, however, modified to some extent by the Renaissance, which developed an interest in other lands, and the Reformation, which gave to much historical writing a partisan theological bias. This still colours most of the "histories" of the Reformation period, because the issues of that time are living issues, and the writers of these histories are committed beforehand by their profession and their position to a particular interpretation. In the 17th century political partisanship coloured historical writing, and that, too, remained a potent motive so long as historians were either Whigs or Tories. Histories were often elaborate party pamphlets, and this race of historians is hardly yet extinct. Macaulay is not greatly superior in impartiality to Hume; Gibbon and Robertson were less open to temptation because they avoided English subjects. Hallam deliberately aimed at impartiality, but he could not escape his Whig atmosphere. Nevertheless, the effort to be impartial marks a new conception of history, which is well expressed in Lord Acton's admonition to his contributors in the *Cambridge Modern History*. Historians are to serve no cause but that of truth; in so far even as they desire a line of investigation to lead to a particular result, they are not, maintains Professor Bury, real historians. S. R. Gardiner perhaps attained most nearly this severe ideal among English historians, and Ranke among Germans. But, even when all conscious bias is eliminated, the unconscious bias remains, and Ranke's history of the Reformation is essentially a middle-class, even *bourgeois*, presentment. Stubbs's medievalist sympathies colour his history throughout, and still more strongly does Froude's anticlericalism. Freeman's bias was peculiar; he is really a West Saxon of Godwine's time reincarnated, and his Somerset hatred of French, Scots and Mercian foreigners sets off his robust loyalty to the house of Wessex. Lecky and Creighton are almost as dispassionate as Gardiner, but are more definitely committed to particular points of views, while democratic fervour pervades the fascinating pages of J.R.Green, and an intellectual secularism, which is almost religious in its intensity and idealism, inspired the genius of Maitland.

The latest controversy about history is whether it is a science or an art. It is, of course, both, simply because there must be science in every art and art in every science. The antithesis is largely false; science lays stress on analysis, art on synthesis. The historian must apply scientific methods to his materials and artistic methods to his results; he must test his documents and then turn them into literature. The relative importance of the two methods is a matter of dispute. There are some who still maintain that history is merely an art, that the best history is the story that is best told, and that what is said is less important than the way in which it is said. This school generally ignores records. Others attach little importance to the form in which truth is presented; they are concerned mainly with the principles and methods of scientific criticism, and specialize in palaeography, diplomatic and sources. The works of this school are little read, but in time its results penetrate the teaching in schools and universities, and then the pages of literary historians; it is represented in England by a fairly good organization, the Royal Historical Society (with which the Camden Society has been amalgamated), and by an excellent periodical, *The English Historical Review* (founded in 1884), while some sort of propaganda is attempted by the Historical Association (started in 1906). Its standards have also been upheld with varying success in great co-operative undertakings, such as the *Dictionary of National Biography*, the *Cambridge Modern History*, and Messrs Longmans' *Political History of England.*

These 19th-century products require some sort of classification for purposes of reference, and the chronological is the most convenient. Lingard's, J. R. Green's and Messrs Longmans' histories are the only notable attempts to tell the history of England as a whole, though Stubbs's *Constitutional History* (3 vols.) covers the middle ages and embodies a political survey as well (for corrections and modifications see Petit-Dutaillis, *Supplementary Studies*, 1908), while Hallam's *Constitutional History* (3 vols.) extends from 1485 to 1760 and Erskine May's (3 vols.) from 1760 to 1860. Sir James Ramsay's six volumes also cover the greater part of medieval English history. There is no work on a larger scale than Lappenberg and Kemble, dealing with England before the Norman Conquest, though J. R. Green's *Making of England* and *Conquest of England* deal with certain portions in some detail, and Freeman gives a preliminary survey in his *Norman Conquest* (6 vols.). For the succeeding period see Freeman's *William Rufus*, J. H. Round's *Feudal England* and *Geoffrey de Mandeville*, and Miss Norgate's *England under the Angevins* and *John Lackland.* From 1216 we have nothing but Ramsay, Stubbs, Longmans' *Political History* and monographs (some of them good), until we come to Wylie's *Henry IV.* (4 vols.); and again from 1413 the same is true (Gairdner's *Lollardy and the Reformation* being the most elaborate monograph) until we come to Brewer's *Reign of Henry VIII.* (2 vols.; to 1530 only), Froude's *History* (12 vols., 1529–1588) and R. W. Dixon's *Church History* (6 vols., 1529–1570). From 1603 to 1656 we have Gardiner's *History* (England, 10 vols.; Civil War, 4 vols.; Commonwealth and Protectorate, 3 vols.), and to 1714 Ranke's *History of England* (6 vols.; see also Firth's *Cromwell* and *Cromwell's Army*, and various editions of texts and monographs). For Charles II. there is no good history; then come Macaulay, and Stanhope and Wyon's *Queen Anne*, and for the 18th century Stanhope and Lecky (England, 7 vols.; Ireland, 5 vols.). From 1793 to 1815 is another gap only partially filled. Spencer Walpole deals with the period from 1815 to 1880, and Herbert Paul with the years 1846–1895.

A few books on special subjects deserve mention. For legal history see Pollock and Maitland's *History of English Law* (2 vols. to Edward I.), Maitland's *Domesday Book and Beyond*, and Anson's *Law and Custom of the Constitution*; for economic history, Cunningham's *Growth of Industry and Commerce*, and Ashley's *Economic History*; for ecclesiastical history, Stephens and Hunt's series (7 vols.); for foreign and colonial, Seeley's *British Foreign Policy* and *Expansion of England*, and J. A. Doyle's books on the American colonies; for military history, Fortescue's *History of the British Army*, Napier's and Oman's works on the *Peninsular War*, and Kinglake's *Invasion of the Crimea*; and for naval history, Corbett's *Drake and the Tudor Navy*, *Successors of Drake*, *English in the Mediterranean* and *Seven Years' War*, and Mahan's *Influence of Sea-Power on History* and *Influence of Sea-Power upon the French Revolution and Empire.*

Bibliography of Bibliographies.—The sources for the middle ages have been enumerated in C. Gross's *Sources and Literature of English History . . . to about 1485* (London, 1900), but there is nothing similar for modern history. G. C. Lee's *Source Book of English History* is not very satisfactory. More information can be obtained from the bibliographies appended to the volumes in Longmans' *Political History*, or the chapters in the *Cambridge Modern History*, or to the biographical articles in the *D.N.B.* and *Ency. Brit.* A series of bibliographical leaflets for the use of teachers is issued by the Historical Association. For MSS. sources see Scargill-Bird's *Guide to the Record Office*, and the class catalogues in the MSS. Department of the British Museum. Lists of the state papers and other documents printed and calendared under the direction of the master of the Rolls and deputy keeper of the Records are supplied at the end of many of their volumes. (A. F. P.)

ENGLISH LANGUAGE. In its historical sense, the name *English* is now conveniently used to comprehend the language of the English people from their settlement in Britain to the present day, the various stages through which it has passed being distinguished as Old, Middle, and New or Modern English. In works yet recent, and even in some still current, the term is confined to the third, or at most extended to the second and third of these stages, since the language assumed in the main the vocabulary and grammatical forms which it now presents, the oldest or inflected stage being treated as a separate language, under the title of *Anglo-Saxon*, while the transition period which connects the two has been called *Semi-Saxon.* This view had the justification that, looked upon by themselves, either as vehicles of thought or as objects of study and analysis, Old English or Anglo-Saxon and Modern English are, for all practical ends, distinct languages,—as much so, for example, as Latin and Spanish. No amount of familiarity with Modern English, including its local dialects, would enable the student to read Anglo-Saxon, three-fourths of the vocabulary of which have perished and been reconstructed within 900 years;[1] nor would a knowledge even of these lost words give him the power, since the grammatical system, alike in accidence and syntax, would be entirely strange to him. Indeed, it is probable that a modern Englishman would acquire the power of reading and writing French in less time than it would cost him to attain to the same proficiency in Old English; so that if the test of distinct languages be their degree of practical difference from each other, it cannot be denied that "Anglo-Saxon" is a distinct language from Modern English. But when we view the subject historically, recognizing the fact that living speech is subject to continuous change in certain definite directions, determined by the constitution and circumstances of mankind, as an evolution or development of which we can trace the steps, and that, owing to the abundance of written materials, this evolution appears so gradual in English that we can nowhere draw distinct lines separating its successive stages, we recognize these stages as merely temporary phases of an individual whole, and speak of the English language as used alike by Cynewulf, by Chaucer, by Shakespeare and by Tennyson.[2] It must not be forgotten, however, that in this wide sense the English language includes, not only the literary or courtly forms of speech used at successive periods, but also the popular and, it may be, altogether unwritten dialects that exist by their side. Only on this basis, indeed, can we speak of Old, Middle and Modern English as the same *language*, since in actual fact the precise *dialect* which is now the cultivated language, or "Standard English," is not the descendant of that dialect which was the cultivated language or "Englisc" of Alfred, but of a sister dialect then sunk in comparative obscurity,—even as the direct descendant of Alfred's Englisc is now to be found in the non-literary rustic speech of Wiltshire and Somersetshire. Causes which, linguistically considered, are external and accidental, have shifted the political and intellectual centre of England, and along with it transferred literary and official patronage from one form of English to another; if the centre of influence had happened to be fixed at York or on the banks of the Forth, both would probably have been neglected for a third.

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[1] A careful examination of several letters of Bosworth's Anglo-Saxon dictionary gives in 2000 words (including derivatives and compounds, but excluding orthographic variants) 535 which still exist as modern English words.

[2] The practical convenience of having one name for what was the same thing in various stages of development is not affected by the probability that (E. A. Freeman notwithstanding) *Engle* and *Englisc* were, at an early period, *not* applied to the whole of the inhabitants of Teutonic Britain, but only to a part of them. The dialects of *Engle* and *Seaxan* were alike old forms of what was afterwards English speech, and so, viewed in relation to it, *Old English*, whatever their contemporary names might be.

The English language, thus defined, is not "native" to Britain, that is, it was not found there at the dawn of history, but was introduced by foreign immigrants at a date many centuries later. At the Roman Conquest of the island the languages spoken by the natives belonged all (so far as is known) to the Celtic branch of the Indo-European or Indo-Germanic family, modern forms of which still survive in Wales, Ireland, the Scottish Highlands, Isle of Man and Brittany, while one has at no distant date become extinct in Cornwall (see CELT: *Language*). Brythonic dialects, allied to Welsh and Cornish, were apparently spoken over the greater part of Britain, as far north as the firths of Forth and Clyde; beyond these estuaries and in the isles to the west, including Ireland and Man, Goidelic dialects, akin to Irish and Scottish Gaelic, prevailed. The long occupation of south Britain by the Romans (A.D. 43–409)—a period, it must not be forgotten, equal to that from the Reformation to the present day, or nearly as long as the whole duration of modern English—familiarized the provincial inhabitants with Latin, which was probably the ordinary speech of the towns. Gildas, writing nearly a century and a half after the renunciation of Honorius in 410, addressed the British princes in that language;[1] and the linguistic history of Britain might have been not different from that of Gaul, Spain and the other provinces of the Western Empire, in which a local type of Latin, giving birth to a neo-Latinic language, finally superseded the native tongue except in remote and mountainous districts,[2] had not the course of events been entirely changed by the Teutonic conquests of the 5th and 6th centuries.

The Angles, Saxons, and their allies came of the Teutonic stock, and spoke a tongue belonging to the Teutonic or Germanic branch of the Indo-Germanic (Indo-European) family, the same race and form of speech being represented in modern times by the people and languages of Holland, Germany, Denmark, the Scandinavian peninsula and Iceland, as well as by those of England and her colonies. Of the original home of the so-called primitive Aryan race (*q.v.*), whose language was the parent Indo-European, nothing is certainly known, though the subject has called forth many conjectures; the present tendency is to seek it in Europe itself. The tribe can hardly have occupied an extensive area at first, but its language came by degrees to be diffused over the greater part of Europe and some portion of Asia. Among those whose Aryan descent is generally recognized as beyond dispute are the Teutons, to whom the Angles and Saxons belonged.

The Teutonic or Germanic people, after dwelling together in a body, appear to have scattered in various directions, their language gradually breaking up into three main groups, which can be already clearly distinguished in the 4th century A.D., North Germanic or Scandinavian, West Germanic or Low and High German, and East Germanic, of which the only important representative is Gothic. Gothic, often called Moeso-Gothic, was the language of a people of the Teutonic stock, who, passing down the Danube, invaded the borders of the Empire, and obtained settlements in the province of Moesia, where their language was committed to writing in the 4th century; its literary remains are of peculiar value as the oldest specimens, by several centuries, of Germanic speech. The dialects of the invaders of Britain belonged to the West Germanic branch, and within this to the Low German group, represented at the present day by Dutch, Frisian, and the various "Platt-Deutsch" dialects of North Germany. At the dawn of history the forefathers of the English appear to have been dwelling between and about the estuaries and lower courses of the Rhine and the Weser, and the adjacent coasts and isles; at the present day the most English or Angli-form dialects of the European continent are held to be those of the North Frisian islands of Amrum and Sylt, on the west coast of Schleswig. It is well known that the greater part of the ancient Friesland has been swept away by the encroachments of the North Sea, and the *disjecta membra* of the Frisian race, pressed by the sea in front and more powerful nationalities behind, are found only in isolated fragments from the Zuider Zee to the coasts of Denmark. Many Frisians accompanied the Angles and Saxons to Britain, and Old English was in many respects more closely connected with Old Frisian than with any other Low German dialect. Of the Geatas, Eotas or "Jutes," who, according to Bede, occupied Kent and the Isle of Wight, and formed a third tribe along with the Angles and Saxons, it is difficult to speak linguistically. The speech of Kent certainly formed a distinct dialect in both the Old English and the Middle English periods, but it has tended to be assimilated more and more to neighbouring southern dialects, and is at the present day identical with that of Sussex, one of the old Saxon kingdoms. Whether the speech of the Isle of Wight ever showed the same characteristic differences as that of Kent cannot now be ascertained, but its modern dialect differs in no respect from that of Hampshire, and shows no special connexion with that of Kent. It is at least entirely doubtful whether Bede's Geatas came from Jutland; on linguistic grounds we should expect that they occupied a district lying not to the north of the Angles, but between these and the old Saxons.

The earliest specimens of the language of the Germanic invaders of Britain that exist point to three well-marked dialect groups: the Anglian (in which a further distinction may be made between the Northumbrian and the Mercian, or South-Humbrian); the Saxon, generally called West-Saxon from the almost total lack of sources outside the West-Saxon domain; and the Kentish. The Kentish and West-Saxon are sometimes, especially in later times, grouped together as southern dialects as opposed to midland and northern. These three groups were distinguished from each other by characteristic points of phonology and inflection. Speaking generally, the Anglian dialects may be distinguished by the absence of certain normal West-Saxon vowel-changes, and the presence of others not found in West-Saxon, and also by a strong tendency to confuse and simplify inflections, in all which points, moreover, Northumbrian tended to deviate more widely than Mercian. Kentish, on the other hand, occupied a position intermediate between Anglian and West-Saxon, early Kentish approaching more nearly to Mercian, owing perhaps to early historical connexion between the two, and late Kentish tending to conform to West-Saxon characteristics, while retaining several points in common with Anglian. Though we cannot be certain that these dialectal divergences date from a period previous to the occupation of Britain, such evidence as can be deduced points to the existence of differences already on the continent, the three dialects corresponding in all likelihood to Bede's three tribes, the Angles, Saxons and Geatas.

As it was amongst the *Engle* or Angles of Northumbria that literary culture first appeared, and as an Angle or *Englisc* dialect was the first to be used for vernacular literature, *Englisc* came eventually to be a general name for all forms of the vernacular as opposed to Latin, &c.; and even when the West-Saxon of Alfred became in its turn the literary or classical form of speech, it was still called Englisc or *English*. The origin of the name *Angul-Seaxan* (Anglo-Saxons) has been disputed, some maintaining that it means a union of Angles and Saxons, others (with better foundation) that it meant *English Saxons*, or Saxons of England or of the Angel-cynn as distinguished from Saxons of the Continent (see *New English Dictionary*, *s.v.*). Its modern use is mainly due to the little band of scholars who in the 16th and 17th centuries turned their attention to the long-forgotten language of Alfred and Ælfric, which, as it differed so greatly from the English of their own day, they found it convenient to distinguish by a name which was applied to themselves by those who spoke it.[1] To these scholars "Anglo-Saxon" and "English" were separated by a gulf which it was reserved for later scholarship to bridge across, and show the historical continuity of the English of all ages.

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[1] The works of Gildas in the original Latin were edited by Mr Stevenson for the English Historical Society. There is an English translation in *Six Old English Chronicles* in Bohn's Antiquarian library.

[2] As to the continued existence of Latin in Britain, see further in Rhys's *Lectures on Welsh Philology*, pp. 226-227; also Dogatschar, *Lautlehre d. gr., lat. u. roman. Lehnworte im Altengl.* (Strassburg, 1888).

As already hinted, the English language, in the wide sense, presents three main stages of development—Old, Middle and Modern—distinguished by their inflectional characteristics. The latter can be best summarized in the words of Dr Henry Sweet in his *History of English Sounds*:[2] "Old English is the period of *full* inflections (*nama, gifan, caru*), Middle English of *levelled* inflections (*naame, given, caare*), and Modern English of *lost* inflections (*name, give, care* = *nām, giv, cār*). We have besides two periods of *transition*, one in which *nama* and *name* exist side by side, and another in which final *e* [with other endings] is beginning to drop." By *lost* inflections it is meant that only very few remain, and those mostly non-syllabic, as the *-s* in stone*s* and love*s*, the *-ed* in lov*ed*, the *-r* in thei*r*, as contrasted with the Old English stán-*as*, lufað, luf-*od-e* and luf-*od-on*, þá-*ra*. Each of these periods may also be divided into two or three; but from the want of materials it is difficult to make any such division for all dialects alike in the first.

As to the chronology of the successive stages, it is of course impossible to lay down any exclusive series of dates, since the linguistic changes were inevitably gradual, and also made themselves felt in some parts of the country much earlier than in others, the north being always in advance of the midland, and the south much later in its changes. It is easy to point to periods at which Old, Middle and Modern English were fully developed, but much less easy to draw lines separating these stages; and even if we recognize between each part a "transition" period or stage, the determination of the beginning and end of this will to a certain extent be a matter of opinion. But bearing these considerations in mind, and having special reference to the midland dialect from which literary English is mainly descended, the following may be given as approximate dates, which if they do not demarcate the successive stages, at least include them:—

Old English or Anglo-Saxon . . .	to 1100
Transition Old English ("Semi-Saxon") .	1100 to 1150
Early Middle English	1150 to 1250
(Normal) Middle English	1250 to 1400
Late and Transition Middle English . .	1400 to 1485
Early Modern or Tudor English . . .	1485 to 1611
Seventeenth century transition . . .	1611 to 1688
Modern or current English	1689 onward

Dr Sweet has reckoned Transition Old English (Old Transition) from 1050 to 1150, Middle English thence to 1450, and Late or Transition Middle English (Middle Transition) 1450 to 1500. As to the Old Transition see further below.

The Old English or Anglo-Saxon tongue, as introduced into Britain, was highly inflectional, though its inflections at the date when it becomes known to us were not so full as those of the earlier Gothic, and considerably less so than those of Greek and Latin during their classical periods. They corresponded more closely to those of modern literary German, though both in nouns and verbs the forms were more numerous and distinct; for example, the German *guten* answers to *three* Old English forms,—*gódne, gódum, gódan*; *guter* to *two*—*gódre, gódra*; *liebten* to *two*,—*lufodon* and *lufeden*. Nouns had four cases, *Nominative*, *Accusative* (only sometimes distinct), *Genitive*, *Dative*, the latter used also with prepositions to express locative, instrumental, and most ablative relations; of a distinct *instrumental* case only vestiges occur. There were several declensions of nouns, the main division being that known in Germanic languages generally as strong and weak,—a distinction also extending to adjectives in such wise that every adjective assumed either the strong or the weak inflection as determined by associated grammatical forms. The first and second personal pronouns possessed a dual number = *we two, ye two*; the third person had a complete declension of the stem *he*, instead of being made up as now of the three stems seen in *he, she, they*. The verb distinguished the subjunctive from the indicative mood, but had only two inflected tenses, present and past (more accurately, that of incomplete and that of completed or "perfect" action)—the former also used for the future, the latter for all the shades of past time. The order of the sentence corresponded generally to that of German. Thus from King Alfred's additions to his translation of Orosius: "Donne þy ylcan dæge hi hine to þæm ade beran wyllað þonne todælað hi his feoh þaet þær to lafe bið æfter þæm gedrynce and þæm plegan, on fif oððe syx, hwilum on ma, swa swa þaes feos andefn bið" ("Then on the same day [that] they him to the pile bear will, then divide they his property that there to remainder shall be after the drinking and the sports, into five or six, at times into more, according as the property's value is").

The poetry was distinguished by alliteration, and the abundant use of figurative and metaphorical expressions, of bold compounds and archaic words never found in prose. Thus in the following lines from Beowulf (ed. Thorpe, l. 645, Zupitza 320):—

*St*ræt wæs *st*án-fáh, *st*ig wisode
*G*umum æt*g*ædere. *g*úð-byrne scán
*H*eard *h*ond-locen. *h*ring-iren scir
*S*ong in *s*earwum, þa hie to *s*ele furðum
*I*n hyra *g*ry're *g*eatwum *g*angan cwomon.

Trans.:—

The street was stone-variegated, the path guided
(The) men together; the war-mailcoat shone,
Hard hand-locked. Ring-iron sheer (bright ring-mail)
Sang in (their) cunning-trappings, as they to hall forth
In their horror-accoutrements going came.

The Old English was a homogeneous language, having very few foreign elements in it, and forming its compounds and derivatives entirely from its own resources. A few Latin appellatives learned from the Romans in the German wars had been adopted into the common West Germanic tongue, and are found in English as in the allied dialects. Such were *stræte* (street, *via strata*), *camp* (battle), *cásere* (Cæsar), *míl* (mile), *pín* (punishment), *mynet* (money), *pund* (pound), *wín* (wine); probably also *cyriĉe* (church), *biscop* (bishop), *læden* (Latin language), *cése* (cheese), *butor* (butter), *pipor* (pepper), *olfend* (camel, *elephantus*), *ynce* (inch, *uncia*), and a few others. The relations of the first invaders to the Britons were to a great extent those of destroyers; and with the exception of the proper names of places and prominent natural features, which as is usual were retained by the new population, few British words found their way into the Old English. Among these are named *broc* (a badger), *bréc* (breeches), *clút* (clout), *púl* (pool), and a few words relating to the employment of field or household menials. Still fewer words seem to have been adopted from the provincial Latin, almost the only certain ones being *castra*, applied to the Roman towns, which appeared in English as *cæstre*, *ceaster*, now found in composition as *-caster*, *-chester*, *-cester*, and *culina* (kitchen), which gave *cylen* (kiln). The introduction and gradual adoption of Christianity, brought a new series of Latin words connected with the offices of the church, the accompaniments of higher civilization, the foreign productions either actually made known, or mentioned in the Scriptures and devotional books. Such were *mynster* (monasterium), *munuc* (monk), *nunne* (nun), *maesse* (mass), *schol* (school), *ælmesse* (eleemosyna), *candel* (candela), *turtle* (turtur), *fic* (ficus), *cedar* (cedrus). These words, whose number increased from the 7th to the 10th century, are commonly called *Latin of the second period*, the Latin of the first period including the Latin words brought by the English from the continent, as well as those picked up in Britain either from the Roman provincials or the Welsh. The Danish invasions of the 8th and 10th centuries resulted in the establishment of extensive Danish and Norwegian populations, about the basin of the Humber and its tributaries, and above Morecambe Bay. Although these Scandinavian settlers must have greatly affected the language of their own localities, but few traces of their influence are to be found in the literature of the Old English period. As with the greater part of the words adopted from the Celtic, it was not until after the dominion of the Norman had overlaid all preceding conquests, and the new English began to emerge from the ruins of the old, that Danish words in any number made their appearance in books, as equally "native" with the Anglo-Saxon.

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[1] Æthelstan in 934 calls himself in a charter "Ongol-Saxna cyning and Brytaenwalda eallaes thyses iglandes"; Eadred in 955 is "Angul-seaxna cyning and cásere totius Britanniae," and the name is of frequent occurrence in documents written in Latin. These facts ought to be remembered in the interest of the scholars of the 17th century, who have been blamed for the use of the term Anglo-Saxon, as if they had invented it. By "Anglo-Saxon" language they meant the language of the people who *sometimes at least* called themselves "Anglo-Saxons." Even now the name is practically useful, when we are dealing with the subject *per se*, as is *Old English*, on the other hand, when we are treating it historically or in connexion with English as a whole.

[2] *Transactions of the Philological Society* (1873–1874), p. 620; new and much enlarged edition, 1888.

The earliest specimens we have of English date to the end of the 7th century, and belong to the Anglian dialect, and particularly to Northumbrian, which, under the political eminence of the early Northumbrian kings from Edwin to Ecgfrið, aided perhaps by the learning of the scholars of Ireland and Iona, first attained to literary distinction. Of this literature in its original form mere fragments exist, one of the most interesting of which consists of the verses uttered by Bede on his deathbed, and preserved in a nearly contemporary MS.:—

> Fore there neid faerae . naenig uuiurthit
> thonc snotturra . than him tharf sie,
> to ymb-hycggannæ . aer his hin-iongae,
> huaet his gastae . godaes aeththa yflaes,
> aefter deoth-daege . doemid uueorthae.

Trans.:—

> Before the inevitable journey becomes not any
> Thought more wise than (that) it is needful for him,
> To consider, ere his hence-going,
> What, to his ghost, of good or ill,
> After death-day, doomed may be.

But our chief acquaintance with Old English is in its West-Saxon form, the earliest literary remains of which date to the 9th century, when under the political supremacy of Wessex and the scholarship of King Alfred it became the literary language of the English nation, the classical "Anglo-Saxon." If our materials were more extensive, it would probably be necessary to divide the Old English into several periods; as it is, considerable differences have been shown to exist between the "early West-Saxon" of King Alfred and the later language of the 11th century, the earlier language having numerous phonetic and inflectional distinctions which are "levelled" in the later, the inflectional changes showing that the tendency to pass from the synthetical to the analytical stage existed quite independently of the Norman Conquest. The northern dialect, whose literary career had been cut short in the 8th century by the Danish invasions, reappears in the 10th in the form of glosses to the Latin gospels and a service-book, often called the *Ritual of Durham*, where we find that, owing to the confusion which had so long reigned in the north, and to special Northumbrian tendencies, *e.g.* the dropping of the inflectional *n* in both verbs and nouns, this dialect had advanced in the process of inflection-levelling far beyond the sister dialects of Mercian and the south, so as already to anticipate the forms of Early Middle English.

Among the literary remains of the Old English may be mentioned the epic poem of Beowulf, the original nucleus of which has been supposed to date to heathen and even continental times, though we now possess it only in a later form; the poetical works of Cynewulf; those formerly ascribed to Cædmon; several works of Alfred, two of which, his translation of Orosius and of *The Pastoral Care* of St Gregory, are contemporary specimens of his language; the Old English or Anglo-Saxon Chronicle; the theological works of Ælfric (including translations of the Pentateuch and the gospels) and of Wulfstan; and many works both in prose and verse, of which the authors are unknown.

The earliest specimens, the inscriptions on the Ruthwell and Bewcastle crosses, are in a Runic character; but the letters used in the manuscripts generally are a British variety of the Roman alphabet which the Anglo-Saxons found in the island, and which was also used by the Welsh and Irish.[1] Several of the Roman letters had in Britain developed forms, and retained or acquired values, unlike those used on the continent, in particular ꝺ ꝼ ᵹ ꞃ ꞅ ꞇ (d f g r s t). The letters *q* and *z* were not used, *q* being represented by *cw*, and *k* was a rare alternative to *c*; *u* or *v* was only a vowel, the consonantal power of *v* being represented as in Welsh by *f*. The Runes called *thorn* and *wên*, having the consonantal values now expressed by *th* and *w*, for which the Roman alphabet had no character, were at first expressed by *th*, ð (a contraction for ꝺꝺ or ꝺh), and *v* or *u*; but at a later period the characters þ and ƿ were revived from the old Runic alphabet. Contrary to Continental usage, the letters *c* and ᵹ (*g*) had originally only their hard or guttural powers, as in the neighbouring Celtic languages; so that words which, when the Continental Roman alphabet came to be used for Germanic languages, had to be written with *k*, were in Old English written with *c*, as *cêne*=keen, *cynd*=kind.[2] The key to the values of the letters, and thus to the pronunciation of Old English, is also to be found in the Celtic tongues whence the letters were taken.

The Old English period is usually considered as terminating 1120, with the death of the generation who saw the Norman Conquest. The Conquest established in England a foreign court, a foreign aristocracy and a foreign hierarchy.[3] The French language, in its Norman dialect, became the only polite medium of intercourse. The native tongue, despised not only as unknown but as the language of a subject race, was left to the use of boors and serfs, and except in a few stray cases ceased to be written at all. The natural results followed.[4] When the educated generation that saw the arrival of the Norman died out, the language, ceasing to be read and written, lost all its literary words. The words of ordinary life whose preservation is independent of books lived on as vigorously as ever, but the literary terms, those that related to science, art and higher culture, the bold artistic compounds, the figurative terms of poetry, were speedily forgotten. The practical vocabulary shrank to a fraction of its former extent. And when, generations later, English began to be used for general literature, the only terms at hand to express ideas above those of every-day life were to be found in the French of the privileged classes, of whom alone art, science, law and theology had been for generations the inheritance. Hence each successive literary effort of the reviving English tongue showed a larger adoption of French words to supply the place of the forgotten native ones, till by the days of Chaucer they constituted a notable part of the vocabulary. Nor was it for the time being only that the French words affected the English vocabulary. The Norman French words introduced by the Conquest, as well as the Central or Parisian French words which followed under the early Plantagenets, were mainly Latin words which had lived on among the people of Gaul, and, modified in the mouths of succeeding generations, had reached forms more or less remote from their originals. In being now adopted as English, they supplied precedents in accordance with which other Latin words might be converted into English ones, whenever required; and long before the Renascence of classical learning, though in much greater numbers after that epoch, these precedents were freely followed.

While the eventual though distant result of the Norman Conquest was thus a large reconstruction of the English vocabulary, the grammar of the language was not directly affected by it. There was no reason why it should—we might almost add, no way by which it could. While the English used their own *words*, they could not forget their own *way* of using them, the inflections and constructions by which alone the words expressed ideas—in other words, their grammar; when one by one French words were introduced into the sentence they became English by the very act of admission, and were at once subjected to all the duties and liabilities of English words in the same position. This is of course precisely what happens at the present day: *telegraph* and *telegram* make participle *telegraphing* and plural *telegrams*, and *naïve* the adverb *naïvely*, precisely as if they had been in the language for ages.

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[1] See on this Rhys, *Lectures on Welsh Philology*, v.

[2] During the Old English period both *c* and ᵹ appear to have acquired a palatal value in conjunction with front or palatal vowel-sounds, except in the north where *c*, and in some cases ᵹ, tended to remain guttural in such positions. This value was never distinguished in Old English writing, but may be deduced from certain phonetic changes depending upon it, and from the use of *c*, *cc*, as an alternative for *tj* (as in *ortᵹeard*, *orceard*=orchard, *fetian*, *feccean*= fetch), as well as from the normal occurrence of *ch* and *y* in these positions in later stages of the language, *e.g.* *cild*=child, *taècean*= teach, ᵹ*iellan*=yell, *dae*ᵹ=day, &c.

[3] For a discriminating view of the effects of the Norman Conquest on the English Language, see Freeman, *Norman Conquest*, ch. xxv.

[4] There is no reason to suppose that any attempt was made to proscribe or suppress the native tongue, which was indeed used in some official documents addressed to Englishmen by the Conqueror himself. Its social degradation seemed even on the point of coming to an end, when it was confirmed and prolonged for two centuries more by the accession of the Angevin dynasty, under whom everything French received a fresh impetus.

But indirectly the grammar was affected very quickly. In languages in the inflected or synthetic stage the terminations must be pronounced with marked distinctness, as these contain the correlation of ideas; it is all-important to hear whether a word is *bonus* or *bonis* or *bonas* or *bonos*. This implies a measured and distinct pronunciation, against which the effort for ease and rapidity of utterance is continually struggling, while indolence and carelessness continually compromise it. In the Germanic languages, as a whole, the main stress-accent falls on the radical syllable, or on the prefix of a nominal compound, and thus at or near the beginning of the word; and the result of this in English has been a growing tendency to suffer the concluding syllables to fall into obscurity. We are familiar with the cockney *winder*, *sofer*, *holler*, *Sarer*, *Sunder*, *would yer*, for wind*ow*, sof*a*, holl*a*, Sar*ah*, Sund*ay*, would *you*, the various final vowels sinking into an obscure neutral one now conventionally spelt *er*, but formerly represented by final *e*. Already before the Conquest, forms originally *hatu*, *sello*, *tunga*, appeared as *hate*, *selle*, *tunge*, with the terminations levelled to obscure *ĕ*; but during the illiterate period of the language after the Conquest this careless obscuring of terminal vowels became universal, all unaccented vowels in the final syllable (except *i*) sinking into *e*. During the 12th century, while this change was going on, we see a great confusion of grammatical forms, the full inflections of Old English standing side by side in the same sentence with the levelled ones of Middle English. It is to this state of the language that the names *Transition* and *Period of Confusion* (Dr Abbott's appellation) point; its appearance, as that of Anglo-Saxon broken down in its endings, had previously given to it the suggestive if not logical appellation of Semi-Saxon.

Although the written remains of the transition stage are few, sufficient exist to enable us to trace the course of linguistic change in some of the dialects. Within three generations after the Conquest, faithful pens were at work transliterating the old homilies of Ælfric, and other lights of the Anglo-Saxon Church, into the current idiom of their posterity.[1] Twice during the period, in the reigns of Stephen and Henry II., Ælfric's gospels were similarly modernized so as to be "understanded of the people."[2] Homilies and other religious works of the end of the 12th century[3] show us the change still further advanced, and the language passing into Early Middle English in its southern form. While these southern remains carry on in unbroken sequence the history of the Old English of Alfred and Ælfric, the history of the northern English is an entire blank from the 11th to the 13th century. The stubborn resistance of the north, and the terrible retaliation inflicted by William, apparently effaced northern English culture for centuries. If anything was written in the vernacular in the kingdom of Scotland during the same period, it probably perished during the calamities to which that country was subjected during the half-century of struggle for independence. In reality, however, the northern English had entered upon its transition stage two centuries earlier; the glosses of the 10th century show that the Danish inroads had there anticipated the results hastened by the Norman Conquest in the south.

Meanwhile a dialect was making its appearance in another quarter of England, destined to overshadow the old literary dialects of north and south alike, and become the English of the future. The Mercian kingdom, which, as its name imports, lay along the *marches* of the earlier states, and was really a congeries of the outlying members of many tribes, must have presented from the beginning a linguistic mixture and transition; and it is evident that more than one intermediate form of speech arose within its confines, between Lancashire and the Thames. The specimens of early Mercian now in existence consist mainly of glosses, in a mixed Mercian and southern dialect, dating from the 8th century; but, in a 9th-century gloss, the so-called Vespasian Psalter, representing what is generally held to be pure Mercian. Towards the close of the Old English period we find some portions of a gloss to the Rushworth Gospels, namely St Matthew and a few verses of St John xviii., to be in Mercian. These glosses, with a few charters and one or two small fragments, represent a form of Anglian which in many respects stands midway between Northumbrian and Kentish, approaching the one or the other more nearly as we have to do with North Mercian or South Mercian. And soon after the Conquest we find an undoubted midland dialect in the transition stage from Old to Middle English, in the eastern part of ancient Mercia, in a district bounded on the south and south-east by the Saxon Middlesex and Essex, and on the east and north by the East Anglian Norfolk and Suffolk and the Danish settlements on the Trent and Humber. In this district, and in the monastery of Peterborough, one of the copies of the Anglo-Saxon Chronicle, transcribed about 1120, was continued by two succeeding hands to the death of Stephen in 1154. The section from 1122 to 1131, probably written in the latter year, shows a notable confusion between Old English forms and those of a Middle English, impatient to rid itself of the inflectional trammels which were still, though in weakened forms, so faithfully retained south of the Thames. And in the concluding section, containing the annals from 1132 to 1154, and written somewhere about the latter year, we find Middle English fairly started on its career. A specimen of this new tongue will best show the change that had taken place:

1140 A.D.—*And*[4] te eorl of Angæu wærd ded, and his sune Henri toc to þe rice. And te cuen of France to-dælde fra þe king, and scæ co*m* to þe iunge eorl Henri. *and* he toc hire to wiue, *and* al Peitou mid hire. Þa ferde he mid micel færd into Engleland *and* wan castles—*and* te king ferde agenes hi*m* mid micel mare ferd. Þoþwæthere fuhtten hi noht. oc ferden þe ærceb*iscop* *and* te wise men betwux heo*m*, and makede *that* sahte *that* te king sculde ben lauerd *and* king wile he liuede. *and* æft*er* his dæi ware Henri king. *and* he helde hi*m* for fader, *and* he hi*m* for sune, *and* sib *and* sæhte sculde ben betwyx heo*m*, and on al Engleland.[5]

With this may be contrasted a specimen of southern English, from 10 to 20 years later (Hatton Gospels, Luke i. 46[6]):

Da cwæð Maria: Min saule mersed drihten, and min gast geblissode on gode minen hælende. For þam þe he geseah his þinene eadmodnysse: Soðlice henen-forð me eadige seggeð alle cneornesse; for þam þe me mychele þing dyde se þe mihtyg ys; *and* his name is halig. *And* his mildheortnysse of cneornisse on cneornesse hine ondraedende. He worhte maegne on hys earme; he to-daelde þa ofermode, on moda heora heortan. He warp þa rice of setlle, and þa eadmode he up-an-hof. Hyngriende he mid gode ge-felde, *and* þa ofermode ydele for-let. He afeng israel his cniht, and gemynde his mildheortnysse; Swa he spræc to ure fæderen, Abrahame *and* his sæde on a weorlde.

To a still later date, apparently close upon 1200, belongs the versified chronicle of Layamon or Laweman, a priest of Ernely on the Severn, who, using as his basis the French *Brut* of Wace, expanded it by additions from other sources to more than twice the extent: his work of 32,250 lines is a mine of illustration for the language of his time and locality. The latter was intermediate between midland and southern, and the language, though forty years later than the specimen from the Chronicle, is much more archaic in structure, and can scarcely be considered even as Early Middle English. The following is a specimen (lines 9064–9079):

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[1] MS. Cotton Vesp. A. 22.

[2] Gospels in Anglo-Saxon, &c., ed. for Cambridge Press, by W. W. Skeat (1871–1887), second text.

[3] *Old English Homilies of Twelfth Century*, first and second series, ed. R. Morris (E.E.T.S.), (1868–1873).

[4] The article þe becomes *te* after a preceding *t* or *d* by assimilation.

[5] Earle, *Two of the Saxon Chronicles parallel* (1865), p. 265.

[6] Skeat, *Anglo-Saxon and Northumbrian Gospels* (1874).

On Kinbelines daeie . . . Þe king wes inne Bruttene, com a Þissen middel aerde . . . anes maidenes sune, iboren wes in BeÞleem . . . of bezste alre burden. He is ihaten Jesu Crist . . . Þurh Þene halie gost, alre worulde wunne . . . walden englenne; faeder he is on heuenen . . . froure moncunnes; sune he is on eorðen . . . of sele Þon maeidene, & Þene halie gost . . . haldeð mid him seoluen.

The Middle English was pre-eminently the *Dialectal* period of the language. It was not till after the middle of the 14th century that English obtained official recognition. For three centuries, therefore, there was no standard form of speech which claimed any pre-eminence over the others. The writers of each district wrote in the dialect familar to them; and between extreme forms the difference was so great as to amount to unintelligibility; works written for southern Englishmen had to be translated for the benefit of the men of the north:—

> " In sotherin Inglis was it drawin,
> And turnid ic haue it till ur awin
> Langage of Þe northin lede
> That can na nothir Inglis rede."
> *Cursor Mundi*, 20,064.

Three main dialects were distinguished by contemporary writers, as in the often-quoted passage from Trevisa's translation of Higden's *Polychronicon* completed in 1387:—

> " Also Englysche men . . . hadde fram þe bygynnynge þre maner speche, Souþeron, Norþeron *and* Myddel speche (in Þe myddel of Þe lond) as hy come of Þre maner people of Germania. . . . Also of Þe forseyde Saxon tonge, Þat ys deled a Þre, *and* ys abyde scarslyche wiÞ feaw uplondysche men *and* ys gret wondur, for men of Þe est wiÞ men of þe west, as hyt were under Þe same part of heyvene, acordeÞ more in sounynge of sÞeche Þan men of Þe norÞ wiÞ men of þe souÞ; Þerfore hyt ys Þat Mercii, Þat buÞ men of myddel Engelond, as hyt were parteners of Þe endes, undurstondeÞ betre Þe syde longages NorÞeron and SouÞeron, Þan NorÞern *and* SouÞern undurstondeÞ oyÞer oÞer."

The modern study of these Middle English dialects, initiated by the elder Richard Garnett, scientifically pursued by Dr Richard Morris, and elaborated by many later scholars, both English and German, has shown that they were readily distinguished by the conjugation of the present tense of the verb, which in typical specimens was as follows:—

Southern.	
Ich singe.	We singeÞ.
Þou singest.	ʒe singeÞ.
He singeÞ.	Hy singeÞ.
Midland.	
Ich, I, singe.	We singen.
Þou singest.	ʒe singen.
He singeÞ.	Hy, thei, singen.
Northern.	
Ic, I, sing(e) (I Þat singes).	We sing(e), We Þat synges.
Þu singes.	ʒe sing(e), ʒe foules synges.
He singes.	Thay sing(e), Men synges.

Of these the southern is simply the old West-Saxon, with the vowels levelled to *e*. The northern second person in *-es* preserves an older form than the southern and West-Saxon *-est*; but the *-es* of the third person and plural is derived from an older *-eth*, the change of *-th* into *-s* being found in progress in the Durham glosses of the 10th century. In the plural, when accompanied by the pronoun subject, the verb had already dropped the inflections entirely as in Modern English. The origin of the *-en* plural in the midland dialect, unknown to Old English, is probably an instance of *form-levelling*, the inflection of the present indicative being assimilated to that of the past, and the present and past subjunctive, in all of which *-en* was the plural termination. In the declension of nouns, adjectives and pronouns, the northern dialect had attained before the end of the 13th century to the simplicity of Modern English, while the southern dialect still retained a large number of inflections, and the midland a considerable number. The dialects differed also in phonology, for while the northern generally retained the hard or guttural values of *k*, *g*, *sc*, these were in the two other dialects palatalized before front vowels into *ch*, *j* and *sh*. *Kirk*, *chirche* or *church*, *bryg*, *bridge; scryke*, *shriek*, are examples. Old English *hw* was written in the north *qu*(h), but elsewhere *wh*, often sinking into *w*. The original long *á* in *stán*, *már*, preserved in the northern *stane*, *mare*, became *ō* elsewhere, as in *stone*, *more*. So that the north presented a general aspect of conservation of old sounds with the most thorough-going dissolution of old inflections; the south, a tenacious retention of the inflections, with an extensive evolution in the sounds. In one important respect, however, phonetic decay was far ahead in the north: the final *e* to which all the old vowels had been levelled during the transition stage, and which is a distinguishing feature of Middle English in the midland and southern dialects, became mute, *i.e.*, disappeared, in the northern dialect before that dialect emerged from its three centuries of obscuration, shortly before 1300. So thoroughly modern had its form consequently become that we might almost call it Modern English, and say that the Middle English stage of the northern dialect is lost. For comparison with the other dialects, however, the same nomenclature may be used, and we may class as Middle English the extensive literature which northern England produced during the 14th century. The earliest specimen is probably the Metrical Psalter in the Cotton Library,[1] copied during the reign of Edward II. from an original of the previous century. The gigantic versified paraphrase of Scripture history called the *Cursor Mundi*,[2] is held also to have been composed before 1300. The dates of the numerous alliterative romances in this dialect have not been determined with exactness, as all survive in later copies, but it is probable that some of them were written before 1300. In the 14th century appeared the theological and devotional works of Richard Rolle the anchorite of Hampole, Dan Jon Gaytrigg, William of Nassington, and other writers whose names are unknown; and towards the close of the century, specimens of the language also appear from Scotland both in official documents and in the poetical works of John Barbour, whose language, barring minute points of orthography, is identical with that of the contemporary northern English writers. From 1400 onward, the distinction between northern English and Lowland Scottish becomes clearly marked.

In the southern dialect one version of the work called the *Ancren Riwle* or " Rule of Nuns," adapted about 1225 for a small sisterhood at Tarrant-Kaines, in Dorsetshire, exhibits a dialectal characteristic which had probably long prevailed in the south, though concealed by the spelling, in the use of *v* for *f*, as *valle* fall, *vordonne* fordo, *vorto* for to, *veder* father, *vrom* from. Not till later do we find a recognition of the parallel use of *z* for *s*. Among the writings which succeed, *The Owl and the Nightingale* of Nicholas de Guildford, of Portesham in Dorsetshire, before 1250, the *Chronicle* of Robert of Gloucester, 1298, and Trevisa's translation of Higden, 1387, are of special importance in illustrating the history of southern English. The earliest form of Langland's *Piers Ploughman*, 1362, as preserved in the Vernon MS., appears to be in an intermediate dialect between southern and midland.[3] The Kentish form of southern English seems to have retained specially archaic features; five short sermons in it of the middle of the 13th century were edited by Dr Morris (1866); but the great work illustrating it is the *Ayenbite of Inwyt* (Remorse of Conscience), 1340,[4] a translation from the French by Dan Michel of Northgate, Kent, who tells us—

> " Þet Þis boc is y-write mid engliss of Kent;
> Þis boc is y-mad uor lewede men,
> Vor uader, and uor moder, and uor oÞer ken,
> Ham uor to berʒe uram alle manyere zen,
> Þet ine hare inwytte ne bleue no uoul wen."

In its use of *v* (*u*) and *z* for *f* and *s*, and its grammatical inflections, it presents an extreme type of southern speech, with peculiarities specially Kentish; and in comparison with contemporary Midland English works, it looks like a fossil of two centuries earlier.

Turning from the dialectal extremes of the Middle English to the midland speech, which we left at the closing leaves of the

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[1] Edited for the Surtees Society, by Rev. J. Stevenson.

[2] Edited for the Early English Text Society, by Rev. Dr Morris.

[3] *The Vision of William concerning Piers the Ploughman* exists in three different recensions, all of which have been edited for the Early English Text Society by Rev. W. W. Skeat.

[4] Edited by Rev. Dr Morris for Early English Text Society, in 1866.

Peterborough *Chronicle* of 1154, we find a rapid development of this dialect, which was before long to become the national literary language. In this, the first great work is the *Ormulum*, or metrical Scripture paraphrase of Orm or Ormin, written about 1200, somewhere near the northern frontier of the midland area. The dialect has a decided smack of the north, and shows for the first time in English literature a large percentage of Scandinavian words, derived from the Danish settlers, who, in adopting English, had preserved a vast number of their ancestral forms of speech, which were in time to pass into the common language, of which they now constitute some of the most familiar words. *Blunt, bull, die, dwell, ill, kid, raise, same, thrive, wand, wing*, are words from this source, which appear first in the work of Orm, of which the following lines may be quoted:—

"Þe Judewisshe folkess boc
hemm seȝȝde, þatt hemm birrde
Twa bukkes samenn to þe preost
att kirrke-dure bringgenn;
And teȝȝ þa didenn bliþeliȝ,
swa summ þe boc hemm tahhte,
And brohhtenn tweȝȝenn bukkess þær
Drihhtin þærwiþþ to lakenn.
And att [1] te kirrke-dure toc
þe preost ta tweȝȝenn bukkess,
And o þatt an he leȝȝde þær
all þeȝȝre sake *and* sinne,
And lét itt eornenn forþwiþþ all
út inntill wilde wesste;
And toc *and* snaþ þatt oþerr bucc
Drihhtin þærwiþþ to lakenn.
All þiss wass don forr here ned,
and ec forr ure nede;
For hemm itt hallp biforenn Godd
to clennssenn hemm of sinne;
And all swa maȝȝ itt hellpenn þe
ȝiff þatt tu willt [itt] follȝhenn.
ȝiff þatt tu willt full innwarrdliȝ
wiþþ fulle trowwþe lefenn
All þatt tatt wass bitacnedd tær,
to lefenn *and* to trowwenn."

Ormulum, ed. White, l. 1324.

The author of the *Ormulum* was a phonetist, and employed a special spelling of his own to represent not only the quality but the *quantities* of vowels and consonants—a circumstance which gives his work a peculiar value to the investigator. He is generally assumed to have been a native of Lincolnshire or Notts, but the point is a disputed one, and there is somewhat to be said for the neighbourhood of Ormskirk in Lancashire.

It is customary to differentiate between east and west midland, and to subdivide these again into north and south. As was natural in a tract of country which stretched from Lancaster to Essex, a very considerable variety is found in the documents which agree in presenting the leading midland features, those of Lancashire and Lincolnshire approaching the northern dialect both in vocabulary, phonetic character and greater neglect of inflections. But this diversity diminishes as we advance.

Thirty years after the *Ormulum*, the east midland rhymed *Story of Genesis and Exodus* [2] shows us the dialect in a more southern form, with the vowels of modern English, and from about the same date, with rather more northern characteristics, we have an east midland *Bestiary*.

Different tests and different dates have been proposed for subdividing the Middle English period, but the most important is that of Henry Nicol, based on the observation that in the early 13th century, as in Ormin, the Old English short vowels in an open syllable still retained their short quantity, as *năma, ŏver, mĕte*; but by 1250 or 1260 they had been lengthened to *nā-me, ō-ver, mē-te*, a change which has also taken place at a particular period in all the Germanic, and even the Romanic languages, as in *buō-no* for *bŏ-num*, *pā-dre* for *pă-trem*, &c. The lengthening of the penult left the final syllable by contrast shortened or weakened, and paved the way for the disappearance of final *e* in the century following, through the stages *nă-me*, *nā-mĕ*, *nā-m'*, *nām*, the one long syllable in *nām*(*e*) being the quantitative equivalent of the two short syllables in *nă-mĕ*; hence the notion that mute *e* makes a preceding vowel long, the truth being that the lengthening of the vowel led to the *e* becoming mute.

After 1250 we have the *Lay of Havelok*, and about 1300 the writings of Robert of Brunne in South Lincolnshire. In the 14th century we find a number of texts belonging to the western part of the district. South-west midland is hardly to be distinguished from southern in its south-western form, and hence texts like *Piers Plowman* elude any satisfactory classification, but several metrical romances exhibit what are generally considered to be west midland characteristics, and a little group of poems, *Sir Gawayne and the Grene Knighte*, the *Pearl*, *Cleanness* and *Patience*, thought to be the work of a north-west midland writer of the 14th century, bear a striking resemblance to the modern Lancashire dialect. The end of the century witnessed the prose of Wycliff and Mandeville, and the poetry of Chaucer, with whom Middle English may be said to have culminated, and in whose writings its main characteristics as distinct from Old and Modern English may be studied. Thus, we find final *e* in full use representing numerous original vowels and terminations as

Him thoughtè that his hertè woldè brekè,

in Old English—

Him þuhte þæt his heorte wolde brecan,

which may be compared with the modern German—

Ihm däuchte dass sein Herze wollte brechen.

In nouns the *-es* of the plural and genitive case is still syllabic—

Reede as the berstl-es of a sow-es eer-es.

Several old genitives and plural forms continued to exist, and the dative or prepositional case has usually a final *e*. Adjectives retain so much of the old declension as to have *-e* in the definite form and in the plural—

The tend-re cropp-es and the yong-e sonne.
And smal-e fowl-es maken melodie.

Numerous old forms of comparison were in use, which have not come down to Modern English, as *herre, ferre, lenger, hext* = higher, farther, longer, highest. In the pronouns, *ich* lingered alongside of *I*; *ye* was only nominative, and *you* objective; the northern *thei* had dispossessed the southern *hy*, but *her* and *hem* (the modern *'em*) stood their ground against *their* and *them*. The verb is *I lov-e, thou lov-est, he lov-eth*; but, in the plural, *lov-en* is interchanged with *lov-e*, as rhyme or euphony requires. So in the plural of the past *we love-den* or *love-de*. The infinitive also ends in *en*, often *e*, always syllabic. The present participle, in Old English *-ende*, passing through *-inde*, has been confounded with the verbal noun in *-ynge, -yng*, as in Modern English. The past participle largely retains the prefix *y-* or *i-*, representing the Old English *ge-*, as in *i-ronne*, *y-don*, Old English *zerunnen*, *zedôn*, run, done. Many old verb forms still continued in existence. The adoption of French words, not only those of Norman introduction, but those subsequently introduced under the Angevin kings, to supply obsolete and obsolescent English ones, which had kept pace with the growth of literature since the beginning of the Middle English period, had now reached its climax; later times added many more, but they also dropped some that were in regular use with Chaucer and his contemporaries.

Chaucer's great contemporary, William Langland, in his *Vision of William concerning Piers the Ploughman*, and his imitator the author of *Pierce the Ploughman's Crede* (about 1400) used the Old English alliterative versification for the last time in the south. Rhyme had made its appearance in the language shortly after the Conquest—if not already known before; and in the south and midlands it became decidedly more popular than alliteration; the latter retained its hold much longer in the north, where it was written even after 1500: many of the northern romances are either simply alliterative, or have both alliteration and rhyme. To these characteristics of northern and southern verse respectively Chaucer alludes in the prologue of the "Persone," who, when called upon for his tale said:—

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[1] Here, and in *tatt, tu, taer*, for *þatt, þu, þaet*, after *t, d*, there is the same phonetic assimilation as in the last section of the Anglo-Saxon Chronicle above.

[2] Edited for the Early English Text Society by Dr Morris (1865).

"But trusteth wel; I am a sotherne man,
I cannot geste *rom, ram, ruf*, by my letter,
And, God wote, rime hold I but litel better:
And therefore, if you list, I wol not glose,
I wol you tell a litel tale in prose."

The changes from Old to Middle English may be summed up thus: Loss of a large part of the native vocabulary, and adoption of French words to fill their place; not infrequent adoption of French words as synonyms of existing native ones; modernization of the English words preserved, by vowel change in a definite direction from back to front, and from open to close, *ą̄* becoming *ǭ*, original *ē, ō*, tending to *ee, oo*, monophthongization of the old diphthongs *eo, ea*, and development of new diphthongs in connexion with *g, h*, and *w*; adoption of French orthographic symbols, *e.g. ou* for *ų̄, qu, v, ch*, and gradual loss of the symbols ᵹ, þ, ð, ƿ; obscuration of vowels after the accent, and especially of final *a, o, u* to *ĕ*; consequent confusion and loss of old inflections, and their replacement by prepositions, auxiliary verbs and rules of position; abandonment of alliteration for rhyme; and great development of dialects, in consequence of there being no standard or recognized type of English.

But the recognition came at length. Already in 1258 was issued the celebrated English proclamation of Henry III., or rather of Simon de Montfort in his name, which, as the only public recognition of the native tongue between William the Conqueror and Edward III., has sometimes been spoken of as the first specimen of English. It runs:—

"Henr*i* þurȝ godes fultume king on Engleneloande Lhoauerd on Yrloand*e*. Duk on Norm*andie* on Aquitain*e* and eorl on Aniow. Send igretinge to alle hise holde ilærde and ileawede on Huntendon*e*-schir*e*. þæt witen ȝe wel alle þæt *we* willen and vnne*n* þæt þæt vre rædesmen alle oþer þe moare dæl of heom þæt beoþ ichosen þurȝ us and þurȝ þæt loandes folk on vre kuneriche. habbeþ idon and schullen don in þe worþnesse of gode and on vre treowþe. for þe freme of þe loande. þurȝ þe besiȝte of þan to-foren-iseide redesmen. beo stedefæst and ilestinde in alle þinge a buten ænde. And we hoaten alle vre treowe in þe treowþe þæt heo vs oȝen. þæt heo stedefæstliche healden and swerien to healden and to werien þo isetnesses þæt þen imakede and beon to makien þurȝ þan to-foren iseide rædesmen. oþer þurȝ þe moare dæl of heom alswo alse hit is biforen iseid. And þæt æhc oþer helpe þæt for to done bi þan ilche oþe aȝenes alle men. Riȝt for to done and to foangen. And noan ne nime of loande ne of eȝte. wherþurȝ þis besiȝte muȝe beon ilet oþer iwersed on onie wise. And ȝif oni oþer onie cumen her onȝenes; we willen and hoaten þæt alle vre treowe heom healden deadliche ifoan. And for þæt we willen þæt þis beo stedefæst and lestinde; we senden ȝew þis writ open iseined wiþ vre seel. to halden amanges ȝew ine hord. Witnesse vs seluen æt Lunden*e*. þane Eȝtetenþe day. on þe Monþe of Octobr*e* In þe Two-and-fowertiȝþe ȝeare of vre cruninge. And þis wes idon ætforen vre isworene redesmen. . . .

"And al on þo ilche worden is isend in to æurihce oþre shcire ouer al þære kuneriche on Engleneloande. and ek in tel Irelonde."

The dialect of this document is more southern than anything else, with a slight midland admixture. It is much more archaic inflectionally than the *Genesis and Exodus* or *Ormulum*; but it closely resembles the old Kentish sermons and *Proverbs of Alfred* in the southern dialect of 1250. It represents no doubt the London speech of the day. London being in a Saxon county, and contiguous to Kent and Surrey, had certainly at first a southern dialect; but its position as the capital, as well as its proximity to the midland district, made its dialect more and more midland. Contemporary London documents show that Chaucer's language, which is distinctly more southern than standard English eventually became, is behind the London dialect of the day in this respect, and is at once more archaic and consequently more southern.

During the next hundred years English gained ground steadily, and by the reign of Edward III. French was so little known in England, even in the families of the great, that about 1350 "John Cornwal, a maystere of gramere, chaungede þe lore (=*teaching*) in gramere scole *and* construccion of [*i.e. from*] Freynsch into Englysch";[1] and in 1362–1363 English by statute took the place of French in the pleadings in courts of law. Every reason conspired that this "English" should be the midland dialect. It was the intermediate dialect, intelligible, as Trevisa has told us, to both extremes, even when these failed to be intelligible to each other; in its south-eastern form, it was the language of London, where the supreme law courts were, the centre of political and commercial life; it was the language in which the Wycliffite versions had given the Holy Scriptures to the people; the language in which Chaucer had raised English poetry to a height of excellence admired and imitated by contemporaries and followers. And accordingly after the end of the 14th century, all Englishmen who thought they had anything to say to their countrymen generally said it in the midland speech. Trevisa's own work was almost the last literary effort of the southern dialect; henceforth it was but a rustic patois, which the dramatist might use to give local colouring to his creations, as Shakespeare uses it to complete Edgar's peasant disguise in *Lear*, or which 19th century research might disinter to illustrate obscure chapters in the history of language. And though the northern English proved a little more stubborn, it disappeared also from literature in England; but in Scotland, which had now become politically and socially estranged from England, it continued its course as the national language of the country, attaining in the 15th and 16th centuries a distinct development and high literary culture, for the details of which readers are referred to the article on SCOTTISH LANGUAGE.

The 15th century of English history, with its bloody French war abroad and Wars of the Roses at home, was a barren period in literature, and a transition one in language, witnessing the decay and disappearance of the final *e*, and most of the syllabic inflections of Middle English. Already by 1420, in Chaucer's disciple Hoccleve, final *e* was quite uncertain; in Lydgate it was practically gone. In 1450 the writings of Pecock against the Wycliffites show the verbal inflections in *-en* in a state of obsolescence; he has still the southern pronouns *her* and *hem* for the northern *their, them*:—

"And here-aȝens holi scripture wole þat men schulden lacke þe coueryng which wommen schulden haue, & thei schulden so lacke bi þat þe heeris of her heedis schulden be schorne, & schulde not growe in lengþe doun as wommanys heer schulde growe. . . .

"Also here-wiþal into þe open siȝt of ymagis in open chirchis, alle peple, men & wommen & children mowe come whanne euere þei wolen in ech tyme of þe day, but so mowe þei not come in-to þe vce of bokis to be delyuered to hem neiþer to be red bifore hem; & þerfore, as for to soone & ofte come into remembraunce of a long mater bi ech oon persoon, and also as forto make þat þe mo persoones come into remembraunce of a mater, ymagis & picturis serven in a specialer maner þan bokis doon, þouȝ in an oþer maner ful substanciali bokis seruen better into remembrauncing of þo same materis þan ymagis & picturis doon; & þerfore, þouȝ writingis seruen weel into remembrauncing upon þe bifore seid þingis, ȝit not at þe ful: Forwhi þe bokis han not þe avail of remembrauncing now seid whiche ymagis han."[2]

The change of the language during the second period of Transition, as well as the extent of dialectal differences, is quaintly expressed a generation later by Caxton, who in the prologue to one of the last of his works, his translation of Virgil's *Eneydos* (1490), speaks of the difficulty he had in pleasing all readers:—

"I doubted that it sholde not please some gentylmen, whiche late blamed me, sayeng, y^t in my translacyons I had ouer curyous termes, whiche coud not be vnderstande of comyn peple, and desired me to vse olde and homely termes in my translacyons. And fayn wolde I satysfy euery man; and so to doo, toke an olde boke and redde therein; and certaynly the englysshe was so rude and brood that I coude not wele vnderstande it. And also my lorde abbot of Westmynster ded do shewe to me late certayn euydences wryton in olde englysshe for to reduce it in to our englysshe now vsid. And certaynly it was wreton in suche wyse that it was more lyke to dutche than englysshe; I coude not reduce ne brynge it to be vnderstonden. And certaynly, our langage now vsed varyeth ferre from that whiche was vsed and spoken whan I was borne. For we englysshemen ben borne vnder the domynacyon of the mone, whiche is neuer stedfaste, but euer wauerynge, wexynge one season, and waneth and dycreaseth another season. And that comyn englysshe that is spoken in one shyre varyeth from a nother. In so much that in my days happened that certayn marchauntes were in a ship*e* in tamyse, for to haue sayled ouer the sea into zelande, and for lacke of wynde thei taryed atte forlond, and wente to lande for to refreshe them. And one of theym named sheffelde, a mercer, cam in to an hows and axed for mete, and specyally he axyd after eggys, And the goode wyf answerde, that she coude speke no frenshe. And the marchaunt was angry, for he also coulde speke no frenshe, but wolde haue hadde egges; and she vnderstode hym not. And thenne at laste a nother sayd that he wolde haue eyren; then the good wyf sayd that she vnderstod hym wel. Loo! what sholde a man in thyse dayes now wryte, egges or eyren? certaynly, it is harde to playse euery man, by cause of dyuersite & chaunge of langage. For in these dayes, euery man that is in ony reputacyon in his countre wyll vtter his comynycacyon and maters in suche maners & termes that fewe men shall vnderstonde theym. And som honest and grete clerkes haue ben wyth me, and desired me to wryte the moste curyous termes that I coude fynde. And thus bytwene playn, rude and curyous, I stande abasshed; but in my Iudgemente, the comyn termes that be dayli vsed ben lyghter to be vnderstonde than the olde and auncyent englysshe."

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[1] Trevisa, *Translation of Higden's Polychronicon.*

[2] Skeat, *Specimens of English Literature*, pp. 49, 54.

In the productions of Caxton's press we see the passage from Middle to Early Modern English completed. The earlier of these have still an occasional verbal plural in *-n*, especially in the word *they ben*; the southern *her* and *hem* of Middle English vary with the northern and Modern English *their*, *them*. In the late works, the older forms have been practically ousted, and the year 1485, which witnessed the establishment of the Tudor dynasty, may be conveniently put as that which closed the Middle English transition, and introduced Modern English. Both in the completion of this result, and in its comparative permanence, the printing press had an important share. By its exclusive patronage of the midland speech, it raised it still higher above the sister dialects, and secured its abiding victory. As books were multiplied and found their way into every corner of the land, and the art of reading became a more common acquirement, the man of Northumberland or of Somersetshire had forced upon his attention the book-English in which alone these were printed. This became in turn the model for his own writings, and by-and-by, if he made any pretensions to education, of his own speech. The written *form* of the language also tended to uniformity. In previous periods the scribe made his own spelling with a primary aim at expressing his own speech, according to the particular values attached by himself or his contemporaries to the letters and combinations of the alphabet, though liable to disturbance in the most common words and combinations by his ocular recollections of the spelling of others. But after the introduction of printing, this ocular recognition of words became ever more and more an aim; the book addressed the mind directly through the eye, instead of circuitously through eye and ear; and thus there was a continuous tendency for written words and parts of words to be reduced to a single form, and that the most usual, or through some accident the best known, but not necessarily that which would have been chosen had the *ear* been called in as umpire. Modern English spelling, with its rigid uniformity as to individual results and whimsical caprice as to principles, is the creation of the printing-office, the victory which, after a century and a half of struggle, mechanical convenience won over natural habits. Besides eventually creating a uniformity in writing, the introduction of printing made or at least ratified some important changes. The British and Old English form of the Roman alphabet has already been referred to. This at the Norman Conquest was superseded by an alphabet with the French forms and values of the letters. Thus *k* took the place of the older *c* before *e* and *i*; *qu* replaced *cw*; the Norman *w* took the place of the *wên* (ƿ), &c.; and hence it has often been said that Middle English stands nearer to Old English in pronunciation, but to Modern English in spelling. But there were certain sounds in English for which Norman writing had no provision; and for these, in writing English, the native characters were retained. Thus the Old English g (ᵹ), beside the sound in *go*, had a guttural sound as in German ta*g*, Irish ma*gh*, and in certain positions a palatalized form of this approaching *y* as in *y*ou (if pronounced with aspiration *hy*ou or *ghy*ou). These sounds continued to be written with the native form of the letter as *bur*ȝ, ȝ*our*, while the French form was used for the sounds in *go*, *age*,—one original letter being thus represented by two. So for the sounds of *th*, especially the sound in *th*at, the Old English *thorn* (þ) continued to be used. But as these characters were not used for French and Latin, their use even in English became disturbed towards the 15th century, and when printing was introduced, the founts, cast for continental languages, had no characters for them, so that they were dropped entirely, being replaced, ȝ by *gh*, *yh*, *y*, and þ by *th*. This was a real loss to the English alphabet. In the north it is curious that the printers tried to express the *forms* rather than the powers of these letters, and consequently ȝ was represented by *z*, the black letter form of which was confounded with it, while the þ was expressed by *y*, which its MS. form had come to approach or in some cases simulate. So in early Scotch books we find *zellow*, *ze*, *yat*, *yem*=*yellow*, *ye*, *that*, *them*; and in Modern Scottish, such names as *Menzies*, *Dalziel*, *Cockenzie*, and the word *gaberlunzie*, in which the *z* stands for *y*.

MODERN ENGLISH thus dates from Caxton. The language had at length reached the all but flectionless state which it now presents. A single older verbal form, the southern *-eth* of the third person singular, continued to be the literary prose form throughout the 16th century, but the northern form in *-s* was intermixed with it in poetry (where it saved a syllable), and must ere long, as we see from Shakespeare, have taken its place in familiar speech. The fuller *an*, *none*, *mine*, *thine*, in the early part of the 16th century at least, were used in positions where their shortened forms *a*, *no*, *my*, *thy* are now found (*none other*, *mine own*=*no other*, *my own*). But with such minute exceptions, the accidence of the 16th century was the accidence of the 19th. While, however, the older inflections had disappeared, there was as yet no general agreement as to the mode of their replacement. Hence the 16th century shows a syntactic licence and freedom which distinguishes it strikingly from that of later times. The language seems to be in a plastic, unformed state, and its writers, as it were, experiment with it, bending it to constructions which now seem indefensible. Old distinctions of case and mood have disappeared from noun and verb, without custom having yet decided what prepositions or auxiliary verbs shall most fittingly convey their meaning. The laxity of word-order which was permitted in older states of the language by the *formal* expression of relations was often continued though the inflections which expressed the relations had disappeared. Partial analogy was followed in allowing forms to be identified in one case, because, in another, such identification was accidentally produced, as for instance the past participles of *write* and *take* were often made *wrote* and *took*, because the contracted participles of *bind* and *break* were *bound* and *broke*. Finally, because, in dropping inflections, the former distinctions even between parts of speech had disappeared, so that *iron*, *e.g.*, was at once noun, adjective and verb, *clean*, adjective, verb and adverb, it appeared as if any word whatever might be used in any grammatical relation, where it conveyed the idea of the speaker. Thus, as has been pointed out by Dr Abbott, "you can *happy* your friend, *malice* or *foot* your enemy, or *fall* an axe on his neck. You can speak and act *easy*, *free*, *excellent*, you can talk of *fair* instead of beauty (fairness), and a *pale* instead of a *paleness*. A *he* is used for a man, and a lady is described by a gentleman as 'the fairest *she* he has yet beheld.' An adverb can be used as a verb, as 'they *askance* their eyes'; as a noun, 'the *backward* and abyss of time'; or as an adjective, a '*seldom* pleasure.'"[1] For, as he also says, "clearness was preferred to grammatical correctness, and brevity both to correctness and clearness. Hence it was common to place words in the order in which they came uppermost in the mind without much regard to syntax, and the result was a forcible and perfectly unambiguous but ungrammatical sentence, such as

> The prince that feeds great natures they will slay him.
> *Ben Jonson.*

or, as instances of brevity,

> Be guilty of my death since of my crime.
> *Shakespeare.*
>
> It cost more to get than to lose in a day.
> *Ben Jonson.*"

These characteristics, together with the presence of words now obsolete or archaic, and the use of existing words in senses different from our own, as general for specific, literal for metaphorical, and vice versa, which are so apparent to every reader of the 16th-century literature, make it useful to separate *Early Modern* or *Tudor* English from the subsequent and still existing stage, since the consensus of usage has declared in favour of individual senses and constructions which are alone admissible in ordinary language.

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[1] *A Shakspearian Grammar*, by Dr E. A. Abbott. To this book we are largely indebted for its admirable summary of the characters of Tudor English.

The beginning of the Tudor period was contemporaneous with the Renaissance in art and literature, and the dawn of modern discoveries in geography and science. The revival of the study of the classical writers of Greece and Rome, and the translation of their works into the vernacular, led to the introduction of an immense number of new words derived from these languages, either to express new ideas and objects or to indicate new distinctions in or grouping of old ideas. Often also it seemed as if scholars were so pervaded with the form as well as the spirit of the old, that it came more natural to them to express themselves in words borrowed from the old than in their native tongue, and thus words of Latin origin were introduced even when English already possessed perfectly good equivalents. As has already been stated, the French words of Norman and Angevin introduction, being principally Latin words in an altered form, when used as English supplied models whereby other Latin words could be converted into English ones, and it is after these models that the Latin words introduced during and since the 16th century have been fashioned. There is nothing in the *form* of the words *procession* and *progression* to show that the one was used in England in the 11th, the other not till the 16th century. Moreover, as the formation of new words from Latin had gone on in French as well as in English since the Renaissance, we often cannot tell whether such words, *e.g.* as *persuade* and *persuasion*, were borrowed from their French equivalents or formed from Latin in England independently. With some words indeed it is impossible to say whether they were formed in England directly from Latin, borrowed from contemporary late French, or had been in England since the Norman period, even *photograph*, *geology* and *telephone* have the form that they would have had if they had been living words in the mouths of Greeks, Latins, French and English from the beginning, instead of formations of the 19th century.[1] While every writer was thus introducing new words according to his notion of their being needed, it naturally happened that a large number were not accepted by contemporaries or posterity; a long list might be formed of these mintages of the 16th and 17th centuries, which either never became current coin, or circulated only as it were for a moment. The revived study of Latin and Greek also led to modifications in the spelling of some words which had entered Middle English in the French form. So Middle English *doute*, *dette*, were changed to *doubt*, *debt*, to show a more immediate connexion with Latin *dubitum*, *debitum*; the actual derivation from the French being ignored. Similarly, words containing a Latin and French *t*, which might be traced back to an original Greek *θ*, were remodelled upon the Greek, *e.g. theme*, *throne*, for Middle English *teme*, *trone*, and, by false association with Greek, *anthem*, Old English *antefne*, Latin *antiphona*; *Anthony*, Latin *Antonius*; *Thames*, Latin *Tamesis*, apparently after *Thomas*.

The voyages of English navigators in the latter part of the 16th century introduced a considerable number of Spanish words, and American words in Spanish forms, of which *negro*, *potato*, *tobacco*, *cargo*, *armadillo*, *alligator*, *galleon* may serve as examples.

The date of 1611, which nearly coincides with the end of Shakespeare's literary work, and marks the appearance of the Authorized Version of the Bible (a compilation from the various 16th-century versions), may be taken as marking the close of Tudor English. The language was thenceforth Modern in structure, style and expression, although the spelling did not settle down to present usage till about the revolution of 1688. The latter date also marks the disappearance from literature of a large number of words, chiefly of such as were derived from Latin during the 16th and 17th centuries. Of these nearly all that survived 1688 are still in use; but a long list might be made out of those that appear for the last time before that date. This sifting of the literary vocabulary and gradual fixing of the literary spelling, which went on between 1611, when the language became modern in structure, and 1689, when it became modern also in form, suggests for this period the name of Seventeenth-Century Transition. The distinctive features of Modern English have already been anticipated by way of contrast with preceding stages of the language. It is only necessary to refer to the fact that the vocabulary is now much more composite than at any previous period. The immense development of the physical sciences has called for a corresponding extension of terminology which has been supplied from Latin and especially Greek; and although these terms are in the first instance *technical*, yet, with the spread of education and general diffusion of the rudiments and appliances of science, the boundary line between *technical* and *general*, indefinite at the best, tends more and more to melt away—this in addition to the fact that words still technical become general in figurative or metonymic senses. *Ache*, *diamond*, *stomach*, *comet*, *organ*, *tone*, *ball*, *carte*, are none the less familiar because once technical words. Commercial, social, artistic or literary contact has also led to the adoption of numerous words from modern European languages, especially French, Italian, Portuguese, Dutch (these two at a less recent period): thus from French *soirée*, *séance*, *dépôt*, *débris*, *programme*, *prestige*; from Italian *bust*, *canto*, *folio*, *cartoon*, *concert*, *regatta*, *ruffian*; from Portuguese *caste*, *palaver*; from Dutch *yacht*, *skipper*, *schooner*, *sloop*. Commercial intercourse and colonization have extended far beyond Europe, and given us words more or fewer from Hindostani, Persian, Arabic, Turkish, Malay, Chinese, and from American, Australian, Polynesian and African languages.[2] More important even than these, perhaps, are the dialect words that from time to time obtain literary recognition, restoring to us obsolete Old English forms, and not seldom words of Celtic or Danish origin, which have been preserved in local dialects, and thus at length find their way into the standard language.

As to the actual proportion of the various elements of the language, it is probable that original English words do not now form more than a fourth or perhaps a fifth of the total entries in a full English dictionary; and it may seem strange, therefore, that we still identify the language with that of the 9th century, and class it as a member of the *Low German* division. But this explains itself, when we consider that of the total words in a dictionary only a small portion are used by any one individual in speaking or even in writing; that this portion includes the great majority of the Anglo-Saxon words, and but a minority of the others. The latter are in fact almost all *names*—the vast majority names of *things* (nouns), a smaller number names of *attributes* and *actions* (adjectives and verbs), and, from their very nature, names of the things, attributes and actions which come less usually or, it may be, very rarely under our notice. Thus in an ordinary book, a novel or story, the foreign elements will amount to from 10 to 15% of the whole; as the subject becomes more recondite or technical their number will increase; till in a work on chemistry or abstruse mathematics the proportion may be 40%. But after all, it is not the question whence words *may* have been taken, but *how they are used* in a language that settles its character. If new words when adopted conform themselves to the manner and usage of the adopting language, it makes absolutely no difference whether they are taken over from some other language, or invented off at the ground. In either case they are *new* words to begin with; in either case also, if they are needed, they will become as thoroughly native, *i.e.* familiar from childhood to those who use them, as those that possess the longest native pedigree. In this respect English is still the same language it was in the days of Alfred; and, comparing its history with that of other Low German tongues, there is no reason to believe that its grammar or structure would have been very different, however different its vocabulary might have been, if the Norman Conquest had never taken place.

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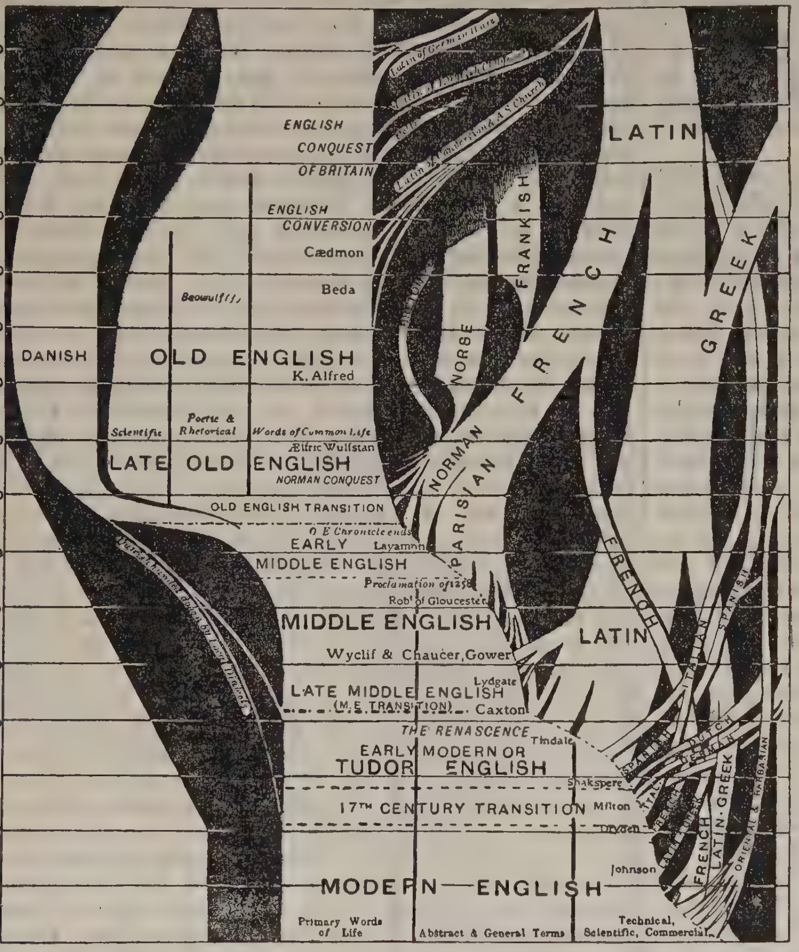
[1] *Evangelist*, *astronomy*, *dialogue*, are words that have so lived, of which their form is the result. *Photograph*, *geology*, &c., take this form *as if* they had the same history.

[2] See extended lists of the foreign words in English in Dr Morris's *Historical Outlines of English Accidence*, p. 33.

A general broad view of the sources of the English vocabulary and of the dates at which the various foreign elements flowed into the language, as well as of the great change produced in it by the Norman Conquest, and consequent influx of French and Latin elements, is given in the accompanying chart. The transverse lines represent centuries, and it will be seen how limited a period after all is occupied by modern English, how long the language had been in the country before the Norman Conquest, and how much of this is prehistoric and without any literary remains. Judging by what has happened during the historic period, great changes may and indeed *must* have taken place between the first arrival of the Saxons and the days of King Alfred, when literature practically begins. The chart also illustrates the continuity of the main stock of the vocabulary, the body of primary "words of common life," which, notwithstanding numerous losses and more numerous additions, has preserved its corporate identity through all the periods. But the "poetic and rhetorical," as well as the "scientific" terms of Old English have died out, and a new vocabulary of "abstract and general terms" has arisen from French, Latin and Greek, while a still newer "technical, commercial and scientific" vocabulary is composed of words not only from these, but from every civilized and many uncivilized languages.



The preceding sketch has had reference mainly to the grammatical changes which the language has undergone; distinct from, though intimately connected with these (as where the confusion or loss of inflections was a consequence of the weakening of final sounds) are the great phonetic changes which have taken place between the 8th and 19th centuries, and which result in making modern English words very different from their Anglo-Saxon originals, even where no element has been lost, as in words like *stone, mine, doom, day, nail, child, bridge, shoot*, Anglo-Saxon *stán, mín, dóm, dæg, nægel, cild, brycg, scéot.* The history of English sounds (see PHONETICS) has been treated at length by Dr A. J. Ellis and Dr Henry Sweet; and it is only necessary here to indicate the broad facts, which are the following. (1) In an accented closed syllable, original short vowels have remained nearly unchanged; thus the words *at, men, bill, God, dust* are pronounced now nearly as in Old English, though the last two were more like the Scotch *o* and North English *u* respectively, and in most words the short *a* had a broader sound like the provincial *a* in *man.* (2) Long accented vowels and diphthongs have undergone a regular sound shift towards closer and more advanced positions, so that the words *bán, hær, soece* or *séce, stól* (*bahn* or *bawn, hêr, sök* or *saik, stōle*) are now *bōne, hair, seek, stool*; while the two high vowels *ú* (=*oo*) and *i* (*ee*) have become diphthongs, as *hús, scír*, now *house, shire*, though the old sound of *u* remains in the north (*hoose*), and the original *i* in the pronunciation *sheer*, approved by Walker, "as in mach*i*ne, and sh*i*re, and magaz*i*ne." (3) Short vowels in an open syllable have usually been lengthened, as in *nă-ma, cŏ-fa*, now *name, cove*; but to this there are exceptions, especially in the case of *ĭ* and *ŭ*. (4) Vowels in terminal unaccented syllables have all sunk into short obscure *ĕ*, and then, if final, disappeared; so *oxa, séo, wudu* became *ox-e, se-e, wud-e*, and then *ox, see, wood*; *oxan, lufod*, now *oxen, loved, lov'd; settan, setton*, later *setten, sette, sett*, now *set.* (5) The back consonants, *c, g, sc*, in connexion with front vowels, have often become palatalized to *ch, j, sh*, as *circe, rycg, fisc*, now *church, ridge, fish.* A medial or final *g* has passed through a guttural or palatal continuant to *w* or *y*, forming a diphthong or new vowel, as in *boga, laga, dæg, heg, drig*, now *bow, law, day, hay, dry. W* and *h* have disappeared before *r* and *l*, as in *write, (w)lisp, (h)ring*; *h* final (=*gh*) has become *f, k, w* or nothing, but has developed the glides *u* or *i* before itself, these combining with the preceding vowel to form a diphthong, or merging with it into a simple vowel-sound, as *ruh, hoh, boh, deah, heah, hleah*, now *rough, hough, bough, dough, high, laugh=ruf, hok, bŏw, dō, hī, lâf. R* after a vowel has practically disappeared in standard English, or at most become vocalized, or combined with the vowel, as in *hear, bàr, more, her.* These and other changes have taken place gradually, and in accordance with well-known phonetic laws; the details as to time and mode may be studied in special works. It may be mentioned that the total loss of grammatical *gender* in English, and the almost complete disappearance of *cases*, are purely phonetic phenomena. *Gender* (whatever its remote origin) was practically the use of adjectives and pronouns with certain distinctive terminations, in accordance with the *genus, genre, gender* or *kind* of nouns to which they were attached; when these distinctive terminations were uniformly levelled to final *ĕ*, or other weak sounds, and thus ceased to distinguish nouns into kinds, the distinctions into genders or kinds having no other existence disappeared. Thus when *þæt gode hors, þone godan hund, þa godan bóc*, became, by phonetic weakening, *þe gode hors, þe gode hownd, þe gode boke*, and later still the *good horse*, the *good hound*, the *good book*, the words *horse, hound, book* were no longer grammatically different kinds of nouns; grammatical gender had ceased to exist. The concord of adjectives has entirely disappeared; the concord of the pronouns is now regulated by *rationality* and *sex*, instead of grammatical gender, which has no existence in English. The man *who* lost *his* life; the bird *which* built *its* nest.

Our remarks from the end of the 14th century have been confined to the standard or literary form of English, for of the other dialects from that date (with the exception of the northern

English in Scotland, where it became in a social and literary sense a distinct language), we have little history. We know, however, that they continued to exist as local and popular forms of speech, as well from occasional specimens and from the fact that they exist still as from the statements of writers during the interval. Thus Puttenham in his *Arte of English Poesie* (1589) says:—

> "Our maker [*i.e.* poet] therfore at these dayes shall not follow Piers Plowman, nor Gower, nor Lydgate, not yet Chaucer, for their language is now not of use with us: neither shall he take the termes of Northern-men, such as they use in dayly talke, whether they be noble men or gentle men or of their best clarkes, all is a [=one] matter; nor in effect any speach used beyond the river of Trent, though no man can deny but that theirs is the purer English Saxon at this day, yet it is not so Courtly nor so currant as our *Southerne* English is, no more is the far Westerne mans speach: ye shall therefore take the usual speach of the Court, and that of London and the shires lying about London within lx myles, and not much above. I say not this but that in every shyre of England there be gentlemen and others that speake but specially write as good Southerne as we of Middlesex or Surrey do, but not the common people of every shire, to whom the gentlemen, and also their learned clarkes do for the most part condescend, but herein we are already ruled by th' English Dictionaries and other bookes written by learned men."—*Arber's Reprint*, p. 157.

In comparatively modern times there has been a revival of interest in these forms of English, several of which following in the wake of the revival of Lowland Scots in the 18th and 19th centuries, have produced a considerable literature in the form of local poems, tales and "folk-lore." In these respects Cumberland, Lancashire, Yorkshire, Devon, Somerset and Dorset, the "far north" and "far west" of Puttenham, where the dialect was felt to be so independent of literary English as not to be branded as a mere vulgar corruption of it, stand prominent. More recently the dialects have been investigated philologically, a department in which, as in other departments of English philology, the elder Richard Garnett must be named as a pioneer. The work was carried out zealously by Prince Louis Lucien Bonaparte and Dr A. J. Ellis, and more recently by the English Dialect Society, founded by the Rev. Professor Skeat, for the investigation of this branch of philology. The efforts of this society resulted in the compilation and publication of glossaries or word-books, more or less complete and trustworthy, of most of the local dialects, and in the production of grammars dealing with the phonology and grammatical features of a few of these, among which that of the Windhill dialect in Yorkshire, by Professor Joseph Wright, and that of West Somerset, by the late F. T. Elworthy, deserve special mention. From the whole of the glossaries of the Dialect Society, and from all the earlier dialect works of the 18th and 19th centuries, amplified and illustrated by the contributions of local collaborators in nearly every part of the British Isles, Professor Joseph Wright has constructed his *English Dialect Dictionary*, recording the local words and senses, with indication of their geographical range, their pronunciation, and in most cases with illustrative quotations or phrases. To this he has added an *English Dialect Grammar*, dealing very fully with the phonology of the dialects, showing the various sounds which now represent each Old English sound, and endeavouring to define the area over which each modern form extends; the accidence is treated more summarily, without going minutely into that of each dialect-group, for which special dialect grammars must be consulted. The work has also a very full and valuable index of every word and form treated.

The researches of Prince L. L. Bonaparte and Dr Ellis were directed specially to the classification and mapping of the existing dialects,[1] and the relation of these to the dialects of Old and Middle English. They recognized a *Northern* dialect lying north of a line drawn from Morecambe Bay to the Humber, which, with the kindred Scottish dialects (already investigated and classed),[2] is the direct descendant of early northern English, and a *South-western* dialect occupying Somerset, Wilts, Dorset, Gloucester and western Hampshire, which, with the *Devonian* dialect beyond it, are the descendants of early southern English and the still older West-Saxon of Alfred. This dialect must in the 14th century have been spoken everywhere south of Thames; but the influence of London caused its extinction in Surrey, Sussex and Kent, so that already in Puttenham it had become "far western." An *East Midland* dialect, extending from south Lincolnshire to London, occupies the cradle-land of the standard English speech, and still shows least variation from it. Between and around these typical dialects are ten others, representing the old Midland proper, or dialects between it and the others already mentioned. Thus "north of Trent" the *North-western* dialect of south Lancashire, Cheshire, Derby and Stafford, with that of Shropshire, represents the early West Midland English, of which several specimens remain; while the *North-eastern* of Nottingham and north Lincolnshire represents the dialect of the *Lay of Havelok*. With the *North Midland* dialect of south-west Yorkshire, these represent forms of speech which to the modern Londoner, as to Puttenham, are still decidedly northern, though actually intermediate between northern proper and midland, and preserving interesting traces of the midland pronouns and verbal inflections. There is an *Eastern* dialect in the East Anglian counties; a *Midland* in Leicester and Warwick shires; a *Western* in Hereford, Worcester and north Gloucestershire, intermediate between south-western and north-western, and representing the dialect of *Piers Plowman*. Finally, between the east midland and south-western, in the counties of Buckingham, Oxford, Berks, Hants, Surrey and Sussex, there is a dialect which must have once been south-western, but of which the most salient characters have been rubbed off by proximity to London and the East Midland speech. In east Sussex and Kent this *South-eastern* dialect attains to a more distinctive character. The *Kentish* form of early Southern English evidently maintained its existence more toughly than that of the counties immediately south of London. It was very distinct in the days of Sir Thomas More; and even, as we see from the dialect attributed to Edgar in *Lear*, was still strongly marked in the days of Shakespeare. In the south-eastern corner of Ireland, in the baronies of Forth and Bargy, in county Wexford, a very archaic form of English, of which specimens have been preserved,[3] was still spoken in the 18th century. In all probability it dated from the first English invasion. In many parts of Ulster forms of Lowland Scotch dating to the settlement under James I. are still spoken; but the English of Ireland generally seems to represent 16th and 17th century English, as in the pronunciation of *tea*, *wheat* (*tay*, *whait*), largely affected, of course, by the native Celtic. The subsequent work of the English Dialect Society, and the facts set forth in the *English Dialect Dictionary*, confirm in a general way the classification of Bonaparte and Ellis; but they bring out strongly the fact that only in a few cases can the boundary between dialects now be determined by precise lines. For every dialect there is a central region, larger or smaller, in which its characteristics are at a maximum; but towards the edges of the area these become mixed and blended with the features of the contiguous dialects, so that it is often impossible to define the point at which the one dialect ends and the other begins. The fact is that the various features of a dialect, whether its distinctive words, characteristic pronunciations or special grammatical features, though they may have the same centre, have not all the same circumference. Some of them extend to a certain distance round the centre; others to a much greater distance. The only approximately accurate way to map the area of any dialect, whether in England, France, Germany or elsewhere, is to take a well-chosen set of its characteristic features—words, senses, sounds or grammatical peculiarities, and draw a line round the area over which each of these extends; between the innermost and outermost of these there will often be a large border district. If the same process be followed with the contiguous dialects,

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[1] See description and map in *Trans. of Philol. Soc.*, 1875–1876, p. 570.

[2] *The Dialect of the Southern Counties of Scotland, its Pronunciation, Grammar and Historical Relations, with an Appendix on the present limits of the Gaelic and Lowland Scotch, and the Dialectal Divisions of the Lowland Tongue; and a Linguistical Map of Scotland*, by James A. H. Murray (London, 1873).

[3] *A Glossary (with some pieces of Verse) of the Old Dialect of the English Colony of Forth and Bargy*, collected by Jacob Poole, edited by W. Barnes, B.D. (London, 1867).

CHRONOLOGICAL TABLE OF THE PERIODS AND DIALECTS OF THE ENGLISH LANGUAGE

Chronological Nomenclature.			Literary Development of the Leading Dialects.			
Divisions.	Subdivisions.	Dates.	Northern English.	Midland English.	Southern English.	
OLD ENGLISH. (Full Inflections.)	EARLY OLD ENGLISH.	500 600 700 800	Anglian. Cædmon, 660. Beda, 734. *Leiden Riddle.* Cynewulf, c. 750.	Anglian. *(Charter Glosses)*, 736-800. *Beowulf* (?) *(Charter Glosses)*, 805—. *Vespasian Ps.*, c. 825. *Charters*, 836-840.	Saxon. *(Charter Glosses)*, 692-786. *(Laws of Ine*, 700). *Charter*, 847.	Kentish. *(Charter Glosses)*, 679-770. *Charters*, 805-840. *Lorica Prayer.* *Psalm* 50, c. 860.
	TYPICAL OLD ENGLISH, or ANGLO-SAXON.	900 1000	Old Northumbrian. *Durham Glosses*, 950-975. *Lindisfarne Gospel Gloss.*	Mercian. *Lorica Glosses.* *Rushworth Gloss, St. Matthew*, ? 975-1000.	Literary West-Saxon or Anglo-Saxon. Alfred, 885. *Judith*, 900-910. *Poems in O. E. Chron.*, 937-979. *Battle of Maldon*, 993. Ælfric, 1000.	
	LATE OLD ENGLISH and OLD ENGLISH TRANSITION.	1100 1150		*Peterborough Chronicle*, 1123-31.	Wulfstan, 1016. *O. E. Chron., Parker MS.* ends, 1070.	
MIDDLE ENGLISH. (Levelled Inflections.)	EARLY MIDDLE ENGLISH.	1200 1250	Early Northern English and Early Scotch.	Early Midland. *Chronicle*, 1154. *Ormulum*, 1200.	Early Southern and S.W. English. *Cotton Homilies*, 1160. Layamon, 1203. *Ancren Riwle*, 1220.	Middle Kentish. *Hatton Gospels*, 1170.
	MIDDLE ENGLISH (typical).	1300 1400	*Cursor Mundi* (?). Hampole, 1350. Barbour, 1375.	Middle English. *Genesis & Exodus*, c. 1250. *Harrowing of Hell*, 1280. Robt. of Brunne, 1303-30. *Pearl, Sir Gawayne.* Wycliffe. Chaucer, Gower.	*Procl. of Henry III.*, 1258. Robt. Gloucester, 1300. Trevisa, 1387.	*Kentish Sermons*, 1250. Shoreham, 1320. *Ayenbite*, 1340.
	LATE MIDDLE ENGLISH and MIDDLE ENGLISH TRANSITION.	1485	*Mandeville* (Northern version). Wyntoun, 1420. *Townley Mysteries.* Henryson, 1470.	Lydgate. Caxton, 1477-90.		
MODERN ENGLISH. (Lost Inflections.)	EARLY MODERN ENGLISH (*Tudor English*).	1611	Middle Scotch. Dunbar, 1500—. Lyndesay. Archbp. Hamilton, 1552. James VI., 1590. Montgomery, c. 1600.	Tudor English. Tyndal, 1525. *Homilies*, 1547-63. Shakspere, 1590-1613. *King James's Bible*, 1611.	*Cornishman* in A. Boorde, 1547. *Gammer Gurton*, 1575.	Kentish Dialect. (*in Sir. T. More.*) (Edgar in *Lear*, 1605.) (in *Ben Jonson.*) *Kentish Wooing Song*, 1611.
	TRANSITIONAL MODERN, or 17TH CENTURY ENGLISH.	1689	Sir W. Mure, 1617-57. *Yorkshire Dialogue*, 1673.	Milton, 1626-71. Dryden, 1663-1700.	*Somersetsh. Man's Complaynt*, c. 1645.	
	CURRENT ENGLISH.	1800 1900	Modern Scotch and North Eng. Dial. Allan Ramsay, 1717. Burns, 1790. Scott, 1815. Ian Maclaren, Barrie, Crockett, etc.	Current English. Addison, 1717. Johnson, 1750. Coleridge, 1805. Macaulay, 1825. Tennyson, 1830.	South-Western Dialect. *Exmoor Scolding*, 1746. Barnes, 1844. Elworthy, 1875-88.	Nairne, *Kentish Tales*, 1700. *Dick and Sal*, 1821.

The vertical lines represent the four leading forms of English—*Northern*, *Midland*, *Southern*, and *Kentish*—and the names occurring down the course of each are those of writers and works in that form of English at the given date. The thickness of the line shows the comparative literary position of this form of speech at the time: *thick* indicating a *literary language*; *medium*, a *literary dialect*; *thin*, a *popular dialect* or *patois*; a *dotted* line shows that this period is *unrepresented* by specimens. The horizontal lines divide the periods; these (after the first two) refer mainly to the Midland English; in inflectional decay the Northern English was at least a century in advance of the Midland, and the Southern nearly as much behind it.

it will be found that some of the lines of each intersect some of the lines of the other, and that the passing of one dialect into another is not effected by the formation of intermediate or blended forms of any one characteristic, but by the overlapping or intersecting of more or fewer of the features of each. Thus a definite border village or district may use 10 of the 20 features of dialect A and 10 of those of B, while a village on the one side has 12 of those of A with 8 of those of B, and one on the other side has 7 of those of A with 13 of those of B. Hence a dialect boundary line can at best indicate the line within which the dialect has, on the whole, more of the features of A than of B or C; and usually no single line can be drawn as a dialect boundary, but that without it there are some features of the same dialect, and within it some features of the contiguous dialects.

Beyond the limits of the British Isles, English is the language of extensive regions, now or formerly colonies. In all these countries the presence of numerous new objects and new conditions of life has led to the supplementing of the vocabulary by the adoption of words from native languages, and special adaptation and extension of the sense of English words. The use of a common literature, however, prevents the overgrowth of these local peculiarities, and also makes them more or less familiar to Englishmen at home. It is only in the older states of the American Union that anything like a local dialect has been produced; and even there many of the so-called Americanisms are quite as much archaic English forms which have been lost or have become dialectal in England as developments of the American soil.

The steps by which English, from being the language of a few thousand invaders along the eastern and southern seaboard of Britain, has been diffused by conquest and colonization over its present area form a subject too large for the limits of this article. It need only be remarked that within the confines of Britain itself the process is not yet complete. Representatives of earlier languages survive in Wales and the Scottish Highlands, though in neither case can the substitution of English be very remote. In Ireland, where English was introduced by conquest much later, Irish is still spoken in patches all over the country; though English is understood, and probably spoken after a fashion, almost everywhere. At opposite extremities of Britain, the Cornish of Cornwall and the Norse dialects of Orkney and Shetland died out very gradually in the course of the 18th century. The Manx, or Celtic of Man, is even now in the last stage of dissolution; and in the Channel Isles the Norman *patois* of Jersey and Guernsey have largely yielded to English.

The table on p. 599 (a revision of that brought before the Philological Society in Jan. 1876) graphically presents the chronological and dialectal development of English. Various names have been proposed for the different stages; it seems only necessary to add to those in the table the descriptive names of Dr Abbott, who has proposed (*How to Parse*, p. 298) to call the Old English, or Anglo-Saxon, the "Synthetical or Inflexional Period"; the Old English Transition (Late Anglo-Saxon of Dr Skeat), the "Period of Confusion"; the Early Middle English, "Analytical Period" (1250–1350); the normal Middle English, "National Period" (1350–1500); the Tudor English, "Period of Licence"; and the Modern English, "Period of Settlement."

BIBLIOGRAPHY.—As the study of English has made immense advances within the last generation, it is only in works recently published that the student will find the subject satisfactorily handled. Among the earlier works treating of the whole subject or parts of it may be mentioned—*A History of English Rhythms*, by Edwin Guest (London, 1838); the *Philological Essays* of Richard Garnett (1835–1848), edited by his son (London, 1859); *The English Language*, by R. G. Latham (5th ed., London, 1862); *Origin and History of the English Language*, by G. P. Marsh (revised 1885); *Lectures on the English Language*, by the same (New York and London, 1863); *Historische Grammatik der englischen Sprache*, by C. F. Koch (Weimar, 1863, &c.); *Englische Grammatik*, by Eduard Mätzner (Berlin, 1860–1865), (an English translation by C. J. Grece, LL.B., London, 1874); *The Philology of the English Tongue*, by John Earle, M.A. (Oxford, 1866, 5th ed. 1892); *Comparative Grammar of the Anglo-Saxon Language*, by F. A. March (New York, 1870); *Historical Outlines of English Accidence*, by the Rev. R. Morris, LL.D. (London, 1873), (new ed. by Kellner); *Elementary Lessons in Historical English Grammar*, by the same (London, 1874); *The Sources of Standard English*, by T. L. Kington Oliphant, M.A. (London, 1873); *Modern English*, by F. Hall (London, 1873); *A Shakespearian Grammar*, by E. A. Abbott, D.D. (London, 1872); *How to Parse*, by the same (London, 1875); *Early English Pronunciation*, &c., by A. J. Ellis (London, 1869); *The History of English Sounds*, by Henry Sweet (London, 1874, 2nd ed. 1888); as well as many separate papers by various authors in the *Transactions of the Philological Society*, and the publications of the Early English Text Society.

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ENGLISH LAW (*History*). In English jurisprudence "legal memory" is said to extend as far as, but no further than the coronation of Richard I. (Sept. 3, 1189). This is a technical doctrine concerning prescriptive rights, but is capable of expressing an important truth. For the last seven centuries, little more or less, the English law, which is now overshadowing a large share of the earth, has had not only an extremely continuous, but a matchlessly well-attested history, and, moreover, has been the subject matter of rational exposition. Already in 1194 the daily doings of a tribunal which was controlling and moulding the whole system were being punctually recorded in letters yet legible, and from that time onwards it is rather the enormous bulk than any dearth of available materials that prevents us from tracing the transformation of every old doctrine and the emergence and expansion of every new idea. If we are content to look no further than the text-books—the books written by lawyers for lawyers—we may read our way backwards to Blackstone (d. 1780), Hale (d. 1676), Coke (d. 1634), Fitzherbert (d. 1538), Littleton (d. 1481), Bracton (d. 1268), Glanvill (d. 1190), until we are in the reign of Henry of Anjou, and yet shall perceive that we are always reading of one and the same body of law, though the little body has become great, and the ideas that were few and indefinite have become many and explicit.

Beyond these seven lucid centuries lies a darker period. Nearly six centuries will still divide us from the dooms of Æthelberht (*c.* 600), and nearly seven from the *Lex Salica* (*c.* 500). We may regard the Norman conquest of England as marking the confluence of two streams of law. The one we may call French or Frankish. If we follow it upwards we pass through the capitularies of Carlovingian emperors and Merovingian kings until we see Chlodwig and his triumphant Franks invading Gaul, submitting their Sicambrian necks to the yoke of the imperial religion, and putting their traditional usages into written Latin. The other rivulet we may call Anglo-Saxon. Pursuing it through the code of Canute (d. 1035) and the ordinances of Alfred (*c.* 900) and his successors, we see Ine publishing laws in the newly converted Wessex (*c.* 690), and, almost a century earlier, Æthelberht doing the same in the newly converted Kent (*c.* 600). This he did, says Beda, in accordance with Roman precedents. Perhaps from the Roman missionaries he had heard tidings of what the Roman emperor had lately been doing far off in New Rome. We may at any rate notice with interest that in order of time Justinian's law-books fall between the *Lex Salica* and the earliest Kentish dooms; also that the great pope who sent Augustine to England is one of the very few men who between Justinian's day and the 11th century lived in the Occident and yet can be proved to have known the

Digest. In the Occident the time for the Germanic "folk-laws" (*Leges Barbarorum*) had come, and a Canon law, ambitious of independence, was being constructed, when in the Orient the lord of church and state was "enucleating" all that was to live of the classical jurisprudence of pagan Rome. It was but a brief interval between Gothic and Lombardic domination that enabled him to give law to Italy: Gaul and Britain were beyond his reach.

The Anglo-Saxon laws that have come down to us (and we have no reason to fear the loss of much beyond some dooms of the Mercian Offa) are best studied as members of a large Teutonic family. Those that proceed from the Kent and Wessex of the 7th century are closely related to the continental folk-laws. Their next of kin seem to be the *Lex Saxonum* and the laws of the Lombards. Then, though the 8th and 9th centuries are unproductive, we have from Alfred (*c.* 900) and his successors a series of edicts which strongly resemble the Frankish capitularies—so strongly that we should see a clear case of imitation, were it not that in Frankland the age of legislation had come to its disastrous end long before Alfred was king. This, it may be noted, gives to English legal history a singular continuity from Alfred's day to our own. The king of the English was expected to publish laws at a time when hardly any one else was attempting any such feat, and the English dooms of Canute the Dane are probably the most comprehensive statutes that were issued in the Europe of the 11th century. No genuine laws of the sainted Edward have descended to us, and during his reign England seems but too likely to follow the bad example of Frankland, and become a loose congeries of lordships. From this fate it was saved by the Norman duke, who, like Canute before him, subdued a land in which kings were still expected to publish laws.

In the study of early Germanic law—a study which now for some considerable time has been scientifically prosecuted in Germany—the Anglo-Saxon dooms have received their due share of attention. A high degree of racial purity may be claimed on their behalf. Celtic elements have been sought for in them, but have never been detected. At certain points, notably in the regulation of the blood-feud and the construction of a tariff of atonements, the law of one rude folk will always be somewhat like the law of another; but the existing remains of old Welsh and old Irish law stand far remoter from the dooms of Æthelberht and Ine than stand the edicts of Rothari and Liutprand, kings of the Lombards. Indeed, it is very dubious whether distinctively Celtic customs play any considerable part in the evolution of that system of rules of Anglian, Scandinavian and Frankish origin which becomes the law of Scotland. Within England itself, though for a while there was fighting enough between the various Germanic folks, the tribal differences were not so deep as to prevent the formation of a common language and a common law. Even the strong Scandinavian strain seems to have rapidly blended with the Anglian. It amplified the language and the law, but did not permanently divide the country. If, for example, we can to-day distinguish between *law* and *right*, we are debtors to the Danes; but very soon *law* is not distinctive of eastern or *right* of western England. In the first half of the 12th century a would-be expounder of the law of England had still to say that the country was divided between the Wessex law, the Mercian law, and the Danes' law, but he had also to point out that the law of the king's own court stood apart from and above all partial systems. The local customs were those of shires and hundreds, and shaded off into each other. We may speak of more Danish and less Danish counties; it was a matter of degree; for rivers were narrow and hills were low. England was meant by nature to be the land of one law.

Then as to Roman law. In England and elsewhere Germanic law developed in an atmosphere that was charged with traditions of the old world, and many of these traditions had become implicit in the Christian religion. It might be argued that all that we call progress is due to the influence exercised by Roman civilization; that, were it not for this, Germanic law would never have been set in writing; and that theoretically unchangeable custom would never have been supplemented or superseded by express legislation. All this and much more of the same sort might be said; but the survival in Britain, or the reintroduction into England, of anything that we should dare to call Roman jurisprudence would be a different matter. Eyes, carefully trained, have minutely scrutinized the Anglo-Saxon legal texts without finding the least trace of a Roman rule outside the ecclesiastical sphere. Even within that sphere modern research is showing that the church-property-law of the middle ages, the law of the ecclesiastical "benefice," is permeated by Germanic ideas. This is true of Gaul and Italy, and yet truer of an England in which Christianity was for a while extinguished. Moreover, the laws that were written in England were, from the first, written in the English tongue; and this gives them a unique value in the eyes of students of Germanic folk-law, for even the very ancient and barbarous *Lex Salica* is a Latin document, though many old Frankish words are enshrined in it. Also we notice—and this is of grave importance—that in England there are no vestiges of any "Romani" who are being suffered to live under their own law by their Teutonic rulers. On the Continent we may see Gundobad, the Burgundian, publishing one law-book for the Burgundians and another for the Romani who own his sway. A book of laws, excerpted chiefly from the Theodosian code, was issued by Alaric the Visigoth for his Roman subjects before the days of Justinian, and this book (the so-called *Breviarium Alarici* or *Lex Romana Visigothorum*) became for a long while the chief representative of Roman law in Gaul. The Frankish king in his expansive realm ruled over many men whose law was to be found not in the *Lex Salica* or *Lex Ribuaria*, but in what was called the *Lex Romana*. "A system of personal law" prevailed: the *homo Romanus* handed on his Roman law to his children, while Frankish or Lombardic, Swabian or Saxon law would run in the blood of the *homo barbarus*. Of all this we hear nothing in England. Then on the mainland of Europe Roman and barbarian law could not remain in juxtaposition without affecting each other. On the one hand we see distinctively Roman rules making their way into the law of the victorious tribes, and on the other hand we see a decay and debasement of jurisprudence which ends in the formation of what modern historians have called a Roman "vulgar-law" (*Vulgarrecht*). For a short age which centres round the year 800 it seemed possible that Frankish kings, who were becoming Roman emperors, would be able to rule by their capitularies nearly the whole of the Christian Occident. The dream vanished before fratricidal wars, heathen invaders, centrifugal feudalism, and a centripetal church which found its law in the newly concocted forgeries of the Pseudo-Isidore (*c.* 850). The "personal laws" began to transmute themselves into local customs, and the Roman vulgar-law began to look like the local custom of those districts where the Romani were the preponderating element in the population. Meanwhile, the Norse pirates subdued a large tract of what was to be northern France—a land where Romani were few. Their restless and boundless vigour these Normans retained; but they showed a wonderful power of appropriating whatever of alien civilization came in their way. In their language, religion and law, they had become French many years before they subdued England. It is a plausible opinion that among them there lived some sound traditions of the Frankish monarchy's best days, and that Norman dukes, rather than German emperors or kings, of the French, are the truest spiritual heirs of Charles the Great.

In our own day German historians are wont to speak of English law as a "daughter" of French or Frankish law. This tendency derived its main impulse from H. Brunner's proof that the germ of trial by jury, which cannot be found in the Anglo-Saxon laws, can be found in the prerogative procedure of the Frankish kings. We must here remember that during a long age English lawyers wrote in French and even thought in French, and that to this day most of the technical terms of the law, more especially of the private law, are of French origin. Also it must be allowed that when English law has taken shape in the 13th century it is very like one of the *coutumes* of northern France. Even when linguistic difficulties have been surmounted, the Saxon Mirror of Eike von Repgow will seem far less familiar to an Englishman than the so-called Establishments of St Louis. This was the outcome of a slow process which fills more than a century (1066–1189), and was in a great measure due to the reforming energy of Henry II., the French prince who, in addition to England, ruled a good half of France. William the Conqueror seems to have intended to govern Englishmen by English law. After the tyranny of Rufus, Henry I. promised a restoration of King Edward's law: that is, the law of the Confessor's time (*Lagam Eadwardi regis vobis reddo*). Various attempts were then made, mostly, so it would seem, by men of French birth, to state in a modern and practicable form the *laga Eadwardi* which was thus restored. The result of their labours is an intricate group of legal tracts which has been explored of late years by Dr Liebermann. The best of these has long been known as the *Leges Henrici Primi*, and aspires to be a comprehensive law-book. Its author, though he had some foreign sources at his command, such as the *Lex Ribuaria* and an epitome of the Breviary of Alaric, took the main part of his matter from the code of Canute and the older English dooms. Neither the Conqueror nor either of his sons had issued many ordinances: the invading Normans had little, if any, written law to bring with them, and had invaded a country where kings had been lawgivers. Moreover, there was much in the English system that the Conqueror was keenly interested in retaining—especially an elaborate method of taxing the land and its holders. The greatest product of Norman government, the grandest feat of government that the world had seen for a long time past, the compilation of *Domesday Book*, was a conservative effort, an attempt to fix upon every landholder, French or English, the amount of geld that was due from his predecessor in title. Himself the rebellious vassal of the French king, the duke of the Normans, who had become king of the English, knew much of disruptive feudalism, and had no mind to see England that other France which it had threatened to become in the days of his pious but incompetent cousin. The sheriffs, though called *vice-comites*, were to be the king's officers; the shire-moots might be called county courts, but were not to be the courts of counts. Much that was sound and royal in English public law was to be preserved if William could preserve it.

The Norman age.

Royal justice.

The gulf that divides the so-called *Leges Henrici* (*c.* 1115) from the text-book ascribed to Ranulf Glanvill (*c.* 1188) seems at first sight very wide. The one represents a not easily imaginable chaos and clash of old rules and new; it represents also a stage in the development of feudalism which in other countries is represented chiefly by a significant silence. The other is an orderly, rational book, which through all the subsequent centuries will be readily understood by English lawyers. Making no attempt to tell us what goes on in the local courts, its author, who may be Henry II.'s chief justiciar, Ranulf Glanvill, or may be Glanvill's nephew, Hubert Walter, fixes our attention on a novel element which is beginning to subdue all else to its powerful operation. He speaks to us of the justice that is done by the king's own court. Henry II. had opened the doors of his French-speaking court to the mass of his subjects. Judges chosen for their ability were to sit there, term after term; judges were to travel in circuits through the land, and in many cases the procedure by way of "an inquest of the country," which the Norman kings had used for the ascertainment of their fiscal rights, was to be at the disposal of ordinary litigants. All this had been done in a piecemeal, experimental fashion by ordinances that were known as "assizes." There had not been, and was not to be, any enunciation of a general principle inviting all who were wronged to bring in their own words their complaints to the king's audience. The general prevalence of feudal justice, and of the world-old methods of supernatural probation (ordeals, battle, oaths sworn with oath-helpers), was to be theoretically respected; but in exceptional cases, which would soon begin to devour the rule, a royal remedy was to be open to any one who could frame his case within the compass of some carefully-worded and prescript formula. With allusion to a remote stage in the history of Roman law, a stage of which Henry's advisers can have known little or nothing, we may say that a "formulary system" is established which will preside over English law until modern times. Certain actions, each with a name of its own, are open to litigants. Each has its own formula set forth in its original (or, as we might say, originating) writ; each has its own procedure and its appropriate mode of trial. The litigant chooses his writ, his action, and must stand or fall by his choice. Thus a book about royal justice tends to become, and Glanvill's book already is, a commentary on original writs.

The precipitation of English law in so coherent a form as that which it has assumed in Glanvill's book is not to be explained without reference to the revival of Roman jurisprudence in Italy. Out of a school of Lombard lawyers at Pavia had come Lanfranc the Conqueror's adviser, and the Lombardists had already been studying Justinian's Institutes. Then at length the Digest came by its rights. About the year 1100 Irnerius was teaching at Bologna, and from all parts of the West men were eagerly flocking to hear the new gospel of civilization. About the year 1149 Vacarius was teaching Roman law in England. The rest of a long life he spent here, and faculties of Roman and Canon law took shape in the nascent university of Oxford. Whatever might be the fate of Roman law in England, there could be no doubt that the Canon law, which was crystallizing in the *Decretum Gratiani* (*c.* 1139) and in the decretals of Alexander III., would be the law of the English ecclesiastical tribunals. The great quarrel between Henry II. and Thomas of Canterbury brought this system into collision with the temporal law of England, and the king's ministers must have seen that they had much to learn from the methodic enemy. Some of them were able men who became the justices of Henry's court, and bishops to boot. The luminous *Dialogue of the Exchequer* (*c.* 1179), which expounds the English fiscal system, came from the treasurer, Richard Fitz Nigel, who became bishop of London; and the treatise on the laws of England came perhaps from Glanvill, perhaps from Hubert Walter, who was to be both primate and chief justiciar. There was healthy emulation of the work that was being done by Italian jurists, but no meek acceptance of foreign results.

Bracton.

A great constructive era had opened, and its outcome was a large and noble book. The author was Henry of Bratton (his name has been corrupted into Bracton), who died in 1268 after having been for many years one of Henry III.'s justices. The model for its form was the treatise of Azo of Bologna ("master of all the masters of the laws," an Englishman called him), and thence were taken many of the generalities of jurisprudence: maxims that might be regarded as of universal and natural validity. But the true core of the work was the practice of an English court which had yearly been extending its operations in many directions. For half a century past diligent record had been kept on parchment of all that this court had done, and from its rolls Bracton cited numerous decisions. He cited them as precedents, paying special heed to the judgments of two judges who were already dead, Martin Pateshull and William Raleigh. For this purpose he compiled a large Note Book, which was discovered by Prof. Vinogradoff in the British Museum in 1884. Thus at a very early time English "common law" shows a tendency to become what it afterwards definitely became, namely, "case law." The term "common law" was being taken over from the canonists by English lawyers, who used it to distinguish the general law of the land from local customs, royal prerogatives, and in short from all that was exceptional or special. Since statutes and ordinances were still rarities, all expressly enacted laws were also excluded from the English lawyers' notion of "the common law." The Great Charter (1215) had taken the form of a grant of "liberties and privileges," comparable to the grants that the king made to individual men and favoured towns. None the less, it was in that age no small body of enacted law, and, owing to its importance and solemnity, it was in after ages regarded as the first article of a statute book. There it was followed by the "provisions" issued at Merton in 1236 and by those issued at

Marlborough after the end of the Barons' War. But during Henry III.'s long reign the swift development of English law was due chiefly to new "original writs" and new "forms of action" devised by the chancery and sanctioned by the court. Bracton knew many writs that were unknown to Glanvill, and men were already perceiving that limits must be set to the inventive power of the chancery unless the king was to be an uncontrollable law-maker. Thus the common law was losing the power of rapid growth when Bracton summed the attained results in a book, the success of which is attested by a crowd of manuscript copies. Bracton had introduced just enough of Roman law and Bolognese method to save the law of England from the fate that awaited German law in Germany. His book was printed in 1569, and Coke owed much to Bracton.

The comparison that is suggested when Edward I. is called the English Justinian cannot be pressed very far. Nevertheless, as is well known, it is in his reign (1272–1307) that English institutions finally take the forms that they are to keep through coming centuries. We already see the parliament of the three estates, the convocations of the clergy, the king's council, the chancery or secretarial department, the exchequer or financial department, the king's bench, the common bench, the commissioners of assize and gaol delivery, the small group of professionally learned judges, and a small group of professionally learned lawyers, whose skill is at the service of those who will employ them. Moreover, the statutes that were passed in the first eighteen years of the reign, though their bulk seems slight to us nowadays, bore so fundamental a character that in subsequent ages they appeared as the substructure of huge masses of superincumbent law. Coke commented upon them sentence by sentence, and even now the merest smatterer in English law must profess some knowledge of *Quia emptores* and *De donis conditionalibus*. If some American states have, while others have not, accepted these statutes, that is a difference which is not unimportant to citizens of the United States in the 20th century. Then from the early years of Edward's reign come the first "law reports" that have descended to us: the oldest of them have not yet been printed; the oldest that has been printed belongs to 1292. These are the precursors of the long series of Year Books (Edw. II.-Hen. VIII.) which runs through the residue of the middle ages. Lawyers, we perceive, are already making and preserving notes of the discussions that take place in court; French notes that will be more useful to them than the formal Latin records inscribed upon the plea rolls. From these reports we learn that there are already, as we should say, a few "leading counsel," some of whom will be retained in almost every important cause. Papal decretals had been endeavouring to withdraw the clergy from secular employment. The clerical element had been strong among the judges of Henry III.'s reign: Bracton was an archdeacon, Pateshull a dean, Raleigh died a bishop. Their places begin to be filled by men who are not in orders, but who have pleaded the king's causes for him—his serjeants or servants at law—and beside them there are young men who are "apprentices at law," and are learning to plead. Also we begin to see men who, as "attorneys at law," are making it their business to appear on behalf of litigants. The history of the legal profession and its monopoly of legal aid is intricate, and at some points still obscure; but the influence of the canonical system is evident: the English attorney corresponds to the canonical proctor, and the English barrister to the canonical advocate. The main outlines were being drawn in Edward I.'s day; the legal profession became organic, and professional opinion became one of the main forces that moulded the law.

The study of English law fell apart from all other studies, and the impulse that had flowed from Italian jurisprudence was ebbing. We have two comprehensive text-books from Edward's reign: the one known to us as *Fleta*, the other as *Britton*; both of them, however, quarry their materials from Bracton's treatise. Also we have two little books on procedure which are attributed to Chief-Justice Hengham, and a few other small tracts of an intensely practical kind. Under the cover of fables about King Alfred, the author of the *Mirror of Justices* made a bitter attack upon King Edward's judges, some of whom had fallen into deep disgrace. English legal history has hardly yet been purged of the leaven of falsehood that was introduced by this fantastic and unscrupulous pamphleteer. His enigmatical book ends that literate age which begins with Glanvill's treatise and the treasurer's dialogue. Between Edward I.'s day and Edward IV.'s hardly anything that deserves the name of book was written by an English lawyer.

14th and 15th centuries.

During that time the body of statute law was growing, but not very rapidly. Acts of parliament intervened at a sufficient number of important points to generate and maintain a persuasion that no limit, or no ascertainable limit, can be set to the legislative power of king and parliament. Very few are the signs that the judges ever permitted the validity of a statute to be drawn into debate. Thus the way was being prepared for the definite assertion of parliamentary "omnicompetence" which we obtain from the Elizabethan statesman Sir Thomas Smith, and for those theories of sovereignty which we couple with the names of Hobbes and Austin. Nevertheless, English law was being developed rather by debates in court than by open legislation. The most distinctively English of English institutions in the later middle ages are the Year-Books and the Inns of Court. Year by year, term by term, lawyers were reporting cases in order that they and their fellows might know how cases had been decided. The allegation of specific precedents was indeed much rarer than it afterwards became, and no calculus of authority so definite as that which now obtains had been established in Coke's day, far less in Littleton's. Still it was by a perusal of reported cases that a man would learn the law of England. A skeleton for the law was provided, not by the Roman rubrics (such as public and private, real and personal, possessory and proprietary, contract and delict), but by the cycle of original writs that were inscribed in the chancery's *Registrum Brevium*. A new form of action could not be introduced without the authority of Parliament, and the growth of the law took the shape of an explication of the true intent of ancient formulas. Times of inventive liberality alternated with times of cautious and captious conservatism. Coke could look back to Edward III.'s day as to a golden age of good pleading. The otherwise miserable time which saw the Wars of the Roses produced some famous lawyers, and some bold doctrines which broke new ground. It produced also Sir Thomas Littleton's (d. 1481) treatise on Tenures, which (though it be not, as Coke thought it, the most perfect work that ever was written in any human science) is an excellent statement of law in exquisitely simple language.

Legal education.

Meanwhile English law was being scholastically taught. This, if we look at the fate of native and national law in Germany, or France, or Scotland, appears as a fact of primary importance. From beginnings, so small and formless that they still elude research, the Inns of Court had grown. The lawyers, like other men, had grouped themselves in gilds, or gild-like "fellowships." The fellowship acquired property; it was not technically incorporate, but made use of the thoroughly English machinery of a trust. Behind a hedge of trustees it lived an autonomous life, unhampered by charters or statutes. There was a hall in which its members dined in common; there was the nucleus of a library; there were also dormitories or chambers in which during term-time lawyers lived celibately, leaving their wives in the country. Something of the college thus enters the constitution of these fellowships; and then something academical. The craft gild regulated apprenticeship; it would protect the public against incompetent artificers, and its own members against unfair competition. So the fellowship of lawyers. In course of time a lengthy and laborious course of education of the medieval sort had been devised. He who had pursued it to its end received a call to the bar of his inn. This call was in effect a degree. Like the doctor or master of a university, the full-blown barrister was competent to teach others, and was expected to read lectures to students. But further, in a manner that is still very dark, these societies had succeeded in making their degrees the only steps that led to practice in the king's courts. At the end of the middle ages (*c.* 1470) Sir John Fortescue rehearsed the praises of the laws of England in a book which is one of the earliest efforts of comparative politics. Contrasting England with France, he rightly connects limited monarchy, public and oral debate in the law courts, trial by jury, and the teaching of national law in schools that are thronged by wealthy and well-born youths. But nearly a century earlier, the assertion that English law affords as subtle and civilizing a discipline as any that is to be had from Roman law was made by a man no less famous than John Wycliffe. The heresiarch naturally loathed the Canon law; but he also spoke with reprobation of the "paynims' law," the "heathen men's law," the study of which in the two universities was being fostered by some of the bishops. That study, after inspiring Bracton, had come to little in England, though the canonist was compelled to learn something of Justinian, and there was a small demand for learned civilians in the court of admiralty, and in what we might call the king's diplomatic service. No medieval Englishman did anything considerable for Roman law. Even the canonists were content to read the books of French and Italian masters, though John Acton (*c.* 1340) and William Lyndwood (1430) wrote meritorious glosses. The Angevin kings, by appropriating to the temporal forum the whole province of ecclesiastical patronage, had robbed the decretists of an inexhaustible source of learning and of lucre. The work that was done by the legal faculties at Oxford and Cambridge is slight when compared with the inestimable services rendered to the cause of national continuity by the schools of English law which grew within the Inns of Court.

Chancery.

A danger threatened: the danger that a prematurely osseous system of common law would be overwhelmed by summary justice and royal equity. Even when courts for all ordinary causes had been established, a reserve of residuary justice remained with the king. Whatever lawyers and even parliaments might say, it was seen to be desirable that the king in council should with little regard for form punish offenders who could break through the meshes of a tardy procedure and should redress wrongs which corrupt and timid juries would leave unrighted. Papal edicts against heretics had made familiar to all men the notion that a judge should at times proceed *summarie et de plano et sine strepitu et figura justitiae.* And so extraordinary justice of a penal kind was done by the king's council upon misdemeanants, and extraordinary justice of a civil kind was ministered by the king's chancellor (who was the specially learned member of the council) to those who "for the love of God and in the way of charity," craved his powerful assistance. It is now well established that the chancellors started upon this course, not with any desire to introduce rules of "equity" which should supplement, or perhaps supplant, the rules of law, but for the purpose of driving the law through those accidental impediments which sometimes unfortunately beset its due course. The wrongs that the chancellor redressed were often wrongs of the simplest and most brutal kind: assaults, batteries and forcible dispossessions. However, he was warned off this field of activity by parliament; the danger to law, to lawyers, to trial by jury, was evident. But just when this was happening, a new field was being opened for him by the growing practice of conveying land to trustees. The English trust of land had ancient Germanic roots, and of late we have been learning how in far-off centuries our Lombard cousins were in effect giving themselves a power of testation by putting their lands in trust. In England, when the forms of action were crystallizing, this practice had not been common enough to obtain the protection of a writ; but many causes conspired to make it common in the 14th century; and so, with the general approval of lawyers and laity, the chancellors began to enforce by summary process against the trustee the duty that lay upon his conscience. In the next century it was clear that England had come by a new civil tribunal. Negatively, its competence was defined by the rule that when the common law offered a remedy, the chancellor was not to intervene. Positively, his power was conceived as that of doing what "good conscience" required, more especially in cases of "fraud, accident or breach of confidence." His procedure was the summary, the heresy-suppressing (not the ordinary and solemn) procedure of an ecclesiastical court; but there are few signs that he borrowed any substantive rules from legist or decretist, and many proofs that within the new field of trust he pursued the ideas of the common law. It was long, however, before lawyers made a habit of reporting his decisions. He was not supposed to be tightly bound by precedent. Adaptability was of the essence of the justice that he did.

The Tudor Age.

A time of strain and trial came with the Tudor kings. It was questionable whether the strong "governance" for which the weary nation yearned could work within the limits of a parliamentary system, or would be compatible with the preservation of the common law. We see new courts appropriating large fields of justice and proceeding *summarie et de plano*; the star chamber, the chancery, the courts of requests, of wards, of augmentations, the councils of the North and Wales; a little later we see the high commission. We see also that judicial torture which Fortescue had called the road to hell. The stream of law reports became intermittent under Henry VIII.; few judges of his or his son's reign left names that are to be remembered. In an age of humanism, alphabetically arranged "abridgments" of medieval cases were the best work of English lawyers: one comes to us from Anthony Fitzherbert (d. 1538), and another from Robert Broke (d. 1558). This was the time when Roman law swept like a flood over Germany. The modern historian of Germany will speak of "the Reception" (that is, the reception of Roman law), as no less important than the Renaissance and Reformation with which it is intimately connected. Very probably he will bestow hard words on a movement which disintegrated the nation and consolidated the tyranny of the princelings. Now a project that Roman law should be "received" in England occurred to Reginald Pole (d. 1558), a humanist, and at one time a reformer, who with good fortune might have been either king of England or pope of Rome. English law, said the future cardinal and archbishop, was barbarous; Roman law was the very voice of nature pleading for "civility" and good princely governance. Pole's words were brought to the ears of his majestic cousin, and, had the course of events been somewhat other than it was, King Henry might well have decreed a reception. The rôle of English Justinian would have perfectly suited him, and there are distinct traces of the civilian's Byzantinism in the doings of the Church of England's supreme head. The academic study of the Canon law was prohibited; regius professorships of the civil law were founded; civilians were to sit as judges in the ecclesiastical courts. A little later, the Protector Somerset was deeply interested in the establishment of a great school for civilians at Cambridge. Scottish law was the own sister of English law, and yet in Scotland we may see a reception of Roman jurisprudence which might have been more whole-hearted than it was, but for the drift of two British and Protestant kingdoms towards union. As it fell out, however, Henry could get what he wanted in church and state without any decisive supersession of English by foreign law. The omnicompetence of an act of parliament stands out the more clearly if it settles the succession to the throne, annuls royal marriages, forgives royal debts, defines religious creeds, attaints guilty or innocent nobles, or prospectively lends the force of statute to the king's proclamations. The courts of common law were suffered to work in obscurity, for jurors feared fines, and matter of state was reserved for council or star chamber. The Inns of Court were spared; their moots and readings did no perceptible harm, if little perceptible good.

Yet it is no reception of alien jurisprudence that must be chronicled, but a marvellous resuscitation of English medieval law. We may see it already in the Commentaries of Edward Plowden (d. 1585) who reported cases at length and lovingly. Bracton's great book was put in print, and was a key to much that had been forgotten or misunderstood. Under Parker's patronage, even the Anglo-Saxon dooms were brought to light; they seemed to tell of a Church of England that had not yet been

Coke.

enslaved by Rome. The new national pride that animated Elizabethan England issued in boasts touching the antiquity, humanity, enlightenment of English law. Resuming the strain of Fortescue, Sir Thomas Smith, himself a civilian, wrote concerning the Commonwealth of England a book that claimed the attention of foreigners for her law and her polity. There was dignified rebuke for the French jurist who had dared to speak lightly of Littleton. And then the common law took flesh in the person of Edward Coke (1552–1634). With an enthusiastic love of English tradition, for the sake of which many offences may be forgiven him, he ranged over nearly the whole field of law, commenting, reporting, arguing, deciding,—disorderly, pedantic, masterful, an incarnate national dogmatism tenacious of continuous life. Imbued with this new spirit, the lawyers fought the battle of the constitution against James and Charles, and historical research appeared as the guardian of national liberties. That the Stuarts united against themselves three such men as Edward Coke, John Selden and William Prynne, is the measure of their folly and their failure. Words that, rightly or wrongly, were ascribed to Bracton rang in Charles's ears when he was sent to the scaffold. For the modern student of medieval law many of the reported cases of the Stuart time are storehouses of valuable material, since the lawyers of the 17th century were mighty hunters after records. Prynne (d. 1669), the fanatical Puritan, published ancient documents with fervid zeal, and made possible a history of parliament. Selden (d. 1654) was in all Europe among the very first to write legal history as it should be written. His book about tithes is to this day a model and a masterpiece. When this accomplished scholar had declared that he had laboured to make himself worthy to be called a common lawyer, it could no longer be said that the common lawyers were *indoctissimum genus doctissimorum hominum.* Even pliant judges, whose tenure of office depended on the king's will, were compelled to cite and discuss old precedents before they could give judgment for their master; and even at their worst moments they would not openly break with medieval tradition, or declare in favour of that "modern police-state" which has too often become the ideal of foreign publicists trained in Byzantine law.

Hale.

The current of legal doctrine was by this time so strong and voluminous that such events as the Civil War, the Restoration and the Revolution hardly deflected the course of the stream. In retrospect, Charles II. reigns so soon as life has left his father's body, and James II. ends a lawless career by a considerate and convenient abdication. The statute book of the restored king was enriched by leaves excerpted from the acts of a lord protector; and Matthew Hale (d. 1676), who was, perhaps, the last of the great record-searching judges, sketched a map of English law which Blackstone was to colour. Then a time of self-complacency came for the law, which knew itself to be the perfection of wisdom, and any proposal for drastic legislation would have worn the garb discredited by the tyranny of the Puritan Cæsar. The need for the yearly renewal of the Mutiny Act secured an annual session of parliament. The mass of the statute law made in the 18th century is enormous; but, even when we have excluded from view such acts as are technically called "private," the residuary matter bears a wonderfully empirical, partial and minutely particularizing character. In this "age of reason," as we are wont to think it, the British parliament seems rarely to rise to the dignity of a general proposition, and in our own day the legal practitioner is likely to know less about the statutes of the 18th century than he knows about the statutes of Edward I., Henry VIII. and Elizabeth. Parliament, it should be remembered, was endeavouring directly to govern the nation. There was little that resembled the permanent civil service of to-day. The choice lay between direct parliamentary government and royal "prerogative"; and lengthy statutes did much of that work of detail which would now be done by virtue of the powers that are delegated to ministers and governmental boards. Moreover, extreme and verbose particularity was required in statutes, for judges were loath to admit that the common law was capable of amendment. A vague doctrine, inherited from Coke, taught that statutes might be so unreasonable as to be null, and any political theory that seemed to derive from Hobbes would have been regarded with not unjust suspicion. But the doctrine in question never took tangible shape, and enough could be done to protect the common law by a niggardly exposition of every legislating word. It is to be remembered that some main features of English public law were attracting the admiration of enlightened Europe. When Voltaire and Montesquieu applauded, the English lawyer had cause for complacency.

The common law was by no means stagnant. Many rules which come to the front in the 18th century are hardly to be traced farther. Especially is this the case in the province of mercantile law, where the earl of Mansfield's (d. 1793) long presidency over the king's bench marked an epoch. It is too often forgotten that, until Elizabeth's reign, England was a thoroughly rustic kingdom, and that trade with England was mainly in the hands of foreigners. Also in medieval fairs, the assembled merchants declared their own "law merchant," which was considered to have a supernational validity. In the reports of the common law courts it is late in the day before we read of some mercantile usages which can be traced far back in the statutes of Italian cities. Even on the basis of the excessively elaborated land law—a basis which Coke's Commentary on Littleton seemed to have settled for ever—a lofty and ingenious superstructure could be reared. One after another delicate devices were invented for the accommodation of new wants within the law; but only by the assurance that the old law could not be frankly abolished can we be induced to admire the subtlety that was thus displayed. As to procedure, it had become a maze of evasive fictions, to which only a few learned men held the historical clue. By fiction the courts had stolen business from each other, and by fiction a few comparatively speedy forms of action were set to tasks for which they were not originally framed. Two fictitious persons, John Doe and Richard Roe, reigned supreme. On the other hand, that healthy and vigorous institution, the Commission of the Peace, with a long history behind it, was giving an important share in the administration of justice to numerous country gentlemen who were thus compelled to learn some law. A like beneficial work was being done among jurors, who, having ceased to be regarded as witnesses, had become "judges of fact." No one doubted that trial by jury was the "palladium" of English liberties, and popularity awaited those who would exalt the office of the jurors and narrowly limit the powers of the judge.

Equity.

But during this age the chief addition to English jurisprudence was made by the crystallization of the chancellor's equity. In the 17th century the chancery had a narrow escape of sharing the fate that befell its twin sister the star chamber. Its younger sister the court of requests perished under the persistent attacks of the common lawyers. Having outlived troubles, the chancery took to orderly habits, and administered under the name of "equity" a growing group of rules, which in fact were supplemental law. Stages in this process are marked by the chancellorships of Nottingham (1673–1675) and Hardwicke (1737–1756). Slowly a continuous series of Equity Reports began to flow, and still more slowly an "equity bar" began to form itself. The principal outlines of equity were drawn by men who were steeped in the common law. By way of ornament a Roman maxim might be borrowed from a French or Dutch expositor, or a phrase which smacked of that "nature-rightly" school which was dominating continental Europe; but the influence exercised by Roman law upon English equity has been the subject of gross exaggeration. Parliament and the old courts being what they were, perhaps it was only in a new court that the requisite new law could be evolved. The result was not altogether satisfactory. Freed from contact with the plain man in the jury-box, the chancellors were tempted to forget how plain and rough good law should be, and to screw up the legal standard of reasonable conduct to a height hardly attainable except by those whose purses could command the constant advice of a family solicitor. A court which started with the idea of doing summary justice for the poor became a court which did a highly refined, but tardy justice, suitable only to the rich.

Blackstone.

About the middle of the century William Blackstone, then a disappointed barrister, began to give lectures on English law at Oxford (1758), and soon afterwards he began to publish (1765) his *Commentaries*. Accurate enough in its history and doctrine to be an invaluable guide to professional students and a useful aid to practitioners, his book set before the unprofessional public an artistic picture of the laws of England such as had never been drawn of any similar system. No nation but the English had so eminently readable a law-book, and it must be doubtful whether any other lawyer ever did more important work than was done by the first professor of English law. Over and over again the *Commentaries* were edited, sometimes by distinguished men, and it is hardly too much to say that for nearly a century the English lawyer's main ideas of the organization and articulation of the body of English law were controlled by Blackstone. This was far from all. The Tory lawyer little thought that he was giving law to colonies that were on the eve of a great and successful rebellion. Yet so it was. Out in America, where books were few and lawyers had a mighty task to perform, Blackstone's facile presentment of the law of the mother country was of inestimable value. It has been said that among American lawyers the *Commentaries* "stood for the law of England," and this at a time when the American daughter of English law was rapidly growing in stature, and was preparing herself for her destined march from the Atlantic to the Pacific Ocean. Excising only what seemed to savour of oligarchy, those who had defied King George retained with marvellous tenacity the law of their forefathers. Profound discussions of English medieval law have been heard in American courts; admirable researches into the recesses of the Year-Books have been made in American law schools; the names of the great American judges are familiar in an England which knows little indeed of foreign jurists; and the debt due for the loan of Blackstone's *Commentaries* is being fast repaid. Lectures on the common law delivered by Mr Justice Holmes of the Supreme Court of the United States may even have begun to turn the scale against the old country. No chapter in Blackstone's book nowadays seems more antiquated than that which describes the modest territorial limits of that English law which was soon to spread throughout Australia and New Zealand and to follow the dominant race in India.

Bentham.

Long wars, vast economic changes and the conservatism generated by the French Revolution piled up a monstrous arrear of work for the English legislature. Meanwhile, Jeremy Bentham (d. 1832) had laboured for the overthrow of much that Blackstone had lauded. Bentham's largest projects of destruction and reconstruction took but little effect. Profoundly convinced of the fungibility and pliability of mankind, he was but too ready to draw a code for England or Spain or Russia at the shortest notice; and, scornful as he was of the past and its historic deposit, a code drawn by Bentham would have been a sorry failure. On the other hand, as a critic and derider of the system which Blackstone had complacently expounded he did excellent service. Reform, and radical reform, was indeed sadly needed throughout a system which was encumbered by noxious rubbish, the useless leavings of the middle ages: trial by battle and compurgation, deodands and benefit of clergy, John Doe and Richard Roe. It is perhaps the main fault of "judge-made law" (to use Bentham's phrase) that its destructive work can never be cleanly done. Of all vitality, and therefore of all patent harmfulness, the old rule can be deprived, but the moribund husk must remain in the system doing latent mischief. English law was full of decaying husks when Bentham attacked it, and his persistent demand for reasons could not be answered. At length a general interest in "law reform" was excited; Romilly and Brougham were inspired by Bentham, and the great changes in constitutional law which cluster round the Reform Act of 1832 were accompanied by many measures which purged the private, procedural and criminal law of much, though hardly enough, of the medieval dross. Some credit for rousing an interest in law, in definitions of legal terms, and in schemes of codification, is due to John Austin (d. 1859) who was regarded as the jurist of the reforming and utilitarian group. But, though he was at times an acute dissector of confused thought, he was too ignorant of the English, the Roman and every other system of law to make any considerable addition to the sum of knowledge; and when Savigny, the herald of evolution, was already in the field, the day for a "Nature-Right"—and Austin's projected "general jurisprudence" would have been a Nature-Right—was past beyond recall. The obsolescence of the map of law which Blackstone had inherited from Hale, and in which many outlines were drawn by medieval formulas, left intelligent English lawyers without a guide, and they were willing to listen for a while to what in their insularity they thought to be the voice of cosmopolitan science. Little came of it all. The revived study of Germanic law in Germany, which was just beginning in Austin's day, seems to be showing that the scheme of Roman jurisprudence is not the scheme into which English law will run without distortion.

Recent changes.

In the latter half of the 19th century some great and wise changes were made by the legislature. Notably in 1875 the old courts were merged in a new Supreme Court of Judicature, and a concurrent administration of law and equity was introduced. Successful endeavours have been made also to reduce the bulk of old statute law, and to improve the form of acts of parliament; but the emergence of new forces whose nature may be suggested by some such names as "socialism" and "imperialism" has distracted the attention of the British parliament from the commonplace law of the land, and the development of obstructive tactics has caused the issue of too many statutes whose brevity was purchased by disgraceful obscurity. By way of "partial codification" some branches of the common law (bills of exchange, sale of goods, partnership) have been skilfully stated in statutes, but a draft criminal code, upon which much expert labour was expended, lies pigeon-holed and almost forgotten. British India has been the scene of some large legislative exploits, and in America a few big experiments have been made in the way of code-making, but have given little satisfaction to the bulk of those who are competent to appreciate their results. In England there are large portions of the law which, in their present condition, no one would think of codifying: notably the law of real property, in which may still be found numerous hurtful relics of bygone centuries. So omnipresent are statutes throughout the whole field of jurisprudence that the opportunity of doing any great feat in the development of law can come but seldom to a modern court. More and more, therefore, the fate of English law depends on the will of parliament, or rather of the ministry. The quality of legal text-books has steadily improved; some of them are models of clear statement and good arrangement; but no one has with any success aspired to be the Blackstone of a new age.

Law reporting.

The Council of Law Reporting was formed in the year 1863. The council now consists of three *ex-officio* members—the attorney-general, the solicitor-general and the president of the Incorporated Law Society, and ten members appointed by the three Inns of Court, the Incorporated Law Society and the council itself on the nomination of the general council of the bar. The practitioner and the student now get for a subscription of four guineas a year the reports in all the superior courts and the House of Lords, and the judicial committee of the privy council issued in monthly parts a king's printer's copy of the statutes, and weekly notes, containing short notes of current decisions and announcements of all new rules made under the Judicature Acts and other acts of parliament, and other legal information. In addition the subscriber receives the chronological index of the statutes published from time to time by the Stationery Office, and last, but not least, the Digests of decided cases published by the council from time to time. In 1892 a Digest was published containing the cases and statutes for twenty-five years, from 1865 to 1890, and this was supplemented by one for the succeeding ten years, from 1891 to 1900. The digesting is now carried on continuously by means of "Current Indexes," which are published monthly and annually, and consolidated into a digest at stated intervals (say) of five years. The Indian appeals series, which is not required by the general practitioner, is supplied separately at one guinea a year.

Legal education.

In the 16th and 17th centuries the corporate life of the Inns of Court in London became less and less active. The general decay of the organization of crafts and gilds showed itself among lawyers as among other craftsmen. Successful barristers, sharing in the general prosperity of the country, became less and less able and willing to devote their time to the welfare of their profession as a whole. The Inns of Chancery, though some of their buildings still remain—picturesque survivals in their "suburbs"—ceased to be used as places for the education of students. The benchers of the Inns of Court, until the revival towards the middle of the 19th century, had wholly ceased to concern themselves with the systematic teaching of law. The modern system of legal education may be said to date from the establishment, in 1852, of the council of legal education, a body of twenty judges and barristers appointed by the four Inns of Court to control the legal education of students preparing to be called to the bar. The most important feature is the examination which a student must pass before he can be called. The examination (which by degrees has been made "stiffer") serves the double purpose of fixing the compulsory standard which all must reach, and of guiding the reading of students who may desire, sooner or later, to carry their studies beyond this standard. The subjects in which the examination is held are divided into Roman law; Constitutional law and legal history; Evidence, Procedure and Criminal law; Real and Personal Property; Equity; and Common law. The council of legal education also appoint a body of readers and assistant readers, practising barristers, who deliver lectures and hold classes.

Meanwhile the custom remains by which a student reads for a year or more as a pupil in the chambers of some practising barrister. In the 18th century it first became usual for students to read with a solicitor or attorney, and after a short time the modern practice grew up of reading in the chambers of a conveyancer, equity draftsman or special pleader, or, in more recent times, in the chambers of a junior barrister. Before the modern examination system, a student required to have a certificate from the barrister in whose chambers he had been a pupil before he could be "called," but the only relic of the old system now is the necessity of "eating dinners," six (three for university men) in each of the four terms for three years, at one of the Inns of Court.

The education of solicitors suffered from the absence of any professional organization until the Incorporated Law Society was established in 1825 and the following years. So far as any professional education is provided for solicitors or required from them, this is due to the efforts of the Law Society. As early as 1729 it was required by statute that any person applying for admission as attorney or solicitor should submit to examination by one of the judges, who was to test his fitness and capacity in consideration of a fee of one shilling. At the same time regular preliminary service under articles was required, that is to say, under a contract by which the clerk was bound to serve for five years. The examination soon became, perhaps always was, an empty form. The Law Society, however, soon showed zeal for the education of future solicitors. In 1833 lectures were instituted. In 1836 the first regular examinations were established, and in 1860 the present system of examinations—preliminary, intermediate and final—came into effect. Of these only the last two are devoted to law, and both are of a strictly professional character. The final examination is a fairly severe test of practical acquaintance with all branches of modern English law. The Law Society makes some provision for the teaching of students, but this teaching is designed solely to assist in preparation for the examinations.

At the universities of Oxford and Cambridge there has, since 1850, been an attempt to promote the study of law. The curriculum of legal subjects in which lectures are given and examinations held is calculated to give a student a sound fundamental knowledge of general principles, as well as an elementary acquaintance with the rules of modern English law. Jurisprudence, Roman law, Constitutional law and International law are taught, as well as the law of Real and Personal Property, the Law of Contract and Tort, Criminal law, Procedure and Evidence. But the law tripos and the law schools suffer from remoteness from the law courts, and from the exclusively academical character of the teaching. Law is also taught, though not on a very large scale, at Manchester and at Liverpool. London University has encouraged the study of law by its examinations for law degrees, at which a comparatively high standard of knowledge is required; and at University College, London, and King's College, London, teaching is given in law and jurisprudence.

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ENGLISH LITERATURE. The following discussion of the evolution of English literature, *i.e.* of the contribution to literature made in the course of ages by the writers of England, is planned so as to give a comprehensive view, the details as to particular authors and their work, and special consideration of the greater writers, being given in the separate articles devoted to them. It is divided into the following sections: (1) Earliest times to Chaucer; (2) Chaucer to the end of the middle ages; (3) Elizabethan times; (4) the Restoration period; (5) the Eighteenth century; (6) the Nineteenth century. The object of these sections is to form connecting links among the successive literary ages, leaving the separate articles on individual great writers to deal with their special interest; attention being paid in the main to the gradually developing characteristics of the product, *quâ* literary. The precise delimitation of what may narrowly be called "English" literature, *i.e.* in the English language, is perhaps impossible, and separate articles are devoted to American literature (*q.v.*), and to the vernacular literatures of Scotland (see Scotland; and Celt: *Literature*), Ireland (see Celt: *Literature*), and Wales (see Celt: *Literature*); see also Canada: *Literature*. Reference may also be made to such general articles on particular forms as Novel; Romance; Verse, &c.

I. Earliest Times to Chaucer

English literature, in the etymological sense of the word, had, so far as we know, no existence until Christian times. There is no evidence either that the heathen English had adopted the Roman alphabet, or that they had learned to employ their native monumental script (the runes) on materials suitable for the writing of continuous compositions of considerable length.

It is, however, certain that in the pre-literary period at least one species of poetic art had attained a high degree of development, and that an extensive body of poetry was handed down—not, indeed, with absolute fixity of form or substance—from generation to generation. This unwritten poetry was the work of minstrels who found their audiences in the halls of kings and nobles. Its themes were the exploits of heroes belonging to the royal houses of Germanic Europe, with which its listeners claimed kinship. Its metre was the alliterative long line, the lax rhythm of which shows that it was intended, not to be sung to regular melodies, but to be recited—probably with some kind of instrumental accompaniment. Of its beauty and power we may judge from the best passages in *Beowulf* (*q.v.*); for there can be little doubt that this poem gained nothing and lost much in the process of literary redaction.

The conversion of the people to Christianity necessarily involved the decline of the minstrelsy that celebrated the glories of heathen times. Yet the descendants of Woden, even when they were devout Christians, would not easily lose all interest in the achievements of their kindred of former days. Chaucer's knowledge of "the song of Wade" is one proof among others that even so late as the 14th century the deeds of Germanic heroes had not ceased to be recited in minstrel verse. The paucity of the extant remains of Old English heroic poetry is no argument to the contrary. The wonder is that any of it has survived at all. We may well believe that the professional reciter would, as a rule, be jealous of any attempt to commit to writing the poems which he had received by tradition or had himself composed. The clergy, to whom we owe the writing and the preservation of the Old English MSS., would only in rare instances be keenly interested in secular poetry. We possess, in fact, portions of four narrative poems, treating of heroic legend—*Beowulf*, *Widsith*, *Finnesburh* and *Waldere*. The second of these has no poetical merit, but great archaeological interest. It is an enumeration of the famous kings known to German tradition, put into the mouth of a minstrel (named Widsith, "far-travelled"), who claims to have been at many of their courts and to have been rewarded by them for his song. The list includes historical persons such as Ermanaric and Alboin, who really lived centuries apart, but (with the usual chronological vagueness of tradition) are treated as contemporaries. The extant fragment of *Finnesburh* (50 lines) is a brilliant battle piece, belonging to a story of which another part is introduced episodically in *Beowulf*. *Waldere*, of which we have two fragments (together 68 lines) is concerned with Frankish and Burgundian traditions based on events of the 5th century; the hero is the "Waltharius" of Ekkehart's famous Latin epic. The English poem may possibly be rather a literary composition than a genuine example of minstrel poetry, but the portions that have survived are hardly inferior to the best passages of *Beowulf*.

It may reasonably be assumed that the same minstrels who entertained the English kings and nobles with the recital of ancient heroic traditions would also celebrate in verse the martial deeds of their own patrons and their immediate ancestors. Probably there may have existed an abundance of poetry commemorative of events in the conquest of Britain and the struggle with the Danes. Two examples only have survived, both belonging to the 10th century: The *Battle of Brunanburh*, which has been greatly over-praised by critics who were unaware that its striking phrases and compounds are mere traditional echoes; and the *Battle of Maldon*, the work of a truly great poet, of which unhappily only a fragment has been preserved.

One of the marvels of history is the rapidity and thoroughness with which Christian civilization was adopted by the English. Augustine landed in 597; forty years later was born an Englishman, Aldhelm, who in the judgment of his contemporaries throughout the Christian world was the most accomplished scholar and the finest Latin writer of his time. In the next generation England produced in Bede (Bæda) a man who in solidity and variety of knowledge, and in literary power, had for centuries no rival in Europe. Aldhelm and Bede are known to us only from their Latin writings, though the former is recorded to have written vernacular poetry of great merit. The extant Old English literature is almost entirely Christian, for the poems that belong to an earlier period have been expurgated and interpolated in a Christian sense. From the writings that have survived, it would seem as if men strove to forget that England had ever been heathen. The four deities whose names are attached to the days of the week are hardly mentioned at all. The names Thunor and Tiw are sometimes used to translate the Latin Jupiter and Mars; Woden has his place (but not as a god) in the genealogies of the kings, and his name occurs once in a magical poem, but that is all. Bede, as a historian, is obliged to tell the story of the conversion; but the only native divinities he mentions are the goddesses Hrēth and Eostre, and all we learn about them is that they gave their names to Hrēthemōnath (March) and Easter. That superstitious practices of heathen origin long survived among the people is shown by the acts of church councils and by a few poems of a magical nature that have been preserved; but, so far as can be discovered, the definite worship of the ancient gods quickly died out. English heathenism perished without leaving a record.

The Old English religious poetry was written, probably without exception, in the cloister, and by men who were familiar with the Bible and with Latin devotional literature. Setting aside the wonderful *Dream of the Rood*, it gives little evidence of high poetic genius, though much of it is marked by a degree of culture and refinement that we should hardly have expected. Its material and thought are mainly derived from Latin sources; its expression is imitated from the native heroic poetry. Considering that a great deal of Latin verse was written by Englishmen in the 7th and succeeding centuries, and that in one or two poems the line is actually composed of an English and a Latin hemistich rhyming together, it seems strange that the Latin influence on Old English versification should have been so small. The alliterative long line is throughout the only metre employed, and although the laws of alliteration and rhythm were less rigorously obeyed in the later than in the earlier poetry, there is no trace of approximation to the structure of Latin verse. It is true that, owing to imitation of the Latin hymns of the church, rhyme came gradually to be more and more frequently used as an ornament of Old English verse; but it remained an ornament only, and never became an essential feature. The only poem in which rhyme is employed throughout is one in which sense is so completely sacrificed to sound that a translation would hardly be possible. It was not only in metrical respects that the Old English religious poetry remained faithful to its native models. The imagery and the diction are mainly those of the old heroic poetry, and in some of the poems Christ and the saints are presented, often very incongruously, under the aspect of Germanic warriors. Nearly all the religious poetry that has any considerable religious value seems to have been written in Northumbria during the 8th century. The remarkably vigorous poem of *Judith*, however, is certainly much later; and the *Exodus*, though early, seems to be of southern origin. For a detailed account of the Old English sacred poetry, the reader is referred to the articles on CÆDMON and CYNEWULF, to one or other of whom nearly every one of the poems, except those of obviously late date, has at some time been attributed.

The Riddles (*q.v.*) of the Exeter Book resemble the religious poetry in being the work of scholars, but they bear much more decidedly the impress of the native English character. Some of them rank among the most artistic and pleasing productions of Old English poetry. The Exeter Book contains also several pieces of a gnomic character, conveying proverbial instruction in morality and worldly wisdom. Their morality is Christian, but it is not unlikely that some of the wise sayings they contain may have come down by tradition from heathen times. The very curious *Dialogue of Solomon and Saturn* may be regarded as belonging to the same class.

The most original and interesting portion of the Old English literary poetry is the group of dramatic monologues—*The Banished Wife's Complaint*, *The Husband's Message*, *The Wanderer*, *The Seafarer*, *Deor* and *Wulf and Eadwacer*. The date of these compositions is uncertain, though their occurrence in the Exeter Book shows that they cannot be later than the 10th century. That they are all of one period is at least unlikely, but they are all marked by the same peculiar tone of pathos. The monodramatic form renders it difficult to obtain a clear idea of the situation of the supposed speakers. It is not improbable that most of these poems may relate to incidents of heroic legend, with which the original readers were presumed to be acquainted. This, however, can be definitely affirmed only in the case of the two short pieces—*Deor* and *Wulf and Eadwacer*—which have something of a lyric character, being the only examples in Old English of strophic structure and the use of the refrain. *Wulf and Eadwacer*, indeed, exhibits a still further development in the same direction, the monotony of the long line metre being varied by the admission of short lines formed by the suppression of the second hemistich. The highly developed art displayed in this remarkable poem gives reason for believing that the existing remains of Old English poetry very inadequately represent its extent and variety.

While the origins of English poetry go back to heathen times, English prose may be said to have had its effective beginning in the reign of Alfred. It is of course true that vernacular prose of some kind was written much earlier. The English laws of Æthelberht of Kent, though it is perhaps unlikely that they were written down, as is commonly supposed, in the lifetime of Augustine (died A.D. 604), or even in that of the king (d. 616), were well known to Bede; and even in the 12th-century transcript that has come down to us, their crude and elliptical style gives evidence of their high antiquity. Later kings of Kent and of Wessex followed the example of publishing their laws in the native tongue. Bede is known to have translated the beginning of the gospel of John (down to vi. 9). The early part of the Anglo-Saxon Chronicle (*q.v.*) is probably founded partly on prose annals of pre-Alfredian date. But although the amount of English prose written between the beginning of the 7th and the middle of the 9th century may have been considerable, Latin continued to be regarded as the appropriate vehicle for works of any literary pretension. If the English clergy had retained the scholarship which they possessed in the days of Aldhelm and Bede, the creation of a vernacular prose literature would probably have been longer delayed; for while Alfred certainly was not indifferent to the need of the laity for instruction, the evil that he was chiefly concerned to combat was the ignorance of their spiritual guides.

Of the works translated by him and the scholars whom he employed, *St Gregory's Pastoral Care* and his *Dialogues* (the latter rendered by Bishop Werferth) are expressly addressed to the priesthood; if the other translations were intended for a wider circle of readers, they are all (not excepting the secular *History of Orosius*) essentially religious in purpose and spirit. In the interesting preface to the *Pastoral Care*, in the important accounts of Northern lands and peoples inserted in the *Orosius*, and in the free rendering and amplification of the *Consolation* of Boethius and of the *Soliloquies* of Augustine, Alfred appears as an original writer. Other fruits of his activity are his Laws (preceded by a collection of those of his 7th-century predecessor, Ine of Wessex), and the beginnings of the Anglo-Saxon Chronicle. The Old English prose after Alfred is entirely of clerical authorship; even the Laws, so far as their literary form is concerned, are hardly to be regarded as an exception. Apart from the Chronicle (see ANGLO-SAXON CHRONICLE), the bulk of this literature consists of translations from Latin and of homilies and saints' lives, the substance of which is derived from sources mostly accessible to us in their original form; it has therefore for us little importance except from the philological point of view. This remark may be applied, in the main, even to the writings of Ælfric, notwithstanding the great interest which attaches to his brilliant achievement in the development of the capacities of the native language for literary expression. The translation of the gospels, though executed in Ælfric's time (about 1000), is by other hands. The sermons of his younger contemporary, Archbishop Wulfstan, are marked by earnestness and eloquence, and contain some passages of historical value.

From the early years of the 11th century we possess an encyclopaedic manual of the science of the time—chronology, astronomy, arithmetic, metre, rhetoric and ethics—by the monk Byrhtferth, a pupil of Abbo of Fleury. It is a compilation, but executed with intelligence. The numerous works on medicine, the properties of herbs, and the like, are in the main composed of selections from Latin treatises; so far as they are original, they illustrate the history of superstition rather than that of science. It is interesting to observe that they contain one or two formulas of incantations in Irish.

Two famous works of fiction, the romance of *Apollonius of Tyre* and the *Letter of Alexander*, which in their Latin form had much influence on the later literature of Europe, were Englished in the 11th century with considerable skill. To the same period belongs the curious tract on *The Wonders of the East.* In these works, and some minor productions of the time, we see that the minds of Englishmen were beginning to find interest in other than religious subjects.

The crowding of the English monasteries by foreigners, which was one of the results of the Norman Conquest, brought about a rapid arrest of the development of the vernacular literature. It was not long before the boys trained in the monastic schools ceased to learn to read and write their native tongue, and learned instead to read and write French. The effects of this change are visible in the rapid alteration of the literary language. The artificial tradition of grammatical correctness lost its hold; the archaic literary vocabulary fell into disuse; and those who wrote English at all wrote as they spoke, using more and more an extemporized phonetic spelling based largely on French analogies. The 12th century is a brilliant period in the history of Anglo-Latin literature, and many works of merit were written in French (see ANGLO-NORMAN). But vernacular literature is scanty and of little originality. The *Peterborough Chronicle*, it is true, was continued till 1154, and its later portions, while markedly exemplifying the changes in the language, contain some really admirable writing. But it is substantially correct to say that from this point until the age of Chaucer vernacular prose served no other purpose than that of popular religious edification. For light on the intellectual life of the nation during this period we must look mainly to the works written in Latin. The homilies of the 12th century are partly modernized transcripts from Ælfric and other older writers, partly translations from French and Latin; the remainder is mostly commonplace in substance and clumsy in expression. At the beginning of the 13th century the *Ancren Riwle* (*q.v.*), a book of counsel for nuns, shows true literary genius, and is singularly interesting in its substance and spirit; but notwithstanding the author's remarkable mastery of English expression, his culture was evidently French rather than English. Some minor religious prose works of the same period are not without merit. But these examples had no literary following. In the early 14th century the writings of Richard Rolle and his school attained great popularity. The profound influence which they exercised on later religious thought, and on the development of prose style, has seldom been adequately recognized. The *Ayenbite of Inwyt* (see MICHEL, DAN), a wretchedly unintelligent translation (finished in 1340) from Frère Lorens's *Somme des vices et des vertus*, is valuable to the student of language, but otherwise worthless.

The break in the continuity of literary tradition, induced by the Conquest, was no less complete with regard to poetry than with regard to prose. The poetry of the 13th and the latter part of the 12th century was uninfluenced by the written works of Old English poets, whose archaic diction had to a great extent become unintelligible. But there is no ground to suppose that the succession of popular singers and reciters was ever interrupted. In the north-west, indeed, the old recitative metre seems to have survived in oral tradition, with little more alteration than was rendered necessary by the changes in the language, until the middle of the 14th century, when it was again adopted by literary versifiers. In the south this metre had greatly degenerated in strictness before the Conquest, but, with gradually increasing laxity in the laws of alliteration and rhythm, it continued long in use. It is commonly believed, with great intrinsic probability but with scanty actual evidence, that in the Old English period there existed, beside the alliterative long line, other forms of verse adapted not for recitation but for singing, used in popular lyrics and ballads that were deemed too trivial for written record. The influence of native popular poetic tradition, whether in the form of recited or of sung verse, is clearly discernible in the earliest Middle English poems that have been preserved. But the authors of these poems were familiar with Latin, and probably spoke French as easily as their mother tongue; and there was no longer any literary convention to restrain them from adopting foreign metrical forms. The artless verses of the hermit Godric, who died in 1170, exhibit in their metre the combined influence of native rhythm and of that of Latin hymnology. The *Proverbs of Alfred*, written about 1200, is (like the later *Proverbs of Hendyng*) in style and substance a gnomic poem of the ancient Germanic type, containing maxims some of which may be of immemorial antiquity; and its rhythm is mainly of native origin. On the other hand, the solemn and touching meditation known as the *Moral Ode*, which is somewhat earlier in date, is in a metre derived from contemporary Latin verse—a line of seven accents, broken by a caesura, and with feminine end-rhymes. In the *Ormulum* (see ORM) this metre (known as the septenarius) appears without rhyme, and with a syllabic regularity previously without example in English verse, the line (or distich, as it may be called with almost equal propriety) having invariably fifteen syllables. In various modified forms, the septenarius was a favourite measure throughout the Middle English period. In the poetry of the 13th century the influence of French models is conspicuous. The many devotional lyrics, some of which, as the *Luve Ron* of Thomas of Hales, have great beauty, show this influence not only in their varied metrical form, but also in their peculiar mystical tenderness and fervour. The *Story of Genesis and Exodus*, the substance of which is taken from the Bible and Latin commentators, derives its metre chiefly from French. Its poetical merit is very small. The secular poetry also received a new impulse from France. The brilliant and sprightly dialogue of the *Owl and Nightingale*, which can hardly be dated later than about 1230, is a "contention" of the type familiar in French and Provençal literature. The "Gallic" type of humour may be seen in various other writings of this period, notably in the *Land of Cockaigne*, a vivacious satire on monastic self-indulgence, and in the fabliau of *Dame Siviz*, a story of Eastern origin, told with almost Chaucerian skill. Predominantly, though not exclusively French in metrical structure, are the charming love poems collected in a MS. (Harl. 2253) written about 1320 in Herefordshire, some of which (edited in T. Wright's *Specimens of Lyric Poetry*) find a place in modern popular anthologies. It is noteworthy that they are accompanied by some French lyrics very similar in style. The same MS. contains, besides some religious poetry, a number of political songs of the time of Edward II. They are not quite the earliest examples of their kind; in the time of the Barons' War the popular cause had had its singers in English as well as in French. Later, the victories of Edward III. down to the taking of Guisnes in 1352, were celebrated by the Yorkshireman Laurence Minot in alliterative verse with strophic arrangement and rhyme.

At the very beginning of the 13th century a new species of composition, the metrical chronicle, was introduced into English literature. The huge work of Layamon, a history (mainly legendary) of Britain from the time of the mythical Brutus till after the mission of Augustine, is a free rendering of the Norman-French *Brut* of Wace, with extensive additions from traditional sources. Its metre seems to be a degenerate survival of the Old English alliterative line, gradually modified in the course of the work by assimilation to the regular syllabic measure of the French original. Unquestionable evidence of the knowledge of the poem on the part of later writers is scarce, but distinct echoes of its diction appear in the chronicle ascribed to Robert of Gloucester, written in rhymed septenary measures about 1300. This work, founded in its earlier part on the Latin historians of the 12th century, is an independent historical source of some value for the events of the writer's own times. The succession of versified histories of England was continued by Thomas Bek of Castleford in Yorkshire (whose work still awaits an editor), and by Robert Mannyng of Brunne (Bourne, Lincolnshire). Mannyng's chronicle, finished in 1338, is a translation, in its earlier part from Wace's *Brut*, and in its later part from an Anglo-French chronicle (still extant) written by Peter Langtoft, canon of Bridlington.

Not far from the year 1300 (for the most part probably earlier rather than later) a vast mass of hagiological and homiletic verse was produced in divers parts of England. To Gloucester belongs an extensive series of Lives of Saints, metrically and linguistically closely resembling Robert of Gloucester's Chronicle, and perhaps wholly or in part of the same authorship. A similar collection was written in the north of England, as well as a large body of homilies showing considerable poetic skill, and abounding in *exempla* or illustrative stories. Of *exempla* several prose collections had already been made in Anglo-French, and William of Wadington's poem *Manuel des pêchés*, which contains a great number of them, was translated in 1303 by Robert Mannyng already mentioned, with some enlargement of the anecdotic element, and frequent omissions of didactic passages. The great rhyming chronicle of Scripture history entitled *Cursor Mundi* (*q.v.*) was written in the north about this time. It was extensively read and transcribed, and exercised a powerful influence on later writers down to the end of the 14th century. The remaining homiletic verse of this period is too abundant to be referred to in detail; it will be enough to mention the sermons of William of Shoreham, written in strophic form, but showing little either of metrical skill or poetic feeling. To the next generation belongs the *Pricke of Conscience* by Richard Rolle, the influence of which was not less powerful than that of the author's prose writings.

Romantic poetry, which in French had been extensively cultivated, both on the continent and in England from the early years of the 12th century, did not assume a vernacular form till about 1250. In the next hundred years its development was marvellously rapid. Of the vast mass of metrical romances produced during this period no detailed account need here be attempted (see ROMANCE, and articles, &c. referred to; ARTHURIAN ROMANCE). Native English traditions form the basis of *King Horn*, *Guy of Warwick*, *Bevis of Hamtoun* and *Havelok*, though the stories were first put into literary form by Anglo-Norman poets. The popularity of these home-grown tales (with which may be classed the wildly fictitious *Coer de Lion*) was soon rivalled by that of importations from France. The English rendering of *Floris and Blancheflur* (a love-romance of Greek origin) is found in the same MS. that contains the earliest copy of *King Horn*. Before the end of the century, the French "matter of Britain" was represented in English by the Southern *Arthur and Merlin* and the Northern *Tristram* and *Yvaine and Gawin*, the "matter of France" by *Roland and Vernagu* and *Otuel*; the *Alexander* was also translated, but in this instance the immediate original was an Anglo-French and not a continental poem. The tale of Troy did not come into English till long afterwards. The Auchinleck MS., written about 1330, contains no fewer than 14 poetical romances; there were many others in circulation, and the number continued to grow. About the middle of the 14th century, the Old English alliterative long line, which for centuries had been used only in unwritten minstrel poetry, emerges again in literature. One of the earliest poems in this revived measure, *Wynnere and Wastour*, written in 1352, is by a professional reciter-poet, who complains bitterly that original minstrel poetry no longer finds a welcome in the halls of great nobles, who prefer to listen to those who recite verses not of their own making. About the same date the metre began to be employed by men of letters for the translation of romance—*William of Palerne* and *Joseph of Arimathea* from the French, *Alexander* from Latin prose. The later development of alliterative poetry belongs mainly to the age of Chaucer.

The extent and character of the literature produced during the first half of the 14th century indicate that the literary use of the native tongue was no longer, as in the preceding age, a mere condescension to the needs of the common people. The rapid disuse of French as the ordinary medium of intercourse among the middle and higher ranks of society, and the consequent substitution of English for French as the vehicle of school instruction, created a widespread demand for vernacular reading. The literature which arose in answer to this demand, though it consisted mainly of translations or adaptations of foreign works, yet served to develop the appreciation of poetic beauty, and to prepare an audience in the near future for a poetry in which the genuine thought and feeling of the nation were to find expression.

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II. Chaucer to the Renaissance

The age of Chaucer is of peculiar interest to the student of literature, not only because of its brilliance and productiveness but also because of its apparent promise for the future. In this, as in other aspects, Chaucer (*c.* 1340–1400) is its most notable literary figure. Beginning as a student and imitator of the best French poetry of his day, he was for a time, like most of his French contemporaries, little more than a skilful maker of elegant verses, dealing with conventional material in a conventional way, arranging in new figures the same flowers and bowers, sunsets and song-birds, and companies of fair women and their lovers, that had been arranged and rearranged by every poet of the court circle for a hundred years, and celebrated in sweet phrases of almost unvarying sameness. Even at this time, to be sure, he was not without close and loving observation of the living creatures of the real world, and his verses often bring us flowers dewy and fragrant and fresh of colour as they grew in the fields and gardens about London, and birds that had learned their music in the woods; but his poetry was still not easily distinguishable from that of Machault, Froissart, Deschamps, Transoun and the other "courtly makers" of France. But while he was still striving to master perfectly the technique of this pretty art of trifling, he became acquainted with the new literature of Italy, both poetry and prose. Much of the new poetry moved, like that of France, among the conventionalities and artificialities of an unreal world of romance, but it was of wider range, of fuller tone, of far greater emotional intensity, and, at its best, was the fabric, not of elegant ingenuity, but of creative human passion,—in Dante, indeed, a wonderful visionary structure in which love and hate, and pity and terror, and the forms and countenances of men were more vivid and real than in the world of real men and real passions. The new prose—which Chaucer knew in several of the writings of Boccaccio—was vastly different from any that he had ever read in a modern tongue. Here were no mere brief anecdotes like those *exempla* which in the middle ages illustrated vernacular as well as Latin sermons, no cumbrous, slow-moving treatises on the Seven Deadly Sins, no half-articulate, pious meditations, but rapid, vivid, well-constructed narratives ranging from the sentimental beauty of stories like Griselda and the Franklin's Tale to coarse mirth and malodorous vulgarity equal to those of the tales told later by Chaucer's Miller and Reeve and Summoner. All these things he studied and some he imitated. There is scarcely a feature of the verse that has not left some trace in his own; the prose he did not imitate as prose, but there can be little doubt that the subject matter of Boccaccio's tales and novels, as well as his poems, affected the direction of Chaucer's literary development, and quickened his habit of observing and utilizing human life, and that the narrative art of the prose was influential in the transformation of his methods of narration.

This transformation was effected not so much through the mere superiority of the Italian models to the French as through the stimulus which the differences between the two gave to his reflections upon the processes and technique of composition, for Chaucer was not a careless, happy-go-lucky poet of divine endowment, but a conscious, reflective artist, seeking not merely for fine words and fine sentiments, but for the proper arrangement of events, the significant exponent of character, the right tone, and even the appropriate background and atmosphere,—as may be seen, for example, in the transformations he wrought in the *Pardoner's Tale*. It is therefore in the latest and most original of the *Canterbury Tales* that his art is most admirable, most distinguished by technical excellences. In these we find so many admirable qualities that we almost forget that he had any defects. His diction is a model of picturesqueness, of simplicity, of dignity, and of perfect adaptation to his theme: his versification is not only correct but musical and varied, and shows a progressive tendency towards freer and more complex melodies; his best tales are not mere repetitions of the ancient stories they retell, but new creations, transformed by his own imaginative realization of them, full of figures having the dimensions and the vivacity of real life, acting on adequate motives, and moving in an atmosphere and against a background appropriate to their characters and their actions. In the tales of the Pardoner, the Franklin, the Summoner, the Squire, he is no less notable as a consummate artist than as a poet.

Chaucer, however, was not the only writer of his day remarkable for mastery of technique. Gower, indeed, though a man of much learning and intelligence, was neither a poet of the first rank nor an artist. Despite the admirable qualities of clearness, order and occasional picturesqueness which distinguish his work, he lacked the ability which great poets have of making their words mean more than they say, and of stirring the emotions even beyond the bounds of this enhanced meaning; and there is not, perhaps, in all his voluminous work in English, French and Latin, any indication that he regarded composition as an art requiring consideration or any care beyond that of conforming to the chosen rhythm and finding suitable rhymes.

There were others more richly endowed as poets and more finely developed as artists. There was the beginner of the *Piers Plowman* cycle,[1] the author of the Prologue and first eight passus of the A-text, a man of clear and profound observation, a poet whose imagination brought before him with distinctness and reality visual images of the motley individuals and masses of men of whom he wrote, an artist who knew how to organize and direct the figures of his dream-world, the movement of his ever-unfolding vision. There was the remarkable successor of this man, the author of the B-text, an almost prophetic figure, a great poetic idealist, and, helpless though he often was in the direction of his thought, an absolute master of images and words that seize upon the heart and haunt the memory. Besides these, an unknown writer far in the north-west had, in *Gawayne and the Grene Knight*, transformed the medieval romance into a thing of speed and colour, of vitality and mystery, no less remarkable for its fluent definiteness of form than for the delights of hall-feast and hunt, the graceful comedy of temptation, and the lonely ride of the doomed Gawayne through the silence of the forest and the deep snow. In the same region, by its author's power of visual imagination, the Biblical paraphrase, so often a mere humdrum narrative, had been transformed, in *Patience*, into a narrative so detailed and vivid that the reader is almost ready to believe that the author himself, rather than Jonah, went down into the sea in the belly of the great fish, and sat humbled and rebuked beside the withered gourd-vine. And there also, by some strange chance, blossomed, with perhaps only a local and temporary fragrance until its rediscovery in the 19th century, that delicate flower of loneliness and aspiration, *Pearl*, a wonder of elaborate art as well as of touching sentiment.

All these writings are great, not only relatively, but absolutely. There is not one of them which would not, if written in our own time, immediately mark its author as a man of very unusual ability. But the point of special concern to us at the present moment is not so much that they show remarkable poetic power, as that they possess technical merits of a very high order. And we are accustomed to believe that, although genius is a purely personal and incommunicable element, technical gains are a common possession; that after Marlowe had developed the technique of blank verse, this technique was available for all; that after Pope had mastered the heroic couplet and Gray the ode, and Poe the short story, all men could write couplets and odes and short stories of technical correctness; that, as Tennyson puts it,

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[1] *Piers Plowman* has been so long attributed as a whole to Langland (*q.v.*), that in spite of modern analytical criticism it is most conveniently discussed under that name.

> "All can grow the flower now,
> For all have got the seed."

But this was singularly untrue of the technical gains made by Chaucer and his great contemporaries. *Pearl* and *Patience* were apparently unknown to the 15th century, but *Gawayne* and *Piers Plowman* and Chaucer's works were known and were influential in one way or another throughout the century. *Gawayne* called into existence a large number of romances dealing with the same hero or with somewhat similar situations, some of them written in verse suggested by the remarkable verse of their model, but the resemblance, even in versification, is only superficial. *Piers Plowman* gave rise to satirical allegories written in the alliterative long line and furnished the figures and the machinery for many satires in other metres, but the technical excellence of the first *Piers Plowman* poem was soon buried for centuries under the tremendous social significance of itself and its successors. And Chaucer, in spite of the fact that he was praised and imitated by many writers and definitely claimed as master by more than one, not only transmitted to them scarcely any of the technical conquests he had made, but seems also to have been almost without success in creating any change in the taste of the public that read his poems so eagerly, any demand for better literature than had been written by his predecessors.

Wide and lasting Chaucer's influence undoubtedly was. Not only was all the court-poetry, all the poetry of writers who pretended to cultivation and refinement, throughout the century, in England and Scotland, either directly or indirectly imitative of his work, but even the humblest productions of unpretentious writers show at times traces of his influence. Scotland was fortunate in having writers of greater ability than England had (see SCOTLAND: *Literature*). In England the three chief followers of Chaucer known to us by name are Lydgate, Hoccleve (see OCCLEVE) and Hawes. Because of their praise of Chaucer and their supposed personal relations to him, Lydgate and Hoccleve are almost inseparable in modern discussions, but 15th century readers and writers appear not to have associated them very closely. Indeed, Hoccleve is rarely mentioned, while Lydgate is not only mentioned continually, but continually praised as Chaucer's equal or even superior. Hoccleve was not, to be sure, as prolific as Lydgate, but it is difficult to understand why his work, which compares favourably in quality with Lydgate's, attracted so much less attention. The title of his greatest poem, *De regimine principum*, may have repelled readers who were not princely born, though they would have found the work full of the moral and prudential maxims and illustrative anecdotes so dear to them; but his attack upon Sir John Oldcastle as a heretic ought to have been decidedly to the taste of the orthodox upper classes, while his lamentations over his misspent youth, his tales and some of his minor poems might have interested any one. Of a less vigorous spirit than Lydgate, he was, in his mild way, more humorous and more original. Also despite his sense of personal loss in Chaucer's death and his care to transmit to posterity the likeness of his beloved master, he seems to have been less slavish than Lydgate in imitating him. His memory is full of Chaucer's phrases, he writes in verse-forms hallowed by the master's use, and he tries to give to his lines the movement of Chaucer's decasyllables, but he is comparatively free from the influence of those early allegorical works of the Master which produced in the 15th century so dreary a flock of imitations.

Lydgate's productivity was enormous,—how great no man can say, for, as was the case with Chaucer also, his fame caused many masterless poems to be ascribed to him, but, after making all necessary deductions, the amount of verse that has come down to us from him is astonishing. Here it may suffice to say that his translations are predominantly epic (140,000 lines), and his original compositions predominantly allegorical love poems or didactic poems. If there is anything duller than a dull epic it is a dull allegory, and Lydgate has achieved both. This is not to deny the existence of good passages in his epics and ingenuity in his allegories, but there is no pervading, persistent life in either. His epics, like almost all the narrative verse of the time, whether epic, legend, versified chronicle or metrical romance, seem designed merely to satisfy the desire of 15th century readers for information, the craving for facts—true or fictitious—the same craving that made possible the poems on alchemy, on hunting, on manners and morals, on the duties of parish priests, on the seven liberal arts. His allegories, like most allegories of the age, are ingenious rearrangements of old figures and old machinery, they are full of what had once been imagination but had become merely memory assisted by cleverness. The great fault of all his work, as of nearly all the literature of the age, is that it is merely a more or less skilful manipulation of what the author had somewhere read or heard, and not a faithful transcript of the author's own peculiar sense or conception of what he had seen or heard or read. The fault is not that the old is repeated, that a twice-told tale is retold, but that it is retold without being re-imagined by the teller of the tale, without taking on from his personality something that was not in it before. Style, to be sure, was a thing that Lydgate and his fellows tried to supply, and some of them supplied it abundantly according to their lights. But style meant to them external decoration, classical allusions, personifications, an inverted or even dislocated order of words, and that famous "ornate diction," those "aureate terms," with which they strove to surpass the melody, picturesqueness and dignity which, for all its simplicity, they somehow dimly discerned in the diction of Chaucer.

Stephen Hawes, with his allegorical treatise on the seven liberal sciences, came later than these men, only to write worse. He was a disciple of Lydgate rather than of Chaucer, and is not only lacking in the vigour and sensitiveness which Lydgate sometimes displays, but exaggerates the defects of his master. If it be a merit to have conceived the pursuit of knowledge under the form of the efforts of a knight to win the hand of his lady, it is almost the sole merit to which Hawes can lay claim. Two or three good situations, an episode of low comedy, and the epitaph of the Knight with its famous final couplet, exhaust the list of his credits. The efforts that have been made to trace through Hawes the line of Spenser's spiritual ancestry seem not well advised. The resemblances that have been pointed out are such as arise inevitably from the allegories and from the traditional material with which both worked. There is no reason to believe that Spenser owed his general conception to Hawes, or that the *Faëry Queene* would have differed in even the slightest detail from its present form if the *Pastime of Pleasure* had never been written. The machinery of chivalric romance had already been applied to spiritual and moral themes in Spain without the aid of Hawes.

It is obvious that the fundamental lack of all these men was imaginative power, poetic ability. This is a sufficient reason for failure to write good poetry. But why did not men of better ability devote themselves to literature in this age? Was it because of the perturbed conditions arising from the prevalence of foreign and civil wars? Perhaps not, though it is clear that if Sir Thomas Malory had perished in one of the many fights through which he lived, the chivalric and literary impulses which he perhaps received from the "Fadre of Curteisy," Richard Beauchamp, earl of Warwick, would have gone for nothing and we should lack the *Morte Darthur*. But it may very well be that the wars and the tremendous industrial growth of England fixed the attention of the strongest and most original spirits among the younger men and so withdrew them from the possible attractions of literature. But, after all, whatever general truth may lie in such speculations, the way of a young man with his own life is as incalculable as any of the four things which Agur son of Jakeh declared to be past finding out; local and special accidents rather than general communal influences are apt to shape the choice of boys of exceptional character, and we have many instances of great talents turning to literature or art when war or commerce or science was the dominant attraction of social life.

But even recognizing that the followers of Chaucer were not men of genius, it seems strange that their imitation of Chaucer was what it was. They not only entirely failed to see what his merits as an artist were and how greatly superior his mature work is to his earlier in point of technique; they even preferred the earlier and imitated it almost exclusively. Furthermore, his mastery of verse seemed to them to consist solely in writing verses of approximately four or five stresses and arranging them in couplets or in stanzas of seven or eight lines. Their preference for the early allegorical work can be explained by their lack of taste and critical discernment and by the great vogue of allegorical writing in England and France. Men who are just beginning to think about the distinction between literature and ordinary writing usually feel that it consists in making literary expression differ as widely as possible from simple direct speech. For this reason some sort of artificial diction is developed and some artificial word order devised. Allegory is used as an elegant method of avoiding unpoetical plainness, and is an easy means of substituting logic for imagination. The failure to reproduce in some degree at least the melody and smoothness of Chaucer's decasyllabic verse, and the particular form which that failure took in Lydgate, are to be explained by the fact that Lydgate and his fellows never knew how Chaucer's verse sounded when properly read. It is a mistake to suppose that the disappearance of final unaccented *e* from many words or its instability in many others made it difficult for Lydgate and his fellows to write melodious verse. Melodious verse has been written since the disappearance of all these sounds, and the possibility of a choice between a form with final *e* and one without it is not a hindrance but an advantage to a poet, as Goethe, Schiller, Heine and innumerable German poets have shown by their practice. The real difficulty with these men was that they pronounced Chaucer's verse as if it were written in the English of their own day. As a matter of fact all the types of verse discovered by scholars in Lydgate's poems can be discovered in Chaucer's also if they be read with Lydgate's pronunciation. Chaucer did not write archaic English, as some have supposed,—that is, English of an earlier age than his own,—it would have been impossible for him to do so with the unfailing accuracy he shows; he did, however, write a conservative, perhaps an old-fashioned, English, such as was spoken by the conservative members of the class of society to which he was attached and for which he wrote. An English with fewer final *e*'s was already in existence among the less conservative classes, and this rapidly became standard English in consequence of the social changes which occurred during his own life. We know that a misunderstanding of Chaucer's verse existed from the 16th century to the time of Thomas Tyrwhitt; it seems clear that it began even earlier, in Chaucer's own lifetime.

There are several poems of the 15th century which were long ascribed to Chaucer. Among them are:—the *Complaint of the Black Knight*, or *Complaint of a Lover's Life*, now known to be Lydgate's; the *Mother of God*, now ascribed to Hoccleve; the *Cuckoo and the Nightingale*, by Clanvowe; *La Belle Dame sans merci*, a translation from the French of Alain Chartier by Richard Ros; *Chaucer's Dream, or the Isle of Ladies*; the *Assembly of Ladies*; the *Flower and the Leaf*; and the *Court of Love*. The two poems of Lydgate and Hoccleve are as good as Chaucer's poorest work. The *Assembly of Ladies* and the *Flower and the Leaf* are perhaps better than the *Book of the Duchess*, but not so good as the *Parliament of Fowls*. The *Flower and the Leaf*, it will be remembered, was very dear to John Keats, who, like all his contemporaries, regarded it as Chaucer's. An additional interest attaches to both it and the *Assembly of Ladies*, from the fact that the author may have been a woman; Professor Skeat is, indeed, confident that he knows who the woman was and when she wrote. These poems, like the *Court of Love*, are thoroughly conventional in material, all the figures and poetical machinery may be found in dozens of other poems in England and France, as Professor Neilson has shown for the *Court of Love* and Mr Marsh for the *Flower and the Leaf*; but there are a freshness of spirit and a love of beauty in them that are not common; the conventional birds and flowers are there, but they seem, like those of Chaucer's *Legend*, to have some touch of life, and the conventional companies of ladies and gentlemen ride and talk and walk with natural grace and ease. The *Court of Love* is usually ascribed to a very late date, as late even as the middle of the 16th century. If this is correct, it is a notable instance of the persistence of a Chaucerian influence. An effort has been made, to be sure, to show that it was written by Scogan and that the writing of it constituted the offence mentioned by Chaucer in his *Envoy to Scogan*, but it has been clearly shown that this is impossible, both because the language is later than Scogan's time and because nothing in the poem resembles the offence clearly described by Chaucer.

Whatever may be true of the authorship of the *Assembly of Ladies* and the *Flower and the Leaf*, there were women writers in England in the middle ages. Juliana of Norwich wrote her *Revelations of Divine Love* before 1400. The much discussed Dame Juliana Berners, the supposed compiler of the treatise on hunting in the *Book of St Albans*, may be mythical, though there is no reason why a woman should not have written such a book; and a shadowy figure that disappears entirely in the sunlight is the supposed authoress of the *Nut Brown Maid*, for if language is capable of definite meaning, the last stanza declares unequivocally that the poem is the work of a man. But there is a poem warning young women against entering a nunnery which may be by a woman, and there is an interesting entry among the records of New Romney for 1463–1464, "Paid to Agnes Forde for the play of the Interlude of our Lord's Passion, 6s. 8d.," which is apparently the earliest mention of a woman dramatist in England. Finally, Margaret, countess of Richmond, the mother of Henry VII., not only aided scholars and encouraged writers, but herself translated the (spurious) fourth book of St Thomas à Kempis's *Imitatio Christi*. Another Margaret, the duchess of Burgundy, it will be remembered, encouraged Caxton in his translation and printing. Women seem, indeed, to have been especially lovers of books and patrons of writers, and Skelton, if we may believe his *Garland of Laurel*, was surrounded by a bevy of ladies comparable to a modern literary club; Erasmus's Suffragette Convention may correspond to no reality, but the Learned Lady arguing against the Monk for the usefulness and pleasure derived from books was not an unknown type. Women were capable of many things in the middle ages. English records show them to have been physicians, churchwardens, justices of the peace and sheriffs, and, according to a satirist, they were also priests.

The most original and powerful poetry of the 15th century was composed in popular forms for the ear of the common people and was apparently written without conscious artistic purpose. Three classes of productions deserve special attention,—songs and carols, popular ballads and certain dramatic compositions. The songs and carols belong to a species which may have existed in England before the Norman Conquest, but which certainly was greatly modified by the musical and lyric forms of France. The best of them are the direct and simple if not entirely artless expressions of personal emotion, and even when they contain, as they sometimes do, the description of a person, a situation, or an event, they deal with these things so subjectively, confine themselves so closely to the rendering of the emotional effect upon the singer, that they lose none of their directness or simplicity. Some of them deal with secular subjects, some with religious, and some are curious and delightful blendings of religious worship and aspiration with earthly tenderness for the embodiments of helpless infancy and protecting motherhood which gave Christianity so much of its power over the affections and imagination of the middle ages. Even those which begin as mere expressions of joy in the Yule-tide eating and drinking and merriment catch at moments hints of higher joys, of finer emotions, and lift singer and hearer above the noise and stir of earth. Hundreds of songs written and sung in the 15th century must have perished; many, no doubt, lived only a single season and were never even written down; but chance has preserved enough of them to make us wonder at the age which could produce such masterpieces of tantalizing simplicity.

The lyrics which describe a situation form a logical, if not a real transition to those which narrate an episode or an event. The most famous of the latter, the *Nut Brown Maid*, has often been called a ballad, and "lyrical ballad" it is in the sense established by Coleridge and Wordsworth, but its affinities are rather with the song or carol than with the folk-ballad, and, like Henryson's charming *Robin and Malkin*, it is certainly the work of a man of culture and of conscious artistic purpose and methods. Unaccompanied, as it is, by any other work of the same author, this poem, with its remarkable technical merits, is an even more astonishing literary phenomenon than the famous single sonnet of Blanco White. It can hardly be doubted that the author learned his technique from the songs and carols.

The folk-ballad, like the song or carol, belongs in some form to immemorial antiquity. It is doubtless a mistake to suppose that any ballad has been preserved to us that is a purely communal product, a confection of the common knowledge, traditions and emotions of the community wrought by subconscious processes into a song that finds chance but inevitable utterance through one or more individuals as the whole commune moves in its molecular dance. But it is equally a mistake to argue that ballads are essentially metrical romances in a state of decay. Both the matter and the manner of most of the best ballads forbid such a supposition, and it can hardly be doubted that in some of the folk-ballads of the 15th century are preserved not only traditions of dateless antiquity, but formal elements and technical processes that actually are derived from communal song and dance. By the 15th century, however, communal habits and processes of composition had ceased, and the traditional elements, formulae and technique had become merely conventional aids and guides for the individual singer. Ancient as they were, conventional as, in a sense, they also were, they exercised none of the deadening, benumbing influence of ordinary conventions. They furnished, one may say, a vibrant framework of emotional expression, each tone of which moved the hearers all the more powerfully because it had sung to them so many old, unhappy, far-off things, so many battles and treacheries and sudden griefs; a framework which the individual singer needed only to fill out with the simplest statement of the event which had stirred his own imagination and passions to produce, not a work of art, but a song of universal appeal. Not a work of art, because there are scarcely half a dozen ballads that are really works of art, and the greatest ballads are not among these. There is scarcely one that is free from excrescences, from dulness, from trivialities, from additions that would spoil their greatest situations and their greatest lines, were it not that we resolutely shut our ears and our eyes, as we should, to all but their greatest moments. But at their best moments the best ballads have an almost incomparable power, and to a people sick, as we are, of the ordinary, the usual, the very trivialities and impertinences of the ballads only help to define and emphasize these best moments. In histories of English literature the ballads have been so commonly discussed in connexion with their rediscovery in the 18th century, that we are apt to forget that some of the very best were demonstrably composed in the 15th and that many others of uncertain date probably belong to the same time.

Along with the genuine ballads dealing with a recent event or a traditional theme there were ballads in which earlier romances are retold in ballad style. This was doubtless inevitable in view of the increasing epic tendency of the ballad and the interest still felt in metrical romances, but it should not mislead us into regarding the genuine folk-ballad as an out-growth of the metrical romance.

Besides the ordinary epic or narrative ballad, the 15th century produced ballads in dramatic form, or, perhaps it were better to say, dramatized some of its epic ballads. How commonly this was done we do not know, but the scanty records of the period indicate that it was a widespread custom, though only three plays of this character (all concerning Robin Hood) have come down to us. These plays had, however, no further independent development, but merely furnished elements of incident and atmosphere to later plays of a more highly organized type. With these ballad plays may also be mentioned the Christmas plays (usually of St George) and the sword-dance plays, which also flourished in the 15th century, but survive for us only as obscure elements in the masques and plays of Ben Jonson and in such modern rustic performances as Thomas Hardy has so charmingly described in *The Return of the Native.*

The additions which the 15th century made to the ancient cycles of Scripture plays, the so-called Mysteries, are another instance of a literary effort which spent itself in vain (see DRAMA). The most notable of these are, of course, the world renowned comic scenes in the *Towneley* (or *Wakefield*) *Plays*, in the pageants of Cain, of Noah and of the Shepherds. In none of these is the 15th century writer responsible for the original comic intention; in the pageants of Cain and of the Shepherds fragments of the work of a 14th century writer still remain to prove the earlier existence of the comic conception, and that it was traditional in the Noah pageant we know from the testimony of Chaucer's Miller; but none the less the 15th century writer was a comic dramatist of original power and of a skill in the development of both character and situation previously unexampled in England. The inability of Lydgate to develop a comic conception is strikingly displayed if one compares his *Pageant for Presentation before the King at Hereford* with the work of this unknown artist. But in our admiration for this man and his famous episode of Mak and the fictitious infant, we are apt to forget the equally fine, though very different qualities shown in some of the later pageants of the *York Plays.* Such, for example, is the final pageant, that of the *Last Judgment*, a drama of slow and majestic movement, to be sure, but with a large and fine conception of the great situation, and a noble and dignified elocution not inadequate to the theme.

The *Abraham and Isaac* play of the Brome MS., extant as a separate play and perhaps so performed, which has been so greatly admired for its cumulative pathos, also belongs demonstrably to this century. It is not, as has been supposed, an intermediate stage between French plays and the Chester *Abraham and Isaac*, but is derived directly from the latter by processes which comparison of the two easily reveals. Scripture plays of a type entirely different from the well-known cyclic mysteries, apparently confined to the Passion and Resurrection and the related events, become known to us for the first time in the records of this century. Such plays seem to have been confined to the towns of the south, and, as both their location and their structure suggest, may have been borrowed from France. In any event, the records show that they flourished greatly and that new versions were made from time to time.

Another form of the medieval drama, the Morality Play, had its origin in the 15th century,—or else very late in the 14th. The earliest known examples of it in England date from about 1420. These are the *Castle of Perseverance* and the *Pride of Life.* Others belonging to the century are *Mind, Will and Understanding*, *Mankind* and Medwall's *Nature.* There are also parts of two pageants in the *Ludus Coventriae* (*c.* 1460) that are commonly classed as Moralities, and these, together with the existence of a few personified abstractions in other plays, have led some critics to suppose that the Morality was derived from the Mystery by the gradual introduction of personified abstractions in the place of real persons. But the two kinds of plays are fundamentally different, different in subject and in technique; and no replacement of real persons by personifications can change a Mystery into a Morality. Moreover, the Morality features in Mysteries are later than the origin of the Morality itself and are due to the influence of the latter. The Morality Play is merely a dramatized allegory, and derives its characters and its peculiar technique from the application of the dramatic method to the allegory, the favourite literary form of the middle ages. None of the 15th century Moralities is literature of the first rank, though both the *Castle of Perseverance* and *Pride of Life* contain passages ringing with a passionate sincerity that communicates itself to the hearer or reader. But it was not until the beginning of the 16th century that a Morality of permanent human interest appeared in *Everyman*, which, after all, is a translation from the Dutch, as is clearly proved by the fact that in the two prayers near the end of the play the Dutch has complicated but regular stanzas, whereas the English has only irregularly rhymed passages.

Besides the Mysteries and Moralities, the 15th century had also Miracle Plays, properly so called, dealing with the lives, martyrdoms and miracles of saints. As we know these only from records of their performance or their mere existence—no texts have been preserved to us, except the very curious *Play of the Sacrament*—it is impossible to speak of their literary or dramatic qualities. The Miracle Play as a form was, of course, not confined to the 15th century. Notwithstanding the assertions of historians of literature that it died out in England soon after its introduction at the beginning of the 12th century, its existence can be demonstrated from *c.* 1110 to the time of Shakespeare. But records seem to indicate that it flourished especially during this period of supposed barrenness.

What was the nature of the "Komedy of Troylous and Pandor" performed before Henry VIII. on the 6th of January 1516 we have no means of knowing. It is very early indeed to assume the influence of either classical or Italian drama, and although we have no records of similar plays from the 15th century, it must be remembered that our records are scanty, that the middle ages applied the dramatic method to all sorts of material, and that it is therefore not impossible that secular plays like this were performed at court at a much earlier date. The record at any rate does not indicate that it was a new type of play, and the Griselda story had been dramatized in France, Italy and the Netherlands before 1500.

That not much good prose was written in the 15th century is less surprising than that so little good verse was written. The technique of verse composition had been studied and mastered in the preceding age, as we have seen, but the technique of prose had apparently received no serious consideration. Indeed, it is doubtful if any one thought of prose as a possible medium of artistic expression. Chaucer apparently did not, in spite of the comparative excellence of his Preface to the *Astrolabe* and his occasional noteworthy successes with the difficulties of the philosophy of Boethius; Wycliffe is usually clumsy; and the translators of Mandeville, though they often give us passages of great charm, obviously were plain men who merely translated as best they could. There was, however, a comparatively large amount of prose written in the 15th century, mainly for religious or educational purposes, dealing with the same sorts of subjects that were dealt with in verse, and in some cases not distinguishable from the verse by any feature but the absence of rhyme. The vast body of this we must neglect; only five writers need be named: John Capgrave, Reginald Pecock, Sir John Fortescue, Caxton and Malory. Capgrave, the compiler of the first chronicle in English prose since the Conquest, wrote by preference in Latin; his English is a condescension to those who could not read Latin and has the qualities which belong to the talk of an earnest and sincere man of commonplace ability. Pecock and Fortescue are more important. Pecock (*c.* 1395–*c.* 1460) was a man of singularly acute and logical mind. He prided himself upon his dialectic skill and his faculty for discovering arguments that had been overlooked by others. His writings, therefore—or at least the *Repressor*—are excellent in general structure and arrangement, his ideas are presented clearly and simply, with few digressions or excrescences, and his sentences, though sometimes too long, are more like modern prose than any others before the age of Elizabeth. His style is lightened by frequent figures of speech, mostly illustrative, and really illustrative, of his ideas, while his intellectual ingenuity cannot fail to interest even those whom his prejudices and preconceptions repel. Fortescue, like Capgrave, wrote by preference in Latin, and, like Pecock, was philosophical and controversial. But his principal English work, the *Difference between an Absolute and a Limited Monarchy*, differs from Pecock's in being rather a pleading than a logical argument, and the geniality and glowing patriotism of its author give it a far greater human interest.

No new era in literary composition was marked by the activity of William Caxton as translator and publisher, though the printing-press has, of course, changed fundamentally the problem of the dissemination and preservation of culture, and thereby ultimately affected literary production profoundly. But neither Caxton nor the writers whose works he printed produced anything new in form or spirit. His publications range over the whole field of 15th century literature, and no doubt he tried, as his quaint prefaces indicate, to direct the public taste to what was best among the works of the past, as when he printed and reprinted the *Canterbury Tales*, but among all his numerous publications not one is the herald of a new era. The only book of permanent interest as literature which he introduced to the world was the *Morte Darthur* of Sir Thomas Malory, and this is a compilation from older romances (see ARTHURIAN LEGEND). It is, to be sure, the one book of permanent literary significance produced in England in the 15th century; it glows with the warmth and beauty of the old knight's conception of chivalry and his love for the great deeds and great men of the visionary past, and it continually allures the reader by its fresh and vivid diction and by a syntax which, though sometimes faulty, has almost always a certain naïve charm; "thystorye (*i.e.* the history) of the sayd Arthur," as Caxton long ago declared, "is so gloryous and shynyng, that he is stalled in the first place of the moost noble, beste and worthyest of the Crysten men"; it is not, however, as the first of a new species, but as the final flower of an old that this glorious and shining book retains its place in English literature.

Whatever may have been the effect of the wars and the growth of industrial life in England in withdrawing men of the best abilities from the pursuit of literature, neither these causes nor any other interfered with the activity of writers of lesser powers. The amount of writing is really astonishing, as is also its range. More than three hundred separate works (exclusive of the large number still ascribed to Lydgate and of the seventy printed by Caxton) have been made accessible by the Early English Text Society and other public or private presses, and it seems probable that an equal number remains as yet unpublished. No list of these writings can be given here, but it may not be unprofitable to indicate the range of interests by noting the classes of writing represented. The classification is necessarily rough, as some writings belong to more than one type. We may note, first, love poems, allegorical and unallegorical, narrative, didactic, lyrical and quasi-lyrical; poems autobiographical and exculpatory; poems of eulogy and appeal for aid; tales of entertainment or instruction, in prose and in verse; histories ancient and modern, and brief accounts of recent historical events, in prose and in verse; prose romances and metrical romances; legends and lives of saints, in prose and in verse; poems and prose works of religious meditation, devotion and controversy; treatises of religious instruction, in prose and in verse; ethical and philosophical treatises, and ethical and prudential treatises; treatises of government, of political economy, of foreign travel, of hygiene, of surgery, of alchemy, of heraldry, of hunting and hawking and fishing, of farming, of good manners, and of cooking and carving. Prosaic and intended merely to serve practical uses as many of these were, verse is the medium of expression as often as prose. Besides this large amount and variety of English compositions, it must be remembered that much was also written in Latin, and that Latin and French works of this and other centuries were read by the educated classes.

Although the intellectual and spiritual movement which we call the Italian Renaissance was not unknown in England in the 14th and 15th centuries, it is not strange that it exercised no perceptible influence upon English literature, except in the case of Chaucer. Chaucer was the only English man of letters before the 16th century who knew Italian literature. The Italians who visited England and the Englishmen who visited Italy were interested, not in literature, but in scholarship. Such studies as were pursued by Free, Grey, Flemming, Tilly, Gunthorpe and others who went to Italy, made them better grammarians and rhetoricians, and no doubt gave them a freer, wider outlook, but upon their return to England they were immediately absorbed in administrative cares, which left them little leisure for literary composition, even if they had had any inclination to write. They prepared the way, however, for the leaders of the great intellectual awakening which began in England with Linacre, Colet, More and their fellows, and which finally culminated in the age of Spenser, Bacon, Shakespeare, Jonson, Gilbert, Harvey and Harriott.

When the middle ages ceased in England it is impossible to say definitely. Long after the new learning and culture of the Renaissance had been introduced there, long after classical and Italian models were eagerly chosen and followed, the epic and lyric models of the middle ages were admired and imitated, and the ancient forms of the drama lived side by side with the new until the time of Shakespeare himself. John Skelton, although according to Erasmus "unum Britannicarum literarum lumen ac decus," and although possessing great originality and vigour both in diction and in versification when attacking his enemies or indulging in playful rhyming, was not only a great admirer of Lydgate, but equalled even the worst of his predecessors in aureate pedantries of diction, in complicated impossibilities of syntax, and in meaningless inversions of word-order whenever he wished to write elegant and dignified literature. And not a little of the absurd diction of the middle of the 16th century is merely a continuation of the bad ideals and practices of the refined writers of the 15th.

In fine, the 15th century has, aside from its vigorous, though sometimes coarse, popular productions, little that can interest the lover of literature. It offers, however, in richest profusion problems for the literary antiquarian and the student of the relations between social conditions and literary productivity,—problems which have usually been attacked only with the light weapons of irresponsible speculation, but which may perhaps be solved by a careful comparative study of many literatures and many periods. Moreover, although in the quality of its literary output it is decidedly inferior to the 14th century, the amount and the wide range of its productions indicate the gradual extension of the habit of reading to classes of society that were previously unlettered; and this was of great importance for the future of English literature, just as the innumerable dramatic performances throughout England were important in developing audiences for Marlowe and Shakespeare and Beaumont and Fletcher.

For bibliography see vol. ii. of the *Cambridge History of Literature* (1909); and Brandl's *Geschichte der mittelenglischen Literatur* (reprinted from Paul's *Grundriss der germanischen Philologie*). Interesting general discussions may be found in the larger histories of English Literature, such as Ten Brink's, Jusserand's, and (a little more antiquated) Courthope's and Morley's. (J. M. MA.)

III. ELIZABETHAN TIMES

General Influences, and Prologue to 1579.—The history of letters in England from More's *Utopia* (1516), the first Platonic vision, to Milton's *Samson Agonistes* (1671), the latest classic tragedy, is one and continuous. That is the period of the English Renaissance, in the wider sense, and it covers all and more of the literature loosely called "Elizabethan." With all its complexity and subdivisions, it has as real a unity as the age of Pericles, or that of Petrarch and Boccaccio, or the period in Germany that includes both Lessing and Heine. It is peculiar in length of span, in variety of power, and in wealth of production, though its master-works on the greater scale are relatively few. It is distinct, while never quite cut off, from the middle age preceding, and also from the classical or "Augustan" age that followed. The coming of Dryden denoted a new phase; but it was still a phase of the Renaissance; and the break that declared itself about 1660 counts as nothing beside the break with the middle ages; for this implied the whole change in art, thought and temper, which re-created the European mind. It is true that many filaments unite Renaissance and middle ages, not only in the religious and purely intellectual region, but in that of art. The matter of Geoffrey of Monmouth, the tales of Arthur and of Troilus, the old fairy folklore of the South, the topic of the *Falls of Princes*, lived on; and so did the characteristic medieval form, allegory and many of the old metres of the 14th century. But then these things were transformed, often out of knowledge. Shakespeare's use of the histories of Macbeth, Lear and Troilus, and Spenser's of the allegoric romance, are examples. And when the gifts of the middle ages are not transformed, as in the *Mirror for Magistrates*, they strike us as survivals from a lost world.

So vital a change took long in the working. The English Renaissance of letters only came into full flower during the last twenty years of the 16th century, later than in any Southern land; but it was all the richer for delay, and would have missed many a life-giving element could it have been driven forward sooner. If the actual process of genius is beyond analysis, we can still notice the subjects which genius receives, or chooses, to work upon, and also the vesture which it chooses for them; and we can watch some of the forces that long retard but in the end fertilize these workings of genius.

General forces.

What, then, in England, were these forces? Two of them lie outside letters, namely, the political settlement, culminating in the later reign of Elizabeth, and the religious settlement, whereby the Anglican Church grew out of the English Reformation. A third force lay within the sphere of the Renaissance itself, in the narrower meaning of the term. It was culture—the prefatory work of culture and education, which at once prepared and put off the flowering of pure genius. "Elizabethan" literature took its complexion from the circumstance that all these three forces were in operation at once. The Church began to be fully articulate, just when the national feeling was at its highest, and the tides of classical and immigrant culture were strongest. Spenser's *Faerie Queene*, Hooker's *Ecclesiastical Polity* and Shakespeare's *Henry V.* came in the same decade (1590–1600). But these three forces, political, religious and educational, were of very different duration and value. The enthusiasm of 1590–1600 was already dying down in the years 1600–1610, when the great tragedies were written; and soon a wholly new set of political forces began to tell on art. The religious inspiration was mainly confined to certain important channels; and literature as a whole, from first to last, was far more secular than religious. But Renaissance culture, in its ramifications and consequences, tells all the time and over the whole field, from 1500 to 1660. It is this culture which really binds together the long and varied chronicle. Before passing to narrative, a short review of each of these elements is required.

Politics.

Down to 1579 the Tudor rule was hardly a direct inspiration to authors. The reign of Henry VII. was first duly told by Bacon, and that of Henry VIII. staged by Shakespeare and Fletcher, in the time of James I. Sir Thomas More found in Roper, and Wolsey in Cavendish, sound biographers, who are nearly the earliest in the language. The later years of Henry VIII. were full of episodes too tragically picturesque for safe handling in the lifetime of his children. The next two reigns were engrossed with the religious war; and the first twenty years of Elizabeth, if they laid the bases of an age of peace, well-being, and national self-confidence that was to prove a teeming soil for letters, were themselves poor in themes for patriotic art. The abortive treason of the northern earls was echoed only in a ringing ballad. But the voyagers, freebooters, and explorers reported their experiences, as a duty, not for fame; and these, though not till the golden age, were edited by Hakluyt, and fledged the poetic fancies that took wing from the "Indian Peru" to the "still-vext Bermoothes." Yet, in default of any true historian, the queen's wise delays and diplomacies that upheld the English power, and her refusal to launch on a Protestant or a national war until occasion compelled and the country was ready, were subjects as uninspiring to poets as the burning questions of the royal marriage or the royal title. But by 1580 the nation was filled with the sense of Elizabeth's success and greatness and of its own prosperity. No shorter struggle and no less achievement could have nursed the insolent, jubilant patriotism of the years that followed; a feeling that for good reasons was peculiar to England among the nations, and created the peculiar forms of the chronicle play and poem. These were borrowed neither from antiquity nor from abroad, and were never afterwards revived. The same exultation found its way into the current forms of ode and pastoral, of masque and allegory, and into many a dedication and interlude of prose. It was so strong as to outlive the age that gave it warrant. The passion for England, the passion of England for herself, animates the bulk of Drayton's *Poly-Olbion*, which was finished so late as 1622. But the public issues were then changing, the temper was darker; and the civil struggle was to speak less in poetry than in the prose of political theory and ecclesiastical argument, until its after-explosion came in the verse of Milton.

Religious change.

The English Reformation, so long political rather than doctrinal or imaginative, cost much writing on all sides; but no book like Calvin's *Institution* is its trophy, at once defining the religious change for millions of later men and marking a term of departure in the national prose. Still, the debating weapons, the axes and billhooks, of vernacular English were sharpened—somewhat jaggedly—in the pamphlet battles that dwarfed the original energies of Sir Thomas More and evoked those of Tyndale and his friends. The powers of the same style were proved for descriptive economy by Starkey's Dialogue between Pole and Lupset, and for religious appeal by the blunt sound rhetoric and forthright jests in the sermons of Latimer (died 1555). Foxe's reports of the martyrs are the type of early Protestant English (1563); but the reforming divines seldom became real men of letters even when their Puritanism, or discontent with the final Anglican settlement and its temper, began to announce itself. Their spirit, however, comes out in many a corner of poetry, in Gascoigne's *Steel Glass* as in Spenser's *Shepherd's Calendar*; and the English Reformation lived partly on its pre-natal memories of Langland as well as of Wycliffe. The fruit of the struggle, though retarded, was ample. Carrying on the work of Fisher and Cranmer, the new church became the nursing mother of English prose, and trained it more than any single influence,—trained it so well, for the purposes of sacred learning, translation and oratory, and also as a medium of poetic feeling, that in these activities England came to rival France. How late any religious writer of true rank arose may be seen by the lapse of over half a century between Henry VIII.'s Act of Supremacy and Hooker's treatise. But after Hooker the chain of eloquent divines was unbroken for a hundred years.

Classical culture.

Renaissance culture had many stages and was fed from many streams. At the outset of the century, in the wake of Erasmus, under the teaching of Colet and his friends, there spread a sounder knowledge of the Greek and Latin tongues, of the classic texts, and so of the ancient life and mind. This period of humanism in the stricter sense was far less brilliant than in Italy and France. No very great scholar or savant arose in Britain for a long time; but neo-Latin literature, the satellite of scholarship, shone brightly in George Buchanan. But scholarship was created and secured; and in at least one, rather solitary, work of power, the *Utopia* (which remained in Latin till 1551), the fundamental process was begun which appropriates the Greek mind, not only for purposes of schooling, but as a source of new and independent thinking. In and after the middle of the century the classics were again put forward by Cheke, by Wilson in his *Art of Rhetoric* (1553), and by Ascham in his letters and in his *Schoolmaster* (1570), as the true staple of humane education, and the pattern for a simple yet lettered English. The literature of translations from the classics, in prose and verse, increased; and these works, at first plain, business-like, and uninspired, slowly rose in style and power, and at last, like the translations from modern tongues, were written by a series of masters of English, who thus introduced Plutarch and Tacitus to poets and historians. This labour of mediation was encouraged by the rapid expansion and reform of the two universities, of which almost every great master except Shakespeare was a member; and even Shakespeare had ample Latin for his purpose.

Italy and France.

The direct impact of the classics on "Elizabethan" literature, whether through such translations or the originals, would take long to describe. But their indirect impact is far stronger, though in result the two are hard to discern. This is another point that distinguishes the English Renaissance from the Italian or the French, and makes it more complex. The knowledge of the thought, art and enthusiasms of Rome and Athens constantly came round through Italy or France, tinted and charged in the passage with something characteristic of those countries. The early playwrights read Seneca in Latin and English, but also the foreign Senecan tragedies. Spenser, when starting on his pastorals, studied the Sicilians, but also Sannazaro and Marot. Shakespeare saw heroic antiquity through Plutarch, but also, surely, through Montaigne's reading of antiquity. Few of the poets can have distinguished the original fountain of Plato from the canalized supply of the Italian Neoplatonists. The influence, however, of Cicero on the Anglican pulpit was immediate as well as constant; and so was that of the conciser Roman masters, Sallust and Tacitus, on Ben Jonson and on Bacon. Such scattered examples only intimate the existence of two great chapters of English literary history,—the effects of the classics and the effects of Italy. The bibliography of 16th-century translations from the Italian in the fields of political and moral speculation, poetry, fiction and the drama, is so large as itself to tell part of the story. The genius of Italy served the genius of England in three distinctive ways. It inspired the recovery, with new modulations, of a lost music and a lost prosody. It modelled many of the chief poetic forms, which soon were developed out of recognition; such were tragedy, allegory, song, pastoral and sonnet. Thirdly, it disclosed some of the master-thoughts upon government and conduct formed both by the old and the new Mediterranean world. Machiavelli, the student of ancient Rome and modern Italy, riveted the creed of Bacon. It might be said that never has any modern people so influenced another in an equal space of time—and letters, here as ever, are only the voice, the symbol, of a whole life and culture—if we forgot the sway of French in the later 17th and 18th centuries. And the power of French was alive also in the 16th. The track of Marot, of Ronsard and the Pleiad and Desportes, of Rabelais and Calvin and Montaigne, is found in England. Journeymen like Boisteau and Belleforest handed on immortal tales. The influence is noteworthy of Spanish mannerists, above all of Guevara upon sententious prose, and of the novelists and humorists, headed by Cervantes, upon the drama. German legend is found not only in Marlowe's *Faustus*, but in the by-ways of play and story. It will be long before the rich and coloured tangle of these threads has been completely unravelled with due tact and science. The presence of one strand may here be mentioned, which appears in unexpected spots.

Philosophy.

As in Greece, and as in the day of Coleridge and Shelley, the fabric of poetry and prose is shot through with philosophical ideas; a further distinction from other literatures like the Spanish of the golden age or the French of 1830. But these were not so much the ideas of the new physical science and of Bacon as of the ethical and metaphysical ferment. The wave of free talk in the circles of Marlowe, Greville and Raleigh ripples through their writings. Though the direct influence of Giordano Bruno on English writers is probably limited to a reminiscence in the *Faerie Queene* (Book vii.), he was well acquainted with Sidney and Greville, argued for the Copernican theory at Greville's house, lectured on the soul at Oxford, and published his epoch-marking Italian dialogues during his two years' stay (1583–1585) in London. The debates in the earlier schools of Italy on the nature and tenure of the soul are heard in the

Nosce Teipsum (1599) of Sir John Davies; a stoicism, "of the schools" as well as "of the blood," animates Cassius and also the French heroes of Chapman; and if the earlier drama is sown with Seneca's old maxims on sin and destiny, the later drama, at least in Shakespeare, is penetrated with the freer reading of life and conduct suggested by Montaigne. Platonism—with its *vox angelica* sometimes a little hoarse—is present from the youthful *Hymns* of Spenser to the last followers of Donne; sometimes drawn from Plato, it is oftener the Christianized doctrine codified by Ficino or Pico. It must be noted that this play of philosophic thought only becomes marked after 1580, when the preparatory tunings of English literature are over.

We may now quickly review the period down to 1580, in the departments of prose, verse and drama. It was a time which left few memorials of form.

Prose to 1580.

Early modern English prose, as a medium of art, was of slow growth. For long there was alternate strife and union (ending in marriage) between the Latin, or more rhetorical, and the ancestral elements of the language, and this was true both of diction and of construction. We need to begin with the talk of actual life, as we find it in the hands of the more naïf writers, in its idiom and gusto and unshapen power, to see how style gradually declared itself. In state letters and reports, in the recorded words of Elizabeth and Mary of Scotland and public men, in travels and memoirs, in Latimer, in the rude early versions of Cicero and Boëthius, in the more unstudied speech of Ascham or Leland, the material lies. At the other extreme there are the English liturgy (1549, 1552, 1559, with the final fusion of Anglican and Puritan eloquence), and the sermons of Fisher and Cranmer,—nearly the first examples of a sinuous, musical and Ciceronian cadence. A noble pattern for saga-narrative and lyrical prose was achieved in the successive versions (1526–1540–1568) of the Hebrew and Greek Scriptures, where a native simple diction of short and melodious clauses are prescribed by the matter itself. Prose, in fact, down to Shakespeare's time, was largely the work of the churchmen and translators, aided by the chroniclers. About the mid-century the stories, as well as the books of conduct and maxim, drawn from Italy and France, begin to thicken. Perverted symmetry of style is found in euphuistic hacks like Pettie. Painter's *Palace of Pleasure* (1566) provided the plots of Bandello and others for the dramatists. Hoby's version (1561) of Castiglione's *Courtier*, with its command of elate and subtle English, is the most notable imported book between Berners's *Froissart* (1523–1525) and North's *Plutarch* (1579). Ascham's *Schoolmaster* is the most typical English book of Renaissance culture, in its narrower sense, since *Utopia*. Holinshed's *Chronicle* (1577–1587) and the work of Halle, if pre-critical, were all the fitter to minister to Shakespeare.

Verse to 1580.

The lyric impulse was fledged anew at the court of Henry VIII. The short lines and harping burdens of Sir Thomas Wyatt's songs show the revival, not only of a love-poetry more plangent than anything in English since Chaucer, but also of the long-deadened sense of metre. In Wyatt's sonnets, octaves, terzines and other Italian measures, we can watch the painful triumphant struggles of this noble old master out of the slough of formlessness in which verse had been left by Skelton. Wyatt's primary deed was his gradual rediscovery of the iambic decasyllabic line duly accented—the line that had been first discovered by Chaucer for England; and next came its building into sonnet and stanza. Wyatt (d. 1542) ended with perfect formal accuracy; he has the honours of victory; and Henry Howard, earl of Surrey (d. 1547), a younger-hearted and more gracious but a lighter poet, carried on his labour, and caught some of Chaucer's as well as the Italian tunes. The blank verse of his two translated *Aeneids*, like all that written previous to Peele, gave little inkling of the latencies of the measure which was to become the cardinal one of English poetry. It was already the vogue in Italy for translations from the classics; and we may think of Surrey importing it like an uncut jewel and barely conscious of its value. His original poems, like those of Wyatt, waited for print till the eve of Elizabeth's reign, when they appeared, with those of followers like Grimoald, in Tottel's *Miscellany* (1557), the first of many such garlands, and the outward proof of the poetical revival dating twenty years earlier. But this was a false dawn. Only one poem of authentic power, Sackville's *Induction* (1563) to that dreary patriotic venture, *A Mirror for Magistrates*, was published for twenty years. In spirit medieval, this picture of the gates of hell and of the kings in bale achieves a new melody and a new intensity, and makes the coming of Spenser far less incredible. But poetry was long starved by the very ideal that nursed it—that of the all-sided, all-accomplished "courtier" or cavalier, to whom verse-making was but one of all the accomplishments that he must perfect, like fencing, or courting, or equestrian skill. Wyatt and Surrey, Sackville and Sidney (and we may add Hamlet, a true Elizabethan) are of this type. One of the first competent professional writers was George Gascoigne, whose remarks on metric, and whose blank verse satire, *The Steel Glass* (1576), save the years between Sackville and Spenser. Otherwise the gap is filled by painful rhymesters with rare flashes, such as Googe, Churchyard and Turberville.

Drama to 1580.

The English Renaissance drama, both comic and tragic, illustrates on the largest scale the characteristic power of the antique at this period—at first to reproduce itself in imitation, and then to generate something utterly different from itself, something that throws the antique to the winds. Out of the Morality, a sermon upon the certainty of death or the temptations of the soul, acted by personified qualities and supernatural creatures, had grown up, in the reign of Henry VII., the Interlude, a dialogue spoken by representative types or trades, who faintly recalled those in Chaucer's *Prologue*. These forms, which may be termed medieval, continued long and blended; sometimes heated, as in *Respublica*, with doctrine, and usually lightened by the comic play of a "Vice" or incarnation of sinister roguery. John Heywood was the chief maker of the pure interludes, and Bishop Bale of the Protestant medleys; his *King Johan*, a reformer's partisan tract in verse, contains the germs of the chronicle play. In the drama down to 1580 the native talent is sparse enough, but the historical interest is high. Out of a seeming welter of forms, the structure, the metres and the species that Kyd and Marlowe found slowly emerged. Comedy was first delivered from the interlude, and fashioned in essence as we know it, by the schoolmasters. Drawing on Plautus, they constructed duly-knitted plots, divided into acts and scenes and full of homely native fun, for their pupils to present. In *Thersites* (written 1537), the oldest of these pieces, and in Udall's *Ralph Roister Doister* (1552 at latest), the best known of them, the characters are lively, and indeed are almost individuals. In others, like *Misogonus* (written 1560), the abstract element and improving purpose remain, and the source is partly neo-Latin comedy, native or foreign. Romance crept in: serious comedy, with its brilliant future, the comedy of high sentiment and averted dangers mingled still with farce, was shadowed forth in *Damon and Pithias* and in the curious play *Common Conditions*; while the domestic comedy of intrigue dawned in Gascoigne's *Supposes*, adapted from Ariosto. Thus were displaced the ranker rustic fun of *Gammer Gurton's Needle* (written *c.* 1559) and other labours of "rhyming mother-wits." But there was no style, no talk, no satisfactory metre. The verse of comedy waited for Greene, and its prose for Lyly. Structure, without style, was also the main achievement of the early tragedies. The Latin plays of Buchanan, sometimes biblical in topic, rest, as to their form, upon Euripides. But early English tragedy was shapen after the Senecan plays of Italy and after Seneca himself, all of whose dramas were translated by 1581. *Gorboduc, or Ferrex and Porrex*, acted about 1561, and written by Sackville and Norton, and Hughes' *Misfortunes of Arthur* (acted 1588), are not so much plays as wraiths of plays, with their chain of slaughters and revenges, their two-dimensional personages, and their lifeless maxims which fail to sweeten the bloodshot atmosphere. The Senecan form was not barren in itself, as its sequel in France was to show: it was only barren for England. After Marlowe it was driven to the study, and was still written (possibly under the impulse of Mary countess of Pembroke), by Daniel and Greville, with much reminiscence of the French Senecans. But it left its trail on the real drama. It set the pattern of a high tragical action, often motived by revenge, swayed by large ideas of fate and retribution, and told in blank metre; and it bequeathed, besides many moral sentences, such minor points of mechanism as the Ghost, the Chorus and the inserted play. There were many hybrid forms like *Gismond of Salern*, based on foreign story, alloyed with the mere personifications of the Morality, and yet contriving, as in the case of *Promos and Cassandra* (the foundation of *Measure for Measure*), to interest Shakespeare. Thus the drama by 1580 had some of its carpentry, though not yet a true style or versification. These were only to be won by escape from the classic tutelage. The ruder chronicle play also began, and the reigns of John and Henry V. amongst others were put upon the stage.

Spenser.

Verse from Spenser to Donne.—Sir Philip Sidney almost shares with Edmund Spenser the honours of announcing the new verse, for part of his *Astrophel and Stella* was written, if not known in unpublished form, about 1580–1581, and contains ten times the passion and poetry of *The Shepherd's Calendar* (1579). This work, of which only a few passages have the seal of Spenser's coming power, was justly acclaimed for its novelty of experiment in many styles, pastoral, satiric and triumphal, and in many measures: though it was criticized for its "rustic" and archaic diction—a "no language" that was to have more influence upon poetry than any of the real dialects of England. Spenser's desire to write high tragedy, avowed in his *October*, was not to be granted; his nine comedies are lost; and he became the chief non-dramatic poet of his time and country. Both the plaintive pessimism of Petrarch and du Bellay, with their favourite method of emblem, and the Platonic theory of the spiritual love and its heavenly begetting sank into him; and the *Hymns To Love* and *To Beauty* are possibly his earliest verses of sustained perfection and exaltation. These two strains of feeling Spenser never lost and never harmonized; the first of them recurs in his *Complaints* of 1591, above all in *The Ruins of Time*, the second in his *Amoretti* (1595) and *Colin Clout* and *Epithalamion*, which are autobiographical. These and a hundred other threads are woven into *The Faerie Queene*, an unfinished allegorical epic in honour of moral goodness, of which three books came out in 1590 and three more in 1596, while the fragment *Of Constancy* (so-called) is first found in the posthumous folio of 1609. This poem is the fullest reflex, outside the drama, of the soul and aspirations of the time. For its scenery and mechanism the *Orlando Furioso* of Ariosto furnishes the framework. In both poems tales of knightly adventure intertwine unconfused; in both the slaying of monsters, the capture of strong places, and the release of the innocent, hindered by wizard and sorcerer, or aided by magic sword and horn and mirror, constitute the quest; and in both warriors, ladies, dwarfs, dragons and figures from old mythology jostle dreamily together. To all this pomp Spenser strove to give a moral and often also a political meaning. Ariosto was not a *vates sacer*; and so Spenser took Tasso's theme of the holy war waged for the Sepulchre, and expanded it into a war between good and evil, as he saw them in the world; between chastity and lust, loyalty and detraction, England and Spain, England and Rome, Elizabeth and usurpers, Irish governor and Irish rebel, right and wrong. The title-virtues of his six extant books he affects to take from Aristotle; but Holiness, Temperance, Chastity, Justice, Friendship and Courtesy form a medley of medieval, puritanical and Greek ideals.

Spenser's moral sentiments, often ethereally noble, might well be contrasted, and that not always to their credit, with those more secular and naturalistic ones that rule in Shakespeare or in Bernardino Telesio and Giordano Bruno. But *The Faerie Queene* lives by its poetry; and its poetry lives independently of its creed. The idealized figures of Elizabeth, who is the Faerie Queene, and of the "magnificent" Prince Arthur, fail to bind the adventures together, and after two books the poem breaks down in structure. And indeed all through it relies on episode and pageant, on its prevailing and insuppressible loveliness of scene and tint, of phrasing and of melody, beside which the inner meaning is often an interruption. Spenser is not to be tired; in and out of his tapestry, with its "glooming light much like a shade," pace his figures on horseback, or in durance, with their clear and pictorial allegoric trappings; and they go either singly, or in his favourite masques or pageants, suggested by emblematical painting or civic procession. He is often duly praised for his lingering and liquid melodies and his gracious images, or blamed for their langour; but his ground-tone is a sombre melancholy—unlike that of Jaques—and his deepest quality as a writer is perhaps his angry power. Few of his forty and more thousand lines are unpoetical; in certainty of style, amongst English poets who have written profusely, he has no equals but Chaucer, Milton and Shelley. His "artificial" diction, drawn from middle English, from dialect or from false analogy, has always the intention and nearly always the effect of beauty; we soon feel that its absence would be unnatural, and it has taken its rank among the habitual and exquisite implements of English poetry. This equality of noble form is Spenser's strength, as dilution and diffusion of phrase, and a certain monotonous slowness of *tempo*, are beyond doubt his weaknesses. His chief technical invention, the nine-line stanza (*ababbcbcC*) was developed not from the Italian octave (*abababcc*), but by adding an alexandrine to the eight-line stave (*ababbcbc*) of Chaucer's *Monk's Tale*. It is naturally articulated twice—at the fifth line, where the turn of repeated rhyme inevitably charms, and at the ninth, which runs now to a crashing climax, now to a pensive and sighing close. In rhyming, Spenser, if not always accurate, is one of the most natural and resourceful of poets. His power over the heroic couplet or quatrain is shown in his fable, *Mother Hubbard's Tale*, and in his curious verse memoir, *Colin Clout*; both of which are medleys of satire and flattery. With formal tasks so various and so hard, it is wonderful how effortless the style of Spenser remains. His *Muiopotmos* is the lightest-handed of mock-heroics. No writer of his day except Marlowe was so faithful to the law of beauty.

Spenserians.

The mantle of Spenser fell, somewhat in shreds, upon poets of many schools until the Restoration. As though in thanks to his master Tasso, he lent to Edward Fairfax, the best translator of the *Jerusalem Delivered* (*Godfrey of Bulloigne*, 1600), some of his own ease and intricate melody. Harington, the witty translator of Ariosto (1591)and spoilt child of the court, owed less to Spenser. The allegorical colouring was nobly caught, if sometimes barbarized, in the *Christ's Victory and Triumph* of the younger Giles Fletcher (1610), and Spenser's emblematic style was strained, even cracked, by Phineas Fletcher in *The Purple Island* (1633), an aspiring fable, gorgeous in places, of the human body and faculties. Both of these brethren clipped and marred the stanza, but they form a link between Spenser and their studentMilton. The allegoric form, long-winded and broken-backed, survived late in Henry More's and Joseph Beaumont's verse disquisitions on the soul. Spenser's pastoral and allusive manner was allowed by Drayton in his *Shepherd's Garland* (1593), and differently by William Browne in *Britannia's Pastorals* (1613–1616), and by William Basse; while his more honeyed descriptions took on a mawkish taste in the anonymous *Britain's Ida* and similar poems. His golden Platonic style was buoyantly echoed in *Orchestra* (1596), Sir John Davies' poem on the dancing spheres. He is continually traceable in 17th-century verse, blending with the alien currents of Ben Jonson and of Donne. He was edited and imitated in the age of Thomson, in the age of William Morris, and constantly between.

Drayton and Daniel.

The typical Elizabethan poet is Michael Drayton; who followed Spenser in pastoral, Daniel, Sidney, Spenser and Shakespeare in sonnet, Daniel again in chronicle and legend, and Marlowe in mythological story, and who yet remained himself. His *Endimion and Phoebe* in passages stands near *Hero and Leander*; his *England's Heroical Epistles* (1597) are in ringing rhetorical couplets; his *Odes* (1606), like the *Ballad of Agincourt* and the

Virginian Voyage, forestall and equal Cowper's or Campbell's; his *Nymphidia* (1627) was the most popular of burlesque fairy poems; and his pastorals are full of graces and felicities. The work of Drayton that is least read and most often mentioned is his *Poly-Olbion* (1612–1622), a vast and pious effort, now and then nobly repaid, to versify the scenery, legend, customs and particularities of every English county. The more recluse and pensive habit of Samuel Daniel chills his long chronicle poems; but with Chapman he is the clearest voice of Stoicism in Elizabethan letters; and his harmonious nature is perfectly expressed in a style of happy, even excellence, free alike from "fine madness" and from strain. Sonnet and epistle are his favoured forms, and in his *Musophilus* (1599) as well as in his admirable prose *Defence of Rhyme* (1602), he truly prophesies the hopes and glories of that *illustre vulgare*, the literary speech of England. All this patriotic and historic verse, like the earlier and ruder *Albion's England* (1586) of William Warner, or Fitzgeoffrey's poem upon Drake, or the outbursts of Spenser, was written during or inspired by the last twenty years of the queen's reign; and the same is true of Shakespeare's and most of the other history plays, which duly eclipsed the formal, rusty-gray chronicle poem of the type of the *Mirror for Magistrates*, though editions (1559–1610) of the latter were long repeated. Patriotic verse outside the theatre, however, full of zeal, started at a disadvantage compared with love-sonnet, song, or mythic narrative, because it had no models before it in other lands, and remained therefore the more shapeless.

Sonnets.

The English love-sonnet, brought in by Wyatt and rifest between 1590 and 1600, was revived as a purely studious imitation by Watson in his *Hekatompathia* (1582), a string of translations in one of the exceptional measures that were freely entitled "sonnets." But from the first, in the hands of Sidney, whose *Astrophel and Stella* (1591) was written, as remarked above, about 1581, the sonnet was ever ready to pulse into feeling, and to flash into unborrowed beauty, embodying sometimes dramatic fancy and often living experience. These three fibres of imitation, imagination and confession are intertwisted beyond severance in many of the cycles, and now one, now another is uppermost. Incaution might read a personal diary into Thomas Lodge's *Phillis* (1593), which is often a translation from Ronsard. Literal judges have announced that Shakespeare's *Sonnets* are but his mode of taking exercise. But there is poetry in "God's plenty" almost everywhere; and few of the series fail of lovely lines or phrasing or even of perfect sonnets. This holds of Henry Constable's *Diana* (1592), of the *Parthenophil and Parthenophe* of Barnabe Barnes (1593), inebriate with poetry, and of the stray minor groups, *Alcilia*, *Licia*, *Caelia*; while the *Caelica* of Fulke Greville, Lord Brooke, in irregular form, is full of metaphysical passion struggling to be delivered. *Astrophel and Stella*, Drayton's *Idea* (1594–1619), Spenser's *Amoretti* and Shakespeare's *Sonnets* (printed 1609) are addressed to definite and probably to known persons, and are charged with true poetic rage, ecstatic or plaintive, desperate or solemn, if they are also intermingled with the mere word-play that mocks or beguiles the ebb of feeling, or with the purely plastic work that is done for solace. In most of these series, as in Daniel's paler but exquisitely-wrought *Delia* (1591–1592), the form is that of the three separate quatrains with the closing couplet for emotional and melodic climax; a scheme slowly but defiantly evolved, through traceable gradations, from that stricter one of Italy, which Drummond and Milton revived, and where the crisis properly coincides with the change from octave to sestet.

Mythic poems.

The amorous mythologic tale in verse derives immediately from contemporary Italy, but in the beginning from Ovid, whose *Metamorphoses*, familiar in Golding's old version (1555–1557), furnished descriptions, decorations and many tales, while his *Heroides* gave Chaucer and Boccaccio a model for the self-anatomy of tragic or plaintive sentiment. Within ten years, between 1588 and 1598, during the early sonnet-vogue, appeared Lodge's *Scillaes Metamorphosis*, Shakespeare's *Venus and Adonis* and *Rape of Lucrece*, Marlowe's *Hero and Leander* and Drayton's *Endimion and Phoebe*. Shakespeare owed something to Lodge, and Drayton to Marlowe. All these points describe a love-situation at length, and save in one instance they describe it from without. The exception is Marlowe, who achieves a more than Sicilian perfection; he says everything, and is equal to everything that he has to say. In *Venus and Adonis* the poet is enamoured less of love than of the tones and poses of lovers and of the beauty and gallant motion of animals, while in *The Rape of Lucrece* he is intent on the gradations of lust, shame and indignation, in which he has a spectator's interest. Virtuosity, or the delight of the executant in his own brilliant cunning, is the mark of most of these pieces.

Lyric.

If we go to the lyrics, the versified mythic tales and the sonnets of Elizabethan times for the kind of feeling that Molière's Alceste loved and that Burns and Shelley poured into song, we shall often come away disappointed, and think the old poetry heartless. But it is not heartless, any more than it is always impassioned or personal; it is decorative. The feeling is often that of the craftsman; it is not of the singer who spends his vital essence in song and commands an answering thrill so long as his native language is alive or understood. The arts that deal with ivories or enamelling or silver suggest themselves while we watch the delighted tinting and chasing, the sense for gesture and grouping (in *Venus and Adonis*), or the delicate beating out of rhyme in a madrigal, or the designing of a single motive, or two contrasted motives, within the panel of the sonnet. And soon it is evident how passion and emotion readily become plastic matter too, whether they be drawn from books or observation or self-scrutiny. This is above all the case in the sonnet; but it is found in the lyric as well. The result is a wonderful fertility of lyrical pattern, a wonderfully diffused power of lyrical execution, never to recur at any later time of English literature. Wyatt had to recover the very form of such verse from oblivion, and this he did in the school of translation and adaptation. Not only the decasyllabic, but the lyric, in short lines had almost died out of memory, and Wyatt brought it back. From his day to Spenser's there is not much lyric that is noteworthy, though in Gascoigne and others the impulse is seen. The introduction of Italian music, with its favourite metrical schemes, such as the madrigal, powerfully schooled and coloured lyric: in especial, the caressing double ending, regular in Italian but heavier in English, became common. The Italian poems were often translated in their own measure, line by line, and the musical setting retained. Their tunes, or other tunes, were then coupled with new and original poems; and both appeared together in the song-books of Dowland the lutanist, of Jones and Byrd (1588), and in chief (1601–1619) of Thomas Campion. The words of Campion's songs are not only supremely musical in the wider sense, but are chosen for their singing quality. Misled awhile by the heresy that rhyme was wrong, he was yet a master of lovely rhyming, as well as of a lyrical style of great range, gaily or gravely happy. But, as with most of his fellows, singing is rather his calling than his consolation. The lyrics that are sprinkled in plays and romances are the finest of this period, and perhaps, in their kind, of any period. Shakespeare is the greatest in this province also; but the power of infallible and unforgettable song is often granted to slighter, gentler playwrights like Greene and Dekker, while it is denied to men of weightier build and sterner purpose like Chapman and Jonson. The songs of Jonson are indeed at their best of absolute and antique finish; but the irrevocable dew of night or dawn seldom lies upon them as it lies on the songs of Webster or of Fletcher. The best lyrics in the plays are dramatic; they must be read in their own setting. While the action stops, they seize and dally with the dominant emotion of the scene, and yet relieve it. The songs of Lodge and Breton, of Drayton and Daniel, of Oxford and Raleigh, and the fervid brief flights of the Jesuit Southwell, show the omnipresence of the vital gift, whether among professional writers of the journalistic type, or among poets whose gift was not primarily song, or among men of action and quality or men of religion, who only wrote when they were stirred. Lullaby and valentine and compliment, and love-plaint ranging from gallantry to desperation, are all there;

and the Fortunate Hour, which visits commonly only a few men in a generation, and those but now and then in their lives, is never far off. But the master of melody, Spenser, left no songs, apart from his two insuperable wedding odes. And religious lyric is rarer before the reign of James. Much of the best lyric is saved for us by the various Miscellanies, *A Handful of Pleasant Delights* (1584), the *Phoenix Nest* (1593) and Davison's *Poetical Rhapsody* (1602); while other such collections, like *England's Helicon* (1600), were chiefly garlands of verse that was already in print.

There is plenty of satiric anger and raillery in the spirit of the time, but the most genuine part of it is drawn off into drama. Except for stray passages in Spenser, Drayton and others, formal satire, though profuse, was a literary unreal thing, a pose in the manner of Persius or Juvenal, and tiresome in expression. In this kind only Donne triumphed. The attempts of Lodge and Hall and Marston and John Davies of Hereford and Guilpin and Wither are for the most part simply weariful in different ways, and satire waited for Dryden and his age. The attempt, however, persisted throughout. Wyatt was the first and last who succeeded in the genial, natural Horatian style.

Metaphysical or fantastic schools.

Verse from Donne to Milton.—As the age of Elizabeth receded, some changes came slowly over non-dramatic verse. In Jonson, as in John Donne (1573–1631), one of the greater poets of the nation, and in many writers after Donne, may be traced a kind of Counter-Renaissance, or revulsion against the natural man and his claims to pleasure—a revulsion from which regret for pleasure lost is seldom far. Poetry becomes more ascetic and mystical, and this feeling takes shelter alike in the Anglican and in the Roman faith. George Herbert (*The Temple*, 1633), the most popular, quaint and pious of the school, but the least poetical; Crashaw, with his one ecstatic vision (*The Flaming Heart*) and occasional golden stanzas; Henry Vaughan, who wrote from 1646 to 1678, with his mystical landscape and magical cadences; and Thomas Traherne, his fellow-dreamer, are the best known of the religious Fantastics. But, earlier than most of these are Lord Herbert of Cherbury, and Habington with his *Castara* (1634), who show the same temper, if a fitful power and felicity. Such writers form the devouter section of the famous "metaphysical" or "fantastic" school, which includes, besides Donne its founder, pure amorists like Carew (whose touch on certain rhythms has no fellow), young academic followers like Cartwright and Cleveland (in whom survives the vein of satire that also marks the school), and Abraham Cowley, who wrote from 1633 to 1678, and was perhaps the most acceptable living poet about the middle of the century. In his *Life of Cowley* Johnson tramples on the "metaphysical" poets and their vices, and he is generally right in detail. The shock of cold quaintness, which every one of them continually administers, is fatal. Johnson only erred in ignoring all their virtues and all their historical importance.

In Donne poetry became deeply intellectualized, and in temper disquisitive and introspective. The poet's emotion is played with in a cat-and-mouse fashion, and he torments it subtly. Donne's passion is so real, if so unheard-of, and his brain so finely-dividing, that he can make almost any image, even the remotest, even the commonest, poetical. His satires, his *Valentine*, his *Litany*, and his lyric or odic pieces in general, have an insolent and sudden daring which is warranted by deep-seated power and is only equalled by a few of those tragedians who are his nearest of kin. The recurring contrast of "wit" or intelligence, and "will" or desire, their struggle, their mutual illumination, their fusion as into some third and undiscovered element of human nature, are but one idiosyncrasy of Donne's intricate soul, whose general progress, so far as his dateless poems permit of its discovery, seems to have been from a paganism that is unashamed but crossed with gusts of compunction, to a mystical and otherwordly temper alloyed with covetous regrets. The *Anatomy of the World* and other ambitious pieces have the same quality amid their outrageous strangeness. In Donne and his successors the merely ingenious and ransacking intellect often came to overbalance truth and passion; and hence arose conceits and abstract verbiage, and the difficulty of finding a perfect poem, however brief, despite the omnipresence of the poetic gift. The "fantastic" school, if it contains some of the rarest sallies and passages in English, is one of the least satisfactory. Its faults only exaggerate those of Sidney, Greville and Shakespeare, who often misuse homely or technical metaphor; and English verse shared, by coincidence not by borrowing, and with variations of its own, in the general strain and torture of style that was besetting so many poets of the Latin countries. Yet these poets well earn the name of metaphysical, not for their philosophic phrasing, but for the shuttle-flight of their fancy to and fro between the things of earth and the realities of spirit that lie beyond the screen of the flesh.

Rhythm.

Between Spenser and Milton many measures of lyrical and other poetry were modified. Donne's frequent use of roughly-accentual, almost tuneless lines is unexplained and was not often followed. Rhythm in general came to be studied more for its own sake, and the study was rewarded. The lovely cordial music of Carew's amorous iambics, or of Wither's trochees, or of Crashaw's odes, or of Marvell's octosyllables, has never been regained. The formal ode set in, sometimes regularly "Pindaric" in strophe-grouping, sometimes irregularly "Pindaric" as in Cowley's experiments. Above all, the heroic couplet, of the isolated, balanced, rhetorical order, such as Spenser, Drayton, Fairfax and Sylvester, the translator (1590–1606) of Du Bartas, had often used, began to be a regular instrument of verse, and that for special purposes which soon became lastingly associated with it. The flatteries of Edmund Waller and the Ovidian translations of Sandys dispute the priority for smoothness and finish, though the fame was Waller's for two generations; but Denham's overestimated *Cooper's Hill* (1642), Cowley's *Davideis* (1656), and even Ogilby's *Aeneid* made the path plainer for Dryden, the first sovereign of the rhetorical couplet which throve as blank verse declined. Sonnet and madrigal were the favoured measures of William Drummond of Hawthornden, a real and exquisite poet of the studio, who shows the general drift of verse towards sequestered and religious feeling. Drummond's *Poems* of 1616 and *Flowers of Zion* (1623) are full of Petrarch and Plato as well as of Christian resignation, and he kept alive the artistry of phrasing and versification in a time of indiscipline and conflicting forms. William Browne has been named as a Spenserian, but his *Britannia's* Pastorals (1613–1616), with their slowly-rippling and overflowing couplets which influenced Keats, were a medley of a novel kind. George Wither may equally rank among the lighter followers of Spenser, the easy masters of lyrical narrative, and the devotional poets. But his *Shepherd's Hunting* and other pieces in his volume of 1622 contain lovely landscapes, partly English and partly artificial, and stand far above his pious works, and still further above the dreary satires which he lived to continue after the Restoration.

Herrick.

Of poets yet unmentioned, Robert Herrick is the chief, with his two thousand lyrics and epigrams, gathered in *Hesperides and Noble Numbers* (1648). His power of song and sureness of cadence are not excelled within his range of topic, which includes flowers and maidens—whom he treats as creatures of the same race—and the swift decay of both their beauties, and secular regret over this decay and his own mortality and the transience of amorous pleasure, and the virtues of his friends, and country sports and lore, and religious compunction for his own paganism. The *Hesperides* are pure Renaissance work, in natural sympathy with the Roman elegiac writings and with the Pseudo-Anacreon. Cowley is best where he is nearest Herrick, and his posy of short lyrics outlives his "epic and Pindaric art." There are many writers who last by virtue of one or two poems; Suckling by his adept playfulness, Lovelace and Montrose by a few gallant stanzas, and many a nameless poet by many a consummate cadence. It is the age of sudden flights and brief perfections.

The long poem.

All the farther out of reach, yet never wholly despaired of or unattempted in England, was the "long poem," heroical and noble, the "phantom epic," that shadow of the ancient masterpieces.

which had striven to life in Italy and France. Davenant's *Gondibert* (1651), Cowley's *Davideis* and Chamberlayne's *Pharonnida* (1659) attest the effort which Milton in 1658 resumed with triumph. These works have between them all the vices possible to epic verse, dulness and flatness, faintness and quaintness and incoherence. But there is some poetry in each of them, and in *Pharonnida* there is far more than enough poetry to save it.

Milton.

Few writers have found a flawless style of their own so early in life as John Milton (1608–1674). His youthful pieces show some signs of Spenser and the Caroline fantastics; but soon his vast poetical reading ran clear and lay at the service of his talent. His vision and phrasing of natural things were already original in the *Nativity Ode*, written when he was twenty; and, there also, his versification was already that of a master, of a renovator. The pensive and figured beauty of *L'Allegro* and *Il Penseroso*, two contrasted emblematic panels, the high innocent Platonism and golden blank verse of the *Comus* (1634); the birth of long-sleeping power in the *Lycidas* (1637), with its unapproached contrivance both in evolution and detail, where the precious essences of earlier myth and pastoral seem to be distilled for an offering in honour of the tombless friend;—the newness, the promise, the sureness of it all amid the current schools! The historian finds in these poems, with their echoes of Plato and Sannazzaro, of Geoffrey of Monmouth and St John, the richest and most perfect instance of the studious, decorative Renaissance style, and is not surprised to find Milton's scholars a century later in the age of Gray. The critic, while feeling that the strictly lyrical, spontaneous element is absent, is all the more baffled by the skill and enduring charm. The sonnets were written before or during Milton's long immersion (1637–1658) in prose and warfare, and show the same gifts. They are not cast in the traditional form of love-cycle, but are occasional poems; in metre they revert, not always strictly but once or twice in full perfection, to the Italian scheme; and they recall not Petrarch but the spiritual elegies or patriot exaltations of Dante or Guidiccioni.

Milton also had a medieval side to his brain, as the *History of Britain* shows. The heroic theme, which he had resolved from his youth up to celebrate, at last, after many hesitations, proved to be the fall of man. This, for one of his creed and for the audience he desired, was the greatest theme of all. Its scene was the Ptolemaic universe with the Christian heaven and hell inserted. The time, indicated by retrospect and prophecy, was the whole of that portion of eternity, from the creation of Christ to the doomsday, of which the history was sacredly revealed. The subject and the general span of the action went back to the popular mystery play; and Milton at first planned out *Paradise Lost* as such a play, with certain elements of classic tragedy embodied. But according to the current theory the epic, not the drama, was the noblest form of verse; and, feeling where his power lay, he adopted the epic. The subject, therefore, was partly medieval, partly Protestant,—for Milton was a true Protestant in having a variant of doctrine shared by no other mortal. But the ordering and presentment, with their overture, their interpolated episodes or narratives, their journeys between Olympus, Earth and hell, invocations, set similes, battles and divine thunderbolts, are those of the classical epic. Had Milton shared the free thought as well as the scholarship of the Renaissance, the poem could never have existed. With all his range of soul and skill, he had a narrower speculative brain than any poet of equal gift; and this was well for his great and peculiar task. But whatever Milton may fail to be, his heroic writing is the permanent and absolute expression of something that in the English stock is inveterate—the Promethean self-possession of the mind in defeat, its right to solitude there, its claim to judge and deny the victor. This is the spirit of his devils, beside whom his divinities, his unfallen angels (Abdiel excepted), and even his human couple with their radiance and beauty of line, all seem shadowy. The discord between Milton's doctrine and his sympathies in *Paradise Lost* (1667) has never escaped notice. The discord between his doctrine and his culture comes out in *Paradise Regained* (1671), when he has at once to reprobate and glorify Athens, the "mother of arts." In this afterthought to the earlier epic the action is slight, the Enemy has lost spirit, and the Christ is something of a pedagogue. But there is a new charm in its even, grey desert tint, sprinkled with illuminations of gold and luxury. In *Samson Agonistes* (1671) the ethical treatment as well as the machinery is Sophoclean, and the theology not wholly Christian. But the fault of Samson is forgotten in his suffering, which is Milton's own; and thus a cross-current of sympathy is set up, which may not be much in keeping with the story, but revives the somewhat exhausted interest and heightens a few passages into a bare and inaccessible grandeur.

The essential solitude of Milton's energies is best seen in his later style and versification. When he resumed poetry about 1658, he had nothing around him to help him as an artist in heroic language. The most recent memories of the drama were also the worst; the forms of Cowley and Davenant, the would-be epic poets, were impossible. Spenser's manner was too even and fluid as a rule for such a purpose, and his power was of an alien kind. Thus Milton went back, doubtless full of Greek and Latin memories, to Marlowe, Shakespeare and others among the greater dramatists (including John Ford); and their tragic diction and measure are the half-hidden bases of his own. The product, however, is unlike anything except the imitations of itself. The incongruous elements of the *Paradise Lost* and its divided sympathies are cemented, at least superficially, by its style, perhaps the surest for dignity, character and beauty that any Germanic language has yet developed. If dull and pedantic over certain stretches, it is usually infallible. It is many styles in one, and Time has laid no hand on it. In these three later poems its variety can be seen. It is perfect in personal invocation and appeal; in the complex but unfigured rhetoric of the speeches; in narrative of all kinds; for the inlaying work of simile or scenery or pageant, where the quick, pure impressions of Milton's youth and prime—possibly kept fresher by his blindness—are felt through the sometimes conventional setting; and for soliloquy and choric speech of a might unapproachable since Dante. To these calls his blank verse responds at every point. It is the seal of Milton's artistry, as of his self-confidence, for it greatly extends, for the epical purpose, all the known powers and liberties of the metre; and yet, as has often been shown, it does so not spasmodically but within fixed technical laws or rather habits. Latterly, the underlying metrical *ictus* is at times hard to detect. But Milton remains by far the surest and greatest instrumentalist, outside the drama, on the English unrhymed line. He would, however, have scorned to be judged on his form alone. His soul and temper are not merely unique in force. Their historic and representative character ensure attention, so long as the oppositions of soul and temper in the England of Milton's time remain, as they still are, the deepest in the national life. He is sometimes said to harmonize the Renaissance and the Puritan spirit; but he does not do this, for nothing can do it. The Puritan spirit is the deep thing in Milton; all his culture only gives immortal form to its expression. The critics have instinctively felt that this is true; and that is why their political and religious prepossessions have nearly always coloured, and perhaps must colour, every judgment passed upon him. Not otherwise can he be taken seriously, until historians are without public passions and convictions, or the strife between the hierarch and the Protestant is quenched in English civilization.

Drama.

Drama, 1580–1642.—We must now go back to the drama, which lies behind Milton, and is the most individual product of all English Literature. The nascent drama of genius can be found in the "University wits," who flourished between 1580 and 1595, and the chief of whom are Lyly, Kyd, Peele, Greene and Marlowe. John Lyly is the first practitioner in prose—of shapely comic plot and pointed talk—the artificial but actual talk of courtly masquers who rally one another with a bright and barren finish that is second nature. *Campaspe*, *Sapho and Phao*, *Midas*, and Lyly's other comedies, mostly written from 1580 to 1591, are frail vessels, often filled with compliment, mythological allegory, or topical satire, and enamelled with pastoral interlude and flower-like song. The work of Thomas Kyd, especially *The Spanish Tragedy* (written *c.* 1585), was the most violent effort to put new wine into the old Senecan bottles, and he probably wrote the lost pre-Shakespearian *Hamlet.* He transmitted to the later drama that subject of pious but ruinous revenge, which is used by Chapman, Marston, Webster and many others; and his chief play was translated and long acted in Germany. Kyd's want of modulation is complete, but he commands a substantial skill of dramatic mechanism, and he has more than the feeling for power, just as Peele and Greene have more than the feeling for luxury or grace. To the expression of luxury Peele's often stately blank verse is well fitted, and it is by far the most correct and musical before Marlowe's, as his *Arraignment of Paris* (1584) and his *David and Bethsabe* attest. Greene did something to create the blank verse of gentle comedy, and to introduce the tone of idyll and chivalry, in his *Friar Bacon and Friar Bungay* (1594). Otherwise these writers, with Nashe and Lodge, fall into the wake of Marlowe.

Marlowe.

Tamburlaine, in two parts (part i. *c.* 1587), *The Life and Death of Doctor Faustus, The Jew of Malta, Edward II.* (the first chronicle play of genius), and the incomplete poem *Hero and Leander* are Christopher Marlowe's title-deeds (1564–1593). He established tragedy, and inspired its master, and created for it an adequate diction and versification. His command of vibrant and heroic recitative should not obscure his power, in his greater passages, describing the descent of Helen, the passing of Mortimer, and the union of Hero and Leander, to attain a kind of Greek transparency and perfection. The thirst for ideal beauty, for endless empire, and for prohibited knowledge, no poet has better expressed, and in this respect Giordano Bruno is nearest him in his own time. This thirst is his own; his great cartoon-figures, gigantic rather than heroic, proclaim it for him: their type recurs through the drama, from Richard III. to Dryden's orotund heroes; but in *Faustus* and in *Edward II.* they become real, almost human beings. His constructive gift is less developed in proportion, though Goethe praised the planning-out of *Faustus.* The glory and influence of Marlowe on the side of form rest largely on his meteoric blank lines, which are varied not a little, and nobly harmonized into periods, and resonant with names to the point of splendid extravagance; and their sound is heard in Milton, whom he taught how to express the grief and despair of demons dissatisfied with their kingdom. Shakespeare did not excel Marlowe in Marlowe's own excellences, though he humanized Marlowe's Jew, launched his own blank verse on the tide of Marlowe's oratory, and modulated, in *Richard II.*, his master's type of chronicle tragedy.

Shakespeare.

As the middle ages receded, the known life of man upon this earth became of sovereign interest, and of this interest the drama is the freest artistic expression. If Marlowe is the voice of the impulse to explore, the plays of Shakespeare are the amplest freight brought home by any voyager. Shakespeare is not only the greatest but the earliest English dramatist who took humanity for his province. But this he did not do from the beginning. He was at first subdued to what he worked in; and though the dry pedantic tragedy was shattered and could not touch him, the gore and rant, the impure though genuine force of Kyd do not seem at first to have repelled him; if, as is likely, he had a hand in *Titus Andronicus.* He probably served with Marlowe and others of the school at various stages in the composition of the three chronicle dramas finally entitled *Henry VI.* But besides the high-superlative style that is common to them all, there runs through them the rhymed rhetoric with which Shakespeare dallied for some time, as well as the softer flute-notes and deeper undersong that foretell his later blank verse. In *Richard III.*, though it is built on the scheme and charged with the style of Marlowe, Shakespeare first showed the intensity of his original power. But after a few years he swept out of Marlowe's orbit into his own vaster and unreturning curve. In *King John* the lyrical, epical, satirical and pathetic chords are all present, if they are scarcely harmonized. Meantime, Lyly and Greene having displaced the uncouther comedy, Shakespeare learned all they had to teach, and shaped the comedy of poetic, chivalrous fancy and good-tempered high spirits, which showed him the way of escape from his own rhetoric, and enabled him to perfect his youthful, noble and gentle blank verse. This attained its utmost fineness in *Richard II.*, and its full cordiality and beauty in the other plays that consummate this period—*A Midsummer Night's Dream, The Merchant of Venice*, and one romantic tragedy, *Romeo and Juliet.* Behind them lay the earlier and fainter romances, with their chivalry and gaiety, *The Comedy of Errors, Love's Labour's Lost* and *The Two Gentlemen of Verona.* Throughout these years blank verse contended with rhyme, which Shakespeare after a while abandoned save for special purposes, as though he had exhausted its honey. The Italian Renaissance is felt in the scenery and setting of these plays. The *novella* furnishes the story, which passes in a city of the Southern type, with its absolute ruler, its fantastic by-laws on which the plot nominally turns, and its mixture of real life and marvel. The personages, at first fainter of feature and symmetrically paired, soon assume sharper outline: Richard II. and Shylock, Portia and Juliet, and Juliet's Nurse and Bottom are created. The *novella* has left the earth and taken wings: the spirit is now that of youth and Fancy (or love brooding among the shallows) with interludes of "fierce vexation," or of tragedy, or of kindly farce. And there is a visionary element, felt in the musings of Theseus upon the nature of poetry of the dream-faculty itself; an element which is new, like the use made of fairy folklore, in the poetry of England.

1590-1595.

1596-1600.

Tragedy is absent in the succeeding histories (1597–1599), and the comedies of wit and romance (1599–1600), in which Shakespeare perfected his style for stately, pensive or boisterous themes. Falstaff, the most popular as he is the wittiest of all imaginable comic persons, dominates, as to their prose or lower world, the two parts of *Henry IV.*, and its interlude or offshoot, *The Merry Wives of Windsor.* The play that celebrates Henry V. is less a drama than a pageant, diversified with mighty orations and cheerful humours, and filled with the love of Shakespeare for England. Here the most indigenous form of art invented by the English Renaissance reaches its climax. The Histories are peopled chiefly by men and warriors, of whom Hotspur, "dying in his excellence and flower," is perhaps more attractive than Henry of Agincourt. But in the "middle comedies," *As You Like It, Much Ado*, and *Twelfth Night*, the warriors are home at court, where women rule the scene and deserve to rule it; for their wit now gives the note; and Shakespeare's prose, the medium of their talk, has a finer grace and humour than ever before, euphuism lying well in subjection behind it.

1601-1608.

Mankind and this world have never been so sharply sifted or so sternly consoled, since Lucretius, as in Shakespeare's tragedies. The energy which created them evades, like that of the sun, our estimate. But they were not out of relation to their time, the first few years of the reign of James, with its conspiracies, its Somerset and Overbury horrors, its enigmatic and sombre figures like Raleigh, and its revulsion from Elizabethan buoyancy. In the same decade were written the chief tragedies of Jonson, Chapman, Dekker, Marston, Tourneur; and *The White Devil*, and *A Yorkshire Tragedy*, and *The Maid's Tragedy*, and *A Woman Killed with Kindness.* But, in spite of Shakespeare's affinities with these authors at many points, *Hamlet, Macbeth, Lear, Othello*, with the three Roman plays (written at intervals and not together), and the two quasi-antique plays *Troilus and Cressida*, and *Timon of Athens*, form a body of drama apart from anything else in the world. They reveal a new tragic philosophy, a new poetic style, a new dramatic technique and a new world of characters. In one way above all Shakespeare stands apart; he not only appropriates the ancient pattern of heroism, of right living and right dying, revealed by North's Plutarch; others did this also; but the intellectual movement of the time, though by no means fully reflected, is reflected in his tragedies far more than elsewhere. The new and troublous thoughts on man and conduct that were penetrating the general mind, the freedom and play of vision that Montaigne above all had stimulated, here find their fullest scope; and Florio's translation (1603) of Montaigne's *Essays*, coming out between the first and the second versions of Shakespeare's *Hamlet*, counted probably for more than any other book. The *Sonnets* (published 1609) are also full of far-wandering thoughts on truth and beauty and on good and evil. The story they reveal may be ranked with the situations of the stranger dramas like *Troilus* and *Measure for Measure.* But whether or no it is a true story, and the *Sonnets* in the main a confession, they would be at the very worst a perfect dramatic record of a great poet's suffering and friendship.

Last period.

Shakespeare's last period, that of his tragi-comedies, begins about 1608 with his contributions to *Pericles, Prince of Tyre.* For unknown reasons he was moved, about the time of his retirement home, to record, as though in justice to the world, the happy turns by which tragic disaster is at times averted. *Pericles*, *The Winter's Tale*, *Cymbeline*, and *The Tempest* all move, after a series of crimes, calumnies, or estrangements, to some final scene of enthralling beauty, where the lost reappear and love is recovered; as though after all the faint and desperate last partings—of Lear and Cordelia, of Hamlet and Horatio—which Shakespeare had imagined, he must make retrieval with the picture of young and happy creatures whose life renews hope even in the experienced. To this end he chose the loose action and free atmosphere of the *roman d'aventure*, which had already been adapted by Beaumont and Fletcher, who may herein have furnished Shakespeare with novel and successful theatrical effects, and who certainly in turn studied his handiwork. In *The Tempest* this tragi-comic scheme is fitted to the tales brought by explorers of far isles, wild men, strange gods and airy music. Even if it be true that in Prospero's words the poet bids farewell to his magic, he took part later nevertheless in the composition of *Henry VIII.*; and not improbably also in *The Two Noble Kinsmen.* His share in two early pieces, *Arden of Feversham* (1592) and *Edward III.*, has been urged, never established, and of many other dramas he was once idly accused.

Shakespeare's throne rests on the foundation of three equal and master faculties. One is that of expression and versification; the next is the invention and presentation of human character in action; the third is the theatrical faculty. The writing of Dante may seem to us more steadily great and perfect, when we remember Shakespeare's conceits, his experiments, his haste and impatience in his long wrestle with tragic language, his not infrequent sheer infelicities. But Dante is always himself, he had not to find words for hundreds of imaginary persons. Balzac, again, may have created and exhibited as many types of mankind, but except in soul he is not a poet. Shakespeare is a supreme if not infallible poet; his verse, often of an antique simplicity or of a rich, harmonious, romantic perfection, is at other times strained and shattered with what it tries to express, and attains beauty only through discord. He is also many persons in one; in his *Sonnets* he is even, it may be thought, himself. But he had furthermore to study a personality not of his own fancying—with something in it of Caliban, of Dogberry and of Cleopatra—that of the audience in a playhouse. He belongs distinctly to the poets like Jonson and Massinger who are true to their art as practical dramatists, not to the poets like Chapman whose works chance to be in the form of plays. Shakespeare's mastery of this art is approved now by every nation. But apart from the skill that makes him eternally actable—the skill of raising, straining and relieving the suspense, and bringing it to such an ending as the theatre will tolerate—he played upon every chord in his own hearers. He frankly enlisted Jew-hatred, Pope-hatred and France-hatred; he flattered the queen, and celebrated the Union, and stormed the house with his *fanfare* over the national soldier, Henry of Agincourt, and glorified England, as in *Cymbeline*, to the last. But in deeper ways he is the chief of playwrights. Unlike another master, Ibsen, he nearly always tells us, without emphasis, by the words and behaviour of his characters, which of them we are to love and hate, and when we are to love and when to hate those whom we can neither love nor hate wholly. Yet he is not to be bribed, and deals to his characters something of the same injustice or rough justice that is found in real life. His loyalty to life, as well as to the stage, puts the crown on his felicity and his fertility, and raises him to his solitude of dramatic greatness.

Jonson.

Shakespeare's method could not be imparted, and despite reverberations in Beaumont, Fletcher, Webster and others he left no school. But his friend Ben Jonson, his nearest equal in vigour of brain, though not in poetical intuition, was the greatest of dramatic influences down to the shutting of the theatres in 1642, and his comedies found fresh disciples even after 1660. He had "the devouring eye and the portraying hand"; he could master and order the contents of a mighty if somewhat burdensome memory into an organic drama, whether the matter lay in Roman historians or before his eyes in the London streets. He had an armoury of doctrine, drawn from the *Poetics* and Horace, which moulded his creative practice. This was also partly founded on a revulsion against the plays around him, with their loose build and moral improbabilities. But in spite of his photographic and constructive power, his vision is too seldom free and genial; it is that of the satirist who thinks that his office is to improve mankind by derisively representing it. And he does this by beginning with the "humour," or abstract idiosyncrasy or quality, and clothing it with accurately minute costume and gesture, so that it may pass for a man; and indeed the result is as real as many a man, and in his best-tempered and youthful comedy, *Every Man in his Humour* (acted 1598), it is very like life. In Jonson's monumental pieces, *Volpone or the Fox* (acted 1605) and *The Alchemist* (acted 1610), our laughter is arrested by the lowering and portentous atmosphere, or is loud and hard, startled by the enormous skill and energy displayed. Nor are the joy and relief of poetical comedy given for an instant by *The Silent Woman*, *Bartholomew Fair* (acted 1614), or *The Staple of News*, still less by topical plays like *Cynthia's Revels*, though their unfailing farce and rampant fun are less charged with contempt. The erudite tragedies, *Sejanus* (acted 1603) and *Catiline*, chiefly live by passages of high forensic power. Jonson's finer elegies, eulogies and lyrics, which are many, and his fragmentary *Sad Shepherd*, show that he also had a free and lovely talent, often smothered by doctrine and temper; and his verse, usually strong but full of knots and snags, becomes flowing and graciously finished. His prose is of the best, especially in his *Discoveries*, a series of ethical essays and critical maxims; its prevalently brief and emphatic rhythms suggesting those of Hobbes, and even, though less easy and civil and various, those of Dryden. The "sons" of Jonson, Randolph and Browne, Shadwell and Wilson, were heirs rather to his riot of "humours," his learned method and satiric aim, than to his larger style, his architectural power, or his relieving graces.

Romantic drama.

As a whole, the romantic drama (so to entitle the remaining bulk of plays down to 1642) is a vast stifled jungle, full of wild life and song, with strange growths and heady perfumes, with glades of sunshine and recesses of poisoned darkness; it is not a cleared forest, where single and splendid trees grow to shapely perfection. It has "poetry enough for anything"; passionate situations, and their eloquence; and a number, doubtless small considering its mass, of living and memorable personages. Moral keeping and constructive mastery are rarer still; and too seldom through a whole drama do we see human life and hear its voices, arranged and orchestrated by the artist. But it can be truly said in defence that while structure without poetry is void (as it tended at times to be in Ben Jonson), poetry without structure is still poetry, and that the romantic drama is like nothing else in this world for variety of accent and unexpectedness of beauty. We must read it through, as Charles Lamb did, to do it justice. The diffusion of its characteristic excellences is surprising. Of its extant plays it is hardly safe to leave one unopened, if we are searchers for whatsoever is lovely or admirable. The reasons for the lack of steadfast power and artistic conscience lay partly in the conditions of the stage. Playwrights usually wrote rapidly for bread, and sold their rights. The performances of each play were few. There was no authors' copyright, and dramas were made to be seen and heard, not to be read. There was no articulate dramatic criticism, except such as we find casually in Shakespeare, and in the practice and theory of Jonson, who was deaf or hostile to some of the chief virtues of the romantic playwrights.

Chapman.

The wealth of dramatic production is so great that only a broad classification is here offered. George Chapman stands apart, nearest to the greatest in high austerity of sentiment and in the gracious gravity of his romantic love-comedies. But the crude melodrama of his tragedies is void of true theatrical skill. His quasi-historical French tragedies on Bussy d'Ambois and Biron and Chabot best show his gift and also his insufferable interrupting quaintness. His versions of Homer (1598–1624), honoured alike by Jonson and by Keats, are the greatest verse translations of the time, and the real work of Chapman's life. Their virtues are only partially Homer's, but the general epic nobility and the majesty of single lines, which in length are the near equivalent of the hexameter, redeem the want of Homer's limpidity and continuity and the translator's imperfect knowledge of Greek. A vein of satiric ruggedness unites Jonson and Chapman with Marston and Hall, the professors of an artificial and disgusting invective; and the same strain spoils Marston's plays, and obscures his genuine command of the language of feverish and bitter sentiment. With these writers satire and contempt of the world lie at the root both of their comedy and tragedy.

Dekker and Heywood.

Middleton and Webster.

Beaumont and Fletcher.

Massinger.

The Many.

It is otherwise with most of the romantic dramatists, who may be provisionally grouped as follows. (*a*) Thomas Dekker and Thomas Heywood are writers-of-all-work, the former profuse of tracts and pamphlets, the latter of treatises and compilations. They are both unrhetorical and void of pose, and divide themselves between the artless comedy of bustling, lively, English humours and pathetic, unheroic tragedy. But Dekker has splendid and poetical dreams, in *Old Fortunatus* (1600) and *The Honest Whore*, both of luxury and of tenderness; while Heywood, as in his *English Traveller* and *Woman killed with Kindness* (acted 1603), excels in pictures of actual, chivalrous English gentlemen and their generosities. The fertility and volubility of these writers, and their modest carelessness of fame, account for many of their imperfections. With them may be named the large crowd of professional journeymen, who did not want for power, but wrote usually in partnership together, like Munday, Chettle and Drayton, or supplied, like William Rowley, underplots of rough, lively comedy or tragedy. (*b*) Amongst dramatists of primarily tragic and sombre temper, who in their best scenes recall the creator of Angelo, Iago and Timon, must be named Thomas Middleton (1570?–1627), John Webster, and Cyril Tourneur. Middleton has great but scattered force, and his verse has the grip and ring of the best period without a sign of the decadence. He is strong in high comedy, like *The Old Law*, that turns on some exquisite point of honour—"the moral sense of our ancestors"; in comedy that is merely graphic and vigorous; and in detached sketches of lowering wickedness and lust, like those in *The Changeling* and *Women beware Women*. He and Webster each created one unforgettable desperado, de Flores in *The Changeling* and Bosola in *The Duchess of Malfi* (whose "pity," when it came, was "nothing akin to him"). In Webster's other principal play, *Vittoria Corombona, or the White Devil* (produced about 1616), the title-character is not less magnificent in defiant crime than Goneril or Lady Macbeth. The style of Webster, for all his mechanical horrors, distils the essences of pity and terror, of wrath and scorn, and is profoundly poetical; and his point of view seems to be blank fatalism, without Shakespeare's ever-arching rainbow of moral sympathy. Cyril Tourneur, in *The Revenger's Tragedy*, is even more of a poet than Webster; he can find the phrase for half-insane wrath and nightmare brooding, but his chaos of impieties revolts the artistic judgment. These specialists, when all is said, are great men in their dark province. (*c*) The playwrights who may be broadly called romantic, of whom Beaumont, Fletcher and Massinger are the chief, while they share in the same sombre vein, have a wider range and move more in the daylight. The three just named left a very large body of drama, tragic, comic and tragi-comic, in which their several shares can partly be discerned by metrical or other tests. Beaumont (d. 1616) is nearest the prime, with his vein of Cervantesque mockery and his pure, beautifully-broken and cadenced verse, which is seen in his contributions to *Philaster* and *The Maid's Tragedy*. Fletcher (d. 1625) brings us closest to the actual gaieties and humours of Jacobean life; he has a profuse comic gift and the rare instinct for natural dialogue. His verse, with its flood of vehement and expansive rhetoric, heard at its best in plays like *Bonduca*, cannot cheat us into the illusion that it is truly dramatic; but it overflows with beauty, like his silvery but monotonous versification with its endecasyllabics arrested at the end. In Fletcher the decadence of form and feeling palpably begins. His personages often face about at critical instants and bely their natures by sudden revulsions. Wanton and cheap characters invite not only dramatic but personal sympathy, as though the author knew no better. There is too much fine writing about a chastity which is complacent rather than instinctive, and satisfied with its formal resistances and technical escapes; so that we are far from Shakespeare's heroines. These faults are present also in Philip Massinger (d. 1640), who offers in substantial recompense, not like Beaumont and Fletcher treasures of incessant vivacious episode and poetry and lyric interlude, but an often splendid and usually solid constructive skill, and a steady eloquence which is like a high table-land without summits. *A New Way to Pay Old Debts* (1632) is the most enduring popular comedy of the time outside Shakespeare's, and one of the best. Massinger's interweaving of impersonal or political conceptions, as in *The Bondman* and *The Roman Actor*, is often a triumph of arrangement; and though he wrote in the reign of Charles, he is saved by many noble qualities from being merely an artist of the decline. (*d*) A mass of plays, of which the authorship is unknown, uncertain or attached to a mere name, baffle classification. There are domestic tragedies, such as *Arden of Feversham*; scions of the vindictive drama, like *The Second Maiden's Tragedy*; historic or half-historic tragedies like *Nero*. There are chronicle histories, of which the last and one of the best is Ford's *Perkin Warbeck*, and melodramas of adventure such as Thomas Heywood poured forth. There are realistic citizen comedies akin to *The Merry Wives*, like Porter's refreshing *Two Angry Women of Abingdon*; there are Jonsonian comedies, vernacular farces, light intrigue-pieces like Field's and many more. Few of these, regarded as wholes, come near to perfection; few fail of some sally or scene that proves once more the unmatched diffusion of the dramatic or poetic instinct. (*e*) Outside the regular drama there are many varieties: academic plays, like *The Return from Parnassus* and *Lingua*, which are still mirthful; many pastoral plays or entertainments in the Italian style, like *The Faithful Shepherdess*; versified character-sketches, of which Day's *Parliament of Bees*, with its Theocritean grace and point, is the happiest; many masques and shows, often lyrically and scenically lovely, of which kind Jonson is the master, and Milton, in his *Comus*, the transfigurer; Senecan dramas made only to be read, like Daniel's and Fulke Greville's; and Latin comedies, like *Ignoramus*. All these species are only now being fully grouped, sifted and edited by scholars, but a number of the six or seven hundred dramas of the time remain unreprinted.

Ford and Shirley.

There remain two writers, John Ford and James Shirley, who kept the higher tradition alive till the Puritan ordinance crushed the theatre in 1642. Ford is another specialist, of grave, sinister and concentrated power (reflected in his verse and diction), to whom no topic, the incest of Annabella in *'Tis Pity She's a Whore*, or the high crazed heroism of Calantha in *The Broken Heart*, is beyond the pale, if only he can dominate it; as indeed he does, without complicity, standing above his subject. Shirley, a fertile writer, has the general characteristic gifts, in a somewhat dilute but noble form, of the more romantic playwrights, and claims honour as the last of them.

Prose from 1579 to 1660.—With all the unevenness of poetry, the sense of style, of a standard, is everywhere; felicity is never far off. Prose also is full of genius, but it is more disfigured than verse by aberration and wasted power. A central, classic, durable, adaptive prose had been attained by Machiavelli, and by Amyot and Calvin, before 1550. In England it was only to become distinct after 1660. Vocabulary, sentence-structure, paragraph, idiom and rhythm were in a state of unchartered freedom, and the history of their crystallization is not yet written. But in more than compensation there is a company of prose masters, from Florio and Hooker to Milton and Clarendon, not one of whom clearly or fully anticipates the modern style, and who claim all the closer study that their special virtues have been for ever lost. They seem farther away from us than the poets around them. The verse of Shakespeare is near to us, for its tradition has persisted; his prose, the most natural and noble of his age, is far away, for its tradition has not persisted. One reason of this difference is that English prose tried to do more work than that of France and Italy; it tried the work of poetry; and it often did that better than it did the normal work of prose. This overflow of the imaginative spirit gave power and elasticity to prose, but made its task of finding equilibrium the harder. Moreover, prose in England was for long a natural growth, never much affected by critical or academic canons as in France; and when it did submit to canons, the result was often merely manner. The tendons and sinews of the language, still in its adolescent power and bewilderment, were long unset; that is, the parts of speech—noun and verb, epithet and adverb—were in freer interchange than at any period afterwards. The build, length and cadence of a complex sentence were habitually elaborate; and yet they were disorganized, so that only the ear of a master could regulate them. The law of taste and measure, perhaps through some national disability, was long unperceived. Prose, in fact, could never be sure of doing the day's work in the right fashion. The cross-currents of pedantry in the midst of simplicity, the distrust of clear plain brevity, which was apt to be affected when it came, the mimicries of foreign fashions, and the quaintness and cumbrousness of so much average writing, make it easier to classify Renaissance prose by its interests than by its styles.

The novel.

Lyly and euphuism.

The Elizabethan novel was always unhappily mannered, and is therefore dead. It fed the drama, which devoured it. The tales of Boccaccio, Bandello, Cinthio, Margaret of Navarre, and others were purveyed, as remarked above, in the forgotten treasuries of Painter, Pettie, Fenton and Whetstone, and many of these works or their originals filled a shelf in the playwrights' libraries. The first of famous English novels, Lyly's *Euphues* (1578), and its sequel *Euphues and his England*, are documents of form. They are commended by a certain dapper shrewdness of observation and an almost witty priggery, not by any real beauty or deep feeling. Euphuism, of which Lyly was only the patentee, not the inventor, strikes partly back to the Spaniard Guevara, and was a model for some years to many followers like Lodge and Greene. It did not merely provide Falstaff with a pattern for mock-moral diction and vegetable similes. It genuinely helped to organize the English sentence, complex or co-ordinate, and the talk of Portia and Rosalind shows what could be made of it. By the arch-euphuists, clauses and clusters of clauses were paired for parallel or contrast, with the beat of emphatic alliteration on the corresponding parts of speech in each constituent clause. This was a useful discipline for prose in its period of groping. Sidney's incomposite and unfinished *Arcadia*, written 1580–1581, despite its painful forced antitheses, is sprinkled with lovely rhythms, with pleasing formal landscapes, and even with impassioned sentiment and situation, through which the writer's eager and fretted spirit shines. Both these stories, like those of Greene and Lodge, show by their somewhat affected, edited delineation of life and their courtly tone that they were meant in chief for the eyes of ladies, who were excluded alike from the stage and from its audience. Nashe's drastic and photographic tale of masculine life, *Jack Wilton, or The Unfortunate Traveller*, stands almost alone, but some of the gap is filled by the contemporary pamphlets, sometimes vivid, often full of fierce or maudlin declamation, of Nashe himself—by far the most powerful of the group—and of Greene, Dekker and Nicholas Breton. Thus the English novel was a minor passing form; the leisurely and amorous romance went on in the next century, owing largely to French influence and example.

Criticism.

In criticism, England may almost be counted with the minor Latin countries. Sidney, in his *Defence of Poesy* (1595, written about 1580), and Jonson, in his *Discoveries*, offer a well-inspired and lofty restatement of the current answers to the current questions, but could give no account of the actual creative writing of the time. To defend the "truth" of poetry—which was identified with all inventive writing and not only with verse—poetry was saddled with the work of science and instruction. To defend its character it was treated as a delightful but deliberate bait to good behaviour, a theory at best only true of allegory and didactic verse. The real relation of tragedy to spiritual things, which is admittedly shown, however hard its definition, in Shakespeare's plays, no critic for centuries tried to fathom. One of the chief quarrels turned on metric. A few lines that Sidney and Campion wrote on what they thought the system of Latin quantity are really musical. This theory, already raised by Ascham, made a stir, at first in the group of Harvey, Sidney, Dyer and Spenser, called the "Areopagus," an informal attempt to copy the Italian academies; and it was revived on the brink of the reign of James. But Daniel's firm and eloquent *Defence of Rhyming* (1602) was not needed to persuade the poets to continue rhyming in syllabic verse. The stricter view of the nature and classification of poetry, and of the dramatic unity of action, is concisely given, partly by Jonson, partly by Bacon in his *Advancement of Learning* and *De Augmentis*; and Jonson, besides passing his famed judgments on Shakespeare and Bacon, enriched our critical vocabulary from the Roman rhetoricians. Scholastic and sensible manuals, like Webbe's *Discourse of Poetry* and the *Art of English Poesy* (1589) ascribed to Puttenham, come in the rear.

Translators.

The translators count for more than the critics; the line of their great achievements from Berners' *Froissart* (1523–1525) to Urquhart's *Rabelais* (1653) is never broken long; and though their lives are often obscure, their number witnesses to that far-spread diffusion of the talent for English prose, which the wealth of English poetry is apt to hide. The typical craftsman in this field, Philemon Holland, translated Livy, Pliny, Suetonius, Plutarch's *Morals* and Camden's *Britannia*, and his fount of English is of the amplest and purest. North, in his translation, made from Amyot's classic French, of Plutarch's *Lives* (1579), disclosed one of the master-works of old example; Florio, in Montaigne's *Essays* (1603), the charter of the new freedom of mental exploration; and Shelton, in *Don Quixote* (1612), the chief tragi-comic creation of continental prose. These versions, if by no means accurate in the letter, were adequate in point of soul and style to their great originals; and the English dress of Tacitus (1591), Apuleius, Heliodorus, Commines, *Celestina* and many others, is so good and often so sumptuous a fabric, that no single class of prose authors, from the time of More to that of Dryden, excels the prose translators, unless it be the Anglican preachers. Their matter is given to them, and with it a certain standard of form, so that their natural strength and richness of phrase are controlled without being deadened. But the want of such control is seen in the many pamphleteers, who are the journalists of the time, and are often also playwrights or tale-tellers, divines or politicians. The writings, for instance, of the hectic, satiric and graphic Thomas Nashe, run at one extreme into fiction, and at the other into the virulent rag-sheets of the Marprelate controversy, which is of historical and social but not of artistic note, being only a fragment of that vast mass of disputatious literature, which now seems grotesque, excitable or dull.

Hooker.

Richard Hooker's *Laws of Ecclesiastical Polity* (1594–1597), an accepted defence of the Anglican position against Geneva and Rome, is the first theological work of note in the English tongue, and the first of note since Wycliffe written by an Englishman. It is a plea for reason as one of the safe and lawful guides to the faith; but it also speaks with admirable temper and large feeling to the ceremonial and aesthetic sense. The First Book, the scaffolding of the treatise, discusses the nature of law at large; but Hooker hardly has pure speculative power, and the language had not yet learnt to move easily in abstract trains of thought. In its elaboration of clause and period, in its delicate resonant eloquence, Hooker's style is Ciceronian; but his inversions and mazes of subordinate sentence somewhat rack the genius of English. Later divines like Jeremy Taylor had to disintegrate, since they could not wield, this admirable but over-complex eloquence. The sermons (1621–1631) of Donne have the mingled strangeness and intimacy of his verse, and their subtle flame, imaginative tenacity, and hold upon the springs of awe make them unique. Though without artificial symmetry, their sentences are intricately harmonized, in strong contrast to such pellet-like clauses as those of the learned Lancelot Andrewes, who was Donne's younger contemporary and the subject of Milton's Latin epitaph.

Bacon.

With Francis Bacon (1561–1626) English philosophy began its unbroken course and took its long-delayed rank in Europe. His prose, of which he is the first high and various master in English, was shaped and coloured by his bent as orator and pleader, by his immixture in affairs, by his speculative brain, and by his use and estimate of Latin. In his conscious craftsmanship, his intellectual confidence and curiosity, his divining faith in the future of science, and his resolve to follow the leadings of nature and experience unswervingly; in his habit of storing and using up his experience, and in his wide wordly insight, crystallized in maxim, he suggests a kind of Goethe, without the poetic hand or the capacity for love and lofty suffering. He saw all nature in a map, and wished to understand and control her by outwitting the "idols," or inherent paralysing frailties of the human judgment. He planned but could not finish a great cycle of books in order to realize this conception. The *De Augmentis Scientiarum* (1623) expanded from the English *Advancement of Knowledge* (1605) draws the map; the *Novum Organum* (1620) sets out the errors of scholasticism and the methods of inductive logic; the *New Atlantis* sketches an ideally equipped and moralized scientific community. Bacon shared with the great minds of his century the notion that Latin would outlast any vernacular tongue, and committed his chief scientific writings to a Latin which is alive and splendid and his own, and which also disciplined and ennobled his English. The *Essays* (1597, 1612, 1625) are his lifelong, gradually accumulated diary of his opinions on human life and business. These famous compositions are often sadly mechanical. They are chippings and basketings of maxims and quotations, and of anecdotes, often classical, put together inductively, or rather by "simple enumeration" of the pros and cons. Still they are the honest notes of a practical observer and statesman, disenchanted—why not?—with mankind, concerned with cause and effect rather than with right and wrong, wanting the finer faith and insight into men and women, but full of reality, touched with melancholy, and redeeming some arid, small and pretentious counsels by many that are large and wise. Though sometimes betraying the workshop, Bacon's style, at its best, is infallibly expressive; like Milton's angels, it is "dilated or condensed" according to its purposes. In youth and age alike, Bacon commanded the most opposite patterns and extremes of prose—the curt maxim, balanced in antithesis or triplet, or standing solitary; the sumptuous, satisfying and brocaded period; the movements of exposition, oratory, pleading and narrative. The *History of Henry VII.* (1622), written after his fall from office, is in form as well as insight and mastery of material the one historical classic in English before Clarendon. Bacon's musical sense for the value and placing of splendid words and proper names resembles Marlowe's. But the master of mid-Renaissance prose is Shakespeare; with him it becomes the voice of finer and more impassioned spirits than Bacon's—the voice of Rosalind and Hamlet. And the eulogist of both men, Ben Jonson, must be named in their company for his senatorial weight and dignity of ethical counsel and critical maxim.

Hobbes.

Funereal prose.

As the Stuart rule declined and fell, prose became enriched from five chief sources: from philosophy, whether formal or unmethodical; from theology and preaching and political dispute; from the poetical contemplation of death; from the observation of men and manners; and from antiquarian scholarship and history. As in France, where the first three of these kinds of writings flourished, it was a time rather of individual great writers than of any admitted pattern or common ideal of prose form, although in France this pattern was always clearlier defined. The mental energy, meditative depth, and throbbing brilliant colour of the English drama passed with its decay over into prose. But Latin was still often the supplanter: the treatise of Lord Herbert of Cherbury, *De Veritate*, of note in the early history of Deism, and much of the writing of the ambidextrous Thomas Hobbes, are in Latin. In this way Latin disciplined English once more, though it often tempted men of genius away from English. The *Leviathan* (1651) with its companion books on *Human Nature* and *Liberty*, and Hobbes' explosive dialogue on the civil wars, *Behemoth* (1679), have the bitter concision of Tacitus and the clearness of a half-relief in bronze. Hobbes' speculations on the human animal, the social contract, the absolute power of the sovereign, and the subservience owed to the sovereign by the Church or "Kingdom of Darkness," enraged all parties, and left their track on the thought and controversial literature of the century. With Ben Jonson and the jurist Selden (whose English can be judged from his *Table Talk*), Hobbes anticipates the brief and clear sentence-structure of the next age, though not its social ease and amenity of form. But his grandeur is not that of a poet, and the poetical prose is the most distinctive kind of this period. It is eloquent above all on death and the vanity of human affairs; its solemn tenor prolongs the reflections of Claudio, of Fletcher's Philaster, or of Spenser's Despair. It is exemplified in Bacon's Essay *Of Death*, in the anonymous descant on the same subject wrongly once ascribed to him, in Donne's plea for suicide, in Raleigh's *History of the World*, in Drummond's *Cypress Grove* (1623), in Jeremy Taylor's sermons and *Holy Dying* (1651), and in Sir Thomas Browne's *Urn-Burial* (1658) and *Letter to a Friend*. Its usual vesture is a long purple period, freely Latinized, though Browne equally commands the form of solemn and monumental epigram. He is also free from the dejection that wraps round the other writers on the subject, and a holy quaintness and gusto relieve his ruminations. The *Religio Medici* (1642), quintessentially learned, wise and splendid, is the fullest memorial of his power. Amongst modern prose writers, De Quincey is his only true rival in musical sensibility to words.

Jeremy Taylor.

Burton.

Jeremy Taylor, the last great English casuist and schoolman, and one of the first pleaders for religious tolerance (in his *Liberty of Prophesying*, 1647), is above all a preacher; tender, intricate, copious, inexhaustible in image and picturesque quotation. From the classics, from the East, from the animal world, from the life of men and children, his illustrations flow, without end or measure. He is a master of the lingering cadence, which soars upward and onward on its coupled clauses, as on balanced iridescent wings, and is found long after in his scholar Ruskin. Imaginative force of another kind pervades Robert Burton's *Anatomy of Melancholy* (1621), where the humorous medium refracts and colours every ray of the recluse's far-travelled spirit. The mass of Latin citation, woven, not quilted, into Burton's style, is another proof of the vitality of the cosmopolitan language. Burton and Browne owe much to the pre-critical learning of their time, which yields up such precious savours to their fancy, that we may be thankful for the delay of more precise science and scholarship. Fancy, too, of a suddener and wittier sort, preserves some of the ample labours of Thomas Fuller, which are scattered over the years 1631–1662; and the *Lives* and *Compleat Angler* (1653) of Izaak Walton are unspoilt, happy or pious pieces of idyllic prose. No adequate note on the secular or sacred learning of the time can here be given; on Camden, with his vast erudition, historical, antiquarian and comparatively critical (*Britannia*, in Latin, 1586); or on Ussher, with his patristic and chronological learning, one of the many *savants* of the Anglican church. Other divines of the same camp pleaded, in a plainer style than Taylor, for freedom of personal judgment and against the multiplying of " vitals in religion "; the chief were Chillingworth, one of the closest of English apologists, in his *Religion of Protestants* (1638), and John Hales of Eton. The Platonists, or rather Plotinists, of Cambridge, who form a curious digression in the history of modern philosophy, produced two writers, John Smith and Henry More, of an exalted and esoteric prose, more directly inspired by Greece than any other of the time; and their champion of erudition, Cudworth, in his *True Intellectual System*, gave some form to their doctrine.

Clarendon.

Above the vast body of pamphlets and disputatious writing that form the historian's material stands Edward Hyde, Earl of Clarendon's *History of the Rebellion*, printed in 1702–1704, thirty years after his death. Historical writing hitherto, but for Bacon's *Henry VII.*, had been tentative though profuse. Raleigh's vast disquisition upon all things, *The History of the World* (1614), survives by passages and poetic splendours; gallantly written second-hand works like Knolles's *History of the Turks*, and the rhetorical *History of the Long Parliament* by May, had failed to give England rank with France and Italy. Clarendon's book, one of the greatest of memoirs and most vivid of portrait-galleries, spiritually unappreciative of the other side, but full of a subtle discrimination of character and political motive, brings its author into line with Retz and Saint-Simon, the watchers and recorders and sometimes the makers of contemporary history. Clarendon's *Life*, above all the picture of Falkland and his friends, is a personal record of the delightful sort in which England was thus far infertile. He is the last old master of prose, using and sustaining the long, sinuous sentence, unworkable in weaker hands. He is the last, for Milton's polemic prose, hurled from the opposite camp, was written between 1643 and 1660. Whether reviling bishops or royal privilege or indissoluble monogamy, or recalling his own youth and aims; or claiming liberty for print in *Areopagitica* (1644); in his demonic defiances, or angelic calls to arms, or his animal eruptions of spite and hatred, Milton leaves us with a sense of the motive energies that were to be transformed into *Paradise Lost* and *Samson*. His sentences are ungainly and often inharmonious, but often irresistible; he rigidly withstood the tendencies of form, in prose as in verse, that Dryden was to represent, and thus was true to his own literary dynasty.

Milton's prose.

The Authorized Version.

A special outlying position belongs to the Authorized Version (1611) of the Bible, the late fruit of the long toil that had begun with Tyndale's, and, on the side of style, with the Wycliffite translations. More scholarly than all the preceding versions which it utilized, it won its incomparable form, not so much because of the " grand style that was in the air," which would have been the worst of models, as because the style had been already tested and ennobled by generations of translators. Its effect on poetry and letters was for some time far smaller than its effect on the national life at large, but it was the greatest translation—being of a whole literature, or rather of two literatures—in an age of great translations.

Some other kinds of writing soften the transition to Restoration prose. The vast catalogue of Characters numbers hundreds of titles. Deriving from Theophrastus, who was edited by Casaubon in 1592, they are yet another Renaissance form that England shared with France. But in English hands, failing a La Bruyère —in Hall's, in Overbury's, even in those of the gay and skilful Earle (*Microcosmographie*, 1628)—the Character is a mere list of the attributes and oddities of a type or calling. It is to th Jonsonian drama of humours what the Pensée, or detache remark, practised by Bishop Hall and later by Butler an Halifax, is to the Essay. These works tended long to be commonplace or didactic, as the popular *Resolves* of Owen Feltham shows Cowley was the first essayist to come down from the desk an talk as to his equals in easy phrases of middle length. A time c dissension was not the best for this kind of peaceful, detache writing. The letters of James Howell, the autobiography c Lord Herbert of Cherbury, and the memoirs of Kenelm Digb belong rather to the older and more mannered than to the mor modern form, though Howell's English is in the plainer an quicker movement.

IV. Restoration Period

French influenc

Literature from 1660 to 1700.—The Renaissance of letters i England entered on a fresh and peculiar phase in the thir quarter of the century. The balance of intellectual and artisti power in Europe had completely shifted since 1580. Inspiratio had died down in Italy, and its older classics were no longer stimulus. The Spanish drama had flourished, but its influenc though real was scattered and indirect. The Germanic countrie were slowly emerging into literature; England they scarcel touched. But the literary empire of France began to declar itself both in Northern and Southern lands, and within half century was assured. Under this empire the English geniu partly fell, though it soon asserted its own equality, and by 172 had so reacted upon France as more than to repay the debt Thus between 1660 and 1700 is prepared a temporary dual contro of European letters. But in the age of Dryden France gave England more than it received; it gave more than it had ever given since the age of Chaucer. During Charles II.'s days Racine, Molière, La Fontaine and Bossue ran the best of their course. Cavalier exiles like Waller, Cowle and Hobbes had come back from the winter of their disconten in Paris, and Saint-Evremond, the typical *bel esprit* and critic settled long in England. A vast body of translations from th French is recounted, including latterly the works of the Protestan refugees printed in the free Low Countries or in England. Naturally this influence told most strongly on the social forms of vers and prose—upon comedy and satire, upon criticism and maxir and epigram, while it also affected theology and thought. An this meant the Renaissance once more, still unexhausted, onl working less immediately and in fresh if narrower channels Greek literature, Plato and Homer and the dramatists, becam dimmer; the secondary forms of Latin poetry came to the fore especially those of Juvenal and the satirists, and the *pedestri sermo*, epistolary and critical, of Horace. These had some direc influence, as Dryden's translation of them, accompanying hi Virgil and Lucretius, may show. But they came commende by Boileau, their chief modernizer, and in their train was th fashion of gallant, epigrammatic and social verse. The traged of Corneille and Racine, developed originally from the Seneca drama, contended with the traditions of Shakespeare an Fletcher, and was reinforced by that of the correcter Jonson, i shaping the new theatre of England. The French codifiers who were often also the distorters, of Aristotle's *Poetics* an Horace's *Ars poëtica*, furnished a canonical body of criticisı on the epic and the drama, to which Dryden is half a discipl and half a rebel. All this implied at once a loss of the larger an fuller inspirations of poetry, a decadence in its great and primar forms, epic, lyric and tragic, and a disposition, in default of suc creative power, to turn and take stock of past production. I England, therefore, it is the age of secondary verse and of nascen often searching criticism.

Scien and Letter

The same critical spirit was also whetted in the fields of scienc and speculation, which the war and the Puritan rule had no encouraged. The activities of the newly-founded Royal Society told directly upon literature, and counted powerfully in the organization of a clear, uniform prose—the " close, naked, natural way of speaking," which the historian of the Society, Sprat, cites part of its programme. And the style of Sprat, as of scientific masters like Newton and Ray the botanist, itself attests the change. A time of profound and peaceful and fruitful scientific labour began; the whole of Newton's *Principia* appeared in 1687; the dream of Bacon came nearer, and England was less isolated from the international work of knowledge. The spirit of method and observation and induction spread over the whole field of thought and was typified in John Locke, whose *Essay concerning Human Understanding* came out in English in 1690, and who applied the same deeply sagacious and cautious calculus to education and religion and the "conduct of the understanding." But his works, though their often mellow and dignified style has been ignorantly underrated, also show the change in philosophic writing since Hobbes. The old grandeur and pugnacity are gone; the imaginative play of science, or quasi-science, on the literature of reflection is gone; the eccentrics, the fantasts, the dreamers are gone, or only survive in curious transitional writers like Joseph Glanvil (*Scepsis scientifica*, 1665) or Thomas Burnet (*Sacred Theory of the Earth*, 1684). This change was in part a conscious and an angry change, as is clear from the attacks made in Samuel Butler's *Hudibras* (1663–1668) upon scholastic verbiage, astrology, fanatical sects and their disputes, poetic and "heroic" enthusiasm and intellectual whim.

Courtly and social influence.

Before the Restoration men of letters, with signal exceptions like Milton and Marvell, had been Cavalier, courtly and Anglican in their sympathies. The Civil War had scattered them away from the capital, which, despite Milton's dream in *Areopagitica* of its humming and surging energies, had ceased to be, what it now again became, the natural haunt and Rialto of authors. The taste of the new king and court served to rally them. Charles II. relished *Hudibras*, used and pensioned Dryden, sat under Barrow and South and heard them with appreciation, countenanced science, visited comedies, and held his own in talk by mother-wit. Letters became the pastime, and therefore one of the more serious pursuits, of men of quality, who soon excelled in song and light scarifying verse and comedy, and took their own tragedies and criticisms gravely. Poetry under such auspices became gallant and social, and also personal and partisan; and satire was soon its most vital form, with the accessories of compliment, rhymed popular argumentation and elegy. The social and conversational instinct was the master-influence in prose. It produced a subtle but fundamental change in the attitude of author to reader. Prose came nearer to living speech, it became more civil and natural and persuasive, and this not least in the pulpit. The sense of ennui, or boredom, which seemed as unknown in the earlier part of the century as it is to the modern German, became strongly developed, and prose was much improved by the fear of provoking it. In all these ways the Restoration accompanied and quickened a speedier and greater change in letters than any political event in English history since the reign of Alfred, when prose itself was created.

Prose and criticism.

The formal change in prose can thus be assigned to no one writer, for the good reason that it presupposes a change of spoken style lying deeper than any personal influence. If we begin with the writing that is nearest living talk—the letters of Otway or Lady Rachel Russell, or the diary of Pepys (1659–1669)—that supreme disclosure of our mother-earth—or the evidence in a state trial, or the dialogue in the more natural comedies; if we then work upwards through some of the plainer kinds of authorship, like the less slangy of L'Estrange's pamphlets, or Burnet's *History of My Own Time*, a solid Whig memoir of historical value, until we reach really admirable or lasting prose like Dryden's *Preface* to his *Fables* (1700), or the maxims of Halifax;—if we do this, we are aware, amid all varieties, survivals and reversions, of a strong and rapid drift towards the style that we call modern. And one sign of this movement is the revulsion against any over-saturating of the working, daily language, and even of the language of appeal and eloquence, with the Latin element. In Barrow and Glanvil, descendants of Taylor and Browne, many Latinized words remain, which were soon expelled from style like foreign bodies from an organism. As in the mid-sixteenth and the mid-eighteenth century, the process is visible by which the Latin vocabulary and Latin complication of sentence first gathers strength, and then, though not without leaving its traces, is forced to ebb. The instinct of the best writers secured this result, and secured it for good and all. In Dryden's diction there is a nearly perfect balance and harmony of learned and native constituents, and a sensitive tact in Gallicizing; in his build of sentence there is the same balance between curtness or bareness and complexity or ungainly lengthiness. For ceremony and compliment he keeps a rolling period, for invective a short sharp stroke without the gloves. And he not only uses in general a sentence of moderate scale, inclining to brevity, but he finds out its harmonies; he is a seeming-careless but an absolute master of rhythm. In delusive ease he is unexcelled; and we only regret that he could not have written prose oftener instead of plays. We should thus, however, have lost their prefaces, in which the bulk and the best of Dryden's criticisms appear. From the *Essay of Dramatic Poesy* (1668) down to the *Preface to Fables* (1700) runs a series of essays: *On the Grounds of Criticism in Tragedy*, *On Heroic Plays*, *On Translated Verse*, *On Satire* and many more; which form the first connected body of criticisms in the language, and are nobly written always. Dryden's prose is literature as it stands, and yet is talk, and yet again is mysteriously better than talk. The critical writings of John Dennis are but a sincere application of the rules and canons that were now becoming conventional; Rymer, though not so despicable as Macaulay said, is still more depressing than Dennis; and for any critic at once so free, so generous and so sure as Dryden we wait in vain for a century.

Contributors to the new prose.

Three or four names are usually associated with Dryden's in the work of reforming or modifying prose: Sprat, Tillotson, Sir William Temple, and George Savile, marquis of Halifax; but the honours rest with Halifax. Sprat, though clear and easy, has little range; Tillotson, though lucid, orderly, and a very popular preacher, has little distinction; Temple, the elegant essayist, has a kind of barren gloss and fine literary manners, but very little to say. The political tracts, essays and maxims of Halifax (died 1695) are the most typically modern prose between Dryden and Swift, and are nearer than anything else to the best French writing of the same order, in their finality of epigram, their neatness and mannerliness and sharpness. The *Character of a Trimmer* and *Advice to a Daughter* are the best examples.

Preachers.

Religious literature, Anglican and Puritan, is the chief remaining department to be named. The strong, eloquent and coloured preaching of Isaac Barrow the mathematician, who died in 1677, is a survival of the larger and older manner of the Church. In its balance of logic, learning and emotion, in its command alike of Latin splendour and native force, it deserves a recognition it has lost. Another athlete of the pulpit, Robert South, who is so often praised for his wit that his force is forgotten, continues the lineage, while Tillotson and the elder Sherlock show the tendency to the smoother and more level prose. But the revulsion against strangeness and fancy and magnificence went too far; it made for a temporary bareness and meanness and disharmony, which had to be checked by Addison, Bolingbroke and Berkeley. From what Addison saved our daily written English, may be seen in the vigorous slangy hackwork of Roger L'Estrange, the translator and pamphleteer, in the news-sheets of Dunton, and in the satires of Tom Brown. These writers were debasing the coinage with their street journalism.

Puritan prose.

Another and far nobler variety of vernacular prose is found in the Puritans. Baxter and Howe, Fox and Bunyan, had the English Bible behind them, which gave them the best of their inspiration, though the first two of them were also erudite men. Richard Baxter, an immensely fertile writer, is best remembered by those of his own fold for his *Saint's Everlasting Rest* (1650) and his autobiography, John Howe for his evangelical apologia *The Living Temple of God*

Bunyan.

(1675), Fox for his *Journal* and its mixture of quaintness and rapturous mysticism. John Bunyan, the least instructed of them all, is their only born artist. His creed and point of view were those of half the nation—the half that was usually inarticulate in literature, or spoke without style or genius. His reading, consisting not only of the Bible, but of the popular allegories of giants, pilgrims and adventure, was also that of his class. *The Pilgrim's Progress*, of which the first part appeared in 1678, the second in 1684, is the happy flowering sport amidst a growth of barren plants of the same tribe. The *Progress* is a dream, more vivid to its author than most men's waking memories to themselves; the emblem and the thing signified are merged at every point, so that Christian's journey is not so much an allegory with a key as a spiritual vision of this earth and our neighbours. *Grace Abounding*, Bunyan's diary of his own voyage to salvation, *The Holy War*, an overloaded fable of the fall and recovery of mankind, and *The Life and Death of Mr Badman*, a novel telling of the triumphal earthly progress of a scoundrelly tradesman, are among Bunyan's other contributions to literature. His union of spiritual intensity, sharp humorous vision, and power of simple speech consummately chosen, mark his work off alike from his own inarticulate public and from all other literary performance of his time.

Transitional verse.

Hudibras.

Songsters.

The transition from the older to the newer poetry was not abrupt. Old themes and tunes were slowly disused, others previously of lesser mark rose into favour, and a few quite fresh ones were introduced. The poems of John Oldham and Andrew Marvell belong to both periods. Both of them begin with fantasy and elegy, and end with satires, which indeed are rather documents than works of art. The monody of Oldham on his friend Morwent is poorly exchanged for the *Satires on the Jesuits* (1681), and the lovely metaphysical verses of Marvell on gardens and orchards and the spiritual love sadly give place to his *Last Instructions to a Painter* (1669). In his *Horatian Ode* Marvell had nobly and impartially applied his earlier style to national affairs; but the time proved too strong for this delightful poet. Another and a stranger satire had soon greeted the Restoration, the *Hudibras* (1663–1678) of Samuel Butler, with its companion pieces. The returned wanderers delighted in this horribly agile, boisterous and fierce attack on the popular party and its religions, and its wrangles and its manners. Profoundly eccentric and tiresomely allusive in his form, and working in the short rhyming couplets thenceforth called "Hudibrastics," Butler founded a small and peculiar but long-lived school of satire. The other verse of the time is largely satire of a different tone and metre; but the earlier kind of finished and gallant lyric persisted through the reign of Charles II. The songs of John Wilmot, Earl of Rochester, are usually malicious, sometimes passionate; they have a music and a splendid self-abandonment such as we never meet again till Burns. Sedley and Dorset and Aphra Behn and Dryden are the rightful heirs of Carew and Lovelace, those infallible masters of short rhythms; and this secret also was lost for a century afterwards.

Dryden.

In poetry, in prose, and to some extent in drama, John Dryden, the creature of his time, is the master of its expression. He began with panegyric verse, first on Cromwell and then on Charles, which is full of fine things and false writing. The *Annus Mirabilis* (1667) is the chief example, celebrating the Plague, the Fire and the naval victory, in the quatrains for which Davenant's pompous *Gondibert* had shown the way. The *Essay on Dramatic Poesy* (1668), a dialogue on the rivalries of blank verse with rhyme, and of the Elizabethan drama with the French, is perfect modern prose; and to this perfection Dryden attained at a bound, while he attained his poetical style more gradually. He practised his couplet in panegyric, in heroic tragedy, and in dramatic prologue and epilogue for twenty years before it was consummate. Till 1680 he supported himself chiefly by his plays, which have not lived so long as their critical prefaces, already mentioned. His diction and versification came to their full power in his satires, rhymed arguments, dedications and translations. *Absalom and Achitophel* (part i., 1681; part ii., with Nahum Tate, 1682), as well as *The Medal* and *Mac Flecknoe*, marked a new birth of English satire, placing it at once on a level with that of any ancient or modern country. The mixture of deadly good temper, Olympian unfairness, and rhetorical and metrical skill in each of these poems has never been repeated. The presentment of Achitophel, earl of Shaftesbury, in his relations with Absalom Walters and Charles the minstrel-king of Judah, as well as the portraits of Shimei and Barzillai and Jotham, the eminent Whigs and Tories, and of the poets Og and Doeg, are things whose vividness age has never discoloured. Dryden's Protestant arguings in *Religio Laici* (1682) and his equally sincere Papistical arguings in *The Hind and the Panther* (1687) are just as skilful. His translations of Virgil and parts of Lucretius, of Chaucer and Boccaccio (*Fables*, 1700), set the seal on his command of his favourite couplet for the higher kinds of appeal and oratory. His *Ode* on Anne Killigrew, and his popular but coarser *Alexander's Feast*, have a more lyric harmony; and his songs, inserted in his plays, reflect the change of fashion by their metrical adeptness and often thoroughgoing wantonness. The epithet of "glorious," in its older sense of a certain conscious and warranted pride of place, not in that of boastful or pretentious, suits Dryden well. Not only did he leave a model and a point of departure for Pope, but his influence recurs in Churchill, in Gray, in Johnson and in Crabbe, where he is seen counteracting, with his large, wholesome and sincere bluntness, the acidity of Pope. Dryden was counted near Shakespeare and Milton until the romantic revival renewed the sense of proportion; but the same sense now demands his acknowledgment as the English poet who is nearest to their frontiers of all those who are exiled from their kingdom.

Tragedy.

Otway.

Restoration and Revolution tragedy is nearly all abortive; it is now hard to read it for pleasure. But it has noble flights, and its historic interest is high. Two of its species, the rhymed heroic play and the rehandling of Shakespeare in blank verse, were also brought to their utmost by Dryden, though in both he had many companions. The heroic tragedies were a hybrid offspring of the heroic romance and French tragedy; and though *The Conquest of Granada* (1669–1670) and *Tyrannic Love* would be very open to satire in Dryden's own vein, they are at least generously absurd. Their intention is never ignoble, if often impossible. After a time Dryden went back to Shakespeare, after a fashion already set by Sir William Davenant, the connecting link with the older tragedy and the inaugurator of the new. They "revived" Shakespeare; they vamped him in a style that did not wholly perish till after the time of Garrick. *The Tempest*, *Troilus and Cressida*, and *Antony and Cleopatra* were thus handled by Dryden; and the last of these, as converted by him into *All for Love* (1678), is loftier and stronger than any of his original plays, its blank verse renewing the ties of Restoration poetry with the great age. The heroic plays, written in one or other metre, lived long, and expired in the burlesques of Fielding and Sheridan. *The Rehearsal* (1671), a gracious piece of fooling partially aimed at Dryden by Buckingham and his friends, did not suffice to kill its victims. Thomas Otway and Nathaniel Lee, both of whom generally used blank verse, are the other tragic writers of note, children indeed of the extreme old age of the drama. Otway's long-acted *Venice Preserved* (1682) has an almost Shakespearian skill in melodrama, a wonderful tide of passionate language, and a blunt and bold delineation of character; but Otway's inferior style and verse could only be admired in an age like his own. Lee is far more of a poet, though less of a dramatist, and he wasted a certain talent in noise and fury.

Comedy.

Restoration comedy at first followed Jonson, whom it was easy to try and imitate; Shadwell and Wilson, whose works are a museum for the social antiquary, photographed the humours of the town. Dryden's many comedies often show his more boisterous and blatant, rarely his finer qualities. Like all playwrights of the time he pillages from the French, and vulgarizes Molière without stint or shame. A truer light comedy began with Sir George Etherege, who mirrored in

Wycherley.

his fops the gaiety and insolence of the world he knew. The society depicted by William Wycherley, the one comic dramatist of power between Massinger and Congreve, at first seems hardly human; but his energy is skilful and faithful as well as brutal; he excels in the graphic reckless exhibition of outward humours and bustle; he scavenges in the most callous good spirits and with careful cynicism. *The Plain Dealer* (1677), a skilful transplantation, as well as a depravation of Molière's *Le Misanthrope*, is his best piece: he writes in prose, and his prose is excellent, modern and lifelike.

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(O. E.*)

V. THE 18TH CENTURY

Social changes.

In the reign of Anne (1702–1714) the social changes which had commenced with the Restoration of 1660 began to make themselves definitely felt. Books began to penetrate among all classes of society. The period is consequently one of differentiation and expansion. As the practice of reading becomes more and more universal, English writers lose much of their old idiosyncrasy, intensity and obscurity. As in politics and religion, so in letters, there is a great development of nationality. Commercial considerations too for the first time become important. We hear relatively far less of religious controversy, of the bickering between episcopalians and nonconformists and of university squabbles. Specialization and cumbrous pedantry fall into profound disfavour. Provincial feeling exercises a diminishing sway, and literature becomes increasingly metropolitan or suburban. With the multiplication of moulds, the refinement of prose polish, and the development of breadth, variety and ease, it was natural enough, having regard to the place that the country played in the world's affairs, that English literature should make its début in western Europe. The strong national savour seemed to stimulate the foreign appetite, and as represented by Swift, Pope, Defoe, Young, Goldsmith, Richardson, Sterne and Ossian, if we exclude Byron and Scott, the 18th century may be deemed the cosmopolitan age, *par excellence*, of English Letters. The charms of 18th-century English literature, as it happens, are essentially of the rational, social and translatable kind: in intensity, exquisiteness and eccentricity of the choicer kinds it is proportionately deficient. It is pre-eminently an age of prose, and although verbal expression is seldom represented at its highest power, we shall find nearly every variety of English prose brilliantly illustrated during this period: the aristocratic style of Bolingbroke, Addison and Berkeley; the gentlemanly style of Fielding; the keen and logical controversy of Butler, Middleton, Smith and Bentham; the rhythmic and balanced if occasionally involved style of Johnson and his admirers; the limpid and flowing manner of Hume and Mackintosh; the light, easy and witty flow of Walpole; the divine chit-chat of Cowper; the colour of Gray and Berkeley; the organ roll of Burke; the detective journalism of Swift and Defoe; the sly familiarity of Sterne; the dance music and wax candles of Sheridan; the pomposity of Gibbon; the air and ripple of Goldsmith; the peeping preciosity of Boswell,—these and other characteristics can be illustrated in 18th-century prose as probably nowhere else.

But more important to the historian of literature even than the development of qualities is the evolution of types. And in this respect the 18th century is a veritable index-museum of English prose. Essentially, no doubt, it is true that in form the prose and verse of the 18th century is mainly an extension of Dryden, just as in content it is a reflection of the increased variety of the city life which came into existence as English trade rapidly increased in all directions. But the taste of the day was rapidly changing. People began to read in vastly increasing numbers. The folio was making place on the shelves for the octavo. The bookseller began to transcend the mere tradesman. Along with newspapers the advertizing of books came into fashion, and the market was regulated no longer by what learned men wanted to write, but what an increasing multitude wanted to read. The arrival of the octavo is said to have marked the enrolment of man as a reader, that of the novel the attachment of woman. Hence, among other causes, the rapid decay of lyrical verse and printed drama, of theology and epic, in ponderous tomes. The fashionable types of which the new century was to witness the fixation are accordingly the essay and the satire as represented respectively by Addison and Steele, Swift and Goldsmith, and by Pope and Churchill. Pope, soon to be followed by Lady Mary Wortley Montagu, was the first Englishman who treated letter-writing as an art upon a considerable scale. Personalities and memoirs prepare the way for history, in which as a department of literature English letters hitherto had been almost scandalously deficient. Similarly the new growth of fancy essay (Addison) and plain biography (Defoe) prepared the way for the English novel, the most important by far of all new literary combinations. Finally, without going into unnecessary detail, we have a significant development of topography, journalism and criticism. In the course of time, too, we shall perceive how the pressure of town life and the logic of a capital city engender, first a fondness for landscape gardening and a somewhat artificial Arcadianism, and then, by degrees, an intensifying love of the country, of the open air, and of the rare, exotic and remote in literature.

Locke: Addison.

At the outset of the new century the two chief architects of public opinion were undoubtedly John Locke and Joseph Addison. When he died at High Laver in October 1704 at the mature age of seventy-two, Locke had, perhaps, done more than any man of the previous century to prepare the way for the new era. Social duty and social responsibility were his two watchwords. The key to both he discerned in the *Human Understanding*—"no province of knowledge can be regarded as independent of reason." But the great modernist of the time was undoubtedly Joseph Addison (1672–1719). He first left the 17th century, with its stiff euphuisms, its formal obsequiousness, its ponderous scholasticism and its metaphorical antitheses, definitely behind. He did for English culture what Rambouillet did for that of France, and it is hardly an exaggeration to call the half-century before the great fame of the English novel, the half century of the *Spectator*.

Steele.

Addison's mind was fertilized by intercourse with the greater and more original genius of Swift and with the more inventive and more genial mind of Steele. It was Richard Steele (1672–1729) in the *Tatler* of 1709–1710 who first realized that the specific which that urbane age both needed and desired was no longer copious preaching and rigorous declamation, but homoeopathic doses of good sense, good taste and good-humoured morality, disguised beneath an easy and fashionable style. Nothing could have suited Addison better than the opportunity afforded him of contributing an occasional essay or roundabout paper in praise of virtue or dispraise of stupidity and bad form to his friend's periodical. When the *Spectator* succeeded the *Tatler* in March 1711, Addison took a more active share in shaping the chief characters (with the immortal baronet, Sir Roger, at their head) who were to make up the "Spectator Club"; and, better even than before, he saw his way, perhaps, to reinforcing his copious friend with his own more frugal but more refined endowment. Such a privileged talent came into play at precisely the right moment to circulate through the coffee houses and to convey a large measure of French courtly ease and elegance into the more humdrum texture of English prose. Steele became rather disreputable in his later years, Swift was banished and went mad, but Addison became a personage of the utmost consideration, and the essay as he left it became an almost indispensable accomplishment to the complete gentlemen of that age. As an architect of opinion from 1717 to 1775 Addison may well rank with Locke.

Swift. The other side, both in life and politics, was taken by Jonathan Swift (1667–1745), who preferred to represent man on his unsocial side. He sneered at most things, but not at his own order, and he came to defend the church and the country squirearchy against the conventicle and Capel court. To undermine the complacent entrenchments of the Whig capitalists at war with France no sap proved so effectual as his pen. Literary influence was then exercised in politics mainly by pamphlets, and Swift was the greatest of pamphleteers. In the *Journal to Stella* he has left us a most wonderful portrait of himself in turn currying favour, spoiled, petted and humiliated by the party leaders of the Tories from 1710–1713. He had always been savage, and when the Hanoverians came in and he was treated as a suspect, his hate widened to embrace all mankind (*Gulliver's Travels*, 1726) and he bit like a mad dog. Would that he could have bitten more, for the infection of English stylists! In wit, logic, energy, pith, resourcefulness and Saxon simplicity, his prose has never been equalled. The choicest English then, it is the choicest English still. **Arbuthnot.** Dr John Arbuthnot (1667–1735) may be described as an understudy of Swift on the whimsical side only, whose malignity, in a nature otherwise most kindly, was circumscribed strictly by the limits of political persiflage. Bernard Mandeville (1670–1733), unorthodox as he was in every respect, discovered a little of Swift's choice pessimism in his assault (in *The Fable of the Bees* of 1723) against the genteel optimism of the *Characteristics* of Lord Shaftesbury. **Bolingbroke.** Neither the matter nor the manner of the brilliant Tory chieftain Henry St John, Viscount Bolingbroke (1678–1751), appears to us now as being of the highest significance; but, although Bolingbroke's ideas were second-hand, his work has an historical importance; his dignified, balanced and decorated style was the cynosure of 18th-century statesmen. His essays on "History" and on "a Patriot King" both disturb a soil well prepared, and set up a reaction against such evil tendencies as a narrowing conception of history and a primarily factious and partisan conception of politics. It may be noted here how the fall of Bolingbroke and the Tories in 1714 precipitated the decay of the Renaissance ideal of literary patronage. The dependence of the press upon the House of Lords was already an anomaly, and the practical toleration achieved in 1695 removed another obstacle from the path of liberation. The government no longer sought to strangle the press. It could generally be tuned satisfactorily and at the worst could always be temporarily muzzled. The pensions hitherto devoted to men of genius were diverted under Walpole to spies and journalists. Yet one of the most unscrupulous of all the fabricators of intelligence, looked down upon as a huckster of the meanest and most inconsiderable literary wares, established his fame by a masterpiece of which literary genius had scarcely even cognizance.

Defoe. The new trade of writing was represented most perfectly by Daniel Defoe (1660–1731), who represents, too, what few writers possess, a competent knowledge of work and wages, buying and selling, the squalor and roguery of the very hungry and the very mean. From reporting sensations and chronicling *faits divers*, Defoe worked his way almost insensibly to the Spanish tale of the old Mendoza or picaresque pattern. *Robinson Crusoe* was a true story expanded on these lines, and written down under stress of circumstance when its author was just upon sixty. Resembling that of Bunyan and, later, Smollett in the skilful use made of places, facts and figures, Defoe's style is the mirror of man in his shirt sleeves. What he excelled in was plain, straightforward story-telling, in understanding and appraising the curiosity of the man in the street, and in possessing just the knowledge and just the patience, and just the literary stroke that would enable him most effectually to satisfy it. He was the first and cleverest of all descriptive reporters, for he knew better than any successor how and where to throw in those irrelevant details, tricks of speech and circumlocution, which tend to give an air of verisimilitude to a bald and unconvincing narrative—the funny little splutterings and naïvetés as of a plain man who is not telling a tale for effect, but striving after his own manner to give the plain unvarnished truth. Defoe contributes story, Addison character, Fielding the life-atmosphere, Richardson and Sterne the sentiment, and we have the 18th-century novel complete—the greatest literary birth of modern time. Addison, Steele, Swift and Defoe, as master-builders of prose fiction, are consequently of more importance than the "Augustan poets," as Pope and his school are sometimes called, for the most that they can be said to have done is to have perfected a more or less transient mode of poetry.

Pope. To the passion, imagination or musical quality essential to the most inspired kinds of poetry Alexander Pope (1688–1744) can lay small claim. His best work is contained in the *Satires* and *Epistles*, which are largely of the proverb-in-rhyme order. Yet in lucid, terse and pungent phrases he has rarely if ever been surpassed. His classical fancy, his elegant turn for periphrasis and his venomous sting alike made him the idol of that urbane age. Voltaire in 1726 had called him the best poet living, and at his death his style was paramount throughout the civilized world. It was the apotheosis of wit, point, lucidity and technical correctness. Pope was the first Englishman to make poetry pay (apart from patronage). He was flattered by imitation to an extent which threatened to throw the school of poetry which he represented into permanent discredit. Prior, Gay, Parnell, Akenside, Pomfret, Garth, Young, Johnson, Goldsmith, Falconer, Glover, Grainger, Darwin, Rogers, Hayley and indeed a host of others—the once famous mob of gentlemen who wrote with ease—worshipped Pope as their poetic founder. The second-rate wore his badge. But although the cult of Pope was the established religion of poetic taste from 1714 to 1798, there were always nonconformists. The poetic revolt, indeed, was far more versatile than the religious revival of the century. **Thomson.** The *Winter* (1726) of James Thomson may be regarded as inaugurating a new era in English poetry. Lady Winchilsea, John Philips, author of *Cyder*, and John Dyer, whose *Grongar Hill* was published a few months before *Winter*, had pleaded by their work for a truthful and unaffected, and at the same time a romantic treatment of nature in poetry; but the ideal of artificiality and of a frigid poetic diction by which English poetry was dominated since the days of Waller and Cowley was first effectively challenged by Thomson. At the time when the Popean couplet was at the height of its vogue he deliberately put it aside in favour of the higher poetic power of blank verse. And he it was who transmitted the sentiment of natural beauty not merely to imitators such as Savage, Armstrong, Somerville, Langhorne, Mickle and Shenstone, but also to his elegist, William Collins, to Gray and to Cowper, and so indirectly to the lyrical bards of 1798. **Collins. Gray.** By the same hands and those of Shenstone experiments were being made in the stanza of *The Faerie Queene*; a little later, owing to the virtuosity of Bishop Percy, the cultivation of the old English and Scottish ballad literature was beginning to take a serious turn. Dissatisfaction with the limitations of "Augustan" poetry was similarly responsible for the revived interest in Shakespeare and Chaucer. Gray stood not only for a far more intimate worship of wild external nature, but also for an awakened curiosity in Scandinavian, Celtic and Icelandic poetry.

To pretend then that the poetic heart of the 18th century was Popean to the core is nothing short of extravagance. There were a number of true poets in the second and third quarters of the century to whom all credit is due as pioneers and precentors of the romantic movement under the depressing conditions to which innovators in poetry are commonly subject. They may strike us as rather an anaemic band after the great Elizabethan poets. Four of them were mentally deranged (Collins, Smart, Cowper, Blake), while Gray was a hermit, and Shenstone and Thomson the most indolent of recluses. The most adventurous, one might say the most virile of the group, was a boy who died at the age of seventeen. Single men all (save for Blake), a more despondent group of artists as a whole it would not perhaps be easy to discover. Catacombs and cypresses were the forms of imagery that came to them most naturally. Elegies and funeral odes were the types of expression in which they were happiest. Yet they strove in the main to follow the gleam in poetry, to reinstate imagination upon its throne, and to substitute the singing voice for the rhetorical recitative of the heroic couplet. Within two years of the death of Pope, in 1746, William Collins was content to *sing* (not say) what he had in him without a glimpse of wit or a flash of eloquence—and in him many have discerned the germ of that romantic *éclosion* which blossomed in *Christabel*. A more important if less original factor in that movement was Collins's severe critic Thomas Gray, a man of the widest curiosities of his time, in whom every attribute of the poet to which scholarship, taste and refinement are contributory may be found to the full, but in whom the strong creative energy is fatally lacking—despite the fact that he wrote a string of "divine truisms" in his *Elegy*, which has given to multitudes more of the exquisite pleasure of poetry than any other single piece in the English language. Shenstone and Percy, Capell, the Wartons and eventually Chatterton, continued to mine in the shafts which Gray had been the first to sink. Their laborious work of discovery resembled that which was commencing in regard to the Gothic architecture which the age of Pope had come to regard as rude and barbaric. The Augustans had come seriously to regard all pre-Drydenic poetry as grossly barbarian. One of the greatest achievements of the mid-eighteenth century was concerned with the disintegration of this obstinate delusion. The process was manifold; and it led, among other things, to a realization of the importance of the study of comparative literature.

The novel.

The literary grouping of the 18th century is, perhaps, the biggest thing on the whole that English art has to show; but among all its groups the most famous, and probably the most original, is that of its proto-novelists Richardson, Fielding, Smollett and Sterne. All nations have had their novels, which are as old at least as Greek vases. The various types have generally had collective appellations such as Milesian Tales, Alexandrian Romances, Romances of Chivalry, Acta Sanctorum, Gesta Romanorum, Cent Nouvelles Nouvelles, Romances of Roguery, Arabian Nights; but owing to the rivalry of other more popular or more respectable or at least more eclectic literary forms, they seldom managed to attain a permanent lodgment in the library. The taste in prose fiction changes, perhaps, more rapidly than that in any other kind of literature. In Britain alone several forms had passed their prime since the days of Caxton and his Arthurian prose romance of *Morte d'Arthur*. Such were the wearisome Arcadian romance or pastoral heroic; the new centos of tales of chivalry like the *Seven Champions of Christendom*; the utopian, political and philosophical romances (*Oceana, The Man in the Moone*); the grotesque and facetious stories of rogues retailed from the Spanish or French in dwarf volumes; the prolix romance of modernized classic heroism (*The Grand Cyrus*); the religious allegory (Bunyan's *Life and Death of Mr Badman*); the novels of outspoken French or Italian gallantry, represented by Aphra Behn; the imaginary voyages so notably adapted to satire by Dr Swift; and last, but not least, the minutely prosaic chronicle-novels of Daniel Defoe. The prospect of the novel was changing rapidly. The development of the individual and of a large well-to-do urban middle class, which was rapidly multiplying its area of leisure, involved a curious and self-conscious society, hungry for pleasure and new sensations, anxious to be told about themselves, willing in some cases even to learn civilization from their betters. The disrepute into which the drama had fallen since Jeremy Collier's attack on it directed this society by an almost inevitable course into the flowery paths of fiction. The novel, it is true, had a reputation which was for the time being almost as unsavoury as that of the drama, but the novel was not a confirmed ill-doer, and it only needed a touch of genius to create for it a vast congregation of enthusiastic votaries. In the *Tatler* and *Spectator* were already found the methods and subjects of the modern novel. The De Coverley papers in the *Spectator*, in fact, want nothing but a love-thread to convert them into a serial novel of a high order. The supreme importance of the sentimental interest had already been discovered and exemplified to good purpose in France by Madame de la Fayette, the Marquise de Tencin, Marivaux and the Abbé Prevost. Samuel Richardson (1689–1762), therefore, when he produced the first two modern novels of European fame in *Pamela* (1740) and *Clarissa* (1748), inherited far more than he invented. There had been Richardsonians before Richardson. *Clarissa* is nevertheless a pioneer work, and we have it on the high authority of M. Jusserand that the English have contributed more than any other people to the formation of the contemporary novel. Of the long-winded, typical and rather chaotic English novel of love analysis and moral sentiment (as opposed to the romance of adventure) Richardson is the first successful charioteer.

Richardson.

Fielding.

The novel in England gained prodigiously by the shock of opposition between the ideals of Richardson and Henry Fielding (1707–1754), his rival and parodist. Fielding's brutal toleration is a fine corrective to the slightly rancid morality of Richardson, with its frank insistence upon the cash-value of chastity and virtue. Fielding is, to be brief, the succinct antithesis of Richardson, and represents the opposite pole of English character. He is the Cavalier, Richardson the Roundhead; he is the gentleman, Richardson the tradesman; he represents church and county, Richardson chapel and borough. Richardson had much of the patient insight and intensity of genius, but he lacked the humour and literary accomplishment which Fielding had in rich abundance. Fielding combined breadth and keenness, classical culture and a delicate Gallic irony to an extent rare among English writers. He lacked the delicate intuition of Richardson in the analysis of women, nor could he compass the broad farcical humour of Smollett or the sombre colouring by which Smollett produces at times such poignant effects of contrast. There was no poetry in Fielding; but there was practically every other ingredient of a great prose writer—taste, culture, order, vivacity, humour, penetrating irony and vivid, pervading common sense, and it is Fielding's chef-d'œuvre *Tom Jones* (1749) that we must regard if not as the fundament at least as the head of the corner in English prose fiction. Before *Tom Jones* appeared, the success of the novel had drawn a new competitor into the field in Tobias Smollett, the descendant of a good western lowland family who had knocked about the world and seen more of its hurlyburly than Fielding himself. In *Roderick Random* (1748) Smollett represents a rougher and more uncivilized world even than that depicted in *Joseph Andrews*. The savagery and horse-play peculiar to these two novelists derives in part from the rogue romance of Spain (as then recently revived by Lesage), and has a counterpart to some extent in the graphic art of Hogarth and Rowlandson; yet one cannot altogether ignore an element of exaggeration which has greatly injured both these writers in the estimation (and still more in the affection) of posterity. The genius which struggles through novels such as *Roderick Random* and *Ferdinand Count Fathom* was nearly submerged under the hard conditions of a general writer during the third quarter of the 18th century, and it speaks volumes for Smollett's powers of recuperation that he survived to write two such masterpieces of sardonic and humorous observation as his *Travels* and *Humphry Clinker*.

Smollett.

The fourth proto-master of the English novel was the antiquarian humorist Lawrence Sterne. Though they owed a good deal to *Don Quixote* and the French novelists, Fielding and Smollett were essentially observers of life in the quick. **Sterne.** Sterne brought a far-fetched style, a bookish apparatus and a deliberate eccentricity into fiction. *Tristram Shandy*, produced successively in nine small volumes between 1760 and 1764, is the pretended history of a personage who is not born (before the fourth volume) and hardly ever appears, carried on in an eccentric rigmarole of old and new, original and borrowed humour, arranged in a style well known to students of the later Valois humorists as *fatrasie*. Far more than Molière, Sterne took his literary *bien* wherever he found it. But he invented a kind of tremolo style of his own, with the aid of which, in conjunction with the most unblushingly indecent innuendoes, and with a conspicuous genius for humorous portraiture, trembling upon the verge of the pathetic, he succeeded in winning a new domain for the art of fiction.

These four great writers then, Richardson, Fielding, Smollett and Sterne—all of them great pessimists in comparison with the benignant philosophers of a later fiction—first thoroughly fertilized this important field. Richardson obtained a European fame during his lifetime. Sterne, as a pioneer impressionist, gave all subsequent stylists a new handle. Fielding and Smollett grasped the new instrument more vigorously, and fashioned with it models which, after serving as patterns to Scott, Marryat, Cooper, Ainsworth, Dickens, Lever, Stevenson, Merriman, Weyman and other romancists of the 19th century, have still retained a fair measure of their original popularity unimpaired.

Johnson.

Apart from the novelists, the middle period of the 18th century is strong in prose writers: these include Dr Johnson, Oliver Goldsmith, Lord Chesterfield and Horace Walpole. The last three were all influenced by the sovereign lucidity of the best French style of the day. Chesterfield and Walpole were both writers of aristocratic experience and of European knowledge and sentiment. Johnson alone was a distinctively English thinker and stylist. His knowledge of the world, outside England, was derived from books, he was a good deal of a scholar, an earnest moralist, and something of a divine; his style, at any rate, reaches back to Taylor, Barrow and South, and has a good deal of the complex structure, the cadence, and the balance of English and Latinistic words proper to the 17th century, though the later influence of Addison and Bolingbroke is also apparent; Johnson himself was fond of the essay, the satire in verse, and the moral tale (*Rasselas*); but he lacked the creative imagination indispensable for such work and excelled chiefly as biographer and critic. For a critic even, it must be admitted that he was singly deficient in original ideas. He upholds authority. He judges by what he regards as the accepted rules, derived by Dryden, Rapin, Boileau, Le Bossu, Rymer, Dennis, Pope and such "estimable critics" from the ancients, whose decisions on such matters he regards as paramount. He tries to carry out a systematic, motived criticism; but he asserts rather than persuades or convinces. We go to his critical works (*Lives of the Poets* and *Essay on Shakespeare*) not for their conclusions, but for their shrewd comments on life, and for an application to literary problems of a caustic common sense. Johnson's character and conversation, his knowledge and memory were far more remarkable than his ideas or his writings, admirable though the best of these were; the exceptional traits which met in his person and made that age regard him as a nonpareil have found in James Boswell a delineator unrivalled in patience, dexterity and dramatic insight. The result has been a portrait of a man of letters more alive at the present time than that which any other age or nation has bequeathed to us. In most of his ideas Johnson was a generation behind the typical academic critics of his date, Joseph and Thomas Warton, who championed against his authority what the doctor regarded as the finicking notions of Gray. Both of the Wartons were enthusiastic for Spenser and the older poetry; they were saturated with Milton whom they placed far above the correct Mr Pope, they wrote sonnets (thereby provoking Johnson's ire) and attempted to revive medieval and Celtic lore in every direction. Johnson's one attempt at a novel or tale was *Rasselas*, a long "Rambler" essay upon the vanity of human hope and ambition, something after the manner of the Oriental tales of which Voltaire had caught the idea from Swift and Montesquieu; but *Rasselas* is quite unenlivened by humour, personality or any other charm.

Goldsmith.

This one quality that Johnson so completely lacked was possessed in its fullest perfection by Oliver Goldsmith, whose style is the supreme expression of 18th-century clearness, simplicity and easy graceful fluency. Much of Goldsmith's material, whether as playwright, story writer or essayist, is trite and commonplace—his material worked up by any other hand would be worthless. But, whenever Goldsmith writes about human life, he seems to pay it a compliment, a relief of fun and good fellowship accompanies his slightest description, his playful and delicate touch could transform every thought that he handled into something radiant with sunlight and fragrant with the perfume of youth. Goldsmith's plots are Irish, his critical theories are French with a light top dressing of Johnson and Reynolds or Burke, while his prose style is an idealization of Addison. His versatility was great, and, in this and in other respects, he and Johnson are constantly reminding us that they were hardened professionals, writing against time for money.

Chesterfield and Walpole.

Much of the best prose work of this period, from 1740 to 1780, was done under very different conditions. The increase of travel, of intercourse between the nobility of Europe, and of a sense of solidarity, self-consciousness, leisure and connoisseurship among that section of English society known as the governing class, or, since Disraeli, as "the Venetian oligarchy," could hardly fail to produce an increasing crop of those elaborate collections of letters and memoirs which had already attained their apogee in France with Mme de Sévigné and the duc de Saint-Simon. England was not to remain far behind, for in 1718 commence the *Letters* of Lady Mary Wortley Montagu; ten years more saw the commencement of Lord Hervey's *Memoirs of the Reign of George II.*; and Lord Chesterfield and Lord Orford (better known as Horace Walpole) both began their inimitable series of *Letters* about 1740. These writings, none of them written ostensibly for the press, serve to show the enormous strides that English prose was making as a medium of vivacious description. The letters are all the re-creation of extensive knowledge and cosmopolitan acquirements; they are not strong on the poetic or imaginative side of things, but they have an intense appreciation of the actual and mundane side of fallible humanity. Lord Chesterfield's *Letters* to his son and to his godson are far more, for they introduce a Ciceronian polish and a Gallic irony and wit into the hitherto uncultivated garden of the literary graces in English prose. Chesterfield, whose theme is manners and social amenity, deliberately seeks a form of expression appropriate to his text—the perfection of tact, neatness, good order and *savoir faire*. After his grandfather, the marquess of Halifax, Lord Chesterfield, the synonym in the vulgar world for a heartless exquisite, is in reality the first fine gentleman and epicurean in the best sense in English polite literature. Both Chesterfield and Walpole were conspicuous as raconteurs in an age of witty talkers, of whose talk R. B. Sheridan, in *The School for Scandal* (1777), served up a *suprême*. Some of it may be tinsel, but it looks wonderfully well under the lights. The star comedy of the century represents the sparkle of this brilliant crowd: it reveals no hearts, but it shows us every trick of phrase, every eccentricity of manner and every foible of thought. But the most mundane of the letter writers, the most frivolous, and also the most pungent, is Horace Walpole, whose writings are an epitome of the history and biography of the Georgian era. "Fiddles sing all through them, wax lights, fine dresses, fine jokes, fine plate, fine equipages glitter and sparkle; never was such a brilliant, smirking Vanity Fair as that through which he leads us." Yet, in some ways, he was a corrective to the self-complacency of his generation, a vast dilettante, lover of "Gothic," of curios and antiques, of costly printing, of old illuminations and stained glass. In his short miracle-novel, called *The Castle of Otranto*, he set a fashion for mystery and terror in fiction, for medieval legend, diablerie, mystery, horror, antique furniture and Gothic jargon, which led directly by the route of Anne Radcliffe, Maturin, *Vathek*, *St Leon* and *Frankenstein*, to *Queenhoo Hall*, to *Waverley* and even to Hugo and Poe.

Fanny Burney. Boswell.

Meanwhile the area of the Memoir was widening rapidly in the hands of Fanny, the sly daughter of the wordly-wise and fashionable musician, Dr Burney, author of a novel (*Evelina*) most satirical and facete, written ere she was well out of her teens; not too kind a satirist of her former patroness, Mrs Thrale (afterwards Piozzi), the least tiresome of the new group of scribbling sibyls, blue stockings, lady dilettanti and Della Cruscans. Both, as portraitists and purveyors of *Johnsoniana*, were surpassed by the inimitable James Boswell, first and most fatuous of all interviewers, in brief a biographical genius, with a new recipe, distinct from Sterne's, for disclosing personality, and a deliberate, artificial method of revealing himself to us, as it were, unawares.

From all these and many other experiments, a far more flexible prose was developing in England, adapted for those critical reviews, magazines and journals which were multiplying rapidly to exploit the new masculine interest, apart from the schools, in history, topography, natural philosophy and the picturesque, just as circulating libraries were springing up to exploit the new feminine passion for fiction, which together with memoirs and fashionable poetry contributed to give the booksellers bigger and bigger ideas.

The progress of authorship.

It is surprising how many types of literary productions with which we are now familiar were first moulded into definite and classical form during the Johnsonian period. In addition to the novel one need only mention the economic treatise, as exemplified for the first time in the admirable symmetry of *The Wealth of Nations*, the diary of a faithful observer of nature such as Gilbert White, the *Fifteen Discourses* (1769–1791) in which Sir Joshua Reynolds endeavours for the first time to expound for England a philosophy of Art, the historico-philosophical tableau as exemplified by Robertson and Gibbon, the light political parody of which the poetry of *The Rolliad* and *Anti-Jacobin* afford so many excellent models; and, going to the other extreme, the ponderous archaeological or topographical monograph, as exemplified in Stuart and Revett's *Antiquities of Athens*, in Robert Wood's colossal *Ruins of Palmyra* (1753), or the monumental *History of Leicestershire* by John Nichols. Such works as this last might well seem the outcome of Horace Walpole's maxim: In this scribbling age "let those who can't write, glean." In short, the literary landscape in Johnson's day was slowly but surely assuming the general outlines to which we are all accustomed. The literary conditions of the period dated from the time of Pope in their main features, and it is quite possible that they were more considerably modified in Johnson's own lifetime than they have been since. The booksellers, or, as they would now be called, publishers, were steadily superseding the old ties of patronage, and basing their relations with authors upon a commercial footing. A stage in their progress is marked by the success of Johnson's friend and Hume's correspondent, William Strahan, who kept a coach, "a credit to literature." The evolution of a normal status for the author was aided by the definition of copyright and gradual extinction of piracy.

Historians.

Histories of their own time by Clarendon and Burnet have been in much request from their own day to this, and the first, at least, is a fine monument of English prose; Bolingbroke again, in 1735, dwelt memorably upon the ethical, political and philosophical value of history. But it was not until the third quarter of the 18th century that English literature freed itself from the imputation of lagging hopelessly behind France, Italy and Germany in the serious work of historical reconstruction. Hume published the first volume of his *History of England* in 1754. Robertson's *History of Scotland* saw the light in 1759 and his *Charles V*. in 1769; Gibbon's *Decline and Fall of the Roman Empire* came in 1776. Hume was, perhaps, the first modernist in history; he attempted to give his work a modern interest and, Scot though he was, a modern style—it could not fail, as he knew, to derive piquancy from its derision of the Whiggish assumption which regarded 1688 as a political millennium. Wm. Robertson was, perhaps, the first man to adapt the polished periphrases of the pulpit to historical generalization. The gifts of compromise which he had learned as Moderator of the General Assembly he brought to bear upon his historical studies, and a language so unfamiliar to his lips as academic English he wrote with so much the more care that the greatest connoisseurs of the day were enthusiastic about "Robertson's wonderful style." Even more portentous in its superhuman dignity was the style of Edward Gibbon, who conbined with the unspiritual optimism of Hume and Robertson a far more concentrated devotion to his subject, an industry more monumental, a greater co-ordinative vigour, and a malice which, even in the 18th century, rendered him the least credulous man of his age. Of all histories, therefore, based upon the transmitted evidence of other ages rather than on the personal observation of the writer's own, Gibbon's *Decline and Fall* has hitherto maintained its reputation best. Hume, even before he was superseded, fell a prey to continuations and abridgements, while Robertson was supplanted systematically by the ornate pages of W. H. Prescott.

The increasing transparency of texture in the working English prose during this period is shown in the writings of theologians such as Butler and Paley, and of thinkers such as Berkeley and Hume, who, by prolonging and extending Berkeley's contention that matter was an abstraction, had shown that mind would have to be considered an abstraction too, thereby signalling a school of reaction to common sense or "external reality" represented by Thomas Reid, and with modifications by David Hartley, Abraham Tucker and others. Butler and Paley are merely two of the biggest amd most characteristic apologists of that day, both great stylists, though it must be allowed that their very lucidity and good sense excites almost more doubt than it stills, and both very successful in repelling the enemy in controversy, though their very success accentuates the faults of that unspiritual age in which churchmen were so far more concerned about the title deeds than about the living portion of the church's estate. Free thought was already beginning to sap their defences in various directions, and in Tom Paine, Priestley, Price, Godwin and Mackintosh they found more formidable adversaries than in the earlier deists. The greatest champion, however, of continuity and conservation both in church and state, against the new schools of latitudinarians and radicals, the great eulogist of the unwritten constitution, and the most perfect master of emotional prose in this period, prose in which the harmony of sense and sound is attained to an extent hardly ever seen outside supreme poetry, was Edmund Burke, one of the most commanding intellects in the whole range of political letters—a striking contrast in this respect to Junius, whose mechanical and journalistic talent for invective has a quite ephemeral value.

Return to nature.

From 1660 to 1760 the English mind was still much occupied in shaking off the last traces of feudality. The crown, the parliament, the manor and the old penal code were left, it is true: but the old tenures and gild-brotherhoods, the old social habits, miracles, arts, faith, religion and letters were irrevocably gone. The attempt of the young Chevalier in 1745 was a complete anachronism, and no sooner was this generally felt to be so than men began to regret that it should be so. Men began to describe as "grand" and "picturesque" scenery hitherto summarized as "barren mountains covered in mist"; while Voltaire and Pope were at their height, the world began to realize that the Augustan age, in its zeal for rationality, civism and trim parterres, had neglected the wild freshness of an age when literature was a wild flower that grew on the common. Rousseau laid the axe to the root of this over-sophistication of life; Goldsmith, half understanding, echoed some of his ideas in "The Deserted Village." Back from books to men was now the prescription—from the crowded town to the spacious country. From plains and valleys to peaks and pinewoods. From cities, where men were rich and corrupt,

Change in poetic spirit.

Cowper. Blake. Burns.

to the earlier and more primitive moods of earth. The breath had scarcely left the body of the Grand Monarque before an intrigue was set on foot to dispute the provisions of his will. So with the critical testament of Pope. Within a few years of his death we find Gray, Warton, Hurd and other disciples of the new age denying to Pope the highest kind of poetic excellence, and exalting imagination and fancy into a sphere far above the Augustan qualities of correct taste and good judgment. Decentralization and revolt were the new watchwords in literature. We must eschew France and Italy and go rather to Iceland or the Hebrides for fresh poetic emotions: we must shun academies and classic coffee-houses and go into the street-corners or the hedge-lanes in search of Volkspoesie. An old muniment chest and a roll of yellow parchment were the finest incentives to the new spirit of the picturesque. How else are we to explain the enthusiasm that welcomed the sham Ossianic poems of James Macpherson in 1760; Percy's patched-up ballads of 1765 (*Reliques of Ancient Poetry*); the new enthusiasm for Chaucer; the "black letter" school of Ritson, Tyrrwhitt, George Ellis, Steevens, Ireland and Malone; above all, the spurious 15th-century poems poured forth in 1768–1769 with such a wild gusto of archaic imagination by a prodigy not quite seventeen years of age? Chatterton's precocious fantasy cast a wonderful spell upon the romantic imagination of other times. It does not prepare us for the change that was coming over the poetic spirit of the last two decades of the century, but it does at least help us to explain it. The great masters of verse in Britain during this period were the three very disparate figures of William Cowper, William Blake and Robert Burns. Cowper was not a poet of vivid and rapturous visions. There is always something of the rusticating city-scholar about his humour. The ungovernable impulse and imaginative passion of the great masters of poesy were not his to claim. His motives to express himself in verse came very largely from the outside. The greater part, nearly all his best poetry is of the occasional order. To touch and retouch, he says, in one of his letters—among the most delightful in English—is the secret of almost all good writing, especially verse. Whatever is short should be nervous, masculine and compact. In all the arts that raise the best occasional poetry to the level of greatness Cowper is supreme. In phrase-moulding, verbal gymnastic and prosodical marquetry he has scarcely a rival, and the fruits of his poetic industry are enshrined in the filigree of a most delicate fancy and a highly cultivated intelligence, purified and thrice refined in the fire of mental affliction. His work expresses the rapid civilization of his time, its humanitarian feeling and growing sensitiveness to natural beauty, home comfort, the claims of animals and the charms of light literature. In many of his short poems, such as "The Royal George," artistic simplicity is indistinguishable from the stern reticence of genius. William Blake had no immediate literary descendants, for he worked alone, and Lamb was practically alone in recognizing what he wrote as poetry. But he was by far the most original of the reactionaries who preceded the Romantic Revival, and he caught far more of the Elizabethan air in his lyric verse than any one else before Coleridge. The *Songs of Innocence* and *Songs of Experience*, in 1789 and 1794, sing themselves, and have a bird-like spontaneity that has been the despair of all song-writers from that day to this. After 1800 he winged his flight farther and farther into strange and unknown regions. In the finest of these earlier lyrics, which owe so little to his contemporaries, the ripple of the stream of romance that began to gush forth in 1798 is distinctly heard. But the first poetic genius of the century was unmistakably Robert Burns. In song and satire alike Burns is racy, in the highest degree, of the poets of North Britain, who since Robert Sempill, Willy Hamilton of Gilbertfield, douce Allan Ramsay, the Edinburgh periwig-maker and miscellanist, and Robert Fergusson, "the writer-chiel, a deathless name," had kept alive the old native poetic tradition, had provided the strolling fiddlers with merry and wanton staves, and had perpetuated the daintiest shreds of national music, the broadest colloquialisms, and the warmest hues of patriotic or local sentiment. Burns immortalizes these old staves by means of his keener vision, his more fiery spirit, his stronger passion and his richer volume of sound. Burns's fate was a pathetic one. Brief, broken glimpses of a genius that could never show itself complete, his poems wanted all things for completeness: culture, leisure, sustained effort, length of life. Yet occasional, fragmentary, extemporary as most of them are, they bear the guinea stamp of true genius. His eye is unerring, his humour of the ripest, his wit both fine and abundant. His ear is less subtle, except when dialect is concerned. There he is infallible. Landscape he understands in subordination to life. For abstract ideas about Liberty and 1789 he cares little. But he is a patriot and an insurgent, a hater of social distinction and of the rich. Of the divine right or eternal merit of the system under which the poor man sweats to put money into the rich man's pocket and fights to keep it there, and is despised in proportion to the amount of his perspiration, he had a low opinion. His work has inspired the meek, has made the poor feel themselves less of ciphers in the world and given courage to the down-trodden. His love of women has inspired some of the most ardently beautiful lyrics in the world. Among modern folk-poets such as Jókai and Mistral, the position of Burns in the hearts of his own people is the best assured.

Bibliographical Note.—The dearth of literary history in England makes it rather difficult to obtain a good general view of letters in Britain during the 18th century. Much may be gleaned, however, from chapters of Lecky's *History of England during the 18th Century*, from Stephen's *Lectures on English Literature and Society in the 18th Century* (1904), from Taine's *History of English Literature* (van Laun's translation), from vols. v. and vi. of Prof. Courthope's *History of English Poetry*, and from the second volume of Chambers's *Cyclopaedia of English Literature* (1902). The two vols. dealing respectively with the *Age of Pope* and the *Age of Johnson* in Bell's Handbooks of English Literature will be found useful, and suggestive chapters will be found in Saintsbury's *Short History* and in A. H. Thompson's *Student's History of English Literature* (1901). The same may, perhaps, be said of books v. and vi. in the *Bookman Illustrated History of English Literature* (1906), by the present writer. Sidelights of value are to be found in Walter Raleigh's little book on the *English Novel*, in Beljame's *Le Publique et les hommes de lettres en Angleterre au XVIII^e siècle*, in H. A. Beers' *History of English Romanticism in the 18th Century* (1899), and above all in Sir Leslie Stephen's *History of English Thought during the 18th Century*; Stephen's *Hours in a Library*, the monographs dealing with the period in the English Men of Letters series, the Vignettes and Portraits of Austin Dobson and George Paston, Elwin's *Eighteenth Century Men of Letters*, and Thomas Wright's *Caricature History of the Georges*, must also be kept in mind. (T. Se.)

VI. The 19th Century

We have seen how great was the reverence which the 18th century paid to poetry, and how many different kinds of poetic experiment were going on, mostly by the imitative efforts of revivalists (Spenserians, Miltonians, Shakespeareans, Ballad-mongers, Scandinavian, Celtic, Gothic scholars and the like), but also in the direction of nature study and landscape description, while the more formal type of Augustan poetry, satire and description, in the direct succession of Pope, was by no means neglected.

Wordsworth.

The most original vein in the 19th century was supplied by the Wordsworth group, the first manifesto of which appeared in the *Lyrical Ballads* of 1798. William Wordsworth himself represents, in the first place, a revolutionary movement against the poetic diction of study-poets since the first acceptance of the Miltonic model by Addison. His ideal, imperfectly carried out, was a reversion to popular language of the utmost simplicity and directness. He added to this the idea of the enlargement of man by Nature, after Rousseau, and went further than this in the utterance of an essentially pantheistic desire to become part of its loveliness, to partake in a mystical sense of the loneliness of the mountain, the sound of falling water, the upper horizon of the clouds and the wind. To the growing multitude of educated people who were being pent in huge cities these ideas were far sweeter than the formalities of the old pastoral. Wordsworth's great discovery, perhaps, was that popular poetry need not be imitative, artificial or condescending, but that a simple story truthfully told of the passion, affliction or devotion of simple folk, and appealing to the primal emotion, is worthy of the highest effort of the poetic artist, and may achieve a poetic value far in advance of conventional descriptions of strikingly grouped incidents picturesquely magnified or rhetorically exaggerated. But Wordsworth's theories might have ended very much where they began, had it not been for their impregnation by the complementary genius of Coleridge.

Coleridge.

Coleridge at his best was inspired by the supreme poetic gifts of passion, imagination, simplicity and mystery, combining form and colour, sound and sense, novelty and antiquity, realism and romanticism, scholarly ode and popular ballad. His three fragmentary poems *The Rime of the Ancient Mariner*, *Christabel* and *Kubla Khan* are the three spells and touchstones, constituting what is often regarded by the best judges as the high-standard of modern English poetry. Their subtleties and beauties irradiated the homelier artistic conceptions of Wordsworth, and the effect on him was permanent. Coleridge's inspiration, on the other hand, was irrecoverable; a physical element was due, no doubt, to the first exaltation indirectly due to the opium habit, but the moral influence was contributed by the Wordsworths. The steady will of the Dalesman seems to have constrained Coleridge's imagination from aimless wandering; his lofty and unwavering self-confidence inspired his friend with a similar energy. Away from Wordsworth after 1798, Coleridge lost himself in visions of work that always remained to be "transcribed," by one who had every poetic gift—save the rudimentary will for sustained and concentrated effort.

Lamb.

Hazlitt.

Leigh Hunt. De Quincey.

Coleridge's more delicate sensibility to the older notes of that more musical era in English poetry which preceded the age of Dryden and Pope was due in no small measure to the luminous yet subtle intuitions of his friend Charles Lamb. Lamb's appreciation of the imaginative beauty inhumed in old English literature amounted to positive genius, and the persistence with which he brought his perception of the supreme importance of imagination and music in poetry to bear upon some of the finest creative minds of 1800, in talk, letters, selections and essays, brought about a gradual revolution in the aesthetic morality of the day. He paid little heed to the old rhetoric and the *ars poetica* of classical comparison. His aim was rather to discover the mystery, the folk-seed and the old-world element, latent in so much of the finer ancient poetry and implicit in so much of the new. The *Essays of Elia* (1820–1825) are the binnacle of Lamb's vessel of exploration. Lamb and his great rival, William Hazlitt, both maintained that criticism was not so much an affair of learning, or an exercise of comparative and expository judgment, as an act of imagination in itself. Hazlitt became one of the master essayists, a fine critical analyst and declaimer, denouncing all insipidity and affectation, stirring the soul with metaphor, soaring easily and acquiring a momentum in his prose which often approximates to the impassioned utterance of Burke. Like Lamb, he wanted to measure his contemporaries by the Elizabethans, or still older masters, and he was deeply impressed by *Lyrical Ballads*. The new critics gradually found responsible auxiliaries, notably Leigh Hunt, De Quincey and Wilson of *Blackwood's*. Leigh Hunt, not very important in himself, was a cause of great authorship in others. He increased both the depth and area of modern literary sensibility. The world of books was to him an enchanted forest, in which every leaf had its own secret. He was the most catholic of critics, but he knew what was poor—at least in other people. As an essayist he is a feminine diminutive of Lamb, excellent in fancy and literary illustration, but far inferior in decisive insight or penetrative masculine wit. The Miltonic quality of impassioned pyramidal prose is best seen in Thomas De Quincey, of all the essayists of this age, or any age, the most diffuse, unequal and irreducible to rule, and which yet at times trembles upon the brink of a rhythmical sonority which seems almost to rival that of the greatest poetry. Leigh Hunt supplies a valuable link between Lamb, the sole external moderator of the Lake school, Byron, Shelley, and the junior branch of imaginative Aesthetic, represented by Keats.

Keats.

John Keats (1795–1821), three years younger than Shelley, was the greatest poetic artist of his time, and would probably have surpassed all, but for his collapse of health at twenty-five. His vocation was as unmistakable as that of Chatterton, with whose youthful ardour his own had points of likeness. The two contemporary conceptions of him as a fatuous Cockney Bunthorne or as "a tadpole of the lakes" were equally erroneous. But Keats was in a sense the first of the virtuoso or aesthetic school (caricatured later by the formula of "Art for Art's sake"); artistic beauty was to him a kind of religion, his expression was more technical, less personal than that of his contemporaries, he was a conscious "romantic," and he travelled in the realms of gold with less impedimenta than any of his fellows. Byron had always himself to talk about, Wordsworth saw the universe too much through the medium of his own self-importance, Coleridge was a metaphysician, Shelley hymned Intellectual Beauty; Keats treats of his subject, "A Greek Urn," "A Nightingale," the season of "Autumn," in such a way that our thought centres not upon the poet but upon the enchantment of that which he sings. In his three great medievalising poems, "The Pot of Basil," "The Eve of St Agnes" and "La Belle Dame Sans Merci," even more than in his Odes, Keats is the forerunner of Tennyson, the greatest of the word-painters. But apart from his perfection of loveliness, he has a natural magic and a glow of humanity surpassing that of any other known poet. His poetry, immature as it was, gave a new beauty to the language. His loss was the greatest English Literature has sustained.

Landor.

Before Tennyson, Rossetti and Morris, Keats's best disciples in the aesthetic school were Thomas Lovell Beddoes, George Dailey and Thomas Hood, the failure of whose "Midsummer Fairies" and "Fair Inez" drove him into that almost mortific vein of verbal humour which threw up here and there a masterpiece such as "The Song of a Shirt." The master virtuoso of English poetry in another department (the classical) during this and the following age was Walter Savage Landor, who threw off a few fragments of verse worthy of the Greek Anthology, but in his Dialogues or "Imaginary Conversations" evolved a kind of violent monologizing upon the commonplace which descends into the most dismal caverns of egotism. Carlyle furiously questioned his competence. Mr Shaw allows his classical amateurship and respectable strenuosity of character, but denounces his work, with a substratum of truth, as that of a "blathering, unreadable pedant."

Shelley.

Among those, however, who found early nutriment in Landor's Miltonic *Gebir* (1798) must be reckoned the most poetical of our poets. P. B. Shelley was a spirit apart, who fits into no group, the associate of Byron, but spiritually as remote from him as possible, hated by the rationalists of his age, and regarded by the poets with more pity than jealousy. He wrote only for poets, and had no public during his lifetime among general readers, by whom, however, he is now regarded as *the poet* par excellence. In his conduct it must be admitted that he was in a sense, like Coleridge, irresponsible, but on the other hand his poetic energy was irresistible and all his work is technically of the highest order of excellence. In ideal beauties it is supreme; its great lack is its want of humanity; in this he is the opposite of Wordsworth who reads human nature into everything. Shelley, on the other hand, dehumanises things and makes them unearthly. He hangs a poem, like a cobweb or a silver cloud, on a horn of the crescent moon, and leaves it to dangle there in a current of ether. His quest was continuous for figures of beauty, figures, however, more ethereal and less sensuous than those in Keats; having obtained such an idea he passed it again and again through the prism of his mind, in talk, letters, prefaces, poems. The deep sense of the mystery of words and their lightest variations in the skein of poetry, half forgotten since Milton's time, had been recovered in a great measure by Coleridge and Wordsworth since 1798; Lamb, too, and Hazlitt, and, perhaps, Hogg were in the secret, while Keats had its open sesame on his lips ere he died. The union of poetic emotion with verbal music of the greatest perfection was the aim of all, but none of these masters made words breathe and sing with quite the same spontaneous ease and fervour that Shelley attained in some of the lyrics written between twenty-four and thirty, such as "The Cloud," "The Skylark," the "Ode of the West Wind," "The Sensitive Plant," the "Indian Serenade."

The path of the new romantic school had been thoroughly prepared during the age of Gray, Cowper and Burns, and it won its triumphs with little resistance and no serious convulsions. The opposition was noisy, but its representative character has been exaggerated. In the meantime, however, the old-fashioned school and the Popean couplet, the Johnsonian dignity of reflection and the Goldsmithian ideal of generalized description, were well maintained by George Crabbe (1754-1832), "though Nature's sternest painter yet the best," a worsted-stockinged Pope and austere delineator of village misdoing and penurious age, and Samuel Rogers (1763–1855), the banker poet, liberal in sentiment, extreme Tory in form, and dilettante delineator of Italy to the music of the heroic couplet. Robert Southey, Thomas Campbell and Thomas Moore were a dozen years younger and divided their allegiance between two schools. In the main, however, they were still poeticisers of the orthodox old pattern, though all wrote a few songs of exceptional merit, and Campbell especially by defying the old anathemas.

Byron.

The great champion of the Augustan masters was himself the architect of revolution. First the idol and then the outcast of respectable society, Lord Byron sought relief in new cadences and new themes for his poetic talent. He was, however, essentially a history painter or a satirist in verse. He had none of the sensitive aesthetic taste of a Keats, none of the spiritual ardour of a Shelley, or of the elemental beauty or artistry of Wordsworth or Coleridge. He manages the pen (said Scott) with the careless and negligent ease of a man of quality. The "Lake Poets" sought to create an impression deep, calm and profound, Byron to start a theme which should enable him to pose, travel, astonish, bewilder and confound as lover of daring, freedom, passion and revolt. For the subtler symphonic music—that music of the spheres to which the ears of poets alone are attuned—Byron had an imperfect sympathy. The delicate ear is often revolted in his poetry by the vices of impromptu work. He steadily refused to polish, to file or to furbish—the damning, inevitable sign of a man born to wear a golden tassel. "I am like the tiger. If I miss the first spring I go growling back to the jungle." Subtlety is sacrificed to freshness and vigour. The exultation, the breadth, the sweeping magnificence of his effects are consequently most appreciated abroad, where the ineradicable flaws of his style have no power to annoy.

The European fame of Byron was from the first something quite unique. At Missolonghi people ran through the streets crying "The great man is dead—he is gone." His corpse was refused entrance at Westminster; but the poet was taken to the inmost heart of Russia, Poland, Spain, Italy, France, Germany, Scandinavia, and among the Slavonic nations generally. In Italy his influence is plainly seen in Berchet, Leopardi, Giusti, and even Carducci. In Spain the Myrtle Society was founded in Byron's honour. Hugo in his *Orientales* traversed Greece. Chateaubriand joined the Greek Committee. Delavigne dedicated his verse to Byron; Lamartine wrote another canto to *Childe Harold*; Mérimée is interpenetrated by Byronesque feeling which also animates the best work of Heine, Pushkin, Lermontov, and Mickievicz, and even De Musset.

Criticism.

Like Scott, Byron was a man of two eras, and not too much ahead of his time to hold the Press-Dragon in fee. His supremacy and that of his satellites Moore and Campbell were championed by the old papers and by the two new blatant Quarterlies, whose sails were filled not with the light airs of the future but by the Augustan "gales" of the classical past. The distinction of this new phalanx of old-fashioned critics who wanted to confer literature by university degree was that they wrote as gentlemen for gentlemen: they first gave criticism in England a respectable shakedown. Francis Jeffrey, a man of extraordinary ability and editor of *The Edinburgh Review* from 1803 to 1829 (with the mercurial Sydney Smith, the first of English conversationists, as his aide-de-camp), exercised a powerful influence as a standardizer of the second rate. He was one of the first of the critics to grasp firmly the main idea of literary evolution—the importance of time, environment, race and historical development upon the literary landscape; but he was vigorously aristocratic in his preferences, a hater of mystery, symbolism or allegory, an instinctive individualist of intolerant pattern. His chief weapons against the new ideas were social superiority and omniscience, and he used both unsparingly. The strident political partisanship of the *Edinburgh* raised up within six years a serious rival in the *Quarterly*, which was edited in turn by the good-natured pedagogue William Gifford and by Scott's extremely able son-in-law John Gibson Lockhart, the "scorpion" of the infant *Blackwood*. With the aid of the remnant of the old anti-Jacobins, Canning, Ellis, Barrow, Southey, Croker, Hayward, Apperley and others, the theory of *Quarterly* infallibility was carried to its highest point of development about 1845.

The historical and critical work of the *Quarterly* era, as might be expected, was appropriate to this gentlemanly censorship. The thinkers of the day were economic or juristic—Bentham, the great codifier; Malthus, whose theory of population gave Darwin his main impulse to theorise; and Mackintosh, whose liberal opposition to Burke deserved a better fate than it has ever perhaps received. The historians were mainly of the second class—the judicial Hallam, the ornate Roscoe, the plodding Lingard, the accomplished Milman, the curious Isaac D'Israeli, the academic Bishop Thirlwall. Mitford and Grote may be considered in the light of Tory and Radical historical pamphleteers, but Grote's work has the much larger measure of permanent value. As the historian of British India, James Mill's industry led him beyond his thesis of Benthamism in practice. Sir William Napier's heroic picture of the Peninsular War is strongly tinged by bias against the Tory administration of 1808–1813; but it conserves some imperishable scenes of war. Some of the most magnetic prose of the Regency Period was contained in the copious and insincere but profoundly emotionalising pamphlets of the self-taught Surrey labourer William Cobbett, in whom Diderot's paradox of a comedian is astonishingly illustrated. Lockhart's Lives of Burns and of Sir Walter Scott—the last perhaps the most memorable prose monument of its epoch—appeared in 1828 and 1838, and both formed the subjects of Thomas Carlyle in the *Edinburgh Review*, where, under the unwelcome discipline of Jeffrey, the new prophet worked nobly though in harness.

Scott.

Great as the triumph of the Romantic masters and the new ideas was, it is in the ranks of the Old School after all that we have to look for the greatest single figure in the literature of this age. Except in the imitative vein of ballad or folk-song, the poetry of Sir Walter Scott is never quite first-rate. It is poetry for repetition rather than for close meditation or contemplation, and resembles a military band more than a full orchestra. Nor will his prose bear careful analysis. It is a good servant, no more. When we consider, however, not the intensity but the vast extent, range and versatility of Scott's powers, we are constrained to assign him the first place in his own age, if not that in the next seat to Shakespeare in the whole of the English literary Pantheon. Like Shakespeare, he made humour and a knowledge of human nature his first instruments in depicting the past. Unlike Shakespeare, he was a born antiquary, and he had a great (perhaps excessive) belief in *mise en scène*, costume, patois and scenic properties generally. His portraiture, however, is Shakespearean in its wisdom and maturity, and, although he wrote very rapidly, it must be remembered that his mind had been prepared by strenuous work for twenty years as a storehouse of material in which nothing was handled until it had been carefully mounted by the imagination, classified in the memory, and tested by experimental use. Once he has got the imagination of the reader well grounded to earth, there is nothing he loves better than telling a good story. Of detail he is often careless. But he trusted to a full wallet, and rightly, for mainly by his abundance he raised the literature of the novel to its highest point of influence, breathing into it a new spirit, giving it a fulness and universality of life, a romantic charm, a dignity and elevation, and thereby a coherence, a power and predominance which it never had before.

In Scott the various lines of 18th-century conservatism and 19th-century romantic revival most wonderfully converge. His intense feeling for Long Ago made him a romantic almost from his cradle. The master faculties of history and humour made a strong conservative of him; but his Toryism was of a very different spring from that of Coleridge or Wordsworth. It was not a reaction from disappointment in the sequel of 1789, nor was it the result of reasoned conviction. It was indwelling, rooted deeply in the fibres of the soil, to which Scott's attachment was passionate, and nourished as from a source by ancestral sentiment and "heather" tradition. This sentiment made Scott a victorious pioneer of the Romantic movement all over Europe. At the same time we must remember that, with all his fondness for medievalism, he was fundamentally a thorough 18th-century Scotsman and successor of Bailie Nicol Jarvie: a worshipper of good sense, toleration, modern and expert governmental ideas, who valued the past chiefly by way of picturesque relief, and was thoroughly alive to the benefit of peaceful and orderly rule, and deeply convinced that we are much better off as we are than we could have been in the days of King Richard or good Queen Bess. Scott had the mind of an enlightened 18th-century administrator and statesmen who had made a fierce hobby of armour and old ballads. To expect him to treat of intense passion or romantic medievalism as Charlotte Brontë or Dante Gabriel Rossetti would have treated them is as absurd as to expect to find the sentiments of a Mrs Browning blossoming amidst the horse-play of *Tom Jones* or *Harry Lorrequer*. Scott has few niceties or secrets: he was never subtle, morbid or fantastic. His handling is ever broad, vigorous, easy, careless, healthy and free. Yet nobly simple and straightforward as man and writer were, there is something very complex about his literary legacy, which has gone into all lands and created bigoted enemies (Carlyle, Borrow) as well as unexpected friends (Hazlitt, Newman, Jowett); and we can seldom be sure whether his influence is reactionary or the reverse. There has always been something semi-feudal about it. The "shirra" has a demesne in letters as broad as a countryside, a band of mesne vassals and a host of Eildon hillsmen, Tweedside cottiers, minor feudatories and forest retainers attached to the "Abbotsford Hunt." Scott's humour, humanity and insistence upon the continuity of history transformed English literature profoundly.

Transition fiction.

Scott set himself to coin a quarter of a million sterling out of the new continent of which he felt himself the Columbus. He failed (quite narrowly), but he made the Novel the paymaster of literature for at least a hundred years. His immediate contemporaries and successors were not particularly great. John Galt (1779–1839), Susan Ferrier (1782–1854) and D. M. Moir (1798–1851) all attempted the delineation of Scottish scenes with a good deal of shrewdness of insight and humour. The main bridge from Scott to the great novelists of the 'forties and 'fifties was supplied by sporting, military, naval and political novels, represented in turn by Surtees, Smith, Hook, Maxwell, Lever, Marryat, Cooper, Morier, Ainsworth, Bulwer Lytton and Disraeli. Surtees gave all-important hints to *Pickwick*, Marryat developed grotesque character-drawing, Ainsworth and Bulwer attempted new effects in criminology and contemporary glitter. Disraeli in the 'thirties was one of the foremost romantic wits who had yet attempted the novel. Early in the 'forties he received the laying-on of hands from the Young England party, and attempted to propagandize the good tidings of his mission in *Coningsby* and *Sybil*, novels full of *entraînement* and promise, if not of actual genius. Unhappily the author was enmeshed in the fatal drolleries of the English party system, and *Lothair* is virtually a confession of abandoned ideals. He completes the forward party in fiction; Jane Austen (1775–1815) stands to this as Crabbe and Rogers to Coleridge and Shelley. She represents the fine flower of the expiring 18th century. Scott could do the trumpet notes on the organ. She fingers the fine ivory flutes. She combines self-knowledge and artistic reticence with a complete tact and an absolute lucidity of vision within the area prescribed. Within the limits of a park wall in a country parish, absolutely oblivious of Europe and the universe, her art is among the finest and most finished that our literature has to offer. In irony she had no rival at that period. But the trimness of her plots and the delicacy of her miniature work have affinities in Maria Edgeworth, Harriet Martineau and Mary Russell Mitford, three excellent writers of pure English prose. There is a finer aroma of style in the contemporary "novels" of Thomas Love Peacock (1785–1866). These, however, are rather tournaments of talk than novels proper, releasing a flood of satiric portraiture upon the idealism of the day—difficult to be apprehended in perfection save by professed students. Peacock's style had an appreciable influence upon his son-in-law George Meredith (1828–1909). His philosophy is for the most part Tory irritability exploding in ridicule; but Peacock was one of the most lettered men of his age, and his flouts and jeers smack of good reading, old wine and respectable prejudices. In these his greatest successor was George Borrow (1803–1881), who used three volumes of half-imaginary autobiography and road-faring in strange lands as a sounding-board for a kind of romantic revolt against the century of comfort, toleration, manufactures, mechanical inventions, cheap travel and commercial expansion, unaccompanied (as he maintains) by any commensurate growth of human wisdom, happiness, security or dignity.

The Victorian era.

In the year of Queen Victoria's accession most of the great writers of the early part of the century, whom we may denominate as "late Georgian," were silent. Scott, Byron, Shelley, Keats, Coleridge, Lamb, Sheridan, Hazlitt, Mackintosh, Crabbe and Cobbett were gone. Wordsworth, Southey, Campbell, Moore, Jeffrey, Sydney Smith, De Quincey, Miss Edgeworth, Miss Mitford, Leigh Hunt, Brougham, Samuel Rogers were still living, but the vital portion of their work was already done. The principal authors who belong equally to the Georgian and Victorian eras are Landor, Bulwer, Marryat, Hallam, Milman and Disraeli; none of whom, with the exception of the last, approaches the first rank in either. The significant work of Tennyson, the Brownings, Carlyle, Dickens, Thackeray, the Brontës, George Eliot, Mrs Gaskell, Trollope, the Kingsleys, Spencer, Mill, Darwin, Ruskin, Grote, Macaulay, Freeman, Froude, Lecky, Buckle, Green, Maine, Borrow, FitzGerald, Arnold, Rossetti, Swinburne, Meredith, Hardy, Stevenson, Morris, Newman, Pater, Jefferies—the work of these writers may be termed conclusively Victorian; it gives the era a stamp of its own and distinguishes it as the most varied in intellectual riches in the whole course of our literature. Circumstances have seldom in the world been more favourable to a great outburst of literary energy. The nation was secure and prosperous to an unexampled degree, conscious of the will and the power to expand still further. The canons of taste were still aristocratic. Books were made and unmade according to a regular standard. Literature was the one form of art which the English understood, in which they had always excelled since 1579, and in which their originality was supreme. To the native genius for poetry was now added the advantage of materials for a prose which in lucidity and versatility should surpass even that of Goldsmith and Hazlitt. The diversity of form and content of this great literature was commensurate with the development of human knowledge and power which marked its age. In this and some other respects it resembles the extraordinary contemporary development in French literature which began under the reign of Louis Philippe. The one signally disconcerting thing about the great Victorian writers is their amazing prolixity. Not content with two or three long books, they write whole literatures. A score of volumes, each as long as the Bible or Shakespeare, barely represents the output of such authors as Carlyle, Ruskin, Froude, Dickens, Thackeray, Newman, Spencer or Trollope.

They obtained vast quantities of new readers, for the middle class was beginning to read with avidity; but the quality of brevity, the knowledge when to stop, and with it the older classic conciseness and the nobler Hellenic idea of a perfect measure—these things were as though they had not been. Meanwhile, the old schools were broken up and the foolscap addressed to the old masters. Singers, entertainers, critics and historians abound. Every man may say what is in him in the phrases that he likes best, and the sole motto that compels is "every style is permissible except the style that is tiresome." The old models are strangely discredited, and the only conventions which hold are those concerning the subjects which English delicacy held to be tabooed. These conventions were inordinately strict, and were held to include all the unrestrained, illicit impulses of love and all the more violent aberrations from the Christian code of faith and ethics. Infidel speculation and the liaisons of lawless love (which had begun to form the staple of the new French fiction—hence regarded by respectable English critics of the time as profoundly vitiated and scandalous) had no recognized existence and were totally ignored in literature designed for general reading. The second or Goody-two-Shoes convention remained strictly in force until the penultimate decade of the 19th century, and was acquiesced in or at least submitted to by practically all the greatest writers of the Victorian age. The great poets and novelists of that day easily out-topped their fellows. Society had no difficulty in responding to the summons of its literary leaders. Nor was their fame partial, social or sectional. The great novelists of early Victorian days were aristocratic and democratic at once. Their popularity was universal within the limits of the language and beyond it. The greatest of men were men of imagination rather than men of ideas, but such sociological and moral ideas as they derived from their environment were poured helter-skelter into their novels, which took the form of huge pantechnicon magazines. Another distinctive feature of the Victorian novel is the position it enabled women to attain in literature, a position attained by them in creative work neither before nor since.

Dickens.

The novelists to a certain extent created their own method like the great dramatists, but such rigid prejudices or conventions as they found already in possession they respected without demur. Both Dickens and Thackeray write as if they were almost entirely innocent of the existence of sexual vice. As artists and thinkers they were both formless. But the enormous self-complacency of the England of their time, assisted alike by the part played by the nation from 1793 to 1815, evangelicalism, free trade (which was originally a system of super-nationalism) and later, evolution, generated in them a great benignity and a strong determination towards a liberal and humanitarian philosophy. Despite, however, the diffuseness of the envelope and the limitations of horizon referred to, the unbookish and almost unlettered genius of Charles Dickens (1812–1870), the son of a poor lower middle-class clerk, almost entirely self-educated, has asserted for itself the foremost place in the literary history of the period. Dickens broke every rule, rioted in absurdity and bathed in extravagance. But everything he wrote was received with an almost frantic joy by those who recognized his creations as deifications of themselves, his scenery as drawn by one of the quickest and intensest observers that ever lived, and his drollery as an accumulated dividend from the treasury of human laughter. Dickens's mannerisms were severe, but his geniality as a writer broke down every obstruction, reduced Jeffrey to tears and Sydney Smith to helpless laughter.

Thackeray.

The novel in France was soon to diverge and adopt the form of an anecdote illustrating the traits of a very small group of persons, but the English novel, owing mainly to the predilection of Dickens for those Gargantuan entertainers of his youth, Fielding and Smollett, was to remain anchored to the history. William Makepeace Thackeray (1811–1863) was even more historical than Dickens, and most of his leading characters are provided with a detailed genealogy. Dickens's great works, excepting *David Copperfield* and *Great Expectations*, had all appeared when Thackeray made his mark in 1848 with *Vanity Fair*, and Thackeray follows most of his predecessor's conventions, including his conventional religion, ethics and politics, but he avoids his worse faults of theatricality. He never forces the note or lashes himself into fury or sentimentality; he limits himself in satire to the polite sphere which he understands, he is a great master of style and possesses every one of its fairy gifts except brevity. He creates characters and scenes worthy of Dickens, but within a smaller range and without the same abundance. He is a traveller and a cosmopolitan, while Dickens is irredeemably Cockney. He is often content to criticize or annotate or to preach upon some congenial theme, while Dickens would be in the flush of humorous creation. His range, it must be remembered, is wide, in most respects a good deal wider than his great contemporary's, for he is at once novelist, pamphleteer, essayist, historian, critic, and the writer of some of the most delicate and sentimental *vers d'occasion* in the language.

Charlotte Brontë.

George Eliot.

Kingsley. Trollope. Reade. Meredith. Hardy.

The absorption of England in itself is shown with exceptional force in the case of Thackeray, who was by nature a cosmopolitan, yet whose work is so absorbed with the structure of English society as to be almost unintelligible to foreigners. The exploration of the human heart and conscience in relation to the new problems of the time had been almost abandoned by the novel since Richardson's time. It was for woman to attempt to resolve these questions, and with the aid of powerful imagination to propound very different conclusions. The conviction of Charlotte Brontë (1816–1855) was that the mutual passionate love of one man and one woman is sacred and creates a centre of highest life, energy and joy in the world. George Eliot (1819–1880), on the other hand, detected a blind and cruel egoism in all such ecstasy of individual passion. It was in the autumn of 1847 that *Jane Eyre* shocked the primness of the coteries by the unconcealed ardour of its love passages. Twelve years later *Adam Bede* astonished the world by the intensity of its ethical light and shade. The introspective novel was now very gradually to establish a supremacy over the historical. The romance of the Brontës' forlorn life colours *Jane Eyre*, colours *Wuthering Heights* and colours *Villette*; their work is inseparable from their story to an extent that we perhaps hardly realize. George Eliot did not receive this adventitious aid from romance, and her work was, perhaps, unduly burdened by ethical diatribe, scientific disquisition and moral and philosophical asides. It is more than redeemed, however, by her sovereign humour, by the actual truth in the portrayal of that absolutely self-centred Midland society of the 'thirties and 'forties, and by the moral significance which she extracts from the smaller actions and more ordinary characters of life by means of sympathy, imagination and a deep human compassion. Her novels are generally admitted to have obtained twin summits in *Adam Bede* (1859) and *Middlemarch* (1872). An even nicer delineator of the most delicate shades of the curiously remote provincial society of that day was Mrs Gaskell (1810–1865), whose *Cranford* and *Wives and Daughters* attain to the perfection of easy, natural and unaffected English narrative. Enthusiasm and a picturesque boyish ardour and partisanship are the chief features of *Westward Ho!* and the other vivid and stirring novels of Charles Kingsley (1819–1875), to which a subtler gift in the discrimination of character must be added in the case of his brother Henry Kingsley (1830–1876). Charles, however, was probably more accomplished as a poet than in the to him too exciting operation of taking sides in a romance. The novels of Trollope, Reade and Wilkie Collins are, generally speaking, a secondary product of the literary forces which produced the great fiction of the 'fifties. The two last were great at structure and sensation: Trollope dogs the prose of every-day life with a certainty and a clearness that border upon inspiration. The great novels of George Meredith range between 1859 and 1880, stories of characters deeply interesting who reveal themselves to us by flashes and trust to our inspiration to do the rest. The wit, the sparkle, the entrain and the horizon of these books, from *Richard Feverel* to the master analysis of

The Egoist, have converted the study of Meredith into an exact science. Thomas Hardy occupies a place scarcely inferior to Meredith's as a stylist, a discoverer of new elements of the plaintive and the wistful in the vanishing of past ideals, as a depicter of the old southern rustic life of England and its tragi-comedy, in a series of novels which take rank with the greatest.

Tennyson.

If Victorian literature had something more than a paragon in Dickens, it had its paragon too in the poet Tennyson. The son of a Lincolnshire parson of squirearchal descent, Alfred Tennyson consecrated himself to the vocation of poesy with the same unalterable conviction that had characterized Milton, Pope, Thomson, Wordsworth and Keats, and that was yet to signalize Rossetti and Swinburne, and he became easily the greatest virtuoso of his time in his art. To lyrics and idylls of a luxurious and exotic picturesqueness he gave a perfection of technique which criticism has chastened only to perfect in such miracles of description as "The Lotus Eaters," "The Dream of Fair Women," and "Morte d'Arthur." He received as vapour the sense of uneasiness as to the problems of the future which pervaded his generation, and in the elegies and lyrics of *In Memoriam*, in *The Princess* and in *Maud* he gave them back to his contemporaries in a running stream, which still sparkles and radiates amid the gloom. After the lyrical monodrama of *Maud* in 1855 he devoted his flawless technique of design, harmony and rhythm to works primarily of decoration and design (*The Idylls of the King*), and to experiments in metrical drama for which the time was not ripe; but his main occupation was varied almost to the last by lyrical blossoms such as "Frater Ave," "Roman Virgil," or "Crossing the Bar," which, like "Tears, Idle Tears" and "O that 'twere possible," embody the aspirations of Flaubert towards a perfected art of language shaping as no other verse probably can.

Browning.

Few, perhaps, would go now to *In Memoriam* as to an oracle for illumination and guidance as many of Queen Victoria's contemporaries did, from the Queen herself downwards. And yet it will take very long ere its fascination fades. In language most musical it rearticulates the gospel of Sorrow and Love, and it remains still a pathetic expression of emotions, sentiments and truths which, as long as human nature remains the same, and as long as calamity, sorrow and death are busy in the world, must be always repeating themselves. Its power, perhaps, we may feel of this poem and indeed of most of Tennyson's poetry, is not quite equal to its charm. And if we feel this strongly, we shall regard Robert Browning as the typical poet of the Victorian era. His thought has been compared to a galvanic battery for the use of spiritual paralytics. The grave defect of Browning is that his ideas, however excellent, are so seldom completely won; they are left in a twilight, or even a darkness more Cimmerian than that to which the worst of the virtuosi dedicate their ideas. Similarly, even in his "Dramatic Romances and Lyrics" (1845) or his "Men and Women" (1855) he rarely depicts action, seldom goes further than interpreting the mind of man as he approaches action. If Dickens may be described as the eye of Victorian literature, Tennyson the ear attuned to the subtlest melodies, Swinburne the reed to which everything blew to music, Thackeray the velvet pulpit-cushion, Eliot the impending brow, and Meredith the cerebral dome, then Browning might well be described as the active brain itself eternally expounding some point of view remote in time and place from its own. Tennyson was ostensibly and always a poet in his life and his art, in his blue cloak and sombrero, his mind and study alike stored with intaglios of the thought of all ages, always sounding and remodelling his verses so that they shall attain the maximum of sweetness and symmetry. He was a recluse. Browning on the other hand dissembled his poethood, successfully disguised his muse under the semblance of a stock merchant, was civil to his fellowmen, and though nervous with bores, encountered every one he met as if he were going to receive more than he could impart. In Tennyson's poetry we are always discovering new beauties. In Browning's we are finding new blemishes. Why he chose rhythm and metre for seven-eighths of his purpose is somewhat of a mystery. His protest against the materialistic view of life is, perhaps, a more valid one than Tennyson's; he is at pains to show us the noble elements valuable in spite of failure to achieve tangible success. He realizes that the greater the man, the greater is the failure, yet protests unfailingly against the despondent or materialist view of life. His nimble appreciation of character and motive attracts the attentive curiosity of highly intellectual people; but the question recurs with some persistence as to whether poetry, after all, was the right medium for the expression of these views.

Ruskin.
Morris.
Symonds.
Pater.

Many of Browning's ideas and fertilizations will, perhaps, owing to the difficulty and uncertainty which attaches to their form, penetrate the future indirectly as the stimulant of other men's work. This is especially the case with those remarkable writers who have for the first time given the fine arts a considerable place in English literature, notably John Ruskin (*Modern Painters*, 1842, *Seven Lamps*, 1849, *Stones of Venice*, 1853), William Morris, John Addington Symonds and Walter Pater. Browning, it is true, shared the discipleship of the first two with Kingsley and Carlyle. But Ruskin outlived all discipleships and transcended almost all the prose writers of his period in a style the elements of emotional power in which still preserve their secret.

Arnold.

More a poet of doubt than either Tennyson or the college friend, A. H. Clough, whose loss he lamented in one of the finest pastoral elegies of all ages, Matthew Arnold takes rank with Tennyson, Browning and Swinburne alone among the Dii Majores of Victorian poetry. He is perhaps a disciple of Wordsworth even more than of Goethe, and he finds in Nature, described in rarefied though at times intensely beautiful phrase, the balm for the unrest of man's unsatisfied yearnings, the divorce between soul and intellect, and the sense of contrast between the barren toil of man and the magic operancy of nature. His most delicate and intimate strains are tinged with melancholy. The infinite desire of what might have been, the *lacrimae rerum*, inspires "Resignation," one of the finest pieces in his volume of 1849 (*The Strayed Reveller*). In the deeply-sighed lines of "Dover Beach" in 1867 it is associated with his sense of the decay of faith. The dreaming garden trees, the full moon and the white evening star of the beautiful English-coloured *Thyrsis* evoke the same mood, and render Arnold one of the supreme among elegiac poets. But his poetry is the most individual in the circle and admits the popular heart never for an instant. As a popularizer of Renan and of the view of the Bible, not as a talisman but as a literature, and, again, as a chastener of his contemporaries by means of the iteration of a few telling phrases about philistines, barbarians, sweetness and light, sweet reasonableness, high seriousness, Hebraism and Hellenism, "young lions of the *Daily Telegraph*," and "the note of provinciality," Arnold far eclipsed his fame as a poet during his lifetime. His crusade of banter against the bad civilization of his own class was one of the most audaciously successful things of the kind ever accomplished. But all his prose theorizing was excessively superficial. In poetry he sounded a note which the prose Arnold seemed hopelessly unable ever to fathom.

Rossetti.

It is easier to speak of the virtuoso group who derived their first incitement to poetry from Chatterton, Keats and the early exotic ballads of Tennyson, far though these yet were from attaining the perfection in which they now appear after half a century of assiduous correction. The chief of them were Dante Gabriel Rossetti, his sister Christina, William Morris and Algernon Charles Swinburne. The founders of this school, which took and acquired the name Pre-Raphaelite, were profoundly impressed by the Dante revival and by the study of the early Florentine masters. Rossetti himself was an accomplished translator from Dante and from Villon. He preferred Keats to Shelley because (like himself) he had no philosophy. The 18th century was to him as if it had never been, he dislikes Greek lucidity and the open air, and prefers lean medieval saints, spectral images and mystic loves. The passion of these students was retrospective; they wanted to revive the literature of a forgotten past, Italian, Scandinavian, French, above all, medieval. To do this is a question of enthusiastic experiment and adventure. Rossetti leads the way with his sonnets and ballads. Christina follows with *Goblin Market*, though she subsequently, with a perfected technique, writes poetry more and more confined to the religious emotions. William Morris publishes in 1858 his *Defence of Guenevere*, followed in ten years by *The Earthly Paradise*, a collection of metrical tales, which hang in the sunshine like tapestries woven of golden thread, where we should naturally expect the ordinary paperhanging of prose romance.

Swinburne.

From the verdurous gloom of the studio with its mysterious and occult properties in which Rossetti compounded his colours, Morris went forth shortly to chant and then to narrate Socialist songs and parables. Algernon Charles Swinburne set forth to scandalize the critics of 1866 with the roses and lilies of vice and white death in *Poems and Ballads*, which was greeted with howls and hisses, and reproach against a "fleshly school of modern poetry." Scandalous verses these were, rioting on the crests of some of these billows of song. More discerning persons perceived the harmless impersonal unreality and mischievous youthful extravagance of all these Cyprian outbursts, that the poems were the outpourings of a young singer up to the chin in the Pierian flood, and possessed by a poetic energy so urgent that it could not wait to apply the touchstones of reality or the chastening planes of experience. Swinburne far surpassed the promoters of this exotic school in technical excellence, and in *Atalanta in Calydon* and its successors may be said to have widened the bounds of English song, to have created a new music and liberated a new harmonic scale in his verse. Of the two elements which, superadded to a consummate technique, compose the great poet, intensity of imagination and intensity of passion, the latter in Swinburne much predominated. The result was a great abundance of heat and glow and not perhaps quite enough defining light. Hence the tendency to be incomprehensible, so fatal in its fascination for the poets of the last century, which would almost justify the title of the triumvirs of twilight to three of the greatest. It is this incomprehensibility which alienates the poet from the popular understanding and confines his audience to poets, students and scholars. Poetry is often comparable to a mountain range with its points and aiguilles, its peaks and crags, its domes and its summits. But Swinburne's poetry, filled with the sound and movement of great waters, is as incommunicable as the sea. Trackless and almost boundless, it has no points, no definite summits. The poet never seems to know precisely when he is going to stop. His metrical flow is wave-like, beautiful and rather monotonous, inseparable from the general effect. His endings seem due to an exhaustion of rhythm rather than to an exhaustion of sense. A cessation of meaning is less perceptible than a cessation of magnificent sound.

Newman and the Church.

Akin in some sense to the attempt made to get behind the veil and to recapture the old charms and spells of the middle ages, to discover the open sesame of the *Morte D'Arthur* and the *Mabinogion* and to reveal the old Celtic and monastic life which once filled and dominated our islands, was the attempt to overthrow the twin gods of the 'forties and 'fifties, state-Protestantism and the sanctity of trade. The curiously assorted Saint Georges who fought these monsters were John Henry Newman and Thomas Carlyle. The first cause of the movement was, of course, the anomalous position of the Anglican Church, which had become a province of the oligarchy officered by younger sons. It stood apart from foreign Protestantism; its ignorance of Rome, and consequently of what it protested against, was colossal; it was conscious of itself only as an establishment—it had produced some very great men since the days of the non-jurors, when it had mislaid its historical conscience, but these had either been great scholars in their studies, such as Berkeley, Butler, Warburton, Thomas Scott, or revivalists, evangelicals and missionaries, such as Wilson, Wesley, Newton, Romaine, Cecil, Venn, Martyn, who were essentially Congregationalists rather than historical Churchmen. A new spiritual beacon was to be raised; an attempt was to be made to realize the historical and cosmic aspects of the English Church, to examine its connexions, its descent and its title-deeds. In this attempt Newman was to spend the best years of his life.

The growth of liberal opinions and the denudation of the English Church of spiritual and historical ideas, leaving "only pulpit orators at Clapham and Islington and two-bottle orthodox" to defend it, seemed to involve the continued existence of Anglicanism in any form in considerable doubt. Swift had said at the commencement of the 18th century that if an act was passed for the extirpation of the gospel, bank stock might decline 1%; but a century later it is doubtful whether the passing of such a bill would have left any trace, however evanescent, upon the stability of the money market. The Anglican *via media* had enemies not only in the philosophical radicals, but also in the new caste of men of science. Perhaps, as J. A. Froude suggests, these combined enemies, *The Edinburgh Review*, Brougham, Mackintosh, the Reform Ministry, Low Church philosophy and the London University were not so very terrible after all. The Church was a vested interest which had a greater stake in the country and was harder to eradicate than they imagined. But it had nothing to give to the historian and the idealist. They were right to fight for what their souls craved after and found in the Church of Andrewes, Herbert, Ken and Waterland. Belief in the divine mission of the Church lingered on in the minds of such men as Alexander Knox or his disciple Bishop Jebb; but few were prepared to answer the question—"What is the Church as spoken of in England? Is it the Church of Christ?"—and the answers were various. Hooker had said it was "the nation"; and in entirely altered circumstances, with some qualifications, Dr Arnold said the same. It was "the Establishment" according to the lawyers and politicians, both Whig and Tory. It was an invisible and mystical body, said the Evangelicals. It was the aggregate of separate congregations, said the Nonconformists. It was the parliamentary creation of the Reformation, said the Erastians. The true Church was the communion of the Pope; the pretended Church was a legalized schism, said the Roman Catholics. All these ideas were floating about, loose and vague, among people who talked much about the Church.

One thing was persistently obvious, namely, that the nationalist church had become opportunist in every fibre, and that it had thrown off almost every semblance of ecclesiastical discipline. The view was circulated that the Church owed its continued existence to the good sense of the individuals who officered it, and to the esteem which possession and good sense combined invariably engendered in the reigning oligarchy. But since Christianity was true—and Newman was the one man of modern times who seems never to have doubted this, never to have overlooked the unmistakable threat of eternal punishment to the wicked and unbelieving—modern England, with its march of intellect and its chatter about progress, was advancing with a light heart to the verge of a bottomless abyss. By a diametrically opposite chain of reasoning Newman reached much the same conclusion as Carlyle. Newman sought a haven of security in a rapprochement with the Catholic Church. The medieval influences already at work in Oxford began to fan the flame which kindled to a blaze in the ninetieth of the celebrated *Tracts for the Times*. It proved the turning of the ways leading Keble and Pusey to Anglican ritual and Newman to Rome. This anti-liberal campaign was poison to the state-churchmen and Protestants, and became perhaps the chief intellectual storm centre of the century. Charles Kingsley in 1864 sought to illustrate by recent events that veracity could not be considered a Roman virtue.

Scientific cross-currents.

After some preliminary ironic sparring Newman was stung into writing what he deliberately called *Apologia pro vita sua*. In this, apart from the masterly dialectic and exposition in which he had already shown himself an adept, a volume of autobiography is made a chapter of general history, unsurpassed in its kind since the *Confessions* of St Augustine, combined with a perfection of form, a precision of phrasing and a charm of style peculiar to the genius of the author, rendering it one of the masterpieces of English prose. But while Newman was thus sounding a retreat, louder and more urgent voices were signalling the advance in a totally opposite direction. The *Apologia* fell in point of time between *The Origin of Species* and *Descent of Man*, in which Charles Darwin was laying the corner stones of the new science of which Thomas Huxley and Alfred Russel Wallace were to be among the first apostles, and almost coincided with the *First Principles* of a synthetic philosophy, in which Herbert Spencer was formulating a set of probabilities wholly destructive to the acceptance of positive truth in any one religion. **Macaulay.** The typical historian of the 'fifties, Thomas Babington Macaulay, and the seminal thinker of the 'sixties, John Stuart Mill, had as determinedly averted their faces from the old conception of revealed religion. Nourished in the school of the great Whig pamphleteer historians, George Grote and Henry Hallam, Macaulay combined gifts of memory, enthusiastic conviction, portraiture and literary expression, which gave to his historical writing a resonance unequalled (even by Michelet) in modern literature. In spite of faults of taste and fairness, Macaulay's resplendent gifts enabled him to achieve for the period from Charles II. to the peace of Ryswick what Thucydides had done for the Peloponnesian War. The pictures that he drew with such exultant force are stamped ineffaceably upon the popular mind. His chief faults are not of detail, but rather a lack of subtlety as regards characterization and motive, a disposition to envisage history too exclusively as a politician, and the sequence of historical events as a kind of ordered progress towards the material ideals of universal trade and Whig optimism as revealed in the Great Exhibition of 1851.

Macaulay's tendency to disparage the past brought his whole vision of the Cosmos into sharp collision with that of his rival **Carlyle.** appellant to the historical conscience, Thomas Carlyle, a man whose despair of the present easily exceeded Newman's. But Carlyle's despondency was totally irrespective of the attitude preserved by England towards the Holy Father, whom he seldom referred to save as "the three-hatted Papa" and "servant of the devil." It may be in fact almost regarded as the reverse or complement to the excess of self-complacency in Macaulay. We may correct the excess of one by the opposite excess of the other. Macaulay was an optimist in ecstasy with the material advance of his time in knowledge and power; the growth of national wealth, machinery and means of lighting and locomotion caused him to glow with satisfaction. Carlyle, the pessimist, regards all such symptoms of mechanical development as contemptible. Far from panegyrizing his own time, he criticizes it without mercy. Macaulay had great faith in rules and regulations, reform bills and parliamentary machinery. Carlyle regards them as wiles of the devil. Frederick William of Prussia, according to Macaulay, was the most execrable of fiends, a cross between Moloch and Puck, his palace was hell, and Oliver Twist and Smike were petted children compared with his son the crown prince. In the same bluff and honest father Carlyle recognized the realized ideal of his fancy and hugged the just man made perfect to his heart of hearts. Such men as Bentham and Cobden, Mill and Macaulay, had in Carlyle's opinion spared themselves no mistaken exertion to exalt the prosperity and happiness of their own day. The time had come to react at all hazards against the prevalent surfeit of civilization. Henceforth his literary activity was to take two main directions. First, tracts for the times against modern tendencies, especially against the demoralizing modern talk about progress by means of money and machinery which emanated like a miasma from the writings of such men as Mill, Macaulay, Brougham, Buckle and from the Quarterlies. Secondly, a cyclopean exhibition of Caesarism, discipline, the regimentation of workers, and the convertibility of the Big Stick and the Bible, with a preference to the Big Stick as a panacea. The snowball was to grow rapidly among such writers as Kingsley, Ruskin, George Borrow, unencumbered by reasoning or deductive processes which they despised. Carlyle himself felt that the condition of England was one for anger rather than discussion. He detested the rationalism and symmetry of such methodists of thought as Mill, Buckle, Darwin, Spencer, Lecky, Ricardo and other demonstrations of the dismal science—mere chatter he called it. The palliative philanthropy of the day had become his aversion even more than the inroads of Rome under cover of the Oxford movement which Froude, Borrow and Kingsley set themselves to correct. As an historian of a formal order Carlyle's historical portraits cannot bear a strict comparison with the published work of Gibbon and Macaulay, or even of Maine and Froude in this period, but as a biographer and autobiographer Carlyle's caustic insight has enabled him to produce much which is of the very stuff of human nature. Surrounded by philomaths and savants who wrote smoothly about the perfectibility of man and his institutions, Carlyle almost alone refused to distil his angry eloquence and went on railing against the passive growth of civilization at the heart of which he declared that he had discovered a cancer. This uncouth Titan worship and prostration before brute force, this constant ranting about jarls and vikings trembles often on the verge of cant and comedy, and his fiddling on the one string of human pretension and bankruptcy became discordant almost to the point of chaos. Instinctively destructive, he resents the apostleship of teachers like Mill, or the pioneer discoveries of men like Herbert Spencer and Darwin. He remains, nevertheless, a great incalculable figure, the cross grandfather of a school of thought which is largely unconscious of its debt and which so far as it recognizes it takes Carlyle in a manner wholly different from that of his contemporaries.

New schools. The deaths of Carlyle and George Eliot (and also of George Borrow) in 1881 make a starting-point for the new schools of historians, novelists, critics and biographers, and those new nature students who claim to cure those evil effects of civilization which Carlyle and his disciples had discovered. History in the hands of Macaulay, Buckle and Carlyle had been occupied mainly with the bias and tendency of change, the results obtained by those who consulted the oracle being more often than not diametrically opposite. **History.** With Froude still on the one hand as the champion of Protestantism, and with E. A. Freeman and J. R. Green on the other as nationalist historians, the school of applied history was fully represented in the next generation, but as the records grew and multiplied in print in accordance with the wise provisions made in 1857 by the commencement of the Rolls Series of medieval historians, and the Calendars of State Papers, to be followed shortly by the rapidly growing volumes of Calendars of Historical Manuscripts, historians began to concentrate their attention more upon the process of change as their right subject matter and to rely more and more upon documents, statistics and other impersonal and disinterested forms of material. Such historical writers as Lecky, Lord Acton, Creighton, Morley and Bryce contributed to the process of transition mainly as essayists, but the new doctrines were tested and to a certain extent put into action by such writers as Thorold Rogers, Stubbs, Gardiner and Maitland. The theory that History is a science, no less and no more, was propounded in so many words by Professor Bury in his inaugural lecture at Cambridge in 1903, and this view and the corresponding divergence of history from the traditional pathway of Belles Lettres has become steadily more dominant in the world of historical research and historical writing since 1881. The bulk of quite modern historical writing can certainly be justified from no other point of view.

The novel. The novel since 1881 has pursued a course curiously analogous to that of historical writing. Supported as it was by masters of the old régime such as Meredith and Hardy, and by those who then ranked even higher in popular esteem such as Wilkie Collins, Anthony Trollope, Besant and Rice, Blackmore, William Black and a monstrous rising regiment of lady novelists—Mrs Lynn Linton, Rhoda Broughton, Mrs Henry Wood, Miss Braddon, Mrs Humphry Ward, the type seemed securely anchored to the old formulas and the old ways. In reality, however, many of these popular workers were already moribund and the novel was being honeycombed by French influence.

This is perceptible in Hardy, but may be traced with greater distinctness in the best work of George Gissing, George Moore, Mark Rutherford, and later on of H. G. Wells, Arnold Bennett and John Galsworthy. The old novelists had left behind them a giant's robe. Intellectually giants, Dickens and Thackeray were equally gigantic spendthrifts. They worked in a state of fervent heat above a glowing furnace, into which they flung lavish masses of unshaped metal, caring little for immediate effect or minute dexterity of stroke, but knowing full well that the emotional energy of their temperaments was capable of fusing the most intractable material, and that in the end they would produce their great downright effect. Their spirits rose and fell, but the case was desperate; copy had to be despatched at once or the current serial would collapse. Good and bad had to make up the tale against time, and revelling in the very exuberance and excess of their humour, the novelists invariably triumphed. It was incumbent on the new school of novelists to economize their work with more skill, to relieve their composition of irrelevancies, to keep the writing in one key, and to direct it consistently to one end—in brief, to unify the novel as a work of art and to simplify its ordonnance.

The novel, thus lightened and sharpened, was conquering new fields. The novel of the 'sixties remained not, perhaps, to win many new triumphs, but a very popular instrument in the hands of those who performed variations on the old masters, and much later in the hands of Mr William de Morgan, showing a new force and quiet power of its own. The novel, however, was ramifying in other directions in a way full of promise for the future. A young Edinburgh student, Robert Louis Stevenson, had inherited much of the spirit of the Pre-Raphaelitic virtuosos, and combined with their passion for the romance of the historic past a curiosity fully as strong about the secrets of romantic technique. A coterie which he formed with W. E. Henley and his cousin R. A. M. Stevenson studied words as a young art student studies paints, and made studies for portraits of buccaneers with the same minute drudgery that Rossetti had studied a wall or Morris a piece of figured tapestry. While thus forming a new romantic school whose work when wrought by his methods should be fit to be grafted upon the picturesque historic fiction of Scott and Dumas, Stevenson was also naturalizing the short story of the modern French type upon English ground. In this particular field he was eclipsed by Rudyard Kipling, who, though less original as a man of letters, had a technical vocabulary and descriptive power far in advance of Stevenson's, and was able in addition to give his writing an exotic quality derived from Oriental colouring. This regional type of writing has since been widely imitated, and the novel has simultaneously developed in many other ways, of which perhaps the most significant is the psychological study as manipulated severally by Shorthouse, Mallock and Henry James.

Criticism.

The expansion of criticism in the same thirty years was not a whit less marked than the vast divagation of the novel. In the early 'eighties it was still tongue-bound by the hypnotic influence of one or two copy-book formulae—Arnold's "criticism of life" as a definition of poetry, and Walter Pater's implied doctrine of art for art's sake. That two dicta so manifestly absurd should have cast such an augur-like spell upon the free expression of opinion, though it may of course, like all such instances, be easily exaggerated, is nevertheless a curious example of the enslavement of ideas by a confident claptrap. A few representatives of the old schools of motived or scientific criticism, deduced from the literatures of past time, survived the new century in Leslie Stephen, Saintsbury, Stopford Brooke, Austin Dobson, Courthope, Sidney Colvin, Watts-Dunton; but their agreement is certainly not greater than among the large class of emancipated who endeavour to concentrate the attention of others without further ado upon those branches of literature which they find most nutritive. Among the finest appreciators of this period have been Pattison and Jebb, Myers, Hutton, Dowden, A. C. Bradley, William Archer, Richard Garnett, E. Gosse and Andrew Lang. Birrell, Walkley and Max Beerbohm have followed rather in the wake of the Stephens and Bagehot, who have criticized the sufficiency of the titles made out by the more enthusiastic and lyrical eulogists. In Arthur Symons, Walter Raleigh and G. K. Chesterton the new age possessed critics of great originality and power, the work of the last two of whom is concentrated upon the application of ideas about life at large to the conceptions of literature. In exposing palpable nonsense as such, no one perhaps did better service in criticism than the veteran Frederic Harrison.

In the cognate work of memoir and essay, the way for which has been greatly smoothed by co-operative lexicographical efforts such as the *Dictionary of National Biography*, the *New English Dictionary*, the *Victoria County History* and the like, some of the most dexterous and permeating work of the transition from the old century to the new was done by H. D. Traill, Gosse, Lang, Mackail, E. V. Lucas, Lowes Dickinson, Richard le Gallienne, A. C. Benson, Hilaire Belloc, while the open-air relief work for dwellers pent in great cities, pioneered by Gilbert White, has been expanded with all the zest and charm that a novel pursuit can endow by such writers as Richard Jefferies, an open-air and nature mystic of extraordinary power at his best, Selous, Seton Thompson, W. H. Hudson.

Poetry.

The age has not been particularly well attuned to the efforts of the newer poets since Coventry Patmore in the *Angel in the House* achieved embroidery, often extremely beautiful, upon the Tennysonian pattern, and since Edward FitzGerald, the first of all letter-writing commentators on life and letters since Lamb, gave a new cult to the decadent century in his version of the Persian centoist Omar Khayyam. The prizes which in Moore's day were all for verse have now been transferred to the prose novel and the play, and the poets themselves have played into the hands of the Philistines by disdaining popularity in a fond preference for virtuosity and obscurity. Most kinds of the older verse, however, have been well represented, descriptive and elegiac poetry in particular by Robert Bridges and William Watson; the music of the waters of the western sea and its isles by W. B. Yeats, Synge, Moira O'Neill, "Fiona Macleod" and an increasing group of Celtic bards; the highly wrought verse of the 17th-century lyrists by Francis Thompson, Lionel Johnson, Ernest Dowson; the simplicity of a more popular strain by W. H. Davies, of a brilliant rhetoric by John Davidson, and of a more intimate romance by Sturge Moore and Walter de la Mare. Light verse has never, perhaps, been represented more effectively since Praed and Calverley and Lewis Carroll than by Austin Dobson, Locker Lampson, W. S. Gilbert and Owen Seaman. The names of C. M. Doughty, Alfred Noyes, Herbert Trench and Laurence Binyon were also becoming prominent at the opening of the 20th century. For originality in form and substance the palm rests in all probability with A. E. Housman, whose *Shropshire Lad* opens new avenues and issues, and with W. E. Henley, whose town and hospital poems had a poignant as well as an ennobling strain. The work of Henry Newbolt, Mrs. Meynell and Stephen Phillips showed a real poetic gift. Above all these, however, in the esteem of many reign the verses of George Meredith and of Thomas Hardy, whose *Dynasts* was widely regarded by the best judges as the most remarkable literary production of the new century.

Drama.

The new printed and acted drama dates almost entirely from the late 'eighties. Tom Robertson in the 'seventies printed nothing, and his plays were at most a timid recognition of the claims of the drama to represent reality and truth. The enormous superiority of the French drama as represented by Augier, Dumas *fils* and Sardou began to dawn slowly upon the English consciousness. Then in the 'eighties came Ibsen, whose daring in handling actuality was only equalled by his intrepid stage-craft. Oscar Wilde and A. W. Pinero were the first to discover how the spirit of these new discoveries might be adapted to the English stage. Gilbert Murray, with his fascinating and tantalizing versions from Euripides, gave a new flexibility to the expansion that was going on in English dramatic ideas. Bernard Shaw and his disciples, conspicuous among them Granville Barker, gave a new seasoning of wit to the absolute novelties of subject, treatment and application with which they transfixed the public which had so long abandoned thought upon entering the theatre. This new adventure enjoyed a *succès de stupeur*, the precise range of which can hardly be estimated, and the force of which is clearly by no means spent.

20th-century changes.

English literature in the 20th century still preserves some of the old arrangements and some of the consecrated phrases of patronage and aristocracy; but the circumstances of its production were profoundly changed during the 19th century. By 1895 English literature had become a subject of regular instruction for a special degree at most of the universities, both in England and America. This has begun to lead to research embodied in investigations which show that what were regarded as facts in connexion with the earlier literature can be regarded so no longer. It has also brought comparative and historical treatment of a closer kind and on a larger scale to bear upon the evolution of literary types. On the other hand it has concentrated an excessive attention perhaps upon the grammar and prosody and etymology of literature, it has stereotyped the admiration of lifeless and obsolete forms, and has substituted antiquarian notes and ready-made commentary for that live enjoyment, which is essentially individual and which tends insensibly to evaporate from all literature as soon as the circumstance of it changes. It is prone, moreover, to force upon the immature mind a rapt admiration for the mirror before ever it has scanned the face of the original. A result due rather to the general educational agencies of the time is that, while in the middle of the 19th century one man could be found to write competently on a given subject, in 1910 there were fifty. Books and apparatus for reading have multiplied in proportion. The fact of a book having been done quite well in a certain way is no longer any bar whatever to its being done again without hesitation in the same way. This continual pouring of ink from one bottle into another is calculated gradually to raise the standard of all subaltern writing and compiling, and to leave fewer and fewer books securely rooted in a universal recognition of their intrinsic excellence, power and idiosyncrasy or personal charm. Even then, of what we consider first-rate in the 19th century, for instance, but a very small residuum can possibly survive. The one characteristic that seems likely to cling and to differentiate this voluble century is its curious reticence, of which the 20th century has already made uncommonly short work. The new playwrights have untaught England a shyness which came in about the time of Southey, Wordsworth and Sir Walter Scott. That the best literature has survived hitherto is at best a pious opinion. As the area of experience grows it is more and more difficult to circumscribe or even to describe the supreme best, and such attempts have always been responsible for base superstition. It is clear that some limitation of the literary stock-in-trade will become increasingly urgent as time goes on, and the question may well occur as to whether we are insuring the right baggage. The enormous apparatus of literature at the present time is suitable only to a peculiar phasis and manner of existence. Some hold to the innate and essential aristocracy of literature; others that it is bound to develop on the popular and communistic side, for that at present, like machinery and other deceptive benefits, it is a luxury almost exclusively advantageous to the rich. But to predict the direction of change in literature is even more futile than to predict the direction of change in human history, for of all factors of history, literature, if one of the most permanent, is also one of the least calculable.

Bibliographical Note.—*The Age of Wordsworth* and *The Age of Tennyson* in Bell's "Handbooks of English Literature" are of special value for this period. Prof. Dowden's and Prof. Saintsbury's 19th-century studies fill in interstices; and of the "Periods of European Literature," the *Romantic Revolt* and *Romantic Triumph* are pertinent, as are the literary chapters in vols. x. and xi. of the *Cambridge Modern History*. Of more specific books George Brandes's *Literary Currents of the Nineteenth Century*, Stedman's *Victorian Poets*, Holman Hunt's *Pre-Raphaelite Brotherhood*, R. H. Hutton's *Contemporary Thought* (and companion volumes), Sir Leslie Stephen's *The Utilitarians*, Buxton Forman's *Our Living Poets*, Dawson's *Victorian Novelists*, Thureau-Dangin's *Renaissance des idées catholiques en Angleterre*, A. Chevrillon's *Sydney Smith et la renaissance des idées libérales en Angleterre*, A. W. Benn's *History of English Thought in the Nineteenth Century*, the publishing histories of Murray, Blackwood, Macvey Napier, Lockhart, &c., J. M. Robertson's *Modern Humanists*, and the critical miscellanies of Lord Morley, Frederic Harrison, W. Bagehot, A. Birrell, Andrew Lang and E. Gosse, will be found, in their several degrees, illuminating. The chief literary lives are those of Scott by Lockhart, Carlyle by Froude, Macaulay by Trevelyan, Dickens by Forster and Charlotte Brontë by Mrs Gaskell. (T. Se.)

ENGLISHRY (*Englescherie*), a legal name given, in the reign of William the Conqueror, to the presentment of the fact that a person slain was an Englishman. If an unknown man was found slain, he was presumed to be a Norman, and the hundred was fined accordingly, unless it could be proved that he was English. Englishry, if established, excused the hundred. Dr W. Stubbs (*Constitutional History*, i. 196) says that possibly similar measures were taken by King Canute. Englishry was abolished in 1340.

See *Select Cases from the Coroners' Rolls, 1265–1413*, ed. C. Gross, Selden Society (London, 1896).

ENGRAVING, the process or result of the action implied by the verb "to engrave" or mark by incision, the marks (whether for inscriptive, pictorial or decorative purposes) being produced, not by simply staining or discolouring the material (as with paint, pen or pencil), but by cutting into or otherwise removing a portion of the substance. In the case of pictures, the engraved surface is reproduced by printing; but this is only one restricted sense of "engraving," since the term includes seal-engraving (where a cast is taken), and also the chased ornamentation of plate or gems, &c.

The word itself is derived from an O. Fr. *engraver* (not to be confused with the same modern French word used for the running of a boat's keel into the beach, or for the sticking of a cart's wheels in the mud,—from *grève*, Provençal *grava*, sands of the sea or river shore; cf. Eng. "gravel"); it was at one time supposed that the Gr. *γράφειν*, to write, was etymologically connected, but this view is not now accepted, and (together with "grave," meaning either to engrave, or the place where the dead are buried) the derivation is referred to a common Teutonic form signifying "to dig" (O. Eng. *grafan*, Ger. *graben*). The modern French *graver*, to engrave, is a later adoption. The idea of a furrow, by digging or cutting, is thus historically associated with an engraving, which may properly include the rudest marks cut into any substance. In old English literature it included carving and sculpture, from which it has become convenient to differentiate the terminology; and the ancients who chiselled their writing on slabs of stone were really "engraving." The word is not applicable, therefore, either strictly to lithography (*q.v.*), nor to any of the photographic processes (see Process), except those in which the surface of the plate is actually eaten into or lowered. In the latter case, too, it is convenient to mark a distinction and to ignore the strict analogy. In modern times the term is, therefore, practically restricted—outside the spheres of gem-engraving and seal-engraving (see Gem), or the inscribing or ornamenting of stone, plate, glass, &c.—to the art of making original pictures (*i.e.* by the draughtsman himself, whether copies of an original painting or not), either by incised lines on metal plates (see Line-Engraving), or by the corrosion of the lines with acid (see Etching), or by the roughening of a metal surface without actual lines (see Mezzotint), or by cutting a wood surface away so as to leave lines in relief (see Wood-Engraving); the result in each case may be called generically an engraving, and in common parlance the term is applied, though incorrectly, to the printed reproduction or "print."

Of these four varieties of engraving—line-engraving, etching, mezzotint or wood-engraving—the woodcut is historically the earliest. Line-engraving is now practically obsolete, while etching and mezzotint have recently come more and more to the front. To the draughtsman the difference in technical handling in each case has in most cases some relation to his own artistic impulse, and to his own feeling for beauty. A line engraver, as P. G. Hamerton said, will not see or think like an etcher, nor an etcher like an engraver in mezzotint. Each kind, with its own sub-varieties, has its peculiar effect and attraction.

A real knowledge of engraving can only be attained by a careful study and comparison of the prints themselves, or of accurate facsimiles, so that books are of little use except as guides to prints when the reader happens to be unaware of their existence, or else for their explanation of technical processes. The value of the prints varies not only according to the artist, but also according to the fineness of the impression, and the "state" (or stage) in the making of the plate, which may be altered from time to time. "Proofs" may also be taken from the plate, and even touched up by the artist, in various stages and various degrees of fineness of impression.

The department of art-literature which classifies prints is called *Iconography*, and the classifications adopted by iconographers are of the most various kinds. For example, if a complete book were written on Shakespearian iconography it would contain full information about all prints illustrating the life and works of Shakespeare, and in the same way there may be the iconography of a locality or of a single event.

The history of engraving is a part of iconography, and various histories of the art exist in different languages. In England W. Y. Ottley wrote an *Early History of Engraving*, published in two volumes 4to (1816), and began what was intended to be a series of notices on engravers and their works. The facilities for the reproduction of engravings by the photographic processes have of late years given an impetus to iconography. One of the best modern writers on the subject was Georges Duplessis, the keeper of prints in the national library of France. He wrote a *History of Engraving in France* (1888), and published many notices of engravers to accompany the reproductions by M. Amand Durand. He is also the author of a useful little manual entitled *Les Merveilles de la gravure* (1871). Jansen's work on the origin of wood and plate engraving, and on the knowledge of prints of the 15th and 16th centuries, was published at Paris in two volumes 8vo in 1808. Among general works see Adam Bartsch, *Le Peintre-graveur* (1803–1843); J. D. Passavant, *Le Peintre-graveur* (1860–1864); P. G. Hamerton, *Graphic Arts* (1882); William Gilpin, *Essay on Prints* (1781); J. Maberly, *The Print Collector* (1844); W. H. Wiltshire, *Introduction to the Study and Collection of Ancient Prints* (1874); F. Wedmore, *Fine Prints* (1897). See also the lists of works given under the separate headings for Line-Engraving, Etching, Mezzotint and Wood-Engraving.

ENGROSSING, a term used in two legal senses: (1) the writing or copying of a legal or other document in a fair large hand (*en gros*), and (2) the buying up of goods wholesale in order to sell at a higher price so as to establish a monopoly. The word "engross" has come into English ultimately from the Late Lat. *grossus*, thick, stout, large, through the A. Fr. *engrosser*, Med. Lat. *ingrossare*, to write in a large hand, and the French phrase *en gros*, in gross, wholesale. Engrossing and the kindred practices of forestalling and regrating were early regarded as serious offences in restraint of trade, and were punishable both at common law and by statute. They were of more particular importance in relation to the distribution of corn supplies. The statute of 1552 defines engrossing as "buying corn growing, or any other corn, grain, butter, cheese, fish or other dead victual, with *intent to sell the same again*." The law forbade all dealing in corn as an article of ordinary merchandise, apart from questions of foreign import or export. The theory was that when corn was plentiful in any district it should be consumed at what it would bring, without much respect to whether the next harvest might be equally abundant, or to what the immediate wants of an adjoining province of the same country might be. The first statute on the subject appears to have been passed in the reign of Henry III., though the general policy had prevailed before that time both in popular prejudice and in the feudal custom. The statute of Edward VI. (1552) was the most important, and in it the offences were elaborately defined; by this statute any one who bought corn to sell it again was made liable to two months' imprisonment with forfeit of the corn. A second offence was punished by six months' imprisonment and forfeit of double the value of the corn, and a third by the pillory and utter ruin. Severe as this statute was, liberty was given by it to transport corn from one part of the country under licence to men of approved probity, which implied that there was to be some buying of corn to sell it again and elsewhere. Practically "engrossing" came to be considered buying wholesale to sell again wholesale. "Forestalling" was different, and the statutes were directed against a class of dealers who went forward and bought or contracted for corn and other provisions, and spread false rumours in derogation of the public and open markets appointed by law, to which our ancestors appear to have attached much importance, and probably in these times not without reason. The statute of Edward VI. was modified by many subsequent enactments, particularly by the statute of 1663, by which it was declared that there could be no "engrossing" of corn when the price did not exceed 48s. per quarter, and which Adam Smith recognized, though it adhered to the variable and unsatisfactory element of price, as having contributed more to the progress of agriculture than any previous law in the statute book. In 1773 these injurious statutes were abolished, but the penal character of "engrossing" and "forestalling" had a root in the common law of England, as well as in the popular prejudice, which kept the evil alive to a later period. As the public enlightenment increased the judges were at no loss to give interpretations of the common law consistent with public policy. Subsequent to the act of 1773, for example, there was a case of conviction and punishment for engrossing hops, *R.* v. *Waddington*, 1800, 1 East, 143, but though this was deemed a sound and proper judgment at the time, yet it was soon afterwards overthrown in other cases, on the ground that buying wholesale to sell wholesale was not in "restraint of trade" as the former judges had assumed.

In 1800, one John Rusby was indicted for having bought ninety quarters of oats at 41s. per quarter and selling thirty of them at 43s. the same day. Lord Kenyon, the presiding judge, animadverted strongly against the repealing act of 1773, and addressed the jury strongly against the accused. Rusby was heavily fined, but, on appeal, the court was equally divided as to whether engrossing, forestalling and regrating were still offences at common law. In 1844, all the statutes, English, Irish and Scottish, defining the offences, were repealed and with them the supposed common law foundation. In the United States there have been strong endeavours by the government to suppress trusts and combinations for engrossing. (See also Trusts; Monopoly.)

Authorities.—D. Macpherson, *Annals of Commerce* (1805); J. S. Girdler, *Observations on Forestalling, Regrating and Ingrossing* (1800); W. Cunningham, *Growth of English Industry and Commerce*; W. J. Ashley, *Economic History*; Sir J. Stephen, *History of Criminal Law*; Murray, *New English Dictionary*.

ENGYON, an ancient town of the interior of Sicily, a Cretan colony, according to legend, and famous for an ancient temple of the Matres which aroused the greed of Verres. Its site is uncertain; some topographers have identified it with Gangi, a town 20 m. S.S.E. of Cefalu, but only on the ground of the similarity of the two names.

See C. Hülsen in Pauly-Wissowa, *Realencyclopädie*, v. 2568.

ENID, a city and the county-seat of Garfield county, Oklahoma, U.S.A., about 55 m. N.W. of Guthrie. Pop. (1900) 3444; (1907) 10,087 (355 of negro descent); (1910) 13,799. Enid is served by the St Louis & San Francisco, the Atchison, Topeka & Santa Fé, and the Chicago, Rock Island & Pacific railways, and by several branch lines, and is an important railway centre. It is the seat of the Oklahoma Christian University (1907; co-educational). Enid is situated in a flourishing agricultural and stock-raising region, of which it is the commercial centre, and has various manufactures, including lumber, brick, tile and flour. Natural gas was discovered near the city in 1907. Enid was founded in 1893 and was chartered as a city in the same year.

ENIGMA (Gr. αἴνιγμα), a riddle or puzzle, especially a form of verse or prose composition in which the answer is concealed by means of metaphors. Such were the famous riddle of the Sphinx and the riddling answers of the ancient oracles. The composition of enigmas was a favourite amusement in Greece and prizes were often given at banquets for the best solution of them (Athen. x. 457). In France during the 17th century enigma-making became fashionable. Boileau, Charles Rivière Dufresny and J. J. Rousseau did not consider it beneath their literary dignity. In 1646 the abbé Charles Cotier (1604–1682) published a *Recueil des ênigmes de ce temps.* The word is applied figuratively to anything inexplicable or difficult of understanding.

ENKHUIZEN, a seaport of Holland in the province of North Holland, on the Zuider Zee, and a railway terminus, 11½ m. N.E. by E. of Hoorn, with which it is also connected by steam tramway. In conjunction with the railway service there is a steamboat ferry to Stavoren in Friesland. Pop. (1900) 6865. Enkhuizen, like its neighbour Hoorn, exhibits many interesting examples of domestic architecture dating from the 16th and 17th centuries, when it was an important and flourishing city. The façades of the houses are usually built in courses of brick and stone, and adorned with carvings, sculptures and inscriptions. Some ruined gateways belonging to the old city walls are still standing; among them being the tower-gateway called the Dromedary (1540), which overlooks the harbour. The tower contains several rooms, one of which was formerly used as a prison. Among the churches mention must be made of the Zuiderkerk, or South church, with a conspicuous tower (1450–1525); and the Westerkerk, or West church, which possesses a beautifully carved Renaissance screen and pulpit of the middle of the 16th century, and a quaint wooden bell-house (1519) built for use before the completion of the bell-tower. There are also a Roman Catholic church and a synagogue. The picturesque town hall (1688) contains some finely decorated rooms with paintings by Johan van Neck, a collection of local antiquities and the archives. Other interesting buildings are the orphanage (1616), containing some 17th and 18th century portraits and ancient leather hangings; the weigh-house (1559), the upper story of which was once used by the Surgeons' Gild, several of the window-panes (dating chiefly from about 1640), being decorated with the arms of various members; the former mint (1611); and the ancient assembly-house of the dike-reeves of Holland and West Friesland. Enkhuizen possesses a considerable fishing fleet and has some shipbuilding and rope-making, as well as market traffic.

ENNEKING, JOHN JOSEPH (1841–), American landscape painter, was born, of German ancestry, in Minster, Ohio, on the 4th of October 1841. He was educated at Mount St Mary's College, Cincinnati, served in the American Civil War in 1861–1862, studied art in New York and Boston, and gave it up because his eyes were weak, only to return to it after failing in the manufacture of tinware. In 1873–1876 he studied in Munich under Schleich and Leier, and in Paris under Daubigny and Bonnat; and in 1878–1879 he studied in Paris again and sketched in Holland. Enneking is a "plein-airist," and his favourite subject is the "November twilight" of New England, and more generally the half lights of early spring, late autumn, and winter dawn and evening.

ENNIS (Gaelic, *Innis*, an island; Irish, *Ennis* and *Inish*), the county town of Co. Clare, Ireland, in the east parliamentary division, on the river Fergus, 25 m. W.N.W. from Limerick by the Great Southern & Western railway. Pop. of urban district (1901) 5093. It is the junction for the West Clare line. Ennis has breweries, distilleries and extensive flour-mills; and in the neighbourhood limestone is quarried. The principal buildings are the Roman Catholic church, which is the pro-cathedral of the diocese of Killaloe; the parish church formed out of the ruins of the Franciscan Abbey, founded in 1240 by Donough Carbrac O'Brien; a school on the foundation of Erasmus Smith, and various county buildings. The abbey, though greatly mutilated, is full of interesting details, and includes a lofty tower, a marble screen, a chapter-house, a notable east window, several fine tombs and an altar of St Francis. On the site of the old court-house a colossal statue in white limestone of Daniel O'Connell was erected in 1865. The interesting ruins of Clare Abbey, founded in 1194 by Donnell O'Brien, king of Munster, are half-way between Ennis and the village of Clare Castle. O'Brien also founded Killone Abbey, beautifully situated on the lough of the same name, 3 m. S. of the town, possessing the unusual feature of a crypt and a holy well. Five miles N.W. of Ennis is Dysert O'Dea, with interesting ecclesiastical remains, a cross, a round tower and a castle. Ennis was incorporated in 1612, and returned two members to the Irish parliament until the Union, and thereafter one to the Imperial parliament until 1885.

ENNISCORTHY, a market town of Co. Wexford, Ireland, in the north parliamentary division, on the side of a steep hill above the Slaney, which here becomes navigable for barges of large size. Pop. of urban district (1901) 5458. It is 77½ m. S. by W. from Dublin by the Dublin & South-Eastern railway. There are breweries and flour-mills; tanning, distilling and woollen manufactures are also prosecuted to some extent, and the town is the centre of the agricultural trade for the district, which is aided by the water communication with Wexford. There are important fowl markets and horse-fairs. Enniscorthy was taken by Cromwell in 1649, and in 1798 was stormed and burned by the rebels, whose main forces encamped on an eminence called Vinegar Hill, which overlooks the town from the east. The old castle of Enniscorthy, a massive square pile with a round tower at each corner, is one of the earliest military structures of the Anglo-Norman invaders, founded by Raymond le Gros (1176). Ferns, the next station to Enniscorthy on the railway towards Dublin, was the seat of a former bishopric, and the modernized cathedral, and ruins of a church, an Augustinian monastery founded by Dermod Mac-Morrough about 1160, and a castle of the Norman period, are still to be seen. Enniscorthy was incorporated by James I., and sent two members to the Irish parliament until the Union.

ENNISKILLEN, WILLIAM WILLOUGHBY COLE, 3RD EARL OF (1807–1886), British palaeontologist, was born on the 25th of January 1807, and educated at Harrow and Christ Church, Oxford. As Lord Cole he early began to devote his leisure to the study and collection of fossil fishes, with his friend Sir Philip de M. G. Egerton, and he amassed a fine collection at Florence Court, Enniskillen—including many specimens that were described and figured by Agassiz and Egerton. This collection was subsequently acquired by the British Museum. He died on the 21st of November 1886, being succeeded by his son (b. 1845) as 4th earl.

The first of the Coles (an old Devonshire and Cornwall family) to settle in Ireland was Sir William Cole (d. 1653), who was "undertaker" of the northern plantation and received a grant of a large property in Fermanagh in 1611, and became provost and later governor of Enniskillen. In 1760 his descendant John Cole (d. 1767) was created Baron Mountflorence, and the latter's son, William Willoughby Cole (1736–1803), was in 1776 created Viscount Enniskillen and in 1789 earl. The 1st earl's second son, Sir Galbraith Lowry Cole (1772–1842), was a prominent general in the Peninsular War, and colonel of the 27th Inniskillings, the Irish regiment with whose name the family was associated.

ENNISKILLEN [INNISKILLING], a market town and the county town of county Fermanagh, Ireland, in the north parliamentary division, picturesquely situated on an island in the river connecting the upper and lower loughs Erne, 116 m. N.W. from Dublin by the Great Northern railway. Pop. of urban district (1901) 5412. The town occupies the whole island, and is connected with two suburbs on the mainland on each side by two bridges. It has a brewery, tanneries and a small manufactory of cutlery, and a considerable trade in corn, pork and flax. In 1689 Enniskillen defeated a superior force sent against it by James II. at the battle of Crom; and part of the defenders of the town were subsequently formed into a regiment of cavalry, which still retains the name of the Inniskilling Dragoons. The town was incorporated by James I., and returned two members to the Irish parliament until the Union; thereafter it returned one to the Imperial parliament until 1885. There are wide communications by water by the river and the upper and lower loughs Erne, and by the Ulster canal to Belfast. The loughs contain trout, large pike and other coarse fish. Two miles from Enniskillen in the lower lough is Devenish Island, with its celebrated monastic remains. The abbey of St Mary here was founded by St Molaise (Laserian) in the 6th century; here too are a fine round tower 85 ft. high, remains of domestic buildings, a holed stone and a tall well-preserved cross. The whole is carefully preserved by the commissioners of public works under the Irish Church Act of 1869. Steamers ply between Enniskillen and Belleek on the lower lake, and between Enniskillen and Knockninny on the upper lake.

ENNIUS, QUINTUS (239–170 B.C.), ancient Latin poet, was born at Rudiae in Calabria. Familiar with Greek as the language in common use among the cultivated classes of his district, and with Oscan, the prevailing dialect of lower Italy, he further acquired a knowledge of Latin; to use his own expression (Gellius xvii. 17), he had three "hearts" (*corda*), the Latin word being used to signify the seat of intelligence. He is said (Servius on *Aen.* vii. 691) to have claimed descent from one of the legendary kings of his native district, Messapus the eponymous hero of Messapia, and this consciousness of ancient lineage is in accordance with the high self-confident tone of his mind, with his sympathy with the dominant genius of the Roman republic, and with his personal relations to the members of her great families. Of his early years nothing is directly known, and we first hear of him in middle life as serving during the Second Punic War, with the rank of centurion, in Sardinia, in the year 204, where he attracted the attention of Cato the elder, and was taken by him to Rome in the same year. Here he taught Greek and adapted Greek plays for a livelihood, and by his poetical compositions gained the friendship of the greatest men in Rome. Amongst these were the elder Scipio and Fulvius Nobilior, whom he accompanied on his Aetolian campaign (189). Through the influence of Nobilior's son, Ennius subsequently obtained the privilege of Roman citizenship (Cicero, *Brutus*, 20. 79). He lived plainly and simply on the Aventine with the poet Caecilius Statius. He died at the age of 70, immediately after producing his tragedy *Thyestes*. In the last book of his epic poem, in which he seems to have given various details of his personal history, he mentions that he was in his 67th year at the date of its composition. He compared himself, in contemplation of the close of the great work of his life, to a gallant horse which, after having often won the prize at the Olympic games, obtained his rest when weary with age. A similar feeling of pride at the completion of a great career is expressed in the memorial lines which he composed to be placed under his bust after death,—"Let no one weep for me, or celebrate my funeral with mourning; for I still live, as I pass to and fro through the mouths of men." From the impression stamped on his remains, and from the testimony of his countrymen, we think of him as a man of a robust, sagacious and cheerful nature (Hor. *Epp.* ii. 1. 50; Cic. *De sen.* 5); of great industry and versatility; combining imaginative enthusiasm and a vein of religious mysticism with a sceptical indifference to popular beliefs and a scorn of religious imposture; and tempering the grave seriousness of a Roman with a genial capacity for enjoyment (Hor. *Epp.* i. 19. 7).

Till the appearance of Ennius, Roman literature, although it had produced the epic poem of Naevius and some adaptations of Greek tragedy, had been most successful in comedy. Naevius and Plautus were men of thoroughly popular fibre. Naevius suffered for his attacks on members of the aristocracy, and, although Plautus carefully avoids any direct notice of public matters, yet the bias of his sympathies is indicated in several passages of his extant plays. Ennius, on the other hand, was by temperament in thorough sympathy with the dominant aristocratic element in Roman life and institutions. Under his influence literature became less suited to the popular taste, more especially addressed to a limited and cultivated class, but at the same time more truly expressive of what was greatest and most worthy to endure in the national sentiment and traditions. He was a man of many-sided activity. He devoted attention to questions of Latin orthography, and is said to have been the first to introduce shorthand writing in Latin. He attempted comedy, but with so little success that in the canon of Volcacius Sedigitus he is mentioned, solely as a mark of respect "for his antiquity," tenth and last in the list of comic poets. He may be regarded also as the inventor of Roman satire, in its original sense of a "medley" or "miscellany," although it was by Lucilius that the character of aggressive and censorious criticism of men and manners was first imparted to that form of literature. The word *satura* was originally applied to a rude scenic and musical performance, exhibited at Rome before the introduction of the regular drama. The *saturae* of Ennius were collections of writings on various subjects, written in various metres and contained in four (or six) books. Among these were included metrical versions of the physical speculations of Epicharmus, of the gastronomic researches of Archestratus of Gela (*Hedyphagetica*), and, probably, of the rationalistic doctrines of Euhemerus. It may be noticed that all these writers whose works were thus introduced to the Romans were Sicilian Greeks. Original compositions were also contained in these *saturae*, and among them the panegyric on Scipio, unless this was a drama. The satire of Ennius seems to have resembled the more artistic satire of Horace in its record of personal experiences, in the occasional introduction of dialogue, in the use made of fables with a moral application, and in the didactic office which it assumed.

But the chief distinction of Ennius was gained in tragic and narrative poetry. He was the first to impart to the Roman adaptations of Greek tragedy the masculine dignity, pathos and oratorical fervour which continued to animate them in the hands of Pacuvius and Accius, and, when set off by the acting of Aesopus, called forth vehement applause in the age of Cicero. The titles of about twenty-five of his tragedies are known to us, and a considerable number of fragments, varying in length from a few words to about fifteen lines, have been preserved. These tragedies were for the most part adaptations and, in some cases, translations from Euripides. One or two were original dramas, of the class called *praetextae*, *i.e.* dramas founded on Roman history or legend; thus, the *Ambracia* treated of the capture of that city by his patron Nobilior, the *Sabinae* of the rape of the Sabine women. The heroes and heroines of the Trojan cycle, such as Achilles, Ajax, Telamon, Cassandra, Andromache, were prominent figures in some of the dramas adapted from the Greek. Several of the more important fragments are found in Cicero, who expresses a great admiration for their manly fortitude and dignified pathos. In these remains of the tragedies of Ennius we can trace indications of strong sympathy with the nobler and bolder elements of character, of vivid realization of impassioned situations, and of sagacious observation of life. The frank bearing, fortitude and self-sacrificing heroism of the best type of the soldierly character find expression in the persons of Achilles, Telamon and Eurypylus; and a dignified and passionate tenderness of feeling makes itself heard in the lyrical utterances of Cassandra and Andromache. The language is generally nervous and vigorous, occasionally vivified with imaginative energy. But it flows less smoothly and easily than that of the dialogue of Latin comedy. It shows the same tendency to aim at effect by alliterations, assonances and plays on words. The rudeness of early art is most apparent in the inequality of the metres in which both the dialogue and the "recitative" are composed.

But the work which gained him his reputation as the Homer of Rome, and which called forth the admiration of Cicero and Lucretius and frequent imitation from Virgil, was the *Annales*, a long narrative poem in eighteen books, containing the record of the national story from mythical times to his own. Although the whole conception of the work implies that confusion of the provinces of poetry and history which was perpetuated by later writers, and especially by Lucan and Silius Italicus, yet it was a true instinct of genius to discern in the idea of the national destiny the only possible motive of a Roman epic. The execution of the poem (to judge from the fragments, amounting to about six hundred lines), although rough, unequal and often prosaic, seems to have combined the realistic fidelity and freshness of feeling of a contemporary chronicle with the vivifying and idealizing power of genius. Ennius prided himself especially on being the first to form the strong speech of Latium into the mould of the Homeric hexameter in place of the old Saturnian metre. And although it took several generations of poets to beat their music out to the perfection of the Virgilian cadences, yet in the rude adaptation of Ennius the secret of what ultimately became one of the grandest organs of literary expression was first discovered and revealed. The inspiring idea of the poem was accepted, purified of all alien material, and realized in artistic shape by Virgil in his national epic. He deliberately imparted to that poem the charm of antique associations by incorporating with it much of the phraseology and sentiment of Ennius. The occasional references to Roman history in Lucretius are evidently reminiscences of the *Annales*. He as well as Cicero speaks of him with pride and affection as "Ennius noster." Of the great Roman writers Horace had least sympathy with him; yet he testifies to the high esteem in which he was held during the Augustan age. Ovid expresses the grounds of that esteem when he characterizes him as

"Ingenio maximus, arte rudis."

A sentence of Quintilian expresses the feeling of reverence for his genius and character, mixed with distaste for his rude workmanship, with which the Romans of the early empire regarded him: "Let us revere Ennius as we revere the sacred groves, hallowed by antiquity, whose massive and venerable oak trees are not so remarkable for beauty as for the religious awe which they inspire" (*Inst. or.* x. 1. 88).

Editions of the fragments by L. Müller (1884), L. Valmaggi (1900, with notes), J. Vahlen (1903); monographs by L. Müller (1884 and 1893), C. Pascal, *Studi sugli scrittori Latini* (1900); see also Mommsen, *History of Rome*, bk. iii. ch. 14. On Virgil's indebtedness to Ennius see V. Crivellari, *Quae praecipue hausit Vergilius ex Naevio et Ennio* (1889).

ENNODIUS, MAGNUS FELIX (A.D. 474–521), bishop of Pavia, Latin rhetorician and poet. He was born at Arelate (Arles) and belonged to a distinguished but impecunious family. Having lost his parents at an early age, he was brought up by an aunt at Ticinum (Pavia); according to some, at Mediolanum (Milan). After her death he was received into the family of a pious and wealthy young lady, to whom he was betrothed. It is not certain whether he actually married this lady; she seems to have lost her money and retired to a convent, whereupon Ennodius entered the Church, and was ordained deacon (about 493) by Epiphanius, bishop of Pavia. From Pavia he went to Milan, where he continued to reside until his elevation to the see of Pavia about 515. During his stay at Milan he visited Rome and other places, where he gained a reputation as a teacher of rhetoric. As bishop of Pavia he played a considerable part in ecclesiastical affairs. On two occasions (in 515 and 517) he was sent to Constantinople by Theodoric on an embassy to the emperor Anastasius, to endeavour to bring about a reconciliation between the Eastern and Western churches. He died on the 17th of July 521; his epitaph still exists in the basilica of St Michael at Pavia (*Corpus Inscriptionum Latinarum*, v. pt. ii. No. 6464).

Ennodius is one of the best representatives of the twofold (pagan and Christian) tendency of 5th-century literature, and of the Gallo-Roman clergy who upheld the cause of civilization and classical literature against the inroads of barbarism. But his anxiety not to fall behind his classical models—the chief of whom was Virgil—his striving after elegance and grammatical correctness, and a desire to avoid the commonplace have produced a turgid and affected style, which, aggravated by rhetorical exaggerations and popular barbarisms, makes his works difficult to understand. It has been remarked that his poetry is less unintelligible than his prose.

The numerous writings of this versatile ecclesiastic may be divided into (1) letters, (2) miscellanies, (3) discourses, (4) poems. The letters on a variety of subjects, addressed to high church and state officials, are valuable for the religious and political history of the period. Of the miscellanies, the most important are: *The Panegyric of Theodoric*, written to thank the Arian prince for his tolerance of Catholicism and support of Pope Symmachus (probably delivered before the king on the occasion of his entry into Ravenna or Milan); like all similar works, it is full of flattery and exaggeration, but if used with caution is a valuable authority; *The Life of St Epiphanius*, bishop of Pavia, the best written and perhaps the most important of all his writings, an interesting picture of the political activity and influence of the church; *Eucharisticon de Vita Sua*, a sort of "confessions," after the manner of St Augustine; the description of the enfranchisement of a slave with religious formalities in the presence of a bishop; *Paraenesis didascalica*, an educational guide, in which the claims of grammar as a preparation for the study of rhetoric, the mother of all the sciences, are strongly insisted on. The discourses (*Dictiones*) are sacred, scholastic, controversial and ethical. The discourse on the anniversary of Laurentius, bishop of Milan, is the chief authority for the life of that prelate; the scholastic discourses, rhetorical exercises for the schools, contain eulogies of classical learning, distinguished professors and pupils; the controversial deal with imaginary charges, the subjects being chiefly borrowed from the *Controversiae* of the elder Seneca; the ethical harangues are put into the mouth of mythological personages (*e.g.* the speech of Thetis over the body of Achilles). Amongst the poems mention may be made of two *Itineraria*, descriptions of a journey from Milan to Brigantium (Briançon) and of a trip on the Po; an apology for the study of profane literature; an epithalamium, in which Love is introduced as execrating Christianity; a dozen hymns, after the manner of St Ambrose, probably intended for church use; epigrams on various subjects, some being epigrams proper—inscriptions for tombs, basilicas, baptisteries—others imitations of Martial, satiric pieces and descriptions of scenery.

There are two excellent editions of Ennodius by G. Hartel (vol. vi. of *Corpus scriptorum ecclesiasticorum Latinorum*, Vienna, 1882) and F. Vogel (vol. vii. of *Monumenta Germaniae historica*, 1885, with exhaustive prolegomena). On Ennodius generally consult M. Fertig, *Ennodius und seine Zeit* (1855–1860); A. Dubois, *La Latinité d'Ennodius* (1903); F. Magani, *Ennodio* (Pavia, 1886); A. Ebert, *Allgemeine Geschichte der Litt. des Mittelalters im Abendlande*, i. (1889); M. Manitius, *Geschichte der christlich-lateinischen Poesie* (1891); Teuffel, *Hist. of Roman Literature*, § 479 (Eng. tr., 1892). French translation by the abbé S. Léglise (Paris, 1906 foll.).

ENNS, a town of Austria, in upper Austria, 11 m. by rail S.E. of Linz. Pop. (1900) 4371. It is situated on the Enns near its confluence with the Danube and possesses a 15th-century castle, an old Gothic church, and a town hall erected in 1565. Three miles to the S.W. lies the Augustinian monastery of St Florian, one of the oldest and largest religious houses of Austria. Founded in the 7th century, it was occupied by the Benedictines till the middle of the 11th century. It was established on a firm basis in 1071, when it passed into the hands of the Augustinians. The actual buildings, which are among the most magnificent in Austria, were constructed between 1686 and 1745. Its library, with over 70,000 volumes, contains valuable manuscripts and also a fine collection of coins. Enns is one of the oldest towns in Austria, and stands near the site of the Roman *Laureacum*. The nucleus of the actual town was formed by a castle, called Anasiburg or Anesburg, erected in 900 by the Bavarians as a post against the incursions of the Hungarians. It soon attained commercial prosperity, and by a charter of 1212 was made a free town. In 1275 it passed into the hands of Rudolph of Habsburg. An encounter between the French and the Austrian troops took place here on the 5th of November 1805.

ENOCH (חֲנוֹךְ, חֲנֹךְ, Ḥănōkh, Teaching or Dedication). (1) In Gen. iv. 17, 18 (J), the eldest son of Cain, born while Cain was building a city, which he named after Enoch; nothing is known of the city. (2) In Gen. v. 24, &c. (P), *seventh* in descent from Adam in the line of Seth; he "walked with God," and after 365 years "was not for God took him." [(1) and (2) are often regarded as both corruptions of the *seventh* primitive king Evedorachos (Enmeduranki in cuneiform inscriptions), the two genealogies, Gen. iv. 16-24, v. 12-17, being variant forms of the Babylonian list of primitive kings. Enmeduranki is the favourite of the sun-god, cf. Enoch's 365 years.[1]] Heb. xi. 5 says Enoch "was not found, because God *translated* him." Later Jewish legends represented him as receiving revelations on astronomy, &c., and as the first author; apparently following the Babylonian account which makes Enmeduranki receive instruction in all wisdom from the sun-god.[1] Two apocryphal works written in the name of Enoch are extant, the *Book of Enoch*, compiled from documents written 200–50 B.C., quoted as the work of Enoch, Jude 14 and 15; and the *Book of the Secrets of Enoch*, A.D. 1–50. Cf. 1 Chron. i. 3; Luke iii. 37; Wisdom iv. 7-14; Ecclus. xliv. 16, xlix. 14. (3) Son, *i.e.* clan, of Midian, in Gen. xxv. 4; 1 Chron. i. 33. (4) Son, *i.e.* clan, of Reuben, E. V. *Hanoch, Henoch*, in Gen. xlvi. 9; Exod. vi. 14; Num. xxvi. 5; 1 Chron. v. 3. There may have been some historical connexion between these two clans with identical names.

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[1] Eberhard Schrader, *Die Keilinschriften und das A.T.*, 3rd ed., pp. 540 f.

ENOCH, BOOK OF. The *Book of Enoch*, or, as it is sometimes called, the *Ethiopic Book of Enoch*, in contradistinction to the *Slavonic Book of Enoch* (see later), is perhaps the most important of all the apocryphal or pseudapocryphal Biblical writings for the history of religious thought. It is not the work of a single author, but rather a conglomerate of literary fragments which once circulated under the names of Enoch, Noah and possibly Methuselah. In the *Book of the Secrets of Enoch* we have additional portions of this literature. As the former work is derived from a variety of Pharisaic writers in Palestine, so the latter in its present form was written for the most part by Hellenistic Jews in Egypt.

The *Book of Enoch* was written in the second and first centuries B.C. It was well known to many of the writers of the New Testament, and in many instances influenced their thought and diction. Thus it is quoted by name as a genuine production of Enoch in the Epistle of Jude, 14 sq., and it lies at the base of Matt. xix. 28 and John v. 22, 27, and many other passages. It had also a vast indirect influence on the Palestinian literature of the 1st century of our era. Like the Pentateuch, the Psalms, the Megilloth, the Pirke Aboth, this work was divided into five parts, with the critical discussion of which we shall deal below. With the earlier Fathers and Apologists it had all the weight of a canonical book, but towards the close of the 3rd and the beginning of the 4th century it began to be discredited, and finally fell under the ban of the Church. Almost the latest reference to it in the early church is made by George Syncellus in his Chronography about A.D. 800. The book was then lost sight of till 1773, when Bruce discovered the Ethiopic version in Abyssinia.

Original Language.—That the *Book of Enoch* was written in Semitic is now accepted on all hands, but scholars are divided as to whether the Semitic language in question was Hebrew or Aramaic. Only one valuable contribution on this question has been made, and that by Halévy in the *Journal Asiatique*, Avril-Mai 1867, pp. 352-395. This scholar is of opinion that the entire work was written in Hebrew. Since this publication, however, fresh evidence bearing on the question has been discovered in the Greek fragment (i.-xxxii.) found in Egypt. Since this fragment contains three Aramaic words transliterated in the Greek, some scholars, and among them Schürer, Lévi and N. Schmidt, have concluded that not only are chapters i.-xxxvi. derived from an Aramaic original, but also the remainder of the book. In support of the latter statement no evidence has yet been offered by these or any other scholars, nor yet has there been any attempt to meet the positive arguments of Halévy for a Hebrew original of xxxvii.-civ., whose Hebrew reconstructions of the text have been and must be adopted in many cases by every editor and translator of the book. A prolonged study of the text, which has brought to light a multitude of fresh passages the majority of which can be explained by retranslation into Hebrew, has convinced the present writer[1] that, whilst the evidence on the whole is in favour of an Aramaic original of vi.-xxxvi., it is just as conclusive on behalf of the Hebrew original of the greater part of the rest of the book.

Versions—Greek, Latin and Ethiopic.—The Semitic original was translated into Greek. It is not improbable that there were two distinct Greek versions. Of the one, several fragments have been preserved in Syncellus (A.D. 800), vi.–x. 14, viii. 4–ix. 4, xv. 8–xvi. 1; of the other, i.-xxxii. in the Giza Greek fragment discovered in Egypt and published by Bouriant (*Fragments grecs du livre d'Enoch*), in 1892, and subsequently by Lods, Dillmann, Charles (*Book of Enoch*, 318 sqq.), Swete, and finally by Radermacher and Charles (*Ethiopic Text*, 3-75). In addition to these fragments there is that of lxxxix. 42-49 (see Gildemeister in the *ZDMG*, 1855, pp. 621-624, and Charles, *Ethiopic Text*, pp. 175-177). Of the Latin version only i. 9 survives, being preserved in the Pseudo-Cyprian's *Ad Novatianum*, and cvi. 1-18 discovered by James in an 8th-century MS. of the British Museum (see James, *Apoc. anecdota*, 146-150; Charles, *op. cit.* 219-222). This version is made from the Greek.

The Ethiopic version, which alone preserves the entire text, is a very faithful translation of the Greek. Twenty-eight MSS. of this version are in the different libraries of Europe, of which fifteen are to be found in England. This version was made from an ancestor of the Greek fragment discovered at Giza. Some of the utterly unintelligible passages in this fragment are literally reproduced in the Ethiopic. The same wrong order of the text in vii.-viii. is common to both. In order to recover the original text, it is from time to time necessary to retranslate the Ethiopic into Greek, and the latter in turn into Aramaic or Hebrew. By this means we are able to detect dittographies in the Greek and variants in the original Semitic. The original was written to a large extent in verse. The discovery of this fact is most helpful in the criticism of the text. This version was first edited by Laurence in 1838 from one MS., in 1851 by Dillmann from five, in 1902 by Flemming from fifteen MSS., and in 1906 by the present writer from twenty-three.

Translations and Commentaries.—Laurence, *The Book of Enoch* (Oxford, 1821); Dillmann, *Das Buch Henoch* (1853); Schodde, *The Book of Enoch* (1882); Charles, *The Book of Enoch* (1893); Beer, "Das Buch Henoch," in Kautzsch's *Apok. u. Pseud. des A.T.* (1900), ii. 217-310; Flemming and Radermacher, *Das Buch Henoch* (1901); Martin, *Le Livre d' Henoch* (1906). *Critical Inquiries.*—The bibliography will be found in Schürer, *Gesch. d. jüdischen Volkes*^{3}, iii. 207-209, and a short critical account of the most important of these in Charles, *op. cit.* pp. 9-21.

The different Elements in the Book, with their respective Characteristics and Dates.—We have remarked above that the *Book of Enoch* is divided into five parts—i.-xxxvi., xxxvii.-lxxi., lxxii.-lxxxii., lxxxiii.-xc., xci-cviii. Some of these parts constituted originally separate treatises. In the course of their reduction and incorporation into a single work they suffered much mutilation and loss. From an early date the compositeness of this work was recognized. Scholars have varied greatly in their critical analyses of the work (see Charles, *op. cit.* 6-21, 309-311). The analysis which gained most acceptation was that of Dillmann (Herzog's *Realencyk.*^{2} xii. 350-352), according to whom the present books consist of—(1) the groundwork, *i.e.* i.-xxxvi., lxxii.-cv., written in the time of John Hyrcanus; (2) xxxvii.-lxxi., xvii.-xix., before 64 B.C.; (3) the Noachic fragments, vi. 3-8, viii. 1-3, ix. 7, x. 1, 11, xx., xxxix. 1, 2*a*, liv. 7–lv. 2, lx., lxv.-lxix. 25, cvi.-cvii.; and (4) cviii., from a later hand. With much of this analysis there is no reason to disagree. The similitudes are undoubtedly of different authorship from the rest of the book, and certain portions of the book are derived from the *Book of Noah.* On the other hand, the so-called groundwork has no existence unless in the minds of earlier critics and some of their belated followers in the present. It springs from at least four hands, and may be roughly divided into four parts, corresponding to the present actual divisions of the book.

A new critical analysis of the book based on this view was given by Charles (*op. cit.* pp. 24-33), and further developed by Clemen and Beer. The analysis of the latter (see Herzog, *Realencyk.*^{3} xiv. 240) is very complex. The book, according to this scholar, is composed of the following separate elements from the Enoch tradition:—(1) Ch. i.-v.; (2) xii-xvi.; (3) xvii.-xix.; (4) xx.-xxxvi.; (5) xxxvii.-lxix. (from diverse sources); (6) lxx.-lxxi.; (7) lxxii.-lxxxii.; (8) lxxxiii.-lxxxiv.; (9) lxxxv.-xc.; (10) xciii., cxi. 12-17; (11) xci. 1-11, 18, 19, xcii., xciv.-cv.; (12) cviii., and from the Noah tradition; (13) vi.-xi.; (14) xxxix. 1-2*a*, liv. 7–lv. 2, lx., lxv.-lxix. 25; (15) cvi.-cvii. Thus while Clemen finds eleven separate sources, Beer finds fifteen. A fresh study from the hand of Appel (*Die Composition des äthiopischen Henochbuchs*, 1906) seeks to reach a final analysis of our book. But though it evinces considerable insight, it cannot escape the charge of extravagance. The original book or ground-work of Enoch consisted of i.-xvi., xx.-xxxvi. This work called forth a host of imitators, and a number of their writings, together with the groundwork, were edited as a Book of Methuselah, *i.e.* lxxii.-cv. Then came the final redactor, who interpolated the groundwork and the Methuselah sections, adding two others from his own pen. The Similitudes he worked up from a series of later sources, and gave them the second place in the final work authenticating them with the name of Noah. The date of the publication of the entire work Appel assigns to the years immediately following the death of Herod.

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[1] The evidence is given at length in R. H. Charles' *Ethiopic Text of Enoch*, pp. xxvii-xxxiii.

We shall now give an analysis of the book, with the dates of the various sections where possible. Of these we shall deal with the easiest first. *Chap. lxxii.-lxxxii.* constitutes a work in itself, the writer of which had very different objects before him from the writers of the rest of the book. His sole aim is to give the law of the heavenly bodies. His work has suffered disarrangements and interpolations at the hands of the editor of the whole work. Thus lxxvi.-lxxvii., which are concerned with the winds, the quarters of the heaven, and certain geographical matters, and lxxxi., which is concerned wholly with ethical matters, are foreign to a work which professes in its title (lxxii. 1) to deal only with the luminaries of the heaven and their laws. Finally, lxxxii. should stand before lxxix.; for the opening words of the latter suppose it to be already read. The date of this section can be partially established, for it was known to the author of Jubilees, and was therefore written before the last third of the 2nd century B.C.

Chaps. lxxxiii.-xc.—This section was written before 161 B.C., for "the great horn," who is Judas the Maccabee, was still warring when the author was writing. (Dillmann, Schürer and others take the great horn to be John Hyrcanus, but this interpretation does violence to the text.) These chapters recount three visions: the first two deal with the first-world judgment; the third with the entire history of the world till the final judgment. An eternal Messianic kingdom at the close of the judgment is to be established under the Messiah, with its centre in the New Jerusalem set up by God Himself.

Chaps. xci.-civ.—In the preceding section the Maccabees were the religious champions of the nation and the friends of the Ḥasidim. Here they are leagued with the Sadducees, and are the declared foes of the Pharisaic party. This section was written therefore after 134 B.C., when the breach between John Hyrcanus and the Pharisees took place and before the savage massacres of the latter by Jannaeus (95 B.C.); for it is not likely that in a book dealing with the sufferings of the Pharisees such a reference would be omitted. These chapters indicate a revolution in the religious hopes of the nation. An eternal Messianic kingdom is no longer anticipated, but only a temporary one, at the close of which the final judgment will ensue. The righteous dead rise not to this kingdom but to spiritual blessedness in heaven itself—to an immortality of the soul. This section also has suffered at the hands of the final editor. Thus xci. 12-17, which describe the last three weeks of the Ten-Weeks Apocalypse, should be read immediately after xciii. 1-10, which recount the first seven weeks of the same apocalypse. But, furthermore, the section obviously begins with xcii. "Written by Enoch the scribe," &c. Then comes xci. 1-10 as a natural sequel. The Ten-Weeks Apocalypse, xciii. 1-10, xci. 12-17, if it came from the same hand, followed, and then xciv. The attempt (by Clemen and Beer) to place the Ten-Weeks Apocalypse before 167, because it makes no reference to the Maccabees, is not successful; for where the history of mankind from Adam to the final judgment is despatched in sixteen verses, such an omission need cause little embarrassment, and still less if the author is the determined foe of the Maccabees, whom he would probably have stigmatized as apostates, if he had mentioned them at all, just as he similarly brands all the Sadducean priesthood that preceded them to the time of the captivity. This Ten-Weeks Apocalypse, therefore, we take to be the work of the writer of the rest of xci.-civ.

Chaps. i.-xxxvi.—This is the most difficult section of the book. It is very composite. Chaps. vi.-xi. is apparently an independent fragment of the Enoch Saga. It is itself compounded of the Semjaza and Azazel myths, and in its present composite form is already presupposed by lxxxviii.-lxxxix. 1; hence its present form is earlier than 166 B.C. It represents a primitive and very sensuous view of the eternal Messianic kingdom on earth, seeing that the righteous beget 1000 children before they die. These chapters appear to be from the Book of Noah; for they never refer to Enoch but to Noah only (x. 1). Moreover, when the author of Jubilees is clearly drawing on the Book of Noah, his subject-matter (vii. 21-25) agrees most closely with that of these chapters in Enoch (see Charles' edition of Jubilees, pp. lxxi. sq. 264). xii.-xvi., on the other hand, belong to the Book of Enoch. These represent for the most part what Enoch saw in a vision. Now whereas vi.-xvi. deal with the fall of the angels, their destruction of mankind, and the condemnation of the fallen angels, the subject-matter now suddenly changes and xvii.-xxxvi. treat of Enoch's journeyings through earth and heaven escorted by angels. Here undoubtedly we have a series of doublets; for xvii.-xix. stand in this relation to xx.-xxxvi., since both sections deal with the same subjects. Thus xvii. 4=xxiii.; xvii. 6=xxii.; xviii. 1=xxxiv.-xxxvi.; xviii. 6-9=xxiv.-xxv., xxxii. 1-2; xviii. 11, xix.=xxi. 7-10; xviii. 12-16=xxi. 1-6. They belong to the same cycle of tradition and cannot be independent of each other. Chap. xx. appears to show that xx.-xxxvi. is fragmentary, since only four of the seven angels mentioned in xx. have anything to do in xxi.-xxxvi. Finally, i.-v. seems to be of a different date and authorship from the rest.

Chaps. xxxvii.-lxxi.—These constitute the well-known Similitudes. They were written before 64 B.C., for Rome was not yet known to the writer, and after 95 B.C., for the slaying of the righteous, of which the writer complains, was not perpetrated by the Maccabean princes before that date. This section consists of three similitudes—xxxviii.-xliv., xlv.-lvii., lviii.-lxix. These are introduced and concluded by xxxvii. and lxx. There are many interpolations—lx., lxv.-lxix. 25 confessedly from the Book of Noah; most probably also liv. 7–lv. 2. Whence others, such as xxxix. 1, 2*a*, xli. 3-8, xliii. sq., spring is doubtful. Chaps. 1, lvi. 5–lvii. 3*a* are likewise insertions.

In R. H. Charles's edition of Enoch, lxxi. was bracketed as an interpolation. The writer now sees that it belongs to the text of the Similitudes though it is dislocated from its original context. It presents two visits of Enoch to heaven in lxxi. 1-4 and lxxi. 5-17. The extraordinary statement in lxxi. 14, according to which Enoch is addressed as "the Son of Man," is seen, as Appel points out, on examination of the context to have arisen from the loss of a portion of the text after verse 13, in which Enoch saw a heavenly being with the Head of Days and asked the angel who accompanied him who this being was. Then comes ver. 14, which, owing to the loss of this passage, has assumed the form of an address to Enoch: "Thou art the Son of Man," but which stood originally as the angel's reply to Enoch: "This is the Son of Man," &c. Ver. 15, then, gives the message sent to Enoch by the Son of Man. In the next verse the second person should be changed into the third. Thus we recover the original text of this difficult chapter. The Messianic doctrine and eschatology of this section is unique. The Messiah is here for the first time described as the pre-existent Son of Man (xlviii. 2), who sits on the throne of God (xlv. 3; xlvii. 3), possesses universal dominion (lxii. 6), and is the Judge of all mankind (lxix. 27). After the judgment there will be a new heaven and a new earth, which will be the abode of the blessed.

The BOOK OF THE SECRETS OF ENOCH, or *Slavonic Enoch.* This new fragment of the Enochic literature has only recently come to light through five MSS. discovered in Russia and Servia. Since about A.D. 500 it has been lost sight of. It is cited without acknowledgment in the *Book of Adam and Eve*, the *Apocalypses of Moses and Paul*, the *Sibylline Oracles*, the *Ascension of Isaiah*, the *Epistle of Barnabas*, and referred to by Origen and Irenaeus (see Charles, *The Book of the Secrets of Enoch*, 1895, pp. xvii-xxiv). For Charles's *editio princeps* of this work, in 1895, Professor Morfill translated two of the best MSS., as well as Sokolov's text, which is founded on these and other MSS. In 1896 Bonwetsch issued his *Das slavische Henochbuch*, in which a German translation of the above two MSS. is given side by side, preceded by a short introduction.

Analysis.—Chaps. i.-ii. Introduction: life of Enoch: his dream, in which he is told that he will be taken up to heaven: his admonitions to his sons. iii.-xxxvi. What Enoch saw in heaven. iii.-vi. The first heaven: the rulers of the stars: the great sea and the treasures of snow, &c. vii. The second heaven: the fallen angels. viii.-x. The third heaven: Paradise and place of punishment. xi.-xvii. The fourth heaven: courses of the sun and moon: phoenixes. xviii. The fifth heaven: the watchers mourning for their fallen brethren. xix. The sixth heaven: seven bands of angels arrange and study the courses of the stars, &c.: others set over the years, the fruits of the earth, the souls of men. xx.-xxxvi. The seventh heaven. The Lord sitting on His throne with the ten chief orders of angels. Enoch is clothed by Michael in the raiment of God's glory and instructed in the secrets of nature and of man, which he wrote down in 366 books. God reveals to Enoch the history of the creation of the earth and the seven planets and circles of the heaven and of man, the story of the fallen angels, the duration of the world through 7000 years, and its millennium of rest. xxxviii.-lxvi. Enoch returns to earth, admonishes his sons: instructs them on what he had seen in the heavens, gives them his books. Bids them not to swear at all nor to expect any intercession of the departed saints for sinners. lvi.-lxiii. Methuselah asks Enoch's blessing before he departs, and to all his sons and their families Enoch gives fresh instruction. lxiv.-lxvi. Enoch addressed the assembled people at Achuszan. lxvii.-lxviii. Enoch's translation. Rejoicings of the people on behalf of the revelation given them through Enoch.

Language and Place of Writing.—A large part of this book was written for the first time in Greek. This may be inferred from such statements as (1) xxx. 13, "And I gave him a name (*i.e.* Adam) from the four substances: the East, the West, the North and the South." Thus Adam's name is here derived from the initial letters of the four quarters: ἀνατολή, δύσις, ἄρκτος, μεσημβρία. This derivation is impossible in Semitic. This context is found elsewhere in the Sibyllines iii. 24 sqq. and other Greek writings. (2) Again our author uses the chronology of the Septuagint and in 1, 4 follows the Septuagint text of Deuteronomy xxxii. 35 against the Hebrew. On the other hand, some sections may wholly or in part go back to Hebrew originals. There is a Hebrew Book of Enoch attributed to R. Ishmael ben Elisha who lived at the close of the 1st century and the beginning of the 2nd century B.C. This book is very closely related to the Book of the Secrets of Enoch, or rather, to a large extent dependent upon it. Did Ishmael ben Elisha use the Book of the Secrets of Enoch in its Greek form, or did he find portions of it in Hebrew? At all events, extensive quotations from a Book of Enoch are found in the rabbinical literature of the middle ages, and the provenance of these has not yet been determined. See *Jewish Encyc.* i. 676 seq.

But there is a stronger argument for a Hebrew original of certain sections to be found in the fact that the Testaments of the XII. Patriarchs appears to quote xxxiv. 2, 3 of our author in T. Napth. iv. 1, T. Benj. ix.

The book in its present form was written in Egypt. This may be inferred (1) from the variety of speculations which it holds in common with Philo and writings of a Hellenistic character that circulated mainly in Egypt. (2) The Phoenixes are Chalkydries (ch. xii.)—monstrous serpents with the heads of crocodiles—are natural products of the Egyptian imagination. (3) The syncretistic character of the creation account (xxv.-xxvi.) betrays Egyptian elements.

Relation to Jewish and Christian Literature.—The existence of a kindred literature in Neo-Hebrew has been already pointed out. We might note besides that it is quoted in the Book of Adam and Eve, the Apocalypse of Moses, the Apocalypse of Paul, the anonymous work *De montibus Sina et Sion*, the Sibylline Oracles ii. 75, Origen, *De princip.* i. 3, 2. The authors of the Ascension of Isaiah, the Apoc. of Baruch and the Epistle of Barnabas were probably acquainted with it. In the New Testament the similarity of matter and diction is sufficiently strong to establish a close connexion, if not a literary dependence. Thus with Matt. v. 9, "Blessed are the peacemakers," cf. lii. 11, "Blessed is he who establishes peace": with Matt. v. 34, 35, 37, "Swear not at all," cf. xlix. 1, "I will not swear by a single oath, neither by heaven, nor by earth, nor by any other creature which God made—if there is no truth in man, let them swear by a word yea, yea, or nay, nay."

Date and Authorship.—The book was probably written between 30 B.C. and A.D. 70. It was written after 30 B.C., for it makes use of Sirach, the (Ethiopic) Book of Enoch and the Book of Wisdom. It was written before A.D. 70; for the temple is still standing: see lix. 2.

The author was an orthodox Hellenistic Jew who lived in Egypt. He believed in the value of sacrifices (xlii. 6; lix. 1, 2, &c.), but is careful to enforce enlightened views regarding them (xlv. 3, 4; lxi. 4, 5.) in the law, lii. 8, 9; in a blessed immortality, l. 2; lxv. 6, 8-10, in which the righteous should be clothed in "the raiment of God's glory," xxii. 8. In questions relating to cosmology, sin, death, &c., he is an eclectic, and allows himself the most unrestricted freedom, and readily incorporates Platonic (xxx. 16), Egyptian (xxv. 2) and Zend (lviii. 4-6) elements into his system of thought.

Anthropological Views.—All the souls of men were created before the foundation of the world (xxiii. 5) and likewise their future abodes in heaven or hell (xlix. 2, lviii. 5). Man's name was derived, as we have already seen, from the four quarters of the world, and his body was compounded from seven substances (xxx. 8). He was created originally good: freewill was bestowed upon him with instruction in the two ways of light and darkness, and then he was left to mould his own destiny (xxx. 15). But his preferences through the bias of the flesh took an evil direction, and death followed as the wages of sin (xxx. 16).

LITERATURE.—Morfill and Charles, *The Book of the Secrets of Enoch* (Oxford, 1896); Bonwetsch, "Das slavische Henochbuch," in the *Abhandlungen der königlichen gelehrten Gesellschaft zu Göttingen* (1896). See also Schürer *in loc.* and the Bible Dictionaries. (R. H. C.)

ENOMOTO, BUYO, VISCOUNT (1839–1909), Japanese vice-admiral, was born in Tokyo. He was the first officer sent by the Tokugawa government to study naval science in Europe, and after going through a course of instruction in Holland he returned in command of the frigate "Kaiyō Maru," built at Amsterdam to order of the Yedo administration. The salient episode of his career was an attempt to establish a republic at Hakodate. Finding himself in command of a squadron which represented practically the whole of Japan's naval forces, he refused to acquiesce in the deposition of the Shōgun, his liege lord, and, steaming off to Yezo (1867), proclaimed a republic and fortified Hakodate. But he was soon compelled to surrender. The newly organized government of the empire, however, instead of inflicting the death penalty on him and his principal followers, as would have been the inevitable sequel of such a drama in previous times, punished them with imprisonment only, and four years after the Hakodate episode, Enomoto received an important post in Hokkaido, the very scene of his wild attempt. Subsequently (1874), as his country's representative in St Petersburg, he concluded the treaty by which Japan exchanged the southern half of Saghalien for the Kuriles. He received the title of viscount in 1885, and afterwards held the portfolios of communications, education and foreign affairs. He died at Tokyo in 1909.

ENOS (anc. *Aenos*), a town of European Turkey, in the vilayet of Adrianople; on the southern shore of the river Maritza, where its estuary broadens to meet the Aegean Sea in the Gulf of Enos. Pop. (1905) about 8000. Enos occupies a ridge of rock surrounded by broad marshes. It is the seat of a Greek bishop, and the population is mainly Greek. It long possessed a valuable export trade, owing to its position at the mouth of the Maritza, the great natural waterway from Adrianople to the sea. But its commerce has declined, owing to the unhealthiness of its climate, to the accumulation of sandbanks in its harbour, which now only admits small coasters and fishing-vessels, and to the rivalry of Dédéagatch, a neighbouring seaport connected with Adrianople by rail.

ENRIQUEZ GOMEZ, ANTONIO (*c.* 1601–*c.* 1661), Spanish dramatist, poet and novelist of Portuguese-Jewish origin, was known in the early part of his career as Enrique Enriquez de Paz. Born at Segovia, he entered the army, obtained a captaincy, was suspected of heresy, fled to France about 1636, assumed the name of Antonio Enriquez Gomez, and became majordomo to Louis XIII., to whom he dedicated *Luis dado de Dios á Anna* (Paris, 1645). Some twelve years later he removed to Amsterdam, avowed his conversion to Judaism, and was burned in effigy at Seville on the 14th of April 1660. He is supposed to have returned to France, and to have died there in the following year. Three of his plays, *El Gran Cardenal de España, don Gil de Albornoz*, and the two parts of *Fernan Mendez Pinto* were received with great applause at Madrid about 1629; in 1635 he contributed a sonnet to Montalban's collection of posthumous panegyrics on Lope de Vega, to whose dramatic school Enriquez Gomez belonged. The *Academias morales de las Musas*, consisting of four plays (including *A lo que obliga el honor*, which recalls Calderon's *Médico de su honra*), was published at Bordeaux in 1642; *La Torre de Babilonia*, containing the two parts of *Fernan Mendez Pinto*, appeared at Rouen in 1647; and in the preface to his poem, *El Samson Nazareno* (Rouen, 1656), Enriquez Gomez gives the titles of sixteen other plays issued, as he alleges, at Seville. There is no foundation for the theory that he wrote the plays ascribed to Fernando de Zárate. His dramatic works, though effective on the stage, are disfigured by extravagant incidents and preciosity of diction. The latter defect is likewise observable in the mingled prose and verse of *La Culpa del primer peregrino* (Rouen, 1644) and the dialogues entitled *Politica Angélica* (Rouen, 1647). Enriquez Gomez is best represented by *El Siglo Pitagórico y Vida de don Gregorio Guadaña* (Rouen, 1644), a striking picaresque novel in prose and verse which is still reprinted.

ENSCHEDE, a town in the province of Overysel, Holland, near the Prussian frontier, and a junction station 5 m. by rail S.E. of Hengelo. Pop. (1900) 23,141. It is important as the centre of the flourishing cotton-spinning and weaving industries of the Twente district; while by the railway via Gronau and

Koesfeld to Dortmund it is in direct communication with the Westphalian coalfields. Enschede possesses several churches, an industrial trade school, and a large park intended for the benefit of the working classes. About two-thirds of the town was burnt down in 1862.

ENSENADA, CENON DE SOMODEVILLA, Marques de la (1702–1781), Spanish statesman, was born at Alesanco near Logroño on the 2nd of June 1702. When he had risen to high office it was said that his pedigree was distinguished, but nothing is known of his parents—Francisco de Somodevilla and his wife Francisca de Bengoechea,—nor is anything known of his own life before he entered the civil administration of the Spanish navy as a clerk in 1720. He served in administrative capacities at the relief of Ceuta in that year and in the reoccupation of Oran in 1731. His ability was recognized by Don Jose Patiños, the chief minister of King Philip V. Somodevilla was much employed during the various expeditions undertaken by the Spanish government to put the king's sons by his second marriage with Elizabeth Farnese, Charles and Philip, on the thrones of Naples and Parma. In 1736 Charles, afterwards King Charles III. of Spain, conferred on him the Neapolitan title of Marques de la Ensenada. The name can be resolved into the three Spanish words "en se nada," meaning "in himself nothing." The courtly flattery of the time, and the envy of the nobles who disliked the rise of men of Ensenada's class, seized upon this poor play on words; an *Ensenada* is, however, a roadstead or small bay. In 1742 he became secretary of state and war to Philip, duke of Parma. In the following year (11th of April 1743), on the death of Patiños's successor Campillo, he was chosen by Philip V. as minister of finance, war, the navy and the Indies (*i.e.* the Colonies). Ensenada met the nomination with a becoming *nolo episcopari*, professing that he was incapable of filling the four posts at once. His reluctance was overborne by the king, and he became in fact prime minister at the age of forty-one. During the remainder of the king's reign, which lasted till the 11th of July 1746, and under his successor Ferdinand VI. until 1754, Ensenada was the effective prime minister. His administration is notable in Spanish history for the vigour of his policy of internal reform. The reports on the finances and general condition of the country, which he drew up for the new king on his accession, and again after peace was made with England at Aix-la-Chapelle on the 18th of October 1748, are very able and clear-sighted. Under his direction the despotism of the Bourbon kings became paternal. Public works were undertaken, shipping was encouraged, trade was fostered, numbers of young Spaniards were sent abroad for education. Many of them abused their opportunity, but on the whole the prosperity of the country revived, and the way was cleared for the more sweeping innovations of the following reign. Ensenada was a strong partizan of a French alliance and of a policy hostile to England. Sir B. Keene, the English minister, supported the Spanish court party opposed to him, and succeeded in preventing him from adding the foreign office to others which he held. Ensenada would probably have fallen sooner but for the support he received from the Portuguese queen, Barbara. In 1754 he offended her by opposing an exchange of Spanish and Portuguese colonial possessions in America which she favoured. On the 20th of July of that year he was arrested by the king's order, and sent into mild confinement at Granada, which he was afterwards allowed to exchange for Puerto de Santa Maria. On the accession of Charles III. in 1759, he was released from arrest and allowed to return to Madrid. The new king named him as member of a commission appointed to reform the system of taxation. Ensenada could not renounce the hope of again becoming minister, and entered into intrigues which offended the king. On the 18th of April 1766 he was again exiled from court, and ordered to go to Medina del Campo. He had no further share in public life, and died on the 2nd of December 1781. Ensenada acquired wealth in office, but he was never accused of corruption. Though, like most of his countrymen, he suffered from the mania for grandeur, and was too fond of imposing schemes out of all proportion with the resources of the state, he was undoubtedly an able and patriotic man, whose administration was beneficial to Spain.

For his administration see W. Coxe, *Memoirs of the Kings of Spain of the House of Bourbon* (London, 1815), but the only complete account of Ensenada is by Don Antonio Rodriguez Villa, *Don Cenon de Somodevilla, Marques de la Ensenada* (Madrid, 1878). (D. H.)

ENSIGN (through the Fr. *enseigne* from the Latin plural *insignia*), a distinguishing token, emblem or badge such as symbols of office, or in heraldry, the ornament or sign, such as the crown, coronet or mitre borne above the charge or arms. The word is more particularly used of a military or naval standard or banner. In the British navy, ensign has a specific meaning, and is the name of a flag having a red, white or blue ground, with the Union Jack in the upper corner next the staff. The white ensign (which is sometimes further distinguished by having the St George's Cross quartered upon it) is only used in the royal navy and the royal yacht squadron, while the blue and red ensigns are the badges of the naval reserve, some privileged companies, and the merchant service respectively (see Flag). Until 1871 the lowest grade of commissioned officers in infantry regiments of the British army had the title of ensign (now replaced by that of second lieutenant). It is the duty of the officers of this rank to carry the colours of the regiment (see Colours, Military). In the 16th century ensign was corrupted into "ancient," and was used in the two senses of a banner and the bearer of the banner. In the United States navy, the title ensign superseded in 1862 that of *passed midshipman*. It designates an officer ranking with second lieutenant in the army.

ENSILAGE, the process of preserving green food for cattle in an undried condition in a silo (from Gr. σιρός, Lat. *sirus*, a pit for holding grain), *i.e.* a pit, an erection above ground, or stack, from which air has been as far as possible excluded. The fodder which is the result of the process is called silage. In various parts of Germany a method of preserving green fodder precisely similar to that used in the case of *Sauerkraut* has prevailed for upwards of a century. Special attention was first directed to the practice of ensilage by a French agriculturist, Auguste Goffart of the district of Sologne, near Orleans, who in 1877 published a work (*Manuel de la culture et de l'ensilage des maïs et autres fourrages verts*) detailing the experiences of many years in preserving green crops in silos. An English translation of Goffart's book by J. B. Brown was published in New York in 1879, and, as various experiments had been previously made in the United States in the way of preserving green crops in pits, Goffart's experience attracted considerable attention. The conditions of American dairy farming proved eminently suitable for the ensiling of green maize fodder; and the success of the method was soon indisputably demonstrated among the New England farmers. The favourable results obtained in America led to much discussion and to the introduction of the system in the United Kingdom, where, with different conditions, success has been more qualified.

It has been abundantly proved that ensilage forms a wholesome and nutritious food for cattle. It can be substituted for root crops with advantage, because it is succulent and digestible; milk resulting from it is good in quality and taste; it can be secured largely irrespective of weather; it carries over grass from the period of great abundance and waste to times when none would otherwise be available; and a larger number of cattle can be supported on a given area by the use of ensilage than is possible by the use of green crops.

Early silos were made of stone or concrete either above or below ground, but it is recognized that air may be sufficiently excluded in a tightly pressed stack, though in this case a few inches of the fodder round the sides is generally useless owing to mildew. In America round erections made of wood and 35 or 40 ft. in depth are most commonly used. The crops suitable for ensilage are the ordinary grasses, clovers, lucerne, vetches, oats, rye and maize, the latter being the most important silage crop in America; various weeds may also be stored in silos with good results, notably spurrey (*Spergula arvensis*), a most troublesome plant in poor light soils. As a rule the crop should be mown when in full flower, and deposited in the silo on the day of its cutting. Maize is cut a few days before it is ripe and is shredded before being elevated into the silo. Fair, dry weather is not essential; but it is found that when moisture, natural and extraneous, exceeds 75% of the whole, good results are not obtained. The material is spread in uniform layers over the floor of the silo, and closely packed and trodden down. If possible, not more than a foot or two should be added daily, so as to allow the mass to settle down closely, and to heat uniformly throughout. When the silo is filled or the stack built, a layer of straw or some other dry porous substance may be spread over the surface. In the silo the pressure of the material, when chaffed, excludes air from all but the top layer; in the case of the stack extra pressure is applied by means of planks or other weighty objects in order to prevent excessive heating.

The closeness with which the fodder is packed determines the nature of the resulting silage by regulating the chemical changes which occur in the stack. When closely packed, the supply of oxygen is limited; and the attendant acid fermentation brings about the decomposition of the carbohydrates present into acetic, butyric and lactic acids. This product is named "sour silage." If, on the other hand, the fodder be unchaffed and loosely packed, or the silo be built gradually, oxidation proceeds more rapidly and the temperature rises; if the mass be compressed when the temperature is 140°–160° F., the action ceases and "sweet silage" results. The nitrogenous ingredients of the fodder also suffer change: in making sour silage as much as one-third of the albuminoids may be converted into amino and ammonium compounds; while in making "sweet silage" a less proportion is changed, but they become less digestible. In extreme cases, sour silage acquires a most disagreeable odour. On the other hand it keeps better than sweet silage when removed from the silo.

ENSTATITE, a rock-forming mineral belonging to the group of orthorhombic pyroxenes. It is a magnesium metasilicate, $MgSiO_3$, often with a little iron replacing the magnesium: as the iron increases in amount there is a transition to bronzite (*q.v.*), and with still more iron to hypersthene (*q.v.*). Bronzite and hypersthene were known long before enstatite, which was first described by G. A. Kenngott in 1855, and named from ἐνστάτης, "an opponent," because the mineral is almost infusible before the blowpipe: the material he described consisted of imperfect prismatic crystals, previously thought to be scapolite, from the serpentine of Mount Zdjar near Schönberg in Moravia. Crystals suitable for goniometric measurement were later found in the meteorite which fell at Breitenbach in the Erzgebirge, Bohemia. Large crystals, a foot in length and mostly altered to steatite, were found in 1874 in the apatite veins traversing mica-schist and hornblende-schist at the apatite mine of Kjörrestad, near Brevig in southern Norway. Isolated crystals are of rare occurrence, the mineral being usually found as an essential constituent of igneous rocks; either as irregular masses in plutonic rocks (norite, peridotite, pyroxenite, &c.) and the serpentines which have resulted by their alteration, or as small idiomorphic crystals in volcanic rocks (trachyte, andesite). It is also a common constituent of meteoric stones, forming with olivine the bulk of the material: here it often forms small spherical masses, or chondrules, with an internal radiated structure.

Enstatite and the other orthorhombic pyroxenes are distinguished from those of the monoclinic series by their optical characters, viz. straight extinction, much weaker double refraction and stronger pleochroism: they have prismatic cleavages (with an angle of 88° 16′) as well as planes of parting parallel to the planes of symmetry in the prism-zone. Enstatite is white, greenish or brown in colour; its hardness is 5½, and sp. gr. 3·2–3·3. (L. J. S.)

ENTABLATURE (Lat. *in*, and *tabula*, a tablet), the architectural term for the superstructure carried by the columns in the classic orders (*q.v.*). It usually consists of three members, the architrave (the supporting member carried from column to column, pier or wall); the frieze (the decorative member); and the cornice (the projecting and protective member). Sometimes the frieze is omitted, as in the entablature of the portico of the caryatides of the Erechtheum. There is every reason to believe that the frieze did not exist in the archaic temple of Diana at Ephesus; and it is not found in the Lycian tombs, which are reproductions in the rock of timber structures based on early Ionian work.

ENTADA, in botany, a woody climber belonging to the family *Leguminosae* and common throughout the tropics. The best-known species is *Entada scandens*, the sword-bean, so called from its large woody pod, 2 to 4 ft. in length and 3 to 4 in. broad, which contains large flat hard polished chestnut-coloured seeds or "beans." The seeds are often made into snuff-boxes or match-boxes, and a preparation from the kernel is used as a drug by the natives in India. The seeds will float for a long time in water, and are often thrown up on the north-western coasts of Europe, having been carried by the Gulf-stream from the West Indies; they retain their vitality, and under favourable conditions will germinate. Linnaeus records the germination of a seed on the coast of Norway.

ENTAIL (from Fr. *tailler*, to cut; the old derivation from *tales haeredes* is now abandoned), in law, a limited form of succession (*q.v.*). In architecture, the term "entail" denotes an ornamental device sunk in the ground of stone or brass, and subsequently filled in with marble, mosaic or enamel.

ENTASIS (from Gr. ἐντείνειν, to stretch a line or bend a bow), in architecture, the increment given to the column (*q.v.*), to correct the optical illusion which produces an apparent hollowness in an extended straight line. It was referred to by Vitruvius (iii. 3), and was first noticed in the columns of the Doric orders in Greek temples by Allason in 1814, and afterwards measured and verified by Penrose. It varies in different temples, and is not found in some: it is most pronounced in the temple of Jupiter Olympius, most delicate in the Erechtheum. The entasis is almost invariably introduced in the spires of English churches.

ENTERITIS (Gr. ἔντερον, intestine), a general medical term for inflammation of the bowels. According to the anatomical part specially attacked, it is subdivided into duodenitis, jejunitis, ileitis, typhlitis, appendicitis, colitis, proctitis. The chief sympton is diarrhoea. The term "enteric fever" has recently come into use instead of "typhoid" for the latter disease; but see Typhoid Fever.

ENTHUSIASM, a word originally meaning inspiration by a divine afflatus or by the presence of a god. The Gr. ἐνθουσιασμός, from which the word is adapted, is formed from the verb ἐνθουσιάζειν, to be ἔνθεος, possessed by a god (θέος). Applied by the Greeks to manifestations of divine "possession," by Apollo, as in the case of the Pythia, or by Dionysus, as in the case of the Bacchantes and Maenads, it was also used in a transferred or figurative sense; thus Socrates speaks of the inspiration of poets as a form of enthusiasm (Plato, *Apol. Soc.* 22 C). Its uses, in a religious sense, are confined to an exaggerated or wrongful belief in religious inspiration, or to intense religious fervour or emotion. Thus a Syrian sect of the 4th century was known as "the Enthusiasts"; they believed that by perpetual prayer, ascetic practices and contemplation, man could become inspired by the Holy Spirit, in spite of the ruling evil spirit, which the fall had given to him. From their belief in the efficacy of prayer (εὐχή), they were also known as Euchites. In ordinary usage, "enthusiasm" has lost its peculiar religious significance, and means a whole-hearted devotion to an ideal, cause, study or pursuit; sometimes, in a depreciatory sense, it implies a devotion which is partisan and is blind to difficulties and objections. (See further Inspiration, for a comparison of the religious meanings of "enthusiasm," "ecstasy" and "fanaticism.")

ENTHYMEME (Gr. ἐν, θυμός), in formal logic, the technical name of a syllogistic argument which is incompletely stated. Any one of the premises may be omitted, but in general it is that one which is most obvious or most naturally present to the mind. In point of fact the full formal statement of a syllogism is rare, especially in rhetorical language, when the deliberate omission of one of the premises has a dramatic effect. Thus the suppression of the conclusion may have the effect of emphasizing the idea which necessarily follows from the premises. Far commoner is the omission of one of the premises which is either too clear to need statement or of a character which makes its omission desirable. A famous instance quoted in the *Port Royal Logic*, pt. iii. ch. xiv., is Medea's remark to Jason in Ovid's *Medea*, "Servare potui, perdere an possim rogas?" where the major premise "Qui servare, perdere possunt" is understood. This use of the word enthymeme differs from Aristotle's original application of it to a syllogism based on probabilities or signs (ἐξ εἰκότων ἢ σημείων), *i.e.* on propositions which are generally valid (εἰκότα) or on particular facts which may be held to justify a general principle or another particular fact (*Anal. prior.* β xxvii. 70 a 10).

See beside text-books on logic, Sir W. Hamilton's *Discussions* (1547); Mansel's ed. of Aldrich, Appendix F; H. W. B. Joseph, *Introd. to Logic*, chap. xvi.

ENTOMOLOGY (Gr. ἔντομα, insects, and λόγος, a discourse), the science that treats of insects, *i.e.* of the animals included in the class Hexapoda of the great phylum (or sub-phylum) Arthropoda. The term, however, is somewhat elastic in its current use, and students of centipedes and spiders are often reckoned among the entomologists. As the number of species of insects is believed to exceed that of all other animals taken together, it is no wonder that their study should form a special division of zoology with a distinctive name.

Beetles (Scarabaei) are the subjects of some of the oldest sculptured works of the Egyptians, and references to locusts, bees and ants are familiar to all readers of the Hebrew scriptures. The interest of insects to the eastern races was, however, economic, religious or moral. The science of insects began with Aristotle, who included in a class "Entoma" the true insects, the arachnids and the myriapods, the Crustacea forming another class ("Malacostraca") of the "Anaema" or "bloodless animals." For nearly 2000 years the few writers who dealt with zoological subjects followed Aristotle's leading.

In the history of the science, various lines of progress have to be traced. While some observers have studied in detail the structure and life-history of a few selected types (insect anatomy and development), others have made a more superficial examination of large series of insects to classify them and determine their relationships (systematic entomology), while others again have investigated the habits and life-relations of insects (insect bionomics). During recent years the study of fossil insects (palaeoëntomology) has attracted much attention.

The foundations of modern entomology were laid by a series of wonderful memoirs on anatomy and development published in the 17th and 18th centuries. Of these the most famous are M. Malpighi's treatise on the silkworm (1669) and J. Swammerdam's *Biblia naturae*, issued in 1737, fifty years after its author's death, and containing observations on the structure and life-history of a series of insect types. Aristotle and Harvey (*De generatione animalium*, 1651) had considered the insect larva as a prematurely hatched embryo and the pupa as a second egg. Swammerdam, however, showed the presence under the larval cuticle of the pupal structures. His only unfortunate contribution to entomology—indeed to zoology generally—was his theory of pre-formation, which taught the presence within the egg of a perfectly formed but miniature adult. A year before Malpighi's great work appeared, another Italian naturalist, F. Redi, had disproved by experiment the spontaneous generation of maggots from putrid flesh, and had shown that they can only develop from the eggs of flies.

Meanwhile the English naturalist, John Ray, was studying the classification of animals; he published, in 1705, his *Methodus insectorum*, in which the nature of the metamorphosis received due weight. Ray's "Insects" comprised the Arachnids, Crustacea, Myriapoda and Annelida, in addition to the Hexapods. Ray was the first to formulate that definite conception of the species which was adopted by Linnaeus and emphasized by his binominal nomenclature. In 1735 appeared the first edition of the *Systema naturae* of Linnaeus, in which the "Insecta" form a group equivalent to the Arthropoda of modern zoologists, and are divided into seven orders, whose names—Coleoptera, Diptera, Lepidoptera, &c., founded on the nature of the wings—have become firmly established. The fascinating subjects of insect bionomics and life-history were dealt with in the classical memoirs (1734–1742) of the Frenchman R. A. F. de Réaumur, and (1752–1778) of the Swede C. de Geer. The freshness, the air of leisure, the enthusiasm of discovery that mark the work of these old writers have lessons for the modern professional zoologist, who at times feels burdened with the accumulated knowledge of a century and a half. From the end of the 18th century until the present day, it is only possible to enumerate the outstanding features in the progress of entomology. In the realm of classification, the work of Linnaeus was continued in Denmark by J. C. Fabricius (*Systema entomologica*, 1775), and extended in France by G. P. B. Lamarck (*Animaux sans vertèbres*, 1801) and G. Cuvier (*Leçons d'anatomie comparée*, 1800–1805), and in England by W. E. Leach (*Trans. Linn. Soc.* xi., 1815). These three authors definitely separated the Arachnida, Crustacea and Myriapoda as classes distinct from the Insecta (see Hexapoda). The work of J. O. Westwood (*Modern Classification of Insects*, 1839–1840) connects these older writers with their successors of to-day.

In the anatomical field the work of Malpighi and Swammerdam was at first continued most energetically by French students. P. Lyonnet had published in 1760 his elaborate monograph on the goat-moth caterpillar, and H. E. Strauss-Dürckheim in 1828 issued his great treatise on the cockchafer. But the name of J. C. L. de Savigny, who (*Mém. sur les animaux sans vertèbres*, 1816) established the homology of the jaws of all insects whether biting or sucking, deserves especial honour. Many anatomical and developmental details were carefully worked out by L. Dufour (in a long series of memoirs from 1811 to 1860) in France, by G. Newport ("Insecta" in *Encyc. Anat. and Physiol.*, 1839) in England, and by H. Burmeister (*Handbuch der Entomologie*, 1832) in Germany. Through the 19th century, as knowledge increased, the work of investigation became necessarily more and more specialized. Anatomists like F. Leydig, F. Müller, B. T. Lowne and V. Graber turned their attention to the detailed investigation of some one species or to special points in the structure of some particular organs, using for the elucidation of their subject the ever-improving microscopical methods of research.

Societies for the discussion and publication of papers on entomology were naturally established as the number of students increased. The Société Entomologique de France was founded in 1832, the Entomological Society of London in 1834. Few branches of zoology have been more valuable as a meeting-ground for professional and amateur naturalists than entomology, and not seldom has the amateur—as in the case of Westwood—developed into a professor. During the pre-Linnaean period, the beauty of insects—especially the Lepidoptera—had attracted a number of collectors; and these "Aurelians"—regarded as harmless lunatics by most of their friends—were the forerunners of the systematic students of later times. While the insect fauna of European countries was investigated by local naturalists, the spread of geographical exploration brought ever-increasing stores of exotic material to the great museums, and specialization—either in the fauna of a small district or in the world-wide study of an order or a group of families—became constantly more marked in systematic work. As examples may be instanced the studies of A. H. Haliday and H. Loew on the European Diptera, of John Curtis on British insects, of H. T. Stainton and O. Staudinger on the European Lepidoptera, of R. M'Lachlan on the European and of H. A. Hagen on the North American Neuroptera, of D. Sharp on the *Dyticidae* and other families of Coleoptera of the whole world.

The embryology of insects is entirely a study of the last century. C. Bonnet indeed observed in 1745 the virgin-reproduction of Aphids, but it was not until 1842 that R. A. von Kölliker described the formation of the blastoderm in the egg of the midge *Chironomus*. Later A. Weismann (1863–1864) traced details of the growth of embryo and of pupa among the Diptera, and A. Kovalevsky in 1871 first described the formation of the germinal layers in insects. Most of the recent work on the embryology of insects has been done in Germany or the United States, and among numerous students V. Graber, K. Heider, W. M. Wheeler and R. Heymons may be especially mentioned.

The work of de Réaumur and de Geer on the bionomics and life-history of insects has been continued by numerous observers, among whom may be especially mentioned in France J. H. Fabre and C. Janet, in England W. Kirby and W. Spence, J. Lubbock (Lord Avebury) and L. C. Miall, and in the United States C. V. Riley. The last-named may be considered the founder of the strong company of entomological workers now labouring in America. Though Riley was especially interested in the bearings of insect life on agriculture and industry—economic entomology (*q. v.*)—he and his followers have laid the science generally under a deep obligation by their researches.

After the publication of C. Darwin's *Origin of Species* (1859) a fresh impetus was given to entomology as to all branches of zoology, and it became generally recognized that insects form a group convenient and hopeful for the elucidation of certain problems of animal evolution. The writings of Darwin himself and of A. R. Wallace (both at one time active entomological collectors) contain much evidence drawn from insects in favour of descent with modification. The phylogeny of insects has since been discussed by F. Brauer, A. S. Packard and many others; mimicry and allied problems by H. W. Bates, F. Müller, E. B. Poulton and M. C. Piepers; the bearing of insect habits on theories of selection and use-inheritance by A. Weismann, G. W. and E. Peckham, G. H. T. Eimer and Herbert Spencer; variation by W. Bateson and M. Standfuss.

Bibliography.—References to the works of the above authors, and to many others, will be found under Hexapoda and the special articles on various insect orders. Valuable summaries of the labours of Malpighi, Swammerdam and other early entomologists are given in L. C. Miall and A. Denny's *Cockroach* (London, 1886), and L. Henneguy's *Les Insectes* (Paris, 1904). (G. H. C.)

ENTOMOSTRACA. This zoological term, as now restricted, includes the Branchiopoda, Ostracoda and Copepoda. The Ostracoda have the body enclosed in a bivalve shell-covering, and normally unsegmented. The Branchiopoda have a very variable number of body-segments, with or without a shield, simple or bivalved, and some of the postoral appendages normally branchial. The Copepoda have normally a segmented body, not enclosed in a bivalved shell-covering, the segments not exceeding eleven, the limbs not branchial.

Under the heading Crustacea the Entomostraca have already been distinguished not only from the Thyrostraca or Cirripedes, but also from the Malacostraca, and an intermediate group of which the true position is still disputed. The choice is open to maintain the last as an independent subclass, and to follow Claus in calling it the Leptostraca, or to introduce it among the Malacostraca as the Nebaliacea, or with Packard and Sars to make it an entomostracan subdivision under the title Phyllocarida. At present it comprises the single family *Nebaliidae*. The bivalved carapace has a jointed rostrum, and covers only the front part of the body, to which it is only attached quite in front, the valve-like sides being under control of an adductor muscle. The eyes are stalked and movable. The first antennae have a lamellar appendage at the end of the peduncle, a decidedly non-entomostracan feature. The second antennae, mandibles and two pairs of maxillae may also be claimed as of malacostracan type. To these succeed eight pairs of foliaceous branchial appendages on the front division of the body, followed on the hind division by four pairs of powerful bifurcate swimming feet and two rudimentary pairs, the number, though not the nature, of these appendages being malacostracan. On the other hand, the two limbless segments that precede the caudal furca are decidedly non-malacostracan. The family was long limited to the single genus *Nebalia* (Leach), and the single species *N. bipes* (O. Fabricius). Recently Sars has added a Norwegian species, *N. typhlops*, not blind but weak-eyed. There are also now two more genera, *Paranebalia* (Claus, 1880), in which the branchial feet are much longer than in *Nebalia*, and *Nebaliopsis* (Sars, 1887), in which they are much shorter. All the species are marine.

Branchiopoda.—In this order, exclusion of the Phyllocarida will leave three suborders of very unequal extent, the Phyllopoda, Cladocera, Branchiura. The constituents of the last have often been classed as Copepoda, and among the Branchiopods must be regarded as aberrant, since the "branchial tail" implied in the name has no feet, and the actual feet are by no means obviously branchial.

Phyllopoda.—This "leaf-footed" suborder has the appendages which follow the second maxillae variable in number, but all foliaceous and branchial. The development begins with a free nauplius stage. In the outward appearance of the adults there is great want of uniformity, one set having their limbs sheltered by no carapace, another having a broad shield over most of them, and a third having a bivalved shell-cover within which the whole body can be enclosed. In accord with these differences the sections may be named Gymnophylla, Notophylla, Conchophylla. The equivalent terms applied by Sars are Anostraca, Notostraca, Conchostraca, involving a termination already appropriated to higher divisions of the Crustacean class, for which it ought to be reserved.

1. Gymnophylla.—These singular crustaceans have long soft flexible bodies, the eyes stalked and movable, the first antennae small and filiform, the second lamellar in the female, in the male prehensile; this last character gives rise to some very fanciful developments. There are three families, two of which form companies rather severely limited. Thus the *Polyartemiidae*, which compensate themselves for their stumpy little tails by having nineteen instead of the normal eleven pairs of branchial feet, consist exclusively of *Polyartemia forcipata* (Fischer, 1851). This species from the high north of Europe and Asia carries green eggs, and above them a bright pattern in ultramarine (Sars, 1896, 1897). The *Thamnocephalidae* have likewise but a single species, *Thamnocephalus platyurus* (Packard, 1877), which justifies its title "bushy-head of the broad tail" by a singularity at each end. Forward from the head extends a long ramified appendage described as the "frontal shrub," backward from the fourth abdominal segment of the male spreads a fin-like expansion which is unique. In the ravines of Kansas, pools supplied by torrential rains give birth to these and many other phyllopods, and in turn "millions of them perish by the drying up of the pools in July" (Packard). The remaining family, the *Branchipodidae*, includes eight genera. In the long familiar *Branchipus*, *Chirocephalus* and *Streptocephalus* the males have frontal appendages, but these are wanting in the "brine-shrimp" *Artemia*, and the same want helps to distinguish *Branchinecta* (Verrill, 1869) from the old genus *Branchipus*. Of *Branchiopsyllus* (Sars, 1897) the male is not yet known, but in his genera of the same date, the Siberian *Artemiopsis* and the South African *Branchipodopsis* (1898), there is no such appendage. Of the last genus the type species *B. hodgsoni* belongs to Cape Colony, but the specimens described were born and bred and observed in Norway. For the study of freshwater Entomostraca large possibilities are now opened to the naturalist. A parcel of dried mud, coming for example from Palestine or Queensland, and after an indefinite interval of time put into water in England or elsewhere, may yield him living forms, both new and old, in the most agreeable variety. Some caution should be used against confounding accidentally introduced indigenous species with those reared from the imported eggs. Those, too, who send or bring the foreign soil should exercise a little thought in the choice of it, since dry earth that has never had any Entomostraca near it at home will not become fertile in them by the mere fact of exportation.

2. Notophylla.—In this division the body is partly covered by a broad shield, united in front with the head; the eyes are sessile, the first antennae are small, the second rudimentary or wanting; of the numerous feet, sometimes sixty-three pairs, exceeding the number of segments to which they are attached, the first pair are more or less unlike the rest, and in the female the eleventh have the epipod and exopod (flabellum and sub-apical lobe of Lankester) modified to form an ovisac. Development begins with a nauplius stage. Males are very rare. The single family *Apodidae* contains only two genera, *Apus* and its very near neighbour *Lepidurus*. *Apus australiensis* (Spencer and Hall, 1896) may rank as the largest of the Entomostraca, reaching in the male, from front of shield to end of telson, a length of 70 mm., in the female of 64 mm. In a few days, or at most a fortnight, after a rainfall numberless specimens of these sizes were found swimming about, "and as not a single one was to be found in the water-pools prior to the rain, these must have been developed from the egg." Similarly, in Northern India *Apus himalayanus* was "collected from a stagnant pool in a jungle four days after a shower of rain had fallen," following a drought of four months (Packard).

3. Conchophylla.—Though concealed within the bivalved shell-cover, the mouth-parts are nearly as in the Gymnophylla, but the flexing of the caudal part is in contrast, and the biramous second antennae correspond with what is only a larval character in the other phyllopods. In the male the first one or two pairs of feet are modified into grasping organs. The small ova are crowded beneath the dorsal part of the valves. The development usually begins with a nauplius stage (Sars, 1896, 1900). There are four families: (*a*) The *Limnadiidae*, with feet from 18 to 32 pairs, comprise four (or five) genera. Of these *Limnadella* (Girard, 1855) has a single eye. It remains rather obscure, though the type species originally "was discovered in great abundance in a roadside puddle subject to desiccation." *Limnadia* (Brongniart, 1820) is supposed to consist of species exclusively parthenogenetic. But when asked to believe that males never occur among these amazons, one cannot but remember how hard it is to prove a negative. (*b*) The *Lynceidae*, with not more than twelve pairs of feet. This family is limited to the species, widely distributed, of the single genus *Lynceus*, established by O. F. Müller in 1776 and 1781, and first restricted by Leach in 1816 in the *Encyclopaedia Britannica* (art. "Annulosa," of that edition). Leach there assigns to it the single species *L. brachyurus* (Müller), and as this is included in the genus *Limnetis* (Lovén, 1846), that genus must be a synonym of *Lynceus* as restricted. (*c*) *Leptestheriidae*. *Estheria* (Rüppell, 1837) was instituted for the species *dahalacensis*, which Sars includes in his genus *Leptestheria* (1898); but *Estheria* was already appropriated, and of its synonyms *Cyzicus* (Audouin, 1837) is lost for vagueness, while *Isaura* (Joly, 1842) is also appropriated, so that *Leptestheria* becomes the name of the typical genus, and determines the name of the family. (*d*) *Cyclestheriidae*. This family consists of the single species *Cyclestheria hislopi* (Baird), reported from India, Ceylon, Celebes, Australia, East Africa and Brazil. Sars (1887) having had the opportunity of raising it from dried Australian mud, found that, unlike other phyllopods, but like the Cladocera, the parent keeps its brood within the shell until their full development.

Cladocera.—In this suborder the head is more or less distinct, the rest of the body being in general laterally compressed and covered by a bivalved test. The title "branching horns" alludes to the second antennae, which are two-branched except in the females of *Holopedium*, with each branch setiferous, composed of only two to four joints. The mandibles are without palp. The pairs of feet are four to six. The eye is single, and in addition to the eye there is often an "eye-spot," *Monospilus* being unique in having the eye-spot alone and no eye, while *Leydigiopsis* (Sars, 1901) has an eye with an eye-spot equal to it or larger. The heart has a pair of venous ostia, often blending into one, and an anterior arterial aorta. Respiration is conducted by the general surface, by the branchial lamina (external branch) of the feet, and the vesicular appendage (when present) at the base of this branch. The "abdomen," behind the limbs, is usually very short, occasionally very long. The "postabdomen," marked off by the two postabdominal setae, usually has teeth or spines, and ends in two denticulate or ciliate claws, or it may be rudimentary, as in *Polyphemus*. Many species have a special glandular organ at the back of the head, which *Sida crystallina* uses for attaching itself to various objects. The Leydigian or nuchal organ is supposed to be auditory and to contain an otolith. The female lays two kinds of eggs—"summer-eggs," which develop without fertilization, and "winter-eggs" or resting eggs, which require to be fertilized. The latter in the *Daphniidae* are enclosed in a modified part of the mother's shell, called the ephippium from its resemblance to a saddle in shape and position. In other families a less elaborate case has been observed, for which Scourfield has proposed the term protoephippium. In *Leydigia* he has recently found a structure almost as complex as that of the *Daphniidae*. In some families the resting eggs escape into the water without special covering. Only the embryos of *Leptodora* are known to hatch out in the nauplius stage. *Penilia* (Dana, 1849) is perhaps the only exclusively marine genus. The great majority of the Cladocera belong to fresh water, but their adaptability is large, since *Moina rectirostris* (O. F. Müller) can equally enjoy a pond at Blackheath, and near Odessa live in water twice as salt as that of the ocean. In point of size a Cladoceran of 5 mm. is spoken of as colossal.

Dr Jules Richard in his revision (1895) retains the sections proposed by Sars in 1865, Calyptomera and Gymnomera. The former, with the feet for the most part concealed by the carapace, is subdivided into two tribes, the Ctenopoda, or "comb-feet," in which the six pairs of similar feet, all branchial and nonprehensile, are furnished with setae arranged like the teeth of a comb, and the Anomopoda, or "variety-feet," in which the front feet differ from the rest by being more or less prehensile, without branchial laminae.

The Ctenopoda comprise two families: (*a*) the *Holopediidae*, with a solitary species, *Holopedium gibberum* (Zaddach), queerly clothed in a large gelatinous involucre, and found in mountain tarns all over Europe, in large lakes of N. America, and also in shallow ponds and waters at sea-level; (*b*) the *Sididae*, with no such involucre, but with seven genera, and rather more than twice as many species. Of *Diaphanosoma modiglianii* Richard says that at different points of Lake Toba in Sumatra millions of specimens were obtained, among which he had not met with a single male.

The Anomopoda are arranged in four families, all but one very extensive. (*a*) *Daphniidae.* Of the seven genera, the cosmopolitan *Daphnia* contains about 100 species and varieties, of which Thomas Scott (1899) observes that "scarcely any of the several characters that have at one time or another been selected as affording a means for discriminating between the different forms can be relied on as satisfactory." Though this may dishearten the systematist, Scourfield (1900) reminds us that "It was in a water-flea that Metschnikoff first saw the leucocytes (or phagocytes) trying to get rid of disease germs by swallowing them, and was so led to his epoch-making discovery of the part played by these minute amoeboid corpuscles in the animal body." For *Scapholeberis mucronata* (O. F. Müller), Scourfield has shown how it is adapted for movement back downwards in the water along the underside of the surface film, which to many small crustaceans is a dangerously disabling trap. (*b*) *Bosminidae.* To *Bosmina* (Baird, 1845) Richard added *Bosminopsis* in 1895. (*c*) *Macrotrichidae.* In this family *Macrothrix* (Baird, 1843) is the earliest genus, among the latest being *Grimaldina* (Richard, 1892) and *Jheringula* (Sars, 1900). Dried mud and vegetable débris from S. Paulo in Brazil supplied Sars with representatives of all the three in his Norwegian aquaria, in some of which the little *Macrothrix elegans* "multiplied to such an extraordinary extent as at last to fill up the water with immense shoals of individuals." "The appearance of male specimens was always contemporary with the first ephippial formation in the females." For *Streblocerus pygmaeus*, grown under the same conditions, Sars observes: "This is perhaps the smallest of the Cladocera known, and is hardly more than visible to the naked eye," the adult female scarcely exceeding 0·25 mm. Yet in the next family *Alonella nana* (Baird) disputes the palm and claims to be the smallest of all known Arthropoda. (*d*) *Chydoridae.* This family, so commonly called *Lynceidae*, contains a large number of genera, among which one may usually search in vain, and rightly so, for the genus *Lynceus*. The key to the riddle is to be found in the *Encyclopaedia Britannica* for 1816. There, as above explained, Leach began the subdivision of Müller's too comprehensive genus, the result being that *Lynceus* belongs to the Phyllopoda, and *Chydorus* (Leach, 1816) properly gives its name to the present family, in which the doubly convoluted intestine is so remarkable. Of its many genera, *Leydigia*, *Leydigiopsis*, *Monospilus* have been already mentioned. *Dadaya macrops* (Sars, 1901), from South America and Ceylon, has a very large eye and an eye-spot fully as large, but it is a very small creature, odd in its behaviour, moving by jumps at the very surface of the water. "To the naked eye it looked like a little black atom darting about in a most wonderful manner."

The Gymnomera, with a carapace too small to cover the feet, which are all prehensile, are divided also into two tribes, the Onychopoda, in which the four pairs of feet have a toothed maxillary process at the base, and the Haplopoda, in which there are six pairs of feet, without such a process. To the *Polyphemidae*, the well-known family of the former tribe, Sars in 1897 added two remarkable genera, *Cercopagis*, meaning "tail with a sling," and *Apagis*, "without a sling," for seven species from the Sea of Azov. The Haplopoda likewise have but a single family, the *Leptodoridae*, and this has but the single genus *Leptodora* (Lilljeborg, 1861). Dr Richard (1895, 1896) gives a Cladoceran bibliography of 601 references.

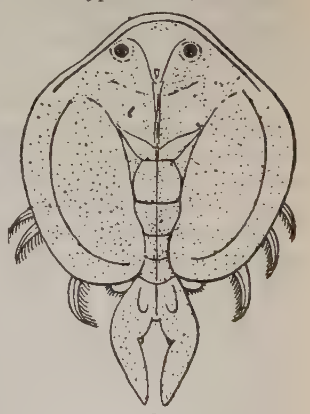

FIG. 1.—*Dolops ranarum* (Stuhlmann).

Branchiura.—This term was introduced by Thorell in 1864 for the *Argulidae*, a family which had been transferred to the Branchiopoda by Zenker in 1854, though sometimes before and since united with the parasitic Copepoda. Though the animals have an oral siphon, they do not carry ovisacs like the siphonostomous copepods, but glue their eggs in rows to extraneous objects. Their lateral, compound, feebly movable eyes agree with those of the Phyllopoda. The family are described by Claus as “intermittent parasites,” because when gorged they leave their hosts, fishes or frogs, and swim about in freedom for a considerable period. The long-known *Argulus* (O. F. Müller) has the second maxillae transformed into suckers, but in *Dolops* (Audouin, 1837) (fig. 1), the name of which supersedes the more familiar *Gyropeltis* (Heller, 1857), these effect attachment by ending in strong hooks (Bouvier, 1897). A third genus, *Chonopeltis* (Thiele, 1900), has suckers, but has lost its first antennae, at least in the female.

OSTRACODA.—The body, seldom in any way segmented, is wholly encased in a bivalved shell, the caudal part strongly inflexed, and almost always ending in a furca. The limbs, including antennae and mouth organs, never exceed seven definite pairs. The first antennae never have more than eight joints. The young usually pass through several stages of development after leaving the egg, and this commonly after, even long after, the egg has left the maternal shell. Parthenogenesis is frequent.

The four tribes instituted by Sars in 1865 were reduced to two by G. W. Müller in 1894, the Myodocopa, which almost always have a heart, and the Podocopa, which have none.

Myodocopa.—These have the furcal branches broad, lamellar, with at least three pairs of strong spines or ungues. Almost always the shell has a rostral sinus. Müller divides the tribe into three families, *Cypridinidae*, *Halocypridae*, and the heartless *Polycopidae*, which constituted the tribe Cladocopa of Sars. From the first of these Brady and Norman distinguish the Asteropidae (fig. 3), remarkable for seven pairs of long branchial leaves which fold over the hinder extremity of the animal, and the *Sarsiellidae*, still somewhat obscure, besides adding the *Rutidermatidae*, knowledge of which is based on skilful maceration of minute and long-dried specimens. The *Halocypridae* are destitute of compound lateral eyes, and have the sexual orifice unsymmetrically placed.

Podocopa.—In these the furcal branches are linear or rudimentary, the shell is without rostral sinus, and, besides distinguishing characters of the second antennae, they have always a branchial plate well developed on the first maxillae, which is inconstant in the other tribe. There are five families: (*a*) *Cyprididae* (? including *Cypridopsidae* of Brady and Norman). In some of the genera parthenogenetic propagation is carried to such an extent that of the familiar *Cypris* it is said, “until quite lately males in this genus were unknown; and up to the present time no male has been found in the British Islands” (Brady and Norman, 1896). On the other hand, the ejaculatory duct with its verticillate sac in the male of *Cypris* and other genera is a feature scarcely less remarkable. (*b*) *Bairdiidae*, which have the valves smooth, with the hinge untoothed. (*c*) *Cytheridae* (? including *Paradoxostomatidae* of Brady and Norman), in which the valves are usually sculptured, with toothed hinge. Of this family the members are almost exclusively marine, but *Limnicythere* is found in fresh water, and *Xestoleberis bromeliarum* (Fritz Müller) lives in the water that collects among the leaves of Bromelias, plants allied to the pine-apples. (*d*) *Darwinulidae*, including the single species *Darwinula stevensoni*, Brady and Robertson, described as “perhaps the most characteristic Entomostracan of the East Anglian Fen District.” (*e*) *Cytherellidae*, which, unlike the Ostracoda in general, have the hinder part of the body segmented, at least ten segments being distinguishable in the female. They have the valves broad at both ends, and were placed by Sars in a separate tribe, called Platycopa.

The range in time of the Ostracoda is so extended that, in G. W. Müller's opinion, their separation into the families now living may have already taken place in the Cambrian period. Their range in space, including carriage by birds, may be co-extensive with the distribution of water, but it is not known what height of temperature or how much chemical adulteration of the water they can sustain, how far they can penetrate underground, nor what are the limits of their activity between the floor and the surface of aquatic expanses, fresh or saline. In individual size they have never been important, and of living forms the largest is one of recent discovery, *Crossophorus africanus*, a Cypridinid about three-fifths of an inch (15·5 mm.) long; but a length of one or two millimetres is more common, and it may descend to the seventy-fifth of an inch. By multitude they have been, and still are, extremely important.

Though the exterior is more uniform than in most groups of Crustacea, the bivalved shell or carapace may be strongly calcified and diversely sculptured (fig. 2), or membranaceous and polished, hairy or smooth, oval or round or bean-shaped, or of some less simple pattern; the valves may fit neatly, or one overlap the other, their hinge may have teeth or be edentulous, and their front part may be excavated for the protrusion of the antennae or have no such “rostral sinus.” By various modifications of their valves and appendages the creatures have become adapted for swimming, creeping, burrowing, or climbing, some of them combining two or more of these activities, for which their structure seems at the first glance little adapted. Considering the imprisonment of the ostracod body within the valves, it is more surprising that the *Asteropidae* and *Cypridinidae* should have a pair of compound and sometimes large eyes, in addition to the median organ at the base of the “frontal tentacle,” than that other members of the group should be limited to that median organ of sight, or have no eyes at all. The median eye when present may have or not have a lens, and its three pigment-cups may be close together or wide apart and the middle one rudimentary. As might be expected, in thickened and highly embossed valves thin spaces occur over the visual organ. The frontal organ varies in form and apparently in function, and is sometimes absent. The first antennae, according to the family, may assist in walking, swimming, burrowing, climbing, grasping, and besides they carry sensory setae, and sometimes they have suckers on their setae (see Brady and Norman on *Cypridina norvegica*). The second antennae are usually the chief motor-organs for swimming, walking and climbing. The mandibles are normally five-jointed, with remnants of an outer branch on the second joint, the biting edge varying from strong development to evanescence, the terminal joints or “palp” giving the organ a leg-like appearance and function, which disappears in suctorial genera such as *Paracytherois*. The variable first maxillae are seldom pediform, their function being concerned chiefly with nutrition, sensation and respiration. The variability in form and function of the second maxillae is sufficiently shown by the fact that G. W. Müller, our leading authority, adopts the confusing plan of calling them second maxillae in the *Cypridinidae* (including *Asteropidae*), maxillipeds in the *Halocypridae* and *Cyprididae*, and first legs in the *Bairdiidae*, *Cytheridae*, *Polycopidae* and *Cytherellidae*, so that in his fine monograph he uses the term first leg in two quite different senses. The first legs, meaning thereby the sixth pair of appendages, are generally pediform and locomotive, but sometimes unjointed, acting as a kind of brushes to cleanse the furca, while in the *Polycopidae* they are entirely wanting. The second legs are sometimes wanting, sometimes pediform and locomotive, sometimes strangely metamorphosed into the “vermiform organ,” generally long, many-jointed, and distally armed with retroverted spines, its function being that of an extremely mobile cleansing foot, which can insert itself among the eggs in the brood-space, between the branchial leaves of *Asterope* (fig. 3), and even range over the external surface of the valves. The “brush-formed” organs of the Podocopa are medially placed, and, in spite of their sometimes forward situation, Müller believes among other possibilities that they and the penis in the *Cypridinidae* may be alike remnants of a third pair of legs, not homologous with the penis of other Ostracoda (Podocopa included). The furca is, as a rule, a powerful motor-organ, and has its laminae edged with strong teeth (ungues) or setae or both. The young, though born with valves, have at first a nauplian body, and pass through various stages to maturity.

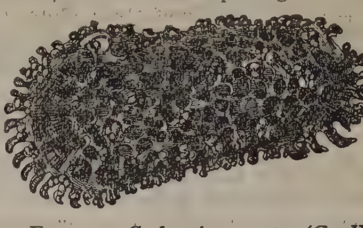

Fig. 2.—*Cythereis ornata* (G. W. Müller). One eye-space is shown above on the left.

Brady and Norman, in their *Monograph of the Ostracoda of the North Atlantic and North-Western Europe* (1889), give a bibliography of 125 titles, and in the second part (1896) they give 55 more. The lists are not meant to be exhaustive, any more than G. W. Müller's literature list of 125 titles in 1894. They do not refer to Latreille, 1802, with whom the term Ostracoda originates.

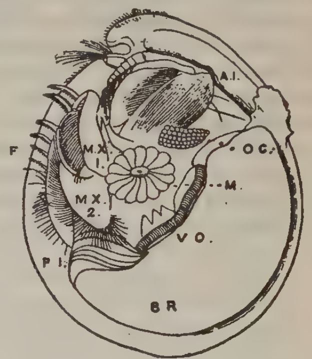

Fig. 3.—*Asterope arthuri*. Left valve removed.

M, End of adductor muscle.
OC, Eye.
AI, Second antenna.
MX. 1, First maxilla.
MX. 2, Second maxilla.
P. 1, First foot.
V.O, Vermiform organ.
BR, Seven branchial leaves.
F, Projecting ungues of the furca.

COPEPODA.—The body is not encased in a bivalved shell; its articulated segments are at most eleven, those behind the genital segment being without trace of limbs, but the last almost always carrying a furca. Sexes separate, fertilization by spermatophores. Ova in single or double or rarely several packets, attached as ovisacs or egg-strings to the genital openings, or enclosed in a dorsal marsupium, or deposited singly or occasionally in bundles. The youngest larvae are typical nauplii. The next, the copepodid or cyclopid, stage is characterized by a cylindrical segmented body, with fore- and hind-body distinct, and by having at most six cephalic limbs and two pairs of swimming feet.

The order thus defined (see Giesbrecht and Schmeil, *Das Tierreich*, 1898), with far over a thousand species (Hansen, 1900), embraces forms of extreme diversity, although, when species are known in all their phases and both sexes, they constantly tend to prove that there are no sharply dividing lines between the free-living, the semi-parasitic, and those which in adult life are wholly parasitic and then sometimes grotesquely unlike the normal standard. Giesbrecht and Hansen have shown that the mouth-organs consist of mandibles, first and second maxillae and maxillipeds; and Claus himself relinquished his long-maintained hypothesis that the last two pairs were the separated exopods and endopods of a single pair of appendages. Thorell's classification (1859) of Gnathostoma, Poecilostoma, Siphonostoma, based on the mouth-organs, was long followed, though almost at the outset shown by Claus to depend on the erroneous supposition that the Poecilostoma were devoid of mandibles. Brady added a new section, Choniostomata, in 1894, and another, Leptostomata, in 1900, each for a single species. Canu in 1892 proposed two groups, Monoporodelphya and Diporodelphya, the copulatory openings of the female being paired in the latter, unpaired in the former. It may be questioned whether this distinction, however important in itself, would lead to a satisfactory grouping of families. In the same year Giesbrecht proposed his division of the order into Gymnoplea and Podoplea.

In appearance an ordinary Copepod is divided into fore- and hind-body, of its eleven segments the composite first being the head, the next five constituting the thorax, and the last five the abdomen. The coalescence of segments, though frequent, does not after a little experience materially confuse the counting. But there is this peculiarity, that the middle segment is sometimes continuous with the broader fore-body, sometimes with the narrower hind-body. In the former case the hind-body, consisting only of the abdomen, forms a pleon or tail-part devoid of feet, and the species so constructed are Gymnoplea, those of the naked or footless pleon. In the latter case the middle segment almost always carries with it to the hind-body a pair of rudimentary limbs, whence the term Podoplea, meaning species that have a pleon with feet. It may be objected that hereby the term pleon is used in two different senses, first applying to the abdomen alone and then to the abdomen plus the last thoracic segment. Even this verbal flaw would be obviated if Giesbrecht could prove his tentative hypothesis, that the Gymnoplea may have lost a pre-genital segment of the abdomen, and the Podoplea may have lost the last segment of the thorax. The classification is worked out as follows:—

1. *Gymnoplea.*—First segment of hind-body footless, bearing the orifices of the genital organs (in the male unsymmetrically placed); last foot of the fore-body in the male a copulatory organ; neither, or only one, of the first pair of antennae in the male geniculating; cephalic limbs abundantly articulated and provided with many plumose setae; heart generally present. Animals usually free-living, pelagic (Giesbrecht and Schmeil).

This group, with 65 genera and four or five hundred species, is divided by Giesbrecht into tribes: (*a*) Amphaskandria. In this tribe the males have both antennae of the first pair as sensory organs. There is but one family, the *Calanidae*, but this is a very large one, with 26 genera and more than 100 species. Among them is the cosmopolitan *Calanus finmarchicus*, the earliest described (by Bishop Gunner in 1770) of all the marine free-swimming Copepoda. Among them also is the peacock Calanid, *Calocalanus pavo* (Dana), with its highly ornamented antennae and gorgeous tail, the most beautiful species of the whole order (fig. 4). (*b*) Heterarthrandria. Here the males have one or the other of the first pair of antennae modified into a grasping organ for holding the female. There are four families, the *Diaptomidae* with 27 genera, the *Pontellidae* with 10, the *Pseudocyclopidae* and *Candaciidae* each with one genus. The first of these families is often called *Centropagidae*, but, as Sars has pointed out, *Diaptomus* (Westwood, 1836) is the oldest genus in it. Of 177 species valid in the family Giesbrecht and Schmeil assign 67 to *Diaptomus*. In regard to one of its species Dr Brady says: "In one instance, at least (Talkin Tarn, Cumberland) I have seen the net come up from a depth of 6 or 8 ft. below the surface with a dense mass consisting almost entirely of *D. gracilis*." The length of this net-filling species is about a twentieth of an inch.

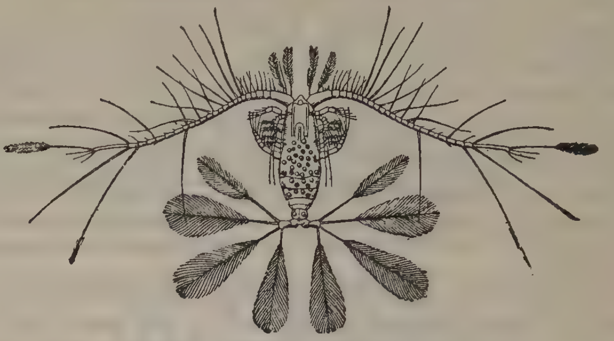

FIG. 4.—*Calocalanus pavo* (Dana).

2. *Podoplea.*—The first segment of the hind-body almost always with rudimentary pair of feet; orifices of the genital organs (symmetrically placed in both sexes) in the following segment; neither the last foot of the fore-body nor the rudimentary feet just mentioned acting as a copulatory organ in the male; both or neither of the first pair of antennae in the male geniculating; cephalic limbs less abundantly articulated and with fewer plumose setae or none, but with hooks and clasping setae. Heart almost always wanting. Free-living (rarely pelagic) or parasitic (Giesbrecht and Schmeil).

This group is also divided by Giesbrecht into two tribes, Ampharthrandria and Isokerandria. In 1892 he distinguished the former as those in which the first antennae of the male have both members modified for holding the female, and the genital openings of the female have a ventral position, sometimes in close proximity, sometimes strongly lateral; the latter as those in which the first antennae of the male are similar to those of the female, the function of holding her being transferred to the male maxillipeds, while the genital openings of the female are dorsal, though at times strongly lateral. In 1899, with a view to the many modifications exhibited by parasitic and semi-parasitic species, the definitions, stripped of a too hampering precision, took a different form: (*a*) Ampharthrandria. "Swimming Podoplea with geniculating first antennae in the male sex, and descendants of such; first antennae in female and male almost always differently articulated." The families occupy fresh water as well as the sea. Naturally "descendants" which have lost the characteristic feature of the definition cannot be recognized without some further assistance than the definition supplies. Of the families comprised, the *Mormonillidae* consist only of *Mormonilla* (Giesbrecht), and are not mentioned by Giesbrecht in 1899 in the grouping of this section. The *Thaumatoessidae* include *Thaumatoessa* (Kröyer), established earlier than its synonym *Thaumaleus* (Kröyer), or than *Monstrilla* (Dana, 1849). The species are imperfectly known. The defect of mouth-organs probably does not apply to the period of youth, which some of them spend parasitically in the body-cavity of worms (Giard, 1896). To the *Cyclopidae* six genera are allotted by Giesbrecht in 1900. *Cyclops* (O. F. Müller, 1776), though greatly restricted since Müller's time, still has several scores of species abundantly peopling inland waters of every kind and situation, without one that can be relied on as exclusively marine like the species of *Oithona* (Baird). The *Misophriidae* are now limited to *Misophria* (Boeck). The presence of a heart in this genus helps to make it a link between the Podoplea and Gymnoplea, though in various other respects it approaches the next family. The *Harpacticidae* owe their name to the genus *Arpacticus* (Milne-Edwards, 1840). Brady in 1880 assigns to this family 33 genera and 81 species. Canu (1892) distinguishes eight sub-families, *Longipediinae*, *Peltidiinae*, *Tachidiinae*, *Amymoninae*, *Harpacticinae*, *Idyinae*, *Canthocamptinae* (for which *Canthocampinae* should be read), and *Nannopinae*, adding *Stenheliinae* (Brady) without distinctive characters for it. The *Ascidicolidae* have variable characters, showing a gradual adaptation to parasitic life in Tunicates. Giesbrecht (1900) considers Canu quite right in grouping together in this single family those parasites of ascidians, simple and compound, which had been previously distributed among families with the more or less significant names *Notodelphyidae*, *Doropygidae*, *Buproridae*, *Schizoproctidae*, *Kossmechtridae*, *Enterocolidae*, *Enteropsidae*. Further, he includes in it his own *Enterognathus comatulae*, not from an ascidian, but from the intestine of the beautiful starfish *Antedon rosaceus*. The *Asterocheridae*, which have a good swimming capacity, except in the case of *Cancerilla tubulata* (Dalyell), lead a semi-parasitic life on echinoderms, sponges, &c., imbibing their food. Giesbrecht, displacing the older name *Ascomyzontidae*, assigns to this family 21 genera in five subfamilies, and suggests that the long-known but still puzzling *Nicothoë* from the gills of the lobster might be placed in an additional subfamily, or be made the representative of a closely related family. The *Dichelestiidae*, on account of their sometimes many-jointed first antennae, are referred also to this tribe by Giesbrecht. (*b*) Isokerandria. "Swimming Podoplea without geniculating first antennae in the male sex, and descendants of such. First antennae of male and female almost always articulated alike." To this tribe Giesbrecht assigns the families *Clausidiidae*, *Corycaeidae*, *Oncaeidae*, *Lichomolgidae*, *Ergasilidae*, *Bomolochidae*, *Clausiidae*, *Nereicolidae*. Here also must for the time be placed the *Caligidae*, *Philichthyidae* (*Philichthydae* of Vogt, Carus, Claus), *Lernaeidae*, *Chondracanthidae*, *Sphaeronellidae* (better known as *Choniostomatidae*, from H. J. Hansen's remarkable study of the group), *Lernaeopodidae*, *Herpyllobiidae*, *Entomolepidae*. For the distinguishing marks of all these, the number of their genera and species, their habits and transformations and dwellings, the reader must be referred to the writings of specialists. Sars (1901) proposed seven suborders—Calanoida, Harpacticoida, Cyclopoida, Notodelphoida, Monstrilloida, Caligoida, Lernaeoida.

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ENTRAGUES, CATHERINE HENRIETTE DE BALZAC D' (1579–1633), marquise de Verneuil, mistress of Henry IV., king of France, was the daughter of Charles Balzac d'Entragues and of Marie Touchet, mistress of Charles IX. Ambitious and intriguing, she succeeded in inducing Henry IV. to promise to marry her after the death of Gabrielle d'Estrées, a promise which led to bitter scenes at court when shortly afterwards Henry married Marie de' Medici. She carried her spite so far as to be deeply compromised in the conspiracy of Marshal Biron against the king in 1606, but escaped with a slight punishment, and in 1608 Henry actually took her back into favour again. She seems then to have been involved in the Spanish intrigues which preceded the death of the king in 1610.

See H. de la Ferrière, *Henri IV. le roi, l'amoureux* (Paris, 1890).

ENTRECASTEAUX, JOSEPH-ANTOINE BRUNI D' (1739–1793), French navigator, was born at Aix in 1739. At the age of fifteen he entered the navy. In the war of 1778 he commanded a frigate of thirty-two guns, and by his clever seamanship was successful in convoying a fleet of merchant vessels from Marseilles to the Levant, although they were attacked by two pirate vessels, each of which was larger than his own ship. In 1785 he was appointed to the command of the French fleet in the East Indies, and two years later he was named governor of the Mauritius and the Isle of Bourbon. While in command of the East India fleet he made a voyage to China, an achievement which, in 1791, led the French government to select him to command an expedition which it was sending out to seek some tidings of the unfortunate La Pérouse, of whom nothing had been heard since February 1788. Rear-admiral d'Entrecasteaux's expedition comprised the "Recherche" and "L'Esperance," with Captain Huon de Kermadec as second in command. No tidings were obtained of the missing navigator, but in the course of his search Entrecasteaux made important geographical discoveries. He traced the outlines of the eastern coast of New Caledonia, made extensive surveys round the Tasmanian coast, and touched at several places on the south coast of New Holland. The two ships entered Storm Bay, Tasmania, on the 21st of April 1792, and remained there until the 16th of May, surveying and naming the d'Entrecasteaux Channel, the entrances to the Huon and Derwent rivers, Bruni Island, Recherche Bay, Port Esperance and various other localities. Excepting the name of the river Derwent (originally called Riviere du Nord by its French discoverers), these foregoing appellations have been retained. Leaving Tasmania the expedition sailed northward for the East Indies, and while coasting near the island of Java, Entrecasteaux was attacked by scurvy and died on the 20th of July 1793.

ENTRE MINHO E DOURO (popularly called *Minho*), a former province of Northern Portugal; bounded on the N. by Galicia in Spain, E. by Traz-os-Montes, S. by Beira and W. by the Atlantic Ocean. Pop. (1900) 1,170,361; area 2790 sq. m. Though no longer officially recognized, the old provincial name remains in common use. The coast-line of Entre Minho e Douro is level and unbroken except by the estuaries of the main rivers; inland, the elevation gradually increases towards the north and east, where several mountain ranges mark the frontier. Of these, the most important are the Serra da Peneda (4728 ft.), between the rivers Minho and Limia; the Serra do Gerez (4357 ft.), on the Galician border; the Serra da Cabreira (4021 ft.), immediately to the south; and the Serra de Marão (4642 ft.), in the extreme south-east. As its name implies, the province is bounded by two great rivers, the Douro (*q.v.*) on the south, and the Minho (Spanish *Miño*) on the north; but a small tract of land south of the Douro estuary is included also within the provincial boundary. There are three other large rivers which, like the Minho, flow west-south-west into the Atlantic. The Limia or Antela (Spanish *Linia*) rises in Galicia, and reaches the sea at Vianna do Castello; the Cavado springs from the southern foot hills of La Raya Seca, on the northern frontier of Traz-os-Montes, and forms, at its mouth, the small harbour of Espozende; and the Ave descends from its sources in the Serra da Cabreira to Villa do Conde, where it enters the Atlantic. A large right-hand tributary of the Douro, the Tamega, rises in Galicia, and skirts the western slopes of the Serra de Marão.

The climate is mild, except among the mountains, and such plants as heliotrope, fuchsias, palms, and aloes thrive in the open throughout the year. Wheat and maize are grown on the plains, and other important products are wine, fruit, olives and chestnuts. Fish abound along the coast and in the main rivers; timber is obtained from the mountain forests, and dairy-farming and the breeding of pigs and cattle are carried on in all parts. As the province is occupied by a hardy and industrious peasantry, and the density of population (419·5 per sq. m.) is more than twice that of any other province on the Portuguese mainland, the soil is very closely cultivated. The methods and implements of the farmers are, however, most primitive, and at the beginning of the 20th century is was not unusual to see a mule, or even a woman, harnessed with the team of oxen to an old-fashioned wooden plough. Small quantities of coal, iron, antimony, lead and gold are mined; granite and slate are quarried; and there are mineral springs at Monção (pop. 2283) on the Minho. The Oporto-Corunna railway traverses the western districts and crosses the Spanish frontier at Tuy; its branch lines give access to Braga, Guimarães and Povoa de Varzim; and the Oporto-Salamanca railway passes up the Douro valley. The greater part of the north and west can only be reached by road, and even the chief highways are ill-kept. In these regions the principal means of transport is the springless wooden cart, drawn by one or more of the tawny and under-sized but powerful oxen, with immense horns and elaborately carved yoke, which are characteristic of northern Portugal. For administrative purposes the province is divided into three districts: Vianna do Castello in the north, Braga in the centre, Oporto in the south. The chief towns are separately described; they include Oporto (167,955), one of the greatest wine-producing cities in the world; Braga (24,202), the seat of an archbishop who is primate of Portugal; the seaports of Povoa de Varzim (12,623) and Vianna do Castello (9990); and Guimarães (9104), a place of considerable historical interest.

ENTREPÔT (a French word, from the Lat. *interpositum*, that which is placed between), a storehouse or magazine for the temporary storage of goods, provisions, &c.; also a place where goods, which are not allowed to pass into a country duty free, are stored under the superintendence of the custom house authorities till they are re-exported. In a looser sense, any town which has a considerable distributive trade is called an *entrepôt*. The word is also used attributively to indicate the kind of trade carried on in such towns.

ENTRE RIOS (Span. "between rivers"), a province of the eastern Argentine Republic, forming the sourthern part of a region sometimes described as the Argentine Mesopotamia, bounded N. by Corrientes, E. by Uruguay with the Uruguay river as the boundary line, S. by Buenos Aires and W. by Santa Fé, the Paraná river forming the boundary line with these two provinces. Pop. (1895) 292,019; (1905, est.) 376,600. The province has an area of 28,784 sq. m., consisting for the most part of an undulating, well-watered and partly-wooded plain, terminating in a low, swampy district of limited extent in the angle between the two great rivers. The great forest of Monteil occupies an extensive region in the N., estimated at nearly one-fifth the area of the province. Its soil is exceptionally fertile and its climate is mild and healthy. The province is sometimes called the "garden of Argentina," which would probably be sufficiently correct had its population devoted as much energy to agriculture as they have to political conflict and civil war. Its principal industry is that of stock-raising, exporting live cattle, horses, hides, jerked beef, tinned and salted meats, beef extract, mutton and wool. Its agricultural products are also important, including wheat, Indian corn, barley and fruits. Lime, gypsum and firewood are also profitable items in its export trade. The Paraná and Uruguay rivers provide exceptional facilities for the shipment of produce and the Entre Rios railways, consisting of a trunk line running E. and W. across the province from Paraná to Concepción del Uruguay and several tributary branches, afford ample transportation facilities to the ports. Another railway line follows the Uruguay from Concordia northward into Corrientes. Entre Rios has been one of the most turbulent of the Argentine provinces, and has suffered severely from political disorder and civil war. Comparative quiet reigned from 1842 to 1870 under the autocratic rule of Gen. J. J. Urquiza. After his assassination in 1870 these partizan conflicts were renewed for two or three years, and then the province settled down to a life of comparative peace, followed by an extraordinary development in her pastoral and agricultural industries. Among these is the slaughtering and packing of beef, the exportation of which has reached large proportions. The capital is Paraná, though the seat of government was originally located at Concepción del Uruguay, and was again transferred to that town during Urquiza's domination. Concepción del Uruguay, or Concepción (founded 1778), is a flourishing town and port on the Uruguay, connected by railway with an extensive producing region which gives it an important export trade, and is the seat of a national college and normal school. Its population was estimated at 9000 in 1905. Other large towns are Gualeguay and Gualeguaychú.

ENVOY (Fr. *envoyé*, "sent"), a diplomatic agent of the second rank. The word *envoyé* comes first into general use in this connexion in the 17th century, as a translation of the Lat. *ablegatus* or *missus* (see DIPLOMACY). Hence the word envoy is commonly used of any one sent on a mission of any sort.

ENZIO (*c.* 1220–1272), king of Sardinia, was a natural son of the emperor Frederick II. His mother was probably a German, and his name, Enzio, is a diminutive form of the German *Heinrich*. His father had a great affection for him, and he was probably present at the battle of Cortenuova in 1237. In 1238 he was married, in defiance of the wishes of Pope Gregory IX., to Adelasia, widow of Ubaldo Visconti and heiress of Torres and Gallura in Sardinia. Enzio took at once the title of king of Torres and Gallura, and in 1243 that of king of Sardinia, but he only spent a few months in the island, and his sovereignty existed in name alone. In July 1239 he was appointed imperial vicegerent in Italy, and sharing in his father's excommunication in the same year, took a prominent part in the war which broke out between the emperor and the pope. He commenced his campaign by subduing the march of Ancona, and in May 1241 was in command of the forces which defeated the Genoese fleet at Meloria, where he seized a large amount of booty and captured a number of ecclesiastics who were proceeding to a council summoned by Gregory to Rome. Later he fought in Lombardy. In 1248 he assisted Frederick in his vain attempt to take Parma, but was wounded and taken prisoner by the Bolognese at Fossalta on the 26th of May 1249. His captivity was a severe blow to the Hohenstaufen cause in Italy, and was soon followed by the death of the emperor. He seems to have been well treated by the people of Bologna, where he remained a captive until his death on the 14th of March 1272. He was apparently granted a magnificent funeral, and was buried in the church of St Dominic at Bologna. During his imprisonment Enzio is said to have been loved by Lucia da Viadagola, a well-born lady of Bologna, who shared his captivity and attempted to procure his release. Some doubt has, however, been cast upon this story, and the same remark applies to another which tells how two friends had almost succeeded in freeing him from prison concealed in a wine-cask, when he was recognized by a lock of his golden hair. His marriage with Adelasia had been declared void by the pope in 1243, and he left one legitimate, and probably two illegitimate daughters. Enzio forms the subject of a drama by E. B. S. Raupach and of an opera by A. F. B. Dulk.

See F. W. Grossman, *König Enzio* (Göttingen, 1883); and H. Blasius, *König Enzio* (Breslau, 1884).

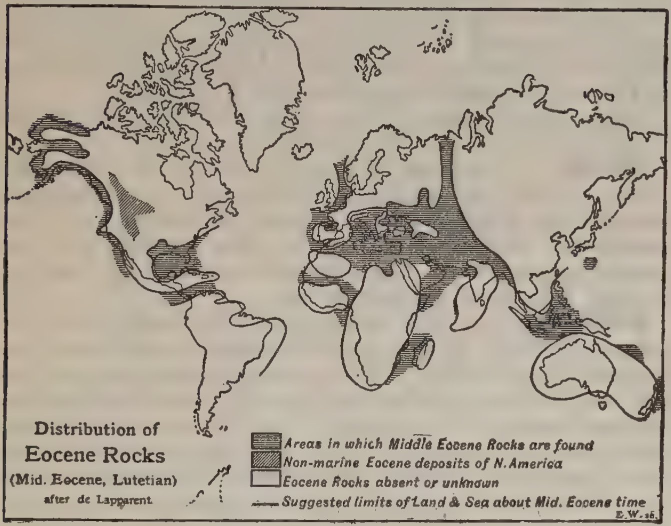
ENZYME (Gr. *ἔνζυμος*, leavened, from *ἐν*, in, and *ζύμη*, leaven), a term, first suggested by Kühne, for an unorganized ferment (see FERMENTATION), a group of substances, in the constitution of plants and animals, which decompose certain carbon compounds occurring in association with them. See also PLANTS: *Physiology*; NUTRITION, &c.

EOCENE (Gr. *ἠώς*, dawn, *καινός*, recent), in geology, the name suggested by Sir C. Lyell in 1833 for the lower subdivision of the rocks of the Tertiary Era. The term was intended to convey the idea that this was the period which saw the dawn of the recent or existing forms of life, because it was estimated that among the fossils of this period only 3½ % of the species are still living. Since Lyell's time much has been learned about the fauna and flora of the period, and many palaeontologists doubt if any of the Eocene *species* are still extant, unless it be some of the lowest forms of life. Nevertheless the name is a convenient one and is in general use. The Eocene as originally defined was not long left intact, for E. Beyrich in 1854 proposed the term "Oligocene" for the upper portion, and later, in 1874, K. Schimper suggested "Paleocene" as a separate appellation for the lower portion. The Oligocene division has been generally accepted as a distinct period, but "Paleocene" is not so widely used.

In north-western Europe the close of the Cretaceous period was marked by an extensive emergence of the land, accompanied, in many places, by considerable erosion of the Mesozoic rocks; a prolonged interval elapsed before a relative depression of the land set in and the first Eocene deposits were formed. The early Eocene formations of the London-Paris-Belgian basin were of fresh-water and brackish origin; towards the middle of the period they had become marine, while later they reverted to the original type. In southern and eastern Europe changes of sea-level were less pronounced in character; here the late Cretaceous seas were followed without much modification by those of the Eocene period, so rich in foraminiferal life. In many other regions, the great gap which separates the Tertiary from the Mesozoic rocks in the neighbourhood of London and Paris does not exist, and the boundary line is difficult to draw. Eocene strata succeed Cretaceous rocks without serious unconformity in the Libyan area, parts of Denmark, S.E. Alps, India, New Zealand and central N. America. The unconformity is marked in England, parts of Egypt, on the Atlantic coastal plain and in the eastern gulf region of N. America, as well as in the marine Eocene of western Oregon. The clastic Flysch formation of the

Carpathians and northern Alps appears to be of Eocene age in the upper and Cretaceous in the lower part. The Eocene sea covered at various times a strip of the Atlantic coast from New Jersey southward and sent a great tongue or bay up the Mississippi valley; similar epicontinental seas spread over parts of the Pacific border, but the plains of the interior with the mountains on the west were meanwhile being filled with terrestrial and lacustrine deposits which attained an enormous development. This great extension of non-marine formations in the Eocene of different countries has introduced difficulties in the way of exact correlation; it is safer, therefore, in the present state of knowledge, to make no attempt to find in the Eocene strata of America and India, &c., the precise equivalent of subdivisions that have been determined with more or less exactitude in the London-Paris-Belgian area.

It is possible that in Eocene times there existed a greater continuity of the northern land masses than obtains to-day. Europe at that time was probably united with N. America through Iceland and Greenland; while on the other side, America may have joined Asia by the way of Alaska. On the other hand, the great central, mediterranean sea which stretched across the Eurasian continents sent an arm northward somewhere just east of the Ural mountains, and thus divided the northern land mass in that region. S. America, Australia and perhaps Africa *may* have been connected more or less directly with the Antarctic continent.


Distribution of Eocene Rocks (Mid. Eocene, Lutetian) after de Lapparent
▤ Areas in which Middle Eocene Rocks are found
▨ Non-marine Eocene deposits of N. America
☐ Eocene Rocks absent or unknown
— Suggested limits of Land & Sea about Mid. Eocene time
E.W.16.

Associated, no doubt, with the crustal movements which closed the Cretaceous and inaugurated the Eocene period, there were local and intermittent manifestations of volcanic activity throughout the period. Diabases, gabbros, serpentines, soda-potash granites, &c., are found in the Eocene of the central and northern Apennines. Tuffs occur in the Veronese and Vicentin Alps—Ronca and Spelecco schists. Tuffs, basalts and other igneous rocks appear also in Montana, Wyoming, California, Oregon, Washington, Idaho, Colorado; also in Central America, the Antillean region and S. America.

It has been very generally assumed by geologists, mainly upon the evidence of plant remains, that the Eocene period opened with a temperate climate in northern latitudes; later, as indicated by the London Clay, Alum Bay and Bournemouth beds, &c., the temperature appears to have been at least subtropical. But it should be observed that the frequent admixture of temperate forms with what are now tropical species makes it difficult to speak with certainty as to the degree of warmth experienced. The occurrence of lignites in the Eocene of the Paris basin, Tirol and N. America is worthy of consideration in this connexion. On the other hand, the coarse boulder beds in the lower Flysch have been regarded as evidence of local glaciation; this would not be inconsistent with a period of widespread geniality of climate, as is indicated by the large size of the nummulites and the dispersion of the marine Mollusca, but the evidence for glaciation is not yet conclusive.

Eocene Stratigraphy.—In Britain, with the exception of the Bovey beds (*q.v.*) and the leaf-bearing beds of Antrim and Mull, Eocene rocks are confined to the south-eastern portion of England. They lie in the two well-marked synclinal basins of London and Hampshire which are conterminous in the western area (Hampshire, Berkshire), but are separated towards the east by the denuded anticline of the Weald. The strata in these two basins have been grouped in the following manner:—

	London Basin.	*Hampshire Basin.*
Upper	Upper Bagshot Sands.	Headon Hill and Barton Sands.
Middle	Middle Bagshot Beds and part of Lower Bagshot Beds.	Bracklesham Beds and leaf beds of Bournemouth and Alum Bay.
Lower	Part of Lower Bagshot Beds, London Clay, Blackheath and Oldhaven Beds, Woolwich and Reading Beds, Thanet Sands.	London Clay and the equivalent Bognor Beds, Woolwich and Reading Beds.

The Thanet sands have not been recognized in the Hampshire basin; they are usually pale yellow and greenish sands with streaks of clay and at the base; resting on an evenly denuded surface of chalk is a very constant layer of green-coated, well-rounded chalk flint pebbles. It is a marine formation, but fossils are scarce except in E. Kent, where it attains its most complete development. The Woolwich and Reading beds (see READING BEDS) contain both marine and estuarine fossils. In western Kent, between the Woolwich beds and the London Clay are the Oldhaven beds or Blackheath pebbles, 20 to 40 ft., made up almost entirely of well-rounded flint pebbles set in sand; the fossils are marine and estuarine. The London Clay, 500 ft. thick, is a marine deposit consisting of blue or brown clay with sandy layers and septarian nodules; its equivalent in the Hampshire area is sometimes called the Bognor Clay, well exposed on the coast of Sussex. The Bagshot, Bracklesham and Barton beds will be found briefly described under those heads.

Crossing the English Channel, we find in northern France and Belgium a series of deposits identified in their general characters with those of England. The anticlinal ridge of the English Weald is prolonged south-eastwards on to the continent, and separates the Belgian from the French Eocene areas much as it separates the areas of London and Hampshire; and it is clear that at the time of deposition all four regions were intimately related and subject to similar variations of marine and estuarine conditions. With a series of strata so variable from point to point it is natural that many purely local phases should have received distinctive names; in the Upper Eocene of the Paris basin the more important formations are the highly fossiliferous marine sands known as the "Sands of Beauchamp" and the local fresh-water limestone, the "Calcaire de St Ouen." The Middle Eocene is represented by the well-known "Calcaire grossier," about 90 ft. thick. The beds in this series vary a good deal lithologically, some being sandy, others marly or glauconitic; fossils are abundant. The Upper Calcaire grossier or "Caillasses" is a fresh-water formation; the middle division is marine; while the lower one is partly marine, partly of fresh-water origin. The numerous quarries and mines for building stone in the neighbourhood of Paris have made it possible to acquire a very precise knowledge of this division, and many of the beds have received trade names, such as "Rochette," "Roche," "Banc franc," "Banc vert," "Cliquart," "Saint Nom;" the two last named are dolomitic. Below these limestones are the nummulitic sands of Cuise and Soissons. The Lower Eocene contains the lignitic plastic clay (*argile plastique*) of Soissons and elsewhere; the limestones of Rilly and Sézanne and the greenish glauconitic sands of Bracheux. The relative position of the above formations with respect to those of Belgium and England will be seen from the table of Eocene strata. The Eocene deposits of southern Europe differ in a marked manner from those of the Anglo-Parisian basin. The most important feature is the great development of nummulitic limestone with thin marls and nummulitic sandstones. The sea in which the nummulitic limestones were formed occupied the site of an enlarged Mediterranean communicating with similar waters right round the world, for these rocks are found not only in southern Europe, including all the Alpine tracts, Greece and Turkey and southern Russia, but they are well developed in northern Africa, Asia Minor, Palestine, and they may be followed through Persia, Baluchistan, India, into China, Tibet, Japan, Sumatra, Borneo and the Philippines. The nummulitic limestones are frequently hard and crystalline, especially where they have been subjected to elevation and compression as in the Alpine region, 10,000 ft. above the sea, or from 16,000, to 20,000 ft., in the central Asian plateau. Besides being a wide-spread formation the nummulitic limestone is locally several thousand feet thick.

While the foraminiferal limestones were being formed over most of southern Europe, a series of clastic beds were in course of formation in the Carpathians and the northern Alpine region, viz. the Flysch and the Vienna sandstone. Some portions of this Alpine Eocene are coarsely conglomeratic, and in places there are boulders of non-local rocks of enormous dimensions included in the argillaceous or sandy matrix. The occurrence of these large boulders together with the scarceness of fossils has suggested a glacial origin for the formation; but the evidence hitherto collected is not conclusive. C. W. von Gümbel has classified the Eocene of the northern Alps (Bavaria, &c.) as follows:—

Upper Eocene	Flysch and Vienna sandstone, with younger nummulitic beds and Häring group.
Middle ,,	Kressenberg Beds, with older nummulitic beds.
Lower ,,	Burberg Beds, Greensands with small nummulites.

The Häring group of northern Tirol contains lignite beds of some importance. In the southern and S.E. Alps the following divisions are recognized.

Upper Eocene	Macigno or Tassello—Vienna Sandstone, conglomerates, marls and shales.
Middle ,,	Nummulitic limestones, three subdivisions.
Lower ,,	Liburnian stage (or Proteocene), foraminiferal limestones with fresh-water intercalations at the top and bottom, the *Cosina* beds, fresh-water in the middle of the series.

In the central and northern Apennines the Eocene strata have been subdivided by Prof. F. Sacco into an upper Bartonian, a middle Parisian and a lower Suessonian series. In the middle member are the representatives of the Flysch and the Macigno. These Eocene strata are upwards of 5500 ft. thick. In northern Africa the nummulitic limestones and sandstones are widely spread; the lower portions comprise the Libyan group and the shales of Esneh on the Nile (Flandrien), the *Alveolina* beds of Sokotra and others; the Mokattam stage of Egypt is a representative of the later Eocene. Much of the N. African Eocene contains phosphatic beds. In India strata of Eocene age are extensively developed; in Sind the marine Ranikot beds, 1500 to 2000 ft., consisting of clays with gypsum and lignite, shales and sandstones; these beds have, side by side with Eocene nummulites, a few fossils of Cretaceous affinities. Above the Ranikot beds are the massive nummulitic limestones and sandstones of the Kirthar group; these are succeeded by the nummulitic limestones and shales at the base of the Nari group. In the southern Himalayan region the nummulitic phase of Eocene deposit is well developed, but there are difficulties in fixing the line of demarcation between this and the younger formations. The lower part of the Sirmur series of the Simla district may belong to this period; it is subdivided into the Kasauli group and the Dagshai group with the Subâthu group at the base. Beneath the thick nummulitic Eocene limestone of the Salt Range are shales and marls with a few coal seams. The marine Eocene rocks of N. America are most extensively developed round the coast of the Gulf of Mexico, whence they spread into the valley of the Mississippi and, as a comparatively narrow strip, along the Atlantic coastal plain to New Jersey.

The series in Alabama, which may be taken as typical of the Gulf coast Eocene, is as follows:—

Upper	Jacksonian, White limestone of Alabama (and Vicksburg?).
Middle	Claibornian: Claiborne series. Buhrstone series.
Lower	Chickasawan Sands and lignites. Midwayan or Clayton formation, limestones.

The above succession is not fully represented in the Atlantic coast states.

On the Pacific coast marine formations are found in California and Oregon; such are the Tejon series with lignite and oil; the Escondido series of S. California (7000 ft.), part of the Pascadero series of the Santa Cruz Mountains; the Pulaski, Tyee, Arago and Coaledo beds—with coals—in Oregon. In the Puget formation of Washington we have a great series of sediments, largely of brackish water origin, and in parts coal-bearing. The total thickness of this formation has been estimated at 20,000 ft. (it may prove to be less than this), but it is probable that only the lower portion is of Eocene age. The most interesting of the N. American Eocene deposits are those of the Rocky Mountains and the adjacent western plains, in Wyoming, Nevada, Nebraska, Colorado, &c.; they are of terrestrial, lacustrine or aeolian origin, and on this account and because they were not strictly synchronous, there is considerable difficulty in placing them in their true position in the time-scale. The main divisions or groups are generally recognized as follows:—

		Mammalian Zonal Forms.
Upper	[1] Uinta Group, 800 ft. (? = Jacksonian).	*Diplacodon.* *Telmatotherium.*
Middle	[2] Bridger Group, 2000 ft. (? = Claibornian)	*Uintatherium.*
Lower	[3] Wind River Group, 800 ft.	*Bathyopsis.*
	[4] Wasatch Group, 2000 ft. (? = Chickasawan)	*Coryphodon.*
Basal	[5] Torrejon Group, 300 ft.	*Pantolambda.*
	[6] Puerco Group, 500 to 1000 ft.	*Polymastodon.*

The Fort Union beds of Canada and parts of Montana and N. Dakota are probably the oldest Eocene strata of the Western Interior; they are some 2000 ft. thick and possibly are equivalent to the Midwayan group. But in these beds, as in those known as Arapahoe, Livingston, Denver, Ohio and Ruby, which are now often classed as belonging to the upper Laramie formation, it is safer to regard them as a transitional series between the Mesozoic and Tertiary systems. There is, however, a marked unconformity between the Eocene Telluride or San Miguel and Poison Canyon formations of Colorado and the underlying Laramie rocks.

Many local aspects of Eocene rocks have received special names, but too little is known about them to enable them to be correctly placed in the Eocene series. Such are the Clarno formation (late Eocene) of the John Day basin, Oregon, the Pinyon conglomerate of Yellowstone Park, the Sphinx conglomerate of Montana, the Whitetail conglomerate of Arizona, the Manti shales of Utah, the Mojave formation of S. California and the Amyzon formation of Nevada.

Of the Eocene of other countries little is known in detail. Strata of this age occur in Central and S. America (Patagonia-Megellanian series—Brazil, Chile, Argentina), in S. Australia (and in the Great Australian Bight), New Zealand, in Seymour Island near Graham Land in the Antarctic Regions, Japan, Java, Borneo, New Guinea, Moluccas, Philippines, New Caledonia, also in Greenland, Bear Island, Spitzbergen and Siberia.

Organic Life of the Eocene Period.—As it has been observed above, the name Eocene was given to this period on the ground that in its fauna only a small percentage of *living* species were present; this estimation was founded upon the assemblage of invertebrate remains in which, from the commencement of this period until the present day, there has been comparatively little change. The real biological interest of the period centres around the higher vertebrate types. In the marine mollusca the most noteworthy change is the entire absence of ammonoids, the group which throughout the Mesozoic era had taken so prominent a place, but disappeared completely with the close of the Cretaceous. Nautiloids were more abundant than they are at present, but as a whole the Cephalopods took a more subordinate part than they had done in previous periods. On the other hand, Gasteropods and Pelecypods found in the numerous shallow seas a very suitable environment and flourished exceedingly, and their shells are often preserved in a state of great perfection and in enormous numbers. Of the Gasteropod genera *Cerithium* with its estuarine and lagoonal forms *Potamides*, *Potamidopsis*, &c., is very characteristic; *Rostellaria*, *Voluta*, *Fusus*, *Pleurotoma*, *Conus*, *Typhis*, may also be cited. *Cardium*, *Venericardia*, *Crassatella*, *Corbulomya*, *Cytherea*, *Lucina*, *Anomia*, *Ostrea* are a few of the many Pelecypod genera. Echinoderms were represented by abundant sea-urchins, *Echinolampas*, *Linthia*, *Conoclypeus*, &c. Corals flourished on the numerous reefs and approximated to modern forms (*Trochosmilia*, *Dendrophyllia*). But by far the most abundant marine organisms were the foraminifera which flourished in the warm seas in countless myriads. Foremost among these are the *Nummulites*, which by their extraordinary numerical development and great size, as well as by their wide distribution, demand special recognition. Many other genera of almost equal importance as rock builders, lived at the same time: *Orthophragma*, *Operculina*, *Assilina*, *Orbitolites*, *Miliola*, *Alveolina*. Crustacea were fairly abundant (*Xanthopsis*, *Portunus*), and most of the orders and many families of modern insects were represented.

When we turn to the higher forms of life, the reptiles and mammals, we find a remarkable contrast between the fauna of the Eocene and those periods which preceded and succeeded it. The great group of Saurian reptiles, whose members had held dominion on land and sea during most of the Mesozoic time, had completely disappeared by the beginning of the Eocene; in their place placental mammals made their appearance and rapidly became the dominant group. Among the early Eocene mammals no trace can be found of the numerous and clearly-marked orders with which we are familiar to-day; instead we find obscurely differentiated forms, which cannot be fitted without violence into any of the modern orders. The early placental mammals were generalized types (with certain non-placental characters) with potentialities for rapid divergence and development in the direction of the more specialized modern orders. Thus, the Creodonta foreshadowed the Carnivora, the

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[1] South of the Uinta Mts. in Utah.
[2] Fort Bridger Basin.
[3] Wind river in Wyoming.
[4] Wasatch Mts. in Utah.
[5] Torrejon in New Mexico.
[6] Puerco river. New Mexico.

Stages.		Paris Basin.	England.	Belgian Basin.	Mediterranean regions and Great Central sea.	Flysch Phase.	North America.
Bartonien.[1]		Limestone of Saint-Ouen. Sands of Mortefontaine. Sands of Beauchamp. Sands of Auvers.	Barton beds. Upper Bagshot sands.	Sands of Lede.	Nummulitic limestones, sandstones and shales.	Upper part of the Alpine Flysch and Vienna and Carpathian sandstones. Macigno of the Apennines and Maritime Alps.	Uinta Group and Jacksonian.
Lutétien.		Calcaire grossier.	Bracklesham and Bournemouth beds. Lower Bagshot sands.	Laekenien. Bruxellien. Panisélien.			Bridger Group and Claibornian.
Yprésien.		Nummulitic sands of Soissons and Sands of Cuise and Aizy.	Alum Bay leaf beds.	Sands of Mons en Pévèle. Flanders Clay.			Wind River Group. Wasatch Group and
Landénien.	Sparnacien.	Plastic Clay and lignite beds.	London Clay. Oldhaven beds. Woolwich and Reading beds.	Upper Landénien sands.			Chickasawan.
	Thanetien.	Limestones of Rilly and Sézanne. Sands of Rilly and Bracheux.	Thanet sands.	Sands of Ostricourt. Landénien tuffeau. Marls of Gelinden.			Torrejon Group and Midwayan. Puerco Group.

Condylarthra presaged the herbivorous groups; but before the close of this period, so favourable were the conditions of life to a rapid evolution of types, that most of the great *orders* had been clearly defined, though none of the Eocene *genera* are still extant. Among the early carnivores were *Arctocyon*, *Palaeonictis*, *Amblyctonus*, *Hyaenodon*, *Cynodon*, *Provivera*, *Patriofelis*. The primitive dog-like forms did not appear until late in the period, in Europe; and true cats did not arrive until later, though they were represented by *Eusmilus* in the Upper Eocene of France. The primitive ungulates (Condylarths) were generalized forms with five effective toes, exemplified in *Phenacodus*. The gross Amblypoda, with five-toed stumpy feet (*Coryphodon*), were prominent in the early Eocene; particularly striking forms were the *Dinoceratidae*, *Dinoceras*, with three pairs of horns or protuberances on its massive skull and a pair of huge canine teeth projecting downwards; *Tinoceras*, *Uintatherium*, *Loxophodon*, &c.; these elephantine creatures, whose remains are so abundant in the Eocene deposits of western America, died out before the close of the period. The divergence of the hoofed mammals into the two prominent divisions, the odd-toed and even-toed, began in this period, but the former did not get beyond the three-toed stage. The least differentiated of the odd-toed group were the Lophiodonts: tapirs were foreshadowed by *Systemodon* and similar forms (*Palaeotherium*, *Paloplotherium*); the peccary-like *Hyracotherium* was a forerunner of the horse, *Hyrochinus* was a primitive rhinoceros. The evolution of the horse through such forms as *Hyracotherium*, *Pachynolophus*, *Eohippus*, &c., appears to have proceeded along parallel lines in Eurasia and America, but the true horse did not arrive until later. Ancestral deer were represented by *Dichobune*, *Amphitragulus* and others, while many small hog-like forms existed (*Diplopus*, *Eohyus*, *Hyopotamus*, *Homacodon*). The primitive stock of the camel group developed in N. America in late Eocene time and sent branches into S. America and Eurasia. The edentates were very generalized forms at this period (Ganodonta); the rodents (Tillodontia) attained a large size for members of this group, *e.g. Tillotherium*. The Insectivores had Eocene forerunners, and the Lemuroids—probable ancestors of the apes—were forms of great interest, *Anaptomorphus*, *Microsyops*, *Heterohyus*, *Microchaerus*, *Coenopithecus*; even the Cetaceans were well represented by *Zeuglodon* and others.

The non-placental mammals although abundant were taking a secondary place; *Didelphys*, the primitive opossum, is noteworthy on account of its wide geographical range.

Among the birds, the large flightless forms, *Eupterornis*, *Gastornis*, were prominent, and many others were present, such as the ancestral forms of our modern gulls, albatrosses, herons, buzzards, eagles, owls, quails, plovers. Reptiles were poorly represented, with the exception of crocodilians, tortoises, turtles and some large snakes.

The flora of the Eocene period, although full of interest, does not convey the impression of newness that is afforded by the fauna of the period. The reason for this difference is this: the newer flora had been introduced and had developed to a considerable extent in the Cretaceous period, and there is no sharp break between the flora of the earlier and that of the later period; in both we find a mixed assemblage—what we should now regard as tropical palms, growing side by side with mild-temperate trees. Early Eocene plants in N. Europe, oaks, willows, chestnuts (Castanea), laurels, indicate a more temperate climate than existed in Middle Eocene when in the Isle of Wight, Hampshire and the adjacent portions of the continent, palms, figs, cinnamon flourished along with the cactus, magnolia, sequoia, cypress and ferns. The late Eocene flora of Europe was very similar to its descendant in modern Australasia.

See A. de Lapparent, *Traité de géologie*, vol. iii. (5th ed., 1906), which contains a good general account of the period, with numerous references to original papers. Also R. B. Newton, *Systematic List of the Frederick E. Edwards Collection of British Oligocene and Eocene Mollusca in the British Museum* (*Natural History*) (1891), pp. 299-325; G. D. Harris, "A Revision of our Lower Eocenes," *Proc. Geologists' Assoc.* x., 1887–1888; W. B. Clark, "Correlation Papers: Eocene" (1891), *U.S. Geol. Survey Bull. No. 83*. For more recent literature consult *Geological Literature added to the Geological Society's Library*, published annually by the society. (J. A. H.)

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Bartonien	from	Barton, England.
Lutétien	„	Lutetia = Paris.
Yprésien	„	Ypres, Flanders.
Landénien	„	Landen, Belgium.
Thanetien	„	The Isle of Thanet.
Sparnacien	„	Sparnacum = Epernay.
Laekenien	„	Laeken, Belgium.
Bruxellien	„	Brussels.
Panisélien	„	Mont Panisel, near Mons.

Other names that have been applied to subdivisions of the Eocene not included in the table are Parisien and Suessonien (Soissons); Ludien (Ludes in the Paris basin) and Priabonien (Priabona in the Vicentine Alps); Heersien (Heer near Maastricht) and Wemmelien (Wemmel. Belgium); very many more might be mentioned.

EON DE BEAUMONT, Charles Geneviève Louise Auguste André Timothée d' (1728–1810), commonly known as the Chevalier d'Eon, French political adventurer, famous for the supposed mystery of his sex, was born near Tonnerre in Burgundy, on the 7th of October 1728. He was the son of an advocate of good position, and after a distinguished course of study at the Collège Mazarin he became a doctor of law by special dispensation before the usual age, and adopted his father's profession. He began literary work as a contributor to Fréron's *Année littéraire*, and attracted notice as a political writer by two works on financial and administrative questions, which he published in his twenty-fifth year. His reputation increased so rapidly that in 1755 he was, on the recommendation of Louis François, prince of Conti, entrusted by Louis XV. (who had originally started his "secret" foreign policy—*i.e.* by undisclosed agents behind the backs of his ministers—in favour of the prince of Conti's ambition to be king of Poland) with a secret mission to the court of Russia. It was on this occasion that he is said for the first time to have assumed the dress of a woman, with the connivance, it is supposed, of the French court.[1] In this disguise he obtained the appointment of reader to the empress Elizabeth, and won her over entirely to the views of his royal master, with whom he maintained a secret correspondence during the whole of his diplomatic career. After a year's absence he returned to Paris to be immediately charged with a second mission to St Petersburg, in which he figured in his true sex, and as brother of the reader who had been at the Russian court the year before. He played an important part in the negotiations between the courts of Russia, Austria and France during the Seven Years' War. For these diplomatic services he was rewarded with the decoration of the grand cross of St Louis. In 1759 he served with the French army on the Rhine as aide-de-camp to the marshal de Broglie, and was wounded during the campaign. He had held for some years previously a commission in a regiment of dragoons, and was distinguished for his skill in military exercises, particularly in fencing. In 1762, on the return of the duc de Nivernais, d'Eon, who had been secretary to his embassy, was appointed his successor, first as resident agent and then as minister plenipotentiary at the court of Great Britain. He had not been long in this position when he lost the favour of his sovereign, chiefly, according to his own account, through the adverse influence of Madame de Pompadour, who was jealous of him as a secret correspondent of the king. Superseded by count de Guerchy, d'Eon showed his irritation by denying the genuineness of the letter of appointment, and by raising an action against Guerchy for an attempt to poison him. Guerchy, on the other hand, had previously commenced an action against d'Eon for libel, founded on the publication by the latter of certain state documents of which he had possession in his official capacity. Both parties succeeded in so far as a true bill was found against Guerchy for the attempt to murder, though by pleading his privilege as ambassador he escaped a trial, and d'Eon was found guilty of the libel. Failing to come up for judgment when called on, he was outlawed. For some years afterwards he lived in obscurity, appearing in public chiefly at fencing matches. During this period rumours as to the sex of d'Eon, originating probably in the story of his first residence at St Petersburg as a female, began to excite public interest. In 1774 he published at Amsterdam a book called *Les Loisirs du Chevalier d'Eon*, which stimulated gossip. Bets were frequently laid on the subject, and an action raised before Lord Mansfield in 1777 for the recovery of one of these bets brought the question to a judicial decision, by which d'Eon was declared a female. A month after the trial he returned to France, having received permission to do so as the result of negotiations in which Beaumarchais was employed as agent. The conditions were that he was to deliver up certain state documents in his possession, and to wear the dress of a female. The reason for the latter of these stipulations has never been clearly explained, but he complied with it to the close of his life. In 1784 he received permission to visit London for the purpose of bringing back his library and other property. He did not, however, return to France, though after the Revolution he sent a letter, using the name of Madame d'Eon, in which he offered to serve in the republican army. He continued to dress as a lady, and took part in fencing matches with success, though at last in 1796 he was badly hurt in one. He died in London on the 22nd of May 1810. During the closing years of his life he is said to have enjoyed a small pension from George III. A post-mortem examination of the body conclusively established the fact that d'Eon was a man.

The best modern accounts are in the duc de Broglie's *Le Secret du roi* (1888); Captain J. Buchan Telfer's *Strange Career of the Chevalier d'Eon* (1888); Octave Homberg and Fernand Jousselin, *Le Chevalier d'Eon* (1904); and A. Lang's *Historical Mysteries* (1904).

EÖTVÖS, JÓZSEF, BARON (1813–1871), Hungarian writer and statesman, the son of Baron Ignacz Eötvös and the baroness Lilian, was born at Buda on the 13th of September 1813. After an excellent education he entered the civil service as a vice-notary, and was early introduced to political life by his father. He also spent many years in western Europe, assimilating the new ideas both literary and political, and making the acquaintance of the leaders of the Romantic school. On his return to Hungary he wrote his first political work, *Prison Reform*; and at the diet of 1839–1840 he made a great impression by his eloquence and learning. One of his first speeches (published, with additional matter, in 1841) warmly advocated Jewish emancipation. Subsequently, in the columns of the *Pesti Hirlap*, Eötvös disseminated his progressive ideas farther afield, his standpoint being that the necessary reforms could only be carried out administratively by a responsible and purely national government. The same sentiments pervade his novel *The Village Notary* (1844–1846), one of the classics of the Magyar literature, as well as in the less notable romance *Hungary in 1514*, and the comedy *Long live Equality!* In 1842 he married Anna Rosty, but his happy domestic life did not interfere with his public career. He was now generally regarded as one of the leading writers and politicians of Hungary, while the charm of his oratory was such that, whenever the archduke palatine Joseph desired to have a full attendance in the House of Magnates, he called upon Eötvös to address it. The February revolution of 1848 was the complete triumph of Eötvös' ideas, and he held the portfolio of public worship and instruction in the first responsible Hungarian ministry. But his influence extended far beyond his own department. Eötvös, Deák and Szechényi represented the pacific, moderating influence in the council of ministers, but when the premier, Batthyány, resigned, Eötvös, in despair, retired for a time to Munich. Yet, though withdrawn from the tempests of the War of Independence, he continued to serve his country with his pen. His *Influence of the Ruling Ideas of the 19th Century on the State* (Pest, 1851–1854, German editions at Vienna and Leipzig the same year) profoundly influenced literature and public opinion in Hungary. On his return home, in 1851, he kept resolutely aloof from all political movements. In 1859 he published *The Guarantees of the Power and Unity of Austria* (Ger. ed. Leipzig, same year), in which he tried to arrive at a compromise between personal union and ministerial responsibility on the one hand and centralization on the other. After the Italian war, however, such a halting-place was regarded as inadequate by the majority of the nation. In the diet of 1861 Eötvös was one of the most loyal followers of Deák, and his speech in favour of the "Address" (see DEÁK, FRANCIS) made a great impression at Vienna. The enforced calm which prevailed during the next few years enabled him to devote himself once more to literature, and, in 1866, he was elected president of the Hungarian academy. In the diets of 1865 and 1867 he fought zealously by the side of Deák, with whose policy he now completely associated himself. On the formation of the Andrássy cabinet (Feb. 1867) he once more accepted the portfolio of public worship and education, being the only one of the ministers of 1848 who thus returned to office. He had now, at last, the opportunity of realizing the ideals of a lifetime. That very year the diet passed his bill for the emancipation of the Jews; though his further efforts in the direction of religious liberty were less successful, owing to the opposition of the Catholics. But his greatest achievement was the National Schools Act, the most complete system of education provided for Hungary since the days of Maria Theresa. Good Catholic though he was (in matters of religion he had been the friend and was the disciple of Montalembert), Eötvös looked with disfavour on the dogma of papal infallibility, promulgated in 1870, and when the bishop of

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[1] But see Lang's *Historical Mysteries*, pp. 241-242, where this traditional account is discussed and rejected.

Fehérvár proclaimed it, Eötvös cited him to appear at the capital *ad audiendum verbum regium*. He was a constant defender of the composition with Austria (*Ausgleich*), and during the absence of Andrássy used to preside over the council of ministers; but the labours of the last few years were too much for his failing health, and he died at Pest on the 2nd of February 1871. On the 3rd of May 1879 a statue was erected to him at Pest in the square which bears his name.

Eötvös occupied as prominent a place in Hungarian literature as in Hungarian politics. His peculiarity, both as a politician and as a statesman, lies in the fact that he was a true philosopher, a philosopher at heart as well as in theory; and in his poems and novels he clothed in artistic forms all the great ideas for which he contended in social and political life. The best of his verses are to be found in his ballads, but his poems are insignificant compared with his romances. It was *The Carthusians*, written on the occasion of the floods at Pest in 1838, that first took the public by storm. The Magyar novel was then in its infancy, being chiefly represented by the historico-epics of Jósiká. Eötvös first modernized it, giving prominence in his pages to current social problems and political aspirations. The famous *Village Notary* came still nearer to actual life, while *Hungary in 1514*, in which the terrible Dozsa *Jacquerie* (see Dozsa) is so vividly described, is especially interesting because it rightly attributes the great national catastrophe of Mohács to the blind selfishness of the Magyar nobility and the intense sufferings of the people. Yet, as already stated, all these books are written with a moral purpose, and their somewhat involved and difficult style is, nowadays at any rate, a trial to those who are acquainted with the easy, brilliant and lively novels of Jókai.

The best edition of Eötvös' collected works is that of 1891, in 17 vols. Comparatively few of his writings have been translated, but there are a good English version (London, 1850) and numerous German versions of *The Village Notary*, while *The Emancipation of the Jews* has been translated into Italian and German (Pest, 1841-1842), and a German translation of *Hungary in 1514*, under the title of *Der Bauernkrieg in Ungarn* was published at Pest in 1850.

See A. Bán, *Life and Art of Baron Joseph Eötvös* (Hung.) (Budapest, 1902); Zoltan Ferenczi *Baron Joseph Eötvös* (Hung.) (Budapest, 1903) [this is tbe best biography]; and M. Berkovics, *Baron Joseph Eotvos anu the French Literature* (Hung.) (Budapest, 1904). (R. N. B.)

EPAMINONDAS (*c.* 418–362), Theban general and statesman, born about 418 B.C. of a noble but impoverished family. For his education he was chiefly indebted to Lysis of Tarentum, a Pythagorean exile who had found refuge with his father Polymnis. He first comes into notice in the attack upon Mantineia in 385, when he fought on the Spartan side and saved the life of his future colleague Pelopidas. In his youth Epaminondas took little part in public affairs; he held aloof from the political assassinations which preceded the Theban insurrection of 379. But in the following campaigns against Sparta he rendered good service in organizing the Theban defence. In 371 he represented Thebes at the congress in Sparta, and by his refusal to surrender the Boeotian cities under Theban control prevented the conclusion of a general peace. In the ensuing campaign he commanded the Boeotian army which met the Peloponnesian levy at Leuctra, and by a brilliant victory on this site, due mainly to his daring innovations in the tactics of the heavy infantry, established at once the predominance of Thebes among the land-powers of Greece and his own fame as the greatest and most original of Greek generals. At the instigation of the Peloponnesian states which armed against Sparta in consequence of this battle, Epaminondas in 370 led a large host into Laconia; though unable to capture Sparta he ravaged its territory and dealt a lasting blow at Sparta's predominance in Peloponnesus by liberating the Messenians and rebuilding their capital at Messene. Accused on his return to Thebes of having exceeded the term of his command, he made good his defence and was re-elected boeotarch. In 369 he forced the Isthmus lines and secured Sicyon for Thebes, but gained no considerable successes. In the following year he served as a common soldier in Thessaly, and upon being reinstated in command contrived the safe retreat of the Theban army from a difficult position. Returning to Thessaly next year at the head of an army he procured the liberation of Pelopidas from the tyrant Alexander of Pherae without striking a blow. In his third expedition (366) to Peloponnesus, Epaminondas again eluded the Isthmus garrison and won over the Achaeans to the Theban alliance. Turning his attention to the growing maritime power of Athens, Epaminondas next equipped a fleet of 100 triremes, and during a cruise to the Propontis detached several states from the Athenian confederacy. When subsequent complications threatened the position of Thebes in Peloponnesus he again mustered a large army in order to crush the newly formed Spartan league (362). After some masterly operations between Sparta and Mantineia, by which he nearly captured both these towns, he engaged in a decisive battle on the latter site, and by his vigorous shock tactics gained a complete victory over his opponents (see Mantineia). Epaminondas himself received a severe wound during the combat, and died soon after the issue was decided.

His title to fame rests mainly on his brilliant qualities both as a strategist and as a tactician; his influence on military art in Greece was of the greatest. For the purity and uprightness of his character he likewise stood in high repute; his culture and eloquence equalled the highest Attic standard. In politics his chief achievement was the final overthrow of Sparta's predominance in the Peloponnese; as a constructive statesman he displayed no special talent, and the lofty pan-Hellenic ambitions which are imputed to him at any rate never found a practical expression.

Cornelius Nepos, *Vita Epaminondae*; Diodorus xv. 52-88; Xenophon, *Hellenica*, vii.; L. Pomtow, *Das Leben des Epaminondas* (Berlin, 1870); von Stein, *Geschichte der spartanischen und thebanischen Hegemonie* (Dorpat, 1884), pp. 123 sqq.; H. Swoboda in Pauly-Wissowa, *Realencyclopädie*, v. pt. 2 (Stuttgart, 1905), pp. 2674-2707; also Army: *History*, § 6. (M. O. B. C.)

EPARCH, an official, a governor of a province of Roman Greece, ἐπαρχος, whose title was equivalent to, or represented that of the Roman *praefectus*. The area of his administration was called an eparchy (ἐπαρχία). The term survives as one of the administrative units of modern Greece, the country being divided into nomarchies, subdivided into eparchies, again subdivided into demarchies (see Greece: *Local Administration*). "Eparch" and "eparchy" are also used in the Russian Orthodox Church for a bishop and his diocese respectively.

EPAULETTE (a French word, from *épaule*, a shoulder), properly a shoulder-piece, and so applied to the shoulder-knot of ribbon to which a scapulary was attached, worn by members of a religious order. The military usage was probably derived from the metal plate (*épaulière*) which protected the shoulder in the defensive armour of the 16th century. It was first used merely as a shoulder knot to fasten the baldric, and the application of it to mark distinctive grades of rank was begun in France at the suggestion, it is said, of Charles Louis Auguste Fouquet, duc de Belle-Isle, in 1759. In modern times it always appears as a shoulder ornament for military and naval uniforms. At first it consisted merely of a fringe hanging from the end of the shoulder-strap or cord over the sleeve, but towards the end of the 18th century it became a solid ornament, consisting of a flat shoulder-piece, extended beyond the point of the shoulder into an oval plate, from the edge of which hangs a thick fringe, in the case of officers of gold or silver. The epaulette is worn in the British navy by officers above the rank of sub-lieutenant; in the army it ceased to be worn about 1855. It is worn by officers in the United States navy above the rank of ensign; since 1872 it is only worn by general officers in the army. In most other countries epaulettes are worn by officers, and in the French army by the men also, with a fringe of worsted, various distinctions of shape and colour being observed between ranks, corps and arms of the service. The "scale" is similar to the epaulette, but has no fringe.

ÉPÉE, CHARLES-MICHEL, Abbé de l' (1712–1789), celebrated for his labours in behalf of the deaf and dumb, was born at Paris on the 25th of November 1712, being the son of the king's architect. He studied for the church, but having declined to sign a religious formula opposed to the doctrines of the Jansenists, he was denied ordination by the bishop of his diocese. He then devoted himself to the study of law; but about the time of his admission to the bar of Paris, the bishop of Troyes granted him ordination, and offered him a canonry in his cathedral. This bishop died soon after, and the abbé, coming to Paris, was, on account of his relations with Soanen, the famous Jansenist, deprived of his ecclesiastical functions by the archbishop of Beaumont. About the same time it happened that he heard of two deaf mutes whom a priest lately dead had been endeavouring to instruct, and he offered to take his place. The Spaniard Pereira was then in Paris, exhibiting the results he had obtained in the education of deaf mutes; and it has been affirmed that it was from him that Épée obtained his manual alphabet. The abbé, however, affirmed that he knew nothing of Pereira's method; and whether he did or not, there can be no doubt that he attained far greater success than Pereira or any of his predecessors, and that the whole system now followed in the instruction of deaf mutes virtually owes its origin to his intelligence and devotion. In 1755 he founded, for this beneficent purpose, a school which he supported at his own expense until his death, and which afterwards was succeeded by the "Institution Nationale des Sourds Muets à Paris," founded by the National Assembly in 1791. He died on the 23rd of December 1789. In 1838 a bronze monument was erected over his grave in the church of Saint Roch. He published various books on his method of instruction, but that published in 1784 virtually supersedes all others. It is entitled *La Véritable Manière d'instruire les sourds et muets, confirmée par une longue expérience.* He also began a *Dictionnaire général des signes*, which was completed by his successor, the abbé Sicard.

ÉPÉE-DE-COMBAT, a weapon still used in France for duelling, and there and elsewhere (blunted, of course) for exercise and amusement in fencing (*q.v.*). It has a sharp-pointed blade, about 35 in. long, without any cutting edge, and the guard, or shell, is bowl-shaped, having its convexity towards the point. The *épée* is the modern representative of the small-sword, and both are distinguished from the older rapier, mainly by being several inches shorter and much lighter in weight. The small-sword (called thus in opposition to the heavy cavalry broadsword), was worn by gentlemen in full dress throughout the 18th century, and it still survives in the modern English court costume.

Fencing practice was originally carried on without the protection of any mask for the face. Wire masks were not invented till near 1780 by a famous fencing-master, La Boëssière the elder, and did not come into general use until much later. Consequently, in order to avoid dangerous accidents to the face, and especially the eyes, it was long the rigorous etiquette of the fencing-room that the point should always be kept low.

In the 17th century a Scottish nobleman, who had procured the assassination of a fencing-master in revenge for having had one of his eyes destroyed by the latter at sword-play, pleaded on his trial for murder that it was the custom to "spare the face."

Rowlandson's well-known drawing of a fencing bout, dated 1787, shows two accomplished amateurs making a foil assault without masks, while in the background a less practised one is having a wire mask tied on.

For greater safety the convention was very early arrived at that no hits should count in a fencing-bout except those landing on the breast. Thus sword-play soon became so unpractical as to lose much of its value as a training for war or the duel. For, hits with "sharps" take effect wherever they are made, and many an expert fencer of the old school has been seriously wounded, or lost his life in a duel, through forgetting that very simple fact.

Strangely enough, when masks began to be generally worn, and the *fleuret* (*anglice*, "foil," a cheap and light substitute for the real épée) was invented, fencing practice became gradually even more conventional than before. No one seems to have understood that with masks all the conventions could be safely done away with, root and branch, and sword-practice might assume all the semblance of reality. Nevertheless it should be clearly recognized that the basis of modern foil-fencing was laid with the épée or small-sword alone, in and before the days of Angelo, of Danet, and the famous chevalier de St George, who were among the first to adopt the fleuret also. All the illustrious French professors who came after them, such as La Boëssière the younger, Lafaugère, Jean Louis, Cordelois, Grisier, Bertrand and Robert, with amateurs like the baron d Ezpeléta, were foil-players pure and simple, whose reputations were gained before the modern épée play had any recognized status. It was reserved for Jacob, a Parisian fencing-master, to establish in the last quarter of the 19th century a definite method of the épée, which differed essentially from all its forerunners. He was soon followed by Baudry, Spinnewyn, Laurent and Ayat. The methods of the four first-named, not differing much *inter se*, are based on the perception that in the real sword fight, where hits are effective on all parts of the person, the "classical" bent-arm guard, with the foil inclining upwards, is hopelessly bad. It offers a tempting mark in the exposed sword-arm itself, while the point requires a movement to bring it in line for the attack, which involves a fatal loss of time. The épée is really in the nature of a short lance held in one hand, and for both rapidity and precision of attack, as well as for the defence of the sword-arm and the body behind it, a position of guard *with the arm almost fully extended, and épée in line with the forearm*, is far the safest. Against this guard the direct lunge at the body is impossible, except at the risk of a mutual or double hit (*le coup des deux veuves*). No safe attack at the face or body can be made without first binding or beating, opposing or evading the adverse blade, and such an attack usually involves an initial forward movement. Beats and binds of the blade, with retreats of the body, or counter attacks with opposition, replace the old foil-parries in most instances, except at close quarters. And much of the offensive is reduced to thrusts at the wrist or forearm, intended to disable without seriously wounding the adversary. The direct lunge (*coup-droit*) at the body often succeeds in tournaments, but usually at the cost of a counter hit, which, though later in time, would be fatal with sharp weapons.

Ayat's method, as might be expected from a first-class foil-player, is less simple. Indeed for years, too great simplicity marked the most successful épée-play, because it usually gained its most conspicuous victories over those who attempted a foil defence, and whose practice gave them no safe strokes for an attack upon the extended blade. But by degrees the épéists themselves discovered new ways of attacking with comparative safety, and at the present day a complete épée-player is master of a large variety of attractive as well as scientific movements, both of attack and defence.

It was mainly by amateurs that this development was achieved. Perhaps the most conspicuous representative of the new school is J. Joseph-Renaud, a consummate swordsman, who has also been a champion foil-player. Lucien Gaudin, Alibert and Edmond Wallace may be also mentioned as among the most skilful amateurs, Albert Ayat and L. Bouché as professors—all of Paris. Belgium, Italy and England have also produced épéists quite of the first rank

The épée lends itself to competition far better than the foil, and the revival of the small-sword soon gave rise in France to "pools" and "tournaments" in which there was the keenest rivalry between all comers.

In considering the épée from a British point of view, it may be mentioned that it was first introduced publicly in London by C. Newton-Robinson at an important assault-at-arms held in the Steinway Hall on the 4th May 1900. Professor Spinnewyn was the principal demonstrator, with his pupil, the late Willy Sulzbacher. The next day was held at the Inns of Court R. V. School of Arms, Lincoln's Inn, the first English open épée tournament for amateurs. It was won by W. Sulzbacher, C. Newton-Robinson being second, and Paul Ettlinger, a French resident in London, third. This was immediately followed by the institution of the Épée Club of London, which, under the successive residencies of a veteran swordsman, Sir Edward Jenkinson, and of Lord Desborough, subsequently held annual open international tournaments. The winners were: in 1901, Willy Sulzbacher; 1902, Robert Montgomerie; 1903, the marquis de Chasseloup-Laubat; 1904, J. J.-Renaud; 1905, R. Montgomerie. In 1906 the Amateur Fencing Association for the first time recognized the best-placed Englishman, Edgar Seligman (who was the actual winner), as the English épée champion. In 1907 R. Montgomerie was again the winner, in 1908 C. L. Daniell, in 1909 R. Montgomerie.

Among the most active of the English amateurs who were the earliest to perceive the wonderful possibilities of épée-play, it is right to mention Captain Hutton, Lord Desborough, Sir Cosmo Duff-Gordon, Bart., Sir Charles Dilke, Bart., Lord Howard de Walden, Egerton Castle, A. S. Cope, R.A., W. H. C. Staveley, C. F. Clay, Lord Morpeth, Evan James, Paul King, J. B. Cunliffe, John Norbury, Jr., Theodore A. Cook, John Jenkinson, R. Montgomerie, S. Martineau, E. B. Milnes, H. J. Law, R. Merivale, the Marquis of Dufferin, Hugh Pollock, R. W. Doyne, A. G. Ross, the Hon. Ivor Guest and Henry Balfour.

Among foreign amateurs who did most to promote the use of the épée in England were Messrs P. Ettlinger, Anatole Paroissien, J. Joseph-Renaud, W. Sulzbacher, René Lacroix, H. G. Berger and the Marquis de Chasseloup-Laubat.

Épée practice became popular among Belgian and Dutch fencers about the same time as in England, and this made it possible to set on foot international team-contests for amateurs, which have done much to promote good feeling and acquaintanceship among swordsmen of several countries. In 1903 a series of international matches between teams of six was inaugurated in Paris. Up to 1909 the French team uniformly won the first place, with Belgium or England second.

English fencers who were members of these international teams were Lord Desborough, Theodore A. Cook, Bowden, Cecil Haig, J. Norbury, Jr., R. Montgomerie, John Jenkinson, F. Townsend, W. H. C. Staveley, S. Martineau, C. L. Daniell, W. Godden, Captain Haig, M. D. V. Holt, Edgar Seligman, C. Newton-Robinson, A. V. Buckland, P. M. Davson, E. M. Amphlett and L. V. Fildes. In 1906 a British épée team of four, consisting of Lord Desborough, Sir Cosmo Duff-Gordon, Bart., Edgar Seligman and C. Newton-Robinson, with Lord Howard de Walden and Theodore Cook as reserves (the latter acting as captain of the team), went to Athens to compete in the international match at the Olympic games. After defeating the Germans rather easily, the team opposed and worsted the Belgians. It thus found itself matched against the French in the final, the Greek team having been beaten by the French and the Dutch eliminated by the Belgians. After a very close fight the result was officially declared a tie. This was the first occasion upon which an English fencing team had encountered a French one of the first rank upon even terms. In fighting off the tie, however, the French were awarded the first prize and the Englishmen the second.

In the Olympic games of London, 1908, the Épée International Individual Tournament was won by Alibert (France), but Montgomerie, Haig and Holt (England) took the 4th, 5th, and 8th places in the final pool. The result of the International Team competition was also very creditable to the English representatives, Daniell, Haig, Holt, Montgomerie and Amphlett, who by defeating the Dutch, Germans, Danes and Belgians took second place to the French. Egerton Castle was captain of the English team.

In open International Tournaments on the Continent, English épéists have also been coming to the front. None had won such a competition up to 1909 outright, but the following had reached the final pool: C. Newton-Robinson, Brussels, 1901 (10th), Étretat, 1904 (6th); E. Seligman, Copenhagen, 1907 (2nd), and Paris, 1909 (12th); R. Montgomerie, Paris, 1909 (5th); and E. M. Amphlett, Paris, 1909 (10th).

The method of ascertaining the victor in épée "tournaments" is by dividing the competitors into "pools," usually of six or eight fencers. Each of these fights an assault for first hit only, with every other member of the same pool, and he who is least often hit, or not at all, is returned the winner. If the competitors are numerous, fresh pools are formed out of the first two, three or four in each pool of the preliminary round, and so on, until a small number are left in for a final pool, the winner of which is the victor of the tournament.

Épée fencing can be, and often is, conducted indoors, but one of its attractions consists in its fitness for open-air practice in pleasant gardens.

In the use of the épée the most essential points are (1) the position of the sword-arm, which, whether fully extended or not, should always be so placed as to ensure the protection of the wrist, forearm and elbow from direct thrusts, by the intervention of the guard or shell; (2) readiness of the legs for *instant* advance or retreat; and (3) the way in which the weapon is held, the best position (though hard to acquire and maintain) being that adopted by J. J. Renaud with the fingers *over* the grip, so that a downward beat does not easily disarm.

The play of individuals is determined by their respective temperaments and physical powers. But every fencer should be always ready to deliver a well-aimed, swift, direct thrust at any exposed part of the antagonist's arm, his mask or thigh. Very tall men, who are usually not particularly quick on their legs, should not as a rule attack, otherwise than by direct thrusts, when matched against shorter men. For if they merely extend their sword-arm in response to a simple attack, their longer reach will ward it off with a stop or counter-thrust. Short men can only attack them safely by beating, binding, grazing, pressing or evading the blade, and the taller fencers must be prepared with all the well-known parries and counters to such offensive movements, as well as with the stop-thrust to be made either with advancing opposition or with a retreat. Fencers of small stature must be exceedingly quick on their feet, unless they possess the art of parrying to perfection, and even then, if slow to shift ground, they will continually be in danger. With plenty of room, the quick mover can always choose the moment when he will be within distance, for an attack which his slower opponent will be always fearing and unable to prevent or anticipate.

It is desirable to put on record the modern form of the weapon. An average épée weighs, complete, about a pound and a half, while a foil weighs approximately one-third less. The épée blade is exactly like that of the old small-sword after the abandonment of the "*colichemarde*" form, in which the "*forte*" of the blade was greatly thickened. In length from guard or shell to point it measures about 35 in., and in width at the shell about $\frac{13}{16}$ths of an inch. From this it gradually and regularly tapers to the point. There is no cutting edge. The side of the épée which is usually held uppermost is slightly concave, the other is strengthened with a midrib, nearly equal in thickness and similar in shape to either half of the true blade. The material is tempered steel. There is a haft or tang about 8 in. long, which is pushed through a circular guard or shell ("*coquille*") of convex form, the diameter of which is normally 5 in. and the convexity 1$\frac{3}{4}$ in. The shell is of steel or aluminium, and if of the latter metal, sometimes fortified at the centre with a disk of steel the size of a crown piece. The insertion of the haft or tang through the shell may be either central or excentric to the extent of about 1 in., for the better protection of the outside of the forearm.

After passing through the shell, the haft of the blade is inserted in a grip or handle ("*poignet*"), averaging 7 in. in length and of quadrangular section, which is made of tough wood covered with leather, india-rubber, wound cord or other strong material with a rough surface. The grip is somewhat wider than its vertical thickness when held in the usual way, and it diminishes gradually from shell to pommel for convenience of holding. It should have a slight lateral curvature, so that in executing circular movements the pommel is kept clear of the wrist. The pommel, usually of steel, is roughly spherical or eight-sided, and serves as a counterbalance. The end of the haft is riveted through it, except in the case of "*épées démontables*," which are the most convenient, as a blade may be changed by simply unscrewing or unlocking the pommel.

An épée is well balanced and light in hand when, on poising the blade across the forefinger, about 1 in. in advance of the shell, it is in equilibrium.

For practice, the point is blunted to resemble the flat head of a nail, and is made still more incapable of penetration by winding around it a small ball of waxed thread, such as cobblers use. This is called the "button." In competitions various forms of "*boutons marqueurs*," all of which are unsatisfactory, are occasionally used. The "*pointe d'arrêt*," like a small tin-tack placed head downwards on the flattened point of the épée, and fastened on by means of the waxed thread, is, on the contrary, most useful, by fixing in the clothes, to show where and when a good hit has been made. The point need only protrude about $\frac{1}{16}$th of an inch from the button. There are several kinds of pointes d'arrêt. The best is called, after its inventor, the "Léon Sazie," and has three blunt points of hardened steel each slightly excentric. The single point is sometimes prevented by the thickness of the button from scoring a good hit.

A mask of wire netting is used to protect the face, and a stout glove on the sword hand. It is necessary to wear strong clothes and to pad the jacket and trousers at the most exposed parts, in case the blade should break unnoticed. A vulnerable spot, which ought to be specially padded, is just under the sword-arm.

Bibliography.—Among the older works on the history and practice of the small-sword, or épée, are the following:—*The Scots Fencing-Master, or Compleat Small-swordsman*, by W. H. Gent (Sir William Hope, afterwards baronet) (Edinburgh, 1687), and several other works by the same author, of later date, for which see *Schools and Masters of Fence*, by Egerton Castle; *Nouveau traité de la perfection sur le fait des armes*, by P. G. F. Girard (Paris, 1736); *L'École des armes*, by M. Angelo (London, 1763); *L'Art des armes*, by M. Danet (2 vols., Paris, 1766–1767); *Nouveau traité de l'art des armes*, by Nicolas Demeuse (Liège, 1778).

More modern are: *Traité de l'art des armes*, by la Böessière, Jr. (Paris, 1818); *Les Armes et le duel*, by A. Grisier (2nd ed., Paris, 1847); *Les Secrets de l'épée*, by the baron de Bazancourt (Paris, 1862); *Schools and Masters of Fence*, by Egerton Castle (London, 1885); *Le Jeu de l'épée*, by J. Jacob and Émil André (Paris, 1887); *L'Escrime pratique au* XIX^{e} *siècle*, by Ambroise Baudry (Paris); *L'Escrime à l'épée*, by A. Spinnewyn and Paul Manonry (Paris, 1898); *The Sword and the Centuries*, by Captain Hutton (London, 1901); "The Revival of the Small-sword," by C. Newton-Robinson, in the *Nineteenth Century and After* (London, January 1905); *Nouveau Traité de l'épée*, by Dr Edom, privately published (Paris, 1908); and, most important of all, *Méthode d'escrime à l'épée*, by J. Joseph-Renaud, privately published (Paris, 1909). (C. E. N. R.)

EPERJES, a town of Hungary, capital of the county of Sáros, 190 m. N.E. of Budapest by rail. Pop. (1900) 13,098. It is situated on the left bank of the river Tarcza, an affluent of the Theiss, and has been almost completely rebuilt since a great fire in 1887. Eperjes is one of the oldest towns of Hungary, and is still partly surrounded by its old walls. It is the seat of a Greek-Catholic bishop, and possesses a beautiful cathedral built in the 18th century in late Gothic style. It possesses manufactures of cloth, table-linen and earthenware, and has an active trade in wine, linen, cattle and grain. About 2 m. to the south is Sóvár with important salt-works.

In the same county, 28 m. by rail N. of Eperjes, is situated the old town of *Bártfa* (pop. 6098), which possesses a Gothic church from the 14th century, and an interesting town-hall, dating from the 15th century, and containing very valuable archives. In its neighbourhood, surrounded by pine forests, are the baths of Bártfa, with twelve mineral springs—iodate, ferruginous and alkaline—used for bathing and drinking.

About 6 m. N.W. of Eperjes is situated the village of Vörösvágás, which contains the only opal mine in Europe. The opal was mined here 800 years ago, and the largest piece hitherto found, weighing 2940 carats and estimated to have a value of £175,000, is preserved in the Court Museum at Vienna.

Eperjes was founded about the middle of the 12th century by a German colony, and was elevated to the rank of a royal free town in 1347 by Louis I. (the Great). It was afterwards fortified and received special privileges. The Reformation found many early adherents here, and the town played an important part during the religious wars of the 17th century. It became famous by the so-called "butchery of Eperjes," a tribunal instituted by the Austrian general Caraffa in 1687, which condemned to death and confiscated the property of a great number of citizens accused of Protestantism. During the 16th and the 17th centuries its German educational establishments enjoyed a wide reputation.

ÉPERNAY, a town of northern France, capital of an arrondissement in the department of Marne, 88 m. E.N.E. of Paris on the main line of the Eastern railway to Châlons-sur-Marne. Pop. (1906) 20,291. The town is situated on the left bank of the Marne at the extremity of the pretty valley of the Cubry, by which it is traversed. In the central and oldest quarter the streets are narrow and irregular; the surrounding suburbs are modern and more spacious, and that of La Folie, on the east, contains many handsome villas belonging to rich wine merchants. The town has also extended to the right bank of the Marne. One of its churches preserves a portal and stained-glass windows of the 16th century, but the other public buildings are modern. Épernay is best known as the principal *entrepôt* of the Champagne wines, which are bottled and kept in extensive vaults in the chalk rock on which the town is built. The manufacture of the apparatus and material used in the champagne industry occupies many hands, and the Eastern Railway Company has important workshops here. Brewing, and the manufacture of sugar and of hats and caps, are also carried on. Épernay is the seat of a sub-prefect and has tribunals of first instance and of commerce, and communal colleges for girls and boys.

Épernay (*Sparnacum*) belonged to the archbishops of Reims from the 5th to the 10th century, at which period it came into the possession of the counts of Champagne. It suffered severely during the Hundred Years' War, and was burned by Francis I. in 1544. It resisted Henry of Navarre in 1592, and Marshal Biron fell in the attack which preceded its capture. In 1642 it was, along with Château-Thierry, erected into a duchy and assigned to the duke of Bouillon.

ÉPERNON, a town of northern France in the department of Eure-et-Loir, at the confluence of the Drouette and the Guesle, 17 m. N.E. of Chartres by rail. Pop. (1906) 2370. It belonged originally to the counts of Montfort, who, in the 11th century, built a castle here of which the ruins are still left, and granted a charter to the town. In the 13th century it became an independent lordship, which remained attached to the crown of Navarre till, in the 16th century, it was sold by King Henry (afterwards King Henry IV. of France) to Jean Louis de Nogaret, for whom it was raised to the rank of a duchy in 1581. The new duke of Épernon was one of the favourites of Henry III., who were called *les Mignons*; the king showered favours upon him, giving him the posts of colonel-general in the infantry and of admiral of France. Under the reign of Henry IV. he made himself practically independent in his government of Provence. He was instrumental in giving the regency to Marie de' Medici in 1610, and as a result exercised a considerable influence upon the government. During his governorship of Guienne in 1622 he had some scandalous scenes with the parlement and the archbishop of Bordeaux. He died in 1642. His eldest son, Henri de Nogaret de la Valette, duke of Candale, served under Richelieu, in the armies of Guienne, of Picardy and of Italy. The second son of Jean Louis de Nogaret, Bernard, who was born in 1592, and died in 1661, was, like his father, duke of Épernon, colonel-general in the infantry and governor of Guienne. After his death, the title of duke of Épernon was borne by the families of Goth and of Pardaillan.

EPHEBEUM (from Gr. ἔφηβος, a young man), in architecture, a large hall in the ancient Palaestra furnished with seats (Vitruvius v. 11), the length of which should be a third larger than the width. It served for the exercises of youths of from sixteen to eighteen years of age.

EPHEBI (Gr. ἐπί, and ἥβη, *i.e.* "those who have reached puberty"), a name specially given, in Athens and other Greek towns, to a class of young men from eighteen to twenty years of age, who formed a sort of college under state control. On the completion of his seventeenth year the Athenian youth attained his civil majority, and, provided he belonged to the first three property classes and passed the scrutiny (δοκιμασία) as to age, civic descent and physical capability, was enrolled on the register of his deme (*ληξιαρχικὸν γραμματεῖον*). He thereby at once became liable to the military training and duties, which, at least in the earliest times, were the main object of the Ephebia. In the time of Aristotle the names of the enrolled ephebi were engraved on a bronze pillar (formerly on wooden tablets) in front of the council-chamber. After admission to the college, the ephebus took the oath of allegiance, recorded in Pollux and Stobaeus (but not in Aristotle), in the temple of Aglaurus, and was sent to Munychia or Acte to form one of the garrison. At the end of the first year of training, the ephebi were reviewed, and, if their performance was satisfactory, were provided by the state with a spear and a shield, which, together with the *chlamys* (cloak) and *petasus* (broad-brimmed hat), made up their equipment. In their second year they were transferred to other garrisons in Attica, patrolled the frontiers, and on occasion took an active part in war. During these two years they were free from taxation, and were not allowed (except in certain cases) to appear in the law courts as plaintiffs or defendants. The ephebi took part in some of the most important Athenian festivals. Thus during the Eleusinia they were told off to fetch the sacred objects from Eleusis and to escort the image of Iacchus on the sacred way. They also performed police duty at the meetings of the ecclesia.

After the end of the 4th century B.C. the institution underwent a radical change. Enrolment ceased to be obligatory, lasted only for a year, and the limit of age was dispensed with. Inscriptions attest a continually decreasing number of ephebi, and with the admission of foreigners the college lost its representative national character. This was mainly due to the weakening of the military spirit and the progress of intellectual culture. The military element was no longer all-important, and the ephebia became a sort of university for well-to-do young men of good family, whose social position has been compared with that of the Athenian "knights" of earlier times. The institution lasted till the end of the 3rd century A.D.

It is probable that the ephebia was in existence in the 5th century B.C., and controlled by the Areopagus and strategus as its moral and military supervisors. In the 4th century their place was taken by ten *sophronistae* (one for each tribe), who, as the name implies, took special interest in the morals of those under them, their military training being in the hands of experts, of whom the chief were the *hoplomachus*, the *acontistes*, the *toxotes* and the *aphetes* (instructors respectively in the use of arms, javelin-throwing, archery and the use of artillery engines). Later, the *sophronistae* were superseded by a single official called *cosmetes*, elected for a year by the people, who appointed the instructors. When the ephebia instead of a military college became a university, the military instructors were replaced by philosophers, rhetoricians, grammarians and artists. In Roman imperial times several new officials were introduced, one of special importance being the director of the Diogeneion, where youths under age were trained for the ephebia. At this period the college of ephebi was a miniature city; its members called themselves "citizens," and it possessed an archon, strategus, herald and other officials, after the model of ancient Athens.

There is an extensive class of inscriptions, ranging from the 3rd century B.C. to the 3rd century A.D., containing decrees relating to the ephebi, their officers and instructors, and lists of the same, and a whole chapter (42) of the Aristotelian *Constitution of Athens* is devoted to the subject. The most important treatises on the subject are: W. Dittenberger, *De ephebis Atticis* (Göttingen, 1863); A. Dumont, *Essai sur l'éphébie attique* (1875–1876); L. Grasberger, *Erziehung und Unterricht im klassichen Altertum*, iii. (Würzburg, 1881); J. P. Mahaffy, *Old Greek Education* (1881); P. Girard, *L'Éducation athénienne au V*^{e} *et IV*^{e} *siècle avant J.-C.* (2nd ed., 1891), and article in Daremberg and Saglio's *Dictionnaire des antiquités* which contains further bibliographical references; G. Gilbert, *The Constitutional Antiquities of Athens* (Eng. tr., 1895); G. Busolt, *Die griechischen Staats- und Rechtsaltertümer* (1892); T. Thalheim and J. Öhler in Pauly-Wissowa, *Realencyclopädie der classischen Altertumswissenschaft*, v. pt. 2 (1905); W. W. Capes, *University Life in Ancient Athens* (1877).

EPHEMERIS (Greek for a "diary"), a table giving for stated times the apparent position and other numerical particulars relating to a heavenly body. The *Astronomical Ephemeris*, familiarly known as the "Nautical Almanac," is a national annual publication containing ephemerides of the principal or more conspicuous heavenly bodies, elements and other data of eclipses, and other matter useful to the astronomer and navigator. The governments of the United Kingdom, United States, France, Germany and Spain publish such annals.

EPHESIANS, EPISTLE TO THE. This book of the New Testament, the most general and least occasional and polemic of all the Pauline epistles, a large section of which seems almost like the literary elaboration of a theological topic, may best be described as a solemn oration, addressed to absent hearers, and intended not primarily to clarify their minds but to stir their emotions. It is thus a true letter, but in the grand style, verging on the nature not of an essay but a poem. *Ephesians* has been called "the crown of St Paul's writings," and whether it be measured by its theological or its literary interest and importance, it can fairly dispute with *Romans* the claim to be his greatest epistle. In the public and private use of Christians some parts of *Ephesians* have been among the most favourite of all New Testament passages. Like its sister Epistle to the Colossians, it represents, whoever wrote it, deep experience and bold use of reflection on the meaning of that experience; if it be from the pen of the Apostle Paul, it reveals to us a distinct and important phase of his thought.

To the nature of the epistle correspond well the facts of its title and address. The title "To the Ephesians" is found in the Muratorian canon, in Irenaeus, Tertullian and Clement of Alexandria, as well as in all the earliest MSS. and versions. Marcion, however (*c.* A.D. 150), used and recommended copies with the title "To the Laodiceans." This would be inexplicable if Eph. i.1 had read in Marcion's copies, as it does in most ancient authorities, "To the saints which are at Ephesus"; but in fact the words ἐν Ἐφέσῳ of verse 1 were probably absent. They were not contained in the text used by Origen (d. 253); Basil (d. 379) says that "ancient copies" omitted the words; and they are actually omitted by Codices B (Vaticanus, 4th century) and ℵ (Sinaiticus, 4th century), together with Codex 67 (11th century). The words "in Ephesus" were thus probably originally lacking in the address, and were inserted from the suggestion of the title. Either the address was general ("to the saints who are also faithful") or else a blank was left. In the latter case the name may have been intended to be supplied orally, in communicating the letter, or a different name may have been written in each of the individual copies. Under any of these hypotheses the address would indicate that we have a circular letter, written to a group of churches, doubtless in Asia Minor. This would account for the general character of the epistle, as well as for the entire and striking absence of personal greetings and of concrete allusions to existing circumstances among the readers. It appears to have drawn its title, "To the Ephesians," from one of the churches for which it was intended, perhaps the one from which a copy was secured when Paul's epistles were collected, shortly before or after the year 100. That our epistle is the one referred to in Col. iv. 16, which was to be had by the Colossians from Laodicea, is not unlikely. Such an identification doubtless led Marcion to alter the title in his copies.

The structure of *Ephesians* is epistolary; it opens with the usual salutation (i.1-2) and closes with a brief personal note and formal farewell (vi.21-24). In the intervening body of the epistle the writer also follows the regular form of a letter. In an ordinary Greek letter (as the papyri show) we should find the salutation followed by an expression of gratification over the correspondent's good health and of prayer for its continuance. Paul habitually expanded and deepened this, and, in this case, that paragraph is enormously enlarged, so that it may be regarded as including chapters i.-iii., and as carrying the main thought of the epistle. Chapters iv.-vi. merely make application of the main ideas worked out in chapters i.-iii. Throughout the epistle we have a singular combination of the seemingly desultory method of a letter, turning aside at a word and straying wherever the mood of the moment leads, with the firm, forward march of earnest and mature thought. In this combination resides the doubtless unconscious but nevertheless real literary art of the composition.

The fundamental theme of the epistle is *The Unity of Mankind in Christ*, and hence the Unity and Divinity of the Church of Christ. God's purpose from eternity was to unite mankind in Christ, and so to bring human history to its goal, the New Man, the measure of the stature of the fulness of Christ. Those who have believed in Christ are the present representatives and result of this purpose; and a clear knowledge of the purpose itself, the secret of the ages, has now been revealed to men. This theme is not formally discussed, as in a theological treatise, but is rather, as it were, celebrated in lofty eulogy and application. First, in chapters i.-iii., under the mask of a conventional congratulatory paragraph, the writer declares at length the privileges which this great fact confers upon those who by faith receive the gift of God, and he is thus able to touch on the various aspects of his subject. Then, in chapters iv.-vi., he turns, with a characteristic and impressive "therefore," to set forth the obligations which correspond to the privileges he has just expounded. This author is indeed interested to prosecute vigorous and substantial thinking, but the mainspring of his interest is the conviction that such thought is significant for inner and outer life.

The relationship, both literary and theological, between the epistle to the *Ephesians* and that to the *Colossians* (*q.v.*) is very close. It is to be seen in many of the prominent ideas of the two writings, especially in the developed view of the central position of Christ in the whole universe; in the conception of the Church as Christ's body, of which He is the head; in the thought of the great Mystery, once secret, now revealed. There is further resemblance in the formal moral code, arranged by classes of persons, and having much the same contents in the two epistles (Eph. v. 22–vi. 9; Col. iii. 18–iv. 1). In both, also, Tychicus carries the letter, and in almost identical language the readers are told that he will by word of mouth give fuller information about the apostle's affairs (Eph. vi. 21-22; Col. iv. 7-8). Moreover, in a great number of characteristic phrases and even whole verses the two are alike. Compare, for instance, Eph. i. 7, Col. i. 14; Eph. i. 10, Col. i. 20; Eph. i. 21, Col. i. 16; Eph. i. 22, 23, Col. i. 18, 19; Eph. ii. 5, Col. ii. 13; Eph. ii. 11, Col. ii. 11; Eph. ii. 16, Col. i. 20; Eph. iii. 2, 3, Col. i. 25, 26, and many other parallels. Only a comparison in detail will give a true impression of the extraordinary degree of resemblance. Yet the two epistles do not follow the same course of thought, and their contents cannot be successfully exhibited in a common synoptical abstract. Each has its independent occasion, purpose, character and method; but they draw largely on a common store of thought and use common means of expression.

The question of the authorship of *Ephesians* is less important to the student of the history of Christian thought than in the case of most of the Pauline epistles, because of the generalness of tone and the lack of specific allusion in the work. It purports to be by Paul, and was held to be his by Marcion and in the Muratorian canon, and by Irenaeus, Tertullian and Clement of Alexandria, all writing at the end of the 2nd century. No doubt of the Pauline authorship was expressed in ancient times; nor is there any lack of early use by writers who make no direct quotation, to raise doubts as to the genuineness of the epistle. The influence of its language is probably to be seen in Ignatius, Polycarp and Hermas, less certainly in the epistle of Barnabas. Some resemblances of expression in Clement of Rome and in Second Clement may have significance. There is here abundant proof that the epistle was in existence, and was highly valued and influential with leaders of Christian thought, about the year 100, when persons who had known Paul well were still living.

To the evidence given above may be added the use of *Ephesians* in the First Epistle of Peter. If the latter epistle could be finally established as genuine, or its date fixed, it would give important evidence with regard to *Ephesians*; but in the present state of discussion we must confine ourselves to pointing out the fact. Some of the more striking points of contact are the following: Eph. i. 3, 1 Peter i. 3; Eph. i. 20, 21, 1 Peter iii. 22; Eph. ii. 2, 3, iv. 17, 1 Peter iv. 3; Eph. ii. 21, 22, 1 Peter ii. 5; Eph. v. 22, 1 Peter iii. 1, 2; Eph. v. 25, 1 Peter iii. 7, 8; Eph. vi. 5, 1 Peter ii. 18, 19. A similar relation exists between *Romans* and *1 Peter*. In both cases the dependence is clearly on the part of *1 Peter*; for ideas and phrases that in *Ephesians* and *Romans* have their firm place in closely wrought sequences, are found in *1 Peter* with less profound significance and transformed into smooth and pointed maxims and apophthegmatic sentences.

Objections to the genuineness of *Ephesians* have been urged since the early part of the 19th century. The influence of Schleiermacher, whose pupil Leonhard Usteri in his *Entwickelung der paulinischen Lehrbegriffs* (1824) expressed strong doubts as to *Ephesians*, carried weight. He held that Tychicus was the author. De Wette first (1826) doubted, then (1843) denied that the epistle was by Paul. The chief attack came, however, from Baur (1845) and his colleagues of the Tübingen school. Against the genuineness have appeared Ewald, Renan, Hausrath, Hilgenfeld, Ritschl, Pfleiderer, Weizsäcker, Holtzmann, von Soden, Schmiedel, von Dobschütz and many others. On the other hand, the epistle has been defended by Bleek, Neander, Reuss, B. Weiss, Meyer, Sabatier, Lightfoot, Hort, Sanday, Bacon, Jülicher, Harnack, Zahn and many others. In recent years a tendency has been apparent among critics to accept *Ephesians* as a genuine work of Paul. This has followed the somewhat stronger reaction in favour of *Colossians*.

Before speaking of the more fundamental grounds urged for the rejection of *Ephesians*, we may look at various points of detail which are of less significance.

(1) The style has unquestionably a slow and lumbering movement, in marked contrast with the quick effectiveness of *Romans* and *Galatians*. The sentences are much longer and less vivacious, as any one can see by a superficial examination. But nevertheless there are parts of the earlier epistles where the same tendency appears (*e.g.* Rom. iii. 23-26), and on the whole the style shows Paul's familiar traits. (2) The vocabulary is said to be peculiar. But it can be shown to be no more so than that of *Galatians* (Zahn, *Einleitung*, i. pp. 365 ff.). On the other hand, some words characteristic of Paul's use appear (notably διό, five times), and the most recent and careful investigation of Paul's vocabulary (Nägeli, *Wortschatz der paulinischen Briefe*, 1905) concludes that the evidence speaks for Pauline authorship. (3) Certain phrases have aroused suspicion, for instance, "the devil" (vi. 11, instead of Paul's usual term "Satan"); "his holy apostles and prophets" (iii. 5, as smacking of later fulsomeness); "I Paul" (iii. 1); "unto me, who am less than the least of all the saints" (iii. 8, as exaggerated). But these cases, when properly understood and calmly viewed, do not carry conviction against the epistle. (4) The relation of *Ephesians* to *Colossians* would be a serious difficulty only if *Colossians* were held to be not by Paul. Those who hold to the genuineness of *Colossians* find it easier to explain the resemblances as the product of the free working of the same mind, than as due to a deliberate imitator. Holtzmann's elaborate and very ingenious theory (1872) that *Colossians* has been expanded, on the basis of a shorter letter of Paul, by the same later hand which had previously written the whole of *Ephesians*, has not met with favour from recent scholars.

But the more serious difficulties which to many minds still stand in the way of the acceptance of the epistle have come from the developed phase of Pauline theology which it shows, and from the general background and atmosphere of the underlying system of thought, in which the absence of the well-known earlier controversies is remarkable, while some things suggest the thought of John and a later age. Among the most important points in which the ideas and implications of *Ephesians* suggest an authorship and a period other than that of Paul are the following:

(*a*) The union of Gentiles and Jews in one body is already accomplished. (*b*) The Christology is more advanced, uses

Alexandrian terms, and suggests the ideas of the Gospel of John. (*c*) The conception of the Church as the body of Christ is new. (*d*) There is said to be a general softening of Pauline thought in the direction of the Christianity of the 2nd century, while very many characteristic ideas of the earlier epistles are absent.

With regard to the changed state of affairs in the Church, it must be said that this can be a conclusive argument only to one who holds the view of the Tübingen scholars, that the Apostolic Age was all of a piece and was dominated solely by one controversy. The change in the situation is surely not greater than can be imagined within the lifetime of Paul. That the epistle implies as already existent a developed system of Gnostic thought such as only came into being in the 2nd century is not true, and such a date is excluded by the external evidence. As to the other points, the question is, whether the admittedly new phase of Paul's theological thought is so different from his earlier system as to be incompatible with it. In answering this question different minds will differ. But it must remain possible that contact with new scenes and persons, and especially such controversial necessities as are exemplified in *Colossians*, stimulated Paul to work out more fully, under the influence of Alexandrian categories, lines of thought of which the germs and origins must be admitted to have been present in earlier epistles. It cannot be maintained that the ideas of *Ephesians* directly contradict either in formulation or in tendency the thought of the earlier epistles. Moreover, if *Colossians* be accepted as Pauline (and among other strong reasons the unquestionable genuineness of the epistle to Philemon renders it extremely difficult not to accept it), the chief matters of this more advanced Christian thought are fully legitimated for Paul.

On the other hand, the characteristics of the thought in *Ephesians* give some strong evidence confirmatory of the epistle's own claim to be by Paul. (*a*) The writer of Eph. ii. 11-22 was a Jew, not less proud of his race than was the writer of Rom. ix.–xi. or of Phil. iii. 4 ff. (*b*) The centre in all the theology of the epistle is the idea of redemption. The use of Alexandrian categories is wholly governed by this interest. (*c*) The epistle shows the same panoramic, pictorial, dramatic conception of Christian truth which is everywhere characteristic of Paul. (*d*) The most fundamental elements in the system of thought do not differ from those of the earlier epistles.

The view which denies the Pauline authorship of *Ephesians* has to suppose the existence of a great literary artist and profound theologian, able to write an epistle worthy of Paul at his best, who, without betraying any recognizable motive, presented to the world in the name of Paul an imitation of *Colossians*, incredibly laborious and yet superior to the original in literary workmanship and power of thought, and bearing every appearance of earnest sincerity. It must further be supposed that the name and the very existence of this genius were totally forgotten in Christian circles fifty years after he wrote. The balance of evidence seems to lie on the side of the genuineness of the Epistle.

If *Ephesians* was written by Paul, it was during the period of his imprisonment, either at Caesarea or at Rome (iii. 1, iv. 1, vi. 20). At very nearly the same time he must have written *Colossians* and *Philemon*; all three were sent by Tychicus. There is no strong reason for holding that the three were written from Caesarea. For Rome speaks the greater probability of the metropolis as the place in which a fugitive slave would try to hide himself, the impression given in *Colossians* of possible opportunity for active mission work (Col. iv. 3, 4; cf. Acts xxviii. 30, 31), the fact that *Philippians*, which in a measure belongs to the same group, was pretty certainly written from Rome. As to the Christians addressed, they are evidently converts from heathenism (ii. 1, 11-13, 17 f., iii. 1, iv. 17); but they are not merely Gentile Christians at large, for Tychicus carries the letter to them, Paul has some knowledge of their special circumstances (i. 15), and they are explicitly distinguished from "all the saints" (iii. 18, vi. 18). We may most naturally think of them as the members of the churches of Asia. The letter is very likely referred to in Col. iv. 16, although this theory is not wholly free from difficulties.

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On early attestation see A. H. Charteris, *Canonicity* (1880) and the *New Testament in the Apostolic Fathers* (Oxford, 1905).

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For a guide to other literature see W. Lock, art. "Ephesians, Epistle to," in Hastings's *Dictionary of the Bible*, the various works of Holtzmann above referred to, and T. K. Abbott's *Commentary*, pp. 35-40. (J. H. Rs.)

EPHESUS, an ancient Ionian city on the west coast of Asia Minor. In historic times it was situate on the lower slopes of the hills, Coressus and Prion, which rise out of a fertile plain near the mouth of the river Caÿster, while the temple and precinct of Artemis or Diana, to the fame of which the town owed much of its celebrity, were in the plain itself, E.N.E. at a distance of about a mile. But there is reason to think both town and shrine had different sites in pre-Ionian times, and that both lay farther south among the foot-hills of Mt. Solmissus. The situation of the city was such as at all times to command a great commerce. Of the three great river basins of Ionia and Lydia, those of the Hermus, Caÿster and Maeander, it commanded the second, and had already access by easy passes to the other two.

The earliest inhabitants assigned to Ephesus by Greek writers are the "Amazons," with whom we hear of Leleges, Carians and Pelasgi. In the 11th century B.C., according to tradition (the date is probably too early), Androclus, son of the Athenian king Codrus, landed on the spot with his Ionians and a mixed body of colonists; and from his conquest dates the history of the Greek Ephesus. The deity of the city was Artemis; but we must guard against misconception when we use that name, remembering that she bore close relation to the primitive Asiatic goddess of nature, whose cult existed before the Ionian migration at the neighbouring Ortygia, and that she always remained the virgin-mother of all life and especially wild life, and an embodiment of the fertility and productive power of the earth. The well-known monstrous representation of her, as a figure with many breasts, swathed below the waist in grave-clothes, was probably of late and alien origin. In early Ionian times she seems to have been represented as a natural matronly figure, sometimes accompanied by a child, and to have been a more typically Hellenic goddess than she became in the Hellenistic and Roman periods.

Twice in the period 700–500 B.C. the city owed its preservation to the interference of the goddess; once when the swarms of the Cimmerians overran Asia Minor in the 7th century and burnt the Artemision itself; and once when Croesus besieged the town in the century succeeding, and only retired after it had solemnly dedicated itself to Artemis, the sign of such dedication being the stretching of a rope from city to sanctuary. Croesus was eager in every way to propitiate the goddess, and since about this time her temple was being restored on an enlarged scale, he presented most of the columns required for the building as well as some cows of gold. That is to say, these gifts were probably paid for out of the proceeds of the sequestration of the property of a rich Lydian merchant, Sadyattes, which Croesus presented to Ephesus (Nic. Damasc. fr. 65). To counteract, perhaps, the growing Lydian influence, Athens, the mother-city of Ephesus, despatched one of her noblest citizens, Aristarchus, to restore law on the basis of the Solonian constitution. The labours of Aristarchus seem to have borne fruit. It was an Ephesian follower of his, Hermodorus, who aided the Decemviri at Rome in their compilation of a system of law. And in the same generation Heraclitus, probably a descendant of Codrus, quitted his hereditary magistracy in order to devote himself to philosophy, in which his name became almost as great as that of any Greek. Poetry had long flourished at Ephesus. From very early times the Homeric poems found a home and admirers there; and to Ephesus belong the earliest elegiac poems of Greece, the war songs of Callinus, who flourished in the 7th century B.C. and was the model of Tyrtaeus. The city seems to have been more than once under tyrannical rule in the early Ionian period; and it fell thereafter first to Croesus of Lydia, and then to Cyrus, the Persian, and when the Ionian revolt against Persia broke out in the year 500 B.C. under the lead of Miletus, the city remained submissive to Persian rule. When Xerxes returned from the march against Greece, he honoured the temple of Artemis, although he sacked other Ionian shrines, and even left his children behind at Ephesus for safety's sake. We hear again of Persian respect for the temple in the time of Tissaphernes (411 B.C.). After the final Persian defeat at the Eurymedon (466 B.C.), Ephesus for a time paid tribute to Athens, with the other cities of the coast, and Lysander first and Agesilaus afterwards made it their headquarters. To the latter fact we owe a contemporary description of it by Xenophon. In the early part of the 4th century it fell again under Persian influence, and was administered by an oligarchy.

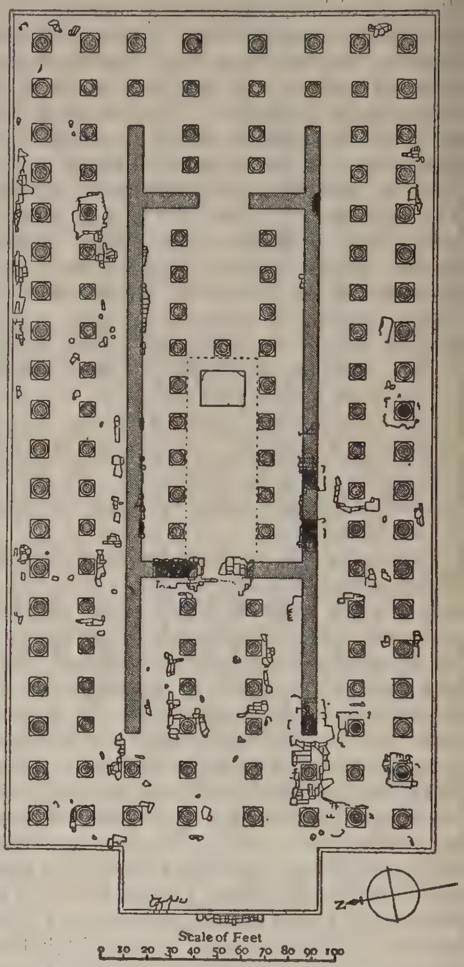
Alexander was received by the Ephesians in 334, and established democratic government. Soon after his death the city fell into the hands of Lysimachus, who introduced fresh Greek colonists from Lebedus and Colophon and, it is said, by means of an artificial inundation compelled those who still dwelt in the plain by the temple to migrate to the city on the hills, which he surrounded by a solid wall. He renamed the city after his wife Arsinoë, but the old name was soon resumed. Ephesus was very prosperous during the Hellenistic period, and is conspicuous both then and later for the abundance of its coinage, which gives us a more complete list of magistrates' names than we have for any other Ionian city. The Roman coinage is remarkable for the great variety and importance of its types. After the defeat of Antiochus the Great, king of Syria, by the Romans, Ephesus was handed over by the conquerors to Eumenes, king of Pergamum, whose successor, Attalus Philadelphus, unintentionally worked the city irremediable harm. Thinking that the shallowness of the harbour was due to the width of its mouth, he built a mole part-way across the latter; the result, however, was that the silting up of the harbour proceeded more rapidly than before. The third Attalus of Pergamum bequeathed Ephesus with the rest of his possessions to the Roman people, and it became for a while the chief city, and for longer the first port, of the province of Asia, the richest in the empire. Henceforth Ephesus remained subject to the Romans, save for a short period, when, at the instigation of Mithradates Eupator of Pontus, the cities of Asia Minor revolted and massacred their Roman residents. The Ephesians even dragged out and slew those Romans who had fled to the precinct of Artemis for protection, notwithstanding which sacrilege they soon returned from their new to their former masters, and even had the effrontery to state, in an inscription preserved to this day, that their defection to Mithradates was a mere yielding to superior force. Sulla, after his victory over Mithradates, brushed away their pretexts, and inflicting a very heavy fine told them that the punishment fell far short of their deserts. In the civil wars of the 1st century B.C. the Ephesians twice supported the unsuccessful party, giving shelter to, or being made use of by, first, Brutus and Cassius, and afterwards Antony, for which partisanship or weakness they paid very heavily in fines.

All this time the city was gradually growing in wealth and in devotion to the service of Artemis. The story of St Paul's doings there illustrates this fact, and the sequel is very suggestive,—the burning, namely, of books of sorcery of great value. Addiction to the practice of occult arts had evidently become general in the now semi-orientalized city. The Christian Church which Paul planted there was governed by Timothy and John, and is famous in Christian tradition as a nurse of saints and martyrs. According to local belief, Ephesus was also the last home of the Virgin, who was lodged near the city by St John and there died. But to judge from the Apocalyptic Letter to this Church (as shown by Sir W. M. Ramsay), the latter showed a dangerous tendency to lightness and reaction, and later events show that the pagan tradition of Artemis continued very strong and perhaps never became quite extinct in the Ephesian district. It was, indeed, long before the spread of Christianity threatened the old local cult. The city was proud to be termed *neocorus* or servant of the goddess. Roman emperors vied with wealthy natives in lavish gifts, one Vibius Salutaris among the latter presenting a quantity of gold and silver images to be carried annually in procession. Ephesus contested stoutly with Smyrna and Pergamum the honour of being called the first city of Asia; each city appealed to Rome, and we still possess rescripts in which the emperors endeavoured to mitigate the bitterness of the rivalry. One privilege Ephesus secured; the Roman governor of Asia always landed and first assumed office there: and it was long the provincial centre of the official cult of the emperor, and seat of the Asiarch. The Goths destroyed both city and temple in the year A.D. 262, and although the city revived and the cult of Artemis continued, neither ever recovered its former splendour. A general council of the Christian Church was held there in 431 in the great double church of St Mary, which is still to be seen. On this occasion Nestorius was condemned, and the honour of the Virgin established as *Theotokus*, amid great popular rejoicing, due, doubtless, in some measure to the hold which the cult of the virgin Artemis still had on the city. (On this council see below.) Thereafter Ephesus seems to have been gradually deserted owing to its malaria; and life transferred itself to another and higher site near the Artemision, the name of which, Ayassoluk (written by early Arab geographers *Ayathulukh*), is now known to be a corruption of the title of St John *Theológos*, given to a great cathedral built on a rocky hill near the present railway station, in the time of Justinian I. This church was visited by Ibn Batuta in A.D. 1333; but few traces are now visible. The ruins of the Artemision, after serving as a quarry to local builders, were finally covered deep with mud by the river Caÿster, or one of its left bank tributaries, the Selinus, and the true site remained unsuspected until 1869.

Excavations.—The first light thrown on the topography of Ephesus was due to the excavations conducted by the architect, J. T. Wood, on behalf of the trustees of the British Museum, during the years 1863–1874. He first explored the Odeum and the Great Theatre situate in the city itself, and in the latter place had the good fortune to find an inscription which indicated to him in what direction to search for the Artemision; for it stated that processions came to the city from the temple by the Magnesian gate and returned by the Coressian. These two gates were next identified, and following up that road which issued from the Magnesian gate, Wood lighted first on a ruin which he believed to be the tomb of Androclus, and afterwards on an angle of the peribolus wall of the time of Augustus. After further tentative explorations, he struck the actual pavement of the Artemision on the last day of 1869.

The Artemision.—Wood removed the whole stratum of superficial deposit, nearly 20 ft. deep, which overlay the huge area of the temple, and exposed to view not only the scanty remains of the latest edifice, built after 350 B.C., but the platform of an earlier temple, now known to be that of the 6th century to which Croesus contributed. Below this he did not find any remains. He discovered and sent to England parts of several sculptured drums (*columnae caelatae*) of the latest temple, and archaic sculptures from the drums and parapet of the earlier building. He also made accurate measurements and a plan of the Hellenistic temple, found many inscriptions and a few miscellaneous antiquities, and had begun to explore the Precinct, when the great expense and other considerations induced the trustees of the British Museum to suspend his operations in 1874. Wood made two subsequent attempts to resume work, but failed; and the site lay desolate till 1904, when the trustees, wishing to have further information about the earlier strata and the Precinct, sent D. G. Hogarth to re-examine the remains. As a result of six months' work, Wood's "earliest temple" was recleared and planned, remains of three earlier shrines were found beneath it, a rich deposit of offerings, &c., belonging to the earliest shrine was discovered, and tentative explorations were made in the Precinct. This deep digging, however, which reached the sand of the original marsh, released much ground water and resulted in the permanent flooding of the site.

The history of the Artemision, as far as it can be inferred from the remains, is as follows. (1) There was no temple on the plain previous to the Ionian occupation, the primeval seat of the nature-goddess having been in the southern hills, at Ortygia (near mod. *Arvalia*). Towards the end of the 8th century B.C. a small shrine came into existence on the plain. This was little more than a small platform of green schist with a sacred tree and an altar, and perhaps later a wooden icon (image), the whole enclosed in a *temenos*: but, as is proved by a great treasure of objects in precious and other metals, ivory, bone, crystal, paste, glass, terra-cotta and other materials, found in 1904–1905, partly within the platform on which the cult-statue stood and partly outside, in the lowest stratum of deposit, this early shrine was presently enriched by Greeks with many and splendid offerings of Hellenic workmanship. A large number of electron coins, found among these offerings, and in style the earliest of their class known, combine with other evidence to date the whole treasure to a period considerably anterior to the reign of Croesus. This treasure is now divided between the museums of Constantinople and London. (2) Within a short time, perhaps after the Cimmerian sack (? 650 B.C.), this shrine was restored, slightly enlarged, and raised in level, but not altered in character. (3) About the close of the century, for some reason not known, but possibly owing to collapse brought about by the marshy nature of the site, this was replaced by a temple of regular Hellenic form. The latter was built in relation to the earlier central statue-base but at a higher level than either of its predecessors, doubtless for dryness' sake. Very little but its foundations was spared by later builders, and there is now no certain evidence of its architectural character; but it is very probable that it was the early temple in which the Ionic order is said to have been first used, after the colonists had made use of Doric in their earlier constructions (*e.g.* in the *Panionion*); and that it was the work of the Cnossian Chersiphron and his son, Metagenes, always regarded afterwards as the first builders of a regular Artemision. Their temple is said by Strabo to have been made bigger by another architect. (4) The latter's work must have been the much larger temple, exposed by Wood, and usually known as the Archaic or Croesus temple. This overlies the remains of No. 3, at a level higher by about a metre, and the area of its *cella* alone contains the whole of the earlier shrines. Its central point, however, was still the primitive statue-base, now enlarged and heightened. About half its pavement, parts of the *cella* walls and of three columns of the peristyle, and the foundations of nearly all the platform, are still in position. The visible work was all of very fine white marble, quarried about 7 m. N.E., near the modern Kos Bunar. Fragments of relief-sculptures belonging to the parapet and columns, and of fluted drums and capitals, cornices and other architectural members have been recovered, showing that the workmanship and Ionic style were of the highest excellence, and that the building presented a variety of ornament, rare among Hellenic temples. The whole ground-plan covered about 80,000 sq. ft. The height of the temple is doubtful, the measurements of columns given us by later authority having reference probably to its successor, the height of which was considered abnormal and marvellous. Judged by the diameter of the drums, the columns of the Croesus temple were not two-thirds of the height of those of the Hellenistic temple. This fourth temple is, beyond question, that to which Croesus contributed, and it was, therefore, in process of building about 540 B.C. Our authorities seem to be referring to it when they tell us that the Artemision was raised by common contribution of the great cities of Asia, and took 120 years to complete. It was dedicated with great ceremony, probably between 430 and 420 B.C., and the famous Timotheus, son of Thersander, carried off the magnificent prize for a lyric ode against all comers. Its original architects were, probably, Paeonius of Ephesus, and Demetrius, a ἱερός of the shrine itself: but it has been suggested that the latter may have been rather the actual contracting builder than the architect. Of this temple Herodotus speaks as existing in his day; and unless weight be given to an isolated statement of Eusebius, that it was burned about 395 B.C., we must assume that it survived until the night when one Herostratus, desirous of acquiring eternal fame if only by a great crime, set it alight. This is said to have happened in 356 B.C. on the October night on which Alexander the Great came into the world, and, as Hegesias said, the goddess herself was absent, assisting at the birth; but the exactness of this portentous synchronism makes the date suspect. (5) It was succeeded by what is called the Hellenistic temple, begun almost immediately after the catastrophe, according to plans drawn by the famous Dinocrates the architect of Alexandria. The platform was once more raised to a higher level, some 7 ft. above that of the Archaic, by means of huge foundation blocks bedded upon the earlier structures; and this increase of elevation necessitated a slight expansion of the area all round, and ten steps in place of three. The new columns were of greater diameter than the old and over 60 ft. high; and from its great height the whole structure was regarded as a marvel, and accounted one of the wonders of the world. Since, however, other Greek temples had colonnades hardly less high, and were of equal or greater area, it has been suggested that the Ephesian temple had some distinct element of grandiosity, no longer known to us—perhaps a lofty sculptured parapet or some imposing form of *podium*. Bede, in his treatise *De sept. mir. mundi*, describes a stupendous erection of several storeys; but his other descriptions are so fantastic that no credence can



Ground plan of the 6th Century ("Croesus") Temple at Ephesus, conjecturally restored by A. E. Henderson.

be attached to this. The fifth temple was once more of Ionic order, but the finish and style of its details as attested by existing remains were inferior to those of its predecessor. The great sculptured drums and pedestals, now in the British Museum, belong to the lower part of certain of its columns: but nothing of its frieze or pediments (if it had any) has been recovered. Begun probably before 350 B.C., it was in building when Alexander came to Ephesus in 334 and offered to bear the cost of its completion. It was probably finished by the end of the century; for Pliny the Elder states that its cypress-wood doors had been in existence for 400 years up to his time. It stood intact, except for very partial restorations, till A.D. 262 when it was sacked and burned by the Goths: but it appears to have been to some extent restored afterwards, and its cult no doubt survived till the Edict of Theodosius closed the pagan temples. Its material was then quarried extensively for the construction of the great cathedral of St John Theológos on the neighbouring hill (Ayassoluk), and a large Byzantine building (a church?) came into existence on the central part of its denuded site, but did not last long. Before the Ottoman conquest its remains were already buried under several feet of silt.

The organization of the temple hierarchy, and its customs and privileges, retained throughout an Asiatic character. The priestesses of the goddess were παρθένοι (*i.e.* unwedded), and her priests were compelled to celibacy. The chief among the latter, who bore the Persian name of Megabyzus and the Greek title Neocorus, was doubtless a power in the state as well as a dignitary of religion. His official dress and spadonic appearance are probably revealed to us by a small ivory statuette found by D. G. Hogarth in 1905. Besides these there was a vast throng of dependents who lived by the temple and its services—*theologi*, who may have expounded sacred legends, *hymnodi*, who composed hymns in honour of the deity, and others, together with a great crowd of *hieroi* who performed more menial offices. The making of shrines and images of the goddess occupied many hands. To support this greedy mob offerings flowed in in a constant stream from votaries and from visitors, who contributed sometimes money, sometimes statues and works of art. These latter so accumulated that the temple became a rich museum, among the chief treasures of which were the figures of Amazons sculptured in competition by Pheidias, Polyclitus, Cresilas and Phradmon, and the painting by Apelles of Alexander holding a thunderbolt. The temple was also richly endowed with lands, and possessed the fishery of the Selinusian lakes, with other large revenues. But perhaps the most important of all the privileges possessed by the goddess and her priests was that of *asylum*. Fugitives from justice or vengeance who reached her precincts were perfectly safe from all pursuit and arrest. The boundaries of the space possessing such virtue were from time to time enlarged. Mithradates extended them to a bowshot from the temple in all directions, and Mark Antony imprudently allowed them to take in part of the city, which part thus became free of all law, and a haunt of thieves and villains. Augustus, while leaving the right of asylum untouched, diminished the space to which the privilege belonged, and built round it a wall, which still surrounds the ruins of the temple at the distance of about a quarter of a mile, bearing an inscription in Greek and Latin, which states that it was erected in the proconsulship of Asinius Gallus, out of the revenues of the temple. The right of asylum, however, had once more to be defended by a deputation sent to the emperor Tiberius. Besides being a place of worship, a museum and a sanctuary, the Ephesian temple was a great bank. Nowhere in Asia could money be more safely bestowed, and both kings and private persons placed their treasures under the guardianship of the goddess.

The City.—After Wood's superficial explorations, the city remained desolate till 1894, when the Austrian Archaeological Institute obtained a concession for excavation and began systematic work. This has continued regularly ever since, but has been carried down no farther than the imperial stratum. The main areas of operation have been: (1) The *Great Theatre*. The stage buildings, orchestra and lower parts of the *cavea* have been cleared. In the process considerable additions were made to Wood's find of sculptures in marble and bronze, and of inscriptions, including missing parts of the Vibius Salutaris texts. This theatre has a peculiar interest as the scene of the tumult aroused by the mission of St Paul; but the existing remains represent a reconstruction carried out after his time. (2) The *Hellenistic Agora*, a huge square, surrounded by porticoes, lying S.W. of the theatre and having fine public halls on the S. It has yielded to the Austrians fine sculpture in marble and bronze and many inscriptions. (3) *The Roman Agora*, with its large halls, lying N.W. of the theatre. Here were found many inscriptions of Roman date and some statuary. (4) A street running from the S.E. angle of the Hellenic Agora towards the Magnesian gate. This was found to be lined with pedestals of honorific statues and to have on the west side a remarkable building, stated in an inscription to have been a library. The tomb of the founder, T. Julius Celsus, is hard by, and some fine Roman reliefs, which once decorated it, have been sent to Vienna. (5) A street running direct to the port from the theatre. This is of great breadth, and had a Horologion half-way down and fine porticoes and shops. It was known as the Arcadiane after having been restored at a higher level than formerly by the emperor Arcadius (A.D. 395). It leaves on the right the great *Thermae* of Constantine, of which the Austrians have cleared out the south-east part. This huge pile used to be taken for the Artemision by early visitors to Ephesus. Part of the quays and buildings round the port were exposed, after measures had been taken to drain the upper part of the marsh. (6) The Double Church of the Virgin " Deipara " in the N.W. of the city, wherein the council of 431 was held. Here interesting inscriptions and Byzantine architectural remains were found. Besides these excavated monuments, the Stadion; the *enceinte* of fortifications erected by Lysimachus, which runs from the tower called the " Prison of St Paul " and right along the crests of the Bulbul (Prion) and Panajir hills; the round monument miscalled the " Tomb of St Luke "; and the Opistholeprian gymnasium near the Magnesian gate, are worthy of attention.

The work done by the Austrians enables a good idea to be obtained of the appearance presented by a great Graeco-Roman city of Asia in the last days of its prosperity. It may be realized better there than anywhere how much architectural splendour was concentrated in the public quarters. But the restriction of the clearance to the upper stratum of deposit has prevented the acquisition of much further knowledge. Both the Hellenistic and, still more, the original Ionian cities remain for the most part unexplored. It should, however, be added that very valuable topographical exploration has been carried out in the environs of Ephesus by members of the Austrian expedition, and that the Ephesian district is now mapped more satisfactorily than any other district of ancient interest in Asia Minor.

The Turkish village of Ayassoluk (the modern representative of Ephesus), more than a mile N.E. of the ancient city, has revived somewhat of recent years owing to the development of its fig gardens by the Aidin railway, which passes through the upper part of the plain. It is noteworthy for a splendid ruined mosque built by the Seljuk, Isa Bey II., of Aidin, in 1375, which contains magnificent columns: for a castle, near which lie remains of the pendentives from the cupola of the great cathedral of St John, now deeply buried in its own ruins: and for an aqueduct, Turkish baths and mosque-tombs. There is a fair inn managed by the Aidin Railway Company.

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EPHESUS, COUNCIL OF. This Church council was convened in 431 for the purpose of taking authoritative action concerning the doctrine of the person of Christ. The councils of Nicaea and Constantinople had asserted the full divinity and real humanity of Christ, without, however, defining the manner of their union. The attempt to solve the apparent incongruity of a perfect union of two complete and distinct natures in one person produced first Apollinarianism, which substituted the divine Logos for the human νοῦς or πνεῦμα of Jesus, thereby detracting from the completeness of his humanity; and then Nestorianism, which destroyed the unity of Christ's person by affirming that the divine Logos dwelt in the man Jesus as in a temple, and that the union of the two was in respect of dignity, and furthermore that, inasmuch as the Logos could not have been born, to call Mary θεοτόκος, "Godbearer," was absurd and blasphemous. The Alexandrians, led by Cyril, stood for the doctrine of the perfect union of two complete natures in one person, and made θεοτόκος the shibboleth of orthodoxy. The theological controversy was intensified by the rivalry of the two patriarchates, Alexandria and Constantinople, for the primacy of the East. As bishop of Constantinople Nestorius naturally looked to the emperor for support, while Cyril turned to Rome. A Roman synod in 430 found Nestorius heretical and decreed his excommunication unless he should recant. Shortly afterwards an Alexandrian synod condemned his doctrines in twelve anathemas, which only provoked counter-anathemas. The emperor now intervened and summoned a council, which met at Ephesus on the 22nd of June 431. Nestorius was present with an armed escort, but refused to attend the council on the ground that the patriarch of Antioch (his friend) had not arrived. The council, nevertheless, proceeded to declare him excommunicate and deposed. When the Roman legates appeared they "examined and approved" the acts of the council, whether as if thereby giving them validity, or as if concurring with the council, is a question not easy to answer from the records. Cyril, the president, apparently regarded the subscription of the legates as the acknowledgment of "canonical agreement" with the synod.

The disturbances that followed the arrival of John, the patriarch of Antioch, are sufficiently described in the article Nestorius.

The emperor finally interposed to terminate that scandalous strife, banished Nestorius and dissolved the council. Ultimately he gave decision in favour of the orthodox. The council was generally received as ecumenical, even by the Antiochenes, and the differences between Cyril and John were adjusted (433) by a "Union Creed," which, however, did not prevent a recrudescence of theological controversy.

See Mansi iv. pp. 567-1482, v. pp. 1-1023; Hardouin i. pp. 1271-1722; Hefele (2nd ed.) ii. pp. 141-247 (Eng. trans. iii. pp. 1-114); Peltanus, *SS. Magni et Ecumen. Conc. Ephesini primi Acta omnia* . . . (Ingolstadt, 1576); Wilhelm Kraetz, *Koptische Akten zum Ephes. Konzil* . . . (Leipzig, 1904); also the articles Nestorius; Cyril; Theodore of Mopsuestia.

The so-called "Robber Synod" of Ephesus (*Latrocinium Ephesinum*) of 449, although wholly irregular and promptly repudiated by the church, may, nevertheless, not improperly be treated here. The archimandrite Eutyches (*q.v.*) having been deposed by his bishop, Flavianus of Constantinople, on account of his heterodox doctrine of the person of Christ, had appealed to Dioscurus, the successor of Cyril in the see of Alexandria, who restored him and moved the emperor Theodosius II. to summon a council, which should "utterly destroy Nestorianism." Rome recognizing that she had more to fear from Alexandria, departed from her traditional policy and sided with Constantinople. The council of 130 bishops, which convened on the 8th of August 449, was completely dominated by Dioscurus. Eutyches was acquitted of heresy and reinstated, Flavianus and other bishops deposed, the Roman legates insulted, and all opposition was overborne by intimidation or actual violence. The death of Flavianus, which soon followed, was attributed to injuries received in this synod; but the proof of the charge leaves something to be desired.

The emperor confirmed the synod, but the Eastern Church was divided upon the question of accepting it, and Leo I. of Rome excommunicated Dioscurus, refused to recognize the successor of Flavianus and demanded a new and greater council. The death of Theodosius II. removed the main support of Dioscurus, and cleared the way for the council of Chalcedon (*q.v.*), which deposed the Alexandrian and condemned Eutychianism.

See Mansi vi. pp. 503 sqq., 606 sqq.; Hardouin ii. 71 sqq.; Hefele (2nd ed.) ii. pp. 349 sqq. (Eng. trans. iii. pp. 221 sqq.); S. G. F. Perry, *The Second Synod of Ephesus* (Dartford, 1881); l'Abbé Martin, *Actes du brigandage d'Éphèse* (Amiens, 1874) and *Le Pseudo-synode connu dans l'histoire sous le nom de brigandage d'Éphèse* (Paris, 1875). (T. F. C.)

EPHOD, a Hebrew word (*ēphōd*) of uncertain meaning, retained by the translators of the Old Testament. In the post-exilic priestly writings (5th century B.C. and later) the ephod forms part of the gorgeous ceremonial dress of the high-priest (see Ex. xxix. 5 sq. and especially Ecclus. xlv. 7-13). It was a very richly decorated object of coloured threads interwoven with gold, worn outside the luxurious mantle or robe; it was kept in place by a girdle, and by shoulder-pieces (?), to which were attached brooches of onyx (fastened to the robe) and golden rings from which hung the "breastplate" (or rather pouch) containing the sacred lots, Urim and Thummim. The somewhat involved description in Ex. xxviii. 6 sqq., xxxix. 2 sqq. (see V. Ryssel's ed. of Dillmann's commentary on Ex.-Lev.) leaves it uncertain whether it covered the back, encircling the body like a kind of waistcoat, or only the front; at all events it was not a garment in the ordinary sense, and its association with the sacred lots indicates that the ephod was used for divination (cf. Num. xxvii. 21), and had become the distinguishing feature of the leading priestly line (cf. 1 Sam. ii. 28).[1] But from other passages it seems that the ephod had been a familiar object whose use was by no means so restricted. Like the teraphim (*q.v.*) it was part of the common stock of Hebrew cult; it is borne (rather than worn) by persons acting in a priestly character (Samuel at Shiloh, priests of Nob, David), it is part of the worship of individuals (Gideon at Ophrah), and is found in a private shrine with a lay attendant (Micah; Judg. xvii. 5; see, however, vv. 10–13).[2] Nevertheless, while the prophetical teaching came to regard the ephod as contrary to the true worship of Yahweh, the priestly doctrine of the post-exilic age (when worship was withdrawn from the community at large to the recognized priesthood of Jerusalem) has retained it along with other remains of earlier usage, legalizing it, as it were, by confining it exclusively to the Aaronites.

An intricate historical problem is involved at the outset in the famous ephod, which the priest Abiathar brought in his hand when he fled to David after the massacre of the priests of Nob. It is evidently regarded as the one which had been in Nob (1 Sam. xxi. 9), and the presence of the priests at Nob is no less clearly regarded as the sequel of the fall of Shiloh. The ostensible intention is to narrate the transference of the sacred objects to David (cf. 2 Sam. i. 10), and henceforth he regularly inquires of Yahweh in his movements (1 Sam. xxiii. 9-12, xxx. 7 sq.; cf. xxiii. 2, 4; 2 Sam. ii. 1, v. 19-23). It is possible that the writer (or writers) desired to trace the earlier history of the ephod through the line of Eli and Abiathar to the time when the Zadokite priests gained the supremacy (see Levites); but elsewhere Abiathar is said to have borne the ark (1 Kings ii. 26; cf. 2 Sam. vii. 6), and this fluctuation is noteworthy by reason of the present confusion in the text of 1 Sam. xiv. 3, 18 (see commentaries).

On one view, the ark in Kirjath-jearim was in non-Israelite hands (1 Sam. vii. 1 sq.); on the other, Saul's position as king necessitates the presumption that his sway extended over Judah and Israel, including those cities which otherwise appear to have been in the hands of aliens (1 Sam. xiv. 47 sq.; cf. xvii. 54, &c.). There are some fundamental divergencies in the representations of the traditions of both David and Saul (*qq.v.*), and there is indirect and independent evidence which makes 1 Kings ii. 26 not entirely isolated. Here it must suffice to remark that the ark, too, was also an object for ascertaining the divine will (especially Judg. xx. 26-28; cf. 18, 23), and it is far from certain that the later records of the ark (which was too heavy to be borne by one), like those of the ephod, are valid for earlier times.

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[1] Cf. the phrase "ephod of prophecy" (*Testament of Levi*, viii. 2). The priestly apparatus of the post-exilic age retains several traces of old mythological symbolism and earlier cult, the meaning of which had not altogether been forgotten. With the dress one may perhaps compare the apparel of the gods Marduk and Adad, for which see A. Jeremias, *Das Alte Test. im Lichte des Alten Orients*, 2nd ed., figs. 33, 46, and pp. 162, 449.

[2] The ordinary interpretation "*linen* ephod" (1 Sam. ii. 18, xxii. 18; 2 Sam. vi. 14) is questioned by T. C. Foote in his useful monograph, *Journ. Bibl. Lit.* xxi., 1902, pp. 3, 47. This writer also aptly compares the infant Samuel with the child who drew the lots at the temple of Fortuna at Praeneste (Cicero, *De divin.* ii. 41, 86), and with the modern practice of employing innocent instruments of chance in lotteries (*op. cit.* pp. 22, 27).

For the form of the earlier ephod the classic passage is 2 Sam. vi. 14, where David girt in (or with) a linen ephod dances before the ark at its entry into Jerusalem and incurs the unqualified contempt of his wife Michal, the daughter of Saul. Relying upon the known custom of performing certain observances in a practically, or even entirely, nude condition, it seems plausible to infer that the ephod was a scanty wrapping, perhaps a loin-cloth, and this view has found weighty support. On the other hand, the idea of contempt at the exposure of the person, to whatever extent, may not have been so prominent, especially if the custom were not unfamiliar, and it is possible that the sequel refers more particularly to grosser practices attending outbursts of religious enthusiasm.[1]

The favourite view that the ephod was also an image rests partly upon 1 Sam. xxi. 9, where Goliath's sword is wrapped in a cloth in the sanctuary of Nob *behind the ephod*. But it is equally natural to suppose that it hung on a nail in the wall, and apart from the omission of the significant words in the original Septuagint, the possibility that the text read "ark" cannot be wholly ignored (see above; also G. F. Moore, *Ency. Bib.* col. 1307, n. 2). Again, in the story of Micah's shrine and the removal of the sacred objects and the Levite priest by the Danites, parallel narratives have been used: the graven and molten images of Judg. xvii. 2-4 corresponding to the ephod and teraphim of ver. 5. Throughout there is confusion in the use of these terms, and the finale refers only to the graven image of Dan (xviii. 30 sq., see 1 Kings xii. 28 sq.). But the combination of ephod and teraphim (as in Hos. iii. 4) is noteworthy, since the fact that the latter were images (1 Sam. xix. 13; Gen. xxxi. 34) could be urged against the view that the former were of a similar character. Finally, according to Judg. viii. 27, Gideon made an ephod of gold, about 70 ℔ in weight, and "put" it in Ophrah. It is regarded as a departure from the worship of Yahweh, although the writer of ver. 33 (cf. also ver. 23) hardly shared this feeling; it was probably something once harmlessly associated with the cult of Yahweh (cf. CALF, GOLDEN), and the term "ephod" may be due to a later hand under the influence of the prophetical teaching referred to above. The present passage is the only one which appears to prove that the ephod was an image, and several writers, including Lotz (*Realencyk. f. prot. Theol.* vol. v., *s.v.*), T. C. Foote (pp. 13-18) and A. Maecklenburg (*Zeit. f. wissens. Theol.*, 1906, pp. 433 sqq.) find this interpretation unnecessary.

Archaeological evidence for objects of divination (see, *e.g.*, the interesting details in Ohnefalsch-Richter, *Kypros, the Bible and Homer*, i. 447 sq.), and parallels from the Oriental area, can be readily cited in support of any of the explanations of the ephod which have been offered, but naturally cannot prove the form which it actually took in Palestine. Since images were clothed, it could be supposed that the diviner put on the god's apparel (cf. *Ency. Bib.* col. 1141); but they were also plated, and in either case the transference from a covering to the object covered is intelligible. If the ephod was a loin-cloth, its use as a receptacle and the known evolution of the article find useful analogies (Foote, p. 43 sq., and *Ency. Bib.* col. 1734 [1]). Finally, if there is no decisive evidence for the view that it was an image (Judg. viii. 27), or that as a wrapping it formed the sole covering of the officiating agent (2 Sam. vi.), all that can safely be said is that it was certainly used in divination and presumably did not differ radically from the ephod of the post-exilic age.

See further, in addition to the monographs already cited, the articles in Hastings's *Dict. Bible* (by S. R. Driver), *Ency. Bib.* (by G. F. Moore), and *Jew. Encyc.* (L. Ginsburg), and E. Sellin, in *Oriental. Studien: Theodor Nöldeke* (ed. Bezold, 1906), pp. 699 sqq. (S. A. C.)

EPHOR (Gr. ἔφορος), the title of the highest magistrates of the ancient Spartan state. It is uncertain when the office was created and what was its original character. That it owed its institution to Lycurgus (Herod. i. 65; cf. Xen. *Respub. Lacedaem.* viii. 3) is very improbable, and we may either regard it as an immemorial Dorian institution (with C. O. Müller, H. Gabriel, H. K. Stein, Ed. Meyer and others), or accept the tradition that it was founded during the first Messenian War, which necessitated a prolonged absence from Sparta on the part of both kings (Plato, *Laws*, iii. 692 A; Aristotle, *Politics*, v. 9. 1=p. 1313 a 26; Plut. *Cleomenes*, 10; so G. Dum, G. Gilbert, A. H. J. Greenidge). There is no evidence for the theory that originally the ephors were market inspectors; they seem rather to have had from the outset judicial or police functions. Gradually they extended their powers, aided by the jealousy between the royal houses, which made it almost impossible for the two kings to co-operate heartily, and from the 5th to the 3rd century they exercised a growing despotism which Plato justly calls a *tyrannis* (*Laws*, 692). Cleomenes III. restored the royal power by murdering four of the ephors and abolishing the office, and though it was revived by Antigonus Doson after the battle of Sellasia, and existed at least down to Hadrian's reign (*Sparta Museum Catalogue*, Introd. p. 10), it never regained its former power.

In historical times the ephors were five in number, the first of them giving his name to the year, like the eponymous archon at Athens. Where opinions were divided the majority prevailed. The ephors were elected annually, originally no doubt by the kings, later by the people; their term of office began with the new moon after the autumnal equinox, and they had an official residence (ἐφορεῖον) in the Agora. Every full citizen was eligible and no property qualification was required.

The ephors summoned and presided over meetings of the Gerousia and Apella, and formed the executive committee responsible for carrying out decrees. In their dealings with the kings they represented the supremacy of the people. There was a monthly exchange of oaths, the kings swearing to rule according to the laws, the ephors undertaking on this condition to maintain the royal authority (Xen. *Resp. Laced.* 15. 7). They alone might remain seated in a king's presence, and had power to try and even to imprison a king, who must appear before them at the third summons. Two of them accompanied the army in the field, not interfering with the king's conduct of the campaign, but prepared, if need be, to bring him to trial on his return. The ephors, again, exercised a general guardianship of law and custom and superintended the training of the young. They shared the criminal jurisdiction of the Gerousia and decided civil suits. The administration of taxation, the distribution of booty, and the regulation of the calendar also devolved upon them. They could actually put *perioeci* to death without trial, if we may believe Isocrates (xii. 181), and were responsible for protecting the state against the helots, against whom they formally declared war on entering office, so as to be able to kill any whom they regarded as dangerous without violating religious scruples. Finally, the ephors were supreme in questions of foreign policy. They enforced, when necessary, the alien acts (ξενηλασία), negotiated with foreign ambassadors, instructed generals, sent out expeditions and were the guiding spirits of the Spartan confederacy.

See the constitutional histories of G. Gilbert (Eng. trans.), pp. 16, 52-59; G. Busolt, p. 84 ff., V. Thumser, p. 241 ff., G. F. Schömann (Eng. trans.), p. 236 ff., A. H. J. Greenidge, p. 102 ff.; Szanto's article "Ephoroi" in Pauly-Wissowa, *Realencyclopädie*, v. 2860 ff.; Ed. Meyer, *Forschungen zur alten Geschichte*, i. 244 ff.; C. O. Müller, *Dorians*, bk. iii. ch. vii.; G. Grote, *History of Greece*, pt. ii. ch. vi.; G. Busolt, *Griechische Geschichte*, i.^{2} 555 ff.; B. Niese, *Historische Zeitschrift*, lxii. 58 ff. Of the many monographs dealing with this subject the following are specially useful: G. Dum, *Entstehung und*

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[1] It is not stated that the linen ephod was David's sole covering, and it is difficult to account for the text in the parallel passage 1 Chron. xv. 27 (where he is clothed with a robe); "girt," too, is ambiguous, since the verb is even used of a sword. On the question of nudity (cf. 1 Sam. xix. 24) see Robertson Smith, *Rel. Sem.*^{2} pp. 161, 450 sq.; *Ency. Bib.* s.vv. "girdle," "sackcloth"; and M. Jastrow, *Journ. Am. Or. Soc.* xx. 144, xxi. 23. The significant terms "uncover," "play" (2 Sam. vi. 20 sq.), have other meanings intelligible to those acquainted with the excesses practised in Oriental cults.

Entwicklung des spartan. Ephorats (Innsbruck, 1878); H. K. Stein, *Das spartan. Ephorat bis auf Cheilon* (Paderborn, 1870); K. Kuchtner, *Entstehung und ursprüngliche Bedeutung des spartan. Ephorats* (Munich, 1897); C. Frick, *De ephoris Spartanis* (Göttingen, 1872); A. Schaefer, *De ephoris Lacedaemoniis* (Greifswald, 1863); E. von Stern, *Zur Entstehung und ursprünglichen Bedeutung des Ephorats in Sparta* (Berlin, 1894). (M. N. T.)

EPHORUS (*c.* 400–330 B.C.), of Cyme in Aeolis, in Asia Minor, Greek historian. Together with the historian Theopompus he was a pupil of Isocrates, in whose school he attended two courses of rhetoric. But he does not seem to have made much progress in the art, and it is said to have been at the suggestion of Isocrates himself that he took up literary composition and the study of history. The fruit of his labours was his Ἱστορίαι in 29 books, the first universal history, beginning with the return of the Heraclidae to Peloponnesus, as the first well-attested historical event. The whole work was edited by his son Demophilus, who added a 30th book, containing a summary description of the Social War and ending with the taking of Perinthus (340) by Philip of Macedon (cf. Diod. Sic. xvi. 14 with xvi. 76). Each book was complete in itself, and had a separate title and preface. It is clear that Ephorus made critical use of the best authorities, and his work, highly praised and much read, was freely drawn upon by Diodorus Siculus[1] and other compilers. Strabo (viii. p. 332) attaches much importance to his geographical investigations, and praises him for being the first to separate the historical from the merely geographical element. Polybius (xii. 25 g) while crediting him with a knowledge of the conditions of naval warfare, ridicules his description of the battles of Leuctra and Mantineia as showing ignorance of the nature of land operations. He was further to be commended for drawing (though not always) a sharp line of demarcation between the mythical and historical (Strabo ix. p. 423); he even recognized that a profusion of detail, though lending corroborative force to accounts of recent events, is ground for suspicion in reports of far-distant history. His style was high-flown and artificial, as was natural considering his early training, and he frequently sacrificed truth to rhetoric effect; but, according to Dionysius of Halicarnassus, he and Theopompus were the only historical writers whose language was accurate and finished. Other works attributed to him were:—*A Treatise on Discoveries*; *Respecting Good and Evil Things*; *On Remarkable Things in Various Countries* (it is doubtful whether these were separate works, or merely extracts from the *Histories*); *A Treatise on my Country*, on the history and antiquities of Cyme, and an essay *On Style*, his only rhetorical work, which is occasionally mentioned by the rhetorician Theon. Nothing is known of his life, except the statement in Plutarch that he declined to visit the court of Alexander the Great.

Fragments in C. W. Müller, *Fragmenta historicorum Graecorum*, i., with critical introduction on the life and writings of Ephorus; see J. A. Klügmann, *De Ephoro historico* (1860); C. A. Volquardsen, *Untersuchungen über die Quellen der griechischen und sicilischen Geschichten bei Diodor. xi.-xvi.* (1868); and specially J. B. Bury, *Ancient Greek Historians* (1909); E. Schwartz, in Pauly-Wissowa, *Realencyc.* s.v.; and article GREECE: *History*: Ancient Authorities.

EPHRAEM SYRUS (Ephraim the Syrian), a saint who lived in Mesopotamia during the first three quarters of the 4th century A.D. He is perhaps the most influential of all Syriac authors; and his fame as a poet, commentator, preacher and defender of orthodoxy has spread throughout all branches of the Christian Church. This reputation he owes partly to the vast fertility of his pen—according to the historian Sozomen he was credited with having written altogether 3,000,000 lines—partly to the elegance of his style and a certain measure of poetic inspiration, more perhaps to the strength and consistency of his personal character, and his ardour in defence of the creed formulated at Nicaea.

An anonymous life of Ephraim was written not long after his death in 373. The biography has come down to us in two recensions. But in neither form is it free from later interpolation; and its untrustworthiness is shown by its conflicting with data supplied by his own works, as well as by the manner in which it is overloaded with miraculous events. The following is a probable outline of the main facts of Ephraim's life. He was born in the reign of Constantine (perhaps in 306) at or near Nisibis. His father was a pagan, the priest of an idol called Abnil or Abizal.[2] During his boyhood Ephraim showed a repugnance towards heathen worship, and was eventually driven by his father from the home. He became a ward and disciple of the famous Jacob—the same who attended the Council of Nicaea as bishop of Nisibis, and died in 338. At his hands Ephraim seems to have received baptism at the age of 18 or of 28 (the two recensions differ on this point), and remained at Nisibis till its surrender to the Persians by Jovian in 363. Probably in the course of these years he was ordained a deacon, but from his humble estimate of his own worth refused advancement to any higher degree in the church. He seems to have played an important part in guiding the fortunes of the city during the war begun by Shapur II. in 337, in the course of which Nisibis was thrice unsuccessfully besieged by the Persians (in 338, 346 and 350). The statements of his biographer to this effect accord with the impression we derive from his own poems (*Carmina Nisibena*, 1-21). His intimate relations with Bishop Jacob were continued with the three succeeding bishops—Babu (338–?349), Vologaeses (?349–361), and Abraham—on all of whom he wrote encomia. The surrender of the city in 363 to the Persians resulted in a general exodus of the Christians, and Ephraim left with the rest. After visiting Amid (Diarbekr) he proceeded to Edessa, and there settled and spent the last ten years of his life. He seems to have lived mainly as a hermit outside the city: his time was devoted to study, writing, teaching and the refutation of heresies. It is possible that during these years he paid a visit to Basil at Caesarea. Near the end of his life he rendered great public service by distributing provisions in the city during a famine. The best attested date for his death is the 9th of June 373. It is clear that this chronology leaves no room for the visit to Egypt, and the eight years spent there in refuting Arianism, which are alleged by his biographer. Perhaps, as has been surmised, there may be confusion with another Ephraim. Nor can he have written the funeral panegyric on Basil who survived him by three months. But with all necessary deductions the biography is valuable as witnessing to the immense reputation for sanctity and for theological acumen which Ephraim had gained in his lifetime, or at least soon after he died. His biographer's statement as to his habits and appearance is worth quoting, and is probably true:—"From the time he became a monk to the end of his life his only food was barley bread and sometimes pulse and vegetables: his drink was water. And his flesh was dried upon his bones, like a potter's sherd. His clothes were of many pieces patched together, the colour of dirt. In stature he was little; his countenance was always sad, and he never condescended to laughter. And he was bald and beardless."

The statement in his Life that Ephraim miraculously learned Coptic falls to the ground with the narrative of his Egyptian visit: and the story of his suddenly learning to speak Greek through the prayer of St Basil is equally unworthy of credence. He probably wrote only in Syriac, though he may have possessed some knowledge of Greek and possibly of Hebrew. But many of his works must have been early translated into other languages; and we possess in MSS. versions into Greek, Armenian, Coptic, Arabic and Ethiopic. The Greek versions occupy three entire volumes of the Roman folio edition, and the extant Armenian versions (mainly of N.T. commentaries) were published at Venice in four volumes in 1836.

It was primarily as a sacred poet that Ephraim impressed himself on his fellow-countrymen. With the exception of his commentaries on scripture, nearly all his extant Syriac works are composed in metre. In many cases the metrical structure is of the simplest, consisting only in the arrangement of the discourse in lines of uniform length—usually heptasyllabic (Ephraim's favourite metre) or pentasyllabic. A more complicated arrangement is found in other poems, such as the *Carmina Nisibena*: these are made up of strophes, each consisting of lines of different lengths according to a settled scheme, with a recurring refrain. T. J. Lamy has estimated that, in this class of poems, there are as many as 66 different varieties of metres to be found in the works of Ephraim. These strophic poems were set to music, and sung by alternating choirs of girls. According to Ephraim's biographer, his main motive for providing these hymns set to music was his desire to counteract the baneful effects produced by the heretical hymns of Bardaiṣan and his son Harmonius, which had enjoyed popularity and been sung among the Edessenes for a century and a half.

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[1] It is now generally recognized, thanks to Volquardsen and others, that Ephorus is the principal authority followed by Diodorus, except in the chapters relating to Sicilian history.

[2] It is true that in the *Confession* attributed to him and printed among his Greek works in the first volume of the Roman edition he speaks (p. 129) of his parents as having become martyrs for the Christian faith. But this document is of very doubtful authenticity.

The subject-matter of Ephraim's poems covers all departments of theology. Thus the Roman edition contains (of metrical works) exegetical discourses, hymns on the Nativity of Christ, 65 hymns against heretics, 85 on the Faith against sceptics, a discourse against the Jews, 85 funeral hymns, 4 on free-will, 76 exhortations to repentance, 12 hymns on paradise, and 12 on miscellaneous subjects. The edition of Lamy has added many other poems, largely connected with church festivals. It must be confessed that, judged by Western standards, the poems of Ephraim are prolix and wearisome in the extreme, and are distinguished by few striking poetic beauties. And so far as they are made the vehicle of reasoning, their efficiency is seriously hampered by their poetic form. On the other hand, it is fair to remember that the taste of Ephraim's countrymen in poetry was very different from ours. As Duval remarks: " quant à la prolixité de saint Éphrem que nous trouvons parfois fastidieuse, on ne peut la condamner sans tenir compte du goût des Syriens qui aimaient les répétitions et les développements de la même pensée, et voyaient des qualités là où nous trouvons des défauts " (*Littér. syriaque*, p. 19). He is no worse in these respects than the best of the Syriac writers who succeeded him. And he surpasses almost all of them in the richness of his diction, and his skill in the use of metaphors and illustrations.

Of Ephraim as a commentator on Scripture we have only imperfect means of judging. His commentaries on the O.T. are at present accessible to us only in the form they had assumed in the *Catena Patrum* of Severus (compiled in 861), and to some extent in quotations by later Syriac commentators. His commentary on the Gospels is of great importance in connexion with the textual history of the N.T., for the text on which he composed it was that of the Diatessaron. The Syriac original is lost: but the ancient Armenian version survives, and was published at Venice in 1836 along with Ephraim's commentary on the Pauline epistles (also only extant in Armenian) and some other works. A Latin version of the Armenian Diatessaron commentary has been made by Aucher and Mösinger (Venice, 1876). Using this version as a clue, J. R. Harris[1] has been able to identify a number of Syriac quotations from or references to this commentary in the works of Isho'dadh, Bar-Kepha (Severus), Bar-ṣalibi and Barhebraeus. Although, as Harris points out, it is unlikely that the original text of the Diatessaron had come down unchanged through the two centuries to Ephraim's day, the text on which he comments was in the main unaffected by the revision which produced the Peshitta. Side by side with this conclusion may be placed the result of F. C. Burkitt's[2] careful examination of the quotations from the Gospels in the other works of Ephraim; he shows conclusively that in all the undoubtedly genuine works the quotations are from a pre-Peshitta text.

As a theologian, Ephraim shows himself a stout defender of Nicaean orthodoxy, with no leanings in the direction of either the Nestorian or the Monophysite heresies which arose after his time. He regarded it as his special task to combat the views of Marcion, of Bardaiṣan and of Mani.

To the modern historian Ephraim's main contribution is in the material supplied by the 72 hymns[3] known as *Carmina Nisibena* and published by G. Bickell in 1866. The first 20 poems were written at Nisibis between 350 and 363 during the Persian invasions; the remaining 52 at Edessa between 363 and 373. The former tell us much of the incidents of the frontier war, and particularly enable us to reconstruct in detail the history of the third siege of Nisibis in 350.

Of the many editions of Ephraim's works a full list is given by Nestle in *Realenk. f. protest. Theol. und Kirche* (3rd ed.). For modern students the most important are: (1) the great folio edition in 6 volumes (3 of works in Greek and 3 in Syriac), in which the text is throughout accompanied by a Latin version (Rome, 1732–1746); on the unsatisfactory character of this edition (which includes many works that are not Ephraim's) and especially of the Latin version, see Burkitt, *Ephraim's Quotations*, pp. 4 sqq.; (2) *Carmina Nisibena*, edited with a Latin translation by G. Bickell (Leipzig, 1866); (3) *Hymni et sermones*, edited with a Latin translation by T. J. Lamy (4 vols., Malines, 1882–1902). Many selected homilies have been edited or translated by Overbeck, Zingerle and others (cf. Wright, *Short History*, pp. 35 sqq.); a selection of the *Hymns* was translated by H. Burgess, *Select Metrical Hymns of Ephrem Syrus* (1853). Of the two recensions of Ephraim's biography, one was edited in part by J. S. Assemani (B.O. i. 26 sqq.) and in full by S. E. Assemani in the Roman edition (iii. pp. xxiii.-lxiii.); the other by Lamy (ii. 5-90) and Bedjan (*Acta mart. et sanct.* iii. 621-665). The long poem on the history of Joseph, twice edited by Bedjan (Paris, 1887 and 1891) and by him attributed to Ephraim, is more probably the work of Balai. (N. M.)

EPHRAIM, a tribe of Israel, called after the younger son of Joseph, who in his benediction exalted Ephraim over the elder brother Manasseh (Gen. xlviii.). These two divisions were often known as the "house of Joseph" (Josh. xvii. 14 sqq.; Judg. i. 22; 2 Sam. xix. 20; 1 Kings xi. 28). The relations between them are obscure; conflicts are referred to in Is. ix. 21,[4] and Ephraim's proud and ambitious character is indicated in its demands as narrated in Josh. xvii. 14; Judg. viii. 1-3, xii. 1-6. Thoughout, Ephraim played a distinctive and prominent part; it probably excelled Manasseh in numerical strength, and the name became a synonym for the northern kingdom of Israel. Originally the name may have been a geographical term for the central portion of Palestine. Regarded as a tribe, it lay to the north of Benjamin, which traditionally belongs to it; but whether the young "brother" (see BENJAMIN) sprang from it, or grew up separately, is uncertain. Northwards, Ephraim lost itself in Manasseh, even if it did not actually include it (Judg. i. 27; 1 Chron. vii. 29); the boundaries between them can hardly be recovered. Ephraim's strength lay in the possession of famous sites: Shechem, with the tomb of the tribal ancestor, also one of the capitals; Shiloh, at one period the home of the ark; Timnath-Serah (or Heres), the burial-place of Joshua; and Samaria, whose name was afterwards extended to the whole district (see SAMARIA).

Shechem itself was visited by Abraham and Jacob, and the latter bought from the sons of Hamor a burial-place (Gen. xxxiii. 19). The story of Dinah may imply some early settlement of tribes in its vicinity (but see SIMEON), and the reference in Gen. xlviii. 22 (see R. V. marg.) alludes to its having been forcibly captured. But how this part of Palestine came into the hands of the Israelites is not definitely related in the story of the invasion (see JOSHUA).

A careful discussion of the Biblical data referring to Ephraim is given by H. W. Hogg, *Ency. Bib.*, s.v. On the characteristic narratives which appear to have originated in Ephraim (viz. the Ephraimite or Elohist source, E), see GENESIS and BIBLE: *Old Testament Criticism*. See further ABIMELECH; GIDEON; MANASSEH; and JEWS: *History*.

EPHTHALITES, or WHITE HUNS. This many-named and enigmatical tribe was of considerable importance in the history of India and Persia in the 5th and 6th centuries, and was known to the Byzantine writers, who call them Ἐφθαλῖται, Εὐθαγῖται, Νεφθαλῖται or Ἀβδελοί. The last of these is an independent attempt to render the original name, which was probably something like Aptal or Haptal, but the initial N of the third is believed to be a clerical error. They were also called *Λευκοὶ Οὔννοι* or *Χοῦνοι*, White (that is fair-skinned) Huns. In Arabic and Persian they are known as Haital and in Armenian as Haithal, Idal or Hepthal. The Chinese name Yetha seems an attempt to represent the same sound. In India they were called Hūnas. Ephthalite is the usual orthography, but Hephthalite is perhaps more correct.

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[1] *Fragments of the Commentary of Ephrem Syrus upon the Diatessaron* (London, 1895).

[2] "Ephraim's Quotations from the Gospel," in *Texts and Studies*, vol. vii. (Cambridge, 1901).

[3] There were originally 77, but 5 have perished.

[4] Inter-tribal feuds during the period of the monarchy may underlie the events mentioned in 1 Kings xvi. 9 sq., 21 sq.; 2 Kings xv. 10, 14.

Our earliest information about the Ephthalites comes from the Chinese chronicles, in which it is stated that they were originally a tribe of the great Yue-Chi (*q.v.*), living to the north of the Great Wall, and in subjection to the Jwen-Jwen, as were also the Turks at one time. Their original name was Hoa or Hoa-tun; subsequently they styled themselves Ye-tha-i-li-to after the name of their royal family, or more briefly Ye-tha. Before the 5th century A.D. they began to move westwards, for about 420 we find them in Transoxiana, and for the next 130 years they were a menace to Persia, which they continually and successfully invaded, though they never held it as a conquest. The Sassanid king, Bahram V., fought several campaigns with them and succeeded in keeping them at bay, but they defeated and killed Peroz (Firūz), A.D. 484. His son Kavadh I. (Kobad), being driven out of Persia, took refuge with the Ephthalites, and recovered his throne with the assistance of their khan, whose daughter he had married, but subsequently he engaged in prolonged hostilities with them. The Persians were not quit of the Ephthalites until 557 when Chosroes Anushirwan destroyed their power with the assistance of the Turks, who now make their first appearance in western Asia.

The Huns who invaded India appear to have belonged to the same stock as those who molested Persia. The headquarters of the horde were at Bamian and at Balkh, and from these points they raided south-east and south-west. Skandagupta repelled an invasion in 455, but the defeat of the Persians in 484 probably stimulated their activity, and at the end of the 5th century their chief Toromana penetrated to Malwa in central India and succeeded in holding it for some time. His son Mihiragula (*c.* 510–540) made Sakāla in the Punjab his Indian capital, but the cruelty of his rule provoked the Indian princes to form a confederation and revolt against him about 528. He was not, however, killed, but took refuge in Kashmir, where after a few years he seized the throne and then attacked the neighbouring kingdom of Gandhara, perpetrating terrible massacres. About a year after this he died (*c.* 540), and shortly afterwards the Ephthalites collapsed under the attacks of the Turks. They do not appear to have moved on to another sphere, as these nomadic tribes often did when defeated, and were probably gradually absorbed in the surrounding populations. Their political power perhaps continued in the Gurjara empire, which at one time extended to Bengal in the east and the Nerbudda in the south, and continued in a diminished form until A.D. 1040. These Gurjaras appear to have entered India in connexion with the Hunnish invasions.

Our knowledge of the Indian Hūnas is chiefly derived from coins, from a few inscriptions distributed from the Punjab to central India, and from the account of the Chinese pilgrim Hsüan Tsang, who visited the country just a century after the death of Mihiragula. The Greek monk Cosmas Indicopleustes, who visited India about 530, describes the ruler of the country, whom he calls Gollas, as a White Hun king, who exacted an oppressive tribute with the help of a large army of cavalry and war elephants. Gollas no doubt represents the last part of the name Mihiragula or Mihirakula.

The accounts of the Ephthalites, especially those of the Indian Hûnas, dwell on their ferocity and cruelty. They are represented as delighting in massacres and torture, and it is said that popular tradition in India still retains the story that Mihiragula used to amuse himself by rolling elephants down a precipice and watching their agonies. Their invasions shook Indian society and institutions to the foundations, but, unlike the earlier Kushans, they do not seem to have introduced new ideas into India or have acted as other than a destructive force, although they may perhaps have kept up some communication between India and Persia. The first part of Mihiragula seems to be the name of the Persian deity Mithra, but his patron deity was Śiva, and he left behind him the reputation of a ferocious persecutor of Buddhism. Many of his coins bear the Nandi bull (Śiva's emblem), and the king's name is preceded by the title *śahi* (shah), which had previously been used by the Kushan dynasty. Toramana's coins are found plentifully in Kashmir, which, therefore, probably formed part of the Hūna dominions before Mihiragula's time, so that when he fled there after his defeat he was taking refuge, if not with his own subjects, at least with a kindred clan.

Greek writers give a more flattering account of the Ephthalites, which may perhaps be due to the fact that they were useful to the East Roman empire as enemies of Persia and also not dangerously near. Procopius says that they were far more civilized than the Huns of Attila, and the Turkish ambassador who was received by Justin is said to have described them as *ἀστικοί*, which may merely mean that they lived in the cities which they conquered. The Chinese writers say that their customs were like those of the Turks; that they had no cities, lived in felt tents, were ignorant of writing and practised polyandry. Nothing whatever is known of their language, but some scholars explain the names Toramana and Jauvla as Turkish.

For the possible connexion between the Ephthalites and the European Huns see HUNS. The Chinese statement that the Hoa or Ye-tha were a section of the great Yue-Chi, and that their customs resembled those of the Turks (Tu-Kiue), is probably correct, but does not amount to much, for the relationship did not prevent them from fighting with the Yue-Chi and Turks, and means little more than that they belonged to the warlike and energetic section of central Asian nomads, which is in any case certain. They appear to have been more ferocious and less assimilative than the other conquering tribes. This may, however, be due to the fact that their contact with civilization was so short; the Yue-Chi and Turks had had some commerce with more advanced races before they played any part in political history, but the Ephthalites appear as raw barbarians, and were annihilated as a nation in little more than a hundred years. Like the Yue-Chi they have probably contributed to form some of the physical types of the Indian population, and it is noticeable that polyandry is a recognized institution among many Himalayan tribes, and is also said to be practised secretly by the Jats and other races of the plains.

Among original authorities may be consulted Procopius, Menander Protector, Cosmas Indicopleustes (trans. McCrindle, Hakluyt Society, 1897), the Kashmir chronicle *Rajataranginî* (trans. Stein, 1900, and Yüan Chwang). See also A. Stein, *White Huns and Kindred Tribes* (1905); O. Franke, *Beiträge aus chinesischen Quellen zur Kenntnis der Türkvölker und Skythen* (1904); Ujfalvy, *Mémoire sur les Huns Blancs* (1898); Drouin, *Mémoire sur les Huns Ephthalites* (1895); and various articles by Vincent Smith, Specht, Drouin, and E. H. Parker in the *Journal of the Royal Asiatic Society*, *Journal asiatique*, *Revue numismatique*, *Asiatic Quarterly*, &c. (C. EL.)

ÉPI, the French architectural term for a light finial, generally of metal, but sometimes of terra-cotta, forming the termination of a spire or the angle of a roof.

EPICENE (from the Gr. *ἐπίκοινος*, common), a term in Greek and Latin grammar denoting nouns which, possessing but one gender, are used to describe animals of either sex. In English grammar there are no true epicene nouns, but the term is sometimes used instead of *common gender*. In figurative and literary language, epicene is an adjective applied to persons having the characteristics of both sexes, and hence is occasionally used as a synonym of "effeminate."

EPICHARMUS (*c.* 540–450 B.C.), Greek comic poet, was born in the island of Cos. Early in life he went to Megara in Sicily, and after its destruction by Gelo (484) removed to Syracuse, where he spent the rest of his life at the court of Hiero, and died at the age of ninety or (according to a statement in Lucian, *Macrobii*, 25) ninety-seven. A brazen statue was set up in his honour by the inhabitants, for which Theocritus composed an inscription (*Epigr.* 17). Epicharmus was the chief representative of the Sicilian or Dorian comedy. Of his works 35 titles and a few fragments have survived. In the city of tyrants it would have been dangerous to present comedies like those of the Athenian stage, in which attacks were made upon the authorities. Accordingly, the comedies of Epicharmus are of two kinds, neither of them calculated to give offence to the ruler. They are either mythological travesties (resembling the satyric drama of Athens) or character comedies. To the first class belong the *Busiris*, in which Heracles is represented as a voracious glutton; the *Marriage of Hebe*, remarkable for a lengthy list of dainties. The second class dealt with different classes of the population (the sailor, the prophet, the boor, the parasite). Some of the plays seem to have bordered on the political, as *The Plunderings*, describing the devastation of Sicily in the time of the poet. A short fragment has been discovered (in the Rainer papyri) from the Ὀδυσσεὺς αὐτόμολος, which told how Odysseus got inside Troy in the disguise of a beggar and obtained valuable information. Another feature of his works was the large number of excellent sentiments expressed in a brief proverbial form; the Pythagoreans claimed him as a member of their school, who had forsaken the study of philosophy for the writing of comedy. Plato (*Theaetetus*, 152 E) puts him at the head of the masters of comedy, coupling his name with Homer and, according to a remark in Diogenes Laërtius, Plato was indebted to Epicharmus for much of his philosophy. Ennius called his didactic poem on natural philosophy *Epicharmus* after the comic poet. The metres employed by Epicharmus were iambic trimeter, and especially trochaic and anapaestic tetrameter. The plot of the plays was simple, the action lively and rapid; hence they were classed among the *fabulae motoriae* (stirring, bustling), as indicated in the well-known line of Horace (*Epistles*, ii. 1. 58):

> "Plautus ad exemplar Siculi properare Epicharmi."

Epicharmus is the subject of articles in Suidas and Diogenes Laërtius (viii. 3). See A. O. Lorenz, *Leben und Schriften des Koers E.* (with account of the Doric drama and fragments, 1864); J. Girard, *Études sur la poésie grecque* (1884); Kaibel in Pauly-Wissowa's *Realencyclopädie*, according to whom Epicharmus was a Siceliot; for the papyrus fragment, Blass in *Jahrbücher für Philologie*, cxxxix., 1889.

EPIC POETRY, or Epos (from the Gr. ἔπος, a story, and ἐπικός, pertaining to a story), the names given to the most dignified and elaborate forms of narrative poetry. The word *epopee* is also, but more rarely, employed to designate the same thing, ἐποποιὸς in Greek being a maker of epic poetry, and ἐποποιΐα what he makes.

It is to Greece, where the earliest literary monuments which we possess are of an epical character, that we turn for a definition of these vast heroic compositions, and we gather that their subject-matter was not confined, as Voltaire and the critics of the 18th century supposed, to "narratives in verse of warlike adventures." When we first discover the epos, hexameter verse has already been selected for its vehicle. In this form epic poems were composed not merely dealing with war and personal romance, but carrying out a didactic purpose, or celebrating the mysteries of religion. These three divisions, to which are severally attached the more or less mythical names of Homer, Hesiod and Orpheus seem to have marked the earliest literary movement of the Greeks. But, even here, we must be warned that what we possess is not primitive; there had been unwritten epics, probably in hexameters, long before the composition of any now-surviving fragment. The saga of the Greek nation, the catalogue of its arts and possessions, the rites and beliefs of its priesthood, must have been circulated, by word of mouth, long before any historical poet was born. We look upon Homer and Hesiod as records of primitive thought, but Professor Gilbert Murray reminds us that "our *Iliad*, *Odyssey*, *Erga* and *Theogony* are not the first, nor the second, nor the twelfth of such embodiments." The early epic poets, Lesches, Linus, Orpheus, Arctinus, Eugammon are the veriest shadows, whose names often betray their symbolic and fabulous character. It is now believed that there was a class of minstrels, the Rhapsodists or Homeridae, whose business it was to recite poetry at feasts and other solemn occasions. "The real bards of early Greece were all nameless and impersonal." When our tradition begins to be preserved, we find everything of a saga-character attributed to Homer, a blind man and an inhabitant of Chios. This gradually crystallized until we find Aristotle definitely treating Homer as a person, and attributing to him the composition of three great poems, the *Iliad*, the *Odyssey* and the *Margites*, now lost (see Homer). The first two of these have been preserved and form for us the type of the ancient epic; when we speak of epic poetry, we unconsciously measure it by the example of the *Iliad* and the *Odyssey*. It is quite certain, however, that these poems had not merely been preceded by a vast number of revisions of the mythical history of the country, but were accompanied by innumerable poems of a similar character, now entirely lost. That antiquity did not regard these other epics as equal in beauty to the *Iliad* seems to be certain; but such poems as *Cypria*, *Iliou Persis* (Sack of Ilion) and *Aethiopis* can hardly but have exhibited other sides of the epic tradition. Did we possess them, it is almost certain that we could speak with more assurance as to the scope of epic poetry in the days of oral tradition, and could understand more clearly what sort of ballads in hexameter it was which rhapsodes took round from court to court. In the 4th century B.C. it seems that people began to write down what was not yet forgotten of all this oral poetry. Unfortunately, the earliest critic who describes this process is Proclus, a Byzantine neo-Platonist, who did not write until some 800 years later, when the whole tradition had become hopelessly corrupted. When we pass from Homer and Hesiod, about whose actual existence critics will be eternally divided, we reach in the 7th century a poet, Peisander of Rhodes, who wrote an epic poem, the *Heracleia*, of which fragments remain. Other epic writers, who appear to be undoubtedly historic, are Antimachus of Colophon, who wrote a *Thebais*; Panyasis, who, like Peisander, celebrated the feats of Heracles; Choerilus of Samos; and Anyte, of whom we only know that she was an epic poetess, and was called "The female Homer." In the 6th and 5th centuries B.C. there was a distinct school of philosophical epic, and we distinguish the names of Xenophanes, Parmenides and Empedocles as the leaders of it.

From the dawn of Latin literature epic poetry seems to have been cultivated in Italy. A Greek exile, named Livius Andronicus, translated the *Odyssey* into Latin during the first Punic War, but the earliest original epic of Rome was the lost *Bellum Punicum* of Naevius, a work to which Virgil was indebted. A little later, Ennius composed, about 172 B.C., in 18 books, an historical epic of the *Annales*, dealing with the whole chronicle of Rome. This was the foremost Latin poem, until the appearance of the *Aeneid*; it was not imitated, remaining, for a hundred years, as Mr Mackail has said, "not only the unique, but the satisfying achievement in this kind of poetry." Virgil began the most famous of Roman epics in the year 30 B.C., and when he died, nine years later, he desired that the MS. of the *Aeneid* should be burned, as it required three years' work to complete it. Nevertheless, it seems to us, and seemed to the ancient world, almost perfect, and a priceless monument of art; it is written, like the great Greek poems on which it is patently modelled, in hexameters. In the next generation, the *Pharsalia* of Lucan, of which Cato, as the type of the republican spirit, is the hero, was the principal example of Latin epic. Statius, under the Flavian emperors, wrote several epic poems, of which the *Thebaid* survives. In the 1st century A.D. Valerius Flaccus wrote the *Argonautica* in 8 books, and Silius Italicus the *Punic War*, in 17 books; these authors show a great decline in taste and merit, even in comparison with Statius, and Silius Italicus, in particular, is as purely imitative as the worst of the epic writers of modern Europe. At the close of the 4th century the style revived with Claudian, who produced five or six elaborate historical and mythological epics of which the *Rape of Proserpine* was probably the most remarkable; in his interesting poetry we have a valuable link between the Silver Age in Rome and the Italian Renaissance. With Claudian the history of epic poetry among the ancients closes.

In medieval times there existed a large body of narrative poetry to which the general title of Epic has usually been given. Three principal schools are recognized, the French, the Teutonic and the Icelandic. Teutonic epic poetry deals, as a rule, with legends founded on the history of Germany in the 4th, 5th and 6th centuries, and in particular with such heroes as Ermanaric, Attila and Theodoric. But there is also an important group in it which deals with English themes, and among these *Beowulf*, *Waldere*, *The Lay of Maldon* and *Finnesburh* are pre-eminent. To this group is allied the purely German poem of *Hildebrand*, attributed to *c.* 800. Among these *Beowulf* is the only one which exists in anything like complete form, and it is of all examples of Teutonic epic the most important. With all its trivialities and incongruities, which belong to a barbarous age, *Beowulf* is yet a solid and comprehensive example of native epic poetry. It is written, like all old Teutonic work of the kind, in alliterative unrhymed rhythm. In Iceland, a new heroic literature was invented in the middle ages, and to this we owe the Sagas, which are, in fact, a reduction to prose of the epics of the warlike history of the North. These Sagas took the place of a group of archaic Icelandic epics, the series of which seems to have closed with the noble poem of *Atlamál*, the principal surviving specimen of epic poetry as it was cultivated in the primitive literature of Iceland. The surviving epical fragments of Icelandic composition are found thrown together in the *Codex Regius*, under the title of *The Elder Edda*, a most precious MS. discovered in the 17th century. The Icelandic epics seem to have been shorter and more episodical in character than the lost Teutonic specimens; both kinds were written in alliterative verse. It is not probable that either possessed the organic unity and vitality of spirit which make the Sagas so delightful. The French medieval epics (see Chansons de Geste) are late in comparison with those of England, Germany and Iceland. They form a curious transitional link between primitive and modern poetry; the literature of civilized Europe may be said to begin with them. There is a great increase of simplicity, a great broadening of the scene of action. The Teutonic epics were obscure and intense, the French *chansons de geste* are lucid and easy. The existing masterpiece of this kind, the magnificent *Roland*, is doubtless the most interesting and pleasing of all the epics of medieval Europe. Professor Ker's analysis of its merits may be taken as typical of all that is best in the vast body of epic which comes between the antique models, which were unknown to the medieval poets, and the artificial epics of a later time which were founded on vast ideal themes, in imitation of the ancients. "There is something lyrical in *Roland*, but the poem is not governed by lyrical principles; it requires the deliberation and the freedom of epic; it must have room to move in before it can come up to the height of its argument. The abruptness of its periods is not really an interruption of its even flight; it is an abruptness of detail, like a broken sea with a larger wave moving under it; it does not impair or disguise the grandeur of the movement as a whole." Of the progress and decline of the *chansons de geste* (*q.v.*) from the ideals of *Roland* a fuller account is given elsewhere. To the *Nibelungenlied* (*q.v.*) also, detailed attention is given in a separate article.

What may be called the artificial or secondary epics of modern Europe, founded upon an imitation of the *Iliad* and the *Aeneid*, are more numerous than the ordinary reader supposes, although but few of them have preserved much vitality. In Italy the *Chanson de Roland* inspired romantic epics by Luigi Pulci (1432–1487), whose *Morgante Maggiore* appeared in 1481, and is a masterpiece of burlesque; by M. M. Boiardo (1434–1494), whose *Orlando Innamorato* was finished in 1486; by Francesco Bello (1440?–1495), whose *Mambriano* was published in 1497; by Lodovico Ariosto (*q.v.*), whose *Orlando Furioso*, by far the greatest of its class, was published in 1516, and by Luigi Dolce (1508–1568), as well as by a great number of less illustrious poets. G.G. Trissino (1478–1549) wrote a *Deliverance of Italy from the Goths* in 1547, and Bernardo Tasso (1493–1569) an *Amadigi* in 1559; Berni remodelled the epic of Boiardo in 1541, and Teofilo Folengo (1491–1544), ridiculed the whole school in an *Orlandino* of 1526. An extraordinary feat of mock-heroic epic was *The Bucket* (1622) of Alessandro Tassoni (1565–1638). The most splendid of all the epics of Italy, however, was, and remains, the *Jerusalem Delivered* of Torquato Tasso (*q.v.*), published originally in 1580, and afterwards rewritten as *The Conquest of Jerusalem*, 1593. The fantastic *Adone* (1623) of G. B. Marini (1569–1625) and the long poems of Chiabrera, close the list of Italian epics. Early Portuguese literature is rich in epic poetry. Luis Pereira Brandão wrote an *Elegiada* in 18 books, published in 1588; Jeronymo Corte-Real (d. 1588) a *Shipwreck of Sepulveda* and two other epics; V. M. Quevedo, in 1601, an *Alphonso of Africa*, in 12 books; Sá de Menezes (d. 1664) a *Conquest of Malacca*, 1634; but all these, and many more, are obscured by the glory of Camoens (*q.v.*), whose magnificent *Lusiads* had been printed in 1572, and forms the summit of Portuguese literature. In Spanish poetry, the *Poem of the Cid* takes the first place, as the great national epic of the middle ages; it is supposed to have been written between 1135 and 1175. It was followed by the *Rodrigo*, and the medieval school closes with the *Alphonso XI.* of Rodrigo Yañez, probably written at the close of the 12th century. The success of the Italian imitative epics of the 15th century led to some imitation of their form in Spain. Juan de la Cueva (1550?–1606) published a *Conquest of Bética* in 1603; Cristóbal de Virues (1550–1610) a *Monserrate*, in 1588; Luis Barahona de Soto continued Ariosto in a *Tears of Angélica*; Gutiérrez wrote an *Austriada* in 1584; but perhaps the finest modern epic in Spanish verse is the *Araucana* (1569–1590) of Alonso de Ercilla y Zúñiga (1533–1595), "the first literary work of merit," as Mr Fitzmaurice-Kelly remarks, "composed in either American continent." In France, the epic never flourished in modern times, and no real success attended the *Franciade* of Ronsard, the *Alaric* of Scudéry, the *Pucelle* of Chapelain, the *Divine Epopée* of Soumet, or even the *Henriade* of Voltaire. In English literature *The Faery Queen* of Spenser has the same claim as the Italian poems mentioned above to bear the name of epic, and Milton, who stands entirely apart, may be said, by his isolated *Paradise Lost*, to take rank with Homer and Virgil, as one of the three types of the mastery of epical composition.

See Bossu, *Traité du poeme épique* (1675); Voltaire, *Sur la poésie épique*; Fauviel, *L'Origine de l'épopée chevaleresque* (1832); W. P. Ker, *Epic and Romance* (1897), and *Essays in Medieval Literature* (1905); Gilbert Murray, *History of Ancient Greek Literature* (1897); W. von Christ, *Geschichte der griechischen Litteratur* (1879); Gaston Paris, *La Littérature française au moyen âge* (1890); Léon Gautier, *Les Épopées françaises* (1865–1868). For works on the Greek epics see also Greek Literature and Cycle. (E. G.)

EPICTETUS (born *c.* A.D. 60), Greek philosopher, was probably a native of Hierapolis in south-west Phrygia. The name Epictetus is merely the Greek for "acquired" (from ἐπικτᾶσθαι); his original name is not known. As a boy he was a slave in the house of Epaphroditus, a freedman and courtier of the emperor Nero. He managed, however, to attend the lectures of the Stoic Musonius Rufus, and subsequently became a freedman. He was lame and of weakly health. In 90 he was expelled with the other philosophers by Domitian, who was irritated by the support and encouragement which the opposition to his tyranny found amongst the adherents of Stoicism. For the rest of his life he settled at Nicopolis, in southern Epirus, not far from the scene of the battle of Actium. There for several years he lived, and taught by close earnest personal address and conversation. According to some authorities he lived into the time of Hadrian; he himself mentions the coinage of the emperor Trajan. His contemporaries and the next generation held his character and teaching in high honour. According to Lucian, the earthenware lamp which had belonged to the sage was bought by an antiquarian for 3000 drachmas. He was never married. He wrote nothing; but much of his teaching was taken down with affectionate care by his pupil Flavius Arrianus, the historian of Alexander the Great, and is preserved in two treatises, of the larger of which, called the *Discourses of Epictetus* ('Επικτήτου Διατριβαί), four books are still extant. The other treatise is a shorter and more popular work, the *Encheiridion* ("Handbook"). It contains in an aphoristic form the main doctrines of the longer work.

The philosophy of Epictetus is intensely practical, and exhibits a high idealistic type of morality. He is an earnest, sometimes stern and sometimes pathetic, preacher of righteousness, who despises the mere graces of style and the subtleties of an abstruse logic. He has no patience with mere antiquarian study of the Stoical writers. The problem of how life is to be carried out well is the one question which throws all other inquiries into the shade. True education lies in learning to wish things to be as they actually are; it lies in learning to distinguish what is our own from what does not belong to us. But there is only one thing which is fully our own,—that is, our will or purpose. God, acting as a good king and a true father, has given us a will which cannot be restrained, compelled or thwarted. Nothing external, neither death nor exile nor pain nor any such thing, can ever force us to act against our will; if we are conquered, it is because we have willed to be conquered. And thus, although we are not responsible for the ideas that present themselves to our consciousness, we are absolutely and without any modification responsible for the way in which we use them. Nothing is ours besides our will. The divine law which bids us keep fast what is our own forbids us to make any claim to what is not ours; and while enjoining us to make use of whatever is given to us, it bids us not long after what has not been given. "Two maxims," he says, "we must ever bear in mind—that apart from the will there is nothing either good or bad, and that we must not try to anticipate or direct events, but merely accept them with intelligence." We must, in short, resign ourselves to whatever fate and fortune bring to us, believing, as the first article of our creed, that there is a god, whose thought directs the universe, and that not merely in our acts, but even in our thoughts and plans, we cannot escape his eye. In the world the true position of man is that of member of a great system, which comprehends God and men. Each human being is in the first instance a citizen of his own nation or commonwealth; but he is also a member of the great city of gods and men, whereof the city political is only a copy in miniature. All men are the sons of God, and kindred in nature with the divinity. For man, though a member in the system of the world, has also within him a principle which can guide and understand the movement of all the members; he can enter into the method of divine administration, and thus can learn—and it is the acme of his learning—the will of God, which is the will of nature. Man, said the Stoic, is a rational animal; and in virtue of that rationality he is neither less nor worse than the gods, for the magnitude of reason is estimated not by length nor by height but by its judgments. Each man has within him a guardian spirit, a god within him, who never sleeps; so that even in darkness and solitude we are never alone, because God is within, our guardian spirit. The body which accompanies us is not strictly speaking ours; it is a poor dead thing, which belongs to the things outside us. But by reason we are the masters of those ideas and appearances which present themselves from without; we can combine them, and systematize, and can set up in ourselves an order of ideas corresponding with the order of nature.

The natural instinct of animated life, to which man also is originally subject, is self-preservation and self-interest. But men are so ordered and constituted that the individual cannot secure his own interests unless he contribute to the common welfare. We are bound up by the law of nature with the whole fabric of the world. The aim of the philosopher therefore is to reach the position of a mind which embraces the whole world in its view,—to grow into the mind of God and to make the will of nature our own. Such a sage agrees in his thought with God; he no longer blames either God or man; he fails of nothing which he purposes and falls in with no misfortune unprepared; he indulges in neither anger nor envy nor jealousy; he is leaving manhood for godhead, and in his dead body his thoughts are concerned about his fellowship with God.

The historical models to which Epictetus reverts are Diogenes and Socrates. But he frequently describes an ideal character of a missionary sage, the perfect Stoic—or, as he calls him, the Cynic. This missionary has neither country nor home nor land nor slave; his bed is the ground; he is without wife or child; his only mansion is the earth and sky and a shabby cloak. He must suffer stripes, and must love those who beat him as if he were a father or a brother. He must be perfectly unembarrassed in the service of God, not bound by the common ties of life, nor entangled by relationships, which if he transgresses he will lose the character of a man of honour, while if he upholds them he will cease to be the messenger, watchman and herald of the gods. The perfect man thus described will not be angry with the wrongdoer; he will only pity his erring brother; for anger in such a case would only betray that he too thought the wrong-doer gained a substantial blessing by his wrongful act, instead of being, as he is, utterly ruined.

The best editions of the works of Epictetus are by J. Schweighäuser (6 vols., Leipzig, 1799–1800) and H. Schenkl (Leipzig, 1894, 1898). English translations by Elizabeth Carter (London, 1758); G. Long (London, 1848, ed. 1877, 1892, 1897); T. W. Higginson (Boston, 1865, new ed. 1890); of the *Encheiridion* alone by H. Talbot (London, 1881); T. W. H. Rolleston (London, 1881). See A. Bonhöffer, *Epiktet und die Stoa* (Stuttgart, 1890) and *Die Ethik des Stoikers Epiktet* (1894); E. M. Schranka, *Der Stoiker Epiktet und seine Philosophie* (Frankfort, 1885); T. Zahn, *Der Stoiker Epiktet und sein Verhältnis zum Christentum* (2nd ed. Erlangen, 1895). See also STOICS and works quoted. (W. W.; X.)

EPICURUS (342–270 B.C.), Greek philosopher, was born in Samos in the end of 342 or the beginning of 341 B.C., seven years after the death of Plato. His father Neocles, a native of Gargettos, a small village of Attica, had settled in Samos, not later than 352, as one of the cleruchs sent out after the victory of Timotheus in 366–365. At the age of eighteen he went to Athens, where the Platonic school was flourishing under the lead of Xenocrates. A year later, however, Antipater banished some 12,000 of the poorer citizens, and Epicurus joined his father, who was now living at Colophon. It seems possible that he had listened to the lectures of Nausiphanes, a Democritean philosopher, and Pamphilus the Platonist, but he was probably, like his father, merely an ordinary teacher. Stimulated, however, by the perusal of some writings of Democritus, he began to formulate a doctrine of his own; and at Mitylene, Colophon and Lampsacus, he gradually gathered round him several enthusiastic disciples. In 307 he returned to Athens, which had just been restored to a nominal independence by Demetrius Poliorcetes, and there he lived for the rest of his life. The scene of his teaching was a garden which he bought for about £300 (80 *minae*). There he passed his days as the loved and venerated head of a remarkable, and up to that time unique, society of men and women. Amongst the number were Metrodorus (d. 277), his brother Timocrates, and his wife Leontion (formerly a hetaera), Polyaenus, Hermarchus, who succeeded Epicurus as chief of the school, Leonteus and his wife Themista, and Idomeneus, whose wife was a sister of Metrodorus. It is possible that the relations between the sexes—in this prototype of Rabelais's Abbey of Thélème—were not entirely what is termed Platonic. But there is on the other hand scarcely a doubt that the tales of licentiousness circulated by opponents are groundless. The stories of the Stoics, who sought to refute the views of Epicurus by an appeal to his alleged antecedents and habits, were no doubt in the main, as Diogenes Laertius says, the stories of maniacs. The general charges, which they endeavoured to substantiate by forged letters, need not count for much, and in many cases they only exaggerated what, if true, was not so heinous as they suggested. Against them trustworthy authorities testified to his general and remarkable considerateness, pointing to the statues which the city had raised in his honour, and to the numbers of his friends, who were many enough to fill whole cities.

The mode of life in his community was plain. The general drink was water and the food barley bread; half a pint of wine was held an ample allowance. "Send me," says Epicurus to a correspondent, "send me some Cythnian cheese, so that, should I choose, I may fare sumptuously." There was no community of property, which, as Epicurus said, would imply distrust of their own and others' good resolutions. The company was held in unity by the charms of his personality, and by the free intercourse which he inculcated and exemplified. Though he seems to have had a warm affection for his countrymen, it was as human beings brought into contact with him, and not as members of a political body, that he preferred to regard them. He never entered public life. His kindliness extended even to his slaves, one of whom, named Mouse, was a brother in philosophy.

Epicurus died of stone in 270 B.C. He left his property, consisting of the garden (Κῆποι Ἐπικούρου), a house in Melite (the south-west quarter of Athens), and apparently some funds besides, to two trustees on behalf of his society, and for the special interest of some youthful members. The garden was set apart for the use of the school; the house became the house of Hermarchus and his fellow-philosophers during his lifetime. The surplus proceeds of the property were further to be applied to maintain a yearly offering in commemoration of his departed father, mother and brothers, to pay the expenses incurred in celebrating his own birthday every year on the 7th of the month Gamelion, and for a social gathering of the sect on the 20th of every month in honour of himself and Metrodorus. Besides similar tributes in honour of his brothers and Polyaenus, he directed the trustees to be guardians of the son of Polyaenus and the son of Metrodorus; whilst the daughter of the last mentioned was to be married by the guardians to some member of the society who should be approved of by Hermarchus. His four slaves, three men and one woman, were left their freedom. His books passed to Hermarchus.

Philosophy.—The Epicurean philosophy is traditionally divided into the three branches of logic, physics and ethics. It is, however, only as a basis of facts and principles for his theory of life that logical and physical inquiries find a place at all. Epicurus himself had not apparently shared in any large or liberal culture, and his influence was certainly thrown on the side of those who depreciated purely scientific pursuits as one-sided and misleading. "Steer clear of all culture" was his advice to a young disciple. In this aversion to a purely or mainly intellectual training may be traced a recoil from the systematic metaphysics of Plato and Aristotle, whose tendency was to subordinate the practical man to the philosopher. Ethics had been based upon logic and metaphysics. But experience showed that systematic knowledge of truth is not synonymous with right action. Hence, in the second place, Plato and Aristotle had assumed a perfect state with laws to guide the individual aright. It was thus comparatively easy to show how the individual could learn to apprehend and embody the moral law in his own conduct. But experience had in the time of Epicurus shown the temporary and artificial character of the civic form of social life. It was necessary, therefore, for Epicurus to go back to nature to find a more enduring and a wider foundation for ethical doctrine, to go back from words to realities, to give up reasonings and get at feelings, to test conceptions and arguments by a final reference to the only touchstone of truth—to sensation. There, and there only, one seems to find a common and a satisfactory ground, supposing always that all men's feelings give the same answer. Logic must go, but so also must the state, as a specially-privileged and eternal order of things, as anything more than a contrivance serving certain purposes of general utility.

To the Epicureans the elaborate logic of the Stoics was a superfluity. In place of logic we find canonic, the theory of the three tests of truth and reality. (1) The only ultimate canon of reality is sensation; whatever we feel, whatever we perceive by any sense, that we know on the most certain evidence we can have to be real, and in proportion as our feeling is clear, distinct and vivid, in that proportion are we sure of the reality of its object. But in what that vividness (ἐνάργεια) consists is a question which Epicurus does not raise, and which he would no doubt have deemed superfluous quibbling over a matter sufficiently settled by common sense. (2) Besides our sensations, we learn truth and reality by our preconceptions or ideas (προλήψεις). These are the fainter images produced by repeated sensations, the "ideas" resulting from previous "impressions"—sensations at second-hand as it were, which are stored up in memory, and which a general name serves to recall. These bear witness to reality, not because we feel anything now, but because we felt it once; they are sensations registered in language, and again, if need be, translatable into immediate sensations or groups of sensation. (3) Lastly, reality is vouched for by the imaginative apprehensions of the mind (φανταστικαὶ ἐπιβολαί), immediate feelings of which the mind is conscious as produced by some action of its own. This last canon, however, was of dubious validity. Epicureanism generally was content to affirm that whatever we effectively feel in consciousness is real; in which sense they allow reality to the fancies of the insane, the dreams of a sleeper, and those feelings by which we imagine the existence of beings of perfect blessedness and endless life. Similarly, just because fear, hope and remembrance add to the intensity of consciousness, the Epicurean can hold that bodily pain and pleasure is a less durable and important thing than pain and pleasure of mind. Whatever we feel to affect us does affect us, and is therefore real. Error can arise only because we mix up our opinions and suppositions with what we actually feel. The Epicurean canon is a rejection of logic; it sticks fast to the one point that "sensation is sensation," and there is no more to be made of it. Sensation, it says, is unreasoning (ἄλογος); it must be accepted, and not criticized. Reasoning can come in only to put sensations together, and to point out how they severally contribute to human welfare; it does not make them, and cannot alter them.

Physics.—In the Epicurean physics there are two parts—a general metaphysic and psychology, and a special explanation of particular phenomena of nature. The method of Epicurus is the argument of analogy. It is an attempt to make the phenomena of nature intelligible to us by regarding them as instances on a grand scale of that with which we are already familiar on a small scale. This is what Epicurus calls explaining what we do not see by what we do see.

In physics Epicurus founded upon Democritus, and his chief object was to abolish the dualism between mind and matter which is so essential a point in the systems of Plato and Aristotle. All that exists, says Epicurus, is corporeal (τὸ πᾶν ἐστι σῶμα); the intangible is non-existent, or empty space. If a thing exists it must be felt, and to be felt it must exert resistance. But not all things are intangible which our senses are not subtle enough to detect. We must indeed accept our feelings; but we must also believe much which is not directly testified by sensation, if only it serves to explain phenomena and does not contravene our sensations. The fundamental postulates of Epicureanism are atoms and the void (ἄτομα καὶ κενόν). Space is infinite, and there is an illimitable multitude of indestructible, indivisible and absolutely compact atoms in perpetual motion in this illimitable space. These atoms, differing only in size, figure and weight, are perpetually moving with equal velocities, but at a rate far surpassing our conceptions; as they move, they are for ever giving rise to new worlds; and these worlds are perpetually tending towards dissolution, and towards a fresh series of creations. This universe of ours is only one section out of the innumerable worlds in infinite space; other worlds may present systems very different from that of our own. The soul of man is only a finer species of body, spread throughout the whole aggregation which we term his bodily frame. Like a warm breath, it pervades the human structure and works with it; nor could it act as it does in perception unless it were corporeal. The various processes of sense, notably vision, are explained on the principles of materialism. From the surfaces of all objects there are continually flowing thin filmy images exactly copying the solid body whence they originate; and these images by direct impact on the organism produce (we need not care to ask how) the phenomena of vision. Epicurus in this way explains vision by substituting for the apparent action of a body at a distance a direct contact of image and organ. But without following the explanation into the details in which it revels, it may be enough to say that the whole hypothesis is but an attempt to exclude the occult conception of action at a distance, and substitute a familiar phenomenon.

The Gods.—This aspect of the Epicurean physics becomes clearer when we look at his mode of rendering particular phenomena intelligible. His purpose is to eliminate the common idea of divine interference. That there are gods Epicurus never dreams of denying. But these gods have not on their shoulders the burden of upholding and governing the world. They are themselves the products of the order of nature—a higher species than humanity, but not the rulers of man, neither the makers nor the upholders of the world. Man should worship them, but his worship is the reverence due to the ideals of perfect blessedness; it ought not to be inspired either by hope or by fear. To prevent all reference of the more potent phenomena of nature to divine action Epicurus rationalizes the processes of the cosmos. He imagines all possible plans or hypotheses, not actually contradicted by our experience of familiar events, which will represent in an intelligible way the processes of astronomy and meteorology. When two or more modes of accounting for a phenomena are equally admissible as not directly contradicted by known phenomena, it seems to Epicurus almost a return to the old mythological habit of mind when a savant asserts that the real cause is one and only one. "Thunder," he says, "may be explained in many other ways; only let us have no myths of divine action. To assign only a single cause for these phenomena, when the facts familiar to us suggest several, is insane, and is just the absurd conduct to be expected from people who dabble in the vanities of astronomy." We need not be too curious to inquire how these celestial phenomena actually do come about; we can learn how they might have been produced, and to go further is to trench on ground beyond the limits of human knowledge.

Thus, if Epicurus objects to the doctrine of mythology, he objects no less to the doctrine of an inevitable fate, a necessary order of things unchangeable and supreme over the human will. The Stoic doctrine of Fatalism seemed to Epicurus no less deadly a foe of man's true welfare than popular superstition. Even in the movement of the atoms he introduces a sudden change of direction, which is supposed to render their aggregation easier, and to break the even law of destiny. So, in the sphere of human action, Epicurus would allow of no absolutely controlling necessity. In fact, it is only when we assume for man this independence of the gods and of fatality that the Epicurean theory of life becomes possible. It assumes that man can, like the gods, withdraw himself out of reach of all external influences, and thus, as a sage, "live like a god among men, seeing that the man is in no wise like a mortal creature who lives in undying blessedness." And this present life is the only one. With one consent Epicureanism preaches that the death of the body is the end of everything for man, and hence the other world has lost all its terrors as well as all its hopes.

The attitude of Epicurus in this whole matter is antagonistic to science. The idea of a systematic enchainment of phenomena, in which each is conditioned by every other, and none can be taken in isolation and explained apart from the rest, was foreign to his mind. So little was the scientific conception of the solar system familiar to Epicurus that he could reproach the astronomers, because their account of an eclipse represented things otherwise than as they appear to the senses, and could declare that the sun and stars were just as large as they seemed to us.

Ethics.—The moral philosophy of Epicurus is a qualified hedonism, the heir of the Cyrenaic doctrine that pleasure is the good thing in life. Neither sect, it may be added, advocated sensuality pure and unfeigned—the Epicurean least of all. By pleasure Epicurus meant both more and less than the Cyrenaics. To the Cyrenaics pleasure was of moments; to Epicurus it extended as a habit of mind through life. To the Cyrenaics pleasure was something active and positive; to Epicurus it was rather negative—tranquillity more than vigorous enjoyment. The test of true pleasure, according to Epicurus, is the removal and absorption of all that gives pain; it implies freedom from pain of body and from trouble of mind. The happiness of the Epicurean was, it might almost seem, a grave and solemn pleasure—a quiet unobtrusive ease of heart, but not exuberance and excitement. The sage of Epicureanism is a rational and reflective seeker for happiness, who balances the claims of each pleasure against the evils that may possibly ensue, and treads the path of enjoyment cautiously. Prudence is, therefore, the only real guide to happiness; it is thus the chief excellence, and the foundation of all the virtues. It is, in fact, says Epicurus—in language which contrasts strongly with that of Aristotle on the same topic—"a more precious power than philosophy." The reason or intellect is introduced to balance possible pleasures and pains, and to construct a scheme in which pleasures are the materials of a happy life. Feeling, which Epicurus declared to be the means of determining what is good, is subordinated to a reason which adjudicates between competing pleasures with the view of securing tranquillity of mind and body. "We cannot live pleasantly without living wisely and nobly and righteously." Virtue is at least a means of happiness, though apart from that it is no good in itself, any more than mere sensual enjoyments, which are good only because they may sometimes serve to secure health of body and tranquillity of mind. (See further ETHICS.)

The Epicurean School.—Even in the lifetime of Epicurus we hear of the vast numbers of his friends, not merely in Greece, but in Asia and Egypt. The crowds of Epicureans were a standing enigma to the adherents of less popular sects. Cicero pondered over the fact; Arcesilaus explained the secession to the Epicurean camp, compared with the fact that no Epicurean was ever known to have abandoned his school, by saying that, though it was possible for a man to be turned into a eunuch, no eunuch could ever become a man. But the phenomenon was not obscure. The doctrine has many truths, and is attractive to many in virtue of its simplicity and its immediate relation to life. The dogmas of Epicurus became to his followers a creed embodying the truths on which salvation depended; and they passed on from one generation to another with scarcely a change or addition. The immediate disciples of Epicurus have been already mentioned, with the exception of Colotes of Lampsacus, a great favourite of Epicurus, who wrote a work arguing "that it was impossible even to live according to the doctrines of the other philosophers." In the 2nd and 1st centuries B.C. Apollodorus, nicknamed κηποτύραννος ("Lord of the Garden"), and Zeno of Sidon (who describes Socrates as "the Attic buffoon": Cic. *De nat. deor.* i. 21, 33, 34) taught at Athens. About 150 B.C. Epicureanism established itself at Rome. Beginning with C. Amafinius or Amafanius (Cic. *Acad.* i. 2, *Tusc.* iv. 3), we find the names of Phaedrus (who became scholarch at Athens *c.* 70 B.C.) and Philodemus (originally of Gadara in Palestine) as distinguished Epicureans in the time of Cicero. But the greatest of its Roman names was Lucretius, whose *De rerum natura* embodies the main teaching of Epicurus with great exactness, and with a beauty which the subject seemed scarcely to allow. Lucretius is a proof, if any were needed, that Epicureanism is compatible with nobility of soul. In the 1st century of the Christian era, the nature of the time, with its active political struggles, naturally called Stoicism more into the foreground, yet Seneca, though nominally a Stoic, draws nearly all his suavity and much of his paternal wisdom from the writings of Epicurus. The position of Epicureanism as a recognized school in the 2nd century is best seen in the fact that it was one of the four schools (the others were the Stoic, Platonist, and Peripatetic) which were placed on a footing of equal endowment when Marcus Aurelius founded chairs of philosophy at Athens. The evidence of Diogenes proves that it still subsisted as a school a century later, but its spirit lasted longer than its formal organization as a school. A great deal of the best of the Renaissance was founded on Epicureanism, and in more recent times a great number of prominent thinkers have been Epicureans in a greater or less degree. Among these may be mentioned Pierre Gassendi, who revived and codified the doctrine in the 17th century; Molière, the comte de Gramont, Rousseau, Fontenelle and Voltaire. All those whose ethical theory is in any degree hedonistic are to some extent the intellectual descendants of Epicurus (see HEDONISM).

Works.—Epicurus was a voluminous writer (πολυγραφώτατος, Diog. Laërt. x. 26)—the author, it is said, of about 300 works. He had a style and vocabulary of his own. His chief aim in writing was plainness and intelligibility, but his want of order and logical precision thwarted his purpose. He pretended to have read little, and to be the original architect of his own system, and the claim was no doubt on the whole true. But he had read Democritus, and, it is said, Anaxagoras and Archelaus. His works, we learn, were full of repetition, and critics speak of vulgarities of language and faults of style. None the less his writings were committed to memory and remained the textbooks of Epicureanism to the last. His chief work was a treatise on nature (Περὶ φύσεως), in thirty-seven books, of which fragments from about nine books have been found in the rolls discovered at Herculaneum, along with considerable treatises by several of his followers, and most notably Philodemus. An epitome of his doctrine is contained in three letters preserved by Diogenes.

Authorities.—The chief ancient accounts of Epicurus are in the tenth book of Diogenes Laërtius, in Lucretius, and in several treatises of Cicero and Plutarch. Gassendi, in his *De vita, moribus, et doctrina Epicuri* (Lyons, 1647), and his *Syntagma philosophiae Epicuri*, systematized the doctrine. The *Volumina Herculanensia* (1st and 2nd series) contain fragments of treatises by Epicurus and members of his school. See also H. Usener, *Epicurea* (Leipzig, 1887) and *Epicuri recogniti specimen* (Bonn, 1880); *Epicuri physica et meteorologica* (ed. J. G. Schneider, Leipzig, 1813); Th. Gomperz in his *Herkulanische Studien*, and in contributions to the Vienna Academy (*Monatsberichte*), has tried to evolve from the fragments more approximation to modern empiricism than they seem to contain. For criticism see W. Wallace, *Epicureanism* (London, 1880), and *Epicurus; A Lecture* (London, 1896); G. Trezza, *Epicuro e l' Epicureismo* (Florence, 1877; ed. Milan, 1885); E. Zeller, *Philosophy of the Stoics, Epicureans and Sceptics* (Eng. trans. O. J. Reichel, 1870; ed. 1880); Sir James Mackintosh, *On the Progress of Ethical Philosophy* (4th ed.); J. Watson, *Hedonistic Theories* (Glasgow, 1895); J. Kreibig, *Epicurus* (Vienna, 1886); A. Goedeckemeyer, *Epikurs Verhältnis zu Demokrit in der Naturphil.* (Strassburg, 1897); Paul von Gizycki, *Über das Leben und die Moralphilos. des Epikur* (Halle, 1879), and *Einleitende Bemerkungen zu einer Untersuchung über den Werth der Naturphilos. des Epikur* (Berlin, 1884); P. Cassel, *Epikur der Philosoph* (Berlin, 1892); M. Guyau, *La Morale d'Épicure et ses rapports avec les doctrines contemporaines* (Paris, 1878; revised and enlarged, 1881); F. Picavet, *De Epicuro novae religionis sectatore* (Paris, 1889); H. Sidgwick, *History of Ethics* (5th ed., 1902). (W. W.; X.)

EPICYCLE (Gr. ἐπί, upon, and κύκλος, circle), in ancient astronomy, a small circle the centre of which describes a larger one. It was especially used to represent geometrically the periodic apparent retrograde motion of the outer planets, Mars, Jupiter and Saturn, which we now know to be due to the annual revolution of the earth around the sun, but which in the Ptolemaic astronomy were taken to be real.

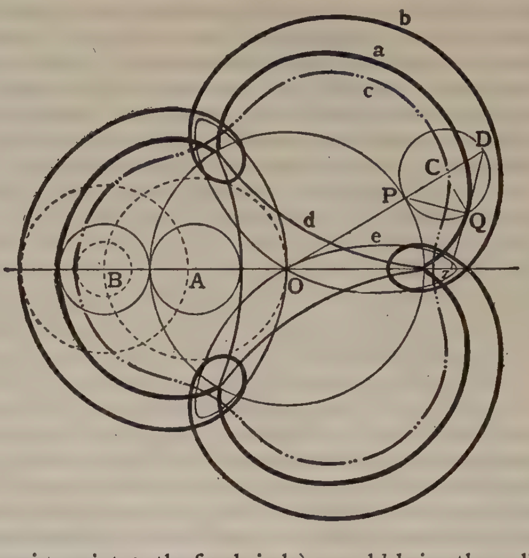
EPICYCLOID, the curve traced out by a point on the circumference of a circle rolling externally on another circle. If the moving circle rolls internally on the fixed circle, a point on the circumference describes a "hypocycloid" (from ὑπό, under). The locus of any other carried point is an "epitrochoid" when the circle rolls externally, and a "hypotrochoid" when the circle rolls internally. The epicycloid was so named by Ole Römer in 1674, who also demonstrated that cog-wheels having epicycloidal teeth revolved with minimum friction (see Mechanics: *Applied*); this was also proved by Girard Desargues, Philippe de la Hire and Charles Stephen Louis Camus. Epicycloids also received attention at the hands of Edmund Halley, Sir Isaac Newton and others; spherical epicycloids, in which the moving circle is inclined at a constant angle to the plane of the fixed circle, were studied by the Bernoullis, Pierre Louis M. de Maupertuis, François Nicole, Alexis Claude Clairault and others.

In the annexed figure, there are shown various examples of the curves named above, when the radii of the rolling and fixed circles are in the ratio of 1 to 3. Since the circumference of a circle is proportional to its radius, it follows that if the ratio of the radii be commensurable, the curve will consist of a finite number of cusps, and ultimately return into itself. In the particular case when the radii are in the ratio of 1 to 3 the epicycloid (curve *a*) will consist of three cusps external to the circle and placed at equal distances along its circumference. Similarly, the corresponding epitrochoids will exhibit three loops or nodes (curve *b*), or assume the form shown in the curve *c*. It is interesting to compare the forms of these curves with the three forms of the cycloid (*q.v.*). The hypocycloid derived from the same circles is shown as curve *d*, and is seen to consist of three cusps arranged internally to the fixed circle; the corresponding hypotrochoid consists of a three-foil and is shown in curve *e*. The epicycloid shown is termed the "three-cusped epicycloid" or the "epicycloid of Cremona."

The cartesian equation to the epicycloid assumes the form

$$x=(a+b)\cos\theta-b\cos(\overline{a+b}/b)\theta,\quad y=(a+b)\sin\theta-b\sin(\overline{a+b}/b)\theta,$$

when the centre of the fixed circle is the origin, and the axis of x passes through the initial point of the curve (*i.e.* the original position of the moving point on the fixed circle), a and b being the radii of the fixed and rolling circles, and θ the angle through which the line joining the centres of the two circles has passed. It may be shown that if the distance of the carried point from the centre of the rolling circle be mb, the equation to the epitrochoid is



$$x=(a+b)\cos\theta-mb\cos(\overline{a+b}/b)\theta,\quad y=(a+b)\sin\theta-mb\sin(\overline{a+b}/b)\theta.$$

The equations to the hypocycloid and its corresponding trochoidal curves are derived from the two preceding equations by changing the sign of b. Leonhard Euler (*Acta Petrop.* 1784) showed that the same hypocycloid can be generated by circles having radii of $\frac{1}{2}(a\pm b)$ rolling on a circle of radius a; and also that the hypocycloid formed when the radius of the rolling circle is greater than that of the fixed circle is the same as the epicycloid formed by the rolling of a circle whose radius is the difference of the original radii. These propositions may be derived from the formulae given above, or proved directly by purely geometrical methods.

The tangential polar equation to the epicycloid, as given above, is $p=(a+2b)\sin(a/\overline{a+2b})\psi$, while the intrinsic equation is $s=4(b/a)(a+b)\cos(a/\overline{a+2b})\psi$ and the pedal equation is $r^2=a^2+(4b.\overline{a+b})p^2/(a+2b)^2$. Therefore any epicycloid or hypocycloid may be represented by the equations $p=A\sin B\psi$ or $p=A\cos B\psi$, $s=A\sin B\psi$ or $s=A\cos B\psi$, or $r^2=A+Bp^2$, the constants A and B being readily determined by the above considerations.

If the radius of the rolling circle be one-half of the fixed circle, the hypocycloid becomes a diameter of this circle; this may be confirmed from the equation to the hypocycloid. If the ratio of the radii be as 1 to 4, we obtain the four-cusped hypocycloid, which has the simple cartesian equation $x^{2/3}+y^{2/3}=a^{2/3}$. This curve is the envelope of a line of constant length, which moves so that its extremities are always on two fixed lines at right angles to each other, *i.e.* of the line $x/\alpha+y/\beta=1$, with the condition $\alpha^2+\beta^2=1/a$, a constant. The epicycloid when the radii of the circles are equal is the cardioid (*q.v.*), and the corresponding trochoidal curves are limaçons (*q.v.*). Epicycloids are also examples of certain caustics (*q.v.*).

For the methods of determining the formulae and results stated above see J. Edwards, *Differential Calculus*, and for geometrical constructions see T. H. Eagles, *Plane Curves*.

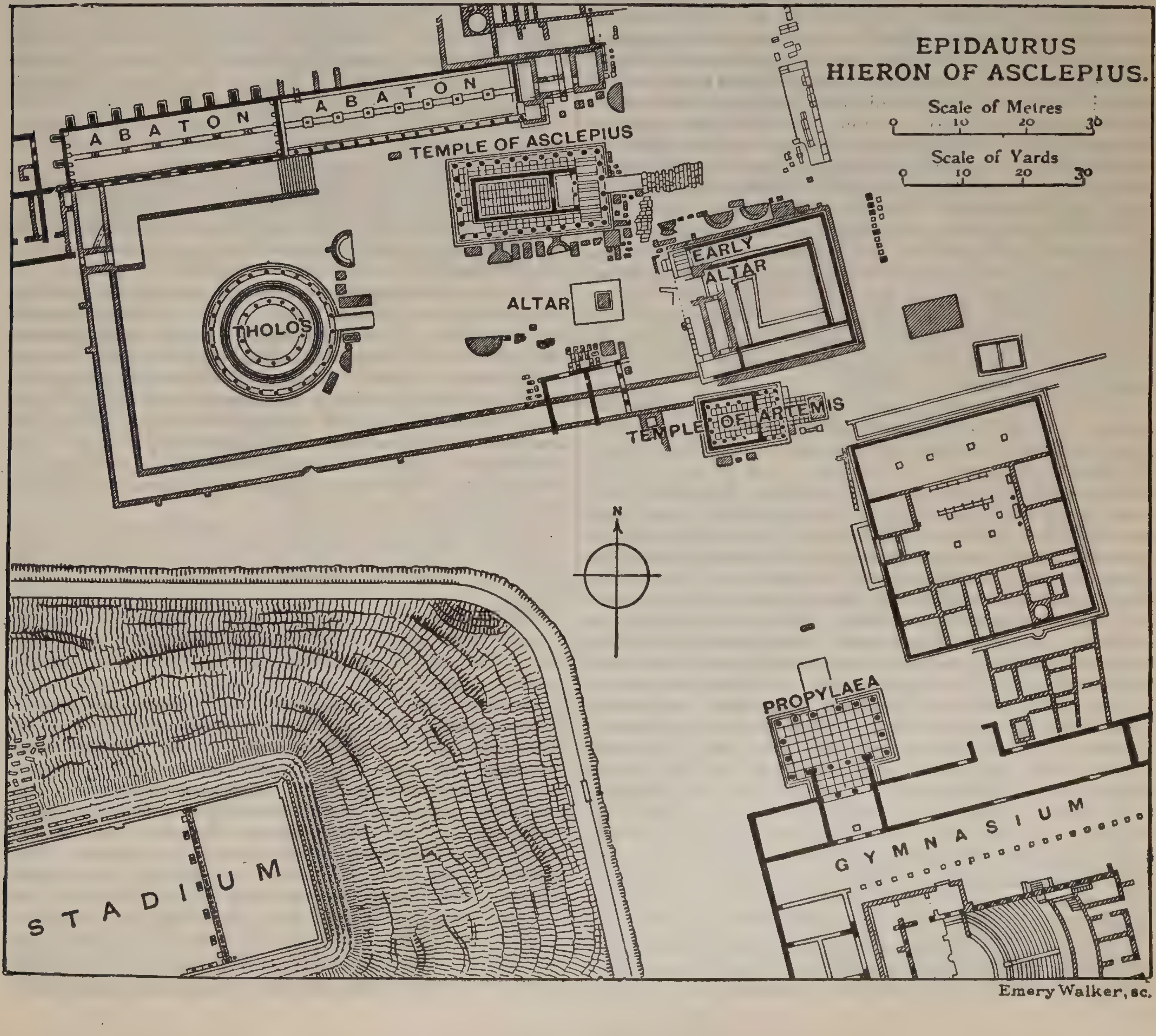
EPIDAURUS, the name of two ancient cities of southern Greece.

1. A maritime city situated on the eastern coast of Argolis, sometimes distinguished as ἡ ἱερὰ Ἐπίδαυρος, or Epidaurus the Holy. It stood on a small rocky peninsula with a natural harbour on the northern side and an open but serviceable bay on the southern; and from this position acquired the epithet of δίστομος, or the two-mouthed. Its narrow but fertile territory consisted of a plain shut in on all sides except towards the sea by considerable elevations, among which the most remarkable were Mount Arachnaeon and Titthion. The conterminous states were Corinth, Argos, Troezen and Hermione. Its proximity to Athens and the islands of the Saronic gulf, the commercial advantages of its position, and the fame of its temple

of Asclepius combined to make Epidaurus a place of no small importance. Its origin was ascribed to a Carian colony, whose memory was possibly preserved in Epicarus, the earlier name of the city; it was afterwards occupied by Ionians, and appears to have incorporated a body of Phlegyans from Thessaly. The Ionians in turn succumbed to the Dorians of Argos, who, according to the legend, were led by Deiphontes; and from that time the city continued to preserve its Dorian character. It not only colonized the neighbouring islands, and founded the city of Aegina, by which it was ultimately outstripped in wealth and power, but also took part with the people of Argos and Troezen in their settlements in the south of Asia Minor. The monarchical government introduced by Deiphontes gave way to an oligarchy, and the oligarchy degenerated into a despotism. When Procles the tyrant was carried captive by Periander of Corinth, the oligarchy was restored, and the people of Epidaurus continued ever afterwards close allies of the Spartan power. The governing body consisted of 180 members, chosen from certain influential families, and the executive was entrusted to a select committee of *artynae* (from ἀρτύνειν, to manage). The rural population, who had no share in the affairs of the city, were called κονίποδες ("dusty-feet"). Among the objects of interest described by Pausanias as extant in Epidaurus are the image of Athena Cissaea in the Acropolis, the temple of Dionysus and Artemis, a shrine of Aphrodite, statues of Asclepius and his wife Epione, and a temple of Hera. The site of the last is identified with the chapel of St Nicolas; a few portions of the outer walls of the city can be traced; and the name Epidaurus is still preserved by the little village of Nea-Epidavros, or Pidhavro.

The *Hieron* (sacred precinct) of Asclepius, which lies inland about 8 m. from the town of Epidaurus, has been thoroughly excavated by the Greek Archaeological Society since the year 1881, under the direction of M. Kavvadias. In addition to the sacred precinct, with its temples and other buildings, the theatre and stadium have been cleared; and several other extensive buildings, including baths, gymnasia, and a hospital for invalids, have also been found. The sacred road from Epidaurus, which is flanked by tombs, approaches the precinct through a gateway or propylaea. The chief buildings are grouped together, and include temples of Asclepius and Artemis, the Tholos, and the Abaton, or portico where the patients slept. In addition to remains of architecture and sculpture, some of them of high merit, there have been found many inscriptions, throwing light on the cures attributed to the god. The chief buildings outside the sacred precinct are the theatre and the stadium.

The temple of Asclepius, which contained the gold and ivory statue by Thrasymedes of Paros, had six columns at the ends and eleven at the sides; it was raised on stages and approached by a ramp at the eastern front. An inscription has been found recording the contracts for building this temple; it dates from



Emery Walker, sc.

about 460 B.C. The sculptor Timotheus—one of those who collaborated in the Mausoleum—is mentioned as undertaking to make the acroteria that stood on the ends of the pediments, and also models for the sculpture that filled one of them. Some of this sculpture has been found; the acroteria are Nereids mounted on sea-horses, and one pediment contained a battle of Greeks and Amazons. The great altar lay to the south of the temple, and a little to the east of it are what appear to be the remains of an earlier altar, built into the corner of a large square edifice of Roman date, perhaps a house of the priests. Just to the south of this are the foundations of a small temple of Artemis. The Tholos lay to the south-west of the temple of Asclepius; it must, when perfect, have been one of the most beautiful buildings in Greece; the exquisite carving of its mouldings is only equalled by that of the Erechtheum at Athens. It consisted of a circular chamber, surrounded on the outside by a Doric colonnade, and on the inside by a Corinthian one. The architect was Polyclitus, probably to be identified with the younger sculptor of that name. In the inscription recording the contracts for its building it is called the Thymele; and this name may give the clue to its purpose; it was probably the idealized architectural representative of a primitive pit of sacrifice, such as may still be seen in the Asclepianum at Athens. The foundations now visible present a very curious appearance, consisting of a series of concentric walls. Those in the middle are thin, having only the pavement of the cella to support, and are provided with doors and partitions that make a sort of subterranean labyrinth. There is no evidence for the statement sometimes made that there was a well or spring below the Tholos. North of the Tholos is the long portico described in inscriptions as the Abaton; it is on two different levels, and the lower or western portion of it had two storeys, of which the upper one was on a level with the ground in the eastern portion. Here the invalids used to sleep when consulting the god, and the inscriptions found here record not only the method of consulting the god, but the manner of his cures. Some of the inscriptions are contemporary dedications; but those which give us most information are long lists of cases, evidently compiled by the priests from the dedications in the sanctuary, or from tradition. There is no reason to doubt that most of the records have at least a basis of fact, for the cases are in accord with well-attested phenomena of a similar nature at the present day; but there are others, such as the miraculous mending of a broken vase, which suggest either invention or trickery.

In early times, though there is considerable variety in the cases treated and the methods of cure, there are certain characteristics common to the majority of the cases. The patient consulting the god sleeps in the Abaton, sees certain visions, and, as a result, comes forth cured the next morning. Sometimes there seem to be surgical cases, like that of a man who had a spear-head extracted from his jaw, and found it laid in his hands when he awoke in the morning, and there are many examples resembling those known at the present day at Lourdes or Tenos, where hysterical or other similar affections are cured by the influence of imagination or sudden emotion. It is, however, difficult to make any scientific use of the records, owing to the indiscriminate manner in which genuine and apocryphal cases are mingled, and circumstantial details are added. We learn the practice of later times from some dedicated inscriptions. Apparently the old faith-healing had lost its efficacy, and the priests substituted for it elaborate prescriptions as to diet, baths and regimen which must have made Epidaurus and its visitors resemble their counterparts in a modern spa. At this time there were extensive buildings provided for the accommodation of invalids, some of which have been discovered and partially cleared; one was built by Antoninus Pius. They were in the form of great courtyards surrounded by colonnades and chambers.

Between the precinct and the theatre was a large gymnasium, which was in later times converted to other purposes, a small odeum being built in the middle of it. In a valley just to the south-west of the precinct is the stadium, of which the seats and goal are well preserved. There is a gutter round the level space of the stadium, with basins at intervals for the use of spectators or competitors, and a post at every hundred feet of the course, thus dividing it into six portions. The goal, which is well preserved at the upper end, is similar to that at Olympia; it consists of a sill of stone sunk level with the ground, with parallel grooves for the feet of the runners at starting, and sockets to hold the posts that separated the spaces assigned to the various competitors, and served as guides to them in running. For these were substituted later a set of stone columns resembling those in the proscenium of a theatre. There was doubtless a similar sill at the lower end for the start of the stadium, this upper one being intended for the start of the diaulos and longer races.

The theatre still deserves the praise given it by Pausanias as the most beautiful in Greece. The auditorium is in remarkable preservation, almost every seat being still *in situ*, except a few where the supporting walls have given way on the wings. The whole plan is drawn from three centres, the outer portion of the curves being arcs of a larger circle than the one used for the central portion; the complete circle of the orchestra is marked by a sill of white limestone, and greatly enhances the effect of the whole. There are benches with backs not only in the bottom row, but also above and below the diazoma. The acoustic properties of the theatre are extraordinarily good, a speaker in the orchestra being heard throughout the auditorium without raising his voice. The stage buildings are not preserved much above their foundations, and show signs of later repairs; but their general character can be clearly seen. They consist of a long rectangular building, with a proscenium or column front which almost forms a tangent to the circle of the orchestra; at the middle and at either end of this proscenium are doors leading into the orchestra, those at the end set in projecting wings; the top of the proscenium is approached by a ramp, of which the lower part is still preserved, running parallel to the parodi, but sloping up as they slope down. The proscenium was originally about 14 ft. high and 12 ft. broad; so corresponding approximately to the Greek stage as described by Vitruvius. M. Kavvadias, who excavated the theatre, believes that the proscenium is contemporary with the rest of the theatre, which, like the Tholos, was built by Polyclitus (the younger); but Professor W. Dörpfeld maintains that it is a later addition. In any case, the theatre at Epidaurus ranks as the most typical of Greek theatres, both from the simplicity of its plan and the beauty of its proportions.

See Pausanias i. 29; *Expédition de la Morée*, ii.; Curtius, *Peloponnesus*, ii.; *Transactions of Roy. Soc. of Lit.*, 2nd series, vol. ii.; Weclawski, *De rebus Epidauriorum* (Posen, 1854).

The excavations at the Hieron have been recorded as they went on in the Πρακτικά of the Greek Archaeological Society, especially for 1881–1884 and 1889, and also in the Ἐφημερὶς Ἀρχαιολογική, especially for 1883 and 1885; see also Kavvadias, *Les Fouilles d'Épidaure* and Τὸ Ἱερὸν τοῦ Ἀσκληπιοῦ ἐν Ἐπιδαύρῳ καὶ ἡ θεράπεια τῶν ἀσθενῶν; Defrasse and Lechat, *Épidaure*. A museum was completed in 1910.

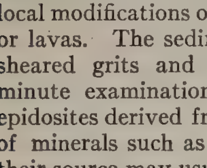
2. A city of Peloponnesus on the east coast of Laconia, distinguished by the epithet of Limera (either "The Well-havened" or "The Hungry"). It was founded by the people of Epidaurus the Holy, and its principal temples were those of Asclepius and Aphrodite. It was abandoned during the middle ages; its inhabitants took posession of the promontory of Minoa, turned it into an island, and built and fortified thereon the city of Monembasia, which became the most flourishing of all the towns in the Morea, and gave its name to the well-known Malmsey or Malvasia wine. The ruins of Epidaurus are to be seen at the place now called Palaea Monemvasia.

A third Epidaurus was situated in Illyricum, on the site of the present Ragusa Vecchia; but it is not mentioned till the time of the civil wars of Pompey and Caesar, and has no special interest. (E. Gr.)

EPIDIORITE, in petrology, a typical member of a family of rocks consisting essentially of hornblende and felspar, often with epidote, garnet, sphene, biotite, or quartz, and having usually a foliated structure. The term is to some extent synonymous with "amphibolite" and "hornblende-schist." These rocks are metamorphic, and though having a mineral constitution somewhat similar to that of diorite, they have been produced really from rocks of more basic character, such as diabase, dolerite and gabbro. They occur principally among the schists, slates and gneisses of such districts as the Scottish Highlands, the north-west of Ireland, Brittany, the Harz, the Alps, and the crystalline ranges of eastern N. America. Their hornblende in microscopic section is usually dark green, rarely brownish; their felspar may be clear and recrystallized, but more frequently is converted into a turbid aggregate of epidote, zoisite, quartz, sericite and albite. In the less complete stages of alteration, ophitic structure may persist, and the original augite of the rock may not have been entirely replaced by hornblende. Pink or brownish garnets are common and may be an inch or two in diameter. The iron oxides, originally ilmenite, are usually altered to sphene. Biotite, if present, is brown; epidote is yellow or colourless; rutile, apatite and quartz all occur with some frequency. The essential minerals, hornblende and felspar, rarely show crystalline outlines, and this is generally true also of the others. The rocks may be fine grained, so that their constituents are hardly visible to the unaided eye; or may show crystals of hornblende an inch in length. Their prevalent colour is dark green and they weather with brown surfaces. In many parts of the world epidiorites and the quartz veins which sometimes occur in them have proved to be auriferous. As they are tough, hard rocks, when fresh, they are well suited for use as road-mending stones. (J. S. F.)

EPIDOSITE, in petrology, a typical member of a family of metamorphic rocks composed mainly of epidote and quartz. In colour they are pale yellow or greenish yellow, and they are hard and somewhat brittle. They may occur in more than one way and are derived from several kinds of rock. Some have been epidotic grits and sandstones; others are limestones which have undergone contact-alteration; probably the majority, however, are allied to epidiorite and amphibolite, and are local modifications of rocks which were primarily basic intrusions or lavas. The sedimentary epidosites occur with mica-schists, sheared grits and granulitic gneisses; they often show, on minute examination, the remains of clastic structures. The epidosites derived from limestones may contain a great variety of minerals such as calcite, augite, garnet, scapolite, &c., but their source may usually be inferred from their close association with calc-silicate rocks in the field. The third group of epidosites may form bands, veins, or irregular streaks and nodules in masses of epidiorite and hornblende-schist. In microscopic section they are often merely a granular mosaic of quartz and epidote with some iron oxides and chlorite, but in other cases they retain much of the structure of the original rock though there has been a complete replacement of the former minerals by new ones. Epidosites when streaked and variegated have been cut and polished as ornamental stones. They are translucent and hard, and hence serve for brooch stones, and the simpler kinds of jewelry. These rocks occasionally carry gold in visible yellow specks. (J. S. F.)

EPIDOTE, a mineral species consisting of basic calcium, aluminium and iron orthosilicate, $Ca_2(AlOH)(Al,Fe)_2(SiO_4)_3$, crystallizing in the monoclinic system. Well-developed crystals are of frequent occurrence: they are commonly prismatic in habit, the direction of elongation being perpendicular to the single plane of symmetry. The faces lettered *M*, *T* and *r* in the figure are often deeply striated in the same direction: *M* is a direction of perfect cleavage, and *T* of imperfect cleavage: crystals are often twinned on the face *T*. Many of the characters of the mineral vary with the amount of iron present (Fe_2O_3,5-17%), for instance, the colour, the optical constants, and the specific gravity (3·3-3·5). The hardness is 6½. The colour is green, grey, brown or nearly black, but usually a characteristic shade of yellowish-green or pistachio-green. The pleochroism is strong, the pleochroic colours being usually green, yellow and brown. The names thallite (from θαλλός, "a young shoot") and pistacite (from πιστάκια, "pistachio nut") have reference to the colour. The name epidote is one of R. J. Haüy's crystallographic names, and is derived from ἐπίδοσις, "increase," because the base of the primitive prism has one side longer than the other. Several other names (achmatite, bucklandite, escherite, puschkinite, &c.) have been applied to this species. Withamite is a carmine-red to straw-yellow, strongly pleochroic variety from Glencoe in Scotland. Fouqueite and clinozoisite are white or pale rose-red varieties containing very little iron, thus having the same chemical composition as the orthorhombic mineral zoisite (*q.v.*).



Epidote is an abundant rock-forming mineral, but one of secondary origin. It occurs in crystalline limestones and schistose rocks of metamorphic origin; and is also a product of weathering of various minerals (felspars, micas, pyroxenes, amphiboles, garnets, &c.) composing igneous rocks. A rock composed of quartz and epidote is known as epidosite. Well-developed crystals are found at many localities, of which the following may be specially mentioned: Knappenwand, near the Gross-Venediger in the Untersulzbachthal in Salzburg, as magnificent, dark green crystals of long prismatic habit in cavities in epidote-schist, with asbestos, adularia, calcite, and apatite; the Ala valley and Traversella in Piedmont; Arendal in Norway (arendalite); Le Bourg d'Oisans in Dauphiné (oisanite and delphinite); Haddam in Connecticut; Prince of Wales Island in Alaska, here as large, dark green, tabular crystals with copper ores in metamorphosed limestone.

The perfectly transparent, dark green crystals from the Knappenwand and from Brazil have occasionally been cut as gem-stones.

Belonging to the same isomorphous group with epidote are the species piedmontite and allanite, which may be described as manganese and cerium epidotes respectively.

Piedmontite has the composition $Ca_2(AlOH)(Fe,Mn)_2(SiO_4)_3$; it occurs as small, reddish-black, monoclinic crystals in the manganese mines at San Marcel, near Ivrea in Piedmont, and in crystalline schists at several places in Japan. The purple colour of the Egyptian *porfido rosso antico* is due to the presence of this mineral.

Allanite has the same general formula $R_2''(R'''OH)R_2'''(SiO_4)_3$, where R'' represents calcium and ferrous iron, and R''' aluminium, ferric iron and metals of the cerium group. In external appearance it differs widely from epidote, being black or dark brown in colour, pitchy in lustre, and opaque in the mass; further, there is little or no cleavage, and well-developed crystals are rarely met with. The crystallographic and optical characters are similar to those of epidote; the pleochroism is strong with reddish-, yellowish-, and greenish-brown colours. Although not a common mineral, allanite is of fairly wide distribution as a primary accessory constituent of many crystalline rocks, *e.g.* gneiss, granite, syenite, rhyolite, andesite, &c. It was first found in the granite of east Greenland and described by Thomas Allan in 1808, after whom the species was named. Allanite is a mineral readily altered by hydration, becoming optically isotropic and amorphous: for this reason several varieties have been distinguished, and many different names applied. Orthite, from ὀρθός, "straight," was the name given by J. J. Berzelius in 1818 to a hydrated form found as slender prismatic crystals, sometimes a foot in length, at Finbo, near Falun in Sweden. (L. J. S.)

EPIGONI ("descendants"), in Greek legend, the sons of the seven heroes who fought against Thebes (see ADRASTUS). Ten years later, to avenge their fathers, the Epigoni undertook a second expedition, which was completely successful. Thebes was forced to surrender and razed to the ground. In early times the war of the Epigoni was a favourite subject of epic poetry. The term is also applied to the descendants of the Diadochi, the successors of Alexander the Great.

EPIGONION (Gr. ἐπιγόνειον), an ancient stringed instrument mentioned in Athenaeus 183 C, probably a psaltery. The epigonion was invented, or at least introduced into Greece, by Epigonus, a Greek musician of Ambracia in Epirus, who was admitted to citizenship at Sicyon as a recognition of his great musical ability and of his having been the first to pluck the strings with his fingers, instead of using the plectrum.[1] The instrument, which Epigonus named after himself, had forty strings.[2] It was undoubtedly a kind of harp or psaltery, since in an instrument of so many strings some must have been of different lengths, for tension and thickness only could hardly have produced forty different sounds, or even twenty, supposing that they were arranged in pairs of unisons. Strings of varying lengths require a frame like that of the harp, or of the Egyptian cithara which had one of the arms supporting the cross bar or zugon shorter than the other,[1] or else strings stretched over harp-shaped bridges on a sound-board in the case of a psaltery. Juba II., king of Mauretania, who reigned from 30 B.C., said (*ap.* Athen. *l.c.*) that Epigonus brought the instrument from Alexandria and played upon it with the fingers of both hands, not only using it as an accompaniment to the voice, but introducing chromatic passages, and a chorus of other stringed instruments, probably citharas, to accompany the voice. Epigonus was also a skilled citharist and played with his bare hands without plectrum.[2] Unfortunately we have no record of when Epigonus lived. Vincenzo Galilei[3] has given us a description of the epigonion accompanied by an illustration, representing his conception of the ancient instrument, an upright psaltery with the outline of the clavicytherium (but no keyboard). (K. S.)

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[1] Michael Praetorius, *Syntagma musicum*, tom. 1, c. 13, p. 380; Salomon van Til, *Sing-Dicht und Spiel-Kunst*, p. 95.

[2] Pollux, *Onomasticon*, lib. iv. cap. 9, 59.

EPIGRAM, properly speaking, anything that is inscribed. Nothing could be more hopeless, however, than an attempt to discover or devise a definition wide enough to include the vast multitude of little poems which at one time or other have been honoured with the title of epigram, and precise enough to exclude all others. Without taking account of its evident misapplications, we find that the name has been given—first, in strict accordance with its Greek etymology, to any actual inscription on monument, statue or building; secondly, to verses never intended for such a purpose, but assuming for artistic reasons the epigraphical form; thirdly, to verses expressing with something of the terseness of an inscription a striking or beautiful thought; and fourthly, by unwarrantable restriction, to a little poem ending in a "point," especially of the satirical kind. The last of these has obtained considerable popularity from the well-known lines—

> "The qualities rare in a bee that we meet
> In an epigram never should fail;
> The body should always be little and sweet,
> And a sting should be left in its tail"—

which represent the older Latin of some unknown writer—

> "Omne epigramma sit instar apis: sit aculeus illi;
> Sint sua mella; sit et corporis exigui."

Attempts not a few of a more elaborate kind have been made to state the essential element of the epigram, and to classify existing specimens; but, as every lover of epigrams must feel, most of them have been attended with very partial success. Scaliger, in the third book of his *Poetics*, gives a fivefold division, which displays a certain ingenuity in the nomenclature but is very superficial: the first class takes its name from *mel*, or honey, and consists of adulatory specimens; the second from *fel*, or gall; the third from *acetum*, or vinegar; and the fourth from *sal*, or salt; while the fifth is styled the condensed, or multiplex. This classification is adopted by Nicolaus Mercerius in his *De conscribendo epigrammate* (Paris, 1653); but he supplemented it by another of much more scientific value, based on the figures of the ancient rhetoricians. Lessing, in the preface to his own epigrams, gives an interesting treatment of the theory, his principal doctrine being practically the same as that of several of his less eminent predecessors, that there ought to be two parts more or less clearly distinguished,—the first awakening the reader's attention in the same way as an actual monument might do, and the other satisfying his curiosity in some unexpected manner. An attempt was made by Herder to increase the comprehensiveness and precision of the theory; but as he himself confesses, his classification is rather vague—the expository, the paradigmatic, the pictorial, the impassioned, the artfully turned, the illusory, and the swift. After all, if the arrangement according to authorship be rejected, the simplest and most satisfactory is according to subjects. The epigram is one of the most catholic of literary forms, and lends itself to the expression of almost any feeling or thought. It may be an elegy, a satire, or a love-poem in miniature, an embodiment of the wisdom of the ages, a bon-mot set off with a couple of rhymes.

> "I cannot tell thee who lies buried here;
> No man that knew him followed by his bier;
> The winds and waves conveyed him to this shore,
> Then ask the winds and waves to tell thee more."
> ANONYMOUS.
>
> "Wherefore should I vainly try
> To teach thee what my love will be
> In after years, when thou and I
> Have both grown old in company,
> If words are vain to tell thee how,
> Mary, I do love thee now?"
> ANONYMOUS.
>
> "O Bruscus, cease our aching ears to vex,
> With thy loud railing at the softer sex;
> No accusation worse than this could be,
> That once a woman did give birth to thee."
> ACILIUS.
>
> "Treason doth never prosper. What's the reason?
> For if it prospers none dare call it treason."
> HARRINGTON.
>
> "Ward has no heart they say, but I deny it;
> He has a heart, and gets his speeches by it."
> ROGERS.

From its very brevity there is no small danger of the epigram passing into childish triviality: the paltriest pun, a senseless anagram, is considered stuff enough and to spare. For proof of this there is unfortunately no need to look far; but perhaps the reader could not find a better collection ready to his hand than the second twenty-five of the *Epigrammatum centuriae* of Samuel Erichius; by the time he reaches No. 11 of the 47th century, he will be quite ready to grant the appropriateness of the identity maintained between the German *Seele*, or soul, and the German *Esel*, or ass.

Of the epigram as cultivated by the Greeks an account is given in the article ANTHOLOGY, discussing those wonderful collections which bid fair to remain the richest of their kind. The delicacy and simplicity of so much of what has been preserved is perhaps their most striking feature; and one cannot but be surprised at the number of poets proved capable of such work. In Latin literature, on the other hand, the epigrammatists whose work has been preserved are comparatively few, and though several of them, as Catullus and Martial, are men of high literary genius, too much of what they have left behind is vitiated by brutality and obscenity. On the subsequent history of the epigram, indeed, Martial has exercised an influence as baneful as it is extensive, and he may fairly be counted the far-off progenitor of a host of scurrilous verses. Nearly all the learned Latinists of the 16th and 17th centuries may claim admittance into the list of epigrammatists,—Bembo and Scaliger, Buchanan and More, Stroza and Sannazaro. Melanchthon, who succeeded in combining so much of Pagan culture with his Reformation Christianity, has left us some graceful specimens, but his editor, Joannes Major Joachimus, has so little idea of what an epigram is, that he includes in his collection some translations from the Psalms. The Latin epigrams of Étienne Pasquier were among the most admirable which the Renaissance produced in France. John Owen, or, as he Latinized his name, Johannes Audoenus, a Cambro-Briton, attained quite an unusual celebrity in this department, and is regularly distinguished as Owen the Epigrammatist. The tradition of the Latin epigram has been kept alive in England by such men as Porson, Vincent Bourne and Walter Savage Landor. Happily there is now little danger of any too personal epigrammatist suffering the fate of Niccolo Franco, who paid the forfeit of his life for having launched his venomous Latin against Pius V., though he may still incur the milder penalty of having his name inserted in the *Index Expurgatorius*, and find, like John Owen, that he consequently has lost an inheritance.

In English literature proper there is no writer like Martial in Latin or Logau in German, whose fame is entirely due to his epigrams; but several even of those whose names can perish never have not disdained this diminutive form. The designation epigram, however, is used by earlier English writers with excessive laxity, and given or withheld without apparent reason.

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[1] For an illustration, see Kathleen Schlesinger, *Orchestral Instruments*, part ii. "Precursors of the Violin Family," fig. 165, p. 219.

[2] Athenaeus, iv. p. 183 d. and xiv. p. 638 a.

[3] *Dialogo della musica antica e moderna*, ed. 1602, p. 40.

The epigrams of Robert Crowley (1550) and of Henry Parrot (1613) are worthless so far as form goes. John Weever's collection (1599) is of interest mainly because of its allusion to Shakespeare. Ben Jonson furnishes a number of noble examples in his *Underwoods*; and one or two of Spenser's little poems and a great many of Herrick's are properly classed as epigrams. Cowley, Waller, Dryden, Prior, Parnell, Swift, Addison, Johnson, Goldsmith and Young have all been at times successful in their epigrammatical attempts; but perhaps none of them has proved himself so much "to the manner born" as Pope, whose name indeed is almost identified with the epigrammatical spirit in English literature. Few English modern poets have followed in his footsteps, and though nearly all might plead guilty to an epigram or two, there is no one who has a distinct reputation as an epigrammatist. Such a reputation might certainly have been Landor's, had he not chosen to write the best of his minor poems in Latin, and thus made his readers nearly as select as his language.

The French are undoubtedly the most successful cultivators of the "salt" and the "vinegar" epigram; and from the 16th century downwards many of their principal authors have earned no small celebrity in this department. The epigram was introduced into French literature by Mellin de St Gelais and Clément Marot. It is enough to mention the names of Boileau, J. B. Rousseau, Lebrun, Voltaire, Marmontel, Piron, Rulhière, and M. J. Chénier. In spite of Rapin's dictum that a man ought to be content if he succeeded in writing one really good epigram, those of Lebrun alone number upwards of 600, and a very fair proportion of them would doubtless pass muster even with Rapin himself. If Piron was never anything better, "pas même académicien," he appears at any rate in Grimm's phrase to have been "une machine à saillies, à épigrammes, et à bons mots." Perhaps more than anywhere else the epigram has been recognized in France as a regular weapon in literary and political contests, and it might not be altogether a hopeless task to compile an epigrammatical history from the Revolution to the present time.

While any fair collection of German epigrams will furnish examples that for keenness of wit would be quite in place in a French anthology, the Teutonic tendency to the moral and didactic has given rise to a class but sparingly represented in French. The very name of *Sinngedichte* bears witness to this peculiarity, which is exemplified equally by the rude *priameln* or *proeameln*, of the 13th and 14th centuries and the polished lines of Goethe and Schiller. Logau published his *Deutsche Sinngetichte Drey Tausend* in 1654, and Wernicke no fewer than six volumes of *Ueberschriften oder Epigrammata* in 1697; Kästner's *Sinngedichte* appeared in 1782, and Haug and Weissen's *Epigrammatische Anthologie* in 1804. Kleist, Opitz, Gleim, Hagedorn, Klopstock and A. W. Schlegel all possess some reputation as epigrammatists; Lessing is *facile princeps* in the satirical style; and Herder has the honour of having enriched his language with much of what is best from Oriental and classical sources.

It is often by no means easy to trace the history of even a single epigram, and the investigator soon learns to be cautious of congratulating himself on the attainment of a genuine original. The same point, refurbished and fitted anew to its tiny shaft, has been shot again and again by laughing cupids or fierce-eyed furies in many a frolic and many a fray. During the period when the epigram was the favourite form in Germany, Gervinus tells us how the works, not only of the Greek and Roman writers, but of Neo-Latinists, Spaniards, Dutchmen, Frenchmen, Englishmen and Poles were ransacked and plundered; and the same process of pillage has gone on in a more or less modified degree in other times and countries. Very noticeable often are the modifications of tone and expression occasioned by national and individual characteristics; the simplicity of the prototype may become common-place in the imitation, the sublime be distorted into the grotesque, the pathetic degenerate into the absurdly sentimental; or on the other hand, an unpromising *motif* may be happily developed into unexpected beauty. A good illustration of the variety with which the same epigram may be translated and travestied is afforded by a little volume published in Edinburgh in 1808, under the title of *Lucubrations on the Epigram*—

Εἰ μὲν ἦν μαθεῖν ἃ δεῖ παθεῖν,
καὶ μὴ παθεῖν, καλὸν ἦν τὸ μαθεῖν·
εἰ δὲ δεῖ παθεῖν ἃ δ' ἦν μαθεῖν,
τί δεῖ μαθεῖν; χρὴ γὰρ παθεῖν.

The two collections of epigrams most accessible to the English reader are Booth's *Epigrams, Ancient and Modern* (1863) and Dodd's *The Epigrammatists* (1870). In the appendix to the latter is a pretty full bibliography, to which the following list may serve as a supplement:—Thomas Corraeus, *De toto eo poëmatis genere quod epigramma dicitur* (Venice, 1569; Bologna, 1590); Cottunius, *De conficiendo epigrammate* (Bologna, 1632); Vincentius Gallus, *Opusculum de epigrammate* (Milan, 1641); Vavassor, *De epigrammate liber* (Paris, 1669); *Gedanke von deutschen Epigrammatibus* (Leipzig, 1698); *Doctissimorum nostra aetate Italorum epigrammata; Flaminii Moleae Naugerii, Cottae, Lampridii, Sadoleti, et aliorum, cura Jo. Gagnaei* (Paris, *c.* 1550); Brugière de Barante, *Recueil des plus belles épigrammes des poëtes français* (2 vols., Paris, 1698); Chr. Aug. Heumann, *Anthologia Latina: hoc est, epigrammata partim a priscis partim junioribus a poëtis* (Hanover, 1721); Fayolle, *Acontologie ou dictionnaire d'épigrammes* (Paris, 1817); Geijsbeck, *Epigrammatische Anthologie*, Sauvage, *Les Guêpes gauloises: petit encyclopédie des meilleurs épigrammes, &c., depuis Clément Marot jusqu'aux poètes de nos jours* (1859); *La Récréation et passe-temps des tristes: recueil d'épigrammes et de petits contes en vers réimprimé sur l'édition de Rouen* 1595, &c. (Paris, 1863). A large number of epigrams and much miscellaneous information in regard to their origin, application and translation is scattered through *Notes and Queries*.

See also an article in *The Quarterly Review*, No. 233.

EPIGRAPHY (Gr. ἐπί, on, and γράφειν, to write), a term used to denote (1) the study of inscriptions collectively, and (2) the science connected with the classification and explanation of inscriptions. It is sometimes employed, too, in a more contracted sense, to denote the palaeography, in inscriptions. Generally, it is that part of archaeology which has to do with inscriptions engraved on stone, metal or other permanent material (not, however, coins, which come under the heading NUMISMATICS).

See INSCRIPTIONS; PALAEOGRAPHY.

EPILEPSY (Gr. ἐπί, upon, and λαμβάνειν, to seize), or FALLING SICKNESS, a term applied generally to a nervous disorder, characterized by a fit of sudden loss of consciousness, attended with convulsions. There may, however, exist manifestations of epilepsy much less marked than this, yet equally characteristic of the disease; while, on the other hand, it is to be borne in mind that many other attacks of a convulsive nature have the term "epileptic" or "epileptiform" applied to them.

Epilepsy was well known in ancient times, and was regarded as a special infliction of the gods, hence the names *morbus sacer*, *morbus divus*. It was also termed *morbus Herculeus*, from Hercules having been supposed to have been epileptic, and *morbus comitialis*, from the circumstance that when any member of the forum was seized with an epileptic fit the assembly was broken up. *Morbus caducus*, *morbus lunaticus astralis*, *morbus demoniacus*, *morbus major*, were all terms employed to designate epilepsy.

There are three well-marked varieties of the epileptic seizure; to these the terms *le grand mal*, *le petit mal* and *Jacksonian epilepsy* are usually applied. Any of these may exist alone, but the two former may be found to exist in the same individual. The first of these, if not the more common, is at least that which attracts the most attention, being what is generally known as an *epileptic fit*.

Although in most instances such an attack comes on suddenly, it is in many cases preceded by certain premonitory indications or warnings, which may be present for a greater or less time previously. These are of very varied character, and may be in the form of some temporary change in the disposition, such as unusual depression or elevation of spirits, or of some alteration in the look. Besides these general symptoms, there are frequently peculiar sensations which immediately precede the onset of the fit, and to such the name of *aura epileptica* is applied. In its strict sense this term refers to a feeling of a breath of air blowing upon some part of the body, and passing upwards towards the head. This sensation, however, is not a common one, and the term has now come to be applied to any peculiar feeling which the patient experiences as a precursor of the attack. The so-called *aura* may be of mental character, in the form of an agonizing feeling of momentary duration; of sensorial character, in the form of pain in a limb or in some internal organ, such as the stomach, or morbid feeling connected with the special senses; or, further, of motorial character, in the form of contractions or trembling in some of the muscles. When such sensations affect a limb, the employment of firm compression by the hand or by a ligature occasionally succeeds in warding off an attack. The aura may be so distinct and of such duration as to enable the patient to lie down, or seek a place of safety before the fit comes on.

The seizure is usually preceded by a loud scream or cry, which is not to be ascribed, as was at one time supposed, to terror or pain, but is due to the convulsive action of the muscles of the larynx, and the expulsion of a column of air through the narrowed glottis. If the patient is standing he immediately falls, and often sustains serious injury. Unconsciousness is complete, and the muscles generally are in a state of stiffness or tonic contraction, which will usually be found to affect those of one side of the body in particular. The head is turned by a series of jerks towards one or other shoulder, the breathing is for the moment arrested, the countenance first pale then livid, the pupils dilated and the pulse rapid. This, the first stage of the fit, generally lasts for about half a minute, and is followed by the state of clonic (*i.e.* tumultuous) spasm of the muscles, in which the whole body is thrown into violent agitation, occasionally so great that bones may be fractured or dislocated. The eyes roll wildly, the teeth are gnashed together, and the tongue and cheeks are often severely bitten. The breathing is noisy and laborious, and foam (often tinged with blood) issues from the mouth, while the contents of the bowels and bladder are ejected. The aspect of the patient in this condition is shocking to witness, and the sight has been known to induce a similar attack in an onlooker. This stage lasts for a period varying from a few seconds to several minutes, when the convulsive movements gradually subside, and relaxation of the muscles takes place, together with partial return of consciousness, the patient looking confusedly about him and attempting to speak. This, however, is soon followed by drowsiness and stupor, which may continue for several hours, when he awakes either apparently quite recovered or fatigued and depressed, and occasionally in a state of excitement which sometimes assumes the form of mania.

Epileptic fits of this sort succeed each other with varying degrees of frequency, and occasionally, though not frequently, with regular periodicity. In some persons they only occur once in a lifetime, or once in the course of many years, while in others they return every week or two, or even are of daily occurrence, and occasionally there are numerous attacks each day. According to Sir J. R. Reynolds, there are four times as many epileptics who have their attacks more frequently than once a month as there are of those whose attacks recur at longer intervals. When the fit returns it is not uncommon for one seizure to be followed by another within a few hours or days. Occasionally there occurs a constant succession of attacks extending over many hours, and with such rapidity that the patient appears as if he had never come out of the one fit. The term *status epilepticus* is applied to this condition, which is sometimes followed with fatal results. In many epileptics the fits occur during the night as well as during the day, but in some instances they are entirely nocturnal, and it is well known that in such cases the disease may long exist and yet remain unrecognized either by the patient or the physician.

The second manifestation of epilepsy, to which the names *epilepsia mitior* or *le petit mal* are given, differs from that above described in the absence of the convulsive spasms. It is also termed by some authors *epileptic vertigo* (giddiness), and consists essentially in the sudden arrest of volition and consciousness, which is of but short duration, and may be accompanied with staggering or some alteration in position or motion, or may simply exhibit itself in a look of absence or confusion, and should the patient happen to be engaged in conversation, by an abrupt termination of the act. In general it lasts but a few seconds, an the individual resumes his occupation without perhaps bein aware of anything having been the matter. In some instance there is a degree of spasmodic action in certain muscles which ma cause the patient to make some unexpected movement, such a turning half round, or walking abruptly aside, or may show itse by some unusual expression of countenance, such as squinting o grinning. There may be some amount of *aura* preceding suc attacks, and also of faintness following them. The *petit ma* most commonly co-exists with the *grand mal*, but has no necessar connexion with it, as each may exist alone. According t Armand Trousseau, the *petit mal* in general precedes the mani festation of the *grand mal*, but sometimes the reverse is the case.

The third manifestation—*Jacksonian epilepsy* or *partia epilepsy*—is distinguished by the fact that consciousness i retained or lost late. The patient is conscious throughout and is able to watch the march of the spasm. The attacks ar usually the result of lesions in the motor area of the brain, suc being caused, in many instances, by depression of the vault of th skull, due to trauma.

Epilepsy appears to exert no necessarily injurious effect upo the general health, and even where it exists in an aggravate form is quite consistent with a high degree of bodily vigour. I is very different, however, with regard to its influence upon th mind; and the question of the relation of epilepsy to insanit is one of great and increasing importance. Allusion has alread been made to the occasional occurrence of maniacal excitemen as one of the results of the epileptic seizure. Such attacks, t which the name of *furor epilepticus* is applied, are generall accompanied with violent acts on the part of the patient, rendering him dangerous, and demanding prompt measures of restraint These attacks are by no means limited to the more severe for of epilepsy, but appear to be even more frequently associate with the milder form—the epileptic vertigo—where they eithe replace altogether or immediately follow the short period of absence characteristic of this form of the disease. Numerous case are on record of persons known to be epileptic being suddenl seized, either after or without apparent spasmodic attack, wit some sudden impulse, in which they have used dangerous violenc to those beside them, irrespective altogether of malevolen intention, as appears from their retaining no recollection whatever, after the short period of excitement, of anything that ha occurred; and there is reason to believe that crimes of heinou character, for which the perpetrators have suffered punishment have been committed in a state of mind such as that no described. The subject is obviously one of the greates medico-legal interest and importance in regard to the questio of criminal responsibility.

Apart, however, from such marked and comparatively rar instances of what is termed epileptic insanity, the general menta condition of the epileptic is in a large proportion of cases unfavourably affected by the disease. There are doubtles examples (and their number according to statistics is estimate at less than one-third) where, even among those suffering fro frequent and severe attacks, no departure from the norma condition of mental integrity can be recognized. But in genera there exists some peculiarity, exhibiting itself either in the for of defective memory, or diminishing intelligence, or what i perhaps as frequent, in irregularities of temper, the patien being irritable or perverse and eccentric. In not a few case there is a steady mental decline, which ends in dementia o idiocy. It is stated by some high authorities that epilepti women suffer in regard to their mental condition more than men It also appears to be the case that the later in life the diseas shows itself the more likely is the mind to suffer. Neither th frequency nor the severity of the seizures seem to have an necessary influence in the matter; and the general opinio appears to be that the milder form of the disease is that wit which mental failure is more apt to be associated. (For consideration of the conditions of the nervous system whic result in epilepsy, see the article NEUROPATHOLOGY.)

The influence of hereditary predisposition in epilepsy is ver marked. It is necessary, however, to bear in mind the point so forcibly insisted on by Trousseau in relation to epilepsy, that hereditary transmission may be either direct or indirect, that is to say, that what is epilepsy in one generation may be some other form of neurosis in the next, and conversely, nervous diseases being remarkable for their tendency to transformation in their descent in families. Where epilepsy is hereditary, it generally manifests itself at an unusually early period of life. A singular fact, which also bears to some extent upon the pathology of this disease, was brought to light by Dr Brown Séquard in his experiments, namely, that the young of animals which had been artifically rendered epileptic were liable to similar seizures. In connexion with the hereditary transmission of epilepsy it must be observed that all authorities concur in the opinion that this disease is one among the baneful effects that often follow marriages of consanguinity. Further, there is reason to believe that intemperance, apart altogether from its direct effect in favouring the occurrence of epilepsy, has an evil influence in the hereditary transmission of this as of other nervous diseases. A want of symmetry in the formation of the skull and defective cerebral development are not infrequently observed where epilepsy is hereditarily transmitted.

Age is of importance in reference to the production of epilepsy. The disease may come on at any period of life, but it appears from the statistics of Reynolds and others, that it most frequently first manifests itself between the ages of ten and twenty years, the period of second dentition and puberty, and again at or about the age of forty.

Among other causes which are influential in the development of epilepsy may be mentioned sudden fright, prolonged mental anxiety, over-work and debauchery. Epileptic fits also occur in connexion with a depraved stage of the general health, and with irritations in distant organs, as seen in the fits occurring in dentition, in kidney disease, and as a result of worms in the intestines. The symptoms traceable to these causes are sometimes termed *sympathetic* or *eccentric epilepsy*; these are but rarely *epileptic* in the strictest sense of the word, but rather epileptiform.

Epilepsy is occasionally feigned for the purpose of extortion, but an experienced medical practitioner will rarely be deceived; and when it is stated that although many of the phenomena of an attack, particularly the convulsive movements, can be readily simulated, yet that the condition of the pupils, which are dilated during the fit, cannot be feigned, and that the impostor seldom bites his tongue or injures himself, deception is not likely to succeed even with non-medical persons of intelligence.

The *medical treatment* of epilepsy can only be briefly alluded to here. During the fit little can be done beyond preventing as far as possible the patient from injuring himself while unconsciousness continues. Tight clothing should be loosened, and a cork or pad inserted between the teeth. When the fit is of long continuance, the dashing of cold water on the face and chest, or the inhalation of chloroform, or of nitrite of amyl, may be useful; in general, however, the fit terminates independently of any such measures. When the fit is over the patient should be allowed to sleep, and have the head and shoulders well raised.

In the intervals of the attack, the general health of the patient is one of the most important points to be attended to. The strictest hygienic and dietetic rules should be observed, and all such causes as have been referred to as favouring the development of the disease should, as far as possible, be avoided. In the case of children, parents must be made to realize that epilepsy is a chronic disease, and that therefore the seizures must not be allowed to interfere unnecessarily with the child's training. The patient must be treated as such only during the attack; between times, though being carefully watched, must be made to follow a child's normal pursuits, and no distinction must be made from other children. The same applies to adults: it is far better for them to have some definite occupation, preferably one that keeps them in the open air. If such patients become irritable, then they should be placed under supervision. As regards those who cannot be looked after at home, colonies on a self-supporting basis have been tried, and where the supervision has been intelligent the success has been proved, a fairly high level of health and happiness being attained.

The various bromides are the only medical drugs that have produced any beneficial results. They require to be given in large doses which are carefully regulated for every individual patient, as the quantities required vary enormously. Children take far larger doses in proportion than adults. They are best given in a very diluted form, and after meals, to diminish the chances of gastric disturbance. Belladonna seems also to have some influence on the disease, and forms a useful addition; arsenic should also be prescribed at times, both as a tonic, and for the sake of the improvement it effects in those patients who develop a tendency to *acne*, which is one of the troublesome results of bromism. The administration of the bromides should be maintained until three years after the cessation of the fits. The occurrence of gastric pain, palpitations and loss of the palate reflex are indications to stop, or to decrease the quantity of the drug. In very severe cases opium may be required.

Surgical treatment for epilepsy is yet in its infancy, and it is too early to judge of its results. This does not apply, however, to cases of *Jacksonian epilepsy*, where a very large number have been operated on with marked benefit. Here the lesion of the brain is, in a very large percentage of the patients, caused by pressure from outside, from the presence of a tumour or a depressed fracture; the removal of the one, or the elevation of the other is the obvious procedure, and it is usually followed by the complete disappearance of the seizures.

EPILOGUE. The appendix or supplement to a literary work, and in particular to a drama in verse, is called an *epilogue*, from ἐπίλογος, the name given by the Greeks to the peroration of a speech. As we read in Shakespeare's *Midsummer Night's Dream*, the epilogue was generally treated as the apology for a play; it was a final appeal made to encourage the good-nature of the audiences, and to deprecate attack. The epilogue should form no part of the work to which it is attached, but should be independent of it; it should be treated as a sort of commentary. Sometimes it adds further information with regard to what has been left imperfectly concluded in the work itself. For instance, in the case of a play, the epilogue will occasionally tell us what became of the characters after the action closed; but this is irregular and unusual, and the epilogue is usually no more than a graceful way of dismissing the audience. Among the ancients the form was not cultivated, further than that the leader of the chorus or the last speaker advanced and said "Vos valete, et plaudite, cives"—"Good-bye, citizens, and we hope you are pleased." Sometimes this formula was reduced to the one word, "Plaudite!" The epilogue as a literary species is almost entirely confined to England, and it does not occur in the earliest English plays. It is rare in Shakespeare, but Ben Jonson made it a particular feature of his drama, and may almost be said to have invented the tradition of its regular use. He employed the epilogue for two purposes, either to assert the merit of the play or to deprecate censure of its defects. In the former case, as in *Cynthia's Revels* (1600), the actor went off, and immediately came on again saying:—

> "Gentles, be't known to you, since I went in
> I am turned rhymer, and do thus begin:—
> The author (jealous how your sense doth take
> His travails) hath enjoined me to make
> Some short and ceremonious epilogue,"—

and then explained to the audience what an exremely interesting play it had been. In the second case, when the author was less confident, his epilogue took a humbler form, as in the comedy of *Volpone* (1605), where the actor said:—

> "The seasoning of a play is the applause.
> Now, as the Fox be punished by the laws,
> He yet doth hope, there is no suffering due
> For any fact which he hath done 'gainst *you*.
> If there be, censure him; here he doubtful stands:
> If not, fare jovially and clap your hands."

Beaumont and Fletcher used the epilogue sparingly, but after their day it came more and more into vogue, and the form was almost invariably that which Ben Jonson had brought into fashion, namely, the short complete piece in heroic couplets. The hey-day of the epilogue, however, was the Restoration, and from 1660 to the decline of the drama in the reign of Queen Anne scarcely a play, serious or comic, was produced on the London stage without a prologue and an epilogue. These were almost always in verse, even if the play itself was in the roughest prose, and they were intended to impart a certain literary finish to the piece. These Restoration epilogues were often very elaborate essays or satires, and were by no means confined to the subject of the preceding play. They dealt with fashions, or politics, or criticism. The prologues and epilogues of Dryden are often brilliantly finished exercises in literary polemic. It became the custom for playwrights to ask their friends to write these poems for them, and the publishers would even come to a prominent poet and ask him to supply one for a fee. It gives us an idea of the seriousness with which the epilogue was treated that Dryden originally published his valuable "Defence of the Epilogue; or An Essay on the Dramatic Poetry of the Last Age" (1672) as a defence of the epilogue which he had written for *The Conquest of Granada.* In France the custom of reciting dramatic epilogues has never prevailed. French criticism gives the name to such adieux to the public, at the close of a non-dramatic work, as are reserved by La Fontaine for certain critical points in the "Fables." (E. G.)

EPIMENIDES, poet and prophet of Crete, lived in the 6th century B.C. Many fabulous stories are told of him, and even his existence is doubted. While tending his father's sheep, he is said to have fallen into a deep sleep in the Dictaean cave near Cnossus where he lived, from which he did not awake for fifty-seven years (Diogenes Laërtius i. 109-115). When the Athenians were visited by a pestilence in consequence of the murder of Cylon, he was invited by Solon (596) to purify the city. The only reward he would accept was a branch of the sacred olive, and a promise of perpetual friendship between Athens and Cnossus (Plutarch, *Solon,* 12; Aristotle, *Ath. Pol.* 1). He died in Crete at an advanced age; according to his countrymen, who afterwards honoured him as a god, he lived nearly three hundred years. According to another story, he was taken prisoner in a war between the Spartans and Cnossians, and put to death by his captors, because he refused to prophesy favourably for them. A collection of oracles, a theogony, an epic poem on the Argonautic expedition, prose works on purifications and sacrifices, and a cosmogony, were attributed to him. Epimenides must be reckoned with Melampus and Onomacritus as one of the founders of Orphism. He is supposed to be the Cretan prophet alluded to in the epistle to Titus (i. 12).

See C. Schultess, *De Epimenide Cretensi* (1877); O. Kern, *De Orphei, Epimenidis . . . Theogoniis* (1888); G. Barone di Vincenzo, *E. di Creta e le Credenze religiose de' suoi Tempi* (1880); H. Demoulin, *Épiménide de Crète* (1901); H. Diels, *Die Fragmente der Vorsokratiker* (1903); O. Kern in Pauly-Wissowa's *Realencyclopädie.*

ÉPINAL, a town on the north-eastern frontier of France, capital of the department of Vosges, 46 m. S.S.E. of Nancy on the Eastern railway between that town and Belfort. Pop. (1906), town 21,296, commune (including garrison) 29,058. The town proper—the Grande Ville—is situated on the right bank of the Moselle, which at this point divides into two arms forming an island whereon another quarter—the Petite Ville—is built. The lesser of these two arms, which is canalized, separates the island from the suburb of Hospice on its left bank. The right bank of the Moselle is bordered for some distance by pleasant promenades, and an extensive park surrounds the ruins of an old stronghold which dominated the Grande Ville from an eminence on the east. Apart from the church of St Goëry (or St Maurice) rebuilt in the 13th century but preserving a tower of the 12th century, the public buildings of Épinal offer little of architectural interest. The old hospital on the island-quarter contains a museum with interesting collections of paintings, Gallo-Roman antiquities, sculpture, &c. Close by stands the library, which possesses many valuable MSS.

The fortifications of Épinal are connected to the southward with Belfort, Dijon and Besançon, by the fortified line of the Moselle, and north of it lies the unfortified zone called the *Trouée d'Épinal,* a gap designedly left open to the invaders between Épinal and Toul, another great fortress which is itself connected by the Meuse *forts d'arrêt* with Verdun and the places of the north-east. Épinal therefore is a fortress of the greatest possible importance to the defence of France, and its works, all built since 1870, are formidable permanent fortifications. The Moselle runs from S. to N. through the middle of the girdle of forts; the fortifications of the right bank, beginning with Fort de la Mouche, near the river 3 m. above Épinal, form a chain of detached forts and batteries over 6 m. long from S. to N., and the northernmost part of this line is immensely strengthened by numerous advanced works between the villages of Dognéville and Longchamp. On the left bank, a larger area of ground is included in the perimeter of defence for the purposes of encampment, the most westerly of the forts, Girancourt, being 7 m. distant from Épinal; from the lower Moselle to Girancourt the works are grouped principally about Uxegney and Sarchey; from Girancourt to the upper river and Fort de la Mouche a long ridge extends in an arc, and on this south-western section the principal defence is Fort Ticha and its annexes. The circle of forts, which has a perimeter of nearly 30 m., was in 1895 reinforced by the construction of sixteen new works, and the area of ground enclosed and otherwise protected by the defences of Épinal is sufficiently extensive to accommodate a large army.

Épinal is the seat of a prefect and of a court of assizes and has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce, training-colleges, a communal college and industrial school, and exchange and a branch of the Bank of France. The town, which is important as the centre of a cotton-spinning region, carries on cotton-spinning, -weaving and -printing, brewing and distilling, and the manufacture of machinery and iron goods, glucose, embroidery, hats, wall-paper and tapioca. An industry peculiar to Épinal is the production of cheap images, lithographs and engravings. There is also trade in wine, grain, live-stock and starch products made in the vicinity. Épinal is an important junction on the Eastern railway.

Épinal originated towards the end of the 10th century with the founding of a monastery by Theodoric (Dietrich) I., bishop of Metz, whose successors ruled the town till 1444, when its inhabitants placed themselves under the protection of King Charles VII. In 1466 it was transferred to the duchy of Lorraine, and in 1766 it was, along with that duchy, incorporated with France. It was occupied by the Germans on the 12th of October 1870 after a short fight, and until the 15th was the headquarters of General von Werder.

EPINAOS (Gr. ἐπί, after, and *ναός,* a temple), in architecture, the open vestibule behind the nave. The term is not found in any classic author, but is a modern coinage, originating in Germany, to differentiate the feature from "opisthodomus," which in the Parthenon was an enclosed chamber.

ÉPINAY, LOUISE FLORENCE PÉTRONILLE TARDIEU D'ESCLAVELLES D' (1726–1783), French writer, was born at Valenciennes on the 11th of March 1726. She is well known on account of her *liaisons* with Rousseau and Baron von Grimm, and her acquaintanceship with Diderot, D'Alembert, D'Holbach and other French men of letters. Her father, Tardieu d'Esclavelles, a brigadier of infantry, was killed in battle when she was nineteen; and she married her cousin Denis Joseph de La Live d'Épinay, who was made a collector-general of taxes. The marriage was an unhappy one; and Louise d'Épinay believed that the prodigality, dissipation and infidelities of her husband justified her in obtaining a formal separation in 1749. She settled in the château of La Chevrette in the valley of Montmorency, and there received a number of distinguished visitors. Conceiving a strong attachment for J. J. Rousseau, she furnished for him in 1756 in the valley of Montmorency a cottage which she named the "Hermitage," and in this retreat he found for a time the quiet and natural rural pleasures he praised so highly. Rousseau, in his *Confessions,* affirmed that the inclination was all on her side; but as, after her visit to Geneva, Rousseau became her bitter enemy, little weight can be given to his statements on this point. Her intimacy with Grimm, which began in 1755, marks a turning-point in her life, for under his influence she escaped from the somewhat compromising conditions of her life at La Chevrette. In 1757–1759 she paid a long visit to Geneva, where she was a constant guest of Voltaire. In Grimm's absence from France (1775–1776), Madame d'Épinay continued, under the superintendence of Diderot, the correspondence he had begun with various European sovereigns. She spent most of her later life at La Briche, a small house near La Chevrette, in the society of Grimm and of a small circle of men of letters. She died on the 17th of April 1783. Her *Conversations d'Émilie* (1774), composed for the education of her grand-daughter, Émilie de Belsunce, was crowned by the French Academy in 1783. The *Mémoires et Correspondance de Mme d'Épinay, renfermant un grand nombre de lettres inédites de Grimm, de Diderot, et de J.-J. Rousseau, ainsi que des détails*, &c., was published at Paris (1818) from a MS. which she had bequeathed to Grimm. The *Mémoires* are written by herself in the form of a sort of autobiographic romance. Madame d'Épinay figures in it as Madame de Montbrillant, and René is generally recognized as Rousseau, Volx as Grimm, Garnier as Diderot. All the letters and documents published along with the *Mémoires* are genuine. Many of Madame d'Épinay's letters are contained in the *Correspondance de l'abbé Galiani* (1818). Two anonymous works, *Lettres à mon fils* (Geneva, 1758) and *Mes moments heureux* (Geneva, 1759), are also by Madame d'Épinay.

See Rousseau's *Confessions*; Lucien Perey [Mlle Herpin] and Gaston Maugras, *La Jeunesse de Mme d'Épinay, les dernières années de Mme d'Épinay* (1882–1883); Sainte-Beuve, *Causeries du lundi*, vol. ii.; Edmond Scherer, *Études sur la littérature contemporaine*, vols. iii. and vii. There are editions of the *Mémoires* by L. Enault (1855) and by P. Boiteau (1865); and an English translation, with introduction and notes (1897), by J. H. Freese.

EPIPHANIUS, SAINT (*c.* 315–402), a celebrated Church Father, born in the beginning of the 4th century at Bezanduca, a village of Palestine, near Eleutheropolis. He is said to have been of Jewish extraction. In his youth he resided in Egypt, where he began an ascetic course of life, and, freeing himself from Gnostic influences, invoked episcopal assistance against heretical thinkers, eighty of whom were driven from the cities. On his return to Palestine he was ordained presbyter by the bishop of Eleutheropolis, and became the president of a monastery which he founded near his native place. The account of his intimacy with the patriarch Hilarion is not trustworthy. In 367 he was nominated bishop of Constantia, previously known as Salamis, the metropolis of Cyprus—an office which he held till his death in 402. Zealous for the truth, but passionate and bigoted, he devoted himself to two great labours, namely, the spread of the recently established monasticism, and the confutation of heresy, of which he regarded Origen and his followers as the chief representatives. The first of the Origenists that he attacked was John, bishop of Jerusalem, whom he denounced from his own pulpit at Jerusalem (394) in terms so violent that the bishop sent his archdeacon to request him to desist; and afterwards, instigated by Theophilus, bishop of Alexandria, he proceeded so far as to summon a council of Cyprian bishops to condemn the errors of Origen. In his closing years he came into conflict with Chrysostom, the patriarch of Constantinople, who had given temporary shelter to four Nitrian monks whom Theophilus had expelled on the charge of Origenism. The monks gained the support of the empress Eudoxia, and when she summoned Theophilus to Constantinople that prelate forced the aged Epiphanius to go with him. He had some controversy with Chrysostom but did not stay to see the result of Theophilus's machinations, and died on his way home. The principal work of Epiphanius is the *Panarion*, or treatise on heresies, of which he also wrote an abridgment. It is a "medicine chest" of remedies for all kinds of heretical belief, of which he names eighty varieties. His accounts of the earlier errors (where he has preserved for us large excerpts from the original Greek of Irenaeus) are more reliable than those of contemporary heresies. In his desire to see the Church safely moored he also wrote the *Ancoratus*, or discourse on the true faith. His encyclopaedic learning shows itself in a treatise on Jewish weights and measures, and another (incomplete) on ancient gems. These, with two epistles to John of Jerusalem and Jerome, are his only genuine remains. He wrote a large number of works which are lost. In allusion to his knowledge of Hebrew, Syriac, Egyptian, Greek and Latin, Jerome styles Epiphanius Πεντάγλωσσος (Five-tongued); but if his knowledge of languages was really so extensive, it is certain that he was utterly destitute of critical and logical power. His early asceticism seems to have imbued him with a love of the marvellous; and his religious zeal served only to increase his credulity. His erudition is outweighed by his prejudice, and his inability to recognize the responsibilities of authorship makes it necessary to assign most value to those portions of his works which he simply cites from earlier writers.

The primary sources for the life are the church histories of Socrates and Sozomen, Palladius's *De vita Chrysostomi* and Jerome's *De vir. illust.* 114. Petau (Petavius) published an edition of the works in 2 vols. fol. at Paris in 1622; cf. Migne, *Patr. Graec.* 41-43. The *Panarion* and other works were edited by F. Oehler (Berlin, 1859–1861). For more recent work especially on the fragments see K. Bonwetsch's art. in Herzog-Hauck's *Realencyk.* v. 417.

Other theologians of the same name were: (1) Epiphanius Scholasticus, friend and helper of Cassiodorus; (2) Epiphanius, bishop of Ticinum (Pavia), *c.* 438–496; (3) Epiphanius, bishop of Constantia and Metropolitan of Cyprus (the Younger), *c.* A.D. 680, to whom some critics have ascribed certain of the works supposed to have been written by the greater Epiphanius; (4) Epiphanius, bishop of Constantia in the 9th century, to whom a similar attribution has been made.

EPIPHANY, FEAST OF. The word epiphany, in Greek, signifies an apparition of a divine being. It was used as a singular or a plural, both in its Greek and Latin forms, according as one epiphany was contemplated or several united in a single commemoration. For in the East from an early time were associated with the feast of the Baptism of Christ commemorations of the physical birth, of the Star of the Magi, of the miracles of Cana, and of the feeding of the five thousand. The commemoration of the Baptism was also called by the Greek fathers of the 4th century the Theophany or Theophanies, and the Day of Lights, *i.e.* of the Illumination of Jesus or of the Light which shone in the Jordan. In the Teutonic west it has become the Festival of the three kings (*i.e.* the Magi), or simply Twelfth day. Leo the Great called it the Feast of the *Declaration*; Fulgentius, of the *Manifestation*; others, of the *Apparition* of Christ.

In the following article it is attempted to ascertain the date of institution of the Epiphany feast, its origin, and its significance and development.

Clement of Alexandria first mentions it. Writing *c.* 194 he states that the Basilidians feasted the day of the Baptism, devoting the whole night which preceded it to lections of the scriptures. They fixed it in the 15th year of Tiberius, on the 15th or 11th of the month Tobi, dates of the Egyptian fixed calendar equivalent to January 10th and 6th. When Clement wrote the great church had not adopted the feast, but toward A.D. 300 it was widely in vogue. Thus the Acts of Philip the Martyr, bishop of Heraclea in Thrace, A.D. 304, mention the "holy day of the Epiphany." Note the singular. Origen seems not to have heard of it as a feast of the Catholic church, but Hippolytus (died *c.* 235) recognized it in a homily which may be genuine.

In the age of the Nicene Council, A.D. 325, the primate of Alexandria was charged at every Epiphany Feast to announce to the churches in a "Festal Letter" the date of the forthcoming Easter. Several such letters written by Athanasius and others remain. In the churches so addressed the feast of Jan. 6 must have been already current.

In Jerusalem, according to the Epistle of Macarius[1] to the Armenians, *c.* 330, the feast was kept with zeal and splendour, and was with Easter and Pentecost a favourite season for Baptism.

We have evidence of the 4th century from Spain that a long fast marked the season of Advent, and prepared for the feast of Epiphany on the 6th of January. The council of

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[1] For its text see *The Key of Truth*, translated by F. C. Conybeare, Oxford, and the article ARMENIAN CHURCH.

Saragossa *c.* 380 enacted that for 21 days, from the 17th of December to the 6th of January, the Epiphany, the faithful should not dance or make merry, but steadily frequent the churches. The synod of Lerida in 524 went further and forbade marriages during Advent. Our earliest Spanish lectionary, the *Liber comicus* of Toledo, edited by Don Morin (*Anecd. Maredsol.* vol. i.), provides lections for five Sundays in Advent, and the gospel lections[1] chosen regard the Baptism of Christ, not His Birth, of which the feast, like that of the Annunciation, is mentioned, but not yet dated, December 25 being assigned to St Stephen. It is odd that for "the Apparition of the Lord" the lection Matt. ii. 1-15 is assigned, although the lections for Advent belong to a scheme which identified Epiphany with the Baptism. This anomaly we account for below. The old editor of the Mozarabic Liturgy, Fr. Antonio Lorenzano, notes in his preface § 28 that the Spaniards anciently terminated the Advent season with the Epiphany Feast. In Rome also the earliest fixed system of the ecclesiastical year, which may go back to 300, makes Epiphany the *caput festorum* or chief of feasts. The Sundays of Advent lead up to it, and the first Sundays of the year are "The Sunday within the octave of Epiphany," "the first Sunday after," and so forth. December 25 is no critical date at all. In Armenia as early as 450 a month of fasting prepared for the Advent of the Lord at Epiphany, and the fast was interpreted as a reiteration of John the Baptist's season of Repentance.

In Antioch as late as about 386 Epiphany and Easter were the two great feasts, and the physical Birth of Christ was not yet feasted. On the eve of Epiphany after nightfall the springs and rivers were blessed, and water was drawn from them and stored for the whole year to be used in lustrations and baptisms. Such water, says Chrysostom, to whose orations we owe the information, kept pure and fresh for one, two and three years, and like good wine actually improved the longer it was kept. Note that Chrysostom speaks of the Feast of the *Epiphanies*, implying two, one of the Baptism, the other of the Second Advent, when Christ will be manifested afresh, and we with him in glory. This Second Epiphany inspired, as we saw, the choice of Pauline lections in the *Liber comicus.* But the salient event commemorated was the Baptism, and Chrysostom almost insists on this as the exclusive significance of the feast:—"It was not when he was born that he became manifest to all, but when he was baptized." In his commentary on Ezekiel Jerome employs the same language *absconditus est et non apparuit*, by way of protest against an interpretation of the Feast as that of the Birth of Jesus in Bethlehem, which was essayed as early as 375 by Epiphanius in Cyprus, and was being enforced in Jerome's day by John, bishop of Jerusalem. Epiphanius boldly removed the date of the Baptism to the 8th of November. "January 6" (=Tobi 11), he writes, "is the day of Christ's Birth, that is, of the Epiphanies." He uses the plural, because he adds on January 6 the commemoration of the water miracle of Cana. Although in 375 he thus protested that January 6 was the day "of the Birth after the Flesh," he became before the end of the century a convert, according to John of Nice, to the new opinion that December 25 was the real day of this Birth. That as early as about 385, January 6 was kept as the physical birthday in Jerusalem, or rather in Bethlehem, we know from a contemporary witness of it, the lady pilgrim of Gaul, whose *peregrinatio*, recently discovered by Gamurrini, is confirmed by the old Jerusalem Lectionary preserved in Armenian.[2] Ephraem the Syrian father is attested already by Epiphanius (*c.* 375) to have celebrated the physical birth on January 6. His genuine Syriac hymns confirm this, but prove that the Baptism, the Star of the Magi, and the Marriage at Cana were also commemorated on the same day. That the same union prevailed in Rome up to the year 354 may be inferred from Ambrose. Philastrius (*De haer.* ch. 140) notes that some abolished the Epiphany feast and substituted a Birth feast. This was between 370 and 390.

In 385 Pope Siricius[3] calls January 6 *Natalicia*, "the Birthday of Christ or of Apparition," and protests against the Spanish custom (at Tarragona) of baptizing on that day—another proof that in Spain in the 4th century it commemorated the Baptism. In Gaul at Vienna in 360 Julian the Apostate, out of deference to Christian feeling, went to church "on the festival which they keep in January and call Epiphania." So Ammianus; but Zonaras in his Greek account of the event calls it the day of the Saviour's Birth.

Why the feast of the Baptism was called the feast or day of the Saviour's Birth, and why fathers of that age when they call Christmas the birthday constantly qualify and add the words "in the flesh," we are able to divine from Pope Leo's (*c.* 447) 18th Epistle to the bishops of Sicily. For here we learn that in Sicily they held that in His Baptism the Saviour was reborn through the Holy Spirit. "The Lord," protests Leo, "needed no remission of sins, no remedy of rebirth." The Sicilians also baptized neophytes on January 6, "because baptism conveyed to Jesus and to them one and the same grace." Not so, argues Leo, the Lord sanctioned and hallowed the power of regeneration, not when He was baptized, but "when the blood of redemption and the water of baptism flowed forth from his side." Neophytes should therefore be baptized at Easter and Pentecost alone, never at Epiphany.

Fortune has preserved to us among the *Spuria* of several Latin fathers, Ambrose, Augustine, Jerome and Maximus of Turin, various homilies for Sundays of the Advent fast and for Epiphany. The Advent lections of these homilists were much the same as those of the Spanish *Liber comicus*; and they insist on Advent being kept as a strict fast, without marriage celebrations. Their Epiphany lection is however Matt. iii. 1-17, which must therefore have once on a time been assigned in the *Liber comicus* also in harmony with its general scheme. The psalms used on the day are, cxiii. (cxiv.) "When Israel went forth," xxviii. (xxix.) "Give unto the Lord," and xxii. (xxiii.) "the Lord is my Shepherd." The same lection of Matthew and also Ps. xxix. are noted for Epiphany in the Greek oration for the day ascribed to Hippolytus, which is at least earlier than 300, and also in special old Epiphany rites for the Benediction of the waters found in Latin, Greek, Armenian, Coptic, Syriac, &c. Now by these homilists as by Chrysostom,[4] the Baptism is regarded as the occasion on which "the Saviour first *appeared* after the flesh in the world or on earth." These words were classical to the homilists, who explain them as best they can. The baptism is also declared to have been "the consecration of Christ," and "regeneration of Christ and a strengthening of our faith," to have been "Christ's second nativity." "This *second birth* hath more renown than his first . . . . for now the God of majesty is inscribed (as his father), but then (at his first birth) Joseph the Carpenter was assumed to be his father . . . he hath more honour who cries aloud from Heaven (viz. God the Father), than he who labours upon earth" (viz. Joseph).[5]

Similarly the old *ordo Romanus* of the age of Pepin (given by Montfaulcon in his preface to the Mozarabic missal in Migne, *Patr. Latina*, 85, col. 46), under the rubric of the Vigil of the Theophany, insists that "the *second birth* of Christ (in Baptism) being distinguished by so many mysteries (*e.g.* the miracle of Cana) is more honoured than the first" (birth from Mary).

These homilies mostly belong to an age (? 300–400) when the commemoration of the physical Birth had not yet found its own day (Dec. 25), and was therefore added alongside of the Baptism on January 6. Thus the two Births, the physical and the spiritual, of Jesus were celebrated on one and the same day, and one homily contains the words: "Not yet is the feast of his origin fully completed, and already we have to celebrate the solemn commemoration of his Baptism. He has hardly been born humanwise, and already he is being *reborn* in sacramental wise. For to-day, though after a lapse of many annual cycles, he was hallowed (or consecrated) in Jordan. So the Lord arranged as to link rite with rite; I mean, in such wise as to be brought forth through the Virgin and to be begotten through the mystery (*i.e.* sacrament) in one and the same season." Another homily preserved in a MS. of the 7th or 8th century and assigned to Maximus of Turin declares that the Epiphany was known as the Birthday of Jesus, either because He was then born of the Virgin or *reborn in baptism.* This also was the classical defence made by Armenian fathers of their custom of keeping the feast of the Birth and Baptism together on January 6. They argued from Luke's gospel that the Annunciation took place on April 6, and therefore the Birth on January 6. The Baptism was on Christ's thirtieth birthday, and should therefore be also kept on January 6. Cosmas Indicopleustes (*c.* 550) relates that on the same grounds believers of Jerusalem joined the feasts. All such reasoning was of course *après coup*. As late as the 9th century the Armenians had at least three discrepant dates for the Annunciation—January 5, January 9, April 6; and of these January 5 and 9 were older than April 6, which they perhaps borrowed from Epiphanius's commentary on the Gospels. The old Latin homilist, above quoted, hits the mark when he declares that the innate logic of things required the Baptism (which must, he says, be any how called a *natal* or birth festival) to fall on the same day as Christmas —*Ratio enim exigit.* Of the argument from the 6th of April as the date of the Annunciation he knows nothing. The 12th century Armenian Patriarch Nerses, like this homilist, merely rests his case against the Greeks, who incessantly reproached the Armenians for ignoring their Christmas on December 25, on the inherent logic of things, as follows:

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[1] These are Matt. iii. 1-11, xi. 2-15, xxi. 1-9; Mark i. 1-8; Luke iii. 1-18. The Pauline lections regard the Epiphany of the Second Advent, of the prophetic or Messianic kingdom.

[2] Translated in *Rituale Armenorum* (Oxford, 1905).

[3] Epist. ad Himerium, c. 2.

[4] Hom. I. in Pentec. *op.* tom. ii. 458; "With us the Epiphanies is the first festival. What is this festival's significance? This, that God was seen upon earth and consorted with men." For this idea there had soon to be substituted that of the manifestation of Christ to the Gentiles.

[5] See the Paris edition of Augustine (1838), tom. v., Appendix, *Sermons* cxvi., cxxv., cxxxv., cxxxvi., cxxxvii.; cf. tom. vi. *dial. quaestionum*, xlvi.; Maximus of Turin, Homily xxx.

> "Just as he was born after the flesh from the holy virgin, so he was *born* through baptism and from the Jordan, by way of example unto us. And since there are here *two births*, albeit differing one from the other in mystic import and in point of time, therefore it was appointed that we should feast them together, as the first, so also the second birth."

The Epiphany feast had therefore in its own right acquired the name of *natalis dies* or birthday, as commemorating the spiritual rebirth of Jesus in Jordan, before the *natalis in carne*, the Birthday *in the flesh*, as Jerome and others call it, was associated with it. This idea was condemned as Ebionite in the 3rd century, yet it influences Christian writers long before and long afterwards. So Tertullian says: "We little fishes (*pisciculi*), after the example of our great fish (ἰχθύν) Jesus Christ the Lord, are born (*gignimur*) in the water, nor except by abiding in the water are we in a state of salvation." And Hilary, like the Latin homilists cited above, writes of Jesus that "he was *born again* through baptism, and then became Son of God," adding that the Father cried, when he had gone up out of the water, "My Son art thou, I have this day begotten thee" (Luke iii. 22). "But this," he adds, "was with the begetting of a man who is being reborn; on that occasion too he himself was being reborn unto God to be perfect son; as he was son of man, so in baptism, he was constituted son of God as well." The idea frequently meets us in Hilary; it occurs in the Epiphany hymn of the orthodox Greek church, and in the Epiphany hymns and homilies of the Armenians.

A letter is preserved by John of Nice of a bishop of Jerusalem to the bishop of Rome which attests a temporary union of both feasts on January 6 in the holy places. The faithful, it says, met before dawn at Bethlehem to celebrate the Birth from the Virgin in the cave; but before their hymns and lections were finished they had to hurry off to Jordan, 13 m. the other side of Jerusalem, to celebrate the Baptism, and by consequence neither commemoration could be kept fully and reverently. The writer therefore begs the pope to look in the archives of the Jews brought to Rome after the destruction of Jerusalem, and to ascertain from them the real date of Christ's birth. The pope looked in the works of Josephus and found it to be December 25. The letter's genuineness has been called in question; but revealing as it does the Church's ignorance of the date of the Birth, the inconvenience and precariousness of its association with the Baptism, the recency of its separate institution, it could not have been invented. It is too tell-tale a document. Not the least significant fact about it is that it views the Baptism as an established feast which cannot be altered and set on another date. Not it but the physical birth must be removed from January 6 to another date. It has been shown above that perhaps as early as 380 the difficulty was got over in Jerusalem by making the Epiphany wholly and solely a commemoration of the miraculous birth, and suppressing the commemoration of the Baptism. Therefore this letter must have been written— or, if invented, then invented before that date. Chrysostom seems to have known of it, for in his Epiphany homily preached at Antioch, *c.* 392 (op. vol. ii. 354, ed. Montf.), he refers to the archives at Rome as the source from which the date December 25 could be confirmed, and declares that he had obtained it from those who dwell there, and who observing it from the beginning and by old tradition, had communicated it to the East. The question arises why the feast of the Baptism was set on January 6 by the sect of Basilides? And why the great church adopted the date? Now we know what sort of considerations influenced this sect in fixing other feasts, so we have a clue. They fixed the Birth of Jesus on Pachon 25 (= May 20), the day of the Niloa, or feast of the descent of the Nile from heaven. We should thus expect January 6 to be equally a Nile festival. And this from various sources we know it was. On Tobi 11, says Epiphanius[1] (*c.* 370), every one draws up water from the river and stores it up, not only in Egypt itself, but in many other countries. In many places, he adds, springs and rivers turn into wine on this day, *e.g.* at Cibyra in Caria and Gerasa in Arabia. Aristides Rhetor (*c.* 160) also relates how in the winter, which began with Tobi, the Nile water was at its purest. Its water, he says, if drawn at the right time conquers time, for it does not go bad, whether you keep it on the spot or export it. Galleys were waiting on a certain night to take it on board and transport it to Italy and elsewhere for libations and lustrations in the Temples of Isis. "Such water," he adds, "remained fresh, long after other water supplies had gone bad. The Egyptians filled their pitchers with this water, as others did with wine; they stored it in their houses for three or four years or more, and recommended it the more, the older it grew, just as the Greeks did their wines."

Two centuries later Chrysostom, as we have seen, commends in identical terms the water blessed and drawn from the rivers at the Baptismal feast. It is therefore probable that the Basilidian feast was a Christianized form of the blessing of the Nile, called by Chabas in his Coptic calendar *Hydreusis.* Masʿūdī the Arab historian of the 10th century, in his *Prairies d'or* (French trans. Paris, 1863, ii. 364), enlarges on the splendours of this feast as he saw it still celebrated in Egypt.

Epiphanius also (*Haer.* 51) relates a curious celebration held at Alexandria of the Birth of the Aeon. On January 5 or 6 the votaries met in the holy compound or Temple of the Maiden (Korē), and sang hymns to the music of the flute till dawn, when they went down with torches into a shrine under ground, and fetched up a wooden idol on a bier representing Korē, seated and naked, with crosses marked on her brow, her hands and her knees. Then with flute-playing, hymns and dances they carried the image seven times round the central shrine, before restoring it again to its dwelling-place below. He adds: "And the votaries say that to-day at this hour *Korē*, that is, the Virgin, gave birth to the Aeon."

Epiphanius says this was a heathen rite, but it rather resembles some Basilidian or Gnostic commemoration of the spiritual birth of the Divine life in Jesus of the Christhood, from the older creation the Ecclesia.

The earliest extant Greek text of the Epiphany rite is in a

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[1] Perhaps Epiphanius is here, after his wont, transcribing an earlier source.

Euchologion of about the year 795, now in the Vatican. The prayers recite that at His baptism Christ hallowed the waters by His presence in Jordan,[1] and ask that they may now be blessed by the Holy Spirit visiting them, by its power and inworking, as the streams of Jordan were blessed. So they will be able to purify soul and body of all who draw up and partake of them. The hymn sung contains such clauses as these:

> "To-day the grace of the Holy Spirit hallowing the waters appears (ἐπιφαίνεται, cf. Epiphany) . . . To-day the systems of waters spread out their backs under the Lord's footsteps. To-day the unseen is seen, that he may reveal himself to us. To-day the Increate is of his own will ordained (*lit.* hath hands laid on him) by his own creature. To-day the Unbending bends his neck to his own servant, in order to free us from servitude. To-day we were liberated from darkness and are illumined by light of divine knowledge. To-day for us the Lord by means of rebirth (*lit.* palingenesy) of the Image reshapes the Archetype."

This last clause is obscure. In the Armenian hymns the ideas of the rebirth not only of believers, but of Jesus, and of the latter's ordination by John, are very prominent.

The history of the Epiphany feast may be summed up thus:—

From the Jews the Church took over the feasts of Pascha and Pentecost; and Sunday was a weekly commemoration of the Resurrection. It was inevitable, however, that believers should before long desire to commemorate the Baptism, with which the oldest form of evangelical tradition began, and which was widely regarded as the occasion when the divine life began in Jesus; when the Logos or Holy Spirit appeared and rested on Him, conferring upon Him spiritual unction as the promised Messiah; when, according to an old reading of Luke iii. 22, He was begotten of God. Perhaps the Ebionite Christians of Palestine first instituted the feast, and this, if a fact, must underlie the statement of John of Nice, a late but well-informed writer (*c.* 950), that it was fixed by the disciples of John the Baptist who were present at Jesus' Baptism. The Egyptian gnostics anyhow had the feast and set it on January 6, a day of the blessing of the Nile. It was a feast of Adoptionist complexion, as one of its names, viz. the Birthday (Greek γενέθλια, Latin *Natalicia* or *Natalis dies*), implies. This explains why in east and west the feast of the physical Birth was for a time associated with it; and to justify this association it was suggested that Jesus was baptized just on His thirtieth birthday. In Jerusalem and Syria it was perhaps the Ebionite or Adoptionist, we may add also the Gnostic, associations of the Baptism that caused this aspect of Epiphany to be relegated to the background, so that it became wholly a feast of the miraculous birth. At the same time other epiphanies of Christ were superadded, *e.g.* of Cana where Christ began His miracles by turning water into wine and *manifested* forth His glory, and of the Star of the Magi. Hence it is often called the Feast of *Epiphanies* (in the plural). In the West the day is commonly called the Feast of the three kings, and its early significance as a commemoration of the Baptism and season of blessing the waters has been obscured; the Eastern churches, however, of Greece, Russia, Georgia, Armenia, Egypt, Syria have been more conservative. In the far East it is still the season of seasons for baptisms, and in Armenia children born long before are baptized at it. Long ago it was a baptismal feast in Sicily, Spain, Italy (see Pope Gelasius to the Lucanian Bishops), Africa and Ireland. In the Manx prayer-book of Bishop Phillips of the year 1610 Epiphany is called the "little Nativity" (*La nolicky bigge*), and the Sunday which comes between December 25 and January 6 is "the Sunday between *the two Nativities*," or *Jih dûni oedyr 'a Nolick*; Epiphany itself is the "feast of the water vessel," *lail ymmyrt uyskey*, or "of the well of water," *Chibbyrt uysky*.

Authorities.—Gregory Nazianz., Orat. xli.; Suicer, *Thesaurus*, s.v. ἐπιφάνεια; Cotelerius *In constit. Apost.* (Antwerp, 1698), lib. v. cap. 13; R. Bingham, *Antiquities* (London, 1834), bk. xx.; Ad. Jacoby, *Bericht über die Taufe Jesu* (Strassburg, 1902); H. Blumenbach, *Antiquitates Epiphaniorum* (Leipzig, 1737); J. L. Schulze, *De festo Sanctorum Luminum*, ed. J. E. Volbeding (Leipzig, 1841); and K. A. H. Kellner, *Heortologie* (Freiburg im Breisgau, 1906). (See also the works enumerated under Christmas.) (F. C. C.)

EPIRUS, or Epeirus, an ancient district of Northern Greece extending along the Ionian Sea from the Acroceraunian promontory on the N. to the Ambracian gulf on the S. It was conterminous on the landward side with Illyria, Macedonia and Thessaly, and thus corresponds to the southern portion of Albania (*q.v.*). The name Epirus (Ἤπειρος) signified "mainland," and was originally applied to the whole coast southward to the Corinthian Gulf, in contradistinction to the neighbouring islands, Corcyra, Leucas, &c. The country is all mountainous, especially towards the east, where the great rivers of north-western Greece —Achelous, Arachthus and Aous—rise in Mt Lacmon, the backbone of the Pindus chain. In ancient times Epirus did not produce corn sufficient for the wants of its inhabitants; but it was celebrated, as it has been almost to the present day, for its cattle and its horses. According to Theopompus (4th cent. B.C.), the Epirots were divided into fourteen independent tribes, of which the principal were the Chaones, the Thesproti and the Molossi. The Chaones (perhaps akin to the Chones who dwelt in the heel of Italy) inhabited the Acroceraunian shore, the Molossians the inland districts round the lake of Pambotis (mod. Jannina), and the Thesprotians the region to the north of the Ambracian gulf. In spite of its distance from the chief centres of Greek thought and action, and the barbarian repute of its inhabitants, Epirus was believed to have exerted at an early period no small influence on Greece, by means more especially of the oracle of Dodona. Aristotle even placed in Epirus the original home of the Hellenes. But in historic times its part in Greek history is mainly passive. The states of Greece proper founded a number of colonies on its coast, which formed stepping-stones towards the Adriatic and the West. Of these one of the earliest and most flourishing was the Corinthian colony of Ambracia, which gives its name to the neighbouring gulf. Elatria, Bucheta and Pandosia, in Thesprotia, originated from Elis. Among the other towns in the country the following were of some importance. In Chaonia: Palaeste and Chimaera, fortified posts to which the dwellers in the open country could retire in time of war; Onchesmus or Anchiasmus, opposite Corcyra (Corfu), now represented by Santi Quarante; Phoenice, still so called, the wealthiest of all the native cities of Epirus, and after the fall of the Molossian kingdom the centre of an Epirotic League; Buthrotum, the modern Butrinto; Phanote, important in the Roman campaigns in Epirus; and Adrianopolis, founded by the emperor whose name it bore. In Thesprotia: Cassope, the chief town of the most powerful of the Thesprotian clans; and Ephyra, afterwards Cichyrus, identified by W. M. Leake with the monastery of St John 3 or 4 m. from Phanari, and by C. Bursian with Kastri at the northern end of the Acherusian Lake. In Molossia: Passaron, where the kings were wont to take the oath of the constitution and receive their people's allegiance; and Tecmon, Phylace and Horreum, all of doubtful identification. The Byzantine town of Rogus is probably the same as the modern Luro, the Greek Oropus.

History.—The kings, or rather chieftains, of the Molossians, who ultimately extended their power over all Epirus, claimed to be descended from Pyrrhus, son of Achilles, who, according to legend, settled in the country after the sack of Troy, and transmitted his kingdom to Molossus, his son by Andromache. The early history of the dynasty is very obscure; but Admetus, who lived in the 5th century B.C., is remembered for his hospitable reception of the banished Themistocles, in spite of the fact that the great Athenian had persuaded his countrymen to refuse the alliance tardily offered by the Molossians when victory against the Persians was already secured. Admetus was succeeded, about 429 B.C., by his son or grandson, Tharymbas or Arymbas I., who being placed by a decree of the people under the guardianship of Sabylinthus, chief of the Atintanes, was educated at Athens, and at a later date introduced a higher civilization among his subjects. Alcetas, the next king mentioned in history, was restored to his throne by Dionysius of Syracuse about 385 B.C. His son Arymbas II. (who succeeded by the death of his brother Neoptolemus) ruled with prudence and equity, and gave encouragement to literature and the arts.

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[1] The same idea is frequent in Epiphany homilies of Chrysostom and other 4th-century fathers.

To him Xenocrates of Chalcedon dedicated his four books on the art of governing; and it is specially mentioned that he bestowed great care on the education of his brother's children. One of them, Troas, he married; Olympias, the other niece, was married to Philip II. of Macedon and became the mother of Alexander the Great. On the death of Arymbas, Alexander the brother of Olympias, was put on the throne by Philip and married his daughter Cleopatra. Alexander assumed the new title of king of Epirus, and raised the reputation of his country abroad. Asked by the Tarentines for aid against the Samnites and Lucanians, he made a descent at Paestum in 332 B.C., and reduced several cities of the Lucani and Bruttii; but in a second attack he was surrounded, defeated and slain near Pandosia in Bruttium.

Aeacides, the son of Arymbas II., succeeded Alexander. He espoused the cause of Olympias against Cassander, but was dethroned by his own soldiers, and had hardly regained his position when he fell in battle (313 B.C.) against Philip, brother of Cassander. He had, by his wife Phthia, a son, the celebrated Pyrrhus, and two daughters, Deidamia and Troas, of whom the former married Demetrius Poliorcetes. His brother Alcetas, who succeeded him, continued unsuccessfully the war with Cassander; he was put to death by his rebellious subjects in 295 B.C., and was succeeded by Pyrrhus (*q.v.*), who for six years fought against the Romans in south Italy and Sicily, and gave to Epirus a momentary importance which it never again possessed.

Alexander, his son, who succeeded in 272 B.C., attempted to seize Macedonia, and defeated Antigonus Gonatas, but was himself shortly afterwards driven from his kingdom by Demetrius. He recovered it, however, and spent the rest of his days in peace. Two other insignificant reigns brought the family of Pyrrhus to its close, and Epirus was thenceforward governed by a magistrate, elected annually in a general assembly of the nation held at Passaron. Having imprudently espoused the cause of Perseus (*q.v.*) in his ill-fated war against the Romans, 168 B.C., it was exposed to the fury of the conquerors, who destroyed, it is said, seventy towns, and carried into slavery 150,000 of the inhabitants. From this blow it never recovered. At the dissolution of the Achaean League (*q.v.*), 146 B.C., it became part of the province of Macedonia, receiving the name Epirus Vetus, to distinguish it from Epirus Nova, which lay to the east.

On the division of the empire it fell to the East, and so remained until the taking of Constantinople by the Latins in 1204, when Michel Angelus Comnenus seized Aetolia and Epirus. On the death of Michel in 1216, these countries fell into the hands of his brother Theodore. Thomas, the last of the direct line, was murdered in 1318 by his nephew Thomas, lord of Zante and Cephalonia, and his dominions were dismembered. Not long after, Epirus was overrun by the Samians and Albanians, and the confusion which had been growing since the division of the empire was worse confounded still. Charles II. Tocco, lord of Cephalonia and Zante, obtained the recognition of his title of Despot of Epirus from the emperor Manuel Comnenus in the beginning of the 15th century; but his family was deprived of their possession in 1431 by Murad (Amurath) II. In 1443, Scanderbeg, king of Albania, made himself master of a considerable part of Epirus; but on his death it fell into the power of the Venetians. From these it passed again to the Turks, under whose dominion it still remains. For modern history see Albania.

Authorities.—Nauze, "Rech. hist. sur les peuples qui s'établirent en Épire," in *Mém. de l'Acad. des Inscr.* (1729); Pouqueville, *Voyage en Morée, &c., en Albanie* (Paris, 1805); Hobhouse, *A Journey through Albania, &c.* (2 vols., London, 1813); Wolfe, "Observations on the Gulf of Arta" in *Journ. Royal Geog. Soc.*, 1834; W. M. Leake, *Travels in Northern Greece* (London, 1835); Merleker, *Darstellung des Landes und der Bewohner von Epeiros* (Königsberg, 1841); J. H. Skene, "Remarkable Localities on the Coast of Epirus," in *Journ. Roy. Geog. Soc.*, 1848; Bowen, *Mount Athos, Thessaly and Epirus* (London, 1852); von Hahn, *Albanesische Studien* (Jena, 1854); Bursian, *Geog. von Griechenland* (vol. i., Leipzig, 1862); Schäfli, "Versuch einer Klimatologie des Thales von Jannina," *Neue Denkschr. d. allgem. schweizer. Ges. f. Naturw.* xix. (Zürich, 1862); Major R. Stuart, "On Phys. Geogr. and Natural Resources of Epirus," in *Journ. R.G.S.*, 1869; Guido Cora, in *Cosmos*; Dumont, "Souvenirs de l'Adriatique, de l'Épire, &c." in *Rev. des deux mondes* (Paris, 1872); de Gubernatis, "L'Epiro," *Bull. Soc. Geogr. Ital.* viii. (Rome, 1872); Dozon, "Excursion en Albanie," *Bull. Soc. Geogr.*, 6th series; Karapanos, *Dodone et ses ruines* (Paris, 1878); von Heldreich, "Ein Beitrag zur Flora von Epirus," *Verh. Bot. Vereins Brandenburg* (Berlin, 1880); Kiepert, "Zur Ethnographie von Epirus," *Ges. Erdk.* xvii. (Berlin, 1879); Zompolides, "Das Land und die Bewohner von Epirus," *Ausland* (Berlin, 1880); A. Philippson, *Thessalien und Epirus* (Berlin, 1897). (J. L. M.)

EPISCOPACY (from Late Lat. *episcopatus*, the office of a bishop, *episcopus*), the general term technically applied to that system of church organization in which the chief ecclesiastical authority within a defined district, or diocese, is vested in a bishop. As such it is distinguished on the one hand from Presbyterianism, government by elders, and Congregationalism, in which the individual church or community of worshippers is autonomous, and on the other from Papalism. The origin and development of episcopacy in the Christian Church, and the functions and attributes of bishops in the various churches, are dealt with elsewhere (see Church History and Bishop). Under the present heading it is proposed only to discuss briefly the various types of episcopacy actually existing, and the different principles that they represent.

The deepest line of cleavage is naturally between the view that episcopacy is a divinely ordained institution essential to the effective existence of a church as a channel of grace, and the view that it is merely a convenient form of church order, evolved as the result of a variety of historical causes, and not necessary to the proper constitution of a church. The first of these views is closely connected with the doctrine of the Apostolical Succession. According to this, Christ committed to his apostles certain powers of order and jurisdiction in the Church, among others that of transmitting these powers to others through "the laying on of hands"; and this power, whatever obscurity may surround the practice of the primitive Church (see Apostle, *ad fin.*) was very early confined to the order of bishops, who by virtue of a special consecration became the successors of the apostles in the function of handing on the powers and graces of the ministry.[1] A valid episcopate, then, is one derived in an unbroken series of "layings on of hands" by bishops from the time of the apostles (see Order, Holy). This is the Catholic view, common to all the ancient Churches whether of the West or East, and it is one that necessarily excludes from the union of Christendom all those Christian communities which possess no such apostolically derived ministry.

Apart altogether, however, from the question of orders, episcopacy represents a very special conception of the Christian Church. In the fully developed episcopal system the bishop sums up in his own person the collective powers of the Church in his diocese, not by delegation of these powers from below, but by divinely bestowed authority from above. "Ecclesia est in episcopo," wrote St Cyprian (Cyp. iv. *Ep.* 9); the bishop, as the successor of the apostles, is the centre of unity in his diocese, the unity of the Church as a whole is maintained by the intercommunion of the bishops, who for this purpose represent their dioceses. The bishops, individually and collectively, are thus the essential ties of Catholic unity; they alone, as the depositories of the apostolic traditions, establish the norm of Catholic orthodoxy in the general councils of the Church. This high theory of episcopacy which, if certain of the Ignatian letters be genuine, has a very early origin, has, of course, fallen upon evil days. The power of the collective episcopate to maintain Catholic unity was disproved long before it was overshadowed by the centralized authority of Rome; before the Reformation, its last efforts to assert its supremacy in the Western Church, at the councils of Basel and Constance, had broken down; and the religious revolution of the 16th century left it largely discredited and exposed to a double attack, by the papal monarchy on the one hand and the democratic Presbyterian model on the other. Within the Roman Catholic Church the high doctrine of episcopacy continued to be maintained by the Gallicans and Febronians (see Gallicanism and Febronianism) as against the claims of the Papacy, and for a while with success; but a system which had failed to preserve the unity of the Church even when the world was united under the Roman empire could not be expected to do so in a world split up into a series of rival states, of which many had already reorganized their churches on a national basis. "Febronius," indeed, was in favour of a frank recognition of this national basis of ecclesiastical organization, and saw in Episcopacy the best means of reuniting the dissidents to the Catholic Church, which was to consist, as it were, of a free federation of episcopal churches under the presidency of the bishop of Rome. The idea had considerable success; for it happened to march with the views of the secular princes. But religious people could hardly be expected to see in the worldly prince-bishops of the Empire, or the wealthy courtier-prelates of France, the trustees of the apostolical tradition. The Revolution intervened; and when, during the religious reaction that followed, men sought for an ultimate authority, they found it in the papal monarch, exalted now by ultramontane zeal into the sole depositary of the apostolical tradition (see ULTRAMONTANISM). At the Vatican Council of 1870 episcopacy made its last stand against papalism, and was vanquished (see VATICAN COUNCIL). The pope still addresses his fellow-bishops as "venerable brothers"; but from the Roman Catholic Church the fraternal union of coequal authorities, which is of the essence of episcopacy, has vanished; and in its place is set the autocracy of one. The modern Roman Catholic Church is episcopal, for it preserves the bishops, whose *potestas ordinis* not even the pope can exercise until he has been duly consecrated; but the bishops as such are now but subordinate elements in a system for which "Episcopacy" is certainly no longer an appropriate term.

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[1] See Bishop C. Gore, *The Church and the Ministry* (1887).

The word Episcopacy has, in fact, since the Reformation, been more especially associated with those churches which, while ceasing to be in communion with Rome, have preserved the episcopal model. Of these by far the most important is the Church of England, which has preserved its ecclesiastical organization essentially unchanged since its foundation by St Augustine, and its daughter churches (see ENGLAND, CHURCH OF, and ANGLICAN COMMUNION). The Church of England since the Reformation has been the chief champion of the principle of Episcopacy against the papal pretensions on the one hand and Presbyterianism and Congregationalism on the other. As to the divine origin of Episcopacy and, consequently, of its universal obligation in the Christian Church, Anglican opinion has been, and still is, considerably divided.[1] The "High Church" view, now predominant, is practically identical with that of the Gallicans and Febronians, and is based on Catholic practice in those ages of the Church to which, as well as to the Bible, the formularies of the Church of England make appeal. So far as this view, however, is the outcome of the general Catholic movement of the 19th century, it can hardly be taken as typical of Anglican tradition in this matter. Certainly, in the 16th and 17th centuries, the Church of England, while rigorously enforcing the episcopal model at home, and even endeavouring to extend it to Presbyterian Scotland, did not regard foreign non-episcopal Churches otherwise than as sister communions. The whole issue had, in fact, become confused with the confusion of functions of the Church and State. In the view of the Church of England the ultimate governance of the Christian community, in things spiritual and temporal, was vested not in the clergy but in the "Christian prince" as the vicegerent of God.[2] It was the transference to the territorial sovereigns of modern Europe of the theocratic character of the Christian heads of the Roman world-empire; with the result that for the reformed Churches the unit of church organization was no longer the diocese, or the group of dioceses, but the Christian state. Thus in England the bishops, while retaining their *potestas ordinis* in virtue of their consecration as successors of the apostles, came to be regarded not as representing their dioceses in the state, but the state in their dioceses. Forced on their dioceses by the royal *Congé d'élire* (*q.v.*), and enthusiastic apostles of the High Church doctrine of non-resistance, the bishops were looked upon as no more than lieutenants of the crown;[3] and Episcopacy was ultimately resisted by Presbyterians and Independents as an expression and instrument of arbitrary government, "Prelacy" being confounded with "Popery" in a common condemnation. With the constitutional changes of the 18th and 19th centuries, however, a corresponding modification took place in the character of the English episcopate; and a still further change resulted from the multiplication of colonial and missionary sees having no connexion with the state (see ANGLICAN COMMUNION). The consciousness of being in the line of apostolic succession helped the English clergy to revert to the principle *Ecclesia est in episcopo*, and the great periodical conferences of Anglican bishops from all parts of the world have something of the character, though they do not claim the ecumenical authority, of the general councils of the early Church (see LAMBETH CONFERENCES).

Of the reformed Churches of the continent of Europe only the Lutheran Churches of Denmark, Iceland, Norway, Sweden and Finland preserve the episcopal system in anything of its historical sense; and of these only the two last can lay claim to the possession of bishops in the unbroken line of episcopal succession.[4] The superintendents (variously entitled also archpriests, deans, provosts, ephors) of the Evangelical (Lutheran) Church, as established in the several states of Germany and in Austria, are not bishops in any canonical sense, though their jurisdictions are known as dioceses and they exercise many episcopal functions. They have no special powers of order, being presbyters, and their legal status is admittedly merely that of officials of the territorial sovereign in his capacity as head of the territorial church (see SUPERINTENDENT). The "bishops" of the Lutheran Church in Transylvania are equivalent to the superintendents.

Episcopacy in a stricter sense is the system of the Moravian Brethren (*q.v.*) and the Methodist Episcopal Church of America (see METHODISM). In the case of the former, claim is laid to the unbroken episcopal succession through the Waldenses, and the question of their eventual intercommunion with the Anglican

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[1] Neither the Articles nor the authoritative Homilies of the Church of England speak of episcopacy as essential to the constitution of a church. The latter make "the three notes or marks" by which a true church is known "pure and sound doctrine, the sacraments administered according to Christ's holy institution, and the right use of ecclesiastical discipline." These marks are perhaps ambiguous, but they certainly do not depend on the possession of the Apostolic Succession; for it is further stated that "the bishops of Rome and their adherents are not the true Church of Christ" (Homily "concerning the Holy Ghost," ed. Oxford, 1683, p. 292).

[2] "He and his holy apostles likewise, namely Peter and Paul, did forbid unto all Ecclesiastical Ministers, dominion over the Church of Christ" (*Homilies appointed to be read in Churches*, "The V. part of the Sermon against Wilful Rebellion," ed. Oxford, 1683, p. 378). Princes are "God's lieutenants, God's presidents, God's officers, God's commissioners, God's judges . . . God's vicegerents" ("The II. part of the Sermon of Obedience," *ib.* p. 64).

[3] Juridically they were, of course, never this in the strict sense in which the term could be used of the Lutheran superintendents (see below). They were never mere royal officials, but peers of parliament, holding their temporalities as baronies under the crown.

[4] During the crisis of the Reformation all the Swedish sees became vacant but two, and the bishops of these two soon left the kingdom. The episcopate, however, was preserved by Peter Magnusson, who, when residing as warden of the Swedish hospital of St Bridget in Rome, had been duly elected bishop of the see of Westeraes, and consecrated, *c.* 1524. No official record of his consecration can be discovered, but there is no sufficient reason to doubt the fact; and it is certain that during his lifetime he was acknowledged as a canonical bishop both by Roman Catholics and by Protestants. In 1528 Magnusson consecrated bishops to fill the vacant sees, and, assisted by one of these, Magnus Sommar, bishop of Strengness, he afterwards consecrated the Reformer, Lawrence Peterson, as archbishop of Upsala, Sept. 22, 1531. Some doubt has been raised as to the validity of the consecration of Peterson's successor, also named Lawrence Peterson, in 1575, from the insufficiency of the documentary evidence of the consecration of his consecrator, Paul Justin, bishop of Åbo. The integrity of the succession has, however, been accepted after searching investigation by men of such learning as Grabe and Routh, and has been formally recognized by the convention of the American Episcopal Church. The succession to the daughter church of Finland, now independent, stands or falls with that of Sweden.

Church was accordingly mooted at the Lambeth Conference of 1908. The bishops of the Methodist Episcopal Church, on the other hand, derive their orders from Thomas Coke, a presbyter of the Church of England, who in 1784 was ordained by John Wesley, assisted by two other presbyters, "superintendent" of the Methodist Society in America. Methodist episcopacy is therefore based on the denial of any special *potestas ordinis* in the degree of bishop, and is fundamentally distinct from that of the Catholic Church—using this term in its narrow sense as applied to the ancient churches of the East and West.

In all of these ancient churches episcopacy is regarded as of divine origin; and in those of them which reject the papal supremacy the bishops are still regarded as the guardians of the tradition of apostolic orthodoxy and the stewards of the gifts of the Holy Ghost to men (see ORTHODOX EASTERN CHURCH; ARMENIAN CHURCH; COPTS: *Coptic Church*, &c.). In the West, Gallican and Febronian Episcopacy are represented by two ecclesiastical bodies: the Jansenist Church under the archbishop of Utrecht (see JANSENISM and UTRECHT), and the Old Catholics (*q.v.*). Of these the latter, who separated from the Roman communion after the promulgation of the dogma of papal infallibility, represent a pure revolt of the system of Episcopacy against that of Papalism. (W. A. P.)

EPISCOPIUS, SIMON (1583–1643), the Latin form of the name of Simon Bischop, Dutch theologian, was born at Amsterdam on the 1st of January 1583. In 1600 he entered the university of Leiden, where he studied theology under Jacobus Arminius, whose teaching he followed. In 1610, the year in which the Arminians presented the famous Remonstrance to the states of Holland, he became pastor at Bleyswick, a small village near Rotterdam; in the following year he advocated the cause of the Remonstrants (*q.v.*) at the Hague conference. In 1612 he succeeded Francis Gomarus as professor of theology at Leiden, an appointment which awakened the bitter enmity of the Calvinists, and, on account of the influence lent by it to the spread of Arminian opinions, was doubtless an ultimate cause of the meeting of the synod of Dort in 1618. Episcopius was chosen as the spokesman of the thirteen representatives of the Remonstrants before the synod; but he was refused a hearing, and the Remonstrant doctrines were condemned without any explanation or defence of them being permitted. At the end of the synod's sittings in 1619, Episcopius and the other twelve Arminian representatives were deprived of their offices and expelled from the country (see DORT, SYNOD OF). Episcopius retired to Antwerp and ultimately to France, where he lived partly at Paris, partly at Rouen. He devoted most of his time to writings in support of the Arminian cause; but the attempt of Luke Wadding (1588–1657) to win him over to the Romish faith involved him also in a controversy with that famous Jesuit. After the death (1625) of Maurice, prince of Orange, the violence of the Arminian controversy began to abate, and Episcopius was permitted in 1626 to return to his own country. He was appointed preacher at the Remonstrant church in Rotterdam and afterwards rector of the Remonstrant college in Amsterdam. Here he died in 1643. Episcopius may be regarded as in great part the theological founder of Arminianism, since he developed and systematized the principles tentatively enunciated by Arminius. Besides opposing at all points the peculiar doctrines of Calvinism, Episcopius protested against the tendency of Calvinists to lay so much stress on abstract dogma, and argued that Christianity was practical rather than theoretical—not so much a system of intellectual belief as a moral power—and that an orthodox faith did not necessarily imply the knowledge of and assent to a system of doctrine which included the whole range of Christian truth, but only the knowledge and acceptance of so much of Christianity as was necessary to effect a real change on the heart and life.

The principal works of Episcopius are his *Confessio s. declaratio sententiae pastorum qui in foederato Belgio Remonstrantes vocantur super praecipuis articulis religionis Christianae* (1621), his *Apologia pro confessione* (1629), his *Verus theologus remonstrans*, and his uncompleted work *Institutiones theologicae*. A life of Episcopius was written by Philip Limborch, and one was also prefixed by his successor, Étienne de Courcelles (Curcellaeus) (1586–1659), to an edition of his collected works published in 2 vols. (1650–1665). See also article in Herzog-Hauck, *Realencyklopädie*.

EPISODE, an incident occurring in the history of a nation, an institution or an individual, especially with the significance of being an interruption of an ordered course of events, an irrelevance. The word is derived from a word (ἐπείσοδος) with a technical meaning in the ancient Greek tragedy. It is defined by Aristotle (*Poetics*, 12) as *μέρος ὅλον τραγῳδίας τὸ μεταξὺ ὅλων χορικῶν μελῶν*, all the scenes, that is, which fall between the choric songs. *εἴσοδος*, or entrance, is generally applied to the entrance of the chorus, but the reference may be to that of the actors at the close of the choric songs. In the early Greek tragedy the parts which were spoken by the actors were considered of subsidiary importance to those sung by the chorus, and it is from this aspect that the meaning of the word, as something which breaks off the course of events, is derived (see A. E. Haigh, *The Tragic Drama of the Greeks*, 1896, at p. 353).

EPISTAXIS (Gr. ἐπί, upon, and στάζειν, to drop), the medical term for bleeding from the nose, whether resulting from local injury or some constitutional condition. In persistent cases of nose-bleeding, various measures are adopted, such as holding the arms over the head, the application of ice, or of such astringents as zinc or alum, or plugging the nostrils.

EPISTEMOLOGY (Gr. ἐπιστήμη, knowledge, and λόγος, theory, account; Germ. *Erkenntnistheorie*), in philosophy, a term applied, probably first by J. F. Ferrier, to that department of thought whose subject matter is the nature and origin of knowledge. It is thus contrasted with metaphysics, which considers the nature of reality, and with psychology, which deals with the objective part of cognition, and, as Prof. James Ward said, "is essentially genetic in its method" (*Mind*, April 1883, pp. 166-167). Epistemology is concerned rather with the possibility of knowledge in the abstract (*sub specie aeternitatis*, Ward, *ibid.*). In the evolution of thought epistemological inquiry succeeded the speculations of the early thinkers, who concerned themselves primarily with attempts to explain existence. The differences of opinion which arose on this problem naturally led to the inquiry as to whether any universally valid statement was possible. The Sophists and the Sceptics, Plato and Aristotle, the Stoics and the Epicureans took up the question, and from the time of Locke and Kant it has been prominent in modern philosophy. It is extremely difficult, if not impossible, to draw a hard and fast line between epistemology and other branches of philosophy. If, for example, philosophy is divided into the theory of knowing and the theory of being, it is impossible entirely to separate the latter (Ontology) from the analysis of knowledge (Epistemology), so close is the connexion between the two. Again, the relation between logic in its widest sense and the theory of knowledge is extremely close. Some thinkers have identified the two, while others regard Epistemology as a subdivision of logic; others demarcate their relative spheres by confining logic to the science of the laws of thought, *i.e.* to formal logic. An attempt has been made by some philosophers to substitute "Gnosiology" (Gr. γνῶσις) for "Epistemology" as a special term for that part of Epistemology which is confined to "systematic analysis of the conceptions employed by ordinary and scientific thought in interpreting the world, and including an investigation of the art of knowledge, or the nature of knowledge as such." "Epistemology" would thus be reserved for the broad questions of "the origin, nature and limits of knowledge" (Baldwin's *Dict. of Philos.* i. pp. 333 and 414). The term Gnosiology has not, however, come into general use. (See PHILOSOPHY.)

EPISTLE, in its primary sense any letter addressed to an absent person; from the Greek word ἐπιστολή, a thing sent on a particular occasion. Strictly speaking, any such communication is an epistle, but at the present day the term has become archaic, and is used only for letters of an ancient time, or for elaborate literary productions which take an epistolary form, that is to say, are, or affect to be, written to a person at a distance.

1. *Epistles and Letters.*—The student of literary history soon discovers that a broad distinction exists between the letter and the epistle. The letter is essentially a spontaneous, non-literary production, ephemeral, intimate, personal and private, a substitute for a spoken conversation. The epistle, on the other hand, rather takes the place of a public speech, it is written with an audience in view, it is a literary form, a distinctly artistic effort aiming at permanence; and it bears much the same relation to a letter as a Platonic dialogue does to a private talk between two friends. The posthumous value placed on a great man's letters would naturally lead to the production of epistles, which might be written to set forth the views of a person or a school, either genuinely or as forgeries under some eminent name. Pseudonymous epistles were especially numerous under the early Roman empire, and mainly attached themselves to the names of Plato, Demosthenes, Aristotle and Cicero.

Both letters and epistles have come down to us in considerable variety and extent from the ancient world. Babylonia and Assyria, Egypt, Greece and Rome alike contribute to our inheritance of letters. Those of Aristotle are of questionable genuineness, but we can rely, at any rate in part, on those of Isocrates and Epicurus. Some of the letters of Cicero are rather epistles, since they were meant ultimately for the general eye. The papyrus discoveries in Egypt have a peculiar interest, for they are mainly the letters of people unknown to fame, and having no thought of publicity. It is less to be wondered at that we have a large collection of ancient epistles, especially in the realm of magic and religion, for epistles were meant to live, were published in several copies, and were not a difficult form of literary effort. The Tell el-Amarna tablets found in Upper Egypt in 1887 are a series of despatches in cuneiform script from Babylonian kings and Phoenician and Palestinian governors to the Pharaohs (*c.* 1400 B.C.). The epistles of Dionysius of Halicarnassus, Plutarch, Seneca and the Younger Pliny claim mention at this point. In the later Roman period and into the middle ages, formal epistles were almost a distinct branch of literature. The ten books of Symmachus' *Epistolae*, so highly esteemed in the cultured circles of the 4th century, may be contrasted with the less elegant but more forceful epistles of Jerome.

The distinction between letters and epistles has particular interest for the student of early Christian literature. G. A. Deissmann (*Bible Studies*) assigns to the category of letters all the Pauline writings as well as 2 and 3 John. The books bearing the names of James, Peter and Jude, together with the Pastorals (though these may contain fragments of genuine Pauline letters) and the Apocalypse, he regards as epistles. The first epistle of John he calls less a letter or an epistle than a religious tract. It is doubtful, however, whether we can thus reduce all the letters of the New Testament to one or other of these categories; and W. M. Ramsay (Hastings' *Dict. Bib.* Extra vol. p. 401) has pointed out with some force that " in the new conditions a new category had been developed—the general letter addressed to a whole class of persons or to the entire Church of Christ." Such writings have affinities with both the letter and the epistle, and they may further be compared with the " edicts and rescripts by which Roman law grew, documents arising out of special circumstances but treating them on general principles." Most of the literature of the sub-apostolic age is epistolary, and we have a particularly interesting form of epistle in the communications between churches (as distinct from individuals) known as the *First Epistle of Clement* (Rome to Corinth), the *Martyrdom of Polycarp* (Smyrna to Philomelium), and the *Letters of the Churches of Vienne and Lyons* (to the congregations of Asia Minor and Phrygia) describing the Gallican martyrdoms of A.D. 177. In the following centuries we have the valuable epistles of Cyprian, of Gregory Nazianzen (to Cledonius on the Apollinarian controversy), of Basil (to be classed rather as letters), of Ambrose, Chrysostom, Augustine and Jerome. The encyclical letters of the Roman Catholic Church are epistles, even more so than bulls, which are usually more special in their destination. In the Renaissance one of the most common forms of literary production was that modelled upon Cicero's letters. From Petrarch to the *Epistolae obscurorum virorum* there is a whole epistolary literature. The *Epistolae obscurorum virorum* have to some extent a counterpart in the Epistles of Martin Marprelate. Later satires in an epistolary form are Pascal's *Provincial Letters*, Swift's *Drapier Letters*, and the *Letters of Junius*. The " open letter " of modern journalism is really an epistle. (A. J. G.)

2. *Epistles in Poetry.*—A branch of poetry bears the name of the Epistle, and is modelled on those pieces of Horace which are almost essays (*sermones*) on moral or philosophical subjects, and are chiefly distinguished from other poems by being addressed to particular patrons or friends. The epistle of Horace to his agent (or *villicus*) is of a more familiar order, and is at once a masterpiece and a model of what an epistle should be. Examples of the work in this direction of Ovid, Claudian, Ausonius and other late Latin poets have been preserved, but it is particularly those of Horace which have given this character to the epistles in verse which form so very characteristic a section of French poetry. The graceful precision and dignified familiarity of the epistle are particularly attractive to the temperament of France. Clement Marot, in the 16th century, first made the epistle popular in France, with his brief and spirited specimens. We pass the witty epistles of Scarron and Voiture, to reach those of Boileau, whose epistles, twelve in number, are the classic examples of this form of verse in French literature; they were composed at different dates between 1668 and 1695. In the 18th century Voltaire enjoyed a supremacy in this graceful and sparkling species of writing; the *Épître à Uranie* is perhaps the most famous of his verse-letters. Gresset, Bernis, Sedaine, Dorat, Gentil-Bernard, all excelled in the epistle. The curious " Épîtres " of J. P. G. Viennet (1777–1868) were not easy and mundane like their predecessors, but violently polemical. Viennet, a hot defender of lost causes, may be considered the latest of the epistolary poets of France.

In England the verse-epistle was first prominently employed by Samuel Daniel in his " Letter from Octavia to Marcus Antonius " (1599), and later on, more legitimately, in his " Certain Epistles " (1601–1603). His letter, in *terza rima*, to Lucy, Countess of Bristol, is one of the finest examples of this form in English literature. It was Daniel's deliberate intention to introduce the Epistle into English poetry, " after the manner of Horace." He was supported by Ben Jonson, who has some fine Horatian epistles in his *Forests* (1616) and his *Underwoods*. *Letters to Several Persons of Honour* form an important section in the poetry of John Donne. Habington's *Epistle to a Friend* is one of his most finished pieces. Henry Vaughan (1622–1695) addressed a fine epistle in verse to the French romance-writer Gombauld (1570–1666). Such " letters " were not unfrequent down to the Restoration, but they did not create a department of literature such as Daniel had proposed. At the close of the 17th century Dryden greatly excelled in this class of poetry, and his epistles to Congreve (1694) and to the duchess of Ormond (1700) are among the most graceful and eloquent that we possess. During the age of Anne various Augustan poets in whom the lyrical faculty was slight, from Congreve and Richard Duke down to Ambrose Philips and William Somerville, essayed the epistle with more or less success, and it was employed by Gay for several exercises in his elegant persiflage. Among the epistles of Gay, one rises to an eminence of merit, that called " Mr Pope's welcome from Greece," written in 1720. But the great writer of epistles in English is Pope himself, to whom the glory of this kind of verse belongs. His " Eloisa to Abelard " (1717) is carefully modelled on the form of Ovid's " Heroides," while in his *Moral Essays* he adopts the Horatian formula for the epistle. In either case his success was brilliant and complete. The " Epistle to Dr Arbuthnot " has not been surpassed, if it has been equalled, in Latin or French poetry of the same class. But Pope excelled, not only in the voluptuous and in the didactic epistle, but in that of compliment as well, and there is no more graceful example of this in literature than is afforded by the letter about the poems of Parnell addressed, in 1721, to Robert, earl of Oxford. After the day of Pope the epistle again fell into desuetude, or occasional use, in England. It revived in the charming naïveté of Cowper's lyrical letters in octosyllabics to his friends, such as William Bull and Lady Austin (1782). At the close of the century Samuel Rogers endeavoured to resuscitate the neglected form in his "Epistle to a Friend" (1798). The formality and conventional grace of the epistle were elements with which the leaders of romantic revival were out of sympathy, and it was not cultivated to any important degree in the 19th century. It is, however, to be noted that Shelley's "Letter to Maria Gisborne" (1820), Keats's "Epistle to Charles Clarke" (1816), and Landor's "To Julius Hare" (1836), in spite of their romantic colouring, are genuine Horatian epistles and of the pure Augustan type. This type, in English literature, is commonly, though not at all universally, cast in heroic verse. But Daniel employs *rime royal* and *terza rima*, while some modern epistles have been cast in short iambic rhymed measures or in blank verse. It is sometimes not easy to distinguish the epistle from the elegy and from the dedication. (E. G.)

For St Paul's Epistles see PAUL, for St Peter's see PETER, for Apocryphal Epistles see APOCRYPHAL LITERATURE, for Plato's see PLATO, &c.

EPISTYLE (Gr. ἐπί, upon, and στῦλος, column), the Greek architectural term for architrave, the lower member of the entablature of the classic orders (*q.v.*).

EPISTYLIS (C. G. Ehrenberg), in zoology, a genus of peritrichous Infusoria with a short oral disc and collar, and a rigid stalk, often branching to form a colony.

EPITAPH (Gr. ἐπιτάφιος, sc. λόγος, from ἐπί, upon, and τάφος, a tomb), strictly, an inscription upon a tomb, though by a natural extension of usage the name is applied to anything written ostensibly for that purpose whether actually inscribed upon a tomb or not. When the word was introduced into English in the 14th century it took the form *epitaphy*, as well as *epitaphe*, which latter word is used both by Gower and Lydgate. Many of the best-known epitaphs, both ancient and modern, are merely literary memorials, and find no place on sepulchral monuments. Sometimes the intention of the writer to have his production placed upon the grave of the person he has commemorated may have been frustrated, sometimes it may never have existed; what he has written is still entitled to be called an epitaph if it be suitable for the purpose, whether the purpose has been carried out or not. The most obvious external condition that suitability for mural inscription imposes is one of rigid limitation as to length. An epitaph cannot in the nature of things extend to the proportions that may be required in an elegy.

The desire to perpetuate the memory of the dead being natural to man, the practice of placing epitaphs upon their graves has been common among all nations and in all ages. And the similarity, amounting sometimes almost to identity, of thought and expression that often exists between epitaphs written more than two thousand years ago and epitaphs written only yesterday is as striking an evidence as literature affords of the close kinship of human nature under the most varying conditions where the same primary elemental feelings are stirred. The grief and hope of the Roman mother as expressed in the touching lines—

> "Lagge fili bene quiescas;
> Mater tua rogat te,
> Ut me ad te recipias:
> Vale!"

find their echo in similar inscriptions in many a modern cemetery.

Probably the earliest epitaphial inscriptions that have come down to us are those of the ancient Egyptians, written, as their mode of sepulture necessitated, upon the sarcophagi and coffins. Those that have been deciphered are all very much in the same form, commencing with a prayer to a deity, generally Osiris or Anubis, on behalf of the deceased, whose name, descent and office are usually specified. There is, however, no attempt to delineate individual character, and the feelings of the survivors are not expressed otherwise than in the fact of a prayer being offered. Ancient Greek epitaphs, unlike the Egyptian, are of great literary interest, deep and often tender in feeling, rich and varied in expression, and generally epigrammatic in form. They are written usually in elegiac verse, though many of the later epitaphs are in prose. Among the gems of the Greek anthology familiar to English readers through translations are the epitaphs upon those who had fallen in battle. There are several ascribed to Simonides on the heroes of Thermopylae, of which the most celebrated is the epigram—

> "Go tell the Spartans, thou that passest by,
> That here, obedient to their laws, we lie."

A hymn of Simonides on the same subject contains some lines of great beauty in praise of those who were buried at Thermopylae, and these may be regarded as forming a literary epitaph. In Sparta epitaphs were inscribed only upon the graves of those who had been especially distinguished in war; in Athens they were applied more indiscriminately. They generally contained the name, the descent, the demise, and some account of the life of the person commemorated. It must be remembered, however, that many of the so-called Greek epitaphs are merely literary memorials not intended for monumental inscription, and that in these freer scope is naturally given to general reflections, while less attention is paid to biographical details. Many of them, even some of the monumental, do not contain any personal name, as in the one ascribed to Plato—

> "I am a shipwrecked sailor's tomb; a peasant's there doth stand:
> Thus the same world of Hades lies beneath both sea and land."

Others again are so entirely of the nature of general reflections upon death that they contain no indication of the particular case that called them forth. It may be questioned, indeed, whether several of this character quoted in ordinary collections are epitaphs at all, in the sense of being intended for a particular occasion.

Roman epitaphs, in contrast to those of the Greeks, contained, as a rule, nothing beyond a record of facts. The inscriptions on the urns, of which numerous specimens are to be found in the British Museum, present but little variation. The letters D.M. or D.M.S. (*Diis Manibus* or *Diis Manibus Sacrum*) are followed by the name of the person whose ashes are enclosed, his age at death, and sometimes one or two other particulars. The inscription closes with the name of the person who caused the urn to be made, and his relationship to the deceased. It is a curious illustration of the survival of traces of an old faith after it has been formally discarded to find that the letters D.M. are not uncommon on the Christian inscriptions in the catacombs. It has been suggested that in this case they mean *Deo Maximo* and not *Diis Manibus*, but the explanation would be quite untenable, even if there were not many other undeniable instances of the survival of pagan superstitions in the thought and life of the early Christians. In these very catacomb inscriptions there are many illustrations to be found, apart from the use of the letters D.M., of the union of heathen with Christian sentiment, (see Maitland's *Church in the Catacombs*). The private burial-places for the ashes of the dead were usually by the side of the various roads leading into Rome, the Via Appia, the Via Flaminia, &c. The traveller to or from the city thus passed for miles an almost uninterrupted succession of tombstones, whose inscriptions usually began with the appropriate words *Siste Viator* or *Aspice Viator*, the origin doubtless of the "Stop Passenger," which still meets the eye in many parish churchyards of Britain. Another phrase of very common occurrence on ancient Roman tombstones, *Sit tibi terra levis* ("Light lie the earth upon thee"), has continued in frequent use, as conveying an appropriate sentiment, down to modern times. A remarkable feature of many of the Roman epitaphs was the terrible denunciation they often pronounced upon those who violated the sepulchre. Such denunciations were not uncommon in later times. A well-known instance is furnished in the lines on Shakespeare's tomb at Stratford-on-Avon, said to have been written by the poet himself—

> "Good frend, for Jesus' sake forbeare
> To digg the dust enclosed heare;
> Bleste be y^e man y^t spares thes stones,
> And curst be he y^t moves my bones."

The earliest existing British epitaphs belonged to the Roman period, and are written in Latin after the Roman form. Specimens are to be seen in various antiquarian museums throughout the country; some of the inscriptions are given in Bruce's *Roman Wall*, and the seventh volume of the *Corpus Inscriptionum Latinarum* edited by Hübner, containing the British inscriptions, is a valuable repertory for the earlier Roman epitaphs in Britain. The earliest, of course, are commemorative of soldiers, belonging to the legions of occupation, but the Roman form was afterwards adopted for native Britons. Long after the Roman form was discarded, the Latin language continued to be used, especially for inscriptions of a more public character, as being from its supposed permanence the most suitable medium of communication to distant ages. It is only, in fact, within recent years that Latin has become unusual, and the more natural practice has been adopted of writing the epitaphs of distinguished men in the language of the country in which they lived. While Latin was the chief if not the sole literary language, it was, as a matter of course, almost exclusively used for epitaphial inscriptions. The comparatively few English epitaphs that remain of the 11th and 12th centuries are all in Latin. They are generally confined to a mere statement of the name and rank of the deceased following the words "Hic jacet." Two noteworthy exceptions to this general brevity are, however, to be found in most of the collections. One is the epitaph to Gundrada, daughter of the Conqueror (d. 1085), which still exists at Lewes, though in an imperfect state, two of the lines having been lost; another is that to William de Warren, earl of Surrey (d. 1089), believed to have been inscribed in the abbey of St Pancras, near Lewes, founded by him. Both are encomiastic, and describe the character and work of the deceased with considerable fulness and beauty of expression. They are written in leonine verse. In the 13th century French began to be used in writing epitaphs, and most of the inscriptions to celebrated historical personages between 1200 and 1400 are in that language. Mention may be made of those to Robert, the 3rd earl of Oxford (d. 1221), as given in Weever, to Henry III. (d. 1272) at Westminster Abbey, and to Edward the Black Prince (d. 1376) at Canterbury. In most of the inscriptions of this period the deceased addresses the reader in the first person, describes his rank and position while alive, and, as in the case of the Black Prince, contrasts it with his wasted and loathsome state in the grave, and warns the reader to prepare for the same inevitable change. The epitaph almost invariably closes with a request, sometimes very urgently worded, for the prayers of the reader that the soul of the deceased may pass to glory, and an invocation of blessing, general or specific, upon all who comply. Epitaphs preserved much of the same character after English began to be used towards the close of the 14th century. The following, to a member of the Savile family at Thornhill, is probably even earlier, though its precise date cannot be fixed:—

"Bonys emongg stonys lys ful
steyl gwylste the sawle wan-
deris were that God wylethe"—

that is, Bones among stones lie full still, whilst the soul wanders whither God willeth. It may be noted here that the majority of the inscriptions, Latin and English, from 1300 to the period of the Reformation, that have been preserved, are upon brasses (see BRASSES, MONUMENTAL). The very curious epitaph on St Bernard, probably written by a monk of Clairvaux, has the peculiarity of being a dialogue in Latin verse.

It was in the reign of Elizabeth that epitaphs in English began to assume a distinct literary character and value, entitling them to rank with those that had hitherto been composed in Latin. We learn from Nash that at the close of the 16th century it had become a trade to supply epitaphs in English verse. There is one on the dowager countess of Pembroke (d. 1621), remarkable for its successful use of a somewhat daring hyperbole. It was written by William Browne, author of *Britannia's Pastorals*:—

"Underneath this sable hearse
Lies the subject of all verse;
Sydney's sister, Pembroke's mother;
Death, ere thou hast slain another
Fair and learn'd and good as she,
Time will throw his dart at thee.
Marble piles let no man raise
To her name for after days;
Some kind woman, born as she,
Reading this, like Niobe,
Shall turn marble, and become
Both her mourner and her tomb."

If there be something of the exaggeration of a conceit in the second stanza, it needs scarcely to be pointed out that epitaphs, like every other form of composition, necessarily reflect the literary characteristics of the age in which they were written. The deprecation of marble as unnecessary suggests one of the finest literary epitaphs in the English language, that by Milton upon Shakespeare.

The epitaphs of Pope are still considered to possess very great literary merit, though they were rated higher by Johnson and critics of his period than they are now.

Dr Johnson, who thought so highly of Pope's epitaphs, was himself a great authority on both the theory and practice of this species of composition. His essay on epitaphs is one of the few existing monographs on the subject, and his opinion as to the use of Latin had great influence. The manner in which he met the delicately insinuated request of a number of eminent men that English should be employed in the case of Oliver Goldsmith was characteristic, and showed the strength of his conviction on the subject. His arguments in favour of Latin were chiefly drawn from its inherent fitness for epitaphial inscriptions and its classical stability. The first of these has a very considerable force, it being admitted on all hands that few languages are in themselves so suitable for the purpose; the second is outweighed by considerations that had considerable force in Dr Johnson's time, and have acquired more since. Even to the learned Latin is no longer the language of daily thought and life as it was at the period of the Reformation, and the great body of those who may fairly claim to be called the well-educated classes can only read it with difficulty, if at all. It seems, therefore, little less than absurd, for the sake of a stability which is itself in great part delusive, to write epitaphs in a language unintelligible to the vast majority of those for whose information presumably they are intended. Though a stickler for Latin, Dr Johnson wrote some very beautiful English epitaphs, as, for example, the following on Philips, a musician:—

"Philips, whose touch harmonious could remove
The pangs of guilty power or hapless love;
Rest here, distressed by poverty no more,
Here find that calm thou gav'st so oft before;
Sleep undisturbed within this peaceful shrine
Till angels wake thee with a note like thine!"

In classifying epitaphs various principles of division may be adopted. Arranged according to nationality they indicate distinctions of race less clearly perhaps than any other form of literature does,—and this obviously because when under the influence of the deepest feeling men think and speak very much in the same way whatever be their country. At the same time the influence of nationality may to some extent be traced in epitaphs. The characteristics of the French style, its grace, clearness, wit and epigrammatic point, are all recognizable in French epitaphs. In the 16th century those of Étienne Pasquier were universally admired. Instances such as "La première au rendez-vous," inscribed on the grave of a mother, Piron's epitaph, written for himself after his rejection by the French Academy—

"Ci-gît Piron, qui ne fut rien,
Pas même académicien"—

and one by a relieved husband, to be seen at Père la Chaise—

"Ci-gît ma femme. Ah! qu'elle est bien
Pour son repos et pour le mien"—

might be multiplied indefinitely. One can hardly look through a collection of English epitaphs without being struck with the fact that these represent a greater variety of intellectual and emotional states than those of any other nation, ranging through every style of thought from the sublime to the commonplace, every mood of feeling from the most delicate and touching to the coarse and even brutal. Few subordinate illustrations of the complex nature of the English nationality are more striking.

Epitaphs are sometimes classified according to their authorship and sometimes according to their subject, but neither division is so interesting as that which arranges them according to their characteristic features. What has just been said of English epitaphs is, of course, more true of epitaphs generally. They exemplify every variety of sentiment and taste, from lofty pathos and dignified eulogy to coarse buffoonery and the vilest scurrility. The extent to which the humorous and even the low comic element prevails among them is a noteworthy circumstance. It is curious that the most solemn of all subjects should have been frequently treated, intentionally or unintentionally, in a style so ludicrous that a collection of epitaphs is generally one of the most amusing books that can be picked up. In this as in other cases, too, it is to be observed that the unintended humour is generally of a much more entertaining kind than that which has been deliberately perpetrated.

See Weever, *Ancient Funerall Monuments* (1631, 1661, Tooke's edit., 1767); Philippe Labbe, *Thesaurus epitaphiorum* (Paris, 1666); *Theatrum funebre extructum a Dodone Richea seu Ottone Aicher* (1675); Hackett, *Select and Remarkable Epitaphs* (1757); de Laplace, *Épitaphes sérieuses, badines, satiriques et burlesques* (3 vols., Paris, 1782); Pulleyn, *Churchyard Gleanings* (c. 1830); L. Lewysohn, *Sechzig Epitaphien von Grabsteinen d. israelit. Friedhofes zu Worms* (1855); Pettigrew, *Chronicles of the Tombs* (1857); S. Tissington, *Epitaphs* (1857); Robinson, *Epitaphs from Cemeteries in London, Edinburgh, &c.* (1859); le Blant, *Inscriptions chrétiennes de la Gaule antérieures au VIII^e siècle* (1856, 1865); Blommaert, Galliard, &c., *Inscriptions funéraires et monumentales de la prov. de Flandre Orient* (Ghent, 1857, 1860); *Inscriptions fun. et mon. de la prov. d'Anvers* (Antwerp, 1857–1860); Chwolson, *Achtzehn hebräische Grabschriften aus der Krim* (1859); J. Brown, *Epitaphs, &c., in Greyfriars Churchyard, Edinburgh* (1867); H. J. Loaring, *Quaint, Curious, and Elegant Epitaphs* (1872); J. R. Kippax, *Churchyard Literature, a Choice Collection of American Epitaphs* (Chicago, 1876); also the poet William Wordsworth's *Essay on Epitaphs*.

EPITHALAMIUM (Gr. ἐπί, at or upon, and θάλαμος, a nuptial chamber), originally among the Greeks a song in praise of bride and bridegroom, which was sung by a number of boys and girls at the door of the nuptial chamber. According to the scholiast on Theocritus, one form, the κατακοιμητικόν, was employed at night, and another, the διεγερτικόν, to arouse the bride and bridegroom on the following morning. In either case, as was natural, the main burden of the song consisted of invocations of blessing and predictions of happiness, interrupted from time to time by the ancient chorus of *Hymen hymenaee*. Among the Romans a similar custom was in vogue, but the song was sung by girls only, after the marriage guests had gone, and it contained much more of what modern morality would condemn as obscene. In the hands of the poets the epithalamium was developed into a special literary form, and received considerable cultivation. Sappho, Anacreon, Stesichorus and Pindar are all regarded as masters of the species, but the finest example preserved in Greek literature is the 18th Idyll of Theocritus, which celebrates the marriage of Menelaus and Helen. In Latin, the epithalamium, imitated from Fescennine Greek models, was a base form of literature, when Catullus redeemed it and gave it dignity by modelling his *Marriage of Thetis and Peleus* on a lost ode of Sappho. In later times Statius, Ausonius, Sidonius Apollinaris and Claudian are the authors of the best-known epithalamia in classical Latin; and they have been imitated by Buchanan, Scaliger, Sannazaro, and a whole host of modern Latin poets, with whom, indeed, the form was at one time in great favour. The names of Ronsard, Malherbe and Scarron are especially associated with the species in French literature, and Marini and Metastasio in Italian. Perhaps no poem of this class has been more universally admired than the *Epithalamium* of Spenser (1595), though he has found no unworthy rivals in Ben Jonson, Donne and Quarles. At the close of *In Memoriam* Tennyson has appended a poem, on the nuptials of his sister, which is strictly an epithalamium.

Epithelium.

EPITHELIAL, ENDOTHELIAL and **GLANDULAR TISSUES,** in anatomy. Every surface of the body which may come into contact with foreign substances is covered with a protecting layer of cells closely bound to one another to form continuous sheets. These are epithelial cells (from θηλή, a nipple). By the formation of outgrowths or ingrowths from these surfaces further structures, consisting largely or entirely of cells directly derived from the surface epithelium, may be formed. In this way originate the central nervous system, the sensitive surfaces of the special sense organs, the glands, and the hairs, nails, &c. The epithelial cells possess typical microscopical characters which enable them to be readily distinguished from all others. Thus the cell outline is clearly marked, the nucleus large and spherical or ellipsoidal. The protoplasm of the cell is usually large in amount and often contains large numbers of granules.

Varieties.

The individual cells forming an epithelial membrane are classified according to their shape. Thus we find *flattened*, or *squamous*, *cubical*, *columnar*, *irregular*, *ciliated* or *flagellated* cells. Many of the membranes formed by these cells are only one cell thick, as for instance is the case for the major part of the alimentary canal. In other instances the epithelial membrane may consist of a number of layers of cells, as in the case of the epidermis of the skin. Considering in the first place those membranes of which the cells are in a single layer we may distinguish the following:—

1. *Columnar Epithelium* (figs. 1 and 2).—This variety covers the main part of the intestinal tract, *i.e.* from the end of the oesophagus to the commencement of the rectum. It is also found lining the ducts of many glands. In a highly typical form it is found covering the villi of the small intestine (fig. 1). The external layer of the cell is commonly modified to form a thin membrane showing a number of very fine radially arranged lines, which are probably the expression of very minute tubular perforations through the membrane.

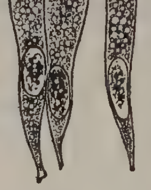

FIG. 1.—Isolated Epithelial Cells from the Small Intestine of the Frog.

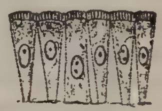

FIG. 2.—Columnar Epithelial Cells resting upon a Basement Membrane.

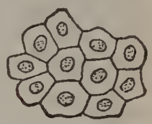

FIG. 3.—Mosaic appearance of a Columnar Epithelial Surface as seen from above.

The close apposition of these cells to form a closed membrane is well seen when a surface covered by them is examined from above (fig. 3). The surfaces of the cells are then seen to form a mosaic, each cell area having a polyhedral shape.

2. *Cubical Epithelium.*—This differs from the former in that the cells are less in height. It is found in many glands and ducts (*e.g.* the kidney), in the middle ear, choroid plexuses of the brain, &c.

3. *Squamous or Flattened Epithelium* (fig. 4).—In this variety the cell is flattened, very thin and irregular in outline. It occurs as the covering epithelium of the alveoli of the lung, of the kidney glomerules and capsule, &c. The surface epithelial cells of a stratified epithelium are also of this type (fig. 4). Closely resembling these cells are those known as endothelial (see later).

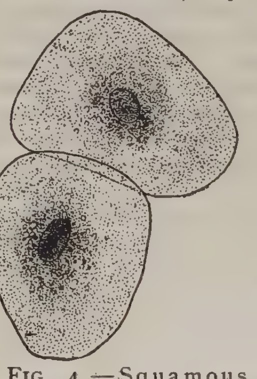

FIG. 4.—Squamous Epithelial Cells from the Mucous Membrane of the Mouth.

4. *Ciliated Epithelium* (fig. 5).—The surface cells of many epithelial membranes are often provided with a number of very fine protoplasmic processes or *cilia*. Most commonly the cells are columnar, but other shapes are also found. During life the cilia are always in movement, and set up a current tending to drive fluid or other material on the surface in one direction along the membrane or tube lined by such epithelium. It is found lining the trachea, bronchi, parts of the nasal cavities and the

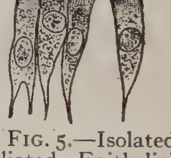

FIG. 5.—Isolated ciliated Epithelial Cells from the Trachea.

uterus, oviduct, vas deferens, epididymis, a portion of the renal tubule, &c.

In the instance of some cells there may be but a single process from the exposed surface of the cell, and then the process is usually of large size and length. It is then known as a *flagellum.* Such cells are common among the surface cells of many of the simple animal organisms.

When the cells of an epithelial surface are arranged several layers deep, we can again distinguish various types:—

1. *Stratified Epithelium* (figs. 6 and 7).—This is found in the epithelium of the skin and of many mucous membranes (mouth, oesophagus, rectum, conjunctiva, vagina, &c.). Here the surface cells are very much flattened (squamous epithelium), those of the middle layer are polyhedral and those of the lowest layer are cubical or columnar. This type of epithelium is found covering surfaces commonly exposed to friction. The surface may be dry as in the skin, or moist, *e.g.* the mouth. The surface cells are constantly being rubbed off, and are then replaced by new cells growing up from below. Hence the deepest layer, that nearest the blood supply, is a formative layer, and in successive stages from this we can trace the gradual transformation of these protoplasmic cells into scaly cells, which no longer show any sign of being alive. In the moist mucous surfaces the number of cells forming the epithelial layer is usually much smaller than in a dry stratified epithelium.

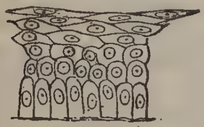

FIG. 6.—A Stratified Epithelium from a Mucous Membrane.

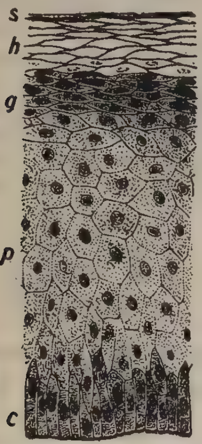

FIG. 7.—Stratified Epithelium from the Skin.
c, Columnar cells resting on the fibrous true skin.
p, The so-called prickle cells.
g, Stratum granulosum.
h, Horny cells.
s, Squamous horny cells.

2. *Stratified Ciliated Epithelium.*—In this variety the superficial cells are ciliated and columnar, between the bases of these are found fusiform cells and the lowest cells are cubical or pyramidal. This epithelium is found lining parts of the respiratory passages, the vas deferens and the epididymis.

3. *Transitional Epithelium* (fig. 8).—This variety of epithelium is found lining the bladder, and the appearance observed depends upon the contracted or distended state of the bladder from which the preparation was made. If the bladder was contracted the form seen in fig. 8 is obtained. The epithelium is in three or more layers, the superficial one being very characteristic. The cells are cubical and fit over the rounded ends of the cells of the next layer. These are pear-shaped, the points of the pear resting on the basement membrane. Between the bases of these cells lie those of the lowermost layer. These are irregularly columnar. If the bladder is distended before the preparation is made, the cells are then found stretched out transversely. This is especially the case with the surface cells, which may then become very flattened.

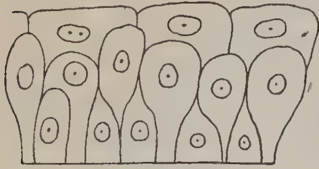

FIG. 8.—Transitional Epithelium from the Urinary Bladder, showing the outlines of the cells only.

Considering epithelium from the point of view of function, it may be classified as protective, absorptive or secretory. It may produce special outgrowths for protective or ornamental purposes, such are hairs, nails, horns, &c., and for such purposes it may manufacture within itself chemical material best suited for that purpose, *e.g.* keratin; here the whole cell becomes modified. In other instances may be seen in the interior of the cells many chemical substances which indicate the nature of their work, *e.g.* fat droplets, granules of various kinds, protein, mucin, watery granules, glycogen, &c. In a typical absorbing cell granules of material being absorbed may be seen. A secreting cell of normal type forming specific substances stores these in its interior until wanted, *e.g.* fat as in sebaceous and mammary glands, ferment precursors (salivary, gastric glands, &c.), and various excretory substances, as in the renal epithelium.

Initially the epithelium cell might have all these functions, but later came specialization and therefore to most cells a specific work. Some of that work does not require the cell to be at the surface, while for other work this is indispensable, and hence when the surface becomes limited those of the former category are removed from the surface to the deeper parts. This is seen typically in secretory and excretory cells, which usually lie below the surface on to which they pour their secretions. If the secretion required at any one point is considerable, then the secreting cells are numerous in proportion and a typical gland is formed. The secretion is then conducted to the surface by a duct, and this duct is also lined with epithelium.

Glands.

Glandular Tissues.—Every gland is formed by an ingrowth from an epithelial surface. This ingrowth may from the beginning possess a tubular structure, but in other instances may start as a solid column of cells which subsequently becomes tubulated. As growth proceeds, the column of cells may divide or give off offshoots, in which case a compound gland is formed. In many glands the number of branches is limited, in others (salivary, pancreas) a very large structure is finally formed by repeated growth and subdivision. As a rule the branches do not unite with one another, but in one instance, the liver, this does occur when a reticulated compound gland is produced. In compound glands the more typical or secretory epithelium is found forming the terminal portion of each branch, and the uniting portions form ducts and are lined with a less modified type of epithelial cell.

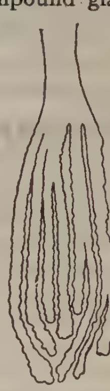

FIG. 9.—A Compound Tubular Gland. One of the pyloric glands of the stomach of the dog.

Glands are classified according to their shape. If the gland retains its shape as a tube throughout it is termed a *tubular* gland, simple tubular if there is no division (large intestine), *compound* tubular (fig. 9) if branching occurs (pyloric glands of stomach). In the simple tubular glands the gland may be coiled without losing its tubular form, *e.g.* in sweat glands. In the second main variety of gland the secretory portion is enlarged and the lumen variously increased in size. These are termed *alveolar* or *saccular* glands. They are again subdivided into simple or compound alveolar glands, as in the case of the tubular glands (fig. 10). A further complication in the case of the alveolar glands may occur in the form of still smaller saccular diverticuli growing out from the main sacculi (fig. 11). These are termed *alveoli.*

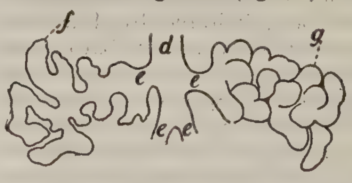

FIG. 10.—A Tubulo-alveolar Gland. One of the mucous salivary glands of the dog. On the left the alveoli are unfolded to show their general arrangement. *d*, Small duct of gland subdividing into branches; *e*, *f* and *g*, terminal tubular alveoli of gland.

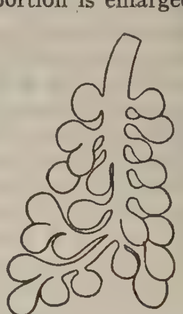

FIG. 11.—A Compound Alveolar Gland. One of the terminal lobules of the pancreas, showing the spherical form of the alveoli.

The typical secretory cells of the glands are found lining the terminal portions of the ramifications and extend upwards to varying degrees. Thus in a typical acinous gland the cells are restricted to the final alveoli. The remaining tubes are to be considered mainly as ducts. In tubulo-alveolar glands the secreting epithelium lines the alveus as well as the terminal tubule.

The gland cells are all placed upon a basement membrane. In many instances this membrane is formed of very thin flattened cells, in other instances it is apparently a homogeneous membrane, and according to some observers is simply a modified part of the basal surface of the cell, while according to others it is a definite structure distinct from the epithelium.

In the secretory portion of the gland and in the smaller ducts the epithelial layer is one cell thick only. In the larger ducts there are two layers of cells, but even here the surface cell usually extends by a thinned-out stalk down to the basement membrane.

The detailed characters of the epithelium of the different glands of the body are given in separate articles (see ALIMENTARY (CANAL, &c.). It will be sufficent here to give the more general characters possessed by these cells. They are cubical or conical cells with distinct oval nuclei and granular protoplasm. Within the protoplasm is accumulated a large number of spherical granules arranged in diverse manners in different cells. The granules vary much in size in different glands, and in chemical composition, but in all cases represent a store of material ready to be discharged from the cell as its secretion. Hence the general appearance of the cell is found to vary according to the previous degree of activity of the cell. If it has been at rest for some time the cell contains very many granules which swell it out and increase its size. The nucleus is then largely hidden by the granules. In the opposite condition, *i.e.* when the cell has been actively secreting, the protoplasm is much clearer, the nucleus obvious and the cell shrunken in size, all these changes being due to the extrusion of the granules.

Endothelium and Mesothelium.—Lining the blood vessels, lymph vessels and lymph spaces are found flattened cells apposed to one another by their edges to form an extremely thin membrane. These cells are developed from the middle embryonic layer and are termed endothelium. A very similar type of cells is also found, formed into a very thin continuous sheet, lining the body-cavity, *i.e.* pleural pericardial and peritoneal cavities. These cells develop from that portion of the mesoderm known as the mesothelium, and are therefore frequently termed mesothelial, though by many they are also included as endothelial cells.

Endothelium and mesothelium.

A mesothelial cell is very flattened, thus resembling a squamous epithelial cell. It possesses a protoplasm with faint granules and an oval or round nucleus (fig. 12). The outline of the cell is irregularly polyhedral, and the borders may be finely serrated. The cells are united to one another by an intercellular cement substance which, however, is very scanty in amount, but can be made apparent by staining with silver nitrate when the appearance reproduced in the figure is seen. By being thus united together, the cells form a continuous layer. This layer is pierced by a number of small openings, known as stomata, which bring the cavity into direct communication with lymph spaces or vessels lying beneath the membrane. The stomata are surrounded by a special layer of cubical and granular cells. Through these stomata fluids and other materials present in the body-cavity can be removed into the lymph spaces.

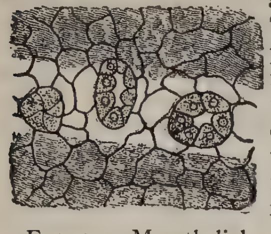

FIG. 12.—Mesothelial Cells forming the Peritoneal Serous Membrane. Three stomata are seen surrounded by cubical cells. One of these is closed. The light band marks the position of a lymphatic. (After Klein.)

Endothelial membranes (fig. 13) are quite similar in structure to mesothelial. They are usually elongated cells of irregular outline and serrated borders.

By means of endothelial or mesothelial membranes the surfaces of the parts covered by them are rendered very smooth, so that movement over the surface is greatly facilitated. Thus the abdominal organs can glide easily over one another within the peritoneal cavity; the blood or lymph experiences the least amount of friction; or again the friction is reduced to a minimum between a tendon and its sheath or in the joint cavities. The cells forming these membranes also possess further physiological properties. Thus it is most probable that they play an active part in the blood capillaries in transmitting substances from the blood into the tissue spaces, or conversely in preventing the passage of materials from blood to tissue space or from tissue space to blood. Hence the fluid of the blood and that of the tissue space need not be of the same chemical composition. (T. G. Br.)

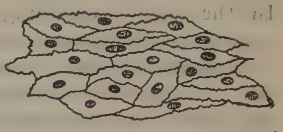

FIG. 13.—Endothelial Cells from the Interior of an Artery.

EPITOME (Gr. ἐπιτομή, from ἐπιτέμνειν, to cut short), an abridgment, abstract or summary giving the salient points of a book, law case, &c., a short and concise account of any particular subject or event. By transference *epitome* is also used to express the representation of a larger thing, concrete or abstract, reproduced in miniature. Thus St Mark's was called by Ruskin the "epitome of Venice," as it embraces examples of all the periods of architecture from the 10th to the 19th centuries.

EPOCH (Gr. ἐποχή, holding in suspense, a pause, from ἐπέχειν, to hold up, to stop), a term for a stated period of time, and so used of a date accepted as the starting-point of an era or of a new period in chronology, such as the birth of Christ. It is hence transferred to a period which marks a great change, whether in the history of a country or a science, such as a great discovery or invention. Thus an event may be spoken of as "epoch-making." The word is also used, synonymously with "period," for any space of time marked by a distinctive condition or by a particular series of events.

In astronomy the word is used for a moment from which time is measured, or at which a definite position of a body or a definite relation of two bodies occurs. For example, the position of a body moving in an orbit cannot be determined unless its position at some given time is known. The given time is then the epoch; but the term is often applied to the mean longitude of the body at the given time.

EPODE, in verse, the third part in an ode, which followed the strophe and the antistrophe, and completed the movement; it was called ἐπῳδὸς περίοδος by the Greeks. At a certain moment the choirs, which had chanted to right of the altar or stage and then to left of it, combined and sang in unison, or permitted the coryphaeus to sing for them all, standing in the centre. When, with the appearance of Stesichorus and the evolution of choral lyric, a learned and artificial kind of poetry began to be cultivated in Greece, a new form, the εἶδος ἐπῳδικόν, or epode-song, came into existence. It consisted of a verse of trimeter iambic, followed by a dimeter iambic, and it is reported that, although the epode was carried to its highest perfection by Stesichorus, an earlier poet, Archilochus, was really the inventor of this form. The epode soon took a firm place in choral poetry, which it lost when that branch of literature declined. But it extended beyond the ode, and in the early dramatists we find numerous examples of monologues and dialogues framed on the epodical system. In Latin poetry the epode was cultivated, in conscious archaism, both as a part of the ode and as an independent branch of poetry. Of the former class, the epithalamia of Catullus, founded on an imitation of Pindar, present us with examples of strophe, antistrophe and epode; and it has been observed that the celebrated ode of Horace, beginning *Quem virum aut heroa lyra vel acri*, possesses this triple character. But the word is now mainly familiar from an experiment of Horace in the second class, for he entitled his fifth book of odes *Epodon liber* or the Book of Epodes. He says in the course of these poems, that in composing them he was introducing a new form, at least in Latin literature, and that he was imitating the effect of the iambic distichs invented by Archilochus. Accordingly we find the first ten of these epodes composed in alternate verses of iambic trimeter and iambic dimeter, thus:—

> "At o Deorum quicquid in coelo regit
> Terras et humanum genus."

In the seven remaining epodes Horace has diversified the measures, while retaining the general character of the distich. This group of poems belongs in the main to the early youth of the poet, and displays a truculence and a controversial heat which are absent from his more mature writings. As he was imitating Archilochus in form, he believed himself justified, no doubt, in repeating the sarcastic violence of his fierce model. The curious thing is that these particular poems of Horace, which are really short lyrical satires, have appropriated almost exclusively the name of epodes, although they bear little enough resemblance to the genuine epode of early Greek literature.

EPONA, a goddess of horses, asses and mules, worshipped by the Romans, though of foreign, probably Gallic, origin. The majority of inscriptions and images bearing her name have been found in Gaul, Germany and the Danube countries; of the few that occur in Rome itself most were exhumed on the site of the barracks of the *equites singulares*, a foreign imperial bodyguard mainly recruited from the Batavians. Her name does not appear in Tertullian's list of the *indigetes di*, and Juvenal contrasts her worship unfavourably with the old Roman Numa ritual. Her cult does not appear to have been introduced before imperial times, when she is often called Augusta and invoked on behalf of the emperor and the imperial house. Her chief function, however, was to see that the beasts of burden were duly fed, and to protect them against accidents and malicious influence. In the countries in which the worship of Epona was said to have had its origin it was a common belief that certain beings were in the habit of casting a spell over stables during the night. The Romans used to place the image of the goddess, crowned with flowers on festive occasions, in a sort of shrine in the centre of the architrave of the stable. In art she is generally represented seated, with her hand on the head of the accompanying horse or animal.

See Tertullian, *Apol.* 16; Juvenal viii. 157; Prudentius, *Apoth.* 197; Apuleius, *Metam.* iii. 27; articles in Daremberg and Saglio's *Dict. des antiquités* and Pauly-Wissowa's *Realencyclopädie.*

EPONYMOUS, that which gives a name to anything (Gr. ἐπώνυμος, from ὄνομα, a name), a term especially applied to the mythical or semi-mythical personages, heroes, deities, &c. from whom a country or city took its name. Thus Pelops is the giver of the name to the Peloponnese. At Athens the chief archon of the year was known as the ἄρχων ἐπώνυμος, as the year was known by his name. There was a similar official in ancient Assyria. In ancient times, as in historical and modern cases, a country or a city has been named after a real personage, but in many cases the person has been invented to account for the name.

EPPING, a market town in the Epping parliamentary division of Essex, England, 17 m. N.N.E. from London by a branch of the Great Eastern railway. Pop. of urban district (1901), 3789. The town lies high and picturesquely, at the northern outskirts of Epping Forest. The modern church of St John the Baptist replaces the old parish church of All Saints in the village of Epping Upland 2 m. N.W. This is in part Norman. There is considerable trade in butter, cheese and sausages.

Epping Forest forms part of the ancient Waltham Forest, which covered the greater part of the county. All the "London Basin," within which the Forest lies, was densely wooded. The Forest became one of the commonable lands of Royal Chases or hunting-grounds. It was threatened with total disafforestation, when under the Epping Forest Act of 1871 a board of commissioners was appointed for the better management of the lands. The corporation of the city of London then acquired the freehold interest of waste land belonging to the lords of the manor, and finally secured 5559½ acres, magnificently timbered, to the use of the public for ever, the tract being declared open by Queen Victoria in 1882. The Ancient Court of Verderers was also revived, consisting of an hereditary lord warden together with four verderers elected by freeholders of the county. The present forest lies between the valleys of the Roding and the Lea, and extends southward from Epping to the vicinity of Woodford and Walthamstow, a distance of about 7 m. It is readily accessible from the villages on its outskirts, such as Woodford, Chingford and Loughton, which are served by branches of the Great Eastern railway. These are centres of residential districts, and, especially on public holidays in the summer, receive large numbers of visitors.

EPPS, the name of an English family, well known in commerce and medicine. In the second half of the 18th century they had been settled near Ashford, Kent, for some generations, claiming descent from an equerry of Charles II., but were reduced in circumstances, when John Epps rose to prosperity as a provision merchant in London, and restored the family fortunes. He had four sons, of whom John Epps (1805–1869), George Napoleon Epps (1815–1874), and James Epps (1821–1907) were notable men of their day, the two former as prominent doctors who were ardent converts to homoeopathy, and James as a homoeopathic chemist and the founder of the great cocoa business associated with his name. Among Dr G. N. Epps's children were Dr Washington Epps, a well-known homoeopathist, Lady Alma-Tadema, and Mrs Edmund Gosse.

ÉPRÉMESNIL (Éspremesnil or Épréménil), **JEAN JACQUES DUVAL D'** (1745–1794), French magistrate and politician, was born in India on the 5th of December 1745 at Pondicherry, his father being a colleague of Dupleix. Returning to France in 1750 he was educated in Paris for the law, and became in 1775 *conseiller* in the parlement of Paris, where he soon distinguished himself by his zealous defence of its rights against the royal prerogative. He showed bitter enmity to Marie Antoinette in the matter of the diamond necklace, and on the 19th of November 1787 he was the spokesman of the parlement in demanding the convocation of the states-general. When the court retaliated by an edict depriving the parlement of its functions, Éprémesnil bribed the printers to supply him with a copy before its promulgation, and this he read to the assembled parlement. A royal officer was sent to the palais de justice to arrest Éprémesnil and his chief supporter Goislard de Montsabert, but the parlement (5th of May 1788) declared that they were all Éprémesnils, and the arrest was only effected on the next day on the voluntary surrender of the two members. After four months' imprisonment on the island of Ste Marguerite, Éprémesnil found himself a popular hero, and was returned to the states-general as deputy of the nobility of the outlying districts of Paris. But with the rapid advance towards revolution his views changed; in his *Réflexions impartiales* . . . (January 1789) he defended the monarchy, and he led the party among the nobility that refused to meet with the third estate until summoned to do so by royal command. In the Constituent Assembly he opposed every step towards the destruction of the monarchy. After a narrow escape from the fury of the Parisian populace in July 1792 he was imprisoned in the Abbaye, but was set at liberty before the September massacres. In September 1793, however, he was arrested at Le Havre, taken to Paris, and denounced to the Convention as an agent of Pitt. He was brought to trial before the revolutionary tribunal on the 21st of April 1794, and was guillotined the next day.

D'Éprémesnil's speeches were collected in a small volume in 1823. See also H. Carré, *Un Précurseur inconscient de la Révolution* (Paris, 1897).

EPSOM, a market town in the Epsom parliamentary division of Surrey, England, 14 m. S.W. by S. of London Bridge. Pop. of urban district (1901), 10,915. It is served by the London & South-Western and the London, Brighton & South Coast railways, and on the racecourse on the neighbouring Downs there is a station (Tattenham Corner) of the South-Eastern & Chatham railway. The principal building is the parish church of St Martin, a good example of modern Gothic, the interior of which contains some fine sculptures by Flaxman and Chantrey. Epsom (a contraction of Ebbisham, still the name of the manor) first came into notice when mineral springs were discovered there about 1618. For some time after their discovery the town enjoyed a wonderful degree of prosperity. After the Restoration it was often visited by Charles II., and when Queen Anne came to the throne, her husband, Prince George of Denmark, made it his frequent resort. Epsom gradually lost its celebrity as a spa, but the annual races held on its downs arrested the decay of the town. Races appear to have been established here as early as James I's residence at Nonsuch, but they did not assume a permanent character until 1730. The principal races—the Derby and Oaks—are named after one of the earls of Derby and his seat, the Oaks, which is in the neighbourhood. The latter race was established in 1779, and the former in the following year. The spring races are held on a Thursday and Friday towards the close of April; and the great Epsom meeting takes place on the Tuesday and three following days immediately before Whitsuntide,—the Derby on the Wednesday, and the Oaks on the Friday (see HORSE-RACING). The grand stand was erected in 1829, and subsequently enlarged; and there are numerous training stables in the vicinity. Close to the town are the extensive buildings of the Royal Medical Benevolent College, commonly called Epsom College, founded in 1855. Scholars on the foundation must be the sons of medical men, but in other respects the school is open. In the neighbourhood is the Durdans, a seat of the earl of Rosebery.

EPSOM SALTS, heptohydrated magnesium sulphate, $MgSO_4 \cdot 7H_2O$, the *magnesii sulphas* of pharmacy (Ger. *Bittersalz*). It occurs dissolved in sea water and in most mineral waters, especially in those at Epsom (from which place it takes its name), Seidlitz, Saidschutz and Pullna. It also occurs in nature in fibrous excrescences, constituting the mineral epsomite or hair-salt; and as compact masses (reichardite), as in the Stassfurt mines. It is also found associated with limestone, as in the Mammoth Caves, Kentucky, and with gypsum, as at Montmartre. Epsom salts crystallizes in the orthorhombic system, being isomorphous with the corresponding zinc and nickel sulphates, and also with magnesium chromate. Occasionally monoclinic crystals are obtained by crystallizing from a strong solution. It is used in the arts for weighting cotton fabrics, as a top-dressing for clover hay in agriculture, and in dyeing. In medicine it is frequently employed as a hydragogue purgative, specially valuable in febrile diseases, in congestion of the portal system, and in the obstinate constipation of painters' colic. In the last case it is combined with potassium iodide, the two salts being exceedingly effective in causing the elimination of lead from the system. It is also very useful as a supplement to mercury, which needs a saline aperient to complete its action. The salt should be given a few hours after the mercury, *e.g.* in the early morning, the mercury having been given at night. It possesses the advantage of exercising but little irritant effect upon the bowels. Its nauseous bitter taste may to some extent be concealed by acidifying the solution with dilute sulphuric acid, and in some cases where full doses have failed the repeated administration of small ones has proved effectual.

For the manufacture of Epsom salts and for other hydrated magnesium sulphates see MAGNESIUM.

EQUATION (from Lat. *aequatio*, *aequare*, to equalize), an expression or statement of the equality of two quantities. Mathematical equivalence is denoted by the sign =, a symbol invented by Robert Recorde (1510–1558), who considered that nothing could be more equal than two equal and parallel straight lines. An equation states an equality existing between two classes of quantities, distinguished as known and unknown; these correspond to the data of a problem and the thing sought. It is the purpose of the mathematician to state the unknowns separately in terms of the knowns; this is called solving the equation, and the values of the unknowns so obtained are called the roots or solutions. The unknowns are usually denoted by the terminal letters, ... x, y, z, of the alphabet, and the knowns are either actual numbers or are represented by the literals a, b, c, &c. ..., *i.e.* the introductory letters of the alphabet. Any number or literal which expresses what multiple of term occurs in an equation is called the coefficient of that term; and the term which does not contain an unknown is called the absolute term. The degree of an equation is equal to the greatest index of an unknown in the equation, or to the greatest sum of the indices of products of unknowns. If each term has the sum of its indices the same, the equation is said to be homogeneous. These definitions are exemplified in the equations:—

$$\begin{aligned} &(1)\ ax^2+2bx+c=0,\\ &(2)\ xy^2+4a^2x=8a^3,\\ &(3)\ ax^2+2hxy+by^2=0. \end{aligned}$$

In (1) the unknown is x, and the knowns a, b, c; the coefficients of x^2 and x are a and $2b$; the absolute term is c, and the degree is 2. In (2) the unknowns are x and y, and the known a; the degree is 3, *i.e.* the sum of the indices in the term xy^2. (3) is a homogeneous equation of the second degree in x and y. Equations of the first degree are called *simple* or *linear*; of the second, *quadratic*; of the third, *cubic*; of the fourth, *biquadratic*; of the fifth, *quintic*, and so on. Of equations containing only one unknown the number of roots equals the degree of the equation; thus a simple equation has one root, a quadratic two, a cubic three, and so on. If one equation be given containing two unknowns, as for example $ax+by=c$ or $ax^2+by^2=c$, it is seen that there are an infinite number of roots, for we can give x, say, any value and then determine the corresponding value of y; such an equation is called *indeterminate*; of the examples chosen the first is a linear and the second a quadratic indeterminate equation. In general, an indeterminate equation results when the number of unknowns exceeds by unity the number of equations. If, on the other hand, we have two equations connecting two unknowns, it is possible to solve the equations separately for one unknown, and then if we equate these values we obtain an equation in one unknown, which is soluble if its degree does not exceed the fourth. By substituting these values the corresponding values of the other unknown are determined. Such equations are called *simultaneous*; and a simultaneous system is a series of equations equal in number to the number of unknowns. Such a system is not always soluble, for it may happen that one equation is implied by the others; when this occurs the system is called *porismatic* or *poristic*. An *identity* differs from an equation inasmuch as it cannot be solved, the terms mutually cancelling; for example, the expression $x^2-a^2=(x-a)(x+a)$ is an identity, for on reduction it gives $0=0$. It is usual to employ the sign $\equiv$ to express this relation.

An equation admits of description in two ways:—(1) It may be regarded purely as an algebraic expression, or (2) as a geometrical locus. In the first case there is obviously no limit to the number of unknowns and to the degree of the equation; and, consequently, this aspect is the most general. In the second case the number of unknowns is limited to three, corresponding to the three dimensions of space; the degree is unlimited as before. It must be noticed, however, that by the introduction of appropriate hyperspaces, *i.e.* of degree equal to the number of unknowns, any equation theoretically admits of geometrical visualization, in other words, every equation may be represented by a geometrical figure and every geometrical figure by an equation. Corresponding to these two aspects, there are two typical methods by which equations can be solved, *viz.* the algebraic and geometric. The former leads to exact results, or, by methods of approximation, to results correct to any required degree of accuracy. The latter can only yield approximate values: when theoretically exact constructions are available there is a source of error in the draughtsmanship, and when the constructions are only approximate, the accuracy of the results is more problematical. The geometric aspect, however, is of considerable value in discussing the theory of equations.

History.—There is little doubt that the earliest solutions of equations are given in the Rhind papyrus, a hieratic document written some 2000 years before our era. The problems solved were of an arithmetical nature, assuming such forms as "a mass and its $\frac{1}{7}$th makes 19." Calling the unknown mass x, we have given $x+\frac{1}{7}x=19$, which is a simple equation. Arithmetical problems also gave origin to equations involving two unknowns; the early Greeks were familiar with and solved simultaneous linear equations, but indeterminate equations, such, for instance, as the system given in the "cattle problem" of Archimedes, were not seriously studied until Diophantus solved many particular problems. Quadratic equations arose in the Greek investigations in the doctrine of proportion, and although they were presented and solved in a geometrical form, the methods employed have no relation to the generalized conception of algebraic geometry which represents a curve by an equation and vice versa. The simplest quadratic arose in the construction of a mean proportional (x) between two lines (a, b), or in the construction of a square equal to a given rectangle; for we have the proportion $a:x=x:b$; *i.e.* $x^2=ab$. A more general equation, viz. $x^2-ax+a^2=0$, is the algebraic equivalent of the problem to divide a line in medial section; this is solved in *Euclid*, ii. 11. It is possible that Diophantus was in possession of an algebraic solution of quadratics; he recognized, however, only one root, the interpretation of both being first effected by the Hindu Bhaskara. A simple cubic equation was presented in the problem of finding two mean proportionals, x, y, between two lines, one double the other. We have $a:x=x:y=y:2a$, which gives $x^2=ay$ and $xy=2a^2$; eliminating y we obtain $x^3=2a^3$, a simple cubic. The Greeks could not solve this equation, which also arose in the problems of duplicating a cube and trisecting an angle, by the ruler and compasses, but only by mechanical curves such as the cissoid, conchoid and quadratrix. Such solutions were much improved by the Arabs, who also solved both cubics and biquadratics by means of intersecting conics; at the same time, they developed methods, originated by Diophantus and improved by the Hindus, for finding approximate roots of numerical equations by algebraic processes. The algebraic solution of the general cubic and biquadratic was effected in the 16th century by S. Ferro, N. Tartaglia, H. Cardan and L. Ferrari (see ALGEBRA: *History*). Many fruitless attempts were made to solve algebraically the quintic equation until P. Ruffini and N. H. Abel proved the problem to be impossible; a solution involving elliptic functions has been given by C. Hermite and L. Kronecker, while F. Klein has given another solution.

In the geometric treatment of equations the Greeks and Arabs based their constructions upon certain empirically deduced properties of the curves and figures employed. Knowing various metrical relations, generally expressed as proportions, it was found possible to solve particular equations, but a general method was wanting. This lacuna was not filled until the 17th century, when Descartes discovered the general theory which explained the nature of such solutions, in particular those wherein conics were employed, and, in addition, established the most important facts that every equation represents a geometrical locus, and conversely. To represent equations containing two unknowns, x, y, ne chose two axes of reference mutually perpendicular, and measured x along the horizontal axis and y along the vertical. Then by the methods described in the article GEOMETRY: *Analytical*, he showed that—(1) a linear equation represents a straight line, and (2) a quadratic represents a conic. If the equation be homogeneous or break up into factors, it represents a number of straight lines in the first case, and the loci corresponding to the factors in the second. The solution of simultaneous equations is easily seen to be the values of x, y corresponding to the intersections of the loci. It follows that there is only one value of x, y which satisfies two linear equations, since two lines intersect in one point only; two values which satisfy a linear and quadratic, since a line intersects a conic in two points; and four values which satisfy two quadratics, since two conics intersect in four points. It may happen that the curves do not actually intersect in the theoretical maximum number of points; the principle of continuity (see GEOMETRICAL CONTINUITY) shows us that in such cases some of the roots are imaginary. To represent equations involving three unknowns x, y, z, a third axis is introduced, the z-axis, perpendicular to the plane xy and passing through the intersection of the lines x, y. In this notation a linear equation represents a plane, and two linear simultaneous equations represent a line, *i.e.* the intersection of two planes; a quadratic equation represents a surface of the second degree. In order to graphically consider equations containing only one unknown, it is convenient to equate the terms to y; *i.e.* if the equation be $f(x)=0$, we take $y=f(x)$ and construct this curve on rectangular Cartesian co-ordinates by determining the values of y which correspond to chosen values of x, and describing a curve through the points so obtained. The intersections of the curve with the axis of x gives the real roots of the equation; imaginary roots are obviously not represented.

In this article we shall treat of: (1) Simultaneous equations, (2) indeterminate equations, (3) cubic equations, (4) biquadratic equations, (5) theory of equations. Simple, linear simultaneous and quadratic equations are treated in the article ALGEBRA; for differential equations see DIFFERENTIAL EQUATIONS.

I. *Simultaneous Equations.*

Simultaneous equations which involve the second and higher powers of the unknown may be impossible of solution. No general rules can be given, and the solution of any particular problem will largely depend upon the student's ingenuity. Here we shall only give a few typical examples.

1. *Equations which may be reduced to linear equations.—Ex.* To solve $x(x-a)=yz$, $y(y-b)=zx$, $z(z-c)=xy$. Multiply the equations by y, z and x respectively, and divide the sum by xyz; then

$$\frac{a}{z}+\frac{b}{x}+\frac{c}{y}=0 \quad \ldots\ldots\ldots \quad (1).$$

Multiply by z, x and y, and divide the sum by xyz; then

$$\frac{a}{y}+\frac{b}{z}+\frac{c}{x}=0 \quad \ldots\ldots\ldots \quad (2).$$

From (1) and (2) by cross multiplication we obtain

$$\frac{1}{y(b^2-ac)}=\frac{1}{z(c^2-ab)}=\frac{1}{x(a^2-bc)}=\frac{1}{\lambda}\text{ (suppose) } (3).$$

Substituting for x, y and z in $x(x-a)=yz$ we obtain

$$\frac{1}{\lambda}=\frac{3abc-(a^3+b^3+c^3)}{(a^2-bc)(b^2-ac)(c^2-ab)};$$

and therefore x, y and z are known from (3). The same artifice solves the equations $x^2-yz=a$, $y^2-xz=b$, $z^2-xy=c$.

2. *Equations which are homogeneous and of the same degree.*—These equations can be solved by substituting $y=mx$. We proceed to explain the method by an example.

Ex. To solve $3x^2+xy+y^2=15$, $31xy-3x^2-5y^2=45$. Substituting $y=mx$ in both these equations, and then dividing, we obtain $31m-3-5m^2=3(3+m+m^2)$ or $8m^2-28m+12=0$. The roots of this quadratic are $m=\frac{1}{2}$ or 3, and therefore $2y=x$, or $y=3x$.

Taking $2y=x$ and substituting in $3x^2+xy+y^2=0$, we obtain $y^2(12+2+1)=15$; $\therefore y^2=1$, which gives $y=\pm 1$, $x=\pm 2$. Taking the second value, $y=3x$, and substituting for y, we obtain $x^2(3+3+9)=15$; $\therefore x^2=1$, which gives $x=\pm 1$, $y=\pm 3$. Therefore the solutions are $x=\pm 2$, $y=\pm 1$ and $x=\pm 1$, $y=\pm 3$. Other artifices have to be adopted to solve other forms of simultaneous equations, for which the reader is referred to J. J. Milne, *Companion to Weekly Problem Papers.*

II. *Indeterminate Equations.*

1. When the number of unknown quantities exceeds the number of equations, the equations will admit of innumerable solutions, and are therefore said to be *indeterminate*. Thus if it be required to find two numbers such that their sum be 10, we have two unknown quantities x and y, and only one equation, viz. $x+y=10$, which may evidently be satisfied by innumerable different values of x and y, if fractional solutions be admitted. It is, however, usual, in such questions as this, to restrict values of the numbers sought to positive integers, and therefore, in this case, we can have only these nine solutions,

$$\begin{aligned} x&=1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9;\\ y&=9,\ 8,\ 7,\ 6,\ 5,\ 4,\ 3,\ 2,\ 1; \end{aligned}$$

which indeed may be reduced to five; for the first four become the same as the last four, by simply changing x into y, and the contrary. This branch of analysis was extensively studied by Diophantus, and is sometimes termed the Diophantine Analysis.

2. Indeterminate problems are of different orders, according to the dimensions of the equation which is obtained after all the unknown quantities but two have been eliminated by means of the given equations. Those of the first order lead always to equations of the form

$$ax\pm by=\pm c,$$

where a, b, c denote given whole numbers, and x, y two numbers to be found, so that both may be integers. That this condition may be fulfilled, it is necessary that the coefficients a, b have no common divisor which is not also a divisor of c; for if $a=md$ and $b=me$, then $ax+by=mdx+mey=c$, and $dx+ey=c/m$; but d, e, x, y are supposed to be whole numbers, therefore c/m is a whole number; hence m must be a divisor of c.

Of the four forms expressed by the equation $ax\pm by=\pm c$, it is obvious that $ax+by=-c$ can have no positive integral solutions. Also $ax-by=-c$ is equivalent to $by-ax=c$, and so we have only to consider the forms $ax\pm by=c$. Before proceeding to the general solution of these equations we will give a numerical example.

To solve $2x+3y=25$ in positive integers. From the given equation we have $x=(25-3y)/2=12-y-(y-1)/2$. Now, since x must be a whole number, it follows that $(y-1)/2$ must be a whole number. Let us assume $(y-1)/2=z$, then $y=1+2z$; and $x=11-3z$, where z might be any whole number whatever, if there were no limitation as to the signs of x and y. But since these quantities are required to be positive, it is evident, from the value of y, that z must be either 0 or positive, and from the value of x, that it must be less than 4; hence z may have these four values, 0, 1, 2, 3.

$$\begin{array}{lllll} \text{If} & z=0, & z=1, & z=2, & z=3; \\ \text{Then} \begin{cases} \\ \\ \end{cases} & \begin{array}{l} x=11, \\ y=1, \end{array} & \begin{array}{l} x=8, \\ y=3, \end{array} & \begin{array}{l} x=5, \\ y=5, \end{array} & \begin{array}{l} x=2, \\ y=7. \end{array} \end{array}$$

3. We shall now give the solution of the equation $ax-by=c$ in positive integers.

Convert a/b into a continued fraction, and let p/q be the convergent immediately preceding a/b, then $aq-bp=\pm 1$ (see CONTINUED FRACTION).

(a) If $aq-bp=1$, the given equation may be written

$$ax-by=c(aq-bp);$$
$$\therefore a(x-cq)=b(y-cp).$$

Since a and b are prime to one another, then $x-cq$ must be divisible by b and $y-cp$ by a; hence

$$(x-cq)/b=(y-cq)/a=t.$$

That is, $x=bt+cq$ and $y=at+cp$.

Positive integral solutions, unlimited in number, are obtained by giving t any positive integral value, and any negative integral value, so long as it is numerically less than the smaller of the quantities cq/b, cp/a; t may also be zero.

(β) If $aq-bp=-1$, we obtain $x=bt-cq$, $y=at-cp$, from which positive integral solutions, again unlimited in number, are obtained by giving t any positive integral value which exceeds the greater of the two quantities cq/b, cp/a.

If a or b is unity, a/b cannot be converted into a continued fraction with unit numerators, and the above method fails. In this case the solutions can be derived directly, for if b is unity, the equation may be written $y=ax-c$, and solutions are obtained by giving x positive integral values greater than c/a.

4. To solve $ax+by=c$ in positive integers. Converting a/b into a continued fraction and proceeding as before, we obtain, in the case of $aq-bp=1$,

$$x=cq-bt,\ y=at-cp.$$

Positive integral solutions are obtained by giving t positive integral values not less than cp/a and not greater than cq/b.

In this case the number of solutions is limited. If $aq-bp=-1$ we obtain the general solution $x=bt-cq$, $y=cp-at$, which is of the same form as in the preceding case. For the determination of the number of solutions the reader is referred to H. S. Hall and S. R. Knight's *Higher Algebra*, G. Chrystal's *Algebra*, and other text-books.

5. If an equation were proposed involving three unknown quantities, as $ax+by+cz=d$, by transposition we have $ax+by=d-cz$, and, putting $d-cz=c'$, $ax+by=c'$. From this last equation we may find values of x and y of this form,

$$x=mr+nc',\ y=mr+n'c',$$
$$\text{or } x=mr+n(d-cz),\ y=m'r+n'(d-cz);$$

where z and r may be taken at pleasure, except in so far as the values of x, y, z may be required to be all positive; for from such restriction the values of z and r may be confined within certain limits to be determined from the given equation. For more advanced treatment of linear indeterminate equations see COMBINATORIAL ANALYSIS.

6. We proceed to indeterminate problems of the second degree: limiting ourselves to the consideration of the formula $y^2=a+bx+cx^2$, where x is to be found, so that y may be a rational quantity. The possibility of rendering the proposed formula a square depends altogether upon the coefficients a, b, c; and there are four cases of the problem, the solution of each of which is connected with some peculiarity in its nature.

Case 1. Let a be a square number; then, putting g^2 for a, we have $y^2=g^2+bx+cx^2$. Suppose $\sqrt{(g^2+bx+cx^2)}=g+mx$; then $g^2+bx+cx^2=g^2+2gmx+m^2x^2$, or $bx+cx^2=2gmx+m^2x^2$, that is, $b+cx=2gm+m^2x$; hence

$$x=\frac{2gm-b}{c-m^2},\ y=\sqrt{(g^2+bx+cx^2)}=\frac{cg-bm+gm^2}{c-m^2}.$$

Case 2. Let c be a square number $=g^2$; then, putting $\sqrt{(a+bx+g^2x^2)}=m+gx$, we find $a+bx+g^2x^2=m^2+2mgx+g^2x^2$, or $a+bx=m^2+2mgx$; hence we find

$$x=\frac{m^2-a}{b-2mg},\ y=\sqrt{(a+bx+g^2x^2)}=\frac{bm-gm^2-ag}{b-2mg}.$$

Case 3. When neither a nor c is a square number, yet if the expression $a+bx+cx^2$ can be resolved into two simple factors, as $f+gx$ and $h+kx$, the irrationality may be taken away as follows:—

Assume $\sqrt{(a+bx+cx^2)}=\sqrt{\{(f+gx)\ (h+kx)\}}=m(f+gx)$, then $(f+gx)\ (h+kx)=m^2(f+gx)^2$, or $h+kx=m^2(f+gx)$; hence we find

$$x=\frac{fm^2-h}{k-gm^2},\ y=\sqrt{\{(f+gx)(h+kx)\}}=\frac{(fk-gh)m}{k-gm^2};$$

and in all these formulae m may be taken at pleasure.

Case 4. The expression $a+bx+cx^2$ may be transformed into a square as often as it can be resolved into two parts, one of which is a complete square, and the other a product of two simple factors; for then it has this form, p^2+qr, where p, q and r are quantities which contain no power of x higher than the first. Let us assume $\sqrt{(p^2+qr)}=p+mq$; thus we have $p^2+qr=p^2+2mpq+m^2q^2$ and $r=2mp+m^2q$, and as this equation involves only the first power of x, we may by proper reduction obtain from it rational values of x and y, as in the three foregoing cases.

The application of the preceding general methods of resolution to any particular case is very easy; we shall therefore conclude with a single example.

Ex. It is required to find two square numbers whose sum is a given square number.

Let a^2 be the given square number, and x^2, y^2 the numbers required; then, by the question, $x^2+y^2=a^2$, and $y=\sqrt{(a^2-x^2)}$. This equation is evidently of such a form as to be resolvable by the method employed in case 1. Accordingly, by comparing $\sqrt{(a^2-x^2)}$ with the general expression $\sqrt{(g^2+bx+cx^2)}$, we have $g=a$, $b=0$, $c=-1$, and substituting these values in the formulae, and also $-n$ for $+m$, we find

$$x=\frac{2an}{n^2+1},\ y=\frac{a(n^2-1)}{n^2+1}.$$

If $a=n^2+1$, there results $x=2n$, $y=n^2-1$, $a=n^2+1$. Hence if r be an even number, the three sides of a rational right-angled triangle are r, $(\frac{1}{2}r)^2-1$, $(\frac{1}{2}r)^2+1$. If r be an odd number, they become (dividing by 2) r, $\frac{1}{2}(r^2-1)$, $\frac{1}{2}(r^2+1)$.

For example, if $r=4$, 4, 4−1, 4+1, or 4, 3, 5, are the sides of a right-angled triangle; if $r=7$, 7, 24, 25 are the sides of a right-angled triangle.

III. *Cubic Equations.*

1. Cubic equations, like all equations above the first degree, are divided into two classes: they are said to be *pure* when they contain only one power of the unknown quantity; and *adfected* when they contain two or more powers of that quantity.

Pure cubic equations are therefore of the form $x^3=r$; and hence it appears that a value of the simple power of the unknown quantity may always be found without difficulty, by extracting the cube root of each side of the equation. Let us consider the equation $x^3-c^3=0$ more fully. This is decomposable into the factors $x-c=0$ and $x^2+cx+c^2=0$. The roots of this quadratic equation are $\frac{1}{2}(-1\pm\sqrt{-3})c$, and we see that the equation $x^3=c^3$ has three roots, namely, one real root c, and two imaginary roots $\frac{1}{2}(-1\pm\sqrt{-3})c$. By making c equal to unity, we observe that $\frac{1}{2}(-1\pm\sqrt{-3})$ are the imaginary cube roots of unity, which are generally denoted by ω and ω^2, for it is easy to show that $(\frac{1}{2}(-1-\sqrt{-3}))^2=\frac{1}{2}(-1+\sqrt{-3})$.

2. Let us now consider such cubic equations as have all their terms, and which are therefore of this form,

$$x^3+Ax^2+Bx+C=0,$$

where A, B and C denote known quantities, either positive or negative.

This equation may be transformed into another in which the second term is wanting by the substitution $x=y-A/3$. This transformation is a particular case of a general theorem. Let $x^n+Ax^{n-1}+Bx^{n-2}\ldots=0$. Substitute $x=y+h$; then $(y+h)^n+A(y+h)^{n-1}\ldots=0$. Expand each term by the binomial theorem, and let us fix our attention on the coefficient of y^{n-1}. By this process we obtain $0=y^n+y^{n-1}(A+nh)+$ terms involving lower powers of y.

Now h can have any value, and if we choose it so that $A+nh=0$, then the second term of our derived equation vanishes.

Resuming, therefore, the equation $y^3+qy+r=0$, let us suppose $y=v+z$; we then have $y^3=v^3+z^3+3vz(v+z)=v^3+z^3+3vzy$, and the original equation becomes $v^3+z^3+(3vz+q)y+r=0$. Now v and z are any two quantities subject to the relation $y=v+z$, and if we suppose $3vz+q=0$, they are completely determined. This leads to $v^3+z^3+r=0$ and $3vz+q=0$. Therefore v^3 and z^3 are the roots of the quadratic $t^2+rt-q^2/27=0$. Therefore

$$v^3=-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)};\ z^3=-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)};$$
$$v=\sqrt[3]{\{-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}};\ z=\sqrt[3]{\{-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}};$$
$$\text{and } y=v+z=\sqrt[3]{\{-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}}+\sqrt[3]{\{-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}}.$$

Thus we have obtained a value of the unknown quantity y, in terms of the known quantities q and r; therefore the equation is resolved.

3. But this is only one of three values which y may have. Let us, for the sake of brevity, put

$$A=-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)},\ B=-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)},$$
$$\text{and put} \begin{cases} \alpha=\tfrac{1}{2}(-1+\sqrt{-3}), \\ \beta=\tfrac{1}{2}(-1-\sqrt{-3}). \end{cases}$$

Then, from what has been shown (§ 1), it is evident that v and z have each these three values,

$$v=\sqrt[3]{A},\ v=\alpha\sqrt[3]{A},\ v=\beta\sqrt[3]{A};$$
$$z=\sqrt[3]{B},\ z=\alpha\sqrt[3]{B},\ z=\beta\sqrt[3]{B}.$$

To determine the corresponding values of v and z, we must consider that $vz=-\frac{1}{3}q=\sqrt[3]{(AB)}$. Now if we observe that $\alpha\beta=1$, it will immediately appear that $v+z$ has these three values,

$$v+z=\sqrt[3]{A}+\sqrt[3]{B},$$
$$v+z=\alpha\sqrt[3]{A}+\beta\sqrt[3]{B},$$
$$v+z=\beta\sqrt[3]{A}+\alpha\sqrt[3]{B},$$

which are therefore the three values of y.

The first of these formulae is commonly known by the name of Cardan's rule (see ALGEBRA: *History*).

The formulae given above for the roots of a cubic equation may be put under a different form, better adapted to the purposes of arithmetical calculation, as follows:—Because $vz=-\frac{1}{3}q$, therefore $z=-\frac{1}{3}q\times 1/v=-\frac{1}{3}q/\sqrt[3]{A}$; hence $v+z=\sqrt[3]{A}-\frac{1}{3}q/\sqrt[3]{A}$: thus it appears that the three values of y may also be expressed thus:

$$y=\sqrt[3]{A}-\tfrac{1}{3}q/\sqrt[3]{A}$$
$$y=\alpha\sqrt[3]{A}-\tfrac{1}{3}q\beta/\sqrt[3]{A}$$
$$y=\beta\sqrt[3]{A}-\tfrac{1}{3}q\alpha/\sqrt[3]{A}.$$

See below, *Theory of Equations*, §§ 16 et seq.

IV. *Biquadratic Equations.*

1. When a biquadratic equation contains all its terms, it has this form,

$$x^4+Ax^3+Bx^2+Cx+D=0,$$

where A, B, C, D denote known quantities.

We shall first consider pure biquadratics, or such as contain only the first and last terms, and therefore are of this form, $x^4=b^4$. In this case it is evident that x may be readily had by two extractions of the square root; by the first we find $x^2=b^2$, and by the second $x=b$. This, however, is only one of the values which x may have; for since $x^4=b^4$, therefore $x^4-b^4=0$; but x^4-b^4 may be resolved into two factors x^2-b^2 and x^2+b^2, each of which admits of a similar resolution; for $x^2-b^2=(x-b)(x+b)$ and $x^2+b^2=(x-b\sqrt{-1})(x+b\sqrt{-1})$. Hence it appears that the equation $x^4-b^4=0$ may also be expressed thus,

$$(x-b)(x+b)(x-b\sqrt{-1})(x+b\sqrt{-1})=0;$$

so that x may have these four values,

$$+b,\quad -b,\quad +b\sqrt{-1},\quad -b\sqrt{-1},$$

two of which are real, and the others imaginary.

2. Next to pure biquadratic equations, in respect of easiness of resolution, are such as want the second and fourth terms, and therefore have this form,

$$x^4+qx^2+s=0.$$

These may be resolved in the manner of quadratic equations; for if we put $y=x^2$, we have

$$y^2+qy+s=0,$$

from which we find $y=\frac{1}{2}\{-q\pm\sqrt{(q^2-4s)}\}$, and therefore

$$x=\pm\sqrt{\tfrac{1}{2}\{-q\pm\sqrt{(q^2-4s)}\}}.$$

3. When a biquadratic equation has all its terms, its resolution may be always reduced to that of a cubic equation. There are various methods by which such a reduction may be effected. The following was first given by Leonhard Euler in the *Petersburg Commentaries*, and afterwards explained more fully in his *Elements of Algebra*.

We have already explained how an equation which is complete in its terms may be transformed into another of the same degree, but which wants the second term; therefore any biquadratic equation may be reduced to this form,

$$y^4+py^2+qy+r=0,$$

where the second term is wanting, and where p, q, r denote any known quantities whatever.

That we may form an equation similar to the above, let us assume $y=\sqrt{a}+\sqrt{b}+\sqrt{c}$, and also suppose that the letters a, b, c denote the roots of the cubic equation

$$z^3+Pz^2+Qz-R=0;$$

then, from the theory of equations we have

$$a+b+c=-P,\qquad ab+ac+bc=Q,\qquad abc=R.$$

We square the assumed formula

$$y=\sqrt{a}+\sqrt{b}+\sqrt{c},$$

and obtain $\quad y^2=a+b+c+2(\sqrt{ab}+\sqrt{ac}+\sqrt{bc})$;

or, substituting $-P$ for $a+b+c$, and transposing,

$$y^2+P=2(\sqrt{ab}+\sqrt{ac}+\sqrt{bc}).$$

Let this equation be also squared, and we have

$$y^4+2Py^2+P^2=4(ab+ac+bc)+8(\sqrt{a^2bc}+\sqrt{ab^2c}+\sqrt{abc^2});$$

and since $\quad ab+ac+bc=Q,$

and $\quad \sqrt{a^2bc}+\sqrt{ab^2c}+\sqrt{abc^2}=\sqrt{abc}(\sqrt{a}+\sqrt{b}+\sqrt{c})=\sqrt{R}.y,$

the same equation may be expressed thus:

$$y^4+2Py^2+P^2=4Q+8\sqrt{R}.y.$$

Thus we have the biquadratic equation

$$y^4+2Py^2-8\sqrt{R}.y+P^2-4Q=0,$$

one of the roots of which is $y=\sqrt{a}+\sqrt{b}+\sqrt{c}$, while a, b, c are the roots of the cubic equation $z^3+Pz^2+Qz-R=0$.

4. In order to apply this resolution to the proposed equation $y^4+py^2+qy+r=0$, we must express the assumed coefficients P, Q, R by means of p, q, r, the coefficients of that equation. For this purpose let us compare the equations

$$y^4+py^2+qy+r=0,$$
$$y^4+2Py^2-8\sqrt{R}y+P^2-4Q=0,$$

and it immediately appears that

$$2P=p,\quad -8\sqrt{R}=q,\quad P^2-4Q=r;$$

and from these equations we find

$$P=\tfrac{1}{2}p,\quad Q=\tfrac{1}{16}(p^2-4r),\quad R=\tfrac{1}{64}q^2.$$

Hence it follows that the roots of the proposed equation are generally expressed by the formula

$$y=\sqrt{a}+\sqrt{b}+\sqrt{c};$$

where a, b, c denote the roots of this cubic equation,

$$z^3+\frac{p}{2}z^2+\frac{p^2-4r}{16}z-\frac{q^2}{64}=0.$$

But to find each particular root, we must consider, that as the square root of a number may be either positive or negative, so each of the quantities $\sqrt{a}$, $\sqrt{b}$, $\sqrt{c}$ may have either the sign + or − prefixed to it; and hence our formula will give eight different expressions for the root. It is, however, to be observed, that as the product of the three quantities $\sqrt{a}$, $\sqrt{b}$, $\sqrt{c}$ must be equal to $\sqrt{R}$ or to $-\frac{1}{8}q$; when q is positive, their product must be a negative quantity, and this can only be effected by making either one or three of them negative; again, when q is negative, their product must be a positive quantity; so that in this case they must either be all positive, or two of them must be negative. These considerations enable us to determine that four of the eight expressions for the root belong to the case in which q is positive, and the other four to that in which it is negative.

5. We shall now give the result of the preceding investigation in the form of a practical rule; and as the coefficients of the cubic equation which has been found involve fractions, we shall transform it into another, in which the coefficients are integers, by supposing $z=\frac{1}{4}v$. Thus the equation

$$z^3+\frac{p}{2}z^2+\frac{p^2-4r}{16}z-\frac{q^2}{64}=0$$

becomes, after reduction,

$$v^3+2pv^2+(p^2-4r)v-q^2=0;$$

it also follows, that if the roots of the latter equation are a, b, c, the roots of the former are $\frac{1}{4}a$, $\frac{1}{4}b$, $\frac{1}{4}c$, so that our rule may now be expressed thus:

Let $y^4+py^2+qy+r=0$ be any biquadratic equation wanting its second term. Form this cubic equation

$$v^3+2pv^2+(p^2-4r)v-q^2=0,$$

and find its roots, which let us denote by a, b, c.

Then the roots of the proposed biquadratic equation are,

when q is negative,	when q is positive,
$y=\frac{1}{2}(\sqrt{a}+\sqrt{b}+\sqrt{c})$,	$y=\frac{1}{2}(-\sqrt{a}-\sqrt{b}-\sqrt{c})$,
$y=\frac{1}{2}(\sqrt{a}-\sqrt{b}-\sqrt{c})$,	$y=\frac{1}{2}(-\sqrt{a}+\sqrt{b}+\sqrt{c})$,
$y=\frac{1}{2}(-\sqrt{a}+\sqrt{b}-\sqrt{c})$,	$y=\frac{1}{2}(\sqrt{a}-\sqrt{b}+\sqrt{c})$,
$y=\frac{1}{2}(-\sqrt{a}-\sqrt{b}+\sqrt{c})$.	$y=\frac{1}{2}(\sqrt{a}+\sqrt{b}-\sqrt{c})$.

See also below, *Theory of Equations*, § 17 et seq. (X.)

V. *Theory of Equations.*

1. In the subject " Theory of Equations " the term *equation* is used to denote an equation of the form $x^n-p_1x^{n-1}\ldots\pm p_n=0$, where $p_1, p_2\ldots p_n$ are regarded as known, and x as a quantity to be determined; for shortness the equation is written $f(x)=0$.

The equation may be *numerical*; that is, the coefficients $p_1, p_2, \ldots p_n$ are then numbers—understanding by number a quantity of the form $a+\beta i$ (a and β having any positive or negative real values whatever, or say each of these is regarded as susceptible of continuous variation from an indefinitely large negative to an indefinitely large positive value), and i denoting $\sqrt{-1}$.

Or the equation may be *algebraical*; that is, the coefficients are not then restricted to denote, or are not explicitly considered as denoting, numbers.

1. We consider first numerical equations. (Real theory, 2-6; Imaginary theory, 7-10.)

Real Theory.

2. Postponing all consideration of imaginaries, we take in the first instance the coefficients to be real, and attend only to the real roots (if any); that is, $p_1, p_2, \ldots p_n$ are real positive or negative quantities, and a root a, if it exists, is a positive or negative quantity such that $a^n-p_1a^{n-1}\ldots\pm p_n=0$, or say, $f(a)=0$.

It is very useful to consider the curve $y=f(x)$,—or, what would come to the same, the curve $Ay=f(x)$,—but it is better to retain the first-mentioned form of equation, drawing, if need be, the ordinate y on a reduced scale. For instance, if the given equation be $x^3-6x^2+11x-6{\cdot}06=0$,[1] then the curve

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[1] The coefficients were selected so that the roots might be nearly 1, 2, 3.

$y=x^3-6x^2+11x-6{\cdot}06$ is as shown in fig. 1, without any reduction of scale for the ordinate.

It is clear that, in general, y is a continuous one-valued function of x, finite for every finite value of x, but becoming infinite when x is infinite; *i.e.*, assuming throughout that the coefficient of x^n is $+1$, then when $x=\infty$, $y=+\infty$; but when $x=-\infty$, then $y=+\infty$ or $-\infty$, according as n is even or odd; the curve cuts any line whatever, and in particular it cuts the axis (of x) in at most n points; and the value of x, at any point of intersection with the axis, is a root of the equation $f(x)=0$.

If β, α are any two values of x ($\alpha>\beta$, that is, α nearer $+\infty$), then if $f(\beta)$, $f(\alpha)$ have opposite signs, the curve cuts the axis an odd number of times, and therefore at least once, between the points $x=\beta$, $x=\alpha$; but if $f(\beta)$, $f(\alpha)$ have the same sign, then between these points the curve cuts the axis an even number of times, or it may be not at all. That is, $f(\beta)$, $f(\alpha)$ having opposite signs, there are between the limits β, α an odd number of real roots, and therefore at least one real root; but $f(\beta)$, $f(\alpha)$ having the same sign, there are between these limits an even number of real roots, or it may be there is no real root. In particular, by giving to β, α the values $-\infty$, $+\infty$ (or, what is the same thing, any two values sufficiently near to these values respectively) it appears that an equation of an odd order has always an odd number of real roots, and therefore at least one real root; but that an equation of an even order has an even number of real roots, or it may be no real root.

If α be such that for $x=$ or $>\alpha$ (that is, x nearer to $+\infty$) $f(x)$ is always $+$, and β be such that for $x=$or $<\beta$ (that is, x nearer to $-\infty$) $f(x)$ is always $-$, then the real roots (if any) lie between these limits $x=\beta$, $x=\alpha$; and it is easy to find by trial such two limits including between them all the real roots (if any).

3. Suppose that the positive value δ is an inferior limit to the difference between two real roots of the equation; or rather (since the foregoing expression would imply the existence of real roots) suppose that there are not two real roots such that their difference taken positively is $=$ or $<\delta$; then, γ being any value whatever, there is clearly at most one real root between the limits γ and $\gamma+\delta$; and by what precedes there is such real root or there is not such real root, according as $f(\gamma)$, $f(\gamma+\delta)$ have opposite signs or have the same sign. And by dividing in this manner the interval β to α into intervals each of which is $=$ or $<\delta$, we should not only ascertain the number of the real roots (if any), but we should also *separate* the real roots, that is, find for each of them limits γ, $\gamma+\delta$ between which there lies this one, and only this one, real root.

In particular cases it is frequently possible to ascertain the number of the real roots, and to effect their separation by trial or otherwise, without much difficulty; but the foregoing was the general process as employed by Joseph Louis Lagrange even in the second edition (1808) of the *Traité de la résolution des équations numériques*;[1] the determination of the limit δ had to be effected by means of the "equation of differences" or equation of the order $\frac{1}{2}n(n-1)$, the roots of which are the squares of the differences of the roots of the given equation, and the process is a cumbrous and unsatisfactory one.

4. The great step was effected by the theorem of J. C. F. Sturm (1835)—viz. here starting from the function $f(x)$, and its first derived function $f'(x)$, we have (by a process which is a slight modification of that for obtaining the greatest common measure of these two functions) to form a series of functions

$$f(x), f'(x), f_2(x)\ \ldots\ f_n(x)$$

of the degrees n, $n-1$, $n-2$ . . . 0 respectively,—the last term $f_n(x)$ being thus an absolute constant. These lead to the immediate determination of the number of real roots (if any) between any two given limits β, α; viz. supposing $\alpha>\beta$ (that is, α nearer to $+\infty$), then substituting successively these two values in the series of functions, and attending only to the signs of the resulting values, the number of the changes of sign lost in passing from β to α is the required number of real roots between the two limits. In particular, taking β, $\alpha=-\infty$, $+\infty$ respectively, the signs of the several functions depend merely on the signs of the terms which contain the highest powers of x, and are seen by inspection, and the theorem thus gives at once the whole number of real roots.

And although theoretically, in order to complete by a finite number of operations the separation of the real roots, we still need to know the value of the before-mentioned limit δ; yet in any given case the separation may be effected by a limited number of repetitions of the process. The practical difficulty is when two or more roots are very near to each other. Suppose, for instance, that the theorem shows that there are two roots between 0 and 10; by giving to x the values 1, 2, 3, . . . successively, it might appear that the two roots were between 5 and 6; then again that they were between 5·3 and 5·4, then between 5·34 and 5·35, and so on until we arrive at a separation; say it appears that between 5·346 and 5·347 there is one root, and between 5·348 and 5·349 the other root. But in the case in question δ would have a very small value, such as ·002, and even supposing this value known, the direct application of the first-mentioned process would be still more laborious.

5. Supposing the separation once effected, the determination of the single real root which lies between the two given limits may be effected to any required degree of approximation either by the processes of W. G. Horner and Lagrange (which are in principle a carrying out of the method of Sturm's theorem), or by the process of Sir Isaac Newton, as perfected by Joseph Fourier (which requires to be separately considered).

First as to Horner and Lagrange. We know that between the limits β, α there lies one, and only one, real root of the equation; $f(\beta)$ and $f(\alpha)$ have therefore opposite signs. Suppose any intermediate value is θ; in order to determine by Sturm's theorem whether the root lies between β, θ, or between θ, α, it would be quite unnecessary to calculate the signs of $f(\theta)$, $f'(\theta)$, $f_2(\theta)$ . . .; only the sign of $f(\theta)$ is required; for, if this has the same sign as $f(\beta)$, then the root is between β, θ; if the same sign as $f(\alpha)$, then the root is between θ, α. We want to make θ increase from the inferior limit β, at which $f(\theta)$ has the sign of $f(\beta)$, so long as $f(\theta)$ retains this sign, and then to a value for which it assumes the opposite sign; we have thus two nearer limits of the required root, and the process may be repeated indefinitely.

Horner's method (1819) gives the root as a decimal, figure by figure; thus if the equation be known to have one real root between 0 and 10, it is in effect shown say that 5 is too small (that is, the root is between 5 and 6); next that 5·4 is too small (that is, the root is between 5·4 and 5·5); and so on to any number of decimals. Each figure is obtained, *not* by the successive trial of all the figures which precede it, but (as in the ordinary process of the extraction of a square root, which is in fact Horner's process applied to this particular case) it is given presumptively as the first figure of a quotient; such value may be too large, and then the next inferior integer must be tried instead of it, or it may require to be further diminished. And it is to be remarked that the process not only gives the approximate value α of the root, but (as in the extraction of a square root) it includes the calculation of the function $f(\alpha)$, which should be, and approximately is, $=0$. The arrangement of the calculations is very elegant, and forms an integral part of the actual method. It is to be observed that after a certain number of decimal places have been obtained, a good many more can be found by a mere division. It is in the progress tacitly assumed that the roots have been first separated.

Lagrange's method (1767) gives the root as a continued fraction $a+\frac{1}{b}+\frac{1}{c}+\ldots$, where a is a positive or negative integer (which may be $=0$), but b, c, . . . are positive integers. Suppose the roots have been separated; then (by trial if need be of consecutive integer values) the limits may be made to be consecutive integer numbers: say they are a, $a+1$; the value of x is therefore $=a+1/y$, where y is positive and greater than 1; from the given equation for x, writing therein $x=a+1/y$, we form an equation of the same order for y, and this equation will have one, and only one, positive root greater than 1; hence finding for it the limits b, $b+1$ (where b is $=$or >1), we have $y=b+1/z$, where z is positive and greater than 1; and so on—that is, we thus obtain the successive denominators b, c, d . . . of the continued fraction. The method is theoretically very elegant, but the disadvantage is that it gives the result in the form of a continued fraction, which for the most part must ultimately be converted into a decimal. There is one advantage in the method, that a commensurable root (that is, a root equal to a rational fraction) is found accurately, since, when such root exists, the continued fraction terminates.

6. Newton's method (1711), as perfected by Fourier (1831), may be

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[1] The third edition (1826) is a reproduction of that of 1808; the first edition has the date 1798, but a large part of the contents is taken from memoirs of 1767–1768 and 1770–1771.

roughly stated as follows. If $x=\gamma$ be an approximate value of any root, and $\gamma+h$ the correct value, then $f(\gamma+h)=0$, that is,

$$f(\gamma)+\frac{h}{1}f'(\gamma)+\frac{h^2}{1\cdot 2}f''(\gamma)+\ldots=0;$$

and then, if h be so small that the terms after the second may be neglected, $f(\gamma)+hf'(\gamma)=0$, that is, $h=-f(\gamma)/f'(\gamma)$, or the new approximate value is $x=\gamma-f(\gamma)/f'(\gamma)$; and so on, as often as we please. It will be observed that so far nothing has been assumed as to the separation of the roots, or even as to the existence of a real root; γ has been taken as the approximate value of a root, but no precise meaning has been attached to this expression. The question arises, What are the conditions to be satisfied by γ in order that the process may by successive repetitions actually lead to a certain real root of the equation; or that, γ being an approximate value of a certain real root, the new value $\gamma-f(\gamma)/f'(\gamma)$ may be a more approximate value.

Referring to fig. 1, it is easy to see that if OC represent the assumed value γ, then, drawing the ordinate CP to meet the curve in P, and the tangent PC′ to meet the axis in C′, we shall have OC′ as the new approximate value of the root. But observe that there is here a real root OX, and that the curve beyond X is convex to the axis; under these conditions the point C′ is nearer to X than was C; and, starting with C′ instead of C, and proceeding in like manner to draw a new ordinate and tangent, and so on as often as we please, we approximate continually, and that with great rapidity, to the true value OX. But if C had been taken on the other side of X, where the curve is concave to the axis, the new point C′ might or might not be nearer to X than was the point C; and in this case the method, if it succeeds at all, does so by accident only, *i.e.* it may happen that C′ or some subsequent point comes to be a point C, such that CO is a *proper* approximate value of the root, and then the subsequent approximations proceed in the same manner as if this value had been assumed in the first instance, all the preceding work being wasted.

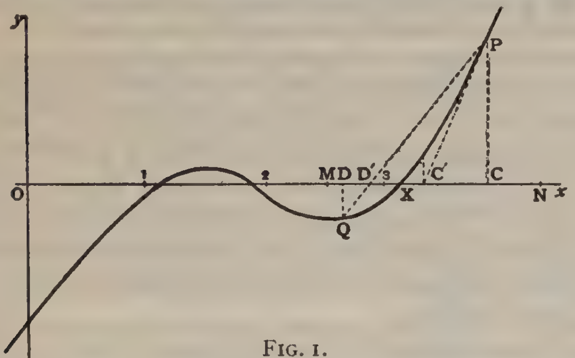

FIG. 1.

It thus appears that for the proper application of the method we require *more* than the mere separation of the roots. In order to be able to approximate to a certain root α, $=$OX, we require to know that, between OX and some value ON, the curve is always convex to the axis (analytically, between the two values, $f(x)$ and $f''(x)$ must have always the same sign). When this is so, the point C may be taken anywhere on the proper side of X, and within the portion XN of the axis; and the process is then the one already explained. The approximation is in general a very rapid one. If we know for the required root OX the two limits OM, ON such that from M to X the curve is always *concave* to the axis, while from X to N it is always convex to the axis,—then, taking D anywhere in the portion MX and (as before) C in the portion XN, drawing the ordinates DQ, CP, and joining the points P, Q by a line which meets the axis in D′, also constructing the point C′ by means of the tangent at P as before, we have for the required root the new limits OD′, OC′; and proceeding in like manner with the points D′, C′, and so on as often as we please, we obtain at each step two limits approximating more and more nearly to the required root OX. The process as to the point D′, translated into analysis, is the ordinate process of interpolation. Suppose OD$=\beta$, OC$=\alpha$, we have approximately $f(\beta+h)=f(\beta)+\dfrac{h\{f(\alpha)-f(\beta)\}}{\alpha-\beta}$, whence if the root is $\beta+h$ then $h=-\dfrac{(\alpha-\beta)f(\beta)}{f(\alpha)-f(\beta)}$.

Returning for a moment to Horner's method, it may be remarked that the correction h, to an approximate value α, is therein found as a quotient the same or such as the quotient $f(\alpha)\div f'(\alpha)$ which presents itself in Newton's method. The difference is that with Horner the integer part of this quotient is taken as the presumptive value of h, and the figure is verified at each step. With Newton the quotient itself, developed to the proper number of decimal places, is taken as the value of h; if too many decimals are taken, there would be a waste of work; but the error would correct itself at the next step. Of course the calculation should be conducted without any such waste of work.

Imaginary Theory.

7. It will be recollected that the expression *number* and the correlative epithet *numerical* were at the outset used in a wide sense, as extending to imaginaries. This extension arises out of the theory of equations by a process analogous to that by which number, in its original most restricted sense of positive integer number, was extended to have the meaning of a real positive or negative magnitude susceptible of continuous variation.

If for a moment number is understood in its most restricted sense as meaning positive integer number, the solution of a simple equation leads to an extension; $ax-b=0$ gives $x=b/a$, a positive fraction, and we can in this manner represent, not accurately, but as nearly as we please, any positive magnitude whatever; so an equation $ax+b=0$ gives $x=-b/a$, which (approximately as before) represents any negative magnitude. We thus arrive at the extended signification of number as a continuously varying positive or negative magnitude. Such numbers may be added or subtracted, multiplied or divided one by another, and the result is always a number. Now from a quadric equation we derive, in like manner, the notion of a complex or imaginary number such as is spoken of above. The equation $x^2+1=0$ is not (in the foregoing sense, number$=$real number) satisfied by any numerical value whatever of x; but we assume that there is a number which we call i, satisfying the equation $i^2+1=0$, and then taking a and b any real numbers, we form an expression such as $a+bi$, and use the expression number in this extended sense: any two such numbers may be added or subtracted, multiplied or divided one by the other, and the result is always a number. And if we consider first a quadric equation $x^2+px+q=0$ where p and q are real numbers, and next the like equation, where p and q are any numbers whatever, it can be shown that there exists for x a numerical value which satisfies the equation; or, in other words, it can be shown that the equation has a numerical root. The like theorem, in fact, holds good for an equation of any order whatever; but suppose for a moment that this was not the case; say that there was a cubic equation $x^3+px^2+qx+r=0$, with numerical coefficients, not satisfied by any numerical value of x, we should have to establish a new imaginary j satisfying some such equation, and should then have to consider numbers of the form $a+bj$, or perhaps $a+bj+cj^2$ (a, b, c numbers $\alpha+\beta i$ of the kind heretofore considered),—first we should be thrown back on the quadric equation $x^2+px+q=0$, p and q being now numbers of the last-mentioned extended form—*non constat* that every such equation has a numerical root—and if not, we might be led to *other* imaginaries k, l, &c., and so on *ad infinitum* in inextricable confusion.

But in fact a numerical equation of any order whatever has always a numerical root, and thus numbers (in the foregoing sense, number$=$quantity of the form $\alpha+\beta i$) form (*what real numbers do not*) a universe complete in itself, such that starting in it we are never led out of it. There may very well be, and perhaps are, numbers in a more general sense of the term (quaternions are not a case in point, as the ordinary laws of combination are not adhered to), but in order to have to do with such numbers (if any) we must start with them.

8. The capital theorem as regards numerical equations thus is, every numerical equation has a numerical root; or for shortness (the meaning being as before), every equation has a root. Of course the theorem is the reverse of self-evident, and it requires proof; but provisionally assuming it as true, we derive from it the general theory of numerical equations. As the term root was introduced in the course of an explanation, it will be convenient to give here the formal definition.

A number a such that substituted for x it makes the function $x_1^n-p_1x^{n-1}\ldots\pm p_n$ to be $=0$, or say such that it satisfies the equation $f(x)=0$, is said to be a root of the equation; that is, a being a root, we have

$$a^n-p_1a^{n-1}\ldots\pm p_n=0,\text{ or say }f(a)=0;$$

and it is then easily shown that $x-a$ is a factor of the function $f(x)$, viz. that we have $f(x)=(x-a)f_1(x)$, where $f_1(x)$ is a function $x^{n-1}-q_1x^{n-2}\ldots\pm q_{n-1}$ of the order $n-1$, with numerical coefficients $q_1, q_2\ldots q_{n-1}$.

In general a is not a root of the equation $f_1(x)=0$, but it may be so—*i.e.* $f_1(x)$ may contain the factor $x-a$; when this is so, $f(x)$ will contain the factor $(x-a)^2$; writing then $f(x)=(x-a)^2f_2(x)$, and assuming that a is not a root of the equation $f_2(x)=0$, $x=a$ is then said to be a double root of the equation $f(x)=0$; and similarly $f(x)$ may contain the factor $(x-a)^3$ and no higher power, and $x=a$ is then a triple root; and so on.

Supposing in general that $f(x)=(x-a)^{\alpha}\mathrm{F}(x)$ (α being a positive integer which may be $=1$, $(x-a)^{\alpha}$ the highest power of $x-a$ which divides $f(x)$, and $\mathrm{F}(x)$ being of course of the order $n-\alpha$), then the equation $\mathrm{F}(x)=0$ will have a root b which will be different from a; $x-b$ will be a factor, in general a simple one, but it may be a multiple one, of $\mathrm{F}(x)$, and $f(x)$ will in this case be $=(x-a)^{\alpha}(x-b)^{\beta}\Phi(x)$ (β a positive integer which may be $=1$, $(x-b)^{\beta}$ the highest power of $x-b$ in $\mathrm{F}(x)$ or $f(x)$, and $\Phi(x)$ being of course of the order $n-\alpha-\beta$). The original equation $f(x)=0$ is in this case said to have α roots each $=a$, β roots each $=b$; and so on for any other factors $(x-c)^{\gamma}$, &c.

We have thus the *theorem*—A numerical equation of the order n has in every case n roots, viz. there exist n numbers, $a, b, \ldots$ (in general all distinct, but which may arrange themselves in any sets of equal values), such that $f(x)=(x-a)(x-b)(x-c)\ldots$ identically.

If the equation has equal roots, these can in general be determined, and the case is at any rate a special one which may be in the first instance excluded from consideration. It is, therefore, in general assumed that the equation $f(x)=0$ has all its roots unequal.

If the coefficients $p_1, p_2, \ldots$ are all or any one or more of them imaginary, then the equation $f(x)=0$, separating the real and imaginary parts thereof, may be written $\mathrm{F}(x)+i\Phi(x)=0$, where $\mathrm{F}(x)$, $\Phi(x)$ are each of them a function with real coefficients; and it thus appears that the equation $f(x)=0$, with imaginary coefficients, has not in general any real root; supposing it to have a real root a, this must be at once a root of each of the equations $\mathrm{F}(x)=0$ and $\Phi(x)=0$.

But an equation with real coefficients may have as well imaginary as real roots, and we have further the *theorem* that for any such equation the imaginary roots enter in pairs, viz. $\alpha+\beta i$ being a root, then $\alpha-\beta i$ will be also a root. It follows that if the order be odd, there is always an odd number of real roots, and therefore at least one real root.

9. In the case of an equation with real coefficients, the question of the existence of real roots, and of their separation, has been already considered. In the general case of an equation with imaginary (it may be real) coefficients, the like question arises as to the situation of the (real or imaginary) roots; thus, if for facility of conception we regard the constituents α, β of a root $\alpha+\beta i$ as the co-ordinates of a point *in plano*, and accordingly represent the root by such point, then drawing in the plane any closed curve or "contour," the question is how many roots lie within such contour.

This is solved theoretically by means of a theorem of A. L. Cauchy (1837), viz. writing in the original equation $x+iy$ in place of x, the function $f(x+iy)$ becomes $=\mathrm{P}+i\mathrm{Q}$, where P and Q are each of them a rational and integral function (with real coefficients) of (x, y). Imagining the point (x, y) to travel along the contour, and considering the number of changes of sign from $-$ to $+$ and from $+$ to $-$ of the fraction corresponding to passages of the fraction through zero (that is, to values for which P becomes $=0$, disregarding those for which Q becomes $=0$), the difference of these numbers gives the number of roots within the contour.

It is important to remark that the demonstration does not presuppose the existence of any root; the contour may be the infinity of the plane (such infinity regarded as a contour, or closed curve), and in this case it can be shown (and that very easily) that the difference of the numbers of changes of sign is $=n$; that is, there are within the infinite contour, or (what is the same thing) there are in all n roots; thus Cauchy's theorem contains really the proof of the fundamental theorem that a numerical equation of the nth order (not only has a numerical root, but) has precisely n roots. It would appear that this proof of the fundamental theorem in its most complete form is in principle identical with the last proof of K. F. Gauss (1849) of the theorem, in the form—A numerical equation of the nth order has always a root.[1]

But in the case of a finite contour, the actual determination of the difference which gives the number of real roots can be effected only in the case of a rectangular contour, by applying to each of its sides separately a method such as that of Sturm's theorem; and thus the actual determination ultimately depends on a method such as that of Sturm's theorem.

Very little has been done in regard to the calculation of the imaginary roots of an equation by approximation; and the question is not here considered.

10. A class of numerical equations which needs to be considered is that of the binomial equations $x^n-a=0$ ($a=\alpha+\beta i$, a complex number). The foregoing conclusions apply, viz. there are always n roots, which, it may be shown, are all unequal. And these can be found numerically by the extraction of the square root, and of an nth root, of *real* numbers, and by the aid of a table of natural sines and cosines.[2] For writing

$$\alpha+\beta i=\sqrt{(\alpha^2+\beta^2)}\left\{\frac{\alpha}{\sqrt{(\alpha^2+\beta^2)}}+\frac{\beta}{\sqrt{(\alpha^2+\beta^2)}}i\right\},$$

there is always a real angle λ (positive and less than 2π), such that its cosine and sine are $=\frac{\alpha}{\sqrt{(\alpha^2+\beta^2)}}$ and $\frac{\beta}{\sqrt{(\alpha^2+\beta^2)}}$ respectively; that is, writing for shortness $\sqrt{(\alpha^2+\beta^2)}=\rho$, we have $\alpha+\beta i=\rho(\cos\lambda+i\sin\lambda)$, or the equation is $x^n=\rho(\cos\lambda+i\sin\lambda)$; hence observing that $\left(\cos\frac{\lambda}{n}+i\sin\frac{\lambda}{n}\right)^n=\cos\lambda+i\sin\lambda$, a value of x is $=\sqrt[n]{\rho}\left(\cos\frac{\lambda}{n}+i\sin\frac{\lambda}{n}\right)$. The formula really gives all the roots, for instead of λ we may write $\lambda+2s\pi$, s a positive or negative integer, and then we have

$$x=\sqrt[n]{\rho}\left(\cos\frac{\lambda+2s\pi}{n}+i\sin\frac{\lambda+2s\pi}{n}\right),$$

which has the n values obtained by giving to s the values $0, 1, 2 \ldots n-1$ in succession; the roots are, it is clear, represented by points lying at equal intervals on a circle. But it is more convenient to proceed somewhat differently; taking one of the roots to be θ, so that $\theta^n=a$, then assuming $x=\theta y$, the equation becomes $y^n-1=0$, which equation, like the original equation, has precisely n roots (one of them being of course $=1$). And the original equation $x^n-a=0$ is thus reduced to the more simple equation $x^n-1=0$; and although the theory of this equation is included in the preceding one, yet it is proper to state it separately.

The equation $x^n-1=0$ has its several roots expressed in the form $1, \omega, \omega^2, \ldots \omega^{n-1}$, where ω may be taken $=\cos\frac{2\pi}{n}+i\sin\frac{2\pi}{n}$; in fact, ω having this value, any integer power ω^k is $=\cos\frac{2\pi k}{n}+i\sin\frac{2\pi k}{n}$, and we thence have $(\omega^k)^n=\cos 2\pi k+i\sin 2\pi k$, $=1$, that is, ω^k is a root of the equation. The theory will be resumed further on.

By what precedes, we are led to the notion (*a* numerical) of the radical $a^{1/n}$ regarded as an n-valued function; any one of these being denoted by $\sqrt[n]{a}$, then the series of values is $\sqrt[n]{a}, \omega\sqrt[n]{a}, \ldots \omega^{n-1}\sqrt[n]{a}$; or we may, if we please, use $\sqrt[n]{a}$ instead of $a^{1/n}$ as a symbol to denote the n-valued function.

As the coefficients of an algebraical equation may be numerical, all which follows in regard to algebraical equations is (with, it may be, some few modifications) applicable to numerical equations; and hence, concluding for the present this subject, it will be convenient to pass on to algebraical equations.

Algebraical Equations.

11. The equation is

$$x^n-p_1x^{n-1}+\ldots\pm p_n=0,$$

and we here *assume* the existence of roots, viz. we assume that there are n quantities $a, b, c \ldots$ (in general all of them different, but which in particular cases may become equal in sets in any manner), such that

$$x^n-p_1x^{n-1}+\ldots\pm p_n=0;$$

or looking at the question in a different point of view, and starting with the roots $a, b, c \ldots$ as given, we express the product of the n factors $x-a, x-b, \ldots$ in the foregoing form, and thus arrive at an equation of the order n having the n roots $a, b, c \ldots$ In either case we have

$$p_1=\Sigma a,\ p_2=\Sigma ab, \ldots p_n=abc \ldots;$$

i.e. regarding the coefficients $p_1, p_2 \ldots p_n$ as given, then we assume the existence of roots $a, b, c, \ldots$ such that $p_1=\Sigma a$, &c.; or, regarding the roots as given, then we write p_1, p_2, &c., to denote the functions Σa, Σab, &c.

As already explained, the epithet algebraical is not used in opposition to numerical; an algebraical equation is merely an equation wherein the coefficients are not restricted to denote, or are not explicitly considered as denoting, numbers. That the abstraction is legitimate, appears by the simplest example; in saying that the equation $x^2-px+q=0$ has a root $x=\frac{1}{2}\{p+\sqrt{(p^2-4q)}\}$, we mean that writing this value for x the equation becomes an identity, $[\frac{1}{2}\{p+\sqrt{(p^2-4q)}\}]^2-p[\frac{1}{2}\{p+\sqrt{(p^2-4q)}\}]+q=0$; and the verification of this identity in nowise depends upon p and q meaning numbers. But if it be asked what there is beyond numerical equations included in the term algebraical equation, or, again, what is the full extent of the meaning attributed to the term—the latter question at any rate it would be very difficult to answer; as to the former one, it may be said that the coefficients may, for instance, be symbols of operation. As regards such equations, there is certainly no proof that every equation has a root, or that an equation of the nth order has n roots; nor is it in any wise clear what the precise signification of the statement is. But it is found that the assumption of the existence of the n roots can be made without contradictory results; conclusions derived from it, if they involve the roots, rest on the same ground as the original assumption; but the conclusion may be independent of the roots altogether, and in this case it is undoubtedly valid; the reasoning, although actually conducted by aid of the assumption (and, it may be, most easily and elegantly in this manner), is really independent of the assumption. In illustration, we observe that it is allowable to express a function of p and q as follows,—that is, by means of a rational symmetrical function of a and b, this can, as a fact, be expressed as a rational function of $a+b$ and ab; and if we prescribe that $a+b$ and ab shall then be changed into p and q respectively, we have the required function of p, q. That is, we have $F(\alpha, \beta)$ as a representation of $f(p, q)$, obtained as if we had $p=a+b$, $q=ab$, but without in any wise assuming the existence of the a, b of these equations.

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[1] The earlier demonstrations by Euler, Lagrange, &c., relate to the case of a numerical equation with real coefficients; and they consist in showing that such equation has always a real quadratic divisor, furnishing two roots, which are either real or else conjugate imaginaries $\alpha+\beta i$ (see Lagrange's *Équations numériques*).

[2] The square root of $\alpha+\beta i$ can be determined by the extraction of square roots of positive real numbers, without the trigonometrical tables.

12. Starting from the equation

$$x^n-p_1x^{n-1}+\ldots=x-a\,.\,x-b\,.\ \&c.$$

or the equivalent equations $p_1=\Sigma a$, &c., we find

$$\begin{aligned}a^n-p_1a^{n-1}+\ldots&=0,\\ b^n-p_1b^{n-1}+\ldots&=0;\\ \vdots\qquad\vdots\qquad&\ \ \vdots\end{aligned}$$

(it is as satisfying these equations that a, b . . . are said to be the roots of $x^n-p_1x^{n-1}+\ \ldots=0$); and conversely from the last-mentioned equations, assuming that a, b . . . are all different, we deduce

$$p_1=\Sigma a,\ p_2=\Sigma ab,\ \&c.$$

and

$$x^n-p_1x^{n-1}+\ldots=x-a\,.\,x-b\,.\ \&c.$$

Observe that if, for instance, $a=b$, then the equations $a^n-p_1a^{n-1}+\ldots=0$, $b^n-p_1b^{n-1}+\ldots=0$ would reduce themselves to a single relation, which would not of itself express that a was a double root,—that is, that $(x-a)^2$ was a factor of $x^n-p_1x^{n-1}+$, &c.; but by considering b as the limit of $a+h$, h indefinitely small, we obtain a second equation

$$na^{n-1}-(n-1)p_1a^{n-2}+\ldots=0,$$

which, with the first, expresses that a is a double root; and then the whole system of equations leads as before to the equations $p_1=\Sigma a$, &c. But the existence of a double root implies a certain relation between the coefficients; the general case is when the roots are all unequal.

We have then the *theorem* that every rational symmetrical function of the roots is a rational function of the coefficients. This is an easy consequence from the less general theorem, every rational and integral symmetrical function of the roots is a rational and integral function of the coefficients.

In particular, the sums of the powers Σa^2, Σa^3, &c.; are rational and integral functions of the coefficients.

The process originally employed for the expression of other functions $\Sigma a^\alpha b^\beta$, &c., in terms of the coefficients is to make them depend upon the sums of powers: for instance, $\Sigma a^\alpha b^\beta=\Sigma a^\alpha\Sigma a^\beta-\Sigma a^{\alpha+\beta}$; but this is very objectionable; the true theory consists in showing that we have systems of equations

$$\begin{aligned}&p_1=\Sigma a,\\ &\left\{\begin{aligned}p_2&=\Sigma ab\\ p_1^2&=\Sigma a^2+2\Sigma ab,\end{aligned}\right.\\ &\left\{\begin{aligned}p_3&=\Sigma abc,\\ p_1p_2&=\Sigma a^2b+3\Sigma abc,\\ p_1^3&=\Sigma a^3+3\Sigma a^2b+6\Sigma abc,\end{aligned}\right.\end{aligned}$$

where in each system there are precisely as many equations as there are root-functions on the right-hand side—*e.g.* 3 equations and 3 functions Σabc, Σa^2b, Σa^3. Hence in each system the root-functions can be determined linearly in terms of the powers and products of the coefficients:

$$\begin{aligned}&\left\{\begin{aligned}\Sigma ab&=p_2,\\ \Sigma a^2&=p_1^2-2p_2,\end{aligned}\right.\\ &\left\{\begin{aligned}\Sigma abc&=p_3,\\ \Sigma a^2b&=p_1p_2-3p_3,\\ \Sigma a^3&=p_1^3-3p_1p_2+3p_3,\end{aligned}\right.\end{aligned}$$

and so on. The other process, if applied consistently, would derive the originally assumed value $\Sigma ab,=p_2$, from the two equations $\Sigma a=p$, $\Sigma a^2=p_1^2-2p_2$; *i.e.* we have $2\Sigma ab=\Sigma a\,.\,\Sigma a-\Sigma a^2,=p_1^2-(p_1^2-2p_2),=2p_2$.

13. It is convenient to mention here the theorem that, x being determined as above by an equation of the order n, any rational and integral function whatever of x, or more generally any rational function which does not become infinite in virtue of the equation itself, can be expressed as a rational and integral function of x, of the order $n-1$, the coefficients being rational functions of the coefficients of the equation. Thus the equation gives x^n a function of the form in question; multiplying each side by x, and on the right-hand side writing for x^n its foregoing value, we have x^{n+1}, a function of the form in question; and the like for any higher power of x, and therefore also for any rational and integral function of x. The proof in the case of a rational non-integral function is somewhat more complicated. The final result is of the form $\phi(x)/\psi(x)=\mathrm{I}(x)$, or say $\phi(x)-\psi(x)\mathrm{I}(x)=0$, where ϕ, ψ, I are rational and integral functions; in other words, this equation, being true if only $f(x)=0$, can only be so by reason that the left-hand side contains $f(x)$ as a factor, or we must have identically $\phi(x)-\psi(x)\mathrm{I}(x)=\mathrm{M}(x)f(x)$. And it is, moreover, clear that the equation $\phi(x)/\psi(x)=\mathrm{I}(x)$, being satisfied if only $f(x)=0$, must be satisfied by each root of the equation.

From the theorem that a rational symmetrical function of the roots is expressible in terms of the coefficients, it at once follows that it is possible to determine an equation (of an assignable order) having for its roots the several values of any given (unsymmetrical) function of the roots of the given equation. For example, in the case of a quartic equation, roots (a, b, c, d), it is possible to find an equation having the roots ab, ac, ad, bc, bd, cd (being therefore a sextic equation): viz. in the product

$$(y-ab)(y-ac)(y-ad)(y-bc)(y-bd)(y-cd)$$

the coefficients of the several powers of y will be symmetrical functions of a, b, c, d and therefore rational and integral functions of the coefficients of the quartic equation; hence, supposing the product so expressed, and equating it to zero, we have the required sextic equation. In the same manner can be found the sextic equation having the roots $(a-b)^2$, $(a-c)^2$, $(a-d)^2$, $b-c)^2$, $(b-d)^2$, $(c-d)^2$, which is the equation of differences previously referred to; and similarly we obtain the equation of differences for a given equation of any order. Again, the equation sought for may be that having for its n roots the given rational functions $\phi(a), \phi(b), \ldots$ of the several roots of the given equation. Any such rational function can (as was shown) be expressed as a rational and integral function of the order $n-1$; and, retaining x in place of any one of the roots, the problem is to find y from the equations $x^n-p_1x^{n-1}\ldots=0$, and $y=\mathrm{M}_0x^{n-1}+\mathrm{M}_1x^{n-2}+\ldots$, or, what is the same thing, from these two equations to eliminate x. This is in fact E. W. Tschirnhausen's transformation (1683).

14. In connexion with what precedes, the question arises as to the number of values (obtained by permutations of the roots) of given unsymmetrical functions of the roots, or say of a given set of letters: for instance, with roots or letters (a, b, c, d) as before, how many values are there of the function $ab+cd$, or better, how many functions are there of this form? The answer is 3, viz. $ab+cd$, $ac+bd$, $ad+bc$; or again we may ask whether, in the case of a given number of letters, there exist functions with a given number of values, 3-valued, 4-valued functions, &c.

It is at once seen that for any given number of letters there exist 2-valued functions; the product of the differences of the letters is such a function; however the letters are interchanged, it alters only its sign; or say the two values are Δ and $-\Delta$. And if P, Q are symmetrical functions of the letters, then the general form of such a function is $\mathrm{P}+\mathrm{Q}\Delta$; this has only the two values $\mathrm{P}+\mathrm{Q}\Delta$, $\mathrm{P}-\mathrm{Q}\Delta$.

In the case of 4 letters there exist (as appears above) 3-valued functions: but in the case of 5 letters there does not exist any 3-valued or 4-valued function; and the only 5-valued functions are those which are symmetrical in regard to four of the letters, and can thus be expressed in terms of one letter and of symmetrical functions of all the letters. These last theorems present themselves in the demonstration of the non-existence of a solution of a quintic equation by radicals.

The theory is an extensive and important one, depending on the notions of *substitutions* and of *groups* (*q.v.*).

15. Returning to equations, we have the very important theorem that, given the value of any unsymmetrical function of the roots, *e.g.* in the case of a quartic equation, the function $ab+cd$, it is in general possible to determine rationally the value of any similar function, such as $(a+b)^3+(c+d)^3$.

The *a priori* ground of this theorem may be illustrated by means of a numerical equation. Suppose that the roots of a quartic equation are 1, 2, 3, 4, then if it is given that $ab+cd=14$, this in effect determines a, b to be 1, 2 and c, d to be 3, 4 (viz. $a=1, b=2$ or $a=2, b=1$, and $c=3$, $d=4$ or $c=3$, $d=4$) or else a, b to be 3, 4 and c, d to be 1, 2; and it therefore in effect determines $(a+b)^3+(c+d)^3$ to be $=370$, and not any other value; that is, $(a+b)^3+(c+d)^3$, as having a single value, must be determinable rationally. And we can in the same way account for cases of failure as regards particular equations; thus, the roots being 1, 2, 3, 4 as before, $a^2b=2$ determines a to be $=1$ and b to be $=2$, but if the roots had been 1, 2, 4, 16 then $a^2b=16$ does not uniquely determine a,b but only makes them to be 1,16 or 2,4 respectively.

As to the *a posteriori* proof, assume, for instance,

$$\begin{aligned} t_1&=ab+cd, & y_1&=(a+b)^3+(c+d)^3,\\ t_2&=ac+bd, & y_2&=(a+c)^3+(b+d)^3,\\ t_3&=ad+bc, & y_3&=(a+d)^3+(b+c)^3: \end{aligned}$$

then $y_1+y_2+y_3$, $t_1y_1+t_2y_2+t_3y_3$, $t_1^2y_1+t_2^2y_2+t_3^2y_3$ will be respectively symmetrical functions of the roots of the quartic, and therefore rational and integral functions of the coefficients; that is, they will be known.

Suppose for a moment that t_1, t_2, t_3 are *all* known; then the equations being linear in y_1, y_2, y_3 these can be expressed rationally in terms of the coefficients and of t_1, t_2, t_3; that is, y_1, y_2, y_3 will be known. But observe further that y_1 is obtained as a function of t_1, t_2, t_3 symmetrical as regards t_2, t_3; it can therefore be expressed as a rational function of t_1 and of t_2+t_3, t_2t_3, and thence as a rational function of t_1 and of $t_1+t_2+t_3$, $t_1t_2+t_1t_3+t_2t_3$, $t_1t_2t_3$; but these last are symmetrical functions of the roots, and as such they are expressible rationally in terms of the coefficients; that is, y_1 will be expressed as a rational function of t_1 and of the coefficients; or t_1 (alone, not t_2 or t_3) being known, y_1 will be rationally determined.

16. We now consider the question of the algebraical solution of equations, or, more accurately, that of the *solution of equations by radicals.*

In the case of a quadric equation $x^2-px+q=0$, we can by the assistance of the sign $\sqrt{\ }(\ )$ or $(\ )^{\frac{1}{2}}$ find an expression for x as a 2-valued function of the coefficients p, q such that substituting this value in the equation, the equation is thereby identically satisfied; it has been found that this expression is

$$x=\tfrac{1}{2}\{p\pm\sqrt{(p^2-4q)}\},$$

and the equation is on this account said to be algebraically solvable, or more accurately solvable by radicals. Or we may by writing $x=-\frac{1}{2}p+z$ reduce the equation to $z^2=\frac{1}{4}(p^2-4q)$, viz. to an equation of the form $x^2=a$; and in virtue of its being thus reducible we say that the original equation is solvable by radicals. And the question for an equation of any higher order, say of the order n, is, can we by means of radicals (that is, by aid of the sign $\sqrt[m]{\ }(\ )$ or $(\ )^{1/m}$, using as many as we please of such signs and with any values of m) find an n-valued function (or any function) of the coefficients which substituted for x in the equation shall satisfy it identically?

It will be observed that the coefficients p, q ... are not explicitly considered as numbers, but even if they do denote numbers, the question whether a numerical equation admits of solution by radicals is wholly unconnected with the before-mentioned theorem of the existence of the n roots of such an equation. It does not even follow that in the case of a numerical equation solvable by radicals the algebraical solution gives the numerical solution, but this requires explanation. Consider first a numerical quadric equation with imaginary coefficients. In the formula $x=\frac{1}{2}\{p\pm\sqrt{(p^2-4q)}\}$, substituting for p, q their given numerical values, we obtain for x an expression of the form $x=\alpha+\beta i\pm\sqrt{(\gamma+\delta i)}$, where α, β, γ, δ are real numbers. This expression substituted for x in the quadric equation would satisfy it identically, and it is thus an algebraical solution; but there is no obvious *a priori* reason why $\sqrt{(\gamma+\delta i)}$ should have a value $=c+di$, where c and d are real numbers calculable by the extraction of a root or roots of real numbers; however the case is (what there was no *a priori* right to expect) that $\sqrt{(\gamma+\delta i)}$ has such a value calculable by means of the radical expressions $\sqrt{\{\sqrt{(\gamma^2+\delta^2)}\pm\gamma\}}$: and hence the algebraical solution of a numerical quadric equation does in every case give the numerical solution. The case of a numerical cubic equation will be considered presently.

17. A cubic equation can be solved by radicals.

Taking for greater simplicity the cubic in the reduced form $x^3+qx-r=0$, and assuming $x=a+b$, this will be a solution if only $3ab=q$ and $a^3+b^3=r$, equations which give $(a^3-b^3)^2=r^2-\frac{4}{27}q^3$, a quadric equation solvable by radicals, and giving $a^3-b^3=\sqrt{(r^2-\frac{4}{27}q^3)}$, a 2-valued function of the coefficients: combining this with $a^3+b^3=r$, we have $a^3=\frac{1}{2}\{r+\sqrt{(r^2-\frac{4}{27}q^3)}\}$, a 2-valued function: we then have a by means of a cube root, viz.

$$a=\sqrt[3]{[\tfrac{1}{2}\{r+\sqrt{(r^2-\tfrac{4}{27}q^3)}\}]},$$

a 6-valued function of the coefficients; but then, writing $q=b/3a$, we have, as may be shown, $a+b$ a 3-valued function of the coefficients; and $x=a+b$ is the required solution by radicals. It would have been wrong to complete the solution by writing

$$b=\sqrt[3]{[\tfrac{1}{2}\{r-\sqrt{(r^2-\tfrac{4}{27}q^3)}\}]},$$

for then $a+b$ would have been given as a 9-valued function having only 3 of its values roots, and the other 6 values being irrelevant. Observe that in this last process we make no use of the equation $3ab=q$, in its original form, but use only the derived equation $27a^3b^3=q^3$, implied in, but not implying, the original form.

An interesting variation of the solution is to write $x=ab(a+b)$, giving $a^3b^3(a^3+b^3)=r$ and $3a^3b^3=q$, or say $a^3+b^3=\dfrac{3r}{q}$, $a^3b^3=\frac{1}{3}q$; and consequently

$$a^3=\tfrac{3}{q}\{r+\sqrt{(r^2-\tfrac{4}{27}q^3)}\},\ \ b^3=\tfrac{3}{q}\{r-\sqrt{(r^2-\tfrac{4}{27}q^3)}\},$$

i.e. here a^3, b^3 are each of them a 2-valued function, but as the only effect of altering the sign of the quadric radical is to interchange a^3, b^3, they may be regarded as each of them 1-valued; a and b are each of them 3-valued (for observe that here only a^3b^3, not ab, is given); and $ab(a+b)$ thus is in appearance a 9-valued function; but it can easily be shown that it is (as it ought to be) only 3-valued.

In the case of a numerical cubic, even when the coefficients are real, substituting their values in the expression

$$x=\sqrt[3]{[\tfrac{1}{2}\{r+\sqrt{(r^2-\tfrac{4}{27}q^3)}\}]}+\tfrac{1}{3}q\div\sqrt[3]{[\tfrac{1}{2}\{r+\sqrt{(r^2-\tfrac{4}{27}q^3)}\}]},$$

this may depend on an expression of the form $\sqrt[3]{(\gamma+\delta i)}$ where γ and δ are real numbers (it will do so if $r^2-\frac{4}{27}q^3$ is a negative number), and then we *cannot* by the extraction of any root or roots of real positive numbers reduce $\sqrt[3]{(\gamma+\delta i)}$ to the form $c+di$, c and d real numbers; hence here the algebraical solution does *not* give the numerical solution, and we have here the so-called "irreducible case" of a cubic equation. By what precedes there is nothing in this that might not have been expected; the algebraical solution makes the solution depend on the extraction of the cube root of a number, and there was no reason for expecting this to be a real number. It is well known that the case in question is that wherein the three roots of the numerical cubic equation are all real; if the roots are two imaginary, one real, then contrariwise the quantity under the cube root is real; and the algebraical solution gives the numerical one.

The irreducible case is solvable by a trigonometrical formula, but this is not a solution by radicals: it consists in effect in reducing the given numerical cubic (not to a cubic of the form $z^3=a$, solvable by the extraction of a cube root, but) to a cubic of the form $4x^3-3x=a$, corresponding to the equation $4\cos^3\theta-3\cos\theta=\cos 3\theta$ which serves to determine $\cos\theta$ when $\cos 3\theta$ is known. The theory is applicable to an algebraical cubic equation; say that such an equation, if it can be reduced to the form $4x^3-3x=a$, is solvable by "trisection"—then the general cubic equation is solvable by trisection.

18. A quartic equation is solvable by radicals. and it is to be remarked that the existence of such a solution depends on the existence of 3-valued functions such as $ab+cd$ of the four roots (a, b, c, d): by what precedes $ab+cd$ is the root of a cubic equation, which equation is solvable by radicals: hence $ab+cd$ can be found by radicals; and since $abcd$ is a given function, ab and cd can then be found by radicals. But by what precedes, if ab be known then any similar function, say $a+b$, is obtainable rationally; and then from the values of $a+b$ and ab we may by radicals obtain the value of a or b, that is, an expression for the root of the given quartic equation: the expression ultimately obtained is 4-valued, corresponding to the different values of the several radicals which enter therein, and we have thus the expression by radicals of each of the four roots of the quartic equation. But when the quartic is numerical the same thing happens as in the cubic, and the algebraical solution does not in every case give the numerical one.

It will be understood from the foregoing explanation as to the quartic how in the next following case, that of the quintic, the question of the solvability by radicals depends on the existence or non-existence of k-valued functions of the five roots (a, b, c, d, e); the fundamental theorem is the one already stated, a rational function of five letters, if it has less than 5, cannot have more than 2 values, that is, there are no 3-valued or 4-valued functions of 5 letters: and by reasoning depending in part upon this theorem, N. H. Abel (1824) showed that a general quintic equation is not solvable by radicals; and *a fortiori* the general equation of any order higher than 5 is not solvable by radicals.

19. The general theory of the solvability of an equation by radicals depends fundamentally on A. T. Vandermonde's remark (1770) that, supposing an equation is solvable by radicals, and that we have therefore an algebraical expression of x in terms of the coefficients, then substituting for the coefficients their values in terms of the roots, the resulting expression must reduce itself to any one at pleasure of the roots a, b, c . . . ; thus in the case of the quadric equation, in the expression $x=\frac{1}{2}\{p+\sqrt{(p^2-4q)}\}$, substituting for p and q their values, and observing that $(a+b)^2-4ab=(a-b)^2$, this becomes $x=\frac{1}{2}\{a+b+\sqrt{(a-b)^2}\}$, the value being a or b according as the radical is taken to be $+(a-b)$ or $-(a-b)$.

So in the cubic equation $x^3-px^2+qx-r=0$, if the roots are a, b, c, and if ω is used to denote an imaginary cube root of unity, $\omega^2+\omega+1=0$, then writing for shortness $p=a+b+c$, $\mathrm{L}=a+\omega b+\omega^2c$, $\mathrm{M}=a+\omega^2b+\omega c$, it is at once seen that LM, $\mathrm{L}^3+\mathrm{M}^3$, and therefore also

$(L^3-M^3)^2$ are symmetrical functions of the roots, and consequently rational functions of the coefficients: hence

$$\tfrac{1}{2}\{L^3+M^3+\sqrt{(L^3-M^3)^2}\}$$

is a rational function of the coefficients, which when these are replaced by their values as functions of the roots becomes, according to the sign given to the quadric radical, $=L^3$ or M^3; taking it $=L^3$, the cube root of the expression has the three values L, ωL, $\omega^2 L$; and LM divided by the same cube root has therefore the values M, $\omega^2 M$, ωM; whence finally the expression

$$\tfrac{1}{3}[p+\sqrt[3]{\{\tfrac{1}{2}(L^3+M^3+\sqrt{(L^3-M^3)^2})\}}+LM\div\sqrt[3]{\{\tfrac{1}{2}L^3+M^3+\sqrt{(L^3-M^3)^2})\}}]$$

has the three values

$$\tfrac{1}{3}(p+L+M),\ \tfrac{1}{3}(p+\omega L+\omega^2 M),\ \tfrac{1}{3}(p+\omega^2 L+\omega M);$$

that is, these are $=a, b, c$ respectively. If the value M^3 had been taken instead of L^3, then the expression would have had the same three values a, b, c. Comparing the solution given for the cubic $x^3+qx-r=0$, it will readily be seen that the two solutions are identical, and that the function $r^2-\frac{4}{27}q^3$ under the radical sign must (by aid of the relation $p=0$ which subsists in this case) reduce itself to $(L^3-M^3)^2$; it is only by each radical being equal to a rational function of the roots that the final expression *can* become equal to the roots a, b, c respectively.

20. The formulae for the cubic were obtained by J. L. Lagrange (1770–1771) from a different point of view. Upon examining and comparing the principal known methods for the solution of algebraical equations, he found that they all ultimately depended upon finding a "resolvent" equation of which the root is $a+\omega b+\omega^2 c+\omega^3 d+\ldots$, ω being an imaginary root of unity, of the same order as the equation; *e.g.* for the cubic the root is $a+\omega b+\omega^2 c$, ω an imaginary cube root of unity. Evidently the method gives for L^3 a quadric equation, which is the "resolvent" equation in this particular case.

For a quartic the formulae present themselves in a somewhat different form, by reason that 4 is not a prime number. Attempting to apply it to a quintic, we seek for the equation of which the root is $(a+\omega b+\omega^2 c+\omega^3 d+\omega^4 e)$, ω an imaginary fifth root of unity, or rather the fifth power thereof $(a+\omega b+\omega^2 c+\omega^3 d+\omega^4 e)^5$; this is a 24-valued function, but if we consider the four values corresponding to the roots of unity $\omega, \omega^2, \omega^3, \omega^4$, viz. the values

$$\begin{gathered}(a+\omega\, b+\omega^2 c+\omega^3 d+\omega^4 e)^5,\\ (a+\omega^2 b+\omega^4 c+\omega\, d+\omega^3 e)^5,\\ (a+\omega^3 b+\omega\, c+\omega^4 d+\omega^2 e)^5,\\ (a+\omega^4 b+\omega^3 c+\omega^2 d+\omega\, e)^5,\end{gathered}$$

any symmetrical function of these, for instance their sum, is a 6-valued function of the roots, and may therefore be determined by means of a sextic equation, the coefficients whereof are rational functions of the coefficients of the original quintic equation; the conclusion being that the solution of an equation of the fifth order is made to depend upon that of an equation of the sixth order. This is, of course, useless for the solution of the quintic equation, which, as already mentioned, does not admit of solution by radicals; but the equation of the sixth order, Lagrange's resolvent sextic, is very important, and is intimately connected with all the later investigations in the theory.

21. It is to be remarked, in regard to the question of solvability by radicals, that not only the coefficients are taken to be arbitrary, but it is assumed that they are represented each by a single letter, or say rather that they are not so expressed in terms of other arbitrary quantities as to make a solution possible. If the coefficients are not all arbitrary, for instance, if some of them are zero, a sextic equation might be of the form $x^6+bx^4+cx^2+d=0$, and so be solvable as a cubic; or if the coefficients of the sextic are given functions of the six arbitrary quantities a, b, c, d, e, f, such that the sextic is really of the form $(x^2+ax+b)(x^4+cx^3+dx^2+ex+f)=0$, then it breaks up into the equations $x^2+ax+b=0$, $x^4+cx^3+dx^2+ex+f=0$, and is consequently solvable by radicals; so also if the form is $(x-a)(x-b)(x-c)(x-d)(x-e)(x-f)=0$, then the equation is solvable by radicals,—in this extreme case rationally. Such cases of solvability are self-evident; but they are enough to show that the general theorem of the non-solvability by radicals of an equation of the fifth or any higher order does not in any wise exclude for such orders the existence of particular equations solvable by radicals, and there are, in fact, extensive classes of equations which are thus solvable; the binomial equations $x^n-1=0$ present an instance.

22. It has already been shown how the several roots of the equation $x^n-1=0$ can be expressed in the form $\cos\frac{2s\pi}{n}+i\sin\frac{2s\pi}{n}$, but the question is now that of the algebraical solution (or solution by radicals) of this equation. There is always a root $=1$; if ω be any other root, then obviously $\omega, \omega^2, \ldots \omega^{n-1}$ are all of them roots; x^n-1 contains the factor $x-1$, and it thus appears that $\omega, \omega^2, \ldots \omega^{n-1}$ are the $n-1$ roots of the equation

$$x^{n-1}+x^{n-2}+\ldots+x+1=0;$$

we have, of course, $\omega^{n-1}+\omega^{n-2}+\ldots+\omega+1=0$.

It is proper to distinguish the cases n prime and n composite; and in the latter case there is a distinction according as the prime factors of n are simple or multiple. By way of illustration, suppose successively $n=15$ and $n=9$; in the former case, if α be an imaginary root of $x^3-1=0$ (or root of $x^2+x+1=0$), and β an imaginary root of $x^5-1=0$ (or root of $x^4+x^3+x^2+x+1=0$), then ω may be taken $=\alpha\beta$; the successive powers thereof, $\alpha\beta$, $\alpha^2\beta^2$, β^3, $\alpha\beta^4$, α^2, β, $\alpha\beta^2$, $\alpha^2\beta^3$, β^4, α, $\alpha^2\beta$, β^2, $\alpha\beta^3$, $\alpha^2\beta^4$, are the roots of $x^{14}+x^{13}+\ldots+x+1=0$; the solution thus depends on the solution of the equations $x^3-1=0$ and $x^5-1=0$. In the latter case, if α be an imaginary root of $x^3-1=0$ (or root of $x^2+x+1=0$), then the equation $x^9-1=0$ gives $x^3=1$, α, or α^2; $x^3=1$ gives $x=1$, α, or α^2; and the solution thus depends on the solution of the equations $x^3-1=0$, $x^3-\alpha=0$, $x^3-\alpha^2=0$. The first equation has the roots $1, \alpha, \alpha^2$; if β be a root of either of the others, say if $\beta^3=\alpha$, then assuming $\omega=\beta$, the successive powers are β, β^2, α, $\alpha\beta$, $\alpha\beta^2$, α^2, $\alpha^2\beta$, $\alpha^2\beta^2$, which are the roots of the equation $x^8+x^7+\ldots+x+1=0$.

It thus appears that the only case which need be considered is that of n a prime number, and writing (as is more usual) r in place of ω, we have $r, r^2, r^3, \ldots r^{n-1}$ as the $(n-1)$ roots of the reduced equation

$$x^{n-1}+x^{n-2}+\ldots+x+1=0;$$

then not only $r^n-1=0$, but also $r^{n-1}+r^{n-2}+\ldots+r+1=0$.

23. The process of solution due to Karl Friedrich Gauss (1801) depends essentially on the arrangement of the roots in a certain order, viz. not as above, with the indices of r in arithmetical progression, but with their indices in geometrical progression; the prime number n has a certain number of prime roots g, which are such that g^{n-1} is the lowest power of g, which is $\equiv 1$ to the modulus n; or, what is the same thing, that the series of powers $1, g, g^2, \ldots g^{n-2}$, each divided by n, leave (in a different order) the remainders $1, 2, 3, \ldots n-1$; hence giving to r in succession the indices $1, g, g^2, \ldots g^{n-2}$, we have, in a different order, the whole series of roots $r, r^2, r^3, \ldots r^{n-1}$.

In the most simple case, $n=5$, the equation to be solved is $x^4+x^3+x^2+x+1=0$; here 2 is a prime root of 5, and the order of the roots is r, r^2, r^4, r^3. The Gaussian process consists in forming an equation for determining the periods $P_1, P_2, =r+r^4$ and r^2+r^3 respectively,—these being such that the symmetrical functions P_1+P_2, P_1P_2 are rationally determinable: in fact $P_1+P_2=-1$, $P_1P_2=(r+r^4)(r^2+r^3)$, $=r^3+r^4+r^6+r^7$, $=r^3+r^4+r+r^2$, $=-1$. P_1, P_2 are thus the roots of $u^2+u-1=0$; and taking them to be known, they are themselves broken up into subperiods, in the present case single terms, r and r^4 for P_1, r^2 and r^3 for P_2; the symmetrical functions of these are then rationally determined in terms of P_1 and P_2; thus $r+r^4=P_1$, $r.r^4=1$, or r, r^4 are the roots of $u^2-P_1u+1=0$. The mode of division is more clearly seen for a larger value of n; thus, for $n=7$ a prime root is $=3$, and the arrangement of the roots is $r, r^3, r^2, r^6, r^4, r^5$. We may form either 3 periods each of 2 terms, $P_1, P_2, P_3=r+r^6, r^3+r^4, r^2+r^5$ respectively; or else 2 periods each of 3 terms, $P_1, P_2=r+r^2+r^4, r^3+r^6+r^5$ respectively; in each case the symmetrical functions of the periods are rationally determinable: thus in the case of the two periods $P_1+P_2=-1$, $P_1P_2=3+r+r^2+r^3+r^4+r^5+r^6$, $=2$; and the periods being known the symmetrical functions of the several terms of each period are rationally determined in terms of the periods, thus $r+r^2+r^4=P_1$, $r.r^2+r.r^4+r^2.r^4=P_2$, $r.r^2.r^4=1$.

The theory was further developed by Lagrange (1808), who, applying his general process to the equation in question, $x^{n-1}+x^{n-2}+\ldots+x+1=0$(the roots $a, b, c\ldots$ being the several powers of r, the indices in geometrical progression as above), showed that the function $(a+\omega b+\omega^2 c+\ldots)^{n-1}$ was in this case a given function of ω with integer coefficients.

Reverting to the before-mentioned particular equation $x^4+x^3+x^2+x+1=0$, it is very interesting to compare the process of solution with that for the solution of the general quartic the roots whereof are a, b, c, d.

Take ω, a root of the equation $\omega^4-1=0$ (whence ω is $=1, -1, i$, or $-i$, at pleasure), and consider the expression

$$(a+\omega b+\omega^2 c+\omega^3 d)^4,$$

the developed value of this is

$$\begin{aligned}=\quad & a^4+b^4+c^4+d^4+6(a^2c^2+b^2d^2)+12(a^2bd+b^2ca+c^2db+d^2ac)\\ +\omega\, & \{4(a^3b+b^3c+c^3+d^3a)+12(a^2cd+b^2da+c^2ab+d^2bc)\}\\ +\omega^2 & \{6(a^2b^2+b^2c^2+c^2d^2+d^2a^2)+4(a^3c+b^3d+c^3a+d^3b)+24abcd\}\\ +\omega^3 & \{4(a^3d+b^3a+c^3b+d^3c)+12(a^2bc+b^2cd+c^2da+d^2ab)\}\ .\end{aligned}$$

that is, this is a 6-valued function of a, b, c, d, the root of a sextic (which is, in fact, solvable by radicals; but this is not here material).

If, however, a, b, c, d denote the roots r, r^2, r^4, r^3 of the special equation, then the expression becomes

$$\begin{aligned} &r^4+r^3+r+r^2+6(1+1)+12(r^2+r^4+r^3+r)\\ &\quad+\omega\{4(1+1+1+1)+12(r^4+r^3+r+r^2)\}\\ &\quad+\omega^2\{6(r+r^2+r^4+r^3)+4(r^2+r^4+r^3+r)\}\\ &\quad+\omega^3\{4(r+r^2+r^4+r^3)+12(r^3+r+r^2+r^4)\}\end{aligned}$$

viz. this is

$$=-1+4\omega+14\omega^2-16\omega^3,$$

a completely determined value. That is, we have

$$(r+\omega r^2+\omega^2 r^4+\omega^3 r^3)^4=-1+4\omega+14\omega^2-16\omega^3,$$

which result contains the solution of the equation. If $\omega=1$, we have $(r+r^2+r^4+r^3)^4=1$, which is right; if $\omega=-1$, then $(r+r^4-r^2-r^3)^4=25$; if $\omega=i$, then we have $\{r-r^4+i(r^2-r^3)\}^4=-15+20i$; and if $\omega=-i$, then $\{r-r^4-i(r^2-r^3)\}^4=-15-20i$; the solution may be completed without difficulty.

The result is perfectly general, thus:—n being a prime number, r a root of the equation $x^{n-1}+x^{n-2}+\ldots+x+1=0$, ω a root of $\omega^{n-1}-1=0$, and g a prime root of $g^{n-1}\equiv 1$ (mod. n), then

$$(r+\omega r^g+\ldots+\omega^{n-2} r^{g^{n-2}})_{n-1}$$

is a given function $M_0+M_1\omega\ldots+M_{n-2}\omega^{n-2}$ with integer coefficients, and by the extraction of $(n-1)$th roots of this and similar expressions we ultimately obtain r in terms of ω, which is taken to be known; the equation $x^n-1=0$, n a prime number, is thus solvable by radicals. In particular, if $n-1$ be a power of 2, the solution (by either process) requires the extraction of square roots only; and it was thus that Gauss discovered that it was possible to construct geometrically the regular polygons of 17 sides and 257 sides respectively. Some interesting developments in regard to the theory were obtained by C. G. J. Jacobi (1837); see the memoir "Ueber die Kreistheilung, u.s.w.," *Crelle*, t. xxx. (1846).

The equation $x^{n-1}+\ldots+x+1=0$ has been considered for its own sake, but it also serves as a specimen of a class of equations solvable by radicals, considered by N. H. Abel (1828), and since called Abelian equations, viz. for the Abelian equation of the order n, if x be any root, the roots are x, θx, $\theta^2 x$, $\ldots\theta^{n-1}x$ (θx being a rational function of x, and $\theta^n x=x$); the theory is, in fact, very analogous to that of the above particular case.

A more general theorem obtained by Abel is as follows:—If the roots of an equation of any order are connected together in such wise that *all* the roots can be expressed rationally in terms of any one of them, say x; if, moreover, θx, $\theta_1 x$ being any two of the roots, we have $\theta\theta_1 x=\theta_1\theta x$, the equation will be solvable algebraically. It is proper to refer also to Abel's definition of an *irreducible* equation:—an equation $\phi x=0$, the coefficients of which are rational functions of a certain number of known quantities $a, b, c\ldots$, is called irreducible when it is impossible to express its roots by an equation of an inferior degree, the coefficients of which are also rational functions of $a, b, c\ldots$ (or, what is the same thing, when ϕx does not break up into factors which are rational functions of $a, b, c\ldots$). Abel applied his theory to the equations which present themselves in the division of the elliptic functions, but not to the modular equations.

24. But the theory of the algebraical solution of equations in its most complete form was established by Evariste Galois (born October 1811, killed in a duel May 1832; see his collected works, *Liouville*, t. xl., 1846). The definition of an irreducible equation resembles Abel's,—an equation is reducible when it admits of a rational divisor, irreducible in the contrary case; only the word *rational* is used in this extended sense that, in connexion with the coefficients of the given equation, or with the irrational quantities (if any) whereof these are composed, he considers any number of other irrational quantities called "adjoint radicals," and he terms rational any rational function of the coefficients (or the irrationals whereof they are composed) and of these adjoint radicals; the epithet irreducible is thus taken either absolutely or in a relative sense, according to the system of adjoint radicals which are taken into account. For instance, the equation $x^4+x^3+x^2+x+1=0$; the left hand side has here no rational divisor, and the equation is irreducible; but this function is $=(x^2+\frac{1}{2}x+1)^2-\frac{5}{4}x^2$, and it has thus the irrational divisors $x^2+\frac{1}{2}(1+\sqrt{5})x+1$, $x^2+\frac{1}{2}(1-\sqrt{5})x+1$; and these, if we *adjoin* the radical $\sqrt{5}$, are rational, and the equation is no longer irreducible. In the case of a given equation, assumed to be irreducible, the problem to solve the equation is, in fact, that of finding radicals by the adjunction of which the equation becomes reducible; for instance, the general quadric equation $x^2+px+q=0$ is irreducible, but it becomes reducible, breaking up into rational linear factors, when we adjoin the radical $\sqrt{(\frac{1}{4}p^2-q)}$.

The fundamental theorem is the Proposition I. of the "Mémoire sur les conditions de résolubilité des équations par radicaux"; viz. given an equation of which $a, b, c\ldots$ are the m roots, there is always a group of permutations of the letters $a, b, c\ldots$ possessed of the following properties:—

1. Every function of the roots invariable by the substitutions of the group is rationally known.

2. Reciprocally every rationally determinable function of the roots is invariable by the substitutions of the group.

Here by an invariable function is meant not only a function of which the form is invariable by the substitutions of the group, but further, one of which the value is invariable by these substitutions: for instance, if the equation be $\phi(x)=0$, then $\phi(x)$ is a function of the roots invariable by any substitution whatever. And in saying that a function is rationally known, it is meant that its value is expressible rationally in terms of the coefficients and of the adjoint quantities.

For instance in the case of a general equation, the group is simply the system of the $1.2.3\ldots n$ permutations of all the roots, since, in this case, the only rationally determinable functions are the symmetric functions of the roots.

In the case of the equation $x^{n-1}\ldots+x+1=0$, n a prime number, $a, b, c\ldots k=r, r^g, r^{g^2}\ldots r^{g^{n-2}}$, where g is a prime root of n, then the group is the cyclical group $abc\ldots k$, $bc\ldots ka$, $\ldots kab\ldots j$, that is, in this particular case the number of the permutations of the group is equal to the order of the equation.

This notion of the group of the original equation, or of the group of the equation as varied by the adjunction of a series of radicals, seems to be the fundamental one in Galois's theory. But the problem of solution by radicals, instead of being the sole object of the theory, appears as the first link of a long chain of questions relating to the transformation and classification of irrationals.

Returning to the question of solution by radicals, it will be readily understood that by the adjunction of a radical the group may be diminished; for instance, in the case of the general cubic, where the group is that of the six permutations, by the adjunction of the square root which enters into the solution, the group is reduced to abc, bca, cab; that is, it becomes possible to express rationally, in terms of the coefficients and of the adjoint square root, any function such as $a^2b+b^2c+c^2a$ which is not altered by the cyclical substitution a into b, b into c, c into a. And hence, to determine whether an equation of a given form is solvable by radicals, the course of investigation is to inquire whether, by the successive adjunction of radicals, it is possible to reduce the original group of the equation so as to make it ultimately consist of a single permutation.

The condition in order that an equation of a given prime order n may be solvable by radicals was in this way obtained—in the first instance in the form (scarcely intelligible without further explanation) that every function of the roots $x_1, x_2\ldots x_n$, invariable by the substitutions x_{ak+b} for x_k, must be rationally known; and then in the equivalent form that the resolvent equation of the order $1.2\ldots(n-2)$ must have a rational root. In particular, the condition in order that a quintic equation may be solvable is that Lagrange's resolvent of the order 6 may have a rational factor, a result obtained from a direct investigation in a valuable memoir by E. Luther, *Crelle*, t. xxxiv. (1847).

Among other results demonstrated or announced by Galois may be mentioned those relating to the modular equations in the theory of elliptic functions; for the transformations of the orders 5, 7, 11, the modular equations of the orders 6, 8, 12 are depressible to the orders 5, 7, 11 respectively; but for the transformation, n a prime number greater than 11, the depression is impossible.

The general theory of Galois in regard to the solution of equations was completed, and some of the demonstrations supplied by E. Betti (1852). See also J. A. Serret's *Cours d'algèbre supérieure*, 2nd ed. (1854); 4th ed. (1877–1878).

25. Returning to quintic equations, George Birch Jerrard (1835) established the theorem that the general quintic equation is by the extraction of only square and cubic roots reducible to the form $x^5+ax+b=0$, or what is the same thing, to $x^5+x+b=0$. The actual reduction by means of Tschirnhausen's theorem was effected by Charles Hermite in connexion with his elliptic-function solution of the quintic equation (1858) in a very elegant manner. It was shown by Sir James Cockle and Robert Harley (1858–1859) in connexion with the Jerrardian form, and by Arthur Cayley (1861), that Lagrange's resolvent equation of the sixth order can be replaced by a more simple sextic equation occupying a like place in the theory.

The theory of the modular equations, more particularly for the case $n=5$, has been studied by C. Hermite, L. Kronecker and F. Brioschi. In the case $n=5$, the modular equation of the order 6 depends, as already mentioned, on an equation of the order 5; and conversely the general quintic equation may be made to depend upon this modular equation of the order 6; that is, assuming the solution of this modular equation, we can solve (not by radicals) the general quintic equation; this is Hermite's solution of the general quintic equation by elliptic functions (1858); it is analogous to the before-mentioned trigonometrical solution of the cubic equation. The theory is reproduced and developed in Brioschi's memoir, "Über die Auflösung der Gleichungen vom fünften Grade," *Math. Annalen*, t. xiii. (1877–1878).

26. The modern work, reproducing the theories of Galois, and exhibiting the theory of algebraic equations as a whole, is C. Jordan's *Traité des substitutions et des équations algébriques* (Paris, 1870). The work is divided into four books—book i., preliminary, relating to the theory of congruences; book ii. is in two chapters, the first relating to substitutions in general, the second to substitutions defined analytically, and chiefly to linear substitutions; book iii. has four chapters, the first discussing the principles of the general theory, the other three containing applications to algebra, geometry, and the theory of transcendents; lastly, book iv., divided into seven chapters, contains a determination of the general types of equations solvable by radicals, and a complete system of classification of these types. A glance through the index will show the vast extent which the theory has assumed, and the form of general conclusions arrived at; thus, in book iii., the algebraical applications comprise Abelian equations, equations of Galois; the geometrical ones comprise Q. Hesse's equation, R. F. A. Clebsch's equations, lines on a quartic surface having a nodal line, singular points of E. E. Kummer's surface, lines on a cubic surface, problems of contact; the applications to the theory of transcendents comprise circular functions, elliptic functions (including division and the modular equation), hyperelliptic functions, solution of equations by transcendents. And on this last subject, solution of equations by transcendents, we may quote the result—"the solution of the general equation of an order superior to five cannot be made to depend upon that of the equations for the division of the circular or elliptic functions"; and again (but with a reference to a possible case of exception), "the general equation cannot be solved by aid of the equations which give the division of the hyperelliptic functions into an odd number of parts." (See also GROUPS, THEORY OF.) (A. CA.)

BIBLIOGRAPHY.—For the general theory see W. S. Burnside and A. W. Panton, *The Theory of Equations* (4th ed., 1899–1901); the Galoisian theory is treated in G. B. Matthews, *Algebraic Equations* (1907). See also the *Ency. d. math. Wiss.* vol. ii.

EQUATION OF THE CENTRE, in astronomy, the angular distance, measured around the centre of motion, by which a planet moving in an ellipse deviates from the mean position which it would occupy if it moved uniformly. Its amount is the correction which must be applied positively or negatively to the mean anomaly in order to obtain the true anomaly. It arises from the ellipticity of the orbit, is zero at pericentre and apocentre, and reaches its greatest amount nearly midway between these points. (See ANOMALY and ORBIT.)

EQUATION OF TIME, the difference between apparent time, determined by the meridian passage of the real sun, and mean time, determined by the passage of the mean sun. It goes through a double period in the course of a year. Its amount varies a fraction of a minute for the same date, from year to year and from one longitude to another, on the same day. The following table shows an average value for any date and for the Greenwich meridian for a number of years, from which the actual value will seldom deviate more than 20 seconds until after 1950. The + sign indicates that the real sun reaches the meridian *after* mean noon; the − sign *before* mean noon.

Table of the Equation of Time.

		m.	s.			m.	s.			m.	s.
Jan.	1	+3	26	Mar.	1	+12	39	May	1	−2	55
	6	5	45		6	11	35		6	−3	27
	11	7	51		11	10	20		11	−3	46
	16	9	43		16	8	58		16	−3	51
	21	11	19		21	7	30		21	−3	40
	26	12	36		26	5	59		26	−3	16
Feb.	1	+13	42	Apr.	1	+4	9	June	1	−2	32
	6	14	14		6	2	40		6	−1	44
	11	14	25		11	+1	15		11	−0	48
	16	14	17		16	−0	3		16	+0	14
	21	13	52		21	−1	12		21	1	19
	26	13	11		26	−2	10		26	2	24
July	1	+3	26	Sept.	1	+0	9	Nov.	1	−16	18
	6	4	21		6	−1	28		6	−16	19
	11	5	8		11	−3	10		11	−15	58
	16	5	44		16	−4	55		16	−15	15
	21	6	8		21	−6	41		21	−14	12
	26	6	18		26	−8	25		26	−12	49
Aug.	1	+6	10	Oct.	1	−10	5	Dec.	1	−11	7
	6	5	47		6	−11	38		6	−9	9
	11	5	9		11	−13	2		11	−6	57
	16	4	17		16	−14	14		16	−4	35
	21	3	12		21	−15	11		21	−2	7
	26	1	55		26	−15	52		26	+0	23

EQUATOR (Late Lat. *aequator*, from *aequare*, to make equal), in geography, that great circle of the earth, equidistant from the two poles, which divides the northern from the southern hemisphere and lies in a plane perpendicular to the axis of the earth; this is termed the "geographical" or "terrestrial equator." In astronomy, the "celestial equator" is the name given to the great circle in which the plane of the terrestrial equator intersects the celestial sphere; it is consequently equidistant from the celestial poles. The "magnetic equator" is an imaginary line encircling the earth, along which the vertical component of the earth's magnetic force is zero; it nearly coincides with the terrestrial equator.

EQUERRY (from the Fr. *écurie*, a stable, through its older form *escurie*, from the Med. Lat. *scuria*, a word of Teutonic origin for a stable or shed, cf. Ger. *Scheuer*; the modern spelling has confused the word with the Lat. *equus*, a horse), a contracted form of "gentleman of the equerry," an officer in charge of the stables of a royal household. At the British court, equerries are officers attached to the department of the master of the horse, the first of whom is called chief equerry (see HOUSEHOLD, ROYAL).

EQUIDAE, the family of perissodactyle ungulate mammals typified by the horse (*Equus caballus*); see HORSE. According to the older classification this family was taken to include only the forms with tall-crowned teeth, more or less closely allied to the typical genus *Equus*. There is, however, such an almost complete graduation from the former to earlier and more primitive mammals with short-crowned cheek-teeth, at one time included in the family *Lophiodontidae* (see PERISSODACTYLA), that it has now become a very general practice to include the whole "phylum" in the family *Equidae*. The *Equidae*, in this extended sense, together with the extinct *Palaeotheriidae*, are indeed now regarded as forming one of four main groups into which the Perissodactyla are divided, the other groups being the Tapiroidea, Rhinocerotoidea and Titanotheriide. For the horse-group the name Hippoidea is employed. All four groups were closely connected in the Lower Eocene, so that exact definition is almost impossible.

In the Hippoidea there is generally the full series of 44 teeth, but the first premolar is often deciduous or wanting in the lower or in both jaws. The incisors are chisel-shaped, and the canines tend to become isolated so as in the now specialized forms to occupy nearly the middle of a longer or shorter gap between the incisors and premolars. In the upper molars the two outer columns of the primitive tubercular molar coalesce to form an outer wall, from which proceed two crescentic transverse crests; the connexion between the crests and the wall being imperfect or slight, and the crests themselves sometimes tubercular. Each of the lower molars carries two crescentic ridges. The number of toes ranges from four to one in the fore-foot, and from three to one in the hind-foot. The paroccipital, postglenoid and post-tympanic processes of the skull are large, and the latter always distinct. Normally there are no traces of horn-cores. The calcaneum lacks the facet for the fibula found in the Titanotheroidea.

In the earlier *Equidae* the teeth were short-crowned, with the premolars simpler than the molars; but there is a gradual tendency to an increase in the height of the crowns of the teeth, accompanied by increasing complexity of structure and the filling up of the hollows with cement. Similarly the gap on each side of the canine tooth in each jaw continues to increase in length; while in all the later forms the orbit is surrounded by a ring of bone. A third modification is the increasing length of limb (as well as in general bodily size), accompanied by a gradual reduction in the number of toes from three or four to one.

All the existing members of the family, such as the domesticated horse (*Equus caballus*) and its wild or half-wild relatives, the asses and the zebras, are included in the typical genus. In all these the crowns of the cheek-teeth are very tall (fig. 1, *b*) and only develop roots late in life; while their grinding-surfaces (fig. 2, *b* and *c*) are very complicated and have all the hollows filled with cement. The summits of the incisors are infolded, producing, when partially worn, the "mark." In the skull the orbit is surrounded by bone, and there is no distinct depression in front of the same. Each limb terminates in one large toe; the lateral digits being represented by the splint-bones, corresponding to the lateral metacarpals and metatarsals of *Hipparion*. Not unfrequently, however, the lower ends of the splint-bones carry a small expansion, representing the phalanges.

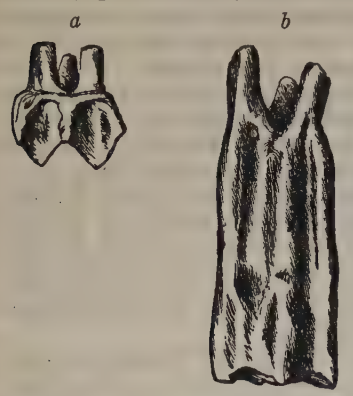


FIG. 1.—*a*, Side view of second upper molar tooth of *Anchitherium* (brachyodont form); *b*, corresponding tooth of horse (hypsidont form).

Remains of horses indistinguishable from *E. caballus* occur in the Pleistocene deposits of Europe and Asia; and it is from them that the dun-coloured small horses of northern Europe and Asia are probably derived. The ancestor of these Pleistocene horses is probably *E. stenonis*, of the Upper Pliocene of Europe, which has a small depression in front of the orbit, while the skull is relatively larger, the feet are rather shorter, and the splint-bones somewhat more developed. In India a nearly allied species (*E. sivalensis*), occurs in the Lower Pliocene, and may have been the ancestor of the Arab stock, which shows traces of the depression in front of the orbit characteristic of the earlier forms. In North America species of *Equus* occur in the Pleistocene and from that continent others reached South America during the same epoch. In the latter country occurs *Hippidium*, in which the cheek-teeth are shorter and simpler, and the nasal bones very long and slender, with elongated slits at the side. The limbs, especially the cannon-bones, are relatively short, and the splint-bones large. The allied Argentine *Onohippidium*, which is also Pleistocene, has still longer nasal bones and slits, and a deep double cavity in front of the orbit, part of which probably contained a gland. *Onohippidium* is certainly off the direct line of descent of the modern horses, and, on account of the length of the nasals and their slits, the same probably holds good for *Hippidium*.

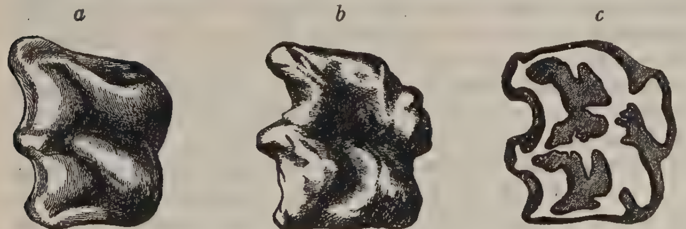


FIG. 2.—*a*, Grinding surface of unworn right upper molar tooth of *Anchitherium*; *b*, corresponding surface of unworn molar of young horse; *c*, the same tooth after it has been some time in use. The uncoloured portions are the dentine or ivory, the shaded parts the cement filling the cavities and surrounding the exterior. The black line separating these two structures is the enamel or hardest constituent of the tooth.

Species from the Pliocene of Texas and the Upper Miocene (Loup Fork) of Oregon were at one time assigned to *Hippidium*, but this is incorrect, that genus being exclusively South American. The name *Pliohippus* has been applied to species from the same two formations on the supposition that the foot-structure was similar to that of *Hippidium*, but Mr J. W. Gidley is of opinion that the lateral digits may have been fully developed.

Apparently there is here some gap in the line of descent of the horse, and it may be suggested that the evolution took place, not as commonly supposed, in North America, but in eastern central Asia, of which the palaeontology is practically unknown; some support is given to this theory by the fact that the earliest species with which we are acquainted occur in northern India.

Be this as it may, the next North American representatives of the family constitute the genera *Protohippus* and *Merychippus* of the Miocene, in both of which the lateral digits are fully developed and terminate in small though perfect hoofs. In both the cheek-teeth have moderately tall crowns, and in the first named of the two those of the milk-series are nearly similar to their permanent successors. In *Merychippus*, on the other hand, the milk-molars have short crowns, without any cement in the hollows, thus resembling the permanent molars of the under-mentioned genus *Anchitherium*. From the well-known *Hipparion*, or *Hippotherium*, typically from the Lower Pliocene of Europe, but also occurring in the corresponding formation in North Africa, Persia, India and China, and represented in the Upper Miocene Loup Fork beds of the United States by species which it has been proposed to separate generically as *Neohipparion*, we reach small horses which are now generally regarded as a lateral offshoot from the *Merychippus* type. The cheek-teeth, which have crowns of moderate height, differ from those of all the foregoing in that the postero-internal pillar (the projection on the right-hand top corner of *c* in fig. 2) is isolated in place of being attached by a narrow neck to the adjacent crescent. The skull, which is relatively short, has a large depression in front of the orbit, commonly supposed to have contained a gland, but this may be doubtful. In the typical, and also in the North American forms these were complete, although small, lateral toes in both feet (fig. 3, *d*), but it is possible that in *H. antilopinum* of India the lateral toes had disappeared. If this be so, we have the development of a monodactyle foot in this genus independently of *Equus*.

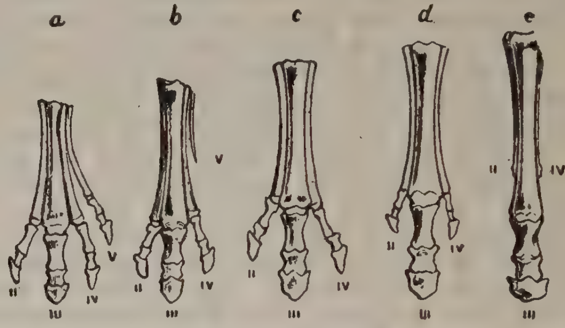


FIG. 3.—Successive stages of modification of the left fore-feet of extinct forms of horse-like animals, showing gradual reduction of the outer and enlargement of the middle toe (III).
a, *Hyracotherium* (Eocene).
b, *Mesohippus* (Oligocene).
c, *Anchitherium* (Miocene).
d, *Hipparion* (Pliocene).
e, *Equus* (Pleistocene).

The foregoing genera constitute the subfamily *Equinae*, or the *Equidae* as restricted by the older writers. In all the dentition is of the hypsodont type, with the hollows of the cheek-teeth filled by cement, the premolars molariform, and the first small and generally deciduous. The orbit is surrounded by a bony ring; the ulna and radius in the fore, and the tibia and fibula in the hind-limb are united, and the feet are of the types described above. Between this subfamily and the second subfamily, *Hyracotheriinae*, a partial connexion is formed by the North American Upper Miocene genera *Desmatippus* and *Anchippus* or *Parahippus*. The characteristics of the group will be gathered from the remarks on the leading genera; but it may be mentioned that the orbit is open behind, the cheek-teeth are short-crowned and without cement (fig. 1, *a*), the gap between the canine and the outermost incisor is short, the bones of the middle part of the leg are separate, and there are at least three toes to each foot.

The longest-known genus and the one containing the largest species is *Anchitherium*, typically from the Middle Miocene of Europe, but also represented by one species from the Upper Miocene of North America. The European *A. aurelianense* was of the size of an ordinary donkey. The cheek-teeth are of the type shown in *a* of figs. 1 and 2; the premolars, with the exception of the small first one, being molar-like; and the lateral toes (fig. 3, *c*) were to some extent functional. The summits of the incisors were infolded to a small extent. Nearly allied is the American *Mesohippus*, ranging from the Lower Miocene to the Lower Oligocene of the United States, of which the earliest species stood only about 18 in. at the shoulder. The incisors were scarcely, if at all, infolded, and there is a rudiment of the fifth metacarpal (fig. 3, *b*). By some writers all the species of *Mesohippus* are included in the genus *Miohippus*, but others consider that the two genera are distinct.

Mesohippus and *Miohippus* are connected with the earliest and most primitive mammal which it is possible to include in the family *Equidae* by means of *Epihippus* of the Uinta or Upper Eocene of North America, and *Pachynolophus*, or *Orohippus*, of the Middle and Lower Eocene of both halves of the northern hemisphere. The final stage, or rather the initial stage, in the series is presented by *Hyracotherium* (*Protorohippus*), a mammal no larger than a fox, common to the Lower Eocene of Europe and North America. The general characteristics of this progenitor of the horses are those given above as distinctive of the group. The cheek-teeth are, however, much simpler than those of *Anchitherium*; the transverse crests of the upper molars not being fully connected with the outer wall, while the premolars in the upper jaw are triangular, and thus unlike the molars. The incisors are small and the canines scarcely enlarged; the latter having a gap on each side in the lower, but only one on their hinder aspect in the upper jaw. The fore-feet have four complete toes (fig. 3, *a*), but there are only three hind-toes, with a rudiment of the fifth metatarsal. The vertebrae are simpler in structure than in *Equus*. From *Hyracotherium*, which is closely related to the Eocene representatives of the ancestral stocks of the other three branches of the Perissodactyla, the transition is easy to *Phenacodus*, the representative of the common ancestor of all the Ungulata.

See also H. F. Osborn, "New Oligocene Horses," *Bull. Amer. Mus.* vol. xx. p. 167 (1904); J. W. Gidley, *Proper Generic Names of Miocene Horses*, p. 191; and the article PALAEONTOLOGY. (R. L.*)

EQUILIBRIUM (from the Lat. *aequus*, equal, and *libra*, a balance), a condition of equal balance between opposite or counteracting forces. By the "sense of equilibrium" is meant the sense, or sensations, by which we have a feeling of security in standing, walking, and indeed in all the movements by which the body is carried through space. Such a feeling of security is necessary both for maintaining any posture, such as standing, or for performing any movement. If this feeling is absent or uncertain, or if there are contradictory sensations, then definite muscular movements are inefficiently or irregularly performed, and the body may stagger or fall. When we stand erect on a firm surface, like a floor, there is a feeling of resistance, due to nervous impulses reaching the brain from the soles of the feet and from the muscles of the limbs and trunk. In walking or running, these feelings of resistance seem to precede and guide the muscular movements necessary for the next step. If these are absent or perverted or deficient, as is the case in the disease known as locomotor ataxia, then, although there is no loss of the power of voluntary movement, the patient staggers in walking, especially if he is not allowed to look at his feet, or if he is blindfolded. He misses the guiding sensations that come from the limbs; and with a feeling that he is walking on a soft substance, offering little or no resistance, he staggers, and his muscular movements become irregular. Such a condition may be artificially brought about by washing the soles of the feet with chloroform or ether. And it has been observed to exist partially after extensive destruction of the skin of the soles of the feet by burns or scalds. This shows that tactile impulses from the skin take a share in generating the guiding sensation. In the disease above mentioned, however, tactile impressions may be nearly normal, but the guiding sensation is weak and inefficient, owing to the absence of impulses from the muscles. The disease is known to depend on morbid changes in the posterior columns of the spinal cord, by which impulses are not freely transmitted upwards to the brain. These facts point to the existence of impulses coming from the muscles and tendons. It is now known that there exist peculiar spindles, in muscle, and rosettes or coils or loops of nerve fibres in close proximity to tendons. These are the end organs of the sense. The transmission of impulses gives rise to the *muscular sense*, and the guiding sensation which precedes co-ordinated muscular movements depends on these impulses. Thus from the limbs streams of nervous impulses pass to the sensorium from the skin and from muscles and tendons; these may or may not arouse consciousness, but they guide or evoke muscular movements of a co-ordinated character, more especially of the limbs.

In animals whose limbs are not adapted for delicate touch nor for the performance of complicated movements, such as some mammals and birds and fishes, the guiding sensations depend largely on the sense of vision. This sense in man, instead of assisting, sometimes disturbs the guiding sensation. It is true that in locomotor ataxia visual sensations may take the place of the tactile and muscular sensations that are inefficient, and the man can walk without staggering if he is allowed to look at the floor, and especially if he is guided by transverse straight lines. On the other hand, the acrobat on the wire-rope dare not trust his visual sensations in the maintenance of his equilibrium. He keeps his eyes fixed on one point instead of allowing them to wander to objects below him, and his muscular movements are regulated by the impulses that come from the skin and muscles of his limbs. The feeling of insecurity probably arises from a conception of height, and also from the knowledge that by no muscular movements can a man avoid a catastrophe if he should fall. A bird, on the other hand, depends largely on visual impressions, and it knows by experience that if launched into the air from a height it can fly. Here, probably, is an explanation of the large size of the eyes of birds. Cover the head, as in hooding a falcon, and the bird seems to be deprived of the power of voluntary movement. Little effect will be produced if we attempt to restrain the movements of a cat by covering its eyes. A fish also is deprived of the power of motion if its eyes are covered. But both in the bird and in the fish tactile and muscular impressions, especially the latter, come into play in the mechanism of equilibrium. In flight the large-winged birds, especially in soaring, can feel the most delicate wind-pressures, both as regards direction and force, and they adapt the position of their body so as to catch the pressure at the most efficient angle. The same is true of the fish, especially of the flat-fishes. In mammals the sense of equilibrium depends, then, on streams of tactile, muscular and visual impressions pouring in on the sensorium, and calling forth appropriate muscular movements. It has also been suggested that impulses coming from the abdominal viscera may take part in the mechanism. The presence in the mesentery of felines (cats, &c.) of large numbers of Pacinian corpuscles, which are believed to be modified tactile bodies, favours this supposition. Such animals are remarkable for the delicacy of such muscular movements, as balancing and leaping.

There is another channel by which nervous impulses reach the sensorium and play their part in the sense of equilibrium, namely, from the semicircular canals, a portion of the internal ear. It is pointed out in the article HEARING that the appreciation of sound is in reality an appreciation of variations of pressure. The labyrinth consists of the vestibule, the cochlea and the semicircular canals. The cochlea receives the sound-waves (variations of pressure) that constitute musical tones. This it accomplishes by the structures in the ductus cochlearis. In the vestibule we find two sacs, the saccule next to and communicating with the ductus cochlearis, and the utricle communicating with the semicircular canals. The base of the stapes communicates pressures to the utricle. The membranous portion of the semicircular canals consists of a tube, dilated at one end into a swelling or pouch, termed the ampulla, and each end communicates freely with the utricle. On the posterior wall of both the saccule and of the utricle there is a ridge, termed in each case the macula acustica, bearing a highly specialized epithelium. A similar structure exists in each ampulla. This would suggest that all three structures have to do with hearing; but, on the other hand, there is experimental evidence that the utricle and the canals may transmit impressions that have to do with equilibrium. Pressure of the base of the stapes is exerted on the utricle. This will compress the fluid in that cavity, and tend to drive the fluid into the semicircular canals that communicate with that cavity by five openings. Each canal is surrounded by a thin layer of perilymph, so that it may yield a little to this pressure, and exert a pull or pressure on the nerve-endings in each ampulla. Thus impulses may be generated in the nerves of the ampullae.

The three semicircular canals lie in the three directions in space, and it has been suggested that they have to do with our appreciation of the direction of sound. But our appreciation of sound is very inaccurate: we look with the eyes for the source of a sound, and instinctively direct the ears or the head, or both, in the direction from which the sound appears to proceed. But the relationship of the canals on the two sides must have a physiological significance. Thus (1) the six canals are parallel, two and two; or (2) the two horizontal canals are in the same plane, while the superior canal on one side is nearly parallel with the posterior canal of the other. These facts point to the two sets of canals and ampullae acting as one organ, in a manner analogous to the action of two retinae for single vision.

We have next to consider how the canals may possibly act in connexion with the sense of equilibrium. In 1820 J. Purkinje studied the vertigo that follows rapid rotation of the body in the erect position on a vertical axis. On stopping the rotation there is a sense of rotation in the opposite direction, and this may occur even when the eyes are closed. Purkinje noticed that the position of the imaginary axis of rotation depends on the axis around which the head revolves. In 1828 M. J. P. Flourens discovered that injury to the canals causes disturbance to the equilibrium and loss of co-ordination, and that sections of the canals produce a rotatory movement of a kind corresponding to the canal that had been divided. Thus division of a membranous canal causes rotatory movements round an axis at right angles to the plane of the divided canal. The body of the animal always moves in the direction of the cut canal. Many other observers have corroborated these experiments. F. Goltz was the first who formulated the conditions necessary for equilibration. He put the matter thus:—(1) A central co-ordinating organ—in the brain; (2) centripetal fibres, with their peripheral terminations—in the ampullae; and (3) centrifugal fibres, with their terminal organs—in the muscular mechanisms. A lesion of any one of these portions of the mechanism causes loss or impairment of balancing. Cyon also investigated the subject, and concluded:—(1) To maintain equilibrium, we must have an accurate notion of the position of the head in space; (2) the function of the semicircular canals is to communicate impressions that give a representation of this position—each canal having a relation to one of the dimensions of space; (3) disturbance of equilibrium follows section; (4) involuntary movements following section are due to abnormal excitations; (5) abnormal movements occurring a few days after the operation are caused by irritation of the cerebellum.

On theoretical considerations of a physical character, E. Mach, Crum-Brown and Breuer have advanced theories based on the idea of the canals being organs for sensations of acceleration of movement, or for the sense of rotation. Mach first pointed out that Purkinje's phenomena, already alluded to, were in all probability related to the semicircular canals. "He showed that when the body is moved in space, in a straight line, we are not conscious of the velocity of motion, but of variations in this velocity. Similarly, if a body is rotated round a vertical axis, we perceive only angular acceleration and not angular velocity. The sensations produced by angular acceleration last longer than the acceleration itself, and the position of the head during the movements enables us to determine direction." Both Mach and Goltz state that varying pressures of the fluid in the canals produced by angular rotation produce sensations of movement (always in a direction opposite to the rotation of the body), and that these, in turn, cause the vertigo of Purkinje and the phenomena of Flourens. Mach, Crum-Brown and Breuer advance hydrodynamical theories in which they assume that the fluids move in the canals. Goltz, on the other hand, supports a hydrostatical theory in which he assumes that the phenomena can be accounted for by varying pressures. Crum-Brown differs from Mach and Breuer as follows:—(1) In attributing movement or variation of pressure not merely to the endolymph, but also to the walls of the membranous canals and to the surrounding perilymph; and (2) in regarding the two labyrinths as one organ, all the six canals being required to form a true conception of the rotating motion of the head. He sums up the matter thus: "We have two ways in which a relative motion can occur between the endolymph and the walls of the cavity containing it—(1) When the head begins to move, here the walls leave the fluid behind; (2) when the head stops, here the fluid flows on. In both cases the sensation of rotation is felt. In the first this sensation corresponds to a real rotation, in the second it does not, but in both it corresponds to a real acceleration (positive or negative) of rotation, using the word acceleration in its technical kinematical sense."

Cyon states that the semicircular canals only indirectly assist in giving a notion of spatial relations. "He holds that knowledge of the position of bodies in space depends on nervous impulses coming from the contracting ocular muscles; that the oculomotor centres are in intimate physiological relationship with the centres receiving impulses from the nerves of the semicircular canals; and that the oculomotor centres, thus excited, produce the movements of the eyeballs, which then determine our notions of spatial relations." These views are supported by experiments of Lee on dog-fish. When the fish is rotated round different axes there are compensating movements of the eyes and fins. "It was observed that if the fish were rotated in the plane of one of the canals, exactly the same movements of the eyes and fins occurred as were produced by experimental operation and stimulation of the ampulla of that canal." Sewall, in 1883, carried out experiments on young sharks and skates with negative results. Lee returned to the subject in 1894, and, after numerous experiments on dog-fish, in which the canals or the auditory nerves were divided, obtained evidence that the ampullae contain sense-organs connected with the sense of equilibrium.

It has been found by physicians and aurists that disease or injury of the canals, occurring rapidly, produces giddiness, staggering, nystagmus (a peculiar twitching movement of the muscles of the eyeballs), vomiting, noises in the ear and more or less deafness. It is said, however, that if pathological changes come on slowly, so that the canals and vestibule are converted into a solid mass, none of these symptoms may occur. On the whole, the evidence is in favour of the view that from the semicircular canals nervous impulses are transmitted, which, co-ordinated with impulses coming from the visual organs, from the muscles and from the skin, form the bases of these guiding sensations on which the sense of equilibrium depends. These impulses may not reach the level of consciousness, but they call into action co-ordinated mechanisms by which complicated muscular movements are effected.

Full bibliographical references are given in the article on "The Ear" by J. G. McKendrick, in Schäfer's *Textbook of Physiology*, vol. ii. p. 1194. (J. G. M.)

EQUINOX (from the Lat. *aequus*, equal, and *nox*, night), a term used to express either the moment at which, or the point at which, the sun apparently crosses the celestial equator. Since the sun moves in the ecliptic, it is in the last-named sense the point of intersection of the ecliptic and the celestial equator. This is the usual meaning of the term in astronomy. There are two such points, opposite each other, at one of which the sun crosses the equator toward the north and at the other toward the south. They are called vernal and autumnal respectively, from the relation of the corresponding times to the seasons of the northern hemisphere. The line of the equinoxes is the imaginary diameter of the celestial sphere which joins them.

The vernal equinox is the initial point from which the right ascensions and the longitudes of the heavenly bodies are measured (see ASTRONOMY: *Spherical*). It is affected by the motions of Precession and Nutation, of which the former has been known since the time of Hipparchus. The actual equinox is defined by first taking the conception of a fictitious point called the Mean Equinox, which moves at a nearly uniform rate, slow varying, however, from century to century. The true equinox then moves around the mean equinox in a period equal to that of the moon's nodes. These two motions are defined with greater detail in the articles PRECESSION OF THE EQUINOXES and NUTATION.

Equinoctial Gales.—At the time of the equinox it is commonly believed that strong gales may be expected. This popular idea has no foundation in fact, for continued observations have failed to show any unusual prevalence of gales at this season. In one case observations taken for fifty years show that during the five days from the 21st to the 25th of March and September, there were fewer gales and storms than during the preceding and succeeding five days.

EQUITES (" horsemen " or " knights," from *equus*, " horse "), in Roman history, originally a division of the army, but subsequently a distinct political order, which under the empire resumed its military character. According to the traditional account, Romulus instituted a cavalry corps, consisting of three *centuriae* (" hundreds "), called after the three tribes from which they were taken (Ramnes, Tities, Luceres), divided into ten *turmae* (" squadrons ") of thirty men each. The collective name for the corps was *celeres* (" the swift," or possibly from κέλης, " a riding horse "); Livy, however, restricts the term to a special body-guard of Romulus. The statements in ancient authorities as to the changes in the number of the equites during the regal period are very confusing; but it is regarded as certain that Servius Tullius found six centuries in existence, to which he added twelve, making eighteen in all, a number which remained unchanged throughout the republican period. A proposal by M. Porcius Cato the elder to supplement the deficiency in the cavalry by the creation of four additional centuries was not adopted. The earlier centuries were called *sex suffragia* (" the six votes "), and at first consisted exclusively of patricians, while those of Servius Tullius were entirely or for the most part plebeian. Until the reform of the comitia centuriata (probably during the censorship of Gaius Flaminius in 220 B.C.; see COMITIA), the equites had voted first, but after that time this privilege was transferred to one century selected by lot from the centuries of the equites and the first class. The equites then voted with the first class, the distinction between the *sex suffragia* and the other centuries being abolished.

Although the equites were selected from the wealthiest citizens, service in the cavalry was so expensive that the state gave financial assistance. A sum of money (*aes equestre*) was given to each eques for the purchase of two horses (one for himself and one for his groom), and a further sum for their keep (*aes hordearium*); hence the name *equites equo publico*. In later times, pay was substituted for the *aes hordearium*, three times as much as that of the infantry. If competent, an eques could retain his horse and vote after the expiration of his ten years' service, and (till 129 B.C.) even after entry into the senate.

As the demands upon the services of the cavalry increased, it was decided to supplement the regulars by the enrolment of wealthy citizens who kept horses of their own. The origin of these *equites equo privato* dates back, according to Livy (v. 7), to the siege of Veii, when a number of young men came forward and offered their services. According to Mommsen, although the institution was not intended to be permanent, in later times vacancies in the ranks were filled in this manner, with the result that service in the cavalry, with either a public or a private horse, became obligatory upon all Roman citizens possessed of a certain income. These *equites equo privato* had no vote in the centuries, received pay in place of the *aes equestre*, and did not form a distinct corps.

Thus, at a comparatively early period, three classes of equites may be distinguished: (*a*) The patrician equites *equo publico* of the *sex suffragia*; (*b*) the plebeian equites in the twelve remaining centuries; (*c*) the equites *equo privato*, both patrician and plebeian.

The equites were originally chosen by the curiae, then in succession by the kings, the consuls, and (after 443 B.C.) by the censors, by whom they were reviewed every five years in the Forum. Each eques, as his name was called out, passed before the censors, leading his horse. Those whose physique and character were satisfactory, and who had taken care of their horses and equipments, were bidden to lead their horse on (*traducere equum*), those who failed to pass the scrutiny were ordered to sell it, in token of their expulsion from the corps. This inspection (*recognitio*) must not be confounded with the full-dress procession (*transvectio*) on the 15th of July from the temple of Mars or Honos to the Capitol, instituted in 304 B.C. by the censor Q. Fabius Maximus Rullianus to commemorate the miraculous intervention of Castor and Pollux at the battle of Lake Regillus. Both inspection and procession were discontinued before the end of the republic, but revived and in a manner combined by Augustus.

In theory, the twelve plebeian centuries were open to all freeborn youths of the age of seventeen, although in practice preference was given to the members of the older families. Other requirements were sound health, high moral character and an honourable calling. At the beginning of the republican period, senators were included in the equestrian centuries. The only definite information as to the amount of fortune necessary refers to later republican and early imperial times, when it is known to have been 400,000 sesterces (about £3500 to £4000). The insignia of the equites were, at first, distinctly military—such as the purple-edged, short military cloak (*trabea*) and decorations for service in the field.

With the extension of the Roman dominions, the equites lost their military character. Prolonged service abroad possessed little attraction for the pick of the Roman youth, and recruiting for the cavalry from the equestrian centuries was discontinued. The equites remained at home, or only went out as members of the general's staff, their places being taken by the *equites equo privato*, the cavalry of the allies and the most skilled horsemen of the subject populations. The first gradually disappeared, and Roman citizens were rarely found in the ranks of the effective cavalry. In these circumstances there grew up in Rome a class of wealthy men, whose sole occupation it was to amass large fortunes by speculation, and who found a most lucrative field of enterprise in state contracts and the farming of the public revenues. These tax-farmers (see PUBLICANI) were already in existence at the time of the Second Punic War; and their numbers and influence increased as the various provinces were added to the Roman dominions. The change of the equites into a body of financiers was further materially promoted (*a*) by the lex Claudia (218 B.C.), which prohibited senators from engaging in commercial pursuits, especially if (as seems probable) it included public contracts (cf. FLAMINIUS, GAIUS); (*b*) by the enactment in the time of Gaius Gracchus excluding members of the senate from the equestrian centuries. These two measures definitely marked off the aristocracy of birth from the aristocracy of wealth —the landed proprietor from the capitalist. The term equites, originally confined to the purely military equestrian centuries of Servius Tullius, now came to be applied to all who possessed the property qualification of 400,000 sesterces.

As the equites practically monopolized the farming of the taxes, they came to be regarded as identical with the *publicani*, not, as Pliny remarks, because any particular rank was necessary to obtain the farming of the taxes, but because such occupation was beyond the reach of all except those who were possessed of considerable means. Thus, at the time of the Gracchi, these *equites-publicani* formed a close financial corporation of about 30,000 members, holding an intermediate position between the nobility and the lower classes, keenly alive to their own interests, and ready to stand by one another when attacked. Although to some extent looked down upon by the senate as following a dishonourable occupation, they had as a rule sided with the latter, as being at least less hostile to them than the democratic party. To obtain the support of the capitalists, Gaius Gracchus conceived the plan of creating friction between them and the senate, which he carried out by handing over to them the control (*a*) of the jury-courts, and (*b*) of the revenues of Asia.

(*a*) Hitherto, the list of jurymen for service in the majority of processes, both civil and criminal, had been composed exclusively of senators. The result was that charges of corruption and extortion failed, when brought against members of that order, even in cases where there was little doubt of their guilt. The popular indignation at such scandalous miscarriages of justice rendered a change in the composition of the courts imperative. Apparently Gracchus at first proposed to create new senators from the equites and to select the jurymen from this mixed body, but this moderate proposal was rejected in favour of one more radical (see W. W. Fowler in *Classical Review*, July 1896). By the lex Sempronia (123 B.C.) the list was to be drawn from persons of free birth over thirty years of age, who must possess the equestrian census, and must not be senators. Although this measure was bound to set senators and equites at variance, it in no way improved the lot of those chiefly concerned. In fact, it increased the burden of the luckless provincials, whose only appeal lay to a body of men whose interests were identical with those of the *publicani*. Provided he left the tax-gatherer alone, the governor might squeeze what he could out of the people, while on the other hand, if he were humanely disposed, it was dangerous for him to remonstrate.

(*b*) The taxes of Asia had formerly been paid by the inhabitants themselves in the shape of a fixed sum. Gracchus ordered that the taxes, direct and indirect, should be increased, and that the farming of them should be put up to auction at Rome. By this arrangement the provincials were ignored, and everything was left in the hands of the capitalists.

From this time dates the existence of the equestrian order as an officially recognized political instrument. When the control of the courts passed into the hands of the property equites, all who were summoned to undertake the duties of judices were called equites; the *ordo judicum* (the official title) and the *ordo equester* were regarded as identical. It is probable that certain privileges of the equites were due to Gracchus; that of wearing the gold ring, hitherto reserved for senators; that of special seats in the theatre, subsequently withdrawn (probably by Sulla) and restored by the lex Othonis (67 B.C.); the narrow band of purple on the tunic as distinguished from the broad band worn by the senators.

Various attempts were made by the senate to regain control of the courts, but without success. The lex Livia of M. Livius Drusus (*q.v.*), passed with that object, but irregularly and by the aid of violence, was annulled by the senate itself. In 82 Sulla restored the right of serving as judices to the senate, to which he elevated 300 of the most influential equites, whose support he thus hoped to secure; at the same time he indirectly dealt a blow at the order generally, by abolishing the office of the censor (immediately revived), in whom was vested the right of bestowing the public horse. To this period Mommsen assigns the regulation, generally attributed to Augustus, that the sons of senators should be knights by right of birth. By the lex Aurelia (70 B.C.) the judices were to be chosen in equal numbers from senators, equites and tribuni aerarii (see AERARIUM), the last-named being closely connected with the equites), who thus practically commanded a majority. About this time the influence of the equestrian order reached its height, and Cicero's great object was to reconcile it with the senate. In this he was successful at the time of the Catilinarian conspiracy, in the suppression of which he was materially aided by the equites. But the union did not last long; shortly afterwards the majority ranged themselves on the side of Julius Caesar, who did away with the tribuni aerarii as judices, and replaced them by equites.

Augustus undertook the thorough reorganization of the equestrian order on a military basis. The *equites equo privato* were abolished (according to Herzog, not till the reign of Tiberius) and the term equites was officially limited to the *equites equo publico*, although all who possessed the property qualification were still considered to belong to the "equestrian order." For the *equites equo publico* high moral character, good health and the equestrian fortune were necessary. Although free birth was considered indispensable, the right of wearing the gold ring (*jus anuli aurei*) was frequently bestowed by the emperor upon freedmen, who thereby became *ingenui* and eligible as equites. Tiberius, however, insisted upon free birth on the father's side to the third generation. Extreme youth was no bar; the emperor Marcus Aurelius had been an eques at the age of six. The sons of senators were eligible by right of birth, and appear to have been known as *equites illustres*. The right of bestowing the *equus publicus* was vested in the emperor; once given, it was for life, and was only forfeitable through degradation for some offence or the loss of the equestrian fortune.

Augustus divided the equites into six *turmae* (regarded by Hirschfeld as a continuation of the *sex suffragia*). Each was under the command of a *sevir* (ἴλαρχος), who was appointed by the emperor and changed every year. During their term of command the *seviri* had to exhibit games (*ludi sevirales*). Under these officers the equites formed a kind of corporation, which, although not officially recognized, had the right of passing resolutions, chiefly such as embodied acts of homage to the imperial house. It is not known whether the *turmae* contained a fixed number of equites; there is no doubt that, in assigning the public horse, Augustus went far beyond the earlier figure of 1800. Thus, Dionysius of Halicarnassus mentions 5000 equites as taking part in a review at which he himself was present.

As before, the equites wore the narrow, purple-striped tunic, and the gold ring, the latter now being considered the distinctive badge of knighthood. The fourteen rows in the theatre were extended by Augustus to seats in the circus.

The old *recognitio* was replaced by the *probatio*, conducted by the emperor in his censorial capacity, assisted by an advisory board of specially selected senators. The ceremony was combined with a procession, which, like the earlier *transvectio*, took place on the 15th of July, and at such other times as the emperor pleased. As in earlier times, offenders were punished by expulsion.

In order to provide a supply of competent officers, each eques was required to fill certain subordinate posts, called *militiae equestres*. These were (1) the command of an auxiliary cohort; (2) the tribunate of a legion; (3) the command of an auxiliary cavalry squadron, this order being as a rule strictly adhered to. To these Septimius Severus added the centurionship. Nomination to the *militiae equestres* was in the hands of the emperor. After the completion of their preliminary military service, the equites were eligible for a number of civil posts, chiefly those with which the emperor himself was closely concerned. Such were various procuratorships; the prefectures of the corn supply, of the fleet, of the watch, of the praetorian guards; the governorships of recently acquired provinces (Egypt, Noricum), the others being reserved for senators. At the same time, the abolition of the indirect method of collecting the taxes in the provinces greatly reduced the political influence of the equites. Certain religious functions of minor importance were also reserved for them. In the jury courts, the equites, thanks to Julius Caesar, already formed two-thirds of the judices; Augustus, by excluding the senators altogether, virtually gave them the sole control of the tribunals. One of the chief objects of the emperors being to weaken the influence of the senate by the opposition of the equestrian order, the practice was adopted of elevating those equites who had reached a certain stage in their career to the rank of senator by *adlectio*. Certain official posts, of which it would have been inadvisable to deprive senators, could thus be bestowed upon the promoted equites.

The control of the imperial correspondence and purse was at first in the hands of freedmen and slaves. The emperor Claudius tentatively entrusted certain posts connected with these to the equites; in the time of Hadrian this became the regular custom. Thus a civil career was open to the equites without the obligation of preliminary military service, and the emperor was freed from the pernicious influence of freedmen. After the reign of Marcus Aurelius (according to Mommsen) the equites were divided into: (*a*) *viri eminentissimi*, the prefects of the praetorian guard; (*b*) *viri perfectissimi*, the other prefects and the heads of the financial and secretarial departments; (*c*) *viri egregii*, first mentioned in the reign of Antoninus Pius, a title by right of the procurators generally.

Under the empire the power of the equites was at its highest in the time of Diocletian; in consequence of the transference of the capital to Constantinople, they sank to the position of a mere city guard, under the control of the prefect of the watch. Their history may be said to end with the reign of Constantine the Great.

Mention may also be made of the *equites singulares Augusti*. The body-guard of Augustus, consisting of foreign soldiers (chiefly Germans and Batavians), abolished by Galba, was revived from the time of Trajan or Hadrian under the above title. It was chiefly recruited from the pick of the provincial cavalry, but contained some Roman citizens. It formed the imperial "Swiss guard," and never left the city except to accompany the emperor. In the time of Severus, these equites were divided into two corps, each of which had its separate quarters, and was commanded by a tribune under the orders of the prefect of the praetorian guard. They were subsequently replaced by the *protectores Augusti*.

See further article ROME: *History*; also T. Mommsen, *Römisches Staatsrecht*, iii.; J. N. Madvig, *Die Verfassung des römischen Staates*, i.; R. Cagnat in Daremberg and Saglio's *Dictionnaire des antiquités*, where full references to ancient authorities are given in the footnotes; A. S. Wilkins in Smith's *Dictionary of Greek and Roman Antiquities* (3rd ed., 1891); E. Belot, *Histoire des chevaliers romains* (1866–1873); H. O. Hirschfeld, *Untersuchungen auf dem Gebiete der römischen Verwaltungsgeschichte* (Berlin, 1877); E. Herzog, *Geschichte und System der römischen Staatsverfassung* (Leipzig, 1884–1891); A. H. Friedländer, *Sittengeschichte Roms*, i. (1901); A. H. J. Greenidge, *History of Rome*, i. (1904); J. B. Bury, *The Student's Roman Empire* (1893): T. M. Taylor, *Political and Constitutional History of Rome* (1899). For a concise summary of different views of the *sex suffragia* see A. Bouché-Leclercq's *Manuel des antiquités romaines*, quoted in Daremberg and Saglio; and on the *equites singulares*, T. Mommsen in *Hermes*, xvi. (1881), p. 458. (J. H. F.)

EQUITY (Lat. *aequitas*), a term which in its most general sense means equality or justice; in its most technical sense it means a system of law or a body of connected legal principles, which have superseded or supplemented the common law on the ground of their intrinsic superiority. Aristotle (*Ethics*, bk. v. c. 10) defines equity as a better sort of justice, which corrects legal justice where the latter errs through being expressed in a universal form and not taking account of particular cases. When the law speaks universally, and something happens which is not according to the common course of events, it is right that the law should be modified in its application to that particular case, as the lawgiver himself would have done, if the case had been present to his mind. Accordingly the equitable man (ἐπιεικής) is he who does not push the law to its extreme, but, having legal justice on his side, is disposed to make allowances. Equity as thus described would correspond rather to the judicial discretion which modifies the administration of the law than to the antagonistic system which claims to supersede the law.

The part played by equity in the development of law is admirably illustrated in the well-known work of Sir Henry Maine on *Ancient Law*. Positive law, at least in progressive societies, is constantly tending to fall behind public opinion, and the expedients adopted for bringing it into harmony therewith are three, viz. legal fictions, equity and statutory legislation. Equity here is defined to mean "any body of rules existing by the side of the original civil law, founded on distinct principles, and claiming incidentally to supersede the civil law in virtue of a superior sanctity inherent in those principles." It is thus different from legal fiction, by which a new rule is introduced surreptitiously, and under the pretence that no change has been made in the law, and from statutory legislation, in which the obligatory force of the rule is not supposed to depend upon its intrinsic fitness. The source of Roman equity was the fertile theory of natural law, or the law common to all nations. Even in the Institutes of Justinian the distinction is carefully drawn in the laws of a country between those which are peculiar to itself and those which natural reason appoints for all mankind. The connexion in Roman law between the ideas of equity, nature, natural law and the law common to all nations, and the influence of the Stoical philosophy on their development, are fully discussed in the third chapter of the work we have referred to. The agency by which these principles were introduced was the edicts of the praetor, an annual proclamation setting forth the manner in which the magistrate intended to administer the law during his year of office. Each successive praetor adopted the edict of his predecessor, and added new equitable rules of his own, until the further growth of the irregular code was stopped by the praetor Salvius Julianus in the reign of Hadrian.

The place of the praetor was occupied in English jurisprudence by the lord high chancellor. The real beginning of English equity is to be found in the custom of handing over to that officer, for adjudication, the complaints which were addressed to the king, praying for remedies beyond the reach of the common law. Over and above the authority delegated to the ordinary councils or courts, a reserve of judicial power was believed to reside in the king, which was invoked as of grace by the suitors who could not obtain relief from any inferior tribunal. To the chancellor, as already the head of the judicial system, these petitions were referred, although he was not at first the only officer through whom the prerogative of grace was administered. In the reign of Edward III. the equitable jurisdiction of the court appears to have been established. Its constitutional origin was analogous to that of the star chamber and the court of requests. The latter, in fact, was a minor court of equity attached to the lord privy seal as the court of chancery was to the chancellor. The successful assumption of extraordinary or equitable jurisdiction by the chancellor caused similar pretensions to be made by other officers and courts. "Not only the court of exchequer, whose functions were in a peculiar manner connected with royal authority, but the counties palatine of Chester, Lancaster and Durham, the court of great session in Wales, the universities, the city of London, the Cinque Ports and other places silently assumed extraordinary jurisdiction similar to that exercised in the court of chancery." Even private persons, lords and ladies, affected to establish in their honours courts of equity.

English equity has one marked historical peculiarity, viz. that it established itself in a set of independent tribunals which remained in standing contrast to the ordinary courts for many hundred years. In Roman law the judge gave the preference to the equitable rule; in English law the equitable rule was enforced by a distinct set of judges. One cause of this separation was the rigid adherence to precedent on the part of the common law courts. Another was the jealousy prevailing in England against the principles of the Roman law on which English equity to a large extent was founded.

When a case of prerogative was referred to the chancellor in the reign of Edward III., he was required to grant such remedy as should be consonant to honesty (*honestas*). And honesty, conscience and equity were said to be the fundamental principles of the court. The early chancellors were ecclesiastics, and under their influence not only moral principles, where these were not regarded by the common law, but also the equitable principles of the Roman law were introduced into English jurisprudence. Between this point and the time when equity became settled as a portion of the legal system, having fixed principles of its own, various views of its nature seem to have prevailed. For a long time it was thought that precedents could have no place in equity, inasmuch as it professed in each case to do that which was just; and we find this view maintained by common lawyers after it had been abandoned by the professors of equity themselves. G. Spence, in his book on the *Equitable Jurisdiction of* *the Court of Chancery*, quotes a case in the reign of Charles II., in which chief justice Vaughan said:

> "I wonder to hear of citing of precedents in matter of equity, for if there be equity in a case, that equity is an universal truth, and there can be no precedent in it; so that in any precedent that can be produced, if it be the same with this case, the reason and equity is the same in itself; and if the precedent be not the same case with this it is not to be cited."

But the lord keeper Bridgeman answered:

> "Certainly precedents are very necessary and useful to us, for in them we may find the reasons of the equity to guide us, and besides the authority of those who made them is much to be regarded. We shall suppose they did it upon great consideration and weighing of the matter, and it would be very strange and very ill if we should disturb and set aside what has been the course for a long series of times and ages."

Selden's description is well known: "Equity is a roguish thing. 'Tis all one as if they should make the standard for measure the chancellor's foot." Lord Nottingham in 1676 reconciled the ancient theory and the established practice by saying that the conscience which guided the court was not the natural conscience of the man, but the civil and political conscience of the judge. The same tendency of equity to settle into a system of law is seen in the recognition of its limits—in the fact that it did not attempt in all cases to give a remedy when the rule of the common law was contrary to justice. Cases of hardship, which the early chancellors would certainly have relieved, were passed over by later judges, simply because no precedent could be found for their interference. The point at which the introduction of new principles of equity finally stopped is fixed by Sir Henry Maine in the chancellorship of Lord Eldon, who held that the doctrines of the court ought to be as well settled and made as uniform almost as those of the common law. From that time certainly equity, like common law, has professed to take its principles wholly from recorded decisions and statute law. The view (traceable no doubt to the Aristotelian definition) that equity mitigates the hardships of the law where the law errs through being framed in universals, is to be found in some of the earlier writings. Thus in the *Doctor and Student* it is said:

> "Law makers take heed to such things as may often come, and not to every particular case, for they could not though they would; therefore, in some cases it is necessary to leave the words of the law and follow that reason and justice requireth, and to that intent equity is ordained, that is to say, to temper and mitigate the rigour of the law."

And Lord Ellesmere said:

> "The cause why there is a chancery is for that men's actions are so divers and infinite that it is impossible to make any general law which shall aptly meet with every particular act and not fail in some circumstances."

Modern equity, it need hardly be said, does not profess to soften the rigour of the law, or to correct the errors into which it falls by reason of its generality.

To give any account, even in outline, of the subject matter of equity within the necessary limits of this article would be impossible. It will be sufficient to say here that the classification generally adopted by text-writers is based upon the relations of equity to the common law, of which some explanation is given above. Thus equitable jurisdiction is said to be exclusive, concurrent or auxiliary. Equity has *exclusive* jurisdiction where it recognizes rights which are unknown to the common law. The most important example is trusts. Equity has *concurrent* jurisdiction in cases where the law recognized the right but did not give adequate relief, or did not give relief without circuity of action or some similar inconvenience. And equity has *auxiliary* jurisdiction when the machinery of the courts of law was unable to procure the necessary evidence.

"The evils of this double system of judicature," says the report of the judicature commission (1863–1867), "and the confusion and conflict of jurisdiction to which it has led, have been long known and acknowledged." A partial attempt to meet the difficulty was made by several acts of parliament (passed after the reports of commissions appointed in 1850 and 1851), which enabled courts of law and equity both to exercise certain powers formerly peculiar to one or other of them. A more complete remedy was introduced by the Judicature Act 1873, which consolidated the courts of law and equity, and ordered that law and equity should be administered concurrently according to the rules contained in the 26th section of the act. At the same time many matters of equitable jurisdiction are still left to the chancery division of the High Court in the first instance. (See CHANCERY.)

AUTHORITIES.—The principles of equity as set out by the following writers may be consulted: J. Story, J. W. Smith, H. A. Smith and W. Ashburner; and for the history see G. Spence, *The Equitable Jurisdiction of the Court of Chancery* (2 vols., 1846–1849); D. M. Kerly, *Historical Sketch of the Equitable Jurisdiction of the Court of Chancery* (1890).

EQUIVALENT, in chemistry, the proportion of an element which will combine with or replace unit weight of hydrogen. When multiplied by the valency it gives the atomic weight. The determination of equivalent weights is treated in the article STOICHIOMETRY. (See also CHEMISTRY.) In a more general sense the term "equivalent" is used to denote quantities of substances which neutralize one another, as for example $NaOH$, HCl, $\frac{1}{2}H_2SO_4$, $\frac{1}{2}Ba(OH)_2$.

ÉRARD, SÉBASTIEN (1752–1831), French manufacturer of musical instruments, distinguished especially for the improvements he made upon the harp and the pianoforte, was born at Strassburg on the 5th of April 1752. While a boy he showed great aptitude for practical geometry and architectural drawing, and in the workshop of his father, who was an upholsterer, he found opportunity for the early exercise of his mechanical ingenuity. When he was sixteen his father died, and he removed to Paris where he obtained employment with a harpsichord maker. Here his remarkable constructive skill, though it speedily excited the jealousy of his master and procured his dismissal, almost equally soon attracted the notice of musicians and musical instrument makers of eminence. Before he was twenty-five he set up in business for himself, his first workshop being a room in the hotel of the duchesse de Villeroi, who gave him warm encouragement. Here he constructed in 1780 his first pianoforte, which was also one of the first manufactured in France. It quickly secured for its maker such a reputation that he was soon overwhelmed with commissions, and finding assistance necessary, he sent for his brother, Jean Baptiste, in conjunction with whom he established in the rue de Bourbon, in the Faubourg St Germain, a piano manufactory, which in a few years became one of the most celebrated in Europe. On the outbreak of the Revolution he went to London where he established a factory. Returning to Paris in 1796, he soon afterwards introduced grand pianofortes, made in the English fashion, with improvements of his own. In 1808 he again visited London, where, two years later, he produced his first double-movement harp. He had previously made various improvements in the manufacture of harps, but the new instrument was an immense advance upon anything he had before produced, and obtained such a reputation that for some time he devoted himself exclusively to its manufacture. It has been said that in the year following his invention he made harps to the value of £25,000. In 1812 he returned to Paris, and continued to devote himself to the further perfecting of the two instruments with which his name is associated. In 1823 he crowned his work by producing his model grand pianoforte with the double escapement. Érard died at Passy, on the 5th of August 1831. (See also HARP and PIANOFORTE.)

ERASMUS, DESIDERIUS (1466–1536), Dutch scholar and theologian, was born on the night of the 27/28th of October, probably in 1466; but his statements about his age are conflicting, and in view of his own uncertainty (*Ep.* x. 29: 466) and the weakness of his memory for dates, the year of his birth cannot be definitely fixed. His father's name seems to have been Rogerius Gerardus. He himself was christened Herasmus; but in 1503, when becoming familiar with Greek, he assimilated the name to a fancied Greek original, which he had a few years before Latinized into Desyderius. A contemporary authority states that he was born at Gouda, his father's native town;

but he adopted the style *Rotterdammensis* or *Roterodamus*, in accordance with a story to which he himself gave credence. His first schooling was at Gouda under Peter Winckel, who was afterwards vice-pastor of the church. In the dull round of instruction in "grammar" he did not distinguish himself, and was surpassed by his early friend and companion, William Herman, who was Winckel's favourite pupil. From Gouda the two boys went to the school attached to St Lebuin's church at Deventer, which was one of the first in northern Europe to feel the influence of the Renaissance. Erasmus was at Deventer from 1475 to 1484, and when he left, had learnt from Johannes Sinthius (Syntheim) and Alexander Hegius, who had come as headmaster in 1483, the love of letters which was the ruling passion of his life. At some period, perhaps in an interval of his time at Deventer, he was a chorister at Utrecht under the famous organist of the cathedral, Jacob Obrecht.

About 1484 Erasmus' father died, leaving him and an elder brother Peter, both born out of wedlock, to the care of guardians, their mother having died shortly before. Erasmus was eager to go to a university, but the guardians, acting under a perhaps genuine enthusiasm for the religious life, sent the boys to another school at Hertogenbosch; and when they returned after two or three years, prevailed on them to enter monasteries. Peter went to Sion, near Delft; Erasmus after prolonged reluctance became an Augustinian canon in St Gregory's at Steyn, a house of the same Chapter near Gouda. There he found little religion and less refinement; but no serious difficulty seems to have been made about his reading the classics and the Fathers with his friends to his heart's content. The monastery once entered, there was no drawing back; and Erasmus passed through the various stages which culminated in his ordination as priest on the 25th of April 1492.

But his ardent spirit could not long be content with monastic life. He brought his attainments somehow to the notice of Henry of Bergen, bishop of Cambrai, the leading prelate at the court of Brussels; and about 1494 permission was obtained for him to leave Steyn and become Latin secretary to the bishop, who was then preparing for a visit to Rome. But the journey was abandoned, and after some months Erasmus found that even with occasional chances to read at Groenendael, the life of a court was hardly more favourable to study than that of Steyn. At the suggestion of a friend, James Batt, he applied to his patron for leave to go to Paris University. The bishop consented and promised a small pension; and in August 1495 Erasmus entered the "domus pauperum" of the college of Montaigu, which was then under the somewhat rigid rule of the reformer Jan Standonck. He at once introduced himself to the distinguished French historian and diplomatist Robert Gaguin (1425–1502) and published a small volume of poems; and he became intimate with Johann Mauburnus (Mombaer), the leader of a mission summoned from Windesheim in 1496 to reform the abbey of Château-Landon. But the life at Montaigu was too hard for him. Every Lent he fell ill and had to return to Holland to recover. He continued to read nevertheless for a degree in theology, and at some time completed the requirements for the B.D. After a year or two he left Montaigu and eked out his money from the bishop by taking pupils. One of these, a young Englishman, William Blount, 4th Baron Mountjoy (d. 1534), persuaded him to visit England in the spring of 1499.

Being without a benefice, he had no settled income to look to, and apart from the precarious profits of teaching and writing books, could only wait on the generosity of patrons to supply him with the leisure he craved. The faithful Batt had sought a pension for him from his own patroness, Anne of Borsselen, the Lady of Veere, who resided at the castle of Tournehem near Calais, and whose son Batt was now teaching. But as nothing promised at once, Erasmus accepted Mountjoy's offer, and thus a tie was formed which led Mountjoy then or a few years later to grant him a pension of £20 for life. Otherwise the visit to England gave no hope of preferment; and in the summer Erasmus prepared to leave. He was delayed, and used the interval to spend two or three months at Oxford, where he found John Colet lecturing on the Epistle to the Romans. Discussions between them on theological questions soon convinced Colet of Erasmus' worth, and he sought to persuade him to stay and teach at Oxford. But Erasmus could not be content with the Bible in Latin. Oxford could teach him no Greek, so away he must go.

In January 1500 he returned to Paris, which though it could offer no Greek teacher better than George Hermonymus, was at least a better centre for buying and for printing books. The next few years were spent still in preparation, supported by pupils' fees and the dedications of books; the *Collectanea adagiorum* in June 1500 to Mountjoy, and some devotional and moral compositions to Batt's patroness and her son. When the plague drove him from Paris, he went to Orleans or Tournehem or St Omer, as the way opened. From 1502 to 1504 he was at Louvain, still declining to teach publicly; among his friends being the future Pope Adrian VI. In January 1504 the archduke Philip gave him fifty livres for the Panegyric which "*ung religieux de l'ordre de St Augustin*" had composed on his Spanish journey; and in October, ten more, for the maintenance of his studies.

He had been working hard at Greek, of which he now felt himself master, at the Fathers (above all at Jerome), and at the Epistles of St Paul, fulfilling the promise made to Colet in Oxford, to give himself to sacred learning. But the bent of his reading is shown by the manuscript with which he returned to Paris at the close of 1504—Valla's *Annotations on the New Testament*, which Badius printed for him in 1505.

Shortly afterwards Lord Mountjoy invited him again to England, and this visit was more successful. He found in London a circle of learned friends through whom he was introduced to William Warham, archbishop of Canterbury, Richard Foxe, bishop of Winchester and other dignitaries. John Fisher (bishop of Rochester), who was then superintending the foundation of Christ's College for the Lady Margaret, took him down to Cambridge for the king's visit; and at length the opportunity came to fulfil his dream of seeing Italy. Baptista Boerio, the king's physician, engaged him to accompany his two sons thither as supervisor of their studies. In September 1506 he set foot on that sacred soil, and took his D.D. at Turin. For a year he remained with his pupils at Bologna, and then, his engagement completed, negotiated with Aldus Manutius for a new edition of his *Adagia* upon a very different scale. The volume of 1500 had been jejune, written when he knew nothing of Greek; 800 adages put together with scanty elucidations. In 1508 he had conceived a work on lines more to the taste of the learned world, full of apt and recondite learning, and now and again relieved by telling comments or lively anecdotes. Three thousand and more collected justified a new title—*Chiliades adagiorum*; and the author's reputation was now established. So secure in public favour did the book in time become, that the council of Trent, unable to suppress it and not daring to overlook it, ordered the preparation of a castrated edition.

To print the *Adagia* he had gone to Venice, where he lived with Andrea Torresano of Asola (Asulanus) and did the work of two men, writing and correcting proof at the same time. When it was finished, with an ample re-dedication to Mountjoy, a new pupil presented himself, Alexander Stewart, natural son of James IV. of Scotland—perhaps through a connexion formed in early days at Paris. They went together to Siena and Rome and then on to Campania, thirsty under the summer sun. When they returned to Rome, his pupil departed to Scotland, to fall a few years later by his father's side at Flodden; Erasmus also found a summons to call him northwards.

On the death of Henry VII. Lord Mountjoy, who had been companion to Prince Henry in his studies, had become a person of influence. He wrote to Erasmus of a land flowing with milk and honey under the "divine" young king, and with Warham sent him £10 for journey money. At first Erasmus hesitated. He had been disappointed in Italy, to find that he had not much to learn from its famed scholarship; but he had made many friends in Aldus's circle—Marcus Musurus, John Lascaris, Baptista Egnatius, Paul Bombasius, Scipio Carteromachus; and his reception had been flattering, especially in Rome, where cardinals had delighted to honour him. But to remain in Rome was to sell himself. He might have the leisure which was so indispensable, but at price of the freedom to read, think, write what he liked. He decided, therefore, to go, though with regrets; which returned upon him sometimes in after years, when the English hopes had not borne fruit.

In the autumn he reached London, and in Thomas More's house in Bucklersbury wrote the witty satire which Milton found "in every one's hands" at Cambridge in 1628, and which is read to this day. The *Moriae encomium* was a sign of his decision. In it kings and princes, bishops and popes alike are shown to be in bondage to Folly; and no class of men is spared. Its author was willing to be beholden to any one for leisure; but he would be no man's slave. For the next eighteen months he is entirely lost to view; when he reappears in April 1511, he is leaving More's house and taking the *Moria* to be printed privily in Paris. Wherever they were spent, these must have been months of hard work, as were the years that followed. His time was now come. The long preparation and training, bought by privation and uncongenial toil, was over, and he was ready to apply himself to the scientific study of sacred letters. His English patrons were liberal. Fisher sent him in August 1511 to teach in Cambridge; Warham gave him a benefice, Aldington in Kent, worth £33,6*s*.8*d*. a year, and in violation of his own rule commuted it for a pension of £20 charged on the living; and the dedications of his books were fruitful. In Cambridge he completed his work on the New Testament, the Letters of Jerome, and Seneca; and then in 1514, when there seemed no prospect of ampler preferment, he determined to transfer himself to Basel and give the results of his labours to the world.

The origin of Erasmus's connexion with Johann Froben is not clear. In 1511 he was preparing to reprint his *Adagia* with Jodocus Badius, who in the following year was to have also Seneca and Jerome. But in 1513 Froben, who had just reprinted the Aldine *Adagia*, acquired through a bookseller-agent Erasmus' amended copy which had been destined for Badius. That the agent was acting entirely on his own responsibility may be doubted; for within a few months Erasmus had decided to betake himself to Basel, bearing with him Seneca and Jerome, the latter to be incorporated in the great edition which Johannes Amerbach and Froben had had in hand since 1510. In Germany he was widely welcomed. The Strassburg Literary Society fêted him, and Johannes Sapidus, headmaster of the Latin school at Schlettstadt, rode with him into Basel. Froben received him with open arms, and the presses were soon busy with his books. Through the winter of 1514–1515 Erasmus worked with the strength of ten; and after a brief visit to England in the spring, the New Testament was set up. Around him was a circle of students, some young, some already distinguished—the three sons of Froben's partner, Johannes Amerbach, who was now dead, Beatus Rhenanus, Wilhelm Nesen, Ludwig Ber, Heinrich Glareanus, Nikolaus Gerbell, Johannes Oecolampadius—who looked to him as their head and were proud to do him service.

Though from this time forward Basel became the centre of occupation and interest for Erasmus, yet for the next few years he was mainly in the Netherlands. On the completion of the New Testament in 1516 he returned to his friends in England; but his appointment, then recent, as councillor to the young king Charles, brought him back to Brussels in the autumn. In the spring of 1517 he went for the last time to England, about a dispensation from wearing his canonical dress, obtained originally from Julius II. and recently confirmed by Leo X., and in May 1518 he journeyed to Basel for three months to set the second edition of the New Testament in progress. But with these exceptions he remained in proximity to the court, living much at Louvain, where he took great interest in the foundation of Hieronymus Busleiden's Collegium Trilingue. His circumstances had improved so much, by pensions, the presents which were showered upon him, and the sale of his books, that he was now in a position to refuse all proposals which would have interfered with his cherished independence. The general ardour for the restoration of the arts and of learning created an aristocratic public, of which Erasmus was supreme pontiff. Luther spoke to the people and the ignorant; Erasmus had the ear of the educated class. His friends and admirers were distributed over all the countries of Europe, and presents were continually arriving from small as well as great, from a donation of 200 florins, made by Pope Clement VII., down to sweetmeats and comfits contributed by the nuns of Cologne (*Ep.* 666). From England, in particular, he continued to receive supplies of money. In the last year of his life Thomas Cromwell sent him 20 angels, and Archbishop Cranmer 18. Though Erasmus led a very hard-working and far from luxurious life, and had no extravagant habits, yet he could not live upon little. The excessive delicacy of his constitution, not pampered appetite, exacted some unusual indulgences. He could not bear the stoves of Germany, and required an open fireplace in the room in which he worked. He was afflicted with the stone, and obliged to be particular as to what he drank. Beer he could not touch. The white wines of Baden or the Rhine did not suit him; he could only drink those of Burgundy or Franche-Comté. He could neither eat, nor bear the smell of, fish. "His heart," he said, "was Catholic, but his stomach was Lutheran." For his constant journeys he required two horses, one for himself and one for his attendant. And though he was almost always found in horse-flesh by his friends, the keep had to be paid for. For his literary labours and his extensive correspondence he required one or more amanuenses. He often had occasion, on his own business, or on that of Froben's press, to send special couriers to a distance, employing them by the way in collecting the free gifts of his tributaries.

Precarious as these means of subsistence seem, he preferred the independence thus obtained to an assured position which would have involved obligations to a patron or professional duties which his weak health would have made onerous. The duke of Bavaria offered to dispense with teaching, if he would only reside, and would have named him on these terms to a chair in his new university of Ingolstadt, with a salary of 200 ducats, and the reversion of one or more prebendal stalls. The archduke Ferdinand offered a pension of 400 florins, if he would only come to reside at Vienna. Adrian VI. offered him a deanery, but the offer seems to have been of a possible and not an actual deanery. Offers, flattering but equally vague, were made from France, on the part of the bishop of Bayeux, and even of Francis I. "Invitor amplissimis conditionibus; offeruntur dignitates et episcopatus; plane rex essem, si juvenis essem" (*Ep.* xix. 106; 735). Erasmus declined all, and in November 1521 settled permanently at Basel, in the capacity of general editor and literary adviser of Froben's press. As a subject of the emperor, and attached to his court by a pension, it would have been convenient to him to have fixed his residence in Louvain. But the bigotry of the Flemish clergy, and the monkish atmosphere of the university of Louvain, overrun with Dominicans and Franciscans, united for once in their enmity to the new classical learning, inclined Erasmus to seek a more congenial home in Basel. To Froben his arrival was the advent of the very man whom he had long wanted. Froben's enterprise, united with Erasmus's editorial skill, raised the press of Basel, for a time, to be the most important in Europe. The death of Froben in 1527, the final separation of Basel from the Empire, the wreck of learning in the religious disputes, and the cheap paper and scamped work of the Frankfort presses, gradually withdrew the trade from Basel. But during the years of Erasmus's co-operation the Froben press took the lead of all the presses in Europe, both in the standard value of the works published and in style of typographical execution. Like some other publishers who preferred reputation to returns in money, Froben died poor, and his impressions never reached the splendour afterwards attained by those of the Estiennes, or of Plantin. The series of the Fathers alone contains Jerome (1516), Cyprian (1520), Pseudo-Arnobius (1522), Hilarius (1523), Irenaeus (Latin, 1526), Ambrose (1527), Augustine (1528), Chrysostom

(Latin, 1530), Basil (Greek, 1532, the first Greek author printed in Germany), and Origen (Latin, 1536). In these editions, partly texts, partly translations, it is impossible to determine the respective shares of Erasmus and his many helpers. The prefaces and dedications are all written by him, and some of them, as that to the Hilarius, are of importance for the history as well of the times as of Erasmus himself. Of his most important edition, that of the Greek text of the New Testament, something will be said farther on.

In this "mill," as he calls it, Erasmus continued to grind incessantly for eight years. Besides his work as editor, he was always writing himself some book or pamphlet called for by the event of the day, some general fray in which he was compelled to mingle, or some personal assault which it was necessary to repel. But though painfully conscious how much his reputation as a writer was damaged by this extempore production, he was unable to resist the fatal facility of print. He was the object of those solicitations which always beset the author whose name upon the title page assures the sale of a book. He was besieged for dedications, and as every dedication meant a present proportioned to the circumstances of the dedicatee, there was a natural temptation to be lavish of them. Add to this a correspondence so extensive as to require him at times to write forty letters in one day. "I receive daily," he writes, "letters from remote parts, from kings, princes, prelates and men of learning, and even from persons of whose existence I was ignorant." His day was thus one of incessant mental activity; but hard work was so far from breeding a distaste for his occupation, that reading and writing grew ever more delightful to him (*literarum assiduitas non modo mihi fastidium non parit, sed voluptatem; crescit scribendo scribendi studium*).

Shortly after Froben's death the disturbances at Basel, occasioned by the zealots for the religious revolution which was in progress throughout Switzerland, began to make Erasmus desirous of changing his residence. He selected Freiburg in the Breisgau, as a city which was still in the dominion of the emperor, and was free from religious dissension. Thither he removed in April 1529. He was received with public marks of respect by the authorities, who granted him the use of an unfinished residence which had been begun to be built for the late emperor Maximilian. Erasmus proposed only to remain at Freiburg for a few months, but found the place so suited to his habits that he bought a house of his own, and remained there six years. A desire for change of air—he fancied Freiburg was damp—rumours of a new war with France, and the necessity of seeing his *Ecclesiastes* through the press, took him back to Basel in 1535. He lived now a very retired life, and saw only a small circle of intimate friends. A last attempt was made by the papal court to enlist him in some public way against the Reformation. On the election of Paul III. in 1534, he had, as usual, sent the new pope a congratulatory letter. After his arrival in Basel, he received a complimentary answer, together with the nomination to the deanery of Deventer, the income of which was reckoned at 600 ducats. This nomination was accompanied with an intimation that more was in store for him, and that steps would be taken to provide for him the income, viz., 3000 ducats, which was necessary to qualify for the cardinal's hat. But Erasmus was even less disposed now than he had been before to barter his reputation for honours. His health had been for some years gradually declining, and disease in the shape of gout gaining upon him. In the winter of 1535–1536 he was confined entirely to his chamber, many days to his bed. Though thus afflicted he never ceased his literary activity, dictating his tract *On the Purity of the Church*, and revising the sheets of a translation of Origen which was passing through the Froben press. His last letter is dated the 28th of June 1536, and subscribed "Eras. Rot. aegra manu." "I have never been so ill in my life before as I am now,—for many days unable even to read." Dysentery setting in carried him off on the 12th of July 1536, in his 70th year.

By his will, made on the 12th of February 1536, he left what he had to leave, with the exception of some legacies, to Bonifazius Amerbach, partly for himself, partly in trust for the benefit of the aged and the infirm, or to be spent in portioning young girls, and in educating young men of promise. He left none of the usual legacies for masses or other clerical purposes, and was not attended by any priest or confessor in his last moments.

Erasmus's features are familiar to all, from Holbein's many portraits or their copies. Beatus Rhenanus, "summus Erasmi observator," as he is called by de Thou, describes his person thus: "In stature not tall, but not noticeably short; in figure well built and graceful; of an extremely delicate constitution, sensitive to the slightest changes of climate, food or drink. After middle life he suffered from the stone, not to mention the common plague of studious men, an irritable mucous membrane. His complexion was fair; light blue eyes, and yellowish hair. Though his voice was weak, his enunciation was distinct; the expression of his face cheerful; his manner and conversation polished, affable, even charming." His highly nervous organization made his feelings acute, and his brain incessantly active. Through his ready sympathy with all forms of life and character, his attention was always alive. The active movement of his spirit spent itself, not in following out its own trains of thought, but in outward observation. No man was ever less introspective, and though he talks much of himself, his egotism is the genial egotism which takes the world into its confidence, not the selfish egotism which feels no interest but in its own woes. He says of himself, and justly, "that he was incapable of dissimulation" (*Ep.* xxvi. 19; 1152). There is nothing behind, no pose, no scenic effect. It may be said of his letters that in them "tota patet vita senis." His nature was flexible without being faultily weak. He has many moods and each mood imprints itself in turn on his words. Hence, on a superficial view, Erasmus is set down as the most inconsistent of men. Further acquaintance makes us feel a unity of character underlying this susceptibility to the impressions of the moment. His seeming inconsistencies are reconciled to apprehension, not by a formula of the intellect, but by the many-sidedness of a highly impressible nature. In the words of J. Nisard, Erasmus was one of those "dont la gloire a été de beaucoup comprendre et d'affirmer peu."

This equal openness to every vibration of his environment is the key to all Erasmus's acts and words, and among them to the middle attitude which he took up towards the great religious conflict of his time. The reproaches of party assailed him in his lifetime, and have continued to be heaped upon his memory. He was loudly accused by the Catholics of collusion with the enemies of the faith. His powerful friends, the pope, Wolsey, Henry VIII., the emperor, called upon him to declare against Luther. Theological historians from that time forward have perpetuated the indictment that Erasmus sided with neither party in the struggle for religious truth. The most moderate form of the censure presents him in the odious light of a trimmer; the vulgar and venomous assailant is sure that Erasmus was a Protestant at heart, but withheld the avowal that he might not forfeit the worldly advantages he enjoyed as a Catholic. When by study of his writings we come to know Erasmus intimately, there is revealed to us one of those natures to which partisanship is an impossibility. It was not timidity or weakness which kept Erasmus neutral, but the reasonableness of his nature. It was not only that his intellect revolted against the narrowness of party, his whole being repudiated its clamorous and vulgar excesses. As he loathed fish, so he loathed clerical fanaticism. Himself a Catholic priest—"the glory of the priesthood and the shame"—the tone of the orthodox clergy was distasteful to him; the ignorant hostility to classical learning which reigned in their colleges and convents disgusted him. In common with all the learned men of his age, he wished to see the power of the clergy broken, as that of an obscurantist army arrayed against light. He had employed all his resources of wit and satire against the priests and monks, and the superstitions in which they traded, long before Luther's name was heard of. The motto which was already current in his lifetime, "that Erasmus laid the egg and Luther hatched it," is so far true, and no more. Erasmus would have suppressed the monasteries, put an end to the domination of the clergy, and swept away scandalous and profitable abuses, but to attack the church or re-mould received theology was far from his thoughts. And when out of Luther's revolt there arose a new fanaticism—that of evangelism, Erasmus recoiled from the violence of the new preachers. "Is it for this," he writes to Melanchthon (*Ep.* xix. 113; 703), "that we have shaken off bishops and popes, that we may come under the yoke of such madmen as Otto and Farel?" Passages have been collected, and it is an easy task, from the writings of Erasmus to prove that he shared the doctrines of the Reformers. Passages equally strong might be culled to show that he repudiated them. The truth is that theological questions in themselves had no attraction for him. And when a theological position was emphasized by party passion it became odious to him. In the words of Drummond: "Erasmus was in his own age the apostle of common sense and of rational religion. He did not care for dogma, and accordingly the dogmas of Rome, which had the consent of the Christian world, were in his eyes preferable to the dogmas of Protestantism. . . . From the beginning to the end of his career he remained true to the purpose of his life, which was to fight the battle of sound learning and plain common sense against the powers of ignorance and superstition, and amid all the convulsions of that period he never once lost his mental balance."

Erasmus is accused of indifference. But he was far from indifferent to the progress of the revolution. He was keenly alive to its pernicious influence on the cherished interest of his life, the cause of learning. "I abhor the evangelics, because it is through them that literature is everywhere declining, and upon the point of perishing." He had been born with the hopes of the Renaissance, with its anticipation of a new Augustan age, and had seen this fair promise blighted by the irruption of a new horde of theological polemics, worse than the old scholastics, inasmuch as they were revolutionary instead of conservative. Erasmus never flouted at religion nor even at theology as such, but only at blind and intemperate theologians.

In the mind of Erasmus there was no metaphysical inclination; he was a man of letters, with a general tendency to rational views on every subject which came under his pen. His was not the mind to originate, like Calvin, a new scheme of Christian thought. He is at his weakest in defending free will against Luther, and indeed he can hardly be said to enter on the metaphysical question. He treats the dispute entirely from the outside. It is impossible in reading Erasmus not to be reminded of the rationalist of the 18th century. Erasmus has been called the "Voltaire of the Renaissance." But there is a vast difference in the relations in which they respectively stood to the church and to Christianity. Voltaire, though he did not originate, yet adopted a moral and religious scheme which he sought to substitute for the church tradition. He waged war, not only against the clergy, but against the church and its sovereigns. Erasmus drew the line at the first of these. He was not an anticipation of the 18th century; he was the man of his age, as Voltaire of his; though Erasmus did not intend it, he undoubtedly shook the ecclesiastical edifice in all its parts; and, as Melchior Adam says of him, "pontifici Romano plus nocuit jocando quam Lutherus stomachando."

But if Erasmus was unlike the 18th century rationalist in that he did not declare war against the church, but remained a Catholic and mourned the disruption, he was yet a true rationalist in principle. The principle that reason is the one only guide of life, the supreme arbiter of all questions, politics and religion included, has its earliest and most complete exemplar in Erasmus. He does not dogmatically denounce the rights of reason, but he practically exercises them. Along with the charm of style, the great attraction of the writings of Erasmus is this unconscious freedom by which they are pervaded.

It must excite our surprise that one who used his pen so freely should have escaped the pains and penalties which invariably overtook minor offenders in the same kind. For it was not only against the clergy and the monks that he kept up a ceaseless stream of satiric raillery; he treated nobles, princes and kings with equal freedom. No 18th century republican has used stronger language than has this pensioner of Charles V. "The people build cities, princes pull them down; the industry of the citizens creates wealth for rapacious lords to plunder; plebeian magistrates pass good laws for kings to violate; the people love peace, and their rulers stir up war." Such outbursts are frequent in the *Adagia*. These freedoms are part cause of Erasmus's popularity. He was here in sympathy with the secret sore of his age, and gave utterance to what all felt but none dared to whisper but he. It marks the difference between 1513 and 1669 that, in a reprint of the *Julius Exclusus* published in 1669 at Oxford, it was thought necessary to leave out a sentence in which the writer of that dialogue, supposed by the editor to be Erasmus, asserts the right of states to deprive and punish bad kings. It is difficult to say to what we are to ascribe his immunity from painful consequences. We have to remember that he was removed from the scene early in the reaction, before force was fully organized for the suppression of the revolution. And his popular works, the *Adagia*, and the *Colloquia* (1524), had established themselves as standard books in the more easy going age, when power, secure in its unchallenged strength, could afford to laugh with the laughers at itself. At the date of his death the Catholic revival, with its fell antipathy to art and letters, was only in its infancy; and when times became dangerous, Erasmus cautiously declined to venture out of the protection of the Empire, refusing repeated invitations to Italy and to France. "I had thought of going to Besançon," he said, "ne non essem in ditione Caesaris" (*Ep.* xxx. 74; 1299). In Italy a Bembo and a Sadoleto wrote a purer Latin than Erasmus, but contented themselves with pretty phrases, and were careful to touch no living chord of feeling. In France it was necessary for a Rabelais to hide his free-thinking under a disguise of revolting and unintelligible jargon. It was only in the Empire that such liberty of speech as Erasmus used was practicable, and in the Empire Erasmus passed for a moderate man. Upon the strength of an established character for moderation he enjoyed an exceptional licence for the utterance of unwelcome truths; and in spite of his flings at the rich and powerful, he remained through life a privileged person with them.

But though the men of the keys and the sword let him go his way unmolested, it was otherwise with his brethren of the pen. A man who is always launching opinions must expect to be retorted on. And when these judgments were winged by epigram, and weighted by the name of Erasmus, who stood at the head of letters, a widespread exasperation was the consequence. Disraeli has not noticed Erasmus in his *Quarrels of Authors*, perhaps because Erasmus's quarrels would require a volume to themselves. "So thin-skinned that a fly would draw blood," as the prince of Carpi expressed it, he could not himself restrain his pen from sarcasm. He forgot that though it is safe to lash the dunces, he could not with equal impunity sneer at those who, though they might not have the ear of the public as he had, could yet contradict and call names. And when literary jealousy was complicated with theological differences, as in the case of the free-thinkers, or with French vanity, as in that of Budaeus, the cause of the enemy was espoused by a party and a nation. The quarrel with Budaeus was strictly a national one. Cosmopolitan as Erasmus was, to the French literati he was still the Teuton. Étienne Dolet calls him "enemy of Cicero, and jealous detractor of the French name." The only contemporary name which could approach to a rivalry with his was that of Budaeus (Budé), who was exactly contemporary, having been born in the same year as Erasmus. Rivals in fame, they were unlike in accomplishment, each having the quality which the other wanted. Budaeus, though a Frenchman, knew Greek well; Erasmus, though a Dutchman, very imperfectly. But the Frenchman Budaeus wrote an execrable Latin style, unreadable then as now, while the Teuton Erasmus charmed the reading world with a style which, though far from good Latin, is the most delightful which the Renaissance has left us.

The style of Erasmus is, considered as Latin, incorrect, sometimes even barbarous, and far removed from any classical model. But it has qualities far above purity. The best Italian Latin is but an echo and an imitation; like the painted glass which we put in our churches, it is an anachronism. Bembo, Sadoleto and the rest write purely in a dead language. Erasmus's Latin was a living and spoken tongue. Though Erasmus had passed nearly all his life in England, France and Germany, his conversation was Latin; and the language in which he talked about common things he wrote. Hence the spontaneity and naturalness of his page, its flavour of life and not of books. He writes from himself, and not out of Cicero. Hence, too, he spoiled nothing by anxious revision in terror lest some phrase not of the golden age should escape from his pen. He confesses apologetically to Christopher Longolius (*Ep.* iii. 63; 402) that it was his habit to extemporize all he wrote, and that this habit was incorrigible; "effundo verius quam scribo omnia." He complains that much reading of the works of St Jerome had spoiled his Latin; but, as Scaliger says (*Scalig*^{a} 2^a), "Erasmus's language is better than St Jerome's." The same critic, however, thought Erasmus would have done better "if he had kept more closely to the classical models."

In the annals of classical learning Erasmus may be regarded as constituting an intermediate stage between the humanists of the Latin Renaissance and the learned men of the age of Greek scholarship, between Angelo Poliziano and Joseph Scaliger. Erasmus, though justly styled by Muretus (*Varr. Lectt.* 7, 15) "eruditus sane vir, ac multae lectionis," was not a "learned" man in the special sense of the word—not an "érudit." He was more than this; he was the "man of letters"—the first who had appeared in Europe since the fall of the Roman empire. His acquirements were vast, and they were all brought to bear upon the life of his day. He did not make a study apart of antiquity for its own sake, but used it as an instrument of culture. He did not worship, imitate and reproduce the classics, like the Latin humanists who preceded him; he did not master them and reduce them to a special science, as did the French Hellenists who succeeded him. He edited many authors, it is true, but he had neither the means of forming a text, nor did he attempt to do so. In editing a father, or a classic, he had in view the practical utility of the general reader, not the accuracy required by the gild of scholars. "His Jerome," says J. Scaliger, "is full of sad blunders" (*Scalig*^{a} 2^a). Even Julien Garnier could discover that Erasmus "falls in his haste into grievous error in his Latin version of St Basil, though his Latinity is superior to that of the other translators" (Pref. in *Opp. St. Bas.*, 1721). It must be remembered that the commercial interests of Froben's press led to the introduction of Erasmus's name on many a title page when he had little to do with the book, *e.g.* the Latin *Josephus* of 1524 to which Erasmus only contributed one translation of 14 pages; or the *Aristotle* of 1531, of which Simon Grynaeus was the real editor. Where Erasmus excelled was in prefaces—not philological introductions to each author, but spirited appeals to the interest of the general reader, showing how an ancient book might be made to minister to modern spiritual demands.

Of Erasmus's works the Greek Testament is the most memorable. It has no title to be considered as a work of learning or scholarship, yet its influence upon opinion was profound and durable. It contributed more to the liberation of the human mind from the thraldom of the clergy than all the uproar and rage of Luther's many pamphlets. As an edition of the Greek Testament it has no critical value. But it was the first, and it revealed the fact that the Vulgate, the Bible of the church, was not only a second-hand document, but in places an erroneous document. A shock was thus given to the credit of the clergy in the province of literature, equal to that which was given in the province of science by the astronomical discoveries of the 17th century. Even if Erasmus had had at his disposal the MSS. subsidia for forming a text, he had not the critical skill required to use them. He had at hand a few late Basel MSS., one of which he sent straight to press, correcting them in places by collations of others which had been sent to him by Colet in England. In four reprints, 1519, 1522, 1527, 1535, Erasmus gradually weeded out many of the typographical errors of his first edition, but the text remained essentially such as he had first printed it. The Greek text indeed was only a part of his scheme. An important feature of the volume was the new Latin version, the original being placed alongside as a guarantee of the translator's good faith. This translation, with the justificatory notes which accompanied it, though not itself a work of critical scholarship, became the starting-point of modern exegetical science. Erasmus did nothing to solve the problem, but to him belongs the honour of having first propounded it.

Besides translating and editing the New Testament, Erasmus paraphrased the whole, except the Apocalypse, between 1517 and 1524. The paraphrases were received with great applause, even by those who had little appreciation for Erasmus. In England a translation of them made in 1548 was ordered to be placed in all parish churches beside the Bible. His correspondence is perhaps the part of his works which has the most permanent value; it comprises about 3000 letters, which form an important source for the history of that period. For the same purpose his *Colloquia* may be consulted. They are a series of dialogues, written first for pupils in the early Paris days, as formulae of polite address, but afterwards expanded into lively conversations, in which many of the topics of the day are discussed. Later in the century they were read in schools, and some of Shakespeare's lines are direct reminiscences of Erasmus.

His complete works have been printed twice; by the Froben firm under the direction of his literary executors (9 vols., Basel, 1540); and by Leclerc at Leiden (11 vols., 1703–1706). For his life the chief contemporary sources are a *Compendium vitae* written by himself in 1524, and a sketch prefixed by Beatus Rhenanus to the Basel edition of 1540. Of his writings he gives an account in his *Catalogus lucubrationum*, composed first in January 1523 and enlarged in September 1524; and also in a letter to Hector Boece of Aberdeen, written in 1530. An elaborate bibliography, entitled *Bibliotheca Erasmiana*, was undertaken by the officials of the Ghent University Library; it is divided into three sections, for Erasmus's writings, the books he edited, and the literature about him. *Listes sommaires* were issued in 1893; and since 1897 the completed volumes have been appearing at intervals. There is an excellent sketch of Erasmus's life down to 1519 in F. Seebohm's *Oxford Reformers* (3rd ed., 1887); and of the many biographies those by S. Knight (1726), J. Jortin (2 vols., 1758–1760) and R. B. Drummond (2 vols., 1873) may be mentioned. There are also two volumes (1901–1904) of translations by F. M. Nichols from Erasmus's letters down to 1517, with an ample commentary which amounts almost to a biography; and an edition of the letters, in Latin, was begun by the Oxford University Press in 1906 (vol. ii., 1910). (M. P.; P. S. A.)

ERASTUS, THOMAS (1524–1583), German-Swiss theologian, whose surname was Lüber, Lieber, or Liebler, was born of poor parents on the 7th of September 1524, probably at Baden, canton of Aargau, Switzerland. In 1540 he was studying theology at Basel. The plague of 1544 drove him to Bologna and thence to Padua as student of philosophy and medicine. In 1553 he became physician to the count of Henneberg, Saxe-Meiningen, and in 1558 held the same post with the elector-palatine, Otto Heinrich, being at the same time professor of medicine at Heidelberg. His patron's successor, Frederick III., made him (1559) a privy councillor and member of the church consistory. In theology he followed Zwingli, and at the sacramentarian conferences of Heidelberg (1560) and Maulbronn (1564) he advocated by voice and pen the Zwinglian doctrine of the Lord's Supper, replying (1565) to the counter arguments of the Lutheran Johann Marbach, of Strassburg. He ineffectually resisted the efforts of the Calvinists, led by Caspar Olevianus, to introduce the Presbyterian polity and discipline, which were established at Heidelberg in 1570, on the Genevan model. One of the first acts of the new church system was to excommunicate Erastus on a charge of Socinianism, founded on his correspondence with Transylvania. The ban was not removed till 1575, Erastus declaring his firm adhesion to the doctrine of the Trinity. His position, however, was uncomfortable, and in 1580 he returned to Basel, where in 1583 he was made professor of ethics. He died on the 31st of December 1583. He published several pieces bearing on medicine, astrology and alchemy, and attacking the system of Paracelsus. His name is permanently associated with a posthumous publication, written in 1568. Its immediate occasion was the disputation at Heidelberg (1568) for the doctorate of theology by George Wither or Withers, an English Puritan (subsequently archdeacon of Colchester), silenced (1565) at Bury St Edmunds by Archbishop Parker. Withers had proposed a disputation against vestments, which the university would not allow; his thesis affirming the excommunicating power of the presbytery was sustained. Hence the treatise of Erastus. It was published (1589) by Giacomo Castelvetri, who had married his widow, with the title *Explicatio gravissimae quaestionis utrum excommunicatio, quatenus religionem intelligentes et amplexantes, a sacramentorum usu, propter admissum facinus arcet, mandato nitatur divino, an excogitata sit ab hominibus.* The work bears the imprint Pesclavii (*i.e.* Poschiavo in the Grisons) but was printed by John Wolfe in London, where Castelvetri was staying; the name of the alleged printer is an anagram of Jacobum Castelvetrum. In the Stationers' Register (June 20, 1589) the printing is said to have been "alowed" by Archbishop Whitgift. It consists of seventy-five *Theses*, followed by a *Confirmatio* in six books, and an appendix of letters to Erastus by Bullinger and Gualther, showing that his *Theses*, written in 1568, had been circulated in manuscript. An English translation of the *Theses*, with brief life of Erastus (based on Melchior Adam's account), was issued in 1659, entitled *The Nullity of Church Censures*; it was reprinted as *A Treatise of Excommunication* (1682), and, as revised by Robert Lee, D.D., in 1844. The aim of the work is to show, on Scriptural grounds, that sins of professing Christians are to be punished by civil authority, and not by withholding of sacraments on the part of the clergy. In the Westminster Assembly a party holding this view included Selden, Lightfoot, Coleman and Whitelocke, whose speech (1645) is appended to Lee's version of the *Theses*; but the opposite view, after much controversy, was carried, Lightfoot alone dissenting. The consequent chapter of the Westminster Confession ("Of Church Censures") was, however, not ratified by the English parliament. "Erastianism," as a by-word, is used to denote the doctrine of the supremacy of the state in ecclesiastical causes; but the problem of the relations between church and state is one on which Erastus nowhere enters. What is known as "Erastianism" would be better connected with the name of Grotius. The only direct reply made to the *Explicatio* was the *Tractatus de vera excommunicatione* (1590) by Theodore Beza, who found himself rather savagely attacked in the *Confirmatio thesium*; *e.g.* "Apostolum et Mosen adeoque Deum ipsum audes corrigere."

See A. Bonnard, *Thomas Éraste et la discipline ecclésiastique* (1894); Gass, in *Allgemeine deutsche Biog.* (1877); G. V. Lechler and R. Stähelin, in A. Hauck's *Realencyklop. für prot. Theol. u. Kirche* (1898). (A. Go.*)

ERATOSTHENES OF ALEXANDRIA (*c.* 276–*c.* 194 B.C.), Greek scientific writer, was born at Cyrene. He studied grammar under Callimachus at Alexandria, and philosophy under the Stoic Ariston and the Academic Arcesilaus at Athens. He returned to Alexandria at the summons of Ptolemy III. Euergetes, by whom he was appointed chief librarian in place of Callimachus. He is said to have died of voluntary starvation, being threatened with total blindness. Eratosthenes was one of the most learned men of antiquity, and wrote on a great number of subjects. He was the first to call himself Philologos (in the sense of the "friend of learning"), and the name Pentathlos was bestowed upon him in honour of his varied accomplishments. He was also called *Beta* as being second in all branches of learning, though not actually first in any. In mathematics he wrote two books *On means* (Περὶ μεσοτήτων) which are lost, but appear, from a remark of Pappus, to have dealt with "loci with reference to means." He devised a mechanical construction for two mean proportionals, reproduced by Pappus and Eutocius (Comm. on Archimedes). His *κόσκινον* or *sieve* (*cribrum Eratosthenis*) was a device for discovering all prime numbers. He laid the foundation of mathematical geography in his *Geographica*, in three books. His greatest achievement was his measurement of the earth. Being informed that at Syene (Assuan), on the day of the summer solstice at noon, a well was lit up through all its depth, so that Syene lay on the tropic, he measured, at the same hour, the zenith distance of the sun at Alexandria. He thus found the distance between Syene and Alexandria (known to be 5000 stadia) to correspond to $\frac{1}{50}$th of a great circle, and so arrived at 250,000 stadia (which he seems subsequently to have corrected to 252,000) as the circumference of the earth. He is credited by Ptolemy and his commentator Theon with having found the distance between the tropics to be $\frac{11}{83}$rds. of the meridian circle, which gives 23° 51′ 20″ for the obliquity of the ecliptic. His astronomical poem *Hermes* began apparently with the birth and exploits of Hermes, then passed to the legend of his having ordered the heavens, the zones and the stars, and gave a history of the latter. His *Erigone*, of which a few fragments are also preserved, is sometimes spoken of as a separate poem, but it may have belonged to the *Hermes*, which appears also to have been known by other names such as *Catalogi*. The still extant *Catasterismi*, containing the story of certain stars in prose, is probably not by Eratosthenes.

Eratosthenes was the founder of scientific chronology in his *χρονογραφία* in which he endeavoured to fix the dates of the chief literary and political events from the conquest of Troy. An important work was his treatise on the old comedy, dealing with theatres and theatrical apparatus generally, and discussing the works of the principal comic poets themselves. Works on moral philosophy, history, and a number of letters were also attributed to him.

There is a complete edition of the fragments of Eratosthenes by Bernhardy (1822); poetical fragments, Hillier (1872); geographical, Seidel (1799) and Berger (1880); *καταστερισμοί*, Schaubach (1795) and Robert (1878). See Sandys, *Hist. Class. Schol.* i. (1906). (T. L. H.)

ERBACH, a town of Germany, in the grand-duchy of Hesse-Darmstadt, on the Mümling, 22 m. S.E. of Darmstadt. It has cloth mills and ivory-turning, for which last branch it possesses a technical school. Wool and cattle fairs are held twice a year. Pop. 2800. The castle contains an interesting collection of weapons and pictures, and in the chapel are the coffins of Einhard, the friend and biographer of Charlemagne, and his wife, Emma.

Erbach has long been the residence of the counts of Erbach, who trace their descent back to the 12th century, and who held the office of cupbearer to the electors palatine of the Rhine until 1806. In 1532 the emperor Charles V. made the county a direct fief of the Empire, on account of the services rendered by Count Eberhard during the Peasants' War. Since 1717 the family has been divided into the three lines of Erbach-Fürstenau, Erbach-Erbach and Erbach-Schönberg, who rank for precedence, not according to the age of their descent, but according to the age of the chief of their line. In 1818 the counts of Erbach-Erbach inherited the county of Wartenberg-Roth, and in 1903 the count of Erbach-Schönberg was granted the title of prince. The county was mediatized in 1806, and is now incorporated with the duchy of Hesse-Darmstadt.

See Simon, *Die Geschichte der Dynasten und Grafen zu Erbach* (Frankfort, 1858).

ERBIUM (symbol, Er; atomic weight, 165-166), one of the metals of the rare earths. The first of the rare earth minerals was discovered in 1794 by J. Gadolin and was named gadolinite from its discoverer. In 1797 Ekeberg showed that gadolinite contained another rare earth, which was given the name yttria. Yttria is an exceedingly complex mixture, which has been decomposed, yielding as an intermediate product terbia. This latter substance in its turn has been split by J. L. Soret, P. T. Cleve, Lecoq de Boisbaudran and others into erbia, holmia, thulia and dysprosia, but it is still doubtful whether any one of these four splitting products is a single substance. The rare earth metals are found in the minerals gadolinite, samarskite, fergusonite, euxenite and cerite. They are separated from the minerals by converting them into oxalates, which by ignition give the corresponding oxides. The oxides are then converted into double sulphates which are separated from each other by repeated fractional crystallization or by fractional precipitation with ammonia or some other base. Erbium forms rose-coloured salts and a rose-coloured oxide. The oxide dissolves slowly in acids; it is not reduced by hydrogen and is infusible. The salts show a characteristic absorption spectrum.

See J. F. Bahr and R. Bunsen (*Ann.*, 1866, 137, p. 1); A. v. Welsbach (*Monats.*, 1883, 4, p. 641; 1884, 5, p. 508; 1885, 6, p. 477); P. T. Cleve (*Comptes rendus*, 1879, 89, p. 478; 1880, 91, pp. 328, 381; 1882, 95, p. 1225; *Bull. de la soc. chim.*, 1874, 21, p. 196; 1883, 39, p. 287); C. Marignac (*Ann.Chim. phys.*, 1849 [3] 27, p. 226); B. Brauner (*Monats.*, 1882, 3, p. 13); W. Crookes (*Proc. Roy. Soc.*, 1886, 40, p. 502); Lecoq de Boisbaudran (*Comptes rendus*, 1886, 102, p. 1005); A. Bettendorf (*Ann.*, 1892, 270, p. 376); M. Muthmann (*Ber.*, 1898, 31, p. 1718; 1900, 33, p. 42); G. Krüss (*Zeit. f. anorg. Chem.*, 1893, 3, p. 108).

ERCILLA Y ZÚNIGA, ALONSO DE (1533–1595), Spanish soldier and poet, was born in Madrid on the 7th of August 1533. In 1548 he was appointed page to the heir-apparent, afterwards Philip II. In this capacity Ercilla visited Italy, Germany and the Netherlands, and was present in 1554 at the marriage of his master to Mary of England. Hearing that an expedition was preparing to subdue the Araucanians of Chile, he joined the adventurers. He distinguished himself in the ensuing campaign; but, having quarrelled with a comrade, he was condemned to death in 1558 by his general, Garcia Hurtado de Mendoza. The sentence was commuted to imprisonment, but Ercilla was speedily released and fought at the battle of Quipeo (14th of December 1558). He returned to Spain in 1562, visited Italy, France, Germany, Bohemia, and in 1570 married Maria de Bazán, a lady distantly connected with the Santa Cruz family; in 1571 he was made knight of the order of Santiago, and in 1578 he was employed by Philip II. on a mission to Saragossa. He complained of living in poverty but left a modest fortune, and was obviously disappointed at not being offered the post of secretary of state. His principal work is *La Araucana*, a poem based on the events of the wars in which he had been engaged. It consists of three parts, of which the first, composed in Chile and published in 1569, is a versified narrative adhering strictly to historic fact; the second, published in 1578, is encumbered with visions and other romantic machinery; and the third, which appeared in 1589–1590, contains, in addition to the subject proper, a variety of episodes mostly irrelevant. This so-called epic lacks symmetry, and has been over-praised by Cervantes and Voltaire; but it is written in excellent Spanish, and is full of vivid rhetorical passages. An analysis of the poem was given by Hayley in his *Essay on Epic Poetry* (1782).

A good biography precedes the *Morceaux choisis* (Paris, 1900) by Jean Ducamin.

ERCKMANN-CHATRIAN, the joint names of two French writers whose collaboration made their work that of, so to speak, one personality. ÉMILE ERCKMANN (1822–1899) was born on the 20th of May 1822 at Phalsbourg, and LOUIS GRATIEN CHARLES ALEXANDRE CHATRIAN (1826–1890) on the 18th of December 1826 at Soldatenthal, Lorraine. In 1847 they began to write together, and continued doing so till 1889. Chatrian died in 1890 at Villemomble near Paris, and Erckmann at Lunéville in 1899. The list of their publications is a long one, ranging from the *Histoires et contes fantastiques* (1849; reprinted from the *Démocrate du Rhin*), *L'Illustre Docteur Mathéus* (1859), *Madame Thérèse* (1863), *L'Ami Fritz* (1864), *Histoire d'un conscrit de 1813* (1864), *Waterloo* (1865), *Le Blocus* (1867), *Histoire d'un paysan* (4 vols., 1868–1870), *L'Histoire du plébiscite* (1872), to *Le Grand-père Lebigue* (1880); besides dramas like *Le Juif polonais* (1869) and *Les Rantzau* (1882). Without any special literary claim, their stories are distinguished by simplicity and genuine descriptive power, particularly in the battle scenes and in connexion with Alsatian peasant life. They are marked by a genuine democratic spirit, and by real patriotism, which developed after 1870 into hatred of the Germans. The authors attacked militarism by depicting the horrors of war in the plainest terms.

See also J. Claretie, *Erckmann-Chatrian* (1883), in the series of "Célébrités contemporaines."

ERDÉLYI, JÁNOS (1814–1868), Hungarian poet and author, was born in 1814 at Kapos, in the county of Ungvár, and educated at the Protestant college of Sárospatak. In 1833 he removed to Pest, where he was, in 1839, elected member of the Hungarian Academy of Sciences. His literary fame was made by his collection of Hungarian national poems and folk-tales, *Magyar Nêpköltêsi Gyüjtemêny, Nêpdalok ês Mondák* (Pest, 1846–1847). This work, published by the Kisfaludy Society, was supplemented by a dissertation upon Hungarian national poetry, afterwards partially translated into German by Stier (Berlin, 1851). Erdélyi also compiled for the Kisfaludy Society an extensive collection of Hungarian proverbs—*Magyar Közmondások könyve* (Pest, 1851),—and was for some time editor of the *Szêpirodalmi Szemle* (*Review of Polite Literature*). In 1848 he was appointed director of the national theatre at Pest; but after 1849 he resided at his native town. He died on the 23rd of January 1868. A collection of folklore was published the year after his death, entitled *A Nêp Koltêszete nêpdalok, nêpmesêk ês közmondások* (Pest, 1869). This work contains 300 national songs, 19 folk-tales and 7362 Hungarian proverbs.

ERDMANN, JOHANN EDUARD (1805–1892), German philosophical writer, was born at Wolmar in Livonia on the 13th of June 1805. He studied theology at Dorpat and afterwards at Berlin, where he fell under the influence of Hegel. From 1829 to 1832 he was a minister of religion in his native town. Afterwards he devoted himself to philosophy, and qualified in that subject at Berlin in 1834. In 1836 he was professor-extraordinary at Halle, became full professor in 1839, and died there on the 12th of June 1892. He published many philosophical text-books and treatises, and a number of sermons; but his chief claim to remembrance rests on his elaborate *Grundriss der Geschichte der Philosophie* (2 vols., 1866), the 3rd edition of which has been translated into English. Erdmann's special merit is that he does not rest content with being a mere summarizer of opinions, but tries to exhibit the history of human thought as a continuous and ever-developing effort to solve the great speculative problems with which man has been confronted in all ages. His chief other works were: *Leib und Seele* (1837), *Grundriss der Psychologie* (1840), *Grundriss der Logik und Metaphysik* (1841), and *Psychologische Briefe* (1851).

ERDMANN, OTTO LINNÉ (1804–1869), German chemist, son of Karl Gottfried Erdmann (1774–1835), the physician who introduced vaccination into Saxony, was born at Dresden on the 11th of April 1804. In 1820 he began to attend the medico-chirurgical academy of his native place, and in 1822 he entered the university of Leipzig where in 1827 he became extraordinary professor, and in 1830 ordinary professor of chemistry. This office he held until his death, which happened at Leipzig on the 9th of October 1869. He was particularly successful as a teacher, and the laboratory established at Leipzig under his direction in 1843 was long regarded as a model institution. As an investigator he is best known for his work on nickel and indigo and other dye-stuffs. With R. F. Marchand (1813–1850) he also carried out a number of determinations of atomic weights. In 1828, in conjunction with A. F. G. Werther (1815–1869), he founded the *Journal für technische und ökonomische Chemie*, which became in 1834 the *Journal für praktische Chemie*. He was also the author of *Über das Nickel* (1827), *Lehrbuch der Chemie* (1828), *Grundriss der Waarenkunde* (1833), and *Über das Studium der Chemie* (1861).

EREBUS, in Greek mythology, son (according to Hesiod, *Theog.* 123) of Chaos, and father of Aether (upper air) and Hemera (day) by his sister Nyx (night). The word, which signifies darkness, is in Homer the gloomy subterranean region through which the departed shades pass into Hades. The entrance to it was in the extreme west, on the borders of Ocean, in the mythical land of the Cimmerians. It is to be distinguished from Tartarus, the place of punishment for the wicked.

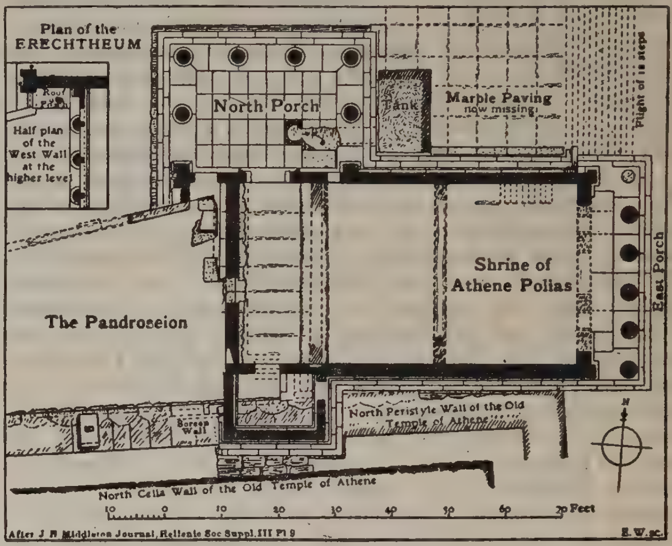
ERECH (*Uruk* in the Babylonian inscriptions; Gr. *Orchoë*), the Biblical name of an ancient city of Babylonia, situated E. of the present bed of the Euphrates, on the line of the ancient Nil canal, in a region of marshes, about 140 m. S.S.E. from Bagdad. It was one of the oldest and most important cities of Babylonia, and the site of a famous temple, called E-Anna, dedicated to the worship of Nana, or Ishtar. Erech played a very important part in the political history of the country from an early time, exercising hegemony in Babylonia at a period before the time of Sargon. Later it was prominent in the national struggles of the Babylonians against Elam (2000 B.C. and earlier), in which it suffered severely; recollections of these conflicts are embodied in the Gilgamesh epic, as it has come down to us through the library of Assur-bani-pal. Erech enjoyed much distinction in the later times, as a seat of learning and of the worship of Ishtar, and Assur-bani-pal drew largely on its literary stores for his library at Nineveh, from which we derive our principal information concerning ancient Babylonian literature. The inscriptions found here show that it continued in existence through the Persian and Seleucid periods. The ruins of the ancient site, known as Warka, which are among the largest in all Babylonia, forming an irregular circle nearly 6 m. in circumference, bounded by a wall, still standing in some places to the height of 40 ft., were explored and partially excavated by W. K. Loftus in 1850 and 1854. The most conspicuous ruin, now called Abu-Berdi, "Father of Marsh Grass," or Buwariye, "reed matting," because of the layers of reeds between each twelve courses of unbaked brick, is the *ziggurat* (tower) of the ancient temple of E-Anna. It is about 100 ft. in height, and strikingly resembles in general appearance the ruins of the ziggurat of the temple of Enlil at Nippur. Second to this in size was the ruin called Wuswas, a walled quadrangle, including an area of more than seven and a half acres, within which was an edifice 246 ft. long and 174 ft. wide, elevated on an artificial platform 50 ft. in height. The south-west façade, still standing in some places to the height of 23 ft., exhibited an interesting use of half columns, and stepped recesses for purposes of decoration. In another ruin Loftus found a wall, 30 ft. long, composed entirely of small yellow terra-cotta nail-headed cones, such as have been discovered in great numbers, inscribed and uninscribed, used for votive purposes in connexion with walls at Tello and elsewhere in Babylonia. His excavations being superficial, the Babylonian inscriptions found by him, about one hundred in all, exclusive of the ancient Ur-Gur bricks from the temple, belong in general to the neo-Babylonian, Persian and Seleucid periods. The older remains are buried deep beneath the huge mass of later debris. Loftus also discovered at Erech, almost everywhere within and without the walls, great numbers of clay coffins, piled one above another, to the height of over 30 ft., forming a vast and, on the whole, well-ordered cemetery belonging to the Persian, Parthian and later occupations of Babylonia, during which period Erech, like other cities of the south, evidently became a necropolis for a large extent of country. After Loftus's time the mounds were visited by various travellers, but no further excavations have been conducted. Work on this important part of the site is attended with very great difficulties, owing to the inaccessible position of the ruins, the unsettled character of the country, the frequent sand-storms, and above all, the immense mass of material of later periods which must be removed before a systematic excavation of the more ancient and interesting ruins could be undertaken. A curious feature of the Warka neighbourhood is the existence of conical sand-hills, rising to a considerable height, so compact as to be almost like stone. These hills extend from Warka northward as far as Tel Ede.

See W. K. Loftus, *Chaldaea and Susiana* (1857); J. P. Peters, *Nippur* (1897); E. Sachau, *Am Euphrat und Tigris* (1900). Cf. also NIPPUR and authorities there quoted. (J. P. PE.)

ERECHTHEUM, a temple (commonly called after Erechtheus, to whom a portion of it was dedicated) on the acropolis at Athens, unique in plan, and in its execution the most refined example of the Ionic order. There is no clear evidence as to when the building was begun, some placing it among the temples projected by Pericles, others assigning it to the time after the peace of Nicias in 421 B.C. The work was interrupted by the stress of the Peloponnesian War, but in 409 B.C. a commission was appointed to make a report on the state of the building and to undertake its completion, which was carried out in the following year.

The peculiar plan of the Erechtheum has given rise to much speculation. It may be due partly to the natural conformation of the rock and the differences of level, partly to the necessity of enclosing within a single building several objects of ancient sanctity, such as the mark of Poseidon's trident and the spring that arose from it, the sacred olive tree of Athena, and the tomb of Cecrops. But there are some features which cannot be so explained, and which have led Professor W. Dörpfeld and others to believe that the plan, as we now have it, is a modification or abridgment of the original design, due to the same conservative influences as led to the curtailment of the plan of the Propylaea (*q.v.*).

The building as completed consisted of a temple of the ordinary type, opening by a door and two windows to the east front, before which stood a portico of six Ionic columns. This part was the temple of Athena Polias. Adjoining it on the west was the central chamber, on a lower level; this chamber was separated by a partition, originally of wood and later of marble, from the western compartment of the temple, which was of peculiar construction. The west end was formed by a wall, on which stood four columns between antae; but the main entrance to this western compartment was through a large and very ornate doorway on the north; and a large Ionic portico, consisting of four columns in the front, and one in the return on each side, was placed in front of this door. At the south end of the western compartment was a smaller door, with steps leading up to the higher level, within a projecting space enclosed by a low wall and covered with a projecting porch carried by six "maidens" or caryatides. The construction of the building at this south-western corner shows that there was some sacred object that had to be bridged over by a huge block of marble; this we know from inscriptions to have been the Cecropeum or tomb of Cecrops. In the north portico a square hole in the floor, with a corresponding hole in the roof above it, must have given access to another sacred object, the mark of Poseidon's trident in the rock. The sacred olive tree probably stood just outside the temple to the west in the Pandroseion. The Ionic order, as used in this temple, is of the most ornate Attic type. The bases of the columns are either reeded or decorated with a plait-pattern; the capital has the broad channel between the volutes subdivided by a carefully-profiled incision; and the top of the shafts is ornamented by a broad band of palmette or honeysuckle pattern. A similar band of ornament runs round the top of the walls outside, and at their base is a reeded torus. The frieze consisted of white marble figures in relief, affixed to a background of black Eleusinian stone.


Plan of the ERECHTHEUM
Roof
Half plan of the West Wall at the higher level
North Porch
Tank
Marble Paving now missing
Flight of 16 steps
Shrine of Athene Polias
East Porch
The Pandroseion
Screen Wall
North Peristyle Wall of the Old Temple of Athene
N
North Cella Wall of the Old Temple of Athene
10 0 10 20 30 40 50 60 70 Feet

After J. H. Middleton Journal, Hellenic Soc Suppl. III Pl 9 E.W. sc.

The contents of the Erechtheum are described by Pausanias. It contained the ancient image of Athena Polias, and three altars, one to Poseidon and Erechtheus, one to Butes and one to Hephaestus; there were portraits of the family of the Butadae on the walls. Within it was also the gold lamp of Callimachus, which burnt for a year without refilling, and had a chimney in the form of a palm-tree.

The Erechtheum was damaged by a fire, soon after its completion, in 406 B.C., but was repaired early in the following century. The west end appears to have been damaged in Roman times and to have been replaced by the attached columns with windows between them which appear in old drawings and are still partially extant. It was used as a church in Christian times, and under Turkish rule as the harem of the governor of Athens. Lord Elgin carried off to London, about 1801–1803, one of the columns of the east portico and one of the caryatides; these were replaced later by terra-cotta casts. During the siege of the Acropolis in 1827, the roof of the north portico was thrown down and the building was otherwise much damaged. It was partially rebuilt between 1838 and 1846; the west front was blown down in a storm in 1852. Since 1900 the project of rebuilding the Erechtheum as far as possible with the original blocks has again been undertaken.

See Stuart, *Antiquities of Athens*; Inwood, *The Erechtheum*; H. Forster in *Papers of American School at Athens*, i. (1882–1883); J. H. Middleton, *Plans and Drawings of Athenian Buildings* (1900), pls. xiv.-xxii.; E. A. Gardner, *Ancient Athens*, chap. viii.; W. Dörpfeld, "Der ursprungliche Plan des Erechtheion" in *Mitteil. Athen.*, 1904, p. 101, taf. 6; G. P. Stevens, "The East Wall of the Erechtheum," in *American Journ. Arch.*, 1906, pls. vi.-ix. (E. Gr.)

ERECHTHEUS, in Greek legend, a mythical king of Athens, originally identified with Erichthonius, but in later times distinguished from him. According to Homer, who knows nothing of Erichthonius, he was the son of Aroura (Earth), brought up by Athena, with whom his story is closely connected. In the later story, Erichthonius (son of Hephaestus and Atthis or Athena herself) was handed over by Athena to the three daughters of Cecrops—Aglauros (or Agraulos), Herse and Pandrosos—in a chest, which they were forbidden to open. Aglauros and Herse disobeyed the injunction, and when they saw the child (which had the form of a snake, or round which a snake was coiled) they went mad with fright, and threw themselves from the rock of the Acropolis (or were killed by the snake). Athena herself then undertook the care of Erichthonius, who, when he grew up, drove out Amphictyon and took possession of the kingdom of Athens. Here he established the worship of Athena, instituted the Panathenaea, and built an Erechtheum. The Erechtheus of later times was supposed to be the grandson of Erechtheus-Erichthonius, and was also king of Athens. When Athens was attacked by the Thracian Eumolpus (or by the Eleusinians assisted by Eumolpus) victory was promised Erechtheus if he sacrificed one of his daughters. Eumolpus was slain and Erechtheus was victorious, but was himself killed by Poseidon, the father of Eumolpus, or by a thunderbolt from Zeus. The contest between Erechtheus and Eumolpus formed the subject of a lost tragedy by Euripides; Swinburne has utilized the legend in his *Erechtheus.* The scene of the opening of the chest is represented on a Greek vase in the British Museum. The name Erichthonius is connected with χθών ("earth") and the representation of him as half-snake, like Cecrops, indicates that he was regarded as one of the autochthones, the ancestors of the Athenians who sprung from the soil.

See Apollodorus iii. 14. 15; Euripides, *Ion*; Ovid, *Metam.* ii. 553; Hyginus, *Poët. astron.* ii. 13; Pausanias i. 2. 5. 8; E. Ermatinger, *Die attische Autochthonensage* (1897); article by J. A. Hild in Daremberg and Saglio's *Dictionnaire des antiquités*; B. Powell in *Cornell Studies*, xvii. (1906), who identifies Erechtheus, Erichthonius, Poseidon and Cecrops, all denoting the sacred serpent of Athena, whose cult she first contested, but then amalgamated with her own. The birth of Erichthonius (as a corn-spirit) is interpreted by Mannhardt as a mythical way of describing the growth of the corn, and by J. E. Harrison (*Myths and Monuments of Ancient Athens*, xxvii.-xxxvi.) as a fiction to explain the ceremony performed by the two maidens called Arrephori. See also Farnell, *Cults of the Greek States*, i. 270; and Frazer's *Pausanias*, ii. 169.

ERESHKIGAL, also known as Allatu, the name of the chief Babylonian goddess of the nether-world where the dead are gathered. Her name signifies "lady of the nether-world." She is known to us chiefly through two myths, both symbolizing the change of seasons, but intended also to illustrate certain doctrines developed in the temple-schools of Babylonia. One of these myths is the famous story of Ishtar's descent to Irkalla or Arālu, as the lower world was called, and her reception by her sister who presides over it; the other is the story of Nergal's offence against Ereshkigal, his banishment to the kingdom controlled by the goddess and the reconciliation between Nergal and Ereshkigal through the latter's offer to have Nergal share the honours of the rule over Irkalla. The story of Ishtar's descent is told to illustrate the possibility of an escape from Irkalla, while the other myth is intended to reconcile the existence of two rulers of Irkalla—a goddess and a god.

It is evident that it was originally a goddess who was supposed to be in control of Irkalla, corresponding to Ishtar in control of fertility and vegetation on earth. Ereshkigal is therefore the sister of Ishtar and from one point of view her counterpart, the symbol of nature during the non-productive season of the year. As the doctrine of two kingdoms, one of this world and one of the world of the dead, becomes crystallized, the dominions of the two sisters are sharply differentiated from one another. The addition of Nergal represents the harmonizing tendency to unite with Ereshkigal as the queen of the nether-world the god who, in his character as god of war and of pestilence, conveys the living to Irkalla and thus becomes the one who presides over the dead. (M. Ja.)

ERETRIA (mod. *Aletria*), an ancient coast town of Euboea about 15 m. S.E. of Chalcis, opposite to Oropus. Eretria, like its neighbour Chalcis (*q.v.*), early entered upon a commercial and colonizing career. Besides founding townships in the west and north of Greece, it acquired dependencies among the Cyclades and joined the great mercantile alliance of Miletus and Aegina. Since the so-called Lelantine War (7th century B.C.) against the coming league of Chalcis, it began to be overshadowed by its rivals. The interference of Eretria in the Ionian revolt (498) brought upon it the vengeance of the Persians, who captured and destroyed it shortly before the battle of Marathon (490). The city was soon rebuilt, and as a member of both the Delian Leagues attached itself by numerous treaties to the Athenians. The latter, through their general Phocion, rescued it from the tyrants suborned by Philip of Macedon (354 and 341). Under Macedonian and Roman rule Eretria fell into insignificance; for a short period under Mark Antony, the triumvir, it became a possession of Athens. Eretria was the birthplace of the tragedian Achaeus and of the "Megarian" philosopher Menedemus.

The modern village, which is sometimes called Nea Psará because the inhabitants of Psará were transferred there in 1821, is on unhealthy low-lying ground near the sea. The excavation of the site was carried out by the American School of Athens (1890–1895). At the foot of the Acropolis Hill, where the ground begins to rise, the theatre lies; and though the material of which this was built is rough, and only seven imperfect rows of seats remain, a good part of the scena and of the chambers behind it is preserved, and beneath these there runs a tunnel, which, together with other peculiar features, has raised interesting questions in connexion with the arrangement of the Greek theatre, the orchestra being at present on a level about 12 ft. below that of the rooms in the scena. Near by are the substructions of a temple of Dionysus and a large altar, and also a gymnasium with arrangements for bathing. Besides these, in 1900 the substructions of a temple of Apollo Daphnephoros were unearthed. Both the northern and the southern side of the hill are flanked by walls, which seem to have reached the sea, where there was a mole and a harbour; and the wall of the acropolis itself remains in one part to the height of eight courses.

Authorities.—Strabo x. 447 f.; Herodotus v. 99, vi. 101; *Corpus Inscr. Atticarum*, i. 339, iv. (2), pp. 5, 10, 22; H. Heinze, *De rebus Eretriensium* (Göttingen, 1869); W. M. Leake, *Travels in Northern Greece* (London, 1835), ii. 266, 443; B. V. Head, *Historia numorum* (Oxford, 1887), pp. 305-308; *Papers of the American School at Athens*, vol. vi. (E. Gr.)

ERETRIAN SCHOOL OF PHILOSOPHY. This Greek school was the continuation of the Elian school, which was transferred to Eretria by Menedemus. It was of small importance, and in the absence of certain knowledge must be supposed to have adhered to the doctrines of Socrates. (See Menedemus.)

ERFURT, a city of Germany, in Prussian Saxony, on the Gera, and the railway Halle-Bebra, about midway between Gotha and Weimar, which are 14 m. distant. Pop. (1875) 48,025; (1905) 100,065. The city, which is dominated on the west by the two citadels of Petersberg and Cyriaxburg, is irregularly built, the only feature in its plan, or want of plan, being the Friedrich Wilhelmsplatz, a broad open space of irregular shape abutting on the Petersberg. On the south-western side of this square, which contains a monument to the elector Frederick Charles Joseph of Mainz (1719–1802), is the Domberg, an eminence on which stand, side by side, the cathedral and the great church of St Severus with its three spires (14th century). The churches are approached by a flight of forty-eight stone steps, the grouping of the whole mass of buildings being exceedingly impressive. The cathedral (*Beatae Mariae Virginis*) is one of the finest churches in Germany. It was begun in the 12th century, but the nave was rebuilt in the 13th in the Gothic style. The magnificent chancel (1349–1372), with the 14th-century crypt below, rests on massive substructures, known as the *Cavate*. The twin towers are set between the chancel and nave. The cathedral contains, besides fine 15th-century glass, some very rich portal sculptures and bronze castings, among others the coronation of the Virgin by Peter Vischer. In one of its towers is the famous bell, called Maria Gloriosa, which bears the date 1497, and weighs 270 cwt. Besides the cathedral and St Severus, which are Roman Catholic, Erfurt possesses several very interesting medieval churches, now Evangelical. Among these may be mentioned the Predigerkirche, dating from the latter half of the 12th century; the Reglerkirche, a Romanesque building (restored in 1859) with a 12th-century tower; and the Barfüsserkirche, a Gothic building containing fine 14th-century monuments. All these were originally monastic churches. Of the former religious houses there survive a Franciscan convent, with a girls' school attached, and an Ursuline convent. The Augustinian monastery, in which Luther lived as a friar, is now used as an orphanage, under the name of the *Martinsstift*. The cell of Luther was destroyed by fire in 1872. A bronze statue of the reformer was erected in the Anger, the chief street of the town, in 1890. At one time Erfurt had a university, of which the charter dated from 1392; but it was suppressed in 1816, and its funds devoted to other purposes, among these being the endowment of an institution founded in 1758 and now called the royal academy of sciences, and the support of the royal library, which now contains 60,000 volumes and over 1000 manuscripts. On the W. and S.W. extensive new quarters have grown up within recent years, *e.g.* Hirschbrühl. The interior of the town hall (1869–1875) is adorned with legendary and historical frescoes by Kämpfer and Peter Janssen. Erfurt possesses also a picture gallery and an antiquarian collection.

The educational establishments of the town include a gymnasium, a realgymnasium, a realschule, technical schools for building and handicrafts, a high-class commercial school, a school of agriculture, and an academy of music. The most notable industry of Erfurt is the culture of flowers and of vegetables, which is very extensively carried on. This industry had its origin in the large gardens attached to the monasteries. It has also important and growing manufactures of ladies' mantles, boots and shoes, machines, furniture, woollen goods, musical instruments, agricultural machinery and implements, leather, tobacco, chemicals, &c. Brewing, bleaching and dyeing are also carried on on a large scale, and there are extensive railway works and a government rifle factory.

Erfurt (Med. *Erpesfurt*, *Erphorde*, Lat. *Erfordia*) is a town of great antiquity. Its origin is obscure, but in 741 it was sufficiently important for St Boniface to found a bishopric here, which was, however, after the martyrdom of the first bishop, Adolar, in 755, reabsorbed in that of Mainz. In 805 the place received certain market rights from the emperor Charlemagne. Later the overlordship was claimed by the archbishops of Mainz, on the strength of charters granted by the emperor Otto I., and their authority in Erfurt was maintained by a burgrave and an *advocatus*, the office of the latter becoming in the 12th century hereditary in the family of the counts of Gleichen. In spite of many vicissitudes (from 1109 to 1137, for instance, the town was subject to the landgraves of Thuringia), and of a charter granted in 1242 by the emperor Frederick II., the archbishops succeeded in upholding their claims. In 1255, however, Archbishop Gerhard I. had to grant the city municipal rights, the burgraviate disappeared, and Erfurt became practically a free town. Its power was at its height early in the 15th century, when it joined the Hanseatic League. It had acquired by force or purchase various countships and other fiefs in the neighbourhood, and ruled a considerable territory; and its wealth was so great that in 1378 it established a university, the first in Europe that embraced the four faculties. By the end of the century, however, its prosperity had sunk owing to the perpetual feud with Mainz, the internecine war in Saxony, and the consequent dwindling of trade. By the convention of Amorbach in 1483 the overlordship of Erfurt was ultimately transferred by the electors of Mainz to Saxony. The political and religious quarrels of the 16th century still further depressed the city, in which the reformed religion was established in 1521. Then came the Thirty Years' War, during which Erfurt was for a while occupied by the Swedes. After the peace of Westphalia (1648) the city was assigned by the emperor to the elector of Mainz, and, on its refusal to submit, it was placed under the ban of the Empire (1660). In 1664 it was captured by the troops of the archbishop of Mainz, and remained in the possession of the electorate till 1802, when it came into the possession of Prussia. In 1808 it was the scene of the memorable interview between Napoleon and the emperor Alexander I. of Russia, at which the kings of Bavaria, Saxony, Westphalia and Württemberg also assisted, which is known as the congress of Erfurt. Here in 1850 the parliament of the short-lived Prussian Northern Union (known as the Erfurt parliament) held its sittings. In 1902 the 100th anniversary of the city's incorporation with Prussia was celebrated.

See W. J. A. von Tettau, *Erfurt in seiner Vergangenheit und Gegenwart* (Erfurt, 1880); C. Beyer, *Geschichte der Stadt Erfurt* (Erfurt, 1900); and F. W. Kampschulte, *Die Universität Erfurt in ihrem Verhältnisse zu dem Humanismus und der Reformation* (1856–1858). For a detailed bibliography see U. Chevalier, *Répertoire des sources. Topo-bibliographie* (Montebéliard, 1894–1899), s.v.

ERGOT, or SPURRED RYE, the drug *ergota* or *Secale cornutum* (Ger. *Mutterkorn*; Fr. *seigle ergoté*), consisting of the sclerotium (or hard resting condition) of a fungus, *Claviceps purpurea*, parasitic on the pistils of many members of the Grass family, but obtained almost exclusively from rye, *Secale cereale*. In the ear of rye that is infected with ergot a species of fermentation takes place, and there exudes from it a sweet yellowish mucus, which after a time disappears. The ear loses its starch, and ceases to grow, and its ovaries become penetrated with the white spongy tissue of the mycelium of the fungus which towards the end of the season forms the sclerotium, in which state the fungus lies dormant through the winter.

The drug consists of grains, usually curved (hence the name, from the O. Fr. *argot*, a cock's spur), which are violet-black or dark-purple externally, and whitish with a tinge of pink within, are between $\frac{1}{3}$ and $1\frac{1}{2}$ in. long, and from 1 to 4 lines broad, and have two lateral furrows, a close fracture, a disagreeable rancid taste, and a faint, fishy odour, which last becomes more perceptible when the powder of the drug is mixed with potash solution. Ergot should be kept in stoppered bottles in order to preserve it from the attacks of a species of mite, and to prevent the oxidation of its fatty oil.

The extremely complex composition of this drug has been studied in great detail, and with such important results that instead of giving ergot itself by the mouth in doses of 20 to 60 grains, it is now possible to obtain much more rapid and certain results by giving one three-hundredth of a grain of one of its constituents hypodermically. This constituent is the alkaloid cornutine, which is the valuable ingredient of the drug. Other ingredients are a fixed oil, present to the extent of 30%, ergotinic acid, a glucoside, trimethylamine, which gives the drug its unpleasant odour, and sphacelinic acid, a non-nitrogenous resinoid body. Of the numerous preparations only two need be mentioned—the liquid extract (dose 10 minims to 2 drachms or more), and the hypodermic injection. The latter does not keep well, and the best way of using ergot is to dissolve tablets obtained from a reputable maker, and containing some of active principles, in pure water, the solution being injected subcutaneously.

Ergot has no external action. Given internally it stimulates the intestinal muscles and may cause diarrhoea. After absorption it slows the pulse by stimulation of the vagus nerves. It has indeed been asserted that the slow pulse characteristic of the puerperal period is really due to the common administration of ergot at that time. This is probably an exaggeration. The important actions of ergot are on the blood-vessels and the uterus. The drug greatly raises the blood-pressure by causing extreme contraction of the arteries. This is mainly due to a direct action on the muscular coats of the vessels, but is also partly of central origin, since the drug also stimulates the vaso-motor centre in the medulla oblongata. This action on the vessels is so marked as to constitute the drug a haemostatic, not only locally but also remotely. It may arrest bleeding from the nose, for instance, when injected hypodermically. Nearly all the constituents share in causing this action, but the sphacelinic acid is probably the most potent. Ergot is the most powerful known stimulant of the pregnant uterus. The action is a double one. At least four of its constituents act directly on the muscular fibre of the uterus, whilst the cornutine acts through the nerves. Of great practical importance is the fact that the cornutine causes rhythmic contractions such as naturally occur, whilst the sphacelinic acid produces a *tonic* contraction of the uterus, which is unnatural and highly inimical to the life of the foetus. Ergot is used in therapeutics as a haemostatic, and is very valuable in haemoptysis and sometimes in haematemesis. But its great use is in obstetrics. The drug should regularly be given hypodermically, and it is important to note that if the injection be made immediately under the skin, an abscess, or considerable discomfort, may ensue. The injection should be intra-muscular, the needle being boldly plunged into a muscular mass, such as that of the deltoid or the gluteal region. The indications for the use of ergot in obstetrics are highly complex and demand detailed treatment. It can only be said here that the drug should only in the rarest possible cases be given whilst the child is still *in utero*. This rule is necessitated by the sphacelinic acid, which causes an unnatural state of the organ. When it is possible to obtain pure cornutine, which is unfortunately very expensive, the precautions necessary in other cases may be abrogated.

Chronic poisoning, or *ergotism*, used frequently to occur amongst the poor fed on rye infected with the *Claviceps*. As it is practically impossible to reproduce the symptoms of ergotism nowadays, whether experimentally in the lower animals, or when the drug is being administered to a human being for some therapeutic purpose, it is believed that the symptoms of ergotism were rendered possible only by the semi-starvation which must have ensued from the use of such rye-bread; for the grain disappears as the fungus develops. There were two types of ergotism. In the gangrenous form various parts of the body underwent gangrene as a consequence of the arrest of blood-supply produced by the action of sphacelinic acid on the arteries. In the spasmodic form the symptoms were of a nervous character. The initial indications of the disease were cutaneous itching, tingling and formication, which gave place to actual loss of cutaneous sensation, first observed in the extremities. Amblyopia and some loss of hearing also occurred, as well as mental failure. With weakness of the voluntary muscles went intermittent spasms which weakened the patient and ultimately led to death by implication of the respiratory muscles. The last-known "epidemic" of ergotism occurred in Lorraine and Burgundy in the year 1816.

ERIC XIV. (1533–1577), king of Sweden, was the only son of Gustavus Vasa and Catherine of Saxe-Lauenburg. The news of his father's death reached Eric as he was on the point of embarking for England to press in person his suit for the hand of Queen Elizabeth. He hastened back to Stockholm, after burying his father, summoned a *Riksdag*, which met at Arboga on the 15th of April 1561, and adopted the royal propositions known as the Arboga articles, considerably curtailing the authority of the royal dukes, John and Charles, in their respective provinces. Two months later Eric was crowned at Upsala, on which occasion he first introduced the titles of baron and count into Sweden, by way of attaching to the crown the higher nobility, these new counts and barons receiving lucrative fiefs adequate to the maintenance of their new dignities.

From the very beginning of his reign Eric's morbid fear of the upper classes drove him to give his absolute confidence to a man of base origin and bad character, though, it must be admitted, of superior ability. This was Göran Persson, born about 1530, who had been educated abroad in Lutheran principles, and after narrowly escaping hanging at the hands of Gustavus Vasa for some vile action entered the service of his son. This powerful upstart was the natural enemy of the nobility, who suffered much at his hands, though it is very difficult to determine whether the initiative in these prosecutions proceeded from him or his master. Göran was also a determined opponent of Duke John, with whom Eric in 1563 openly quarrelled, because John, contrary to the royal orders, had married (Oct. 4, 1562) Catherine, daughter of Sigismund I. of Poland, engaging at the same time to assist the Polish king to conquer Livonia. This act was a flagrant breach of that paragraph of the Arboga articles which forbade the royal dukes to contract any political treaty without the royal assent. An army of 10,000 men was immediately sent by Eric to John's duchy of Finland, and John and his consort were seized, brought over to Sweden and detained as prisoners of state in Gripsholm Castle. But Eric did not stop here. His suspicion suggested to him that, if his own brother failed him, the loyalty of the great nobles, especially the members of the ancient Sture family, who had been notable in Sweden when the Vasas were unknown, could not be depended upon. The head of the Sture family at this time was Count Svante, who had married a sister of Gustavus Vasa's second wife, and had by her a numerous family, of whom two sons, Nils and Eric, still survived. The dark tragedy, known as the Sture murders, began with Eric XIV.'s strange treatment of young Count Nils. In 1566 he was summoned before a newly erected tribunal and condemned to death for gross neglect of duty, though not one of the frivolous charges brought against him could be substantiated. The death penalty was commuted into a punishment worse because more shameful than death. On the 15th of June 1566 the unfortunate youth, bruised and bleeding from shocking ill-treatment, was placed upon a wretched hack, with a crown of straw on his head, and led in derision through the streets of Stockholm. The following night he was sent a prisoner to the fortress of Örbyhus. A few days later he was appointed ambassador extraordinary, and despatched to Lorraine to resume the negotiations for Eric's marriage with the princess Renata. Before he returned, however, Eric had resolved to marry Karin, or Kitty Månsdatter, the daughter of a common soldier, who had been his mistress since 1565. In January 1567 Eric extorted a declaration from two of his senators that they would assist him to punish all who should try to prevent his projected marriage; and, in the middle of May, a *Riksdag* was summoned to Upsala to judge between the king and those of the aristocracy whom he regarded as his personal enemies. Eric himself arrived at Upsala on the 16th in a condition of incipient insanity. On the 19th he opened parliament in a speech which, as he explained, he had to deliver extempore owing to "the treachery" of his secretary. Two days later Nils Sture arrived at Upsala fresh from his embassy to Lorraine, and was at once thrown into prison, where other members of the nobility were already detained. On the following day Eric murdered Nils in his cell with his own hand, and by his order the other prisoners were despatched by the royal provost marshal forthwith. These murders were committed so promptly and secretly that it is doubtful whether the estates, actually in session at the same place, knew what had been done when, on the 26th of May, under violent pressure from Göran Persson, they signed a document declaring that all the accused gentlemen under detention had acted like traitors, and confirming all sentences already passed or that might be passed upon them.

During the greater part of 1567 Eric was so deranged that a committee of senators was appointed to govern the kingdom. One of his illusions was that not he was king but his brother John, whom he now set at liberty. When, at the beginning of 1568, Eric recovered his reason, a reconciliation was effected between the king and the duke, on condition that John recognized the legality of his brother's marriage with Karin Månsdatter, and her children as the successors to the throne. A month later, on the 4th of July, he was solemnly married to Karin at Stockholm by the primate. The next day Karin was crowned queen of Sweden and her infant son Gustavus proclaimed prince-royal. Shortly after his marriage Eric issued a circular ordering a general thanksgiving for his delivery from the assaults of the devil. This document, in every line of which madness is legible, convinced most thinking people that Eric was unfit to reign. The royal dukes, John and Charles, had already taken measures to depose him; and in July the rebellion broke out in Östergötland. Eric at first offered a stout resistance and won two victories; but on the 17th of September the dukes stood before Stockholm, and Eric, after surrendering Göran Persson to the horrible vengeance of his enemies, himself submitted, and resigned the crown. On the 30th of September 1568 John III. was proclaimed king by the army and the nobility; and a *Riksdag*, summoned to Stockholm, confirmed the choice and formally deposed Eric on the 25th of January 1569. For the next seven years the ex-king was a source of the utmost anxiety to the new government. No fewer than three rebellions, with the object of releasing and reinstating him, had to be suppressed, and his prison was changed half a dozen times. On the 10th of March 1575, an assembly of notables, lay and clerical, at John's request, pronounced a formal sentence of death upon him. Two years later, on the 24th of February 1577, he died suddenly in his new prison at Örbyhus, poisoned, it is said, by his governor, Johan Henriksen.

See *Sveriges Historia*, vol. iii. (Stockholm, 1880); Robert Nisbet Bain, *Scandinavia*, cap. 4-6 (Cambridge, 1905); Eric Tegel, *Konung Eriks den XIV. historia* (Stockholm, 1751). (R. N. B.)

ERICACEAE, in botany, a natural order of plants belonging to the higher or gamopetalous division of Dicotyledons. They are woody plants, sometimes with a slender creeping stem as in bilberry, *Vaccinium* (fig. 1), or *Andromeda* (fig. 2), or forming low bushes as in the heaths, or larger, sometimes becoming tree-like, as in species of *Rhododendron*. The leaves are alternate, opposite or whorled in arrangement, and in their form and structure show well-marked adaptation for life in dry or exposed situations. Thus in the true heaths they are needle-like, with the margins often rolled back to form a groove or an almost closed chamber on the under side. In others such as *Rhododendron* or *Arbutus* they are often leathery and evergreen, the strongly cuticularized upper surface protecting a water-storing tissue situated above the green layers of the leaf. The flowers are sometimes solitary and axillary or terminal as in *Andromeda*, but are generally arranged in racemose inflorescences at the end of the branches as in *Arbutus* and *Rhododendron*, or on small lateral shoots as in *Erica*. They are hermaphrodite and generally regular with parts in 4 or 5, thus: sepals 4 or 5, petals 4 or 5, stamens 8 or 10 in two series, the outer of which is opposite the petals, and carpels 4 or 5. The corolla is usually more or less bell-shaped, and in the heaths persists in a dry state in the fruit. The petals with the stamens are situated on the outer edge of a honey-secreting disk. The anthers show a very great variety in shape, the halves are often more or less free and often appendaged; they open to allow the escape of the pollen by a terminal pore or slit. The carpels are united to form a 4- to 5-chambered ovary, which bears a simple elongated style ending in a capitate stigma; each ovary-chamber contains one to many ovules attached to a central placenta. The brightly coloured corolla, the presence of nectar and the scent render the flowers attractive to insects, and the projection of the stigma beyond the anthers favours crossing. The fruit is generally a capsule containing many seeds, as in *Erica* (fig. 3) or *Rhododendron*; sometimes a berry as in *Arbutus*.

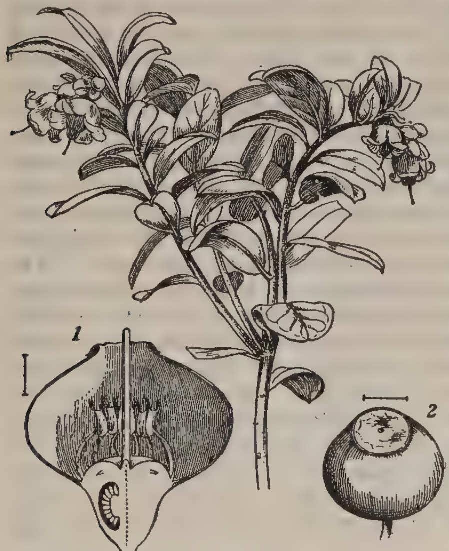


FIG. 1.—*Vaccinium vitis-idaea*, with leaf and flower, nat. size. 1, Flower of *V. myrtillus*, cut lengthwise. 2, Fruit of same.

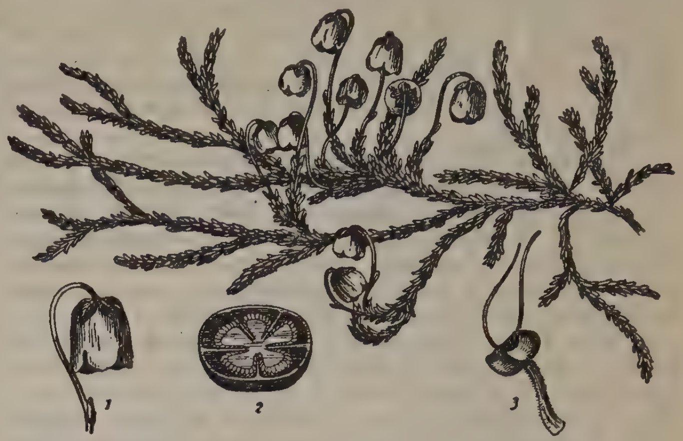


FIG. 2.—*Andromeda Hypnoides*, nat. size. 1, Flower; 2, Unripe fruit cut across; 3, Stamen—all enlarged.

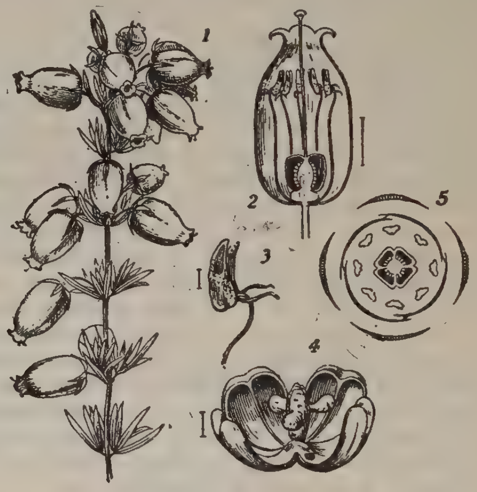


FIG. 3.

1, Flowering shoot of *Erica cinerea*, about $1\frac{1}{2}$ nat. size.
2, Flower cut lengthwise.
3, Stamen showing appendages and porous dehiscence of anther.
4, Capsule showing the loculicidal dehiscence; a few seeds remain attached to the central axis.
5, Diagram of the flower having four sepals, four divisions of the corolla, eight stamens in two rows, and four divisions of the pistil.

The order falls into four distinct tribes, which are characterized by the relative position of the ovary and by the fruit and seed. They are as follows:—

1. *Rhododendron tribe*, characterized by capsular fruit, seed with a loose coat, deciduous petals and anthers without appendages. It consists mainly of the great genus *Rhododendron* (in which *Azalea* is included by recent botanists), which is chiefly

developed in the mountains of eastern Asia, many species occurring on the Himalayas. *Dabeocia*, St Dabeoc's heath, occurs in Ireland.

2. *Arbutus Tribe.*—Fruit a berry or capsule, petals deciduous and anthers with bristle-like appendages, chiefly north temperate to arctic in distribution. *Arbutus Unedo*, the strawberry-tree, so called from its large scarlet berry, is a southern European species which extends into south Ireland. *Arctostaphylos* (bearberry) and *Andromeda* are arctic and alpine genera occurring in Britain. *Epigaea repens* is the trailing arbutus or mayflower of Atlantic America.

3. *Vaccinium Tribe.*—Ovary inferior, fruit a berry. Extends from the north temperate zone to the mountains of the tropics. *Vaccinium*, the largest genus, has four British species: *V. Myrtillus* is the bilberry (*q.v.*), blaeberry or whortleberry, *V. Vitis-Idaea* the cowberry, and *V. Oxycoccos* the cranberry (*q.v.*). This tribe is sometimes regarded as a separate order Vacciniaceae, distinguished by its inferior ovary.

4. *Erica Tribe.*—Fruit usually a capsule, seeds round, not winged; corolla persisting round the ripe fruit; anthers often appendaged. The largest genus is *Erica*, the true heath (*q.v.*), with over 400 species, the great majority of which are confined to the Cape; others occur on the mountains of tropical Africa and in Europe and North Africa, especially the Mediterranean region. *E. cinerea* (purple heather) and *E. Tetralix* (cross-leaved heath) are common British heaths. *Calluna* is the ling or Scotch heather.

ERICHSEN, SIR JOHN ERIC, Bart. (1818–1896), British surgeon, born on the 19th of July 1818 at Copenhagen, was the son of Eric Erichsen, a member of a well-known Danish family. He studied medicine at University College, London, and at Paris, devoting himself in the early years of his career to physiology, and lecturing on general anatomy and physiology at University College hospital. In 1844 he was secretary to the physiological section of the British Association, and in 1845 he was awarded the Fothergillian gold medal of the Royal Humane Society for his essay on asphyxia. In 1848 he was appointed assistant surgeon at University College hospital, and in 1850 became full surgeon and professor of surgery, his lectures and clinical teaching being much admired; and in 1875 he joined the consulting staff. His *Science and Art of Surgery* (1853) went through many editions. He rose to be president of the College of Surgeons in 1880. From 1879 to 1881 he was president of the Royal Medical and Chirurgical Society. He was created a baronet in 1895, having been for some years surgeon-extraordinary to Queen Victoria. As a surgeon his reputation was world-wide, and he counts (says Sir W. MacCormac in his volume on the Centenary of the Royal College of Surgeons) "among the makers of modern surgery." He was a recognized authority on concussion of the spine, and was often called to give evidence in court on obscure cases caused by railway accidents, &c. He died at Folkestone on the 23rd of September 1896.

ERICHT, LOCH, a lake partly in Inverness-shire and partly in Perthshire, Scotland, lying between the districts of Badenoch on the N. and Rannoch on the S. The boundary line is drawn from a point opposite to the mouth of the Alder, and follows the centre of the longitudinal axis north-eastwards to 56° 50′ N., where it strikes eastwards to the shore. All of the lake to the S. and E. of this line belongs to Perthshire, the rest, forming the major portion, to Inverness-shire. It is a lonely lake, situated in extremely wild surroundings at a height of 1153 ft. above the sea, being thus the loftiest lake of large size in the United Kingdom. It is over 14½ m. long, with a mean breadth of half a mile and over 1 m. at its maximum. Its area amounts to some 7¼ sq. m., and it receives the drainage of an area of nearly 50½ sq. m. The mean depth is 189 ft., and the maximum 512 ft. It has a general trend from N.E. to S.W., the head lying 1 m. from Dalwhinnie station on the Highland railway. It receives many streams, and discharges at the south-western extremity by the Ericht. Salmon and trout afford good fishing. The surrounding mountains are lofty and rugged. Ben Alder (3757 ft.) on the west shore is the chief feature of the great Corrour deer forest. The only point of interest on the banks is the cavern, near the mouth of the Alder, in which Prince Charles Edward concealed himself for a time after the battle of Culloden.

ERICSSON, JOHN (1803–1889), Swedish-American naval engineer, was born at Langbanshyttan, Wermland, Sweden, on the 31st of July 1803. He was the second son of Olaf Ericsson, an inspector of mines, who died in 1818. Showing from his earliest years a strong mechanical bent, young Ericsson, at the age of twelve, was employed as a draughtsman by the Swedish Canal Company. From 1820 to 1827 he served in the army, where his drawing and military maps attracted the attention of the king, and he soon attained the rank of captain. In 1826 he went to London, at first on leave of absence from his regiment, and in partnership with John Braithwaite constructed the "Novelty," a locomotive engine for the Liverpool & Manchester railway competition at Rainhill in 1829, when the prize, however, was won by Stephenson's "Rocket." The number of Ericsson's inventions at this period was very great. Among other things he worked out a plan for marine engines placed entirely below the water-line. Such engines were made for the "Victory," for Captain (afterwards Sir) John Ross's voyage to the Arctic regions in 1829, but they did not prove satisfactory. In 1833 his caloric engine was made public. In 1836 he took out a patent for a screw-propeller, and though the priority of his invention could not be maintained, he was afterwards awarded a one-fifth share of the £20,000 given by the Admiralty for it. At this time Captain Stockton, of the United States navy, gave an order for a small iron vessel to be built by Laird of Birkenhead, and to be fitted by Ericsson with engines and screw. This vessel reached New York in May 1839. A few months later Ericsson followed his steamer to New York, and there he resided for the rest of his life, establishing himself as an engineer and a builder of iron ships. In 1848 he was naturalized as a citizen of the United States. He had many difficulties to contend with, and it was only by slow degrees that he established his fame and won his way to competence. At his death he seems to have been worth about £50,000. The provision of defensive armour for ships of war had long occupied his attention, and he had constructed plans and a model of a vessel lying low in the water, carrying one heavy gun in a circular turret mounted on a turntable. In 1854 he sent his plans to the emperor of the French. Louis Napoleon, however, acting probably on the advice of Dupuy de Lôme, declined to use them. The American Civil War, and the report that the Confederates were converting the "Merrimac" into an ironclad, caused the navy department to invite proposals for the construction of armoured ships. Among others, Ericsson replied, and as it was thought that his design might be serviceable in inland waters, the first armoured turret ship, the "Monitor," was ordered; she was launched on the 30th of January 1862, and on the 9th of March she fought the celebrated action with the Confederate ram "Merrimac." The peculiar circumstances in which she was built, the great importance of the battle, and the decisive nature of the result gave the "Monitor" an exaggerated reputation, which further experience did not confirm. In later years Ericsson devoted himself to the study of torpedoes and sun motors. He published *Solar Investigations* (New York, 1875) and *Contributions to the Centennial Exhibition* (New York, 1877). He died in New York on the 8th of March 1889, and in the following year, on the request of the Swedish government, his body was sent to Stockholm and thence into Wermland, where, at Filipstad, it was buried on the 15th of September.

A *Life of Ericsson* by William Conant Church was published in New York in 1890 and in London in 1893.

ERIDANUS, or FLUVIUS ("the river"), in astronomy, a constellation of the southern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); Ptolemy catalogued 34 stars in it. *θ Eridani*, a fine double star of magnitudes 3·5 and 5·5, is now of the third magnitude. It is supposed to be identical with the *Achernar* of Al-Sufi, who described it as of the first magnitude; this star has therefore decreased in brilliancy in historic times. The star o_2 *Eridani* (numbered 40 by Flamsteed) was discovered to be a ternary star group by Herschel in 1783; it consists of a close pair, of magnitudes 9·2 and 10·9, revolving in a period of 180 years, associated with a star of magnitude 4·5, which is distant from the pair by 82″; these stars have an exceptionally swift proper motion, about 4″ per annum. Eridanus was the ancient name of the river Po.

ERIDU, one of the oldest religious centres of the Sumerians, described in the ancient Babylonian records as the "city of the deep." The special god of this city was Ea (*q.v.*), god of the sea and of wisdom, and the prominence given to this god in the incantation literature of Babylonia and Assyria suggests not only that many of our magical texts are to be traced ultimately to the temple of Ea at Eridu, but that this side of the Babylonian religion had its origin in that place. Certain of the most ancient Babylonian myths, especially that of Adapa, may also be traced back to the shrine of Ea at Eridu. But while of the first importance in matters of religion, there is no evidence in Babylonian literature of any special political importance attaching to Eridu, and certainly at no time within our knowledge did it exercise hegemony in Babylonia. The site of Eridu was discovered by J. E. Taylor in 1854, in a ruin then called by the natives Abu-Shahrein, a few miles south-south-west of Moghair, ancient Ur, nearly in the centre of the dry bed of an inland sea, a deep valley, 15 m. at its broadest, covered for the most part with a nitrous incrustation, separated from the alluvial plain about Moghair by a low, pebbly, sandstone range, called the Hazem, but open toward the north to the Euphrates and stretching southward to the Khanega wadi below Suk-esh-Sheiukh. In the rainy season this valley becomes a sea, flooded by the discharge of the Khanega; in summer the Arabs dig holes here which supply them with brackish water. The ruins, in which Taylor conducted brief excavations, consist of a platform of fine sand enclosed by a sandstone wall, 20 ft. high, the corners toward the cardinal points, on the N.W. part of which was a pyramidal tower of two stages, constructed of sun-dried brick, cased with a wall of kiln-burned brick, the whole still standing to a height of about 70 ft. above the platform. The summit of the first stage was reached by a staircase on the S.E. side, 15 ft. wide and 70 ft. long, constructed of polished marble slabs, fastened with copper bolts, flanked at the foot by two curious columns. An inclined road led up to the second stage on the N.W. side. Pieces of polished alabaster and marble, with small pieces of pure gold and gold-headed copper nails, found on and about the top of the second stage, indicated that a small but richly adorned sacred chamber, apparently plated within or without in gold, formerly crowned the top of this structure. Around the whole tower was a pavement of inscribed baked bricks, resting on a layer of clay 2 ft. thick. On the S.E. part of the terrace were the remains of several edifices, containing suites of rooms. Inscriptions on the bricks identified the site as that of Eridu. Since Taylor's time the place has not been visited by any explorer, owing to the unsafe condition of the neighbourhood; but T. K. Loftus (1854) and J. P. Peters (1890) both report having seen it from the summit of Moghair. The latter states that the Arabs at that time called the ruin Nowawis, and apparently no longer knew the name Abu-Shahrein. Through an error, in many recent maps and Assyriological publications Eridu is described as located in the alluvial plain, between the Tigris and the Euphrates. It was, in fact, an island city in an estuary of the Persian Gulf, stretching up into the Arabian plateau. Originally "on the shore of the sea," as the old records aver, it is now about 120 m. from the head of the Persian Gulf. Calculating from the present rate of deposit of alluvium at the head of that gulf, Eridu should have been founded as early as the seventh millennium B.C. It is mentioned in historical inscriptions from the earliest times onward, as late as the 6th century B.C. From the evidence of Taylor's excavations, it would seem that the site was abandoned about the close of the Babylonian period.

See J. E. Taylor, *Journal of the Royal Asiatic Society*, vol. xv. (1855); F. Delitzsch, *Wo lag das Paradies?* (1881); J. P. Peters, *Nippur* (1897); M. Jastrow, *The Religion of Babylonia and Assyria* (1898); H. V. Hilprecht, *Excavations in Assyria and Babylonia* (1904); L. W. King, *A History of Sumer and Akkad* (1910). (J. P. Pe.)

ERIE, the most southerly of the Great Lakes of North America, between 41° 23′ and 42° 53′ N., and 78° 51′ and 83° 28′ W., bounded W. by the state of Michigan, S. and S.E. by Ohio, Pennsylvania and New York, and N. by the province of Ontario. It is nearly elliptical, the major axis, 250 m. long, lying east and west; its greatest breadth is 60 m.; its area about 10,000 sq. m.; and the total area of its basin 34,412 sq. m. Its elevation above mean sea-level is 573 ft.; and its surface is nearly 9 ft. below that of Lake Huron, which discharges into it through St Clair river, Lake St Clair and Detroit river, and is 327 ft. above that of Lake Ontario, this great difference being absorbed by the rapids and falls in the Niagara river, which joins the two lakes. Lake Erie is very shallow, and may be divided into three basins, the western extending to Point Pelee and including all the islands, containing about 1200 sq. m., with a comparatively flat bottom at 5 to 6 fathoms; the main basin, between Point Pelee and the narrows at Long Point, containing about 6700 sq. m., and having a marked shelving bottom deepening gradually to 14 fathoms; and the portion east of the narrows, containing about 2100 sq. m., having a depression 30 fathoms deep just east from Long Point, with an extensive flat of 11 fathoms depth between it and the main basin. The Canadian shore is low and flat throughout, the United States shore is low but bordered by an elevated plateau through which the rivers have cut deep channels. The lake basin is relatively so small that the rivers are without importance; Grand river, on the north shore, is the largest tributary. The flat alluvial soil bordering on the lake is very fertile, and the climate is well adapted for fruit cultivation. Large quantities of peaches, grapes and small fruits are grown; the islands in the west end have a climate much warmer and more equable than the adjoining mainland, and are practically covered with vineyards. The low clayey or sandy shores are subject to erosion by waves. In severe storms the water near shore is filled with sand, which is deposited where the currents are checked around the ends of jetties in such a way as to form bars out into the lake across improved channels. This shoaling has rendered continuous dredging necessary at every harbour on the lake west of Erie, Pa. In consequence of the shallowness of the lake its waters are easily disturbed, making navigation very rough and dangerous, and causing large fluctuations of surface. Strong winds are frequent, as nearly every cyclonic depression traversing North America, either from the westward or the Gulf of Mexico, passes near enough to Lake Erie to be felt. Westerly gales are more frequent, and have more effect on the water surface than easterly ones, lowering the water as much as 7 to 8 ft. at the west end and raising it 5 to 8 ft. at the east end. The worst storms occur in autumn, when the immense quantity of shipping on the lake makes them specially destructive. There are no tides, and usually only a slight current towards the outlet, though powerful currents are temporarily produced by the rapid return of waters after a storm, and during the height of a westerly gale there is invariably a reflex current into the west end of the lake. There is an annual fluctuation in the level of the lake, varying from a minimum of 9 in. to a maximum of 2 ft., the normal low level occurring in February and the high level in midsummer. Standard high water (of 1838) is 575·11 ft. above mean sea-level, and the lowest record was 570·8 in November 1895. The harbours and exits of the lake freeze over, but the body of the lake never freezes completely.

Ice-breaking car ferries run across the lake all winter. General navigation opens as a rule in the middle of April and closes in the middle of December. The volume of traffic is immense, because practically all freight from the more westerly lakes finds terminal harbours in Lake Erie. Official statistics of commerce passing through the Detroit river into the lake during the season of 1906 show that 35,128 vessels, having a net register of 50,673,897 tons, carried 63,805,571 (short) tons of freight, valued at $662,971,053. The 1175 vessels engaged in this business were valued at $106,223,000. Over 90% of the whole traffic is in United States ships to United States ports. Fine passenger steamers run nightly between Buffalo and Cleveland and Detroit, and there are many shorter passenger routes.

The large traffic on Lake Erie has brought into existence a number of important harbours on the south shore, nearly all artificially made and deepened, with entrances between two breakwaters running into the lake at right angles to the coast line. The principal of these are Toledo, Sandusky, Huron, Vermilion, Lorain, Cleveland, Fairport, Ashtabula, Conneaut, Erie (a natural harbour), Dunkirk and Buffalo, Rondeau, Port Stanley, Port Burwell, Port Dover, Port Maitland and Port Colborne. The Miami and Erie canal, leading from Maumee river to Cincinnati, 244½ m., with a branch to Port Jefferson, 14 m., with locks 90 by 15 by 4 ft., connects with Lake Erie through Toledo. The Erie canal leading from Buffalo to the Hudson river at Troy, and connecting with Lake Ontario at Oswego, had a capacity for boats 98 ft. long, 17 ft. 10 in. beam, with 6 ft. draught, until in 1907 the State of New York undertook its deepening to accommodate boats of 1000 tons capacity. Buffalo from its position at the eastern limit of deep draught lake navigation is a city of first rate commercial importance. Its harbour is formed by an artificial breakwater, built parallel with the shore about half a mile distant from it. It receives practically all the Lake Erie grain shipments besides large quantities of iron ore, lumber and copper, and is a large shipping port for coal, principally anthracite. It has over 600 m. of railway tracks to accommodate lake freights. The Welland canal, 26¾ m. long, connecting Lake Ontario and Lake Erie, with locks 270 by 45 by 14 ft., leaves Lake Erie at Port Colborne, where the Canadian government have constructed an artificial harbour and elevators for transhipment of grain from upper lake freighters to lighters of canal capacity.

Fishing operations are carried on extensively in Lake Erie, the fish being taken with gill nets, seines and pound nets. Each state touching the lake has its own fishery regulations, which differ amongst themselves as well as from those of the Dominion. Both nations maintain a Fishery Protection Service, and the fisheries are replenished from artificial hatcheries. The most numerous and valuable fish are the lesser white fish (*Coregonus artedi*, Le Sueur), pickerel (*Stizostedion vitreum*, Walb.), pike (*Lucius lucius*, L.), and white fish (*Coregonus clupeiformis*, Mitchill), in the order named. The fish caught are estimated to be worth annually $1,000,000. They are collected in fishing tugs and distributed by rail throughout the United States and Canada.

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ERIE, a city, a port of entry, and the county-seat of Erie county, Pennsylvania, U.S.A., on Lake Erie, 148 m. by rail N. of Pittsburg and near the N.W. corner of the state. Pop. (1890) 40,634; (1900) 52,733, of whom 11,957 were foreign-born, including 5226 from Germany and 1468 from Ireland, and 26,797 were of foreign parentage (both parents foreign-born), including 13,316 of German parentage and 4203 of Irish parentage; (1910 census) 66,525. Erie is served by the New York, Chicago & St Louis, the Lake Shore & Michigan Southern, the Erie & Pittsburg (Pennsylvania Company), the Philadelphia & Erie (Pennsylvania railway), and the Bessemer & Lake Erie railways, and by steamboat lines to many important lake ports. The city extends over an area of about 7 sq. m., which for the most part is quite level and is from 50 to 175 ft. above the lake. Erie has a fine harbour about 4 m. in length, more than 1 m. in width, and with an average depth of about 20 ft.; it is nearly enclosed by Presque Isle, a long narrow strip of land of about 3000 acres from 300 ft. to 1 m. in width, and the national government has protected its entrance and deepened its channel by constructing two long breakwaters. Most of the streets of the city are 60 ft. wide—a few are 100 ft.—and nearly all intersect at right angles; they are paved with brick and asphalt, and many in the residential quarters are shaded with fine elms and maples. The city has four parks, in one of which is a soldiers' and sailors' monument of granite and bronze, and not far away, along the shore of lake and bay, are several attractive summer resorts. Among Erie's more prominent buildings are the United States government building, the city hall, the public library, and the county court house. The city's charitable institutions consist of two general hospitals, each of which has a training school for nurses; a municipal hospital, an orphan asylum, a home for the friendless, two old folks' homes, and a bureau of charities; here, also, on a bluff, within a large enclosure and overlooking both lake and city, is the state soldiers' and sailors' home, and near by is a monument erected to the memory of General Anthony Wayne, who died here on the 15th of December 1796.

Erie is the commercial centre of a large and rich grape-growing and agricultural district, has an extensive trade with the lake ports and by rail (chiefly in coal, iron ore, lumber and grain), and is an important manufacturing centre, among its products being iron, engines, boilers, brass castings, stoves, car heaters, flour, malt liquors, lumber, planing mill products, cooperage products, paper and wood pulp, cigars and other tobacco goods, gas meters, rubber goods, pipe organs, pianos and chemicals. In 1905 the city's factory products were valued at $19,911,567, the value of foundry and machine-shop products being $6,723,819, of flour and grist-mill products $1,444,450, and of malt liquors $882,493. The municipality owns and operates its water-works.

On the site of Erie the French erected Fort Presque Isle in 1753, and about it founded a village of a few hundred inhabitants. George Washington, on behalf of the governor of Virginia, came in the same year to Fort Le Bœuf (on the site of the present Waterford), 20 m. distant, to protest against the French fortifying this section of country. The protest, however, was unheeded. The village was abandoned in or before 1758, owing probably to an epidemic of smallpox, and the fort was abandoned in 1759. It was occupied by the British in 1760, but on the 22nd of June 1763 this was one of the several forts captured by the Indians during the Conspiracy of Pontiac. In 1764 the British regained nominal control and retained it until 1785, when it passed into the possession of the United States. The place was laid out as a town in 1795; in 1800 it became the county-seat of the newly-erected county of Erie; it was incorporated as a borough in 1805, the charter of that year being revised in 1833; and in 1851 it was incorporated as a city. At Erie were built within less than six months most of the vessels with which Commodore Oliver H. Perry won his naval victory over the British off Put-in-Bay on the 10th of September 1813.

ERIGENA, JOHANNES SCOTUS (*c.* 800–*c.* 877), medieval philosopher and theologian. His real name was Johannes Scotus (Scottus) or John the Scot. The combination Johannes Scotus Erigena has not been traced earlier than Ussher and Gale; even Gale uses it only in the heading of the version of St Maximus. The date of Erigena's birth is very uncertain, and there is no evidence to show definitely where he was born. The name Scotus, which has often been taken to imply Scottish origin, really favours the theory that he was an Irishman according to the then usage of *Scotus* or *Scotigena*. Prudentius, bishop of Troyes, definitely states that he was of Irish extraction. The pseudonym commonly read Erigena, used by himself in the titles of his versions of Dionysius the Areopagite, is *Ierugena* (in later MSS. Erugena and Eriugena), formed apparently on the analogy of *Graiugena* ("Greek-born"), which he applies to St Maximus. There seems no reason to doubt that Eriugena is connected with Erin, the name for Ireland, and Ierugena suggests the Greek ἱερός, ἱερὸς νῆσος being a common name for Ireland. On the other hand, William of Malmesbury prefers to read Heruligena, which would make Scotus a Pannonian, while Bale says he was born at St David's, Dempster connects him with Ayr, and Gale with Eriuven in Hereford. Some early writers thought there were two persons, John Scotus and John Erigena.

Of Erigena's early life nothing is known. Bale quotes the story that he travelled in Greece, Italy and Gaul, and studied not only Greek, but also Arabic and Chaldaean. Since, however, Bale describes him as "ex patricio genitore natus," it is a reasonable inference (so R. L. Poole) that Bale confused him with one John, the son of Patricius, a Spaniard, who tells much the same story of his own travels. The knowledge of Greek displayed in Erigena's works is not such as to compel us to conclude that he had actually visited Greece. That he had a competent acquaintance with Greek is manifest from his translations of Dionysius the Areopagite and of Maximus, from the manner in which he refers to Aristotle, and from his evident familiarity with Neoplatonist writers and the fathers of the early church. Roger Bacon, in his severe criticism on the ignorance of Greek displayed by the most eminent scholastic writers, expressly exempts Erigena, and ascribes to him a knowledge of Aristotle in the original.

Among other legends which have at various times been attached to Erigena are that he was invited to France by Charlemagne, and that he was one of the founders of the university of Paris. The only portion of Erigena's life as to which we possess accurate information was that spent at the court of Charles the Bald. Charles invited him to France soon after his accession to the throne, probably in the year 843, and placed him at the head of the court school (*schola palatina*). The reputation of this school seems to have increased greatly under Erigena's leadership, and the philosopher himself was treated with indulgence by the king. William of Malmesbury's amusing story illustrates both the character of Scotus and the position he occupied at the French court. The king having asked, "Quid distat inter sottum et Scottum?" Erigena replied, "Mensa tantum."

The first of the works known to have been written by Erigena during this period was a treatise on the eucharist, which has not come down to us (by some it has been identified with a treatise by Ratramnus, *De corpore et sanguine Domini*). In it he seems to have advanced the doctrine that the eucharist was merely symbolical or commemorative, an opinion for which Berengarius was at a later date censured and condemned. As a part of his penance Berengarius is said to have been compelled to burn publicly Erigena's treatise. So far as we can learn, however, Erigena's orthodoxy was not at the time suspected, and a few years later he was selected by Hincmar, archbishop of Reims, to defend the doctrine of liberty of will against the extreme predestinarianism of the monk Gottschalk (Gotteschalchus). The treatise *De divina praedestinatione*, composed on this occasion, has been preserved, and from its general tenor one cannot be surprised that the author's orthodoxy was at once and vehemently suspected. Erigena argues the question entirely on speculative grounds, and starts with the bold affirmation that philosophy and religion are fundamentally one and the same—"Conficitur inde veram esse philosophiam veram religionem, conversimque veram religionem esse veram philosophiam." Even more significant is his handling of authority and reason, to which we shall presently refer. The work was warmly assailed by Drepanius Florus, canon of Lyons, and Prudentius, and was condemned by two councils—that of Valence in 855, and that of Langres in 859. By the former council his arguments were described as *Pultes Scotorum* ("Scots porridge") and *commentum diaboli* ("an invention of the devil").

Erigena's next work was a Latin translation of Dionysius the Areopagite (see Dionysius Areopagiticus) undertaken at the request of Charles the Bald. This also has been preserved, and fragments of a commentary by Erigena on Dionysius have been discovered in MS. A translation of the Areopagite's pantheistical writings was not likely to alter the opinion already formed as to Erigena's orthodoxy. Pope Nicholas I. was offended that the work had not been submitted for approval before being given to the world, and ordered Charles to send Erigena to Rome, or at least to dismiss him from his court. There is no evidence, however, that this order was attended to.

The latter part of his life is involved in total obscurity. The story that in 882 he was invited to Oxford by Alfred the Great, that he laboured there for many years, became abbot at Malmesbury, and was stabbed to death by his pupils with their "styles," is apparently without any satisfactory foundation, and doubtless refers to some other Johannes. Erigena in all probability never left France, and Hauréau has advanced some reasons for fixing the date of his death about 877.

Erigena is the most interesting figure among the middle-age writers. The freedom of his speculation, and the boldness with which he works out his logical or dialectical system of the universe, altogether prevent us from classing him along with the scholastics properly so called. He marks, indeed, a stage of transition from the older Platonizing philosophy to the later and more rigid scholasticism. In no sense whatever can it be affirmed that with Erigena philosophy is in the service of theology. The above-quoted assertion as to the substantial identity between philosophy and religion is indeed repeated almost *totidem verbis* by many of the later scholastic writers, but its significance altogether depends upon the selection of one or other term of the identity as fundamental or primary. Now there is no possibility of mistaking Erigena's position: to him philosophy or reason is first, is primitive; authority or religion is secondary, derived. "Auctoritas siquidem ex vera ratione processit, ratio vero nequaquam ex auctoritate. Omnis enim auctoritas, quae vera ratione non approbatur, infirma videtur esse. Vera autem ratio, quum virtutibus suis rata atque immutabilis munitur, nullius auctoritatis adstipulatione roborari indiget" (*De divisione naturae*, i. 71). F. D. Maurice, the only historian of note who declines to ascribe a rationalizing tendency to Erigena, obscures the question by the manner in which he states it. He asks his readers, after weighing the evidence advanced, to determine "whether he (Erigena) used his philosophy to explain away his theology, or to bring out what he conceived to be the fullest meaning of it." These alternatives seem to be wrongly put. "Explaining away theology" is something wholly foreign to the philosophy of that age; and even if we accept the alternative that Erigena endeavours speculatively to bring out the full meaning of theology, we are by no means driven to the conclusion that he was primarily or principally a theologian. He does not start with the datum of theology as the completed body of truth, requiring only elucidation and interpretation; his fundamental thought is that of the universe, nature, τὸ πᾶν, or God, as the ultimate unity which works itself out into the rational system of the world. Man and all that concerns man are but parts of this system, and are to be explained by reference to it; for explanation or understanding of a thing is determination of its place in the universal or all. Religion or revelation is one element or factor in the divine process, a stage or phase of the ultimate rational life. The highest faculty of man, reason, *intellectus*, *intellectualis visio*, is that which is not content with the individual or partial, but grasps the whole and thereby comprehends the parts. In this highest effort of reason, which is indeed God thinking in man, thought and being are at one, the opposition of being and thought is overcome. When Erigena starts with such propositions, it is clearly impossible to understand his position and work if we insist on regarding him as a scholastic, accepting the dogmas of the church as ultimate data, and endeavouring only to present them in due order and defend them by argument.

Erigena's great work, *De divisione naturae*, which was condemned by a council at Sens, by Honorius III. (1225), who described it as "swarming with worms of heretical perversity," and by Gregory XIII. in 1585, is arranged in five books. The form of exposition is that of dialogue; the method of reasoning is the syllogistic. The leading thoughts are the following. *Natura* is the name for the universal, the totality of all things, containing in itself being and non-being. It is the unity of which all special phenomena are manifestations. But of this nature there are four distinct classes:—(1) that which creates and is not created; (2) that which is created and creates; (3) that which is created and does not create; (4) that which neither is created nor creates. The first is God as the ground or origin of all things, the last is God as the final end or goal of all things, that into which the world of created things ultimately returns. The second and third together compose the created universe, which is the manifestation of God, God *in processu*, *Theophania*. Thus we distinguish in the divine system beginning, middle and end; but these three are in essence one—the difference is only the consequence of our finite comprehension. We are compelled to envisage this eternal process under the form of time, to apply temporal distinctions to that which is extra- or supra-temporal.

The universe of created things, as we have seen, is twofold:—*first*, that which is created and creates—the primordial ideas, archetypes, immutable relations, divine acts of will, according to which individual things are formed; *second*, that which is created and does not create, the world of individuals, the effects of the primordial causes, without which the causes have no true being. Created things have no individual or self-independent existence; they are only in God; and each thing is a manifestation of the divine, *theophania*, *divina apparitio*.

God alone, the uncreated creator of all, has true being. He is the true universal, all-containing and incomprehensible. The lower cannot comprehend the higher, and therefore we must say that the existence of God is above being, above essence; God is above goodness, above wisdom, above truth. No finite predicates can be applied to him; his mode of being cannot be determined by any category. True theology is negative. Nevertheless the world, as the *theophania*, the revelation of God, enables us so far to understand the divine essence. We recognize his being in the being of all things, his wisdom in their orderly arrangement, his life in their constant motion. Thus God is for us a Trinity—the Father as substance or being (οὐσία), the Son as wisdom (δύναμις), the Spirit as life (ἐνέργεια). These three are realized in the universe—the Father as the system of things, the Son as the word, *i.e.* the realm of ideas, the Spirit as the life or moving force which introduces individuality and which ultimately draws back all things into the divine unity. In man, as the noblest of created things, the Trinity is seen most perfectly reflected; *intellectus* (νοῦς), *ratio* (λόγος) and *sensus* (διάνοια) make up the threefold thread of his being. Not in man alone, however, but in all things, God is to be regarded as realizing himself, as becoming incarnate.

The infinite essence of God, which may indeed be described as *nihilum* (nothing) is that from which all is created, from which all proceeds or emanates. The first procession or emanation, as above indicated, is the realm of ideas in the Platonic sense, the word or wisdom of God. These ideas compose a whole or inseparable unity, but we are able in a dim way to think of them as a system logically arranged. Thus the highest idea is that of *goodness*; things *are*, only if they are good; being without well-being is naught. *Essence* participates in goodness—that which is good has being, and is therefore to be regarded as a species of good. *Life*, again, is a species of essence, *wisdom* a species of life, and so on, always descending from genus to species in a rigorous logical fashion.

The ideas are the eternal causes, which, under the moving influence of the spirit, manifest themselves in their effects, the individual created things. Manifestation, however, is part of the being or essence of the causes, that is to say, if we interpret the expression, God of necessity manifests himself in the world and is not without the world. Further, as the causes are eternal, timeless, so creation is eternal, timeless. The Mosaic account, then, is to be looked upon merely as a mode in which is faintly shadowed forth what is above finite comprehension. It is altogether allegorical, and requires to be interpreted. Paradise and the Fall have no local or temporal being. Man was originally sinless and without distinction of sex. Only after the introduction of sin did man lose his spiritual body, and acquire the animal nature with its distinction of sex. Woman is the impersonation of man's sensuous and fallen nature; on the final return to the divine unity, distinction of sex will vanish, and the spiritual body will be regained.

The most remarkable and at the same time the most obscure portion of the work is that in which the final return to God is handled. Naturally sin is a necessary preliminary to this redemption, and Erigena has the greatest difficulty in accounting for the fact of sin. If God is true being, then sin can have no substantive existence; it cannot be said that God knows of sin, for to God knowing and being are one. In the universe of things, *as* a universe, there can be no sin; there must be perfect harmony. Sin, in fact, results from the will of the individual who falsely represents something as good which is not so. This misdirected will is punished by finding that the objects after which it thirsts are in truth vanity and emptiness. Hell is not to be regarded as having local existence; it is the inner state of the sinful will. As the object of punishment is not the will or the individual himself, but the misdirection of the will, so the result of punishment is the final purification and redemption of all. Even the devils shall be saved. All, however, are not saved at once; the stages of the return to the final unity, corresponding to the stages in the creative process, are numerous, and are passed through slowly. The ultimate goal is *deificatio*, *theosis* or resumption into the divine being, when the individual soul is raised to a full knowledge of God, and where knowing and being are one. After all have been restored to the divine unity, there is no further creation. The ultimate unity is that which neither is created nor creates.

Editions.—There is a complete edition of Erigena's works in J. P. Migne's *Patrologiae cursus completus* (vol. cxxii.), edited by H. J. Floss (Paris, 1853). The *De divina praedestinatione* was published in Gilbert Mauguin's *Veterum auctorum qui nono saeculo de praedestinatione et gratia scripserunt opera et fragmenta* (Paris, 1650). The commentary ("Expositiones") on Dionysius' *Hierarchiae caelestes* appeared in the *Appendix ad opera edita ab A. Maio* (ed. J. Cozza, Rome, 1871). Of the *De divisione naturae*, editions have been published by Thomas Gale (Oxford, 1681); C. B. Schlüter (Münster, 1838); and in Floss's *Opera omnia*; there is a German translation by Ludwig Noack, *Johannes Scotus Erigena über die Eintheilung der Natur* (3 vols., 1874–1876). Erigena was also the author of some poems edited by L. Traube in *Monumenta Germaniae historica. Poëtae Latini aevi Carolini*, iii. (1896). A commentary on the *Opuscula sacra* of Boëtius is attributed to him and edited by E. K. Rand (1906). Monographs on Erigena's life and works are numerous; see St René Taillandier, *Scot Érigène et la philosophie scholastique* (1843); T. Christlieb, *Leben u. Lehre des Johannes Scotus Erigena* (Gotha, 1860); J. N. Huber, *Johannes Scotus Erigena* (Munich, 1861); W. Kaulich, *Das speculative System des Johannes Scotus Erigena* (Prague, 1860); A. Stöckl, *De Joh. Scoto Erigena* (1867); L. Noack, *Über Leben und Schriften des Joh. Scotus Erigena: die Wissenschaft und Bildung seiner Zeit* (Leipzig, 1876); R. L. Poole, *Medieval Thought* (1884), and article in *Dictionary of National Biography*; T. Wotschke, *Fichte und Erigena* (Halle, 1896); M. Baumgartner in Wetzer and Welte's *Kirchenlexikon*, x. (1897); Alice Gardner's *Studies in John the Scot* (1900); J. Dräseke, *Joh. Scotus Erigena und seine Gewährsmänner* (Leipzig, 1902); S. M. Deutsch in Herzog-Hauck's *Realencyklopädie für protestantische Theologie*, xviii. (1906); J. E. Sandys, *Hist. of Classical Scholarship* (1906), pp. 491–495. See also the general works on scholastic philosophy, especially Hauréau, Stöckl and Kaulich. An admirable résumé is given by F. D. Maurice, *Medieval Phil.* pp. 45-79. (R. Ad.; J. M. M.)

ERIGONE, in Greek mythology, daughter of Icarius, the hero of the Attic deme Icaria. Her father, who had been taught by Dionysus to make wine, gave some to some shepherds, who became intoxicated. Their companions, thinking they had been poisoned, killed Icarius and buried him under a tree on Mount Hymettus (or threw his body into a well). Erigone, guided by her faithful dog Maera, found his grave, and hanged herself on the tree. Dionysus sent a plague on the land, and all the maidens of Athens, in a fit of madness, hanged themselves like Erigone. Icarius, Erigone and Maera were set among the stars as Boötes (or Arcturus), Virgo and Procyon. The festival called Aeora (the "swing") was subsequently instituted to propitiate Icarius and Erigone. Various small images (in Lat. *oscilla*) were suspended on trees and swung backwards and forwards, and offerings of fruit were made (Hyginus, *Fab.* 130, *Poët. astron.* ii. 4; Apollodorus iii. 14). The story was probably intended to explain the origin of these *oscilla*, by which Dionysus, as god of trees (Dendrites), was propitiated, and the baneful influence of the dog-star averted (see also Oscilla).

ERIN, an ancient name for Ireland. The oldest form of the word is Ériu, of which Érinn is the dative case. Ériu was itself almost certainly a contraction from a still more primitive form *Iberiu* or *Iveriu*; for when the name of the island was written in ancient Greek it appeared as Ἰουερνιά (Ivernia), and in Latin as *Iberio*, *Hiberio* or *Hibernia*, the first syllable of the word Ériu being thus represented in the classical languages by two distinct vowel sounds separated by *b* or *v*. Of the Latin variants, *Iberio* is the form found in the most ancient Irish MSS., such as the *Confession* of St Patrick, and the same saint's *Epistle to Coroticus*. Further evidence to the same effect is found in the fact that the ancient Breton and Welsh names for Ireland were Ywerddon or Iverdon. In later Gaelic literature the primitive form Ériu became the dissyllable Éire; hence the Norsemen called the island the land of Éire, *i.e.* Ireland, the latter word being originally pronounced in three syllables. (See Ireland: *Notices of Ireland in Greek and Roman writers*.) Nothing is known as to the meaning of the word in any of its forms, and Whitley Stokes's suggestion that it may have been connected with the Sanskrit *avara*, meaning "western," is admittedly no more than conjecture. There was, indeed, a native Irish legend, worthless from the standpoint of etymology, to account for the origin of the name. According to this myth there were three kings of the Dedannans reigning in Ireland at the coming of the Milesians, named MacColl, MacKecht and MacGrena. The wife of the first was Eire, and from her the name of the country was derived. Curiously, Ireland in ancient Erse poetry was often called "Fodla" or "Bauba," and these were the wives of the other two kings in the legend.

ERINNA, Greek poet, contemporary and friend of Sappho, a native of Rhodes or the adjacent island of Telos, flourished about 600 (according to Eusebius, 350 b.c.). Although she died at the early age of nineteen, her poems were among the most famous of her time and considered to rank with those of Homer. Of her best-known poem, 'Ηλακάτη (the *Distaff*), written in a mixture of Aeolic and Doric, which contained 300 hexameter lines, only 4 lines are now extant. Three epigrams in the Palatine anthology, also ascribed to her, probably belong to a later date.

The fragments have been edited (with those of Alcaeus) by J. Pellegrino (1894).

ERINYES (Lat. *Furiae*), in Greek mythology, the avenging deities, properly the angry goddesses or goddesses of the curse pronounced upon evil-doers. According to Hesiod (*Theog.* 185) they were the daughters of Earth, and sprang from the blood of the mutilated Uranus; in Aeschylus (*Eum.* 321) they are the daughters of Night, in Sophocles (*O.C.* 40) of Darkness and Earth. Sometimes one Erinys is mentioned, sometimes several; Euripides first spoke of them as three in number, to whom later Alexandrian writers gave the names Alecto (unceasing in anger), Tisiphone (avenger of murder), Megaera (jealous). Their home is the world below, whence they ascend to earth to pursue the wicked. They punish all offences against the laws of human society, such as perjury, violation of the rites of hospitality, and, above all, the murder of relations. But they are not without benevolent and beneficent attributes. When the sinner has expiated his crime they are ready to forgive. Thus, their persecution of Orestes ceases after his acquittal by the Areopagus. It is said that on this occasion they were first called Eumenides ("the kindly"), a euphemistic variant of their real name. At Athens, however, where they had a sanctuary at the foot of the Areopagus hill and a sacred grove at Colonus, their regular name was Semnae (venerable). Black sheep were sacrificed to them during the night by the light of torches. A festival was held in their honour every year, superintended by a special priesthood, at which the offerings consisted of milk and honey mixed with water, but no wine. In Aeschylus, the Erinyes are represented as awful, Gorgon-like women, wearing long black robes, with snaky locks, bloodshot eyes and claw-like nails. Later, they are winged maidens of serious aspect, in the garb of huntresses, with snakes or torches in their hair, carrying scourges, torches or sickles. The identification of Erinyes with Sanskrit Saranyu, the swift-speeding storm cloud, is rejected by modern etymologists; according to M. Bréal, the Erinyes are the personification of the formula of imprecation (ἀρά), while E. Rohde sees in them the spirits of the dead, the angry souls of murdered men.

See C. O. Müller, *Dissertations on the Eumenides of Aeschylus*, (Eng. tr., 1835); A. Rosenberg, *Die Erinyen* (1874); J. E. Harrison, *Prolegomena to the Study of Greek Religion* (1903); and *Journal of Hellenic Studies*, xix. p. 205, according to whom the Erinyes were primarily local ancestral ghosts, potent for good or evil after death, earth genii, originally conceived as embodied in the form of snakes, whose primitive haunt and sanctuary was the omphalos at Delphi; E. Rohde, *Psyche* (1903); A. Rapp in Roscher's *Lexikon der Mythologie*, and J. A. Hild in Daremberg and Saglio's *Dictionnaire des antiquités*, s. v. FURIAE.

ERIPHYLE, in Greek mythology, sister of Adrastus and wife of Amphiaraus. Having been bribed by Polyneices with the necklace of Harmonia, she persuaded her husband to take part in the expedition of the Seven against Thebes, although he knew it would prove fatal to him. Before setting out, the seer charged his sons to slay their mother as soon as they heard of his death. The attack on Thebes was repulsed, and during the flight the earth opened and swallowed up Amphiaraus together with his chariot. His son Alcmaeon, as he had been bidden, slew his mother, and was driven from place to place by the Erinyes, seeking purification and a new home (Apollodorus iii. 6. 7).

ERIS, in Greek mythology, a sister of the war-god Ares (Homer, *Iliad*, iv. 440), and in the Hesiodic theogony (225) a daughter of Night. In the later legends of the Trojan War, Eris, not having been invited to the marriage festival of Peleus and Thetis, flings a golden apple (the "apple of discord") among the guests, to be given to the most beautiful. The claims of the three deities Hera, Aphrodite and Athena are decided by Paris in favour of Aphrodite, who as a reward assists him to gain possession of Helen (Hyginus, *Fab.* 92; Lucian, *Charidemus*, 17). Hesiod also mentions (*W. and D.* 24) a beneficent Eris, the personification of honourable rivalry. In Virgil (*Aeneid*, viii. 702) and other Roman poets Eris is represented by Discordia.

ERITH, an urban district in the north-western parliamentary division of Kent, England, 14 m. E. by S. of London, on the South Eastern & Chatham railway. Pop. (1891) 13,414; (1901) 25,296. It lies on the south bank of the Thames and extends up the hills above the shore, many villas having been erected on the higher ground. The park of a former seat, Belvedere, was thus built over (*c.* 1860), and the mansion became a home for disabled seamen. The church of St John the Baptist, though largely altered by modern restoration, retains Early English to Perpendicular portions, and some early monuments and brasses. Erith has large engineering and gun factories, and in the neighbourhood are gunpowder, oil, glue and manure works. The southern outfall works of the London main drainage system are at Crossness in the neighbouring lowland called Plumstead Marshes. Erith is the headquarters of several yacht clubs. Erith, the name of which is commonly derived from A.S. *Ærra-hythe* (old haven), was anciently a borough, and was granted a market and fairs in 1313. Down to the close of the 17th century it was of some importance as a naval station.

ERITREA, an Italian colony on the African coast of the Red Sea. It extends from Ras Kasar, a cape 110 m. S. of Suakin, in 18° 2′ N., as far as Ras Dumeira (12° 42′ N.), in the Strait of Bab-el-Mandeb, a coast-line of about 650 m. The colony is bounded inland by the Anglo-Egyptian Sudan, Abyssinia and French Somaliland. It consists of the coast lands lying between the capes named and of part of the northern portion of the Abyssinian plateau. The total area is about 60,000 sq. m. The population is approximately 450,000, of which, exclusive of soldiers, not more than 3000 are whites.

The land frontier starting from Ras Kasar runs in a south-westerly direction until in about 14° 15′ N., 36° 35′ E. it reaches the river Setit, some distance above the junction of that stream with the Atbara. This, the farthest point inland, is 198 m. S.W. of Massawa. The frontier now turns east, following for a short distance the course of the river Setit; thence it strikes north-easterly to the Mareb, and from 38° E. follows that river and its tributaries the Belesa and Muna, until within 42 m. of the sea directly south of Annesley Bay. At this point the frontier turns south and east, crossing the Afar or Danakil country at a distance of 60 kilometres (37·28 m.) from the coast-line. About 12°20′ N. the French possessions in Somaliland are reached. Here the frontier turns N.E. and so continues until the coast of the Red Sea is again reached at a point south of the town of Raheita. In the southern part of the colony are small sultanates, such as those of Aussa and Raheita, which are under Italian protection. The Dahlak archipelago and other groups of islands along the coast belong to Eritrea.

Physical Features.—The coast-line is of coral formation and is, in the neighbourhood of Massawa, thickly studded with small islands. The chief indentations are Annesley Bay, immediately south of Massawa, and Assab Bay in the south. The colony consists of two widely differing regions. The northern division is part of the Abyssinian highlands. The southern division, part of the Afar or Danakil country, includes all the territory of the colony south of Annesley Bay. These two regions are connected by a narrow strip of land behind Annesley Bay, where the Abyssinian hills approach close to the sea. From this bay the coast-line trends S.E. so that at Tajura Bay the distance between the Abyssinian hills and the sea is over 200 m. The Afar country is part of the East African rift-valley, and in the southern parts of the valley its surface is diversified by ranges of hills, frequently volcanic, and by lakes. The plains, however, extend over large areas, they are generally arid and are often covered with mimosa trees which form a kind of jungle called by the natives *khala*. The torrents which descend from the Abyssinian plateau usually fail to reach the sea. They are mostly bordered by dense vegetation; in the dry season water is found in pools in the river beds or can be obtained by digging. The principal rivers enter and are lost in one or other of two salt plains or basins, that of Asali in the north and that of Aussa in the south. The Hawash flows through the Aussa country in a N.E. direction, but is lost in lakes Abbebad and Aussa (see ABYSSINIA). The Raguali and other rivers drain into the Asali basin. This basin, like that of Aussa, is in places 200 ft. below sea-level. On the west the Asali basin reaches to the Abyssinian foot-hills; in its southern part is the small lake Alelbad. The eastern edge of the basin is formed by a ridge of gypsum and on its margin grow palms. In parts the salt lies thick on the plain, which then has the appearance of a lake frozen over. South of Lake Alelbad is a volcano called Artali or Erta-alé (" the smoky "), and farther to the S.E., in about 13° 15′ N., is the peak of Afdera, which was in eruption in June 1907. The hills, 1000 to 4000 ft. in height, which run more or less parallel to and a few miles from the coast, include the volcano of Dubbi (reported active in 1861), some 30 m. S. of the port of Edd (Eddi). In 14° 52′ N., 39° 53′ E. and near the northern end of the zone of depression the volcano of Alid (2985 ft.) rises from the trough. Its chief crest forms an elongated ring and encloses a crater over half a mile in diameter and with walls 350 ft. high. North and south of Alid extends a vast lava field. Dubbi and Alid are in Italian territory; the greater part of Afar belongs to Abyssinia.

At Annesley Bay the narrow coast plain is succeeded by foothills separated by small valleys through which flow innumerable streams. From these hills the ascent to the plateau which constitutes northern Eritrea is very steep. This tableland, which has a general elevation of about 6500 ft., is fairly fertile despite a desert region—Sheb—to the S.E. of Keren. It is characterized by rich, well-watered valleys, verdant plains and flat-topped hills with steep sides, running in ranges or isolated. The highest hills in Eritrean territory rise to about 10,000 ft. The plateau is known by various names, the region directly west of Massawa being called Hamasen. To the west and north the plateau sinks in terraces to the plains of the Sudan, and eastward falls more abruptly to the Red Sea, the coast plain, known as the Samhar, consisting of sandy country covered with mimosa and, along the khors, with a somewhat richer vegetation.

The colony contains no navigable streams. For a short distance the Setit (known in its upper course as the Takazze), a tributary of the Atbara, forms the frontier, as does also in its upper course the Gash or Mareb (see Abyssinia). The Mareb, often dry in summer, in the floods is a large and impassable river. Both the Setit and Mareb have a general westerly course across the Abyssinian plateau. The Baraka (otherwise Barka) and Anseba rise in the Hamasen plateau near Asmara within a short distance of each other. The Baraka flows west and then north; the Anseba, which has a more easterly course, also flows northward and joins the Baraka a little N. of 17° N. A few miles below the confluence the Baraka leaves Italian territory. It is (as is the Anseba) an intermittent stream. After heavy rain it discharges some of its water into the Red Sea north of Tokar. The whole of the hill country north of Asmara belongs to the drainage area of the Baraka or Anseba. Of the numerous streams which, north of the Danakil country, run direct from the hills to the Red Sea, the Hadas may be mentioned, as along the valley of that stream is one of the most frequented routes to the tableland. The Hadas, in time of flood, reaches the ocean near Adulis in Annesley Bay.

Climate.—The climate in different parts of the colony varies greatly. Three distinct climatic zones are found:—(1) that of the coastlands, including altitudes up to 1650 ft., (2) that of the escarpments and valleys, and (3) that of the high plateau and alpine summits. In the coast zone the heat and humidity are excessive during most of the year, June, September and October being the hottest months. Rains occur between November and April, during which time the temperature is lower. In this zone malarial fevers prevail in winter. The heat is greatest at Massawa, where the mean temperature averages 88° F., but where, in summer, the thermometer often rises to 120° F. in the shade. In the second zone the climate is more temperate and there is considerable variation in temperature owing to nocturnal radiation. This zone falls within the régime of the summer monsoon rains, while those districts adjoining the coast zone enjoy also winter rains. August is the most rainy and May the hottest month. On the high plateau, *i.e.* the third zone, the climate is generally moderately cool. Slight rain falls in the spring and abundant monsoon rains from June to September. The heat is greatest in the dry season, November to April. Above 8500 ft. the climate becomes sub-alpine in character.

Flora and Fauna.—In the low country the flora differs little from that of tropical Africa generally, whilst on the plateau the vegetation is characteristic of the temperate zone. The olive tree grows on the high plateau and covers the flanks of the hills to within 3000 ft. of sea-level. The sycamore-fig tree grows to enormous proportions in parts of the plateau. Lower down durra, maize and bultuc grow in profusion. In the northern part of the colony, especially along the Khor Baraka, the dom palm flourishes. The fauna includes, in the low country, the lion, panther, elephant, camel, and antelope of numerous species. On the plateau the fauna is that of Abyssinia (*q.v.*).

Inhabitants.—The inhabitants of the plains and foothills are for the most part semi-nomad shepherds, living on durra and milk. In the north these people are largely of Arab or Hamitic stock, such as the Beni-Amer, but include various negro tribes. Afar and Somali form the population of the southern regions. The inhabitants of the plateau are Abyssinians. The nomads are Mussulmans and are, as a rule, docile and pacific, though the Danakils are given to occasional raiding. The Abyssinians are more warlike, but they have settled down under Italian rule. Among the native industries are mat-weaving, cotton-weaving, silver-working and rudimentary iron and leather working. (See Afars; Somaliland and Abyssinia.)

Towns.—The principal places on the coast are Massawa (*q.v.*), pop. about 10,000, the chief seaport of the colony, Assab, chief town of the Danakil region, to which converges the trade from Abyssinia across the Aussa country, and Zula (*q.v.*), identified with the ancient Adulis. The chief town in the interior is Asmara (*q.v.*), the capital of the colony and under the Abyssinians capital of the province of Hamasen, and favourite headquarters of Ras Alula (see below and also Abyssinia). It is situated 7800 ft. above the sea, and has something of the aspect of a European town. Keren, 50 m. N.W. of Asmara, is the centre for a district (Bogos) fertilized by the upper course of the Anseba; Agordat, on the river Baraka, on the road from Keren to Kassala, is the centre of the Beni-Amer, Algheden and Sabderat tribes; Mogolo, on the lower Mareb, is the rendezvous of the Baria and Baza tribes. Towards Abyssinia the chief towns are Saganeiti (capital of the Okulé-Kusai province), Godofelassi and Adi-Ugri, the two latter situated in the fertile plain of the Seraé; Adiquala, on the edge of the Mareb gorge; and Arrasa, the centre of the districts constituting the province of Deki-Tesfa.

Agriculture and Trade.—The nomads of the plains possess large herds of cattle and camels. The low country is almost entirely pastoral and unsuited for the cultivation of crops. On the other hand almost all European cereals flourish in the intermediate zone and on the high plateau, and the Abyssinian is a good agriculturist and understands irrigation. Numbers of emigrants from Italy possess farms on the plateau. Experiments in the cultivation of coffee, tobacco and cotton have given good results in the intermediate zone. Besides camels and oxen, sheep and goats are numerous, and meat, hides and butter are articles of local trade. Hides are the principal export (about £50,000 a year). Wax, gum, coffee and ivory are also exported. Pearl fishing is carried on at Massawa and the Dahlak islands. The annual value of the fisheries is about £40,000 (pearls £10,000, mother of pearl £30,000). Gold mines are worked near Asmara. Salt, obtained from the salt lakes in the Aussa and Danakil countries, is a valuable article of commerce. Cotton goods are the chief imports. There is a little trade with northern Abyssinia, but it is undeveloped. For the five years 1901–1905 the average value of the external trade was £456,000 per annum. The imports more than doubled the exports.

Communications.—A railway, 65 m. long, connects Massawa with Asmara. An extension of the line is planned from Asmara to Sabderat and Kassala. The whole territory is crossed by camel and mule paths between the sea and the high plateau, and between the various centres of population. Every valley that brings water to the Red Sea has a route leading to the high plateau. The great arteries, however, number three, which, starting from Massawa by way of Asmara, run, two to Abyssinia, and one to Kassala and Khartum. They are all more or less practicable for carts, and are flanked by a good telegraph line as long as they lie in Italian territory. There are also two caravan routes from Assab Bay, across the Danakil country to southern Abyssinia. The northern leads by a comparatively easy ascent to Yejju, the more southern follows the valley of the Hawash. A telegraph line 500 m. long connects Massawa with Adis Ababa via Asmara. Massawa is also telegraphically connected with the outside world by a cable to Perim via Assab. There is regular steamship communication with Italy.

Administration.—Eritrea is administered by a civil governor responsible to the ministry of foreign affairs at Rome. It is divided into six provinces, each governed by a regional commissioner. Some tracts of frontier territory are detached from the various regions and entrusted to political residents, as, for instance, on the Sudan frontier and also on the Abyssinian boundary, where strict surveillance is necessary to repress raiding incursions from Tigré, and where the chief intelligence department is established. The six regions or principal provinces are:—Asmara, which includes Hamasen and other small districts; Keren, which comprises the high territories to the north of Asmara, *i.e.* the Bogos country; Massawa, extending over all the tribes between the high plateau and the sea from the Habābs to the Danakil; Assab, which extends from Edd to Raheita; Okulé-Kusai, the plateau country S.E. of Asmara; Seraé, including Deki-Tesfa, the country S.W. of Asmara. The regional commissioners and the political residents act either by means of the village headmen (*Shum* or *Chicca*), by the chiefs of districts in the few localities where villages are still organized in districts, or by the headmen of tribes, and by the councils of the elders wherever these remain.

Revenue is derived from customs duties, direct taxation and tribute paid by the nomad tribes. The local revenue, which for the period 1897–1907 was about £100,000 a year, is supplemented by grants from Italy, the total cost of the administration being about £400,000 yearly. Nearly half the expenditure is on the military force maintained.

Justice.—Civil justice for natives is administered, in the first instance, by the headmen of villages, provinces, tribes, or by councils of notables (*Shumagalle*); in appeal, by the residents and regional tribunals, and, in the last instance, by the colonial court of appeal. Europeans are entirely under Italian jurisdiction. Penal justice is administered by Italian judges only. An administrative tribunal settles, without appeal, questions of tribute, disputes concerning family, village or tribal landmarks, as well as suits involving the colonial government. The civil laws for the natives are those established by local usage. Europeans are answerable to the Italian civil code. Penal laws are the same as in Italy, except where modified by local usages. Appeal to the Rome court of cassation is admitted against all penal and civil sentences.

Defence.—Defence is entrusted to a corps of colonial troops, partly Italian and partly native; to a militia (*milizia mobile*) formed by natives who have already served in the colonial corps; and to the *chitet* or general levy which, in time of war, places all male able-bodied inhabitants under arms. The regional commissioners and political residents have at their disposal some hundreds of irregular paid soldiers under native chiefs. In war time these irregulars form part of the colonial corps, but in time of peace serve as frontier police. The colonial corps, about 5000 strong, garrisons the chief places of strategic importance, such as Asmara, Keren and Saganeiti. The irregular troops, on foot, or mounted on camels, number about 1000 men. The militia consists of 3500 men of all arms, and is intended in time of war to reinforce the various divisions of the colonial corps. The *chitet* yields between 3000 and 4000 men, to be employed on the lines of communication or in caravan service. All these troops are intended to ward off a first attack, so as to allow time for the arrival of reinforcements from Italy. The customs and political surveillance along the coast is entrusted, afloat, to the Massawa naval station, and, ashore, to a coastguard company 400 strong stationed at Meder, with detachments at Assab, Massawa, Raheita, Edd and Taclai.

History.—Traces of the ancient Eritrean civilization are scarce. During the prosperous periods of ancient Egypt, Egyptian squadrons asserted their rule over the west Red Sea coast, and under the Ptolemies the port of Golden Berenice (Adulis?) was an Egyptian fortress, afterwards abandoned. During the early years of the Roman empire, Eritrea formed part of an important independent state—that of the Axumites (Assamites). At the end of the reign of Nero, and perhaps even earlier, the king of the Axumites ruled over the Red Sea coast from Suakin to the strait of Bab-el-Mandeb, and traded constantly with Egypt. This potentate called himself "king of kings," commanded an army and a fleet, coined money, adopted Greek as the official language, and lived on good terms with the Roman empire. The Axumites belonged originally to the Hamitic race, but the immigration of the Himyaritic tribes of southern Arabia speedily imposed a new language and civilization. Therefore the ancient Abyssinian language, Geez, and its living dialects, Amharic and Tigrina, are Semitic, although modified by the influence of the old Hamitic Agau or Agao. Adulis (Adovlis), slightly to the north of Zula (*q.v.*), was the chief Axumite port. From Adulis started the main road, which led across the high plateau to the capital Axomis (Axum). Along the road are still to be seen vestiges of cities and inscribed monuments, such as the Himyaritic inscriptions on the high plateau of Kohait, the six obelisks with a Saban inscription at Toconda, and an obelisk with an inscription at Amba Sait. Other monuments exist elsewhere, as well as coins of the Axumite period with Greek and Ethiopian inscriptions. After the rise of the Ethiopian empire the history of Eritrea is bound up with that of Ethiopia, but not so entirely as to be completely fused. The documents of the Portuguese expedition of the 16th century and other Ethiopian records show that all the country north of the Mareb enjoyed relative autonomy under a vassal of the Ethiopian emperor.

Michael, counsellor of Solomon, who was king of the country north of the Mareb, usurped the throne of Solomon during the reign of the Emperor Atzié Jasu II. (1729–1753), and, after proclaiming himself ras of Tigré and "protector of the empire," ceded the North Mareb country to an enemy of the rightful dynasty. Hence a long struggle between the dispossessed family and the occupants of the North Mareb throne. The coast regions had meantime passed from the control of the Abyssinians. In the 16th century the Turks made themselves masters of Zula, Massawa, &c., and these places were never recovered by the Abyssinians. In 1865 Massawa and the neighbouring coast was acquired by Egypt, the khedive Ismail entertaining projects for connecting the port by railway with the Nile. The Egyptians took advantage of civil war in Abyssinia to seize Keren and the Bogos country in 1872[1], an action against which the negus Johannes (King John), newly come to the throne, did not at the time protest. In 1875 and 1876 the Egyptians, who sought to increase their conquests, were defeated by the Abyssinians at Gundet and Gura. Walad Michael, the hereditary ruler of Bogos, fought as ally of King John at Gundet and of the Egyptians at Gura. For two years Walad Michael continued to harass the border, but in December 1878 he submitted to King John, by whose orders he was (Sept. 1879) imprisoned upon an amba, or flat-topped mountain, whence he only succeeded in escaping in 1890. In 1879 his territory was given by King John to Ras Alula, who retained it until, in August 1889, the Italians occupied Asmara (see ABYSSINIA: *History*).

An Egyptian garrison remained at Keren in the Bogos country until 1884, when in consequence of the revolt of the Mahdi it was withdrawn, Bogos being occupied by Abyssinia on the 12th of September of that year. On the 5th of February 1885 an Italian force, with the approval of Great Britain, occupied Massawa, the Egyptian garrison returning to Egypt. This occupation led to wars with Abyssinia and finally to the establishment of the colony in its present limits. The history of the Italian-Abyssinian relations is fully told in the articles ITALY and ABYSSINIA (history sections).

It was not, however, at Massawa that Italy first obtained a foothold in eastern Africa. The completion of the Suez Canal led Italy as well as Great Britain and France to seek territorial rights on the Red Sea coasts. The purchase of Assab and the neighbouring region for £1880, from the sultan Berehan of Raheita for use as a coaling station by the Italian Rubattino Steamship Company, in March 1870, formed the nucleus of Italy's colonial possessions. This purchase was protested against by Egypt, Turkey and Great Britain; the last named power being willing to recognize an Italian commercial settlement, but nothing more. (The Indian government viewed the establishment of the Italians on the new highway to the East with a good deal of ill-humour.) Eventually, the British opposition being overcome and that of Egypt and Turkey disregarded, Assab, by a decree of the 5th of July 1882, was declared an Italian colony. Between 1883 and 1888 various treaties were concluded with the sultan of Aussa ceding the Danakil coast to Italy and recognizing an Italian protectorate over the whole of his country—through which passes the trade route from Assab Bay to Shoa.

On the 1st of January 1890 the various Italian possessions on the coast of the Red Sea were united by royal decree into one province under the title of the Colony of Eritrea—so named after the Erythraeum Mare of the Romans. At first the government of the colony was purely military, but after the defeat of the Italians by the Abyssinians at Adowa, the administration was placed upon a civil basis (1898–1900). The frontiers were further defined by a French-Italian convention (24th of January 1900) fixing the frontier between French Somaliland and the Italian possessions at Raheita, and also by various agreements with Great Britain and Abyssinia. A tripartite agreement between Italy, Abyssinia and Great Britain, dated the 15th of May 1902, placed the territory of the Kanama tribe, on the north bank of the Setit, within Eritrea. A convention of the 16th of May 1908 settled the Abyssinian-Eritrean frontier in the Afar country, the boundary being fixed at 60 kilometres from the coast. The task of reconstructing the administration on a civil basis and of developing the commerce of the colony was entrusted to Signor F. Martini, who was governor for nine years (1898–1906). Under civil rule the colony made steady though somewhat slow progress.

AUTHORITIES.—See B. Melli, *La Colonia Eritrea dalle sue origini al anno 1901* (Parma, 1901); G. B. Penne, *Per l'Italia Africana. Studio critico* (Rome, 1906); R. Perini, *Di qua dal Marèb* (Florence, 1905), a monograph on the Asmara zone; F. Martini, *Nell' Africa Italiana* (3rd ed., Milan, 1891); A. B. Wylde, *Modern Abyssinia*, chaps. v.-ix. (London, 1901); E. D. Schoenfeld, *Erythräa und der ägyptische Sudân*, chaps. i.-xii. (Berlin, 1904); Luigi Chiala, *La Spedizione di Massana* (Turin, 1888); *Abyssinian Green Books* published at intervals in 1895 and 1896, covering the period from 1870 to the end of the Italo-Abyssinian War; Vico Mantegazza, *La Guerra in Africa* (Florence, 1896); General Baratieri, *Memorie d'Africa* (Rome, 1898); C. de la Jonquière, *Les Italiens en Érythrée* (Paris, 1897); G. F. H. Berkeley, *The Campaign of Adowa* (London, 1902). For orography and geology see an article by P. Verri in *Boll. Soc. geog. italiana*,

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[1] During the Second Empire unsuccessful efforts were made by France to obtain a Red Sea port and a foothold in northern Abyssinia. (See SOMALILAND: *French*.)

1909, and for climate an article in *Rivista coloniale* (1906), by A. Tancredi. A. Allori compiled a *Piccolo Dizionario eritreo, italiano-arabo-amarico* (Milan, 1895).

For Afar consult W. Munzinger, "A Journey through the Afar Country" in *Journ. Royal Geog. Soc.* for 1869; V. Bottego, "Nella Terra dei Danakil," in *Boll. Soc. Geog. Italiana*, 1892; Count C. Rossini, "Al Rágali" in *L'Espl. Comm.* of Milan, 1903–1904; and articles by G. Dainelli and O. Marinelli in the *Riv. Geog. Italiana* of Florence for 1906–1908, dealing with the volcanic regions.

Bibliographies will be found in G. Fumagalli's *Bibliografia Etiopica* (Milan, 1893) and in the *Riv. Geog. Italiana* for 1907.

ERIVAN, a government of Russia, Transcaucasia, having the province of Kars on the W., the government of Tiflis on the N., that of Elisavetpol on the N. and E., and Persia and Turkish Armenia on the S. It occupies the top of an immense plateau (6000-8000 ft.). Continuous chains of mountains are met with only on its borders, and in the E., but the whole surface is thickly set with short ridges and isolated mountains of volcanic origin, of which Alagöz (14,440 ft.) and Ararat (16,925 ft.) are the most conspicuous and the most important. Both must have been active in Tertiary times. Lake Gok-cha (540 sq. m.) is encircled by such volcanoes, and the neighbourhood of Alexandropol is a "volcanic amphitheatre," being entirely buried under volcanic deposits. The same is true of the slopes leading down to the river Aras; and the valley of the upper Aras is a stony desert, watered only by irrigation, which is carried on with great difficulty owing to the character of the soil. The government is drained by the Aras, which forms the boundary with Persia and flows with great velocity down its stony bed, the fall being 17-22 ft. per mile in its upper course, and 9 ft. at Ordubad, where it quits the government, while lower down it again increases to 23 ft. Many of the small lakes, filling volcanic craters, are of great depth. Timber is very scarce. A variety of useful minerals exists, but only rock-salt is obtained, at Nakhichevan and Kulp. The climate is extremely varied, the following being the average temperatures and mean annual rainfall at Alexandropol (alt. 5078 ft.) and Aralykh (2755 ft.) respectively: year 42°, January 12°, July 65°, mean rainfall 16·2 in.; and year 53°, January 20·5°, July 79°, rainfall 6·3 in. The population numbered 829,578 in 1897 (only 375,086 women), of whom 82,278 lived in the towns. An estimate in 1906 gave a total of 909,100. They consist chiefly of Armenians (441,000), Tatars (40%), Kurds (49,389), with Russians, Greeks and Tates. Most of the Armenians belong to the Gregorian (Christian) Church, and only 4020 to the Armenian Catholic Church. The Tatars are mostly Shiite Mussulmans, only 27,596 being Sunnites; 7772 belong to the peculiar faith of the Yezids. While barley only can be grown on the high parts of the plateau, cotton, mulberry, vines and all sorts of fruit are cultivated in the valley of the Aras. Cattle-breeding is extensively carried on; camels also are bred, and leeches are collected out of the swamps and exported to Persia. Industry is in its infancy, but cottons, carpets, and felt goods are made in the villages. A considerable trade is carried on with Persia, but trade with Asia Minor is declining. The government is divided into seven districts—Erivan, Alexandropol, Echmiadzin (chief town, Vagarshapat), Nakhichevan, Novobayazet, Surmali (chief town, Igdyr), and Sharur-daralagöz (chief town, Norashen). The principal towns are Erivan (see below), Alexandropol (32,018 inhabitants in 1897), Novobayazet (8507), Nakhichevan (8845), and Vagarshapat (3400).

ERIVAN, or Irwan, in Persian, *Rewan*, a town of Russia, capital of the government of the same name, situated in 40° 14′ N., 44° 38′ E., 234 m. by rail S.S.W. of Tiflis, on the Zanga river, from which a great number of irrigation canals are drawn. Altitude, 3170 ft. Pop. (1873) 11,938; (1897) 29,033. The old Persian portion of the town consists mainly of narrow crooked lanes enclosed by mud walls, which effectually conceal the houses, and the modern Russian portion is laid out in long ill-paved streets. On a steep rock, rising about 600 ft. above the river, stand the ruins of the 16th-century Turkish fortress, containing part of the palace of the former Persian governors, a handsome but greatly dilapidated mosque, a modern Greek church and a cannon foundry. One chamber, called the Hall of the Sardar, bears witness to former splendour in its decorations. The finest building in the city is the mosque of Hussein Ali Khan, familiarly known as the Blue Mosque from the colour of the enamelled tiles with which it is richly encased. At the mosque of Zal Khan a passion play is performed yearly illustrative of the assassination of Hussein, the son of Ali. Erivan is an Armenian episcopal see, and has a theological seminary. The only manufactures are a little cotton cloth, leather, earthenware and blacksmiths' work. The fruits of the district are noted for their excellence—especially the grapes, apples, apricots and melons. Armenians, Persians and Tatars are the principal elements in the population, besides some Russians and Greeks. The town fell into the power of the Turks in 1582, was taken by the Persians under Shah Abbas in 1604, besieged by the Turks for four months in 1615, and reconquered by the Persians under Nadir Shah in the 18th century. In 1780 it was successfully defended against Heraclius, prince of Georgia; and in 1804 it resisted the Russians. At length in 1827 Paskevich took the fortress by storm, and in the following year the town and government were ceded to Russia by the peace of Turkman-chai. A Tatar poem in celebration of the event has been preserved by the Austrian poet, Bodenstedt, in his *Tausend und ein Tage im Orient* (1850).

ERLANGEN, a town of Germany, in the kingdom of Bavaria, on a fertile plain, at the confluence of the Schwabach and the Regnitz, 11 m. N.W. of Nuremberg, on the railway from Munich to Bamberg. Pop. (1905) 23,720. It is divided into an old and a new town, the latter consisting of wide, straight and well-built streets. The market place is a fine square. Upon it stand the town-hall and the former palace of the margraves of Bayreuth, now the main building of the university. The latter was founded by the margrave Frederick (d. 1763), who, in 1742, established a university at Bayreuth, but in 1743 removed it to Erlangen. A statue of the founder, erected in 1843 by King Louis I. of Bavaria, stands in the centre of the square and faces the university buildings. The university has faculties of philosophy, law, medicine and Protestant theology. Connected with it are a library of over 200,000 volumes, geological, anatomical and mineralogical institutions, a hospital, several clinical establishments, laboratories and a botanical garden. Among the churches of the town (six Protestant and one Roman Catholic), only the new town church, with a spire 220 ft. high, is remarkable. The chief industries of Erlangen are spinning and weaving, and the manufacture of glass, paper, brushes and gloves. The brewing industry is also important, the beer of Erlangen being famous throughout Germany and large quantities being exported.

Erlangen owes the foundation of its prosperity chiefly to the French Protestant refugees who settled here on the revocation of the edict of Nantes and introduced various manufactures. In 1017 the place was transferred from the bishopric of Würzburg to that of Bamberg; in 1361 it was sold to the king of Bohemia. It became a town in 1398 and passed into the hands of the Hohenzollerns, burgraves of Nuremberg, in 1416. There for nearly three centuries it was the property of the margraves of Bayreuth, being ceded with the rest of Bayreuth to Prussia in 1791. In 1810 it came into the possession of Bavaria. Erlangen was for many years the residence of the poet Friedrich Rückert, and of the philosophers Johann Gottlieb Fichte and Friedrich Wilhelm von Schnelling.

See Stein and Müller, *Die Geschichte von Erlangen* (1898).

ERLE, SIR WILLIAM (1793–1880), English lawyer and judge, was born at Fifehead-Magdalen, Dorset, on the 1st of October 1793, and was educated at Winchester and at New College, Oxford. Having been called to the bar at the Middle Temple in 1819 he went the western circuit, became counsel to the Bank of England, sat in parliament from 1837 to 1841 for the city of Oxford, and, although of opposite politics to Lord Lyndhurst, was made by him a judge of the common pleas in 1845. He was transferred to the queen's bench in the following year, and in 1859 came back to the common pleas as chief justice upon the promotion of Sir Alexander Cockburn. He retired in 1866, receiving the highest eulogiums for the ability and impartiality with which he had discharged the judicial office. He died at his estate at Bramshott, Hampshire, on the 28th of January

1880, and a monument without his name but in his memory (sometimes erroneously supposed to mark the place where an old gibbet was) stands on the top of Hindhead.

See E. Manson, *Builders of our Law* (1904).

ERLKÖNIG, or Erl-King, a mythical character in modern German literature, represented as a gigantic bearded man with a golden crown and trailing garments, who carries children away to that undiscovered country where he himself abides. There is no such personage in ancient German mythology, and the name is linguistically nothing more than the perpetuation of a blunder. It first appeared in Herder's *Stimmen der Völker* (1778), where it is used in the translation of the Danish song of the *Elf-King's Daughter* as equivalent to the Danish *ellerkonge*, or *ellekonge*, that is, *elverkonge*, the king of the elves; and the true German word would have been *Elbkönig* or *Elbenkönig*, afterwards used under the modified form of *Elfenkönig* by Wieland in his *Oberon* (1780). Herder was probably misled by the fact that the Danish word *elle* signifies not only elf, but also alder tree (Ger. *Erle*). His mistake at any rate has been perpetuated by both English and French translators, who speak of a "king of the alders," "un roi des aunes," and find an explanation of the myth in the tree-worship of early times, or in the vapoury emanations that hang like weird phantoms round the alder trees at night. The legend was adopted by Goethe as the subject of one of his finest ballads, rendered familiar to English readers by the translations of Lewis and Sir Walter Scott; and since then it has been treated as a musical theme by Reichardt and Schubert.

ERMAN, PAUL (1764–1851), German physicist, was born in Berlin on the 29th of February 1764. He was the son of the historian Jean Pierre Erman (1735–1814), author of *Histoire des réfugiés*. He became teacher of science successively at the French gymnasium in Berlin, and at the military academy, and on the foundation of the university of Berlin in 1810 he was chosen professor of physics. He died at Berlin on the 11th of October 1851. His work was mainly concerned with electricity and magnetism, though he also made some contributions to optics and physiology. His son, Georg Adolf Erman (1806–1877), was born in Berlin on the 12th of May 1806, and after studying natural science at Berlin and Königsberg, spent from 1828 to 1830 in a journey round the world, an account of which he published in *Reise um die Erde durch Nordasien und die beiden Ozeane* (1833–1848). The magnetic observations he made during his travels were utilized by C. F. Gauss in his theory of terrestrial magnetism. He was appointed professor of physics at Berlin in 1839, and died there on the 12th of July 1877. From 1841 to 1865 he edited the *Archiv für wissenschaftliche Kunde von Russland*, and in 1874 he published, with H. J. R. Petersen, *Die Grundlagen der Gauss'schen Theorie und die Erscheinungen des Erdmagnetismus im Jahre 1829*.

His son Johann Peter Adolf Erman (1854–), a famous Egyptologist, was born in Berlin on the 31st of October 1854. Educated at Leipzig and Berlin, he became extraordinary professor in 1883 and ordinary professor in 1892 of Egyptology in the university of Berlin, and in 1885 he was appointed director of the Egyptian department of the royal museum. For an account of the Egyptological work of Erman and his school, see Egypt: *Language*.

ERMANARIC (fl. 350–376), king of the East Goths, belonged to the Amali family, and was the son of Achiulf. His name occurs as Ermanaricus (Jordanes), Aírmanareiks (Gothic), *Eormenric* (A. Sax.), Jörmunrek (Norse), Ermenrich (M.H. German). Ermanaric built up for himself a vast kingdom, which eventually extended from the Danube to the Baltic and from the Don to the Theiss. He drove the Vandals out of Dacia, compelled the allegiance of the neighbouring tribes of West Goths, procured the submission of the Herules, of many Slav and Finnish tribes, and even of the Esthonians on the shores of the Gulf of Bothnia. In his later days the west Goths threw off his yoke, and, on the invasion of the Huns, rather than witness the downfall of his kingdom he is said by Ammianus Marcellinus to have committed suicide. His fate early became the centre of popular tradition, which found its way into the narrative of Jordanes or Jornandes (*De rebus geticis*, chap. 24), who compared him to Alexander the Great and certainly exaggerated the extent of his kingdom. He is there said to have caused a certain Sunilda or Sanielh to be torn asunder by wild horses on account of her husband's traitorous conduct. Her brothers Sarus and Ammius sought to avenge her. They succeeded in wounding, not in killing the Gothic king, whose death supervened in his one hundred and tenth year from the joint effects of his wound and fear of the Hunnish invasion. This is evidently a paraphrase of popular story which sought to supply plausible reasons for Ermanaric's end. In German legend Ermanaric became the typical cruel tyrant, and references to his crimes abound in German epic and in Anglo-Saxon poetry. He is made to replace Odoacer as the enemy of Dietrich of Bern, his nephew, and his history is related in the Norse *Vilkina* or *Thidrekssaga*, which chiefly embodies German tradition. His evil genius, Sifka, Sibicho or Bicci, brings about the death of his three sons. The Harlungs, Imbrecke and Fritile,[1] are his nephews, whom he has strangled for the sake of their treasure, the Brisingo meni. Sonhild or Svanhild becomes the wife of Ermanaric, and the motive for her murder is replaced by an accusation of adultery between Svanhild and her stepson. The story was already connected with the Nibelungen when it found its way to the Scandinavian north by way of Germany. In the *Völsunga Saga* Svanhild is the daughter of Sigurd and Gudrun. She is given in marriage to the Gothic king Jörmunrek (Ermanaric), who sends his son Randver as proxy wooer in company of Bicci, the evil counsellor. Randver is persuaded by Bicci to take his father's bride for himself. Randver is hanged and Svanhild trampled to death by horses in the gate of the castle. Gudrun eggs on Sörli and Hamdir or Hamtheow, her two sons by her third husband, Jonakr the Hun, to avenge their sister. On the way they slay their half-brother Erp, whom they suspect of lukewarmness in the cause; arrived in the hall of Ermanaric they make a great slaughter of the Goths, and hew off the hands and feet of Ermanaric, but they themselves are slain with stones. The tale is told with variations by Saxo Grammaticus (*Historia Danica*, ed. Müller, p. 408, &c.), and in the Icelandic poems, the *Lay of Hamtheow*, *Gudrun's Chain of Woe*, and in the prose *Edda*.

Bibliography.—W. Grimm, in *Die deutsche Heldensage* (2nd ed., Berlin, 1867), quotes the account given by Jordanes, references in Beowulf, in the *Wanderer's Song*, *Exeter Book*, in *Parcival*, in *Dietrichs Flucht*, the account given in the *Quedlinburg Chronicle*, by Ekkehard in the *Chronicon Urspergense*, by Saxo Grammaticus, &c. See also Vigfússon and Powell, *Corpus poëticum boreale*, vol. i. (Oxford, 1883), and H. Symons, "Die deutsche Heldensage" in Paul's *Grundriss d. german. Phil.* vol. iii. (Strassburg, 1900).

ERMELAND, or Ermland (*Varmia*), a district of Germany, in East Prussia, extending from the Frisches Haff, a bay in the Baltic, inland towards the Polish frontier. It is a well-wooded sandy tract of country, has an area of about 1650 sq. m., a population of 240,000, and is divided into the districts of Braunsberg, Heilsberg, Rössel and Allenstein.

Ermeland was originally one of the eleven districts of old Prussia and was occupied by the Teutonic Knights (*Deutscher Orden*), being made in 1250 one of the four bishoprics of the country under their sway. The bishop of Ermeland shortly afterwards declared himself independent of the order, and became a prince of the Empire. In 1466 Ermeland, together with West Prussia, was by the peace of Thorn attached to the crown of Poland, and the bishop had a seat in the Polish senate. In 1772 it was again incorporated with Prussia. Among the bishops of the see, which still exists, with its seat in Frauenberg, may be mentioned Aeneas Sylvius Piccolomini, afterwards Pope Pius II., and Cardinal Stanislaus Hosius (1504–1579), the founder of the Jesuit college in Braunsberg.

See Hipler, *Literaturgeschichte des Bisthums Ermeland* (Braunsberg, 1873); the *Monumenta historiae Warmiensis* (Mainz, 1860–1864, and Braunsberg, 1866–1872, 4 vols.); and Buchholz, *Abriss einer Geschichte des Ermlands* (Braunsberg, 1903.)

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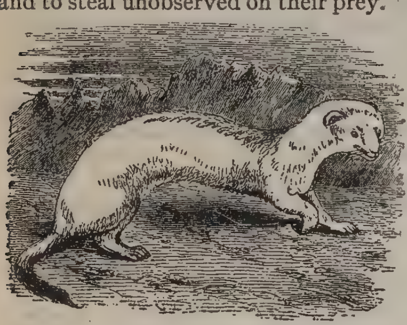
[1] Emerka and Fridla (Beowulf, *Quedlingburg Chron.*), Aki and Etgard (*Vilkina Saga*). In the original myth the Harlungs, who are not to be confused with the Hartung brothers, were sent to bring home Sūryā, the bride of the sky-god, Irmintiu.

ERMELO, a district and town of the Transvaal. The district lies in the south-east of the province and is traversed by the Drakensberg. In it are Lake Chrissie, the only true lake in the country, and the sources of the Vaal, Olifants, Komati, and Usuto rivers, which rise within 30 m. of one another. The region has a general elevation of about 5500 ft. and is fine agricultural and pastoral country, besides containing valuable minerals, including coal and gold. Ermelo town, pop. (1904) 1451, is by rail 175 m. S.E. of Johannesburg, and 74 m. S.S.W. of Machadodorp on the Pretoria-Delagoa Bay railway. A government experimental farm, with some 1000 acres of plantations, is maintained here.

ERMINE, an alternative name for the stoat (*Putorius ermineus*), apparently applicable in its proper sense only when the animal is in its white winter coat. This animal measures 10 in. in length exclusive of the tail, which is about 4 in. long, and becomes bushy towards the point. The fur in summer is reddish brown above and white beneath, changing in the winter of northern latitudes to snowy whiteness, except at the tip of the tail, which at all seasons is black. In Scottish specimens this change in winter is complete, but in those found in the southern districts of England it is usually only partial, the ermine presenting during winter a piebald appearance. The white colour is evidently protective, enabling the animals to elude the observations of their enemies, and to steal unobserved on their prey. It also retains heat better than a dark covering, and may thus serve to maintain an equable temperature at all seasons within the body. The colour change seems to be due to phagocytes devouring the pigment-bodies of the hair, and not to a moult.

The species is a native of the temperate and subarctic zones of the Old World, and is represented in America by a form which can scarcely be regarded as specifically distinct. It inhabits thickets and stony places, and frequently makes use of the deserted burrows of moles and other underground mammals. Exceedingly sanguinary in disposition, and agile in its movements, it feeds principally on rats, water-rats and rabbits, which it pursues with pertinacity and boldness, hence the name *stoat*, signifying bold, by which it is commonly known. It takes readily to water, and will even climb trees in pursuit of prey. It is particularly destructive to poultry and game, and has often been known to attack hares, fixing itself to the throat of its victim, and defying all the efforts of the latter to disengage it. The female brings forth five young ones about the beginning of summer. The winter coat of the ermine forms one of the most valuable of commercial furs, and is imported in enormous quantities from Norway, Sweden, Russia and Siberia. It is largely used for muffs and tippets, and as a trimming for state robes, the jet black points of the tails being inserted at regular intervals as an ornament. In the reign of Edward III. the wearing of ermine was restricted to members of the royal family; but it now enters into almost all state robes, the rank and position of the wearer being in many cases indicated by the presence or absence, and the disposition, of the black spots. (See also FUR.)



Ermine or Stoat (*Putorius ermineus*).

ERMINE STREET. Documents and writers of the 11th and succeeding centuries occasionally mention four "royal roads" in Britain—Icknield Street, Erning or Ermine Street, Watling Street and Foss Way—as standing apart from all other existing roads and enjoying the special protection of the king. Unfortunately these authorities are not at all agreed as to their precise course; the roads themselves do not occur as specially privileged in actual legal or other practice, and it is likely that the category of Four Roads is the invention of a lawyer or an antiquary. The names are, however, attested to some extent by early charters which name them among other roads, as boundaries. From these charters we know that Icknield Street ran along the Berkshire downs and the Chilterns, that Ermine Street ran more or less due north through Huntingdonshire, that Watling Street ran north-west across the midlands from London to Shrewsbury, and Foss diagonally to it from Lincoln or Leicester to Bath and mid-Somerset. This evidence only proves the existence of these roads in Saxon and Norman days. But they all seem to be much older. Icknield Street is probably a prehistoric ridgeway along the downs, utilized perhaps by the Romans near its eastern end, but in general not Roman. Ermine Street coincides with part of a line of Roman roads leading north from London through Huntingdon to Lincoln. This line is followed by the Old North Road through Cheshunt, Buntingford, Royston, and Huntingdon to Castor near Peterborough; and thence it can be traced through lanes and byways past Ancaster to Lincoln. Watling Street is the Roman highway from London by St Alban's (Verulamium) to Wroxeter near Shrewsbury (Viroconium). Foss is the Roman highway from Lincoln to Bath and Exeter. Hence it has been supposed, and is still frequently alleged, that the Four Roads were the principal highways of Roman Britain. This, however, is not the case. Icknield Street is not Roman and the three roads which follow Roman lines, Ermine Street, Watling Street, and Foss, held no peculiar position in the Romano-British road system (see BRITAIN: *Roman*). In later times, the names Ermine Street, Icknield Street and Watling Street have been applied to other roads of Roman or supposed Roman origin. This, however, is wholly the work of Elizabethan or subsequent antiquaries and deserves no credence.

The derivations of the four names are unknown. Icknield, Ermine and Watling may be from English personal names; Foss, originally Fos, seems to be the Lat. *fossa* in its occasional medieval sense of a bank of upcast earth or stones, such as the *agger* of a road. (F. J. H.)

ERMOLDUS NIGELLUS, or ERMOLD THE BLACK, was a monk of Aquitaine, who accompanied King Pippin, son of the emperor Louis I., on a campaign into Brittany in 824. Subsequently he was banished from Pippin's court on a charge of inciting the king against his father, and retired to Strassburg, where he sought to regain the emperor's favour by writing a poem on his life and deeds. About 830 he obtained his recall, and has been identified with Hermoldus, who appears as Pippin's chancellor in 838. Ermoldus was a cultured man with a knowledge of the Latin poets, and his poem, *In honorem Hludovici imperatoris*, has some historical value. It consists of four books and deals with the life and exploits of Louis from 781 to 826. He also wrote two poems in imitation of Ovid, which were addressed to Pippin.

His writings are published in the *Monumenta Germaniae historica. Scriptores*, Band 2 (Hanover, 1826 fol.); by J. P. Migne in the *Patrologia Latina*, tome 105 (Paris, 1844); and by E. Dümmler in the *Poëtae Latini aevi Carolini*, Band 2 (Berlin, 1881–1884). See W. O. Henkel, *Über den historischen Werth der Gedichte des Ermoldus Nigellus* (Eilenburg, 1876); W. Wattenbach, *Deutschlands Geschichtsquellen*, Band 1 (Berlin, 1904); and A. Potthast, *Bibliotheca historica*, pp. 430-431 (Berlin, 1896).

ERNE, the name of a river and two lakes in the north-west of Ireland. The river rises in Lough Gowna, county Longford, 214 ft. above sea-level, flows north through Lough Oughter with a serpentine course and a direction generally northward, and then broadens into the Upper Lough Erne, a shallow irregular sheet of water 13 m. long, so beset with islands as to present the appearance of a number of water-channels ramifying through the land. The river then winds past the town of Enniskillen on its island, and enters Lough Erne, a beautiful lake nearly 18 m. long and 5 m. in extreme width, containing many islands, but less closely covered with them than the upper lough. One of them, Devenish, is celebrated for its antiquarian remains (see ENNISKILLEN). The river then runs westward to Donegal Bay, forming a fine fall at Ballyshannon (*q.v.*). Lough Erne contains trout and pike. These waters admit of navigation by small steamers, but little trade is carried on. The area of the Erne basin, which includes a vast number of small loughs, is about 1600 sq. m., and it covers part of the counties Cavan, Longford, Leitrim, Fermanagh and Donegal. The length of the Erne valley is about 70 m. [illegible]

ERNEST I. [Ernst Anton Karl Ludwig], duke of Saxe-Coburg-Gotha (1784–1844), was the son of Francis, duke of Saxe-Coburg-Saalfeld, and was born on the 2nd of January 1784. At the time of his father's death (9th of December 1806) the duchy of Coburg was occupied by Napoleon as conquered territory, and Ernest did not come into his inheritance till after the peace of Tilsit (July 1807). Owing to the part he had played in assisting the Prussians at the battle of Auerstädt he continued out of favour with Napoleon, and he threw himself with vigour into the war of liberation against the French. After the battle of Leipzig he was given the command of the V. army corps and reduced Mainz by blockade; he also commanded the Saxon troops during the campaign of 1815. By the congress of Vienna he was rewarded with the principality of Lichtenberg on the left bank of the Rhine, which received a slight augmentation after the second peace of Paris. These territories he sold to Prussia in 1834. In 1826, in the division of the territories of the duchy of Saxe-Gotha which followed the death of its last duke (February 1825), he received the duchy of Gotha, ceding that of Saalfeld to the duke of Meiningen; and he now exchanged his style of Ernest III. of Saxe-Coburg-Saalfeld for that of Ernest I. of Saxe-Coburg-Gotha. In 1821 he had given a constitution to Coburg, but he did not interfere with the traditional system of estates at Gotha. He died on the 29th of January 1844.

Duke Ernest, who was not only a good soldier and keen sportsman, but an enlightened patron of the arts and sciences, did much for the economic, educational and constitutional development of his territories; and his advice always carried great weight in the councils of the other German sovereigns. It was, however, for the splendid international position attained by the house of Coburg under him that his reign is chiefly distinguished. His younger brother Leopold (*q.v.*) became king of the Belgians; his brother Ferdinand (b. 1785) married the wealthy princess Antoinette von Kohary (1816) and was the father of the duchess of Nemours and of the future King Ferdinand of Portugal. Of his sisters, Antoinette (1779–1824) married Duke Alexander of Württemberg; Juliane [Alexandra Feodorovna] (1781–1860) married the Russian cesarevich Constantine, from whom she was, however, divorced in 1820; and Victoria (1786–1861), wife of Edward Augustus, duke of Kent, became the mother of Queen Victoria. Duke Ernest was twice married: (1) in 1817 to Louise, daughter of Duke Augustus of Saxe-Gotha, whom he finally divorced in 1826; (2) in 1831 to Maria, daughter of Duke Alexander of Württemberg. Of his sons, by his first wife, Ernest succeeded him in the duchy, and Albert married Queen Victoria.

ERNEST II., duke of Saxe-Coburg-Gotha (1818–1893), was born at Coburg on the 21st of June 1818, being the eldest son of Duke Ernest I. He enjoyed a varied education; he studied at the university of Bonn with his brother Albert; his military training he received in the Saxon army. The widespread connexions of his family opened to him many courts of Europe, and after he became of age he travelled much. The position of his uncle Leopold, who was king of the Belgians, and especially the marriage of his brother Albert to the queen of England, his cousin, gave him peculiar opportunities for becoming acquainted with the political problems of Europe. In 1840–1841 he undertook a journey to Spain and Portugal; in the latter country another cousin, Ferdinand, was king-consort. In 1844 he succeeded his father. His own character and the influence of the king of the Belgians made him one of the most Liberal princes in Germany. He was able to bring to a satisfactory conclusion disputes with the Coburg estates. He passed through the ordeal of the revolution of 1848 with little trouble, for he anticipated the demands of the people of Gotha for a reform, and in 1852 introduced a new constitution by which the administration of his two duchies was assimilated in many points. The government of his small dominions did not afford sufficient scope for his restless and versatile ambition; his desire to play a great part in German affairs was probably increased by the feeling that, though he was the head of his house, he was to some extent overshadowed by the younger branches of the family which ruled in Belgium, England and Portugal. He was one of the foremost supporters of every attempt made to reform the German constitution and bring about the unity of Germany. He took a warm interest in the proceedings of the Frankfort parliament, and it was often said, probably without reason, that he hoped to be chosen emperor himself. However that may be, he strongly urged the king of Prussia to accept that position when it was offered him in 1849; he took a very prominent part in the complicated negotiations of the following year, and it was at his suggestion that a congress of princes met at Berlin in 1850. He highly valued the opportunities which this and similar meetings gave him for exercising political influence, and he would have felt most at home as a member of a permanent council of the German princes.

Ambitious also of military distinction, and sympathizing with the rising of the people of Schleswig-Holstein against the Danes in 1849, Ernest accepted a command in the federal army. In the engagement of Eckernförde in April 1849 the troops under his orders succeeded in capturing two Danish frigates, a remarkable feat of which he was justly proud. His greatest services to Germany were performed during the years of reaction which followed; almost alone among the German princes he remained faithful to the Liberal and National ideals, and he allowed his dominions to be used as an asylum by the writers and politicians who had to leave Prussia and Saxony. The reactionary parties looked on him with great suspicion, and it was at this time that he formed a friendship with Gustav Freytag, the celebrated novelist, whom he protected when the Prussian government demanded his arrest. His connexion with the English court gave him a position of much influence, but no one was more purely German in his feelings and opinions. The marriage of his niece Victoria with Frederick, the heir to the Prussian throne, strengthened his connexion with Prussia, but caused the Conservative party to look with increased suspicion on the Coburg influence. He was the first German prince to visit Napoleon III., and was present when Orsini made his celebrated attempt on the emperor's life. After 1860 he became the chief patron and protector of the *National Verein*; he encouraged the newly-formed rifle clubs, and notwithstanding the strong disapproval of his fellow-monarchs, allowed his court to become the centre of the rising national agitation. Still a warm adherent of Prussia, in 1862 he set an example to the other princes by voluntarily making an agreement by which his troops were placed in war under the command of the king of Prussia. Like all the other Nationalists, he was much embarrassed by the policy of Bismarck, and the democratic opinions of the Coburg court, which were shared by the crown prince Frederick, were a serious embarrassment to that minister. The opposition became more accentuated when the duke allowed his dominions to be used as the headquarters of the agitation in favour of Frederick, duke of Augustenburg, who claimed the duchies of Schleswig and Holstein, and it was at this time that Bismarck is reported to have said that if Frederick the Great had been alive the duke would have been in the fortress of Spandau. In 1863 he was present at the *Fürstentag* in Frankfort, and from this time was in more frequent communication with the Austrian court, where his cousin Alexander, Count Mensdorff, was minister. However, when war broke out in 1866, he at once placed his troops at the disposition of Prussia; Bismarck had in an important letter explained to him his policy and tactics. He was personally concerned in one of the most interesting events of the war; for the Hanoverian army, in its attempt to march south and join the Bavarians, had to pass through Thuringia, and the battle of Langensalza was fought in the immediate neighbourhood of Gotha. His troops took part in the battle, which ended in the rout of the Prussians, the duke, who was not present during the fight, in vain attempting to stop it. He bore an important share in the negotiations before and after the battle, and his action at this time has been the subject of much controversy, for it was suggested that while he offered to mediate he really acted as a partisan of Prussia. For his services to Prussia he received as a present the forest of Schmalkalden. He was with the Prussian headquarters in Bohemia during the latter part of the war.

With the year 1866 the political rôle which Ernest had played ended. The result was perhaps not quite equal to his expectations, but it must be remembered how difficult was the position of the minor German princes; and he quoted with great satisfaction the words used in 1871 by the emperor William at Versailles, that "to him in no small degree was due the establishment of the empire." He was a man of varied tastes, a good musician—he composed several operas and songs—and a keen sportsman, a quality in which he differed from his brother. Notwithstanding his Liberalism, he had a great regard for the dignity of his rank and family, and in his support of constitutional government would never have sacrificed the essential prerogatives of sovereignty. He died at Reinhardsbrunn on the 22nd of August 1893. In 1842 the duke married Alexandrine, daughter of the grandduke of Baden; there were no children by this marriage and the succession to Saxe-Coburg-Gotha passed therefore to the children of his younger brother Albert. By Albert's marriage contract the duchy could not be held together with the English crown; thus his eldest son, afterwards Edward VII., was passed over and it came to his second son, Alfred, duke of Edinburgh (1844–1900). When Alfred died without sons in July 1900 the succession to the duchy passed to a younger brother Arthur, duke of Connaught; but the duke and his son, Arthur, passed on their claim to Charles Edward, duke of Albany (b. 1884), who became duke of Saxe-Coburg-Gotha in succession to his uncle Alfred. In 1905 Charles Edward married Victoria Adelaide (b. 1885), princess of Schleswig-Holstein, by whom he has a son John Leopold (b. 1906).

Duke Ernest was something of a writer. He brought out an account of the travels in Egypt and Abyssinia which he undertook in 1862 as *Reise des Herzogs Ernst von Sachsen-Koburg-Gotha nach Ägypten* (Leipzig, 1864); and he published his memoirs, *Aus meinem Leben und aus meiner Zeit* (Berlin, 1887–1889). This work is in three volumes and contains much valuable information on a most critical period of German history; there is an English translation by P. Andreae (1888–1890).

See also Sir T. Martin, *Life of H.R.H. the Prince Consort* (1875–1880); Hon. C. Grey, *Early Years of the Prince Consort* (1867); A. Ohorn, *Herzog Ernst II., ein Lebensbild* (Leipzig, 1894); and E. Tempeltey, *Herzog Ernst von Koburg und das Jahr 1866* (Berlin, 1898). (J. W. He.)

ERNEST AUGUSTUS (1771–1851), king of Hanover and duke of Cumberland, fifth son of the English king George III., was born at Kew on the 5th of June 1771. Having studied at the university of Göttingen, he entered the Hanoverian army, serving as a leader of cavalry when war broke out between Great Britain and France in 1793, and winning a reputation for bravery. He lost the sight of one eye at the battle of Tournai in May 1794, and when Hanover withdrew from the war in 1795 he returned to England, being made lieutenant-general in the British army in 1799. In the same year he was created duke of Cumberland and Teviotdale and granted an allowance of £12,000 a year, after which he held several lucrative military positions in England, and began to attend the sittings of the House of Lords and to take part in political life. A stanch Tory, the duke objected to all proposals of reform, especially to the granting of any relief to the Roman Catholics, and had great influence with his brother the prince regent, afterwards King George IV., in addition to being often consulted by the Tory leaders. In 1810 he was severely injured by an assassin, probably his valet Sellis, who was found dead; and subsequently two men were imprisoned for asserting that the duke had murdered his valet. Recovering from his wounds, Cumberland again proceeded to the seat of war; and having been made a British field-marshal, was in command of the Hanoverian army during the campaigns of 1813 and 1814, being present, although not in action, at the battle of Leipzig. In May 1815 Ernest married his cousin, Frederica (1778–1841), daughter of Charles II. duke of Mecklenburg-Strelitz and widow of Frederick, prince of Solms-Braunfels, a union which was very repugnant to his mother Queen Charlotte, and was disliked in England, where the duke's strong Toryism had made him unpopular. Parliament refused to increase his allowance from £18,000, to which it had been raised in 1804, to £24,000 a year, and indignant at the treatment he received the duke spent some years in Berlin. Returning to England after the accession of George IV. in 1820, his political power was again considerable, while deaths in the royal family made it likely that he would succeed to the throne. Although his personal influence with the sovereign ceased upon the death of George IV. in 1830, the duke continued to oppose all measures for the extension of civil and religious liberty, including the Reform Bill of 1832; and his unpopularity was augmented by suspicions that he had favoured the formation of Orange lodges in the army. When William IV. died in June 1837, the crowns of Great Britain and Hanover were separated; and Ernest, as the nearest male heir of the late king, became king of Hanover. At once cancelling the constitution which William had given to his kingdom in 1833, he acted as an absolute monarch, and the constitution which he sanctioned in 1840 was permeated with his own illiberal ideas. In German politics he was vigilant and active, and mindful of the material interests of his country. His reign, however, was a stormy one, and serious trouble between king and people had arisen when he died at Herrenhausen on the 18th of November 1851 (see Hanover: *History*). In spite of his arbitrary rule and his reactionary ideas the king was popular among his subjects, and his statue in Hanover bears the words "*Dem Landes Vater sein treues Volk.*" Ernest, who is generally regarded as the ablest of the sons of George III., left an only child, George, who succeeded him as king of Hanover.

See C. A. Wilkinson, *Reminiscences of the Court and Times of King Ernest of Hanover* (London, 1886); von Malortie, *König Ernst August* (Hanover, 1861); and the various histories of Great Britain and Hanover for the period.

ERNESTI, JOHANN AUGUST (1707–1781), German theologian and philologist, was born on the 4th of August 1707, at Tennstädt in Thuringia, of which place his father was pastor, besides being superintendent of the electoral dioceses of Thuringia, Salz and Sangerhausen. At the age of sixteen he was sent to the celebrated Saxon cloister school of Pforta (Schulpforta). At twenty he entered the university of Wittenberg, and studied afterwards at the university of Leipzig. In 1730 he was made master in the faculty of philosophy. In the following year he accepted the office of conrector in the Thomas school of Leipzig, of which J. M. Gesner was then rector, an office to which Ernesti succeeded in 1734. He was, in 1742, named professor *extraordinarius* of ancient literature in the university of Leipzig, and in 1756 professor *ordinarius* of rhetoric. In the same year he received the degree of doctor of theology, and in 1759 was appointed professor *ordinarius* in the faculty of theology. Through his learning and his manner of discussion, he co-operated with S. J. Baumgarten of Halle (1706–1757) in disengaging the current dogmatic theology from its many scholastic and mystical excrescences, and thus paved a way for a revolution in theology. He died, after a short illness, in his seventy-sixth year, on the 11th of September 1781.

It is perhaps as much from the impulse which Ernesti gave to sacred and profane criticism in Germany, as from the intrinsic excellence of his own works in either department, that he must derive his reputation as a philologist or theologian. With J. S. Semler he co-operated in the revolution of Lutheran theology, and in conjunction with Gesner he instituted a new school in ancient literature. He detected grammatical niceties in Latin, in regard to the consecution of tenses which had escaped preceding critics. His canons are, however, not without exceptions. As an editor of the Greek classics, Ernesti hardly deserves to be named beside his Dutch contemporaries, Tiberius Hemsterhuis (1685–1766), L. C. Valckenaer (1715–1785), David Ruhnken (1723–1798), or his colleague J. J. Reiske (1716–1774). The higher criticism was not even attempted by Ernesti. But to him and to Gesner is due the credit of having formed, by discipline and by example, philologists greater than themselves, and of having kindled the national enthusiasm for ancient learning. It is chiefly in hermeneutics that Ernesti has any claim to eminence as a theologian. But here his merits are distinguished, and, at the period when his *Institutio Interpretis N. T.* was published (1761), almost peculiar to himself. In it we find the principles of a general interpretation, formed without the assistance of any particular philosophy, but consisting of observations and rules which, though already enunciated, and applied in the criticism of the profane writers, had never rigorously been employed in biblical exegesis. He was, in fact, the founder of the grammatico-historical school. He admits in the sacred writings as in the classics only one acceptation, and that the grammatical, convertible into and the same with the logical and historical. Consequently he censures the opinion of those who in the illustration of the Scriptures refer everything to the illumination of the Holy Spirit, as well as that of others who, disregarding all knowledge of the languages, would explain words by things. The "analogy of faith," as a rule of interpretation, he greatly limits, and teaches that it can never afford of itself the explanation of words, but only determine the choice among their possible meanings. At the same time he seems unconscious of any inconsistency between the doctrine of the inspiration of the Bible as usually received and his principles of hermeneutics.

Among his works the more important are:—I. In classical literature: *Initia doctrinae Solidioris* (1736), many subsequent editions; *Initia rhetorica* (1730); editions, mostly annotated, of Xenophon's *Memorabilia* (1737), Cicero (1737–1739), Suetonius (1748), Tacitus (1752), the *Clouds* of Aristophanes (1754), Homer (1759–1764), Callimachus (1761), Polybius (1764), as well as of the *Quaestura* of Corradus, the Greek lexicon of Hedericus, and the *Bibliotheca Latina* of Fabricius (unfinished); *Archaeologia litteraria* (1768), new and improved edition by Martini (1790); Horatius Tursellinus *De particulis* (1769). II. In sacred literature: *Antimuratorius sive confutatio disputationis Muratorianae de rebus liturgicis* (1755–1758); *Neue theologische Bibliothek*, vols. i. to x. (1760–1769); *Institutio interpretis Nov. Test.* (3rd ed., 1775); *Neueste theologische Bibliothek*, vols. i. to x. (1771–1775). Besides these, he published more than a hundred smaller works, many of which have been collected in the three following publications:—*Opuscula oratoria* (1762, 2nd ed., 1767); *Opuscula philologica et critica* (1764, 2nd ed., 1776); *Opuscula theologica* (1773). See Herzog-Hauck, *Realencyklopädie*; J. E. Sandys, *Hist. of Class. Schol.* iii. (1908).

ERNESTI, JOHANN CHRISTIAN GOTTLIEB (1756–1802), German classical scholar, was born at Arnstadt, Thuringia, and studied under his uncle, J. A. Ernesti, at the university of Leipzig. On the 5th of June, 1782, he was made supplementary professor of philosophy at his own university; and on the death of his cousin August Wilhelm in 1801 he was for five months professor of rhetoric. He died on the 5th of June of the following year.

His principal works are:—Editions of Aesop's *Fabulae* (1781); of the *Glossae sacrae of Hesychius* (1785) and *Suidas and Phavorinus* (1786); and of *Silius Italicus Punica* (1791–1792); *Lexicon Technologiae Graecorum rhetoricae* (1795); *Lexicon technologiae Latinorum rhetoricae* (1797), and *Cicero's Geist und Kunst* (1799–1802).

ERNST, HEINRICH WILHELM (1814–1865), German violinist and composer, was born at Brünn, in Moravia, in 1814. He was educated at the Conservatorium of Vienna, studying the violin under Joseph Böhm and Joseph Mayseder, and composition under Ignaz von Seyfried. At the age of sixteen he made a concert tour in south Germany, which established his reputation as a violinist of the highest promise. In 1832 he went to Paris, where he lived for several years. During this period he formed an intimacy with Stephen Heller, which resulted in their charming joint compositions—the *Pensées fugitives* for piano and violin. In 1843 he paid his first visit to London. The impression which he then made as a violinist was more than confirmed in the following year, when his rare powers were recognized by the musical public. Thenceforward he visited England nearly every year, until his health broke down owing to long-continued neuralgia of a most severe kind. The last seven years of his life were spent in retirement, chiefly at Nice, where he died on the 8th of October 1865. As a violinist Ernst was distinguished by his almost unrivalled executive power, loftiness of conception, and intensely passionate expression. As a composer he wrote chiefly for his own instrument, and his *Elegie* and *Otello Fantasia* rank among the most treasured works for the violin.

ERODE, a town of British India, in the Coimbatore district of Madras, situated on the right bank of the river Cauvery, which is here crossed by an iron railway girder bridge of 22 spans. Pop. (1901) 15,529. Here the South Indian railway joins the South-Western line of the Madras railway, 243 m. from Madras. There are exports of cotton and saltpetre; and the town has a steam cotton press.

EROS, a minor planet discovered by Witt at Berlin on the 14th of August 1898, and, so far as yet known, unique in that its perihelion lies far within the orbit of Mars.

EROS, in Greek mythology, the god of love. He is not mentioned in Homer; in Hesiod (*Theog.* 120) he is one of the oldest and the most beautiful of the gods, whose power neither gods nor men can resist. He also evolves order and harmony out of Chaos by uniting the separated elements. This cosmic Eros, who in Orphic cosmogony sprang from the world-egg which Chronos, or Time, laid in the bosom of Chaos, and which is the origin of all created beings, degenerated in later mythology into the capricious god of sexual passion, the son of Aphrodite and Zeus, Ares or Hermes. He is commonly represented as a mischievous boy, the tormentor of gods and men, even his own mother not being proof against his attacks. His brother is Anteros, the god of mutual love, who punishes those who do not return the love of others, without which Eros could not thrive; he is sometimes described as the opponent of Eros. The chief associates of Eros are Pothos and Himeros (Longing and Desire), Peitho (Persuasion), the Muses and the Graces; he himself is in constant attendance on Aphrodite. Later writers (Euripides being the first) assumed the existence of a number of Erotes (like the Roman Amores and Cupidines) with similar attributes. According to the philosophers, Eros was not only the god of sexual love, but also of the loyal and devoted friendship of men; hence the Theban "Sacred Band" was devoted to him, and the Cretans and Spartans offered sacrifice to him before going into battle (Athenaeus xiii. p. 561). In Alexandrian poetry Eros is at one time the powerful god who conquers all, at another the elfish god of love. For the Roman adaptation of Eros see Cupid, and for the later legend of Cupid and Psyche see Psyche.

In art Eros is represented as a beautiful youth or a winged child. His attributes are the bow and arrows and a burning torch. The rose, the hare, the cock and the goat are frequently associated with him. The most celebrated statue of him was at Thespiae, the work of Praxiteles. Other famous representations are the Vatican torso and Eros trying his bow (in the Capitoline museum).

See J. E. Harrison, *Prolegomena to the Study of Greek Religion* (1903); G. F. Schömann, *De Cupidine Cosmogonico* (1852); E. Gerhard, *Über den Gott Eros* (1850); articles in Roscher's *Lexikon der Mythologie*, Daremberg and Saglio's *Dictionnaire des antiquités*, and Pauly-Wissowa's *Realencyclopädie*.

ERPENIUS (original name van Erpe), **THOMAS** (1584–1624), Dutch Orientalist, was born at Gorcum, in Holland, on the 11th of September 1584. After completing his early education at Leiden, he entered the university of that city, and in 1608 took the degree of master of arts. By the advice of Scaliger he studied Oriental languages whilst taking his course of theology. He afterwards travelled in England, France, Italy and Germany, forming connexions with learned men, and availing himself of the information which they communicated. During his stay at Paris he contracted a friendship with Casaubon, which lasted during his life, and also took lessons in Arabic from an Egyptian, Joseph Barbatus, otherwise called Abu-dakni. At Venice he perfected himself in the Turkish, Persic and Ethiopic languages. After a long absence, Erpenius returned to his own country in 1612, and on the 10th of February 1613 he was appointed professor of Arabic and other Oriental languages, Hebrew excepted, in the university of Leiden. Soon after his settlement at Leiden, animated by the example of Savary de Brèves, who had established an Arabic press at Paris at his own charge, he caused new Arabic characters to be cut at a great expense, and erected a press in his own house. In 1619 the curators of the university of Leiden instituted a second chair of Hebrew in his favour. In 1620 he was sent by the States of Holland to induce Pierre Dumoulin or André Rivet to settle in that country; and after a second journey he was successful in inducing Rivet to comply with their request. Some time after the return of Erpenius, the states appointed him their interpreter; and in this capacity he had the duty imposed upon him of translating and replying to the different letters of the Moslem princes of Asia and Africa. His reputation had now spread throughout all Europe, and several princes, the kings of England and Spain, and the archbishop of Seville made him the most flattering offers; but he constantly refused to leave his native country. He was preparing an edition of the Koran with a Latin translation and notes, and was projecting an Oriental library, when he died prematurely on the 13th of November 1624.

Among his works may be mentioned his *Grammatica Arabica*, published originally in 1613 and often reprinted; *Rudimenta linguae Arabicae* (1620); *Grammatica Ebraea generalis* (1621); *Grammatica Chaldaica et Syria* (1628); and an edition of Elmacin's *History of the Saracens*.

ERROLL (or Errol), **FRANCIS HAY**, 9th Earl of (d. 1631), Scottish nobleman, was the son of Andrew, 8th earl, and of Lady Jean Hay, daughter of William, 6th earl. The date of his birth is unrecorded, but he succeeded to the earldom (cr. 1453) in 1585, was early converted to Roman Catholicism, and as the associate of Huntly joined in the Spanish conspiracies against the throne of Elizabeth. A letter written by him, declaring his allegiance to the king of Spain, having been intercepted and sent by Elizabeth to James in February 1589, he was declared a rebel by the council. He engaged with Huntly and Crawford in a rebellion in the north of Scotland, but their forces surrendered at Aberdeen on the arrival of the king in April; and in July Erroll gave himself up to James, who leniently refrained from exacting any penalty. In September of the same year he entered into a personal bond with Huntly for mutual assistance; and in 1590 displeased the king by marrying, in spite of his prohibition, Lady Elizabeth Douglas, daughter of the earl of Morton. He was imprisoned on suspicion of complicity in the attempt made by Gray and Bothwell to surprise the king at Falkland in June 1592; and though he obtained his release, he was again proclaimed a rebel on account of the discovery of his signature to two of the "Spanish Blanks," unwritten sheets subscribed with the names of the chief conspirators in a plot for a Spanish invasion of Scotland, to be filled up later with the terms of the projected treaty. After a failure to apprehend him in March 1593, Erroll and his companions were sentenced to abjure Romanism or leave the kingdom; and on their non-compliance were in 1594 declared traitors. On the 3rd of October they defeated at Glenlivet a force sent against them under Argyll; though Erroll himself was severely wounded, and Slains Castle, his seat, razed to the ground. The rebel lords left Scotland in 1595, and Erroll, on report of his further conspiracies abroad, was arrested by the states of Zealand, but was afterwards allowed to escape. He returned to Scotland secretly in 1596, and on the 20th of June 1597 abjured Romanism and made his peace with the Kirk. He enjoyed the favour of the king, and in 1602 was appointed a commissioner to negotiate the union with England. His relations with the Kirk, however, were not so amicable. The reality of his conversion was disputed, and on the 21st of May 1608 he was confined to the city of Perth "for the better resolution of his doubts," being subsequently declared an obstinate "papist," excommunicated, deprived of his estate, and imprisoned at Dumbarton; and after some further vacillation was finally released in May 1611. Lord Erroll died on the 16th of July 1631, and was buried in the church of Slains. He married (1) Anne, daughter of John, 4th earl of Atholl; (2) Margaret, daughter of the regent Murray; and (3) Elizabeth, daughter of William, 6th earl of Morton. By his third wife he had several children, of whom his eldest son, William, succeeded him. The dispute which began in his lifetime concerning the hereditary office of lord high constable between the families of Erroll and of the Earl Marischal was settled finally in favour of the former; thus establishing the precedence enjoyed by the earls of Erroll next after the royal family over all other subjects in Scotland.

See *The Erroll Papers* (Spalding Club Miscellany, vol. ii. 211); Andrew Lang, *Hist. of Scotland*, vol. ii.; *Hist. MSS. Comm. MSS. of Earl of Mar and Kellie*; D. Calderwood's *Hist. of the Church of Scotland*; John Spalding's *Memorials* (Spalding Club, 1850); *Collected Essays* of T. G. Law, ed. by P. H. Brown (1904); *Treason and Plot*, by M. A. S. Hume (1901).

ERROR (Lat. *error*, from *errare*, to wander, to err), a mistake, a departure or deviation from what is true, exact or right. For the legal process by which a judgment could be reversed on the ground of error, known as a "writ of error," see Writ and Appeal. The words "error excepted" or "errors and omissions excepted" (contracted to "E.E." "E. & O.E."), are frequently placed at the end of a statement of account or an invoice, so that the accounting party may reserve the right to correct any errors or omissions which may be subsequently discovered, or make further claims in respect of them. In mathematics, "error" is the deviation of an observed or calculated quantity from its true value. The calculus of errors leads to the formulation of the "law of error," which is an analytical expression of the most probably true value of a series of discordant values (see Probability).

ERSCH, JOHANN SAMUEL (1766–1828), the founder of German bibliography, was born at Grossglogau, in Silesia, on the 23rd of June 1766. In 1785 he entered the university of Halle with the view of studying theology; but soon his whole attention became engrossed by history, bibliography and geography. At Halle he made the acquaintance of J. E. Fabri, professor of geography; and when the latter was made professor of history and statistics at Jena, Ersch accompanied him thither, and aided him in the preparation of several works. In 1788 he published the *Verzeichnis aller anonymischen Schriften*, as a supplement to the 4th edition of Meusel's *Gelehrtes Deutschland*. The researches required for this work suggested to him the preparation of a *Repertorium über die allgemeinen deutschen Journale und andere periodische Sammlungen für Erdbeschreibung, Geschichte, und die damit verwandten Wissenschaften* (Lemgo, 1790–1792). The fame which this publication acquired him led to his being engaged by Schütz and Hufeland to prepare an *Allgemeines Repertorium der Literatur*, published in 8 vols. (Jena and Weimar, 1793–1809), which condensed the literary productions of 15 years (1785–1800), and included an account not merely of the books published during that period, but also of articles in periodicals and magazines, and even of the criticisms to which each book had been subjected. While engaged in this great work he also projected *La France littéraire*, which was published at Hamburg in 5 vols., from 1797 to 1806. In 1795 he went to Hamburg to edit the *Neue Hamburger Zeitung*, founded by Victor Klopstock, brother of the poet, but returned in 1800 to Jena to take active part in the *Allgemeine Literaturzeitung*. He also obtained in the same year the office of librarian in the university, and in 1802 was made professor of philosophy. In 1803 he accepted the chair of geography and statistics at Halle, and in 1808 was made principal librarian. He here projected a *Handbuch der deutschen Literatur seit der Mitte des 18. Jahrh. bis auf die neueste Zeit* (Leipzig, 1812–1814) and, along with Johann Gottfried Gruber (*q.v.*), the *Allgemeine Encyklopädie der Wissenschaften und Künste* (Leipzig, 1818 ffg.) which he continued as far as the 21st volume. The accuracy and thoroughness of this monumental encyclopaedia make it still an indispensable book of reference. Ersch died at Halle on the 16th of January 1828.

ERSKINE, EBENEZER (1680–1754), Scottish divine, the chief founder of the Secession Church (formed of dissenters from the Church of Scotland), was born on the 22nd of June 1680, most probably at Dryburgh, Berwickshire. His father, Henry Erskine, who was at one time minister at Cornhill, Durham, was ejected in 1662 by the Act of Uniformity, and, after suffering some years' imprisonment, was after the Revolution appointed to the parish of Chirnside, Berwickshire. After studying at the university of Edinburgh, Ebenezer became minister of Portmoak, Kinross-shire. There he remained for twenty-eight years, after which, in the autumn of 1731, he was translated to the West Church, Stirling. Some time before this, he, along with some other ministers, was "rebuked and admonished," by the general assembly, for defending the doctrines contained in the *Marrow of Modern Divinity* (see BOSTON, THOMAS). A sermon which he preached on lay patronage before the synod of Perth in 1733 furnished new grounds of accusation, and he was compelled to shield himself from rebuke by appealing to the general assembly. Here, however, the sentence of the synod was confirmed, and after many fruitless attempts to obtain a hearing, he, along with William Wilson of Perth, Alexander Moncrieff of Abernethy and James Fisher of Kinclaven, was suspended from the ministry by the commission in November of that year. Against this sentence they protested, and constituted themselves into a separate church court, under the name of the associate presbytery. In 1739 they were again summoned before the assembly, and in their corporate capacity declined to acknowledge the authority of the church, and were deposed in the following year. They received numerous accessions to their communion, and remained in harmony with each other till 1747, when a division took place in regard to the nature of the oath administered to burgesses. Erskine joined with the "burgher" section, and became their professor of theology. He continued also to preach to a numerous congregation in Stirling till his death, which took place on the 2nd of June 1754. Erskine was a very popular preacher, and a man of considerable force of character; he acted throughout on principle with honesty and courage. The burgher and anti-burgher sections of the Secession Church were reunited in 1820, and in 1847 they united with the relief synod in forming the United Presbyterian Church.

Erskine's published works consist chiefly of sermons. His *Life and Diary*, edited by the Rev. Donald Fraser, was published in 1840. His *Works* were published in 1785.

ERSKINE, HENRY (1746–1817), lord advocate of Scotland, the second son of Henry David, 10th earl of Buchan and brother of the lord chancellor Erskine, was born in Edinburgh on the 1st of November 1746. He was educated at the universities of St Andrews, Glasgow and Edinburgh, and was admitted a member of the faculty of advocates in 1768. His reputation as a clever and fluent speaker was first made in the debates of the general assembly, of which he had been early elected an elder. In 1783 he was appointed to the office of lord advocate, which he held during the brief coalition ministry of Fox and North. In 1785 he was elected dean of the faculty of advocates, and was re-elected annually till 1796, when his conduct in moving a series of resolutions at a public meeting, condemning the government's sedition and treason bills, brought on him the opposition of the ministerial party, and he was deposed in favour of Robert Dundas. On the formation of the Grenville ministry in 1806 he again became lord advocate and was returned to parliament for the Haddington burghs, which he exchanged at the general election of the same year for the Dumfries burghs. His tenure of the lord advocateship ended in March 1807 on the downfall of the ministry. In 1811 he gave up his practice at the bar and retired to his country residence of Almondel, in Linlithgowshire, where he died on the 8th of October 1817.

His eldest son, Henry David (1783–1857), succeeded as 12th earl of Buchan on his uncle's death in 1829.

Erskine's reputation will survive as the finest and most eloquent orator of his day at the Scottish bar; added to a charming forensic style was a most captivating wit, which, as Lord Jeffrey said, was "all argument, and each of his delightful illustrations a material step in his reasoning." Erskine was also the author of some poems, of which the best known is "The Emigrant" (1783).

See Lieut.-Col. A. Fergusson's *Henry Erskine* (1882).

ERSKINE, JOHN (1721–1803), Scottish divine, son of John Erskine of Carnock, was born on the 2nd of June 1721. He studied law for a time after completing his course in arts at the university of Edinburgh, but was eventually licensed to preach in 1743; and was successively parish minister of Kirkintilloch, near Glasgow, Culross, in Fifeshire (1753), New Greyfriars church in Edinburgh (1758), and Old Greyfriars church in 1768, where he became the colleague of Principal Robertson, the historian. Here he remained until his death, which took place on the 19th of January 1803. Dr Erskine's writings consist chiefly of controversial pamphlets on theological subjects. His sermons are clear, vigorous expositions of a moderate Calvinism, in which metaphysical argument and practical morality are happily blended. In church politics he was the leader of the evangelical party; and was much beloved for his high character and amiability.

For his life and works see Sir H. Moncreiff Wellwood, *Life and Writings of J. Erskine, D.D.* (Edinburgh, 1818).

ERSKINE, JOHN, of Carnock (1695–1768), Scottish jurist, son of Lieut.-Colonel John Erskine, was born in 1695. He was admitted a member of the faculty of advocates in 1719. Although he never enjoyed much practice at the bar, he acquired a high reputation as a sound and learned lawyer, and in 1737 was appointed professor of Scots law in the university of Edinburgh. In 1754 he published his *Principles of the Law of Scotland*. He retired from his chair in 1765; and during the remainder of his uneventful life he occupied himself with the preparation of his great work, the *Institutes of the Law of Scotland*, which he did not live to publish. He died at Cardross, Perthshire, on the 1st of March 1768.

Erskine's *Institutes*, although not exhibiting the grasp of principle which distinguished his great predecessor Lord Stair, is so conspicuous for learning, accuracy and sound good sense, that it has always been esteemed of the highest authority on the law of Scotland. The first edition appeared in 1773 and it has been many times reprinted. The *Principles*, although published first, is substantially an abridgment of the larger work, and is in some respects superior to it, being more concise and direct. It retains its place as the text-book on Scots law, and is frequently being re-edited.

ERSKINE, JOHN, of Dun (1509–1591), Scottish reformer, the son of Sir John Erskine, laird of Dun, was born in 1509, and was educated at King's College, Aberdeen. At the age of twenty-one Erskine was the cause—probably by accident—of a priest's death, and was forced to go abroad, where he came under the influence of the new learning. It was through his agency that Greek was first taught in Scotland by Petrus de Marsiliers at Montrose. This fact counted for much in the progress of the Reformation. Erskine was also drawn towards the new faith, being a close friend of George Wishart, the reformer, from whose fate he was saved by his wealth and influence, and of John Knox, whose advice openly to discountenance the mass was given in the lodgings of the laird of Dun. In the stormy controversies of the time of Mary Stuart and James VI. Erskine was a conspicuous figure and a moderating influence. He was able to soothe the queen when her feelings had been outraged by Knox's denunciations—being a man "most gentill of nature"—and frequently acted as mediator both between the catholic and reforming parties, and among the reformers themselves. In 1560 he was appointed—though a layman—superintendent of the reformed church of Scotland for Angus and Mearns, and in 1572 he gave his assent to the modified episcopacy proposed by Morton at the Leith convention. Though never himself ordained, he was held in such high esteem by the leaders of the church as to be more than once elected moderator of the general assembly (first in 1564), and he was amongst those who in 1578 drew up the *Second Book of Discipline*. From 1579 he was a member of the king's council. He died in 1591. Erskine owed his peculiar influence among the Scottish reformers to the union—rare in those days—of steadfast convictions with a conciliatory manner; Queen Mary described him as "a mild and sweet-natured man, with true honesty and uprightness."

See the "Dun Papers" in the *Spalding Club Miscellany*, vol. iv. (1849), and the article by T. F. Henderson in the *Dict. Nat. Biog.*

ERSKINE, RALPH (1685–1752), Scottish divine, brother of Ebenezer Erskine (*q.v.*), was born on the 18th of March 1685. After studying at the university of Edinburgh, he was in 1711 ordained assistant minister at Dunfermline. He homologated the protests which his brother laid on the table of the assembly after being rebuked for his synod sermon, but he did not formally withdraw from the establishment till 1737. He was also present, though not as a member, at the first meeting of the associate presbytery. When the severance took place on account of the oath administered to burgesses, he adhered, along with his brother, to the burgher section. He died after a short illness on the 6th of November 1752.

His works consist of sermons, poetical paraphrases and gospel sonnets. The *Gospel Sonnets* have frequently appeared separately. His *Life and Diary*, edited by the Rev. D. Fraser, was published in 1842.

ERSKINE, THOMAS, of Linlathen (1788–1870), Scottish theologian, youngest son of David Erskine, writer to the signet in Edinburgh, and of Anne Graham, of the Grahams of Airth, was born on the 13th of October 1788. He was a descendant of John, 1st or 6th earl of Mar, regent of Scotland in the reign of James VI., a grandson of Colonel John Erskine of Carnock. After being educated at the high school of Edinburgh and at Durham, he attended the literary and law classes at the university of Edinburgh, and becoming in 1810 a member of the Edinburgh faculty of advocates, he for some time enjoyed the intimate acquaintance of Cockburn, Jeffrey, Scott and other distinguished men whose talent then lent lustre to the Scottish bar. In 1816 he succeeded to the family estate of Linlathen, near Dundee, and devoted himself to theology. The writings of Erskine, especially his published letters, are distinguished by a graceful style, and possess originality and interest. His theological views have a considerable similarity to those of Frederick Denison Maurice, who acknowledges having been indebted to him for his first true conception of the meaning of Christ's sacrifice. Erskine had little interest in the "historical criticism" of Christianity, and regarded as the only proper criterion of its truth its conformity or nonconformity with man's spiritual nature, and its adaptability or non-adaptability to man's spiritual needs. He considered the incarnation of Christ as the necessary manifestation to man of an eternal sonship in the divine nature, apart from which those filial qualities which God demands from man could have no sanction; by *faith* as used in Scripture he understood to be meant a certain moral or spiritual activity or energy which virtually implied salvation, because it implied the existence of a principle of spiritual life possessed of an immortal power. This faith, he believed, could be properly awakened only by the manifestation, through Christ, of love as the law of life, and as identical with an eternal righteousness which it was God's purpose to bestow on every individual soul. As an interpreter of the mystical side of Calvinism and of the psychological conditions which correspond with the doctrines of grace Erskine is unrivalled. During the last thirty-three years of his life Erskine ceased from literary work. Among his friends were Madame Vernet, the duchess de Broglie, the younger Mdme de Stael, M. Vinet of Lausanne, Edward Irving, Frederick D. Maurice, Dean Stanley, Bishop Ewing, Dr John Brown and Thomas Carlyle. His wide influence was due to his high character and unassuming earnestness. He died at Edinburgh on the 20th of March 1870.

His principal works are *Remarks on the Internal Evidence for the Truth of Revealed Religion* (1820), an *Essay on Faith* (1822), and the *Unconditional Freeness of the Gospel* (1828). These have all passed through several editions, and have also been translated into French. He is also the author of the *Brazen Serpent* (1831), the *Doctrine of Election* (1839), several "Introductory Essays" to editions of *Christian Authors*, and a posthumous work entitled *Spiritual Order and Other Papers* (1871). Two vols. of his letters, edited by William Hanna, D.D., with reminiscences by Dean Stanley and Principal Shairp, appeared in 1877.

ERSKINE, THOMAS ERSKINE, 1st Baron (1750–1823), lord chancellor of England, was the third and youngest son of Henry David, 10th earl of Buchan, and was born in Edinburgh on the 10th of January 1750. From an early age he showed a strong desire to enter one of the learned professions; but his father, owing to his straitened circumstances, was unable to do more than give him a good school education at the high school of Edinburgh and the grammar school of St Andrews. In 1764 he was sent as a midshipman on board the "Tartar," but on finding, when he returned to this country after four years' absence in North America and the West Indies, that there was little immediate chance of his rank of acting lieutenant being confirmed, he quitted the service and entered the army, purchasing a commission in the 1st Royals with the meagre patrimony which had been left to him. But promotion here was as slow as in the navy; while in 1770 he had added greatly to his difficulties by marrying the daughter of Daniel Moore, M.P. for Marlow, an excellent wife, but as poor as himself. However, an accidental visit to an assize court in the town in which he was quartered, and an interview with Lord Mansfield, the presiding judge, confirmed his resolve to quit the army for the law. Accordingly on the 26th of April 1775 he was admitted a student of Lincoln's Inn. He also on the 13th of January following entered himself as a gentleman commoner on the books of Trinity College, Cambridge, but merely that by graduating he might be called two years earlier.

He read in the chambers of Francis Buller (afterwards Mr Justice Buller) and George (afterwards Baron) Wood, and was called to the bar on the 3rd of July 1778. His success was immediate and brilliant. An accident was the means of giving him his first case, *Rex* v. *Baillie*, in which he appeared for Captain Thomas Baillie, the lieutenant-governor of Greenwich hospital, who had published a pamphlet animadverting in severe terms upon the abuses which Lord Sandwich, the first lord of the admiralty, had introduced into the management of the hospital, and against whom a rule had been obtained from the court of king's bench to show cause why a criminal information for libel should not be filed. Erskine was the junior of five counsel; and it was his good fortune that the prolixity of his leaders consumed the whole of the first day, thereby giving the advantage of starting afresh next morning. He made use of this opportunity to deliver a speech of wonderful eloquence, skill and courage, which captivated both the audience and the court. The rule was discharged, and Erskine's fortune was made. He received, it is said, thirty retainers before he left the court. In 1781 he delivered another remarkable speech, in defence of Lord George Gordon—a speech which gave the death-blow to the doctrine of constructive treason. In 1783, when the Coalition ministry came into power, he was returned to parliament as member for Portsmouth. His first speech in the House of Commons was a failure; and he never in parliamentary debate possessed anything like the influence he had at the bar. He lost his seat at the dissolution in the following year, and remained out of parliament until 1790, when he was again returned for Portsmouth. But his success at the bar continued unimpaired. In 1783 he received a patent of precedence. His first special retainer was in defence of Dr W. D. Shipley, dean of St Asaph, who was tried in 1784 at Shrewsbury for seditious libel—a defence to which was due the passing of the Libel Act 1792, laying down the principle that it is for the jury, and not for the judge to decide the question whether or no a publication is a libel. In 1789 he was counsel for John Stockdale, a bookseller, who was charged with seditious libel in publishing a pamphlet in favour of Warren Hastings, whose trial was then proceeding; and his speech on this occasion, probably his greatest effort, is a consummate specimen of the art of addressing a jury. Three years afterwards he brought down the opposition alike of friends and foes by defending Thomas Paine, author of *The Rights of Man*—holding that an advocate has no right, by refusing a brief, to convert himself into a judge. As a consequence he lost the office of attorney-general to the prince of Wales, to which he had been appointed in 1786; the prince, however, subsequently made amends by making him his chancellor. Among Erskine's later speeches may be mentioned those for Horne Tooke and the other advocates of parliamentary reform, and that for James Hadfield, who was accused of shooting at the king. On the accession of the Grenville ministry in 1806 he was made lord chancellor, an office for which his training had in no way prepared him, but which he fortunately held only during the short period his party was in power. Of the remainder of his life it would be well if nothing could be said. Occasionally speaking in parliament, and hoping that he might return to office should the prince become regent, he gradually degenerated into a state of useless idleness. Never conspicuous for prudence, he aggravated his increasing poverty by an unfortunate second marriage.

His first wife had died in 1805, and he married at Gretna Green a Miss Mary Buck. The date of this marriage is not definitely known. Once only—in his conduct in the case of Queen Caroline—does he recall his former self. He died at Almondell, Linlithgowshire, on the 17th of November 1823, of pneumonia, caught on the voyage to Scotland.

Erskine's great forensic reputation was, to a certain extent, a concomitant of the numerous political trials of the day, but it was also due to his impassioned eloquence and undaunted courage, which so often carried audience and jury and even the court along with him. As a judge he did not succeed; and it has been questioned whether under any circumstances he could have succeeded. For the office of chancellor he was plainly unfit. As a lawyer he was well read, but by no means profound. His strength lay in the keenness of his reasoning faculty, in his dexterity and the ability with which he disentangled complicated masses of evidence, and above all in his unrivalled power of fixing and commanding the attention of juries. To no department of knowledge but law had he applied himself systematically, with the single exception of English literature, of which he acquired a thorough mastery in early life, at intervals of leisure in college, on board ship, or in the army. Vanity is said to have been his ruling personal characteristic; but those who knew him, while they admit the fault, say that in him it never took an offensive form, even in old age, while the singular grace and attractiveness of his manner endeared him to all with whom he came in contact.

By his first wife he had four sons and four daughters. His eldest son, David Montagu (1776–1855), was a well-known diplomatist; his second son, Henry David (1786–1859), was dean of Ripon; and his third son, Thomas (1788–1864), became a judge of the court of common pleas. By his second wife he had one son, born in 1821.

In 1772 Erskine published *Observations on the Prevailing Abuses in the British Army*, a pamphlet which had a large circulation, and in later life, *Armata*, an imitation of *Gulliver's Travels*. His most noted speeches have repeatedly appeared in a collected form. See Campbell's *Lives of the Chancellors*; Moore's *Diaries*; Fergusson's *Henry Erskine* (1882); Dumerit's *Henry Erskine, a Study* (Paris, 1883); Lord Brougham's *Memoir*, prefixed to Erskine's *Speeches* (1847); Romilly's *Memoirs*; the *Croker Papers*; Lord Holland's *Memoirs*.

ERUBESCITE, a native copper-iron sulphide, Cu_5FeS_4, of importance as an ore of copper. It crystallizes in the cubic system, the usual form being that of interpenetrating cubes twinned on an octahedral plane. The faces are usually curved and rough, and the crystals confusedly aggregated together. Compact and granular masses are of more frequent occurrence. The colour on a freshly fractured surface is bronzy or coppery, but in moist air this rapidly tarnishes with iridescent blue and red colours; hence the names purple copper ore, variegated copper ore (Ger. *Buntkupfererz*), horse-flesh ore, and erubescite (from the Lat. *erubescere*, "to grow red"). The lustre is metallic, and the streak greyish-black; hardness 3; sp. gr. 5·0. Bornite (after Baron Ignaz von Born, b. 1742, d. 1791) is a name in common use for this mineral, and it predates erubescite, the name given by J. D. Dana in 1850, but afterwards rejected by him; French authors use the name phillipsite, after the English mineralogist, R. Phillips, who analysed the mineral; both these earlier names had, however, been previously used for other minerals.

Owing to the frequent presence of mechanically admixed chalcopyrite and chalcocite, the published analyses of erubescite show wide variations, the copper, for example, varying from 50 to 70%. Even the best Cornish crystals enclose a nucleus of chalcopyrite ($CuFeS_2$), and an analysis of these made in 1839 led to the long-accepted formula Cu_3FeS_3. Recently, B. J. Harrington has analysed carefully selected material and obtained the formula Cu_5FeS_4.

Erubescite occurs in copper-bearing veins, and has been mined as an ore of copper at Redruth in Cornwall, Montecatini in the province of Pisa, Tuscany, Bristol in Connecticut, Acton in Canada, and other localities in North America. The best crystallized specimens are from the Carn Brea mine and other copper mines in the neighbourhood of Redruth, and from Bristol in Connecticut. Recently a few large isolated crystals with the form of icositetrahedra have been found with calcite and albite in a gold-vein on Frossnitz-Alpe in the Gross-Venediger, Tirol. (L. J. S.)

ERYSIPELAS (a Greek word, probably derived from ἐρυθρός, red, and πέλλα, skin)—synonyms, *the Rose, St Anthony's Fire*—an acute contagious disease, characterized by a special inflammation of the skin, caused by a streptococcus. Erysipelas is endemic in most countries, and epidemic at certain seasons, particularly the spring of the year. The poison is not very virulent, but it certainly can be conveyed by bedding and the clothes of a third person. Two varieties are occasionally described, a traumatic and an idiopathic, but the disease seems to depend in all cases upon the existence of a wound or abrasion. In the so-called idiopathic variety, of which *facial erysipelas* is the best known, the point of entry is probably an abrasion by the lachrymal duct.

When the erysipelas is of moderate character there is simply a redness of the integument, which feels somewhat hard and thickened, and upon which there often appear small vesications. This redness, though at first circumscribed, tends to spread and affect the neighbouring sound skin, until an entire limb or a large area of the body may become involved in the inflammatory process. There is usually considerable pain, with heat and tingling in the affected part. As the disease advances the portions of skin first attacked become less inflamed, and exhibit a yellowish appearance, which is followed by slight desquamation of the cuticle. The inflammation in general gradually disappears. Sometimes, however, it breaks out again, and passes over the area originally affected the second time. But besides the skin, the subjacent tissues may become involved in the inflammation, and give rise to the formation of pus. This is termed *phlegmonous erysipelas*, and is much more apt to occur in connexion with the traumatic variety of the disease. Occasionally the affected parts become gangrenous. Certain complications are apt to arise in erysipelas affecting the surface of the body, particularly inflammation of serous membranes, such as the pericardium or pleura.

Erysipelas of the face usually begins with symptoms of general illness, the patient feeling languid, drowsy and sick, while frequently there is a distinct rigor followed with fever. Sore throat is sometimes felt, but in general the first indication of the local affection is a red and painful spot at the side of the nose or on one of the cheeks or ears. Occasionally it would appear that the inflammation begins in the throat, and reaches the face through the nasal fossae. The redness gradually spreads over the whole surface of the face, and is accompanied with swelling, which in the lax tissues of the cheeks and eyelids is so great that the features soon become obliterated and the countenance wears a hideous expression. Advancing over the scalp, the disease may invade the neck and pass on to the trunk, but in general the inflammation remains confined to the face and head. While the disease progresses, besides the pain, tenderness and heat of the affected parts, the constitutional symptoms are very severe. The temperature rises often to 105° or higher, remains high for four or five days, and then falls by crisis. Delirium is a frequent accompaniment. The attack in general lasts for a week or ten days, during which the inflammation subsides in the parts of the skin first attacked, while it spreads onwards in other directions, and after it has passed away there is, as already observed, some slight desquamation of the cuticle.

Although in general the termination is favourable, serious and occasionally fatal results follow from inflammation of the membranes of the brain, and in some rare instances sudden death has occurred from suffocation arising from oedema glottidis, the inflammatory action having spread into and extensively involved the throat. One attack of this disease, so far from protecting from, appears rather to predispose to others. It is sometimes a complication in certain forms of exhausting disease, such as phthisis or typhoid fever, and is then to be regarded as of serious import. A very fatal form occasionally attacks new-born infants, particularly in the first four weeks of their lives. In epidemics of puerperal fever this form of erysipelas has been specially found to prevail.

The treatment of erysipelas is best conducted on the expectant system. The disease in most instances tends to a favourable termination; and beyond attention to the condition of the stomach and bowels, which may require the use of some gentle laxative, little is necessary in the way of medicine. The employment of preparations of iron in large doses is strongly recommended by many physicians. But the chief point is the administration of abundant nourishment in a light and digestible form. Of the many local applications which may be employed, hot fomentations will be found among the most soothing. Dusting the affected part with powdered starch, and wrapping it in cotton wadding, is also of use.

In the case of phlegmonous erysipelas complicating wounds, free incisions into the part are necessary.

ERYTHRAE [mod. *Litri*], one of the Ionian cities of Asia Minor, situated on a small peninsula stretching into the Bay of Erythrae, at an equal distance from the mountains Mimas and Corycus, and directly opposite the island of Chios. In the peninsula excellent wine was produced. The town was said to have been founded by Ionians under Knopos, son of Codrus. Never a large city, it sent only eight ships to the battle of Lade. The Erythraeans owned for a considerable time the supremacy of Athens, but towards the close of the Peloponnesian war they threw off their allegiance to that city. After the battle of Cnidus, however, they received Conon, and paid him honours in an inscription, still extant. Erythrae was the birthplace of two prophetesses—one of whom, Sibylla, is mentioned by Strabo as living in the early period of the city; the other, Athenais, lived in the time of Alexander the Great. The ruins include well-preserved Hellenistic walls with towers, of which five are still visible. The acropolis (280 ft.) has the theatre on its N. slope, and eastwards lie many remains of Byzantine buildings. Modern Litri is a considerable place and port, extending from the ancient harbour to the acropolis. The smaller coasting steamers call, and there is an active trade with Chios and Smyrna.

ERYTHRITE, the name given to (1) a mineral composed of a hydrated cobalt arsenate, and (2) in chemistry, a tetrahydric alcohol. (1) The mineral erythrite has the formula $Co_3(AsO_4)_2\cdot 8H_2O$, and crystallizes in the monoclinic system and is isomorphous with vivianite. It sometimes occurs as beautiful radially-arranged groups of blade-shaped crystals with a bright crimson colour and brilliant lustre. On exposure to light the colour and lustre deteriorate. There is a perfect cleavage parallel to the plane of symmetry, on which the lustre is pearly. Cleavage flakes are soft ($H=2$), sectile and flexible; specific gravity 2·95. The mineral is, however, more often found as an earthy encrustation with a peach-blossom colour, and in this form was early (1727) known as cobalt-bloom (Ger. *Kobaltblüthe*). The name erythrite, from ἐρυθρός, "red," was given by F. S. Beudant in 1382. Erythrite occurs as a product of alteration of smaltite ($CoAs_2$) and other cobaltiferous arsenides. The finest crystallized specimens are from Schneeberg in Saxony. The earthy variety has been found in Thuringia and Cornwall and some other places. (2) The alcohol erythrite has the constitutional formula $HO\cdot H_2C\cdot CH(OH)\cdot CH(OH)\cdot CH_2OH$; it is also known as erythrol, erythroglucin and phycite. It corresponds to tartaric acid, and, like this substance, it occurs in four stereo-isomeric forms. The internally compensated modification, *i*-erythrite, corresponding to mesotartaric acid, occurs free in the algae *Protococcus vulgaris*, and as the orsellinate, erythrin, $C_4H_6(OH)_2(O\cdot C_8H_7O_3)_2$, in many lichens and algae, especially *Roccella montagnei*. It has a sweet taste, melts at 126°, and boils at 330°. Careful oxidation with dilute nitric acid gives erythrose or tetrose, which is probably a mixture of a trioxyaldehyde and trioxyketone. Energetic oxidation gives erythritic acid and mesotartaric acid. *i*-Erythrite and the racemic mixture of the dextro and laevo varieties were synthesized by Griner in 1893 from divinyl.

ERZERUM, or Arzrum (Arm. *Garin*), the chief town of an important vilayet of the same name in Asiatic Turkey. It is a military station and a fortress of considerable strategical value, closing the roads from Kars, Olti and other parts of the frontier. Several important routes from Trebizond and various parts of Anatolia converge towards it from the west. It is situated at the eastern end of an open bare plain, 30 m. long and about 12 wide, bordered by steep, rounded mountains and traversed by the Kara Su, or western Euphrates, which has its source in the Dumlu Dagh a few miles north of that town, which lies at an elevation of 6250 ft. above sea-level, while the near hills rise to 10,000 ft. The scenery in the neighbourhood is striking, lofty bare mountains being varied by open plains and long valleys dotted with villages. Just east of the town is the broad ridge of the Deveboyun ("Camel's Neck"), across which the road passes to Kars. To the south is the Palanduken range, from which emerge numerous streams, supplying the town with excellent water. In the plain to the north the Kara Su traverses extensive marshes which afford good wildfowl-shooting in the spring.

The town is surrounded by an earthen enceinte or rampart with some forts on the hills just above it, and others on the Deveboyun ridge facing east, the whole forming a position of considerable strength. The old walls and the citadel have disappeared. Inside the ramparts the town lies rather cramped, with narrow, crooked streets, badly drained and dirty; the houses are generally built of dark grey volcanic stone with flat roofs, the general aspect, owing to the absence of trees, being somewhat gloomy. The water-supply from Palanduken is distributed by wooden pipes to numerous public fountains. The town has a population of about 43,000, including about 10,000 Armenians, 2000 Persians and a few Jews. It has a garrison in peace of about 5000 men. It is the seat of the British consulate for Kurdistan, and there are other European consulates besides an American mission with schools. The great altitude accounts for very severe winter cold, occasionally 10° to 25° below zero F., accompanied by blizzards (*tipi*) sometimes fatal to travellers overtaken by them. The summer heat is moderate (59° to 77°).

There are several well-built mosques (none older than the 16th century), public baths, and several good khans. There are Armenian and Catholic churches, but the most beautiful building is a *medresse* erected in the 12th century by the Seljuks, with ornamental doorway and two graceful minarets known as the *Chifte Minare*.

Situated on the main road from Trebizond into north-west Persia, the town has always a large caravan traffic, principally of camels, but since the improvement of communications in Russia this has declined. A good carriage-road leads to the coast at Trebizond, the journey being made in five or six days. There are also roads to Kars, Bayazid, Erzingan and Kharput. Blacksmiths' and coppersmiths' work is better here than in most Turkish towns; horse-shoes and brasswork are also famous. There are several tanneries, and Turkish boots and saddles are largely made. Jerked beef (*pasdirma*) is also prepared in large quantities for winter use. The plain produces wheat, barley, millet and vegetables. Wood fuel is scarce, the present supply being from the Tortum district, whence surface coal and lignite are also brought; but the usual fuel is *tezek* or dried cow-dung. The bazaars are of no great interest. Good Persian carpets and similar goods can be obtained.

Erzerum is a town of great antiquity, and has been identified with the Armenian Garin Kalakh, the Arabic Kalikale, and the Byzantine Theodosiopolis of the 5th century, when it was a frontier fortress of the empire—hence its name *Erzen-er-Rum*. It was captured by the Seljuks in 1201, when it was an important city, and it fell into Turkish possession in 1517. In July 1829 it was captured by the Russian general Paskevich, and the occupation continued until the peace of Adrianople (September 1829). The town was unsuccessfully attacked by the Russians on the 9th of November 1877 after a victory gained by them a short time previously on the Deveboyun heights; it was occupied by them during the armistice (7th of February 1878) and restored to Turkey after the treaty of Berlin. In 1859 a severe earthquake destroyed much of the town, and another in November 1901 caused much damage.

The Erzerum vilayet extends from the Persian frontier at Bayazid, all along the Russian frontier and westward into Anatolia at Baiburt and Erzingan. It is divided into the three sanjaks of Bayazid, Erzerum, and Erzingan. It includes the highest portion of the Armenian plateau, and consists of bare undulating uplands varied by lofty ranges. The deep gorges of the Chorokh and Tortum streams north of the town alone have a different appearance, being well wooded in places. Both arms of the Euphrates have their rise in this country as well as the Aras (Araxes) and the Chorokh (Acampsis). It is an agricultural country with few industries. Besides forests, iron, salt, sulphur and other mineral springs are found. Some of the coal and lignite mines in Tortum have been recently worked to supply fuel for Erzerum. The population is largely Armenian and Kurd with some Turks (Moslems 500,000, Christians 140,000). (C. W. W.; F. R. M.)

ERZGEBIRGE, a mountain chain of Germany, extending in a W.S.W. direction from the Elbe to the Elstergebirge along the frontier between Saxony and Bohemia. Its length from E.N.E. to W.S.W. is about 80 m., and its average breadth about 25 m. The southern declivity is generally steep and rugged, forming in some places an almost perpendicular wall of the height of from 2000 to 2500 ft.; while the northern, divided at intervals into valleys, sometimes of great fertility and sometimes wildly romantic, slopes gradually towards the great plain of northern Germany. The central part of the chain forms a plateau of an average height of more than 3000 ft. At the extremities of this plateau are situated the highest summits of the range:—in the south-east the Keilberg (4080 ft.); in the north-east the Fichtelberg (3980 ft.); and in the south-west the Spitzberg (3650 ft.). Between the Keilberg and the Fichtelberg, at the height of about 3300 ft., is situated Gottesgab, the highest town in Bohemia. Geologically, the Erzgebirge range consists mainly of gneiss, mica and phyllite. As its name (Ore Mountains) indicates, it is famous for its mineral ores. These are chiefly silver and lead, the layers of both of which are very extensive, tin, nickel, copper and iron. Gold is found in several places, and some arsenic, antimony, bismuth, manganese, mercury and sulphur. The Erzgebirge is celebrated for its lace manufactures, introduced by Barbara Uttmann in 1541, embroideries, silk-weaving and toys. The climate is in winter inclement in the higher elevations, and, as the snow lies deep until the spring, the range is largely frequented by devotees of winter sport, ski, toboganning, &c. In summer the air is bracing, and many climatic health resorts have sprung into existence, among which may be mentioned Kipsdorf, Bärenfels and Oberwiesenthal. Communication with the Erzgebirge is provided by numerous lines of railway, some, such as that from Freiberg to Brüx, that from Chemnitz to Komotau, and that from Zwickau to Carlsbad, crossing the range, while various local lines serve the higher valleys.

The Elstergebirge, a range some 16 m. in length, in which the Weisse Elster has its source, runs S.W. from the Erzgebirge to the Fichtelgebirge and attains a height of 2630 ft.

See Grohmann, *Das Obererzgebirge und seine Städte* (1903), and Schurtz, *Die Pässe des Erzgebirges* (1891); also Daniel, *Deutschland*, vol. ii., and Gebauer, *Länder und Völkerkunde*, vol. i.

ERZINGAN, or ERZINJAN (*Arsinga* of the middle ages), the chief town of a sanjak in the Erzerum vilayet of Asiatic Turkey. It is the headquarters of the IV. army corps, being a place of some military importance, with large barracks and military factories. It is situated at an altitude of 3900 ft., near the western end of a rich well-watered plain through which runs the Kara Su or western Euphrates. It is surrounded by orchards and gardens, and is about a mile from the right bank of the river, which here runs in two wide channels crossed by bridges. One wide street traverses the town from east to west, but the others are narrow, unpaved and dirty, except near the new government buildings and the large modern mosque of Hajji Izzet Pasha to the north, which are the only buildings of note. The principal barracks, military hospital and clothing factory are at Karateluk on the plain and along the foot-hills to the north 3 m. off, one recent addition to the business buildings having electric power and modern British machinery; some older barracks and a military tannery and boot factory being in the town. The population numbers about 15,000, of whom about half are Armenians living in a separate quarter. The principal industries are the manufacture of silk and cotton and of copper dishes and utensils. The climate is hot in summer but moderate in winter. A carriage-road leads to Trebizond, and other roads to Sivas, Karahissar, Erzerum and Kharput. The plain, almost surrounded by lofty mountains, is highly productive with many villages on it and the border hills. Wheat, fruit, vines and cotton are largely grown, and cattle and sheep are bred. Water is everywhere abundant, and there are iron and hot sulphur springs. The battle in which the sultan of Rum (1243) was defeated by the Mongols took place on the plain, and the celebrated Armenian monastery of St Gregory, " the Illuminator," lies on the hills 11 m. S.W. of the town.

Erzingan occupies the site of an early town in which was a temple of Anaitis. It was an important place in the 4th century when St Gregory lived in it. The district passed from the Byzantines to the Seljuks after the defeat of Romanus, 1071, and from the latter to the Mongols in 1243. After having been held by Mongols, Tatars and Turkomans, it was added to the Osmanli empire by Mahommed II. in 1473. In 1784 the town was almost destroyed by an earthquake. (C.W.W.; F. R. M.)

ESAR-HADDON [Assur-akhi-iddina, " Assur has given a brother "], Assyrian king, son of Sennacherib; before his accession to the throne he had also borne another name, Assur-etil-ilani-yukin-abla. At the time of his father's murder (the 20th of Tebet, 681 B.C.) he was commanding the Assyrian army in a war against Ararat. The conspirators, after holding Nineveh for 42 days, had been compelled to fly northward and invoke the aid of the king of Ararat. On the 12th of Iyyar (680 B.C.) a decisive battle was fought near Malatia, in which the veterans of Assyria won the day, and at the close of it saluted Esar-haddon as king. He returned to Nineveh, and on the 8th of Sivan was crowned king. A good general, Esar-haddon was also an able and conciliatory administrator. His first act was to crush a rebellion among the Chaldaeans in the south of Babylonia and then to restore Babylon, the sacred city of the West, which had been destroyed by his father. The walls and temple of Bel were rebuilt, its gods brought back, and after his right to rule had been solemnly acknowledged by the Babylonian priesthood Esar-haddon made Babylon his second capital. A year or two later Media was invaded and Median chiefs came to Nineveh to offer homage to their conqueror. He now turned to Palestine, where the rebellion of Abdi-milkutti of Zidon was suppressed, its leader beheaded, and a new Zidon built out of the ruins of the older city (676–675 B.C.). All Palestine now submitted to Assyria, and 12 Syrian and 10 Cyprian princes (including Manasseh of Judah) came to pay him homage and supply him with materials for his palace at Nineveh. But a more formidable enemy had appeared on the Assyrian frontier (676 B.C.). The Cimmerii (see SCYTHIA) under Teuspa poured into Asia Minor; they were, however, overthrown in Cilicia, and the Cilician mountaineers who had joined them were severely punished. It was next necessary to secure the southern frontier of the empire. Esar-haddon accordingly marched into the heart of Arabia, to a distance of about 900 m., across a burning and waterless desert, and struck terror into the Arabian tribes. At last he was free to complete the policy of his predecessors by conquering Egypt, which alone remained to threaten Assyrian dominion in the West. Baal of Tyre had transferred his allegiance from Esar-haddon to the Egyptian king Tirhaka and opened to the latter the coast road of Palestine; leaving a force, therefore, to invest Tyre, Esar-haddon led the main body of the Assyrian troops into Egypt on the 5th of Adar, 673 B.C. The desert was crossed with the help of the Arabian sheikh. Egypt seems to have submitted to the invader and was divided into twenty satrapies. Another campaign, however, was needed before it could be finally subdued. In 670 B.C. Esar-haddon drove the Egyptian forces before him in 15 days (from the 3rd to the 18th of Tammuz) all the way from the frontier to Memphis, thrice defeating them with heavy loss and wounding Tirhaka himself. Three days after Memphis fell, and this was soon afterwards followed by the surrender of Tyre and its king. In 668 B.C. Egypt again revolted, and while on the march to reduce it Esar-haddon fell ill and died on the 10th of Marchesvan. His empire was divided between his two sons Assur-bani-pal and Samas-sum-yukin, Assur-bani-pal receiving Assyria and his brother Babylonia, an arrangement, however, which did not prove to be a success. Esar-haddon was the builder of a palace at Nineveh as well as of one which he erected at Calah for Assur-bani-pal.

AUTHORITIES.—E. A. W. Budge, *History of Esarhaddon* (1880); E. Schrader, *Keilinschriftliche Bibliothek*, ii. (1889) (Abel and Winckler in ii. pp. 120-153); G. Maspero, *Passing of the Empires*, pp. 345 sqq.; F. von Luschan, "Ausgrabungen in Sendschirli," i. (*Mitteilungen aus den orientalischen Sammlungen*, 1893). (A. H. S.)

ESAU, the son of Isaac and Rebecca, in the Bible, and the elder twin brother of Jacob. He was so called because he was red (*admōnī*) and hairy when he was born, and the name Edom (red) was given to him when he sold his birthright to Jacob for a meal of *red* lentil pottage (Gen. xxv. 21-34). Another story of the manner in which Jacob obtained the superiority is related in Gen. xxvii. Here the younger brother impersonated the elder, and succeeded in deceiving his blind father by imitating the hairiness of his brother. He thus gained the blessing intended for the first-born, and Esau, on hearing how he had been forestalled, vowed to kill him. Jacob accordingly fled to his mother's relatives, and on his return, many years later, peace was restored between them (xxxii. sq.). These primitive stories of the relations between the eponymous heads of the Edomites and Israelites are due to the older (Judaean) sources; the late notices of the Priestly school (see GENESIS) preserve a different account of the parting of the two (Gen. xxxvi. 6-8), and lay great stress upon Esau's marriages with the Canaanites of the land, unions which were viewed (from the writer's standpoint) with great aversion (Gen. xxvi. 34 sq., xxvii. 46). For "Esau" as a designation of the Edomites, cf. Jer. xlix. 8, Obad. *vv.* 6, 8, and on their history, see EDOM.

Esau's characteristic hairiness (Gen. xxv. 25, xxvii. 11) has given rise to the suggestion that his name is properly *'ēshav*, from a root corresponding to the Arab. *'athiya*, to have thick or matted hair. Mt Seir, too, where he resided, etymologically suggests a "shaggy" mountain-land. According to Hommel (*Sud-arab. Chrestom.* p. 39 sq.) the name Esau has S. Arabian analogies. On the possible identity of the name with Usoos, the Phoenician demi-god (Philo of Byblus, ap. Eusebius, *Praep. Evang.* i. 10), see Cheyne, *Encyc. Bib.* col. 1333; Lagrange, *Études sur les religions sémitiques*, p. 416 (Paris, 1905); Ed. Meyer, *Israeliten*, 278 sq. (and, on general questions, *ib.* 128 sq., 329 sqq.). (S. A. C.)

ESBJERG, a seaport of Denmark in the *amt* (county) of Ribe, 18 m. from the German frontier on the west coast of Jutland. It has railway communication with the east and north of Jutland, and with Germany. It was granted municipal rights in 1900, having grown with astonishing rapidity from 13 inhabitants in 1868 to 13,355 in 1901. This growth it owes to the construction of a large harbour in 1868–1888. It is the principal outlet westward for S. Jutland; exports pork and meat, butter, eggs, fish, cattle and sheep, skins, lard and agricultural seeds, and has regular communication with Harwich and Grimsby in England. Three miles S.E. is Nordby on the island of Fanö, the northernmost of the North Frisian chain. It is an arid bank of heathland and dunes, but both Nordby and Sönderho in the south are frequented as seaside resorts. The former has a school of navigation. The fisheries are valuable.

ESCANABA, a city and the county-seat of Delta county, Michigan, U.S.A., on Little Bay de Noquette, an inlet of Green Bay, about 60 m. S. of Marquette. Pop. (1890) 6808; (1900) 9549, of whom 3214 were foreign-born; (1910 census) 13,194. It is served by the Chicago & North-Western and the Escanaba & Lake Superior railways. It is built on a picturesque promontory which separates the waters of Green Bay from Little Bay de Noquette, and its delightful summer climate, wild landscape scenery and facilities for boating and trout fishing make it a popular summer resort. Escanaba has a water front of 8 m., and is an important centre for the shipment of iron-ore, for which eight large and well-equipped docks are provided—there is an ore-crushing plant here; considerable quantities of lumber and fish are also shipped, and furniture, flooring (especially of maple) and wooden ware (butter-dishes and clothes-pins) are manufactured. There is a large tie-preserving plant here. Good water power is supplied by the Escanaba river. Escanaba was settled in 1863, was incorporated as a village in 1883, and was first chartered as a city in the same year.

ESCAPE (in mid. Eng. *eschape* or *escape*, from the O. Fr. *eschapper*, modern *échapper*, and *escaper*, low Lat. *escapium*, from *ex*, out of, and *cappa*, cape, cloak; cf. for the sense development the Gr. ἐκδύεσθαι, literally to put off one's clothes, hence to slip out of, get away), a verb meaning to get away from, especially from impending danger or harm, to avoid capture, to regain one's liberty after capture. As a substantive, "escape," in law, is the regaining of liberty by one in custody contrary to due process of law. Such escape may be by force, if out of prison it is generally known as "prison-breach" or "prison-breaking," or by the voluntary or negligent act of the custodian. Where the escape is caused by the force or fraud of others it is termed "rescue" (*q.v.*). "Escape" is used in botany of a cultivated plant found growing wild. The word is also used of a means of escape, *e.g.* "fire-escape," and of a loss or leakage of gas, current of electricity or water.

ESCHATOLOGY (Gr. ἔσχατος, last, and λόγος, science; the "doctrine of last things"), a theological term derived from the New Testament phrases "the last day" (ἐν τῇ ἐσχάτῃ ἡμέρᾳ, John vi. 39), "the last times" (ἐπ' ἐσχάτων τῶν χρόνων, 1 Peter i. 20), "the last state" (τὰ ἔσχατα, Matt. xii. 45), a conception taken over from ancient prophecy (Is. ii. 2; Mal. iv. 1). It was the common belief in the apostolic age that the second advent of Christ was near, and would give the divine completion to the world's history. The use of the term, however, has been extended so as to include all that is taught in the Scriptures about the future life of the individual as well as the final destiny of the world. The reasons for the belief in a life after death are discussed in the article IMMORTALITY. The present article, after a brief glance at the conceptions of the future of the individual or the world found in other religions, will deal with the teaching of the Old and New Testaments, the Jewish and the Christian Church regarding the hereafter.

There is a bewildering variety in the views of the future life and world held by different peoples. The future life may be conceived as simply a continuation of the present life in its essential features, although under conditions more or less favourable. It may also be thought of as retributive, as a reversal of present conditions so that the miserable are comforted, and the prosperous laid low, or as a reward or punishment for good or evil desert here. Personal identity may be absorbed, as in the transmigration of souls, or it may even be denied, while the good or bad result of one life is held to determine the weal or woe of another. The scene of the future life may be thought of on earth, in some distant part of it, or above the earth, in the sky, sun, moon or stars, or beneath the earth. The abodes of bliss and the places of torment may be distinguished, or one last dwelling-place may be affirmed for all the dead. Sometimes the good find their abiding home with the gods; sometimes a number of heavens of varying degrees of blessedness is recognized (see F. B. Jevons, *An Introduction to the History of Religion*, chs. xxi. and xxii., 1902; and J. A. MacCulloch's *Comparative Theology*, xiv., 1902).

(1) Confucius, though unwilling to discuss any questions concerning the dead, by approving ancestor-worship recognized a future life. (2) Taoism promises immortality as the reward of

merit. (3) *The Book of the Dead*—a guide-book for the departed on his long journey in the unseen world to the abode of the blessed—shows the attention the Egyptian religion gave to the state of the dead. (4) Although the Babylonian religion presents a very gloomy view of the world of the dead, it is not without a few faint glimpses of a hope that a few mortals at least may gain deliverance from the dread doom. (5) A characteristic feature of Indian thought is the transmigration of the soul from one mode of life to another, the physical condition of each being determined by the moral and religious character of the preceding. But deliverance from this cycle of existences, which is conceived as misery, is promised by means of speculation and asceticism. Denying the continuance of the soul, Buddhism affirmed a continuity of moral consequences (*Karma*), each successive life being determined by the total moral result of the preceding life. Its doctrine of salvation was a guide to, if not absolute non-existence, yet cessation of all consciousness of existence (*Nirvana*). Later Buddhism has, however, a doctrine of many heavens and hells. (6) In Zoroastrianism not only was continuance of life recognized, but a strict retribution was taught. Heaven and hell were very clearly distinguished, and each soul according to its works passed to the one or to the other. But this faith did not concern itself only with the future lot of the individual soul. It was also interested in the close of the world's history, and taught a decisive, final victory of Ormuzd over Ahriman, of the forces of good over the forces of evil. It is not at all improbable that Jewish eschatology in its later developments was powerfully influenced by the Persian faith. (7) Mahommedanism reproduces and exaggerates the lower features of popular Jewish and Christian eschatology (see the separate articles on these religions).

Eastern Religions.

Old Testament.

In the Old Testament we can trace the gradual development of an ever more definite doctrine of "the final condition of man and the world." This is regarded as the last stage in a moral process, a redemptive purpose of God. The eschatology of the Old Testament is thus closely connected with, but not limited by, Messianic hope, as there are eschatological teachings that are not Messianic. As the Old Testament revelation is concerned primarily with the elect nation, and only secondarily (in the later writings) with the individual persons composing it, we follow the order of importance as well as of time in dealing first with the people. The universalism which marks the promise to the seed of the woman (Gen. iii. 15) appears also in the blessing of Noah (ix. 25). In the promise to Abraham (xii. 3) this universal good is directly related to God's particular purpose for His chosen people; so also in the blessing of Jacob (xlix.) and of Moses (Deut. xxxiii.). David's last words (2 Sam. xxiii.) blend together his desire that his family should retain the kingship, and his aspiration for a kingdom of righteousness on earth. The conception of the "Day of the Lord" is frequent and prominent in the prophets, and the sense given to the phrase by the people and by the prophets throws into bold relief the contrast between popular beliefs and the prophetic faith. The people simply expected deliverance from their miseries and burdens by the intervention of Yahweh, because He had chosen Israel for His people. The prophets had an ethical conception of Yahweh; the sin of His own people and of other nations called for His intervention in judgment as the moral ruler of the world. But judgment they conceived as preparing for redemption. The day of the Lord is always an eschatological conception, as the term is applied to the final and universal judgment, and not to any less decisive intervention of God in the course of human history. In the pre-exilic prophets the judgment of God is "primarily on Israel, although it also embraces the nations"; during the Exile and at the Restoration the judgment is represented as falling on the nations while redemption is being wrought for God's people; after the Restoration the people of God is again threatened, but still the warning of judgment is mainly directed towards the nations and deliverance is promised to Israel. As the manifestation of God in grace as well as judgment, the day of the Lord will bring joy to Israel and even to the world. As a day of judgment it is accompanied by terrible convulsions of nature (not to be taken figuratively, but probably intended literally by the prophets in accordance with their view of the absolute subordination of nature to the divine purpose for man). It ushers in the Messianic age. While the moral issues are finally determined by this day, yet the world of the Messianic age is painted with the colours of the prophet's own surroundings. Israel is restored to its own land, and to it the other nations are brought into subjugation, by force or persuasion. The contributions of the Old Testament to Christian eschatology embrace these features: "(1) The manifestation or advent of God; (2) the universal judgment; (3) behind the judgment the coming of the perfect kingdom of the Lord, when all Israel shall be saved and when the nations shall be partakers of their salvation; and (4) the finality and eternity of this condition, that which constitutes the blessedness of the saved people being the Presence of God in the midst of them—this last point corresponding to the Christian idea of heaven" (A. B. Davidson, in Hastings's *Bible Dictionary*, i. p. 738). This hope is for the people on this earth though transfigured.

To the individual it would seem at first only old age is promised (Is. lxv. 20; Zech. viii. 4), but the abolition of death itself is also declared (Is. xxv. 8). The resurrection, which appears at first as a revival of the dead nation (Hos. vi. 2; Ez. xxxvii. 12–14), is afterwards promised for the pious individuals (Is. xxvi. 19), so that they too may share in the national restoration. Only in Daniel xii. 2 is taught a resurrection of the wicked "to shame and everlasting contempt" as well as of the righteous to "everlasting life." It was only at the Exile, when the nation ceased to be, that the worth of the individual came to be recognized, and the hopes given to the nation were claimed for the individual. In dealing with the individual eschatology we must carefully distinguish the popular ideas regarding death and the hereafter which Israel shared with the other Semitic peoples, from the intuitions, inferences, aspirations evoked in the pious by the divine revelation itself. The former have not the moral significance or the religious value of the latter. The starting-point of the development was the common belief that the dead continued to exist in an unsubstantial mode of life, but cut off from fellowship with God and man; but faith left this far behind. Sheol is the common abode of the righteous and the ungodly: life there is shadowy and feeble, but seems to continue in a wavering and dim reflection features of this life. As the present life is, however, determined by moral issues, and as death does not change man's relation to God, moral considerations could not be absolutely excluded from the future life. A forward step had to be taken. Pious men, in fellowship with God, when they faced the fact of death, were led either to challenge its right, or to give a new meaning to it. Either there was a protest against death itself, and a demand for immortality (Ps. xvi. 9–11), or death was conceived as something different for the saint and for the sinner; fellowship with God would not and could not be interrupted (Ps. xlix. 14, 15, lxxiii. 17-28). The vision of God is anticipated after death's sleep (Ps. xvii. 15; Job xix. 25-27). This belief in individual immortality is expressed poetically and obscurely: it is later than the eschatology of the people. It assumes the moral distinction of the righteous and the ungodly, and seeks a solution for the problem of the lack of harmony of present character and condition. Its deepest motive, however, is religious. The soul once in fellowship with God cannot even by death be separated from God. The individual hoped that he would live to share the nation's good, and thus the two streams of Old Testament eschatology at last flow together.

Apocryphal and Apocalyptic books.

It is in the apocryphal and apocalyptic literature of Judaism that the fullest development of eschatology can be traced. Four words may serve to express the difference of the doctrine of these writings and the teaching of the Old Testament. Eschatology was *universalized* (God was recognized as the creator and moral governor of all the world), *individualized* (God's judgment was directed, not to nations in a future age, but to individuals in a future life), *transcendentalized* (the future age was more and more contrasted with the present, and the transition from the one to the other was not expected as the result of historical movements, but of miraculous divine acts), and *dogmatized* (the attempt was made to systematize in some measure the vague and varied prophetic anticipations). Only a very brief summary of the conceptions current in these writings can be given. The coming of the Messiah will be preceded by the Last Woes. The Messiah is very variously conceived: (1) "a passive, though supreme member of the Messianic Kingdom"; (2) "an active warrior who slays his enemies with his own hand"; (3) "one who slays his enemies by the word of his mouth, and rules by virtue of his justice, faith and holiness"; (4) a supernatural person, "eternal Ruler and Judge of Mankind" (R. H. Charles in Hastings's *Bible Dictionary*, i. p. 748). In some of the writings no Messianic kingdom is looked for; in others only a temporal duration on earth is assigned to it; in others still it abides for ever either on earth as it is, or on earth transformed. The dispersion among the nations is to return home. Sometimes the Resurrection is narrowed down to the resurrection of the righteous, at others widened out to the resurrection of all mankind for the last judgment. A blessed immortality after judgment, or even after death itself, is sometimes taught without reference to any resurrection. Retribution in human history is recognized, but attention is specially concentrated on the final judgment, which is usually conceived as taking place in two stages. (1) The Messianic is executed by the Messiah or the saints by victory in war, or by judicial sentence. (2) The final remains in God's hands; but in one writing (the *Ethiopic Enoch*) is represented as Messiah's function. This judgment either closes the Messianic age, if thought of as temporal, or ushers it in, if conceived as eternal, or closes the world's history, if no Messianic age is expected. The place of torment for the wicked was called Gehenna (the valley of Hinnom or the Sons of Hinnom, where the bodies of criminals were cast out, is described in Is. lxvi. 24). Here corporal as well as spiritual punishment was endured; it was inflicted on apostate Jews or the wicked generally; the righteous witnessed its initial stages but not its final form. In later Judaism it was the purgatory of faithless Jews, who at last reached Paradise, but it remained the place of eternal torment for the Gentiles. Paradise was sometimes regarded as the division of Sheol to which the righteous passed after death, but at others it was conceived as the heavenly abode of Moses, Enoch and Elijah, to which other saints would pass after the last judgment.

New Testament.

The eschatology of the New Testament attaches itself not only to that of the Old Testament but also to that of contemporary Judaism, but it avoids the extravagances of the latter. Not at all systematic, it is occasional, practical, poetical and dominantly evangelical, laying stress on the hope of the righteous rather than the doom of the wicked. The teaching of Jesus centres, according to the Synoptists, in the great idea of the "Kingdom of God," which is already present in the teacher Himself, but also future as regards its completion. In some parables a gradual realization of the kingdom is indicated (Matt. xiii.); in other utterances its consummation is connected with Christ's own return, His Parousia (Matt. xxiv. 3, 37, 39), the time of which, however, is unknown even to Himself (Mark xiii. 32). In this eschatological discourse (Matt. xxiv., xxv.) He speaks of the destruction of Jerusalem and of the end of the world as near, and seemingly as one. This is in accordance with the characteristic of prophecy, which sees in "timeless sequence" events which are historically separated from one another. While the Return is represented in the Synoptists as an external event, it is conceived in the fourth gospel as an internal experience in the operation of the Spirit on the believer (John xiv. 16-21); nevertheless here also the Parousia in the synoptic sense is looked for (John xxi. 22; cf. 1 John ii. 28). The object of the Second Coming is the execution of judgment by Christ (Matt. xxv. 31), both individual (xxii. 1-14) and universal (xiii. 36-42). The present subjective judgment, in which men determine their destiny by their attitude to Christ, on which the fourth gospel lays stress (John iii. 17-21, ix. 39), is not inconsistent with the anticipation of a final judgment (John xii. 48, v. 27). This judgment presupposes the resurrection, belief in which was rejected by the Sadducees, but accepted by the Pharisees and the majority of the Jewish people, and confirmed by Christ, not only as an individual spiritual renovation (John v. 25, 26), but as a universal physical resuscitation (28 and 29; Matt. xxii. 30). This resurrection is of the unjust as well as the just (Matt. v. 29, 30, x. 28; Luke xiv. 14). On the *Intermediate State* Jesus does not speak clearly. He uses the term Hades twice metaphorically (Matt. xi. 23, xvi. 18), and once in a parable, the "Rich Man and Lazarus" (Luke xvi. 23), in which he employs the current phrases such as "Abraham's bosom" (verse 22), without any definite doctrinal intention, to unveil the secrets of the hereafter by confirming with His authority the common beliefs of His time. The term Paradise (Luke xxiii. 43) seems to be used "in a large and general sense as a word of hope and comfort," and we need not attach to it any of the more definite associations which it had in Jewish eschatology. When he speaks of death as "sleep" (Luke viii. 52; John xi. 11) it is to give men gentler and sweeter thoughts of it, not to inculcate the doctrine of an intermediate state as an unconscious condition. There are words which suggest rather the hope of an immediate entrance of the just into the Father's house and glory (John xiv. 2, 3, xvii. 24). He spoke frequently and distinctly both of final reward for the righteous and final penalty for the wicked. "The recompense of the righteous is described as an inheritance, entrance into the kingdom, treasure in heaven, an existence like the angelic, a place prepared, the Father's house, the joy of the Lord, life, eternal life and the like; and there is no intimation that the reward is capable of change, that the condition is a terminable one. The retribution of the wicked is described as death, outer darkness, weeping and wailing and gnashing of teeth, the undying worm, the quenchless fire, exclusion from the kingdom, eternal punishment and the like" (S. D. J. Salmond in Hastings's *Bible Dictionary*, p. 752). Degrees of award are recognized (Luke xii. 47, 48). Gehenna is applied to the condition of the lost (Matt. xviii. 9). Two sayings are held to point to a terminable penalty (Matt. v. 25, 26, xii. 31, 32), but the one is so figurative and the other so obscure, that we are not warranted in drawing any such definite conclusion from either of them. The finality of destiny seems to be unmistakably expressed (Matt. vii. 23, x. 33, xiii. 30, xxv. 46, xxvi. 24; Mark ix. 43-48, viii. 36; Luke ix. 26; John iii. 16, viii. 21, 24). No second opportunity for deciding the issue of life or death is recognized by Jesus.

Pharisees and Sadducees.

The apostolic eschatology presents resemblance amid difference. Jude (v. 6), as well as 2 Peter (ii. 4), refers to the judgment of the fallen angels. 2 Peter describes the place of their detention as Tartarus, and teaches that Christ's *Parousia* is to bring the whole present system of things to its conclusion, and the world itself to an end (iii. 10, 13). After the destruction of the existing order by fire, "a new heaven and a new earth" will appear as the abode of righteousness. The question of greatest interest in 1 Peter is the relation of two passages in it, the preaching to the spirits in prison (iii. 18-22) and the preaching of the Gospel to the dead (iv. 6) to the "larger hope." Peter's discourse also contains a phrase which suggests the belief of a descent of Christ into Hades in the interval between His death and His resurrection (Acts ii. 31). No certainty has been reached in the interpretation of these passages, but they may suggest to the Christian mind the expectation that the final destiny of no soul can be fixed until in some way or other, in this life or the next, the opportunity of decision for or against Christ has been given. The phrase "the times of restoration of all things" (iii. 21) is too vague in itself, and is too isolated in its context to warrant the dogmatic teaching of universalism, although there are other passages which seem to point towards the same goal. While John's Apocalypse is distinctly eschatological, the Epistles and the Gospels often give these conceptions an ethical and spiritual import, without, however, excluding the eschatological. Life is present while eternal (1 John v. 12, 13), but it is also future (ii. 25). There is expected a future manifestation of Christ as He is, and what the believer himself will be does not yet appear (iii. 2). The writer speaks of the last hour (ii. 18), the Antichrist that cometh (ii. 22, iv. 3), and the Christian's full reward (2 John v. 8) as well as the Parousia (1 John ii. 28). The Apocalypse reproduces much of the current Jewish eschatology. A millennial reign of Christ on earth is interposed between the first resurrection, confined to the saints and especially the martyrs, and the second resurrection for the rest of the dead. A final outburst of Satan's power is followed by his overthrow and the Last Judgment.

Although Paul sometimes describes the Kingdom of God as present (Rom. xiv. 17; 1 Cor. iv. 20; Col. i. 13), it is usually represented as future. The Parousia fills a large place in his thought, and, if more prominent in his earlier writings, is not altogether absent from his later, although the expectation of personal survival does seem to grow less confident (cf. 1 Cor. xv. 51 and Phil. i. 20-24). The doctrines of the Resurrection, the Last Judgment, the Reward of the Righteous and the Punishment of the Wicked are not less distinctly expressed than in the other apostolic writings. Peculiar elements in Paul's eschatology are the doctrines of the Rapture of the Saints (1 Thess. iv. 17) and the Man of Sin (2 Thess. ii. 3-6), but these have affinities elsewhere. A reference to the millennial reign of Christ in the period between the two resurrections is sometimes sought in 1 Cor. xv. 22-24; but it is not a chronology of the last things Paul is here giving. So also a justification for the doctrine of purgatory is sought in iii. 12-15; but the day and the fire are of the last judgment. A descent of Christ into Hades, implying an extension of the opportunity of grace such as is supposed to be taught in 1 Peter, is also discovered in the obscure statements in Rom. x. 7 (where Paul is freely quoting Deut. xxx. 11-14), and Eph. iv. 10 (where he is commenting on Ps. lxviii. 18). Universal restoration is inferred from 1 Cor. xv. 24-28, "God all in all," Phil. ii. 10-11, every knee bowing to, and every tongue confessing Jesus Christ, Eph. i. 9, 10, the summing up of all things in Christ, Col. i. 20, God reconciling all things unto Himself in Christ. These passages inspire a hope, but do not sustain a certainty. Paul's shrinking from the disembodied state and longing to be clothed upon at death in 2 Cor. v. 1-8, cannot be regarded as a proof of an *interim* body prior to and preparatory for the resurrection body. Paul links the human resurrection with a universal renovation (Rom. viii. 19-23). Paul's eschatology is not free of obscurities and ambiguities; and in the New Testament eschatology generally we are forced to recognize a mixture of inherited Jewish and original Christian elements (see ANTICHRIST).

During the first century of the existence of the Gentile Christian Church, "the hope of the approaching end of the world and the glorious kingdom of Christ" was dominant, although warnings had to be given against doubt and indifference. Redemption was thought of as still future, as the power of the devil had not been broken but rather increased by the First Advent, and the Second Advent was necessary to his complete overthrow. The expectations were often grossly materialistic, as is evidenced by Papias's quotation as the words of the Lord of a group of sayings from the Apocalypse of Baruch, setting forth the amazing fruitfulness of the earth in the Messianic time.

Gnostics.

Montanism.

The Gnostics rejected this eschatology as in their view the enlightened spirit already possessed immortality. Marcion expected that the Church would be assailed by Antichrist; a visible return of Christ he did not teach, but he recognized that human history would issue in a separation of the good from the bad. Montanism sought to form a new Christian commonwealth which, separated from the world, should prepare itself for the descent of the Jerusalem from above, and its establishment in the spot which by the direction of the Spirit had been chosen in Phrygia. While Irenaeus held fast the traditional eschatological beliefs, yet his conception of the Christian salvation as a deification of man tended to weaken their hold on Christian thought. The Alogi in the 2nd century rejected the Apocalypse on account of its chiliasm, its teaching of a visible reign of Christ on earth for a thousand years. Montanism also brought these apocalyptic expectations into discredit in orthodox ecclesiastical circles. The Alexandrian theology strengthened this movement against chiliasm. Clement of Alexandria taught that justice is not merely retributive, that punishment is remedial, that probation continues after death till the final judgment, that Christ and the apostles preached the Gospel in Hades to those who lacked knowledge, but whose heart was right, that a spiritual body will be raised. Origen taught that a germ of the spiritual body is in the present body, and its development depends on the character, that perfect bliss is reached only by stages, that the evil are purified by pain, conscience being symbolized by fire, and that all, even the devil himself, will at last be saved. Both regarded chiliasm with aversion. But in the 5th century there were rejected as heretical (1) "the doctrine of universalism, and the possibility of the redemption of the devil; (2) the doctrine of the complete annihilation of evil; (3) the conception of the penalties of hell as tortures of conscience; (4) the spiritualizing version of the resurrection of the body; (5) the idea of the continued creation of new worlds" (A. Harnack, *History of Dogma*, iii. p. 186).

Epiphanius, following Methodius, insisted on the most perfect identity between the resurrection body and the material body; and this belief, enforced in the West by Jerome, soon established itself as alone orthodox. Augustine made experiments on the flesh of a peacock in order to find physical evidence for the doctrine. He held fast to eternal punishment, but allowed the possibility of mitigations. Some believers, he taught, may pass through purgatorial fires; and this middle class may be helped by the sacraments and the alms of the living. "There are many souls not good enough to dispense with this provision, and not bad enough to be benefited by it" (*op. cit.* v. 233). This doctrine was sanctioned and developed by Gregory the Great. "After God has changed eternal punishments into temporary, the justified must expiate these temporary penalties for sin in purgatory" (p. 268). This view was inferred indirectly from Matt. xii. 31, and directly from 1 Cor. iii. 12–15. Afterwards purgatory took more and more the place of hell, and was subject to the control of the church. As regards the saints, different degrees of blessedness were recognized; they were supposed to wait in Hades for the return of Christ, but gradually the belief gained ground, especially in regard to the martyrs, that their souls at once entered Paradise. The primitive Christian eschatology was preserved in the West as it was not in the East, and in times of exceptional distress the expectation of Antichrist emerged again and again. In the middle ages there was an extravagance of speculation on this subject, which may be seen in the last division of Aquinas' *Summa Theologiae*. He proposes thirty questions on these matters, among which are the following: "whether souls are conducted to heaven or hell immediately after death"; "whether the limbus of hell is the same as Abraham's bosom"; "whether the sun and moon will be really obscured at the day of judgment"; "whether all the members of the human body will rise with it"; "whether the hair and nails will reappear"; could thought become "more lawless and uncertain"?

In Protestant Theology.

While rejecting purgatory, Protestantism took over this eschatology. Souls passed at once to heaven or to hell; a doctrine even less adequate to the complex quality of human life. Luther himself looked for the passing away of the present evil world. Socinianism taught a new spiritual body, an intermediate state in which the soul is near non-existence, an annihilation of the wicked, as immortality is the gift of God. Swedenborg discards a physical resurrection, as at death the eyes of men are opened to the spiritual world in which we exist now, and they continue to live essentially as they lived here, until by their affinities they are drawn to heaven or hell. The doctrine of *eternal punishment* has been opposed on many grounds, such as the disproportion between the offence and the penalty, the moral and religious immaturity of the majority of men at death, the diminution of the happiness of heaven involved in the knowledge of the endless suffering of others (Schleiermacher), the defeat of the divine purpose of righteousness and grace that the continued antagonism of any of God's creatures would imply, the dissatisfaction God as Father must feel until His whole family is restored. It has been argued that the term "eternal" has reference not to duration of time but quality of being (Maurice); but it does seem certain that the writers in the Holy Scriptures who used it did not foresee an end either to the life or to the death to which they applied the term. The contention should not be based on the meaning of a single word, but on such broader considerations as have been indicated above. The doctrine of *conditional* immortality taught by Socinianism was accepted by Archbishop Whately, and has been most persistently advocated by Edward White, who "maintains that immortality is a truth, not of reason, but of revelation, a gift of God" bestowed only on believers in Christ; but he admits a continued probation after death for such as have not hardened their hearts by a rejection of Christ. According to Albrecht Ritschl "the *wrath* of God means the resolve of God to annihilate those men who finally oppose themselves to redemption, and the final purpose of the kingdom of God." He thus makes immortality conditional on inclusion in the kingdom of God. The doctrine of *universal restoration* was maintained by Thomas Erskine of Linlathen on the ground of the Fatherhood of God, and Archdeacon Wilson anticipates such discipline after death as will restore all souls to God. C. I. Nitzsch argues against the doctrine of the annihilation of the wicked, regards the teaching of Scripture about eternal damnation as hypothetical, and thinks it possible that Paul reached the hope of universal restoration. I. A. Dorner maintains that hopeless perdition can be the penalty only of the deliberate rejection of the Gospel, that those who have not had the opportunity of choice fairly and fully in this life will get it hereafter, but that the right choice will in all cases be made we cannot be confident. The attitude of theologians generally regarding individual destiny is well expressed by Dr James Orr, "The conclusion I arrive at is that we have not the elements of a complete solution, and we ought not to attempt it. What visions beyond there may be, what larger hopes, what ultimate harmonies, if such there are in store, will come in God's good time; it is not for us to anticipate them, or lift the veil where God has left it down" (*The Christian View of God and the World*, 1893, p. 397).

Although in recent theological thought attention has been mainly directed to individual destiny, yet the other elements of Christian eschatology must not be altogether passed over. History has offered the authoritative commentary on the prophecy of the Parousia of Christ. The presence and power of His Spirit, the spread of His Gospel, the progress of His kingdom have been as much a fulfilment of the eschatological teaching of the New Testament as His life and work on earth were a fulfilment of Messianic prophecy, for fulfilment always transcends prophecy. Even if the common beliefs of the apostolic age have not modified the evangelist's reports of Jesus' teaching, it must be remembered that He used the common prophetic phraseology, the literal fulfilment of which is not to be looked for. Some parables (the leaven, the mustard seed) suggest a gradual progressive realization of His kingdom. The Fourth Gospel interprets both judgment and resurrection spiritually. Accordingly the general resurrection and the last judgment may be regarded as the temporal and local forms of thought to express the universal permanent truths that life survives death in the completeness of its necessary organs and essential functions, and that the character of that continued life is determined by personal choice of submission or antagonism to God's purpose of grace in Christ, the perfect realization of which is the Christian's hope for himself, mankind and the world.

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ESCHEAT (O. Fr. *eschete*, from *escheoir*, to fall to one's share; Lat. *excidere*, to fall out), in English law, the reversion of lands to the next lord on the failure of heirs of the tenant. "When the tenant of an estate in fee simple dies without having alienated his estate in his lifetime or by his will, and without leaving any heirs either lineal or collateral, the lands in which he held his estate escheat, as it is called, to the lord of whom he held them" (Williams on the *Law of Real Property*). This rule is explained by the conception of a freehold estate as an interest in lands held by the freeholder from some lord, the king being lord paramount. (See ESTATE.) The granter retains an interest in the land similar to that of the donor of an estate for life, to whom the land reverts after the life estate is ended. As there are now few freehold estates traceable to any mesne or intermediate lord, escheats, when they do occur, fall to the king as lord paramount. Besides escheat for defect of heirs, there was formerly also escheat *propter delictum tenentis*, or by the corruption of the blood of the tenant through attainder consequent on conviction and sentence for treason or felony. The blood of the tenant becoming corrupt by attainder was decreed no longer inheritable, and the effect was the same as if the tenant had died without heirs. The land, therefore, escheated to the next heir, subject to the superior right of the crown to the forfeiture of the lands,—in the case of treason for ever, in the case of felony for a year and a day. All this was abolished by the Felony Act 1870, which provided for the appointment of an administrator to the property of the convict. Escheat is also an incident of copyhold tenure. Trust estates were not subject to escheat until the Intestates' Estates Act 1884, but now by that act the law of escheat applies in the same manner as if the estate or interest were a legal estate in corporeal hereditaments.

ESCHENBURG, JOHANN JOACHIM (1743–1820), German critic and literary historian, was born at Hamburg on the 7th of December 1743. After receiving his early education in his native town, he studied at Leipzig and Göttingen. In 1767 he was appointed tutor, and subsequently professor, at the Collegium Carolinum in Brunswick. The title of "Hofrat" was conferred on him in 1786, and in 1814 he was made one of the directors of the Carolinum. He is best known by his efforts to familiarize his countrymen with English literature. He published a series of German translations of the principal English writers on aesthetics, such as J. Brown, D. Webb, Charles Burney, Joseph Priestley and R. Hurd; and Germany owes also to him the first complete translation (in prose) of Shakespeare's plays (*William Shakespear's Schauspiele*, 13 vols., Zürich, 1775–1782). This is virtually a revised edition of the incomplete translation published by Wieland between 1762 and 1766. Eschenburg died at Brunswick on the 29th of February 1820.

Besides editing, with memoirs, the works of Hagedorn, Zachariä and other German poets, he was the author of a *Handbuch der klassischen Literatur* (1783); *Entwurf einer Theorie und Literatur der schönen Wissenschaften* (1783); *Beispielsammlung zur Theorie und Literatur der schönen Wissenschaften* (8 vols., 1788–1795); *Lehrbuch der Wissenschaftskunde* (1792); and *Denkmäler altdeutscher Dichtkunst* (1799). Most of these works have passed through several editions. Eschenburg was also a poet of some pretensions, and some of his religious hymns, *e.g. Ich will dich noch im Tod erheben* and *Dir trau' ich, Gott, und wanke nicht*, are contained in many hymnals to this day.

ESCHENMAYER, ADAM KARL AUGUST VON (1768–1852), German philosopher and physicist, was born at Neuenburg in Württemberg in July 1768. After receiving his early education at the Caroline academy of Stuttgart, he entered the university of Tübingen, where he received the degree of doctor of medicine. He practised for some time as a physician at Sulz, and then at Kirchheim, and in 1811 he was chosen extraordinary professor of philosophy and medicine at Tübingen. In 1818 he became ordinary professor of practical philosophy, but in 1836 he resigned and took up his residence at Kirchheim, where he devoted his whole attention to philosophical studies. Eschenmayer's views are largely identical with those of Schelling, but he differed from him in regard to the knowledge of the absolute. He believed that in order to complete the arc of truth philosophy must be supplemented by what he called "non-philosophy," a kind of mystical illumination by which was obtained a belief in God that could not be reached by mere intellectual effort (see Höffding, *Hist. of Mod. Phil.*, Eng. trans. vol. 2, p. 170). He carried this tendency to mysticism into his physical researches, and was led by it to take a deep interest in the phenomena of animal magnetism. He ultimately became a devout believer in demoniacal and spiritual possession; and his later writings are all strongly impregnated with the lower supernaturalism.

His principal works are—*Die Philosophie in ihrem Übergange zur Nichtphilosophie* (1803); *Versuch die scheinbare Magie des thierischen Magnetismus aus physiol. und psychischen Gesetzen zu erklären* (1816); *System der Moralphilosophie* (1818); *Psychologie in drei Theilen, als empirische, reine, angewandte* (1817, 2nd ed. 1822); *Religionsphilosophie* (3 vols., 1818–1824); *Die Hegel'sche Religionsphilosophie verglichen mit dem christl. Princip* (1834); *Der Ischariotismus unserer Tage* (1835) (directed against Strauss's *Life of Jesus*); *Konflikt zwischen Himmel und Hölle, an dem Dämon eines besessenen Mädchens beobachtet* (1837); *Grundriss der Naturphilosophie* (1832); *Grundzüge der christl. Philosophie* (1840); and *Betrachtungen über den physischen Weltbau* (1852).

ESCHER VON DER LINTH, ARNOLD (1807–1872), Swiss geologist, the son of Hans Conrad Escher (1767–1823), was born at Zürich on the 8th of June 1807. In 1856 he became professor of geology at the École Polytechnique at Zürich. His researches led him to be regarded as one of the founders of Swiss geology. With B. Studer he produced (1852–1853) the first elaborate geological map of Switzerland. He was the author also of *Geologische Bemerkungen über das nördliche Vorarlberg und einige angrenzenden Gegenden*, published at Zürich in 1853. He died on the 12th of July 1872.

ESCHSCHOLTZ, JOHANN FRIEDRICH (1793–1831), Russian traveller and naturalist, was born in November 1793, at Dorpat, where he died in May 1831. He was naturalist and physician to Otto von Kotzebue's exploring expedition during 1815–1818. On his return he was appointed extraordinary professor of anatomy (1819) and director of the zoological museum of the university at Dorpat (1822), and in 1823–1826 he accompanied Kotzebue on his second voyage of discovery. He became ordinary professor of anatomy at Dorpat in 1828. Among his publications were the *System der Akalephen* (1829), and the *Zoologischer Atlas* (1829–1833). The botanical genus *Eschscholtzia* was named by Adelbert von Chamisso in his honour.

ESCHWEGE, a town of Germany, in the Prussian province of Hesse-Nassau, on the Werra, and the railway Treysa-Leinefelde, 28 m. S.E. of Cassel. Pop. (1905) 11,113. It consists of the old town on the left, the new town on the right, bank of the Werra, and Brückenhausen on a small island connected with the old and new town by bridges. It is a thriving manufacturing town, its chief industries being leather-making, yarn-spinning, cotton- and linen-weaving, the manufactures of cigars, brushes, liquors and oil, and glue- and soap-boiling. It has two ancient buildings, the Nikolai-turm, built in 1455, and the old castle. After being part of Thuringia, Eschwege passed to Hesse in 1263. It was recovered by the landgrave of Thuringia in 1388, but soon reverted to Hesse, and it became the residence of one of the branches of the Hessian royal house, a branch which died out in 1655.

ESCHWEILER, a town of Germany, in the Prussian Rhine province, on the Inde, and the railways Cologne-Herbesthal and Munich-Gladbach-Stolberg, about 8 m. E.N.E. from Aix-la-Chapelle. Pop. (1905) 20,643. The town has an Evangelical and four Roman Catholic churches, a gymnasium and an orphanage. The manufacture of iron and steel goods is carried on; other industries include the manufacture of zinc wares, tanning, distilling and brewing. In the neighbourhood there are valuable coal mines.

See Koch, *Geschichte der Stadt Eschweiler* (Frankfort, 1890).

ESCOBAR Y MENDOZA, ANTONIO (1589–1669), Spanish churchman of illustrious descent, was born at Valladolid in 1589. He was educated by the Jesuits, and at the age of fifteen took the habit of that order. He soon became a famous preacher, and his facility was so great that for fifty years he preached daily, and sometimes twice a day. In addition he was a voluminous writer, and his works fill eighty-three volumes. His first literary efforts were Latin verses in praise of Ignatius Loyola (1613) and the Virgin Mary (1618); but he is best known as a writer on casuistry. His principal works belong to the fields of exegesis and moral theology. Of the latter the best known are *Summula casuum conscientiae* (1627); *Liber theologiae moralis* (1644), and *Universae theologiae moralis problemata* (1652–1666). The first mentioned of these was severely criticised by Pascal in the fifth and sixth of his *Provincial Letters*, as tending to inculcate a loose system of morality. It contains the famous maxim that purity of intention may be a justification of actions which are contrary to the moral code and to human laws; and its general tendency is to find excuses for the majority of human frailties. His doctrines were disapproved of by many Catholics, and were mildly condemned by Rome. They were also ridiculed in witty verses by Molière, Boileau and La Fontaine, and gradually the name Escobar came to be used in France as a synonym for a person who is adroit in making the rules of morality harmonize with his own interests. Escobar himself is said to have been simple in his habits, a strict observer of the rules of his order, and unweariedly zealous in his efforts to reform the lives of those with whom he had to deal. It has been said of him that "he purchased heaven dearly for himself, but gave it away cheap to others." He died on the 4th of July 1669.

ESCOIQUIZ, JUAN (1762–1820), Spanish ecclesiastic, politician and writer, was born in Navarre in 1762. His father was a general officer and he began life as a page in the court of King Charles III. He entered the church and was provided for by a prebend at Saragossa. Godoy in his memoirs asserts that Escoiquiz sought to gain his favour by flattery. There is every reason to believe that this is an accurate statement of the case. The mere fact that he was selected to be the tutor of the heir-apparent, Ferdinand, afterwards King Ferdinand VII., is of itself a proof that he exerted himself to gain the goodwill of the reigning favourite. In 1797 he published a translation of Young's *Night Thoughts*, which does not of itself show that he was well acquainted with English, for the version may have been made with the help of the French. In 1798 he published a long and worthless so-called epic on the conquest of Mexico. Escoiquiz was in fact a busy and pushing member of the literary clique which looked up to Godoy as its patron. But his position as tutor to the heir to the throne excited his ambition. He began to hope that he might play the part of those court ecclesiastics who had often had an active share in the government of Spain. As Ferdinand grew up, and after his marriage with a Neapolitan princess, he became the centre of a court opposition to Godoy and to his policy of alliance with France. Escoiquiz was the brains, as far as there were any brains, of the intrigue. His activity was so notorious that he was exiled from court, but was consoled by a canonry at Toledo. This half measure was as ineffective as was to have been expected. Escoiquiz continued to be in constant communication with the prince. Toledo is close to Madrid, and the correspondence was easily maintained. He had a large share in the conspiracy of the Escorial which was detected on the 28th of October 1807. He was imprisoned and sent for trial with other conspirators. But as they had appealed to Napoleon, who would not suffer his name to be mentioned, the government had to allow the matter to be hushed up, and the prisoners were acquitted. After the outbreak at Aranjuez on the 17th of March 1808, in which he had a share, he became one of the most trusted advisers of Ferdinand. The new king's decision to go to meet Napoleon at Bayonne was largely inspired by him. In 1814 Escoiquiz published at Madrid his *Idea Sencilla de las razones que motivaron el viage del Rey Fernando VII. à Bayona* (Honest representation of the causes which inspired the journey of King Ferdinand VII. to Bayonne).

It is a valuable historical document, and contains a singularly vivid account of an interview with Napoleon. Escoiquiz was far too firmly convinced of his ingenuity and merits to conceal the delusions and follies of himself and his associates. He displays his own vanity, frivolity and futile cleverness with much unconscious humour, but, it is only fair to allow, with some literary dexterity. When the Spanish royal family was imprisoned by Napoleon, Escoiquiz remained with Ferdinand at Valençay. In 1813 he published at Bourges a translation of Milton's *Paradise Lost*. When Ferdinand was released in 1814 he came back to Madrid in the hope that his ambition would now be satisfied, but the king was tired of him, and was moreover resolved never to be subjected by any favourite. After a very brief period of office in 1815 he was sent as a prisoner to Murcia. Though he was afterwards recalled, he was again exiled to Ronda, where he died on the 27th of November 1820.

ESCOMBE, HARRY (1838–1899), South African statesman, a member of a Somersetshire family, was born at Notting Hill, London, on the 25th of July 1838, and was educated at St Paul's school. After four years in a stockbroker's office, he emigrated, in 1859, to the Cape. The following year he moved to Natal, and, after trying other occupations, qualified as an attorney. He became recognized as the ablest pleader in the colony, and, in 1872, was elected for Durban as a member of the legislative council, and subsequently was also placed on the executive council. In 1880 he secured the appointment of a harbour board for Natal, and was himself made chairman. The transformation of the port of Durban into a harbour available for ocean liners was due entirely to his energy. In 1888–1889 he defended Dinizulu and other Zulu chiefs against a charge of high treason. For several years he opposed the grant of responsible government to Natal, but by 1890 had become convinced of its desirability, and on its conferment in 1893 he joined the first ministry formed, serving under Sir John Robinson as attorney-general. In February 1897, on Sir John's retirement, Escombe became premier, remaining attorney-general and also holding the office of minister of education and minister of defence. In the summer of that year he was in London with the other colonial premiers at the celebration of the Diamond Jubilee of Queen Victoria, and was made a member of the privy council. Cambridge University conferred upon him the honorary degree of LL.D. The election that followed his return to Natal proved unfavourable to his policy, and he resigned office (October 1897). Throughout his life he took an active interest in national defence. He had served in the Zulu War of 1879, was commander of the Natal Naval Volunteers and received the volunteer long service decoration. In October 1899 he went to the northern confines of the colony to take part in preparing measures of defence against the invasion by the Boers. He died on the 27th of December 1899.

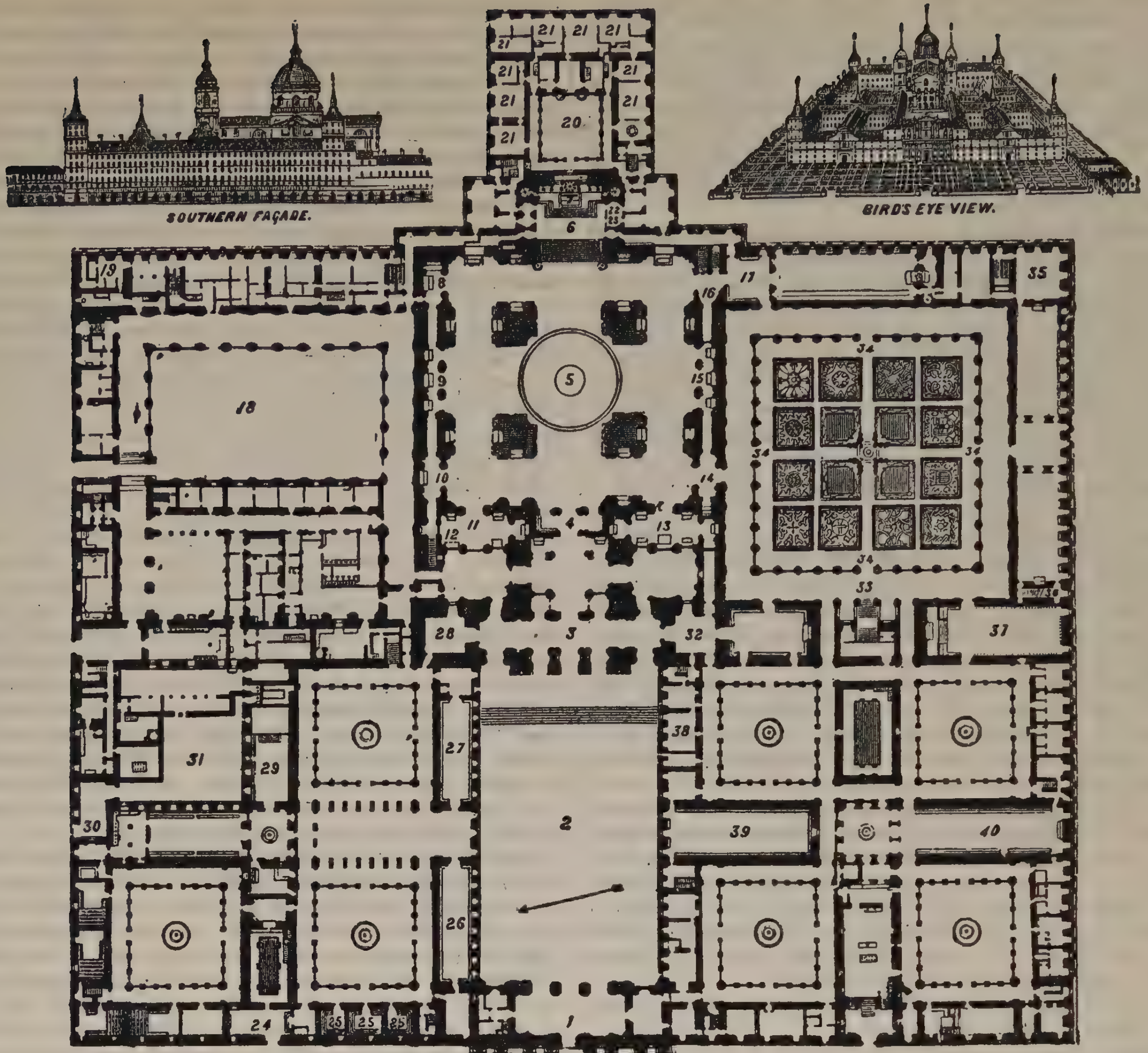
The *Speeches of the late Right Hon. Harry Escombe* (Maritzburg, 1903), edited by J. T. Henderson, contains brief biographical notes by Sir John Robinson and the editor.

ESCORIAL, or Escurial, in Spain, one of the most remarkable buildings in Europe, comprising at once a convent, a church, a palace and a mausoleum. The Escorial is situated 3432 ft. above the sea, on the south-western slopes of the Sierra de Guadarrama, and thus within the borders of the province of Madrid and the kingdom of New Castile. By the Madrid-Ávila railway it is 31 m. N.W. of Madrid. The surrounding country is a sterile and gloomy wilderness exposed to the cold and blighting blasts of the Sierra.

According to the usual tradition, which there seems no sufficient reason to reject, the Escorial owes its existence to a vow made by Philip II. of Spain (1556–1598), shortly after the battle of St Quentin, in which his forces succeeded in routing the army of France. The day of the victory, the 10th of August 1557, was sacred to St Laurence; and accordingly the building was dedicated to that saint, and received the title of *El real monasterio de San Lorenzo del Escorial*. The last distinctive epithet was derived from the little hamlet in the vicinity which furnished shelter, not only to the workmen, but to the monks of St Jerome who were afterwards to be in possession of the monastery; and the hamlet itself is generally but perhaps erroneously supposed to be indebted for its name to the *scoriae* or dross of certain old iron mines. The preparation of the plans and the superintendence of the work were entrusted by the king to Juan Bautista de Toledo, a Spanish architect who had received most of his professional education in Italy. The first stone was laid in April 1563; and under the king's personal inspection the work rapidly advanced. Abundant supplies of *berroqueña*, a granite-like stone, were obtained in the neighbourhood, and for rarer materials the resources of both the Old and the New World were put under contribution. The death of Toledo in 1567 threatened a fatal blow at the satisfactory completion of the enterprise, but a worthy successor was found in Juan Herrera, Toledo's favourite pupil, who adhered in the main to his master's designs. On the 13th of September 1584 the last stone of the masonry was laid, and the works were brought to a termination in 1593. Each successive occupant of the Spanish throne has done something, however slight, to the restoration or adornment of Philip's convent-palace, and Ferdinand VII. (1808–1833) did so much in this way that he has been called a second founder. In all its principal features, however, the Escorial remains what it was made by the genius of Toledo and Herrera working out the grand, if abnormal, desires of their master.

The ground plan of the building is estimated to occupy an area of 396,782 sq. ft., and the total area of all the storeys would form a causeway 1 metre in breadth and 95 m. in length. There are seven towers, fifteen gateways and, according to Los Santos, no fewer than 12,000 windows and doors. The general arrangement is shown by the accompanying plan. Entering by the main entrance the visitor finds himself in an atrium, called the Court of the Kings (*Patio de los reyes*), from the 16th-century statues of the kings of Judah, by Juan Bautista Monegro, which adorn the façade of the church. The sides of the atrium are unfortunately occupied by plain ungainly buildings five storeys in height, awkwardly accommodating themselves to the upward slope of the ground. Of the grandeur of the church itself, however, there can be no question: it is the finest portion of the whole Escorial, and, according to Fergusson, deserves to rank as one of the great Renaissance churches of Europe. It is about 340 ft. from east to west by 200 from north to south, and thus occupies an area of about 70,000 sq. ft. The dome is 60 ft. in diameter, and its height at the centre is about 320 ft. In glaring contrast to the bold and simple forms of the architecture, which belongs to the Doric style, were the bronze and marbles and pictures of the high altar, the masterpiece of the Milanese Giacomo Trezzo, almost ruined by the French in 1808. Directly under the altar is situated the pantheon or royal mausoleum, a richly decorated octagonal chamber with upwards of twenty niches, occupied by black marble *urnas* or sarcophagi, kept sacred for the dust of kings or mothers of kings. There are the remains of Charles V. (1516–1556), of Philip II., and of all their successors on the Spanish throne down to Ferdinand VII., with the exception of Philip V. (1700–1746) and Ferdinand VI. (1746–1759). Several of the sarcophagi are still empty. For the other members of the royal family there is a separate vault, known as the *Panteon de los Infantes*, or more familiarly by the dreadfully suggestive name of *El Pudridero*. The most interesting room in the palace is Philip II.'s cell, from which through an opening in the wall he could see the celebration of mass while too ill to leave his bed.

The library, situated above the principal portico, was at one time one of the richest in Europe, comprising the king's own collection, the extensive bequest of Diego de Mendoza, Philip's ambassador to Rome, the spoils of the emperor of Morocco, Muley Zidan (1603–1628) and various contributions from convents, churches and cities. It suffered greatly in the fire of 1671, and has since been impoverished by plunder and neglect. Among its curiosities still extant are two New Testament Codices of the 10th century and two of the 11th; various works by Alphonso the Wise (1252–1284), a Virgil of the 14th century, a Koran of the 15th, &c. Of the Arabic manuscripts which it contained in the 17th century a catalogue was given in J. H. Hottinger's



Views and Plan of the Escorial.[1]

CHURCH
1. Principal entrance and portico.
2. Court of the kings (*Patio de los reyes*).
3. Vestibule of the church.
4. Choir of the seminarists.
5. Centre of the church and projection of the dome.
6. Greater chapel.
7. High altar.
8. Chapel of St John.
9. Chapel of St Michael.
10. Chapel of St Maurice.
11. Chapel of the Rosary.
12. Tomb of Louisa Carlota.
13. Chapel of the *Patrocinio*.
14. Chapel of the *Cristo de la buena muerte*.
15. Chapel of the Eleven Thousand Virgins.
16. Former Chapel of the *Patrocinio*.
17. Sacristy.

PALACE
18. Principal court of the palace.
19. Ladies' tower.
20. Court of the masks.
21. Apartments of the royal children.
22. Royal oratory.
23. Oratory where Philip II. died.

SEMINARY
24. Entrance to seminary.
25. Classrooms.
26. Old philosophical hall.
27. Old theological hall.
28. Chamber of secrets.
29. Old refectory.
30. Entrance to the college.
31. College yard.

CONVENT
32. Clock tower.
33. Principal cloister.
34. Court of the evangelists.
35. Prior's cell.
36. Archives.
37. Old church.
38. Visitors' hall.
39. Manuscript library.
40. Convent refectory.

Promptuarium sive bibliotheca orientalis, published at Heidelberg in 1658, and another in the 18th, in M. Casiri's *Bibliotheca Arabico-Hispanica* (2 vols., Madrid, 1760–1770). Of the artistic treasures with which the Escorial was gradually enriched, it is sufficient to mention the frescoes of Peregrin or Pellagrino Tibaldi, Luis de Carbajal, Bartolommeo Carducci or Carducho, and Luca Giordano, and the pictures of Titian, Tintoretto and Velasquez. These paintings all date from the 15th or the 17th century. Many of those that are movable have been transferred to Madrid, and many others have perished by fire or sack. The conflagration of 1671, already mentioned, raged for fifteen days, and only the church, a part of the palace, and two towers escaped uninjured. In 1808 the whole building was exposed to the ravages of the French soldiers under General La Houssaye. On the night of the 1st of October 1872, the college and seminary, a part of the palace and the upper library were devastated by fire; but the damage was subsequently repaired. In 1885 the conventual buildings were occupied by Augustinian monks.

The reader will find a remarkable description of the emotional influence of the Escorial in E. Quinet's *Vacances en Espagne* (Paris, 1846), and for historical and architectural details he may consult the following works:—Fray Juan de San Geronimo, *Memorias sobre la fundacion del Escorial y su fabrica*, in the *Coleccion de documentos ineditos para la historia de España*, vol. vii.; Y. de Herrera, *Sumario y breve declaracion de los diseños y estampas de la fab. de S. Lorencio el Real del Escurial* (Madrid, 1589); José de Siguenza, *Historia de la orden de San Geronyno*, &c. (Madrid, 1590).

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[1] Reduced from a large plan of the Escorial in the British Museum, *Monasterio del Escorial*, published at Madrid in 1876.

L. de Cabrera de Cordova, *Felipe Segundo* (Madrid, 1619); James Wadsworth, *Further Observations of the English Spanish Pilgrime* (London, 1629, 1630); Ilario Mazzorali de Cremona, *Le Reali Grandezze del Escuriale* (Bologna, 1648); De los Santos, *Descripcion del real monasterio*, &c. (Madrid, 1657); Andres Ximenes, *Descripcion*, &c. (Madrid, 1764); Y. Quevedo, *Historia del Real Monasterio*, &c. (Madrid, 1849); A. Rotondo, *Hist. artistica, . . . del monasterio de San Lorenzo* (Madrid, 1856–1861); W. H. Prescott, *Life of Philip II.* (London, 1887); J. Fergusson, *History of the Modern Styles of Architecture* (London, 1891–1893); Sir W. Stirling-Maxwell, *Annals of the Artists of Spain* (London, 1891).

ESCOVEDO, JUAN DE (*d.* 1578), Spanish politician, secretary of Don John of Austria, and chiefly notable as having been the victim of one of the mysteries of the 16th century, began life in the household of Ruy Gomez de Silva, prince of Eboli, the most trusted minister of the early years of the reign of Philip II. By the will of the prince he was endowed for life with the post of *Regidor*, or legal representative of the king in the municipality of Madrid. He was also associated with Antonio Perez as one of the secretaries who acted as the agents of the king in all dealings with the various governing boards which formed the Spanish administration. When Don John of Austria, after the battle of Lepanto in 1571, began to launch on a policy of self-seeking adventure, Escovedo was appointed as his secretary with the intention that he should act as a check on these follies. Unhappily for himself and for Don John he went heart and soul into all the prince's schemes. He began to disobey orders from Madrid and became entangled in intrigues to manage or even to coerce the king. In July 1577, and contrary to the king's orders, he came to Spain from Flanders, where Don John was then governor. It is said that he discovered the love intrigue between Antonio Perez and the widowed princess of Eboli, Ana Mendoza de la Cerda. This is, however, mere gossip and supposition. There can be no doubt that he was a busy intriguer, or that the king, acting on the then very generally accepted doctrine that the sovereign has a right to act for the public interest without regard to forms of law, gave orders to Antonio Perez that he was to be put out of the way. After two clumsy attempts had been made to poison him at Perez's table, he was killed by bravos on the night of Easter Monday, the 31st of March 1578. According to an old tradition the murder took place outside the church of St Maria in Madrid, which was pulled down in 1868.

See Gaspar Muro, *La Princesse d'Eboli* (Paris, 1878); and W. H. Prescott, *Reign of Philip II.* (1855–59).

ESCUINTLA, the capital of the department of Escuintla, Guatemala; on the southern slope of the Sierra Madre, 45 m. S.W. of Guatemala city. Pop. (1905) about 12,000. Escuintla is locally celebrated for its hot mineral springs. It is the commercial centre of a fertile district, which produces coffee, cane-sugar and cocoa; it has also a brisk transit trade in most of the products of Guatemala, owing to its position on the interoceanic railway between Puerto Barrios on the Atlantic and San José (30 m. S.) on the Pacific. A branch railway which goes westward to San Augustin meets this line at Escuintla.

ESCUTCHEON (O. Fr. *escucheon*, *escusson*, modern *écusson*, through a Late Lat. form from Lat. *scutum*, shield), an heraldic term for a shield with armorial bearings displayed (see HERALDRY). The word is also applied to the shields used on tombs, in the spandrils of doors or in string-courses, and to the ornamented plates from the centre of which door-rings, knockers, &c., are suspended, or which protect the wood of the key-hole from the wear of the key. In medieval times these were often worked in a very beautiful manner.

ESHER, WILLIAM BALIOL BRETT, 1ST VISCOUNT (1817–1899), English lawyer and master of the rolls, was a son of the Rev. Joseph G. Brett, of Chelsea, and was born on the 13th of August 1817. He was educated at Westminster and at Caius College, Cambridge. Called to the bar in 1840, he went the northern circuit, and became a Q.C. in 1861. On the death of Richard Cobden he unsuccessfully contested Rochdale as a Conservative, but in 1866 was returned for Helston in unique circumstances. He and his opponent polled exactly the same number of votes, whereupon the mayor, as returning officer, gave his casting vote for the Liberal candidate. As this vote was given after four o'clock, however, an appeal was lodged, and the House of Commons allowed both members to take their seats. Brett rapidly made his mark in the House, and in 1868 he was appointed solicitor-general. On behalf of the crown he prosecuted the Fenians charged with having caused the Clerkenwell explosion. In parliament he took a leading part in the promotion of bills connected with the administration of law and justice. He was (August 1868) appointed a justice in the court of common pleas. Some of his sentences in this capacity excited much criticism, notably so in the case of the gas stokers' strike, when he sentenced the defendants to imprisonment for twelve months, with hard labour, which was afterwards reduced by the home secretary to four months. On the reconstitution of the court of appeal in 1876, Brett was elevated to the rank of a lord justice. After holding this position for seven years, he succeeded Sir George Jessel as master of the rolls in 1883. In 1885 he was raised to the House of Lords as Baron Esher. He opposed the bill proposing that an accused person or his wife might give evidence in their own case, and supported the bill which empowered lords of appeal to sit and vote after their retirement. The Solicitors Act of 1888, which increased the powers of the Incorporated Law Society, owed much to his influence. In 1880 he delivered a remarkable speech in the House of Lords, deprecating the delay and expense of trials, which he regarded as having been increased by the Judicature Acts. Lord Esher suffered, perhaps, as master of the rolls from succeeding a lawyer of such eminence as Jessel. He had a caustic tongue, but also a fund of shrewd common sense, and one of his favourite considerations was whether a certain course was "business" or not. He retired from the bench at the close of 1897, and a viscounty was conferred upon him on his retirement, a dignity never given to any judge, lord chancellors excepted, "for mere legal conduct since the time of Lord Coke." He died in London on the 24th of May 1899.

Lord Esher was succeeded in the title by his only surviving son, Reginald Baliol Brett (*b.* 1852), who was secretary to the office of works from 1895 to 1902, but subsequently came into far greater public prominence in 1904 as chairman of the war office reconstitution committee after the South African War.

ESHER, a township in the Epsom parliamentary division of Surrey, England, 14½ m. S.W. of London by the London & South Western railway (Esher and Claremont station). It is pleasantly situated on rising ground above the river Mole, 3 m. from its junction with the Thames. To the north-west lie the grounds of Esher Place. Of the mansion-house founded by William of Waynflete, bishop of Winchester (*c.* 1450), in which Cardinal Wolsey resided for three or four weeks after his sudden fall from power in 1529, only the gatehouse remains. It is known as Wolsey's Tower, but is apparently part of Waynflete's foundation. A new mansion was erected in 1803. To the south is Claremont Palace, built by the great Lord Clive (1769) on the site of a mansion of Sir John Vanbrugh. In 1816 it was the residence of Princess Charlotte, wife of Prince (afterwards King) Leopold. She died here in 1817, and on the death of her husband in 1865 the property passed to the crown. Louis Philippe, ex-king of the French, resided here from 1848 until his death in 1850. In 1882 Claremont became the private property of Queen Victoria. Christ Church, Esher, contains fine memorials of King Leopold and others, and one of its three bells is said to have been brought from San Domingo by Sir Francis Drake. To the north near the railway station is Sandown Park, where important race meetings are held. Esher is included in the urban district of Esher and The Dittons, of which Thames Ditton is a favourite riverside resort. The whole district is largely residential. Pop. (1901) 9489.

ESKER (O. Irish *eiscir*), a local name for long mounds of glacial gravel frequently met with in Ireland. Eskers (the Swedish *åsar*) are among the occasionally puzzling relics of the British glacial period. They wind from side to side across glaciated country and have evidently been formed by channels upon or under the ice. "Where streams of considerable size form tunnels under or in the ice these may become more or less filled with wash, and when the ice melts the aggraded channels appear as long ridges of gravel and sand known as *eskers*. It has been thought that similar ridges are sometimes formed in valleys cut in the ice from top to bottom, and even that they rise from gravel and sand lodged in super-glacial channels. The latter at least is probably rare, as the surface streams have usually high gradients, swift currents and smooth bottoms, and hence give little opportunity for lodgment. In the case of ice-sheets, too, in which eskers are chiefly developed, there is usually no surface material except at the immediate edge, where the ice is thin and its layers upturned" (T. C. Chamberlin and R. D. Salisbury, *Geology, Processes and their Results*). Eskers are to be distinguished from kames (*q.v.*).

ESKILSTUNA, a town of Sweden in the district (*län*) of Södermanland, on the Hjelmar river, which unites lakes Hjelmar and Mälar, 65 m. W. of Stockholm by rail. Pop. (1900) 13,663. The place is mentioned in the 13th century, and is said to derive its name from Eskil, an English missionary who suffered martyrdom on the spot. It rose into importance in the reign of Charles X., who bestowed on it considerable privileges, and gave the first impulse to its manufacturing activity. It is the chief seat in Sweden of the iron and steel industries, its cutlery being especially noted, while damascened work is a specialty. There is a technical school for the metal industries. There are, in the town or its neighbourhood, great engineering, gun-making, and rolling and polishing works and breweries. The largest mechanical works are those of Munktell and Tunafors. The Karl Gustaf Stads rifle factory was established in 1814.

ESKIMO, Eskimos or Esquimaux (a corruption of the Abnaki Indian *Eskimantsic* or the Ojibway *Ashkimeq*, both terms meaning "those who eat raw flesh": they call themselves "Innuit," "the people"), a North American Indian people, inhabiting the arctic coast of America from Greenland to Alaska, and a small portion of the Asiatic shore of Bering Strait. On the American shores they are found, in broken tribes, from East Greenland to the western shores of Alaska—never far inland, or south of the region where the winter ice allows seals to congregate. Even on hunting expeditions they never travel more than 30 m. from the coast. Save a slight admixture of European settlers, they are the only inhabitants of both sides of Davis Strait and Baffin Bay. They extend as far south as about 50° N. lat. on the eastern side of America, and in the west to 60° on the eastern shore of Bering Strait, while 55° to 60° are their southern limits on the shore of Hudson Bay. Throughout all this range there are no other tribes save where the Kennayan and Ugalenze Indians (of western America) come down to the shore to fish. The Aleutians are closely allied to the Eskimo in habits and language. H. J. Rink divides the Eskimo into the following groups, the most eastern of which would have to travel nearly 5000 m. to reach the most western: (1) The East Greenland Eskimo, few in number, every year advancing farther south, and coming into contact with the next section. (2) The West Greenlanders, civilized, living under the Danish crown, and extending from Cape Farewell to 74° N. lat. (3) The Northernmost Greenlanders—the Arctic Highlanders of Sir John Ross—confined to Smith, Whale, Murchison and Wolstenholme Sounds, north of the Melville Bay glaciers. These—the most isolated and uncivilized of all the Eskimo—had no boats or bows and arrows until about 1868. (4) The Labrador Eskimo, mostly civilized. (5) The Eskimo of the middle regions, occupying the coasts from Hudson Bay to Barter Island, beyond Mackenzie river, inhabiting a stretch of country 2000 m. in length and 800 in breadth. (6) The Western Eskimo, from Barter Island to the western limits in America. (7) The Asiatic Eskimo.

The Eskimo are not a tall race, their height varying from 5 ft. 4 in. to 5 ft. 10 in., but men of 6 ft. are met. Both men and women are muscular and active, the former often inclining to fat. The faces of both have a pleasing, good-humoured expression, and not infrequently are even handsome. The typical face is broadly oval, flat, with fat cheeks; forehead not high, and rather retreating; teeth good, though, owing to the character of the food, worn down to the gums in old age; nose very flat; eyes rather obliquely set, small, black and bright; head largish, and covered with coarse black hair, which the women fasten up into a knot on the top, and the men clip in front and allow to hang loose and unkempt behind. Their skulls are of the mesocephalic type, the height being greater than the breadth; according to Davis, 75 is the index of the latter and 77 of the former. Some of the tribes slightly compress the skulls of their new-born children laterally (Hall), but this practice is a very local one. The men have usually a slight moustache, but no whiskers, and rarely any beard. The skin has generally a "bacony" feel, and when cleaned of the smoke, grease and other dirt—the accumulation of which varies according to the age of the individual—is only so slightly brown that red shows in the cheeks of the children and young women. The hands and feet are small and well formed. The Eskimo dress entirely in skins of the seal, reindeer, bear, dog, or even fox, the first two being, however, the most common. The men's and women's dress is much the same, a jacket suit, the trousers tucked into seal-skin boots. The jacket has a hood, which in cold weather is used to cover the head, leaving only the face exposed. The women's jacket has a large hood for carrying a child and an absurd-looking tail behind, which is, however, usually tucked up. The women's trousers are usually ornamented with eider-duck neck feathers or embroidery of native dyed leather; their boots, which are of white leather, or (in Greenland) dyed of various colours, reach over the knees, and in some tribes are very wide at the top, thus giving them an awkward appearance and a clumsy waddling walk. In winter two suits are worn, one with the hair inside, the other with it outside. They also sometimes wear shirts of bird-skins, and stockings of dog or young reindeer skins. Their clothes are very neatly made, fit beautifully, and are sewn with "sinew-thread," with a bone needle if a steel one cannot be had. In person the Eskimo are usually filthy, and never wash. Infants are, however, sometimes cleaned by being licked by their mother before being put into the bag of feathers which serves as their bed, cradle and blankets.

In summer the Eskimo live in conical skin tents, and in winter usually in half-underground huts of stone, turf, earth and bones, entered by a long tunnel-like passage, which can only be traversed on all fours. Sometimes, if residing temporarily at a place, they will erect neat round huts of blocks of snow with a sheet of ice for a window. In the roof are deposited their spare harpoons, &c.; and from it is suspended the steatite basin-like lamp, the flame of which, the wick being of moss, serves as fire and light. On one side of the hut is the bench which is used as sofa, seats and common sleeping place. The floor is usually very filthy, a pool of blood or a dead seal being often to be seen there. Ventilation is almost non-existent; and after the lamp has blazed for some time, the heat is all but unbearable. In the summer the wolfish-looking dogs lie outside on the roof of the huts, in the winter in the tunnel-like passage just outside the family apartment. The Western Eskimo build their houses chiefly of planks, merely covered on the outside with green turf. The same Eskimo have, in the more populous places, a public room for meetings. "Council chambers" are also said to exist in Labrador, but are only known in Greenland by tradition. Sometimes in south Greenland and in the Western Eskimo country the houses are made to accommodate several families, but as a rule each family has a house to itself.

The Eskimo are solely hunters and fishers, and derive most of their food from the sea. Their country allows of no cultivation; and beyond a few berries, roots, &c., they use no vegetable food. The seal, the reindeer and the whale supply the bulk of their food, as well as their clothing, light, fuel, and frequently also, when driftwood is scarce or unavailable, the material for various articles of domestic economy. Thus the Eskimo canoe is made of seal-skin stretched on a wooden or whalebone frame, with a hole in the centre for the paddler. It is driven by a bone-tipped double-bladed paddle. A waterproof skin or entrail dress is tightly fastened round the mouth of the hole so that, should the canoe overturn, no water can enter. A skilful paddler can turn a complete somersault, boat and all, through the water.

The Eskimo women use a flat-bottomed skin luggage-boat. The Eskimo sledge is made of two runners of wood or bone—even, in one case on record, of frozen salmon (Maclure)—united by cross bars tied to the runners by hide thongs, and drawn by from 4 to 8 dogs harnessed abreast. Some of their weapons are ingenious—in particular, the harpoon, with its detachable point to which an inflated sealskin is fastened. When the quarry is struck, the floating skin serves to tire it out, marks its course, and buoys it up when dead. The bird-spears, too, have a bladder attached, and points at the sides which strike the creature should the spear-head fail to wound. An effective bow is made out of whale's rib. Altogether, with meagre material the Eskimo show great skill in the manufacture of their weapons. Meat is sometimes boiled, but, when it is frozen, it is often eaten raw. Blood, and the half-digested contents of the reindeer's paunch, are also eaten; and sometimes, but not habitually, blubber. As a rule this latter is too precious: it must be kept for winter fuel and light. The Eskimo are enormous eaters; two will easily dispose of a seal at a sitting; and in Greenland, for instance, each individual has for his daily consumption, on an average, 2½ ℔ of flesh with blubber, and 1 ℔ of fish, besides mussels, berries, sea-weed, &c., to which in the Danish settlements may be added 2 oz. of imported food. Ten pounds of flesh, in addition to other food, is not uncommonly consumed in a day in time of plenty. A man will lie on his back and allow his wife to feed him with tit-bits of blubber and flesh until he is unable to move.

The Eskimo cannot be strictly called a wandering race. They are nomadic only in so far that they have to move about from place to place during the fishing and shooting season, following the game in its migrations. They have, however, no regular property. They possess only the most necessary utensils and furniture, with a stock of provisions for less than one year; and these possessions never exceed certain limits fixed upon by tradition or custom. Long habit and the necessities of their life have also compelled those having food to share with those having none—a custom which, with others, has conduced to the stagnant conditions of Eskimo society and to their utter improvidence.

Their intelligence is considerable, as their implements and folk-tales abundantly prove. They display a taste for music, cartography and drawing, display no small amount of humour, are quick at picking up peculiar traits in strangers, and are painfully acute in detecting the weak points or ludicrous sides of their character. They are excellent mimics and easily learn the dances and songs of the Europeans, as well as their games, such as chess and draughts. They gamble a little—but in moderation, for the Eskimo, though keen traders, have a deep-rooted antipathy to speculation. When they offer anything for sale—say at a Danish settlement in Greenland—they always leave it to the buyer to settle the price. They have also a dislike to bind themselves by contract. Hence it was long before the Eskimo in Greenland could be induced to enter into European service, though when they do they pass to almost the opposite extreme—they have no will of their own. Public licentiousness or indecency is rare among them. In their private life their morality is, however, not high. The women are especially erring; and in Greenland, at places where strangers visit, their extreme laxity of morals, and their utter want of shame, are not more remarkable than the entire absence of jealousy or self-respect on the part of their countrymen and relatives. Theft in Greenland is almost unknown; but the wild Eskimo make very free with strangers' goods—though it must be allowed that the value they attach to the articles stolen is some excuse for the thieves. Among themselves, on the other hand, they are very honest—a result of their being so much under the control of public opinion. Lying is said to be as common a trait of the Eskimo as of other savages in their dealings with Europeans. They have naturally not made any figure in literature. Their folk-lore is, however, extensive, and that collected by Dr Rink shows considerable imagination and no mean talent on the part of the story-tellers. In Greenland and Labrador most of the natives have been taught by the missionaries to read and write in their own language. Altogether, the literature published in the Eskimo tongue is considerable. Most of it has been printed in Denmark, but some has been "set up" in a small printing-office in Greenland, from which about 280 sheets have issued, beside many lithographic prints. A journal (*Atuagagldliutit nalinginarmik tusaruminásassumik univkat*, *i.e.* "something for reading, accounts of all entertaining subjects") has been published since 1861.

The Eskimo in Greenland and Labrador are, with few exceptions, nominally at least, Christians. The native religion is a vague animism, and consists of a belief in good and evil spirits, limited each to its own sphere; in a Heaven and Hell; and a childish faith is placed in the native wizards, who are regarded as intermediaries between mankind and the spirit-powers. The worship of the whale-spirit, so important a factor in their daily economy, is prevalent.

As regards language, the idiom spoken from Greenland to north-eastern Siberia is, with a few exceptions, the same; any difference is only that of dialect. It differs from the whole group of European languages, not merely in the sound of the words, but more especially, according to Rink, in the construction. Its most remarkable feature is that a sentence of a European language is expressed in Eskimo by a single word constructed out of certain elements, each of which corresponds in some degree to one of our words. One specimen commonly given to visitors to Greenland may suffice: *Savigiksiniariartokasuaromaryotittogog*, which is equivalent to "He says that you also will go away quickly in like manner and buy a pretty knife." Here is one word serving in the place of 17. It is made up as follows: *Savig* a knife, *ik* pretty, *sini* buy, *ariartok* go away, *asuar* hasten, *omar* wilt, *y* in like manner, *otit* thou, *tog* also, *og* he says.

The Eskimo have no chiefs or political and military rulers. Fabricius concisely described them in his day: "*Sine Deo, domino, reguntur consuetudine.*" The government is mainly a family one, though a man distinguished for skill in the chase, and for strength and shrewdness, often has considerable power in the village. No political or social tie is recognized between the villages, though general good-fellowship seems to mark their relations. They never go to war with each other; and though revengeful and apt to injure an enemy secretly, they rarely come to blows, and are morbidly anxious not to give offence. Indeed, in their intercourse with each other, all Eskimo indulge in much hyperbolical compliment. But they are not without courage. On the Coppermine and Mackenzie rivers, where they sometimes come into collision with their American-Indian kinsmen, they fight fiercely. Polygamy is rare, but the rights of divorce and re-marriage are unrestricted. The Eskimo have intricate rules governing the ownership of property and the rights of the hunter. As a race they are singularly undemonstrative. When they met each other they used to rub noses together, but this, though a common custom still among the wild Eskimo, is entirely abandoned in Greenland except for the petting of children. There is, in Greenland at least, no national mode of salutation, either on meeting or parting. When a guest enters a house, commonly not the least sign is made either by him or his host. On leaving a place they sometimes say "inûvdluaritse," *i.e.* live well, and to a European "aporniakinatit," *i.e.* do not hurt thy head, viz. against the upper part of the doorway. The Eskimo, excluding the few on the Asiatic coast, are estimated at about 29,000.

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ESKI-SHEHR, a town of Asia Minor, in the Kutaiah sanjak of the Brusa (Khudavendikiar) vilayet. It is a station on the Haidar Pasha-Angora railway, 194½ m. from the former and 164 m. from Angora, and the junction for Konia; and is situated on the right bank of the Pursak Su (*Tembris*), a tributary of the Sakaria, at the foot of the hills that border the broad treeless valley. Pop. 20,000 (Moslems 15,000, Christians 5000). Eski-Shehr, *i.e.* "the old town," lies about a mile from the ruins of the ancient Phrygian Dorylaeum. The latter is mentioned in connexion with the wars of Lysimachus and Antigonus (about 302 B.C.), and frequently figures in Byzantine history as an imperial residence and military rendezvous. It was the scene of the defeat of the Turks under Kilij-Arslan by the crusaders in 1097, and fell finally to the Turks of Konia in 1176. The town is divided by a small stream into a commercial quarter on low ground, in which are the bazaars, khans and the hot sulphur springs (122° F.) which are mentioned as early as the 3rd century by Athenaeus; and a residential quarter on the higher ground. The town is noted for its good climate, the Pursak Su for the abundance of its fish, and the plain for its fertility. About 18 m. to the E. are extensive deposits of meerschaum. The clay is partly manufactured into pipes in the town, but the greater proportion finds its way to Europe and especially to Germany. The annual output is valued at £272,000.

See Murray's *Hdbk. to Asia Minor* (1893); V. Cuinet, *Turquie d'Asie* (Paris, 1894).

ESMARCH, JOHANNES FRIEDRICH AUGUST VON (1823–1908), German surgeon, was born at Tönning, in Schleswig-Holstein, on the 9th of January 1823. He studied at Kiel and Göttingen, and in 1846 became B. R. K. von Langenbeck's assistant at the Kiel surgical hospital. He served in the Schleswig-Holstein War of 1848 as junior surgeon, and this directed his attention to the subject of military surgery. He was taken prisoner, but afterwards exchanged, and was then appointed as surgeon to a field hospital. During the truce of 1849 he qualified as *Privatdocent* at Kiel, but on the fresh outbreak of war he returned to the troops and was promoted to the rank of senior surgeon. In 1854 he became director of the surgical clinic at Kiel, and in 1857 head of the general hospital and professor at the university. During the Schleswig-Holstein War of 1864 Esmarch rendered good service to the field hospitals of Flensburg, Sundewitt and Kiel. In 1866 he was called to Berlin as member of the hospital commission, and also to take the superintendence of the surgical work in the hospitals there. When the Franco-German War broke out in 1870 he was appointed surgeon-general to the army, and afterwards consulting surgeon at the great military hospital near Berlin. In 1872 he married Princess Henrietta of Schleswig-Holstein-Sonderburg-Augustenburg, aunt of the Empress Auguste Victoria. In 1887 a patent of nobility was conferred on him. He died at Kiel on the 23rd of February 1908. Esmarch was one of the greatest authorities on hospital management and military surgery. His *Handbuch der kriegschirurgischen Technik* was written for a prize offered by the empress Augusta, on the occasion of the Vienna Exhibition of 1877, for the best handbook for the battlefield of surgical appliances and operations. This book is illustrated by admirable diagrams, showing the different methods of bandaging and dressing, as well as the surgical operations as they occur on the battlefield. Esmarch himself invented an apparatus, which bears his name, for keeping a limb nearly bloodless during amputation. No part of Esmarch's work is more widely known than that which deals with "First Aid," his *First Aid on the Battlefield* and *First Aid to the Injured* being popular manuals on the subject. The latter is the substance of a course of lectures delivered by him in 1881 to a "Samaritan School," the first of the kind in Germany, founded by Esmarch in 1881, in imitation of the St John's Ambulance classes which had been organized in England in 1878. These lectures were very generally adopted as a manual for first aid students, edition after edition having been called for, and they have been translated into numerous languages, the English version being the work of H.R.H. Princess Christian. No ambulance course would be complete without a demonstration of the Esmarch bandage. It is a three-sided piece of linen or cotton, of which the base measures 4 ft. and the sides 2 ft. 10 in. It can be used folded or open, and applied in thirty-two different ways. It answers every purpose for temporary dressing and field-work, while its great recommendation is that the means for making it are always at hand.

ESNA, or Esneh, a town of Upper Egypt on the W. bank of the Nile, 454 m. S.S.E. of Cairo by rail, the railway station being on the opposite side of the river. Pop. (1897) 16,000, mostly Copts. Esna, one of the healthiest towns in Egypt, is noted for its manufactures of pottery and its large grain and live stock markets. It formerly had a large trade with the Sudan. A caravan road to the south goes through the oasis of Kurkur. The trade, almost stopped by the Mahdist Wars, is now largely diverted by railway and steamboat routes. There is, however, considerable traffic with the oasis of Kharga, which lies almost due west of the town. Nearly in the centre of the town is the Ptolemaic and Roman temple of the ram-headed Khnūm, almost buried in rubbish and houses. The interior of the pronaos is accessible to tourists, and contains the latest known hieroglyphic inscription, dating from the reign of Decius (A.D. 249–251). With Khnūm are associated the goddesses Sati and Neith. In the neighbourhood are remains of Coptic buildings, including a subterranean church (discovered 1895) in the desert half a mile beyond the limits of cultivation. The name Esna is from the Coptic *Sne*. By the Greeks the place was called Latopolis, from the worship here of the latus fish. In the persecutions under Diocletian A.D. 303, the Christians of Esna, a numerous body, suffered severely. In later times the town frequently served as a place of refuge for political exiles. The so-called Esna barrage across the Nile (built 1906–1908) is 30 m. higher up stream at Edfu.

ESOTERIC, having an inner or secret meaning. This term, and its correlative "exoteric," were first applied in the ancient Greek mysteries to those who were initiated (ἔσω, within) and to those who were not (ἔξω, outside), respectively. It was then transferred to a supposed distinction drawn by certain philosophers between the teaching given to the whole circle of their pupils and that containing a higher and secret philosophy which was reserved for a select number of specially advanced or privileged disciples. This distinction was ascribed by Lucian (*Vit. Auct.* 26) to Aristotle (*q.v.*), who, however, uses ἐξωτερικοὶ λόγοι (*Nic. Ethics*) merely of "popular treatises." It was probably adopted by the Pythagoreans and was also attributed to Plato. In the sense of mystic it is used of a secret doctrine of theosophy, supposed to have been traditional among certain disciples of Buddhism.

ESPAGNOLS SUR MER, LES, the name given to the naval victory gained by King Edward III. of England over a Spanish fleet off Winchelsea, on the 29th of August 1350. Spanish ships had fought against England as the allies or mercenaries of France, and there had been instances of piratical violence between the trading ships of both nations. A Spanish merchant fleet was loading cargoes in the Flemish ports to be carried to the Basque coast. The ships were armed and had warships with them. They were all under the command of Don Carlos de la Cerda, a soldier of fortune who belonged to a branch of the Castilian royal family. On its way to Flanders the Spanish fleet had captured a number of English trading ships, and had thrown the crews overboard. Piratical violence and massacre of this kind was then universal on the sea. On the 10th of August, when the king was at Rotherhithe, he announced his intention of attacking the Spaniards on their way home. The rendezvous of his fleet was at Winchelsea, and thither the king went by land, accompanied by his wife and her ladies, by his sons, the Black Prince and John of Gaunt, as well as by many nobles. The ladies were placed in a convent and the king embarked on his flagship, the "Cog Thomas," on the 28th of August. The English fleet did not put to sea but remained at anchor, waiting for the appearance of the Spaniards. Its strength is not known with certainty, but Stow puts it at 50 ships and pinnaces. Carlos de la Cerda was obviously well disposed to give the king a meeting.

He might easily have avoided the English if he had kept well out in the Channel. But he relied on the size and strength of his 40 large ships, and in expectation of an encounter had recruited a body of mercenaries—mostly crossbowmen—in the Flemish ports. In the afternoon of the 29th of August he bore down boldly on King Edward's ships at anchor at Winchelsea. When the Spaniards hove in sight, the king was sitting on the deck of his ship, with his knights and nobles, listening to his minstrels who played German airs, and to the singing of Sir John Chandos. When the look-out in the tops reported the enemy in sight, the king and his company drank to one another's health, the trumpet was sounded, and the whole line stood out. All battles at that time, whether on land or sea, were finally settled by stroke of sword. The English steered to board the Spaniards. The king's own ship was run into by one of the enemy with such violence that both were damaged, and she began to sink. The Spaniard stood on, and the "Cog Thomas" was laid alongside another, which was carried by boarding. It was high time, for the king and his following had barely reached the deck of the Spaniard before the "Cog Thomas" went to the bottom. Other Spaniards were taken, but the fight was hot. La Cerda's crossbowmen did much execution, and the higher-built Spaniards were able to drop bars of iron or other weights on the lighter English vessels, by which they were damaged. The conflict was continued till twilight. At the close the large English vessel called "La Salle du Roi," which carried the king's household, and was commanded by the Fleming, Robert of Namur, afterwards a knight of the Garter, was grappled by a big Spaniard, and was being dragged off by him. The crew called loudly for a rescue, but were either not heard or, if heard, could not be helped. The "Salle du Roi" would have been taken if a Flemish squire of Robert of Namur, named Hannequin, had not performed a great feat of arms. He boarded the Spaniard and cut the halyards of her mainsail with his sword. The Spanish ship was taken. King Edward is said to have captured 14 of the enemy. What his own loss was is not stated, but as his own vessel, and also the vessel carrying the Black Prince, were sunk, and from the peril of "La Salle du Roi," we may conclude that the English fleet suffered heavily. There was no pursuit, and a truce was made with the Basque towns the next year.

The battle with "the Spaniards on the sea" is a very typical example of a medieval sea-fight, when the ships were of the size of a small coaster or a fishing smack, were crowded with men, and when the personal prowess of a single knight or squire was an important element of strength.

The only real authority for the battle is Froissart, who was at different times in the service of King Edward or of his wife, Philippa of Hainaut, and of the counts of Namur. He repeated what was told him by men who had been present, and dwells as usual on the "chivalry" of his patrons. See his *Chroniques*, iv. 91. (D. H.)

ESPALIER (a French word, derived from the Ital. *spalliera*, something to rest the *spalla* or shoulder against; the word is ultimately the same as *épaulière*, a shoulder-piece), a lattice-work or row of stakes, originally shoulder high, on which fruit trees, shrubs and flowers, particularly roses and creepers, are trained. Espaliers are usually made of larch or other wood, iron and metal rails being too great conductors of heat and cold. The advantage of this method of training is that the fruit, &c., is more easily got at, and while protected from wind, is freely exposed to sun and air, and not so open to extreme changes of temperature as when trained on a wall. (See HORTICULTURE.)

ESPARTERO, BALDOMERO (1792–1879), duke of Vitoria, duke of Morella, prince of Vergara, Count Luchana, knight of the Toison d'Or, &c. &c., Spanish soldier and statesman, was born at Granatulu, a town of the province of Ciudad Real, on the 27th of February 1792. He was the ninth child of a carter, who wanted to make him a priest, but the lad at fifteen enlisted in a battalion of students to fight against the armies of Napoleon I. In 1811 Espartero was appointed a lieutenant of Engineers in Cadiz, but having failed to pass his examination he entered a line regiment. In 1815 he went to America as a captain under General Morillo, who had been made commander-in-chief to quell the risings of the colonies on the Spanish Main. For eight years Espartero distinguished himself in the struggle against the colonists. He was several times wounded, and was made major and colonel on the battlefields of Cochabamba and Sapachni. He had to surrender to Sucre at the final battle of Ayacucho, which put an end to Castilian rule. He returned to Spain, and, like most of his companions in arms, remained under a cloud for some time. He was sent to the garrison town of Logroño, where he married the daughter of a rich landowner, Doña Jacinta Santa Cruz, who eventually survived him. Henceforth Logroño became the home of the most prominent of the Spanish political generals of the 19th century. Espartero became in 1832, on the death of King Ferdinand VII., one of the most ardent defenders of the rights of his daughter, Isabella II. The government sent him to the front, directly the Carlist War broke out, as commandant of the province of Biscay, where he severely defeated the Carlists in many encounters. He was quickly promoted to a divisional command, and then made a lieutenant-general. At times he showed qualities as a *guerillero* quite equal to those of the Carlists, like Zumalacarregui and Cabrera, by his daring marches and surprises. When he had to move large forces he was greatly superior to them as an organizer and strategist, and he never disgraced his successes by cruelty or needless severity. Twice he obliged the Carlists to raise the siege of Bilbao before he was appointed commander-in-chief of the northern army on the 17th of September 1836, when the tide of war seemed to be setting in favour of the pretender in the Basque provinces and Navarre, though Don Carlos had lost his ablest lieutenant, the Basque Zumalacarregui. His military duties at the head of the principal national army did not prevent Espartero from showing for the first time his political ambition. He displayed such radical and reforming inclinations that he laid the foundations of his popularity among the lower and middle classes, which lasted more than a quarter of a century, during which time the Progressists, Democrats and advanced Liberals ever looked to him as a leader and adviser. In November 1836 he again forced the Carlists to raise the siege of Bilbao. His troops included the British legion under Sir de Lacy Evans. This success turned the tide of war against Don Carlos, who vainly attempted a raid towards Madrid. Espartero was soon at his heels, and obliged him to hurry northwards, after several defeats. In 1839 Espartero carefully opened up negotiations with Maroto and the principal Carlist chiefs of the Basque provinces. These ended in their accepting his terms under the famous convention of Vergara, which secured the recognition of their ranks and titles for nearly 1000 Carlist officers. Twenty thousand Carlist volunteers laid down their arms at Vergara; only the irreconcilables led by Cabrera held out for a while in the central provinces of Spain. Espartero soon, however, in 1840, stamped out the last embers of the rising, which had lasted seven years. He was styled "El pacificador de España," was made a grandee of the first class, and received two dukedoms.

During the last three years of the war Espartero, who had been elected a deputy, exercised from his distant headquarters such influence over Madrid politics that he twice hastened the fall of the cabinet, and obtained office for his own friends. At the close of the war the queen regent and her ministers attempted to elbow out Espartero and his followers, but a *pronunciamiento* ensued in Madrid and other large towns which culminated in the marshal's accepting the post of prime minister. He soon became virtually a dictator, as Queen Christina took offence at his popularity and resigned, leaving the kingdom very soon afterwards. Directly the Cortes met they elected Espartero regent by 179 votes to 103 in favour of Arguelles, who was appointed guardian of the young queen. For two years Espartero ruled Spain in accordance with his Radical and conciliatory dispositions, giving special attention to the reorganization of the administration, taxation and finances, declaring all the estates of the church, congregations and religious orders to be national property, and suppressing the *diezma*, or tenths. He suppressed the Republican risings with as much severity as he did the military *pronunciamientos* of

Generals Concha and Diego de Leon. The latter was shot in Madrid. Espartero crushed with much energy a revolutionary rising in Barcelona, but on his return to Madrid was so coldly welcomed that he perceived that his prestige was on the wane. The advanced Progressists coalesced with the partisans of the ex-regent Christina to promote *pronunciamientos* in Barcelona and many cities. The rebels declared Queen Isabel of age, and, led by General Narvaez, marched upon Madrid. Espartero, deeming resistance useless, embarked at Cadiz on the 30th of July 1843 for England, and lived quietly apart from politics until 1848, when a royal decree restored to him all his honours and his seat in the senate. He retired to his house in Logroño, which he left six years later, in 1854, when called upon by the queen to take the lead of the powerful Liberal and Progressist movement which prevailed for two years. The old marshal vainly endeavoured to keep his own Progressists within bounds in the Cortes of 1854–1856, and in the great towns, but their excessive demands for reforms and liberties played into the hands of a clerical and reactionary court and of the equally retrograde governing classes. The growing ambition of General O'Donnell constantly clashed with the views of Espartero, until the latter, in sheer disgust, resigned his premiership and left for Logroño, after warning the queen that a conflict was imminent between O'Donnell and the Cortes, backed by the Progressist militia. O'Donnell's *pronunciamiento* in 1856 put an end to the Cortes, and the militia was disarmed, after a sharp struggle in the streets of the capital. After 1856 Espartero resolutely declined to identify himself with active politics, though at every stage in the onward march of Spain towards more liberal and democratic institutions he was asked to take a leading part. He refused to allow his name to be brought forward as a candidate when the Cortes of 1868, after the Revolution, sought for a ruler. Espartero, strangely enough, adopted a laconic phrase when successive governments on their advent to power invariably addressed themselves to the venerable champion of liberal ideas. To all—to the Revolution of 1868, the Constituent Cortes of 1869, King Amadeus, the Federal Republic of 1873, the nameless government of Marshal Serrano in 1874, the Bourbon restoration in 1875—he simply said: "Cumplase la voluntad nacional" ("Let the national will be accomplished"). King Amadeus made him prince of Vergara. The Restoration raised a statue to him near the gate of the Retiro Park in Madrid. Spaniards of all shades, except Carlists and Ultramontanes, paid homage to his memory when he passed away at his Logroño residence on the 8th of January 1879. His tastes were singularly modest, his manners rather reserved, but always kind and considerate for humble folk. He was a typical Spanish soldier-politician, though he had more of the better traits of the soldier born and bred than of the arts of the statesman. His military instincts did not always make it easy for him to accommodate himself to courtiers and professional politicians. (A. E. H.)

ESPARTO, or Spanish Grass, *Stipa tenacissima*, a grass resembling the ornamental feather-grass of gardens. It is indigenous to the south of Spain and the north of Africa (where it is known as Halfa or Alfa), and is especially abundant in the sterile and rugged parts of Murcia and Valencia, and in Algeria, flourishing best in sandy, ferruginous soils, in dry, sunny situations on the sea coast. Pliny (*N.H.* xix. 2) described what appears to have been the same plant under the name of *spartum*, whence the designation *campus spartarius* for the region surrounding New Carthage. It attains a height of 3 or 4 ft. The stems are cylindrical, and clothed with short hair, and grow in clusters of from 2 to 10 ft. in circumference; when young they serve as food for cattle, but after a few years' growth acquire great toughness of texture. The leaves vary from 6 in. to 3 ft. in length, and are grey-green in colour; on account of their tenacity of fibre and flexibility they have for centuries been employed for the making of ropes, sandals, baskets, mats and other articles. Ships' cables of esparto, being light, have the quality of floating on water, and have long been in use in the Spanish navy.

Esparto leaves contain 56% by weight of fibre, or about 10% more than straw, and hence have come into requisition as a substitute for linen rags in the manufacture of paper. For this purpose they were first utilized by the French, and in 1857 were introduced into Great Britain. When required for paper-making the leaves should be gathered before they are quite matured; if, however, they are obtained too young, they furnish a paper having an objectionable semi-transparent appearance. The leaves are gathered by hand, and from 2 to 3 cwt. may be collected in a day by a single labourer. They are generally obtained during the dry summer months, as at other times their adherence to the stems is so firm as often to cause the uprooting of the plants in the attempt to remove them. Esparto may be raised from seed, but cannot be harvested for twelve or fifteen years after sowing.

Another grass, *Lygeum Spartum*, with stiff rush-like leaves, growing in rocky soil on the high plains of countries bordering on the Mediterranean, especially of Spain and Algeria, is also a source of esparto.

For the processes of the paper manufacturer esparto is used in the dry state, and without cutting; roots and flowers and stray weeds are first removed, and the material is then boiled with caustic soda, washed, and bleached with chlorine solution. Sundry experiments have been made to adapt esparto for use in the coarser textile fabrics. Messrs A. Edger and B. Proctor in 1877 directed attention to the composition of the slag resulting from the burning of esparto, which they found to be strikingly similar to that of average medical bottle glass, the latter yielding on analysis 66·3% of silica and 25·1% of alkalies and alkaline earths, and the slag 64.6 and 27·45% of the same respectively.

ESPERANCE, a small seaport on a fine natural harbour on the south coast of West Australia, 275 m. north-east from Albany. It is a summer resort, and in the neighbourhood are interesting caves. Its importance as a seaport is due to its being on the high road between the eastern states and the gold-fields, and the nearest place for the shipment of gold from the Coolgardie fields.

ESPERANTO, an artificial international auxiliary language (see Universal Languages), first published in 1887, seven years after the appearance of its predecessor Volapük (*q.v.*), which it has now completely supplanted. Its author was a Russian physician, Dr L. Zamenhof, born in 1859 at Bielostok, where the spectacle of the feuds of the four races—each speaking different languages—which inhabit it (Russians, Poles, Germans and Jews) at an early date suggested to him the idea of remedying the evil by the introduction of a neutral language, standing apart from the existing national languages. His first idea was to resuscitate some dead language. Then he tried to construct a new language on an a priori basis. At the same time he made what he appears to have considered the great discovery that the bulk of the vocabulary of a language consists not of independent roots, but of compounds and derivatives formed from a comparatively small number of roots.

At first he tried to construct his roots a priori by arbitrary combinations of letters. Then he fell back on the plan of taking his roots ready-made from existing languages, as the inventor of Volapük had done before him. But instead of taking them mainly from one language, he has selected them from the chief European languages, but not impartially. Like all inventors of artificial languages, he is more ready to experiment with foreign languages than with his own; and hence the Slavonic roots in Esperanto are much less numerous than those taken from the other European languages. Here his choice has been to some extent guided by considerations of internationality, although he has not fully grasped the importance of the principle of maximum internationality, so well worked out in the latest rival of Esperanto—Idiom Neutral (see Universal Languages). Thus he adopts a large number of international words—generally unaltered except in spelling—such as *teatr*, *tabak*, even when it would be easy to form equivalent terms from the roots already existing in the language. Where there is no one international word, he selects practically at random, keeping, however, a certain balance between the Romance words, taken chiefly from Latin (*tamen*) and French (*trotuar*), on the one hand, and the Germanic on the other hand, the latter being taken sometimes from German (*nur*, "only"), sometimes from English, the words being generally written more or less phonetically (*rajt*=right). Most of the Germanic words are badly chosen from the international point of view. Thus the German word quoted above would not be intelligible to any one ignorant of German. Indeed, from the international point of view all specially German words ought to be excluded, or else reduced to the common Germanic form; thus *trink* ought to be made into *drink*, the *t* being a specially German modification of the *d*, preserved not only in English but in all the remaining Germanic languages. This incongruous mixture of languages is not only jarring and repulsive, but adds greatly to the difficulty of mastering the vocabulary for the polyglot as well as the monolingual learner.

The inventor has taken great pains to reduce the number of his roots to a minimum; there are 2642 of them in his dictionary, the *Universala Vortaro* (from Ger. *Wort*, "word"), which does not include such international words as *poezio*, *telefono*; these the learner is supposed to recognize and form without help. The most eccentric feature of the vocabulary, and the one to which it owes much of its brevity, is the extensive use of the prefix *mal-* to reverse the meaning of a word, as in *malamiko*, "enemy," and even *malbona*, "bad."

The phonology of the language is very simple. The vowels are only five in number, *a*, *e*, *i*, *o*, *u*, used without any distinction of quantity, as in Russian. There are six diphthongs, expressed by an unnecessarily complicated notation. The consonant-system is simple enough in itself, but is greatly complicated in writing by the excessive and mostly unnecessary use made of diacritical letters not only for simple sounds but also for consonant-groups. *c* is used for *ts*, as in Polish.

The grammar is, like that of Volapük, partly borrowed from existing languages, partly *a priori* and arbitrary. The use of the final vowels belongs to the latter category. The use of *-a* to indicate adjectives and of *-o* to indicate nouns as in *kara amiko*, "dear (male) friend," is a source of confusion to those familiar with the Romance languages, and has proved a bar to the diffusion of Esperanto among the speakers of these languages. On the other hand, the following paradigm will show how faithfully Esperanto can reproduce the defects of conventional European grammar:—

	Singular.	Plural.
Nominative . .	*la bona patro*	*la bonaj patroj*
Accusative . .	*la bonan patron*	*la bonajn patrojn.*

It is difficult to see why the accusative should be kept when all the other cases are replaced by prepositions.

The verb is better than the noun. Its inflections are *-as* present, *-is* preterite, *-os* future, *-us* conditional, *-u* imperative and subjunctive, *-i* infinitive, together with the following participles:—

	Active.	Passive.
Present . . .	*-anta*	*-ata*
Preterite . . .	*-inta*	*-ita*
Future . . .	*-onta*	*-ota*

The inventor has followed the good example of his native language in using *esti*, "to be," as the auxiliary verb both in the passive, where it is combined with passive participles, and in the secondary tenses of the active (perfect, pluperfect, &c.), where it is of course combined with the active participles. The participles can be made into nouns and adverbs by changing the final *-a* into *-o* and *-e* respectively: thus *tenonto*, "the future holder," *perdinte*, "through having lost."

The table of the forty-five correlative pronouns, adjectives and adverbs is also elaborate and ingenious.

Much ingenuity is displayed in the syntax, as well as some happy simplifications. But, on the other hand, there is much in it that is fanciful, arbitrary and vague, as in the use of the definite article—where the author has unfortunately followed French rather than English usage—and in the moods of the verb.

The following specimens will show the general character of this easy-flowing but somewhat heavy and monotonous language—"bad Italian," as it is called by its detractors:—

Patro nia, kiu estas en la ĉielo, sankta estu via nomo; venu regeco via; estu volo via, kiel en la ĉielo, tiel ankaŭ sur la tero. Panon nian ĉiutagan donu al ni hodiaŭ; kaj pardonu al ni ŝuldojn niajn, kiel ni ankaŭ pardonas al niaj ŝuldantoj; kaj ne konduku nin en tenton, sed liberigu nin de la malbono.

Estimata Sinjoro. Per tiu ĉi libreto mi havas la honoron prezenti al vi la lingvon internacian Esperanto. Esperanto tute ne havas la intencon malfortigi la lingvon naturan de ia popolo. Gi devas nur servi por la rilatoj internaciaj kaj por tiuj verkoj aŭ produktoj, kiuj interesas egale la tutan mondon.

In summing up the merits and defects of Esperanto we must begin by admitting that it is the most reasonable and practical artificial language that has yet appeared. Its inventor has had the double advantage of being able to profit by the mistakes of his predecessors, and of being himself, by force of circumstances, a better linguist. It must further be admitted that he has made as good a use of these advantages as was perhaps possible without systematic training in scientific philology in its widest sense. This last defect explains why the enthusiasm which his work has excited in the great world of linguistic dilettantes has not been shared by the philologists: in spite of its superiority to Volapük, they see in it the same radical defects. Whether they are rash or not in predicting for it a similar fate, remains to be seen. The Esperantists, warned by the fate of Volapük, have adopted the wise policy of suppressing all internal disunion by submitting to the dictatorship of the inventor, and so presenting a united front to the enemy. One thing is clear: either Esperanto must be taken as it is without change, or else it must crumble to pieces; its failure to work out consistently the principle of the maximum of internationality for its root-words is alone enough to condemn it as hopelessly antiquated even from the narrow point of view which regards "international" as synonymous with "European"—a view which political development in the Far East has made equally obsolete. (H. Sw.)

ESPINAY, TIMOLÉON D' (1580–1644), French soldier, was the eldest of the four sons of François d'Espinay, seigneur de Saint Luc (1554–1597), and was himself marquis de Saint Luc. In 1603 he accompanied Sully in his embassy to London. In 1622, in his capacity as vice-admiral of France, he gained some advantages over the defenders of La Rochelle, obliging the Huguenot commander, Benjamin de Rohan, seigneur de Soubise, to evacuate the islands of Ré and Oléron. In 1627 he was named lieutenant-general of Guienne and marshal of France.

ESPINEL, VICENTE MARTINEZ (1551–1624), Spanish poet and novelist, was baptized on the 28th of December 1551, and educated at Salamanca. He was expelled from the university in 1572, and served as a soldier in Flanders, returning to Spain in 1584 or thereabouts. He took orders in 1587, and four years later became chaplain at Ronda, absented himself from his living, and was deprived of his cure; but his musical skill obtained for him the post of choirmaster at Plasencia. His *Diversas Rimas* (1591) are undeniably good examples of technical accomplishment and caustic wit. Espinel, however, survives as the author of a clever picaresque novel entitled *Relaciones de la vida del Escudero Marcos de Obregón* (1618). It is, in many passages, an autobiography of Espinel with picturesque embellishments. Marcos is not a chivalresque "esquire," but an adventurer who seeks his fortune by attaching himself to great men; and the object of the author is to warn young men against such a life. Apart from the unedifying confessions of the hero, the book contains curious anecdotes concerning prominent contemporaries, and the episodical stories are told with great spirit; the style is extremely correct, though somewhat diffuse. Le Sage has not scrupled to borrow from *Marcos de Obregón* many of the incidents and characters in *Gil Blas*—a circumstance which induced Isla to give to his Spanish translation of Le Sage's work the jesting title, *Gil Blas restored to his Country and his Native Tongue.* In the 1775 edition of the *Siècle de Louis XIV.* Voltaire grossly exaggerates in saying that *Gil Blas* is taken entirely from *Marcos de Obregón.* Espinel was a clever musician and added a fifth string to the guitar. He revived the measure known as *décimas* or *espinelas*, consisting of a stanza of ten octosyllabic lines. Most of the poems which he left in manuscript remain unpublished owing to their licentious character.

Bibliography.—J. Perez de Guzmán's edition of *Marcos de Obregón* (Barcelona, 1881) includes a valuable introduction; Léo Claretie, *Le Sage romancier* (Paris, 1890), discusses exhaustively the question of Le Sage's indebtedness to Espinel. For some previously unpublished poems see Pedro Salvá y Mallén, *Catálogo de la biblioteca de Salvá* (Valencia, 1872).

ESPIRITO SANTO, a maritime state of Brazil, bounded N. by Bahia, E. by the Atlantic Ocean, S. by Rio de Janeiro, and W. by Minas Geraes. Pop. (1890) 135,997; (1900) 209, 783; area, 17,316 sq. m. With the exception of Sergipe it is the smallest of the Brazilian states. The western border of the state is traversed by low ranges of mountains forming a northward continuation of the Serra do Mar. The longest and most prominent of these ranges, which are for the most part the eastern escarpments of the great Brazilian plateau, is the Serra dos Aymores, which extends along fully two-thirds of the western frontier. Farther S. the ranges are much broken and extend partly across the state toward the seaboard; the more prominent are known as the Serra do Espigão, Serra da Chibata, Serra dos Pilões and Serra dos Purys. The eastern and larger part of the state belongs to the coastal plain, in great part low and swampy, with large areas of sand barrens, and broken by isolated groups and ranges of hills. With the exception of these sandy plains the country is heavily forested, even the mountain sides being covered with vegetation to their summits. The northern and southern parts are fertile, but the central districts are comparatively poor. The coastal plain comprises a sandy, unproductive belt immediately on the coast, back of which is a more fertile tertiary plain, well suited, near the higher country, to the production of sugar and cotton. The inland valleys and slopes are very fertile and heavily forested, and much of the Brazilian export of rosewood and other cabinet woods is drawn from this state. There is only one good bay on the coast, that of Espirito Santo, on which the port of Victoria is situated. The river-mouths are obstructed by sand bars and admit small vessels only. The principal rivers of the state are the Mucury, which rises in Minas Geraes and forms the boundary line with Bahia, the Itaunas, São Domingos, São Matheus, Doce, Timbuhy, Santa Maria, Jucú, Benevente, Itapemirim, and Itabapoana, the last forming the boundary line with Rio de Janeiro. The Doce, São Matheus, and Itapemirim rise in Minas Geraes and flow entirely across the state. The lower courses of these rivers are generally navigable, that of the Rio Doce for a distance of 90 m. The climate of the coastal zone and deeper valleys is hot, humid and unhealthy, malarial fevers being prevalent. In the higher country the temperature is lower and the climate is healthy. Espirito Santo is almost exclusively agricultural, sugar-cane, coffee, rice, cotton, tobacco, mandioca and tropical fruits being the principal products. Agriculture is in a very backward condition, however, and the state is classed as one of the poorest and most unprogressive in the republic. The rivers and shallow coast waters are well stocked with fish, but there are no fishing industries worthy of mention. There are three railway lines in operation in the state—one running from Victoria to Cachoeira do Itapemirim (50 m.), and thence, by another line, to Santo Eduardo in Rio de Janeiro (58 m.), where connexion is made with the Leopoldina system running into the national capital, and a third running north-westerly from Victoria to Diamantina, Minas Geraes, about 450 m. The chief cities and towns of the state, with their populations in 1890, are Victoria, São Matheus (municipality, 7761) on a river of the same name 16 m. from the sea, Serra (municipality, 6274), Guarapary (municipality, 5310), a small port S. by W. of the capital, Conceicão da Barra (municipality, 5628), the port of São Matheus and Cachoeira do Itapemirim (4049), an important commercial centre in the south.

Espirito Santo formed part of one of the original captaincies which were given to Vasco Fernandes Coutinho by the Portuguese crown. The first settlement (1535) was at the entrance to the bay of Espirito Santo, and its name was afterwards given to the bay and captaincy. It once included the municipality of Campos, now belonging to the state of Rio de Janeiro.

The islands of Trinidade and Martim Vaz, which lie about 715 m. E. of Victoria, belong politically to this state. They are uninhabited, but considerable importance is attached to the former because Great Britain has twice attempted to take possession of it. It rises 1200 ft. above sea-level and is about 6 m. in circumference, but it has no value other than that of an ocean cable station. An excellent description of this singular island is to be found in E. F. Knight's *Cruise of the "Alerte"* (London, 1895).

ESPRONCEDA, JOSÉ IGNACIO JAVIER ORIOL ENCARNACIÓN DE (1808–1842), Spanish poet, son of an officer in the Bourbon regiment, was born at or near Almendralejo de los Barros on the 25th of March 1808. On the close of the war he was sent to the preparatory school of artillery at Segovia, and later became a pupil of the poet Lista, then professor of literature at St Matthew's College in Madrid. In his fourteenth year he had attracted his master's attention by his verses, and had joined a secret society. Sentenced to five years' seclusion in the Franciscan convent at Guadalajara, he began an epic poem entitled *Pelayo*, of which fragments survive. He escaped to Portugal and thence to England, where he found the famous Teresa whom he had met at Lisbon; here, too, he became a student of Shakespeare, Milton and Byron. In 1830 he eloped with Teresa to Paris, took part in the July revolution, and soon after joined the raid of Chapalangarra on Navarre. In 1833 he returned to Spain and obtained a commission in the queen's guards. This, however, he soon forfeited by a political song, and he was banished to Cuéllar, where he wrote a poor novel entitled *Sancho Saldaña ó el Castellano de Cuéllar* (1834). He took an active part in the revolutionary risings of 1835 and 1836, and, on the accession to power of the Liberal party in 1840, was appointed secretary of legation at the Hague; in 1842 he was elected deputy for Almería, and seemed likely to play a great part in parliamentary life. But his constitution was undermined, and, after a short illness, he died at Madrid on the 23rd of May 1842. His poems, first published in 1840, at once gained for him a reputation which still continues undiminished. The influence of Byron pervades Espronceda's life and work. It is present in an ambitious variant on the Don Juan legend, *El Estudiante de Salamanca*, Elvira's letter being obviously modelled on Julia's letter in *Don Juan*; the *Canción del Pirata* is suggested by *The Corsair*; and the Byronic inspiration is not wanting even in the noble fragment entitled *El Diablo Mundo*, based on the story of Faust. But in *El Mendigo*, in *El Reo de Muerte*, in *El Verdugo*, and in the sombre vehement lines, *A Jarifa en una orgía*, Espronceda approves himself the most potent and original lyrical poet produced by Spain during the 19th century.

Bibliography.—*Obras poéticas y escritos en prosa* (Madrid, 1884), edited by Blanca Espronceda de Escosura, the poet's daughter (the second volume has not been published); E. Rodriguez Solís, *Espronceda; su tiempo, su vida, y sus obras* (Madrid, 1883); E. Piñeyro, *El Romanticismo en España* (Paris, 1904).

ESQUIRE (O. Fr. *escuyer*, Mod. Fr. *écuyer*, derived through the form *escudier* from Med. Lat. *scutarius*, "shield-bearer"), originally the attendant on a knight, whose helm, shield and lance he carried at the tournament or in the field of battle. The esquire ranked immediately below the knight bachelor, and his office was regarded as the apprentice stage of knighthood. The title was regarded as one of function, not of birth, and was not hereditary. In time, however, its original significance was lost sight of, and it came to be a title of honour, implying a rank between that of knight and valet or gentleman, as it technically still remains. Thus in the later middle ages esquire (*armiger*) was the customary description of holders of knight's fees who had not taken up their knighthood, whence the surviving custom of entitling the principal landowner in a parish "the squire" (see Squire). Camden, at the close of the 16th century, distinguished four classes entitled to bear the style: (1) The eldest sons of knights, and their eldest sons, in perpetual succession; (2) the eldest sons of the younger sons of peers, and their eldest sons, in like perpetual succession; (3) esquires created by royal letters patent or other investiture, and their eldest sons; (4) esquires by office, *e.g.* justices of the peace and others who bear any office of trust under the crown. To these the writer in the 3rd edition of the *Encyclopaedia Britannica* (1797) added Irish peers and the eldest sons of British peers, who, though they bear courtesy titles, have in law only the right to be styled esquires. Officers of the king's courts, and of the royal household, counsellors at law and justices of the peace he described as esquires only "by reputation"; and justices of the peace have the title only as long as they are in commission; while certain heads of great landed families are styled "esquires" by prescription. "But the meaner ranks of people," he adds indignantly, "who know no better, do often basely prostitute this title; and, to the great confusion of all rank and precedence, every man who makes a decent appearance, far from thinking himself in any way ridiculed by finding the superscription of his letters thus decorated, is fully gratified by such an address."

It is clear, however, that the title of esquire was very loosely used at a much earlier date. On this point Selden is somewhat scornfully explicit. "To whomsoever, either by blood, place in the State or other eminency, we conceive some higher attribute should be given, than that sole Title of Gentleman, knowing yet that he hath no other honorary title legally fixed upon him, we usually style him an *Esquire*, in such passages as require legally that his degree or state be mentioned; as especially in Indictments and Actions whereupon he may be outlawed. Those of other nations who are Barons or great Lords in their own Countries, and no knights, are in legal proceedings stiled with us, Esquires only. Some of our greatest Heralds have their divisions of Esquires applied to this day. I leave them as I see them, where they may be easily found." Coke, too, says that every one is entitled to be termed esquire who has the legal right to call himself a gentleman (2. *Institutes*, 688).

At the present time the following classes are recognized as esquires on occasions of ceremony or for legal purposes:—(1) All sons of peers and lords of parliament during their fathers' lives, and the younger sons of such peers, &c., after their fathers' deaths; the eldest sons of peers' younger sons, and their eldest sons for ever. (2) Noblemen of all other nations. (3) The eldest sons of baronets and knights. (4) Persons bearing arms and the title of esquire by letters patent. (5) Esquires of the Bath and their eldest sons. (6) Barristers-at-law. (7) Justices of the peace and mayors while in commission or office. (8) The holders of any superior office under the crown. (9) Persons styled esquires by the sovereign in their patents, commissions or appointments.[1] (10) Attorneys in colonies where the functions of counsel and attorney are united (in England solicitors are "gentlemen," not "esquires").

In practice, however, the title of esquire, now to all intents and purposes meaningless, is given to any one who "can bear the port, charge and countenance of a gentleman." The word has followed the same course as that of "gentleman" (*q.v.*), and for very similar reasons. It is still not customary in Great Britain to address *e.g.* a well-to-do person engaged in trade as esquire at his shop; it would be offensive not to do so at his private residence. In America, on the other hand, the use of the word "esquire" is practically obsolete, "Mr" ("Mister" or "Master," at one time the title special to a "gentleman") being the general form of address.

See Selden, *Titles of Honor* (1672); Camden, *Britannia* (ed. London, 1594); Coke, *Institutes*; *Enc. of the Laws of England*, s. "Esquire"; Du Cange, *Glossarium* (ed. 1886), s. "Scutarius," "Scutifer" and "Armiger"; *New English Dictionary*, s. "Esquire." (W. A. P.)

ESQUIROL, JEAN ÉTIENNE DOMINIQUE (1772–1840), French alienist, was born at Toulouse on the 3rd of February 1772. In 1794 he became a pupil of the military hospital of Narbonne, and subsequently studied in Paris at the Salpêtrière under P. Pinel, whose assistant he became. In 1811 he was chosen physician to the Salpêtrière, and in 1817 he began a course of lectures on the treatment of the insane, in which he made such revelations of the abuses existing in the lunatic asylums of France that the government appointed a commission to inquire into the subject. Esquirol in this and other ways greatly assisted Pinel's efforts for the introduction of humaner methods. The asylums of Rouen, Nantes and Montpellier were built in accordance with his plans. In 1823 he became inspector-general of the university of Paris for the faculties of medicine, and in 1826 chief physician of the asylum at Charenton. He died at Paris on the 13th of December 1840. Besides contributing to the *Dictionnaire des sciences médicales* and the *Encyclopédie des gens du monde*, Esquirol wrote *Des maladies mentales, considérées sous les rapports médical, hygiénique, et médico-légal* (2 vols., Paris, 1838).

ESQUIROS, HENRI FRANÇOIS ALPHONSE (1812–1876), French writer, was born in Paris on the 23rd of May 1812. After some minor publications he produced *L'Évangile du peuple* (1840), an exposition of the life and character of Jesus as a social reformer. This work was considered an offence against religion and decency, and Esquiros was fined and imprisoned. He was elected in 1850 as a social democrat to the Legislative Assembly, but was exiled in 1851 for his opposition to the Empire. Returning to France in 1869 he was again a member of the Legislative Assembly, and in 1876 was elected to the senate. He died at Versailles on the 12th of May 1876. He turned to account his residence in England in *L'Angleterre et la vie anglaise* (5 vols., 1859–1869). Among his numerous works on social subjects may be noted:—*Histoire des Montagnards* (2 vols., 1847); *Paris, ou les sciences, les institutions et les mœurs au XIX^e siècle* (2 vols., 1847); and *Histoire des martyrs de la liberté* (1851).

ESS, JOHANN HEINRICH VAN (1772–1847), German Catholic theologian, was born at Warburg, Westphalia, on the 15th of February 1772. He was educated at the Dominican gymnasium of his native town, and in 1790 entered, as a novice, the Benedictine abbey of Marienmünster, in the bishopric of Paderborn. His Benedictine name was Leander. He was priest at Schwalenberg from 1799 to 1812, after which he became extraordinary professor of theology and joint-director of the teachers' seminary at Marburg. In 1818 he received the doctorate of theology and of canonical law. In 1807, in conjunction with his cousin Karl van Ess, he had published a German translation of the New Testament, and, as its circulation was discountenanced by his superiors, he published in 1808 a defence of his views, entitled *Auszüge aus den heiligen Vätern und anderen Lehrern der katholischen Kirche über das nothwendige und nützliche Bibellesen.* An improved edition of this tractate was published in 1816, under the title *Gedanken über Bibel und Bibellehre*, and in the same year appeared *Was war die Bibel den ersten Christen?* In 1822 he published the first part of a German translation of the Old Testament, which was completed in 1836. In 1822 he resigned his offices at Marburg in order to devote his whole time to the defence of his views regarding Bible reading by the people, and to endeavour to promote the circulation of the scriptures. He was associated first with the Catholic Bible Society of Regensburg, and then with the British and Foreign Bible Society. He died at Affolderbach in the Odenwald on the 13th of October 1847.

ESSAY, ESSAYIST (Fr. *essai*, Late Lat. *exagium*, a weighing or balance; *exigere*, to examine; the term in general meaning any trial or effort). As a form of literature, the essay is a composition of moderate length, usually in prose, which deals in an easy, cursory way with the external conditions of a subject, and, in strictness, with that subject only as it affects the writer. Dr Johnson, himself an eminent essayist, defines an essay as "an irregular, undigested piece"; the irregularity may perhaps be admitted, but want of thought, that is to say lack of proper mental digestion, is certainly not characteristic of a fine example. It should, on the contrary, always be the brief and light result of experience and profound meditation, while "undigested" is the last epithet to be applied to the essays of Montaigne, Addison or Lamb. Bacon said that the Epistles of Seneca were "essays," but this can hardly be allowed. Bacon himself goes on to admit that "the word is late, though the thing is ancient." The word, in fact, was invented for this species of writing by Montaigne, who merely meant that these were experiments in a new kind of literature. This original meaning, namely that these pieces were attempts or endeavours, feeling their way towards the expression of what would need a far wider space to exhaust, was lost in England in the course of the eighteenth century. This is seen by the various attempts made in the nineteenth century to coin a word which should express a still smaller work, as distinctive in comparison with the essay as the essay is by the side of the monograph; none of these linguistic experiments, such as *essayette*, *essaykin* (Thackeray) and *essaylet* (Helps) have taken hold of the language. As a matter of fact, the journalistic word *article* covers the lesser form of essay, although not exhaustively, since the essays in the monthly and quarterly reviews, which are fully as extended as an essay should ever be, are frequently termed "articles," while many "articles" in newspapers, dictionaries and encyclopaedias are in no sense essays. It may be said that the idea of a detached work is combined with the word "essay," which should be neither a section of a disquisition nor a chapter in a book which aims at the systematic development of a story. Locke's *Essay on the Human Understanding* is not an essay at all, or cluster of essays, in this technical sense, but refers to the experimental and tentative nature of the inquiry which the philosopher was undertaking. Of the curious use of the word so repeatedly made by Pope mention will be made below.

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[1] In practice this means every one receiving such a patent, commission or appointment.

The essay, as a species of literature, was invented by Montaigne, who had probably little suspicion of the far-reaching importance of what he had created. In his dejected moments, he turned to rail at what he had written, and to call his essays "inepties" and "sottises." But in his own heart he must have been well satisfied with the new and beautiful form which he had added to literary tradition. He was perfectly aware that he had devised a new thing; that he had invented a way of communicating himself to the world as a type of human nature. He designed it to carry out his peculiar object, which was to produce an accurate portrait of his own soul, not as it was yesterday or will be to-morrow, but as it is to-day. It is not often that we can date with any approach to accuracy the arrival of a new class of literature into the world, but it was in the month of March 1571 that the essay was invented. It was started in the second story of the old tower of the castle of Montaigne, in a study to which the philosopher withdrew for that purpose, surrounded by his books, close to his chapel, sheltered from the excesses of a fatiguing world. He wrote slowly, not systematically; it took nine years to finish the two first books of the essays. In 1574 the manuscript of the work, so far as it was then completed, was nearly lost, for it was confiscated by the pontifical police in Rome, where Montaigne was residing, and was not returned to the author for four months. The earliest imprint saw the light in 1580, at Bordeaux, and the Paris edition of 1588, which is the fifth, contains the final text of the great author. These dates are not negligible in the briefest history of the essay, for they are those of its revelation to the world of readers. It was in the delightful chapters of his new, strange book that Montaigne introduced the fashion of writing briefly, irregularly, with constant digressions and interruptions, about the world as it appears to the individual who writes. The *Essais* were instantly welcomed, and few writers of the Renaissance had so instant and so vast a popularity as Montaigne. But while the philosophy, and above all the graceful stoicism, of the great master were admired and copied in France, the exact shape in which he had put down his thoughts, in the exquisite negligence of a series of essays, was too delicate to tempt an imitator. It is to be noted that neither Charron, nor Mlle de Gournay, his most immediate disciples, tried to write essays. But Montaigne, who liked to fancy that the Eyquem family was of English extraction, had spoken affably of the English people as his "cousins," and it has always been admitted that his genius has an affinity with the English. He was early read in England, and certainly by Bacon, whose is the second great name connected with this form of literature. It was in 1597, only five years after the death of Montaigne, that Bacon published in a small octavo the first ten of his essays. These he increased to 38 in 1612 and to 58 in 1625. In their first form, the essays of Bacon had nothing of the fulness or grace of Montaigne's; they are meagre notes, scarcely more than the headings for discourses. It is possible that when he wrote them he was not yet familiar with the style of his predecessor, which was first made popular in England, in 1603, when Florio published that translation of the *Essais* which Shakespeare unquestionably read. In the later editions Bacon greatly expanded his theme, but he never reached, or but seldom, the freedom and ease, the seeming formlessness held in by an invisible chain, which are the glory of Montaigne, and distinguish the typical essayist. It would seem that at first, in England, as in France, no lesser writer was willing to adopt a title which belonged to so great a presence as that of Bacon or Montaigne. The one exception was Sir William Cornwallis (d. 1631), who published essays in 1600 and 1617, of slight merit, but popular in their day. No other English essayist of any importance appeared until the Restoration, when Abraham Cowley wrote eleven "Several Discourses by way of Essays," which did not see the light until 1668. He interspersed with his prose, translations and original pieces in verse, but in other respects Cowley keeps much nearer than Bacon to the form of Montaigne. Cowley's essay "Of Myself" is a model of what these little compositions should be. The name of Bacon inspires awe, but it is really not he, but Cowley, who is the father of the English essay; and it is remarkable that he has had no warmer panegyrists than his great successors, Charles Lamb and Macaulay. Towards the end of the century, Sir George Mackenzie (1636–1691) wrote witty moral discourses, which were, however, essays rather in name than form. Whenever, however, we reach the eighteenth century, we find the essay suddenly became a dominant force in English literature. It made its appearance almost as a new thing, and in combination with the earliest developments of journalism. On the 12th of April 1709 appeared the first number of a penny newspaper, entitled the *Tatler*, a main feature of which was to amuse and instruct fashionable readers by a series of short papers dealing with the manifold occurrences of life, *quicquid agunt homines*. But it was not until Steele, the founder of the *Tatler*, was joined by Addison that the eighteenth-century essay really started upon its course. It displayed at first, and indeed it long retained, a mixture of the manner of Montaigne with that of La Bruyère, combining the form of the pure essay with that of the character-study, as modelled on Theophrastus, which had been so popular in England throughout the seventeenth century. Addison's early *Tatler* portraits, in particular such as those of "Tom Folio" and "Ned Softly," are hardly essays. But Steele's "Recollections of Childhood" is, and here we may observe the type on which Goldsmith, Lamb and R. L. Stevenson afterwards worked. In January 1711 the *Tatler* came to an end, and was almost immediately followed by the *Spectator*, and in 1713 by the *Guardian*. These three newspapers are storehouses of admirable and typical essays, the majority of them written by Steele and Addison, who are the most celebrated eighteenth-century essayists in England. Later in the century, after the publication of other less successful experiments, appeared Fielding's essays in the *Covent Garden Journal* (1752) and Johnson's in the *Rambler* (1750), the *Adventurer* (1752) and the *Idler* (1759). There followed a great number of polite journals, in which the essay was treated as "the bow of Ulysses in which it was the fashion for men of rank and genius to try their strength." Goldsmith reached a higher level than the Chesterfields and Bonnel Thorntons had dreamed of, in the delicious sections of his *Citizen of the World* (1760). After Goldsmith, the eighteenth-century essay declined into tamer hands, and passed into final feebleness with the pedantic Richard Cumberland and the sentimental Henry Mackenzie. The *corpus* of eighteenth-century essayists is extremely voluminous, and their reprinted works fill some fifty volumes. There is, however, a great sameness about all but the very best of them, and in no case do they surpass Addison in freshness, or have they ventured to modify the form he adopted for his lucubrations. What has survived of them all is the lightest portion, but it should not be forgotten that a very large section of the essays of that age were deliberately didactic and "moral." A great revival of the essay took place during the first quarter of the nineteenth century, and foremost in the history of this movement must always be placed the name of Charles Lamb. He perceived that the real business of the essay, as Montaigne had conceived it, was to be largely personal. The famous *Essays of Elia* began to appear in the *London Magazine* for August 1820, and proceeded at fairly regular intervals until December 1822; early in 1823 the first series of them were collected in a volume. The peculiarity of Lamb's style as an essayist was that he threw off the Addisonian and still more the Johnsonian tradition, which had become a burden that crushed the life out of each conventional essay, and that he boldly went back to the rich verbiage and brilliant imagery of the seventeenth century for his inspiration. It is true that Lamb had great ductility of style, and that, when he pleases, he can write so like Steele that Steele himself might scarcely know the difference, yet in his freer flights we are conscious of more exalted masters, of Milton, Thomas Browne and Jeremy Taylor. He succeeded, moreover, in reaching a poignant note of personal feeling, such as none of his predecessors had ever aimed at; the essays called "Dream Children" and "Blakesmoor" are examples of this, and they display a degree of harmony and perfection in the writing of the pure essay such as had never been attempted before, and has never since been reached. Leigh Hunt, clearing away all the didactic and pompous elements which had overgrown the essay, restored it to its old *Spectator* grace, and was the most easy nondescript writer of his generation in periodicals such as the *Indicator* (1819) and the *Companion* (1828). The sermons, letters and pamphlets of Sydney Smith were really essays of an extended order. In Hazlitt and Francis Jeffrey we see the form and method of the essay beginning to be applied to literary criticism. The writings of De Quincey are almost exclusively essays, although many of the most notable of them, under his vehement pen, have far outgrown the limits of the length laid down by the most indulgent formalist. His biographical and critical essays are interesting, but they are far from being trustworthy models in form or substance. In a sketch, however rapid, of the essay in the nineteenth century, prominence must be given to the name of Macaulay. His earliest essay, that on Milton, appeared in the *Edinburgh Review* in 1825, very shortly after the revelation of Lamb's genius in "Elia." No two products cast in the same mould could, however, be more unlike in substance. In the hands of Macaulay the essay ceases to be a confession or an autobiography; it is strictly impersonal, it is literary, historical or controversial, vigorous, trenchant and full of party prejudice. The periodical publication of Macaulay's Essays in the *Edinburgh Review* went on until 1844; when we cast our eyes over this mass of brilliant writing we observe with surprise that it is almost wholly contentious. Nothing can be more remarkable than the difference in this respect between Lamb and Macaulay, the former for ever demanding, even cajoling, the sympathy of the reader, the latter scanning the horizon for an enemy to controvert. In later times the essay in England has been cultivated in each of these ways, by a thousand journalists and authors. The "leaders" of a daily newspaper are examples of the popularization of the essay, and they point to the danger which now attacks it, that of producing a purely ephemeral or even momentary species of effect. The essay, in its best days, was intended to be as lasting as a poem or a historical monograph; it aimed at being one of the most durable and precious departments of literature. We still occasionally see the production of essays which have this more ambitious aim; within the last quarter of the nineteenth century the essays of R. L. Stevenson achieved it. His *Familiar Studies* are of the same class as those of Montaigne and Lamb, and he approached far more closely than any other contemporary to their high level of excellence. We have seen that the tone of the essay should be personal and confidential; in Stevenson's case it was characteristically so. But the voices which please the public in a strain of pure self-study are few at all times, and with the cultivation of the analytic habit they tend to become less original and attractive. It is possible that the essay may die of exhaustion of interest, or may survive only in the modified form of accidental journalism.

The essay, although invented by a great French writer, was very late in making itself at home in France. The so-called *Essais* of Leibnitz, Nicole, Yves Marie André and so many others were really treatises. Voltaire's famous *Essai sur les mœurs des nations* is an elaborate historical disquisition in nearly two hundred chapters. Later, the voluminous essays of Joseph de Maistre and of Lamennais were not essays at all in the literary sense. On the other hand, the admirable *Causeries du lundi* of Sainte-Beuve (1804–1869) are literary essays in the fulness of the term, and have been the forerunners of a great army of brilliant essay-writing in France. Among those who have specially distinguished themselves as French essayists may be mentioned Théophile Gautier, Paul de Saint-Victor, Anatole France, Jules Lemaître, Ferdinand Brunetière and Émile Faguet. All these are literary critics, and it is in the form of the analysis of manifestations of intellectual energy that the essay has been most successfully illustrated in France. All the countries of Europe, since the middle of the 19th century, have adopted this form of writing; such monographs or reviews, however, are not perfectly identical with the essay as it was conceived by Addison and Lamb. This last, it may be supposed, is a definitely English thing, and this view is confirmed by the fact that in several European languages the word "essayist" has been adopted without modification.

In the above remarks it has been taken for granted that the essay is always in prose. Pope, however, conceived an essay in heroic verse. Of this his *Essay on Criticism* (1711) and his *Essay on Man* (1732–1734) are not good examples, for they are really treatises. The so-called *Moral Essays* (1720–1735), on the contrary, might have been contributed, if in prose, either to the *Spectator* or the *Guardian*. The idea of pure essays, in verse, however, did not take any root in English literature. (E. G.)

ESSEG, Essegg or Essek (Hung. *Eszék*; Croatian *Osjek*), a royal free town, municipality, and capital of the county of Virovitica (*Veröcze*), in Croatia-Slavonia, on the right bank of the Drave, 9 m. W. of its confluence with the Danube, and 185 m. S. of Buda-Pest by rail. Pop. (1900) 24,930; chiefly Magyars and Croats, with a few Germans and Jews. At Esseg the Drave is crossed by two bridges, and below these it is navigable by small steamers. The upper town, with the fortress, is under military authority; the new town and the lower town, which is the headquarters of commerce, are under civil authority. The only buildings of note are the Roman Catholic and Orthodox churches, Franciscan and Capuchin monasteries, synagogue, gymnasium, modern school, hospital, chamber of commerce, and law-courts. Esseg has a thriving trade in grain, fruit, live-stock, plum-brandy and timber. Tanning, silk-weaving and glass-blowing are also carried on.

Esseg owes its origin to its fortress, which existed as early as the time of the Romans under the name of *Mursia*; though the present structure dates only from 1720. At the beginning of the Hungarian revolution of 1848 the town was held by the Hungarians, but on the 4th of February 1849 it was taken by the Austrians under General Baron Trebersberg.

ESSEN, a manufacturing town of Germany, in the Prussian Rhine province, 22 m. N.E. from Düsseldorf, on the main line of railway to Berlin, in an undulating and densely populated district. Pop. (1849) 8813; (1875) 54,790; (1905) 229,270. It lies at the centre of a network of railways giving it access to all the principal towns of the Westphalian iron and coal fields. Its general aspect is gloomy; it possesses few streets of any pretensions, though those in the old part, which are mostly narrow, present, with their grey slate roofs and green shutters, a picturesque appearance. Of its religious edifices (twelve Roman Catholic, one Old Catholic, six Protestant churches, and a synagogue) the minster, dating from the 10th century, with fine pictures, relics and wall frescoes, is alone especially remarkable. This building is very similar to the Pfalz-Kapelle (*capella* *in palatio*) at Aix-la-Chapelle. Among the town's principal secular buildings are the new Gothic town-hall, the post office and the railway station. There are several high-grade (classical and modern) schools, technical, mining and commercial schools, a theatre, a permanent art exhibition, and hospitals. Essen also has a beautiful public park in the immediate vicinity. The town originally owed its prosperity to the large iron and coal fields underlying the basin in which it is situated. Chief among its industrial establishments are the famous iron and steel works of Krupp (*q.v.*), and the whole of Essen may be said to depend for its livelihood upon this firm, which annually expends vast sums in building and supporting churches, schools, clubs, hospitals and philanthropic institutions, and in other ways providing for the welfare of its employees. There are also manufactories of woollen goods and cigars, dyeworks and breweries.

Essen was originally the seat of a Benedictine nunnery, and was formed into a town about the middle of the 10th century by the abbess Hedwig. The abbess of the nunnery, who held from 1275 the rank of a princess of the Empire, was assisted by a chapter of ten princesses and countesses; she governed the town until 1803, when it was secularized and incorporated with Prussia. In 1807 it came into the possession of the grand dukes of Berg, but was transferred to Prussia in 1814.

See Funcke, *Geschichte des Fürstenthums und der Stadt Essen* (Elberfeld, 1851); Kellen, *Die Industriestadt Essen in Wort und Bild* (Essen, 1902); and A. Shadwell, *Industrial Efficiency* (London, 1906).

ESSENES, a monastic order among the Jews prior to Christianity. Their first appearance in history is in the time of Jonathan the Maccabee (161–144 B.C.). How much older they may have been we have no means of determining, but our authorities agree in assigning to them a dateless antiquity. The name occurs in Greek, in the two forms *’Εσσηνοί* and *’Εσσαῖοι*. *’Εσσηνοί* is used by Josephus fourteen times, *’Εσσαῖοι* six, but the latter is the only form used by Philo (ii. 457, 471, 632). *’Εσσηνοί* is also used by Synesius and Hippolytus, and its Latin equivalent by Pliny and Solinus; *’Εσσαῖοι* by Hegesippus and Porphyry. In Epiphanius we find the forms *’Οσσαῖοι*, *’Οσσηνοί*, and *’Ιεσσαῖοι*. There is a place named Essa mentioned by Josephus (*Ant.* xiii. 15, § 3), from which the name may have been formed, just as the Christians were originally called *Ναζαρηνοί* or *Ναζωραῖοι*, from Nazara. This etymology, however, is not much in favour now. Lightfoot explains the name as meaning "the silent ones," others as meaning "physicians." Perhaps there is most authority in favour of deriving it from the Syriac חֲסֵין, which in the emphatic state becomes חַסְיָא, so that we have a Semitic correspondence to both the Greek forms *’Εσσηνοί* and *’Εσσαῖοι*. This etymology makes the word mean "pious." It has also been urged in excuse for Philo's absurd derivation from *ὅσιος*.

The original accounts we have of them are confined to three authors—Philo, Pliny the Elder, and Josephus. Philo describes them in his treatise known as *Quod omnis probus liber* (§§ 12, 13; ii. 457–460), and also in his "Apology for the Jews," a fragment of which has been preserved by Eusebius (*Praep. Ev.* viii. 11, 12). Pliny (*N.H.* v. 17) has a short but striking sketch of them, derived in all probability from Alexander Polyhistor, who is mentioned among the authorities for the fifth book of his *Natural History*. This historian, of whom Eusebius had a very high opinion (*Praep. Ev.* ix. 17, § 1), lived in the time of Sulla. Josephus treats of them at length in his *Jewish War* (ii. 8), and more briefly in two passages of his *Antiquities* (xiii. 5, § 9; xviii. 1, § 5). He has also interesting accounts of the prophetic powers possessed by three individual members of the sect—Judas (*B.J.* i. 3, § 5; *Ant.* xiii. 11, § 2), Menahem (*Ant.* xv. 10, § 5), and Simon (*B.J.* ii. 7, § 3; *Ant.* xvii. 13, § 3). Besides this he mentions an Essene Gate in Jerusalem (*B.J.* v. 4, § 2) and a person called John the Essene, one of the bravest and most capable leaders in the war against the Romans (*B.J.* ii. 20, § 4; iii. 2, § 1). Josephus himself made trial of the sect of Essenes in his youth; but from his own statement it appears that he must have been a very short time with them, and therefore could not have been initiated into the inner mysteries of the society (*De vita sua*, 2). After this the notices that we have of the Essenes from antiquity are mere reproductions, except in the case of Epiphanius (died A.D. 402), who, however, is so confused a writer as to be of little value. Solinus, who was known as "Pliny's Ape," echoed the words of his master about a century after that writer's death, which took place in A.D. 79. Similarly Hippolytus, who lived in the reign of Commodus (A.D. 180–192), reproduced the account of Josephus, adding a few touches of his own. Porphyry (A.D. 233–306) afterwards did the same, but had the grace to mention Josephus in the context. Eusebius quoted the account as from Porphyry, though he must have known that *he* had derived it from Josephus (*Praep. Ev.* ix. 3, §§ 1, 13). But Porphyry's name would impress pagan readers. There is also a mention of the Essenes by Hegesippus (Eus. *H.E.* iv. 22) and by Synesius in his life of Dio Chrysostom. It has been conjectured that the Clementine literature emanated from Essenes who had turned Christian. (See EBIONITES.)

The Essenes were an exclusive society, distinguished from the rest of the Jewish nation in Palestine by an organization peculiar to themselves, and by a theory of life in which a severe asceticism and a rare benevolence to one another and to mankind in general were the most striking characteristics. They had fixed rules for initiation, a succession of strictly separate grades within the limits of the society, and regulations for the conduct of their daily life even in its minutest details. Their membership could be recruited only from the outside world, as marriage and all intercourse with women were absolutely renounced. They were the first society in the world to condemn slavery both in theory and practice; they enforced and practised the most complete community of goods. They chose their own priests and public office-bearers, and even their own judges. Though their prevailing tendency was practical, and the tenets of the society were kept a profound secret, it is perfectly clear from the concurrent testimony of Philo and Josephus that they cultivated a kind of speculation, which not only accounts for their spiritual asceticism, but indicates a great deviation from the normal development of Judaism, and a profound sympathy with Greek philosophy, and probably also with Oriental ideas. At the same time we do our Jewish authorities no injustice in imputing to them the patriotic tendency to idealize the society, and thus offer to their readers something in Jewish life that would bear comparison at least with similar manifestations of Gentile life.

There is some difficulty in determining how far the Essenes separated themselves locally from their fellow-countrymen. Josephus informs us that they had no single city of their own, but that many of them dwelt in every city. While in his treatise *Quod omnis*, &c., Philo speaks of their avoiding towns and preferring to live in villages, in his "Apology for the Jews" we find them living in many cities, villages, and in great and prosperous towns. In Pliny they are a perennial colony settled on the western shore of the Dead Sea. On the whole, as Philo and Josephus agree in estimating their number at 4000 (Philo, *Q.O.P.L.* § 12; Jos. *Ant.* xviii. 1, § 5), we are justified in suspecting some exaggeration as to the many cities, towns and villages where they were said to be found. As agriculture was their favourite occupation, and as their tendency was to withdraw from the haunts and ordinary interests of mankind, we may assume that with the growing confusion and corruption of Jewish society they felt themselves attracted from the mass of the population to the sparsely peopled districts, till they found a congenial settlement and free scope for their peculiar view of life by the shore of the Dead Sea. While their principles were consistent with the neighbourhood of men, they were better adapted to a state of seclusion.

The Essenes did not renounce marriage because they denied the validity of the institution or the necessity of it as providing for the continuance of the human race, but because they had a low opinion of the character of women (Jos. *B.J.* ii. 8, § 2; Philo, "Apol. for the Jews" in Eus. *Praep. Ev.* viii. 11, § 8). They adopted children when very young, and brought them up on their own principles. Pleasure generally they rejected as evil. They despised riches not less than pleasure; neither poverty nor wealth was observable among them; at initiation every one gave his property into the common stock; every member in receipt of wages handed them over to the funds of the society. In matters of dress the asceticism of the society was very pronounced. They regarded oil as a defilement, even washing it off if anointed with it against their will. They did not change their clothes or their shoes till they were torn in pieces or worn completely away. The colour of their garments was always white. Their daily routine was prescribed for them in the strictest manner. Before the rising of the sun they were to speak of nothing profane, but offered to it certain traditional forms of prayer as if beseeching it to rise. Thereafter they went about their daily tasks, working continuously at whatever trade they knew till the fifth hour, when they assembled, and, girding on a garment of linen, bathed in cold water. They next seated themselves quietly in the dining hall, where the baker set bread in order, and the cook brought each a single dish of one kind of food. Before meat and after it grace was said by a priest. After dinner they resumed work till sunset. In the evening they had supper, at which guests of the order joined them, if there happened to be any such present. Withal there was no noise or confusion to mar the tranquillity of their intercourse; no one usurped more than his share of the conversation; the stillness of the place oppressed a stranger with a feeling of mysterious awe. This composure of spirit was owing to their perfect temperance in eating and drinking. Not only in the daily routine of the society, but generally, the activity of the members was controlled by their presidents. In only two things could they take the initiative, helpfulness and mercy; the deserving poor and the destitute were to receive instant relief; but no member could give anything to his relatives without consulting the heads of the society. Their office-bearers were elected. They had also their special courts of justice, which were composed of not less than a hundred members, and their decisions, which were arrived at with extreme care, were irreversible. Oaths were strictly forbidden; their word was stronger than an oath. They were just and temperate in anger, the guardians of good faith, and the ministers of peace, obedient to their elders and to the majority. But the moral characteristics which they most earnestly cultivated and enjoined will best appear in their rules of initiation. There was a novitiate of three years, during which the intending member was tested as to his fitness for entering the society. If the result was satisfactory, he was admitted, but before partaking of the common meal he was required to swear awful oaths, that he would reverence the deity, do justice to men, hurt no man voluntarily or at the command of another, hate the unjust and assist the just, and that he would render fidelity to all men, but especially to the rulers, seeing that no one rules but of God. He also vowed, if he should bear rule himself, to make no violent use of his power, nor outshine those set under him by superior display, to make it his aim to cherish the truth and unmask liars, to be pure from theft and unjust gain, to conceal nothing from his fellow-members, nor to divulge any of their affairs to other men, even at the risk of death, to transmit their doctrines unchanged, and to keep secret the books of the society and the names of the angels.

Within the limits of the society there were four grades so distinct that if any one touched a member of an inferior grade he required to cleanse himself by bathing in water; members who had been found guilty of serious crimes were expelled from the society, and could not be received again till reduced to the very last extremity of want or sickness. As the result of the ascetic training of the Essenes, and of their temperate diet, it is said that they lived to a great age, and were superior to pain and fear. During the Roman war they cheerfully underwent the most grievous tortures rather than break any of the principles of their faith. In fact, they had in many respects reached the very highest moral elevation attained by the ancient world; they were just, humane, benevolent, and spiritually-minded; the sick and aged were the objects of a special affectionate regard; and they condemned slavery, not only as an injustice, but as an impious violation of the natural brotherhood of men (Philo ii. 457). There were some of the Essenes who permitted marriage, but strictly with a view to the preservation of the race; in other respects they agreed with the main body of the society.

It will be apparent that the predominant tendency of the society was practical. Philo tells us expressly that they rejected logic as unnecessary to the acquisition of virtue, and speculation on nature as too lofty for the human intellect. Yet they had views of their own as to God, Providence, the soul, and a future state, which, while they had a practical use, were yet essentially speculative. On the one hand, indeed, they held tenaciously by the traditional Judaism: blasphemy against their lawgiver was punished with death, the sacred books were preserved and read with great reverence, though not without an allegorical interpretation, and the Sabbath was most scrupulously observed. But in many important points their deviation from the strait path of Judaic development was complete. They rejected animal sacrifice as well as marriage; the oil with which priests and kings were anointed they accounted unclean; and the condemnation of oaths and the community of goods were unmistakable innovations for which they found no hint or warrant in the old Hebrew writings. Their most singular feature, perhaps, was their reverence for the sun. In their speculative hints respecting the soul and a future state, we find another important deviation from Judaism, and the explanation of their asceticism. They held that the body is mortal, and its substance transitory; that the soul is immortal, but, coming from the subtlest ether, is lured as by a sorcery of nature into the prison-house of the body. At death it is released from its bonds, as from long slavery, and joyously soars aloft. To the souls of the good there is reserved a life beyond the ocean, and a country oppressed by neither rain, nor snow, nor heat, but refreshed by a gentle west wind blowing continually from the sea (cf. Hom. *Od.* iv. 566-568), but to the wicked a region of wintry darkness and of unceasing torment. Josephus tells us too that the Essenes believed in fate; but in what sense, and what relation it bore to Divine Providence, does not appear.

The above evidence has left students in doubt as to whether Essenism is to be regarded as a pure product of the Jewish mind or as due in part to some foreign influence. On the one hand it might be maintained that the Essenes out-Pharisee'd the Pharisees. They had in common with that sect their veneration for Moses and the Law, their Sabbatarianism, their striving after ceremonial purity, and their tendency towards fatalism. But if the Pharisees abstained from good works on the Sabbath, the Essenes abstained even from natural necessities (Jos. *B.J.* ii. 8, § 9); if the Pharisees washed, the Essenes bathed before dinner; if the Pharisees ascribed some things to Fate, the Essenes ascribed all (Jos. *Ant.* xiii. 5, § 9). But on the other hand the Essenes avoided marriage, which the Pharisees held in honour; they offered no animal-sacrifices in the Temple; they refrained from the use of oil, which was customary among the Pharisees (Luke vii. 46); above all, they offered prayers to the sun, after the manner denounced in Ezekiel (viii. 16). These and other points of divergences are not explained by Ritschl's interesting theory that Essenism was an organized attempt to carry out the idea of " a kingdom of priests and an holy nation " (Ex. xix. 6).

Granting then that some foreign influence was at work in Essenism, we have four theories offered to us—that this influence was Persian, Buddhist, Pythagorean, or lastly, as maintained by Lipsius, that of the surrounding Syrian heathenism. Each of these views has had able advocates, but it must not be supposed that they are mutually exclusive. If we consider how Philo, while remaining a devout Jew in religion, yet managed to assimilate the whole Stoic philosophy, we can well believe that the Essenes might have been influenced, as Zeller maintained that they were, by Neo-Pythagoreanism. But as Pythagoras himself came from Samos, and his doctrines have a decidedly Oriental tinge, it may very well be that both he and the Essenes drew from a common source; for there is no need to reject, as is so commonly done, the statements of our authorities as to the antiquity of the Essenes. This common source we may believe with Lightfoot to have been the Persian religion, which we know to have profoundly influenced that of Israel, independently of the Essenes.

The fact that the Pharisees and Sadducees so often figure in the pages of the New Testament, while the Essenes are never mentioned, might plausibly be interpreted to show that the New Testament emanated from the side of the Essenes. So far as concerns the Epistle of St James this interpretation would probably be correct. That work contains the doctrine common to the Essenes with Plato, and suggestive of Persian Dualism, that God is the author of good only. There are also certain obvious points of resemblance between the Essenes and the early Christians. Both held property in common; both had scattered communities which received guests one from the other; both avoided a light use of oaths; both taught passive obedience to political authority. The list might be enlarged, but it would not necessarily prove more than that the early Christians shared in the ideas of their age. Christianity was to some extent a popularization of Essenism, but there is little reason for believing that Jesus himself was an Essene. De Quincey's contention that there were no Essenes but the early Christians is now a literary curiosity.

The original sources of our knowledge of the Essenes have been mentioned at the beginning of this paper; the best modern discussions of them are to be found in such works as Zeller's *Philosophie der Griechen*, vol. iii.; Ewald, *Geschichte d. V. Israël*, iii. 419-428; Reuss, *La Théologie chrétienne au siècle apostolique*, i. 122-131; Keim, *Life of Jesus of Nazara*, vol. i.; Lightfoot on the Colossians; Lucius, *Der Essenismus in seinem Verhältniss zum Judenthum*; Wellhausen, *Israelitische und jüdische Geschichte*; Ed. Schürer, *The Jewish People in the Time of Jesus Christ*, div. ii. vol. ii. § 30. The copious bibliography in Conybeare's edition of Philo's *De vita contemplativa* bears upon the Essenes as well as upon the Therapeutes. For a specially Jewish view of the Essenes see Kohler's article in the *Jewish Encyclopaedia*. They are there regarded as being "simply the rigorists among the Pharisees." But we are also told that "the Pharisees characterized the Essene as 'a fool who destroyed the world.'" (T. K.; St G. S.)

ESSENTUKI, a watering-place of south Russia, in the government of Terek, 11 m. by rail W. from Pyatigorsk; altitude, 2096 ft. Its alkaline and sulphur-alkaline mineral waters, similar to those of Ems, Selters and Vichy, are much visited in summer. The climate shows great variations in temperature. Pop. (1897) 9974.

ESSEQUIBO, or Essequebo, one of the three settlements of British Guiana, taking its name from the river Essequibo. (See Guiana.)

ESSEX, EARLS OF. The first earl of Essex was probably Geoffrey de Mandeville (*q.v.*), who became earl about 1139, the earldom being subsequently held by his two sons, Geoffrey and William, until the death of the latter in 1189. In 1199 Geoffrey Fitzpeter or Fitzpiers (d. 1213), who was related to the Mandevilles through his wife Beatrice, became earl of Essex, and on the death of Geoffrey's son William in 1227 the earldom reverted for the second time to the crown. Then the title to the earldom passed by marriage to the Bohuns, earls of Hereford, and before 1239 Humphrey de Bohun (d. 1275) had been recognized as earl of Essex. With the earldom of Hereford the earldom of Essex became extinct in 1373; afterwards it was held by Thomas of Woodstock, duke of Gloucester, a son of Edward III. and the husband of Eleanor de Bohun; and from Gloucester it passed to the Bourchiers, Henry Bourchier (d. 1483), who secured the earldom in 1461, being one of Gloucester's grandsons. The second and last Bourchier earl was Henry's grandson Henry, who died early in 1540. A few weeks before his execution in 1540 Thomas Cromwell (*q.v.*) was created earl of Essex; then in 1543 William Parr, afterwards marquess of Northampton, obtained the earldom by right of his wife Anne, a daughter of the last Bourchier earl. Northampton lost the earldom when he was attainted in 1553; and afterwards it passed to the famous family of Devereux, Walter Devereux, who was created earl of Essex in 1572, being related to the Bourchiers. Robert, the 3rd and last Devereux earl, died in 1646. In 1661 Arthur Capel was created earl of Essex, and the earldom is still held by his descendants.

ESSEX, ARTHUR CAPEL, 1st[1] Earl of (1632–1683), English statesman, son of Arthur, 1st Baron Capel of Hadham (*c.* 1641), executed in 1649, and of Elizabeth, daughter and heir of Sir Charles Morrison of Cashiobury in Hertfordshire, was baptized on the 28th of January 1632. In June 1648, then a sickly boy of sixteen, he was taken by Fairfax's soldiers from Hadham to Colchester, which his father was defending, and carried every day round the works with the hope of inducing Lord Capel to surrender the place. At the restoration he was created Viscount Malden and earl of Essex (20th of April 1661), with special remainder to the male issue of his father, and was made lord-lieutenant of Hertfordshire and a few years later of Wiltshire.[2]

He early showed himself antagonistic to the court, to Roman Catholicism, and to the extension of the royal prerogative, and was coupled by Charles II. with Holles as "stiff and sullen men," who would not yield against their convictions to his solicitations. In 1669 he was sent as ambassador to King Christian V. of Denmark, in which capacity he gained credit by refusing to strike his flag to the governor of Kronborg. In 1672 he was made a privy councillor and lord-lieutenant of Ireland. He remained in office till 1677, and his administration was greatly commended by Burnet and Ormonde,[3] the former describing it "as a pattern to all that come after him." He identified himself with Irish interests, and took immense pains to understand the constitution and the political necessities of the country, appointing men of real merit to office, and maintaining an exceptional independence from solicitation and influence. He held a just balance between the Roman Catholics, the English Church and the Presbyterians, protecting the former as far as public opinion in England would permit, and governing the native Irish with firmness and moderation. The purity and patriotism of his administration were in strong contrast to the hopeless corruption prevalent in that at home and naturally aroused bitter opposition, as an obstacle to the unscrupulous employment of Irish revenues for the satisfaction of the court and the king's expenses. In particular he came into conflict with Lord Ranelagh, to whom had been assigned the Irish revenues on condition of his supplying the requirements of the crown, and whose accounts Essex refused to pass. He opposed strongly the lavish gifts of forfeited estates to court favourites and mistresses, prevented the grant of Phoenix Park to the duchess of Cleveland, and refused to encumber the administration by granting reversions. Finally the intrigues of his enemies at home, and Charles's continual demands for money, which Ranelagh undertook to satisfy, brought about his recall in April 1677. He immediately joined the country party and the opposition to Danby's government, and on the latter's fall in 1679 was appointed a commissioner of the treasury, and the same year a member of Sir William Temple's new-modelled council. He followed the lead of Halifax, who advocated not the exclusion of James, but the limitation of his sovereign powers, and looked to the prince of Orange rather than to Monmouth as the leader of Protestantism, incurring thereby the hostility of Shaftesbury, but at the same time gaining the confidence of Charles. He was appointed by Charles together with Halifax to hear the charges against Lauderdale. In July he wrote a wise and statesmanlike letter to the king, advising him to renounce his project of raising a new company of guards. Together with Halifax he urged Charles to summon the parliament, and after his refusal resigned the treasury in November, the real cause being, according to one account,[4] a demand upon the treasury by the duchess of Cleveland for £25,000, according to another "the niceness of touching French money," "that makes my Lord Essex's squeasy stomach that it can no longer digest his employment."[5]

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[1] *i.e.* in the Capel line.

[2] *Hist. MSS. Comm. ser.*; *Duke of Beaufort's MSS.* 45.

[3] *Life of Ormonde*, by T. Carte, viii. 468 (1851), vol. iv. p. 529.

[4] *Hist. MSS. Comm.* 7th Rep. app. 477b.

[5] *Ib.* 6th Rep. app. 741b.

Subsequently his political attitude underwent a change, the exact cause of which is not clear—probably a growing conviction of the dangers threatened by a Roman Catholic sovereign of the character of James. He now, in 1680, joined Shaftesbury's party and supported the Exclusion Bill, and on its rejection by the Lords carried a motion for an association to execute the scheme of expedients promoted by Halifax. On the 25th of January 1681 at the head of fifteen peers he presented a petition to the king, couched in exaggerated language, requesting the abandonment of the session of parliament at Oxford. He was a jealous prosecutor of the Roman Catholics in the popish plot, and voted for Stafford's attainder, on the other hand interceding for Archbishop Plunket, implicated in the pretended Irish plot. He, however, refused to follow Shaftesbury in his extreme courses, declined participation in the latter's design to seize the Tower in 1682, and on Shaftesbury's consequent departure from England became the leader of Monmouth's faction, in which were now included Lord Russell, Algernon Sidney, and Lord Howard of Escrick. Essex took no part in the wilder schemes of the party, but after the discovery of the Rye House Plot in June 1683, and the capture of the leaders, he was arrested at Cashiobury and imprisoned in the Tower. His spirits and fortitude appear immediately to have abandoned him, and on the 13th of July he was discovered in his chamber with his throat cut. His death was attributed, quite groundlessly, to Charles and James, and the evidence points clearly if not conclusively to suicide, his motive being possibly to prevent an attainder and preserve his estate for his family. He, was, however, undoubtedly a victim of the Stuart administration, and the antagonism and tragic end of men like Essex, deserving men, naturally devoted to the throne, constitutes a severe indictment of the Stuart rule.

He was a statesman of strong and sincere patriotism, just and unselfish, conscientious and laborious in the fulfilment of public duties, blameless in his official and private life. Evelyn describes him as "a sober, wise, judicious and pondering person, not illiterate beyond the rule of most noblemen in this age, very well versed in English history and affairs, industrious, frugal, methodical and every way accomplished"; and declares he was much deplored, few believing he had ever harboured any seditious designs.[1] He married Lady Elizabeth Percy, daughter of Algernon, 10th earl of Northumberland, by whom, besides a daughter, he had an only son Algernon (1670–1710), who succeeded him as 2nd earl of Essex.

BIBLIOGRAPHY.—See the Lives in the *Dict. of Nat. Biography* and in *Biographia Britannica* (Kippis), with authorities there collected; Essex's Irish correspondence is in the *Stow Collection* in the British Museum, Nos. 200-217, and selections have been published in *Letters written by Arthur Capel, Earl of Essex* (1770) and in the *Essex Papers* (Camden Society, 1890), to which can now be added the *Calendars of State Papers, Domestic*, which contain a large number of his letters and which strongly support the opinion of his contemporaries concerning his unselfish patriotism and industry; see also *Somers Tracts* (1813), x., and for other pamphlets relating to his death the catalogue of the British Museum.

ESSEX, ROBERT DEVEREUX, 2ND[2] EARL OF (1566–1601), son of the 1st Devereux earl, was born at Netherwood, Herefordshire, on the 19th of November 1566. He entered the university of Cambridge and graduated in 1581. In 1585 he accompanied his stepfather, the earl of Leicester, on an expedition to Holland, and greatly distinguished himself at the battle of Zutphen. He now took his place at court, where so handsome a youth soon found favour with Queen Elizabeth, and in consequence was on bad terms with Raleigh. In 1587 he was appointed master of the horse, and in the following year was made general of the horse and installed knight of the Garter. On the death of Leicester he succeeded him as chief favourite of the queen, a position which injuriously affected his whole subsequent life, and ultimately resulted in his ruin. While Elizabeth was approaching the mature age of sixty, Essex was scarcely twenty-one. Though well aware of the advantages of his position, and somewhat vain of the queen's favour, his constant attendance on her at court was irksome to him beyond all endurance; and when he could not make his escape to the scenes of foreign adventure after which he longed, he varied the monotony of his life at court by intrigues with the maids of honour. He fought a duel with Sir Charles Blount, a rival favourite of the queen, in which the earl was disarmed and slightly wounded in the thigh.

In 1589, without the queen's consent, he joined the expedition of Drake and Sir John Norris against Spain, but in June he was compelled to obey a letter enjoining him at his "uttermost peril" to return immediately. In 1590 Essex married the widow of Sir Philip Sidney, but in dread of the queen's anger he kept the marriage secret as long as possible. When it was necessary to avow it, her rage at first knew no bounds, but as the earl did "use it with good temper," and "for her majesty's better satisfaction was pleased that my lady should live retired in her mother's house," he soon came to be "in very good favour." In 1591 he was appointed to the command of a force auxiliary to one formerly sent to assist Henry IV. of France against the Spaniards; but after a fruitless campaign he was finally recalled from the command in January 1592. For some years after this most of his time was spent at court, where he held a position of unexampled influence, both on account of the favour of the queen and from his own personal popularity. In 1596 he was, after a great many "changes of humour" on the queen's part, appointed along with Lord Howard of Effingham, Raleigh and Lord Thomas Howard, to the command of an expedition, which was successful in defeating the Spanish fleet, capturing and pillaging Cadiz, and destroying 53 merchant vessels. It would seem to have been shortly after this exploit that the beginnings of a change in the feelings of the queen towards him came into existence. On his return she chided him that he had not followed up his successes, and though she professed great pleasure at again seeing him in safety, and was ultimately satisfied that the abrupt termination of the expedition was contrary to his advice and remonstrances, she forbade him to publish anything in justification of his conduct. She doubtless was offended at his growing tendency to assert his independence, and jealous of his increasing popularity with the people; but it is also probable that her strange infatuation regarding her own charms, great as it was, scarcely prevented her from suspecting either that his professed attachment had all along been somewhat alloyed with considerations of personal interest, or that at least it was now beginning to cool. Francis Bacon, at that time his most intimate friend, endeavoured to prevent the threatened rupture by writing him a long letter of advice; and although perseverance in a long course of feigned action was for Essex impossible, he for some time attended pretty closely to the hints of his mentor, so that the queen "used him most graciously." In 1597 he was appointed master of the ordnance, and in the following year he obtained command of an expedition against Spain, known as the Islands or Azores Voyage. He gained some trifling successes, but as the Plate fleet escaped him he failed of his main purpose; and when on his return the queen met him with the usual reproaches, he retired to his home at Wanstead. This was not what Elizabeth desired, and although she conferred on Lord Howard of Effingham the earldom of Nottingham for services at Cadiz, the main merit of which was justly claimed by Essex, she ultimately held out to the latter the olive branch of peace, and condescended to soothe his wounded honour by creating him earl marshal of England. That, nevertheless, the irritated feelings neither of Essex nor of the queen were completely healed was manifested shortly afterwards in a manner which set propriety completely at defiance. In a discussion on the appointment of a lord deputy to Ireland, Essex, on account of some taunting words of Elizabeth, turned his back upon her with a gesture indicative not only of anger but of contempt, and when she, unable to control her indignation, slapped him on the face, he left her presence swearing that such an insult he would not have endured even from Henry VIII.

In 1599, while Ulster was in rebellion under the earl of Tyrone, the office of lieutenant and governor-general of Ireland was conferred on Essex, and a large force put at his command.

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[1] *Diary and Corresp.* (1850), ii. 141, 178.

[2] *i.e.* in the Devereux line.

His campaign was an unsuccessful one, and by acting in various ways in opposition to the commands of the queen and the council, agreeing with Tyrone on a truce in September, and suddenly leaving the post of duty with the object of privately vindicating himself before the queen, he laid himself open to charges more serious than that of mere incompetency. For these misdemeanours he was brought in June 1600 before a specially constituted court, deprived of all his high offices, and ordered to live a prisoner in his own house during the queen's pleasure. Chiefly through the intercession of Bacon his liberty was shortly afterwards restored to him, but he was ordered not to return to court. For some time he hoped for an improvement in his prospects, but when he was refused the renewal of his patent for sweet wines, hope was succeeded by despair, and half maddened by wounded vanity, he made an attempt (Feb. 7, 1601) to incite a revolution in his behalf, by parading the streets of London with 300 retainers, and shouting, "For the queen! a plot is laid for my life!" These proceedings awakened, however, scarcely any other feelings than mild perplexity and wonder; and finding that hope of assistance from the citizens was vain, he returned to Essex House, where after defending himself for a short time he surrendered. After a trial—in which Bacon, who prosecuted, delivered a speech against his quondam friend and benefactor, the bitterness of which was quite unnecessary to secure a conviction entailing at least very severe punishment—he was condemned to death, and notwithstanding many alterations in Elizabeth's mood, the sentence was carried out on the 25th of February 1601.

Essex was in person tall and well proportioned, with a countenance which, though not strictly handsome, possessed, on account of its bold, cheerful and amiable expression, a wonderful power of fascination. He was a patron of literature, and himself a poet. His carriage was not very graceful, but his manners are said to have been "courtly, grave and exceedingly comely." He was brave, chivalrous, impulsive, imperious sometimes with his equals, but generous to all his dependants and incapable of secret malice; and these virtues, which were innate and which remained with him to the last, must be regarded as somewhat counterbalancing, in our estimation of him, the follies and vices created by temptations which were exceptionally strong.

See Hon. W. B. Devereux, *Lives of the Earls of Essex* (1853); and *Bacon and Essex*, by E. A. Abbott (1877). Also the article BACON, FRANCIS, and authorities there.

ESSEX, ROBERT DEVEREUX, 3RD[1] EARL OF (1591–1646), son of the preceding, was born in 1591. He was educated at Eton and at Merton College, Oxford. Shortly after the arrival of James I. in London, Essex (whose title was restored, and the attainder on his father removed, in 1604) was placed about the prince of Wales, as a sharer both in his studies and amusements. At the early age of fifteen he was married to Frances Howard, daughter of the earl of Suffolk, but she was his wife only in name; during his absence abroad (1607–1609) she fell in love with Sir Robert Carr (afterwards earl of Somerset), and on her charging her husband with physical incapacity, the marriage was annulled in 1613. A second marriage which he contracted in 1631 with Elizabeth, daughter of Sir William Paulet, also ended unhappily. From 1620 to 1623 he served in the wars of the Palatinate, and in 1625 he was vice-admiral of a fleet which made an unsuccessful attempt to capture Cadiz. In 1639 he was lieutenant-general of the army sent by Charles against the Scottish Covenanters; but on account of the irresolution of the king no battle occurred, and the army was disbanded at the end of the year. Essex was discharged "without ordinary ceremony," and refused an office which at that time fell vacant, "all which," says Clarendon, "wrought very much upon his rough, proud nature, and made him susceptible of some impressions afterwards which otherwise would not have found such easy admission." Having taken the side of the parliament against Charles, he was, on the outbreak of the civil war in 1642, appointed to the command of the parliamentary army. At the battle of Edgehill he remained master of the field, and in 1643 he captured Reading, and relieved Gloucester; but in the campaign of the following year, on account of his hesitation to fight against the king in person, nearly his whole army fell into the hands of Charles. In 1645, on the passing of the self-denying ordinance, providing that no member of parliament should hold a public office, he resigned his commission; but on account of his past services his annuity of £10,000 was continued to him for life. He died on the 14th of September 1646, of a fever brought on by over-exertion in a stag-hunt in Windsor Forest; his line becoming extinct.

See the "Life of Robert Earl of Essex," by Robert Codrington, M.A., printed in *Hart. Misc.*; Clarendon's *History of the Rebellion*; and Hon. W. B. Devereux, *Lives of the Earls of Essex* (1853).

ESSEX, WALTER DEVEREUX, 1ST[2] EARL OF (1541–1576), the eldest son of Sir Richard Devereux, was born in 1541. His grandfather was the 2nd Baron Ferrers, who was created Viscount Hereford in 1550 and by his mother was a nephew of Henry Bourchier, a former earl of Essex. Walter Devereux succeeded as 2nd Viscount Hereford in 1558, and in 1561 or 1562 married Lettice, daughter of Sir Francis Knollys. In 1569 he served as high marshal of the field under the earl of Warwick and Lord Clinton, and materially assisted them in suppressing the northern insurrection. For his zeal in the service of Queen Elizabeth on this and other occasions, he in 1572 received the Garter and was created earl of Essex, the title which formerly belonged to the Bourchier family. Eager to give proof of "his good devotion to employ himself in the service of her majesty," he offered on certain conditions to subdue and colonize, at his own expense, a portion of the Irish province of Ulster, at that time completely under the dominion of the rebel O'Neills, under Sir Brian MacPhelim and Tirlogh Luineach, with the Scots under their leader Sorley Boy MacDonnell. His offer, with certain modifications, was accepted, and he set sail for Ireland in July 1573, accompanied by a number of earls, knights and gentlemen, and with a force of about 1200 men. The beginning of his enterprise was inauspicious, for on account of a storm which dispersed his fleet and drove some of his vessels as far as Cork and the Isle of Man, his forces did not all reach the place of rendezvous till late in the autumn, and he was compelled to entrench himself at Belfast for the winter. Here, by sickness, famine and desertions, his troops were diminished to little more than 200 men. Intrigues of various sorts, and fighting of a guerilla type, followed with disappointing results, and Essex had difficulties both with the deputy Fitzwilliam and with the queen. Essex was in straits himself, and his offensive movements in Ulster took the form of raids and brutal massacres among the O'Neills; in October 1574 he treacherously captured MacPhelim at a conference in Belfast, and after slaughtering his attendants had him and his wife and brother executed at Dublin. Elizabeth, instigated apparently by Leicester, after encouraging Essex to prepare to attack the Irish chief Tirlogh Luineach, suddenly commanded him to "break off his enterprise"; but, as she left him a certain discretionary power, he took advantage of it to defeat Tirlogh Luineach, chastise Antrim, and massacre several hundreds of Sorley Boy's following, chiefly women and children, discovered hiding in the caves of Rathlin. He returned to England in the end of 1575, resolved "to live henceforth an untroubled life"; but he was ultimately persuaded to accept the offer of the queen to make him earl marshal of Ireland. He arrived in Dublin in September 1576, and three weeks afterwards died of dysentery. There were suspicions that he had been poisoned by Leicester, who shortly after his death married his widow, but these were not confirmed by the post-mortem examination. The endeavours of Essex to better the condition of Ireland were a dismal failure; and the massacres of the O'Neills and of the Scots of Rathlin leave a dark stain on his reputation.

See Sidney Lee's article in the *Dict. Nat. Biog.*; *Lives of the Devereux Earls of Essex*, by Hon. Walter B. Devereux (1853); Froude's *History of England*, vol. x.; J. S. Brewer, *Athenaeum* (1870), part i. pp. 261, 326.

ESSEX, an eastern county of England, bounded N. by Cambridgeshire and Suffolk, E. by the North Sea, S. by the Thames, dividing it from Kent, W. by the administrative county of London and by Hertfordshire. Its area is 1542 sq. m. Its configuration is sufficiently indicated by the direction of its rivers. Except that in the N.W. the county includes the heads of a few valleys draining northward to the Cam and so to the Great Ouse, all the streams, which are never of great size, run southward and eastward, either into the Thames, or into the North Sea by way of the broad, shallow estuaries which ramify through the flat coast lands. The highest ground lies consequently in the north-west, between the Cam basin and the rivers of the county. Its principal southward extension is that between the Lea (which with its tributary the Stort forms a great part of the western boundary) and the Roding, and east of the Roding valley. The other chief rivers may be specified according to their estuaries, following the coast northward from Shoeburyness at the Thames mouth. That of the Roach ramifies among several islands of which Foulness is the largest, but its main branch joins the Crouch estuary. Next follows the Blackwater, which receives the Chelmer, the Brain and other streams. Following a coast of numerous creeks and islets, with the large island of Mersea, the Colne estuary is reached. The Colne and Blackwater may be said to form one large estuary, as they enter the sea by a well-marked common mouth, 5 m. in width, between Sales Point and Colne Point. There is a great irregular inlet (Hamford Water) receiving no large stream, W. of the Naze promontory, and then the Stour, bounding the county on the north, joins its estuary to that of the Orwell near the sea. There are several seaside watering-places in favour owing to their proximity to London, of which Southend-on-Sea above the mouth of the Thames, Clacton-on-Sea, Walton-on-the-Naze, and Dovercourt adjoining Harwich are the chief. These and other stations on the estuaries are also in favour with yachtsmen. The sea has at some points seriously encroached upon the land within historic times. The low soft cliffs at various points are liable to give way against the waves; in other parts dykes and embankments are necessary to prevent inundation. Inland, that is apart from the flat coast-district, the country is pleasantly undulating and for the most part well wooded. It was formerly, indeed, almost wholly forested, the great Waltham Forest stretching from Colchester to the confines of London. Of this a fragment is preserved in Epping Forest (see EPPING) between the Lea and the Roding. On the other side of the Roding Hainault Forest is traceable, but was disafforested in 1851. The oak is the principal tree; a noteworthy example was that of Fairlop in Hainault, which measured 45 ft. in girth, but was blown down in 1820.

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[1] *i.e.* in the Devereux line.

[2] *i.e.* in the Devereux line.

Geology.—The geological structure of the county is very simple: the greater part is occupied by the London clay with underlying Reading beds and Thanet sands, with here and there small patches of Bagshot gravels on elevated tracts, as at High Beech, Langdon Hill, Brentwood and Rayleigh; and occasionally the same beds are represented by the large boulder-like Sarsen stones on the lower ground. In the north, the chalk, which underlies the Tertiary strata over the whole county, appears at the surface and forms the downs about Saffron Walden, Birdbrook and Great Yeldham; it is brought up again by a small disturbance at Grays Thurrock where it is quarried on a large scale for lime, cement and whiting. Small patches of Pleistocene Red Crag rest upon the Eocene strata at Beaumont and Oakley, and are very well exposed at Walton-on-the-Naze where they are very fossiliferous. Most of the county is covered by a superficial deposit of glacial drifts, sands, gravel and in places boulder clay, as at Epping, Dunmow and Hornchurch where the drift lies beneath the Thames gravel. An interesting feature in relation to the glacial drift is a deep trough in the Cam valley revealed by borings to be no less than 340 ft. deep at Newport; this ancient valley is filled with drift. In the southern part of the county are broad spreads of gravel and brick earth, formed by the Thames; these have been excavated for brick-making and building purposes about Ilford, Romford and Grays, and have yielded the remains of hippopotamus, rhinoceros and mammoth. More recent alluvial deposits are found in the valley at Walthamstow and Tilbury, in which the remains of the beaver have been discovered.

The roads of this county with a clay soil foundation were for generations repaired with flints picked by women and children from the surface of the fields. Gravel is difficult of access. With the exception of chalk for lime (mainly obtained at Ballingdon in the north and Grays in the south), septaria for making cement, and clay for bricks, the underground riches of the county are meagre.

Agriculture.—As an agricultural county Essex ranks high. Some four-fifths of the total area is under cultivation, and about one-third of that area is in permanent pasture. Wheat, barley and oats, in that relative order, are the principal grain crops, Essex being one of the chief grain-producing counties. The wheat and barley are in particularly high favour, the wheat of various standard species being exported for seed purposes, while the barley is especially useful in malting. Beans and peas are largely grown, as are vegetables for the London market. Hop-growing was once important. From the comparative dryness of the climate Essex does not excel in pasturage, and winter grazing receives the more attention. The numbers of cattle increase steadily, and store bullocks are introduced in large numbers from Norfolk, Lincolnshire, Ireland and Wales. Of sheep there are but few distinct flocks, and the numbers decrease. Pigs are generally of a high-class Berkshire type.

Other Industries.—The south-west of the county, being contiguous to London, is very densely populated, and is the seat of large and varied industries. For example, there are numbers of chemical works, the extensive engine shops and works of the Great Eastern railway at Stratford, government powder works in the vicinity of Waltham Abbey, and powder stores at Purfleet on the Thames. The extensive water-works for east London, by the Lea near Walthamstow, may also be mentioned. The docks at Plaistow and Tilbury on the Thames employ many hands. Apart from this industrial district, there are considerable engineering works, especially for agricultural implements, at Chelmsford, Colchester and elsewhere; several silk works, as at Braintree and Halstead; large breweries, as at Brentwood, Chelmsford and Romford; and lime and cement works at Grays Thurrock. The oyster-beds of the Colne produce the famous Colchester natives, and there are similar beds in the Crouch and Roach, for which Burnham-on-Crouch is the centre; and in the Blackwater (Maldon).

Communications.—Railway communications are supplied principally by the Great Eastern railway, of which the main line runs by Stratford, Ilford, Romford, Brentwood, Chelmsford, Witham, Colchester, and Manningtree. The Cambridge and northern line of this company, following the Lea valley, does not touch the county until it diverges along the valley of the Stort. The chief branches are those to Southend and Burnham, Witham to Maldon, Colchester to Brightlingsea, to Clacton and to Walton, and Manningtree to Harwich, on the coast; and Witham to Braintree and Bishop's Stortford, and Mark's Tey to Sudbury and beyond, inland; while there are several branch lines among the manufacturing and residential suburbs in the south-west, to Walthamstow and Buckhurst Hill, Chigwell, Loughton, Epping, Ongar, &c. The London, Tilbury & Southend railway, following the Thames, serves the places named, and the Colne Valley railway runs from Chappel junction near Mark's Tey by Halstead to Haverhill.

On the Thames, besides the great docks at Plaistow (Victoria and Albert) and the deep-water docks at Tilbury, the principal calling places for vessels are Grays, Purfleet and Southend, while Barking on the Roding has also shipping trade, and the Lea affords important water-connexions. Elsewhere, the principal port is Harwich, at the mouth of the Stour, one of the chief ports of England for European passenger traffic. Other towns ranking as lesser estuarine ports are: Brightlingsea and Wivenhoe on the Colne, forming a member of the Cinque Port of Sandwich; Colchester, Maldon on the Blackwater, and Burnham-on-Crouch. The Stour, Chelmer, and Lea and Stort are the principal navigable inland waterways.

Population and Administration.—The area of the ancient county is 986,975 acres, with a population in 1891 of 785,445 and in 1901 of 1,085,771. The area of the administrative county is 979,532 acres. The county contains nineteen hundreds. It is divided into eight parliamentary divisions, and it also includes the parliamentary boroughs of Colchester and West Ham, the latter consisting of two divisions. Each of these returns one member. The county divisions are—Northern or Saffron Walden, North-eastern or Harwich, Eastern or Maldon, Western or Epping, Mid or Chelmsford, South-eastern, Southern or Romford, South-western or Walthamstow, returning one member each. The municipal boroughs are—Chelmsford (12,580), Colchester (38,373), East Ham (96,018), Harwich (10,070), Maldon (5565), Saffron Walden (5896), Southend-on-Sea (28,857), and one county borough, West Ham (267,358). The following are the other urban districts—Barking Town (21,547), Braintree (5330), Brentwood (4932), Brightlingsea (4501), Buckhurst Hill (4786), Burnham-on-Crouch (2919), Chingford (4373), Clacton (7456), Epping (3789), Frinton-on-Sea (644), Grays Thurrock (13,834), Halstead (6073), Ilford (41,234), Leigh-on-Sea (3667), Leyton (98,912), Loughton (4730), Romford (13,656), Shoeburyness (4081), Waltham Holy Cross (6549), Walthamstow (95,131), Walton-on-the-Naze (2014), Wanstead (9179), Witham (3454), Wivenhoe (2560), Woodford (13,798). Essex is in the South-eastern circuit, and assizes are held at Chelmsford. The boroughs of Harwich and Southend-on-Sea have separate commissions of the peace, and the boroughs of Colchester, Maldon, Saffron Walden and West Ham have, in addition, separate courts of quarter sessions. The county is ecclesiastically within the diocese of St Albans (with a small portion within that of Ely) and is divided into two archdeaconries; containing 452 parishes or districts wholly or in part. There are 399 civil parishes.

There is a military station and depot for recruits at Warley, and a garrison at Tilbury. At Shoeburyness there are a school of gunnery and an extensive ground for testing government artillery of the largest calibre.

History (see also below under ESSEX, KINGDOM OF).—Essex probably originated as a shire in the time of Æthelstan. According to the Domesday Survey it comprised nineteen hundreds, corresponding very closely in extent and in name with those of the present day. The additional half-hundred of Thunreslan on the Suffolk border has disappeared; Witbrictesherna is now Dengie; and the liberty of Havering-atte-Bower appears to have been taken out of Becontree. Essex and Hertfordshire were under one sheriff until the time of Elizabeth. At the time of the Survey Count Eustace held a vast fief in Essex, and the court of the Honour of Boulogne was held at Witham. Bentry Heath in Dagenham, Hundred Heath in Tendring and Castle Hedingham in Hinckford were the meeting-places of their respective hundreds. The stewardship of the forest of Essex was held by the earls of Oxford until deprived of it for adherence to the Lancastrian cause. In 1421 certain parts of Essex inherited by Henry V. from his mother were brought under the jurisdiction of the duchy of Lancaster.

Essex was part of the see of London from the time of the foundation of the bishopric in the 7th century. The archdeaconries are first mentioned in 1108; that of Essex extended over the south of the county and in 1291 included eight deaneries; the north of the county was divided between the archdeaconries of Middlesex and Colchester, comprising three and six deaneries respectively. Colchester was constituted a suffragan bishopric by Henry VIII. In 1836 Essex was transferred to the diocese of Rochester, with the exception of nine parishes which remained in London. In 1845 the archdeacon of Middlesex ceased to exercise control in Essex, and the deaneries were readjusted. In 1875 Essex was transferred to the newly created diocese of St Albans, and in 1877 the archdeaconry of Essex was subdivided into eighteen deaneries and that of Colchester into sixteen.

Owing to its proximity to the capital Essex was intimately associated with all the great historical struggles. The nobility of Essex took a leading part in the struggle for the charter, and of the twenty-four guardians of the charter, four were Essex barons. The castles of Pleshey, Colchester, and Hedingham were held against the king in the Barons' War of the reign of Henry III., and 5000 Essex men joined the peasant rising of 1381. During the Wars of the Roses the Lancastrian cause was supported by the de Veres, while the Bourchiers and Lord Fitz-Walter were among the Yorkist leaders. Several Essex men were concerned in the Gunpowder Plot, and in the Civil War of the 17th century the county rendered valuable aid to the parliament.

After the Conquest no Englishman retained estates in Essex of any importance, and the chief lay barons at the time of the Survey were Geoffrey de Mandeville and Aubrey de Vere. The de Veres, earls of Oxford, were continuously connected with the county until the extinction of the title two centuries ago. Pleshey was the stronghold of the Mandevilles, and, although the house became extinct in 1189, its descendants in the female line retained the title of earls of Essex. The Honour of Hatfield Peverel held by Ranulf Peverel after the Conquest escheated to the crown in the reign of Henry I., and in the same reign the fief of Robert Gernon passed to the house of Mountfichet.

Essex has always been mainly an agricultural county, and the ordinary agricultural pursuits were carried on at the time of the Domesday Survey, which also mentions salt-making, wine-making, bee-culture and cheese-making, while the oyster fisheries have been famous from the earliest historic times. The woollen industry dates back to Saxon times, and for many centuries ranked as the most important industry. Cloth-weaving was introduced in the 14th century, and in the 16th century Colchester was noted for its "bays and says." Colchester also possessed a valuable leather industry in the 16th century, at which period Essex was considered an exceptionally wealthy and prosperous county; Norden, writing in 1594, describes it as "moste fatt, frutefull, and full of all profitable things." The decline of the cloth industry in the 17th century caused great distress, but a number of smaller industries began to take its place. Saffron-culture and silk-weaving were extensively carried on in the 17th century, and the 18th century saw the introduction of the straw-plait industry, potash-making, calico-printing, malting and brewing, and the manufacture of Roman cement.

The county returned four members to parliament in 1290. From 1295 it returned two members for the county and two for Colchester. Maldon acquired representation in 1331 and Harwich in 1604. Under the Reform Act of 1832 the county returned four members in four divisions. Under the Representation of the People Act of 1868 Maldon and Harwich each lost one member, and the county returned six members in three divisions.

Antiquities.—It is supposed by many antiquaries that Saxon masonry can be detected in the foundations of several of the Essex churches, but, with the exception of Ashingdon church tower, believed to have been erected by Canute after his victory over Edmund Ironside, there is no obviously recognizable building belonging to that period. This is probably to be in part ascribed to the fact that the comparative scarcity of stone and the unusual abundance of timber led to the extensive employment of the latter material. Several of the Essex churches, as Blackmore, Mountnessing, Margaretting, and South Benfleet, have massive porches and towers of timber; and St Andrew's church, Greenstead, with its walls of solid oak, continues an almost unique example of its kind. Of the four round churches in England one is in Essex at Little Maplestead; it is both the smallest and the latest. The churches of South Weald, Hadleigh, Blackmore, Heybridge and Hadstock may be mentioned as containing Norman work; with the church of Castle Hedingham for its fine Transitional work; Southchurch, Danbury and Boreham as being partly Early English; Ingatestone, Stebbing and Tilty for specimens of Decorated architecture; and Messing, Thaxted, Saffron Walden, and the church of St Peter ad Vincula at the small town of Coggeshall, near Colchester, as specimens of Perpendicular. Stained glass windows have left their traces in several of the churches, the finest remains being those of Margaretting, which represent a tree of Jesse and the daisy or herb Margaret. Paintings have evidently been largely used for internal decoration: a remarkable series, probably of the 12th century, but much restored in the 14th, exists in the chancel of Copford church; and in the church at Ingatestone there was discovered in 1868 an almost unique fresco representation of the seven deadly sins. The oldest brasses preserved in the county are those of Sir William Fitz-Ralph at Pebmarsh, about 1323; Richard of Beltown, at Corringham, 1340; Sir John Gifford, at Bowers

Gifford, 1348; Ralph de Kneyton, at Aveley, 1370; Robert de Swynbourne, at Little Horkesley, 1391; and Sir Ingelram de Bruyn, at South Ockendon, 1400. The brass of Thomas Heron, aged 14, at Little Ilford, though dating only from 1517, is of interest as a picture of a schoolboy of the period. Ancient wooden effigies are preserved at Danbury, Little Leighs and Little Horkesley.

Essex was rich in monastic foundations, though the greater number have left but meagre ruins behind. The Benedictines had an abbey at Saffron Walden, nunneries at Barking and Wickes, and priories at Earl's or Monk's Colne and Castle Hedingham; the Augustinian canons had an abbey at Waltham (see WALTHAM ABBEY; the portion remaining shows Norman work of the finest character), priories at Thoby, Blackmore, Bicknacre, Little Leighs, Little Dunmow and St Osyth (see BRIGHTLINGSEA); there were Cistercian abbeys at Coggeshall, Stratford and Tilty; the Cluniac monks were settled at Prittlewell, the Premonstratensians at Beleigh Abbey, and the Knights Hospitallers at Little Maplestead. Barking Abbey is said to date its first origin from the 7th century; most of the others arose in the 12th and 13th centuries. Besides the keep at Colchester there is a fine Norman castle at Castle Hedingham, and two dilapidated round towers still stand at Hadleigh near Southend. Ongar, the house of the de Lacys, and Pleshey, the seat of the earls of Essex, have left only mounds. Havering-atte-Bower, the palace that was occupied by many queens, is replaced by a modern house; Wickham, the mansion of the bishops of London, no longer stands. New Hall, which was successively occupied by Henry VIII., Elizabeth, the earl of Essex, George Villiers, duke of Buckingham, and Cromwell, is now a nunnery of the order of the Holy Sepulchre. Audley End, the mansion of Lord Braybrooke, is a noble example of the domestic architecture of the Jacobean period; Layer Marney is an interesting proof of the Italian influences that were at work in the time of Wolsey. Horeham Hall was built by Sir John Cutt in the reign of Henry VII., and Gosfield Hall is of about the same date.

See Norden, *Speculi Britanniae Pars: an Hist. and Geogr. Descrip. of the County of Essex* (1594) (edited for the Camden Society by Sir Henry Ellis, 1840, from the original MS. in the Marquis of Salisbury's library at Hatfield); Nicholas Tindal, *Hist. of Essex* (1720); N. Salmon, *The Hist. and Antiq. of Essex* (London, 1740)—based on the collections of James Strangman of Hadleigh (v. *Trans. of Essex Arch. Soc.* vol. ii.); P. Morant, *Hist. and Antiq. of the County of Essex* (London, 1768); P. Muilman, *New and Complete Hist. of Essex from a late Survey, by a Gentleman* (Chelmsford, 6 vols., 1770–1772, London, 1779); Elizabeth Ogbourne, *Hist. of Essex* (London, part i., 1814); *Excursions through Essex, illustrated with one hundred engravings* (2 vols., London, 1818); T. Wright, *Hist. and Topography of Essex* (1831); W. Berry, *Pedigrees of Families in Essex* (1841); A. Suckling, *Memorials of the Antiquities, &c., of the County of Essex* (London, 1845); W. Andrews (ed.), *Bygone Essex* (London, 1892); J. T. Page (ed.), *Essex in the Days of Old* (London, 1898); *Victoria County History, Essex*; *Transactions of the Essex Arch. Soc.* from 1858. An account of various MS. collections connected with the county is given by H. W. King in vol. ii. of the *Transactions* (1863).

ESSEX, KINGDOM OF, one of the kingdoms into which Anglo-Saxon Britain was divided, properly the land of the East Saxons. Of its origin and early history we have no record except the bare statement of Bede that its settlers were of the Old Saxon race. In connexion with this it is interesting to notice that the East Saxon dynasty claimed descent from Seaxneat, not Woden. The form Seaxneat is identical with Saxnot, one of three gods mentioned in a short continental document probably of Old Saxon origin. Bede does not mention this kingdom in his narrative until 604, the year of the consecration of Mellitus to the see of London. The boundaries of Essex were in later times the rivers Stour and Thames, but the original limits of the kingdom are quite uncertain; towards the west it probably included most if not the whole of Hertfordshire, and in the 7th century the whole of Middlesex. In 604 we find Essex in close dependence upon Kent, being ruled by Saberht, sister's son of Æthelberht, under whom the East Saxons received Christianity. The three sons of Saberht, however, expelled Mellitus from his see, and even after their death in battle against the West Saxons, Eadbald of Kent was unable to restore him. In the year 653 we find Northumbrian influence paramount in Essex, for King Sigeberht at the instance of Oswio became a Christian and received Cedd, the brother of St Chad, in his kingdom as bishop, Tilbury and *Ythanceastere* (on the Blackwater) being the chief scenes of his work. Swithhelm, the successor of Sigeberht, was on terms of friendship with the East Anglian royal house, King Æthelwald being his sponsor at his baptism by Cedd. It was probably about this time that Erconwald, afterwards bishop of London, founded the monastery of Barking. Swithhelm's successors Sigehere and Sebbe were dependent on Wulfhere, the powerful king of Mercia, who on the apostasy of Sigehere sent Bishop Jaruman to restore the faith. There are grounds for believing that an East Saxon conquest of Kent took place in this reign. A forged grant of Ceadwalla speaks of the fall of Kent before Sigehere as a well-known event; and in a Kentish charter dated 676 a king of Kent called Swebhard grants land with the consent of his father King Sebbe. In 692 or 694 Sebbe abdicated and received the monastic vows from Waldhere, the successor of Erconwald at London. His sons Sigeheard and Swefred succeeded him as kings of Essex, Sigehere being apparently dead. As the laws of Ine of Wessex speak of Erconwald as "my bishop," it is possible that the influence of Wessex for a short time prevailed in Essex; but a subsequent charter of Swefred is approved by Coenred of Mercia, and Offa, the son of Sigehere, accompanied the same king to Rome in 709. From this time onwards the history of Essex is almost a blank. In 743 or 745 Æthelbald of Mercia is found granting privileges at the port of London, and perhaps the western portion of the kingdom had already been annexed, for henceforward London is frequently the meeting-place of the Mercian council. The violent death of Selred, king of Essex, is mentioned in the *Saxon Chronicle* under the year 746; but we have no more information of historical importance until the defeat of the Mercian king Beornwulf in 825, when Essex, together with Kent, Sussex and Surrey, passed into the hands of Ecgbert, king of Wessex. After 825 we hear of no more kings of Essex, but occasionally of earls. About the year 870 Essex passed into the hands of the Danes and was left to them by the treaty between Alfred and Guthrum. It was reconquered by Edward the Elder. The earldom in the 10th century apparently included several other counties, and its most famous holder was the ealdorman Brihtnoth, who fell at the battle of Maldon in 991.

The following is a list of kings of Essex of whom there is record: Saberht (d. *c.* 617); three sons of Saberht, including probably Saweard and Seaxred; Sigeberht (Parvus); Sigeberht II.; Swithhelm (d. *c.* 664); Sigehere (reigned perhaps 664–689); Sebbe, son of Seaxred (664–694); Sigeheard (reigning in 693–694); Swefred (reigning in 693–694 and in 704); the two last being sons of Sebbe; Swebriht (d. 738); Selred (d. 746); Swithred, grandson of Sigeheard (succ. 746); Sigeric, son of Selered (abd. 798); Sigered, son of Sigeric (reigning in 823).

See Bede, *Hist. Eccl.*, edited by C. Plummer (Oxford, 1896), ii. 3, 5; *Saxon Chronicle* (Earle and Plummer, Oxford, 1899), *s.a.* 823, 894, 904, 913, 921, 994; William of Malmesbury, *Gesta Regum*, Rolls Series (ed. Stubbs, 1887–1889); *Simeon of Durham*, *s.a.* 746 (ed. T. Arnold, 1882) and appendix, *s.a.* 738; Florence of Worcester (ed. B. Thorpe, London, 1848–1849); H. Sweet, *Oldest English Texts*, p. 179 (London, 1885). (F. G. M. B.)

ESSLINGEN, a town of Germany, in the kingdom of Württemberg, in a fertile district on the Neckar, 9 m. S.E. from Stuttgart, on the railway to Ulm. Pop. (1905) 29,750. It is surrounded by medieval walls with towers and bastions, and has thirteen suburbs, one lying on an island in the river. On a commanding height above the town lies the old citadel. The inner town has an old (1430) and a new Rathaus, the latter, formerly a palace, an exceedingly handsome edifice. The church of Our Lady (Frauenkirche) is a fine Gothic building of the 15th century, and has a beautifully sculptured doorway and a lattice spire 240 ft. high. The church of St Dionysius dated from the 13th century, and possesses a fine screen and a ciborium of 1486. Esslingen possesses several schools, a theatre and a richly endowed hospital, while its municipal archives contain much valuable literature bearing especially on the period of the Reformation. The town has railway, machine and electrical works; cloth, gloves and buttons are also manufactured here, and there are spinning-mills. There is a large lithographic establishment, and a considerable trade is done in wine and fruit, the wines of Esslingen being very famous.

Esslingen, which dates from the 8th century, became a town in 886. It was soon a place of importance; it became a free imperial city in 1209 and was surrounded with walls by order of the emperor Frederick II. Its liberty was frequently threatened by the rulers of Württemberg, but it did not become part of that country until 1802.

See K. H. S. Pfaff, *Geschichte der Reichsstadt Esslingen* (Esslingen, 1852); and Ströhmfeld, *Esslingen in Wort und Bild* (Esslingen, 1902).

ESTABLISHMENT (O. Fr. *establissement*, Fr. *établissement*, late Norm. Fr. *establishement*, from O. Fr. *establir*, Fr. *établir*, Lat. *stabilire*, to make stable), generally the act of establishing or fact of being established, and so by transference a thing established. Thus we may speak of the establishment (*i.e.* setting up) of a business, the "long establishment" of a business, and of the manager of "the establishment." In a special sense the word is applied, with something of all the three abovementioned connotations, to certain religious bodies in their relation to the state. It is with this latter that the present article is concerned.

Perhaps the best definition which can be given, and which will cover all cases, is that establishment implies the existence of some definite and distinctive relation between the state and a religious society (or conceivably more than one) other than that which is shared in by other societies of the same general character. Of course, a certain relationship must needs exist between the state and every society, religious or secular, by virtue of the sovereignty of the state over each and all of its members. Every society must possess certain principles or perform certain acts, and the state may make the profession of such principles unlawful, or impose a penalty upon the performance of such acts; and, moreover, every society is liable before the law as to the fulfilment of its obligations towards its members and the due administration of its property should it possess any. With all this establishment has nothing to do. It is not concerned with what pertains to the religious society *qua* society, or with what is common to all religious societies, but with what is exceptional. It denotes any special connexion with the state, or privileges and responsibilities before the law, possessed by one religious society to the exclusion of others; in a word, establishment is of the nature of a monopoly. But it does not imply merely privilege. The state and the Church have mutual obligations towards one another: each is, to some extent, tied by the existence of this relationship, and each accepts the limitations for the sake of the advantages which accrue to itself. The state does so in view of what it believes to be the good of all its members; for "the true end for which religion is established is not to provide for the true faith, but for civil utility" (Warburton), even if the latter be held to be implied in the former. On the other hand, the Church accepts these relations for the facilities which they involve, *i.e.* for its own benefit. It will be seen that this definition excludes, and rightly, many current presuppositions. Establishment affirms the *fact*, but does not determine the precise *nature*, of the connexion between the state and the religious society. It does not tell us, for example, when or how it began, whether it is the result of an unconscious growth (as with the Gallican Church previous to the French Revolution), or of a determinate legislative act (as with the same Church re-established by the Concordat of 1801). It does not tell us whether an endowment of the religious society by the state is included; what particular privileges are enjoyed by the religious society; and what limitations are placed upon the free exercise of its life. These things can only be ascertained by actual inquiry; for the conditions are precisely similar in no two cases.

To proceed to details. At the present day there is no established religion in the United States, the German empire as a whole, Holland, Belgium, France and Austria-Hungary (saving, indeed, "the rights of the sovereign arising from ecclesiastical dignity"[1]); whereas there are religious establishments in Russia, Greece, Sweden, Norway, Denmark, Prussia,[2] Spain, Portugal and even in Italy, as well as in England and Scotland. These, however, differ greatly amongst themselves. In Russia the "Orthodox Catholic Eastern" is the state religion. The emperor is, by the fundamental laws of the empire, "the sovereign defender and protector of the dogmas of the dominant faith, who maintains orthodoxy and holy discipline within the Church," although, of course, he cannot modify either its dogmas or its outward order. Further, "the autocratic (*i.e.* imperial) power acts in the ecclesiastical administration by means of the Most Holy Ruling Synod, created by it"; and all the officers of the Church are appointed by it. The enactments of the Synod do not become law till they have received the emperor's sanction, and are then published, not in its name but in his; and a large part of the revenues of the Church is derived from state subsidies. In Greece "the dominant religion (Ἡ *ἐπικρατοῦσα θρησκεία*) is that of the Eastern Orthodox Church of Christ"; and although toleration is otherwise complete, no proselytism from the Church of Greece is allowed. The king swears to protect it, but no powers pertain to him with regard to it such as those which the tsar enjoys; the present king is not a member of it, but his successors must be. In Sweden, Lutheranism was adopted as the state religion by the synod of Upsala (*Upsala möte*) in 1593, and the king must profess it. The "Lutheran Protestant Church" retains an episcopal order, and is supported out of its own revenues. Archbishops and bishops are chosen by the king out of those names submitted to him, and he also nominates to royal peculiars. The ecclesiastical law (*Kyrkolag*), first constituted in 1686, is part of the law of the state, but may not be modified or abrogated without consent of a General Synod; and although *ad interim* interpretations of that law may be given by the king on the advice of the Supreme Court, since 1866 these have been subject to review and rejection by the next General Synod. In Norway the "Evangelical-Lutheran" is the "official religion," but the Church is supported by the state, its property having been secularized. It is also more subject to the king, who by the constitution is to "regulate all that concerns divine service and the clergy," and to see that the prescribed order is carried out. It is much the same in Denmark, where, however, the "Evangelical-Lutheran Church" has since the fundamental constitutional law of the 5th of June 1849 been officially described as the National Church (*Folkekirche*) instead of the State Church (*Statskirche*) as formerly, and the constitution provides for its regulation by further legislation, which has not yet been passed. For Prussia, see under that heading; it need only be added that self-government still tends to increase, but that the emperor William II. has exercised his office as *summus episcopus* more freely than most of his predecessors. In Spain the "Catholic, Apostolic and Roman" religion is that of the state, "the nation binds itself to maintain its worship and its ministers," and the rites of any other religion are only permitted in private. The patriarch of the Indies and the archbishops are senators by right, and the king may nominate others from amongst the bishops; only laymen may sit in the chamber of deputies. Convents were suppressed, and their property confiscated, in 1835 and 1836; in 1859 the remaining ecclesiastical property was exchanged for untransferable government securities and the support of the clergy of the State Church is assured by an unrepealed law previous to the present constitution. In Portugal it is much the same, but all the home bishops sit in the upper chamber as peers (*Pares do Reino*) by right, and there is no restriction on membership of the chamber of deputies. A more important point is that the king confers all ecclesiastical benefices and nominates the bishops, instead of their being chosen, as in Spain, by agreement between the civil power and the papacy. In Italy, in spite of the feud between the papacy and the civil power, the fact remains that, by the *Statuto fondamentale*, "the Catholic, Apostolic and Roman religion is the sole religion of the state," and the king may nominate "archbishops and bishops of the state" to be senators. The *Legge sulle prerogative del Summo Pontifice*, &c., or "Law of Guarantees," by which the papal prerogatives are secured, has been declared by the Council of State to be a fundamental law; and while many civil restrictions upon the activities of the Church are removed by it, outside Rome and the suburbicarian dioceses the royal *exequatur* is still required before a bishop is installed. Moreover, the bulk of Church property having been secularized, the Italian clergy receive a stipend from the state.

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[1] In effect this involves the establishment of all religious denominations, for none can exist without the express authorization of the state, and all are subject to more or less interference on its part. Thus the emperor-king is, in his capacity of head of the state, technically "bishop" of the Evangelical Church, the constitution of which was fixed by an imperial patent in 1866 and modified by another in 1891 (see Herzog-Hauck, *Realencykl.* ed. 1904, *s.* "Österreich").—[Ed.]

[2] Also in the other German Protestant states. The relations of the Roman Catholic Church with the various governments are settled by separate concordats with the papacy (see CONCORDAT).

Church and State in Britain.

Establishment is, of course, a distinctively English term, but it implies precisely the same thing as "Staatsreligion" or "église dominante" does elsewhere, neither more nor less. It denotes the existence of a special relationship between Church and state without defining its precise nature. The statement that the Church of England or the Scottish Kirk is "established by law" denotes that it has a peculiar status before the law; but that is all. (*a*) There is no basis whatever for the once popular assumption that the word "established" as applied to the Church means "created," or the like; on the contrary, the modern use of the word in this sense is a misleading perversion. To *establish* is to make firm or stable; and a thing cannot be established unless it is already in existence. A few examples will make it clear that this is the true sense of the word, and that in which it is used here. "Stablish the thing, O God, that thou hast wrought in us" (Ps. lxviii. 28, P.B.; A.V. and R.V. "strengthen") implies that the thing is already wrought; it could not be "stablished" else. "Stablish your hearts" (Jas v. 8) implies that the hearts are already in existence. "Until he had her settled in her raine With safe assuraunce and establishment" (*Faerie Queene*, v. xi. 35) would have been impossible unless the reign had already begun. This is the meaning of the words in many Tudor acts of parliament, "be it enacted, ordained and established," or the like (21 Hen. VIII. c. 1; 27 Hen. VIII. c. 28, s. 9; 28 Hen. VIII. c. 13 [Ireland]; 28 Hen. VIII. c. 18 [Ireland]; 33 Hen. VIII. c. 27; 1 Eliz. c. 1, ss. 15, 17; 1 Eliz. c. 4, s. 4); that which is then and there enacted is to be valid for the future. (*b*) Nor is it necessarily implied that establishment is a process completed once for all. Every law touching the Church slightly alters its conditions; everything that affects the relations of Church and state may be regarded as a measure of establishment or the reverse. When the two Houses of Parliament, in an address to William III. after his coronation, spoke of their proposed measures of toleration, the king said in his reply, "I do hope that the ease which you design to Dissenters will contribute very much to the establishment of the Church" (Cobbett, *Parl. Hist.* v. 218). And Defoe (in 1702) published an ironical tract with the title, *The Shortest Way with the Dissenters, or Proposals for the Establishment of the Church.* (*c*) Nor is it necessarily implied that there was any specific time at which establishment took place. Such may indeed be the case, as with the Kirk in Scotland; but it certainly cannot be said that the English Church was established at any particular time, or by any particular legislative act. There were, no doubt, periods when the existing relations between Church and state were modified or re-defined, notably in the 16th and 17th centuries; but the relations themselves are far older. In fact, they existed from the very first: the English Church and state grew up side by side, and from the beginning they were in close relations with one another. But although the state of things which it represented was there from the first, the term "established" or "established by law" only came into use at a later date. Until there was some other religious society to be compared with it such a distinctive epithet would have had no point. As, however, there arose religious societies which had no status before the law, it became more natural; and yet more so when the formularies of the Church came to be "established" by civil sanctions (the Books of Common Prayer by 5 and 6 Edw. VI. c. 1, s. 4, &c.; the Articles by 13 Eliz. c. 12; the new Ordinal by 13 and 14 Car. II. c. 4, title). Accordingly the Church itself came to be spoken of as established by law; first, it would seem, in the Canons of 1604, and subsequently in many statutes (Act of Settlement, 6 Anne, c. 8 and c. 11, &c.). In all such cases the Church is described as already established, not as being established by the particular canon or statute. In other words, the constitutional status of the Church is affirmed, but nothing is said as to how it arose.

The legislative changes of the 16th and 17th centuries brought "establishment" into greater prominence and greatly modified its conditions, but a moment's thought will show that it did not begin then. If, *e.g.*, all post-Reformation ecclesiastical statutes were non-existent, the relations between Church and state would be very different, but there would still be an "establishment." The bishops would sit in the House of Lords, the clergy would tax themselves in convocation, the Church courts would possess coercive jurisdiction, and so on. The present relations of Church and state in England may be briefly summed up as follows:—(1) *The personal relation of the crown to the Church*, including (*a*) restraints upon the action of convocation (formulated by 25 Hen. VIII. c. 19); (*b*) nomination of bishops, &c. (25 Hen. VIII. c. 20); (*c*) power of supervision as visitor, long disused (26 Hen. VIII. c. 1; 1 Eliz. c. 1, s. 17); (*d*) power of receiving appeals as the fount of civil justice (25 Hen. VIII. c. 19, &c.). In connexion with these, it must be borne in mind that (*a*) the holder of the crown receives coronation from the church and takes an oath having reference to it (1 Will. III. c. 6), and (*b*) the crown is held on the condition of communion with the Church of England (Act of Settlement; the conditions of communion are laid down in the Prayer Book, which itself is sanctioned by law). (2) *The relation of the Church to the crown in parliament.* No change has been permitted in its doctrine or formularies without the sanction of an act of parliament. (3) *Privileges of the Church and clergy.* Of these may be mentioned (*a*) the coercive jurisdiction of the Church courts; (*b*) the right of bishops to sit in the House of Lords. It need hardly be said that establishment in England does not include an endowment of the Church by the state. Nothing of the kind ever took place on any large scale, and the grants for Church purposes in the 18th century are comparable with the *regium donum* to Nonconformists.

The position of the Church of Ireland until its disestablishment (see below) was not dissimilar. With Scotland the case is different. The establishment of the Kirk was an entirely new process, carried out by a more or less definite series of legislative and administrative acts. The Convention of Estates which met at Edinburgh in 1560 ordered the drawing up of a new Confession of Faith, which was done in four days by a committee of preachers, and on the 24th of August it passed three acts, one abolishing the pope's authority and all jurisdiction of Catholic prelates, another repealing the old statutes in favour of the Old Church, the third forbidding the celebrating and hearing of mass under penalty of imprisonment, exile and death. The intention was to make a clean sweep of the Old Church, which was denounced as "the Kirk Malignant."[1] The new model thus set up was confirmed by the Scottish act of 1567, c. 6, which declared it to be "the onely true and halie kirk of Jesus Christ within this realme." Again, after the revolution of 1688 had put an end to the attempts of the Stuart kings to impose the episcopal model on Scotland, by the act of 1690, c. 5, the crown and estates "ratifie and establish the Confession of Faith, . . . as also they do establish, ratifie and confirm the Presbyterian government and discipline." The "Act of Security" of 1705, as incorporated in the Act of Union 1706, speaking of it "as now by law established," says that "Her Majesty . . . doth hereby establish and confirm" it, and finally declares this act, "with the Establishment therein contained," to be "a fundamental and essential condition of the Union." Nevertheless, the conditions of establishment in the Scottish Kirk are much easier than those of the Church of England. It is bound by the statutes sanctioning its doctrine and order, but within these limits its legislative and judicial freedom is unimpaired. A royal commissioner is present at the meetings of the general assembly, but he need not be a member of the Kirk; and there is no constitutional tie between the crown and the Kirk such as there is in England. There is what may accurately be described as a state endowment, the bulk of the property of the Old Church having been conferred upon the Scottish Kirk.

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[1] Andrew Lang, *Hist. of Scotland*, ii. p. 75 ff. Compare with this the position of the reformers generally in England, where even so stout a Puritan as William Harrison (*Description of England*, 1570) does not dream of separating the organic life of the Church of England from that of the pre-Reformation Church. (Ed.).

The Colonies.

Not unnaturally the organization of Anglican Churches in the colonies was followed in some cases by their establishment, which included endowment. It was so, for example, in the East and West Indies; and the disestablishment of the West Indian Church in 1868 was followed, in 1873, by a re-establishment of the Church in Barbados by the colonial legislature. India is the only other part of the empire (outside Great Britain) in which there is to-day a religious establishment.

Disestablishment.

Disestablishment is in theory the annulling of establishment; but since an established Church is usually rich, disestablishment generally includes disendowment, even where there is no state endowment of religion. It is, in short, the abrogation of establishment, coupled with such a confiscation of Church property as the state thinks good in the interests of the community. The disestablishment of the West Indian Church in 1868 has already been referred to; in 1869 the Irish Church Disestablishment Bill was passed. Private bills relating to Scotland have more than once been brought forward. In 1895 the Liberal government introduced a suspensory bill, intended as the preliminary step towards disestablishing and disendowing the Church in Wales; it was withdrawn, however, in the same session, and the question of Welsh disestablishment slumbered until in 1906 a royal commission was appointed by the Liberal government to inquire into the subject, and in 1909 a bill was introduced on much the same lines as in 1895.

The case of the Irish Church will illustrate the process of disestablishment, although, of course, the precise details would vary in other cases. The Irish Church Act was passed in 1869 by Gladstone's first government, after considerable opposition, and provided that from January 1, 1871, the union created by statute between the Churches of England and Ireland should be dissolved, and the Church of Ireland should "cease to be established by law." Existing ecclesiastical corporations were dissolved, and their rights ceased, compensation being given to all individuals and their personal precedence being secured for life. All rights of patronage, including those of the crown, were abolished, with compensation in the case of private patrons; and the archbishops and bishops ceased to have the right of summons to the House of Lords. All laws restraining the freedom of action of the Church were repealed; the ecclesiastical law, however, to subsist by way of contract amongst the members of the Church (until altered by a representative body). Provision was made for the incorporation by charter of the representative body of the Church, should such a body be found, with power to hold landed property. All existing ecclesiastical property was vested in a commission, which was to give compensation for life interests, to transfer to the new representative body the churches, glebe houses, and £500,000 in compensation for endowments by private persons since 1660, and to hold the rest for such purposes as parliament might thereafter determine.

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ESTABLISHMENT OF A PORT, the technical expression for the time that elapses between the moon's transit across the meridian at new or full moon at a given place and the time of high water at that place. The interval (constant at any one place) may vary from 6 mins. (Harwich) to 11 hrs. 45 mins. (North Foreland). At London Bridge it is 1 hr. 58 mins. (See also Tide.)

ESTAING, CHARLES HECTOR, Comte d' (1729–1794), French admiral, was born at the château of Ruvel, Auvergne, in 1729. He entered the army as a colonel of infantry, and in 1757 he accompanied count de Lally to the East Indies, with the rank of brigadier-general. In 1759 he was made prisoner at the siege of Madras, but was released on parole. Before the ratification of his exchange he obtained command of some vessels, and conducted various naval attacks against the English; and having, on his return to France in 1760, fallen accidentally into their hands, he was, on the ground of having broken his parole, thrown into prison at Portsmouth, but as the charge could not be properly substantiated he was soon afterwards released. In 1763 he was named lieutenant-general in the navy, and in 1777 vice-admiral; and in 1778 he obtained the command of a fleet intended to assist the United States against Great Britain. He sailed on the 13th of April, and between the 11th and the 22nd of July, blockaded Howe at Sandy Hook, but did not venture to attack him, though greatly superior in force. In concert with the American generals, he planned an attack on Newport, preparatory to which he compelled the British to destroy some war vessels that were in the harbour; but before the concerted attack could take place, he put to sea against the English fleet, under Lord Howe, when owing to a violent storm, which arose suddenly and compelled the two fleets to separate before engaging in battle, many of his vessels were so shattered that he found it necessary to put into Boston for repairs. He then sailed for the West Indies on the 4th of November. After a feeble attempt to retake Santa Lucia from Admiral Barrington, he captured St Vincent and Grenada. On the 6th of July 1779 he fought a drawn battle with Admiral John Byron, who retired to St Christopher. Though superior in force, D'Estaing would not attack the English in the roadstead, but set sail to attack Savannah. All his attempts, as well as those of the Americans, against the town were repulsed with heavy loss, and he was finally compelled to retire. He returned to France in 1780. He was in command of the combined fleet before Cadiz when the peace was signed in 1783; but from that time his chief attention was devoted to politics. In 1787 he was elected to the assembly of the notables; in 1789 he was appointed commandant of the national guard; and in 1792 he was chosen admiral by the National Assembly. Though in favour of national reform he continued to cherish a strong feeling of loyalty to the royal family, and on the trial of Marie Antoinette in 1793 bore testimony in her favour. On this account, and because of certain friendly letters which had passed between him and the queen, he was himself brought to trial, and was executed on the 28th of April 1794.

See *Marins et soldats français en Amérique*, by the Viscomte de Noailles (1903); Beatson, *Naval and Military Memoirs of Great Britain*, vol. v.

ESTATE (through O. Fr. *estat*, mod. *état*, from Lat. *status*, state, condition, position, *stare*, to stand), the state or condition in which a man lives, now chiefly used poetically and in such phrases as "man's estate," or "of high estate"; "state" has superseded most of the uses of the word except (1) in property and (2) in constitutional law.

1. In the law of property the word is employed in several senses. In the widest sense a man's estate comprises his entire belongings; so much of it as consists of land and certain other interests associated therewith is his "real estate"; the rest is his "personal estate." The word is more particularly applied to interests in land, and in popular and general use "an estate" means the land itself. The strict technical meaning of "an estate" is an interest in lands, and this conception lies at the root of the English theory of property in land. "The first thing that the student has to do," says Joshua Williams (*Law of Real Property*), "is to get rid of the idea of absolute ownership. Such an idea is quite unknown to the English law. No man is in law the absolute owner of lands. He can only hold an estate in them." That is, the notion of tenure, of holding by a tenant from a lord, prevails. The last lord of all from whom all land was ultimately held was the king. Persons holding directly from the king and granting to others were the king's tenants *in capite*, and were the mesne lords of their tenants.

Estates in land may be classified according to (1) the quantity of their interest or duration, (2) the time of enjoyment, and (3) the number and connexion of the tenants. According to (1), an estate may be either a freehold of inheritance or a freehold not of inheritance. A freehold of inheritance may be (*a*) an estate in fee simple, which is the largest estate a man can hold in English law, and comes close to the idea of absolute ownership, repudiated by Williams; an estate in fee simple is inheritable by a man's heirs generally, he has full powers of disposition over it, and may alienate the whole or part. (*b*) It may also be in limited fees, which are again subdivided into (i.) qualified or base fee, (ii.) fee conditional, so called at the common law, afterwards, on the passing of the statute *De Donis Conditionalibus*, fee tail, which may be general as to the heirs of a man's body, or special, as to the heirs *male* (or *female*) of his body. A freehold not of inheritance may be either (1) conventional, as an estate for life, which may be either an estate for one's own life or for the life of another (*pur autre vie*); (2) legal, or created by operation of law, as tenancy in tail after possibility of issue extinct (*i.e.* where an estate is given to a man and the heirs of his body by his present wife, and the wife dies without issue, the husband becomes tenant in tail after possibility of issue extinct); tenancy by curtesy (see Curtesy); tenancy in dower (see Dower).

Estates not of freehold or less than freehold are subdivided into (i.) estates for years (often called estates for a term of years, the instrument creating it being termed a *lease* or demise, and the estate itself a *leasehold interest*); (ii.) estates at will, that is, where lands or tenements are let by one man to another to have and to hold at the will of the lessor; (iii.) estates at sufferance, where one comes into possession of land under a lawful title, and continues in possession after his title has determined.

According to (2), estates are either in possession or in expectancy. Estates in expectancy are either (*a*) in remainder, which may be vested or contingent, or (*b*) in reversion (see Remainder, Reversion).

According to (3), estates may be either (i.) in severalty, that is, the holding of an estate by a person in his own right only, without any other person being joined or connected with him in point of interest therein; (ii.) estates in joint tenancy (see Joint); (iii.) coparcenary (*q.v.*); and (iv.) tenancy in common, where two or more hold the same land, by several and distinct titles, but with unity of possession. (See also Real Property.)

2. In constitutional law an estate is an order or class having a definite share as such in the body politic, and participating either directly or by its representatives in the government. The system of representation by estates took its rise in western Europe during the 13th century, at a time when the feudal system was being broken up through various causes, notably the growing wealth and power of the towns. In the feudal council the clergy and the territorial nobles had alone had a voice; but the 13th century, to quote Stubbs (*Const. Hist.* ii. 168, ed. 1875), "turns the feudal council into an assembly of estates, and draws the constitution of the third estate from the ancient local machinery which it concentrates." This is, allowing for differences of detail, true of other countries as well as England. To the two estates already existing, clergy and nobles, is added a third, that of the commons (burgesses and knights of the shire) in England, that of the *roturiers* in France (known as the *tiers état*). This division into three estates became the norm, but it was not universal, nor inevitable.[1] Even in England there was a tendency to create other estates, the king for instance treating with the merchants separately for grants of money to be raised by taxing the general body of merchants in the country; and there was a similar tendency on the part of the lawyers. But for the accident of their sitting and voting together, the burgesses and knights of the shire would also have formed separate estates. In Aragon the cortes contained four estates (*brazos* or arms), the clergy, the great barons (*ricos hombres*), the minor barons (knights or *infanzones*), and the towns. The Swedish diet had also four—clergy, barons, burghers and peasants.

The system of estates, based on the medieval conception of society as divided into definite orders, formed the basis of whatever constitutional forms survived in Europe till the French Revolution. In England, of course, it had early become obscured, the House of Commons representing the whole nation outside the narrow order of the peers. The creation of an estate of lesser nobles or landowners had been prevented by the fusion of the knights of the shire with the burgesses; the spiritual estate was ruled out by the determination of the clergy to deliberate and tax themselves in their own convocation, leaving the bishops, as spiritual peers, to represent their interests in parliament.

The phrase "the three estates of the realm" still survives, but to most men it conveys no clear meaning. The erroneous conception early arose—Hallam says it was current among the popular lawyers of the 17th century—that the "three estates" were king, lords and commons, as representing the three great divisions of legislative authority. Such a conception might be possible in Hungary, where the crown of St Stephen symbolizes not so much the royal power as the co-ordination of the powers of all the organs of the state, including the king; but in England the king represents the whole nation and in no sense a separate interest within it, which is the essence of an estate. The phrase "three estates" as applied to the English constitution at present is, in fact, misleading. It is now usually understood of the lords spiritual, the lords temporal, and the commons.

The conception of the "three estates of the realm" as the great divisions of legislative authority led in England to the coining of the phrase "fourth estate," to indicate some power of corresponding magnitude in the state distinct from them. Fielding thus spoke of "the mob," and Hazlitt of Cobbett; but the phrase is now usually applied to the press, a usage originating in a speech by Burke (Carlyle, *Hero-worship*, Lect. v.).

In the constitutional struggles of the European continent, from the Revolution onward, the rival theories of representation by estates and of popular representation have played a great part. The crucial moment of the French Revolution was when the vote according to "order" was rejected and the estates of the clergy and nobles were merged with the *tiers état*, the states-general thus becoming the National Assembly. This was the precedent followed, generally speaking, during the 19th century in the other countries in which constitutional government was established. In most of them the medieval estates lingered on in provincial diets (*Landtage*),[1] and the famous Article XIII. of the Federal Act (*Bundesakte*) of Vienna decreed that "assemblies of estates" should be set up, wherever not already existing, in the German states. The efforts of Metternich and the statesmen of his school were directed, not so much to abolishing the constitutional model, as to establishing it, if need were, on traditional and conservative lines. This is what was meant by the famous reply of the emperor Francis I. to the Magyar deputation: "All the world is playing the fool and demanding fanciful constitutions." When the need for making constitutional concessions became urgent, the attempt was accordingly made to base them on the system of estates. But the central diet convoked in 1847 by Frederick William IV. to Berlin, technically a concentration of provincial estates, quickly converted itself as Metternich had prophesied—into a national assembly; and precisely the same thing happened in the case of the first Austrian parliament in 1848. In Hungary the revolution was in some respects more conservative in character. The March Laws of 1848 preserved the general character of the House of Magnates, comparable to the British House of Lords, but converted the Lower House from what was practically representative of the estate of the lesser nobles into a national representative assembly. Of all the sovereign states of Europe only the grand-duchies of Mecklenburg still (1909) retain the ancient system of estates untouched. The diet, which is common to the two duchies, consists of the *Ritterschaft*, in which all tenants in chivalry (*Rittergutsbesitzer*), whether noble or non-noble, have a voice, and the *Landschaft*, which consists of the chief magistrates of the towns. The former is taken as representative of the peasant proprietors and copy-holders (*Hintersassen*), the latter of the burghers.

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[1] In Scotland the three estates were the prelates, the tenants-in-chief and the burgesses, the third estate joining the others for the first time about the beginning of the 14th century. In 1428 commissioners of shires, men elected by the minor tenants-in-chief, were ordered to appear in parliament; the greater tenants-in-chief then coalesced with the prelates and the three estates were the lords, clerical and lay, the commissioners of shires and the burgesses. From 1640 to 1660 parliament was reorganized, the prelates being excluded, but at the Restoration the old order was re-established. The Scottish parliament was accustomed to depute much of its work to a committee, composed of members from each of the three orders, and the committee of the estates was very prominent during the struggle between Charles I. and his people.

The plural form ESTATES or STATES (Fr. *états*, Ger. *Stände*) is the name commonly given to an assembly of estates (*assemblée des états*, *Ständeversammlung*). When such an assembly is not merely local or provincial it is called the estates-general or states-general (*états généraux*), *e.g.* in France the assembly of the deputies of the three estates of the realm as distinct from the provincial estates which met periodically in the so-called *pays d'états*.

For further details about the estates in England and elsewhere see W. Stubbs, *Constitutional History*, vol. ii. (1896); H. Hallam, *The Middle Ages* (1855); F. W. Maitland, *Constitutional History of England* (1908); A. Luchaire, *Histoire des institutions monarchiques de la France* (1883–1885); G. Waitz, *Deutsche Verfassungsgeschichte* (Kiel, 1865–1878); and A. S. Rait, *The Scottish Parliament* (1901). See also REPRESENTATION.

ESTATE AND HOUSE AGENTS. A person exercising the calling of a house agent in England is required, under a penalty of £20, to take out yearly a licence upon which £2 is charged as a duty of excise, unless he is licensed as an auctioneer or appraiser, or is an agent employed in the management of landed estates, or a solicitor or conveyancer who has taken out his annual certificate as such. In this connexion a person is deemed to be a house agent if he advertises for sale or for letting, or in any way negotiates for the selling or letting of any furnished house or part of any furnished house (any storey or flat rated and let as a separate tenement being for this purpose a house); subject, however, to the qualification that no one is to be deemed to be a house agent by reason of his letting, or offering to let, or in any way negotiating for the letting of, any house the annual rent or value of which does not exceed £25.

A house agent who is merely instructed to act in the usual way of his calling has no authority to bind his employer by a contract. His business is to endeavour to find a person willing to become a purchaser or tenant and then to communicate his offer to the owner. Unless express authority is given to the agent to sell or let, and for that purpose to enter into a binding contract, the principal reserves his right to accept or refuse the offer. As a rule, a house or estate agent has no authority to receive payment on behalf of the principal. Where he is employed to procure a tenant, he must use reasonable diligence to ascertain that the person to whom the property is let through his agency is fit to be a tenant. He does not, however, in any way guarantee the payment of the rent. A house agent may not, for or in expectation of payment, prepare any deed relating to the sale or letting of real or personal estate. There is, however, no similar prohibition as to agreements not under seal, and it is a common practice for house agents to charge for the preparation of them.

House agents are usually remunerated by way of commission. The scale adopted by the Institute of Estate and House Agents embodies the rates usually charged. In the absence of express provision upon the subject between the principal and the agent, commission is payable only when the latter has found a purchaser or tenant. If, however, he had found a person willing to buy or take property upon the terms upon which the principal intimated to him his willingness to sell or let it, the principal will be liable to pay the amount of the commission, even though in fact he refuses or is unable to sell or let it. Where the agent can show that he has brought about a sale or tenancy he will be entitled to the commission notwithstanding the fact that another agent has been paid, or has recovered in an action, commission in respect of the same sale or tenancy. The agent's authority may be revoked at any time; but, where he has already performed the service for which he was employed, the principal cannot defeat his right to be paid the amount of the commission by subsequently revoking his authority. If the agent is unsuccessful in finding a purchaser or tenant, as the case may be, he will not, as a rule, have any right to remuneration for his efforts in the matter.

Most auctioneers, in addition to holding auctions, carry on the business of house and estate agency. The number of licences issued to house agents and appraisers in England for the year ended 31st March 1899 was 4429, and for the year ended 31st March 1909, 4618. The number of licences issued to auctioneers in England for the corresponding periods was 6389 and 6543 respectively. (H. HA.)

ESTATE DUTY. For purposes of the national revenue in the United Kingdom, the Finance Act 1894 imposed on all property passing by death after the 1st of August 1894 a duty called estate duty, in lieu of certain other duties previously payable. The objects of the act were—(1) simplification of the death duties and equalization as between real and personal property, and (2) aggregation of all the property passing on a death, and taxation at rates graduated according to the value of the whole. Before the act a duty (probate duty) was taken on the free personal property of deceased persons in the hands of the executor or administrator, without regard to the subsequent distribution. The legacy and succession duties were levied on distribution of the property passing on the death, from the persons taking any property under the will or intestacy of the deceased, or under settlement, or by devolution of title on his death. These two latter duties were mutually exclusive, and together covered practically all property passing by death. They were levied at rates graduated according to consanguinity. In 1888 an attempt was made to equalize the rates of the death duties as between property which paid the probate and legacy duties, and property which paid succession duty only. But the Finance Act 1894 replaced the probate duty by a duty extending to all property real or personal passing on or by reference to death, whether by disposition of the deceased or not, without regard to its tenure or destination. The Finance Acts of 1907 and 1909–1910 increased the scale of duties laid down in 1894.

For this purpose all property passing on a death is aggregated to form one estate, on the capital value of which the duty is charged, at rates graduated from 1 to 15% according to the aggregate value. Besides the property of which the deceased was competent to dispose at his death, the aggregated estate includes property in which he had an interest ceasing on his death, from the cesser of which a benefit accrues, or which was disposed of by him within twelve months of death, or at any time, with reservation of an interest to himself. The extent to which property is deemed to pass on the cesser of a limited interest is measured by the proportion of the income to which the interest extended, without regard to the tenure of the deceased or his successor. Property may therefore be included in the aggregate estate at its capital value owing to the passing of a life-interest only, the property being settled so that the absolute ownership does not pass at all. But when the duty has once been paid on property passing under a settlement, the property does not again become chargeable until it passes on the death of a person who is or has been competent to dispose of it. To compensate for this advantage, when property passing under a settlement made after the act pays the estate duty, a further duty of 2 % (settlement estate duty) is taken, except where the only subsequent life-interest is that of the wife or husband of the deceased.

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[1] These diets are, wherever they still exist, survivals of the "parliaments" of separate territorial units.

The rate of duty being fixed according to the aggregate capital value of the whole estate, the charge is distributed according to the different modes of disposition of the property comprised in the estate. The duty on the personalty which passes to the executor as such is paid by him, as the probate duty was, and comes out of the general estate. For the other property passing, trustees, or any person to whom it passes for a beneficial interest in possession, are made accountable, and are required to bring in an account of the property and pay the duty. The duty is a first charge on such property, and, when it is paid by a person having a life-interest only, he may charge the *corpus* of the property with it. The duty on real property included in an account is payable by eight yearly or sixteen half-yearly instalments, becoming due twelve months after the death, and bearing interest at 3 % from that date. On other property, except in a few special cases, the duty bears interest at 3 % from the date of the death. When the estate duty has been paid no further duty is chargeable on property comprised in the estate which passes to lineal relations of the deceased. But on property passing to collaterals or strangers legacy or succession duty, as the case may be, is payable by the devisees or successors, at a rate (which is the same whichever duty be payable) fixed according to consanguinity.

For a detailed account of the provisions of the act of 1894 and subsequent amending acts, and of the practical working of the duty, reference is made to Austen-Cartmell, *Finance Acts* (1894–1907); Hanson, *Death Duties* (London, 1904); Soward, *Handbook to the Estate Duty* (4th ed., London, 1900); and to the reports of the commissioners of Inland Revenue for 1894–1895 and subsequent years.

ESTCOURT, RICHARD (1668–1712), English actor, began by playing comedy parts in Dublin. His first London appearance was in 1704 as Dominick, in Dryden's *Spanish Friar*, and he continued to take important parts at Drury Lane, being the original Pounce in Steele's *Tender Husband* (1705), Sergeant Kite in Farquhar's *Recruiting Officer*, and Sir Francis Gripe in Mrs Centlivre's *Busybody*. He was an excellent mimic and a great favourite socially. Estcourt wrote a comedy, *The Fair Example, or the Modish Citizen* (1703), and *Prunella* (1704), an interlude.

ESTE, one of the oldest of the former reigning houses of Italy. It is in all probability of Lombard origin, and descended, according to Muratori, from the princes who governed in Tuscany in Carolingian times. The lordship of the town of Este was first acquired by Alberto Azzo II., who also bore the title of marquis of Italy[1] (d. *c.* 1097); he married Kunitza or Kunegonda, sister of Welf or Guelph III., duke of Carinthia. Welf died without issue, and was succeeded by Welf IV., son of Kunitza, who married a daughter of Otto II., duke of Bavaria, and who obtained the duchy of Bavaria in 1070. Through him the house of Este became connected with the princely houses of Brunswick and Hanover, from which the sovereigns of England are descended. The Italian titles and estates were inherited by Folco I. (1060–1135), son of Alberto Azzo by his second wife Gersende, daughter of Herbert I., count of Maine.[2] The house of Este played a great part in the history of medieval and Renaissance Italy, and it first comes to the front in the wars between the Guelphs and Ghibellines; as leaders of the former party its princes received at different times Ferrara, Modena, Reggio and other fiefs and territories.

Obizzo I., son of Folco, was the first to bear the title of marquis of Este. He entered into the Guelphic league against the emperor Frederick I., and was comprehended in the treaty of Venice of 1177 by which municipal *podestàs* (foreigners chosen as heads of cities to administer justice impartially) were instituted. He was elected podestà of Padua in 1178, and in 1184 he was reconciled with Frederick, who created him marquis of Genoa and Milan, a dignity somewhat similar to that of imperial vicar. By the marriage of his son Azzo to the heiress of the Marchesella family (the story that she was carried off to prevent her marrying an enemy of the Este is a pure legend), he came to acquire great influence in Ferrara, although he was opposed by the hardly less powerful house of Torelli.

Obizzo died in 1194 and Azzo V. having predeceased him, the marquisate devolved on his grandson Azzo VI. (1170–1212), who became head of the Guelph party, and to him the people of Ferrara sacrificed their liberty by making him their first lord (1208). But during his lifetime civil war raged in the city, between the Este and the Torelli, each party being driven out again and again. Azzo (also called Azzolino) died in 1212 and was succeeded by Aldobrandino I., who in 1213 concluded a treaty with Salinguerra Torelli, the head of that house, to divide the government of the city between them. On his death in 1215 he was succeeded by his brother Azzo VII. (1205–1264), surnamed Novello, but Salinguerra Torelli usurped all power in Ferrara and expelled Azzo (1222). In 1240 Pope Gregory IX. determined on another war against the emperor Frederick II., but deemed it wise to begin by crushing the chief Ghibelline houses. Thus Azzo found himself in league with the pope and various Guelph cities in his attempt to regain Ferrara. That town underwent a four months' siege, and was at last compelled to surrender; Salinguerra was sent to Venice as a prisoner, and Azzo ruled in Ferrara once more. The Ghibelline party was annihilated, but the city enjoyed peace and happiness within, although her citizens took part in the wars raging outside. The Guelph cause triumphed, Frederick being defeated several times, and after his death Azzo helped in crushing the terrible Eccelino da Romano (*q.v.*) who upheld the imperial cause, at the battle of Cassano (1259). He died in 1264 and was succeeded by Obizzo II. (1240–1293) his grandson, who in 1288 received the lordship of Modena, and that of Reggio in 1289. He was a capable but cruel ruler, and while professing devotion to the Guelph cause, did homage to the German king Rudolph I. when he descended into Italy.

Obizzo II. died in 1293 and was succeeded by his son Azzo VIII., but the latter's brothers, Aldobrandino and Francesco, who were to have shared in the government, were expelled and became his bitter enemies. The misgovernment of Azzo led to the revolt of Reggio and Modena, which shook off his yoke. Enemies arose on all sides, and he spent his last years in perpetual fighting. He died in 1308, and having no legitimate children, his brothers, his natural son Fresco, and others disputed the succession. A papal legate was appointed, and though the Este returned they were placed under pontifical tutelage.

The history of the house now becomes involved and of little interest until we come to Nicholas III. (1384–1441), who exercised sway over Ferrara, Modena, Parma and Reggio, waged many wars, was made general of the army of the Church, and in his later years governor of Milan, where he died, not without suspicion of poison. To him succeeded Lionello (1407–1450), a wise and virtuous ruler and a patron of literature and art; then Borso (1413–1471), his brother, who was created duke of Modena and Reggio by the emperor Frederick III., and duke of Ferrara by the pope. In spite of the wars by which all Italy was torn, Ferrara enjoyed a period of peace and prosperity under Borso; he patronized literature, established a printing-press at Ferrara, surrounded himself with learned men, and his court was of unparalleled splendour. He also protected industry and commerce, and ruled with great wisdom. His brother Ercole I. (1431–1505), who succeeded him in 1471, was less fortunate, and had to engage in a war with Venice, owing to a dispute about the salt monopoly, with the result that by the peace of 1484 he was forced to cede the district of Polesine to the republic. But the last years of his life were peaceful and prosperous, so that afterwards men looked back to the days of Ercole I. as to a golden age; his capital was noted both for its luxury and as the resort of men eminent in literature and art. Boiardo the poet was his minister, and Ariosto obtained his patronage.

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[1] *i.e.* Margrave of the Empire (*marchio Sancti Imperii*) in Italy. (See MARQUESS.)

[2] Another son of Azzo and Gersende became count of Maine as Hugh III. (d. 1131).

Ercole's daughter Beatrice d'Este (1475–1497), duchess of Milan, one of the most beautiful and accomplished princesses of the Italian Renaissance, was bethrothed at the age of five to Lodovico Sforza (known as *il Moro*), duke of Bari, regent and afterwards duke of Milan, and was married to him in January 1491. She had been carefully educated, and availed herself of her position as mistress of one of the most splendid courts of Italy to surround herself with learned men, poets and artists, such as Niccolò da Correggio, Bernardo Castiglione, Bramante, Leonardo da Vinci and many others. In 1492 she visited Venice as ambassador for her husband in his political schemes, which consisted chiefly in a desire to be recognized as duke of Milan. On the death of Gian Galeazzo Sforza, Lodovico's usurpation was legalized, and after the battle of Fornovo (1495) both he and his wife took part in the peace congress of Vercelli between Charles VIII. of France and the Italian princes, at which Beatrice showed great political ability. But her brilliant career was cut short by death through childbirth, on the 3rd of January 1497. She belongs to the best class of Renaissance women, and was one of the culture influences of the age; to her patronage and good taste are due to a great extent the splendour of the Castello of Milan, of the Certosa of Pavia and of many other famous buildings in Lombardy.

Her sister Isabella d'Este (1474–1539), marchioness of Mantua, was carefully educated both in letters and in the arts like Beatrice, and was married when barely sixteen to Francesco Gonzaga, marquis of Mantua (1490). She showed great diplomatic and political skill, especially in her negotiations with Cesare Borgia (*q.v.*), who had dispossessed Guidobaldo da Montefeltro, duke of Urbino, the husband of her sister-in-law and intimate friend Elisabetta Gonzaga (1502). She received the deposed duke and duchess, as well as other princes in the same condition, at her court of Mantua, which was one of the most brilliant in Italy, and like her sister she gathered together many eminent men of letters and artists, Raphael, Andrea Mantegna and Giulio Romano being among those whom she employed. Both she and her husband were greatly influenced by Baldassare Castiglione (1478–1529), author of *Il Cortigiano*, and it was at his suggestion that Giulio Romano was summoned to Mantua to enlarge the Castello and other buildings. Isabella was "undoubtedly, among all the princesses of the 15th and 16th centuries, the one who most strikingly and perfectly personified the aspirations of the Renaissance" (Eugène Müntz); but her character was less attractive than that of her sister, and in her love of collecting works of art she showed a somewhat grasping nature, being ever anxious to cut down the prices of the artists who worked for her.

To Ercole I. succeeded his son Alphonso I. (1486–1534), the husband of Lucrezia Borgia (*q.v.*), daughter of Pope Alexander VI. During nearly the whole of his reign he was engaged in the Italian wars, but by his diplomatic skill and his military ability he was for many years almost always successful. He was gifted with great mechanical skill, and his artillery was of world-wide reputation. On the formation of the league of Cambrai against Venice in 1508, he was appointed to the supreme command of the papal troops by Julius II.; but after the Venetians had sustained a number of reverses they made peace with the pope and joined him against the French. Alphonso was invited to co-operate in the new combination, and on his refusal war was declared against him; but although he began by losing Modena and Reggio, he subsequently inflicted several defeats on the papal troops. He fought on the side of the French at the battle of Ravenna (1512), from which, although victorious, they derived no advantage. Soon afterwards they retired from Italy, and Alphonso, finding himself abandoned, tried to make his peace with the pope, through the mediation of Fabrizio Colonna. He went to Rome for the purpose and received absolution, but on discovering that Julius meant to detain him a prisoner, he escaped in disguise, and the pope's death in 1513 gave him a brief respite. But Leo X. proved equally bent on the destruction of the house of Este, when he too was cut off by death. Alphonso availed himself of the troubles of the papacy during the reign of the equally hostile Clement VII. to recapture Reggio (1523) and Modena (1527), and was confirmed in his possession of them by the emperor Charles V., in spite of Clement's opposition.

He died in 1534, and was succeeded by his son Ercole II. (1508–1559), who married Renée, daughter of Louis XII. of France, a princess of Protestant proclivities and a friend of Calvin. On joining the league of France and the papacy against Spain, Ercole was appointed lieutenant-general of the French army in Italy. The war was prosecuted, however, with little vigour, and peace was made with Spain in 1558. The duke and his brother, Cardinal Ippolito the Younger, were patrons of literature and art, and the latter built the magnificent Villa d' Este at Tivoli. He was succeeded by Alphonso II. (1533–1597), remembered for his patronage of Tasso, whom he afterwards imprisoned. He reorganized the army, enriched the public library, encouraged agriculture, but was extravagant and dissipated. With him the main branch of the family came to an end, and although at his death he bequeathed the duchy to his cousin Cesare (1533–1628), Pope Clement VIII., renewing the Church's hostility to the house of Este, declared that prince to be of illegitimate birth (a doubtful contention), and by a treaty with Lucrezia, Alphonso's sister, Ferrara was made over to the Holy See. Cesare held Modena and Reggio, but with him the Estensi cease to play an important part in Italian politics. For two centuries this dynasty had been one of the greatest powers in Italy, and its court was perhaps the most splendid in Europe, both as regards pomp and luxury and on account of the eminent artists, poets and scholars which it attracted.

The subsequent heads of the family were: Alphonso III., who retired to a monastery in 1629 and died in 1644; Francis I. (1610–1658), who commanded the French army in Italy in 1647; Alphonso IV. (1634–1662), the father of Mary Beatrice, the queen of James II. of England, who fought in the French army during the Spanish War, and founded the picture gallery of Modena; Francis II. (1660–1694), who originated the Este library, also at Modena, and founded the university; Rinaldo (1655–1737), through whose marriage with Charlotte Felicitas of Brunswick-Lüneburg the long-separated branches of the house of Este were reunited; Francis III. (1698–1780), who married the daughter of the regent Philip of Orleans. Francis III. wished to remain neutral during the war between Spain and Austria (1740), but the imperialists having occupied and devastated his duchy, he took the Spanish side and was appointed *generalissimo* of the Spanish army in Italy. He was re-established in his possessions by the treaty of Aix-la-Chapelle (1748), and on being reconciled with the empress Maria Theresa, he received from her the title of governor of Lombardy in 1754. With his son Ercole III. Rinaldo (1727–1803), who at the peace of Campoformio lost his duchy, the male line of the Estensi came to an end. His only daughter, Marie Beatrice (d. 1829), was married to the archduke Ferdinand, third son of the emperor Francis I. Ferdinand was created duke of Breisgau in 1803, and at his death in 1806 he was succeeded by his son Francis IV. (*q.v.*), to whom the duchy of Modena was given at the treaty of Vienna in 1814. He died in 1846 and was succeeded by Francis V. (*q.v.*), who lost his possessions by the events of 1859. With his death in 1875 the title and estates passed to the archduke Francis Ferdinand, heir to the Austro-Hungarian throne. The children of Lady Augusta Murray, daughter of the earl of Dunmore, by her marriage with Augustus Frederick, duke of Sussex, sixth son of George III. of Great Britain, assumed the old name of d' Este, and claimed recognition as members of the royal family; but as the marriage was in violation of the royal marriages act of 1773, it was declared invalid, and their claims were set aside.

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ESTE (anc. *Ateste*, *q.v.*), a town and episcopal see of Venetia, Italy, in the province of Padua, 20 m. S.S.W. of it by rail. Pop. (1901) 8671 (town); 10,779 (commune). It lies 49 ft. above sea-level below the southern slopes of the Euganean Hills. The external walls of the castle still rise above the town on the N., but the interior is now occupied by the cattle-market. A fragment of the once enormous Palazzo Mocenigo, of the 16th century, is now occupied by the important archaeological museum (see Ateste). The cathedral was erected in 1690–1720, on the site of an older building destroyed by an earthquake in 1688. S. Martino is a church in the Lombard Romanesque style. The archives in the Palazzo Comunale are important.

After the Roman period the history of Este is a blank until the Lombard period, in which it was dependent on Monselice. In the 10th century the family of Este (see above) established itself in the castle above the town. At the end of the 13th century Padua, which had already captured Este more than once, became definitely mistress of it. When the Carrara family succumbed in 1405, Este voluntarily surrendered to Venice and was allowed its independence, under a podestà; and thenceforth it followed the fortunes of Venetia.

ESTÉBANEZ CALDERÓN, SERAFÍN (1799–1867), a Spanish author, best known by the pseudonym of "El Solitario," was born at Málaga on the 27th of December 1799. His first literary effort was *El Listón verde*, a poem signed "Safinio" and written to celebrate the revolution of 1820. He was called to the bar, and settled for some time at Madrid, where he published a volume of verses in 1831 under the assumed name of "El Solitario." He obtained an exaggerated reputation as an Arabic scholar, and played a minor part in the political movements of his time. He died at Madrid on the 5th of February 1867. His most interesting work, *Escenas andaluzas* (1847), is in a curiouly affected style, the vocabulary being partly archaic and partly provincial; but, despite its eccentric mannerisms, it is a vivid record of picturesque scenes and local customs. Estébanez Calderón is also the author of an unfinished history, *De la conquista y pérdida de Portugal* (1883), issued posthumously under the editorship of his nephew, Antonio Cánovas del Castillo.

ESTELLA, a town of northern Spain, in the province of Navarre, on the left bank of the river Ega, 15 m. W.S.W. of Pamplona. Pop. (1900) 5736. Estella, which occupies the site of a Roman town of uncertain name, contains several monasteries and churches, a medieval citadel, and a college which was formerly a university. Its principal industries are the manufacture of woollen and linen fabrics and brandy-making; and it has a considerable trade in fruit, wine and cattle. Estella commands several defiles on the roads from Castile and Aragon, and on that account occupies a position of considerable strategic importance. It was long the headquarters of Don Carlos, who was proclaimed king here in 1833. In 1873 it was the chief stronghold of the Carlists, and in 1874, when driven from other places, they succeeded in retiring to Estella. On the 16th of February 1876 the Carlists in the town surrendered unconditionally. For an account of the Carlist rising see Spain: *History*.

ESTERHÁZY OF GALÁNTHA, a noble Magyar family. Its origin has been traced, not without some uncertainty, to Salamon of Estoras, whose sons Péter and Illyés divided their patrimony in 1238. Péter founded the family of Zerházy, and Illyés that of Illyesházy, which became extinct in the male line in 1838. The first member of the family to emerge definitely into history was Ferencz Zerházy (1563–1594), vice lord-lieutenant of the county of Pressburg, who took the name of Esterházy when he was created *Freiherr* of Galántha, an estate acquired by the family in 1421. His eldest son, Dániel (d. 1654), founded the house of Czesznek, the third, Pál (d. 1641), the line of Zólyom (Altsohl), and the fourth, Miklós, that branch of the family which occupies the most considerable place in Hungarian history, that of Fraknó or Forchtenstein.

This Miklós [Nicholas] Esterházy of Galántha (1582–1645) was born at Galántha on the 8th of April 1582. His parents were Protestants, and he himself, at first, followed the Protestant persuasion; but he subsequently went over to Catholicism and, along with Cardinal Pázmány, his most serious rival at court, became a pillar of Catholicism, both religiously and politically, and a worthy opponent of the two great Protestant champions of the period, Gabriel Bethlen and George I. Rákóczy. In 1611 he married Orsolyá, the widow of the wealthy Ferencz Mágocsy, thus coming into possession of her gigantic estates, and in 1622 he acquired Fraknó. Matthias II. made him a baron (1613), count of Beregh (1617), and lord-lieutenant of the county of Zólyom and *magister curiae regiae* (1618). At the coronation of Ferdinand II., when he officiated as grand-standard-bearer, he received the order of the Golden Fleece and fresh donations. At the diet of Sopron, 1625, he was elected palatine of Hungary. As a diplomatist he powerfully contributed to bring about the peace of Nikolsburg (1622) and the peace of Linz (1645) (see Hungary: *History*). His political ideal was the consolidation of the Habsburg dynasty as a means towards freeing Hungary from the Turkish yoke. He himself, on one occasion (1623), defeated the Turks on the banks of the Nyitra; but anything like sustained operations against them was then impossible. He was also one of the most eminent writers of his day. He died at Nagy-Heflán on the 11th of September 1645, leaving five sons.

See *Works of Nicholas Esterházy*, with a biography by Ferencz Toldi (Hung.) (Pest, 1852); *Nicholas Count Esterházy, Palatine of Hungary* (a biography, Hung.) (Pest, 1863–1870).

His third son Pál [Paul] (1635–1713), prince palatine, founded the princely branch of the family of Esterházy. He was born at Kis Marton (Eisenstadt) on the 7th of September 1635. In 1663 he fought, along with Miklós Zrinyi, against the Turks, and distinguished himself under Montecuculi. In 1667 he was appointed commander-in-chief in south Hungary, where he defeated the malcontents at Leutschau and Györk. In 1681 he was elected palatine. In 1683 he participated in the deliverance of Vienna from the Turks, and entered Buda in 1686 at the head of 20,000 men. Thoroughly reactionary, and absolutely devoted to the Habsburgs, he contributed more than any one else to the curtailing of the privileges of the Magyar gentry in 1687, when he was created a prince of the Empire, with (in 1712) succession to the first-born of his house. His "aulic tendencies" made him so unpopular that his offer of mediation between the Rákóczy insurgents and the government was rejected by the Hungarian diet, and the negotiations, which led to the peace of Szatmár (see Hungary: *History*), were entrusted to János Pállfy. He died on the 26th of March 1713. He loved the arts and sciences, wrote several religious works, and was one of the chief compilers of the *Trophaeum Domus Inclytae Estoratianae*.

See Lajos Merényi, *Prince Paul Esterházy* (Hung.) (Budapest, 1895).

Prince Pál Antal, grandson of the prince palatine Pál, was a distinguished soldier, who rose to the rank of field-marshal in 1758. On his death in 1762 he was succeeded by his brother.

Prince Miklós József [Nicholas Joseph] (1714–1790), also a brilliant soldier, is perhaps best remembered as a patron of the fine arts. For his services in command of an infantry brigade at Kolin (1757) he was specially mentioned by Count Daun, and became one of the original members of the order of Maria Theresa. In 1762 he was appointed captain of Maria Theresa's Hungarian bodyguard, in 1764 *Feldzeugmeister*, and in 1768 field marshal. His other honours included the Golden Fleece and the grade of commander in the order of Maria Theresa. Joseph II. conferred the princely title, which had previously been limited to the eldest-born of the house, on all his descendants, male and female. Esterházy died in Vienna on the 28th of September 1790. He rebuilt in the Renaissance style Schloss Esterházy, the splendour of which won for it the name of the Hungarian Versailles. Haydn was for thirty years conductor of his private orchestra and general musical director, and many of his compositions were written for the private theatre and the concerts of this prince.

His grandson, Prince Miklós [Nicholas] (1765–1833) was born on the 12th of December 1765. He began life as an officer in the guards, subsequently making the grand tour, which first awakened his deep interest in art. He quitted the army for diplomacy after reaching the rank of *Feldzeugmeister*, and was employed as extraordinary ambassador, on special occasions, when he displayed a magnificence extraordinary even for the Esterházys. He made at Vienna an important collection of paintings and engravings, which came into the possession of the Hungarian Academy at Budapest in 1865. At his summer palace of Kis Marton (Eisenstadt) he erected a monument to Haydn. His immense expenditure on building and the arts involved the family in financial difficulties for two generations. When the French invaded Austria in 1797, he raised a regiment of 1000 men at his own expense. In 1809, when Napoleon invited the Magyars to elect a new king to replace the Habsburgs, overtures were made to Prince Nicholas, who refused the honour and, further, raised a regiment of volunteers in defence of Austrian interests. He died at Como on the 24th of November 1833.

His son, Prince Pál Antal [Paul Anthony] (1786–1866), entered the diplomatic service. In 1806 he was secretary of the embassy in London, and in 1807 worked with Prince Metternich in the same capacity in Paris. In 1810 he was accredited to the court of Dresden, where he tried in vain to detach Saxony from Napoleon, and in 1814 he accompanied his father on a secret mission to Rome. He took a leading part in all the diplomatic negotiations consequent upon the wars of 1813–1815, especially at the congress of Châtillon, and on the conclusion of peace was, at the express desire of the prince regent, sent as ambassador to London. In 1824 he represented Austria as ambassador extraordinary at the coronation of Charles X., and was the premier Austrian commissioner at the London conferences of 1830–1836. In 1842 he quitted diplomacy for politics and attached himself to "the free-principles party." He was minister for foreign affairs in the first responsible Hungarian ministry (1848), but resigned his post in September bcause he could see no way of reconciling the court with the nation. The last years of his life were spent in comparative poverty and isolation, as even the Esterházy-Forchtenstein estates were unequal to the burden of supporting his fabulous extravagance and had to be placed in the hands of curators.

The cadet branch of the house of Fraknó, the members of which bear the title of count, was divided into three lines by the sons of Ferencz Esterházy (1641–1683).

The eldest of these, Count Antal (1676–1722), distinguished himself in the war against Rákóczy in 1703, but changed sides in 1704 and commanded the left wing of the Kuruczis at the engagements of Nagyszombat (1704) and Vereskö (1705). In 1706 he defeated the imperialist general Guido Stahremberg and penetrated to the walls of Vienna. Still more successful were his operations in the campaign of 1708, when he ravaged Styria, twice invaded Austria, and again threatened Vienna, on which occasion the emperor Joseph narrowly escaped falling into his hands. In 1709 he was routed by the superior forces of General Sigbert Heister at Palota, but brought off the remainder of his arms very skilfully. In 1710 he joined Rákóczy in Poland and accompanied him to France and Turkey. He died in exile at Rodosto on the shores of the Black Sea. His son Bálint József [Valentine Joseph], by Anna Maria Nigrelli, entered the French army, and was the founder of the Hallewyll, or French, branch of the family, which became extinct in the male line in 1876 with Count Ladislas.

See *Count Esterházy's Campaign Diary* (Hung.), ed. by K. Thaly (Pest, 1901).

Count Bálint Miklós (1740–1805), son of Bálint József, was an enthusiastic partisan of the duc de Choiseul, on whose dismissal, in 1764, he resigned the command of the French regiment of which he was the colonel. It was Esterházy who conveyed to Marie Antoinette the portrait of Louis XVI. on the occasion of their betrothal, and the close relations he maintained with her after her marriage were more than once the occasion of remonstrance on the part of Maria Theresa, who never seems to have forgotten that he was the grandson of a rebel. At the French court he stood in high favour with the comte d'Artois. He was raised to the rank of maréchal de camp, and made inspector of troops in the French service in 1780. At the outbreak of the French Revolution, he was stationed at Valenciennes, where he contrived for a time to keep order, and facilitated the escape of the French *emigrês* by way of Namur; but, in 1790, he hastened back to Paris to assist the king. At the urgent entreaty of the comte d'Artois in 1791 he quitted Paris for Coblenz, accompanied Artois to Vienna, and was sent to the court of St Petersburg the same year to enlist the sympathies of Catherine II. for the Bourbons. He received an estate from Catherine II., and although the gift was rescinded by Paul I., another was eventually granted him. He died at Grodek in Volhynia on the 23rd of July 1805.

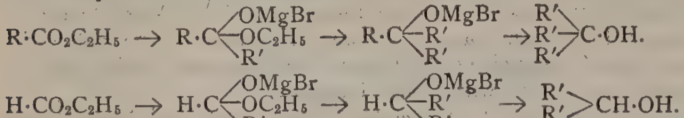
See *Mémoires*, ed. by E. Daudet (Fr.) (Paris, 1905), and *Lettres* (Paris, 1906).

Two other sons of Count Ferencz (d. 1685), Ferencz and József, founded the houses of Dotis and Cseklész (Landschütz) respectively. Of their descendants, Count Móricz (1807–1890) of Dotis, Austrian ambassador in Rome until 1856, became in 1861 a member of the ministry formed by Anton Schmerling, and in 1865 joined the clerical cabinet of Richard Belcredi. His bitter hostility to Prussia helped to force the government of Vienna into the war of 1866. His official career closed in 1866, but he remained one of the leaders of the clerical party.

See also Count János Esterházy, *Description of the Esterházy Family* (Hung., Budapest, 1901). (R. N. B.)

ESTERS, in organic chemistry, compounds formed by the condensation of an alcohol and an acid, with elimination of water; they may also be considered as derivatives of alcohols, in which the hydroxylic hydrogen has been replaced by an acid radical, or as acids in which the hydrogen of the carboxyl group has been replaced by an alkyl or aryl group. In the case of the polybasic acids, all the hydrogen atoms can be replaced in this way, and the compounds formed are known as "neutral esters." If, however, some of the hydrogen of the acid remain undisplaced, then "acid esters" result. These acid esters retain some of the characteristic properties of the acids, forming, for example, salts, with basic oxides. Esters may be prepared by heating the silver salt of an acid with an alkyl iodide; by heating the alcohols or alcoholates with an acid chloride; by distilling the anhydrous sodium salt of an acid with a mixture of the alcohol and concentrated sulphuric acid; or by heating for some hours on the water bath, a mixture of an acid and an alcohol, with a small quantity of hydrochloric or sulphuric acids (E. Fischer and A. Speier, *Ber.*, 1896, 28, p. 3252).

The esters of the aliphatic and aromatic acids are colourless neutral liquids, which are generally insoluble in water, but readily dissolve in alcohol and ether. Many possess a fragrant odour and are prepared in large quantities for use as artificial fruit essences. They hydrolyse readily when boiled with solutions of caustic alkalies or mineral acids, yielding the constituent acid and alcohol. When heated with ammonia, they yield acid amides (*q.v.*). They form unstable addition products with sodium ethylate or methylate. With the Grignard reagent, they form addition compounds which on the addition of water yield tertiary alcohols, except in the case of ethyl formate, where a secondary alcohol is obtained.



$$R{\cdot}CO_2C_2H_5 \rightarrow R{\cdot}C\begin{cases}OMgBr\\OC_2H_5\\R'\end{cases} \rightarrow R{\cdot}C\begin{cases}OMgBr\\R'\\R'\end{cases} \rightarrow \begin{matrix}R'\\R'\\R'\end{matrix}\Big\rangle C{\cdot}OH.$$

$$H{\cdot}CO_2C_2H_5 \rightarrow H{\cdot}C\begin{cases}OMgBr\\OC_2H_5\\R'\end{cases} \rightarrow H{\cdot}C\begin{cases}OMgBr\\R'\\R'\end{cases} \rightarrow \begin{matrix}R'\\R'\end{matrix}\Big\rangle CH{\cdot}OH.$$

N. Menschutkin (*Ber.*, 1882, 15, p. 1445; *Ann.*, 1879, 195, p. 334) examined the rate of esterification of many acids with alcohols. It was found that the normal primary alcohols were all esterified at about the same rate, the secondary alcohols more slowly than the primary, and the tertiary alcohols still more slowly. The investigation also showed that the nature of the acid used affected the result, for in an homologous series of acids it was found that as the molecule of the acid became more complex, the rate of esterification became less. The formation of an ester by the interaction of an acid with an alcohol is a "reversible" or "balanced" action, for as M. Berthelot and L. Péan de St Gilles (*Ann. Chim. Phys.*, 1862 (3), 65, p. 385 et seq.) have shown in the case of the formation of ethyl acetate from ethyl alcohol and acetic acid, a point of equilibrium is reached, beyond which the reacting system cannot pass, unless the system be disturbed in some way by the removal of one of the products of the reaction. V. Meyer (*Ber.*, 1894, 27, p. 510 et seq.) showed that in benzenoid compounds ortho-substituents exert a great hindering effect on the esterification of alcohols by acids in the presence of hydrochloric acid, this hindering being particularly marked when two substituents are present in the ortho positions to the carboxyl group. In such a case the ester is best prepared by the action of an alkyl halide on the silver salt of the acid, and when once prepared, can only be hydrolysed with great difficulty.

Ethyl formate, $H{\cdot}CO_2C_2H_5$, boils at 55° C. and has been used in the artificial preparation of rum. Ethyl acetate (acetic ether), $CH_3{\cdot}CO_2C_2H_5$, boils at 75° C. Isoamylisovalerate, $C_4H_9{\cdot}CO_2C_5H_{11}$, boils at 196° C. and has an odour of apples. Ethyl butyrate, $C_3H_7{\cdot}CO_2C_2H_5$, boils at 121° C. and has an odour of pineapple. The fats (*q.v.*) and waxes (*q.v.*) are the esters of the higher fatty acids and alcohols. The esters of the higher fatty acids, when distilled under atmospheric pressure, are decomposed, and yield an olefine and a fatty acid.

Esters of the mineral acids are also known and may be prepared by the ordinary methods as given above. The neutral esters are as a rule insoluble in water and distil unchanged; on the other hand, the acid esters are generally soluble in water, are non-volatile, and form salts with bases. *Ethyl hydrogen sulphate* (sulphovinic acid), $C_2H_5{\cdot}HSO_4$, is obtained by the action of concentrated sulphuric acid on alcohol. The ester is separated from the solution by means of its barium salt, and the salt decomposed by the addition of the calculated amount of sulphuric acid. It is a colourless oily liquid of strongly acid reaction; its aqueous solution decomposes on standing and on heating it forms diethyl sulphate and sulphuric acid. *Dimethyl sulphate*, $(CH_3)_2SO_4$, is a colourless liquid which boils at 187°-188° C., with partial decomposition. It is used as a methylating agent (F. Ullmann). Great care should be taken in using dimethyl and diethyl sulphates, as the respiratory organs are affected by the vapours, leading to severe attacks of pneumonia. *Ethyl nitrate*, $C_2H_5{\cdot}ONO_2$, is a colourless liquid which boils at 86·3° C. It is prepared by the action of nitric acid on ethyl alcohol (some urea being added to the nitric acid, in order to destroy any nitrous acid that might be produced in secondary reactions and which, if not removed, would cause explosive decomposition of the ethyl nitrate). It burns with a white flame and is soluble in water. When heated with ammonia it yields ethylamine nitrate, and when reduced with tin and hydrochloric acid it forms hydroxylamine (*q.v.*) (W. C. Lossen). *Ethyl nitrite*, $C_2H_5{\cdot}ONO$, is a liquid which boils at 18° C.; the crude product obtained by distilling a mixture of alcohol, sulphuric and nitric acids and copper turnings is used in medicine under the name of "sweet spirits of nitre." *Amyl nitrite*, $C_5H_{11}{\cdot}ONO$, boils at 96° C. and is used in the preparation of the anhydrous diazonium salts (E. Knoevenagel, *Ber.*, 1890, 23, p. 2094). It is also used in medicine.

ESTHER. The *Book of Esther*, in the Bible, relates how a Jewish maiden, Esther, cousin and foster-daughter of Mordecai, was made his queen by the Persian king Ahasuerus (Xerxes) after he had divorced Vashti; next, how Esther and Mordecai frustrated Haman's endeavour to extirpate the Jews; how Haman, the grand-vizier, fell, and Mordecai succeeded him; how Esther obtained the king's permission for the Jews to destroy all who might attack them on the day which Haman had appointed by lot for their destruction; and lastly, how the feast of Purim (Lots ?) was instituted to commemorate their deliverance. Frequent incidental references are made to Persian court-usages (explanations are given in i. 13, viii. 8), while on the other hand the religious rites of the Jews (except fasting), and even Jerusalem and the temple, and the name of Israel, are studiously ignored. Even the name of God is not once mentioned, perhaps from a dread of its profanation during the Saturnalia of Purim. The early popularity of the book is shown by the interpolated passages in the Septuagint and the Old Latin versions.

The criticism of *Esther* began in the 18th century. As soon as the questioning spirit arose, the strangeness of many statements in the book leaped into view. A moderate scholar of our day can find no historical nucleus, and calls it a sort of historical romance.[1] The very first verses in the book startle the reader by their exaggerations, *e.g.* a banquet lasting 180 days, "127 provinces." Farther on, the improbabilities of the plot are noticeable. Esther, on her elevation, keeps her Jewish origin secret (ii. 10; cf. vii. 3 ff.), although she has been taken from the house of her uncle, who is known to be a Jew (iii. 4; cf. vi. 13), and has remained in constant intercourse with him (ii. 11, 19, 20, 22; cf. iv. 4-17). We are further told that the grand-vizier was an Agagite or Amalekite (iii. 1, &c.); would the nobility of Persia have tolerated this ? Or did Haman too keep his non-Persian origin secret? Also that Mordecai offered a gross affront to Haman, for which no slighter punishment would satisfy Haman than the destruction of the whole Jewish race (iii. 2-6). Of this savage design eleven months' notice is given (iii. 12-14); and when the danger has been averted by the cleverness of Esther, the provincial Jews are allowed to butcher 75,000, and those in the capital 800 of their Persian fellow-subjects (ix. 6-16).

It is urged, on the other hand, that the assembly mentioned in i. 3 may be that referred to by Herodotus (vii. 8) as having preceded the expedition against Greece. This hypothesis, however, requires us to suppose that Xerxes had returned from Sardis to Susa by the tenth month of the seventh year of his reign, which is barely credible. In the reckoning of 127 provinces (cf. Dan. vi. 1; 1 Esd. iii. 2) satrapies and sub-satrapies may be confounded. It is at any rate correct to include India among the provinces; this is justified, not only by Herodotus (iii. 94), but by the inscriptions of Darius at Persepolis and Naksh-i-Rustam. Herodotus again (vii. 8) confirms the custom referred to in Esth. ii. 12. But what authority can make the conduct of Mordecai credible ? To-day the harem is impenetrable, while "any one declining to stand as the grand-vizier passes is almost beaten to death."[2] This, surely, is what a real Mordecai would have suffered from a real Haman. Even the capricious Xerxes would never have permitted the entire destruction of one of the races of the empire, nor would a vizier have proposed it.

Serious difficulties of another kind remain. Mordecai is represented as a fellow-captive of Jeconiah (597 B.C.), and grand-vizier in Xerxes's twelfth year (474 B.C.)! This is parallel to the strange statement in Tobit xiv. 15. And how can we find room for Esther as queen by the side of Amestris (Herod. vii. 14, ix. 112)? How, too, can a Jewess have been a legal queen (see Herod. iii. 84) ? Then take the supposed Persian proper names. "Ahasuerus" may no doubt stand, but very few of the rest (see Nöldeke, *Ency. Bib.* col. 1402). As to the style, the general verdict is that it points to a late date (see Driver, *Introd.*[6], p. 484). Altogether, critics decline to date the book earlier than the 3rd or even 2nd century B.C.

So far we have only been carrying on 18th-century criticism. In more recent years, however, new lines of inquiry have been opened up. First of all by the great Semitic scholar Lagarde. His thesis (seldom defended now) was that Purim corresponds to Fūrdigan, the name of the old Persian New Year's and All Souls' festival held in spring, on which the Persians were wont to exchange presents (cf. Esth. ix. 19). In 1891 came a new explanation of Esther from Zimmern. It is true that in its earlier form his theory was very incomplete. But in justice to this scholar we may notice that from the first he looked for light to Babylonia, and that many other critics now take up the same position. There is also another new point which has to be mentioned, viz. that, judging from our experience elsewhere, the Book of Esther has probably passed through various stages of development. Here, then, are two points which call for investigation, viz. (1) a possible mythological element in Esther, and (2) possible stages of development prior to that represented by the Hebrew text.

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[1] Kautzsch, *Old Testament Literature* (1898), p. 130.

[2] So Morier, the English minister to the Persian court, quoted by Dean Stanley.

As to the first point. The Second Targum (on Esth. ii. 7) long ago declared that Esther was so called "because she was like the planet Venus." Recent scholars have expressed the same idea more critically. Esther is a modification of Ishtar, the name of the Babylonian goddess of fertility and of the planet Venus, whose myth must have been partially known to the Israelites even in pre-exilic times,[1] and after the fall of the state must have acquired a still stronger hold on Jewish exiles. A general knowledge of the myth of Marduk among the Israelites cannot indeed be proved. Singularly enough, the Babylonian colonists in the cities of Samaria are said to have made idols, not of Marduk, but of a deity called Succoth-benoth[2] (2 Kings xvii. 30). Nor does the Second Targum help us here; it gives a wild explanation of Mordecai as "pure myrrh." Still it is plain that the name of the god Marduk (Merodach) was known to the Jews, and the Cosmogony in Gen. i. is considered by critics to have ultimately arisen out of the myth of Marduk's conflict with the dragon (see Cosmogony). At any rate the name Mordecai (the vocalization is uncertain) looks very much like Marduk, which, with terminations added, often occurs in cuneiform documents as a personal name.[3] Add to this, that, according to Jensen, Ishtar in mythology was the cousin of Marduk, just as the legend represents Esther as the cousin of Mordecai.[4] The same scholar also accounts for Esther's other name Hadassah (Esth. ii. 7); *hadasshatu* in Babylonian means "bride," which may have been a title of Ishtar.

But we cannot stop short here. Unless the mythological key can also explain Haman and Vashti, it is of no use. Jensen, now followed by Zimmern, is equal to the occasion. Haman, he says, is a corruption of Hamman or Humman or Uman, the name of the chief deity of the Elamites, in whose capital (Susa) the scene of the narrative is laid, while Vashti is Mashti (or Vashti), probably the name of an Elamite goddess.

Following the real or fancied light of these names, Prof. Jensen holds that the Esther-legend is based on a mythological account of the victory of the Babylonian deities over those of Elam, which in plain prose means the deliverance of ancient Babylonia from its Elamite oppressors, and that such an account was closely connected with the Babylonian New Year's festival, called Zagmuk, just as the Esther-legend is connected with the festival of Purim.

We are bound, however, to mention some critical objections. (1) The Babylonian festival corresponding to Purim was not the spring festival of Zagmuk, but the summer festival of Ishtar, which is probably the Sacaea of Berossus, an orgiastic festival analogous to Purim. (2) According to Jensen's theory, Mordecai, and not Esther, ought to be the direct cause of Haman's ruin. (3) No such Babylonian account as Jensen postulates can be indicated. (4) The identifications of names are hazardous. Fancy a descendant of Kish called Marduk, and an "Agagite" called Hamman! Elsewhere Mordecai (Ezra ii. 2; Neh. vii. 7) occurs among names which are certainly not Persian (Bigvai is no exception), and Haman (Tobit xiv. 10) appears as a nephew of Achiachar, which is not a Persian name. Esther, moreover, ought to be parallel to Judith; fancy likening the representative of Israel to the goddess Ishtar!

Next, as to the preliminary literary phases of Esther. Such phases are probable, considering the later phases represented in the Septuagint. There may have once existed in Hebrew a story of the deadly feud between Mordecai (if that be the original name) and Haman, with elements suggested by the story of the battle between the Supreme God and the dragon (see Cosmogony). As the legend stands, Mordecai and Esther seem to be in each other's way. In a passage (i. 5 in LXX.) only found in the Septuagint, but which may have belonged to the original Esther, reference is made to a dream of Mordecai respecting two great dragons, *i.e.* Mordecai and Haman (x. 7). This seems to confirm the view here mentioned. If so, however, there must also have been an Esther-legend, which was afterwards worked up with that of Mordecai. This is, in fact, the view of Erbt. Winckler takes a different line. Linguistic facts and certain points in the contents seem to him to show that our Esther is a work of the age of the Seleucidae; more precisely he thinks of the time of the revolt of Molon under Antiochus III. Of course there was a Book of Esther before this, and even in its redacted form our Esther reflects the period of three Persian kings, viz. Cyrus, Cambyses and Darius. Lastly, Cheyne (*Ency. Bib.* "Purim," § 7), while agreeing with Winckler that the book is based on an earlier narrative, holds that that earlier text differed more widely from the present in its geographical and historical setting than Winckler seems to suppose. The problem of the origin of the name Purim, however, can hardly be said to have received a final solution.

Bibliography.—Kuenen, *History of Israel*, iii. (1875), 148-153; Lagarde, *Purim* (1887); Zimmern in Stade's *Zeitschrift*, xi. (1891), pp. 157-169, and *Keilinschriften und das Alte Testament*$^{(3)}$, 485, 515-520, Jensen in Wildeboer's *Esther* (in Marti's series, 1898), pp. 173-175; Winckler, *Keilinschriften und das Alte Testament*$^{(3)}$, p. 288, *Altorientalische Forschungen*, 3rd ser. i. 1-64; Erbt, *Die Purimsage* (1900); *Ency. Biblica*, articles "Esther" and "Purim" (a composite article). (T. K. C.)

Additions to Book of Esther. These "additions" were written originally in Greek and subsequently interpolated in the Greek translation of the Book of Esther. Here the principle of interpolation has reached its maximum. Of 270 verses, 107 are not to be found in the Hebrew text. These additions are distributed throughout the book in the Greek, but in the Latin Bible they were relegated to the end of the canonical book by Jerome—an action that has rendered them meaningless. In the Greek the additions form with the canonical text a consecutive history. They were made probably in the time of the Maccabees, and their aim was to supply the religious element which is so completely lacking in the canonical work. The first, which gives the dream of Mordecai and the events which led to his advancement at the court of Artaxerxes, precedes chap. i. of the canonical text: the second and fifth, which follow iii. 13 and viii. 12, furnish copies of the letters of Artaxerxes referred to in these verses; the third and fourth, which are inserted after chap. iv., consist of the prayers of Mordecai and Esther, with an account of Esther's approach to the king. The last, which closes the book, tells of the institution of the feast of Purim. The Greek text appears in two widely-differing recensions. The one is supported by ABא, and the other—a revision of the first—by codices 19, 93a, 108b. The latter is believed to have been the work of Lucian. Swete, *Old Test. in Greek*, ii. 755, has given the former, while Lagarde has published both texts with critical annotations in his *Librorum Veteris Testamenti Canonicorum*, i. 504-541 (1883), and Scholz in his *Kommentar über das Buch Esther* (1892).

For an account of the Latin and Syriac versions, the Targums, and the later Rabbinic literature connected with this subject, and other questions relating to these additions, see Fritzsche, *Exeget. Handbuch zu den Apok.* (1851), i. 67-108; Schürer$^{(3)}$, iii. 330-332; Fuller in *Speaker's Apocr.* i. 360-402; Ryssel in Kautzsch's *Apok. u. Pseud.* i. 193-212; Siegfried in *Jewish Encyc.* v. 237 sqq.; Swete, *Introd. to the Old Test. in Greek*, 257 seq.; L. B. Paton, "A Text-Critical Apparatus to the Book of Esther" in *O.T. and Semitic Studies in Memory of W. R. Harper* (Chicago, 1908). (R. H. C.)

ESTHONIA (Ger. *Ehstland* and *Esthland*, Esthonian *Eestimaa* and *Meie-maa*, also *Viroma* and *Rahvama*; Lettish *Iggaun Senna*), a Baltic province of Russia, stretching along the south coast of the Gulf of Finland, and having Lake Peipus and Livonia on the S. and the government of St Petersburg on the E. An archipelago of islands, of which Dagö is the largest, belongs to this government (Oesel belongs to Livonia). The area is 7818 sq. m., 503 sq. m. of this being insular. The surface is low, not exceeding 100 ft. in altitude along the coast and alongside Lake Peipus, while in the interior the average elevation ranges from 200 to 300 ft., and nowhere exceeds 450 ft. It was entirely covered with the bottom moraine of the great ice-sheet of the Glacial Epoch, resting upon Silurian sandstones and limestones. In places sands and clays overlie the glacial deposits. The principal stream is the Narova, which issues from Lake Peipus, flows along the eastern border, and empties into the Gulf of Finland. The other drainage arteries are all small, but many in number; while lakes and marshes aggregate fully 22½% of the total surface. The climate is severe, great cold being experienced in winter, though moist west winds exercise a moderating influence. Nevertheless the annual mean temperature ranges between 39° and 43° Fahr. In 1878 the nobility, mostly of German descent, owned and farmed 52% of the land; 42% was farmed, but not owned, by the peasants, mostly Esths or Ehsts, and only 3% was owned by persons outside the ranks of the nobility. Since then one-fourth of the peasantry have been enabled to purchase their holdings, more than half a million acres having passed into their possession. Agriculture is the chief occupation, and it is, on all the larger holdings, carried on with greater scientific knowledge than in any other part of Russia. Of the total area about 16·6% is under cultivation; meadows and grass-lands amount to 41·7%; and forests cover 19%. The principal crops are rye, oats, barley and potatoes, with large quantities of vegetables. Cattle-breeding flourishes, and meat and butter are constantly increasing items of export. The manufactories consist chiefly of distilleries (over 13,500,000 gallons annually), cotton (at Kränholm falls on the Narova), woollen, flour, paper and saw mills, iron and machinery works, and match factories. Fishing is active along the coast, especially for anchovies. The province is intersected by a railway running from St Petersburg to Reval, with branches from the latter city westwards to Baltic Port and southwards into Livonia, and from Taps south to Yuryev (Dorpat). The chief seaports are Reval, Baltic Port, Hapsal, Kunda and Dagö. Esthonia is divided into four districts, the chief towns of which are Reval (pop. in 1897, 66,292), the capital of the province; Hapsal, a lively watering-place (3238); Weissenstein (2509); and Wesenberg (5560). The population, which consists chiefly of Ehstes (365,959 in 1897), Russians (18,000), Germans (16,000), Swedes (5800), and some Jews, is growing fairly fast; in 1870 it numbered 323,960, and in 1897 413,747, of whom 210,199 were women and 76,315 lived in towns; in 1906 it was estimated at 451,700. Ninety-six per cent. of the whole belong to the Lutheran Church. Education is, for Russia, relatively high.

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[1] See Zimmern, *Die Keilinschriften und das Alte Test.*$^{(3)}$, p. 438.

[2] *Ibid.* p. 396.

[3] Johns, *Assyrian Deeds*, iii. 198-199; *Amer. Journ. of Sem. Languages* (April 1902), p. 158.

[4] So too Zimmern, in Gunkel's *Schöpfung und Chaos*, p. 313, note 2.

The Esths, Ehsts or Esthonians, who call themselves Tallopoeg and Maamees, are known to the Russians as Chukhni or Chukhontsi, to the Letts as Igqauni, and to the Finns as Virolaiset. They belong to the Finnish family, and consequently to the Ural-Altaic division of the human race. Altogether they number close upon one million, and are thus distributed: 365,959 in Esthonia (in 1897), 518,594 in Livonia, 64,116 in the government of St Petersburg, 25,458 in that of Pskov, and 12,855 in other parts of Russia. As a race they exhibit manifest evidences of their Ural-Altaic or Mongolic descent in their short stature, absence of beard, oblique eyes, broad face, low forehead and small mouth. In addition to that they are an under-sized, ill-thriven people, with long arms and thin, short legs. They cling tenaciously to their native language, which is closely allied to the Finnish, and divisible into two, or according to some authorities into three, principal dialects—Dorpat Esthonian and Reval Esthonian, with Pernau Esthonian. Reval Esthonian, which preserves more carefully the full inflectional forms and pays greater attention to the laws of euphony, is recognized as the literary language. Since 1873 the cultivation of their mother-tongue has been sedulously promoted by an Esthonian Literary Society (*Eesti Korjameeste Selts*), which publishes *Toimetused*, or "Instructions" in all sorts of subjects. They have a decided love of poetry, and exhibit great facility in improvising verses and poems on all occasions, and they sing, everywhere, from morning to night. Like the Finns they possess rich stores of national songs. These, which bear an unmistakable family likeness to those of the great Finnish epic of the *Kalevala*, were collected as the Kalevi Poëg, and edited by Kreutswald (1857), and translated into German by Reinthal (1857–1859) and Bertram (1861) and by Löwe (1900). Other collections of *Esthnische Volkslieder* have been published by Neuss (1850–1852) and Kreutzwald and Neuss (1854); while Kreutzwald (1866) and Jannsen (1888) have published collections of legends and national tales. The earliest publication in Esthonian was a Lutheran catechism in the 16th century. An Esthonian translation of the New Testament was printed at Reval in 1715. Between 1813 and 1832 there appeared at Pernau twenty volumes of *Beiträge zur genauern Kenntniss der esthnischen Sprache*, by Rosenplänter, and from 1840 onwards many valuable papers on Esthonian subjects were contributed to the *Verhandlungen der gelehrten esthnischen Gesellschaft zu Dorpat*. F. J. Wiedemann, who laboured indefatigably in the registration and preservation of matters connected with Esthonian language and lore, published an *Esthnisch-deutsches Wörterbuch* (1865; 2nd ed. by Hurt, 1891, &c.), and in 1903 there appeared at Reval a *Deutsch-esthnisches Wörterbuch*, by Ploompun and Kann.

The Esthonians first appear in history as a warlike and predatory race, the terror of the Baltic seamen in consequence of their piracies. More than one of the Danish kings made serious attempts to subdue them. Canute VI. invaded their country (1194–1196) and forced baptism upon many of them, but no sooner did his war-ships disappear than they reverted to their former heathenism. In 1219 Waldemar II. undertook a more formidable crusade against them, in the course of which he founded the town and episcopal see of Reval. By his efforts the northern portion of the race were made submissive to the Danish crown; but, though conquered, they were by no means subdued, and were incessantly in revolt, until, after a great rebellion in 1343, Waldemar IV. Atterdag sold for 19,000 marks his portion of Esthonia in 1346, to the order of the Knights of the Sword. These German crusaders had already, after a quarter of a century's fighting, in 1224 gained possession of the regions inhabited by the southern portion of the race, that is those now included in Livonia. From that time for nearly six hundred years or more the Esthonians were practically reduced to a state of serfdom to the German landowners. In 1521 the nobles and cities of Esthonia voluntarily placed themselves under the protection of the crown of Sweden; but after the wars of Charles XII., Esthonia was formally ceded to his victorious rival, Peter the Great, by the peace of Nystad (1721). Serfdom was abolished in 1817 by Tsar Alexander I.; but the condition of the peasants was so little improved that they rose in open revolt in 1859. Since 1878, however, a vast change for the better has been effected in their economic position (see above). The determining feature of their recent history has been the attempt made by the Russian government (since 1881) and the Orthodox Greek Church (since 1883) to russify and convert the inhabitants of the province, Germans and Esths alike, by enforcing the use of Russian in the schools and by harsh and repressive measures aimed at their native language.

See Merkel, *Die freien Letten und Esthen* (1820); Parrot, *Versuch einer Entwickelung der Sprache, Abstammung, &c., der Liwen, Lätten, Eesten* (1839); F. Kruse, *Urgeschichte des esthnischen Volksstammes* (1846); Wiedemann, *Grammatik der esthnischen Sprache* (1875), and *Aus dem innern und äussern Leben der Esthen* (1876); Köppen, *Die Bewohner Esthlands* (1847); F. Müller, *Beiträge zur Orographie und Hydrographie von Esthland* (1869–1871); Bunge, *Das Herzogthum Esthland unter den Königen von Dänemark* (1877); and Seraphim, *Geschichte Liv-, Est-, und Kurlands* (2nd ed., 1897) and various papers in the *Finnisch-Ugrische Forschungen*.

(P. A. K.; J. T. Be.; C. El.)

ESTIENNE (or Étienne; the French form of the name; anglicized to Stephens, and latinized to Stephanus), a French family of scholars and printers.

The founder of the race was Henri Estienne (d. 1520), the scion of a noble family of Provence, who came to Paris in 1502, and soon afterwards set up a printing establishment at the top of the rue Saint-Jean de Beauvais, on the hill of Saint-Geneviève opposite the law school. He died in 1520, and, his three sons being minors, the business was carried on by his foreman Simon de Colines, who in 1521 married his widow.

Robert Estienne (1503–1559) was Henri's second son. After his father's death he acted as assistant to his stepfather, and in this capacity superintended the printing of a Latin edition of the New Testament in 16mo (1523). Some slight alterations which he had introduced into the text brought upon him the censures of the faculty of theology. It was the first of a long series of disputes between him and that body. It appears that he had intimate relations with the new Evangelical preachers almost from the beginning of the movement, and that soon after this time he definitely joined the Reformed Church. In 1526 he entered into possession of his father's printing establishment, and adopted as his device the celebrated olive-tree (a reminiscence doubtless of his grandmother's family of Montolivet), with the motto from the epistle to the Romans (xi. 20), *Noli altum sapere*, sometimes with the addition *sed time*. In 1528 he married Perrette, a daughter of the scholar and printer Josse Bade (Jodocus Badius), and in the same year he published his first Latin Bible, an edition in folio, upon which he had been at work for the last four years. In 1532 appeared his *Thesaurus linguae Latinae*, a dictionary of Latin words and phrases, upon which for two years he had toiled incessantly, with no other assistance than that of Thierry of Beauvais. A second edition, greatly enlarged and improved, appeared in 1536, and a third, still further improved, in 3 vols. folio, in 1543. Though the *Thesaurus* is now superseded, its merits must not be forgotten. It was vastly superior to anything of the kind that had appeared before; it formed the basis of future labours, and even as late as 1734 was considered worthy of being re-edited. In 1539 Robert was appointed king's printer for Hebrew and Latin, an office to which, after the death of Conrad Neobar in 1540, he united that of king's printer for Greek. In 1541 he was entrusted by Francis I. with the task of procuring from Claude Garamond, the engraver and type-founder, three sets of Greek type for the royal press. The middle size were the first ready, and with these Robert printed the *editio princeps* of the *Ecclesiasticae Historiae* of Eusebius and others (1544). The smallest size were first used for the 16mo edition of the New Testament known as the *O mirificam* (1546), while with the largest size was printed the magnificent folio of 1550. This edition involved the printer in fresh disputes with the faculty of theology, and towards the end of the following year he left his native town for ever, and took refuge at Geneva, where he published in 1552 a caustic and effective answer to his persecutors under the title *Ad censuras theologorum Parisiensium, quibus Biblia a R. Stephano, Typographo Regio, ex usa calumniose notarunt, eiusdem R. S. responsio*. A French translation, which is remarkable for the excellence of its style, was published by him in the same year (printed in Rénouard's *Annales de l'imprimerie des Estienne*). At Geneva Robert proved himself an ardent partisan of Calvin, several of whose works he published. He died there on the 7th of September 1559.

It is by his work in connexion with the Bible, and especially as an editor of the New Testament, that he is on the whole best known. The text of his New Testament of 1550, either in its original form or in such slightly modified form as it assumed in the Elzevir text of 1634, remains to this day the traditional text. But this is due rather to its typographical beauty than to any critical merit. The readings of the fifteen MSS. which Robert's son Henri had collated for the purpose were merely introduced into the margin. The text was still almost exactly that of Erasmus. It was, however, the first edition ever published with a critical apparatus of any sort. Of the whole Bible Robert printed eleven editions—eight in Latin, two in Hebrew and one in French; while of the New Testament alone he printed twelve—five in Greek, five in Latin and two in French. In the Greek New Testament of 1551 (printed at Geneva) the present division into verses was introduced for the first time. The *editiones principes* which issued from Robert's press were eight in number, viz. *Eusebius*, including the *Praeparatio evangelica* and the *Demonstratio evangelica* as well as the *Historia ecclesiastica* already mentioned (1544–1546), *Moschopulus* (1545), *Dionysius of Halicarnassus* (February 1547), *Alexander Trallianus* (January 1548), *Dio Cassius* (January 1548), *Justin Martyr* (1551), *Xiphilinus* (1551), *Appian* (1551), the last being completed, after Robert's departure from Paris, by his brother Charles, and appearing under his name. These editions, all in folio, except the *Moschopulus*, which is in 4to, are unrivalled for beauty. Robert also printed numerous editions of Latin classics, of which perhaps the folio *Virgil* of 1532 is the most noteworthy, and a large quantity of Latin grammars and other educational works, many of which were written by Maturin Cordier, his friend and co-worker in the cause of humanism.

Charles Estienne (1504 or 1505–1564), the third son of Henri, was, like his brother Robert, a man of considerable learning. After the usual humanistic training he studied medicine, and took his doctor's degree at Paris. He was for a time tutor to Jean Antoine de Baïf, the future poet. In 1551, when Robert Estienne left Paris for Geneva, Charles, who had remained a Catholic, took charge of his printing establishment, and in the same year was appointed king's printer. In 1561 he became bankrupt, and he is said to have died in a debtors' prison.

His principal works are *Praedium Rusticum* (1554), a collection of tracts which he had compiled from ancient writers on various branches of agriculture, and which continued to be a favourite book down to the end of the 17th century; *Dictionarium historicum ac poëticum* (1553), the first French encyclopaedia; *Thesaurus Ciceronianus* (1557), and *De dissectione partium corporis humani libri tres*, with well-drawn woodcuts (1548). He also published a translation of an Italian comedy, *Gli Ingannati*, under the title of *Le Sacrifice* (1543; republished as *Les Abusez*, 1549), which had some influence on the development of French comedy; and *Paradoxes* (1553), an imitation of the *Paradossi* of Ortensio Landi.

Henri Estienne (1531–1598), sometimes called Henri II., was the eldest son of Robert. In the preface to his edition of Aulus Gellius (1585), addressed to his son Paul, he gives an interesting account of his father's household, in which, owing to the various nationalities of those who were employed on the press, Latin was used as a common language. Henri thus picked up Latin as a child, but by his own request he was allowed to learn Greek as a serious study before Latin. At the age of fifteen he become a pupil of Pierre Danès, at that time the first Greek scholar in France. Two years later he began to attend the lectures of Jacques Toussain, one of the royal professors of Greek, and in the same year (1545) was employed by his father to collate a MS. of Dionysius of Halicarnassus. In 1547 he went to Italy, where he spent three years in hunting for and collating MSS. and in intercourse with learned men. In 1550 he visited England, where he was favourably received by Edward VI., and then Flanders, where he learnt Spanish. In 1551 he joined his father at Geneva, which henceforth became his home. In 1554 he gave to the world, as the firstfruits of his researches, two first editions, viz. a tract of Dionysius of Halicarnassus and the so-called "Anacreon." In 1556 he discovered at Rome ten new books (xi.-xx.) of Diodorus Siculus. In 1557 he issued from the press which in the previous year he had set up at Geneva three first editions, viz. *Athenagoras*, *Maximus Tyrius*, and some fragments of Greek historians, including Appian's ’Αννιβαλική, and ’Ιβηρική and an edition of Aeschylus, in which for the first time the *Agamemnon* was printed in entirety and as a separate play. In 1559 he printed a Latin translation from his own pen of Sextus Empiricus, and an edition of Diodorus Siculus with the new books. His father dying in the same year, he became under his will owner of his press, subject, however, to the condition of keeping it at Geneva. In 1566 he published his best-known French work, the *Apologie pour Hérodote*, or, as he himself called it, *L'Introduction au traité de la conformité des merveilles anciennes avec les modernes ou Traité préparatif à l'Apologie pour Hérodote*. Some passages being considered objectionable by the Geneva consistory, he was compelled to cancel the pages containing them. The book became highly popular, and within sixteen years twelve editions were printed. In 1572 he published the great work upon which he had been labouring for many years, the *Thesaurus Graecae linguae*, in 5 vols. fol. The publication in 1578 of his *Deux Dialogues du nouveau françois italianizé* brought him into a fresh dispute with the consistory. To avoid their censure he went to Paris, and resided at the French court for a year. On his return to Geneva he was summoned before the consistory, and, proving contumacious, was imprisoned for a week. From this time his life became more and more of a nomad one. He is to be found at Basel, Heidelberg, Vienna, Pest, everywhere but at Geneva, these journeys being undertaken partly in the hope of procuring patrons and purchasers, for the large sums which he had spent on such publications as the *Thesaurus* and the *Plato* of 1578 had almost ruined him. His press stood nearly at a standstill. A few editions of classical authors were brought out, but each successive one showed a falling off. Such value as the later ones had was chiefly due to the notes furnished by Casaubon, who in 1586 had married his daughter Florence. His last years were marked by ever-increasing infirmity of mind and temper. In 1597 he left Geneva for the last time. After visiting Montpellier, where Casaubon was now professor, he started for Paris, but was seized with sudden illness at Lyons, and died there at the end of January 1598.

Few men have ever served the cause of learning more devotedly. For over thirty years the amount which he produced, whether as printer, editor or original writer, was enormous. The productions of his press, though printed with the same beautiful type as his father's books, are, owing to the poorness of the paper and ink, inferior to them in general beauty. The best, perhaps, from a typographical point of view, are the *Poëtae Graeci principes* (folio, 1566), the *Plutarch* (13 vols. 8vo, 1572), and the *Plato* (3 vols. folio, 1578). It was rather his scholarship which gave value to his editions. He was not only his own press-corrector but his own editor. Though by the latter half of the 16th century nearly all the important Greek and Latin authors that we now possess had been published, his untiring activity still found some gleanings. Eighteen first editions of Greek authors and one of a Latin author are due to his press. The most important have been already mentioned. Henri's reputation as a scholar and editor has increased of late years. His familiarity with the Greek language has always been admitted to have been quite exceptional; but he has been accused of want of taste and judgment, of carelessness and rashness. Special censure has been passed on his *Plutarch*, in which he is said to have introduced conjectures of his own into the text, while pretending to have derived them from MS. authority. But a late editor, Sintenis, has shown that, though like all the other editors of his day he did not give references to his authorities, every one of his supposed conjectures can be traced to some MS. Whatever may be said as to his taste or his judgment, it seems that he was both careful and scrupulous, and that he only resorted to conjecture when authority failed him. And, whatever the merit of his conjectures, he was at any rate the first to show what conjecture could do towards restoring a hopelessly corrupt passage. The work, however, on which his fame as a scholar is most surely based is the *Thesaurus Graecae linguae*. After making due allowance for the fact that considerable materials for the work had been already collected by his father, and that he received considerable assistance from the German scholar Sylburg, he is still entitled to the very highest praise as the producer of a work which was of the greatest service to scholarship and which in those early days of Greek learning could have been produced by no one but a giant. Two editions of the *Thesaurus* were published in the 19th century—at London by Valpy (1815–1825) and at Paris by Didot (1831–1863).

It was one of Henri Estienne's great merits that, unlike nearly all the French scholars who preceded him, he did not neglect his own language. In the *Traité de la conformité du langage françois avec le Grec* (published in 1565, but without date; ed. L. Feugère, 1850), French is asserted to have, among modern languages, the most affinity with Greek, the first of all languages. *Deux Dialogues du nouveau françois italianizé* (Geneva, 1578; ed. P. Ristelhuber, 2 vols., 1885) was directed against the fashion prevailing in the court of Catherine de' Medici of using Italian words and forms. The *Project du livre intitulé de la Précellence du langage françois* (Paris, 1579; ed. E. Huguet, 1896) treats of the superiority of French to Italian. An interesting feature of the *Précellence* is the account of French proverbs, and, Henry III. having expressed some doubts as to the genuineness of some of them, Henri Estienne published, in 1594, *Les Premices ou le I. livre des Proverbes epigrammatizez* (never reprinted and very rare).

Finally, there remains the *Apologie pour Hérodote*, his most famous work. The ostensible object of the book is to show that the strange stories in Herodotus may be paralleled by equally strange ones of modern times. Virtually it is a bitter satire on the writer's age, especially on the Roman Church. Put together without any method, its extreme desultoriness makes it difficult to read continuously, but the numerous stories, collected partly from various literary sources, notably from the preachers Menot and Maillard, partly from the writer's own multifarious experience, with which it is packed, make it an interesting commentary on the manners and fashions of the time. But satire, to be effective, should be either humorous or righteously indignant, and, while such humour as there is in the *Apologie* is decidedly heavy, the writer's indignation is generally forgotten in his evident relish for scandal. The style is, after all, its chief merit. Though it bears evident traces of hurry, it is, like that of all Henri Estienne's French writings, clear, easy and vigorous, uniting the directness and sensuousness of the older writers with a suppleness and logical precision which at this time were almost new elements in French prose. An edition of the *Apologie* has recently been published by Liseux (ed. Ristelhuber, 2 vols., 1879), after one of the only two copies of the original uncancelled edition that are known to exist. The very remarkable political pamphlet entitled *Discours merveilleux de la vie et actions et déportemens de Catherine de Medicis*, which appeared in 1574, has been ascribed to Henri Estienne, but the evidence both internal and external is conclusive against his being the author of it. Of his Latin writings the most worthy of notice are the *De Latinitate falso suspecta* (1576), the *Pseudo-Cicero* (1577) and the *Nizoliodidascalus* (1578), all three written against the Ciceronians, and the *Francofordiense Emporium* (1574), a panegyric on the Frankfort fair (reprinted with a French translation by Liseux, 1875). He also wrote a large quantity of indifferent Latin verses, including a long poem entitled *Musa monitrix Principum* (Basel, 1590).

The primary authorities for an account of the Estiennes are their own works. In the garrulous and egotistical prefaces which Henri was in the habit of prefixing to his editions will be found many scattered biographical details. Twenty-seven letters from Henri to John Crato of Crafftheim (ed. F. Passow, 1830) have been printed, and there is one of Robert's in Herminjard's *Correspondence des Réformateurs dans de pays de langue française* (9 vols. published 1866–1897), while a few other contemporary references to him will be found in the same work. The secondary authorities are Janssen van Almeloveen, *De vitis Stephanorum* (Amsterdam, 1683); Maittaire, *Stephanorum historia* (London, 1709); A. A. Rénouard, *Annales de l'imprimerie des Estienne* (2nd ed., Paris, 1843); the article on Estienne by A. F. Didot in the *Nouv. Biog. gén.*; Mark Pattison, *Essays*, i. 67 ff. (1889); L. Clément, *Henri Estienne et son œuvre française* (Paris, 1899). There is a good account of Henri's *Thesaurus* in the *Quart. Rev.* for January 1820, written by Bishop Blomfield. (A. A. T.)

ESTON, an urban district in the Cleveland parliamentary division of the North Riding of Yorkshire, England, 4 m. S.E. of Middlesbrough, on a branch of the North Eastern railway. Pop. (1901) 11,199. This is one of the principal centres from which the great ironstone deposits of the Cleveland Hills are worked, and there are extensive blast-furnaces, iron-foundries and steam sawing-mills in the district. Immediately W. of Eston lies the urban district of Ormesby (pop. 9482), and the whole district is densely populated (see MIDDLESBROUGH). Marton, west of Ormesby, was the birthplace of Captain Cook (1728). Numerous early earthworks fringe the hills to the south.

ESTOPPEL (from O. Fr. *estopper*, to stop, bar; *estoupe*, mod. *étoupe*, a plug of tow; Lat. *stuppa*), a rule in the law of evidence by which a party in litigation is prohibited from asserting or denying something, when such assertion or denial would be inconsistent with his own previous statements or conduct. Estoppel is said to arise in three ways—(1) by record or judgment, (2) by deed, and (3) by matter *in pais* or conduct. (1) Where a cause of action has been tried and final judgment has been pronounced, the judgment is conclusive—either party attempting to renew the litigation by a new action would be estopped by the judgment. "Every judgment is conclusive proof as against parties and privies, of facts directly in issue in the case, actually decided by the court, and appearing from the judgment itself to be the ground on which it was based."—Stephen's *Digest of the Law of Evidence*, Art. 41. (2) It is one of the privileges of *deeds* as distinguished from simple contracts that they operate by way of estoppel. "A man shall always be estopped by his own deed, or not permitted to aver or prove anything in contradiction to what he has once so solemnly and deliberately avowed" (Blackstone, 2 *Com.* 295); *e.g.* where a bond recited that the defendants were authorized by acts of parliament to borrow money, and that under such authority they had borrowed money from a certain person, they were estopped from setting up as a defence that they did not in fact so borrow money, as stated by their deed. (3) Estoppel by conduct, or, as it is still sometimes called, estoppel by matter *in pais*, is the most important head. The rule practically comes to this that, when a person in his dealings with others has acted so as to induce them to believe a thing to be true and to act on such belief, he may not in any proceeding between himself and them deny the thing to be true; *e.g.* a partner retiring from a firm without giving notice to the customers, cannot, as against a customer having no knowledge of his retirement, deny that he is a partner.

As between landlord and tenant the principle operates to prevent the denial by the tenant of the landlord's title. So if a person comes upon land by the licence of the person in possession, he cannot deny that the licenser had a title to the possession at the time the licence was given. Again, if a man accepts a bill of exchange he may not deny the signature or the capacity of the drawer. So a person receiving goods as baillee from another cannot deny the title of that other to the goods at the time they were entrusted to him.

Estoppel of whatever kind is subject to one general rule, that it cannot override the law of the land; for example, a corporation would not be estopped as to acts which are *ultra vires*.

See L. F. Everest and E. Strode, *The Law of Estoppel*; M. Cababé, *Principles of Estoppel*.

ESTOUTEVILLE, GUILLAUME D' (1403–1483), French ecclesiastic, was bishop of Angers, of Digne, of Porto and Santa Rufina, of Ostia and Velletri, archbishop of Rouen, prior of Saint Martin des Champs, abbot of Mont St Michel, of St Ouen at Rouen, and of Montebourg. He was sent to France as legate by Pope Nicholas V. to make peace between Charles VII. and England (1451), and undertook, *ex officio*, the revision of the trial of Joan of Arc; he afterwards reformed the statutes of the university of Paris. He then went to preside over the assembly of clergy which met at Bourges to discuss the observation of the Pragmatic Sanction (see BASEL, COUNCIL OF), finally returning to Rome, where he passed almost all the rest of his life. He was a great builder, Rouen, Mont St Michel, Pontoise and Gaillon owing many noble buildings to his initiative.

ESTOVERS (from the O. Fr. *estover*, *estovoir*, a verb used as a substantive in the sense of that which is necessary; the word is of disputed origin; it has been referred to the Lat. *stare*, to stand, or *studere*, to desire), a term, in English law, for the wood which a tenant for life or years may take from the land he holds for repair of his house, the implements of husbandry, and the hedges and fences, and for firewood. The O. Eng. word for estover was *bote* or *boot* (literally meaning "good," "profit," the same word as seen in "better"). The various kinds of estovers were thus known as house-bote, cart or plough-bote, hedge or hay-bote, and fire-bote respectively. These rights may, of course, be restricted by express covenants. Copyholders have similar rights over the land they occupy and over the waste of the manor, in which case the rights are known as "Commons of estovers." (See COMMONS.)

ESTRADA, LA, a town of north-western Spain, in the province of Pontevedra, 15 m. S. by E. of Santiago de Compostela. Pop. (1900) 23,916. La Estrada is the chief town of a densely-populated mountainous district; its industries are agriculture, stock-breeding, and the manufacture of linen and woollen cloth. Timber from the mountain forests is conveyed from La Estrada to the river Ulla, 4 m. N., and thence floated down to the seaports on Arosa Bay. The nearest railway-station is Requeijo, 7 m. W., on the Pontevedra-Santiago railway. There are mineral springs at La Estrada and at Caldas de Reyes, 11 m. W.S.W.

ESTRADE, a French architectural term for a raised platform (see DAIS). In the Levant the estrade of a divan is called Sopha (Blondel), from which comes our "sofa."

ESTRADES, GODEFROI, COMTE D' (1607–1686), French diplomatist and marshal, was born at Agen. He was the son of François d'Estrades (d. 1653), a partisan of Henry IV., and brother of Jean d'Estrades, bishop of Condom. He became a page to Louis XIII., and at the age of nineteen was sent on a mission to Maurice of Holland. In 1646 he was named ambassador extraordinary to Holland, and took part in the conferences at Münster. Sent in 1661 to England, he obtained in 1662 the restitution of Dunkirk. In 1667 he negotiated the treaty of Breda with the king of Denmark, and in 1678 the treaty of Nijmwegen, which ended the war with Holland. Independently of these diplomatic missions, he took part in the principal campaigns of Louis XIV., in Italy (1648), in Catalonia (1655), in Holland (1672); and was created marshal of France in 1675. He left *Lettres, mémoires et négociations en qualité d'ambassadeur en Hollande depuis 1663 jusqu' en 1668*, of which the first edition in 1709 was followed by a nine-volume edition (London (the Hague), 1743).

Of the sons of Godefroi d'Estrades, Jean François d'Estrades was ambassador to Venice and Piedmont; Louis, marquis d'Estrades (d. 1711), succeeded his father as governor of Dunkirk, and was the father of Godefroi Louis, comte d'Estrades, lieutenant-general, who was killed at the siege of Belgrade, 1717.

See Felix Salomon, *Frankreichs Beziehungen zu dem Scottischen Aufstand* (1637–1640), containing an excursus on the falsification of the letters of the comte d'Estrades; Philippe Lauzun, *Le Maréchal d'Estrades* (Agen, 1896).

ESTREAT (O. Fr. *estrait*, Lat. *extracta*), originally, a true copy or duplicate of some original writing or record; now used only with reference to the enforcement of a forfeited recognizance. At one time it was the practice to extract and certify into the exchequer copies of entries in court rolls which contained provisions or orders in favour of the treasury, hence the estreating of a recognizance was the taking out from among the other records of the court in which it was filed and sending it to the exchequer to be enforced, or sending it to the sheriff to be levied by him, and then returned by the clerk of the peace to the lords of the treasury. (See RECOGNIZANCE.)

ESTRÉES, GABRIELLE D' (1573–1599), mistress of Henry IV. of France, was the daughter of Antoine d'Estrées, marquis of Cœuvres, and Françoise Babou de la Bourdaisière. Henry IV., who in November 1590 stayed at the castle of Cœuvres, became violently enamoured of her. Her father, anxious to save his daughter from so perilous an entanglement, married her to Nicholas d'Amerval, seigneur de Liancourt, but the union proved unhappy, and in December 1592, Gabrielle, whose affection for the king was sincere, became his mistress. She lived with him from December 1592 onwards, and bore him several children, who were recognized and legitimized by him. She possessed the king's entire confidence; he willingly listened to her advice, and created her marchioness of Monceaux, duchess of Beaufort (1597) and Étampes (1598), a peeress of France. The king even proposed to marry her in the event of the success of his suit for the nullification by the Holy See of his marriage with Margaret of Valois; but before the question was settled Gabrielle died, on the 10th of April 1599. Poison was of course suspected; but her death was really caused by puerperal convulsions (*eclampsia*).

See Adrien Desclozeaux, *Gabrielle d'Estrées, Marquise de Monceaux, &c.* (Paris, 1889).

ESTREMADURA, or EXTREMADURA, an ancient territorial division of central and western Portugal, and of western Spain; comprising the modern districts of Leiria, Santarem and Lisbon, in Portugal, and the modern provinces of Badajoz and Cáceres in Spain. Pop. (1900) 2,095,818; area, 23,055 sq. m. The name of Estremadura appears to be of early Romance or Late Latin origin, and probably was applied to all the far western lands (*extrema ora*) bordering upon the lower Tagus, as far as the Atlantic Ocean. It is thus equivalent to *Land's End*, or *Finistère*. In popular speech it is more commonly used than the names of the modern divisions mentioned above, which were created in the 19th century. As, however, there are many racial, economic and historic differences between Portuguese and Spanish Estremadura, the two provinces are separately described below.

1. Portuguese Estremadura is bounded on the N. by Beira, E. and S. by Alemtejo, and W. by the Atlantic Ocean. Pop. (1900) 1,221,418; area, 6937 sq. m. The greatest length of the province, from N. to S., is 165 m.; its greatest breadth, from E. to W., is 72 m. The general uniformity of the coast-line is broken by the broad and deep estuaries of the Tagus and the Sado, and by the four conspicuous promontories of Cape Carvoeiro, Cape da Roca, Cape Espichel and Cape de Sines. The Tagus is the great navigable waterway of Portuguese Estremadura, flowing from north-east to south-west, and fed by many minor tributaries, notably the Zezere on the right and the Zatas on the left. It divides the country into two nearly equal portions, wholly dissimilar in surface and character. South of the Tagus the land is almost everywhere low, flat and monotonous, while in several places it is rendered unhealthy by undrained marshes. The

Sado, which issues into Setubal Bay, is the only important river of this region. North of the Tagus, and parallel with its right bank, extends the mountain chain which is known at its northern extremity as the Serra do Aire and, where it terminates above Cape da Roca, as the Serra da Cintra. This ridge, which is buttressed on all sides by lesser groups of hills, and includes part of the famous lines of Torres Vedras (*q.v.*), exceeds 2200 ft. in height, and constitutes the watershed between the right-hand tributaries of the Tagus and the Liz, Sizandro and other small rivers which flow into the Atlantic. On its seaward side, except for the line of sheer and lofty cliffs between Cape Carvoeiro and Cape da Roca, the country is mostly flat and sandy, with extensive heaths and pine forests; but along the fertile and well-cultivated right bank of the Tagus the river scenery, with its terraced hills of vines, olives and fruit trees, often resembles that of the Rhine in Germany. The natural resources of Portuguese Estremadura, with its inhabitants, industries, commerce, communications, &c., are described under PORTUGAL; for on such matters there is little to be said of this central and most characteristic province which does not apply to the whole kingdom. Separate articles are also devoted to Lisbon, the capital, and Abrantes, Cintra, Leiria, Mafra, Santarem, Setubal, Thomar, Torres Novas and Torres Vedras, the other chief towns. The women of Peniche, a small fishing village on the promontory of Cape Carvoeiro, have long been celebrated throughout Portugal for their skill in the manufacture of fine laces.

2. Spanish Estremadura is bounded on the N. by Leon and Old Castile, E. by New Castile, S. by Andalusia, and W. by the Portuguese province of Beira and Alemtejo, which separate it from Portuguese Estremadura. Pop. (1900) 882,410; area, 16,118 sq. m. Spanish Estremadura consists of a tableland separated from Leon and Old Castile by the lofty Sierra de Gredos, the plateau of Béjar and the Sierra de Gata, which form an almost continuous barrier along the northern frontier, with its summits ranging from 6000 to more than 8500 ft. in altitude. On the south the comparatively low range of the Sierra Morena constitutes the frontier of Andalusia; on the east and west there is a still more gradual transition to the plateau of New Castile and the central plains of Portugal. The tableland of Spanish Estremadura is itself bisected from east to west by a line of mountains, the Sierras of San Pedro, Montanchez and Guadalupe (4000-6000 ft.), which separate its northern half, drained by the river Tagus, from its southern half, drained by the Guadiana. These two halves are respectively known as Alta or Upper Estremadura (the modern Cáceres), and Baja or Lower Estremadura (the modern Badajoz). The Tagus and Guadiana flow from east to west through a monotonous country, level or slightly undulating, often almost uninhabited, and covered with a thin growth of shrubs and grass. Perhaps the most characteristic feature of this tableland is the vast heaths of gum-cistus, which in spring colour the whole landscape with leagues of yellow blossom, and in summer change to a brown and arid wilderness.

The climate in summer is hot but not unhealthy, except in the swamps which occur along the Guadiana. The rainfall is scanty; dew, however, is abundant and the nights are cool. Although the high mountains are covered with snow in November, the winters are not usually severe. The soil is naturally fertile, but drought, floods and locusts render agriculture difficult, and sheep-farming is the most important of Estremaduran industries. (See SPAIN: *Agriculture.*) In the 19th century, however, this industry lost much of its former importance owing to foreign competition.

Immense herds of swine are bred and constitute a great source of support to the inhabitants, not only supplying them with food, but also forming a great article of export to other provinces—the pork, bacon and hams being in high esteem. The beech, oak and chestnut woods afford an abundance of food for swine, and there are numerous plantations of olive, cork and fruit trees, but a far greater area of forest has been destroyed. For an account of commerce, mining, communications, &c., in Spanish Estremadura, with a list of the chief towns, see CÁCERES and BADAJOZ. In character and physical type, the people of this region are less easily classified than those of other Spanish provinces. They lack the endurance and energy of the Galicians, the independent and enterprising spirit of the Asturians, Basques and Catalans, the culture of the Castilians and Andalusians. Their failure to develop a distinctive local type of character and civilization is perhaps due to the adverse economic history of their country. The two great waterways which form the natural outlet for Estremaduran commerce flow to the Atlantic through a foreign and, for centuries, a hostile territory. Like other parts of Spain, Estremadura suffered severely from the expulsion of the Jews and Moors (1492–1610), while the compensating treasure, derived during the same period from Spanish America, never reached a province so remote at once from the sea and from the chief centres of national life. Although Cortes (1485–1547), the conqueror of Mexico and Pizarro (*c.* 1471–1541), the conqueror of Peru, were both born in Estremadura, their exploits, far from bringing prosperity to their native province, only encouraged the emigration of its best inhabitants. Heavy taxation and harsh land-laws prevented any recovery, while the felling of the forests reduced many fertile areas to waste land, and rendered worse a climate already unfavourable to agriculture. Few countries leave upon the mind of the traveller a deeper impression of hopeless poverty.

ESTREMOZ, a town of Portugal, in the district of Evora, formerly included in the province of Alemtejo; 104 m. by rail E. of Lisbon, on the Casa Branca-Evora-Elvas railway. Pop. (1900) 7920. Estremoz is built at the base of a hill crowned by a large dismantled citadel; its fortifications, which in the 17th century accommodated 20,000 troops and rendered the town one of the principal defences of the frontier, are now obsolete. There are marble quarries in the neighbourhood, and the Estremoz *bilhas*, red earthenware jars, are used throughout Portugal as water-holders and exported to Spain. At Ameixial (1188) and Montes Claros, near Estremoz, the Spanish were severely defeated by the Portuguese in 1663 and 1665. Villa Viçosa (3841), 10 m. S.E., is a town of pre-Roman origin, containing a royal palace. The altars with Latin inscriptions to the Iberian god Endovellicus, found at Villa Viçosa, are preserved in the museum of the Royal Academy of Sciences, Lisbon.

ESTUARY (from the Lat. *aestuarium*, a place reached by *aestus*, the tide), an arm of the sea narrowing inwards at the mouth of a river where sea and fresh water meet and are mixed, *i.e.* the tidal portion of a river's mouth. Structurally the estuary may represent the long-continued action of river erosion and tidal erosion confined to a narrow channel, most effective where most concentrated, or an estuary may be the drowned portion of the lower part of a river-valley. In a map of Britain showing sea-depths it will be observed that under the Severn estuary the sea deepens in a number of steps descending by concentric V's that become blunter towards deep water until the last is a mere indentation pointing towards the long narrow termination of the present estuary. In this and in similar cases the progress of the estuary is indicated upon what is now the continental shelf. The chief interest in estuarine conditions is the mingling of sea and fresh water. Where, as in the Severn and the Thames, the fresh water meets the sea gradually the water is mixed, and there is very little change in salinity at high tide. The fresh water flows over the salt water and there is a continuous rapid change in salinity towards the sea, for the currents sweeping in and out mix the water constantly. Where the river brings down a great quantity of fresh water in a narrow channel, the change of salinity at high and low water is very marked. "When, however, the inlet is very large compared with the river, and there is no bar at the opening, the estuarine character is only shown at the upper end. In the Firth of Forth, for example, the landward half is an estuary, but in the seaward half the water has become more thoroughly mixed, the salinity is almost uniform from surface to bottom, and increases very gradually towards the sea. The river-water meets the sea diffused uniformly through a deep mass of water scarcely fresher than the sea itself, so that the two mix uniformly, and the sea becomes slightly freshened throughout its whole depth for many miles from land" (H. R. Mill, *Realm of Nature*, 1897).

ESZTERGOM (Ger. *Gran*; Lat. *Strigonium*), a town of Hungary, capital of the county of the same name, 36 m. N.W. of Budapest by rail. Pop. (1900) 16,948, mostly Magyars and Roman Catholics. It is situated on the right bank of the Danube, nearly opposite the confluence of the Gran, and is divided into the town proper and three suburbs. The town is the residence of the primate of Hungary, and its cathedral, built in 1821–1870, after the model of St Peter's at Rome, is one of the finest and largest in the country. It is picturesquely built on an elevated and commanding position, 215 ft. above the Danube, and its dome, visible from a long distance, is 260 ft. high, and has a diameter of 52 ft. The interior is very richly decorated, notably with fine frescoes, and its treasury and fine library of over 60,000 volumes are famous. Besides several other churches and two monastic houses, the principal buildings include the handsome palace of the primate, erected in 1883; the archiepiscopal library, with valuable incunabula and old MSS.; the seminary for the education of Roman Catholic priests; the residences of the chapter; and the town-hall. The population is chiefly employed in cloth-weaving, wine-making and agricultural pursuits. An iron bridge, 1664 ft. long, connects Esztergom with the market town of Párkány (pop. 2836) on the opposite bank of the Danube.

Esztergom is one of the oldest towns of Hungary, and is famous as the birthplace of St Stephen, the first prince crowned "apostolic king" of Hungary. During the early times of the Hungarian monarchy it was the most important mercantile centre in the country, and it was the meeting-place of the diets of 1016, 1111, 1114 and 1256. It was almost completely destroyed by Tatar hordes in 1241, but was rebuilt and fortified by King Béla IV. In 1543 it fell into the hands of the Turks, from whom it was recovered, in 1595, by Carl von Mansfeld. In 1604 it reverted to the Turks, who held it till 1683, when it was regained by the united forces of John Sobieski, king of Poland, and Prince Charles of Lorraine. It was created an archbishopric in 1001. During the Turkish occupation of the town the archbishopric was removed to Tyrnau, while the archbishop himself had his residence in Pressburg. Both returned to Esztergom in 1820. In 1708 it was declared a free city by Joseph I. On the 13th of April 1818 it was partly destroyed by fire.

For numerous authorities on the see and cathedral of Esztergom see V. Chevalier, *Répertoire des sources. Topo-bibliogr.* s.v. "Gran." Of these may be mentioned especially F. Knauz, *Monumenta Ecclesiae Strigoniensis* (3 vols., Eszterg, 1874); Joseph Dankó, *Geschichtliches . . . aus dem Graner Domschatz* (Gran, 1880).

ÉTAGÈRE, a piece of light furniture very similar to the English what-not, which was extensively made in France during the latter part of the 18th century. As the name implies, it consists of a series of stages or shelves for the reception of ornaments or other small articles. Like the what-not it was very often cornerwise in shape, and the best Louis XVI. examples in exotic woods are exceedingly graceful and elegant.

ETAH, a town and district of British India, in the Agra division of the United Provinces. The town is situated on the Grand Trunk road. Pop. (1901) 8796. The district has an area of 1737 sq. m. The district consists for the most part of an elevated alluvial plateau, dipping down on its eastern slope into the valley of the Ganges. The uplands are irrigated by the Ganges canal. Between the modern bed of the Ganges and its ancient channel lies a belt of fertile land, covered with a rich deposit of silt, and abundantly supplied with natural moisture. A long line of swamps and hollows still marks the former course of the river; and above it rises abruptly the original cliff which now forms the terrace of the upland plain. The Kali Nadi, a small stream flowing in a deep and narrow gorge, passes through the centre of the district, and affords an outlet for the surface drainage. Etah was at an early date the seat of a primitive Aryan civilization, and the surrounding country is mentioned by Hsüan Tsang, the Chinese Buddhist pilgrim of the 7th century A.D., as rich in temples and monasteries. But after the bloody repression of Buddhism before the 8th century, the district seems to have fallen once more into the hands of aboriginal tribes, from whom it was wrested a second time by Rajputs during the course of their great migration eastward. With the rest of upper India it passed under the sway of Mahmud of Ghazni in 1017, and thenceforth followed the fortunes of the Mahommedan empire. At the end of the 18th century it formed part of the territory over which the wazir of Oudh had made himself ruler, and it came into the possession of the British government in 1801, under the treaty of Lucknow. During the mutiny of 1857 it was the scene of serious disturbances, coupled with the usual anarchic quarrels among the native princes. In 1901 the population was 863,948, showing an increase of 23% in the decade due to the extension of canal irrigation. It is traversed by a branch of the Rajputana railway from Agra to Cawnpore, with stations at Kasganj and Soron, which are the two largest towns. It has several printing presses, indigo factories, and factories for pressing cotton, and there is a considerable agricultural export trade.

ÉTAMPES, ANNE DE PISSELEU D'HEILLY, Duchesse d' (1508–*c.* 1580), mistress of Francis I. of France, daughter of Guillaume de Pisseleu, sieur d'Heilly, a nobleman of Picardy. She came to court before 1522, and was one of the maids of honour of Louise of Savoy. Francis I. made her his mistress, probably on his return from his captivity at Madrid (1526), and soon gave up Madame de Châteaubriant for her. Anne was sprightly, pretty, witty and cultured, and succeeded in keeping the favour of the king till the end of the reign (1547). The liaison received some official recognition; when Queen Eleanor entered Paris (1530), the king and Anne occupied the same window. In 1533 Francis gave her in marriage to Jean de Brosse, whom he created duc d'Étampes. The influence of the duchesse d'Étampes, especially in the last years of the reign, was considerable. She upheld Admiral Chabot against the constable de Montmorency, who was supported by her rival, Diane de Poitiers, the dauphin's mistress. She was a friend to new ideas, and co-operated with the king's sister, Marguerite d'Angoulême. She used her influence to elevate and enrich her family, her uncle, Antoine Sanguin (d. 1559), being made bishop of Orleans in 1535 and a cardinal in 1539.[1] The accusations made against her of having allowed herself to be won over by the emperor Charles V. and of playing the traitor in 1544 rest on no serious proof. After the death of Francis I. (1547) she was dismissed from the court by Diane de Poitiers, humiliated in every way, and died in obscurity much later, probably in the reign of Henry III.

See Paulin Paris, *Études sur François Ier* (Paris, 1885).

ÉTAMPES, a town of northern France, capital of an arrondissement in the department of Seine-et-Oise, on the Orléans railway, 35 m. S. by W. of Paris. Pop. (1906) 8720. Étampes is a long straggling town hemmed in between the railway on the north and the Chalouette on the south; the latter is a tributary of the Juine which waters the eastern outskirts of the town. A fine view of Étampes is obtained from the Tour Guinette, a ruined keep built by Louis VI. in the 12th century on an eminence on the other side of the railway. Notre-Dame du Fort, the chief church, dates from the 11th and 12th centuries; irregular in plan, it is remarkable for a fine Romanesque tower and spire, and for the crenellated wall which partly surrounds it. The interior contains ancient paintings and other artistic works. St Basile (12th and 16th centuries), which preserves a Romanesque doorway, and St Martin (12th and 13th centuries), with a leaning tower of the 16th century, are of less importance. The civil buildings offer little interest, but two houses named after Anne de Pisseleu (see above), mistress of Francis I., and Diane de Poitiers, mistress of Henry II., are graceful examples of Renaissance architecture. In the square there is a statue of the naturalist, Geoffroy Saint-Hilaire, who was born in Étampes. The subprefecture, a tribunal of first instance, and a communal college are among the public institutions of Étampes. Flour-milling, metal-founding, leather-dressing, printing and the manufacture of boots and shoes and hosiery are carried on; there are quarries of paving-stone, nurseries and market gardens in the vicinity, and the town has important markets for cereals and sheep.

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[1] The château of Meudon, belonging to the Sanguin family, was handed over to the duchesse d'Étampes in 1539. Sanguin was translated to Limoges in 1546, and became archbishop of Toulouse in 1550.

Étampes (Lat. *Stampae*) existed at the beginning of the 7th century and in the early middle ages belonged to the crown domain. During the middle ages it was the scene of several councils, the most notable of which took place in 1130 and resulted in the recognition of Innocent II. as the legitimate pope. In 1652, during the war of the Fronde it suffered severely at the hands of the royal troops under Turenne.

Lords, Counts and Dukes of Étampes.—The lordship of Étampes, in what is now the department of Seine et Oise in France, belonged to the royal domain, but was detached from it on several occasions in favour of princes, or kings' favourites. St Louis gave it to his mother Blanche of Castile, and then to his wife Marguerite of Provence. Louis, the brother of Philip the Fair, became lord of Étampes in 1317 and count in 1327; he was succeeded by his son and his grandson. Francis I. raised the countship of Étampes to the rank of a duchy for his mistress Anne de Pisseleu D'Heilly. The new duchy passed to Diane de Poitiers (1553), to Catherine of Lorraine, duchess of Montpensier (1578), to Marguerite of Valois (1582) and to Gabrielle d'Estrées (1598). The latter transmitted it to her son, César of Vendôme, and his descendants held it till 1712. It then passed by inheritance to the families of Bourbon-Conti and of Orleans.

ÉTAPLES, a town of northern France, in the department of Pas-de-Calais, on the right bank of the estuary of the Canche, 3 m. from the Straits of Dover, 17 m. S. of Boulogne by rail. Pop. (1906) 5136. Étaples has a small fishing and commercial port which enjoyed a certain importance during the middle ages. Boat-building is carried on. There is an old church with a statue of the Virgin much revered by the sailors. The Canche is crossed by a bridge over 1600 ft. in length. Le Touquet, in the midst of pine woods, and the neighbouring watering-place of Paris-Plage, 3½ m. W. of Étaples at the mouth of the estuary, are much frequented by English and French visitors for golf, tennis and bathing, and Étaples itself is a centre for artists. Antiquarian discoveries in the vicinity of Étaples have led to the conjecture that it occupies the site of the Gallo-Roman port of *Quentovicus*. In 1492 a treaty was signed here between Henry VII., king of England, and Charles VIII., king of France.

ETAWAH, a town and district of British India, in the Agra division of the United Provinces. The town is situated on the left bank of the Jumna, and has a station on the East Indian railway, 206 m. from Allahabad. Pop. (1901) 42,570. Deep fissures intersect the various quarters of the town, over which broad roads connect the higher portions by bridges and embankments. The Jama Masjid (Great Mosque) is the chief architectural ornament of Etawah. It was originally a Hindu temple, and was adapted to its present use by the Mahommedan conquerors. Several fine Hindu temples also stand about the mound on which are the ruins of the ancient fort. Etawah is now only the civil headquarters of the district, the military cantonment having been abandoned in 1861. Considerable trade is carried on by rail and river. The manufactures include cotton cloth, skin-bottles, combs and horn-ware and sweetmeats.

The District of Etawah has an area of 1691 sq. m. It forms a purely artificial administrative division, stretching across the level plain of the Doab, and beyond the valley of the Jumna, to the gorges of the Chambal, and the last rocky outliers of the Vindhyan range. The district exhibits a striking variety of surface and scenery. The greater portion lies within the Doab or level alluvial plain between the Ganges and the Jumna. This part falls naturally into two sections, divided by the deep and fissured valley of the river Sengar. The tract to the north-east of that stream is rich and fertile, being watered by the Cawnpore and Etawah branches of the Ganges canal, and other important works. The south-western region has the same natural advantages, but possesses no great irrigation system, and is consequently less fruitful than the opposite slopes. Near the banks of the Jumna, the plain descends into the river valley by a series of wild ravines and terraces, inhabited only by a scattered race of hereditary herdsmen. Beyond the Jumna again a strip of British territory extends along the tangled gorges of the Chambal and the Kuari Nadi, far into the borders of the Gwalior state. This outlying tract embraces a series of rocky glens and mountain torrents, crowned by the ruins of native strongholds, and interspersed with narrow ledges of cultivable alluvium. The climate, once hot and sultry, has now become comparatively moist and equable under the influence of irrigation and the planting of trees.

Etawah was marked out by its physical features as a secure retreat for the turbulent tribes of the Upper Doab, and it was not till the 12th century that any of the existing castes settled on the soil. After the Mussulman conquests of Delhi and the surrounding country, the Hindus of Etawah appear to have held their own for many generations against the Mahommedan power; but in the 16th century Baber conquered the district, with the rest of the Doab, and it remained in the hands of the Moguls until the decay of their empire. After passing through the usual vicissitudes of Mahratta and Jat conquests during the long anarchy which preceded the British rule, Etawah was annexed by the wazir of Oudh in 1773. The wazir ceded it to the East India Company in 1801, but it still remained so largely in the hands of lawless native chiefs that some difficulty was experienced in reducing it to orderly government. During the mutiny of 1857 serious disturbances occurred in Etawah, and the district was occupied by the rebels from June to December; order was not completely restored till the end of 1858. In 1901 the population was 806,798, showing an increase of 11% in the decade. The district is partly watered by branches of the Ganges canal, and is traversed throughout by the main line of the East Indian railway from Cawnpore to Agra. Cotton, oilseeds and other agricultural produce are exported, and some indigo is made, but manufacturing industry is slight.

ETCHING (Dutch, *etsen*, to eat), a form of engraving (*q.v.*) in which, in contradistinction to line engraving (*q.v.*), where the furrow is produced by the ploughing of the burin, the copper is eaten away or corroded by acid.

To prepare a plate for etching it is first covered with etching-ground, a composition which resists acid. The qualities of a ground are to be so adhesive that it will not quit the copper when a small quantity is left isolated between lines, yet not so adhesive that the etching point cannot easily and entirely remove it; at the same time a good ground will be hard enough to bear the hand upon it, or a sheet of paper, yet not so hard as to be brittle. The ground used by Abraham Bosse, the French painter and engraver (1602–1676) was composed as follows:—Melt 2 oz. of white wax; then add to it 1 oz. of gum-mastic in powder, a little at a time, stirring till the wax and the mastic are well mingled; then add, in the same manner, 1 oz. of bitumen in powder. There are three different ways of applying an etching-ground to a plate. The old-fashioned way was to wrap a ball of the ground in silk, heat the plate, and then rub the ball upon the surface, enough of the ground to cover the plate melting through the silk. To equalize the ground a dabber was used, which was made of cotton-wool under horsehair, the whole inclosed in silk. This method is still used by many artists, from tradition and habit, but it is far inferior in perfection and convenience to that which we will now describe. When the etching-ground is melted, add to it half its volume of essential oil of lavender, mix well, and allow the mixture to cool. You have now a paste which can be spread upon a cold plate with a roller; these rollers are covered with leather and made (very carefully) for the purpose. You first spread a little paste on a sheet of glass (if too thick, add more oil of lavender and mix with a palette knife), and roll it till the roller is quite equally charged all over, when the paste is easily transferred to the copper, which is afterwards gently heated to expel the oil of lavender. In both these methods of grounding a plate, the work is not completed until the ground has been smoked, which is effected as follows. The plate is held by a hand-vice if a small one, or if large, is fixed at some height, with the covered side downwards. A smoking torch, composed of many thin bees-wax dips twisted together, is then lighted and passed repeatedly under the plate in every direction, till the ground has incorporated enough lampblack to blacken it. The third way of covering a plate for etching is to apply the ground in solution as collodion is applied by photographers. The ground may be dissolved in chloroform, or in oil of lavender. The plate being grounded, its back and edges are protected from the acid by Japan varnish, which soon dries, and then the drawing is traced upon it. The best way of tracing a drawing is to use sheet gelatine, which is employed as follows. The gelatine is laid upon the drawing, which its transparence allows you to see perfectly, and you trace the lines by scratching the smooth surface with a sharp point. You then fill these scratches with fine black-lead, in powder, rubbing it in with the finger, turn the tracing with its face to the plate, and rub the back of it with a burnisher. The black-lead from the scratches adheres to the etching ground and shows upon it as pale grey, much more visible than anything else you can use for tracing. Then comes the work of the etching-needle, which is merely a piece of steel sharpened more or less. J. M. W. Turner used a prong of an old steel fork which did as well as anything, but neater etching-needles are sold by artists' colourmakers. The needle removes the ground or cover and lays the copper bare. Some artists sharpen their needles so as to present a cutting edge which, when used sideways, scrapes away a broad line; and many etchers use needles of various degrees of sharpness to get thicker or thinner lines. It may be well to observe, in connexion with this part of the subject, that whilst thick lines agree perfectly well with the nature of woodcut, they are very apt to give an unpleasant heaviness to plate engraving of all kinds, whilst thin lines have generally a clear and agreeable appearance in plate engraving. Nevertheless, lines of moderate thickness are used effectively in etching when covered with finer shading, and very thick lines indeed were employed with good results by Turner when he intended to cover them with mezzotint (*q.v.*), and to print in brown ink, because their thickness was essential to prevent them from being overwhelmed by the mezzotint, and the brown ink made them print less heavily than black. Etchers differ in opinion as to whether the needle ought to scratch the copper or simply to glide upon its surface. A gliding needle is much more free, and therefore communicates a greater appearance of freedom to the etching, but it has the inconvenience that the etching-ground may not always be entirely removed, and then the lines may be defective from insufficient biting. A scratching needle, on the other hand, is free from this serious inconvenience, but it must not scratch irregularly so as to *engrave* lines of various depth. The *biting* in former times was generally done with a mixture of nitric acid and water, in equal proportions; but in the present day a Dutch mordant is a good deal used, which is composed as follows: Hydrochloric acid, 100 grammes; chlorate of potash, 20 grammes; water, 880 grammes. To make it, heat the water, add the chlorate of potash, wait till it is entirely dissolved, and then add the acid. The nitrous mordant acts rapidly and causes ebullition; the Dutch mordant acts slowly and causes no ebullition. The nitrous mordant widens the lines; the Dutch mordant bites in depth, and does not widen the lines to any perceptible degree. The time required for both depends upon temperature. A mordant bites slowly when cold, and more and more rapidly when heated. To obviate irregularity caused by difference of temperature, it is a good plan to heat the Dutch mordant artificially to 95° Fahr. by lamps under the bath (for which a photographer's porcelain tray is most convenient), and keep it steadily to that temperature; the results may then be counted upon; but whatever the temperature fixed upon, the results will be regular if it is regular. To get different degrees of biting on the same plate the lines which are to be pale are "stopped out" by being painted over with Japan varnish or with etching ground dissolved in oil of lavender, the darkest lines being reserved to the last, as they have to bite longest. When the acid has done its work properly the lines are bitten in such various degrees of depth that they will print with the degree of blackness required; but if some parts of the subject require to be made paler, they can be lowered by rubbing them with charcoal and olive oil, and if they have to be made deeper they can be rebitten, or covered with added shading. Rebiting is done with the roller above mentioned, which is now charged very lightly with paste and rolled over the copper with no pressure but its own weight, so as to cover the smooth surface but not fill up any of the lines. The oil of lavender is then expelled as before by gently heating the plate, but it is not smoked. The lines which require rebiting may now be rebitten, and the others preserved against the action of the acid by stopping out. These are a few of the most essential technical points in etching, but there are many matters of detail for which the reader is referred to the special works on the subject.

There are many varieties in the processes of etching, and it is only necessary here to indicate the essential facts. A brief analysis of different styles may be given.

(1) *Pure Line.* As there is line engraving, so there is line etching; but as the etching-needle is a freer instrument than the burin, the line has qualities which differ widely from those of the burin line. Each of the two has its own charm and beauty; the liberty of the one is charming, and the restraint of the other is admirable also in its right place. In line etching, as in line engraving, the great masters purposely exhibit the line and do not hide it under too much shading. (2) *Line and Shade.* This answers exactly in etching to Mantegna's work in engraving. The most important lines are drawn first throughout, and the shade thrown over them like a wash with the brush over a pen sketch in indelible ink. (3) *Shade and Texture.* This is used chiefly to imitate oil-painting. Here the line (properly so called) is entirely abandoned, and the attention of the etcher is given to texture and chiaroscuro. He uses lines, of course, to express these, but does not exhibit them for their own beauty; on the contrary, he conceals them.

Of these three styles of etching the first is technically the easiest, and being also the most rapid, is adopted for sketching on the copper from nature; the second is the next in difficulty; and the third the most difficult, on account of the biting, which is never easy to manage when it becomes elaborate. The etcher has, however, many resources; he can make passages paler by burnishing them, or by using charcoal, or he can efface them entirely with the scraper and charcoal; he can darken them by rebiting or by regrounding the plate and adding fresh work; and he need not run the risk of biting the very palest passages of all, because these can be easily done with the *dry point*, which is simply a well-sharpened stylus used directly on the copper without the help of acid. It is often asserted that any one can etch who can draw, but this is a mistaken assertion likely to mislead. Without requiring so long an apprenticeship as the burin, etching is a very difficult art indeed, the two main causes of its difficulty being that the artist does not see his work properly as he proceeds, and that mistakes or misfortunes in the biting, which are of frequent occurrence to the inexperienced, may destroy all the relations of tone.

Etching, like line engraving, owed much to the old masters, but whereas, with the exception of Albert Dürer, the painters were seldom practical line engravers, they advanced etching not only by advice given to others but by the work of their own hands. Rembrandt did as much for etching as either Raphael or Rubens for line engraving; and in landscape the etchings of Claude had an influence which still continues, both Rembrandt and Claude being practical workmen in etching, and very skilful workmen. Ostade, Ruysdael, Berghem, Paul Potter, Karl Dujardin, etched as they painted, and so did a greater than any of them, Vandyck. In the earlier part of the 19th century etching was almost a defunct art, except as it was employed by engravers as a help to get faster through their work, of which "engraving" got all the credit, the public being unable to distinguish between etched lines and lines cut with the burin. But from the middle of the century dates a great revival of etching as an independent art, a revival which has extended all over Europe.

Apart from the copying of pictures by etching—which was found commercially preferable to the use of line engraving—

a number of artists and amateurs gradually practised original etching with increasing success, notably Sir Seymour Haden, J. M. Whistler, Samuel Palmer and others in England, Felix Bracquemond, C. F. Daubigny, Charles Jacque, Adolphe Appian, Maxime Lalanne, Jules Jacquemart and others on the continent, besides that singular and remarkable genius, Charles Méryon. Etching clubs, or associations of artists for the publication of original etchings, were gradually founded in England, France, Germany and Belgium. Méryon and Whistler are two of the greatest modern etchers. Among earlier names mention may be made of Andrew Geddes (1783–1844) and of Sir David Wilkie (1785–1841). Geddes was the finer artist with the needle; he it was whom Rembrandt best inspired; his work was in the grand manner. Of the rich and rare dry-points "At Peckham Rye" and "At Halliford-on-Thames," the deepest and most brilliant master of landscape would have no need to be ashamed. David Wilkie's prints were, naturally, not less dramatic than his pictures, but the etcher's particular gift was possessed by him more intermittently: it is shown best in "The Receipt," a strong and vivid, dexterous sketch, quite full of character. J. S. Cotman's (1782–1842) etchings are also historically interesting though they were "soft ground" for the most part. They show all his qualities of elegance and freedom as a draughtsman, and much of his large dignity in the distribution of light and shade. T. Girtin (1775–1802), in the preparations for his views of Paris, was notably happy. The work of Sir Francis Seymour Haden (b. 1818) had a powerful influence on the art in England. Between 1858 and 1879 Seymour Haden—the first president of the Royal Society of Painter Etchers—produced the vast majority of his plates, which have always good draughtsmanship, unity of effect and a personal impression. They show a strong feeling for nature. If, amongst some two hundred subjects, it were necessary to select one or two for peculiar praise, they might be the "Breaking up of the *Agamemnon*," the almost perfect "Water Meadow," the masterly presentment of "Erith Marshes," and the later dry-point of "Windmill Hill." Another great etcher—Frenchman by birth, but English by long residence—is Alphonse Legros (*q.v.*). Great in expression and suggestive draughtsmanship, austere and economical in line, Legros's work is the grave record of the observation and the fancy of an imaginative mind. In poetic portraiture nothing can well exceed his etched vision of G. F. Watts; "La Mort du Vagabond" is noticeable for terror and homely pathos; "Communion dans l'Église St Médard" is perhaps the best instance of the dignity, vigour and grave sympathy with which he addresses himself to ecclesiastical themes. Something of these latter qualities, in dealing with similar themes, Legros passed on to his pupil, Sir Charles Holroyd (b. 1861)—an etcher in the true vein; whilst an earlier pupil, prolific as himself, as imaginative, and sometimes more deliberately uncouth—William Strang, A.R.A. (b. 1859)—carried on in his own way the tradition of that part of Legros's practice, the preoccupation with the humble, for which Legros himself found certain warrant in a portion of the great *œuvre* of Rembrandt. Frank Short, A.R.A. (b. 1857), as with the very touch of Turner, carried to completion great designs that Turner left unfinished for the *Liber studiorum*. The delicacy of "Sleeping till the Flood," the curiously suggestive realism of "Wrought Nails"—a scene in the Black Country—entitle him to a lasting place in the list of the fine wielders of the etching-needle. D. Y. Cameron (b. 1865) betrays the influence of Rembrandt in a noble etching, "Border Towers," and the influence of Méryon in such a print as that of "The Palace, Stirling." His "London Set" is particularly fine. The individuality of C. J. Watson is less marked, but his skill, chiefly in architectural work, is noticeable. Admirers of the studiously accurate portraiture of a great monument may be able to set Watson's print of "St Étienne du Mont" by the side of Méryon's august and mysterious and ever-memorable vision. Paul Helleu (b. 1859) in his brilliant sketches, particularly of women, has used the art of etching in a peculiarly individual and delightful way. Among the numerous other modern etchers only a bare mention can be made of Oliver Hall, Minna Bolingbroke and Elizabeth Armstrong (Mrs Watson and Mrs Stanhope Forbes), Alfred East, Robert Macbeth, Walter Sickert, Robert Goff, Mortimer Menpes, Percy Thomas, Raven Hill, and Prof. H. von Herkomer, in England; in France, Roussel, J. F. Raffaëlli (b. 1850), Besnard and J. J. J. Tissot (1836–1902).

The oldest treatise on etching is that of Abraham Bosse (1645). See also P. G. Hamerton, *Etching and Etchers* (1868), and *Etchers' Handbook* (1881); F. Wedmore, *Etching in England* (1895); Singer and Strang, *Etching, Engraving, &c.* (1897).

ETEOCLES, in Greek legend, king of Thebes, son of Oedipus and Jocasta (Iocaste). After their father had been driven out of the country, he and his brother Polyneices agreed to reign alternately for a year. Eteocles, however, refused to keep the agreement, and Polyneices fled to Adrastus, king of Argos, whom he persuaded to undertake the famous expedition against Thebes on his behalf. The two brothers met in single combat, and both were slain. The Theban rulers decreed that only Eteocles should receive the honour of burial, but the decree was set at naught by Antigone (*q.v.*), the sister of Polyneices. The fate of Eteocles and Polyneices forms the subject of the *Seven against Thebes* of Aeschylus and the *Phoenissae* of Euripides.

ETESIAN WIND (Lat. *etesius*, annual; Gr. ἔτος, year), a Mediterranean wind blowing from the north and west in summer for about six weeks annually.

ÉTEX, ANTOINE (1808–1888), French sculptor, painter and architect, was born in Paris on the 20th of March 1808. He first exhibited in the salon of 1833, his work including a reproduction in marble of his "Death of Hyacinthus," and the plaster cast of his "Cain and his race cursed by God." Thiers, who was at this time minister of public works, now commissioned him to execute the two groups of "Peace" and "War," placed at each side of the Arc de Triomphe. This last, which established his reputation, he reproduced in marble in the salon of 1839. The French capital contains numerous examples of the sculptural works of Étex, which included mythological and religious subjects besides a great number of portraits. His paintings include the subjects of Eurydice and the martyrdom of Saint Sebastian, and among the best known of his architectural productions are the tomb of Napoleon I. in the Invalides and a monument of the revolution of 1848. Étex wrote a number of essays on subjects connected with the arts. The last year of his life was spent at Nice, and he died at Chaville (Seine-et-Oise) on the 14th of July 1888.

See P. E. Mangeant, *Antoine Étex, peintre, sculpteur et architecte, 1808–1888* (Paris, 1894).

ETHER, $(C_2H_5)_2O$, the *Aether* of pharmacy, a colourless, volatile, highly inflammable liquid, of specific gravity 0·736 at 0°, boiling-point 35° C., and freezing-point -117°·4 C. (K. Olszewski). It has a strong and characteristic odour, and a hot sweetish taste, is soluble in ten parts of water, and in all proportions in alcohol, and dissolves bromine, iodine, and, in small quantities, sulphur and phosphorus, also the volatile oils, most fatty and resinous substances, guncotton, caoutchouc and certain of the vegetable alkaloids. The vapour mixed with oxygen or air is violently explosive. The making of ether by the action of sulphuric acid on alcohol was known in about the 13th century; and later Basil Valentine and Valerius Cordus described its preparation and properties. The name ether appears to have been applied to the drug only since the times of Frobenius, who in 1730 termed it *spiritus aethereus* or *vini vitriolatus*. It was considered to be a sulphur compound, hence its name sulphur ether; this idea was proved to be erroneous by Valentine Rose in about 1800. Ether is manufactured by the distillation of 5 parts of 90% alcohol with 9 parts of concentrated sulphuric acid at a temperature of 140°-145° C., a constant stream of alcohol being caused to flow into the mixture during the operation. The distillate is purified by treatment with lime and calcium chloride, and subsequent distillation. The mechanism of this reaction was explained by A. Williamson in 1850. For other methods of preparation see ETHERS.[1]

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[1] See also J. v. Liebig, *Ann. Chem. Pharm.*, 1837, 23, p. 39; 1839, 30, p. 129; E. Mitscherlich, *Pogg. Ann.*, 1836, 31, p. 273; 1841, 53, p. 95; A. W. Williamson, *Phil. Mag.*, 1850 (3), 37, p. 350.

The presence of so small a quantity as 1% of alcohol may be detected in ether by the colour imparted to it by aniline violet; if water or acetic acid be present, the ether must be shaken with anhydrous potassium carbonate before the application of the test. When heated with zinc dust, it yields ethylene and water. Chromic acid oxidizes it to acetic acid and ozone oxidizes it to ethyl peroxide. In contact with hydriodic acid gas at 0° C., it forms ethyl iodide (R. D. Silva, *Ber.*, 1875, 8, p. 903), and with water and a little sulphuric acid at 180° C., it yields alcohol (E. Erlenmeyer, *Zeit. f. chemie*, 1868, p. 343). It forms crystalline compounds with bromine and with many metallic salts.

Medicine.—For the anaesthetic properties of ether see ANAESTHESIA. Applied externally, ether evaporates very rapidly, producing such intense cold as to cause marked local anaesthesia. For this purpose it is best applied as a fine spray, but ethyl chloride is generally found more efficient and produces less subsequent discomfort. It aids the absorption of fats and may be used with cod liver oil when the latter is administered by the skin. If it be rubbed in or evaporation be prevented, it acts, like alcohol and chloroform, as an irritant. Ten to twenty minims of ether, subcutaneously injected, constitute perhaps the most rapid and powerful cardiac stimulant known, and are often employed for this purpose in cases of syncope under anaesthesia. Taken internally, ether acts in many respects similarly to alcohol and chloroform, but its stimulant action on the heart is much more marked, being exerted both reflexly from the stomach and directly after its rapid absorption. Ether is thus the type of a rapidly diffusible stimulant. It is also useful in relieving the paroxysms of asthma. The dose for repeated administration is from 10 to 30 minims and for a single administration up to a drachm.

Chronic Poisoning.—A dose of a little more than a drachm (a teaspoonful) will produce a condition of inebriation lasting for one-half to one hour, but the dose must soon be greatly increased. The after-effects are, if anything, rather pleasant, and the habit of ether drinking is certainly not so injurious as alcoholism. The principal symptons of chronic ether-drinking are a weakening of the activity of the special senses, and notably sight and hearing, a lowering of the intelligence and a degree of general paresis (partial paralysis) of motion.

ETHEREDGE [or ETHEREGE], **SIR GEORGE** (*c.* 1635–1691), English dramatist, was born about the year 1635, and belonged to an Oxfordshire family. He is said to have been educated at Cambridge, but Dennis assures us that " to his certain knowledge he understood neither Greek nor Latin." He travelled abroad early, and seems to have resided in France. It is possible that he witnessed in Paris the performances of some of Molière's earliest comedies; and he seems, from an allusion in one of his plays, to have been personally acquainted with Bussy Rabutin. On his return to London he studied the law at one of the Inns of Court. His tastes were those of a fine gentleman, and he indulged freely in pleasure.

Sometime soon after the Restoration he composed his comedy of *The Comical Revenge* or *Love in a Tub*, which introduced him to Lord Buckhurst, afterwards the earl of Dorset. This was brought out at the Duke's theatre in 1664, and a few copies were printed in the same year. It is partly in rhymned heroic verse, like the stilted tragedies of the Howards and Killigrews, but it contains comic scenes that are exceedingly bright and fresh. The sparring between Sir Frederick and the Widow introduced a style of wit hitherto unknown upon the English stage. The success of this play was very great, but Etheredge waited four years before he repeated his experiment. Meanwhile he gained the highest reputation as a poetical beau, and moved in the circle of Sir Charles Sedley, Lord Rochester and the other noble wits of the day. In 1668 he brought out *She would if she could*, a comedy in many respects admirable, full of action, wit and spirit, although to the last degree frivolous and immoral. But in this play Etheredge first shows himself a new power in literature; he has nothing of the rudeness of his predecessors or the grossness of his contemporaries. We move in an airy and fantastic world, where flirtation is the only serious business of life. At this time Etheredge was living a life no less frivolous and unprincipled than those of his Courtals and Freemans. He formed an alliance with the famous actress Mrs Elizabeth Barry; she bore him a daughter, on whom he settled £6000, but who, unhappily, died in her youth. His wealth and wit, the distinction and charm of his manners, won Etheredge the general worship of society, and his temperament is best known by the names his contemporaries gave him, of " gentle George " and " easy Etheredge." Rochester upbraided him for inattention to literature; and at last, after a silence of eight years, he came forward with one more play, unfortunately his last. *The Man of Mode or Sir Fopling Flutter*, indisputably the best comedy of intrigue written in England before the days of Congreve, was acted and printed in 1676, and enjoyed an unbounded success. Besides the merit of its plot and wit, it had the personal charm of being supposed to satirize, or at least to paint, persons well known in London. Sir Fopling Flutter was a portrait of Beau Hewit, the reigning exquisite of the hour; in Dorimant the poet drew the earl of Rochester, and in Medley a portrait of himself; while even the drunken shoemaker was a real character, who made his fortune from being thus brought into public notice. After this brilliant success Etheredge retired from literature; his gallantries and his gambling in a few years deprived him of his fortune, and he looked about for a rich match. He was knighted before 1680, and gained the hand and the money of a rich widow. He was sent by Charles II. on a mission to the Hague, and in March 1685 was appointed resident minister in the imperial German court at Regensburg. He was very uncomfortable in Germany, and after three and a half years' residence left for Paris. He had collected a library at Regensburg, some volumes of which are in the theological college there. His MS. despatches are preserved in the British Museum, where they were discovered and described by Mr Gosse in 1881; they add very largely to our knowledge of Etheredge's career. He died in Paris, probably in 1691, for Narcissus Luttrell notes in February 1692 that " Sir George Etherege, the late King James' ambassador to Vienna, died lately in Paris."

Etheredge deserves to hold a more distinguished place in English literature than has generally been allotted to him. In a dull and heavy age, he inaugurated a period of genuine wit and sprightliness. He invented the comedy of intrigue, and led the way for the masterpieces of Congreve and Sheridan. Before his time the manner of Ben Jonson had prevailed in comedy, and traditional " humours " and typical eccentricities, instead of real characters, had crowded the comic stage. Etheredge paints with a light, faint hand, but it is from nature, and his portraits of fops and beaux are simply unexcelled. No one knows better than he how to present a gay young gentleman, a Dorimant, " an unconfinable rover after amorous adventures." His genius is as light as thistle-down; he is frivolous, without force of conviction, without principle; but his wit is very sparkling, and his style pure and singularly picturesque. No one approaches Etheredge in delicate touches of dress, furniture and scene; he makes the fine airs of London gentlemen and ladies live before our eyes even more vividly than Congreve does; but he has less insight and less energy than Congreve. Had he been poor or ambitious, he might have been to England almost what Molière was to France, but he was a rich man living at his ease, and he disdained to excel in literature. Etheredge was " a fair, slender, genteel man, but spoiled his countenance with drinking." His contemporaries all agree in acknowledging that he was the soul of affability and sprightly good-nature.

The life of Etheredge was first given in detail by Edmund Gosse in *Seventeenth Century Studies* (1883). His works were edited by A. W. Verity, in 1888. (E. G.)

ETHERIDGE, JOHN WESLEY (1804–1866), English nonconformist divine, was born near Newport, Isle of Wight, on the 24th of February 1804. He received most of his early education from his father. Though he never attended any university he acquired ultimately a thorough knowledge of Greek, Latin, Hebrew, Syriac, French and German. In 1824 he was placed on the Wesleyan Methodist plan as a local preacher. In 1826 his offer to enter the ministry was accepted, and after the usual probationary trial he was received into full connexion at the conference of 1831. For two years after this he remained at Brighton, and in 1833 he removed to Cornwall, being stationed successively at the Truro and Falmouth circuits. From Falmouth he removed to Darlaston, where in 1838 his health gave way. For a good many years he was a supernumerary, and lived for a while at Caen and Paris, where in the public libraries he found great facilities for prosecuting his favourite Oriental studies. His health having considerably improved, he became, in 1843, pastor of the Methodist church at Boulogne. He returned to England in 1847, and was appointed successively to the circuits of Islington, Bristol, Leeds, Penzance, Penryn, Truro and St Austell in east Cornwall. Shortly after his return to England he received the degree of Ph.D. from the university of Heidelberg. He was a patient, modest, hard-working and accurate scholar. He died at Camborne on the 24th of May 1866.

His principal works are *Horae Aramaicae* (1843); *History, Liturgies and Literature of the Syrian Churches* (1847); *The Apostolic Acts and Epistles, from the Peshito or Ancient Syriac* (1849); *Jerusalem and Tiberias, a Survey of the Religious and Scholastic Learning of the Jews* (1856); *The Targums of Onkelos and Jonathan ben Uzziel* (1st vol. in 1862, 2nd in 1865). See *Memoir*, by Rev. Thornley Smith (1871).

ETHERIDGE, ROBERT (1819–1903), English geologist and palaeontologist, was born at Ross, in Herefordshire, on the 3rd of December 1819. After an ordinary school education in his native town, he obtained employment in a business house in Bristol. There he devoted his spare time to natural history pursuits, and in 1850 was appointed curator of the museum attached to the Bristol Philosophical Institution. He also became lecturer on botany in the Bristol medical school. In 1857, through the influence of Sir Roderick I. Murchison, he was appointed to a post in the Museum of Practical Geology in London, and eventually became palaeontologist to the Geological Survey. In 1865 he assisted Prof. Huxley in the preparation of a *Catalogue of Fossils in the Museum of Practical Geology*. His chief work for many years was in naming the fossils collected during the progress of the Geological Survey, and in supplying the lists that were appended to numerous official memoirs. In this way he acquired an exceptional knowledge of British fossils, and he ultimately prepared an elaborate work entitled *Fossils of the British Islands, Stratigraphically and Zoologically arranged*. Only the first volume dealing with the Palaeozoic species was published (1888). Etheridge also was author of several papers on the Rhaetic Beds, and of an important essay on the Physical Structure of North Devon, and on the Palaeontological Value of the Devonian Fossils (1867). He edited, and in the main rewrote, the second part of a new edition of John Phillips' Manual of Geology—entitled *Stratigraphical Geology and Palaeontology* (1885). He was elected F.R.S. in 1871, and was president of the Geological Society in 1881–1882. In 1881 Etheridge was transferred from the Geological Survey to the geological department of the British Museum, where he served as assistant keeper until 1891. He died at Chelsea, London, on the 18th of December 1903.

Memoir by Dr Henry Woodward (with list of works and portrait) in *Geological Magazine*, January 1904; also Memoir by H. B. Woodward (with portrait) in *Proc. Bristol Nat. Soc.* x. 175.

ETHERS, in organic chemistry, compounds of the general formula $R\cdot O\cdot R'$, where $R, R' =$ alkyl or aryl groups. They may be regarded as the anhydrides of the alcohols, being formed by elimination of one molecule of water from two molecules of the alcohols; those in which the two hydrocarbon radicals are similar are known as *simple* ethers, and those in which they are dissimilar as *mixed* ethers. They may be prepared by the action of concentrated sulphuric acid on the alcohols, alkyl sulphuric acids being first formed, which yield ethers on heating with alcohols. The process may be made a continuous one by running a thin stream of alcohol continually into the heated reaction mixture of alcohol and sulphuric acid. Benzene sulphonic acid has been used in place of sulphuric acid (F. Krafft, *Ber.*, 1893, 26, p. 2829). A. W. Williamson (*Ann.*, 1851, 77, p. 38; 1852, 81, p. 77) prepared ether by the action of sodium ethylate on ethyl iodide, and showed that all ethers must possess the structural formula given above (see also *Brit. Assoc. Reports*, 1850, p. 65). They may also be prepared by heating the alkyl halides with silver oxide.

The ethers are neutral volatile liquids (the first member, methyl ether, is a gas at ordinary temperature). Phosphorus pentachloride converts them into alkyl chlorides, a similar decomposition taking place when they are heated with the haloid acids. Nitric acid and chromic acid oxidize them in such a manner that they yield the same products as the alcohols from which they are derived. With chlorine they yield substitution products.

Methyl ether, $(CH_3)_2O$, was first prepared by J. B. Dumas and E. Péligot (*Ann. chim. phys.*, 1835, [2] 58, p. 19) by heating methyl alcohol with sulphuric acid. It is best prepared by heating methyl alcohol and sulphuric acid to 140° C. and leading the evolved gas into sulphuric acid. The sulphuric acid solution is then allowed to drop slowly into an equal volume of water, when the methyl ether is liberated (E. Erlenmeyer and A. Kriechbaumer, *Ber.*, 1874, 7, p. 699). It is a pleasant-smelling gas, which burns when ignited, and may be condensed to a liquid which boils at 23·6° C. It is somewhat soluble in water and readily soluble in alcohol, and concentrated sulphuric acid. It combines with hydrochloric acid gas to form a compound $(CH_3)_2O\cdot HCl$ (C. Friedel, *Comptes rendus*, 1875, 81, p. 152). *Methyl ethyl ether*, $CH_3\cdot O\cdot C_2H_5$, is prepared from methyl iodide and sodium ethylate, or from ethyl iodide and sodium methylate (A. W. Williamson, *Ann.*, 1852, 81, p. 77). It is a liquid which boils at 10·8° C.

For diethyl ether see Ether, and for methyl phenyl ether (anisole) and ethyl phenyl ether (phenetole) see Carbolic Acid.

ETHICS, the name generally given to the science of moral philosophy. The word "ethics" is derived from the Gr. ἠθικός, that which pertains to ἦθος, character.

For convenience in reference, the arrangement followed in this article may be explained at the outset:—

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Section I. contains a general survey of the subject; it shows in what sense ethics is to be regarded as a special field of philosophical investigation—its relations to other departments of thought, especially to psychology, religion and modern physical science. The article makes no attempt to give a detailed, casuistical examination of the matter of ethical theory. For this, reference must be made to special articles on philosophic schools, writers and terms.

Section II. is a historical sketch in four parts tracing the main lines of development in ethical speculation from its birth to the present day. Here again it has been possible to notice only the salient points or landmarks, leaving all detail to special articles as above. All important writers whose names occur in this sketch are treated in special biographical articles, and references are given as often as possible to supplementary articles which illustrate and explain points which cannot be fully treated here. This is especially the case in connexion with technical terms (whose history and meaning are inevitably taken for granted) and biographical information about minor ethical writers.

I. Definition and Subject-Matter of Ethics

In its widest sense, the term "ethics" would imply an examination into the general character or habits of mankind, and would even involve a description or history of the habits of men in particular societies living at different periods of time. Such a field of study would obviously be too wide for any particular science or philosophy to investigate, and moreover portions of the field are already occupied by history, by anthropology and by the particular sciences (*e.g.* physiology, anatomy, biology), in so far as the habits and character of men depend upon the material processes which these sciences examine. Even philosophies such as logic and aesthetic would be necessary for such an investigation, if thought and artistic production are normal human habits and elements in character. Ethics then is usually confined to the particular field of human character and conduct so far as they depend upon or exhibit certain general principles commonly known as moral principles. Men in general characterize their own conduct and character and that of other men by such general adjectives as good, bad, right and wrong, and it is the meaning and scope of these adjectives, primarily in relation to human conduct, and ultimately in their final and absolute sense, that ethics investigates.

A not uncommon definition of ethics as the "science of conduct" is inexact for various reasons. (1) The sciences are descriptive or experimental. But a description of what acts or what ends of action men in the present or the past call, or have called, "good" or "bad" is clearly beyond human powers. And experiments in morality (apart from the inconvenient practical consequences likely to ensue) are useless for purposes of ethics, because the moral consciousness would itself at one and the same time be required to make the experiment and to provide the subject upon which the experiment is performed. (2) Ethics is a philosophy and not a science. Philosophy is a process of reflection upon the presuppositions involved in unreflective thought. In logic and metaphysics it investigates either the process of apprehension itself, or conceptions such as cause, substance, space, time, which the ordinary scientific consciousness never criticizes. In moral philosophy the place of the body of sciences, which philosophy as the theory of knowledge investigates, is taken by the developed moral consciousness, which already pronounces moral judgment without hesitation, and claims authority to subject to continual criticism the institutions and forms of social life which it has itself helped to create.

When ethical speculation first begins, conceptions such as those of duty, responsibility, the will as the ultimate subject of moral approbation and disapprobation, are already in existence and already operative. Moral philosophy in a certain sense adds nothing to these conceptions, though it sets them in a clearer light. The problems of the moral consciousness at the time at which it first becomes reflective are not strictly speaking philosophical problems at all. It is occupied with just such questions as each individual man who wishes to act rightly is constantly called upon to answer, *e.g.* questions such as "What particular action will meet the claims of justice under such and such circumstances?" or "What degree of ignorance will excuse this particular person in this particular case from his responsibility?" It tries to attain a knowledge as complete as possible of the circumstances under which the act contemplated must be performed, the personalities of the persons whom it may affect, and the consequences (so far as they can be foreseen) which it will produce, and then by virtue of its own power of moral discrimination pronounces judgment. And the ever-recurring problem of the moral consciousness, "What ought to be done?" is one which receives a clearer and more definite answer as men become more able in the course of moral experience to apply those principles of the moral consciousness which are yet employed in that experience from the outset. Nevertheless there is a sense in which moral philosophy may be said to originate out of difficulties inherent in the nature of morality itself, although it remains true that the questions which ethics attempts to answer are never questions with which the moral consciousness as such is confronted. The fact that men give different answers to moral problems which seem similar in character, or even the mere fact that men disregard, when they act immorally, the dictates and implicit principles of the moral consciousness is certain sooner or later to produce the desire either, on the one hand, to justify immoral action by casting doubt upon the authority of the moral consciousness and the validity of its principles, or, on the other hand, to justify particular moral judgments either by (the only valid method) an analysis of the moral principle involved in the judgment and a demonstration of its universal acceptation, or by some attempted proof that the particular moral judgment is arrived at by a process of inference from some universal conception of the Supreme Good or the Final End from which all particular duties or virtues may be deduced. It may be that criticism of morality first originates with a criticism of existing moral institutions or codes of ethics; such a criticism may be due to the spontaneous activity of the moral consciousness itself. But when such criticism passes into the attempt to find a universal criterion of morality—such an attempt being in effect an effort to make morality scientific—and especially when the attempt is seen, as it must in the end be seen, to fail (the moral consciousness being superior to all standards of morality and realizing itself wholly in particular judgments), then ethics as a *process of reflection* upon the nature of the moral consciousness may be said to begin. If this be true it follows that one of the chief function of ethics must be criticism of mistaken attempts to find a criterion of morality superior to the pronouncements of the moral consciousness itself. The ultimate superiority of the moral consciousness over all other standards is recognized, even by those who impugn its authority, whenever they claim that all men ought to recognize the superior value of the standards which they themselves wish to substitute. Similarly, their opponents refute their arguments by showing that they are based ultimately upon a recognition of certain distinctions which are moral distinctions (*i.e.* imply a moral consciousness capable of discriminating between right and wrong in particular cases), and that these moral distinctions conflict with the conclusions which they reach.

This may briefly be illustrated by reference to some of the great fundamental controversies of ethics. None of these originates out of conflicting statements of the moral consciousness, *i.e.* there is no fundamental contradiction in morality itself. No one (if unsophisticated) ever confused the conception of pleasure with the conception of the Good, or thought that the claims of selfish interest were identical with those of duty. But the controversy between hedonists and antihedonists originates as soon as men reflect that a good which is not in some sense "my" good is not good at all, or that no act can be said to be moral which does not satisfy "me." Or, again, the reflection that the mark or sign of the perfect performance of a particular virtuous act or function is the presence of a characteristic pleasure which always accompanies it, is opposed to the reflection that it is a mark of the highest morality never to rest satisfied, and out of these seemingly contradictory statements of the reflective consciousness might arise a multitude of controversies either concerning pleasure and duty, or the even more difficult and complex conceptions of merit, progress, and the nature of the Supreme Good or Final End.

The Sciences.

Theology.

When and how fresh controversies in ethics will begin it would be impossible for any one to foretell. Sometimes the dominance of a particular science or branch of study is the occasion of an attempt to apply to ethics ideas borrowed from or analogous to the conceptions of that science. False analogies drawn between ethics and mathematics or between morality and the perception of beauty have wrought much mischief in modern and to some degree even in ancient ethics. The influence of ideas borrowed from biology is everywhere manifest in the ethical speculations of modern times. Sometimes, again, whole theories of ethics have been formulated which can be seen in the end to be efforts to subordinate moral conceptions to conceptions belonging properly to institutions or departments of human thought and activity which the moral consciousness has itself originated. Law, for instance, depends, or at least ought to depend, upon men's need for and consciousness of justice. And such institutions as the family and the state are created by the social consciousness, which is the moral consciousness from another aspect. Yet morality has been subordinated to legal and social sanctions, and moral advance has been held to be conditioned by political and social necessities which are not moral needs. Similarly no one since civilization emerged from barbarism has ever really been willing to yield allegiance to a deity who is not moral in the fullest and highest sense of the word. God is not superior to moral law. Yet there have been whole systems of theological ethics which have attempted to base human morality upon the arbitrary will of God or upon the supreme authority of a divinely inspired book or code of laws. One of the greatest of all ethical controversies, that concerning the freedom of the will, arose directly out of what was in reality a theological problem—the necessity, namely, of reconciling God's foreknowledge with human freedom. The unreflective moral consciousness never finds it difficult to distinguish between a man's power of willing and all the forces of circumstance, heredity and the like, which combine to form the temptations to which he may yield or bid defiance; and such facts as "remorse" and "penitence" are a continual testimony to man's sense of freedom. But so soon as men perceive upon reflection an apparent discrepancy between the utterances of their moral consciousness and certain conclusions to which theological speculation (or at a later period metaphysical and scientific inquiries) seems inevitably to lead them, they will not rest satisfied until the belief in the will's freedom (hitherto unquestioned) is upon further reflection justified or condemned. It is clear then that the complexity of the subject-matter of ethics is such that no sharply defined boundary lines can be drawn between it and other branches of inquiry. Just in so far as it presupposes the apprehension of moral facts, it must presuppose a knowledge of the system of social relationships upon which some at least of those facts depend. No one, for instance, could inquire into the nature of justice without being further compelled to undertake an examination of the nature of the state.

Psychology.

It would be difficult to decide how much of the dispute between the advocates of pleasure theories and their opponents turns upon vexed questions of psychology, and how much is strictly relevant to ethics. If, as has already been said, one of the chief tasks of ethics is to prevent the intrusion into its own sphere of inquiry of ideas borrowed from other and alien sources, then obviously these sources must be investigated. One example of this necessity may be given. It is sometimes maintained that the proper method of ethics is the psychological method; ethics, we are told, should examine as its subject-matter moral sentiments wherever found, without raising ultimate questions as to the nature of obligation or moral authority in general. Now if in opposition to such arguments the ultimate character of moral obligation be defended, it will be necessary to point out that no one feels moral sentiments except in connexion with particular objects of moral approbation or disapprobation (*e.g.* gratitude is inexplicable apart from a particular relationship existing between two or more persons), and that these objects are objects of the moral consciousness alone. But such a line of argument is certain to make necessary an inquiry into the nature of the objects of psychological study which may produce quite unforeseen results for psychology.

Nothing therefore is to be gained by confining ethics within limits which must from the nature of the case be arbitrary. The defender at all events of the supremacy of moral intuitions must be prepared to follow whither the argument leads, into whatever strange quarters it may direct him. But this much may be said by way of delimitation of the scope of ethics: however complicated and involved its arguments and processes of inference may become, the facts from which they start and the conclusions to which they point are such as the moral consciousness alone can understand or warrant. (H. H. W.)

II. HISTORICAL SKETCH

A. *Greek and Graeco-Roman Ethics.*—The ethical speculation of Greece, and therefore of Europe, had no abrupt and absolute beginning. The naive and fragmentary precepts of conduct, which are everywhere the earliest manifestation of nascent moral reflection, are a noteworthy element in the gnomic poetry of the 7th and 6th centuries B.C. Their importance is shown by the traditional enumeration of the Seven Sages of the 6th century, and their influence on ethical thought is attested by the references of Plato and Aristotle. But from these unscientific utterances to a philosophy of morals was a long process. In the practical wisdom of Thales (*q.v.*), one of the seven, we cannot discern any systematic theory of morality. In the case of Pythagoras, conspicuous among pre-Socratic philosophers as the founder not merely of a school, but of a sect or order bound by a common rule of life, there is a closer connexion between moral and metaphysical speculation. The doctrine of the Pythagoreans that the essence of justice (conceived as equal retribution) was a square number, indicates a serious attempt to extend to the region of conduct their mathematical view of the universe; and the same may be said of their classification of good with unity, straightness and the like, and of evil with the opposite qualities. Still, the enunciation of the moral precepts of Pythagoras appears to have been dogmatic, or even prophetic, rather than philosophic, and to have been accepted by his disciples with an unphilosophic reverence as the *ipse dixit*[1] of the master. Hence, whatever influence the Pythagorean blending of ethical and mathematical notions may have had on Plato, and, through him, on later thought, we cannot regard the school as having really forestalled the Socratic inquiry after a completely reasoned theory of conduct. The ethical element in the "dark" philosophizing of Heraclitus (*c.* 530–470 B.C.), though it anticipates Stoicism in its conceptions of a law of the universe, to which the wise man will carefully conform, and a divine harmony, in the recognition of which he will find his truest satisfaction, is more profound, but even less systematic. It is only when we come to Democritus, a contemporary of Socrates, the last of the original thinkers whom we distinguish as pre-Socratic, that we find anything which we can call an ethical system. The fragments that remain of the moral treatises of Democritus are sufficient, perhaps, to convince us that the turn of Greek philosophy in the direction of conduct, which was actually due to Socrates, would have taken place without him, though in a less decided manner; but when we compare the Democritean ethics with the post-Socratic system to which it has most affinity, Epicureanism, we find that it exhibits a very rudimentary apprehension of the formal conditions which moral teaching must fulfil before it can lay claim to be treated as scientific.

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[1] This well-known phrase was originally attributed to the Pythagoreans.

The truth is that no system of ethics could be constructed until attention had been directed to the vagueness and inconsistency of the common moral opinions of mankind. For this purpose was needed the concentration of a philosophic intellect of the first order on the problems of practice. In Socrates first we find the required combination of a paramount interest in conduct and an ardent desire for knowledge. The pre-Socratic thinkers were all primarily devoted to ontological research; but by the middle of the 5th century B.C. the conflict of their dogmatic systems had led some of the keenest minds to doubt the possibility of penetrating the secret of the physical universe. This doubt found expression in the reasoned scepticism of Gorgias, and produced the famous proposition of Protagoras, that human apprehension is the only standard of existence. The same feeling led Socrates to abandon the old physico-metaphysical inquiries. In his case, moreover, it was strengthened by a naive piety that forbade him to search into things of which the gods seemed to have reserved the knowledge to themselves. The regulation of human action, on the other hand (except on occasions of special difficulty, for which omens and oracles might be vouchsafed), they had left to human reason. On this accordingly Socrates concentrated his efforts.

The Sophists.

Though, however, Socrates was the first to arrive at a proper conception of the problems of conduct, the general idea did not originate with him. The natural reaction against the metaphysical and ethical dogmatism of the early thinkers had reached its climax in the Sophists (*q.v.*). Gorgias and Protagoras are only representatives of what was really a universal tendency to abandon dogmatic theory and take refuge in practical matters, and especially, as was natural in the Greek city-state, in the civic relations of the citizen. The education given by the Sophists aimed at no general theory of life, but professed to expound the art of getting on in the world and of managing public affairs. In their eulogy of the virtues of the citizen, they pointed out the prudential character of justice and the like as a means of obtaining pleasure and avoiding pain. The Greek conception of society was such that the life of the free-born citizen consisted mainly of his public function, and, therefore, the pseudo-ethical disquisitions of the Sophists satisfied the requirements of the age. None thought of ἀρετή (virtue or excellence) as a unique quality possessed of an intrinsic value, but as the virtue of the citizen, just as good flute-playing was the virtue of the flute-player. We see here, as in other activities of the age, a determination to acquire technical knowledge, and to apply it directly to the practical issue; just as music was being enriched by new technical knowledge, architecture by modern theories of plans and T-squares (*sc.* Hippodamus), the handling of soldiers by the new technique of "tactics" and "hoplitics," so citizenship must be analysed afresh, systematized and adapted in relation to modern requirements. The Sophists had studied these matters superficially indeed but with thoroughness as far as they went, and it is not remarkable that they should have taken the methods which were successful in rhetoric, and applied them to the "science and art" of civic virtues. Plato's *Protagoras* claims, not unjustly, that in teaching virtue they simply did systematically what every one else was doing at haphazard. But in the true sense of the word, they had no ethical system at all, nor did they contribute save by contrast to ethical speculation. They merely analysed conventional formulae, much in the manner of certain modern so-called "scientific" moralists. Into this arena of hazy popular common sense Socrates brought a new critical spirit, showing that these popular lecturers, in spite of their fertile eloquence, could not defend their fundamental assumptions, nor even give rational definitions of what they professed to explain. Not only were they thus "ignorant," but they were also perpetually inconsistent with themselves in dealing with particular instances. Thus, by the aid of his famous "dialectic," Socrates arrived first at the negative result that the professed teachers of the people were as ignorant as he himself claimed to be, and in a measure justified the eulogy of Aristotle that he rendered to philosophy the service of "introducing induction and definitions." This description of his work is, however, both too technical and too positive, if we may judge from those earlier dialogues of Plato in which the real Socrates is found least modified. The pre-eminent wisdom which the Delphic oracle attributed to him was held by himself to consist in a unique consciousness of ignorance. Yet it is equally clear from Plato that there was a most important positive element in the teaching of Socrates in virtue of which it is just to say with Alexander Bain, "the first important name in ancient ethical philosophy is Socrates." The union of the negative and the positive elements in his work has caused historians no little perplexity, and we cannot quite save the philosopher's consistency unless we regard some of the doctrines attributed to him by Xenophon as merely tentative and provisional. Still the positions of Socrates that are most important in the history of ethical thought not only are easy to harmonize with his conviction of ignorance, but even render it easier to understand his unwearied cross-examination of common opinion. While he showed clearly the difficulty of acquiring knowledge, he was convinced that knowledge alone could be the source of a coherent system of virtue, as error of evil. Socrates, therefore, first in the history of thought, propounds a positive scientific law of conduct. Virtue is knowledge. This principle involved the paradox that no man, knowing good, would do evil. But it was a paradox derived from his unanswerable truisms, "Every one wishes for his own good, and would get it if he could," and "No one would deny that justice and virtue generally are goods, and of all goods the best." All virtues are, therefore, summed up in knowledge of the good. But this good is not, for Socrates, duty as distinct from interest. The force of the paradox depends upon a blending of duty and interest in the single notion of good, a blending which was dominant in the common thought of the age. This it is which forms the kernel of the positive thought of Socrates according to Xenophon. He could give no satisfactory account of Good in the abstract, and evaded all questions on this point by saying that he knew "no good that was not good *for something in particular*," but that good is consistent with itself. For himself he prized above all things the wisdom that is virtue, and in the task of producing it he endured the hardest penury, maintaining that such life was richer in enjoyment than a life of luxury. This many-sidedness of view is illustrated by the curious blending of noble and merely utilitarian sentiment in his account of friendship: a friend who can be of no service is valueless; yet the highest service that a friend can render is moral improvement.

Socrates.

The historically important characteristics of his moral philosophy, if we take (as we must) his teaching and character together, may be summarized as follows:—(1) an ardent inquiry for knowledge nowhere to be found, but which, if found, would perfect human conduct; (2) a demand meanwhile that men should act as far as possible on some consistent theory; (3) a provisional adhesion to the commonly received view of good, in all its incoherent complexity, and a perpetual readiness to maintain the harmony of its different elements, and demonstrate the superiority of virtue by an appeal to the standard of self-interest; (4) personal firmness, as apparently easy as it was actually invincible, in carrying out consistently such practical convictions as he had attained. It is only when we keep all these points in view that we can understand how from the spring of Socratic conversation flowed the divergent streams of Greek ethical thought.

The Socratic Schools.

Four distinct philosophical schools trace their immediate origin to the circle that gathered round Socrates—the Megarian, the Platonic, the Cynic and the Cyrenaic. The impress of the master is manifest on all, in spite of the wide differences that divide them; they all agree in holding the most important possession of man to be wisdom or knowledge, and the most important knowledge to be knowledge of Good. Here, however, the agreement ends. The more philosophic part of the circle, forming a group in which Euclid of Megara (see MEGARIAN SCHOOL) seems at first to have taken the lead, regarded this Good as the object of a still unfulfilled quest, and were led to identify it with the hidden secret of the universe, and thus to pass from ethics to metaphysics. Others again, whose demand for knowledge was more easily satisfied, and who were more impressed with the positive and practical side of the master's teaching, made the quest a much simpler affair. They took the Good as already known, and held philosophy to consist in the steady application of this knowledge to conduct. Among these were Antisthenes the Cynic and Aristippus of Cyrene. It is by their recognition of the duty of living consistently by theory instead of mere impulse or custom, their sense of the new value given to life through this rationalization, and their effort to maintain the easy, calm, unwavering firmness of the Socratic temper, that we recognize both Antisthenes and Aristippus as "Socratic men," in spite of the completeness with which they divided their master's positive doctrine into systems diametrically opposed. Of their contrasted principles we may perhaps say that, while Aristippus took the most obvious logical step for reducing the teaching of Socrates to clear dogmatic unity, Antisthenes certainly drew the most natural inference from the Socratic life.

Aristippus.

Aristippus (see CYRENAICS) argued that, if all that is beautiful or admirable in conduct has this quality as being useful, *i.e.* productive of some further good; if virtuous action is essentially action done with insight, or rational apprehension of the act as a means to this good, this good must be pleasure. Bodily pleasures and pains Aristippus held to be the keenest, though he does not seem to have maintained this on any materialistic theory, as he admitted the existence of purely mental pleasures, such as joy in the prosperity of one's native land. He fully recognized that his good was capable of being realized only in successive parts, and gave even exaggerated emphasis to the rule of seeking the pleasure of the moment, and not troubling oneself about a dubious future. It was in the calm, resolute, skilful culling of such pleasures as circumstances afforded from moment to moment, undisturbed by passion, prejudices or superstition, that he conceived the quality of wisdom to be exhibited; and tradition represents him as realizing this ideal to an impressive degree. Among the prejudices from which the wise man was free he included all regard to customary morality beyond what was due to the actual penalties attached to its violation; though he held, with Socrates, that these penalties actually render conformity reasonable. Thus early in the history of ethical theory appeared the most thoroughgoing exposition of hedonism.

The Cynics.

Far otherwise was the Socratic spirit understood by Antisthenes and the Cynics (*q.v.*). They equally held that no speculative research was needed for the discovery of good and virtue, and maintained that the Socratic wisdom was exhibited, not in the skilful pursuit, but in the rational disregard of pleasure,—in the clear apprehension of the intrinsic worthlessness of this and most other objects of men's ordinary desires and aims. Pleasure, indeed, Antisthenes declared roundly to be an evil; "Better madness than a surrender to pleasure." He did not overlook the need of supplementing merely intellectual insight by "Socratic force of soul"; but it seemed to him that, by insight and self-mastery combined, an absolute spiritual independence might be attained which left nothing wanting for perfect well-being (see also DIOGENES). For as for poverty, painful toil, disrepute, and such evils as men dread most, these, he argued, were positively useful as means of progress in spiritual freedom and virtue. There is, however, in the Cynic notion of wisdom, no positive criterion beyond the mere negation of irrational desires and prejudices. We saw that Socrates, while not claiming to have found the abstract theory of good or wise conduct, practically understood by it the faithful performance of customary duties, maintaining always that his own happiness was therewith bound up. The Cynics more boldly discarded both pleasure and mere custom as alike irrational; but in so doing they left the freed reason with no definite aim but its own freedom. It is absurd, as Plato urged, to say that knowledge is the good, and then when asked "knowledge of what?" to have no positive reply but "of the good"; but the Cynics do not seem to have made any serious effort to escape from this absurdity.

The ultimate views of these two Socratic schools we shall have to notice presently when we come to the post-Aristotelian schools. We must now proceed to trace the fuller development of the Socratic theory in the hands of Plato and Aristotle.

Plato.

The ethics of Plato cannot properly be treated as a finished result, but rather as a continual movement from the position of Socrates towards the more complete, articulate system of Aristotle; except that there are ascetic and mystical suggestions in some parts of Plato's teaching which find no counterpart in Aristotle, and in fact disappear from Greek philosophy soon after Plato's death until they are revived and fantastically developed in Neopythagoreanism and Neoplatonism. The first stage at which we can distinguish Plato's ethical view from that of Socrates is presented in the *Protagoras*, where he makes a serious, though clearly tentative effort to define the object of that knowledge which he with his master regards as the essence of all virtue. Such knowledge, he here maintains, is really mensuration of pleasures and pains, whereby the wise man avoids those mistaken under-estimates of future feelings in comparison with present which we commonly call "yielding to fear or desire." This hedonism has perplexed Plato's readers needlessly (as we have said in speaking of the Cyrenaics); inasmuch as hedonism is the most obvious corollary of the Socratic doctrine that the different common notions of good—the beautiful, the pleasant and the useful—were to be somehow interpreted by each other. By Plato, however, this conclusion could have been held only before he had accomplished the movement of thought by which he carried the Socratic method beyond the range of human conduct and developed it into a metaphysical system.

This movement may be expressed thus. "If we know," said Socrates, "what justice is, we can give an account or definition of it"; true knowledge must be knowledge of the general fact, common to all the individual cases to which we apply our general notion. But this must be no less true of other objects of thought and discourse; the same relation of general notions to particular examples extends through the whole physical universe; we can think and talk of it only by means of such notions. True or scientific knowledge then must be general knowledge, relating, not to individuals primarily, but to the general facts or qualities which individuals exemplify; in fact, our notion of an individual, when examined, is found to be an aggregate of such general qualities. But, again, the object of true knowledge must be what really exists; hence the reality of the universe must lie in general facts or relations, and not in the individuals that exemplify them.

So far the steps are plain enough; but we do not yet see how this logical Realism (as it was afterwards called) comes to have the essentially ethical character that especially interests us in Platonism. Plato's philosophy is now concerned with the whole universe of being; yet the ultimate object of his philosophic contemplation is still "the good," now conceived as the ultimate ground of all being and knowledge. That is, the essence of the universe is identified with its end,—the "formal" with the "final" cause of things, to use the later Aristotelian phraseology. How comes this about?

Perhaps we may best explain this by recurring to the original application of the Socratic method to human affairs. Since all rational activity is for some end, the different arts or functions of human industry are naturally defined by a statement of their ends or uses; and similarly, in giving an account of the different artists and functionaries, we necessarily state their end, "what they are good for." In a society well ordered on Socratic principles, every human being would be put to some use; the essence of his life would consist in doing what he was good for (his proper ἔργον). But again, it is easy to extend this view throughout the whole region of organized life; an eye that does not attain its end by seeing is without the essence of an eye. In short, we may say of all organs and instruments that they are what we think them in proportion as they fulfil their function and attain their end. If, then, we conceive the whole universe organically, as a complex arrangement of means to ends, we shall understand how Plato might hold that all things really *were*, or (as we say) "realized their idea," in proportion as they accomplished the special end or good for which they were adapted. Even Socrates, in spite of his aversion to physics, was led by pious reflection to expound a teleological view of the physical world, as ordered in all its parts by divine wisdom for the realization of some divine end; and, in the metaphysical turn which Plato gave to this view, he was probably anticipated by Euclid of Megara, who held that the one real being is "that which we call by many names, Good, Wisdom, Reason or God," to which Plato, raising to a loftier significance the Socratic identification of the beautiful with the useful, added the further name of Absolute Beauty, explaining how man's love of the beautiful finally reveals itself as the yearning for the end and essence of being.

Plato, therefore, took this vast stride of thought, and identified the ultimate notions of ethics and ontology. We have now to see what attitude he will adopt towards the practical inquiries from which he started. What will now be his view of wisdom, virtue, pleasure and their relation to human well-being?

The answer to this question is inevitably somewhat complicated. In the first place we have to observe that philosophy has now passed definitely from the market-place into the lecture-room. The quest of Socrates was for the true art of conduct for a man living a practical life among his fellows. But if the objects of abstract thought constitute the real world, of which this world of individual things is but a shadow, it is plain that the highest, most real life must lie in the former region and not in the latter. It is in contemplating the abstract reality which concrete things obscurely exhibit, the type or ideal which they imperfectly imitate, that the true life of the mind in man must consist; and as man is most truly man in proportion as he is mind, the desire of one's own good, which Plato, following Socrates, held to be permanent and essential in every living thing, becomes in its highest form the philosophic yearning for knowledge. This yearning, he held, springs—like more sensual impulses—from a sense of want of something formerly possessed, of which there remains a latent memory in the soul, strong in proportion to its philosophic capacity; hence it is that in learning any abstract truth by scientific demonstration we merely make explicit what we already implicitly know; we bring into clear consciousness hidden memories of a state in which the soul looked upon Reality and Good face to face, before the lapse that imprisoned her in an alien body and mingled her true nature with fleshly feelings and impulses. We thus reach the paradox that the true art of living is really an "art of dying" as far as possible to mere sense, in order more fully to exist in intimate union with absolute goodness and beauty. On the other hand, since the philosopher must still live and act in the concrete sensible world, the Socratic identification of wisdom and virtue is fully maintained by Plato. Only he who apprehends good in the abstract can imitate it in such transient and imperfect good as may be realized in human life, and it is impossible that, having this knowledge, he should not act on it, whether in private or public affairs. Thus, in the true philosopher, we shall necessarily find the practically good man, who being "likest of men to the gods is best loved by them"; and also the perfect statesman, if only the conditions of his society allow him a sphere for exercising his statesmanship.

Virtue a harmony.

The characteristics of this practical goodness in Plato's matured thought correspond to the fundamental conceptions in his view of the universe. The soul of man, in its good or normal condition, must be ordered and harmonized under the guidance of reason. The question then arises, "Wherein does this order or harmony precisely consist?" In explaining how Plato was led to answer this question, it will be well to notice that, while faithfully maintaining the Socratic doctrine that the highest virtue was inseparable from knowledge of the good, he had come to recognize an inferior kind of virtue, possessed by men who were not philosophers. It is plain that if the good that is to be known is the ultimate ground of the whole of things, it is attainable only by a select and carefully trained few. Yet we can hardly restrict all virtue to these alone. What account, then, was to be given of ordinary "civic" bravery, temperance and justice? It seemed clear that men who did their duty, resisting the seductions of fear and desire, must have right opinions, if not knowledge, as to the good and evil in human life; but whence comes this right "opinion"? Partly, Plato said, it comes by nature and "divine allotment," but for its adequate development "custom and practice" are required. Hence the paramount importance of education and discipline for civic virtue; and even for future philosophers such moral culture, in which physical and aesthetic training must co-operate, is indispensable; no merely intellectual preparation will suffice. His point is that perfect knowledge cannot be implanted in a soul that has not gone through a course of preparation including much more than physical training. What, then, is this preparation? A distinct step in psychological analysis was taken when Plato recognized that its effect was to produce the "harmony" above mentioned among different parts of the soul, by subordinating the impulsive elements to reason. These non-rational elements he further distinguished as appetitive (τὸ ἐπιθυμητικόν) and spirited (τὸ θυμοειδές or θυμός)—the practical separateness of which from each other and from reason he held to be established by our inner experience.

On this triple division of the soul he founded a systematic view of the four kinds of goodness recognized by the common moral consciousness of Greece, and in later times known as the Cardinal Virtues (*q.v.*). Of these the two most fundamental were (as has been already indicated) wisdom—in its highest form philosophy—and that harmonious and regulated activity of all the elements of the soul which Plato regards as the essence of uprightness in social relations (δικαιοσύνη). The import of this term is essentially social; and we can explain Plato's use of it only by reference to the analogy which he drew between the individual man and the community. In a rightly ordered polity social and individual well-being alike would depend on that harmonious action of diverse elements, each performing its proper function, which in its social application is more naturally termed δικαιοσύνη. We see, moreover, how in Plato's view the fundamental virtues, Wisdom and Justice in their highest forms, are mutually involved. Wisdom will necessarily maintain orderly activity, and this latter consists in regulation by wisdom, while the two more special virtues of Courage (ἀνδρεία) and Temperance (σωφροσύνη) are only different sides or aspects of this wisely regulated action of the complex soul.

Such, then, are the forms in which essential good seemed to manifest itself in human life. It remains to ask whether the statement of these gives a complete account of human well-being, or whether pleasure also is to be included. On this point Plato's view seems to have gone through several oscillations. After apparently maintaining (*Protagoras*) that pleasure is *the* good, he passes first to the opposite extreme, and denies it (*Phaedo*, *Gorgias*) to be a good at all. For (1), as concrete and transient, it is obviously not the real essential good that the philosopher seeks; (2) the feelings most prominently recognized as pleasures are bound up with pain, as good can never be with evil; in so far, then, as common sense rightly recognizes some pleasures as good, it can only be from their tendency to produce some further good. This view, however, was too violent a divergence from Socratism for Plato to remain in it. That pleasure is not the real absolute good, was no ground for not including it in the good of concrete human life; and after all only coarse and vulgar pleasures were indissolubly linked to the pains of want. Accordingly, in the *Republic* he has no objection to trying the question of the intrinsic superiority of philosophic or virtuous[1] life by the standard of pleasure, and argues that the philosophic (or good) man alone enjoys real pleasure, while the sensualist spends his life in oscillating between painful want and the merely neutral state of painlessness, which he mistakes for positive pleasure. Still more emphatically is it declared in the *Laws* that when we are "discoursing to men, not to gods," we must show that the life which we praise as best and noblest is also that in which there is the greatest excess of pleasure over pain. But though Plato holds this inseparable connexion of best and pleasantest to be true and important, it is only for the sake of the vulgar that he lays this stress on pleasure. For in the most philosophical comparison in the *Philebus* between the claims of pleasure and wisdom the former is altogether worsted; and though a place is allowed to the pure pleasures of colour, form and sound, and of intellectual exercise, and even to the "necessary" satisfaction of appetite, it is only a subordinate one. At the same time, in his later view, Plato avoids the exaggeration of denying all positive quality of pleasure even to the coarser sensual gratifications; they are undoubtedly cases of that "replenishment" or "restoration" to its "natural state" of a bodily organ, in which he defines pleasure to consist (see *Timaeus*, pp. 64, 65); he merely maintains that the common estimate of them is to a large extent illusory, or a false appearance of pleasure is produced by contrast with the antecedent or concomitant painful condition of the organ. It is not surprising that this somewhat complicated and delicately balanced view of the relations of "good" and "pleasure" was not long maintained within the Platonic school, and that under Speusippus, Plato's successor, the main body of Platonists took up a simply anti-hedonistic position, as we learn from the polemic of Aristotle. In the *Philebus*, however, though a more careful psychological analysis leads him to soften down the exaggerations of this attack on sensual pleasure, the antithesis of knowledge and pleasure is again sharpened, and a desire to depreciate even good pleasures is more strongly shown; still even here pleasure is recognized as a constituent of that philosophic life which is the highest human good, while in the *Laws*, where the subject is more popularly treated, it is admitted that we cannot convince man that the just life is the best unless we can also prove it to be the pleasantest.

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[1] It is highly characteristic of Platonism that the issue in this dialogue, as originally stated, is between virtue and vice, whereas, without any avowed change of ground, the issue ultimately discussed is between the philosophic life and the life of vulgar ambition or sensual enjoyment.

Plato and Aristotle.

When a student passes from Plato to Aristotle, he is so forcibly impressed by the contrast between the habits of mind of the two authors, and the literary manners of the two philosophers, that it is easy to understand how their systems have come to be popularly conceived as diametrically opposed to each other; and the uncompromising polemic which Aristotle, both in his ethical and in his metaphysical treatises, directs against Plato and the platonists, has tended strongly to confirm this view. Yet a closer inspection shows us that when a later president of the Academy (Antiochus of Ascalon) repudiated the scepticism which for two hundred years had been accepted as the traditional Platonic doctrine, he had good grounds for claiming Plato and Aristotle as consentient authorities for the ethical position which he took up. For though Aristotle's divergence from Plato is very conspicuous when we consider either his general conception of the subject of ethics, or the details of his system of virtues, still his agreement with his master is almost complete as regards the main outline of his theory of human good; the difference between the two practically vanishes when we view them in relation to the later controversy between Stoics and Epicureans. Even on the cardinal point on which Aristotle entered into direct controversy with Plato, the definite disagreement between the two is less than at first appears; the objections of the disciple hit that part of the master's system that was rather imagined than thought; the main positive result of Platonic speculation only gains in distinctness by the application of Aristotelian analysis.

Plato, we saw, held that there is one supreme science or wisdom, of which the ultimate object is absolute good; in the knowledge of this, the knowledge of all particular goods—that is, of all that we rationally desire to know—is implicitly contained; and also all practical virtue, as no one who truly knows what is good can fail to realize it. But in spite of the intense conviction with which he thus identified metaphysical speculation and practical wisdom, we find in his writings no serious attempt to deduce the particulars of human well-being from his knowledge of absolute good, still less to unfold from it the particular cognitions of the special arts and sciences. Indeed, we may say that the distinction which Aristotle explicitly draws between speculative science or wisdom and practical wisdom (on its political side statesmanship) is really indicated in Plato's actual treatment of the subjects, although the express recognition of it is contrary to his principles. The discussion of good (*e.g.*) in his *Philebus* relates entirely to human good, and the respective claims of Thought and Pleasure to constitute this; he only refers in passing to the Divine Thought that is the good of the ordered world, as something clearly beyond the limits of the present discussion. So again, in his last great ethico-political treatise (the *Laws*) there is hardly a trace of his peculiar metaphysics. On the other hand, the relation between human and divine good, as presented by Aristotle, is so close that we can hardly conceive Plato as having definitely thought it closer. The substantial good of the universe, in Aristotle's view, is the pure activity of universal abstract thought, at once subject and object, which, itself changeless and eternal, is the final cause and first source of the whole process of change in the concrete world. And both he and Plato hold that a similar activity of pure speculative intellect is that in which the philosopher will seek to exist, though he must, being a man, concern himself with the affairs of ordinary human life, a region in which his highest good will be attained by realizing perfect moral excellence. No doubt Aristotle's demonstration of the inappropriateness of attributing moral excellence to the Deity seems to contradict Plato's doctrine that the just man as such is "likest the gods," but here again the discrepancy is reduced when we remember that the essence of Plato's justice (δικαιοσύνη) is harmonious activity. No doubt, too, Aristotle's attribution of pleasure to the Divine Existence shows a profound metaphysical divergence from Plato; but it is a divergence which has no practical importance. Nor, again, is Aristotle's divergence from the Socratic principle that all "virtue is knowledge" substantially greater than Plato's, though it is more plainly expressed. Both accept the paradox in the qualified sense that no one can deliberately act contrary to what appears to him good, and that perfect virtue is inseparably bound up with perfect wisdom or moral insight. Both, however, recognize that this actuality of moral insight is not a function of the intellect only, but depends rather on careful training in good habits applied to minds of good natural dispositions, though the doctrine has no doubt a more definite and prominent place in Aristotle's system. The disciple certainly takes a step in advance by stating definitely, as an essential characteristic of virtuous action, that it is chosen for its own sake, for the beauty of virtue alone; but herein he merely formulates the conviction that his master inspires. Nor, finally, does Aristotle's account of the relation of pleasure to human well-being (although he has to combat the extreme anti-hedonism to which the Platonic school under Speusippus had been led) differ materially from the outcome of Plato's thought on this point, as the later dialogues present it to us. Pleasure, in Aristotle's view, is not the primary constituent of well-being, but rather an inseparable accident of it; human well-being is essentially well-doing, excellent activity of some kind, whether its aim and end be abstract truth or noble conduct; knowledge and virtue are objects of rational choice apart from the pleasure attending them; still all activities are attended and in a manner perfected by pleasure, which is better and more desirable in proportion to the excellence of the activity. He no doubt criticizes Plato's account of the nature of pleasure, arguing that we cannot properly conceive pleasure either as a "process" or as "replenishment"—the last term, he truly says, denotes a material rather than a psychical fact. But this does not interfere with the general ethical agreement between the two thinkers; and the doctrine that vicious pleasures are not true or real pleasures is so characteristically Platonic that we are almost surprised to find it in Aristotle.

In so far as there is any important difference between the Platonic and the Aristotelian views of human good, we may observe that the latter has substantially a closer correspondence to the positive element in the ethical teaching of Socrates,

Aristotle's ethics.

though it is presented in a far more technical and scholastic form, and involves a more distinct rejection of the fundamental Socratic paradox. The same result appears when we compare the methods of the three philosophers. Although the Socratic induction forms a striking feature of Plato's dialogues, his ideal method of ethics is purely deductive; he admits common sense only as supplying provisional steps and starting-points from which the mind is to ascend to knowledge of absolute good, through which knowledge alone, as he conceives, the lower notions of particular goods are to be truly conceived. Aristotle, discarding the transcendentalism of Plato, naturally retained from Plato's teaching the original Socratic method of induction from and verification by common opinion. Indeed, the windings of his exposition are best understood if we consider his literary manner as a kind of Socratic dialogue formalized and reduced to a monologue. He first leads us by an induction to the fundamental notion of ultimate end or good for man. All men, in acting, aim at some result, either for its own sake or as a means to some further end; but obviously not everything can be sought merely as a means; there must be some ultimate end. In fact men commonly recognize such an end, and agree to call it well-being[1] (εὐδαιμονία). But they take very different views of its nature; how shall we find the true view? We observe that men are classified according to their functions; all kinds of man, and indeed all organs of man, have their special functions, and are judged as functionaries and organs according as they perform their functions well or ill. May we not then infer that man, as man, has his proper function, and that the well-being or "doing well" that all seek really lies in fulfilling well the proper function of man,—that is, in living well that life of the rational soul which we recognize as man's distinctive attribute?

Again, this Socratic deference to common opinion is not shown merely in the way by which Aristotle reaches his fundamental conception; it equally appears in his treatment of the conception itself. In the first place, though in Aristotle's view the most perfect well-being consists in the exercise of man's "divinest part," pure speculative reason, he keeps far from the paradox of putting forward this and nothing else as human good; so far, indeed, that the greater part of his treatise is occupied with an exposition of the inferior good which is realized in practical life when the appetitive or impulsive (semi-rational) element of the soul operates under the due regulation of reason. Even when the notion of "good performance of function" was thus widened, and when it had further taken in the pleasure that is inseparably connected with such functioning, it did not yet correspond to the whole of what a Greek commonly understood as "human well-being." We may grant, indeed, that a moderate provision of material wealth is indirectly included, as an indispensable pre-requisite of a due performance of many functions as Aristotle conceives it—his system admits of no beatitudes for the poor; still there remain other goods, such as beauty, good birth, welfare of progeny, the presence or absence of which influenced the common view of a man's well-being, though they could hardly be shown to be even indirectly important to his "well-acting." These Aristotle attempts neither to exclude from the philosophic conception of well-being nor to include in his formal definition of it. The deliberate looseness which is thus given to his fundamental doctrine characterizes more or less his whole discussion of ethics. He plainly says that the subject does not admit of completely scientific treatment; his aim is to give not a definite theory of human good, but a practically adequate account of its most important constituents.

The most important element, then, of well-being or good life for ordinary men Aristotle holds to consist in well-doing as determined by the notions of the different moral excellences. In expounding these, he gives throughout the pure result of analytical observation of the common moral consciousness of his age. Ethical truth, in his view, is to be attained by careful comparison of particular moral opinions, just as physical truth is to be obtained by induction from particular physical observations. On account of the conflict of opinion in ethics we cannot hope to obtain certainty upon all questions; still reflection will lead us to discard some of the conflicting views and find a reconciliation for others, and will furnish, on the whole, a practically sufficient residuum of moral truth. This adhesion to common sense, though it involves a sacrifice of both depth and completeness in Aristotle's system, gives at the same time an historical interest which renders it deserving of special attention as an analysis of the current Greek ideal of "fair and good life" (καλοκἀγαθία). His virtues are not arranged on any clear philosophic plan; the list shows no serious attempt to consider human life exhaustively, and exhibit the standard of excellence appropriate to its different departments or aspects. He seems to have taken as a starting-point Plato's four cardinal virtues. The two comprehensive notions of Wisdom and Justice (δικαιοσύνη) he treats separately. As regards both his analysis leads him to diverge considerably from Plato. As we saw, his distinction between practical and speculative Wisdom belongs to the deepest of his disagreements with his master; and in the case of δικαιοσύνη again he distinguishes the wider use of the term to express Law-observance, which (he says) coincides with the social side of virtue generally, and its narrower use for the virtue that "aims at a kind of equality," whether (1) in the distribution of wealth, honour, &c., or (2) in commercial exchange, or (3) in the reparation of wrong done. Then, in arranging the other special virtues, he begins with courage and temperance, which (after Plato) he considers as the excellences of the "irrational element" of the soul. Next follow two pairs of excellences, concerned respectively with wealth and honour: (1) liberality and magnificence, of which the latter is exhibited in greater matters of expenditure, and (2) laudable ambition and high-mindedness similarly related to honour. Then comes gentleness—the virtue regulative of anger; and the list is concluded by the excellences of social intercourse, friendliness (as a mean between obsequiousness and surliness), truthfulness and decorous wit.

The abundant store of just and close analytical observation contained in Aristotle's account of these notions give it a permanent interest, even beyond its historical value as a delineation of the Greek ideal of "fair and good" life.[2] But its looseness of arrangement and almost grotesque co-ordination of qualities widely differing in importance are obvious. Thus his famous general formula for virtue, that it is a mean or middle state, always to be found somewhere between the vices which stand to it in the relation of excess and defect, scarcely avails to render his treatment more systematic. It was important, no doubt, to express the need of observing due measure and proportion, in order to attain good results in human life no less than in artistic products; but the observation of this need was no new thing in Greek literature; indeed, it had already led the Pythagoreans and Plato to find the ultimate essence of the ordered universe in number. But Aristotle's purely quantitative statement of the relation of virtue and vice is misleading, even where it is not obviously inappropriate; and sometimes leads him to such eccentricities as that of making simple veracity a mean between boastfulness and mock-modesty.[3]

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[1] This cardinal term is commonly translated "happiness"; and it must be allowed that it is the most natural term for what we (in English) agree to call "our being's end and aim." But happiness so definitely signifies a state of feeling that it will not admit the interpretation that Aristotle (as well as Plato and the Stoics) expressly gives to εὐδαιμονία; the confusion is best avoided by rendering the word by the less familiar "well-being."

[2] Aristotle follows Plato and Socrates in identifying the notions of καλός ("fair," "beautiful") and ἀγαθός ("good") in their application to conduct. We may observe, however, that while the latter term is used to denote the virtuous man, and (in the neuter) equivalent to End generally, the former is rather chosen to express the quality of virtuous acts which in any particular case is the end of the virtuous agent. Aristotle no doubt faithfully represents the common sense of Greece in considering that, in so far as virtue is in itself good to the virtuous agent, it belongs to that species of good which we distinguish as beautiful. In later Greek philosophy the term καλόν ("honestum") became still more technical in the signification of "morally good."

[3] The above account is considerably expanded in H. Sidgwick's *Hist. of Ethics* (5th ed., 1902), pp. 59-70.

It ought to be said that Aristotle does not present the formula just discussed as supplying a criterion of good conduct in any particular case; he expressly leaves this to be determined by "correct reasoning, and the judgment of the practically-wise man (ὁ φρόνιμος)." We cannot, however, find that he has furnished any substantial principles for its determination; indeed, he hardly seems to have formed a distinct general idea of the practical syllogism by which he conceives it to be effected.[1] The kind of reasoning which his view of virtuous conduct requires is one in which the ultimate major premise states a distinctive characteristic of some virtue, and one or more minor premises show that such characteristic belongs to a certain mode of conduct under given circumstances; since it is essential to good conduct that it should contain its end in itself, and be chosen for its own sake. But he has not failed to observe that practical reasonings are not commonly of this kind, but are rather concerned with actions as means to ulterior ends; indeed, he lays stress on this as a characteristic of the "political" life, when he wishes to prove its inferiority to the life of pure speculation. Though common sense will admit that virtues are the best of goods, it still undoubtedly conceives practical wisdom as chiefly exercised in providing those inferior goods which Aristotle, after recognizing the need or use of them for the realization of human well-being, has dropped out of sight; and the result is that, in trying to make clear his conception of practical wisdom, we find ourselves fluctuating continually between the common notion, which he does not distinctly reject, and the notion required as the keystone of his ethical system.

Transition to Stoicism.

On the whole, there is probably no treatise so masterly as Aristotle's *Ethics*, and containing so much close and valid thought, that yet leaves on the reader's mind so strong an impression of dispersive and incomplete work. It is only by dwelling on these defects that we can understand the small amount of influence that his system exercised during the five centuries after his death, as compared with the effect which it has had, directly or indirectly, in shaping the thought of modern Europe. Partly, no doubt, the limited influence of his disciples, the Peripatetics (*q.v.*), is to be attributed to that exaltation of the purely speculative life which distinguished the Aristotelian ethics from other later systems, and which was too alien from the common moral consciousness to find much acceptance in an age in which the ethical aims of philosophy had again become paramount. Partly, again, the analytical distinctness of Aristotle's manner brings into special prominence the difficulties that attend the Socratic effort to reconcile the ideal aspirations of men with the principles on which their practical reasonings are commonly conducted. The conflict between these two elements of Common Sense was too profound to be compromised; and the moral consciousness of mankind demanded a more trenchant partisanship than Aristotle's. Its demands were met by the Stoic school which separated the moral from the worldly view of life, with an absoluteness and definiteness that caught the imagination; which regarded practical goodness as the highest manifestation of its ideal of wisdom; and which bound the common notions of duty into an apparently coherent system, by a formula that comprehended the whole of human life, and exhibited its relation to the ordered process of the universe. The intellectual descent of its ethical doctrines is principally to be traced to Socrates through the Cynics, though an important element in them seems attributable to the school that inherited the "Academy" of Plato. Both Stoic and Cynic maintained, in its sharpest form, the fundamental tenet that the practical knowledge which is virtue, with the condition of soul that is inseparable from it, is alone to be accounted good. He who exercises this wisdom or knowledge has complete well-being; all else is indifferent to him. It is true that the Cynics were more concerned to emphasize the negative side of the sage's well-being, while the Stoics brought into more prominence its positive side. This difference, however, did not amount to disagreement. The Stoics, in fact, seem generally to have regarded the eccentricities of Cynicism as an emphatic manner of expressing the essential antithesis between philosophy and the world; a manner which, though not necessary or even normal, might yet be advantageously adopted by the sage under certain circumstances.[2]

Stoicism.

Wherein, then, consists this knowledge or wisdom that makes free and perfect? Both Cynics and Stoics (*q.v.*) agreed that the most important part of it was the knowledge that the sole good of man lay in this knowledge or wisdom itself. It must be understood that by wisdom they meant wisdom realized in act; indeed, they did not conceive the existence of wisdom as separable from such realization. We may observe, too, that the Stoics rejected the divergence which we have seen gradually taking place in Platonic-Aristotelian thought from the position of Socrates, "that no one aims at what he knows to be bad." The stress that their psychology laid on the essential unity of the rational self that is the source of voluntary action prevented them from accepting Plato's analysis of the soul into a regulative element and elements needing regulation. They held that what we call passion is a morbid condition of the rational soul, involving erroneous judgment as to what is to be sought or shunned. From such passionate errors the truly wise man will of course be free. He will be conscious indeed of physical appetite; but he will not be misled into supposing that its object is really a good; he cannot, therefore, hope for the attainment of this object or fear to miss it, as these states involve the conception of it as a good. Similarly, though like other men he will be subject to bodily pain, this will not cause him mental grief or disquiet, as his worst agonies will not disturb his clear conviction that it is really indifferent to his true reasonable self.

That this impassive sage was a being not to be found among living men the later Stoics at least were fully aware. They faintly suggested that one or two moral heroes of old time might have realized the ideal, but they admitted that all other philosophers (even) were merely in a state of progress towards it. This admission did not in the least diminish the rigour of their demand for absolute loyalty to the exclusive claims of wisdom. The assurance of its own unique value that such wisdom involved they held to be an abiding possession for those who had attained it;[3] and without this assurance no act could be truly wise or virtuous. Whatever was not of knowledge was of sin; and the distinction between right and wrong being absolute and not admitting of degrees all sins were equally sinful; whoever broke the least commandment was guilty of the whole law. Similarly, all wisdom was somehow involved in any one of the manifestations of wisdom, commonly distinguished as particular virtues; though whether these virtues were specifically distinct, or only the same knowledge in different relations, was a subtle question on which the Stoics do not seem to have been agreed.

Aristotle had already been led to attempt a refutation of the Socratic identification of virtue with knowledge; but his attempt had only shown the profound difficulty of attacking the paradox, so long as it was admitted that no one could of deliberate purpose act contrary to what seemed to him best. Now, Aristotle's divergence from Socrates had not led him so far as to deny this; while for the Stoics who had receded to the original Socratic position, the difficulty was still more patent. This theory of virtue led them into two dilemmas. Firstly, if virtue is knowledge, does it follow that vice is involuntary? If not, it must be that ignorance is voluntary. This alternative is the less dangerous to morality, and as such the Stoics chose it. But they were not yet at the end of their perplexities; for while they were thus driven to an extreme extension of the range of human volition, their view of the physical universe involved an equally thorough-going determinism. How could the vicious man be responsible if his vice were strictly pre-determined? The Stoics answered that the error which was the essence of vice was so far voluntary that it could be avoided if men chose to exercise their reason. No doubt it depended on the innate force and firmness[1] of a man's soul whether his reason was effectually exercised; but moral responsibility was saved if the vicious act proceeded from the man himself and not from any external cause.

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[1] There is a certain difficulty in discussing Aristotle's views on the subject of practical wisdom, and the relation of the intellect to moral action, since it is most probable that the only accounts that we have of these views are not part of the genuine writings of Aristotle. Still books vi. and vii. of the *Nicomachean Ethics* contain no doubt as pure Aristotelian doctrine as a disciple could give, and appear to supply a sufficient foundation for the general criticism expressed in the text.

[2] It has been suggestively said that Cynicism was to Stoicism what monasticism was to early Christianity. The analogy, however, must not be pressed too far, since orthodox Stoics do not ever seem to have regarded Cynicism as the more perfect way.

[3] The Stoics were not quite agreed as to the immutability of virtue, but they were agreed that, when once possessed, it could only be lost through the loss of reason itself.

With all this we have not ascertained the positive practical content of this wisdom. How are we to emerge from the barren circle of affirming (1) that wisdom is the sole good and unwisdom the sole evil, and (2) that wisdom is the knowledge of good and evil; and attain some method for determining the particulars of good conduct? The Cynics made no attempt to solve this difficulty; they were content to mean by virtue what any plain man meant by it, except in so far as their sense of independence led them to reject certain received precepts and prejudices. The Stoics, on the other hand, not only worked out a detailed system of duties—or, as they termed them, "things meet and fit" (*καθήκοντα*) for all occasions of life; they were further especially concerned to comprehend them under a general formula. They found this by bringing out the positive significance of the notion of Nature, which the Cynic had used chiefly in a negative way, as an antithesis to the "consentions" (*νόμος*), from which his knowledge had made him free. Even in this negative use of the notion it is necessarily implied that whatever active tendencies in man are found to be "natural"—that is, independent of and uncorrupted by social customs and conventions—will properly take effect in outward acts, but the adoption of "conformity to nature" as a general positive rule for outward conduct seems to have been due to the influence on Zeno of Academic teaching. Whence, however, can this authority belong to the natural, unless nature be itself an expression or embodiment of divine law and wisdom? The conception of the world, as organized and filled by divine thought, was common, in some form, to all the philosophies that looked back to Socrates as their founder,—some even maintaining that this thought was the sole reality. This pantheistic doctrine harmonized thoroughly with the Stoic view of human good; but being unable to conceive substance idealistically, they (with considerable aid from the system of Heraclitus) supplied a materialistic side to their pantheism,—conceiving divine thought as an attribute of the purest and most primary of material substances, a subtle fiery aether. This theological view of the physical universe had a double effect on the ethics of the Stoic. In the first place it gave to his cardinal conviction of the all-sufficiency of wisdom for human well-being a root of cosmical fact, and an atmosphere of religious and social emotion. The exercise of wisdom was now viewed as the pure life of that particle of divine substance which was in very truth the "god within him"; the reason whose supremacy he maintained was the reason of Zeus, and of all gods and reasonable men, no less than his own; its realization in any one individual was thus the common good of all rational beings as such; "the sage could not stretch out a finger rightly without thereby benefiting all other sages,"—nay, it might even be said that he was "as useful to Zeus as Zeus to him."[2] But again, the same conception served to harmonize the higher and the lower elements of human life. For even in the physical or non-rational man, as originally constituted, we may see clear indications of the divine design, which it belongs to his rational will to carry into conscious execution; indeed, in the first stage of human life, before reason is fully developed, uncorrupted natural impulse effects what is afterwards the work of reason. Thus the formula of "living according to nature," in its application to man as the "rational animal," may be understood both as directing that reason is to govern, and as indicating how that government is to be practically exercised. In man, as in every other animal, from the moment of birth natural impulse prompts to the maintenance of his physical frame; then, when reason has been developed and has recognized itself as its own sole good, these "primary ends of nature" and whatever promotes these still constitute the outward objects at which reason is to aim; there is a certain value (*ἀξία*) in them, in proportion to which they are "preferred" (*προηγμένα*) and their opposites "rejected" (*ἀποπροηγμένα*); indeed it is only in the due and consistent exercise of such choice that wisdom can find its practical manifestation. In this way all or most of the things commonly judged to be "goods"—health, strength, wealth, fame,[1] &c.,—are brought within the sphere of the sage's choice, though his real good is solely in the wisdom of the choice, and not in the thing chosen.

The doctrine of conformity to Nature as the rule of conduct was not peculiar to Stoicism. It is found in the theories of Speusippus, Xenocrates, and also to some extent in those of the Peripatetics. The peculiarity of the Stoics lay in their refusing to use the terms "good and evil" in connexion with "things indifferent," and in pointing out that philosophers, though independent of these things, must yet deal with them in practical life.

So far we have considered the "nature" of the individual man as apart from his social relations; but the sphere of virtue, as commonly conceived, lies chiefly in these, and this was fully recognized in the Stoic account of duties (*καθήκοντα*); indeed, in their exposition of the "natural" basis of justice, the evidence that man was born not for himself but for mankind is the most important part of their work in the region of practical morality. Here, however, we especially notice the double significance of "natural," as applied to (1) what actually exists everywhere or for the most part, and (2) what would exist if the original plan of man's life were fully carried out; and we find that the Stoics have not clearly harmonized the two elements of the notion. That man was "naturally" a social animal Aristotle had already taught; that all rational beings, in the unity of the reason that is common to all, form naturally one community with a common law was (as we saw) an immediate inference from the Stoic conception of the universe as a whole. That the members of this "city of Zeus" should observe their contracts, abstain from mutual harm, combine to protect each other from injury, were obvious points of natural law; while again, it was clearly necessary to the preservation of human society that its members should form sexual unions, produce children, and bestow care on their rearing and training. But beyond this nature did not seem to go in determining the relations of the sexes; accordingly, we find that community of wives was a feature of Zeno's ideal commonwealth, just as it was of Plato's; while, again, the strict theory of the school recognized no government or laws as true or binding except those of the sage; he alone is the true ruler, the true king. So far, the Stoic "nature" seems in danger of being as revolutionary as Rousseau's. Practically, however, this revolutionary aspect of the notion was kept for the most part in the background; the rational law of an ideal community was not distinguished from the positive ordinances and customs of actual society; and the "natural" ties that actually bound each man to family, kinsmen, fatherland, and to unwise humanity generally, supplied the outline on which the external manifestation of justice was delineated. It was a fundamental maxim that the sage was to take part in public life; and it does not appear that his political action was to be regulated by any other principles than those commonly accepted in his community. Similarly, in the view taken by the Stoics of the duties of social decorum, and in their attitude to the popular religion, we find a fluctuating compromise between the disposition to repudiate what is conventional, and the disposition to revere what is established, each tendency expressing in its own way the principle of "conforming to nature."

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[1] Hence some members of the school, without rejecting the definition of virtue = knowledge, also defined it as "strength and force."

[2] It is apparently in view of this union in reason of rational beings that friends are allowed to be "external goods" to the sage, and that the possession of good children is also counted a good.

[1] The Stoics seem to have varied in their view of "good repute," *εὐδοξία*; at first, when the school was more under the influence of Cynicism, they professed an outward as well as an inward indifference to it; ultimately they conceded the point to common sense, and included it among *προηγμένα*.

Stoics and hedonists.

Among the primary ends of nature, in which wisdom recognized a certain preferability, the Stoics included freedom from bodily pain; but they refused, even in this outer court of wisdom, to find a place for pleasure. They held that the latter was not an object of uncorrupted natural impulse, but an "aftergrowth" (ἐπιγέννημα). They thus endeavoured to resist Epicureanism even on the ground where the latter seems prima facie strongest; in its appeal, namely, to the natural pleasure-seeking of all living things. Nor did they merely mean by pleasure (ἡδονή) the gratification of bodily appetite; we find (*e.g.*) Chrysippus urging, as a decisive argument against Aristotle, that pure speculation was "a kind of amusement; that is, pleasure." Even the "joy and gladness" (χαρά, εὐφροσύνη) that accompany the exercise of virtue seem to have been regarded by them as merely an inseparable accident, not the essential constituent of well-being. It is only by a later modification of Stoicism that cheerfulness or peace of mind is taken as the real ultimate end, to which the exercise of virtue is merely a means. At the same time it is probable that the serene joys of virtue and the griefléssness which the sage was conceived to maintain amid the worst tortures, formed the main attractions of Stoicism for ordinary minds. In this sense it may be fairly said that Stoics and Epicureans made rival offers to mankind of the same kind of happiness; and the philosophical peculiarities of either system may be traced to the desire of being undisturbed by the changes and chances of life. The Stoic claims on this head were the loftiest; as the well-being of their sage was independent, not only of external things and bodily conditions, but of time itself; it was fully realized in a single exercise of wisdom and could not be increased by duration. This paradox is violent, but it is quite in harmony with the spirit of Stoicism; and we are more startled to find that the Epicurean sage, no less than the Stoic, is to be happy even on the rack; that his happiness, too, is unimpaired by being restricted in duration, when his mind has apprehended the natural limits of life; that, in short, Epicurus makes no less strenuous efforts than Zeno to eliminate imperfection from the conditions of human existence. This characteristic, however, is the key to the chief differences between Epicureanism and the more naïve hedonism of Aristippus. The latter system gave the simplest and most obvious answer to the inquiry after ultimate good for man; but besides being liable, when developed consistently, to offend the common moral consciousness, it conspicuously failed to provide the "completeness" and "security" which, as Aristotle says, "one divines to belong to man's true Good." Philosophy, in the Greek view, should be the art as well as the science of good life; and hedonistic philosophy would seem a bungling and uncertain art of pleasure, as pleasure is ordinarily conceived. Nay, it would even be found that the habit of philosophical reflection often operated adversely to the attainment of this end, by developing the thinker's self-consciousness, so as to disturb that normal relation to external objects on which the zest of ordinary enjoyment depends. Hence we find that later thinkers of the Cyrenaic school felt themselves compelled to change their fundamental notion; thus Theodorus defined the good as "gladness" (χαρά) depending on wisdom, as distinct from mere pleasure, while Hegesias proclaimed that happiness was unattainable, and that the chief function of wisdom was to render life painless by producing indifference to all things that give pleasure. But by such changes their system lost the support that it had had in the pleasure-seeking tendencies of ordinary men. It was clear that if philosophic hedonism was to be established on a broad and firm basis, it must in its notion of good combine what the plain man naturally sought with what philosophy could plausibly offer. Such a combination was effected, with some little violence, by Epicurus; whose system with all its defects showed a remarkable power of standing the test of time, as it attracted the unqualified adhesion of generation after generation of disciples for a period of some six centuries.

Epicurus.

In the fundamental principle of his philosophy Epicurus is not original. Aristippus (cf. also Plato in the *Protagoras* and Eudoxus) had already maintained that pleasure is the sole ultimate good, and pain the sole evil; that no pleasure is to be rejected except for its painful consequences, and no pain to be chosen except as a means to greater pleasure; that the stringency of all laws and customs depends solely on the legal and social penalties attached to their violation; that, in short, all virtuous conduct and all speculative activity are empty and useless, except as contributing to the pleasantness of the agent's life. And Epicurus assures us that he means by pleasure what plain men mean by it; and that if the gratifications of appetite and sense are discarded, the notion is emptied of its significance. So far the system would seem to suit the inclinations of the most thorough-going voluptuary. The originality of Epicurus lay in his theory that the highest point of pleasure, whether in body or mind, is to be attained by the mere removal of pain or disturbance, after which pleasure admits of variation only and not of augmentation; that therefore the utmost gratification of which the body is capable may be provided by the simplest means, and that "natural wealth" is no more than any man can earn. When further he teaches that the attainment of happiness depends almost entirely upon insight and right calculation, fortune having very little to do with it; that the pleasures and pains of the mind are far more important than those of the body, owing to the accumulation of feeling caused by memory and anticipation; and that an indispensable condition of mental happiness lies in relieving the mind of all superstitions, which can be effected only by a thorough knowledge of the physical universe—he introduces an ample area for the exercise of the philosophic intellect. So again, in the stress that he lays on the misery which the most secret wrong-doing must necessarily cause from the perpetual fear of discovery, and in his exuberant exaltation of the value of disinterested friendship, he shows a sincere, though not completely successful, effort to avoid the offence that consistent egoistic hedonism is apt to give to ordinary human feeling. As regards friendship, Epicurus was a man of peculiarly unexclusive sympathies.[1] The genial fellowship of the philosophic community that he collected in his garden remained a striking feature in the traditions of his school; and certainly the ideal which Stoics and Epicureans equally cherished of a brotherhood of sages was most easily realized on the Epicurean plan of withdrawing from political and dialectical conflict to simple living and serene leisure, in imitation of the gods apart from the fortuitous concourse of atoms that we call a world. No doubt it was rather the practical than the theoretical side of Epicureanism which gave it so strong a hold on succeeding generations.

Later Greek philosophy. Stoicism in Rome.

The two systems that have just been described were those that most prominently attracted the attention of the ancient world, so far as it was directed to ethics, from their almost simultaneous origin to the end of the 2nd century A.D., when Stoicism almost vanishes from our view. But side by side with them the schools of Plato and Aristotle still maintained a continuity of tradition, and a more or less vigorous life; and philosophy, as a recognized element of Graeco-Roman culture, was understood to be divided among these four branches. The internal history, however, of the four schools was very different. We find no development worthy of notice in Aristotelian ethics (see PERIPATETICS). The Epicureans, again, from their unquestioning acceptance of the "dogmas"[2] of their founder, almost deserve to be called a sect rather than a school. On the other hand, the changes in Stoicism are very noteworthy; and it is the more easy to trace them, as the only original writings of this school which we possess are those of the later Roman Stoics. These changes may be attributed partly to the natural inner development of the system, partly to the reaction of the Roman mind on the essentially Greek doctrine which it received,—a reaction all the more inevitable from the very affinity between the Stoic sage and the ancient Roman ideal of manliness. It was natural that the earlier Stoics should be chiefly occupied with delineating the inner and outer characteristics of ideal wisdom and virtue, and that the gap between the ideal sage and the actual philosopher, though never ignored, should yet be somewhat overlooked. But when the question "What is man's good?" had been answered by an exposition of perfect wisdom, the practical question "How may a man emerge from the folly of the world, and get on the way towards wisdom?" naturally attracted attention; and the preponderance of moral over scientific interest, which was characteristic of the Roman mind, gave this question especial prominence. The sense of the gap between theory and fact gives to the religious element of Stoicism a new force; the soul, conscious of its weakness, leans on the thought of God, and in the philosopher's attitude towards external events, pious resignation preponderates over self-poised indifference; the old self-reliance of the reason, looking down on man's natural life as a mere field for its exercise, makes room for a positive aversion to the flesh as an alien element imprisoning the spirit; the body has come to be a "corpse which the soul sustains,"[1] and life a "sojourn in a strange land";[2] in short, the ethical idealism of Zeno has begun to borrow from the metaphysical idealism of Plato.

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[1] It is noted of him that he did not disdain the co-operation either of women or of slaves in his philosophical labours.

[2] The last charge of Epicurus to his disciples is said to have been, *τῶν δογμάτων μεμνῆσθαι.*

History of Plato's school.

In no one of these schools was the outward coherence of tradition so much strained by inner changes as it was in Plato's. The alterations, however, in the metaphysical position of the Academics had little effect on their ethical teaching, as, even during the period of Scepticism, they appear to have presented as probable the same general view of human good which Antiochus afterwards dogmatically announced as a revival of the common doctrine of Plato and Aristotle. And during the period of a century and a half between Antiochus and Plutarch, we may suppose the school to have maintained the old controversy with Stoicism on much the same ground, accepting the formula of "life according to nature," but demanding that the "good" of man should refer to his nature as a whole, the good of his rational part being the chief element, and always preferable in case of conflict, but yet not absolutely his sole good. In Plutarch, however, we see the same tendencies of change that we have noticed in later Stoicism. The conception of a normal harmony between the higher and lower elements of human life has begun to be disturbed, and the side of Plato's teaching that deals with the inevitable imperfections of the world of concrete experience becomes again prominent. For example, we find Plutarch amplifying the suggestion in Plato's latest treatise (the *Laws*) that this imperfection is due to a bad world-soul that strives against the good,—a suggestion which is alien to the general tenor of Plato's doctrine, and had consequently been unnoticed during the intervening centuries. We observe, again, the value that Plutarch attaches, not merely to the sustainment and consolation of rational religion, but to the supernatural communications vouchsafed by the divinity to certain human beings in dreams, through oracles, or by special warnings, like those of the genius of Socrates. For these flashes of intuition, he holds, the soul should be prepared by tranquil repose and the subjugation of sensuality through abstinence. The same ascetic effort to attain by aloofness from the body a pure receptivity for supernatural influences, is exhibited in Neo-Pythagoreanism. But the general tendency that we are noting did not find its full expression in a reasoned system until we come to the Egyptian Plotinus.

Neo-platonism.

The system of Plotinus (205–270 A.D.) is a striking development of that element of Platonism which has had most fascination for the medieval and even for the modern mind, but which had almost vanished out of sight in the controversies of the post-Aristotelian schools. At the same time the differences are the more noteworthy from the reverent adhesion which the Neoplatonists always maintain to Plato. Plato identified good with the real essence of things; with that in them which is definitely conceivable and knowable. It belongs to this view to regard the imperfection of things as devoid of real being, and so incapable of being definitely thought or known; accordingly, we find that Plato has no technical term for that in the concrete sensible world which hinders it from perfectly expressing the abstract ideal world, and which in Aristotle's system is distinguished as absolutely formless matter (ὕλη). And so, when we pass from the ontology to the ethics of Platonism, we find that, though the highest life is only to be realized by turning away from concrete human affairs and their material environment, still the sensible world is not yet an object of positive moral aversion; it is rather something which the philosopher is seriously concerned to make as harmonious, good and beautiful as possible. But in Neoplatonism the inferiority of the condition in which the embodied human soul finds itself is more intensely and painfully felt; hence an express recognition of formless matter (ὕλη) as the "first evil," from which is derived the "second evil," body (σῶμα), to whose influence all the evil in the soul's existence is due. Accordingly the ethics of Plotinus represent, we may say, the moral idealism of the Stoics cut loose from nature. The only good of man is the pure existence of the soul, which in itself, apart from the contagion of the body, is perfectly free from error or defect; if only it can be restored to the untrammelled activity of its original being, nothing external, nothing bodily, can positively impair its perfect welfare. It is only the lowest form of virtue—the "civic" virtue of Plato's *Republic*—that is employed in regulating those animal impulses whose presence in the soul is due to its mixture with the body; higher or philosophic wisdom, temperance, courage and justice are essentially purifications from this contagion; until finally the highest mode of goodness is reached, in which the soul has no community with the body, and is entirely turned towards reason. It should be observed that Plotinus himself is still too Platonic to hold that the absolute mortification of natural bodily appetites is required for purifying the soul; but this ascetic inference was drawn to the fullest extent by his disciple Porphyry.

There is, however, a yet higher point to be reached in the upward ascent of the Neoplatonist from matter; and here the divergence of Plotinus from Platonic idealism is none the less striking, because it is a *bona fide* result of reverent reflection on Plato's teaching. The cardinal assumption of Plato's metaphysic is, that the real is definitely thinkable and knowable in proportion as it is real; so that the further the mind advances in abstraction from sensible particulars and apprehension of real being, the more definite and clear its thought becomes. Plotinus, however, urges that, as all thought involves difference or duality of some kind, it cannot be the primary fact in the universe, what we call God. He must be an essential unity prior to this duality, a Being wholly without difference or determination; and, accordingly, the highest mode of human existence, in which the soul apprehends this absolute, must be one in which all definite thought is transcended, and all consciousness of self lost in the absorbing ecstasy. Porphyry tells us that his master Plotinus attained the highest state four times during the six years which he spent with him.

Neoplatonism, originally Alexandrine, is often regarded as Hellenistic rather than Hellenic, a product of the mingling of Greek with Oriental civilization. But however Oriental may have been the cast of mind that welcomed this theosophic asceticism, the forms of thought by which these views were philosophically reached are essentially Greek; and it is by a thoroughly intelligible process of natural development, in which the intensification of the moral consciousness represented by Stoicism plays an important part, that the Hellenic pursuit of knowledge culminates in a preparation for ecstasy, and the Hellenic idealization of man's natural life ends in a settled antipathy to the body and its works. At the same time we ought not to overlook the affinities between the doctrine of Plotinus and that remarkable combination of Greek and Hebrew thought which Philo Judaeus had expounded two centuries before; nor the fact that Neoplatonism was developed in

[1] Epictetus. [2] Marcus Aurelius.

conscious antagonism to the new religion which had spread from Judea, and was already threatening the conquest of the Graeco-Roman world, and also to the Gnostic systems (see GNOSTICISM); nor, finally, that it furnished the chief theoretical support in the last desperate struggle that was made under Julian to retain the old polytheistic worship.

B. *Christianity and Medieval Ethics.*—In the present article we are not concerned with the origin of the Christian religion, nor with its outward history. Nor have we to consider the special doctrines that have formed the bond of union of the Christian communities except in their ethical aspect, their bearing on the systematization of human aims and activities. This aspect, however, must necessarily be prominent in discussing Christianity, which cannot be adequately treated merely as a system of theological beliefs divinely revealed, and special observances divinely sanctioned; for it claims to regulate the whole man, in all departments of his existence. It was not till the 4th century A.D. that the first attempt was made to offer a systematic exposition of Christian morality; and nine centuries more had passed away before a genuinely philosophic intellect, trained by a full study of Aristotle, undertook to give complete scientific form to the ethical doctrine of the Catholic church. Before, however, we take a brief survey of the progress of systematic ethics from Ambrose to Thomas Aquinas, it may be well to examine the chief features of the new moral consciousness that had spread through Graeco-Roman civilization, and was awaiting philosophic synthesis. It will be convenient to consider first the new *form* or universal characteristics of Christian morality, and afterwards to note the chief points in the *matter* or particulars of duty and virtue which received development or emphasis from the new religion.

Christian and Jewish "law of God."

The first point to be noticed is the new conception of morality as the positive law of a theocratic community possessing a written code imposed by divine revelation, and sanctioned by divine promises and threatenings. It is true that we find in ancient thought, from Socrates downwards, the notion of a law of God, eternal and immutable, partly expressed and partly obscured by the shifting codes and customs of actual human societies. But the sanctions of this law were vaguely and, for the most part, feebly imagined; its principles were essentially unwritten, and thus referred not to the external will of an Almighty Being who claimed unquestioning submission, but rather to the reason that gods and men shared, by the exercise of which alone they could be adequately known and defined. Hence, even if the notion of law had been more prominent than it was in ancient ethical thought, it could never have led to a juridical, as distinct from a philosophical, treatment of morality. In Christianity, on the other hand, we early find that the method of moralists determining right conduct is to a great extent analogous to that of jurisconsults interpreting a code. It is assumed that divine commands have been implicitly given for all occasions of life, and that they are to be ascertained in particular cases by interpretation of the general rules obtained from texts of scripture, and by inference from scriptural examples. This juridical method descended naturally from the Jewish theocracy, of which Christendom was a universalization. Moral insight, in the view of the most thoughtful Jews of the age immediately preceding Christianity, was conceived as knowledge of a divine code, emanating from an authority external to human reason which had only the function of interpreting and applying its rules. This law was derived partly from Moses, partly from the utterances of the later prophets, partly from oral tradition and from the commentaries and supplementary maxims of generations of students. Christianity inherited the notion of a written divine code acknowledged as such by the "true Israel"—now potentially including the whole of mankind, or at least the chosen of all nations,—on the sincere acceptance of which the Christian's share of the divine promises to Israel depended. And though the ceremonial part of the old Hebrew code was altogether rejected, and with it all the supplementary jurisprudence resting on tradition and erudite commentary, still God's law was believed to be contained in the sacred books of the Jews, supplemented by the teaching of Christ and his apostles. By the recognition of this law the church was constituted as an ordered community, essentially distinct from the State; the distinction between the two was emphasized by the withdrawal of the early Christians from civic life, to avoid the performance of idolatrous ceremonies imposed as official expressions of loyalty, and by the persecutions which they had to endure, when the spread of an association apparently so hostile to the framework of ancient society had at length alarmed the imperial government. Nor was the distinction obliterated by the recognition of Christianity as the state religion under Constantine.

Thus the jural form in which morality was conceived only emphasized the fundamental difference between it and the laws of the state. The ultimate sanctions of the moral code were the infinite rewards and punishments awaiting the immortal soul hereafter; but the church early felt the necessity of withdrawing the privileges of membership from apostates and allowing them to be gradually regained only by a solemn ceremonial expressive of repentance, protracted through several years. This formal and regulated "penitence" was extended from apostasy to other grave—or, as they were subsequently called, "deadly"—sins; while for minor offences all Christians were called upon to express contrition by fasting and abstinence from ordinarily permitted pleasures, as well as verbally in public and private devotions. "Excommunication" and "penance" thus came to be temporal ecclesiastical sanctions of the moral law. As the graduation of these sanctions naturally became more minute, a correspondingly detailed classification of offences was rendered necessary, and thus a system of ecclesiastical jurisprudence was gradually produced, somewhat analogous to that of Judaism. At the same time this tendency to make prominent a scheme of external duties has always been counteracted in Christianity by the remembrance of its original antithesis to Jewish legalism. We find that this antithesis, as exaggerated by some of the Gnostic sects of the 2nd and 3rd centuries A.D., led, not merely to theoretical antinomianism, but even (if the charges of their orthodox opponents are not entirely to be discredited) to gross immorality of conduct. A similar tendency has shown itself at other periods of church history. And though such antinomianism has always been sternly repudiated by the moral consciousness of Christendom, it has never been forgotten that "inwardness," rightness of heart or spirit, is the preeminent characteristic of Christian goodness. It must not, of course, be supposed that the need of something more than mere fulfilment of external duty was ignored even by the later Judaism. Rabbinic erudition could not forget the repression of vicious desires in the tenth commandment, the stress laid in Deuteronomy on the necessity of service to God, or the inculcation by later prophets of humility and faith. "The real and only Pharisee," says the Talmud, "is he who does the will of his Father because he loves Him." But it remains true that the contrast with the "righteousness of the scribes and pharisees" has always served to mark the requirement of "inwardness" as a distinctive feature of the Christian code—an inwardness not merely negative, tending to the repression of vicious desires as well as vicious acts, but also involving a positive rectitude of the inner state of the soul.

Christian and Pagan inwardness.

In this aspect Christianity invites comparison with Stoicism, and indeed with pagan ethical philosophy generally, if we except the hedonistic schools. Rightness of purpose, preference of virtue for its own sake, suppression of vicious desires, were made essential points by the Aristotelians, who attached the most importance to outward circumstances in their view of virtue, no less than by the Stoics, to whom all outward things were indifferent. The fundamental differences between pagan and Christian ethics depend not on any difference in the value set on rightness of heart, but on different views of the essential form or conditions of this inward rightness. In neither case is it presented purely and simply as moral rectitude. By the pagan philosophers it was always conceived under the form of Knowledge or Wisdom,

Faith.

it being inconceivable to all the schools sprung from Socrates that a man could truly know his own good and yet deliberately choose anything else. This knowledge, as Aristotle held, might be permanently precluded by vicious habits, or temporarily obliterated by passion, but if present in the mind it must produce rightness of purpose. Or even if it were held with some of the Stoics that true wisdom was out of the reach of the best men actually living, it none the less remained the ideal condition of perfect human life. By Christian teachers, on the other hand, the inner springs of good conduct were generally conceived as Faith and Love. Of these notions the former has a somewhat complex ethical import; it seems to blend several elements differently prominent in different minds. Its simplest and commonest meaning is that emphasized in the contrast of "faith" with "sight"; where it signifies belief in the invisible divine order represented by the church, in the actuality of the law, the threats, the promises of God, in spite of all the influences in man's natural life that tend to obscure this belief. Out of this contrast there ultimately grew an essentially different opposition between faith and knowledge or reason, according to which the theological basis of ethics was contrasted with the philosophical; the theologians maintaining sometimes that the divine law is essentially arbitrary, the expression of will, not reason; more frequently that its reasonableness is inscrutable, and that actual human reason should confine itself to examining the credentials of God's messengers, and not the message itself. But in early Christianity this latter antithesis was as yet undeveloped; faith means simply force in clinging to moral and religious conviction, whatever their rational grounds may be; this force, in the Christian consciousness, being inseparably bound up with personal loyalty and trust towards Christ, the leader in the battle with evil, the ruler of the kingdom to be realized. So far, however, there is no ethical difference between Christian faith and that of Judaism, or its later imitation, Mahommedanism; except that the personal affection of loyal trust is peculiarly stirred by the blending of human and divine natures in Christ, and the rule of duty impressively taught by the manifestation of his perfect life. A more distinctively Christian, and a more deeply moral, significance is given to the notion in the antithesis of "faith" and "works." Here faith means more than loyal acceptance of the divine law and reverent trust in the lawgiver; it implies a consciousness, at once continually present and continually transcended, of the radical imperfection of all human obedience to the law, and at the same time of the irremissible condemnation which this imperfection entails. The Stoic doctrine of the worthlessness of ordinary human virtue, and the stern paradox that all offenders are equally, in so far as all are absolutely, guilty, find their counterparts in Christianity; but the latter (maintaining this ideal severity in the moral standard, with an emotional consciousness of what is involved in it quite unlike that of the Stoic) overcomes its practical exclusiveness through faith. This faith, again, may be conceived in two modes, essentially distinct though usually combined. In one view it gives the believer strength to attain, by God's supernatural aid or "grace," a goodness of which he is naturally incapable; in the other view it gives him an assurance that, though he knows himself a sinner deserving of utter condemnation, a perfectly just God still regards him with favour on account of the perfect services and suffering of Christ. Of these views the former is the more catholic, more universally present in the Christian consciousness; the latter more deeply penetrates the mystery of the Atonement, as expounded in the Pauline epistles.

Love.

Purity.

But faith, however understood, is rather an indispensable pre-requisite than the essential motive principle of Christian good conduct. This motive is supplied by the other central notion, love. On love depends the "fulfilling of the law," and the sole moral value of Christian duty—that is, on love to God, in the first place, which in its fullest development must spring from Christian faith; and, secondly, love to all mankind, as the objects of divine love and sharers in the humanity ennobled by the incarnation. This derivative philanthropy characterizes the spirit in which all Christian performance of social duty is to be done; loving devotion to God being the fundamental attitude of mind that is to be maintained throughout the whole of the Christian's life. But further, as regards abstinence from unlawful acts and desires prompting to them, we have to notice another form in which the inwardness of Christian morality manifests itself, which, though less distinctive, should yet receive attention in any comparison of Christian ethics with the view of Graeco-Roman philosophy. The profound horror with which the Christian's conception of a suffering as well as an avenging divinity tended to make him regard all condemnable acts was tinged with a sentiment which we may perhaps describe as a ceremonial aversion moralized—the aversion, that is, to foulness or impurity. In Judaism, as in other, especially Oriental, religions, the natural dislike of material defilement has been elevated into a religious sentiment, and made to support a complicated system of quasi-sanitary abstinences and ceremonial purifications; then, as the ethical element predominated in the Jewish religion, a moral symbolism was felt to reside in the ceremonial code, and thus aversion to impurity came to be a common form of the ethico-religious sentiment. Then, when Christianity threw off the Mosaic ritual, this religious sense of purity was left with no other sphere besides morality; while, from its highly idealized character, it was peculiarly well adapted for that repression of vicious desires which Christianity claimed as its special function.

Distinctive particulars of Christian morality.

The distinctive features of Christian ethics are obedience, unworldliness, benevolence, purity and humility. They are naturally connected with the more general characteristics just stated; though many of them may also be referred directly to the example and precepts of Christ, and in several cases they are clearly due to both causes, inseparably combined.

1. We may notice, in the first place, that the conception of morality as a code which, if not in itself arbitrary, is yet to be accepted by men with unquestioning submission, tends naturally to bring into prominence the virtue of *obedience to authority*; just as the philosophic view of goodness as the realization of reason gives a special value to *self-determination* and independence (as we see more clearly in the post-Aristotelian schools where ethics is distinctly separated from politics).

2. Again, the opposition between the natural world and the spiritual order into which the Christian has been born anew led not merely to a contempt equal to that of the Stoic for wealth, fame, power, and other objects of worldly pursuit, but also, for some time at least, to a comparative depreciation of the domestic and civic relations of the natural man. This tendency was exhibited most simply and generally in the earliest period of the church's history. In the view of primitive Christians, ordinary human society was a world temporarily surrendered to Satanic rule, over which a swift and sudden destruction was impending; in such a world the little band who were gathered in the ark of the church could have no part or lot,—the only attitude they could maintain was that of passive alienation. On the other hand, it was difficult practically to realize this alienation, and a keen sense of this difficulty induced the same hostility to the body as a clog and hindrance, that we find to some extent in Plato, but more fully developed in Neoplatonism, Neopythagoreanism, and other products of the mingling of Greek with Oriental thought. This feeling is exhibited in the value set on fasting in the Christian church from the earliest times, and in an extreme form in the self-torments of later monasticism; while both tendencies, anti-worldliness and anti-sensualism, seem to have combined in causing the preference of celibacy over marriage which is common to most early Christian writers.[1] Patriotism, again, and the sense of civic duty, the most elevated of all social sentiments in the Graeco-Roman civilization, tended, under the influence of Christianity, either to expand itself into universal philanthropy, or to concentrate

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[1] *E.g.* Justin Martyr, Origen, Tertullian, Cyprian.

itself on the ecclesiastical community. "We recognize one commonwealth, the world," says Tertullian; "we know," says Origen, "that we have a fatherland founded by the word of God." We might further derive from the general spirit of Christian unworldliness that repudiation of the secular modes of conflict, even in a righteous cause, which substituted a passive patience and endurance for the old pagan virtue of courage, in which the active element was prominent. Here, however, we clearly trace the influence of Christ's express prohibition of violent resistance to violence, and his inculcation, by example and precept, of a love that was to conquer even natural resentment. An extreme result of this influence is shown in Tertullian's view, that no Christian could properly hold the office of a secular magistrate in which he would have to doom to death, chains, imprisonment; but even more sober writers, such as Ambrose, extend Christian passivity so far as to preclude self-defence even against a murderous assault. The common sense of Christendom gradually shook off these extravagances; but the reluctance to shed blood lingered long, and was hardly extinguished even by the growing horror of heresy. We have a curious relic of this in the later times of ecclesiastical persecution, when the heretic was doomed to the stake that he might be punished in some manner "short of bloodshed."[1]

Benevolence.

3. It is, however, in the impulse given to practical beneficence in all its forms, by the exaltation of love as the root of all virtues, that the most important influence of Christianity on the particulars of civilized morality is to be found; although the exact amount of this influence is here somewhat difficult to ascertain, since it merely carries further a development traceable in the history of pagan morality. This development appears when we compare the different post-Socratic systems of ethics. In Plato's exposition of the different virtues there is no mention whatever of benevolence, although his writings show a keen sense of the importance of friendship as an element of philosophic life, especially of the intense personal affection naturally arising between master and disciple. Aristotle goes somewhat further in recognizing the moral value of friendship (φιλία); and though he considers that in its highest form it can be realized only by the fellowship of the wise and good, he yet extends the notion so as to include the domestic affections, and takes notice of the importance of mutual kindness in binding together all human societies. Still in his formal statement of the different virtues, positive beneficence is discernible only under the notion of "liberality," in which form its excellence is hardly distinguished from that of graceful profusion in self-regarding expenditure (*Nic. Eth.* iv. 1). Cicero, on the other hand, in his paraphrase of a Stoic treatise on external duties (*De officiis*), ranks the rendering of positive services to other men as a chief department of social duty; and the Stoics generally recognized the universal fellowship and natural mutual claims of human beings as such. Indeed, this recognition in later Stoicism is sometimes expressed with so much warmth of feeling as to be hardly distinguishable from Christian philanthropy. Nor was this regard for humanity merely a doctrine of the school. Partly through the influence of Stoic and other Greek philosophy, partly from the natural expansion of human sympathies, the legislation of the Empire, during the first three centuries, shows a steady development in the direction of natural justice and humanity; and some similar progress may be traced in the general tone of moral opinion. Still the utmost point that this development reached fell considerably short of the standard of Christian charity. Without dwelling on the immense impetus given to the practice of social duty generally by the religion that made beneficence a form of divine service, and identified "piety" with "pity," we have to put down as definite changes introduced by Christianity—(1) the severe condemnation and final suppression of the practice of exposing infants; (2) effective abhorrence of the barbarism of gladiatorial combats; (3) immediate moral mitigation of slavery, and a strong encouragement of emancipation; (4) great extension of the eleemosynary provision made for the sick and the poor. As regards almsgiving, however—the importance of which has caused it to usurp, in modern languages, the general name of "charity"—it ought to be observed that Christianity merely universalized a duty which has always been inculcated by Judaism, within the limits of the chosen people.

4. The same may be said of the stricter regulation which Christianity enforced on the relations of the sexes; except so far as the prohibition of divorce is concerned, and the stress laid on "purity of heart" as contrasted with merely outward chastity.

5. Even the peculiarly Christian virtue of humility, which presents so striking a contrast to the Greek "highmindedness," was to some extent anticipated in the Rabbinic teaching. Its far greater prominence under the new dispensation may be partly referred to the express teaching and example of Christ; partly, in so far as the virtue is manifested in the renunciation of external rank and dignity, or the glory of merely secular gifts and acquirements, it is one aspect of the unwordliness which we have already noticed; while the deeper humility that represses the claim of personal merit even in the saint belongs to the strict self-examination, the continual sense of imperfection, the utter reliance on strength not his own, which characterize the inner moral life of the Christian. Humility in this latter sense, "before God," is an essential condition of all truly Christian goodness.

We have, however, yet to notice the enlargement of the sphere of ethics due to its close connexion with theology; for while this added religious force and sanction to ordinary moral obligations, it equally tended to impart a moral aspect to religious belief and worship. "Duty to God"—as distinct from duty to man—had not been altogether unrecognized by pagan moralists; but the rather dubious relations of even the more orthodox philosophy to the established polytheism had generally prevented them from laying much stress upon it. Again,—just as the Stoics held wisdom to be indispensable to real rectitude of conduct, while at the same time they included under the notion of wisdom a grasp of physical as well as ethical truth,—so the similar emphasis laid on inwardness in Christian ethics caused orthodoxy or correctness of religious belief to be regarded as essential to goodness, and heresy as the most fatal of vices, corrupting as it did the very springs of Christian life. To the philosophers (with the single exception of Plato), however, convinced as they were that the multitude must necessarily miss true well-being through their folly and ignorance, it could never occur to guard against these evils by any other method than that of providing philosophic instruction for the few; whereas the Christian clergy, whose function it was to offer truth and eternal life to all mankind, naturally regarded theological misbelief as insidious preventible contagion. Indeed, their sense of its deadliness was so keen that, when they were at length able to control the secular administration, they rapidly overcame their aversion to bloodshed, and initiated that long series of religious persecutions to which we find no parallel in the pre-Christian civilization of Europe. It was not that Christian writers did not feel the difficulty of attributing criminality to sincere ignorance or error. But the difficulty is not really peculiar to theology; and the theologians usually got over it (as some philosophers had surmounted a similar perplexity in the region of ethics proper) by supposing some latent or antecedent voluntary sin, of which the apparently involuntary heresy was the fearful fruit.

Lastly, we must observe that, in proportion as the legal conception of morality as a code of which the violation deserves supernatural punishment predominated over the philosophic view of ethics as the method for attaining natural felicity, the question of man's freedom of will to obey the law necessarily became prominent. At the same time it cannot be broadly said that Christianity took a decisive side in the metaphysical controversy on free-will and necessity; since, just as in Greek philosophy the need of maintaining freedom as the ground of responsibility clashes with the conviction that no one deliberately chooses his own harm, so in Christian ethics it clashes with the attribution of all true human virtue to supernatural grace, as well as with the belief in divine foreknowledge. All we can say is that in the development of Christian thought the conflict of conceptions was far more profoundly felt, and far more serious efforts were made to evade or transcend it.

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[1] Citra sanguinis effusionem.

Development of opinion in early Christianity.

In the preceding account of Christian morality, it has been already indicated that the characteristics delineated did not all exhibit themselves simultaneously to the same extent, or with perfect uniformity throughout the church. Changes in the external condition of Christianity, the different degrees of civilization in the societies of which it was the dominant religion, and the natural process of internal development, continually brought different features into prominence; while again, the important antagonisms of opinion within Christendom frequently involved ethical issues—even in the Eastern Church—until in the 4th century it began to be absorbed in the labour of a dogmatic construction. Thus, for example, the anti-secular tendencies of the new creed, to which Tertullian (160–220) gave violent and rigid expression, were exaggerated in the Montanist heresy which he ultimately joined; on the other hand, Clement of Alexandria, in opposition to the general tone of his age, maintained the value of pagan philosophy for the development of Christian faith into true knowledge (Gnosis), and the value of the natural development of man through marriage for the normal perfecting of the Christian life. So again, there is a marked difference between the writers before Augustine and those that succeeded him in all that concerns the internal conditions of Christian morality. By Justin and other apologists the need of redemption, faith, grace is indeed recognized, but the theological system depending on these notions is not sufficiently developed[1] to come into even apparent antagonism with the freedom of the will. Christianity is for the most part conceived as essentially a proclamation through the Divine Word, to immortal beings gifted with free choice, of the true code of conduct sanctioned by eternal rewards and punishments. This legalism contrasts strikingly with the efforts of pagan philosophy to exhibit virtue as its own reward; and the contrast is triumphantly pointed out by more than one early Christian writer. Lactantius (*circa* 300 A.D.), for example, roundly declares that Plato and Aristotle, referring everything to this earthly life, "made virtue mere folly"; though himself maintaining, with pardonable inconsistency, that man's highest good did not consist in mere pleasure, but in the consciousness of the filial relation of the soul to God. It is plain, however, that on this external legalistic view of duty it was impossible to maintain a difference in kind between Christian and pagan morality; the philosopher's conformity to the rules of chastity and beneficence, so far as it went, was indistinguishable from the saint's. But when this inference was developed in the teaching of Pelagius, it was repudiated as heretical by the church, under the powerful leadership of Augustine (354–430); and the doctrine of man's

Augustine.

incapacity to obey God's law by his unaided moral energy was pressed to a point at which it was difficult to reconcile it with the freedom of the will. Augustine is fully aware of the theoretical indispensability of maintaining Free Will, from its logical connexion with human responsibility and divine justice; but he considers that these latter points are sufficiently secured if actual freedom of choice between good and evil is allowed in the single case of our progenitor Adam.[2] For since the *natura seminalis* from which all men were to arise already existed in Adam, in his voluntary preference of self to God, humanity chose evil once for all; for which ante-natal guilt all men are justly condemned to perpetual absolute sinfulness and consequent punishment, unless they are elected by God's unmerited grace to share the benefits of Christ's redemption. Without this grace it is impossible for man to obey the "first greatest commandment" of love to God; and, this unfulfilled, he is guilty of the whole law, and is only free to choose between degrees of sin; his apparent external virtues have no moral value, since inner rightness of intention is wanting. "All that is not of faith is of sin"; and faith and love are mutually involved and inseparable; faith springs from the divinely imparted germ of love, which in its turn is developed by faith to its full strength, while from both united springs hope, joyful yearning towards ultimate perfect fruition of the object of love. These three Augustine (after St Paul) regards as the three essential elements of Christian virtue; along with these he recognizes the fourfold division of virtue into prudence, temperance, courage and justice according to their traditional interpretation; but he explains these virtues to be in their true natures only the same love to God in different aspects or exercises. The uncompromising mysticism of this view may be at once compared and contrasted with the philosophical severity of Stoicism. Love of God in the former holds the same absolute and unique position as the sole element of moral worth in human action, which, as we have seen, was occupied by knowledge of Good in the latter; and we may carry the parallel further by observing that in neither case is this severity in the abstract estimate of goodness necessarily connected with extreme rigidity in practical precepts. Indeed, an important part of Augustine's work as a moralist lies in the reconciliation which he laboured to effect between the anti-worldly spirit of Christianity and the necessities of secular civilization. For example, we find him arguing for the legitimacy of judicial punishments and military service against an over-literal interpretation of the Sermon on the Mount; and he took an important part in giving currency to the distinction between evangelical "counsels" and "commands," and so defending the life of marriage and temperate enjoyment of natural good against the attacks of the more extravagant advocate of celibacy and self-abnegation; although he fully admitted the superiority of the latter method of avoiding the contamination of sin.

Ambrose.

The attempt to Christianize the old Platonic list of virtues, which we have noticed in Augustine's system, was probably due to the influence of his master Ambrose, in whose treatise *De officiis ministrorum* we find for the first time an exposition of Christian duty systematized on a plan borrowed from a pre-Christian moralist. It is interesting to compare Ambrose's account of what subsequently came to be known as the "four cardinal virtues" with the corresponding delineations in Cicero's[3] *De officiis* which served the bishop as a model. Christian Wisdom, so far as it is speculative, is of course primarily theological; it has God, as the highest truth, for its chief object, and is therefore necessarily grounded on faith. Christian Fortitude is essentially firmness in withstanding the seductions of good and evil fortune, resoluteness in the conflict perpetually waged against wickedness without carnal weapons—though Ambrose, with the Old Testament in his hand, will not quite relinquish the ordinary martial application of the term. "Temperantia" retains the meaning of "observance of due measure" in all conduct, which it had in Cicero's treatise; though its notion is partly modified by being blended with the newer virtue of humility. Finally in the exposition of Christian Justice the Stoic doctrine of the natural union of all human interests is elevated to the full height and intensity of evangelical philanthropy; the brethren are reminded that the earth was made by God a common possession of all, and are bidden to administer their means for the common benefit; Ambrose, we should observe, is thoroughly aware of the fundamental union of these different virtues in Christianity, though he does not, like Augustine, resolve them all into the one central affection of love of God.

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[1] To show the crudity of the notion of redemption in early Christianity, it is sufficient to mention that many fathers represent Christ's ransom as having been paid to the devil; sometimes adding that by the concealment of Christ's divinity under the veil of humanity a certain deceit was (fairly) practised on the great deceiver.

[2] It is to be observed that Augustine prefers to use "freedom" not for the power of willing either good or evil, but the power of willing good. The highest freedom, in his view, excludes the possibility of willing evil.

[3] Cicero's works are unimportant in the history of ancient ethics, as their philosophical matter was entirely borrowed from Greek treatises now lost; but the influence exercised by them (especially by the *De officiis*) over medieval and even modern readers was very considerable.

Ecclesiastical morality in the "Dark Ages."

Under the influence of Ambrose and Augustine, the four cardinal virtues furnished a basis on which the systematic ethical theories of subsequent theologians were built. With them the triad of Christian graces, Faith, Hope and Love, and the seven gifts of the Spirit (Isaiah xi. 2) were often combined. In antithesis to this list, an enumeration of the "deadly sins" obtained currency. These were at first commonly reckoned as eight; but a preference for mystical numbers characteristic of medieval theologians finally reduced them to seven. The statement of them is variously given,—Pride, Avarice, Anger, Gluttony, Unchastity, are found in all the lists; the remaining two (or three) are variously selected from among Envy, Vainglory, and the rather singular sins Gloominess (*tristitia*) and Languid Indifference (*acidia* or *acedia*, from Gr. ἀκηδία). These latter notions show plainly, what indeed might be inferred from a study of the list as a whole, that it represents the moral experience of the monastic life, which for some centuries was more and more unquestioningly regarded as in a peculiar sense "religious." It should be observed that the (also Augustinian) distinction between "deadly" and "venial" sins had a technical reference to the quasi-jural administration of ecclesiastical discipline, which grew gradually more organized as the spiritual power of the church established itself amid the ruins of the Western empire, and slowly developed into the theocracy that almost dominated Europe during the latter part of the middle ages. "Deadly" sins were those for which formal ecclesiastical penance was held to be necessary, in order to save the sinner from eternal damnation; for "venial" sins he might obtain forgiveness, through prayer, almsgiving, and the observance of the regular fasts. We find that "penitential books" for the use of the confessional, founded partly on traditional practice and partly on the express decrees of synods, come into general use in the 7th century. At first they are little more than mere inventories of sins, with their appropriate ecclesiastical punishments; gradually cases of conscience come to be discussed and decided, and the basis is laid for that system of casuistry which reached its full development in the 14th and 15th centuries. This ecclesiastical jurisprudence, and indeed the general relation of the church to the ruder races with which it had to deal during this period, necessarily tended to encourage a somewhat external view of morality. But a powerful counterpoise to this tendency was continually maintained by the fervid inwardness of Augustine, transmitted through Gregory the Great, Isidore of Seville, Alcuin, Hrabanus Maurus, and other writers of the philosophically barren period between the destruction of the Western empire and the rise of Scholasticism.

Medieval moral philosophy.

Scholastic ethics, like scholastic philosophy, attained its completest result in the teaching of Thomas Aquinas. But before giving a brief account of the ethical part of his system, it will be well to notice the salient points in the long and active discussion that led up to it. In the pantheistic system of Erigena (*q.v.*) (*circa* 810–877) the chief philosophic element is supplied by the influence of Plato and Plotinus, transmitted through an unknown author of the 5th century, who assumed the name of Dionysius the Areopagite. Accordingly the ethical side of this doctrine has the same negative and ascetic character that we have observed in Neoplatonism. God is the only real Being; evil is essentially unreal and incognizable; the true aim of man's life is to return to perfect union with God out of the degraded material existence into which he has fallen. This doctrine found little acceptance among Erigena's contemporaries, and was certainly unorthodox enough to justify the condemnation which it subsequently received from Honorius III.; but its influence, together with that of the Pseudo-Dionysius, had a considerable share in developing the more emotional orthodox mysticism of the 12th and 13th centuries; and Neoplatonism (or Platonism received through a Neoplatonic tradition) remained a distinct element in medieval thought, though obscured in the period of mature scholasticism by the predominant influence of Aristotle. Passing on to Anselm (1033–1109), we observe that the Augustinian doctrine of original sin and man's absolute need of unmerited grace is retained in his theory of salvation; he also follows Augustine in defining freedom as the "power not to sin"; though in saying that Adam fell "spontaneously" and "by his free choice," though not "through its freedom," he has implicitly made the distinction that Peter the Lombard afterwards expressly draws between the freedom that is opposed to necessity and freedom from the slavery to sin. Anselm further softens the statement of Augustinian predestinationism by explaining that the freedom to will is not strictly lost even by fallen man; it is inherent in a rational nature, though since Adam's sin it only exists potentially in humanity, except where it is made actual by grace.

In a more real sense Abelard (1079–1142) tries to establish the connexion between man's ill desert and his free consent. He asserts that the inherited propensity to evil is not strictly a sin, which is only committed when the conscious self yields to vicious inclination. With a similar stress on the self-conscious side of moral action, he argues that rightness of conduct depends solely on the intention, at one time pushing this doctrine to the paradoxical assertion that all outward acts as such are indifferent.[1] In the same spirit, under the reviving influence of ancient philosophy (with which, however, he was imperfectly acquainted and the relation of which to Christianity he extravagantly misunderstood), he argues that the old Greek moralists, as inculcating a disinterested love of good—and so implicitly love of God as the highest good—were really nearer to Christianity than Judaic legalism was. Nay, further, he required that the Christian "love to God" should be regarded as pure only if purged from the self-regarding desire of the happiness which God gives. The general tendency of Abelard's thought was suspiciously regarded by contemporary orthodoxy;[2] and the over-subtlety of the last-mentioned distinction provoked vehement replies from orthodox mystics of the age. Thus, Hugo of St Victor (1077–1141) argues that all love is necessarily so far "interested" that it involves a desire for union with the beloved; and since eternal happiness consists in this union, it cannot truly be desired apart from God; while Bernard of Clairvaux (1091–1153) more elaborately distinguishes four stages by which the soul is gradually led from (1) merely self-regarding desire for God's aid in distress, to (2) love him for his loving-kindness to it, then also (3) for his absolute goodness, until (4) in rare moments this love for himself alone becomes the sole all-absorbing affection. This controversy Peter the Lombard endeavoured to compose by the scholastic art of taking distinctions, of which he was a master. In his treatise, *Libri sententiarum*, mainly based on Augustinian doctrine, we find a distinct softening of the antithesis between nature and grace and an anticipation of the union of Aristotelian and Christian thought, which was initiated by Albert the Great and completed by Thomas Aquinas.

Thomas Aquinas.

The moral philosophy of Aquinas is Aristotelianism with a Neoplatonic tinge, interpreted and supplemented by a view of Christian dogma derived chiefly from Augustine. All action or movement of all things irrational as well as rational is directed towards some end or good,—that is, really and ultimately towards God himself, the ground and first cause of all being, and unmoved principle of all movement. This universal though unconscious striving after God, since he is essentially intelligible, exhibits itself in its highest form in rational beings as a desire for knowledge of him; such knowledge, however, is beyond all ordinary exercise of reason, and may be only partially revealed to man here below. Thus the *summum bonum* for man is objectively God, subjectively the happiness to be derived from loving vision of his perfections; although there is a lower kind of happiness to be realized here below in a normal human existence of virtue and friendship, with mind and body sound and whole and properly trained for the needs of life. The higher happiness is given to man by free grace of God; but it is given to those only whose heart is right, and as a reward of virtuous actions. Passing to consider what actions are virtuous, we first observe generally that the morality of an act is in part, but only in part, determined by its particular motive; it partly depends on its external object and circumstances, which render it either objectively in harmony with the "order of reason" or the reverse. In the classification of particular virtues and vices we can distinguish very clearly the elements supplied by the different teachings which Aquinas has imbibed. He follows Aristotle closely in dividing the "natural" virtues into intellectual and moral, giving his preference to the former class, and the intellectual again into speculative and practical; in distinguishing within the speculative class the "intellect" that is conversant with principles, the "science" that deduces conclusions, and the "wisdom" to which belongs the whole process of knowing the sublimest objects of knowledge; and in treating practical wisdom as inseparably connected with moral virtues, and therefore in a sense moral. His distinction among moral virtues of the justice that renders others their due from the virtues that control the appetites and passions of the agent himself, represents his interpretation of the *Nicomachean Ethics*; while his account of these latter virtues is a simple transcript of Aristotle's, just as his division of the non-rational element of the soul into "concupiscible" and "irascible" is the old Platonic one. In arranging his list, however, he defers to the established doctrine of the four cardinal virtues (derived from Plato and the Stoics through Cicero); accordingly, the Aristotelian ten have to stand under the higher genera of (1) the prudence which gives reasoned rules of conduct, (2) the temperance which restrains misleading desire, and (3) the fortitude that resists misleading fear of dangers or toils. But before these virtues are ranked the three "theologic" virtues, faith, love and hope, supernaturally "instilled" by God, and directly relating to him as their object. By faith we obtain that part of our knowledge of God which is beyond the range of mere natural wisdom or philosophy; naturally (*e.g.*), we can know God's existence, but not his trinity in unity, though philosophy is useful to defend this and other revealed verities; and it is essential for the soul's welfare that all articles of the Christian creed, however little they can be known by natural reason, should be apprehended through faith; the Christian who rejects a single article loses hold altogether of faith and of God. Faith is the substantial basis of all Christian morality, but without love—the essential form of all the Christian virtues—it is "formless" (*informis*). Christian love is conceived (after Augustine) as primarily love to God (beyond the natural yearning of the creature after its ultimate good), which expands into love towards all God's creatures as created by him, and so ultimately includes even self-love. But creatures are only to be loved in their purity as created by God; all that is bad in them must be an object of hatred till it is destroyed. In the classification of sins the Christian element predominates; still we find the Aristotelian vices of excess and defect, along with the modern divisions into "sins against God, neighbour and self," "mortal and venial sins," and so forth.

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[1] Abelard afterwards retracted this view, at least in its extreme form; and in fact does not seem to have been fully conscious of the difference between (1) unfulfilled intention to do an act objectively right, and (2) intention to do what is merely believed by the agent to be right.

[2] He was condemned by two synods, in 1121 and 1140.

From the notion of sin—treated in its jural aspect—Aquinas passes naturally to the discussion of Law. The exposition of this conception presents to a great extent the same matter that was dealt with by the exposition of moral virtues, but in a different form; the prominence of which may perhaps be attributed to the growing influence of Roman jurisprudence, which attained in the 12th century so rapid and brilliant a revival in Italy. This side of Thomas's system is specially important, since it is just this blending of theological conceptions with the abstract theory of the later Roman law that gave the starting-point for independent ethical thought in the modern world. Under the general idea of law, defined as an "ordinance of reason for the common good, promulgated by him who has charge of the community," Thomas distinguishes (1) the eternal law or regulative reason of God which embraces all his creatures, rational and irrational; (2) "natural law," being that part of the eternal law that relates to rational creatures as such; (3) human law, which properly consists of more particular deductions from natural law particularized and adapted to the varying circumstances of actual communities; (4) divine law specially revealed to man. As regards natural law, he teaches that God has implanted in the human mind a knowledge of its immutable general principles; and not only knowledge, but a disposition, to which he applies the peculiar scholastic name *synderesis*,[1] that unerringly prompts to the realization of these principles in conduct, and protests against their violation. All acts of natural virtue are implicitly included within the scope of this law of nature; but in the application of its principles to particular cases—to which the term "conscience" should be restricted—man's judgment is liable to err, the light of nature being obscured and perverted by bad education and custom. Human law is required, not merely to determine the details for which natural law gives no intuitive guidance, but also to supply the force necessary for practically securing, among imperfect men, the observance of the most necessary rules of mutual behaviour. The rules of this law must be either deductions from principles of natural law, or determinations of particulars which it leaves indeterminate; a rule contrary to nature could not be valid as law at all. Human law, however, can deal with outward conduct alone, and natural law, as we have seen, is liable to be vague and obscure in particular applications. Neither natural nor human law, moreover, takes into account that supernatural happiness which is man's highest end. Hence they need to be supplemented by a special revelation of divine law. This revelation is distinguished into the law of the old covenant and the law of the gospel; the latter of these is productive as well as imperative since it carries with it the divine grace that makes its fulfilment possible. We have, however, to distinguish in the case of the gospel between (1) absolute commands and (2) "counsels," which latter recommend, without positively ordering the monastic life of poverty, celibacy and obedience as the best method of effectively turning the will from earthly to heavenly things.

But how far is man able to attain either natural or Christian perfection? This is the part of Thomas's system in which the cohesion of the different elements seems weakest. He is scarcely aware that his Aristotelianized Christianity inevitably combines two different difficulties in dealing with this question: first, the old pagan difficulty of reconciling the proposition that will is a rational desire always directed towards apparent good, with the freedom of choice between good and evil that the jural view of morality seems to require; and, secondly, the Christian difficulty of harmonizing this latter notion with the absolute dependence on divine grace which the religious consciousness affirms. The latter difficulty Thomas, like many of his predecessors, avoids by supposing a "co-operation" of free-will and grace, but the former he does not fully meet. It is against this part of his doctrines that the most important criticism, in ethics, of his rival Duns Scotus (*c.* 1266–1308) was directed. He urged that will could not be really free if it were bound to reason, as Thomas (after Aristotle) conceives it; a really free choice must be perfectly indeterminate between reason and unreason. Scotus consistently maintained that the divine will is similarly independent of reason, and that the divine ordering of the world is to be conceived as absolutely arbitrary. On this point he was followed by the acute intellect of William of Occam (d. *c.* 1347). This doctrine is obviously hostile to all reasoned morality; and in fact, notwithstanding the dialectical ability of Scotus and Occam, the work of Thomas remained indubitably the crowning result of the great constructive effort of medieval philosophy. The effort was, indeed, foredoomed to failure, since it attempted the impossible task of framing a coherent

Duns Scotus

William of Occam.

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[1] *Synderesis* (Gr. συντήρησις, from συντηρεῖν, to watch closely, observe) is used in this sense in Jerome (*Com. in Ezek.* i. 4-10).

system out of the heterogeneous data furnished by Scripture, the fathers, the church and Aristotle—equally unquestioned, if not equally venerated, authorities. Whatever philosophic quality is to be found in the work of Thomas belongs to it in spite of, not in consequence of, its method. Still, its influence has been great and long-enduring,—in the Catholic Church primarily, but indirectly among Protestants, especially in England, since the famous first book of Hooker's *Ecclesiastical Polity* is to a great extent taken from the *Summa theologiae.*

Medieval mysticism.

Partly in conscious antagonism to the schoolmen, yet with close affinity to the central ethico-theological doctrine which they read out of or into Aristotle, the mystical manner of thought continued to maintain itself in the church. Philosophically it rested upon Neoplatonism, but its development in strict connexion with Christian orthodoxy begins in the 12th century with Bernard of Clairvaux and Hugo of St Victor. It blended the Christian element of love with the ecstatic vision of Plotinus, sometimes giving the former a decided predominance. In its more moderate form, keeping wholly within the limits of ecclesiastical orthodoxy, this mysticism is represented by Bonaventura and Gerson; while it appears more independent and daringly constructive in the German Eckhart, advancing in some of his followers to open breach with the church, and even to practical immorality.

Casuistry.

In the brief account above given of the general ethical view of Thomas Aquinas no mention has been made of the detailed discussion of particular duties included in the *Summa theologiae*; in which, for the most part, an excellent combination of moral elevation with sobriety of judgment is shown, though on certain points the scholastic pedantry of definition and distinction is unfavourable to due delicacy of treatment. As the properly philosophic interest of scholasticism faded in the 14th and 15th centuries, the quasi-legal treatment of morality came again into prominence, borrowing a good deal of matter from Thomas and other schoolmen. One result of this was a marked development and systematization of casuistry. The best known *Summae casuum conscientiae*, compiled for the conduct of auricular confession, belong to the 14th and 15th centuries. The oldest, the *Astesana*, from Asti in Piedmont, is arranged as a kind of text-book of morality on a scholastic basis; later manuals are merely lists of questions and answers. It was inevitable that, in proportion as this casuistry assumed the character of a systematic penal jurisprudence, its precise determination of the limits between the prohibited and the allowable, with all doubtful points closely scrutinized and illustrated by fictitious cases, would have a tendency to weaken the moral sensibilities of ordinary minds; the greater the industry spent in deducing conclusions from the diverse authorities, the greater necessarily became the number of points on which doctors disagreed; and the central authority that might have repressed serious divergences was wanting in the period of moral weakness[1] that the church went through after the death of Boniface VIII. A plain man perplexed by such disagreements might naturally hold that any opinion maintained by a pious and orthodox writer must be a safe one to follow; and thus weak consciences were subtly tempted to seek the support of authority for some desired relaxation of a moral rule. It does not, however, appear that this danger assumed formidable proportions until after the Reformation; when, in the struggle made by the Catholic church to recover its hold on the world, the principle of authority was, as it were, forced into keen, balanced and prolonged conflict with that of reliance on private judgment.

The Jesuits.

To the Jesuits, the foremost champions in this struggle, it seemed indispensable that the confessional should be made attractive; for this purpose ecclesiastico-moral law must be somehow "accommodated" to worldly needs; and the theory of "Probabilism" supplied a plausible method for effecting this accommodation. The theory proceeded thus: A layman could not be expected to examine minutely into a point on which the learned differed; therefore he could not fairly be blamed for following any opinion that rested on the authority of even a single doctor; therefore his confessor must be authorized to hold him guiltless if any such "probable" opinion could be produced in his favour; nay, it was his duty to suggest such an opinion, even though opposed to his own, if it would relieve the conscience under his charge from a depressing burden. The results to which this Probabilism, applied with an earnest desire to avoid dangerous rigour, led in the 17th century were revealed to the world in the immortal *Lettres provinciales* of Pascal.

The Reformation. Transition to modern ethical philosophy.

In tracing the development of casuistry we have been carried beyond the great crisis through which Western Christianity passed in the 16th century. The Reformation which Luther initiated may be viewed on several sides, even if we consider only its ethical principles and effects. It maintained the simplicity of Apostolic Christianity against the elaborate system of a corrupt hierarchy, the teaching of Scripture alone against the commentaries of the fathers and the traditions of the church, the right of private judgment against the dictation of ecclesiastical authority, the individual responsibility of every human soul before God in opposition to the papal control over purgatorial punishments, which had led to the revolting degradation of venal indulgences. Reviving the original antithesis between Christianity and Jewish legalism, it maintained the inwardness of faith to be the sole way to eternal life, in contrast to the outwardness of works; returning to Augustine, and expressing his spirit in a new formula, to resist the Neo-Pelagianism that had gradually developed itself within the apparent Augustinianism of the church, it maintained the total corruption of human nature, as contrasted with that "congruity" by which, according to the schoolmen, divine grace was to be earned; renewing the fervent humility of St Paul, it enforced the universal and absolute imperativeness of all Christian duties, and the inevitable unworthiness of all Christian obedience, in opposition to the theory that "condign" merit might be gained by "supererogatory" conformity to evangelical "counsels." It will be seen that these changes, however profoundly important, were, ethically considered, either negative or quite general, ralating to the tone and attitude of mind in which all duty should be done. As regards all positive matter of duty and virtue, and most of the prohibitive code for ordinary men, the tradition of Christian teaching was carried on substantially unchanged by the Reformed churches. Even the old method of casuistry was maintained[2] during the 16th and 17th centuries; though Scriptural texts, interpreted and supplemented by the light of natural reason, now furnished the sole principles on which cases of conscience were decided.

Humanism.

In the 17th century, however, the interest of this quasi-legal treatment of morality gradually faded; and the ethical studies of educated minds were occupied with the attempt, renewed after so many centuries, to find an independent philosophical basis for the moral code. The renewal of this attempt was only indirectly due to the Reformation; it is rather to be connected with the more extreme reaction from the medieval religion which was partly caused by, partly expressed in, that enthusiastic study of the remains of old pagan culture that spread from Italy over Europe in the 15th and 16th centuries. To this "humanism" the Reformation seemed at first more hostile than the Roman hierarchy; indeed, the extent to which this latter had allowed itself to become paganized by the Renaissance was one of the points that especially roused the Reformers' indignation. Not the less important is the indirect stimulus given by the Reformation towards the development of a moral philosophy independent alike of Catholic and Protestant assumptions. Scholasticism, while reviving philosophy as a handmaid to theology, had metamorphosed its method into one resembling that of its mistress; thus shackling the renascent intellectual activity which it stimulated by the double bondage to Aristotle and to the church. When the Reformation shook the traditional authority in one department, the blow was necessarily felt in the other. Not twenty years after Luther's defiance of the pope, the startling thesis "that all that Aristotle taught was false" was prosperously maintained by the youthful Ramus before the university of Paris; and almost contemporaneously the group of remarkable thinkers in Italy who heralded the dawn of modern physical science—Cardanus, Telesio, Patrizzi, Campanella, Bruno—began to propound their Aristotelian theories of the constitution of the physical universe. It was to be foreseen that a similar assertion of independence would make itself heard in ethics also; and, indeed, amid the clash of dogmatic convictions, and the variations of private judgment, it was natural to seek for an ethical method that might claim universal acceptance from all sects.

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[1] The refusal of the council of Constance to condemn Jean Petit's advocacy of assassination is a striking example of this weakness. Cf. Milman, *Lat. Christ.* book xiii. c. 9.

[2] As the chief English casuists we may mention Perkins, Hall, Sanderson, as well as the more eminent Jeremy Taylor, whose *Ductor dubitantium* appeared in 1660.

Grotius.

C. *Modern Ethics.*—The need of such independent principles was most strongly felt in the region of man's civil and political relations, especially the mutual relations of communities. Accordingly we find that modern ethical controversy began in a discussion of the law of nature. Albericus Gentilis (1557–1611) and Hugo Grotius (1583–1645) were the first to give a systematic account. Natural law, according to Grotius and other writers of the age, is that part of divine law which follows from the essential nature of man, who is distinguished from animals by his "appetite" for tranquil association with his fellows, and his tendency to act on general principles. It is therefore as unalterable, even by God himself, as the truths of mathematics, although its effect may be overruled in any particular case by an express command of God; hence it is cognizable *a priori*, from the abstract consideration of human nature, though its existence may be known *a posteriori* also from its universal acceptance in human societies. The conception, as we have seen, was taken from the later Roman jurists; by them, however, the law of nature was conceived as something that underlay existing law, and was to be looked for through it, though it might ultimately supersede it, and in the meanwhile represented an ideal standard, by which improvements in legislation were to be guided. Still the language of the jurists in some passages (cf. *Inst. of Justinian*, ii. 1, 2) clearly implied a period of human history in which men were governed by natural law alone, prior to the institution of civil society. Posidonius had identified this period with the mythical "golden age"; and such ideas easily coalesced with the narrative in Genesis. Thus there had become current the conception of a "state of nature" in which individuals or single families lived side by side—under none other than those "natural" laws which prohibited mutual injury and interference in the free use of the goods of the earth common to all, and upheld parental authority, fidelity of wives, and the observance of compacts freely made. This conception Grotius took, and gave it additional force and solidity by using the principles of this natural law for the determination of international rights and duties, it being obvious that independent nations, in their corporate capacities, were still in that "state of nature" in their mutual relations. It was not, of course, assumed that these laws were universally obeyed; indeed, one point with which Grotius is especially concerned is the natural right of private war, arising out of the violation of more primary rights. Still a general observance was involved in the idea of a natural law as a "dictate of right reason indicating the agreement or disagreement of an act with man's rational and social nature"; and we may observe that it was especially necessary to assume such a general observance in the case of contracts, since it was by an "express or tacit pact" that the right of property (as distinct from the mere right to non-interference during use) was held by him to have been instituted. A similar "fundamental pact" had long been generally regarded as the normal origin of legitimate sovereignty.

The ideas above expressed were not peculiar to Grotius; in particular the doctrine of the "fundamental pact" as the jural basis of government had long been maintained, especially in England, where the constitution historically established readily suggested such a compact. At the same time the rapid and remarkable success of Grotius's treatise (*De jure belli et pacis*) brought his view of Natural Right into prominence, and suggested such questions as—"What is man's ultimate reason for obeying these laws? Wherein exactly does this their agreement with his rational and social nature consist? How far, and in what sense, is his nature really social?"

Hobbes.

It was the answer which Hobbes (1588–1679) gave to these fundamental questions that supplied the starting-point for independent ethical philosophy in England. The nature of this answer was determined by the psychological views to which Hobbes had been led, possibly to some extent under the influence of Bacon,[1] partly perhaps through association with his younger contemporary Gassendi, who, in two treatises, published between the appearance of Hobbes's *De cive* (1642) and that of the *Leviathan* (1651), endeavoured to revive interest in Epicurus. Hobbes's psychology is in the first place materialistic; he holds, that is, that in any of the psychophysical phenomena of human nature the reality is a material process of which the mental feeling is a mere "appearance." Accordingly he regards pleasure as essentially motion "helping vital action," and pain as motion "hindering" it. There is no logical connexion between this theory and the doctrine that appetite of desire has always pleasure (or the absence of pain) for its object; but a materialist, framing a system of psychology, will naturally direct his attention to the impulses arising out of bodily wants, whose obvious end is the preservation of the agent's organism; and this, together with a philosophic wish to simplify, may lead him to the conclusion that all human impulses are similarly self-regarding. This, at any rate, is Hobbes's cardinal doctrine in moral psychology, that each man's appetites or desires are naturally directed either to the preservation of his life, or to that heightening of it which he feels as pleasure.[2] Hobbes does not distinguish instinctive from deliberate pleasure-seeking; and he confidently resolves the most apparently unselfish emotions into phases of self-regard. Pity he finds to be grief for the calamity of others, arising from imagination of the like calamity befalling oneself; what we admire with seeming disinterestedness as beautiful (*pulchrum*) is really "pleasure in promise"; when men are not immediately seeking present pleasure, they desire power as a means to future pleasure, and thus have a derivative delight in the exercise of power that prompts to what we call benevolent action. Since, then, all the voluntary actions of men tend to their own preservation or pleasure, it cannot be reasonable to aim at anything else; in fact, nature rather than reason fixes this as the end of human action; it is reason's function to show the means. Hence if we ask why it is reasonable for any individual to observe the rules of social behaviour that are commonly called moral, the answer is obvious that this is only indirectly reasonable, as a means to his own preservation or pleasure. It is not, however, in this, which is only the old Cyrenaic or Epicurean answer, that the distinctive point of Hobbism lies. It is rather in the doctrine that even this indirect reasonableness of the most fundamental moral rules is entirely conditional on their general observance, which cannot be secured apart from government. For example, it is not reasonable for me to perform my share of a contract, unless I have reason for believing that the other party will perform his; and this I cannot have, except in a society in which he will be punished for non-performance. Thus the ordinary rules of social behaviour are only hypothetically obligatory; they are actualized by the establishment of a "common power" that may " use the strength and means of all " to enforce on all the observance of rules tending to the common benefit. On the other hand Hobbes yields to no one in maintaining the paramount importance of moral regulations. The precepts of good faith, equity, requital of benefits, forgiveness of wrong so far as security allows, the prohibition of contumely, pride, arrogance, —which may all be summed up in the formula, " Do not that to another which thou wouldest not have done to thyself " (*i.e.* the negative of the " golden rule ")—he still calls " immutable and eternal laws of nature "—meaning that, though a man is not unconditionally bound to realize them, he is, as a reasonable being, bound to desire that they should be realized. The pre-social state of man, in his view, is also pre-moral; but it is therefore utterly miserable. It is a state in which every one has a right to everything that may conduce to his preservation;[1] but it is therefore also a state of war—a state so wretched that it is the first dictate of rational self-love to emerge from it into social peace and order. Hence Hobbes's ideal constitution naturally comes to be an unquestioned and unlimited—though not necessarily monarchical—despotism. Whatever the government declares to be just or unjust must be accepted as such, since to dispute its dictates would be the first step towards anarchy, the one paramount peril outweighing all particular defects in legislation and administration. It is perhaps easy to understand how, in the crisis of 1640, when the ethico-political system of Hobbes first took written shape, a peace-loving philosopher should regard the claims of individual conscience as essentially anarchical, and dangerous to social well-being; but however strong might be men's yearning for order, a view of social duty, in which the only fixed positions were selfishness everywhere and unlimited power somewhere, could not but appear offensively paradoxical.

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[1] This influence was not exercised in the region of ethics. Bacon's brief outline of moral philosophy (in the *Advancement of Learning*, ii. 20-22) is highly pregnant and suggestive. But Bacon's great task of reforming scientific method was one which, as he conceived it, left morals on one side; he never made any serious effort to reduce his ethical views to a coherent system, methodically reasoned on an independent basis. The outline given in the *Advancement* was never filled in, and does not seem to have had any effect on the subsequent course of ethical speculation.

[2] He even identifies the desire with the pleasure, apparently regarding the stir of appetite and that of fruition as two parts of the same "motion."

There was, however, in his theory an originality, a force, an apparent coherence which rendered it undeniably impressive; in fact, we find that for two generations the efforts to construct morality on a philosophical basis take more or less the form of answers to Hobbes. From an ethical point of view Hobbism divides itself naturally into two parts, which by Hobbes's peculiar political doctrines are combined into a coherent whole, but are not otherwise necessarily connected. Its theoretical basis is the principle of egoism; while, for practically determining the particulars of duty it makes morality entirely dependent on positive law and institution. It thus affirmed the relativity of good and evil in a double sense; good and evil, for any individual citizen, may from one point of view be defined as the objects respectively of his desire and his aversion; from another, they may be said to be determined for him by his sovereign. It is this latter aspect of the system which is primarily attacked by the first generation of writers that replied to Hobbes. This attack, or rather the counter-exposition of orthodox doctrine, is conducted on different methods by the Cambridge moralists and by Cumberland respectively. Cumberland is content with the legal view of morality, but endeavours to establish the validity of the laws of nature by taxing them on the single supreme principle of rational regard for the " common good of all," and showing them, as so based, to be adequately supported by the divine sanction. The Cambridge school, regarding morality primarily as a body of truth rather than a code of rules, insist on its absolute character and intuitive certainty.

The Cambridge moralists, Cudworth.

Cudworth was the most distinguished of the little group of thinkers at Cambridge in the 17th century, commonly known as the Cambridge Platonists (*q.v.*). In his treatise on *Eternal and Immutable Morality* his main aim is to maintain the " essential and eternal distinctions of good and evil " as independent of mere will, whether human or divine. These distinctions, he insists, have an objective reality, cognizable by reason no less than the relations of space or number; and he endeavours to refute Hobbism—which he treats as a " novantique philosophy," a mere revival of the relativism of Protagoras—chiefly by the following *argumentum ad hominem.* He argues that Hobbes's atomic materialism involves the conception of an objective physical world, the object not of passive sense that varies from man to man, but of the active intellect that is the same in all; there is therefore, he urges, an inconsistency in refusing to admit a similar exercise of intellect in morals, and an objective world of right and wrong, which the mind by its normal activity clearly apprehends as such.

More.

Cudworth, in the work above mentioned, gives no systematic exposition of the ethical principles which he holds to be thus intuitively apprehended. But we may supply this deficiency from the *Enchiridion Ethicum* of Henry More, another thinker of the same school. More gives a list of 23 *Noemata Moralia*, the truth of which will, he says, be immediately manifest. Some of these admit of a purely egoistic application, and appear to be so understood by the author—as (*e.g.*) that goods differ in quality as well as in duration, and that the superior good or the lesser evil is always to be preferred; that absence of a given amount of good is preferable to the presence of equivalent evil; that future good or evil is to be regarded as much as present, if equally certain, and nearly as much if very probable. Objections, both general and special, might be urged by a Hobbist against these modes of formulating man's natural pursuit of self-interest; but the serious controversy between Hobbism and modern Platonism related not to such principles as these, but to others which demand from the individual a (real or apparent) sacrifice for his fellows. Such are the evangelical principle of " doing as you would be done by "; the principle of justice, or " giving every man his own, and letting him enjoy it without interference "; and especially what More states as the abstract formula of benevolence, that " if it be good that one man should be supplied with the means of living well and happily, it is mathematically certain that it is doubly good that two should be so supplied, and so on." The question, however, still remains, what motive any individual has to conform to these social principles when they conflict with his natural desires. To this Cudworth gives no explicit reply, and the answer of More is hardly clear. On the one hand he maintains that these principles express an absolute good, which is to be called intellectual because its essence and truth are apprehended by the intellect We might infer from this that the intellect, so judging, is itself the proper and complete determinant of the will, and that man, as a rational being, ought to aim at the realization of absolute good for its own sake. In spite, however, of possible inferences from his definition of virtue, this does not seem to be really More's view. He explains that though absolute good is discerned by the intellect, the " sweetness and flavour " of it is apprehended, not by the intellect proper, but by what he calls a " boniform faculty "; and it is in this sweetness and flavour that the motive to virtuous conduct lies; ethics is the " art of living well and happily," and true happiness lies in " the pleasure which the soul derives from the sense of virtue." In short, More's Platonism appears to be really as hedonistic as Hobbism; only the feeling to which it appeals as ultimate motive is of a kind that only a mind of exceptional moral refinement can habitually feel with the decisive intensity required.

It is to be observed that though More lays down the abstract principle of regarding one's neighbour's good as much as one's own with the full breadth with which Christianity inculcates it, yet when he afterwards comes to classify virtues he is too much under the influence of Platonic-Aristotelian thought to give a distinct place to benevolence, except under the old form of liberality. In this respect his system presents a striking contrast to Cumberland's, whose treatise *De Legibus Naturae*

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[1] In spite of Hobbes's uncompromising egoism, there is a noticeable discrepancy between his theory of the ends that men naturally seek and his standard for determining their natural rights. This latter is never Pleasure simply, but always Preservation—though on occasion he enlarges the notion of " preservation " into " preservation of life so as not to be weary of it." His view seems to be that in a state of nature *most* men *will* fight, rob, &c., " for delectation merely " or " for glory," and that hence all men must be allowed an indefinite right to fight, rob, &c., " for preservation."

Cumberland.

(1672), though written like More's in Latin, is yet in its ethical matter thoroughly modern. Cumberland is a thinker both original and comprehensive, and, in spite of defects in style and clearness, he is noteworthy as having been the first to lay down that "regard for the common good of all" is the supreme rule of morality or law of nature. So far he may be fairly called the precursor of later utilitarianism. His fundamental principle and supreme "Law of Nature" is thus stated: "The greatest possible benevolence of every rational agent towards all the rest constitutes the happiest state of each and all, so far as depends on their own power, and is necessarily required for their happiness; accordingly Common Good will be the Supreme Good." It is, however, important to notice that in his "good" is included not merely happiness but "perfection"; and he does not even define perfection so as to exclude from it the notion of absolute moral perfection and save his theory from an obvious logical circle. A notion so vague could not possibly be used with any precision for determining the subordinate rules of morality; but in fact Cumberland does not attempt this; his supreme principle is designed not to rectify, but merely to support and systematize, common morality. This principle, as was said, is conceived as strictly a law, and therefore referred to a lawgiver, God, and provided with a sanction in its effects on the agent's happiness. That the divine will is expressed by it, Cumberland, "not being so fortunate as to possess innate ideas," tries to prove by a long inductive examination of the evidences of man's essential sociality exhibited in his physical and mental constitution. His account of the sanction, again, is sufficiently comprehensive, including both the internal and the external rewards of virtue and punishments of vice; and he, like later utilitarians, explains moral obligation to lie in the force exercised on the will by these sanctions; but as to the precise manner in which individual is implicated with universal good, and the operation of either or both in determining volition, his view is indistinct if not actually inconsistent.

Locke.

The clearness which we seek in vain from Cumberland is found to the fullest extent in Locke, whose *Essay on the Human Understanding* (1690) was already planned when Cumberland's treatise appeared. Yet Locke's ethical opinions have been widely misunderstood; since from a confusion between "innate ideas" and "intuitions," which has been common in recent ethical discussion, it has been supposed that the founder of English empiricism must necessarily have been hostile to "intuitional" ethics. The truth is that, while Locke agrees entirely with Hobbes as to the egoistic basis of rational conduct, and the interpretation of "good" and "evil" as "pleasure" and "pain," or that which is productive of pleasure and pain, he yet agrees entirely with Hobbes's opponents in holding ethical rules to be actually obligatory independently of political society, and capable of being scientifically constructed on principles intuitively known,—though he does not regard these principles as implanted in the mind at birth. The aggregate of such rules he conceives as the law of God, carefully distinguishing it, not only from civil law, but from the law of opinion or reputation, the varying moral standard by which men actually distribute praise and blame; as being divine it is necessarily sanctioned by adequate rewards and punishments. He does not, indeed, speak of the scientific construction of this code as having been actually effected, but he affirms its possibility in language remarkably strong and decisive. "The idea," he says, "of a Supreme Being, infinite in power, goodness, and wisdom, whose workmanship we are, and upon whom we depend, and the idea of ourselves, as understanding rational beings, being such as are clear in us, would, I suppose, if duly considered and pursued, afford such foundations of our duty and rules of action, as might place morality among the sciences capable of demonstration; wherein, I doubt not, but from self-evident propositions, by necessary consequences as incontestable as those in mathematics, the measure of right and wrong might be made out." As Locke cannot consistently mean by God's "goodness" anything but the disposition to give pleasure, it might be inferred that the ultimate standard of right rules of action ought to be the common happiness of the beings affected by the action; but Locke does not explicitly adopt this standard. The only instances which he gives of intuitive moral truths are the purely formal propositions, "No government allows absolute liberty," and "Where there is no property there is no injustice,"—neither of which has any evident connexion with the general happiness. As regards his conception of the Law of Nature, he takes it in the main immediately from Grotius and Pufendorf, more remotely from the Stoics and the Roman jurists.

Clarke.

We might give, as a fair illustration of Locke's general conception of ethics, a system which is frequently represented as diametrically opposed to Lockism; namely, that expounded in Clarke's Boyle lectures on the *Being and Attributes of God* (1704). It is true that Locke is not particularly concerned with the ethico-theological proposition which Clarke is most anxious to maintain,—that the fundamental rules of morality are independent of arbitrary will, whether divine or human. But in his general view of ethical principles as being, like mathematical principles,[1] essentially truths of relation, Clarke is quite in accordance with Locke; while of the four fundamental rules that he expounds, Piety towards God, Equity, Benevolence and Sobriety (which includes self-preservation), the first is obtained, just as Locke suggests, by "comparing the idea" of man with the idea of an infinitely good and wise being on whom he depends; and the second and third are axioms self-evident on the consideration of the equality or similarity of human individuals as such. The principle of equity —that "whatever I judge reasonable or unreasonable for another to do for me, that by the same I declare reasonable or unreasonable that I in the like case should do for him," is merely a formal statement of the golden rule of the gospel. We may observe that, in stating the principle of benevolence, "since the greater good is always most fit and reasonable to be done, every rational creature ought to do all the good it can to its fellow-creatures," Clarke avowedly follows Cumberland, from whom he quotes the further sentence that "universal love and benevolence is as plainly the most direct, certain and effectual means to this good as the flowing of a point is to produce a line." The quotation may remind us that the analogy between ethics and mathematics ought to be traced further back than Locke; in fact, it results from the influence exercised by Cartesianism over English thought generally, in the latter half of the 17th century. It must be allowed that Clarke is misled by the analogy to use general ethical terms ("fitness," "agreement" of things, &c.), which overlook the essential distinction between what is and what ought to be; and even in one or two expressions to overleap this distinction extravagantly, as (*e.g.*) in saying that the man who "wilfully acts contrary to justice wills things to be what they are not and cannot be." What he really means is less paradoxically stated in the general proposition that "originally and in reality it is natural and (morally speaking) necessary that the will should be determined in every action by the reason of the thing and the right of the case, as it is natural and (absolutely speaking) necessary that the understanding should submit to a demonstrated truth." But though it is an essential point in Clarke's view that what is right is to be done as such, apart from any consideration of pleasure or pain, it is to be inferred that he is not prepared to apply this doctrine in its unqualified form to such a creature as man, who is partly under the influence of irrational impulses. At least when he comes to argue the need of future rewards and punishments we find that his claim on behalf of morality is startlingly reduced. He now only contends that "virtue deserves to be chosen for its own sake, and vice to be avoided, though a man was sure for his own particular neither to gain nor lose anything by the practice of either." He fully admits that the question is altered when vice is attended by pleasure and profit to the vicious man, virtue by loss and calamity; and even that it is "not truly reasonable that men by adhering to virtue should part with their lives, if thereby they deprived themselves of all possibility of receiving any advantage from their adherence."

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[1] It should be noticed, however, that it is only in his treatment of Equity and Benevolence that he really follows out the mathematical analogy (cf. Sidgwick's *History of Ethics*, 5th ed., pp. 180-181).

Thus, on the whole, the impressive earnestness with which Clarke enforces the doctrine of rational morality only rendered more manifest the difficulty of establishing ethics on an independent philosophical basis; so long at least as the psychological egoism of Hobbes is not definitely assailed and overthrown. Until this is done, the utmost demonstration of the abstract reasonableness of social duty only leaves us with an irreconcilable antagonism between the view of abstract reason and the self-love which is allowed to be the root of man's appetitive nature. Let us grant that there is as much intellectual absurdity in acting unjustly as in denying that two and two make four; still, if a man has to choose between absurdity and unhappiness, he will naturally prefer the former; and Clarke, as we have already seen, is not really prepared to maintain that such preference is irrational.[1]

Shaftesbury.

It remains to try another psychological basis for ethical construction; instead of presenting the principle of social duty as abstract reason, liable to conflict to any extent with natural self-love, we may try to exhibit the naturalness of man's social affections, and demonstrate a normal harmony between these and his self-regarding impulses. This is the line of thought which Shaftesbury (1671–1713) may be said to have initiated. This theory had already been advanced by Cumberland and others, but Shaftesbury was the first to make it the cardinal point in his system; no one had yet definitely transferred the centre of ethical interest from the Reason, conceived as apprehending either abstract moral distinctions or laws of divine legislation, for the emotional impulses that prompt to social duty; no one had undertaken to distinguish clearly, by analysis of experience, the disinterested and self-regarding elements of our appetitive nature, or to prove inductively their perfect harmony. In his *Inquiry concerning Virtue and Merit* he begins by attacking the egoism of Hobbes, which, as we have seen, was not necessarily excluded by the doctrine of rational intuitions of duty. This interpretation, he says, would be true only if we considered man as a wholly unrelated individual. Such a being we might doubtless call "good," if his impulses were adapted to the attainment of his own felicity. But man we must and do consider in relation to a larger system of which he forms a part, and so we call him "good" only when his impulses and dispositions are so balanced as to tend towards the good of this whole. And again we do not attribute goodness to him merely because his outward acts have beneficial results. When we speak of a man as good, we mean that his dispositions or affections are such as tend of themselves to promote the good or happiness of human society. Hobbes's moral man, who, if let loose from governmental constraint, would straightway spread ruin among his fellows, is not what we commonly agree to call good. Moral goodness, then, in a "sensible creature" implies primarily disinterested affections, whose direct object is the good of others; but Shaftesbury does not mean (as he has been misunderstood to mean) that only such benevolent social impulses are good, and that these are always good. On the contrary, he is careful to point out, first, that immoderate social affections defeat themselves, miss their proper end, and are therefore bad; secondly, that as an individual's good is part of the good of the whole "self-affections" existing in a duly limited degree are morally good. Goodness, in short, consists in due combination, in just proportion, of both sorts of "affections," tendency to promote general good being taken as the criterion of the right degrees and proportions. This being established, the main aim of Shaftesbury's argument is to prove that the same balance of private and social affections, which tends naturally to public good, is also conducive to the happiness of the individual in whom it exists. Taking the different impulses in detail, he first shows how the individual's happiness is promoted by developing his social affections, mental pleasures being superior to bodily, and the pleasures of benevolence the richest of all. In discussing this he distinguishes, with well-applied subtlety, between the pleasurableness of the benevolent emotions themselves, the sympathetic enjoyment of the happiness of others, and the pleasure arising from a consciousness of their love and esteem. He then exhibits the unhappiness that results from any excess of the self-regarding impulses, bodily appetite, desire of wealth, emulation, resentment, even love of life itself; and ends by dwelling on the intrinsic painfulness of all malevolence.[2]

One more special impulse remains to be noticed. We have seen that goodness of character consists in a certain harmony of self-regarding and social affections. But virtue, in Shaftesbury's view, is something more; it implies a recognition of moral goodness and immediate preference of it for its own sake. This immediate pleasure that we take in goodness (and displeasure in its opposite) is due to a susceptibility which he calls the "reflex" or "moral" sense, and compares with our susceptibility to beauty and deformity in external things; it furnishes both an additional direct impulse to good conduct, and an additional gratification to be taken into account in the reckoning which proves the coincidence of virtue and happiness. This doctrine of the moral sense is sometimes represented as Shaftesbury's cardinal tenet; but though characteristic and important, it is not really necessary to his main argument; it is the crown rather than the keystone of his ethical structure.

The appearance of Shaftesbury's *Characteristics* (1713) marks a turning-point in the history of English ethical thought. With the generation of moralists that followed, the consideration of abstract rational principles falls into the background, and its place is taken by introspective study of the human mind, observation of the actual play of its various impulses and sentiments. This empirical psychology had not indeed been neglected by previous writers. More, among others, had imitated Descartes in a discussion of the passions, and Locke's essay had given a still stronger impulse in the same direction; still, Shaftesbury is the first moralist who distinctly takes psychological experience as the basis of ethics. His suggestions were developed by Hutcheson into one of the most elaborate systems of moral philosophy which we possess; through Hutcheson, if not directly, they influenced Hume's speculations, and are thus connected with later utilitarianism. Moreover, the substance of Shaftesbury's main argument was adopted by Butler, though it could not pass the scrutiny of that powerful and cautious intellect without receiving important modifications and additions. On the other hand, the ethical optimism of Shaftesbury, rather broadly impressive than exactly reasoned, and connected as it was with a natural theology that implied the Christian scheme to be superfluous, challenged attack equally from orthodox divines and from cynical freethinkers. Of these latter Mandeville, the author of *The Fable of the Bees, or Private Vices Public Benefits* (1723), was a conspicuous if not a typical specimen. He can hardly be called a "moralist"; and though it is impossible to deny him a considerable share of philosophic penetration, his anti-moral paradoxes have not even apparent coherence. He is convinced that virtue (where it is more than a mere pretence) is purely artificial; but not quite certain whether it is a useless trammel of appetites and passions that are advantageous to society, or a device creditable to the politicians who introduced it by playing upon the "pride and vanity" of the "silly creature man." The view, however, to which he gave audacious expression, that moral regulation is something alien to the natural man, and imposed on him from without, seems to have been very current in the polite society of his time, as we learn both from Berkeley's *Alciphron* and from Butler's more famous sermons.

Mandeville.

The view of "human nature" against which Butler preached was not exactly Mandeville's, nor was it properly to be called

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[1] It should be observed that, while Clarke is sincerely anxious to prove that most principles are binding independently of Divine appointment, he is no less concerned to show that morality requires the practical support of revealed religion.

[2] Three classes of impulses are thus distinguished by Shaftesbury:—(1) "Natural Affections," (2) "Self-affections," and (3) "Unnatural Affections." Their characteristics are further considered in the *History of Ethics*, p. 186 seq.

Butler.

Hobbist, although Butler fairly treats it as having a philosophical basis in Hobbes's psychology. It was, so to say, Hobbism turned inside out,—rendered licentious and anarchical instead of constructive. Hobbes had said "the natural state of man is non-moral, unregulated; moral rules are means to the end of peace, which is a means to the end of self-preservation." On this view morality, though dependent for its actuality on the social compact which establishes government, is actually binding on man as a reasonable being. But the quasi-theistic assumption that what is natural must be reasonable remained in the minds of Hobbes's most docile readers, and in combination with his thesis that egoism is natural, tended to produce results which were dangerous to social well-being. To meet this view Butler does not content himself, as is sometimes carelessly supposed, with insisting on the natural claim to authority of the conscience which his opponent repudiated as artificial; he adds a subtle and effective argument *ad hominem.* He first follows Shaftesbury in exhibiting the social affections as no less natural than the appetites and desires which tend directly to self-preservation; then reviving the Stoic view of the *prima naturae,* the first objects of natural appetites, he argues that pleasure is not the primary aim even of the impulses which Shaftesbury allowed to be "self-affections"; but rather a result which follows upon their attaining their natural ends. We have, in fact, to distinguish self-love, the "general desire that every man hath of his own happiness" or pleasure, from the particular affections, passions, and appetites directed towards objects other than pleasure, in the satisfaction of which pleasure consists. The latter are "necessarily presupposed" as distinct impulses in "the very idea of an interested pursuit"; since, if there were no such pre-existing desires, there would be no pleasure for self-love to aim at. Thus the object of hunger is not the pleasure of eating but food; hunger is therefore, strictly speaking, no more "interested" than benevolence; granting that the pleasures of the table are an important element in the happiness at which self-love aims, the same at least may be said for the pleasures of love and sympathy. Further, so far from bodily appetites (or other particular desires) being forms of self-love, there is no one of them which under certain circumstances may not come into conflict with it. Indeed, it is common for men to sacrifice to passion what they know to be their true interests; at the same time we do not consider such conduct "natural" in man as a rational being; we rather regard it as natural for him to govern his transient impulses. Thus the notion of natural unregulated egoism turns out to be a psychological chimera. Indeed, we may say that an egoist must be doubly self-regulative, since rational self-love ought to restrain not only other impulses, but itself also; for as happiness is made up of feelings that result from the satisfaction of impulses other than self-love, any over-development of the latter, enfeebling these other impulses, must proportionally diminish the happiness at which self-love aims. If, then, it be admitted that human impulses are naturally under government, the natural claim of conscience or the moral faculty to be the supreme governor will hardly be denied.

But has not self-love also, by Butler's own account, a similar authority, which may come into conflict with that of conscience? Butler fully admits this, and, in fact, grounds on it an important criticism of Shaftesbury. We have seen that in the latter's system the "moral sense" is not absolutely required, or at least is necessary only as a substitute for enlightened self-regard; since if the harmony between prudence and virtue, self-regarding and social impulses, is complete, mere self-interest will prompt a duly enlightened mind to maintain precisely that "balance" of affections in which goodness consists. But to Butler's more cautious mind the completeness of this harmony did not seem sufficiently demonstrable to be taken as a basis of moral teaching; he has at least to contemplate the possibility of a man being convinced of the opposite; and he argues that unless we regard conscience as essentially authoritative—which is not implied in the term "moral sense"—such a man is really bound to be vicious; "since interest, one's own happiness, is a manifest obligation." Still on this view, even if the authority of conscience be asserted, we seem reduced to an ultimate dualism of our rational nature. Butler's ordered polity of impulses turns out to be a polity with two independent governments. Butler does not deny this, so far as mere claim to authority is concerned;[1] but he maintains that, the dictates of conscience being clear and certain, while the calculations of self-interest lead to merely probable conclusions, it can never be practically reasonable to disobey the former, even apart from any proof which religion may furnish of the absolute coincidence of the two in a future life.

Wollaston.

This dualism of governing principles, conscience and self-love, in Butler's system, and perhaps, too, his revival of the Platonic conception of human nature as an ordered and governed community of impulses, is perhaps most nearly anticipated in Wollaston's *Religion of Nature Delineated* (1722). Here, for the first time, we find "moral good" and "natural good" or "happiness" treated separately as two essentially distinct objects of rational pursuit and investigation; the harmony between them being regarded as matter of religious faith, not moral knowledge. Wollaston's theory of moral evil as consisting in the practical contradiction of a true proposition, closely resembles the most paradoxical part of Clarke's doctrine, and was not likely to approve itself to the strong common sense of Butler; but his statement of happiness or pleasure as a "justly desirable" end at which every rational being "ought" to aim corresponds exactly to Butler's conception of self-love as a naturally governing impulse; while the "moral arithmetic" with which he compares pleasures and pains, and endeavours to make the notion of happiness quantitatively precise, is an anticipation of Benthamism.

Hutcheson.

There is another side of Shaftesbury's harmony which Butler was ultimately led to oppose in a more decided manner,—the opposition, namely, between conscience or the moral sense and the social affections. In the *Sermons,* indeed (1729), Butler seems to treat conscience and calm benevolence as permanently allied though distinct principles, but in the *Dissertation on Virtue,* appended to the *Analogy* (1739), he maintains that the conduct dictated by conscience will often differ widely from that to which mere regard for the production of happiness would prompt. We may take this latter treatise as representing the first in the development of English ethics, at which what were afterwards called "utilitarian" and "intuitional" morality were first formally opposed; in earlier systems the antithesis is quite latent, as we have incidentally noticed in the case of Cumberland and Clarke. The argument in Butler's dissertation was probably directed chiefly against Hutcheson, who in his *Inquiry into the Original of our Ideas of Beauty and Virtue* had definitely identified virtue with benevolence. The identification is slightly qualified in Hutcheson's posthumously published *System of Moral Philosophy* (1755), in which the general view of Shaftesbury is more fully developed, with several new psychological distinctions, including Butler's separation of "calm" benevolence—as well as, after Butler, "calm self-love"—from the "turbulent" passions, selfish or social. Hutcheson follows Butler again in laying stress on the regulating and controlling function of the moral sense; but he still regards "kind affections" as the principal objects of moral approbation—the "calm" and "extensive" affections being preferred to the turbulent and narrow—together with the desire and love of moral excellence which is ranked with universal benevolence, the two being equally worthy and necessarily harmonious. Only in a secondary sense is approval due to certain "abilities and dispositions immediately connected with virtuous affections," as candour, veracity, fortitude, sense of honour; while in a lower grade still are placed sciences and arts, along with even bodily skills and gifts; indeed, the approbation we give to these is not strictly moral, but is referred to the "sense of decency or dignity," which (as well as the sense of honour) is to be distinguished from the moral sense. Calm self-love Hutcheson regards as morally indifferent; though he enters into a careful analysis of the elements of happiness,[1] in order to show that a true regard for private interest always coincides with the moral sense and with benevolence. While thus maintaining Shaftesbury's "harmony" between public and private good, Hutcheson is still more careful to establish the strict disinterestedness of benevolent affections. Shaftesbury had conclusively shown that these were not in the vulgar sense selfish; but the very stress which he lays on the pleasure inseparable from their exercise suggests a subtle egoistic theory which he does not expressly exclude, since it may be said that this "intrinsic reward" constitutes the real motive of the benevolent man. To this Hutcheson replies that no doubt the exquisite delight of the emotion of love is a motive to sustain and develop it; but this pleasure cannot be directly obtained, any more than other pleasures, by merely desiring it; it can be sought only by the indirect method of cultivating and indulging the disinterested desire for others' good, which is thus obviously distinct from the desire for the pleasure of benevolence. He points to the fact that the imminence of death often intensifies instead of diminishing a man's desire for the welfare of those he loves, as a crucial experiment proving the disinterestedness of love; adding, as confirmatory evidence, that the sympathy and admiration commonly felt for self-sacrifice depends on the belief that it is something different from refined self-seeking.

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[1] In a remarkable passage near the close of his eleventh sermon Butler seems even to allow that conscience would have to give way to self-love, if it were possible (which it is not) that the two should come into ultimate and irreconcilable conflict.

It remains to consider how, from the doctrine that affection is the proper object of approbation, we are to deduce moral rules or "natural laws" prescribing or prohibiting outward acts. It is obvious that all actions conducive to the general good will deserve our highest approbation if done from disinterested benevolence; but how if they are not so done? In answering this question, Hutcheson avails himself of the scholastic distinction between "material" and "formal" goodness. "An action," he says, "is *materially* good when in fact it tends to the interest of the system, so far as we can judge of its tendency, or to the good of some part consistent with that of the system, whatever were the affections of the agent. An action is *formally* good when it flowed from good affection in a just proportion." On the pivot of this distinction Hutcheson turns round from the point of view of Shaftesbury to that of later utilitarianism. As regards "material" goodness of actions, he adopts explicitly and unreservedly the formula afterwards taken as fundamental by Bentham; holding that "that action is best which procures the greatest happiness for the greatest numbers, and the worst which in a like manner occasions misery." Accordingly his treatment of external rights and duties, though decidedly inferior in methodical clearness and precision, does not differ in principle from that of Paley or Bentham, except that he lays greater stress on the immediate conduciveness of actions to the happiness of individuals, and more often refers in a merely supplementary or restrictive way to their tendencies in respect of general happiness. It may be noticed, too, that he still accepts the "social compact" as the natural mode of constituting government, and regards the obligations of subjects to civil obedience as normally dependent on a tacit contract; though he is careful to state that consent is not absolutely necessary to the just establishment of beneficent government, nor the source of irrevocable obligation to a pernicious one.

Hume.

An important step further in political utilitarianism was taken by Hume in his *Treatise on Human Nature* (1739). Hume concedes that a compact is the natural means of peacefully instituting a new government, and may therefore be properly regarded as the ground of allegiance to it at the outset; but he urges that, when once it is firmly established the duty of obeying it rests on precisely the same combination of private and general interests as the duty of keeping promises; it is therefore absurd to base the former on the latter. Justice, veracity, fidelity to compacts and to governments, are all co-ordinate; they are all "artificial" virtues, due to civilization, and not belonging to man in his "ruder and more natural" condition; our approbation of all alike is founded on our perception of their useful consequences. It is this last position that constitutes the fundamental difference between Hutcheson's ethical doctrine and Hume's.[2] The former, while accepting utility as the criterion of "material goodness," had adhered to Shaftesbury's view that dispositions, not results of action, were the proper object of moral approval; at the same time, while giving to benevolence the first place in his account of personal merit, he had shrunk from the paradox of treating it as the sole virtue, and had added a rather undefined and unexplained train of qualities,—veracity, fortitude, activity, industry, sagacity,—immediately approved in various degrees by the "moral sense" or the "sense of dignity." This naturally suggested to a mind like Hume's, anxious to apply the experimental method to psychology, the problem of reducing these different elements of personal merit—or rather our approval of them—to some common principle. The old theory that referred this approval entirely to self-love, is, he holds, easy to disprove by "crucial experiments" on the play of our moral sentiments; rejecting this, he finds the required explanation in the sympathetic pleasure that attends our perception of the conduciveness of virtue to the interests of human beings other than ourselves. He endeavours to establish this inductively by a survey of the qualities, commonly praised as virtues, which he finds to be always either useful or immediately agreeable, either (1) to the virtuous agent himself or (2) to others. In class (2) he includes, besides the Benevolence of Shaftesbury and Hutcheson, the useful virtues, Justice, Veracity and Fidelity to compacts; as well as such immediately agreeable qualities as politeness, wit, modesty and even cleanliness. The most original part of his discussion, however, is concerned with qualities immediately useful to their possessor. The most cynical man of the world, he says, with whatever "sullen incredulity" he may repudiate virtue as a hollow pretence, cannot really refuse his approbation to "discretion, caution, enterprise, industry, frugality, economy, good sense, prudence, discernment"; nor again, to "temperance, sobriety, patience, perseverance, considerateness, secrecy, order, insinuation, address, presence of mind, quickness of conception, facility of expression." It is evident that the merit of these qualities in our eyes is chiefly due to our perception of their tendency to serve the person possessed of them; so that the cynic in praising them is really exhibiting the unselfish sympathy of which he doubts the existence. Hume admits the difficulty that arises, especially in the case of the "artificial" virtues, such as justice, &c., from the undeniable fact that we praise them and blame their opposites without consciously reflecting on useful or pernicious consequences; but considers that this may be explained as an effect of "education and acquired habits."[3]

So far the moral faculty has been considered as contemplative rather than active; and this, indeed, is the point of view from which Hume mainly regards it. If we ask what actual motive we have for virtuous conduct, Hume's answer is not quite clear. On the one hand, he speaks of moral approbation as derived from "humanity and benevolence," while expressly recognizing, after Butler, that there is a strictly disinterested element in our benevolent impulses (as also in hunger, thirst, love of fame and other passions). On the other hand, he does not seem to think that moral sentiment or "taste" can "become a motive to action," except as it "gives pleasure or pain, and thereby constitutes happiness or misery." It is difficult to make these views quite consistent; but at any rate Hume emphatically maintains that "*reason* is no motive to action," except so far as it "directs the impulse received from appetite or inclination";

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[1] It is worth noticing that Hutcheson's express definition of the object of self-love includes "perfection" as well as "happiness"; but in the working out of his system he considers private good exclusively as happiness or pleasure.

[2] Hume's ethical view was finally stated in his *Inquiry into the Principles of Morals* (1751), which is at once more popular and more purely utilitarian than his earlier work.

[3] Hume remarks that in some cases, by "association of ideas," the rule by which we praise and blame is extended beyond the principle of utility from which it arises; but he allows much less scope to this explanation in his second treatise than in his first.

and recognizes—in his later treatise at least—no "obligation" to virtue, except that of the agent's interest or happiness. He attempts, however, to show, in a summary way, that all the duties which his moral theory recommends are also "the true interest of the individual,"—taking into account the importance to his happiness of "peaceful reflection on one's own conduct."

Adam Smith.

But even if we consider the moral consciousness merely as a particular kind of pleasurable emotion, there is an obvious question suggested by Hume's theory, to which he gives no adequate answer. If the essence of "moral taste" is sympathy with the pleasure of others, why is not this specific feeling excited by other things beside virtue that tend to cause such pleasure? On this point Hume contents himself with the vague remark that "there are a numerous set of passions and sentiments, of which thinking rational beings are by the original constitution of nature the only proper objects." The truth is, that Hume's notion of moral approbation was very loose, as is sufficiently shown by the list of "useful and agreeable" qualities which he considers worthy of approbation.[1] It is therefore hardly surprising that his theory should leave the specific quality of the moral sentiments a fact still needing to be explained. An original and ingenious solution of this problem was offered by his contemporary Adam Smith, in his *Theory of Moral Sentiments* (1759). Without denying the actuality or importance of that sympathetic pleasure in the perceived or inferred effects of virtues and vices he yet holds that the essential part of common moral sentiment is constituted rather by a more direct sympathy with the impulses that prompt to action or expression. The spontaneous play of this sympathy he treats as an original and inexplicable fact of human nature, but he considers that its action is powerfully sustained by the pleasure that each man finds in the accord of his feelings with another's. By means of this primary element, compounded in various ways, Adam Smith explains all the phenomena of the moral consciousness. He takes first the semi-moral notion of "propriety" or "decorum," and endeavours to show inductively that our application of this notion to the social behaviour of another is determined by our degree of sympathy with the feeling expressed in such behaviour. Thus the prescriptions of good taste in the expression of feeling may be summed up in the principle, "reduce or raise the expression to that with which spectators will sympathize." When the effort to restrain feeling is exhibited in a degree which surprises as well as pleases, it excites admiration as a virtue or excellence; such excellences Adam Smith quaintly calls the "awful and respectable," contrasting them with the "amiable virtues" which consist in the opposite effort to sympathize, when exhibited in a remarkable degree. From the sentiments of propriety and admiration we proceed to the sense of merit and demerit. Here a more complex phenomenon presents itself for analysis; we have to distinguish in the sense of merit—(1) a direct sympathy with the sentiments of the agent, and (2) an indirect sympathy with the gratitude of those who receive the benefit of his actions. In the case of demerit there is a direct antipathy to the feelings of the misdoer, but the chief sentiment excited is sympathy with those injured by the misdeed. The object of this sympathetic resentment, impelling us to punish, is what we call injustice; and thus the remarkable stringency of the obligation to act justly is explained, since the recognition of any action as unjust involves the admission that it may be forcibly obstructed or punished. Moral judgments, then, are expressions of the complex normal sympathy of an impartial spectator with the active impulses that prompt to and result from actions. In the case of our own conduct what we call conscience is really sympathy with the feelings of an imaginary impartial spectator.

Adam Smith gives authority to his moral system by saying that "moral principles are justly to be regarded as the laws of the Deity"; but this he never proves. So Hume insists emphatically on the "reality of moral obligation"; but is found to mean no more by this than the real existence of the likes and dislikes that human beings feel for each other's qualities. The fact is that amid the analysis of feelings aroused by the sentimentalism of Shaftesbury's school, the fundamental questions "What is right?" and "Why?" had been allowed to drop into the background, and the consequent danger to morality was manifest. The binding force of moral rules becomes evanescent if we admit, with Hutcheson, that the "sense" of them may properly vary from man to man as the palate does; and it seems only another way of putting Hume's doctrine, that reason is not concerned with the ends of action, to say that the mere existence of a moral sentiment is in itself no reason for obeying it. A reaction, in one form or another, against the tendency to dissolve ethics into psychology was inevitable; since mankind generally could not be so far absorbed by the interest of psychological hypothesis as to forget their need of establishing practical principles. It was obvious, too, that this reaction might take place in either of the two lines of thought, which, having been peacefully allied in Clarke and Cumberland, had become distinctly opposed to each other in Butler and Hutcheson. It might either fall back on the moral principles commonly accepted, and, affirming their objective validity, endeavour to exhibit them as a coherent and complete set of ultimate ethical truths; or it might take the utility or conduciveness to pleasure, to which Hume had referred for the origin of most sentiments, as an ultimate end and standard by which these sentiments might be judged and corrected. The former is the line adopted with substantial agreement by Price, Reid, Stewart and other members of the still existing Intuitional school; the latter method, with considerably more divergence of view and treatment, was employed independently and almost simultaneously by Paley and Bentham in both ethics and politics, and is at the present time widely maintained under the name of Utilitarianism.

Price.

Price's *Review of the Chief Questions and Difficulties of Morals* was published in 1757, two years before Adam Smith's treatise. In regarding moral ideas as derived from the "intuition of truth or immediate discernment of the nature of things by the understanding," Price revives the general view of Cudworth and Clarke; but with several specific differences. Firstly, his conception of "right" and "wrong" as "single ideas" incapable of definition or analysis—the notions "right," "fit," "ought," "duty," "obligation," being coincident or identical—at least avoids the confusions into which Clarke and Wollaston had been led by pressing the analogy between ethical and physical truth. Secondly, the emotional element of the moral consciousness, on which attention had been concentrated by Shaftesbury and his followers, though distinctly recognized as accompanying the intellectual intuition, is carefully subordinated to it. While right and wrong, in Price's view, are "real objective qualities" of actions, moral "beauty and deformity" are subjective ideas; representing feelings which are partly the necessary effects of the perceptions of right and wrong in rational beings as such, partly due to an "implanted sense" or varying emotional susceptibility. Thus, both reason and sense of instinct co-operate in the impulse to virtuous conduct, though the rational element is primary and paramount. Price further follows Butler in distinguishing the perception of merit and demerit in agents as another accompaniment of the perception of right and wrong in actions; the former being, however, only a peculiar species of the latter, since, to perceive merit in any one is to perceive that it is right to reward him. It is to be observed that both Price and Reid are careful to state that the merit of the agent depends entirely on the intention or "formal rightness" of his act; a man is not blameworthy for unintended evil, though he may of course be blamed for any wilful neglect (cf. Arist., *Eth. Nic.*, iii. 1), which has caused him to be ignorant of his real duty. When we turn to the subject matter of virtue, we find that Price, in comparison with More or Clarke is decidedly laxer in accepting and stating his ethical first principles; chiefly owing to the new antithesis to the view of Shaftesbury and Hutcheson by which his controversial position is complicated. What Price is specially concerned to show is the existence of ultimate principles *beside* the principle of universal benevolence. Not that he repudiates the obligation either of rational benevolence or self-love; on the contrary, he takes more pains than Butler to demonstrate the reasonableness of either principle. "There is not anything," he says, "of which we have more undeniably an intuitive perception, than that it is 'right to pursue and promote happiness,' whether for ourselves or for others." Finally, Price, writing after the demonstration by Shaftesbury and Butler of the actuality of disinterested impulses in human nature, is bolder and clearer than Cudworth or Clarke in insisting that right actions are to be chosen because they are right by virtuous agents as such, even going so far as to lay down that an act loses its moral worth in proportion as it is done from natural inclination.

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[1] In earlier editions of the *Inquiry* Hume expressly included all approved qualities under the general notion of "virtue." In later editions he avoided this strain on usage by substituting or adding "merit" in several passages—allowing that some of the laudable qualities which he mentions would be more commonly called "talents," but still maintaining that "there is little distinction made in our internal estimation" of "virtues" and "talents."

Reid.

On this latter point Reid, in his *Essays on the Active Powers of the Human Mind* (1788), states a conclusion more in harmony with common sense, only maintaining that "no act can be morally good in which regard for what is right has not *some* influence." This is partly due to the fact that Reid builds more distinctly than Price on the foundation laid by Butler; especially in his acceptance of that duality of governing principles which we have noticed as a cardinal point in the latter's doctrine. Reid considers "regard for one's good on the whole" (Butler's self-love) and "sense of duty" (Butler's conscience) as two essentially distinct and co-ordinate rational principles, though naturally often comprehended under the one term, Reason. The rationality of the former principle he takes pains to explain and establish; in opposition to Hume's doctrine that it is no part of the function of reason to determine the ends which we ought to pursue, or the preference due to one end over another. He urges that the notion of "good[1] on the whole" is one which only a reasoning being can form, involving as it does abstraction from the objects of all particular desires, and comparison of past and future with present feelings; and maintains that it is a contradiction to suppose a rational being to have the notion of its Good on the Whole without a desire for it, and that such a desire must naturally regulate all particular appetites and passions. It cannot reasonably be subordinated even to the moral faculty; in fact, a man who doubts the coincidence of the two—which on religious grounds we must believe to be complete in a morally governed world—is reduced to the "miserable dilemma whether it is better to be a fool or a knave." As regards the moral faculty itself, Reid's statement coincides in the main with Price's; it is both intellectual and active, not merely perceiving the "rightness" or "moral obligation" of actions (which Reid conceives as a simple unanalysable relation between act and agent), but also impelling the will to the performance of what is seen to be right. Both thinkers hold that this perception of right and wrong in actions is accompanied by a perception of merit and demerit in agents, and also by a specific emotion; but whereas Price conceives this emotion chiefly as pleasure or pain, analogous to that produced in the mind by physical beauty or deformity, Reid regards it chiefly as benevolent affection, esteem and sympathy (or their opposites), for the virtuous (or vicious) agent. This "pleasurable good-will," when the moral judgment relates to a man's own actions, becomes "the testimony of a good conscience—the purest and most valuable of all human enjoyments." Reid is careful to observe that this moral faculty is not "innate" except in germ; it stands in need of "education, training, exercise (for which society is indispensable), and habit," in order to the attainment of moral truth. He does not with Price object to its being called the "moral sense," provided we understand by this a source not merely of feelings or notions, but of "ultimate truths." Here he omits to notice the important question whether the premises of moral reasoning are universal or individual judgments; as to which the use of the term "sense" seems rather to suggest the second alternative. Indeed, he seems himself quite undecided on this question; since, though he generally represents ethical method as deductive, he also speaks of the "original judgment that this action is right and that wrong."

The truth is that the construction of a scientific method of ethics is a matter of little practical moment to Reid. Thus, though he offers a list of first principles, by deduction from which these common opinions may be confirmed, he does not present it with any claim to completeness. Besides maxims relating to virtue in general,—such as (1) that there is a right and wrong in conduct, but (2) only in voluntary conduct, and that we ought (3) to take pains to learn our duty, and (4) fortify ourselves against temptations to deviate from it—Reid states five fundamental axioms. The first of these is merely the principle of rational self-love, "that we ought to prefer a greater to a lesser good, though more distinct, and a less evil to a greater,"—the mention of which seems rather inconsistent with Reid's distinct separation of the "moral faculty" from "self-love." The third is merely the general rule of benevolence stated in the somewhat vague Stoical formula, that "no one is born for himself only." The fourth, again, is the merely formal principle that "right and wrong must be the same to all in all circumstances," which belongs equally to all systems of objective morality; while the fifth prescribes the religious duty of "veneration or submission to God." Thus, the only principle which ever appears to offer definite guidance as to social duty is the second, "that so far as the intention of nature appears in the constitution of man, we ought to act according to that intention," the vagueness[2] of which is obvious. (For Reid's views on moral freedom see A. Bain, *Mental Science*, pp. 422, seq.)

Dugald Stewart.

A similar incompleteness in the statement of moral principles is found if we turn to Reid's disciple, Dugald Stewart, whose *Philosophy of the Active and Moral Powers of Man* (1828) contains the general view of Butler and Reid, and to some extent that of Price,—expounded with more fulness and precision, but without important original additions or modifications. Stewart lays stress on the obligation of justice as distinct from benevolence; but his definition of justice represents it as essentially impartiality,—a virtue which (as was just now said of Reid's fourth principle) must equally find a place in the utilitarian or any other system that lays down universally applicable rules of morality. Afterwards, however, Stewart distinguishes "integrity or honesty" as a branch of justice concerned with the rights of other men, which form the subject of "natural jurisprudence." In this department he lays down the moral axiom "that the labourer is entitled to the fruit of his own labour" as the principle on which complete rights of property are founded; maintaining that occupancy alone would only confer a transient right of possession during use. The only other principles which he discusses are veracity and fidelity to promises, gratitude being treated as a natural instinct prompting to a particular kind of just actions.

Whewell.

It will be seen that neither Reid nor Stewart offers more than a very meagre and tentative contribution to that ethical science by which, as they maintain, the received rules of morality may be rationally deduced from self-evident first principles. A more ambitious attempt in the same direction was made by Whewell in his *Elements of Morality* (1846). Whewell's general moral view differs from that of his Scottish predecessors chiefly in a point where we may trace the influence of Kant—viz. in his rejection of self-love as an independent rational and governing principle, and his consequent refusal to admit happiness, apart from duty, as a reasonable end for the individual. The moral reason, thus left in sole supremacy, is represented as enunciating five ultimate principles,—those of benevolence, justice, truth, purity and order. With a little straining these are made to correspond to five chief divisions of Jus,—personal security (benevolence being opposed to the ill-will that commonly causes personal injuries), property, contract, marriage and government; while the first, second and fourth, again, regulate respectively the three chief classes of human motives,—affections, mental desires and appetites. Thus the list, with the addition of two general principles, "earnestness" and "moral purpose," has a certain air of systematic completeness. When, however, we look closer, we find that the principle of order, or obedience to government, is not seriously intended to imply the political absolutism which it seems to express, and which English common sense emphatically repudiates; while the formula of justice is given in the tautological or perfectly indefinite proposition "that every man ought to have his own." Whewell, indeed, explains that this latter formula must be practically interpreted by positive law, though he inconsistently speaks as if it supplied a standard for judging laws to be right or wrong. The principle of purity, again, "that the lower parts of our nature ought to be subject to the higher," merely particularizes that supremacy of reason over non-rational impulses which is involved in the very notion of reasoned morality. Thus, in short, if we ask for a clear and definite fundamental intuition, distinct from regard for happiness, we find really nothing in Whewell's doctrine except the single rule of veracity (including fidelity to promises); and even of this the axiomatic character becomes evanescent on closer inspection, since it is not maintained that the rule is practically unqualified, but only that it is practically undesirable to formulate its qualifications.

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[1] It is to be observed that whereas Price and Stewart (after Butler) identify the object of self-love with happiness or pleasure, Reid conceives this "good" more vaguely as including perfection *and* happiness; though he sometimes uses "good" and happiness as convertible terms, and seems practically to have the latter in view in all that he says of self-love.

[2] *E.g.* Reid proposes to apply this principle in favour of monogamy, arguing from the proportion of males and females born; without explaining why, if the intention of nature hence inferred excludes occasional polygamy, it does not also exclude occasional celibacy.

Intuitional and utilitarian schools.

On the whole, it must be admitted that the doctrine of the intuitional school of the 18th and 19th centuries has been developed with less care and consistency than might have been expected, in its statement of the fundamental axioms or intuitively known premises of moral reasoning. And if the controversy which this school has conducted with utilitarianism had turned principally on the determination of the matter of duty, there can be little doubt that it would have been forced into more serious and systematic effort to define precisely and completely the principles and method on which we are to reason deductively to particular rules of conduct.[1] But in fact the difference between intuitionists and utilitarians as to the method of determining the particulars of the moral code was complicated with a more fundamental disagreement as to the very meaning of "moral obligation." This Paley and Bentham (after Locke) interpreted as merely the effect on the will of the pleasures or pains attached to the observance or violation of moral rules, combining with this the doctrine of Hutcheson that "general good" or "happiness" is the final end and standard of these rules; while they eliminated all vagueness from the notion of general happiness by defining it to consist in "excess of pleasure over pain"—pleasures and pains being regarded as "differing in nothing but continuance or intensity." The utilitarian system gained an attractive air of simplicity by thus using a single perfectly clear notion—pleasure and its negative quantity pain—to answer both the fundamental questions of mortals, "What is right?" and "Why should I do it?" But since there is no logical connexion between the answers that have thus come to be considered as one doctrine, this apparent unity and simplicity has really hidden fundamental disagreements, and caused no little confusion in ethical debate.

Paley.

In Paley's *Principles of Moral and Political Philosophy*[2] (1785), the link between general pleasure (the standard) and private pleasure or pain (the motive) is supplied by the conception of divine legislation. To be "obliged" is to be "urged by a violent motive resulting from the command of another"; in the case of moral obligation, the command proceeds from God, and the motive lies in the expectation of being rewarded and punished after this life. The commands of God are to be ascertained "from scripture and the light of nature combined." Paley, however, holds that scripture is given less to teach morality than to illustrate it by example and enforce it by new sanctions and greater certainty, and that the light of nature makes it clear that God wills the happiness of his creatures. Hence, his method in deciding moral questions is chiefly that of estimating the tendency of actions to promote or diminish the general happiness. To meet the obvious objections to this method, based on the immediate happiness caused by admitted crimes (such as "knocking a rich villain on the head"), he lays stress on the necessity of general rules in any kind of legislation;[3] while, by urging the importance of forming and maintaining good habits, he partly evades the difficulty of calculating the consequences of particular actions. In this way the utilitarian method is freed from the subversive tendencies which Butler and others had discerned in it; as used by Paley, it merely explains the current moral and jural distinctions, exhibits the obvious basis of expediency which supports most of the received rules of law and morality and furnishes a simple solution, in harmony with common sense, of some perplexing casuistical questions. Thus (*e.g.*) "natural rights" become rights of which the general observance would be useful apart from the institution of civil government; as distinguished from the no less binding "adventitious rights," the utility of which depends upon this institution. Private property is in this sense "natural" from its obvious advantages in encouraging labour, skill, preservative care; though actual rights of property depend on the general utility of conforming to the law of the land by which they are determined. We observe, however, that Paley's method is often mixed with reasonings that belong to an alien and older manner of thought; as when he supports the claim of the poor to charity by referring to the intention of mankind "when they agreed to a separation of the common fund," or when he infers that monogamy is a part of the divine design from the equal numbers of males and females born. In other cases his statement of utilitarian considerations is fragmentary and unmethodical, and tends to degenerate into loose exhortation on rather trite topics.

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[1] We may observe that some recent writers, who would generally be included in this school, avoid in various ways the difficulty of constructing a code of external conduct. Sometimes they consider moral intuition as determining the comparative excellence of conflicting motives (James Martineau), or the comparative quality of pleasures chosen (Laurie), which seems to be the same view in a hedonistic garb; others hold that what is intuitively perceived is the rightness or wrongness of individual acts—a view which obviously renders ethical reasoning practically superfluous.

[2] The originality—such as it is—of Paley's system (as of Bentham's) lies in its method of working out details rather than in its principles of construction. Paley expressly acknowledges his obligations to the original and suggestive, though diffuse and whimsical, work of Abraham Tucker (*Light of Nature Pursued*, 1768–1774). In this treatise, as in Paley's, we find "every man's own satisfaction, the spring that actuates all his motives," connected with "general good, the root whereout all our rules of conduct and sentiments of honour are to branch," by means of natural theology demonstrating the "unniggardly goodness of the author of nature." Tucker is also careful to explain that satisfaction or pleasure is "one and the same in kind, however much it may vary in degree, . . . whether a man is pleased with hearing music, seeing prospects, tasting dainties, performing laudable actions, or making agreeable reflections," and again that by "general good" he means "quantity of happiness," to which "every pleasure that we do to our neighbour is an addition." There is, however, in Tucker's theological link between private and general happiness a peculiar ingenuity which Paley's common sense has avoided. He argues that men having no free will have really no desert; therefore the divine equity must ultimately distribute happiness in equal shares to all; therefore I must ultimately increase my own happiness most by conduct that adds most to the general fund which Providence administers.

But in fact the outline of Paley's utilitarianism is to be found a generation earlier—in Gay's dissertation prefixed to Law's edition of King's *Origin of Evil*—as the following extracts will show:—"The idea of virtue is the conformity to a rule of life, directing the actions of all rational creatures with respect to each other's happiness; to which every one is always obliged. . . . Obligation is the necessity of doing or omitting something in order to be happy. . . . Full and complete obligation which will extend to all cases can only be that arising from the authority of God. . . . The will of God [so far as it directs behaviour to others] is the immediate rule or criterion of virtue . . . but it is evident from the nature of God that he could have no other design in creating mankind than their happiness; and therefore he wills their happiness; therefore that my behaviour so far as it may be a means to the happiness of mankind should be such; so this happiness of mankind may be said to be the criterion of virtue once removed."

The same dissertation also contains the germ of Hartley's system, as we shall presently notice.

[3] It must be allowed that Paley's application of this argument is somewhat loosely reasoned, and does not sufficiently distinguish the consequence of a single act of beneficent manslaughter from the consequences of a general permission to commit such acts.

Bentham and his school.

In unity, consistency and thoroughness of method, Bentham's utilitarianism has a decided superiority over Paley's. He considers actions solely in respect of their pleasurable and painful consequences, expected or actual; and he recognizes the need of making a systematic register of these consequences, free from the influences of common moral opinion, as expressed in the "eulogistic" and "dyslogistic" terms in ordinary use. Further, the effects that he estimates are all of a definite, palpable, empirically ascertainable quality; they are such pleasures and pains as most men feel and all can observe, so that all his political or moral inferences lie open at every point to the test of practical experience. Every one, it would seem, can tell what value he sets on the pleasures of alimentation, sex, the senses generally, wealth, power, curiosity, sympathy, antipathy (malevolence), the goodwill of individuals or of society at large, and on the corresponding pains, as well as the pains of labour and organic disorders;[1] and can guess the rate at which they are valued by others; therefore if it be once granted that all actions are determined by pleasures and pains, and are to be tried by the same standard, the art of legislation and private conduct is apparently placed on an empirical basis. Bentham, no doubt, seems to go beyond the limits of experience proper in recognizing "religious" pains and pleasures in his fourfold division of sanctions, side by side with the "physical," "political," and "moral" or "social"; but the truth is that he does not seriously take account of them, except in so far as religious hopes and fears are motives actually operating, which therefore admit of being observed and measured as much as any other motives. He does not himself use the will of an omnipotent and benevolent being as a means of logically connecting individual and general happiness. He thus undoubtedly simplifies his system, and avoids the doubtful inferences from nature and Scripture in which Paley's position is involved; but this gain is dearly purchased. For in answer to the question that immediately arises, How then are the sanctions of the moral rules which it will most conduce to the general happiness for men to observe, shown to be always adequate in the case of all the individuals whose observance is required? he is obliged to admit that "the only interests which a man is at all times sure to find adequate motives for consulting are his own." Indeed, in many parts of his work, in the department of legislative and constitutional theory, it is rather assumed that the interests of some men will continually conflict with those of their fellows, unless we alter the balance of prudential calculation by a readjustment of penalties. But on this assumption a system of private conduct on utilitarian principles cannot be constructed until legislative and constitutional reform has been perfected. And, in fact, "private ethics," as conceived by Bentham, does not exactly expound such a system; but rather exhibits the coincidence, *so far as it extends*, between private and general happiness, in that part of each man's conduct that lies beyond the range of useful legislation. It was not his place, as a practical philanthropist, to dwell on the defects in this coincidence;[2] and since what men generally expect from a moralist is a completely reasoned account of what they ought to do, it is not surprising that some of Bentham's disciples should have either ignored or endeavoured to supply the gap in his system. One section of the school even maintained it to be a cardinal doctrine of utilitarianism that a man always gains his own greatest happiness by promoting that of others; another section, represented by John Austin, apparently returned to Paley's position, and treated utilitarian morality[3] as a code of divine legislation; others, with Grote, are content to abate the severity of the claims made by "general happiness" on the individual, and to consider utilitarian duty as practically limited by reciprocity; while on the opposite side an unqualified subordination of private to general happiness was advocated by J. S. Mill, who did more than any other member of the school to spread and popularize utilitarianism in ethics and politics.

Varieties of utilitarian doctrine.

The fact is that there are several different ways in which a utilitarian system of morality may be used, without deciding whether the sanctions attached to it are always adequate. (1) It may be presented as practical guidance to all who choose "general good" as their ultimate end, whether they do so on religious grounds, or through the predominance in their minds of impartial sympathy, or because their conscience acts in harmony with utilitarian principles, or for any combination of these or any other reasons; or (2) it may be offered as a code to be obeyed not absolutely, but only so far as the coincidence of private and general interest may in any case be judged to extend; or again (3) it may be proposed as a standard by which men may reasonably agree to praise and blame the conduct of others, even though they may not always think fit to act on it. We may regard morality as a kind of supplementary legislation, supported by public opinion, which we may expect the public, when duly enlightened, to frame in accordance with the public interest. Still, even from this point of view, which is that of the legislator or social reformer rather than the moral philosopher, our code of duty must be greatly influenced by our estimate of the degrees in which men are normally influenced by self-regard (in its ordinary sense of regard for interests not sympathetic) and by sympathy or benevolence, and of the range within which sympathy may be expected to be generally effective. Thus, for example, the moral standard for which a utilitarian will reasonably endeavour to gain the support of public opinion must be essentially different in quality, according as he holds with Bentham that nothing but self-regard will "serve for diet," though "for a dessert benevolence is a very valuable addition"; or with J. S. Mill that disinterested public spirit should be the prominent motive in the performance of all socially useful work, and that even hygienic precepts should be inculcated, not chiefly on grounds of prudence, but because "by squandering our health we disable ourselves from rendering services to our fellow-creatures."

J. S. Mill.

Not less important is the interval that separates Bentham's polemical attitude towards the moral sense from Mill's conciliatory position, that "the mind is not in a state conformable to utility unless it loves virtue as a thing desirable in itself." Such love of virtue Mill holds to be in a sense natural, though not an ultimate and inexplicable fact of human nature; it is to be explained by the "Law of Association" of feelings and ideas, through which objects originally desired as a means to some further end come to be directly pleasant or desirable. Thus, the miser first sought money as a means to comfort, but ends by sacrificing comfort to money; and similarly though the first promptings to justice (or any other virtue) spring from the non-moral pleasures gained or pains avoided by it, through the link formed by repeated virtuous acts the performance of them ultimately comes to have that immediate satisfaction attached to it which we distinguished as moral. Indeed, the acquired tendency to virtuous conduct may become so strong that the habit of willing it may continue, "even when the reward which the virtuous man receives from the consciousness of well-doing is anything but an equivalent for the sufferings he undergoes or the wishes he may have to renounce." It is thus that the before-mentioned self-sacrifice of the moral hero is conceived by Mill to be possible and actual. The moral sentiments, on this view, are not phases of self-love as Hobbes held; nor can they be directly identified with sympathy, either in Hume's way or in Adam Smith's; in fact, though apparently simple they are really derived in a complex manner from self-love and sympathy combined with more primitive impulses. Justice (*e.g.*) is regarded by Mill as essentially resentment moralized by enlarged sympathy and intelligent self-interest; what we mean by injustice is harm done to an assignable individual by a breach of some rule for which we desire the violator to be punished, for the sake both of the person injured and of society at large, including ourselves. As regards moral sentiments generally, the view suggested by Mill is more definitely given by the chief living representative of the associationist school, Alexander Bain; by whom the distinctive characteristics of conscience are traced to "education under government or authority," though prudence, disinterested sympathy and other emotions combine to swell the mass of feeling vaguely denoted by the term moral. The combination of antecedents is somewhat differently given by different writers; but all agree in representing the conscience of any individual as naturally correlated to the interests of the community of which he is a member, and thus a natural ally in enforcing utilitarian rules, or even a valuable guide when utilitarian calculations are difficult and uncertain.

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[1] This list gives twelve out of the fourteen classes in which Bentham arranges the springs of action, omitting the religious sanction (mentioned afterwards), and the pleasures and pains of self-interest, which include all the other classes except sympathy and antipathy.

[2] In the *Deontology* published by Bowring from MSS. left after Bentham's death, the coincidence is asserted to be complete.

[3] It should be observed that Austin, after Bentham, more frequently uses the term "moral" to connote what he more distinctly calls "positive morality," the code of rules supported by common opinion in any society.

Association and evolution.

This substitution of hypothetical history for direct analysis of the moral sense is really older than the utilitarianism of Paley and Bentham, which it has so profoundly modified. The effects of association in modifying mental phenomena were noticed by Locke, and made a cardinal point in the metaphysic of Hume; who also referred to the principle slightly in his account of justice and other "artificial" virtues. Some years earlier, Gay,[1] admitting Hutcheson's proof of the actual disinterestedness of moral and benevolent impulses, had maintained that these (like the desires of knowledge or fame, the delight of reading, hunting and planting, &c.) were derived from self-love by "the power of association." But a thorough and systematic application of the principle to ethical psychology is first found in Hartley's *Observations on Man* (1748). Hartley, too, was the first to conceive association as producing, instead of mere cohesion of mental phenomena, a quasi-chemical combination of these into a compound apparently different from its elements. He shows elaborately how the pleasures and pains of "imagination, ambition, self-interest, sympathy, theopathy, and the moral sense" are developed out of the elementary pleasures and pains of sensation; by the coalescence into really complex but apparently single ideas of the "miniatures" or faint feelings which the repetition of sensations contemporaneously or in immediate succession tends to produce in cohering groups. His theory assumes the correspondence of mind and body, and is applied *pari passu* to the formation of ideas from sensations, and of "compound vibratiuncules in the medullary substance" from the original vibrations that arise in the organ of sense.[2] The same general view was afterwards developed with much vigour and clearness on the psychical side alone by James Mill in his *Analysis of the Human Mind.* The whole theory has been persistently controverted by writers of the intuitional school, who (unlike Hartley) have usually thought that this derivation of moral sentiments from more primitive feelings would be detrimental to the authority of the former. The chief argument against this theory has been based on the early period at which these sentiments are manifested by children, which hardly allows time for association to produce the effects ascribed to it. This argument has been met in recent times by the application to mind of the physiological theory of heredity, according to which changes produced in the mind (brain) of a parent, by association of ideas or otherwise, tend to be inherited by his offspring; so that the development of the moral sense or any other faculty or susceptibility of existing man may be hypothetically carried back into the prehistoric life of the human race, without any change in the manner of derivation supposed. At present, however, the theory of heredity is usually held in conjunction with Darwin's theory of natural selection; according to which different kinds of living things in the course of a series of generations come gradually to be endowed with organs, faculties and habits tending to the preservation of the individual or species under the conditions of life in which it is placed. Thus we have a new zoological factor in the history of the moral sentiments, which, though in no way opposed to the older psychological theory of their formation through coalescence of more primitive feelings, must yet be conceived as controlling and modifying the effects of the law of association by preventing the formation of sentiments other than those tending to the preservation of human life. The influence of the Darwinian theory, moreover, has extended from historical psychology to ethics, tending to substitute "preservation of the race under its conditions of existence" for "happiness" as the ultimate end and standard of virtue.

Free-will.

Before concluding this sketch of the development of English ethical thought from Hobbes to the thinkers of the 19th century, it will be well to notice briefly the views held by different moralists on the question of free-will,—so far, that is, as they have been put forward as ethically important. We must first distinguish three meanings in which "freedom" is attributed to the will or "inner self" of a human being, viz. (1) the general power of choosing among different alternatives of action without a motive, or against the resultant force of conflicting motives; (2) the power of choice between the promptings of reason and those of appetites (or other non-rational impulses) when the latter conflict with reason; (3) merely the quality of acting rationally in spite of conflicting impulses, however strong, the *non posse peccare* of the medieval theologians.[3] It is obvious that "freedom" in this third sense is in no way incompatible with complete determination; and, indeed, is rather an ideal state after which the moral agent ought to aspire than a property which the human will can be said to possess. In the first sense, again, as distinct from the second, the assertion of "freedom" has no ethical significance, except in so far as it introduces a general uncertainty into all our inferences respecting human conduct. Even in the second sense it hardly seems that the freedom of a man's will can be an element to be considered in examining what it is right or best for him to do (though of course the clearest convictions of duty will be fruitless if a man has not sufficient self-control to enable him to act on them); it is rather when we ask whether it is just to punish him for wrong-doing that it seems important to know whether he could have done otherwise. But in spite of the strong interest taken in the theological aspect of this question by the Protestant divines of the 17th century, it does not appear that English moralists from Hobbes to Hume laid any stress on the relation of free-will either to duty generally or to justice in particular. Neither the doctrine of Hobbes, that deliberation is a mere alternation of competing desires, voluntary action immediately following the "last appetite," nor the hardly less decided Determinism of Locke, who held that the will is always moved by the greatest present uneasiness, appeared to either author to require any reconciliation with the belief in human responsibility. Even in Clarke's system, where Indeterminism is no doubt a cardinal notion, its importance is metaphysical rather than ethical; Clarke's view being that the apparently arbitrary particularity in the constitution of the cosmos is really only explicable by reference to creative free-will. In the ethical discussion of Shaftesbury and sentimental moralists generally this question drops naturally out of sight; and the cautious Butler tries to exclude its perplexities as far as possible from the philosophy of practice. But since the reaction, led by Price and Reid, against the manner of philosophizing that had culminated in Hume, free-will has been generally maintained by the intuitional school to be an essential point of ethics; and, in fact, it is naturally connected with the judgment of good and ill desert which these writers give as an essential element in their analysis of the moral consciousness. An irresistible motive, it is forcibly said, palliates or takes away guilt; no one can blame himself for yielding to necessity, and no one can properly be punished for what he could not have prevented. In answer to this argument some necessarians have admitted that punishment can be legitimate only if it be beneficial to the person punished; others, again, have held that the lawful use of force is to restrain lawless force; but most of those who reject free-will defend punishment on the ground of its utility in deterring others from crime, as well as in correcting or restraining the criminal on whom it falls.

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[1] In the before-mentioned dissertation. Cf. note 2 to p. 835. Hartley refers to this treatise as having supplied the starting-point for his own system.

[2] It should be noticed that Hartley's sensationalism is far from leading him to exalt the corporeal pleasures. On the contrary, he tries to prove elaborately that they (as well as the pleasures of imagination, ambition, self-interest) cannot be made an object of primary pursuit without a loss of happiness on the whole—one of his arguments being that these pleasures occur earlier in time, and "that which is prior in the order of nature is always less perfect than that which is posterior."

[3] It may be observed that in the view of Kant and others (2) and (3) are somewhat confusingly blended.

French influence on English ethics.

Helvetius.

In the preceding sketch we have traced the course of English ethical speculation without bringing it into relation with contemporary European thought on the same subject. And in fact almost all the systems described, from Hobbes downward, have been of essentially native growth, showing hardly any traces of foreign influence. We may observe that ethics is the only department in which this result appears. The physics and psychology of Descartes were much studied in England, and his metaphysical system was certainly the most important antecedent of Locke's; but Descartes hardly touched ethics proper. So again the controversy that Clarke conducted with Spinoza, and afterwards with Leibnitz, was entirely confined to the metaphysical region. Catholic France was a school for Englishmen in many subjects, but not in morality; the great struggle between Jansenists and Jesuits had a very remote interest for them. It was not till near the close of the 18th century that the impress of the French revolutionary philosophy began to manifest itself in England; and even then its influence was mostly political rather than ethical. It is striking to observe how even in the case of writers such as Godwin, who were most powerfully affected by the French political movement, the moral basis, on which the new social order of rational and equal freedom is constructed, is almost entirely of native origin; even when the tone and spirit are French, the forms of thought and manner of reasoning are still purely English. In the derivation of Benthamism alone—which, it may be observed, first becomes widely known in the French paraphrase of Dumont—an important element is supplied by the works of a French writer, Helvetius; as Bentham himself was fully conscious. It was from Helvetius that he learnt that, men being universally and solely governed by self-love, the so-called moral judgments are really the common judgments of any society as to its common interests; that it is therefore futile on the one hand to propose any standard of virtue, except that of conduciveness to general happiness, and on the other hand useless merely to lecture men on duty and scold them for vice; that the moralist's proper function is rather to exhibit the coincidence of virtue with private happiness; that, accordingly, though nature has bound men's interests together in many ways, and education by developing sympathy and the habit of mutual help may much extend the connexion, still the most effective moralist is the legislator, who by acting on self-love through legal sanctions may mould human conduct as he chooses. These few simple doctrines give the ground plan of Bentham's indefatigable and lifelong labours.

Comte.

So again, in the modified Benthamism which the persuasive exposition of J. S. Mill afterwards made popular in England, the influence of Auguste Comte (*Philosophie positive*, 1829–1842, and *Système de politique positive*, 1851–1854) appears as the chief modifying element. This influence, so far as it has affected moral as distinct from political speculation, has been exercised primarily through the general conception of human progress; which, in Comte's view, consists in the ever-growing preponderance of the distinctively human attributes over the purely animal, social feelings being ranked highest among human attributes, and highest of all the most universalized phase of human affection, the devotion to humanity as a whole. Accordingly, it is the development of benevolence in man, and of the habit of "living for others," which Comte takes as the ultimate aim and standard of practice, rather than the mere increase of happiness. He holds, indeed, that the two are inseparable, and that the more *altruistic* any man's sentiments and habits of action can be made, the greater will be the happiness enjoyed by himself as well as by others. But he does not seriously trouble himself to argue with egoism, or to weigh carefully the amount of happiness that might be generally attained by the satisfaction of egoistic propensities duly regulated; a supreme unquestioning self-devotion, in which all personal calculations are suppressed, is an essential feature of his moral ideal. Such a view is almost diametrically opposed to Bentham's conception of normal human existence; the newer utilitarianism of Mill represents an endeavour to find the right middle path between the two extremes.

It is to be observed that, in Comte's view, devotion to humanity is the principle not merely of morality, but of religion; *i.e.* it should not merely be practically predominant, but should be manifested and sustained by regular and partly symbolical forms of expression, private and public. This side of Comte's system, however, and the details of his ideal reconstruction of society, in which this religion plays an important part, have had but little influence either in England or elsewhere. It is more important to notice the general effect of his philosophy on the method of determining the particulars of morality as well as of law (as it ought to be). In the utilitarianism of Paley and Bentham the proper rules of conduct, moral and legal, are determined by comparing the imaginary consequences of different modes of regulation on men and women, conceived as specimens of a substantially uniform and unchanging type. It is true that Bentham expressly recognizes the varying influences of climate, race, religion, government, as considerations which it is important for the legislator to take into account; but his own work of social construction was almost entirely independent of such considerations, and his school generally appear to have been convinced of their competence to solve all important ethical and political questions for human beings of all ages and countries, without regard to their specific differences. But in the Comtian conception of social science, of which ethics and politics are the practical application, the knowledge of the laws of the evolution of society is of fundamental and continually increasing importance; humanity is regarded as having passed through a series of stages, in each of which a somewhat different set of laws and institutions, customs and habits, is normal and appropriate. Thus present man is a being that can only be understood through a knowledge of his past history; and any effort to construct for him a moral and political ideal, by a purely abstract and unhistorical method, must necessarily be futile; whatever modifications may at any time be desirable in positive law and morality can only be determined by the aid of "social dynamics." This view extends far beyond the limits of Comte's special school or sect, and has been widely accepted.

German influence on English ethics.

When we turn from French philosophy to German, we find the influence of the latter on English ethical thought almost insignificant until a very recent period. In the 17th century, indeed, the treatise of Pufendorf on the *Law of Nature*, in which the general view of Grotius was restated with modifications, partly designed to effect a compromise with the doctrine of Hobbes, seems to have been a good deal read at Oxford and elsewhere. Locke includes it among the books necessary to the complete education of a gentleman. But the subsequent development of the theory of conduct in Germany dropped almost entirely out of the cognizance of

Englishmen; even the long dominant system of Wolff (d. 1754) was hardly known. Nor had Kant any serious influence in England until the second quarter of the 19th century. We find, however, distinct traces of Kantian influence in Whewell and other writers of the intuitional school, and at a later date it became so strong that its importance on subsequent ethical thought can scarcely be over-estimated.

Kant.

Categorical imperative.

The English moralist with whom Kant has most affinity is Price; in fact, Kantism, in the ethical thought of modern Europe, holds a place somewhat analogous to that formerly occupied by the teaching of Price and Reid among English moralists. Kant, like Price and Reid, holds that man as a rational being is unconditionally bound to conform to a certain rule of right, or "categorical imperative" of reason. Like Price he holds that an action is not good unless done from a good motive, and that this motive must be essentially different from natural inclination of any kind; duty, to be duty, must be done for duty's sake; and he argues, with more subtlety than Price or Reid, that though a virtuous act is no doubt pleasant to the virtuous agent, and any violation of duty painful, this moral pleasure (or pain) cannot strictly be the motive to the act, because it follows instead of preceding the recognition of our obligation to do it.[1] With Price, again, he holds that rightness of intention and motive is not only an indispensable condition or element of the rightness of an action, but actually the sole determinant of its moral worth; but with more philosophical consistency he draws the inference—of which the English moralist does not seem to have dreamt—that there can be no separate rational principles for determining the "material" rightness of conduct, as distinct from its "formal" rightness; and therefore that all rules of duty, so far as universally binding, must admit of being exhibited as applications of the one general principle that duty ought to be done for duty's sake. This deduction is the most original part of Kant's doctrine. The dictates of reason, he points out, must necessarily be addressed to all rational beings as such; hence, my intention cannot be right unless I am prepared to will the principle on which I act to be a universal law. He considers that this fundamental rule or imperative "act on a maxim which thou canst will to be law universal" supplies a sufficient criterion for determining particular duties in all cases. The rule excludes wrong conduct with two degrees of stringency. Some offences, such as making promises with the intention of breaking them, we cannot even conceive universalized; as soon as every one broke promises no one would care to have promises made to him. Other maxims, such as that of leaving persons in distress to shift for themselves, we can easily conceive to be universal laws, but we cannot without contradiction will them to be such; for when we are ourselves in distress we cannot help desiring that others should help us.

Another important peculiarity of Kant's doctrine is his development of the connexion between duty and free-will. He holds that it is through our moral consciousness that we know that we are free; in the cognition that I ought to do what is right because it is right and not because I like it, it is implied that this purely rational volition is possible; that my action can be determined, not "mechanically," through the necessary operation of the natural stimuli of pleasurable and painful feelings, but in accordance with the laws of my true, reasonable self. The realization of reason, or of human wills so far as rational, thus presents itself as the absolute end of duty; and we get, as a new form of the fundamental practical rule, "act so as to treat humanity, in thyself or any other, as an end always, and never as a means only." We may observe, too, that the notion of freedom connects ethics with jurisprudence in a simple and striking manner. The fundamental aim of jurisprudence is to realize external freedom by removing the hindrances imposed on each one's free action through the interferences of other wills. Ethics shows how to realize internal freedom by resolutely pursuing rational ends in opposition to those of natural inclination. If we ask what precisely are the ends of reason, Kant's proposition that "all rational beings as such are ends in themselves for every rational being" hardly gives a clear answer. It might be interpreted to mean that the result to be practically sought is simply the development of the rationality of all rational beings—such as men—whom we find to be as yet imperfectly rational. But this is not Kant's view. He holds, indeed, that each man should aim at making himself the most perfect possible instrument of reason; but he expressly denies that the perfection of others can be similarly prescribed as an end to each. It is, he says, "a contradiction to regard myself as in duty bound to promote the perfection of another, . . . a contradiction to make it a duty for me to do something for another which no other but himself can do." In what practical sense, then, am I to make other rational beings my ends? Kant's answer is that what each is to aim at in the case of others is not Perfection, but Happiness, *i.e.* to help them to attain those purely subjective ends that are determined for each not by reason, but by natural inclination. He explains also that to seek one's own happiness cannot be prescribed as a duty, because it is an end to which every man is inevitably impelled by natural inclination: but that just because each inevitably desires his own happiness, and therefore desires that others should assist him in time of need, he is bound to make the happiness of others his ethical end, since he cannot *morally* demand aid from others, without accepting the obligation of aiding them in like case. The exclusion of private happiness from the ends at which it is a duty to aim contrasts strikingly with the view of Butler and Reid, that man, as a rational being, is under a "manifest obligation" to seek his own interest. The difference, however, is not really so great as it seems; since in another part of his system Kant fully recognizes the reasonableness of the individual's regard for his own happiness. Though duty, in his view, excludes regard for private happiness, the *summum bonum* is not duty alone, but happiness combined with moral worth; the demand for happiness as the reward of duty is so essentially reasonable that we must postulate a universal connexion between the two as the order of the universe; indeed, the practical necessity of this postulate is the only adequate rational ground that we have for believing in the existence of God.

Hegel.

Before the ethics of Kant had begun to be seriously studied in England, the rapid and remarkable development of metaphysical view and method of which the three chief stages are represented by Fichte, Schelling and Hegel respectively had already taken place; and the system of the latter was occupying the most prominent position in the philosophical thought of Germany.[2] Hegel's ethical doctrine (expounded chiefly in his *Philosophie des Rechts*, 1821) shows a close affinity, and also a striking contrast, to Kant's. He holds, with Kant, that duty or good conduct consists in the conscious realization of the free reasonable will, which is essentially the same in all rational beings. But in Kant's view the universal content of this will is only given in the formal condition of "only acting as one can desire all to act," to be subjectively applied by each rational agent to his own volition; whereas Hegel conceives the universal will as objectively presented to each man in the laws, institutions and customary morality of the community of which he is a member. Thus, in his view, not merely natural inclinations towards pleasures, or the desires for selfish happiness, require to be morally resisted; but even the prompting of the individual's conscience, the impulse to do what seems to him right, if it comes into conflict with the common sense of his community. It is true that Hegel regards the conscious effort to realize one's own conception of good as a higher stage of moral development than the mere conformity to the jural rules establishing property, maintaining contract and allotting punishment to crime, in which the universal will is first expressed; since in such conformity this will is only accomplished accidentally by the outward concurrence of individual wills, and is not essentially realized in any of them. He holds, however, that this conscientious effort is self-deceived and futile, is even the very root of moral evil, except it attains its realization in harmony with the objective social relations in which the individual finds himself placed. Of these relations the first grade is constituted by the family, the second by civil society, and the third by the state, the organization of which is the highest manifestation of universal reason in the sphere of practice.

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[1] Singularly enough, the English writer who approaches most nearly to Kant on this point is the utilitarian Godwin, in his *Political Justice*. In Godwin's view, reason is the proper motive to acts conducive to general happiness: reason shows me that the happiness of a number of other men is of more value than my own; and the perception of this truth affords me at least *some* inducement to prefer the former to the latter. And supposing it to be replied that the motive is really the moral uneasiness involved in choosing the selfish alternative, Godwin answers that this uneasiness, though a "constant step" in the process of volition, is a merely "accidental" step—"I feel pain in the neglect of an act of benevolence, because benevolence is judged by me to be conduct which it becomes me to adopt."

[2] In Kantism, as we have partly seen, the most important ontological beliefs—in God, freedom and immortality of the soul—are based on necessities of ethical thought. In Fichte's system the connexion of ethics and metaphysics is still more intimate; indeed, we may compare it in this respect to Platonism; as Plato blends the most fundamental notions of each of these studies in the one idea of good, so Fichte blends them in the one idea free-will. "Freedom," in his view, is at once the foundation of all being and the end of all moral action. In the systems of Schelling and Hegel ethics falls again into a subordinate place; indeed, the ethical view of the former is rather suggested than completely developed. Neither Fichte nor Schelling has exercised more than the faintest and most indirect influence on ethical philosophy in England; it therefore seems best to leave the ethical doctrines of each to be explained in connexion with the rest of his system.

Hegelianism appears as a distinct element in modern English ethical thought; but the direct influence of Hegel's system is perhaps less important than that indirectly exercised through the powerful stimulus which it has given to the study of the historical development of human thought and human society. According to Hegel, the essence of the universe is a process of thought from the abstract to the concrete; and a right understanding of this process gives the key for interpreting the evolution in time of European philosophy. So again, in his view, the history of mankind is a history of the necessary development of the free spirit through the different forms of political organization: the first being that of the Oriental monarchy, in which freedom belongs to the monarch only; the second, that of the Graeco-Roman republics, in which a select body of free citizens is sustained on a basis of slavery; while finally in the modern societies, sprung from the Teutonic invasion of the decaying Roman empire, freedom is recognized as the natural right of all members of the community. The effect of the lectures (posthumously edited) in which Hegel's "Philosophy of History" and "History of Philosophy" were expounded, has extended far beyond the limits of his special school; indeed, the predominance of the historical method in all departments of the theory of practice is not a little due to their influence. (H. S.; X.)

D. *Ethics since 1879.*—Ethical controversies, like most other speculative disputes, have, during the latter part of the 19th and the beginning of the 20th century, centred round Darwinian theories. The chief characteristic of English moral philosophy in its previous history has been its comparative isolation from great movements, sometimes contemporary movements, of philosophical or scientific thought. Ethics in England no less than on the continent of Europe suffered until the time of Bacon from the excessive domination of theological dogma and the traditional scholastic and Aristotelian philosophy. But the moral philosophy of the 18th century, freed from scholastic trammels, was a genuine native product, arising out of the real problem of conduct and reaching its conclusions, at least ostensibly, by an analysis of, and an appeal to, the facts of conduct and the nature of morality. Even at the beginning of the 19th century, when the main interest of writers who belonged to the Utilitarian school was mainly political, the influence of political theories upon contemporary moral philosophy was upon the whole an influence of which the moral philosophers themselves were unconscious; and from the nature of things moral and political philosophy have a tendency to become one and the same inquiry. Mill, it is true, and Comte both encouraged the idea that society and conduct alike were susceptible of strictly scientific investigation. But the attempt not only to treat ethics scientifically, but actually to subordinate the principles of conduct to the principles of existing biological science or group of sciences biological in character, was reserved for post-Darwinian moral philosophers. That attempt has not, in the opinion of the majority of critics, been successful, and perhaps what is most permanent in the contribution of modern times to ethical theory will ultimately be attributed to philosophers antagonistic to evolutionary ethics. Nevertheless the application of the historical method to inquiries concerning the facts of morality and the moral life—itself part of the great movement of thought to which Darwin gave the chief impetus—has caused moral problems to be presented in a novel aspect; while the influence of Darwinism upon studies which have considerable bearing upon ethics, *e.g.* anthropology or the study of comparative religion, has been incalculable.

The other great movement in modern moral philosophy due to the influence of German, and especially Hegelian, idealism followed naturally for the most part from the revival of interest in metaphysics noticeable in the latter half of the 19th century.

But metaphysical systems of ethics are no novelty even in England, and, while the increased interest in ultimate issues of philosophy has enormously deepened and widened men's appreciation of moral problems and the issues involved in conduct, the actual advance in ethical theory produced by such speculations has been comparatively slight. What is of lasting importance is the re-affirmation upon metaphysical grounds of the right of the moral consciousness to state and solve its own difficulties, and the successful repulsion of the claims of particular sciences such as biology to include the sphere of conduct within their scope and methods. And both evolutionary and idealistic ethics agree in repudiating the standpoint of narrow individualism, alike insist upon the necessity of regarding the self as social in character, and regard the end of moral progress as only realizable in a perfect society.

It is perhaps too much to hope that the long-continued controversy between hedonists and anti-hedonists has been finally settled. But certainly few modern moral philosophers would be found in the present day ready to defend the crudities of hedonistic psychology as they appear in Bentham and Mill. A certain common agreement has been reached concerning the impossibility of regarding pleasure as the sole motive criterion and end of moral action, though different opinions still prevail as to the place occupied by pleasure in the summum bonum, and the possibility of a hedonistic calculus.

The failure of "laissez-faire" individualism in politics to produce that common prosperity and happiness which its advocates hoped for caused men to question the egoistic basis upon which its ethical counterpart was constructed. Similarly the comparative failure of science to satisfy men's aspirations alike in knowledge and, so far as the happiness of the masses is concerned, in practice has been largely instrumental in producing that revolt against material prosperity as the end of conduct which is characteristic of idealist moral philosophy. To this revolt, and to the general tendency to find the principle of morality in an ideal good present to the consciousness of all persons capable of acting morally, the widespread recognition of reason as the ultimate court of appeal alike in religion or politics, and latterly in economics also, has no doubt contributed largely. In the main the appeal to reason has followed the traditional course of such movements in ethics, and has re-affirmed in the light of fuller reflection the moral principles implicit in the ordinary moral consciousness. It is only in the present day that there are noticeable signs of dissatisfaction with current morality itself, and a tendency to substitute or advocate a new morality based ostensibly upon conclusions derived from the facts of scientific observation.

Darwin himself seems never to have questioned, in the sceptical direction in which his followers have applied his principles, the absolute character of moral obligation. What interested

Darwin.

him chiefly, in so far as he made a study of morality, was the development of moral conduct in its preliminary stages. He was principally concerned to show that in morality, as in other departments of human life, it was not necessary to postulate a complete and abrupt gap between human and merely animal existence, but that the instincts and habits which contribute to survival in the struggle for existence among animals develop into moral qualities which have a similar value for the preservation of human and social life. Regarding the social tendency as originally itself an instinct developed out of parental or filial affection, he seems to suggest that natural selection, which was the chief cause of its development in the earlier stages, may very probably influence the transition from purely tribal and social morality into morality in its later and more complex forms. But he admits that natural selection is not necessarily the only cause, and he refrains from identifying the fully developed morality of civilized nations with the "social instinct." Moreover, he recognizes that qualities, *e.g.* loyalty and sympathy, which may have been of great service to the tribe in its primitive struggle for existence, may become a positive hindrance to physical efficiency (leading as they do to the preservation of the unfit) at a later stage. Nevertheless to check our sympathy would lead to the "deterioration of the noblest part of our nature," and the question, which is obviously of vital importance, whether we should obey the dictates of reason, which would urge us only to such conduct as is conducive to natural selection, or remain faithful to the noblest part of our nature at the expense of reason, he leaves unsolved.

Spencer.

It was in Herbert Spencer, the triumphant "buccinator novi temporis," that the advocates of evolutionary ethics found their protagonist. Spencer looked to ideas derived from the biological sciences to provide a solution of all the enigmas of morality, as of most other departments of life; and he conceived it "to be the business of moral science to deduce from the laws of life and the conditions of existence what kinds of action necessarily tend to produce happiness and what kinds to produce unhappiness." It is clear, therefore, that any moral science which is to be of value must wait until the "laws of life" and "conditions of existence" have been satisfactorily determined, presumably by biology and the allied sciences; and there are few more melancholy instances of failure in philosophy than the paucity of the actual results attained by Spencer in his lifetime in his application of the so-called laws of evolution to human conduct—a failure recognized by Spencer himself. His own contribution to ethics was vitiated at the outset by the fact that he never shook himself free from the trammels of the philosophy which his own system was intended to supersede. He began by disclaiming any affinity to Utilitarianism on the part of his own philosophy. He pointed out that the principle of the greatest happiness of the greatest number is a principle without any definite meaning, since men are nowhere unanimous in their standard of happiness, but regard the conception of happiness rather as a problem to be solved than a test to be applied. Universal happiness would require omniscience to legislate for it and the "normal" or, as some would say, "perfect" man to desire it; neither of these conditions of its realization is at present in existence. Further, the principle that "everybody is to count for one, nobody for more than one," is equally unsatisfactory. It may be taken to imply that the useless and the criminal should be entitled to as much happiness as the useful and the virtuous. While it gives no rule for private as distinct from public conduct, it provides no real guidance for the legislator. For neither happiness, nor the concrete means to happiness, nor finally the conditions of its realization can be distributed; and in the end "not general happiness becomes the ethical standard by which legislative action is to be guided, but universal justice." Yet the implications of this latter conclusion Spencer never fully thought out. He accepted bodily without farther questioning the hedonistic psychology by which the Utilitarians sought to justify their theory while he rejected the theory itself. Good, *e.g.* defined by him "as conduct conducive to life," is also further defined as that which is "conducive to a surplus of pleasures over pains." Happiness, again, is always regarded as consisting in feeling, ultimately in pleasant feeling, and there is no attempt to apply the same principles of criticism which he had successfully applied to the Utilitarians' "happiness" to the conception of "pleasure." And, though he maintains as against the Utilitarians the existence of certain fundamental moral intuitions which have come to be quite independent of any present conscious experience of their utility, he yet holds that they are the results of accumulated racial experiences gradually organized and inherited. Finally, side by side with a theory of the nature of moral obligation thus fundamentally empirical and a posteriori in its outlook, he maintains in his account of justice the existence of the idea of justice as distinct from a mere sentiment, carrying with it an a priori belief in its existence and identical in its a priori and intuitive character with the ultimate criterion of Utilitarianism itself. The fact is that any close philosophical analysis of Spencer's system of ethics can only result in the discovery of a multitude of mutually conflicting and for the most part logically untenable theories. It is frequently impossible to discover whether he wishes by an appeal to evolutionary principles to reinforce the sanctions and emphasize the absolute character of the traditional morality which in the main he accepts without question from the current opinions about conduct of his age, or whether he wishes to discredit and disprove the validity of that morality in order to substitute by the aid of the biological sciences a new ethical code. The argument, for instance, that intuitive and a priori beliefs gain their absolute character from the fact that they are the result of continued transmission and accumulation of past nervous modifications in the history of the race would, if taken seriously, lead us to the belief that ultimate ethical sanctions are to be sought, not by an appeal to the moral consciousness, but by the investigation of brain tissue and the relation of man's bodily organism to its environment. Yet such a view would be totally at variance with much that Spencer says (especially in his treatment of justice) concerning the trustworthiness and inevitable character of men's constant appeal to the intuitions of their moral consciousness. Moreover, the very fact itself of the possibility of inheriting acquired moral characteristics is still hotly debated by those biologists with whom should rest the ultimate verdict. Again, the argument that "conduct is good or bad according as its total effects are pleasurable or painful," and that ultimately "pleasure-giving acts are life-sustaining acts," seems to involve Spencer in a multitude of unverified assumptions and contradictory theories. In the first place it is never clear whether Spencer regards the fact that a particular course of conduct is accompanied by a feeling of pleasure as a test of its life-preserving and life-sustaining character, or whether he wishes us to use as our criterion of what is pleasant in conduct the fact that the conduct in question seems conducive to the continued existence of man's organic life. He apparently passes from one criterion to the other as best suits the purpose of the moment. He does not prove the coincidence of life-sustaining and pleasant activities. He assumes throughout that the pleasant is the opposite of what is painful, and seems unaware of the difficulty of determining by means of terms so highly abstract the specific character of moral action. We find in his theory no satisfactory attempt to discriminate between the pleasure aimed at by the altruist and the immediate pleasure of egoistic action. Similarly he disregards the distinction between pleasant feeling as an immediate motive of conduct and the idea of the attainment of future pleasure whether by the race or by the individual. Spencer is involved in effect in most of the confusions and contradictions of hedonistic psychology.

Nor is his attempt to construct a scientific criterion out of data derived from the biological sciences productive of satisfactory results. He is hampered by a distinction between "absolute" and "relative" ethics definitely formulated in the last two chapters of *The Data of Ethics*. Absolute ethics would deal with such laws as would regulate the conduct of ideal man in an ideal society, *i.e.* a society where conduct has reached the stage of complete adjustment to the needs of social life. Relative ethics, on the other hand, is concerned only with such conduct as is advantageous for that society which has not yet reached the end of complete adaptation to its environment, *i.e.* which is at present imperfect. It is hardly necessary to say that Spencer does not tell us how to bring the two ethical systems into correlation. And the actual criteria of conduct derived from biological considerations are almost ludicrously inadequate. Conduct, *e.g.*, is said to be more moral in proportion as it exhibits a tendency on the part of the individual or society to become more "definite," "coherent" and "heterogeneous." Or, again, we should recognize as a test of the "authoritative" character of moral ideas or feelings the fact that they are complex and representative, referring to a remote rather than to a proximate good, remembering the while that "the sense of duty is transitory, and will diminish as fast as moralization increases." In fact, no acceptable scientific criterion emerges, and the outcome of Spencer's attempt to ascertain the laws of life and the conditions of existence is either a restatement of the dictates of the moral consciousness in vague and cumbrous quasi-scientific phraseology, or the substitution of the meaningless test of "survivability" as a standard of perfection for the usual and intelligible standards of "good" and "right."

Leslie Stephen.

A similar criticism might fairly be passed upon the majority of philosophers who approach ethics from the standpoint of evolution. Sir Leslie Stephen, for instance, wishes to substitute the conception of "social health" for that of universal happiness, and considers that the conditions of social health are to be discovered by an examination of the "social organism" or of "social tissue," the laws of which can be studied apart from those laws by which the individuals composing society regulate their conduct. "The social evolution means the evolution of a strong social tissue; the best type is the type implied by the strongest tissue." But on the important question as to what constitutes the strongest social tissue, or to what extent the analogy between society as at present constituted and organic life is really applicable, we are left without certain guidance. The fact is that with few exceptions evolutionary moral philosophers evade the choice between alternatives which is always presented to them. They begin, for the most part, with a belief that in ethics as in other departments of human knowledge "the more developed must be interpreted by the less developed"—though frequently in the sequel complexity or posteriority of development is erected as a standard by means of which to judge the process of development itself. They are not content to write a *history* of moral development, applying to it the principles by which Darwinians seek to explain the development of animal life. But the search of origins frequently leads them into theories of the nature of that moral conduct whose origin they are anxious to find quite at variance with current and accepted beliefs concerning its nature. The discovery of the so-called evolution of morality out of non-moral conditions is very frequently an unconscious subterfuge by which the evolutionist hides the fact that he is making a priori judgments upon the value of the moral concepts held to be evolved. To accept such theories of the origin of morality would carry with it the conviction that what we took for "moral" conduct was in reality something very different, and has been so throughout its history. The legitimate inference which should follow would be the denial of the validity of those moral laws which have hitherto been regarded as absolute in character, and the substitution for all customary moral terms of an entirely new set based upon biological considerations. But it is precisely this, the only logical inference, which most evolutionary philosophers are unwilling to draw. They cannot give up their belief in customary morality. Professor Huxley maintained, for example, in a famous lecture that "the ethical progress of society depends not on imitating the cosmic process, still less in running away from it, but in combating it" (*Romanes Lecture, ad fin.*). And very frequently arguments are adduced by evolutionists to prove that men's belief in the absolute character of moral precepts is one of the necessary means adopted by nature to carry out her designs for the social welfare of mankind. Yet the other alternative, to which such reasoning points, they are reluctant to accept. For the belief that moral obligation is absolute in character, that it is alike impossible to explain its origin and transcend its laws, would make the search for a scientific criterion of conduct to be deduced from the laws of life and conditions of existence meaningless, if not absurd.

Nietzsche.

Perhaps the one European thinker who has carried evolutionary principles in ethics to their logical conclusion is Friedrich Nietzsche. Almost any system of morality or immorality might find some justification in Nietzsche's writings, which are extraordinarily chaotic and full of the wildest exaggerations. Yet it has been a true instinct which has led popular opinion as testified to by current literature to find in Nietzsche the most orthodox exponent of Darwinian ideas in their application to ethics. For he saw clearly that to be successful evolutionary ethics must involve the "transvaluation of all values," the "demoralization" of all ordinary current morality. He accepted frankly the glorification of brute strength. superior cunning and all the qualities necessary for success in the struggle for existence, to which the ethics of evolution necessarily tend. He proclaimed himself, before everything else, a physiologist, and looked to physiology to provide the ultimate standard for everything that has value; and though his own ethical code necessarily involves the disappearance of sympathy, love, toleration and all existing altruistic emotions, he yet in a sense finds room for them in such altruistic self-sacrifice as prepares the way for the higher man of the future. Thus, after a fashion, he is able to reconcile the conflicting claims of egoism and altruism and succeed where most apostles of evolution fail. The Christian virtues, sympathy for the weak, the suffering, &c., represent a necessary stage to be passed through in the evolution of the *Übermensch*, *i.e.* the stage when the weak and suffering combine in revolt against the strong. They are to be superseded, not so much because all social virtues are to be scorned and rejected, as because in their effects, *i.e.* in their tendency to perpetuate and prolong the existence of the weak and those who are least well equipped and endowed by nature, they are anti-social in character and inimical to the survival of the strongest and most vigorous type of humanity. Consequently Nietzsche in effect maintains the following paradoxical position: he explains the existence of altruism upon egoistical principles; he advocates the total abolition of all altruism by carrying these same egoistical principles to their logical conclusion; he nevertheless appeals to that moral instinct which makes men ready to sacrifice their own narrow personal interests to the higher good of society—an instinct profoundly altruistic in character—as the ultimate justification of the ethics he enunciates. Such a position is a *reductio ad absurdum* of the attempt to transcend the ultimate character of those intuitions and feelings which prompt men to benevolence. Thus, though incidentally there is much to be learned from Nietzsche, especially from his criticism of the ethics of pessimism, or from the strictures he passes upon the negative morality of extreme asceticism or quietism, his system inevitably provides its own refutation. For no philosophy which travesties the real course of history and distorts the moral facts is likely to commend itself to the sober judgment of mankind however brilliant be its exposition or ingenious its arguments. Finally, the conceptions of strength, power and masterfulness by which Nietzsche attempts to determine his own moral ideal, become, when examined, as relative and unsatisfactory as other criteria of moral action said to be deduced from evolutionary principles. Men desire strength or power not as ends but as means to ends beyond them; Nietzsche is most convincing when the *Übermensch* is left undefined. Imagined as ideal man, *i.e.* as morality depicts him, he becomes intelligible; imagined as Nietzsche describes him he reels back into the beast, and that distinction which chiefly separates man from the animal world out of which he has emerged, viz. his unique power of self-consciousness and self-criticism, is obliterated.

It was upon this crucial difficulty, *i.e.* the transition in the

T.H.Green.

evolution of morality from the stage of purely animal and unconscious action to specifically human action,—*i.e.* action directed by self-conscious and purposive intelligence to an end conceived as good,—that the polemic of T. H. Green and his idealistic followers fastened. And it is perhaps unfortunate that metaphysical doctrines enunciated chiefly for the purposes of criticism not in themselves vitally necessary to the theory of morality propounded should have been regarded as the main contribution to ethical theory of idealist writers, and as such treated severely by hostile critics. Green's principal objection to evolutionary moral philosophy is contained in the argument that no merely "natural" explanation of the facts of morality is conceivable. The knowing consciousness,—*i.e.* so far as conduct is concerned the moral consciousness,—can never become an object of knowledge in the sense in which natural phenomena are objects of scientific knowledge. For such knowledge implies the existence of a knowing consciousness as a relating and uniting intelligence capable of distinguishing itself from the objects to which it relates. And more particularly the existence of the moral consciousness implies "the transition from mere want to consciousness of wanted object, from impulse to satisfy the want to effort for the realization of the wanted objects, implies the presence of the want to a subject which distinguishes itself from it." Consequently the facts of moral development imply with the emergence of human consciousness the appearance of something qualitatively different from the facts with which physiology for instance deals, imply a stratum as it were in development which no examination of animal tissues, no calculation of consequences with regard to the preservation of the species can ever satisfactorily explain. However far back we go in the history of humanity, if the presence of consciousness be admitted at all, it will be necessary to admit also the presence to consciousness of an ideal which can be accepted or rejected, of a power of looking before and after, and aiming at a future which is not yet fully realized. But unfortunately the temporary exigencies of criticism made it necessary for Green to emphasize the metaphysic of the self, *i.e.* to insist upon the necessity of a critical examination of the pre-requisites of any form of self-consciousness and especially of the knowing consciousness, to such an extent that critics have lost sight of the real dependence of his metaphysic upon the direct evidence of the moral consciousness. The philosophic value, the sincerity, the breadth and depth of his treatment of moral facts and institutions have been fully recognized. What has not been adequately realized is that the metaphysical basis of his system of ethics—the argument, for example, contained in the introduction to the *Prolegomena*—is unfairly treated if divorced from his treatment of morals as a whole, and that it can be justly estimated only if interpreted as much as the conclusion as the starting-point of moral theory. The doctrine of the eternity of the self, for instance, against which much criticism (*e.g.* Taylor, *The Problem of Conduct*, chap. ii.) has been directed, though it is chiefly expressed in the language of epistemology, has its roots nevertheless in the direct testimony of moral experience. For morality implies a power in the individual of rising above the interests of his own narrower self and identifying himself in the pursuit of a universal good with the true interests of all other selves. Similarly the conception of the self as a moral unity arises naturally out of the impossibility of finding the summum bonum in a succession of transient states of consciousness such as hedonism for example postulates. Good as a true universal can only be realized by a true self, and both imply a principle of unity not wholly expressible in terms of the particulars which it unifies. But whether the idealistic interpretation of the nature of universal good be the true one, *i.e.* whether we are justified in identifying that self-consciousness which is capable of grasping the principle of unity with the principle of unity which it grasps is a metaphysical and theistic problem comparatively irrelevant to Green's moral theory. It would be quite possible to accept his criticisms of naturalism and hedonism while rejecting many of the metaphysical inferences which he draws. A somewhat similar answer might be returned to those critics who find Green's use of the term "self-realization" or "self-development" as characteristic of the moral ideal unsatisfactory. It is quite easy to exhibit the futility of such a conception if understood formally for the practical purposes of moral philosophy. If the phrase be understood to mean the realization of some capacities of the self it does not appear to discriminate sufficiently between the good and bad capacities; while the realization under present conditions of all the capacities of a self is impossible. And to aim so far as is possible at all-round development would again ignore the distinction between vice and virtue. But used in the sense in which Green habitually uses it self-realization implies, as he puts it, the fulfilment by the good man of his rational capacity or the idea of a best that is in time, *i.e.* the distinction between the good and the bad self is never ignored, but is the fundamental assumption of his theory. And if it be urged that the expression is in any case tautological, *i.e.* that the good is defined in terms of self-realization and self-realization in terms of the good, it may be doubted whether any rational system of ethics can avoid a similar imputation. Green would admit that in a certain sense the conception of "good" is indefinable, *i.e.* that it can only be recognized in the particulars of conduct of which it is the universal form. Only, therefore, to those philosophers who believe in the existence of a criterion of morality, *i.e.* a universal test such as that of pleasure, happiness and the like, by which we can judge of the worth of actions, will Green's position seem absurd; since, on the contrary, such conceptions as those of "self-development" or "self-realization" seem to have a definite and positive value if they call attention to the metaphysical implications of morality and accurately characterize the moral facts. What ambiguity they possess arises from the ambiguity of morality itself. For moral progress consists in the actualization of what is already potentially in existence. The striking merit of Green's moral philosophy is that the idealism which he advocates is rooted and grounded in moral habits and institutions: and the metaphysic in which it culminates is based upon principles already implicitly recognized by the moral consciousness of the ordinary man. Nothing could be farther from Green's teaching than the belief that constructive metaphysics could, unaided by the intuitions of the moral consciousness, discover laws for the regulation of conduct.

Taylor.

But although Green's loyalty to the primary facts of the moral consciousness prevented him from constructing a rationalistic system of morals based solely upon the conclusions of metaphysics, it was perhaps inevitable that the revival of interest in metaphysics so prominent in his own speculations should lead to a more daring criticism of ethical first principles in other writers. Bradley's *Ethical Studies* had presented with great brilliancy an idealist theory of morality not very far removed from that of Green's *Prolegomena*. But the publication of *Appearance and Reality* by the same author marked a great advance in philosophical criticism of ethical postulates, and a growing dissatisfaction with current reconciliations between moral first principles and the conclusions of metaphysics. *Appearance and Reality* was not primarily concerned with morals, yet it inevitably led to certain conclusions affecting conduct, and it was no very long time before these conclusions were elaborated in detail. Professor A. E. Taylor's *Problem of Conduct* (1901) is one of the most noteworthy and independent contributions to Moral Philosophy published in recent years. But it nevertheless follows in the main Bradley's line of criticism and may therefore be regarded as representative of his school. There are two principal positions in Professor Taylor's work:—(1) a refusal to base ethics upon metaphysics, and (2) the discovery of an irreconcilable dualism in the nature of morality which takes many shapes, but may be summarized roughly as consisting in an ultimate opposition between egoism and altruism. With regard to the first of these Taylor says (*op. cit.* p. 4) that his object is to show that "ethics is as independent of metaphysical speculation for its principles and methods as any of the so-called 'natural sciences'; that its real basis must be sought not in philosophical theories about the nature of the Absolute or the ultimate constitution of the Universe, but in the empirical facts of human life as they are revealed to us in our concrete everyday experience of the world and mankind, and sifted and systematized by the sciences of psychology and sociology. . . . Ethics should be regarded as a purely ‘ positive ’ or ‘ experimental ’ and not as a ‘ speculative ’ science.” With regard to the second position one quotation will suffice (*op. cit.* p. 183). “ Altruism and egoism are divergent developments from the common psychological root of primitive ethical sentiment. Both developments are alike unavoidable, and each is ultimately irreconcilable with the other. Neither egoism nor altruism can be made the sole basis of moral theory without mutilation of the facts, nor can any higher category be discovered by the aid of which their rival claims may be finally adjusted.”

Professor Taylor expounds these two theories with great brilliance of argument and much ingenuity, yet neither of them will perhaps carry complete conviction to the minds of the majority of his critics. It is curious, in the first place, to find the independence of moral philosophy upon metaphysics supported by metaphysical arguments. For whatever may be the real character of the interrelation of moral and metaphysical first principles it is obvious that Taylor’s own dissatisfaction with current moral principles arises from an inability to believe in their ultimate rationality, *i.e.* a belief that they are untenable from the standpoint of ultimate metaphysics; and perhaps the most interesting portion of his book is the chapter entitled “ Beyond Good and Bad,” in which the highest and final form of the ethical consciousness of mankind is subjected to searching criticism. But further, it is becoming increasingly apparent that psychology (upon which Taylor would base morality) itself involves metaphysical assumptions; its position in fact cannot be stated except as a metaphysical position, whether that of subjective idealism or any other. And the need which most philosophers have felt for some philosophical foundation for morality arises, not from any desire to subordinate moral insight to speculative theory, but because the moral facts themselves are inexplicable except in the light of first principles which metaphysics alone can criticize.

Taylor himself attempts to find the roots of ethics in the moral sentiments of mankind, the moral sentiments being primarily feelings or emotions, though they imply and result in judgments of approval and disapproval upon conduct. But it may be doubted whether he succeeds in clearly distinguishing ethical feelings from ethical judgments, and if they are to be treated as synonymous it seems difficult to avoid the conclusion that the implications of moral “ judgment ” must involve a reference to metaphysics.

Moreover, it is obvious that a great part of Taylor’s quarrel with current moral ideals arises from the fact that they do not commend themselves to the moral judgment, *i.e.* from the standpoint of real goodness they are unsatisfactory, being tainted with evil. Hence it appears difficult to reconcile what is in effect a belief in the validity of the judgments of the moral consciousness with a belief that the real source and justification of that consciousness are to be found in the very sentiments and vague mass of floating feelings upon which it pronounces. Scepticism seems to be the only possible result of such a position. Taylor’s polemic against metaphysical systems of ethics is based throughout upon an alleged discrepancy and separation between the facts of moral “ experience,” the judgments of the moral consciousness, and theories as to the nature of these which the philosophers whom he attacks would by no means accept. There is no doubt a distinction between morality as a form of consciousness and reflection upon that morality. But such a distinction neither corresponds to, nor testifies to, the existence of a distinction between morality as “ experience ” and morality as “ theory ” or “ idea.”

Taylor is more persuasive when he is developing his second main thesis—that of the alleged existence of an ultimate dualism in the nature of morality. His accounts of the genesis of the conceptions of obligation and responsibility as of most of the ultimate conceptions with which moral philosophy deals will be accepted or rejected to the extent to which the main contention concerning the psychological basis of ethics commends itself to the reader. But in his exposition of the fundamental contradiction involved in morality elaborated with much care and illustrative argument he appeals for the most part to facts familiar to the unphilosophical moral consciousness. He begins by finding an ultimate opposition between the instincts of self-assertion and instincts which secure the production and protection of the coming generation even in the infra-ethical world with which biology deals. He traces this opposition into the forms in which it appears in the social life of mankind (as, *e.g.*, in the difficulty of reconciling the conflicting claims of individual self-development and self-culture and social service), and finds “ a hidden root of insincerity and hypocrisy beneath all morality ” (p. 243), inasmuch as it is not possible to pursue any one type of ideal without some departure from singleness of purpose. And he finds all the conceptions by which men have hoped to reconcile admitted antagonisms and divergencies between moral ideals claiming to be ultimate and authoritative alike unsatisfactory (p. 285). Progress is illusory; there is no satisfactory goal to which moral development inevitably tends; religion in which some take refuge when distressed by the inexplicable contradictions of moral conduct itself “ contains and rests upon an element of make believe ” (p. 489).

With Taylor’s presentation of the difficulties with which morality is expected to grapple probably few would be found seriously to disagree, though they might consider it unduly pessimistic. But when he turns what is in effect a statement of certain forms of moral difficulty into an attack upon the logical and coherent character of morality itself, he is not so likely to command assent. For the difficulty all men meet with in realizing goodness, or in being moral, is not in itself evidence of an inherent contradiction in the nature of goodness as such. And what perhaps would first strike an unprejudiced critic in Taylor’s examples of conflicting ideals or antagonistic yet ultimate moral judgments would be the perception that they are not necessarily moral ideas or judgments at all, and hence necessarily not ultimate.

The claims of self-culture and of social service may when considered in the abstract or in some hypothetical case appear antagonistic and irreconcilable. But when they present themselves to the individual moral consciousness it may be safely asserted (1) that there can be only one moral choice possible, *i.e.* that their opposition (where they are opposed) involves no conflict of duties; and (2) that whichever ideal is in the end preferred, opportunities will nevertheless be provided within its realization for the concurrent realization of activities and capacities ordinarily associated with the ideal alleged to be contradictory. For just as there is no self-realization which does not involve self-sacrifice, so there is no room for that species of egoism within the confines of morality which is incompatible with social service.

It will be clear from the foregoing account of Taylor’s work that the tendency of his thought, as of that of Bradley, is by no means directed to the confirmation or re-establishment of those principles of conduct recognized by the ordinary moral consciousness. Psychology or metaphysics tend in their systems to usurp the place of authority formerly assigned to ethics proper.

Martineau.

It would be true on the whole to assert that evolutionary systems of ethics such as those of Herbert Spencer, Sir Leslie Stephen or Professor S. Alexander (*Moral Order and Progress*, 1899), together with the metaphysical theories of morals of which T. H. Green and Bradley and Taylor are the chief representatives, have dominated the field of ethical speculation since 1870. Nevertheless it is only necessary to mention such a work as Martineau’s *Types of Ethical Theory* to dispel the notion that the type of moral philosophy most characteristically English, *i.e.* consisting in the patient analysis of the form and nature of the moral consciousness itself, has given way or is likely to give way to more ambitious and constructive efforts. Martineau’s chief endeavour was, as he himself says, to interpret, to vindicate, and to systematize the moral sentiments, and if the actual exhibition of what is involved, *e.g.*, in moral choice is the vindication of morality Martineau may be said to have been successful. It is with his interpretation and systematization of the moral sentiments that most of Martineau's critics have found fault. It is impossible, *e.g.*, to accept his ordered hierarchy of "springs of action" without perceiving that the real principle upon which they can be arranged in order at all must depend upon considerations of circumstances and consequences, of stations and duties, with which a strict intuitionalism such as that of Martineau would have no dealing.[1] Similarly the notion of Conscience as a special faculty giving its pronouncements immediately and without reflection cannot be maintained in the face of modern psychological analysis and is untrue to the nature of moral judgment itself. And Martineau is curiously unsympathetic to the universal and social aspect of morality with which evolutionary and idealist moral philosophers are so largely occupied. Nevertheless there have been few moral philosophers who have, apart from the idiosyncrasies of their special prepossessions, set forth with clearer insight or with greater nobility of language the essential nature of the moral consciousness.

Sidgwick.

Equal in importance to Martineau's work is Professor Sidgwick's *Methods of Ethics* which appeared in 1874. The two works are alike in loftiness of outlook and in the fact that they are devoted to the re-examination of the nature of the moral consciousness to the exclusion of alien branches of inquiry. In most other respects they differ. Martineau is much more in sympathy with idealism than Sidgwick, whose work consists in a restatement from a novel and independent standpoint of the Utilitarian position. And Sidgwick has been far more successful than any other moral philosopher with the exception of T. H. Green and Bradley in founding a school of thought. Many of his most acute critics would be the first to admit how much they owe to his teaching. Chief among the more recent of these is G. E. Moore, whose book *Principia Ethica* is an important original contribution to ethical thought. And although Dr Hastings Rashdall (*The Theory of Good and Evil*, Oxford, 1907) is not in agreement with Sidgwick's own particular type of hedonistic theory in his own philosophical position, he occupies a point of view somewhat similar to that of Sidgwick's main attitude of Rational Utilitarianism. Rashdall's two volumes exhibit also a welcome return on the part of English thought to the proper business of the moral philosopher—the examination of the nature of moral conduct. Other works, such as Professor L. T. Hobhouse's *Morals in Evolution* or Professor E. A. Westermarck's *Origin and Development of the Moral Ideas*, testify to a continued interest in the history of morality and in the anthropological inquiries with which moral philosophy is closely connected.

Much that is of importance for moral philosophy has recently been written upon problems that more properly belong to the philosophy of religion and the theory of knowledge. J. F. M'Taggart's *Studies in Hegelian Cosmology*, and his later work, *Some Dogmas of Religion*, contain interesting contributions to the theory of pleasure and of the problem of free will and determinism. A notable instance of this tendency is seen in the developments of the theory of pragmatism (*q.v.*), for which F. C. S. Schiller has proposed the general term "humanism." Such aspects as concern ethics include, for example, the limited indeterminism involved in the theory, the attitude of the religious consciousness expressed by William James (*Will to Believe* and *Pragmatism*), and the pragmatic conception of the good. And the widespread interest in social problems has produced a revival of speculation concerning questions partly political and party ethical in character, *e.g.* the nature of justice. Finally it has become apparent that many problems hitherto left for political economy to solve belong more properly to the moralist, if not to the moral philosopher, and it may be confidently expected that with the increased complexity of social life and the disappearance of many sanctions of morality hitherto regarded as inviolable, the future will bring a renewed and practical interest in the theory of conduct likely to lead to fresh developments in ethical speculation.

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ETHIOPIA, or Aethiopia (Gr. *Αἰθιοπία*), the ancient classical name of a district of north-eastern Africa, bounded on the N. by Egypt and on the E. by the Red Sea.[1] The application of the name has varied considerably at different times. In the Homeric poems the *Aethiopes* are the furthest of mankind both eastward and westward; the gods go to their banquets and probably the Sun sets in their country. With the growth of scientific geography they came to be located somewhat less vaguely, and indeed their name was employed as the equivalent of the Assyrian and Hebrew Cush (*q.v.*), the Kesh or Ekōsh of the Hieroglyphics (first found in Stele of Senwosri I.), *i.e.* a country extending from about the 24th to the 10th degree of N. lat., while its limits to the E. and W. were doubtful. The etymology of the name, which to a Greek ear meant "swarthy-faced," is unknown, nor can we say why in official inscriptions of the Axumite dynasty the word is used as the equivalent of Habashat (whence the modern Abyssinia), which, from the context would appear to denote a tribe located in S. Arabia, whose name was rendered by the Greek geographers as *Abaseni* and *Abissa*.

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[1] Cf. A. Seth Pringle-Pattison, *The Philosophical Radicals. Martineau's Philosophy*, p. 92.

[1] For the topography and later history see Sudan and Abyssinia.

The inhabitants of Ethiopia, partly perhaps owing to their honourable mention in the Homeric poems, attracted the attention of many Greek researchers, from Democritus onwards. Herodotus divides them into two main groups, a straight-haired race and a woolly-haired race, dwelling respectively to the East and West, and this distinction is confirmed by the Egyptian monuments. From his time onwards various names of tribes are enumerated, and to some extent geographically located, most of these appellations being Greek words, applied to the tribes by strangers in virtue of what seemed to be their leading characteristics, *e.g.* "Long-lived," "Fish-eaters," "Troglodytes," &c. The bulk of our information is derived from Egyptian monuments, whence it appears that, originally occupied by independent tribes, who were raided (first by Seneferu or Snefru, first king of the IVth or last of the IIIrd Dynasty) and gradually subjected by Egyptian kings (the steps in this process are traced by E. W. Budge, *The Egyptian Sudan*, 1907, i. 505 sqq.), under the XVIIIth Dynasty it became an Egyptian province, administered by a viceroy (at first the Egyptian king's son), called prince of Kesh, and paying tributes in negroes, oxen, gold, ivory, rare beads, hides and household utensils. The inhabitants frequently rebelled and were as often subdued; records of these repeated conquests were set up by the Egyptian kings in the shape of steles and temples; of the latter the temple of Amenhotep (Amenophis) III. at Soleb or Sulb seems to have been the most magnificent. Ethiopia became independent towards the 11th century B.C., when the XXIst Dynasty was reigning in Egypt. A state was founded, having for its capital Napata (mod. *Merawi*) at the foot of Jebel Barkal, "the sacred mountain," which in time became formidable, and in the middle of the 8th century conquered Egypt; an Egyptian campaign is recorded in the famous stele of King Pankhi. The fortunes of the Ethiopian (XXVth) Dynasty belong to the history of Egypt (*q.v.*). After the Ethiopian yoke had been shaken off by Egypt, about 660 B.C., Ethiopia continued independent, under kings of whom not a few are known from inscriptions. Besides a number whose names have been discovered in cartouches at Jebel Barkal, the following, of whom all but the third have left important steles, can be roughly dated: Tandamane, son of Tirhaka (667–650), Asperta (630–600), Pankharer (600–560), Harsiōtf (560–525), Nastasen (525–500). From the evidence of the stele of the second (the Coronation Stele) and that of the fifth it has been inferred that the sovereignty early in this period became elective, a deputation of the various orders in the realm being (as Diodorus states), when a vacancy occurred, sent to Napata, where the chief god Amen selected out of the members of the royal family the person who was to succeed, and who became officially the god's son; and it seems certain that the priestly caste was more influential in Ethiopia than in Egypt both before and after this period. Another stele (called the Stele of Excommunication) records the expulsion of a priestly family guilty of murder (H. Schäfer, *Klio*, vi. 287): the name of the sovereign who expelled them has been obliterated. The stele of Harsiōtf contains the record of nine expeditions, in the course of which the king subdued various tribes south of Meroë and built a number of temples. The stele of the last of these sovereigns, now in the Berlin Museum, and edited by H. Schäfer (Leipzig, 1901), contains valuable information concerning the state of the Ethiopian kingdom in its author's time. Shortly after his accession he was threatened with invasion by Cambyses, the Persian conqueror of Egypt, but (according to his own account) destroyed the fleet sent by the invader up the Nile, while (as we learn from Herodotus) the land-force succumbed to famine (see Cambyses). It further appears that in his time and that of his immediate predecessors the capital of the kingdom had been removed from Napata, where in the time of Harsiōtf the temples and palaces were already in ruins, to Meroë at a distance of 60 camel-hours to the south-east. But Napata retained its importance as the religious metropolis; it was thither that the king went to be crowned, and there too the chief god delivered his oracles, which were (it is said) implicitly obeyed. The local names in Nastasen's inscription, describing his royal circuit, are in many cases obscure. A city named Pnups (Hierogl. Pa-Nebes) appears to have constituted the most northerly point in the empire. These Ethiopian kings seem to have made no attempt to reconquer Egypt, though they were often engaged in wars with the wild tribes of the Sudan. For the 5th and 4th centuries B.C. the history of the country is a blank. A fresh epoch was, however, inaugurated by Ergamenes, a contemporary of Ptolemy Philadelphus, who is said to have massacred the priests at Napata, and destroyed sacerdotal influence, till then so great that the king might at the priests' order be compelled to destroy himself; Diodorus attributes this measure to Ergamenes' acquaintance with Greek culture, which he introduced into his country. A temple was built by this king at Pselcis (Dakka) to Thoth. Probably the sovereignty again became hereditary. Occasional notices of Ethiopia occur from this time onwards in Greek and Latin authors, though the special treatises by Agatharchides and others are lost. According to these the country came to be ruled by queens named Candace. One of them was involved in war with the Romans in 24 and 23 B.C.; the land was invaded by C. Petronius, who took the fortress Premis or Ibrim, and sacked the capital (then Napata); the emperor Augustus, however, ordered the evacuation of the country without even demanding tribute. The stretch of land between Assuan (Syene) and Maharraka (Hiera Sycaminus) was, however, regarded as belonging to the Roman empire, and Roman cohorts were stationed at the latter place. To judge by the monuments it is possible that there were queens who reigned alone. Pyramids were erected for queens as well as for kings, and the position of the queens was little inferior to that of their consorts, though, so far as monumental representations go, they always yielded precedence to the latter. Candace appears to be found as the name of a queen for whom a pyramid was built at Meroë. A great builder was Netekamane, who is represented with his queen Amanetari on temples of Egyptian style at many points up the Nile—at Amara just above the second cataract, and at Napata, as well as at Meroë, Benaga and Naga in the distant Isle of Meroë. He belongs, probably, to the Ptolemaic age. Later, in the Roman period, the type in sculpture changed from the Egyptian. The figures are obese, especially the women, and have pronounced negro features, and the royal person is loaded with bulging gold ornaments. Of this period also there is a royal pair, Netekamane and Amanetari, imitating the names of their conspicuous predecessors. In the 4th century A.D. the state of Meroë was ravaged by the Nubas (?) and the Abyssinians, and in the 6th century its place was taken by the Christian state of Nubia (see Dongola).

Contrary to the opinion of the Greeks, the Ethiopians appear to have derived their religion and civilization from the Egyptians. The royal inscriptions are written in the hieroglyphic character and the Egyptian language, which, however, in the opinion of experts, steadily deteriorate after the separation of Ethiopia from Egypt. About the time of Ergamenes, or (according to some authorities) before, a vernacular came to be employed in inscriptions, written in a special alphabet of 23 signs in parallel hieroglyphic and cursive forms. The cursive is to be read from right to left, the hieroglyphic, contrary to the Egyptian method, in the direction in which the figures face. The Egyptian equivalents of six characters have been made out by the aid of bilingual cartouches. Words are divided from each other by pairs of dots, and it is clear that the forms and values of the signs are largely based on Egyptian writing; but as yet decipherment has not been attained, nor can it yet be stated to what group the language should be assigned (F. Ll. Griffith in D. R. MacIver's *Areika*, Oxford, 1909, and later researches).

Notices in Greek authors are collected by P. Paulitschke, *Die geographische Erforschung des afrikanischen Continents* (Vienna, 1880); the inscriptions were edited and interpreted by G. Maspero, *Revue archéol.* xxii., xxv.; *Mélanges d'Assyriologie et d'Égyptologie*, ii., iii.; *Records of the Past*, vi.; *T.S.B.A.* iv.; Schäfer, *l.c.*, and *Zeitschrift für ägyptische Sprache*, xxxiii. See also J. H. Breasted, "The Monuments of Sudanese Nubia," in *American Journal of Semitic*

Languages (October 1908), and the work of E. W. Budge cited above. A description of the chief ruins and the results of Dr D. R. MacIver's researches in northern Nubia, begun in 1907, will be found under Sudan: *Anglo-Egyptian*.

The Axumite Kingdom.—About the 1st century of the Christian era a new kingdom grew up at Axum (*q.v.*), of which a king Zoscales is mentioned in the *Periplus Maris Erythraei*. Fragments of the history of this kingdom, of which there is no authentic chronicle, have been made out chiefly by the aid of inscriptions, of which the following is a list:—(1) Greek inscription of Adulis, copied by Cosmas Indicopleustes in 545, the beginning, with the king's name, lost. (2) Sabaean inscription of Ela Amida in two halves, discovered by J. Theodore Bent at Axum in 1893, and completed by E. Littmann in 1906. (3) Ethiopic inscription probably of the same king, imperfect (Littmann). (4) Trilingual inscription of Aeizanes, the Greek version discovered by Henry Salt in 1805, the Sabaean by Bent, and the Ethiopic (Geez) by Littmann. (5) Ethiopic inscription of Aeizanes (so Littmann), son of Ela Amida, discovered by Eduard Rüppell in 1833. (6) Ethiopic inscriptions of Hetana-Dan'el, son of Dabra Efrem. These are all long inscriptions giving details of wars, &c. The sixth is later than the rest, which are to be attributed to the most flourishing period of the kingdom, the 4th and 5th centuries A.D. The fourth is pagan, the fifth Christian, Aeizanes having in the interval embraced Christianity. It was to this king that the emperor Constantius addressed a letter in 356 A.D.

Aeizanes and his successors style themselves kings of the Axumites, Homerites (Himyar), Raidan, the Ethiopians (Habašat), the Sabaeans, Silee, Tiamo, the Bugaites (Beǵa) and Kasu. This style implies considerable conquests in South Arabia, which, however, must have been lost to the Axumites by A.D. 378. They claim to rule the Kasu or Meroitic Ethiopians; and the fifth inscription records an expedition along the Atbara and the Nile to punish the Nuba and Kasu, and a fragment of a Greek inscription from Meroë was recognized by Sayce as commemorating a king of Axum. Except for these inscriptions Axumite history is a blank until in the 6th century we find the Axumite king sending an expedition to wreck the Jewish state then existing in S. Arabia, and reducing that country to a state of vassalage: the king is styled in Ethiopian chronicles Caleb (Kaleb), in Greek and Arabic documents El-Esbaha. In the 7th century a successor to this king, named Abraha or Abraham, gave refuge to the persecuted followers of Mahomet at the beginning of his career (see Arabia: *History*, *ad init.*). A few more names of kings occur on coins, which were struck in Greek characters till about A.D. 700, after which time that language seems definitely to have been displaced in favour of Ethiopic or Geez: the condition of the script and the coins renders them all difficult to identify with the names preserved in the native lists, which are too fanciful and mutually contradictory to furnish of themselves even a vestige of history. For the period between the rise of Islam and the beginning of the modern history of Abyssinia there are a few notices in Arabic writers; so we have a notice of a war between Ethiopia and Nubia about 687 (C. C. Rossini in *Giorn. Soc. Asiat. Ital.* x. 141), and of a letter to George king of Nubia from the king of Abyssinia some time between 978 and 1003, when a Jewish queen Judith was oppressing the Christian population (I. Guidi, *ibid.* iii. 176, 7).

The Abyssinian chronicles, it may be noted, attribute the foundation of the kingdom to Menelek (or Ibn el-Hakim), son of Solomon and the queen of Sheba. The Axumite or Menelek dynasty was driven from northern Abyssinia by Judith, but soon after another Christian dynasty, that of the Zagués, obtained power. In 1268 the reigning prince abdicated in favour of Yekūnō Amlāk, king of Shoa, a descendant of the monarch overthrown by Judith (see Abyssinia).

See A. Dillman, *Die Anfänge des axumitischen Reiches* (Berlin, 1879); E. Drouin, *Revue archéol.* xliv. (1882); T. Mommsen, *Geschichte der römischen Provinzen*, chap. xiii.; W. Dittenberger, *Orientis Graeci Inscriptiones selectae*, Nos. 199, 200; Littmann u. Kroncker, *Vorbericht der deutschen Aksum-Expedition* (Berlin, 1906), and Littman's subsequent researches.

Ethiopic Literature

The employment of the Geez or Ethiopic language for literary purposes appears to have begun no long time before the introduction of Christianity into Abyssinia, and its pagan period is represented by two Axumite inscriptions (published by D. H. Müller in J. T. Bent's *Sacred City of the Ethiopians*, 1893), and an inscription at Matara (published by C. C. Rossini, *Rendiconti Accad. Lincei*, 1896). As a literary language it survived its use as a vernacular, but it is unknown at what time it ceased to be the latter. In Sir W. Cornwallis Harris's *Highlands of Aethiopia* (1844) there is a list of rather more than 100 works extant in Ethiopic; subsequent research has chiefly brought to light fresh copies of the same works, but it has contributed some fresh titles. A conspectus of all the MSS. known to exist in Europe (over 1200 in number) was published by C. C. Rossini in 1899 (*Rendiconti Accad. Lincei*, ser. v. vol. viii.); of these the largest collection is that in the British Museum, but others of various sizes are to be found in the chief libraries of Europe. R. E. Littmann (in the *Zeitschrift für Assyriologie*, xv. and xvi.) describes two collections at Jerusalem, one of which contains 283 MSS.; and Rossini (*Rendiconti*, 1904) a collection of 35 MSS. belonging to the Catholic mission at Cheren. Other collections exist in Abyssinia, and many MSS. are in private hands. In 1893 besides portions of the Bible some 40 Ethiopic books had been printed in Europe (enumerated in L. Goldschmidt's *Bibliotheca Aethiopica*), but many more have since been published.

Geez literature is ordinarily divided into two periods, of which the first dates from the establishment of Christianity in the 5th century, and ends somewhere in the 7th; the second from the re-establishment of the Salomonic dynasty in 1268, continuing to the present time. It consists chiefly of translations, made in the first period from Greek, in the second from Arabic. It has no authors of the first or even of the second rank. Its character as a sacred and literary language is due to its translation of the Bible, which in the ordinary enumeration is made to contain 81 books, 46 of the Old Testament, and 35 of the New. These figures are most probably obtained by adding to the ordinary canonical books *Maccabees*, *Tobit*, *Judith*, *Wisdom*, *Ecclesiasticus*, *Baruch*, *Jubilees*, *Enoch*, the *Ascension of Isaiah*, *Ezra IV.*, *Shepherd of Hermas*, the *Synodos* (Canons of the Apostles), the *Book of Adam*, and *Joseph Ben Gorion*. For the distinction between canonical and apocryphal appears to be unknown to the Ethiopic Church, whose chief service to Biblical literature consists in its preservation of various apocryphal works which other parts of Christendom have lost or possess only in an imperfect form (see Enoch; Jubilees, Book of, &c.). It should be observed that the *Maccabees* of the Ethiopic Bible is an entirely different work from the books of that name included in the Septuagint, of which, however, the Abyssinians have a recent version made from the Vulgate; specimens of their own *Maccabees* have been published by J. Horovitz in the *Zeitschrift für Assyriologie*, vol. xx. The MSS. of the Biblical books vary very much, and none of them can claim any great antiquity; the oldest extant MS. of the four Books of Kings appears to be one in the Museo Borgiano, presented by King Amda Sion (1314) to the Virgin Mary in Jerusalem (described by N. Roupp, *ibid.* xvi. 296-342). Hence P. de Lagarde supposed the Ethiopic version to have been made from the Arabic, which indeed is in accordance with a native tradition. This opinion is held by few; C. F. A. Dillman distinguished in the case of the Old Testament three classes of MSS., a *versio antiqua*, made from the Septuagint (probably in the Hesychian text), a class revised from Greek MSS., and a class revised from the Hebrew (probably through the medium of an Arabic version). An examination of ten chapters of St Matthew by L. Hackspill (*ibid.* vol. xi.) led to the result that the Ethiopic version of the Gospels was made about A.D. 500, from a Syro-occidental text, and that this original translation is represented by Cod. Paris. Aeth. 32; whereas most MSS. and all printed editions contain a text influenced by the Alexandrian Vulgate, and show traces of Arabic. Rossini (*ibid.* x. 232) has made it probable that the

Abba Salāmā, whom the native tradition identifies with Frumentius, evangelist of Abyssinia, to whom the translation of the Bible was ascribed, was in reality a Metropolitan of the early 14th century, who revised the corrupt text then current. Of the ancient translation the latest book is said to be Ecclesiasticus, translated in the year 678. The New Testament has been published repeatedly (first in Rome, 1548–1549; some letters about its publication were edited by I. Guidi in the *Archivio della Soc. Rom. di Storia Patria*, 1886), and C. F. A. Dillmann edited a critical text of most of the Old Testament and Apocrypha, but did not live to complete it; portions have been edited by J. Bachmann and others.

Other translations thought to belong to the first period are the *Sherʻata Makhbār*, ascribed to S. Pachomius; the *Kerilos*, a collection of homilies and tracts, beginning with Cyril of Alexandria *De recta fide*; and the *Physiologus*, a fanciful work on Natural History (edited by F. Hommel, Leipzig, 1877).

Of the works belonging to the second period much the most important are those which deal with Abyssinian history. A court official, called *sahāfē teʻezāzenet* (secretary), having under him a staff of scribes, was employed to draw up the public annals year by year; and on these official compositions the Abyssinian histories are based. The earliest part of the Axum chronicle preserved is that recording the wars of Amda Sion (1314–1344) against the Moslems; it is doubtful, however, whether even this exists in its original form, as some scholars think; according to its editor (J. Perruchon in the *Journ. Asiat.* for 1889) it is preserved in a recension of the time of King Zarʻa Yaʻkūb. Under King Lebna Dengel (1508–1540) the annals of his four predecessors, Zarʻa Yaʻkūb, Baeda Maryam, Eskender and Naʻod (1434–1508) were drawn up; those of the first two were published by J. Perruchon (Paris, 1893); in the *Journ. Asiat.* for 1894 the same scholar published a further fragment of the history of Baeda Maryam, written by the tutor to the king's children, and the history of Eskender, Amda Sion II. and Naʻod as compiled in Lebna Dengel's time. The history of Lebna Dengel was published by the same scholar (*Journ. Semit.* i. 274) and Rossini (*Rendiconti*, 1894, v. p. 617); that of his successor Claudius (1540–1559) by Conzelmann (Paris, 1895); that of his successor Minas (1559–1563) by F. M. E. Pereira (Lisbon, 1888); those of the three following kings, Sharsa Dengel, Zā Dengel, and Yaʻkūb, by Rossini (*Rendiconti*, 1893). The history of the next king Sysenius (1606–1632) by Abba Meherka Dengel and Tekla Shelase was edited by Pereira (Lisbon, 1892); the chronicles of Joannes I., Iyasu I. and Bakaffa (1682–1730) by I. Guidi, with a French translation (Paris, 1903–1905); all are contemporary, and the names of the chroniclers of the last two kings are recorded. Besides these we have the partly fabulous chronicle of Lalibela (of uncertain date, but before the Salomonian dynasty was restored), edited by Perruchon (Paris, 1892); and a brief chronicle of Abyssinia, drawn up in the reign of Iyasu II. (1729–1753), embodying materials abridged, but often unaltered, was published by R. Basset, in the *Journ. Asiat.* for 1882 (cf. Rossini in the *Rendiconti*, 1893–1894, p. 668), and has since formed the basis for Abyssinian history. Many compilations of the sort exist in MS. in libraries, and great praise is bestowed on the one which E. Rüppell, when travelling in Abyssinia, ordered to be drawn up for his use. It is now in the collection of his MSS. at Frankfurt. Ethiopic scholars speak of a special "historical style" which comes from the mixture of the styles of different periods, and the admixture of Amharic phrases and idioms. The historian of the wars of Amda Sion is credited with some literary merit; most of the chroniclers have little.

The remaining literature of the second period is thought to begin somewhat earlier than these chronicles. To the time of King Yekūnō Amlāk (1268–1283) the historical romance called *Kebra Nagaset* (Glory of Kings) is assigned by its editor, C. Bezold (Bavarian Academy, 1904); other scholars gave it a somewhat later date. Its purpose is to glorify the Salomonian dynasty, whence, in spite of a colophon which declares it to be a translation, it was regarded as an original work; since, however, it shows evident signs of having been translated from Arabic, Bezold supposes that its author, Ishāk, was an immigrant whose native language was Arabic, in which therefore he would naturally write the first draft of his book. To the time of Yagbea Sion (*ob.* 1294) belongs the *Vision of the Prophet Habakkuk in Kartasā*, as also the works of Abba Salāmā, regarded as the founder of the Ethiopic renaissance, one of whose sermons is preserved in a Cheren MS. With his name are connected the *Acts of the Passion*, the *Service for the Dead* and the translation of Philexius, *i.e.* Philoxenus. King Zarʻa Yaʻkūb composed or had composed for him as many as seven books; the most important of these is the *Book of Light* (Mashafa Berhān), paraphrased as *Kirchenordnung*, by Dillmann, who gave an analysis of its contents (*Über die Regierung des Königs Zarʻa Yaʻkob*, Berl. Acad., 1884). He also organized the compilation of the Miracles of the Virgin Mary, one of the most popular of Ethiopic books; a magnificent edition was printed by E. W. Budge in the Meux collection (London, 1900). In the same reign the Arabic chronicle of al-Makīn was translated into Geez. Under Lebna Dengel (*ob.* 1540), besides the above-mentioned collection of chronicles, we hear of the translation from the Arabic of the history and martyrdom of St George, the Commentary of J. Chrysostom on the Epistle to the Hebrews, and the ascetic works of J. Saba called *Aragāwī manfasāwī*. Under Claudius (1540–1559) Maba Sion is said to have translated from the Arabic *The Faith of the Fathers*, a vast compilation, including the *Didascalia Apostolorum* (edited by Platt, London, 1834), and the *Creed of Jacob Baradaeus* (published by Cornill, *ZDMG.* xxx. 417-466), and to the same reign belong the *Book of Extreme Unction* (*Mashafa Kandīl*), and the religious romance *Barlaam et Joasaph* also paraphrased from the Arabic (partly edited by A. Zotenberg in *Notices et Extraits*, vol. xxviii.). The *Confession of Faith* of King Claudius has been repeatedly printed. The reign of Sharsa Dengel (*ob.* 1595) was marked by many literary monuments, such as the religious and controversial compilation called *Mazmura Chrestos*, and the translation, by a certain Salik, of the religious encyclopaedia (Mashafa Hāiā) of the monk Nikon; an Arab merchant from Yemen, who took on conversion the name Anbākōm (Habakkuk), translated a number of books from the Arabic. Under Yaʻkūb (*ob.* 1605) the valuable chronicle of John of Nikiou was translated from Arabic (edited by A. Zotenberg with French translation in *Notices et extraits*, vol. xxiv.). Under John, about 1687, the *Spiritual Medicine* of Michael, bishop of Adtrib and Malig, was translated. The literature that is not accurately dated consists largely of liturgies, prayers and hymns; Ethiopic poetry is chiefly, if not entirely, represented by the last of these, the most popular work of the kind being an ode in praise of the Virgin, called *Weddase Maryam* (edited by K. Fries, Leipzig, 1892). Various hymn-books bear the names *Degua*, *Zemmare* and *Mawasʻet* (Antiphones); there is also a biblical history in verse called *Mashafa Madbal* or *Mestīra Zamān*. Homilies also exist in large numbers, both original and translated, sometimes after the Arabic fashion in rhymed prose. Hagiology is naturally an important department in Ethiopic literature. In the great collection called *Synaxar* (translated originally from Arabic, but with large additions) for each day of the year there is the history of one or more saints; an attempt has been made by H. Dünsing (1900) to derive some actual history from it. Many texts containing lives of individual saints have been issued. Such are those of Maba Sion and Gabra Chrestos, edited by Budge in the Meux collection (London, 1899); the Acts of S. Mercurius, of which a fragment was edited by Rossini (Rome, 1904); the unique MS. of the original, one of the most extensive works in the Geez language, was burned by thieves who set fire to the editor's house. The same scholar began a series of *Vitae Sanctorum antiquiorum*, while *Monumenta Aethiopiae hagiologica* and *Vitae Sanctorum indigenarum* have been edited by B. Turaiev (Leipzig and St Petersburg, 1902, and Rome, 1905). Other lives have been edited by Pereira, Guidi, &c. Similar in historical value to these works is the *History of the Exploits of Alexander*, of which various recensions have been edited by Budge (London, 1895). See further ALEXANDER THE GREAT, section on the legends, *ad fin.*

Of Law the most important monument is the *Fatha Nagaset*

(Judgment of Kings), of which an official edition was issued by I. Guidi (Rome, 1899), with an Italian translation; it is a version probably made in the early 16th century of the Arabic code of Ibn ʽAssal, of the 12th century, whose work, being meant for Christians living under Moslem rule, was not altogether suitable for an independent Christian kingdom; yet the need for such a code made it popular and authoritative in Abyssinia. The translator was not quite equal to his task, and the Brit. Mus. MS. 800 exhibits an attempt to correct it from the original.

Science can scarcely be said to exist in Geez literature, unless a medical treatise, of which the British Museum possesses a copy, comes under this head. Philosophy is mainly represented by mystical commentaries on Scripture, such as the *Book of the Mystery of Heaven and Earth*, by Ba-Hailu Michael, probably of the 15th century, edited by Perruchon and Guidi (Paris, 1903). There is, however, a translation of the Book of the Wise Philosophers, made by Michael, son of Abba Michael, consisting of various aphorisms; specimens have been edited by Dillmann in his Chrestomathy, and J. Cornill (Leipzig, 1876). There is also a translation of *Secundus the Silent*, edited by Bachmann (Berlin, 1888). Far more interesting than these is the treatise of Zarʽa Yaʽkūb of Axum, composed in the year 1660 (edited by Littmann, 1904), which contains an endeavour to evolve rules of life according to nature. The author reviews the codes of Moses, the Gospel and the Koran, and decides that all contravene the obvious intentions of the Creator. He also gives some details of his own life and his occupation of scribe. A less original treatise by Walda Haywat accompanies it. Epistolography is represented by the diplomatic correspondence of some of the kings with the Portuguese and Spanish courts; some documents of this sort have been edited by C. Beccari, *Documenti inediti per la storia d' Etiopia* (Rome, 1903); lexicography, by the vocabulary called *Sawāsew*. The first Ethiopic book printed was the Psalter (Rome, 1513), by John Potken of Cologne, the first European who studied the language.

See C. C. Rossini, "Note per la storia letteraria Abissina," in *Rendiconti della R. Accad. dei Lincei* (1899); Fumagalli, *Bibliografia Etiopica* (1893); Basset, *Études sur l'histoire de l'Éthiopie* (1882); Catalogues of various libraries, especially British Museum (Wright), Paris (Zotenberg), Oxford and Berlin (Dillmann), Frankfurt (Goldschmidt). Plates illustrating Ethiopic palaeography are to be found in Wright's Catalogue; an account of the illustrations in Ethiopic MSS. is given by Budge in his *Life of Maba Sion*; and a collection of inscriptions in the church of St Stefano dei Mori, in Rome, by Gallina in the *Archivio della Soc. Rom. di Storia Patria* (1888).

(D. S. M.*)

ETHNOLOGY and **ETHNOGRAPHY** (from the Gr. ἔθνος, race, and λόγος, science, or γράφειν, to write), sciences which in their narrowest sense deal respectively with man as a racial unit (*mankind*), *i.e.* his development through the family and tribal stages into national life, and with the distribution over the earth of the races and nations thus formed. Though the etymology of the words permits in theory of this line of division between ethnology and ethnography, in practice they form an indivisible study of man's progress from the point at which anthropology (*q.v.*) leaves him.

Ethnology is thus the general name for investigations of the widest character, including subjects which in this encyclopaedia are dealt with in detail under separate headings, such as ARCHAEOLOGY, ART (and allied articles), COMMERCE, GEOGRAPHY (and the headings for countries and tribes), FAMILY, NAME, ETHICS, LAW, MYTHOLOGY, FOLK-LORE (and allied articles), PHILOLOGY (and allied articles), AGRICULTURE, ARCHITECTURE, RELIGION, SOCIOLOGY, &c., &c. It covers generally the whole history of the material and intellectual development of man, as it has passed through the stages of (*a*) hunting and fishing, (*b*) sheep and cattle tending, (*c*) agriculture, (*d*) industry. It investigates his food, his weapons, tools and implements, his housing, his social, economic and commercial organization, forms of government, language, art, literature, morals, superstitions and religious systems. In this sense ethnology is the older term for what now is called sociology. At the present day the progress of research has in practice, however, restricted the "ethnologist" as a rule to the study of one or more branches only of so wide a subject, and the word "ethnology" is used with a somewhat vague meaning for any ethnological study; each country or nation has thus its own separate ethnology. It becomes more convenient, therefore, to deal with the ethnology as a special subject in each case. "Ethnography," in so far as it has a distinctive province, is then conveniently restricted to the scientific mapping out of different racial regions, nations and tribes; and it is only necessary here to refer the reader to the separate articles on continents, &c., where this is done. The only fundamental problem which need here be referred to is that of the whole question of the division of mankind into separate races at all, which is consequential on the earlier problem (dealt with in the article ANTHROPOLOGY) as to man's origin and antiquity.

If we assume that man existed on the earth in remote geological time, the question arises, was this pleistocene man specifically one? What evidence is there that he represented in his different habitats a series of varieties of one species rather than a series of species? The evidence is of three kinds, (1) anatomical, (2) physiological, (3) cultural and psychical.

1. Dr Robert Munro, in his address to the Anthropological section of the British Association in 1893, said: "All the osseous remains of man which have hitherto been collected and examined point to the fact that, during the larger portion of the quarternary period, if not, indeed, from its very commencement, he had already acquired his human characteristics." By "characteristics" is here meant those anatomical ones which distinguish man from other animals, not the physical criteria of the various races. Do, then, these anatomical characteristics of pleistocene man show such differences among themselves and between them and the types of man existing to-day as to justify the assumption that there has ever been more than one species of man?

The undoubted "osseous remains" of pleistocene man are few. Burial was not practised, and the few bones found are for the most part those which have by mere chance been preserved in caves or rock-shelters. Of these the three chief "finds," in order of probable age, are the Trinil (Java) brain-cap, the lowest human skull yet described, characterized by depressed cranial arch, with a cephalic index of 70; the Neanderthal (Germany) skull, remarkable for its flat retreating curve with an index of 73–76; and the two nearly perfect skeletons found at Spy (Belgium), the skulls of which exhibit enormous brow ridges with cranial indices of 70 and 75. All these skulls, taken in conjunction with other well-authenticated human remains such as those found at La Naulette (Belgium), Shipka (Balkan Peninsula), Olmo (Italy), Predmert (Bohemia) and in Argentina and Brazil, make it possible to reconstruct anatomically the varying types of pleistocene man, and to establish the fact that in essential features the same primitive type has persisted through all time. The skeleton bones show differences so slight as to admit of pathological or other explanation. What Professor Kollmann says of man to-day was true in the remotest ages. Referring to Cuvier's statement that from a single bone it is possible to determine the very species to which an animal belongs, he says, "Precisely on this ground I have mainly concluded that the existence of several human species cannot be recognized, for we are unacquainted with a single tribe from a single bone of which we might with certainty determine to what species it belonged." Such differences as the bones exhibit are progressive modifications towards the higher neolithic and modern types, and are in themselves entirely incapable of supporting the theory that the owner of the Trinil skull, say, and the "man of Spy" belonged to separate species. All these "osseous remains" belong to the palaeolithic period, and from the cranial indices it is thus clear that palaeolithic man was long-headed. Neolithic man is, speaking generally, round-headed, and it has been urged that round-headedness is entirely synchronous with the neolithic age, and that the long-headed palaeolithic species of mankind gave place all at once to the round-headed neolithic species. The point thus raised involves the physiological as well as, indeed more than, the anatomical proofs of man's specific unity.

2. All physiologists agree that species cannot breed with species. Darwin himself laid it down as a fundamental principle, If then the palaeolithic and neolithic types represented separate species, they would be found to remain distinct through all time. This is not the case. There is evidence that extreme dolichocephaly continued into neolithic times, and was only slowly modified into brachycephaly. In the neolithic caves of Italy, Austria, Belgium, and the barrows of Great Britain, skulls of all types are found. The later cave-dwellers and early dolmen builders of Europe were at first long-headed, then of medium type, and finally in some places exclusively round-headed. In England the round-heads appear to be synchronous with the metal age, as shown by the contents of the barrows, and, as on the continental mainland, the two types gradually blended. Permanent fertility between them in prehistoric Europe is thus proved. And this is the case throughout the habitable globe. An examination of the osseous remains of American man supports the view that the human species has not varied since quaternary times. The palaeolithic type is to be found among modern European populations. Certain skulls from South Australia seem cast in almost the same mould as the Neanderthal. After thousands of years nearly pure descendants of quaternary man are found among living races. And man's mutual fertility in prehistoric is repeated throughout historic times: strict racial purity is almost unknown. Thus the unity of the species man is proved by the test of fertility.

3. The works of early man everywhere present the most startling resemblance. The palaeolithic implements all over the globe are all of one pattern. "The implements in distant lands," writes Sir J. Evans, "are so identical in form and character with the British specimens that they might have been manufactured by the same hands. . . . On the banks of the Nile, many hundreds of feet above its present level, implements of the European types have been discovered; while in Somaliland, in an ancient river-valley at a great elevation above the sea, Sir H.W. Seton-Karr has collected a large number of implements formed of flint and quartzite, which, judging from their form and character, might have been dug out of the drift-deposits of the Somme and the Seine, the Thames or the ancient Solent." This identity in the earliest arts is repeated in the later stages of man's culture; his arts and crafts, his manners and customs, exhibit a similarity so close as to compel the presumption that all the races are but divisions of one family. But perhaps the greatest psychical proof of man's specific unity is his common possession of language. Theodore Waitz writes: "Inasmuch as the possession of a language of regular grammatical structure forms a fixed barrier between man and brute, it establishes at the same time a near relationship between all people in psychical respects. . . . In the presence of this common feature of the human mind, all other differences lose their import" (*Anthropology*, p. 273). As Dr J. C. Prichard urged, "the same inward and mental nature is to be recognized in all races of men. When we compare this fact with the observations, fully established, as to the specific instincts and separate psychical endowments of all the distinct tribes of sentient beings in the Universe we are entitled to draw confidently the conclusion that all human races are of one species and one family." It has been argued that stock languages imply stock races, but this assumption is untenable. There are some fifty irreducible stock languages in the United States and Canada, yet, taking into consideration the physical and moral homogeneity of the American Indian races, he would be a reckless theorist who held that there were therefore fifty separate human species. If it were so, how have they descended? There are no anthropoid apes in America, none of the ape family higher than the Cebidae, from which it is impossible to trace men. Again, in Australia there is certainly one stock language, yet there are not even Cebidae. In Caucasia, there are many distinct forms of speech, yet all the peoples belong to the Caucasic division of mankind.

Man, then, may be regarded as specifically one, and thus he must have had an original cradle-land, whence the peopling of the earth was brought about by migration. The evidence tends to prove that the world was peopled by a generalized proto-human form. Each division of mankind would thus have had its pleistocene ancestors, and would have become differentiated into races by the influence of climatic and other surroundings. As to the man's cradle-land there have been many theories, but the weight of evidence is in favour of Indo-Malaysia.

Of all animals man's range alone coincides with that of the habitable globe, and the real difficulty of the "cradle-land" theory lay in explaining how the human race spread to every land. This problem has been met by geology, which proves that the earth's surface has undergone great changes since man's appearance, and that continents, long since submerged, once existed, making a complete land communication from Indo-Malaysia. The evidence for the Indo-African continent has been summed up by R. D. Oldham,[1] and proofs no less cogent are available of the former existence of an Eurafrican continent, while the extension of Australia in the direction of New Guinea is more than probable. Thus the ancestor of man was free to move in all directions over the eastern hemisphere. The western hemisphere was more than probably connected with Europe and Asia, in Tertiary times, by a continent, the existence of which is evidenced by a submarine bank stretching from Scotland through the Faeroes and Iceland to Greenland, and on the other side by continuous land at what is now the Behring Straits.

Acclimatization has been urged as an argument against the cradle-land theory, but the peopling of the globe took place in inter-Glacial if not pre-Glacial ages, when the climate was much milder everywhere, and thus pleistocene man met no climatic difficulties in his migrations.

Probably before the close of Palaeolithic times all the primary divisions of man were specialized in their several habitats by the influence of their surroundings. The profound effect of climate is seen in the relative culture of races. Thus, tropical countries are inhabited by savage or semi-savage peoples, while the higher races are confined to temperate zones. The primary divisions of mankind, Ethiopic, Mongolic, Caucasic, were certainly differentiated in neolithic times, and these criteria had almost certainly occurred not consecutively in one area but simultaneously in several areas. A Negro was not metamorphosed into a Mongol, nor the latter into a White, but the several semi-simian precursors under varying environments developed into generalized Negro, generalized Mongol, generalized Caucasian.

Taking, then, these three primary divisions as those into which it is most reasonable broadly to divide mankind they may be analysed as to their racial constituents and their habitats as follows:—

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[1] Writing in the *Geographical Journal*, March 1894, on "Evolution of Indian Geography," he says: "The plants of Indian and African coal measures are without exception identical, and among the few animals which have been found in India one is indistinguishable from an African species, another is closely allied, and both faunas are characterized by the very remarkable genus group of reptiles comprising the Dicynodon and other allied forms (see *Manual of Geology of India*, 2nd ed. p. 203). These, however, are not the only analogies, for near the coast of South Africa there are developed a series of beds containing the plant fossils in the lower part and marine shells in the upper, known as the Uitenhage series, which corresponds exactly to the small patches of the Rajmahál series along the east coast of India. The few plant forms found in the lower beds of Africa are mostly identical with or closely allied to the Rajmahál species, while of the very few marine shells in the Indian outcrops, which are sufficiently well preserved for identification, at least one species is identical with an African form. These very close relationships between the plants and animals of India and Africa at this remote period appear inexplicable unless there were direct land communications between them over what is now the Indian Ocean. On the east coast of India in the Khasi Hills, and on the coast of South Africa, the marine fossils of late jurassic and early cretaceous age are largely identical with, or very closely allied to each other, showing that they must have been inhabitants of one and the same great sea. In western India the fossils of the same age belong to a fauna which is found in the north of Madagascar, in northern and eastern Africa, in western Asia, and ranges into Europe —a fauna differing so radically from that of the eastern exposures that only a few specimens of world-wide range are found in both. Seeing that the distances between the separate outcrops containing representatives of the two faunas are much less than those separating the outcrops from the nearest ones of the same fauna, the only possible explanation of the facts is that there was a continuous stretch of dry land connecting South Africa and India and separating two distinct marine zoological provinces."

1. Caucasic or White Man is best divided, following Huxley, into (*a*) Xanthochroi or "fair whites" and (*b*) Melanochroi or "dark whites." (*a*) The first—tall, with almost colourless skin, blue or grey eyes, hair from straw colour to chestnut, and skulls varying as to proportionate width—are the prevalent inhabitants of Northern Europe, and the type may be traced into North Africa and eastward as far as India. On the south and west it mixes with that of the Melanochroi and on the north and east with that of the Mongoloids. (*b*) The "dark whites" differ from the fair whites in the darkening of the complexion to brownish and olive, and of the eyes and hair to black, while the stature is somewhat lower and the frame lighter. To this division belong a large part of those classed as Celts, and of the populations of Southern Europe, such as Spaniards, Greeks and Arabs, extending as far as India, while endless intermediate grades between the two white types testify to ages of intermingling. Besides these two main types, the Caucasic division of mankind has been held with much reason to include such aberrant types as the brown Polynesian races of the Eastern Pacific, Samoans, Hawaiians, Maoris, &c., the proto-Malay peoples of the Eastern archipelago, sometimes termed Indonesians, represented by the Dyaks of Borneo and the Battaks of Sumatra, the Todas of India and the Ainus of Japan.

2. Mongolic or Yellow Man prevails over the vast area lying east of a line drawn from Lapland to Siam. His physical characteristics are a short squat body, a yellowish-brown or coppery complexion, hair lank, straight and black, flat small nose, broad skull, usually without prominent brow-ridges, and black oblique eyes. Of the typical Mongolic races the chief are the Chinese, Tibetans, Burmese, Siamese; the Finnic group of races occupying Northern Europe, such as Finns, Lapps, Samoyedes and Ostyaks, and the Arctic Asiatic group represented by the Chukchis and Kamchadales; the Tunguses, Gilyaks and Golds north of, and the Mongols proper west of, Manchuria; the pure Turkic peoples and the Japanese and Koreans. Less typical, but with the Mongolic elements so predominant as to warrant inclusion, are the Malay peoples of the Eastern archipelago. Lastly, though differentiated in many ways from the true Mongol, the American races from the Eskimo to the Fuegians must be reckoned in the Yellow division of mankind.

3. Negroid or Black Man is primarily represented by the Negro of Africa between the Sahara and the Cape district, including Madagascar. The skin varies from dark brown to brown-black, with eyes of the same colour, and hair usually black and always crisp or woolly. The skull is narrow, with orbital ridges not prominent, the jaws protrude, the nose is flat and broad, and the lips thick and everted. Two important families are classed in this division; some authorities hold, as special modifications of the typical Negro to-day, others as actually nearer the true generalized Negroid type of neolithic times. First are the Bushman of South Africa, diminutive in stature and of a yellowish-brown colour: the neighbouring Hottentot is believed to be the result of crossing between the Bushman and the true Negro. Second are the large Negrito family, represented in Africa by the dwarf races of the equatorial forests, the Akkas, Batwas, Wochuas and others, and beyond Africa by the Andaman Islanders, the Aetas of the Philippines, and probably the Senangs and other aboriginal tribes of the Malay Peninsula. The Negroid type seems to have been the earliest predominant in the South Sea islands, but it is impossible to say certainly whether it is itself derived from the Negrito, or the latter is a modification of it, as has been suggested above. In Melanesia, the Papuans of New Guinea, of New Caledonia, and other islands, represent a more or less Negroid type, as did the now extinct Tasmanians.

Excluded from this survey of the grouping of Man are the aborigines of Australia, whose ethnical affinities are much disputed. Probably they are to be reckoned as Dravidians, a very remote blend of Caucasic and Negro man. For a detailed discussion of the branches of these three main divisions of Man the reader must refer to articles under race headings, and to Negro; Negritos; Mongols; Malays; Indians, North American; Australia; Africa; &c., &c.

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ETHYL, in chemistry, the name given to the alkyl radical C_2H_5. The compounds containing this radical are treated under other headings; the hydride is better known as ethane, the alcohol, C_2H_5OH, is the ordinary alcohol of commerce, and the oxide $(C_2H_5)_2O$ is ordinary ether.

ETHYL CHLORIDE, or Hydrochloric Ether, C_2H_5Cl, a chemical compound prepared by passing dry hydrochloric acid gas into absolute alcohol. It is a colourless liquid with a sweetish burning taste and an agreeable odour. It is extremely volatile, boiling at 12·5° C. (54·5° F.), and is therefore a gas at ordinary room temperatures; it is stored in glass tubes fitted with screw-capped nozzles. The vapour burns with a smoky green-edged flame. It is largely used in dentistry and slight surgical operations to produce local anaesthesia (*q.v.*), and is known by the trade-name kelene. More volatile anaesthetics such as anestile or anaesthyl and coryl are produced by mixing with methyl chloride; a mixture of ethyl and methyl chlorides with ethyl bromide is known as somnoform.

ETHYLENE, or Ethene, C_2H_4, or $H_2C{:}CH_2$, the first representative of the series of olefine hydrocarbons, is found in coal gas. It is usually prepared by heating a mixture of ethyl alcohol and sulphuric acid. G. S. Newth (*Jour. Chem. Soc.*, 1901, 79, p. 915) obtains a purer product by dropping ethyl alcohol into syrupy phosphoric acid (sp. gr. 1·75) warmed to 200° C., subsequently raising the temperature to 220° C. It can also be obtained by the action of sodium on ethylidene chloride (B. Tollens, *Ann.*, 1866, 137, p. 311); by the reduction of copper acetylide with zinc dust and ammonia; by heating ethyl bromide with an alcoholic solution of caustic potash; by passing a mixture of carbon bisulphide and sulphuretted hydrogen over red-hot copper; and by the electrolysis of a concentrated solution of potassium succinate,

$$(CH_2\cdot CO_2K)_2+2H_2O=C_2H_4+2CO_2+2KOH+H_2.$$

It is a colourless gas of somewhat sweetish taste; it is slightly soluble in water, but more so in alcohol and ether. It can be liquefied at −1·1° C., under a pressure of 42½ atmos. It solidifies at −181° C. and melts at −169° C. (K. Olszewski); it boils at −105° C. (L. P. Cailletet), or −102° to −103° C. (K. Olszewski). Its critical temperature is 13° C., and its specific gravity is 0·9784 (air = 1). The specific gravity of liquid ethylene is 0·386 (3° C.). Ethylene burns with a bright luminous flame, and forms a very explosive mixture with oxygen. For the combustion of ethylene see Flame. On strong heating it decomposes, giving, among other products, carbon, methane and acetylene (M. Berthelot, *Ann.*, 1866, 139, p. 277). Being an unsaturated hydrocarbon, it is capable of forming addition products, *e.g.* it combines with hydrogen in the presence of platinum black, to form ethane, C_2H_6, with sulphur trioxide to form carbyl sulphate, $C_2H_4(SO_3)_2$, with hydrobromic and hydriodic acids at 100° C. to form ethyl bromide, C_2H_5Br, and ethyl iodide, C_2H_5I, with sulphuric acid at 160–170° C. to form ethyl sulphuric acid, $C_2H_5\cdot HSO_4$, and with hypochlorous acid to form glycol chlorhydrin, $Cl\cdot CH_2\cdot CH_2\cdot OH$. Dilute potassium permanganate solution oxidizes it to ethylene glycol, $HO\cdot CH_2\cdot CH_2\cdot OH$, whilst fuming nitric acid converts it into oxalic acid. Several compounds of ethylene and metallic chlorides are known; *e.g.* ferric chloride in the presence of ether at 150° C. gives $C_2H_4{\cdot}FeCl_3{\cdot}2H_2O$ (J. Kachtler, *Ber.*, 1869, 2, p. 510), while platinum bichloride in concentrated hydrochloric acid solution absorbs ethylene, forming the compound $C_2H_4{\cdot}PtCl_2$ (K. Birnbaum, *Ann.*, 1868, 145, p. 69).

ÉTIENNE, CHARLES GUILLAUME (1778–1845), French dramatist and miscellaneous writer, was born near Saint Dizier, Haute Marne, on the 5th of January 1778. He held various municipal offices under the Revolution and came in 1796 to Paris, where he produced his first opera, *Le Rêve*, in 1799, in collaboration with Antoine Frédéric Gresnick. Although Étienne continued to write for the Paris theatres for twenty years from that date, he is remembered chiefly as the author of one comedy, which excited considerable controversy. *Les Deux Gendres* was represented at the Théâtre Français on the 11th of August 1810, and procured for its author a seat in the Academy. A rumour was put in circulation that Étienne had drawn largely on a manuscript play in the imperial library, entitled *Conaxa, ou les gendres dupés.* His rivals were not slow to take up the charge of plagiarism, to which Étienne replied that the story was an old one (it existed in an old French *fabliau*) and had already been treated by Alexis Piron in *Les Fils ingrats.* He was, however, driven later to make admissions which at least showed a certain lack of candour. The bitterness of the attacks made on him was no doubt in part due to his position as editor-in-chief of the official *Journal de l'Empire.* His next play, *L'Intrigante* (1812), hardly maintained the high level of *Les Deux Gendres*; the patriotic opera *L'Oriflamme* and his lyric masterpiece *Joconde* date from 1814. Étienne had been secretary to Hugues Bernard Maret, duc de Bassano, and in this capacity had accompanied Napoleon throughout his campaigns in Italy, Germany, Austria and Poland. During these journeys he produced one of his best pieces, *Brueys et Palaprat* (1807). During the Restoration Étienne was an active member of the opposition. He was seven times returned as deputy for the department of Meuse, and was in full sympathy with the revolution of 1830, but the reforms actually carried out did not fulfil his expectations, and he gradually retired from public life. Among his other plays may be noted: *Les Deux Mères*, *Le Pacha de Suresnes*, and *La Petite École des pères*, all produced in 1802, in collaboration with his friend Gaugiran de Nanteuil (1778–1830). With Alphonse Dieudonné Martainville (1779–1830) he wrote an *Histoire du Théâtre Français* (4 vols., 1802) during the revolutionary period. Étienne was a bitter opponent of the romanticists, one of whom, Alfred de Vigny, was his successor and panegyrist in the Academy. He died on the 13th of March 1845.

His *Œuvres* (6 vols., 1846–1853) contain a notice of the author by L. Thiessé.

ETIQUETTE, a term for ceremonial usage, the rules of behaviour observed in society, more particularly the formal rules of ceremony to be observed at court functions, &c., the procedure, especially with regard to precedence and promotions in an organized body or society. Professions, such as the law or medicine, observe a code of etiquette, which the members must observe as protecting the dignity of the profession and preventing injury to its members. The word is French. The O. Fr. *estiquette* or *estiquet* meant a label, or "ticket," the true English derivative. The ultimate origin is Teutonic, from *sticken*, to post up, stick, affix. Cotgrave explains the word in French as a billet for the benefit or advantage of him that receives it, a form of introduction and also a notice affixed at the gate of a court of law. The development of meaning in French from a label to ceremonial rules is not difficult in itself, but, as the *New English Dictionary* points out, the history has not been clearly established.

ETNA (Gr. Αἴτνη, from αἴθω, burn; Lat. *Aetna*), a volcano on the east coast of Sicily, the summit of which is 18 m. N. by W. of Catania. Its height was ascertained to be 10,758 ft. in 1900, having decreased from 10,870 ft. in 1861. It covers about 460 sq. m., and by rail the distance round the base of the mountain is 86 m., though, as the railway in some places travels high, the correct measurement is about 91 m. The height cannot have been very different in ancient times, for the so-called Torre del Filosofo, which is only 1188 ft. below the present summit, is a building of Roman date. The shape is that of a truncated cone, interrupted on the west by the Valle del Bove, a huge sterile abyss, 3 m. wide, bounded on three sides by perpendicular cliffs (2000 to 4000 ft.). Its south-west portion, which is the deepest, was perhaps the original crater. There are also some 200 subsidiary cones, some of them over 3000 ft. high, which have risen over lateral fissures. On the slopes of the mountain there are three distinct zones of vegetation, distinguished by Strabo (vi. p. 273 ff.). The lowest, up to about 3000 ft., is the zone of cultivation, where vegetables, and above them where water is more scanty, vines and olives flourish. Owing to its extraordinary fertility it is densely populated, having 930 inhabitants per sq. m. below 2600 ft., and 3056 inhabitants per sq. m. in the triangle between Catania, Nicolosi and Acireale. The next zone is the wooded zone, and is hardly inhabited, only a few isolated houses occurring. The lower part of it (up to about 6000 ft.) consists chiefly of forests of evergreen pines (*Pinus nigricans*), the upper (up to about 6800 ft.) of birchwoods (*Betula alba*). A few oaks and red beeches occur, while chestnut trees grow anywhere between 1000 and 5300 ft. In the third and highest zone the vegetation is stunted, and there is a narrow zone of sub-Alpine shrubs, but no Alpine flora. In the last 2000 ft. five phanerogamous species only are to be found, the first three of which are peculiar to the mountain: *Senecio Etnensis* (which is found quite close to the crater), *Anthemis Etnensis*, *Robertsia taraxacoides*, *Tanacetum vulgare* and *Astragalus siculus.* No trace of animal life is to be found in this zone; for the greater part of the year it is covered with snow, but by the end of summer this has almost all melted, except for that preserved in the covered pits in which it is stored for use for cooling liquids, &c., in Catania and elsewhere. The ascent is best undertaken in summer or autumn. From the village of Nicolosi, 9 m. to the N.W. of Catania, about 7 or 8 hours are required to reach the summit. Thucydides mentions eruptions in the 8th and 5th centuries B.C., and others are mentioned by Livy in 125, 121 and 43 B.C. Catania was overwhelmed in 1169, and many other serious eruptions are recorded, notably in 1669, 1830, 1852, 1865, 1879, 1886, 1892, 1899 and March 1910.

According to Lyell, Etna is rather older than Vesuvius—perhaps of the same geological age as the Norwich Crag. At Trezza, on the eastern base of the mountain, basaltic rocks occur associated with fossiliferous Pliocene clays. The earliest eruptions of Etna are older than the Glacial period in Central and Northern Europe. If all the minor cones and monticules could be stripped from the mountain, the diminution of bulk would be extremely slight. Lyell concluded that, although no approximation can be given of the age of Etna, "its foundations were laid in the sea in the newer Pliocene period." From the slope of the strata from one central point in the Val del Bue he further concluded that there once existed a second great crater of permanent eruption. The rocks erupted by Etna have always been very constant in composition, viz. varieties of basaltic lava and tuff containing little or no olivine—the rock type known as labradorite. At Acireale the lava has assumed the prismatic or columnar form in a striking manner; at the rock of Aci it is in parts spheroidal. The Grotte des Chèvres has been regarded as an enormous gas-bubble in the lava. The remarkable stability of the mountain appears to be due to the innumerable dikes which penetrate the lava flows and tuff beds in all directions and thus bind the whole mass together.

From the earliest times the mountain has naturally been the subject of legends. The Greeks believed it to be either the mountain with which Zeus had crushed the giant Typhon (so Pindar, *Pyth.* i. 34 seq.; Aeschylus, *Prometheus Vinctus,* 351 seq.; Strabo xiii. p. 626), or Enceladus (Virgil, *Georg.* i. 471; Oppian, *Cyn.* i. 273), or the workshop of Hephaestus and the Cyclopes (Cic. *De divin.* ii. 19; cf. Lucil., *Aetna*, 41 seq., Solin, 11). Several Roman writers, on the other hand, attempted to explain the phenomena which it presented by natural causes (*e.g.* Lucretius vi. 639 seq.; Lucilius, *Aetna*, 511 seq.). Ascents of the mountain were not infrequent in those days—one was made by Hadrian.

See Sartorius von Waltershausen, *Atlas des Ätna* (Leipzig, 1880); E. Chaix, *Carta Volcanologica e topographica dell'Etna* (showing lava streams up to 1892); G. de Lorenzo, *L'Etna* (Bergamo, 1907).

ETNA, a borough of Allegheny county, Pennsylvania, U.S.A., in the western part of the state, on the W. bank of the Allegheny river (about 5 m. from its junction with the Monongahela), and about 2 m. N. of the city of Pittsburg, of which it is a suburb. Pop. (1880) 2334; (1890) 3767; (1900) 5384 (1702 foreign-born); (1910) 5830. It is served by the Pennsylvania railway and by electric lines. Among its industrial establishments are rolling mills, tube and pipe works, furnaces, steel mills, a brass foundry, and manufactories of electrical railway supplies, boxes, asbestos coverings, enamel work and ice. The city's industrial history dates from 1820, when a small factory for the manufacture of scythes and sickles was set up. Natural gas, piped from Butler county, was early used here as a fuel in the iron mills. Etna, formerly called Steuart's Town, was incorporated as a borough in 1869.

ETON, a town of Buckinghamshire, England, on the north (left) bank of the river Thames, opposite Windsor, within which parliamentary borough it is situated. Pop. of urban district (1901) 3301. It is famous for its college, the largest of the ancient English public schools. The "King's College of Our Lady of Eton beside Windsor" was founded by Henry VI. in 1440–1441, and endowed mainly from the revenues of the alien priories suppressed by Henry V. The founder followed the model established by William of Wykeham in his foundations of Winchester and New College, Oxford. The original foundation at Eton consisted of a provost, 10 priests, 4 clerks, 6 choristers, a schoolmaster, 25 poor and indigent scholars, and the same number of poor men or bedesmen. In 1443, however, Henry considerably altered his original plans; the number of scholars was increased to 70, and the number of bedesmen reduced to 13. A connexion was then established, and has been maintained ever since, though in a modified form, between Eton and Henry's foundation of King's College, Cambridge. One of the king's chief advisers was William of Waynflete, who had been master of Winchester College, and was appointed provost of Eton in 1443. Among further alterations to the foundation in this year was the establishment of *commensales* or commoners, distinct from the scholars; and these under the name of "oppidans" now form the principal body of the boys. The college survived with difficulty the unsettled period at the close of Henry's reign; while Edward IV. curtailed its possessions, and was at first desirous of amalgamating it with the ecclesiastical foundation of St George, Windsor Castle. In 1506 the annual revenue amounted to £652; and through benefactions and the rise in the value of property the college has grown to be very richly endowed. In 1870 commissioners under an act of 1868 appointed the governing body of the college to consist of the provost of Eton, the provost of King's College, Cambridge, five representatives nominated respectively by the university of Oxford, the university of Cambridge, the Royal Society, the lord chief justice and the masters, and four representatives chosen by the rest of the governing body. By this body the foundation was in 1872 made to consist of a provost and ten fellows (not priests, but merely the members of the governing body other than the provost), a headmaster of the school, and a lower master, at least seventy scholars (known as "collegers"), and not more than two chaplains or conducts. Originally it was necessary that the scholars should be born in England, of lawfully married parents, and be between eight and sixteen years of age; but according to the statutes of 1872 the scholarships are open to all boys who are British subjects, and (with certain limitations as to the exact date of birth) between twelve and fifteen years of age. A number of foundation scholarships for King's College, Cambridge, are open for competition amongst the boys; and there are besides several other valuable scholarships and exhibitions, most of which are tenable only at Cambridge, some at Oxford, and some at either university. The teaching embraces the customary range of classical and modern subjects; but until the first half of the 19th century the normal course of instruction remained almost wholly classical; and although there were masters for other subjects, they were unconnected with the general business of the school, and were attended at extra hours.

The school buildings were founded in 1441 and occupied in part by 1443, but the whole original structure was not completed till fifty years later. The older buildings consist of two quadrangles, built partly of freestone but chiefly of brick. The outer quadrangle, or school-yard, is enclosed by the chapel, upper and lower schools, the original scholars' dormitory ("long chamber"), now transformed, and masters' chambers. It has in its centre a bronze statue of the royal founder. The buildings enclosing the inner or lesser quadrangle contain the residence of the fellows, the library, hall and various offices. The chapel, on the south side of the school-yard, represents only the choir of the church which the founder originally intended to build; but as this was not completed Waynflete added an ante-chapel. The chapel was built upon a raised platform of stone, as was the hall, in order to lift it above the flood-level of the Thames. It contains some interesting monuments of provosts of the college and others, and at the west end of the ante-chapel is a fine marble statue of the founder in his royal robes, by John Bacon. A chantry contains the tomb of Roger Lupton (provost 1503–1535), whose most notable monument is the fine tower between the school-yard and the cloisters to the east; though other parts of his building also remain. The space enclosed by two buttresses on the north side of the chapel, at the point where steps ascend to the north door, is the model of the peculiar form of court for the game of fives which takes name from Eton, with its "buttress" (represented by the projecting balustrade), the ledges round the walls, and the step dividing the floor into two levels. From the foundation of the college the chapel was used as the parish church until 1854, and not until 1875, after the alteration of the ancient constitution had secularized the foundation, was the parish of Eton created into a separate vicarage. The chapel does not accommodate the whole school; and a new chapel, from the designs of Sir Arthur Blomfield, is used by the lower school. The library contains many manuscripts (notably an Oriental and Egyptian collection) and rare books; and there is also a library for the use of the boys. The college in modern times has far outgrown its ancient buildings, and new buildings, besides the lower chapel, include the new schools, with an observatory, a chemical laboratory, science schools and boarding-houses. In 1908 King Edward VII. opened a fine range of buildings erected in honour of the Old Etonians who served in the South African War, and in memory of those who fell there. The architect was Mr L. K. Ball, an old Etonian. The buildings include a school hall, a domed octagonal library, and a classical museum.

The principal annual celebration is held on the 4th of June, the birthday of King George III., who had a great kindness for the school. This is the speech-day; and after the ceremonies in the school a procession of boats takes place on the Thames. In the sport of rowing Eton occupies a unique position among the public schools, and a large proportion of the oarsmen in the annual Oxford and Cambridge boat-race are *alumni* of the school. Another annual celebration is the occasion of the contest between collegers and oppidans at a peculiar form of football known as the wall game, from the fact that it is played against a wall bordering the college playing-field. This game takes place on St Andrew's Day, the 30th of November. The field game of football commonly played at Eton has also peculiar rules. The annual cricket match between Eton and Harrow schools, at Lord's ground, London, is always attended by a large and fashionable gathering. A singular custom termed the *Montem*, of unknown origin, but first mentioned in 1561, was observed here triennially on Whit-Tuesday. The last celebration took place in 1844, the ceremony being abolished just before it fell due in 1847. It consisted of a procession of the boys in a kind of military order, with flags and music, headed by their "captain," to a small mound called Salt Hill, near the Bath road, where they levied contributions, or "salt," from the passers-by and spectators. The sum collected sometimes exceeded £1000—the surplus, after deducting certain expenses, becoming the property of the captain of the school. The average number of pupils at Eton exceeds 1000.

See E. S. Creasy, *Memoirs of Eminent Etonians, with Notices of the Early History of the College* (1850); *Sketches of Eton* (1873); Sir H. C. Maxwell Lyte, *History of Eton College from 1440 to 1875* (1875); J. Heneage Jesse, *Memoirs of Celebrated Etonians* (1875); *The Eton Portrait Gallery*, by a Barrister of the Inner Temple (1875); A. C. Benson, *Fasti Etonienses* (1899); L. Cust, *History of Eton College* (1899).

ÉTRETAT, a watering-place of France, in the department of Seine-Inférieure, on the coast of the English Channel, 16½ m. N. by E. of Havre by road. Pop. (1906) 1982. It is situated between fine cliffs in which, here and there, the sea has worn archways, pinnacles and other curious forms. The small stream traversing the valley, at the extremity of which Étretat lies, flows underground for some distance but rises to the surface on the beach. A Roman road and aqueduct and other Roman and Gallic remains have been discovered. The church of Notre-Dame, a Romanesque building, with a nave of the 11th century and a central tower and choir of the 13th century, is a fine example of the Norman architecture of those periods. Fishing is carried on, though there is no port and the fishermen haul their boats up the beach; the old hulks (*caloges*) serve as sheds and even as dwellings. Étretat sprang into popularity during the latter half of the 19th century, largely owing to the frequent references to it in the novels of Alphonse Karr.

ETRURIA, an ancient district of Italy, the extent of which varied considerably, and, especially in the earliest periods, is very difficult to define (see section *Language*). The name is the Latin equivalent of the Greek Τυρρηνία or Τυρσηνία, which is used by Latin writers also in the forms *Tyrrhenia, Tyrrhenii*; the Romans also spoke of Tusci, whence the modern Tuscany (*q.v.*). In early times the district appears to have included the whole of N. Italy from the Tiber to the Alps, but by the end of the 5th century B.C. it was considerably diminished, and about the year 100 B.C. its boundaries were the Arnus (Arno), the Apennines and the Tiber. In the division of Italy by Augustus it formed the seventh *regio* and extended as far north as the river Macra, which separated it from Liguria.

History.—The authentic history of Etruria is very meagre, and consists mainly in the story of its relations with Carthage, Greece and Rome. At some period unknown, prior to the 6th century, the Etrurians became a conquering people and extended their power not only northwards over, probably, Mantua, Felsina, Melpum and perhaps Hadria and Ravenna (Etruria Circumpadana), but also southwards into Latium and Campania. The chronology of this expansion is entirely unknown, nor can we recover with certainty the names of the cities which constituted the two leagues of twelve founded in the conquered districts on the analogy of the original league in Etruria proper (below). In the early history of Rome the Etruscans play a prominent part. According to the semi-historical tradition they were the third of the constituent elements which went to form the city of Rome. The tradition has been the subject of much controversy, and is still an unsolved problem. It is practically certain, however, that there is no foundation for the ancient theory (cf. Prop. iv. [v.] 1. 31) that the third Roman tribe, known as Luceres, represented an Etruscan element of the population, and it is held by many authorities that the tradition of the Tarquin kings of Rome represents, not an immigrant wave, but the temporary domination of Etruscan lords, who extended their conquests some time before 600 B.C. over Latium and Campania. This theory is corroborated by the fact that during the reigns of the Tarquin kings Rome appears as the mistress of a district including part of Etruria, several cities in Latium, and the whole of Campania, whereas our earliest picture of republican Rome is that of a small state in the midst of enemies. For this problem see further under ROME: *History*, section "The Monarchy."

After the expulsion of the Tarquins the chief events in Etruscan history are the vain attempt to re-establish themselves in Rome under Lars Porsena of Clusium, the defeat of Octavius Mamilius, son-in-law of Tarquinius Superbus, at Lake Regillus, and the treaty with Carthage. This last event shows that the Etruscan power was formidable, and that by means of their fleet the Etruscans held under their exclusive control the commerce of the Tyrrhenian Sea. By this treaty Corsica was assigned to the Etruscans while Carthage obtained Sardinia. Soon after this, decay set in. In 474 the Etruscan fleet was destroyed by Hiero I. (*q.v.*) of Syracuse; Etruria Circumpadana was occupied by the Gauls, the Campanian cities by the Samnites, who took Capua (see CAMPANIA) in 423, and in 396, after a ten years' siege, Veii fell to the Romans. The battle of the Vadimonian Lake (309) finally extinguished Etruscan independence, though for nearly two centuries still the prosperity of the Etruscan cities far exceeded that of Rome itself. Henceforward Etruria is finally merged in the Roman state.

ETRUSCAN ANTIQUITIES

The large recent discoveries of Etruscan objects have not materially altered the conclusions arrived at a generation ago. It is not so much our appreciation of the broad lines of the manners and arts of the Etruscans that has altered as our understanding of the geographic and social causes which made them what they were. One great difficulty in the study of the remains is that a very large portion of them have been found by unofficial excavators who have been naturally unwilling to tell whence they came, and that certain other excavations, such as those carried out by Comm. Barnabei for the Villa Giulia museum, have been carried out under conditions which help but little towards increasing our knowledge.[1] The increase has, however, been steady, even if not all one could wish.

Ethnology.—The origin of the Etruscans will most likely never be absolutely fixed,[2] but their own tradition (Tacitus, *Ann.* iv. 55) that they came out of Lydia seems not impossible. Herodotus (i. 94) and Strabo (v. 220) tell of Lydians landing at the mouth of the Po and crossing the Apennines into Etruria. Thus it seems certain that though the earliest immigrants, known to the later Etruscans as the *Rasena*, may have come down from the north, still they were joined by a migration from the east before they had developed a civilization of their own, and it is this double race that became the Etruscans as we know them in tradition and by their works. To give a date to the migration of the *Rasena* from the north, for which the only evidence is the fact that the Etruscan language is found in various parts of north Italy,[3] is impossible, but we can perhaps give an approximate one to the coming of the Lydians or Tyrrhenians (Thuc. iv. 109; Herod. i. 57). We know that there was a great wave of migration from Greece to Italy about 1000 B.C., and as the earliest imported Greek objects found in the tombs cannot be dated many generations later than this, this year may be considered as giving us roughly the time when the real Etruscan civilization began.

It has been, and still is, a common mistake to speak of the Etruscans as though they were closely confined to that part of Italy called Etruria on the maps, but it is quite certain that in the early stages of their development they were differentiated from the Umbrians on the north-east and the Latins on the south in ways due rather to the locality than to race or essential character.[4] To primitive peoples open seas or deserts are a greater hindrance to intercourse than mountains or rivers, and even these did not cut off Etruria from the neighbouring regions of Italy. The Apennines that separated her from Umbria were not difficult to cross, and the Tiber which formed the boundary between her and Latium has been a far greater element of separation in the minds of modern authors than it ever was in reality. Narrow, not particularly swift, often shallow, such a stream can never have caused more than a moment's delay to the hardy Etruscans. When Rome was founded, the river of course could be used like a moat round a castle as a means of defence, but that is very different from its being a permanent bar to the spread of a given culture. The fact that the alphabets used in other parts of Italy besides Etruria are derived from the Etruscan or from similar Grecian sources, that Rome was ruled by Etruscan kings, that the temple of Jupiter on the Capitoline was decorated by Etruscan artists (Livy x. 23; Pliny, *H.N.* xxxv. 157), that the decorations of the temple found by Signor Mazzoleni near Conca (*Notizie degli scavi*, 1896) are of the same kind as others found in Etruria, show that the influences which grew to their clearest development in the region west of the Tiber had a marked effect over a broader region than is usually admitted. This too was the belief of the Greek historians, many of whom considered Rome as a Tyrrhenian city.[1]

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[1] For Barnabei's excavations see Fausto Benedetti, *Gli Scavi di Narce ed il Museo di Villa Giulia* (1900).

[2] For a further discussion see *ad fin.*, section *Language*.

[3] See Pauli, *Altitalische Forschungen*, vol. i.; also sect. *Language* (below).

[4] Cf. the contents of the graves found by Boni in the Roman Forum (*Notizie degli Scavi*, 1902, 1903, 1905) with the objects represented in the plates of Montelius, *La Civilisation primitive en Italie*, pt. i. For the cemeteries at Novilara cf. Brizio, *Monumenti antichi*, vol. v.

Cities and Organization.—The chief cities of Etruria proper were Veii, Tarquinii, Falerii, Caere, Volci, Volsinii, Clusium, Arretium, Cortona, Perusia, Volaterrae (Volterra), Rusellae, Populonium and Faesulae. That the country was thickly settled is made plain by the ruins that have been found. It was governed by kings who were elected for life, but whose power depended largely on the leaders (*lucumones*) of the separate states or regions and on the aristocracy (Censorinus, *De die natali*, iv. 13). Later the office of king was abolished and replaced by annual magistrates (Livy v. 1). Below the aristocracy came the free people, who were divided into *curiae* (Serv. *ad Aen.* x. 202), and then the slaves. There can be little doubt that the early organization of the people at Rome was typical of Etruria (Niebuhr, *Röm. Gesch.* 2nd ed. i. 389).

A league of twelve cities is mentioned by the ancients (Livy iv. 23), whose delegates met at the temple of Voltumna, but we are not told which cities formed the league, and there can be little doubt that the list changed from time to time. A glance at the map makes clear some of the general relations of these cities to one another and to the outer world. They are well spread all over the country, and by no means only along the coast. None of the important ones is among the mountains. This means that the earliest inhabitants of the country were not roving traders like the Mycenaean Greeks, and that the cities drew their wealth and strength from agricultural pursuits, for which the country was well suited, as the three rivers, Arnus, Umbro and Tiber, with their feeders (not to mention several lesser streams), channel it in all directions. We get a hint as to the government of the cities from the fact that many of the Roman forms and apanages of office were derived from the Etruscans (Dion. Hal. iii. 61); for instance, the diadem worn by those honoured with a triumph, the ivory sceptre and the embroidered toga (Tertull. *De Cor.* 13), and so too the golden bulla and the praetexta (Festus, *s.v.* "Sardi"). Such things give us an idea as to the aristocratic basis of the government. Of the actual laws we know something also. Cicero (*Div.* ii. 23) tells the story of the miraculous uncovering by a ploughboy of a child who had the wisdom of a sage, and how the child's words were written down by the amazed folk, and became their archives and the source of their law. Coming down to historic times we find that their code, known as the *libri disciplinae Etruscae*, consisted of various parts (Festus, *s.v.* "Ritualis"). There were the *libri haruspicini* (Cic. *Div.* i. 33, 72), which dealt with the interpretation of the will of the gods by means of sacrifice; the *libri fulgurales*, which explained the messages of the gods in the thunder and lightning; and finally the *libri rituales*, which held the rules for the conduct of daily life—how to found cities, where to place the gates, how to take the census, and the general ordering of the people both in peace and war.

Natural Resources and Commerce.—Such was the country and such the laws. The people were a warrior stock with little commercial skill. Much of their wealth was due to trade, but they were not the restless, conquering blood that goes in search of new markets. They waited for the buyers to come to them. That their wealth and consequent power were gathered contemporaneously with that of Greece is shown by various facts. One of these is that Dionysius of Phocaea settled in Sicily after the Ionian revolt (in which his native city took part) had been quelled by Darius, and thence harried the Etruscans (Herod. vi. 17). Their power is also shown by the fact that they made an alliance with the Carthaginians, with the result that they obtained control of Corsica (Herod. i. 166), and this union continued for many generations.[2] That this treaty was no exceptional one is shown by Aristotle (*Pol.* iii. 96, *Op.* ii. 261), who says that there were numerous treatises, concerning their alliances and mutual rights, between the two peoples. That the Greeks held the Etruscans in considerable dread is suggested by the fact that Hesiod (*Theog.* 1011 foll.) names one of their leaders Agrios, "the Wild Man," and by the fear they had of the straits of Messina, where they imagined Scylla and Charybdis, which, unless the whirlpools were of very different character then than now, were as likely to be the pirate bands of Carthaginians and Etruscans who guarded the channel. And this explanation is strengthened by Euripides (*Med.* 1342, 1359), whose Medea compares herself to "Scylla, who dwells on the Tyrrhenian shore." The wealth that was the source of this power of the Etruscans must in the main have been drawn from agriculture and forestry. The rich land with its many streams could scarcely be surpassed for the raising of crops and cattle, and the hills were heavily timbered. That it was such material as this, which leaves no trace with the passing of time, that they sold cannot be doubted, for there is plenty of evidence that their country was visited by foreign traders of many lands, and that they bought largely of them, especially of metals. Metals also suggest that another source of their wealth was that of the middleman. Their towns were the centres of exchange, where the north and west met the south and east. They had no mines of gold or tin, but the carriers of tin, iron or amber[3] from the north met in the markets of Etruria the Phoenician and Greek merchants bringing gold and ivory and the other luxuries of the East. The quantities of gold, silver and bronze found in Etruscan tombs prove this clearly. Of these metals the only one found in unworked form, in what are practically pigs, is bronze. This in the form of *aes rude* has frequently been found in considerable quantities, and the larger and better formed bits of metals known as *aes signatum* are not rare. Both forms are usually spoken of as the earliest forms of money, but as the *aes rude* generally bears no marks of valuation or of any mint, and as the *aes signatum* is far too large and heavy for ordinary circulation, it is probable that these shapes of metal are not to be considered strictly or alone as coins, but as forms given to the alloy of tin and copper made and sold by the Etruscans to the foreigners for purposes of manufacture. This of course does not exclude their use as money. Where the copper for this bronze came from is not certain, but probably a great part was from the mines at Volaterrae. Still another proof that what the Etruscans sold was the product of their fields or crude metals imported from the north, is the fact that though in the museum at Carthage and elsewhere there are a few vases and other objects which probably come from Etruria, still such objects are extremely uncommon. On the other hand, articles obviously imported from the East are by no means uncommon in Etruria. Such are the ostrich shells from Volci,[4] the Phoenician cups from

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[1] τήν τε Ῥωμην αὐτὴν τῶν συγγραφέων Τυρρηνίδα πόλιν εἶναι ὑπέλαβον, Dion Hal. i. 29; but see sect. *Language* for meaning of Τυρρηνία.

[2] For the wars of the Greeks against the Carthaginians and the Etruscans see Busolt, *Griechische Geschichte*, ii. 218 ff.

[3] Pliny (*H.N.* xxxvii. 11). He says that amber was brought by the Germans down the valley of the Po. Thence the trade-route crossed the Apennines to Pisa (Scylax in *Geographi minores*, ed. Didot, i. p. 25). In the consideration of problems suggested by amber it is too often forgotten that a very beautiful dark amber is found in Sicily.

[4] Montelius, *Civilization primitive en Italie*, ii. pl. 265; cf. Petrie, *Naukratis*, i. pl. 20, fig. 15, and Perrot-Chipiez, *Histoire de l'art*, iii.

Palestrina,[1] the Egyptian glazed vases and scarabs found on more than one site.[2] All this goes to show that the Etruscans lacked in their earlier days skilful workers in the arts and crafts.

Habits and Customs.—The lack of literary remains of the Etruscans does not cramp our knowledge of their habits as much as might be supposed, owing to the numerous paintings that are left. These paintings are on the walls of the tombs at Veii, Corneto, Chiusi (Clusium), and elsewhere,[3] and give a varied picture of the dress, utensils and habits of the people. The evidence of many ancient authors cannot be questioned that as a race the Etruscans in historic times were much given to luxurious living. So much so in fact that Virgil (*Georg.* ii. 193) speaks of the *pinguis Tyrrhenus* (a trumpeter at the altar) and Catullus (xxxix. 11) of the *obesus Etruscus.* Diodorus (v. 40) gives a succinct account in which he says that "their country was so fertile they derived therefrom not only sufficient for their needs but enough to supply them with luxuries. Twice a day they partook of elaborate repasts at which the tables were decked with embroidered cloths and vessels of gold and silver. The servants were numerous and noticeable for the richness of their attire. The houses, too, were large and commodious. In fact, giving themselves up to sensuous enjoyments they had naturally lost the glorious reputation their ancestors had won in war." This last remark shows that Diodorus recognized the important difference between the early Etruscans who built up the country and the later ones who merely enjoyed it. Naturally courtesans flourished in such a community. Timaeus and Theopompus tell how the women lived and ate and even exercised with the men (Athen. xii. 14; cf. iv. 38), habits which of course gave the Roman satirists many openings for attack (Plaut. *Cist.* ii. 3. 563; cf. Herod. i. 98; Strabo xi. 14). In dress they differed but little from the Romans, both wearing the toga and the tunic. Hats too, often of pointed form, were common (Serv. *ad Aen.* ii. 683), as the paintings show, but it was their shoes for which they were particularly famous. One author (Lydus, *de Magistr.* i. 17. 36) suggests that Romulus borrowed from Etruria the type of shoe he gave the senators, and this may well be true, though the form mentioned, the *kampagus,* is of late origin. At any rate *σανδάλια Τυρρηνικά* are frequently mentioned. From the pictures and remains we know that they had wooden soles strengthened with bronze, and that the uppers were of leather and bound with thongs.

Their occupations of trade and agriculture have been already mentioned. For their leisure hours they had athletic games including gladiatorial shows (Athen. iv. 153; cf. Livy ix. 40. 7; Strabo v. 250), hunting, music and dancing. All these are shown in the tomb pictures, and all, with the exception of the hunting, developed first as a part of religious service, and their importance is shown by the strictness of the rules that governed them (Cicero, *De harusp. resp.* ii. 23). Did a dancer lose step, or an attendant lift his hand from the chariot, the games lost their value as a religious service. An idea of the splendour of the triumphs that accompanied victorious generals and of the parades at the games is given by Appian (*De reb. Punic.* viii. 66) and Dionysius (vii. 92). The music that was an accompaniment of all their occupations, even of hunting (Aelian, *De natur. anim.* xii. 46), was mainly produced by the single or double flute, the mastery of which by the Etruscans was known to all the world. They also had small harps and trumpets.

For the regularization of all these duties and pleasures there was a calendar and time-division for the day. It is noteworthy that the beginning of the day was for them the moment when the sun was at the zenith (Serv. *ad Aen.* v. 738). In this they differed from the Greeks, who began their day with the sunset, and the Romans, who reckoned theirs from midnight. The weeks were of eight days, the first being market day and the day when the people could appeal to the king, and the months were lunar. The years were kept numbered by the annual driving of a nail into the walls of the temple of Nortia at Volsinii (Livy vii. 3. 7), a custom later adopted by the Romans, who used the Capitoline temple for the same purpose. In Rome this rite was performed on the Ides of September, and it is likely that it took place in Etruria on the same date, the natural end of the year among an agricultural folk. A still longer measure of time was the *saeculum,* which was supposed to be the length of the longest life of all those born in the year in which the preceding oldest inhabitant died (Censorinus, *De die natali,* 17. 5; cf. Zosimus ii. 1). According to later writers[4] the Etruscan race was to last ten *saecula,* and the emperor Augustus in his memoirs (Serv. *ad. Bucol.* ix. 47) says that the comet of the year 44 B.C. was said by the priests to betoken the beginning of the tenth *saeculum.* The earliest *saecula* had been, according to Varro, 100 years long. The later ones varied in length from 105 to 123 years. The round number 100 is obviously an *ex post facto* approximation, and the accuracy of the others is probably more apparent than real, but if we reckon back some 900 years from the date given by Augustus we arrive at just about the time when the archaeological evidence leads us to believe that the Etruscans in Italy were beginning to recognize their individuality.

Religion.—To retrace the religious development of the Etruscans from its mystic beginnings is beyond our power, and it is unlikely that any future discoveries will help us much. We are, however, able to draw a clear, if not a detailed, picture of the worship paid to the various divinities, partly from the direct information we have concerning them and partly from the analogies which may safely be drawn between them and the Romans.

The frequency of sacrifice among them and their belief in the short duration of the race[5] show clearly their belief in a good and a bad principle, and the latter seems to have been predominant in their minds. Storms, earthquakes, the birth of deformities, all gave evidence of evil powers, which could be appeased sometimes only by human sacrifice. We miss here the Greek joy in human life and the beauties of earth. The gods (*aesar*) were divided into two main groups, the *Dii Consentes* and a vaguer set of powers, the *Dii Involuti* (Seneca, *Quaest. Nat.* ii. 41), to whom even Jupiter bowed. They all dwelt in various parts of the heavens (Martianus Capella, *De nupt. Phil.* i. 41 ff.). Of the *Dii Consentes* the most important group consisted of Jupiter (*Tinia*), Juno (*Uni*) and Minerva (*Menrva*). In some towns, such as Veii and Falerii, Juno was the chief deity, and at Perusia she was worshipped like the Greek Aphrodite in conjunction with Vulcan (the Greek *Hephaestus*). This shows that though in exterior form the Etruscan gods were influenced by the Greeks, still their character and powers betoken different beliefs. An interesting point to note about Minerva (*Menrva*) is that she was the goddess of the music of flutes and horns. The myth of Athena and Marsyas probably originated in Asia Minor, and a Pelasgian Tyrrhenian founded in Argos the temple of Athena Salpinx (Paus. ii. 21. 3). The evident connexion between Asia Minor and Etruria in these facts cannot be overlooked. Besides these deities there were Venus (*Turan*), Bacchus (*Fufluns*), Mercury (*Turms*), Vulcan (*Sethlans*). Of these, Sethlans is in a way the most important, for he shows a connexion in prehistoric times between Etruria and the East.[6] Other deities of Greek origin there were—Ares, Apollo, Heracles, the Dioscuri; in fact, as the centuries passed, the Greek divinities were adopted almost without exception. Besides these there were also many gods of Latin or Sabine origin, of whom little is known but their names; these may often be local appellations for the same god. Among these were Voltumna at Volsinii and Vertumnus at Rome, Janus, Nortia, goddess of Fortuna, Fēronia, whose temple was at a town of the same name at the foot of Soracte,[7] Mantus, Pales, Vejovis, Eileithyia and Ceres.

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[1] *Monumenti dell' Inst. Arch. Rom.* x. pl. 31; *Museo Etrusco Vaticano,* i. pl. 63-69; cf. *Annali dell'Inst. Arch.,* 1896, p. 199 ff.

[2] Vase with hieroglyphs found at Santa Marinella, *Bollettino dell' Inst. Arch.,* 1841, p. 111; *Mon. antichi,* viii. p. 88.

[3] G. Dennis, *Cities and Cemeteries of Etruria.*

[4] Varro *ap.* Serv. *ad Aen.* viii. 526; see Helbig, *Bull. dell' Inst. Arch.* (1876), 227.

[5] Censorinus, *De Die Nat.* 17.

[6] See Preller, *Röm. Myth.* s.v. "Volcanus." Opposed to this see Wissowa, *Religion u. Kultus der Römer,* who seems to misinterpret the evidence.

[7] Strabo v. 2. 39; cf. Livy i. 30; Dion. Hal. iii. 32.

Such were the leading gods; in addition there was the world of spirits whom we know in Rome as the Manes, Lares and Penates. The latter were of four classes, pertaining to Jove, Neptune, the gods of the lower world, and to men.[1] The Lares too were of various sorts (*familiares*, *compitales*, *viales*), and with them the souls of the dead, after the performance of due expiatory rites, took their place as *dii animales* (Serv. *ad Aen.* iii. 168 and 302). The Manes are the vaguest group of all and were confined almost wholly to the lower world (Festus, s.v. "Mundus"; Apuleius, *De deo Socratis*). Over all these ruled Mantus and Mania, the counterparts of Pluto and Persephone in Greece. As a result of this complete hierarchy of divine powers the priesthood of Etruria was large, powerful, and of such fame that Etruscan *haruspices* were sent for from distant places to interpret the sacrifices and the oracles (Livy v. i. 6, xxvii. 37. 6).

Art.—The evidence drawn from tradition and custom which we have so far considered in relation to the origin and beliefs of the Etruscans has taken us into the prehistoric times much earlier than those when the handicrafts developed into true fine arts. The contents of the earliest graves[2] show but few traces of any feeling for art either in architecture or in the lesser forms of household and personal decoration. Gradually, however, as one comes down towards the more fixed historic periods, certain objects, obviously imported from the eastern Mediterranean, occur, and these are the first signs of an interest in the beauty or curiosity of things, an interest that local workmen could not yet satisfy, but which stirred them to endeavour. It was probably during the 9th century that this began, not long after the period when foreign trade began to flourish.

The history of Etruscan art has usually been wrongly estimated owing to the widespread delusion that objects found in Etruria were in the true sense products of native artists and indicative of native-grown culture. It is only recently, and not even yet completely, that the term "Etruscan" has been given up as the name for the terra-cotta vases (which were found in the 19th century by the earlier archaeologists of the modern scientific school in great quantities in the Etruscan tombs); these are now known to have been made by Greek potters. There are few books on the subject of Etruscan art. The best known is Jules Martha's *L'Art étrusque* (2nd ed., 1889), a book which, though full of accurate data, shows absolute lack of discrimination between those works that are of Etruscan fabric and those that were brought from other lands, particularly Greece and the Greek colonies of Magna Graecia and Sicily. These latter are too generally forgotten in the study both of Greek and of Etruscan art, and all works which show the Greek spirit are vaguely supposed to have been produced on the Greek mainland. As much of the following must be to some extent controversial in character, a concrete illustration may serve to prevent misconception as to this important distinction. The beautiful throne in the Ludovisi collection representing the birth of Aphrodite is commonly spoken of as though made by some sculptor in Greece. It seems at least as likely that it comes from Sicily. Not only is the character of the modelling similar to what we find on Sicilian sculptures and coins, and not quite so sharp as on most works from Greece, but there is a lyrical feeling for nature in the pose of the figures and in the pebbled soil on which the main group stands, which seems to answer to the Sicilian feeling as we know it in poetry rather than to the Greek.

Architecture.

The houses of the earliest times were, to judge by the burial urns known from their shape as *hut-urns*, small single-room constructions of rectangular plan similar to certain types of the *capanne* used by the shepherds to-day. Probably the walls were wattled and the roofs were certainly thatched, for the urns show plainly the long beams fastened together at the top and hanging from the ridge down each side. Tombs cut in the rock offer other and later models of house construction, but give no suggestion that the Etruscans had any artistic sense in architecture. Such tombs are mostly later than the 5th century B.C., and show the most simple form of wood construction. Posts or columns hold up the walls and the sloping roofs, the latter made of beams with boards laid lengthwise, covered by others from ridge to eave, the intervening space forming a coffer, sometimes decorated. Though the walls of such tombs are often covered with paintings, the relation of the various parts (and, let it be remembered, these tombs represent the houses of the living) shows but the coarsest sense of proportion. The elements of the decoration, such as capitals, mouldings, rosettes, patterns, are borrowed from Greece, Egypt or elsewhere, and are used redundantly and with no refinement.[3]

The temples did not differ from those in Greece in any essential principal of construction except that they were generally square, from the desire to make them answer to the *templum* or quadripartite division of the heavens elaborated by the priests. In Roman times "Etruscan style" was the term used for colonnades with wide intercolumniations, and this shows how the early builders used wood with its possibility of long architrave beams rather than stone as in Greece. The interior arrangements of the temple also varied from the Grecian models, for owing to the fact that the gods of Etruria were often worshipped in groups of three the cella was divided into three chambers. The decoration—metopes, friezes, acroteria, &c.—was of terra-cotta fastened by nails to the wooden walls.

Though we know that the Etruscans were famous for their games,[4] still there are no remains of *circi*, and so too, though the *satyristae* were well known,[5] no theatres are left. They were obviously a race of no literary taste or culture. The theatre at Fiesole which is often referred to as Etruscan unquestionably dates from Roman times.

Underground tombs have already been mentioned in their relation to house-architecture, but there are the *tumuli* such as that called *la Cucumella* at Volci, that of the Curiatii at Albano, or that of Porsena at Clusium, which Pliny describes as one of the wonders of Italy (*H.N.* xxxvi. 19). These great walled-in mounds with their complex of interior chambers are interesting as reminiscent of tombs in Lydia, but architecturally they are barbaric and show no developed skill.

There remains one monument which has always been supposed to show a real advance made by the Etruscans in the art of architecture—the *cloaca maxima* in Rome. This round-arched drain was supposed to have been built by Etruscans, and it was only in 1903 that Commendatore Boni in excavating the Forum proved that the drain was originally uncovered, and that the arch was built at the end of the Republic. Thus the honour, not of discovering the arch, for it was known to the East, but of popularizing its use, does not belong to the Etruscans, though they did use it at a comparatively late time for city gates, as at Volterra.[6] The false arch and dome of the Mycenaeans seems to have been familiar to them, though there are but few cases of its use on a large scale. The best-known instances are the Tullianum or Mamertine prison in Rome, the Regulini-Galassi tomb at Cervetri,[7] one at Sesto Fiorentino near Florence,[8] at Cortona,[9] at Chiusi, and also those in Latium.[10]

Although there was, therefore, but little development in the greater arts of literature and architecture among the Etruscans, it is evident enough that there was much desire to possess the products of the lesser arts, such as sculpture, jewelry and household ornaments. But here too the study has been made difficult by the failure to distinguish between native and imported products. Before studying the objects themselves it is well to recall the legendary character of Etruscan chronology as reckoned in *saecula*. Helbig[1] showed that we cannot consider any of the traditional dates as being accurate until about 644 B.C., the beginning, that is, of the fifth *saeculum*. This is probably about one hundred years after the introduction of the Chalcidian (Ionic) alphabet into the country. One of the earliest examples of the use of it is on a vase found in the Regulini-Galassi tomb. In considering the trade of the country it has been pointed out that its chief political connexions were with Carthage, but the artistic sense of Carthaginians or other Phoenicians was not more developed than that of the Etruscans. They were traders, and doubtless brought the Etruscans some of the Egyptian and Eastern objects which have been found in their tombs, articles that date from the 7th and 6th centuries B.C. But beside the Phoenicians the Ionian Greeks from the 9th century had been trading and colonizing in Sicily and Italy. Herodotus (i. 163) tells how the Phocaeans were the first of the Greeks to take long voyages, and that they discovered the Adriatic and Tyrrhenian seas and Iberia. Thucydîdes (vi. 3. 1) says that it was Chalcidians from Euboea who first settled in Sicily. Pliny (*Hist. Nat.* xxxv. 12. 43) writes in the same sense, for he tells of Demaratus who came from Corinth with the artists Eucheir, Diopus, Eugrammus, about 650 B.C., and first started sculpture in Italy. These traditions of the coming of Ionian Greeks to Italy are completely borne out by the archaeological remains found in Ionian lands and in Etruria, and it is agreed that a great part of what has hitherto been considered Etruscan is no more Etruscan than the Moorish plates of the 15th century found in Italy are Florentine. The best works in most of the smaller arts are almost without exception Greek, the earlier Ionian, the later Attic; the remainder are made with the distinct intention of imitating Greek models, and so should be considered as Greek, inasmuch as they do not show a natural, original expression of feeling on the part of the Etruscan workman. The Etruscans were dull artists in all lines. They were skilful copyists, nothing more, as is absolutely proved by the simple fact that we know of no Etruscan artist by name. If one takes the articles which are of obviously local manufacture, such as the burial urns[2] or the ordinary bronze mirrors, or the pottery, it would be hard to find a similar quantity of work by any other race so lacking in originality of conception or high excellence of technique.

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[1] Nigidius Figulus *ap.* Arnob. *adv. Nat.* iii. 40; cf. *Nig. Fig. reliquiae*, ed. Ant. Swoboda (1888), p. 83.

[2] Montelius, *Civ. Prim. en Italie.*

[3] For an illustration of the Corneto tomb see ARCHITECTURE, vol. ii. p. 559.

[4] Appian viii. 66; Tertullian, *De spect.* 5; Plutarch, *Qu. Rom.* 107.

[5] Dion. Hal. vii. 72.

[6] Montelius, *Civ. Prim.* ii. pl. 172.

[7] *Ib.* pl. 333; cf. 343. [8] *Ib.* pl. 166. [9] *Ib.* pl. 173.

[10] *Monum. Ant.* xv. p. 151; *Bull. d. Com. Arch. di Roma*, 1898, p. 111

In the study of the monuments a division must be made distinguishing between the obviously Greek works, the works done with a desire to copy Greek models and the work of native artists. To separate the objects in the way suggested required a very considerable familiarity with Greek art, and though in many cases the result may be doubtful, still so much must be taken from the Etruscans that they are shown to have little more artistic feeling than the Romans. In the earlier centuries a strong eastern influence appears in the copying of sphinxes and similar eastern motives, but this soon gave way to the stronger Greek influence, as was natural, for the intercourse with the Phoenicians was spasmodic whereas that with the Greeks was constant. But even with the Greeks to kindle their imaginations, the Etruscans produced no school of art; no steady progression is traceable. In various towns there were various fashions of pottery or jewelry, but good, bad and indifferent constantly occur together in a way possible only among a people who possessed no natural artistic capacities and had no widespread standards of cultivated taste. The Ionians have been mentioned as having strongly affected the arts in Etruria, and, though in the later centuries Athens undoubtedly exported heavy consignments to Italy, the taste of the Etruscans seems generally to have preferred the rather heavy loose style of the Ionians, even when direct contact with them was lost and its place taken by direct relations with Athens and her colonies.

Pottery.

Pottery[3] practised enormously by the Etruscans shows as clearly as possible their essential strength and weakness as artists. Even the black ware called *bucchero* is now known to have been manufactured in other lands and not to be an exclusively Etruscan style. In the earlier tombs this ware is present in greater numbers than any other, and the vases exhibit considerable dexterity of manufacture so far as form goes. But it is evident from comparisons with early Ionian vases that the better proportioned of the shapes are direct copies of the Ionian. The decoration of the *bucchero* is either engraved, in which case it is almost always extremely rude, or formed by figures modelled or pressed by a mould on to the body of the vase. In these two last cases the figures are often suggestive of the farther East (Egyptian and Mesopotamia), but still more frequently they are taken from Greek originals, and the natural tendency of the Etruscan artist to be a copyist is very marked. Whence the moulds for these vases came is not known, but analogy with other classes of work makes it practically certain that some were imported and some made by the imitating workmen. There are other classes of vases which at first sight look as though they were imported from Greece, but by the nature of their clay are recognized to be Etruscan imitations of Greek originals. The imitation is often very skilful, for the Etruscan artist rivalled his Grecian master in deftness of hand, if not in imagination. Such, for instance, are the large amphoras decorated with bands of animals in the Corinthian style. Besides these native vases the tombs have yielded great quantities of others which used to be called Etruscan, but are now known to have been imported from Greece. Until the 6th century B.C. these vases are mostly Ionian, but at that time the trade of the Phocaeans was waning before that of Athens, and henceforward the Athenian ware is the commonest. Intercourse with Athens, however, came to an end about 480, when the Sicilian Greeks mastered the trade of the western Mediterranean, so that in the Etruscan tombs later than this date we find fewer and fewer imported vases, and more and more native imitations. It is generally taken for granted that these Attic vases were brought to Etruria by Greek traders, but considering how little the Greek historians, even Herodotus, knew of that country, this is unlikely. Then, too, the chief products Etruria had to give Greece were metals, so it is more likely that it was the Etruscan traders who, having carried metal to Greece (where Etruscan bronze was famous[4]), brought back the vases.

Scarabs.

Though most collections make no distinction between Greek and Etruscan scarabs the differences, though slight, are quite certain, and consist in the greater elaboration of the borders, edges and backs of the Etruscan examples. The commonest material for these gems is red carnelian, and agate frequently occurs. The beetle shape is undoubtedly due to the Phoenicians, who familiarized the Etruscans with the Egyptian scarab and with its signification as an amulet; while in technique they are more Greek, in use they are more Egyptian, for they were used not only as seals but as ornaments—as in the decoration of necklaces.[5] What we learn from them merely serves to strengthen what we learn from the pottery—that the Etruscans depended on the Greek world for their artistic conceptions. Though many Phoenician gems (in fact, scarcely any other kind) have been found in Sardinia, these are comparatively rare in Etruria, where the earliest gems occur about 650 B.C. Some of these earliest show the Ionian influence, which is also shown in certain gold rings, but most of them represent the Attic style as seen on the black-figured vases of Athens. To understand them one has but to know Attic sculpture, the complete history of which is repeated in these small and beautifully worked stones. At first one finds the single figures, awkward in form and modelling, but full of life in composition—one finds the same mistakes in anatomy (*i.e.* the muscles of the stomach); and then come the figures beautifully worked and accurately observed, but with the slight hardness and rigidity that belongs to all pre-Raphaelite work; and finally one sees the figures carved with the easy assurance of the master, sometimes single, sometimes in groups, but always Attic in their unrivalled representation of the beauties of the human figure, and in the innumerable lovely scenes taken from everyday life. Not infrequently inscriptions are cut in the gem, but these are not as on Greek gems the name of the carver or the owner, but the name of the Greek hero represented. In regard to technique one point is specially noteworthy. Many of the gems are carved with the round drill, and the disks made by this are not modelled into any real semblance of a figure. This is not a sign of the antiquity of the gem, for there are examples in which together with this method will be seen a figure finished with the greatest care; it is thus evident that the gem-cutter left the marks of his round drill because of their decorative value. This they undoubtedly possess, and it is one of the few cases in which the Etruscans showed any art sense.

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[1] *Annali dell' Inst. Arch.*, 1876, 230.

[2] Gerhard, *Etruskische Spiegel*; Körte, *Rilievi delle urne Etrusche.*

[3] See Pottier, *Catalogue des vases antiques, II. L'École Ionienne*, Boehlau, *Aus ionischen und italischen Nekropolen*; Karo, *De arte vascularia antiquissima*; Endt, *Ionische Vasenmalerei*. See further CERAMICS, § *Etruscan*.

[4] Athen. i. 28.

[5] Martha, *L'Art étrusque*, pl. 1, 4; *Bull. dell'Inst.* (1837) p. 46.

Bronze.

Bronze was used extensively. Weapons of course were fashioned of it, but these are simple in shape and decoration; no such examples as those from Mycenae occur. Objects of large size, as the bronze doors of Veii,[1] the chariots of Perugia in the New York museum, or large tripods or shields, show that the artisans had large quantities of the material at their disposal. As with the vases or gems, so in these metal objects the distinction must be drawn between pure Etruscan work and the work that was done by Greek workmen or by artisans copying the Greek style. As Etruscan art has been wrongly estimated through forgetfulness of the Greek influence, so Greek bronzes have possibly received credit that does not belong to them. Etruscan candelabra and vases were famous among the Greeks (Ath. i. 28. 6; xv. 700 c). The chariots above mentioned and the tripods in the Harvard museum are plainly Greek; the round shields with ornament in bands are native. Antefixes of tombs were of bronze, and in some cases the eyes of the figures were inlaid with glass paste. The best-known articles of bronze are the mirrors,[2] which are very dependent on Greece for their models, though the poor style in which the scenes that decorate them are in most cases carved shows that these articles of common use were produced, as was natural, mainly by ordinary workmen. In rare cases the figures are not engraved but are given in low relief. These mirrors seem to have been mainly intended for women, and the scenes on them in large numbers of cases are of such a character as to bear out this idea; for instead of scenes of battle such as occur on the gems, scenes with satyrs and maenads are commoner, or the story of Helen or the labours of Hercules. So far as development goes they pass through the same stages as the gems, though owing to their larger surface they are more generally decorated with groups of figures.[3] Another well-known class of work is the *cistae* or cylindrical bronze boxes found mostly at Praeneste, where they seem to have been especially popular. The engraved figures on them are of the same character as those on the mirrors, and it is noteworthy that these figures are often better in style than the figures modelled in the round that serve as handles, or than the legs which also are modelled. This, taken together with the fact that the same figures are repeated in several cases on more than one gem or mirror, makes it probable that the workmen, like the later potters of Arezzo, had a stock of models brought from Greece, which they repeated and combined to suit their fancy.

Gold and silver.

The paintings and contents of the tombs have made it plain that the wealth of the Etruscans was very considerable, and that they spent much on jewelry, gold and silver.[4] Their extravagance in this regard was well known,[5] and the rings, the necklaces, the diadems, the bracelets and the earrings show that there was a large class of well-to-do people. The eastern and Greek influences are clearly marked in the figures used in decoration, and in certain shapes of rings, but in one technical matter the Etruscans seem to have made a discovery: it was in the use of granulated ornament, that is, ornament made by soldering on to the gold object infinitely small globules of the same metal laid in various designs and patterns, each globule soldered by itself. Though this style of ornament occurs in Egypt, Cyprus, Rhodes and Magna Graecia, nowhere is it accomplished with such extraordinary minuteness as in Etruria. That they should do this was natural. The difficulty of it seems to have pleased them, for it is commoner than the earlier filigree work made of wire soldered on to the gold base. Reference has been made to the scarabs set as ornament in the gold necklaces, and similarly we find amber used and, in the later work, precious stones and pearls.

Sculpture.

As in Greece the Etruscans first carved their figures out of wood,[6] but what these figures were like we can only imagine. The earliest known figures in the round are even less successful than the contemporary Greek work. An early attempt at a female bust[7] is made not by casting but by riveting plates of bronze together. A half life size bust in the Tyszkiewicz collection[8] made probably about 600 B.C. is cast solid. Later they learned the art of hollow-casting, but their attempts to reproduce figures in the round are generally lacking in skill. One reason for this was the lack of good marble, the quarries at Carrara not having been used till Roman times. Terra-cotta was the material most commonly used, and their skill in modelling and colouring this was great. The earlier statues of large size have perished; but there are three famous sarcophagi which show the work of Ionian Etruscan artists;[9] one is in the British Museum, one in the Louvre and one in the Villa di Papa Giulio at Rome. The elaborate detail and careful work, the types of the figures and the style of their dress all point to the same Ionic origin as that of the bronze chariots already mentioned. The type of sarcophagus illustrated by these examples became very common, and in the figures that decorate the covers can be traced the various influences that affected the whole of Etruscan art. In an example from Volci[10] the later Attic influence is strongly marked. Such work shows little power of origination, but much of the interest taken by careful workmen by copying carefully, and the tendency that such workmen almost invariably display of overloading the subject with too much ornament and detail. The small ash-urns, either of stone or terra-cotta, are in certain ways more interesting than the more elaborate sarcophagi, for on these urns the heads of the figures reclining on one elbow which form the usual decoration of the covers are often obvious attempts at portraiture. Single busts[11] show this same desire for accurate likeness of the person represented, and in this one line of art the Etruscans showed a new feeling, one that found its finest expression in the hands of the later Roman portraitists. The main difference between such portraits and the Greek ones is that the Greek artist thought of his subject as illustrating character that showed itself in ways of repose and thought—the essential, lasting individuality. The Etruscan and Roman portraitist thought, on the other hand, of his subject as illustrating character in ways of action; hence pure Etruscan and Roman portraits are much more tense in line, and the expression of the eye is not dreamy but distinctly focussed. They are different, but, as art, one is as fine as the other. The scenes on the sides of these urns are, as in the case of the gems and mirrors, very frequently taken from Greek story, and often are scenes of battle.[12] Work in relief for the friezes and the other decorations of temples was very common, and shows remarkable skill in the mere processes of modelling and baking the slabs of terra-cotta that were fastened by nails to the beams. So far as the figures themselves are concerned, they seem to have but little meaning in connexion with the building they decorate.

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[1] Plutarch, *Camillus*, 12.

[2] Gerhard, *Etr. Spiegel* (continued by Klugmann and Körte).

[3] Mirrors of Greek style, Gerhard, 111, 112, 116, 240, 305, 352; Klugmann-Körte, 107, 131, 160.

[4] See plates in Martha and in *Monumenti dell' Inst.*, also *Mon. Ant.* iv. and Milani's *Studie materiali.*

[5] Juvenal v. 164; Ovid, *Am.* iii. 13. 25 ff.

[6] Pliny, *H.N.* xiv. 9; xvi. 216.

[7] From the Polledrara tomb at Vulci, Martha fig. 335.

[8] *Coll. Tyszkiewicz*, pl. 13.

[9] *Mon. dell' Inst.* vi. pl. 59, cf. *Annali* (1861), p. 402; *Mon. Ant.* viii. pl. xiii.-xiv.

[10] *Mon. dell' Inst.* viii. pl. 20; Martha p. 347.

[11] Martha pp. 333, 348.

[12] See Körte, *Rilievi delle urne Etrusche.*

Satyrs and maenads, chariot-races and such scenes taken over from Greek models are perhaps the commonest. In none of the obviously native work is there any more instinctive feeling for the greater qualities of sculpture than in the gems. Little is original, almost everything dependent on earlier masters. There is no absorption of the artist by his work which produces great work, great because the beholder thinks rather of the work produced than of the artist who produces it. For this reason such figures as the bronze chimaera or the bronze Athena in the Florence museum are presumably not Etruscan but Greek.

Painting.

There is no evidence that the Etruscans had easel-paintings like the Greeks, but their skill in painting is well illustrated by the pictures with which they frequently covered the inner walls of their tombs. The wall was prepared with a coating of fine white stucco on which the figures were painted with a large variety of tints. The best of them have been found at Tarquinii, Chiusi, Volci, Caere, Veii.[1] The paintings exhibit the usual Greek influences. They show a certain ponderous realism, but as works of art they are of little value. As pictures of the life and customs of the people they are of great importance.

Coins.

As works of art their coins[2] are the worst efforts of the Etruscans. Gold, silver and bronze were used, but no examples can be dated earlier than the beginning of the 5th century B.C. The coins are struck according to four different standards of weight, due perhaps to different trade-connexions. The bronze coinage shows a distinct scale of reduction in weight due to the increasing use of the precious metals. Many examples show a design only on one side. The designs of the majority of the types are taken from Greek models, but strangely enough the die-cutters show no such skill as that of the makers of gems.

Arms and Armour.—In the early periods the chief weapons (besides bows and arrows which bore flint or bronze heads) were few and simple, and were of bronze. Iron ones have been found, and their rarity is doubtless partly due to their having rusted away. Spears of very various weights were common and also swords and daggers. These latter had straight two-edged blades with the handle either of the same piece or of some other material fastened on with rivets. The blades of the daggers are generally engraved with lines and zigzags. Shields were of circular and oval shape. These two were of bronze, the round ones decorated in Homeric fashion with concentric circles of ornament, the motives being geometric patterns or an animal repeated endlessly. Breastplates with overlapping shoulder-straps and belts, broader in front than behind, with decoration of the same kind as the bucchero vases, are not uncommon. Greaves and helmets completed their equipment. The former seem to have been less ornate than those the Greeks wore; the latter were of various shapes, the commonest being round caps with a knob on the top, or a deeper shape with a crest from front to back. Some are shown with side-pieces raised like wings, but these are perhaps merely cheek-pieces raised on hinges. In later times they had trumpets and axes, and their arms became practically the same as the Roman, as one sees from the representations in the tombs. (R. N.)

LANGUAGE

1. By "Etruscan" is meant the language spoken by the people called Etrusci (more commonly Tusci) by the Romans, Turskum numen (*i.e. Tuscum nomen*) by their neighbours the Umbrians of Iguvium (*q.v.*), and Τυρσηνοί (later, *e.g.* in Strabo's time, Τυρρηνοί) by the Greeks. Their own name for themselves was *Rasĕnna* (or *Rasĕna*), according to Dionysius Halic. (i. 30), but it seems now to be fairly probable that this was no more than the name of a leading house (represented later on in Pisa and elsewhere) dominant at some fairly early date in some one locality (see below). Niebuhr attempted on slender grounds (*Rom. Hist.*, ed. 3 [Eng. trans.], i. p. 41) to distinguish between the Τυρρηνοί and the Tusci in order to accept the strongly supported tradition of a Lydian origin for the "Tyrrhenes" (see below), while rejecting it for the "Tuscans," but no one has since attempted to maintain the distinction (Dittenberger, *Hermes*, 1906, p. 85, footnote, regards the form in *-ηνοί* as a "Graecized form of a local name" equivalent to *Tusci*), and we now know enough of the morphology of Etruscan names to recognize *Tur-s-co-* and *Tur-s-ēno-* as closely parallel Etrusco-Latin stems, cf. *Venu-c-ius*: *Venu-senus* both from Etr. *venu* (Schulze, *Lat. Eigennamen*, p. 405) and *Ras-ena*: *Ras-c-anius* (*ibid.* p. 92); or *Voluscus, Volscus*: *Volusēnus* (where the formative suffixes in each word are Etrusco-Latin whether the root be the same or not). But the analysis of the names cannot be entirely satisfactory until the first syllable of Etrusci—in Greek writers sometimes Ἔτρουσκοι, *e.g.* in *Strabo*—ed. Meineke—has been explained.

2. The extent of territory over which this language was spoken varied considerably at different epochs, but we have only a few fixed points of chronology. From two separate sources, both traditional and probably sound (Dion. Hal. i. 26, and Plutarch, *Sulla*, 7; cf. Varro, quoted by Censorinus c. 17. 6), we should ascribe the first appearance of the Etruscans in Italy to the 12th century B.C. The intimate connexion in form between the names *Roma*, *Romulus* and the Etruscan gentes rumate, rumulna (*Romatia*, *Romilia*, &c.), and the fact that many of the early names in Rome (*e.g. Ratumenna, Capena, Tities, Luceres, Ramnes*) are characteristically Etruscan, justifies the conclusion that the foundation of the city, in the sense at least of its earliest fortification, was due to Etruscans (Schulze, p. 580). The most likely interpretation of Cato's date for the Etruscan "foundation" of Capua is 598 B.C. (Conway, *Italic Dialects*, pp. 99 and 83). In 524 B.C. (Dion. Hal. vii. 2) the Etruscans were defeated by Aristodemus of Cumae, and in 474 by Hiero of Syracuse in a great naval battle off Cumae. Between 445 and 425 (*It. Dial.* l.c.) they were driven out of Capua by the Samnites, but they lingered in parts of Campania (as far south as Salernum) till at least the next century, as inscriptions show (*ib.* pp. 94 ff., 53), as at Praeneste and Tusculum (*ib.* p. 310 ff.) till the 3rd century or later. In Etruria itself the oldest inscriptions (on the stelae of Faesulae and Volaterrae) can hardly be later than the 6th century B.C. (C. Pauli, *Altital. Forsch.* ii. part 2, 24 ff.); the Romans had become dominant early in the 3rd century (C.I.L. xi. 1 *passim*), but the bulk of the Etruscan inscriptions show later forms than those found in the old town of Volsinii destroyed by the Romans in 280 B.C. (C. Pauli, *ib.* i. 127). In the north of Italy we find Etruscan written in two alphabets (of Sondrio and Bozen) between 300 and 150 B.C. (*id. ib.* pp. 63 and 126). The evidence of an Etruscan linen book wrapped round a mummy (see below) seems to suggest that there was some Etruscan colony at Alexandria in the period of the Ptolemies. At least one Etruscan suffix has passed into the Romance languages, *-iθa* or *-ita* in Etr. *lautniθa* (from *lautni* "familiaris," or "libertus"), and Etr.-Lat. *Iulitta*, which became Ital. *-etta*, Fr.-Eng. *-ette*.

3. Finally must be mentioned the remarkable pre-Hellenic epitaph discovered on the island of Lemnos in 1885 (Pauli, *Altital. Forsch.* ii. 1 and 2), the language of which offers remarkable resemblances to Etruscan, especially in the phrase *śialχveiz aviz* (? = "fifty years old"); cf. Etr. *cealχus avils* (? "twenty years old"); and the pair of endings *-ezi*, *-ale* in consecutive words; cf. Etr. *larθiale hulχniesi*; the style of the sculptural figure has also parallels in the oldest type of Etruscan monuments. The alphabet of this inscription is identical (Kirchhoff, *Stud. Griech. Alphab.*, 4th ed., p. 54) with that of the older group of Phrygian inscriptions, which mention King Midas and are therefore older than 620 B.C. With this should be combined the fact that a marked peculiarity of the South-Etruscan alphabet (↑=*f*, but earlier = the Greek *digamma*) has demonstrably arisen out of ϙ=*q*) on Phrygian soil, see *Class. Rev.* xii., 1898, p. 462. Despite the reasonable but not unanswerable difficulty of Kretschmer (*Einleitung in d. Geschichte d. griech. Sprache*, 1896, p. 240), the

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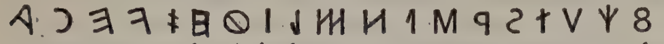
[1] See *Mon. dell' Inst.* i. pl. 32-33, v. 16, 17, 33, 34, vi. 30-32, 79, viii. 36, ix. 13-15; Micali, *Mon. Ined.* pl. 58. Cf. Helbig, *Annali* (1863) p. 336, (1870) pp. 5-74; Brunn, *ib.* (1866), p. 442.

[2] Mommsen, *Röm. Münzwesen*; G. F. Hill, *Handbook of Greek and Roman Coins*; Deecke, *Etruskische Forschungen*; also article NUMISMATICS.

weight of the evidence appears to be distinctly in favour of the Etruscan character of the language, and Pauli's view is now generally accepted by students of Etruscan; hence the inclusion of the inscription in the *Corpus Inscc. Etruscarum.*

4. The first attempt to interpret Etruscan inscriptions was made by Phil. Buonarroti (*Explic. et conject. ad monum.* &c., Florence, 1726), who, as was almost inevitable at that epoch, tried to explain the language as a dialect of Latin. But no real study was possible before the determination of the alphabet by Lepsius (*Inscc. Umbr. et Oscae*, Leipzig, 1841), and his discovery that five of the Tables of Iguvium (*q.v.*), though written in Etruscan alphabet, contained a language akin to Latin but totally different from Etruscan, though some of the non-Italic peculiarities of Etruscan had been already pointed out by Ottfried Müller (*Die Etrusker*, Breslau, 1828). The earliest inscriptions, *e.g.* the terra-cotta stele of Capua of the 5th century B.C., are written in "serpentine boustrophedon," but in its common form of the 3rd century B.C. the alphabet is retrograde, and has the following nineteen letters:—


a, c, e, v, z, h, θ, i, l, m, n, p, s′, r, s, t, u, χ, f

On older monuments 𐌊=*k* occurs as an archaic form of *c*; Ϙ=*q*; ⋈, a sibilant of some kind; and C = ϕ, this last mostly in foreign words. In the earlier monuments the cross-bars of *e* and *v* and *h* have a more decidedly oblique inclination, and *s* is often angular (ʓ). The mediae *b*, *g*, *d*, though they often occur in words handed down by writers as Etruscan, are never found in the Etruscan inscriptions, though the presence of the mediae in the Umbrian and Oscan alphabets and in the abecedaria shows that they existed in the earliest form of the Etruscan alphabet, O is very rare. The form ↑ (earlier 𐌇↑)=*f* in south Etruscan and Faliscan inscriptions should also be mentioned. Its combination with 𐌇 *h* shows that it had once served to denote the sound of digamma just as Latin F. The varieties of the alphabet in use between the Apennines and the Alps were first examined by Mommsen (*Inschriften nord-etruskischen Alphabets*, 1853), and have since been discussed by Pauli (*Altitalische Forschungen*, 1885–1894, esp. vol. iii., *Die Veneter*, p. 218, where other references will be found, see also VENETI).

5. The determination of the alphabet was followed by a large number of different attempts to explain the Etruscan forms from words in some other language to which it was supposed that Etruscan might be akin; Scandinavian and Basque and Semitic have been tried among the rest. These attempts, however ingenious, have all proved fruitless; even the latest and least fanciful (*Remarques sur le parenté de la langue étrusque*, Copenhagen, 1899; *Bulletin de l'Académie Royale des Sciences et des Lettres de Danemark*, 1899, p. 373), in which features of some living dialects of the Caucasus are cautiously compared by Prof. V. Thomsen (as independently by Pauli, see § 12), is at the best premature, and as to the numerals probably misleading. Worst of all was the effort of W. Corssen (*Die Sprache der Etrusker*, 1875), in whom learning and enthusiasm were combined with loose methods of both epigraphy and grammar, to revive the view of Buonarroti. The only solid achievement in the period of Corssen's influence (1860–1880) was the description of the works of art (tombs, vases, mirrors and the like) from the different centres of Etruscan population; Dennis's *Cities and Cemeteries of Etruria* (1st ed., 1848; 2nd, 1878) contributes something even to the study of the language, because many of the figures in the scenes sculptured or engraved bear names in Etruscan form (*e.g. usils*, "sun"; or "of the sun," on the *templum* of Placentia; *fufluns*, "Bacchus"; *tuχulχa*, a demon or fury; see Dennis, *Cities*, 2nd ed., frontispiece, and p. 354).

6. The reaction against Corssen's method was led first by W. Deecke, *Corssen und die Sprache der Etrusker* (1876), *Etruskische Forschungen* (1875–1880), and continued by Carl Pauli at first jointly with Deecke and afterwards singly with greater power (*Etruskische Studien*, 1873), *Etr. Forschungen u. Studien* (Göttingen-Stuttgart, 1881–1884), *Altitalische Studien* (Hanover, 1883–1887); *Altitalische Forschungen* (Leipzig, 1885–1894). Of the work achieved during the last generation by him and the few but distinguished scholars associated with him (Danielsson, Schaefer, Skutsch and Torp) it may perhaps be said that, though the positive knowledge yet reaped is scanty, so much has been done in other ways that the prospect is full of promise. In the first place, the only sound method of dealing with an unknown language, that of interpreting the records of the language by their own internal evidence in the first instance (not by the use of imaginary parallels in better known languages whose kinship with the problematic language is merely assumed), has been finally established and is now followed even by scholars like Elia Lattes, who still retain some affection for the older point of view. By this means enough certainty has been obtained on many characteristic features of the language to bring about a general recognition of the fact that Etruscan, if we put aside its borrowings from the neighbouring dialects of Italy, is in no sense an Indo-European language. In the second place, the great undertaking of the *Corpus Inscriptionum Etruscarum*, founded by Carl Pauli, with the support of the Berlin Academy, conducted by him from 1893 till his death in 1901, and continued by Danielsson, Herbig and Torp, for the first time provided a sound basis for the study in a text of the inscriptions, edited with care and arranged according to their provenance. The first volume contains over four thousand inscriptions from the northern half of Etruria. Thirdly, the discoveries of recent years have richly increased the available material, especially by two documents each of some length. (1) The 5th-century stele of terra-cotta from S. Maria di Capua already cited, published by Buecheler in *Rhein. Museum*, lv., 1900, p. 1) and now in the Royal Museum at Berlin, is the longest Etruscan inscription yet found. Its best preserved part contains some two hundred words of continuous text, and is divided into paragraphs, of which the third may be cited in the reading approved by Danielsson and Torp, and with the division of words adopted by Torp (in his *Bemerkungen zur etrusk. Inschr. von S. Maria di Capua*, Christiania, 1905), to which the student may be referred. "iśvei tule ilucve, an priś laruns ilucuθuχ, nun: tiθuaial χues χaθc(e) anulis mulu rizile, ziz riin puiian acasri, ti-m an tule, leθam sul; ilucu-per priś an ti, ar vus; ta aius, nunθeri." (2) The linen wrappings of an Egyptian mummy (of the Ptolemaic period) preserved in the Agram museum were observed to show on their inner surface some writing, which proved to be Etruscan and to contain more than a thousand words of largely continuous text (Krall, "Die etruskischen Mumienbinden des Agramer. Museums," *Denkschr. d. k. Akad. d. Wissenschaften*, 41, Vienna, 1892). The writing has probably nothing to do with the mummy as it is on the inner surface of the bands, and these are torn fragments of the original book. The alphabet is of about the 3rd century B.C.

7. From the recurrence of a number of particular formulae with frequent numerals at intervals, the book seems to be a liturgical document. Torp has pointed out that the two documents have some forty words in common, and, with Lattes ("Primi Apprenti sulla grande iscriz. Etrusca," &c., in *Rendic. d. Reale Inst. Lomb.*, serie ii. vol. xxxviii., 1900, p. 345 ff.), has shown that both contain lists of offerings made to certain gods (among them Suri, Leθam, and Calu); and Skutsch (*Rhein. Mus.* 56, 1901, p. 639) has added a plausible conjecture as to the occasions of the offerings, based on the phrase "flerχva neθunsl" "Neptuni statua" (or "statuae pars"); Torp has made it very probable that the words *vacl* (or *vacil*) and *nun*, which recur at regular intervals in both, mean "address," "recite," "pray," or the like, preceding or following spoken parts of the ritual.

8. Along with the growth of the material, some positive increase in knowledge of the language has been attained. Independently of the work done upon particular inscriptions, such as that which has just been described, a considerable addition has come from the elaborate study of Latin proper names already mentioned by Prof. W. Schulze of Berlin (*Zur Geschichte lateinischer Eigennamen*, Berlin, 1904), which has incidentally embodied and somewhat extended the points of Etruscan nomenclature previously observed. The chief results for our purpose may be briefly stated. It will be convenient to use the following terms:—

(1) *praenomen* = personal name of the individual.
e.g. Vel or *Lar* of a man, *Larθi* or *θana* of a woman.
(2) *nomen* = family name.

e.g. *Tite* or *Vipi* or *Tetna*, of men.
Titi or *Vipinei* or *Tetinei*, of women.

(3) *cognomen* = additional family name.

e.g. *Faru* or *Petru* of men, *Farui*, *Vetui* of women.

(4) *agnomen* = special cognomen derived from the cognomen of the father.

e.g. *Hanusa* (in Latin spelling *Hannossa*) or *Pultusa* (also *Pultus*) of a man; *Hanunia* of a woman.

All these are commonly in the "nominative" (as the examples just quoted from Schulze, pp. 316–327) in sepulchral inscriptions.

Besides these, we have certain other descriptions used in forms which may be called a "genitive-dative" case, or a "derivative possessive" Adjective. These may be entitled:—

(5) *paternum* (*a*) = praenomen of father, used generally after the *nomen* of son or daughter.

e.g. *arnθal* "of Arnθ," more commonly simply *ar*, so *ls* for *Laris-al*, to which *clan* "son," often abbreviated *c*, and *seχ* or *sec* (abbrev. *ś*) "daughter," are sometimes added.

paternum (*b*) = *nomen* of father, used only after the *praenomen* of a daughter (*e.g.* *θana velθurnas*, "Thana daughter of Velthurna"), to which *seχ* "daughter," often abbreviated *s*, is sometimes added.

(6) *maternum* (*a*) = nomen of mother.

e.g. *pumpunial*, "of Pumpuni" (in Lat. form *Pomponia*); *alfnal* "of Alfnei" (Lat. *Alfia*); *hetarias*, "of Hetaria."

maternum (*b*) = cognomen of mother.

e.g. *vetnal*, "of Vetui," or "of Vetonia," *hesual*, "of Hesui."

maternum (*c*) = agnomen of mother.

e.g. *cumeruniaś*, "of Cumerunia," *i.e.* "of a daughter of the *cumeru*-family."

(7) *maritale*—(i.) *nomen*, or (ii.) *cognomen*, or (iii.) *agnomen* of husband, used directly after the *nomen* of the wife, the word *puia*, "wife," being often added.

e.g. (i.) *larθi cencui larcnasa*, "Larthia Cenconia, wife of a Largena"; (ii.) *larθia pulfnei spaspusa*, "Larthia Pulfennia, wife of a Spaspo"; this form being the same as that used for the *agnomen* of a man (see above)—(iii.) *hastia cainei leusla*, "Hastia Caia, wife of a son of a Leo"; and with a longer and possibly not synonymous form of suffix *θania titi latinial śec hanuslisa*, "Thania Titia, daughter of Latinia, wife of a Hanusa"—these secondary derivatives in *-sla*, &c., being an example of what is called *genetivus genetivi*, a characteristic Etruscan formation, not confined to this feminine use.

These examples will probably enable the reader to interpret the great mass of the names on Etruscan tombs. It should be added (1) that no clear distinction can be drawn between the use of the *cognomina* and the *nomina*, though it is probable that in origin the *cognomen* came from some family connected with the gens by marriage; and (2) that the *praenomen* generally comes first, but sometimes second (especially when both *nomen* and *praenomen* are added in the genitive to the name of a son or daughter).

9. The examples given illustrate also the few principles of inflexion and word-formation that are reasonably certain, for example, the various "genitival" endings. Those in *-ś* and *-l* are also found in dedications where in Latin a dative would be used:—*e.g.* (*mi*) *θuplθaś alpan turce* "(hoc) deae Thupelthae donum dedit," where *turce* shows the only verbal inflection yet certainly known; cf. *amce*, "was," *arce*, "made," *zilacnuce*, "held the office of a *Zilaχ*," *lupuce*, "passed away." More important are the formative principles which the proper names display. Endings *-a*, *-u*, *-e* and *-na* are common in the "Nominative"—and in Etruscan there appears to be no distinction between this case and the Accusative— of men's names; the endings *-i*, *-ei*, *-nei*, *-nia* and *-unia* are among the commonest for women's names. But no trace of gender has yet been observed in common nouns or adjectives. Nor is it always easy to distinguish a "Case" from a noun-stem. The women's names corresponding to the men's names in *-u* are sometimes *-ui*, sometimes *-nei*, sometimes longer forms (*ves-acnei*, beside *ves-u*, *hanunia* from *hanu*). And the so-called Genitives can themselves be inflected, as we have seen. The form *neθunsl* "of Neptune," may even have swallowed up the nominatival *-s* of the Italic *Neptunus*.

10. In view of the protracted discussion as to the numerals and the dice on which the first six are written, it should be added that only the following points are certain: (1) that *maχ* = one; (2) that the next five numbers are somehow represented by *ci*, *θu*, *huθ*, *sa* and *zal*; (3) and the next three somehow by *cezp-*, *semφ-* and *muv*; (4) that the suffix *-alχ-* denotes the tens, or some of them, *e.g.* *cealχ-* beside *ci* (? 50 and 5); (5) that the suffix *-z* or *-s* is multiplicative (*es*(*a*)*ls* from *zal*). It is almost certain that *zal* must mean either 2 or 6, and of these a stronger case can, perhaps, be made for the latter meaning. *Zathrum* appears to be the corresponding ten (? 60). Skutsch's article in *Indogerm. Forschungen*, v. p. 256, remains the best account.

In close connexion with the numerals on sepulchral inscriptions appear the words *ril*, "old, aged," *avils*, "annorum," or "aetatis," and *tivr*, "month" (from *tiv*, "moon").

11. Schulze has shown (*e.g.*, p. 410) that a large number of familiar endings (*e.g.* those which when Latinized become *-acius*, *-alius*, *-annius*, *-arius*, *-asius*, *-atius*, *-avus*, *-avius*, *-ax*, and a similar series with *-o-*, *-ocius*, &c.), and further those with the elements, *-lno-*, *-lino-*, *-enna*, *-eno-*, *-tern-*, *-turn-*, *-tric-*, &c., exhibit different methods by which *nomina* were built up from *praenomina* in Etruscan. Finally it is of considerable historical importance to observe that a great mass of the *praenomina* used for this purpose are clearly of Italic origin, *e.g.* *Helva*, *Barba*, *Vespa*, *Nero*, *Pedo*, from all of which (and many more) there are derivatives which at one stage or other were certainly or probably Etruscan. It is this incorporation of Italic elements into the Etruscan nomenclature—itself a familiar and inevitable feature of the pirate-type of conquest and settlement, under which many women who bear and nurse and first name the children belong to the conquered race—that has entrapped so many scholars into the delusion that the language itself was Indo-European.

12. So far the language has been discussed without any reference to ethnology. But the facts stated above in regard to the extension of the language in space and time are clearly adverse to the hypothesis that it came into Italy from the north, and fully bear out Livy's account (v. 33. 11) that the Etruscans of the Alpine valleys had been driven into that isolation by the invasion of the Gauls (beginning about 400 B.C.). And the accumulating evidence of a connexion with Asia Minor (see *e.g.* above §3) justifies confidence in the unbroken testimony of every Roman writer, which cannot but represent the traditions of the Etruscans themselves, and the evidence of similar traditions from the Asiatic side given by Herodotus (i. 97) to the effect that they came to Italy by sea from Lydia. Against this there has never been anything to set but the silence of "the Lydian historian Xanthus" (Dion. Hal. i. 28; cf. 30) who may have had many excellent reasons for it other than a disbelief of the tradition, and of whom in any case we know nothing save the vague commendation of Dionysius. And it is not merely the miscellanies of Athenaeus (*e.g.* xii. 519) but the unimpeachable testimony of the Umbrian Plautus (*Cistellaria*, 2. 3. 19), singularly neglected since Dennis's day, that convicts the Etruscans of an institution practised by the Lydians and other non-Indo-European peoples of Asia Minor, but totally repugnant to all the peoples among whom the Etruscans moved in their western settlement. The reader may be referred to Dennis's introductory chapter for a very serviceable collection of the other ancient testimony as to their origin. In the present state of our knowledge of the language it is best to disregard its apparent or alleged resemblances to various features of various Caucasian dialects pointed out by Thomsen (see above) and Pauli (*Altit. Forsch.* ii. 2, p. 147 ff.), and to acquiesce in Kretschmer's (*op. cit.* p. 408) *non liquet* as to the particular people of Asia Minor from whom the Etruscans sprang. But meanwhile it is clear that such evidence as has been obtained by epigraphic and linguistic research is not in any sense hostile but distinctly favourable to the tradition of their origin which they themselves must have maintained.

AUTHORITIES.—Beside those mentioned in the text, see Professor F. Skutsch's article "Etruskisch," in the new current (1908) edition of Pauly-Wissowa's *Encyclopaedia*; A. Torp's *Etruskische Beiträge*, and other shorter writings; E. Lattes's *Correzioni, giunte, postille al C.I. Etrusc.* (Florence, 1904), and his most valuable *Iscriz. paleolatine di provenienza Etrusca* (1895); Schaefer's articles in Pauli's *Altitalische Studien* (see above), and, with caution, Deecke's revision of Müller's *Etrusker* (Stuttgart, 1877). Some account of the relations of Etruscans with different Italic communities will be found in the relevant chapters of R. S. Conway's edition of the remains of *The Italic Dialects* (1897). Newly discovered Etruscan inscriptions are regularly published in the *Notizie degli scavi di antichità*, the official Italian journal of excavations (published by the *Reale Accad. dei Lincei*, but procurable separately). Fabretti's *Corpus Inscc. Italicarum* with its supplements was formerly useful, but in any doubtful reading its authority is worth little, and its commentary and glossary represent the epoch of Corssen. The regular contributions of Prof. Skutsch (under the general heading "Lateinische Sprache") to Vollmer's *Jahresbericht f. d. Fortschritte der romanischen Sprachwissenschaft*; and of Prof. Herbig to Bursian's *Jahresbericht über die Fortschritte der classischen Altertumswissenschaft* will both be of service. The present writer is indebted to both Professor Skutsch and Professor Torp for valuable guidance and instruction. (R. S. C.)

ETTENHEIM, a town of Germany, in the grand-duchy of Baden, pleasantly situated on the Ettenbach, under the western slope of the Black Forest, 7 m. E. from the Rhine by rail. Pop. (1900) 3106. It has a handsome Roman Catholic church, with ceiling frescoes, and containing the tomb of Cardinal Rohan, the last prince bishop of Strassburg, who resided here from 1790 till 1803; a Protestant church and a medieval town-hall.

Its industries include the manufacture of tobacco, soap and leather, and there is a considerable trade in wine and agricultural produce. Founded in the 8th century by Eddo, bishop of Strassburg, Ettenheim remained attached to that see until 1802, when it passed to Baden. Louis Antoine Henri de Bourbon-Condé, duke of Enghien (1772–1804), who had taken refuge here in 1801, was arrested in Ettenheim on the 15th of March 1804 and conveyed to Paris, where he was shot on the 20th of March following. The Benedictine abbey of Ettenheimmünster, which was founded in the 8th century and which was dissolved in 1803, occupied a site south of the town.

ETTINGSHAUSEN, CONSTANTIN, BARON VON (1826–1897), Austrian geologist and botanist, was born in Vienna on the 16th of June 1826. He graduated as a doctor of medicine in Vienna, and became in 1854 professor of botany and natural history at the medical and surgical military academy in that city. In 1871 he was chosen professor of botany at Graz, a position which he occupied until the close of his life. He was distinguished for his researches on the Tertiary floras of various parts of Europe, and on the fossil floras of Australia and New Zealand. He died at Graz on the 1st of February 1897.

PUBLICATIONS.—*Die Farnkräuter der Jetztwelt zur Untersuchung und Bestimmung der in den Formationen der Erdrinde eingeschlossenen Überreste von vorweltlichen Arten dieser Ordnung nach dem Flächen-Skelet bearbeitet* (1865); *Physiographie der Medicinal-Pflanzen* (1862); *A Monograph of the British Eocene Flora* (with J. Starkie Gardner), Palaeontograph. Soc. vol. i. (Filices, 1879–1882).

ETTLINGEN, a town of Germany, in the grand-duchy of Baden, on the Alb, and the railway Mannheim-Basel, 4½ m. S. of Karlsruhe. Pop. (1905) 8040. It is still surrounded by old walls and ditches, and presents a medieval and picturesque appearance. Among its more striking edifices are an old princely residence, with extensive grounds, an Evangelical and two Roman Catholic churches, and the buildings of a former monastery. There are also many Roman remains, notable among them the "Neptune" sculpture, now embedded in the wall of the town-hall. Its chief manufactures are paper-making, spinning, weaving and machine building. The cultivation of wine and fruit is also largely carried on, and in these products considerable trade is done.

The first notice of Ettlingen dates from the 8th century. It became a town in 1227 and was presented by the emperor Frederick II. to the margrave of Baden. In 1689 it was pillaged by the French, and near the town Moreau defeated the archduke Charles on the 9th and 10th of July 1796.

See Schwarz, *Geschichte der Stadt Ettlingen* (Carlsruhe, 1900).

ETTMÜLLER, ERNST MORITZ LUDWIG (1802–1877), German philologist, was born at Gersdorf near Löbau, in Saxony, on the 5th of October 1802. He was privately educated by his father, the Protestant pastor of the village, entered the gymnasium at Zittau in 1816 and studied from 1823 to 1826 at the university of Leipzig. After a period of about two years during which he was partly abroad and partly at Gersdorf, he proceeded to Jena, where in 1830 he delivered, under the auspices of the university, a course of lectures on the old Norse poets. Three years later he was called to occupy the mastership of German language and literature at the Zürich gymnasium; and in 1863 he left the gymnasium for the university, with which he had been partially connected twenty years before. He died at Zürich in April 1877. To the study of English Ettmüller contributed by an alliterative translation of Beowulf (1840), an Anglo-Saxon chrestomathy entitled *Engla and Seaxna scopas and boceras* (1850), and a well-known *Lexicon Anglo-Saxonicum* (1851), in which the explanations and comments are given in Latin, but the words unfortunately are arranged according to their etymological affinity, and the letters according to phonetic relations. He edited a large number of High and Low German texts, and to the study of the Scandinavian literatures he contributed an edition of the *Völuspa* (1831), a translation of the *Lieder der Edda von den Nibelungen* (1837) and an old Norse reading book and vocabulary. He was also the author of a *Handbuch der deutschen Literaturgeschichte* (1847), which includes the treatment of the Anglo-Saxon, the Old Scandinavian, and the Low German branches; and he popularized a great deal of literary information in his *Herbstabende und Winternächte: Gespräche über Dichtungen und Dichter* (1865–1867). The alliterative versification which he admired in the old German poems he himself employed in his *Deutsche Stammkönige* (1844) and *Das verhängnissvolle Zahnweh, oder Karl der Grosse und der Heilige Goar* (1852).

ETTMÜLLER, MICHAEL (1644–1683), German physician, was born at Leipzig on the 26th of May 1644, studied at his native place and at Wittenberg, and after travelling in Italy, France and England was recalled in 1668 to Leipzig, where he was admitted a member of the faculty of medicine in 1676. About the same time the university confided to him the chair of botany, and appointed him extraordinary professor of surgery and anatomy. He died on the 9th of March 1683, at Leipzig. He enjoyed a great reputation as a lecturer, and wrote many tracts on medical and chemical subjects. His collected works were published in 1708 by his son, Michael Ernst Ettmüller (1673–1732), who was successively professor of medicine (1702), anatomy and surgery (1706), physiology (1719) and pathology (1724) at Leipzig.

ETTRICK, a river and parish of Selkirkshire, Scotland. The river rises in Capel Fell (2223 ft.), a hill in the extreme S.W. of the shire, and flows in a north-easterly direction for 32 m. to its junction with the Tweed, its principal affluent being the Yarrow. In the parish of Ettrick were born James Hogg, the "Ettrick shepherd" (the site of the cottage being marked by a monument erected in 1898), Tibbie (Elizabeth) Shiel (1782–1878), keeper of the famous inn at the head of St Mary's Loch, both of whom are buried in the churchyard, and Thomas Boston (1713–1767), one of the founders of the Relief church. About 2 m. below Ettrick church is Thirlestane Castle, the seat of Lord Napier and Ettrick, a descendant of the Napiers of Merchiston, and beside it is the ruin of the stronghold that belonged to John Scott of Thirlestane, to whom, in reward for his loyalty, James V. granted a sheaf of spears as a crest, and the motto, "Ready, aye ready." Two miles up Rankle Burn, a right-hand tributary, lies the site of Buccleuch, another stronghold of the Scotts, which gave them the titles of earl (1619) and duke (1663). Only the merest fragment remains of Tushielaw tower, occupying high ground opposite the confluence of the Rankle and the Ettrick, the home of Adam Scott, "King of the Border," who was executed for his misdeeds in 1530. Lower down the dale is Deloraine, recalling one of the leading characters in *The Lay of the Last Minstrel.* If the name come from the Gaelic *dail Orain*, "Oran's field," the district was probably a scene of the labours of St Oran (d. 548), an Irish saint and friend of Columba. It seems that Sir Walter Scott's rhythm has caused the accent wrongly to be laid on the last, instead of the penultimate syllable. Carterhaugh, a corruption of Carelhaugh, occupying the land where Ettrick and Yarrow meet, was the scene of the ballad of "Young Tamlane," and of the historic football match in 1815, under the auspices of the duke of Buccleuch, between the burghers of Selkirk, championed by Walter Scott, sheriff of the Forest (not yet a baronet), and the men of Yarrow vale, championed by the Ettrick shepherd.

ETTY, WILLIAM (1787–1849), British painter, was born at York, on the 10th of March 1787. His father had been in early life a miller, but had finally established himself in the city of York as a baker of spice-bread. After some scanty instruction of the most elementary kind, the future painter, at the age of eleven and a half, left the paternal roof, and was bound apprentice in the printing-office of the *Hull Packet.* Amid many trials and discouragements he completed his term of seven years' servitude, and having in that period come by practice, at first surreptitious, though afterwards allowed by his master "in lawful hours," to know his own powers, he removed to London.

The kindness of an elder brother and a wealthy uncle, William Etty, himself an artist, stood him in good stead. He commenced his training by copying without instruction from nature, models, prints, &c.—his first academy, as he himself says, being a plaster-cast shop in Cock Lane, Smithfield. Here he made a copy from an ancient cast of Cupid and Psyche, which was shown to Opie, and led to his being enrolled in 1807 as student of the Academy, whose schools were at that time conducted in Somerset House. Among his fellow scholars at this period of his career were some who in after years rose to eminence in their art, such as Wilkie, Haydon, Collins, Constable. His uncle generously paid the necessary fee of one hundred guineas, and in the summer of 1807 he was admitted to be a private pupil of Sir Thomas Lawrence, who was at the very acme of his fame. Etty himself always looked on this privilege as one of incalculable value, and till his latest day regarded Lawrence as one of the chief ornaments of British art. For some years after he quitted Sir Thomas's studio, even as late as 1816, the influence of his preceptor was traceable in the mannerism of his works. Though he had by this time made great progress in his art, his career was still one of almost continual failure, hardly cheered by even a passing ray of success. In 1811, after repeated rejections, he had the satisfaction of seeing his "Telemachus rescuing Antiope" on the walls of the Academy. It was badly hung, however, and attracted little notice. For the next five years he persevered with quiet and constant energy in overcoming the disadvantages of his early training with yearly growing success, and he was even beginning to establish something like a name when in 1816 he resolved to improve his knowledge of art by a journey to Italy. After an absence of three months, however, he was compelled to return home without having penetrated farther south than Florence. Struggles and vexations still continued to harass him, but he bore up against them with patient endurance and force of will. In 1820 his "Coral-finders," exhibited at the Royal Academy, attracted much attention, and its success was more than equalled by that of "Cleopatra's arrival in Cilicia," shown in the following year. In 1822 he again set out on a tour to Italy, taking Paris on his way, and astonishing his fellow-students at the Louvre by the rapidity and fidelity with which he copied from the old masters in that gallery. On arriving at Rome he immediately resumed his studies of the old masters, and elicited many expressions of wonder from his Italian fellow-artists for the same qualities which had gained the admiration of the French. Though Etty was duly impressed by the grand *chefs-d'œuvre* of Raphael and Michelangelo at Rome, he was not sorry to exchange that city for Venice, which he always regarded as the true home of art in Italy. His own style as a colourist held much more of the Venetian than of any other Italian school, and he admired his prototypes with a zeal and exclusiveness that sometimes bordered on extravagance.

Early in 1824 he returned home to find that honours long unjustly withheld were awaiting him. In that year he was made an associate of the Royal Academy, and in 1828 he was promoted to the full dignity of an Academician. In the interval between these dates he had produced the "Combat (Woman interceding for the Vanquished)," and the first of the series of three pictures on the subject of Judith, both of which ultimately came into the possession of the Scottish Academy. Etty's career was from this time one of slow but uninterrupted success. In 1830 he again crossed the channel with the view to another art tour through the continent; but he was overtaken in Paris by the insurrection of the Three Days, and was so much shocked by the sights he was compelled to witness in that time that he returned home with all convenient speed. During the next ten years of his life the zeal and unabated assiduity of his studies were not at all diminished. He was a constant attendant at the Academy Life School, where he used to work regularly along with the students, notwithstanding the remonstrances of some of his fellow-Academicians, who thought the practice undignified. The course of his studies was only interrupted by occasional visits to his native city, and to Scotland, where he was welcomed with the utmost enthusiasm, and *fêted* with the most gratifying heartiness by his brother-artists at Edinburgh. On the occasion of one of these visits he gave the finishing touches to his trio of Judiths. In 1840, and again in 1841, Etty undertook a pilgrimage to the Netherlands, to seek and examine for himself the masterpieces of Rubens in the churches and public galleries there. Two years later he once more visited France with a view to collecting materials for what he called "his last epic," his famous picture of "Joan of Arc." This subject, which would have tasked to the full even his great powers in the prime and vigour of manhood, proved almost too serious an undertaking for him in his old age. It exhibits, at least, amid great excellences, undeniable proofs of decay on the part of the painter; yet it brought a higher price than any of his earlier and more perfect works, £2500. In 1848, after completing this work, he retired to York, having realized a comfortable independence. One wish alone remained for him now to gratify; he desired to see a "gathering" of his pictures. With much difficulty and exertion he was enabled to assemble the great majority of them from various parts of the British Islands; and so numerous were they that the walls of the large hall he engaged in London for their exhibition were nearly covered. This took place in the summer of 1849; on the 13th of November of that same year he died. He received the honours of a public funeral in his native city.

Etty holds a secure place among English artists. His drawing was frequently incorrect, but in feeling and skill as a colourist he has few equals. His most conspicuous defects as a painter were the result of insufficient general culture and narrowness of sympathy.

See Etty's autobiography, published in the *Art Journal* for 1849, and the *Life of William Etty, R.A.*, by Gilchrist (2 vols., 1855).

ETYMOLOGY (Gr. *ἔτυμος*, true, and *λόγος*, account), that part or branch of the science of linguistics which deals with the origin or derivation of words. The Greek word *ἔτυμος*, in so far as it was applied to words, referred to the real underlying meaning rather than to the origin. It was the Stoics who asserted that the discovery of *τὸ ἔτυμον* would explain the essence of the things and ideas represented by words. Plato in the *Cratylus* makes a nearer approach to the modern view when he connects, *e.g.* *γυνή*, woman, with *γονή*, seed, while he jests at such etymological feats as the derivation of *οὐρανός*, heaven, *ἀπὸ τοῦ ὁρᾶν τἄ ἄνω*, from looking at things above, or *ἄνθρωπος*, man, from *ὁ ἀναθρῶν ἃ ὄπωπεν*, he who looks up at what he sees. Until the comparative study of philology and the development of the laws underlying phonetic changes, the derivation of words was a matter mostly of guess-work, sometimes right but more often wrong, based on superficial resemblances of form and the like. This popular etymology, to which the Germans have given the name *Volksetymologie* or folk-etymology, has had much influence in the form which words take (*e.g.* "crawfish" or "crayfish," from the French *crevis*, modern *écrevisse*, or "sand-blind," from *samblind*, *i.e.* semi-, half-blind), and has frequently been the occasion of homonyms. W. W. Skeat has embodied in certain canons or rules some well-known principles which should be observed in giving the etymology of a word; these may be usefully given here: "(1) Before attempting an etymology, ascertain the earliest form and use of the word, and observe chronology. (2) Observe history and geography; borrowings are due to actual contact. (3) Observe phonetic laws, especially those which regulate the mutual relation of consonants in the various Aryan languages, at the same time comparing the vowel sounds. (4) In comparing two words, A and B, belonging to the same language, of which A contains the lesser number of syllables, A must be taken to be the more original word, unless we have evidence of contraction or other corruption. (5) In comparing two words, A and B, belonging to the same language and consisting of the same number of syllables, the older form can usually be distinguished by observing the sound of the principal vowel. (6) Strong verbs, in the Teutonic languages, and the so-called "irregular verbs" in Latin, are commonly to be considered as primary, other related forms being taken from them. (7) The whole of a word, and not a portion only, ought to be reasonably accounted for; and, in tracing changes of form, any infringement of phonetic laws is to be regarded with suspicion. (8) Mere resemblances of form and apparent connexion in sense between languages which have different phonetic laws or no necessary connexion are commonly a delusion, and are not to be regarded. (9) When words in two different languages are more nearly alike than the ordinary phonetic laws would allow, there is a strong probability that one language has borrowed the word from the other. Truly cognate words ought not to be *too much* alike. (10) It is useless to offer an explanation of an English word which will not *also* explain all the cognate forms" (Introduction to *Etymological Dictionary of the English Language*, 1898).

An English word is either "the extant formal representative or direct phonetic descendant of an earlier (Teutonic) word, or it has been *adopted* or *adapted* from some foreign language," adoption being a popular, and adaptation being a literary or learned process; finally, there is *formation*, *i.e.* the "combination of existing words (foreign or native) or parts of words with each other or with living formatives, *i.e.* syllables which no longer exist as separate words, but yet have an appreciable signification which they impart to the new product" (see Introduction to the Oxford *New English Dictionary*, p. xx). A further classification of words according to their origin is that into (1) naturals, *i.e.* purely native words, like "mother," "father," "house"; (2) those which become perfectly naturalized, though of foreign origin, like "cat," "mutton," "beef"; (3) denizens, words naturalized in usage but keeping the foreign pronunciation, spelling and inflections, *e.g.* "focus," "camera"; (4) aliens, words for foreign things, institutions, offices, &c., for which there is no English equivalent, *e.g.*, *menu*, *table d'hôte*, *impi*, *lakh*, *mollah*, *tarbush*; (5) casuals, *e.g.*, *bloc*, *Ausgleich*, *sabotage*, differing only from "aliens" in their temporary use. The full etymology of a word should include the phonetic descent, the source of the word, whether from a native or from a foreign origin, and, if the latter, whether by adoption or adaptation, or, if a *formed* word, the origin of the parts which go to make it up. In the present edition of the *Encyclopaedia Britannica* such full etymologies, which would be necessary and in place in an etymological dictionary, have not been given in every instance, but brief etymological notes are appended, showing in outline the sources and history, and in many cases the development in meaning. (See also DICTIONARY.)

EU, a town of north-western France, in the department of Seine-Inférieure, on the river Bresle, 64 m. N.N.E. of Rouen on the Western railway, and 2 m. E.S.E. of Le Tréport, at the mouth of the Bresle, which is canalized between the two towns. Pop. (1906) 4865. The extensive forest of Eu lies to the south-east of the town. Eu has three buildings of importance—the beautiful Gothic church of St Laurent (12th and 13th centuries) of which the exterior of the choir with its three tiers of ornamented buttressing and the double arches between the pillars of the nave are architecturally notable; the chapel of the Jesuit college (built about 1625), in which are the tombs of Henry, third duke of Guise, and his wife, Katherine of Cleves; and the château. The latter was begun by Henry of Guise in 1578, in place of an older château burnt by Louis XI. in 1475 to prevent its capture by the English. It was continued by Mademoiselle de Montpensier in the latter half of the 17th century, and restored by Louis Philippe who, in 1843 and 1845, received Queen Victoria within its walls. In 1902 the greater part of the building was destroyed by fire. The town has a tribunal of commerce and a communal college, flour-mills, manufactories of earthenware, biscuits, furniture, casks, and glass and brick works; the port has trade in grain, timber, hemp, flax, &c.

Eu (Augusta) was in existence under the Romans. The first line of its counts, supposed to be descended from the dukes of Normandy, had as heiress Alix (died 1227), who married Raoul (Ralph) de Lusignan, known as the Sire d'Issoudun from his lordship of that name. Through their grand-daughter Marie, the countship of Eu passed by marriage to the house of Brienne, two members of which, both named Raoul, were constables of France. King John confiscated the countship in 1350, and gave it to John of Artois (1352). His great-grandson, Charles, son of Philip of Artois, count of Eu, and Marie of Berry, played a conspicuous part in the Hundred Years' War. He was taken prisoner at the battle of Agincourt (1415), and remained in England twenty-three years, in accordance with the dying injunctions of Henry V. that he was not to be let go until his son, Henry VI., was of age to govern his dominions. He accompanied Charles VII. on his campaigns in Normandy and Guyenne, and was made lieutenant-general of these two provinces. It was he who effected a reconciliation between the king and the dauphin after the revolt of the latter. He was created a peer of France in 1458, and made governor of Paris during the war of the League of the Public Weal (1465). He died on the 15th of July 1472 at the age of about seventy-eight, leaving no children. His sister's son, John of Burgundy, count of Nevers, now received the countship, which passed through heiresses, in the 15th century, to the house of Cleves, and to that of Lorraine-Guise. In 1660 Henry II. of Lorraine, duke of Guise, sold it to "Mademoiselle," Anne Marie Louise d'Orléans, duchesse de Montpensier (*q.v.*), who made it over (1682) to the duke of Maine, bastard son of Louis XIV., as part of the price of the release of her lover Lauzun. The second son of the duke of Maine, Louis Charles de Bourbon (1701–1775), bore the title of count of Eu. In 1755 he inherited from his elder brother, Louis Auguste de Bourbon (1700–1755), prince de Dombes, great estates, part of which he sold to the king. The remainder, which was still considerable, passed to his cousin the duke of Penthièvre. These estates were confiscated at the Revolution; but at the Restoration they were bestowed by Louis XVII. on the duchess-dowager of Orléans who, in 1821, bequeathed them to her son, afterwards King Louis Philippe. They were again confiscated in 1852, but were restored to the Orleans family by the National Assembly after the Franco-German War. The title of count of Eu was revived in the 19th century in favour of the eldest son of the duke of Nemours, second son of King Louis Philippe.

EUBOEA (pronounced *Evvia* in the modern language), EURIPOS, or NEGROPONT, the largest island of the Grecian archipelago. It is separated from the mainland of Greece by the Euboic Sea. In general outline it is long and narrow; it is about 90 m. long, and varies in breadth from 30 m. to 4. Its general direction is from N.W. to S.E., and it is traversed throughout its length by a mountain range, which forms part of the chain that bounds Thessaly on the E., and is continued south of Euboea in the lofty islands of Andros, Tenos and Myconos. The principal peaks of this range are grouped in three knots which divide the island into three portions. Towards the north, opposite the Locrian territory, the highest peaks are Mts. Gaetsades (4436 ft.) and Xeron (3232 ft.). The former was famed in ancient times for its medicinal plants, and at its foot are the celebrated hot springs, near the town of Aedepsus (mod. Lipsos), called the Baths of Heracles, used, we are told, by the dictator L. Cornelius Sulla, and still frequented by the Greeks for the cure of gout, rheumatism and digestive disorders. These springs, strongly sulphurous, rise a short distance inland at several points, and at last pour steaming over the rocks, which they have yellowed with their deposit, into the Euboic Sea. Opposite the entrance of the Maliac Gulf is the promontory of Cenaeum, the highest point (2221 ft.) behind which is now called Lithada, a corruption of Lichades, the ancient name of the islands off the extremity of the headland. Here again we meet with the legends of Heracles, for this cape, together with the neighbouring coast of Trachis, was the scene of the events connected with the death of that hero, as described by Sophocles in the *Trachiniae*. Near the north-east extremity of the island, and almost facing the entrance of the Gulf of Pagasae, is the promontory of Artemisium, celebrated for the great naval victory gained by the Greeks over the Persians, 480 B.C. Towards the centre, to the N.E. of Chalcis, rises the highest of its mountains, Dirphys or Dirphe, now Mount Delphi (5725 ft.), the bare summit of which is not entirely free from snow till the end of May, while its sides are clothed with pines and firs, and lower down with chestnuts and planes. It is one of the most conspicuous summits of eastern Greece, and from its flanks the promontory of Chersonesus projects into the Aegean. At the southern extremity the highest mountain is Ocha, now called St Elias (4830 ft.).

The south-western promontory was named Geraestus, the south-eastern Caphareus; the latter, an exposed point, attracts the storms, which rush between it and the neighbouring cliffs of Andros as through a funnel. The whole of the eastern coast is rocky and destitute of harbours, especially the part called Coela, or "the Hollows," where part of the Perisan fleet was wrecked. So greatly was this dreaded by sailors that the principal line of traffic from the north of the Aegean to Athens used to pass by Chalcis and the Euboic Sea.

Euboea was believed to have originally formed part of the mainland, and to have been separated from it by an earthquake. This is the less improbable because it lies in the neighbourhood of a line of earthquake movement, and both from Thucydides and from Strabo we hear of the northern part of the island being shaken at different periods, and the latter writer speaks of a fountain at Chalcis being dried up by a similar cause, and a mud volcano formed in the neighbouring plain. Evidences of volcanic action are also traceable in the legends connected with Heracles at Aedepsus and Cenaeum, which here, as at Lemnos and elsewhere in Greece, have that origin. Its northern extremity is separated from the Thessalian coast by a strait, which at one point is not more than a mile and a half in width. In the neighbourhood of Chalcis, both to the north and the south, the bays are so confined as readily to explain the story of Agamemnon's fleet having been detained there by contrary winds. At Chalcis itself, where the strait is narrowest, it is called the Euripus, and here it is divided in the middle by a rock, on which formerly a castle stood. The channel towards Boeotia, which is now closed, is spanned by a stone bridge. The other, which is far the deeper of the two, is crossed by an iron swing-bridge, allowing for the passage of vessels. This bridge, which dates from 1896, replaced a smaller wooden swing-bridge erected in 1856. The extraordinary changes of tide which take place in this passage have been a subject of wonder from classical times. At one moment the current runs like a river in one direction, and shortly afterwards with equal velocity in the other. Strabo speaks of it as varying seven times in the day, but it is more accurate to say, with Livy, that it is irregular. A bridge was first constructed here in the twenty-first year of the Peloponnesian War, when Euboea revolted from Athens; and thus the Boeotians, whose work it was, contrived to make that country "an island to every one but themselves." The Boeotians by this means secured a powerful weapon of offence against Athens, being able to impede their supplies of gold and corn from Thrace, of timber from Macedonia, and of horses from Thessaly. The name Euripus was corrupted during the middle ages into Evripo and Egripo, and in this latter form transferred to the whole island, whence the Venetians, when they occupied the district, altered it to Negroponte, referring to the bridge which connected it with the mainland.

The rivers of Euboea are few in number and scanty in volume. In the north-eastern portion the Budorus flows into the Aegean, being formed by two streams which unite their waters in a small plain, and were perhaps the Cereus and Neleus concerning which the story was told that sheep drinking the water of the one became white, of the other black. On the north coast, near Histiaea, is the Callas; and on the western side the Lelantus, near Chalcis, flowing through the plain of the same name. This plain, which intervenes between Chalcis and Eretria, and was a fruitful source of contention to those cities, is the most considerable of the few and small spaces of level ground in the island, and was fertile in corn. Aristotle, when speaking of the aristocratic character of the horse, as requiring fertile soil for its support, and consequently being associated with wealth, instances its use among the Chalcidians and Eretrians, and in the former of those two states we find a class of nobles called *Hippobotae*. This rich district was afterwards occupied by Athenian cleruchs. The next largest plain was that of Histiaea, and at the present day this and the neighbourhood of the Budorus (Ahmet-Aga) are the two best cultivated parts of Euboea, owing to the exertions of foreign colonists. The mountains afford excellent pasturage for sheep and cattle, which were reared in great quantities in ancient times, and seem to have given the island its name; these pastures belonged to the state. The forests are extensive and fine, and are now superintended by government officials, called δασοφύλακες, in spite or with the connivance of whom the timber is being rapidly destroyed—partly from the merciless way in which it is cut by the proprietors, partly from its being burnt by the shepherds, for the sake of the rich grass that springs up after such conflagrations, and partly owing to the goats, whose bite kills all the young growths. In the mountains were several valuable mines of iron and copper; and from Karystos, at the south of the island, came the green and white marble, the modern Cipollino, which was in great request among the Romans of the imperial period for architectural purposes, and the quarries of which belonged to the emperor. The scenery of Euboea is perhaps the most beautiful in Greece, owing to the varied combinations of rock, wood and water; for from the uplands the sea is almost always in view, either the wide island-studded expanse of the Aegean, or the succession of lakes formed by the Euboic Sea, together with mountains of exquisite outline, while the valleys and maritime plains are clothed either with fruit trees or with plane trees of magnificent growth.

On the other hand, no part of Greece is so destitute of interesting remains of antiquity as Euboea. The only site which has attracted archaeologists is that of Eretria (*q.v.*), which was excavated by the American School of Athens in 1890–1895.

Like most of the Greek islands, Euboea was originally known under other names, such as Macris and Doliche from its shape, and Ellopia and Abantis from the tribes inhabiting it. The races by which it was occupied at an early period were different in the three districts, into which, as we have seen, it was naturally divided. In the northern portion we find the Histiaei and Ellopes, Thessalian races, which probably had passed over from the Pagasaean Gulf. In central Euboea were the Curetes and Abantes, who seem to have come from the neighbouring continent by way of the Euripus; of these the Abantes, after being reinforced by Ionians from Attica, rose to great power, and exercised a sort of supremacy over the whole island, so that in Homer the inhabitants generally are called by that name. The southern part was occupied by the Dryopes, part of which tribe, after having been expelled from their original seats in the south of Thessaly by the Dorians, migrated to this island, and established themselves in the three cities of Karystos, Dystos and Styra. The population of Euboea at the present day is made up of elements not less various, for many of the Greek inhabitants seem to have immigrated, partly from the mainland, and partly from other islands; and besides these, the southern portion is occupied by Albanians, who probably have come from Andros; and in the mountain districts nomad Vlach shepherds are found.

History.—The history of the island is for the most part that of its two principal cities, Chalcis and Eretria, the latter of which was situated about 15 m. S.E. of the former, and was also on the shore of the Euboic Sea. The neighbourhood of the fertile Lelantian or Lelantine plain, and their proximity to the place of passage to the mainland, were evidently the causes of the choice of site, as well as of their prosperity. Both cities were Ionian settlements from Attica, and their importance in early times is shown by their numerous colonies in Magna Graecia and Sicily, such as Cumae, Rhegium and Naxos, and on the coast of Macedonia, the projecting portion of which, with its three peninsulas, hence obtained the name of Chalcidice. In this way they opened new trade routes to the Greeks, and extended the field of civilization. How great their commerce was is shown by the fact that the Euboic scale of weights and measures was in use at Athens (until Solon, *q.v.*) and among the Ionic cities generally. They were rival cities, and at first appear to have been equally powerful; one of the earliest of the sea-fights mentioned in Greek history took place between them, and in this we are told that many of the other Greek states took part. It was in consequence of the aid which the people of Miletus lent to the Eretrians on this occasion that Eretria sent five ships to aid the Ionians in their revolt against the Persians (see IONIA); and owing to this, that city was the first plac in Greece proper to be attacked by Datis and Artaphernes in 490 B.C. It was utterly ruined on that occasion, and its inhabitants were transported to Persia. Though it was restored after the battle of Marathon, on a site at a little distance from its original position, it never regained its former eminence, but it was still the second city in the island. From this time its neighbour Chalcis, which, though it suffered from a lack of good water, was, as Strabo says, the natural capital from its commanding the Euripus, held an undisputed supremacy. Already, however, this city had suffered from the growing power of Athens. In the year 506, when the Chalcidians joined with the Boeotians and the Spartan king Cleomenes in a league against that state, they were totally defeated by the Athenians, who established 4000 Attic settlers (see Cleruchy) on their lands, and seem to have reduced the whole island to a condition of dependence. Again, in 446, when Euboea endeavoured to throw off the yoke, it was once more reduced by Pericles, and a new body of settlers was planted at Histiaea in the north of the island, after the inhabitants of that town had been expelled. This event is referred to by Aristophanes in the *Clouds* (212), where the old farmer, on being shown Euboea on the map " lying outstretched in all its length," remarks,—" I know; we laid it prostrate under Pericles." The Athenians fully recognized its importance to them, as supplying them with corn and cattle, as securing their commerce, and as guaranteeing them against piracy, for its proximity to the coast of Attica rendered it extremely dangerous to them when in other hands, so that Demosthenes, in the *De corona*, speaks of a time when the pirates that made it their headquarters so infested the neighbouring sea as to prevent all navigation. But in the 21st year of the Peloponnesian war the island succeeded in regaining its independence. After this we find it taking sides with one or other of the leading states, until, after the battle of Chaeronea, it passed into the hands of Philip II. of Macedon, and finally into those of the Romans. By Philip V. of Macedon Chalcis was called one of the three fetters of Greece, Demetrias on the Gulf of Pagasae and Corinth being the other two.

In modern history Euboea or Negropont comes once more prominently into notice at the time of the fourth crusade. In the partition of the Eastern empire by the Latins which followed that event the island was divided into three fiefs, the occupants of which ere long found it expedient to place themselves under the protection of the Venetian republic, which thenceforward became the sovereign power in the country. For more than two centuries and a half during which the Venetians remained in possession, it was one of the most valuable of their dependencies, and the lion of St Mark may still be seen, both over the sea gate of Chalcis and in other parts of the town. At length in 1470, after a valiant defence, this well-fortified city was wrested from them by Mahommed II., and the whole island fell into the hands of the Turks. One desperate attempt to regain it was made by Francesco Morosini (d. 1694) in 1688, when the city was besieged by land and sea for three months; but owing to the strength of the place, and the disease which thinned their ranks, the assailants were forced to withdraw. At the conclusion of the Greek War of Independence, in 1830, the island was delivered from the Turkish sway, and constituted a part of the newly established Greek state. Euboea at the present time produces a large amount of grain, and its mineral wealth is also considerable, great quantities of magnesia and lignite being exported. In 1899 it was constituted a separate *nome* (pop. 1907, 116,903).

Bibliography.—H. N. Ulrichs, *Reisen und Forschungen in Griechenland*, vol. ii. (Berlin, 1863); C. Bursian, *Geographie von Griechenland*, vol. ii. (Leipzig, 1872); C. Neumann and J. Partsch, *Physikalische Geographie von Griechenland* (Breslau, 1885); Baedeker's *Greece* (3rd ed., Leipzig, 1905); for statistics see Greece: *Topography*. (H. F. T.)

EUBULIDES, a native of Miletus, Greek philosopher and successor of Eucleides as head of the Megarian school. Nothing is known of the events of his life. Indirect evidence shows that he was a contemporary of Aristotle, whom he attacked with great bitterness. There was also a tradition that Demosthenes was one of his pupils. His name has been preserved chiefly by some celebrated, though false and captious, syllogisms of which he was the reputed author. Though mainly examples of verbal quibbling, they serve to show the difficulties of language and of explaining the relations of sense-given impressions. Eubulides wrote a treatise on Diogenes the Cynic and also a number of comedies. (See Megarian School of Philosophy.)

EUBULUS, of Anaphlystus, Athenian demagogue during the time of Demosthenes. He was a persistent opponent of that statesman, and was chiefly instrumental in securing the acquittal of Aeschines (who had been his own clerk) when accused of treachery in connexion with the embassy to Philip of Macedon. Eubulus took little interest in military affairs, and was (at any rate at first) a strong advocate of peace at any price. He devoted himself to matters of administration, especially in the department of finance, and although he is said to have increased the revenues and to have done real service to his country, there is no doubt that he took advantage of his position to make use of the material forces of the state for his own aggrandizement. His proposal that any one who should move that the Theoric Fund should be applied to military purposes should be put to death may have gained him the goodwill of the people, but it was not in the true interest of the state. Later, Eubulus himself seems to have recognized this, and to have been desirous of modifying or repealing the regulation, but it was too late; Athens had lost all feelings of patriotism; cowardly and indolent, she rivalled even Tarentum in her luxury and extravagance (Theopompus in Athenaeus iv. p. 166). As one of the chief members of an embassy to Philip, Eubulus allowed himself to be won over, and henceforth did his utmost to promote the cause of the Macedonian. The indignant remonstrances of Demosthenes failed to weaken Eubulus's hold on the popular favour, and after his death (before 330) he was distinguished with special honours, which were described by Hypereides in a speech (Περὶ τῶν Εὐβούλου δωρεῶν) now lost. Eubulus was no doubt a man of considerable talent and reputation as an orator, but none of his speeches has survived, nor is there any appreciation of them in ancient writers. Aristotle (*Rhetoric*, i. 15. 15) mentions a speech against Chares, and Theopompus (in his *Philippica*) had given an account of his life, extracts from which are preserved in Harpocration.

See Demosthenes, *De corona*, pp. 232, 235; *De falsa legatione*, pp. 434, 435, 438; *Adversus Leptinem*, p. 498; *In Midiam*, pp. 580, 581; Aeschines, *De falsa legatione, ad fin.*; Index to C. W. Müller's *Oratores Attici*; A. D. Schäfer, *Demosthenes und seine Zeit* (1885).

EUBULUS, Athenian poet of the Middle comedy, flourished about 370 B.C. Fragments from about fifty of the 104 plays attributed to him are preserved in Athenaeus. They show that he took little interest in political affairs, but confined himself chiefly to mythological subjects, ridiculing, when opportunity offered, the bombastic style of the tragedians, especially Euripides. His language is pure, and his versification correct.

Fragments in T. Kock, *Comicorum Atticorum fragmenta*, ii. (1884).

EUCALYPTUS, a large genus of trees of the natural order Myrtaceae, indigenous, with a few exceptions, to Australia and Tasmania. In Australia the Eucalypti are commonly called " gum-trees " or " stringy-bark trees," from their gummy or resinous products, or fibrous bark. The genus, from the evidence of leaf-remains, appears to have been represented by several species in Eocene times. The leaves are leathery in texture, hang obliquely or vertically, and are studded with glands which contain a fragrant volatile oil. The petals cohere to form a cap[1] which is discarded when the flower expands. The fruit is surrounded by a woody cup-shaped receptacle and contains very numerous minute seeds. The Eucalypti are rapid in growth, and many species are of great height, *E. amygdalina*, the tallest known tree, attaining to as much as 480 ft., exceeding in height the Californian big-tree (*Sequoia gigantea*), with a diameter of 81 ft. *E. globulus*, so called from the rounded form of its cap-like corolla, is the blue gum tree of Victoria and Tasmania. The leaves of trees from three to five years of age are large, sessile and of a glaucous-white colour, and grow horizontally;

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[1] Whence the name (εὐκάλυπτος, well-covered) given by L'Héritier, 1788.

those of older trees are ensiform, 6–12 in. long, and bluish-green in hue, and are directed downwards. The flowers are single or in clusters, and nearly sessile. This species is one of the largest trees in the world, and attains a height of 375 ft. Since 1854 it has been successfully introduced into the south of Europe, Algeria, Egypt, Tahiti, New Caledonia, Natal and India, and has been extensively planted in California, and, with the object of lessening liability to droughts, along the line of the Central Pacific railway. It would probably thrive in any situation having a mean annual temperature not below 60° F., but it will not endure a temperature of less than 27° F. Its supposed property of reducing the amount of malaria in marshy districts is attributable to the drainage effected by its roots, rather than to the antiseptic exhalations of its leaves. To the same cause also is ascribed the gradual disappearance of mosquitoes in the neighbourhood of plantations of this tree, as at Lake Fezara, in Algeria. Since about 1870, when the tree was planted in its cloisters, the monastery of St Paolo a la trè Fontana has become habitable throughout the year, although situated in one of the most fever-stricken districts of the Roman Campagna. An essential oil is obtained by aqueous distillation of the leaves of this and other species of *Eucalyptus*, which is a colourless or straw-coloured fluid when freshly prepared, with a characteristic odour and taste, of sp. gr. 0.910 to 0.930, and soluble in its own weight of alcohol. This consists of many different bodies, the most important of which is eucalyptol, a volatile oil, which constitutes about 70%. This is the portion of eucalyptus oil which passes over between 347° and 351° F., and crystallizes at 30° F. It consists chiefly of a terpene and cymene. Eucalyptus oil also contains, after exposure to the air, a crystallizable resin derived from eucalyptol. The dose of the oil is ½ to 3 minims. Eucalyptol may be given in similar doses, and is preferable for purposes of inhalation. The oil derived from *E. amygdalina* contains a large quantity of phellandrene, which forms a crystalline nitrate, and is very irritating when inhaled. The oils from different species of *Eucalyptus* vary widely in composition.

Eucalyptus oil is probably the most powerful antiseptic of its class, especially when it is old, as ozone is formed in it on exposure to air. Internally it has the typical actions of a volatile oil in marked degree. Like quinine, it arrests the normal amoeboid movements of the polymorphonuclear leucocytes, and has a definite antiperiodic action; but it is a very poor substitute for quinine in malaria. In large doses it acts as an irritant to the kidneys, by which it is largely excreted, and as a marked nervous depressant, abolishing the reflex functions of the spinal cord and ultimately arresting respiration by its action on the medullary centre. An emulsion, made by shaking up equal parts of the oil and powdered gum-arabic with water, has been used as a urethral injection, and has also been given internally in drachm doses in pulmonary tuberculosis and other microbic diseases of the lungs and bronchi. The oil has somehow acquired an extraordinary popular reputation in influenza, but there is no evidence to show that it has any marked influence upon this disease or that its use tends to lessen the chances of infection. It has been used as an antiseptic by surgeons, and is an ingredient of "catheter oil," used for sterilizing and lubricating urethral catheters, now that carbolic oil, formerly employed, has been shown to be practically worthless as an antiseptic. *Eucalyptus rostrata* and other species yield eucalyptus or red gum, which must be distinguished from Botany Bay kino. Red gum is very powerfully astringent and is given internally, in doses of 2 to 5 grains, in cases of diarrhoea and pharyngeal inflammation. It is prepared by the pharmacist in the form of tinctures, insufflations, syrups, lozenges, &c. Red gum is official in Great Britain. *E. globulus*, *E. resinifera*, and other species, yield what is known as Botany Bay kino, an astringent dark-reddish amorphous resin, which is obtained in a semi-fluid state by making incisions in the trunks of the trees. The kino of *E. gigantea* contains a notable proportion of gum. J. H. Maiden enumerates more than thirty species as kino-yielding. From the leaves and young bark of *E. mannifera* and *E. viminalis* is procured Australian manna, a hard, opaque, sweet substance, containing melitose. On destructive distillation the leaves yield much gas, 10,000 cub. ft. being obtained from one ton. The wood is extensively used in Australia as fuel, and the timber is of remarkable size, strength and durability. Maiden enumerates nearly 70 species as timber-yielding trees including *E. amygdalina*, the wood of which splits with remarkable facility, *E. botryoides*, hard, tough and durable and one of the finest timbers for shipbuilding, *E. diversicolor* or "karri," *E. globulus*, *E. leucoxylon* or ironbark, *E. marginata* or "jarrah" (see Jarrah Wood), *E. obliqua*, *E. resinifera*, *E. siderophloia* and others. The timber is often very hard, tough and durable, and useful for shipbuilding, building, fencing, planks, &c. The bark of different species of *Eucalyptus* has been used in paper-making and tanning, and in medicine as a febrifuge.

For further details see Baron von Müller's monograph of the genus, *Eucalyptographia* (Melbourne, 1879–1884); J. H. Maiden, *Useful Native Plants of Australia* (1889).

EUCHARIS, in botany, a genus of the natural order Amaryllidaceae, containing a few species, natives of Columbia. *Eucharis amazonica* or *grandiflora* is the best-known and most generally cultivated species. It is a bulbous plant with broad stalked leaves, and an erect scape 1½ to 2 ft. long, bearing an umbel of three to ten large white showy flowers. The flowers resemble the daffodil in having a prominent central cup or corona, which is sometimes tinged with green. It is propagated by removing the offsets, which may be done in spring, potting them singly in 6-in. pots. It requires good loamy soil, with sand enough to keep the compost open, and should have a good supply of water and a temperature of 65° to 70° during the night, with a rise of 8° or 10° in the day. During summer growth is to be encouraged by repotting, but the plants should afterwards be slightly rested by removal to a night temperature of about 60°, water being withheld for a time, though they must not go too long dry, the plant being an evergreen. By the turn of the year they may again have more heat and more water, and this will probably induce them to flower. After this is over they may be shifted and grown again as before; and, as they get large, either be divided to form new plants or allowed to develop into nobler specimens. With a stock of the smaller plants to start them in succession, they may be had in flower all the year round. A few years ago the bulbs of *E. amazonica* were badly inflicted with a disease known as the Eucharis mite, and all kinds of remedies were tried without avail, although steeping in Condy's fluid appeared to give the best results. The disease appears to have died out again. Other species of Eucharis now met with in gardens are *E. Bakeriana*, *E. Mastersii*, *E. Lowii* and *E. Sanderii*. A remarkable hybrid was raised a few years ago between *Eucharis* and the allied genus *Urceolina*, to which the compound name *Urceocharis* was given.

EUCHARIST (Gr. εὐχαριστία, thanksgiving), in the Christian Church, one of the ancient names of the sacrament of the Lord's Supper or Holy Communion. The term εὐχαριστία was at first applied to the act of thanksgiving associated with the sacrament; later, so early as the 2nd century, to the objects, *e.g.* the sacramental bread and wine, for which thanks were given; and so to the whole celebration. The term *Mass*, which has the same connotation, is derived from the Lat. *missa* or *missio*, because the children and catechumens, or unbaptized believers, were dismissed before the eucharistic rite began. Other names express various aspects of the rite: Communion (Gr. κοινωνία), the fellowship between believers and union with Christ; *Lord's Supper*, so called from the manner of its institution; *Sacrament* as a consecration of material elements; the *Mystery* (in Eastern churches) because only the initiated participated; the *Sacrifice* as a rehearsal of Christ's passion. In this article the history of the rite is first traced up to A.D. 200 in documents taken in their chronological order; differences of early and later usage are then discussed; lastly, the meaning of the original rite is examined.

St Paul (1 Cor. xi. 17-34) attests that the faithful met regularly in church, *i.e.* in religious meetings, to eat the dominical or Lord's Supper, but that this aim was frustrated by some who ate up their provisions before others, so that the poor were left hungry while the rich got drunk; and the meetings were animated less by a spirit of brotherhood and charity than of division and faction. He directs that, when they so meet, they shall wait for one another. Those who are too hungry to wait shall eat at home; and not put to shame those who have no houses (and presumably not enough food either), by bringing their viands to church and selfishly eating them apart.

It was therefore not the quantity or quality of the food eaten that constituted the meal a Lord's Supper; nor even the circumstances that they ate it "in church," as was assumed by those guilty of the practices here condemned; but only the pervading sense of brotherhood and love. The contrast lay between the *Dominical Supper* or food and drink shared unselfishly by all with all, and the *private supper*, the feast of Dives, shamelessly gorged under the eyes of timid and shrinking Lazarus. By way of enforcing this point Paul repeats the tradition he had received direct from the Lord, and already handed on to the Corinthians, of how "the Lord Jesus on the night in which he was betrayed" (not necessarily the night of Passover) "took bread and having given thanks brake it and said, This is my body, which is for your sake; this do in remembrance of me. In like manner also the cup, after supper, saying, This cup is the new covenant through my blood: this do, as oft as ye drink it, in remembrance of me." Paul adds that this rite commemorated the Lord's death and was to be continued until he should come again, as in that age they expected him to do after no long interval: "As often as ye eat this bread and drink the cup, ye do (or ye shall) proclaim the Lord's death till he come."

The same epistle (x. 17) attests that one loaf only was broken and distributed: "We who are many, are one loaf (or bread), one body; for we all partake of the one loaf (or bread)." As a single loaf could not satisfy the hunger of many, the rehearsal in these meals of Christ's own action must have been a crowning episode, enhancing their sanctity. The *Fractio Panis* probably began, as the drinking of the cup certainly ended, the supper; the interval being occupied with the common consumption by the faithful of the provisions they brought. This much is implied by the words "after supper." If, in any case, all present had eaten in their homes beforehand, the giving of the cup would immediately follow on the breaking and eating of the one loaf, but Paul's words indicate that the common meal within the church was the norm. Those who ate at home marked themselves out as both greedy and lacking in charity. There is no demand that they should come fasting, or Paul could not recommend in (xi. 34) that those who were too hungry to wait until all the brethren were assembled in church, should eat at home and beforehand.

Mark xiv. 22-25, Matt. xxvi. 26-29, Luke xxii. 14-20, are, in order of time, our next accounts, Mark representing the oldest tradition. They all in substance repeat Paul's account; but identify the night on which Jesus was betrayed with that of the Pascha. In Matthew and Mark, Jesus says of the bread "Take ye it, this is my body," omitting the idea of sacrifice imported by Paul's addition "which is for you"; but in them Jesus enunciates the same idea when he says of the cup: "This is my blood of the covenant which is poured out for many," Mathew adding "for the remission of sins," a phrase which savours of Heb. ix. 22: "apart from the shedding of blood there is no remission." It is a later addition, and so may be the words "which is poured out for many." But the words which follow have an antique ring: "Amen, I say unto you, I will no more drink of the fruit of the vine, until that day when I drink it new in the kingdom of God." For here Jesus affirms his conviction, in view of his impending death, which unlike his disciples he foresaw, that, when the kingdom of God is instituted on earth, he will take his place in it. But this is the last time he will sit down upon earth with his disciples at the table of the millenarist hope. These sources do not hint that the Last Supper is to be repeated by Christ's followers until the advent of the kingdom. Luke's account is too much interpolated from Paul, and the texts of his oldest MSS. too discrepant, for us to rely on it except so far as it supports the other gospels. It emphasizes the fact that the Last Supper was the Pascha. "With desire have I desired to eat this Passover, before I suffer"; and places the bread after the wine, unless indeed the Pauline interpolation comprises the whole of verse 19.

The fourth gospel, written perhaps A.D. 90–100, sublimates the rite, in harmony with its general treatment of the life of Jesus: "I am the living bread which cometh down out of heaven, that a man may eat thereof and not die" (John vi. 51). As in 1 Cor. x. the flesh of Christ is contrasted with the manna which saved not the Jews from death, so here the latter ask: "How can this man give us his flesh to eat?" and Jesus answers: "Amen, Amen I say unto you, Except ye eat the flesh of the Son of Man and drink his blood, ye have not life in yourselves. . . . He that eateth my flesh and drinketh my blood abideth in me and I in him." In an earlier passage, again in reference to the manna, Jesus is called "the bread of God, which cometh down out of heaven, and giveth life unto the world." They ask: "Lord, ever more give us this bread," and he answers: "I am the bread of life: he that cometh to me shall not hunger, and he that believeth on me shall never thirst." This writer's thought is coloured by the older speculations of Philo, who in metaphor called the Logos the heavenly bread and food, the cupbearer and cup of God; and he seems even to protest against a literal interpretation of the words of institution, since he not only pointedly omits them in his account of the Last Supper, but in v. 63 of this chapter writes: "It is the Spirit that quickeneth; the flesh profiteth nothing: the *words* that I have spoken unto you are spirit and are life."

In Acts ii. 46 we read that, "the faithful continued steadfastly with one accord in the temple"; at the same time "breaking bread at home they partook of food with gladness and singleness of heart, praising God." All such repasts must have been sacred, but we do not know if they included the Eucharistic rite. The care taken in the selecting and ordaining of the seven deacons argues a religious character for the common meals, which they were to serve. Their main duty was to look after the duty of the Hellenistic widows, but inasmuch as meats strangled or consecrated to idols were forbidden, it probably devolved on the deacons to take care that such were not introduced at these common meals. The Essenes, similarly, appointed houses all over Palestine where they could safely eat, and priests of their own to prepare their food. Some Christians escaped the difficulties of their position by eating no meat at all. "He that is weak," says Paul (Rom. xiv. 1), "eateth herbs"; that is, becomes a vegetarian. Rather than scandalize weaker brethren, Paul was willing to eat herbs the rest of his life.

The travel-document in Acts often refers to the solemn breaking of bread. Thus Paul in xxvii. 35, having invited the ship's company of 276 persons to partake of food, took bread, gave thanks to God in the presence of all, and brake it and began to eat. The rest on board then began to be of good cheer, and themselves also took food. Here it is not implied that Paul shared his food except with his co-believers, but he ate before them all. Whether he repeated the words of institution we cannot say.

In Acts xx. 7 the faithful of Troas gather together to break bread "on the first day of the week" after sunset. After a discourse Paul, who was leaving them the next morning, broke bread and ate. This was surely such a meeting as we read of in 1 Cor. x., and was held on Sunday by night; but long before dawn, since after it Paul "talked with them a long while, even till break of day." In 1 Cor. xvi. 1 Paul bids the Corinthians, as he had bidden the churches of Galatia, lay up in store on the first of the week, each one of them, money for the poor saints of Jerusalem. This is the first notice of Sunday Eucharistic collections of alms for the poor.

Here seems to belong in the order of development the Cathar Eucharist (see CATHARS). The Cathars used only the Lord's prayer in consecrating the bread and used water for wine.

The next document in chronological order is the so-called Teaching of the Apostles (A.D. 90–110). This assigns prayers and rubrics for the celebration of the Eucharist:—

IX.

"1. Now with regard to the Thanksgiving, thus give ye thanks.

"2. First concerning the cup:—We give thanks to thee, our Father, for the holy vine[1] of David thy servant, which thou didst make known to us through Jesus thy servant;[2] to thee be the glory for ever.

"3. And concerning the broken bread:—We give thanks to thee, our Father, for the life and knowledge which thou didst make known to us through Jesus thy servant; to thee be the glory for ever.

"4. As this broken bread was (once) scattered on the face of the mountains and, gathered together, became one,[3] even so may thy Church be gathered together from the ends of the earth into thy kingdom; for thine is the glory and the power through Jesus Christ for ever.

"5. But let no one eat or drink of your Thanksgiving (Eucharist), but they who have been baptized into the name of the Lord; for concerning this the Lord hath said, Give not that which is holy unto the dogs.[4]

X.

"1. Then, after being filled, thus give ye thanks:—

"2. We give thanks to thee, holy Father, for thy holy name, which thou hast caused to dwell in our hearts, and for the knowledge and faith and immortality which thou didst make known to us through Jesus Christ thy servant; to thee be the glory for ever.

"3. Thou Almighty Sovereign, didst create all things for thy name's sake, and food and drink thou didst give to men for enjoyment, that they should give thanks unto thee; but to us thou didst of thy grace give spiritual food and drink and life eternal through thy servant.

"4. Before all things, we give thee thanks that thou art mighty; to thee be the glory for ever.

"5. Remember, Lord, thy church to deliver it from all evil, and to perfect it in thy love, and gather it together from the four winds,[5] the sanctified, unto thy kingdom, which thou hast prepared for it; for thine is the power and the glory for ever.

"6. Come grace, and pass this world away. Hosanna to the God of David! If any one is holy, let him come. If any one is not, let him repent. Maranatha.[6] Amen.

"But allow the prophets to give thanks as much as they will."

From a subsequent section, ch. xiv. 1, we learn that the Eucharist was on Sunday:—"Now when ye are assembled together on the Lord's day of the Lord, break bread and give thanks, having first confessed your transgressions, so that your sacrifice may be pure."

The above, like the uninterpolated Lucan account, places the cup first and has no mention of the body and blood of Christ. But in this last and other respects it contrasts with the other synoptic and with the Pauline accounts. The cup is not the *blood* of Jesus, but *the holy vine of David*, revealed through Jesus; and the holy vine can but signify the spiritual Israel, the *Ecclesia* or church or Messianic Kingdom, into which the faithful are to be gathered.

The one loaf, as in Paul, symbolizes the unity of the *ecclesia*, but the cup and bread, given for enjoyment, are symbols at best of the spiritual food and drink of the life eternal given of grace by the Almighty Father through his servant (lit. boy) Jesus. The bread and wine are indeed an offering to God of what is his own, pure because offered in purity of heart; but they are not interpreted of the sacrifice of Jesus' body broken on the cross, or of his blood shed for the remission of sin. It is not, as in Paul, a meal commemorative of Christ's death, nor connected with the Passover, as in the Synoptics. Least of all is it a sacramental eating of the flesh and drinking of the blood of Jesus, a perpetual renewal of kinship, physical and spiritual, with him. The teaching rather breathes the atmosphere of the fourth gospel, which sets the Last Supper before the feast of the Passover (xiii. 1), and pointedly omits Christ's institution of the Eucharist, substituting for it the washing of his disciples' feet. The blessing of the Bread and Cup, as an incident in a feast of Christian brotherhood, is all that the *Didache* has in common with Paul and the Synoptists. The use of the words "after being filled," in x. 1, implies that the brethren ate heartily, and that the cup and bread formed no isolated episode. The Baptized alone are admitted to this Supper, and they only after confession of their sins. Every Sunday at least they are to celebrate it. A prophet can "in the Spirit appoint a table," that is, order a Lord's Supper to be eaten, whenever he is warned by the Spirit to do so. But he must not himself partake of it—a very practical rule. The prophets are to give thanks as they like at these "breakings of bread," without being restricted to the prayers here set forth. In xv. 3 the overseers or bishops and deacons, though their functions are less spiritual than administrative and economic, are allowed to take the place of the prophets and teachers. The phrase used is *λειτουργεῖν τὴν λειτουργίαν*, "to liturgize the liturgy." This word "liturgy" soon came to connote the Eucharist. The prophets who normally preside over the Suppers are called "your high-priests," and receive from the faithful the first-fruits of the winepress and threshing-floor, of oxen and sheep, and of each batch of new-made bread, and of oil. Out of these they provide the Suppers held every Lord's day, offering them as "a pure sacrifice." Bishops and deacons hold a subordinate place in this document; but the contemporary Epistle of Clement of Rome attests that these bishops "had offered the gifts without blame and holily." The word "liturgy" is also used by Clement.

Pliny's Letter (Epist. 96), written A.D. 112 to the emperor Trajan, about the Christians of Bithynia, attests that on a fixed day, *stato die* (no doubt Sunday), they met before dawn and recited antiphonally a hymn "to Christ as to a god." They then separated, but met again later to partake of a meal, which, however, was of an ordinary and innocent character. Pliny regarded their meal as identical in character with the common meals of *hetairiae*, *i.e.* the trade-gilds or secret societies, which were then, as now, often inimical to the government. Even benefit societies were feared and forbidden by the Roman autocrats, and the "dominical suppers" of the Christians were not likely to be spared. Pliny accordingly forbade them in Bithynia, and the renegade Christians to whom he owed his information gave them up. These suppers included an Eucharist; for it was because the faithful ate in the latter of the flesh and blood of the Son of God that the charge of devouring children was made against them. If, then, this afternoon meal did not include it, Pliny's remark that their food was ordinary and innocent is unintelligible.

Ignatius, about A.D. 120, in his letter to the Ephesians, defines the one bread broken in the Eucharist as a "drug of immortality, and antidote that we should not die, but live for ever in Jesus Christ." He also rejects as invalid any Eucharist not held "under the bishop or one to whom he shall have committed it." For the Christian prophet has disappeared, and with him the custom of holding Eucharists in private dwellings.

In the Epistle to Diognetus, formerly assigned to Justin Martyr, we read (*v.* 7) that "Christians have in vogue among themselves a table common, yet not common" (*i.e.* unclean). In Justin's first apology (*c.* 140) we have two detailed accounts of the Eucharist, of which the first, in ch. 65, describes the first communion of the newly baptized:—

"After we have thus washed the person who has believed and conformed we lead him to the brethren so called, where they are gathered together, to offer public prayer both for ourselves and for the person illuminated, and for all others everywhere, earnestly, to the end that having learned the truth we may be made worthy to be found not only in our actions good citizens, but guardians of the things enjoined.

"We salute one another with a kiss at the end of the prayers. Then there is presented to the president of the brethren bread and a cup of water (and of a mixture,)[7] and he having taken it sends up praise and glory to the father of all things by the name of the Son and Holy Spirit, and he offers at length thanksgiving (*eucharistia*) for our having been made worthy of these things by him. But when he concludes the prayer and thanksgiving all the people present answer with acclamation 'Amen.' But the word 'Amen' in Hebrew signifies 'so be it.' And when the president has given thanks, and all the people have so answered, those who are called by us deacons distribute to each of those present, for them to partake of the bread (and wine)[8] and water, for which thanks have been given, and they carry portions away to those who are not present. And this food is called by us *Eucharistia*, and of it none may partake save those who believe our teachings to be true and have been washed in the bath which is for remission of sin and rebirth, and who so live as

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[1] Ps. lxxx. 8-19.
[2] Acts iv. 25, 27.
[3] 1 Cor. x. 17; Soph. iii. 10.
[4] Matt. vii. 6.
[5] Matt. xxiv. 31.
[6] 1 Cor. xvi. 22.
[7] We should probably omit the words bracketed.
[8] The codex Othcbonianus omits the words bracketed.

> Christ taught. For we do not receive these things as common bread or common drink. For as Jesus Christ our Saviour was made flesh by Word of God and possessed flesh and blood for our sake; so we have been taught that the food blessed (lit. thanked for) by prayer of Word spoken by him, food by which our blood and flesh are by change of it (into them) nourished, is both flesh and blood of Jesus so made flesh. For the apostles in the memorials made by them, which are called gospels, have so related it to have been enjoined on them: to wit, that Jesus took bread, gave thanks and said: This do ye in memory of me, this is my body, and the cup likewise he took and gave thanks and said, This is my blood; and he distributed to them alone. And this rite too the evil demons by way of imitation handed down in the mysteries of Mithras. For that bread and a cup of water is presented in the rites of their initiation with certain conclusions (*or* epilogues), you either know or can learn."

The second account, in ch. 67, adds that the faithful both of town and country met for the rite on Sunday, that the prophets were read as well as the gospels, that the president after the reading delivered an exhortation to imitate in their lives the goodly narratives; and that each brought offerings to the president out of which he aided orphans and widows, the sick, the prisoners and strangers sojourning with them. These contributions of the faithful seem to be included by Justin along with the bread and cup as sacrifices acceptable to God. But he also particularly specifies (Dialog. 345) that perfect and pleasing sacrifices alone consist in prayers and thanksgivings (*thusia*). The elements are *gifts* or *offerings*. Justin was a Roman, but may not represent the official Roman church. The rite as he pictures it agrees well with the developed liturgies of a later age.

Irenaeus (Gaul and Asia Minor, before 190) in his work *against heresies*, iv. 31, 4, points to the sacrament in proof that the human body may become incorruptible:

> " As bread from the earth on receiving unto itself the invocation of God is no longer common bread, but is an Eucharist, composed of two elements, an earthly and a heavenly, so our bodies by partaking of the Eucharist cease to be corruptible, and possess the hope of eternal resurrection."

There is a similar passage in the 36th fragment (ed. Harvey ii. p. 500), sketching the rite and calling the elements antitypes:

> " The oblation of the Eucharist is not fleshly, but spiritual and so pure. For we offer to God the bread and the cup of blessing (εὐλογία), thanking him for that he bade the earth produce these fruits for our sustenance. And therewith having finished the offering (προσφορά) we invoke the Holy Spirit to constitute this offering, both the bread body of Christ and the cup the blood of Christ, that those who partake of these antitypes (ἀντίτυπα, *i.e.* surrogates) may win remission of sins and life eternal."

Here we note the stress laid on the Invocation of the Spirit to operate the transformation of the elements, though in what sense they are transformed is not defined. This *Epiklesis* survives in the Greek liturgies, but in the Roman a prayer takes its place that the angel of the Lord may take the oblation laid on the visible altar, and carry it up to the altar sublime into the presence of the divine majesty. We must not forget that the church of Irenaeus was Greek.

To the second century, lastly, belongs in part the evidence of the catacombs, on the walls of which are depicted persons reclining at tables supporting a fish, accompanied by one or more baskets of loaves, and more rarely by flasks of wine or water. The fish represents Christ; and in the Inscription of Abercius, bishop of Hierapolis about A.D. 160, we have this symbolism enshrined in a literary form: " In company with Paul I followed, while everywhere Faith led the way, and set before me the fish from the fountain, mighty and stainless, whom a pure virgin grasped, and gave this to friends to eat always, having good wine and giving the mixt cup with bread." This representation of baskets of loaves and several fishes, or of one fish and several loaves, seems to contradict the usage of one loaf. It may represent the *agapê* or Lord's Supper as a whole, of which the one loaf and cup formed an episode. Or the entire stock of bread may have been regarded as flesh of Jesus in virtue of the initial consecration of one single loaf.

To the second century also belong two gnostic uses. Firstly, that of Marcus, a Valentinian, of South Gaul about 150, whose influence extended to Asia Minor. Irenaeus relates (Bk. I., ch. vii. 2), that this " magician " used in the Eucharist cups apparently mixt with wine, but really containing water, and during long invocations made them appear " purple and red, as if the universal Grace χάρις dropped some of her blood into the cup through his invocation, and by way of inspiring worshippers with a passion to taste the cup and drink deep of the influence termed Charis." Such a rite presupposes a belief in a real change of the elements; and water must have been used. In the sequel Irenaeus recites the Invocation read by Marcus before the communicants:—

> " Grace that is before all things, that passeth understanding and words, replenish thy inner man, and make to abound in thee the knowledge of her, sowing in the good soil the grain of mustard seed."

The *Acts of Thomas*, secondly, ch. 46, attest an Eucharistic usage, somewhat apart from the orthodox. The apostle spreads a linen cloth on a bench, lays on it bread of blessing (εὐλογία), and says:

> " Jesus Christ, Son of God, who hast made us worthy to commune in the Eucharist of thy holy body and precious blood, Lo, we venture on the thanksgiving (*Eucharistia*) and invocation of thy blessed name, come now and communicate with us. And he began to speak and said: Come Pity supreme, come communion of the male, come Lady who knowest the mysteries of the Elect one, . . . come secret mother . . . come and communicate with us in this Eucharist which we perform in thy name and in the love (*agapê*) in which we are met at thy calling. And having said this he made a cross upon the bread, and brake it and began to distribute it. And first he gave to the woman, saying: This shall be to thee for remission of sins and release of eternal transgressions. And after her he gave also to all the rest that had received the seal."

In the 2nd century the writer who nearest approaches to the later idea of Transubstantiation is the gnostic Theodotus (*c.* 160):

> " The bread no less than the oil is hallowed by the power of the name. They remain the same in outward appearance as they were received, but by that power they are transformed into a spiritual power. So the water when it is exorcised and becomes baptismal, not only drives out the evil principle, but also contracts a power of hallowing."

In the Fathers of the first three or four centuries can be traced the same tendency to spiritualize the Eucharist as we encountered in the fourth gospel, and in the *Didache*. Ignatius, though in *Smyrn.* 7 he asserts the Eucharist to be Christ's " flesh which suffered for our sins," elsewhere speaks of the blood as being " joy eternal and lasting," as " hope," as " love incorruptible," and of the flesh as " faith " or as " the gospel." Clement of Alexandria (*c.* 180) regards the rite as an initiation in divine knowledge and immortality. The only food he recognizes is spiritual; *e.g.* knowledge of the divine Essence is " eating and drinking of the divine Word." So Origen declares the bread which God the Word asserted was his body to be that which nourishes souls, the word from God the Word proceeding, the Bread from the heavenly Bread. Not the visible bread held in his hand, nor the visible cup, were Christ's body and blood, but the word in the mystery of which the bread was to be broken and the wine to be poured out. " We drink Christ's blood," he says elsewhere, " when we receive His words in which standeth Life." So the author of the *Contra Marcellum* writes in view of John vi. 63 as follows (*De eccl. Theol.* p. 180):

> " In these words he instructed them to interpret in a spiritual sense his utterances about his flesh and blood. Do not, he said, think that I mean the flesh which invests and covers me, and bid you eat that; nor suppose either that I command you to drink my sensible and somatic blood. Nay, you know well that my words which I have spoken unto you are spirit and life. It follows that the very words and discourses are his flesh and blood, of which he that constantly partakes, nourished as it were upon heavenly bread, will partake of the heavenly life. Let not then, he says, this scandalize you which I have said about eating of my flesh and about drinking of my blood. Nor let the obvious and first hand meaning of what I said about my flesh and blood disturb you when you hear it. For these words avail nothing if heard and understood literally (*or* sensibly). But it is the spirit which quickens them that can understand spiritually what they hear."

But these views were not those of the uninstructed pagans who filled the churches and needed a rite which brought them, as their old sacrifices had done, into physical contact and union with their god. Their point of view was better expressed in the scruples of priests, who, as Tertullian (*c.* 200) records (*De

Corona, iii.), were careful lest a crumb of the bread or a drop of the wine should fall on the ground, and by such incidents the body of Christ be harassed and attacked!

The Eucharist as a Sacrifice.—Before the 3rd century we cannot trace the view that in the Eucharistic rite the death of Christ, regarded from the Pauline standpoint as an atoning or redemptive sacrifice for the sins of mankind, is renewed and repeated, though the germ out of which it would surely grow is already present in the words " My blood . . . which is shed for many " of Matt. and Mark; yet more surely in Paul's " my body which is in your behoof " and " this do in commemoration of me," where the Greek word for *do*, Gr. ποιεῖτε, Lat. *facite*, could to pagan ears mean " this do ye sacrifice." In the first two centuries the rite is spoken of as an offering and as a bloodless sacrifice; but it is God's own creations, the bread and wine, alms and first-fruits, which, offered with a pure conscience, he receives as from friends, and bestows in turn on the poor; it is the praise and prayers which are the sacrifice. In these centuries baptism was the rite for the remission of sin, not the Eucharist; it is the prophet in the *Didache* who presides at the Lord's Supper, not the Levitically conceived priest; nor as yet has the Table become an Altar. Among Christians, prayers, supplications and thanksgivings have taken the place of the sacrifices of the old covenant.

In Cyprian of Carthage (*c.* 250) we first find the Eucharist regarded as a sacrifice of Christ's body and blood offered by the priest for the sins of the living and dead. We cannot drink the blood of Christ unless Christ has been first trodden under foot and pressed. . . . As Jesus our high priest offered himself as a sacrifice to his Father, so the human priest takes Christ's place, and imitates his action by offering in church a true and full sacrifice to God the Father (Ep. 63). He speaks of the dominical host (*hostia*), and takes the verb to *do* in Paul's letter in the sense of to *sacrifice.* As early as Tertullian prayers for the dead, who were named, were offered in the rite; but there was as yet no idea of the sacrifice of Christ being reiterated in their behalf. After Cyprian's day this view gains ground in the West, and almost obscures the older view that the rite is primarily an act of communion with Christ. In harmony with Cyprian's new conception is another innovation of his age and place, that of children communicating; both were the natural accompaniment of infant baptism, of which we first hear in his letters. In the East we do not hear of the sacrifice of the body and blood before Eusebius, about the year 300. In the Armenian church of the 12th century the idea of a reiterated sacrificial death of Christ still seemed bizarre and barbarous.[1] But as early as 558 in Gaul the bread was arranged on the altar in the form of a man, so that one believer ate his eye, another his ear, a third his hand, and so on, according to their respective merits! This was forbidden by Pope Pelagius I.; but in the Greek church the custom survives, the priest even stabbing with " the holy spear " in its right side the human figure planned out of the bread, by way of rehearsing in pantomime the narrative of John xix. 34.

The change from a commemoration of the Passion to a re-enacting of it came slowly in the Greek church. Thus Chrysostom (*Hom.* 17, *ad Heb.*), after writing " We offer (ποιοῦμεν) not another sacrifice, but the same," instantly corrects himself and adds: " or rather we perform a commemoration of the sacrifice." This was exactly the position also of the Armenian church.

Wine or Water?—Justin Martyr perhaps contemplated the use of water instead of wine, and Tatian his pupil used it. The Marcionites, the Ebionites, or Judaeo-Christians of Palestine, the Montanists of Phrygia, Africa and Galatia, the confessor Alcibiades of Lyons, *c.* A.D. 177 (Euseb. *Hist. Eccl.* v. 3. 2), equally used it. Cyprian (*Ep.* 63) affirms (*c.* 250) that his predecessors on the throne of Carthage had used water, and that many African bishops continued to do so, " out of ignorance," he says, " and simplemindedness, and God would forgive them." Pionius, the Catholic martyr of Smyrna, *c.* 250, also used water. In the *Acts of Thomas* it is used. Such uniformity of language has led Prof. Harnack to suppose that in the earliest age water was used equally with wine, and Eusebius the historian, who had means of judging which we have not, saw no difficulty in identifying with the first converts of St Mark the Therapeutae of Philo who took only bread and water in their holy repast.

Abercius and Irenaeus are the first to speak of wine mixt with water, of a *krāma* (κρᾶμα) or *temperamentum.* In the East, then as now, no one took wine without so mixing it. Cyprian insists on the admixture of water, which he says represented the humanity of Jesus, as wine his godhood. The users of water were named *Aquarii* or *hydroparastatae* in the 4th century, and were liable to death under the code of Theodosius. Some of the Monophysite churches, *e.g.* the Armenian, eschewed water and used pure wine, so falling under the censure of the council *in Trullo* of A.D. 692. Milk and honey was added at first communions. Oil was sometimes offered, as well as wine, but it would seem for consecration only, and not for consumption along with the sacrament. With the bread, however, was sometimes consecrated cheese, *e.g.* by the African Montanists in the 2nd century. Bitter herbs also were often added, probably because they were eaten with the Paschal lamb. Many early canons forbid the one and the other. Hot water was mixt with the wine in the Greek churches for some centuries, and this custom is seen in catacomb paintings. It increased the resemblance to real blood.

Position of the Faithful at the Eucharist.—Tertullian, Eusebius, Chrysostom and others represent the faithful as standing at the Eucharist. In the art of the catacombs they sit or recline in the ordinary attitude of banqueters. In the age of Christ standing up at the Paschal meal had been given up, and it was become the rule to recline. Kneeling with a view to adoration of the elements was unheard of in the primitive church, and the Armenian Fathers of the 12th century insist that the sacrament was intended by Christ to be eaten and not gazed at (Nerses, *op. cit.* p. 167). Eucharistic or any other liturgical vestments were unknown until late in the 5th century, when certain bishops were honoured with the same *pallium* worn by civil officials (see VESTMENTS).

In the Latin and in the Monophysite churches of Armenia and Egypt unleavened bread is used in the Eucharist on the somewhat uncertain ground that the Last Supper was the Paschal meal. The Greek church uses leavened.

Transubstantiation.—In the primitive age no one asked how Christ was present in the Eucharist, or how the elements became his body and blood. The Eucharist formed part of an *agapê* or love feast until the end of the 2nd century, and in parts of Christendom continued to be so much later. It was, save where animal sacrifices survived, *the* Christian sacrifice, *par excellence*, the counterpart for the converted of the sacrificial communions of paganism; and though charged with higher significance than these, it yet reposed on a like background of religious usage and beliefs. But when the Agapé on one side and paganism on the other receded into a dim past, owing to the enhanced sacrosanctity of the Eucharist and because of the severe edicts of the emperor Theodosius and his successors, the psychological background fell away, and the Eucharist was left isolated and hanging in the air. Then men began to ask themselves what it meant. Rival schools of thought sprang up, and controversy raged over it, as it had aforetime about the *homoousion*, or the two natures. Thus the sacrament which was intended to be a bond of peace, became a chief cause of dissension and bloodshed, and was often discussed as if it were a vulgar talisman.

Serapion of Thmuis in Egypt, a younger contemporary of Athanasius, in his Eucharistic prayers combines the language of the *Didache* with a high sacramentalism alien to that document which now only survived in the form of a grace used at table in the nunneries of Alexandria (see AGAPÉ). He entreats " the Lord of Powers to fill this sacrifice with his Power and Participation," and calls the elements a " living sacrifice, a bloodless offering." The bread and wine before consecration are " likenesses of his body and blood," this in virtue of the words pronounced over them by Jesus on the night of his betrayal. The prayer then continues thus: "O God of truth, let thy holy Word settle upon this bread, that the bread may become body of the word, and on this cup, that the cup may become blood of the truth. And cause all who communicate to receive a drug of life for healing of every disease and empowering of all moral advance and virtue." Here the bread and wine become by consecration tenements in which the Word is reincarnated, as he aforetime dwelled in flesh. They cease to be mere *likenesses* of the body and blood, and are changed into receptacles of divine power and intimacy, by swallowing which we are benefited in soul and body. Cyril of Jerusalem in his *catechises* 5[1] enunciates the same idea of *μεταβολή* or transformation.

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[1] See Nerses of Lambron, *Opera Armenice* (Venice, 1847), pp. 74, 75, 101, &c.

Gregory of Nyssa also about the same date (in Migne, *Patrolog. Graeca*, vol. 46, col. 581, oration on the Baptism) asserts a "transformation" or "transelementation" (*μεταστοιχείωσις*) of the elements into centres of mystic force; and assimilates their consecration to that of the water of baptism, of the altar, of oil or chrism, of the priest. He compares it also to the change of Moses' rod into a snake, of the Nile into blood, to the virtue inherent in Elijah's mantle or in the wood of the cross or in the clay mixt of dust and the Lord's spittle, or in Elisha's relics which raised a corpse to life, or in the burning bush. All these, he says, "were parcels of matter destitute of life and feeling, but through miracles they became vehicles of the power of God absorbed or taken into themselves." He thus views the consecration of the elements as akin to other consecrations; and, like priestly ordination, as involving "a metamorphosis for the better," a phrase which later on became classical. John of Damascus (*c.* 750) believed the bread to be mysteriously changed into the Christ's body, just as when eaten it is changed into any human body; and he argued that it is wrong to say, as Irenaeus had said, that the elements are mere antitypes after as before consecration. In the West, Augustine, like Eusebius and Theodoret, calls the elements signs or symbols of the body and blood signified in them; yet he argues that Christ "took and lifted up his own body in his hands when he took the bread." At the same time he admits that "no one eats Christ's flesh, unless he has first adored" (*nisi prius adoraverit*). But he qualifies this "Receptionist" position by declaring that Judas received the sacrament, as if the unworthiness of the recipient made no difference.

Out of this mist of contradictions scholastic thought strove to emerge by means of clear-cut definitions. The drawback for the dogmatist of such a view as Serapion broaches in his prayers was this, that although it explained how the Logos comes to be immanent in the elements, as a soul in its body, nevertheless it did not guarantee the presence in or rather substitution for the natural elements of Christ's real body and blood. It only provided an *ἀντίτυπον* or surrogate body. In 830–850, Paschasius Radbert taught that after the priest has uttered the words of institution, nothing remains save the body and blood under the outward form of bread and wine; the substance is changed and the accidents alone remain. The elements are miraculously recreated as body and blood. This view harmonized with the docetic view which lurked in East and West, that the manhood of Jesus was but a likeness or semblance under which the God was concealed. So Marcion argued that Christ's body was not really flesh and blood, or he could not have called it bread and wine. Paschasius shrank from the logical outcome of his view, namely, that Christ's body or part of it is turned into human excrement, but Ratramnus, another monk of Corbey, in a book afterwards ascribed to Duns Scotus, drew this inference in order to discredit his antagonists, and not because he believed it himself. The elements, he said, remain physically what they were, but are spiritually raised as symbols to a higher power. Perhaps we may illustrate his position by saying that the elements undergo a change analogous to what takes place in iron, when by being brought into an electric field it becomes magnetic. The substance of the elements remain as well as their accidents, but like baptismal water they gain by consecration a hidden virtue benefiting soul and body. Ratramnus's view thus resembled Serapion's, after whom the elements furnish a new vehicle of the Spirit's influence, a new body through which the Word operates, a fresh sojourning among us of the Word, though consecrated bread is in itself no more Christ's natural body than are we who assimilate it. Other doctors of the 9th century, *e.g.* Hincmar of Reims and Haimo of Halberstadt, took the side of Paschasius, and affirmed that the substance of the bread and wine is changed, and that God leaves the colour, taste and other outward properties out of mercy to the worshippers, who would be overcome with dread if the underlying real flesh and blood were nakedly revealed to their gaze!

Berengar in the 11th century assailed this view, which was really that of transubstantiation, alleging that there is no substance in matter apart from the accidents, and that therefore Christ cannot be *corporally* present in the sacrament; because, if so, he must be *spatially* present, and there will be two material bodies in one space; moreover his body will be in thousands of places at once. Christ, he said, is present spiritually, so that the elements, while remaining what they were, unremoved and undestroyed, are advanced to be something better: *omne cui a Deo benedicatur, non absumi, non auferri, non destrui, sed manere et in melius quam erat necessario provehi.* This was the phrase of Gregory of Nyssa.

Berengar in a weak moment in 1059 was forced by the pope to recant and assert that "the true body and blood are not only a sacrament, but in truth touched and broken by the hands of the priests and pressed by the teeth of the faithful," and this position remains in every Roman catechism. Such dilemmas as whether a mouse can devour the true body, and whether it is not involved in all the obscenities of human digestive processes, were ill met by this ruling. Each party dubbed the other *stercoranists* (dung-feasters), and the controversy was often marred by indecencies.

As in the 3rd century the Roman church decided in respect of baptism that the sacrament carries the church and not the church the sacrament, so in the dispute over the Eucharist it ended, in spite of more spiritual views essayed by Peter Lombard, by insisting on the more materialistic view at the fourth Lateran Council in 1215, whose decree runs thus:—"The body and blood of Jesus Christ are truly contained in the sacrament of the altar under the species of bread and wine, the bread and wine respectively being transubstantiated into body and blood by divine power, so that in order to the perfecting of the mystery of unity we may ourselves receive from his (body) what he himself receives from ours." In 1264 Urban IV. instituted the Corpus Christi Feast by way of giving liturgical expression to this view.

Communion in One Kind.—Up to about 1100 laymen in the West received the communion in both kinds, and except in a few disciplinary cases the wine was not refused. In 1099, by a decree of Pope Paschal II., children might omit the wine and invalids the bread. The communion of the laity in the bread alone was enjoined by the council of Constance in 1415, and by the council of Trent in 1562. The reformed churches of the West went back to the older rule which Eastern churches had never forsaken.

Mass.—The term *mass*, which survives in Candlemas, Christmas, Michaelmas, is from the Latin *missa*, which was in the 3rd century a technical term for the dismissal of any lay meeting, *e.g.* of a law-court, and was adopted in that sense by the church as early as Ambrose (*c.* 350). The catechumens or unbaptized, together with the penitents, remained in church during the Litany, collect, three lections, two psalms and homily. The deacon then cried out: "Let the catechumens depart. Let all catechumens go out." This was the *missa* of the catechumens. The rest of the rite was called *missa fidelium*, because only the initiated remained. Similarly the collect with which often the rite began is the prayer *ad collectam*, *i.e.* for the congregation met together or collected. The corresponding Greek word was *synaxis*.

After the catechumens were gone the priest said: "The Lord be with you, let us pray," and the service of the mass followed.

In the West, says Duchesne (*Origines*, p. 179), not only catechumens, but the baptized who did not communicate left the church before the communion of the faithful began (? after the communion of the clergy). In Anglican churches non-communicants used to leave the church after the prayer for the Church Militant. Ritualists now keep unconfirmed children in church during the entire rite, through ignorance of ancient usage, in order that they may learn to adore the consecrated elements. For this moment of homage to material elements ritually filled with divine potency may be so exaggerated as to obscure the rite's ancient significance as a communion of the faithful in mystic food.

Ideas of Reformers.—The 16th-century reformers strove to avoid the literalism of the words "This is my body," accepted frankly by the Roman and Eastern churches, and urged a Receptionist view, viz. that Christ is in the sacrament only spiritually consumed by worthy recipients alone, the material body not being actually chewed. This is seen by a comparison of other confessions with the Profession of Catholic Faith in accordance with the council of Trent, in the bull of Pius IV., which runs thus:—

> "I profess that in the Mass is offered to God a true, proper and propitiatory sacrifice, for the living and the dead, and that in the most holy sacrament of the Eucharist there is truly really and in substance the body and blood, together with the soul and divinity of our Lord Jesus Christ, and that there does take place a conversion of the entire substance of the bread into the body, and of the entire substance of the wine into the blood, which conversion the Catholic Church doth call Transubstantiation. I also admit that under one of the other species alone the entire and whole Christ and the true sacrament is received."

The 28th Article of Religion of the Church of England is as follows:—

> "The Supper of the Lord . . . is a Sacrament of our Redemption by Christ's death; insomuch that to such as rightly, worthily, and with faith, receive the same, the Bread which we break is a partaking of the Body of Christ, and likewise the Cup of Blessing is a partaking of the Blood of Christ.
>
> "Transubstantiation . . . cannot be proved by holy writ. . . .
>
> "The Body of Christ is given, taken and eaten, in the Supper, only after a heavenly and spiritual manner. And the mean whereby the Body of Christ is received and eaten in the Supper is Faith.
>
> "The Sacrament of the Lord's Supper was not by Christ's ordinance reserved, carried about, lifted up, or worshipped."

At the end of the communion rite the prayer-book, in view of the ordinance to receive the Sacrament kneeling, adds the following:—

> "It is hereby declared, that thereby no adoration is intended, or ought to be done, either unto the Sacramental Bread or Wine, there bodily received, or unto any Corporal Presence of Christ's natural Flesh and Blood. For the Sacramental Bread and Wine remain still in their very natural substances, and therefore may not be adored (for that were idolatry, to be abhorred of all faithful Christians); and the natural Body and Blood of our Saviour Christ are in Heaven, and not here; it being against the truth of Christ's natural Body to be at one time in more places than one."

These monitions and prescriptions are rapidly becoming a dead-letter, but they possess a certain historical interest.

The Helvetic Confession[1] of A.D. 1566 (*caput* xxi. *De sacra coena Domini*) runs as follows:—

> "That it may be more rightly and clearly understood how the flesh and blood of Christ can be food and drink of the faithful, and be received by them unto eternal life, let us add these few remarks. Chewing is not of one kind alone. For there is a corporeal chewing, by which food is taken into the mouth by man, bruised with the teeth and swallowed down into the belly. . . . As the flesh of Christ cannot be corporeally chewed without wickedness and truculence, so it is not food of the belly. . . . There is also a spiritual chewing of the body of Christ, not such that by it we understand the very food to be changed into spirit, but such that, the body and blood of the Lord abiding in their essence and peculiarity, they are spiritually communicated to us, not in any corporeal way, but in a spiritual, through the Holy Spirit which applies and bestows on us those things which were prepared through the flesh and blood of the Lord betrayed for our sake to death, to wit, remission of sins, liberation and life eternal, so that Christ lives in us and we in him. . . .
>
> "In addition to the aforesaid spiritual chewing, there is also a sacramental chewing of the Lord's body, by which the faithful not only partakes spiritually and inwardly of the true body and blood of the Lord, but outwardly by approaching the Lord's table, receives the visible sacrament of his body and blood. . . . But he who without faith approaches the sacred table, albeit he communicate in the sacrament, yet he perceives not the matter of the sacrament, whence is life and salvation. . . ."

The Augustan Confession presented by the German electors to Charles V. in the section on the Mass merely protests against the view that "the Lord's Supper is a work (*opus*) which being performed by a priest earns remission of sin for the doer and for others, and that in virtue of the work done (*ex opere operato*), without a good motive on the part of the user. Also that being applied for the dead, it is a satisfaction, that is to say, earns for them remission of the pains of purgatory."

The Saxon Confession of Wittenberg, June 1551, while protesting against the same errors, equally abstains from trying to define narrowly how Christ is present in the sacrament.

Consubstantiation.—The symbolical books of the Lutheran Church, following the teaching of Luther himself, declare the doctrine of the real presence of Christ's body and blood in the eucharist, *together with* the bread and wine (*consubstantiation*), as well as the ubiquity of his body, as the orthodox doctrine of the church. One consequence of this view was that the unbelieving recipients are held to be as really partakers of the body of Christ in, with and under the bread as the faithful, though they receive it to their own hurt. (Hagenbach, *Hist. of Doctr.* ii. 300.)

Of all the Reformers, the teaching of Zwingli was the farthest removed from that of Luther. At an early period he asserted that the Eucharist was nothing more than food for the soul, and had been instituted by Christ only as an act of commemoration and as a visible sign of his body and blood (*Christenliche Ynleitung*, 1523, quoted by Hagenbach, *Hist. of Doctr.* ii. 296, Clark's translation). But that Zwingli did not reject the higher religious significance of the Eucharist, and was far from degrading the bread and wine into "nuda et inania symbola," as he was accused of doing, we see from his *Fidei ratio ad Carolum Imperatorem* (*ib.* p. 297).

Original Significance of the Eucharist.—It is doubtful if the attempts of reformers to spiritualize the Eucharist bring us, except so far as they pruned ritual extravagances, nearer to its original significance; perhaps the Roman, Greek and Oriental churches have better preserved it. This significance remains to be discussed; the cognate question of how far the development of the Eucharist was influenced by the pagan mysteries is discussed in the article SACRAMENT.

That the Lord's Supper was from the first a meal symbolic of Christian unity and commemorative of Christ's death is questioned by none. But Paul, while he saw this much in it, saw much more; or he could not in the same epistle, x. 18-22 assimilate communion in the flesh and blood of Jesus, on the one hand, to the sacrificial communion with the altar which made Israel after the flesh one; and on the other to the communion with devils attained by pagans through sacrifices offered before idols. It has been justly remarked of the Pauline view, that—

> "The union with the Lord Himself, to which those who partake of the Lord's Supper have, is compared with the union which those who partake of a sacrifice have with the deity to whom the altar is devoted—in the case of the Israelites with God, of the heathen with demons. This idea that to partake of sacrifice is to devote oneself to the deity, lies at the root of the ancient idea of worship, whether Jewish or heathen; and St Paul uses it as being readily understood. In this connexion the symbol is never a mere symbol, but a means of real union. 'The cup is the covenant'" (Prof. Sanday in Hastings' *Dictionary of the Bible*, 3, 149).

Paul caps his argument thus:—"Ye cannot drink the cup of the Lord and the cup of demons: ye cannot partake of the table of the Lord and of the table of demons. Or do we provoke the Lord to jealousy? Are we stronger than he?" And these words with their context prove that Paul, like the Fathers of the church, regarded the gods and goddesses as real living supernatural beings, but malignant. They were the powers and principalities with whom he was ever at war. The Lord also is jealous of them, if any one attempt to combine their cult with his, for to do so is to doubt the supremacy of his name above all names. Both in its inner nature then and outward effects the Eucharist was the Christian counterpart of these two other forms of communion of which one, the heathen, was excluded from the first, and the other, the Jewish, soon to disappear. It is their analogue, and to understand it we must understand them, not forgetting that Paul, as a Semite, and his hearers, as converted pagans, were imbued with the sacrificial ideas of the old world.

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[1] This represents the views of Calvin.

"A kin," remarks W. Robertson Smith (*Religion of the Semites*, 1894), "was a group of persons whose lives were so bound up together, in what must be called a physical unity, that they could be treated as parts of one common life. The members of one kindred looked on themselves as one living whole, a single animated mass of blood, flesh and bones, of which no member could be touched without all the members suffering." "In later times," observes the same writer (*op. cit.* p. 313), "we find the conception current that any food which two men partake of together, so that the same substance enters into their flesh and blood, is enough to establish some sacred unity of life between them; but in ancient times this significance seems to be always attached to participation in the flesh of a sacrosanct victim, and the solemn mystery of its death is justified by the consideration that only in this way can the sacred cement be procured, which creates or keeps alive a living bond of union between the worshippers and their god. This cement is nothing else than the actual life of the sacred and kindred animal, which is conceived as residing in its flesh, but specially in its blood, and so, in the sacred meal, is actually distributed among all the participants, each of whom incorporates a particle of it with his own individual life."

The above conveys the cycle of ideas within which Paul's reflection worked. Christ who knew no sin (2 Cor. v. 21) had been made sin, and sacrificed for us, becoming as it were a new Passover (1 Cor. v. 7). By a mysterious sympathy the bread and wine over which the words, "This is my body which is for you," and "This cup is the new covenant in my blood," had been uttered, became Christ's body and blood; so that by partaking of these the faithful were united with each other and with Christ into one kinship. They became the body of Christ, and his blood or life was in them, and they were members of him. Participation in the Eucharist gave actual life, and it was due to their irregular attendance at it that many members of the Corinthian church "were weak and sickly and not a few slept" (*i.e.* had died). As the author already cited adds (p. 313): "The notion that by eating the flesh, or particularly by drinking the blood, of another living being, a man absorbs its nature or life into his own, is one which appears among primitive peoples in many forms."

But this effect of participation in the bread and cup was not in Paul's opinion automatic, was no mere *opus operatum*; it depended on the ethical co-operation of the believer, who must not eat and drink *unworthily*, that is, after refusing to share his meats with the poorer brethren, or with any other guilt in his soul. The phrases "discern the body" and "discern ourselves" in 1 Cor. xi. 29, 31 are obscure. Paul evidently plays on the verb, *krinô*, *diakrinô*, *katakrinô* (κρίνω, διακρίνω, κατακρίνω). The general sense is clear, that those who consume the holy food without a clear conscience, like those who handle sacred objects with impure hands, will suffer physical harm from its contact, as if they were undergoing the ordeal of touching a holy thing. The idea, therefore, seems to be that as we must distinguish the holy food over which the words "This is my body" have been uttered from common food, so we must separate ourselves before eating it from all that is guilty and impure. The food that is *taboo* must only be consumed by persons who are equally *taboo* or pure. If they are not pure, it condemns them.

The "one" loaf has many parallels in ancient sacrifices, *e.g.* the Latin tribes when they met annually at their common temple partook of a "single" bull. And in Greek *Panegureis* or festivals the sacrificial wine had to be dispensed from one common bowl: "Unto a common cup they come together, and from it pour libations as well as sacrifice," says Aristides Rhetor in his *Isthmica in Neptunum*, p. 45. To ensure the continued unity of the bread, the Roman church ever leaves over from a preceding consecration half a holy wafer, called *fermentum*, which is added in the next celebration.

With what awe Paul regarded the elements mystically identified with Christ's body and life is clear from his declaration in 1 Cor. xi. 27, that he who consumes them unworthily is guilty or holden of the Lord's body and blood. This is the language of the ancient ordeal which as a test of innocence required the accused to touch or still better to eat a holy element. A wife who drank the holy water in which the dust of the Sanctuary was mingled (Num. v. 17 foll.) offended so deeply against it, if unfaithful, that she was punished with dropsy and wasting. The very point is paralleled in the *Acts of Thomas*, ch. xlviii. A youth who has murdered his mistress takes the bread of the Eucharist in his mouth, and his two hands are at once withered up. The apostle immediately invites him to confess the crime he must have committed, "for, he says, the Eucharist of the Lord hath convicted thee."

It has been necessary to consider at such length St Paul's account of the Eucharist, both because it antedates nearly by half a century that of the gospels, and because it explains the significance which the rite had no less for the Gnostics than for the great church. The synoptists' account is to be understood thus: Jesus, conscious that he now for the last time lies down to eat with his disciples a meal which, if not the Paschal, was anyhow anticipatory of the Millennial Regeneration (Matt. xix. 28), institutes, as it were, a blood-brotherhood between himself and them. It is a covenant similar to that of Exodus xxiv., when after the peace-offering of oxen, Moses took the blood in basins and sprinkled half of it on the altar and on twelve pillars erected after the twelve tribes, and the other half on the people, to whom he had first read out the writing of the covenant and said, "Behold the blood of the covenant which the Lord hath made with you concerning all these words."

But the covenant instituted by Jesus on the eve of his death was hardly intended as a new covenant with God, superseding the old. This reconstruction of its meaning seems to have been the peculiar revelation of the Lord to Paul, who viewed Christ's crucifixion and death as an atoning sacrifice, liberating by its grace mankind from bonds of sin which the law, far from snapping, only made more sensible and grievous. This must have been the gist of the special revelation which he had received from Christ as to the inner character of a supper which he already found a ritual observance among believers. The Eucharist of the synoptists is rather a covenant or tie of communion between Jesus and the twelve, such as will cause his life to survive in them after he has been parted from them in the flesh. An older prophet would have slain an animal and drunk its blood in common with his followers, or they would all alike have smeared themselves with it. In the East, even now, one who wishes to create a blood tie between himself and his followers and cement them to himself, makes under his left breast an incision from which they each in turn suck his blood. Such barbarism was alien to the spirit of the Founder, who substitutes bread and wine for his own flesh and blood, only imparting to these his own quality by the declaration that they *are* himself. He broke the bread not in token of his approaching death, but in order to its equal distribution. Wine he rather chose than water as a surrogate for his actual blood, because it already in Hebrew sacrifices passed as such. "The Hebrews," says Robertson Smith (*op. cit.* p. 230), "treated it like the blood, pouring it out at the base of the altar." As a red liquid it was a ready symbol of the blood which is the life. It was itself the covenant, for the genitive τῆς διαθήκης in Mark xiv. 24 is epexegetic, and Luke and Paul rightly substitute the nominative. It was, as J. Wellhausen remarks,[1] a better cement than the bread, because through the drinking of it the very blood of Jesus coursed through the veins of the disciples, and that is why more stress is laid on it than on the bread. To the apostles, as Jews bred and born, the action and words of their master formed a solemn and intelligible appeal. It belongs to the same order of ideas that the headship of the Messianic *ecclesia* in Judea was assigned after the death of Jesus to his eldest brother James, and after him for several generations to the eldest living representative of his family.

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[1] *Das Evangelium Marci*, p. 121.

To the modern mind it is absurd that an image or symbol should be taken for that which is imaged or symbolized, and that is why the early history of the Eucharist has been so little understood by ecclesiastical writers. And yet other religions, ancient and modern, supply many parallels, which are considered in the article SACRAMENT.

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Reservation of the Eucharist

The practice of reserving the sacred elements for the purpose of subsequent reception prevailed in the church from very early times. The Eucharist being the seal of Christian fellowship, it was a natural custom to send portions of the consecrated elements by the hands of the deacons to those who were not present (Justin Martyr, *Apol.* i. 65). From this it was an easy development, which prevailed before the end of the 2nd century, for churches to send the consecrated Bread to one another as a sign of communion (the εὐχαριστία mentioned by Irenaeus, *ap.* Eus. *H.E.* v. 24), and for the faithful to take it to their own homes and reserve it in *arcae* or caskets for the purpose of communicating themselves (Tert. *ad Uxor.* ii. 5, *De orat.* 19; St Cypr. *De lapsis*, 132). Being open to objection on grounds both of superstition and of irreverence, these customs were gradually put down by the council of Laodicea in A.D. 360. But some irregular forms of reservation still continued; the prohibition as regards the lay people was not extended, at any rate with any strictness, to the clergy and monks; the Eucharist was still carried on journeys; occasionally it was buried with the dead; and in a few cases the pen was even dipped in the chalice in subscribing important writings. Meanwhile, both in East and West, the general practice has continued unbroken of reserving the Eucharist, in order that the "mass of the presanctified" might take place on certain "aliturgic" days, that the faithful might be able to communicate when there was no celebration, and above all that it might be at hand to meet the needs of the sick and dying. It was reserved in a closed vessel, which took various forms from time to time, known in the East as the ἀρτοφόριον, and in the West as the *turris*, the *capsa*, and later on as the *pyx*. In the East it was kept against the wall behind the altar; in the West, in a locked aumbry in some part of the church, or (as in England and France) in a pyx made in the form of a dove and suspended over the altar.

In the West it has been used in other ways. A portion of the consecrated Bread from one Eucharist, known as the "Fermentum," was long made use of in the next, or sent by the bishop to the various churches of his city, no doubt with the object of emphasizing, the solidarity and the continuity of "the one Eucharist"; and amongst other customs which prevailed for some centuries, from the 8th onward, were those of giving it to the newly ordained in order that they might communicate themselves, and of burying it in or under the altar-slab of a newly consecrated church. At a later date, apparently early in the 14th century, began the practice of carrying the Eucharist in procession in a monstrance; and at a still later period, apparently after the middle of the 16th century, the practice of Benediction with the reserved sacrament, and that of the "forty hours' exposition," were introduced in the churches of the Roman communion. It should be said, however, that most of these practices met with very considerable opposition both from councils and from theologians and canonists, amongst others from the English canonist William Lyndwood (*Provinciale*, lib. iii. c. 26), on the following grounds amongst others: that the Body of Christ is the food of the soul, that it ought not to be reserved except for the benefit of the sick, and that it ought not to be applied to any other use than that for which it was instituted.

In England, during the religious changes of the 16th century, such of these customs as had already taken root were abolished; and with them the practice of reserving the Eucharist in the churches appears to have died out too. The general feeling on the subject is expressed by the language of the 28th Article, first drafted in 1553, to the effect that "the sacrament of the Lord's Supper was not by Christ's ordinance reserved, carried about, lifted up or worshipped," and by the fact that a form was provided for the celebration of the Holy Eucharist for the sick in their own homes. This latter practice was in accordance with abundant precedent, but had become very infrequent, if not obsolete, for many years before the Reformation. The first Prayer-Book of Edward VI. provided that if there was a celebration in church on the day on which a sick person was to receive the Holy Communion, it should be reserved, and conveyed to the sick man's house to be administered to him; if not, the curate was to visit the sick person before noon and there celebrate according to a form which is given in the book. At the revision of the Prayer-Book in 1552 all mention of reservation is omitted, and the rubric directs that the communion is to be celebrated in the sick person's house, according to a new form; and this service has continued, with certain minor changes, down to the present day. That the tendency of opinion in the English Church during the period of the Reformation was against reservation is beyond doubt, and that the practice actually died out would seem to be equally clear. The whole argument of some of the controversial writings of the time, such as Bishop Cooper on *Private Mass*, depends upon that fact; and when Cardinal du Perron alleged against the English Church the lack of the reserved Eucharist, Bishop Andrewes replied, not that the fact was otherwise, but that reservation was unnecessary in view of the English form for the Communion of the Sick: "So that reservation needeth not; the intent is had without it" (*Answers to Cardinal Perron, &c.*, p. 19, Library of Anglo-Catholic Theology). It does not follow, however, that a custom which has ceased to exist is of necessity forbidden, nor even that what was rejected by the authorities of the English Church in the 16th century is so explicitly forbidden as to be unlawful under its existing system; and not a few facts have to be taken into account in any investigation of the question. (1) The view has been held that in the Eucharist the elements are only consecrated as regards the particular purpose of reception in the service itself, and that consequently what remains unconsumed may be put to common uses. If this view were held (and it has more than once made its appearance in church history, though it has never prevailed), reservation might be open to objection on theological grounds. But such is not the view of the Church of England in her doctrinal standards, and there is an express rubric directing that any that remains of that which was consecrated is not to be carried out of the church, but reverently consumed. There can therefore be no theological obstacle to reservation in the English Church: it is a question of practice only. (2) Nor can it be said that the rubric just referred to is in itself a condemnation of reservation: it is rather directed, as its history proves, against the irreverence which prevailed when it was made; and in fact its wording is based upon that of a pre-Reformation order which coexisted with the practice of reservation (Lyndwood, *Provinciale*, lib. iii. tit. 26, note *q*). (3) Nor can it be said that the words of the 28th Article (see above) constitute in themselves an express prohibition of reservation, strong as their evidence may be as to the practice and feeling of the time. The words are the common property of an earlier age which saw nothing objectionable in reservation for the sick. (4) It has indeed been contended (by Bishop Wordsworth of Salisbury) that reservation was not actually, though tacitly, continued under the second Prayer-Book of Edward VI., since that book orders that the curate shall "minister," and not "celebrate," the communion in the sick person's house. But such a tacit sanction on the part of the compilers of the second Prayer-Book is in the highest degree improbable, in view of their known opinions on the subject; and an examination of contemporary writings hardly justifies the contention that the two words are so carefully used as the argument would demand. Anyhow, as the bishop notes, this could not be the case with the Prayer-Book of 1661, where the word is "celebrate." (5) The Elizabethan Act of Uniformity contained a provision that at the universities the public services, with the exception of the Eucharist, might be in a language other than English; and in 1560 there appeared a Latin version of the Prayer-Book, issued under royal letters patent, in which there was a rubric prefixed to the Order for the Communion of the Sick, based on that in the first Prayer-Book of Edward VI. (see above), and providing that the Eucharist should be reserved for the sick person if there had been a celebration on the same day. But although the book in question was issued under letters patent, it is not really a translation of the Elizabethan book at all, but simply a reshaping of Aless's clever and inaccurate translation of Edward VI.'s first book. In the rubric in question words are altered here and there in a way which shows that its reappearance can hardly be a mere printer's error; but in any case its importance is very slight, for the Act of Uniformity specially provides that the English service alone is to be used for the Eucharist. (6) It has been pointed out that reservation for the sick prevails in the Scottish Episcopal Church, the doctrinal standards of which correspond with those of the Church of England. But it must be remembered that the Scottish Episcopal Church has an additional order of its own for the Holy Communion, and that consequently its clergy are not restricted to the services in the Book of Common Prayer. Moreover, the practice of reservation which has prevailed in Scotland for over 150 years would appear to have arisen out of the special circumstances of that church during the 18th century, and not to have prevailed continuously from earlier times. (7) Certain of the divines who took part in the framing of the Prayer-Book of 1661 seem to speak of the practice as though it actually prevailed in their day. But Bishop Sparrow's words on the subject (*Rationale*, p. 349) are not free from difficulty on any hypothesis, and Thorndike (*Works*, v. 578, Library of Anglo-Catholic Theology) writes in such a style that it is often hard to tell whether he is describing the actual practice of his day or that which in his view it ought to be. (8) There appears to be more evidence than is commonly supposed to show that a practice analogous to that of Justin Martyr's day has been adopted from time to time in England, viz. that of conveying the sacred elements to the houses of the sick during, or directly after, the celebration in church. And in 1899 this practice received the sanction of Dr Westcott, then bishop of Durham. (9) On the other hand, the words of the oath taken by the clergy under the 36th of the Canons of 1604 are to the effect that they will use the form prescribed in the Prayer-Book and none other, except so far as shall be otherwise ordered by lawful authority; and the Prayer-Book does not even mention the reservation of the Eucharist, whilst the Articles mention it only in the way of depreciation.

The matter has become one of no little practical importance owing to modern developments of English Church life. On the one hand, it is widely felt that neither the form for the Communion of the Sick, nor yet the teaching with regard to spiritual communion in the third rubric at the end of that service, is sufficient to meet all the cases that arise or may arise. On the other hand, it is probable that in many cases the desire for reservation has arisen, in part at least, from a wish for something analogous to the Roman Catholic customs of exposition and benediction; and the chief objection to any formal practice of reservation, on the part of many who otherwise would not be opposed to it, is doubtless to be found in this fact. But however that may be, the practice of reservation of the Eucharist, either in the open church or in private, has become not uncommon in recent days.

The question of the legality of reservation was brought before the two archbishops in 1899, under circumstances analogous to those in the Lambeth Hearing on Incense (*q.v.*). The parties concerned were three clergymen, who appealed from the direction of their respective diocesans, the bishops of St Albans and Peterborough and the archbishop of York: in the two former cases the archbishop (Temple) of Canterbury was the principal and the archbishop of York (Maclagan) the assessor, whilst in the latter case the functions were reversed. The hearing extended from 17th to 20th July; counsel were heard on both sides, evidence was given in support of the appeals by two of the clergy concerned and by several other witnesses, lay and clerical, and the whole matter was gone into with no little fulness. The archbishops gave their decision on the 1st of May 1900 in two separate judgments, to the effect that, in Dr Temple's words, "the Church of England does not at present allow reservation in any form, and that those who think that it ought to be allowed, though perfectly justified in endeavouring to get the proper authorities to alter the law, are not justified in practising reservation until the law has been so altered." The archbishop of York also laid stress upon the fact that the difficulties in the way of the communion of the sick, when they are really ready for communion, are not so great as has sometimes been suggested.

See W. E. Scudamore, *Notitia eucharistica* (2nd ed., London, 1876); and art. "Reservation" in *Dictionary of Christian Antiquities*, vol. ii. (London, 1893); *Guardian* newspaper, July 19 and 26, 1899, and May 2, 1900; *The Archbishops of Canterbury and York on Reservation of the Sacrament* (London, 1900); J. S. Franey, *Mr Dibdin's Speech on Reservation, and some of the Evidence* (London, 1899); F. C. Eeles, *Reservation of the Holy Eucharist in the Scottish Church* (Aberdeen, 1899); Bishop J. Wordsworth, *Further Considerations on Public Worship* (Salisbury, 1901). (W. E. Co.)

EUCHRE, a game of cards. The name is supposed by some to be a corruption of *écarté*, to which game it bears some resemblance; others connect it with the Ger. *Juchs* or *Jux*, a joke, owing to the presence in the pack, or "deck," of a special card called "the joker"; but neither derivation is quite satisfactory. The "deck" consists of 32 cards, all cards between the seven and ace being rejected from an ordinary pack. Sometimes the sevens and eights are rejected as well. The "joker" is the best card, *i.e.* the highest trump. Second in value is the "right bower" (from Dutch *boer*, farmer, the name of the knave), or knave of trumps; third is the "left bower," the knave of the other suit of the same colour as the right bower, also a trump: then follow ace, king, queen, &c., in order. Thus if spades are trumps the order is (1) the joker, (2) knave of spades, (3) knave of clubs, (4) ace of spades, &c. The joker, however, is not always used. When it is, the game is called "railroad" euchre. In suits not trumps the cards rank as at whist. Euchre can be played by two, three or four persons. In the cut for deal, the highest card deals, the knave being the highest and the ace the next best card. The dealer gives five cards to each person, two each and then three each, or vice versa: when all have received their cards the next card in the pack is turned up for trumps.

Two-handed Euchre.—If the non-dealer, who looks at his cards first, is satisfied, he says "I order it up," *i.e.* he elects to play with his hand as it stands and with the trump suit as turned up. The dealer then rejects one card, which is put face downwards at the bottom of the pack, and takes the trump card into his hand. If, however, the non-dealer is not satisfied with his original hand, he says "I pass," on which the dealer can either "adopt," or "take it up," the suit turned up, and proceed as before, or he can pass, turning down the trump card to show that he passes. If both players pass, the non-dealer can make any other suit trumps, by saying "I make it spades," for example, or he can pass again, when the dealer can either make another suit trumps or pass. If both players pass, the hand is at an end. If the trump card is black and either player makes the other black suit trumps, he "makes it next"; if he makes a red suit trumps he "crosses the suit"; the same applies to trumps in a red suit, *mutatis mutandis*. The non-dealer leads; the dealer must follow suit if he can, but he need not win the trick, nor need he trump if unable to follow suit. The left bower counts as a trump, and a trump must be played to it if led. The game is five up. If the player who orders up or adopts makes five tricks (a "march") he scores two points; if four or three tricks, one point; if he makes less than three tricks, he is "euchred" and the other player scores two. A rubber consists of three games, each game counting one, unless the loser has failed to score at all, when the winner counts two for that game. This is called a "lurch." When a player wins three tricks, he is said to win the "point." The rubber points are two, as at whist. All three games are played out, even if one player win the first two. It is sometimes agreed that if a score "laps," *i.e.* if the winner makes more than five points in a game, the surplus may be carried on to the next game. The leader should be cautious about ordering up, since the dealer will probably hold one trump in addition to the one he takes in. If the point is certain, the leader should pass, in case the dealer should take up the trump. If the dealer "turns it down," it is not wise to "make it," unless the odds on getting the point against one trump are two to one. With good cards in two suits, it is best to make it "next," as the dealer is not likely to have a bower in that suit. The dealer, if he adopts, should discard a singleton, unless it is an ace. If the dealer's score is three, only a very strong hand justifies one in "ordering up." It is generally wise in play to discard a singleton and not to unguard another suit. With one's adversary at four, the trump should be adopted even on a light hand.

Three-handed (*cut-throat*) *Euchre*.—In this form of the game the option of playing or passing goes round in rotation, beginning with the player on the dealer's left. The player who orders up, takes up, or makes, plays against the other two; if he is euchred his adversaries score two each; by other laws he is set back two points, and should his score be at love, he has then to make seven points. The procedure is the same as in two-handed euchre.

Four-handed Euchre.—The game is played with partners, cutting and sitting, and the deal passing, as at whist. If the first player passes, the second may say "I assist," which is the same as "ordering up," or he may pass. If the first player has ordered up, his partner may say "I take it from you," which means that he will play alone against the two adversaries, the first player's cards being put face downwards on the table, and not being used in that hand. Any player can similarly play "a lone hand," his partner taking no part in the play. Even if the first hand plays alone, the third may take it from him. Similarly the dealer may take it from the second hand, but the second hand cannot take it from the dealer. If all four players pass, the first player can pass, make it, or play alone, naming the suit he makes. The third hand can "take it" from the first, or play alone in the suit made by the first, the dealer having a similar right over his own partner. If all four pass again, the hand is at an end and the deal passes. The game is five up, points being reckoned as before. If a lone player makes five tricks his side scores four: if three tricks, one: if he fails to make three tricks the opponents score four. It is not wise for the first hand to order up or cross the suit unless very strong. It is good policy to lead trumps through a hand that assists, bad policy to do so when the leader adopts. Trumps should be led to a partner who has ordered up or made it. It is sometimes considered wise for the first hand to "keep the bridge," *i.e.* order up with a bad hand, to prevent the other side from playing alone, if their score is only one or two and the leader's is four. This right is lost if a player reminds his partner, after the trump card has been turned, that they are at the point of bridge. If the trump under these circumstances is not ordered up, the dealer should turn down, unless very strong. The second hand should not assist unless really strong, except when at the point of four-all or four-love. When led through, it is generally wise, *ceteris paribus*, to head the trick. The dealer should always adopt with two trumps in hand, or with one trump if a bower is turned up. At four-all and four-love he should adopt on a weaker hand. Also, being fourth player, he can make it on a weaker hand than other players. If the dealer's partner assists, the dealer should lead him a trump at the first opportunity; it is also a good opportunity for the dealer to play alone if moderately strong. If a player who generally keeps the bridge passes, his partner should rarely play alone.

Extracts from Rules.—If the dealer give too many or too few cards to any player, or exposes two cards in turning up, it is a misdeal and the deal passes. If there is a faced card in the pack, or the dealer exposes a card, he deals again. If any one play with the wrong number of cards, or the dealer plays without discarding, trumps being ordered up, his side forfeits two points (a lone hand four points) and cannot score during that hand. The revoke penalty is three points for each revoke (five in the case of a lone hand), and no score can be made that hand; a card may be taken back, before the trick is quitted, to save a revoke, but it is an exposed card. If a lone player expose a card, no penalty; if he lead out of turn, the card led may be called. If an adversary of a lone player plays out of turn to his lead, all the cards of both adversaries can be called, and are exposed on the table.

Bid Euchre.—This game resembles "Napoleon" (*q.v.*). It is played with a euchre deck, each player receiving five cards, the others being left face-downwards. Each player "bids," *i.e.* declares and makes a certain number of tricks, the highest bidder leading and his first card being a trump. When six play, the player who bids highest claims as his partner the player who has the best card of the trump suit, not in the bidder's hand: if it is among the undealt cards, which is ascertained by the fact that no one else holds it, he calls for the next best and so on. The partners then play against the other four.

EUCKEN, RUDOLF CHRISTOPH (1846–), German philosopher, was born on the 5th of January 1846 at Aurich in East Friesland. His father died when he was a child, and he was brought up by his mother, a woman of considerable activity. He was educated at Aurich, where one of his teachers was the philosopher Wilhelm Reuter, whose influence was the dominating factor in the development of his thought. Passing to the university of Göttingen he took his degree in classical philology and ancient history, but the bent of his mind was definitely towards the philosophical side of theology. Subsequently he studied in Berlin, especially under Trendelenburg, whose ethical tendencies and historical treatment of philosophy greatly attracted him. From 1871 to 1874 Eucken taught philosophy at Basel, and in 1874 became professor of philosophy at the university of Jena. In 1908 he was awarded the Nobel prize for literature. Eucken's philosophical work is partly historical and partly constructive, the former side being predominant in his earlier, the latter in his later works. Their most striking feature is the close organic relationship between the two parts. The aim of the historical works is to show the necessary connexion between philosophical concepts and the age to which they belong; the same idea is at the root of his constructive speculation. All philosophy is philosophy of life, the development of a new culture, not mere intellectualism, but the application of a vital religious inspiration to the practical problems of society. This practical idealism Eucken described by the term "Activism." In accordance with this principle, Eucken has given considerable attention to social and educational problems.

His chief works are:—*Die Methode der aristotelischen Forschung* (1872); the important historical study on the history of conceptions, *Die Grundbegriffe der Gegenwart* (1878; Eng. trans. by M. Stuart Phelps, New York, 1880; 3rd ed. under the title *Geistige Strömungen der Gegenwart*, 1904; 4th ed., 1909); *Geschichte der philos. Terminologie* (1879); *Prolegomena zu Forschungen über die Einheit des Geisteslebens* (1885); *Beiträge zur Geschichte der neueren Philosophie* (1886, 1905); *Die Einheit des Geisteslebens* (1888); *Die Lebensanschauungen der grossen Denker* (1890; 7th ed., 1907; Eng. trans., W. Hough and Boyce Gibson, *The Problem of Human Life*, 1909); *Der Wahrheitsgehalt der Religion* (1901; 2nd ed., 1905); *Thomas von Aquino und Kant* (1901); *Gesammelte Aufsätze zu Philos. und Lebensanschauung* (1903); *Philosophie der Geschichte* (1907); *Der Kampf um einen geistigen Lebensinhalt* (1896, 1907); *Grundlinien einer neuen Lebensanschauung* (1907); *Einführung in die Philosophie der Geisteslebens* (1908; Eng. trans., *The Life of the Spirit*, F. L. Pogson, 1909, Crown Theological Library); *Der Sinn und Wert des Lebens* (1908; Eng. trans., 1909); *Hauptprobleme der Religionsphilosophie der Gegenwart* (1907). The following of Eucken's works also have been translated into English:—*Liberty in Teaching in the German Universities* (1897); *Are the Germans still a Nation of Thinkers?* (1898); *Progress of Philos. in the 19th Century* (1899); *The Finnish Question* (1899); *The Present Status of Religion in Germany* (1901). See W. R. Boyce Gibson, *Rudolf Eucken's Philosophy of Life* (2nd ed., 1907), and *God with Us* (1909); for the historical work, Falckenberg's *Hist. of Philos.* (Eng. trans., 1895, index); also H. Pöhlmann, *R. Euckens Theologie mit ihren philosophischen Grundlagen dargestellt* (1903); O. Siebert, *R. Euckens Welt- und Lebensanschauung* (1904).

EUCLASE, a very rare mineral, occasionally cut as a gem-stone for the cabinet. It bears some relation to beryl in that it is a silicate containing beryllium and aluminium, but hydrogen is also present, and the analyses of euclase lead to the formula $HBeAlSiO_5$ or $Be(AlOH)SiO_4$. It crystallizes in the monoclinic system, the crystals being generally of prismatic habit, striated vertically, and terminated by acute pyramids. Cleavage is perfect, parallel to the clinopinacoid, and this suggested to R. J. Haüy the name euclase, from the Greek εὖ, easily, and κλάσις, fracture. The ready cleavage renders the stone fragile with a tendency to chip, and thus detracts from its use for personal ornament. The colour is generally pale-blue or green, though sometimes the mineral is colourless. When cut it resembles certain kinds of beryl (aquamarine) and topaz, from which it may be distinguished by its specific gravity (3·1). Its hardness (7·5) is rather less than that of topaz. Euclase occurs with topaz at Boa Vista, near Ouro Preto (Villa Rica) in the province of Minas Geraes, Brazil. It is found also with topaz and chrysoberyl in the gold-bearing gravels of the R. Sanarka in the South Urals; and is met with as a rarity in the mica-schist of the Rauris in the Austrian Alps.

EUCLID [Eucleides], of Megara, founder of the Megarian (also called the eristic or dialectic) school of philosophy, was born *c.* 450 B.C., probably at Megara, though Gela in Sicily has also been named as his birthplace (Diogenes Laërtius ii. 106), and died in 374. He was one of the most devoted of the disciples of Socrates. Aulus Gellius (vi. 10) states that, when a decree was passed forbidding the Megarians to enter Athens, he regularly visited his master by night in the disguise of a woman; and he was one of the little band of intimate friends who listened to the last discourse. He withdrew subsequently with a number of fellow disciples to Megara, and it has been conjectured, though there is no direct evidence, that this was the period of Plato's residence in Megara, of which indications appear in the *Theaetetus.* He is said to have written six dialogues, of which only the titles have been preserved. For his doctrine (a combination of the principles of Parmenides and Socrates) see Megarian School.

EUCLID, Greek mathematician of the 3rd century B.C.; we are ignorant not only of the dates of his birth and death, but also of his parentage, his teachers, and the residence of his early years. In some of the editions of his works he is called *Megarensis*, as if he had been born at Megara in Greece, a mistake which arose from confounding him with another Euclid, a disciple of Socrates. Proclus (A.D. 412–485), the authority for most of our information regarding Euclid, states in his commentary on the first book of the *Elements* that Euclid lived in the time of Ptolemy I., king of Egypt, who reigned from 323 to 285 B.C., that he was younger than the associates of Plato, but older than Eratosthenes (276–196 B.C.) and Archimedes (287–212 B.C.). Euclid is said to have founded the mathematical school of Alexandria, which was at that time becoming a centre, not only of commerce, but of learning and research, and for this service to the cause of exact science he would have deserved commemoration, even if his writings had not secured him a worthier title to fame. Proclus preserves a reply made by Euclid to King Ptolemy, who asked whether he could not learn geometry more easily than by studying the *Elements*—"There is no royal road to geometry." Pappus of Alexandria, in his *Mathematical Collection*, says that Euclid was a man of mild and inoffensive temperament, unpretending, and kind to all genuine students of mathematics. This being all that is known of the life and character of Euclid, it only remains therefore to speak of his works.

Among those which have come down to us the most remarkable is the *Elements* (Στοιχεῖα) (see Geometry). They consist of thirteen books; two more are frequently added, but there is reason to believe that they are the work of a later mathematician, Hypsicles of Alexandria.

The question has often been mooted, to what extent Euclid, in his *Elements*, is a discoverer or a compiler. To this question no entirely satisfactory answer can be given, for scarcely any of the writings of earlier geometers have come down to our times. We are mainly dependent on Pappus and Proclus for the scanty notices we have of Euclid's predecessors, and of the problems which engaged their attention; for the solution of problems, and not the discovery of theorems, would seem to have been their principal object. From these authors we learn that the property of the right-angled triangle had been found out, the principles of geometrical analysis laid down, the restriction of constructions in plane geometry to the straight line and the circle agreed upon, the doctrine of proportion, for both commensurables and incommensurables, as well as loci, plane and solid, and some of the properties of the conic sections investigated, the five regular solids (often called the Platonic bodies) and the relation between the volume of a cone or pyramid and that of its circumscribed cylinder or prism discovered. Elementary works had been written, and the famous problem of the duplication of the cube reduced to the determination of two mean proportionals between two given straight lines. Notwithstanding this amount of discovery, and all that it implied, Euclid must have made a great advance beyond his predecessors (we are told that "he arranged the discoveries of Eudoxus, perfected those of Theaetetus, and reduced to invincible demonstration many things that had previously been more loosely proved"), for his *Elements* supplanted all similar treatises, and, as Apollonius received the title of "the great geometer," so Euclid has come down to later ages as "the elementator."

For the past twenty centuries parts of the *Elements*, notably the first six books, have been used as an introduction to geometry. Though they are now to some extent superseded in most countries, their long retention is a proof that they were, at any rate, not unsuitable for such a purpose. They are, speaking generally, not too difficult for novices in the science; the demonstrations are rigorous, ingenious and often elegant; the mixture of problems and theorems gives perhaps some variety, and makes their study less monotonous; and, if regard be had merely to the metrical properties of space as distinguished from the graphical, hardly any cardinal geometrical truths are omitted. With these excellences are combined a good many defects, some of them inevitable to a system based on a very few axioms and postulates. Thus the arrangement of the propositions seems arbitrary; associated theorems and problems are not grouped together; the classification, in short, is imperfect. Other objections, not to mention minor blemishes, are the prolixity of the style, arising partly from a defective nomenclature, the treatment of parallels depending on an axiom which is not axiomatic, and the sparing use of superposition as a method of proof.

Of the thirty-three ancient books subservient to geometrical analysis, Pappus enumerates first the *Data* (Δεδομένα) of Euclid. He says it contained 90 propositions, the scope of which he describes; it now consists of 95. It is not easy to explain this discrepancy, unless we suppose that some of the propositions, as they existed in the time of Pappus, have since been split into two, or that what were once scholia have since been erected into propositions. The object of the *Data* is to show that when certain things—lines, angles, spaces, ratios, &c.—are given by hypothesis, certain other things are given, that is, are determinable. The book, as we are expressly told, and as we may gather from its contents, was intended for the investigation of problems; and it has been conjectured that Euclid must have extended the method of the *Data* to the investigation of theorems. What prompts this conjecture is the similarity between the analysis of a theorem and the method, common enough in the *Elements*, of *reductio ad absurdum*—the one setting out from the supposition that the theorem is true, the other from the supposition that it is false, thence in both cases deducing a chain of consequences which ends in a conclusion previously known to be true or false.

The *Introduction to Harmony* (Εἰσαγωγὴ ἁρμονική), and the *Section of the Scale* (Κατατομὴ κανόνος), treat of music. There is good reason for believing that one at any rate, and probably both, of these books are not by Euclid. No mention is made of them by any writer previous to Ptolemy (A.D. 140), or by Ptolemy himself, and in no ancient codex are they ascribed to Euclid.

The *Phaenomena* (Φαινόμενα) contains an exposition of the appearances produced by the motion attributed to the celestial sphere. Pappus, in the few remarks prefatory to his sixth book, complains of the faults, both of omission and commission, of writers on astronomy, and cites as an example of the former the second theorem of Euclid's *Phaenomena*, whence, and from the interpolation of other proofs, David Gregory infers that this treatise is corrupt.

The *Optics* and *Catoptrics* (Ὀπτικά, Κατοπτρικά) are ascribed to Euclid by Proclus, and by Marinus in his preface to the *Data*, but no mention is made of them by Pappus. This latter circumstance, taken in connexion with the fact that two of the propositions in the sixth book of the *Mathematical Collection* prove the same things as three in the *Optics*, is one of the reasons given by Gregory for deeming that work spurious. Several other reasons will be found in Gregory's preface to his edition of Euclid's works.

In some editions of Euclid's works there is given a book on the *Divisions of Superficies*, which consists of a few propositions, showing how a straight line may be drawn to divide in a given ratio triangles, quadrilaterals and pentagons. This was supposed by John Dee of London, who transcribed or translated it, and entrusted it for publication to his friend Federico Commandino of Urbino, to be the treatise of Euclid referred to by Proclus as *τὸ περὶ διαιρέσεων βιβλίον*. Dee mentions that, in the copy from which he wrote, the book was ascribed to Machomet of Bagdad, and adduces two or three reasons for thinking it to be Euclid's. This opinion, however, he does not seem to have held very strongly, nor does it appear that it was adopted by Commandino. The book does not exist in Greek.

The fragment, in Latin, *De levi et ponderoso*, which is of no value, and was printed at the end of Gregory's edition only in order that nothing might be left out, is mentioned neither by Pappus nor Proclus, and occurs first in Bartholomew Zamberti's edition of 1537. There is no reason for supposing it to be genuine.

The following works attributed to Euclid are not now extant:—

1. Three books on *Porisms* (Περὶ τῶν πορισμάτων) are mentioned both by Pappus and Proclus, and the former gives an abstract of them, with the lemmas assumed. (See PORISM.)

2. Two books are mentioned, named Τόπων πρὸς ἐπιφανείᾳ, which is rendered *Locorum ad superficiem* by Commandino and subsequent geometers. These books were subservient to the analysis of loci, but the four lemmas which refer to them and which occur at the end of the seventh book of the *Mathematical Collection*, throw very little light on their contents. R. Simson's opinion was that they treated of curves of double curvature, and he intended at one time to write a treatise on the subject. (See Trail's *Life of Dr Simson*).

3. Pappus says that Euclid wrote four books on the *Conic Sections* (βιβλία τέσσαρα Κωνικῶν), which Apollonius amplified, and to which he added four more. It is known that, in the time of Euclid, the parabola was considered as the section of a right-angled cone, the ellipse that of an acute-angled cone, the hyperbola that of an obtuse-angled cone, and that Apollonius was the first who showed that the three sections could be obtained from any cone. There is good ground therefore for supposing that the first four books of Apollonius's *Conics*, which are still extant, resemble Euclid's *Conics* even less than Euclid's *Elements* do those of Eudoxus and Theaetetus.

4. A book on *Fallacies* (Περὶ ψευδαρίων) is mentioned by Proclus, who says that Euclid wrote it for the purpose of exercising beginners in the detection of errors in reasoning.

This notice of Euclid would be incomplete without some account of the earliest and the most important editions of his works. Passing over the commentators of the Alexandrian school, the first European translator of any part of Euclid is Boëtius (500), author of the *De consolatione philosophiae*. His *Euclidis Megarensis geometriae libri duo* contain nearly all the definitions of the first three books of the *Elements*, the postulates, and most of the axioms. The enunciations, with diagrams but no proofs, are given of most of the propositions in the first, second and fourth books, and a few from the third. Some centuries afterwards, Euclid was translated into Arabic, but the only printed version in that language is the one made of the thirteen books of the *Elements* by Nasir Al-Dīn Al-Tūsī (13th century), which appeared at Rome in 1594.

The first printed edition of Euclid was a translation of the fifteen books of the *Elements* from the Arabic, made, it is supposed, by Adelard of Bath (12th century), with the comments of Campanus of Novara. It appeared at Venice in 1482, printed by Erhardus Ratdolt, and dedicated to the doge Giovanni Mocenigo. This edition represents Euclid very inadequately; the comments are often foolish, propositions are sometimes omitted, sometimes joined together, useless cases are interpolated, and now and then Euclid's order changed.

The first printed translation from the Greek is that of Bartholomew Zamberti, which appeared at Venice in 1505. Its contents will be seen from the title: *Euclidis megarēsis philosophi platonici Mathematicaruꝫ disciplinarū Janitoris: Habent in hoc volumine quicūqꝫ ad mathematicā substantiā aspirāt: elemētorum libros xiii cū expositione Theonis insignis mathematici . . . Quibus . . . adjuncta. Deputatum scilicet Euclidi volumē xiiii cū expositiōe Hypsi. Alex. Itidēqꝫ Phaeno. Specu. Perspe. cum expositione Theonis ac mirandus ille liber Datorum cum expositiōe Pappi Mechanici una cū Marini dialectici protheoria. Bar. Zāber. Vene. Interꝑte.*

The first printed Greek text was published at Basel, in 1533, with the title Εὐκλείδου Στοιχείων βιβλ. ιε ἐκ τῶν Θέωνος συνουσιῶν. It was edited by Simon Grynaeus from two MSS. sent to him, the one from Venice by Lazarus Bayfius, and the other from Paris by John Ruellius. The four books of Proclus's commentary are given at the end from an Oxford MS. supplied by John Claymundus.

The English edition, the only one which contains all the extant works attributed to Euclid, is that of Dr David Gregory, published at Oxford in 1703, with the title, Εὐκλείδου τὰ σωζόμενα. *Euclidis quae supersunt omnia.* The text is that of the Basel edition, corrected from the MSS. bequeathed by Sir Henry Savile, and from Savile's annotations on his own copy. The Latin translation, which accompanies the Greek on the same page, is for the most part that of Commandino. The French edition has the title, *Les Œuvres d'Euclide, traduites en Latin et en Français, d'après un manuscrit très-ancien qui était resté inconnu jusqu'à nos jours. Par F. Peyrard, Traducteur des œuvres d'Archimède.* It was published at Paris in three volumes, the first of which appeared in 1814, the second in 1816 and the third in 1818. It contains the *Elements* and the *Data*, which are, says the editor, certainly the only works which remain to us of this ever-celebrated geometer. The texts of the Basel and Oxford editions were collated with 23 MSS., one of which belonged to the library of the Vatican, but had been sent to Paris by the comte de Peluse (Monge). The Vatican MS. was supposed to date from the 9th century; and to its readings Peyrard gave the greatest weight. What may be called the German edition has the title Εὐκλείδου Στοιχεῖα. *Euclidis Elementa ex optimis libris in usum Tironum Graece edita ab Ernesto Ferdinando August.* It was published at Berlin in two parts, the first of which appeared in 1826 and the second in 1829. The above mentioned texts were collated with three other MSS. Modern standard editions are by Dr Heiberg of Copenhagen, *Euclidis Elementa, edidit et Latine interpretatus est J. L. Heiberg.* vols. i.-v. (Lipsiae, 1883–1888), and by T. L. Heath, *The Thirteen Books of Euclid's Elements*, vols. i.-iii. (Cambridge, 1908).

Of translations of the *Elements* into modern languages the number is very large. The first English translation, published at London in 1570, has the title, *The Elements of Geometrie of the most auncient Philosopher Euclide of Megara. Faithfully (now first) translated into the Englishe toung, by H. Billingsley, Citizen of London. Whereunto are annexed certaine Scholies, Annotations and Inventions, of the best Mathematiciens, both of time past and in this our age.* The first French translation of the whole of the *Elements* has the title, *Les Quinze Livres des Elements d'Euclide. Traduicts de Latin en François. Par D. Henrion, Mathematicien.* The first edition of it was published at Paris in 1615, and a second, corrected and augmented, in 1623. Pierre Forcadel de Beziés had published at Paris in 1564 a translation of the first six books of the *Elements*, and in 1565 of the seventh, eighth and ninth books. An Italian translation, with the title, *Euclide Megarense acutissimo philosopho solo introduttore delle Scientie Mathematice. Diligentemente rassettato, et alla integrità ridotto, per il degno professore di tal Scientie Nicolò Tartalea Brisciano*, was published at Venice in 1569, and Federico Commandino's translation appeared at Urbino in 1575; a Spanish version, *Los Seis Libros primeros de la geometria de Euclides. Traduzidos en lēgua Española por Rodrigo Camorano, Astrologo y Mathematico*, at Seville in 1576; and a Turkish one, translated from the edition of J. Bonnycastle by Husaīn Rʿfkī, at Bulak in 1825. Dr Robert Simson's editions of the first six and the eleventh and twelfth books of the *Elements*, and of the *Data*.

AUTHORITIES.—The authors and editions above referred to; Fabricius, *Bibliotheca Graeca*, vol. iv.; Murhard's *Litteratur der mathematischen Wissenschaften*; Heilbronner's *Historia matheseos universae*; De Morgan's article "Eucleides" in Smith's *Dictionary of Biography and Mythology*; Moritz Cantor's *Geschichte der Mathematik*, vol. i. (J. S. M.)

EUCRATIDES, king of Bactria (*c.* 175–129 B.C.), came to the throne by a rebellion against the dynasty of Euthydemus, whose son Demetrius had conquered western India. His authority was challenged by a great many other pretenders and Greek dynasts in Sogdiana, Aria (Herat), Drangiana (Sijistan), &c., whose names—Pantaleon, Agathocles, Antimachus, Antalcidas "the victorious" (νικηφόρος), Plato, whose unique coin is dated from the year 147 of the Seleucid era (=166 B.C.), and others—are known only from coins with Greek and Indian legends. In the west the Parthian king Mithradates I. began to enlarge his kingdom and attacked Eucratides; he succeeded in conquering two provinces between Bactria and Parthia, called by Strabo "the country of Aspiones and Turiua," two Iranian names. But the principal opponent of Eucratides was Demetrius (*q.v.*) of India, who attacked him with a large army "of 300,000 men"; Eucratides fled with 300 men into a fortress and was besieged. But at last he beat

Demetrius, and conquered a great part of western India. According to Apollodorus of Artemita, the historian of the Parthians, he ruled over 1000 towns (Strabo xv. 686; transferred to Diodotus of Bactria in Justin 41, 4. 6); and the extent of his kingdom over Bactria, Sogdiana (Bokhara), Drangiana (Sijistan), Kabul and the western Punjab is confirmed by numerous coins. On these coins, which bear Greek and Indian legends (in Kharoshti writing, cf. BACTRIA), he is called "the great King Eucratides." On one his portrait and name are associated on the reverse with those of Heliocles and Laodice; Heliocles was probably his son, and the coin may have been struck to celebrate his marriage with Laodice, who seems to have been a Seleucid princess. In Bactria Eucratides founded a Greek city, Eucratideia (Strabo xi. 516, Ptolem. vi. 11. 8). On his return from India Eucratides was (about 150 B.C.) murdered by his son, whom he had made co-regent (Justin 41, 6). This son is probably the Heliocles just mentioned, who on his coins calls himself "the Just" (βασιλέως Ἡλιοκλέους δικαίου). In his time the Graeco-Bactrian kingdom lost the countries north of the Hindu Kush. Mongolian tribes, the Yue-chi of the Chinese, called by the Greeks Scythians, by the Indians Saka, among which the Tochari are the most conspicuous, invaded Sogdiana in 159 B.C. and conquered Bactria in 139. Meanwhile the Parthian kings Mithradates I. and Phraates II. conquered the provinces in the west of the Hindu Kush (Justin 41, 6. 8); for a short time Mithradates I. extended his dominion to the borders of India (Diod. 33. 18, Orosius v. 4. 16). When Antiochus VII. Sidetes tried once more to restore the Seleucid dominion in 130, Phraates allied himself with the Scythians (Justin 42, 1. 1); but after his decisive victory in 129 he was attacked by them and fell in the battle. The changed state of affairs is shown by the numerous coins of Heliocles; while his predecessors maintained the Attic standard, which had been dominant throughout the Greek east, he on his later coins passes over to a native silver standard, and his bronze coins became quite barbarous. Besides his coins we possess coins of many other Greek kings of these times, most of whom take the epithet of "invincible" (ἀνίκητος) and "saviour" σωτήρ). They are records of a desperate struggle of the Greeks to maintain their nationality and independence in the Far East; one usurper after the other rose to fight for the rescue of the kingdom. But these internal wars only accelerated the destruction; about 120 B.C. almost the whole of eastern Iran was in the hands either of a Parthian dynasty or of the Mongol invaders, who are now called Indo-Scythians. Only in the Kabul valley and western India the Greeks maintained themselves about two generations longer (see MENANDER). (ED. M.)

EUDAEMONISM (from Gr. εὐδαιμονία, literally the state of being under the protection of a benign spirit, a "good genius"), in ethics, the name applied to theories of morality which find the chief good of man in some form of happiness. The term Eudaemonia has been taken in a large number of senses, with consequent variations in the meaning of Eudaemonism. To Plato the "happiness" of all the members of a state, each according to his own capacity, was the final end of political development. Aristotle, as usual, adopted "eudaemonia" as the term which in popular language most nearly represented his idea and made it the keyword of his ethical doctrine. None the less he greatly expanded the content of the word, until the popular idea was practically lost: if a man is to be called εὐδαίμων, he must have all his powers performing their functions freely in accordance with virtue, as well as a reasonable degree of material well-being; the highest conceivable good of man is the life of contemplation. Aristotle further held that the good man in achieving virtue must experience pleasure (ἡδονή), which is, therefore, not the same as, but the sequel to or concomitant of eudaemonia. Subsequent thinkers have to a greater or less degree identified the two ideas, and much confusion has resulted. Among the ancients the Epicureans expressed all eudaemonia in terms of pleasure. On the other hand attempts have been made to separate hedonism, as the search for a continuous series of physical pleasures, from eudaemonism, a condition of enduring mental satisfaction. Such a distinction involves the assumptions that bodily pleasures are generically different from mental ones, and that there is in practice a clearly marked dividing line,—both of which hypotheses are frequently denied. Among modern writers, James Seth (*Ethical Princ.*, 1894) resumes Aristotle's position, and places Eudaemonism as the mean between the Ethics of Sensibility (hedonism) and the Ethics of Rationality, each of which overlooks the complex character of human life. The fundametal difficulty which confronts those who would distinguish between pleasure and eudaemonia is that all pleasure is ultimately a mental phenomenon, whether it be roused by food, music, doing a moral action or committing a theft. There is a marked disposition on the part of critics of hedonism to confuse "pleasure" with animal pleasure or "passion,"—in other words, with a pleasure phenomenon in which the predominant feature is entire lack of self-control, whereas the word "pleasure" has strictly no such connotation. Pleasure is strictly nothing more than the state of being pleased, and hedonism the theory that man's chief good consists in acting in such a way as to bring about a continuous succession of such states. That they are in some cases produced by physical or sensory stimuli does not constitute them irrational, and it is purely arbitrary to confine the word pleasure to those cases in which such stimuli are the proximate causes. The value of the term Eudaemonism as an antithesis to Hedonism is thus very questionable.

EUDOCIA AUGUSTA (*c.* 401–*c.* 460), the wife of Theodosius II., East Roman emperor, was born in Athens, the daughter of the sophist Leontius, from whom she received a thorough training in literature and rhetoric. Deprived of her small patrimony by her brothers' rapacity, she betook herself to Constantinople to obtain redress at court. Her accomplishments attracted Theodosius' sister Pulcheria, who took her into her retinue and destined her to be the emperor's wife. After receiving baptism and discarding her former name, Athenaïs, for that of Aelia Līcinia Eudocia, she was married to Theodosius in 421; two years later, after the birth of a daughter, she received the title Augusta. The new empress repaid her brothers by making them consuls and prefects, and used her large influence at court to protect pagans and Jews. In 438–439 she made an ostentatious pilgrimage to Jerusalem, whence she brought back several precious relics; during her stay at Antioch she harangued the senate in Hellenic style and distributed funds for the repair of its buildings. On her return her position was undermined by the jealousy of Pulcheria and the groundless suspicion of an intrigue with her protégé Paulinus, the master of the offices. After the latter's execution (440) she retired to Jerusalem, where she was made responsible for the murder of an officer sent to kill two of her followers and stripped of her revenues. Nevertheless she retained great influence; although involved in the revolt of the Syrian monophysites (453), she was ultimately reconciled to Pulcheria and readmitted into the orthodox church. She died at Jerusalem about 460, after devoting her last years to literature. Among her works were a paraphrase of the Octateuch in hexameters, a paraphrase of the books of Daniel and Zechariah, a poem on St Cyprian and on her husband's Persian victories. A *Passion History* compiled out of Homeric verses, which Zonaras attributed to Eudocia, is perhaps of different authorship.

See W. Wiegand, *Eudokia* (Worms, 1871); F. Gregorovius, *Athenaïs* (Leipzig, 1892); C. Diehl, *Figures byzantines* (Paris, 1906), pp. 25-49; also THEODOSIUS. On her works cf. A. Ludwich, *Eudociae Augustae carminum reliquiae* (Königsberg, 1893).

EUDOCIA MACREMBOLITISSA (*c.* 1021–1096), daughter of John Macrembolites, was the wife of the Byzantine emperor Constantine X., and after his death (1067) of Romanus IV. She had sworn to her first husband on his deathbed not to marry again, and had even imprisoned and exiled Romanus, who was suspected of aspiring to the throne. Perceiving, however, that she was not able unaided to avert the invasions which threatened the eastern frontier of the empire, she revoked her oath, married Romanus, and with his assistance dispelled the impending danger. She did not live very happily with her new husband, who was warlike and self-willed, and when he was taken prisoner by the Turks (1071) she was compelled to vacate the throne in favour of her son Michael and retire to a convent, where she died. The dictionary of mythology entitled *’Ιωνιά* (“ Collection of Violets ”), which formerly used to be ascribed to her, was not composed till 1543 (Constantine Palaeokappa).

See J. Flach, *Die Kaiserin Eudokia Makrembolitissa* (Tübingen, 1876); P. Pulch, *De Eudociae quod fertur Violario* (Strassburg, 1880); and in *Hermes*, xvii. (1882), p. 177 ff.

EUDOXIA LOPUKHINA (1669–1731), tsaritsa, first consort of Peter the Great, was the daughter of the boyarin Theodore Lopukhin. Peter, then a youth of seventeen, married her on the 27th of January 1689 at the command of his mother, who hoped to wean him from the wicked ways of the German suburb of Moscow by wedding him betimes to a lady who was as pious as she was beautiful. The marriage was in every way unfortunate. Accustomed from her infancy to the monastic seclusion of the *terem*, or women's quarter, Eudoxia's mental horizon did not extend much beyond her embroidery-frame or her illuminated service-book. From the first her society bored Peter unspeakably, and after the birth of their second, short-lived son Alexander, he practically deserted her. In 1698 she was unceremoniously sent off to the Pokrovsky monastery at Suzdal for refusing to consent to a divorce, though it was not till June 1699 that she disappeared from the world beneath the hood of sister Elena. In the monastery, however, she was held in high honour by the archimandrite; the nuns persisted in regarding her as the lawful empress; and she was permitted an extraordinary degree of latitude, unknown to Peter, who dragged her from her enforced retreat in 1718 on a charge of adultery. As the evidence was collected by Peter's creatures, it is very doubtful whether Eudoxia was guilty, though she was compelled to make a public confession. She was then divorced and consigned to the remote monastery of Ladoga. Here she remained for ten years till the accession of her grandson, Peter II., when the reactionaries proposed to appoint her regent. She was escorted with great ceremony to Moscow in 1728 and exhibited to the people attired in the splendid, old-fashioned robes of a tsaritsa; but years of rigid seclusion had dulled her wits, and her best friends soon convinced themselves that a convent was a much more suitable place for her than a throne. An allowance of 60,000 roubles a year was accordingly assigned to her, and she disappeared again in a monastery at Moscow, where she died in 1731.

See Robert Nisbet Bain, *Pupils of Peter the Great* (London, 1895), chaps. ii. and iv.; and *The First Romanovs* (London, 1905), chaps. viii. and xii. (R. N. B.)

EUDOXUS, of Cnidus, Greek savant, flourished about the middle of the 4th century B.C. It is chiefly as an astronomer that his name has come down to us (see ASTRONOMY and ZODIAC). From a life by Diogenes Laërtius, we learn that he studied at Athens under Plato, but, being dismissed, passed over into Egypt, where he remained for sixteen months with the priests of Heliopolis. He then taught physics in Cyzicus and the Propontis, and subsequently, accompanied by a number of pupils, went to Athens. Towards the end of his life he returned to his native place, where he died. Strabo states that he discovered that the solar year is longer than 365 days by 6 hours; Vitruvius that he invented a sun-dial. The *Phaenomena* of Aratus is a poetical account of the astronomical observations of Eudoxus. Several works have been attributed to him, but they are all lost; some fragments are preserved in the extant *Τῶν ’Αράτου καὶ Εὐδόξου φαινομένων ἐξηγήσεων βιβλία τρία* of the astronomer Hipparchus (ed. C. Manitius, 1894). According to Aristotle (*Ethics* x. 2), Eudoxus held that pleasure was the chief good, because (1) all beings sought it and endeavoured to escape its contrary, pain; (2) it is an end in itself, not a relative good. Aristotle, who speaks highly of the sincerity of Eudoxus's convictions, while giving a qualified approval to his arguments, considers him wrong in not distinguishing the different kinds of pleasure and in making pleasure the *summum bonum*.

See J. A. Letronne, *Sur les écrites et les travaux d'Eudoxe de Cnide, d'après L. Ideler* (1841); G. V. Schiaparelli, *Le Sfere omocentriche di Eudosso* (Milan, 1876); T. H. Martin in *Académie des inscriptions*, 3rd of October, 1879; article in Ersch and Gruber's *Allgemeine Encyklopädie*.

EUDOXUS, of Cyzicus, Greek navigator, flourished about 130 B.C. He was employed by Ptolemy Euergetes, who sent out a fleet under him to explore the Arabian Sea. After two successful voyages, Eudoxus left the Egyptian service, and proceeded to Cadiz with the object of fitting out an expedition for the purpose of African discovery; and we learn from Strabo, who utilized the results of his observations, that the veteran explorer made at least two voyages southward along the coast of Africa.

There is a good account of Eudoxus in E. H. Bunbury, *History of Ancient Geography*, ii. (1879); see also P. Gaffarel, *Eudoxe de Cyzique* (1873).

EUGENE OF SAVOY [FRANÇOIS EUGÈNE], PRINCE (1663–1736), fifth son of Prince Eugene Maurice of Savoy-Carignano, count of Soissons, and of Olympia Mancini, niece of Cardinal Mazarin, was born at Paris on the 18th of October 1663. Originally destined for the church, Eugene was known at court as the *petit abbé*, but his own predilection was strongly for the army. His mother, however, had fallen into disgrace at court, and his application for a commission, repeated more than once, was refused by Louis XIV. This, and the influence of his mother, produced in him a lifelong resentment against the king. Having quitted France in disgust, he proceeded to Vienna, where his relative the emperor Leopold I. received him kindly, and he served with the Austrian army during the campaign of 1683 against the Turks. He displayed his bravery in a cavalry fight at Petronell (7th July) and in the great battle for the relief of Vienna. The emperor now gave him the command of a regiment of dragoons. At the capture of Buda in 1686 he received a wound (3rd August), but he continued to serve up to the siege of Belgrade in 1688, in which he was dangerously wounded. At the instigation of Louvois, a decree of banishment from France was now issued against all Frenchmen who should continue to serve in foreign armies. “ The king will see me again,” was Eugene's reply when the news was communicated to him; he continued his career in foreign service.

Prince Eugene's next employment was in a service that required diplomatic as well as military skill (1689). He was sent by the emperor Leopold to Italy with the view of binding the duke of Savoy to the coalition against France and of co-operating with the Italian and Spanish troops. Later in 1689 he served on the Rhine and was again wounded. He returned to Italy in time to take part in the battle of Staffarda, which resulted in the defeat of the coalition at the hands of the French marshal Catinat; but in the spring of 1691 Prince Eugene, having secured reinforcements, caused the siege of Coni to be raised, took possession of Carmagnola, and in the end completely defeated Catinat. He followed up his success by entering Dauphiné, where he took possession of Embrun and Gap. After another campaign, which was uneventful, the further prosecution of the war was abandoned owing to the defection of the duke of Savoy from the coalition, and Prince Eugene returned to Vienna, where he soon afterwards received the command of the army in Hungary, on the recommendation of the veteran count Rüdiger von Starhemberg, the defender of Vienna in 1683. It was about this time that Louis XIV. secretly offered him the bâton of a marshal of France, with the government of Champagne which his father had held, and also a pension. But Eugene rejected these offers with indignation, and proceeded to operate against the Turks commanded by Kara Mustapha. After some skilful manœuvres, he surprised the enemy (September 11th, 1697) at Zenta, on the Theiss. His attack was vigorous and daring, and the victory was one of the most complete and important ever won by the Austrian arms. Formerly it was often stated that the battle of Zenta was fought against express orders from the court, that Eugene was placed under arrest for violating these orders, and that a proposal to bring him before a council of war was frustrated only by the threatening attitude of the citizens of Vienna. This story, minute in details as it is, is entirely without foundation. After a further period of manœuvres, peace was at length concluded at Karlowitz on the 26th of January 1699.

Two years later he was again in active service in the War of the Spanish Succession (*q.v.*). At the beginning of the year 1701 he was sent into Italy once more to oppose his old antagonist Catinat. He achieved a rapid success, crossing the mountains from Tirol into Italy in spite of almost insurmountable difficulties (*Journal d. militärwissensch. Verein*, No. 5, 1907), forcing the French army, after sustaining several checks, to retire behind the Oglio, where a series of reverses equally unexpected and severe led to the recall of Catinat in disgrace. The incapable duke of Villeroi, who succeeded to the command of which Catinat had been deprived, ventured to attack Eugene at Chiari, and was repulsed with great loss. And this was only the forerunner of more signal reverses; for, in a short time, Villeroi was forced to abandon the whole of the Mantuan territory and to take refuge in Cremona, where he seems to have considered himself secure. By means of a stratagem, however, Eugene penetrated into the city during the night, at the head of 2000 men, and, though he found it impossible to hold the town, succeeded in carrying off Villeroi as a prisoner. But as the duke of Vendôme, a much abler general, replaced the captive, the incursion, daring though it was, proved anything but advantageous to the Austrians. The generalship of his new opponent, and the fact that the French army had been largely reinforced, while reinforcements had not been sent from Vienna, forced Prince Eugene to confine himself to a war of observation. The campaign was terminated by the sanguinary battle of Luzzara, fought on the 1st of August 1702, in which each party claimed the victory. Both armies having gone into winter quarters, Eugene returned to Vienna, where he was appointed president of the council of war. He then set out for Hungary in order to combat the insurgents in that country; but his means proving insufficient, he effected nothing of importance. The collapse of the revolt, however, soon freed the prince for the more important campaign in Bavaria, where, in 1704, he made his first campaign along with Marlborough. Similarity of tastes, views and talents soon established between these two great men a friendship which is rarely to be found amongst military chiefs, and contributed in the fullest measure to the success which the allies obtained. The first and perhaps the most important of these successes was that of Höchstädt or Blenheim (*q.v.*) on the 3rd of August 1704, where the English and imperial troops triumphed over one of the finest armies that France had ever sent into Germany.

But since Prince Eugene had quitted Italy, Vendôme, who commanded the French army in that country, had obtained various successes against the duke of Savoy, who had once more joined Austria. The emperor deemed the crisis so serious that he recalled Eugene and sent him to Italy to the assistance of his ally. Vendôme at first opposed great obstacles to the plan which the prince had formed for carrying succours into Piedmont; but after a variety of marches and counter-marches, in which both commanders displayed signal ability, the two armies met at Cassano (August 16, 1705), where a deadly engagement ensued, and Prince Eugene received two severe wounds which forced him to quit the field. This accident decided the fate of the battle and for the time suspended the prince's march towards Piedmont. Vendôme, however, was recalled, and La Feuillade (who succeeded him) was incapable of long arresting the progress of such a commander as Eugene. After once more passing several rivers in presence of the French army, and executing one of the most skilful and daring marches he had ever performed, the latter appeared before the entrenched camp at Turin, which place the French were now besieging with an army eighty thousand strong. Prince Eugene had only thirty thousand men; but his antagonist the duke of Orleans, though full of zeal and courage, wanted experience, and Marshal Marsin, his *adlatus*, held powers from Louis XIV. which could not fail to produce dissensions in the French headquarters. With equal courage and address, Eugene profited by the misunderstandings between the French generals; and on the 7th of September 1706 he attacked the French army in its entrenchments and gained a victory which decided the fate of Italy. In the heat of the battle Eugene received a wound, and was thrown from his horse. His recompense for this important service was the government of the Milanese, of which he took possession with great pomp on the 16th of April 1707. He was also made lieutenant-general to the emperor Joseph I.

The attempt which he made against Toulon in the course of the same year failed completely, because the invasion of the kingdom of Naples retarded the march of the troops which were to have been employed in it, and this delay afforded Marshal de Tessé time to make good dispositions. Obliged to renounce his project, therefore, the prince went to Vienna, where he was received with great enthusiasm both by the people and by the court. "I am very well satisfied with you," said the emperor, "excepting on one point only, which is, that you expose yourself too much." This monarch immediately despatched Eugene to Holland, and to the different courts of Germany, in order to forward the necessary preparations for the campaign of the following year, 1708 (see Spanish Succession, War of the).

Early in the spring of 1708 the prince proceeded to Flanders, in order to assume the command of the German army which his diplomatic ability had been mainly instrumental in assembling, and to unite his forces with those of Marlborough. The campaign was opened by the victory of Oudenarde (*q.v.*), to which the perfect union of Marlborough and Eugene on the one hand, and the misunderstanding between Vendôme and the duke of Burgundy on the other, seem to have equally contributed. The French immediately abandoned the Low Countries, and, remaining in observation, made no attempt whatever to prevent Eugene's army, covered by that of Marlborough, making the siege of Lille. The French governor, Boufflers, made a glorious defence, and Eugene paid a flattering tribute to his valour in inviting him to prepare the articles of capitulation himself, with the words "I subscribe to everything beforehand, well persuaded that you will not insert anything unworthy of yourself or of me." After this important conquest, Eugene and Marlborough proceeded to the Hague, where they were received in the most flattering manner by the public, by the states-general, and above all, by their esteemed friend the pensionary Heinsius. Negotiations were then opened for peace, but proved fruitless. In 1709 France put forth a supreme effort, and placed Marshal Villars, her best living general, in command. The events of this year were very different to those of previous campaigns, and the bloody battle of Malplaquet (*q.v.*), though a victory for Marlborough and Eugene, led to little result, and this at the cost of enormous losses. The Dutch army, it is said, never recovered from the slaughter of Malplaquet; indeed, the success was so dearly bought that the allies found themselves soon afterwards out of all condition to undertake anything. Their army accordingly went into winter quarters, and Prince Eugene returned to Vienna, whence the emperor almost immediately despatched him to Berlin. From the king of Prussia the prince obtained everything which he had been instructed to require; and having thus fulfilled his mission, he returned into Flanders, where, excepting the capture of Douai, Bethune and Aire, the campaign of 1710 presented nothing remarkable. On the death of the emperor Joseph I. in April 1711, Prince Eugene, in concert with the empress, exerted his utmost endeavours to secure the crown to the archduke, who afterwards ascended the imperial throne under the name of Charles VI. In the same year the changes which had occurred in the policy, or rather the caprice, of Queen Anne, brought about an approximation between England and France, and put an end to the influence which Marlborough had hitherto possessed. When this political revolution became known, Prince Eugene immediately repaired to London, charged with a mission from the emperor to re-establish the credit of his illustrious companion in arms, as well as to re-attach England to the coalition. The mission having proved unsuccessful, the emperor found himself under the necessity of making the campaign of 1712 with the aid of the Dutch alone. The defection of the English, however, did not induce Prince Eugene to abandon his favourite plan of invading France. He resolved, at whatever cost, to penetrate into Champagne; and in order to support his operations by the possession of some important places, he began by making himself master of Quesnoy. But the Dutch, having been surprised and beaten in the lines of Denain, where Prince Eugene had placed them at too great a distance to receive timely support in case of an attack, he was obliged to raise the siege of Landrecies, and to abandon the project which he had so long cherished. This was the last campaign in which Austria acted in conjunction with her allies. Abandoned first by England and then by Holland, the emperor, notwithstanding these desertions, still wished to maintain the war in Germany; but Eugene was unable to relieve either Landau or Freiburg, which were successively obliged to capitulate; and seeing the Empire thus laid open to the armies of France, and even the Austrian hereditary states themselves exposed to invasion, the prince counselled his master to make peace. Sensible of the prudence of this advice, the emperor immediately entrusted Eugene with full powers to negotiate a treaty of peace, which was concluded at Rastadt on the 6th of March 1714. On his return to Vienna, Prince Eugene was employed for a time in political matters, and at this time he exchanged the government of the Milanese for that of the Austrian Netherlands.

It was not long, however, before he was again called on to assume the command of the army in the field. In the spring of 1716 the emperor, having concluded an offensive alliance with Venice against Turkey, appointed Eugene to command the army of Hungary; and at Peterwardein he gained (5th of August 1716) a signal victory over a Turkish army of more than twice his own strength. In recognition of this service to Christendom the pope sent to the victorious general the consecrated hat and sword which the court of Rome was accustomed to bestow upon those who had triumphed over the infidels. Eugene won another victory in this campaign at Temesvár. But the ensuing campaign, that of 1717, was still more remarkable on account of the battle of Belgrade. After having besieged the city for a month Eugene found himself in a most critical, if not hopeless situation. He had to deal not only with the garrison of 30,000 men, but with a relieving army of 200,000, and his own force was only about 40,000 strong. In these circumstances the only possible deliverance was by a bold and decided stroke. Accordingly on the morning of the 16th of August 1717 Prince Eugene ordered a general attack, which resulted in the total defeat of the enemy with an enormous loss, and in the capitulation of the city six days afterwards. The prince was wounded in the heat of the action, this being the thirteenth time that he had been hit upon the field of battle. On his return to Vienna he received, among other testimonies of gratitude, a sword valued at 80,000 florins from the emperor. The popular song "Prinz Eugen, der edle Ritter," commemorates the victory of Belgrade. In the following year, 1718, after some fruitless negotiations with a view to the conclusion of peace, he again took the field; but the treaty of Passarowitz (July 21, 1718) put an end to hostilities at the moment when the prince had well-founded hopes of obtaining still more important successes than those of the last campaign, and even of reaching Constantinople, and dictating a peace on the shores of the Bosporus.

As the government of the Netherlands, up to 1724 held by Eugene, had now for some reason been bestowed on a sister of the emperor, the prince was appointed vicar-general of Italy, with a pension of 300,000 florins. Though still retaining his official position and much of his influence at court, his personal relations with the emperor were not so cordial as before, and he suffered from the intrigues of the Spanish or anti-German party. The most remarkable of these political intrigues was the conspiracy of Tedeschi and Nimptsch against the prince in 1719. On discovering this the prince went to the emperor and threatened to lay down all his offices if the conspirators were not punished, and after some resistance he achieved his purpose. During the years of peace between the treaty of Passarowitz and the War of the Polish Succession, Eugene occupied himself with the arts and with literature, to which he had hitherto been able to devote little of his time. This new interest led him to correspond with many of the most eminent men in Europe. But the contest which arose out of the succession of Augustus II. to the throne of Poland having afforded Austria a pretext for attacking France, war was resolved on, contrary to the advice of Eugene (1734). In spite of this, however, he was appointed to command the army destined to act upon the Rhine, which from the commencement had very superior forces opposed to it; and if it could not prevent the capture of Philipsburg after a long siege, it at least prevented the enemy from entering Bavaria. Prince Eugene, having now attained his seventy-first year, no longer possessed the vigour and activity necessary for a general in the field, and he welcomed the peace which was concluded on the 3rd of October 1735. On his return to Vienna his health declined more and more, and he died in that capital on the 21st of April 1736, leaving an immense inheritance to his niece, the princess Victoria of Savoy.

Of a character cold and severe, Prince Eugene had almost no other passion than that of glory. He died unmarried, and seemed so little susceptible to female influence that he was styled a Mars without a Venus. That he was one of the great captains of history is universally admitted. He was strangely unlike the commanders of his time in many respects, though as a matter of course he was, when he saw fit to follow the accepted rules, equal to any in careful and methodical strategy. The special characteristics of his generalship were imagination, fiery energy, and a tactical resolution which was rare indeed in the 18th century. Despising the lives of his soldiers as much as he exposed his own, it was always by persevering efforts and great sacrifices that he obtained victory. His almost invariable success raised the reputation of the Austrian army to a point which it never reached either before or since his day. War was with him a passion. Always on the march, in camps, or on the field of battle during more than fifty years, and under the reigns of three emperors, he had scarcely passed two years together without fighting. Yet his political activity was not inconsiderable, and his advice was always sound and well-considered; while in his government of the Netherlands, which he exercised through the marquis de Prié, he set himself resolutely to oppose the many wild schemes, such as Law's Mississippi project, in which the times were so fertile. His interest in literature and art has been alluded to above. His palace in Vienna, and the Belvedere near that city, his library, and his collection of paintings, were renowned. Prince Eugene was a man of the middle size, but, upon the whole, well made; the cast of his visage was somewhat long, his mouth moderate and almost always open; his eyes were black and animated, and his complexion such as became a warrior.

See A. v. Arneth, *Prinz Eugen* (3 vols., Vienna, 1858; 2nd ed., 1864); H. v. Sybel, *Prinz Eugen von Savoyen* (Munich, 1868); Austrian official history, *Feldzüge des Prinzen Eugen von Savoyen* (Vienna, 1876); Malleson, *Prince Eugene* (London, 1888); Heller, *Militärische Korrespondenz des Prinzen Eugens* (Vienna, 1848); Keym, *Prinz Eugen* (Freiburg, 1899); *Österr. militärische Zeitschrift* ("Streffleur"); Ridler's *Österr. Archiv für Geschichte* (1831–1833); *Archivio storico Italico*, vol. 17; *Mitteil. des Instituts für österr. Geschichtsforschung*, vol. 13.

The political memoirs attributed to Prince Eugene (ed. Sartori, Tübingen, 1812) are spurious; see Böhm, *Die Sammlung der hinterlassenen politischen Schriften des Prinzen Eugens* (Freiburg, 1900).

EUGENE, a city and the county-seat of Lane county, Oregon, U.S.A., on the Willamette river, at the head of navigation, about 125 m. S. of Portland. Pop. (1900) 3236, of whom 237 were foreign-born; (1910 Federal census) 9009. Eugene is served by the Southern Pacific railroad and by interurban electric railway. It is situated on the edge of a broad and fertile prairie, at the foot of a ridge of low hills and within view of the peaks of the Coast Range; the streets are pleasantly shaded with Oregon maples. The city is most widely known as the seat of the University of Oregon. This institution, opened in 1876 and having 95 instructors and 734 students in 1907–1908, occupies eight buildings on a grassy slope along the river bank, and embraces a college of literature, science and the arts, a college of engineering, a graduate school, and (at Portland) a school of law and a school of medicine. In the city is the Eugene Divinity School of the Disciples of Christ, opened in 1895. Eugene is the commercial centre of an extensive agricultural district; does a large business in grain, fruit, hops, cattle, wool and lumber; and has various manufactures, including flour, lumber, woollen goods and canned fruit. Eugene was settled in 1854, and was first incorporated in 1864.

EUGENICS (from the Gr. εὐγενής, well born), the modern name given to the science which deals with the influences which improve the inborn qualities of a race, but more particularly with those which develop them to the utmost advantage, and which generally serves to disseminate knowledge and encourage action in the direction of perpetuating a higher racial standard. The founder of this science may be said to be Sir Francis Galton (*q.v.*), who has done much to further its study, not only by his writings, but by the establishment of a research fellowship and scholarship in eugenics in the university of London. The aim of the science as laid down by Galton is to bring as many influences as can reasonably be employed, to cause the useful classes in the community to contribute *more* than their proportion to the next generation. It can hardly be said that the science has advanced beyond the stage of disseminating a knowledge of the laws of heredity, so far as they are surely known, and endeavouring to promote their further study. Useful work has been done in the compilation of statistics of the various conditions affecting the science, such as the rates with which the various classes of society in ancient and modern nations have contributed in civic usefulness to the population at various times, the inheritance of ability, the influences which affect marriage, &c.

Works by Galton bearing on eugenics are: *Hereditary Genius* (2nd ed., 1892), *Human Faculty* (1883), *Natural Inheritance* (1889), *Huxley Lecture of the Anthropol. Inst. on the Possible Improvement of the Human Breed under the existing Conditions of Law and Sentiment* (1901); see also *Biometrika* (a journal for the statistical study of biological problems, of which the first volume was published in 1902).

EUGÉNIE [MARIE-EUGÉNIE-IGNACE-AUGUSTINE DE MONTIJO] (1826–), wife of Napoleon III., emperor of the French, daughter of Don Cipriano Guzman y Porto Carrero, count of Teba, subsequently count of Montijo and grandee of Spain, was born at Grenada on the 5th of May 1826. Her mother was a daughter of William Kirkpatrick, United States consul at Malaga, a Scotsman by birth and an American by nationality. Her childhood was spent in Madrid, but after 1834 she lived with her mother and sister chiefly in Paris, where she was educated, like so many French girls of good family, in the convent of the Sacré Cœur. When Louis Napoleon became president of the Republic she appeared frequently with her mother at the balls given by the prince president at the Elysée, and it was here that she made the acquaintance of her future husband. In November 1852 mother and daughter were invited to Fontainebleau, and in the picturesque hunting parties the beautiful young Spaniard, who showed herself an expert horsewoman, was greatly admired by all present and by the host in particular. Three weeks later, on the 2nd of December, the Empire was formally proclaimed, and during a series of fêtes at Compiègne, which lasted eleven days (19th to 30th December), the emperor became more and more fascinated. On New Year's Eve, at a ball at the Tuileries, Mdlle de Montijo, who had necessarily excited much jealousy and hostility in the female world, had reason to complain that she had been insulted by the wife of an official personage. On hearing of it the emperor said to her, "Je vous vengerai"; and within three days he made a formal proposal of marriage. In a speech from the throne on the 22nd of January he formally announced his engagement, and justified what some people considered a mésalliance. "I have preferred," he said, "a woman whom I love and respect to a woman unknown to me, with whom an alliance would have had advantages mixed with sacrifices." Of her whom he had chosen he ventured to make a prediction: "Endowed with all the qualities of the soul, she will be the ornament of the throne, and in the day of danger she will become one of its courageous supports." The marriage was celebrated with great pomp at Notre Dame on the 30th of January 1853. On the 16th of March 1856 the empress gave birth to a son, who received the title of Prince Imperial. The emperor's prediction regarding her was not belied by events. By her beauty, elegance and charm of manner she contributed largely to the brilliancy of the imperial régime, and when the end came, she was, as the official *Enquête* made by her enemies proved, one of the very few who showed calmness and courage in face of the rising tide of revolution. The empress acted three times as regent during the absence of the emperor,—in 1859, 1865 and 1870,—and she was generally consulted on important questions. When the emperor vacillated between two lines of policy she generally urged on him the bolder course; she deprecated everything tending to diminish the temporal power of the papacy, and she disapproved of the emperor's liberal policy at the close of his reign. On the collapse of the Empire she fled to England, and settled with the emperor and her son at Chislehurst. After the emperor's death she removed to Farnborough, where she built a mausoleum to his memory. In 1879 her son was killed in the Zulu War, and in the following year she visited the spot and brought back the body to be interred beside that of his father. At Farnborough and in a villa she built at Cap Martin on the Riviera, she continued to live in retirement, following closely the course of events, but abstaining from all interference in French politics.

EUGENIUS, the name of four popes.

EUGENIUS I., pope from 654 to 657. Elected on the banishment of Martin I. by the emperor Constans II., and at the height of the Monothelite crisis, he showed greater deference than his predecessor to the emperor's wishes, and made no public stand against the patriarchs of Constantinople. He, however, held no communication with them, being closely watched in this respect by Roman opinion.

EUGENIUS II., pope, was a native of Rome, and was chosen to succeed Pascal I. in 824. His election did not take place without difficulty. Eugenius was the candidate of the nobles, and the clerical faction brought forward a competitor. But the monk Wala, the representative of the emperor Lothair, succeeded in arranging matters, and Eugenius was elected. Lothair, however, came to Rome in person, and took advantage of this opportunity to redress many abuses in the papal administration, to vest the election of the pope in the nobles, and to confirm the statute that no pope should be consecrated until his election had the approval of the emperor. A council which assembled at Rome during the reign of Eugenius passed several enactments for the restoration of church discipline, took measures for the foundation of schools and chapters, and decided against priests wearing a secular dress or engaging in secular occupations. Eugenius also adopted various provisions for the care of the poor and of widows and orphans. He died in 827. (L. D.*)

EUGENIUS III. (Bernardo Paganelli), pope from the 15th of February 1145 to the 8th of July 1153, a native of Pisa, was abbot of the Cistercian monastery of St Anastasius at Rome when suddenly elected to succeed Lucius II. His friend and instructor, Bernard of Clairvaux, the most influential ecclesiastic of the time, remonstrated against his election on account of his "innocence and simplicity," but Bernard soon acquiesced and continued to be the mainstay of the papacy throughout Eugenius's pontificate. It was to Eugenius that Bernard addressed his famous work *De consideratione*. Immediately after his election, the Roman senators demanded the pope's renunciation of temporal power. He refused and fled to Farfa, where he was consecrated on the 17th of February. By treaty of December 1145 he recognized the republic under his suzerainty, substituted a papal prefect for the "patrician" and returned to Rome. The celebrated schismatic, Arnold of Brescia, however, put himself again at the head of the party opposed to the temporal power of the papacy, re-established the patricianate, and forced the pope to leave Rome. Eugenius had already, on hearing of the fall of Edessa, addressed a letter to Louis VII. of France (December 1145), announcing the Second Crusade and granting plenary indulgence under the usual conditions to those who would take the cross; and in January 1147 he journeyed to France to further preparations for the holy war and to seek aid in the constant feuds at Rome. After holding synods at Paris, Reims and Trier, he returned to Italy in June 1148 and took up his residence at Viterbo. The following month he excommunicated Arnold of Brescia in a synod at Cremona, and thenceforth devoted most of his energies to the recovery of his see. As the result of negotiations between Frederick Barbarossa and the Romans, Eugenius was finally enabled to return to Rome in December 1152, but died in the following July. He was succeeded by Anastasius IV. Eugenius retained the stoic virtues of monasticism throughout his stormy career, and was deeply reverenced for his personal character. His tomb in St Peter's acquired fame for miraculous cures, and he was pronounced blessed by Pius IX. in 1872.

The chief sources for the career of Eugenius III. are his letters in J. P. Migne, *Patrol. Lat.*, vols. 106, 180, 182, and in *Bibliothèque de l'École des Chartes*, vol. 57 (Paris, 1896); the life by Cardinal Boso in J. M. Watterich, *Pontif. Roman. vitae*, vol. 2; and the life by John of Salisbury in *Monumenta Germaniae historica. Scriptores*, vol. 20.

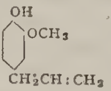
See J. Langen, *Geschichte der römischen Kirche von Gregor VII. bis Innocenz III.* (Bonn, 1893); F. Gregorovius, *Rome in the Middle Ages*, vol. 4, trans. by Mrs G. W. Hamilton (London, 1900–1902); K. J. von Hefele, *Conciliengeschichte*, Bd. 5, 2nd ed.; Jaffé-Wattenbach, *Regesta pontif. Roman.* (1885–1888); M. Jocham, *Geschichte des Lebens u. der Verehrung des seligen Papstes Eugen III.* (Augsburg, 1873); G. Sainati, *Vita del beato Eugenio III* (Pisa, 1868); J. Jastrow and G. Winter, *Deutsche Geschichte im Zeitalter der Hohenstaufen*, i. (Stuttgart, 1897); C. Neumann, *Bernhard von Clairvaux u. die Anfänge der zweiten Kreuzzuges* (Heidelberg, 1882); B. Kugler, *Analekten zur Geschichte des zweiten Kreuzzugs* (Tübingen, 1878, 1883). (C. H. Ha.)

Eugenius IV. (Gabriel Condulmieri), pope from the 3rd of March 1431 to the 23rd of February 1447, was born at Venice of a merchant family in 1383. He entered the Celestine order and came into prominence during the pontificate of his uncle, Gregory XII., by whom he was appointed bishop of Siena, papal treasurer, protonotary, cardinal-priest of St Marco e St Clemente, and later cardinal-priest of Sta Maria in Trastevere. His violent measures, as pope, against the relations of his predecessor, Martin V., at once involved him in a serious contest with the powerful house of Colonna. But by far the most important feature of Eugenius's pontificate was the great struggle between pope and council. On the 23rd of July 1431 his legate opened the council of Basel which had been convoked by Martin, but, distrustful of its purposes and moved by the small attendance, the pope issued a bull on the 18th of December 1431, dissolving the council and calling a new one to meet in eighteen months at Bologna. The council refused to dissolve, renewed the revolutionary resolutions by which the council of Constance had been declared superior to the pope, and cited Eugenius to appear at Basel. A compromise was arranged by Sigismund, who had been crowned emperor at Rome on the 31st of May 1433, by which the pope recalled the bull of dissolution, and, reserving the rights of the Holy See, acknowledged the council as ecumenical (15th of December 1433). The establishment of an insurrectionary republic at Rome drove him into exile in May 1434, and, although the city was restored to obedience in the following October, he remained at Florence and Bologna. Meanwhile the struggle with the council broke out anew. Eugenius at length convened a rival council at Ferrara on the 8th of January 1438 and excommunicated the prelates assembled at Basel. The result was that the latter formally deposed him as a heretic on the 25th of June 1439, and in the following November elected the ambitious Amadeus VIII., duke of Savoy, antipope under the title of Felix V. The conduct of France and Germany seemed to warrant this action, for Charles VII. had introduced the decrees of the council of Basel, with slight changes, into the former country through the Pragmatic Sanction of Bourges (7th of July 1438), and the diet of Mainz had deprived the pope of most of his rights in the latter country (26th of March 1439). At Florence, whither the council of Ferrara had been transferred on account of an outbreak of the plague, was effected in July 1439 a union with the Greeks, which, as the result of political necessities, proved but temporary. This union was followed by others of even less stability. Eugenius signed an agreement with the Armenians on the 22nd of November 1439, and with a part of the Jacobites in 1443; and in 1445 he received the Nestorians and Maronites. He did his best to stem the Turkish advance, pledging one-fifth of the papal income to the crusade which set out in 1443, but which met with overwhelming defeat. His rival, Felix V., meanwhile obtained small recognition, and the latter's ablest adviser, Aeneas Sylvius Piccolomini, made peace with Eugenius in 1442. The pope's recognition of the claims to Naples of King Alphonso of Aragon withdrew the last important support from the council of Basel, and enabled him to make a victorious entry into Rome on the 28th of September 1443, after an exile of nearly ten years. His protests against the Pragmatic Sanction of Bourges were ineffectual, but by means of the Concordat of the Princes, negotiated by Piccolomini with the electors in February 1447, the whole of Germany declared against the antipope. Although his pontificate had been so stormy and unhappy that he is said to have regretted on his death-bed that he ever left his monastery, nevertheless Eugenius's victory over the council of Basel and his efforts in behalf of church unity contributed greatly to break down the conciliar movement and restore the papacy to the position it had held before the Great Schism. Eugenius was dignified in demeanour, but inexperienced and vacillating in action and excitable in temper. Bitter in his hatred of heresy, he yet displayed great kindness to the poor. He laboured to reform the monastic orders, especially the Franciscan, and was never guilty of nepotism. Although a type of the austere monk in his private life, he was a sincere friend of art and learning, and in 1431 re-established finally the university at Rome. He died on the 23rd of February 1447, and was succeeded by Nicholas V.

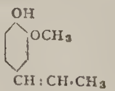
See L. Pastor, *History of the Popes*, vol. 1., trans. by F. I. Antrobus (London, 1899); M. Creighton, *History of the Papacy*, vol. 3 (London, 1899); F. Gregorovius, *Rome in the Middle Ages*, vol. 7, trans. by Mrs G. W. Hamilton (London, 1900–1902); K. J. von Hefele, *Conciliengeschichte*, Bd. 7, 2nd ed.; H. H. Milman, *Latin Christianity*, vol. 8 (London, 1896); G. Voigt, *Enea Silvio de Piccolomini*, Bd. 1-3 (Berlin, 1856); *Aus den Annaten-Registern der Päpste Eugen IV., Pius II., Paul II. u. Sixtus IV.*, ed. by K. Hayn (Cologne, 1896). There is an admirable article by Tschackert in Hauck's *Realencyklopädie*, 3rd ed. vol. 5. (C. H. Ha.)

EUGENOL (*allyl guaiacol, eugenic acid*), $C_{10}H_{12}O_2$, an odoriferous principle; it is the chief constituent of oil of cloves, and occurs in many other essential oils. It can be synthetically prepared by the reduction of coniferyl alcohol, $(HO)(CH_3O)C_6H_3 \cdot CH:CH \cdot CH_2OH$, which occurs in combination with glucose in the glucoside coniferin, $C_{16}H_{22}O_8$. It is a colourless oil boiling at 247° C., and having a spicy odour. On oxidation with potassium permanganate it gives homovanillin, vanillin, &c.; with chromic acid in acetic acid solution it is converted into carbon dioxide and acetic acid, whilst nitric acid oxidizes it to oxalic acid. By the action of alkalis it is converted into iso-eugenol, which on oxidation yields vanillin, the odorous principle of vanilla (*q.v.*). This transformation of allyl phenols into propenyl phenols is very general (see *Ber.*, 1889, 22, p. 2747; 1890, 23, p. 862). Alkali fusion of eugenol gives protocatechuic acid. The amount of eugenol in oil of cloves can be estimated by acetylation, in presence of pyridine (A. Verley and Fr. Baelsing, *Ber.*, 1901, 34, p. 3359). *Chavibetol*, an isomer of eugenol, occurs in the ethereal oil obtained from *Piper betle*.

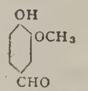
The structural relations are:



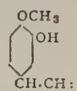
Eugenol.



Iso-eugenol



Vanillin



Chavibetol

EUHEMERUS [Euemerus, Evemerus], Greek mythographer, born at Messana, in Sicily (others say at Chios, Tegea, or Messene in Peloponnese), flourished about 300 B.C., and lived at the court of Cassander. He is chiefly known by his *Sacred History* (Ἱερὰ ἀναγραφή), a philosophical romance, based upon archaic inscriptions which he claimed to have found during his travels in various parts of Greece. He particularly relies upon an account of early history which he discovered on a golden pillar in a temple on the island of Panchaea when on a voyage round the coast of Arabia, undertaken at the request of Cassander, his friend and patron. There is apparently no doubt that this island is imaginary. In this work he for the first time systematized an old Oriental (perhaps Phoenician) method of interpreting the popular myths, asserting that the gods who formed the chief objects of popular worship had been originally heroes and conquerors, who had thus earned a claim to the veneration of their subjects. This system spread widely, and the early Christians especially appealed to it as a confirmation of their belief that ancient mythology was merely an aggregate of fables of human invention. Euhemerus was a firm upholder of the Cyrenaic philosophy, and by many ancient writers he was regarded as an atheist. His work was translated by Ennius into Latin, but the work itself is lost, and of the translation only a few fragments, and these very short, have come down to us.

This rationalizing method of interpretation is known as Euhemerism. There is no doubt that it contains an element of truth; as among the Romans the gradual deification of ancestors and the apotheosis of emperors were prominent features of religious development, so among primitive peoples it is possible to trace the evolution of family and tribal gods from great chiefs and warriors. All theories of religion which give prominence to ancestor worship and the cult of the dead are to a certain extent Euhemeristic. But as the sole explanation of the origin of the idea of gods it is not accepted by students of comparative religion. It had, however, considerable vogue in France. In the 18th century the abbé Banier, in his *Mythologie et la fable expliquées par l'histoire*, was frankly Euhemeristic; other leading Euhemerists were Clavier, Sainte-Croix, Raoul Rochette, Em. Hoffmann and to a great extent Herbert Spencer.

See Raymond de Block, *Évhémère, son livre et sa doctrine* (Mons, 1876); G. N. Némethy, *Euhemeri relliquiae* (Budapest, 1889); Ganss, *Quaestiones Euhemereae* (Kempen, 1860); Otto Sieroka, *De Euhemero* (1869); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit*, vol. i. (Leipzig, 1891); and works on comparative religion and mythology.

EULENSPIEGEL [Ulenspiegel], **TILL**, the name of a German folk-hero, and the title of a popular German chapbook on the subject, of the beginning of the 16th century. The oldest existing German text of the book was printed at Strassburg in 1515 (*Ein kurtzweilig lesen von Dyl Vlenspiegel geboren vss dem land zu Brunsswick*), and again in 1519. This is not in the original dialect, which was undoubtedly Low Saxon, but in High German, the translation having been formerly ascribed—but on insufficient evidence—to the Catholic satirist Thomas Murner. Its hero, Till Eulenspiegel or Ulenspiegel, the son of a peasant, was born at Kneitlingen in Brunswick, at the end of the 13th or at the beginning of the 14th century. He died, according to tradition, at Mölln near Lübeck in 1350. The jests and practical jokes ascribed to him were collected—if we may believe a statement in one of the old prints—in 1483; but in any case the edition of 1515 was not even the oldest High German edition. Eulenspiegel himself is locally associated with the Low German area extending from Magdeburg to Hanover, and from Lüneburg to the Harz Mountains. He is the wily peasant who loves to exercise his wit and roguery on the tradespeople of the towns, above all, on the innkeepers; but priests, noblemen, even princes, are also among his victims. His victories are often pointless, more often brutal; he stoops without hesitation to scurrility and obscenity, while of the finer, sharper wit which the humanists and the Italians introduced into the anecdote, he has little or nothing. His jests are coarsely practical, and his satire turns on class distinctions. In fact, this chapbook might be described as the retaliation of the peasant on the townsman who in the 14th and 15th centuries had begun to look down upon the country boor as a natural inferior.

In spite of its essentially Low German character, *Eulenspiegel* was extremely popular in other lands, and, at an early date, was translated into Dutch, French, English, Latin, Danish, Swedish, Bohemian and Polish. In England, "Howleglas" (Scottish, *Holliglas*) was long a familiar figure; his jests were rapidly adapted to English conditions, and appropriated in the collections associated with Robin Goodfellow, Scogan and others. Ben Johnson refers to him as "Howleglass" and "Ulenspiegel" in his *Masque of the Fortunate Isles*, *Poetaster*, *Alchemist* and *Sad Shepherd*, and a verse by Taylor the "water poet" would seem to imply that the "Owliglasse" was a familiar popular type. Till Eulenspiegel's "merry pranks" have been made the subject of a well-known orchestral symphony by Richard Strauss. In France, it may be noted, the name has given rise to the words *espiègle* and *espièglerie*.

The Strassburg edition of 1515 (British Museum) has been reprinted by H. Knust in the *Neudrucke deutscher Literaturwerke des 16. und 17. Jahrh.* No. 55-56 (1885); that of 1519 by J. M. Lappenberg, *Dr Thomas Murners Ulenspiegel* (1854). W. Scherer ("Die Anfänge des Prosaromans in Deutschland," in *Quellen und Forschungen*, vol. xxi., 1877, pp. 28 ff. and 78 ff.) has shown that there must have been a still earlier High German edition. See also C. Walter in *Niederdeutsches Jahrbuch*, xix. (1894), pp. 1 ff. Further editions appeared at Cologne, printed by Servais Kruffter, undated (reproduced in photo-lithography from the two imperfect copies in Berlin and Vienna, 1865); Erfurt, 1532, 1533–1537 and 1538; Cologne, 1539; Strassburg, 1539; Augsburg, 1540 and 1541; Strassburg, 1543; Frankfort on the Main, 1545; Strassburg, 1551; Cologne, 1554, &c. Johann Fischart published an adaptation in verse, *Der Eulenspiegel Reimensweis* (Strassburg, 1571), K. Simrock a modernization in 1864 (2nd ed., 1878); there is also one by K. Pannier in Reclam's *Universalbibliothek* (1883). The earliest translation was that into Dutch, printed by Hoochstraten at Antwerp (Royal Lib., Copenhagen); it is undated, but may have appeared as early as 1512. See facsimile reprint by M. Nijhoff (the Hague, 1898). This served as the basis for the first French version: *Ulenspiegel, de sa vie, de ses œuvres et merveilleuses aduentures par luy faictes . . . . nouuellement translate et corrige de Flamant en Francoys* (Paris, 1532). Reprint, edited by P. Jannet (1882). This was followed by upwards of twenty French editions down to the beginning of the 18th century. The latest translation is that by J. C. Delepierre (Bruges, 1835 and 1840). Cf. Prudentius van Duyse, *Étude littéraire sur Tiel l'Espiègle* (Ghent, 1858). The first complete English translation was also made from the Dutch, and bears the title: *Here beginneth a merye Jest of a man called Howleglas*, &c., printed by Copland in three editions, probably between 1548 and 1560. Reprint by F. Ouvry (1867). This, however, was itself merely a reprint of a still older English edition (1518?), of which the British Museum possesses fragments. Reprinted by F. Brie, *Eulenspiegel in England* (1903). In 1720 appeared *The German Rogue, or the Life and Merry Adventures of Tiel Eulenspiegel. Made English from the High-Dutch*; and an English illustrated edition, adapted by K. R. H. Mackenzie in 1880 (2nd ed., 1890). On Eulenspiegel in England, see especially C. H. Herford, *Studies in the Literary Relations of England and Germany in the Sixteenth Century* (1888), pp. 242 ff., and F. Brie's work already referred to. (J. G. R.)

EULER, LEONHARD (1707–1783), Swiss mathematician, was born at Basel on the 15th of April 1707, his father Paul Euler, who had considerable attainments as a mathematician, being Calvinistic pastor of the neighbouring village of Riechen. After receiving preliminary instructions in mathematics from his father, he was sent to the university of Basel, where geometry soon became his favourite study. His mathematical genius gained for him a high place in the esteem of Jean Bernoulli, who was at that time one of the first mathematicians in Europe, as well as of his sons Daniel and Nicolas Bernoulli. Having taken his degree as master of arts in 1723, Euler applied himself, at his father's desire, to the study of theology and the Oriental languages with the view of entering the church, but, with his father's consent, he soon returned to geometry as his principal pursuit. At the same time, by the advice of the younger Bernoullis, who had removed to St Petersburg in 1725, he applied himself to the study of physiology, to which he made a happy application of his mathematical knowledge; and he also attended the medical lectures at Basel. While he was engaged in physiological researches, he composed a dissertation on the nature and propagation of sound, and an answer to a prize question concerning the masting of ships, to which the French Academy of Sciences adjudged the second rank in the year 1727.

In 1727, on the invitation of Catherine I., Euler took up his residence in St Petersburg, and was made an associate of the Academy of Sciences. In 1730 he became professor of physics, and in 1733 he succeeded Daniel Bernoulli in the chair of mathematics. At the commencement of his new career he enriched the academical collection with many memoirs, which excited a noble emulation between him and the Bernoullis, though this did not in any way affect their friendship. It was at this time that he carried the integral calculus to a higher degree of perfection, invented the calculation of sines, reduced analytical operations to a greater simplicity, and threw new light on nearly all parts of pure mathematics. In 1735 a problem proposed by the academy, for the solution of which several eminent mathematicians had demanded the space of some months, was solved by Euler in three days, but the effort threw him into a fever which endangered his life and deprived him of the use of his right eye. The Academy of Sciences at Paris in 1738 adjudged the prize to his memoir on the nature and properties of fire, and in 1740 his treatise on the tides shared the prize with those of Colin Maclaurin and Daniel Bernoulli—a higher honour than if he had carried it away from inferior rivals.

In 1741 Euler accepted the invitation of Frederick the Great to Berlin, where he was made a member of the Academy of Sciences and professor of mathematics. He enriched the last volume of the *Mélanges* or Miscellanies of Berlin with five memoirs, and these were followed, with an astonishing rapidity, by a great number of important researches, which are scattered throughout the annual memoirs of the Prussian Academy. At the same time he continued his philosophical contributions to the Academy of St Petersburg, which granted him a pension in 1742. The respect in which he was held by the Russians was strikingly shown in 1760, when a farm he occupied near Charlottenburg happened to be pillaged by the invading Russian army. On its being ascertained that the farm belonged to Euler, the general immediately ordered compensation to be paid, and the empress Elizabeth sent an additional sum of four thousand crowns.

In 1766 Euler with difficulty obtained permission from the king of Prussia to return to St Petersburg, to which he had been originally invited by Catherine II. Soon after his return to St Petersburg a cataract formed in his left eye, which ultimately deprived him almost entirely of sight. It was in these circumstances that he dictated to his servant, a tailor's apprentice, who was absolutely devoid of mathematical knowledge, his *Anleitung zur Algebra* (1770), a work which, though purely elementary, displays the mathematical genius of its author, and is still reckoned one of the best works of its class. Another task to which he set himself immediately after his return to St Petersburg was the preparation of his *Lettres à une princesse d'Allemagne sur quelques sujets de physique et de philosophie* (3 vols., 1768–1772). They were written at the request of the princess of Anhalt-Dessau, and contain an admirably clear exposition of the principal facts of mechanics, optics, acoustics and physical astronomy. Theory, however, is frequently unsoundly applied in it, and it is to be observed generally that Euler's strength lay rather in pure than in applied mathematics.

In 1755 Euler had been elected a foreign member of the Academy of Sciences at Paris, and some time afterwards the academical prize was adjudged to three of his memoirs *Concerning the Inequalities in the Motions of the Planets*. The two prize-questions proposed by the same academy for 1770 and 1772 were designed to obtain a more perfect theory of the moon's motion. Euler, assisted by his eldest son Johann Albert, was a competitor for these prizes, and obtained both. In the second memoir he reserved for further consideration several inequalities of the moon's motion, which he could not determine in his first theory on account of the complicated calculations in which the method he then employed had engaged him. He afterwards reviewed his whole theory with the assistance of his son and W. L. Krafft and A. J. Lexell, and pursued his researches until he had constructed the new tables, which appeared in his *Theoria motuum lunae* (1772). Instead of confining himself, as before, to the fruitless integration of three differential equations of the second degree, which are furnished by mathematical principles, he reduced them to the three co-ordinates which determine the place of the moon; and he divided into classes all the inequalities of that planet, as far as they depend either on the elongation of the sun and moon, or upon the eccentricity, or the parallax, or the inclination of the lunar orbit. The inherent difficulties of this task were immensely enhanced by the fact that Euler was virtually blind, and had to carry all the elaborate computations it involved in his memory. A further difficulty arose from the burning of his house and the destruction of the greater part of his property in 1771. His manuscripts were fortunately preserved. His own life was only saved by the courage of a native of Basel, Peter Grimmon, who carried him out of the burning house.

Some time after this an operation restored Euler's sight; but a too harsh use of the recovered faculty, along with some carelessness on the part of the surgeons, brought about a relapse. With the assistance of his sons, and of Krafft and Lexell, however, he continued his labours, neither the loss of his sight nor the infirmities of an advanced age being sufficient to check his activity. Having engaged to furnish the Academy of St Petersburg with as many memoirs as would be sufficient to complete its *Acta* for twenty years after his death, he in seven years transmitted to the academy above seventy memoirs, and left above two hundred more, which were revised and completed by another hand.

Euler's knowledge was more general than might have been expected in one who had pursued with such unremitting ardour mathematics and astronomy as his favourite studies. He had made very considerable progress in medical, botanical and chemical science, and he was an excellent classical scholar, and extensively read in general literature. He was much indebted to an uncommon memory, which seemed to retain every idea that was conveyed to it, either from reading or meditation. He could repeat the *Aeneid* of Virgil from the beginning to the end without hesitation, and indicate the first and last line of every page of the edition which he used. Euler's constitution was uncommonly vigorous, and his general health was always good. He was enabled to continue his labours to the very close of his life. His last subject of investigation was the motion of balloons, and the last subject on which he conversed was the newly discovered planet Herschel (Uranus). He died of apoplexy on the 18th of September 1783, whilst he was amusing himself at tea with one of his grandchildren.

Euler's genius was great and his industry still greater. His works, if printed in their completeness, would occupy from 60 to 80 quarto volumes. He was simple and upright in his character, and had a strong religious faith. He was twice married, his second wife being a half-sister of his first, and he had a numerous family, several of whom attained to distinction. His *éloge* was written for the French Academy by the marquis de Condorcet, and an account of his life, with a list of his works, was written by Von Fuss, the secretary to the Imperial Academy of St Petersburg.

The works which Euler published separately are: *Dissertatio physica de sono* (Basel, 1727, in 4to); *Mechanica, sive motus scientia analytice exposita* (St Petersburg, 1736, in 2 vols. 4to); *Einleitung in die Arithmetik* (ibid., 1738, in 2 vols. 8vo), in German and Russian; *Tentamen novae theoriae musicae* (ibid. 1739, in 4to); *Methodus inveniendi lineas curvas, maximi minimive proprietate gaudentes* (Lausanne, 1744, in 4to); *Theoria motuum planetarum et cometarum* (Berlin, 1744, in 4to); *Beantwortung*, &c., or Answers to Different Questions respecting Comets (ibid., 1744, in 8vo); *Neue Grundsätze*, &c., or New Principles of Artillery, translated from the English of Benjamin Robins, with notes and illustrations (ibid., 1745, in 8vo); *Opuscula varii argumenti* (ibid., 1746–1751, in 3 vols. 4to); *Novae et correctae tabulae ad loca lunae computanda* (ibid., 1746, in 4to); *Tabulae astronomicae solis et lunae* (ibid., 4to); *Gedanken*, &c., or Thoughts on the Elements of Bodies (ibid. 4to); *Rettung der göttlichen Offenbarung*, &c., Defence of Divine Revelation against Freethinkers (ibid., 1747, in 4to); *Introductio in analysin infinitorum* (Lausanne, 1748, in 2 vols. 4to); *Scientia navalis, seu tractatus de construendis ac dirigendis navibus* (St Petersburg, 1749, in 2 vols. 4to); *Theoria motus lunae* (Berlin, 1753, in 4to); *Dissertatio de principio minimae actionis, una cum examine objectionum cl. prof. Koenigii* (ibid., 1753, in 8vo); *Institutiones calculi differentialis, cum ejus usu in analysi Infinitorum ac doctrina serierum* (ibid., 1755, in 4to); *Constructio lentium objectivarum*, &c. (St Petersburg, 1762, in 4to); *Theoria motus corporum solidorum seu rigidorum* (Rostock, 1765, in 4to); *Institutiones calculi integralis* (St Petersburg, 1768–1770, in 3 vols. 4to); *Lettres à une Princesse d'Allemagne sur quelques sujets de physique et de philosophie* (St Petersburg, 1768–1772, in 3 vols. 8vo); *Anleitung zur Algebra*, or Introduction to Algebra (ibid., 1770, in 8vo); *Dioptrica* (ibid., 1767–1771, in 3 vols. 4to); *Theoria motuum lunae nova methodo pertractata* (ibid., 1772, in 4to); *Novae tabulae lunares* (ibid., in 8vo); *Théorie complète de la construction et de la manœuvre des vaisseaux* (ibid., 1773, in 8vo); *Éclaircissements sur* *établissements en faveur tant des veuves que des morts*, without a date; *Opuscula analytica* (St Petersburg, 1783–1785, in 2 vols. 4to).

See Rudio, *Leonhard Euler* (Basel, 1884); M. Cantor, *Geschichte der Mathematik*.

EUMENES, the name of two rulers of Pergamum.

1. EUMENES I. succeeded his uncle Philetaerus in 263 B.C. The only important event in his reign was his victory near Sardis over Antiochus Soter, which enabled him to secure possession of the districts round his capital. (See PERGAMUM.)

2. EUMENES II., son of Attalus I., was king of Pergamum from 197–159 B.C. During the greater part of his reign he was a loyal ally of the Romans, who bestowed upon him signal marks of favour. He materially contributed to the defeat of Antiochus of Syria at the battle of Magnesia (190), and as a reward for his services the Thracian Chersonese and all Antiochus's possessions as far as the Taurus were bestowed upon him, including a protectorate of such Greek cities as had not been declared free. In his quarrels with his neighbours the Romans intervened on his behalf, and on the occasion of his visit to Rome to complain of the conduct of Perseus, king of Macedonia, he was received with the greatest distinction. On his return journey he narrowly escaped assassination by the emissaries of Perseus. Although he supported the Romans in the war against Macedonia, he displayed so little energy and interest (even recalling his auxiliaries) that he was suspected of intriguing with the enemy. According to Polybius there was some foundation for the suspicion, but Eumenes declared that he had merely been negotiating for an exchange of prisoners. Nothing, however, came of these negotiations, whatever may have been their real object; and Eumenes, in order to avert suspicion, sent his congratulations to Rome by his brother Attalus after the defeat of Perseus (168). Attalus was received courteously but coldly; and Eumenes in alarm set out to visit Rome in person, but on his arrival at Brundusium was ordered to leave Italy at once. Eumenes never regained the good graces of the Romans, who showed especial favour to Attalus on his second visit to Rome, probably with the object of setting him against Eumenes; but the ties of kinship proved too strong. The last years of his reign were disturbed by renewed hostilities against Prusias of Bithynia and the Celts of Galatia, and probably only his death prevented a war with Rome. Eumenes, although physically weak, was a shrewd and vigorous ruler and politician, who raised his little state from insignificance to a powerful monarchy. During his reign Pergamum became a flourishing city, where men of learning were always welcome, among them Crates of Mallus, the founder of the Pergamene school of criticism. Eumenes adorned the city with splendid buildings, amongst them the great altar with the frieze representing the Battle of the Giants; but the greatest monument of his liberality was the foundation of the library, which was second only to that of Alexandria.

See Livy xxxix. 51, xlii. 11-16; Polybius xxi.-xxxii.; Appian, *Syriaca*; Livy, *Epit.* 46; Cornelius Nepos, *Hannibal*, 10; A. G. van Cappelle, *Commentatio de regibus et antiquitatibus Pergamenis* (Amsterdam, 1841). For the altar of Zeus, see PERGAMUM; for treaty with Cretan cities (183 B.C.) see *Monumenti antichi*, xviii. 177.

EUMENES (*c.* 360–316 B.C.), Macedonian general, was a native of Cardia in the Thracian Chersonesus. At a very early age he was employed as private secretary by Philip II. of Macedon, and on the death of that prince, by Alexander, whom he accompanied into Asia. In the division of the empire on Alexander's death, Cappadocia and Paphlagonia were assigned to Eumenes; but as they were not yet subdued, Leonnatus and Antigonus were charged by Perdiccas to put him in possession. Antigonus, however, disregarded the order, and Leonnatus in vain attempted to induce Eumenes to accompany him to Europe and share in his far-reaching designs. Eumenes joined Perdiccas, who installed him in Cappadocia. When Craterus and Antipater, having reduced Greece, determined to pass into Asia and overthrow the power of Perdiccas, their first blow was aimed at Cappadocia. Craterus and Neoptolemus, satrap of Armenia, were completely defeated by Eumenes (321); Neoptolemus was killed, and Craterus died of his wounds. After the murder of Perdiccas in Egypt by his own soldiers, the Macedonian generals condemned Eumenes to death, and charged Antipater and Antigonus with the execution of their order. Eumenes, being defeated through the treachery of one of his officers, fled to Nora, a strong fortress on the confines of Cappadocia and Lycaonia, where he defended himself for more than a year. The death of Antipater (319) produced complications. He left the regency to his friend Polyperchon over the head of his son Cassander, who entered into an alliance with Antigonus and Ptolemy against Polyperchon, supported by Eumenes, who, having escaped from Nora, was threatening Syria and Phoenicia. In 318 Antigonus marched against him, and Eumenes withdrew east to join the satraps of the provinces beyond the Tigris. After two indecisive battles in Iran, Eumenes was betrayed by his own soldiers to Antigonus and put to death. He was an able soldier, who did his utmost to maintain the unity of Alexander's empire in Asia; but his efforts were frustrated by the generals and satraps, who hated and despised the "secretary" and "foreigner."

See Plutarch, *Eumenes*; Cornelius Nepos, *Eumenes*; Diod. Sic. xviii., xix.; Arrian, *Anabasis*, vii.; Quintus Curtius x. 4. 10; Justin xiii. 8; A. Vezin, *Eumenes von Kardia. Ein Beitrag zur Geschichte der Diadochenzeit* (Münster i. W., 1907). Also MACEDONIAN EMPIRE.

EUMENIDES (from Gr. εὐμενής, kindly; εὖ, well, and μένος, disposition), the "kindly ones," a euphemism for the Furies or Erinyes (*q.v.*). They give their name to a famous play by Aeschylus (*q.v.*), written in glorification of the old religion and aristocratic government of Athens, in opposition to the new democracy of the Periclean period.

EUMENIUS (*c.* A.D. 260–311), one of the Roman panegyrists, was born at Augustodunum (*Autun*) in Gallia Lugdunensis. He was of Greek descent; his grandfather, who had migrated from Athens to Rome, finally settled at Autun as a teacher of rhetoric. Eumenius probably took his place, for it was from Autun that he went to be *magister memoriae* (private secretary) to Constantius Chlorus, whom he accompanied on several of his campaigns. In 296 Chlorus determined to restore the famous schools (*scholae Maenianae*) of Autun, which had been greatly damaged by the inroads of the Bagaudae (peasant banditti), and appointed Eumenius to the management of them, allowing him to retain his offices at court and doubling his salary. Eumenius generously gave up a considerable portion of his emoluments to the improvement of the schools. There is no doubt that Eumenius was a heathen, not even a nominal follower of Christianity, like Ausonius and other writers from Gaul. Nothing is known of his later years; but he must have lived at least till 311, if the *Gratiarum Actio* to Constantine is by him. Of the twelve discourses included in the collection of *Panegyrici Latini* (ed. E. Bährens, 1874), the following are probably by Eumenius. (1) *Pro restaurandis* (or *instaurandis*) *scholis*, delivered (297) in the forum at Autun before the governor of the province. Its chief object is to set forth the steps necessary to restore the schools to their former state of efficiency, and the author lays stress upon the fact that he intends to assist the good work out of his own pocket. (2) An address (297) to the Caesar Constantius Chlorus, congratulating him on his victories over Allectus and Carausius in Britain, and containing information of some value as to the British methods of fighting. (3) A panegyric on Constantine (310). (4) An address of thanks (311) from the inhabitants of Autun (whose name had been changed from Augustodunum to Flavia) to Constantine for the remission of taxes and other benefits. (5) A festal address (307) on the marriage of Constantine and Fausta, the daughter of Maximian. All these speeches, with the exception of (1), were delivered at Augusta Trevirorum (Trèves), whose birthday is celebrated in (3). Eumenius is far the best of the orators of his time, and superior to the majority of the writers of imperial panegyrics. He shows greater self-restraint and moderation in his language, which is simple and pure, and on the whole is free from the gross flattery which characterizes such productions. This fault is most conspicuous in (3), which led Heyne (*Opuscula*, vi. 80) to deny the authorship of Eumenius on the ground that it was unworthy of him.

There are treatises on Eumenius by B. Kilian (Würzburg, 1869), S. Brandt (Freiburg im Breisgau, 1882), and H. Sachs (Halle, 1885); see also Gaston Boissier, "Les Rhéteurs gaulois du IVe siècle," in *Journal des savants* (1884).

EUMOLPUS ("sweet singer"), in Greek mythology, son of Poseidon and Chione, the daughter of Boreas, legendary priest, poet and warrior. He finally settled in Thrace, where he became king. During a war between the Eleusinians and Athenians under Erechtheus, he went to the assistance of the former, who on a previous occasion had shown him hospitality, but was slain with his two sons, Phorbas and Immaradus. According to another tradition, Erechtheus and Immaradus lost their lives; the Eleusinians then submitted to Athens on condition that they alone should celebrate the mysteries, and that Eumolpus and the daughters of Celeus should perform the sacrifices. It is asserted by others that Eumolpus with a colony of Thracians laid claim to Attica as having belonged to his father Poseidon (Isocrates, *Panath.* 193). The Eleusinian mysteries were generally considered to have been founded by Eumolpus, the first priest of Demeter, but, according to some, by Eumolpus the son of Musaeus, Eumolpus the Thracian being the father of Keryx, the ancestor of the priestly family of the Kerykes. As priest, Eumolpus purifies Heracles from the murder of the Centaurs; as musician, he instructs him (as well as Linus and Orpheus) in playing the lyre, and is the reputed inventor of vocal accompaniments to the flute. Suidas reckons him one of the early poets and a writer of hymns of consecration, and Diodorus Siculus quotes a line from a Dionysiac hymn attributed to Eumolpus. He is also said to have been the first priest of Dionysus, and to have introduced the cultivation of the vine and fruit trees (Pliny, *Nat. Hist.* vii. 199). His grave was shown at Athens and Eleusis. His descendants, called Eumolpidae, together with the Kerykes, were the hereditary guardians of the mysteries (*q.v.*).

See Apollodorus ii. 5, iii. 15; Pausanias i. 38. 2; Hyginus, *Fab.* 273; Homeric *Hymn to Demeter*, 476; Strabo vii. p. 321; Diod. Sic. i. 11; article "Eumolpidai," by J. A. Hild in Daremberg and Saglio's *Dictionnaire des antiquités.*

EUNAPIUS, Greek sophist and historian, was born at Sardis, A.D. 347. In his native city he studied under his relative the sophist Chrysanthius, and while still a youth went to Athens, where he became a favourite pupil of Proaeresius the rhetorician. He possessed a considerable knowledge of medicine. In his later years he seems to have resided at Athens, teaching rhetoric. Initiated into the Eleusinian mysteries, he was admitted into the college of the Eumolpidae and became hierophant. There is evidence that he was still living in the reign of the younger Theodosius (408–450). Eunapius was the author of two works, one entitled *Lives of the Sophists* (Βίοι φιλοσόφων καὶ σοφιστῶν), and the other consisting of a continuation of the history of Dexippus (*q.v.*). The former work is still extant; of the latter only excerpts remain, but the facts are largely incorporated in the work of Zosimus. It embraced the history of events from A.D. 270–404. The *Lives of the Sophists*, which deals chiefly with the contemporaries of the author, is valuable as the only source for the history of the neo-Platonism of that period. The style of both works is bad, and they are marked by a spirit of bitter hostility to Christianity. Photius (cod. 77) had before him a "new edition" of the history in which the passages most offensive to the Christians were omitted.

Edition of the *Lives* by J. F. Boissonade (1822), with notes by D. Wyttenbach; history fragments in C. W. Müller, *Fragmenta Hist. Graecorum*, iv.; V. Cousin, *Fragments philosophiques* (1865).

EUNOMIUS (d. *c.* 393), one of the leaders of the extreme or "anomoean" Arians, who are sometimes accordingly called Eunomians, was born at Dacora in Cappadocia early in the 4th century. He studied theology at Alexandria under Aetius, and afterwards came under the influence of Eudoxius of Antioch, where he was ordained deacon. On the recommendation of Eudoxius he was appointed bishop of Cyzicus in 360. Here his free utterance of extreme Arian views led to popular complaints, and Eudoxius was compelled, by command of the emperor, Constantius II., to depose him from the bishopric within a year of his elevation to it. During the reigns of Julian and Jovian, Eunomius resided in Constantinople in close intercourse with Aetius, consolidating an heretical party and consecrating schismatical bishops. He then went to live at Chalcedon, whence in 367 he was banished to Mauretania for harbouring the rebel Procopius. He was recalled, however, before he reached his destination. In 383 the emperor Theodosius, who had demanded a declaration of faith from all party leaders, punished Eunomius for continuing to teach his distinctive doctrines, by banishing him to Halmyris in Moesia. He afterwards resided at Chalcedon and at Caesarea in Cappadocia, from which he was expelled by the inhabitants for writing against their bishop Basil. His last days were spent at Dacora his birthplace, where he died about 393. His writings were held in high reputation by his party, and their influence was so much dreaded by the orthodox, that more than one imperial edict was issued for their destruction (*Cod. Theod.* xvi. 34). Consequently his commentary on the epistle to the Romans, mentioned by the historian Socrates, and his epistles, mentioned by Philostorgius and Photius, are no longer extant. His first apologetical work (Ἀπολογητικός), written probably about 360 or 365, has been entirely recovered from the celebrated refutation of it by Basil, and may be found in J. A. Fabricius, *Bibl. Gr.* viii. pp. 262-305. A second apology, written before 379 (Ὑπὲρ ἀπολογίας ἀπολογία), exists only in the quotations given from it in a refutation by Gregory of Nyssa. The exposition of faith (Ἔκθεσις τῆς πίστεως), called forth by the demand of Theodosius, is still extant, and has been edited by Valesius in his notes to Socrates, and by Ch. H. G. Rettberg in his *Marcelliana.*

The teaching of the Anomoean school, led by Aetius and Eunomius, starting from the conception of God as ὁ ἀγέννητος, argued that between the ἀγέννητος and γέννητος there could be no *essential*, but at best only a *moral*, resemblance. "As the Unbegotten, God is an absolutely simple being; an act of generation would involve a contradiction of His essence by introducing duality into the Godhead." According to Socrates (v. 24), Eunomius carried his views to a practical issue by altering the baptismal formula. Instead of baptizing in the name of the Trinity, he baptized in the name of the Creator and into the death of Christ. This alteration was regarded by the orthodox as so serious that Eunomians on returning to the church were rebaptized, though the Arians were not. The Eunomian heresy was formally condemned by the council of Constantinople in 381. The sect maintained a separate existence for some time, but gradually fell away owing to internal divisions.

See C. R. W. Klose, *Geschichte und Lehre des Eumonius* (Kiel, 1833); F. Loofs in Hauck-Herzog, *Realencyk. für prot. Theol.*; Whiston's *Eunomianismus redivivus* contains an English translation of the first apology. See also Arius.

EUNUCH (Gr. εὐνοῦχος), an emasculated male. From remote antiquity among the Orientals, as also at a later period in Greece, eunuchs were employed to take charge of the women, or generally as chamberlains—whence the name *οἱ τὴν εὐνὴν ἔχοντες*, *i.e.* those who have charge of the bed-chamber. Their confidential position in the harems of princes frequently enabled them to exercise an important influence over their royal masters, and even to raise themselves to stations of great trust and power (see Harem). Hence the term eunuch came to be applied in Egypt to any court officer, whether a *castratus* or not. The common idea that eunuchs are necessarily deficient in courage and in intellectual vigour is amply refuted by history. We are told, for example, by Herodotus that in Persia they were especially prized for their fidelity; and they were frequently promoted to the highest offices. Narses, the famous general under Justinian, was a eunuch, as was also Hermias, governor of Atarnea in Mysia, to whose manes the great Aristotle offered sacrifices, besides celebrating the praises of his patron and friend in a poem (still extant) addressed to *Virtue* (see Lucian's dialogue entitled *Eunuchus*). The capacity of eunuchs for public affairs is strikingly illustrated by the histories of Persia, India and China; and considerable power was exercised by the eunuchs under the later Roman emperors. The hideous trade of castrating boys to be sold as eunuchs for Moslem harems has continued to modern times, the principal district whence they are taken being north-central Africa (Bagirmi, &c.). As the larger proportion of children die after the operation (generally total removal) owing to unskilful surgery, such as recover fetch at least three or four times the ordinary price of slaves. Even more vile, as being practised by a civilized European nation, was the Italian practice of castrating boys to prevent the natural development of the voice, in order to train them as adult soprano singers, such as might formerly be heard in the Sistine chapel. Though such mutilation is a crime punishable with severity, the supply of "soprani" never failed so long as their musical powers were in demand in high quarters. Driven long ago from the Italian stage by public opinion, they remained the musical glory and moral shame of the papal choir till the accession of Pope Leo XIII., one of whose first acts was to get rid of them. Mention must here also be made of the class of voluntary eunuchs, who have emasculated themselves, or caused the operation to be performed on them, for the avoidance of sexual sin or temptation. This unnatural development of asceticism appears in early Christian ages, its votaries acting on the texts Matt. xix. 12, v. 28-30. Origen's case is the most celebrated example, and by the 3rd century there had arisen a sect of eunuchs, of whom Augustine says (*De haeres.* c. 37), "Valesii et seipsos castrant et hospites suos, hoc modo existimantes Deo se debere servire" (see Neander, *History of Chr. Church,* vol. ii. p. 462; Bingham, *Antiq. Chr. Church,* book iv. chap. 3.) Such practices have been always opposed by the general body of the Christian churches, but have not even now ceased. A secret sect of the kind exists in Russia, whose practice of castration is expressed in their name of Skopzi. (E. B. T.)

EUNUCH FLUTE, or ONION FLUTE (Fr. *flûte eunuque, flûte à l'onion, mirliton*; Ger. *Zwiebelflöte*), a wind instrument in use during the 16th and 17th centuries, producing music akin to the comb-music of the nursery, and still manufactured as a toy (*mirliton*). The onion flute consists of a wooden tube widening out slightly to form a bell. The upper end of the tube is closed by means of a very fine membrane similar to an onion skin stretched across the aperture like the vellum of a drum. The mouthpiece, a simple round hole, is pierced a couple of inches below the membrane; into this hole the performer sings, his voice setting up vibrations in the membrane, which thus intensifies the sound and changes its timbre to a bleating quality. A movable cap fits over the membrane to protect it. Mersenne[1] has given a drawing of the eunuch flute together with a description; he states that the vibrations of the membrane improve the sound of the voice, and by reflecting it, give it an added charm. There were concerts of these flutes in four or five parts in France, adds Mersenne, and they had the advantage over other kinds of reproducing more nearly the sound of the voice.

EUONYMUS, in botany, a genus of deciduous or evergreen shrubs or small trees, widely distributed in the north temperate zone, and represented in Britain by *E. europaeus*, the spindle tree, so called from its hard tough wood being formerly used for spindles. It is a shrub or small tree growing in copses or hedges, with a grey smooth bark, four-angled green twigs, opposite leaves and loose clusters of small greenish-white flowers. The ripe fruit is a pale crimson colour and splits into four lobes exposing the bright orange-coloured seed. *E. japonicus* is a hardy evergreen shrub, often variegated and well known in gardens. The Greek name εὐώνυμος, of good name, lucky, is probably a euphemism; the flowering was said to foretell plague.

EUPALINUS, of Megara, a Greek architect, who constructed for the tyrant Polycrates of Samos a remarkable tunnel to bring water to the city, passing under a hill. This aqueduct still exists, and is one of the most remarkable constructions in Greece (see AQUEDUCT: *Greek*).

EUPATORIA (Russ. *Evpatoria*; also known as *Kozlov* and to the Turks as *Gezlev*), a seaport of Russia, in the government of Taurida, on the W. coast of the Crimea, 20 m. N.W. of Simferopol, on a sandy promontory on the north of Kalamita Bay, in 45° 12′ N. and 33° 40′ E. Pop. (1871) 8294; (1897) 17,915. This number includes many Jews, the Karaite sect having here their principal synagogue. Here too resides the spiritual head (*gakhan*) of the sect. Of its numerous ecclesiastical buildings three are of interest —the synagogue of the Karaite Jews; one of the mosques, which has fourteen cupolas and is built (1552) after the plan of St Sophia in Constantinople; and the Greek Catholic cathedral (1898). The port or rather roadstead has a sandy bottom, and is exposed to violent storms from the N.E. The trade is principally in cereals, skins, cow-hair, felt, tallow and salt. Eupatoria has some repute as a sea-bathing resort.

According to some authorities it was near this spot that a military post, *Eupatorium*, was established in the 1st century A.D. by Diophantus, the general of Mithradates the Great, king of Pontus. Towards the end of the 15th century the Turks built the fortress of Gezleveh on the present site, and it became the capital of a khanate. It was occupied by the Russians under Marshal Münnich in 1736, and in 1771 by Prince Dolgorukov. Its annexation to Russia took place in 1783. In 1854 the Anglo-French troops were landed in the neighbourhood of Eupatoria, and in February 1855 the town was occupied by the Turkish forces.

EUPATRIDAE (Gr. εὖ, well; πατήρ, father, *i.e.* "Sons of noble fathers"), the ancient nobility of Attica. Tradition ascribes to Theseus, whom it also regards as the author of the union (*synoecism*) of Attica round Athens as a political centre, the division of the Attic population into three classes, Eupatridae, Geomori and Demiurgi. The lexicographers mention as characteristics of the Eupatridae that they are the autochthonous population, the dwellers in the city, the descendants of the royal stock. It is probable that after the time of the *synoecism* the nobles who had hitherto governed the various independent communities were obliged to reside in Athens, now the seat of government; and at the beginning of Athenian history the noble clans form a class which has the monopoly of political privilege. It is possible that in very early times the Eupatridae were the only full citizens of Athens; for the evidence suggests that they alone belonged to the phratries, and the division into phratries must have covered the whole citizen body. It is indeed just possible that the term may originally have signified "true member of a clan," since membership of a phratry was a characteristic of each clan (γένος). It is not probable that the Eupatrid families were all autochthonous, even in the loose sense of that term. Some had no doubt immigrated to Attica when the rest had long been settled there. Traces of this union of immigrants with older inhabitants have been detected in the combination of Zeus Herkeios with Apollo Patroös as the ancient gods of the phratry.

The exact relation of the Eupatridae to the other two classes has been a matter of dispute. It seems probable that the Eupatridae were the governing class, the only recognized nobility, the Geomori the country inhabitants of all ranks, and the Demiurgi the commercial and artisan population. The division attributed to Theseus is always spoken of by ancient authorities as a division of the entire population; but Busolt has recently maintained the view that the three classes represent three elements in the Attic nobility, namely, the city nobility, the landed nobility and the commercial nobility, and exclude altogether the mass of the population. At any rate it seems certain from the little we know of the early constitutional history of Athens, that the Eupatridae represent the only nobility that had any political recognition in early times. The political history of the Eupatridae is that of a gradual curtailment of privilege. They were at the height of their power in the period during the limitation of the monarchy. They alone held the two offices, those of polemarch and archon, which were instituted during the 8th century B.C. to restrict the powers of the kings. In 712 B.C. the office of king (βασιλεύς) was itself thrown open to all Eupatrids (see ARCHON). They thus had the entire control of the administration, and were the sole dispensers of justice in the state. At this latter privilege, which perhaps formed the strongest bulwark of the authority of the Eupatridae, a severe blow was struck (*c.* 621 B.C.) by the publication of a criminal code by Draco (*q.v.*), which was followed by the more detailed and permanent code of Solon (*c.* 594 B.C.), who further threw open the highest offices to any citizen possessed of a certain amount of landed property (see SOLON), thus putting the claims of the Eupatridae to political influence on a level with those of the wealthier citizens of all classes. The most highly coveted office at this time was not that of Βασιλεύς, which, like that of the *rex sacrorum* in Rome, had been stripped of all save its religious authority, but that of the Archon; soon after the legislation of Solon repeated struggles for this office between the Eupatridae and leading members of the other two classes resulted in a temporary change. Ten archons[1] were appointed, five of whom were to be Eupatridae, three Agroeci (*i.e.* Geomori), and two Demiurgi (Arist. *Ath. Pol.* xiii. 2). This arrangement, though short-lived, is significant of the decay of the political influence of the Eupatridae, and it is not likely that they recovered, even in practice, any real control of the government. By the middle of the 6th century the political influence of birth was at an end.

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[1] *L'Harmonie universelle* (Paris, 1636), livre v. prop. iv. pp. 228-229.

The name Eupatridae survived in historical times, but the Eupatridae were then excluded from the cult of the "Semnae" at Athens, and also held the hereditary office of "expounder of the law" (ἐξηγητής) in connexion with purification from the guilt of murder. The combination of these two characteristics suggests some connexion with the legend of Orestes. Again, Isocrates (xvi. 25) says of Alcibiades that his grandfather was a Eupatrid and his grandmother an Alcmaeonid, which suggests that in the 5th century the Eupatrids were a single clan, like the Alcmaeonids, and that the name had acquired a new signification. A pursuit of these two suggestions has established the probability that this "Eupatrid" clan traced its origin to Orestes, and derived its name from the hero, who was above all a benefactor of his father. The word will well bear this sense in the two passages in which Sophocles (*Electra*, 162, 859) applies it to Orestes; and it is likely enough that after the disappearance of the old Eupatridae as a political corporation, the name was adopted in a different sense, but not without a claim to the distinction inherent in the older sense, by one of the oldest of the clans.

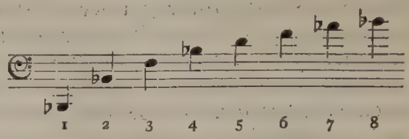
BIBLIOGRAPHY.—G. Busolt, *Die griechischen Staats- und Rechtsaltertümer* (Müller, *Handbuch der klassischen Altertumswissenschaft*, iv. 1), pp. 127 et seq., 155 et seq., 248 (Munich, 1892); G. Gilbert, *Greek Constitutional Antiquities*, p. 101 et seq. (Eng. trans., London, 1895); for Eupatridae in historical times, J. Töpffer, *Attische Genealogie*, p. 175 et seq. (Berlin, 1889). See also the articles AREOPAGUS, ARCHON. (A. M. CL.)

EUPEN (Fr. *Néau*), a town of Germany, in the Prussian Rhine province, in a beautiful valley at the confluence of the Helle and Vesdre, 9 m. S. of Aix-la-Chapelle by rail. Pop. (1905) 14,297. It is a flourishing commercial place, and besides cloth and buckskin mills it has net and glove manufactories, soapworks, dyeworks, tanneries and breweries, and also carries on a considerable trade in cattle and dairy produce. It has a Protestant and four Roman Catholic churches, a Franciscan monastery, a progymnasium, an orphanage, a hospital, and a chamber of commerce. As part of the duchy of Limburg, Eupen was under the government of Austria until the peace of Lunéville in 1801, when it passed to France. In 1814 it came into the possession of Prussia.

EUPHEMISM (from Gr. εὔφημος, having a sound of good omen; εὖ, well, and φήμη, sound or voice), a figure of speech in which an unpleasant or coarse phrase is replaced by a softer or less offensive expression. A euphemism has sometimes a metaphorical sense, as in the substitution of the word "sleep" for "death."

EUPHONIUM (Fr. *baryton*; Ger. *Tenor Tube*), a modern brass wind instrument, known in military bands as euphonium and in the orchestra as tuba. The euphonium consists of a brass tube with a conical bore of wide calibre ending in a wide-mouthed bell; it is played by means of a cup-shaped mouthpiece. The sound is produced as in the bombardon, which is the bass of the euphonium, by the varied tension of the lips across the mouthpiece, whereby the natural open notes or harmonics, consisting of the series here shown, are obtained.

The intervening notes of the chromatic scale are obtained by means of valves or pistons usually four in number, which by opening a passage into additional lengths of tubing lower the pitch one, half, one-and-a-half, two-and-a-half tones (see BOMBARDON; TUBA; VALVES). The euphonium gives out the fundamental, or first note of the harmonic series, readily, but no harmonic above the eighth. Euphoniums are made in C and in B♭, the latter being more generally used. By means of all the valves used at once, the B♭, an octave below the fundamental, can be reached, giving a compass of four octaves, with chromatic intervals. The bass clef is used in notation. The euphonium is treated by French and German composers as a transposing instrument; in England the real notes are usually written, except when the treble clef is used. The quality of tone is rich and full, harmonizing well with that of the trombone. The euphonium speaks readily in the lower register, but slowly, of course, owing to the long dip of the pistons. Messrs Rudall Carte have removed this difficulty by their patent *short action* pistons, which have but half the dip of the old pistons. On these instruments it is easy to execute rapid passages.



The euphonium is frequently said to be a saxhorn, corresponding to the baryton member of that family, but the statement is misleading. The bombardon and euphonium, like the saxhorns, are the outcome of the application of valves to the bugle family, but there is a radical difference in construction; the tubas (bombardon and euphonium) have a conical bore of sufficiently wide calibre to allow of the production of the fundamental harmonic, which is absent in the saxhorns. The Germans classify brass wind instruments as *whole* and *half*[1] according to whether, having the wide bore of the bugle, the *whole* length of the tube is available and gives the fundamental proper to an organ pipe of the same length or whether by reason of the narrow bore in proportion to the length, only *half* the length of the instrument is of practical utility, the harmonic series beginning with the second harmonic. (See BOMBARDON.) (K. S.)

EUPHORBIA, in botany, a large genus of plants from which the order Euphorbiaceae takes its name. It includes more than 600 species and is of almost world-wide distribution. It is represented in Britain by the spurges—small, generally smooth, herbaceous plants with simple leaves and inconspicuous flowers arranged in small cup-like heads (*cyathia*). The cyathium is a characteristic feature of the genus, and consists of a number of male flowers, each reduced to a single stamen, surrounding a central female flower which consists only of a stalked pistil; the group of flowers is enveloped in a cup formed by the union of four or five bracts, the upper part of which bears thick, conspicuous, gland-like structures, which in exotic species are often brilliantly coloured, giving the cyathium the appearance of a single flower. Another characteristic is the presence of a milky juice, or latex, in the tissues of the plant. In one section of the genus the plants resemble cacti, having a thick succulent stem and branches with the leaves either very small or completely reduced to a small wart-like excrescence, with which is generally associated a tuft of spines (a reduced shoot). These occur in the warmer parts of the world as a type of dry country or desert vegetation. The only species of note are *E. fulgens* and *E. jacquiniaeflora*, for the warm greenhouse; *E. Cyparissias* (the Cypress spurge), *E. Wulfeni*, *E. Lathyris* and *E. Myrsinites*, for the open air.

EUPHORBIACEAE, in botany, a large natural order of flowering plants, containing more than 220 genera with about

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[1] For a discussion of this see ARCHON.

[1] See Dr Schafhäutl's article on "Musical Instruments" in sect. iv. of *Bericht der Beurtheilungs- Commission bei der Allg. deutschen Industrie Ausstellung* (Munich, 1854), pp. 169-170; also Fried. Zamminer, *Die Musik und die Musikinstrumente in ihrer Beziehung zu den Gesetzen der Akustik* (Giessen, 1855).

4000 species, chiefly tropical, but spreading over the whole earth with the exception of the arctic and cold alpine zones. They are represented in Britain by the spurges (*Euphorbia*, *q.v.*) (fig. 1) and dog's mercury (*Mercurialis*) (fig. 2), which are herbaceous plants, but the greater number are woody plants and often trees. The large genus *Euphorbia* shows great variety in habit; many species, like the English spurges, are annual herbs, others form bushes, while in the desert regions of tropical Africa and the Canary Islands species occur resembling cacti, having thick fleshy stems and leaves reduced to spines. Another large genus, *Phyllanthus*, contains small annual herbs as well as trees, while in some species the leaves are reduced to scales, and the branches are flattened, forming phylloclades. The leaves also show great variety in form and arrangement, being simple and entire as in the English spurges, or deeply cut as in *Ricinus* (castor-oil) (fig. 3), and *Manihot* or sometimes palmately compound (*Hevea*). The majority contain a milky juice or latex in their tissues which exudes on cutting or bruising. In *Hevea*, *Manihot* and others the latex yields caoutchouc. The flowers are unisexual; male and female flowers are borne on the same, as in the spurges (fig. 1), or on different plants, as in dog's mercury (fig. 2). Their arrangement shows considerable variation, but the flowers are generally grouped in crowded definite partial inflorescences, which are themselves arranged in spikes or stand in the axils of the upper leaves. These partial inflorescences are generally unisexual, the male often containing numerous flowers while the female flowers are solitary. The partial inflorescence (*cyathium*) of *Euphorbia* (fig. 1) resembles superficially a hermaphrodite flower. It contains a central terminal flower, consisting of a naked pistil; below this are borne four or five bracts which unite to form a cup-shaped involucre resembling a calyx; each of these bracts subtends a small cyme of male flowers each consisting only of one stamen. Between the segments of the cup are large oval or crescent-shaped glands which are often brightly coloured, forming petal-like structures.

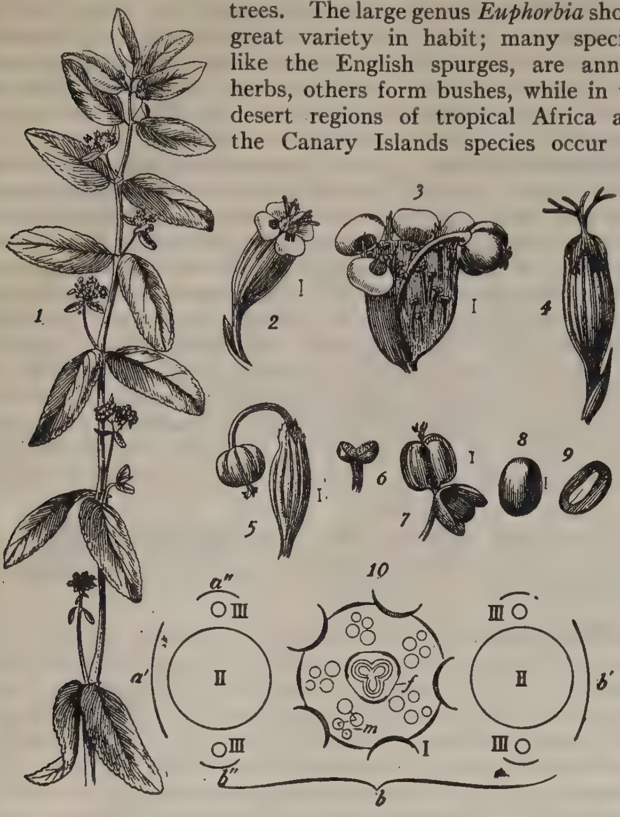


FIG. 1.

1. Shoot of *Euphorbia hypericifolia*, about $\frac{1}{2}$ nat. size.
2. A partial inflorescence, *cyathium*, bearing the petaloid glands.
3. A similar one at a later stage, cut open to show the single-stamened (monandrous) male flowers and the central long-stalked female flower.
4. A cyathium without petaloid glandular appendages.
5. A similar one at a later stage with nearly ripe fruit.
6. An anther dehiscing.
7. Fruit dehiscing and exposing one of the three seeds.
8. Seed.
9. Seed cut lengthwise exposing the embryo.
10. Diagram of the inflorescence of *Euphorbia*, illustrating the dichasial cymose arrangement of the ultimate branches.

b, Bract subtending the central terminal cyathium I.

a′ b′, Bracteoles of the first order subtending the secondary cyathia II.

a″ b″, Bracteoles of the second order subtending the tertiary cyathia III.

In the central cyathium I. are shown the details of the arrangement of the male flowers in monochasial cymes, *m*, and the central female flower, *f*.

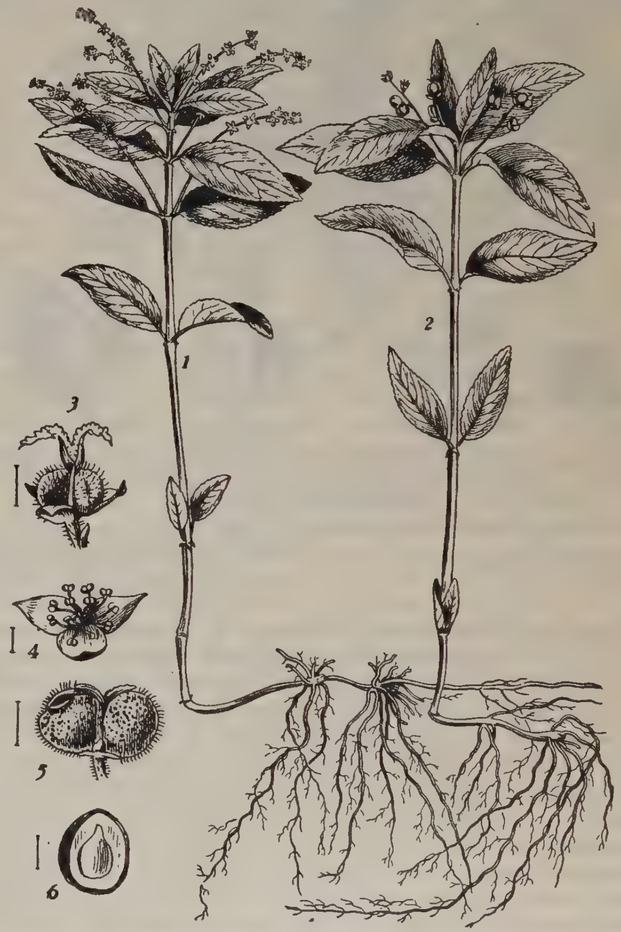


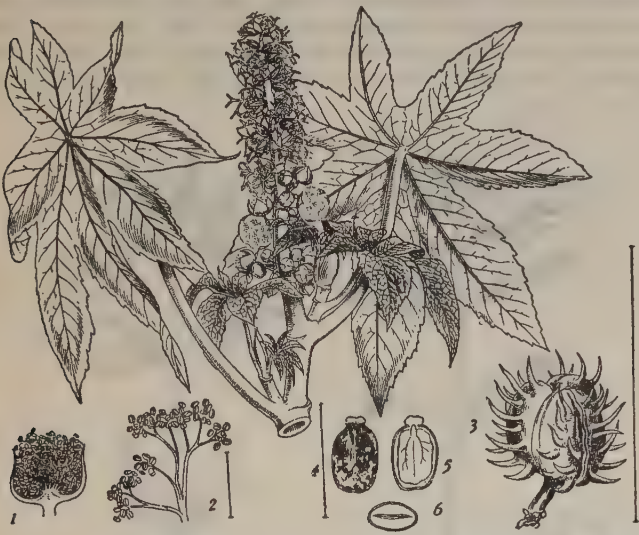
FIG. 2.—Dog's Mercury (*Mercurialis perennis*).

1. Male plant.
2. Female plant; $\frac{1}{3}$ nat. size.
3. Female flower.
4. Male flower.
5. Fruit beginning to split open.
6. Seed cut lengthwise showing the embryo.

The form of the flower shows great variety. The most complete type occurs in *Wielandia*, a shrub from the Seychelles Islands, in which the flowers have their parts in fives, a calyx and corolla being succeeded in the male flower by 5 stamens, in the female by 5 carpels. Generally, however, only 3 carpels are present, as in *Euphorbia*; *Mercurialis* (fig. 2) has minute apetalous flowers with 3 sepals, followed in the male by 8 to 20 stamens, in the female by a bicarpellary pistil. In the large tropical genus *Croton* a pentamerous calyx and corolla are generally present, the stamens are often very numerous, and the female flower has three carpels. In *Manihot*, a large tropical American genus to which belongs the manioc or cassava (*M. utilissima*), the calyx is often large and petaloid. In a great many genera the corolla is absent. The most reduced type of flower is that described in EUPHORBIA, where the male consists of one stamen separated from its pedicel by a joint, and the female of a naked tricarpellary pistil. The stamens are sometimes more or less united (monadelphous), and in castor-oil (*Ricinus*) (fig. 3) are much branched. The ovary generally contains three chambers, and bears three simple or more often bipartite styles; each chamber contains one or two pendulous ovules, which generally bear a cap-like outgrowth or *caruncle*, which persists in the seed (well shown in castor oil, fig. 3).

As the stamens and pistil are borne by different flowers, cross-fertilization is necessary. In *Mercurialis* and others with inconspicuous flowers pollination is effected by the wind, but in many cases insects are attracted to the flower by the highly-coloured bracts, as in many *Euphorbias* and *Dalechampia*, or by the coloured calyx as in *Manihot*; the presence of honey is also frequently an attraction, as in the honey-glands on the bracts of the cyathium of *Euphorbia*. The fruit is generally a capsule which splits into three divisions (*cocci*), separating from the central column, and splitting lengthwise into two valves. In the mancinil (*Hippomane mancinella*) of Central America the fruit is a drupe like a plum, and in some genera berries occur. In the sandbox tree (*Hura crepitans*) of tropical America the ovary consists of numerous carpels, and forms when mature a capsule which splits with great violence and a loud report into a number of woody cocci. The seeds contain abundant endosperm and a large straight or bent embryo.

Several members of the order are of economic importance.



From Bentley and Trimen's *Medicinal Plants*, by permission of J. & A. Churchill.

FIG. 3.—Castor Oil (*Ricinus communis*). End of shoot with flower-spike; about ⅓ nat. size.

1. Section of male flower, about nat. size.
2. Group of stamens
3. Fruit.
4. Seed.
5 and 6. Vertical and transverse sections of seed showing embryo in position.

Manihot utilissima, manioc or cassava (*q.v.*), is one of the most important tropical food-plants, its thick tuberous root being rich in starch; it is the source of Brazilian arrowroot. Caoutchouc or india-rubber is obtained from species of *Hevea*, *Mabea*, *Manihot* and *Sapium*. Castor oil (*q.v.*) is obtained from the seeds of *Ricinus communis*. The seeds of *Aleurites moluccana* and *Sapium sebiferum* also yield oil. Resin is obtained from species of *Croton* and *Euphorbia*. Many of the species are poisonous; *e.g.* the South African *Toxicodendron* is one of the most poisonous plants known. Many, such as *Euphorbia*, *Mercurialis*, *Croton*, *Jatropha*, *Tragia*, have been, or still are, used as medicines. Species of *Codiaeum* (*q.v.*), *Croton*, *Euphorbia*, *Phyllanthus*, *Jatropha* and others are used as ornamental plants in gardens.

The box (*Buxus*) and a few allied genera which were formerly included in Euphorbiaceae are now generally regarded as forming a distinct order—Buxaceae, differing from Euphorbiaceae in the position of the ovule in the ovary-chamber and in the manner of splitting of the fruit.

EUPHORBIUM, an acrid dull-yellow or brown resin, consisting of the concreted milky juice of several species of *Euphorbia*, cactus-like perennial plants indigenous to Morocco. It dissolves in alcohol, ether and turpentine; in water it is only slightly soluble. It consists of two or more resins and a substance euphorbone, $C_{20}H_{36}O$ or $C_{15}H_{24}O$. Pliny states that the name of the drug was given to it in honour of Euphorbus, the physician of Juba II., king of Mauretania. In former times euphorbium was valued in medicine for its drastic, purgative and emetic properties.

EUPHORBUS, son of Panthoüs, one of the bravest of the Trojan heroes, slain by Menelaus (*Iliad*, xvii. 1-60). Pythagoras, in support of his doctrine of the transmigration of souls, declared that he had once been this Euphorbus, whose shield, hung up in the temple of Argos by Menelaus, he claimed as his own (Horace, *Odes*, i. 28. 11; Diog. Laërt. viii. 1).

EUPHORION, Greek poet and grammarian, born at Chalcis in Euboea about 275 B.C. He spent much of his life in Athens, where he amassed great wealth. About 221 he was invited by Antiochus the Great to the court of Syria. He assisted in the formation of the royal library at Antioch, of which he held the post of librarian till his death. He wrote mythological epics, amatory elegies, epigrams and a satirical poem (Ἀραί, "curses") after the manner of the *Ibis* of Callimachus. Prose works on antiquities and history are also attributed to him. Like Lycophron, he was fond of using archaic and obsolete expressions, and the erudite character of his allusions rendered his language very obscure. His elegies were highly esteemed by the Romans; they were imitated or translated by Cornelius Gallus and also by the emperor Tiberius.

Fragments in Meineke, "De Euphorionis Chalcidensis vita et scriptis," in his *Analecta Alexandrina* (1843); for a recently discovered fragment of about 30 lines see *Berliner Klassikertexte*, v. 1 (1907).

EUPHRANOR, of Corinth (middle of the 4th century B.C.), the only Greek artist who excelled both as a sculptor and as a painter. In Pliny we have lists of his works; among the paintings, a cavalry battle, a Theseus, and the feigned madness of Odysseus; among the statues, Paris, Leto with her children Apollo and Artemis, Philip and Alexander in chariots. Unfortunately we are unable among existing statues to identify any which are copies from works of Euphranor (but see a series of attributions by Six in *Jahrbuch*, 1909, 7 foll.). He appears to have resembled his contemporary Lysippus, notably in the attention he paid to symmetry, in his preference for bodily forms slighter than those usual in earlier art, and in his love of heroic subjects. He wrote a treatise on proportions.

EUPHRATES (Babylon. *Purattu*, Heb. *Perath*, Arab. *Frāt* or *Furāt*, Old Pers. *Ufratu*, Gr. Εὐφράτης), the largest river of western Asia. It may be divided into three divisions, upper, lower and middle, each of which is distinguished by special physical features, and has played a conspicuous part in the world's history, retaining to the present day monumental evidence of the races who have lined its banks.

Upper Division.—The upper Euphrates consists of two arms, which, rising on the Armenian plateau, and flowing west in long shallow valleys parallel to Mount Taurus, eventually unite and force their way southward through that range to the level of Mesopotamia. The northern or western and shorter arm, called by the Turks Kara Su, "black water," or Frāt Su (Armenian, *Ephrāt* or *Yephrāt*; Arab. *Nahr el-Furāt* or *Frāt*), well known to occidentalists as the Euphrates, from its having been the boundary of the Roman empire, is regarded also by Orientals as the main stream. It rises in the Dumlu Dagh, N.N.W. of Erzerum, in a large circular pool (altitude, 8625 ft.), which is venerated by Armenians and Moslems, and flows south-east to the plain of Erzerum (5750 ft.). Thence it continues through a narrow valley W.S.W. to Erzingan (3900 ft.), receiving on its way the Ovajik Su (right), the Tuzla Su (left), and the Merjan and Chanduklu (right). Below Erzingan the Frāt flows south-west through a rocky gorge to Kemakh (*Kamacha*; Armenian, *Gamukh*), where it is crossed by a bridge and receives the Kumur Su (right). At Avshin it enters a cañon, with walls over 1000 ft. high, which extends to the bridge at Pingan, and lower down it is joined from the west by the Chalta Irmak (*Lycus*; Arab. *Lūkīya*), on which stands Divrik (Tephrike). Then, entering a deep gorge with lofty rock walls and magnificent scenery, it runs south-east to its junction with the Murad Su. The Frāt, separated by the easy pass of Deve-boyūn from the valley of the Araxes (Aras), marks the natural line of communication between northern Persia and the West—a route followed by the nomad Turks, Mongols and Tatars on their way to the rich lands of Asia Minor. It is a rapid river of considerable volume, and below Erzingan is navigable, down stream, for rafts. The southern or eastern and longer arm, called by the Turks Murad Su (*Arsanias Fl.*; Armenian, *Aradzani*; Arab. *Nahr Arsanas*), rises south-west of Diadin, in the northern flank of the Ala Dagh (11,500 ft.), and flows west to the Alashgerd plain. Here it is joined by the Sharian Su from the west, and the two valleys form a great trough through which the caravan road from Erzerum to Persia runs. The united stream breaks through the mountains to the south, and, receiving on its way the Patnotz Su (left) and the Khinis Su (right), flows south-west, west and south, through the rich plain of Bulanik to the plain of Mūsh. Here it is joined by the Kara Su (*Teleboas*), which, rising near Lake Van, runs past Mūsh and waters the plain. The river now runs W.S.W. through a deep rocky gorge, in which it receives the Gunig Su (right), to Palu (where there are cuneiform inscriptions); and continues through more open country to its junction with the Frāt Su. About 10 m. E.N.E. of Kharpūt the Murad is joined by its principal tributary, the Peri Su, which drains the wild mountain district, Dersim, that lies in the loop between the two arms. The Murad Su is of greater volume than the Frāt, but its valley below Mūsh is contracted and followed by no great road. Below the junction of the two arms the Euphrates flows south-west past the lead mines of Keban Maden, where it is 120 yds. wide, and is crossed by a ferry (altitude, 2425 ft.), on the Sivas-Kharpūt road. It then runs west, south and east round the rock-mass of Musher Dagh, and receives (right) the Kuru Chai, down which the Sivas-Malatia road runs, and the Tokhma Su, from Gorun (*Gauraina*) and Darende. At the ferry on the Malatia-Kharpūt road (cuneiform inscription) it flows eastwards in a valley about a quarter of a mile wide, but soon afterwards enters a remarkable gorge, and forces its way through Mount Taurus in a succession of rapids and cataracts. After running south-east through the grandest scenery, and closely approaching the source of the western Tigris, it turns south-west and leaves the mountains a few miles above Samsāt (*Samosata*; altitude, 1500 ft.). The general direction of the great gorges of the Euphrates, Pyramus (Jihun) and Sarus (Sihun) seems to indicate that their formation was primarily due to the same terrestrial movements that produced the Jordan-ʽAraba depression to the south. The length of the Frāt is about 275 m.; of the Murad, 415 m.; and of the Euphrates from the junction to Samsāt, 115 m.

Middle Division.—The middle division, which extends from Samsāt to Hit, is about 720 m. long. In this part of its course the Euphrates runs through an open, treeless and sparsely peopled country, in a valley a few miles wide, which it has eroded in the rocky surface. The valley bed is more or less covered with alluvial soil, and cultivated in places by artificial irrigation. The method of this irrigation is peculiar. Three or four piers or sometimes bridges of masonry are run out into the bed of the river, frequently from both sides at once, raising the level of the stream and thus giving a water power sufficient to turn the gigantic wheel or wheels, sometimes almost 40 ft. in diameter, which lift the water to a trough at the top of the dam, whence it is distributed among the gardens and melon patches, rice, cotton, tobacco, liquorice and durra fields, between the immediate bed of the river and the rocky banks which shut it out from the desert. The wheels, called *naoura*, are of the most primitive construction, made of rough branches of trees, with palm leaf paddles, rude clay vessels being slung on the outer edge to catch the water, of which they raise a prodigious amount, only a comparatively small part of which, however, is poured into the aqueducts on top of the dams. These latter are exceedingly picturesque, often consisting of a series of well-built Gothic arches, and give a peculiar character to the scenery; but they are also great impediments to navigation. In some parts of the river 300 *naouras* have been counted within a space of 130 m., but of late years many have fallen into decay. By far the larger part of the valley is quite uncultivated, and much of it is occupied by tamarisk jungles, the home of countless wild pigs. Where the valley is still cultivated, the *jerd*, a skin raised by oxen, is gradually being substituted for the *naoura*, no more of the latter being constructed to take the place of those which fall into decay.

In this part of its course the rocky sides of the valley, which sometimes closely approach the river, are composed of marls and gypsum, with occasional selenite, overlaid with sandstone, with a topping of breccia or conglomerate, and rise at places to a height of 200 ft. or more. At one point, however, 26 m. above Deir, where lie the ruins of Halebiya, the river breaks through a basaltic dike, el-Ḥamme, some 300 to 500 ft. high. On either side of the river valley a steppe-like desert, covered in the spring with verdure, the rest of the year barren and brown, stretches away as far as the eye can see. Anciently the country on both sides of the Euphrates was habitable as far as the river Khabur; at the present time it is all desert from Birejik downward, the camping ground of Bedouin Arabs, the great tribe of Anazeh occupying *esh-Shām*, the right bank, and the Shammar the left bank, Mesopotamia of the Romans, now called el-Jezīreh or the island. To these the semi-sedentary Arabs who sparsely cultivate the river valley, dwelling sometimes in huts, sometimes in caves, pay a tribute, called *kúbbe*, or brotherhood, as do also the riverain towns and villages, except perhaps the very largest. The Turkish government also levies taxes on the inhabitants of the river valley, and for this purpose, and to maintain a caravan route from the Mediterranean coast to Bagdad, maintains stations of a few *zaptiehs* or *gens d'armes*, at intervals of about 8 hours (caravan time), occupying in general the stations of the old Persian post road. The only riverain towns of any importance on this stretch of the river to-day are Samsāt, Birejik, Deir, ʽAna and Hit.

In early times the Euphrates was important as a boundary. It was the theoretical eastern limit of the Jewish kingdom; for a long time it separated Assyria from the Khita or Hittites; it divided the eastern from the western satrapies of Persia (Ezra iv. 17; Neh. ii. 7); and it was at several periods the boundary of the Roman empire. Until the advent of the nomads from central Asia, and the devastation of Mesopotamia and the opposite Syrian shore of the river, there were many flourishing cities along its course, the ruins of which, representing all periods, still dot its banks. Samsāt itself represents the ancient Samosata, the capital of the Seleucid kings of Commagene (*Kumukh* of the Assyrian inscriptions), and here the Persian Royal Road from Sardis to Susa is supposed to have crossed the river. Below Samsāt the river runs S.W. to Rum-Kaleh, or "castle of the Romans" (Armenian, *Hrhomgla*). At this point was another passage of the river, defended by the castle which gives its name to the spot, and which stands on a high hill overhanging the right bank, its base washed by an abundant stream, the Sanjeh (Gr. Σίγγας), which enters the Euphrates on the west. From this point the river runs rather east of south for about 25 m. past Khalfat (ferry) to Birejik or Bir, the ancient Birtha, where it is only 110 m. from the Mediterranean, the bed of the river being 628½ ft. above that sea. This was the Apamea-Zeugma, where the high road from east to west crossed the river, and it is still one of the most frequented of all the passages into Mesopotamia, being the regular caravan route from Iskanderun and Aleppo to Urfa, Diarbekr and Mosul. From Birejik the river runs sluggishly, first a little to the east, then a little to the west of south, over a sandy or pebbly bed, past Jerablus (? *Europus*, *Carchemish*, the ancient Hittite capital), near which the Sajur (*Sagura*; *Sangar* of the Assyrian inscriptions) enters from the west, to Meskene, 2 m. southward of which are the ruins of Barbalissus (Arab. *Balis*), the former port of Aleppo, now, owing to changes in the bed, some distance from the water. Six miles below this the ruins of Kalʽat Dibse mark the site of the ancient Thapsacus (*Tiphsah* of 1 Kings iv. 24), the most important passage of the middle Euphrates, where both Cyrus, on his expedition against his brother, and Alexander the Great crossed that river, and the ancient port of Syria. Here the river turns quite sharply eastward. A day's journey beyond Meskene are the remains of Siffin (Roman *Sephe*), where Moawiya defeated the caliph Ali in 657 (see CALIPHATE), and opposite this, on the west bank, a picturesque ruin called Kalʽat Jaʽber (*Dausara*). A day's journey beyond this, on the Syrian side, stand the remains of ancient Sura, a frontier fortress of the Romans against the Parthians; 20 m. S. of which, inland, lie the well-preserved ruins of Reseph (Assyrian, *Resafa* or *Rosafa*). Half a day's journey beyond Sura, on the Mesopotamian side of the river, are the extensive ruins of Haragla (*Heraclea*) and Rakka, once the capital of Harun al-Rashid (*Nicephorium* of Alexander; *Callinicus* of the Seleucids and Romans). Here the Belikh (*Bilechas*) joins the Euphrates, flowing southward through the biblical Aram Naharaim from Urfa (*Edessa*) and Harran (*Carrhae*); and from this point to el-Ḳaim four days' below Deir, the course of the river is south-easterly. Two days' journey beyond Rakka, where the Euphrates breaks through the basalt dike of el-Ḥamme, are two admirably preserved ruins, built of gypsum and basalt, that on the Mesopotamian side called Zelebiya (Chanuga), and that on the Syrian, much the finer of the two, Halebiya or Zenobiya, the ancient Zenobia. Twenty-six miles farther down lies the town of Deir (*q.v.*), where the river divides into two channels and the river valley opens out into quite extensive plains. Here the roads from Damascus, by way of Palmyra, and from Mosul, by way of the Khabur, reach the Euphrates, and here there must always have been a town of considerable commercial and strategic importance. The region is to-day covered with ruins and ruin mounds. A little below Deir the river is joined by the Khabur (*Khaboras*, Biblical *Khabor*), the frontier of the Roman empire from Diocletian's time, which rises in the Karaja Dagh, and, with its tributary, the Jaghijagh (*Mygdonius*; Arab. *Hirmas*) flows south through the land of Gozan in which Sargon settled the deported Israelites in 721 B.C. At the mouth of the Khabur stood the Roman frontier fortress of *Circesium* (Assyrian, *Sirki*; Arab. *Kirkessie*) now el-Buseira. The corresponding border town on the Syrian side is represented by the picturesque and finely preserved ruins called Salahiya, the Ad-dalie or Dalie (*Adalia*) of Arabic times, two days below Deir, whose more ancient name is as yet unknown. Between Salahiya and Deir, on an old canal, known in Arabic times as Said, leaving the Euphrates a little below Deir and rejoining it above Salahiya, stand the almost more picturesque ruins of the once important Arabic fortress of Raḥba.

As far as the Khabur Mesopotamia seems to have been a well-inhabited country from at least the 15th century B.C., when it constituted the Hittite kingdom of Mitanni, down to about the 12th century A.D., and the same is true of the country on the Syrian side of the Euphrates as far as the eastern limit of the Palmyrene. Below this point the back country on the Syrian side has always been a complete desert. On the Mesopotamian side there would seem, from the accounts of Xenophon and Ptolemy, to have been an affluent which joined the Euphrates between Deir and ʽAna, called Araxes by the former, Saocoras by the latter; but no trace of such a stream has been found by modern explorers and the country in general has always been uninhabited. Below Salahiya the river-bed narrows and becomes more rocky. A day's journey beyond Salahiya, on a bluff on the Mesopotamian side of the river, are the conspicuous ruins of el-ʽIrsi (*Corsote?*). Half a day's journey beyond, at a point where two great wadis enter the Euphrates, on the Syrian side, stands Jabriya, an unidentified ruined town of Babylonian type, with walls of unbaked brick, instead of the stone heretofore encountered. At this point the river turns sharply a little north of east, continuing on that course somewhat over 40 m. to ʽAna, where it bends again to the south-east. Just above ʽAna are rapids, and from this point to Hit the river is full of islands, while the bed is for the most part narrow, leaving little cultivable land between it and the bluffs. ʽAna itself, a very ancient town, of Babylonian origin, once sacred probably to the goddess of the same name, lay originally on several islands in the stream, where ruins, principally of the Arabic and late Persian period, are visible. Here palm trees, which had begun to appear singly at Deir, grow in large groves, the olive disappears entirely, and we have definitely passed over from the Syrian to the Babylonian flora and climate. Between ʽAna and Hit there were anciently at least four island cities or fortresses, and at the present time three such towns, insignificant relics of former greatness, Haditha, Alus or el-ʽUzz and Jibba still occupy the old sites. Of these Alus is evidently the ancient Auzara or Uzzanesopolis, the city of the old Arabic goddess ʽUzza; Haditha, an important town under the Abbasids, was earlier known as Baia Malcha; while Jibba has not been identified. The fourth city, Thilutha or Olabus, once occupied the present deserted island of Telbeis, half a day's journey below ʽAna. About half-way between ʽAna and Hit, in the neighbourhood of Haditha, the river has a breadth of 300 yds., with a depth of 18 ft., and a flood speed of 4 knots. At this point we begin to encounter sulphur springs and bitter streams redolent with bitumen, a formation which reaches its climax at Hit (*q.v.*), where a small stream (the "river of Ahava" of Ezra viii. 21) enters the Euphrates from the Syrian side, on which, about 8 m. from its mouth, stands the small town of Kubeitha.

The middle Euphrates, from Samsāt to Hit, is to-day an avenue of ruins, of which only the more conspicuous or important have been indicated here. It was from a remote period, antedating certainly 3000 B.C., the highway of empire and of commerce between east and west, more specifically between Babylonia or Irak and Syria, and numerous empires, peoples and civilizations have left their records on its shores. Its time of greatest prosperity and importance was the period of the Abbasid caliphate, and Arabic geographers as late as A.D. 1200 mention an astonishingly large number of important cities situated on its shores or islands. The Mongol invasion, in the latter part of that century, wrought their ruin, however, and from that time to the present there has been a steady decline in the commercial importance of the Euphrates route, and consequently also of the towns along its course, until at the present time it is only an avenue of ruins.

Lower Division.—Hit stands almost at the head of the alluvial deposit, about 550 m. from the Persian Gulf, separated from it by a couple of small spurs of the Syrian plateau, and may be said to mark the beginning of the lower Euphrates. Thence the river flows S.E. and S.S.E. to its junction with the Tigris below Korna, through an unbroken plain, with no natural hills, except a few sand (or sandstone?) hills in the neighbourhood of Warka, and no trace of rock, except at el-Haswa, above Hillah. At Hit the river is from 30 to 35 ft. in depth, with a breadth of 250 yds., and a current of 4 m. an hour, but from this point it diminishes in volume, receiving no new affluents but dissipating itself in canals and lagoons. At Feluja, in the latitude of Bagdad, the Euphrates and Tigris closely approach each other, and then, widening out, enclose the plain of Babylonia (Arab. *Sawād*). Through this part of its course the current of the river, except where restricted by floating bridges—at Feluja, Mussaïb, Hillah, Diwanieh and Samawa—does not normally exceed a mile an hour, and both on the main stream and on its canals the *jerd* or ox-bucket takes the place of the *naoura* or water-wheel for purposes of irrigation.

In early times irrigating canals distributed the waters over the plain, and made it one of the richest countries of the East, so that historians report three crops of wheat to have been raised in Babylonia annually. As main arteries for this circulation of water through its system great canals, constituting in reality so many branches of the river, connected all parts of Babylonia, and formed a natural means both of defence and also of transportation from one part of the country to another. The first of these canals, taken off on the right bank of the river a little below Hit, followed the extreme skirt of the alluvium the whole way to the Persian Gulf near Basra, and thus formed an outer barrier, strengthened at intervals with watch-towers and fortified posts, to protect the cultivated land of the *Sawād* against the incursions of the desert Arabs. This gigantic work, the line of which may still be traced throughout its course, was formerly called the *Khandak Sabūr* or "Sapor's trench," being ascribed to the Sassanian king, Shapur I. Dholahtaf, but is now known as the Cherra-Saadeh, and is in the popular tradition said to have been excavated by a man from Basra at the behest of a woman of Hit whom he desired to make his wife. How early this work was begun is not clear, but it would appear to have been at least largely reconstructed in the time of the great Nebuchadrezzar. The next important canal, the Dujayl (Dojail), left the Euphrates on the left, about a league above Ramadiya (*Ar-Rabb*), and flowed into the Tigris between Ukbara and Bagdad. The ʿIsa, which is largely identical with the modern Sakhlawiya, left the Euphrates a little below Anbar (*Perisabora*) and joined the Tigris at Bagdad. This canal still carries water and was navigable for steamboats until about 1875. Sarsar, the modern Abu-Ghurayb, leaves the Euphrates three leagues lower down and enters the Tigris between Bagdad and Ctesiphon. The Nahr Malk or royal river, modern Radhwaniya, leaves the Euphrates five leagues below this and joins the Tigris three leagues below Ctesiphon; while the Kutha, modern Habl-Ibrahim, leaving the Euphrates three leagues below the Malk joins the Tigris ten leagues below Ctesiphon. In the time of the Arabs these were the chief canals, and the cuts from the main channels of the Nahr ʿIsa, Nahr Sarsar, Nahr Malk (or Nahr Malcha), and Nahr Kutha, reticulating the entire country between the rivers, converted it into a continuous and luxuriant garden.

Just below Mussaïb there has been for all ages a great bifurcation of the river. The right arm was the original bed, and the left arm, on which Babylon was built, the artificial deviation, as is clear from the cuneiform inscriptions. In the time of Alexander the nomenclature was reversed, the right arm being known as Pallacopas. Under the Arabs the old designation again prevailed and the Euphrates is always described by the Arabian geographers as the river which flows direct to Kufa, while the present stream, passing along the ruins of Babylon to Hillah and Diwanieh, has been universally known as the Nahr Sura. Occidental geographers, however, have followed the Greek use, and so to-day we call the river of Babylon or Nahr Sura the Euphrates and the older westerly channel the Hindieh canal. At the present time the preservation of the embankments about the point of bifurcation demands the constant care of the Bagdad government. The object is to allow sufficient water to drain off to the westward for the due irrigation of the land, while the Hillah bed still retains the main volume of the stream, and is navigable to the sea. But it frequently happens that the dam at the head of the Hindieh is carried away, and, a free channel being thus opened for the waters of the river to the westward, the Hillah bed shoals to 2 or 3 ft., or even dries up altogether, while the country to the west of the river is turned into lakes and swamps. Below the bifurcation the river of Babylon was again divided into several streams, and indeed the most famous of all the ancient canals was the Arakhat (*Archous* of the Greeks and *Serrāt* and *Nil* of the Arabs), which left that river just above Babylon and ran due east to the Tigris, irrigating all the central part of the Jezīreh, and sending down a branch through Nippur and Erech to rejoin the Euphrates a little above the modern Nasrieh. The Narss, also, the modern Daghara, which is still navigable to Nippur and beyond, left the Sura a little below Hillah; and at the present day another large canal, the Kehr, branches off near Diwanieh. It is easy to distinguish the great primitive watercourses from the lateral ducts which they fed, the latter being almost without banks and merely traceable by the winding curves of the layers of alluvium in the bed, while the former are hedged in by high banks of mud, heaped up during centuries of dredging.

Not a hundredth part of the old irrigation system is now in working order. A few of the mouths of the smaller canals are kept open so as to receive a limited supply of water at the rise of the river in May, which then distributes itself over the lower lying lands in the interior, almost without labour on the part of the cultivators, giving birth in such localities to the most abundant crops, but by far the larger portion of the region between the rivers is at present an arid howling wilderness dotted with *tels* or ruin-heaps, strewn in the most part with broken pottery, the evidence of former habitation, and bearing nothing but the camel-thorn, the wild caper, the colocynth-apple, wormwood and other weeds of the desert. The swamps are full of huge reeds, bordered with tamarisk jungles, and in its lower reaches, where the water stretches out into great marshes, the river is clogged with a growth of agrostis. To obtain a correct idea of this region it must be borne in mind also that the course of the river and the features of the country on both banks are subject to constant fluctuation. The Hindieh canal and the main stream, the ancient Sura, rejoin one another at Samawa. Down to this point, the bed of the Euphrates being higher than that of the Tigris, the canals run from the former to the latter, but below this the situation is reversed. At Nasrieh the Shatt-el-Haï, at one time the bed of the Tigris, and still navigable during the greater part of the year, joins the Euphrates. From this point downward, and to some extent above this as far as Samawa, the river forms a succession of reedy lagoons of the most hopeless character, the Paludes Chaldaici of antiquity, el Batihāt of the Arabs. Along this part of its course the river is apt to be choked with reeds and, except where bordered by lines of palm trees, the channel loses itself in lakes and swamps. The inhabitants of this region are wild and inhospitable and utterly beyond the control of the Turkish authorities, and navigation of the river between Korna and Suk-esh-Sheiukh is unsafe owing to the attacks of armed pirates. From Garmat Ali, where the Tigris and Euphrates at present unite,[1] under the title of Shatt-el-Arab, the river sweeps on to Basra, 1000 yds. in width and from 3 to 5 fathoms deep, navigable for steamers of good size. From Korna to Basra the banks of the river are well cultivated and the date groves almost continuous; indeed this is the greatest date-producing region of the world. Twenty-five miles below Basra the river Karun from Shushter and Dizful throws off an arm, which seems to be artificial, into the Euphrates. This arm is named the Haffār, and at the confluence is situated the Persian town of Muhamrah, a place most conveniently located for trade. In this vicinity was situated, at the time of the Christian era, the Parthian city of Spasini-Charax, which was succeeded by Bahman Ardashir (*Bamishir*) under the Sassanians, and by Moharzi under the Arabs. The left bank of the river from this point belongs to Persia. It consists of an island named Abbadan, about 45 m. long, formed by alluvial deposits during the last fifteen centuries. (For the character of this alluvium and its rate of deposit see IRAK.)

Even more than the upper and middle Euphrates the lower Euphrates, from Hit downward, abounds in ruins of ancient towns and cities, from the earliest prehistoric period onward to the close of the Caliphate (see IRAK). The fact also that many of the most ancient of these ruins, like Ur, Lagash (Sirpurla), Larsa, Erech, Nippur, Sippara and Babylon, were situated on the banks of the great canals would indicate that the control of the waters of the rivers by a system of canalization and irrigation was one of the first achievements of civilization. This ancient system of canalization was inherited from the Persians (who, in turn, inherited it from their predecessors), by the Arabs, who long maintained it in working order, and the astonishing fertility and consequent prosperity of the country watered by the Euphrates, its tributaries and its canals, is noticed by all ancient writers. The land itself, an alluvial deposit, is very fruitful. Wheat and the date palm seem to have been indigenous, and the latter is still one of the chief poductions of the country, but in later years rice has taken the place of wheat as the staff of life. The decline of the country dates from the appearance of Turkish nomads in the 11th century; its ruin was completed by the Shammar Arabs in the 17th century; but, if the ancient system of irrigation were restored, sufficient grain could be grown to alter the conditions of the wheat supply of the world. At the present time, instead of the innumerable cities of former days, there is a succession of small towns along the course of the river—Ramadiya, Feluja, Mussaïb, Hillah, Diwanieh, Samawa, el-Khudr (an ancient daphne or sacred grove, 31° 11′ 58″ N., 76° 6′ 9″ E., the only one anywhere which preserves to this day its ancient charter of the inviolability of all life within its precincts), Nasrieh and Suk-esh-Sheiukh—by means of which the Turkish government controls the river and levies taxes on a small part of the adjacent territory. At such settlements the river is lined with gardens and plantations of palms. The greater part of the region, however, even along the river shores, is inhabited only by roaming Bedouin or half-savage Maʿdan Arabs (see Irak).

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[1] The confluence for about 500 years was at Korna, over 30 m. higher up. Sir W. Willcocks discovered (1909) that from Suk-esh-Sheiukh the Euphrates had formed a new channel through the marshes. (See *Geog. Journal*, Jan. 1910).

Navigation.—The length of the Euphrates from its source at Diadin to the sea is about 1800 m., and its fall during the last 1200 m. about 10 ins. per mile. The river begins to rise in the end of March and attains its greatest height between the 21st and the 28th of May. It is lowest in November, and rocks, shallows, and the remains of old dams then render it almost unnavigable. In antiquity, however, it was evidently in use for the transportation of merchandise and even of armies. Boats built in Syrian ports were placed on the Euphrates by Sennacherib and Alexander, and Herodotus states (i. 185) that in his day the river was a frequented route followed by merchants on their way from the Mediterranean to Babylon. As the most direct line of transit between the Mediterranean and the Persian Gulf, offering an alternative means of communication with India not greatly inferior to the Egyptian route, the Euphrates route early attracted the attention of the British government. During the Napoleonic wars, indeed, and up to the time when the introduction of steam navigation rendered the Red Sea accessible at all seasons of the year, the political correspondence of the home and Indian governments usually passed by the Euphrates route. Various plans were suggested for the development of this route as a means of goods as well as postal conveyance, and in 1835 Colonel F. R. Chesney was sent out at the head of an expedition with instructions to transport two steamers from the Mediterranean to the Euphrates, and, after putting them together at Birejik, to attempt the descent of the river to the sea. One of these steamers was lost in a squall during the passage down the river near el-ʿIrsi, but the other performed the voyage in safety and thus demonstrated the practicability of the downward navigation. Following on this first experiment, the East India Company, in 1841, proposed to maintain a permanent flotilla on the Tigris and Euphrates, and set two vessels, the "Nitocris" and the "Nimrod," under the command of Captain Campbell of the Indian navy, to attempt the ascent of the latter river. The experiment was so far successful that, with incredible difficulty, the two vessels did actually reach Meskene, but the result of the expedition was to show that practically the river could not be used as a high-road of commerce, the continuous rapids and falls during the low season, caused mainly by the artificial obstructions of the irrigating dams, being insurmountable by ordinary steam power, and the aid of hundreds of hands being thus required to drag the vessels up the stream at those points by main force. Under Midhat Pasha, governor-general of Bagdad from 1866 to 1871, an attempt was made by the Turkish authorities to establish regular steam navigation on the Euphrates. Midhat caused many of the dams to be destroyed and for some years occasional steamers were run between Meskene and Hillah in flood time, from April to August. But with the transfer of Midhat this feeble attempt at navigation was abandoned. At the present time the river is navigated by sailing craft of some size from Hit downward. Above that point there is no navigation except by the native rafts (*kellek*), which descend the river and are broken up on arrival at their point of destination. There is, however, little travel of this sort on the Euphrates in comparison with the amount on the Tigris.

When it became evident that, under present conditions at least, the navigation of the middle Euphrates was impracticable, attention was turned, owing to the peculiarly advantageous geographical position of its valley, to schemes for connecting the Mediterranean and Persian Gulf by railway as an alternative means of communication with India, and various surveys were made for this purpose and various routes laid out. All these schemes, however, fell through either on the financial question, or on the unwillingness of the Turkish government to sanction any line not connected directly with Constantinople. With the acquisition of the Suez Canal, moreover, the value of this route from the British standpoint was so greatly diminished that the scheme, so far as England was concerned, was quite abandoned. (For further notice of the railway question see Bagdad.)

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(H. C. R.; C. W. W.; J. P. Pe.)

EUPHRONIUS, the most noted of the group of great vase-painters, who lived in Athens in the time of the Persian wars, and worked upon red-figured vases (see Greek Art and Ceramics). There is a monograph by W. Klein dealing with the artist. As all the great paintings of Greece have disappeared, we are obliged to trust to the designs on vases for our knowledge of Greek drawing and composition. Euphronius is stiff and archaic in style, but his subjects are varied, his groupings original and striking, and his mastery of the line decided. In their way, the vases which he painted will hold their own in comparison with those of any nation; for simplicity, truthfulness and charm they can scarcely be matched.

EUPHROSYNE, the name of two Byzantine empresses.

1. Euphrosyne, a daughter of Constantine VI. Although she had taken a monastic vow she became the second wife of Michael II. (*q.v.*), a marriage which was practically forced upon her by Michael, who was anxious to strengthen his claims to the throne by an alliance with the last representative of the Isaurian dynasty, and secured the compliance of senate and patriarch with his desire. No issue was born of this union, and after the death of her husband and accession of her stepson Theophilus Euphrosyne again retired into a convent.

2. Euphrosyne, the wife of Alexius III. (*q.v.*). After securing the election of her husband to the throne by wholesale bribery she virtually took the government into her hands and restored the waning influence of the monarchy over the nobles. In spite of her talent for government she went far to hasten the empire's downfall by her unbounded extravagance, and made the dynasty unpopular by her open profligacy, which went unpunished but for one short term of banishment. She followed her husband into exile in 1203 and died seven years later in Epirus.

EUPHUISM, the peculiar mode of speaking and writing brought into fashion in England towards the end of the reign of Elizabeth by the vogue of the fashionable romance of *Euphues*, published in 1578 by John Lyly. As early as 1570 Ascham in his *Schoolmaster* had said that "Euphues" (that is, a man well-endowed by nature, from the Gr. εὖ, φυή, well, growth) is "he that is apt by goodness of wit, and appliable by readiness of will, to learning, having all other qualities of the mind and parts of the body that must another day serve learning." Lyly adopted this word as the name of the hero of his romance, and it is with him that the vogue of Euphuism began. John Lyly, "always averse to the crabbed studies of logic and philosophy, and his genie being naturally bent to the pleasant paths of poetry," devoted himself exclusively to the service of the ladies, a thing absolutely unprecedented in English literature. He addressed himself to "the gentlewomen of England," and he had the audacity, in that grave age, to say that he would rather see his books "lie shut in a lady's casket than open in a scholar's study." In order to attain this object, he set himself to create a superfine style in writing, and to illustrate this in his compositions. He undertook to produce a pleasurable literature for the boudoir and the bower. Lyly was twenty-six when he published in 1579 the first part of *Euphues: the Anatomy of Wit*: a second part, entitled *Euphues and his England*, appeared in 1580. His object was diametrically opposed to that of writers who had striven to instruct, reprove or edify their contemporaries. Lyly, assuming that women only will read his book, says:—"After dinner, you may overlook it to keep you from sleep, or if you be heavy to bring you asleep, for to work upon a full stomach is against physic, and therefore better were it to hold *Euphues* in your hands, though you let him fall when you be willing to wink, than to sew in a closet and prick your fingers when you begin to read."

For a comprehension of the nature of Euphuism it is necessary to remember that the object of its invention was to attract and to disarm the ladies by means of an ingenious and playful style, of high artificiality, which should give them the idea that they were being entertained by an enthusiastic adorer, not instructed by a solemn pedagogue. For fifty years the romance of *Euphues* retained its astonishing popularity. As late as 1632 the publisher Edward Blount (1560?–1632), recalling the earliest enthusiasm of the public, wrote of John Lyly, "Oblivion shall not so trample on a son of the Muses, and such a son as they called their darling. Our nation are in his debt for a new English which he taught them. *Euphues and his England* began first that language. All our ladies were then his scholars, and that beauty in Court, which could not parley Euphuism, was as little regarded, as she which, now there, speaks not French." Among those who applied themselves to this "new English," one of the most ardent was Queen Elizabeth herself, who has been styled by J. R. Green "the most affected and destestable of euphuists." At the height of the popularity of this strange dialect, it was said by William Webbe, in his *Discourse of English Poetry* (1586), to consist in a combination of "singular eloquence and brave composition of apt words and sentences, in fit phrases, in pithy sentences, in gallant tropes, in flowing speech," while a French poet of the same age calls Lyly a "raffineur" of the English speech; another panegyrist describes him as "*alter Tullius*," meaning that, in inventing Euphuism, he had introduced into English the refinements of a Ciceronian style.

When we put aside these excessive compliments, and no less the attacks from which the style suffered as soon as it began to go out of fashion, we are able to observe merits as well as faults in this very curious experiment. Euphuism did not attempt to render the simplicity of nature. On the contrary, in order to secure refinement, it sought to be as affected, as artificial, as high-pitched as possible. Its most prominent feature was an incessant balancing of phrases in chains of antitheses, thus:—"Though the tears of the hart be salt, yet the tears of the boar be sweet, and though the tears of some women be counterfeit to deceive, yet the tears of many be current to try their love"; or this:—"Reject it not because it proceedeth from one which hath been lewd, no more than ye would neglect the gold because it lieth in the dirty earth, or the pure wine for that it cometh out of a homely presse, or the precious stone *aetites* which is found in the filthy nests of the eagle, or the precious gem *draconites*, that is ever taken out of the poisoned dragon." This second excerpt, moreover, suggests another of the main characteristics of Euphuism, the incessant use, for purposes of ornament, of similes taken from fabulous records of zoology; or relating to mythical birds, fishes or minerals. This was a feature of the "new English" which was excessively admired, and copied with a senseless extravagance. Instances of it are found on every page of Lyly's books, thus:—"Although the worm entereth almost into every wood, yet he eateth not the cedar-tree; though the stone *cylindrus* at every thunder-clap roll from the hill, yet the pure sleek stone mounteth at the noise; though the rust fret the hardest steel, yet doth it not eat into the emerald; though polypus change his hue, yet the salamander keepeth his colour"; and so on, *ad infinitum*. That lady was considered most proficient in euphuism who could keep up longest these chains of similes taken out of fabulous natural history. Alliteration was also a particular ornament of the euphuistic style, as: "The bavin, though it burn bright, is but a blaze," but the use of this artifice by Lyly himself was rarely exaggerated; for instances of its excess we have rather to turn to his imitators. In the following passage the typical forms of Euphuism, in its pure and original conditions, are so combined and illustrated as to require no further commentary: "Do we not commonly see that in painted pots is hidden the deadliest poison? that in the greenest grass is the greatest serpent? in the clearest water the ugliest toad? Doth not experience teach us that in the most curious sepulchre are enclosed rotten bones? that the cypress tree beareth a fair leaf, but no fruit? that the ostrich carrieth fair feathers, but rank flesh?"—and so forth. It will be noticed that these characteristics differ in many respects from the specimens of euphuism which are most familiar to a modern reader, namely the extravagant speech placed in the mouth of Sir Piercie Shafton in Sir Walter Scott's romance of *The Monastery*. Scott modelled this character on what he called that "forgotten and obsolete model of folly, once fashionable," Lyly's novel of *Euphues*, but he had not studied the original to sufficient purpose, and the bombastic ravings of Sir Piercie, who simply talks like a lunatic, have deceived many readers as to the real characteristics of Euphuism. Scott betrays his own error when he says that "the extravagance of Euphuism . . . predominates in the romances of Calprenède and Scuderi," in which it is true that a tone of preposterous gallantry finds a language of its own, but that is not the language of Euphues. What Sir Piercie Shafton talks is a mixture of the style of these French romances, with the ostentation of Sir Fopling Flutter and the extravagances of the Scotch translator of Rabelais. But these various sorts of pretentious eloquence have little or nothing in common with the balanced and conceited style of Euphues.

We find that the genuine sort of this kind of superfine conversation was originally called "Euphues," simply, as Overbury speaks of a man "who speaks Euphues, not so gracefully as heartily." The earliest instance of the word "Euphuism" which has been traced occurs in a letter, written by Gabriel Harvey in 1592, when he speaks of a man, who would be smart, as talking "a little Euphuism." Dekker, in the *Gull's Hornbook* of 1609, uses the word as an adjective, and denounces "Euphuised gentlewomen." When the practice was going out of fashion we find it thus severely stigmatized by Michael Drayton, a poet who had little sympathy with the artificial refinement of Lyly. In an elegy, printed in 1627, Drayton refers to the merit of Sir Philip Sidney, who recalled English prose to sanity, and

"did first reduce
Our tongue from Lyly's writings then in use,
Talking of stones, stars, plants, of fishes, flies,
Playing with words and idle similes,
As th' English apes and very zanies be
Of everything that they do hear and see,
So imitating his ridiculous tricks
They spake and writ, all like mere lunatics."

This severe censure of Euphuism may serve to remind us that hasty critics have committed an error in supposing the *Arcadia* of Sidney to be composed in the fashionable jargon. That was certainly not the intention of the author, and in fact the publication of the *Arcadia*, eleven years after that of *Euphues*, marks the beginning of the downfall of the popularity of the latter. Sidney's prose, it is true, was extremely ornamented, but it was instinct with romantic fancy, and it affected a chivalrous and florid fulness which was artificial enough, but wholly distinct from the more homely elegance of Euphuism as we have defined it. The publication of the *Arcadia* was a severe blow to the Euphuists. Immediately the ladies began to desert their former favourite, and the object at court became, as Ben Jonson noted, to "observe as pure a phrase and use as choice figures in ordinary conference as any be in the *Arcadia*." But, in the meantime, Lyly had found in Greene, Lodge, Dickenson, Nicholas Breton and others enthusiastic disciples who had learned all the formulas of Euphuism, and could bring them forth as fluently and elegantly as he could himself. Nevertheless the trick wore out, with the taste that it had created, and by the close of the reign of James I. Euphuism had become a dead language.

Critics have not failed to insist, on the other hand, that a species of Euphuism existed before Euphues was thought of. It has been supposed that a translation of the familiar epistles, or, as they were called, the "Golden Letters," of a Spanish monk, Antonio de Guevara, led Lyly to conceive the extraordinary style which bears the name of his hero. Between 1574 and 1578 Edward Hellowes (fl. 1550–1600) translated into a very extravagant English prose three of the works of Guevara. Earlier than this, in 1557, Sir Thomas North had published a version of the same Spanish writer's *Reloj de Principes* (The Dial of Princes), a moral and philosophical romance which is not without a certain likeness in plan and language to *Euphues*. It is extremely difficult to know to what extent these translations, which were not strikingly unlike many other specimens of the ornamented English prose of their period, can be said to be responsible for the production of Euphuism. At all events no one can doubt that it was Lyly who concentrated the peculiarities of mannerism, and who gave to it the stamp of his own remarkable talent.

See Landmann, *Der Euphuismus* (1881); Arber's edition of *Euphues* (1869); R. W. Bond's *Complete Works of Lyly* (1902); Hallam, Jusserand, S. Lee, *passim*. (E. G.)

EUPION (Gr. εὖ, well, πίων, fat), a hydrocarbon of the paraffin series, probably a pentane, C_5H_{12}, discovered by K. Reichenbach in wood-tar. It is also formed in the destructive distillation of many substances, as wood, coal, caoutchouc, bones, resin and the fixed oils. It is a colourless highly volatile and inflammable liquid, having at 20° C. a specific gravity of 0·65.

EUPOLIS (*c.* 446–411 B.C.), Athenian poet of the Old Comedy, flourished in the time of the Peloponnesian War. Nothing whatever is known of his personal history. With regard to his death, he is said to have been thrown into the sea by Alcibiades, whom he had attacked in one of his plays, but it is more likely that he died fighting for his country. He is ranked by Horace (*Sat.* i. 4, 1), along with Cratinus and Aristophanes, as the greatest writer of his school. With a lively and fertile fancy Eupolis combined a sound practical judgment; he was reputed to equal Aristophanes in the elegance and purity of his diction, and Cratinus in his command of irony and sarcasm. Although he was at first on good terms with Aristophanes, their relations subsequently became strained, and they accused each other, in most virulent terms, of imitation and plagiarism. Of the 17 plays attributed to Eupolis, with which he obtained the first prize seven times, only fragments remain. Of these the best known were: the *Kolakes*, in which he pilloried the spendthrift Callias, who wasted his substance on sophists and parasites; *Maricas*, an attack on Hyperbolus, the successor of Cleon, under a fictitious name; the *Baptae*, against Alcibiades and his clubs, at which profligate foreign rites were practised. Other objects of his attack were Socrates and Cimon. The *Demoi* and *Poleis* were political, dealing with the desperate condition of the state and with the allied (or tributary) cities.

Fragments in T. Kock, *Comicorum Atticorum fragmenta*, i. (1880).

EUPOMPUS, the founder of the great school of painting which flourished in the 4th century at Sicyon in Greece. He was eclipsed by his successors, and is chiefly remembered for the advice which he is said to have given to Lysippus to follow nature rather than any master.

EURASIAN, a term originally confined to India, where for upwards of half a century it was used to denote children born of Hindu mothers and European (especially Portuguese)fathers. Following the geographical employment of the word *Eurasia* to describe the whole of the great land mass which is divided into the continents of Europe and Asia, Eurasian has come to be descriptive of any half-caste born of parents representing the races of the two continents. It has further an ethnological sense, A. H. Keane (*Ethnology*, 1896) proposing to find in the Eurasian Steppe the true home of the primitive Aryan groups. Joseph Deniker (*Anthropology*, 1900) makes a Eurasian group to include such peoples (Ugrians, Turko-Tatars, &c.) as are represented in both continents. Giuseppe Sergi, in his *Mediterranean Race* (London, 1901), uses Eurasiatic to denote that variety of man which "brought with it into Europe (from Asia in the later Neolithic period) flexional languages of Aryan or Indo-European type."

EURE, a department of north-western France, formed in 1790 from a portion of the old province of Normandy, together with the countship of Évreux and part of Perche. Pop. (1906) 330,140. Area, 2330 sq. m. It is bounded N. by the department of Seine Inférieure, W. by Calvados, S.W. by Orne, S. by Eure-et Loir, and E. by Seine-et-Oise and Oise. The territory of Eure, which nowhere exceeds 800 ft. in altitude, is broken up by its rivers into well-wooded plateaus with a general inclination from south to north. Forests cover about one-fifth of the department. The Seine flows from S.E. to N.W. through the E. of the department, and after touching the frontier at two or three points forms near its mouth part of the northern boundary. All the rivers of the department flow into the Seine,—on the right bank the Andelle and the Epte, and on the left the Eure with its tributaries the Avre and the Iton, and the Risle with its tributary the Charentonne. The Eure, from which the department takes its name, rises in Orne, and flowing through Eure-et-Loir, falls into the Seine above Pont de l'Arche, after a course of 44 m. in the department. The Risle likewise rises in Orne, and flows generally northward to its mouth in the estuary of the Seine. The climate is mild, but moist and variable. The soil is for the most part clayey, resting on a bed of chalk, and is, in general, fertile and well tilled. The chief cereal cultivated is wheat; oats, colza, flax and beetroot are also grown. There is a wide extent of pasturage, on which are reared a considerable number of cattle and sheep, and especially those horses of pure Norman breed for which the department has long been celebrated. Fruit is very abundant, especially apples and pears, from which much cider and perry are made. The mineral products of Eure include freestone, marl, lime and brick-clay. The chief industries are the spinning of cotton and wool, and the weaving, dyeing and printing of fabrics of different kinds. Brewing, flour-milling, distilling, turnery, cotton-bleaching, cider-making, metal-founding, tanning, and the manufacture of glass, paper, iron ware, nails, pins, wind-instruments, bricks and sugar are also carried on. Coal and raw materials for its industries are the chief imports of Eure; its exports include cattle, poultry, eggs, butter, grain and manufactured goods. The department is served chiefly by the Western railway; the Seine, Eure and Risle provide 87 m. of navigable waterway. Eure is divided into the following arrondissements (containing 36 cantons, 700 communes):—Évreux, Louviers, Les Andelys, Bernay, and Pont-Audemer. Its capital is Évreux, which is the seat of a bishopric of the ecclesiastical province of Rouen. The department belongs to the III. Army Corps and to the académie (educational division) of Caen. Its court of appeal is at Rouen.

Évreux, Les Andelys, Bernay, Louviers, Pont-Audemer, Verneuil, Vernon and Gisors are the principal towns of the department. At Gaillon there are remains of a celebrated château of the archbishops of Rouen (see LOUVIERS). Pont de l'Arche has a fine Gothic church, with stained-glass windows of the 16th and 17th centuries; the church of Tillières-sur-Arvre is a graceful specimen of the Renaissance style. The churches of Conches (15th or 16th century) and of Rugles (13th, 15th and 16th centuries), and the château of Beaumesnil (16th century) are also of architectural interest.

EURE-ET-LOIR, an inland department of north-western France, formed in 1790 of portions of Orléanais and Normandy. Pop. (1906) 273,823. Area, 2293 sq. m. It is bounded N. by the department of Eure, W. by Orne and Sarthe, S. by Loir-et-Cher, S.E. by Loiret, and E. by Seine-et-Oise. The Perche in the south-west and the Thimerais in the north-west are districts of hills and valleys, woods, lakes and streams. The region of the east and south is a level and uniform expanse, consisting for the most part of the riverless but fertile plain of Beauce, sometimes called the "granary of France." The northern part of Eure-et-Loir is watered by the Eure, with its tributaries the Vègre, Blaise and Avre, a small western portion by the Huisne, and the south by the Loir with its tributaries the Conie and the Ozanne. The air is pure, the climate mild, dry and not subject to sudden changes. The soil consists, for the most part, either of clay intermixed with sand or of calcareous earth, and is on the whole fruitful. Agriculture is better conducted than in most of the departments of France, and the average yield per acre is greater. Cereals occupy half the surface, wheat and oats being chiefly cultivated. Among the other agricultural products are barley, hemp, flax and various vegetables, including good asparagus. Wine is not extensively produced, nor is it of the best quality; but in some parts, especially in the Perche, there is an abundant supply of apples, from which cider is made as the common drink of the inhabitants. The extensive meadows supply pasturage for a large number of cattle and sheep, and the horses raised in the Perche have a wide reputation as draught animals. Bee-farming is commonly prosecuted. The department produces lime, grindstones and brick-clay. The manufactures are not extensive; but there are flour- and saw-mills, tanneries and leather-works, copper and iron foundries, starch-works, dye-works, distilleries, breweries and potteries; and agricultural implements, cotton and woollen goods, and yarn, hosiery, boots and shoes, sugar, felt hats and paper are made. Eure-et-Loir exports the products of its soil and live-stock; its imports include coal, wine and wearing apparel. It is served by the railways of the Western and the Orléans Companies and by those of the state, but it has no navigable waterways. The department has Chartres for its capital, and is divided into the arrondissements of Chartres, Châteaudun, Dreux and Nogent-le-Rotrou (24 cantons and 426 communes). It forms the diocese of Chartres (province of Paris), and belongs to the académie (educational division) of Paris and the region of the IV. Army Corps. Its court of appeal is at Paris.

Chartres, Dreux, Châteaudun, Nogent-le-Rotrou and Anet are the more noteworthy places in the department (*q.v.*). At Bonneval the lunatic asylum occupies the 18th-century buildings of a former Benedictine abbey. The abbey church belonged to the 13th century, but only a gateway flanked by two massive towers is left. The château of Maintenon dating from the 16th and 17th centuries was presented by Louis XIV. to Madame de Maintenon, by whom additions were made; the aqueduct (17th century) in the park was designed to carry the water of the Eure to Versailles, but was not completed. There is a fine château of the late 15th century, restored in modern times, at Montigny-le-Gannelon, and another of the 15th, 16th and 17th centuries, at one time the property of Sully, at Villebon. St Lubin-des-Joncherets has a handsome church of the 11th century, in which there are stained-glass windows dating from the 16th century.

EUREKA, a city, port of entry, and the county seat of Humboldt county, California, U.S.A., on the E. shore of Humboldt Bay. Pop. (1880) 2639; (1890) 4858; (1900) 7327 (2035 foreign-born); (1910) 11,845. It has a good harbour, greatly improved by the National government, and is connected with San Francisco, Portland and other coast ports by steamship lines. In 1909 a railway (the Northwestern Pacific), to connect Eureka with San Francisco, was under construction. The district owes its reputation as a health resort to its equable climate and to the protection afforded by the wide coast timber belt. Eureka is the principal point for the shipment of redwood lumber, and saw-milling is carried on here on an enormous scale. Several short railways run from Eureka and Arcata (pop. in 1900, 952) across the bay, into the forests, and bring lumber to the mills, most of which are in or near Eureka. Humboldt county was organized in 1853. Eureka was then already the centre of an important lumber trade, principally in spars. It was incorporated in 1856, displacing Union (now Arcata) as the county-seat in the same year.

EUREKA SPRINGS, a city and health resort, one of the county-seats—Berryville being the other—of Carroll county, in the extreme north-western part of Arkansas, U.S.A., in the Ozark uplift, 1800 ft. above the sea-level. Pop. (1890) 3706; (1900) 3572 (142 of negro descent); (1910) 3228. There is a transient population of thousands of visitors during the year. The city is built picturesquely on the sides of a gulch, down which runs the Missouri & North Arkansas railway. A creek running through the city empties into the White river, only a few miles distant. The surrounding country varies in character from mountains to rolling prairie. The encircling hills are laden with a covering of pine. The normal mean temperature for the year is about 59° F. (42° F. in winter, 61° F. in spring, 75° F. in summer, and 58° F. in autumn); the average rainfall, about 33 in. The atmosphere is dry and clear. Apart from its share in the agricultural interests of the surrounding region,—devoted mainly to Indian corn, small grains and fruits,—the entire economy of Eureka Springs centres in its medicinal springs, more than forty of which, lying within the corporate limits, are held in trust by the city for the free use of the public. The temperature of the springs varies from about 57° F. to 64° F. Each gallon of their waters contains about 28·5 cub. in. of gaseous matter and from 6 to 9 grains of solids held in solution. The city waterworks are owned by the municipality. The springs have been exploited since 1879, when the first settlement was made. The city was chartered in 1880.

EURIPIDES (480–406 B.C.), the great Greek dramatic poet, was born in 480 B.C., on the very day, according to the legend, of the Greek victory at Salamis, where his Athenian parents had taken refuge; and a whimsical fancy has even suggested that his name—*son of Euripus*—was meant to commemorate the first check of the Persian fleet at Artemisium. His father Mnesarchus was at least able to give him a liberal education; it was a favourite taunt with the comic poets that his mother Clito had been a herb-seller—a quaint instance of the tone which public satire could then adopt with plausible effect. At first he was intended, we are told, for the profession of an athlete,—a calling of which he has recorded his opinion with something like the courage of Xenophanes. He seems also to have essayed painting; but at five-and-twenty he brought out his first play, the *Peliades*, and thenceforth he was a tragic poet. At thirty-nine he gained the first prize, and in his career of about fifty years he gained it only five times in all. This fact is perfectly consistent with his unquestionably great and growing popularity in his own day. Throughout life he had to compete with Sophocles, and with other poets who represented tragedy of the type consecrated by tradition. The hostile criticism of Aristophanes was witty; and, moreover, it was true, granting the premise from which Aristophanes starts, that the tragedy of Aeschylus and Sophocles is the only right model. Its unfairness, often extreme, consists in ignoring the changing conditions of public feeling and taste, and the possibilities, changed accordingly, of an art which could exist only by continuing to please large audiences. It has usually been supposed that the unsparing derision of the comic poets contributed not a little to make the life of Euripides at Athens uncomfortable; and there is certainly one passage in a fragment of the *Melanippe* (Nauck, *Frag.*, 495), which would apply well enough to his persecutors:—

ἀνδρῶν δὲ πολλοὶ τοῦ γέλωτος οὕνεκα
ἀσκοῦσι χάριτας κερτόμους· ἐγὼ δέ πως
μισῶ γελοίους, οἵτινες σοφῶν πέρι
ἀχάλιν' ἔχουσι στόματα.

(To raise vain laughter, many exercise
The arts of satire; but my spirit loathes
These mockers whose unbridled mockery
Invades grave themes.)

The infidelity of two wives in succession is alleged to explain the poet's tone in reference to the majority of their sex, and to complete the picture of an uneasy private life. He appears to have been repelled by the Athenian democracy, as it tended to become less the rule of the people than of the mob. Thoroughly the son of his day in intellectual matters, he shrank from the coarser aspects of its political and social life. His best word is for the small farmer (αὐτουργός), who does not often come to town, or soil his rustic honesty by contact with the crowd of the market-place.

About 409 B.C. Euripides left Athens, and after a residence in the Thessalian Magnesia repaired, on the invitation of King Archelaus, to the Macedonian court, where Greeks of distinction were always welcome. In his *Archelaus* Euripides celebrated that legendary son of Temenus, and head of the Temenid dynasty, who had founded Aegae; and in one of the meagre fragments he evidently alludes to the beneficent energy of his royal host in opening up the wild land of the North. It was at Pella, too, that Euripides composed or completed, and perhaps produced, the *Bacchae*. Jealous courtiers, we are told, contrived to have him attacked and killed by savage dogs. It is odd that the fate of Actaeon should be ascribed, by legend, to two distinguished Greek writers, Euripides and Lucian; though in the former case at least the fate has not such appropriateness as the Byzantine biographer discovers in the latter, on the ground that its victim "had waxed rabid against the truth." The death of Euripides, whatever its manner, occurred in 406 B.C., when he was seventy-four. Sophocles followed him in a few months, but not before he had been able to honour the memory of his younger rival by causing his actors to appear with less than the full costume of the Dionysiac festival. Soon afterwards, in the *Frogs*, Aristophanes pronounced the epitaph of Attic comedy on Attic tragedy.

The historical interest of such a life as that of Euripides consists in the very fact that its external record is so scanty—that, unlike Aeschylus or Sophocles, he had no place in the public action of his time, but dwelt apart as a student and a thinker. He has made his Medea speak of those who, through following quiet paths, have incurred the reproach of apathy (ῥᾳθυμίαν). Undoubtedly enough of the old feeling for civic life remained to create a prejudice against one who held aloof from the affairs of the city. Quietness (ἀπραγμοσύνη), in this sense, was still regarded as akin to indolence (ἀργία). Yet here we see how truly Euripides was the precursor of that near future which, at Athens, saw the more complete divergence of society from the state.

In an age which is not yet ripe for reflection or for the subtle analysis of character, people are content to express in general types those primary facts of human nature which strike every one. Achilles will stand well enough for the young chivalrous warrior, Odysseus for the man of resource and endurance. In the case of the Greeks, these types had not merely an artistic and a moral interest; they had, further, a religious interest, because the Greeks believed that the epic heroes, sprung from the gods, were their own ancestors. Greek tragedy arose when the choral worship of Dionysus, the god of physical rapture, had engrafted upon it a dialogue between actors who represented some persons of the legends consecrated by this faith. The dramatist was accordingly obliged to refrain from multiplying those minute touches which, by individualizing the characters too highly, would detract from their general value as types in which all Hellenic humanity could recognize its own image glorified and raised a step nearer to the immortal gods. This necessity was further enforced by the existence of the chorus, the original element of the drama, and the very essence of its nature as an act of Dionysiac worship. Those utterances of the chorus, which to the modern sense are so often platitudes, were not so to the Greeks, just because the moral issues of tragedy were felt to have the same typical generality as these comments themselves.

An unerring instinct keeps both Aeschylus and Sophocles within the limits imposed by this law. Euripides was only fifteen years younger than Sophocles. But, when Euripides began to write, it must have been clear to any man of his genius and culture that, though an established prestige might be maintained, a new poet who sought to construct tragedy on the old basis would be building on sand. For, first, the popular religion itself—the very foundation of tragedy—had been undermined. Secondly, scepticism had begun to be busy with the legends which that religion consecrated. Neither gods nor heroes commanded all the old unquestioning faith. Lastly, an increasing number of the audience in the theatre began to be destitute of the training, musical and poetical, which had prepared an earlier generation to enjoy the chaste and placid grandeur of ideal tragedy.

Euripides made a splendid effort to maintain the place of tragedy in the spiritual life of Athens by modifying its interests in the sense which his own generation required. Could not the heroic persons still excite interest if they were made more real,—if, in them, the passions and sorrows of every-day life were portrayed with greater vividness and directness? And might not the less cultivated part of the audience at least enjoy a thrilling plot, especially if taken from the home-legends of Attica? Euripides became the virtual founder of the romantic drama. In so far as his work fails, the failure is one which probably no artistic tact could then have wholly avoided. The frame within which he had to work was one which could not be stretched to his plan. The chorus, the masks, the narrow stage, the conventional costumes, the slender opportunities for change of scenery, were so many fixed obstacles to the free development of tragedy in the new direction. But no man of his time could have broken free from these traditions; in attempting to do so he must have wrecked either his fame or his art. It is not the fault of Euripides if in so much of his work we feel the want of harmony between matter and form. Art abhors compromise; and it was the misfortune of Attic tragedy in his generation that nothing but a compromise could save it. Two devices have become common phrases of reproach against him—the prologue and the *deus ex machina*. Doubtless the prologue is a slipshod and sometimes ludicrous expedient. But the audiences of his days were far from being so well versed as their fathers in the mythic lore, and, on the other hand, a dramatist who wished to avoid trite themes had now to go into the byways of mythology. A prologue was often perhaps desirable or necessary for the instruction of the audience. As regards the *deus ex machina*, a distinction should be observed between those cases in which the solution is really mechanical, as in the *Andromache* and perhaps the *Orestes*, and those in which it is warranted or required by the plot, as in the *Hippolytus* and the *Bacchae*. The choral songs in Euripides, it may be granted, have often nothing to do with the action. But the chorus was the greatest of difficulties for a poet who was seeking to present drama of romantic tendency in the plastic form consecrated by tradition. So far from censuring Euripides on this score, we should be disposed to regard his management of the chorus as a signal proof of his genius, originality and skill.

Works.

Euripides is said to have written 92 dramas, including 8 satyr-plays. The best critics of antiquity allowed 75 as genuine. Nauck has collected 1117 Euripidean fragments. Among these, numbers 1092-1117 are doubtful or spurious; numbers 842-1091 are from plays of uncertain title; numbers 1-841 represent fifty-five lost pieces, among which some of the best known are the *Andromeda*, *Antiope*,[1] *Bellerophon*, *Cresphontes*, *Erechtheus*, *Oedipus*, *Phaëthon*, and *Telephus*.

1. The *Alcestis*, as the didascaliae tell us, was brought out in Ol. 85. 2, *i.e.* at the Dionysia in the spring of 438 B.C., as the fourth play of a tetralogy comprising the *Cretan Women*, the *Alcmaeon at Psophis*, and the *Telephus*. The *Alcestis* is altogether removed from the character, essentially grotesque, of a mere satyric drama On the other hand, it has features which distinctly separate it from a Greek tragedy of the normal type. First, the subject belongs to none of the great cycles, but to a byway of mythology, and involves such strange elements as the servitude of Apollo in a mortal household, the decree of the fates that Admetus must die on a fixed day, and the restoration of the dead Alcestis to life. Secondly, the treatment of the subject is romantic and even fantastic,—strikingly so in the passage where Apollo is directly confronted with the daemonic figure of Thanatos. Lastly, the boisterous, remorseful, and generous Heracles makes, not, indeed, a satyric drama, but a distinctly satyric scene—a scene which, in the frank original, hardly bears the subtle interpretation which in *Balaustion* is hinted by the genius of Browning, that Heracles got drunk in order to keep up other people's spirits. When the happy ending is taken into account, it is not surprising that some should have called the *Alcestis* a tragi-comedy. But we cannot so regard it. The slight and purely incidental strain of comedy is but a moment of relief between the tragic sorrow and

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[1] A considerable fragment of the *Antiope* was discovered in Egypt in the latter part of the 19th century; ed. J. P. Mahaffy in vol. viii. of the *Cunningham Memoirs* (Dublin, 1891); and quite recently fragments, probably from the *Hypsipyle*, the *Phaëthon*, and the *Cretans* (see *Berliner Klassikertexte*, v. 2, 1907).

terror of the opening and the joy, no less solemn, of the conclusion. In this respect the *Alcestis* might more truly be compared to such a drama as the *Winter's Tale*; the loss and recovery of Hermione by Leontes do not form a tragi-comedy because we are amused betweenwhiles by Autolycus and the clown. It does not seem improbable that the *Alcestis*—the earliest of the extant plays—may represent an attempt to substitute for the old satyric drama an after-piece of a kind which, while preserving a satyric element, should stand nearer to tragedy. The taste and manners of the day were perhaps tiring of the merely grotesque entertainment that old usage appended to the tragedies; just as, in the sphere of comedy, we know from Aristophanes that they were tiring of broad buffoonery. An original dramatist may have seen an opportunity here. However that may be, the *Alcestis* has a peculiar interest for the history of the drama. It marks in the most signal manner, and perhaps at the earliest moment, that great movement which began with Euripides,—the movement of transition from the purely Hellenic drama to the romantic.

2. The *Medea* was brought out in 431 B.C. with the *Philoctetes*, the *Dictys*, and a lost satyr-play called the *Reapers* (*Theristae*). Euripides gained the third prize, the first falling to Euphorion, the son of Aeschylus, and the second to Sophocles. If it is true that Euripides modelled his *Medea* on the work of an obscure predecessor, Neophron, at least he made the subject thoroughly his own. Hardly any play was more popular in antiquity with readers and spectators, with actors, or with sculptors. Ennius is said to have translated and adopted it. We do not know how far it may have been used by Ovid in his lost tragedy of the same name; but it certainly inspired the rhetorical performance of Seneca, which may be regarded as bridging the interval between Euripides and modern adaptations. We may grant at once that the *Medea* of Euripides is not a faultless play; that the dialogue between the heroine and Aegeus is not happily conceived; that the murder of the children lacks an adequate dramatic motive; that there is something of a moral anti-climax in the arrangements of Medea, before the deed, for her personal safety. But the *Medea* remains a tragedy of first-rate power. It is admirable for the splendid force with which the character of the strange and strong-hearted woman, a barbarian friendless among Hellenes, is thrown out against the background of Hellenic life in Corinth.

3. The extant *Hippolytus* (429 B.C.)—sometimes called *Stephanephoros*, the "wreath-bearer," from the garland of flowers which, in the opening scene, the hero offers to Artemis—was not the first drama of Euripides on this theme. In an earlier play of the same name, we are told, he had shocked both the moral and the aesthetic sense of Athens. In this earlier *Hippolytus*, Phaedra herself had confessed her love to her step-son, and, when repulsed, had falsely accused him to Theseus, who doomed him to death; at the sight of the corpse, she had been moved to confess her crime, and had atoned for it by a voluntary death. This first *Hippolytus* is cited as *Hippolytus the Veiled* (καλυπτόμενος), either, as Toup and Welcker thought, from Hippolytus covering his face in horror, or, as Bentley with more likelihood suggested, because the youth's shrouded corpse was brought upon the scene. It can scarcely be doubted that the chief dramatic defect of our *Hippolytus* is connected with the unfavourable reception of its predecessor. Euripides had been warned that limits must be observed in the dramatic portrayal of a morally repulsive theme. In the later play, accordingly, the whole action is made to turn on the jealous feud between Aphrodite, the goddess of love, and Artemis, the goddess of chastity. Phaedra not only shrinks from breathing her secret to Hippolytus, but destroys herself when she learns that she is rejected. But the natural agency of human passion is now replaced by a supernatural machinery; the slain son and the bereaved father are no longer the martyrs of sin, the tragic witnesses of an inexorable law; rather they and Phaedra are alike the puppets of a divine caprice, the scapegoats of an Olympian quarrel in which they have no concern. But if the dramatic effect of the whole is thus weakened, the character of Phaedra is a fine psychological study; and, as regards form, the play is one of the most brilliant. Boeckh (*De tragoediae Graecae principiis*, p. 180 f.) is perhaps too ingenious in finding an allusion to the plague at Athens (430 B.C.) in the ὦ κακὰ θνητῶν στυγεραί τε νόσοι of v. 177, and in v. 209 f.; but it can scarcely be doubted that he is right in suggesting that the closing words of Theseus (v. 1460)

> ὦ κλειν' Ἀθηνῶν Παλλάδος θ' ὁρίσματα, οἵου στερήσεσθ' ἀνδρός,

and the reply of the chorus, κοινὸν τόδ' ἄχος, &c., contain a reference to the recent death of Pericles (429 B.C.).

4. The *Hecuba* may be placed about 425 B.C. Thucydides (iii. 104) notices the purification of Delos by the Athenians, and the restoration of the Panionic festival there, in 426 B.C.—an event to which the choral passage, v. 462 f., probably refers. It appears more hazardous to take v. 650 f. as an allusion to the Spartan mishap at Pylos. The subject of the play is the revenge of Hecuba, the widowed queen of Priam, on Polymestor, king of Thrace, who had murdered her youngest son Polydorus, after her daughter Polyzena had already been sacrificed by the Greeks to the shade of Achilles. The two calamities which befall Hecuba have no direct connexion with each other. In this sense the play lacks unity of design. On the other hand, both events serve the same end—viz. to heighten the tragic pathos with which the poet seeks to surround the central figure of Hecuba. The drama illustrates the skill with which Euripides, while failing to satisfy the requirements of artistic drama, could sustain interest by an ingeniously woven plot. It is a representative *Intriguenstück*, and well exemplifies the peculiar power which recommended Euripides to the poets of the New Comedy.

5. The *Andromache*, according to a notice in the *scholia Veneta* (446), was not acted at Athens, at least in the author's life-time; though some take the words in the Greek argument (τὸ δρᾶμα τῶν δευτέρων) to mean that it was among those which gained a second prize. The invective on the Spartan character which is put into the mouth of Andromache contains the words, ἀδίκως εὐτυχεῖτ' ἀν' Ἑλλάδα, and this, with other indications, points to the Peloponnesian successes of the years 424–422 B.C. Andromache, the widow of Hector, has become the captive and concubine of Neoptolemus, son of Achilles. During his absence, her son Molossus is taken from her, with the aid of Menelaus, by her jealous rival Hermione. Mother and son are rescued from death by Peleus; but meanwhile Neoptolemus is slain at Delphi through the intrigues of Orestes. The goddess Thetis now appears, ordains that Andromache shall marry Helenus, and declares that Molossus shall found a line of Epirote kings, while Peleus shall become immortal among the gods of the sea. The *Andromache* is a poor play. The contrasts, though striking, are harsh and coarse, and the compensations dealt out by the *deus ex machina* leave the moral sense wholly unsatisfied. Technically the piece is noteworthy as bringing on the scene four characters at once—Andromache, Molossus, Peleus and Menelaus (v. 545 f.).

6. The *Ion* is an admirable drama, the finest of those plays which deal with legends specially illustrating the traditional glories of Attica. It is also the most perfect example of the poet's skill in the structure of dramatic intrigue. For its place in the chronological order there are no data except those of style and metre. Judging by these, Hermann would place it "neither after Ol. 89, nor much before"—*i.e.* somewhere between 424 and 421 B.C.; and this may be taken as approximately correct. The scene is laid throughout at the temple of Delphi. The young Ion is a priest in the temple of Delphi when Xuthus and his wife Creusa, daughter of Erechtheus, come to inquire of the god concerning their childlessness; and it is discovered that Ion is the son of Creusa by the god Apollo. Athena herself appears, and commands that Ion shall be placed on the throne of Athens, foretelling that from him shall spring the four Attic tribes, the Teleontes (priests), Hopletes (fighting-men), Argadeis (husbandmen) and Aigikoreis (herdsmen). The play must have been peculiarly effective on the Athenian stage, not only by its situations, but through its appeal to Attic sympathies.

7. The *Suppliants* who give their name to the play are Argive women, the mothers of Argive warriors slain before the walls of Thebes, who, led by Adrastus, king of Argos, come as suppliants to the altar of Demeter at Eleusis. Creon, king of Thebes, has refused burial to their dead sons. The Athenian king Theseus demands of Creon that he shall grant the funeral rites; the refusal is followed by a battle in which the Thebans are vanquished, and the bodies of the Argive dead are then brought to Eleusis. At the close the goddess Athena appears, and ordains that a close alliance shall be formed between Athens and Argos. Some refer the play to 417 B.C., when the democratic party at Athens rose against the oligarchs. But a more probable date is 420 B.C., when, through the agency of Alcibiades, Athens and Argos concluded a defensive alliance. The play has a strongly marked rhetorical character, and is, in fact, a panegyric, with an immediate political aim, on Athens as the champion of humanity against Thebes.

8. The *Heracleidae*—a companion piece to the *Suppliants*, and of the same period—is decidedly inferior in merit. Here, too, there are direct references to contemporary history. The defeat of Argos by the Spartans in 418 B.C. strengthened the Argive party who were in favour of discarding the Athenian for the Spartan alliance (Thuc. v. 76). In the *Heracleidae*, the sons of the dead Heracles, persecuted by the Argive Eurystheus, are received and sheltered at Athens. Thus, while Athens is glorified, Sparta, whose kings are descendants of the Heracleidae, is reminded how unnatural would be an alliance between herself and Argos.

9. The *Heracles Mainomenos*[1] (*Hercules Furens*), which, on grounds of style, can scarcely be put later than 420–417 B.C., shares with the two last plays the purpose of exalting Athens in the person of Theseus. Heracles returns from Hades—whither, at the command of Eurystheus, he went to bring back Cerberus—just in time to save his wife Megara and his children from being put to death by Lycus of Thebes, whom he slays. As he is offering lustral sacrifice after the deed, he is suddenly stricken with madness by Lyssa (Fury), the daemonic agent of his enemy the goddess Hera, and in his frenzy he slays his wife and children. Theseus finds him, in his agony of despair, about to kill himself, and persuades him to come to Athens, there to seek grace and pardon from the gods. The unity of the plot may be partly vindicated by observing that the slaughter of Lycus entitled Heracles to the gratitude of Thebes, whereas the slaughter of his own kinsfolk made it unlawful that he should remain there; thus, having found a refuge only to lose it, Heracles has no hope left but in Athens, whose praise is the true theme of the entire drama.

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[1] (Originally simply *Heracles*, the addition *Mainomenos* being due to the Aldine ed.)

10. *Iphigenia among the Tauri*, which metre and diction mark as one of the later plays, is also one of the best—excellent both in the management of a romantic plot and in the delineation of character. The scene is laid at the temple of Artemis in the Tauric Chersonese (the Crimea)—on the site of the modern Balaklava. Iphigenia, who had been doomed to die at Aulis for the Greeks, had been snatched from that death by Artemis, and had become priestess of the goddess at the Tauric shrine, where human victims were immolated. Two strangers, who had landed among the Tauri, have been sentenced to die at the altar. She discovers in them her brother Orestes and his friend Pylades. They plan an escape, are recaptured, and are finally delivered by the goddess Athena, who commands Thoas, king of the land, to permit their departure. Iphigenia, Orestes and Pylades return to Greece, and establish the worship of the Tauric Artemis at Brauron and Halae in Attica. The drama of Euripides necessarily suggests a comparison with that of Goethe; and many readers will probably also feel that, while Goethe is certainly not inferior in fineness of ethical portraiture, he has the advantage in his management of the catastrophe. But it is only just to Euripides to remember that, while his competitor had free scope of treatment, he, a Greek dramatist, was bound to the motive of the Greek legend, and was obliged to conclude with the foundation of the Attic worship.

11. The *Troades* appeared in 415 B.C. along with the *Alexander*, the *Palamedes*, and a satyr-play, the *Sisyphus*. It is a picture of the miseries endured by noble Trojan dames—Hecuba, Andromache, Cassandra—immediately after the capture of Troy. There is hardly a plot in the proper sense—only an accumulation of sorrows on the heads of the passive sufferers. The piece is less a drama than a pathetic spectacle, closing with the crash of the Trojan towers in flame and ruin. The *Troades* is indeed remarkable among Greek tragedies for its near approach to the character of melodrama. It must be observed that there is no ground for the inference—sometimes made an accusation against the poet—that the choral passage, v. 794 f., was intended to encourage the Sicilian expedition, sent forth in the same year (415 B.C.). The mention of the "land of Aetna over against Carthage" (v. 220) speaks of it as "renowned for the trophies of prowess"—a topic, surely, not of encouragement but of warning.

12. The *Helena*—produced, as we learn from the Aristophanic scholia, in 412 B.C., the year of the lost *Andromeda*—is not one of its author's happier efforts. It is founded on a strange variation of the Trojan myth, first adopted by Stesichorus in his Palinode—that only a wraith of Helen passed to Troy, while the real Helen was detained in Egypt. In this play she is rescued from the Egyptian king, Theoclymenus, by a ruse of her husband Menelaus, who brings her safely back to Greece. The romantic element thus engrafted on the Greek myth is more than fantastic: it is well-nigh grotesque. The comic poets—notably Aristophanes in the *Thesmophoriazusae*—felt this; nor can we blame them if they ridiculed a piece in which the mode of treatment was so discordant with the spirit of Greek tradition, and so irreconcilable with all that constituted the higher meaning of Greek tragedy.

13. The *Phoenissae* was brought out, with the *Oenomaus* and the *Chrysippus*, in 411 B.C., the year in which the recall of Alcibiades was decreed by the army at Samos, and, after the fall of the Four Hundred, ratified by the Assembly at Athens (Thuc. viii. 81, 97). The dialogue between Iocaste and Polynices on the griefs of banishment (*τί τὸ στέρεσθαι πατρίδος*, v. 388 f.) has a certain emphasis which certainly looks like an allusion to the pardon of the famous exile. The subject of the play is the same as that of the Aeschylean *Seven against Thebes*—the war of succession in which Argos supported Polynices against his brother Eteocles. The Phoenician maidens who form the chorus are imagined to have been on their way from Tyre to Delphi, where they were destined for service in the temple, when they were detained at Thebes by the outbreak of the war—a device which affords a contrast to the Aeschylean chorus of Theban elders, and which has also a certain fitness in view of the legends connecting Thebes with Phoenicia. But Euripides has hardly been successful in the rivalry—which he has even pointed by direct allusions—with Aeschylus. The *Phoenissae* is full of brilliant passages, but it is rather a series of effective scenes than an impressive drama.

14. Plutarch (*Lys.* 15) says that, when Athens had surrendered to Lysander (404 B.C.) and when the fate of the city was doubtful, a Phocian officer happened to sing at a banquet of the leaders the first song of the chorus in the *Electra* of Euripides—

Ἀγαμέμνονος ὦ κόρα,
ἤλυθον, Ἠλέκτρα, ποτὶ σὰν ἀγροτέραν αὐλάν,

and that "when they heard it, all were touched, so that it seemed a cruel deed to destroy for ever the city so famous once, the mother of such men." The character of the *Electra*, in metre and in diction, seems to show that it belongs to the poet's latest years. If Müller were right in referring to the Sicilian expedition the closing passage in which the Dioscuri declare that they haste "to the Sicilian sea, to save ships upon the deep" (v. 1347), then the play could not be later than 413 B.C. But it may with more probability be placed shortly before the *Orestes*, which in some respects it much resembles: perhaps in or about the year 410 B.C. No play of Euripides has been more severely criticized. The reason is evident. The *Choephori* of Aeschylus and the *Electra* of Sophocles appear to invite a direct comparison with this drama. But, as R. C. Jebb suggested,[1] such criticism as that of Schlegel should remember that works of art are proper subjects of direct comparison only when the theories of art which they represent have a common basis. It is surely unmeaning to contrast the elaborate homeliness of the Euripidean *Electra* with the severe grandeur of its rivals. Aeschylus and Sophocles, as different exponents of an artistic conception which is fundamentally the same, may be profitably compared; Euripides interprets another conception, and must be tried by other principles. His *Electra* is, in truth, a daring experiment—daring, because the theme is one which the elder school had made peculiarly its own.

15. The *Orestes*, acted in 408, bears the mark of the age in the prominence which Euripides gives to the assembly of Argos—which has to decide the fate of Orestes and Electra—and to rhetorical pleading. The plot proceeds with sufficient clearness to the point at which Orestes and Electra have been condemned to death. But the later portion of the play, containing the intrigues for their rescue and the final achievement of their deliverance, is both too involved and too inconsequent for a really tragic effect. Just as in the *Electra*, the heroic persons of the drama are reduced to the level of commonplace. There is not a little which borders on the ludicrous, and it can be seen how easy would have been the passage from such tragedy as this to the restrained parody in which the Middle Comedy delighted. It is, however, inconceivable that, as some have supposed, the *Orestes* can have been a deliberate compromise between tragedy and farce. It cannot have been meant to be played, as a fourth piece, instead of a regular satyric drama. Rather it indicates the level to which the heroic tragedy itself had descended under the treatment of a school which was at least logical. The celebrity of the play in the ancient world—as Paley observes, there are more ancient quotations from the *Orestes* than from all the extant plays of Aeschylus and Sophocles together—is perhaps partly explained by the unusually frequent combination in this piece of striking sentiment with effective situation.

16. The *Iphigenia at Aulis*, like the *Bacchae*, was brought out only after the death of Euripides. It is a very brilliant and beautiful play,—probably left by the author in an unfinished state,—and has suffered from interpolation more largely, perhaps, than any other of his works. As regards its subject, it forms a prelude to the *Iphigenia in Tauris*. Iphigenia has been doomed by her father Agamemnon to die at Aulis, as Calchas declares that Artemis claims such a sacrifice before the adverse winds can fall.

The genuine play, as we have it, breaks off at v. 1508, when Iphigenia has been led to the sacrificial altar. A spurious epilogue, of wretched workmanship (v. 1509-1628), relates, in the speech of a messenger, how Artemis saved the maiden.

17. The *Bacchae*, unlike the preceding play, appears to have been finished by its author, although it is said not to have been acted, on the Athenian stage at least, till after his death. It was composed, or completed, during the residence of Euripides with Archelaus, and in all probability was originally designed for representation in Macedonia—a region with whose traditions of orgiastic worship the Dionysus myth was so congenial. The play is sometimes quoted as the *Pentheus*. It has been justly observed that Euripides seldom named a piece from the chorus, unless the chorus bore an important part in the action or the leading action was divided between several persons. Possibly, however, in this instance he may designedly have chosen a title which would at once interest the Macedonian public. *Pentheus* would suggest a Greek legend about which they might know or care little. The *Bacchae* would at once announce a theme connected with rites familiar to the northern land.

It is a magnificent play, alone among extant Greek tragedies in picturesque splendour, and in that sustained glow of Dionysiac enthusiasm to which the keen irony lends the strength of contrast. If Euripides had left nothing else, the *Bacchae* would place him in the first rank of poets, and would prove his possession of a sense rarely manifested by Greek poets,—perhaps by no one of his own contemporaries in equal measure except Aristophanes,—a feeling for natural beauty lit up by the play of fancy. R. Y. Tyrrell, in his edition of the *Bacchae*, has given the true answer to the theory that the *Bacchae* is a recantation. Euripides had never rejected the facts which formed the basis of the popular religion. He had rather sought to interpret them in a manner consistent with belief in a benevolent Providence. The really striking thing in the *Bacchae* is the spirit of contentment and of composure which it breathes,—as if the poet had ceased to be vexed by the seeming contradictions which had troubled him before. Nor should it be forgotten that, for the Greek mind of his age, the victory of Dionysus in the *Bacchae* carried a moral even more direct than the victory of Aphrodite in the *Hippolytus*. The great nature-powers who give refreshment to mortals cannot be robbed of their due tribute without provoking a nemesis. The refusal of such a homage is not, so the Greeks deemed, a virtue in itself: in the sight of the gods it may be only a cold form of *ὕβρις*, overweening self-reliance—the quality personified in Pentheus.

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[1] Introduction to the *Electra* of Sophocles, p. xiii., in *Catena Classicorum*, 2nd ed.

The *Bacchae* was always an exceptionally popular play—partly because its opportunities as a spectacle fitted it for gorgeous representation, and so recommended it for performance at courts and on great public occasions. "Demetrius the Cynic" (says Lucian, *Adv. Indoctum*, 19) "saw an illiterate person at Corinth reading a very beautiful poem—the *Bacchae* of Euripides, I think it was; he was at the place where the messenger narrates the doom of Pentheus and the deed of Agave. Demetrius snatched the book from him and tore it up, saying, 'It is better for Pentheus to be torn up at once by me than to be mangled over and over again by you.'"

18. The *Cyclops*, of uncertain date, is the only extant example of a satyric drama. The plot is taken mainly from the story of Odysseus and Polyphemus in the 9th book of the *Odyssey*. In order to be really successful in farce of this kind, a poet should have a fresh feeling for the nature of the art parodied. It is because Euripides was not in accord with the spirit of the heroic myths that he is not strong in mythic travesty. His own tragedies—such as the *Helen*, the *Electra* and the *Orestes*—had, in their several ways, contributed to destroy the meaning of satyric drama. They had done gravely very much what satyric drama aimed at doing grotesquely. They had made the heroic persons act and talk like ordinary men and women. The finer side of such parody had lost its edge; only broad comedy remained.

19. The *Rhesus* is still held by some to be what the didascaliae and the grammarians call it—a work of Euripides; and Paley has ably supported this view. But the scepticism first declared by Valcknaer has gained ground, and the *Rhesus* is now almost universally recognized as spurious. The art and the style, still more evidently the feeling and the mind, of Euripides are absent. If it cannot be ascribed to a disciple of his matured school, it is still less like the work of an Alexandrian. The most probable view seems to be that which assigns it to a versifier of small dramatic power in the latest days of Attic tragedy. It has this literary interest, that it is the only extant play of which the subject is directly taken from our *Iliad*, of which the tenth book—the Δολώνεια—has been followed by the playwright with a closeness which is sometimes mechanical.

Literary history of Euripides.

When the first protests of the comic poets were over, Euripides was secure of a wide and lasting renown. As the old life of Athens passed away, as the old faiths lost their meaning and the peculiarly Greek instincts in art lost their truth and freshness, Aeschylus and Sophocles might cease to be fully enjoyed save by a few; but Euripides could still charm by qualities more readily and more universally recognized. The comparative nearness of his diction to the idiom of ordinary life rendered him less attractive to the grammarians of Alexandria than authors whose erudite form afforded a better scope for the display of learning or the exercise of ingenuity. But there were two aspects in which he engaged their attention. They loved to trace the variations which he had introduced into the standard legends. And they sought to free his text from the numerous interpolations which even then had resulted from his popularity on the stage. Philochorus (about 306–260 B.C.), best known for his *Atthis*, dealt, in his treatise on Euripides, especially with the mythology of the plays. From 300 B.C. to the age of Augustus a long series of critics busied themselves with this poet. The first systematic arrangement of his reputed works is ascribed to Dicaearchus and Callimachus in the early part of the 3rd century B.C. Among those who furthered the exact study of his text, and of whose work some traces remain in the extant scholia, were Aristophanes of Byzantium, Callistratus, Apollodorus of Tarsus, Timachidas, and pre-eminently Didymus; probably also Crates of Pergamum and Aristarchus. At Rome Euripides was early made known through the translations of Ennius and the freer adaptations of Pacuvius. When Hellenic civilization was spread through the East, the mixed populations of the new settlements welcomed a dramatic poet whose taste and whose sentiment were not too severely or exclusively Attic. The Parthian Orodes and his court were witnessing the *Bacchae* of Euripides when the Agave of the hour was suddenly enabled to lend a ghastly reality to the terrible scene of frenzied triumph by displaying the gory head of the Roman Crassus. Mommsen has noted the moment as one in which the power of Rome and the genius of Greece were simultaneously abased in the presence of sultanism. So far as Euripides is concerned, the incident may suggest another and a more pleasing reflection; it may remind us how the charm of his humane genius had penetrated the recesses of the barbarian East, and had brought to rude and fierce peoples at least some dim and distant apprehension of that gracious world in which the great spirits of ancient Hellas had moved. A quaintly significant testimony to the popularity of Euripides is afforded by the Byzantine Χριστὸς πάσχων. This drama, narrating the events which preceded and attended the Passion, is a cento of no less than 2610 verses, taken from the plays of Euripides, principally from the *Bacchae*, the *Troades* and the *Rhesus*. The traditional ascription of the authorship to Gregory of Nazianzus is now generally rejected; another conjecture assigns it to Apollinaris of Laodicea, and places the date of composition at about A.D. 330.[1] Although the text used by the author of the cento may not have been a good one, the value of the piece for the diplomatic criticism of Euripides is necessarily very considerable; and it was diligently used both by Valcknaer and by Porson.

Dante, who does not mention Aeschylus or Sophocles, places Euripides, with the tragic poets Antiphon and Agathon, and the lyrist Simonides, in the first circle of Purgatory (xxii. 106), among those

> 'piùe
> Greci, che già di lauro ornar la fronte."

Casaubon, in a letter to Scaliger, salutes that scholar as worthy to have lived at Athens with Aristophanes and Euripides—a compliment which certainly implies respect for his correspondent's powers as a peacemaker. In popular literature, too, where Aeschylus and Sophocles were as yet little known, the 16th and 17th centuries testify to the favour bestowed upon Euripides. G. Gascoigne's and Francis Kinwelmersh's *Jocasta*, played at Gray's Inn in 1566, is a literal translation of Lodovico Dolce's *Giocasta*, which derives from the *Phoenissae*, probably through the Latin translation of R. Winter (Basel, 1541). Among early French translations from Euripides may be mentioned the version of the *Iphigenia in Tauris* by Thomas Sibilet in 1549, and that of the *Hecuba* by Bouchetel in 1550. About a century later Racine gave the world his *Andromaque*, his *Iphigénie* and his *Phèdre*; and many have held that, at least in the last-named of these, "the disciple of Euripides" has excelled his master. Bernhardy notices that the performance of the *Hippolytus* at Berlin in 1851 seemed to show that, for the modern stage, the *Phèdre* has the advantage of its Greek original. Racine's great English contemporary seems to have known and to have liked Euripides better than the other Greek tragedians. In the *Reason of Church Government* Milton certainly speaks of "those dramatic constitutions in which Sophocles and Euripides reign"; in the preface to his own drama, again, he joins the names of Aeschylus, Sophocles and Euripides,—"the three tragic poets unequalled yet by any." But the *Samson Agonistes* itself clearly shows that Milton's chief model in this kind was the dramatist whom he himself has called—as if to suggest the skill of Euripides in the delineation of pathetic women—"sad Electra's poet"; and the work bears a special mark of this preference in the use of Euripidean monodies. In the second half of the 18th century such men as J. J. Winckelmann (1717–1768) and G. E. Lessing (1729–1781) gave a new life to the study of the antique. Hitherto the art of the old world had been better known through Roman than through Greek interpreters. The basis of the revived classical taste had been Latin. But now men gained a finer perception of those characteristics which belong to the Greek work of the great time, a fuller sense of the difference between the Greek and the Roman genius where each is at its best, and generally a clearer recognition of the qualities which distinguish ancient art in its highest purity from modern romantic types. Euripides now became the object of criticism from a new point of view. He was compared with Aeschylus and Sophocles as representatives of that ideal Greek tragedy which ranges with the purest type of sculpture. Thus tried, he was found wanting; and he was condemned with all the rigour of a newly illuminated zeal. B. G. Niebuhr (1776–1831) judged him harshly; but no critic approached A. W. Schlegel (1767–1845) in severity of one-sided censure. Schlegel, in fact, will scarcely allow that Euripides is tolerable except by comparison with Racine. L. Tieck (1773–1853) showed truer appreciation for a brother artist when he described the work of Euripides as the dawn of a romantic poetry haunted by dim yearnings and forebodings. Goethe—who, according to Bernhardy, knew Euripides only "at a great distance"—certainly admired him highly, and left an interesting memorial of Euripidean study in his attempted reconstruction of the lost *Phaëthon*. There are some passages in Goethe's conversations with Eckermann which form effective quotations against the Greek poet's real or supposed detractors. "To feel and respect a great personality, one must be something oneself. All those who denied the sublime to Euripides were either poor wretches incapable of comprehending such sublimity or shameless charlatans who, in their presumption, wished to make more of themselves than they were." "A poet whom Socrates called his friend, whom Aristotle lauded, whom Alexander admired, and for whom Sophocles and the city of Athens put on mourning on hearing of his death, must certainly have been some one. If a modern man like Schlegel must pick out faults in so great an ancient, he ought only to do it upon his knees" (J. A. Symonds, *Greek Poets*, i. 230). We yield to no one in admiration of Goethe; but we cannot think that these rather bullying utterances are favourable examples of his method in aesthetic discussion; nor have they any logical force except as against those—if there be any such—who deny that Euripides is a great poet. One of the most striking of modern criticisms on Euripides is the sketch by Mommsen in his history of Rome (bk. iii. ch. 14). It is, in our opinion, less than just to Euripides as an artist. But it indicates, with true historical insight, his place in the development of his art, the operation of those external conditions which made him what he was, and the nature of his influence on succeeding ages.

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[1] (According to Karl Krumbacher, *Gesch. der byz. Lit.*, it is an 11th-century production of unknown authorship.)

Manuscript tradition of Euripides.

The manuscript tradition of Euripides has a very curious and instructive history. It throws a suggestive light on the capricious nature of the process by which some of the greatest literary treasures have been saved or lost. Nine plays of Euripides were selected, probably in early Byzantine times, for popular and educational use. These were—*Alcestis, Andromache, Hecuba, Hippolytus, Medea, Orestes, Phoenissae, Rhesus, Troades*. This list includes at least two plays, the *Andromache* and the *Troades*, which, even in the small number of the extant dramas, are universally allowed to be of very inferior merit—to say nothing of the *Rhesus*, which is generally allowed to be spurious. On the other hand, the list omits at least three plays of first-rate beauty and excellence, the very flower, indeed, of the extant collection—the *Ion*, the *Iphigenia in Tauris*, and the *Bacchae*—the last certainly, in its own kind, by far the most splendid work of Euripides that we possess. Had these three plays been lost, it is not too much to say that the modern estimate of Euripides must have been decidedly lower. But all the ten plays not included in the select list had a narrow escape of being lost, and, as it is, have come to us in a much less satisfactory condition.

A. Kirchhoff was the first, in his editions, thoroughly to investigate the history and the affinities of the Euripidean manuscripts.[1] All our MSS. are, he thinks, derived from a lost archetype of the 9th or 10th century, which contained the nineteen plays (counting the *Rhesus*) now extant. From this archetype a copy, also lost, was made about A.D. 1100, containing only the nine select plays. This copy became the source of all our best MSS. for those plays. They are—(1) Marcianus 471, in the library of St Mark at Venice (12th century): *Andromache, Hecuba, Hippolytus* (to v. 1234), *Orestes, Phoenissae*; (2) Vaticanus 909, 12th century, nine plays; (3) Parisinus 2712, 13th century, 7 plays (all but *Troades* and *Rhesus*). Of the same stock, but inferior, are (4) Marcianus 468, 13th century: *Hecuba, Orestes, Medea* (v. 1-42), *Orestes, Phoenissae*; (5) Havniensis (from *Hafnia*, Copenhagen, according to Paley), a late transcript from a MS. resembling Vat. 909, nine plays. A second family of MSS. for the nine plays, sprung from the same copy, but modified by a Byzantine recension of the 13th century, is greatly inferior.

The other ten plays have come to us only through the preservation of two MSS., both of the 14th century, and both ultimately derived, as Kirchhoff thinks, from the archetype of the 9th or 10th century. These are (1) Palatinus 287, Kirchhoff's B, usually called Rom. C., thirteen plays, viz. six of the select plays (*Androm., Med., Rhes., Hipp., Alc., Troad.*), and seven others—*Bacchae, Cyclops, Heracleidae, Supplices, Ion, Iphigenia in Aulide, Iphigenia in Tauris*; and (2) Flor. 2, Elmsley's C., eighteen plays, viz. all but the *Troades*. This MS. is thus the only one for the *Helena*, the *Electra*, and the *Hercules Furens*. By far the greatest number of Euripidean MSS. contain only three plays,—the *Hecuba, Orestes* and *Phoenissae*,—these having been chosen out of the select nine for school use—probably in the 14th century.

It is to be remembered that, as a selection, the nine chosen plays of Euripides correspond to those seven of Aeschylus and those seven of Sophocles which alone remain to us. If, then, these nine did not include the *Iphigenia in Tauris*, the *Ion* or the *Bacchae*, may we not fairly infer that the lost plays of the other two dramatists comprised works at least equal to any that have been preserved? May we not even reasonably doubt whether we have received those masterpieces by which their highest excellence should have been judged?

Scholia.

The extant scholia on Euripides are for the nine select plays only. The first edition of the scholia on seven of these plays (all but the *Troades* and *Rhesus*) was published by Arsenius—a Cretan whom the Venetians had named as bishop of Monemvasia, but whom the Greeks had refused to recognize—at Venice in 1534. The scholia on the *Troades* and *Rhesus* were first published by L. Dindorf, from Vat. 909, in 1821. The best complete edition is that of W. Dindorf (1863).[2] The collection, though loaded with rubbish—including worthless analyses of the lyric metres by Demetrius Triclinius—includes some invaluable comments derived from the Alexandrian critics and their followers.

Editiones Principes.—1496. J. Lascaris (Florence), *Medea, Hippolytus, Alcestis, Andromache*. 1503. M. Musurus (Aldus, Venice), *Eur. Tragg.* XVII., to which in vol. ii. the *Hercules Furens* was added as an 18th; *i.e.* this edition contained all the extant plays except the *Electra*, which was first given to the world by P. Victorius from Florentinus C. in 1545. The Aldine edition was reprinted at Basel in 1537.

The complete edition of Joshua Barnes (1694) is no longer of any critical value. The first thorough work done on Euripides was by L. C. Valcknaer in his edition of the *Phoenissae* (1755), and his *Diatribe in Eur. perditorum dramatum relliquias* (1767), in which he argued against the authenticity of the *Rhesus*.

Principal Editions of Selected Plays.—J. Markland (1763–1771), *Supplices, Iphigenia A., Iphigenia T.*; Ph. Brunck (1779–1780), *Andromache, Medea, Orestes, Hecuba*; R. Porson (1797–1801), *Hecuba, Orestes, Phoenissae, Medea*; H. Monk (1811–1818), *Hippolytus, Alcestis, Iphigenia A., Iphigenia T.*; P. Elmsley (1813–1821), *Medea, Bacchae, Heraclidae, Supplices*; G. Hermann (1831–1841), *Hecuba* (animadv. ad R. Porsoni notas, first in 1800), *Crestes, Alcestis, Iphigenia A., Iphigenia T., Helena, Ion, Hercules Furens*; C. Badham (1851–1853), *Iphigenia T., Helena, Ion*; H. Weil, *Hipp., Medea, Hec., Iph. in T., Iph. in A., Electra, Crestes* (2nd ed., 1890). It is impossible to give a list of the English and foreign editions of single plays, but mention may be made of the *Bacchae, by* J. E. Sandys (4th ed., 1900) and R. Y. Tyrrell (1892); *Medea*, by A. W. Verrall(1883); *Hippolytus*, by J. P. Mahaffy (1881); and of the *Hercules Furens*, by Wilamowitz-Möllendorff (2nd ed., 1895), with a comprehensive introduction on the literature of Euripides. A selected list (up to 1896) will be found in J. B. Mayor's *Guide to the Choice of Classical Books*; see also N. Wecklein in C. Bursian's *Jahresbericht*, xxviii. (1897), and for the earlier literature W. Engelmann, *Scriptores Graeci* (1881). The little volumes on Euripides by J. P. Mahaffy (1879) and W. B. Donne in Blackwood's "Ancient Classics for English Readers" will be found generally useful; see also P. Decharme, *Euripide et l'esprit de son théâtre* (1893); A. W. Verrall, *Euripides the Rationalist* (1895), and *Essays on Four Plays of Euripides* (1905); N. J. Patin, *Étude sur Euripide* (1872); O. Ribbeck, *Euripides und seine Zeit*; and (for the life of the poet) Wilamowitz's ed. of the *Hercules Furens* (i. 1-42); P. Masqueray, *Euripide et ses idées* (1908).

Modern Complete Editions.—W. Dindorf (1870, in *Poët. Scenici*, ed. 5); A. Kirchhoff (1855, ed. min. 1867); F. A. Paley (2nd ed., 1872–1880), with commentary; A. Nauck (1880–1887, Teubner series); G. G. Murray in Oxford *Scriptorum Classicorum bibliotheca* (1902, foll.).

English Translations.—Among these may be noted the complete verse translation by A. S. Way (1894–1898); that in prose by E. P. Coleridge (1896); and G. G. Murray's verse translations (1902–1906). A literary interest attaches to Robert Browning's "Transcript" of the *Alcestis* in his *Balaustion*, and to Goethe's reconstruction of Euripides' lost *Phaëthon* in the 1840 edition of his works, vol. xxxiii. pp. 22-43. (R. C. J.; X.)

EUROCLYDON (Gr. *εὖρος*, east wind; *κλύδων*, wave), a stormy wind from the N.E. or N.N.E. in the eastern Mediterranean. Where the Authorized Version of the Bible (Acts xxvii. 14) mentions *euroclydon*, the Revised Version, taking the reading *εὐρακύλων*, has *euraquilo*, or north-easter. The word is sometimes used for the Bora (*q.v.*).

EUROPA (or rather, Europe), in Greek mythology, according to Homer (*Iliad*, xiv. 321), the daughter of Phoenix or, in a later story, of Agenor, king of Phoenicia. The beauty of Europa fired the love of Zeus, who approached her in the form of a white bull and carried her away from her native Phoenicia to Crete, where she became the mother of Minos, Rhadamanthys and Sarpedon. She was worshipped under the name of Hellotis in Crete, where the festival Hellotia, at which her bones, wreathed in myrtle, were carried round, was held in her honour (Athenaeus xv. p. 678). Some consider Europa to be a moon-goddess; others explain the story by saying that she was carried off by a king of Crete in a ship decorated with the figure-head of a bull. O. Gruppe (*De Cadmi Fabula*, 1891) endeavours to show that the myth of Europa is only another version of the myth of Persephone.

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[1] See also a clear account in the preface to vol. iii. of Paley's edition.

[2] New ed. by E. Schwartz (1887–1891).

See Apollodorus iii. 1; Ovid, *Metam.* ii. 833; articles by Helbig in Roscher's *Lexikon der Mythologie*, and by Hild in Daremberg and Saglio's *Dictionnaire des antiquités.* Fig. 26 in the article GREEK ART (archaic metope from Palermo) represents the journey of Europa over the sea on the back of the bull.

EUROPE, the smallest of those principal divisions of the land-surface of the globe which are usually distinguished by the conventional name of continents.

I. GEOGRAPHY AND STATISTICS

Individuality of the continent.

It has justly become a commonplace of geography to describe Europe as a mere peninsula of Asia, but while it is necessary to bear this in mind in some aspects of the geography of the continent, more particularly in relation to the climate, the individuality of the continent is established in the clearest manner by the course of history and the resultant distribution of population. The earliest mention of Europe is in the Homeric *Hymn to Apollo*, but there Europe is not the name of a continent, but is opposed to the Peloponnesus and the islands of the Aegean. The distinction between Europe and Asia is found, however, in Aeschylus in the 5th century B.C., but there seems to be little doubt that this opposition was learnt by the Greeks from some Asiatic people. On Assyrian monuments the contrast between *asu,* "(the land of) the rising sun," and *ereb* or *irib,* "(the land of) darkness" or "the setting sun," is frequent, and these names were probably passed on by the Phoenicians to the Greeks, and gave rise to the names of Asia and Europe. Where the names originated the geographical distinction was clearly marked by the intervention of the sea, and this intervention marked equally clearly the distinction between Europe and Libya (Africa). As the knowledge of the world extended, the difficulty, which still exists, of fixing the boundary between Europe and Asia where there is land connexion, caused uncertainty in the application of the two names, but never obscured the necessity for recognizing the distinction. Even in the 3rd century B.C. Europe was regarded by Eratosthenes as including all that was then known of northern Asia. But the character of the physical features and climate finally determined the fact that what we know as Europe came to be occupied by more or less populous countries in intimate relation with one another, but separated on the east by unpeopled or very sparsely peopled areas from the countries of Asia, and the boundary between the two continents has long been recognized as running somewhere through this area. Within the limits thus marked out on the east and on other sides by the sea "the climatic conditions are such that inhabitants are capable of and require a civilization of essentially the same type, based upon the cultivation of our European grains."[1] Those inhabitants have had a common history in a greater measure than those of any other continent, and hence are more thoroughly conscious of their dissimilarities from, than of their consanguinity with, the peoples of the east and the south.

Boundaries.

On the subject of the boundaries of Europe there is still divergence of opinion. While some authorities take the line of the Caucasus as the boundary in the south-east, others take the line of the Manych depression, between the upper end of the Sea of Azov and the Caspian Sea, nearly parallel to the Caucasus. Various limits are assigned to the continent on the east. Officially the crest of the Caucasus and that of the Urals are regarded in Russia as the boundaries between Europe and Asia on the south-east and east respectively,[2] although in neither case does the boundary correspond with the great administrative divisions, and in the Urals it is impossible to mark out any continuous crest. Reclus, without attempting to assign any precise position to the boundary line between the two continents, makes it run through the relatively low and partly depressed area north of the Caucasus and east of the Urals. The Manych depression, marking the lowest line of this area to the north of the Caucasus, has been taken as the boundary of Europe on the south-east by Wagner in his edition of Guthe's *Lehrbuch der Geographie*,[3] and the same limit is adopted in Kirchhoff's *Länderkunde des Erdteils Europa*[4] and Stanford's *Compendium of Geography and Travel.* In favour of this limit it appears that much weight ought to be given to the consideration put forward by Wagner, that from time immemorial the valleys on both sides of the Caucasus have formed a refuge for Asiatic peoples, especially when it is borne in mind that this contention is reinforced by the circumstance that the steppes to the north of the Caucasus must interpose a belt of almost unpeopled territory between the more condensed populations belonging undoubtedly to Asia and Europe respectively. Continuity of population would be an argument in favour of assigning the whole of the Urals to Europe, but here the absence of any break in such continuity on the east side makes it more difficult to fix any boundary line outside of that system. Hence on this side it is perhaps reasonable to attach greater importance to the fact that the Urals form a boundary not only orographically, but to some extent also in respect of climate and vegetation,[5] and on that account to take a line following the crest of the different sections of that system as the eastern limit between the two continents.[6] Obviously, however, any eventual agreement among geographers on this head must be more or less arbitrary and conventional. In any case it must be borne in mind that, whatever conventional boundary be adopted, the use of the name Europe as so limited must be confined to statements of extent or implying extent. The facts as to climate, fauna and flora have no relation to any such arbitrary boundary, and all statistical statements referring to the countries of Europe must include the part of Russia beyond the Urals up to the frontier of Siberia. In such statements, however, in the present article the whole of the lieutenancy of the Caucasus will be left out of account. As to extent it is provisionally advisable to give the area of the continent within different limits.

Extent.

The following calculations in English square miles (round numbers) of the area of Europe, within different limits, are given in Behm and Wagner's *Bevölkerung der Erde*, No. viii. (Gotha, Justus Perthes, 1891), p. 53:—Europe, within the narrowest physical limits (to the crest of the Urals and the Manych depression, and including the Sea of Azov, but excluding the Caspian Steppe, Iceland, Novaya Zemlya, Spitsbergen and Bear Island) 3,570,000 sq. m. The same, with the addition of the Caspian Steppe up to the Ural river and the Caspian Sea, 3,687,750 sq. m. The same, with the addition of the area between the Manych depression and the Caucasus, 3,790,500 sq. m. The same, with the addition of territories east of the Ural Mountains, the portion of the Caspian Steppe east of the Ural river as far as the Emba, and the southern slopes of the Caucasus,

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[1] H. Wagner's edition of Guthe's *Lehrbuch der Geographie* (5th ed., Hanover 1882).

[2] At the summit of each of the Trans-Ural railways (Perm-Tyumeh and Ufa-Chelyabinsk) and that of the road across the Caucasus from Vladikavkaz to Tiflis, sign-posts, with the name Europe on one side, Asia on the other, mark this boundary.

[3] Fifth edition, vol. ii. pp. 24-25.

[4] Pt. i. pp. 11-12.

[5] Griesbach, on the strength of Middendorff's observations, remarks that, in addition to European fruit trees, oak, maples, elms, ashes and the black alder do not cross the Urals, while the lime tree is reduced to the size of a shrub (*La Végétation du globe*, translated by Tchihatchef, i. p. 181).

[6] On the history of the boundary between Asia and Europe see F. G. Hahn in the *Mitteilungen des Vereins für Erdkunde zu Leipzig* (1881), pp. 83-104. Hahn, on the ground that true mountain systems must be regarded as forming geographical units, pronounces against the practice of making "natural boundaries" run along mountain crests, and assigns the whole of the Caucasus region to Europe as all belonging to such a system, but orographically quite different from the Armenian plateau (p. 103). But surely it is no less different from the European plain.

3,988,500 sq. m. The same, with Iceland, Novaya Zemlya, Spitsbergen and Bear Island, 4,093,000 sq. m. In all these calculations the islands in the Sea of Marmora, the Canary Islands, Madeira, and even the Azores, are excluded, but all the Greek islands of the Aegean Sea and the Turkish islands of Thasos, Lemnos, Samothrace, Imbros, Hagiostrati or Bozbaba, and even Tenedos, are included.

Extreme points.

The most northern point of the mainland area is Cape Nordkyn in Norway, 71° 6′ N.; its most southern, Cape Tarifa in Spain, in 36° 0′ N.; its most western, Cape da Roca in Portugal, 9° 27′ W.; and its most eastern, a spot near the north end of the Ural Mountains, in 66° 20′ E. A line drawn from Cape St Vincent in Portugal to the Ural Mountains near Ekaterinburg has a length of 3293 m., and finds its centre in the W. of Russian Poland. From the mouth of the Kara to the mouth of the Ural river the direct distance is 1600 m., but the boundary line has a length of 2400 m.

Coast-line.

Two of the most striking features in the general conformation of Europe are the great number of its primary and secondary peninsulas, and the consequent exceptional development of its coast-line—an irregularity and development which have been one of the most potent of the physical factors of its history. The total length of coast-line was estimated by Reuschle in 1869 at 19,820 m., of which about 3600 were counted as belonging to the Arctic Ocean, 8390 to the Atlantic, and 7830 to the Black Sea and Mediterranean. This estimate, however, does not take into account minor indentations. Reclus's estimate, including the more important indentations, brings the coast-line up to 26,700 m., and that of Strelbitsky up to 47,790 m. (smaller islands not included), or 1 m. of coast for about 75 sq. m. of area. Rohrbach[1] calculated the mean distance of all points in the interior of Europe from the sea at 209 m. as compared with 292 m. in the case of North America, the continent which ranks next in this respect. It must be pointed out, however, that such calculations are apt to be very misleading, inasmuch as the commercial value of the relations thus determined depends not merely on the existence of natural harbours or the presence of facilities for the construction of artificial harbours, but also on the presence of natural facilities for communication between such harbours and a productive interior.

Changes of coast-line.

The consideration just mentioned gives great significance to the fact that while the coast-line of Europe is in its general features very much the same as it was at the beginning of the true historic period, it has undergone a number of important local changes, some at least of which are due to causes that are at work over very extensive areas. These changes may be conveniently classified under four heads: the formation of deltas by the alluvium of rivers; the increase of the land-surface due to upheaval; the advance of the sea by reason of its own erosive activity; and the advance of the sea through the subsidence of the land. The actual form of the coast, however, is frequently due to the simultaneous or successive action of several of the causes—sea and river and subterranean forces helping or resisting each other. That changes in the coast-line on the shores of the Gulf of Bothnia have taken place within historical times through elevation of the land seems now to be generally admitted. The commune of Hvittisbofjärd north of Björneborg on the Finland side of that gulf gained about 2¼ sq. m. between 1784 and 1894, an amount greater than could be accounted for by the most liberal estimates of alluvial deposit, and the most careful investigation seems to show that on the Swedish coast of that gulf a rise has taken place in recent years on the east coast of Sweden from about 57° 20′ N. increasing in amount towards the north up to 62° 20′ N., where it reaches an average of about two-fifths of an inch annually.[2] Our information is naturally most complete in regard to the Mediterranean coasts, as these were the best known to the first book-writing nations. There we find that all the great rivers have been successfully at work—more especially the Rhone, the Ebro and the Po. The activity of the Rhone, indeed, as a maker of new land, is astonishing. The tower of St Louis, erected on the coast in 1737, is now upwards of four miles inland; the city of Arles is said to be nearly twice as far from the sea as it was in the Roman period. The present St Gilles was probably a harbour when the Greeks founded Marseilles, and Aigues Mortes, which took its place in the middle ages, was no longer on the coast in the time of St Louis (13th century), but Narbonne continued to be a seaport till the 14th century. At the mouth of the Hérault, according to Fischer,[3] the coast advances at least two metres or about 7 ft. annually; and it requires great labour to keep the harbour of Cette from being silted up. The Po is even more efficient than the Rhone, if the size of its basin be taken into account. Ravenna, which was at one time an insular city like Venice, has now a wide stretch of downs partly covered with pine forest between it and the sea. Aquileia, one of the greatest seaports of the Mediterranean in the early centuries of the Christian era, is now 7 m. from the coast, and Adria, which gives its name to the sea, is 13. The islands on which Venice is built have sunk about 3 ft. since the 16th century: the pavement of the square of St Mark's has frequently required to be raised, and the boring of a well has shown that a layer of vegetable remains, indicating a flora identical with that observed at present on the neighbouring mainland, exists at a depth of 400 ft. below the alluvial deposits. A little to the south of Rovigno on the Istrian coast on the opposite side of the Adriatic a diver found at the depth of about 85 ft. the remains of a town, which has been identified with the island town of Cissa, of which nothing had been known after the year 679.[4] At Zara ancient pavements and mosaics are found below the sea-level, and the district at the mouth of the Narenta has been changed into a swamp by the advance of the sea. A process of elevation, on the other hand, is indicated along nearly all the coasts of Sicily, at the southern end of Sardinia, the east of Corsica, and perhaps in the neighbourhood of Nice, while the west coast of Italy from the latitude of Rome to the southern shores of the Gulf of Salerno has undergone considerable oscillations of level within historical times. About the time of the settlement of the Greeks the coast stood at least 20 ft. above the level of the present day. Depression began in Roman times, though then the land was still 16 ft. higher than now. A more rapid depression began in the middle ages, so that the sea-level rose from 18 to 20 ft. above the present zero, and the coast began gradually to rise again at the close of the 15th century.[5] Passing eastward to the Balkan peninsula, we find considerable changes on the coast-line of Greece; but as they are only repetitions on a smaller scale of the phenomena already described, it is sufficient to indicate the Gulf of Arta and the mouth of the Spercheios as two of the more important localities. The latter especially is interesting to the historian as well as to the geologist, as the river has greatly altered the physical features of one of the world's most famous scenes—the battlefield of Thermopylae.

If we proceed to the Atlantic seaboard we observe, as we might expect, great modifications in the embouchures of the Garonne and the Loire, but by far the most remarkable variations of sea and land have taken place in the region extending from the south of Belgium in the neighbourhood of the Straits of Dover to the mouth of the Elbe and the west coast of Schleswig-Holstein. Here there has been a prolonged struggle between man and nature, in which on the whole nature has hitherto had the best of the battle. While, as is well known, much land below sea-level in the Low Countries has been protected against the sea by dikes and reclaimed, and the coast-line has been, on the whole, advanced between the Elbe and the Eider,[6] there has been a great loss of land in the interior of Holland since the beginning of the Christian era, and on the balance a large loss of land north of the Eider since the first half of the 13th century.[7] In the 1st century A.D. the Zuider Zee appears to have been represented only by a comparatively small inland lake, the dimensions of which were increased by different inroads of the sea, the last and greatest of which occurred in 1395. Among the local changes of European significance within this area may be mentioned the silting up towards the end of the 15th century of the channel known as the Zwin running north-eastwards from Bruges, which through that cause lost its shipping and in the end all its former renown as a seat of commerce.

The Baltic shores of Germany display the same phenomena of local gain and loss. In the western section inroads of the sea have been extensive: the island of Rügen would no longer serve for the disembarkation of an army like that of Gustavus Adolphus; Wollin and Usedom are growing gradually less; large stretches of the mainland are fringed with submerged forests; and at intervals the sites of well-known villages are occupied by the sea. Towards the east the great rivers are successfully working in the opposite direction. In the Gulf of Danzig the alluvial deposits of the Vistula cover an area of 615 sq. m.; in the 13th century the knights of Marienburg enclosed with dikes about 350 sq. m.; and an area of about 70 sq. m. was added in the course of the 14th. The Memel is silting up the Kurisches Haff, which, like the Frisches Haff, is separated from the open sea by a line of dunes comparable with those of the Landes in France. The so-called strand or coast-lines at various altitudes round the Scandinavian peninsula, though belonging for the most part to glacial times, speak also of relative changes of level in the post-glacial period.

Volcanoes and earthquakes.

The changes briefly indicated above take place so gradually for the most part that it requires careful observation and comparison of data to establish their reality. It is very different with those changes which we usually ascribe to volcanic agency. Besides the great outlying "hearth" of Iceland, there are four centres of volcanic activity in Europe—all of them, however, situated in the Mediterranean. Vesuvius on the western coast of Italy, Etna in the island of Sicily, and Stromboli in the Lipari group, have been familiarly known from the earliest historic times; but the fourth has only attracted particular attention since the 18th century. It lies in the Archipelago, on the southern edge of the Cyclades, near the little group of islets called Santorin. The region was evidently highly volcanic at an earlier period, for Milo, one of the nearest of the islands, is simply a ruined crater still presenting smoking solfataras and other traces of former activity. The devastations produced by the eruptions of the European volcanoes are usually confined within very narrow limits; and it is only at long intervals that any part of the continent is visited by a really formidable earthquake. The only part of Europe, however, for which there are no recorded earthquakes is central and northern Russia; and the Alps and Carpathians, especially the intra-Carpathian area of depression, Greece, Italy, especially Calabria and the adjoining part of Sicily, the Sierra Nevada and the Pyrenees, the Lisbon district and the rift valley of the upper Rhine (between the Vosges and the Black Forest) are all regions specially liable to earthquake shocks and occasionally to shocks of considerable intensity. One well-marked seismic line extends along the south side of the Alps from Lake Garda by Udine and Görz to Fiume, and another forms a curve convex towards the south-east passing first through Calabria, then through the north-east of Sicily to the south of the Peloritan Mountains.[1] Of all European earthquakes in modern times, the most destructive are that of Lisbon in 1755, and that of Calabria in 1783; the devastation produced by the former has become a classical instance of such disasters in popular literature, and by the latter 100,000 people are said to have lost their lives. Calabria again suffered severely in 1865, 1870, 1894, 1905 and 1908.

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[1] *Petermanns Mitteilungen* (1890), p. 91.

[2] See Supan's *Physische Erdkunde*, 4th ed., pp. 376-377, and the authorities there quoted.

[3] "Küstenveränderungen im Mittelmeergebiet," in *Ztschr. der Ges. für Erdkunde zu Berlin* (1878).

[4] See *Mitteil. der Wiener Geog. Gesellschaft* (1890), p. 333.

[5] See R. T. Günther, *Contributions to the Study of Earth-Movements in the Bay of Naples* (Oxford, 1903), and "Earth-Movements in the Bay of Naples," in the *Geog. Journ.* vol. xxii. pp. 121-149, 269-285.

[6] See *Petermanns Mitteil.* (1891), Pl. 8.

[7] *Ib.* (1893), Pl. 12.

Relief.

If the European mountains are arranged according to their greatest elevations, they rank as follows:—(1) the Swiss Alps, with their highest peaks above 15,000 ft.; (2) the Sierra Nevada, the Pyrenees, and Etna, about 11,000 ft.; (3) the Apennines, the Corsican Mountains, the Carpathians, the Balkans, and the Despoto Dagh, from 8000 to 9000; (4) the Guadarrama, the Scandinavian Alps, the Dinaric Alps, the Greek Mountains, and the Cevennes, between 6000 and 8000; (5) the mountains of Auvergne, the Jura, the Riesengebirge, the mountains of Sardinia, Majorca, Minorca, and the Crimea, the Black Forest, the Vosges, and the Scottish Highlands, from 4000 to 6000.

The following estimates are based on those contained in the fifth edition, by Dr Hermann Wagner, of Guthe's *Lehrbuch der Geographie*. In the original the figures are given in German sq. m. and in sq. kilometres in round numbers, and the equivalents here given in English sq. m. are similarly treated:—

	Sq. m.
The great European plain in its widest sense	2,660,000
The same exclusive of inland seas	2,300,000
The same exclusive of the Scandinavian and British lowlands	2,125,000
All other European lowlands	385,000
The Hungarian plain	38,000
The Po plain	21,000
The Scandinavian highlands	190,000
The Ural Mountains	127,000
The Alps	85,000
The Carpathians	72,000
The Apennines	42,500
The Pyrenees	21,500

Several estimates have been made of the average elevation of the continent, but it is enough to give here the main results. In the following list, where a conversion from metres into feet has been necessary, the nearest multiple of 5 ft. has been given:—Humboldt, 675 ft.; Leipoldt,[2] 975 ft.; De Lapparent,[3] 960 ft.; Murray,[4] 939 ft.; Supan,[5] 950 ft.; von Tillo,[6] 1040 ft.; Heiderich,[7] 1230 ft.; Penck,[8] 1085 ft. The exceptionally high estimate of Heiderich is due to the fact that by him Transcaucasia and the islands of Novaya Zemlya, Spitsbergen and Iceland are reckoned as included in Europe.

Arrangement of the highlands.

Of more geographical significance than these estimates are the facts with regard to the arrangement of the highlands of the continent. It is indeed this arrangement combined with the form of the coast-line which has indirectly given to Europe its individuality. Three points have to be noted under this head:—(1) the fact that the highlands of Europe are so distributed as to allow of the penetration of westerly winds far to the east; (2) the fact that the principal series of highlands has a direction from east to west, Europe in this point resembling Asia but differing from North America; and (3) that in Europe the mountain systems belonging to the series of highlands

Name of River.	Length in English Miles.		Area of Basin in sq. m.
	Strelbitsky.	Other Authorities.	Strelbitsky.
Volga	1977[1]	2107[2]	563,300
Danube	1644	..	315,435
Ural	1446	1477[2]	96,350
Dnieper (Dnyepr)	1064	1328[2]	203,460
Kama	984	1115[2]	202,615
Don (Russia)	980	1123[2]	166,125
Pechora	915	1024[2]	127,225
Rhine	709	..	63,265
Oka	706	914[2]	93,205
Dniester (Dnyestr)	646	835[2]	29,675
Elbe	612	..	55,340
Vistula	596	646[2]	73,905
Vyatka	596	680[2]	50,555
Tagus	566	..	31,865[3]
Theiss (Tisza)	550	..	59,350
Loire	543	..	46,755
Save	535	..	37,595
Meuse	530	..	12,740
Mezen	496	507[2]	30,410
Donets	487	613[2]	37,890
Douro	485	..	36,705
Düna (S. Dvina)	470	576[2]	32,975
Ebro	470	..	38,580[3]
Rhone	447	..	38,180
Desna	438	590[2]	33,535
Niemen (Nyeman)	437	537[2]	34,965
Drave	434	..	15,745
Bug (Southern)	428	477[2]	26,225
Seine	425	..	30,030
Oder	424	..	17,150
Kuban	405	509[2]	21,490
Khoper	387	563[2]	23,120
Maros	390	..	16,975
Pripet	378	404[2]	46,805
Guadalquivir	374	..	21,580[3]
Pruth (Prutŭ)	368	503[2]	10,330
Northern Dvina	358	447[2]	141,075
Weser-Werra	355	..	19,925
Po	354	..	28,920[3]
Garonne-Gironde	342	..	32,745
Vetluga	328	464[2]	14,325
Pinega	328	407[2]	17,425
Glommen	326	352[4]	15,930
Bug (Western)	318	450[2]	22,460
Guadiana	316	..	25,300[3]
Aluta (Alt, Oltŭ)	308	..	9,095
Mosel	300	..	10,950
Main	300	..	10,600
Maritsa	272	..	20,790
Jucar	270	..	7,620[3]
Mologa	268	338[2]	15,005
Tornea	268	..	13,045
Inn	268	..	9,825
Saône	268	..	8,295
Moldau	255	267[4]	10,860
Moksha	249	371[2]	19,090
Ljusna	243	..	7,700
Mur	242	..	5,200
Morava, Servian	235	..	15,715
Klar	224	..	4,520
Voronezh	218	305[2]	7,760
Berezina	218	285[2]	9,295
Saale	215	..	8,970
Onega	212	245[2]	22,910
Vág (Waag)	212	..	6,245
Dema	209	275[2]	4,830
San	203	444[2]	6,135
Moskva	189	305[2]	5,910
Western Manych	176	295[2]	37,820
Klyazma	159	394[2]	15,200

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[1] See Ed. Suess, *The Face of the Earth*, translated by H. B. C. Sollas, vol. i. (Oxford, 1904); J. Milne, *Seismology* (London, 1886); R. Hörnes, *Erdbebenkunde* (Leipzig, 1893).

[2] *Die mittlere Höhe Europas* (Plauen, 1874).

[3] *Traité de géologie* (Paris, 1883).

[4] *Scot. Geog. Mag.* (1888), p. 23.

[5] *Petermanns Mitteilungen* (1889), p. 17.

[6] *Trans.* (*Izvestiya*) *Imp. Rus. Geog. Soc.* (1889), p. 113.

[7] *Die mittleren Erhebungsverhältnisse der Erdoberfläche*, pt. i., in Penck's *Geographische Abhandlungen*, vol. v. (Vienna, 1891).

[8] *Morphologie der Erdoberfläche*, vol. i.

[1] The equivalent of the figures given in *Superficie de l'Europe*. A later measurement by Strelbitsky yielded a result equal to 2215 English miles.

[2] General von Tillo, in *Transactions* (*Izvestiya*) *Imp. Rus. Geog. Soc.* vol. xix. (1883), pp. 160-161.

[3] Dr Al. Bludau in *Petermanns Mitteilungen* (1898), pp. 185-187, has given new calculations of the areas of the basins of certain European rivers, namely, the Tagus, 31,250 sq. m.; Ebro, 32,810 sq. m.; Guadalquivir, 21,620 sq. m.; Po, 28,800 sq. m.; Guadiana, 25,810 sq. m.; and Jucar, 8245 sq. m.

[4] St Martin, *Dict. de géog. univ.*

referred to not only have more or less well-marked breaks between them, but are themselves so notched by passes and cut by transverse valleys as to present great facilities for crossing in proportion to their average altitude. The first and second of these points have special importance with reference to the climate and will accordingly be considered more fully under that head. The second is also of importance with reference to the means of communication, to which the third also refers, and detailed consideration of these points in that relation will be reserved for that heading. Here, however, it may be noted that in Europe the distribution of the natural resources for the maintenance of the inhabitants is such that, if we leave out of account Russia, which is almost entirely outside of the series of highlands running east and west, the population north of the mountains is roughly about 50% greater than that south of the mountains, whereas in Asia the population north of the east and west highland barrier is utterly insignificant as compared with that to the south.

From the table given on p. 909 (col. 1) it will be seen that the most extensive of the highland areas of Europe is that of Scandinavia, which has a general trend from south-south-west to north-north-east, and is completely detached by seas and plains from the highland area to the south. There are other completely detached highland areas in Iceland, the British Isles, the Ural Mountains, the small Yaila range in the south of the Crimea, and the Mediterranean islands. The connected series of highlands is that which extends from the Iberian peninsula to the Black Sea stretching in the middle of Germany northwards to about 52° N. In the Iberian peninsula we have the most marked example of the tableland form in Europe, and these tablelands are bounded on the north by the Cantabrian Mountains, which descend to the sea, and the Pyrenees, which, except at their extremities, cut off the Iberian peninsula from the adjoining country more extensively than any other chain in the continent. Between the foot-hills of the Pyrenees, however, and those of the central plateau of France the ground sinks in the Passage of Naurouse or Gap of Carcassonne to a well-marked gap establishing easy communication between the valley of the Garonne and the lower part of that of the Rhone. The highlands in the north spread northwards and then north-eastwards till they join the Vosges, but sink in elevation towards the north-east so as to allow of several easy crossings. East of the Vosges the Rhine valley forms an important trough running north and south through the highlands of western Germany. To the south of the Vosges again undulating country of less than 1500 ft. in elevation, the well-known Burgundy Gate or Gap of Belfort, constitutes a well-marked break between those mountains and the Jura, and establishes easy communication between the Rhine and the Saône-Rhone valleys. The latter valley divides in the clearest manner the highlands of central France from both the Alps and the Jura, while between these last two systems there lies the wedge of the Swiss midlands contracting south-westwards to a narrow but important gap at the outlet of the Lake of Geneva. Between the Alps and the mountains of the Italian and Balkan peninsulas the orographical lines of demarcation are less distinct, but on the north the valley of the Danube mostly forms a wide separation between the Alps and the mountains of the Balkan peninsula on the south and the highlands of Bohemia and Moravia, the Carpathians and the Transylvanian Alps on the north. The valleys of the Eger and the Elbe form distinct breaks in the environment of Bohemia, and the Sudetes on the north-east of Bohemia and Moravia are even more clearly divided from the Carpathians by the valley of the upper Oder, the Moravian Gate, as it is called, which forms the natural line of communication between the south-east of Prussia and Vienna.

Rivers.

An estimate has been made by Strelbitsky of the length and of the area of the basins of all the principal rivers of Europe. In the table on p. 909 all the estimates given without any special authority are based on Strelbitsky's figures, but it should be mentioned that the estimates of length made by him evidently do not take into account minor windings, and are therefore generally less than those given by others. The authorities are separately cited for the originals of all other figures given in the table.[1]

The observations on the temperature of European rivers have been collected and discussed by Dr Adolf E. Forster.[2] He finds that the dominant factor in determining that temperature is the temperature of the air above, but that rivers are divisible into four groups with respect to the relation between these temperatures at different seasons of the year. These groups are rivers flowing from glaciers, in which the temperature is warmer than the air in winter, colder in summer; rivers flowing from lakes, characterized by peculiarly high winter temperatures, in consequence of which the mean temperature for the year is always above that of the air; rivers flowing from springs, which, at least near their source, are more rapidly cooled by low than warmed by high air temperatures; and rivers of the plains, which have a higher mean temperature than the air in all months of the year.

In various parts of Europe, more particularly in calcareous regions, such as the Jura, the Causses in the south-east of France, and the Karst in the north-west of the Balkan peninsula, there are numerous subterranean or partly subterranean rivers. Several of the more important rivers are of very irregular flow, and some are subject to really formidable floods. This is particularly the case with rivers a large part of whose basin is made up of crystalline or other impervious rocks with steep slopes, like those of the Loire in France and the Ebro in Spain. The Danube and its tributaries, the great rivers of Germany, above all eastern Germany, and those of Italy, are also notorious for their inundations. In southern Europe, where the summers are nearly rainless, most of the rivers disappear altogether in that season.

Name of Lake and Country.	Height above Sea.	Area.	Greatest Depth.	Mean Depth.	Volume. Millions of Cub. Ft.
	Ft.	Sq. m.	Ft.	Ft.	
Ladoga, Russia	15	7004	730	..	..
Onega, ,,	115	3765	About 1200	..	..
Vener, Sweden	145	2149	280	..	..
Chudskoye or Peipus, Russia	100	1357[3]	90	..	..
Vetter, Sweden	290	733	415	..	..
Saima, Russia	255	680	185	..	..
Päjäne, ,,	255	608	..	..	..
Enare, ,,	490	549	..	..	..
Segozero, ,,	..	481	140	..	..
Mälar, Sweden	1·6	449	170	..	..
Byelo-Ozero, Russia	400	434	35	..	..
Pielis, Russia	305	422	..	..	..
Topozero, Russia	..	411	..	..	..
Uleå, ,,	375	380	60	..	..
Ilmen, ,,	107	358	..	..	..
Vigozero, ,,	..	332	..	..	..
Imandra, ,,	..	329	..	..	..
Balaton, Hungary	350	266	13	..	..
Geneva, France and Switzerland	1220	225	1015	500	3,140,000
Kovdozero, Russia	..	225	..	..	..
Constance, Germany and Switzerland	1295	208	825	295	1,711,000
Hjelmar, Sweden	79	187	60	..	..
Neagh, Ireland	48	153	113	..	..
Kubinskoye, Russia	..	152	..	..	..
Mjösen, Norway	395	152	1485	..	..
Garda, Italy and Austria	215	143	1135	445	1,757,000
Torne-träsk, Sweden	1140	139	..	..	..
Neusiedler-see, Hungary	370	137	13	..	..
Scutari, Turkey	20	About 130	33	12½	45,900
Siljan, Sweden	..	123	..	..	..
Virzjärvi, Russia	115	107	24	..	..
Seliger, ,,	825	100	105	..	..
Stor Afvan, Sweden	1370	92	925	..	..
Yalpukh, Russia	..	89	..	..	..
Neuchâtel, Switzerland	1415	85	500	210	500,000
Ylikitkakärvi, Russia	680	85	30	..	..
Maggiore, Italy and Switzerland	645	82	1220	575	1,316,000
Corrib, Ireland	30	71	152	..	..
Como, Italy	655	56	1360	..	..

Lakes and marshes.

For many European lakes, especially the smaller ones, estimates have been made of the mean depth and the volume. A list of all the European lakes for which the altitude, extent, and greatest depth could be ascertained, compiled by Dr K. Peucker, is published in the *Geog. Zeitschrift* (1896), pp. 606-616, where estimates of the mean depth and the volume are also given where procurable. The table given above, comprising only the larger lakes, is mainly based on this list, where the original authorities are mentioned. The figures entered in the table not taken from this list are after Strelbitsky, the *Géog. Universelle* of V. de St Martin, or, in the case of Swedish lakes, from the official handbook of Sweden.[1]

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[1] In other parts of this work areas of river-basins and lakes, and other measurements, may be observed to conflict in some degree with those given here. Various authorities naturally differ, both in methods of estimating and in standards of precision.

[2] Penck's *Geographische Abhandlungen*, vol. v. pt. iv. (Vienna, 1894); noticed in *Geog. Journ.* vol. vi. p. 264.

[3] Including L. Pskov as well as the connecting arm known as Teploye.

The Alpine lakes break up into a southern and northern subdivision—the former consisting of the Lago Maggiore, and the lakes of Lugano and Como, Lago d'Iseo, and Lago di Garda, all connected by affluents with the system of the Po; and the latter the Lake of Geneva threaded by the Rhone, Lakes Constance, Zürich, Neuchâtel, Biel and other Swiss lakes belonging to the basin of the Rhine, and a few of minor importance belonging to the Danube. The north Russian lakes, Ladoga, Onega, &c., are mainly noticeable as the largest members of what in some respects is the most remarkable system of lakes in the continent—the Finno-Russian, which consists of an almost countless number of comparatively small irregular basins formed in the surface of a granitic plateau. In Finland proper they occupy no less than a twelfth of the total area.

A few of the number are very shallow. The Neusiedler See, for example (the Peiso Lacus of the Latins and Fertö-tava of the Hungarians), completely dried up in 1693, 1738 and 1864, and left its bed covered for the most part with a deposit of salt.[2] Lakes Copais in Boeotia and Fucino Celano in Italy have been entirely turned into dry land. The progress of agriculture has greatly diminished the extent of marsh land in Europe. The Minsk marshes in Russia form the largest area of this character still left, and on these large encroachments are gradually being made. Extensive marshes in northern Italy have been completely drained. The partial draining of the Pomptine marshes in Italy made Pope Pius VII. famous in the 18th century, and further reclamation works are still in progress there and elsewhere in the same country. (G. G. C.)

Geology.

The geological history of Europe[3] is, to a large extent, a history of the formation and destruction of successive mountain chains. Four times a great mountain range has been raised across the area which now is Europe. Three times the mountain range has given way; portions have sunk beneath the sea, and have been covered by more recent sediments, while other portions remained standing and now rise as isolated blocks above the later beds which surround them. The last of the mountain ranges still stands, and is known under the names of the Alps, the Carpathians, the Balkans, the Caucasus, &c., but the work of destruction has already begun, and gaps have been formed by the collapse of parts of the chain. The Carpathians were once continuous with the Alps, and the Caucasus was probably connected with the Balkans across the site of the Black Sea.

These mountain chains were not raised by direct uplift. They consist of crumpled and folded strata, and are, in fact, wrinkles in the earth's outer crust, formed by lateral compression, like the puckers which appear in a tablecloth when we push it forward against a book or other heavy object lying upon it. How the lateral or tangential pressures originated is still matter of controversy, but the usually accepted explanation is as follows. The interior of the earth in cooling contracts more rapidly than the exterior, and, if no other change took place, the outer crust would be left as a hollow sphere without any internal support. But the materials of which it is composed are not strong enough to bear its enormous weight, and, like an arch which is too weak in its abutments, it collapses upon the interior core. Where the crust is rigid it fractures, as an ordinary arch would fracture; and some portions fall inward, while other parts may even be wedged a little outward. Where, on the other hand, the crust is made of softer rock, it crumples and folds, and a mountain chain is produced. Such a mountain chain, for want of a better term, is called a folded mountain chain. The folding is most intense where a flexible portion of the crust lies next to a more rigid part. Where the folding has occurred, the rocks which were once comparatively soft become hard and rigid, and the next series of wrinkles will usually be formed beyond the limits of the old one. This is what has happened in the European area.

The oldest mountain chain lay in the extreme north-west of Europe, and its relics are seen in the outer Hebrides, the Lofoten Islands and the north of Norway. The rocks of this ancient chain have since been converted into gneiss, and they were folded and denuded before the deposition of the oldest known fossiliferous sediments. The mountain system must therefore have been formed in Pre-Cambrian times, and it has been called by Marcel Bertrand the Huronian chain. It is probable that a great land-mass lay towards the north-west; but in the sea which certainly existed south-east of the chain, the Cambrian, Ordovician and Silurian beds were deposited. In Russia and South Sweden these beds still lie flat and undisturbed; but in Norway, Scotland, the Lake District, North Wales and the north of Ireland they were crushed against the north-western continent and were not only intensely folded but were pushed forward over the old rocks of the Huronian chain. Thus was formed the Caledonian mountain system of Ed. Suess, in which the folds run from south-west to north-east. It was raised at the close of the Silurian period.

Then followed, in northern Europe, a continental period. By the elevation of the Caledonian chain the northern land-mass had grown southward and now extended as far as the Bristol Channel. Upon it the Old Red Sandstone was laid down in inland seas or lakes, while farther south contemporaneous deposits were formed in the open sea.

During the earlier part of the Carboniferous period the sea spread over the southern shores of the northern continent; but later the whole area again became land and the Coal Measures of northern Europe were laid down. Towards the close of the Carboniferous period the third great mountain chain was formed. It lay to the south of the Caledonian chain, and its northern margin stretched from the south of Ireland through South Wales, the north of France and the south of Belgium, and was continued round the Harz and the ancient rocks of Bohemia, and possibly into the south of Russia. It is along this northern margin, where the folded beds have been thrust over the rocks which lay to the north, that the coalfields of Dover and of Belgium occur. The general direction of the folds is approximately from west to east; but the chain consisted of two arcs, the western of which is called by Suess the Armorican chain and the eastern the Variscian. The two arcs together, which were undoubtedly formed at the same period, have been named by Bertrand the Hercynian chain. Everywhere the chief folding seems to have occurred before the deposition of the highest beds of the Upper Carboniferous, which lie unconformably upon the folded older beds. The Hercynian chain appears to have been of considerable breadth, at least in western Europe, for the Palaeozoic rocks of Spain and Portugal are thrown into folds which have the same general direction and which were formed at approximately the same period. In eastern Europe the evidence is less complete, because the Hercynian folds are buried beneath more recent deposits and have in some cases been masked by the superposition of a later series of folds.

The formation of this Carboniferous range was followed in northern Europe by a second continental period somewhat similar to that of the Old Red Sandstone, but the continent extended still farther to the south. The Permian and Triassic deposits of England and Germany were laid down in inland seas or upon the surface of the land itself. But southern Europe was covered by the open sea, and here, accordingly, the contemporaneous deposits were marine.

The Jurassic and Cretaceous periods were free from any violent folding or mountain building, and the sea again spread over a large part of the northern continent. There were indeed several oscillations, but in general the greater part of southern and central Europe lay beneath the waters of the ocean. Some of the fragments of the Hercynian chain still rose as islands above the waves, and at certain periods there seems to have been a more or less complete barrier between the waters which covered northern Europe and those which lay over the Mediterranean region. Thus, while the estuarine deposits of the Upper Jurassic and Lower Cretaceous were laid down in England and Germany, the purely marine Tithonian formation, with its peculiar fauna, was deposited in the south; and while the Chalk was formed in northern Europe, the Hippurite limestone was laid down in the south.

The Tertiary period saw fundamental changes in the geography of Europe. The formation of the great mountain ranges of the south, the Alpine system of Suess, perhaps began at an earlier date, but it was in the Eocene and Miocene periods that the chief part of the elevation took place. Arms of the sea extended up the valley of the Rhone and around the northern margin of the Alps, and also spread over the plains of Hungary and of southern Russia. Towards the middle of the Miocene period some of these arms were completely cut off from the ocean and large deposits of salt were formed, as at Wieliczka. At a later period south-eastern Europe was covered by a series of extensive lagoons, and the waters of these lagoons gradually became brackish, and then fresh, before the area was finally converted into dry land. Great changes also took place in the Mediterranean region. The Black Sea, the Aegean, the Adriatic and the Tyrrhenian Sea were all formed at various times during the Tertiary period, and the depression of these areas seems to be closely connected with the elevation of the neighbouring mountain chains.

Exactly what was happening in northern Europe during these great changes in the south it is not easy to say. The basaltic flows of the north of Ireland, the western islands of Scotland, the Faeroe Islands and Iceland are mere fragments of former extensive plateaus. No sign of marine Tertiary deposits of earlier age than Pliocene has been found in this northern part of Europe, and on the other hand plant remains are abundant in the sands and clays interbedded with the basalts. It is probable, therefore, that in Eocene times a great land-mass lay to the north-west of Europe, over which the basalt lavas flowed, and that the formation of this part of the Atlantic and perhaps of the North Sea did not take place until the Miocene period.

At a later date the climate, for some reason which has not yet been fully explained, grew colder over the whole of Europe, and the northern part was covered by a great ice-sheet which extended southward nearly as far as lat. 50° N., and has left its marks over the whole of the northern part of the continent. With the final melting and disappearance of the ice-sheet, the topography of Europe assumed nearly its present form, and man came upon the scene. Minor changes, such as the separation of Great Britain from the continent, may have occurred at a later date; but since the Glacial period there have, apparently, been no fundamental modifications in the configuration of Europe.

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[1] *Sweden, its People and its Industry* (Stockholm, 1904).

[2] See Ascherson, "Die Austrocknung des Neusiedler Sees," in *Z. der Ges. für Erdkunde zu Berlin* (1865).

[3] See Suess, *The Face of the Earth*; M. Bertrand, "Sur la distribution géographique des roches éruptives en Europe," *Bull. Soc. Géol. France*, ser. 3, vol. xvi. (1887–1888), pp. 573-617. A translation of a lecture by Suess, giving a short summary of his views on the structure of Europe, will be found in the *Canadian Record of Science*, vol. vii. pp. 235-246.

The elevation of each of the great mountain systems already described was accompanied by extensive eruptions of volcanic rocks, and the sequence appears to have been similar in every case. The volcanoes of the Mediterranean are the last survivors of the great eruptions which accompanied the elevation of the Alpine mountain system. (P. La.)

Winds.

In western Europe by far the most prevalent wind is the S.W. or W.S.W. It represents 25% of the annual total; while the N. is only 6%, the N.E. 8, the E. 9, the S. 13, the W. 17 and the N.W. 11. Of the summer total it represents 22%, while the N. is 9, N.E. 8, E. 7, S.E. 7, W. 21 and N.W. 17. In south-eastern Europe, on the other hand, the prevailing winds are from the N. and E.—the E. having the preponderance in winter and autumn.[1] Of local winds the most remarkable are the föhn, in the Alps, distinguished for its warmth and dryness; the Rotenturm wind of Transylvania, which has similar characteristics; the bora of the Upper Adriatic, so noticeable for its violence; the mistral of southern France; the etesian winds of the Mediterranean; and the sirocco, which proves so destructive to the southern vegetation. Though it is only at comparatively rare intervals that the winds attain the development of a hurricane, the destruction of life and property which they occasion, both by sea and land, is in the aggregate of no small moment. About six or seven storms from the west pass over the continent every winter, usually appearing later in the southern districts, such as Switzerland or the Adriatic, than in the northern districts, as Scotland and Denmark.

Climate.

The great determining factors of the climate of Europe are these. The northern borders of the continent are within the Arctic Circle; the most southern points of the mainland are 13½° or more north of the Tropic of Cancer; to the east extends for about 3000 m. the continuous land surface of Asia; to the west lie the waters of the north Atlantic, which penetrate in great inland seas to the north and south of the great European peninsula; the prevailing winds in western Europe as already stated are more or less south-westerly; and the arrangement of the highlands is such as to allow of the penetration of winds with a westerly element in their direction far to the east. The first two of these factors are not distinguishing influences. They affect the climate of Europe in the same manner as they do that of any other land surface in the same latitudes.

The remaining factors, however, are of the highest importance. It is to them in fact that Europe owes in a very large measure those physical conditions which are the basis of its recognition as a separate continent. In estimating the value of those factors one must bear in mind, first, that the waters of the north Atlantic are exceptionally warm, especially on the European side of the ocean. The Gulf Stream carries a large body of warm water northwards to near the parallel of 40° N., and to the north of the Gulf Stream prevailing south-westerly winds, especially during the winter months, drift onwards to the western and northern shores of Europe, even as far east as Spitsbergen, large bodies of water of an exceptionally high temperature. Secondly, one must bear in mind that these relatively high temperatures over the ocean promote evaporation and thus favour the presence of a relatively large amount of water-vapour in the air over those parts of the ocean which adjoin the continent; and, thirdly, that, as the winds are the sole means of carrying water-vapour from one part of the earth's surface to the other, and the sole means of carrying heat and cold from the ocean to the land, the prevailing south-westerly winds are allowed by the superficial configuration to bring a relatively high rainfall and a relatively large amount of heat in winter to land farther in the interior than in any corresponding latitudes. During the summer the winds referred to have a cooling effect, but not to the same degree as those of winter tend to raise the temperature. From the point of view just indicated the only part of the world that is fairly comparable with Europe is the west of North America; but, as there the outline and superficial configuration are quite different, the oceanic influences affect only a narrow strip of seaboard and not any extent of land which could be regarded as of continental rank. It is owing to these influences that in the greater part of Europe there is a more or less continuous population dependent on agriculture. On the east side of Europe, again, the existence of the continent of Asia has a marked effect on the climate which also aids in giving to Europe its individual character. It is owing to that circumstance that the south-east of the continent, which has temperatures as favourable to agriculture as the corresponding latitudes of eastern Asia or eastern North America, is without the copious rains which make those temperatures so valuable, and hence forms part of the desert that divides the populations of Europe and Asia.

Precipitation.

On the local distribution of rainfall and temperature, the physical configuration of the continent has very marked effects. Here as elsewhere there is a striking difference both in the amount of rainfall and the temperature on the weather and lee sides of mountains and even low hills. But with reference to this it should not be forgotten that water-vapour, heat and cold may be carried farther into the land by winds blowing in a different direction from that of those by which they were introduced from the ocean, and, with reference to rainfall, that the condensation of water-vapour may be brought out by different winds from those by which the water-vapour was brought to the area in which it is condensed. Water-vapour that may have been introduced by a south-westerly wind may be driven against a mountain side by a northerly or easterly wind, and thus cause rain on the northern or eastern side of the mountain. Still, any rainfall map of Europe indicates clearly enough the origin of the water-vapour to which the rainfall is due. Such a map, taking into account the results of more detailed investigations of different parts of the continent, is that of Joseph Reger.[2] This map shows the rainfall or rather total precipitation in seven tints at intervals of 250 mm. (about 10 in.) up to 1000 mm., and beyond that at intervals of 500 mm. up to 2000 mm. In some parts of the continent the limits of a rainfall of 200 mm. and 600 mm. are also shown. The picture there given is too complicated for brief description except by saying quite generally that it shows on the whole a diminution in the total amount of precipitation from west to east, and that the heaviest precipitation is indicated on the west or south and most exposed sides of mountains. The areas of scantiest rainfall lie to the north and north-west of the Caspian Sea and in the interior of the Kola Peninsula, north-west of the White Sea. The Stye in the English Lake District, some 2 m. from and 650 ft. higher than Seathwaite, has long been reputed to be the station recording the heaviest rainfall in Europe, but it has been shown to have a rival in Crkvice, a station immediately to the north of the Bocche di Cattaro on the Dalmatian coast. In the period 1881–1890 the average rainfall at the Stye amounted to 177 in., in 1891–1900 that at Crkvice amounted to about 179 in.[3]

Snowfall.

The amount of the snowfall as distinguished from the rest of the precipitation is now coming to be recognized as an important climatological element. So far, however, the only European country in which a record of the snowfall is kept is Russia, but it may be pointed out that the scantiness of the winter precipitation and accordingly of snow in the south-east of Europe almost entirely prevents the cultivation of winter wheat, which is thus left without the protective blanket enjoyed in some other parts of the world with cold winters.

Seasonal distribution of rainfall.

The important subject of the seasonal distribution of the rainfall of Europe has received attention from Drs A. J. Herbertson, Köppen and Supan, and Mr A. Angot. The rainfall of each month in Europe as in the other continents is shown by Dr A. J. Herbertson in *The Distribution of Rainfall over the Land.*[4] On plate 19 of the *Atlas of Meteorology*, by J. G. Bartholomew and A. J. Herbertson, Dr Köppen has furnished maps showing the months of maximum rainfall and the seasons of maximum and minimum rain frequency in different parts of Europe. Mr A. Angot's work on the subject is published in two papers in the *Annales du bureau central météor. de France*, a series of memoirs in which the rainfall observations of Europe for the thirty years 1861–1890 are recorded and discussed. The first paper (1893, B, pp. 157-194) deals with the Iberian Peninsula, the second (1895, B, pp. 155-192) with western Europe (from about 43° to 58° N. and as far east as about 19° to 21° E.). Both papers are accompanied by maps showing by six tints the mean rainfall for each month as well as for the entire year; and that on western Europe, by maps extending in the west as far south as Avila, the proportion of the rainfall occurring during the winter, spring, autumn and summer months respectively. But the most instructive maps on the subject embracing the whole of Europe are four maps prepared by Dr Supan[5] to show the percentage of the total rainfall of the year occurring in spring, summer, autumn and winter respectively. From the maps it appears that all the southern and western coasts of Europe have a high proportion of rain in autumn, and that this is true also of the whole of the Italian peninsula and the islands of the western half of the Mediterranean, of all the south-west of the Balkan peninsula, including the Peloponnesus, of the Saône-Rhone valley and both sides of the Gulf of Bothnia, and that a high winter rainfall is characteristic of Iceland, the extreme western coasts of Scotland, Ireland, France and the Iberian peninsula, as well as of the greater part of the Mediterranean region, but more particularly the south-east, while in this region, and, again more particularly in the south-east, there is a great scarcity of summer rains, which, on the other hand, form the highest percentage in the interior and eastern parts of the continent. If the year be divided into a winter and summer half, the area with a predominance of summer rains begins in the east of Great Britain and extends eastwards, while the Mediterranean region generally is one of rainy winters and relatively dry summers. The consequence is that with similar conditions of soil and superficial configuration the Mediterranean region is agriculturally much less productive, except where there are means of irrigation, than the corresponding latitudes in the east of Asia and the east of North America, where there are corresponding summer temperatures but an opposite seasonal distribution of rainfall.

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[1] Vesselovski, as quoted by Voeikov, *Die atmosphärische Circulation.*

[2] Plate 1 in *Petermanns Mitteilungen* (1903).

[3] See a paper on "Das regenreichste Gebiet Europas," by Prof. Kassner, Berlin, in *Petermanns Mitteilungen* (1904), p. 281.

[4] London, 1901 (one of the publications of the Royal Geog. Society).

[5] Plate 21 in *Petermanns Mitteilungen* (1900).

Sunshine. In connexion with the seasonal distribution of rainfall may be noticed the prevalence of sunshine and cloud. The map accompanying König's paper on the duration of sunshine[1] shows on the whole, outside of the Mediterranean peninsulas, an increase from north-west to south-east (Orkney Islands, 1145 hours = 26 % of the total possible; Sulina, 2411 hours = 55 %). In the Mediterranean peninsulas the duration is everywhere great—greatest, so far as the records go, at Madrid, 2908 hours = 66 %. Dr P. Elfert's[2] map illustrating cloud-distribution in central Europe embraces the region from Denmark to the basin of the Arno, and from the confluence of the Loire and Allier to the mouths of the Danube.

Temperature. The temperature of the continent has been illustrated by Dr Supan in an interesting series of maps based on actual observations not reduced to sea-level, and showing the duration in months of the periods within which the mean daily temperature lies within certain ranges (at or below 32° F.; 50°–68° F.; above 68° F.).[3] The first of these maps strikingly illustrates the effect on temperature of the strong westerly winds of winter, and, in the south, that of winds from the Mediterranean Sea as well as the protection afforded to the Mediterranean countries against cold winds from the north by the barrier of mountains. South of the parallel of 60° there is no lowland area in the west of Europe where the average daily temperature is at or below the freezing point for as much as one month, and in the Mediterranean region only the higher parts of the mountains besides the northern part of the Balkan Peninsula are characterized by such prolonged frosts. On the other hand, on the parallel of 50° N. the duration of such low temperatures increases at first rapidly, afterwards more gradually, from west to east. The second map illustrating the duration of average daily temperatures between 50° and 68° F., that is, the temperatures favourable to the ordinary vegetation of the temperate zone, shows that the duration of such temperatures increases on the whole from south to north, and that by far the greater part of the continent south of 53° N. has at least six months within those limits, and south of 58° N. at least five months. The third of the maps shows that the high temperatures which it illustrates are prolonged for a month or more throughout the Mediterranean region, but outside of that region hardly anywhere except in the south-western plains of France, the Rhone valley and a large area in the south-east of Russia. Without doubt an important cause of the prolonged duration of high temperatures in this last area is the relatively long duration of sunshine already mentioned as shown by König's map to be characteristic of south-eastern Europe.

Mention should here be made also of Brückner's remarkable treatise on the variations of climate in time. Though it deals with such variations over the entire land-surface of the globe, a large proportion of the data are derived from Europe, for which continent, accordingly, it furnishes a great number of particulars with regard to secular variations in temperature, rainfall, the date of the vintage, the frequency of cold winters, the level of rivers and lakes, the duration of the ice-free period of rivers (in this case all Russian), and other matters. Those relating to the date of the vintage are of peculiar interest. They apply to 29 stations in France, south-west Germany and Switzerland, and for one station (Dijon) go back with few breaks to the year 1391; and as the variations of climate of which they give an indication correspond precisely to the indications derived from temperature and rainfall in those periods in which we have corresponding data for these meteorological elements, they may be taken as warranting conclusions with regard to these points even for periods for which direct data are wanting. A period of early vintages corresponds to one of comparatively scanty rains and high temperatures. It is accordingly interesting to note that the data referred to indicate, on the whole, for Dijon an earlier vintage for the average of all periods of five years down to 1435 than for the average of the periods of the same length from 1816–1880; but that the figures generally show no regular retardation from period to period, but more or less regular oscillations, differing in their higher and lower limits in different periods of long duration.

Cultivated plants. Much light has been thrown on the present state of agriculture in Europe by the publication of Engelbrecht's *Landbauzonen der aussertropischen Länder*.[4] Of the two chief bread-plants of Europe, wheat and rye, wheat is cultivated as far north as about 69° N. both in Norway and Finland, but the limit of the area in which more wheat is cultivated than rye to the west and south, more rye than wheat to the east and north, runs parallel to the west coast of the Netherlands and Belgium, then strikes south-eastwards so as to include nearly all Germany except Alsace-Lorraine and the south-west of Württemberg, also eastern Switzerland, nearly all the Alpine provinces of Austria and nearly the whole region north of the Carpathians, as well as the greater part of Bohemia within the area in which rye predominates, while in Russia the limit runs east-north-east from about 44° N. in the west to about 55° N in the Urals. On one side of this line wheat makes up more than 80 % of the entire grain area[5] in western Rumania, in Italy and a large part of the south-west of France, and from 40 % to 60 % in the south-east of England. Spelt is cultivated in the south-west of Germany, Belgium and northern Switzerland, on the middle Volga and in Dalmatia and Servia. Rye covers more than 50 % of the grain area in the east of Holland and Belgium, in the north-west of Germany, in central and eastern Germany and in middle Russia. Oats are more cultivated than all varieties of wheat in Ireland, in the west and the northern half of Great Britain, in Finland and in the greater part of Denmark and Schleswig-Holstein. Barley is more largely cultivated than oats both in the extreme north and the south of the continent. Maize is cultivated to a great extent in the north-west of the Iberian Peninsula, in the south-west of France, in northern Italy and in the lands bordering the lower Danube; in many parts covering an area equal to or greater than that occupied by all grain crops. Millets (various species of panicum) are most extensively cultivated in the south-east of Europe. The kind of millet known as guinea-corn or durra (*Sorghum vulgare* Pers.), so extensively cultivated in Africa and India, is grown to a small extent on the east side and in the interior of Istria. Buckwheat is cultivated in the west and east of the continent—in the west from the Pyrenees to Jutland, in the east throughout southern and middle Russia. The potato is very largely cultivated in western, northern and central Europe, but has made comparatively little progress in Russia. The cultivation of lentils is most largely pursued in the west and south-west of Germany and in the south and north of France. That of lupines has spread with great rapidity since 1840 in the dry sandy regions of eastern Germany, where lupines have proved as well adapted for such soils as the more widely cultivated sainfoin has done for dry chalky and other limestone soils. Sugar beet is most largely cultivated in the extreme north of France and the adjoining parts of Belgium and in central Germany, to a less but still considerable extent in south-eastern Germany, northern Bohemia and the south-west of Russia. Flax, like other industrial plants, shows a tendency to concentrate itself on specially favourable districts. It is most extensively grown in Russia from the vicinity of Riga north-eastwards, even crossing in the north-east the 70th parallel of latitude; but it is also an important crop in the north-east of Ireland, in Belgium and Holland, in Lombardy and in northern Tirol. Hemp is more extensively cultivated in central and southern Europe, above all in Russia. Teasels are grown in various spots in the south-east of France and in south Germany. The cultivation of madder is not yet extinct in Holland and Belgium, that of weld (*Reseda luteola*), woad (*Isatis tinctoria*) and saffron not yet in France.

The vine can be grown without protection in southern Scandinavia, and has been known to ripen its grapes in the open air at Christiansund in 63° 7′; but its cultivation is of no importance north of $47\frac{1}{2}$° on the Atlantic coast, $50\frac{1}{2}$° on the Rhine, and from 50° to 52° in eastern Germany, the limit falling rapidly southwards to the east of 17° E. The olive, with its double crop, is one of the principal objects of cultivation in Italy, Spain and Greece, and is not without its importance in Portugal, Turkey and southern Austria. Tobacco is grown to a considerable extent in many parts of western, central and southern Europe, for the most part under government regulation. The most important tobacco districts are the Rhine valley in Baden and Alsace, Hungary, Rumania, the banks of the Dnieper, Bosnia and the south-west and other parts of France. The cultivation is even carried on in Sweden and Great Britain, but the most northerly area in which it occupies as much as 0·1 % of the grain area is the Danish island of Fyen (Fünen).

Hop-growing is hardly known in the south, but forms an important industry in England, Austria, Germany and Belgium. Among the exotics exclusively cultivated in the south are the sugar-cane, the cotton plant, and rice. The first, which is found in Spain and Sicily, is of little practical moment; the second holds a secondary position in Turkey and Greece; and the third is pretty extensively grown in special districts of Italy, more particularly in the valley of the Po. Even pepper is cultivated to a small extent in the extreme south of Spain. Of the vast number of fruit trees which flourish in different parts of the continent only a few can be mentioned. Their produce furnishes articles of export to Austria-Hungary, Germany, France, Belgium, Italy and Spain. In Sardinia the acorn of the *Quercus Ballota* is still used as a food, and in Italy, France and Austria the chestnut is of very common consumption. In the Mediterranean region the prevailing forms—which the Germans conveniently sum together in the expression *Südfrüchte*, or southern fruits—are the orange, the citron, the almond, the pomegranate, the fig and the carob tree. The palm trees have a very limited range: the date palm (*Phoenix dactylifera*) ripens only in southern Spain with careful culture; the dwarf palm (*Chamaerops humilis*) forms thickets along the Spanish coast and in Sicily, and appears less frequently in southern Italy and Greece.

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[1] *Nova Acta Leop. Karol. d. deutschen Akad. d. Naturforscher*, vol. lxvii. No. 3 (Halle, 1896).

[2] *Petermanns Mitteilungen* (1890), pl. 11 (text pp. 137-145).

[3] *Ib.* (1887), pl. 10 (text pp. 165-172).

[4] Berlin, 3 vols. (one made up of maps), 1898–1899.

[5] By this term (*Getreidefläche*) Engelbrecht designates the area occupied by wheat and other varieties of triticum, rye, oats and barley.

Wheat and rye.

Special interest attaches to the two main bread crops of Europe, wheat and rye, the average annual production of which in the different countries of the continent at three periods is shown in the following tables.

Average Production of Wheat in Millions of Bushels.

	1872–1876.[1]	1881–1890.[2]	1894–1903.[3]
Austria-Hungary[4]	137	161	191
Belgium	22	18	15
Bulgaria[5]	..	40	36
Denmark	4·7	5	3·6
France	277	309	335
Germany	101	93	127
Greece	..	7	4
Italy	140	122	131
Netherlands	6	6	6
Norway	0·3	0·3	0·4
Portugal	9	8	8
Rumania[5]	..	50	57
Russia[6]	275	242	325
Servia[5]	..	8	11
Spain[7]	168	73	101
Sweden	3	3·7	4·5
Switzerland	2	2·6	5
Turkey in Europe[5]	..	38	18
United Kingdom	91	78	57

Average Production of Rye in Millions of Bushels in the chief Rye-producing Countries of Europe.[8]

	1872–1876.	1881–1890.	1894–1903.
Austria-Hungary	129	122	124
Belgium	16	17	20
Denmark	15	17	22
France	69	69	73
Germany	209	228	368
Netherlands	10	11	16
Russia[9]	715	713	971
Spain	32	21	23
Sweden	18	20	27

Perhaps the most striking facts revealed by these two tables are these; first, that the United Kingdom is the only great wheat-growing country which has shown a great decline in the amount of production in two successive periods; and, second, that both Germany and Russia show a great advance under both wheat and rye between the last two periods. This gives interest to statistics of acreage under these two crops, and some data under that head are given in the adjoining tables.

Acreage under Wheat.[10]

Period.	United Kingdom.	France.	Italy.	Germany.	Austria.	Hungary.	Russia (*ex*-Poland).	Rumania.
Average, 1881–1885	2·8	17·2	11·7[11]	4·6	2·6	6·5	28·9[12]	..
„ 1886–1890	2·5	17·3	10·9[11]	4·8	2·8	7·1	..	..
„ 1891–1895	2·0	16·7	11·3[11]	4·9	2·7	8·3	32·5	3·5
„ 1896–1900	2·0	16·9	11·3[11]	4·9	2·6	8·2	36·9	3·8
„ 1901–1903	1·7	16·3	12·0	4·4	2·6	9·0	42·8	3·9

Acreage under Rye.

Period.	Germany.	Russia (*ex*-Poland)
1881–1890	14·50	..
1883–1887	..	64·6
1899–1903	14·74	65·5

These figures show that the increased production is only in part, in some cases in small part, attributable to increase in area, and the following figures giving the average annual yield of wheat per acre (*a*) in the period preceding 1885, and (*b*) generally in the period of five years preceding 1905, shows that an improvement in yield in recent years has been very general.

	(*a*)	(*b*)		(*a*)	(*b*)
Austria	15·8	17·3	Italy	12·0	12·8
Hungary	15·5	17·5	Netherlands	25·0	30·7
Belgium	24·5	34·5	Russia	8·0	9·7
France	18·0	19·2	Poland	..	14·8
Germany	18·5	28·2	United Kingdom	29	29·9

Forests.

When the Aryan peoples began their immigration into Europe a large part of the surface must have been covered with primeval forest; for even after long centuries of human occupation the Roman conquerors found vast regions where the axe had made no lasting impression. The account given by Julius Caesar of the Silva Hercynia is well known: it extended, he tells us, for sixty days' journey from Helvetia eastward, and it probably included what are now called the Schwarzwald, the Odenwald, the Spessart, the Rhön, the Thüringerwald, the Harz, the Fichtelgebirge, the Erzgebirge and the Riesengebirge. Since then the progress of population has subjected many thousands of square miles to the plough, and in some parts of the continent it is only where the ground is too sterile or too steep that the trees have been allowed to retain possession. Several countries, where the destruction has been most reckless, have been obliged to take systematic measures to control the exploitation and secure the replantation of exhausted areas. To this they have been constrained not only by lack of timber and fuel, but also by the prejudicial effects exerted on the climate and the irrigation of the country by the denudation of the high grounds. But even now, on the whole, Europe is well wooded, and two or three countries find an extensive source of wealth in the export of timber and other forest productions, such as turpentine, tar, charcoal, bark, bast and potash.

The following estimates of the forest areas of European countries are given in G. S. Boulger's *Wood*:—

Countries.	Thousands of Acres.	Per cent. of Total Area.
Russia	469,500	34
Sweden	43,000	24
Austria-Hungary	42,624	29
France	20,642	19
Spain	20,465	16·3
Germany	20,047	25·6
Norway	17,290	25
Italy	9,031	18
Turkey	5,958	14
United Kingdom	2,500	3·8
Switzerland	1,905	18·8
Greece	1,886	11·8
Portugal	1,107	5
Belgium	1,073	12
Holland	486	6
Denmark	364	4·6

Domestic animals.

Horse-breeding is a highly important industry in almost all European countries, and in several, as Russia, France, Hungary and Spain, the state gives it exceptional support. Almost every district of the continent has a breed of its own: Russia reckons those of the Bashkirs, the Kalmucks, the Don-Cossacks, the Esthonians and the Finlanders as among its best; France sets store by those of Flanders, Picardy, Normandy, Limousin and Auvergne; Germany by those of Hanover, Oldenburg and Mecklenburg, which indeed rank among the most powerful in the world; and Great Britain by those of Suffolk and Clydesdale. The English racers are famous throughout the world, and Iceland and the Shetland Islands are well known for their hardy breed of diminutive ponies. The ass and the mule are most abundant in the southern parts of the continent, more especially in Spain, Italy and Greece. The camel is not popularly considered a European animal; but it is reared in Russia in the provinces of Orenburg, Astrakhan and Taurid, in Turkey on the Lower Danube, and in Spain at Madrid and Cadiz; and it has even been introduced into Tuscany. A much more important beast of burden in eastern and southern Europe is the ox: the long lines of slow-moving wains in Rumania, for example, are not unlike what one would expect in Cape Colony. In western Europe it is mainly used for the plough or fattened for its flesh. It is estimated that there are about 100 distinct local varieties or breeds in Europe, and within the last hundred years an enormous advance has been made in the development and specialization of the finer types. The cows of Switzerland and of Guernsey may be taken as the two extremes in point of size, and the "Durhams" and "Devonshires" of England as examples of the results of human supervision and control. The Dutch breed ranks very high in the production of milk. The buffalo is frequent in the south of Europe, more especially in the countries on the Lower Danube and in southern Italy. Sheep are of immense economic value to most European countries, above all to Spain and Portugal, Great Britain, France, Hungary, the countries of the Balkan Peninsula, the Baltic provinces of Germany and the south-east of Russia. The local varieties are even more numerous than in the case of the horned cattle, and the development of remarkable breeds quite as wonderful. In all the more mountainous countries the goat is abundant, especially in Spain, Italy and Germany. The pig is distributed throughout the whole continent, but in no district does it take so high a place as in Servia. In the rearing and management of poultry France is the first country in Europe, and has consequently a large surplus of both fowls and eggs. In Pomerania, Brandenburg, West Prussia, Mecklenburg and Württemberg the breeding of geese has become a great source of wealth, and the town of Strassburg is famous all the world over for its *pâtés de foie gras*. Under this heading may also be mentioned the domesticated insects, the silkworm, the bee and the cantharis. The silkworm is most extensively reared in northern Italy, but also in the southern parts of the Rhone valley in France, and to a smaller extent in several other Mediterranean and southern countries. Bee-keeping is widespread. The cantharis is largely reared in Spain, but also in other countries in southern and central Europe.

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[1] Based on Scherzer, *Das wirtschaftliche Leben der Völker*, p. 12.

[2] From the *Fifth Report of the United States Department of Agriculture*, Division of Statistics, Miscellaneous Series, p. 13.

[3] Based on the *Corn Trade Year-book* (1904), p. 284.

[4] Exclusive of Bosnia and Herzegovina, in which the average production in 1894–1903 was about 2½ million bushels.

[5] The estimates for Bulgaria, Rumania, Servia and Turkey in Europe for 1872–1876 are not comparable with those of the two later periods on account of the territorial changes since that date. Those for Bulgaria in the period 1881–1890 include Eastern Rumelia.

[6] Including Poland.

[7] Spanish statistics very imperfect.

[8] Based on the same authorities as the wheat table. In the original, however, the figures for 1894–1903 are given in "quarters of 480 lb," while the figures given above are calculated on an average quarter of 462 lb.

[9] Including Poland, but not Finland, in which the average production of rye is estimated at about 11,000,000 bushels.

[10] Mainly from or based on the Agricultural Returns for Great Britain, 1905.

[11] Single years.

[12] Period 1883–1887.

Minerals.

The most important mineral products of Europe are coal and iron ore. In order of production the leading coal-producing countries have long been the United Kingdom, Germany, France and Belgium. Since 1897 Russia has held the fifth place, followed by Austria-Hungary, Spain and Sweden. The production in other countries is insignificant. Besides coal, lignite is produced in great amount in Germany and Austria-Hungary, and to a small amount in France, Italy and a few other countries. Down to 1895 the United Kingdom stood first among the iron-ore producing countries of Europe, but since 1896 the order under this head has been the German Customs' Union, the United Kingdom, Spain, France, Russia, Sweden, Austria-Hungary and Belgium. By far the most important iron-ore producing district of Europe is that which lies on different slopes of the hills in which German Lorraine, the grand duchy of Luxemburg and France meet, the district producing all the ore of Luxemburg and the principal supplies of Germany and France. Another important producing district is what is known as the Siegerland on the confines of the Prussian provinces of the Rhine and Westphalia. Next in importance to these are the iron-ore deposits of the United Kingdom, the chief being those of the Cleveland district south of the Tees, and the hematite fields of Cumberland and Furness.

With regard to the mineral production of Europe generally, perhaps the most notable fact to record is the relatively lower place taken by the United Kingdom in the production both of coal and iron. Here it is enough to state the main results. In the production of coal the United Kingdom is indeed still far ahead of all other European countries, but notwithstanding the fact that the British export of coal has been increasing much more rapidly than the production, this country has not been able to keep pace with Germany and Russia in the rate of increase of production. In 1878 the production of coal in the German empire was only about 34% of that of the United Kingdom, but in 1906 it had grown to nearly 50%. This, too, was exclusive of lignite, the production of which in Germany is increasing still more rapidly. It was equal to little more than one-fourth of the coal production in 1878, but more than two-fifths in 1906. The coal production of Russia (mainly European Russia) is still relatively small, but it is increasing more rapidly than that of any other European country. While in 1878 it was little more than 2% of that of the United Kingdom, in 1906 the corresponding ratio was above 8%. In the production of iron ores the decline in the position of the United Kingdom is much more marked. The production reached a maximum in 1882 (18,032,000 tons), and since then it has sunk in one year (1893) as low as 11,200,000 tons, while, on the other hand, there was a rapid increase in the production of such ores in the German Zollverein (including Luxemburg), France, Spain, Sweden and Russia, down to 1900, with a more progressive movement, in spite of fluctuations, in all these countries than in the United Kingdom in more recent years. In the total amount of production the United Kingdom in 1905 took the second place. While in 1878 the production of iron ores in the German Zollverein was little more than a third of that in the United Kingdom, in 1905 it exceeded that of the United Kingdom by nearly 60%.

An indication of the relative importance of different European countries in the production of ores and metals of less aggregate value than coal and iron is given in the following tables[1]:—

	Gold.	Silver.	Quicksilver Ore.	Tin Ore.
	kilos.	kilos.	m.t.	m.t.
Austria	126	38,940	91,494	54
German Empire	121	177,183	..	134
Hungary	3,738	13,642	..	..
Italy	..	..	80,638	..
Norway	..	6,367	..	..
Portugal	29	..	..	22
Russia	8,202 [2]	..	? [4]	..
Spain	..	? [3]	26,186	86
United Kingdom	58	4,614	..	7,268 [5]

Kilos = kilograms. M.t. = metric tons.

	Copper Ore.	Lead Ore.	Manganese Ore.	Zinc Ore.
	m.t.	m.t.	m.t.	m.t.
Austria	20,255	19,683	13,402	32,037
Belgium	..	121	120	3,858
Bosnia-Herzegovina	765	..	7,651	31
France	2,547	11,795 [9]	11,189	53,466
German Empire	768,523	140,914	52,485	704,590
Greece	..	? [10]	10,040	26,258
Hungary	1,338	564	10,895	..
Italy	147,135	40,945	3,060	155,821
Norway	32,203	(see zinc)	..	3,308 [13]
Portugal	352,689 [6]	511	22	1,267
Russia	? [7]	..	? [12]	9,612
Spain	2,888,777 [8]	263,519 [11]	62,822	170,383
Sweden	19,655	1,938 [9]	2,680	52,552 [14]
United Kingdom	7,598	31,289	23,127	23,190

M.t. = metric tons.

Platinum has hitherto been obtained nowhere in Europe except in the auriferous sands in the Russian government of Perm. Nickel is derived from Germany, Norway and Sweden; antimony from Germany and Hungary; bismuth from Saxony and Bohemia. Bauxite, which is used in the manufacture of aluminium, is obtained from France, Styria and Ireland. In order of importance the chief salt-producing countries are the United Kingdom (in which for some years the amount produced has been for the most part stationary or declining), Germany (which is rapidly increasing its production), Russia, France, Spain, Italy, Austria-Hungary, Rumania and Switzerland. Besides common salt Germany has for many years been producing a rapidly increasing amount of potash salts, of which it has almost a monopoly. Italy (chiefly Sicily) is by far the most important producer of sulphur. Among other mineral products may be mentioned the boric acid and statuary marble of Tuscany, the statuary marble of Greece, the asphalt of Switzerland, Italy, Germany and Austria-Hungary, the slates of Wales, Scotland and France, the kaolin of Germany, England and France, and the abundand glass sands of Belgium, France and Bohemia.

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[1] Based on *Mines and Quarries: General Report and Statistics for 1906*, pt. iv. (Cd. 4145), 1908.

[2] Production in the Ural districts only.

[3] See note 11.

[4] A considerable quantity of quicksilver is produced in the government of Ekaterinoslav.

[5] Dressed.

[6] Cupreous pyrites and cupreous iron pyrites, besides which a considerable quantity of copper precipitate is produced.

[7] A small quantity of copper ore is produced in Finland, but the bulk of the Russian production is in the Asiatic provinces.

[8] Mainly cupreous iron pyrites.

[9] Argentiferous.

[10] In 1906 Greece produced 12,308 m.t. of argentiferous pig lead.

[11] Of which 158,424 m.t. argentiferous.

[12] A considerable quantity of manganese ore is produced in the government of Ekaterinoslav, but the main seat of Russian production is the Caucasus.

[13] Zinc and lead ore.

[14] In addition to 28,891 m.t. of calcined zinc ore.

Commerce, industries and railways.

With regard to commerce, industries and railways, as a whole, Europe may be said to be characterized by the rapid development of manufacturing at the expense of agricultural industry. With few exceptions the countries of Europe that export agricultural products are able to spare a diminishing proportion of the aggregate of such produce for export. Other countries are becoming more and more dependent on imported agricultural products. Most European countries, even if not able to export a large proportion of manufactured articles, are at least securing a greater and greater command of the home market for such products.[1] Inland centres of manufacturing industry are extending the range of their markets. All these changes have been largely, if not chiefly, promoted by the improvements in the means of communication, and the methods of transport by sea and land. Larger ships more economically propelled have brought grain at a cheaper and cheaper rate from all parts of the world, and improved methods of refrigeration have made fresh meat, butter and other perishable commodities even from the southern hemisphere articles of rapidly growing importance in European markets. Improvements in transport have likewise tended to cheapen British coal in many parts of the mainland of Europe. On the other hand, the extension of the railway network of the continent has brought a wider area within the domain of the manufacturing regions associated with the coalfields occurring at intervals in central Europe from the upper Oder to the basin of the Ruhr, as well as some of the more detached coalfields of Russia. As affecting the relative advantages of different European countries for carrying on manufacturing industry, three inventions or discoveries of recent years may be mentioned as of capital importance: (1) the invention in 1879 of the Thomas process for the manufacture of ingot iron and steel from the phosphoric iron ores, an invention which gave a greatly enhanced value to the ores on the borders of Lorraine, Luxemburg and Alsace, as well as others both in England and on the continent; (2) the invention of efficient machines for the application of power by means of electricity, an invention which gave greatly increased importance to the water-power of mountainous countries; and (3) the discovery of the fact that from lignite an even higher grade of producer gas may be obtained than from coal, a discovery obviously of special importance for the great lignite-producing districts of Germany and Bohemia.

Water-power.

Such particulars as can be procured with regard to the utilization of water-power in the countries of Europe which use that source of power most largely are given in the following table:—

Countries.	Date.	Total Horse-power used in Mechanical Industry.	Total Horse-power in Hydraulic Installations.	Percentage belonging to Hydraulic Installations.
		Thousands.	Thousands.	Per cent.
Germany	1895	3427	629	18
France	1899	..	575	..
	1904	2581[2]	650[2]	25
Austria-Hungary	1902	..	437	..
Italy	1899	2209	337	15
Sweden	1903	453	..	about 50[3]
Norway	1904	254	186	73
Switzerland	1895	153	88	58
	1895	153	95[4]	62
	1901	320	185	58
	1901	320	223[4]	70
	1905	516	?	?

The figures derived from the three recent industrial censuses of Switzerland are very instructive, especially if one is justified in including the electric among the hydraulic installations. The estimates that have been made of the total available water-power in a few European countries are mostly based on such problematical data that they are not worth giving. One very uncertain element in such calculations is the amount of water-power that is capable of being artificially created by the construction of valley-dams, such as have been erected on a small scale in the Harz and other mining and smelting regions of Germany from an early date, and are now being built on a much larger scale in the Rhine region and other parts of Europe, or is incidentally provided in the construction of canals.

Transcontinental routes.

The commercial history of Europe has illustrated from the earliest times the influence of the outline and physical features in determining great trade-routes along certain lines. At all periods land routes have connected the southern seas with the Baltic and the North Sea, effecting the great saving of distance more or less indicated by the following table:—

	Distance by Sea.	Direct Distance.	Distance by Rail.
	st. m.	m.	m.
St Petersburg–Odessa	5240	930	1217
Riga–Odessa	4985	765	1022
Danzig–Odessa	4735	745	1009
Stettin–Triest	4065	550	854
Lübeck–Venice	3920	640	871
Hamburg–Triest	3820	560	945
Hamburg–Venice	3805	555	886
Hamburg–Genoa	2845	640	880
Antwerp–Venice	3500	515	850
Antwerp–Genoa	2535	515	778
Antwerp–Marseilles	2350	?	725
Calais–Genoa	2400	555	780
Calais–Marseilles	2215	535	721
Havre–Marseilles	2135	475	678
Bordeaux–Cette	1945	227	295
Calais–Constantinople	3510	1445	2134
Calais–Salonica	3370	1215	1911
Christiania–Stockholm	780	260	357
Luleå–Narvik (Ofotenfjord)	1970	240	295

From the form of the continent it obviously results that the farther east the route lies the greater is the saving of distance. The precise direction of the routes has been very largely fixed, however, by the physical features; by the course of the rivers where navigable rivers formed parts of the routes; in other cases by the situation and form of the mountains, or the direction of the river valleys which is implied in the form of the mountains. From the Black Sea the most convenient starting-point is obviously towards the west, and two connecting routes with the Baltic lie wholly to the east of the mountains. One route makes use of the Bug or the Dniester, the San and the Vistula so far as possible, while another starting in the same way proceeds round the foot-hills of the Carpathians, thus finding easy crossing places on the head-streams of the rivers, as far as the Oder and then down that stream. Another route is up the Danube to the neighbourhood of Vienna, and then north-eastwards through the opening between the Carpathians and the Sudetic range to the head-waters of the Oder, crossing a water-parting little more than 1000 ft. in altitude. The first route was certainly used again and again by the ancient Greeks, starting from Olbia near the mouth of the Bug, the objective point being the coast in the south-east of the Baltic supplying the amber which was so important an article of commerce in early times. This route was again much used in the middle ages, when Visby, on Gotland, undoubtedly selected on account of the security afforded by an island station, was for hundreds of years an important centre of trade both in northern products (of which furs were the most valuable) and those of the East (pepper and other spices, silks and other costly articles). Numerous coins, Roman, Byzantine and Arabic, found not merely in Gotland itself but also at various points along the route indicated, testify to the long-continued importance of this route. In the middle ages the Oder route was also largely used whether reached by rounding the Carpathians or ascending the Danube, and in connexion with that route the island of Bornholm long formed a focus of commerce answering to that in Gotland farther east. The Danube route was also made use of farther west, and formed a large part of a great route connecting the East with the north-west of Europe. The valuable goods of the Orient could be conveyed up-stream as high as Ratisbon (Regensburg), and thence north-westward across Nuremberg to Frankfort-on-Main, from which access was had to the Rhine gorge leading on to Cologne and the ports of Dordrecht and Rotterdam, Bruges and Ghent; or they could be carried still farther up-stream to Ulm, thence by a route winding through the north of the Black Forest to Strassburg and from that point north of the Vosges to the Marne and Seine.

Farther west use was made at an early date of passes by which the whole system of the Alps could be crossed, or partly crossed and partly rounded, in a single rise. The ancient Etruscans, in exchanging their earthenware and bronzes for the amber found largely in those

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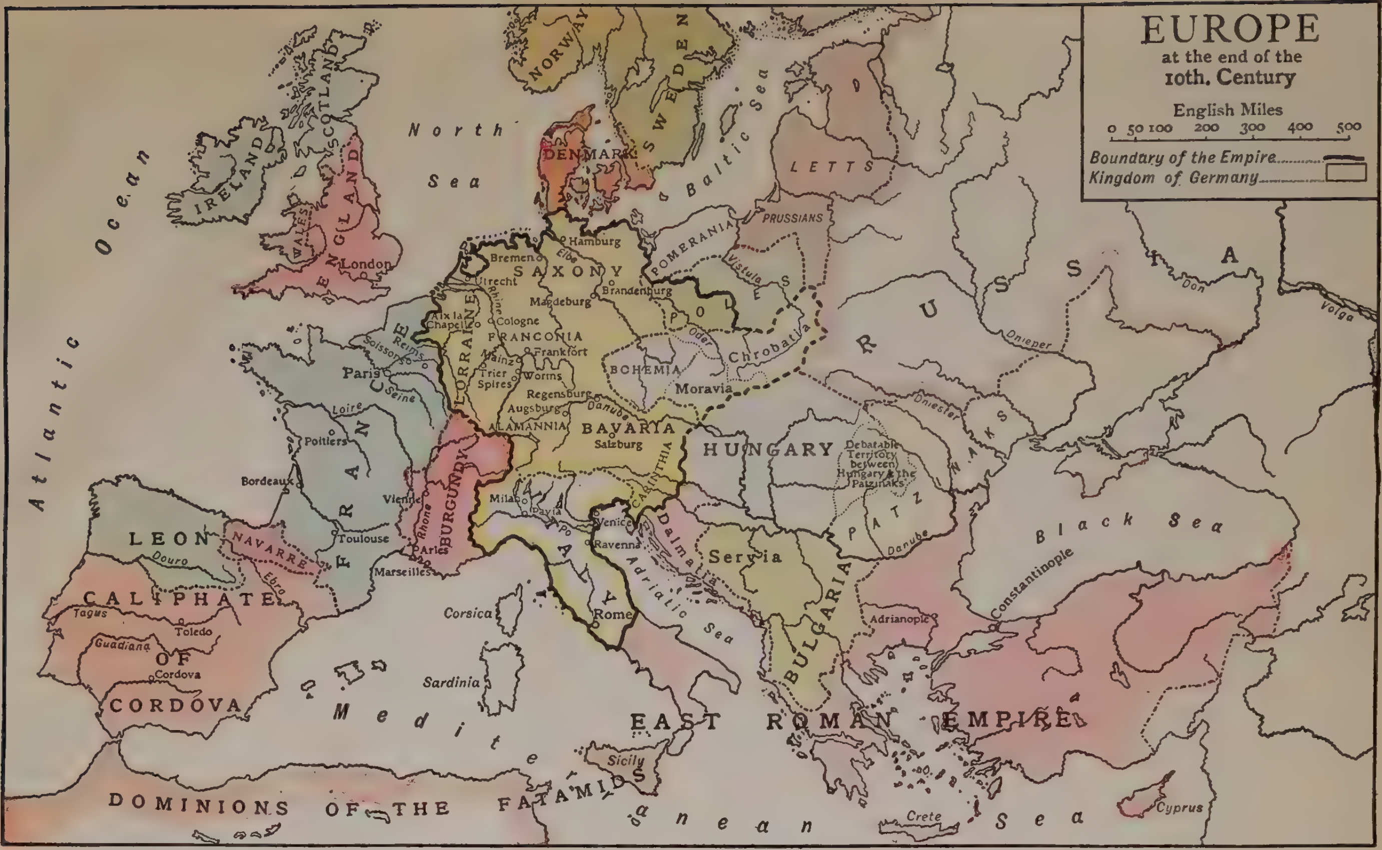
[1] Probably the most complete synopsis of the evidence on this point is to be found in Prince Kropotkin's *Fields, Factories and Workshops* (London, 1899).

[2] The total horse-power used in mechanical industries is obtained by adding 650,000, the estimated total of horse-power in hydraulic installations given in an article in the *Annales de géographie* for January 1904, to the total steam-power in fixed engines officially given for 1903, and accordingly excludes gas and other engines not driven by steam- or water-power.

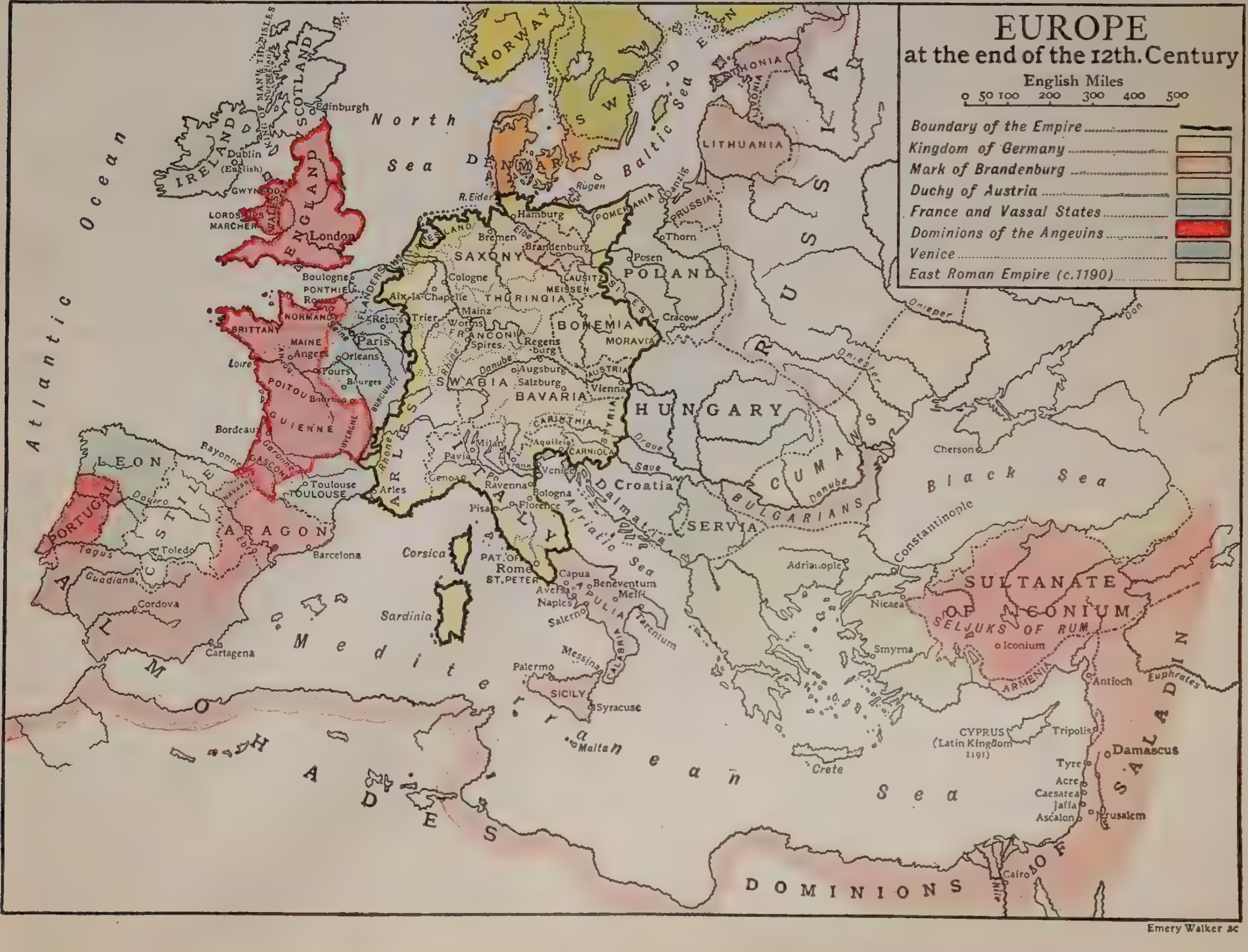
[3] The proportion estimated in the official publication entitled *Sweden: its People and its Industry*, edited by G. Sundbärg (Stockholm, 1904).

[4] Including the installations returned in the Swiss industrial censuses as electric, most if not all of which are probably driven by water-power.



EUROPE
at the end of the 10th. Century

English Miles
0 50 100 200 300 400 500
Boundary of the Empire
Kingdom of Germany
Atlantic Ocean
North Sea
Baltic Sea
NORWAY
SWEDEN
DENMARK
SCOTLAND
IRELAND
WALES
ENGLAND
London
LETTS
PRUSSIANS
POMERANIA
Vistula
RUSSIA
Don
Volga
Dnieper
Dniester
PATZINAKS
Hamburg
Bremen
Elbe
SAXONY
Utrecht
Brandenburg
Magdeburg
Aix la Chapelle
Cologne
LORRAINE
FRANCONIA
Frankfort
Mainz
Trier
Worms
Spires
Regensburg
Augsburg
ALAMANNIA
BAVARIA
Salzburg
CARINTHIA
BOHEMIA
Moravia
Oder
Chrobatia
HUNGARY
Debatable Territory between Hungary & the Patzinaks
Danube
Soissons
Reims
Paris
Seine
Loire
Poitiers
FRANCE
Bordeaux
Vienne
Toulouse
BURGUNDY
Rhone
Arles
Marseilles
Milan
Pavia
Po
Venice
Ravenna
ITALY
Rome
Dalmatia
Servia
BULGARIA
Adriatic Sea
Black Sea
Constantinople
Adrianople
LEON
Douro
NAVARRE
Ebro
CALIPHATE OF CORDOVA
Tagus
Toledo
Guadiana
Cordova
Corsica
Sardinia
Mediterranean Sea
Sicily
Crete
Cyprus
EAST ROMAN EMPIRE
DOMINIONS OF THE FATAMIDS



EUROPE
at the end of the 12th. Century

English Miles
0 50 100 200 300 400 500
Boundary of the Empire
Kingdom of Germany
Mark of Brandenburg
Duchy of Austria
France and Vassal States
Dominions of the Angevins
Venice
East Roman Empire (c.1190)
Atlantic Ocean
North Sea
Baltic Sea
NORWAY
SWEDEN
DENMARK
R. Eider
Rügen
ESTHONIA
LIVONIA
LITHUANIA
RUSSIA
PRUSSIA
Danzig
POMERANIA
Thorn
Posen
POLAND
Cracow
SILESIA
Dnieper
Don
Dniester
CUMANS
BULGARIANS
SCOTLAND
Edinburgh
ISLE OF MAN
IRELAND
Dublin (English)
GWYNEDD
LORDS MARCHER
WALES
ENGLAND
London
Boulogne
PONTHIEU
Rouen
FLANDERS
NORMANDY
BRITTANY
MAINE
Angers
Paris
Reims
Orleans
Tours
Bourges
Loire
POITOU
Bourbon
BURGUNDY
GUIENNE
AUVERGNE
Bordeaux
Bayonne
Garonne
GASCONY
Toulouse
TOULOUSE
NAVARRE
HOLLAND
Hamburg
Bremen
Elbe
Brandenburg
SAXONY
LAUSITZ
MEISSEN
Cologne
Aix-la-Chapelle
THURINGIA
Mainz
Trier
Worms
FRANCONIA
Spires
Regensburg
Danube
Augsburg
BOHEMIA
MORAVIA
AUSTRIA
Vienna
SWABIA
Salzburg
BAVARIA
STYRIA
CARINTHIA
CARNIOLA
Aquileia
ARLES
Rhine
Rhone
Arles
Milan
Pavia
Verona
Genoa
Po
Venice
Ravenna
Bologna
Florence
Pisa
ITALY
PAT. OF ST. PETER
Rome
Capua
Benevento
Melfi
Aversa
Naples
Salerno
APULIA
Tarentum
CALABRIA
Messina
Palermo
SICILY
Syracuse
Malta
Croatia
Save
Drave
Dalmatia
HUNGARY
SERVIA
Adriatic Sea
Black Sea
Constantinople
Adrianople
Nicaea
Smyrna
Crete
CYPRUS (Latin Kingdom 1191)
SULTANATE OF ICONIUM
SELJUKS OF RUM
Iconium
ARMENIA
Antioch
Euphrates
Tripolis
Damascus
Tyre
Acre
Caesarea
Jaffa
Ascalon
Jerusalem
Cairo
Nile
DOMINIONS OF SALADIN
LEON
PORTUGAL
CASTILE
Douro
Tagus
Toledo
Guadiana
Cordova
Cartagena
ARAGON
Ebro
Barcelona
ALMOHADES
Corsica
Sardinia
Mediterranean Sea
DOMINIONS

Emery Walker sc

times not only in the Baltic but also on the eastern shores of the North Sea north of the Rhine mouths, made regular use of at least three such passes. One of these was the Brenner, the summit of which is under 4500 ft. in height, approached on the south side by the valley of the Adige and its tributary the Eisak, on the other side by the Inn valley and that of its small tributary the Sill. By this route the Alps at about their widest are crossed with exceptional ease; and hence it was natural that it should have been used by the Etruscans to reach the amber shores of the Baltic, and in all subsequent periods in intercourse between central Europe and northern Italy. In their trade with the mouth of the Rhine the Etruscans appear to have used only the passes approached by the Dora Baltea, which leads equally to the Little St Bernard, to the south of Mont Blanc, and so to the Isère valley and the Rhone, and to the Great St Bernard, to the east of Mont Blanc, and so directly to the Rhone valley above the Lake of Geneva, by which route the remainder of the Alps could be rounded on the west and the Rhine valley reached by crossing the northern Jura. Roman roads were afterwards made across all these passes, although that across the Great St Bernard (the highest of all, above 8100 ft.) seems never to have been made practicable for carriages. The Romans also made use of three intervening passes by which in a single rise from the Po basin the heads of valleys leading right down to the head of Lake Constance could be reached. These were the Bernardino, Splügen and Septimer, to mention them in the order from west to east. By the Romans the Simplon was also made use of as affording the most direct connexion between Milan and the upper Rhone valley. All these passes were likewise in use in the middle ages when Venice and Genoa were the great intermediaries in the trade in pepper and spices and other Oriental products. The Brenner afforded the most direct connexion between Venice and southern Germany, on a route leading also to northern Germany by way of Ratisbon and afterwards the rivers of the Elbe basin, and finally (from the end of the 14th century) by a canal to Lübeck, which was the great distributing centre of these and other products for the Baltic. To take the most direct route to the Rhine valley and north-western Europe some other pass (the Seefeld or the Fern) in the Bavarian Alps had to be crossed and the Rhine valley reached by Augsburg, and thence either by way of Ulm or Frankfort. From Genoa the routes in the early middle ages were by way of Milan to the Lake of Constance, and thence by way of Ulm if the Rhine valley was the goal, and by way of Augsburg if it was the Baltic. The St Gotthard route, the most direct connexion between Milan and the north of the Alps, was added about the end of the 13th century. The Mont Cenis pass from an early date afforded the most direct connexion between Genoa and the middle Rhone valley by way of Turin. When modern carriage roads came to be built it was still the same routes that were chosen. The road across the Brenner, completed in 1772, was the first of these. The building of the great Swiss carriage roads across the passes in the early part of the 19th century was inaugurated by Napoleon's road across the Simplon completed in 1805. A later paragraph will show that modern railways follow much the same, if not exactly the same, routes. On the early use of the Saône-Rhone valleys, and the route between the foothills of the Cevennes and the Pyrenees, it is not necessary to insist, but it may be mentioned that English tin was sometimes conveyed to the Mediterranean (Marseilles) by this latter route in Roman times.

Inland waterways.

Since the introduction of railways inland waterways have in most countries taken a very inferior position as means of transport. The articles on the different countries supply the necessary information with respect to those which have a purely national interest, but here mention must be made of those which have significance as belonging to trans-European routes or have an international value. The importance of shortening the water-route between the opposite sides of the great European isthmus separating the Baltic and the Black Sea is brought into prominence by the constant revival of projects for a ship-canal connecting those coasts. A definite step taken with a view to carrying out such a project was the sanction given by the tsar in April 1905 for the appointment of a special commission to inquire into the practicability of a scheme for the excavation of a canal about 28 ft. deep between Riga and Kherson, utilizing the waters of the Düna or western Dvina, the Berezina and Dnieper. Since the completion in 1845 of the Ludwigs or Danube-Main Canal, running from the Main near Bamberg to Kelheim on the Danube, it has been possible to go by water from the mouth of the Rhine to the mouth of the Danube; but this canal has in reality no trans-European significance. It cannot take barges of a greater capacity than 125 tons, is not adapted for steamers, and carries only a very small amount of traffic. But projects for connecting the Danube with northern Europe by water are still entertained. Of these the most advanced are those for establishing connexions through Austria. On the 11th of June 1901 the Austrian diet passed an act prescribing the construction of a canal connecting the Oder with the Danube through the Morava, and another connecting the Danube at Linz with the Moldau-Elbe, and the improvement of the navigation on the connected waterways. The Oder-Danube canal thus authorized would have to cross a watershed of little more than 1000 ft. in altitude as against 1365 ft. in the case of the Ludwigs Canal; but the Elbe-Danube Canal would have to cross one of about 2250 ft. Under the provisions of the act the work is to be completed by 1924. In Germany projects have been actively agitated for improving the Danube-Main connexion either wholly or partly along the route of the present canal, and for establishing a new connexion by means of a canal of at least 6½ ft. in depth by way of the Neckar, the Rems and the Brenz, joining the Danube at Lauingen about midway between Ulm and Donauwörth. The Moldau-Elbe is itself an important international waterway, inasmuch as it allows of steamer traffic from Prague in Bohemia to Hamburg, and by means of a connecting canal to Lübeck. But the most important of all international waterways in Europe is the Rhine, on which even sea-going steamers regularly ascend to Cologne, and an amount of traffic crosses the Dutch frontier three or four times as great as that which makes use of the Manchester ship-canal. The river is also navigable to Basel in Switzerland, though above Strassburg the river is little used, being replaced since 1834 by the Rhine and Rhone canal, which connects the two rivers through the Ill and the Saône. The Rhine is also connected with the Seine by the Marne and Rhine canal passing north of the Vosges, and its tributary the Moselle is also navigable from France into Germany. The Meuse again is navigable from France through Belgium into Holland, and is connected by more than one route with the Seine, and in the densely peopled mining and manufacturing country in the north of France and the adjoining parts of Belgium numerous waterways ramify in different directions. Even in an article on Europe the entirely French canals connecting the Seine and Rhone (Burgundy canal, summit-level 1230 ft., completed 1832), the Loire and Rhone (Canal du Centre, summit-level 990 ft., completed in 1793), and the Canal du Midi, connecting the Garonne at Toulouse with Cette on the Mediterranean, may be mentioned inasmuch as they establish communication between different seas. The last is of special interest because it is the oldest (completed in 1681), because it makes use of the lowest crossing, surmounting the passage of Naurouse, or Gap of Carcassonne, at an altitude of 625 ft., and because it effects the greatest shortening of distance from sea to sea. On this account the project of establishing a ship-canal of modern dimensions along this route has been as often revived as that of the Black Sea and Baltic canal. In the east of Europe the Vistula and Memel are both international waterways, but they are of little importance compared with those in the west. The Kaiser Wilhelm or North Sea and Baltic canal, opened in 1895, has, however, no little international value, inasmuch as it shortens the sea-route to the Baltic for all North Sea ports to the south of Newcastle, and affords the means of avoiding a rather dangerous passage round the north of Jutland. A minor degree of international interest belongs to the ship-canal through the Isthmus of Corinth, opened on the 6th of August 1893.

Railways.

The following table gives a summary statement of the progress of railway construction in European countries down to the end of the 19th century:—

Railways in European Countries.

	Date of opening of first line.	Miles open.					
		1875.	1880.	1885.	1890.	1895.	1900.
Austria	1837	6,402	7,083	8,270	9,506	10,180	11,912
Belgium	1835	2,171	2,399	2,740	2,810	2,839	2,851
Bosnia-Herzegovina	1879	..	..	..	342	471	..
Bulgaria	1866	..	..	..	..	535	921
Denmark	1847	689	975	1,195	1,217	1,371	1,809
France	1828	13,529	16,275	20,177	20,666	22,505	26,739
German Empire	1835	17,376	20,693	22,640	25,411	27,392	30,974
Great Britain	1825	14,510	15,563	16,594	17,281	18,001	18,680
Greece	1869	7	7	278	452	?	641
Hungary	1846	3,992	4,421	5,605	6,984	8,651	10,624
Ireland	1834	2,148	2,370	2,575	2,792	3,173	3,183
Italy	1836	4,771	5,340	6,408	7,983	9,579	9,864
Luxemburg	1873	110	..	..	..	270	..
Netherlands	1839	1,006	1,143	1,496	1,653	1,869	2,007
Norway	1854	345	652	970	970	1,071	1,231
Portugal	1856	643	710	949	1,316	1,336	1,346
Rumania	1869	766	859	1,100	1,590	1,617	1,920
Russia [1]	1838	12,166	14,026	15,934	18,059	21,948	27,345
Servia	1884	..	..	155	335	335	355
Spain	1848	3,801	4,550	5,547	6,211	7,483	8,206
Sweden	1856	2,171	3,654	4,279	4,980	6,058	7,018
Switzerland	1844	1,257	1,596	1,795	2,014	2,233	2,401
Turkey	1872	..	727	657	657	935	..

[1] Excluding Finland.

The chief railways of most European countries are on the same gauge as that originally adopted in Great Britain, namely, 4 ft. 8½ in. Irish railways are, however, on the gauge of 5 ft. 3 in. The standard gauge in Russia is 5 ft., that of Spain and Portugal about 5 ft. 6 in. The still isolated railway system of Greece is upon a narrow gauge. The very general use of a common gauge obviously greatly facilitates international trade. It allows, for example, of wagons from Germany entering every country on its frontier except Russia. It allows of German coal being carried without break of bulk to Paris, Milan and the mainland of Denmark. By means of train-ferries German trains can also be conveyed to Copenhagen by way of Warnemünde and Gjedser and then across the channel separating Falster and Zealand; and there is a similar means of communication between Copenhagen and Malmö (Sweden) and between Lindau in Bavaria on the Lake of Constance and Romanshorn on the same lake in the Swiss canton of Thurgau. The establishment of this method of transport between England and France has been urged in opposition to the Channel Tunnel scheme.

Of the railway systems of the mainland of Europe as a whole the main features are these. There is a broad belt running from the North Sea eastwards between the lines marked by Amsterdam and Hanover on the north, and Calais, Liége, Düsseldorf and Halle on the south, in which important lines of railway run from west to east. About 12° E. those lines begin to converge on Berlin. This belt is crossed in the Rhine valley by a much narrower but very important belt running north and south, now connected with the Italian railway system through the St Gotthard tunnel. To the south of the west end of the west-to-east belt lies the principal railway focus in western Europe, Paris, from which important lines radiate in all directions; two of these radiating lines now establish communication with the Italian railway system, through the Mont Cenis and Simplon tunnels respectively, and other two connecting with the Spanish system round the ends of the Pyrenees. Berlin in central Europe is perhaps an even more important railway focus. Among the chief lines radiating from it are one through Leipzig and Munich and connecting with the Italian railway system by the Brenner route, and another through Dresden and Prague to Vienna, and then by the Semmering pass by one route to Triest and by another to Venice. East of Berlin the railways of Europe begin to form wider meshes. Two main lines diverge towards the north-east, one by Küstrin and Königsberg and the other by Frankfort on the Oder and Thorn, both uniting at Eydtkühnen to the east of Königsberg before crossing the Prussian frontier and passing on to St Petersburg. From Thorn a line branches off by Warsaw to Moscow, the chief railway focus in eastern Europe. South-east from Berlin there runs another important line through Breslau, Cracow and Lemberg to Odessa, skirting to a large extent the foot-hills of the Carpathians like the ancient trade route from Olbia to the Baltic. Two routes on which there are services organized by the International Sleeping Car Company connect London with Constantinople, and it is noteworthy that both of these indicate the importance of the physical feature which has determined the position of the great north-south belt of railways above mentioned, and also of towns famous as commercial centres in the middle ages. One of these is the route of the Orient Express, which goes by Calais, Paris and Strassburg, then east of Strassburg runs north in the Rhine valley for about 40 m. to Karlsruhe, then winds through the hilly country between the Black Forest proper and the Odenwald to Stuttgart, proceeding thence by Ulm, Augsburg and Munich to Linz and then by the valley of the Danube through Vienna and Budapest to Belgrade, and thence by the valleys of the Morava, Nishava and Maritza to Constantinople. The other is that of the Ostend-Vienna express, going by Ostend to Brussels, and through Aix-la-Chapelle to Cologne, then up the Rhine gorge southwards to Bingen and eastwards to Mainz and on to Frankfort (on the Main), thence south-eastwards by the route so celebrated in the middle ages through Nuremberg to Regensburg (Ratisbon), and thence down the valley of the Danube coinciding with the Orient Express route from a point a few miles above Linz. From the Orient Express route a branch crosses from the valley of the Morava to that of the Vardar, establishing a connexion with Salonica.

In the development of this railway system the mountains have proved the most formidable of natural obstacles, and at the head of the mountains in this respect as in others stand the Alps. The first railway to cross one of the main chains of the Alps was the Semmering line on the route from Vienna to the Adriatic, constructed in 1848–1854. Its summit is in a tunnel less than 1 m. long, 2940 ft. above sea-level or nearly 300 ft. below the level of the pass. South of the Semmering, however, various other passes have to be crossed, and it was not till 1857 that the railway to Triest (by Laibach) was completed, and not till the late seventies that the more direct route to Venice across the Tarvis pass in Carinthia was established. Of the route from Triest by Görz across the Karawanken and Tauern Alps to Salzburg and south-eastern Germany the first section was opened only in 1906. After the Semmering the next railway to cross the Alps was that following the Brenner route which crosses the summit of the pass at the height of 4490 ft., and, as already stated, is the only pass that has to be crossed on the way from Munich to the plains of Italy. Next followed in 1871 the western route through the so-called Mont Cenis tunnel, really under the Col de Fréjus, to the west of the Mont Cenis pass, and effecting a crossing between the valleys of the Arc (Rhone basin) and the Dora Riparia (Po basin) at an altitude of 4380 ft., or nearly 2500 ft. lower than the pass previously used, but only by piercing the mountains in a tunnel more than 7½ m. long. Next in order was the St Gotthard route, opened in 1882, the most direct route between northern Italy and western Germany, connecting the Lake of Lucerne with the valley of the Ticino. Here the altitude is reduced to 3785 ft., about 3150 ft. below the sumit-level of the pass, but the tunnel length is increased to rather more than 9¼ m. The Simplon route opened in June 1906, between the upper Rhone valley and the Toce valley, shortening the route between Milan and northern France, effects the crossing at an altitude of only 2300 ft., nearly 4300 ft. lower than the pass, but by increasing the tunnel length to 12¼ m. Steps were subsequently taken to continue the Simplon route northwards by a tunnel through the Lötschberg in the Bernese Alps, and a project is entertained for continuing the Vintschgau (upper Adige) railway across or under the Reschenscheideck to the Inn valley. An important east-west crossing of the Alps was effected when the Arlberg tunnel (6·37 m. long, summit-level 4300 ft.) connecting the Inn valley with that of the Rhine above the Lake of Constance was opened in 1884.

Several lines wind through and cross the Jura. That which in 1857 pierced the Hauenstein, in the north of Switzerland, attained international importance on the opening of the St Gotthard tunnel, inasmuch as it lies on the route thence through Lucerne to the Rhine valley at Basel; and that which crosses the Col de Jougne between Vallorbe and Pontarlier acquired similar importance on the completion of the Simplon tunnel. Further projects are entertained for shortening the connexion between this tunnel and the north of France by making a more direct line from Vallorbe to the French side of the Jura, or by making a railway across or under the Col de la Faucille (4340 ft.), north-west of Geneva.

Of the two railways that pass round the extremity of the Pyrenees, the western was the first to be constructed, the eastern was not opened till 1878. Hitherto the intervening mountains have proved more of a railway barrier than the mightier system of the Alps, but in 1904 a convention was concluded between the French and Spanish governments providing for the establishment of railway connexion between the two countries at three points of the great chain.

There are several railways across the Carpathians, mostly by passes under 3000 ft. in height. The fact that the Tömös Pass, on the direct route from Hungary through Transylvania to Bucharest, attains an altitude of 3370 ft. was undoubtedly one reason why the railway following this route, completed in December 1879, passing through several tunnels, was one of the last to be constructed. But the obstruction of mountains has not been the only cause of delay in the building of railways. Sparseness of population and general economic backwardness have also proved hindrances, especially in Russia and the Balkan Peninsula. The railways to Constantinople and Salonica were completed only in 1888, and yet the highest altitude on the Constantinople line is only 2400 ft., that on the Salonica line 1750 ft. Among other important railways of recent date and of more than merely national significance may be mentioned that bringing Bucharest into connexion with the Black Sea port of Costantza by means of a bridge across the Danube at Chernavoda (opened in September 1895); a line across the Carpathians connecting Debreczen with Lemberg, the continuation of the line eastwards from Lemberg to Kiev; a network bringing the coalfield of the Donets basin into connexion with ports on the Sea of Azov; a line in the south-east of Russia connecting Novocherkask with Vladikavkaz, and branches running from the same point connecting that line with Novorossiysk on the Black Sea on the one hand, and with Tsaritsyn at the last angle of the Volga on the other hand; a line in northern Russia bringing Archangel into connexion with the European system at Vologda (opened in 1898); a detached line in the north-east across the Urals from Perm by Ekaterinburg (completed in 1878) to Tyumeñ (completed in 1884). Chelyabinsk on the Siberian railway has a branch running northwards to Ekaterinburg, and this line now affords uninterrupted communication with the northern Dvina, inasmuch as the railway which originally started at Perm has been carried westwards through Vyatka and then northwards to Kotlas at the point of origin of that river, to which point it was opened in 1900; and a line in the east connecting the European system at Samara with the great mining centre at Zlatoust, already in 1890 continued across the Urals to Miyas, and since then carried farther east as the great Siberian railway.

The result of the construction of the numerous transcontinental railways has been to bring rail and sea-routes and ports on opposite sides of the continents into competition with one another to a greater degree than is possible in any other continent. The more valuable, and above all perishable commodities may be sent right across the continent even through the mountains. Even from Great Britain, which is bound to carry on its external commerce in part by sea, goods are sometimes sent far south in Italy by railways running from one or other of the North Sea ports. It will hence be readily understood that for inland trade on the mainland the competition between ports on opposite sides of the continent and between different railways will be very keen, greatly to the advantage of the inland centres to which that competition extends. This competition is inevitably all the more keen now that the trade of Europe with the East is once more carried on through the Mediterranean as it was in ancient times and the middle ages. The great shortening of the sea-route in this trade at such ports as Marseilles, Triest, Venice and Genoa, indicated by the figures below, goes far to counterbalance the extra cost even of railway transport across the mountains.

Distance in Nautical Miles from Port Said.

London	3215	Marseilles	1506
Bremen	3502	Genoa	1426
Hamburg	3520	Venice	1330
Stettin	3749	Brindisi	930
St Petersburg	4300	Odessa	1130

Ethnology.

An enormous amount of investigation with regard to European ethnology has been carried on in recent years. These labours have chiefly consisted in the study of the physical type of different countries or districts, but it is not necessary to consider in detail the results arrived at. It should, however, be pointed out that the idea of an Aryan race may be regarded as definitely abandoned. One cannot even speak with assurance of the diffusion of an Aryan civilization. It is at least not certain that the civilization that was spread by the migration of peoples speaking Aryan tongues originated amongst and remained for a time peculiar to such peoples. The utmost that can be said is that the Aryan languages must in their earliest forms have spread from some geographical centre. That centre, however, is no longer sought for in Asia, but in some part of Europe, so that we can no longer speak of any detachment of Aryan-speaking peoples entering Europe.

The most important works, summarizing the labours of a host of specialists on the races of Europe, are those of Ripley and Deniker.[1] Founding upon a great multitude of data that have been collected with regard to the form of the head, face and nose, height, and colour of the hair and eyes, most of the leading anthropologists seem to have come to the conclusion that there are three great racial types variously and intricately intermingled in Europe. As described and named by Ripley, these are: (1) the Teutonic, characterized by long head and face and narrow aquiline nose, high stature, very light hair and blue eyes; (2) the Alpine, characterized by round head, broad face, variable rather broad heavy nose, medium height and "stocky" frame, light chestnut hair and hazel grey eyes; and (3) the Mediterranean, characterized by long head and face, rather broad nose, medium stature and slender build, dark brown or black hair and dark eyes. The Teutonic race is entirely confined to north-western Europe, and embraces some groups speaking Celtic languages. It is believed by Ripley to have been differentiated in this continent, and to have originally been one with the other long-headed race, sometimes known as the Iberian, and to the Italians as the Ligurian race, which "prevails everywhere south of the Pyrenees, along the southern coast of France, and in southern Italy, including Sicily and Sardinia," and which extends beyond the confines of Europe into Africa. The Alpine race is geographically intermediate between these two, having its centre in the Alps, while in western Europe it is spread most widely over the more elevated regions, and in eastern Europe "becomes less pure in proportion as we go east from the Carpathians across the great plains of European Russia." This last race, which is most persistently characterized by the shape of the head, is regarded by Ripley as an intrusive Asiatic element which once advanced as a wedge amongst the earlier long-headed population as far as Brittany, where it still survives in relative purity, and even into Great Britain, though not Ireland, but afterwards retired and contracted its area before an advance of the long-headed races. Deniker, basing his classification on essentially the same data as Ripley and others, while agreeing with them almost entirely with regard to the distribution of the three main traits (cephalic index, colour of hair and eyes, and stature) on which anthropologists rely, yet proceeds further in the subdivision of the races of Europe. He recognizes six principal and four secondary races. The six principal races are the Nordic (answering approximately to the Teutonic of Ripley), the Littoral or Atlanto-Mediterranean, the Ibero-Insular, the Oriental, the Adriatic or Dinaric and the Occidental or Cevenole.

Language.

Although language is no test of race, it is the best evidence for present or past community of social or political life; and nothing is better fitted to give a true impression of the position and relative importance of the peoples of Europe than a survey of their linguistic differences and affinities.[2] The following table contains the names of the various languages which are still spoken on the continent, as well as of those which, though now extinct, can be clearly traced in other forms. Two asterisks are employed to mark those which are emphatically dead languages, while one indicates those which have a kind of artificial life in ecclesiastical or literary usage.

I. INDO-EUROPEAN.		
1. INDIC branch, represented by		Gipsy dialects.
2. IRANIC branch, " "	(*a*)	Ossetian.
	(*b*)	Armenian.
3. HELLENIC branch, " "	*(*a*)	Greek.
	(*b*)	Romaic.
	(*c*)	Neo-Hellenic.
4. ITALIC branch, " "	*(*a*)	Latin.
	**(*b*)	Oscan.
	**(*c*)	Umbrian, &c.
Neo-Latin	(*d*)	French.
	(*e*)	Walloon.
	(*f*)	Provençal.
	(*g*)	Italian.
	(*h*)	Ladin (Rumonsh, Rumansh, Rheto-Romance).
	(*i*)	Spanish.
	(*j*)	Portuguese.
	(*k*)	Rumanian.
5. CELTIC branch, represented by	(*a*)	Irish.
	(*b*)	Erse or Gaelic.
	(*c*)	Manx.
	(*d*)	Welsh.
	**(*e*)	Cornish.
	(*f*)	Low Breton.
6. TEUTONIC branch, represented by	**(*a*)	Gothic.
Scandinavian	**(*b*)	Norse or Old Norse.
	(*c*)	Icelandic and Faeroese.
	(*d*)	Norwegian.
	(*e*)	Swedish.
	(*f*)	Danish.
Low German	**(*g*)	Saxon, Anglo-Saxon, or First English.
	(*h*)	English.
	**(*i*)	Old Saxon.
	(*j*)	Platt-Deutsch or Low German.
	(*k*)	Flemish } Netherlandish.
	(*l*)	Dutch } Netherlandish.
	(*m*)	Frisic.
High German	**(*n*)	Old High German.
	(*o*)	Middle High German.
	(*p*)	New High or Literary German.
7. SLAVONIC branch, represented by	*(*a*)	Church Slavonic.
South-Eastern	(*b*)	Russian.
	(*c*)	Ruthenian, Rusniak, or Little-Russian.
	(*d*)	White Russian or Bielo-Russian.
	(*e*)	Bulgarian.
	(*f*)	Servo-Croatian.
	(*g*)	Slovenian.
Western	(*h*)	Czech (Bohemian).
	(*i*)	Slovakish.
	(*j*)	Polish.
	(*k*)	Sorbian (Wendic, Lusatian).
	*(*l*)	Polabian.
8. LETTIC branch, represented by	**(*a*)	Old Prussian.
	(*b*)	Lettish.
	(*c*)	Lithuanian.
9. UNATTACHED	**?(*a*)	Old Dacian.
	(*b*)	Albanian.
II. SEMITIC.		
1. CANAANITIC branch, represented by	*(*a*)	Hebrew.
	**(*b*)	Phoenician or Punic.
2. ARABIC branch, represented by	**(*a*)	Arabic.
	**(*b*)	Mozarabic.
	(*c*)	Maltese.
III. FINNO-TATARIC (Turanian, Ural-Altaic, &c.).		
1. FINNO-UGRIC languages	(*a*)	Samoyede.
	(*b*)	Finnish or Suomi.
	(*c*)	Esthonian, Livonian, Vepsish, Votish.
	(*d*)	Lappish.
	(*e*)	Cheremissian.
	(*f*)	Mordvinian.
	(*g*)	Ziryenian and Permian.
	(*h*)	Votiak.
	(*i*)	Magyar.
2. TATAR-TURKISH languages	(*a*)	Turkish.
	(*b*)	Kazan Tatar, Crimean Tatar, Bashkir, Kirghiz.
	(*c*)	Chuvash.
3. MONGOLIAN languages.		Kalmuk.
4. UNATTACHED.		Basque.

From this conspectus it appears that there are still about 60 distinct languages spoken in Europe, without including Latin, Greek, Old Slavonic and Hebrew, which are still used in literature or ecclesiastical liturgies. Besides all those which are spoken over extensive territories, and some even which are confined within very narrow limits, are broken up into several distinct dialects.

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[1] See bibliography at the end of the article.

[2] See on the whole subject Hovelacque's *Science of Language*, Latham's *Nationalities of Europe*, and the same author's *Philology*.

Political boundaries.

The boundaries of European countries have of course been determined by history, and in some cases only historical events can be held to account for their general situation, the influence of geographical conditions being seen only on a minute examination of details. In most cases, however, it is otherwise. The present political boundaries were all settled when the general distribution of population in the continent was in a large measure determined by the geographical conditions, and accordingly the lines along which they run for the most part show the influence of such conditions very clearly, and thus present in many cases a marked contrast to the political boundaries in America and Australia, where the boundaries have often been marked out in advance of the population. In Europe the general rule is that the boundaries tend to run through some thinly peopled strip or tract of country, such as is formed by mountain ranges, elevated tablelands too bleak for cultivation, relatively high ground of no great altitude where soil and climate are less favourable to cultivation than the lower land on either side, or low ground occupied by heaths or marshes or some other sterile soil; but it is the exception for important navigable rivers to form boundaries between countries or even between important administrative divisions of countries, and for such exceptions a special explanation can generally be found. Navigable rivers unite rather than separate, for the obvious reason that they generally flow through populous valleys, and the vessels that pass up and down can touch as easily on one side as the other. Minor rivers, on the other hand, flowing through sparsely peopled valleys frequently form portions of political boundaries simply because they are convenient lines of demarcation. A brief examination of the present political map of Europe will serve to illustrate these rules.

The eastern frontier of the Netherlands begins by running southwards through a marsh nearly parallel to the Ems but nowhere touching it, then winds south or south-westwards through a rather sparsely peopled district to the Rhine. This river it crosses. It then approaches but does not touch the Meuse, but runs for a considerable distance roughly parallel to that river along higher ground, where the population is much more scanty than in the valley. On the side of Belgium the Dutch boundary is for the most part thoroughly typical, winding between the dreariest parts of the Dutch or Belgium provinces of North Brabant, Limburg and Antwerp. The Scheldt nowhere forms a boundary between countries, not even at its wide estuary. The eastern frontier of Belgium is quite typical both on the side of Germany and Luxemburg. It is otherwise, however, on the south, there that country confines with France, and indeed the whole of the north-east frontier of France may be called a historical frontier, showing the influence of geographical conditions only in details. One of these details, however, deserves attention, the tongue in which it advances northwards into Belgium so as to give to France the natural fortress of Givet, a tongue, be it noted, the outline of which is as typical a boundary as is to be seen in Europe in respect of scantiness of population, apart from the fortress.

The mountainous frontiers of France on the east and south require hardly any comment. Only in the Burgundy Gate between the Vosges and the Jura has an artificial boundary had to be drawn, and even that in a minor degree illustrates the general rule. The division of the Iberian peninsula between Spain and Portugal goes back in effect to the Christian reaction against the Moors. The valley of the Miño and its tributaries establishes a natural connexion between Galicia and the rest of Spain; but an independent crusade against the Moors starting from the lower part of the valley of the Douro resulted in the formation of the kingdom of Portugal, which found its natural eastern limit on the scantily peopled margin of the Iberian tableland, where the rivers cease to be navigable and flow through narrow gorges, that of the Tagus, where the river marks the frontier, being almost without inhabitants, especially on the Spanish side.

The greater part of the Italian boundary is very clearly marked geographically, though we have to look back to the weakness of divided Italy to account for the instances in which northern mountaineers have pushed their way into southern Alpine valleys. Even in these parts, however, there are interesting illustrations of geographical influence in the way in which the Italian boundary crosses the northern ends of the Lago Maggiore and the Lake of Garda, and cuts off portions of Lake Lugano both in the east and west. In all these cases the frontier crosses from one steep unpeopled slope to another, assigning the population at different ends or on different sides of the lakes to the country to which belongs the adjacent population not lying on their shores.

Of the Swiss frontiers all that it is necessary to remark is that the river Rhine in more than one place marks the boundary, in one, however, where it traverses alluvial flats liable to inundation (on the side of Austria), in the other place where it rushes through a gorge below the falls of Schaffhausen. The southern frontier of Germany is almost throughout typical, the northern is the sea, except where a really artificial boundary runs through Jutland.

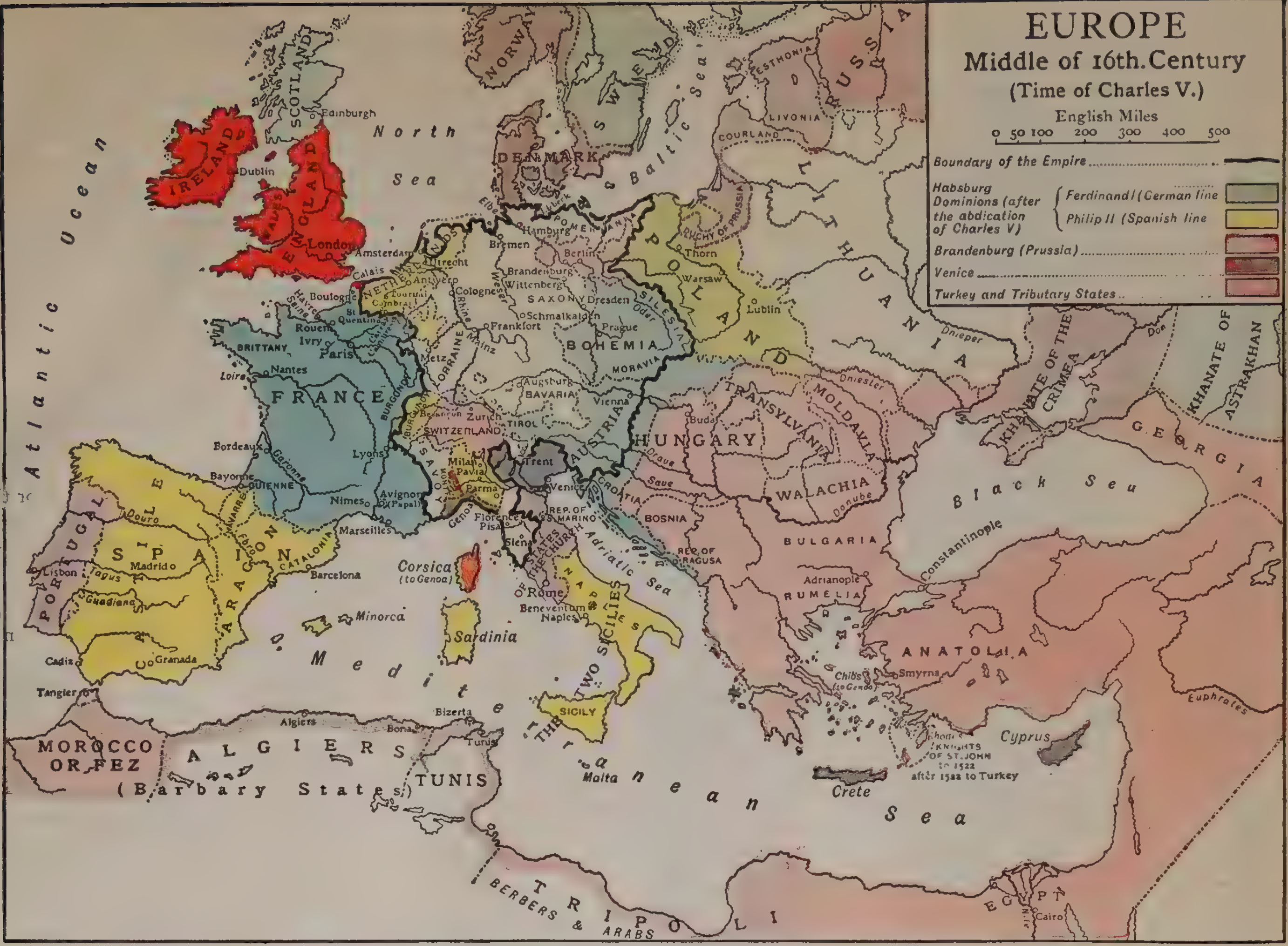
In the east of Germany and the north-east of Austria the winding frontier through low plains is the result of the partition of Poland, but in spite of the absence of marked physical features it is for the most part in its details almost as typical as the mountainous frontier on the south of Germany. All the great rivers are crossed. Most of the line runs through a tract of strikingly scanty population, and the dense population in one part of it, where upper Silesia confines with Russian Poland, has been developed since the boundary was fixed.

In the Balkan Peninsula the most striking facts are that the Balkans do not, and the Danube to a large extent does form a boundary. Geographical features, however, bring the valley of the Maritsa (eastern Rumelia) into intimate relation with upper Bulgaria, the connexion of which with Bulgaria north of the Balkans had long been established by the valley of the Isker, narrow as that valley is. On the side of Rumania, again, it is the marshes on the left bank of the Danube even more than the river itself that make of that river a frontier. An examination of the eastern boundary of all that is included in Russia in Europe will furnish further illustrations of the general rule.

Finally, on the north-west of Russia it was only natural that the Tornea and the Tana should be taken as lines of demarcation in that thinly peopled region, and it was equally natural that where the

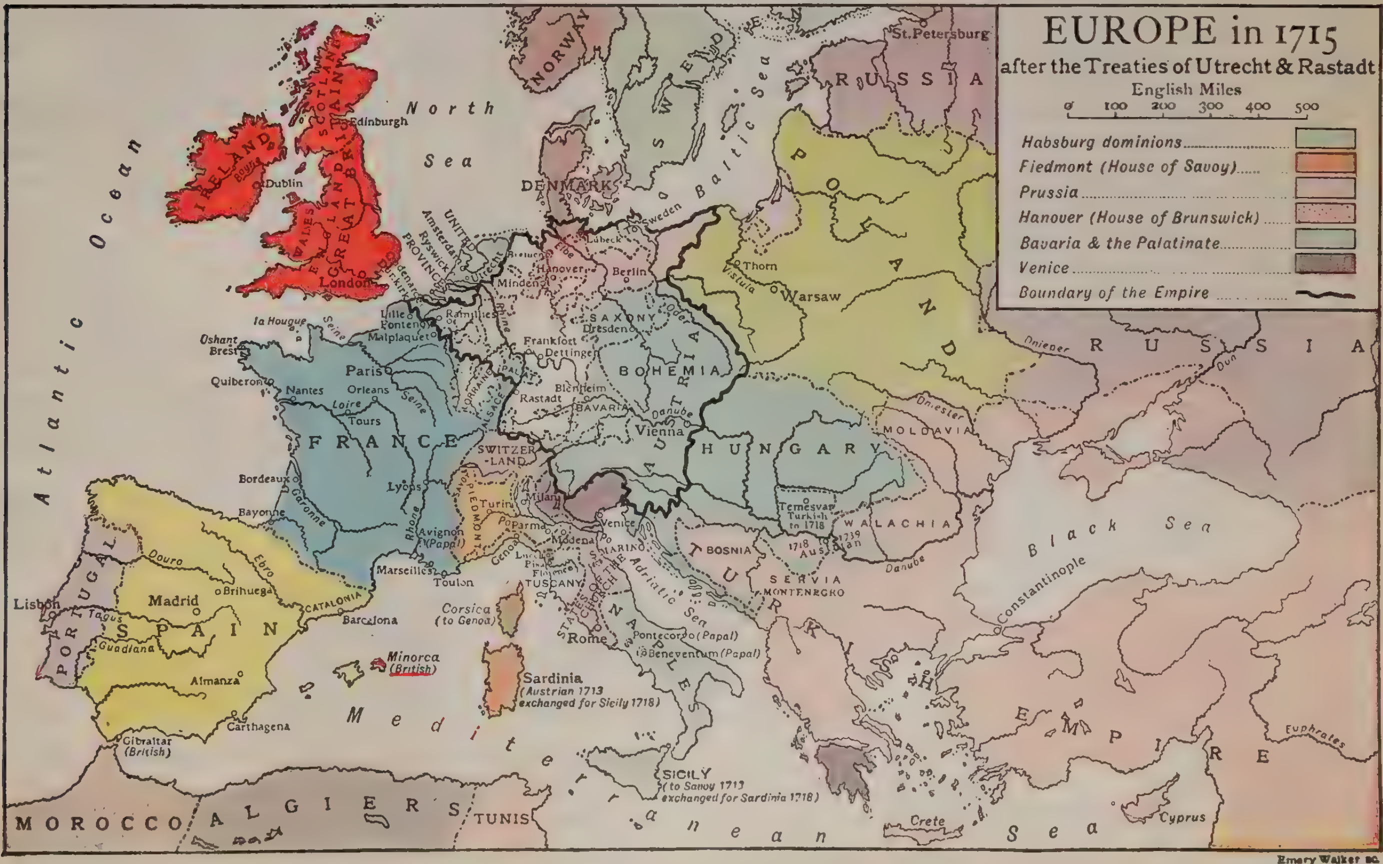
Countries.	Area.	Population.			Pop. per sq. m.
	English sq. m.	About 1880.	About 1890.	About 1900.	
Austria-Hungary	241,466	37,884	41,358	45,405[11]	188
Bosnia-Herzegovina(a)	19,735	1,336[1]	. .	1,568[12]	81
Liechtenstein	61	. .	9[7]	. .	147
Belgium	11,373	5,520	6,069	6,694[16]	589
Denmark (b)	15,431	1,980	2,185	2,465[14]	160
France	207,206	. .	38,343[7]	38,596[14]	186
Monaco	8	. .	. .	15[13]	. .
German Empire	208,760	45,234	49,428	56,345[16]	270
Luxemburg	1,003	. .	. .	237[16]	247
Greece	24,974	. .	2,187[8]	2,434[15]	97
Italy	110,676	28,460[2]	. .	32,450[14]	293
San Marino	23	. .	. .	11[17]	435
Montenegro	3,500	. .	. .	228[15]	65
Netherlands	12,741	4,013[3]	4,511[8]	5,103[17]	400
Portugal	34,347(c)	4,160[4]	4,660	5,423[16]	153
Rumania	50,588	. .	. .	5,913[17]	117
Russia	1,951,249	89,685[1]	. .	103,671[18]	53
Finland	144,255	2,176[1]	. .	2,555[11]	18
Servia	18,762	1,908[5]	. .	2,494[16]	133
Spain (a)	191,994	16,432[6]	17,262[9]	18,618[16]	97
Andorra	175	. .	5	. .	29
Sweden	173,968	4,566	4,785	5,136[16]	30
Norway	126,053	. .	2,001[7]	2,231[16]	18
Switzerland	15,976	2,846	2,933[10]	3,314[16]	207
Turkey (Europe)(e)	66,840	. .	. .	5,892 ?	90
Bulgaria (f)	37,323	2,008[2]	3,154[10]	3,733[14]	100
Crete	3,328	. .	302[9]	304[16]	91
Thasos	152	. .	. .	12 ?	79
United Kingdom	121,742	35,026[2]	37,881[7]	41,455[14]	341

(a) Annexed by imperial decree to Austria-Hungary in 1908.
(b) Including Faeroe Islands.
(c) Area exclusive of Tagus and Sado inlets (together 161 sq. m.).
(d) Excluding Canary Islands. (e) With Novi-bazar.
(f) Bulgaria proclaimed its independence of Turkey in 1908.
[1] 1885. [2] 1881. [3] 1879. [4] 1878. [5] 1884. [6] 1887. [7] 1891.
[8] 1889. [9] Census 1890. [10] 1888. [11] Census 1900. [12] Census 1895.
[13] Estimate 1897. [14] Census 1901. [15] Census 1896. [16] Census 1900.
[17] Census 1899. [18] Census 1897.



EUROPE
Middle of 16th. Century
(Time of Charles V.)

English Miles
0 50 100 200 300 400 500
Boundary of the Empire
Habsburg Dominions (after the abdication of Charles V)
Ferdinand I (German line
Philip II (Spanish line
Brandenburg (Prussia)
Venice
Turkey and Tributary States
Atlantic Ocean
North Sea
Baltic Sea
Mediterranean Sea
Black Sea
IRELAND
SCOTLAND
ENGLAND
WALES
Edinburgh
Dublin
London
NORWAY
SWEDEN
DENMARK
FINLAND
ESTHONIA
LIVONIA
COURLAND
RUSSIA
LITHUANIA
POLAND
DUCHY OF PRUSSIA
Thorn
Warsaw
Lublin
Dnieper
Don
KHANATE OF THE CRIMEA
KHANATE OF ASTRAKHAN
GEORGIA
NETHERLANDS
Amsterdam
Utrecht
Calais
Antwerp
Boulogne
Tournai
Cambrai
St. Quentin
Bremen
Hamburg
POMERANIA
Berlin
Brandenburg
Wittenberg
SAXONY
Dresden
Cologne
Schmalkalden
Frankfort
Prague
BOHEMIA
SILESIA
MORAVIA
Mainz
LORRAINE
Metz
Augsburg
BAVARIA
Vienna
AUSTRIA
TIROL
Zurich
SWITZERLAND
Trent
HUNGARY
Buda
TRANSYLVANIA
MOLDAVIA
WALACHIA
Danube
Dniester
Drave
Save
CROATIA
BOSNIA
REP. OF RAGUSA
BULGARIA
Adrianople
RUMELIA
Constantinople
ANATOLIA
Smyrna
Chios (to Genoa)
Rhodes KNIGHTS OF ST. JOHN to 1522 after 1522 to Turkey
Cyprus
Crete
Euphrates
EGYPT
Cairo
FRANCE
BRITTANY
Rouen
Ivry
Paris
Nantes
Loire
BURGUNDY
Bordeaux
Garonne
GUIENNE
Bayonne
Lyons
Nimes
Avignon (Papal)
Marseilles
SAVOY
Milan
Pavia
Parma
Genoa
Venice
REP. OF SAN MARINO
Florence
Pisa
Siena
STATES OF THE CHURCH
Rome
Benevento
Naples
NAPLES
THE TWO SICILIES
SICILY
Adriatic Sea
Corsica (to Genoa)
Sardinia
Minorca
Malta
SPAIN
CASTILE
ARAGON
NAVARRE
CATALONIA
PORTUGAL
Lisbon
Madrid
Douro
Tagus
Guadiana
Ebro
Barcelona
Cadiz
Granada
Tangier
MOROCCO OR FEZ
ALGIERS (Barbary States)
Algiers
Bona
Bizerta
Tunis
TUNIS
TRIPOLI
BERBERS & ARABS



EUROPE in 1715
after the Treaties of Utrecht & Rastadt

English Miles
0 100 200 300 400 500
Habsburg dominions
Piedmont (House of Savoy)
Prussia
Hanover (House of Brunswick)
Bavaria & the Palatinate
Venice
Boundary of the Empire
Atlantic Ocean
North Sea
Baltic Sea
Mediterranean Sea
Black Sea
IRELAND
GREAT BRITAIN
SCOTLAND
ENGLAND
WALES
Edinburgh
Dublin
Boyne
London
NORWAY
SWEDEN
FINLAND
St. Petersburg
RUSSIA
DENMARK
Sweden
Lübeck
UNITED PROVINCES
Amsterdam
Ryswick
Utrecht
Blenheim
Hanover
Minden
Berlin
POLAND
Thorn
Vistula
Warsaw
Dnieper
Don
la Hougue
Seine
Oshant
Brest
Quiberon
Lille
Fontenoy
Malplaquet
Ramillies
SAXONY
Dresden
Oder
Frankfort
Dettingen
PALATINATE
LORRAINE
Rastadt
BOHEMIA
BAVARIA
Danube
Vienna
AUSTRIA
HUNGARY
Dniester
MOLDAVIA
Temesvar Turkish to 1718
WALACHIA
1718 Aus. 1739 Turk.
SERVIA
MONTENEGRO
BOSNIA
TURKISH EMPIRE
Constantinople
Euphrates
Crete
Cyprus
FRANCE
Paris
Orleans
Nantes
Loire
Tours
Bordeaux
Garonne
Bayonne
Lyons
Rhone
Avignon (Papal)
Marseilles
Toulon
SWITZERLAND
PIEDMONT
SAVOY
Turin
Milan
Parma
Modena
Venice
Genoa
Pisa
Florence
TUSCANY
STATES OF THE CHURCH
Rome
Pontecorvo (Papal)
Benevento (Papal)
NAPLES
Adriatic Sea
Corsica (to Genoa)
Sardinia (Austrian 1713 exchanged for Sicily 1718)
SICILY (to Savoy 1713 exchanged for Sardinia 1718)
Minorca (British)
SPAIN
PORTUGAL
Lisbon
Madrid
Brihuega
Douro
Tagus
Guadiana
Ebro
CATALONIA
Barcelona
Almanza
Carthagena
Gibraltar (British)
MOROCCO
ALGIERS
TUNIS

Emery Walker sc.

boundary between Norway and Sweden descends from the fjeld in the south it should leave to Norway both sides of the valley of the Glommen.

Population. The preceding table shows the area of the countries of Europe, with their estimated or enumerated populations in thousands (000 omitted) at different dates.

A noteworthy feature of the distribution of population in Europe, especially in western, southern and central Europe, in modern times, is the high degree of aggregation in towns, which is exhibited in the following table[1] for the different countries or regions of the continent:—

	Percentage in Towns.		All Towns over 20,000.
	Over 100,000.	From 20,000 to 100,000.	
England and Wales	34·8	23·5	58·3
Scotland	29·7	9·9	39·7
Ireland	14·2	5·3	19·5
Norway	10·8	6·8	17·6
Sweden	8·5	2·6	11·2
Denmark	19·4	6·6	26·0
German Empire	17·0	11·2	28·2
Netherlands	22·3	15·0	37·3
Belgium	18·6	12·0	30·6
France	13·7	10·3	24·0
Spain and Portugal	10·5	5·7	16·2
Bosnia, Servia and Bulgaria	...	4·2	4·2
Rumania	4·6	7·2	11·8
Hungary	3·7	9·1	12·8
Galicia and Bukovina	2·0	4·8	6·8
Cis-Leithan provinces of Austria (exclusive of the two latter)	12·4	5·9	18·3
Poland	10·6	4·2	14·8
Baltic Provinces, Russia	11·4	8·3	19·7
Moscow region[2]	9·6	5·4	15·0
Black earth governments, Great Russia[3]	0·7	4·9	5·6
Governments of middle and lower Volga[4]	3·3	4·0	7·3
South Russia[5]	7·0	8·5	15·5
Finland	3·8	4·3	8·1

The following table contains a list of the towns with more than 100,000 inhabitants, not in every case according to the most recent census, but, in order to make the populations fairly comparable with one another, according to the nearest census or available estimate to 1900. Population in thousands (000 omitted):—

*London (Greater, 1901)	6581
London (Registration, 1901)	4536
*Paris (w. subs.)	2877
" (City, 1901)	2661
*Berlin (w. subs.)	2073
" (1900)	1884
Vienna (1900)	1662
*St Petersburg (w. subs., 1897)	1267
*Constantinople (w. subs.)	1200
Moscow (w. subs., 1897)	1036
Glasgow (w. subs., 1901)	910
Hamburg-Altona (1900)	867
Liverpool (w. subs., 1901)	767
Manchester-Salford (1901)	765
Budapest (1900)	732
Warsaw (1897)	638
†Birmingham (w. subs., 1901)	599
*Naples (comm., 1901)	565
Brussels (1901)	563
*Madrid (1900)	540
Amsterdam (1902)	540
*Barcelona (1900)	533
Munich (1900)	500
Marseilles (1901)	495
*Milan (comm., 1901)	493
Copenhagen (w. subs., 1901)	477
*Rome (comm., 1901)	463
Lyons (1901)	460
Leipzig (1900)	455
Leeds (w. subs., 1901)	444
Breslau (1900)	423
Odessa (1897)	405
Dresden (1900)	395
Edinburgh-Leith (1901)	393
Sheffield (1901)	381
Dublin (w. subs., 1901)	373
Cologne (1900)	372
*Lisbon (1900)	356
Belfast (1901)	349
Rotterdam (1902)	348
Turin (comm., 1901)	335
Bristol (1901)	329
Newcastle-Gateshead (1901)	325
Prague (w. subs., 1900)	317
Lódz (1897)	315
*Palermo (comm., 1901)	310
Stockholm (1902)	306
Elberfeld-Barmen (1901)	299
Bordeaux (w. subs., 1896)	289
Frankfort-on-Main	288
Riga (w. subs., 1897)	283
Bucharest (1899)	282
Bradford (1901)	280
Antwerp (1901)	273
‡West Ham (1901)	267
Nuremberg (1900)	261
Kiev (1897)	247
Hull (1901)	241
Nottingham (1901)	240
Hanover (1900)	237
Genoa (comm., 1901)	235
Magdeburg (1900)	230
Christiania (1900)	226
The Hague (1902)	222
Roubaix–Tourcoing (1901)	220
Düsseldorf (1900)	214
*Valencia (1900)	214
Florence (comm., 1901)	205
Leicester (1901)	212
Lille (1901)	211
Chemnitz (1900)	207
Portsmouth (1901)	189
Charlottenburg (1900)	189
Königsberg (1900)	188
Triest (1900)	179
Plymouth-Devonport (1901)	177
Stuttgart (1900)	176
Kharkov (1897)	174
Bolton (1901)	168
Oporto (1900)	168
Cardiff (1901)	164
Bremen (1900)	163
Ghent (1901)	162
Dundee (1901)	161
Vilna (1897)	160
Brighton-Hove (1901)	160
Lemberg (1900)	160
Liége (1901)	160
Halle a S. (1900)	157
Aberdeen (1901)	153
Bologna (comm., 1901)	152
*Venice (comm., 1901)	152
Catania (comm., 1901)	150
Messina (comm., 1901)	150
Salonica	150
Strassburg (1900)	150
Zürich (comm., 1900)	150
Seville (1900)	148
St Etienne (1901)	147
Sunderland (1901)	147
Dortmund (1900)	142
Danzig (1900)	141
Mannheim (1900)	140
Stettin (1895)	140
Croydon (1901)	139
Graz (1900)	138
Oldham (1901)	137
Saratov (1897)	137
Aachen (1900)	135
Gothenburg (1902)	134
Toulouse (1896)	134
Nantes (1901)	133
Kazan (1897)	132
Malaga (1900)	130
Havre (1901)	130
Blackburn (1901)	128
Brunswick (1900)	128
Ekaterinoslav (1897)	121
Rostov-on-Don (1897)	120
Essen (1900)	119
Posen (1900)	117
Preston (1901)	113
Astrakhan (1897)	113
Norwich (1901)	112
Murcia (1900)	112
Birkenhead (1901)	111
Athens (1896)	111
Tula (1897)	111
Brünn (1900)	110
Kishinev (1897)	109
Basel (comm., 1900)	109
Utrecht (1902)	109
Kiel (1900)	108
Reims (1901)	108
Krefeld (1900)	107
Derby (1901)	106
Kassel (1900)	106
Halifax (1901)	105
Nice (1901)	105
Southampton (1901)	105
Nancy (1901)	103
Szeged (1900)	103
Toulon (1901)	102
Cartagena (1900)	100

Comm. = commune. w. subs. = with suburbs.

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[1] Taken from a paper by Professor Voeikov on "Verteilung der Bevölkerung auf der Erde unter dem Einfluss der Naturverhältnisse und der menschlichen Tätigkeit," in *Petermanns Mitteil.* (1906), p. 249, where corresponding figures are given for other parts of the world.

[2] Kaluga, Smolensk, Tver, Moscow, Yaroslav, Kostromer and Vladimir.

[3] Kursk, Orel, Tula, Ryazan, Tambov, Voronezh and Penza.

[4] Nizhniy Novgorod, Kazan, Simbirsk, Samara, Saratov and Astrakhan.

[5] Bessarabia, Kherson, Taurida, Ekaterinoslav and Don Province.

* In 1800 only those to which an asterisk is prefixed rose above 100,000. Thirty-four out of the 144 towns enumerated in the list above belong to the British Isles.

† The contiguous parliamentary boroughs of Birmingham and Aston Manor.

‡ Part of Greater London.

with Europe); W. Z. Ripley, *The Races of Europe* (London, 1900); J. Deniker, *The Races of Man* (London, 1900); R. G. Latham, *The Nationalities of Europe* (London, 2 vols., 1863); J. G. Bartholomew, "The Mapping of Europe," in *Scot. Geog. Magazine* (1890), p. 293; Joseph Prestwich, *Geological Map of Europe* (Oxford, 1880); A. Supan, *Die Bevölkerung der Erde* (viii. Gotha, 1891, and x. Gotha, 1899); Strelbitsky, *La Superficie de l'Europe* (St Petersburg, 1882); Oppel, "Die progressive Zunahme der Bevölkerung Europas," *Petermanns Mitteil.* (Gotha, 1886); Dr W. Koch, *Handbuch für den Eisenbahn-Güterverkehr* (Berlin), published annually (gives railway distances on all the lines of Europe except those of the British Isles, Greece, Portugal and Spain); *Verkehrsatlas von Europa* (Leipzig), frequently re-issued; *Grosser Atlas der Eisenbahnen von Mitteleuropa* (Leipzig); *Verlag für Börsen* and *Finanzliteratur*, frequently re-issued (gives kilometric distances between a great number of places and a great variety of other information in the text); K. Wiedenfeld, *Die nordwesteuropäischen Welthäfen* (Berlin, 1903) (an important work discussing the geographical basis of the commercial importance of the seaports of London, Liverpool, Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp and Havre). Papers relating to the climate of Europe: J. Hann, "Die Vertheilung des Luftdruckes über Mittel- und Süd-Europa" (based on monthly and annual means for the period 1851–1880), in Penck's *Geograph. Abhandlungen* (vol. ii. No. 2, Vienna, 1887); A. Supan, "Die mittlere Dauer der Haupt-Wärme-perioden in Europa," *Petermanns Mitteil.* (1887), pl. 10, and pp. 165-172; Joseph Reger, "Regenkarte von Europa," in *Petermanns Mitteil.* (1903), pl. 1; A. Supan, "Die jahreszeitliche Verteilung der Niederschläge in Europa," &c., *ibid.* (1890), pl. 21, and pp. 296-297; P. Elfert, "Die Bewölkung in Mitteleuropa mit Einschluss der Karpatenländer," *ibid.* (1890), pl. 11 and pp. 137-145; König, "Die Dauer des Sonnenscheins in Europa," in *Nova Acta Leopoldina Karol. der deutschen Akad. der Naturforscher*, vol. lxvii. No. 3 (Halle, 1896); E. Ihne, "Phänologische Karte des Frühlingseinzugs in Mitteleuropa," in *Petermanns Mitteil.* (1905), pl. 9, and pp. 97-108; A. Angot, "Régime des pluies de la péninsule ibérique," in *Annales du bur. cent. météor. de France* (1893, B. pp. 157-194), and "Régime des pluies de l'Europe occidentale," *ibid.* (1895, B. pp. 155-192); E. D. Brückner, "Die Klimaschwankungen seit 1700," in Penck's *Geograpnische Abhandlungen*, iv. Pl. 2 (Vienna, 1890); Supan, "Die Verschiebung der Bevölkerung in Mitteleuropa mit Einschluss der Karpatenländer," *Petermanns Mitteil.* (1892); Block, *L'Europe politique et sociale* (2nd ed., 1892); E. Reclus, "Hégémonie de l'Europe," in *La Société nouvelle* (Brussels, 1894). Publications relating to the measurement of a degree of longitude on the parallel of 52° N. from Valentia (Ireland) to the eastern frontier of Russia: (1) Stebnitsky, account of the Russian section of this work in the *Memoirs* (Zapiski) *of the Milit. Topog. Section of the Russian General Staff*, vols. xlix. and l. (St. Petersburg, 1893) (in Russian, see notice in *Petermanns Mitteil.* (1894), *Litteraturbericht*, No. 289); (2) and (3) *Die europäische Längengradmessung in 52° Br. von Greenwich bis Warschau*; (2) Part i., Helmert, *Hauptdreiecke und Grundlinienanschlüsse von England bis Polen* (Berlin, 1893); (3) Part ii., Börsch and Krüger, *Geodätische Linien, Parallelbogen, und Lothabweichungen zwischen Feaghmain und Warschau* (Berlin, 1896); J. G. Kohl, *Die geographische Lage der Hauptstädte Europas* (Leipzig, 1874); Paul Meuriot, *Des agglomérations urbaines dans l'Europe contemporaine* (Paris, 1898); Scharff, *The History of the European Fauna* (London, 1899). (G. G. C.)

2. POLITICAL HISTORY

The origin of the name of Europe has been dealt with above, and the difficulty of any exact definition of the geographical limits covered by this term has been pointed out. A similar difficulty meets us when we come to deal with European history. We know what we mean when we speak of European civilization, though in its origins, as in its modern developments, this was not confined to Europe. In one sense the history of Europe is the history of this civilization and of the forces by which it was produced, preserved and developed; for a separate history of Europe could never have been written but for the alien powers by which this civilization was for centuries confined within the geographical limits of the European continent. Moreover, within these geographical limits the tradition of the Roman empire, and above all the organization of the Catholic Church, gave to the European nations, and the states based upon them, a homogeneity which without them could not have survived. The name of Europe, indeed, remained until modern times no more than "a geographical expression"; its diplomatic use, in the sense of a group of states having common interests and duties, is, indeed, no older than the 19th century; in the middle ages its place was taken by the conceptions of the Church and the Empire, which, though theoretically universal, were practically European. Yet the history of the states system of Europe, though enormously influenced by outside forces, possesses from the first a character of its own, which enables it to be treated as a separate unit. This historical Europe, however, has never been exactly commensurate with Europe considered as a geographical division. Russia, though part of Europe geographically—even if we set the limits of Asia at the Don with certain old geographers—had but slight influence on European history until the time of Peter the Great. The Ottoman empire, though its influence on the affairs of Europe was from the first profound, was essentially an Asiatic power, and was not formally introduced into the European system until the treaty of Paris of 1856. It still remains outside European civilization.

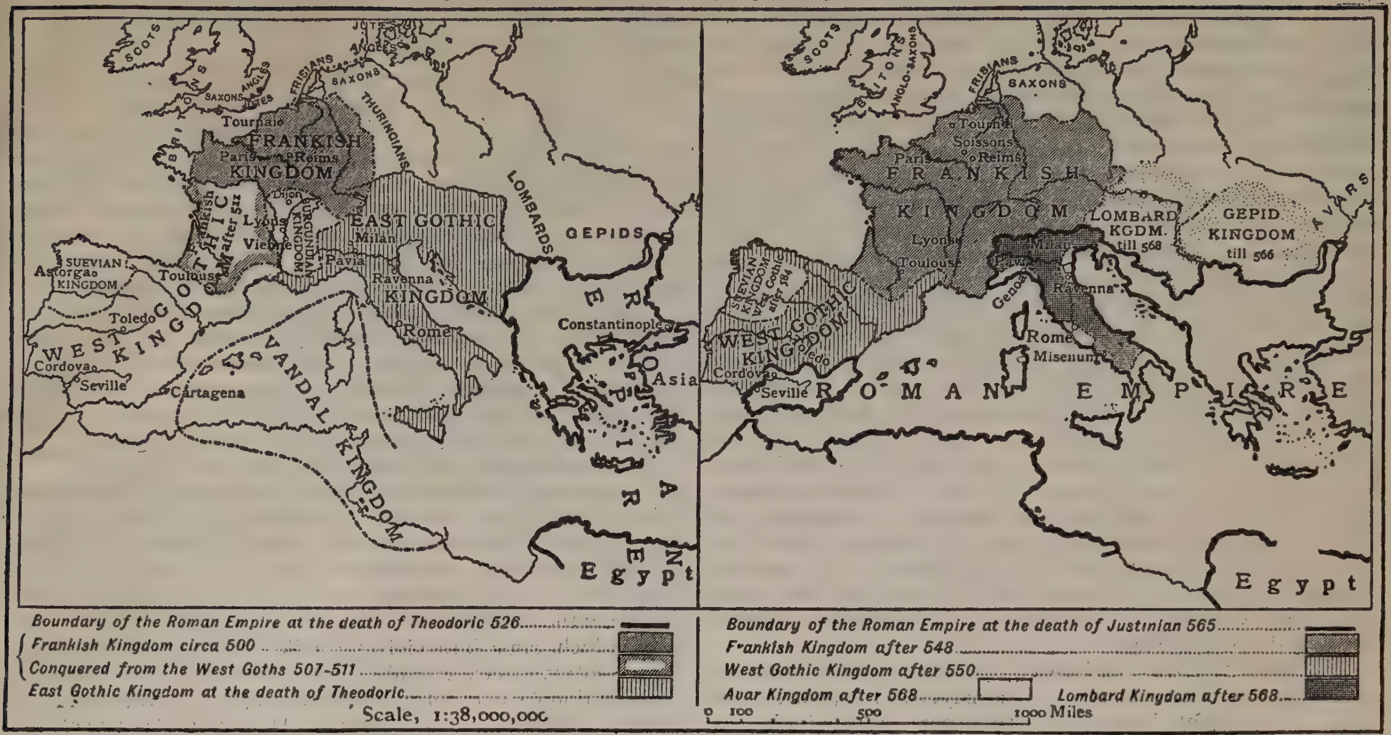
Europe, then, as we now conceive the term in its application to the political system and the type of culture established in this part of the world, may, broadly speaking, be traced to four principal origins: (1) The Aegean civilization (Hellenic and pre-Hellenic); (2) the Roman empire; (3) Christianity; (4) the break-up of the Roman empire by the Teutonic invasions. All these forces helped in the development of Europe as we now know it. To the Aegean civilization, whether transformed by contact with Rome, and again transformed by the influence of Christianity and the religious genius of the middle ages—or rediscovered during the classical Renaissance—Europe owes the characteristic qualities of its thought and of its expression in literature and art. From republican Rome it largely draws its conceptions of law and of administrative order. From the Roman empire it inherited a tradition of political unity which survived, in visible form, though but as a shadowy symbol, until the last Holy Roman emperor abdicated in 1806; survived also, more fruitfully, in the rules of the Roman lawyers which developed into modern international law. Yet more does Europe owe to Christianity, an Asiatic religion, but modified by contact with Greek thought and powerfully organized on the lines of the Roman administrative system. The Roman Church remained a reality when the Roman empire had become little more than a name, and was throughout the period of chaos and transformation that followed the collapse of the Roman empire the most powerful instrument for giving to the heterogeneous races of Europe a common culture and a certain sense of common interests.

The history of Europe, then, might well begin with the origins of Greece and Rome, and trace the rise of the Roman empire and the successive influence upon it of Hellenism and Christianity. These subjects are, however, very fully dealt with elsewhere (see AEGEAN CIVILIZATION; GREECE; ROME; CHURCH HISTORY); and it will, therefore, be more convenient to begin this account with the Teutonic invasions and the break-up of the Roman empire, events which mark the definite beginning of the modern European states system.

In a sense the Roman empire had been already "barbarized" before the invasions of the barbarians *en masse*. Land left vacant by the dwindling of the population was colonized by immigrants, Teutonic and other, from beyond the frontiers; the Roman legions were largely recruited from Germans and other non-Romans, some of whom even rose to the imperial purple. Thus, in the end, the Roman emperor, with his guard and his household, ruling over an empire mercilessly exploited to fill his treasury, was essentially indistinguishable from those barbarian chiefs, with their *antrustions* and their primitive fiscal methods, who entered into portions of his inheritance and carried on the traditions of his rule.

The history of the Teutonic peoples prior to their organized invasions of the empire is dealt with elsewhere (see TEUTONIC PEOPLES). It was in the 4th century that the pressure of their advance was first felt on the frontiers, and this led to a change in the government of the empire which was to have notable consequences. In A.D. 330 Constantine had transferred the capital from Rome to Byzantium (Constantinople), but the empire, from the Forth to the Tigris, continued to be administered successfully from a single centre. Not, however, for long: the increasing perils from without made a closer supervision essential, and after the death of Theodosius I. (395) the empire was divided

EUROPE IN THE VI CENTURY


SCOTS
SAXONS
FRISIANS
THURINGIANS
LOMBARDS
GEPIDS
FRANKISH KINGDOM
Tournai
Paris
Reims
Dijon
Lyons
Vienne
Toulouse
Milan
Pavia
Ravenna
Rome
EAST GOTHIC KINGDOM
SUEVIAN KINGDOM
Astorga
Toledo
WEST GOTHIC KINGDOM
Cordova
Seville
Cartagena
VANDAL KINGDOM
Constantinople
Asia
ROMAN EMPIRE
Egypt
Soissons
FRANKISH KINGDOM
LOMBARD KGDM. till 568
GEPID KINGDOM till 566
AVARS
Genoa
Misenum
Boundary of the Roman Empire at the death of Theodoric 526
Frankish Kingdom circa 500
Conquered from the West Goths 507-511
East Gothic Kingdom at the death of Theodoric
Scale, 1:38,000,000
Boundary of the Roman Empire at the death of Justinian 565
Frankish Kingdom after 548
West Gothic Kingdom after 550
Avar Kingdom after 568
Lombard Kingdom after 568
0 100 500 1000 Miles

Emery Walker sc

between emperors of the East and West. It was the beginning not only of the break-up of the empire, but of that increasing divergence between the eastern and western types of European religion and culture which has continued to this day.

The pressure of the Teutonic invasions became increasingly strong during the reigns of the emperor Valens and his successors. These invasions were of two types, (1) migrations of whole peoples with their old German patriarchal organization complete, (2) bands, larger or smaller, of emigrants in search of land to settle on, without tribal cohesion, but organized under the leadership of military chiefs. The earlier invaders, Goths and Vandals, and later the Burgundians and Lombards were of the first type; to the second belonged the Franks, "free" men from the Saxon plain, and the Saxon invaders of Britain. The distinction was a vital one; for the Goths, Vandals, Burgundians and Lombards never took root in the soil, and succumbed in turn, while the Frankish and Saxon immigrants, each man lord in his own estate, not only maintained themselves, but set up at the cost of the Roman organization and of the power of their own kings a wholly new polity, based on the independence of the territorial unit, which later on was to develop into feudalism.

The Teutonic Invasions.

It was owing to the pressure of Turanian invaders from the East that the Teutonic peoples were first forced to take refuge within the empire. In 378 the Goths defeated and slew the emperor Valens in a battle near Adrianople; in 410 Alaric, king of the West Goths, sacked Rome; and shortly after his death the Goths passed into Gaul and Spain. In 429 Gaiseric, king of the Vandals, at the invitation, it is said, of the governor Bonifacius, passed over from Spain to Roman Africa, which became the centre of another Teutonic kingdom, soon established as a great naval power which for a while commanded the Mediterranean and devastated the coasts of Italy and Sicily with its piracies.

Meanwhile the Franks and Burgundians were pressing into Germany and Gaul, while from 449 onwards the Saxons, the Angles and the Jutes invaded and occupied Britain. For a moment it was doubtful if the Aryan or Turanian races would be supreme, but in 451 Attila, king of the Huns, was decisively beaten in the battle of Châlons by a combination of Franks, Goths and Romans, under the Roman general Aetius and Theodosius, king of the Goths. This battle decided that Europe was to be Christian and independent of Asia and Africa. In 476 the succession of Western emperors came to an end with Odoacer's occupation of Rome, and with the decision of the Roman senate that one emperor was enough, and that the Eastern emperor, Zeno, should rule the whole empire. For a time Theodoric, king of the East Goths, ruled Italy, Gaul and Spain; but after his death in 526 the empire of the East Goths was shattered, and changes took place which led to the rise of independent Teutonic kingdoms in Gaul and Spain. In Gaul Clovis (d. 511), the king of the Franks, had already established his power, and in Spain, the West Gothic kingdom, with its capital at Toledo, now asserted its Teutonic independence. Under the emperor Justinian (527–565), indeed, the Roman empire seemed in a fair way to recover its supremacy; the Vandal kingdom in Africa was destroyed; in 555 the Byzantine general Narses finally shattered the power of the East Goths in Italy, and the exarchate of Ravenna was established in dependence on the Eastern emperor; the West Goths were forced to give up the south of Spain; and the Persians were checked. But with the death of Justinian troubles began. In 568 the Lombards, under Alboin, appeared in Italy, which they overran as far south as the Tiber, establishing their kingdom on the ruins of the exarchate. Though in Asia the emperor Heraclius, in a series of victorious campaigns, broke the Persian power and succeeded even in extending the Roman dominion, Italy, save for a while Ravenna itself and a few scattered sea-coast towns, was thenceforth lost to the empire of which in theory it still formed a part.

This catastrophe produced one result the importance of which it is impossible to exaggerate; the development of the political power of the papacy. At the beginning of the 6th century Rome, under Theodoric the Goth, was still the city of the Caesars, the tradition of its ancient life was yet unbroken; at the end of the century Rome, under Pope Gregory the Great (590–604), had become the city of the popes. And with the city the popes entered into some of the inheritance of the Caesars; in the world-wide activity of Gregory we already have a foreshadowing of universal claims, often effectively asserted, which made the great medieval popes, in a truer sense than the medieval emperors, the representatives of the idea of Roman imperial unity (see Rome, sec. ii. *Middle Ages*; Papacy).

The Hegira, A. D. 622. Rise of Mahommedanism.

The next event that profoundly affected the history of Europe was the rise of Mahommedanism. In A.D. 622, sixteen years after Gregory's death, occurred the flight (*Hijra*) of Mahomet from Mecca to Medina, which fixed the memorable era of the Hegira. The full force of the militant religion founded by the Arab prophet was not felt till after his death (632). The emperor Heraclius, the vigour of his manhood passed, was unable to meet this new peril; the Arabs, strong in their hardy simplicity and new-born religious fanaticism, and aided by the treason and cowardice of the decadent Roman governing classes, overran Asia Minor, conquered Egypt and the whole of northern Africa, overwhelmed the Gothic kingdom in Spain, and even penetrated beyond the Pyrenees to the conquest of the province of Narbonne. One of the chief effects of these Arab conquests was that Christian civilization became gradually confined to Europe; another was that the trade routes to the East were closed to the Western nations. The conquest of Narbonne marked the limit of the advance of Islam in western Europe, for in 732 the Arabs were overthrown by Charles Martel in the battle of Tours, and a few years later were driven out of Gaul. In Spain, however, they succeeded in maintaining themselves throughout the middle ages, developing a high type of civilization which had a considerable influence on the intellectual life of medieval Europe; and it was not till 1494 that Granada, their last possession in the peninsula, was conquered by the Christian monarchs, Ferdinand and Isabella.

The Carolingians.

The battle of Tours emphasized and increased the power and reputation of Charles Martel. As a mayor of the palace to the decadent Merovingian successors of Clovis, he was virtually ruler of the Franks, and, after his death, the last of the *rois fainéants* of the house of Merovech was deposed, and Pippin, Charles's son, was elected king of the Franks. The prestige of the Carolingian house (to give it the name it was later known by) was increased when, at the urgent entreaty of Pope Stephen III., Pippin marched into Italy and saved Rome from the Lombards, who were endeavouring to extend their power southwards. Pippin's son Charles (Charlemagne) finally conquered the Lombards in 774 and thus added part of northern Italy to his dominions.

The coronation of Charles the Great as emperor, 800.

In 797 an event of the highest importance to the European world took place. The emperor Constantine VI. was deposed by his mother Irene, who seized the throne. Thereupon Pope Leo and the Roman people definitely threw off the authority of the emperors of Constantinople, on the ground that a woman could not hold the position of Caesar. In 800 Leo crowned Charlemagne emperor at Rome, and henceforth till 1453, when Constantinople was conquered by the Turks, there was an Eastern and a Western empire. Till his death in 814 Charlemagne was king of the Franks as well as emperor. His kingdom embraced not only all Germany and modern France, but included a large part of Italy and Spain as far as the Ebro. Under his rule western Europe was united in a powerful empire, in the organization of which the principles of Roman and Teutonic administration were blended; and, after his death, he left to his successors, the Frankish and German kings, the tradition of a centralized government which survived the chaos of the period that followed, and the prescriptive right to the title and prestige of Roman emperors—a tradition and a claim that were to exercise a notable effect on the development of European history for centuries to come. (See FRANCE: *History* and CHARLEMAGNE.)

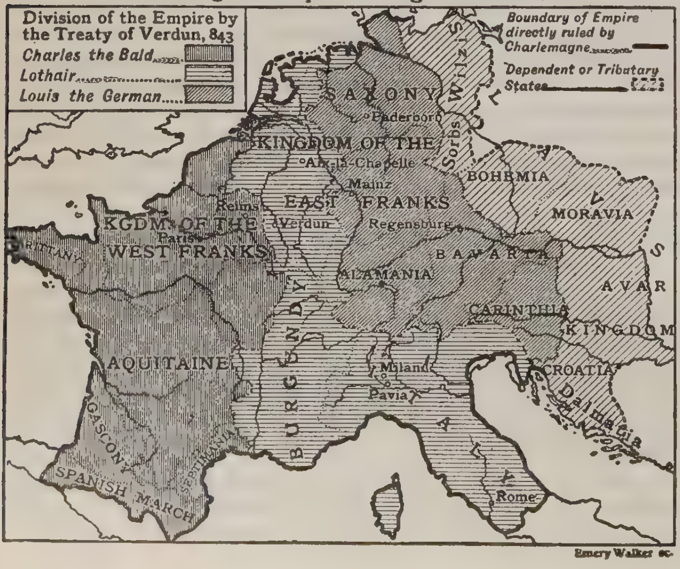
Europe after the death of Charlemagne.

The period from the death of Charlemagne (814) to the 12th century is characterized in western Europe by the general weakening of the idea of central government and by the rise of feudalism. During the same period the East Roman or Byzantine empire escaped disruption and, preserving the traditions of Roman civil and military administration, formed an effective barrier for Europe and Christendom against the advancing tide of Islam. At the same time, however, the growing divergence between the Eastern and Western Churches, which had been accentuated by the iconoclastic controversy (see ICONOCLASTS), and was destined in 1053 to culminate in a definite schism, was gradually widening the breach between the two types of European civilization, which came into violent conflict at the beginning of the 13th century, when crusaders from western Europe captured Constantinople and set up a Latin empire in the East (see ROMAN EMPIRE, LATER; CHURCH HISTORY; CRUSADES). In western Europe, meanwhile, the unity of the empire did not long survive Charlemagne. Its definite break-up dates from the treaty of Verdun (843), by which Charles the Bald received Neustria, Aquitaine and western Burgundy, Louis the German Bavaria, Swabia, Saxony and Thuringia, and the emperor Lothair the middle kingdom known by his name, the *regnum Lotharii* or Lotharingia (see LORRAINE). By the partition of Mersen (870) Lotharingia itself was divided between the West and East Frankish realms—France and Germany, terms which from this time begin to represent true national divisions. With the treaties of Verdun and Mersen the history of the European state system may be said to begin.

Rise of feudalism.

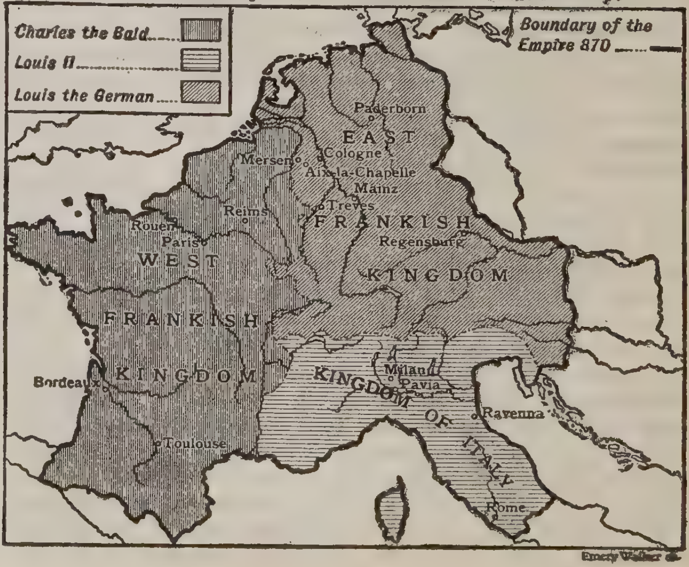
At first, indeed, it seemed as though the nascent states were about to be dissolved by disruption from within and attacks from without. All alike were subject to the attacks of the Norse sea-rovers, hardy pirates who not only scourged all the coasts of Europe but penetrated, burning and harrying, far inland up the great waterways. Meanwhile, the weakening of central government due to dynastic

Charlemagne's Empire at its greatest extent.

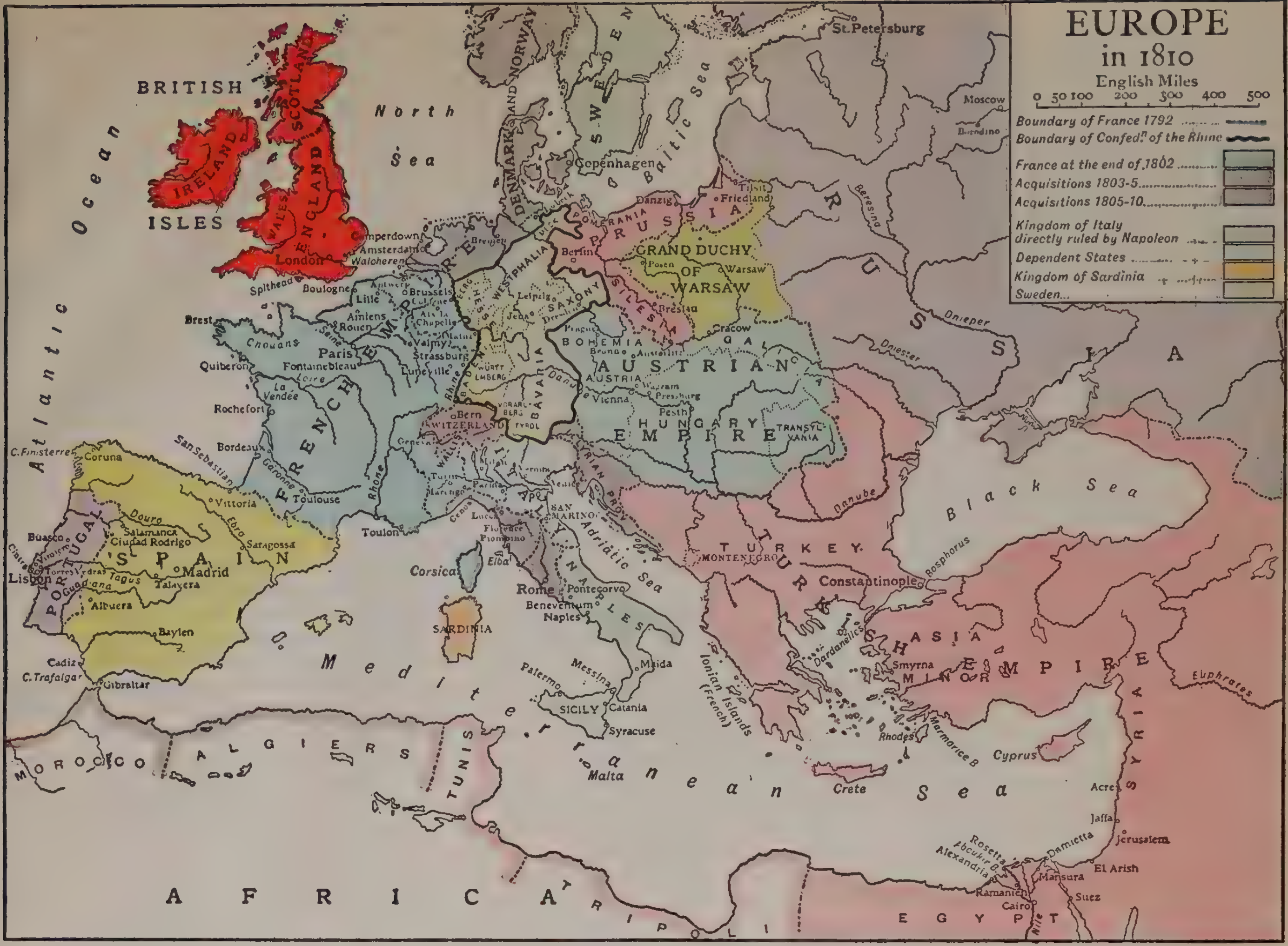

Division of the Empire by the Treaty of Verdun, 843
Charles the Bald ▥
Lothair ▤
Louis the German ▨
Boundary of Empire directly ruled by Charlemagne
Dependent or Tributary States
SAXONY
Paderborn
KINGDOM OF THE
Aix-la-Chapelle
Mainz
EAST FRANKS
Reims
Verdun
Regensburg
KGDM. OF THE WEST FRANKS
Paris
BRITTANY
BAVARIA
ALAMANIA
AVAR KINGDOM
CARINTHIA
MORAVIA
BOHEMIA
Sorbs
WILZI
SLAVS
AQUITAINE
GASCONY
SPANISH MARCH
SEPTIMANIA
BURGUNDY
Milan
Pavia
ITALY
Rome
CROATIA
Dalmatia

Emery Walker sc.

The Western Empire after the Partition of Mersen 870

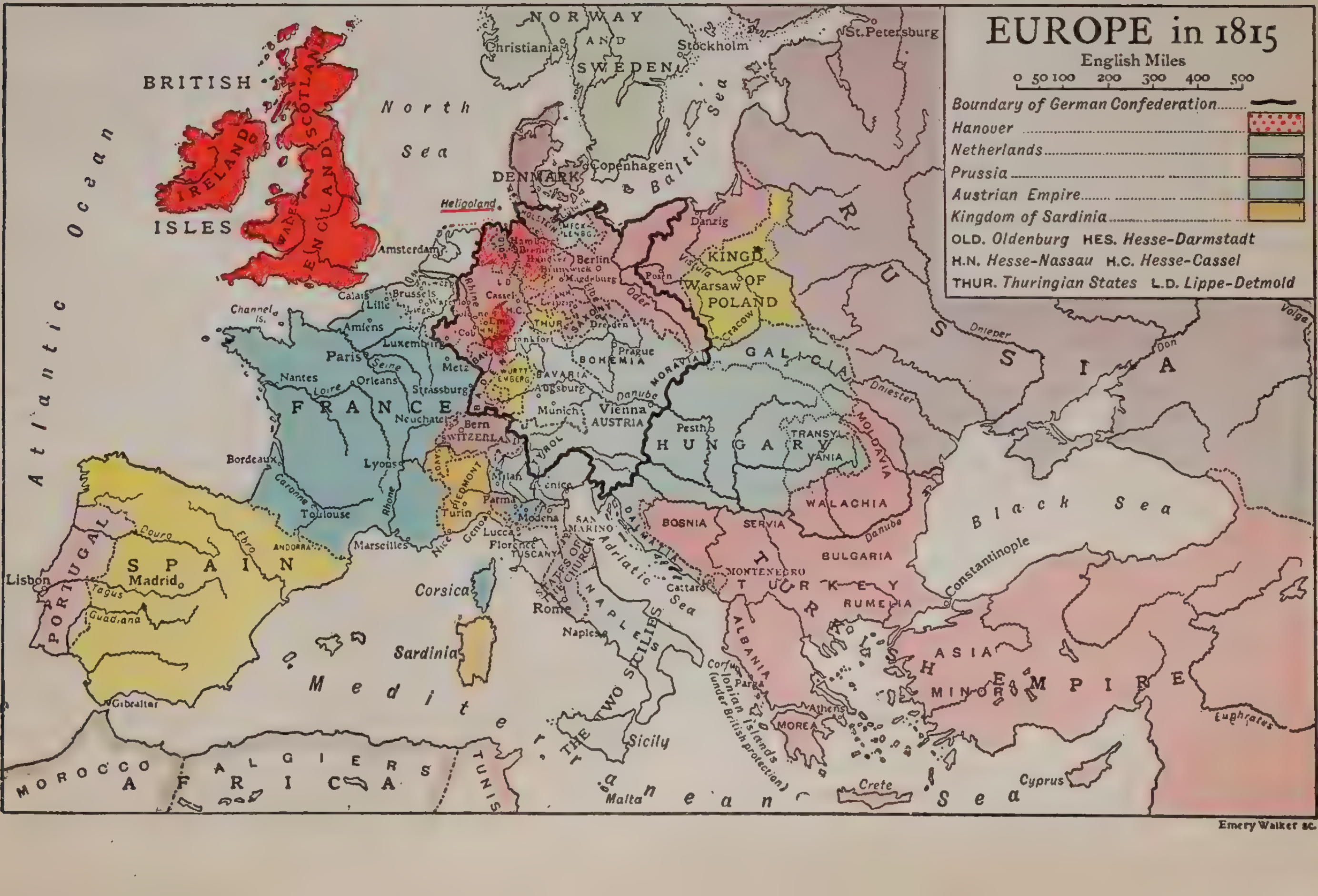

Charles the Bald ▥
Louis II ▤
Louis the German ▨
Boundary of the Empire 870
Paderborn
EAST
Cologne
Mersen
Aix-la-Chapelle
Mainz
Treves
FRANKISH
Regensburg
KINGDOM
Reims
Rouen
Paris
WEST
FRANKISH
KINGDOM
Bordeaux
Toulouse
KINGDOM OF ITALY
Milan
Pavia
Ravenna
Rome

Emery Walker sc.



EUROPE in 1810

English Miles
0 50 100 200 300 400 500
Boundary of France 1792
Boundary of Confedⁿ of the Rhine
France at the end of 1802
Acquisitions 1803-5
Acquisitions 1805-10
Kingdom of Italy directly ruled by Napoleon
Dependent States
Kingdom of Sardinia
Sweden
BRITISH ISLES
IRELAND
SCOTLAND
ENGLAND
WALES
London
North Sea
Atlantic Ocean
NORWAY
DENMARK
SWEDEN
Copenhagen
Baltic Sea
St. Petersburg
Moscow
Borodino
RUSSIA
PRUSSIA
Danzig
Tilsit
Friedland
GRAND DUCHY OF WARSAW
Warsaw
Berlin
WESTPHALIA
SAXONY
SILESIA
Breslau
FRENCH EMPIRE
Paris
Brussels
Amsterdam
Boulogne
Brest
Bordeaux
Toulouse
Toulon
BAVARIA
WÜRTTEMBERG
SWITZERLAND
Bern
TYROL
BOHEMIA
Vienna
AUSTRIAN EMPIRE
HUNGARY
TRANSYLVANIA
GALICIA
ILLYRIAN PROVINCES
SPAIN
PORTUGAL
Lisbon
Madrid
Corunna
Vittoria
Salamanca
Ciudad Rodrigo
Talavera
Albuera
Baylen
Cadiz
C. Trafalgar
Gibraltar
Corsica
SARDINIA
Elba
Rome
NAPLES
Naples
SICILY
Malta
Adriatic Sea
Ionian Islands (French)
TURKEY
MONTENEGRO
Constantinople
Bosphorus
Black Sea
Dniester
Dnieper
Danube
ASIA MINOR
TURKISH EMPIRE
Smyrna
Crete
Cyprus
Rhodes
SYRIA
Acre
Jaffa
Jerusalem
El Arish
EGYPT
Alexandria
Rosetta
Damietta
Cairo
Suez
Mediterranean Sea
MOROCCO
ALGIERS
TUNIS
TRIPOLI
AFRICA



EUROPE in 1815

English Miles
0 50 100 200 300 400 500
Boundary of German Confederation
Hanover
Netherlands
Prussia
Austrian Empire
Kingdom of Sardinia
OLD. Oldenburg
HES. Hesse-Darmstadt
H.N. Hesse-Nassau
H.C. Hesse-Cassel
THUR. Thuringian States
L.D. Lippe-Detmold
BRITISH ISLES
IRELAND
SCOTLAND
ENGLAND
WALES
North Sea
Atlantic Ocean
NORWAY AND SWEDEN
Christiania
Stockholm
St. Petersburg
DENMARK
Copenhagen
Baltic Sea
Heligoland
HOLSTEIN
MECKLENBURG
Hamburg
Bremen
Hanover
Berlin
Magdeburg
Danzig
Posen
KINGD. OF POLAND
Warsaw
Cracow
Amsterdam
Brussels
Calais
Lille
Amiens
Luxemburg
Cassel
Frankfort
Metz
Strassburg
Dresden
Prague
BOHEMIA
MORAVIA
BAVARIA
WÜRTTEMBERG
Augsburg
Munich
Vienna
AUSTRIA
TYROL
HUNGARY
TRANSYLVANIA
GALICIA
RUSSIA
Dnieper
Dniester
Don
Volga
FRANCE
Paris
Nantes
Orleans
Lyons
Bordeaux
Toulouse
Marseilles
Neuchatel
Bern
SWITZERLAND
PIEDMONT
Turin
Nice
Genoa
Milan
Venice
Parma
Modena
Lucca
Florence
TUSCANY
SAN MARINO
STATES OF THE CHURCH
Rome
NAPLES
Naples
THE TWO SICILIES
Sicily
Corsica
Sardinia
SPAIN
Madrid
ANDORRA
PORTUGAL
Lisbon
Gibraltar
MOLDAVIA
WALACHIA
BOSNIA
SERVIA
BULGARIA
MONTENEGRO
Cattaro
RUMELIA
ALBANIA
TURKEY
Constantinople
Black Sea
Corfu
Parga
Ionian Islands (under British protection)
Athens
MOREA
Crete
Cyprus
ASIA MINOR
TURKISH EMPIRE
Euphrates
Adriatic Sea
Mediterranean Sea
Malta
MOROCCO
ALGIERS
TUNIS
AFRICA

Emery Walker sc.

struggles had led to the growth of independent or semi-independent powers within the states themselves. The Frank landowners had successfully asserted their independence of the jurisdiction of the king (or emperor) and his officials; the imperial officials themselves, dukes or counts, had received grants of lands with similar immunities (*beneficia*), and these had become hereditary. Thus sprang up a class of great territorial nobles to whom, amid the growing anarchy, men looked for protection rather than to the weak and remote central power; and so, out of the chaos that followed the break-up of the empire of Charlemagne, was born the feudal system of the middle ages (see Feudalism). This organization was admirable for defence; and with its aid, before the close of the first decade of the 10th century, the frontiers of France and Germany had been made safe against the northern barbarians, who had either been driven off and barriers erected against their return—*e.g.* the marks established by Henry the Fowler along the middle Elbe—or, as in the case of the Normans, absorbed into a system well adapted for such a process. By the treaty of St Claire-sur-Epte (911) between Charles the Simple and Rollo, chief of the Norsemen, the Normans were established in the country since known as Normandy (*q.v.*), as feudatories of the French crown. In England, by the treaty of Wedmore (878) between Alfred and the Danish king Guthrum, the Danes had already been established in a large part of England.

Royalty and feudalism.

Feudalism, by the time the Northmen had been subdued by its aid, was quite firmly established in the western part of Europe. During the 11th century it was carried by the Normans into England, into Sicily and southern Italy, and by the nobles of the first crusade into the newly established kingdom of Jerusalem (1099). By the kings of France, England and Germany, however, who saw themselves in danger of being stripped of all but the semblance of power by its delegation to their more or less nominal vassals, the feudal organization was early recognized as impossible as a form of state government, if the state was to be preserved; and the history of the three great European powers during the succeeding centuries is mainly that of the struggle of the sovereigns against the disruptive ambitions of the great feudal nobles. In England the problem was, from the outset, simplified; for though William the Conqueror introduced the system of feudal land tenure into England in 1066 he refused to set it up as his system of government, retaining alongside of it the old English national policy. In France, on the other hand, feudalism as a system of government had become firmly established; and it was not till the days of Philip Augustus (1180–1223) and Louis IX. (1226–1270) that the monarchy began to get the upper hand. From this time until the 17th century the power of the French monarchy, in spite of occasional lapses, grew steadily stronger. The reverse was the case with the German kingship. Its association with the undefined claims involved in the title of Roman emperor, traditionally attached to it, and notably those to authority in Italy, necessitated concession after concession to the feudal nobles, in order to purchase their support for their assertion. The kingship, moreover, became elective; the imperial title was obtainable only at Rome at the hands of the pope; and the German kings thus became entangled in contests, not only with their own vassals, but with the tremendous spiritual force of the medieval papacy by which, for its own ends, the spirit of feudal insubordination was from time to time fomented. Thus in Germany the feudal nobles gradually acquired a sovereign status which, in some cases, has survived the territorial rearrangements of the 19th century and left its mark on the federal constitution of modern Germany; while the kingship and the imperial title grew more and more shadowy till in 1806 it vanished altogether. (See English History; France: *History*; Germany: *History*.)

The rise of the house of Capet.

In France the process by which a strong hereditary monarchy was established was a slow one. During the greater part of the 10th century the Carolingians, stripped of the vast domains which had been the basis of the power of Pippin, owed their continued existence to the forbearance of Hugh the Great, count of Paris. In 987, however, the last Carolingian king died, and Hugh Capet, son of Hugh the Great, the most powerful of the territorial magnates, was chosen king of France. With his election dates the real beginning of the French monarchy, and under him and his successors Paris became the capital of France. Hugh's election, however, was the work of the great feudatories, and France remained divided among a number of great fiefs, of which the chief were Brittany, Anjou, Flanders, Vermandois, Champagne, Burgundy, Aquitaine, Poitou, Gascony, Toulouse and Normandy.

The royal power in Germany.

While the central power in France advanced slowly but steadily, the development of the royal authority in Germany was in the 10th and 11th centuries more rapid. In 911 the German magnates had elected Conrad the Franconian to reign over them, and in 919 Henry "the Fowler" of Saxony, "whose reign forms one of the great turning-points in the history of the German nation." He defeated the Hungarians, the Slavs and the Danes, and by encouraging the growth and development of towns he contributed greatly to the formation of the German kingdom. His immediate successors, Otto the Great and Otto II., continued his work, which was only interrupted for a short time during the reign of the idealist Otto III., whose "cosmopolitan imperialism" brought him into collision with the German Church and to some extent with the German nobles. Henry II. (1002–1025) asserted with success his authority over Germany, and his successor Conrad II., who belonged to the Salian or Franconian line, did much to secure unity and prosperity to the Empire. His son and successor Henry III. (1039–1056) governed Germany wisely, and his reign witnessed the culminating point of the Holy Roman Empire. At the time of his death it seemed probable that Germany, like England and France, would gradually escape from the thraldom of the great feudatories. The future of the German monarchy depended upon the ability of future kings to suppress the forces of feudal disintegration in Germany, and to withstand the temptation of struggling to establish their influence over Italy. Unfortunately for German kingship Henry IV. (1056–1106) was only six years old on his accession, and when he became a man he found that the papacy under Hildebrand's influence was practically independent of the emperor. Had Henry confined his efforts to coercing the German barons he might, like the Normans and Angevins in England, and like the Capetians in France, have proved successful. Unfortunately for Germany Henry entered upon the famous contest with the papacy under Gregory VII. (1073–1080), which ended in the 13th century in the defeat of the Empire in the person of Frederick II. The struggle began in 1073 over the question of investiture (*q.v.*), and widened into a duel between the spiritual and temporal powers. During the early years of the contest the influence of the papacy reached a high pitch and made itself felt in the crusading movement, which received its first impetus from Pope Urban II., who appealed to Europe at the council of Clermont in 1095 to recover the Holy Places from the Turks.

The eastern Empire and the Crusades.

During the 11th century the Eastern Empire was attacked by the Russians, the Normans and the Seljuks. The emperor Alexius Comnenus found himself on his accession in 1081 threatened by the Seljuks (the victors in the decisive battle of Manzikert in 1071) and by the Sicilian Normans who in 1081 besieged Durazzo. In 1083 he defeated the Normans in the battle of Durazzo, and with the death of Robert Guiscard in 1085 all danger from a fresh Norman invasion passed away. But the first crusade brought new anxieties to Alexius, for he feared that the crusaders might attack Constantinople. That fear removed, he took advantage of the increased connexion between eastern and western Europe by bestowing commercial privileges upon the Italian trading republics, who thus gained access to the ports of the Empire on easy terms.

With the era of the Crusades, which lasted till the middle of the 13th century, Europe entered upon a period of change, the importance of which is realized by contrasting the condition of western Christendom in the 11th with its condition in the 13th century. Between the opening and close of the crusading movement Europe underwent a complete revolution. While the

The Crusades and the Hildebrandine reformation.

Crusades tended to enhance the prestige and authority of the papacy and the power of European monarchs, they also led to increased knowledge of the East, to the rapid development of commerce, to the introduction of new industries, to the rapid decline of the influence of the feudal nobility, and to the rapid development of town life (see Commune). At the same time the Hildebrandine reformation was having an immense influence upon the intellectual condition of Europe. The 12th century saw the establishment of many new monastic orders (see Monasticism), and at the same time a remarkable speculative and literary revival (see Scholasticism). This movement owed not a little of its success to the influence of the Crusades, which stirred up intellectual as well as commercial activity. This intellectual activity, as well as the fruits of commercial expansion, were—since learning was still a monopoly of the clerical order—weapons in the hands of the papacy, which in the 12th century attained the height of its power, if not of its pretensions. It is, indeed, impossible to exaggerate the influence of the Roman Church upon the development of Europe at this period. The popes, in fact, represented Europe in a sense that could not be predicated of the emperors; the terror of their spiritual power, their vast wealth derived from the tribute of all the West, their unique experience of international affairs, and—in the case of the great popes of this epoch—the superiority of their minds and characters, made them not only the spiritual rulers of Europe, but the effective centres of whatever political unity it possessed. As a Byzantine observer was to observe of Innocent III., they had become the successors of the Caesars rather than of Peter (see Papacy).

Growth of the royal power in France.

Nowhere were the beneficial effects of the Crusades seen more clearly than in France. The smaller fiefs were steadily absorbed by the greater lordships, which in their turn fell victims to the royal power. It might almost be said that "modern France is a creation of the Crusades." The effects of the crusading movement were felt in France as early as the reign of Louis VI. (1108–1137). Aided by his able minister Suger, Louis managed before his death to add to the possessions of his house the Île de France and a prospective claim to Poitou and Aquitaine. Under his successor Louis VII. (1137–1180) the consolidation movement was checked owing to the marriage of Eleanor of Aquitaine (after her divorce from Louis VII.) to Henry II. of England. By the addition of his wife's lands (Gascony and Guienne) to those which he had already inherited from his father and mother (Normandy, Anjou, Touraine and Maine) Henry was enabled to form the powerful though short-lived Angevin empire. But the lost ground was rapidly recovered by Philip Augustus (1180–1223), who took advantage of the weakness and folly of John of England, and before 1215 had united firmly to France Normandy, Maine, Anjou and Touraine. Louis VIII. and Louis IX. adhered firmly to the policy of Philip IV., and in 1258, by the treaty of Paris, Henry III. of England recognized the loss of Poitou. There thus remained to England out of the vast continental domains of Henry II. only Gascony and Guienne.

General results of the Crusades.

The rest of Europe was also in various degrees affected by the Crusades. While Spain was occupied in a crusade of her own against the Moors and gradually driving them into Granada, Germany, Italy, and to some extent England, were interested in, and influenced by, the Crusades against the Turks. During the absence of many of the nobles in the East the growth of towns and the development of the mercantile class proceeded without interruption. The trading classes demanded strong governments and equal justice, and vigorously supported the monarchs in their suppression of feudalism.

During the 12th and 13th centuries the Crusades thus proved a large factor in the commercial prosperity of the Italian maritime states; an "open door" between East and West was secured, and reinforcements from Europe were poured into Syria as long as the peoples of the West regarded the stability of the Latin kingdom of Syria as a matter of prime importance. During the crusading period a check was placed to the tide of Mahommedan conquest, while to the caliphate the Crusades proved a perpetual drain upon its material resources. To the Mahommedans the possession of the Holy Places by the Christians was as great a humiliation as their desecration by the Mahommedans was to the crusaders. Unfortunately the Crusades led to a disastrous schism between the Byzantine empire and western Christendom, which had calamitous results. The decay of the crusading spirit was a necessary result of the growth of the consolidation of the European nations, but the price paid was the fall of Constantinople and the establishment of the Turks in eastern Europe. The Crusades thus not only postponed the conquest of Constantinople by the Turks for some two hundred years, but led, as had already been said, to a vast expansion of commerce, as seen in the rapid growth and development of the Italian cities, and to a striking development of town life.

The struggle between the Empire and the papacy.

The Crusades had enormously strengthened the power and prestige of the papacy, and indirectly contributed to its victory over the Empire in the person of Frederick II. From the reign of the emperor Henry IV. to the death of Frederick II. in 1250 the struggle between the Empire and the papacy continued, and is coincident in point of time with the Crusades. The reign of Frederick Barbarossa (1152–1190) saw that struggle at its height, and during that reign it became apparent that the emperor's efforts to unite Italy and Germany under one crown were doomed to failure. The rise and success of the alliance of Italian republics known as the Lombard League no doubt contributed to the success of the papacy, but in their contest with the popes the emperors never had any chance of gaining a permanent victory. Frederick II. continued with great energy to attempt the hopeless task of dominating the papacy, but his possession of Sicily only made the popes more determined than ever to establish their predominance in Italy. Frederick's death in 1250 marked not only the triumph of the papacy in Italy, but also that of feudalism in Germany. He has been called the "most dazzling of the long line of imperial failures," and with him ends the Empire as it was originally conceived. Henceforward the Holy Roman Empire, which implied the unity of Italy and Germany, and the close alliance of pope and emperor, no longer exists save in name, and its place is taken by a glorified German kingship presiding over a confederation of turbulent German nobles.

Europe in the 14th and 15th centuries.

Thus with the later years of the 13th century Europe had arrived at the definite close of one epoch and the beginning of another. The period of the Crusades was over, the theory of the Holy Roman Empire had broken down. The period from the beginning of the 14th to the close of the 15th century might well be styled the latter days of medieval Europe.

During the 14th and 15th centuries the idea of regarding Europe as one state in which emperor and pope presided over a number of subordinate kings gave way before the spirit of nationalism and particularism. England, France and Spain were rapidly becoming strong centralized monarchies which stood in striking contrast to the weakened Empire. Partly no doubt owing to the failure of the Empire and papacy to work together, a great impetus had been given to the formation of national monarchies. While Frederick II. had failed, Louis IX. and Philip IV. of France, Ferdinand III. of Castile (1217–1252), James the Conqueror, king of Aragon (1213–1276) and Edward I. of England (1239–1307) succeeded in laying the foundations of strong monarchies which after two centuries of struggles with the dying efforts of feudalism were established on a firm basis. In spite of the intellectual activity and political developments which characterized the 13th, 14th and 15th centuries it remains true that the later middle ages were marked by the decay of those remarkable social and political forces which had been such striking characteristics of the earlier period (see Middle Ages).

Thus the 14th and 15th centuries have characteristics which differentiate them from all preceding and succeeding centuries,

Summary of the characteristics of the 14th and 15th centuries.

The triumph of the papacy over the Empire had been short-lived. Owing to the disturbed state of Italy, Clement V. was in 1305 compelled to take refuge at Avignon, and till 1377—a period known as the Babylonish captivity—the popes remained in France. While the Empire and papacy steadily decline, while the Byzantine empire falls before the Turks, strong monarchies are gradually formed in England, France, Spain, and Portugal, and in Italy the Renaissance movement covers the later years of the 15th century with glory (see RENAISSANCE). During these centuries there is common to Europe no one principle which is to be found in all kingdoms. But while the old system, founded on belief in the unity of Europe under the Empire and papacy, declines amid chaos and turbulence, there is much intellectual and political activity which portends the appearance of an entirely new state of things. The 14th and 15th centuries may truly be styled a period of transition.

The decline of the Empire, 1254-1519.

From the death of Conrad IV., the son of Frederick II., in 1254 to 1273, when Rudolph of Habsburg became king, chaos reigned in Germany, and the period is known as the Great Interregnum. The forces of decentralization strengthened themselves, and the emperors found that the formation of a strong and united German kingdom was an impossibility. Rudolph of Habsburg (1273–1291), realizing what were the limits of his power in Germany and the futility of attempting to establish his hold upon Italy, began that policy of family aggrandizement which was continued so notably by successive members of his house. His reign witnessed the firm establishment of the house of Anjou in Naples, and, after the Sicilian Vespers in 1282, the supremacy of the house of Aragon in Sicily. Refusing to follow the example of Frederick II. and to take part in distant expeditions, Rudolph conquered Austria, Styria, Carinthia and Carniola, Vienna became the capital of the Habsburg dominions in Germany, and his son Albert of Austria, who was king from 1298 to 1308, was careful to continue the policy of his father. Though no Habsburg was again elected to the imperial throne till 1438, when the long succession of emperors began which continued unbroken till 1742, the establishment of the Habsburgs in Austria by Rudolph proved an event of European importance. From that time the leading members of the Habsburg family never lost an opportunity of aggrandizement. In 1335 they received Carinthia, in 1363 the Tirol. While, however, the Habsburgs, the Wittelsbachs and later the house of Brandenburg were strengthening themselves, the Empire was steadily declining in power and influence. The 14th century saw Switzerland shake itself free from the Austrian house and establish its independence, which was, however, not formally acknowledged till the treaty of Westphalia in 1648.

During the 14th century the weakness of the Empire became more and more accentuated under the weak rule of Louis IV. On his death in 1346 his successor Charles of Luxemburg, known as the emperor Charles IV., made a celebrated attempt to form a strong centralized German monarchy. With that object he issued in 1356 the Golden Bull, by which it was hoped that all matters connected with the imperial election would be settled. The number of imperial electors was settled, and henceforth they were to consist of the archbishops of Cologne, Mainz and Trier, and of the king of Bohemia, the duke of Saxony, the margrave of Brandenburg and the count palatine of the Rhine. Charles hoped to concentrate gradually in his house all the chief German provinces, and having by the Golden Bull endeavoured to check the growth of the towns, he expected to establish firmly the imperial influence in Germany. But the towns were too strong to be coerced, and during his reign the Swabian cities formed a union; and though the marriage of his son Sigismund to the heiress of the king of Hungary and Poland, and the possession of Brandenburg, which fell to him in 1373, seemed steps towards the realization of his hopes, his death in 1378 left his work unfinished. Moreover, his son and successor Wenceslaus (1378–1400) proved, like Richard II. of England and Charles VI. of France, unequal to the task of checking the growing independence of the nobles and the cities. The Hanseatic League (*q.v.*) was at the height of its power, and in 1381 the Rhenish towns formed a confederation. Wenceslaus, like Richard II., had fallen upon evil times. The advance westwards by the Turks occupied the attention of his brother Sigismund, now king of Hungary; he was himself unpopular in Bohemia, and at the same time was exposed to the intrigues of his cousin Jobst of Moravia, who had secured Brandenburg. In 1400 Wenceslaus was formally deposed by the electors, and spent the rest of his life in Bohemia, where he died in 1419. His successor Rupert of the palatinate reigned from 1400 to 1410, and during his reign the council of Pisa endeavoured to bring to an end the great schism which had followed upon the return of Pope Urban VI. from Avignon to Rome in 1377. Two popes had been elected, one living at Rome, the other at Avignon, and Christian Europe was scandalized at the sight of two rival pontiffs. On Rupert's death the electors chose Sigismund the brother of Wenceslaus, and he ruled as emperor from 1411 to 1437.

Decline of the papacy.

Sigismund, emperor, 1411-1437.

The taking of Constantinople by the Turks.

Thus at the beginning of the 15th century the papacy was seen to have fallen from the high position which it occupied at the time of the death of Frederick II. The Avignon captivity followed by the great schism weakened its temporal as well as its spiritual power and prestige, while national developments and dynastic ambitions, such as led to the Hundred Years' War, diverted men's minds from religious to purely temporal concerns. The work of Wycliffe and Hus illustrated not only the decline of papal prestige but also the general opinion that reform in the papacy was necessary. Sigismund's reign as emperor was rendered noteworthy by the part which he took in the council of Constance (*q.v.*), and by his successful efforts to suppress the Hussite movement in Bohemia (see HUSSITES). That country on the death of Wenceslaus in 1419 fell to Sigismund, but it was not till 1431, after a long and sanguinary war, that the opposition to the union of Bohemia with the Empire was suppressed. Led by Žižka and other able chiefs, the Bohemians who were Slavs utilized the Hussite movement in a vigorous attempt to secure their independence. In 1436 Sigismund was formally acknowledged king of Bohemia. In 1431, the year of the final overthrow of the Bohemians and the Hussites, he opened the council of Basel (*q.v.*), being resolved to establish a religious peace in Europe and to prevent the Hussite doctrines from spreading into Germany. In 1438 Sigismund died, leaving Germany involved in a quarrel with the papacy, but having successfully withstood the efforts of the Bohemians to acquire independence. Sigismund's death marks an epoch in the history of the Empire, for his successor Albert of Austria proved to be the first of a long line of Habsburg emperors. Albert himself reigned only from 1438 to 1440, but on his death the imperial dignity was conferred upon another member of the Habsburg house, Frederick, duke of Styria and Carinthia, known as the emperor Frederick III. With his accession the imperial throne became practically hereditary in the Habsburg family. Frederick's long reign, which lasted from 1440 to 1493, was of little benefit to Germany; for he showed no administrative skill and proved a weak and incapable ruler. Undoubtedly his lot fell upon evil days, for not only were the Turks at the height of their power, but both Bohemia and Hungary gave him much anxiety. The imminent fall of Constantinople, the last barrier of Christendom against Islam in the East, was a threat not only to the Empire, but to all Christian Europe. But western Europe was too much occupied with internecine feuds to unite effectively against the common enemy. In vain the emperor John VI. had gone in person to solicit aid at the various courts of the West; in vain he had humbled himself to pay the price asked, by subscribing to the abnegation of the distinctive tenets of the Orthodox Church, which secured the ephemeral reunion of Christendom at the council of Florence (1438). The crusading spirit was dead; the European powers stirred no finger to save the imperial city; and in 1453 Sultan Mahommed II. rode through the breach over the body of the last of the Eastern

Caesars, and planted the crescent on the dome of the metropolitan church of Eastern Christendom (see TURKEY; and ROMAN EMPIRE, LATER).

The fall of Constantinople marked the definite establishment on European soil of a power alien and hostile to all that was characteristic of European civilization. It was a power, moreover, which could live only by expanding; and for over two hundred years to come the dread of Ottoman aggression was a dominant factor in the politics of eastern Europe. The tide of Turkish advance could have been arrested by a union of Europe; but the appeals of Pope Nicholas V. fell unheeded upon a sceptical age, intent only on its dynastic and particularist ambitions. To the emperor the ousting of the Ottomans from the Balkan peninsula seemed of less importance than the consolidation of the Habsburg power in Germany, and its extension over the neighbouring kingdoms of Hungary and Bohemia. France was exhausted by the long agony of the Hundred Years' War, which came to an end the very year of the fall of Constantinople, and the French kings—especially Louis XI. (1461–1483)—were busy for the rest of the century crushing out the remnants of feudalism and consolidating the power of the monarchy. As for Italy, with its petty tyrants and its *condottieri*, there was no hope of uniting it for any purpose whatever, least of all a religious purpose, and Spain was busy with her own crusades against the Moors. The exploits of John Hunyadi, king of Hungary, against the Turks, therefore, remained isolated and unsupported. In 1456 he checked their advance northwards by a brilliant victory which led to the relief of Belgrade; but he died the same year, and his death was followed by a struggle for the succession between Hungarians and Bohemians. The racial and religious quarrels of the Balkan peoples had made it possible for the Turks to obtain a foothold in Europe; the jealousies and internecine struggles of the Christian states made possible the vast expansion of the Ottoman power, which in the 17th century was to advance the frontiers of Islam to those of Germany and to reduce the emperors, in their relations with the Porte, to the status of tributary princes.

The victory of Ladislaus, son of Casimir, king of Poland, who succeeded in uniting in his own person the crowns of Bohemia, Hungary and Poland, threatened to result in the permanent independence of those countries of the house of Habsburg. But in 1490 Ladislaus was compelled by Maximilian, son of Frederick III., to sign the treaty of Pressburg, providing for the eventual succession of the Habsburgs to Hungary and Bohemia.

Consolidation of the Habsburg power.

In other ways the reign of Frederick III. laid the foundations of the greatness of his family. In 1477 Maximilian married Mary, duchess of Burgundy and heiress of Charles the Bold, and through her the Habsburgs obtained Franche Comté and the Netherlands. The line, *Bella gerant alii, tu felix Austria nube*, well described the method by which the house of Habsburg increased its possessions and established its fortunes. A.E.I.O.U. (*Austriae est imperare orbi universo*) was the device invented for his house at that time by Frederick III. and it proved no idle boast. Maximilian I., the son of Frederick III., reigned from 1493 to 1519, and during his reign Europe passed from medieval to modern times. Some reforms in the Empire were carried out, but the events of his reign made it apparent that it was impossible to set up a centralized monarchy in Germany (see MAXIMILIAN I.; GERMANY and AUSTRIA: *History*).

France in the 13th and 14th centuries.

Far different developments were taking place during the 14th and 15th centuries in France, Spain, the Scandinavian north and in England. During the greater part of the 14th century France was engaged in foreign wars and in internal complications, and it seemed doubtful if a strong centralized monarchy would be firmly established. The failure of Philip VI. (1328–1350) and John (1350–1364) in their contest with England weakened the central power in France, and, though Charles V. (1364–1389), owing to his own sagacity and the weakness of the English government, managed to regain for France many of her lost provinces, the French power both at home and abroad again declined under the rule of the incapable Charles VII. (1380–1422). In fact the year 1422 may be said to mark the lowest stage in the history of the French monarchy. From that year an improvement gradually set in. A national sentiment, as exemplified in the career of Joan of Arc (*q.v.*), was developed; an alliance, essential for the successful expulsion of the English from France, was made in 1435 between the king of France and the duke of Burgundy; and in 1439 the famous ordinance empowering the king to maintain a standing army and to raise money for its maintenance was passed at Orleans by the states-general. These measures proved successful; in 1453 the Hundred Years' War came to an end, and Louis XI. managed between 1461 and 1483 to establish an absolutism in France on sure foundations. Under his successor Charles VIII. (1483–1498), Brittany was annexed, and France, secure from all danger of a feudal reaction, entered with the invasion of Italy in 1494 by Charles VIII. upon modern times. A similar process is observable in England and Spain. In England the Wars of the Roses were followed by the establishment of a strong monarchy under Henry VII., while in Spain Ferdinand and Isabella established in place of anarchy the royal authority, and during their reign suppressed all attempts at provincial independence. In 1491 the consolidation of Spain was completed by the conquest of Granada. In 1397, by the union of Calmar, the three kingdoms of Norway, Sweden and Denmark were united under Eric XIII. This union was, however, short-lived, and in the early years of the 16th century came definitely to an end (see NORWAY; SWEDEN; DENMARK).

The close of the middle ages.

The close of the middle ages and the beginning of modern times was marked by several noteworthy events. The invention of printing, the discovery of America and the invasion of Italy by Charles VIII. all occurred before the end of the 15th century, while in the early years of the 16th century the ideal of civil and ecclesiastical unity was finally shattered by the Reformation and by the development of the modern states system, accompanied by the prominence henceforward attached to the question of the balance of power.

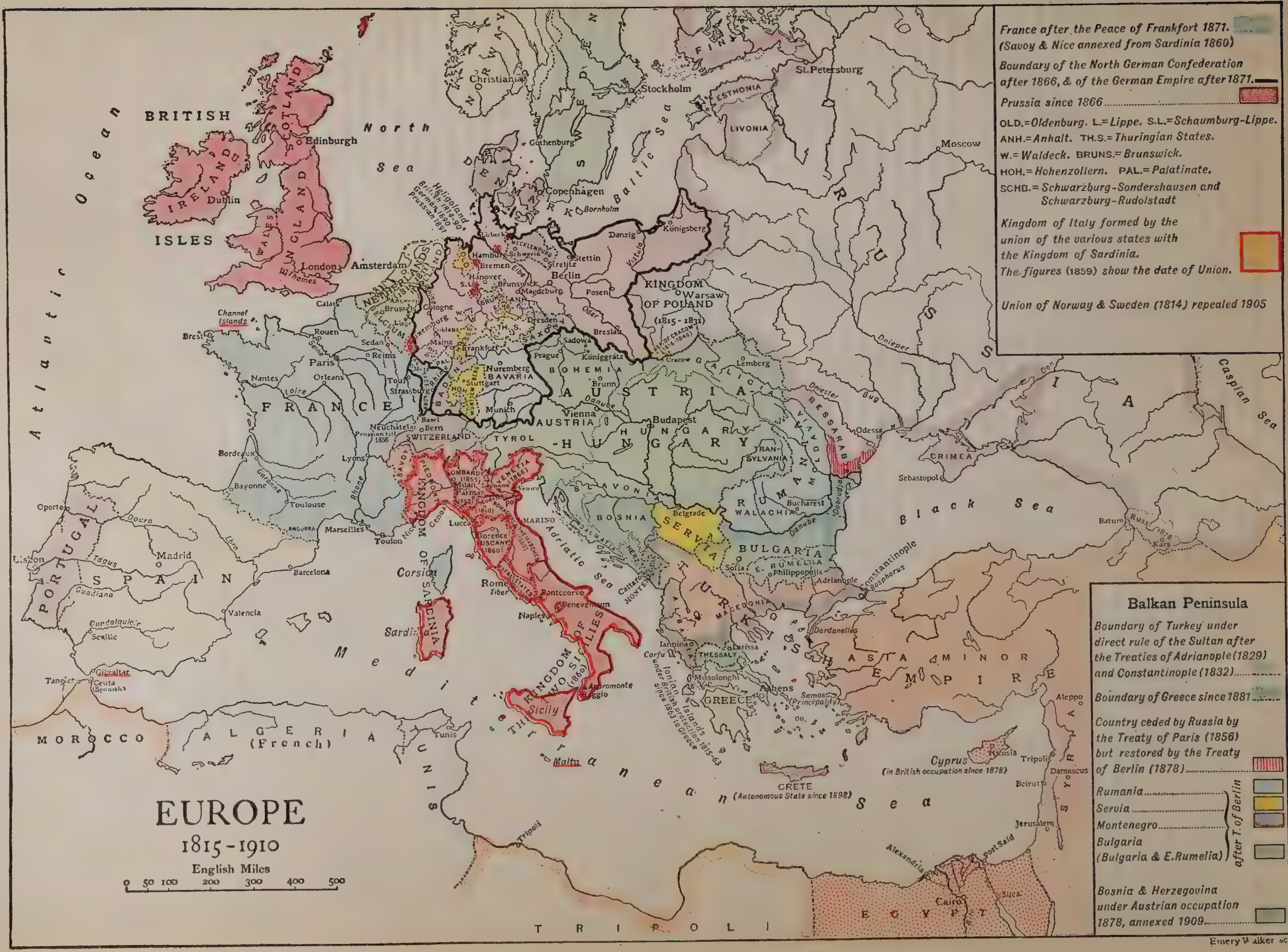
The Renaissance.

During the whole of the 15th century Europe had been affected by what is known as the Renaissance movement, which marked the transition from the medieval to the modern order. This movement, caused by the growth of learning, had its first home in Italy, which had witnessed a marvellous revival of interest in classical antiquity, in painting and in sculpture, accompanied by a keen intellectual activity in religious and political, no less than in literary matters. Criticism of existing beliefs was developed, knowledge became widely diffused, and, while the way was prepared for the substitution of individualism for the old ecclesiastical system, the development of commerce coincident with the discovery of America and the establishment of monarchical systems destroyed feudalism (see RENAISSANCE). The later years of the 15th, and the early years of the 16th, centuries may be described as the transition from medievalism to modern times, from feudalism to individualism, from the idea of a world church and a world empire to one in which national consolidation was the chief feature and monarchical government a necessity.

Summary of European history from 1500.

From the beginning of the 16th century Europe entered upon modern times. Many events marked the close of the middle ages. The discovery of America, the decay of Venice, the development of the European states system, the rise of diplomacy as a permanent international system (see DIPLOMACY), the wars of religion—all these are the general characteristics of the new period upon which Europe now enters. With the growth of monarchies arises the belief in the divine right of kings, the development of territorial sovereignty, and wars of ambition like those waged by Louis XIV.

With the 18th century democratic ideas first begin to appear side by side with the rule of the enlightened despots such as Frederick the Great, Catherine II. and Joseph II. The outbreak of the French Revolution brings to an end the old European system, upsets the ideas on which it was founded, and leads to important territorial changes.



EUROPE
1815-1910

English Miles
0 50 100 200 300 400 500
France after the Peace of Frankfort 1871.
(Savoy & Nice annexed from Sardinia 1860)
Boundary of the North German Confederation after 1866, & of the German Empire after 1871.
Prussia since 1866
OLD.=Oldenburg. L.=Lippe. S.L.=Schaumburg-Lippe.
ANH.=Anhalt. TH.S.=Thuringian States.
W.=Waldeck. BRUNS.=Brunswick.
HOH.=Hohenzollern. PAL.=Palatinate.
SCHB.=Schwarzburg-Sondershausen and Schwarzburg-Rudolstadt
Kingdom of Italy formed by the union of the various states with the Kingdom of Sardinia.
The figures (1859) show the date of Union.
Union of Norway & Sweden (1814) repealed 1905
Balkan Peninsula
Boundary of Turkey under direct rule of the Sultan after the Treaties of Adrianople (1829) and Constantinople (1832)
Boundary of Greece since 1881
Country ceded by Russia by the Treaty of Paris (1856) but restored by the Treaty of Berlin (1878)
Rumania
Servia
Montenegro
Bulgaria (Bulgaria & E.Rumelia)
after T. of Berlin
Bosnia & Herzegovina under Austrian occupation 1878, annexed 1909
BRITISH ISLES
SCOTLAND
IRELAND
ENGLAND
WALES
Edinburgh
Dublin
London
Thames
Atlantic Ocean
North Sea
NORWAY
SWEDEN
Christiania
Stockholm
Gothenburg
DENMARK
Copenhagen
Bornholm
Baltic Sea
FINLAND
St. Petersburg
ESTHONIA
LIVONIA
Moscow
RUSSIA
Heligoland British 1814-90 German 1890 Prussian 1891
Amsterdam
NETHERLANDS
BELGIUM
Brussels
Liege
Luxemburg
Lubeck
Hamburg
Bremen
Elbe
Hanover
Brunswick
Magdeburg
MECKLENBURG SCHWERIN
Strelitz
Stettin
Berlin
Danzig
Vistula
Königsberg
Posen
Oder
Breslau
KINGDOM OF POLAND (1815-1831)
Warsaw
REP. OF CRACOW (1815-1846)
Cracow
Cologne
Coblenz
Mainz
Frankfort
Dresden
SAXONY
Sadowa
Königgrätz
Prague
BOHEMIA
Brunn
Nuremberg
BAVARIA
Stuttgart
WURTEMBERG
BADEN
Munich
Strassburg
Danube
Vienna
AUSTRIA-HUNGARY
GALICIA
Lemberg
Budapest
TRANSYLVANIA
TYROL
SWITZERLAND
Basel
Bern
Neuchatel Prussian till 1856
Calais
Channel Islands
Brest
Rouen
Seine
Paris
Sedan
Reims
Toul
Nantes
Loire
Orleans
FRANCE
Lyons
Rhone
Bordeaux
Garonne
Bayonne
Toulouse
Marseilles
Toulon
ANDORRA
Oporto
Douro
Lisbon
Tagus
PORTUGAL
Madrid
SPAIN
Ebro
Guadiana
Guadalquivir
Seville
Barcelona
Valencia
Gibraltar
Tangier
Ceuta (Spanish)
MOROCCO
ALGERIA (French)
TUNIS
Tunis
Tripoli
TRIPOLI
EGYPT
Alexandria
Cairo
Port Said
Suez
SAVOY
PIEDMONT
KINGDOM OF SARDINIA
Nice
Genoa
LOMBARDY (1859)
Milan
Parma
Modena
VENETIA (1866)
Venice
Lucca
ROMAGNA
Florence
TUSCANY (1860)
THE MARCHES (1860)
SAN MARINO
PAPAL STATES
Rome
Tiber
Pontecorvo
Benevento
Naples
KINGDOM OF THE TWO SICILIES (1860)
Aspromonte
Reggio
Sicily
Malta
Corsica
Sardinia
Mediterranean Sea
Adriatic Sea
SLAVONIA
DALMATIA
BOSNIA
HERZ.
Cattaro
MONTENEGRO
Belgrade
SERVIA
RUMANIA
WALACHIA
MOLDAVIA
Bucharest
Dobrudja
BESSARABIA
Dniester
Bug
Odessa
Dnieper
Don
CRIMEA
Sebastopol
Black Sea
Caspian Sea
Batum
Kars
Russ. 1878
BULGARIA
Sofia
E. RUMELIA
Philippopolis
Adrianople
Constantinople
Bosphorus
Dardanelles
TURKISH EMPIRE
ALBANIA
MACEDONIA
Iannina
Corfu
Ionian Islands under British protection 1815-63 since 1863 to Greece
THESSALY
Larissa
Missolonghi
GREECE
Athens
Samos (Principality)
CRETE (Autonomous State since 1898)
Cyprus (in British occupation since 1878)
Nicosia
ASIA MINOR
Aleppo
SYRIA
Tripoli
Beirut
Damascus
Jerusalem

Emery Walker sc.

The balance of power and the beginning of modern times.

The advent of the Reformation, as has already been pointed out, finally shattered that ideal of civil and religious unity which had been the main characteristic of the middle ages. Thus from the beginning of the 16th century Europe sees the development of the modern states system and becomes the scene of national wars in which the idea of the balance of power was the leading principle (see Balance of Power). That principle did not allow of the recognition of the rights of nationalities, and till the wars of the French Revolution the interests of the various European states were usually subordinated to the dynastic aims of their rulers. During the ensuing centuries the balance of power in Europe was seriously threatened; during the first half of the 16th century by Charles V., during the latter half of the same century by Philip II., in the first half of the 17th century by the house of Habsburg, and in the latter half by Louis XIV.

The close of the Seven Years' War seemed to prelude a period of British ascendancy on the continent, but that danger passed away with the outbreak of the war between Great Britain and her American colonies. For a time the balance of power in Europe was completely shattered by Napoleon's brilliant conquests, but his fall, while to a great extent restoring the political equilibrium, gave an opportunity to Alexander of Russia to dominate Europe. Thus the 16th century definitely marked the beginning of modern times both from a political as well as from a religious point of view.

The Reformation and the rivalry of Charles V. and Francis I.

With the accession of Francis I. to the French and Charles V. to the imperial throne began the long rivalry between France and the house of Habsburg, which continued with few interruptions till 1756. In the struggle between Charles V. and Francis I., which began in 1521, the former had the advantage, and the battle of Pavia (1525) seemed likely to lead to the permanent pre-eminence of the imperial cause. But unexpected allies were found by Francis in the German reformers and in the Turks. The nailing by Luther of his ninety-five theses to the door of the Wittenberg church, followed by the decisions of the diet of Worms in 1521, led to a rapid development of Lutheran opinions among the princes of the north of Germany. Charles V.'s victory over France in 1525 and his reconciliation with the papacy in 1529 seemed, however, to prelude the suppression of the Protestant opinions. But Francis I. again took up arms, while the invasions of Suleiman the Magnificent, during whose reign the Turkish influence was not only felt in Hungary and Germany but extended to the west basin of the Mediterranean, forced Charles to temporize. When in 1544 the conclusion of the peace of Crépy with Francis I. enabled Charles to turn his attention to the rapid growth of Protestantism, it was too late to adopt with any chance of success a policy of suppression. In 1552 he found himself compelled to agree to the treaty of Passau which implied the adoption of a policy of compromise, and which in 1555 was followed by a definite arrangement at Augsburg, which admitted the principle of *cujus regio, ejus religio.* Till the outbreak of the Thirty Years' War in 1618, the settlement of Augsburg tended to keep peace between the Catholics and the Protestants. Equally unsuccessful were Charles's later efforts against France; in 1553 he lost Metz, Toul and Verdun, and in 1556 he retired to Spain, leaving the Empire to his brother Ferdinand, and Spain, the Netherlands and his Italian possessions to his son Philip. The latter, after winning the battle of St Quentin in 1557, made peace with Henry II. of France by the treaty of Cateau-Cambrésis in 1559.

The Counter-Reformation.

By this peace a term was put to the struggle between France on the one hand and the Empire and Spain on the other, and the kings of France and Spain were enabled to turn their attention to the issues raised by the immense growth of Protestantism since 1521. While Charles V. had been engaged in his struggles with the Turks and the French, Protestantism had rapidly developed. In Sweden, in Denmark, in England, in various parts of Germany, and in France Protestant principles had been largely adopted (see Reformation).

Though the forces of Roman Catholicism had for a time been vanquished they had still to be counted with. From the middle of the 16th century the growth of Protestantism began to be checked, and a period of reaction against the Reformation set in. For a time it seemed that the efforts of Roman Catholicism would be successful and that the cause of Protestantism would be permanently weakened. The papacy since the beginning of the 16th century had reformed itself, the council of Trent (*q.v.*), which closed its sittings in 1564, had given Roman Catholicism a "clearly and sharply defined body of doctrine," and the Catholic Church had become "more united, less wordly, and more dependent on herself." In this work of reorganization the Jesuits had played a great part, and the success of the Counter-Reformation was largely due to their efforts (see Jesuits). Paul III., Pius IV. and V., Gregory XIII. and Sixtus V. are all good examples of the reforming popes of the 16th century. Under them the Jesuits worked; they restored Catholicism in Poland, Bohemia and south Germany; and supported by them the Inquisition crushed Protestantism out of Spain and Italy.

The aims of Philip II.

The interest of the Counter-Reformation movement from 1559 to 1618 centres round Philip II. of Spain. While Pius V. (1566–1572) is the best example of the Counter-Reformation popes, Philip II. took the lead among European Catholic monarchs in working for the extinction of Protestantism. His recovery of the southern Netherlands for the Catholic cause, his attempt to conquer England, his intention of subjugating France, were all parts of a scheme to advance simultaneously his own power and that of the Counter-Reformation.

Circumstances combined to aid Philip, and while he was endeavouring to carry out his political aims, the Jesuits were busily occupied in winning back large portions of Europe to allegiance to the papacy. But failure attended most of Philip's projects. Though he succeeded in recovering the southern or Walloon provinces of the Netherlands, he was unable to conquer the northern provinces, which under William of Orange formed themselves into the Dutch republic (see Holland: *History*). His scheme for the conquest of England failed, and the Spanish Armada was totally defeated in 1588. Nor was his plan for the subjection of France more successful. After a tedious civil war between the Catholics and Huguenots, Henry of Navarre appeared as a national leader, who, having overcome the armies of the League with which Philip was allied, concluded the peace of Vervins in 1598. In consenting to this treaty Philip acknowledged that his schemes for the establishment of his influence over France had failed. Thus, when the 16th century closed, England's independence was assured, the Dutch republic was established, the French monarchy was rapidly recovering from the effects of the religious wars and the decadence of the Spanish monarchy had set in. But the religious question was still unsettled, religious passions ran high, and no satisfactory agreement between Catholicism and Protestantism had been, or seemed likely to be arrived at. The successes of the Counter-Reformation under the Jesuits and such men as Ferdinand of Styria (afterwards the emperor Ferdinand II.) and Maximilian of Bavaria only roused strenuous opposition on the part of Calvinist princes such as Frederick IV., the elector palatine.

The approach of the Thirty Years' War.

Various events had indicated the approach of a final struggle between Protestantism and Catholicism during the early years of the 17th century. The seizure of Donauwörth, a town with Protestant sympathies, by Maximilian of Bavaria in 1607, the formation of the Protestant Union in 1608 and of the Catholic League in 1609, the questions raised in 1609 by the Cleves-Jülich affair, the preparations of Henry IV. of France for an anti-Habsburg campaign—all these showed that the political atmosphere was charged with electricity. Till 1618, however, an open conflict between Protestantism and Catholicism in Germany was averted; in that year the acceptance, by the Calvinist Frederick, the elector palatine, of the crown of Bohemia, proved the starting-point of the Thirty Years' War.

The Thirty Years' War.

Till the death of Gustavus Adolphus in 1632 that war preserved a religious or semi-religious character. The emperor Ferdinand II., Philip III. of Spain and Maximilian of Bavaria undoubtedly hoped to suppress Protestantism in Germany, while Wallenstein, the great imperial general, was prepared to conquer Denmark, Sweden and Norway, and to convert the Baltic into an Austrian lake. Though the resistance of Christian IV. of Denmark was vain, the jealousy felt by the Catholic princes of Wallenstein and the skill of Gustavus Adolphus caused the total failure of these ambitious schemes. All hope of seeing the imperial flag waving over the Baltic was dispelled by the victory of Breitenfeld, and that of Lützen in 1632, and though Gustavus Adolphus fell in the last-named battle, he had saved north Germany from falling into the hands of the Jesuits.

Entry of France into the war.

With his death the Thirty Years' War became in the main a political struggle between France and the Habsburgs—a continuation of the wars of Francis I. and Henry II. against Charles V., and of the war between Henry IV. and Philip II. Ferdinand II. had attempted to carry back the religious history of the Empire more than seventy years, and had failed. He had endeavoured to make the Empire a reality and to revive and carry out the designs of Charles V. His failure was now complete. The edict of Restitution issued in 1629 remained a dead letter, and from 1632 to 1648 he and his successor Ferdinand III. had to employ all their energies in defending their possessions from the attacks of the French and Swedes.

The death of Gustavus Adolphus followed in 1634 by the assassination of Wallenstein proved an admirable opportunity for the entry of France into the Thirty Years' War. And till 1648, in spite of occasional reverses, the French and their allies gradually wore down their adversaries. After the death of Henry IV. in 1610 France had temporarily retired from a foremost place in the politics of Europe, and for some thirty years her ministers were busy in coercing the Huguenots and establishing the supremacy of the crown which was threatened by the nobles. Once united at home France was ready and eager to seize the opportunity for inflicting a severe blow upon the Habsburgs in Spain and Austria. The time for such action was well chosen. Austria was weakened by the war which had been waged since 1618, while Spain, exhausted by her efforts in the preceding century, had entered upon a long period of decay, and was about to see Portugal regain its independence. The Protestant princes in the north of Germany were ready to ally with France and Sweden against the emperor, even the Catholic Bavarian duke was to prove a doubtful ally of the Habsburg house. In 1642 Richelieu and in 1643 Louis XIII. died, but though Louis XIV. was an infant, and the French nobles by their cabals hindered the work of the regency, Mazarin successfully carried out the anti-Habsburg policy of his predecessors and brought the war against Austria to a successful conclusion. (See further THIRTY YEARS' WAR.)

The peace of Westphalia, 1648.

The peace of Westphalia in 1648 marked the virtual close of religious conflicts in Europe. It also marked the end of the attempts of the Habsburgs to establish a monarchical system throughout all Germany. By that peace the practical independence of the German princes was assured. Henceforward each prince could decide what form of religion was to be observed in his dominions. Thus Lutheranism, Calvinism and Catholicism were alike tolerated, and this recognition of the principle of compromise prepared the way for a wider toleration. Moreover, the petty principalities of the Empire, which numbered over 300, were allowed the right of concluding alliances with any foreign power, of making their own laws, and of carrying on war. Thus, in consequence of this most important concession of the emperor, the Empire lost all cohesion and became little more than a confederation. The states had firmly established their "liberties," the princes were now emancipated from imperial control, and it was evident that, unless by some means the house of Austria could re-establish its ascendancy, the eventual dissolution of the Empire must sooner or later follow. The peace of Westphalia thus marks for Europe, and in a special sense for Germany, the end of an important epoch. For Germany the changes introduced into its political life amounted to nothing less than a revolution, for there "the mainspring of the national life was broken." For Europe the Thirty Years' War brought to a close "the mighty impulses which the great movements of the Renaissance and Reformation had imparted to the aspirations" of men in all parts of the western world.

The treaties of the Pyrenees and Oliva.

It was not, however, till the treaties of the Pyrenees (1659) and Oliva (1660) were signed that the echoes of the Thirty Years' War died away, and Europe entered upon a period in which the political ambitions of Louis XIV. threatened the interests of Europe and absorbed the attention of all European statesmen. During the intervening years from 1648 to 1659 Spain and France continued the struggle, while Charles X. of Sweden in 1654 entered upon a career of aggression and conquest in the north of Europe, which was only ended with his death on the 23rd of February 1660. Upon the balance of power in the north of Europe the wars of Charles X. had little permanent effect, and the peace of Oliva to a great extent merely marked the restoration of the *status quo*. But the peace of the Pyrenees was far more important. During its struggle with France, Spain found itself also involved in hostilities with England, and the real rottenness of the Spanish monarchy became rapidly apparent. Any assistance which might have been hoped for from the emperor was prevented by the formation of leagues of German princes—lay and ecclesiastical—in 1657 and 1658, which had the full support of France. The effect of the formation of the second league was at once apparent: all hope of assistance to Spain from the emperor was seen to have disappeared, and the conclusion of a pacific settlement between France and Spain was at once arrived at. The peace of the Pyrenees was a triumph for the *Rheinbund*, no less than for France.

The age of Louis XIV.

With the beginning of the personal rule of Louis XIV. in 1661, and the return of Charles II. to England in 1660, a new period in the history of personal monarchy in Europe began. At the time of the peace of Westphalia the monarchy in Europe was under a cloud. In England the cause of Charles I. was lost in France the Fronde was holding its own against Mazarin; in Germany the princes had triumphed over the emperor; even in Russia the nobles were aiming at the curtailment of the power of the crown. But from 1660 it became evident that these attempts to secure the curtailment of the monarchical power were, with few exceptions, not destined to be successful. Though all chance of the establishment of a strong central authority in Germany had disappeared, the various states composing the Empire now entered upon a new period in their history and speedily formed miniature despotisms. Of these Brandenburg, Saxony and Bavaria were the most important. In Denmark Frederick III. made his crown hereditary, and his establishment of an absolutism was imitated by Charles XI. of Sweden a few years later.

Thus when Louis XIV. took into his own hands the government of France, the absolutist principle was triumphant all over Europe. The period of his personal rule lasted from 1661 to his death in 1715, and is known as "the age of Louis XIV." During that period France was the leading monarchy in Europe, and the most conspicuous not only in arms but also in all the arts of civilization. While Turenne, Luxemburg, Villars and many others exemplified, till the rise of Marlborough, the pre-eminence of French generals, Pascal, Racine, Corneille, Molière and Fénelon testified to the commanding position taken by France in the world of literature. The building of Versailles and the establishment of the French court there was an event of importance not only in the history of France, but also in the history of Europe. The history of Europe may without exaggeration be said during the reign of Louis XIV. to centre round Versailles.

The political condition of Europe, 1661-1688.

During his reign France took the lead in European politics, and established her supremacy all the more easily, owing partly to the weakness of most of the European countries, partly to the aggressions of the Turks, whose invasions of eastern Europe occupied from 1683 to 1699 the attention of the Poles and of the Austrians. The weakness or neutrality of the various European states was due to various causes. England was prevented till 1689 from taking a part in opposing the ambitious schemes of Louis XIV. owing to the personal aims of Charles II. and James II. Philip IV. and Charles II. of Spain could do nothing to resist the growing ascendancy of France, owing to the increasing weakness and rapid decadence of Spain, whose disappearance from the rank of great powers was one of the most striking features in the history of Europe during the second half of the 17th century. The weakness of Germany from the peace of Westphalia to the end of the century, due partly to the establishment of the independence of the princes of the Empire, partly to the unrest in Hungary, partly to the aggressions of the Turks, was obviously an immense gain to Louis XIV.

Louis' aggressions.

Realizing the strength of his own position and the weakness of that of most of the European states, he entered in 1667 into the Devolution war and secured several fortresses in the Spanish Netherlands. From 1672 to 1678 he was again at war with Holland, and from 1673 with the emperor, Spain and Brandenburg as well. At the same time the Turks invaded Poland, but were successfully resisted by John Sobieski. In 1676, however, they made the favourable treaty of Zurawna, securing Kamenets and portions of Podolia and the Ukraine. Thus, while the Turks were threatening the independence of eastern Europe, Louis XIV. was attacking the independence of western Europe. In 1678 he made the treaty of Nijmwegen, securing great advantages for France. Till the end of the century Europe was faced with two serious problems: Could she successfully cope with the Turks on her eastern frontier? And could she resist the continued aggressions of France on her western frontier? Consequently the years from 1678 to the end of the century were of vital importance to the European world. For during that period the French and Turks made unceasing efforts to extend their frontiers at the expense of Germany. Encouraged by the weakness of the chief European states, Louis set up the Chambers of Reunion, seized Strassburg in time of peace and attempted to annex Luxemburg. At the same time it seemed that an independent Gallican Church would be set up, and that Louis, like Henry VIII., would sever all connexion with Rome. The persecution of the Jansenists and the revocation of the edict of Nantes in 1685 established something akin to religious uniformity in France. Buoyed up by his successes abroad and at home, and conscious that he had nothing to fear from England or from Spain, Louis prepared to carry out his schemes, with regard to the extension of his territory eastwards, at the expense of Germany. Simultaneously with Louis' aggressions in western Europe, the Turks had made an attempt to capture Vienna in 1683. Fortunately the efforts of the emperor Leopold, aided by John Sobieski, king of Poland, were successful, and the Turkish tide of conquest was gradually but successfully checked. It was not, however, till the accession of William III. to the English throne that the tide of French conquest in western Europe was in like manner successfully resisted, and it was not till the treaty of Ryswick in 1697 that Louis realized that Europe had set a limit to his conquests. That treaty inflicted a blow on the prestige of France, just as the treaty of Karlowitz, concluded in 1699, was an important step in the decline of the Ottoman power. By that treaty, which marks a definite beginning in the history of the Austro-Hungarian monarchy, the hands of the emperor were freed, and he was able to devote his attention to the Spanish succession question, which already engrossed the attention of all Europe.

The Spanish Succession War.

The decadence of Spain had been obvious to all Europe since the middle of the century, and in anticipation of the death of the Spanish king Charles II., Louis XIV. and William III. had made a partition treaty in October 1698, which was superseded in March 1700 by a second partition treaty. However, on the death of King Charles on the 1st of November 1700 Louis repudiated the partition treaties and accepted the crown of Spain for his grandson Philip, who became Philip V. of Spain. Not content with this success Louis committed a number of aggressive acts which led to the War of the Spanish Succession in 1702. That war continued till 1713, when the treaty of Utrecht, followed in 1714 by the treaties of Rastadt and Baden, ended a struggle which had many results of vital importance to Europe. Great Britain, strengthened by the possession of Gibraltar and Minorca, by her establishment in Canada, and by trading rights in South America, henceforward stood forth as a rising colonial power to whom the command of the sea was essential. Austria obtained not only Belgium, which she held till the French Revolution, but also a firm foothold in Italy, which she maintained till 1859. To Spain the war indirectly brought unexpected benefits. Freed from her expensive possessions in Belgium and Italy, and now ruled by a new dynasty, Spain, so far from meeting with the fate which later attended Poland, entered upon a new period in her career, and throughout the 18th century showed considerable power of resistance to the colonial policy of Great Britain.

The 18th century.

With all its defects the treaty of Utrecht proved in many ways an excellent settlement. Till 1740, although a few short wars took place, Europe as a whole enjoyed peace. But with the settlement of Utrecht Europe seemed to have lost all touch with the high ideals which occasionally, as in the career of Gustavus Adolphus, or in the English great rebellion, or in the defence of Vienna by John Sobieski, were met with. The 18th century was marked by the dominance of a perverted system of the balance of power, which regarded such acts as the Prussian seizure of Silesia and the partition of Poland as justifiable on the ground that might is right.

European politics—1715-1740.

Before many years had passed after the treaty of Utrecht it became evident that two new nations were forcing themselves into the front rank of European powers. These were Russia and Prussia. The treaty of Nystäd in 1721 was to the north of Europe what the treaty of Utrecht was to the western and southern nations. It marked the decline of Sweden and the rise of Russia, which henceforth played an important part in European politics. Nevertheless till 1740 with the exception of the short Polish Succession War 1733–35 and the equally short war of 1737–39, in which Russia and Austria fought against Turkey, no general European struggle took place. That this was so was due in great measure to the alliance of 1717 between Great Britain and France, to the subsequent peace policy upheld by Walpole, Fleury, Patiño and Horn (the English, French, Spanish and Swedish ministers), to the hostility between the courts of Vienna and Madrid—only momentarily healed by the treaty of Vienna in 1725—and to the uncertain character of Russian politics.

During those years from 1713 to 1740 the great powers were slowly forming themselves into groups, bound together by motives of interest. Thus Spain and France after 1729 began to realize that both countries were interested in checking Great Britain's colonial developments, while Spain was also ready to seize every opportunity of increasing her possessions in Italy at the expense of Austria.

1740 a new epoch.

With the year 1740 Europe entered upon a new epoch. The rivalry of Austria and Prussia for the leadership of Germany definitely began, and the struggle between Great Britain and France for supremacy in India, Canada and the West Indies entered upon an acute phase. The War of the Austrian Succession (1740–48) holds therefore an important place in the history of Europe, and proved with the Seven Years' War, which was practically a continuation of it, of very real interest to Europe.

In April 1748 Great Britain, France and Holland signed preliminaries of peace, which on the 18th of October became the definitive treaty of Aix-la-Chapelle. The other powers concerned agreed to the treaty with reluctance, Spain on the 20th of October, Austria on the 8th of November, and Sardinia on the

The Treaty of Aix-la-Chapelle, 1748.

20th of November. By the terms of the peace France and Great Britain restored the conquests in America, India and Europe which each had made from the other. As regards the other powers, the peace left serious heart-burnings. Sardinia, though gaining territory in the Milanese, was compelled to relinquish her hold on Piacenza and its territory, and to restore Finale to Genoa; Austria had to yield Parma and Piacenza to Don Philip, and to recognize the loss of Silesia to Prussia; Spain was compelled to forgo all hope of regaining Gibraltar. The importance of the terms of this treaty lies in the fact that they indicate not only the lines followed by later European settlements, but also the tendency of later European developments. To Great Britain the treaty was only a pause in her expansion in Canada and in her advance to the establishment of her influence over all India. To France the treaty was equally a presage of future disasters in India and Canada. The retention of Silesia by Prussia was a pronouncement to all Europe that a new power had arisen which was destined in 1866 to oust Austria from her dominant position in Germany. The gains won by Sardinia, too, indicated that the real danger to Austria's position in Italy would come from the house of Savoy.

The Seven Years' War.

The Seven Years' War (1756–63) opened with a diplomatic revolution as important as that of 1717, when France and Great Britain made an alliance. In May 1756, as a reply to the treaty of Westminster the Second, made in January between Great Britain and Prussia, France and Austria, united in the treaty of Versailles. This unexpected union, which lasted till the French Revolution, between two powers which had been hostile to each other from the beginning of the 16th century, amazed all Europe. However, it had not the results expected, for although Russia, which was allied with Austria, sent large armies headed by capable generals to the war, Frederick the Great remained unconquered. This result was partly due to the English alliance, partly to the incapable French generals, and partly to the state of internal politics in Russia. The treaties of Paris (February 10, 1763) and Hubertsburg (February 15) marked an important stage in the history of Europe. By the first Great Britain emerged from the war an imperial power with possessions all over the world, by the second Prussia was recognized as the equal of Austria in Europe.

Close of the Seven Years' War to the French Revolution.

The period from the close of the Seven Years' War to the French Revolution saw all the special characteristics and tendencies of the 18th century in an accentuated form. Benevolent despotism found representatives not only in Frederick the Great and Maria Theresa, but also in Joseph II., Catherine II., Charles III. of Spain, and Leopold of Tuscany. Reforming ministers, too, flourished in the persons of Tanucci, Turgot, Squillaci, Florida Blanca, D'Aranda and many others. Instances, too, of the low state of political morality are to be found. The indefensible seizure of Silesia by Frederick the Great was followed in 1772 by the equally immoral partition of Poland, and it was clearly apparent that monarchs, though ostensibly actuated by a desire for the welfare of their subjects, were resolved that reforms should come from above and not from below. The chief European events during these years were (1) the partition of Poland; (2) the war of the Bavarian Succession; (3) the alliance of Russia with Prussia in 1764 and with Austria in 1781; (4) the entry of France and Spain into war between Great Britain and her American colonies; (5) the combined attack of Russia and Austria against Turkey (1787–92); (6) the Triple Alliance of 1788.

No sooner was the Seven Years' War ended than France and Spain, having made the third family compact in 1761 (the other two were signed in 1733 and 1743), prepared to take revenge upon Great Britain at the first favourable opportunity. The result of this determination, and of Great Britain's absorption in internal politics, was that Russia, Prussia and Austria were enabled to carry out the first partition of Poland in 1772. The entry of France into the American war of independence rendered it impossible for Joseph II., single-handed, to carry out his project of exchanging the Austrian Netherlands for Bavaria, and he was compelled, after a short war, to give up for the time his project and to agree to the treaty of Teschen (1779). The continuance of the American War proved of great value to Russia and enhanced her position in Europe. Not only had she, together with France, brought about the treaty of Teschen, but in 1780 she headed the league of armed neutrality, and between 1780 and 1784 annexed the Crimea. The conclusion of the war of American Independence enabled Great Britain to regain her influence in Europe, and when Russia and Austria combined to attack Turkey, and when France threatened to re-establish her influence in Holland, Pitt formed with the Prussian king and the stadtholder the famous Triple Alliance of 1788. During the ensuing four years the influence of that alliance made itself felt in an unmistakable way. All hope of the establishment of French influence in Holland was destroyed; Denmark was forced to relinquish an attack on Sweden, then at war with Russia; and after Leopold of Tuscany had succeeded Joseph II. as emperor in 1790, the revolution in the Netherlands was brought to an end. Moreover, through the influence of Leopold the hostility of Prussia to Austria was removed, and the two powers in July 1790 made the treaty of Reichenbach. Great Britain, the chief member of the Triple Alliance, had supported the pacific solution of all these questions so menacing to European peace, and Pitt was aided in his policy by the emperor Leopold, who in 1791 made the treaty of Sistova with the Turks. Danger to the peace of Europe was, however, caused by the attempt of the Spaniards to annex Nootka Sound, and by the continuance of the war between Russia and Turkey. The former difficulty was, however, removed in November 1790 by an agreement between Great Britain and Spain, and in January 1792 Russia made the treaty of Jassy with Turkey.

French Revolution, 1789.

Instead of Europe remaining at peace the year 1792 saw the beginning of a series of wars which did not come to a final conclusion till the battle of Waterloo. While the east of Europe was engaged in war, and while the Triple Alliance was busy attempting to restore peace to Europe, the French Revolution had broken out in 1789. The assistance given by France to the American colonists had brought the country to bankruptcy, and no course was left to Louis XVI. except to summon the states-general in May 1789. In that year a revolution against the reforms of Joseph II. had taken place in the Netherlands, and a revolution was being prepared in Poland for the overthrow of the aristocratic constitution and for the establishment of an hereditary monarchy. At first the revolution in France was entirely occupied with internal reforms, but after the dissolution of the Constituent Assembly in September 1791 the Girondists, whose influence became paramount, determined by the advice of Brissot to insist upon a policy of menace towards the Empire which would inevitably lead to war. War would, they hoped, result in the downfall of monarchy in France. On the other hand, Lafayette and his party advocated war on the ground that it would strengthen the cause of monarchy. In April 1792 war was accordingly declared upon Austria, then in alliance with Prussia. After a short period of failure the French in September won the battle of Valmy, and in November the battle of Jemappes. French armies advanced to the Rhine, Belgium was occupied, the Scheldt was declared open, and Holland was threatened. In consequence of the danger to Holland, Pitt adopted a warlike tone, and in February 1793 France declared war upon Great Britain. In that war Spain, Sardinia and Tuscany joined, so that France was practically fighting all Europe. Nevertheless, owing to the want of union among the allies, to the Polish questions which distracted Prussia and Austria, and to the determination and patriotism of all classes in France, the allies were discomfited and the league of powers broken up in 1795, when the treaties of Basel were made. Only Great Britain, Austria and Sardinia remained in arms against France, which was till 1799 ruled by the Directory. The next few years witnessed a series of most startling events. The successes of Napoleon Bonaparte in the Italian campaigns of 1797 and 1798 led to the peace of Cherasco with Sardinia,

Opening of the war between France and Great Britain, 1793.

and the peace of Campo Formio with Austria. Only Great Britain remained at war with France. In 1799, taking advantage of the absence of Napoleon in Egypt, the Second Coalition was formed by Russia, Great Britain and Austria. Though the French were driven from Italy, Massena defeated the Russians in Switzerland, and the English were forced to retire from Holland. The return of Napoleon from Egypt was followed by the establishment of the Consulate in November 1799, by the overthrow of the Austrians at Marengo and Hohenlinden, by the treaty of Lunéville with the emperor, and by the treaty of Amiens in 1802 with the English government. (See FRENCH REVOLUTIONARY WARS.)

The treaties of Lunéville and Amiens.

The German Revolution.

Up to this point the Revolution may be said to have benefited Europe and to have shaken to its base the 18th-century ideas of government. During the years succeeding the peace of Campo Formio a revolution was effected in Germany. The Holy Roman Empire had become an anachronism, and as soon as France became possessed of the left bank of the Rhine it was obvious that the imperial constitution required revision. The jealousies existing among the German princes and the overthrow of Austria at Austerlitz enabled Napoleon to carry out a revolution in Germany according to his own ideas. At first, in 1804, new arrangements were made with regard to the character and formation of the diet. The constitution of that assembly was so altered that a Protestant majority free from Austrian influence was now assured. The middle states, such as Prussia, Baden, Bavaria, Württemberg and Hanover, received additions of territory, taken either from the ecclesiastical states or from the lands belonging to the imperial knights. After Austerlitz Napoleon in 1806 established the Confederation of the Rhine, and the Holy Roman Empire came finally to an end. A great European revolution had now been effected, but much remained to be done before a feeling of nationality could be aroused among the people of central Europe.

The causes of Napoleon's success.

Napoleon aims at the destruction of Great Britain.

Already before the peace of Amiens Pitt had tried to stir up national feeling in Austria and Prussia, the means which he suggested for opposing Napoleon being in great measure those which were adopted in 1813 and 1814. But during Pitt's lifetime central Europe was not moved by any feeling of nationality or of patriotism. During the war of the Second Coalition in 1799 Austria had acted without any regard for her allies, while Prussia, from motives of jealousy of and from want of confidence in Austria, had refused to move. It was not till the small states which hitherto had formed independent units had been destroyed and Austria and Prussia trampled under foot by Napoleon that a strong national spirit in Germany was evoked. Until the treaty of Tilsit had been signed in 1807 these was no visible growth of a national uprising in any part of Europe. During the intervening years Prussia had been crushed at Jena and her kingdom cut short (1806), while Alexander I. of Russia, after a fierce campaign against Napoleon, had agreed in 1807 to the treaty of Tilsit, which apparently placed Europe at the feet of France and Russia. Napoleon was, as he thought, now in a position to bring about the humiliation of Great Britain. Already in November 1806, realizing that he could not ruin England by direct invasion, he had issued the first Berlin Decree, which ordered the exclusion of British goods from the continent. The Continental System necessitated by the victory of Trafalgar was thus definitely set up. After Tilsit he proposed to become supreme in the Baltic, and, by securing the dependence of Spain and Portugal, to dominate the Mediterranean, and to resume his plans for conquests in the East, and for the destruction of the British power in India. Thus the effects of the British naval victories of the Nile and Trafalgar would be completely nullified, the Mediterranean would be closed to British ships, Great Britain's Indian possessions would be lost, and Great Britain herself would be forced by starvation into surrender. Fortunately for Europe various circumstances hindered the realization of these ambitious schemes. Alexander, who feared that the French emperor desired Constantinople, never proved a very helpful ally, the measures taken by Great Britain seriously interfered with Napoleon's schemes, and, before he had subjugated Spain, first Austria in 1809 and then Russia in 1812 offered an active resistance to his projects. The first note of opposition to Napoleon's plans was struck by Canning, when in 1807 he carried off the Danish fleet to England. Then the British fleet conveyed to Brazil in safety the Portuguese royal family when Portugal was invaded by Junot, while the surrender of 30,000 French troops at Baylen in July 1808, which was followed in August by the convention of Cintra, indicated that Spanish patriotism was, when roused, as effective as in the days of the Spanish Succession War. Austria was the first country to follow the example of Spain, and though she was defeated at Wagram and forced to accept Napoleon's hard terms, the national feeling aroused in Germany in 1809 rapidly developed. But Napoleon was apparently unconscious of the growth and importance of a national sentiment in any of the subject countries. In 1810 he had married Marie Louise of Austria, on the 20th of March 1811 a son was born to him, and he now seems to have resolved upon the establishment of a strictly hereditary empire with Paris its capital and Rome its second city. In extent, his empire would be vaster than that of Charlemagne, and the pope was to be completely subordinate to the emperor. This conception of the establishment of a reformed Holy Roman Empire with its centre at Paris did not appear unrealizable in 1811 when everything seemed to favour the new Charlemagne. Napoleon's power was apparently securely established, and during the years 1810 and 1811 he was again returning to his vast oriental designs. A sudden check, however, was about to be placed upon his ambitious schemes.

The triumph of "nationality."

The establishment of French influence in Italy and Germany had stirred up in both countries a national feeling, the growth of which was encouraged by the example of Spain. No greater mistake was ever made by Napoleon than when, ignoring the strength of the Spanish resistance, and the development of a national movement in Germany, he resolved to enter upon the Russian campaign and to march to Moscow. Unconsciously Napoleon "had called into vigorous life the forces of Democracy and Nationality in Germany and Italy." The failure of the Moscow campaign led at once to a national rising in Prussia, and as soon as Austria had united her forces with those of Prussia and Russia, the overthrow of Napoleon at Leipzig in October 1813 was the result; and "the imperial yoke was shaken from the neck of the German people." Napoleon's wars had roused feelings of patriotism in Italy, Germany, Russia and Spain. It was at least realized by the nations of continental Europe, what had long been apparent to Englishmen, that a nation to be strong must be united. To "the subversive cosmopolitanism" of the French Revolution was now opposed the modern idea of nationality, against which the Napoleonic legions hurled themselves in vain. (See NAPOLEON I.; NAPOLEONIC CAMPAIGNS; FRENCH REVOLUTION; ALEXANDER I., emperor of Russia; METTERNICH.) (A. HL.)

Reconstruction of Europe.

Congress of Vienna, 1814-1815.

The downfall of Napoleon involved that of the political system of Europe which he had constructed. The changes wrought by the revolutionary period in the old states system were, however, too profound to admit of any attempt at a complete restoration, even had the interests of the allied powers been consistent with such a course. The object of the four great powers in whose hands the settlement of Europe now lay, was rather, after taking precautions to confine France within her "legitimate boundaries," to arrange such a "just equilibrium" in Europe that no individual state should for the future be in a position to overset the balance of power. The first object was to be attained by the re-establishment of the ancient dynasty in France, as a guarantee to Europe against a renewal of the revolutionary propaganda; the second was the work of the congress of Vienna, by which, between September 1814 and June 1815, the reconstruction of Europe was taken in hand. The opening of the congress, in which for the first time all Europe seemed to be united for the friendly settlement of common interests, was hailed as the dawn of a new era. In a sense it was so; but hardly in the manner nor to the degree that some had hoped. In its councils the arts of the old diplomacy, still inspired by the traditional principles or lack of principles, were directed to the old ends; and the world, as though the popular upheaval of the Revolution had never been, was treated as real estate to be parcelled out by the executors of Napoleon's empire among sovereigns by divine right, regardless of the wishes of the populations, which figured in the protocols merely as numbers to be balanced and bartered one against the other.

This process of "dividing the spoils," as Gentz called it, was naturally pregnant with possibilities of quarrels. Of these the most dangerous was that provoked by the resolution of the emperor Alexander I. at all costs to keep the former grand-duchy of Warsaw for himself, while compensating Prussia for the loss of some of her Polish territories by the annexation to her of all Saxony. The deadlock caused by the stubborn insistence on this plan, which the other great powers were equally determined to frustrate, all but led to war, and by a secret treaty signed on the 3rd of January 1815, Great Britain, France, and Austria agreed to make common cause in that event against Russia and Prussia. It needed Napoleon's return from Elba (March 1815) to remind the powers that their particular interests must still be subordinated to those of Europe. The common peril restored the broken harmony; and while the armies of the Alliance were closing in for the final struggle with the French emperor, the congress hurried on its deliberations, and on the 9th of June 1815, a few days before the battle of Waterloo, by which Napoleon's power was finally shattered, the Final Act, embodying the treaties of Vienna, was signed.

Territorial adjustments of the Vienna treaties.

The territorial arrangements thus effected were for half a century the basis of the states system of Europe, and the treaties in which they were defined the charter of international relations. It was in central Europe, where Napoleon's policy had most profoundly affected the pre-revolutionary system, that the greatest changes were made. No attempt, indeed, was made to restore the Holy Roman Empire, in spite of the protest of the pope against the failure to re-establish "the centre of political unity"; but the Confederation of the Rhine having come to an end, Germany was reconstituted as a confederation of sovereign states, in which all the former members of the Empire which had survived the revolutionary epoch found a place (see GERMANY). Austria, in virtue of the imperial tradition of the house of Habsburg, received the presidency of the federal diet; but the bulk of her territories lay outside the frontiers of the Confederation, and the non-German character of the Habsburg monarchy was accentuated by the other arrangements at the congress. In Italy Lombardo-Venetia was erected into a kingdom under the Austrian crown; while the dynastic settlements in the other Italian states tended to make Austrian influence supreme in the peninsula (see ITALY). In return for this, Austria surrendered her claim to her former possessions in the Low Countries, which were annexed to the crown of Holland, so as to form, under the title of the United Netherlands, an efficient barrier to French aggression northwards. The function of defender of Germany on the Rhine frontier which Austria thus abandoned was assigned to Prussia, an arrangement pregnant with momentous issues. In compensation for her disappointment in the matter of Saxony, half of which was ultimately restored to the dynasty of Wettin, she received a large accession of territory in the Rhine provinces, carved partly out of the suppressed kingdom of Westphalia, partly out of the former ecclesiastical states, and comprising the imperial city of Aix-la-Chapelle and the former electorate of Cologne. To Prussia also was conceded the right to garrison the federal fortress of Luxemburg.

Of the other German states, Bavaria, which alone was sufficiently powerful to be of any great importance in the general affairs of Europe, reaped the reward of her timely defection from the cause of her protector Napoleon. She had, indeed, to restore to Austria the territories annexed to her at the expense of the Habsburg monarchy by the French emperor: Tirol, the Quarters of the Inn and of the Hausruck, and part of Salzburg. But she received ample compensation elsewhere, notably the former Bavarian Palatinate with a strip of territory to connect it with Bavaria proper. The right to garrison the federal fortress of Mainz was also ultimately conceded to her. Bavaria was thus placed in a position to continue her traditional policy of aiming at the position of a European great power and holding the balance between Austria and Prussia (see BAVARIA: *History*). The two other German states whose elevation to kingdoms had symbolized a similar ambition, Saxony and Württemberg, were henceforth relegated to a position of third-rate importance; Saxony depended for her very existence on the rivalry of her more powerful neighbours: Württemberg protested in vain against the dictatorship of the great powers to which she was forced to submit. Finally, the electorate of Hanover, partly out of compliment to the king of Great Britain, partly because with the abolition of the Holy Empire the title elector had fallen obsolete, was elevated to a kingdom. The request of the elector of Hesse for a similar concession in his case was refused by the powers assembled at Aix-la-Chapelle in 1818.

Of great importance were the changes effected in the north and east of Europe. The affairs of the Ottoman empire, which the treaty of Bucharest (1812) between Russia and Turkey had left in a very unsatisfactory condition, were not dealt with by the congress, in spite of the efforts of Great Britain to bring them into discussion. But the concessions made to the emperor Alexander elsewhere represented a notable advance in the European position of Russia. The possession of Finland, conquered from the Swedes in 1808, was confirmed to her; and, above all, the erection of the former grand-duchy of Warsaw into a constitutional kingdom of Poland under the Russian crown not only thrust the Muscovite power like a wedge into the heart of Germany, but seemed to threaten the Polish possessions of Austria and Prussia by setting up a quasi-independent Poland as a centre of attraction to the scattered elements of the Polish nation; though in the sequel the establishment of the city of Cracow and its territory as an independent republic, to avoid the difficult question of its assignment elsewhere, proved a more fruitful source of nationalist unrest. In the north the settlement confirmed by the congress marked the definite withdrawal of the Scandinavian Powers from any active influence on the affairs of the continent. Alone of the *parvenu* monarchs of the Napoleonic age Bernadotte retained the crown of Sweden, to which, by the treaty of Kiel, that of Norway had been added. On the other hand, by the cession of Swedish Pomerania to Prussia, Sweden finally withdrew from the southern shores of the Baltic. The Scandinavian states ceased henceforth to play any determining part in European politics. In the south, on the other hand, the restoration of Savoy and Piedmont to Victor Emmanuel I., king of Sardinia, and the incorporation in his dominions of the territories of the former republic of Genoa, were factors pregnant with mighty issues. The object of this increase of the power of the house of Savoy was but to erect a barrier against any possible renewal of French aggression in Italy; in effect it established the nucleus of the power which was to struggle successfully with Austria for the hegemony of Italy.

The gains of Great Britain in Europe were comparatively small, though by no means unimportant. By the retention of Malta she secured her power in the Mediterranean, and this was further increased by the treaty of Paris (November 5, 1815), by which the powers recognized her protectorate over the Ionian Islands. (See VIENNA, CONGRESS OF.)

The powers and France.

But for the episode of the Hundred Days, France would have emerged from the congress with recovered prestige and mistress of at least some of the territorial gains of the revolutionary wars; though Napoleon had thrown away, during the negotiations at Châtillon, the chance of preserving for her her "natural frontiers" of the Rhine. the Alps and the Pyrenees. After Napoleon's second downfall she was in serious danger of dismemberment, for which the German powers clamoured as essential to their safety. That Louis XVIII. continued to rule over the territories "handed down to him by his ancestors" was due to the magnanimity, or policy, of the emperor Alexander I. (*q.v.*), and the commonsense of Castlereagh and Wellington, who saw well that the "just equilibrium," which it was their object to establish, could not be secured if France were unduly weakened, and that peace could never be preserved if the French people were left to smart under a sense of permanent injury. By the second peace of Paris, signed on the 20th of November 1815, France retained her traditional boundaries. The unsatisfied ambition to secure her "national frontiers" was to bear troublesome fruit later.

That the treaties embodied in the Final Act of Vienna represented a settlement of all outstanding questions was believed by nobody. They had been negotiated for weary months in an atmosphere of diplomatic and feminine intrigue; they had been concluded in a hurry, under the influence of the panic caused by Napoleon's return from Elba. To Friedrich von Gentz they were at best but "partial arrangements," useful as forming an authoritative basis for the establishment of a more complete and satisfactory system. The history of the international politics of Europe for the years immediately succeeding the congress of Vienna is that of the attempt to establish such a system.

Treaty of Nov. 20, 1815, and the Concert of Europe.

The Holy Alliance.

England and the Concert.

After a quarter of a century of almost ceaseless wars, what Europe needed above all things was peace and time to recuperate. This conviction was common to all the powers who had inherited Napoleon's dictatorship in Europe; but on the question of the method by which peace should be secured, and the principles which should guide their action, a fateful divergence of view soon became apparent within their councils. All were agreed that France still represented the storm centre of Europe; and a second treaty, signed on the 20th of November 1815, renewed the provisions of the treaty of Chaumont, in view of any fresh outburst of the French revolutionary spirit. But the new treaty went further. By its 6th article it was declared that "in order to consolidate the intimate tie that unites the four sovereigns for the happiness of the world, the High Contracting Powers have agreed to renew at fixed intervals . . . meetings consecrated to great common objects and to the examination of such measures as at each of these epochs shall be judged most salutary for the peace and prosperity of the nations and for the maintenance of the peace of Europe." This was the formal charter of the concert of the great powers by which for the next seven years Europe was governed, a concert to which the name "Holy Alliance" has been commonly but erroneously applied. The Holy Alliance, drawn up by the emperor Alexander I., and signed by him, the emperor Francis, and King Frederick William III. of Prussia on the 26th of September 1815, represented a different and conflicting ideal. Actually it was not a treaty at all, but at best a declaration of principles to which any Christian could subscribe, at worst—to quote Castlereagh—"a piece of sublime mysticism and nonsense" from the political point of view (see HOLY ALLIANCE). It gained its sole political importance from the persistent efforts of the tsar and his ministers to replace the committee of the great powers, established by the treaty of the 20th of November, by a "Universal Union" of all the powers, great and small, who had signed the Holy Alliance, and thus to establish that "Confederation of Europe" of which the autocratic idealist had borrowed the conception from the theorists of the 18th century (see ALEXANDER I., emperor of Russia). It was clear from the first that any attempt to set up such a central government of Europe under a "universal guarantee" would imperil the independence of the sovereign states; and from the first Great Britain, represented by Castlereagh, protested against it. She would consent to take common action on the basis of the treaties she had actually signed, consulting with her allies on each case as it arose; but to vague and general engagements she refused to commit herself. The attitude of Austria and Prussia was from the outset less clear. Metternich was torn between dread of revolution and dread of Russia; the Holy Alliance, though essentially "verbiage," might be useful in holding the imperial Jacobin in check; the "universal guarantee" could not but be discouraging to the "sects"; on the other hand, the extreme willingness of the tsar to march 200,000 Russians for any "European" purpose in any direction convenient or inconvenient to Austria, was—to say the least—disconcerting. Frederick William III., on the other hand, though he too had signed the Holy Alliance with reluctance, in moments of panic saw in the "universal guarantee" his best defence against the renewed attack by France which was his nightmare. In effect, owing to the firm attitude of Castlereagh at the congress of Aix-la-Chapelle, "the transparent soul of the Holy Alliance" never received a body, though attempts were subsequently made at the congresses of Troppau, Laibach and Verona to apply some of its supposed principles—attempts that led to the definitive breach of Great Britain with the Alliance.

Congress of Aix-la-Chapelle, 1818.

The highwater-mark of the activity of the Allies as a central government for Europe was reached at the congress of Aix-la-Chapelle (*q.v.*) in 1818. France was now admitted to the Alliance, the objects of which were reaffirmed by a public declaration to which she adhered; but at the same time a secret treaty renewed the compact of Chaumont between the four other powers. Certain questions outstanding from the congress of Vienna were referred for settlement to a ministerial conference to meet at Frankfort in the following year. The treaty which was the result of this conference was signed on the 20th of July 1819. The bulk of it was concerned with territorial settlements in Germany: between Austria and Bavaria, and Bavaria and Baden; but some of the articles arranged for the cession of the border fortresses Philippeville and Mariembourg to the Netherlands, defined the frontiers of Savoy, and settled the reversion of the Italian duchies held by the empress Marie Louise.

Alexander I. of Russia and Metternich.

Congress and protocol of Troppau, 1820.

Meanwhile the balance of forces within the European concert had shown a tendency to shift. At the outset the restless activity of the emperor Alexander, his incalculable idealism, and his hardly veiled ambitions had drawn Austria and Great Britain together in common suspicion of an influence that threatened to be little less disturbing to the world's peace than that of Napoleon. But at Aix Metternich had begun to realize that, in the long-run, the system of repression which he held to be essential to the stability of the European, and above all of the Austrian, polity would receive little effective aid from Great Britain, fettered as she was by constitutional forms; while Alexander, alarmed at the discovery of revolutionary plots against his person, had already shown gratifying signs of repentance. The "Jacobin" propaganda of the tsar's agents continued, it is true, especially in Italy; and, in spite of the murder of the dramatist Kotzebue, as a Russian emissary, by the fanatical "Bursche" Karl Sand, Alexander joined with Castlereagh in protesting against the reactionary policy embodied in the Carlsbad Decrees of October 1819. But the murder of the duke of Berri on the 13th of February 1820 completed the Russian autocrat's "conversion." At the congress of Troppau, which met in the autumn of the same year, he was a "changed man," committed henceforth heart and soul to Metternich and his policy. The outcome of this new understanding was the famous Troppau Protocol, published to the world on the 19th of November 1820, and signed by Austria, Prussia and Russia. The immediate occasion of this manifesto was the military insurrection, under General Pepe, at Naples, by which the Spanish constitution of 1812 had been forced on the king (see NAPLES: *History*). But the protocol embodied a general principle involving issues infinitely more important than any arising out of this particular question. "States which have undergone a change of government due to revolution," it declared, "the results of which threaten other states, *ipso facto* cease to be members of the European alliance, and remain excluded from it till their situation gives guarantees for legal order and stability. If, owing to such alterations, immediate danger threatens other states, the powers bind themselves, by peaceful means, or if need be by arms, to bring back the guilty state into the bosom of the Great Alliance."

This was, in effect, an attempt to apply the principle of the Carlsbad Decrees to all the world; and, had the attempt succeeded, all Europe would have been turned into a confederation on the model of that of Germany; for a political alliance, charged with the safeguarding of the territorial settlement defined by treaty, would have been substituted a central diet of the great powers, armed with undefined authority; and the sovereign independence of the nations would have been at an end. To any such principle, and therefore to the protocol in which it was embodied, Great Britain offered an uncompromising opposition. In vain Metternich urged upon Castlereagh that the protocol was but the logical conclusion drawn from premises to which he was already committed; for, if the alliance was to be effective in maintaining peace, it must interfere wherever and whenever peace should be threatened, and therefore to crush internal revolutions which could not but have an external result. The logic was perfect; the proposition that on which every "project of peace" must eventually break. Castlereagh's reply was, in brief, that Great Britain could never admit a principle which she would not in any circumstances allow to be applied in her own case.

First rift in the alliance.

Congress of Laibach, 1821.

The absence of the signatures of Great Britain and France from the Troppau protocol marked the first rift in the alliance, a rift that was soon to develop into a breach. For the time, indeed, the crack was "papered over." Castlereagh was prepared to leave Austria a free hand to deal with the risings in Naples and Piedmont, since she had treaty rights in the former case and her interests, as an Italian power, were threatened in both. Great Britain was even represented at the congress which reassembled at Laibach in January 1821, though Lord Stewart, the ambassador at Vienna, was not armed with full powers. Castlereagh had approved of the invitation sent to the king of Naples to attend the congress, as implying "negotiation," an improvement on the dictatorial attitude of the protocol. But everything in the conferences tended still further to shatter the unstable foundations of the alliance. Capo d'Istria, as though the debates of Aix-la-Chapelle had never been, raised once more the spectre of the "Universal Union" which Castlereagh believed he had laid for ever. Metternich, anxious to prove to the Italian Liberals that the tsar was no longer their friend, welcomed the demonstration, and Prussia followed obediently in Austria's wake. "It is clear," wrote Lord Stewart, "that a Triple Understanding has been created which binds the parties to carry forward their own views in spite of any difference of opinion which may exist between them and the two great constitutional governments." (See TROPPAU and LAIBACH.)

Effect of revolution in Spain.

Congress of Verona, 1822.

But the narrower "Holy Alliance" of the three autocratic monarchies, as opposed to the two western constitutional monarchies, was not in fact destined to take shape till after the Paris revolution of 1830. Several factors delayed the process, notably the revolt of the Greeks against the Ottoman rule, and the Spanish question, which latter formed the main subject of discussion at the congress of Verona in 1822. In the Eastern Question the interests of Austria and Great Britain were identical; both desired to maintain the integrity of Turkey; both saw that this integrity was in the greatest peril owing to the possible intervention of the Orthodox tsar in favour of his co-religionists in revolt; and both agreed that the best means of preventing such intervention was to bind the Russian emperor to the European concert by using his devotion to the principles of the Holy Alliance. At Verona, however, the Eastern question was entirely overshadowed by that of Spain, and in this matter the views of Great Britain were diametrically opposed to those of the other powers of the alliance. She shared indeed with France and Austria the strenuous objection to the emperor Alexander's proposal to march 150,000 Russians into Piedmont in order to deal with Jacobinism whether in France or Spain; but she protested equally strenuously against the counter-proposal of France, which was ultimately adopted, that a French army should march into Spain to liberate the king from his constitutional fetters in the name of Europe. George Canning, carrying on the tradition of Castlereagh, once more protested, through Wellington, as British plenipotentiary at the congress, against the whole principle of intervention; and when, in spite of the British protest, the other powers persisted, the breach of Great Britain with the continental alliance was proclaimed to all the world. When, on the 7th of April 1823, the French army under the duke of Angoulême crossed the Bidassoa, the great experiment of governing Europe through a central committee of the great powers was at an end. (See VERONA, CONGRESS OF; ALEXANDER I.; LONDONDERRY, ROBERT STEWART, 2nd marquess of; CANNING, GEORGE.)

End of the "Confederation of Europe."

Principle of nationality.

Henceforth, though the treaties survived, and with them the principle of the concert on which they were based, "Europe" as a diplomatic conception tends to sink into the background and to be replaced by the old international anarchy of the 18th century. To Canning this development seemed wholly welcome. He applied to the rivalry of states the Liberal principle of free competition as the sole condition of healthy growth. "Villèle is a minister of thirty years ago," he wrote to Bagot on the 3rd of January 1823, "no revolutionary scoundrel: but constitutionally hating England, as Choiseul and Vergennes used to hate us, and so things are getting back to a wholesome state again. Every nation for itself, and God for us all." But the essential difference between the rivalries of the 18th and 19th centuries was in the conception of the "nation." To Canning, as to the diplomatists of the congress of Vienna, "nation" was synonymous with "state," and national boundaries were those defined by the treaties, which Canning was as bent on preserving as any of his reactionary contemporaries. The conception of the divine right of every nationality to readjust political frontiers to suit its own ideals was as foreign to him as to Metternich. Yet this principle of nationality, which was destined during the 19th century to wreck the political structure consecrated at Vienna, and to leave to the succeeding age a host of unsolved and insoluble problems, found in Canning its earliest champion in the higher councils of Europe. The recognition of the independence of the South American republics and of the belligerent rights of the Greek insurgents were both in the first instance motived by the particular interests of Great Britain; but they were none the less hailed as concessions to the principles of nationality, to which they gave an impetus which was destined to continue till the face of Europe had been transformed.

Europe and the revolt of Greece.

Economic progress; rise of the middle classes.

This in fact constitutes the main significance for Europe of the War of Greek Independence, which lasted from the first rising of the Greeks in the Morea in 1821 till the signature of the treaty of London on the 7th of May 1832 (see GREEK INDEPENDENCE, WAR OF; TURKEY: *History*). Its actual outcome, so far as the political structure of Europe was concerned, was but to add an insignificant kingdom to the European states system. But its moral effect was immense. The sacrosanctity of the *status quo* had been violated, and violated with the active aid of three of the powers of the continental alliance: Russia, France and Great Britain. Metternich was right when he said that, in principle, there was no difference between the Greek insurgents and any other "rebels against legitimate authority," and the Liberals of all Europe, forced into inactivity by the Austrian police system, hailed in the Greeks the champions of their own cause. Philhellenism, beyond its proper enthusiasm, served as a convenient veil for agitations that had little concern with Greece. Other forces making for political change were simultaneously at work. The peace secured by the concert of the powers had given free play to the mechanical and industrial innovations that heralded the marvellous economic revolution of the coming age; wealth increased rapidly, and with it the influence and the ambition of the middle classes. The revolution of July 1830, which established the *bourgeois* monarchy in France, marked their first triumph. In

Revolutions of 1830.

countries less economically advanced, *e.g.* Germany and Italy, the attempt to follow French example ended in failure; but the revolt of the Belgians, for reasons partly economic and partly national, against the domination of the Dutch, resulted in the establishment of the independent kingdom of Belgium—the first actual breach in the territorial settlement of 1815. In Great Britain the agitation of the disfranchised middle classes, which seemed to threaten a violent revolution, ended in 1832 in the passing of the Reform Bill and their admission to political power. (See France; Germany; Italy; Belgium; English History.)

The easy success of the revolutions in the west of Europe had been due, not to any reluctance of the reactionary powers to interfere on the basis of the old agreements, but to their preoccupation with the national revolt in Poland (*q.v.*). In view of this, and of the attitude of Great Britain, they had to recognize the title of Louis Philippe as king of the French, merely stipulating that he should guarantee to maintain the treaties. In spite of the overthrow of the legitimate dynasty in France, and of the partition of the kingdom of the Netherlands, the territorial settlement of Vienna remained, after the revolution of 1830, substantially intact. Outside the limits of the treaties, however, fateful changes were in progress. These were determined, broadly speaking, by the two main questions that dominated international politics between the years 1831 and 1841: (1) the antagonism between the western constitutional powers, France and Great Britain, and the eastern autocratic powers, Russia, Austria and Prussia; and (2) the crisis in the Eastern question resulting from the revolt of Mehemet Ali, pasha of Egypt, against the Porte.

Anglo-French "entente."

The strained relations between Great Britain and France, resulting from the French policy of aggression in the Spanish peninsula, which had more than once brought the two powers to the verge of war, had been eased before the fall of the government of Charles X. The peril of a French hegemony over the vast colonial empire of Spain had been forestalled by Canning's recognition of the independence of the South American republics; the intrigues of France in favour of the partisans of Dom Miguel in Portugal had been checkmated by a politic breach, on behalf of the Portuguese Liberals, of the British principle of non-intervention, and finally the chief cause of offence had been removed, in 1827, by the withdrawal of the French army of occupation from Spain. In the Greek question the two powers had acted cordially in concert; and this good understanding even the French conquest of Algiers in 1830, which laid the foundations of the French empire in Africa, had not availed to shatter; for the eyes of the Tory ministry were still fixed on France as the potential focus of revolutionary propaganda, and any over-sea possessions she might acquire were, in Wellington's opinion, so many hostages for her good behaviour given to British sea-power. The results of the July revolution in Paris were accepted by Great Britain so soon as it became clear that Louis Philippe stood for peace and not for revolutionary aggression; the armed intervention of France in favour of the Belgians in August 1831 was stopped by the firm language of Palmerston; the French occupation of Ancona, as a countermove to Austrian aggressions in Italy, was accepted as "an incident of the balance of power"; and the intention of the king of the French to abide by the treaties, which became clearer with the consolidation of his power at home, paved the way for that *entente* between the two Liberal powers which lasted until 1840.

The constitutional v. the autocratic powers.

The cleavage between the fundamental principles of the two groups of autocratic and constitutional powers was not only apparent in their general attitude towards constitutional and national movements, but affected also the position taken up by them during the crisis of the Eastern question evoked by the revolt of Mehemet Ali, pasha of Egypt, a crisis by which between 1839 and 1841 all other diplomatic issues were overshadowed. (See Mehemet Ali.) During the Greek revolt the efforts of Austria had been directed to preventing a Russian attack upon Turkey; these efforts had failed, and Metternich's worst fears seemed to be realized when the Russo-Turkish campaigns of 1828–29 issued in the treaty of Adrianople (September 14, 1829) and the apparently complete vassalage of the sultan to the tsar. But when, in 1832, Sultan Mahmud appealed in his despair to the emperor Nicholas to save him from ruin at the hands of the Egyptian rebels, and, as the result, the treaty of Unkiar Skelessi (July 8, 1833) seemed to place definitely in the hands of Russia the keys of the Black Sea, it was left to France and Great Britain to give voice to the protest of Europe. Austria, alarmed by the revolutionary movements of 1830, accepted the fact of Russian preponderance at Constantinople, rather than risk a breach with the autocrat who was now the main pillar of the Holy Alliance. The emperor Nicholas, for his part, was equally prepared to surrender some of his ambitions in the East for the sake of the common cause, the more so since to Russian statesmen the maintenance of Turkey in a condition of weakness and dependence now seemed preferable to any attempt to break it up. The result of these dispositions was the convention of Münchengrätz (September 18, 1833) between Russia, Austria and Prussia, by which the three powers undertook to guarantee the integrity of the Ottoman empire. In the following month a secret convention was signed at Berlin between the same powers (October 15), reaffirming the right of the powers to intervene in the internal affairs of a friendly state at the request of its legitimate sovereign, a right with which no third power would be allowed to interfere, such interference to be regarded by the three powers as an act of hostility directed against all of them.

The Eastern question. Mehemet Ali.

Conventions of Münchengrätz and Berlin, 1833.

The Tsar Nicholas I. and Palmerston.

Affairs of Spain and Portugal. Quadruple Alliance of 1834.

This reconstitution of the "Holy Alliance" on a narrower basis was the work of the emperor Nicholas, whose masterful personality had by this time quite overshadowed the influence of Metternich in the councils of the autocratic powers. There was no formal breach of the Grand Alliance; the "treaties" remained in force; but the French revolution of 1830 had produced a practical disruption which was every day accentuated by the attitude of the British government under the influence of Palmerston. For Palmerston had now become "the firebrand of Europe," openly proclaiming his contempt for international law and equally openly posing as the protector of "oppressed nationalities." "If these two powers (France and England)," wrote the tsar to King Frederick William of Prussia, "have the courage to profess loudly rebellion and the overturn of all stability, we ought to have the right and the courage to support Divine right." This deep cleavage of principles was immediately exhibited in the attitude of the powers towards the troubles in the Spanish peninsula. In September 1833 Ferdinand VII. of Spain died, and, under the Pragmatic Sanction, his daughter Isabella succeeded under the regency of Queen Christina; in July, Dom Miguel, the absolutist pretender to the throne of Portugal, had made himself master of Lisbon. In Spain Don Carlos, Ferdinand's brother, claimed the crown as the legitimate heir, and began the long agony of the Carlist wars; in Portugal the constitutionalists upheld in arms the rights of Queen Maria da Gloria (see Spain and Portugal). Carlists and Miguelists, making common cause, had the moral support of the allies of Münchengrätz; while France and Great Britain took the side of the Liberals. A formal alliance between the two western powers, proposed by Talleyrand, was indeed refused by Palmerston, who had no wish to commit Great Britain to an irrevocable breach with Austria and Russia, and was suspicious of the ambitions of France in Spain; but ultimately a triple alliance between Great Britain, Spain and Portugal—with the object of restoring order in the peninsula—was converted, under pressure from the French government, into the Quadruple Alliance of the 22nd of April 1834.

The *entente* implied by this formal instrument was, however, more apparent than real. When, in the spring of 1835, Queen Christina applied to the Allies for help against a renewed Carlist rising, Palmerston's suspicions were again aroused by

Nicholas I. and Great Britain.

Breach of Anglo-French "entente" 1840.

the somewhat naïve suggestion of Thiers that France should once more intervene as in 1823, a suggestion that was firmly rejected. Palmerston's counter-proposal of an English expedition met with as little favour in Paris. The Anglo-French *entente* was proving but a "cardboard alliance," as Wellington called it; and the emperor Nicholas, to whom the existence of Louis Philippe as king of the French was at once a sacrilege and a menace, began with a good hope to work for its destruction. The fears roused by the Reform Act of 1832 had been belied by its results; the conservative temper of the British electorate had restored to Great Britain the prestige of a legitimate power; and the pledge of the tsar's renewed confidence and goodwill was the visit of the cesarevich (afterwards the emperor Alexander II.) to the English court in 1839. This was not without its effect on the public sentiment; but the triumph of the tsar's diplomacy was due to fresh complications in the Eastern question, due to the renewed effort of Sultan Mahmud to crush the hated viceroy of Egypt. These events will be found outlined in the article Mehemet Ali. Here it will suffice to say that the convention of London of the 15th of July 1840, signed by Great Britain, Austria, Prussia and Russia without calling France into counsel, marked the definite breach of the Anglo-French *entente*, a breach which was but imperfectly healed by the Straits' Convention signed by all the powers on the 13th of July 1841.

Great Britain and France.

The Straits' Convention was hailed by Count Nesselrode, the Russian foreign secretary, as having re-established "the federative system of the European states on its old basis." This was true, in so far as it created yet another precedent for the concerted action of the European powers, and once more consecrated the right of "Europe" to decide in common on questions of first-rate international importance. But the divergence of interests and principles within the concert were too great to be healed by the settlement of a single issue, however important, and this divergence increased as events moved towards the revolutionary outbreaks of 1848. When, in 1846, the independent republic of Cracow was suppressed by agreement of the three autocratic powers, on the ground that it had become a dangerous centre of revolutionary agitation, it was Great Britain and France that protested against an arbitrary infraction of the treaties by the very governments which had laid the greatest stress upon their sanctity. The *entente* between the two Liberal powers had been patched up after the closure of the Egyptian Question; it was cemented by visits of Queen Victoria and the prince consort to the Château d'Eu (1843 and 1845), and of King Louis Philippe to Windsor (1844); and it survived, in spite of several causes of friction, notably the crisis in Morocco (*q.v.*), until 1846, when the affair of the Spanish Marriages brought it to a somewhat dramatic conclusion.

The "Spanish Marriages."

The "February Revolution," 1848.

The attempt to secure the succession to the Spanish throne for his descendants by pressing on the marriage of the duke of Montpensier with the infanta Luisa, before that of the young queen Isabella had been proved to be fruitful in children, was on the part of Louis Philippe more than a breach of faith with Great Britain (how deeply it was resented may be learnt from Queen Victoria's letters); it was a breach of faith with the revolution that had made him king. Since 1840, indeed, the whole tendency of the king's policy had been to revert to the traditional standpoint of the Bourbons; internally, "resistance" to the growing claims of the democracy; externally, dynastic ambition. But in endeavouring to win the goodwill of the reactionary powers he only succeeded in losing that of the classes of his own people on which his authority was based. In 1847 he joined with the three autocratic powers in supporting the clerical and reactionary *Sonderbund* in Switzerland, in defiance of the protests of Great Britain and the attitude of the majority of Frenchmen. When, in February 1848, the revolution broke out in Paris, the *bourgeois* monarchy, utterly discredited, fell without a struggle (see France and Louis Philippe).

Revolution of 1848 outside France.

The revolution in Paris was not the cause of the political upheaval which in the year 1848 convulsed Europe from Ireland to the banks of the Danube; it had indeed been preceded by the triumph of Liberalism in Switzerland, by successful revolutions in Naples and Palermo, and by the grant of a constitution in Piedmont; but flaming up as it were in the revolutionary centre of Europe, it acted as the beacon signal for the simultaneous outbreak of movements which, though long prepared, might but for this have been detached and spasmodic. It was this simultaneity which gave to the revolutions of 1848 their European character and their formidable force. They were the outcome of various, dissimilar and sometimes contradictory impulses—political, social, racial. In France the issue resolved itself into a struggle between the new working-class ideal of Socialism and the *bourgeois* ideal of the great Revolution; in England the Chartist movement presented, in a less degree, the same character; in Germany, in the Austrian empire, in Italy, on the other hand, the dominant motives were constitutional and nationalist, and of these two the latter became in the end the determining factor. The events of the different revolutions are described elsewhere (see France; Austria; Germany; Hungary; Italy). From the point of view of Europe such unity as they possessed was due to their being, so far as Central Europe was concerned, directed against the system of "stability" associated with the name of Metternich. In hatred of this system German, Czech, Magyar, and Italian were united; Kossuth's great speech of the 3rd of March echoed far beyond the frontiers of Hungary; the fall of Metternich (March 13) was a victory, not only for the populace of Vienna, but for all the peoples and races which had worn the Austrian fetters. It was the signal for revolutions in Hungary (the passing of the "March Laws"), in Bohemia, in Prussia (March 15), in Milan; on the 23rd of March, Charles Albert of Sardinia, placing himself at the head of the Italian national movement, declared war against Austria. Against a movement so widespread and apparently inspired by a common purpose the governments were powerless. The collapse of the Austrian administration, of which the inherent rottenness was now revealed, involved that of those reactionary powers which had leaned upon it. One by one they accepted what seemed to be the inevitable; even Pope Pius IX. sent troops to fight under the banner of St Peter for the Italian cause; while in Berlin Frederick William IV., wrapped in the gold and black colours of imperial Germany, posed as the leader of "the glorious German revolution." When, on the 18th of May, the parliament of United Germany was opened at Frankfort, it seemed as though pan-German dreams were on the threshold of realization; while in Italy, early in the same month, Lombardy, Modena, Parma and Piacenza declared by plebiscites for incorporation in the north Italian kingdom, Venice following suit on the 4th of June. A profound modification of the European states system seemed inevitable.

Causes of the failure of the revolutionary movements.

That, in the event, the revolutions of 1848 left the territorial settlement of Vienna intact, was due in the main to the marvellous resisting power of the Habsburg monarchy, the strength of which lay in the traditional loyalty of the army and the traditional policy of balancing race against race within the empire. The triumph of democracy in Germany was made possible only by the temporary collapse of the Habsburg power, a collapse due to the universality and apparent unanimity of the onslaught upon it. But it was soon clear that the unanimity was more apparent than real. The victory of the democratic forces had been too easy, too seemingly overwhelming; the establishment of the constitutional principle in the main centres of autocracy seemed to make common action against the powers of reaction of secondary importance, and free play was allowed to the racial and national antagonisms that had been present from the first. The battle of German, as well as of Italian, liberty was being fought out on the plains of Lombardy; yet the German democrats, whether in Vienna or Frankfort, hailed the victories of the veteran Radetzky as triumphs of Germanism. In Bohemia the revolution was wrecked on the rivalry of German and Czech; and when the Hungarians drew the sword against Austria, the imperial government was reinforced by the hatred of the southern Slavs for their Magyar task-masters.

Victory of the conservative forces.

Thus, from the chaos of warring races, the old order began slowly to reappear. So early as the 15th of June 1848 Prince Windischgrätz had restored order in Prague and received the thanks of the Frankfort parliament; on the 25th of July Radetzky's victory at Custozza set free the imperialist army in Italy; on the 4th of September Jellachich, ban of Croatia, invaded Hungary in the name of the united empire; on the 1st of November Windischgrätz entered democratic Vienna. The alliance of the army and the Slav races had won the victory over German democracy. The combating of Hungarian nationalism proved a longer and a harder task; but the Austrian victory of Kapolna (February 26–27, 1849) encouraged Schwarzenberg to dissolve the rump of the *Reichsrath* at Kremsier and proclaim a new constitution for the whole empire, including Hungary. The Magyar victories that followed issued in the proclamation, on the 14th of April, of the independence of Hungary. But though the Austrian arms had not been strong enough to crush the Hungarian revolt, they had proved at least the vitality of the conservative principle. The emperor Nicholas I. of Russia had watched in disgusted silence the weak spirit of concession with which the revolutions had been everywhere met; so long as the sovereigns seemed to forget their divine mission he had held rigorously aloof, and had only broken silence to congratulate Windischgrätz on his capture of Vienna and Schwarzenberg on his reassertion of vigorous principles. Now, however, that Divine Right was in arms against the forces of disorder, he was prepared to listen to the prayer of the emperor Francis Joseph for assistance against the Hungarian rebels. The engagements of 1833 were remembered; and in the brotherly spirit of the Holy Alliance, Hungary was subdued by Russian armies and handed over, without *quid pro quo*, to her legitimate king.

Prussia and Austria. Convention of Olmütz, 1850.

Görgei's capitulation of Világos (August 14, 1849) cleared the ground for the complete restoration of the system destroyed by the March revolutions of the year before. The refusal of Frederick William IV. of Prussia to accept the imperial crown (April 21, 1849) had already advertised the failure of the constitutional and unionist movement in Germany; and Prussia, her military prestige restored, stood once more face to face with Austria in rivalry for the hegemony of Germany. In the diplomatic contest that followed Prussia was worsted, her claims to an independent supremacy in the north were defeated, and the convention of Olmütz (November 29, 1850) restored the *status quo* of the Confederation as established in 1815.

Napoleon III. and Europe.

Rise of socialism.

“The Napoleonic Idea.”

Within three years of the great upheaval of 1848 the forces of revolution seemed everywhere to have been subdued, the states system of Europe to have been re-established on the basis of the treaties of Vienna. In reality, however, this restoration was only on the surface; the cracks in the structure of the European system had—to use Bismarck's phrase applied to another occasion—only been “papered over”; and soon ominous rents revealed the fact that the forces that had threatened it with sudden ruin were still at work. One fateful breach in the treaties had, indeed, been accepted as beyond repair; when the dust of the revolutionary turmoil was at length laid a Bonaparte was once more firmly seated on the throne of France. The emperor Nicholas, watching from the calm of Russia, had realized all that the recognition of this fact would involve; he had proposed to set in motion the somewhat rusty machinery of the Grand Alliance, but the other autocratic powers were in no case to support a legitimist crusade, and when Napoleon in 1852 assumed the title of emperor, all Europe recognized his right to do so, even Nicholas being fain to content himself with refusing to treat the *parvenu* monarch as his “brother,” and to admit his style of “third” Napoleon, which seemed to imply a dynastic claim. Napoleon, indeed, was accepted by the powers, as he was welcomed by the French people, as the “saviour of society” from the newly revealed perils of the social revolution. For new and ominous forces had made their appearance since the revolution of 1830 had established the middle classes in power. The industrial development had proceeded in the west of Europe with astonishing rapidity, with its resulting concentration of vast populations in factories and factory cities; and this “proletariat,” excluded from any voice in the government, and exposed in accordance with the prevailing economic theories of doctrinaire Liberalism to the horrors of unrestricted competition, had begun to organize itself in a movement, of which the catchword was “the right to work” and the banner the red flag of the socialist commune. The reign of Charles X. had been the *reductio ad absurdum* of the principle of legitimacy; that of Louis Philippe had discredited for ever government based solely on the *bourgeoisie*; the socialistic experiments of 1848 in Paris had collapsed amid the anarchy and bloodshed of the June days. At this opportune moment Louis Napoleon Bonaparte proclaimed to the French people the “Napoleonic Idea” as conceived by himself. The great Napoleon had been the incarnation of the Revolution, had “sprung armed from the Revolution, like Minerva from the head of Jupiter”; he had ruled because to him the people, by whom the Revolution had been made, had delegated the duty of representing, protecting and guiding it. Of this idea Louis Napoleon conceived himself to be the heir; and when by a double plebiscite the French nation had established him in supreme power, first as president for life (1851), then as emperor (1852), he was able to claim that he represented the people in a far more immediate sense than could be asserted of the chance majority of any representative assembly.

Economic revolution in Europe.

It was clear that, sooner or later, Napoleon III. would prove a disturbing force in Europe. His title to rule was that he represented France; it followed therefore that he must be hostile to “the treaties,” by which the traditional aspirations of France, *e.g.* for her “natural boundaries” of Rhine, Alps and Pyrenees, were restrained. He reigned as “emperor of the French”; it followed that he represented that principle of nationality which the treaties ignored. He could not afford—as Metternich had said of Ferdinand of Naples—“to treat his throne as an arm-chair”; and any activity he might display would be almost certainly at the expense of the established order. At the outset, indeed, it was his policy to pose as its custodian. To conciliate the French clericals he supported the pope against the Italian Liberals; but otherwise he proclaimed aloud his devotion to the arts of peace. A period of rapid material expansion succeeded the unrest of the revolutionary years; engineers and men of science were quickly producing a change in all the material conditions of life, greater than could have been effected by any political revolution; especially the face of Europe was gradually being covered with a network of railways, which it was hoped would draw the European nations not only materially but morally closer together. The first universal exhibition, opened under the auspices of the prince consort at London in 1851, was intended to advertise and consecrate the dawn of a new era of international peace and goodwill. The Crystal Palace at Sydenham, once hailed as the “bright Koh-i-nur of the West,” remains the dismal monument of a hope so soon to be belied by the hard logic of events. For no period since 1815 has been so occupied with wars and the rumours of war as the twenty years that followed the opening of this great temple of peace.

The Crimean War.

One question, that of the ultimate destination of the duchies of Schleswig and Holstein, which threatened the tranquillity of the West, was temporarily settled by the conference of London in 1852 (see SCHLESWIG-HOLSTEIN QUESTION). But about the same time anxious watchers noticed on the political horizon in the East a cloud, no bigger than a man's hand, that threatened a serious storm. At first this was no more than a quarrel between Greek and Latin monks about the custody of certain holy places and things in Palestine.

Congress of Paris, 1856.

It soon, however, became clear that behind these insignificant combatants loomed the figures of the emperors of Russia and France. The motives that induced Napoleon to take up the cause of the rights of the Latin church in this matter were partly political, partly personal. He resented the tsar's attitude towards himself; he wished to gain the firm support of the clergy for his throne; he desired to win prestige for himself and his dynasty by reasserting the traditional influence of France in the Ottoman empire. The events that led up to the Crimean War, and those of the war itself, are told elsewhere (see Crimean War). Great Britain had been drawn into the war by her traditional policy of preserving the Ottoman empire as a barrier against the advance of Russia to the Mediterranean and the consequent danger to the British empire in India. It is now generally conceded that, so far as these objects were concerned, the war was a tragic mistake. The hopes that were built on the capacity of Turkey to reform itself were disappointed; the restrictions imposed upon Russia were repudiated at the first opportunity, during the Franco-German War in 1870; and the results of the Russo-Turkish War of 1876 have shown that a far more effective barrier against Russia than the weakened Ottoman empire has been furnished by the young and vigorous national states of the Balkan Peninsula. None the less, the treaty of Paris (1856), by which the war was closed, marks an important epoch in the diplomatic history of Europe; and it is impossible to say that the blood spilled in the Crimea was wholly wasted. At the time the main success of the allied powers seemed to be in the thrusting back of Russia from the Danube by the cession of Bessarabia, the extinction of Russian sea-power in the Black Sea, the formal repudiation of the tsar's claim to a special right of interference in Turkey. But the true significance of the work of the congress of Paris lies in the impetus given by it to the development of an effective international law. The concert of Europe was consecrated anew by the solemn admission of the Ottoman empire to an equality of *status* with the European powers and the declaration of the collective obligations of Europe towards it. The congress, moreover, acted in some sort as the legislative body of Europe; it established the principle of the free navigation of the Danube and of the right of all nations to carry their commerce into the Black Sea; by a declaration, signed by all the powers present, it abolished the practice of granting letters of marque to privateers in war time. The question was even discussed of establishing some sanction by which the rules of international law agreed upon should be enforced upon recalcitrant states; and, though nothing was settled, a *vœu* to this effect was entered upon the protocol. The congress of Paris thus set a precedent more hopeful than those of the congresses held earlier in the century, because the issues were not confused by the supposed necessity for upholding "legitimacy" at all costs; it was a stage in the progress from the ideals of the Grand Alliance to those of the Hague Conference.

Preponderance of France.

Napoleon and Italy. War of 1859.

Napoleon and Germany.

The conclusion of the Crimean War left the emperor Napoleon the most influential personage in Europe; and Paris, the seat of the congress, became also the centre of the diplomatic world. Russia had been bled almost to death by the war; Austria was discredited and isolated owing to the dubious part she had played in it; Prussia had not recovered from the humiliation of Olmütz; Great Britain was soon plunged into the critical struggle of the Indian Mutiny. The time was obviously opportune for the realization of some of the aspirations implied in the Napoleonic idea. The opportunity came from the side of Italy. By sending Sardinian troops to fight in a quarrel not their own, alongside the Allies in the Crimea, Cavour had purchased for Piedmont the right to be heard in the councils of the powers—a right of which he had made use at the Paris congress to denounce before all Europe the Austrian misrule in Italy. The Italian unionists were at one with Napoleon in desiring to overset "the treaties"; and the Franco-Italian alliance which, in 1859, drove the Austrians out of Lombardy and established the nucleus of the Italian kingdom was the beginning of a process which, within twelve years, was to change the balance of Europe. It was ominous of the future that it was largely the menace of Prussian intervention that persuaded Napoleon to conclude the armistice of Villafranca (July 11, 1859), which, contrary to his agreement with Victor Emmanuel, left Venice to the Austrians. In spite of the peace of Zürich (November 10), indeed, the union of Italy continued during the succeeding years, and Savoy and Nice were the reward of the French emperor's connivance (see Italy). France thus once more gained her "natural frontier" of the Alps; the question was whether she would be able to regain her other natural frontier on the Rhine. The times were not unpropitious for an enterprise which was undoubtedly one of the main objects of Napoleon's policy. The European concert had ceased to exist as an effective force; the treaties had been violated with impunity; in Germany, where the tension between the two great powers had not been eased by Prussia's dubious attitude during the war, there was little prospect of a united opposition to French aggression, and the conditions seemed highly favourable for reviving the traditional policy of exploiting German disunion for the aggrandizement of France. Prussia was arming, but her armaments were directed not against Napoleon but against Austria; and the beginning of the reign of William I., who had become regent in 1858 and king in 1861, pointed to the development of a situation in which the French emperor would once again become the arbiter of Germany. On the 29th of March 1862 Prussia signed a commercial treaty with France on a basis that involved the exclusion of Austria from the Zollverein, and replied to the protests of the court of Vienna by recognizing the new kingdom of Italy. In September of the same year King William placed the supreme direction of Prussian policy in the hands of Otto von Bismarck, whose views on the exclusion of Austria from Germany were known to all the world.

Decline of Napoleon's influence.

The outcome of the Polish insurrection of 1863, however, again altered the aspect of things, and in a direction unfavourable to France (see Poland: *History*). Napoleon had been forced by French public opinion to come forward as the protector of the Poles; but the spectacle of a Bonaparte posing as the champion of "the treaties" was not impressive; his brave words were not translated into action; and he only succeeded in offending Russia by his protests and alienating Great Britain by his tergiversations. The proffered intervention of Austria, France and Great Britain was rejected in a note of Prince Gorchakov to Baron Brunnow, the Russian ambassador in London (July 1, 1863); no action followed; and the last effort to put forward the treaties of Vienna as the common law of Europe ended in a fiasco. British ministers, who had been made to look somewhat ridiculous, henceforth began to be chary of active intervention in continental affairs; Austria and France were alike discredited and isolated. Prussia which, under Bismarck's auspices, had aided Russia in suppressing the Poles (convention of February 8, 1863) alone emerged from the crisis with increased prestige. Bismarck, indeed, was too wary to accept the tsar's suggestion of an offensive alliance and an immediate combined attack on Austria and France; but in the coming struggle for the hegemony of Germany he was assured at least of Russia's neutrality.

Rivalry of Prussia and Austria. Schleswig-Holstein question.

The final act in this long rivalry began with the opening up of the Schleswig-Holstein question on the death of Frederick VII. of Denmark and the accession of the "protocol-king" Christian IX. (November 15, 1863). The German claim to the Elbe duchies, the Danish claim to at least Schleswig as an integral part of the northern kingdom, were but subordinate issues of questions far more fateful, the developments of which once more illustrated the hopeless enfeeblement of the idea of the European concert. In the struggle for the possession of the duchies the general sentiment of Germany was on one side, that of Europe on the other. By the protocol of 1852 the duchies had been treated as an integral part of Denmark, and France and Great Britain, as signatory powers, alike protested against the action of Austria and Prussia in asserting the German claim by force of arms. But, as in the case of Poland, protests were not followed by action; Napoleon in the end contented himself with proposing his favourite "Napoleonic idea" of a plebiscite, to discover the wishes of the populations concerned; Palmerston, who realized some of the important issues involved, allowed his warlike attitude, under exalted influences, to evaporate in words. Thus Great Britain earned the lasting resentment of Germans, without succeeding in preventing the establishment of German sea-power in the Baltic. For the Prussian war-harbour of Kiel and the Kiel canal were in Bismarck's mind from the outset. Throughout he intended to make the duchies a part of Prussia and to use the whole question as a means for the solution of that of Germany. The Austro-Prussian War of 1866 grew inevitably out of the Dano-German War of 1864; and the treaty of Prague (Aug. 23, 1866), which excluded Austria from Germany and established the North German Confederation under the headship of Prussia, not only absorbed into Prussia the North German states which had sided with Austria, but by the annexation to her of Schleswig and Holstein laid the foundations of German power in the North Sea, and of German rivalry with England in the future.

Austro-Prussian War of 1866. Prussia supreme in Germany.

Napoleon and Prussia.

More immediate were the effects of the campaign of Königgrätz on France. The rapid and overwhelming victory of Prussia overthrew all the calculations of Napoleon, who had looked to intervening as arbiter between exhausted combatants. The sudden menace of the new German power alarmed him, and he sought to secure the Rhine frontier for France, by negotiations with Prussia, in the form of "compensations" at the expense of the South German states. He succeeded only in placing a fresh weapon in Bismarck's hands. The communication of the French overtures to the South German courts was enough to throw them into the arms of Prussia; and treaties of offensive and defensive alliance were signed in August 1866 between Prussia and Württemberg (3rd), Baden (17th), and Bavaria (22nd), by which the king of Prussia was to receive the supreme command of the allied armies in time of war. In vain Napoleon tried to retrieve his damaged prestige by securing compensation elsewhere. His proposal that the grand-duchy of Luxemburg, which had not been included in the new German Confederation, should fall to France by agreement with Prussia was no more successful than his other demands for "compensation." Luxemburg was declared a neutral state by the convention of London in 1867 (see LUXEMBURG), and the French proposal, published by Bismarck in *The Times* at the outset of the war of 1870, only damaged the French emperor's cause in the eyes of Europe.

Meanwhile public feeling in France had become seriously excited by this sudden menace of a hostile power on her eastern frontier, and this excitement was raised to fever heat when it became known that the vacant throne of Spain had been offered to and accepted by a prince of the house of Hohenzollern. Napoleon's policy had become hopelessly discredited by the successive fiascos in Poland, Mexico and Germany, and even the establishment of a liberal constitution in 1869 could not avail to restore confidence in him. He knew the risk he ran in challenging a conflict with a power whose military efficiency had been so strikingly displayed; but by refusing to do so, in the excited state of public feeling, he would have risked his throne. He reckoned on the traditional jealously of the South German states for Prussia and their traditional friendship with France; he was assured, too, of the support of Austria, in the event of a victorious opening of the campaign. On the other hand Bismarck was bent on war, which, in accordance with his policy of "blood and iron," he believed to be the sole effective means of binding the heterogeneous elements of Germany into a coherent whole. The device of the "Ems telegrams" (see BISMARCK) was sufficient to end the hesitations of Napoleon by giving an irresistible volume to the cry of the war party in France; and on the 19th of July the French emperor's declaration of war was handed in at Berlin.

The Franco-German War, 1870-1871.

The new German Empire.

The story of the struggle that followed is told elsewhere (see FRANCO-GERMAN WAR). The hopes that Napoleon had based on the action of the South German courts was belied; and the first crushing German victories (Weissenburg, August 4, and Wörth, August 6) not only removed all chance of Austrian co-operation but brought down with a crash the imposing façade of the Second Empire. On the 2nd of September Napoleon surrendered, with his army, at Sedan; and two days later the Empire was overthrown and a provisional republican government set up at Paris. On the 19th Paris itself was invested and, after a heroic defence, capitulated on the 28th of January 1871. On the 18th of January, at the palace of Versailles, William I., king of Prussia, was proclaimed German emperor. On the 26th of February were signed the preliminaries of peace, by which France agreed to cede to the German empire Alsace (except Belfort and its territory) and German Lorraine, with Metz and Thionville (Diedenhofen), and to pay a war indemnity of five milliards of francs (£200,000,000) in three years, to be secured by the occupation of French territory. The definitive treaty was signed at Frankfort-on-Main on the 10th of May 1871.

Dual system in Austria-Hungary.

Union of Italy.

The most important outcome of the events which culminated in the Franco-German War and its result was the establishment of a powerful German empire, which was destined to dominate the continent for years to come, and the expansive ambitions of which remain pregnant with menace for the future. So great an overturn, however, involved other changes in the territorial system, which may be briefly summarized. The most notable of these was the reconstruction of the Austrian monarchy as a result of the war of 1866. By the treaty of Vienna (October 3, 1866) between Austria and Italy, Austria recognized the Italian kingdom and ceded to it the city and territory of Venice, thus surrendering the traditional claim of the Habsburgs to domination in Italy. This was followed in 1867 by the establishment of the Dual Monarchy in the Habsburg dominions under the auspices of Bismarck's rival, Count Beust,—Francis Joseph being crowned king of Hungary, and a separate constitution being established for Hungary and the *Cis-Leithan* dominions of the Austrian emperor (see AUSTRIA: *History*). In Italy, meanwhile, the unification of the kingdom had continued after the conclusion of the war of 1859 by the treaty of Zürich. In 1860 Tuscany, Parma and Modena were united to the monarchy of Victor Emmanuel, at the cost of the cession of Nice and Savoy to Napoleon. In May of the same year Garibaldi and his "Thousand" landed in Sicily, which he reduced by the end of June; in August he crossed to the mainland, and the capitulation of Francis II. of the Two Sicilies at Gaeta on the 13th of February 1861 ended the Bourbon kingdom in southern Italy. On the 17th of March Victor Emmanuel II. was proclaimed king of United Italy. This title, as mentioned above, was recognized by Austria in 1866, when Italy was increased by the cession of Venice. Finally, Rome, which had been preserved to the papacy by Napoleon's troops, was on their withdrawal occupied by the Italians on the 20th of September 1870. Thus the temporal power of the popes came to an end; and the unification of Italy was completed (see ITALY: *History*).

Another significant outcome of the collapse of France was the denunciation by Russia of the "Black Sea" clauses of the treaty of Paris of 1856, an action rendered possible by the *entente* between the governments of Berlin and St Petersburg. In the note addressed to the signatory powers announcing that Russia no longer felt herself bound by the clauses of the treaty limiting her sovereign rights in the Black Sea, Prince Gorchakov wrote: "It would be difficult to affirm that the written law founded on the respect for treaties, as the basis of public right and rule of the relations of states, has preserved the same moral sanction as in former times." The action of Russia was, in fact, a practical illustration of Bismarck's *dicta* that "*rebus sic stantibus* is involved in all treaties that require performance" (*Mem.* ii. 280), and that "*ultro posse nemo obligatur* holds good in spite of all treaty obligations whatsoever, nor can any treaty guarantee the discharge of obligations when the private interest of those who lie under them no longer reinforces the text" (*ib.* ii. 270). Great Britain did her best to counteract a doctrine so subversive of international confidence. For a moment at least a diplomatic breach with Russia seemed inevitable. At Bismarck's suggestion, however, a conference was held at London to arrange the affair. There was, in the circumstances, no chance of forcing Russia to recede from her position; but in order "to reconcile facts with principles" the conference on the 17th of January 1871 agreed on a formula announcing that "contracting powers can only rid themselves of their treaty engagements by an understanding with their co-signatories." Thus the principle of the European concert was saved. But, for the time at least, it seemed that the triumph of Bismarck's diplomacy had re-established

> . . . the simple plan
> That they should take who have the power
> And they should keep who can.

Beust was not far wrong when he exclaimed, "Je ne vois plus de l'Europe!" (W. A. P.)

By the Franco-German War of 1870–71 and the creation of the German empire the political condition of Europe was profoundly changed. Germany became for a time the leading power on the continent of Europe, and German statesmanship had to devise means for preventing, until the new edifice was thoroughly consolidated, the formation of a hostile coalition of jealous rivals. The first thing to be done in this direction was to secure the support of Russia and Austria to the new order of things.

Russian policy towards Germany.

With regard to Russia there was little cause for apprehension. She had aided Bismarck to carry out his audacious schemes in the past, and there was no reason to suppose that she would change her policy in the immediate future. The *rapprochement* dated from the Polish insurrection of 1863, when the governments of France and England, yielding to popular excitement, made strong diplomatic representations to Russia in favour of the Poles, whereas Bismarck not only refused to join in the diplomatic campaign, but made a convention with the cabinet of St Petersburg by which the Russian and German military authorities on the frontiers should aid each other in suppressing the disturbances. From that time the friendship ripened steadily. The relations between the two powers were not, it is true, always without a cloud. More than once the bold designs of Bismarck caused uneasiness and dissatisfaction in St Petersburg, especially during the Schleswig-Holstein complications of 1864 and the Austro-Prussian conflict of 1866; but the wily statesman of Berlin, partly by argument and partly by dexterously manipulating the mutual trust and affection between the two sovereigns, always succeeded in having his own way without producing a rupture, so that during the Franco-German War of 1870–71 Russia maintained an extremely benevolent neutrality, and prevented Austria and Italy from taking part in the struggle. So benevolent was the neutrality that the emperor William at the end of the campaign felt constrained to write to the tsar that he owed to His Majesty the happy issue of the campaign and would never forget the fact. Having thus helped to create the German empire, Alexander II. was not likely to take an active part in destroying it, and Bismarck could look forward confidently to a long continuance of the cordial relations between the two courts.

Austrian relations with Germany.

The second part of the German chancellor's programme, the permanent conciliation of Austria, was not so easily carried out. Austria had been the great sufferer, more perhaps even than France, from Bismarck's aggressive policy. For generations she had resisted strenuously and successfully the efforts of the Hohenzollerns to play the leading part in Germany, and she had always considered her own influence in Germany as essential to the maintenance of her position as a first-class power. By the disastrous campaign of 1866 and the consequent treaty of Prague, Austria had been formally excluded from all direct influence in German affairs. With these events still fresh in his recollection, the emperor Francis Joseph could hardly be expected to support the new empire created by his rival at Austria's expense, and it was known that on the eve of the Franco-German War he had been negotiating with the French government for a combined attack on Prussia. To an ordinary statesman the task of permanently conciliating such a power might well have seemed hopeless, but Bismarck did not shrink from it, and even before the signature of the treaty of Prague he had prepared the way for attaining his object. "With regard to Austria," he himself explained on one occasion, "I had two courses open to me after her defeat, either to destroy her entirely or to respect her integrity and prepare for our future reconciliation when the fire of revenge had died out. I chose the latter course, because the former would have been the greatest possible act of folly. Supposing that Austria had disappeared, consider the consequences." He then described very graphically those probable consequences, and drew the conclusion: "for the sake of our own life Austria must live. I had no hesitation, therefore, and ever since 1866 my constant effort has been to stitch up the great torn texture and to re-establish amicable relations with our ancient associate of the Confederation." For this purpose he tried to soothe the Austrian susceptibilities, and suggested confidentially that compensation for the losses of territory, influence and prestige in Italy and Germany might be found in south-eastern Europe, especially by the acquisition of Bosnia and Herzegovina; but so long as his rival Count Beust was minister for foreign affairs in Vienna, and Austria had the prospect of being able to recover her lost position by the assistance of Russia and France, these efforts had no success. It was only when Prince Gorchakov had declined Count Beust's advances, which took the form of suggesting the abolition of the Black Sea clauses of the treaty of Paris, and when France had been paralysed for some years by her war with Germany, that a *rapprochement* between the cabinets of Vienna and Berlin became possible. Bismarck lost no time in making advances. From the German headquarters at Versailles he sent a despatch to Vienna suggesting the establishing of more cordial relations between the two countries, and Count Beust replied in an equally amicable tone. The emperor Francis Joseph, finding himself isolated, had evidently accepted the inevitable with his customary resignation, and abandoned his dreams of again playing the leading part in Germany. As a further proof of the change in his disposition and aims he replaced Count Beust by Count Andrássy, who was a personal friend of Bismarck, and who wished, as a Hungarian, to see Austria liberated from her German entanglement, and he consented to pay a visit to Berlin for the purpose of drawing still closer the relations between the two governments.

The Dreikaiserbund.

Bismarck was delighted at this turn of affairs, but he advanced with his usual caution. He gave it to be clearly understood that improvement in his relations with Vienna must not disturb the long-established friendship with St Petersburg. The tsar, on hearing privately of the intended meeting, gave a hint to Prince Reuss, the German ambassador, that he expected an invitation, and was invited accordingly. The meeting of the three sovereigns took place at Berlin at the end of August 1872. The three ministers, Prince Bismarck, Prince Gorchakov and Count Andrássy, held daily conferences, on the basis that the chief aim in view should be the maintenance of peace in Europe, and that in all important international affairs the three powers should consult with each other and act in concert. As a result of three days' consultation the Three Emperor's League was founded, without any formal treaty being signed. In this way the danger of a powerful coalition being formed against the young German empire was averted, for in the event of a conflict with France, Germany could count on at least the benevolent neutrality of Russia and Austria, and from the other powers she had nothing to fear. What ulterior designs Bismarck may have had in forming the league, or "Alliance" as it is often called, must be to some extent a matter of conjecture, but we shall probably not be far wrong in adopting the view of a competent Russian authority, who defines the policy of the German chancellor thus: "To make Austria accept definitively her deposition as a Germanic power, to put her in perpetual conflict with Russia in the Balkan Peninsula, and to found on that irreconcilable rivalry the hegemony of Germany."

For more than two years there was an outward appearance of extreme cordiality between the three powers. They acted together diplomatically, and on all suitable occasions the three allied monarchs exchanged visits and sent each other congratulations and good wishes. There was, however, from the beginning very little genuine confidence between them. Before the breaking up of the conferences at Berlin, Alexander II. and his chancellor had conversations with the French ambassador, in which they not only showed that they had suspicions of future aggressive designs on the part of Germany, but also gave an assurance that so long as France fulfilled her engagements to Germany she had nothing to fear. A few months later, when the emperor William paid his return visit to the tsar in St Petersburg, a defensive convention was concluded by the two monarchs behind the back of their Austrian ally. Without knowing anything about the existence of this convention, the Austrian ally did not feel comfortable in his new position. In Vienna the old anti-Prussian feeling was still strong. The so-called party of the archdukes and the military resisted the policy of Andrássy, and sought to establish closer relations with Russia, so that German support might be unnecessary, but as Bismarck has himself testified, "Russia did not yet respond. The wound caused by the conduct of Austria during the Crimean War was not yet healed. Andrássy made himself very popular in the court society of St Petersburg during his visit there with his imperial master, but the traditional suspicion of Austrian policy remained." Altogether, the new league was not a happy family. So long as all the members of it were content to accept the *status quo*, the latent germs of dissension remained hidden from the outside world, but as soon as the temporary state of political quietude was replaced by a certain amount of activity and initiative, they forced their way to the surface. No one of the three powers regarded the *status quo* as a satisfactory permanent arrangement. In Berlin much anxiety was caused by the rapid financial and military recovery of France, and voices were heard suggesting that a new campaign and a bigger war indemnity might be necessary before the recuperation was complete. In St Petersburg there was a determination to take advantage of any good opportunity for recovering the portion of Bessarabia ceded by the treaty of Paris, and thereby removing the last tangible results of the Crimean War. In Vienna there was a desire to obtain in the Balkan Peninsula, in accordance with the suggestion of Bismarck, compensation for the losses in Italy and Germany. Thus each of the members of the league was hatching secretly a little aggressive scheme for its own benefit, and the danger for the rest of Europe lay in the possibility of their reconciling their schemes so far as to admit of an agreement for action in common. Fortunately for the onlookers there were important conflicting interests, and the task of reconciling them was extremely difficult, as the subsequent course of events proved.

The storm-cloud of 1875.

The first of the three powers to move was Germany. In February 1875 M. de Radowitz was despatched to St Petersburg on a secret mission in order to discover whether, in the event of hostilities between Germany and France, Russia would undertake to maintain a neutral attitude as she had done in 1870–1871; in that case Germany might be relied on to co-operate with her in her great designs in the East. Prince Gorchakov did not take the bait with the alacrity that was expected. Having overcome in some measure his hatred of Austria, which had distorted for so many years his political vision, he had come to understand that it was not for the interests of his own country to have as neighbour a powerful united Germany instead of a weak confederation of small states, and he now perceived that it would be a grave error of policy to allow Germany to destroy still more to her own advantage the balance of power in Europe by permanently weakening France. No doubt he desired to recover the lost portion of Bessarabia and to raise Russian prestige in the East, but he did not wish to run the risk of exciting a great European war, and he believed that what he desired might be effected without war by the diplomatic skill which had warded off European intervention during the Polish troubles of 1863, and had recovered for Russia her freedom of action in the Black Sea during the Franco-Prussian War of 1870–71. In reply, therefore, to M. de Radowitz's inquiries and suggestions, he declared that the Russian court fostered no ambitious designs in the East or in the West, and desired only peace and the maintenance of the *status quo*, with possibly an amelioration in the miserable condition of the Christian subjects of the sultan. This rebuff did not suffice to dispel the gathering storm. The warlike agitation in the German inspired press continued, and the French government became thoroughly alarmed. General Leflô, the French ambassador in St Petersburg, was instructed to sound the Russian government on the subject. Prince Gorchakov willingly assured him that Russia would do all in her power to incline the Berlin cabinet to moderation and peace, and that the emperor would take advantage of his forthcoming visit to Berlin to influence the emperor William in this sense. A few days later General Leflô received similar assurances from the emperor himself, and about the same time the British government volunteered to work likewise in the cause of peace. Representations were accordingly made by both governments during the tsar's visit to Berlin, and both the emperor William and his chancellor declared that there was no intention of attacking France. The danger of war, which the well-informed German press believed to be "in sight," was thus averted, but the incident sowed the seeds of future troubles, by awakening in Bismarck a bitter personal resentment against his Russian colleague. By certain incautious remarks to those around him, and still more by a circular to the representatives of Russia abroad, dated Berlin and beginning with the words *maintenant la paix est assurée*, Gorchakov seemed to take to himself the credit of having checkmated Bismarck and saved Europe from a great war. Bismarck resented bitterly this conduct on the part of his old friend, and told him frankly that he would have reason to regret it. In the Russian official world it is generally believed that he took his revenge in the Russo-Turkish War and the congress of Berlin. However this may be, he has himself explained that "the first cause of coldness" was the above incident, "when Gorchakov, aided by Decazes, wanted to play at my expense the part of a saviour of France, to represent me as the enemy of European peace, and to procure for himself a triumphant *quos ego* to arrest by a word and shatter my dark designs!" In any case the incident marks the beginning of a new phase in the relations of the three powers; henceforth Bismarck can no longer count on the unqualified support of Russia, and in controlling the Russo-Austrian rivalry in south-eastern Europe, while professing to be impartial, he will lean to the side of Count Andrássy rather than to that of Prince Gorchakov. He is careful, however, not to carry this tendency so far as to produce a *rapprochement* between Russia and France. The danger of a Franco-Russian alliance hostile to Germany is already appearing on the political horizon, but it is only a little cloud no bigger than a man's hand.

Russia and Germany divided.

The next move in the aggressive game was made by Austria, with the connivance of Russia. During the summer of 1875 an insurrection of the Christian Slavs in Herzegovina, which received support from the neighbouring principalities of Montenegro and Servia, was fostered by the Austrian authorities and encouraged by the Russian consuls on the Adriatic coast. A European concert was formed for the purpose of settling the disturbance by means of local administrative reforms, but the efforts of the powers failed, because the insurgents hoped to obtain complete liberation from Turkish rule; and in the beginning of July, with a view to promoting this solution, Servia and Montenegro declared war against the Porte. Thereupon Russia began to show her hand more openly. The government allowed volunteers to be recruited in Moscow and St Petersburg, and the Russian general Chernayev, who had distinguished himself in Central Asia, was appointed to the

Austro-Russian agreement, 1876.

command of the Servian army. When the ball had thus been set rolling, the two powers chiefly concerned considered that the time had come for embodying the result of their informal confidential pourparlers in a secret agreement, which is known as the convention of Reichstadt, because it was signed at a meeting of the two emperors in the little Bohemian town of that name. It bore the date of the 8th of July 1876—exactly a week after Servia and Montenegro had declared war—and it contained the following stipulations: (1) That so long as the struggle which had just begun remained undecided, the two sovereigns should refrain from interference, and that in the event of the principalities being defeated, any modification of the territorial or political *status quo ante* to their detriment should be prevented; (2) that in the event of the principalities proving victorious, and territorial changes taking place, Austria should claim compensation in Bosnia and Herzegovina, and Russia should demand the restitution of the portion of Bessarabia which she had lost by the Crimean War; (3) that in the event of the collapse of the Ottoman empire, the two powers should act together to create autonomous principalities in European Turkey, to unite Thessaly and Crete to Greece, and to proclaim Constantinople a free town. The contracting parties evidently expected that the two principalities would be victorious in their struggle with the Porte, and that the compensations mentioned would be secured without a great European war. Their expectations were disappointed. Montenegro made a brave stand against superior forces, but before five months had passed Servia was at the mercy of the Turkish army, and Russia had to come to the assistance of her protégé. A Russian ultimatum stopped the advance of the Turks on Belgrade, and an armistice, subsequently transformed into a peace, was signed.

Bulgarian Question.

Russia and Austria had now to choose between abandoning their schemes and adopting some other course of action, and unforeseen incidents contributed towards making them select the latter alternative. In June 1876 an attempt at insurrection in Bulgaria had been repressed with savage brutality by the Turks, and the details, as they became known some weeks later, produced much indignation all over Europe. In England the excitement, fanned by the eloquence of Gladstone, became intense, and compelled the Disraeli cabinet to take part, very reluctantly, in a diplomatic campaign, with the object of imposing radical reforms on Turkey. In Russia the excitement and indignation were equally great, and the tsar gradually formed the resolution that if the powers would not act collectively and energetically, so as to compel the Porte to yield, he would undertake the work single-handed. This resolution he announced publicly in a speech delivered at Moscow on the 10th of November 1876. The powers did not like the idea of separate Russian action, and in order to prevent it they agreed to hold a conference in Constantinople for the purpose of inducing the Porte to introduce the requisite reforms. The Porte was at that moment under the influence of popular patriotic excitement which made it indisposed to accept orders, or even well-meant advice, from governments more or less hostile to it, and the inconsiderate mode of procedure suggested by General Ignatiev, and adopted by the other delegates, made it still more unconciliatory. At the first plenary sitting of the conference the proceedings were disturbed by the sound of artillery, and the Turkish representative explained that the salvo was in honour of the new Ottoman constitution, which was being promulgated by the sultan. The inference suggested was that as Turkey had spontaneously entered on the path of liberal and constitutional reform for all Ottoman subjects, it became superfluous and absurd to talk of small reforms for particular provinces, such as the conference was about to propose. The deliberations continued, but finally the Porte refused to accept what the plenipotentiaries considered an irreducible minimum, and the conference broke up without obtaining any practical result. The tsar's Moscow declaration about employing single-handed the requisite coercive measures now came to be fulfilled.

San Stefano.

In order to make a successful aggressive move on Turkey, Russia had first of all to secure her rear and flank by an arrangement with her two allies. In Berlin she encountered no difficulties. Bismarck had no objection to seeing Russia weaken herself in a struggle with Turkey, provided she did not upset the balance of power in south-eastern Europe, and he felt confident that he could prevent by diplomatic means any such catastrophe. He was inclined, therefore, to encourage rather than restrain the bellicose tendencies of St Petersburg. In Vienna the task of coming to a definite arrangement was much more difficult, and it was only after protracted and laborious negotiations that a convention was concluded on the 15th of January 1877, and formally signed three months later. It was a development of the agreement of Reichstadt, modified according to the changes in the situation, but retaining the essential principle that in the event of the territorial *status quo* being altered, Russia should recover the lost portion of Bessarabia, and Austria should get Bosnia and a part of Herzegovina. Having made these preliminary arrangements, Russia began the campaign simultaneously in Europe and Asia Minor, and after many reverses and enormous sacrifices of blood and treasure, she succeeded in imposing on the Turks the "preliminary peace" of San Stefano (3rd March 1878). That peace was negotiated with very little consideration for the interests of the other powers, and as soon as the terms of it became known in Vienna and London there was an outburst of indignation. In negotiating the treaty General Ignatiev had ignored the wishes of Austria, and had even, according to the contention of Andrássy, infringed the convention signed at the beginning of the war. However this may be, the peace of San Stefano brought to the surface the latent conflict of interests between the two empires. Russia's aim was to create a big Bulgaria under the influence of St. Petersburg, and to emancipate Servia and Montenegro as far as possible from Austrian influence, whereas Austria objected to the creation of any large Slav state in the Balkan Peninsula, and insisted on maintaining her influence at Belgrade and Tsetigne (Cetinje). In vain Prince Gorchakov endeavoured to conciliate Austria and to extract from Count Andrássy a clear statement of the terms he would accept. Count Andrássy was in no hurry to extricate Russia from her difficulties, and suggested that the whole question should be submitted to a European congress. The suggestion was endorsed by Great Britain, which likewise objected to the San Stefano arrangements, and Bismarck declined to bring any pressure to bear on the cabinet of Vienna.

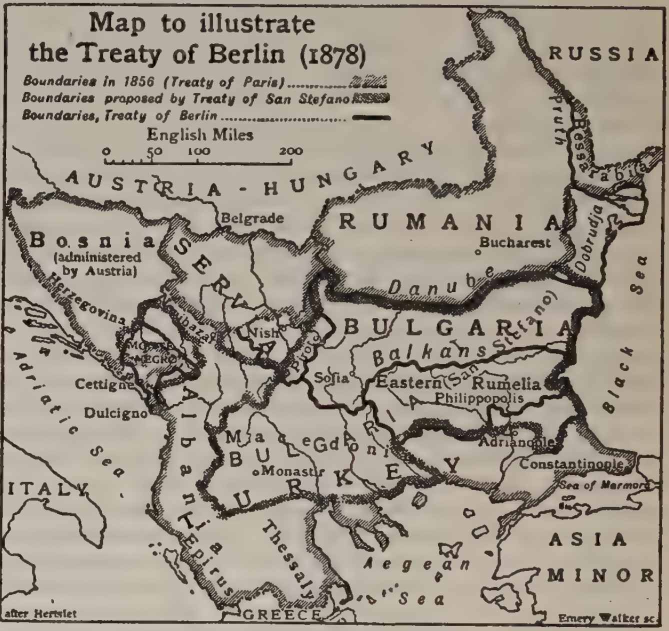
Berlin Congress.

Deceived in her expectations of active support from her two allies, Russia found herself in an awkward position. From a military point of view it was absolutely necessary for her to come to an arrangement either with Austria or with England, because the communications of her army before Constantinople with its base could be cut by these two powers acting in concert—the land route being dominated by Austria, and the Black Sea route by the British fleet, which was at that time anchored in the Sea of Marmora. As soon, therefore, as the efforts to obtain the support of her two allies against the demands of England had failed, negotiations were opened in London, and on the 30th of May a secret convention was signed by Lord Salisbury and Count Schuvalov. By that agreement the obstacles to the assembling of the congress were removed. The congress met in Berlin on the 13th of June, and after many prolonged sittings and much secret negotiation the treaty of Berlin was signed on the 13th of July. By that treaty the preliminary peace of San Stefano was considerably modified. The big Bulgaria defined by General Ignatiev was divided into three portions, the part between the Danube and the Balkans being transformed into a vassal principality, the part between the Balkans and the Rhodope being made into an autonomous province, called Eastern Rumelia, under a Christian governor named by the sultan with the assent of the powers, and the remainder being placed again under the direct rule of the Porte. The independence of Montenegro, Servia and Rumania was formally recognized, and each of these principalities received a considerable accession of territory. Rumania, however, in return for the Dobrudja, which it professed not to desire, was obliged to give back to Russia the portion of Bessarabia ceded after the Crimean War. In Asia Minor Russia agreed to confine her annexations to the districts of Kars, Ardahan and Batum, and to restore to Turkey the remainder of the occupied territory. As a set-off against the large acquisitions of the Slav races, the powers recommended that the sultan should cede to the kingdom of Greece the greater part of Thessaly and Epirus, under the form of a rectification of frontiers. At first the sultan refused to act on this recommendation, but in March 1881 a compromise was effected by which Greece obtained Thessaly without Epirus. Bosnia and Herzegovina were to be occupied and administered by Austria-Hungary, and the Austrian authorities were to have the right of making roads and keeping garrisons in the district of Novi-Bazar, which lies between Servia and Montenegro. In all the provinces of European Turkey for which special arrangements were not made in the treaty, the Porte undertook (Art. 23) to introduce organic statutes similar to that of Crete, adapted to the local conditions. This article, like many of the subordinate stipulations of the treaty, remained a dead letter. We may mention specially Art. 61, in which the Sublime Porte undertook to realize without delay the ameliorations and reforms required in the provinces inhabited by Armenians, and to guarantee their safety against the Circassians and Kurds. Equally unreliable proved the scheme of Lord Beaconsfield to secure good administration throughout the whole of Asia Minor by the introduction of reforms under British control, and to prevent the further expansion of Russia in that direction by a defensive alliance with the Porte. A convention to that effect was duly signed at Constantinople a few days before the meeting of the congress (4th June 1878), but the only part of it which was actually realized was the occupation and administration of Cyprus by the British government. The new frontiers stipulated in the treaty of San Stefano, and subsequently rectified by the treaty of Berlin, are shown in the accompanying sketch-map.

Cyprus Convention.

Russian resentment against Bismarck.

The secret schemes of Russia and Austria, in so far as they were defined in the agreement of Reichstadt and the subsequent Austro-Russian treaty of Vienna, had thus been realized. Russia had recovered the lost portion of Bessarabia, and Austria had practically annexed Bosnia and Herzegovina, though the nominal suzerainty of the sultan over the two provinces was maintained. But Russia was far from satisfied with the results, which seemed to her not at all commensurate with the sacrifices imposed on her by the war, and her dissatisfaction led to a new grouping of the powers. Before the opening of the Berlin congress Bismarck had announced publicly that he would refrain from taking sides with any of the contending parties, and would confine himself to playing the part of an honest broker. The announcement was received by the Russians with astonishment and indignation. What they expected was not an impartial arbiter, but a cordial and useful friend in need. In 1871 the emperor William, as we have seen, had spontaneously declared to the tsar that Germany owed to His Majesty the happy issue of the war, and that she would never forget it, and we may add that on that occasion he signed himself "Your ever grateful Friend." Now, in 1878, when the moment had come for paying at least an instalment of this debt, and when Russia was being compelled to make concessions which she described as incompatible with her dignity, Bismarck had nothing better to offer than honest brokerage. The indignation in all classes was intense, and the views commonly held regarding Bismarck's "duplicity" and "treachery" were supposed to receive ample confirmation during the sittings of the congress and the following six months. On the 4th of February 1879 Prince Gorchakov wrote to the ambassador in Vienna: "Needless to say, that in our eyes the Three Emperors' Alliance is practically torn in pieces by the conduct of our two allies. At present it remains for us merely to terminate the liquidation of the past, and to seek henceforth support in ourselves alone." The same view of the situation was taken in Berlin and Vienna, though the result was attributed, of course, to different causes, and the danger of serious complications became so great that Bismarck concluded with Andrássy in the following October (1879) a formal defensive alliance, which was avowedly directed against Russia, and which subsequently developed into the Triple Alliance, directed against Russia and France.



The causes of the rupture are variously described by the different parties interested. According to Bismarck the Russian government began a venomous campaign against Germany in the press, and collected, with apparently hostile intentions, enormous masses of troops near the German and Austrian frontiers, whilst the tsar adopted in his correspondence with the emperor William an arrogant and menacing tone which could not be tolerated. On the other hand, the Russians declare that the so-called Press-Campaign was merely the spontaneous public expression of the prevailing disappointment among all classes in Russia, that the military preparations had a purely defensive character, and that the tsar's remarks, which roused Bismarck's ire, did not transgress the limits of friendly expostulation such as sovereigns in close friendly relations might naturally employ. Subsequent revelations tend rather to confirm the Russian view. After an exhausting war and without a single powerful ally, Russia was not likely to provoke wantonly a great war with Germany and Austria. The press attacks were not more violent than those which frequently appear in newspapers which draw their inspiration from the German foreign office, and the accusations about the arrogant attitude and menacing tone of Alexander II. are not at all in harmony with his known character, and are refuted by the documents since published by Dr Busch. The truth seems to be that the self-willed chancellor was actuated by nervous irritation and personal feeling more than by considerations of statecraft. His imperial master was not convinced by his arguments, and showed great reluctance to permit the conclusion of a separate treaty with Austria. Finally, with much searching of heart, he yielded to the importunity of his minister; but in thus committing an unfriendly act towards his old ally, he so softened the blow that the personal good relations between the two sovereigns suffered merely a momentary interruption. Bismarck himself soon recognized that the permanent estrangement of Russia would be a grave mistake of policy, and the very next year (1880), negotiations for a treaty of defensive alliance between the two cabinets were begun. Nor did the accession to the throne of Russia of Alexander III., who had long enjoyed the reputation of being systematically hostile to Germans, produce a rupture, as was expected. Six months after his father's death, the young tsar met the old kaiser at Danzig

(September 1881), and some progress was made towards a complete renewal of the traditional friendship. Immediately afterwards a further step was taken towards re-establishing the old state of things with regard also to Austria. On his return to St Petersburg, Alexander III. remembered that he had received some time previously a telegram of congratulation from the emperor Francis Joseph, and he now replied to it very cordially, referring to the meeting at Danzig, and describing the emperor William as "that venerable friend with whom we are united in the common bonds of a profound affection." The words foreshadowed a revival of the Three Emperors' League, which actually took place three years later.

Growth of the Triple Alliance.

The removal of all immediate danger of a Franco-Russian alliance did not prevent Bismarck from strengthening in other ways the diplomatic position of Germany, and the result of his efforts soon became apparent in the alliance of Italy with the two central powers. Ever since the Franco-German War of 1870–71, and more especially since the congress of Berlin in 1878, the Italian government had shown itself restless and undecided in its foreign policy. As it was to France that Italy owed her emancipation from Austrian rule, it seemed natural that the two countries should remain allies, but anything like cordial co-operation was prevented by conflicting interests and hostile feeling. The French did not consider the acquisition of Savoy and Nice a sufficient compensation for the assistance they had given to the cause of Italian unity, and they did not know, or did not care to remember, that their own government was greatly to blame for the passive attitude of Italy in the hour of their great national misfortunes. On the other hand, a considerable amount of bitterness against France had been gradually accumulating in the hearts of the Italians. As far back as the end of the war of 1859, popular opinion had been freely expressed against Napoleon III., because he had failed to keep his promise of liberating Italy "from the Alps to the Adriatic." The feeling was revived and intensified when it became known that he was opposing the annexation of central and southern Italy, and that he obtained Savoy and Nice as the price of partly withdrawing his opposition. Subsequently, in the war of 1866, he was supposed to have insulted Italy by making her conclude peace with Austria, on the basis of the cession of Venetia, before she could wipe out the humiliation of her defeats at Custozza and Lissa. Then came the French protection of the pope's temporal power as a constant source of irritation, producing occasional explosions of violent hostility, as when the new Chassepot rifles were announced to have "worked wonders" among the Garibaldians at Mentana. When the Second Empire was replaced by the Republic, the relations did not improve. French statesmen of the Thiers school had always condemned the imperial policy of permitting and even encouraging the creation of large, powerful states on the French frontiers, and Thiers himself publicly attributed to this policy the misfortunes of his country. With regard to Italy, he said openly that he regretted what had been done, though he had no intention of undoing it. The first part of this statement was carefully noted in Italy, and the latter part was accepted with scepticism. In any case his hand might perhaps be forced, for in the first republican chamber the monarchical and clerical element was very strong, and it persistently attempted to get something done in favour of the temporal power. Even when the party of the Left undertook the direction of affairs in 1876, the government did not become anti-clerical in its foreign policy, and Italian statesmen resigned themselves to a position of political isolation. The position had its advantages. Events in the Balkan Peninsula foreshadowed a great European war, and it seemed that in the event of Europe's being divided into two hostile camps, Italy might have the honour and the advantage of regulating the balance of power. By maintaining good relations with all her neighbours and carefully avoiding all inconvenient entanglements, she might come forward at the critical moment and dictate her own terms to either of the contending parties, or offer her services to the highest bidder. This Machiavellian policy did not give the expected results. Being friends with everybody in a general way may be the best course for an old, conservative country which desires merely the maintenance of the *status quo*, but it does not secure the energetic diplomatic support required by a young enterprising state which wishes to increase its territory and influence. At the congress of Berlin, when several of the powers got territorial acquisitions, Italy got nothing. The Italians, who were in the habit of assuming, almost as a matter of principle, that from all European complications they had a right to obtain some tangible advantage, were naturally disappointed, and they attributed their misfortune to their political isolation. The policy of the free hand consequently fell into disrepute, and the desire for a close, efficient alliance revived. But with what power or powers should an alliance be made? The remnants of the old party of action, who still carried the *Italia Irredenta* banner, had an answer ready. They recommended that alliances should be concluded with a view to wresting from Austria the Trentino and Trieste, with Dalmatia, perhaps, into the bargain. On the other hand, the Conservatives and the Moderates considered that the question of the Trentino and Trieste was much less important than that of political influence in the Mediterranean. A strong Austria was required, it was said, to bar the way of Russia to the Adriatic, and France must not be allowed to pursue unchecked her policy of transforming the Mediterranean into a French lake. Considerations of this kind led naturally to the conclusion that Italy should draw closer to the powers of central Europe. So the question appeared from the standpoint of "la haute politique." From the less elevated standpoint of immediate political interests, it presented conflicting considerations. A *rapprochement* with the central powers might prevent the conclusion of a commercial treaty with France, and thereby increase the financial and economic difficulties with which the young kingdom was struggling, whereas a *rapprochement* with France would certainly excite the hostility of Bismarck, who was retiring from the *Kulturkampf* and journeying towards Canossa, and who might possibly conciliate the pope by helping him to recover his temporal sovereignty at the expense of Italy. Altogether the problem was a very complicated one. The conflicting currents so nearly balanced each other, that the question as to which way the ship would drift might be decided by a little squall of popular sentiment. A very big squall was brewing.

France and Tunis.

During the congress of Berlin the French government was very indignant when it discovered that Lord Beaconsfield had recently made a secret convention with the sultan for the British occupation of Cyprus, and in order to calm its resentment Lord Salisbury gave M. Waddington to understand that, so far as England was concerned, France would be allowed a free hand in the Regency of Tunis, which she had long coveted. Though the conversations on the subject and a subsequent exchange of notes were kept strictly secret, the Italian government soon got wind of the affair, and it was at first much alarmed. It considered, in common with Italians generally, that Tunis, on the ground of historic right and of national interests, should be reserved for Italy, and that an extension of French territory in that direction would destroy, to the detriment of Italy, the balance of power in the Mediterranean. These apprehensions were calmed for a time by assurances given to the Italian ambassador in Paris. M. Gambetta assured General Cialdini that he had no intention of making Italy an irreconcilable enemy of France, and M. Waddington declared, on his word of honour, that so long as he remained minister of foreign affairs nothing of the sort would be done by France without a previous understanding with the cabinet of Rome. M. Waddington honourably kept his word, but his successor did not consider himself bound by the assurance; and when it was found that the Italians were trying systematically to establish their influence in the Regency at the expense of France, the French authorities, on the ground that a Tunisian tribe called the Kroumirs had committed depredations in Algeria, sent an armed force into the Regency, and imposed on the bey the Bardo treaty, which transformed Tunis into a French protectorate.

The establishment of a French protectorate over a country which the Italians had marked out for themselves as necessary for the defence and colonial expansion of the kingdom had the effect which Gambetta had foreseen—it made Italy, for a time at least, the irreconcilable enemy of France. Whilst the French were giving free expression to their patriotic exultation, and even Gambetta himself, in defiance of what he had said to Cialdini, was congratulating Jules Ferry on having restored France to her place among the nations, the Italians were trying to smother their indignation and to discover some means of retrieving what they had lost. The only remedy seemed to be to secure foreign alliances, and there was now no hesitation as to where they should be sought. Simple people in Italy imagined that if an alliance had been concluded sooner with Germany and Austria, these powers would have prevented France from trampling on the sacred interests of Italy. This idea was entirely erroneous, because Austria had little or no interest in the Tunisian Question, and Bismarck was not at all sorry to see France embark on an enterprise which distracted her attention from Alsace-Lorraine and removed all danger of a Franco-Italian alliance. The illusion, however, had a powerful influence on Italian public opinion. The government was now urged to conclude without further delay an alliance with the central powers, and the recommendation was not unwelcome to the king, because most of the Italian Gallophils had anti-dynastic and republican tendencies, and he was naturally disposed to draw nearer to governments which proclaimed themselves the defenders of monarchical institutions and the opponents of revolutionary agitation. After protracted negotiations, in which Italy tried in vain to secure protection for her own separate interests in the Mediterranean, defensive treaties of alliance were concluded with the cabinets of Vienna and Berlin in May 1882. Though the Italian statesmen did not secure by these treaties all they wanted, they felt that the kingdom was protected against any aggressive designs which might be entertained by France or the Vatican, and when the treaties were renewed in 1887 they succeeded in getting somewhat more favourable conditions.

Triple Alliance signed 1882.

By the creation of this Triple Alliance, which still subsists, the diplomatic position of Germany was greatly strengthened, but Bismarck was still haunted by the apprehension of a Franco-Russian alliance, and he made repeated attempts to renew the old cordial relations with the court of St Petersburg. He was bold enough to hope that, notwithstanding the Austro-German treaty of October 1879, avowedly directed against Russia, and the new Triple Alliance, by which the Austro-German Alliance was strengthened, he might resuscitate the Three Emperors' League in such a form as to ensure, even more effectually than he had done on the former occasion, the preponderance of Germany in the arrangement. With this object he threw out a hint to the Russian ambassador, M. Sabourof, in the summer of 1883, that the evil results of the congress of Berlin might be counteracted by a formal agreement between the three emperors. The suggestion was transmitted privately by M. Sabourof to the tsar, and was favourably received. Alexander III. was disquieted by the continuance of the Nihilist agitation, and was not averse from drawing closer to the conservative powers; and as he desired tranquillity for some time in the Balkan Peninsula, he was glad to have security that his rival would do nothing in that part of the world without a previous understanding. M. de Giers, who had now succeeded Prince Gorchakov in the direction of foreign affairs, was accordingly despatched to Friedrichsruh to discuss the subject with Bismarck. The practical result of the meeting was that negotiations between the two governments were begun, and on the 21st of March 1884 a formal document was signed in Berlin. About six months later, in the month of September, the three emperors met at Skiernevice and ratified the agreement. Thus, without any modification of the Triple Alliance, which was directed against Russia, the old Three Emperors' League, which included Russia, was revived. Germany and Austria, being members of both, were doubly protected, for in the event of being attacked they could count on at least the benevolent neutrality of both Russia and Italy. France was thereby completely isolated.

Dreikaiserbund revived 1884.

In drawing up the secret treaty of Skiernevice, which may be regarded as the *chef-d'œuvre* of Bismarckian diplomacy, the German chancellor's chief aims evidently were to paralyse Russia by yoking her to Germany and Austria, to isolate France, and to realize his old scheme of holding the balance between Russia and Austria in the Balkan Peninsula. With a view to attaining the first two objects it was stipulated that if any one of the three powers were forced to make war on a fourth power, the two other contracting parties should observe a benevolent neutrality towards their ally. If we may believe a well-informed Russian authority, Bismarck wished it to be understood that in the event of *two* of the powers being at war with a fourth, the stipulation about benevolent neutrality should still hold good, but Alexander III. objected, on the ground that he could not remain a passive spectator of a duel in which France would be confronted by two antagonists. In his third object Bismarck was successful, for it was expressly laid down that in all cases of a disagreement between two of the parties in the affairs of the Balkan Peninsula, the third power should decide between them. This meant, of course, that in all discussions between Russia and Austria, the two great rivals in the Eastern Question, Bismarck should always have a casting vote. In return for all this, Russia obtained two small concessions: firstly, that Germany and Austria should seek to restrain the sultan from permitting the passage of the Dardanelles to an English fleet, as he had done in 1878, when the Russian army was before Constantinople; and, secondly, that they should not oppose the union of Bulgaria and Eastern Rumelia, if it was accomplished by the force of things and within the limits traced by the congress of Berlin.

Bulgarian crisis.

This new form of the Three Emperors' League had all the organic defects of its predecessor, and was destined to be still more shortlived. The claims of Russia and Austria might be reconcilable in theory, but in practice they were sure to conflict; and however much Bismarck might try to play the part of an honest broker, he was certain to be suspected of opposing Russia and favouring Austria. It was therefore only during a period of political stagnation in south-eastern Europe that the arrangement could work smoothly. The political stagnation did not last long. Prince Alexander of Bulgaria had for some time been fretting under the high-handed interference of the Russian agents in the principality, and had begun to oppose systematically what the Russians considered their legitimate influence. Relations between Sofia and St Petersburg had consequently become strained, when a crisis was suddenly brought about by the revolution of Philippopolis in September 1885. The conspirators arrested and expelled the governor-general, who had been appointed by the sultan with the assent of the powers, and at the same time proclaimed the union of the autonomous province of Eastern Rumelia with the principality of Bulgaria, in defiance of the stipulations of the treaty of Berlin. The revolution had been effected with the connivance and approval of the regularly accredited Russian agents in Philippopolis, but it had not received the sanction of the Russian government, and was resented as a new act of insubordination on the part of Prince Alexander. When he arrived in Philippopolis and accepted the declaration of union, the cabinet of St Petersburg protested against any such infraction of the Berlin treaty, and the Porte prepared to send an army into the province. It was restrained from taking this step by the ambassadors in Constantinople, so that an armed conflict between Turks and Bulgarians was prevented; but no sooner had the Bulgarians been relieved from this danger on their eastern frontier, than they were attacked from the west by the Servians, who were determined to get ample compensation for any advantage which the Bulgarians might obtain. The Bulgarian army defeated the Servians at Slivnitza (November 19–20, 1885), and was marching on Belgrade when its advance was stopped and an armistice arranged by the energetic intervention of the Austrian government. Following the example of the Servians, the Greeks were preparing to exact territorial compensation likewise; but as their mobilization was a slow process, the powers had time to restrain them from entering on active hostilities, first by an ultimatum (April 26, 1886), and afterwards by a blockade of their ports (May 1886). By that time, thanks to the intervention of the powers, a peace between Bulgaria and Servia had been signed at Bucharest (March 3); and with regard to Eastern Rumelia a compromise had been effected by which the formal union with the principality was rejected, and the prince was appointed governor-general of the province for a term of five years. This was in reality union in disguise.

The diplomatic solution of the problem averted the danger of a European war, but it left a great deal of dissatisfaction, which soon produced new troubles. Not only had Prince Alexander escaped punishment for his insubordination to Russia, but he and the anti-Russian party among the Bulgarians had obtained a decided success. This could not well be tolerated. Before six months had passed (August 21, 1886) Prince Alexander was kidnapped by conspirators in his palace at Sofia and conveyed secretly to Russian Bessarabia. As soon as the incident was reported to the tsar, the prince was released, and he at once returned to Sofia, where a counter-revolution had been effected in his favour; but he considered his position untenable, and formally abdicated. A fortnight after his departure General Kaulbars arrived from St Petersburg with instructions from the tsar to restore order in accordance with Russian interests. In St Petersburg it was supposed that the Bulgarian people were still devoted to Russia, and that they were ready to rise against and expel the politicians of the Nationalist party led by Stambolof. General Kaulbars accordingly made a tour in the country and delivered speeches to the assembled multitudes, but Stambolof's political organization counteracted all his efforts, and on the 20th of November he left Bulgaria and took the Russian consuls with him. Stambolof maintained his position, suppressed energetically several insurrectionary movements, and succeeded in getting Prince Ferdinand of Coburg elected prince (July 7, 1887), in spite of the opposition of Russia, who put forward as candidate a Russian subject, Prince Nicholas of Mingrelia. Prince Ferdinand was not officially recognized by the sultan and the powers, but he continued to reign under the direction of Stambolof, and the Russian government, passively accepting the accomplished facts, awaited patiently a more convenient moment for action.

Russian hostility to Germany.

These events in the Balkan Peninsula necessarily affected the mutual relations of the powers composing the Three Emperors' League. Austria could not remain a passive and disinterested spectator of the action of Russia in Bulgaria. Her agents had given a certain amount of support to Prince Alexander in his efforts to emancipate himself from Russian domination; and when the prince was kidnapped and induced to abdicate, Count Kalnoky had not concealed his intention of opposing further aggression. Bismarck resisted the pressure brought to bear on him from several quarters in favour of the anti-Russian party in Bulgaria, but he was suspected by the Russians of siding with Austria and secretly encouraging the opposition to Russian influence. This revived the hatred against him which had been created by his pro-Austrian leanings after the Russo-Turkish War. The feeling was assiduously fomented by the Russian press, especially by M. Katkoff, the editor of the *Moscow Gazette*, who exercised great influence on public opinion and had personal relations with Alexander III. On the 31st of July 1886, three weeks before the kidnapping of Prince Alexander, he had begun a regular journalistic campaign against Germany, and advocated strongly a new orientation of Russian policy. M. de Giers, minister of foreign affairs, was openly attacked as a partisan of the German alliance, and his "pilgrimages to Friedrichsruh and Berlin" were compared to the humiliating journeys of the old Russian grand-princes to the Golden Horde in the time of the Tatar domination. The moment had come, it was said, for Russia to emancipate herself from German diplomatic thraldom, and for this purpose a *rapprochement* with France was suggested. The idea was well received by the public, and it seemed to be not unpalatable to the tsar, for the *Moscow Gazette* was allowed to continue its attacks on M. de Giers's policy of maintaining the German alliance. In Berlin such significant facts could not fail to produce uneasiness, because one of the chief aims of Bismarck's policy had always been to prevent a Russo-French *entente cordiale*. The German press were instructed to refute the arguments of their Russian colleagues, and to prove that if Russia had really lost her influence in the Balkan Peninsula, the fact was due to the blunders of her own diplomacy. The controversy did not produce at once a serious estrangement between the two cabinets, but it marked the beginning of a period of vacillation on the part of Alexander III. When the treaty of Skiernevice was about to expire in 1887, he positively refused to renew the Three Emperors' League, but he consented to make, without the cognizance of Austria, a secret treaty of alliance with Germany for three years. Not satisfied with this guarantee against the danger of a Franco-Russian alliance, Bismarck caused attacks to be made in the press on Russian credit, which was rapidly gaining a footing on the Paris bourse, and he imprudently showed his hand by prohibiting the Reichsbank from accepting Russian securities as guarantees. From that moment the tsar's attitude changed. All his dormant suspicions of German policy revived. When he passed through Berlin in November 1887, Bismarck had a long audience, in which he defended himself with his customary ability, but Alexander remained unmoved in his conviction that the German government had systematically opposed Russian interests, and had paralysed Russian action in the Balkan Peninsula for the benefit of Austria; and he failed to understand the ingenious theory put forward by the German chancellor, that two powers might have a severe economic struggle without affecting their political relations. Bismarck had to recognize that, for the moment at least, the Three Emperors' League, which had served his purposes so well, could not be resuscitated, but he had still a certain security against the hostility of Russia in the secret treaty. Soon, however, this link was also to be broken. When the treaty expired in 1890 it was not renewed. By that time Bismarck had been dismissed, and he subsequently reproached his successor, Count Caprivi, with not having renewed it, but in reality Count Caprivi was not to blame. Alexander III. was determined not to renew the alliance, and was already gravitating slowly towards an understanding with France.

Franco-Russian entente.

No treaty or formal defensive engagement of any kind existed between Russia and France, but it was already tolerably certain that in the event of a great war the two nations would be found fighting on the same side, and the military authorities in both countries felt that if no arrangements were made beforehand for concerted action,—such arrangements having been long ago completed by the powers composing the Triple Alliance,—they would begin the campaign at a great disadvantage. This was perfectly understood by both governments; and after some hesitation on both sides, Generals Vannovski and Obruchev, on the one side, and Generals Saussier, Miribel and Boisdeffre on the other, were permitted to discuss plans of co-operation. At the same time a large quantity of Lebel rifles were manufactured in France for the Russian army, and the secret of making smokeless powder was communicated to the Russian military authorities. The French government wished to go further and conclude a defensive alliance, but the tsar was reluctant to bind himself with a government which had so little stability, and which might be induced to provoke a war with Germany by the prospect of Russian support. Even the military convention was not formally ratified until 1894. The enthusiastic partisans of the alliance flattered themselves that the tsar's reluctance had been overcome, when he received very graciously Admiral Gervais and his officers during the visit of the French fleet to Cronstadt in the summer of 1891, but their joy was premature. The formal *rapprochement* between the two governments was much slower than the unofficial *rapprochement* between the two nations. More than two years passed before the Cronstadt visit was returned by the Russian fleet, under Admiral Avelan. The enthusiastic ovations which the admiral and his subordinates received in Toulon and Paris (October 1893) showed how eager and anxious the French people were for an alliance with Russia, but the Russian government was in no hurry to gratify their wishes. Of the official action all we know with certainty is, that immediately after the Cronstadt visit in 1891 a diplomatic protocol about a defensive alliance was signed; that during the special mission of General Boisdeffre to St Petersburg in 1892 negotiations took place about a military convention; that in 1894 the military convention was ratified; that in the summer of 1895 M. Ribot, when prime minister, first spoke publicly of an alliance; and that during the visit of the president of the French Republic to St Petersburg, in August 1897, France and Russia were referred to as allies in the complimentary speeches of the tsar and of M. Félix Faure. Though we are still in the dark as to the precise terms of the arrangement, there is no doubt that close friendly relations were established between the two powers, and that in all important international affairs they sought to act in accord with each other. It is equally certain that for some years Russia was the predominant partner, and that, in accordance with the pacific tendencies of the tsar, she systematically exercised a restraining influence on France.

The Triple entente and the Triple Alliance.

The great expectations excited among the French people by the *entente cordiale* were consequently not realized, and there appeared gradually premonitory symptoms of a reaction in public opinion, but the alliance between the two governments was maintained, and though the Triple Alliance was weakened by the internal troubles of Austria-Hungary and by a tendency on the part of Italy to gravitate towards France, the grouping of the great powers was not radically changed till the Russo-Japanese War of 1904–5. By that war the balance of power in Europe was seriously disturbed. Russia inadvertently provoked a struggle with Japan which made such a drain on her energies and material resources that her political influence in Europe necessarily suffered a partial eclipse. Thus the Triple Alliance outweighed its rival, and there was a danger of the German emperor's taking advantage of the situation to secure for himself a diplomatic predominance in Europe. France at once perceived that there was a grave danger for herself, and naturally looked about for some diplomatic support to replace that of Russia, which had lost much of its value. From her uncomfortable isolation there were only two possible exits—a *rapprochement* with Germany or a *rapprochement* with England. Both of these demanded sacrifices. The former required a formal abandonment of all ideas of recovering Alsace and Lorraine; the latter a formal recognition of British predominance in Egypt. Under the influence of M. Delcassé the French government chose what seemed the lesser of two evils, and concluded with the English foreign office in April 1904 a general agreement, of which the most important stipulation was that France should leave England a free hand in Egypt, and that England in return should allow France, within certain limits, a free hand in Morocco. On that basis was effected a *rapprochement* between the two governments which soon developed into an *entente cordiale* between the two nations. The efforts of the German emperor to undermine the *entente* by insisting on the convocation of a conference to consider the Morocco question caused M. Delcassé to resign, and produced considerable anxiety throughout Europe, but the desired result was not attained. On the contrary, the conference in question, which met at Algeciras in January 1906, ended in strengthening the *entente* and in accentuating the partial isolation of Germany.

The grouping of the great continental states into two opposite but not necessarily hostile camps helped to preserve the balance of power and the peace of Europe. The result was that the causes of conflict which arose from time to time up to the end of the 19th century were localized. Some of the principal questions involved may be more particularly mentioned.

Armenia.

The Armenian Question was brought prominently before Europe by the Russo-Turkish War of 1877–78. In the treaties of San Stefano and Berlin the Sublime Porte undertook "to carry out without delay the ameliorations and reforms required by local needs in the provinces inhabited by the Armenians, and to guarantee their security against the Circassians and the Kurds." This stipulation remained a dead letter, and the relations between the Armenians and the Mussulmans became worse than before, because the protection of the powers encouraged in the oppressed nationality far-reaching political aspirations, and the sultan regarded the political aspirations and the intervention of the powers as dangerous for the integrity and independence of his empire. For some fifteen years the Armenians continued to hope for the efficacious intervention of their protectors, but when their patience became exhausted and the question seemed in danger of being forgotten, they determined to bring it again to the front. Some of them confined themselves to agitating abroad, especially in England, in favour of the cause, whilst others made preparations for exciting an insurrectionary movement in Constantinople and Asia Minor. These latter knew very well that an insurrection could be suppressed by the Turkish government without much difficulty, but they hoped that the savage measures of repression which the Turks were sure to employ might lead to the active intervention of Europe and ensure their liberation from Turkish rule, as the famous "atrocities" of 1876 had led to the political emancipation of Bulgaria. In due course—1895–1896—the expected atrocities took place, in the form of wholesale massacres in Constantinople and various towns of Asia Minor. The sultan was subjected to diplomatic pressure and threatened with more efficient means of coercion. In the diplomatic campaign England took the lead, and was warmly supported by Italy, but Germany, Austria and France showed themselves lukewarm, not to say indifferent, and Russia, departing from her traditional policy of protecting the Christians of Turkey, vetoed the employment of force for extracting concessions from the sultan. In these circumstances the Porte naturally confined itself to making a few reforms on paper, which were never carried out. Thus the last state of the Armenians was worse than the first, but the so-called European concert was maintained, and the danger of a great European war was averted.

Crete.

The next attempt to raise the Eastern Question was made by the Greeks. In 1896 a semi-secret society called the Ethniké Hetairia began a Panhellenic agitation, and took advantage of one of the periodical insurrections in Crete to further its projects. In February 1897 the Cretan revolutionary committee proclaimed the annexation of the island to the Hellenic kingdom, and a contingent of Greek regular troops landed near Canea under the command of Colonel Vassos to take possession of the island in the name of King George. The powers, objecting to this arbitrary proceeding, immediately occupied Canea with a mixed force from the ships of war which were there at the time, and summoned the Greek government to withdraw its troops. The summons was disregarded, and the whole of the Greek army was mobilized on the frontier of Thessaly and Epirus. In consequence of a raid into Turkish territory the Porte declared war on the 17th of April, and the short campaign ended in the defeat of the Greeks. The powers intervened to put an end to the hostilities, and after prolonged negotiations a peace was concluded by which Greece had to consent to a strategical rectification of frontier and to pay a war indemnity of £4,000,000. Thus a second time the European concert acted effectually in the interests of peace, but it did not stand the strain of the subsequent efforts to solve the Cretan Question. Finding the Turks less conciliatory after their military success, and being anxious to remain in cordial relations with the Porte, Germany withdrew from further co-operation with the powers, and Austria followed her example. They did not, however, offer any active opposition, and the question received a temporary solution by the appointment of Prince George, second son of the king of Greece, as high commissioner and governor-general of the island. (See CRETE.)

The conflicting desires of several of the powers to obtain colonial possessions in various parts of the world, and to forestall their competitors in the act of taking possession, were bound to introduce complications in which England, as the greatest

Africa.

of colonial powers, would generally be involved; and as the unappropriated portions of the earth's surface at the beginning of the period under discussion were to be found chiefly in Africa, it was in the Dark Continent that the conflicts of interests mostly took place. England's chief competitors were France and Germany. Her traditional policy, except in the south of the continent, where the conditions of soil and climate were favourable to European colonists, had been purely commercial. She had refrained from annexation of territory, as involving too much expenditure and responsibility, and confined her protection to the trading stations on the coast. When France came into the field this policy had to be abandoned. The policy of France was also commercial in a certain sense, but the methods she adopted were very different. She endeavoured to bring under her authority, by annexation or the establishment of protectorates, the largest possible extent of territory, in order to increase her trade by a system of differential tariffs; she encroached on the hinterland of British settlements, and endeavoured to direct artificially the native inland trade towards her own ports. A glance at the map of the African West Coast will suffice to show the success with which this policy was carried out. When the British government awoke to the danger, all that could be done was to prevent further encroachments by likewise annexing territory. The result is shown in the article Africa: § 5. In her dealings with France about the partition of Africa, England was generally conciliatory, but she was always inflexible in guarding carefully the two entrances to the Mediterranean. There was, therefore, a permanent danger of conflict in Egypt and Morocco. When England in 1882 considered it necessary to suppress the Arabi insurrection, she invited France to co-operate, but the French government declined, and left the work to be done by England alone. England had no intention of occupying the country permanently, but she had to take precautions against the danger of French occupation after her withdrawal, and these precautions were embodied in an Anglo-Turkish convention signed at Constantinople in May 1887. France prevented the ratification of the convention by the sultan, with the result that the British occupation has been indefinitely prolonged. She still clung persistently, however, to the hope of obtaining a predominant position in the valley of the Nile, and she tried to effect her purpose by gaining a firm foothold on the upper course of the river. The effort which she made in 1898 to attain this end, by simultaneously despatching the Marchand mission from her Congo possessions and inciting the emperor Menelek of Abyssinia to send a force from the east to join hands with Major Marchand at Fashoda, was defeated by the overthrow of the Khalifa and the British occupation of Khartum. For a few days the two nations seemed on the brink of war, but the French government, receiving no encouragement from St Petersburg, consented to withdraw the Marchand mission, and a convention was signed defining the respective spheres of influence of the two countries.

In Morocco the rivalry between the two powers was less acute but not less persistent and troublesome. France aspired to incorporate the sultanate with her north African possessions, whilst England had commercial interests to defend and was firmly resolved to prevent France from getting unfettered possession of the southern coast of the Straits of Gibraltar. As in Egypt, so in Morocco the dangers of conflict were averted, in 1904, by a general agreement, which enabled France to carry out in Morocco, as far as England was concerned, her policy of pacific penetration, but debarred her from erecting fortifications in the vicinity of the straits. Germany thereafter strongly opposed French claims in Morocco, but after a period of great tension, and the holding of an ineffectual conference at Algeciras in 1906, an understanding was come to in 1909 (see Morocco: *History*).

With Germany likewise, from 1880 onwards, England had some diplomatic difficulties regarding the partition of Africa, but they never reached a very acute phase, and were ultimately settled by mutual concessions. By the arrangement of 1890, in which several of the outstanding questions were solved, Heligoland was ceded to Germany in return for concessions in East Africa. A conflict of interests in the southern Pacific was amicably arranged by the Anglo-German convention of April 1886, in which a line of demarcation was drawn between the respective spheres of influence in the islands to the north and east of the Australian continent, and by the convention of 1899, in virtue of which Germany gained possession of Samoa and renounced in favour of England all pretensions to the Tonga Archipelago.

Asia.

In Asia the tendencies of the European powers to territorial expansion, and their desire to secure new markets for their trade and industry, have affected from time to time their mutual relations. More than once England and Russia have had disputes about the limits of their respective spheres of influence in central Asia, but the causes of friction have steadily diminished as the work of frontier delimitation has advanced. The important agreement of 1872–1873 was supplemented by the protocol of the 22nd of July 1887 and the Pamir delimitation of 1895, so that the Russo-Afghan frontier, which is the dividing line between the Russian and British spheres of influence, has now been carried right up to the frontier of the Chinese empire. The delimitation of the English and French spheres of influence in Asia has also progressed. In 1885 France endeavoured to get a footing on the Upper Irrawaddy, the hinterland of British Burma, and England replied in the following year by annexing the dominions of King Thebaw, including the Shan States as far east as the Mekong. Thereupon France pushed her Indo-Chinese frontier westwards, and in 1893 made an attack on the kingdom of Siam, which very nearly brought about a conflict with England. After prolonged negotiations an arrangement was reached and embodied in a formal treaty (January 1896), which clearly foreshadows a future partition between the two powers, but guarantees the independence of the central portion of the kingdom, the Valley of the Menam, as a buffer-state. Farther north, in eastern China, the aggressive tendencies and mutual rivalries of the European powers have produced a problem of a much more complicated kind. Firstly Germany, then Russia, next England, and finally France took portions of Chinese territory, under the thin disguise of long leases. They thereby excited in the Chinese population and government an intense anti-foreign feeling, which produced the Boxer movement and culminated in the attack on the foreign legations at Pekin in the summer of 1900. (See China: *History*.)

In 1899–1901 the relations of the European powers were disturbed by the Boer War in South Africa. In nearly every country of Europe popular feeling was much excited against England, and in certain influential quarters the idea was entertained of utilizing this feeling for the formation of a coalition against the British empire; but in view of the decided attitude assumed by the British government, and the loyal enthusiasm displayed by the colonies, no foreign government ventured to take the initiative of intervention, and it came gradually to be recognized that no European state had any tangible interest in prolonging the independence and maladministration of the Boer republics.

One permanent factor in the history of Europe after the war of 1870–71 was the constant increase of armaments by all the great powers, and the proportionate increase of taxation. The fact made such an impression on the young emperor of Russia, Nicholas II., that he invited the powers to consider whether the further increase of the burdens thereby imposed on the nations might not be arrested by mutual agreement; and a conference for this purpose was convened at the Hague (May 18–July 29, 1899), but the desirable object in view was not attained. (See Arbitration, International.) (D. M. W.)

Progress of the Peace movement.

Though neither the first Hague Conference nor the second, which met in 1907, did much to fulfil the expectations of those who hoped for the establishment of a system which should guarantee the world against the disasters of war, they undoubtedly tended to create a strong public opinion in favour of peaceful methods in the solution of international problems which has not been without its effect. Any attempt to organize the concert of the powers must always fail, as it failed in the early part of the 19th century, so long as the spirit of national and racial rivalry is stronger than the consciousness of common interests; and the early years of the 20th century showed no diminution, but rather an accentuation of this rivalry. The court of arbitration established at the Hague early in 1901 may deal effectively with questions as to which both parties desire a *modus vivendi*, and the pacific efforts of King Edward VII., which did so much to prevent misunderstandings likely to lead to war, resulted from 1903 onwards in a series of arbitration treaties between Great Britain and other powers which guaranteed the Hague court an effective activity in such matters. But more perilous issues, involving deep-seated antagonisms, have continued to be dealt with by the methods of the old diplomacy backed by the armed force of the powers. How far the final solution of such problems has been helped or hindered by the general reluctance to draw the sword must for some time to come remain an open question. Certainly, during the early years of the 20th century, many causes of difference which a hundred years earlier would assuredly have led to war, were settled, or at least shelved, by diplomacy. Of these the questions of Crete, of Armenia, and of contested claims in Africa have already been mentioned. Other questions of general interest which might have led to war, but which found a peaceful solution, were those of the separation of Norway and Sweden, and the rivalry of the powers in the northern seas. In October 1905 Sweden formally recognized the separate existence of Norway (see NORWAY: *History* and SWEDEN: *History*). On the 23rd of April 1908 were signed the "Declarations"; the one, signed by the four Baltic littoral powers, recognized "in principle" the maintenance of the territorial *status quo* in that sea; the other—to which Great Britain, France, Germany, Denmark, Sweden and Holland were the parties—sanctioned a similar principle in regard to the North Sea. These were followed, in June of the same year, by two agreements intended to apply the same principles to the southern European waters, signed by France and Spain and Great Britain and Spain respectively. Another agreement, that signed between Russia and Great Britain in 1907 for the delimitation of their spheres of influence in Persia and the northern borders of the Indian empire, though having no direct relation to European affairs, exercised considerable influence upon them by helping to restore the international prestige of Russia, damaged by the disasters of the war with Japan and the internal disturbances that followed. The new cordial understanding between the British and Russian governments was cemented by the meeting of King Edward VII. and the emperor Nicholas II. at Reval in June 1908.

Revival of the Eastern Question.

More perilous to European peace, however, than any of these issues was the perennial unrest in Macedonia, which threatened sooner or later to open up the whole Eastern Question once more in its acutest form. The situation was due to the internecine struggle of the rival Balkan races—Greek, Bulgarian, Servian—to secure the right to the reversion of territories not yet derelict. But behind these lesser issues loomed the great secular rivalries of the powers, and beyond these again the vast unknown forces of the Mahommedan world, ominously stirring. The very vastness of the perils involved in any attempt at a definitive settlement compelled the powers to accept a compromise which, it was hoped, would restore tolerable conditions in the wretched country. But the "Mürzsteg programme," concerted between the Austrian and Russian emperors in 1903, and imposed upon the Porte by the diplomatic pressure of the great powers, did not produce the effects hoped for. The hideous tale of massacres of helpless villagers by organized Greek bands, and of equally hideous, if less wholesale, reprisals by Bulgarian bands, grew rather than diminished, and reached its climax in the early months of 1908. The usefulness of the new *gendarmerie*, under European officers, which was to have co-operated with the Ottoman authorities in the restoration of order, was from the outset crippled by the passive obstruction of the Turkish government. The sultan, indeed, could hardly be blamed for watching with a certain cynical indifference the mutual slaughter of those "Christians" whose avowed ideal was the overthrow of Mahommedan rule, nor could he be expected to desire the smooth working of a system against which he had protested as a violation of his sovereign rights. In 1908 the powers were still united in bringing pressure to bear on the Porte to make the reforms effective; but the proposal of Great Britain to follow the precedent of the Lebanon and commit the administration of Macedonia to a Mussulman governor appointed by the sultan, but removable only by consent of the powers, met with little favour either at Constantinople or among the powers whose ulterior aims might have been hampered by such an arrangement.

Young Turkish revolution, 1908.

European results.

European crisis provoked by Austria.

Such was the condition of affairs when in October 1908 the revolution in Turkey altered the whole situation. The easy and apparently complete victory of the Young Turks, and the re-establishment without a struggle of the constitution which had been in abeyance since 1876, took the whole world by surprise, and not least those who believed themselves to be most intimately acquainted with the conditions prevailing in the Ottoman empire. The question of the Near East seemed in fair way of settlement by the action of conflicting races themselves, who in the enthusiasm of new-found freedom appeared ready to forget their ancient internecine feuds and to fraternize on the common ground of constitutional liberty (see TURKEY: *History*). By the European powers the proclamation of the constitution was received, at least outwardly, with unanimous approval, general admiration being expressed for the singular moderation and self-restraint shown by the Turkish leaders and people. Whatever views, however, may have been openly expressed, or secretly held, as to the revolution so far as it affected the Ottoman empire itself, there could be no doubt that its effects on the general situation in Europe would be profound. These effects were not slow in revealing themselves. On the 5th of October Prince Ferdinand of Bulgaria proclaimed himself king (*tsar*) of the Bulgarians; and two days later the emperor Francis Joseph issued a rescript announcing the annexation of Bosnia and Herzegovina to the Habsburg monarchy (see BULGARIA: *History* and BOSNIA AND HERZEGOVINA: *History*). Whatever cogent reasons there may have been for altering the status of these countries in view of the changed conditions in Turkey, there could be no doubt that the method employed was a violation of the public law of Europe. By the declaration of London of 1871, to which Austria-Hungary herself had been a principal party, it had been laid down that "contracting powers could only rid themselves of their treaty engagements by an understanding with their co-signatories." This solemn reaffirmation of a principle on which the whole imposing structure of international law had, during the 19th century, been laboriously built up was now cynically violated. The other powers, confronted with the *fait accompli*, protested; but the astute statesman who had staked his reputation as foreign minister of the Dual Monarchy on the success of this *coup* had well gauged the character and force of the opposition he would have to meet. Baron von Aehrenthal, himself more Slav than German, in spite of his name, had served a long apprenticeship in diplomacy at Belgrade and St Petersburg; he knew how fully he could rely upon the weakness of Russia, and that if Russian Pan-Slav sentiment could be cowed, he need fear nothing from the resentment of the Servians. He was strong, too, in the moral and—in case of need—the material support of Germany. With Germany behind her, Austria-Hungary had little to fear from the opposition of the powers of the triple *entente*, Great Britain, France and Russia. This diagnosis of the situation was justified by the event. For months, indeed, Europe seemed on the verge of a general war. During the autumn the nationalist excitement in Servia and Montenegro rose to fever-heat, and Austria responded by mobilizing her forces on the frontiers and arming the Catholic Bosnians as a precaution against a rising of their Orthodox countrymen. Only the winter seemed to stand between Europe and a war bound to become general, and men looked forward with apprehension to the melting of the snows. It is too early as yet to write the history of the diplomatic activities by which this disaster was avoided. Their general outline, however, is clear enough. The protests of Turkey at a violation of treaty rights, doubly resented as likely to damage the prestige of the new constitutional régime, were sympathetically received by the powers of the triple *entente*. An international conference was at once suggested as the only proper authority for carrying out any modifications of the treaty of Berlin necessitated by the new conditions in Turkey; the right of Austria-Hungary to act on her own initiative was strenuously denied; Bulgarian independence and Prince Ferdinand's title of king were meantime refused recognition. In the assertion of these principles Great Britain, Russia and France were united. Germany, on the other hand, maintained an attitude of reserve, though diplomatically "correct"; she accepted the principle of a conference, but made her consent to its convocation conditional on that of her ally Austria-Hungary. But the latter refused to agree to any conference in which the questions at issue should be reopened; the most that she would accept was a conference summoned merely to register the *fait accompli* and to arrange "compensations" not territorial but financial.

The German-Austrian victory.

For a while it seemed as though Baron Aehrenthal's ambition had o'erleaped itself. The reluctance of the Russian government, conscious of its military and political weakness, to take extreme measures seemed likely to be overborne by the Pan-Slav enthusiasm of the Russian people, and the Austrian statesman's policy to have placed him in an *impasse* from which it would be difficult to extricate himself, save at an expense greater than that on which he had calculated. At this point Germany, conscious throughout of holding the key to the situation, intervened with effect. Towards the end of March 1909 the German ambassador at St Petersburg, armed with an autograph letter from the emperor William II., had an interview with the tsar. What were the arguments he used is not known; but the most powerful are supposed to have been the German forces which had been mobilized on the Polish frontier. In any case, the result was immediate and startling. Russia, without previous discussion with her allies, dissociated herself from the views she had hitherto held in common with them, and accepted the German-Austrian standpoint. All question of a conference was now at an end; and all that the powers most friendly to Turkey could do was to persuade her to make the best of a bad bargain. The Ottoman government, preoccupied with the internal questions which were to issue in the abortive attempt at counter-revolution in April, was in no condition to resist friendly or unfriendly pressure. The principle of a money payment in compensation for the shadowy rights of the sultan over the lost provinces was accepted,[1] and Bulgarian independence under King Ferdinand was recognized on the very eve of the new victory of the Young Turks which led to the deposition of Abd-ul-Hamid II. and the proclamation of Sultan Mahommed V. (see TURKEY: *History*).

Its moral.

The change made by these events in the territorial system of Europe was of little moment. A subject principality, long practically independent, became a sovereign state; the *Almanach de Gotha* was enriched with a new royal title; the sentiment of the Bulgarian people was gratified by the restoration of their historic tsardom. Two provinces long annexed to the Habsburg monarchy *de facto* became so *de jure*, and the vision of a Serb empire with a free outlet to the sea, never very practicable, was finally dissolved. Of vastly greater importance were the moral and international issues involved. The whole conception of an effective concert of Europe, or of the World, based on the supposed sacred obligation of treaties and the validity of international law, was revealed, suddenly and brutally, as the baseless fabric of a dream. The most momentous outcome of the international debates caused by Austria's high-handed action was the complete triumph of Bismarck's principle that treaties cease to be valid "when the private interest of those who lie under them no longer reinforces the text." Henceforth, it was felt, no reaffirmation of a principle of international comity and law, so successfully violated, could serve to disguise the brutal truth that in questions between nations, in the long-run, might is right—that there is no middle term between the naked submission preached by Tolstoy and his disciples and Napoleon's *dictum* that "Providence is with the big battalions." In Great Britain, especially, public opinion was quick to grasp this truth. It was realized that it was the immense armed power of Germany that had made her the arbiter in a question vitally affecting the interests of all Europe. Germany alone emerged from the crisis with prestige enormously enhanced; for without her intervention Austria could not have resisted the pressure of the powers. The cry for disarmament, encouraged by the action of Sir Henry Campbell-Bannerman's government, suddenly died down in England; and the agitation in favour of an increased ship-building programme, that followed the revelation by the first lord of the admiralty (April 1909) of Germany's accelerated activity in naval construction, showed that public opinion had been thoroughly awakened to the necessity of maintaining for Great Britain her maritime supremacy, on which not only her position in Europe but the existence of her over-sea empire depended.

BIBLIOGRAPHICAL NOTE.—(1) *Bibliographies.*—Lists of the principal works on the history of the various European countries, and of their main sources, are given in the bibliographies attached to the separate articles (see also those appended to the articles PAPACY; CHURCH HISTORY; DIPLOMACY; CRUSADES; FEUDALISM, &c.). For the sources of the medieval history of Europe see Ulysse Chevalier's monumental *Répertoire des sources historiques du moyen âge; Bio-Bibliographie* (Paris, 1877, &c.), which with certain limitations (notably as regards the Slav, Hungarian and Scandinavian countries) gives references to published documents for all names of people, however obscure, occurring in medieval history. In 1894 M. Chevalier began the publication of a second series of his *Répertoire*, under the somewhat misleading title of *Topo-Bibliographie*, intended as a compendious guide to the places, institutions, &c., of the middle ages; though very useful, this is by no means so complete as the *Bio-Bibliographie*. August Potthast's *Bibliotheca historica medii aevi* (2nd ed., Berlin, 1895–1896) gives a complete catalogue of all the annals, chronicles and other historical works which appeared in Europe between the years 375 and 1500 and have since been printed, with short notes on their value and significance, and references to critical works upon them. See also the article RECORD. For authorities on the history of Europe from the end of the 15th to the 19th centuries inclusive the excellent bibliographies appended to the volumes of the *Cambridge Modern History* are invaluable.

(2) *Works.*—Of general works the most important are the *Histoire générale du IV*^{me} *siècle à nos jours*, published under the direction of E. Lavisse and A. Rambaud (Paris, 1894, &c.), in 12 vols., covering the period from the 4th to the end of the 19th century: Leopold von Ranke's *Weltgeschichte* (Leipzig, 1881, &c.), in 9 vols., covering (i.) the oldest group of nations and the Greeks; (ii.) the Roman Republic; (iii.) the ancient Roman Empire; (iv.) the East Roman empire and the origin of the Romano-German kingdoms; (v.) the Arab world-power and the empire of Charlemagne; (vi.) dissolution of the Carolingian and foundation of the German empire; (vii.) zenith and decay of the German empire; the hierarchy under Gregory VII.; (viii.) crusades and papal world-power (12th and 13th centuries); (ix.) period of transition to the modern world (14th and 15th centuries). To this may be added Ranke's works on special periods: *e.g. Die Fürsten und Völker von Süd-Europa im 16ten und 17ten Jahrhundert* (2nd ed., Leipzig, 1837–1839); *Geschichten der romanischen und germanischen Völker*, 1494–1514 (2nd ed., Leipzig, 1874, Eng. trans. 1887). In English the most important general work is the *Cambridge Modern History* (1903, &c.), produced by the collaboration of English and foreign scholars, and covering the ground from the end of the 15th to the 19th century inclusive. The *Historians' History of the World*, edited by Dr H. Smith Williams (1908), is a compilation from the works of eminent historians of all ages, and the value of its various parts is therefore that of the historians responsible for them. Its chief merit is that it makes accessible to English readers many foreign or obscure sources which would otherwise have remained closed to the general reader. It also contains essays by notable modern scholars on the principal epochs and tendencies of the world's history, the texts of a certain number of treaties, &c., not included as yet in other collections, and comprehensive bibliographies. On a less ambitious scale are the volumes of the "Periods of European History" series (London, 1893, &c.): Per. I. *The Dark Ages, 476–918*, by C. W. C. Oman (1893); Per. II. *The Empire and the Papacy, 918–1273*, by T. F. Tout (1898); Per. III. *The Close of the Middle Ages, 1273–1494*, by R. Lodge (1901); *Europe in the 16th Century, 1494–1598*, by A. H. Johnson (1897); *The Ascendancy of France*, by H. O. Wakeman (1894); *The Balance of Power*, by A. Hassal (1896); *Revolutionary Europe*, by H. Morse Stephens (1893); *Modern Europe*, by W. Alison Phillips (1901,

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[1] The Austro-Turkish protocol had been signed at Constantinople on the 5th of March; it was now ratified by the Turkish parliament on the 5th of April.

5th ed., 1908). See also T. H. Dyer, *History of Modern Europe from the fall of Constantinople*, revised and continued to the end of the 19th century by A. Hassal (6 vols., London, 1901). Besides the above may be mentioned, for European history since the outbreak of the French Revolution, A. Sorel, *L'Europe et la Révolution Française* (7 vols., Paris, 1885, &c.), a work of first-class importance; A. Stern, *Geschichte Europas seit den Wiener Verträgen von 1815* (Stuttgart and Berlin, 1894, &c.), based on the study of much new material, still in progress (1908); C. Seignobos, *Histoire politique de l'Europe contemporaine* (Paris, 1897), a valuable text-book with copious bibliography (Eng. trans., London, 1901); C. M. Andrews, *Historical development of Europe*, 2 vols. (New York, 1896–1898).

(3) *Published Documents.*—For the vast mass of published sources reference must be made to the bibliographies mentioned above. It must be borne in mind, however, that these represent but a fraction of the unpublished material, and that the great development of original research is constantly revealing fresh sources, throwing new light on old problems, and not seldom upsetting conclusions long established as final. For these latest developments of scholarship the numerous historical and archaeological reviews published in various countries should be consulted: *e.g. The English Historical Review* (London); *The Scottish Hist. Rev.* (Glasgow); *The American Hist. Rev.* (London and New York); the *Revue historique* (Paris); the *Historische Zeitschrift* (Munich). The most notable collections of treaties are J. Dumont's *Corps diplomatique*, covering the period from A.D. 800 to 1731 (Amsterdam and the Hague, 1726–1731); F. G. de Martens and his continuators, *Recueil des traités*, &c. (1791, &c.), covering with its supplements the period from 1494 to 1874; F. (T. T.) de Martens, *Recueil des traités conclus par la Russie*, &c. (14 vols., St Petersburg, 1874, &c.); A. and J. de Clercq, *Recueil des traités de la France* (Paris, 1864; new ed., 1880, &c.); L. Neumann, *Recueil des traités conclus par l'Autriche* (from 1763), (6 vols., Leipzig, 1855); new series, by L. Neumann and A. de Plason (16 vols., Vienna, 1877–1903); *Österreichische Staatsverträge* (vol. i. *England*, 1526–1748), published by the Commission for the modern history of Austria (Innsbruck, 1907), with valuable introductory notes; *British and Foreign State Papers* (from the termination of the war in 1814), compiled at the Foreign Office by the Librarian and Keeper of the Papers (London, 1819, &c.); Sir E. Hertslet, *The Map of Europe by Treaty* (from 1814), (4 vols., London, 1875–1891). See the article TREATIES. (W. A. P.)

EUROPIUM, a metallic chemical element, symbol Eu, atomic weight 152·0 (O=16). The oxide Eu_2O_3 occurs in very small quantity in the minerals of the rare earths, and was first obtained in 1896 by E. A. Demarçay from Lecoq de Boisbaudran's samarium; G. Urbain and H. Lacombe in 1904 obtained the pure salts by fractional crystallization of the nitric acid solution with magnesium nitrate in the presence of bismuth nitrate. The salts have a faint pink colour, and show a faint absorption spectrum; the spark spectrum is brilliant and well characterized.

EURYDICE (Εὐρυδίκη), in Greek mythology, the wife of Orpheus (*q.v.*). She was the daughter of Nereus and Doris, and died from the bite of a serpent when fleeing from Aristaeus, who wished to offer her violence (Virgil, *Georgics*, iv. 454-527; Ovid, *Metam.* x. 1 ff.).

EURYMEDON, one of the Athenian generals during the Peloponnesian War. In 428 B.C. he was sent by the Athenians to intercept the Peloponnesian fleet which was on the way to attack Corcyra. On his arrival, finding that Nicostratus with a small squadron from Naupactus had already placed the island in security, he took the command of the combined fleet, which, owing to the absence of the enemy, had no chance of distinguishing itself. In the following summer, in joint command of the land forces, he ravaged the district of Tanagra; and in 425 he was appointed, with Sophocles, the son of Sostratides, to the command of an expedition destined for Sicily. Having touched at Corcyra on the way, in order to assist the democratic party against the oligarchical exiles, but without taking any steps to prevent the massacre of the latter, Eurymedon proceeded to Sicily. Immediately after his arrival a pacification was concluded by Hermocrates, to which Eurymedon and Sophocles were induced to agree. The terms of the pacification did not, however, satisfy the Athenians, who attributed its conclusion to bribery; two of the chief agents in the negotiations were banished, while Eurymedon was sentenced to pay a heavy fine. In 414 Eurymedon, who had been sent with Demosthenes to reinforce the Athenians at the siege of Syracuse, was defeated and slain before reaching land (Thucydides iii., iv., vii.; Diod. Sic. xiii. 8, 11, 13).

EUSDEN, LAURENCE (1688–1730), English poet, son of the Rev. Laurence Eusden, rector of Spofforth, Yorkshire, was baptized on the 6th of September 1688. He was educated at St Peter's school, York, and at Trinity College, Cambridge. He became a minor fellow of his college in 1711, and in the next year was admitted to a full fellowship. He was made poet laureate in 1718 by the lord chancellor, the duke of Newcastle, as a reward for a flattering poem on his marriage. He was rector of Coningsby, Lincolnshire, where he died on the 27th of September 1730. His name is less remembered by his translations and gratulatory poems than by the numerous satirical allusions of Pope, *e.g.*

> "Know, Eusden thirsts no more for sack or praise;
> He sleeps among the dull of ancient days."
> *Dunciad*, bk. i. 11. 293-294.

EUSEBIUS (Gr. Εὐσέβιος, from εὐσεβής, pious, cf. the Latin name Pius), a name borne by a large number of bishops and others in the early ages of the Christian Church. Of these the most important are separately noticed below. No less than 25 saints of this name (sometimes corrupted into Eusoge, Euruge, Usoge, Usuge, Uruge and St Sebis) are venerated in the Roman Catholic Church, of whom 23 are included in the Bollandist *Acta Sanctorum*; many are obscure martyrs, monks or anchorites, but two deserve at least a passing notice.

EUSEBIUS, bishop of Vercelli (d. 371), is notable not only as a stout opponent of Arianism, but also as having been, with St Augustine, the first Western bishop to unite with his clergy in adopting a strict monastic life after the Eastern model (see Ambrose, *Ep. 63 ad Vercellenses*, § 66). The legend that he was stoned to death by the Arians was probably invented for the edification of the Orthodox.

EUSEBIUS, bishop of Samosata (d. 380), played a considerable part in the later stages of the Arian controversy in the East. He is first mentioned among the Homoean and Homoeusian bishops who in 363 accepted the Homousian formula at the synod of Antioch presided over by Meletius, with whose views he seems to have identified himself (see MELETIUS OF ANTIOCH). According to Theodoret (5, 4, 8) he was killed at Doliche in Syria, where he had gone to consecrate a bishop, by a stone cast by an Arian woman. He thus became a martyr, and found a place in the Catholic calendar (see the article by Loofs in Herzog-Hauck, *Realencykl.*, ed. 1898, v. p. 620).

EUSEBIUS OF LAODICEA, though not included among the saints, was noted for his saintly life. He was an Alexandrian by birth, and gained so great a reputation for his self-denial and charity that when in 262 the city was besieged by the troops of the emperor Gallienus he obtained permission, together with Anatolius, from their commander Theodotus, to lead out the non-combatants, whom he tended "like a father and physician." He went with Anatolius to Syria, and took part in the controversy against Paul of Samosata, bishop of Antioch. He became bishop of Laodicea, probably in the following year (263), and died some time before 268. His friend Anatolius succeeded him as bishop in the latter year (see the article by E. Hennecke in Herzog-Hauck, v. 619).

EUSEBIUS, bishop of Rome for four months under the emperor Maxentius, in 309 or 310. The Christians in Rome, divided on the question of the reconciliation of apostates, on which Eusebius held the milder view, brought forward a competitor, Heraclius. Both competitors were expelled by the emperor, Eusebius dying in exile in Sicily. He was buried in the cemetery of St Calixtus at Rome; and the extant epitaph, in eight hexameter lines, set up here by his successor Damasus, contains all the information there is about his life.

EUSEBIUS [OF CAESAREA] (*c.* 260–*c.* 340), ecclesiastical historian, who called himself Eusebius Pamphili, because of his devotion to his friend and teacher Pamphilus, was born probably in Palestine between A.D. 260 and 265, and died as bishop of Caesarea in the year 339 or 340. We know little of his youth beyond the fact that he became associated at an early day with Pamphilus, presbyter of the Church of Caesarea, and founder of a theological school there (see *Hist. Eccl.* vii. 32). Pamphilus gathered about him a circle of earnest students who devoted themselves especially to the study of the Bible and the transcription of Biblical codices, and also to the defence and spread of the writings of Origen, whom they regarded as their master. Pamphilus had a magnificent library, which Eusebius made diligent use of, and a catalogue of which he published in his lost *Life* of Pamphilus (*Hist. Eccl.* vi. 32). In the course of the Diocletian persecution, which broke out in 303, Pamphilus was imprisoned for two years, and finally suffered martyrdom. During the time of his imprisonment (307–309) Eusebius distinguished himself by assiduous devotion to his friend, and assisted him in the preparation of an apology for Origen's teaching (*Hist. Eccl.* vi. 33), the first book of which survives in the Latin of Rufinus (printed in Routh's *Reliquiae sacrae*, iv. 339 sq., and in Lommatzsch's edition of Origen's Works, xxiv. p. 293 sq.). After the death of Pamphilus Eusebius withdrew to Tyre, and later, while the Diocletian persecution was still raging, went to Egypt, where he seems to have been imprisoned, but soon released. He became bishop of Caesarea between 313 and 315, and remained such until his death. The patriarchate of Antioch was offered him in 331, but declined (*Vita Constantini*, iii. 59 sq.).

Eusebius was a very important figure in the church of his day. He was not a great theologian nor a profound thinker, but he was the most learned man of his age, and stood high in favour with the emperor Constantine. At the council of Nicaea in 325 he took a prominent part, occupying a seat at the emperor's right hand, and being appointed to deliver the panegyrical oration in his honour. He was the leader of the large middle party of Moderates at the council, and submitted the first draft of the creed which was afterwards adopted with important changes and additions. In the beginning he was the most influential man present, but was finally forced to yield to the Alexandrian party, and to vote for a creed which completely repudiated the position of the Arians, with whom he had himself been hitherto more in sympathy than with the Alexandrians. He was placed in a difficult predicament by the action of the council, and his letter to the Caesarean church explaining his conduct is exceedingly interesting and instructive (see Socrates, *Hist. Eccl.* i. 8, and cf. McGiffert's translation of Eusebius' *Church History*, p. 15 sq.). To understand his conduct, it is necessary to look briefly at his theological position. By many he has been called an Arian, by many his orthodoxy has been defended. The truth is, three stages are to be distinguished in his theological development. The first preceded the outbreak of the Arian controversy, when, as might be expected in a follower of Origen, his interest was anti-Sabellian and his emphasis chiefly upon the subordination of the Son of God. In his works written during this period (for instance, the *Praeparatio evangelica* and *Demonstratio evangelica*), as in the works of Origen himself and other ante-Nicene fathers, expressions occur looking in the direction of Arianism, and others looking in the opposite direction. The second stage began with the outbreak of the controversy in 318, and continued until the Nicene Council. During this period he took the side of Arius in the dispute with Alexander of Alexandria, and accepted what he understood to be the position of Arius and his supporters, who, as he supposed, taught both the divinity and subordination of the Son. It was natural that he should take this side, for in his traditional fear of Sabellianism, in which he was one with the followers of Origen in general, he found it difficult to approve the position of Alexander, who seemed to be doing away altogether with the subordination of the Son. And, moreover, he believed that Alexander was misrepresenting the teaching of Arius and doing him great injustice (cf. his letters to Alexander and Euphration preserved in the proceedings of the second council of Nicaea, Act. vi. tom. 5: see Mansi's *Concilia*, xiii. 316 sq.; English translation in McGiffert, *op. cit.* p. 70). Meanwhile at the council of Nicaea he seems to have discovered that the Alexandrians were right in claiming that Arius was carrying his subordinationism so far as to deny all real divinity to Christ. To this length Eusebius himself was unwilling to go, and so, convinced that he had misunderstood Arius, and that the teaching of the latter was imperilling the historic belief in the divinity of Christ, he gave his support to the opposition, and voted for the Nicene Creed, in which the teachings of the Arians were repudiated. From this time on he was a supporter of Nicene orthodoxy over against Arianism (cf., *e.g.*, his *Contra Marcellum*, *De ecclesiastica theologia*, and *Theophania*). But he never felt in sympathy with the extreme views of the Athanasian party, for they seemed to him to savour of Sabellianism, which always remained his chief dread (cf. his two works against Marcellus of Ancyra). His personal friends, moreover, were principally among the Arians, and he was more closely identified with them than with the supporters of Athanasius. But he was always a man of peace, and while commonly counted one of the opponents of Athanasius, he did not take a place of leadership among them as his position and standing would have justified him in doing, and Athanasius never spoke of him with bitterness as he did of other prominent men in the party. (For a fuller description of the development of Eusebius' Christology and of his attitude throughout the Arian controversy, see McGiffert, *op. cit.* p. 11 sq.)

Eusebius was one of the most voluminous writers of antiquity, and his labours covered almost every field of theological learning. If we look in his works for brilliancy and originality we shall be disappointed. He was not a creative genius like Origen or Augustine. His claim to greatness rests upon his vast erudition and his sound judgment. Nearly all his works possess genuine and solid merits which raise them above the commonplace, and many of them still remain valuable. His exegesis is superior to that of most of his contemporaries, and his apologetic is marked by fairness of statement, breadth of treatment, and an instinctive appreciation of the difference between important and unimportant points. His style, it is true, is involved and obscure, often rambling and incoherent. This quality is due in large part to the desultory character of his thinking. He did not always clearly define his theme before beginning to write, and he failed to subject what he produced to a careful revision. Ideas of all sorts poured in upon him while he was writing, and he was not always able to resist the temptation to insert them whether pertinent or not. His great learning is evident everywhere, but he is often its slave rather than its master. It is as an historian that he is best known, and to his *History of the Christian Church* he owes his fame and his familiar title "The Father of Church History." This work, which was published in its final form in ten books in 324 or early in 325, is the most important ecclesiastical history produced in ancient times. The reasons leading to the great undertaking, in which Eusebius had no predecessors, were in part historical, in part apologetic. He believed that he was living at the beginning of a new age, and he felt that it was a fitting time, when the old order of things was passing away, to put on record for the benefit of posterity the great events which had occurred during the generations that were past. He thus wrote, as any historian might, for the information and instruction of his readers, and yet he had all the time an apologetic purpose, to exhibit to the world the history of Christianity as a proof of its divine origin and efficacy. His plan is stated at the very beginning of the work:—

> "It is my purpose to write an account of the successions of the holy Apostles as well as of the times which have elapsed from the day of our Saviour to our own; to relate how many and important events are said to have occurred in the history of the church; and to mention those who have governed and presided over the church in the most prominent parishes, and those who in each generation have proclaimed the divine word either orally or in writing. It is my purpose also to give the names and number and times of those who through love of innovation have run into the greatest errors, and proclaiming themselves discoverers of knowledge, falsely so called, have like fierce wolves unmercifully devastated the flock of Christ. It is my intention, moreover, to recount the misfortunes which immediately came on the whole Jewish nation in consequence of their plots against our Saviour, and to record the ways and times in which the divine word has been attacked by the Gentiles, and to describe the character of those who at various periods have contended for it in the face of blood and tortures, as well as the confessions which have been made in our own day, and the gracious and kindly succour which our Saviour has accorded them all."

The value of the work does not lie in its literary merit, but in the wealth of the materials which it furnishes for a knowledge of the early church. Many prominent figures of the first three centuries are known to us only from its pages. Many fragments, priceless on account of the light which they shed upon movements of far-reaching consequence, have been preserved in it alone. Eusebius often fails to appreciate the significance of the events which he records; in many cases he draws unwarranted conclusions from the given premises; he sometimes misinterprets his documents and misunderstands men and movements; but usually he presents us with the material upon which to form our own judgment, and if we differ with him we must at the same time thank him for the data that enable us independently to reach other results. But the work is not merely a thesaurus, it is a history in a true sense, and it has an intrinsic value of its own, independent of its quotations from other works. Eusebius possessed extensive sources of knowledge no longer accessible to us. The number of books referred to as read is enormous. He also had access to the archives of state, and gathered from them information beyond the reach of most. But the value of his work is due, not simply to the sources employed, but also to the use made of them. Upon this matter there has been, it is true, some diversity of opinion among modern scholars, but it is now generally admitted, and can be abundantly shown, that he was not only diligent in gathering material, but also far more thorough-going than most writers of antiquity in discriminating between trustworthy and untrustworthy reports, frank in acknowledging his ignorance, scrupulous in indicating his authorities in doubtful cases, less credulous than most of his contemporaries, and unfailingly honest. His principal faults are his carelessness and inaccuracy in matters of chronology, his lack of artistic skill in the presentation of his material, his desultory method of treatment, and his failure to look below the surface and grasp the real significance and vital connexion of events. He commonly regards an occurrence as sufficiently accounted for when it is ascribed to the activity of God or of Satan. But in spite of its defects the *Church History* is a monumental work, which need only be compared with its continuations by Socrates, Sozomen, Theodoret, Rufinus and others, to be appreciated at its true worth.

In addition to the *Church History* we have from Eusebius' pen a *Chronicle* in two books (*c.* 303; later continued down to 325), the first containing an epitome of universal history, the second chronological tables exhibiting in parallel columns the royal succession in different nations, and accompanied by notes marking the dates of historical events. A revised edition of the second book with a continuation down to his own day was published in Latin by St Jerome, and this, together with some fragments of the original Greek, was our only source for a knowledge of the Chronicle until the discovery of an Armenian version of the whole work, which was published by Aucher in 1818 (Latin translation in Schoene's edition), and of two Syriac versions published in Latin translation respectively in 1866 (by Roediger in Schoene's edition) and in 1884 (by Siegfried and Gelzer). Other historical works still extant are the *Martyrs of Palestine* and the *Life of Constantine.* The former is an account of martyrdoms occurring in Palestine during the years 303 to 310, of most of which Eusebius himself was an eye-witness. The work exists in a longer and a shorter recension, the former in a Syriac version (published with English translation by Cureton, 1861), the latter in the original Greek attached to the *Church History* in most MSS. (printed with the History in the various editions). The *Life of Constantine,* in four books, published after the death of the emperor, which occurred in 337, is a panegyric rather than a sober history, but contains much valuable material. Of Eusebius' apologetic works we still have the *Contra Hieroclem, Praeparatio evangelica, Demonstratio evangelica,* and *Theophania.* The first is a reply to a lost work against the Christians written by Hierocles, a Roman governor and contemporary of Eusebius. The second and third, taken together, are the most elaborate and important apologetic work of the early church. The former, in fifteen books, aims to show that the Christians are justified in accepting the sacred writings of the Hebrews, and in rejecting the religion and philosophy of the Greeks. The latter, in twenty books, of which only the first ten and fragments of the fifteenth are extant, endeavours to prove from the Hebrew Scriptures themselves that the Christians are right in going beyond the Jews and adopting new principles and practices. The former is thus a preparation for the latter, and the two together constitute a defence of Christianity against all the world, heathen as well as Jews. In grandeur of conception, comprehensiveness of treatment, and breadth of learning, this apology surpasses all other similar works of antiquity. The *Praeparatio* is also valuable because of its large number of quotations from classical literature, many of them otherwise unknown to us. The *Theophania,* though we have many fragments of the original Greek, is extant as a whole only in a Syriac version first published by Lee in 1842. Its subject is the manifestation of God in the incarnation of the Word, and it aims to give with an apologetic purpose a brief exposition of the divine authority and influence of Christianity. Of Eusebius' dogmatic and polemic writings, we still have two works against his contemporary, Marcellus, bishop of Ancyra, the one known as *Contra Marcellum,* the other as *De theologia ecclesiastica.* The former and briefer aims simply to expose the errors of Marcellus, whom Eusebius accuses of Sabellianism, the latter to refute them. We also have parts of a General Introduction (Ἡ καθόλου στοιχειώδης εἰσαγωγή), which consisted of ten books (the sixth to the ninth books and a few other fragments still extant), under the title of *Prophetical Extracts* (Προφητικαὶ ἐκλογαί). Although this formed part of a larger work it was complete in itself and circulated separately. It contains prophetical passages from the Old Testament relating to the person and work of Christ, accompanied by explanatory notes. Of Biblical and exegetical works we have a considerable part of Eusebius' Commentaries on the Psalms and on Isaiah, which are monuments of learning, industry and critical acumen, though marred by the use of the allegorical method characteristic of the school of Origen; also a work on the names of places mentioned in Scripture, or the *Onomasticon,* the only one extant of a number of writings on Old Testament topography; and an epitome and some fragments of a work in two parts on Gospel Questions and Solutions, the first part dealing with the genealogies of Christ given in Matthew and Luke, the second with the apparent discrepancies between the various gospel accounts of the resurrection. Other important works which have perished wholly or in large part, and some orations and minor writings still extant, it is not necessary to refer to more particularly. (See Preuschen's list in Harnack's *Alt-christliche Litteraturgeschichte,* i. 2, p. 55 sq. Preuschen gives thirty-eight titles, besides orations and letters, but it is doubtful whether all of the Commentaries mentioned really existed.)

Bibliography.—The only edition of Eusebius' extant works which can lay claim even to relative completeness is that of Migne (*Patrologia graeca,* tom. xix.-xxiv.). The publication of a new critical edition was begun in 1902 in the Berlin Academy's *Greek Fathers* (*Die griechischen christlichen Schriftsteller der ersten drei Jahrhunderte,* Leipzig). Many of Eusebius' works have been published separately. Thus the *Church History,* first by Stephanus (Paris, 1554); by Valesius with copious notes, together with the *Life of Constantine,* the *Oration in Praise of Constantine,* and the Histories of Socrates, Sozomen, Theodoret, &c. (best edition that of Reading (Cambridge, 1720), in three volumes, folio); by Heinichen (1827, second edition 1868–1870 in three volumes, a very useful edition, containing also the *Life of Constantine* and the *Oration in Praise of Constantine,* with elaborate notes); by Burton (1838; a handy reprint in a single volume by Bright, 1881), and by many others. The most recent and best edition is that of Schwartz in the Berlin Academy's *Greek Fathers,* of which the first half has appeared, accompanied by the Latin version of Rufinus edited by Mommsen. The history was early put into Syriac (edited by Bedjan, Leipzig, 1897; also by Wright, McLean and Merx, London, 1898), Armenian (edited by Djarian, Venice, 1877), and Latin, and has been translated into many modern languages, the latest English version being that of McGiffert, in the *Nicene and Post-Nicene Fathers,* second series, volume i. (New York, 1890). Of the *Chronicle,* the best edition is by Schoene in two volumes (Berlin, 1866–1875). The *Life of Constantine* and the *Oration in Praise of Constantine* are published by Valesius, Heinichen and others in their editions of the *Church History,* also in the first volume of the Berlin Academy's edition (ed. by Heikel), and an English translation by Richardson in the volume containing McGiffert's translation of the *Church History.* Gaisford published the *Prophetical Extracts* (Oxford, 1842), the *Praeparatio evangelica* (1843), the *Demonstratio evangelica* (1852), and the works against Hierocles and Marcellus (1852); and the works against Marcellus have appeared in the edition of the Berlin Academy (vol. iv.). The *Onomasticon* has been published frequently, among others by Lagarde (Göttingen, 1870; 2nd ed., 1887), and is contained in the edition of the Berlin Academy (vol. iii.). The *Theophania* was first published by Lee (Syriac version, 1842; English translation, 1843). A German translation of the Syriac version, with the extant fragments of the original Greek, is given in the edition of the Berlin Academy (vol. iii.).

Acacius, the pupil of Eusebius and his successor in the see of Caesarea, wrote a life of him which is unfortunately lost. His own writings contain little biographical material, but we get information from Athanasius, Philostorgius, Socrates, Sozomen, Theodoret, Jerome's *De vir. ill.,* and Photius. Among the many modern accounts in church histories, histories of Christian literature, encyclopaedias, &c., may be mentioned a monograph by Stein, *Eusebius Bischof von Caesarea* (Würzburg, 1859), meagre but useful as far as it goes; the magnificent article by Lightfoot in the *Dictionary of Christian Biography;* the account by McGiffert in his translation of the *Church History;* Erwin Preuschen's article in Herzog-Hauck, *Realencyklop.* (3rd ed., 1898); the treatment of the Chronology of Eusebius writings in Harnack's *Alt-christliche Litteraturgeschichte,* ii. 2, p. 106 sq.; and Bardenhewer's *Patrologie,* p. 2260 f. The many

special discussions of Eusebius' separate works, particularly of his *Church History*, and of his character as an historian, cannot be referred to here. Elaborate bibliographies will be found in McGiffert's translation, and in Preuschen's article in Herzog-Hauck. (A.C. McG.)

EUSEBIUS [of Emesa] (d. *c.* 360), a learned ecclesiastic of the Greek church, was born at Edessa about the beginning of the 4th century. After receiving his early education in his native town, he studied theology at Caesarea and Antioch and philosophy and science at Alexandria. Among his teachers were Eusebius of Caesarea and Patrophilus of Scythopolis. The reputation he acquired for learning and eloquence led to his being offered the see of Alexandria in succession to the deposed Athanasius at the beginning of 339, but he declined, and the council (of Antioch) chose Gregory of Cappadocia, " a fitter agent for the rough work to be done." Eusebius accepted the small bishopric of Emesa (the modern Homs) in Phoenicia, but his powers as mathematician and astronomer led his flock to accuse him of practising sorcery, and he had to flee to Laodicea. A reconciliation was effected by the patriarch of Antioch, but tradition says that Eusebius finally resigned his charge and lived a studious life in Antioch. His fame as an astrologer commended him to the notice of the emperor Constantius II., with whom he became a great favourite, accompanying him on many of his expeditions. The theological sympathies of Eusebius were with the semi-Arian party, but his interest in the controversy was not strong. His life was written by his friend George of Laodicea. He was a man of extraordinary learning, great eloquence and considerable intellectual power, but of his numerous writings only a few fragments are now in existence.

See Migne, *Patrol. Graec.* vol. lxxxvi.

EUSEBIUS [of Myndus], Greek philosopher, a distinguished Neoplatonist and pupil of Aedesius who lived in the time of Julian, and who is described by Eunapius as one of the " Golden Chain " of Neoplatonism. He ventured to criticize the magical and theurgic side of the doctrine, and exasperated the emperor, who preferred the mysticism of Maximus and Chrysanthius. He devoted himself principally to logic. Stobaeus in the *Sermones* collected a number of ethical dicta of one Eusebius, who may perhaps be identical with the Neoplatonist.

The fragments have been collected by Mullach in his *Fragmenta Phil. Graec.*, and by Orelli, in *Opuscula veter. graec. sentent. et moral.*

EUSEBIUS [of Nicomedia] (d. 341?), Greek bishop and theologian, was the defender of Arius in a still more avowed manner than his namesake of Caesarea, and from him the Eusebian or middle party specially derived its name, giving him in return the epithet of Great. He was a contemporary of the bishop of Caesarea, and united with him in the enjoyment of the friendship and favour of the imperial family. He is said to have been connected by his mother with the emperor Julian, whose early tutor he was. His first bishopric was Berytus (Beirut) in Phoenicia, but his name is especially identified with the see of Nicomedia, which, from the time of Diocletian till Constantine established his court at Byzantium, was regarded as the capital of the eastern part of the empire. He warmly espoused the cause of Arius in his quarrel with his bishop Alexander, and wrote a letter in his defence to Paulinus, bishop of Tyre, which is preserved in the *Church History* of Theodoret. Trained in the school of Lucian of Antioch, his views appear to have been identical with those of Eusebius of Caesarea in placing Christ above all created beings, the only begotten of the Father, but in refusing to recognize him to be " of the same substance " with the Father, who is alone in essence and absolute being.

At the council of Nicaea Eusebius of Nicomedia earnestly opposed, along with his namesake of Caesarea, the insertion of the Homousian clause, but after being defeated in his object he also signed the creed in his own sense of *ὅμοιος κατ' οὐοίαν*. He refused, however, to sign the anathema directed against the Arians, not, as he afterwards explained, because of his variance from the Athanasian theology, but " because he doubted whether Arius really held what the anathema imputed to him " (Sozom. ii. 15). After the council he continued vigorously to espouse the Arian cause, and was so far carried away in his zeal against the Athanasians that he was temporarily banished from his see as a disturber of the peace of the church. But his alienation from the court was of short duration. He retained the confidence of the emperor's sister Constantia, through whose influence he was promoted to the see of Nicomedia, and by her favour he was restored to his position, and speedily acquired an equal ascendancy over the emperor. He was selected to administer baptism to him in his last illness. There seems no doubt that Eusebius of Nicomedia was more of a politician than a theologian. He was certainly a partisan in the great controversy of his time, and is even credited (although on insufficient evidence) with having used unworthy means to procure the deposition of Eustathius, the " orthodox " bishop of Antioch (Theodoret i. 21). His restless ambition and love of power are not to be denied. To the last he defended Arius, and at the time of the latter's sudden death, 336, it was chiefly through his menace, as representing the emperor, that the church of Constantinople was thrown into anxiety as to whether the leader should be readmitted to the bosom of the church. The death of Constantine followed hard upon that of Arius; and Eusebius, who was promoted in 339 to the see of Constantinople, became the leader of the anti-Nicene party till his own death in (probably) 341. The real activity of Eusebius and his party must be studied in connexion with the Arian controversy (see Arius).

EUSKIRCHEN, a town of Germany, in the Prussian Rhine province, on a plateau lying to the E. of the Eifel range, at the junction of railways from Cologne and Bonn and 10 m. W. of the latter. Pop. (1905) 10,285. It has an Evangelical and a Roman Catholic church, and its industries include cloth, sugar and stocking manufactures, besides breweries and tanneries.

EUSTACE, the name of four counts of Boulogne.

Eustace I., a son of Count Baldwin II., held the county from 1046 until his death in 1049.

His son, Eustace II. (d. 1093), count of Boulogne, was the husband of Goda, daughter of the English king Æthelred the Unready, and aunt of Edward the Confessor. Eustace paid a visit to England in 1051, and was honourably received at the Confessor's court. A brawl in which he and his servants became involved with the citizens of Dover led to a serious quarrel between the king and Earl Godwine. The latter, to whose jurisdiction the men of Dover were subject, refused to punish them. His contumacy was made the excuse for the outlawry of himself and his family. In 1066 Eustace came to England with Duke William, and fought at the battle of Hastings. In the following year, probably because he was dissatisfied with his share of the spoil, he assisted the Kentishmen in an attempt to seize Dover Castle. The conspiracy failed, and Eustace was sentenced to forfeit his English fiefs. Subsequently he was reconciled to the Conqueror, who restored a portion of the confiscated lands.

Eustace died in 1093, and was succeeded by his son, Eustace III., who went on crusade in 1096, and died about 1125. On his death the county of Boulogne came to his daughter, Matilda, and her husband Stephen, count of Blois, afterwards king of England, and in 1150 it was given to their son, Eustace IV.

Eustace IV. (d. 1153) became the heir-apparent to his father's possessions by the death of an elder brother before 1135. In 1137 he did homage for Normandy to Louis VII. of France, whose sister, Constance, he subsequently married. Eustace was knighted in 1147, at which date he was probably from sixteen to eighteen years of age; and in 1151 he joined Louis in an abortive raid upon Normandy, which had accepted the title of the empress Matilda, and was now defended by her husband, Geoffrey of Anjou. At a council held in London on the 6th of April 1152 Stephen induced a small number of barons to do homage to Eustace as their future king; but the primate, Theobald, and the other bishops declined to perform the coronation ceremony on the ground that the Roman curia had declared against the claim of Eustace. The death of Eustace, which occurred during the next year, was hailed with general satisfaction as opening the possibility of a peaceful settlement between Stephen and his rival, the young Henry of Anjou. The *Peterborough Chronicle*, not content with voicing this sentiment, gives Eustace a bad character. "He was an evil man and did more harm than good wherever he went; he spoiled the lands and laid thereon heavy taxes." He had used threats against the recalcitrant bishops, and in the war against the Angevin party had demanded contributions from religious houses; these facts perhaps suffice to account for the verdict of the chronicler.

See Sir James Ramsay, *Foundations of England*, vol. ii. (London, 1898); J. M. Lappenberg, *History of England under the Norman Kings* (trans. B. Thorpe, Oxford, 1857); and E. A. Freeman, *History of the Norman Conquest* (Oxford, 1867–1879).

EUSTATHIUS, of Antioch, sometimes styled "the Great" (fl. 325), was a native of Side in Pamphylia. About 320 he was bishop of Beroea, and he was patriarch of Antioch before the council of Nicaea in 325. In that assembly he distinguished himself by his zeal against the Arians, though the *Allocutio ad Imperatorem* with which he has been credited is hardly genuine. His anti-Arian polemic against Eusebius of Caesarea made him unpopular among his fellow-bishops in the East, and a synod convened at Antioch in 330 passed a sentence of deposition, which was confirmed by the emperor. He was banished to Trajanopolis in Thrace, where he died, probably about 337, though possibly not till 360.

The only complete work by Eustathius now extant is the *De Engastrimytho contra Origenem* (ed. by A. Jahn in *Texte und Untersuchungen*, ii. 4). Other fragments are enumerated by F. Loofs in Herzog-Hauck's *Realencyklopädie*.

EUSTATHIUS, or EUMATHIUS, surnamed Macrembolites ("living near the long bazaar"), the last of the Greek romance writers, flourished in the second half of the 12th century A.D. His title *Protonobilissimus* shows him to have been a person of distinction, and if he is also correctly described in the MSS. as μέγας χαρτοφύλαξ (chief keeper of the ecclesiastical archives), he must have been a Christian. He was the author of *The Story of Hysmine and Hysminias*, in eleven books, a tedious and inferior imitation of the *Cleitophon and Leucippe* of Achilles Tatius. There is nothing original in the plot, and the work is tasteless and often coarse. Although the author borrowed from Homer and other Attic poets, the chief source of his phraseology was the rhetorician Choricius of Gaza. The style is remarkable for the absence of hiatus and an extremely laboured use of antithesis. The digressions on works of art, apparently the result of personal observation, are the best part of the work. A collection of eleven *Riddles*, of which solutions were written by the grammarian Manuel Holobolos, is also attributed to Eustathius.

The best edition of both romance and riddles is by I. Hilberg (1876, who fixes the date of Eustathius between 850 and 988), with critical apparatus and prolegomena, including the solutions; of the *Riddles* alone by M. Treu (1893). On Eustathius generally, see J. C. Dunlop, *History of Fiction* (1888, new ed. in Bohn's *Standard Library*); E. Rohde, *Der griechische Roman* (1900); K. Krumbacher, *Geschichte der byzantinischen Litteratur* (1897). There are many translations in modern languages, of which that by P. le Bas (1825) may be recommended; there is an English version from the French by L. H. le Moine (London and Paris, 1788).

EUSTATHIUS, archbishop of Thessalonica, Byzantine scholar and author (probably a native of Constantinople), flourished during the second half of the 12th century. He was at first a monk, and afterwards deacon of St Sophia and teacher of rhetoric in his native city. In 1174 he was chosen bishop of Myra in Lycia, but in 1175 was transferred to Thessalonica. He was outspoken and independent, and did not hesitate to oppose the emperor Manuel, when the latter desired an alteration in the formula of abjuration necessary for converts from Mahommedanism. In 1185, when Thessalonica was captured by the Normans under William II. of Sicily, Eustathius secured religious toleration for the conquered. He died about 1193. His best known work is his *Commentary on the Iliad and Odyssey of Homer* (παρεκβολαί, critical compilations), valuable as containing numerous extracts from the scholia of other critics, whose works have now perished. He also wrote a commentary on the geographical epic of Dionysius Periegetes, in which much of Stephanus of Byzantium and the lost writings of Arrian is preserved. A commentary on Pindar has been lost, with the exception of the preface, which contains an essay on lyric poetry, a life of Pindar, and an account of the Olympic games. A history of the conquest of Thessalonica by the Normans, a congratulatory address to the emperor Manuel, a plea for an improved water-supply for Constantinople, and an extensive correspondence with clerical and lay dignitaries, are evidence of his versatility. He is also the author of various religious works, chiefly directed against the prevailing abuses of his time, which almost anticipate, though in a milder form, the denunciations of Luther; the most important of these is *The Reform of Monastic Life*. A commentary on the pentecostal hymn of John of Damascus may also be mentioned.

Editions: Homer Commentary, by G. Stallbaum (1825–1830); preface to Pindar Commentary, by F. W. Schneidewin (1837); Dionysius Commentary in C. W. Müller, *Geographici Graeci minores*, ii.; pentecostal hymn, in A. Mai, *Spicilegium Romanum*, v. 2 (1841). The smaller works have been edited (1832) and the *De Thessalonica* (1839) by L. F. Tafel; many will be found in J. P. Migne, *Patrologia Graeca*, cxxxv., cxxxvi. Five new speeches have been edited by W. Regel, *Fontes rerum Byzantinarum*, i. (1892).

EUSTYLE (from Gr. εὖ, well, and στῦλος, column), the architectural term for the intercolumniation defined by Vitruvius (iii. 3) as being of the best proportion, *i.e.* two and a half diameters (see INTERCOLUMNIATION).

EUTAWVILLE, a town of Berkeley county, South Carolina, U.S.A., about 55 m. N.N.W. of Charleston. Pop. (1900) 305; (1910) 405. It is served by the Atlantic Coast Line railway. The town lies on high ground near the Santee river, in a region abounding in swamps, limestone cliffs and pine forests. At present its chief interest is in lumber, but in colonial days it was a settlement of aristocratic rice planters. The neighbouring Eutaw Springs issue first from the foot of a hill and form a large stream of clear, cool water, but this, only a few yards away, again rushes underground to reappear about ⅛ m. farther on. At Eutaw Springs, on the 8th of September 1781, was fought the last battle in the field in the Southern States during the War of American Independence. About 2300 Americans under General Nathanael Greene here attacked a slightly inferior force under Colonel Alexander Stewart; at first the Americans drove the British before them, but later in the day the latter took a position in a brick house and behind palisades, and from this position the Americans were unable to drive them. On the night of the 9th, however, Colonel Stewart retreated toward Charleston, abandoning 1000 stand of arms. The battle has been classed as a tactical victory for the British and a strategical victory for the Americans, terminating a campaign which left General Greene in virtual possession of the Carolinas, the British thereafter confining themselves to Charleston. The Americans lost in killed and wounded 408 men (including Colonel William Washington, wounded and captured); the British, 693.

EUTHYDEMUS, a native of Magnesia, who overturned the dynasty of Diodotus of Bactria, and became king of Bactria about 230 B.C. (Polyb. xi. 34; Strabo xi. 515 wrongly makes him the first king). In 208 he was attacked by Antiochus the Great, whom he tried in vain to resist on the shores of the river Arius, the modern Herirud (Polyb. x. 49). The war lasted three years, and was on the whole fortunate for Antiochus. But he saw that he was not able to subdue Bactria and Sogdiana, and so in 206 concluded a peace with Euthydemus, through the mediation of his son Demetrius, in which he recognized him as king (Polyb. xi. 34). Soon afterwards Demetrius (*q.v.*) began the conquest of India. There exist many coins of Euthydemus; those on which he is called god are struck by the later king Agathocles. Other coins with the name Euthydemus, which show a youthful face, are presumably those of Euthydemus II., who cannot have ruled long and was probably a son of Demetrius. (ED. M.)

EUTIN, a town of Germany, capital of the principality of Lübeck, which is an enclave in the Prussian province of Schleswig-Holstein and belongs to the grand-duchy of Oldenburg, picturesquely situated on the Lake Eutin, 20 m. N. from Lübeck by the railway to Kiel. Pop. (1905) 5204. It possesses a Roman Catholic and two Protestant churches, a palace with a fine park, and a monument to Weber, the composer, who was born here. Towards the end of the 18th century Eutin acquired some fame as the residence of a group of poets and writers, of whom the best-known were Johann Heinrich Voss, the brothers Stolberg, and Friedrich Heinrich Jacobi. In the neighbourhood is a beautiful tract of country, rich in beech forests and fjords, known as "the Holstein Switzerland," largely frequented in summer by the Hamburgers.

Eutin was, according to tradition, founded by Count Adolf II. of Holstein. In 1155 it fell to the bishopric of Lübeck and was often the residence of the prelates of that see. After some vicissitudes of fortune during the middle ages and the Thirty Years' War, it came into the possession of the house of Holstein, and hence to Prussia in 1866.

EUTROPIUS, Roman historian, flourished in the latter half of the 4th century A.D. He held the office of secretary (*magister memoriae*) at Constantinople, accompanied Julian on his expedition against the Persians (363), and was alive during the reign of Valens (364–378), to whom he dedicates his history. This work (*Breviarium historiae Romanae*) is a complete compendium, in ten books, of Roman history from the foundation of the city to the accession of Valens. It was compiled with considerable care from the best accessible authorities, and is written generally with impartiality, and in a clear and simple style. Although the Latin in some instances differs from that of the purest models, the work was for a long time a favourite elementary school-book. Its independent value is small, but it sometimes fills a gap left by the more authoritative records. The *Breviarium* was enlarged and continued down to the time of Justinian by Paulus Diaconus (*q.v.*); the work of the latter was in turn enlarged by Landolfus Sagax (*c.* 1000), and taken down to the time of the emperor Leo the Armenian (813–820) in the *Historia Miscella*.

Of the Greek translations by Capito Lycius and Paeanius, the version of the latter is extant in an almost complete state. The best edition of Eutropius is by H. Droysen (1879), containing the Greek version and the enlarged editions of Paulus Diaconus and Landolfus; smaller critical editions, C. Wagener (1884), F. Rühl (1887). J. Sorn's *Der Sprachgebrauch des Historikers Eutropius* (1892) contains a systematic account of the grammar and style of the author. There are numerous English school editions and translations.

EUTYCHES (*c.* 380–*c.* 456), a presbyter and archimandrite at Constantinople, first came into notice in A.D. 431 at the council of Ephesus, where, as a zealous adherent of Cyril (*q.v.*) of Alexandria, he vehemently opposed the doctrine of the Nestorians (*q.v.*). They were accused of teaching that the divine nature was not incarnated in but only attendant on Jesus, being superadded to his human nature after the latter was completely formed. In opposition to this Eutyches went so far as to affirm that after the union of the two natures, the human and the divine, Christ had only *one nature*, that of the incarnate Word, and that therefore His human body was essentially different from other human bodies. In this he went beyond Cyril and the Alexandrine school generally, who, although they expressed the unity of the two natures in Christ so as almost to nullify their duality, yet took care verbally to guard themselves against the accusation of in any way circumscribing or modifying his real and true humanity. It would seem, however, that Eutyches differed from the Alexandrine school chiefly from inability to express his meaning with proper safeguards, for equally with them he denied that Christ's human nature was either transmuted or absorbed into his divine nature. The energy and imprudence of Eutyches in asserting his opinions led to his being accused of heresy by Domnus of Antioch and Eusebius, bishop of Dorylaeum, at a synod presided over by Flavian at Constantinople in 448. As his explanations were not considered satisfactory, the council deposed him from his priestly office and excommunicated him; but in 449, at a council held in Ephesus convened by Dioscurus of Alexandria and overawed by the presence of a large number of Egyptian monks, not only was Eutyches reinstated in his office, but Eusebius, Domnus and Flavian, his chief opponents, were deposed, and the Alexandrine doctrine of the "one nature" received the sanction of the church. This judgment is the more interesting as being in distinct conflict with the opinion of the bishop of Rome—Leo—who, departing from the policy of his predecessor Celestine, had written very strongly to Flavian in support of the doctrine of the two natures and one person. Meanwhile the emperor Theodosius died, and Pulcheria and Marcian who succeeded summoned, in October 451, a council (the fourth ecumenical) which met at Chalcedon (*q.v.*). There the synod of Ephesus was declared to have been a "robber synod," its proceedings were annulled, and, in accordance with the rule of Leo as opposed to the doctrines of Eutyches, it was declared that the two natures were united in Christ, but without any alteration, absorption or confusion. Eutyches died in exile, but of his later life nothing is known. After his death his doctrines obtained the support of the Empress Eudocia and made considerable progress in Syria. In the 6th century they received a new impulse from a monk of the name of Jacob, who united the various divisions into which the Eutychians, or Monophysites (*q.v.*), had separated into one church, which exists at the present time under the name of the Jacobite Church, and has numerous adherents in Armenia, Egypt and Ethiopia.

See R. L. Ottley, *The Doctrine of the Incarnation*, ii. 97 ff.; A. Harnack, *History of Dogma*, iv. *passim*; F. Loofs, *Dogmengeschichte* (4th ed., 1906), 297 f., and the art. in Herzog-Hauck, *Realencyk. für prot. Theol.*, with a full bibliography.

EUTYCHIANUS, pope from 275 to 283. His original epitaph was discovered in the catacombs (see Kraus, *Roma sotterranea*, p. 154 et seq.), but nothing more is known of him.

EUTYCHIDES, of Sicyon in Achaea, Greek sculptor of the latter part of the 4th century B.C., was a pupil of Lysippus. His most noted work was a statue of Fortune, which he made for the city of Antioch, then newly founded. The goddess, who embodied the idea of the city, was seated on a rock, crowned with towers, and having the river Orontes at her feet. There is a small copy of the statue in the Vatican (see GREEK ART). It was imitated by a number of Asiatic cities; and indeed most statues of cities since erected borrow something from the work of Eutychides.

EUYUK, or EYUK (the *eu* pronounced as in French), a small village in Asia Minor, in the Angora vilayet, 12 m. N.N.E. of Boghaz Keui (*Pteria*), built on a mound which contains some remarkable ruins of a large building—a palace or sanctuary—anterior to the Greek period and belonging to the same civilization as the ruins and rock-reliefs at Pteria. These ruins consist of a gateway and an approach enclosed by two lateral walls, 15 ft. long, from the outer end of which two walls return outwards at right angles, one to right and one to left. The gateway is flanked by two huge blocks, each carved in front into the shape of a sphinx, while on the inner face is a relief of a two-headed eagle with wings displayed. Of the approach and its returning walls only the lower courses remain: they consist of large blocks adorned with a series of bas-reliefs similar in type to those carved on the rocks of Boghaz Keui. Behind the gateway is another vestibule leading to another portal which gives entrance to the building, the lateral walls and abutments of the portal being also decorated with reliefs much worn. These reliefs belong to that pre-Greek oriental art generally called Hittite, of which there are numerous remains in the eastern half of the peninsula. It is now generally agreed that the scenes represented are religious processions. On the left returning wall is a train of priestly attendants headed by the chief priest and priestess (the latter carrying a *lituus*), clad in the dress of the deities they serve and facing an altar, behind which is an image of a bull on a pedestal (representing the god); then comes an attendant leading a goat and three rams for sacrifice, followed by more priests with *litui* or musical instruments, after whom comes a bull bearing on his back the sacred *cista* (?). On the lateral walls of the approach we have a similar procession of attendants headed by the chief priestess and priest, who pours a libation at the feet of the goddess seated on her throne; while on the right returning wall are fragments of a third procession approaching another draped figure of the goddess on her throne (placed at the angle opposite the bull on the pedestal), the train being again brought up by a bull.

These are all scenes in the ritual of the indigenous naturalistic religion which was spread, in slightly varying forms, all over Asia Minor, and consisted in the worship of the self-reproductive powers of nature, personified in the great mother-goddess (called by various names Cybele, Leto, Artemis, &c.) and the god her husband-and-son (Attis, Men, Sabazios, &c.), representing the two elements of the ultimate divine nature (see Great Mother of the Gods). Here, as in the oriental mysteries generally, the goddess is made more prominent. Where Greek influence affects the native religion, emphasis tends to be laid on the god, but the character of the religion remains everywhere ultimately the same (see Ramsay, *Cities and Bishoprics of Phrygia*, ch. iii.).

Authorities.—Perrot, *Explor. de la Galatie* (1862) and *Hist. de l'art* (Eng. trans., 1890); Humann and Puchstein, *Reisen in Kleinasien u. Nordsyrien* (1890); Hogarth in Murray's *Handbook to Asia Minor* (1895); Chantre, *Mission en Cappadoce* (1898). See also Hittites. (J. G. C. A.)

EVAGORAS, son of Nicocles, king of Salamis in Cyprus 410–374 B.C. He claimed descent from Teucer, half-brother of Ajax, son of Telamon, and his family had long been rulers of Salamis until supplanted by a Phoenician exile. When the usurper was in turn driven out by a Cyprian noble, Evagoras, fearing that his life was in danger, fled to Cilicia. Thence he returned secretly in 410, and with the aid of a small band of adherents regained possession of the throne. According to Isocrates, whose panegyric must however be read with caution, Evagoras was a model ruler, whose aim was to promote the welfare of his state and of his subjects by the cultivation of Greek refinement and civilization, which had been almost obliterated in Salamis by a long period of barbarian rule. He cultivated the friendship of the Athenians, and after the defeat of Conon at Aegospotami he afforded him refuge and hospitality. For a time he also maintained friendly relations with Persia, and secured the aid of Artaxerxes II. for Athens against Sparta. He took part in the battle of Cnidus (394), in which the Spartan fleet was defeated, and for this service his statue was placed by the Athenians side by side with that of Conon in the Ceramicus. But the energy and enterprise of Evagoras soon roused the jealousy of the Great King, and relations between them became strained. From 391 they were virtually at war. Aided by the Athenians and the Egyptian Hakor (Acoris), Evagoras extended his rule over the greater part of Cyprus, crossed over to Asia Minor, took several cities in Phoenicia, and persuaded the Cilicians to revolt. After the peace of Antalcidas (387), to which he refused to agree, the Athenians withdrew their support, since by its terms they recognized the lordship of Persia over Cyprus. For ten years Evagoras carried on hostilities single-handed, except for occasional aid from Egypt. At last he was totally defeated at Citium, and compelled to flee to Salamis. Here, although closely blockaded, he managed to hold his ground, and took advantage of a quarrel between the Persian generals to conclude peace (376). Evagoras was allowed to remain nominally king of Salamis, but in reality a vassal of Persia, to which he was to pay a yearly tribute. The chronology of the last part of his reign is uncertain. In 374 he was assassinated by a eunuch from motives of private revenge.

The chief authority for the life of Evagoras is the panegyric of Isocrates addressed to his son Nicocles; see also Diod. Sic. xiv. 115, xv. 2-9; Xenophon, *Hellenica*, iv. 8; W. Judeich, *Kleinasiatische Studien* (Marburg, 1892), and art. Hellenism.

EVAGRIUS (*c.* 536–600), surnamed Scholasticus, Church historian, was born at Epiphania in Coele-Syria. His surname shows him to have been an advocate, and it is supposed that he practised at Antioch. He was the legal adviser of Gregory, patriarch of that city, whom he successfully defended at Constantinople against certain serious charges. Through this connexion he was brought under the notice of the emperor Tiberius Constantine, who honoured him with the rank of quaestorian; Maurice Tiberius made him master of the rolls. His influence and reputation were so considerable that on the occasion of his second marriage a public festival was celebrated in his honour, which was interrupted by a terrible earthquake. Evagrius's name has been preserved by his *Ecclesiastical History* in six books, extending over the period from the third general council (that of Ephesus, 431) to the year 593. It thus continues the work of Eusebius, Socrates, Sozomen and Theodoret. Though not wholly trustworthy, and often very credulous, this work is on the whole impartial, and appears to have been compiled from original documents, from which many valuable excerpts are given. It is particularly helpful to the student of the history of dogma during the 5th and 6th centuries, while the political history of the time is by no means neglected. Evagrius made use of the writings of Eustathius, John of Epiphania, John Malalas, Procopius, and (possibly) Menander Protector.

The best edition of the History is that of L. Parmentier and J. Bidez (London, 1898), which contains the Scholia; it is also included in Migne's *Patrologia Graeca*, lxxxvi. There is an English translation in Bohn's *Ecclesiastical Library*. See Krumbacher, *Geschichte der byzantinischen Litteratur* (1897); F. C. Baur, *Die Epochen der kirchlichen Geschichtsschreibung* (1852); L. Jeep, *Quellenuntersuchungen zu den griechischen Kirchenhistorikern* (1884).

EVANDER (Gr. Εὔανδρος, "good man"), in Roman legend, son of Mercury and Carmenta, or of Echemus, king of Arcadia. According to the story, Evander left the Arcadian town of Pallantion about sixty years before the Trojan War and founded Pallanteum or Palatium on the hill afterwards called the Palatine. This is only one of the many Greek legends adopted by the Romans for the purpose of connecting places in Italy with others of like-sounding name in Greece. To Evander was attributed the introduction of Greek rites and customs into his new country; of writing, music and other arts; of the worship of Pan (called Faunus by the Italians) and the festival of Lupercalia. In Virgil he receives Aeneas hospitably, and assists him against Turnus. Probably Evander was identical with the god Faunus (the "favourer"), and the tale of his Arcadian origin was due to the desire to establish connexion with Greece; the name of his reputed mother (or wife) Carmenta is genuinely Italian.

See Livy i. 6. 7; Ovid, *Fasti*, i. 471, v. 99; Dion. Halic. i. 31-33; Virgil, *Aeneid*, viii. 335.

EVANGELICAL ALLIANCE, an association of individual Christians of different denominations formed in London in August 1846, at a conference of over 900 clergymen and laymen from all parts of the world, and representing upwards of fifty sections of the Protestant church. The idea originated in Scotland in the preceding year, and was intended "to associate and concentrate the strength of an enlightened Protestantism against the encroachments of popery and Puseyism, and to promote the interests of a scriptural Christianity," as well as to combat religious indifference. A preliminary meeting was held at Liverpool in October 1845. The movement obtained wide support in other countries, more especially in America, and organizations in connexion with it now exist in the different capitals throughout the world. The object of the alliance, according to a resolution of the first conference, is "to enable Christians to realize in themselves and to exhibit to others that a living and everlasting union binds all true believers together in the fellowship of the church." At the same conference the following nine points were adopted as the basis of the alliance: "Evangelical views in regard to the divine inspiration, authority and sufficiency of the Holy Scriptures; the right and duty of private judgment in the interpretation of the Holy Scriptures; the unity of the Godhead and the Trinity of persons therein; the utter depravity of human nature in consequence of the fall; the incarnation of the Son of God, His work of atonement for sinners of mankind, and His mediatorial intercession and reign; the justification of the sinner by faith alone; the work of the Holy Spirit in the conversion and sanctification of the sinner; the immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked; the divine institution of the Christian ministry, and the obligations and perpetuity of the ordinances of Baptism and the Lord's Supper," it being understood, however, (1) that such a summary "is not to be regarded in any formal or ecclesiastical sense as a creed or confession," and (2) that "the selection of certain tenets, with the omission of others, is not to be held as implying that the former constitute the whole body of important truth, or that the latter are unimportant."

Annual conferences of branches of the alliance are held in England, America and several continental countries; and it is provided that a general conference, including representatives of the whole alliance, be held every seventh year, or oftener if it be deemed necessary. Such conferences have been held in London in 1851; Paris, 1855; Berlin, 1857; Geneva, 1861; Amsterdam, 1867; New York, 1873; Basel, 1879; Copenhagen, 1885; Florence, 1891; London, 1896 and 1907. They are occupied with the discussion of the " best methods of counteracting infidelity, Romanism and ritualism, and the desecration of the Lord's Day," and of furthering the positive objects of the alliance. The latter are sometimes stated as follows: (*a*) " The world girdled by prayer "; a world-wide week of prayer is held annually, beginning on the first Sunday in the year. (*b*) " The maintenance of religious liberty throughout the world." (*c*) " The relief of persecuted Christians in all parts "; the alliance has agents in many countries to help the persecuted by distributing relief, &c., and in Russia there is a travelling agent who endeavours to help the Stundists. (*d*) " The manifestation of the unity of all believers and the upholding of the evangelical faith."

The following publications may be mentioned:—*The Evangelical Alliance Monthly Intelligencer*, *The Evangelical Alliance Quarterly*, both published in London; A. J. Arnold, *History of the Evangelical Alliance* (London, 1897); and the reports of the proceedings of the different conferences.

EVANGELICAL ASSOCIATION of North America, a religious denomination, founded about the beginning of the 19th century by Jacob Albright (1759–1808), a German Lutheran of Pennsylvania. About 1790 he began an itinerant mission among his fellow-countrymen, chiefly in Pennsylvania; and meeting with considerable success, he was, at an assembly composed of adherents from the different places he had visited, elected in 1800 presiding elder or chief pastor, and shortly afterwards rules of government were adopted somewhat similar to those of the Methodist Episcopal Church. The theological standards of the two bodies are also in close agreement. In 1807 Albright was appointed bishop of the community, which adopted its present name in 1818. In 1816 the first annual conference was held, and in 1843 there was instituted a general conference, composed of delegates chosen by the annual conferences and constituting the highest legislative and judicial authority in the church. The members of the general conference hold office for four years. In 1891 a long internal controversy resulted in a division. A law-suit awarded the property to the branch making its headquarters at Indianapolis, whereon the other party, numbering 40,000, that met at Philadelphia, constituted themselves the United Evangelical Church. The Association in 1906 had about 105,000 members, besides some 10,000 in Germany and Switzerland, and has nearly 2000 churches and 1200 itinerant and other preachers. There are four bishops. It distributes much evangelical literature, and supports a mission in Japan.

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E. Re.	Elisée Reclus. See the biographical article: Reclus, J. J. E.	**Fire.**
E. Tn.	Rev. Ethelred Leonard Taunton, (d. 1907). Author of *The English Black Monks of St Benedict*; *History of the Jesuits in England.*	**Feckenham;** **Fisher, John.**
E. W. H.	Ernest William Hobson, M.A., D.Sc., F.R.S., F.R.A.S. Fellow and Tutor in Mathematics, Christ's College, Cambridge. Stokes Lecturer in Mathematics in the University.	**Fourier's Series.**
F. C. C.	Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen). Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of *The Ancient Armenian Texts of Aristotle*; *Myth, Magic and Morals*; &c.	**Extreme Unction.**
F. G. P.	Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst. Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for Women. Formerly Hunterian Professor at the Royal College of Surgeons.	**Eye:** *Anatomy.*
F. J. H.	Francis John Haverfield, M.A., LL.D., F.S.A. Camden Professor of Ancient History in the University of Oxford. Fellow of Brasenose College. Ford's Lecturer, 1906–1907. Fellow of the British Academy. Author of Monographs on Roman History, especially Roman Britain; &c.	**Fosse.**
F. J. W.	Frederick Joseph Wall, F.C.S. Secretary to the Football Association.	**Football:** *Association* (*in part*).
F. R. C.	Frank R. Cana. Author of *South Africa from the Great Trek to the Union.*	**France:** *Colonies.*
F. S.	Francis Storr, M.A. Editor of the *Journal of Education*, London. Officier d'Académie, Paris.	**Fable.**
G. A. B.	George A. Boulenger, D.Sc., Ph.D., F.R.S. In charge of the Collections of Reptiles and Fishes, Department of Zoology, British Museum. Vice-President of the Zoological Society of London.	**Flat-fish.**
G. A. Be.	George Andreas Berry, M.B., F.R.C.S., F.R.S. (Edin.). Hon. Surgeon Oculist to His Majesty in Scotland. Formerly Senior Ophthalmic Surgeon, Edinburgh Royal Infirmary, and Lecturer on Ophthalmology in the University of Edinburgh. Vice-President, Ophthalmological Society. Author of *Diseases of the Eye*; *The Elements of Ophthalmoscopic Diagnosis*; *Subjective Symptoms in Eye Diseases*; &c.	**Eye:** *Diseases.*
G. B. A.	George Burton Adams, A.M., B.D., Ph.D., Litt.D. Professor of History, Yale University. Editor of *American Historical Review.* Author of *Civilization during the Middle Ages*; *Political History of England, 1066–1216*; &c.	**Feudalism.**
G. C. L.	George Collins Levey, C.M.G. Member of Board of Advice to Agent-General of Victoria. Formerly Editor and Proprietor of the *Melbourne Herald.* Secretary, Colonial Committee of Royal Commission to Paris Exhibition, 1900. Secretary, Adelaide Exhibition, 1887. Secretary, Royal Commission, Hobart Exhibition, 1894–1895. Secretary to Commissioners for Victoria at the Exhibitions in London, Paris, Vienna, Philadelphia and Melbourne, 1873, 1876, 1878, 1880–1881.	**Exhibition.**
G. E.	Rev. George Edmundson, M.A., F.R.Hist.S. Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909. Hon. Member, Dutch Historical Society, and Foreign Member, Netherlands Association of Literature.	**Flanders.**
G. F. Z.	George Frederick Zimmer, A.M.Inst.C.E. Author of *Mechanical Handling of Material.*	**Flour and Flour Manufacture.**
G. G. P.*	George Grenville Phillimore, M.A., B.C.L. Christ Church, Oxford. Barrister-at-Law, Middle Temple.	**Fishery, Law of.**
G. P.	Gifford Pinchot, A.M., D.Sc., LL.D. Professor of Forestry, Yale University. Formerly Chief Forester, U.S.A. President of the National Conservation Association. Member of the Society of American Foresters, Royal English Arboricultural Society, &c. Author of *The White Pine*; *A Primer of Forestry*; &c.	**Forests and Forestry:** *United States.*
G. W. T.	Rev. Griffiths Wheeler Thatcher, M.A., B.D. Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford.	**Fairūzābādī;** **Fakhr ud-Dīn Rāzi;** **Fārābī; Farazdaq.**

H. B. S.	Rev. Henry Barclay Swete, M.A., D.D., Litt.D. Regius Professor of Divinity, Cambridge University. Fellow of Gonville and Caius College, Cambridge. Fellow of King's College, London. Fellow of British Academy. Hon. Canon of Ely Cathedral. Author of *The Holy Spirit in the New Testament*; &c.	**Fathers of the Church.**
H. Ch.	Hugh Chisholm, M.A. Formerly Scholar of Corpus Christi College, Oxford. Editor of the 11th Edition of the *Encyclopaedia Britannica*; Co-Editor of the 10th edition.	**Forster.**
H. De.	Hippolyte Delehaye, S.J. Assistant in the compilation of the Bollandist publications: *Analecta Bollandiana* and *Acta Sanctorum*.	**Fiacre, Saint;** **Florian, Saint.**
H. F. G.	Hans Friedrich Gadow, F.R.S., Ph.D. Strickland Curator and Lecturer on Zoology in the University of Cambridge. Author of "Amphibia and Reptiles," in the *Cambridge Natural History*.	**Flamingo.**
H. L. S.	H. Lawrence Swinburne (d. 1909).	**Flag.**
H. St.	Henry Sturt, M.A. Author of *Idola Theatri*; *The Idea of a Free Church*; *Personal Idealism*.	**Fechner;** **Feuerbach, Ludwig A.**
H. W. C. D.	Henry William Carless Davis, M.A. Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls' College, Oxford, 1895–1902. Author of *England under the Normans and Angevins*; *Charlemagne*.	**Fitz Neal;** **Fitz Peter, Geoffrey;** **Fitz Stephen, William;** **Fitz Thedmar; Flambard;** **Florence of Worcester.**
H. W. S.	H. Wickham Steed. Correspondent of *The Times* at Vienna. Correspondent of *The Times* at Rome, 1897–1902.	**Fabrizi.**
I. A.	Israel Abrahams, M.A. Reader in Talmudic and Rabbinic Literature, University of Cambridge. President, Jewish Historical Society of England. Author of *A Short History of Jewish Literature*; *Jewish Life in the Middle Ages*.	**Exilarch;** **Eybeschutz.**
J. A. C.	Sir Joseph Archer Crowe, K.C.M.G. See the biographical article: Crowe, Sir Joseph A.	**Eyck, Van.**
J. A. H.	John Allen Howe, B.Sc. Curator and Librarian of the Museum of Practical Geology, London. Author of *The Geology of Building Stones*.	**France:** *Geology*.
J. A. S.	John Addington Symonds, LL.D. See the biographical article: Symonds, John A.	**Ficino;** **Filelfo.**
J. B.*	Joseph Burton. Partner in Pilkington's Tile and Pottery Co., Clifton Junction, Manchester.	**Firebrick** (*in part*).
J. B. P.	James Bell Pettigrew, M.D., LL.D., F.R.S., F.R.C.P. (Edin.) (1834–1908). Chandos Professor of Medicine and Anatomy, University of St Andrews, 1875–1908. Author of *Animal Locomotion*; &c.	**Flight and Flying** (*in part*).
J. Bt.	James Bartlett. Lecturer on Construction, Architecture, Sanitation, Quantities, &c., at King's College, London. Member of Society of Architects. Member of Institute of Junior Engineers.	**Foundations.**
J. C. M.	James Clerk Maxwell, LL.D. See the biographical article: Maxwell, James Clerk.	**Faraday.**
J. E. C. B.	John Edward Courtenay Bodley, M.A. Balliol College, Oxford. Corresponding Member of the Institute of France. Author of *France*; *The Coronation of Edward VII.*; &c.	**France:** *History, 1870–1910.*
J. E. P. W.	John Edward Power Wallis, M.A. Puisne Judge, Madras. Vice-Chancellor of Madras University. Inns of Court Reader in Constitutional Law, 1892–1897. Formerly Editor of *State Trials*.	**Extradition.**
J. F. St.	John Frederick Stenning, M.A. Dean and Fellow of Wadham College, Oxford. University Lecturer in Aramaic. Lecturer in Divinity and Hebrew at Wadham College.	**Exodus, Book of.**
J. G. H.	Joseph G. Horner, A.M.I.Mech.E. Author of *Plating and Boiler Making*; *Practical Metal Turning*; &c.	**Forging;** **Founding.**
J. G. R.	John George Robertson, M.A., Ph.D. Professor of German at the University of London. Formerly Lecturer on the English Language, Strassburg University. Author of *History of German Literature*; &c.	**Fouqué, Baron.**
J. H. P.*	John Hungerford Pollen, M.A. (d. 1908). Formerly Professor of Fine Arts in Catholic University of Dublin. Fellow of Merton College, Oxford. Cantor Lecturer, Society of Arts, 1885. Author of *Ancient and Modern Furniture and Woodwork*; *Ancient and Modern Gold and Silversmith's Work*; *The Trajan Column*; &c.	**Fan.**
J. Hl. R.	John Holland Rose, M.A., Litt.D. Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. Author of *Life of Napoleon I.*; *Napoleonic Studies*; *The Development of the European Nations*; *The Life of Pitt*; chapters in the *Cambridge Modern History*.	**Fouché.**
J. H. R.	John Horace Round, M.A., LL.D. (Edin.). Author of *Feudal England*; *Studies in Peerage and Family History*; *Peerage and Pedigree*; &c.	**Ferrers:** *Family*; **Fitzgerald:** *Family*.

J. I.	JULES ISAAC. Professor of History at the Lycée of Lyons.	**Francis I. of France.**
J. K. L.	SIR JOHN KNOX LAUGHTON, M.A., LITT.D. Professor of Modern History, King's College, London. Secretary of the Navy Records Society. Served in the Baltic, 1854–1855; in China, 1856–1859. Mathematical and Naval Instructor, Royal Naval College, Portsmouth, 1866–1873; Greenwich, 1873–1885. President, Royal Meteorological Society, 1882–1884. Honorary Fellow, Gonville and Caius College, Cambridge. Fellow, King's College, London. Author of *Physical Geography in its Relation to the Prevailing Winds and Currents*; *Studies in Naval History*; *Sea Fights and Adventures*; &c.	**Farragut;** **Fitzroy.**
J. L. B.	JULIAN LEVETT BAKER, F.I.C. Analytical and Consulting Chemist. Examiner in Brewing to the City and Guilds of London Institute, Department of Technology. Hon. Secretary of the Institute of Brewing. Author of *The Brewing Industry*; &c.	**Fermentation.**
J. Ma.	JOHN MACDONALD.	**Fair** (*in part*).
J. M. S.	JAMES MONTGOMERY STUART. Author of *The History of Free Trade in Tuscany*; *Reminiscences and Essays.*	**Foscolo.**
J. Pa.	JAMES PATON, F.L.S. Superintendent of Museums and Art Galleries of Corporation of Glasgow. Assistant in Museum of Science and Art, Edinburgh, 1861–1876. President of Museums Association of United Kingdom, 1896. Editor and part-author of *Scottish National Memorials*, 1890.	**Feather** (*in part*).
J. P. E.	JEAN PAUL HIPPOLYTE EMMANUEL ADHÉMAR ESMEIN. Professor of Law in the University of Paris. Officer of the Legion of Honour. Member of the Institute of France. Author of *Cours élémentaire d'histoire du droit français*; &c.	**France:** *Law and Institutions.*
J. R. C.	JOSEPH ROGERSON COTTER, M.A. Assistant to the Professor of Natural and Experimental Philosophy, Trinity College, Dublin. Editor of 2nd edition of Preston's *Theory of Heat.*	**Fluorescence.**
J. R. F.*	JOSEPH R. FISHER. Editor of the *Northern Whig*, Belfast. Author of *Finland and the Tsars*; *Law of the Press*; &c.	**Finland.**
J. R. J. J.	JULIAN ROBERT JOHN JOCELYN. Colonel, R.A. Formerly Commandant, Ordnance College; Member of Ordnance Committee; Commandant, Schools of Gunnery.	**Fireworks:** *History.*
J. S. Bl.	REV. JOHN SUTHERLAND BLACK, M.A., LL.D. Assistant Editor, 9th edition, *Encyclopaedia Britannica.* Joint Editor of the *Encyclopaedia Biblica.* Translated Ritschl's *Critical History of the Christian Doctrine of Justification and Reconciliation.*	**Fasting;** **Feasts and Festivals.**
J. S. F.	JOHN SMITH FLETT, D.Sc., F.G.S. Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby Medallist of the Geological Society of London.	**Felsite;** **Flint.**
J. S. K.	JOHN SCOTT KELTIE, LL.D., F.S.S., F.S.A. (Scot.). Secretary, Royal Geographical Society. Knight of Swedish Order of North Star. Commander of the Norwegian Order of St Olaf. Hon. Member, Geographical Societies of Paris, Berlin, Rome, &c. Editor of *Statesman's Year Book.* Editor of the *Geographical Journal.*	**Finland** (*in part*); **Flinders.**
J. T. Be.	JOHN T. BEALBY. Joint Author of Stanford's *Europe.* Formerly Editor of the *Scottish Geographical Magazine.* Translator of Sven Hedin's *Through Asia, Central Asia and Tibet*; &c.	**Fens;** **Ferghana** (*in part*).
K. S.	KATHLEEN SCHLESINGER. Author of *The Instruments of the Orchestra.*	**Fiddle; Fife; Flageolet;** **Flute** (*in part*).
L. D.*	LOUIS DUCHESNE. See the biographical article: DUCHESNE, L. M. O.	**Formosus.**
L. F. S.	LESLIE FREDERIC SCOTT, M.A., K.C.C. Barrister-at-Law, Inner Temple.	**Factor.**
L. J.	LIEUT.-COLONEL LOUIS CHARLES JACKSON, R.E., C.M.G. Assistant Director of Fortifications and Works, War Office. Formerly Instructor in Fortification, R.M.A., Woolwich. Instructor in Fortification and Military Engineering, School of Military Engineering, Chatham.	**Fortification and Siegecraft.**
L. V.*	LUIGI VILLARI. Italian Foreign Office (Emigration Dept.). Formerly Newspaper Correspondent in east of Europe. Italian Vice-Consul in New Orleans, 1906; Philadelphia, 1907; Boston, U.S.A., 1907–1910. Author of *Italian Life in Town and Country*; *Fire and Sword in the Caucasus*; &c.	**Faliero; Fanti, Manfredo;** **Farini, Luigi Carlo;** **Farnese:** *Family*; **Ferdinand I. and IV. of Naples;** **Ferdinand II. of the Two Sicilies;** **Fiesco; Filangieri, C.;** **Florence; Foscari;** **Fossombroni;** **Francis II. of the Two Sicilies;** **Francis IV. and V. of Modena.**

M. Ha.	MARCUS HARTOG, M.A., D.SC., F.L.S. Professor of Zoology, University College, Cork. Author of "Protozoa," in *Cambridge Natural History*; and papers for various scientific journals.	**Flagellata;** **Foraminifera.**
N. W. T.	NORTHCOTE WHITBRIDGE THOMAS, M.A. Government Anthropologist to Southern Nigeria. Corresponding Member of the Société d'Anthropologie de Paris. Author of *Thought Transference*; *Kinship and Marriage in Australia*; &c.	**Faith Healing;** **Fetishism;** **Folklore.**
O. H.*	OTTO HEHNER, F.I.C., F.C.S. Public Analyst. Formerly President of Society of Public Analysts. Vice-President of Institute of Chemistry of Great Britain and Ireland. Author of works on Butter Analysis; Alcohol Tables; &c.	**Food Preservation.**
O. M.	DAVID ORME MASSON, M.A., D.SC., F.R.S. Professor of Chemistry, Melbourne University. Author of papers on chemistry in the transactions of various learned societies.	**Fireworks:** *Modern.*
P. A.	PAUL DANIEL ALPHANDÉRY. Professor of the History of Dogma, École Pratique des Hautes Études, Sorbonne, Paris. Author of *Les Idées morales chez les hétérodoxes latines au début du XIII^e siècle.*	**Flagellants.**
P. A. K.	PRINCE PETER ALEXEIVITCH KROPOTKIN. See the biographical article: KROPOTKIN, P. A.	**Ferghana** (*in part*); **Finland** (*in part*).
P. C. Y.	PHILIP CHESNEY YORKE, M.A. Magdalen College, Oxford.	**Falkland; Fanshaw;** **Fawkes, Guy; Fell, John;** **Fortescue, Sir John.**
P. C. M.	PETER CHALMERS MITCHELL, F.R.S., F.Z.S., D.SC., LL.D. Secretary to the Zoological Society of London. University Demonstrator in Comparative Anatomy and Assistant to Linacre Professor at Oxford, 1881–1891. Examiner in Zoology to the University of London, 1903. Author of *Outlines of Biology*; &c.	**Evolution.**
P. G. K.	PAUL GEORGE KONODY. Art Critic of the *Observer* and the *Daily Mail*. Formerly Editor of *The Artist*. Author of *The Art of Walter Crane*; *Velasquez, Life and Work*; &c.	**Fiorenzo di Lorenzo;** **Fragonard.**
P. J. H.	PHILIP JOSEPH HARTOG, M.A., L. ÈS SC. (Paris). Academic Registrar of the University of London. Author of *The Writing of English*, and articles in the Special Reports on educational subjects of the Board of Education.	**Examinations** (*in part*).
P. W.	PAUL WIRIATH. Director of the École Supérieure Pratique de Commerce et d'Industrie, Paris.	**France:** *History to 1870.*
R. Ad.	ROBERT ADAMSON, LL.D. See the biographical article: ADAMSON, R.	**Fichte;** **Fourier, F. C. M.**
R. A. S. M.	ROBERT ALEXANDER STEWART MACALISTER, M.A., F.S.A. St John's College, Cambridge. Director of Excavations for the Palestine Exploration Fund.	**Font.**
R. H. C.	REV. ROBERT HENRY CHARLES, M.A., D.D., D.LITT. (Oxon.). Grinfield Lecturer and Lecturer in Biblical Studies, Oxford. Fellow of the British Academy. Formerly Senior Moderator of Trinity College, Dublin. Author and Editor of *Book of Enoch*; *Book of Jubilees*; *Apocalypse of Baruch*; *Assumption of Moses*; *Ascension of Isaiah*; *Testaments of the XII. Patriarchs*; &c.	**Ezra:** *Third and Fourth Books of.*
R. J. M.	RONALD JOHN MCNEILL, M.A. Christ Church, Oxford. Barrister-at-Law. Formerly Editor of the *St James's Gazette*, London.	**Fenians;** **Fitzgerald, Lord Edward;** **Flood, Henry.**
R. L.*	RICHARD LYDEKKER, F.R.S., F.G.S., F.Z.S. Member of the Staff of the Geological Survey of India, 1874–1882. Author of *Catalogue of Fossil Mammals, Reptiles and Birds in British Museum*; *The Deer of all Lands*; *The Game Animals of Africa*; &c.	**Flying-Squirrel;** **Fox.**
R. N. B.	ROBERT NISBET BAIN (d. 1909). Assistant Librarian, British Museum, 1883–1909. Author of *Scandinavia: the Political History of Denmark, Norway and Sweden, 1513–1900*; *The First Romanovs, 1613–1725*; *Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796*; &c.	**Fersen, Counts von.**
R. Po.	RENÉ POUPARDIN, D. ÈS L. Secretary of the École des Chartes. Honorary Librarian at the Bibliothèque Nationale, Paris. Author of *Le Royaume de Provence sous les Carolingiens*; *Recueil des chartes de Saint-Germain*; &c.	**Franche-Comté.**
R. P. S.	R. PHENÉ SPIERS, F.S.A., F.R.I.B.A. Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, London. Corresponding Member of the Institute of France. Editor of Fergusson's *History of Architecture*. Author of *Architecture: East and West*; &c.	**Flute:** *Architecture.*
R. S. C.	ROBERT SEYMOUR CONWAY, M.A., D.LITT. (Cantab.). Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin in University College, Cardiff; and Fellow of Gonville and Caius College, Cambridge. Author of *The Italic Dialects*.	**Falisci.**
R. Tr.	ROLAND TRUSLOVE, M.A. Formerly Scholar of Christ Church, Oxford. Fellow, Dean and Lecturer in Classics at Worcester College, Oxford.	**France:** *Statistics.*

S. A. C.	Stanley Arthur Cook, M.A. Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904–1908. Author of *Glossary of Aramaic Inscriptions*; *The Laws of Moses and the Code of Hammurabi*; *Critical Notes on Old Testament History*; *Religion of Ancient Palestine*; &c.	**Exodus, The;** **Ezra and Nehemiah, Books of.**
S. C.	Sidney Colvin, LL.D. See the biographical article: Colvin, S.	**Fine Arts; Finiguerra;** **Flaxman.**
St C.	Viscount St Cyres. See the biographical article: Iddesleigh, 1st Earl of	**Fénelon.**
S. E. B.	Hon. Simeon Eben Baldwin, M.A., LL.D. Professor of Constitutional and Private International Law in Yale University. Director of the Bureau of Comparative Law of the American Bar Association. Formerly Chief Justice of Connecticut. Author of *Modern Political Institutions*; *American Railroad Law*; &c.	**Extradition:** ***U.S.A.***
S. E. S.-R.	Stephen Edward Spring-Rice, M.A., C.B. (1856–1902). Formerly Principal Clerk, H.M. Treasury, and Auditor of the Civil List. Fellow of Trinity College, Cambridge.	**Exchequer** (***in part***).
T. A. I.	Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.	**Explosives:** ***Law.***
T. As.	Thomas Ashby, M.A., D.Litt. (Oxon.), F.S.A. Director of British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Corresponding Member of the Imperial German Archaeological Institute. Author of the *Classical Topography of the Roman Campagna*; &c.	**Faesulae; Falerii; Falerio;** **Fanum Fortunae;** **Ferentino; Fermo;** **Flaminia Via;** **Florence:** ***Early History;*** **Fondi; Fonni; Forum Appii.**
T. Ba.	Sir Thomas Barclay, M.P. Member of the Institute of International Law. Member of the Supreme Council of the Congo Free State. Officer of the Legion of Honour. Author of *Problems of International Practice and Diplomacy*; &c. M.P. for Blackburn, 1910.	**Exterritoriality.**
T. H. H.*	Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc., F.R.G.S. Colonel in the Royal Engineers. Superintendent, Frontier Surveys, India, 1892–1898. Gold Medallist, R.G.S., London, 1887. H.M. Commissioner for the Persia-Beluch Boundary, 1896. Author of *The Indian Borderland*; *The Gates of India*; &c.	**Everest, Mount.**
T. K. C.	Rev. Thomas Kelly Cheyne, D.D. See the biographical article: Cheyne, T. K.	**Eve** (***in part***).
T. Se.	Thomas Seccombe, M A. Lecturer in History, East London and Birkbeck Colleges, University of London. Stanhope Prizeman, Oxford, 1887. Formerly Assistant Editor of *Dictionary of National Biography*, 1891–1901. Joint-author of *The Bookman History of English Literature*. Author of *The Age of Johnson*; &c.	**Fawcett, Henry.**
T. Wo.	Thomas Woodhouse. Head of Weaving and Textile Designing Department, Technical College, Dundee.	**Flax.**
V. M.	Victor Charles Mahillon. Principal of the Conservatoire Royal de Musique at Brussels. Chevalier of the Legion of Honour.	**Flute** (***in part***).
W. A. B. C.	Rev. William Augustus Brevoort Coolidge, M.A., F.R.G S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880–1881. Author of *Guide to Switzerland*; *The Alps in Nature and in History*; &c. Editor of the *Alpine Journal*, 1880–1889.	**Feldkirch.**
W. A. P.	Walter Alison Phillips, M.A. Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of *Modern Europe*; &c.	**Excellency; Faust;** **Febronianism.**
W. B.*	William Burton, M.A., F.C.S. Chairman, Joint Committee of Pottery Manufacturers of Great Britain. Author of *English Stoneware and Earthenware*; &c.	**Firebrick** (***in part***).
W. Ca.	Walter Camp, A.M. Member of Yale University Council. Author of *American Football*; *Football Facts and Figures*; &c.	**Football:** ***American*** (***in part***).
W. Ga.	Walter Garstang, M.A., D.Sc. Professor of Zoology at the University of Leeds. Scientific Adviser to H.M. Delegates on the International Council for the Exploration of the Sea, 1901–1907. Formerly Fellow of Lincoln College, Oxford. Author of *The Races and Migrations of the Mackerel*; *The Impoverishment of the Sea*; &c.	**Fisheries.**
W. He.	Walter Hepworth. Formerly Commissioner of the Council of Education, Science and Art Department, South Kensington.	**Fool.**
W. M. R.	William Michael Rossetti. See the biographical article: Rossetti, Dante G.	**Ferrari, Gaudenzio;** **Fielding, Copley;** **Franceschi, Piero; Francia.**

W. P. P.	William Plane Pycraft, F.Z.S. Assistant in the Zoological Department, British Museum. Formerly Assistant Linacre Professor of Comparative Anatomy, Oxford. Vice-President of the Selborne Society. Author of *A History of Birds*; &c.	**Feather** (*in part*).
W. N. S.	William Napier Shaw, M.A., LL.D., D.Sc., F.R.S. Director of the Meteorological Office. Reader in Meteorology in the University of London. President of Permanent International Meteorological Committee. Member of Meteorological Council, 1897–1905. Hon. Fellow of Emmanuel College, Cambridge. Fellow of Emmanuel College, 1877–1899; Senior Tutor, 1890–1899. Joint Author of *Text Book of Practical Physics*; &c.	**Fog.**
W. P. R.	Hon. William Pember Reeves. Director of London School of Economics. Agent-General and High Commissioner for New Zealand, 1896–1909. Minister of Education, Labour and Justice, New Zealand, 1891–1896. Author of *The Long White Cloud, a History of New Zealand*; &c.	**Fox, Sir William.**
W. R. S.	William Robertson Smith, LL.D. See the biographical article: Smith, W. R.	**Eve** (*in part*).
W. R. E. H.	William Richard Eaton Hodgkinson, Ph.D., F.R.S. Professor of Chemistry and Physics, Ordnance College, Woolwich. Formerly Professor of Chemistry and Physics, R.M.A., Woolwich. Part Author of Valentin-Hodgkinson's *Practical Chemistry*; &c.	**Explosives.**
W. Sch.	Sir Wilhelm Schlich, K.C.I.E., M.A., Ph.D., F.R.S., F.L.S. Professor of Forestry at the University of Oxford. Hon. Fellow of St John's College. Author of *A Manual of Forestry*; *Forestry in the United Kingdom*; *The Outlook of the World's Timber Supply*; &c.	**Forests and Forestry.**
W. W. F.*	William Warde Fowler, M.A. Fellow of Lincoln College, Oxford. Sub-rector, 1881–1904. Gifford Lecturer, Edinburgh University, 1908. Author of *The City-State of the Greeks and Romans*; *The Roman Festivals of the Republican Period*; &c.	**Fortuna.**
W. W. R.*	William Walker Rockwell, Lic.Theol. Assistant Professor of Church History, Union Theological Seminary, New York. Author of *Die Doppelehe des Landgrafen Philipp von Hessen.*	**Ferrara-Florence, Council of**

PRINCIPAL UNSIGNED ARTICLES

Evil Eye.
Excise.
Execution.
Executors and Administrators.
Exeter.
Exile.
Eylau.
Famine.
Fault.
Federal Government.
Federalist Party.
Fehmic Courts.
Felony.
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Fictions.
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Filigree
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ENCYCLOPÆDIA BRITANNICA

ELEVENTH EDITION

VOLUME X

EVANGELICAL CHURCH CONFERENCE, a convention of delegates from the different Protestant churches of Germany. The conference originated in 1848, when the general desire for political unity made itself felt in the ecclesiastical sphere as well. A preliminary meeting was held at Sandhof near Frankfort in June of that year, and on the 21st of September some five hundred delegates representing the Lutheran, the Reformed, the United and the Moravian churches assembled at Wittenberg. The gathering was known as *Kirchentag* (church diet), and, while leaving each denomination free in respect of constitution, ritual, doctrine and attitude towards the state, agreed to act unitedly in bearing witness against the non-evangelical churches and in defending the rights and liberties of the churches in the federation. The organization thus closely resembles that of the Free Church Federation in England. The movement exercised considerable influence during the middle of the 19th century. Though no *Kirchentag*, as such, has been convened since 1871, its place has been taken by the *Kongress für innere Mission*, which holds annual meetings in different towns. There is also a biennial conference of the evangelical churches held at Eisenach to discuss matters of general interest. Its decisions have no legislative force.

EVANGELICAL UNION, a religious denomination which originated in the suspension of the Rev. James Morison (1816–1893), minister of a United Secession congregation in Kilmarnock, Scotland, for certain views regarding faith, the work of the Holy Spirit in salvation, and the extent of the atonement, which were regarded by the supreme court of his church as anti-Calvinistic and heretical. Morison was suspended by the presbytery in 1841 and thereupon definitely withdrew from the Secession Church. His father, who was minister at Bathgate, and two other ministers, being deposed not long afterwards for similar opinions, the four met at Kilmarnock on the 16th of May 1843 (two days before the "Disruption" of the Free Church), and, on the basis of certain doctrinal principles, formed themselves into an association under the name of the Evangelical Union, "for the purpose of countenancing, counselling and otherwise aiding one another, and also for the purpose of training up spiritual and devoted young men to carry forward the work and 'pleasure of the Lord.'" The doctrinal views of the new denomination gradually assumed a more decidedly anti-Calvinistic form, and they began also to find many sympathizers among the Congregationalists of Scotland. Nine students were expelled from the Congregational Academy for holding "Morisonian" doctrines, and in 1845 eight churches were disjoined from the Congregational Union of Scotland and formed a connexion with the Evangelical Union. The Union exercised no jurisdiction over the individual churches connected with it, and in this respect adhered to the Independent or Congregational form of church government; but those congregations which originally were Presbyterian vested their government in a body of elders. In 1889 the denomination numbered 93 churches; and in 1896, after prolonged negotiation, the Evangelical Union was incorporated with the Congregational Union of Scotland.

See *The Evangelical Union Annual*; *History of the Evangelical Union*, by F. Ferguson (Glasgow, 1876); *The Worthies of the E.U.* (1883); W. Adamson, *Life of Dr James Morison* (1898).

EVANS, CHRISTMAS (1766–1838), Welsh Nonconformist divine, was born near the village of Llandyssul, Cardiganshire, on the 25th of December 1766. His father, a shoemaker, died early, and the boy grew up as an illiterate farm labourer. At the age of seventeen, becoming servant to a Presbyterian minister, David Davies, he was affected by a religious revival and learned to read and write in English and Welsh. The itinerant Calvinistic Methodist preachers and the members of the Baptist church at Llandyssul further influenced him, and he soon joined the latter denomination. In 1789 he went into North Wales as a preacher and settled for two years in the desolate peninsula of Lleyn, Carnarvonshire, whence he removed to Llangefni in Anglesey. Here, on a stipend of £17 a year, supplemented by a little tract-selling, he built up a strong Baptist community, modelling his organization to some extent on that of the Calvinistic Methodists. Many new chapels were built, the money being collected on preaching tours which Evans undertook in South Wales.

In 1826 Evans accepted an invitation to Caerphilly, where he remained for two years, removing in 1828 to Cardiff. In 1832, in response to urgent calls from the north, he settled in Carnarvon and again undertook the old work of building and collecting. He was taken ill on a tour in South Wales, and died at Swansea on the 19th of July 1838. In spite of his early disadvantages and personal disfigurement (he had lost an eye in a youthful brawl), Christmas Evans was a remarkably powerful preacher. To a natural aptitude for this calling he united a nimble mind and an inquiring spirit; his character was simple, his piety humble and his faith fervently evangelical. For a time he came under Sandemanian influence, and when the Wesleyans entered Wales he took the Calvinist side in the bitter controversies that were frequent from 1800 to 1810. His chief characteristic was a vivid and affluent imagination, which absorbed and controlled all his other powers, and earned for him the name of "the Bunyan of Wales."

His works were edited by Owen Davies in 3 vols. (Carnarvon, 1895–1897). See the *Lives* by D. R. Stephens (1847) and Paxton Hood (1883).

EVANS, EVAN HERBER (1836–1896), Welsh Nonconformist divine, was born on the 5th of July 1836, at Pant yr Onen near Newcastle Emlyn, Cardiganshire. As a boy he saw something of the "Rebecca Riots," and went to school at the neighbouring village of Llechryd. In 1853 he went into business, first at Pontypridd and then at Merthyr, but next year made his way to Liverpool. He decided to enter the ministry, and studied arts and theology respectively at the Normal College, Swansea, and the Memorial College, Brecon, his convictions being deepened by the religious revival of 1858–1859. In 1862 he succeeded Thomas Jones as minister of the Congregational church at Morriston near Swansea. In 1865 he became pastor of Salem church, Carnarvon, a charge which he occupied for nearly thirty years despite many invitations to English pastorates. In 1894 he became principal of the Congregational college at Bangor. He died on the 30th of December 1896. He was chairman of the Welsh Congregational Union in 1886 and of the Congregational Union of England and Wales in 1892; and by his earnest ministry, his eloquence and his literary work, especially in the denominational paper *Y Dysgedydd*, he achieved a position of great influence in his country.

See *Life* by H. Elvet Lewis.

EVANS, SIR GEORGE DE LACY (1787–1870), British soldier, was born at Moig, Limerick, in 1787. He was educated at Woolwich Academy, and entered the army in 1806 as a volunteer, obtaining an ensigncy in the 22nd regiment in 1807. His early service was spent in India, but he exchanged into the 3rd Light Dragoons in order to take part in the Peninsular War, and was present in the retreat from Burgos in 1812. In 1813 he was at Vittoria, and was afterwards employed in making a military survey of the passes of the Pyrenees. He took part in the campaign of 1814, and was present at Pampeluna, the Nive and Toulouse; and later in the year he served with great distinction on the staff in General Ross's Bladensburg campaign, and took part in the capture of Washington and of Baltimore and the operations before New Orleans. He returned to England in the spring of 1815, in time to take part in the Waterloo campaign as assistant quartermaster-general on Sir T. Picton's staff. As a member of the staff of the duke of Wellington he accompanied the English army to Paris, and remained there during the occupation of the city by the allies. He was still a substantive captain in the 5th West India regiment, though a lieutenant-colonel by brevet, when he went on half-pay in 1818. In 1830 he was elected M.P. for Rye in the Liberal interest; but in the election of 1832 he was an unsuccessful candidate both for that borough and for Westminster. For the latter constituency he was, however, returned in 1833, and, except in the parliament of 1841–1846, he continued to represent it till 1865, when he retired from political life. His parliamentary duties did not, however, interfere with his career as a soldier. In 1835 he went out to Spain in command of the Spanish Legion, recruited in England, and 9600 strong, which served for two years in the Carlist War on the side of the queen of Spain. In spite of great difficulties the legion won great distinction on the battlefields of northern Spain, and Evans was able to say that no prisoners had been taken from it in action, that it had never lost a gun or an equipage, and that it had taken 27 guns and 1100 prisoners from the enemy. He received several Spanish orders, and on his return in 1839 was made a colonel and K.C.B. In 1846 he became major-general; and in 1854, on the breaking-out of the Crimean War, he was made lieutenant-general and appointed to command the 2nd division of the Army of the East. At the battle of the Alma, where he received a severe wound, his quick comprehension of the features of the combat largely contributed to the victory. On the 26th of October he defeated a large Russian force which attacked his position on Mount Inkerman. Illness and fatigue compelled him a few days after this to leave the command of his division in the hands of General Pennefather; but he rose from his sick-bed on the day of the battle of Inkerman, the 5th of November, and, declining to take the command of his division from Pennefather, aided him in the long-protracted struggle by his advice. On his return invalided to England in the following February, Evans received the thanks of the House of Commons. He was made a G.C.B., and the university of Oxford conferred on him the degree of D.C.L. In 1861 he was promoted to the full rank of general. He died in London on the 9th of January 1870.

EVANS, SIR JOHN (1823–1908), English archaeologist and geologist, son of the Rev. Dr A. B. Evans, head master of Market Bosworth grammar school, was born at Britwell Court, Bucks, on the 17th of November 1823. He was for many years head of the extensive paper manufactory of Messrs John Dickinson at Nash Mills, Hemel Hempstead, but was especially distinguished as an antiquary and numismatist. He was the author of three books, standard in their respective departments: *The Coins of the Ancient Britons* (1864); *The Ancient Stone Implements, Weapons and Ornaments of Great Britain* (1872, 2nd ed. 1897); and *The Ancient Bronze Implements, Weapons and Ornaments of Great Britain and Ireland* (1881). He also wrote a number of separate papers on archaeological and geological subjects—notably the papers on "Flint Implements in the Drift" communicated in 1860 and 1862 to *Archaeologia*, the organ of the Society of Antiquaries. Of that society he was president from 1885 to 1892, and he was president of the Numismatic Society from 1874 to the time of his death. He also presided over the Geological Society, 1874–1876; the Anthropological Institute, 1877–1879; the Society of Chemical Industry, 1892–1893; the British Association, 1897–1898; and for twenty years (1878–1898) he was treasurer of the Royal Society. As president of the Society of Antiquaries he was an *ex officio* trustee of the British Museum, and subsequently he became a permanent trustee. His academic honours included honorary degrees from several universities, and he was a corresponding member of the Institut de France. He was created a K.C.B. in 1892. He died at Berkhamsted on the 31st of May 1908.

His eldest son, Arthur John Evans, born in 1851, was educated at Brasenose College, Oxford, and Göttingen. He became fellow of Brasenose and in 1884 keeper of the Ashmolean Museum at Oxford. He travelled in Finland and Lapland in 1873–1874, and in 1875 made a special study of archaeology and ethnology in the Balkan States. In 1893 he began his investigations in Crete, which have resulted in discoveries of the utmost importance concerning the early history of Greece and the eastern Mediterranean (see Aegean Civilization and Crete). He is a member of all the chief archaeological societies in Europe, holds honorary degrees at Oxford, Edinburgh and Dublin, and is a fellow of the Royal Society. His chief publications are: *Cretan Pictographs and Prae-Phoenician Script* (1896); *Further Discoveries of Cretan and Aegean Script* (1898); *The Mycenaean Tree and Pillar Cult* (1901); *Scripta Minoa* (1909 foll.); and reports on the excavations. He also edited with additions Freeman's *History of Sicily*, vol. iv.

EVANS, OLIVER (1755–1819), American mechanician, was born at Newport, Delaware, in 1755. He was apprenticed to a wheelwright, and at the age of twenty-two he invented a machine for making the card-teeth used in carding wool and cotton. In 1780 he became partner with his brothers, who were practical millers, and soon introduced various labour-saving appliances which both cheapened and improved the processes of flour-milling. Turning his attention to the steam engine, he employed steam at a relatively high pressure, and the plans of his invention which he sent over to England in 1787 and in 1794–1795 are said to have been seen by R. Trevithick, whom in that case he anticipated in the adoption of the high-pressure principle. He made use of his engine for driving mill machinery; and in 1803 he constructed a steam dredging machine, which also propelled itself on land. In 1819 a disastrous fire broke out in his factory at Pittsburg, and he did not long survive it, dying at New York on the 21st of April 1819.

EVANSON, EDWARD (1731–1805), English divine, was born on the 21st of April 1731 at Warrington, Lancashire. After graduating at Cambridge (Emmanuel College) and taking holy orders, he officiated for several years as curate at Mitcham. In 1768 he became vicar of South Mimms near Barnet; and in November 1769 he was presented to the rectory of Tewkesbury, with which he held also the vicarage of Longdon in Worcestershire. In the course of his studies he discovered what he thought important variance between the teaching of the Church of England and that of the Bible, and he did not conceal his convictions. In reading the service he altered or omitted phrases which seemed to him untrue, and in reading the Scriptures pointed out errors in the translation. A crisis was brought on by his sermon on the resurrection, preached at Easter 1771; and in November 1773 a prosecution was instituted against him in the consistory court of Gloucester. He was charged with "depraving the public worship of God contained in the liturgy of the Church of England, asserting the same to be superstitious and unchristian, preaching, writing and conversing against the creeds and the divinity of our Saviour, and assuming to himself the power of making arbitrary alterations in his performance of the public worship." A protest was at once signed and published by a large number of his parishioners against the prosecution. The case was dismissed on technical grounds, but appeals were made to the court of arches and the court of delegates. Meanwhile Evanson had made his views generally known by several publications. In 1772 appeared anonymously his *Doctrines of a Trinity and the Incarnation of God, examined upon the Principles of Reason and Common Sense.* This was followed in 1777 by *A Letter to Dr Hurd, Bishop of Worcester, wherein the Importance of the Prophecies of the New Testament and the Nature of the Grand Apostasy predicted in them are particularly and impartially considered.* He also wrote some papers on the Sabbath, which brought him into controversy with Joseph Priestley, who published the whole discussion (1792). In the same year appeared Evanson's work entitled *The Dissonance of the four generally received Evangelists,* to which replies were published by Priestley and David Simpson (1793). Evanson rejected most of the books of the New Testament as forgeries, and of the four gospels he accepted only that of St Luke. In his later years he ministered to a Unitarian congregation at Lympston, Devonshire. In 1802 he published *Reflections upon the State of Religion in Christendom,* in which he attempted to explain and illustrate the mysterious foreshadowings of the Apocalypse. This he considered the most important of his writings. Shortly before his death at Colford, near Crediton, Devonshire, on the 25th of September 1805, he completed his *Second Thoughts on the Trinity,* in reply to a work of the bishop of Gloucester.

His sermons (prefaced by a Life by G. Rogers) were published in two volumes in 1807, and were the occasion of T. Falconer's *Bampton Lectures* in 1811. A narrative of the circumstances which led to the prosecution of Evanson was published by N. Havard, the town-clerk of Tewkesbury, in 1778.

EVANSTON, a city of Cook county, Illinois, U.S.A., on the shore of Lake Michigan, 12 m. N. of Chicago. Pop. (1900) 19,259, of whom 4441 were foreign-born; (1910 U. S. census) 24,978. It is served by the Chicago & North-Western, and the Chicago, Milwaukee & St Paul railways, and by two electric lines. The city is an important residential suburb of Chicago. In 1908 the Evanston public library had 41,430 volumes. In the city are the College of Liberal Arts (1855), the Academy (1860), and the schools of music (1895) and engineering (1908) of Northwestern University, co-educational, chartered in 1851, opened in 1855, the largest school of the Methodist Episcopal Church in America. In 1909–1910 it had productive funds amounting to about $7,500,000, and, including all the allied schools, a faculty of 418 instructors and 4487 students; its schools of medicine (1869), law (1859), pharmacy (1886), commerce (1908) and dentistry (1887) are in Chicago. In 1909 its library had 114,869 volumes and 79,000 pamphlets (exclusive of the libraries of the professional schools in Chicago); and the Garrett Biblical Institute had a library of 25,671 volumes and 4500 pamphlets. The university maintains the Grand Prairie Seminary at Onarga, Iroquois county, and the Elgin Academy at Elgin, Kane county. Enjoying the privileges of the university, though actually independent of it, are the Garrett Biblical Institute (Evanston Theological Seminary), founded in 1855, situated on the university campus, and probably the best-endowed Methodist Episcopal theological seminary in the United States, and affiliated with the Institute, the Norwegian Danish Theological school; and the Swedish Theological Seminary, founded at Galesburg in 1870, removed to Evanston in 1882, and occupying buildings on the university campus until 1907, when it removed to Orrington Avenue and Noyes Street. The Cumnock School of Oratory, at Evanston, also co-operates with the university. By the charter of the university the sale of intoxicating liquors is forbidden within 4 m. of the university campus. The manufacturing importance of the city is slight, but is rapidly increasing. The principal manufactures are wrought iron and steel pipe, bakers' machinery and bricks. In 1905 the value of the factory products was $2,550,529, being an increase of 207·3% since 1900. In Evanston are the publishing offices of the National Woman's Christian Temperance Union. Evanston was incorporated as a town in 1863 and as a village in 1872, and was chartered as a city in 1892. The villages of North Evanston and South Evanston were annexed to Evanston in 1874 and 1892 respectively.

EVANSVILLE, a city and the county-seat of Vanderburg county, Indiana, U.S.A., and a port of entry, on the N. bank of the Ohio river, 200 m. below Louisville, Kentucky—measuring by the windings of the river, which double the direct distance. Pop. (1890) 50,756; (1900) 59,007; (1910 census) 69,647. Of the total population in 1900, 5518 were negroes, 5626 were foreign-born (including 4380 from Germany and 384 from England), and 17,419 were of foreign parentage (both parents foreign-born), and of these 13,910 were of German parentage. Evansville is served by the Evansville & Terre Haute, the Evansville & Indianapolis, the Illinois Central, the Louisville & Nashville, the Louisville, Henderson & St Louis, and the Southern railways, by several interurban electric lines, and by river steamboats. The city is situated on a plateau above the river, and has a number of fine business and public buildings, including the court house and city hall, the Southern Indiana hospital for the insane, the United States marine hospital, and the Willard library and art gallery, containing in 1908 about 30,000 volumes. The city's numerous railway connexions and its situation in a coal-producing region (there are five mines within the city limits) and on the Ohio river, which is navigable nearly all the year, combine to make it the principal commercial and manufacturing centre of Southern Indiana. It is in a tobacco-growing region, is one of the largest hardwood lumber markets in the country, and has an important shipping trade in pork, agricultural products, dried fruits, lime and limestone, flour and tobacco. Among its manufactures in 1905 were flour and grist mill products (value, $2,638,914), furniture ($1,655,246), lumber and timber products ($1,229,533), railway cars ($1,118,376), packed meats ($998,428), woollen and cotton goods, cigars and cigarettes, malt liquors, carriages and wagons, leather and canned goods. The value of the factory products increased from $12,167,524 in 1900 to $19,201,716 in 1905, or 57·8%, and in the latter year Evansville ranked third among the manufacturing cities in the state. The waterworks are owned and operated by the city. First settled about 1812, Evansville was laid out in 1817, and was named in honour of Robert Morgan Evans (1783–1844), one of its founders, who was an officer under General W. H. Harrison in the war of 1812. It soon became a thriving commercial town with an extensive river trade, was incorporated in 1819, and received a city charter in 1847. The completion of the Wabash

& Erie Canal, in 1853, from Evansville to Toledo, Ohio, a distance of 400 m., greatly accelerated the city's growth.

EVARISTUS, fourth pope (*c.* 98–105), was the immediate successor of Clement.

EVARTS, WILLIAM MAXWELL (1818–1901), American lawyer, was born in Boston on the 6th of February 1818. He graduated at Yale in 1837, was admitted to the bar in New York in 1841, and soon took high rank in his profession. In 1860 he was chairman of the New York delegation to the Republican national convention. In 1861 he was an unsuccessful candidate for the United States senatorship from New York. He was chief counsel for President Johnson during the impeachment trial, and from July 1868 until March 1869 he was attorney-general of the United States. In 1872 he was counsel for the United States in the "Alabama" arbitration. During President Hayes's administration (1877–1881) he was secretary of state; and from 1885 to 1891 he was one of the senators from New York. As an orator Senator Evarts stood in the foremost rank, and some of his best speeches were published. He died in New York on the 28th of February 1901.

EVE, the English transcription, through Lat. *Eva* and Gr. Εὔα, of the Hebrew name חַוָּה Ḥavvah, given by Adam to his wife because she was "mother of all living," or perhaps more strictly, "of every group of those connected by female kinship" (see W. R. Smith, *Kinship*, 2nd ed., p. 208), as if Eve were the personification of mother-kinship, just as Adam ("man") is the personification of mankind.

[The abstract meaning "life" (LXX. Ζωή), once favoured by Robertson Smith, is at any rate unsuitable in a popular story. Wellhausen and Nöldeke would compare the Ar. *ḥayyatun*, "serpent," and the former remarks that, if this is right, the Israelites received their first ancestress from the Ḥivvites (Hivites), who were originally the serpent-tribe (*Composition des Hexateuchs*, p. 343; cf. *Reste arabischen Heidentums*, 2nd ed., p. 154). Cheyne, too, assumes a common origin for Ḥavvah and the Ḥivvites.]

Creation of Eve.

[The account of the origin of Eve (Gen. iii. 21-23) runs thus: "And Yahweh-Elohim caused a deep sleep to fall upon the man, and he slept. And he took one of his ribs, and closed up the flesh in its stead, and the rib which Yahweh-Elohim had taken from the man he built up into a woman, and he brought her to the man." Enchanted at the sight, the man now burst out into elevated, rhythmic speech: "This one," he said, "at length is bone of my bone and flesh of my flesh," &c.; to which the narrator adds the comment, "Therefore doth a man forsake his father and his mother, and cleave to his wife, and they become one flesh (body)." Whether this comment implies the existence of the custom of *beena*, marriage (W.R.Smith, *Kinship*, 2nd ed., p. 208), seems doubtful. It is at least equally possible that the expression "his wife" simply reflects the fact that among ordinary Israelites circumstances had quite naturally brought about the prevalence of monogamy.[1] What the narrator gives is not a doctrine of marriage, much less a precept, but an explanation of a simple and natural phenomenon. How is it, he asks, that a man is so irresistibly drawn towards a woman? And he answers: Because the first woman was built up out of a rib of the first man. At the same time it is plain that the already existing tendency towards monogamy must have been powerfully assisted by this presentation of Eve's story as well as by the prophetic descriptions of Yahweh's relation to Israel under the figure of a monogamous union.]

New Testament application.

[The narrator is no rhetorician, and spares us a description of the ideal woman. But we know that, for Adam, his strangely produced wife was a "help (or helper) matching or corresponding to him"; or, as the Authorized Version puts it, "a help meet for him" (ii. 18*b*). This does not, of course, exclude subordination on the part of the woman; what is excluded is that exaggeration of natural subordination which the narrator may have found both in his own and in the neighbouring countries, and which he may have regarded as (together with the pains of parturition) the punishment of the woman's transgression (Gen. iii. 16). His own ideal of woman seems to have made its way in Palestine by slow degrees. An apocryphal book (Tobit viii. 6, 7) seems to contain the only reference to the section till we come to the time of Christ, to whom the comment in Gen. ii. 24 supplies the text for an authoritative prohibition of divorce, which presupposes and sanctifies monogamy (Matt. x. 7, 8; Matt. xix. 5). For other New Testament applications of the story of Eve see 1 Cor. xi. 8, 9 (especially); 2 Cor. xi. 3; 1 Tim. ii. 13, 14; and in general cf. ADAM, and *Ency. Biblica*, "Adam and Eve."]

Imaginative or legendary developments.

[The seeming omissions in the Biblical narrative have been filled up by imaginative Jewish writers.] The earliest source which remains to us is the Book of Jubilees, or Leptogenesis, a Palestinian work (referred by R. H. Charles to the century immediately preceding the Christian era; see APOCALYPTIC LITERATURE). In this book, which was largely used by Christian writers, we find a chronology of the lives of Adam and Eve and the names of their daughters—Avan and Azura.[2] The Targum of Jonathan informs us that Eve was created from the thirteenth rib of Adam's right side, thus taking the view that Adam had a rib more than his descendants. Some of the Jewish legends show clear marks of foreign influence. Thus the notion that the first man was a double being, afterwards separated into the two persons of Adam and Eve (*Berachot*, 61; *Erubin*, 18), may be traced back to Philo (*De mundi opif.* §53; cf. *Quaest. in Gen.* lib. i. §25), who borrows the idea, and almost the words, of the myth related by Aristophanes in the Platonic *Symposium* (189 D, 190 A), which, in extravagant form, explains the passion of love by the legend that male and female originally formed one body.

[A recent critic[3] (F. Schwally) even holds that this notion was originally expressed in the account of the creation of man in Gen. i. 27. This involves a textual emendation, and one must at least admit that the present text is not without difficulty, and that Berossus refers to the existence of primeval monstrous androgynous beings according to Babylonian mythology.] There is an analogous Iranian legend of the true man, which parted into man and woman in the Bundahish[4] (the Parsi Genesis), and an Indian legend, which, according to Spiegel, has presumably an Iranian source.[5]

Course of Jewish and Christian interpretation.

[It has been remarked elsewhere (ADAM, §16) that though the later Jews gathered material for thought very widely, such guidance as they required in theological reflection was mainly derived from Greek culture. What, for instance, was to be made of such a story as that in Gen. ii.-iv.? To "minds trained under the influence of the Jewish Haggada, in which the whole Biblical history is freely intermixed with legendary and parabolic matter," the question as to the literal truth of that story could hardly be formulated. It is otherwise when the Greek leaven begins to work.]

Josephus, in the prologue to his *Archaeology*, reserves the problem of the true meaning of the Mosaic narrative, but does not regard everything as strictly literal. Philo, the great representative of Alexandrian allegory, expressly argues that in the nature of things the trees of life and knowledge cannot be taken otherwise than symbolically. His interpretation of the creation of Eve is, as has been already observed, plainly suggested by a Platonic myth. The longing for reunion which love implants in the divided halves of the original dual man is the source of sensual pleasure (symbolized by the serpent), which in turn is the beginning of all transgression. Eve represents the sensuous or perceptive part of man's nature, Adam the reason. The serpent, therefore, does not venture to attack Adam directly.

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[1] That polygamy had not become morally objectionable is shown by the stories of Lamech, Abraham and Jacob.

[2] See West's authoritative translation in *Pah̆lavi Texts* (Sacred Books of the East).

[3] "Die bibl. Schöpfungsberichte" (*Archiv für Religionswissenschaft*, ix. 171 ff.).

[4] Spiegel, *Erânische Alterthumskunde*, i. 511.

[5] Muir, *Sanscrit Texts*, vol. i. p. 25; cf. Spiegel, vol. i. p. 458.

It is sense which yields to pleasure, and in turn enslaves the reason and destroys its immortal virtue. This exposition, in which the elements of the Bible narrative become mere symbols of the abstract notions of Greek philosophy, and are adapted to Greek conceptions of the origin of evil in the material and sensuous part of man, was adopted into Christian theology by Clement and Origen, notwithstanding its obvious inconsistency with the Pauline anthropology, and the difficulty which its supporters felt in reconciling it with the Christian doctrine of the excellence of the married state (Clemens Alex. *Stromata*, p. 174). These difficulties had more weight with the Western church, which, less devoted to speculative abstractions and more deeply influenced by the Pauline anthropology, refused, especially since Augustine, to reduce Paradise and the fall to the region of pure *intelligibilia*; though a spiritual sense was admitted along with the literal (Aug. *Civ. Dei*, xiii. 21).[1]

The history of Adam and Eve became the basis of anthropological discussions which acquired more than speculative importance from their connexion with the doctrine of original sin and the meaning of the sacrament of baptism. One or two points in Augustinian teaching may be here mentioned as having to do particularly with Eve. The question whether the soul of Eve was derived from Adam or directly infused by the Creator is raised as an element in the great problem of traducianism and creationism (*De Gen. ad lit.* lib. x.). And it is from Augustine that Milton derives the idea that Adam sinned, not from desire for the forbidden fruit, but because love forbade him to dissociate his fate from Eve's (*ibid.* lib. xi. *sub fin.*). Medieval discussion moved mainly in the lines laid down by Augustine. A sufficient sample of the way in which the subject was treated by the schoolmen may be found in the *Summa* of Thomas, pars i. qu. xcii. *De productione mulieris.*

The Reformers, always hostile to allegory, and in this matter especially influenced by the Augustinian anthropology, adhered strictly to the literal interpretation of the history of the Protoplasts, which has continued to be generally identified with Protestant orthodoxy. The disintegration of the confessional doctrine of sin in last century was naturally associated with new theories of the meaning of the biblical narrative; but neither renewed forms of the allegorical interpretation, in which everything is reduced to abstract ideas about reason and sensuality, nor the attempts of Eichhorn and others to extract a kernel of simple history by allowing largely for the influence of poetical form in so early a narrative, have found lasting acceptance. On the other hand, the strict historical interpretation is beset with difficulties which modern interpreters have felt with increasing force, and which there is a growing disposition to solve by adopting in one or other form what is called the *mythical* theory of the narrative. But interpretations pass under this now popular title which have no real claim to be so designated. What is common to the "mythical" interpretations is to find the real value of the narrative, not in the form of the story, but in the thoughts which it embodies. But the story cannot be called a myth in the strict sense of the word, unless we are prepared to place it on one line with the myths of heathenism, produced by the unconscious play of plastic fancy, giving shape to the impressions of natural phenomena on primitive observers. Such a theory does no justice to a narrative which embodies profound truths peculiar to the religion of revelation. Other forms of the so-called mythical interpretation are little more than abstract allegory in a new guise, ignoring the fact that the biblical story does not teach general truths which repeat themselves in every individual, but gives a view of the purpose of man's creation, and of the origin of sin, in connexion with the divine plan of redemption. Among his other services in refutation of the unhistorical rationalism of last century, Kant has the merit of having forcibly recalled attention to the fact that the narrative of Genesis, even if we do not take it literally, must be regarded as presenting a view of the beginnings of the history of the human race (*Muthmasslicher Anfang der Menschengeschichte*, 1786). Those who recognize this fact ought not to call themselves or be called by others adherents of the mythical theory, although they also recognize that in the nature of things the divine truths brought out in the history of the creation and fall could not have been expressed either in the form of literal history or in the shape of abstract metaphysical doctrine; or even although they may hold—as is done by many who accept the narrative as a part of supernatural revelation—that the specific biblical truths which the narrative conveys are presented through the vehicle of a story which, at least in some of its parts, may possibly be shaped by the influence of legends common to the Hebrews with their heathen neighbours. (W. R. S.; [T. K. C.])

EVECTION (Latin for "carrying away"), in astronomy, the largest inequality produced by the action of the sun in the monthly revolution of the moon around the earth. The deviation expressed by it has a maximum amount of about 1° 15′ in either direction. It may be considered as arising from a semi-annual variation in the eccentricity of the moon's orbit and the position of its perigee. It was discovered by Ptolemy.

EVELETH, a city of St Louis county, Minnesota, U.S.A., about 71 m. N.N.W. of Duluth. Pop. (1900) 2752; (1905, state census) 5332, of whom 2975 were foreign-born (1145 Finns, 676 Austrians and 325 Swedes); (1910) 7036. Eveleth is served by the Duluth, Missabe & Northern and the Duluth & Iron Range railways. It lies in the midst of the great red and brown hematite iron-ore deposits of the Mesabi Range—the richest in the Lake Superior district—and the mining and shipping of this ore are its principal industries. The municipality owns and operates the water-works, the water being obtained from Lake Saint Mary, one of a chain of small lakes lying S. of the city. Eveleth was first chartered as a city in 1902.

EVELYN, JOHN (1620–1706), English diarist, was born at Wotton House, near Dorking, Surrey, on the 31st of October 1620. He was the younger son of Richard Evelyn, who owned large estates in the county, and was in 1633 high sheriff of Surrey and Sussex. When John Evelyn was five years old he went to live with his mother's parents at Cliffe, near Lewes. He refused to leave his "too indulgent" grandmother for Eton, and when on her husband's death she married again, the boy went with her to Southover, where he attended the free school of the place. He was admitted to the Middle Temple in February 1637, and in May be became a fellow commoner of Balliol College, Oxford. He left the university without taking a degree, and in 1640 was residing in the Middle Temple. In that year his father died, and in July 1641 he crossed to Holland. He was enrolled as a volunteer in Apsley's company, then encamped before Genep on the Waal, but his commission was apparently complimentary, his military experience being limited to six days of camp life, during which, however, he took his turn at "trailing a pike." He returned in the autumn to find England on the verge of civil war. Evelyn's part in the conflict is best told in his own words:—

> "12th November was the battle of Brentford, surprisingly fought. . . . . I came in with my horse and arms just at the retreat; but was not permitted to stay longer than the 15th by reason of the army marching to Gloucester; which would have left both me and my brothers exposed to ruin, without any advantage to his Majesty . . . and on the 10th [December] returned to Wotton, nobody knowing of my having been in his Majesty's army."

At Wotton he employed himself in improving his brother's property, making a fishpond, an island and other alterations in the gardens. But he found it difficult to avoid taking a side; he was importuned to sign the Covenant, and "finding it impossible to evade doing very unhandsome things," he obtained leave in October 1643 from the king to travel abroad. From this date his *Diary* becomes full and interesting. He travelled in France and visited the cities of Italy, returning in the autumn of 1646 to Paris, where he became intimate with Sir Richard Browne, the English resident at the court of France. In June of the following year he married Browne's daughter and heiress Mary, then a child of not more than twelve years of age. Leaving his wife in the care of her parents, he returned to England to settle his affairs. He visited Charles I. at Hampton Court in 1647, and during the next two years maintained a cipher correspondence with his father-in-law in the royal interest. In 1649 he obtained a pass to return to Paris, but in 1650 paid a short visit to England. The defeat of Charles II. at Worcester in 1651 convinced him that the royalist cause was hopeless, and he decided to return to England. He went in 1652 to Sayes Court at Deptford, a house which Sir Richard Browne had held on a lease from the crown. This had been seized by the parliament, but Evelyn was able to compound with the occupiers for £3500, and after the Restoration his possession was secured. Here his wife joined him, their eldest son, Richard, being born in August 1652. Under the Commonwealth Evelyn amused himself with his favourite occupation of gardening, and made many friends among the scientific inquirers of the time. He was one of the promoters of the scheme for the Royal Society, and in the king's charter in 1662 was nominated a member of its directing council. Meanwhile he had refused employment from the government of the Commonwealth, and had maintained a cipher correspondence with Charles. In 1659 he published an *Apology for the Royal Party*, and in December of that year he vainly tried to persuade Colonel Herbert Morley, then lieutenant of the Tower, to forestall General Monk by declaring for the king. From the Restoration onwards Evelyn enjoyed unbroken court favour till his death in 1706; but he never held any important political office, although he filled many useful and often laborious minor posts. He was commissioner for improving the streets and buildings of London, for examining into the affairs of charitable foundations, commissioner of the Mint, and of foreign plantations. In 1664 he accepted the responsibility for the care of the sick and wounded and the prisoners in the Dutch war. He stuck to his post throughout the plague year, contenting himself with sending his family away to Wotton. He found it impossible to secure sufficient money for the proper discharge of his functions, and in 1688 he was still petitioning for payment of his accounts in this business. Evelyn was secretary of the Royal Society in 1672, and as an enthusiastic promoter of its interests was twice (in 1682 and 1691) offered the presidency. Through his influence Henry Howard, duke of Norfolk, was induced to present the Arundel marbles to the university of Oxford (1667) and the valuable Arundel library to Gresham College (1678). In the reign of James II., during the earl of Clarendon's absence in Ireland, he acted as one of the commissioners of the privy seal. He was seriously alarmed by the king's attacks on the English Church, and refused on two occasions to license the illegal sale of Roman Catholic literature. He concurred in the revolution of 1688, in 1695 was entrusted with the office of treasurer of Greenwich hospital for old sailors, and laid the first stone of the new building on the 30th of June 1696. In 1694 he left Sayes Court to live at Wotton with his brother, whose heir he had become, and whom he actually succeeded in 1699. He spent the rest of his life there, dying on the 27th of February 1706. Evelyn's house at Sayes Court had been let to Captain, afterwards Admiral John Benbow, who was not a "polite" tenant. He sublet it to Peter the Great, who was then visiting the dockyard at Deptford. The tsar did great damage to Evelyn's beautiful gardens, and, it is said, made it one of his amusements to ride in a wheelbarrow along a thick holly hedge planted especially by the owner. The house was subsequently used as a workhouse, and is now almshouses, the grounds having been converted into public gardens by Mr Evelyn in 1886.

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[1] Thus in medieval theology Eve is a type of the church, and her formation from the rib has a mystic reason, inasmuch as blood and water (the sacraments of the church) flowed from the side of Christ on the cross (Thomas, *Summa*, par. i. qu. xcii.).

It will be seen that Evelyn's politics were not of the heroic order. But he was honourable and consistent in his adherence to the monarchical principle throughout his life. With the court of Charles II. he could have had no sympathy, his dignified domestic life and his serious attention to religion standing in the strongest contrast with the profligacy of the royal surroundings. His *Diary* is therefore a valuable chronicle of contemporary events from the standpoint of a moderate politician and a devout adherent of the Church of England. He had none of Pepys's love of gossip, and was devoid of his all-embracing curiosity, as of his diverting frankness of self-revelation. Both were admirable civil servants, and they had a mutual admiration for each other's sterling qualities. Evelyn's *Diary* covers more than half a century (1640–1706) crowded with remarkable events, while Pepys only deals with a few years of Charles II.'s reign.

Evelyn was a generous art patron, and Grinling Gibbons was introduced by him to the notice of Charles II. His domestic affections were very strong. He had six sons, of whom John (1655–1699), the author of some translations, alone reached manhood. He has left a pathetic account of the extraordinary accomplishments of his son Richard, who died before he was six years old, and of a daughter Mary, who lived to be twenty, and probably wrote most of her father's *Mundus muliebris* (1690). Of his two other daughters, Susannah, who married William Draper of Addiscombe, Surrey, survived him.

Evelyn's *Diary* remained in MS. until 1818. It is in a quarto volume containing 700 pages, covering the years between 1641 and 1697, and is continued in a smaller book which brings the narrative down to within three weeks of its author's death. A selection from this was edited by William Bray, with the permission of the Evelyn family, in 1818, under the title of *Memoirs illustrative of the Life and Writings of John Evelyn, comprising his Diary from 1641 to 1705/6, and a Selection of his Familiar Letters*. Other editions followed, the most notable being those of Mr H. B. Wheatley (1879) and Mr Austin Dobson (3 vols., 1906). Evelyn's active mind produced many other works, and although these have been overshadowed by the famous *Diary* they are of considerable interest. They include: *Of Liberty and Servitude* . . . (1649), a translation from the French of François de la Mothe le Vayer, Evelyn's own copy of which contains a note that he was "like to be call'd in question by the Rebells for this booke"; *The State of France, as it stood in the IXth year of . . . Louis XIII.* (1652); *An Essay on the First Book of T. Lucretius Carus de Rerum Natura. Interpreted and made English verse by J. Evelyn* (1656); *The Golden Book of St John Chrysostom, concerning the Education of Children. Translated out of the Greek by J. E.* (printed 1658, dated 1659); *The French Gardener: instructing how to cultivate all sorts of Fruit-trees* . . . (1658), translated from the French of N. de Bonnefons; *A Character of England* . . . (1659), describing the customs of the country as they would appear to a foreign observer, reprinted in *Somers' Tracts* (ed. Scott, 1812), and in the *Harleian Miscellany* (ed. Park, 1813); *The Late News from Brussels unmasked* . . . (1660), in answer to a libellous pamphlet on Charles I. by Marchmont Needham; *Fumifugium, or the inconvenience of the Aer and Smoak of London dissipated* (1661), in which he suggested that sweet-smelling trees should be planted in London to purify the air; *Instructions concerning erecting of a Library* . . . (1661), from the French of Gabriel Naudé; *Tyrannus or the Mode, in a Discourse of Sumptuary Laws* (1661); *Sculptura: or the History and Art of Chalcography and Engraving in Copper* . . . (1662); *Sylva, or a Discourse of Forest Trees* . . . *to which is annexed Pomona* . . . *Also Kalendarium Hortense* . . . (1664); *A Parallel of the Ancient Architecture with the Modern* . . . (1664), from the French of Roland Fréart; *The History of the three late famous Imposters, viz. Padre Ottomano, Mahomed Bei, and Sabatei Sevi* . . . (1669); *Navigation and Commerce* . . . *in which his Majesties title to the Dominion of the Sea is asserted against the Novel and later Pretenders* (1674), which is a preface to a projected history of the Dutch wars undertaken at the request of Charles II., but countermanded on the conclusion of peace; *A Philosophical Discourse of Earth* . . . (1676), a treatise on horticulture, better known by its later title of *Terra*; *The Compleat Gardener* . . . (1693), from the French of J. de la Quintinie; *Numismata* . . . (1697). Some of these were reprinted in *The Miscellaneous Writings of John Evelyn*, edited (1825) by William Upcott. Evelyn's friendship with Mary Blagge, afterwards Mrs Godolphin, is recorded in the diary, when he says he designed "to consecrate her worthy life to posterity." This he effectually did in a little masterpiece of religious biography which remained in MS. in the possession of the Harcourt family until it was edited by Samuel Wilberforce, bishop of Oxford, as the *Life of Mrs Godolphin* (1847), reprinted in the "King's Classics" (1904). The picture of Mistress Blagge's saintly life at court is heightened in interest when read in connexion with the scandalous memoirs of the comte de Gramont, or contemporary political satires on the court. Numerous other papers and letters of Evelyn on scientific subjects and matters of public interest are preserved, a collection of private and official letters and papers (1642–1712) by, or addressed to, Sir Richard Browne and his son-in-law being in the British Museum (*Add. MSS.* 15857 and 15858).

Next to the *Diary* Evelyn's most valuable work is *Sylva*. By the glass factories and iron furnaces the country was being rapidly depleted of wood, while no attempt was being made to replace the damage by planting. Evelyn put in a plea for afforestation, and besides producing a valuable work on arboriculture, he was able to assert in his preface to the king that he had really induced landowners to plant many millions of trees.

EVERDINGEN, ALLART VAN (1621–?1675), Dutch painter and engraver, the son of a government clerk at Alkmaar, was born, it is said, in 1621, and educated, if we believe an old tradition, under Roeland Savery at Utrecht. He wandered in 1645 to Haarlem, where he studied under Peter de Molyn, and finally settled about 1657 at Amsterdam, where he remained till his death. It would be difficult to find a greater contrast than that which is presented by the works of Savery and Everdingen. Savery inherited the gaudy style of the Breughels, which he carried into the 17th century; whilst Everdingen realized the large and effective system of coloured and powerfully shaded landscape which marks the precursors of Rembrandt. It is not easy on this account to believe that Savery was Everdingen's master, while it is quite within the range of probability that he acquired the elements of landscape painting from de Molyn. Pieter de Molyn, by birth a Londoner, lived from 1624 till 1661 in Haarlem. He went periodically on visits to Norway, and his works, though scarce, exhibit a broad and sweeping mode of execution, differing but slightly from that transferred at the opening of the 17th century from Jan van Goyen to Solomon Ruysdael. His etchings have nearly the breadth and effect of those of Everdingen. It is still an open question when de Molyn wielded influence on his clever disciple. Alkmaar, a busy trading place near the Texel, had little of the picturesque for an artist except polders and downs or waves and sky. Accordingly we find Allart at first a painter of coast scenery. But on one of his expeditions he is said to have been cast ashore in Norway, and during the repairs of his ship he visited the inland valleys, and thus gave a new course to his art. In early pieces he cleverly represents the sea in motion under varied, but mostly clouded, aspects of sky. Their general intonation is strong and brown, and effects are rendered in a powerful key, but the execution is much more uniform than that of Jacob Ruysdael. A dark scud lowering on a rolling sea near the walls of Flushing characterizes Everdingen's "Mouth of the Schelde" in the Hermitage at St Petersburg. Storm is the marked feature of sea-pieces in the Staedel or Robartes collections; and a strand with wreckers at the foot of a cliff in the Munich Pinakothek may be a reminiscence of personal adventure in Norway. But the Norwegian coast was studied in calms as well as in gales; and a fine canvas at Munich shows fishermen on a still and sunny day taking herrings to a smoking hut at the foot of a Norwegian crag. The earliest of Everdingen's sea-pieces bears the date of 1640. After 1645 we meet with nothing but representations of inland scenery, and particularly of Norwegian valleys, remarkable alike for wildness and a decisive depth of tone. The master's favourite theme is a fall in a glen, with mournful fringes of pines interspersed with birch, and log-huts at the base of rocks and craggy slopes. The water tumbles over the foreground, so as to entitle the painter to the name of "inventor of cascades." It gives Everdingen his character as a precursor of Jacob Ruysdael in a certain form of landscape composition; but though very skilful in arrangement and clever in effects, Everdingen remains much more simple in execution; he is much less subtle in feeling or varied in touch than his great and incomparable countryman. Five of Everdingen's cascades are in the museum of Copenhagen alone: of these, one is dated 1647, another 1649. In the Hermitage at St Petersburg is a fine example of 1647; another in the Pinakothek at Munich was finished in 1656. English public galleries ignore Everdingen; but one of his best-known masterpieces is the Norwegian glen belonging to Lord Listowel. Of his etchings and drawings there are much larger and more numerous specimens in England than elsewhere. Being a collector as well as an engraver and painter, he brought together a large number of works of all kinds and masters; and the sale of these by his heirs at Amsterdam on the 11th of March 1676 gives an approximate clue to the date of the painter's death.

His two brothers, Jan and Caesar, were both painters. CAESAR VAN EVERDINGEN (1606–1679), mainly known as a portrait painter, enjoyed some vogue during his life, and many of his pictures are to be seen in the museums and private houses of Holland. They show a certain cleverness, but are far from entitling him to rank as a master.

EVEREST, SIR GEORGE (1790–1866), British surveyor and geographer, was the son of Tristram Everest of Gwerndale, Brecknockshire, and was born there on the 4th of July 1790. From school at Marlow he proceeded to the military academy at Woolwich, where he attracted the special notice of the mathematical master, and passed so well in his examinations that he was declared fit for a commission before attaining the necessary age. Having gone to India in 1806 as a cadet in the Bengal Artillery, he was selected by Sir Stamford Raffles to take part in the reconnaissance of Java (1814–1816); and after being employed in various engineering works throughout India, he was appointed in 1818 assistant to Colonel Lambton, the founder of the great trigonometrical survey of that country. In 1823, on Colonel Lambton's death, he succeeded to the post of superintendent of the survey; in 1830 he was appointed by the court of directors of the East India Company surveyor-general of India; and from that date till his retirement from the service in 1843 he continued to discharge the laborious duties of both offices. During the rest of his life he resided in England, where he became fellow of the Royal Society and an active member of several other scientific associations. In 1861 he was made a C.B. and received the honour of knighthood, and in 1862 he was chosen vice-president of the Royal Geographical Society. He died at Greenwich on the 1st of December 1866. The geodetical labours of Sir George Everest rank among the finest achievements of their kind; and more especially his measurement of the meridional arc of India, 11½° in length, is accounted as unrivalled in the annals of the science. In great part the Indian survey is what he made it.

His works are purely professional:—A paper in vol. i. of the *Memoirs of the Royal Astronomical Society*, pointing out a mistake in La Caille's measurement of an arc of the meridian which he had discovered during sick-leave at the Cape of Good Hope; *An account of the measurement of the arc of the meridian between the parallels of 18° 3′ and 24° 7′, being a continuation of the Grand Meridional Arc of India, as detailed by Lieut.-Col. Lambton in the volumes of the Asiatic Society of Calcutta* (London, 1830); *An account of the measurement of two sections of the Meridional Arc of India bounded by the parallels of 18° 3′ 15″, 24° 7′ 11″, and 20° 30′ 48″* (London, 1847).

EVEREST, MOUNT, the highest mountain in the world. It is a peak of the Himalayas situated in Nepal almost precisely on the intersection of the meridian 87 E. long. with the parallel 28 N. lat. Its elevation as at present determined by trigonometrical observation is 29,002 ft., but it is possible that further investigation into the value of refraction at such altitudes will result in placing the summit even higher. It has been confused with a peak to the west of it called Gaurisankar (by Schlagintweit), which is more than 5000 ft. lower; but the observations of Captain Wood from peaks near Khatmandu, in Nepal, and those of the same officer, and of Major Ryder, from the route between Lhasa and the sources of the Brahmaputra in 1904, have definitely fixed the relative position of the two mountain masses, and conclusively proved that there is no higher peak than Everest in the Himalayan system. The peak possesses no distinctive native name and has been called Everest after Sir George Everest (*q.v.*), who completed the trigonometrical survey of the Himalayas in 1841 and first fixed its position and altitude. (T. H. H.*)

EVERETT, ALEXANDER HILL (1790–1847), American author and diplomatist, was born in Boston, Massachusetts, on the 19th of March 1790. He was the son of Rev. Oliver Everett (1753–1802), a Congregational minister in Boston, and the brother of Edward Everett. He graduated at Harvard in 1806, taking the highest honours of his year, though the youngest member of his class. He spent one year as a teacher in Phillips Academy, Exeter, New Hampshire, and then began the study of law in the office of John Quincy Adams. In 1809 Adams was appointed minister to Russia, and Everett accompanied him as his private secretary, remaining attached to the American legation in Russia until 1811. He was secretary of the American legation at The Hague in 1815–1816, and *chargé d'affaires* there from 1818 to 1824. From 1825 to 1829, during the presidency of John Quincy Adams, he was the United States minister to Spain. At that time Spain recognized none of the governments established by her revolted colonies, and Everett became the medium of all communications between the Spanish government and the several nations of Spanish origin which had been established, by successful revolutions, on the other side of the ocean. Everett was a member of the Massachusetts legislature in 1830–1835, was president of Jefferson College in Louisiana in 1842–1844, and was appointed commissioner of the United States to China in 1845, but did not go to that country until the following year, and died on the 29th of May 1847 at Canton, China. Everett, however, is known rather as a man of letters than as a diplomat. In addition to numerous articles, published chiefly in the *North American Review*, of which he was the editor from 1829 to 1835, he wrote: *Europe, or a General Survey of the Political Situation of the Principal Powers, with Conjectures on their Future Prospects* (1822), which attracted considerable attention in Europe and was translated into German, French and Spanish; *New Ideas on Population* (1822); *America, or a General Survey of the Political Situation of the Several Powers of the Western Continent, with Conjectures on their Future Prospects* (1827), which was translated into several European languages; a volume of *Poems* (1845); and *Critical and Miscellaneous Essays* (first series, 1845; second series, 1847).

EVERETT, CHARLES CARROLL (1829–1900), American divine and philosopher, was born on the 19th of June 1829, at Brunswick, Maine. He studied at Bowdoin College, where he graduated in 1850, after which he proceeded to Berlin. Subsequently he took a degree in divinity at the Harvard Divinity School. From 1859 to 1869 he was pastor of the Independent Congregational (Unitarian) church at Bangor, Maine. This charge he resigned to take the Bussey professorship of theology at Harvard University, and, in 1878, became dean of the faculty of theology. Interested in a variety of subjects, he devoted himself chiefly to the philosophy of religion, and published *The Science of Thought* (Boston, 1869; revised 1891). He also wrote *Fichte's Science of Knowledge* (1884); *Poetry, Comedy and Duty* (1888); *Religions before Christianity* (1883); *Ethics for Young People* (1891); *The Gospel of Paul* (1892). He died at Cambridge on the 16th of October 1900.

EVERETT, EDWARD (1794–1865), American statesman and orator, was born in Dorchester, Massachusetts, on the 11th of April 1794. He was the son of Rev. Oliver Everett and the brother of Alexander Hill Everett (*q.v.*). His father died in 1802, and his mother removed to Boston with her family after her husband's death. At seventeen Edward Everett graduated from Harvard College, taking first honours in his class. While at college he was the chief editor of *The Lyceum*, the earliest in the series of college journals published at the American Cambridge. His earlier predilections were for the study of law, but the advice of Joseph Stevens Buckminster, a distinguished preacher in Boston, led him to prepare for the pulpit, and as a preacher he at once distinguished himself. He was called to the ministry of the Brattle Street church (Unitarian) in Boston before he was twenty years old. His sermons attracted wide attention in that community, and he gained a considerable reputation as a theologian and a controversialist by his publication in 1814 of a volume entitled *Defence of Christianity*, written in answer to a work, *The Grounds of Christianity Examined* (1813), by George Bethune English (1787–1828), an adventurer, who, born in Cambridge, Massachusetts, was in turn a student of law and of theology, an editor of a newspaper, and a soldier of fortune in Egypt. Everett's tastes, however, were then, as always, those of a scholar; and in 1815, after a service of little more than a year in the pulpit, he resigned his charge to accept a professorship of Greek literature in Harvard College.

After nearly five years spent in Europe in preparation, he entered with enthusiasm on his duties, and, for five years more, gave a vigorous impulse, not only to the study of Greek, but to all the work of the college. In January 1820 he assumed the charge of the *North American Review*, which now became a quarterly; and he was indefatigable during the four years of his editorship in contributing on a great variety of subjects. From 1825 to 1835 he was a member of the National House of Representatives, supporting generally the administration of President J. Q. Adams and opposing that of Jackson, which succeeded it. He bore a part in almost every important debate, and was a member of the committee of foreign affairs during the whole time of his service in Congress. Everett was a member of nearly all the most important select committees, such as those on the Indian relations of the state of Georgia, the Apportionment Bill, and the Bank of the United States, and drew the report either of the majority or the minority. The report on the congress of Panama, the leading measure of the first session of the Nineteenth Congress, was drawn up by Everett, although he was the youngest member of the committee and had just entered Congress. He led the unsuccessful opposition to the Indian policy of General Jackson (the removal of the Cherokee and other Indians, without their consent, from lands guaranteed to them by treaty).

In 1835 he was elected governor of Massachusetts. He brought to the duties of the office the untiring diligence which was the characteristic of his public life. We can only allude to a few of the measures which received his efficient support, *e.g.* the establishment of the board of education (the first of such boards in the United States), the scientific surveys of the state (the first of such public surveys), the criminal law commission, and the preservation of a sound currency during the panic of 1837.

Everett filled the office of governor for four years, and was then defeated by a single vote, out of more than one hundred thousand. The election is of interest historically as being the first important American election where the issue turned on the question of the prohibition of the retail sale of intoxicating liquors. In the following spring he made a visit with his family to Europe. In 1841, while residing in Florence, he was named United States minister to Great Britain, and arrived in London to enter upon the duties of his mission at the close of that year. Great questions were at that time open between the two countries—the north-eastern boundary, the affair of M'Leod, the seizure of American vessels on the coast of Africa, in the course of a few months the affair of the "Creole," to which was soon added the Oregon question. His position was more difficult by reason of the frequent changes that took place in the department at home, which, in the course of four years, was occupied successively by Messrs Webster, Legaré, Upshur, Calhoun and Buchanan. From all these gentlemen Everett received marks of approbation and confidence.

By the institution of the special mission of Lord Ashburton, however, the direct negotiations between the two governments were, about the time of Everett's arrival in London, transferred to Washington, though much business was transacted at the American legation in London.

Immediately after the accession of Polk to the presidency Everett was recalled. From January 1846 to 1849, as the successor of Josiah Quincy, he was president of Harvard College. On the death, in October 1852, of his friend Daniel Webster, to whom he had always been closely attached, and of whom he was always a confidential adviser, he succeeded him as secretary of state, which post he held for the remaining months of Fillmore's administration, leaving it to go into the Senate in 1853, as one of the representatives of Massachusetts. Under the work of the long session of 1853–1854 his health gave way. In May 1854 he resigned his seat, on the orders of his physician, and retired to what was called private life.

But, as it proved, the remaining ten years of his life most widely established his reputation and influence throughout America. As early as 1820 he had established a reputation as an orator, such as few men in later days have enjoyed. He was frequently invited to deliver an "oration" on some topic of historical or other interest. With him these "orations," instead of being the ephemeral entertainments of an hour, became careful studies of some important theme. Eager to avert, if possible, the impending conflict of arms between the North and South, Everett prepared an "oration" on George Washington, which he delivered in every part of America. In this way, too, he raised more than one hundred thousand dollars, for the purchase of the old home of Washington at Mount Vernon. Everett also prepared for the *Encyclopaedia Britannica* a biographical sketch of Washington, which was published separately in 1860. In 1860 Everett was the candidate of the short-lived Constitutional-Union party for the vice-presidency, on the ticket with John Bell (*q.v.*), but received only 39 electoral votes. During the Civil War he zealously supported the national government and was called upon in every quarter to speak at public meetings. He delivered the last of his great orations at Gettysburg, after the battle, on the consecration of the national cemetery there. On the 9th of January 1865 he spoke at a public meeting in Boston to raise funds for the southern poor in Savannah. At that meeting he caught cold, and the immediate result was his death on the 15th of January 1865.

In Everett's life and career was a combination of the results of diligent training, unflinching industry, delicate literary tastes and unequalled acquaintance with modern international politics. This combination made him in America an entirely exceptional person. He was never loved by the political managers; he was always enthusiastically received by assemblies of the people. He would have said himself that the most eager wish of his life had been for the higher education of his countrymen. His orations have been collected in four volumes (1850–1859). A work on international law, on which he was engaged at his death, was never finished. Allibone records 84 titles of his books and published addresses. (E. E. H.)

EVERETT, a city of Middlesex county, Massachusetts, U.S.A., adjoining Chelsea and 3 m. N. of Boston, of which it is a residential suburb. Pop. (1880) 4159; (1890) 11,068; (1900) 24,336, of whom 6882 were foreign-born; (1910 census) 33,484. It covers an area of about 3 sq. m. and is served by the Boston & Maine railway and by interurban electric lines. Everett has the Frederick E. Parlin memorial library (1878), the Shute memorial library (1898), the Whidden memorial hospital and Woodlawn cemetery (176 acres). The principal manufactures are coke, chemicals and boots and shoes; among others are iron and structural steel. According to the U.S. Census of Manufactures (1905), "the coke industry in Everett is unique, inasmuch as illuminating gas is the primary product and coke really a by-product, while the coal used is brought from mines located in Nova Scotia." The value of the city's total factory product increased from $4,437,180 in 1900 to $6,135,650 in 1905 or 38·3%. Everett was first settled about 1630, remaining a part of Malden (and being known as South Malden) until 1870, when it was incorporated as a township. It was chartered as a city in 1892.

EVERETT, a city, a sub-port of entry, and the county-seat of Snohomish county, Washington, U.S.A., on Puget Sound, at the mouth of the Snohomish river, about 35 m. N. of Seattle. Pop. (1900) 7838; (1910 U. S. census) 24,814. The city is served by the Northern Pacific and the Great Northern railways, being the western terminus of the latter's main transcontinental line, by interurban electric railway, and by several lines of Sound and coasting freight and passenger steamboats. Everett has a fine harbour with several large iron piers. Among its principal buildings are a Carnegie library, a Y.M.C.A. building and two hospitals. The buildings of the Pacific College were erected here by the United Norwegian Lutheran Church in 1908. The city is in a rich lumbering, gardening, farming, and copper-, gold- and silver-mining district. There is a U.S. assayer's office here, and there are extensive shipyards, a large paper mill, iron works, and, just outside the city limits, the smelters of the American Smelters Securities Company, in connexion with which is one of the two plants in the United States for saving arsenic from smelter fumes. Lumber interests, however, are of most importance, and here are some of the largest lumber plants in the Pacific Northwest. Red-cedar shingles are an important product. Everett was settled in 1891 and was incorporated in 1893. Its rapid growth is due to its favourable situation as a commercial port, its transportation facilities, and its nearness to extensive forests whence the material for its chief industries is obtained.

EVERGLADES, an American lake, about 8000 sq. m. in area, in which are numerous half-submerged islands; situated in the southern part of Florida, U.S.A., in Lee, De Soto, Dade and St Lucie counties. West of it is the Big Cypress Swamp. The floor of the lake is a limestone basin, extending from Lake Okechobee in the N. to the extreme S. part of the state, and the lake varies in depth from 1 to 12 ft., its water being pure and clear. The surface is above tide level, and the lake is enclosed, probably on all sides, within an outcropping limestone rim, averaging about 10 ft. above mean low tide, and approaching much nearer to the Atlantic on the E. than to the gulf on the W. There are several small outlets, such as the Miami river and the New river on the E. and the Shark river on the S.W., but no streams empty into the Everglades, and the water-supply is furnished by springs and precipitation. There is a general south-easterly movement of the water. The soil of the islands is very fertile and is subject to frequent inundations, but gradually the water area is being replaced by land. The vegetation is luxuriant, the live oak, wild lemon, wild orange, cucumber, papaw, custard apple and wild rubber trees being among the indigenous species; there are, besides, many varieties of wild flowers, the orchids being especially noteworthy. The fauna is also varied; the otter, alligator and crocodile are found, also the deer and panther, and among the native birds are the ibis, egret, heron and limpkin. There are two seasons, wet and dry, but the climate is equable.

Systematic exploration has been prevented by the dense growth of saw grass (*Cladium effusum*), a kind of sedge, with sharp, saw-toothed leaves, which grows everywhere on the muck-covered rock basin and extends several feet above the shallow water. The first white man to enter the region was Escalente de Fontenada, a Spanish captive of an Indian chief, who named the lake Laguno del Espiritu Santo and the islands Cayos del Espiritu Santo. Between 1841 and 1856 various United States military forces penetrated the Everglades for the purpose of attacking and driving out the Seminoles, who took refuge here. The most important explorations during the later years of the 19th century were those of Major Archie P. Williams in 1883, James E. Ingraham in 1892 and Hugh L. Willoughby in 1897. The Seminole Indians were in 1909 practically the only inhabitants. In 1850 under the "Arkansas Bill," or Swamp and Overflow Act, practically all of the Everglades, which the state had been urging the federal government to drain and reclaim, were turned over to the state for that purpose, with the provision that all proceeds from such lands be applied to their reclamation. A board of trustees for the Internal Improvement Fund, created in 1855 and having as members *ex officio* the governor, comptroller, treasurer, attorney-general and commissioner-general, sold and allowed to railway companies much of the grant. Between 1881 and 1896 a private company owning 4,000,000 acres of the Everglades attempted to dig a canal from Lake Okechobee through Lake Hicpochee and along the Caloosahatchee river to the Gulf of Mexico; the canal was closed in 1902 by overflows. Six canals were begun under state control in 1905 from the lake to the Atlantic, the northernmost at Jensen, the southernmost at Ft. Lauderdale; the total cost, estimated at $1,035,000 for the reclamation of 12,500 sq. m., is raised by a drainage tax (not to exceed 10 cents per acre) levied by the trustees of the Internal Improvement Fund and Board of Drainage commissioners. The small area reclaimed prior to that year (1905) was found very fertile and particularly adapted to raising sugar-cane, oranges and garden truck.

See Hugh L. Willoughby's *Across the Everglades* (Philadelphia, 1898), and especially an article "The Everglades of Florida" by Edwin A. Dix and John M. MacGonigle, in the *Century Magazine* for February 1905.

EVERGREEN, a general term applied to plants which are always in leaf, as contrasted with deciduous trees which are bare for some part of the year (see HORTICULTURE). In temperate or colder zones where a season favourable to vegetation is succeeded by an unfavourable or winter season, leaves of evergreens must be protected from the frost and cold drying winds, and are therefore tougher or more leathery in texture than those of deciduous trees, and frequently, as in pines, firs and other conifers, are needle-like, thus exposing a much smaller surface to the drying action of cold winds. The number of seasons for which the leaves last varies in different plants; every season some of the older leaves fall, while new ones are regularly produced. The common English bramble is practically evergreen, the leaves lasting through winter and until the new leaves are developed next spring. In privet also the leaves fall after the production of new ones in the next year. In other cases the leaves last several years, as in conifers, and may sometimes be found on eleven-year-old shoots.

EVERLASTING, or IMMORTELLE, a plant belonging to the division *Tubuliflorae* of the natural order Compositae, known botanically as *Helichrysum orientale.* It is a native of North Africa, Crete, and the parts of Asia bordering on the Mediterranean; and it is cultivated in many parts of Europe. It first became known in Europe about the year 1629, and has been cultivated since 1815. In common with several other plants of the same group, known as "everlastings," the immortelle plant possesses a large involucre of dry scale-like or scarious bracts, which preserve their appearance when dried, provided the plant be gathered in proper condition. The chief supplies of *Helichrysum orientale* come from lower Provence, where it is cultivated in large quantities on the ground sloping to the Mediterranean, in positions well exposed to the sun, and usually in plots surrounded by dry stone walls. The finest flowers are grown on the slopes of Bandols and Ciotat, where the plant begins to flower in June. It requires a light sandy or stony soil, and is very readily injured by rain or heavy dews. It can be propagated in quantity by means of offsets from the older stems. The flowering stems are gathered in June, when the bracts are fully developed, all the fully-expanded and immature flowers being pulled off and rejected. A well-managed plantation is productive for eight or ten years. The plant is tufted in its growth, each plant producing 60 or 70 stems, while each stem produces an average of 20 flowers. About 400 such stems weigh a kilogramme. A hectare of ground will produce 40,000 plants, bearing from 2,400,000 to 2,800,000 stems, and weighing from $5\frac{1}{2}$ to $6\frac{1}{2}$ tons, or from 2 to 3 tons per acre. The colour of the bracts is a deep yellow. The natural flowers are commonly used for garlands for the dead, or plants dyed black are mixed with the yellow ones. The plant is also dyed green or orange-red, and thus employed for bouquets or other ornamental purposes.

Other species of *Helichrysum* and species of allied genera with scarious heads of flowers are also known as "everlastings." One of the best known is the Australian species *H. bracteatum*, with several varieties, including double forms, of different colours; *H. vestitum* (Cape of Good Hope) has white satiny heads. Others are species of *Helipterum* (West Australia and South Africa), *Ammobium* and *Waitzia* (Australia) and *Xeranthemum* (south Europe). Several members of the natural order Amarantaceae have also "everlasting" flowers; such are *Gomphrena globosa*, with rounded or oval heads of white, orange, rose or violet, scarious bracts, and *Celosia pyramidalis*, with its elegant, loose, pyramidal inflorescences. Frequently these everlastings are mixed with bleached grasses, as *Lagurus ovatus*, *Briza maxima*, *Bromus brizaeformis*, or with the leaves of the Cape silver tree (*Leucadendron argenteum*), to form bouquets or ornamental groups.

EVERSLEY, CHARLES SHAW LEFEVRE, VISCOUNT (1794–1888), speaker of the British House of Commons, eldest son of Mr Charles Shaw (who assumed his wife's name of Lefevre in addition to his own on his marriage), was born in London on the 22nd of February 1794, and educated at Winchester and at Trinity College, Cambridge. He was called to the bar in 1819, and though a diligent student was also a keen sportsman. Marrying a daughter of Mr Samuel Whitbread, whose wife was the sister of Earl Grey, afterwards premier, he thus became connected with two influential political families, and in 1830 he entered the House of Commons as member for Downton, in the Liberal interest. In 1831 he was returned, after a severe contest, as one of the county members for Hampshire, in which he resided; and after the passing of the Reform Act of 1832 he was elected for the Northern Division of the county. For some years Mr Shaw Lefevre was chairman of a committee on petitions for private bills. In 1835 he was chairman of a committee on agricultural distress, but as his report was not accepted by the House, he published it as a pamphlet addressed to his constituents. He acquired a high reputation in the House of Commons for his judicial fairness, combined with singular tact and courtesy, and when Mr James Abercromby retired in 1839, he was nominated as the Liberal candidate for the chair. The Conservatives put forward Henry Goulburn, but Mr Shaw Lefevre was elected by 317 votes to 299. The period was one of fierce party conflict, and the debates were frequently very acrimonious; but the dignity, temper and firmness of the new speaker were never at fault. In 1857 he had served longer than any of his predecessors, except the celebrated Arthur Onslow (1691–1768), who was speaker for more than 33 years in five successive parliaments. Retiring on a pension, he was raised to the peerage as Viscount Eversley of Heckfield, in the county of Southampton. His appearances in the House of Lords were very infrequent, but in his own county he was active in the public service. From 1859 he was an ecclesiastical commissioner, and he was also appointed a trustee of the British Museum. He died on the 28th of December 1888, the viscountcy becoming extinct.

His younger brother, Sir JOHN GEORGE SHAW LEFEVRE (1797–1879), who was senior wrangler at Cambridge in 1818, had a long and distinguished career as a public official. He was under-secretary for the colonies, and had much to do with the introduction of the new poor law in 1834, and with the foundation of the colony of South Australia; then having served on several important commissions he was made clerk of the parliaments in 1855, and in the same year became one of the first civil service commissioners. He helped to found the university of London, of which he was vice-chancellor for twenty years, and also the Athenaeum Club. He died on the 20th of August 1879.

The latter's son, GEORGE JOHN SHAW LEFEVRE (b. 1832), was created Baron Eversley in 1906, in recognition of long and prominent services to the Liberal party. He had filled the following offices:—civil lord of the admiralty, 1856; secretary to the board of trade, 1869–1871; under-secretary, home office, 1871; secretary to the admiralty, 1871–1874; first commissioner of works, 1881–1883; postmaster-general, 1883–1884; first commissioner of works, 1892–1893; president of local government board, 1894–1895; chairman of royal commission on agriculture, 1893–1896.

EVESHAM, a market-town and municipal borough in the Evesham parliamentary division of Worcestershire, England, 107 m. W.N.W. of London by the Great Western railway, and 15 m. S.E. by E. of Worcester, with a station on the Redditch-Ashchurch branch of the Midland railway. Pop. (1901) 7101. It lies on the right (north) bank of the Avon, in the rich and beautiful Vale of Evesham. The district is devoted to market-gardening and orchards, and the trade of the town is mainly agricultural. Evesham is a place of considerable antiquity, a Benedictine house having been founded here by St Egwin in the 8th century. It became a wealthy abbey, but was almost wholly destroyed at the Dissolution. The churchyard, however, is entered by a Norman gateway, and there survives also a magnificent isolated bell-tower dating from 1533, of the best ornate Perpendicular workmanship. The abbey walls surround the churchyard, but almost the only other remnant is a single Decorated arch. Close to the bell-tower, however, are the two parish churches of St Lawrence and of All Saints, the former of the 16th century, the latter containing Early English work, and the ornate chapel of Abbot Lichfield, who erected the bell-tower. Other buildings include an Elizabethan town hall, the grammar school, founded by Abbot Lichfield, and the picturesque almonry. The borough includes the parish of Bengeworth St Peter, on the left bank of the river. Evesham is governed by a mayor, 4 aldermen and 12 councillors. Area, 2265 acres.

Evesham (*Homme*, *Ethomme*) grew up around the Benedictine abbey, and had evidently become of some importance as a trading centre in 1055, when Edward the Confessor gave it a market and the privileges of a commercial town. It is uncertain when the town first became a borough, but the Domesday statement that the men paid 20s. may indicate the existence of a more or less organized body of tradesmen. Before 1482 the burgesses were holding the town at a fee farm rent of twenty marks, but the abbot still had practical control of the town, and his steward presided over the court at which the bailiffs were chosen. After the Dissolution the manor with the markets and fairs and other privileges was granted to Sir Philip Hoby, who increased his power over the town by persuading the burgesses to agree that, after they had nominated six candidates for the office of bailiff, the steward of the court instructed by him should indicate the two to be chosen. This privilege was contested by Queen Elizabeth, but when the case was taken before the court of the exchequer it was decided in favour of Sir Philip's heir, Sir Edward Hoby. In 1604 James I. granted the burgesses their first charter, but in the following year, by a second charter, he incorporated Evesham with the village of Bengeworth, and granted that the borough should be governed by a mayor and seven aldermen, to whom he gave the power of holding markets and fairs and several other privileges which had formerly belonged to the lord of the manor. Evesham received two later charters, but in 1688 that of 1605 was restored and still remains the governing charter of the borough. Evesham returned two members to parliament in 1295 and again in 1337, after which date the privilege lapsed until 1604. Its two members were reduced to one by the act of 1867, and the borough was disfranchised in 1885.

Evesham gave its name to the famous battle, fought on the 4th of August 1265, between the forces of Simon de Montfort, earl of Leicester, and the royalist army under Prince Edward. After a masterly campaign, in which the prince had succeeded in defeating Leicester in the valleys of the Severn and Usk, and had destroyed the forces of the younger Montfort at Kenilworth before he could effect a junction with the main body, the royalist forces approached Evesham in the morning of the 4th of August in time to intercept Leicester's march towards Kenilworth. Caught in the bend of the river Avon by the converging columns, and surrounded on all sides, the old earl attempted to cut his way out of the town to the northward. At first the fury of his assault forced back the superior numbers of the prince; but Simon's Welsh levies melted away and his enemies closed the last avenue of escape. The final struggle took place on Green Hill, a little to the north-west of the town, where the devoted friends of de Montfort formed a ring round their leader, and died with him. The spot is marked with an obelisk.

EVIDENCE (Lat. *evidentia*, *evideri*, to appear clearly), a term which may be defined briefly as denoting the facts presented to the mind of a person for the purpose of enabling him to decide a disputed question. Evidence in the widest sense includes all such facts, and reference may be made to the article Logic for the science or art of dealing with the proper way of drawing correct conclusions and the nature of proof. In a narrower sense, however, evidence includes in English law only such facts as are allowed to be so presented in the course of judicial proceedings. Thus we say that a fact is not evidence, meaning thereby that it is not admissible as evidence in accordance with the rules of English law. The law of legal evidence is part of the law of procedure. It determines the kinds of evidence which may be produced in judicial proceedings, and regulates the mode in which, and the conditions under which, evidence may be produced and tested.

History.

The English law of evidence is of comparatively modern growth. It enshrines certain maxims, some derived from Roman law, some invented by Coke, who, as J. B. Thayer says, "spawned Latin maxims freely." But for the most part it was built up by English judges in the course of the 18th century, and consists of this judge-made law, as modified by statutory enactments of the 19th century. Early Teutonic procedure knew nothing of evidence in the modern sense, just as it knew nothing of trials in the modern sense. What it knew was "proofs." There were two modes of proof, ordeals and oaths. Both were appeals to the supernatural. The judicial combat was a bilateral ordeal. Proof followed, instead of preceding, judgment. A judgment of the court, called by German writers the *Beweisurteil*, and by M. M. Bigelow the "medial judgment," awarded that one of the two litigants must prove his case, by his body in battle, or by a one-sided ordeal, or by an oath with oath-helpers, or by the oaths of witnesses. The court had no desire to hear or weigh conflicting testimony. To do so would have been to exercise critical faculties, which the court did not possess, and the exercise of which would have been foreign to the whole spirit of the age. The litigant upon whom the burden of furnishing proof was imposed had a certain task to perform. If he performed it, he won; if he failed, he lost. The number of oath-helpers varied in different cases, and was determined by the law or by the court. They were probably, at the outset, kinsmen, who would have had to take up the blood-feud. At a later stage they became witnesses to character. In the cases, comparatively rare, where the oaths of witnesses were admitted as proof, their oaths differed materially from the sworn testimony of modern courts. As a rule no one could testify to a fact unless, when the fact happened, he was solemnly "taken to witness." Then, when the witness was adduced, he came merely to swear to a set formula. He did not make a promissory oath to answer questions truly. He merely made an assertory oath in a prescribed form.

In the course of the 12th and 13th centuries the old formal accusatory procedure began to break down, and to be superseded by another form of procedure known as *inquisitio*, inquest, or *enquête*. Its decay was hastened by the decree of the fourth Lateran Council in 1215, which forbade ecclesiastics to take part in ordeals. The Norman administrative system introduced into England by the Conquest was familiar with a method of ascertaining and determining facts by means of a verdict, return or finding made on oath by a body of men drawn from the locality. The system may be traced to Carolingian, and even earlier, sources. Henry II., by instituting the grand assize and the four petty assizes, placed at the disposal of litigants in certain actions the opportunity of giving proof by the verdict of a sworn inquest of neighbours, proof "by the country." The system was gradually extended to other cases, criminal as well as civil. The verdict given was that of persons having a general, but not necessarily a particular, acquaintance with the persons, places and facts to which the inquiry related. It was, in fact, a finding by local popular opinion. Had the finding of such an inquest been treated as final and conclusive in criminal cases, English criminal procedure might, like the continental inquisition, the French *enquête*, have taken the path which, in the forcible language of Fortescue (*De laudibus*, &c.) "leads to hell" (*semita ipsa est ad gehennam*). Fortunately English criminal procedure took a different course. The spirit of the old accusatory procedure was applied to the new procedure by inquest. In serious cases the words of the jurors, the accusing jurors, were treated not as testimony, but as accusation, the new indictment was treated as corresponding to the old appeal, and the preliminary finding by the accusing jury had to be supplemented by the verdict of another jury. In course of time the second jury were required to base their findings not on their own knowledge, but on evidence submitted to them. Thus the modern system of inquiry by grand jury and trial by petty jury was gradually developed.

A few words may here be said about the parallel development of criminal procedure on the continent of Europe. The tendency in the 12th and 13th centuries to abolish the old formal methods of procedure, and to give the new procedure the name of inquisition or inquest, was not peculiar to England. Elsewhere the old procedure was breaking down at the same time, and for similar reasons. It was the great pope Innocent III., the pope of the fourth Lateran Council, who introduced the new inquisitorial procedure into the canon law. The procedure was applied to cases of heresy, and, as so applied, especially by the Dominicans, speedily assumed the features which made it infamous. "Every safeguard of innocence was abolished or disregarded; torture was freely used. Everything seems to have been done to secure a conviction." Yet, in spite of its monstrous defects, the inquisitorial procedure of the ecclesiastical courts, secret in its methods, unfair to the accused, having torture as an integral element, gradually forced its way into the temporal courts, and may almost be said to have been adopted by the common law of western Europe. In connexion with this inquisitorial procedure continental jurists elaborated a theory of evidence, or judicial proofs, which formed the subject of an extensive literature. Under the rules thus evolved full proof (*plena probatio*) was essential for conviction, in the absence of confession, and the standard of full proof was fixed so high that it was in most cases unattainable. It therefore became material to obtain confession by some means or other. The most effective means was torture, and thus torture became an essential feature in criminal procedure. The rules of evidence attempted to graduate the weight to be attached to different kinds of testimony and almost to estimate that weight in numerical terms. "Le parlement de Toulouse," said Voltaire, "a un usage très singulier dans les preuves par témoins. On admet ailleurs des demi-preuves, . . . mais à Toulouse on admet des quarts et des huitièmes de preuves." Modern continental procedure, as embodied in the most recent codes, has removed the worst features of inquisitorial procedure, and has shaken itself free from the trammels imposed by the old theory and technical rules of proof. But in this, as in other branches of law, France seems to have paid the penalty for having been first in the field with codification by lagging behind in material reforms. The French Code of Criminal Procedure was largely based on Colbert's Ordonnance of 1670, and though embodying some reforms, and since amended on certain points, still retains some of the features of the unreformed procedure which was condemned in the 18th century by Voltaire and the *philosophes.* Military procedure is in the rear of civil procedure, and the trial of Captain Dreyfus at Rennes in 1899 presented some interesting archaisms. Among these were the weight attached to the rank and position of witnesses as compared with the intrinsic character of their evidence, and the extraordinary importance attributed to confession even when made under suspicious circumstances and supported by flimsy evidence.

The history of criminal procedure in England has been traced by Sir James Stephen. The modern rules and practice as to evidence and witnesses in the common law courts, both in civil and in criminal cases, appear to have taken shape in the course of the 18th century. The first systematic treatise on the English law of evidence appears to have been written by Chief Baron Gilbert, who died in 1726, but whose *Law of Evidence* was not published until 1761. In writing it he is said to have been much influenced by Locke.[1] It is highly praised by Blackstone as "a work which it is impossible to abstract or abridge without losing some beauty and destroying the charm of the whole"; but Bentham, who rarely agrees with Blackstone, speaks of it as running throughout "in the same strain of anility, garrulity, narrow-mindedness, absurdity, perpetual misrepresentation and indefatigable self-contradiction." In any case it remained the standard authority on the law of evidence throughout the remainder of the 18th century. Bentham wrote his *Rationale of Judicial Evidence, specially applied to English Practice,* at various times between the years 1802 and 1812. By this time he had lost the nervous and simple style of his youth, and required an editor to make him readable. His great interpreter, Dumont, condensed his views on evidence into the *Traité des preuves judiciaires*, which was published in 1823. The manuscript of the *Rationale* was edited for English reading, and to a great extent rewritten, by J. S. Mill, and was published in five volumes in 1827. The book had a great effect both in England and on the continent. The English version, though crabbed and artificial in style, and unmeasured in its invective, is a storehouse of comments and criticisms on the principles of evidence and the practice of the courts, which are always shrewd and often profound. Bentham examined the practice of the courts by the light of practical utility. Starting from the principle that the object of judicial evidence is the discovery of truth, he condemned the rules which excluded some of the best sources of evidence. The most characteristic feature of the common-law rules of evidence was, as Bentham pointed out, and, indeed, still is, their exclusionary character. They excluded and prohibited the use of certain kinds of evidence which would be used in ordinary inquiries. In particular, they disqualified certain classes of witnesses on the ground of interest in the subject-matter of the inquiry, instead of treating the interest of the witness as a matter affecting his credibility. It was against this confusion between competency and credibility that Bentham directed his principal attack. He also attacked the system of paper evidence, evidence by means of affidavits instead of by oral testimony in court, which prevailed in the court of chancery, and in ecclesiastical courts. Subsequent legislation has endorsed his criticisms. The Judicature Acts have reduced the use of affidavits in chancery proceedings within reasonable limits. A series of acts of parliament have removed, step by step, almost all the disqualifications which formerly made certain witnesses incompetent to testify.

Before Bentham's work appeared, an act of 1814 had removed the incompetency of ratepayers as witnesses in certain cases relating to parishes. The Civil Procedure Act 1833 enacted that a witness should not be objected to as incompetent, solely on the ground that the verdict or judgment would be admissible in evidence for or against him. An act of 1840 removed some doubts as to the competency of ratepayers to give evidence in matters relating to their parish. The Evidence Act 1843 enacted broadly that witnesses should not be excluded from giving evidence by reason of incapacity from crime or interest. The Evidence Act 1851 made parties to legal proceedings admissible witnesses subject to a proviso that "nothing herein contained shall render any person who in any criminal proceeding is charged with the commission of any indictable offence, or any offence punishable on summary conviction, competent or compellable to give evidence for or against himself or herself, or shall render any person compellable to answer any question tending to criminate himself or herself, or shall in any criminal proceeding render any husband competent or compellable to give evidence for or against his wife, or any wife competent or compellable to give evidence for or against her husband." The Evidence (Scotland) Act 1853 made a similar provision for Scotland. The Evidence Amendment Act 1853 made the husbands and wives of parties admissible witnesses, except that husbands and wives could not give evidence for or against each other in criminal proceedings or in proceedings for adultery, and could not be compelled to disclose communications made to each other during marriage. Under the Matrimonial Causes Act 1857 the petitioner can be examined and cross-examined on oath at the hearing, but is not bound to answer any question tending to show that he or she has been guilty of adultery. Under the Matrimonial Causes Act 1859, on a wife's petition for dissolution of marriage on the ground of adultery coupled with cruelty or desertion, husband and wife are competent and compellable to give evidence as to the cruelty or desertion. The Crown Suits &c. Act 1865 declared that revenue proceedings were not to be treated as criminal proceedings for the purposes of the acts of 1851 and 1853. The Evidence Further Amendment Act 1869 declared that parties to actions for breach of promise of marriage were competent to give evidence in the action, subject to a proviso that the plaintiff should not recover unless his or her testimony was corroborated by some other material evidence. It also made the parties to proceedings instituted in consequence of adultery, and their husbands and wives, competent to give evidence, but a witness in any such proceeding, whether a party or not, is not to be liable to be asked or bound to answer any question tending to show that he or she has been guilty of adultery, unless the witness has already given evidence in the same proceeding in disproof of the alleged adultery. There are similar provisions applying to Scotland in the Conjugal Rights (Scotland) Amendment Act 1861, and the Evidence Further Amendment (Scotland) Act 1874. The Evidence Act 1877 enacts that "on the trial of any indictment or other proceeding for the non-repair of any public highway or bridge, or for a nuisance to any public highway, river, or bridge, and of any other indictment or proceeding instituted for the purpose of trying or enforcing a civil right only, every defendant to such indictment or proceeding, and the wife or husband of any such defendant shall be admissible witnesses and compellable to give evidence." From 1872 onwards numerous enactments were passed making persons charged with particular offences, and their husbands and wives, competent witnesses. The language and effect of these enactments were not always the same, but the insertion of some provision to this effect in an act creating a new offence, especially if it was punishable by summary proceedings, gradually became almost a common form in legislation. In the year 1874 a bill to generalize these particular provisions, and to make the evidence of persons charged with criminal offences admissible in all cases was introduced by Mr Gladstone's government, and was passed by the standing committee of the House of Commons. During the next fourteen years bills for the same purpose were repeatedly introduced, either by the government of the day, or by Lord Bramwell as an independent member of the House of Lords. Finally the Criminal Evidence Act 1898, introduced by Lord Halsbury, has enacted in general terms that "every person charged with an offence, and the wife or husband, as the case may be, of the person so charged, shall be a competent witness for the defence at every stage of the proceedings, whether the person so charged is charged solely or jointly with any other person." But this general enactment is qualified by some special restrictions, the nature of which will be noticed below. The act applies to Scotland but not to Ireland. It was not to apply to proceedings in courts-martial unless so applied by general orders or rules made under statutory authority. The provisions of the act have been applied by rules to military courts-martial, but have not yet been applied to naval courts-martial. The removal of disqualifications for want of religious belief is referred to below under the head of "Witnesses."

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[1] Reference may be made to a well-known passage in the *Essay concerning Human Understanding* (Book iv. ch. xv.): "The grounds of probability are—First, the conformity of anything with our own knowledge, observation and experience. Second, the testimony of others touching their observation and experience. In the testimony of others is to be considered (1) the number, (2) the integrity, (3) the skill of the witnesses. (4) The design of the author, where it is a testimony out of a book cited. (5) The consistency of the parts and circumstances of the relation. (6) Contrary testimonies."

Literature.

The act of 1898 finishes for the present the history of English legislation on evidence. For a view of the legal literature on the subject it is necessary to take a step backwards. Early in the 19th century Chief Baron Gilbert was superseded as an authority on the English law of evidence by the books of Phillips (1814) and Starkie (1824), who were followed by Roscoe (*Nisi Prius*, 1827; *Criminal Cases*, 1835), Greenleaf (American, 1842), Taylor (based on Greenleaf, 1848), and Best (1849). In 1876 Sir James FitzJames Stephen brought out his *Digest of the Law of Evidence*, based upon the Indian Evidence Act 1872, which he had prepared and passed as law member of the council of the governor-general of India. This Digest obtained a rapid and well-deserved success, and has materially influenced the form of subsequent writings on the English law of evidence. It sifted out what Stephen conceived to be the main rules of evidence from the mass of extraneous matter in which they had been embedded. Roscoe's Digests told the lawyer what things must be proved in order to sustain particular actions or criminal charges, and related as much to pleadings and to substantive law as to evidence proper. Taylor's two large volumes were a vast storehouse of useful information, but his book was one to consult, not to master. Stephen eliminated much of this extraneous matter, and summed up his rules in a series of succinct propositions, supplemented by apt illustrations, and couched in such a form that they could be easily read and remembered. Hence the English Digest, like the Indian Act, has been of much educational value. Its most original feature, but unfortunately also its weakest point, is its theory of relevancy. Pondering the multitude of "exclusionary" rules which had been laid down by the English courts, Stephen thought that he had discovered the general principle on which those rules reposed, and could devise a formula by which the principle could be expressed. "My study of the subject," he says, "both practically and in books has convinced me that the doctrine that all facts in issue and relevant to the issue, and no others, may be proved, is the unexpressed principle which forms the centre of and gives unity to all the express negative rules which form the great mass of the law." The result was the chapter on the relevancy of facts in the Indian Evidence Act, and the definition of relevancy in s. 7 of that act. This definition was based on the view that a distinction could be drawn between things which were and things which were not causally connected with each other, and that relevancy depended on causal connexion. Subsequent criticism convinced Stephen that his definition was in some respects too narrow and in others too wide, and eventually he adopted a definition out of which all reference to causality was dropped. But even in their amended form the provisions about relevancy are open to serious criticism. The doctrine of relevancy, *i.e.* of the probative effect of facts, is a branch of logic, not of law, and is out of place both in an enactment of the legislature and in a compendium of legal rules. The necessity under which Stephen found himself of extending the range of relevant facts by making it include facts "deemed to be relevant," and then narrowing it by enabling the judge to exclude evidence of facts which are relevant, illustrates the difference between the rules of logic and the rules of law. Relevancy is one thing; admissibility is another; and the confusion between them, which is much older than Stephen, is to be regretted. Rightly or wrongly English judges have, on practical grounds, declared inadmissible evidence of facts, which are relevant in the ordinary sense of the term, and which are so treated in non-judicial inquiries. Under these circumstances the attempt so to define relevancy as to make it conterminous with admissibility is misleading, and most readers of Stephen's Act and Digest would find them more intelligible and more useful if "admissible" were substituted for "relevant" throughout. Indeed it is hardly too much to say that Stephen's doctrine of relevancy is theoretically unsound and practically useless. The other parts of the work contain terse and vigorous statements of the law, but a Procrustean attempt to make legal rules square with a preconceived theory has often made the language and arrangement artificial, and the work, in spite of its compression, still contains rules which, under a more scientific treatment, would find their appropriate place in other branches of the law. These defects are characteristic of a strong and able man, who saw clearly, and expressed forcibly what he did see, but was apt to ignore or to deny the existence of what he did not see, whose mind was vigorous rather than subtle or accurate, and who, in spite of his learning, was somewhat deficient in the historical sense. But notwithstanding these defects, the conspicuous ability of the author, his learning, and his practical experience, especially in criminal cases, attach greater weight to FitzJames Stephen's statements than to those of any other English writer on the law of evidence.

Rules.

The object of every trial is, or may be, to determine two classes of questions or issues, which are usually distinguished as questions of law, and questions of fact, although the distinction between them is not so clear as might appear on a superficial view. In a trial by jury these two classes of questions are answered by different persons. The judge lays down the law. The jury, under the guidance of the judge, find the facts. It was with reference to trial by jury that the English rules of evidence were originally framed; it is by the peculiarities of this form of trial that many of them are to be explained; it is to this form of trial alone that some of the most important of them are exclusively applicable. The negative, exclusive, or exclusionary rules which form the characteristic features of the English law of evidence, are the rules in accordance with which the judge guides the jury. There is no difference of principle between the method of inquiry in judicial and in non-judicial proceedings. In either case a person who wishes to find out whether a particular event did or did not happen, tries, in the first place, to obtain information from persons who were present and saw what happened (direct evidence), and, failing this, to obtain information from persons who can tell him about facts from which he can draw an inference as to whether the event did or did not happen (indirect evidence). But in judicial inquiries the information given must be given on oath, and be liable to be tested by cross-examination. And there are rules of law which exclude from the consideration of the jury certain classes of facts which, in an ordinary inquiry, would, or might, be taken into consideration. Facts so excluded are said to be "not admissible as evidence," or "not evidence," according as the word is used in the wider or in the narrower sense. And the easiest way of determining whether a fact is or is not evidence in the narrower sense, is first to consider whether it has any bearing on the question to be tried, and, if it has, to consider whether it falls within any one or more of the rules of exclusion laid down by English law. These rules of exclusion are peculiar to English law and to systems derived from English law. They have been much criticized, and some of them have been repealed or materially modified by legislation. Most of them may be traced to directions given by a judge in the course of trying a particular case, given with special reference to the circumstances of that case, but expressed in general language, and, partly through the influence of text-writers, eventually hardened into general rules. In some cases their origin is only intelligible by reference to obsolete forms of pleading or practice. But in most cases they were originally rules of convenience laid down by the judge for the assistance of the jury. The judge is a man of trained experience, who has to arrive at a conclusion with the help of twelve untrained men, and who is naturally anxious to keep them straight, and give them every assistance in his power. The exclusion of certain forms of evidence assists the jury by concentrating their attention on the questions immediately before them, and by preventing them from being distracted or bewildered by facts which either have no bearing on the question before them, or have so remote a bearing on those questions as to be practically useless as guides to the truth. It also prevents a jury from being misled by statements the effect of which, through the prejudice they excite, is out of all proportion to their true weight. In this respect the rules of exclusion may be compared to blinkers, which keep a horse's eyes on the road before him. In criminal cases the rules of exclusion secure fair play to the accused, because he comes to the trial prepared to meet a specific charge, and ought not to be suddenly confronted by statements which he had no reason to expect would be made against him. They protect absent persons against statements affecting their character. And lastly they prevent the infinite waste of time which would ensue in the discussion of a question of fact if an inquiry were allowed to branch out into all the subjects with which that fact is more or less connected. The purely practical grounds on which the rules are based, according to the view of a great judge, may be illustrated by some remarks of Mr Justice Willes (1814–1872). In discussing the question whether evidence of the plaintiff's conduct on other occasions ought to be admitted, he said:—

"It is not easy in all cases to draw the line and to define with accuracy where probability ceases and speculation begins; but we are bound to lay down the rule to the best of our ability. No doubt the rule as to confining the evidence to that which is relevant and pertinent to the issue is one of great importance, not only as regards the particular case, but also with reference to saving the time of the court, and preventing the minds of the jury from being drawn away from the real point they have to decide.... Now it appears to me that the evidence proposed to be given in this case, if admitted, would not have shown that it was more probable that the contract was subject to the condition insisted upon by the defendant. The question may be put thus, Does the fact of a person having once or many times in his life done a particular act in a particular way make it more probable that he has done the same thing in the same way upon another and different occasion? To admit such speculative evidence would, I think, be fraught with great danger.... If such evidence were held admissible it would be difficult to say that the defendant might not in any case, where the question was whether or not there had been a sale of goods on credit, call witnesses to prove that the plaintiff had dealt with other persons upon a certain credit; or, in an action for an assault, that the plaintiff might not give evidence of former assaults committed by the defendant upon other persons, or upon other persons of a particular class, for the purpose of showing that he was a quarrelsome individual, and therefore that it was highly probable that the particular charge of assault was well founded. The extent to which this sort of thing might be carried is inconceivable.... To obviate the prejudices, the injustice, and the waste of time to which the admission of such evidence would lead, and bearing in mind the extent to which it might be carried, and that litigants are mortal, it is necessary not only to adhere to the rule, but to lay it down strictly. I think, therefore, the fact that the plaintiff had entered into contracts of a particular kind with other persons on other occasions could not be properly admitted in evidence where no custom of trade to make such contracts, and no connexion between such and the one in question, was shown to exist" (*Hollingham* v. *Head*, 1858, 4 C.B. N.S. 388).

There is no difference between the principles of evidence in civil and in criminal cases, although there are a few special rules, such as those relating to confessions and to dying declarations, which are only applicable to criminal proceedings. But in civil proceedings the issues are narrowed by mutual admissions of the parties, more use is made of evidence taken out of court, such as affidavits, and, generally, the rules of evidence are less strictly applied. It is often impolitic to object to the admission of evidence, even when the objection may be sustained by previous rulings. The general tendency of modern procedure is to place a more liberal and less technical construction on rules of evidence, especially in civil cases. In recent volumes of law reports cases turning on the admissibility of evidence are conspicuous by their rarity. Various causes have operated in this direction. One of them has been the change in the system of pleading, under which each party now knows before the actual trial the main facts on which his opponent relies. Another is the interaction of chancery and common-law practice and traditions since the Judicature Acts. In the chancery courts the rules of evidence were always less carefully observed, or, as Westminster would have said, less understood, than in the courts of common law. A judge trying questions of fact alone might naturally think that blinkers, though useful for a jury, are unnecessary for a judge. And the chancery judge was apt to read his affidavits first, and to determine their admissibility afterwards. In the meantime they had affected his mind.

The tendency of modern text-writers, among whom Professor J. B. Thayer (1831–1902), of Harvard, was perhaps the most independent, instructive and suggestive, is to restrict materially the field occupied by the law of evidence, and to relegate to other branches of the law topics traditionally treated under the head of evidence. Thus in every way the law of evidence, though still embodying some principles of great importance, is of less comparative importance as a branch of English law than it was half a century ago. Legal rules, like dogmas, have their growth and decay. First comes the judge who gives a ruling in a particular case. Then comes the text-writer who collects the scattered rulings, throws them into the form of general propositions, connects them together by some theory, sound or unsound, and often ignores or obscures their historical origin. After him comes the legislator who crystallizes the propositions into enactments, not always to the advantage of mankind. So also with decay. Legal rules fall into the background, are explained away, are ignored, are denied, are overruled. Much of the English law of evidence is in a stage of decay.

The subject-matter of the law of evidence may be arranged differently according to the taste or point of view of the writer. It will be arranged here under the following heads:—I. Preliminary Matter; II. Classes of Evidence; III. Rules of Exclusion; IV. Documentary Evidence; V. Witnesses.

I. PRELIMINARY MATTER

Under this head may be grouped certain principles and considerations which limit the range of matters to which evidence relates.

1. *Law and Fact.*—Evidence relates only to facts. It is therefore necessary to touch on the distinction between law and facts. *Ad quaestionem facti non respondent judices; ad quaestionem juris non respondent juratores.* Thus Coke, attributing, after his wont, to Bracton a maxim which may have been invented by himself. The maxim became the subject of political controversy, and the two rival views are represented by Pulteney's lines—

> "For twelve honest men have decided the cause
> Who are judges alike of the facts and the laws,"

and by Lord Mansfield's variant—

> "Who are judges of facts, but not judges of laws."

The particular question raised with respect to the law of libel was settled by Fox's Libel Act 1792. Coke's maxim describes in a broad general way the distinction between the functions of the judge and of the jury, but is only true subject to important qualifications. Judges in jury cases constantly decide what may be properly called questions of fact, though their action is often disguised by the language applied or the procedure employed. Juries, in giving a general verdict, often practically take the law into their own hands. The border-line between the two classes of questions is indicated by the "mixed questions of law and fact," to use a common phrase, which arise in such cases as those relating to "necessaries," "due diligence," "negligence," "reasonableness," "reasonable and probable cause." In the treatment of these cases the line has been drawn differently at different times, and two conflicting tendencies are discernible. On the one hand, there is the natural tendency to generalize common inferences into legal rules, and to fix legal standards of duty. On the other hand, there is the sound instinct that it is a mistake to define and refine too much in these cases, and that the better course is to leave broadly to the jury, under the general guidance of the judge, the question what would be done by the "reasonable" or "prudent" man in particular cases. The latter tendency predominates in modern English law, and is reflected by the enactments in the recent acts codifying the law on bills of exchange and sale of goods, that certain questions of reasonableness are to be treated as questions of fact. On the same ground rests the dislike to limit the right of a jury to give a general verdict in criminal cases. Questions of custom begin by being questions of fact, but as the custom obtains general recognition it becomes law. Many of the rules of the English mercantile law were "found" as customs by Lord Mansfield's special juries. Generally, it must be remembered that the jury act in subordinate co-operation with the judge, and that the extent to which the judge limits or encroaches on the province of the jury is apt to depend on the personal idiosyncrasy of the judge.

2. *Judicial Notice.*—It may be doubted whether the subject of judicial notice belongs properly to the law of evidence, and whether it does not belong rather to the general topic of legal or judicial reasoning. Matters which are the subject of judicial notice are part of the equipment of the judicial mind. It would be absurd to require evidence of every fact; many facts must be assumed to be known. The judge, like the juryman, is supposed to bring with him to the consideration of the question which he has to try common sense, a general knowledge of human nature and the ways of the world, and also knowledge of things that "everybody is supposed to know." Of such matters judicial notice is said to be taken. But the range of general knowledge is indefinite, and the range of judicial notice has, for reasons of convenience, been fixed or extended, both by rulings of the judges and by numerous enactments of the legislature. It would be impossible to enumerate here the matters of which judicial notice must or may be taken. These are to be found in the text-books. For present purposes it must suffice to say that they include not only matters of fact of common and certain knowledge, but the law and practice of the courts, and many matters connected with the government of the country.

3. *Presumptions.*—A presumption in the ordinary sense is an inference. It is an argument, based on observation, that what has happened in some cases will probably happen in others of the like nature. The subject of presumptions, so far as they are mere inferences or arguments, belongs, not to the law of evidence, or to law at all, but to rules of reasoning. But a legal presumption, or, as it is sometimes called, a presumption of law, as distinguished from a presumption of fact, is something more. It may be described, in Stephen's language, as "a rule of law that courts and judges shall draw a particular inference from a particular fact, or from particular evidence, unless and until the truth" (perhaps it would be better to say 'soundness') "of the inference is disproved." Courts and legislatures have laid down such rules on grounds of public policy or general convenience, and the rules have then to be observed as rules of positive law, not merely used as part of the ordinary process of reasoning or argument. Some so-called presumptions are rules of substantive law under a disguise. To this class appear to belong "conclusive presumptions of law," such as the common-law presumption that a child under seven years of age cannot commit a felony. So again the presumption that every one knows the law is merely an awkward way of saying that ignorance of the law is not a legal excuse for breaking it. Of true legal presumptions, the majority may be dealt with most appropriately under different branches of the substantive law, such as the law of crime, of property, or of contract, and accordingly Stephen has included in his *Digest of the Law of Evidence* only some which are common to more than one branch of the law. The effect of a presumption is to impute to certain facts or groups of facts a prima facie significance or operation, and thus, in legal proceedings, to throw upon the party against whom it works the duty of bringing forward evidence to meet it. Accordingly the subject of presumptions is intimately connected with the subject of the burden of proof, and the same legal rule may be expressed in different forms, either as throwing the advantage of a presumption on one side, or as throwing the burden of proof on the other. Thus the rule in Stephen's Digest, which says that the burden of proving that any person has been guilty of a crime or wrongful act is on the person who asserts it, appears in the article entitled "Presumption of Innocence." Among the more ordinary and more important legal presumptions are the presumption of regularity in proceedings, described generally as a presumption *omnia esse rite acta*, and including the presumption that the holder of a public office has been duly appointed, and has duly performed his official duties, the presumption of the legitimacy of a child born during the mother's marriage, or within the period of gestation after her husband's death, and the presumptions as to life and death. "A person shown not to have been heard of for seven years by those (if any) who, if he had been alive, would naturally have heard of him, is presumed to be dead unless the circumstances of the case are such as to account for his not being heard of without assuming his death; but there is no presumption as to the time when he died, and the burden of proving his death at any particular time is upon the person who asserts it. There is no presumption" (*i.e.* legal presumption) "as to the age at which a person died who is shown to have been alive at a given time, or as to the order in which two or more persons died who are shown to have died in the same accident, shipwreck or battle" (Stephen, *Dig.*, art. 99). A document proved or purporting to be thirty years old is presumed to be genuine, and to have been properly executed and (if necessary) attested if produced from the proper custody. And the legal presumption of a "lost grant," *i.e.* the presumption that a right or alleged right which has been long enjoyed without interruption had a legal origin, still survives in addition to the common law and statutory rules of prescription.

4. *Burden of Proof.*—The expression *onus probandi* has come down from the classical Roman law, and both it and the Roman maxims, *Agenti incumbit probatio*, *Necessitas probandi incumbit ei qui dicit non ei qui negat*, and *Reus excipiendo fit actor*, must be read with reference to the Roman system of actions, under which nothing was admitted, but the plaintiff's case was tried first; then, unless that failed, the defendant's on his *exceptio*; then, unless that failed, the plaintiff's on his *replicatio*, and so on. Under such a system the burden was always on the "actor." In modern law the phrase "burden of proof" may mean one of two things, which are often confused—the burden of establishing the proposition or issue on which the case depends, and the burden of producing evidence on any particular point either at the beginning or at a later stage of the case. The burden in the former sense ordinarily rests on the plaintiff or prosecutor. The burden in the latter sense, that of going forward with evidence on a particular point, may shift from side to side as the case proceeds. The general rule is that he who alleges a fact must prove it, whether the allegation is couched in affirmative or negative terms. But this rule is subject to the effect of presumptions in particular cases, to the principle that in considering the amount of evidence necessary to shift the burden of proof regard

must be had to the opportunities of knowledge possessed by the parties respectively, and to the express provisions of statutes directing where the burden of proof is to lie in particular cases. Thus many statutes expressly direct that the proof of lawful excuse or authority, or the absence of fraudulent intent, is to lie on the person charged with an offence. And the Summary Jurisdiction Act 1848 provides that if the information or complaint in summary proceedings negatives any exemption, exception, proviso, or condition in the statute on which it is founded, the prosecutor or complainant need not prove the negative, but the defendant may prove the affirmative in his defence.

II. Classes of Evidence

Evidence is often described as being either oral or documentary. To these two classes should be added a third, called by Bentham real evidence, and consisting of things presented immediately to the senses of the judge or the jury. Thus the judge or jury may go to view any place the sight of which may help to an understanding of the evidence, and may inspect anything sufficiently identified and produced in court as material to the decision. Weapons, clothes and things alleged to have been stolen or damaged are often brought into court for this purpose. Oral evidence consists of the statements of witnesses. Documentary evidence consists of documents submitted to the judge or jury by way of proof. The distinction between primary and secondary evidence relates only to documentary evidence, and will be noticed in the section under that head. A division of evidence from another point of view is that into direct and indirect, or, as it is sometimes called, circumstantial evidence. By direct evidence is meant the statement of a person who saw, or otherwise observed with his senses, the fact in question. By indirect or circumstantial evidence is meant evidence of facts from which the fact in question may be inferred. The difference between direct and indirect evidence is a difference of kind, not of degree, and therefore the rule or maxim as to "best evidence" has no application to it. Juries naturally attach more weight to direct evidence, and in some legal systems it is only this class of evidence which is allowed to have full probative force. In some respects indirect evidence is superior to direct evidence, because, as Paley puts it, "facts cannot lie," whilst witnesses can and do. On the other hand facts often deceive; that is to say, the inferences drawn from them are often erroneous. The circumstances in which crimes are ordinarily committed are such that direct evidence of their commission is usually not obtainable, and when criminality depends on a state of mind, such as intention, that state must necessarily be inferred by means of indirect evidence.

III. Rules of Exclusion

It seems desirable to state the leading rules of exclusion in their crude form instead of obscuring their historical origin by attempting to force them into the shape of precise technical propositions forming parts of a logically connected system. The judges who laid the foundations of our modern law of evidence, like those who first discoursed on the duties of trustees, little dreamt of the elaborate and artificial system which was to be based upon their remarks. The rules will be found, as might be expected, to be vague, to overlap each other, to require much explanation, and to be subject to many exceptions. They may be stated as follows:—(1) Facts not relevant to the issue cannot be admitted as evidence. (2) The evidence produced must be the best obtainable under the circumstances. (3) Hearsay is not evidence. (4) Opinion is not evidence.

1. *Rule of Relevancy.*—The so-called rule of relevancy is sometimes stated by text-writers in the form in which it was laid down by Baron Parke in 1837 (*Wright* v. *Doe and Tatham*, 7 A. and E. 384), when he described "one great principle" in the law of evidence as being that "all facts which are relevant to the issue may be proved." Stated in different forms, the rule has been made by FitzJames Stephen the central point of his theory of evidence. But relevancy, in the proper and natural sense, as we have said, is a matter not of law, but of logic. If Baron Parke's dictum relates to relevancy in its natural sense it is not true; if it relates to relevancy in a narrow and artificial sense, as equivalent to admissible, it is tautological. Such practical importance as the rule of relevancy possesses consists, not in what it includes, but in what it excludes, and for that reason it seems better to state the rule in a negative or exclusive form. But whether the rule is stated in a positive or in a negative form its vagueness is apparent. No precise line can be drawn between "relevant" and "irrelevant" facts. The two classes shade into each other by imperceptible degrees. The broad truth is that the courts have excluded from consideration certain matters which have some bearing on the question to be decided, and which, in that sense, are relevant, and that they have done so on grounds of policy and convenience. Among the matters so excluded are matters which are likely to mislead the jury, or to complicate the case unnecessarily, or which are of slight, remote, or merely conjectural importance. Instances of the classes of matters so excluded can be given, but it seems difficult to refer their exclusion to any more general principle than this. Rules as to evidence of character and conduct appear to fall under this principle. Evidence is not admissible to show that the person who is alleged to have done a thing was of a disposition or character which makes it probable that he would or would not have done it. This rule excludes the biographical accounts of the prisoner which are so familiar in French trials, and is an important principle in English trials. It is subject to three exceptions: first, that evidence of good character is admissible in favour of the prisoner in all criminal cases; secondly, that a prisoner indicted for rape is entitled to call evidence as to the immoral character of the prosecutrix; and thirdly, that a witness may be called to say that he would not believe a previous witness on his oath. The exception allowing the good character of a prisoner to influence the verdict, as distinguished from the sentence, is more humane than logical, and seems to have been at first admitted in capital cases only. The exception in rape cases does not allow evidence to be given of specific acts of immorality with persons other than the prisoner, doubtless on the ground that such evidence would affect the reputations of third parties. Where the character of a person is expressly in issue, as in actions of libel and slander, the rule of exclusion, as stated above, does not apply. Nor does it prevent evidence of bad character from being given in mitigation of damages, where the amount of damages virtually depends on character, as in cases of defamation and seduction. As to conduct there is a similar general rule, that evidence of the conduct of a person on other occasions is not to be used merely for the purpose of showing the likelihood of his having acted in a similar way on a particular occasion. Thus, on a charge of murder, the prosecutor cannot give evidence of the prisoner's conduct to other persons for the purpose of proving a bloodthirsty and murderous disposition. And in a civil case a defendant was not allowed to show that the plaintiff had sold goods on particular terms to other persons for the purpose of proving that he had sold similar goods on the same terms to the defendant. But this general rule must be carefully construed. Where several offences are so connected with each other as to form parts of an entire transaction, evidence of one is admissible as proof of another. Thus, where a prisoner is charged with stealing particular goods from a particular place, evidence may be given that other goods, taken from the same place at the same time, were found in his possession. And where it is proved or admitted that a person did a particular act, and the question is as to his state of mind, that is to say, whether he did the act knowingly, intentionally, fraudulently, or the like, evidence may be given of the commission by him of similar acts on other occasions for the purpose of proving his state of mind on the occasion. This principle is most commonly applied in charges for uttering false documents or base coin, and not uncommonly in charges for false pretences, embezzlement or murder. In proceedings for the receipt or possession of stolen property, the legislature has expressly authorized evidence to be given of the possession by the prisoner of other stolen property, or of his previous conviction of an offence involving fraud or dishonesty

(Prevention of Crimes Act 1871). Again, where there is a question whether a person committed an offence, evidence may be given of any fact supplying a motive or constituting preparation for the offence, of any subsequent conduct of the person accused, which is apparently influenced by the commission of the offence, and of any act done by him, or by his authority, in consequence of the offence. Thus, evidence may be given that, after the commission of the alleged offence, the prisoner absconded, or was in possession of the property, or the proceeds of the property, acquired by the offence, or that he attempted to conceal things which were or might have been used in committing the offence, or as to the manner in which he conducted himself when statements were made in his presence and hearing. Statements made to or in the presence of a person charged with an offence are admitted as evidence, not of the facts stated, but of the conduct or demeanour of the person to whom or in whose presence they are made, or of the general character of the transaction of which they form part (under the *res gestae* rule mentioned below).

2. *Best Evidence Rule.*—Statements to the effect of the best evidence rule were often made by Chief Justice Holt about the beginning of the 18th century, and became familiar in the courts. Chief Baron Gilbert, in his book on evidence, which must have been written before 1726, says that "the first and most signal rule in relation to evidence is this, that a man must have the utmost evidence the nature of the fact is capable of." And in the great case of *Omichund* v. *Barker* (1744), Lord Hardwicke went so far as to say, "The judges and sages of the law have laid down that there is but one general rule of evidence, the best that the nature of the case will admit" (1 Atkyns 49). It is no wonder that a rule thus solemnly stated should have found a prominent place in text-books on the law of evidence. But, apart from its application to documentary evidence, it does not seem to be more than a useful guiding principle which underlies, or may be used in support of, several rules.

It is to documentary evidence that the principle is usually applied, in the form of the narrower rule excluding, subject to exceptions, secondary evidence of the contents of a document where primary evidence is obtainable. In this form the rule is a rule of exclusion, but may be most conveniently dealt with in connexion with the special subject of documentary evidence. As noticed above, the general rule does not apply to the difference between direct and indirect evidence. And, doubtless on account of its vague character, it finds no place in Stephen's Digest.

3. *Hearsay.*—The term "hearsay" primarily applies to what a witness has heard another person say in respect to a fact in dispute. But it is extended to any statement, whether reduced to writing or not, which is brought before the court, not by the author of the statement, but by a person to whose knowledge the statement has been brought. Thus the hearsay rule excludes statements, oral or written, made in the first instance by a person who is not called as a witness in the case. Historically this rule may be traced to the time when the functions of the witnesses were first distinguished from the functions of the jury, and when the witnesses were required by their formula to testify *de visu suo et auditu*, to state what they knew about facts from the direct evidence of their senses, not from the information of others. The rule excludes statements the effect of which is liable to be altered by the narrator, and which purport to have been made by persons who did not necessarily speak under the sanction of an oath, and whose accuracy or veracity is not tested by cross-examination. It is therefore of practical utility in shutting out many loose statements and much irresponsible gossip. On the other hand, it excludes statements which are of some value as evidence, and may indeed be the only available evidence. Thus, a statement has been excluded as hearsay, even though it can be proved that the author of the statement made it on oath, or that it was against his interest when he made it, or that he is prevented by insanity or other illness from giving evidence himself, or that he has left the country and disappeared, or that he is dead.

Owing to the inconveniences which would be caused by a strict application of the rule, it has been so much eaten into by exceptions that some persons doubt whether the rule and the exceptions ought not to change places. Among the exceptions the following may be noticed: (*a*) *Certain sworn statements.*—In many cases statements made by a person whose evidence is material, but who cannot come before the court, or could not come before it without serious difficulty, delay or expense, may be admitted as evidence under proper safeguards. Under the Indictable Offences Act 1848, where a person has made a deposition before a justice at a preliminary inquiry into an offence, his deposition may be read in evidence on proof that the deponent is dead, or too ill to travel, that the deposition was taken in the presence of the accused person, and that the accused then had a full opportunity of cross-examining the deponent. The deposition must appear to be signed by the justice before whom it purports to have been taken. Depositions taken before a coroner are admissible under the same principle. And the principle probably extends to cases where the deponent is insane, or kept away by the person accused. There are other statutory provisions for the admission of depositions, as in the Criminal Law Amendment Act 1867; the Foreign Jurisdiction Act 1890; and the Children Act 1908, incorporating an act of 1894. In civil cases the rule excluding statements not made in court at the trial is much less strictly applied. Frequent use is made of evidence taken before an examiner, or under a commission. Affidavits are freely used for subordinate issues or under an arrangement between the parties, and leave may be given to use evidence taken in other proceedings. The old chancery practice, under which evidence, both at the trial and at other stages of a proceeding, was normally taken by affidavit, irrespectively of consent, was altered by the Judicature Acts. Under the existing rules of the supreme court evidence may be given by affidavit upon any motion, petition or summons, but the court or a judge may, on the application of either party, order the attendance for cross-examination of the person making the affidavit. (*b*) *Dying declarations.*—In a trial for murder or manslaughter a declaration by the person killed as to the cause of his death, or as to any of the circumstances of the transaction which resulted in his death, is admissible as evidence. But this exception is very strictly construed. It must be proved that the declarant, at the time of making the declaration, was in actual danger of death, and had given up all hope of recovery. (*c*) *Statements in pedigree cases.*—On a question of pedigree the statement of a deceased person, whether based on his own personal knowledge or on family tradition, is admissible as evidence, if it is proved that the person who made the statement was related to the person about whose family relations the statement was made, and that the statement was made before the question with respect to which the evidence is required had arisen. (*d*) *Statements as to matters of public or general interest.*—Statements by deceased persons are admissible as evidence of reputation or general belief in questions relating to the existence of any public or general right or custom, or matter of public and general interest. Statements of this kind are constantly admitted in questions relating to right of way, or rights of common, or manorial or other local customs. Maps, copies of court rolls, leases and other deeds, and verdicts, judgments, and orders of court fall within the exception in cases of this kind. (*e*) *Statements in course of duty or business.*—A statement with respect to a particular fact made by a deceased person in pursuance of his duty in connexion with any office, employment or business, whether public or private, is admissible as evidence of that fact, if the statement appears to have been made from personal knowledge, and at or about the time when the fact occurred. This exception covers entries by clerks and other employees. (*f*) *Statements against interest.*—A statement made by a deceased person against his pecuniary or proprietary interest is admissible as evidence, without reference to the time at which it was made. Where such a statement is admissible the whole of it becomes admissible, though it may contain matters not against the interest of the person who made it, and though the total effect may be in his favour. Thus, where there was a question whether a particular sum was a gift or a loan, entries in an account book of receipt of interest on the sum were admitted, and a statement in the book that the alleged debtor had on a particular date acknowledged the loan was also admitted. (*g*) *Public documents.*—Under this head may be placed recitals in public acts of parliament, notices in the *London*, *Edinburgh*, or *Dublin Gazette* (which are made evidence by statute in a large number of cases), and entries made in the performance of duty in official registers or records, such as registers of births, deaths or marriages, registers of companies, records in judicial proceedings, and the like. An entry in a public document may be treated as a statement made in the course of duty, but it is admissible whether the person who made the statement is alive or dead, and without any evidence as to personal knowledge, or the time at which the statement is made. (*h*) *Admissions.*—By the term "admission," as here used, is meant a statement made out of the witness-box by a party to the proceedings, whether civil or criminal, or by some person whose statements are binding on that party, against the interest of that party. The term includes admissions made in answer to interrogatories, or to a notice to admit facts, but not admissions made on the pleadings. Admissions, in this sense of the term, are admissible as evidence against the person by whom they are made, or on whom they are binding, without reference to the life or death of the person who made them. A person is bound by the statements of his agent, acting within the scope of his authority, and barristers and solicitors are agents for their clients in the conduct of legal proceedings. Conversely, a person suing or defending on behalf of another, *e.g.* as agent, or trustee, is bound by the statements of the person whom he represents. Statements respecting property made by a predecessor in title bind the successor. Where a statement is put in evidence as an admission by, or binding on, any person, that person is entitled to have the whole statement given in evidence. The principle of this rule is obviously sound, because it would be unfair to pick out from a man's statement what tells against him, and to suppress what is in his favour. But the application of the rule is sometimes attended with difficulty. An admission will not be allowed to be used as evidence if it was made under a stipulation, express or implied, that it should not be so used. Such admissions are said to be made "without prejudice." (*i*) *Confessions.*—A confession is an admission by a person accused of an offence that he has committed the offence of which he is accused. But the rules about admitting as evidence confessions in criminal proceedings are much more strict than the rules about admissions in civil proceedings. The general rule is, that a confession is not admissible as evidence against any person except the person who makes it. But a confession made by one accomplice in the presence of another is admissible against the latter to this extent, that, if it implicates him, his silence under the charge may be used against him, whilst on the other hand his prompt repudiation of the charge might tell in his favour. In other words, the confession may be used as evidence of the conduct of the person in whose presence it was made. A confession cannot be admitted as evidence unless proved to be voluntary. A confession is not treated as being voluntary if it appears to the court to have been caused by any inducement, threat or promise which proceeded from a magistrate or other person in authority concerned in the charge, and which, in the opinion of the court, gave the accused person reasonable ground for supposing that by making a confession he would gain some advantage or avoid some evil in reference to the proceedings against him. This applies to any inducement, threat or promise having reference to the charge, whether it is addressed directly to the accused person or is brought to his knowledge indirectly. But a confession is not involuntary merely because it appears to have been caused by the exhortations of a person in authority to make it as a matter of religious duty, or by an inducement collateral to the proceedings, or by an inducement held out by a person having nothing to do with the apprehension, prosecution or examination of the prisoner. Thus, a confession made to a gaol chaplain in consequence of religious exhortation has been admitted as evidence. So also has a confession made by a prisoner to a gaoler in consequence of a promise by the gaoler, that if the prisoner confessed he should be allowed to see his wife. To make a confession involuntary, the inducement must have reference to the prisoner's escape from the charge against him, and must be made by some person having power to relieve him, wholly or partially, from the consequences of the charge. A confession is treated as voluntary if, in the opinion of the court, it was made after the complete removal of the impression produced by any inducement, threat or promise which would have made it involuntary. Where a confession was made under an inducement which makes the confession involuntary, evidence may be given of facts discovered in consequence of the confession, and of so much of the confession as distinctly relates to those facts. Thus, A, under circumstances which make the confession involuntary, tells a policeman that he, A., had thrown a lantern into the pond. Evidence may be given that the lantern was found in the pond, and that A. said he had thrown it there. It is of course improper to try to extort a confession by fraud or under the promise of secrecy. But if a confession is otherwise admissible as evidence, it does not become inadmissible *merely* because it was made under a promise of secrecy, or in consequence of a deception practised on the accused person for the purpose of obtaining it, or when he was drunk, or because it was made in answer to questions, whether put by a magistrate or by a private person, or because he was not warned that he was not bound to make the confession, and that it might be used against him. If a confession is given in evidence, the whole of it must be given, and not merely the parts disadvantageous to the accused person. Evidence amounting to a confession may be used as such against the person who gave it, though it was given on oath, and though the proceeding in which it was given had reference to the same subject-matter as the proceeding in which it is to be used, and though the witness might have refused to answer the questions put to him. But if, after refusing to answer such questions, the witness is improperly compelled to answer, his answers are not a voluntary confession. The grave jealousy and suspicion with which the English law regards confessions offer a marked contrast to the importance attached to this form of evidence in other systems of procedure, such as the inquisitorial system which long prevailed, and still to some extent prevails, on the continent. (*j*) *Res gestae.*—Statements are often admitted as evidence on the ground that they form part of what is called the "transaction," or *res gestae*, the occurrence or nature of which is in question. For instance, where an act may be proved, statements accompanying and explaining the act made by or to the person doing it, may be given in evidence. There is no difficulty in understanding the principle on which this exception from the hearsay rule rests, but there is often practical difficulty in applying it, and the practice has varied. How long is the "transaction" to be treated as lasting? What ought to be treated as "the immediate and natural effect of continuing action," and, for that reason, as part of the *res gestae*? When an act of violence is committed, to what extent are the terms of the complaint made by the sufferer, as distinguished from the fact of a complaint having been made, admissible as evidence? These are some of the questions raised. The cases in which statements by a person as to his bodily or mental condition may be put in evidence may perhaps be treated as falling under the same principle. In the Rugeley poisoning case, statements by the deceased person before his illness as to his state of health, and as to his symptoms during illness, were admitted as evidence for the prosecution. Under the same principle may also be brought the rule as to statements in conspiracy cases. In charges of conspiracy, after evidence has been given of the existence of the plot, and of the connexion of the accused with it, the charge against one conspirator may be supported by evidence of anything done, written, or said, not only by him, but by any other of the conspirators, in furtherance of the common purpose. On the other hand, a statement made by one conspirator, not in execution of the common purpose, but in narration of some event forming part of the conspiracy, would be treated, not as part of the "transaction," but as a statement excluded by the hearsay rule. Thus the admissibility of writings in conspiracy cases may depend on the time when they can be shown to have been in the possession of a fellow-conspirator, whether before or after the prisoner's apprehension. (*k*) *Complaints in rape cases, &c.*—In trials for rape and similar offences, the fact that shortly after the commission of the alleged offence a complaint was made by the person against whom the offence was committed, and also the terms of the complaint, have been admitted as evidence, not of the facts complained of, but of the consistency of the complainant's conduct with the story told by her in the witness-box, and as negativing consent on her part.

4. *Opinion.*—The rule excluding expressions of opinion also dates from the first distinction between the functions of witnesses and jury. It was for the witnesses to state facts, for the jury to form conclusions. Of course every statement of fact involves inference, and implies a judgment on phenomena observed by the senses. And the inference is often erroneous, as in the answer to the question, "Was he drunk?" A prudent witness will often guard himself, and is allowed to guard himself, by answering to the best of his belief. But, for practical purposes, it is possible to draw a distinction between a statement of facts observed and an expression of opinion as to the inference to be drawn from these facts, and the rule telling witnesses to state facts and not express opinions is of great value in keeping their statements out of the region of argument and conjecture. The evidence of "experts," that is to say, of persons having a special knowledge of some particular subject, is generally described as constituting the chief exception to the rule. But perhaps it would be more accurate to say that experts are allowed a much wider range than ordinary witnesses in the expression of their opinions, and in the statement of facts on which their opinions are based. Thus, in a poisoning case, a doctor may be asked as an expert whether, in his opinion, a particular poison produces particular symptoms. And, where lunacy is set up as a defence, an expert may be asked whether, in his opinion, the symptoms exhibited by the alleged lunatic commonly show unsoundness of mind, and whether such unsoundness of mind usually renders persons incapable of knowing the nature of their acts, or of knowing that what they do is either wrong or contrary to the law. Similar principles are applied to the evidence of engineers, and in numerous other cases. In cases of disputed handwriting the evidence of experts in handwriting is expressly recognized by statute (Evidence and Practice on Criminal Trials 1865).

IV. Documentary Evidence

Charters and other writings were exhibited to the jury at a very early date, and it is to writings so exhibited that the term "evidence" or "evidences" seems to have been originally applied *par excellence.* The oral evidence of witnesses came later. Where a document is to be used as evidence the first question is how its contents are to be proved. To this question the principle of "best evidence" applies, in the form of the rule that primary evidence must be given except in the cases where secondary evidence is allowed. By primary evidence is meant the document itself produced for inspection. By secondary evidence is meant a copy of the document, or verbal accounts of its contents.

The rule as to the inadmissibility of a copy of a document is applied much more strictly to private than to public or official documents. Secondary evidence may be given of the contents of a private document in the following cases:

(*a*) Where the original is shown or appears to be in the possession of the adverse party, and he, after having been served with reasonable notice to produce it, does not do so.

(*b*) Where the original is shown or appears to be in the possession or power of a stranger not legally bound to produce it, and he, after having been served with a writ of *subpoena duces tecum*, or after having been sworn as a witness and asked for the document, and having admitted that it is in court, refuses to produce it.

(*c*) Where it is shown that proper search has been made for the original, and there is reason for believing that it is destroyed or lost.

(*d*) Where the original is of such a nature as not to be easily movable, as in the case of a placard posted on a wall, or of a tombstone, or is in a country from which it is not permitted to be removed.

(*e*) Where the original is a document for the proof of which special provision is made by any act of parliament, or any law in force for the time being. Documents of that kind are practically treated on the same footing as private documents.

(*f*) Where the document is an entry in a banker's book, provable according to the special provisions of the Bankers' Books Evidence Act 1879.

Secondary evidence of a private document is usually given either by producing a copy and calling a witness who can prove the copy to be correct, or, when there is no copy obtainable, by calling a witness who has seen the document, and can give an account of its contents. No general definition of public document is possible, but the rules of evidence applicable to public documents are expressly applied by statute to many classes of documents. Primary evidence of any public document may be given by producing the document from proper custody, and by a witness identifying it as being what it professes to be. Public documents may always be proved by secondary evidence, but the particular kind of secondary evidence required is in many cases defined by statute. Where a document is of such a public nature as to be admissible in evidence on its mere production from the proper custody, and no statute exists which renders its contents provable by means of a copy, any copy thereof or extract therefrom is admissible as proof of its contents, if it is proved to be an examined copy or extract, or purports to be signed or certified as a true copy or extract by the officer to whose custody the original is entrusted. Many statutes provide that various certificates, official and public documents, documents and proceedings of corporations and of joint stock and other companies, and certified copies of documents, by-laws, entries in registers and other books, shall be receivable as evidence of certain particulars in courts of justice, if they are authenticated in the manner prescribed by the statutes. Whenever, by virtue of any such provision, any such certificate or certified copy is receivable as proof of any particular in any court of justice, it is admissible as evidence, if it purports to be authenticated in the manner prescribed by law, without calling any witness to prove any stamp, seal, or signature required for its authentication, or the official character of the person who appears to have signed it. The Documentary Evidence Acts 1868, 1882 and 1895, provide modes of proving the contents of several classes of proclamations, orders and regulations.

If a document is of a kind which is required by law to be attested, but not otherwise, an attesting witness must be called to prove its due execution. But this rule is subject to the following exceptions:

(*a*) If it is proved that there is no attesting witness alive, and capable of giving evidence, then it is sufficient to prove that the attestation of at least one attesting witness is in his handwriting, and that the signature of the person executing the document is in the handwriting of that person.

(*b*) If the document is proved, or purports to be, more than thirty years old, and is produced from what the court considers to be its proper custody, an attesting witness need not be called, and it will be presumed without evidence that the instrument was duly executed and attested.

Where a document embodies a judgment, a contract, a grant, or disposition of property, or any other legal transaction or "act in the law," on which rights depend, the validity of the transaction may be impugned on the ground of fraud, incapacity, want of consideration, or other legal ground. But this seems outside the law of evidence. In this class of cases a question often arises whether extrinsic evidence can be produced to vary the nature of the transaction embodied in the document. The answer to this question seems to depend on whether the document was or was not intended to be a complete and final statement of the transaction which it embodies. If it was, you cannot go outside the document for the purpose of ascertaining the nature of the transaction. If it was not, you may. But the mere statement of this test shows the difficulty of formulating precise rules, and of applying them when formulated. Fitz-James Stephen mentions, among the facts which may be proved in these cases, the existence of separate and consistent oral agreements as to matters on which the document is silent, if there is reason to believe that the document is not a complete and final statement of the transaction, and the existence of any usage or custom with reference to which a contract may be presumed to have been made. But he admits that the rules on the subject are "by no means easy to apply, inasmuch as from the nature of the case an enormous number of transactions fall close on one side or the other of most of them." The underlying principle appears to be a rule of substantive law rather than of evidence. When parties to an arrangement have reduced the terms of the arrangement to a definite, complete, and final written form, they should be bound exclusively by the terms embodied in that form. The question in each case is under what circumstances they ought to be treated as having done so.

The expression "parol evidence," which includes written as well as verbal evidence, has often been applied to the extrinsic evidence produced for the purpose of varying the nature of the transaction embodied in a document. It is also applied to extrinsic evidence used for another purpose, namely, that of explaining the meaning of the terms used in a document. The two questions, What is the real nature of the transaction referred to in a document? and, What is the meaning of a document? are often confused, but are really distinct from each other. The rules bearing on the latter question are rules of construction or interpretation rather than of evidence, but are ordinarily treated as part of the law of evidence, and are for that reason included by Fitz James Stephen in his Digest. In stating these rules he adopts, with verbal modifications, the six propositions laid down by Vice-Chancellor Wigram in his *Examinations of the Rules of Law respecting the admission of Extrinsic Evidence in Aid of the Interpretation of Wills.* The substance of these propositions appears to be this, that wherever the meaning of a document cannot be satisfactorily ascertained from the document itself, use may be made of any other evidence for the purpose of elucidating the meaning, subject to one restriction, that, except in cases of equivocation, *i.e.* where a person or thing is described in terms applicable equally to more than one, resort cannot be had to extrinsic expressions of the author's intention.

V. WITNESSES

1. *Attendance.*—If a witness does not attend voluntarily he can be required to attend by a writ of *subpoena*.

2. *Competency.*—As a general rule every person is a competent witness. Formerly persons were disqualified by crime or interest, or by being parties to the proceedings, but these disqualifications have now been removed by statute, and the circumstances which formerly created them do not affect the competency, though they may often affect the credibility, of a witness.

Under the general law as it stood before the Criminal Evidence Act 1898 came into force, a person charged with an offence was not competent to give evidence on his own behalf. But many exceptions had been made to this rule by legislation, and the rule itself was finally abolished by the act of 1898. Under that law a person charged is a competent witness, but he can only give evidence for the defence, and can only give evidence if he himself applies to do so. Under the law as it stood before 1898, persons jointly charged and being tried together were not competent to give evidence either for or against each other. Under the act of 1898 a person charged jointly with another is a competent witness, but only for the defence, and not for the prosecution. If, therefore, one of the persons charged applies to give evidence his cross-examination must not be conducted with a view to establish the guilt of the other. Consequently, if it is thought desirable to use against one prisoner the evidence of another who is being tried with him, the latter should be released, or a separate verdict of not guilty taken against him. A prisoner so giving evidence is popularly said to turn king's evidence. It follows that, subject to what has been said above as to persons tried together, the evidence of an accomplice is admissible against his principal, and *vice versa*. The evidence of an accomplice is, however, always received with great jealousy and caution. A conviction on the unsupported testimony of an accomplice may, in some cases, be strictly legal, but the practice is to require it to be confirmed by unimpeachable testimony in some material part, and more especially as to his identification of the person or persons against whom his evidence may be received. The wife of a person charged is now a competent witness, but, except in certain special cases, she can only give evidence for the defence, and can only give evidence if her husband applies that she should do so. The special cases in which a wife can be called as a witness either for the prosecution or for the defence, and without the consent of the person charged, are cases arising under particular enactments scheduled to the act of 1898, and relating mainly to offences against wives and children, and cases in which the wife is by common law a competent witness against her husband, *i.e.* where the proceeding is against the husband for bodily injury or violence inflicted on his wife. The rule of exclusion extends only to a lawful wife. There is no ground for supposing that the wife of a prosecutor is an incompetent witness. A witness is incompetent if, in the opinion of the court, he is prevented by extreme youth, disease affecting his mind, or any other cause of the same kind, from recollecting the matter on which he is to testify, from understanding the questions put to him, from giving rational answers to those questions, or from knowing that he ought to speak the truth. A witness unable to speak or hear is not incompetent, but may give his evidence by writing or by signs, or in any other manner in which he can make it intelligible. The particular form of the religious belief of a witness, or his want of religious belief, does not affect his competency. This ground of incompetency has now been finally removed by the Oaths Act 1888. It will be seen that the effect of the successive enactments which have gradually removed the disqualifications attaching to various classes of witnesses has been to draw a distinction between the *competency* of a witness and his *credibility*. No person is disqualified on moral or religious grounds, but his character may be such as to throw grave doubts on the value of his evidence. No relationship, except to a limited extent that of husband and wife, excludes from giving evidence. The parent may be examined on the trial of the child, the child on that of the parent, master for or against servant, and servant for or against master. The relationship of the witness to the prosecutor or the prisoner in such cases may affect the credibility of the witness, but does not exclude his evidence.

3. *Privilege.*—It does not follow that, because a person is *competent* to give evidence, he can therefore be compelled to do so.

No one, except a person charged with an offence when giving evidence on his own application, and as to the offence wherewith he is charged, is bound to answer a question if the answer would, in the opinion of the court, have a tendency to expose the witness, or the wife or husband of the witness, to any criminal charge, penalty, or forfeiture, which the court regards as reasonably likely to be preferred or sued for. Accordingly, an accomplice cannot be examined without his consent, but if an accomplice who has come forward to give evidence on a promise of pardon, or favourable consideration, refuses to give full and fair information, he renders himself liable to be convicted on his own confession. However, even accomplices in such circumstances are not required to answer on their cross-examination as to other offences. Where, under the new law, a person charged with an offence offers himself as a witness, he may be asked any question in cross-examination, notwithstanding that it would tend to criminate him as to the offence charged. But he may not be asked, and if he is asked must not be required to answer, any question tending to show that he has committed, or been convicted of, or been charged with, any other offence, or is of bad character, unless:—

(i.) The proof that he has committed, or been convicted of, the other offence is admissible evidence to show that he is guilty of the offence with which he is then charged; or,

(ii.) He has personally, or by his advocate, asked questions of the witnesses for the prosecution, with a view to establish his own good character, or has given evidence of his good character, or the nature or conduct of the defence is such as to involve imputations on the character of the prosecutor or the witnesses for the prosecution; or,

(iii.) He has given evidence against any other person charged with the same offence.

He may not be asked questions tending to criminate his wife.

The privilege as to criminating answers does not cover answers merely tending to establish a civil liability. No one is excused from answering a question or producing a document only because the answer or document may establish or tend to establish that he owes a debt, or is otherwise liable to any civil proceeding. It is a privilege for the protection of the witness, and therefore may be waived by him. But there are other privileges which cannot be so waived. Thus, on grounds of public policy, no one can be compelled, or is allowed, to give evidence relating to any affairs of state, or as to official communications between public officers upon public affairs, except with the consent of the head of the department concerned, and this consent is refused if the production of the information asked for is considered detrimental to the public service.

Again, in cases in which the government is immediately concerned, no witness can be compelled to answer any question the answer to which would tend to discover the names of persons by or to whom information was given as to the commission of offences. It is, as a rule, for the court to decide whether the permission of any such question would or would not, under the circumstances of the particular case, be injurious to the administration of justice.

A husband is not compellable to disclose any communication made to him by his wife during the marriage; and a wife is not compellable to disclose any communication made to her by her husband during the marriage.

A legal adviser is not permitted, whether during or after the termination of his employment as such, unless with his client's express consent, to disclose any communication, oral or documentary, made to him *as such legal adviser*, by or on behalf of his client, during, in the course of, and for the purpose of his employment, or to disclose any advice given by him to his client during, in the course of, and for the purpose of such employment. But this protection does not extend to—

(*a*) Any such communication if made in furtherance of any criminal purpose; nor

(*b*) Any fact observed by a legal adviser in the course of his employment as such, showing that any crime or fraud has been committed since the commencement of his employment, whether his attention was directed to such fact by or on behalf of his client or not; nor

(*c*) Any fact with which the legal adviser became acquainted otherwise than in his character as such.

Medical men and clergymen are not privileged from the disclosure of communications made to them in professional confidence, but it is not usual to press for the disclosures of communications made to clergymen.

4. *Oaths.*—A witness must give his evidence under the sanction of an oath, or of what is equivalent to an oath, that is to say, of a solemn promise to speak the truth. The ordinary form of oath is adapted to Christians, but a person belonging to a non-Christian religion may be sworn in any form prescribed or recognized by the custom of his religion. (See the article OATH.)

5. *Publicity.*—The evidence of a witness at a trial must, as a general rule, be given in open court in the course of the trial. The secrecy which was such a characteristic feature of the "inquisition" procedure is abhorrent to English law, and, even where publicity conflicts with decency, English courts are very reluctant to dispense with or relax the safeguards for justice which publicity involves.

6. *Examination.*—The normal course of procedure is this. The party who begins, *i.e.* ordinarily the plaintiff or prosecutor, calls his witnesses in order. Each witness is first examined on behalf of the party for whom he is called. This is called the examination in chief. Then he is liable to be cross-examined on behalf of the other side. And, finally, he may be re-examined on behalf of his own side. After the case for the other side has been opened, the same procedure is adopted with the witnesses for that side. In some cases the party who began is allowed to adduce further evidence in reply to his opponent's evidence. The examination is conducted, not by the court, but by or on behalf of the contending parties. It will be seen that the principle underlying this procedure is that of the duel, or conflict between two contending parties, each relying on and using his own evidence, and trying to break down the evidence of his opponent. It differs from the principle of the "inquisition" procedure, in which the court takes a more active part, and in which the cases for the two sides are not so sharply distinguished. In a continental trial it is often difficult to determine whether the case for the prosecution or the case for the defence is proceeding. Conflicting witnesses stand up together and are "confronted" with each other. In the examination in chief questions must be confined to matters bearing on the main question at issue, and a witness must not be asked leading questions, *i.e.* questions suggesting the answer which the person putting the question wishes or expects to receive, or suggesting disputed facts about which the witness is to testify. But the rule about leading questions is not applied where the questions asked are simply introductory, and form no part of the real substance of the inquiry, or where they relate to matters which, though material, are not disputed. And if the witness called by a person appears to be directly hostile to him, or interested on the other side, or unwilling to reply, the reason for the rules applying to examination in chief breaks down, and the witness may be asked leading questions and cross-examined, and treated in every respect as though he was a witness called on the other side, except that a party producing a witness must not impeach his credit by general evidence of bad character (Evidence and Practice on Criminal Trials Act 1865). In cross-examination questions not bearing on the main issue and leading questions may be put and (subject to the rules as to privilege) must be answered, as the cross-examiner is entitled to test the examination in chief by every means in his power. Questions not bearing on the main issue are often asked in cross-examination merely for the purpose of putting off his guard a witness who is supposed to have learnt up his story. In cross-examination questions may also be asked which tend either to test the accuracy or credibility of the witness, or to shake his credit by impeaching his motives or injuring his character. The licence allowed in cross-examination has often been seriously abused, and the power of the court to check it is recognized by one of the rules of the supreme court (R.S.C. xxxvi. 39, added in 1883). It is considered wrong to put questions which assume that facts have been proved which have not been proved, or that answers have been given contrary to the fact. A witness ought not to be pressed in cross-examination as to any facts which, if admitted, would not affect the question at issue or the credibility of the witness. If the cross-examiner intends to adduce evidence contrary to the evidence given by the witness, he ought to put to the witness in cross-examination the substance of the evidence which he proposes to adduce, in order to give the witness an opportunity of retracting or explaining. Where a witness has answered a question which only tends to affect his credibility by injuring his character, it is only in a limited number of cases that evidence can be given to contradict his answer. Where he is asked whether he has ever been convicted of any felony or misdemeanour, and denies or refuses to answer, proof may be given of the truth of the facts suggested (28 & 29 Vict. c. 15, s. 6). The same rule is observed where he is asked a question tending to show that he is not impartial. Where a witness has previously made a statement inconsistent with his evidence, proof may be given that he did in fact make it. But before such proof is given the circumstances of the alleged statement, sufficient to designate the particular occasion, must be mentioned to the witness, and he must be asked whether he did or did not make the statement. And if the statement was made in, or has been reduced to, writing, the attention of the witness must, before the writing is used against him, be called to those parts of the writing which are to be used for the purpose of contradicting him (Evidence and Practice on Criminal Trials Act 1865, ss. 4, 5). The credibility of a witness may be impeached by the evidence of persons who swear that they, from their knowledge of the witness, believe him to be unworthy of credit on his oath. These persons may not on their examination in chief give reasons for their belief, but they may be asked their reasons in cross-examination, and their answers cannot be contradicted. When the credit of a witness is so impeached, the party who called the witness may give evidence in reply to show that the witness is worthy of credit. Re-examination must be directed exclusively to the explanation of matters referred to in cross-examination, and if new matter is, by the permission of the court, introduced in re-examination, the other side may further cross-examine upon it. A witness under examination may refresh his memory by referring to any writing made by himself at or about the time of the occurrence to which the writing relates, or made by any other person, and read and found accurate by the witness at or about the time. An expert may refresh his memory by reference to professional treatises.

For the history of the English law of evidence, see Brunner, *Entstehung der Schwurgerichte*; Bigelow, *History of Procedure in England*; Stephen (Sir J. F.), *History of the Criminal Law of England*; Pollock and Maitland, *History of English Law*, bk. ii. ch. ix.; Thayer, *Preliminary Treatise on Evidence at the Common Law*. The principal text-books now in use are—Roscoe, *Digest of the Law of Evidence on the Trial of Actions at Nisi Prius* (18th ed., 1907); Roscoe, *Digest of the Law of Evidence in Criminal Cases* (13th ed., 1908); Taylor, *Treatise on the Law of Evidence* (10th ed., 1906); Best, *Principles of the Law of Evidence* (10th ed., 1906); Powell, *Principles and Practice of the Law of Evidence* (8th ed., 1904); Stephen, *Digest of the Law of Evidence* (8th ed., 1907); Wills, *Theory and Practice of the Law of Evidence* (1907). For the history of the law of criminal evidence in France, see Esmein, *Hist. de la procédure criminelle en France*. For Germany, see Holtzendorff, *Encyclopädie der Rechtswissenschaft* (passages indexed under head "Beweis"); Holtzendorff, *Rechtslexikon* ("Beweis"). (C. P. I.)

EVIL EYE. The terror of the arts of "fascination," *i.e.* that certain persons can bewitch, injure and even kill with a glance, has been and is still very widely spread. The power was not thought to be always maliciously cultivated. It was as often supposed to be involuntary (cf. Deuteronomy xxviii. 54); and a story is told of a Slav who, afflicted with the evil eye, at last blinded himself in order that he might not be the means of injuring his children (Woycicki, *Polish Folklore*, trans. by Lewenstein, p. 25). Few of the old classic writers fail to refer to the dread power. In Rome the "evil eye" was so well recognized that Pliny states that special laws were enacted against injury to crops by incantation, excantation or fascination. The power was styled *βασκανία* by the Greeks and *fascinatio* by the Latins. Children and young animals of all kinds were thought to be specially susceptible. Charms were worn against the evil eye both by man and beast, and in Judges viii. 21 it is thought there is a reference to this custom in the allusion to the "ornaments" on the necks of camels. In classic times the wearing of amulets was universal. They were of three classes: (1) those the intention of which was to attract on to themselves, as the lightning-rod the lightning, the malignant glance; (2) charms hidden in the bosom of the dress; (3) written words from sacred writings. Of these three types the first was most numerous. They were oftenest of a grotesque and generally grossly obscene nature. They were also made in the form of frogs, beetles and so on. But the ancients did not wholly rely on amulets. Spitting was among the Greeks and Romans a most common antidote to the poison of the evil eye. According to Theocritus it is necessary to spit three times into the breast of the person who fears fascination. Gestures, too, often intentionally obscene, were regarded as prophylactics on meeting the dreaded individual. The evil eye was believed to have its impulse in envy, and thus it came to be regarded as unlucky to have any of your possessions praised. Among the Romans, therefore, it was customary when praising anything to add *Praefiscini dixerim* (Fain Evil! I should say). This custom survives in modern Italy, where in like circumstances is said *Si mal occhio non ci fosse* (May the evil eye not strike it). The object of these conventional phrases was to prove that the speaker was sincere and had no evil designs in his praise. Though there is no set formula, traces of the custom are found in English rural sayings, *e.g.* the Somersetshire "I don't wish ee no harm, so I on't zay no more." This is what the Scots call "forespeaking," when praise beyond measure is likely to be followed by disease or accident. A Manxman will never say he is very well: he usually admits that he is "middling," or qualifies his admission of good health by adding "now" or "just now." The belief led in many countries to the saying, when one heard anybody or anything praised superabundantly, "God preserve him or it." So in Ireland, to avoid being suspected of having the evil eye, it is advisable when looking at a child to say "God bless it"; and when passing a farm-yard where cows are collected at milking time it is usual for the peasant to say, "The blessing of God be on you and all your labour." Bacon writes: "It seems some have been so curious as to note that the times when the stroke of an envious eye does most hurt are particularly when the party envied is beheld in glory and triumph."

The powers of the evil eye seem indeed to have been most feared by the prosperous. Its powers are often quoted as almost limitless. Thus one record solemnly declares that in a town of Africa a fascinator called Elzanar killed by his evil art no less than 80 people in two years (W. W. Story, *Castle St Angelo*, 1877, p. 149). The belief as affecting cattle was universal in the Scottish Highlands as late as the 18th century and still lingers. Thus if a stranger looks admiringly on a cow the peasants still think she will waste away, and they offer the visitor some of her milk to drink in the belief that in this manner the spell is broken. The modern Turks and Arabs also think that their horses and camels are subject to the evil eye. But the people of Italy, especially the Neapolitans, are the best modern instances of implicit believers. The *jettatore*, as the owner of the evil eye is called, is so feared that at his approach it is scarcely an exaggeration to say that a street will clear: everybody will rush into doorways or up alleys to avoid the dreaded glance. The *jettatore di bambini* (fascinator of children) is the most dreaded of all. The evil eye is still much feared for horses in India, China, Turkey, Greece and almost everywhere where horses are found. In rural England the pig is of all animals oftenest "overlooked." While the Italians are perhaps the greatest believers in the evil eye as affecting persons, the superstition is rife in the East. In India the belief is universal. In Bombay the blast of the evil eye is supposed to be a form of spirit-possession. In western India all witches and wizards are said to be evil-eyed. Modern Egyptian mothers thus account for the sickly appearance of their babies. In Turkey passages from the Koran are painted on the outside of houses to save the inmates, and texts as amulets are worn upon the person, or hung upon camels and horses by Arabs, Abyssinians and other peoples. The superstition is universal among savage races.

For a full discussion see *Evil Eye* by F. T. Elworthy (London, 1895); also W. W. Story, *Castle St Angelo and the Evil Eye* (1877); E. N. Rolfe and H. Ingleby, *Naples in 1888* (1888); Johannes Christian Frommann, *Tractatus de fascinatione novus et singularis*, &c., &c. (Nuremburg, 1675); R. C. Maclagan, *Evil Eye in the Western Highlands* (1902).

EVOLUTION. The modern doctrine of evolution or "evolving," as opposed to that of simple creation, has been defined by Prof. James Sully in the 9th edition of this encyclopaedia as a "natural history of the cosmos including organic beings, expressed in physical terms as a mechanical process." The following exposition of the historical development of the doctrine is taken from Sully's article, and for the most part is in his own words.

In the modern doctrine of evolution the cosmic system appears as a natural product of elementary matter and its laws. The various grades of life on our planet are the natural consequences of certain physical processes involved in the gradual transformations of the earth. Conscious life is viewed as conditioned by physical (organic and more especially nervous) processes, and as evolving itself in close correlation with organic evolution. Finally, human development, as exhibited in historical and prehistorical records, is regarded as the highest and most complex result of organic and physical evolution. This modern doctrine of evolution is but an expansion and completion of those physical theories (see below) which opened the history of speculation. It differs from them in being grounded on exact and verified research. As such, moreover, it is a much more limited theory of evolution than the ancient. It does not necessarily concern itself about the question of the infinitude of worlds in space and in time. It is content to explain the origin and course of development of the world, the solar or, at most, the sidereal system which falls under our own observation. It would be difficult to say what branches of science had done most towards the establishment of this doctrine. We must content ourselves by referring to the progress of physical (including chemical) theory, which has led to the great generalization of the conservation of energy; to the discovery of the fundamental chemical identity of the matter of our planet and of other celestial bodies, and of the chemical relations of organic and inorganic bodies; to the advance of astronomical speculation respecting the origin of the solar system, &c.; to the growth of the science of geology which has necessitated the conception of vast and unimaginable periods of time in the past history of our globe, and to the rapid march of the biological sciences which has made us familiar with the simplest types and elements of organism; finally, to the development of the science of anthropology (including comparative psychology, philology, &c.), and to the vast extension and improvement of all branches of historical study.

History of the Idea of Evolution.—The doctrine of evolution in its finished and definite form is a modern product. It required for its formation an amount of scientific knowledge which could only be very gradually acquired. It is vain, therefore, to look for clearly defined and systematic presentations of the idea among ancient writers. On the other hand, nearly all systems of philosophy have discussed the underlying problems. Such questions as the origin of the cosmos as a whole, the production of organic beings and of conscious minds, and the meaning of the observable grades of creation, have from the dawn of speculation occupied men's minds; and the answers to these questions often imply a vague recognition of the idea of a gradual evolution of things. Accordingly, in tracing the antecedents of the modern philosophic doctrine we shall have to glance at most of the principal systems of cosmology, ancient and modern. Yet since in these systems inquiries into the *esse* and *fieri* of the world are rarely distinguished with any precision, it will be necessary to indicate very briefly the general outlines of the system so far as they are necessary for understanding their bearing on the problems of evolution.

Mythological Interpretation.—The problem of the origin of the world was the first to engage man's speculative activity. Nor was this line of inquiry pursued simply as a step in the more practical problem of man's final destiny. The order of ideas observable in children suggests the reflection that man began to discuss the "whence" of existence before the "whither." At first, as in the case of the child, the problem of the genesis of things was conceived anthropomorphically: the question "How did the world arise?" first shaped itself to the human mind under the form "Who made the world?" As long as the problem was conceived in this simple manner there was, of course, no room for the idea of a necessary self-conditioned evolution. Yet the first indistinct germ of such an idea appears to emerge in combination with that of creation in some of the ancient systems of theogony. Thus, for example, in the myth of the ancient Parsees, the gods Ormuzd and Ahriman are said to evolve themselves out of a primordial matter. It may be supposed that these crude fancies embody a dim recognition of the physical forces and objects personified under the forms of deities, and a rude attempt to account for their genesis as a natural process. These first unscientific ideas of a genesis of the permanent objects of nature took as their pattern the process of organic reproduction and development, and this, not only because these objects were regarded as personalities, but also because this particular mode of becoming would most impress these early observers. This same way of looking at the origin of the material world is illustrated in the Egyptian notion of a cosmic egg out of which issues the god (Phta) who creates the world.

Indian Philosophy.—Passing from mythology to speculation properly so called, we find in the early systems of philosophy of India theories of emanation which approach in some respects the idea of evolution. Brahma is conceived as the eternal self-existent being, which on its material side unfolds itself to the world by gradually condensing itself to material objects through the gradations of ether, fire, water, earth and the elements. At the same time this eternal being is conceived as the all-embracing world-soul from which emanates the hierarchy of individual souls. In the later system of emanation of Sankhya there is a more marked approach to a materialistic doctrine of evolution. If, we are told, we follow the chain of causes far enough back we reach unlimited eternal creative nature or matter. Out of this "principal thing" or "original nature" all material and spiritual existence issues, and into it will return. Yet this primordial creative nature is endowed with volition with regard to its own development. Its first emanation as plastic nature contains the original soul or deity out of which all individual souls issue.

Early Greek Physicists.—Passing by Buddhism, which, though teaching the periodic destruction of our world by fire, &c., does not seek to determine the ultimate origin of the cosmos, we come to those early Greek physical philosophers who distinctly set themselves to eliminate the idea of divine interference with the world by representing its origin and changes as a natural process. The early Ionian physicists, including Thales, Anaximander and Anaximenes, seek to explain the world as generated out of a primordial matter (Gr. ὕλη; hence the name "Hylozoists"), which is at the same time the universal support of things. This substance is endowed with a generative or transmutative force by virtue of which it passes into a succession of forms. They thus resemble modern evolutionists, since they regard the world with its infinite variety of forms as issuing from a simple mode of matter. More especially the cosmology of Anaximander resembles the modern doctrine of evolution in its conception of the indeterminate (τὸ ἄπειρον) out of which the particular forms of the cosmos are differentiated. Again, Anaximander may be said to prepare the way for more modern conceptions of material evolution by regarding his primordial substance as eternal, and by looking on all generation as alternating with destruction, each step of the process being of course simply a transformation of the indestructible substance. Once more, the notion that this indeterminate body contains potentially in itself the fundamental contraries—hot, cold, &c.—by the excretion or evolution of which definite substances were generated, is clearly a forecasting of that antithesis of potentiality and actuality which from Aristotle downwards has been made the basis of so many theories of development. In conclusion, it is noteworthy that though resorting to utterly fanciful hypotheses respecting the order of the development of the world, Anaximander agrees with modern evolutionists in conceiving the heavenly bodies as arising out of an aggregation of diffused matter, and in assigning to organic life an origin in the inorganic materials of the primitive earth (pristine mud). The doctrine of Anaximenes, who unites the conceptions of a determinate and indeterminate original substance adopted by Thales and Anaximander in the hypothesis of a primordial and all-generating air, is a clear advance on these theories, inasmuch as it introduces the scientific idea of condensation and rarefaction as the great generating or transforming agencies. For the rest, his theory is chiefly important as emphasizing the vital character of the original substance. The primordial air is conceived as animated. Anaximenes seems to have inclined to a view of cosmic evolution as throughout involving a quasi-spiritual factor. This idea of the air as the original principle and source of life and intelligence is much more clearly expressed by a later writer, Diogenes of Apollonia. Diogenes made this conception of a vital and intelligent air the ground of a teleological view of climatic and atmospheric phenomena. It is noteworthy that he sought to establish the identity of organic and inorganic matter by help of the facts of vegetal and animal nutrition. Diogenes distinctly taught that the world is of finite duration, and will be renewed out of the primitive substance.

Heraclitus again deserves a prominent place in a history of the idea of evolution. Heraclitus conceives of the incessant process of flux in which all things are involved as consisting of two sides or moments—generation and decay—which are regarded as a confluence of opposite streams. In thus making transition or change, viewed as the identity of existence and non-existence, the leading idea of his system, Heraclitus anticipated in some measure Hegel's peculiar doctrine of evolution as a dialectic process.[1] At the same time we may find expressed in figurative language the germs of thoughts which enter into still newer doctrines of evolution. For example, the notion of conflict (πόλεμος) as the father of all things and of harmony as arising out of a union of discords, and again of an endeavour by individual things to maintain themselves in permanence against the universal process of destruction and renovation, cannot but remind one of certain fundamental ideas in Darwin's theory of evolution.

Empedocles.—Empedocles took an important step in the direction of modern conceptions of physical evolution by teaching that all things arise, not by transformations of some primitive form of matter, but by various combinations of a number of permanent elements. Further, by maintaining that the elements are continually being combined and separated by the two forces love and hatred, which appear to represent in a figurative way the physical forces of attraction and repulsion, Empedocles may be said to have made a considerable advance in the construction of the idea of evolution as a strictly mechanical process. It may be observed, too, that the hypothesis of a primitive compact mass (*sphaerus*), in which love (attraction) is supreme, has some curious points of similarity to, and contrast with, that notion of a primitive nebulous matter with which the modern doctrine of cosmic evolution usually sets out. Empedocles tries to explain the genesis of organic beings, and, according to Lange, anticipates the idea of Darwin that adaptations abound, because it is their nature to perpetuate themselves. He further recognizes a progress in the production of vegetable and animal forms, though this part of his theory is essentially crude and unscientific. More important in relation to the modern problems of evolution is his thoroughly materialistic way of explaining the origin of sensation and knowledge by help of his peculiar hypothesis of effluvia and pores. The supposition that sensation thus rests on a material process of absorption from external bodies naturally led up to the idea that plants and even inorganic subtances are precipient, and so to an indistinct recognition of organic life as a scale of intelligence.

Atomists.—In the theory of Atomism taught by Leucippus and Democritus we have the basis of the modern mechanical conceptions of cosmic evolution. Here the endless harmonious diversity of our cosmos, as well as of other worlds supposed to coexist with our own, is said to arise through the various combination of indivisible material elements differing in figure and magnitude only. The force which brings the atoms together in the forms of objects is inherent in the elements, and all their motions are necessary. The origin of things, which is also their substance, is thus laid in the simplest and most homogeneous elements or principles. The real world thus arising consists only of diverse combinations of atoms, having the properties of magnitude, figure, weight and hardness, all other qualities being relative only to the sentient organism. The problem of the genesis of mind is practically solved by identifying the soul, or vital principle, with heat or fire which pervades in unequal proportions, not only man and animals, but plants and nature as a whole, and through the agitation of which by incoming effluvia all sensation arises.

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[1] This is brought out by F. Lassalle, *Die Philosophie Herakleitos*, p. 126.

Aristotle.—Aristotle is much nearer a conception of evolution than his master Plato. It is true he sets out with a transcendent Deity, and follows Plato in viewing the creation of the cosmos as a process of descent from the more to the less perfect according to the distance from the original self-moving agency. Yet on the whole Aristotle leans to a teleological theory of evolution, which he interprets dualistually by means of certain metaphysical distinctions. Thus even his idea of the relation of the divine activity to the world shows a tendency to a pantheistic notion of a divine thought which gradually realizes itself in the process of becoming. Aristotle's distinction of form and matter, and his conception of becoming as a transition from actuality to potentiality, provides a new ontological way of conceiving the process of material and organic evolution.[1] To Aristotle the whole of nature is instinct with a vital impulse towards some higher manifestation. Organic life presents itself to him as a progressive scale of complexity determined by its final end, namely, man.[2] In some respects Aristotle approaches the modern view of evolution. Thus, though he looked on species as fixed, being the realization of an unchanging formative principle (*φύσις*), he seems, as Ueberweg observes, to have inclined to entertain the possibility of a spontaneous generation in the case of the lowest organisms. Aristotle's teleological conception of organic evolution often approaches modern mechanical conceptions. Thus he says that nature fashions organs in the order of their necessity, the first being those essential to life. So, too, in his psychology he speaks of the several degrees of mind as arising according to a progressive necessity.[3] In his view of touch and taste, as the two fundamental and essential senses, he may remind one of Herbert Spencer's doctrine. At the same time Aristotle precludes the idea of a natural development of the mental series by the supposition that man contains, over and above a natural finite soul inseparable from the body, a substantial and eternal principle (*νοῦς*) which enters into the individual from without. Aristotle's brief suggestions respecting the origin of society and governments in the *Politics* show a leaning to a naturalistic interpretation of human history as a development conditioned by growing necessities.

Strato.—Of Aristotle's immediate successors one deserves to be noticed here, namely, Strato of Lampsacus, who developed his master's cosmology into a system of naturalism. Strato appears to reject Aristotle's idea of an original source of movement and life extraneous to the world in favour of an immanent principle. All parts of matter have an inward plastic life whereby they can fashion themselves to the best advantage, according to their capability, though not with consciousness.

The Stoics.—In the cosmology of the Stoics we have the germ of a monistic and pantheistic conception of evolution. All things are said to be developed out of an original being, which is at once material (fire) and spiritual (the Deity), and in turn they will dissolve back into this primordial source. At the same time the world as a developed whole is regarded as an organism which is permeated with the divine Spirit, and so we may say that the world-process is a self-realization of the divine Being. The formative principle or force of the world is said to contain the several rational germinal forms of things. Individual things are supposed to arise out of the original being, as animals and plants out of seeds. Individual souls are an efflux from the all-compassing world-soul. The necessity in the world's order is regarded by the Stoics as identical with the divine reason, and this idea is used as the basis of a teleological and optimistic view of nature. Very curious, in relation to modern evolutional ideas, is the Stoical doctrine that our world is but one of a series of exactly identical ones, all of which are destined to be burnt up and destroyed.

The Epicureans—Lucretius.—The Epicureans differed from the Stoics by adopting a purely mechanical view of the world-process. Their fundamental conception is that of Democritus; they seek to account for the formation of the cosmos, with its order and regularity, by setting out with the idea of an original (vertical) motion of the atoms, which somehow or other results in movements towards and from one another. Our world is but one of an infinite number of others, and all the harmonies and adaptations of the universe are regarded as a special case of the infinite possibilities of mechanical events. Lucretius regards the primitive atoms (first beginnings or first bodies) as seeds out of which individual things are developed. All living and sentient things are formed out of insentient atoms (*e.g.* worms spring out of dung). The peculiarity of organic and sentient bodies is due to the minuteness and shape of their particles, and to their special motions and combinations. So, too, mind consists but of extremely fine particles of matter, and dissolves into air when the body dies. Lucretius traces, in the fifth book of his poem, the progressive genesis of vegetal and animal forms out of the mother-earth. He vaguely anticipates the modern idea of the world as a survival of the fittest when he says that many races may have lived and died out, and that those which still exist have been protected either by craft, courage or speed. Lucretius touches on the development of man out of a primitive, hardy, beast-like condition. Pregnant hints are given respecting a natural development of language which has its germs in sounds of quadrupeds and birds, of religious ideas out of dreams and waking hallucinations, and of the art of music by help of the suggestion of natural sounds. Lucretius thus recognizes the whole range of existence to which the doctrine of evolution may be applied.

Neoplatonists.—In the doctrines of the Neoplatonists, of whom Plotinus is the most important, we have the world-process represented after the example of Plato as a series of descending steps, each being less perfect than its predecessors, since it is further removed from the first cause.[4] The system of Plotinus, Zellar remarks, is not strictly speaking one of emanation, since there is no communication of the divine essence to the created world; yet it resembles emanation inasmuch as the genesis of the world is conceived as a necessary physical effect, and not as the result of volition. In Proclus we find this conception of an emanation of the world out of the Deity, or the absolute, made more exact, the process being regarded as threefold—(1) persistence of cause in effect, (2) the departure of effect from cause, and (3) the tendency of effect to revert to its cause.

The Fathers.—The speculations of the fathers respecting the origin and course of the world seek to combine Christian ideas of the Deity with doctrines of Greek philosophy. The common idea of the origin of things is that of an absolute creation of matter and mind alike. The course of human history is regarded by those writers who are most concerned to refute Judaism as a progressive divine education. Among the Gnostics we meet with the hypothesis of emanation, as, for example, in the curious cosmic theory of Valentinus.

Middle Ages—Early Schoolmen.—In the speculative writings of the middle ages, including those of the schoolmen, we find no progress towards a more accurate and scientific view of nature. The cosmology of this period consists for the most part of the Aristotelian teleological view of nature combined with the Christian idea of the Deity and His relation to the world. In certain writers, however, there appears a more elaborate transformation of the doctrine of creation into a system of emanation. According to John Scotus Erigena, the nothing out of which the world is created is the divine essence. Creation is the act by which God passes through the primordial causes, or universal ideas, into the region of particular things (*processio*), in order finally to return to himself (*reversio*). The transition from the universal to the particular is of course conceived as a descent or degradation. A similar doctrine of emanation is to be found in the writings of Bernhard of Chartres, who conceives the process of the unfolding of the world as a movement in a circle from the most general to the individual, and from this back to the most general. This movement is said to go forth from God to the animated heaven, stars, visible world and man, which represent decreasing degrees of cognition.

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[1] Zeller says that through this distinction Aristotle first made possible the idea of development.

[2] See this well brought out in G. H. Lewes's *Aristotle*, p. 187.

[3] Grote calls attention to the contrast between Plato's and Aristotle's way of conceiving the gradations of mind (*Aristotle*, ii. 171).

[4] Zeller observes that this scale of decreasing perfection is a necessary consequence of the idea of a transcendent deity.

Arab Philosophers.—Elaborate doctrines of emanation, largely based on Neoplatonic ideas, are also propounded by some of the Arabic philosophers, as by Fārābī and Avicenna. The leading thought is that of a descending series of intelligences, each emanating from its predecessor, and having its appropriate region in the universe.

Jewish Philosophy.—In the Jewish speculations of the middle ages may be found curious forms of the doctrine of emanations uniting the Biblical idea of creation with elements drawn from the Persians and the Greeks. In the later and developed form of the Kabbala, the origin of the world is represented as a gradually descending emanation of the lower out of the higher. Among the philosophic Jews, the Spanish Avicebron, in his *Fons Vitae*, expounds a curious doctrine of emanation. Here the divine will is viewed as an efflux from the divine wisdom, as the intermediate link between God, the first substance, and all things, and as the fountain out of which all forms emanate. At the same time all forms, including the higher intelligible ones, are said to have their existence only in matter. Matter is the one universal substance, body and mind being merely specifications of this. Thus Avicebron approaches, as Salomon Munk observes,[1] a pantheistic conception of the world, though he distinctly denies both matter and form to God.

Later Scholastics.—Passing now to the later schoolmen, a bare mention must be made of Thomas Aquinas, who elaborately argues for the absolute creation of the world out of nothing, and of Albertus Magnus, who reasons against the Aristotelian idea of the past eternity of the world. More importance attaches to Duns Scotus, who brings prominently forward the idea of a progressive development in nature by means of a process of determination. The original substance of the world is the *materia primo-prima*, which is the immediate creation of the Deity. This serves Duns Scotus as the most universal basis of existence, all angels having material bodies. This matter is differentiated into particular things (which are not privations but perfections) through the addition of an individualizing principle (*haecceitas*) to the universal (*quidditas*). The whole world is represented by the figure of a tree, of which the seeds and roots are the first indeterminate matter, the leaves the accidents, the twigs and branches corruptible creatures, the blossoms the rational soul, and the fruit pure spirits or angels. It is also described as a bifurcation of two twigs, mental and bodily creation out of a common root. One might almost say that Duns Scotus recognizes the principle of a gradual physical evolution, only that he chooses to represent the mechanism by which the process is brought about by means of quaint scholastic fictions.

Revival of Learning.—The period of the revival of learning, which was also that of a renewed study of nature, is marked by a considerable amount of speculation respecting the origin of the universe. In some of these we see a return to Greek theories, though the influence of physical discoveries, more especially those of Copernicus, Kepler and Galileo, is distinctly traceable.

Telesio.—An example of a return to early Greek speculation is to be met with in Bernardino Telesio. By this writer the world is explained as a product of three principles—dead matter, and two active forces, heat and cold. Terrestrial things arise through a confluence of heat, which issues from the heavens, and cold, which comes from the earth. Both principles have sensibility, and thus all products of their collision are sentient, that is, feel pleasure and pain. The superiority of animals to plants and metals in the possession of special organs of sense is connected with the greater complexity and heterogeneity of their structure.

Giordano Bruno.—In the system of Giordano Bruno, who sought to construct a philosophy of nature on the basis of new scientific ideas, more particularly the doctrine of Copernicus, we find the outlines of a theory of cosmic evolution conceived as an essentially vital process. Matter and form are here identified, and the evolution of the world is presented as the unfolding of the world-spirit to its perfect forms according to the plastic substratum (matter) which is but one of its sides. This process of change is conceived as a transformation, in appearance only, of the real unchanging substance (matter and form). All parts of matter are capable of developing into all forms; thus the materials of the table and chair may under proper circumstances be developed to the life of the plant or of the animal. The elementary parts of existence are the *minima*, or monads, which are at once material and mental. On their material side they are not absolutely unextended, but spherical. Bruno looked on our solar system as but one out of an infinite number of worlds. His theory of evolution is essentially pantheistic, and he does not employ his hypothesis of monads in order to work out a more mechanical conception.

Campanella.—A word must be given to one of Bruno's contemporary compatriots, namely Campanella, who gave poetic expression to that system of universal vitalism which Bruno developed. He argues, from the principle *quicquid est in effectibus esse et in causis*, that the elements and the whole world have sensation, and thus he appears to derive the organic part of nature out of the so-called "inorganic."

Boehme.—Another writer of this transition period deserves a passing reference here, namely, Jacob Boehme the mystic, who by his conception of a process of inner diremption as the essential character of all mind, and so of God, prepared the way for later German theories of the origin of the world as the self-differentiation and self-externalization of the absolute spirit.

Hobbes and Gassendi.—The influence of an advancing study of nature, which was stimulated if not guided by Bacon's writings, is seen in the more careful doctrines of materialism worked out almost simultaneously by Hobbes and Gassendi. These theories, however, contain little that bears directly on the hypothesis of a natural evolution of things. In the view of Hobbes, the difficulty of the genesis of conscious minds is solved by saying that sensation and thought are part of the reaction of the organism on external movement. Yet Hobbes appears (as Clarke points out) to have vaguely felt the difficulty; and in a passage of his *Physics* (chap. 25, sect. 5) he says that the universal existence of sensation in matter cannot be disproved, though he shows that when there are no organic arrangements the mental side of the movement (*phantasma*) is evanescent. The theory of the origin of society put forth by Hobbes, though directly opposed in most respects to modern ideas of social evolution, deserves mention here by reason of its enforcing that principle of struggle (*bellum omnium contra omnes*) which has played so conspicuous a part in the modern doctrine of evolution. Gassendi, with some deviations, follows Epicurus in his theory of the formation of the world. The world consists of a finite number of atoms, which have in their own nature a self-moving force or principle. These atoms, which are the seeds of all things, are, however, not eternal but created by God. Gassendi distinctly argues against the existence of a world-soul or a principle of life in nature.

Descartes.—In the philosophy of Descartes we meet with a dualism of mind and matter which does not easily lend itself to the conception of evolution. His doctrine that consciousness is confined to man, the lower animals being unconscious machines (*automata*), excludes all idea of a progressive development of mind. Yet Descartes, in his *Principia Philosophiae*, laid the foundation of the modern mechanical conception of nature and of physical evolution. In the third part of this work he inclines to a thoroughly natural hypothesis respecting the genesis of the physical world, and adds in the fourth part that the same kind of explanation might be applied to the nature and formation of plants and animals. He is indeed careful to keep right with the orthodox doctrine of creation by saying that he does not believe the world actually arose in this mechanical way out of the three kinds of elements which he here supposes, but that he simply puts out his hypothesis as a mode of conceiving how it might have arisen. Descartes's account of the mind and its passions is thoroughly materialistic, and to this extent he works in the direction of a materialistic explanation of the origin of mental life.

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[1] *Mélanges de philosophie juive et arabe*, p. 225.

Spinoza.—In Spinoza's pantheistic theory of the world, which regards thought and extension as but two sides of one substance, the problem of becoming is submerged in that of being. Although Spinoza's theory attributes a mental side to all physical events, he rejects all teleological conceptions and explains the order of things as the result of an inherent necessity. He recognizes gradations of things according to the degree of complexity of their movements and that of their conceptions. To Spinoza (as Kuno Fischer observes) man differs from the rest of nature in the degree only and not in the kind of his powers. So far Spinoza approaches the conception of evolution. He may be said to furnish a further contribution to a metaphysical conception of evolution in his view of all finite individual things as the infinite variety to which the unlimited productive power of the universal substance gives birth. Sir F. Pollock has taken pains to show how nearly Spinoza approaches certain ideas contained in the modern doctrine of evolution, as for example that of self-preservation as the determining force in things.

Locke.—In Locke we find, with a retention of certain anti-evolutionist ideas, a marked tendency to this mode of viewing the world. To Locke the universe is the result of a direct act of creation, even matter being limited in duration and created. Even if matter were eternal it would, he thinks, be incapable of producing motion; and if motion is itself conceived as eternal, thought can never begin to be. The first eternal being is thus spiritual or "cogitative," and contains in itself all the perfections that can ever after exist. He repeatedly insists on the impossibility of senseless matter putting on sense.[1] Yet while thus placing himself at a point of view opposed to that of a gradual evolution of the organic world, Locke prepared the way for this doctrine in more ways than one. First of all, his genetic method as applied to the mind's ideas—which laid the foundations of English analytical psychology—was a step in the direction of a conception of mental life as a gradual evolution. Again he works towards the same end in his celebrated refutation of the scholastic theory of real specific essences. In this argument he emphasizes the vagueness of the boundaries which mark off organic species with a view to show that these do not correspond to absolutely fixed divisions in the objective world, that they are made by the mind, not by nature.[2] This idea of the continuity of species is developed more fully in a remarkable passage (*Essay*, bk. iii. ch. vi. § 12), where he is arguing in favour of the hypothesis, afterwards elaborated by Leibnitz, of a graduated series of minds (species of spirits) from the Deity down to the lowest animal intelligence. He here observes that "all quite down from us the descent is by easy steps, and a continued series of things, that in each remove differ very little from one another." Thus man approaches the beasts, and the animal kingdom is nearly joined with the vegetable, and so on down to the lowest and "most inorganical parts of matter." Finally, it is to be observed that Locke had a singularly clear view of organic arrangements (which of course he explained according to a theistic teleology) as an adaptation to the circumstances of the environment or to "the neighbourhood of the bodies that surround us." Thus he suggests that man has not eyes of a microscopic delicacy, because he would receive no great advantage from such acute organs, since though adding indefinitely to his speculative knowledge of the physical world they would not practically benefit their possessor (*e.g.* by enabling him to avoid things at a convenient distance).[3]

Idea of Progress in History.—Before leaving the 17th century we must just refer to the writers who laid the foundations of the essentially modern conception of human history as a gradual upward progress. According to Flint,[4] there were four men who in this and the preceding century seized and made prominent this idea, namely, Bodin, Bacon, Descartes and Pascal. The former distinctly argues against the idea of a deterioration of man in the past. In this way we see that just as advancing natural science was preparing the way for a doctrine of physical evolution, so advancing historical research was leading to the application of a similar idea to the collective human life.

English Writers of the 18th Century—Hume.—The theological discussions which make up so large a part of the English speculation of the 18th century cannot detain us here. There is, however, one writer who sets forth so clearly the alternative suppositions respecting the origin of the world that he claims a brief notice. We refer to David Hume. In his *Dialogues concerning Natural Religion* he puts forward tentatively, in the person of one of his interlocutors, the ancient hypothesis that since the world resembles an animal or vegetal organism rather than a machine, it might more easily be accounted for by a process of generation than by an act of creation. Later on he develops the materialistic view of Epicurus, only modifying it so far as to conceive of matter as finite. Since a finite number of particles is only susceptible of finite transpositions, it must happen (he says), in an eternal duration that every possible order or position will be tried an infinite number of times, and hence this world is to be regarded (as the Stoics maintained) as an exact reproduction of previous worlds. The speaker seeks to make intelligible the appearance of art and contrivance in the world as a result of a natural settlement of the universe (which passes through a succession of chaotic conditions) into a stable condition, having a constancy in its forms, yet without its several parts losing their motion and fluctuation.

French Writers of the 18th Century.—Let us now pass to the French writers of the 18th century. Here we are first struck by the results of advancing physical speculation in their bearing on the conception of the world. Careful attempts, based on new scientific truths, are made to explain the genesis of the world as a natural process. Maupertuis, who, together with Voltaire, introduced the new idea of the universe as based on Newton's discoveries, sought to account for the origin of organic things by the hypothesis of sentient atoms. Buffon the naturalist speculated, not only on the structure and genesis of organic beings, but also on the course of formation of the earth and solar system, which he conceived after the analogy of the development of organic beings out of seed. Diderot, too, in his varied intellectual activity, found time to speculate on the genesis of sensation and thought out of a combination of matter endowed with an elementary kind of sentience. De la Mettrie worked out a materialistic doctrine of the origin of things, according to which sensation and consciousness are nothing but a development out of matter. He sought (*L'Homme-machine*) to connect man in his original condition with the lower animals, and emphasized (*L'Homme-plante*) the essential unity of plan of all living things. Helvétius, in his work on man, referred all differences between our species and the lower animals to certain peculiarities of organization, and so prepared the way for a conception of human development out of lower forms as a process of physical evolution. Charles Bonnet met the difficulty of the origin of conscious beings much in the same way as Leibnitz, by the supposition of eternal minute organic bodies to which are attached immortal souls. Yet though in this way opposing himself to the method of the modern doctrine of evolution, he aided the development of this doctrine by his view of the organic world as an ascending scale from the simple to the complex. Robinet, in his treatise *De la nature*, worked out the same conception of a gradation in organic existence, connecting this with a general view of nature as a progress from the lowest inorganic forms of matter up to man. The process is conceived as an infinite series of variations or specifications of one primitive and common type. Man is the *chef-d'œuvre* of nature, which the gradual progression of beings was to have as its last term, and all lower creations are regarded as pre-conditions of man's existence, since nature "could only realize the human form by combining in all imaginable ways each of the traits which was to enter into it." The formative force in this process of evolution (or "metamorphosis") is conceived as an intellectual principle (*idée génératrice*). Robinet thus laid the foundation of that view of the world as wholly vital, and as a progressive unfolding of a spiritual formative principle, which was afterwards worked out by Schelling. It is to be added that Robinet adopted a thorough-going materialistic view of the dependence of mind on body, going even to the length of assigning special nerve-fibres to the moral sense. The system of Holbach seeks to provide a consistent materialistic view of the world and its processes. Mental operations are identified with physical movements, the three conditions of physical movement, inertia, attraction and repulsion, being in the moral world self-love, love and hate. He left open the question whether the capability of sensation belongs to all matter, or is confined to the combinations of certain materials. He looked on the actions of the individual organism and of society as determined by the needs of self-preservation. He conceived of man as a product of nature that had gradually developed itself from a low condition, though he relinquished the problem of the exact mode of his first genesis and advance as not soluble by data of experience. Holbach thus worked out the basis of a rigorously materialistic conception of evolution.

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[1] Yet he leaves open the question whether the Deity has annexed thought to matter as a faculty, or whether it rests on a distinct spiritual principle.

[2] Locke half playfully touches on certain monsters, with respect to which it is difficult to determine whether they ought to be called men. (*Essay*, book iii. ch. vi. sect. 26, 27.)

[3] A similar coincidence between the teleological and the modern evolutional way of viewing things is to be met with in Locke's account of the use of pain in relation to the preservation of our being (bk. ii. ch. vii. sect. 4).

[4] *Philosophy of History* (1893), p. 103, where an interesting sketch of the growth of the idea of progress is to be found.

The question of human development which Holbach touched on was one which occupied many minds both in and out of France during the 18th century, and more especially towards its close. The foundations of this theory of history as an upward progress of man out of a barbaric and animal condition were laid by Vico in his celebrated work *Principii di scienza nuova*. In France the doctrine was represented by Turgot and Condorcet.

German Writers of the 18th Century—Leibnitz.—In Leibnitz we find, if not a doctrine of evolution in the strict sense, a theory of the world which is curiously related to the modern doctrine. The chief aim of Leibnitz is no doubt to account for the world in its static aspect as a co-existent whole, to conceive the ultimate reality of things in such a way as to solve the mystery of mind and matter. Yet by his very mode of solving the problem he is led on to consider the nature of the world-process. By placing substantial reality in an infinite number of monads whose essential nature is force or activity, which is conceived as mental (representation), Leibnitz was carried on to the explanation of the successive order of the world. He prepares the way, too, for a doctrine of evolution by his monistic idea of the substantial similarity of all things, inorganic and organic, bodily and spiritual, and still more by his conception of a perfect gradation of existence from the lowest "inanimate" objects, whose essential activity is confused representation, up to the highest organized being—man—with his clear intelligence.[1] Turning now to Leibnitz's conception of the world as a process, we see first that he supplies, in his notion of the underlying reality as force which is represented as spiritual (*quelque chose d'analogique au sentiment et à l'appétit*), both a mechanical and a teleological explanation of its order. More than this, Leibnitz supposes that the activity of the monads takes the form of a self-evolution. It is the following out of an inherent tendency or impulse to a series of changes, all of which were virtually pre-existent, and this process cannot be interfered with from without. As the individual monad, so the whole system which makes up the world is a gradual development. In this case, however, we cannot say that each step goes out of the other as in that of individual development. Each monad is an original independent being, and is determined to take this particular point in the universe, this place in the scale of beings. We see how different this metaphysical conception is from that scientific notion of cosmic evolution in which the lower stages are the antecedents and conditions of the higher. It is probable that Leibnitz's notion of time and space, which approaches Kant's theory, led him to attach but little importance to the successive order of the world. Leibnitz, in fact, presents to us an infinite system of perfectly distinct though parallel developments, which on their mental side assume the aspect of a scale, not through any mutual action, but solely through the determination of the Deity. Even this idea, however, is incomplete, for Leibnitz fails to explain the physical aspect of development. Thus he does not account for the fact that organic beings—which have always existed as preformations (in the case of animals as *animaux spermatiques*)—come to be developed under given conditions. Yet Leibnitz prepared the way for a new conception of organic evolution. The modern monistic doctrine, that all material things consist of sentient elements, and that consciousness arises through a combination of these, was a natural transformation of Leibnitz's theory.[2]

Lessing.—Of Leibnitz's immediate followers we may mention Lessing, who in his *Education of the Human Race* brought out the truth of the process of gradual development underlying human history, even though he expressed this in a form inconsistent with the idea of a spontaneous evolution.

Herder.—Herder, on the other hand, Lessing's contemporary, treated the subject of man's development in a thoroughly naturalistic spirit. In his *Ideen zur Philosophie der Geschichte*, Herder adopts Leibnitz's idea of a graduated scale of beings, at the same time conceiving of the lower stages as the conditions of the higher. Thus man is said to be the highest product of nature, and as such to be dependent on all lower products. All material things are assimilated to one another as organic, the vitalizing principle being inherent in all matter. The development of man is explained in connexion with that of the earth, and in relation to climatic variations, &c. Man's mental faculties are viewed as related to his organization, and as developed under the pressure of the necessities of life.[3]

Kant.—Kant's relation to the doctrine of evolution is a many-sided one. In the first place, his peculiar system of subjective idealism, involving the idea that time is but a mental form to which there corresponds nothing in the sphere of noümenal reality, serves to give a peculiar philosophical interpretation to every doctrine of cosmic evolution. Kant, like Leibnitz, seeks to reconcile the mechanical and teleological views of nature, only he assigns to these different spheres. The order of the inorganic world is explained by properly physical causes. In his *Naturgeschichte des Himmels*, in which he anticipated the nebular theory afterwards more fully developed by Laplace, Kant sought to explain the genesis of the cosmos as a product of physical forces and laws. The worlds, or systems of worlds, which fill infinite space are continually being formed and destroyed. Chaos passes by a process of evolution into a cosmos, and this again into chaos. So far as the evolution of the solar system is concerned, Kant held these mechanical causes as adequate. For the world as a whole, however, he postulated a beginning in time (whence his use of the word creation), and further supposed that the impulse of organization which was conveyed to chaotic matter by the Creator issued from a central point in the infinite space spreading gradually outwards.[4] While in his cosmology Kant thus relies on mechanical conceptions, in his treatment of organic life his mind is, on the contrary, dominated by teleological ideas. An organism was to him something controlled by a formative organizing principle. It was natural, therefore, that he rejected the idea of a spontaneous generation of organisms (which was just then being advocated by his friend Forster), not only as unsupported by experience but as an inadequate hypothesis. Experience forbids our excluding organic activity from natural causes, also our excluding intelligence from purposeful (*zwecktätigen*) causes; hence experience forbids our defining the fundamental force or first cause out of which living creatures arose.[1] Just as Kant thus sharply marks off the regions of the inorganic and the organic, so he sets man in strong opposition to the lower animals. His ascription to man of a unique faculty, free-will, forbade his conceiving our species as a link in a graduated series of organic developments. In his doctrine of human development he does indeed recognize an early stage of existence in which our species was dominated by sensuous enjoyment and instinct. He further conceives of this stage as itself a process of (natural) development, namely, of the natural disposition of the species to vary in the greatest possible manner so as to preserve its unity through a process of self-adaptation (*Anarten*) to climate. This, he says, must not be conceived as resulting from the action of external causes, but is due to a natural disposition (*Anlage*). From this capability of natural development (which already involves a teleological idea) Kant distinguishes the power of moral self-development or self-liberation from the dominion of nature, the gradual realization of which constitutes human history or progress. This moral development is regarded as a gradual approach to that rational, social and political state in which will be realized the greatest possible quantity of liberty. Thus Kant, though he appropriated and gave new form to the idea of human progress, conceived of this as wholly distinct from a natural (mechanical) process. In this particular, as in his view of organic actions, Kant distinctly opposed the idea of evolution as one universal process swaying alike the physical and the moral world.

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[1] G. H. Lewes points out that Leibnitz is inconsistent in his account of the intelligence of man in relation to that of lower animals, since when answering Locke he no longer regards these as differing in degree only.

[2] Both Lewes and du Bois Reymond have brought out the points of contact between Leibnitz's theory of monads and modern biological speculations (*Hist. of Phil.* ii. 287, and *Leibnitzsche Gedanken in der modernen Naturwissenschaft*, p. 23 seq.).

[3] For Herder's position in relation to the modern doctrine of evolution see F. von Bärenbach's *Herder als Vorgänger Darwins*, a work which tends to exaggerate the proximity of the two writers.

[4] Kant held it probable that other planets besides our earth are inhabited, and that their inhabitants form a scale of beings, their perfection increasing with the distance of the planet which they inhabit from the sun.

Schelling.—In the earlier writings of Schelling, containing the philosophy of identity, existence is represented as a becoming, or process of evolution. Nature and mind (which are the two sides, or polar directions, of the one absolute) are each viewed as an activity advancing by an uninterrupted succession of stages. The side of this process which Schelling worked out most completely is the negative side, that is, nature. Nature is essentially a process of organic self-evolution. It can only be understood by subordinating the mechanical conception to the vital, by conceiving the world as one organism animated by a spiritual principle or intelligence (*Weltseele*). From this point of view the processes of nature from the inorganic up to the most complex of the organic become stages in the self-realization of nature. All organic forms are at bottom but one organization, and the inorganic world shows the same formative activity in various degrees or potences. Schelling conceives of the gradual self-evolution of nature in a succession of higher and higher forms as brought about by a limitation of her infinite productivity, showing itself in a series of points of arrest. The detailed exhibition of the organizing activity of nature in the several processes of the organic and inorganic world rests on a number of fanciful and unscientific ideas. Schelling's theory is a bold attempt to revitalize nature in the light of growing physical and physiological science, and by so doing to comprehend the unity of the world under the idea of one principle of organic development. His highly figurative language might leave us in doubt how far he conceived the higher stages of this evolution of nature as following the lower in time. In the introduction to his work *Von der Weltseele*, however, he argues in favour of the possibility of a transmutation of species in periods incommensurable with ours. The evolution of mind (the positive pole) proceeds by way of three stages—theoretic, practical and aesthetical activity. Schelling's later theosophic speculations do not specially concern us here.

Followers of Schelling.—Of the followers of Schelling a word or two must be said. Heinrich Steffens, in his *Anthropologie*, seeks to trace out the origin and history of man in connexion with a general theory of the development of the earth, and this again as related to the formation of the solar system. All these processes are regarded as a series of manifestations of a vital principle in higher and higher forms. Oken, again, who carries Schelling's ideas into the region of biological science, seeks to reconstruct the gradual evolution of the material world out of original matter, which is the first immediate appearance of God, or the absolute. This process is an upward one, through the formation of the solar system and of our earth with its inorganic bodies, up to the production of man. The process is essentially a polar linear action, or differentiation from a common centre. By means of this process the bodies of the solar system separate themselves, and the order of cosmic evolution is repeated in that of terrestrial evolution. The organic world (like the world as a whole) arises out of a primitive chaos, namely, the infusorial slime. A somewhat similar working out of Schelling's idea is to be found in H. C. Oersted's work entitled *The Soul in Nature* (Eng. trans.). Of later works based on Schelling's doctrine of evolution mention may be made of the volume entitled *Natur und Idee*, by G. F. Carus. According to this writer, existence is nothing but a becoming, and matter is simply the momentary product of the process of becoming, while force is this process constantly revealing itself in these products.

Hegel.—Like Schelling, Hegel conceives the problem of existence as one of becoming. He differs from him with respect to the ultimate motive of that process of gradual evolution which reveals itself alike in nature and in mind. With Hegel the absolute is itself a dialectic process which contains within itself a principle of progress from difference to difference and from unity to unity. "This process (W. Wallace remarks) knows nothing of the distinctions between past and future, because it implies an eternal present." This conception of an immanent spontaneous evolution is applied alike both to nature and to mind and history. Nature to Hegel is the idea in the form of hetereity; and finding itself here it has to remove this exteriority in a progressive evolution towards an existence for itself in life and mind. Nature (says Zeller) is to Hegel a system of gradations, of which one arises necessarily out of the other, and is the proximate truth of that out of which it results. There are three stadia, or moments, in this process of nature—(1) the mechanical moment, or matter devoid of individuality; (2) the physical moment, or matter which has particularized itself in bodies—the solar system; and (3) the organic moment, or organic beings, beginning with the geological organism—or the mineral kingdom, plants and animals. Yet this process of development is not to be conceived as if one stage is naturally produced out of the other, and not even as if the one followed the other in time. Only spirit has a history; in nature all forms are contemporaneous.[2] Hegel's interpretation of mind and history as a process of evolution has more scientific interest than his conception of nature. His theory of the development of free-will (the objective spirit), which takes its start from Kant's conception of history, with its three stages of legal right, morality as determined by motive and instinctive goodness (*Sittlichkeit*), might almost as well be expressed in terms of a thoroughly naturalistic doctrine of human development. So, too, some of his conceptions respecting the development of art and religion (the absolute spirit) lend themselves to a similar interpretation. Yet while, in its application to history, Hegel's theory of evolution has points of resemblance with those doctrines which seek to explain the world-process as one unbroken progress occurring in time, it constitutes on the whole a theory apart and *sui generis*. It does not conceive of the organic as succeeding on the inorganic, or of conscious life as conditioned in time by lower forms. In this respect it resembles Leibnitz's idea of the world as a development; the idea of evolution is in each case a metaphysical as distinguished from a scientific one. Hegel gives a place in his metaphysical system to the mechanical and the teleological views; yet in his treatment of the world as an evolution the idea of end or purpose is the predominant one.

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[1] Kant calls the doctrine of the transmutation of species "a hazardous fancy of the reason." Yet, as Strauss and others have shown, Kant's mind betrayed a decided leaning at times to a more mechanical conception of organic forms as related by descent.

[2] Hegel somewhere says that the question of the eternal duration of the world is unanswerable: time as well as space can be predicated of finitudes only.

Of the followers of Hegel who have worked out his peculiar idea of evolution it is hardly necessary to speak. A bare reference may be made to J. K. F. Rosenkranz, who in his work *Hegel's Naturphilosophie* seeks to develop Hegel's idea of an earth-organism in the light of modern science, recognizing in crystallization the morphological element.

Schopenhauer.—Of the other German philosophers immediately following Kant, there is only one who calls for notice here, namely, Arthur Schopenhauer. This writer, by his conception of the world as will which objectifies itself in a series of gradations from the lowest manifestations of matter up to conscious man, gives a slightly new shape to the evolutional view of Schelling, though he deprives this view of its optimistic character by denying any co-operation of intelligence in the world-process. In truth, Schopenhauer's conception of the world as the activity of a blind force is at bottom a materialistic and mechanical rather than a spiritualistic and teleological theory. Moreover, Schopenhauer's subjective idealism, and his view of time as something illusory, hindered him from viewing this process as a sequence of events in time. Thus he ascribes eternity of existence to species under the form of the "Platonic ideas." As Ludwig Noiré observes, Schopenhauer has no feeling for the problem of the origin of organic beings. He says Lamarck's original animal is something metaphysical, not physical, namely, the will to live. "Every species (according to Schopenhauer) has of its own will, and according to the circumstances under which it would live, determined its form and organization,—yet not as something physical in time, but as something metaphysical out of time."

Von Baer.—Before leaving the German speculation of the first half of the century, a word must be said of von Baer, to whose biological contributions we shall refer later in this article, who recognized in the law of development the law of the universe as a whole. In his *Entwickelungsgeschichte der Thiere* (p. 264) he distinctly tells us that the law of growing individuality is "the fundamental thought which goes through all forms and degrees of animal development and all single relations. It is the same thought which collected in the cosmic space the divided masses into spheres, and combined these to solar systems; the same which caused the weather-beaten dust on the surface of our metallic planet to spring forth into living forms." Von Baer thus prepared the way for Herbert Spencer's generalization of the law of organic evolution as the law of all evolution.

Comte.—As we arrive at the 19th century, though yet before the days of Darwin, biology is already beginning to affect the general aspect of thought. It might suffice to single out the influence of Auguste Comte, as the last great thinker who wrote before Darwinism began to permeate philosophic speculation. Though Comte did not actually contribute to a theory of cosmic organic evolution, he helped to lay the foundations of a scientific conception of human history as a natural process of development determined by general laws of human nature together with the accumulating influences of the past. Comte does not recognize that this process is aided by any increase of innate capacity; on the contrary, progress is to him the unfolding of fundamental faculties of human nature which always pre-existed in a latent condition; yet he may perhaps be said to have prepared the way for the new conception of human progress by his inclusion of mental laws under biology.

Development of the Biological Doctrine.—In the 19th century the doctrine of evolution received new biological contents and became transformed from a vague, partly metaphysical theory to the dominant modern conception. At this point it is convenient to leave the guidance of Professor J. Sully and to follow closely T. H. Huxley, who in the 9th edition of this encyclopaedia traced the history of the growth of the biological idea of evolution from its philosophical beginnings to its efflorescence in Charles Darwin.

In the earlier half of the 18th century the term "evolution" was introduced into biological writings in order to denote the mode in which some of the most eminent physiologists of that time conceived that the generation of living things took place; in opposition to the hypothesis advocated, in the preceding century, by W. Harvey in that remarkable work[1] which would give him a claim to rank among the founders of biological science, even had he not been the discoverer of the circulation of the blood.

One of Harvey's prime objects is to defend and establish, on the basis of direct observation, the opinion already held by Aristotle, that, in the higher animals at any rate, the formation of the new organism by the process of generation takes place, not suddenly, by simultaneous accretion of rudiments of all or the most important of the organs of the adult, nor by sudden metamorphosis of a formative substance into a miniature of the whole, which subsequently grows, but by *epigenesis*, or successive differentiation of a relatively homogeneous rudiment into the parts and structures which are characteristic of the adult.

> "Et primo, quidem, quoniam per *epigenesin* sive partium superexorientium additamentum pullum fabricari certum est: quaenam pars ante alias omnes exstruatur, et quid de illa ejusque generandi modo observandum veniat, dispiciemus. Ratum sane est et in ovo manifeste apparet quod *Aristoteles* de perfectorum animalium generatione enuntiat: nimirum, non omnes partes simul fieri, sed ordine aliam post aliam; primumque existere particulam genitalem, cujus virtute postea (tanquam ex principio quodam) reliquae omnes partes prosiliant. Qualem in plantarum seminibus (fabis, puta, aut glandibus) gemmam sive apicem protuberantem cernimus, totius futurae arboris principium. *Estque haec particula velut filius emancipatus seorsumque collocatus, et principium per se vivens; unde postea membrorum ordo describitur; et quaecunque ad absolvendum animal pertinent, disponuntur.*[2] Quoniam enim *nulla pars se ipsam generat; sed postquam generata est, se ipsam jam auget; ideo eam primum oriri necesse est, quae principium augendi contineat* (*sive enim planta, sive animal est, aeque omnibus inest quod vim habeat vegetandi, sive nutriendi*),[3] simulque reliquas omnes partes suo quamque ordine distinguat et formet; proindeque in eadem primogenita particula anima primario inest, sensus, motusque, et totius vitae auctor et principium." (*Exercitatio* 51.)

Harvey proceeds to contrast this view with that of the "Medici," or followers of Hippocrates and Galen, who, "badly philosophizing," imagined that the brain, the heart, and the liver were simultaneously first generated in the form of vesicles; and, at the same time, while expressing his agreement with Aristotle in the principle of epigenesis, he maintains that it is the blood which is the primal generative part, and not, as Aristotle thought, the heart.

In the latter part of the 17th century the doctrine of epigenesis thus advocated by Harvey was controverted on the ground of direct observation by M. Malpighi, who affirmed that the body of the chick is to be seen in the egg before the *punctum sanguineum* makes it appearance. But from this perfectly correct observation a conclusion which is by no means warranted was drawn, namely, that the chick as a whole really exists in the egg antecedently to incubation; and that what happens in the course of the latter process is no addition of new parts, "alias post alias natas," as Harvey puts it, but a simple expansion or unfolding of the organs which already exist, though they are too small and inconspicuous to be discovered. The weight of Malpighi's observations therefore fell into the scale of that doctrine which Harvey terms metamorphosis, in contradistinction to epigenesis.

The views of Malpighi were warmly welcomed on philosophical grounds by Leibnitz,[4] who found in them a support to his hypothesis of monads, and by Nicholas Malebranche;[1] while, in the middle of the 18th century, not only speculative considerations, but a great number of new and interesting observations on the phenomena of generation, led the ingenious Charles Bonnet and A. von Haller, the first physiologist of the age, to adopt, advocate and extend them.

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[1] The *Exercitationes de generatione animalium*, which Dr George Ent extracted from him and published in 1651.

[2] *De generatione animalium*, lib. ii. cap. x.

[3] *De generatione animalium*, lib. ii. cap. iv.

[4] "Cependant, pour revenir aux formes ordinaires ou aux âmes matérielles, cette durée qu'il leur faut attribuer, à la place de celle qu'on avoit attribuée aux atomes pourroit faire douter si elles ne vont pas de corps en corps; ce qui seroit la métempsychose, à peu près comme quelques philosophes ont cru la transmission du mouvement

Bonnet affirms that, before fecundation, the hen's egg contains an excessively minute but complete chick; and that fecundation and incubation simply cause this germ to absorb nutritious matters, which are deposited in the interstices of the elementary structures of which the miniature chick, or germ, is made up. The consequence of this intussusceptive growth is the "development" or "evolution" of the germ into the visible bird. Thus an organized individual (*tout organisé*) "is a composite body consisting of the original, or *elementary*, parts and of the matters which have been associated with them by the aid of nutrition"; so that, if these matters could be extracted from the individual (*tout*), it would, so to speak, become concentrated in a point, and would thus be restored to its primitive condition of a *germ*; "just as, by extracting from a bone the calcareous substance which is the source of its hardness, it is reduced to its primitive state of gristle or membrane."[2]

"Evolution" and "development" are, for Bonnet, synonymous terms; and since by "evolution" he means simply the expansion of that which was invisible into visibility, he was naturally led to the conclusion, at which Leibnitz had arrived by a different line of reasoning, that no such thing as generation, in the proper sense of the word exists in nature. The growth of an organic being is simply a process of enlargement, as a particle of dry gelatine may be swelled up by the intussusception of water; its death is a shrinkage, such as the swelled jelly might undergo on desiccation. Nothing really new is produced in the living world, but the germs which develop have existed since the beginning of things; and nothing really dies, but, when what we call death takes place, the living thing shrinks back into its germ state.[3]

The two parts of Bonnet's hypothesis, namely, the doctrine that all living things proceed from pre-existing germs, and that these contain, one enclosed within the other, the germs of all future living things, which is the hypothesis of "emboîtement," and the doctrine that every germ contains in miniature all the organs of the adult, which is the hypothesis of evolution or development, in the primary senses of these words, must be carefully distinguished. In fact, while holding firmly by the former, Bonnet more or less modified the latter in his later writings, and, at length, he admits that a "germ" need not be an actual miniature of the organism, but that it may be merely an "original preformation" capable of producing the latter.[4]

But, thus defined, the germ is neither more nor less than the "particula genitalis" of Aristotle, or the "primordium vegetale" or "ovum" of Harvey; and the "evolution" of such a germ would not be distinguishable from "epigenesis."

Supported by the great authority of Haller, the doctrine of evolution, or development, prevailed throughout the whole of the 18th century, and Cuvier appears to have substantially adopted Bonnet's later views, though probably he would not have gone all lengths in the direction of "emboîtement." In a well-known note to Charles Léopold Laurillard's *Éloge*, prefixed to the last edition of the *Ossemens fossiles*, the "radical de l'être" is much the same thing as Aristotle's "particula genitalis" and Harvey's "ovum."[5]

Bonnet's eminent contemporary, Buffon, held nearly the same views with respect to the nature of the germ, and expresses them even more confidently.

> "Ceux qui ont cru que le cœur étoit le premier formé, se sont trompés; ceux qui disent que c'est le sang se trompent aussi: tout est formé en même temps. Si l'on ne consulte que l'observation, le poulet se voit dans l'œuf avant qu'il ait été couvé."[6]
>
> "J'ai ouvert une grande quantité d'œufs à differens temps avant et après l'incubation, et je me suis convaincu par mes yeux que le poulet existe en entier dans le milieu de la cicatrule au moment qu'il sort du corps de la poule."[7]

The "moule intérieur" of Buffon is the aggregate of elementary parts which constitute the individual, and is thus the equivalent of Bonnet's germ,[8] as defined in the passage cited above. But Buffon further imagined that innumerable "molécules organiques" are dispersed throughout the world, and that alimentation consists in the appropriation by the parts of an organism of those molecules which are analogous to them. Growth, therefore, was, on this hypothesis, partly a process of simple evolution, and partly of what has been termed syngenesis. Buffon's opinion is, in fact, a sort of combination of views, essentially similar to those of Bonnet, with others, somewhat similar to those of the "Medici" whom Harvey condemns. The "molécules organiques" are physical equivalents of Leibnitz's "monads."

It is a striking example of the difficulty of getting people to use their own powers of investigation accurately, that this form of the doctrine of evolution should have held its ground so long; for it was thoroughly and completely exploded, not long after its enunciation, by Caspar Frederick Wolff, who in his *Theoria generationis*, published in 1759, placed the opposite theory of epigenesis upon the secure foundation of fact, from which it has never been displaced. But Wolff had no immediate

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et celle des espèces. Mais cette imagination est bien éloignée de la nature des choses. Il n'y a point de tel passage; et c'est ici où les transformations de Messieurs Swammerdam, Malpighi, et Leewenhoek, qui sont des plus excellens observateurs de notre tems, sont venues à mon secours et m'ont fait admettre plus aisément, que l'animal, et toute autre substance organisée ne commence point lorsque nous le croyons, et que sa génération apparente n'est qu'un développement et une espèce d'augmentation. Aussi ai-je remarqué que l'auteur de la *Recherche de la vérité*, M. Regis, M. Hartsœker, et d'autres habiles hommes n'ont pas été fort éloignés de ce sentiment." Leibnitz, *Système nouveau de la nature* (1695). The doctrine of "Emboîtement" is contained in the *Considérations sur le principe de vie* (1705); the preface to the *Théodicée* (1710); and the *Principes de la nature et de la grâce* (§ 6) (1718).

[1] "Il est vrai que la pensée la plus raisonnable et la plus conforme à l'expérience sur cette question très difficile de la formation du fœtus; c'est que les enfans sont déjà presque tout formés avant même l'action par laquelle ils sont conçus; et que leurs mères ne font que leur donner l'accroissement ordinaire dans le temps de la grossesse." *De la recherche de la vérité*, livre ii. chap. vii. p. 334 (7th ed., 1721).

[2] *Considérations sur les corps organisés*, chap. x.

[3] Bonnet had the courage of his opinions, and in the *Palingénésie philosophique*, part vi. chap. iv., he develops a hypothesis which he terms "évolution naturelle"; and which, making allowance for his peculiar views of the nature of generation, bears no small resemblance to what is understood by "evolution" at the present day:—

"Si la volonté divine a créé par un seul Acte l'Universalité des êtres, d'où venoient ces plantes et ces animaux dont Moyse nous décrit la Production au troisième et au cinquième jour du renouvellement de notre monde?

"Abuserois-je de la liberté de conjectures si je disois, que les Plantes et les Animaux qui existent aujourd'hui sont parvenus par une sorte d'évolution naturelle des Êtres organisés qui peuplaient ce premier Monde, sorti immédiatement des MAINS du CRÉATEUR?...

"Ne supposons que trois révolutions. La Terre vient de sortir des MAINS du CRÉATEUR. Des causes préparées par sa SAGESSE font développer de toutes parts les Germes. Les Êtres organisés commencent à jouir de l'existence. Ils étoient probablement alors bien différens de ce qu'ils sont aujourd'hui. Ils l'étoient autant que ce premier Monde différoit de celui que nous habitons. Nous manquons de moyens pour juger de ces dissemblances, et peut-être que le plus habile Naturaliste qui auroit été placé dans ce premier Monde y auroit entièrement méconnu nos Plantes et nos Animaux."

[4] "Ce mot (germe) ne désignera pas seulement un corps organisé *réduit en petit*; il désignera encore toute espèce de *préformation originelle dont un Tout organique peut résulter comme de son principe immédiat.*"—*Palingénésie philosophique*, part. x. chap. ii.

[5] "M. Cuvier considérant que tous les êtres organisés sont dérivés de parens, et ne voyant dans la nature aucune force capable de produire l'organisation, croyait à la pré-existence des germes; non pas à la pré-existence d'un être tout formé, puisqu'il est bien évident que ce n'est que par des développemens successifs que l'être acquiert sa forme; mais, si l'on peut s'exprimer ainsi, à la pré-existence du *radical de l'être*, radical qui existe avant que la série des évolutions ne commence, et qui remonte certainement, suivant la belle observation de Bonnet, à plusieurs générations."—Laurillard, *Éloge de Cuvier*, note 12.

[6] *Histoire naturelle*, tom. ii. ed. ii. (1750), p. 350.

[7] *Ibid.* p. 351.

[8] See particularly Buffon, *l.c.* p. 41.

successors. The school of Cuvier was lamentably deficient in embryologists; and it was only in the course of the first thirty years of the 19th century that Prévost and Dumas in France, and, later on, Döllinger, Pander, von Bär, Rathke, and Remak in Germany, founded modern embryology; and, at the same time, proved the utter incompatibility of the hypothesis of evolution as formulated by Bonnet and Haller with easily demonstrable facts.

Nevertheless, though the conceptions originally denoted by "evolution" and "development" were shown to be untenable, the words retained their application to the process by which the embryos of living beings gradually make their appearance; and the terms "development," "Entwickelung," and "evolutio" are now indiscriminately used for the series of genetic changes exhibited by living beings, by writers who would emphatically deny that "development" or "Entwickelung" or "evolutio," in the sense in which these words were usually employed by Bonnet or Haller, ever occurs.

Evolution, or development, is, in fact, at present employed in biology as a general name for the history of the steps by which any living being has acquired the morphological and the physiological characters which distinguish it. As civil history may be divided into biography, which is the history of individuals, and universal history, which is the history of the human race, so evolution falls naturally into two categories—the evolution of the individual (see EMBRYOLOGY) and the evolution of the sum of living beings.

The Evolution of the Sum of Living Beings.—The notion that all the kinds of animals and plants may have come into existence by the growth and modification of primordial germs is as old as speculative thought; but the modern scientific form of the doctrine can be traced historically to the influence of several converging lines of philosophical speculation and of physical observation, none of which go further back than the 17th century. These are:—

1. The enunciation by Descartes of the conception that the physical universe, whether living or not living, is a mechanism, and that, as such, it is explicable on physical principles.

2. The observation of the gradations of structure, from extreme simplicity to very great complexity, presented by living things, and of the relation of these graduated forms to one another.

3. The observation of the existence of an analogy between the series of gradations presented by the species which compose any great group of animals or plants, and the series of embryonic conditions of the highest members of that group.

4. The observation that large groups of species of widely different habits present the same fundamental plan of structure; and that parts of the same animal or plant, the functions of which are very different, likewise exhibit modifications of a common plan.

5. The observation of the existence of structures, in a rudimentary and apparently useless condition, in one species of a group, which are fully developed and have definite functions in other species of the same group.

6. The observation of the effects of varying conditions in modifying living organisms.

7. The observation of the facts of geographical distribution.

8. The observation of the facts of the geological succession of the forms of life.

1. Notwithstanding the elaborate disguise which fear of the powers that were led Descartes to throw over his real opinions, it is impossible to read the *Principes de la philosophie* without acquiring the conviction that this great philosopher held that the physical world and all things in it, whether living or not living, have originated by a process of evolution, due to the continuous operation of purely physical causes, out of a primitive relatively formless matter.[1]

The following passage is especially instructive:—

> "Et tant s'en faut que je veuille que l'on croie toutes les choses que j'écrirai, que même je prétends en proposer ici quelques-unes que je crois absolument être fausses; à savoir, je ne doute point que le monde n'ait été créé au commencement avec autant de perfection qu'il en a; en sorte que le soleil, la terre, la lune, et les étoiles ont été dès lors; et que la terre n'a pas eu seulement en soi les semences des plantes, mais que les plantes même en ont couvert une partie; et qu'Adam et Ève n'ont pas été créés enfans mais en âge d'hommes parfaits. La religion chrétienne veut que nous le croyons ainsi, et la raison naturelle nous persuade entièrement cette vérité; car si nous considérons la toute puissance de Dieu, nous devons juger que tout ce qu'il a fait a eu dès le commencement toute la perfection qu'il devoit avoir. Mais néanmoins, comme on connoîtroit beaucoup mieux quelle a été la nature d'Adam et celle des arbres de Paradis si on avoit examiné comment les enfants se forment peu à peu dans le ventre de leurs mères et comment les plantes sortent de leurs semences, que si on avoit seulement considéré quels ils ont été quand Dieu les a créés: tout de même, nous ferons mieux entendre quelle est généralement la nature de toutes les choses qui sont au monde si nous pouvons imaginer quelques principes qui soient fort intelligibles et fort simples, desquels nous puissions voir clairement que les astres et la terre et enfin tout ce monde visible auroit pu être produit ainsi que de quelques semences (bien que nous sachions qu'il n'a pas été produit en cette façon) que si nous la décrivions seulement comme il est, ou bien comme nous croyons qu'il a été créé. Et parceque je pense avoir trouvé des principes qui sont tels, je tâcherai ici de les expliquer."[2]

If we read between the lines of this singular exhibition of force of one kind and weakness of another, it is clear that Descartes believed that he had divined the mode in which the physical universe had been evolved; and the *Traité de l'homme* and the essay *Sur les passions* afford abundant additional evidence that he sought for, and thought he had found, an explanation of the phenomena of physical life by deduction from purely physical laws.

Spinoza abounds in the same sense, and is as usual perfectly candid—

> "Naturae leges et regulae, secundum quas omnia fiunt et ex unis formis in alias mutantur, sunt ubique et semper eadem."[3]

Leibnitz's doctrine of continuity necessarily led him in the same direction; and, of the infinite multitude of monads with which he peopled the world, each is supposed to be the focus of an endless process of evolution and involution. In the *Protogaea*, xxvi., Leibnitz distinctly suggests the mutability of species—

> "Alii mirantur in saxis passim species videri quas vel in orbe cognito, vel saltem in vicinis locis frustra quaeras. Ita *Cornua Ammonis*, quae ex nautilorum numero habeantur, passim et forma et magnitudine (nam et pedali diametro aliquando reperiuntur) ab omnibus illis naturis discrepare dicunt, quas praebet mare. Sed quis absconditos ejus recessus aut subterraneas abyssos pervestigavit? quam multa nobis animalia antea ignota offert novus orbis? Et credibile est per magnas illas conversiones etiam animalium species plurimum immutatas."

Thus in the end of the 17th century the seed was sown which has at intervals brought forth recurrent crops of evolutional hypotheses, based, more or less completely, on general reasonings.

Among the earliest of these speculations is that put forward by Benoît de Maillet in his *Telliamed*, which, though printed in 1735, was not published until twenty-three years later. Considering that this book was written before the time of Haller, or Bonnet, or Linnaeus, or Hutton, it surely deserves more respectful consideration than it usually receives. For De Maillet not only has a definite conception of the plasticity of living things, and of the production of existing species by the modification of their predecessors, but he clearly apprehends the cardinal maxim of modern geological science, that the explanation of the structure of the globe is to be sought in the deductive application to geological phenomena of the principles established inductively by the study of the present course of nature. Somewhat later, P. L. M. de Maupertuis[4] suggested a curious hypothesis as to the causes of variation, which he thinks may be sufficient to account for the origin of all animals from a single pair. Jean Baptiste René Robinet[1] followed out much the same line of thought as De Maillet, but less soberly; and Bonnet's speculations in the *Palingênésie*, which appeared in 1769, have already been mentioned. Buffon (1753–1778), at first a partisan of the absolute immutability of species, subsequently appears to have believed that larger or smaller groups of species have been produced by the modification of a primitive stock; but he contributed nothing to the general doctrine of evolution.

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[1] As Buffon has well said:—"L'idée de ramener l'explication de tous les phénomènes à des principes mécaniques est assurément grande et belle, ce pas est le plus hardi qu'on peut faire en philosophie, et c'est Descartes qui l'a fait."—*l.c.* p. 50.

[2] *Principes de la philosophie*, Troisième partie, § 45.

[3] *Ethices*, Pars tertia, Praefatio.

[4] *Système de la Nature. Essai sur la formation des corps organisés*, 1751, xiv.

Erasmus Darwin (*Zoonomia*, 1794), though a zealous evolutionist, can hardly be said to have made any real advance on his predecessors; and, notwithstanding the fact that Goethe had the advantage of a wide knowledge of morphological facts, and a true insight into their signification, while he threw all the power of a great poet into the expression of his conceptions, it may be questioned whether he supplied the doctrine of evolution with a firmer scientific basis than it already possessed. Moreover, whatever the value of Goethe's labours in that field, they were not published before 1820, long after evolutionism had taken a new departure from the works of Treviranus and Lamarck—the first of its advocates who were equipped for their task with the needful large and accurate knowledge of the phenomena of life as a whole. It is remarkable that each of these writers seems to have been led, independently and contemporaneously, to invent the same name of "biology" for the science of the phenomena of life; and thus, following Buffon, to have recognized the essential unity of these phenomena, and their contradistinction from those of inanimate nature. And it is hard to say whether Lamarck or Treviranus has the priority in propounding the main thesis of the doctrine of evolution; for though the first volume of Treviranus's *Biologie* appeared only in 1802, he says, in the preface to his later work, the *Erscheinungen und Gesetze des organischen Lebens*, dated 1831, that he wrote the first volume of the *Biologie* "nearly five-and-thirty years ago," or about 1796.

Now, in 1794, there is evidence that Lamarck held doctrines which present a striking contrast to those which are to be found in the *Philosophie zoologique*, as the following passages show:—

> "685. Quoique mon unique objet dans cet article n'ait été que de traiter de la cause physique de l'entretien de la vie des êtres organiques, malgré cela j'ai osé avancer en débutant, que l'existence de ces êtres étonnants n'appartiennent nullement à la nature; que tout ce qu'on peut entendre par le mot *nature*, ne pouvoit donner la vie, c'est-à-dire, que toutes les qualités de la matière, jointes à toutes les circonstances possibles, et même à l'activité répandue dans l'univers, ne pouvaient point produire un être muni du mouvement organique, capable de reproduire son semblable, et sujet à la mort.
>
> "686. Tous les individus de cette nature, qui existent, proviennent d'individus semblables qui tous ensemble constituent l'espèce entière. Or, je crois qu'il est aussi impossible à l'homme de connoître la cause physique du premier individu de chaque espèce, que d'assigner aussi physiquement la cause de l'existence de la matière ou de l'univers entier. C'est au moins ce que le résultat de mes connaissances et de mes réflexions me portent à penser. S'il existe beaucoup de variétés produites par l'effet des circonstances, ces variétés ne dénaturent point les espèces; mais on se trompe, sans doute souvent, en indiquant comme espèce, ce qui n'est que variété; et alors je sens que cette erreur peut tirer à conséquence dans les raisonnements que l'on fait sur cette matière."[2]

The first three volumes of Treviranus's *Biologie*, which contains his general views of evolution, appeared between 1802 and 1805. The *Recherches sur l'organisation des corps vivants*, which sketches out Lamarck's doctrines, was published in 1802; but the full development of his views in the *Philosophie zoologique* did not take place until 1809.

The *Biologie* and the *Philosophie zoologique* are both very remarkable productions, and are still worthy of attentive study, but they fell upon evil times. The vast authority of Cuvier was employed in support of the traditionally respectable hypotheses of special creation and of catastrophism; and the wild speculations of the *Discours sur les révolutions de la surface du globe* were held to be models of sound scientific thinking, while the really much more sober and philosophical hypotheses of the *Hydrogéologie* were scouted. For many years it was the fashion to speak of Lamarck with ridicule, while Treviranus was altogether ignored.

Nevertheless, the work had been done. The conception of evolution was henceforward irrepressible, and it incessantly reappears, in one shape or another,[3] up to the year 1858, when Charles Darwin and A. R. Wallace published their *Theory of Natural Selection*. The *Origin of Species* appeared in 1859; and thenceforward the doctrine of evolution assumed a position and acquired an importance which it never before possessed. In the *Origin of Species*, and in his other numerous and important contributions to the solution of the problem of biological evolution, Darwin confined himself to the discussion of the causes which have brought about the present condition of living matter, assuming such matter to have once come into existence. On the other hand, Spencer[4] and E. Haeckel[5] dealt with the whole problem of evolution. The profound and vigorous writings of Spencer embody the spirit of Descartes in the knowledge of our own day, and may be regarded as the *Principes de la philosophie* of the 19th century; while, whatever hesitation may not unfrequently be felt by less daring minds in following Haeckel in many of his speculations, his attempt to systematize the doctrine of evolution and to exhibit its influence as the central thought of modern biology, cannot fail to have a far-reaching influence on the progress of science.

If we seek for the reason of the difference between the scientific position of the doctrine of evolution in the days of Lamarck and that which it occupies now, we shall find it in the great accumulation of facts, the several classes of which have been enumerated above, under the second to the eighth heads. For those which are grouped under the second to the seventh of these classes, respectively, have a clear significance on the hypothesis of evolution, while they are unintelligible if that hypothesis be denied. And those of the eighth group are not only unintelligible without the assumption of evolution, but can be proved never to be discordant with that hypothesis, while, in some cases, they are exactly such as the hypothesis requires. The demonstration of these assertions would require a volume, but the general nature of the evidence on which they rest may be briefly indicated.

2. The accurate investigation of the lowest forms of animal life, commenced by Leeuwenhoek and Swammerdam, and continued by the remarkable labours of Réaumur, Abraham Trembley, Bonnet, and a host of other observers in the latter part of the 17th and the first half of the 18th centuries, drew the attention of biologists to the gradation in the complexity of organization which is presented by living beings, and culminated in the doctrine of the *échelle des êtres*, so powerfully and clearly stated by Bonnet, and, before him, adumbrated by Locke and by Leibnitz. In the then state of knowledge, it appeared that all the species of animals and plants could be arranged in one series, in such a manner that, by insensible gradations, the mineral passed into the plant, the plant into the polype, the polype into the worm, and so, through gradually higher forms of life, to man, at the summit of the animated world.

But, as knowledge advanced, this conception ceased to be tenable in the crude form in which it was first put forward. Taking into account existing animals and plants alone, it became obvious that they fell into groups which were more or less sharply separated from one another; and, moreover, that even the species of a genus can hardly ever be arranged in linear series. Their natural resemblances and differences are only to be expressed by disposing them as if they were branches springing from a common hypothetical centre.

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[1] *Considérations philosophiques sur la gradation naturelle des formes de l'être; ou les essais de la nature qui apprend à faire l'homme* (1768).

[2] *Recherches sur les causes des principaux faits physiques*, par J. B. Lamarck. Paris. Seconde année de la République. In the preface, Lamarck says that the work was written in 1776, and presented to the Academy in 1780; but it was not published before 1794, and at that time it presumably expressed Lamarck's mature views. It would be interesting to know what brought about the change of opinion manifested in the *Recherches sur l'organisation des corps vivants*, published only seven years later.

[3] See the "Historical Sketch" prefixed to the last edition of the *Origin of Species*.

[4] *First Principles* and *Principles of Biology* (1860–1864).

[5] *Generelle Morphologie* (1866).

Lamarck, while affirming the verbal proposition that animals form a single series, was forced by his vast acquaintance with the details of zoology to limit the assertion to such a series as may be formed out of the abstractions constituted by the common characters of each group.[1]

Cuvier on anatomical, and Von Baer on embryological grounds, made the further step of proving that, even in this limited sense, animals cannot be arranged in a single series, but that there are several distinct plans of organization to be observed among them, no one of which, in its highest and most complicated modification, leads to any of the others.

The conclusions enunciated by Cuvier and Von Baer have been confirmed in principle by all subsequent research into the structure of animals and plants. But the effect of the adoption of these conclusions has been rather to substitute a new metaphor for that of Bonnet than to abolish the conception expressed by it. Instead of regarding living things as capable of arrangement in one series like the steps of a ladder, the results of modern investigation compel us to dispose them as if they were the twigs and branches of a tree. The ends of the twigs represent individuals, the smallest groups of twigs species, larger groups genera, and so on, until we arrive at the source of all these ramifications of the main branch, which is represented by a common plan of structure. At the present moment it is impossible to draw up any definition, based on broad anatomical or developmental characters, by which any one of Cuvier's great groups shall be separated from all the rest. On the contrary, the lower members of each tend to converge towards the lower members of all the others. The same may be said of the vegetable world. The apparently clear distinction between flowering and flowerless plants has been broken down by the series of gradations between the two exhibited by the *Lycopodiaceae*, *Rhizocarpeae*, and *Gymnospermeae*. The groups of *Fungi*, *Licheneae* and *Algae* have completely run into one another, and, when the lowest forms of each are alone considered, even the animal and vegetable kingdoms cease to have a definite frontier.

If it is permissible to speak of the relations of living forms to one another metaphorically, the similitude chosen must undoubtedly be that of a common root, whence two main trunks, one representing the vegetable and one the animal world, spring; and, each dividing into a few main branches, these subdivide into multitudes of branchlets and these into smaller groups of twigs.

As Lamarck has well said:—[2]

> " Il n'y a que ceux qui se sont longtemps et fortement occupés de la détermination des espèces, et qui ont consulté de riches collections, qui peuvent savoir jusqu'à quel point les *espèces*, parmi les corps vivants, se fondent les unes dans les autres, et qui ont pu se convaincre que, dans les parties où nous voyons des *espèces* isolées, cela n'est ainsi que parcequ'il nous en manque d'autres qui en sont plus voisines et que nous n'avons pas encore recueillies.
>
> " Je ne veux pas dire pour cela que les animaux qui existent forment une série très-simple et partout également nuancée; mais je dis qu'ils forment une série rameuse, irrégulièrement graduée et qui n'a point de discontinuité dans ses parties, ou qui, du moins, n'en a toujours pas eu, s'il est vrai que, par suite de quelques espèces perdues, il s'en trouve quelque part. Il en résulte que les *espèces* qui terminent chaque rameau de la série générale tiennent, au moins d'un côté, à d'autres espèces voisines qui se nuancent avec elles. Voilà ce que l'état bien connu des choses me met maintenant à portée de démontrer. Je n'ai besoin d'aucune hypothèse ni d'aucune supposition pour cela: j'en atteste tous les naturalistes observateurs."

3. In a remarkable essay[3] Meckel remarks:—

> " There is no good physiologist who has not been struck by the observation that the original form of all organisms is one and the same, and that out of this one form, all, the lowest as well as the highest, are developed in such a manner that the latter pass through the permanent forms of the former as transitory stages. Aristotle, Haller, Harvey, Kielmeyer, Autenrieth, and many others have either made this observation incidentally, or, especially the latter, have drawn particular attention to it, and drawn therefrom results of permanent importance for physiology."

Meckel proceeds to exemplify the thesis, that the lower forms of animals represent stages in the course of the development of the higher, with a large series of illustrations.

After comparing the salamanders and the perenni-branchiate *Urodela* with the tadpoles and the frogs, and enunciating the law that the more highly any animal is organized the more quickly does it pass through the lower stages, Meckel goes on to say:—

> " From these lowest Vertebrata to the highest, and to the highest forms among these, the comparison between the embryonic conditions of the higher animals and the adult states of the lower can be more completely and thoroughly instituted than if the survey is extended to the Invertebrata, inasmuch as the latter are in many respects constructed upon an altogether too dissimilar type; indeed they often differ from one another far more than the lowest vertebrate does from the highest mammal; yet the following pages will show that the comparison may be also extended to them with interest. In fact, there is a period when, as Aristotle long ago said, the embryo of the highest animal has the form of a mere worm, and, devoid of internal and external organization, is merely an almost structureless lump of polype-substance. Notwithstanding the origin of organs, it still for a certain time, by reason of its want of an internal bony skeleton, remains worm and mollusk, and only later enters into the series of the Vertebrata, although traces of the vertebral column even in the earliest periods testify its claim to a place in that series."—*Op. cit.* pp. 4, 5.

If Meckel's proposition is so far qualified, that the comparison of adult with embryonic forms is restricted within the limits of one type of organization; and if it is further recollected, that the resemblance between the permanent lower form and the embryonic stage of a higher form is not special but general, it is in entire accordance with modern embryology; although there is no branch of biology which has grown so largely, and improved its methods so much since Meckel's time, as this. In its original form, the doctrine of " arrest of development," as advocated by Geoffroy Saint-Hilaire and Serres, was no doubt an over-statement of the case. It is not true, for example, that a fish is a reptile arrested in its development, or that a reptile was ever a fish; but it is true that the reptile embryo, at one stage of its development, is an organism which, if it had an independent existence, must be classified among fishes; and all the organs of the reptile pass, in the course of their development, through conditions which are closely analogous to those which are permanent in some fishes.

4. That branch of biology which is termed morphology is a commentary upon, and expansion of, the proposition that widely different animals or plants, and widely different parts of animals or plants, are constructed upon the same plan. From the rough comparison of the skeleton of a bird with that of a man by Pierre Delon, in the 16th century (to go no further back), down to the theory of the limbs and the theory of the skull at the present day; or, from the first demonstration of the homologies of the parts of a flower by C. F. Wolff, to the present elaborate analysis of the floral organs, morphology exhibits a continual advance towards the demonstration of a fundamental unity among the seeming diversities of living structures. And this demonstration has been completed by the final establishment of the cell theory (see CYTOLOGY), which involves the admission of a primitive conformity, not only of all the elementary structures in animals and plants respectively, but of those in the one of these great divisions of living things with those in the other. No *a priori* difficulty can be said to stand in the way of evolution, when it can be shown that all animals and all plants proceed by modes of development, which are similar in principle, from a fundamental protoplasmic material.

5. The innumerable cases of structures, which are rudimentary and apparently useless, in species, the close allies of which possess well-developed and functionally important homologous

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[1] " Il s'agit donc de prouver que la série qui constitute l'échelle animale réside essentiellement dans la distribution des masses principales qui la composent et non dans celle des espèces ni même toujours dans celle des genres."—*Phil. zoologique*, chap. v.

[2] *Philosophie zoologique*, première partie, chap. iii.

[3] " Entwurf einer Darstellung der zwischen dem Embryozustände der höheren Thiere und dem permanenten der niederen stattfindenden Parallele," *Beyträge zur vergleichenden Anatomie*, Bd. ii, 1811.

structures, are readily intelligible on the theory of evolution, while it is hard to conceive their *raison d'être* on any other hypothesis. However, a cautious reasoner will probably rather explain such cases deductively from the doctrine of evolution than endeavour to support the doctrine of evolution by them. For it is almost impossible to prove that any structure, however rudimentary, is useless—that is to say, that it plays no part whatever in the economy; and, if it is in the slightest degree useful, there is no reason why, on the hypothesis of direct creation, it should not have been created. Nevertheless, double-edged as is the argument from rudimentary organs, there is probably none which has produced a greater effect in promoting the general acceptance of the theory of evolution.

6. The older advocates of evolution sought for the causes of the process exclusively in the influence of varying conditions, such as climate and station, or hybridization, upon living forms. Even Treviranus has got no further than this point. Lamarck introduced the conception of the action of an animal on itself as a factor in producing modification. Starting from the well-known fact that the habitual use of a limb tends to develop the muscles of the limb, and to produce a greater and greater facility in using it, he made the general assumption that the effort of an animal to exert an organ in a given direction tends to develop the organ in that direction. But a little consideration showed that, though Lamarck had seized what, as far as it goes, is a true cause of modification, it is a cause the actual effects of which are wholly inadequate to account for any considerable modification in animals, and which can have no influence at all in the vegetable world; and probably nothing contributed so much to discredit evolution, in the early part of the 19th century, as the floods of easy ridicule which were poured upon this part of Lamarck's speculation. The theory of natural selection, or survival of the fittest, was suggested by William Charles Wells in 1813, and further elaborated by Patrick Matthew in 1831. But the pregnant suggestions of these writers remained practically unnoticed and forgotten, until the theory was independently devised and promulgated by Charles Robert Darwin and Alfred Russell Wallace in 1858, and the effect of its publication was immediate and profound.

Those who were unwilling to accept evolution, without better grounds than such as are offered by Lamarck, and who therefore preferred to suspend their judgment on the question, found in the principle of selective breeding, pursued in all its applications with marvellous knowledge and skill by Darwin, a valid explanation of the occurrence of varieties and races; and they saw clearly that, if the explanation would apply to species, it would not only solve the problem of their evolution, but that it would account for the facts of teleology, as well as for those of morphology; and for the persistence of some forms of life unchanged through long epochs of time, while others undergo comparatively rapid metamorphosis.

How far "natural selection" suffices for the production of species remains to be seen. Few can doubt that, if not the whole cause, it is a very important factor in that operation; and that it must play a great part in the sorting out of varieties into those which are transitory and those which are permanent.

But the causes and conditions of variation have yet to be thoroughly explored; and the importance of natural selection will not be impaired, even if further inquiries should prove that variability is definite, and is determined in certain directions rather than in others, by conditions inherent in that which varies. It is quite conceivable that every species tends to produce varieties of a limited number and kind, and that the effect of natural selection is to favour the development of some of these, while it opposes the development of others along their predetermined lines of modification.

7. No truths brought to light by biological investigation were better calculated to inspire distrust of the dogmas intruded upon science in the name of theology than those which relate to the distribution of animals and plants on the surface of the earth. Very skilful accommodation was needful, if the limitation of sloths to South America, and of the *Ornithorhynchus* to Australia, was to be reconciled with the literal interpretation of the history of the Deluge; and, with the establishment of the existence of distinct provinces of distribution, any serious belief in the peopling of the world by migration from Mount Ararat came to an end.

Under these circumstances, only one alternative was left for those who denied the occurrence of evolution; namely, the supposition that the characteristic animals and plants of each great province were created, as such, within the limits in which we find them. And as the hypothesis of "specific centres," thus formulated, was heterodox from the theological point of view, and unintelligible under its scientific aspect, it may be passed over without further notice, as a phase of transition from the creational to the evolutional hypothesis.

8. In fact, the strongest and most conclusive arguments in favour of evolution are those which are based upon the facts of geographical, taken in conjunction with those of geological, distribution.

Both Darwin and Wallace lay great stress on the close relation which obtains between the existing fauna of any region and that of the immediately antecedent geological epoch in the same region; and rightly, for it is in truth inconceivable that there should be no genetic connexion between the two. It is possible to put into words the proposition, that all the animals and plants of each geological epoch were annihilated, and that a new set of very similar forms was created for the next epoch, but it may be doubted if any one who ever tried to form a distinct mental image of this process of spontaneous generation on the grandest scale ever really succeeded in realizing it.

In later years the attention of the best palaeontologists has been withdrawn from the hodman's work of making "new species" of fossils, to the scientific task of completing our knowledge of individual species, and tracing out the succession of the forms presented by any given type in time.

Evolution at the Beginning of the 20th century.—Since Huxley and Sully wrote their masterly essays in the 9th edition of this encyclopaedia, the doctrine of evolution has outgrown the trammels of controversy and has been accepted as a fundamental principle. Writers on biological subjects no longer have to waste space in weighing evolution against this or that philosophical theory or religious tradition; philosophical writers have frankly accepted it, and the supporters of religious tradition have made broad their phylacteries to write on them the new words. A closer scrutiny of the writers of all ages who preceded Charles Darwin, and, in particular, the light thrown back from Darwin on the earlier writings of Herbert Spencer, have made plain that without Darwin the world by this time might have come to a general acceptance of evolution; but it seems established as a historical fact that the world has come to accept evolution, first, because of Darwin's theory of natural selection, and second, because of Darwin's exposition of the evidence for the actual occurrence of organic evolution. The evidence as set out by Darwin has been added to enormously; new knowledge has in many cases altered our conceptions of the mode of the actual process of evolution, and from time to time a varying stress has been laid on what are known as the purely Darwinian factors in the theory. The balance of these tendencies has been against the attachment of great importance to sexual selection, and in favour of attaching a great importance to natural selection; but the dominant feature in the recent history of the theory has been its universal acceptance and the recognition that this general acceptance has come from the stimulus given by Darwin.

Ontogeny.

A change has taken place in the use of the word evolution. Huxley, following historical custom, devoted one section of his article to the "Evolution of the Individual." The facts and theories respecting this are now discussed under such headings as EMBRYOLOGY; HEREDITY; VARIATION AND SELECTION; under these headings must be sought information on the important recent modifications with regard to the theory of the relation between the development of the individual and the development of the race, the part played by the environment on the individual, and the modern developments of the old quarrel between evolution and epigenesis. The most striking general change has been against seeing in the facts of ontogeny any direct evidence as to phylogeny. The general proposition as to a parallelism between individual and ancestral development is no doubt indisputable, but extended knowledge of the very different ontogenetic histories of closely allied forms has led us to a much fuller conception of the mode in which stages in embryonic and larval history have been modified in relation to their surroundings, and to a consequent reluctance to attach detailed importance to the embryological argument for evolution.

Phylogeny.

The vast bulk of botanical and zoological work on living and extinct forms published during the last quarter of the 19th century increased almost beyond all expectation the evidence for the fact of evolution. The discovery of a single fossil creature in a geological stratum of a wrong period, the detection of a single anatomical or physiological fact irreconcilable with origin by descent with modification, would have been destructive of the theory and would have made the reputation of the observer. But in the prodigious number of supporting discoveries that have been made no single negative factor has appeared, and the evolution from their predecessors of the forms of life existing now or at any other period must be taken as proved. It is necessary to notice, however, that although the general course of the stream of life is certain, there is not the same certainty as to the actual individual pedigrees of the existing forms. In the attempts to place existing creatures in approximately phylogenetic order, a striking change, due to a more logical consideration of the process of evolution, has become established and is already resolving many of the earlier difficulties and banishing from the more recent tables the numerous hypothetical intermediate forms so familiar in the older phylogenetic trees. The older method was to attempt the comparison between the highest member of a lower group and the lowest member of a higher group—to suppose, for example, that the gorilla and the chimpanzee, the highest members of the apes, were the existing representatives of the ancestors of man and to compare these forms with the lowest members of the human race. Such a comparison is necessarily illogical, as the existing apes are separated from the common ancestor by at least as large a number of generations as separate it from any of the forms of existing man. In the natural process of growth, the gap must necessarily be wider between the summits of the twigs than lower down, and, instead of imagining "missing links," it is necessary to trace each separate branch as low down as possible, and to institute the comparisons between the lowest points that can be reached. The method is simply the logical result of the fact that every existing form of life stands at the summit of a long branch of the whole tree of life. A due consideration of it leads to the curious paradox that if any two animals be compared, the zoologically lower will be separated from the common ancestor by a larger number of generations, since, on the average, sexual maturity is reached more quickly by the lower form. Naturally very many other factors have to be considered, but this alone is a sufficient reason to restrain attempts to place existing forms in linear phylogenetic series. In embryology the method finds its expression in the limitation of comparisons to the corresponding stages of low and high forms and the exclusion of the comparisons between the adult stages of low forms and the embryonic stages of higher forms. Another expression of the same method, due to Cope, and specially valuable to the taxonomist, is that when the relationship between orders is being considered, characters of subordinal rank must be neglected. It must not be supposed that earlier writers all neglected this method, or still less that all writers now employ it, but merely that formerly it was frequently overlooked by the best writers, and now is neglected only by the worst. The result is, on the one hand, a clearing away of much fantastic phylogeny, on the other, an enormous reduction of the supposed gaps between groups.

Comparative anatomy.

There has been a renewed activity in the study of existing forms from the point of view of obtaining evidence as to the nature and origin of species. Comparative anatomists have been learning to refrain from basing the diagnosis of a species, or the description of the condition of an organ, on the evidence of a single specimen. Naturalists who deal specially with museum collections have been compelled, it is true, for other reasons to attach an increasing importance to what is called the type specimen, but they find that this insistence on the individual, although invaluable from the point of view of recording species, is unsatisfactory from the point of view of scientific zoology; and propositions for the amelioration of this condition of affairs range from a refusal of Linnaean nomenclature in such cases, to the institution of a division between *master species* for such species as have been properly revised by the comparative morphologist, and *provisional species* for such species as have been provisionally registered by those working at collections. Those who work with living forms of which it is possible to obtain a large number of specimens, and those who make revisions of the provisional species of palaeontologists, are slowly coming to some such conception as that a species is the abstract central point around which a group of variations oscillate, and that the peripheral oscillations of one species may even overlap those of an allied species. It is plain that we have moved far from the connotation and denotation of the word *species* at the time when Darwin began to discuss the origin of species, and that the movement, on the one hand, tends to simplify the problem philosophically, and, on the other, to make it difficult for the amateur theorist.

The conception of evolution is being applied more rigidly to the comparative anatomy of organs and systems of organs. When a series of the modifications of an anatomical structure has been sufficiently examined, it is frequently possible to decide that one particular condition is primitive, ancestral or central, and that the other conditions have been derived from it. Such a condition has been termed, with regard to the group of animals or plants the organs of which are being studied, *archecentric*. The possession of the character in the archecentric condition in (say) two of the members of the group does not indicate that these two members are more nearly related to one another than they are to other members of the group; the archecentric condition is part of the common heritage of all the members of the group, and may be retained by any. On the other hand, when the ancestral condition is modified, it may be regarded as having moved outwards along some radius from the archecentric condition. Such modified conditions have been termed *apocentric*. It is obvious that the mere apocentricity of a character can be no guide to the affinities of its possessor. It is necessary to determine if the modification be a simple change that might have occurred in independent cases, in fact if it be a multiradial apocentricity, or if it involved intricate and precisely combined anatomical changes that we could not expect to occur twice independently; that is to say, if it be a uniradial apocentricity. Multiradial apocentricities lie at the root of many of the phenomena that have been grouped under the designation *convergence*. Especially in the case of manifest adaptations, organs possessed by creatures far apart genealogically may be moulded into conditions that are extremely alike. Sir E. Ray Lankester's term, *homoplasy*, has passed into currency as designating such cases where different genetic material has been pressed by similar conditions into similar moulds. These may be called heterogeneous homoplasies, but it is necessary to recognize the existence of homogeneous homoplasies, here called multiradial apocentricities. A complex apocentric modification of a kind which we cannot imagine to have been repeated independently, and which is to be designated as uniradial, frequently forms a new centre around which new diverging modifications are produced. With reference to any particular group of forms such a new centre of modification may be termed a *metacentre*, and it is plain that the archecentre of the whole group is a metacentre of the larger group of which the group under consideration is a branch. Thus, for instance, the archecentric condition of any Avian structure is a metacentre of the Sauropsidan stem. A form of apocentricity extremely common and often perplexing may be termed *pseudocentric*; in such a condition there is an apparent simplicity that reveals its secondary nature by some small and apparently meaningless complexity.

Bionomics.

Another group of investigations that seems to play an important part in the future development of the theory of evolution relates to the study of what is known as organic symmetry. The differentiations of structure that characterize animals and plants are being shown to be orderly and definite in many respects; the relations of the various parts to one another and to the whole, the modes of repetition of parts, and the series of changes that occur in groups of repeated parts appear to be to a certain extent inevitable, to depend on the nature of the living material itself and on the necessary conditions of its growth. Closely allied to the study of symmetry is the study of the direct effect of the circumambient media on embryonic young and adult stages of living beings (see EMBRYOLOGY: *Physiology*; HEREDITY; and VARIATION AND SELECTION), and a still larger number of observers have added to our knowledge of these. It is impossible here to give even a list of the names of the many observers who in recent times have made empirical study of the effects of growth-forces and of the symmetrical limitations and definitions of growth. It is to be noticed, however, that, even after such phenomena have been properly grouped and designated under Greek names as laws of organic growth, they have not become explanations of the series of facts they correlate. Their importance in the theory of evolution is none the less very great. In the first place, they lessen the number of separate facts to be explained; in the second, they limit the field within which explanation must be sought, since, for instance, if a particular mode of repetition of parts occur in mosses, in flowering-plants, in beetles and in elephants, the seeker of ultimate explanations may exclude from the field of his inquiry all the conditions individual to these different organic forms, and confine himself only to what is common to all of them; that is to say, practically only the living material and its environment. The prosecution of such inquiries is beginning to make unnecessary much ingenious speculation of a kind that was prominent from 1880 to 1900; much futile effort has been wasted in the endeavour to find on Darwinian principles special "selection-values" for phenomena the universality of which places them outside the possibility of having relations with the particular conditions of particular organisms. On the other hand, many of those who have been specially successful in grouping diverse phenomena under empirical generalizations have erred logically in posing their generalizations against such a *vera causa* as the preservation of favoured individuals and races. The thirty years which followed the publication of the *Origin of Species* were characterized chiefly by anatomical and embryological work; since then there has been no diminution in anatomical and embryological enthusiasm, but many of the continually increasing body of investigators have turned again to bionomical work. Inasmuch as Lamarck attempted to frame a theory of evolution in which the principle of natural selection had no part, the interpretation placed on their work by many bionomical investigators recalls the theories of Lamarck, and the name *Neo-Lamarckism* has been used of such a school of biologists, particularly active in America. The weakness of the Neo-Lamarckian view lies in its interpretation of heredity; its strength lies in its zealous study of the living world and the detection therein of proximate empirical laws, a strength shared by very many bionomical investigations, the authors of which would prefer to call themselves Darwinians, or to leave themselves without sectarian designation.

Biometrics.

Statistical inquiry into the facts of life has long been employed, and in particular Francis Galton, within the Darwinian period, has advocated its employment and developed its methods. Within quite recent years, however, a special school has arisen with the main object of treating the processes of evolution quantitatively. Here it is right to speak of Karl Pearson as a pioneer of notable importance. It has been the habit of biologists to use the terms variation, selection, elimination, correlation and so forth, vaguely; the new school, which has been strongly reinforced from the side of physical science, insists on quantitative measurements of the terms. When the anatomist says that one race is characterized by long heads, another by round heads, the biometricist demands numbers and percentages. When an organ is stated to be variable, the biometricist demands statistics to show the range of the variations and the mode of their distribution. When a character is said to be favoured by natural selection, the biometricist demands investigation of the death-rate of individuals with or without the character. When a character is said to be transmitted, or to be correlated with another character, the biometricist declares the statement valueless without numerical estimations of the inheritance or correlation. The subject is still so new, and its technical methods (see VARIATION AND SELECTION) have as yet spread so little beyond the group which is formulating and defining them, that it is difficult to do more than guess at the importance of the results likely to be gained. Enough, however, has already been done to show the vast importance of the method in grouping and codifying the empirical facts of life, and in so preparing the way for the investigation of ultimate "causes." The chief pitfall appears to be the tendency to attach more meaning to the results than from their nature they can bear. The ultimate value of numerical inquiries must depend on the equivalence of the units on which they are based. Many of the characters that up to the present have been dealt with by biometrical inquiry are obviously composite. The height or length of the arm of a human being, for instance, is the result of many factors, some inherent, some due to environment, and until these have been sifted out, numerical laws of inheritance or of correlation can have no more than an empirical value. The analysis of composite characters into their indivisible units and statistical inquiry into the behaviour of the units would seem to be a necessary part of biometric investigation, and one to which much further attention will have to be paid.

Segregation.

It is well known that Darwin was deeply impressed by differences in flora and fauna, which seemed to be functions of locality, and not the result of obvious dissimilarities of environment. A. R. Wallace's studies of island life, and the work of many different observers on local races of animals and plants, marine, fluviatile and terrestrial, have brought about a conception of segregation as apart from differences of environment as being one of the factors in the differentiation of living forms. The segregation may be geographical, or may be the result of preferential mating, or of seasonal mating, and its effects plainly can be made no more of than proximate or empirical laws of differentiation, of great importance in codifying and simplifying the facts to be explained. The minute attention paid by modern systematists to the exact localities of subspecies and races is bringing together a vast store of facts which will throw further light on the problem of segregation, but the difficulty of utilizing these facts is increased by an unfortunate tendency to make locality itself one of the diagnostic characters.

Bathmism.

Consideration of phylogenetic series, especially from the palaeontological side, has led many writers to the conception that there is something of the nature of a growth-force inherent in organisms and tending inevitably towards divergent evolution. It is suggested that even in the absence of modification produced by any possible Darwinian or Lamarckian factors, that even in a neutral environment, divergent evolution of some kind would have occurred. The conception is necessarily somewhat hazy, but the words *bathmism* and *bathmic Evolution* have been employed by a number of writers for some such conception. Closely connected with it, and probably underlying many of the facts which have led to it, is a more definite group of ideas that may be brought together under the phrase "phylogenetic limitation of variation." In its simplest form, this phrase implies such an obvious fact as that whatever be the future development of, say, existing cockroaches, it will be on lines determined by the present structure of these creatures. In a more general way, the phrase implies that at each successive branching of the tree of life, the branches become more specialized, more defined, and, in a sense, more limited. The full implications of the group of ideas require, and are likely to receive, much attention in the immediate future of biological investigation, but it is enough at present to point out that until the more obvious lines of inquiry have been opened out much more fully, we cannot be in a position to guess at the existence of a residuum, for which such a metaphysical conception as bathmism would serve even as a convenient disguise for ignorance.

Almost every side of zoology has contributed to the theory of evolution, but of special importance are the facts and theories associated with the names of Gregor Mendel, A. Weismann and Hugo de Vries. These are discussed under the headings HEREDITY; MENDELISM; and VARIATION AND SELECTION. It has been a feature of great promise in recent contributions to the theory of evolution, that such contributions have received attention almost directly in proportion to the new methods of observation and the new series of facts with which they have come. Those have found little favour who brought to the debate only formal criticisms or amplifications of the Darwinian arguments, or re-marshallings of the Darwinian facts, however ably conducted. The time has not yet come for the attempt to synthesize the results of the many different and often apparently antagonistic groups of workers. The great work that is going on is the simplification of the facts to be explained by grouping them under empirical laws; and the most general statement relating to these that can yet be made is that no single one of these laws has as yet shown signs of taking rank as a *vera causa* comparable with the Darwinian principle of natural selection.

For evolution in relation to society see SOCIOLOGY.

REFERENCES.—Practically, every botanical and zoological publication of recent date has its bearing on evolution. The following are a few of the more general works: Bateson, *Materials for the Study of Variation*; Bunge, *Vitalismus und Mechanismus*; Cope, *Origin of the Fittest*, *Primary Factors of Organic Evolution*, *Darwin's Life and Letters*; H. de Vries, *Species and Varieties and their Origin by Mutation*; Eimer. *Organic Evolution*; Gulick, "Divergent Evolution through Cumulative Segregation," *Jour. Linn. Soc.* xx.; Haacke, *Schöpfung des Menschen*: Mitchell, "Valuation of Zoological Characters," *Trans. Linn. Soc.* viii. pt. 7; Pearson, *Grammar of Science*; Romanes, *Darwin and after Darwin*; Sedgwick, Presidential Address to Section Zoology, *Brit. Ass. Rep. 1899*; Wallace, *Darwinism*; Weismann, *The Germ-Plasm*. Further references of great value will be found in the works of Bateson and Pearson referred to above, and in the annual volumes of the *Zoological Record*, particularly under the head "General Subject." (P. C. M.)

EVORA, the capital of an administrative district in the province of Alemtejo, Portugal; 72 m. E. by S. of Lisbon, on the Casa Branca-Evora-Elvas railway. Pop. (1900) 16,020. Evora occupies a fertile valley enclosed by low hills. It is surrounded by ramparts flanked with towers, and is further defended by two forts; but the neglected condition of these, combined with the narrow arcaded streets and crumbling walls of Roman or Moorish masonry, gives the city an appearance corresponding with its real antiquity. Evora is the see of an archbishop, and has several churches, convents and hospitals, barracks, a diocesan school and a museum. A university, founded in 1550, was abolished on the expulsion of the Jesuits in the 18th century. The cathedral, originally a Romanesque building erected 1186–1204, was restored in Gothic style about 1400; its richly decorated chancel was added in 1761. The church of São Francisco (1507–1525) is a good example of the blended Moorish and Gothic architecture known as Manoellian. The art gallery, formerly the archbishop's palace, contains a collection of Portuguese and early Flemish paintings. An ancient tower, and the so-called aqueduct of Sertorius, 9 m. long, have been partly demolished to make room for the market-square, in which one of the largest fairs in Portugal is held at midsummer. Both tower and aqueduct were long believed to have been of Roman origin, but are now known to have been constructed about 1540–1555 in the reign of John III., at the instance of an antiquary named Resende. The aqueduct was probably constructed on the site of the old Roman one. A small Roman temple is used as a public library; it is usually known as the temple of Diana, a name for which no valid authority exists. Evora is of little commercial importance, except as an agricultural centre, but its neighbourhood is famous for its mules and abounds in cork-woods; there are also mines of iron, copper, and asbestos and marble quarries.

Under its original name of *Ebora*, the city was from 80 to 72 B.C. the headquarters of Sertorius, and it long remained an important Roman military station. It was called *Liberalitas Juliae* on account of certain municipal privileges bestowed on it by Julius Caesar (*c.* 100–44 B.C.). Its bishopric, founded in the 5th century, was raised to an archbishopric in the 16th. In 712 Evora was conquered by the Moors, who named it *Jabura*; and it was only retaken in 1166. Fom 1663 to 1665 it was held by the Spaniards. In 1832 Dom Miguel, retreating before Dom Pedro, took refuge in Evora; and here was signed the convention of Evora, by which he was banished. (See PORTUGAL.)

The administrative district of Evora coincides with the central part of Alemtejo (*q.v.*); pop. (1900) 128,062; area, 2856 sq. m.

ÉVREUX, a town of north-western France, capital of the department of Eure, 67 m. W.N.W. of Paris on the Western railway to Cherbourg. Pop. (1906) town, 13,773; commune, 18,971. Situated in the pleasant valley of the Iton, arms of which traverse it, the town, on the south, slopes up toward the public gardens and the railway station. It is the seat of a bishop, and its cathedral is one of the largest and finest in France. Part of the lower portion of the nave dates from the 11th century; the west façade with its two ungainly towers is, for the most part, the work of the late Renaissance, and various styles of the intervening period are represented in the rest of the church. A thorough restoration was completed in 1896. The elaborate north transept and portal are in the flamboyant Gothic; the choir, the finest part of the interior, is in an earlier Gothic style. Cardinal de la Balue, bishop of Évreux in the latter half of the 15th century, constructed the octagonal central tower, with its elegant spire; to him is also due the Lady chapel, which is remarkable for some finely preserved stained glass. Two rose windows in the transepts and the carved wooden screens of the side chapels are masterpieces of 16th-century workmanship. The episcopal palace, a building of the 15th century, adjoins the south side of the cathedral. An interesting belfry, facing the handsome modern town hall, dates from the 15th century. The church of St Taurin, in part Romanesque, has a choir of the 14th century and other portions of later date; it contains the shrine of St Taurin, a work of the 13th century. At Vieil Évreux, 3½ m. south-east of the town, the remains of a Roman theatre, a palace, baths and an aqueduct have been discovered, as well as various relics which are now deposited in the museum of Évreux. Évreux is the seat of a prefect, a court of assizes, of tribunals of first instance and commerce, a chamber of commerce and a board of trade arbitrators, and has a branch of the Bank of France, a lycée and training colleges for teachers. The making of ticking, boots and shoes, agricultural implements and gas motors, and metal-founding and bleaching are carried on.

Vieil-Évreux (*Mediolanum Aulercorum*) was the capital of the Gallic tribe of the *Aulerci Eburovices* and a flourishing city during the Gallo-Roman period. Its bishopric dates from the 4th century.

The first family of the counts of Évreux which is known was descended from an illegitimate son of Richard I., duke of Normandy, and became extinct in the male line with the death of Count William in 1118. The countship passed in right of Agnes, William's sister, wife of Simon de Montfort-l'Amaury (d. 1087) to the house of the lords of Montfort-l'Amaury. Amaury III. of Montfort ceded it in 1200 to King Philip Augustus. Philip the Fair presented it (1307) to his brother Louis, for whose benefit Philip the Long raised the countship of Évreux into a peerage of France (1317). Philip of Évreux, son of Louis, became king of Navarre by his marriage with Jeanne, daughter of Louis the Headstrong (Hutin), and their son Charles the Bad and their grandson Charles the Noble were also kings of Navarre. The latter ceded his countships of Évreux, Champagne and Brie to King Charles VI. (1404). In 1427 the countship of Évreux was bestowed by King Charles VII. on Sir John Stuart of

Darnley (c. 1365–1429), the commander of his Scottish bodyguard, who in 1423 had received the seigniory of Aubigny and in February 1427/8 was granted the right to quarter the royal arms of France for his victories over the English (see Lady Elizabeth Cust, *Account of the Stuarts of Aubigny in France, 1422–1672*, 1891). On Stuart's death (before Orleans during an attack on an English convoy) the countship reverted to the crown. It was again temporarily alienated (1569–1584) as an appanage for Francis, duke of Anjou, and in 1651 was finally made over to Frédéric Maurice de la Tour d'Auvergne, duke of Bouillon, in exchange for the principality of Sedan.

EWALD, GEORG HEINRICH AUGUST VON (1803–1875), German Orientalist and theologian, was born on the 16th of November 1803 at Göttingen, where his father was a linen-weaver. In 1815 he was sent to the gymnasium, and in 1820 he entered the university of his native town, where under J. G. Eichhorn and T. C. Tychsen he devoted himself specially to the study of Oriental languages. At the close of his academical career in 1823 he was appointed to a mastership in the gymnasium at Wolfenbüttel, and made a study of the Oriental manuscripts in the Wolfenbüttel library. But in the spring of 1824 he was recalled to Göttingen as *repetent*, or theological tutor, and in 1827 (the year of Eichhorn's death) he became professor *extraordinarius* in philosophy and lecturer in Old Testament exegesis. In 1831 he was promoted to the position of professor *ordinarius* in philosophy; in 1833 he became a member of the Royal Scientific Society, and in 1835, after Tychsen's death, he entered the faculty of theology, taking the chair of Oriental languages.

Two years later occurred the first important episode in his studious life. In 1837, on the 18th of November, along with six of his colleagues he signed a formal protest against the action of King Ernst August (duke of Cumberland) in abolishing the liberal constitution of 1833, which had been granted to the Hanoverians by his predecessor William IV. This bold procedure of the seven professors led to their speedy expulsion from the university (14th December). Early in 1838 Ewald received a call to Tübingen, and there for upwards of ten years he held a chair as professor *ordinarius*, first in philosophy and afterwards, from 1841, in theology. To this period belong some of his most important works, and also the commencement of his bitter feud with F. C. Baur and the Tübingen school. In 1847, "the great shipwreck-year in Germany," as he has called it, he was invited back to Göttingen on honourable terms—the liberal constitution having been restored. He gladly accepted the invitation. In 1862–1863 he took an active part in a movement for reform within the Hanoverian Church, and he was a member of the synod which passed the new constitution. He had an important share also in the formation of the Protestantenverein, or Protestant association, in September 1863. But the chief crisis in his life arose out of the political events of 1866. His loyalty to King George (son of Ernst August) would not permit him to take the oath of allegiance to the victorious king of Prussia, and he was therefore placed on the retired list, though with the full amount of his salary as pension. Perhaps even this degree of severity might have been held by the Prussian authorities to be unnecessary, had Ewald been less exasperating in his language. The violent tone of some of his printed manifestoes about this time, especially of his *Lob des Königs u. des Volkes*, led to his being deprived of the *venia legendi* (1868) and also to a criminal process, which, however, resulted in his acquittal (May 1869). Then, and on two subsequent occasions, he was returned by the city of Hanover as a member of the North German and German parliaments. In June 1874 he was found guilty of a libel on Prince Bismarck, whom he had compared to Frederick II. in "his unrighteous war with Austria and his ruination of religion and morality," to Napoleon III. in his way of "picking out the best time possible for robbery and plunder." For this offence he was sentenced to undergo three weeks' imprisonment. He died in his 72nd year of heart disease on the 4th of May 1875.

Ewald was no common man. In his public life he displayed many noble characteristics,—perfect simplicity and sincerity, intense moral earnestness, sturdy independence, absolute fearlessness. As a teacher he had a remarkable power of kindling enthusiasm; and he sent out many distinguished pupils, among whom may be mentioned Hitzig, Schrader, Nöldeke, Diestel and Dillmann. His disciples were not all of one school, but many eminent scholars who apparently have been untouched by his influence have in fact developed some of the many ideas which he suggested. His numerous writings, from 1823 onwards, were the reservoirs in which the entire energy of a life was stored. His *Hebrew Grammar* inaugurated a new era in biblical philology. All subsequent works in that department have been avowedly based on his, and to him will always belong the honour of having been, as Hitzig has called him, "the second founder of the science of the Hebrew language." As an exegete and biblical critic no less than as a grammarian he has left his abiding mark. His *Geschichte des Volkes Israël*, the result of thirty years' labour, was epoch-making in that branch of research. While in every line it bears the marks of intense individuality, it is at the same time a product highly characteristic of the age, and even of the decade, in which it appeared. If it is obviously the outcome of immense learning on the part of its author, it is no less manifestly the result of the speculations and researches of many laborious predecessors in all departments of history, theology and philosophy. Taking up the idea of a divine education of the human race, which Lessing and Herder had made so familiar to the modern mind, and firmly believing that to each of the leading nations of antiquity a special task had been providentially assigned, Ewald felt no difficulty about Israel's place in universal history, or about the problem which that race had been called upon to solve. The history of Israel, according to him, is simply the history of the manner in which the one true religion really and truly came into the possession of mankind. Other nations, indeed, had attempted the highest problems in religion; but Israel alone, in the providence of God, had succeeded, for Israel alone had been inspired. Such is the supreme meaning of that national history which began with the exodus and culminated (at the same time virtually terminating) in the appearing of Christ. The historical interval that separated these two events is treated as naturally dividing itself into three great periods,—those of Moses, David and Ezra. The periods are externally indicated by the successive names by which the chosen people were called—Hebrews, Israelites, Jews. The events prior to the exodus are relegated by Ewald to a preliminary chapter of primitive history; and the events of the apostolic and post-apostolic age are treated as a kind of appendix. The entire construction of the history is based, as has already been said, on a critical examination and chronological arrangement of the available documents. So far as the results of criticism are still uncertain with regard to the age and authorship of any of these, Ewald's conclusions must of course be regarded as unsatisfactory. But his work remains a storehouse of learning and is increasingly recognized as a work of rare genius.

Of his works the more important are:—*Die Composition der Genesis kritisch untersucht* (1823), an acute and able attempt to account for the use of the two names of God without recourse to the document-hypothesis; he was not himself, however, permanently convinced by it; *De metris carminum Arabicorum* (1825); *Das Hohelied Salomo's übersetzt u. erklärt* (1826; 3rd ed., 1866); *Kritische Grammatik der hebr. Sprache* (1827)—this afterwards became the *Ausführliches Lehrbuch der hebr. Sprache* (8th ed., 1870); and it was followed by the *Hebr. Sprachlehre für Anfänger* (4th ed., 1874); *Über einige ältere Sanskritmetra* (1827); *Liber Vakedii de Mesopotamiae expugnatae historia* (1827); *Commentarius in Apocalypsin Johannis* (1828); *Abhandlungen zur biblischen u. orientalischen Literatur* (1832); *Grammatica critica linguae Arabicae* (1831–1833); *Die poetischen Bücher des alten Bundes* (1835–1837, 3rd ed., 1866–1867); *Die Propheten des alten Bundes* (1840–1841, 2nd ed., 1867–1868); *Geschichte des Volkes Israël* (1843–1859, 3rd ed., 1864–1868); *Alterthümer Israels* (1848); *Die drei ersten Evangelien übersetzt u. erklärt* (1850); *Über das äthiopische Buch Henoch* (1854); *Die Sendschreiben des Apostels Paulus übersetzt u. erklärt* (1857); *Die Johanneischen Schriften übersetzt u. erklärt* (1861–1862); *Über das vierte Esrabuch* (1863); *Sieben Sendschreiben des neuen Bundes* (1870); *Das Sendschreiben an die Hebräer u. Jakobos' Rundschreiben* (1870); *Die Lehre der Bibel von Gott, oder Theologie des alten u. neuen Bundes* (1871–1875). The *Jahrbücher der biblischen Wissenschaft* (1849–1865) were edited, and for the most part written, by him. He was the chief promoter of the *Zeitschrift für die Kunde des*

Morgenlandes, begun in 1837; and he frequently contributed on various subjects to the *Götting. gelehrte Anzeigen*. He was also the author of many pamphlets of an occasional character.

The following have been translated into English:—*Hebrew Grammar*, by John Nicholson (from 2nd German edition) (London 1836); *Introductory Hebrew Grammar* (from 3rd German edition) (London, 1870); *History of Israel*, 5 vols. (corresponding to vols. i.-iv. of the German), by Russell Martineau and J. Estlin Carpenter (London, 1867–1874); *Antiquities of Israel*, by H. S. Solly (London, 1876); *Commentary on the Prophets of the Old Testament*, by J. Frederick Smith (2 vols., London, 1876–1877); *Isaiah the Prophet*, chaps. i.-xxxiii., by O. Glover (London, 1869); *Life of Jesus Christ*, also by O. Glover (London, 1865).

See the article in Herzog-Hauck; T. Witton Davies, *Heinrich Ewald* (1903); and cf. T. K. Cheyne, *Founders of Old Testament Criticism* (1893); F. Lichtenberger, *History of German Theology in the Nineteenth Century* (1889).

EWALD, JOHANNES (1743–1781), the greatest lyrical poet of Denmark, was the son of a melancholy and sickly chaplain at Copenhagen, where he was born on the 18th of November 1743. At the age of eleven he was sent to school at Schleswig, his father's birthplace, and returned to the capital only to enter the university in 1758. His father was by that time dead, and in his mother, a frivolous and foolish woman, he found neither sympathy nor moral support. At fifteen he fell passionately in love with Arense Hulegaard, a girl whose father afterwards married the poet's mother; and the romantic boy resolved on various modes of making himself admired by the young lady. He began to learn Abyssinian, for the purpose of going out as a missionary to Africa, but this scheme was soon given up, and he persuaded a brother, four years older than himself, to run away that they might enlist as hussars in the Prussian army. They managed to reach Hamburg just when the Seven Years' War was commencing and were allowed to enter a regiment. But the elder brother soon got tired and ran away, while the poet, after a series of extraordinary adventures, deserted to the Austrian army, where from being drummer he rose to being sergeant, and was only not made an officer because he was a Protestant. In 1760 he was weary of a soldier's life and deserted again, getting safe back to Denmark. For the next two years he worked with great diligence at the university, but the Arense for whom he had gone through so much hardship and taken so much pains married another man almost immediately after Ewald's final and very successful examination. The disappointment was one from which he never recovered, but his own weakness of will was largely to blame for it. He plunged into dissipation of every kind, and gave his serious thoughts only to poetry.

In 1763 his first work, a perfunctory dissertation, *De pyrologia sacra*, first saw the light. In 1764 he made a considerable success with a short prose story in the popular manner of Sneedorf, *Lykkens Tempel* (The Temple of Fortune), which was translated into German and Icelandic. On the death of Frederick V., however, Ewald first appeared prominently as a poet; he published in 1766 three *Elegies* over the dead king, which were received with universal acclamation, and of which one, at least, is a veritable masterpiece. But his dramatic poem *Adam og Eva* (Adam and Eve), by far the finest imaginative work produced in Denmark up to that time, was rejected by the Society of Arts in 1767 and was not published until 1769. At the latter date, however, its merits were perceived. In 1770 Ewald attained success with *Philet*, a narrative and lyrical poem, and still more with his splendid *Rolf Krage*, the first original Danish tragedy. For the next ten years Ewald was occupied in producing one brilliant poetical work after another, in rapid succession. In 1771 he published *De brutale Klappers* (The Brutal Clappers), a tragicomedy or parody satirizing the dispute then raging between the critics and the manager of the Royal Theatre; in 1772 he translated from the German the lyrical drama of *Philemon and Baucis*, and brought out his versified comedy of *Harlequin Patriot*, a satire on the passion for political scribbling created by Struensee's introduction of the liberty of the press. In 1773 he published *Pebersvendene* (Old Bachelors), a prose comedy. In 1771 he had already collected some of his lyrical poems under the title of *Adskilligt af Johannes Ewald* (Miscellanies). In 1774 appeared the heroic opera of *Balder's Död* (Balder's Death), and in 1779 the finest of his works, the lyrical drama *Fiskerne* (The Fishers), which contains the Danish National Song, "King Christian stood by the high Mast," his most famous lyric. In the two poems last mentioned, however, Ewald passed beyond contemporary taste, and these great works, the pride of Danish literature, were coldly received. But while the new poetry was slowly winning its way into popular esteem, the poet did not lack admirers, and at the head of these he founded in 1775 the Danish Literary Society, a body which became influential, and which made the study of Ewald a cultus. But the poet's health had broken; when he was writing *Rolf Krage* he was already an inmate of the consumptive hospital, and when he seemed to be recovering, his health was shattered again by a night spent in the frosty streets. He embittered his existence by the recklessness of his private life, and finally, through a fall from a horse, he ended by becoming a complete invalid. His last ten years were full of acute suffering; his mother treated him with cruelty, his family with neglect, and but few even of his friends showed any manliness or generosity towards him. In 1774 he was placed in the house of an inspector of fisheries at Rungsted, where Anna Hedevig Jacobsen, the daughter of the house, tended the wasted poet with infinite tenderness and skill. He stayed in this house for three years, and wrote there some of his finest later lyrics. Meanwhile he had fallen deeply in love with the charming solace of his sufferings and won her consent to a marriage. This step, however, was prevented by his family, who roughly removed him to their own keeping near Kronborg. Here he was treated so infamously that he insisted on being taken back to Copenhagen in 1777, where he found an older, but no less tender nurse, in Ane Kirstine Skou. Here he wrote *Fiskerne* with his imagination full of the familiar shore at Hornbaek, near Rungsted. In 1780 he was a little better, and managed to be present at the theatre at the first performance of his poem. But this excitement hastened his end, and after months of extreme agony he died on the 17th of March 1781, and was carried to the grave by a large assembly of his admirers, since he was now just recognized by the public for the first time as the greatest national poet. Among his papers were found fragments of three dramas, two on old Scandinavian subjects, entitled *Frode* and *Helgo*, and the third a tragedy on the story of *Hamlet*, which he meant to treat in a way wholly distinct from Shakespeare's.

Ewald belongs to the race of poetical reformers who appeared in all countries of Europe at the end of the 18th century; but it is interesting to observe that in point of time he preceded all of them. He was born six years earlier than Goethe and Alfieri, sixteen years before Schiller, nine years before André Chénier, and twenty-seven years earlier than Wordsworth, but he did for Denmark what each of these poets did for his own country. Ewald found Danish literature given over to tasteless rhetoric, and without art or vigour. He introduced vivacity of style, freshness and brevity of form, and an imaginative study of nature which was then unprecedented. But perhaps his greatest claim to notice is the fact that he was the first person to call the attention of the Scandinavian peoples to the treasures of their ancient history and mythology, and to suggest the use of these in imaginative writing. With a colouring more distinctly modern than that of Collins and Gray, his lyrics yet resemble the odes of these his English contemporaries more closely than those of any continental poet; from another point of view his ballads remind us of those of Schiller, which they preceded. His dramas, which had an immense influence on the Danish stage, are now chiefly of antiquarian interest, with the exception of "The Fishers," a work that must always live as a great national poem. In personal character and in fate Ewald seems to have been not unlike Heinrich Heine.

The first collected edition of Ewald's works began to appear in his lifetime. It is in four volumes, 1780–1784. His works have constantly been reprinted, but the standard edition is that by Liebenberg, in 8 vols., 1850–1855. The best biographies of him are those by C. Molbech (1831), Hammerich (1860) and Andreas Dolleris (1900). (E. G.)

EWART, WILLIAM (1798–1869), English politician, was born in Liverpool on the 1st of May 1798. He was educated at Eton and Christ Church, Oxford, gaining the Newdigate prize for English verse. He was called to the bar at the Middle Temple in 1827, and the next year entered parliament for the borough of Bletchingley in Surrey. He subsequently sat for Liverpool from 1830 to 1837, for Wigan in 1839, and for Dumfries Burghs from 1841 until his retirement from public life in 1868. He died at Broadleas, near Devizes, on the 23rd of January 1869. Ewart, who was an advanced liberal in politics, was responsible during his long political career for many useful measures. In 1834 he carried a bill for the abolition of hanging in chains, and in 1837 he was successful in getting an act passed for abolishing capital punishment for cattle-stealing and other offences. In 1850 he carried a bill for establishing free libraries supported out of the rates, and in 1864 he was instrumental in getting an act passed for legalizing the use of the metric system of weights and measures. He was always a strong advocate for the abolition of capital punishment, and on his motion in 1864 a select committee was appointed to consider the subject. Other reforms which he advocated and which have since been carried out were an annual statement on education, and the examination of candidates for the civil service and army.

EWE, a group of Negro peoples of the Slave Coast, West Africa. By the natives their country is called *Ewe-me*, "Land of the Ewe." The Ewe family forms five linguistic groups: the Anlo or Anglawa on the Gold Coast frontier, the Krepi of Anfueh speech, the Jeji, the Dahomeyans and the Mahi.

See further DAHOMEY, and A. B. Ellis, *The Ewe-Speaking Peoples of the Slave Coast . . .* (London, 1890).

EWELL, RICHARD STODDERT (1817–1872), American soldier, lieutenant-general in the Confederate army, was born in Georgetown, now a part of Washington, D.C., on the 2nd of February 1817, and graduated at West Point in 1840. As a cavalry officer he saw much active service in the Mexican War and later in Indian warfare in New Mexico. He resigned his commission at the outbreak of the Civil War, and entered the Confederate service. He commanded a brigade in the first Bull Run campaign, and a division in the famous Valley Campaign of "Stonewall" Jackson, to whom he was next in rank. At Cross Keys he was in command of the forces which defeated General Frémont. Ewell's division served with Jackson in the Seven Days and in the campaign of Second Bull Run. At the action of Groveton Ewell lost a leg, but did not on that account retire from active service, though other generals led his men in the sanguinary battles of Antietam (where they lost 47% of their numbers) and Fredericksburg. After the death of "Stonewall" Jackson, Ewell was promoted lieutenant-general and appointed to command the 2nd Corps, with which he had served from the beginning of the Valley Campaign. His promotion set aside General J. E. B. Stuart, the temporary commander of Jackson's corps; that Ewell, crippled as he was, was preferred to the brilliant cavalry leader was a marked testimony to his sterling qualities as a soldier. The invasion of Pennsylvania soon followed, Ewell's corps leading the advance of Lee's army. A federal force was skilfully cut off and destroyed near Winchester, Va., and Ewell's corps then raided Maryland and southern Pennsylvania unchecked. At the battle of Gettysburg, the 2nd Corps decided the fighting of the first day in favour of the Confederates, driving the enemy before them; on the second day it fought a desperate action on Lee's left wing. Ewell took part in the closing operations of 1863 and in all the battles of the Wilderness and Petersburg campaigns. In the final campaign of 1865 he and the remnant of his corps were cut off and forced to surrender at Sailor's Creek, a few days before his chief capitulated to Grant at Appomattox. After the war General Ewell lived in retirement. He died near Spring Hill, Maury County, Tennessee, on the 25th of January 1872.

EWING, ALEXANDER (1814–1873), Scottish divine, was born of an old Highland family in Aberdeen on the 25th of March 1814. In October 1838 he was admitted to deacon's orders, and after his return from Italy he took charge of the episcopal congregation at Forres, and was ordained a presbyter in the autumn of 1841. In 1846 he was elected first bishop of the newly restored diocese of Argyll and the Isles, the duties of which position he discharged till his death on the 22nd of May 1873. In 1851 he received the degree of D.C.L. from the university of Oxford. Though hampered by a delicate bodily constitution, he worked in a spirit of buoyant cheerfulness. By the charm of his personal manner and his catholic sympathies he gradually attained a prominent position. In theological discussion he contended for the exercise of a wide tolerance, and attached little importance to ecclesiastical authority and organization. His own theological position had close affinity with that of Thomas Erskine of Linlathen and Frederick Denison Maurice; but his opinions were the fruit of his own meditation, and were coloured by his own individuality. The trend of his teaching is only to be gathered from fragmentary publications—letters to the newspapers, pamphlets, special sermons, essays contributed to the series of *Present Day Papers*, of which he was the editor, and a volume of sermons entitled *Revelation considered as Light.*

Besides his strictly theological writings, Ewing was the author of the *Cathedral or Abbey Church of Iona* (1865), the first part of which contains drawings and descriptive letterpress of the ruins, and the second a history of the early Celtic church and the mission of St Columba. See *Memoir of Alexander Ewing, D.C.L.*, by A. J. Ross (1877).

EWING, JULIANA HORATIA ORR (1841–1885), English writer of books for children, daughter of the Rev. Alfred Gatty and of Margaret Gatty (*q.v.*), was born at Ecclesfield, Yorkshire, in 1841. One of a large family, she was accustomed to act as nursery story-teller to her brothers and sisters, and her brother Alfred Scott Gatty provided music to accompany her plays. She was well educated in classics and modern languages, and at an early age began to publish verses, being a contributor to *Aunt Judy's Magazine*, which her mother started in 1866. *The Land of Lost Toys* and many other of Juliana's stories appeared in this magazine. In 1867 she married Major Alexander Ewing, himself an author, and the composer of the well-known hymn "Jerusalem the Golden." From this time until her death (13th may 1885), previously to which she had been a constant invalid, Mrs Ewing produced a number of charming children's stories. The best of these are: *The Brownies* (1870), *A Flat-Iron for a Farthing* (1873), *Lob-lie-by the Fire* (1874), *The Story of a Short Life* (1885) and *Jackanapes* (1884), the two last-named, in particular, obtaining great success; among others may be mentioned *Mrs Over-the-Way's Remembrances* (1869), *Six to Sixteen*, *Jan of the Windmill* (1876), *A Great Emergency* (1877), *We and the World* (1881), *Old-Fashioned Fairy Tales*, *Brothers of Pity* (1882), *The Doll's Wash*, *Master Fritz*, *Our Garden*, *A Soldier's Children*, *Three Little Nest-Birds*, *A Week Spent in a Glass-House*, *A Sweet Little Dear*, and *Blue-Red* (1883). Many of these were published by the S.P.C.K. Simple and unaffected in style, and sound and wholesome in matter, with quiet touches of humour and bright sketches of scenery and character, Mrs Ewing's best stories have never been surpassed in the style of literature to which they belong.

EWING, THOMAS (1789–1871), American lawyer and statesman, was born near the present West Liberty, West Virginia, on the 28th of December 1789. His father, George Ewing, settled at Lancaster, Fairfield county, Ohio, in 1792. Thomas graduated at Ohio University, Athens, Ohio, in 1815, and in August 1816 was admitted to the bar at Lancaster, where he won high rank as an advocate. He was a Whig member of the United States senate in 1831–1837, and as such took a prominent part in the legislative struggle over the United States Bank, whose rechartering he favoured and which he resolutely defended against President Jackson's attack, opposing in able speeches the withdrawal of deposits and Secretary Woodbury's "Specie Circular" of 1836. In March 1841 he became secretary of the treasury in President W. H. Harrison's cabinet. When, however, after President Tyler's accession, the relations between the President and the Whig Party became strained, he retired (September 1841) and was succeeded by Walter Forward (1786–1852).

Subsequently from March 1849 to July 1850 he was a member of President Taylor's cabinet as the first secretary of the newly established department of the interior. He thoroughly organized the department, and in his able annual report advocated the construction by government aid of a railroad to the Pacific Coast. In 1850–1851 he filled the unexpired term of Thomas Corwin in the U.S. Senate, strenuously opposing Clay's compromise measures and advocating the abolition of slavery in the District of Columbia. He was subsequently a delegate to the Peace Congress in 1861, and was a loyal supporter of President Lincoln's war policy. He died at Lancaster, Ohio, on the 26th of October 1871.

His daughter was the wife of General William T. Sherman. His son, Hugh Boyle Ewing (1826–1905), served throughout the Civil War in the Federal armies, rising from the rank of colonel (1861) to that of brigadier-general (1862) and brevet major-general (1865), and commanding brigades at Antietam and Vicksburg and a division at Chickamauga; and was minister of the United States to the Netherlands in 1866–1870. Another son, Thomas Ewing (1829–1896), studied at Brown University in 1852–1854 (in 1894, by a special vote, he was placed on the list of graduates in the class of 1856); he was a lawyer and a free-state politician in Kansas in 1857–1861, and was the first chief-justice of the Kansas supreme court (1861–1862). In the Civil War he attained the rank of brigadier-general (March 1863) and received the brevet of major-general (1865). He was subsequently a representative in Congress from Ohio in 1877–1881; and from 1882 to 1896 practised law in New York City, where he was long one of the recognized leaders of the bar.

EXAMINATIONS. The term "examination" (*i.e.* inspecting, weighing and testing; from Lat. *examen*, the tongue of a balance) is used in the following article to denote a systematic test of knowledge, and of either special or general capacity or fitness, carried out under the authority of some public body.

1. *History.*—The oldest known system of examinations in history is that used in China for the selection of officers for the public service (*c.* 1115 B.C.), and the periodic tests which they undergo after entry (*c.* 2200 B.C.). See CHINA; also W. A. P. Martin, *The Lore of Cathay* (1901), p. 311 et seq.; T. L. Bullock, "Competitive Examinations in China" (*Nineteenth Century*, July 1894); and Étienne Zi, *Pratique des examens littéraires en Chine* (Shanghai, 1894). The abolition of this system was announced in 1906, and, as a partial substitute, it was decided to hold an annual examination in Peking of Chinese graduates educated abroad (*Times*, 22nd of October 1906).

The majority of examinations in western countries are derived from the university examinations of the middle ages. The first universities of Europe consisted of corporations of teachers and of students analogous to the trade gilds and merchant gilds of the time. In the trade gilds there were apprentices, companions, and masters. No one was admitted to mastership until he had served his apprenticeship (*q.v.*), nor, as a rule, until he had shown that he could accomplish a piece of work to the satisfaction of the gild.

The object of the universities was to teach; and to the three classes established by the gild correspond roughly the *scholar*, the *bachelor* or pupil-teacher (see Rashdall i. 209, note 2, and 221, note 5), and the *master* or *doctor* (two terms at first equivalent) who, having served his apprenticeship and passed a definite technical test, had received permission to teach. The early universities of Europe, being under the same religious authority and animated by the same philosophy, resembled each other very closely in curriculum and general organization and examinations, and by the authority of the emperor, or of the pope in most cases, the permission to teach granted by one university was valid in all (*jus ubicunque docendi*).

The earliest university examinations of which a description is available are those in civil and in canon law held at Bologna at a period subsequent to 1219. The student was admitted without examination as bachelor after from four to six years' study, and after from six to eight years' study became qualified as a candidate for the doctorate. He might obtain the doctorate in both branches of law in ten years (Rashdall i. 221-222).

The doctoral examination at Bologna in the 13th-14th centuries consisted of two parts—a private examination which was the real test, and a public one of a ceremonial character (*conventus*). The candidate first took an "oath that he had complied with all the statutable conditions, that he would give no more than the statutable fees or entertainments to the rector himself, the doctor or his fellow-students, and that he would obey the rector." He was then presented to the archdeacon of Bologna by one or more doctors, who were required to have satisfied themselves of his fitness by private examination. On the morning of the examination, after attending mass, he was assigned by one of the doctors of the assembled college two passages (*puncta*) in the civil or canon law, which he retired to his house to study, possibly with the assistance of the presenting doctor. Later in the day he gave a lecture on, or exposition of, the prepared passages, and was examined on them by two of the doctors appointed by the college. Other doctors might then put supplementary questions on law arising out of the passages, or might suggest objections to his answers. The vote of the doctors present was taken by ballot, and the fate of the candidate was determined by the majority. The successful candidate, who received the title of licentiate, was, on payment of a heavy fee and other expenses, permitted to proceed to the *conventus* or final public examination. This consisted in the delivery of a speech and the defence of a thesis on some point of law, selected by the candidate, against opponents selected from among the students. The successful candidate received from the archdeacon the formal "licence to teach" by the authority of the pope in the name of the Trinity, and was invested with the insignia of office. At Bologna, though not at Paris, the "permission to teach" soon became fictitious, only a small number of doctors being allowed to exercise the right of teaching in that university (Rashdall).

In the faculty of arts of Paris, towards the end of the 13th century, the system was already more complicated than at Bologna. The baccalaureate, licentiateship, and mastership formed three distinct degrees. For admission to the baccalaureate a preliminary test or "Responsions" was first required, at which the candidate had to dispute in grammar or logic with a master. The examiners then inspected the certificates (*schedulae*) of residence and of having attended lectures in the prescribed subjects, and examined him in the contents of his books. The successful candidate was admitted to maintain a thesis against an opponent, a process called "determination" (see Rashdall i. 443 et seq.), and as bachelor was then permitted to give "cursory" lectures. After five or six years from the date of beginning his studies (matriculation) and being twenty years of age (these conditions varied at different periods), a bachelor was permitted to present himself for the examination for the licentiateship, which was divided into two parts. The first part was conducted in private by the chancellor and four examiners (*temptatores in cameris*), and included an inquiry into the candidate's residence, attendance at lectures, and performance of exercises, as well as examination in prescribed books; those candidates adjudged worthy were admitted to the more important examination before the faculty, and the names of successful candidates were sent to the chancellor in batches of eight or more at a time, arranged in order of merit. (The order of merit at the examination for the licentiateship existed in Paris till quite recently.) Each successful candidate was then required to maintain a thesis chosen by himself (*quodlibetica*) in St Julian's church, and was finally submitted to a purely formal public examination (*collatio*) at either the episcopal palace or the abbey of Ste Geneviève, before receiving from the chancellor, in the name of the Trinity, the licence to incept or begin to teach in the faculty of arts. After some six months more the licentiate took part "in a peculiarly solemn disputation known as his 'Vespers,'" then gave his formal inaugural lecture or disputation before the faculty, and was received into the faculty as master. This last process was called "inception."

In discussing the value of medieval examinations of the kind described, Paulsen (*The German Universities* (1906), p. 25) asserts that they were well adapted to increase a student's alertness, his power of comprehending new ideas, and his ability quickly and surely to assimilate them to his own, and that "they did more to enable [students] to grasp a subject than the mute and solitary reviewing and cramming of our modern examinations can possibly do." At their best they fulfilled precisely the technical purpose for which they were intended; they fully tested the capacity of the candidate to teach the subjects which he was required to teach in accordance with the methods which he was required to use. The limitations of the test were the limitations of the educational and philosophic ideals of the time, in which a dogmatic basis was presupposed to all knowledge and criticism was limited to the superstructure. At their worst, even with venal examiners (and additional fees were often offered as a bribe), Rashdall regards these examinations (at the end of the 13th century) as probably "less of a farce than the pass examinations of Oxford and Cambridge almost within the memory of persons now living." It is, however, to be pointed out that the standard in Paris and elsewhere at a later date became scandalously low in some cases. In some universities the sons of nobles were regularly excused certain examinations. At Cambridge in 1774 Fellow Commoners were examined with such precipitation to fulfil the formal requirements of the statutes that the ceremony was termed "huddling for a degree" (Jebb, *Remarks upon the Present Mode of Education in the University of Cambridge*, 4th ed., 1774, p. 32). The last privileges of this kind were abolished at Cambridge by a grace passed on the 20th of March 1884.

In the medieval examinations described above we find most of the elements of our present examinations: certificates of previous study and good conduct, preparation of set-books, questioning on subjects not specially prepared, division of examinations into various parts, classification in order of merit, payment of fees, the presentation of a dissertation, and the defence and publication of a thesis (a term of which the meaning has now become extended).

The requirement to write answers to questions written or dictated, to satisfy a practical test (other than in teaching), and a clinical test in medicine, appear to be of later date.[1] The medieval candidate for the doctorate in medicine, although required to have attended practice before presenting himself, discussed as his thesis a purely theoretical question, often semi-theological in character, of which as an extreme example may be quoted "whether Adam had a navel."

The competitive system was developed considerably at Louvain, and in the 15th century the candidates for the mastership of arts were divided into three classes (*rigorosi*, honour-men; *transibiles*, pass-men; *gratiosi*, charity-passes), while a fourth, which was not published, contained the names of those who failed. In the 17th century the first class comprised the names of twelve, and the second, of twenty-four, candidates, who were divided on the report of their teachers into classes before the examination, and finally arranged in order of merit by the examiners (Vernulaeus, quoted by Sir W. Hamilton, *Discussions*, 1852; p. 647; Rashdall, *loc. cit.* ii. 262). At the Cambridge tripos (as described by Jebb in 1774, *Remarks*, &c., pp. 20-31) the first twenty-four candidates were also selected by a preliminary test; they were then divided further into "wranglers" (the disputants, *par excellence*) and *Senior Optimes*, the next twelve on the list being called the *Junior Optimes*. These names have in the mathematics tripos survived the procedure. (The name *Tripos* is derived from the three-legged stool on which "an old bachilour," selected for the purpose, sat during his disputation with the senior bachelor of the year, who was required to propound two questions to him.)

The subjects in which the medieval universities examined were (i.) those of the trivium and quadrivium in the faculty of arts; (ii.) theology; (iii.) medicine; and (iv.) civil and canon law. The number of subjects in which examinations are held has since grown immensely. We can only sketch in outline the transformations of certain typical university systems of examinations.

At Oxford there is no record of a process of formal examination on books similar to that of Paris (Rashdall, ii. 442 et seq.), disputations being apparently the only test applied in its early history. Examinations were definitely introduced for the B.A. and M.A. degrees by Laud in 1636–1638 (Brodrick, *History of Oxford*, p. 114), but the standard prescribed was so much beyond the actual requirements of later times that it may be doubted if it was enforced. The studies fell in the 18th century into an "abject state," from which they were first raised by a statute passed in 1800 (*Report of Oxford University Commission of 1850–1852*, p. 60 et seq.), under which distinctions were first allotted to the ablest candidates for the bachelor's degree. Further changes were made in 1807 and 1825; and in 1830 a distinction was made between honours examinations of a more difficult character, at which successful candidates were divided into four classes, and pass examinations of an easier character. By the statutes of 1849 and 1858 an intermediate "Moderations" examination was instituted between the preliminary examination called "Responsions" and the final examination. Since 1850, although fresh subjects of examination have been introduced, no considerable change of system has been made.

The bachelor's degree at Oxford tended from an early period to be postponed to an advanced stage of studies, while the requirements for the master's degree diminished until, in 1807, the examination for the M.A. was abolished. It is now awarded to bachelors of three years' standing on payment of a fee.

Cambridge in early times followed the example of Oxford, and here also the bachelor's degree became more and more important (Bass Mullinger, *History of the University of Cambridge from 1535* . . . , p. 414), and the M.A. has been finally reduced to a mere formality, awarded on terms similar to those of the sister university. The standard of examinations was raised in Cambridge at an earlier date than at Oxford, and in the 18th century the tripos "established the reputation of Cambridge as a School of Mathematical Science." The school, however, produced few, if any, great mathematicians between Newton and George Green. It was only between 1830 and 1840 that the standard of the tripos became a high one. At Cambridge there is no intermediate examination between the "Previous Examination" (commonly called "Little-go"), which corresponds to Oxford "Responsions" or "Smalls" and the triposes and examinations for the "Poll" degree, which correspond to the Oxford final honours and pass examinations respectively. But most of the triposes have been divided into two parts, of which the second is not obligatory in order to obtain a degree. The "senior wrangler" was the first candidate in order of merit in the first part of the mathematical tripos. The abolition of order of merit at this examination was decided on in 1906, and names of candidates appeared in this order for the last time in 1909.

At the Scottish universities the B.A. degree has become extinct, and the M.A., awarded on the results of examination, is the first degree in the faculty of arts.

The incorporation of the university of London in 1836 marks an era in the history of examinations; the teaching and examining functions of a university were dissociated for the first time. Until 1858 the London examinations were open only to students in affiliated colleges, and the teachers had no share in the appointment of the examiners or indetermining the curricula for examinations; in 1858 the examinations were thrown open to all comers, and no requirements were insisted on with regard to courses of study except for degrees in the faculty of medicine. The sole function of the university was to examine, and its examinations for matriculation and for degrees in arts and science were carried on by means of written papers not only in London but in many centres in the United Kingdom and the colonies. From the first the degrees were (unlike those of Oxford and Cambridge until 1871) open to all male persons without religious distinctions; and in 1878 they were opened to women. (Tripos examinations were thrown open to women at Cambridge by the grace of 24th Feb. 1881, and at Oxford women were admitted to examinations for honours by statute of 29th April 1884. Proposals to admit women to university degrees were rejected by Oxford and Cambridge in 1896 and 1897 respectively.)

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[1] W. W. Rouse Ball in his *History of the Study of Mathematics at Cambridge* (1889), p. 193, states that he can find no record of any European examinations by means of written papers earlier than those introduced by R. Bentley at Trinity College, Cambridge, in 1702.

The standard of difficulty set by the university of London was a high one, very much higher for its pass degrees than the corresponding standards at Oxford and Cambridge, while the standard for honours was equally high. In medicine the examinations were made both wider in range and more searching than those of any other examining body. But, for reasons dealt with below, great discontent was roused by the new system. In 1880 the Victoria University, Manchester, was established, in which teaching and examining were again united; and in the universities since established, with the exception of the Royal University of Ireland (which was created in 1880 as an examining body on the model of London, but which was dissolved under the Irish Universities Act 1908, and replaced by the National University of Ireland and the Queen's University of Belfast), the precedent of Victoria has been followed. By an act passed in 1898, of which the provisions came into force in 1900, the university of London was reconstituted as a teaching university, although provision was made for the continuance of the system of examinations by "external examiners" for "external students," together with "internal examinations" for "internal students," in which the teachers and the external examiners of the university are associated. The examinations in music and the final examinations in law and medicine are carried on [1910] both for "internal" and "external" students by "external" examiners only, who are, however, appointed on the recommendation of boards of studies consisting mainly of London teachers.

At the university of Dublin, examinations have been maintained both for the B.A. and M.A. degrees, and students may be admitted to the examinations in subjects other than divinity, law, medicine, and engineering without attendance at university courses.

The examinations of the newer universities, the Victoria University of Manchester, Birmingham, Liverpool, Leeds, Sheffield and Wales, are open only to students at these universities, and are conducted by the teachers in association with one or more external examiners for each subject. In some universities, *e.g.* Manchester, the M.A. degree is given after examination to students who have taken a pass, and without examination to those who have taken an honours degree.

The universities which have departed furthest from the medieval system of examinations, at any rate in appearance, are those of Germany. The baccalaureate has disappeared, but students cannot be matriculated without having passed the *Abiturienten-examen* (see below), probably the most severe of all entrance examinations (foreign students may be exempted under certain conditions). The student desiring to proceed to the doctorate is free from examinations thereafter until he presents his thesis for the doctor's degree,[1] when, if it is accepted, he is submitted to a public oral examination not only in his principal subject (*Hauptfach*), but also as a rule in two or more collateral subjects (*Nebenfächer*). The doctor's degree does not give the right to teach in a faculty (*venia legendi*). To acquire this a doctor must present a further thesis (*Habilitationsschrift*), and must deliver two lectures, one before the faculty, followed by a discussion (*colloquium*), the other in public; but these lectures "seem to be merely secondary and are tending to become so more and more"; "scientific productiveness is so sharply emphasized among the conditions for admission that it overshadows all the rest" (Paulsen, *loc. cit.* p. 165).

In France the examination for the baccalaureate, though conducted in part by university examiners, has become a school-leaving examination (see below). The licentiateship has been preserved in the faculties of arts, science and laws, and is in point of difficulty about equal to the pass degree examinations of the university of London, though differing in the nature of the tests. In the faculty of sciences, the three subjects of examination selected may, under a recent regulation, be taken separately. Until a few years ago the successful candidates at the licentiateship were arranged in order of merit. For the doctorate in the faculty of letters two theses must be submitted, of which the subject and plan must be approved by the faculty (until recently one of them was required to be written in Latin). Permission to print the theses is given by the rector or vice-rector after report from one or more professors, and they are then discussed publicly by the faculty and the candidate (*soutenance de thèse*). In this public discussion the "disputation" of the middle ages survives in its least changed form. The literary theses required by French universities are, as a rule, volumes of several hundred pages, and more important in character even than the German *Habilitationsschrift*. The possession of the doctorate is a *sine qua non* for eligibility to a university chair, and to a lectureship in the university of Paris.

In the faculty of sciences a candidate for the doctorate may submit two theses, or else submit one thesis and undergo an oral examination.

For the doctorate in law, a thesis and two oral examinations are required.

In the faculty of medicine there is no licentiateship, but for the doctorate six examinations must be passed and a thesis submitted.

There is also a special doctorate, the "*doctorat d'Université*," awarded on a thesis and an oral examination; and there are diplomas (*Diplômes d'Études supérieures*) awarded on dissertations and examinations on subjects in philosophy, history and geography, classics or modern languages, selected mainly by the candidate and approved by the faculty.

2. *Professional Examinations.* (*a*) *Teaching.*—University examinations for degrees having ceased to be used as technical tests of teaching capacity, new examinations have been devised for this purpose. The test for German university teachers has been described above. For secondary teachers, W. von Humboldt instituted a special examination in 1810 (Paulsen, *Gesch. des gelehrten Unterrichts*, ii. pp. 283 and 393), and an examination for primary teachers was instituted in Prussia in 1794.

In France there is a competitive examination for secondary teachers, the *agrégation*, originally established in 1766. *Agrégés* have a right to state employment and they alone can occupy the highest teaching post (*chaire de professeur*) in a state secondary school, other posts being open to licentiates. There are also examinations for primary teachers. The tests for teachers are different for the two sexes.

In England there is no obligatory test for secondary teachers. The universities and the College of Preceptors conduct examinations for teaching diplomas. The Board of Education holds special examinations (Preliminary Certificate examination and Certificate examination, &c.) for primary teachers.

(*b*) *Medicine.*—See MEDICAL EDUCATION.

(*c*) *Other Professions.*—A system of professional examinations carried on by professional bodies, in some cases with legal sanction, was developed in England during the 19th century. Those in the following subjects are the most important: Accountancy (Institute of Chartered Accountants and Society of Accountants and Auditors), actuarial work (Institute of Actuaries), music (Royal Academy of Music, Royal College of Music, Trinity College of Music, Royal College of Organists, and the Incorporated Society of Musicians), pharmacy (Pharmaceutical Society), plumbing (the Plumbers' Company), surveying (Surveyors' Institution), veterinary medicine (Royal College of Veterinary Surgeons), technical subjects, *e.g.* cotton-spinning, dyeing, motor-manufacture (City & Guilds of London Institute), architecture (Royal Institute of British Architects), commercial subjects, shorthand (the Society of Arts and London Chamber of Commerce), engineering (Institutions of Civil Engineers, of Mechanical Engineers, and of Electrical Engineers).

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[1] It should be mentioned that the professors of chemistry of a number of German, Austrian and Swiss universities, have, by agreement, instituted an intermediate examination in that subject which students are required to pass before beginning work on the doctoral thesis. The examination of the students is conducted by the teachers concerned.

3. *School-leaving Examinations.*—The faculty of arts in medieval universities covered secondary as well as higher education in the subjects concerned. The division in arts subjects between secondary and university education has been drawn at different levels in different countries. Thus the first two years of the arts curriculum in English and American universities correspond, roughly speaking, to the last two years spent in a secondary school of Germany or France, and the continental "school-leaving examinations" correspond to the intermediate examinations of the newer English universities and to the pass examinations for the degree at Oxford and Cambridge (Mark Pattison, *Suggestions on Academical Organization*, 1868, p. 238, and Matthew Arnold, *Higher Schools and Universities in Germany*, 1892, p. 209).

A tabular summary is given (see Tables I., II., III., IV.) of the requirements of the secondary school-leaving examinations of France, Prussia (for the nine-year secondary schools) and Scotland, and of the university of London.

There are in England a number of school examinations which, under prescribed conditions, also serve as school-leaving examinations, and give entrance to certain universities, especially the Oxford and Cambridge local examinations (both established in 1858), and the examinations of the Oxford and Cambridge "Joint Board." A movement to reduce the number of entrance examinations and to secure uniformity in their standard was set on foot in 1901. In that year the General Medical Council communicated to the Board of Education a memorial on the subject from the Headmasters' Conference. The memorial was further communicated to various professional bodies concerned. Conferences were held by the consultative committee of the Board of Education in 1903, with representatives of the universities, the Headmasters' Conference, the Association of Head-Masters, the Association of Head-Mistresses, the College of Preceptors, the Private Schools' Association, and with representatives of professional bodies. The committee were of opinion that a central board, consisting of representatives of the Board of Education and the different examining bodies, should be established, to co-ordinate and control the standards of the examinations, and to secure interchangeability of certificates, &c., as soon as a sufficient number of such bodies signified their willingness to be represented on the board. They recommended that the examination should be conducted by external and internal examiners, representing in each case the examining body and the school staff respectively, and that reports on the school work of candidates should be available for reference by the examiners (circular of the Board of Education of 12th of July 1904).

The "accrediting" system in the United States was started by the university of Michigan in 1871. A school desiring to be accredited is submitted to inspection without previous notice. If the inspection is satisfactory, the school is accredited by a university for from one to three years, and upon the favourable report of its principal any of its students are admitted to the university by which it has been accredited without any entrance examination. In practice it is found that many students whom their teachers refuse to certify are able to pass the university entrance examination. The statistics of nine years show that the standard of the certified students is higher than that of non-certified students. Two hundred and fifty schools are accredited by the university of Michigan. In 1904 it was stated that the system was gaining favour in the east,[1] and that it had been adopted more or less by all the eastern colleges and universities with the exception of Harvard, Yale, Princeton and Columbia.

4. *Methods of Examination.*—Examinations may test (i.) knowledge, or, more exactly, the power of restating facts and arguments of a kind that may be learnt by rote; (ii.) the power of doing something, *e.g.* of making a *précis* of a written document, of writing a letter or a report on a particular subject with a particular object in view, of translating from or into a foreign language, of solving a mathematical problem, of criticizing a passage from a literary work, of writing an essay on an historical or literary subject with the aid of books in a library, of diagnosing the malady of a patient, of analysing a chemical mixture or compound; and (the highest form under the rubric) of making an original contribution to learning or science as the result of personal investigation or experiment. Examinations are carried out at present by means of (1) written papers; (2) oral examinations; (3) practical, including in medicine clinical, tests; (4) theses; or a combination of these.

Written.

In written examinations the candidates are, as a rule, supplied with a number of printed questions, of which they must answer all, or a certain proportion, within a given time, varying, as a rule, from $1\frac{1}{2}$ to 3 hours, the latter being the duration most generally adopted for higher examinations in England. Whereas in France and Germany the questions are generally few in number and require long answers, showing constructive skill and mastery of the mother-tongue on the part of the candidates, such "essay-papers" are comparatively rare in England. In many subjects, the written examinations test memory rather than capacity. It has been suggested that sets of questions to be answered in writing should as a rule be divided into two parts: (i.) a number of questions requiring short answers and intended to test the range of the candidate's knowledge; (ii.) questions requiring long answers, intended to test its depth, and the candidate's powers of co-ordination and reflection. A necessary condition for the application of the second kind of test is that time should be given for reflection and for rewriting, say one-third or one-quarter of the whole time allowed. A further distinction is important, especially in such subjects as mathematics or foreign languages, in which it is legitimate to ask what precise power on the part of a candidate the passing of an examination shall signify. Owing to a prevailing confusion between tests of memory and tests of capacity, the allowance for chance fairly applied to the former is apt to be unduly extended to the latter. In applying tests of memory, it may be legitimate to allow a candidate to pass who answers correctly from 30 to 50% of the questions; such an allowance if applied to a test of capacity, such as the performance of a sum in addition, the solution of triangles by means of trigonometrical tables, or the translation of an easy passage from a foreign language, appears to be irrational. A candidate who obtains only 50% of the marks in performing such operations cannot be regarded as being able to perform them; and, if the examination is to be treated as a test of his capacity to perform them, he should be rejected unless he obtains full marks, less a certain allowance (say 10, or at most 20%) in view of the more or less artificial conditions inherent in all examinations.

Oral.

The oral examination is better suited than the written to discover the range of a candidate's knowledge; it also serves as a test of his powers of expression in his mother-tongue, or in a foreign language, and may be used (as in the examination for entrance to the Osborne Naval College) to test the important qualities (hardly tested in any other examinations at present), readiness of wit, common-sense and nerve. It may be objected that candidates are heavily handicapped by nervousness in oral examinations, but this objection does not afford sufficient ground for rejecting the test, provided that it is supplemented by others. Oral tests are used almost invariably in medical examinations; and there is a growing tendency to make them compulsory in dealing with modern languages. Oral examinations are much more used abroad than in England, where the pupils during their school years receive but little exercise in the art of consecutive speaking.

The laboratory examination may be used in subjects like physics, chemistry, geology, zoology, botany, anatomy, physiology, to test powers of manipulation and knowledge of experimental methods. In some cases (*e.g.* in certain honours

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[1] See E. E. Brown in *Monographs on Education in the United States* (ed. by N. M. Butler, 1900, i. 164), and T. Gregory Foster and H. R. Reichel, *Report of Mosely Educational Commission* (1904), pp. 117-119 and 288-289.

TABLE I.—PRUSSIA: ABITURIENTEN EXAMEN

I. Name of Examination.	II. Minimum Age for Entry.	III. Length of Course of Study.	IV. Subjects.	V. Co-ordination with Teaching.	VI. Examiners.	VII. Nature of Examination and General Remarks.
Abiturienten Examen (established in 1788).	Age only limited by condition of length of school course. The usual age is 17-18.	9 years. Candidates who have not attended the 9 years' school course may be admitted to the examination on special application.	In *Gymnasium*. Written. German essay. Mathematics. Translation into Latin. Translation from Greek into German. Oral. Latin. Greek. English or French. Religion. History. Mathematics. In *Real-Gymnasium*. Written. German essay. Mathematics. Translation from Latin. Translation from German into, or essay in, English or French. Physics. Oral. Latin. English. French. Physics or Chemistry. Religion. History. Mathematics. In *Ober-Realschule*. Written. German essay. Mathematics. An exercise in French and in English (an essay in one language and a translation from the other into German). Physics or Chemistry. Oral. English. French. Physics. Chemistry. Religion. History. Mathematics.	The object of the examination is defined as being a test of whether the candidate has fulfilled the aims laid down in the curricula, &c., prescribed for a *Gymnasium*, *Real-gymnasium* or *Ober-realschule*, as the case may be, and the subjects of examination are those prescribed in the curricula for the kind of school concerned. The report on the school work of each candidate in his various subjects is laid before the Examining Board before the beginning of the examination.	The Examining Board consists of a government inspector (*der Königliche Kommissar*) acting as chairman, the headmaster of the school, and the teachers of the highest classes in the school. The inspector may nominate a deputy, who is, as a rule, the headmaster of the school. Each teacher concerned selects for the written examination three alternative subjects in his branch, from which, after receiving a report thereon from the headmaster, the inspector makes a final choice. The papers are marked by the teachers concerned, and circulated to the whole Board of Examiners, who then decide whether individual candidates shall be (i.) rejected, (ii.) admitted with exemption from the oral examination, or (iii.) submitted to the oral examination.	The written examination extends over four or five days. Only one paper is given each day, for which 3 to 5½ hours are allowed (5½ hours for the German essay). For essays in foreign languages dictionaries may be used.

TABLE II.—FRANCE: BACCALAURÉAT

I. Name of Examination.	II. Minimum Age for Entry.	III. Length of Course of Study.	IV. Subjects.	V. Co-ordination with Teaching.	VI. Examiners.	VII. Nature of Examination and General Remarks.
Baccalauréat de l'enseignement secondaire. This examination has been carried on under different forms since 1808. The regulations summarized here date from 1902, when the *baccalauréat* described replaced the *baccalauréat-ès-lettres*, *baccalauréat-ès-sciences*, and *baccalauréat de l'enseignement moderne*.	Part I., 16; or, with special permission, 15. Part II. may not be taken within an academic year after passing Part I.	There is no requirement of attendance. Part I. of the examination corresponds exactly to the subjects taken in the "second cycle" of secondary education, and Part II. to the *classe de philosophie* and *classe de mathématiques*. See also under V.	Part I. is divided into four Branches, viz.:— (1) Latin-Greek. (2) Latin-modern languages. (3) Latin-science. (4) Science-modern languages. In each Branch the examination is divided into two parts, viz. written and oral. The nature of the examination may be indicated by the following requirements in Branch (1):— Written. (i.) French composition. (ii.) Translation from Latin. (iii.) Translation from Greek. Oral. (i.) Explanation of a Greek text. (ii.) Explanation of a Latin text. (iii.) Explanation of a French text. (iv.) Test in a modern foreign language. (v.) Interrogation on ancient history. (vi.) Interrogation on modern history. (vii.) Interrogation on geography. (viii.) Interrogation on mathematics. (ix.) Interrogation on physics. Part II. is divided into two Branches, viz.:— (1) Philosophy. (2) Mathematics. The nature of the examination may be indicated by the following requirements in Branch (1):— Written. (i.) An essay in French on a philosophical subject. (ii.) An examination in physical and natural science. Oral. (i.) Interrogation on philosophy and philosophical writers. (ii.) Interrogation on contemporary history. (iii.) Interrogation on physical science. (iv.) Interrogation on natural science.	The syllabus of the examination is that prescribed for the higher classes in the Government secondary schools. The candidate may submit his *livret scolaire*, or school record, which will be taken into account.	The Board of Examiners (or "jury") consists of (i.) University examiners being members of a faculty of letters or faculty of sciences; (ii.) secondary teachers, active or retired, selected by the minister of public instruction. The Board consists of from four to six examiners, of whom, when the number is even, half are chosen from either category.	The written portion of Part I. extends over from 9 to 10 hours in all (not on a single day), in periods of 3 or 4 hours each; the written portion of Part II. extends over from 6 to 9 hours. The oral examination for each part lasts ¾ hour on the average, and is public.

TABLE III.—SCOTLAND: SCHOOL-LEAVING EXAMINATION

I. Name of Examination.	II. Minimum Age for Entry.	III. Length of Course of Study.	IV. Subjects.	V. Co-ordination with Teaching.	VI. Examiners.	VII. Nature of Examination and General Remarks.
Scottish school-leaving examination (established 1888). (See pamphlet on the "Leaving Certificate Examination" issued by the Scottish Education Department, 1908.)	17 on 1st of January following the year in which the candidate passes the last of the written examinations.	4 years.	Candidates must pass in four subjects on the higher grade standard, or in three subjects on the higher grade standard and two on the lower. A pass in drawing is accepted in lieu of one of the two lower grade passes. A pass in Gaelic is reckoned as a pass on the lower grade. All candidates must have passed in higher English and in either higher or lower grade mathematics. The remaining subjects may be either science with one or more languages (Latin, Greek, French, German, Spanish, or Italian), or languages only. But where two or more languages other than English are taken, the candidate's group must include either higher or lower grade Latin. A pass in Spanish, Italian, or science (in which subjects there is only one examination) is reckoned as a pass on the higher grade standard.	Schools are inspected, and the course of instruction must be approved by the Scottish Education Department, but the examinations are conducted by external examiners with whom teachers are not associated.	The examiners are appointed by the Scottish Education Department.	The examination consists of a written examination and an oral examination, on which stress is laid. The length of the examination varies with the subjects selected. The periods of examination vary from 1 to 2½ hours. If the candidate selects on the higher grade, English, Latin, mathematics, and French, the examination extends over 19½ hours.

TABLE IV.—UNIVERSITY OF LONDON SCHOOL EXAMINATION, MATRICULATION STANDARD

I. Name of Examination.	II. Minimum Age For Entry.	III. Length of Course of Study.	IV. Subjects.	V. Co-ordination with Teaching.	VI. Examiners.	VII. Nature of Examination and General Remarks.
School examination, matriculation standard (established in 1902). *Note*—A higher school-leaving certificate is awarded to pupils who (i.) have pursued an approved course of study for a period of years at a school or schools under inspection approved by the University; and (ii.) being matriculated students, have passed the "higher school examination" in at least three subjects at one and the same examination.	The minimum age of entry is 15, but if the candidate is under 16 he must remain at school until he is 16 years of age in order to be qualified for the school-leaving certificate, and cannot be registered as a student of the University until he has reached that age.	The curriculum of each school is considered on its own merits.	Pupils must satisfy the examiners in not less than five subjects, as follows:— (1) English. (2) Elementary mathematics. (3) Latin, or elementary mechanics, or elementary physics — heat, light and sound, or elementary chemistry, or elementary botany, or general elementary science. (4) and (5) Two of the following subjects, neither of which has already been taken under section (3). If Latin be not taken, one of the other subjects selected must be another language, either ancient or modern, from the list, and languages other than those included in the list may be taken if approved by the University, provided that the language is included in the regular curriculum:— Latin, Greek, French, German, ancient history, modern history, history and geography, physical and general geography, logic, geometrical and mechanical drawing, mathematics (more advanced), elementary mechanics, elementary chemistry, elementary physics — heat, light and sound, elementary physics — electricity and magnetism, elementary biology—botany, elementary biology—zoology, general elementary science (chemistry and physics).	Schools under approved inspection, and course of instruction approved by the University. The papers are ordinarily set on the matriculation syllabus, but papers may be specially set more closely in accordance with the school curriculum provided that the syllabus proposed is approved by the University as at least equivalent to that for which it is substituted.	The examiners are ordinarily those appointed by the University for the ordinary matriculation examination.	The examination extends over at least 18 hours, and includes an oral examination in modern languages.

Practical.

examinations) the examination may be prolonged over one or more days, and may test higher powers of investigation. But such powers can only be fully tested by the performance of original work, under conditions difficult to fulfil in the examination room or laboratory. At the French examinations for the *prix de Rome* the candidates are required to execute a painting in a given number of days, under strict supervision (*en loge*).

In medicine the clinical examination of a patient is a test carried out under conditions more nearly approaching those of actual work than any other; and distinction in medical examinations is probably more often followed by distinction in after life than is the case in other examinations.

Thesis.

For the doctor's degree (where this is not an honorary distinction) a thesis or dissertation is generally, though not invariably, required in England. Of recent years the thesis has been introduced into lower examinations; it is required for the master's degree at London in the case of internal students, in subjects other than mathematics (1910); both at Oxford and London, the B.Sc. degree, and at Cambridge the B.A. degree, may be given for research, although the number of students proceeding to a degree in this way is at present relatively small. In certain of the honours B.A. and B.Sc. examinations at Manchester and Liverpool, candidates may take the written portion of the examination at the end of the second year's course of study and submit a dissertation at the end of the third year. Theses are generally examined by two or more specialists.

5. *Competitive Examinations.*—The arrangement of students in order of merit led naturally to the use of examinations not only as a qualifying but also as a selective test, and to the offering of money prizes (including exhibitions, scholarships and fellowships) on the results. In 1854 selection by examination as a method of appointment to posts in the English public service was first substituted for the patronage system, which had caused grave dissatisfaction (see Macaulay's speech on the subject, *The Times* of the 25th of June 1853). The first public competitive examination for the Royal Military Academy, Woolwich, took place in

1855, and in 1870 the principle of open competition for the civil service was adopted as a general rule. (For further details see Civil Service.)

In the Württemberg civil service candidates are admitted to a year's probation after passing a theoretical examination, at the conclusion of which they must pass an examination of a more practical character (A. Herbert, *Sacrifice of Education* . . ., 1889, p. 111).

In the award of scholarships, &c., it should be definitely decided whether the scholarship is to be awarded (1) for attainment, in which case the examination-test pure and simple may suffice, or (2) for promise, in which case personal information and a *curriculum vitae* are necessary. To take a simple instance: a candidate partly educated in Germany may obtain more marks in German at a scholarship examination than another who is more gifted, but whose opportunities have been less; the question at once arises, are the examiners to take the circumstances of the candidate into account or not? It is understood that at the colleges of the older universities such circumstances are considered. It must again be decided whether the financial circumstances of candidates are to be taken into account; are scholarships intended as prizes, or as a means of enabling poor students to obtain a university education? In some cases wealthy students have been known to return the emoluments of scholarships. It many universities of the United States there is a definite understanding that emoluments shall only be accepted by those needing them. It would not be difficult to ask candidates to make a confidential declaration on this subject on entrance and to establish in Great Britain a tradition similar to that of the United States, and steps in this direction have been taken both at Oxford and Cambridge (Lord Curzon of Kedleston, *University Reform*, p. 86).

A special allowance may be made for age. In certain scholarship examinations held formerly by the London County Council a percentage was added to the marks of each candidate proportionate to the number of months by which his age fell short of the maximum age for entry. The whole subject of entrance scholarships at English schools and universities, and especially their tendency to produce premature specialization, has recently been much discussed.

6. *The Organization and Conduct of Examinations.*—The organization and conduct of examinations, in such a way that each candidate shall be treated in precisely the same way as every other candidate, is a complex matter, especially where several thousand candidates are concerned. The greatest precautions must be taken to ensure the secrecy of the examination papers before the examination, and the effective isolation of individual candidates during the examination. The supervision should be adequate to remove all temptation to copying. The hygienic conditions should be such as to reduce the strain to a minimum. The question of the mental fatigue produced by examinations has been studied by certain German observers, but has not yet been fully investigated.

7. *Marking, Classification and Errors of Detail.*—In applying a single test in a qualifying examination it would be sufficient to mark candidates as passing or failing. But examinations consist as a rule of a number of tests, each one of which is complex; and a mark is recorded in respect of each test or portion of a test in order to enable the examining body to estimate the performance, considered as a whole, of the candidate. At Oxford the marks are not numerical, but the papers are judged as of this or that supposed "class," and various degrees of merit are indicated by the symbols $\alpha, \beta, \gamma, \delta$, to which the signs + or − may be prefixed, according as they are above or below a certain standard within each class. At Cambridge, numerical marks are used. The advantage of numerical marks is that they are more easily manipulated than symbols; the disadvantage, that they produce the false impression that merit can be estimated with mathematical accuracy. Professor F. Y. Edgeworth, in two papers on "The Statistics of Examinations" and the "Element of Chance in Competitive Examinations" (*Journal of the Royal Statistical Society*, 1888 and 1890), has dealt with the subject, although on somewhat limited lines. His investigations show clearly that with candidates near the border-line of failure, which must necessarily be fixed at a given point (subject to certain allowances, where more than one subject is considered), the element of chance necessarily enters largely into the question of pass and failure. The fact may be stated in this way:—the general efficiency of the test being granted, it is true to say that the large majority of those who pass an examination will be superior in efficiency to those who fail; but a few of those who fail may be superior to a few of those who pass. These errors are not peculiar to the examination system, they are inherent in all human judgments. It is necessary to allow for them in considering the failure of an individual candidate as an index of inefficiency.

The element of chance, which prevails in the region on either side of the border between pass and failure, obviously prevails equally on either side of the border between "classes," where candidates are classified; it has been suggested by Dr Schuster that numerical order should accompany classification so as to avoid the creation of an artificial gap between the last candidate in one class and the highest in the next. Edgeworth's objection to such an argument is that the number of uncertainties is far less when candidates are classed than when they are placed in ostensible order of merit.

The difficulties of comparison of marks are further complicated when students take different subjects and it is necessary to compare their merit by means of marks allotted by different examiners and added together. In a pass examination the question has to be considered how far, if at all, excellence in one subject shall compensate for deficiency in another, a question which is indeterminate until the precise object of the whole examination is formulated. In the competitive examination for the Indian civil service, places are allotted on the aggregate of marks obtained in a number of subjects selected by the candidate from a list of thirty-two. The successful candidates are compared a year later on the results of another examination in which there is again a choice, though a much more limited one. The order of merit in the two examinations is, as a rule, very different.

Two further points may be noted. An examiner may have underestimated the time required to answer the questions which he has set; this will be obvious if with a large number of candidates (say 300 or 400) none approaches the maximum mark. In this case the maximum should be reduced. Again, it is generally recognized to be undesirable to give marks for a smattering. In order to avoid this various devices are adopted. The simplest is to award a proportion of marks (say 10 to 15, or even 20%) for "general impression." In some examinations, unless say 20% or more marks are obtained for a particular subject, no credit is given for the paper in that subject. Latham (*The Action of Examinations*, 1877, p. 490) describes other numerical adjustments used to meet this difficulty, especially that used in English civil service examinations. The numerical results of the civil service examinations are reduced so as to conform to a certain symmetrical "frequency-curve," of which the abscissae represent percentages of marks between definite limits and the ordinates the number of candidates obtaining marks between those limits. C. E. Fawsitt (*The Education of the Examiner*, Royal Philosophical Society of Glasgow, 1905) shows that frequency-curves deduced from actual investigation of class-marks are not symmetrical, but have two maxima corresponding to the performance of "non-workers" and of "workers." In pass examinations of a well-known character there is a maximum just beyond the pass mark, this being the point of efficiency at which many students aim.

8. *The Object and Efficiency of Examinations, and their Indirect Effects.*—In order to estimate the efficiency of an examination as a test, the precise question should be asked in each case—what is it intended to test? Much of the evil attributed to, and resulting from, examinations is due to the fact that this question has not been definitely put, and that a test legitimate for certain purposes has been used for others to which it is unsuited. Examinations are suited in the first instance for the

purpose for which they were originally designed in medieval universities—the test of technical and professional capacity; it has never been proposed to abolish qualifying examinations for doctors, pharmaceutical chemists, &c.; the tests applied are (or should be) direct tests of capacity carried out under conditions as nearly as possible like those of actual practice. If a student can auscultate correctly, or make up a prescription, at an examination, he will in all probability be able to do so in other circumstances.

Examinations as tests of the knowledge of isolated facts are necessarily of relatively small value, because the memory of such facts is transient; and memorization of a large number of facts for examination purposes is generally admitted to be specially transient; the "knowledge-test," considered apart from a test of capacity, is in fact not a test of permanent knowledge, but of the power of retaining facts for a length of time which it is impossible to estimate and which with some candidates extends over a few weeks only. When used as tests of "general culture," examinations, in the view of Paulsen, based on a study of German education, not only fail in their purpose, but tend to destroy the faculties which it is desired to develop (*Geschichte des gelehrten Unterrichts*, ii. 684 et seq.); to prepare ready answers to the numberless questions which an examiner may ask on a large variety of subjects is to paralyse the natural and free activity of the mind (cf. A. C. Benson on the results of English secondary classical education, *From a College Window*, 3rd ed., 1906, pp. 154-177). If pushed to its logical conclusion the view of Paulsen must, it is submitted, lead to the complete abandonment at examinations of tests of "knowledge" as distinguished from direct tests of capacity. Thus isolated questions on details of grammar would disappear from papers on the mother-tongue and on foreign languages, in which the test would consist mainly or entirely of composition and translation. Erudition would be tested by the power of writing, at leisure, a dissertation on some subject selected by the examiners or the candidate or, in the case of a teacher, by the delivery of a lecture on the subject. At the French *agrégation* candidates are given twenty-four hours for the preparation of a lecture of this kind. Such examinations would test the "skill in the manipulation of facts which is the true sign of a trained intelligence" (cf. K. Pearson, "The Function of Science in the Modern State," *Ency. Brit.* 10th ed. xxxii. Prefatory essay). They might possibly be supplemented by easy oral examinations to test both range of knowledge and readiness of mind. But in the case of a pupil who had passed through a good secondary school it would be as safe to rely for supplementary information under this head on the testimony of his teachers, as it is to rely on their evidence with regard to the fundamental and all-important element on which no examination supplies direct information—personal character.

The main arguments of those opposed to the examination system may be summarized as follows: (i.) Examinations tend to destroy natural interests and exclude from the attention of the pupil all matters outside the purview of the examination (they would not do so if examinations were so limited in character that preparation therefor could absorb only a fraction of the pupil's time); (ii.) they tend to cultivate a personal judgment where no personal basis of judgment is possible (this argument, directed mainly against the Oxford essay system, applies not to examinations in general, but to the character of the subjects set for essays); (iii.) competitive examinations on the home and Indian civil services scheme tend to diffuse mental energy over too many subjects (but see (xviii.) below); (iv.) examinations, especially competitive examinations, tend to become more and more difficult, difficulty being confused with efficiency—this has shown itself with the Cambridge mathematical tripos, in which for years questions of increasing difficulty were set on relatively unimportant subjects, until the examination was reformed (reply: all examinations should be overhauled periodically); (v.) they tend to paralyse the powers of exposition, all statements of knowledge being thrown into a form suitable, not for an uninstructed person, but for one who already possesses it, the examiner (this tendency should be counteracted by definite training in composition); (vi.) the sample of knowledge and capacity yielded at an examination is frequently not a fair sample; it is liable to extreme variations in a favourable sense, if the candidate happens to have prepared the precise questions asked; in an unfavourable sense, if the candidate is suffering from misfortune or from accidental ill-health, the latter, owing to the periodic function, occurring much more frequently in the case of women than of men—[the reform of examination methods may remove to a great extent the element of chance in questions set; in a competitive examination it is impossible to allow for ill-health; in a qualifying examination it is difficult to make any allowance unless the examination is definitely conducted in whole or in part by the teachers, and the past record of the candidate is taken into account (cf. Paulsen, *The German Universities*, pp. 344-345)]; (vii.) examinations of several hundred candidates at a time cannot be rationally conducted so as to be equally fair to the individuality of all candidates; the individual test is the only complete one (it is admitted that examinations on a large scale necessarily involve a margin of error; but this error may be reduced to a minimum, especially by a combination of oral and practical with written work); (viii.) the multiplicity of school examinations required for different reasons produces confusion in our secondary education (there is a growing tendency to admit equivalence of "school-leaving" and entrance examinations; thus entrance examinations of Oxford, Cambridge and London, and the Northern Universities Joint Board are interchangeable under certain conditions); (ix.) the multiplicity of examinations tends to "underselling" (the success of the London examinations in medicine proves that a high standard attracts candidates as well as a low one; possibly intermediate standards may be killed in the competition; it is by no means obvious that a uniform system of examinations would conduce to efficiency); (x.) examinations produce physical damage to health, especially in the case of women-students (on this point more statistical evidence is needed; see, however, Engelmann quoted by G. Stanley Hall, *Adolescence*, 1905, ii. 588 et seq.); (xi.) examinations have in England mechanically cast the education of women into the same mould as that of men, without reference to the different social functions of the two sexes (the remedy is obvious); (xii.) it is unjustifiable to give a man a university position on the results of his performance in the examination room, a practice common in England though almost unknown on the continent; a just estimate of a man's powers in research or for teaching can only be properly based on his performance. The present system merely leads to the transmission of the sterile art of passing examinations. (At Oxford and Cambridge many fellowships are now awarded on the results of examination; it is sometimes stated, in defence of this system, that young men cannot be expected to carry out research in classics or philosophy.)

On the other hand, the defenders of examinations reply that (xiii.) examinations are necessary in order to test the efficiency of schools to which grants of public money are given (this argument has become somewhat out of date owing to the recent substitution of "inspection" for examination as a test of the efficiency of schools; a combination of inspection and examination is also sometimes used); (xiv.) they serve as a necessary incentive to steady and concentrated work[1] (the reply made to this is that the incentive is a bad one, and that with efficient teachers it is unnecessary); (xv.) they show both student and teacher where they have failed (unnecessary for efficient teachers); (xvi.) though possibly harmful to the highest class of men, they are good for the mass (reply: no system which damages the highest class of men is tolerable); (xvii.) they are indispensable as an impartial means of selecting men for the civil service; (xviii.) in a difficult examination like the first class civil service examination the qualities of quickness of comprehension, industry, concentration, power of rapidly passing from one subject to another, good health, are necessary for success, though not tested directly, and these qualities are valuable in any kind of work (this appears to be incontrovertible); (xix.) examination records show that success in examinations is generally followed by success in after-life, and the test is therefore efficient (it does not follow that certain rejected candidates may not be extremely efficient); (xx.) as a plea for purely "external examinations," teachers cannot be trusted to be impartial and it is better for a boy to "cram" than to curry favour with his teacher (Latham).

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[1] The Oxford commissioners of 1852 reported that "the examinations have become the chief instruments not only for testing the proficiency of the students but also for stimulating and directing the studies of the place" (*Report*, p. 61).

The brief comments in brackets, appended above to the arguments, merely indicate what has been said or can be said on the other side. It can scarcely be doubted that in spite of the powerful objections that have been advanced against examinations, they are, in the view of the majority of English people, an indispensable element in the social organization of a highly specialized democratic state, which prefers to trust nearly all decisions to committees rather than to individuals. But in view of the extreme importance of the matter, and especially of the evidence that, for some cause or other (which may or may not be the examination system), intellectual interest and initiative seem to diminish in many cases very markedly during school and college life in England, the whole subject seems to call for a searching and impartial inquiry.

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EXARCH (*ἔξαρχος*, a chief person or leader), a title that has been conferred at different periods on certain chief officers or governors, both in secular and ecclesiastical matters. Of these, the most important were the exarchs of Ravenna (*q.v.*). In the ecclesiastical organization the exarch of a *diocese* (the word being here used of the political division) was in the 4th and 5th centuries the same as primate. This dignity was intermediate between the patriarchal and the metropolitan, the name patriarch being restricted after A.D. 451 to the chief bishops of the most important cities (see Patriarch). The title of Exarch was also formerly given in the Eastern Church to a general or superior over several monasteries, and to certain ecclesiastics deputed by the patriarch of Constantinople to collect the tribute payable by the Church to the Turkish government. In the modern Greek Church an exarch is a deputy, or legate *a latere*, of the patriarch, whose office it is to visit the clergy and churches in the provinces allotted to him. The title of exarch has been borne by the head of the Bulgarian Church (see Bulgaria), since in 1872 it repudiated the jurisdiction of the Greek patriarch of Constantinople. Hence the names of the politico-religious parties in the recent history of the Near East: "Exarchists" and "Patriarchists."

EXCAMBION (a word connected with a large class of Low Latin and Romance forms, such as *cambium*, *concambium*, *scambium*, from Lat. *cambire*, Gr. *κάμβειν* or *κάμπτειν*, to bend, turn or fold), in Scots law, the exchange (*q.v.*) of one heritable subject for another. The modern Scottish excambion may consist in the exchange of any heritable subjects whatever, *e.g.* a patronage or, what often occurs, a portion of a glebe for servitude. Writing is not, by the law of Scotland, essential to an excambion. Chiefly in favour of the class of cottars and small feuars, and for convenience in straightening marches, the law will consider the most informal memoranda, and even a verbal agreement, if supported by the subsequent possession. The power to excamb was gradually conferred on entailed proprietors. The Montgomery Act, which was passed in 1770, to facilitate agricultural improvements, permitted 50 acres arable and 100 acres not fit for the plough to be excambed. This was enlarged by the Rosebery Act in 1836, under which one-fourth of an entailed estate, not including the mansion-house, home farm and policies, might be excambed, provided the heirs took no higher grassum (O.E. *gersum*, fine) than £200. The power was applied to the whole estate by the Rutherford Act of 1848, and the necessary consents of substitute heirs are now regulated by the Entail (Scotland) Act 1882.

EXCELLENCY (Lat. *excellentia*, excellence), a title or predicate of honour. The earliest records of its use are associated with the Frank and Lombard kings; *e.g.* Anastasius Bibliothecarius (d. *c.* 886) in his life of Pope Honorius refers to Charlemagne as "his excellency" (*ejus excellentia*); and during the middle ages it was freely applied to or assumed by emperors, kings and sovereign princes generally, though rather as a rhetorical flourish than as a part of their formal style. Its use is well illustrated in the various charters in the Red Book of the exchequer, where the addresses to the king vary between "your excellency," "your dignity" (*vestra dignitas*), "your sublimity" (*vestra sublimitas*) and the like, according to the taste and inventiveness of the writers. Du Cange also gives examples of the style *excellentia* being applied to the pope and even to a bishop (in a charter of 1182). With the gradual stereotyping of titles of honour that of "excellency" was definitively superseded in the case of sovereigns of the highest rank, about the beginning of the 15th century, by those of "highness" and "grace," and later by "majesty," first assumed in England by King Henry VIII.

Dukes and counts of the Empire and the Italian reigning princes continued, however, to be "excellencies" for a while longer. In 1593 the bestowal of the title of *excellence* by Henry IV. of France on the duc de Nevers, his ambassador at Rome, set a precedent that was universally followed from the time of the treaty of Westphalia (1648). This, together with the reservation in 1640 of the title "eminence" (*q.v.*) to the cardinals, led the Italian princes to adopt the style of "highness" (*altezza*) instead of "excellency." In France, from 1654 onwards, the title of *excellence* was given to all high civil and military officials, and this example was followed in Germany in the 18th century.

The subsequent fate of the title varies very greatly in different countries. In Great Britain it is borne by the viceroy of India, the lord-lieutenant of Ireland, all governors of colonies and ambassadors. In the United States it is part of the official style of the governors of states, but not of that of the president; though diplomatic usage varies in this respect, some states (*e.g.* France) conceding to him the style of "excellency," others (*e.g.* Belgium) refusing it. The custom of other republics differs: in France the president is addressed as *excellence* by courtesy; in Switzerland the title is omitted; in the South American republics it is part of the official style (Pradier-Fodéré, *Cours de droit diplom.* i. 89). In Spain the title of *excelencia* properly belonged to the grandees and to those who had the right to be covered in the royal presence, but it was extended also to high officials, viceroys, ministers, captains-general, lieutenants-general, ambassadors and knights of the Golden Fleece. In Austria the title *Exzellenz* belongs properly to privy councillors. It has, however, gradually been extended by custom to all the higher military commands from lieutenant-field-marshal upwards. Ministers, even when not privy councillors, are styled *Exzellenz*. In Germany the title is borne by the imperial chancellor, the principal secretaries of state, ministers and *Oberpräsidenten* in Prussia, by generals from the rank of lieutenant-general upwards, by the chief court officials, and it is also sometimes bestowed as a title of honour in cases where it is not attached to the office held by its recipient. In Russia the title is very common, being borne by all officers from major-general upwards and by all officials above the rank of acting privy councillor. Officers and officials of the highest rank have the title of "high excellency." Finally, in Italy, the title *eccelenza*, which had come to be used in the republics of Venice and Genoa as the usual form of address to nobles, has become as meaningless as the English title of "esquire" or the address of "sir," being, especially in the south, the usual form of address to any stranger.

In the diplomatic service the title of excellency is technically reserved to ambassadors, but in addressing envoys also this form is commonly used by courtesy. (W. A. P.)

EXCHANGE, in general, the action of mutual giving and receiving objects, interests, benefits, rights, &c. The word comes through the French from the Late Lat. *excambium* (see EXCAMBION). The present article deals with the theory and practice of exchange in monetary transactions, but this may conveniently be prefaced by a brief statement as to the law relating to the exchange of property and other matters. In English law exchange is defined as the mutual grant of equal interests, the one in consideration of the other. The ancient common law conveyance had certain restrictions, *e.g.* identity in quantity of interest, fee-simple for fee-simple, &c., entry to perfect the conveyance, and an implied warranty of title and right of entry by either party in case of eviction. Such exchanges are now effected by mutual conveyances with the usual covenants for title. Exchanges are also frequently made by order of the Board of Agriculture under the Inclosure Acts, and there are also statutes enabling ecclesiastical corporations to exchange benefices with the approval of the ecclesiastical commissioners. The international exchange of territories is effected by treaties. The exchange of prisoners of war is regulated by documents called "cartels" (Med. Lat. *cartellus*, diminutive of *carta*, paper, bill), which specify a certain agreed-on value for each rank of prisoners. The practice superseded the older one of ransom at the end of a war. By the Regimental Exchanges Act 1875 the sovereign may by regulation authorize exchanges by officers from one regiment to another. (For "labour exchanges" see UNEMPLOYMENT.)

Exchange in relation to money affairs denotes a species of barter not of goods but of the value of goods, a payment in one place being exchanged for a payment in another place. The popular statement of the theory of exchange represents four principals involved in two transactions. A and B are two persons residing in one place different from the domicile of C and D; A sells goods to C; B buys goods from D; A sells his claim on C to B, who remits it to D in satisfaction of his debt, and D receives the cash from C, so that, assuming the two transactions to be of equal value, one piece of paper satisfies the four parties to these two transactions, and the trouble, expense and risk of sending money from both places are avoided. The piece of paper which performs the service may be a telegraphic order, cheque or bill of exchange. In this elementary proposition there would be no difficulty of exchange, as the full value of A's claim on C would be paid for by B, who is under the necessity of sending in exactly similar amount of money to D; but it can be seen that in actual practice the claims of one place on another place would not be exactly balanced by the necessities of the one place to meet obligations in the other place; thus arises the complication of exchange, which may best be described as the price of monetary claims on distant debtors.

Supposing, for example, that A in London had a claim on C in Edinburgh amounting to £100, and that B in London did not require to remit more than £90 to D in Edinburgh, it is evident that B in London must be offered some inducement to take over the whole of A's claim. B might give A £99: 19: 0, and could then, after satisfying his debt to D, have £10 to his credit in Edinburgh, which he could retain there at interest until he had incurred further liability to D, or he could have the balance of £10 returned him in coin at an expense, say, of sixpence; this would leave B with a profit of sixpence on the transaction, and, assuming that these figures are reasonable, exchange on Edinburgh in London would be one shilling discount per £100. Supposing the necessities of B induced him to offer A only £99:14:0 for his £100 claim, A would then prefer that C remitted him £100 in coin, which, on the above scale of expenses would cost 5s. and A would receive £99:15:0 net. On these premises, exchange on Edinburgh in London cannot fall below ¼% discount, and the same circumstances prevent it from rising above ¼% premium, for B, in no case, would pay more for A's claim than £100 plus the cost of sending coin to Scotland. If this basis is appreciated, all exchange problems between different countries can be mastered, and the quotations in the daily papers of cable payments, sight drafts (cheques) and long bills are then understood and supply an interesting indication of the state of international financial relations. As shown above, the balance of indebtedness must eventually be remitted by coin, and consequently when exchange in any city is quoted at one or other of the limit points given in our example as ¼% discount or ¼% premium, this exchange immediately acquires a very serious importance, because with the development of modern monetary systems under which enormous trade is carried on with a most moderate foundation of actual coin the weakening or strengthening of that foundation is a very vital matter.

While the understanding of the theory is essential for any facile interpretation of an exchange, there are of course innumerable details of practice which require to be known to identify the limit points of exchange in any particular city. The limit points can only be taken advantage of by banking experts, and, although we assume a trader remitting his indebtedness in coin when he is asked to pay too high a price for his bill of exchange, in actual affairs the banker will supply the cheque or bill and himself will do the professional business of sending away bullion. Similarly, we have represented one trader drawing on another trader and selling his draft to a third trader who remits the draft to a fourth. In actual practice, however, No. 1 draws on No. 2 and disposes of his draft to a banker; No. 4 draws on No. 3 and sells his draft to a banker; because, speaking generally, whenever goods are shipped, the shipper immediately requires his money; he draws a bill against the goods, and it is the function of a banker to help, as a sort of debt-collecting agency, by buying these drafts; and the bank, being a mart for all forms of remittance, gets an immense variety of demand for cable payments, cheques and bills on all centres. This does not affect the theory, for it must be remembered that the banker is a necessary link between the buyer and seller of exchange, because the seller can only sell what he has and the buyer must have exactly what he wants.

To return to the question of limit points: if a universal currency system existed, with the same monetary standard that is used in England, and the coinage kept in a proper condition of weight and fineness, and the coin readily supplied to meet every reasonable claim—if, in fact, the pound sterling were the prevalent coin and the English banking system obtained everywhere, then we should find all exchange quotations as simple as our case of London and Edinburgh, that is to say, all exchanges would be quoted at par or a premium or a discount. The limit points in any place of the exchange on London would represent simply and obviously the cost of the transmission of the coin. These limit points would vary at each place according to the distance from London, the cost of freight, the risk involved in the transmission and the local rate of interest. On the continent of Europe some advance has been made in the direction of a universal coinage. Countries subscribing to the Latin Union have agreed on the franc as a common unit, and Belgium, Switzerland, France and Italy quote exchange between themselves at a premium or discount. Greece, Spain and other countries are also parties to the arrangement, but their currencies are in a bad state, and the exchange quotations involve a considerable element of speculation. We have, however, to deal with another factor in international finance, namely, the enormous variety of currency systems; and we have then to discover, in each case, the exchange which represents par and corresponds to our £100 for £100 in the London-Edinburgh example. The United States furnishes perhaps the easiest problem, and we must find out how many dollars in gold contain exactly the same amount of the precious metal as is contained in one hundred sovereigns. The answer is 486⅝, and the arithmetic is a question of the mint laws of the two countries. Gold coin in the United States contains one-tenth alloy and in England one-twelfth alloy. Ten dollars contain 258 grains of gold, nine-tenths fine. One pound contains 123·274 grains of gold, eleven-twelfths fine, consequently £100 is worth $486⅝, or, to be exact, $486⅔, and when cable payments between London and New York are quoted at 4·86⅝ for the £1 sterling, exchange is about par. As a cable payment is an immediate transfer from one city to another, no question of interest or other charge is involved. Owing to the cost of sending gold as detailed above, the New York cable exchange varies from about 4·84 to 4·89½; at the former point gold leaves London for New York, and at the latter point gold comes to England. Besides insurance, freight, packing, commission and interest, there must also be considered the circumstance that coin taken in bulk is always a little worn and under full weight, and in the process of turning sovereigns into dollars, the result would not bear out the calculation based on the mint regulations: consequently, when taking gold from London, the demand would first fall on the raw metal as received from South Africa or Australia to be minted in the United States, then on any stock of American coin the Bank of England might have and be willing to sell by weight (which would be accounted by tale in New York), and lastly the demand would be satisfied by sovereigns taken by tale from the Bank of England and converted by weight in America.

The instance of the American quotation may be further taken to explain some of the numerous points which the study of the exchange involves. In the first place, it will be noted that we have quoted the price in dollars. In London, business in bills, &c., on New York is quoted either in pence or in dollars, that is to say, payments are negotiated for so many dollars either at 49 $\frac{3}{16}$ pence per dollar, or at the equivalent rate $4·88 for the pound. In practice it is much more convenient to quote in London in the money of the foreign country, as it makes comparison with the foreign rate on London very simple. Some foreign countries quote exchange on London in pence, and then, of course, in relation to those countries the same practice will obtain in England, but the majority of the exchange quotations on London are in francs, marks, gulden, lire, kronen or other foreign money. Another point which must be explained is the reason why exchange varies between what we have called the limit points; why there is sometimes so much demand for bills on London and why at other times so many bills are being offered. Similar causes operate on other exchanges, and if we develop the New York case we shall provide explanations for exchange movements in other countries.

At one time the financial relations between England and America were as follows. England was the principal creditor of the United States, and the latter country had to remit continually very large amounts in payment of interest on English money and profits on English investments, in payment for shipping freights, for banking commissions, insurance premiums and an immense variety of services, besides paying for the large imports which crossed the Atlantic from English ports. In the fall of the year these payments would be more than offset by the enormous exports of food-stuffs, cotton, tobacco, &c., so that during the first half of the year exchange would be at or about the limit of 4·89½ and gold would have to be sent from New York to supplement the deficient quantity of bills. In the autumn the produce bills would flood the exchange market and gold would be sent from London as exchange got to the other limit point of 4·84. These conditions are still very potent, but latterly another element has entered into the position, and the new development is so powerful as to reverse sometimes what we may call the natural and legitimate movement in the exchange. This new element is the more intimate banking and financial relationship which has been established between the two countries. As American conditions have become more stable, with better security for capital and an assured feeling about the currency of the United States, bankers in London have gladly allowed their banking friends in New York and other large cities to draw bills on London whenever there was a good demand for sterling remittances. We have, therefore, to consider a fresh type of bill of which the drawer has no claim on the drawee, but, on the other hand, incurs a debt to the drawee. To take a very usual method, a banker in Wall Street, New York, will advance money to stockbrokers, investors and speculators against bonds and shares with a 20% margin. He deposits this security with a trust company in New York which acts both for the American and English banker. The Wall Street banker then draws a bill at 60 days' sight or 90 days' sight on the banker in Lombard Street and sells this draft to supply the money he lends the stockbroker. Two or three months hence the New York banker must send money to London with which to meet the bill, so that, whereas, in the case of a commercial bill, the produce is despatched and in due course the consignee must find the money for the bill, in the case of a finance bill, as it is called, the bill is drawn and in due course the drawer must send the value with which it is to be honoured. In any event the acceptor, the London banker, has to pay the bill, so that it will be easily understood that relations of the greatest confidence are necessary between the drawer and drawee before finance bills of this class can be created.

The profit arising from the transaction we have sketched is realized by the separate parties in this way. The New York banker lends money for three months, say, at 5% per annum, he pays a commission of $\frac{1}{32}$% to the trust company which has custody of the security, a charge equivalent to ⅛% interest per annum. He draws on London at 90 days' sight and sells the bill at 4·83⅝, the cable rate being 4·87¾, the buyer of a three months' bill making the allowance for the English bill stamp of ½ per mille and the London discount rate of 3%. The drawer of the bill must also pay a commission of $\frac{3}{16}$% to the London banker who accepts the draft; this is equivalent to another ¾% per annum in the rate of discount, so that money raised in this way costs ⅛% for the trust company, 3% the London discount rate, about ¼% for bill stamps, and ¾% for London commission—altogether, 4⅛%; and, as the money is loaned at 5%, there appears to be ⅞% profit to the drawer of the bill. This, however, is on the assumption that the cable rate is still 4·87¾ when the bill falls due for payment and that the drawer would have to pay that price to telegraph the money to meet the draft. But exchange on London can go up or down between 4·84 and 4·89½, and if at the end of the three months the cable rate is 4·84 the New York banker will be able to cover his bill at almost the same rate at which he sold it and will only be out of pocket to the extent of the commissions and stamps, so that the accommodation will only cost him 1½% and his profit will be 3½%. If he has to pay more than 4·87¾ for his cable at the maturity of the bill his profit will be less than ⅞%, and he may even be a loser on the transaction.

It is obvious, then, that a high rate of interest in New York, with a high rate of exchange on London and a low rate of discount in England, would induce the creation of these finance bills. The supply of these bills would prevent New York exchange reaching the limit point at which gold leaves the United States, and the maturity of these bills in the autumn would ensure a demand for the produce bills and possibly prevent exchange from falling to the other limit point at which London has to send gold to New York.

We have pointed out the essential difference between these finance bills and what we have called produce bills, but there is another very striking difference, that of the question of supply. These finance bills are obviously very difficult to limit in their amounts; produce bills are, of course, limited by the extent of the surplus crops of the United States and by the demand for the produce in Europe, but so long as it is mutually satisfactory to the big finance houses in both countries to draw on credit granted in London, so long may these accommodation bills be created, and the pressure of the bills in New York may depress exchange so much that gold leaves London at a time when it is required in other directions. In such a case the embarrassment caused by this artificial drain of the gold reserve would much more than offset the amount of the commission earned by the accepting houses. The Bank of England may have to raise its rate of discount at the expense of the entire home trade; probably, also, with the rise in the value of money, consequent on the diminished resources, all investment securities fall in value and more onerous terms must be submitted to by the government, corporations and colonies, in the issue of any loans they may require. It will, therefore, be appreciated that, although these finance bills may be perfectly safe, their excessive creation is viewed with great disfavour, and considerable apprehension is felt when the adventures of speculators in New York make great demands for loans against stocks and shares, and, through the instrumentality of these finance bills, shift the burden on to the shoulders of the London discount market. The effect of this is to level money rates as between New York and London, and in the process the pressure falls on London and the relief goes to America. Eventually, of course, the bills must be met and funds sent for that purpose from across the Atlantic, but in the meanwhile the disturbance of the gold supply is an inconvenience.

We have explained the process of employing credits granted in London to finance Wall Street; there are, also, many other types of bill to which the acceptor lends his name on the assurance that he will in due course be supplied with the funds required to meet the acceptance. In the case of the produce bills, a London banker will accept the bills in order that they may be more easily marketable than if they were drawn direct on the actual consignee of the cotton, tobacco or wheat. The consignees in Liverpool, &c., pay a commission for this assistance and reimburse the London bank as the produce is gradually disposed of. The transaction appears slightly more complicated when English bankers accept bills for produce shipped from the United States to merchants living in Hamburg, Genoa, Singapore and all other great ports, but the principle is the same, and the influence of such business on the exchange affects, in the first instance, the quotation between America and London, but afterwards, when money must be sent to London with which to honour the bills, the exchanges with Germany, Italy or the Straits Settlements bear their share in the eventual adjustment, the spinners, tobacco manufacturers and corn factors requiring drafts on London where so much of the trade of the world is financed.

We shall have to consider later the reasons which ensure to London this peculiar and predominant position. We have so far used the American exchange as an example to explain causes which produce fluctuations in all the principal exchanges on London and to show the points between which fluctuations are limited. The fact that America is still developing at a much greater rate than the Old World makes an important distinction between the financial position in New York and the financial position of the big capitals in Europe. There is not in America the huge accumulation of savings and investment money which the Old World has collected, so that whereas Europe helps to finance the United States, the latter country has so many home enterprises that she can spare none of her funds to assist Europe. It would not be possible for London to draw on New York such bills as we have described as finance bills, for they could never be discounted there except on the most onerous terms, and there is nothing in America which corresponds to the London money market.

We have to deal with dollars and cents in America, with francs in France, with marks in Germany, and different money units in nearly every country; but, given the mint regulations, the theoretical par of exchange and the theoretical limit points are arrived at by simple arithmetic. An exhaustive statement with reference to every country would involve an amount of tedious repetition, so that for the purposes of this article it is more instructive to consider the essential differences between the important exchanges than to go into the details of coinage, which would appeal rather to the numismatist than to the exchange expert.

The United States, offering as it does a vast field for profitable investment, must annually remit huge amounts for interest on bonds and shares held by Europeans; coupons and dividend warrants payable in America are offered for sale daily in London, and at the end of the quarters the amount of these claims, coupons and drawn bonds is very large, and a considerable set off to the indebtedness of Europe for American produce. It is often asserted that the United States is rapidly getting sufficiently wealthy to repurchase all these bonds and shares; but whenever trade conditions are exceptionally good in the States, fresh evidence is forthcoming that assistance from London and Europe is essential to finance the commercial development of the United States. This illustrates a feature common to all new countries, and the effect is that they make annual payments to the older countries and especially to England.

A government loan or other large borrowing arranged abroad will immediately move the exchange in favour of the borrowing country. A tendency adverse to the United States results from the drafts and letters of credit of the large number of holiday makers who cross the Atlantic and spend so much money in Europe. When remittance is made of the incomes of Americans who have taken up their residence in the Old World the exchange is affected in a similar manner.

In one respect the United States stands far superior to most of the older countries. There are no restrictions on the free export of gold when exchange reaches the limit point showing that the demand for bills on London exceeds the supply. New York (with London and India) is a free gold market, and this is undoubtedly one of the reasons why money is so readily advanced to the United States, and the finance bills, to which we referred above, would not be allowed to the same extent were it not for the fact that New York will remit gold when other forms of remittance are insufficient to satisfy foreign creditors. When exchange between Paris and London reaches the theoretical limit point of 25·32 (25 francs 32 centimes for the £1 sterling), gold does not leave Paris for London unless the Bank of France is willing to allow it. By law, silver is also legal tender in France, and if the State Bank is pressed for gold a premium will be charged for it if it is supplied. Gold may be collected on cheaper terms in small amounts from the great trading corporations or from the offices of the railways, but a large shipment can only be made by special arrangement with the Bank of France. Similarly, in Germany, where a gold standard is supposed to obtain, if a banker requires a large amount of gold from the Reichsbank he is warned that he had better not take it, and if he persists he incurs the displeasure of the government institution to the prejudice of his business, so that the theoretical limit point of 20 marks 52 pf. to the pound sterling has no practical significance, and gold cannot be secured from Berlin when exchange is against that city, and Germany has, when put to the test, an inconvertible and sometimes a debased currency. There is no state bank in the United States, and no government interference with the natural course of paying debts. On the other hand, when monetary conditions in New York indicate a great shortage of funds, and rates of interest are uncomfortably high, the United States treasury has sometimes parted with some of its revenue accumulations to the principal New York bankers on condition that they at once engage a similar amount of gold for import from abroad, which shall be turned over to the treasury on arrival. As these advances are made free of interest the effect is to adjust the limit point of 484 to about 485, and the United States treasury seems to have taken a leaf out of the book of the German Reichsbank, which frequently offers similar facilities to gold importers and creates an artificial limit point in the Berlin Exchange. The Reichsbank gives credit in Berlin for gold that has only got as far as Hamburg, and sometimes gives so many days' credit that the agent in London of German banking houses can afford an extravagant price for bar gold and even risk the loss in weight on a withdrawal of sovereigns, although the exchange may not have fallen to the other limit point of 20·32. In England the only effort that is made to attract gold is some action by the Bank of England in the direction of raising discount rates; occasionally, also, the bank outbids other purchasers for the arrivals of raw gold from South Africa, Australia and other mining countries. Quite exceptionally, for instance during the Boer War, the Bank of England allowed advances free of interest against gold shipped to London.

Many of the principal banking houses in all the important capitals receive continually throughout the day telegraphic information of the tendency and movement of all the exchanges, and on the smallest margin of profit a large business is done in what is called arbitrage (*q.v.*). For instance, cheques or bills on London will be bought by X in Paris and remitted to Y in London. X will recoup himself by selling a cable payment on Z in New York. Z will put himself in funds to meet the cable payment by selling 60 days' sight drafts on Y, who pays the 60 days' drafts at maturity out of the proceeds of the cheques or bills received from Paris, and this complicated transaction, involving no outlay of capital, must show some minute profit after all expense of bill stamps, discount, cables and commissions has been allowed for. Such business is very difficult and very technical. The arbitrageur must be in first-class credit, must make the most exact calculation, and be prompt to take advantage of the small differences in exchange, differences which can be only temporary, as these operations soon bring about an adjustment.

The European exchanges with which London is chiefly concerned are Paris and Berlin, through which centres most of the financial business of the rest of Europe is conducted; for example, Scandinavia, Russia and Austria bank more largely with Berlin than elsewhere. Italy, Switzerland, Belgium and Spain bank chiefly in Paris. European claims on London or debts to London are settled mostly through Germany or France, and consequently the German and French rates of exchange are affected by the relation of England with the rest of the Continent. The exchanges on Paris and Berlin are therefore most carefully watched by all those big interests which are concerned with the rate of discount and the value of money in London.

If the Paris cheque falls to 25·12, gold arrivals in the London bullion market will be taken by French bankers unless the profit shown by the exchange on some other country enables other buyers to pay more for the gold than Paris can afford. If the Paris cheque falls still further, it would pay to take sovereigns from the Bank of England for export, and so much would be taken as would satisfy the demand to send money to France, or until the consequent scarcity of money in London made rates of interest so high in England that French bankers would prefer to leave money and perhaps increase their balances. As between London and Paris and Berlin the greatest factor operating the exchanges is the relative value of money in the three centres. There is no great excess of trade balance at any season in favour of Germany or France and against England. On the other hand the banking relations between those countries are very intimate, and if funds can be very profitably employed in one of these places, there will be a good demand for remittance, and exchange will move in favour of that place, that is to say, exchange will go towards that limit point at which gold will be sent. The great pastoral and agricultural countries like South America, Egypt and India are in a position to draw very largely on London when their crops or other products are ready for shipment. In the early months of the year gold goes freely to South America to pay for the cereals, hides and meat, and in the autumn Egypt and India send such quantities of cotton and wheat that exchange moves heavily in favour of those countries, and gold must go to adjust the trade balance. During the rest of the year the gold tends to return as these countries always require bills on London or some form of payment to meet interest and dividends on European money invested in their government debts, railways and trading enterprises, and to pay for the European manufactures which they import. Exchange then moves in favour of England, and the Bank of England can replenish its reserve. Over the greater part of the world the rate of exchange on London is an indication simply of the trade balance. The greater part of the world receives payment for food stuffs, and has to pay for European manufactures, shipping freights, banking services and professional commissions.

The greatest complication in exchange questions arises when we have to deal with a country employing a silver standard, and, fortunately for the development of trade, this problem has disappeared of late years in the case of India, Ceylon, Japan, Mexico and the Straits Settlements, and now the only important country using silver as a standard is China. When the monetary standard in one country is only a commodity in another country we are as far removed from the ideal of an international currency as can be imagined. We can fix no limit points to the exchange and we cannot settle any theoretical par of exchange. The price of silver in the gold-using country may vary as much as the price of copper or tin, and in the silver-using country gold is dealt in just as any other metal. In both cases the only metal of constant price is the metal which is used as the money standard. The easiest method of explaining the position is to consider that any one in a gold-using country having a claim in currency on a silver-using country has to offer for sale so many ounces of silver, and vice versa the exporter in a silver-using country sending produce to London has to offer a draft representing so many ounces of gold. This introduces a very unsatisfactory element. To take a practical example:—a tea-grower in China has raised his crop in spite of the usual experience of weather and labour difficulties and the endless risks that a planter must face; the tea is then sent to London to take its chance of good or bad prices, and at the same time the planter has a draft to sell representing locally a certain weight of gold; now, in addition to all the risks of weather and trading conditions, and the chances of the fluctuations in the tea market, he is compelled to gamble in the metal market on the price of gold. Some years ago when a large number of important countries employed a silver standard it was seriously suggested that a fixed ratio should be agreed internationally at which gold and silver should be exchanged. This advocacy of bimetallism (*q.v.*) was especially persistent at a time when silver had suffered a very great fall in price and the prominent exponents could generally be identified either as extremely practical men who were interested in the price of silver, or as very inexperienced theorists. The difficulty of the two standards was successfully solved by discarding the use of silver, and the chief silver-using countries adopted a gold standard which has given greater security for the investment of foreign capital, has simplified business and brought about a large increase of trade.

In the case of a country of which the government has been subject to great financial difficulties, gold has been shipped to satisfy foreign creditors so long as the supply held out, and the exchange with such a country will continue to move adversely with every fresh political embarrassment and any other economic cause reflecting on the national credit. With the collapse of the monarchy in Brazil the value of the milreis fell from 27d. to 5d., and all the Spanish-American countries have from time to time afforded most distressing examples of the demoralizing effects on the currency of unstable and reckless administration. In Europe similar results have been shown by the mistrust inspired by the governments of Spain, Greece, Italy and some other states. The raising of revenue by the use of the printing press creates an inconvertible and depreciating paper currency which frightens foreign capital and severely taxes the unfortunate country which must make payment abroad for the service of debt and other obligations. With the tardy appreciation of the old proverb that "honesty is the best policy" nearly every country of importance has made strenuous efforts to improve the integrity of its money.

Exchange quotations are not published from many of the British colonies, as their financial business is in the hands of a comparatively few excellently managed banks, which establish, by agreement, conventional exchanges fixed for a considerable period, notably in the case of Australia, New Zealand and South Africa. The Scottish and Irish banks supply similar examples of a monopoly in exchange.

The following table taken from the money article of a London daily paper indicates the exchanges which are of most interest to England:—

Foreign Exchanges.

	June 14.	June 15.	June 16.
Paris, cheques . .	25 f. 18 c.	25 f. 18 c.	25 f. 18 c.
,, Mkt. discount .	$2\frac{1}{2}$-$\frac{5}{8}$ p.c.	$2\frac{1}{2}$-$\frac{5}{8}$ p.c.	$2\frac{1}{2}$-$\frac{5}{8}$ p.c.
Brussels, cheques .	25 f. 23 c.	25 f. $23\frac{1}{2}$ c.	. .
Berlin, sight . . .	20 m. $48\frac{3}{4}$ pf.	20 m. $48\frac{3}{4}$ pf.	20 m. 48 pf.
,, 8 days . .	20 m. $46\frac{1}{2}$ pf.	20 m. $46\frac{1}{4}$ pf.	20 m. $45\frac{1}{2}$ pf.
,, Mkt. discount	$3\frac{7}{8}$ p.c.	$3\frac{7}{8}$ p.c.	$3\frac{7}{8}$ p.c.
Vienna, sight . . .	Holiday	24 kr. $02\frac{1}{4}$ h.	24 kr. $02\frac{3}{4}$ h.
Amsterdam, sight .	12 fl. $13\frac{1}{8}$ c.	12 fl. $13\frac{1}{4}$ c.	. .
Italy, sight . . .	Holiday	25 lire 15 c.	. .
Madrid, sight. . .	,,	27 ps. 68	. .
Lisbon, sight . . .	,,	. .	. .
St Petersburg, 3ms. .	94 r. 10	94 r. 10	. .
Bombay, T.T. . .	1s. 4d.	1s. 4d.	1s. 4d.
Calcutta, T.T. . .	1s. 4d.	1s. 4d.	1s. 4d.
Hong-Kong, T.T. .	2s. $1\frac{1}{16}$d.	2s. $1\frac{1}{16}$d.	2s. $1\frac{1}{16}$d.
Shanghai, T.T. . .	2s. $10\frac{3}{4}$d.	2s. $10\frac{5}{8}$d.	2s. $10\frac{5}{8}$d.
Singapore, T.T. . .	2s. $4\frac{1}{16}$d.	2s. $4\frac{1}{16}$d.	2s. $4\frac{1}{16}$d.
Yokohama, T.T.. .	2s. $0\frac{3}{8}$d.	2s. $0\frac{3}{8}$d.	2s. $0\frac{3}{8}$d.
*Rio de Jan'ro, 90 days	$16\frac{9}{16}$d.	$16\frac{9}{16}$d.	$16\frac{17}{32}$d.
*Valparaiso, 90 days Coml.	$14\frac{3}{8}$d.	$14\frac{3}{8}$d.	$14\frac{1}{4}$d.
*B. Ayres, 90 days .	$48\frac{1}{8}$d.	48d.	48d.

* These rates are telegraphed on the day preceding their receipt.

In the case of Paris and Berlin it will be noticed that the local rate of discount is also given, as the value of money in these centres, in relation to the value of money in London, is the most important factor in a movement of the exchange. Vienna has become important owing to the improvement in the financial position of Austria, and still greater improvement is shown in the case of Italy, whose currency stands in the above list better even than that of France. Spain, which should stand at about the same rate, still has a depreciated paper currency. Lisbon stands also at a discount, as the milreis should be worth $53\frac{1}{4}$ pence.

In Russia the exchange showing 94.10 roubles to £10 is carefully and cleverly controlled in spite of the bad internal position. The India exchanges move slightly, as the currency is firmly established at the rate of 15 rupees to the £1. Hong-Kong quotes for the old Mexican dollar and a British trade dollar; Shanghai for the tael containing on an average $517\frac{1}{2}$ grains of fine silver. The Straits Settlements have fixed their money on a gold basis at 2s. 4d. per dollar, on the lines of the arrangement made in India. In Japan there is a gold standard, and par of exchange is 2s. $0\frac{1}{2}$d. for the yen. Brazil, Chile and Argentina have a depreciated paper currency, and the last quotation of 48d. is for the gold dollar equal to five francs, but there is a premium on gold in the River Plate of $127.27\frac{1}{2}$% and for the present a gold standard is re-established on this basis. The letters T.T. with the eastern exchanges signify telegraphic transfer or the rate for payments made by cable. The very important New York rates are always given in another part of the daily paper with other details of American commercial interest.

These rates are all quotations for payments in England, and all over the world the exchange on London is the exchange of the greatest importance. This unique position was gained originally, probably, through the geographical position of the United Kingdom, and has been maintained owing to several reasons which secure to London a peculiar position by comparison with any other capital. Britain's colossal trade ensures a supply of and a demand for English remittances. Even when goods or produce are dealt in between foreign countries a credit is opened in London, so that the shipper of the produce can offer in the local market a bill of exchange which is readily saleable. With the highly developed banking system a large amount of deposits is collected in London, and the result is that bills of any usance up to six months can be immediately discounted, and the proceeds, if required, can be handed over in gold. There are in London a great number of wealthy banks and banking houses whose reputation and solidity allow any one of them to accept bills for amounts varying from one to ten millions sterling, whereby large commissions are earned.

These four advantages, namely, a free gold market, a huge trade, an enormous accumulation of wealth, and a discount market such as exists nowhere else, have made London an unrivalled financial centre, and consequently bills on London are an international money and the best medium of exchange.

AUTHORITIES.—*A B C of the Foreign Exchanges*, by George Clare; *Foreign Exchanges*, by Goschen; *Arbitrage*, by Deutsch; *Arbitrages et Parités*, by Ottomar Haupt; Swoboda, *Arbitrage* (12th edition), by Max Fuerst. (E. M. HA.)

EXCHEQUER. The word "exchequer" is the English form of the Fr. *échiquier*, low Lat. *scaccarium*, and its primary meaning is a chess-board (see CHESS). As the name of a government department dealing with accounts it is derived from the exchequer or the "abacus" by means of which such accounts were kept, such a contrivance being almost universally in use before the introduction of the Arabic notation. In England the department or court of accounts was named originally "the tallies" from the notched sticks or tallies which constituted the primitive means of account-keeping (which were only abolished in 1826), and was only subsequently, probably in the reign of Henry I., named the exchequer from the use of the abacus. Both the name and the general features of the institution may reasonably be attributed to Norman influence, since we find both in Normandy and in the Norman kingdom of Sicily, as well as in Scotland and Ireland; the two latter cases being directly due to English example. As a court of law the exchequer owed its existence in England, as elsewhere, to the necessity of deciding legal questions arising from matters of account, and its secondary activities soon overshadowed its original functions.

We cannot say whether the exchequer, as known in England, is older than the beginning of the 12th century. The treasury, which may be regarded as one of its constituents, dates from before the conquest, and the officers of the exchequer who were drawn from the treasury staff can be traced back to Domesday. But our earliest information about the exchequer itself, apart from that afforded by the pipe rolls (see RECORD), rests on a treatise (*Dialogus de Scaccario*) written about A.D. 1179 by Richard, bishop of London and treasurer of England. His father, Nigel, bishop of Ely, had been treasurer of Henry I., and nephew to that king's great financial minister Roger, bishop of Salisbury. Nigel is said to have reconstituted the exchequer after the troubles of Stephen's reign upon the model which he inherited from his uncle. The Angevin, or rather the Norman, exchequer cannot be regarded in strictness as a permanent department. It consisted of two parts: the lower exchequer, which was closely connected with the permanent treasury and was an office for the receipt and payment of money; and the upper exchequer, which was a court sitting twice a year to settle accounts and thus nearly related to the Curia Regis (*q.v.*). We dare hardly say that either exchequer existed in vacation; indeed the word (like the word "diet") seems to have been limited at first to the actual sitting of the king's court for financial purposes. The Michaelmas and Easter exchequers were the sessions of this court "at the exchequer" or chess-board as it had previously sat "at the tallies." The constitution of the court was that of the normal Frankish curia. The king was the nominal president, and the court consisted of his great officers of state and his barons, or tenants-in-chief, and it is doubtless due to the fact that the exchequer was originally the curia itself sitting for a special purpose that its unofficial judges retained the name of "barons" until recent times. Of the great officers we may probably find the steward in the person of the justiciar, the normal president of the court. He sat at the head of the exchequer table. The butler was not represented. The chancellor sat on the justiciar's left; he was custodian *ex officio* of the seal of the court, and thus responsible for the issue of all writs and summonses, and moreover for the keeping of a duplicate roll of accounts embodying the judgments of the court. On the left of the chancellor, and thus clear of the table, since their services might be required elsewhere at any moment, sat the constable, the two chamberlains and the marshal. The constable was the chief of the outdoor service of the court, and was responsible for everything connected with the army, or with hunting and hawking. The two chamberlains were the lay colleagues of the treasurer, and shared with him the duty of receiving and paying money, and keeping safe the seal of the court, and all the records and other contents of the treasury. The marshal, who was subordinate to the constable, shared his duties, and was specially responsible for the custody of prisoners and of the vouchers produced by accountants. At the head of the table on the justiciar's right sat, in Henry II.'s time, an extraordinary member of the court, the bishop of Winchester. The treasurer, like the chancellor a clerk, sat at the head of the right-hand side of the table. He charged the accountants with their fixed debts, and dictated the contents of the great roll of accounts (or pipe roll) which embodied the decisions of the court as to the indebtedness of the sheriffs and other accountants. These persons with certain subordinates constituted the court of accounts, or upper exchequer, whereas the lower exchequer, or exchequer of receipt, consisted almost exclusively of the subordinates of the treasurer and chamberlains. In the upper exchequer the justiciar appointed the calculator, who exhibited the state of each account by means of counters on the exchequer table, so that the proceedings of the court might be clear to the presumably illiterate sheriff. The calculator sat in the centre of the side of the table on the president's left. The chancellor's staff consisted of the *Magister Scriptorii* (probably the ancestor of the modern master of the rolls), whose duties are not stated; a clerk (the modern chancellor of the exchequer) who settled the form of all writs and summonses, charged the sheriff with all fines and amercements, and acted as a check on the treasurer in the composition of the great roll; and a scribe (afterwards the comptroller of the pipe), who wrote out the writs and summonses and kept a duplicate of the great roll, known as the chancellor's roll. The constable's subordinates were the marshal and a clerk, who, besides the duty of paying outdoor servants of the crown, had the special task of producing duplicates of all writs issued by the Curia Regis. The treasurer and chamberlains, being colleagues, had a joint staff, the clerical or literate members of which were servants of the treasurer, while the lay or illiterate members depended on the chamberlains. Hence while the treasurer and his clerks kept their accounts by means of rolls, the chamberlains and their serjeants duplicated them so far as possible by means of tallies. Thus the great roll was written by the treasurer's scribe (the engrosser, afterwards the clerk of the pipe), while the payments on account and other allowances to be credited to the sheriff were registered by the tally cutter of the chamberlains.

In the exchequer of receipt the staff was similarly divided between the treasurer and chamberlains; the treasurer having a clerk who kept the issue and receipt rolls (the later clerk of the pells) and four tellers, while each of the chamberlains was represented by a knight (afterwards the deputy chamberlains), who controlled the clerk's account by means of tallies, and held their lands by this serjeanty; these three had joint control of the treasury, and could not act independently. The other serjeants were the knight or "pesour" who weighed the money, the melter who assayed it, and the ushers of the two exchequers. It should be noted that all the lay offices of the treasury in both exchequers were hereditary. Henry II. had also a personal clerk who supervised the proceedings personally in the upper, and by deputy in the lower, exchequer.

The business of the ancient exchequer was primarily financial, although we know that some judicial business was done there and that the court of common pleas was derived from it rather than from the curia proper. The principal accountants were the sheriffs, who were bound, as the king's principal financial agents in each county, to give an account of their stewardship twice a year, at the exchequers of Easter and Michaelmas. Half the annual revenue was payable at Easter, and at Michaelmas the balance was exacted, and the accounts made up for the year, and formally enrolled on the pipe roll. The fixed revenue consisted of the farms of the king's demesne lands within the counties, of the county mints, and of certain boroughs (see BOROUGH) which paid annual sums as the price of their liberties. Danegeld was also regarded as fixed revenue, though after the accession of Henry II. it was not frequently levied. There were also rents of assarts and purprestures and mining and other royalties. The casual revenue consisted of the profits of the feudal incidents (escheat, wardship and marriage), of the profits of justice (amercements, and goods of felons and outlaws), and of fines, or payments made by the king's subjects to secure grants of land, wardships or marriages, and of immunities, as well as for the hastening and sometimes the delaying of justice. Besides this, there were the revenues arising from aids and scutages of the king's military tenants, tallages of the crown lands, customs of ports, and special "gifts," or general assessments made on particular occasions. For the collection of all these the sheriff was primarily responsible, though in some cases the accountants dealt directly with the exchequer, and were bound to make their appearance in person on the day when the sheriff accounted.

We gather both from tradition and from the example of the Scottish exchequer that the farms of demesne lands were originally paid in kind, by way of purveyance for the royal household, and although such farms are expressed even in Domesday Book in terms of money, the tradition that there was a system of customary valuation is a sufficient explanation, and not of itself incredible. At some date, possibly under the administration of Roger of Salisbury, the inconvenience of this arrangement led to the substitution of money payments at the exchequer. The rapid deterioration of a small silver coinage led to successive efforts to maintain the value of these payments, first by a "scale" deduction of 6d. in the £ for wear, then by the substitution of payment by weight for payment by tale, and finally by the reduction of most of such payments to their pure silver value by means of an assay, a process originally confined to payments from particular manors. Only the farms of counties, however, were so treated, and not all of those. The amount to be deducted in these cases was settled by the weighing and assaying of a specimen pound of silver in the presence of the sheriff by the pesour and the melter in the lower exchequer. The casual revenue was paid by tale, and for the determination of its amount it was necessary to have copies of all grants made in the chancery on which rents were reserved, or fines payable. These were known first as *contrabrevia* and later as *originalia*; the profits of justice were settled by the delivery of "estreats" from the justices, while for certain minor casualties the oath of the sheriff was at first the only security. At a later date many of them were determined by copies of inquisitions sent in from the chancery. All this business might be transacted anywhere in England, and though convenience placed the exchequer first at Winchester (where the treasury was), and afterwards usually at Westminster, it held occasional sessions at other towns even in the 14th century.

The Angevin exchequer, described by Richard the Treasurer, remained the ideal of the institution throughout its history, and the lineaments of the original exemplar were never completely effaced; but the rapid increase both of financial and judicial business led to a multiplication of machinery and a growing complexity of constitution. Even in the time of Henry II. we gather that the great officers of state, except the treasurer and chancellor, commonly attended by deputy. In the reign of Henry III. the chancellor had also ceased to attend, and his clerk acquired the title of chancellor of the exchequer. To the same period belongs the institution of the king's and lord treasurer's remembrancers. These at first had common duties and kept duplicate rolls, but by the ordinance of 1323 their functions were differentiated. Henceforward the king's remembrancer was more particularly concerned with the casual, and the lord treasurer's remembrancer with the fixed revenue. The former put all debts in charge, while the latter saw to their recovery when they had found their way on to the great roll. Hence the preliminary stages of each account, the receiving and registering of the king's writs to the treasurer and barons, and the drawing up of all particulars of account, lay with the king's remembrancer, and he retained the corresponding vouchers. The lord treasurer's remembrancer exacted the "remanets" of such accounts as had been enrolled, as well as reserved rents and fixed revenue, and so became closely connected with the clerk of the pipe. Before the end of the 14th century these three offices had already crystallized into separate departments.

In the meantime the increasing length and variety of accounts, as well as the growth of judicial business, had led to various efforts at reform. As early as 22 Henry II. it became necessary to remove from the great roll the debts which it seemed hopeless to levy, and further ordinances to the same end were made by statute in 54 Henry III. and in 12 Edward I. By this last a special "exannual roll" was established in which the "desperate debts" were recorded, in order that the sheriff might be reminded of them yearly without their overloading the great roll. But the largest accession of financial business arose from the "foreign accounts," that is to say, the accounts of national services, which did not naturally form part of the account of any county. These did not in the reign of Henry II. form a part of the exchequer business. Such expenses as appear on the pipe roll were paid by the sheriffs, or by the bailiffs of "honours"; payments out of the treasury itself would only appear on the receipt and issue rolls, and the "spending departments" probably drew their supplies from the camera curie, and not directly from the exchequer. In the course of the 13th century the exchequer gradually acquired partial control of these national accounts. Even in 18 Henry II. there is an account for the forests of England, and soon the mint, the wardrobe and the escheators followed. The undated statute of the exchequer (probably about 1276) provides for escheators, the earldom of Chester, the Channel Islands, the customs and the wardrobe. During the reign of Edward I., the wardrobe account became unmanageable, since it not only financed the household, army, navy and diplomatic service, but raised money on the customs independently of the exchequer. The reform of 1323–1326, due to Walter de Stapledon, in remedying this state of things, greatly increased the number of "foreign accounts" by making the great wardrobe (the storekeeping department), the butler, purveyors, keepers of horses or of the stud, the clerk of the "hamper" of the chancery (who took the fees for the great seal), and the various ambassadors, directly accountable to the exchequer. At the same time the sheriffs' accounts were expedited by the further simplification of the great roll, and by appointing a special officer, the "foreign apposer," to take the account of the "green wax," or estreats, so that two accounts could go on at once. Another baron (the 5th or cursitor baron) was appointed, and the whole business of foreign accounts was transferred to a separate building where one baron and certain auditors spent their whole time in settling the balances due on the accounts already mentioned, as well as those of castles, &c., not let to farm, Wales, Gascony, Ireland, aids (clerical and lay), temporalities of vacant bishoprics, abbeys, priories and dignities, mines of silver and tin, ulnage and so forth. These balances were accounted for in the exchequer itself, and entered on the pipe roll, but the preliminary accounts were filed by the king's remembrancer, and enrolled separately by the treasurer's remembrancer as a supplement to the pipe roll.

The next important change, about the end of the 15th century, was the gradual substitution of special auditors appointed by the crown, known as the auditors of the prests (the predecessors of the commissioners for auditing public accounts), for the auditors of the exchequer. Accounts when passed by them were presented in duplicate and "declared" before the treasurer, under-treasurer and chancellor. Of the two copies, one, on paper, was retained by the auditors, the other, on parchment, was successively enrolled by the king's and lord treasurer's remembrancers, and finally by the clerk of the pipe, to secure the levying of any "remanets" or "supers" by process of the exchequer.

Besides the two great difficulties of the postponement of financial to legal business, and of preventing the sheriffs from exacting the same debt twice, the exchequer was, as has been seen, hampered in its functions by the interference of other departments in financial matters. Its own branches even acquired a certain independence. The exchequer of the Jews, which came to an end in 18 Edward I., was such a branch. In 27 Henry VIII. the court of augmentations was established to deal with forfeited lands of monasteries. This was followed in 32 & 33 Henry VIII. by the courts of first-fruits and tenths and of general surveyors. These were reabsorbed by the exchequer in 1 Mary, but remained as separate departments within it. But the development of the treasury, which succeeded to the functions of the camera curie or the king's chamber, ultimately reduced the administrative functions of the exchequer to unimportance, and the audit office took over its duties with regard to public accounts. So that when the statute of 3 & 4 William IV. cap. 99, removed the sheriff's accounts also from its competence, and brought to an end the series of pipe rolls which begins in 1130, the ancient exchequer may be said to have come to an end. (C. J.)

In 1834 an act was passed abolishing the old offices of the exchequer, and creating a new exchequer under a comptroller-general, the detailed business of payments formerly made at the exchequer being transferred to the paymaster-general, whose office was further enlarged in 1836 and 1848. And in 1866, as the result of a select committee reporting unfavourably on the system of exchequer control as established in 1834, the exchequer was abolished altogether as a distinct department of state, and a new exchequer and audit department established.

The ancient term exchequer now survives mainly as the official title of the national banking account of the United Kingdom. This central account is commonly called the exchequer, and its statutory title is "His Majesty's Exchequer." It may also be described with statutory authority as "The Account of the Consolidated Fund of Great Britain and Ireland." This account is, in fact, divided between the Banks of England and Ireland. At the head office of each of these institutions receipts are accepted and payments made on account of the exchequer; but in published documents the two accounts are consolidated into one, the balances only at the two banks being shown separately.

Operations affecting the exchequer are regulated by the Exchequer and Audit Departments Act 1866. Section 10 prescribes that the gross revenue of the United Kingdom (less drawbacks and repayments, which are not really revenue) is payable, and must sooner or later be paid into the exchequer. Section 11 directs that payments should be made from the fund so formed to meet the current requirements of spending departments. Sections 13, 14, 15 lay down the conditions under which money can be drawn from the exchequer. Drafts on the exchequer require the approval of an officer independent of the executive government, the comptroller and auditor-general. But the description of the formal procedure required by statute cannot adequately express the actual working of the system, or the part it plays in the national finance. The simplicity of the system laid down by the act of 1866 has been disturbed by the diversion of certain branches or portions of revenue from the exchequer to "Local Taxation Accounts," under a system initiated by the Local Government Act 1888, and much extended since.

While the exchequer is, as already stated, the central account, it is not directly in contact with the details of either revenue or expenditure. As regards revenue, the produce of taxes and other sources of income passes, in the first instance, into the separate accounts of the respective receiving departments—mainly, of course, those of the customs, inland revenue and post office. A not inconsiderable portion is received in the provinces, and remitted to London or Dublin by bills or otherwise, and the ultimate transfers to the exchequer are made (in round sums) from the accounts of the receiving departments in London or in Dublin. Thus, there are always considerable sums due to the exchequer by the revenue departments; on the other hand, as floating balances are (for the sake of economy) used temporarily for current expenses, there are generally amounts due by the exchequer to the receiving departments; such cross claims are adjusted periodically, generally once a month. The finance accounts of the United Kingdom show the gross amounts due to the exchequer from the departments, and likewise the amounts payable out of the gross revenue in priority to the claim of the exchequer. On the expenditure side a similar system prevails. No detailed payments are made direct from the exchequer, but round sums are issued from it to subsidiary accounts, from which the actual drafts for the public services are met. For instance, the interest on the national debt is paid by the Bank of England from a separate account fed by transfers of round sums from the exchequer as required. Similarly, payments for army, navy and most civil services are met by the paymaster-general out of an account of his own, fed by daily transfers from the exchequer.

This system has two noticeable effects. Firstly, it secures the simplicity and finality of the exchequer accounts, and therefore of all ordinary statements of national finance. Every evening the chancellor of the exchequer can tell his position so far as the exchequer is concerned; on the first day of every quarter the press is able to comment on the national income and expenditure up to the evening before. The annual account is closed on the evening of the 31st of March, and there can be no reopening of the budget of a past year such as may occur under other financial systems. The second effect of the system is to introduce a certain artificiality into the financial statements. Actual facts cannot be reduced to the simplicity of exchequer figures; there is always (as already explained) revenue received by government which has not yet reached the exchequer; and there must always be a considerable outstanding liability in the form of cheques issued but not yet cashed. The suggested criticism is, however, met if it can be shown that, on the whole, the differences between the true revenue and the exchequer receipts, or between the true (or audited) expenditure and the exchequer issues, are not, taking one year with another, relatively considerable. The following figures (000's omitted) illustrate this point:—

Expenditure.

Year.	Exchequer Issues.	Audited Expenditure.	Difference.
1888–1889	£85,674	£86,070	£+396
1889–1890	86,083	86,033	− 50
1890–1891	87,732	87,638	− 94
1891–1892	89,928	90,125	+197
1892–1893	90,375	90,164	−211
1893–1894	91,303	91,530	+227
1894–1895	93,919	93,818	−101
1895–1896	97,764	97,667	− 97
1896–1897	101,477	101,543	+ 66
1897–1898	102,936	103,010	+ 74
Total for 10 years	£927,191	£927,598	£+407

Revenue.

Year.	Exchequer Receipts.	Actual Revenue.	Difference.
1888–1889	£88,473	£88,038	£−435
1889–1890	89,304	89,416	+112
1890–1891	89,489	89,282	−207
1891–1892	90,995	91,428	+433
1892–1893	90,395	90,181	−214
1893–1894	91,133	91,265	+132
1894–1895	94,684	94,873	+189
1895–1896	101,974	102,031	+ 57
1896–1897	103,960	104,089	+129
1897–1898	106,614	106,691	+ 77
Total for 10 years	£947,011	£947,294	£+273

Surplus.

Year.	Exchequer Accounts.	Diff. between Actual Rev. and Aud. Exp.	Difference.
1888–1889	£2,799	£1,968	£−831
1889–1890	3,221	3,383	+162
1890–1891	1,757	1,644	−113
1891–1892	1,067	1,303	+236
1892–1893	20	17	− 3
1893–1894	*−170*	*−265*	− 95
1894–1895	765	1,055	+290
1895–1896	4,210	4,364	+154
1896–1897	2,473	2,546	+ 73
1897–1898	3,678	3,681	+ 3
Total for 10 years	£19,820	£19,696	£−124

The third column in the above shows the price which has to be paid (in the form of discrepancies between facts and figures) for the simplicity secured to statements and records of the national finance by the present system embodied in the term exchequer. Probably few will think the price too high in consideration of the advantages secured.

The principal official who derives a title from the exchequer in its living sense is, of course, the chancellor of the exchequer. He is the person named second in the patent appointing commissions for executing the office of lord high treasurer of Great Britain and Ireland; but he is appointed chancellor of the exchequer for Great Britain and chancellor of the exchequer for Ireland by two additional patents. Although, in fact, the finance minister of the United Kingdom, he has no *statutory* power over the exchequer apart from his position as second commissioner of the treasury; but in virtue of his office he is by statute master of the mint, senior commissioner for the reduction of the national debt, a trustee of the British Museum, an ecclesiastical commissioner, a member of the board of agriculture, a commissioner of public works and buildings, local government, and education, a commissioner for regulating the offices of the House of Commons, and has certain functions connected with the office of the secretary of state for India. The only other exchequer officer requiring mention is the comptroller and auditor-general, whose functions as comptroller-general of the exchequer have been already described.

The ancient name of the national banking account has been attached to two of the forms of unfunded national debt. Exchequer bills, which date from the reign of William and Mary (they took the place of the tallies, previously used for the same purpose), became extinct in 1897, but exchequer bonds (first issued by Mr Gladstone in 1853) still possess a practical importance. An exchequer bond is a promise by government to pay a specified sum after a specified period, generally three or five years, and meanwhile to pay interest half-yearly at a specified rate on that sum. Government possesses no general power to issue exchequer bonds; such power is only conferred by a special act, and for specified purposes; but when the power has been created, exchequer bonds issued in pursuance of it are governed by general statutory provisions contained in the Exchequer Bills and Bonds Act 1866, and amending acts. These acts create machinery for the issue of exchequer bonds and for the payment of interest thereon, and protect them against forgery.

Some traces may be mentioned of the ancient uses of the name exchequer which still remain. The chancellor of the exchequer still presides at the ceremony of "pricking the list of sheriffs," which is a quasi-judicial function; and on that occasion he wears a robe of black silk with gold embroidery, which suggests a judicial costume. In England the last judge who was styled baron of the exchequer (Baron Pollock) died in 1897. In Scotland the jurisdiction of the barons of the exchequer was transferred to the court of session in 1856, but the same act requires the appointment of one of the judges as "lord ordinary in exchequer causes," which office still exists. In Ireland Lord Chief Baron Palles was the last to retain the old title. A street near Dublin Castle is called Exchequer Street, recalling the separate Irish exchequer, which ceased in 1817. The old term also survives in the full title of the treasury representative in Scotland, which is "The King's and the Lord Treasurer's Remembrancer in Exchequer," while his office in the historic Parliament Square is styled "Exchequer Chambers."

(S. E. S.-R.)

BIBLIOGRAPHY.—For the early exchequer Thomas Madox's *History and Antiquities of the Exchequer* (London, 1711) remains the standard authority, and in it the *Dialogus de Scaccario* of Richard the Treasurer (1179) was first printed (edited since by A. Hughes, C. G. Crump and C. Johnson, Oxford, 1902). The publications of the Pipe Roll Society (London, 1884 et seq.), the Pipe Rolls and Chancellor's Roll, printed by the Record Commission (London, 1833 and 1844), and H. Hall's edition of the *Receipt Roll of the Exchequer 31 Henry II.* (London, 1899) should also be consulted. A popular account is in H. Hall's *Court Life under the Plantagenets* (London, 1901), and a careful study in Dr Parow's thesis, *Compotus Vicecomitis* (Berlin, 1906). For the 13th and 14th centuries H. Hall's edition of the *Red Book of the Exchequer* (London, Rolls Series, 1896) is essential, as also the Public Record Office *List of Foreign Accounts* (London, 1900). Later practice may be gathered from the similar *List and Index of Declared Accounts* (London, 1893), and from such books as Sir T. Fanshawe's *Practice of the Exchequer Court*, written about A.D. 1600 (London, 1658); Christopher Vernon's *The Exchequer Opened* (London, 1661), or Sir Geoffrey Gilbert's *Treatise on the Court of Exchequer* (London, 1758), as well as from the statutes abolishing various offices in the exchequer. H. Hall's *Antiquities of the Exchequer* (London, 1891) gives many interesting details of various dates. For the Scottish exchequer *The Exchequer Rolls of Scotland* (Edinburgh, 1878 et seq.) should be consulted, while Gilbert's book noted above gives some details on that of Ireland. See also Appendix 13 to the great account of *Public Income and Expenditure from 1688 to 1869*, in three volumes, prepared for parliament by H. W. Chisholm (1869); and for sidelights on the working of the office from 1825 to 1866 the reminiscences of the same author (the last chief clerk of the exchequer) in *Temple Bar* (January to April 1891).

EXCISE (derived through the Dutch, *excijs* or *accijs*, possibly from Late Lat. *accensare,—ad*, to, and *census*, tax; the word owes something to a confusion with *excisum*, cut out), a term now well known in public finance, signifying a duty charged on home goods, either in the process of their manufacture, or before their sale to the home consumers. This form of taxation implies a commonwealth somewhat advanced in manufactures, markets and general riches; and it interferes so directly with the industry and liberty of the subject that it has seldom been introduced save in some supreme financial exigency, and has as seldom been borne, even after long usage, with less than the ordinary impatience of taxation. Yet excise duties can boast a respectable antiquity, having a distinct parallel in the *vectigal rerum venalium* (or toll levied on all commodities sold by auction, or in public market) of the Romans. But the Roman excise was mild compared with that of modern nations, having never been more than *centesima*, or 1%, of the value; and it was much shorter lived than the modern examples, having been first imposed by Augustus, reduced for a time one-half by Tiberius, and finally abolished by Caligula, A.D. 38, so that the Roman excise cannot have had a duration of much more than half a century. Its remission must have been deemed a great boon in the marts of Rome, since it was commemorated by the issue of small brass coins with the legend *Remissis Centesimis*, specimens of which are still to be found in collections.

The history of this branch of revenue in the United Kingdom dates from the period of the civil wars, when the republican government, following the example of Holland, established, as a means of defraying the heavy expenditure of the time, various duties of excise, which the royalists when restored to power found too convenient or too necessary to be abandoned, notwithstanding their origin and their general unpopularity. On the contrary, they were destined to be steadily increased both in number and in amount. It is curious that the first commodities selected for excise were those on which this branch of taxation, after great extension, had again in the period of reform and free trade been in a manner permanently reduced, viz. malt liquors, and such kindred beverages as cider perry and spruce beer. The other excise duties remaining are chiefly in the form of licences, such as to kill game and to use and carry guns, to sell gold and silver plate, to pursue the business of appraisers or auctioneers, hawkers or pedlars, pawnbrokers or patent-medicine vendors, to manufacture tobacco or snuff, to deal in sweets or in foreign wines, to make vinegar, to roast malt, or to use a still in chemistry or otherwise. It may be presumed that the policy of the licence duties was at first not so much to collect revenue, though in the aggregate they yielded a large sum, as to guard the main sources of excise, and to place certain classes of dealers, by registration and an annual payment to the exchequer, under a direct legal responsibility. The excise system of the United Kingdom as now pruned and reformed, however, while still the most prolific of all the sources of revenue, is simple in process, and is contentedly borne as compared with what was the case in the 18th, and the beginning of the 19th century. The wars with Bonaparte strained the government resources to the uttermost, and excise duties were multiplied and increased in every practicable form. Bricks, candles, calico prints, glass, hides and skins, leather, paper, salt, soap, and other commodities of home manufacture and consumption were placed, with their respective industries, under excise surveillance and fine. When the duties could no longer be increased in number, they were raised in rate. The duty on British spirits, which had begun at a few pence per gallon in 1660, rose step by step to 11s. 8¼d. per gallon in 1820; and the duty on salt was augmented to three or fourfold its value.

The old unpopularity of excise, though now somewhat out of date, must have had real enough grounds. It breaks out in English literature, from songs and pasquinades to grave political essays and legal commentaries. Blackstone, in quoting the declaration of parliament in 1649 that "excise is the most easy and indifferent levy that can be laid upon the people," adds on his own authority that "from its first original to the present time its very name has been odious to the people of England" (book i. cap. 8, tenth edition, 1786); while the definition of "excise" gravely inserted by Dr Johnson in the *Dictionary*, at the imminent risk of subjecting the eminent author to a prosecution for libel—viz. "a hateful tax levied upon commodities, and adjudged not by the common judges of property, but wretches hired by those to whom excise is paid"—can hardly be ever forgotten.

The duties of excise in the United Kingdom were, until the passing of the Finance Act 1908, under the control of the commissioners of inland revenue; they are now under the control of the commissioners of customs; the amount raised, apart from changes in the rate, shows a fairly constant tendency to increase, and is usually regarded as one of the best tests of the prosperity of the working classes.

The *spirit duty* is levied according to the quantity of "proof spirit" contained in the product of distillation, and the charge is taken at three different points in the process of manufacture, the trader being liable for the result of the highest of the three calculations. What is known as "proof spirit" is obtained by mixing nearly equal weights of pure alcohol and water, the quantity of pure alcohol being in bulk about 57% of the whole. Owing to the high rate of duty as compared with the volume and intrinsic value of the spirits, the whole process of manufacture is carried on under the close supervision of revenue officials. All the vessels used are measured by them and are secured with revenue locks; the premises are under constant survey; and notice has to be given by the distiller of the materials used and of the several stages of his operations. Though the charge for duty is raised at the time when the process of distillation is completed, the duty is not actually paid until the spirits are required for consumption. In the meanwhile they may be retained in an approved "warehouse," which is also subject to close supervision.

The *beer duty* dates from 1880, in which year it was substituted for the duty on malt. The specific gravity of the worts depends chiefly on the amount of sugar which they contain, and is ascertained by the saccharometer.

Excise *licences* may be divided into—(*a*) licences for the sale or manufacture of excisable liquors, (*b*) licences for other trades, such as tobacco dealers or manufacturers, auctioneers, pawnbrokers, &c., (*c*) licences for male servants, carriages, motors and armorial bearings, and (*d*) gun, game and dog licences. Nearly the whole of the licence duties is paid over to the local taxation account.

The *railway passenger duty*, which was made an excise duty by the Railway Passenger Duty Act 1847, applies only to Great Britain. It is levied on all passenger fares exceeding 1d. per mile, the rate being 2% on urban and 5% on other traffic.

The other items which go to make up the excise revenue are the charges on deliveries from bonded warehouses, and the duties on coffee mixture labels and on chicory.

For more detailed information reference should be made to Highmore's *Excise Laws*, and the annual reports of the commissioners of inland revenue, especially those issued in 1870 and 1885. See also TAXATION; ENGLISH FINANCE.

EXCOMMUNICATION (Lat. *ex*, out of, away from; *communis*, common), the judicial exclusion of offenders from the rights and privileges of the religious community to which they belong. The history of the practice of excommunication may be traced through (1) pagan analogues, (2) Hebrew custom, (3) primitive Christian practice, (4) medieval and monastic usage, (5) modern survivals in existing Christian churches.

1. Among pagan analogues are the Gr. *χερνίβων εἴργεσθαι* (Demosth. 505, 14), the exclusion of an offender from purification with holy water. This exclusion was enforced in the case of persons whose hands were defiled with bloodshed. Its consequences are described Aesch. *Choëph.* 283, *Eum.* 625 f., Soph. *Oed. Tyr.* 236 ff. The Roman *exsecratio* and *diris devotio* was a solemn pronouncement of a religious curse by priests, intended to call down the divine wrath upon enemies, and to devote them to destruction by powers human and divine. The Druids claimed the dread power of excluding offenders from sacrifice (Caes. *B.G.* vi. 13). Primitive Semitic customs recognize that when persons are laid under a ban or taboo (*ḥerem*) restrictions are imposed on contact with them, and that the breach of these involves supernatural dangers. Impious sinners, or enemies of the community and its god, might be devoted to utter destruction.

2. *Hebrew Custom.*—In a theocracy excommunication is necessarily both a civil and a religious penalty. The word used in the New Testament to describe an excommunicated person, *ἀνάθεμα* (1 Cor. xvi. 22, Gal. i. 8-9, Rom. ix. 3), is the Septuagint rendering of the Hebrew *ḥerem*. The word means "set apart" (cf. harem), and does not distinguish originally between things set apart because devoted to God and things devoted to destruction. Lev. xxvii. 16-34 defines the law for dealing with "devoted" things; according to *v.* 28 "No devoted thing that a man shall devote unto the Lord, of all that he hath, whether of man or beast, or of the field of his possession, shall be sold or redeemed. None devoted shall be ransomed, he shall surely be put to death." As in Greece and Rome whole cities or nations might be devoted to destruction by pronouncement of a ban (Numbers xxi. 2, 3, Deut. ii. 34, iii. 6, vii. 2). Occasionally Israelites as well as aliens fall under the curse (Judg. xxi. 5, 11). A milder form of penalty was the temporary separation or seclusion (*niddah*) prescribed for ceremonial uncleanness. This was the ordinary form of religious discipline. In the time of Ezra the Jewish "magistrates and judges" among their ecclesiastico-civil functions have the right of pronouncing sentence whether it be unto death, or to "rooting out," or to confiscation of goods, or to imprisonment (Ezra vii. 26). There is also a lighter form of excommunication which "devotes" the goods of an offender, but only separates him from the congregation. Both major and minor kinds of excommunication are recognized by the Talmud. The lesser (*niddah*) involved exclusion from the synagogue for thirty days, and other penalties, and might be renewed if the offender remained impenitent. The major excommunication (*ḥerem*) excluded from the Temple as well as the synagogue and from all association with the faithful. Spinoza was excommunicated (July 16, 1656) for contempt of the law. Seldon (*De jure nat. et gen.*, iv. 7) gives the text of the curse pronounced on the culprit. The *Exemplar Humanae Vitae* of Uriel d'Acosta also deserves reference. The practice of the Jewish courts in New Testament times may be inferred from certain passages in the Gospels. Luke vi. 22, John ix. 22, xii. 42 indicate that exclusion from the synagogue was a recognized penalty, and that it was probably inflicted on those who confessed Jesus as the Christ. John xvi. 2 ("Whosoever killeth you," &c.) may point to the power of inflicting the major penalty. The Talmud itself says that the judgment of capital cases was taken away from Israel forty years before the destruction of the Temple. "Forty" is probably a round number without historical value, but the circumstance recorded by this tradition and confirmed by the evangelist's account of the trial of Jesus is historical, and is to be regarded as one of several restrictions imposed on the Jewish courts in the time of the Roman procurators.

3. *Primitive Christian Practice.*—The use of excommunication as a form of Christian discipline is based on the precept of Christ and on apostolic practice. The general principles which govern the exclusion of members from a religious community may be gathered from the New Testament writings. Matt. xviii. 15-17 prescribes a threefold admonition, first privately, then in the presence of witnesses (cf. Titus iii. 10), then before the church. This is a graded procedure as in the Jewish synagogue and makes exclusion a last resort. Nothing is said as to the nature and effects of excommunication. The tone of the passage when compared with the disciplinary methods of the synagogue indicates that its purpose was to introduce elements of reason and moral suasion in place of sterner methods. Its object is rather the protection of the church than the punishment of the sinner. The offender is only treated as a heathen and publican when the purity and safety of the church demand it. In the *locus classicus* on this subject (1 Cor. v. 5) Paul refers to a formal meeting of the Corinthian church at which the incestuous person is "delivered unto Satan for the destruction of the flesh that the spirit may be saved in the day of the Lord Jesus." These are mysterious words implying (1) a formal ecclesiastical censure, (2) a physical penalty, (3) the hope of a spiritual result. The form of penalty which would meet these conditions is not explained. There is a reference in 2 Cor. ii. 6-11 to a case of discipline which may or may not be the same. If it be the same it indicates that the excommunication had not been final; the offender had been received back. If it be not the same it shows the Corinthian

church exercising discipline independently of apostolic advice. Up to this point there is no established formal practice. 1 Tim. i. 20 (" Hymenaeus and Alexander whom I delivered unto Satan that they might be taught not to blaspheme ") seems to refer to an excommunication, but it does not appear whether the apostle had acted as representing a church, nor is there anything to explain the exact consequences or limits of the deliverance to Satan. 1 Cor. xvi. 22, Gal. i. 8, 9, Rom. ix. 3 refer to the practice of regarding a person as anathema. Taking these passages as a whole they seem to point to an exclusion from church fellowship rather than to a final cutting off from the hope of salvation. In the pastoral letters there is already a formal and recognized method of procedure in cases of church discipline. 1 Tim. v. 19, 20 requires two or three witnesses in the case of an accusation against an elder, and a public reproof. Tit. iii. 20 recognizes a factious spirit as a reason for excommunication after two admonitions (cf. Tim. vi. and 2 John v. 10). In 3 John v. 9-10 Diotrephes appears to have secured an excommunication by the action of a party in the church. It is clear from these illustrations that within the New Testament there is development from spontaneous towards strictly regulated methods; also that the use of excommunication is chiefly for disciplinary and protective rather than punitive purposes. A process which is intended to produce penitence and ultimate restoration cannot at the same time contemplate handing the offender over to eternal punishment.

4. *Medieval and Monastic Usage.*—The writings of the church Fathers give sufficient evidence that two degrees of excommunication, the ἀφορισμός and the ἀφορισμὸς παντελής, as they were generally called, were in use during, or at least soon after, the apostolic age. The former, which involved exclusion from participation in the eucharistic service and from the eucharist itself, though not from the so-called " service of the catechumens," was the usual punishment of comparatively light offences; the latter, which was the penalty for graver scandals, involved " exclusion from all church privileges,"—a vague expression which has sometimes been interpreted as meaning total exclusion from the very precincts of the church building (*inter hiemantes orare*) and from the favour of God (Bingham, *Antiquities of Christian Church*, xvi. 2. 16). For some sins, such as adultery, the sentence of excommunication was in the 2nd century regarded as παντελής in the sense of being irrevocable. Difference of opinion as to the absolutely " irremissible " character of mortal sins led to the important controversy associated with the names of Zephyrinus, Tertullian, Calistus, Hippolytus, Cyprian and Novatian, in which the stricter and more montanistic party held that for those who had been guilty of such sins as theft, fraud, denial of the faith, there should be no restoration to church fellowship even in the hour of death. On this point the provincial synods of Illiberis (Elvira) in 305 and of Ancyra in 315 subsequently came to conflicting decisions, the council of Elvira forbidding the reception of offenders into communion during life, and the council of Ancyra fixing a limit to the penalty in the same cases. But the excommunication was on all hands regarded as being " medicinal " in its character. It is noteworthy that the word ἀνάθεμα had fallen into disuse about the beginning of the 4th century, and that, throughout the same period, no instance of the judicial use of the phrase παραδοῦναι τῷ Σατανᾷ can be found.

A new chapter in the history of the church censure may be said to have begun with the publication of those imperial edicts against heresy, the first of which, *De summa trinitate et fide catholica*, dates from 380. Till then exclusion from church privileges had been a spiritual discipline merely; thenceforward it was to expose a man to serious temporal risks. Excommunication still continued to be occasionally used in the spirit of genuine Christian fidelity, as by Ambrose in the case of Theodosius himself (390); but the temptation to wield it as an instrument of secular tyranny too often proved to be irresistible. The church fell back on carnal weapons in her warfare and invoked the secular powers to uphold the ecclesiastical. In the formula used by Synesius (410) which is to be found in Bingham's *Antiquities*, we already find the attention of magistrates specially called to the censured person. The history of the next thousand years shows that the magistrates were seldom slow to respond to the appeal. Even the hastiest survey of that long and interesting period enables the student to notice a marked development in the theory and practice of excommunication. One or two points may be specially noted. (1) When the Empire became nominally Christian and the quality of the church life was sacrificed to the quantity of its adherents, the original character of excommunication was lost. The power of excommunication was transferred from the community to the bishop, and was liable to abuse from personal motives: Gregory the Great rebukes a bishop for using for private ends power conferred for the public good (*Epist.* ii. 34). Excommunication became a common penalty applied in numberless cases (see the *Penitential* of Archbishop Theodosius: Haddan and Stubbs, *Councils and Documents*, iii. 1737), and was invested with superstitious terrors. (2) While it had been held as an undoubted principle by the ancient church that this sentence could only be passed on living individuals whose fault had been distinctly stated and fully proved, we find the medieval church on the one hand sanctioning the practice of excommunication of the dead (Morinus, *De poenit.* x. c. 9), and, on the other hand, by means of the papal interdict, excluding whole countries and kingdoms at once from the means of grace. The earliest well-authenticated instance of such an interdict is that which was passed (998) by Pope Gregory V. on France, in consequence of the contumacy of King Robert the Wise. Other instances are those laid respectively on Germany in 1102 by Gregory VII. (Hildebrand), on England in 1208 by Innocent III., on Rome itself in 1155 by Adrian IV. (3) While in the ancient church the language used in excommunicating had been carefully measured, we find an amazing recklessness in the phraseology employed by the medieval clergy. The curse of Ernulphus or Arnulphus of Rochester (*c.* 1100), often quoted by students of English literature, is a very fair specimen of that class of composition. With it may be compared the formula transcribed by Dr Burton in his *History of Scotland* (iii. 317 ff.). To the spoken word was added the language of symbol. By means of lighted candles violently dashed to the ground and extinguished the faithful were graphically taught the meaning of the greater excommunication—though in a somewhat misleading way, for it is a fundamental principle of the canon law that *disciplina est excommunicatio, non eradicatio.* The first instance, however, of excommunication by " bell, book and candle " is comparatively late (*c.* 1190).

5. *Modern Survivals in Existing Christian Churches.*—At the Reformation the necessity for church discipline did not cease to be recognized; but the administration of it in many Reformed churches has passed through a period of some confusion. In some instances the old episcopal power passed more or less into the hands of the civil magistrate (a state of matters which was highly approved by Erastus and his followers), in other cases it was conceded to the presbyterial courts. In the Anglican Church the bishops (subject to appeal to the sovereign) have the right of excommunicating, and their sentence, if sustained, may in certain cases carry with it civil consequences. But this right is in practice never exercised. In the law of England sentence of excommunication, upon being properly certified by the bishop, was followed by the writ *de excommunicato capiendo* for the arrest of the offender. The statute 5 Eliz. c. 23 provided for the better execution of this writ. By the 53 Geo. III. c. 127 (which does not, however, extend to Ireland) it was enacted that " excommunication, together with all proceedings following thereupon, shall in all cases, save those hereafter to be specified, be discontinued." Disobedience to or contempt of the ecclesiastical courts is to be punished by a new writ, *de contumace capiendo*, to follow on the certificate of the judge that the defender is contumacious and in contempt. Sect. 2 provides that nothing shall prevent " any ecclesiastical court from pronouncing or declaring persons to be excommunicate on definite sentences pronounced as spiritual censures for offences of ecclesiastical cognizance." No persons so excommunicated

shall incur any civil penalty or incapacity whatever, save such sentence of imprisonment, not exceeding six months, as the court shall direct and certify to the king in chancery.

In the churches which consciously shaped their polity at or after the Reformation the principle of excommunication is preserved in the practice of church discipline. Calvin devotes a chapter in the *Institutes* (bk. iv. chap. xii.) to the "Discipline of the Church; its Principal Use in Censure and Excommunication." The three ends proposed by the church in such discipline are there stated to be, (1) that those who lead scandalous lives may not to the dishonour of God be numbered among Christians, seeing that the church is the body of Christ; (2) that the good may not be corrupted by constant association with the wicked; (3) that those who are censured or excommunicated, confounded with shame, may be led to repentance. He differentiates decisively between excommunication and anathema. "When Christ promises that what his ministers bind on earth shall be bound in heaven, he limits the power of binding to the censure of the church; by which those who are excommunicated are not cast into eternal ruin and condemnation, but by having their life and conduct condemned are also certified of their final condemnation unless they repent. For excommunication differs from anathema: anathema which ought to be very rarely, or never, resorted to, in precluding all pardon, execrates a person, and devotes him to eternal perdition: whereas excommunication rather censures and punishes his conduct. Yet in such a manner by warning him of his future condemnation it recalls him to salvation" (*Inst.* bk. iv. chap. xii. 10). The Reformed churches in England and America accepted the distinction between public and private offences. The usual provision is that private offences are to be dealt with according to the rule in Matt. v. 23-24, xviii. 15-17; public offences are to be dealt with according to the rule in 1 Cor. v. 3-5, 13. The public expulsion or suspension of the offender is necessary for the good repute of the church, and its influence over the faithful members. The expelled member may be readmitted on showing the fruits of repentance.

In Scotland three degrees of church censure are recognized—admonition, suspension from sealing ordinances (which may be called temporary excommunication), and excommunication properly so-called. Intimation of the last-named censure may occasionally (but very rarely) be given by authority of a presbytery in a public and solemn manner, according to the following formula:—"Whereas thou N. hast been by sufficient proof convicted (here mention the sin) and after due admonition and prayer remainest obstinate without any evidence or sign of true repentance: Therefore in the name of the Lord Jesus Christ, and before this congregation, I pronounce and declare thee N. excommunicated, shut out from the communion of the faithful, debar thee from privileges, and deliver thee unto Satan for the destruction of thy flesh, that thy spirit may be saved in the day of the Lord Jesus." This is called the greater excommunication. The congregation are thereafter warned to shun all unnecessary converse with the excommunicate (see *Form of Process*, c. 8). Formerly excommunicated persons were deprived of feudal rights in Scotland; but in 1690 all acts enjoining civil pains upon sentences of excommunication were finally repealed (Burton's *History*, vii. 435).

The question whether the power of excommunication rests in the church or in the clergy has been an important one in the history of English and American churches. Hooker lays down (*Survey*, pt. 3, pp. 33-46) four necessary conditions for the execution of a sentence involving church discipline. "(1) The cause exactly recorded is fully and nakedly to be presented to the consideration of the congregation. (2) The elders are to go before the congregation in laying open the rule so far as reacheth any particular now to be considered, and to express their judgment and determination thereof, so far as appertains to themselves. (3) Unless the people be able to convince them of errors and mistakes in their sentence, they are bound to joyn their judgment with theirs to the compleating of the sentence. (4) The sentence thus compleatly issued is to be solemnly passed and pronounced upon the delinquent by the ruling Elder whether it be of censure or excommunication." In this passage it is clear that the effective power of discipline is regarded as being wholly in the power of the individual church or congregation. Hooker expressly denies the power of synods to excommunicate: "that there should be Synods, which have *potestatem juridicam* is nowhere proved in Scripture because it is not a truth" (*Survey*, pt. 4, pp. 48, 49).

The confession of faith issued by the London-Amsterdam church (the original of the Pilgrim Fathers' churches) in 1596 declares that the Christian congregation having power to elect its minister has also power to excommunicate him if the case so require (Walker, *Creeds and Platforms of Congregationalism*, p. 66). In 1603 the document known as "Points of Difference" (*i.e.* from the established Anglicanism) submitted to James I. sets forth: "That all particular Churches ought to be so constituted as, having their owne peculiar Officers, the whole body of every Church may meet together in one place, and jointly performe their duties to God and one towards another. And that the censures of admonition and excommunication be in due manner executed, for sinne, convicted, and obstinately stood in. This power also to be in the body of the Church whereof the partyes so offending and persisting are members." The *Cambridge Platform* of 1648 by which the New England churches defined their practice, devotes ch. xiv. to "excommunication and other censures." It follows in the main the line of Hooker and Calvin, but adds (§6) an important definition: "Excommunication being a spirituall punishment it doth not prejudice the excommunicate in, nor deprive him of his *civil* rights, therfore toucheth not princes, or other magistrates, in point of their civil dignity or authority. And, the excommunicate being but as a publican and a heathen, heathen being lawfully permitted to come to hear the word in church assemblyes; wee acknowledg therfore the like liberty of hearing the word, may be permitted to persons excommunicate, that is permitted unto heathen. And because wee are not without hope of his recovery, wee are not to account him as an enemy but to admonish him as a brother." The Savoy Declaration of 1658 defines the theory and practice of the older English Nonconformist churches in the section on the "Institution of Churches and the Order appointed in them by Jesus Christ" (xix.). The important article is as follows:—"The Censures so appointed by Christ, are Admonition and Excommunication; and whereas some offences are or may be known onely to some, it is appointed by Christ, that those to whom they are so known, do first admonish the offender in private: in publique offences where any sin, before all; or in case of non-amendment upon private admonition, the offence being related to the Church, and the offender not manifesting his repentance, he is to be duely admonished in the Name of Christ by the whole Church, by the Ministery of the Elders of the Church, and if this Censure prevail not for his repentance, then he is to be cast out by Excommunication with the consent of the Church."

In contemporary English Free Churches the purity of the church is commonly secured by the removal of persons unsuitable for membership from the church books by a vote of the responsible authority. (D. Mn.)

EXCRETION (Lat. *ex*, out of, *cernere*, *cretum*, to separate), in plant and animal physiology, the separation from an organ of some substance, also the substance separated. The term usually refers to the separation of waste or harmful products, as distinguished from "secretion," which refers to products that play a useful or necessary part in the functions of the organism.

EXECUTION (from Lat. *ex-sequor*, *exsecutus*, follow or carry out), the carrying into effect of anything, whether a rite, a piece of music, an office, &c.; and so sometimes involving a notion of skill in the performance. Technically, the word is used in law in the *execution* of a deed (its formal signing and sealing), an *execution* (see below) by the sheriff's officers under a "writ of execution" (the enforcement of a judgment on a debtor's goods); and *execution of death* has been shortened to the one word to denote Capital Punishment (*q.v.*).

Civil Execution may be defined as the process by which the judgments or orders of courts of law are made effectual. In Roman law the earliest mode of execution was the seizure, legalized by the *actio per manus injectionem*, of the debtor as a slave of the creditor. During the later Republic, imprisonment took the place of slavery. Under the régime of the *actio per manus injectionem*, the debtor might dispute the debt—the issue being raised by his finding a substitute (*vindex*) to conduct the case for him. By the time of Gaius (iv. 25) the *actio per manus injectionem* had been superseded by the *actio judicati*, the object of which was to enable the creditor to take payment of the debt or compel the debtor to find security (*pignus in causa judicati captum: Cautio judicatum solvi*), and in A.D. 320 Constantine abolished imprisonment for debt, unless the debtor were contumacious. The time allowed for payment of a judgment debt was by the XII. Tables 30 days; it was afterwards extended to two months, and ultimately, by Justinian, to four months. The next stage in the Roman law of execution was the recognition of bankruptcy either against the will of the bankrupt (*missio in bona*) or on the application of the bankrupt (*cessio bonorum*; and see BANKRUPTCY). Lastly, in the time of Antoninus Pius, judgment debts were directly enforced by the seizure and sale of the debtor's property. Slaves, oxen and implements of husbandry were privileged; and movable property was to be exhausted before recourse was had to land (see Hunter, *Roman Law*, 4th ed. pp. 1029 et seq., Sohm, *Inst. Rom. Law*, 2nd ed. pp. 302-305).

GREAT BRITAIN.—The English law of execution is very complicated, and only a statement of the principal processes can here be attempted.

High Court.—Fieri Facias. A judgment for the recovery of money or costs is enforced, as a rule, by writ of *fieri facias* addressed to the sheriff, and directing him to cause to be made (*fieri facias*) of the goods and chattels of the debtor a levy of a sum sufficient to satisfy the judgment and costs, which carry interest at 4% per annum. The seizure effected by the sheriff or his officer, under this writ, of the property of the debtor, is what is popularly known as "the putting-in" of an execution. The seizure should be carried out with all possible despatch. The sheriff or his officer must not break open the debtor's house in effecting a seizure, for "a man's house is his castle" (*Semayne's Case* [1604], 5 Coke Rep. 91); but this principle applies only to a dwelling-house, and a barn or outhouse unconnected with the dwelling-house may be broken into. The sheriff on receipt of the writ endorses on it the day, hour, month and year when he received it; and the writ binds the debtor's goods as at the date of its delivery, except as regards goods sold before seizure in market overt, or purchased for value, without notice before actual seizure (Sale of Goods Act 1893, s. 26, which supersedes s. 16 of the Statute of Frauds and s. 1 of the Mercantile Law Amendment Act 1856). This rule is limited to goods, and does not apply to the money or bank notes of the debtor which are not bound by the writ till seized under it (*Johnson* v. *Pickering*, Oct. 14, 1907, C.A.). The mere seizure of the goods, however, although, subject to such exceptions as those just stated, it binds the interest of the debtor, and gives the sheriff such an interest in the goods as will enable him to sue for the recovery of their possession, does not pass the property in the goods to the sheriff. The goods are in the custody of the law. But the property remains in the debtor who may get rid of the execution on payment of the claim and fees of the sheriff [as to which see Sheriffs Act 1887, s. 20, and order of 21st of August 1888, *Annual Practice* (1908), vol. ii. p. 278]. The wearing apparel, bedding, tools, &c., of the debtor to the value of £5 are protected. Competing claims as to the ownership of the goods seized are brought before the courts by the procedure of "interpleader." After seizure, the sheriff must retain possession, and, in default of payment by the execution debtor, proceed to sell. Where the judgment debt, including legal expenses, exceeds £20, the sale must be by public auction, unless the Court otherwise orders, and must be publicly advertised. The proceeds of sale, after deduction of the sheriff's fees and expenses, become the property of the execution creditor to the extent of his claim. The Bankruptcy Act 1890 (53 & 54 Vict. c. 71, s. 11 [2]) requires the sheriff in case of sale under a judgment for a sum exceeding £20 to hold the proceeds for 14 days in case notice of bankruptcy proceedings should be served upon him (see BANKRUPTCY). The form of the writ of *fieri facias* requires the sheriff to make a return to the writ. In practice this is seldom done unless the execution has been ineffective or there has been delay in the execution of the writ; but the judgment creditor may obtain an order calling on the sheriff to make a return. A sheriff or his officer, who is guilty of extortion in the execution of the writ, is liable to committal for contempt, and to forfeit £200 and pay all damages suffered by the person aggrieved (Sheriffs Act 1887 [50 & 51 Vict. c. 55], s. 29 [2]), besides being civilly liable to such person. Imprisonment for debt in execution of civil judgments is now abolished except in cases of default in the nature of contempt, unsatisfied judgments for penalties, defaults by persons in a fiduciary character, and defaults by judgment debtors (Debtors Act 1869 [32 & 33 Vict. c. 62]; Bankruptcy Act 1883 [46 & 47 Vict. c. 52], ss. 53, 103). Imprisonment for debt has been abolished within similar limits in Scotland (Debtors [Scotland] Act 1880 [43 & 44 Vict. c. 34] and Ireland, Debtors [Ireland] Act 1872, 35 & 36 Vict. c. 57). There may still be imprisonment in England, under the writ—rarely used in practice—*ne exeat regno*, which issues to prevent a debtor from leaving the kingdom.

Writ of Elegit.—The writ of *elegit* is a process enabling the creditor to satisfy his judgment debt out of the lands of the debtor. It derives its name from the election of the creditor in favour of this mode of recovery. It is founded on the Statute of Westminster (1285, 13 Ed. I. c. 18), under which the sheriff was required to deliver to the creditor all the chattels (except oxen and beasts of the plough) and *half* the lands of the debtor until the debt was satisfied. By the Judgments Act 1838 the remedy was extended to *all* the debtor's lands, and by the Bankruptcy Act 1883 the writ no longer extends to the debtor's goods. The writ is enforceable against legal interests whether in possession or remainder (*Hood-Barrs* v. *Cathcart*, 1895, 2 Ch. 411), but not against equitable interests in land (*Earl of Jersey* v. *Uxbridge Rural Sanitary Authority*, 1891, 3 Ch. 183). When the debtor's interest is equitable, recourse is had to equitable execution by the appointment of a receiver or to bankruptcy proceedings.

The writ is directed to the sheriff, who, after marking on it the date of its receipt, at once in pursuance of its directions holds an inquiry with a jury as to the nature and value of the interest of the debtor in the lands extended under the writ, and delivers to the creditor at a reasonable price and extent in accordance with the writ, the lands of which the debtor was possessed in the bailiwick. When the sheriff has returned and filed a record (in the central office of the High Court) of the writ and the execution thereof, the execution creditor becomes "tenant to the elegit." Where the land is freehold the creditor acquires only a chattel interest in it; where the land is leasehold he acquires the whole of the debtor's interest (*Johns* v. *Pink*, 1900, 1 Ch. 296). The creditor is entitled to hold the land till his debt is satisfied, or enough to satisfy it is tendered to him, and under the Judgments Act 1864 the creditor may obtain an order for sale. Until the land is delivered on execution and the writs which have effected the delivery are registered in the Land Registry, the judgment does not create any charge on the land so as to fetter the debtor's power of dealing with it. Land Charges Registration Acts 1888 and 1900. (See R.S.C., O. xliii.)

Writs of Possession and Delivery.—Judgments for the recovery or for the delivery of the possession of land are enforceable by writ of possession. The recovery of specific chattels is obtained by writ of delivery (R.S.C., O. xlvii., xlviii.).

Writ of Sequestration.—Where a judgment directing the payment of money into court, or the performance by the defendant of any act within a limited time, has not been complied with, or where a corporation has wilfully disobeyed a judgment, a writ of sequestration is issued, to not less than four sequestrators, ordering them to enter upon the real estate of the party in default, and "sequester" the rents and profits until the judgment has been obeyed (R.S.C., O. xliii. r. 6).

Equitable Execution.—Where a judgment creditor is otherwise unable to reach the property of his debtor he may obtain equitable execution, usually by the appointment of a receiver, who collects the rents and profits of the debtor's land for the benefit of the creditor (R.S.C., O. l. rr. 15A-22). But receivers may be appointed of interests in personal property belonging to the debtor by virtue of the Judicature Act 1873, s. 25 (8).

Attachment.—A judgment creditor may "attach" debts due by third parties to his debtor by what are known as garnishee proceedings. Stock and shares belonging to a judgment debtor may be charged by a charging order, so as, in the first instance, to prevent transfer of the stock or payment of the dividends, and ultimately to enable the judgment creditor to realise his charge. A writ of attachment of the person of a defaulting debtor or party may be obtained in a variety of cases akin to contempt (*e.g.* against a person failing to comply with an order to answer interrogatories, or against a solicitor not entering an appearance in an action, in breach of his written undertaking to do so), and in the cases where imprisonment for debt is still preserved by the Debtors Act 1869 (R.S.C., O. xliv.). CONTEMPT OF COURT (*q.v.*) in its ordinary forms is also punishable by summary committal.

County Courts.—In the county courts the chief modes of execution are "warrant of execution in the nature of a writ of *fieri facias*"; garnishee proceedings; equitable execution; warrants of possession and delivery, corresponding to the writs of possession and delivery above mentioned; committal, where a judgment debtor has, or, since the date of the judgment has had, means to pay his debt; and attachment of the person for contempt of court. If the judgment debtor assaults the bailiff or his officer or rescues the goods, he is liable to a fine not exceeding £5.

SCOTLAND.—The principal modes of execution or "diligence" in Scots law are (i.) Arrestment and furthcoming, which corresponds to the English garnishee proceedings; (ii.) arrestment *jurisdictionis fundandae causa*, *i.e.* the seizure of movables within the jurisdiction to found jurisdiction against their owner, being a foreigner; this precedure, which is not, however, strictly a "diligence," as it does not bind the goods, is analogous to the French *saisie-arrêt*, and to the obsolete practice in the mayor's court of London known as "foreign attachment" (see Glyn and Jackson, *Mayor's Court Practice*, 2nd ed., vii. 260); (iii.) arrestment under *meditatione fugae* warrant, corresponding to the old English writ of *ne exeat regno*, and applicable in the case of a debtor who intends to leave Scotland to evade an action; (iv.) arrestment on dependence, *i.e.* of funds in security; (v.) poinding, *i.e.* valuation and sale of the debtor's goods; (vi.) sequestration, *e.g.* of tenant's effects under a landlord's hypothec for rent; (vii.) action of adjudication, by which a debtor's "heritable" (*i.e.* real) estate is transferred to his judgment creditor in satisfaction of his debt or security therefor. In Scots law "multiplepoinding" is the equivalent of "interpleader."

Ireland.—The law of execution in Ireland (see R.S.C., 1905, Orders xli.-xlviii.) is practically the same as in England.

British Possessions.—The Judicature Acts of most of the Colonies have also adopted English Law. Parts of the French *Code de procédure civile* are still in force in Mauritius. But its provisions have been modified by local enactment (No. 19 of 1868) as regards realty, and the rules of the Supreme Court 1903 have introduced the English forms of writs. Quebec and St Lucia, where French law formerly prevailed, have now their own codes of Civil Procedure. The law of execution under the Quebec Code resembles the French, that under the St Lucia Code the English system. In British Guiana and Ceylon, in which Roman Dutch law in one form or another prevailed, the English law of execution has now in substance been adopted (British Guiana Rules of Court, 1900, Order xxxvi.)., Ceylon (Code of Civil Procedure, No. 2 of 1889); the modes of execution in the South African Colonies are also the subject of local enactment, largely influenced by English law (cf. the Sheriffs' Ordinance, 1902, No. 9 of 1902), (Orange River Colony) and (Proclamation 17 of 1902), Transvaal (Nathan, *Common Law of South Africa*, vol. iv. p. 2206); and generally, Van Zyl, *Judicial Practice of South Africa*, pp. 198 et seq.

United States.—Execution in the United States is founded upon English law, which it closely resembles. Substantially the same forms of execution are in force. The provisions of the Statute of Frauds making the lien of execution attach only on delivery to the sheriff were generally adopted in America, and are still law in many of the states. The law as to the rights and duties of sheriffs is substantially the same as in England. The "homestead laws" (*q.v.*) which are in force in nearly all the American States exempt a certain amount or value of real estate occupied by a debtor as his homestead from a forced sale for the payment of his debts. This homestead legislation has been copied in some British colonies, *e.g.* Western Australia (No. 37 of 1898, Pt. viii.), Quebec (Rev. Stats., ss. 1743-1748), Manitoba (Rev. Stats., 1902, c. 58, s. 29, c. 21, s. 9), Ontario (Rev. Stats., 1897, c. 29), British Columbia (Rev. Stats., 1897, c. 93), New South Wales (Crown Lands Act 1895, Pt. iii.), New Zealand (Family Homes Protection Act 1895, No. 20 of 1895).

France.—Provisional execution (*saisie-arrêt*) with a view to obtain security has been already mentioned. Execution against personalty (*saisie-exécution*) is preceded by a *commandement* or summons, personally served upon, or left at the domicile of the debtor calling on him to pay. The necessary bedding of debtors and of their children residing with them, and the clothes worn by them, cannot be seized in execution under any circumstances. Objects declared by law to be immovable by destination (*immeubles par destination*), such as beasts of burden and agricultural implements, books relating to the debtor's profession, to the value of 300 francs, workmen's tools, military equipments, provisions and certain cattle cannot be seized, even for a debt due to Government, unless in respect of provisions furnished to the debtor, or amounts due to the manufacturers or vendors of protected articles or to parties who advanced moneys to purchase, manufacture or repair them. Growing fruits cannot be seized except during the six weeks preceding the ordinary period when they become ripe. Execution against immovable property (*la saisie immobilière*) is preceded also by a summons to pay, and execution cannot issue until the expiry of 30 days after service of such summons (see further Code Proc. Civ., Arts. 673-689). Imprisonment for debt was abolished in all civil and commercial matters by the law of 22nd of July 1867, which extends to foreigners. It still subsists in favour of the State for non-payment of fines, &c. The French system is in substance in force in Belgium (Code Civ. Proc., Arts. 51 et seq.), the Netherlands (Code Civ. Proc., Arts. 430 et seq.), Italy (Code Civ. Proc., Arts. 553 et seq., 659 et seq.), and Spain.

Germany.—Under the German Code of Civil Prodecure (Arts. 796 et seq.), both the goods and (if the goods do not offer adequate security) the person of the debtor may be seized (the process is called *arrest*) as a guarantee of payment. The debtor's goods cannot be sold except in pursuance of a judgment notified to the debtor either before or within a prescribed period after the execution (Art. 809 [3], and law of 30th of April 1886). Imprisonment for debt in civil and commercial matters has been abolished or limited on the lines of the French law of 1867 in many countries (*e.g.* Italy, law of the 6th of December 1877; Belgium, law of the 27th of July 1871; Greece, law of the 9th of March 1900; Russia, decree of the 7th of March 1879).

Authorities.—Anderson, *Execution* (London, 1889); *Annual Practice* (London, 1908); Johnston Edwards, *Execution* (London, 1888); Mather, *Sheriff Law* (London, 1903). As to Scots law, Mackay, *Manual of Practice* (Edinburgh, 1893). As to American law, Bingham, *Judgments and Executions* (Philadelphia, 1836); A. C. Freeman, *Law of Execution, Civil Cases* (3rd ed., San Francisco, 1900); H. M. Herman, *Law of Executions* (New York, 1875); American Notes to *tit.* "Execution," in *Ruling Cases* (London and Boston, 1897); Bouvier, *Law Dict.*, ed. Rawle (1897), *s.v.* "Execution."

EXECUTORS AND ADMINISTRATORS, in English law, those persons upon whom the property of a deceased person both real and personal devolves according as he has or has not left a will. Executors differ from administrators both in the mode of their creation and in the date at which their estate vests. An executor can only be appointed by the will of his testator; such appointment may be express or implied, and in the latter case he is said to be an executor "according to the tenor." The estate of an executor vests in him from the date of the testator's death. An administrator on the other hand is appointed by the probate division of the High Court, and his estate does not vest till such appointment, the title to the property being vested till then in the judge of the probate division. As to whom the court will appoint administrators and the various kinds of administrators see under Administration. Apart from these two points the rights and liabilities of executors and administrators are the same, and they may be indifferently referred to as the representative of the deceased. As to their appointment before the establishment of the court of probate see articles Will and Intestacy. Before the Land Transfer Act 1897, the real estate of the deceased did not devolve upon the representative but vested directly in the devisee or heir-at-law, but by that act it was provided that the personal representative should be also the real representative, and therefore it may now be said broadly that the representative takes the whole estate of the deceased. There are, however, a few minor exceptions to this rule, of which the most important are lands held in joint tenancy and copyhold lands. As the representative stands in the shoes of the deceased he is entitled to sue upon any contract or for any debt which the deceased might have sued in his lifetime.

The duties of a representative are as follows: 1. To bury the deceased in a manner suitable to the estate he leaves behind him; and the expenses of such funeral take precedence of any duty or debt whatever; but extravagant expenses will not be allowed. No rule can be laid down as to what is a reasonable allowance for this purpose, as it is impossible to know at the time of the funeral what the estate of the deceased may amount to. The broad rule is that the representative must allow such sum as seems reasonable, having regard to all the circumstances of the case and the conditions in life of the deceased, remembering that if he should exceed this he will be personally liable for such excess in the event of the estate proving insolvent.

2. He must obtain probate or letters of administration to the deceased within six months of the death, or, if such grant be disputed, within two months of the determination of such suit. The penalty for not doing so is fixed by the Stamp Act 1815, § 37, at £100, and an additional stamp duty at the rate of 10%. As to the formalities of Probate see that article.

3. Strictly speaking, he must compile an inventory of all the estate of the deceased, whether in possession or outstanding, and he is to deliver it to the court on oath. He is to collect all the goods so inventoried and to commence actions to get in all those outstanding, and he is responsible to creditors for the whole of such estate, whether in possession or in action. This duty is thrown upon the representative by an act of 1529, but it is not the modern practice to exhibit such inventory unless he be cited for it in the spiritual court at the instance of a party interested. It is, however, necessary to file an affidavit setting out the value of the estate of the deceased upon applying for a grant of probate or letters of administration.

4. The representative must pay the debts of the deceased according to their priority. Next to the legitimate funeral expenses come the costs of proving and administering the estate; in the event, however, of the funeral and testamentary expenses being charged by the will upon any particular fund, they will be primarily payable out of that fund. The representative must be careful to pay the debts according to the rules of priority, otherwise he will become personally liable to the creditors of one degree if he has exhausted the estate in paying creditors of a lesser degree. First of all, a solicitor has a lien for his costs upon any fund or duty which he has recovered for the deceased; next in order come debts due to the crown by record or speciality; then debts given a priority by statute, as, for example, by the Poor Relief Act 1743, money due by an overseer of the poor to his parish. Next, debts of record, *i.e.*

judgment recovered against the deceased in any court of record; all such debts are equal among themselves, but a judgment creditor who has sued out execution is preferred to one who has not; another class of debts of record are statutes merchant and staple, or recognizances in the nature of statute staple, *i.e.* bonds of record acknowledged before the lord mayor of London or the mayor of the staple. Last in the order of debts come specialty and simple contract debts, which by Hinde Palmer's Act (the Executors Act 1869) are of equal degree, though as between specialty debts bonds given for value rank before voluntary bonds unless assigned for value, and as between simple contract debts those due to the crown have priority. Though the creditors can if necessary take all the estate of the deceased to satisfy their claims, yet as between the various classes of assets the representative must pay the debts out of assets in the following order: (i.) General personal estate not specifically bequeathed nor exempted from payment of debts; (ii.) real estate appropriated to debts; (iii.) real estate descended; (iv.) real estate devised charged with payment of debts; (v.) general pecuniary legacies *pro rata*; (vi.) specific legacies and devises; (vii.) real estate over which a general power of appointment has been exercised by will; (viii.) the widow's paraphernalia.

5. The debts of the deceased being satisfied, the representative must next proceed to satisfy the legacies and devises left by the testator. In order to enable him to do this with safety to himself, it is provided that he cannot be compelled to divide the estate among the legatees or next of kin until twelve months from the death of the deceased (this is commonly known as "the executor's year"), though if there is no doubt as to the solvency of the estate he may do so at once. As a further protection the representative may give notice by advertisement for creditors to send in their claims against the estate, and on expiration of the notices he may proceed to divide the estate, though even then the creditor may follow the assets to the person who has received them and recover for his debt. As between legatees the following priorities must be observed: (1) Specific legatees and devisees, (2) demonstrative legatees, and (3) general legatees; and as to this last class the testator can give priority to one over another. If there are not sufficient assets to pay the general legatees they must abate rateably. Legacies were not payable out of the real estate prior to the Land Transfer Act 1897, unless the testator charged the realty with them. Even then unless the testator exonerates his personalty from payment of the legacies the personalty will be the first fund chargeable. It has been suggested that the effect of the act is to make the realty chargeable *pro rata* with the personalty, but this is doubtful.

6. The residue, after all legacies and devises are satisfied, must, if there be a will, be paid to the residuary legatee therein named, and if there be no will the real estate will go to the heir (see Inheritance) and the personalty to the next of kin (see Intestacy). It was held at one time that in default of a residuary legatee the residue fell to the executor himself, but now nothing less than the expressed intention of the testator can give it to him.

The liabilities of the representative may be shortly stated. He is liable in his representative capacity in all cases where the deceased would be liable were he alive. To this general rule there are some exceptions. The representative cannot be sued for breach of a contract for personal services which can be performed only in the lifetime of the person contracting, nor again can he be sued in a case where unliquidated damages only could have been recovered against the deceased. He is liable in his personal capacity in the following cases: if he contracts to pay a debt due by the deceased, or if having admitted that he had assets in his hands sufficient to pay a debt or legacy he has misapplied such assets so that he cannot satisfy them; or lastly, if by mismanaging the estate and effects of the deceased he has made himself liable for a *devastavit*. Shortly stated, a representative is bound to exercise the ordinary care of a business man in administering the estate of the deceased, and he will be liable for the loss to the estate caused by his own negligence, or by the negligence of a co-representative which his act or neglect has rendered possible. Though the general rule of *delegatus non potest delegari* holds good of a representative, yet in certain cases he may "rely upon skilled persons in matters in which he cannot be expected to be experienced," *e.g.* he must employ solicitors to conduct a lawsuit.

The privileges of the representative are these: he may prefer one creditor to another of equal degree; he may retain a debt owing to him from the deceased as against other creditors of equal degree (see Retainer); he may reimburse himself out of the estate all expenses incurred in the execution of his trust.

An executor *de son tort* is one who, without any title to do so, wrongfully intermeddles with the assets of the deceased, dealing with them in such a way as to hold himself out as executor. In such a case he is subject to all the liabilities of an executor, and can claim none of the privileges. He may be treated by the creditor as the executor, and, if he is really assuming to act as executor, creditors and legatees will get a good title from him, but he is liable to be sued by the rightful representative for damages for interfering with the property of the deceased.

Scotland.—Executor in Scots law is a more extensive term than in English. He is either nominative or dative, the latter appointed by the court and corresponding in most respects to the English administrator. Caution is required from the latter, not from the former. By the common law doctrine of passive representation the heir or executor was liable to be sued for implement of the deceased's obligations. The Roman principle of *beneficium inventarii* was first introduced by an act of 1695. As the law at present stands, the heir or executor is liable only to the value of the succession, except where there has been vitious intromission in movables, and in *gestio pro haerede* (behaviour as heir) and other cases in heritables. The present inventory duty on succession to movables and heritables depends on the Finance Acts 1894–1909 (see Estate Duty). In England the executor is bound to pay the debts of the deceased in a certain order, but in Scotland they all rank *pari passu* except privileged debts (see Privilege).

Authorities.—R. L. Vaughan Williams, *The Law of Executors and Administrators*; W. G. Walker, *Compendium on the Law of Executors and Administrators*; James Schouler, *Law of Executors and Administrators* (3rd ed., Boston, 1901).

EXEDRA, or Exhedra (from Gr. ἐξ, out, and ἕδρα, a seat), an architectural term originally applied to a seat or recess out of doors, intended for conversation. Such recesses were generally semicircular, as in the important example built by Herodes Atticus at Olympia. In the great Roman thermae (baths) they were of large size, and like apses were covered with a hemispherical vault. An example of these exists at Pompeii in the Street of the Tombs. From Vitruvius we learn that they were often covered over, and they are described by him (v. 11) as places leading out of porticoes, where philosophers and rhetoricians could debate or harangue.

EXELMANS, RENÉ JOSEPH ISIDORE, Count (1775–1852), marshal of France, was born at Bar-le-Duc on the 13th of November 1775. He volunteered into the 3rd battalion of the Meuse in 1791, became a lieutenant in 1797, and in 1798 was aide-de-camp to General Éblé, and in the following year to General Broussier. In his first campaign in Italy he greatly distinguished himself; and in April 1799 he was rewarded for his services by the grade of captain of dragoons. In the same year he took part with honour in the conquest of Naples and was again promoted, and in 1801 he became aide-de-camp to General Murat. He accompanied Murat in the Austrian, Prussian and Polish campaigns of 1805, 1806 and 1807. At the passage of the Danube, and in the action of Wertingen, he specially distinguished himself; he was made colonel for the valour which he displayed at Austerlitz, and general of brigade for his conduct at Eylau in 1807. In 1808 he accompanied Murat to Spain, but was there made prisoner and conveyed to England. On regaining his liberty in 1811 he went to Naples, where King Joachim Murat appointed him grand-master of horse. Exelmans, however, rejoined the French army on the eve of the Russian campaign, and on the field of Borodino won the rank of general of division. In the retreat from Moscow his steadfast courage was conspicuously manifested on several occasions. In 1813 he was made, for services in the campaign of Saxony and Silesia, grand-officer of the Legion of Honour, and in 1814 he reaped additional glory by his intrepidity and skill in the campaign of France. When the Bourbons were restored, Exelmans retained his position in the army. In January 1815 he was tried on an accusation of having treasonable relations with Murat, but was acquitted. Napoleon on his return from Elba made Exelmans a peer of France and placed him in command of the II. cavalry corps, which he commanded in the Waterloo campaign, the battle of Ligny and Grouchy's march on Wavre. In the closing operations round Paris Exelmans won great distinction. After the second Restoration he denounced, in the House of Peers, the execution of Marshal Ney as an "abominable assassination"; thereafter he lived in exile in Belgium and Nassau for some years, till 1819, when he was recalled to France. In 1828 he was appointed inspector-general of cavalry; and after the July revolution of 1830 he received from Louis Philippe the grand cross of the Legion of Honour, and was reinstated as a peer of France. At the revolution of 1848 Exelmans was one of the adherents of Louis Napoleon; and in 1851 he was, in recognition of his long and brilliant military career, raised to the dignity of a marshal of France. His death, which took place on the 10th of July 1852, was the result of a fall from his horse.

EXEQUATUR, the letter patent, issued by a foreign office and signed by a sovereign, which guarantees to a foreign consul the rights and privileges of his office, and ensures his recognition in the state in which he is appointed to exercise them. If a consul is not appointed by commission he receives no exequatur; and a notice in the *Gazette* in this case has to suffice. The exequatur may be withdrawn, but in practice, where a consul is obnoxious, an opportunity is afforded to his government to recall him.

EXETER, EARL, MARQUESS AND DUKE OF. These English titles have been borne at different times by members of the families of Holand or Holland, Beaufort, Courtenay and Cecil. The earls of Devon of the family of de Redvers were sometimes called earls of Exeter; but the 1st duke of Exeter was JOHN (*c.* 1355–1400), a younger son of Thomas Holand, earl of Kent (d. 1360). John's mother, Joan (d. 1385), a descendant of Edward I., married for her third husband Edward the Black Prince, by whom she was the mother of Richard II., and her son John was thus the king's half-brother, a relationship to which he owed his high station at the English court. He married Elizabeth (d. 1426), a daughter of John of Gaunt, duke of Lancaster, and was constantly in Richard's train until 1385, when his murder of Ralph Stafford disturbed these friendly relations. John then went to Spain as constable of the English army under John of Gaunt; but after his return to England in 1387 he was created earl of Huntingdon, was made admiral of the fleet and chamberlain of England, and was again high in the king's favour. He was Richard's chief helper in the proceedings against the lords appellant in 1397, was created duke of Exeter in September of this year, and went with the king to Ireland in 1399. After the accession of his brother-in-law, Henry IV., Holand was tried for his share in the events of 1397, and was reduced to his earlier rank of earl of Huntingdon. He was soon plotting against Henry's life, and after the projected rising in 1400 had failed he was captured and was probably beheaded at Pleshey in Essex on the 16th of January 1400.[1] He was afterwards attainted and his titles and lands were forfeited.

In 1416 THOMAS BEAUFORT, earl of Dorset, was created duke of Exeter; but this dignity was only granted for his life, and consequently it expired on his death in 1426.

In 1416 JOHN (1395–1447), son of John Holand, the former duke of Exeter, was allowed to take his father's earldom of Huntingdon. This nobleman rendered great assistance to Henry V. in his conquest of France, fighting both on sea and on land. He was marshal of England, admiral of England and governor of Aquitaine under Henry VI.; was one of the king's representatives at the conference of Arras in 1435; and in 1443 was created duke of Exeter. When he died on the 5th of August 1447 his titles passed to his son HENRY (1430–1473), who, although married to Anne (d. 1476), daughter of Richard, duke of York, fought for Henry VI. during the Wars of the Roses. After having been imprisoned by York at Pontefract, he was present at the battle of Towton, sailed with Henry's queen, Margaret of Anjou, to Flanders in 1463, and was wounded at Barnet in 1471. In 1461 he had been attainted and his dukedom declared forfeited, and he died without sons, probably in 1473.

Coming to the family of Courtenay the title of marquess of Exeter was borne by HENRY COURTENAY (*c.* 1496–1538), earl of Devon, who was made a marquess in 1525. A grandson of Edward IV., Courtenay was a prominent figure at the court of Henry VIII. until Thomas Cromwell rose to power, when his high birth, his great wealth and his independent position made him an object of suspicion. Some slight discontent in the west of England gave the occasion for his arrest, and he was tried and beheaded on the 9th of December 1538. A few days later he was declared a traitor and his titles were forfeited; although his only son, EDWARD (*c.* 1526–1556), who was restored to the earldom of Devon in 1553 and was a suitor for the hand of Queen Mary, is sometimes called marquess of Exeter.

The title of earl of Exeter was first bestowed upon the Cecils (see CECIL: *Family*) in 1605 when THOMAS, 2nd Lord Burghley (1542–1623), the eldest son of William Cecil, Lord Burghley, was made earl of Exeter by James I. Thomas had been a member of parliament during the reign of Queen Elizabeth, who knighted him in 1575, and had fought under the earl of Leicester in the Netherlands. After his father's death in 1598 he became president of the Council of the North and was made a knight of the Garter. He died on the 7th or 8th of February 1623. His direct descendants continued to bear the title of earl of Exeter, and in 1801 HENRY (1754–1804), the 10th earl, was advanced to the dignity of marquess of Exeter, the present marquess being his lineal descendant. It may be noted that the 1st marquess is Tennyson's "lord of Burghley."

See G. E. C(okayne), *Complete Peerage* (1887–1898).

EXETER, a city and county of a city, municipal, county and parliamentary borough, and the county town of Devonshire, England, 172 m. W.S.W. of London, on the London & South Western and the Great Western railways. Pop. (1901) 47,185. The ancient city occupies a broad ridge of land, which rises steeply from the left bank of the Exe. At the head of the ridge is the castle, on the site of a great British earthwork. The High Street and its continuation, called Fore Street, are narrow, but very picturesque, with many houses of the 16th and 17th centuries. There is a maze of lesser streets within the ancient walls, the line of which may be traced. All the gates have disappeared. The suburbs, which have greatly extended since the beginning of the 19th century, contain many good streets, terraces and detached villas. The surrounding country is rich, fertile and of great beauty. Extensive views are commanded in the direction of Haldon, a stretch of high moorland which may be regarded as an outlier of Dartmoor. The lofty mound of the castle is laid out as a promenade, with fine trees and broad walks.

The cathedral, although not one of the largest in England, is unsurpassed in the beauty of its architecture and the richness of its details. With the exception of the Norman transeptal towers, the general character is Decorated, ranging from about 1280 to 1369. Transeptal towers occur elsewhere in England only in the collegiate church of Ottery St Mary, in Devonshire, for which Exeter cathedral served as a model. The west front is of later date than the rest (probably 1369–1394), and the porch is wholly covered with statues. Within, the most noteworthy features are the long unbroken roof, extending throughout nave and choir, with no central tower or lantern; the beautiful sculpture of bosses and corbels; the minstrel's gallery, projecting from the north triforium of the nave; and the remarkable manner in which the several parts of the church are made to correspond. The window tracery is much varied; but each window answers to that on the opposite side of nave or choir; pier answers to pier, aisle to aisle, and chapel to chapel, while the transeptal towers complete the balance of parts. A complete restoration under Sir G. G. Scott was carried out between 1870 and 1877. The modern stall work, the reredos, the choir pavement of tiles, rich marbles and porphyries, the stained glass and the sculptured pulpits in choir and nave are meritorious. The episcopal throne, a sheaf of tabernacle work in wood, was erected by Bishop Stapeldon about 1320, and in the north transept is an ancient clock. The most interesting monuments are those of bishops of the 12th and 13th centuries, in the choir and lady chapel. Some important MSS., including the famous book of Saxon poetry given by Leofric to his cathedral, are preserved in the chapter-house. The united sees of Devonshire and Cornwall were fixed at Exeter from the installation there of Leofric (1050) by the Confessor, until the re-erection of the Cornish see in 1876. The bishop's palace embodies Early English portions. The diocese covers the greater part of Devonshire, with a very small part of Dorsetshire.

The guildhall in the High Street is a picturesque Elizabethan building, which contains some interesting portraits; among them being one of General Monk, who was a native of Devon, and another of Henrietta, duchess of Orleans, given by her brother Charles II. Both are by Sir Peter Lely. The assize hall and sessions house dates from 1774. The Albert Memorial Museum contains a school of art, an excellent free library, a reading-room, and a museum of natural history and antiquities. There is a good collection of local birds, and some remarkable pottery and bronze relics extracted from barrows near Honiton or found in various parts of Devonshire. Of the castle, called Rougemont, the chief architectural remnant is a portion of a gateway tower which may be late Norman. Traces are also seen of the surrounding earthworks, which may have belonged to the original British stronghold. Beneath the castle wall is the pleasant promenade of Northernhay. The churches of Exeter are of little importance, being mostly small, and closely beset with buildings, but the modern church of St Michael (1860) deserves notice. The Devon and Exeter Institution, founded in 1813, contains a large and valuable library, and among educational establishments may be noticed the technical and university extension college, the diocesan training college and school; and the grammar school, which was founded under a scheme of Walter de Stapeldon, bishop of Exeter and founder of Exeter College, Oxford, in 1332, and refounded in 1629, but occupies modern buildings (1886) outside the city. It is endowed with a large number of leaving exhibitions, and about 150 boys are educated. There are two market-houses in the city, many hospitals and many charitable institutions, including the picturesque hospital or almshouse of William Wynard, recorder of Exeter (1439).

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[1] There is some difference of opinion about the place and manner of the earl's death, and this question has an important bearing upon the privilege of trial by peers of the realm. See L. W. Vernon-Harcourt, *His Grace the Steward and Trial of Peers* (1907).

Exeter is one of the principal railway centres in the south-west, and it also has some shipping trade, communicating with the sea by way of the Exeter ship-canal, originally cut in the reign of Elizabeth (1564), and enlarged in 1675 and 1827. This canal is an interesting work, being the first canal carried out in the United Kingdom for the purpose of enabling sea-going vessels to pass to an inland port. The river Exe was very early utilized by small craft trading to Exeter, parliament having granted powers for the improvement of the navigation by the construction of a canal 3 m. long from Exeter to the river; at a later date this canal was extended lower down to the tidal estuary of the Exe. Previous to the year 1820 it was only available for vessels of a draft not exceeding 9 ft., but by deepening it, raising the banks, and constructing new locks, vessels drawing 14 ft. of water were enabled to pass up to a basin and wharves at Exeter. These works were carried out under the advice of Thomas Telford. A floating basin is accessible to vessels of 350 tons. Larger vessels lie at Topsham, at the junction of the canal with the estuary of the Exe; while at the mouth of the estuary is the port of Exmouth. Imports are miscellaneous, while paper, grain, cider and other goods are exported. Brewing, paper-making and iron-founding are carried on, and the city is an important centre of agricultural trade. The parliamentary borough returns one member. The city is governed by a mayor, 14 aldermen and 42 councillors. Area, 3158 acres. The eastern suburb of Heavitree, where is the Exeter city asylum, is an urban district with a population (1901) of 7529.

Exeter was the Romano-British country town of *Isca Damnoniorum*—the most westerly town in the south-west of Roman Britain. Mosaic pavements, potsherds, coins and other relics have been found, and probably traces of the Roman walls survive here and there in the medieval walls. It is said to be the *Caer Isce* of the Britons, and its importance as a British stronghold is shown by the great earthwork which the Britons threw up to defend it, on the site of which the castle was afterwards built, and by the number of roads which branch from it. Exeter is famous for the number of sieges which it sustained as the chief town in the south-west of England. In 1001 it was unsuccessfully besieged by the Danes, but in the following year was given by King Æthelred to Queen Emma, who appointed as reeve, Hugh, a Frenchman, owing to whose treachery it was taken and destroyed by Sweyn in 1003. By 1050, however, it had recovered, and was chosen by Leofric as the new seat of the bishops of Devon. In 1068, after a siege of eighteen days, Exeter surrendered to the Conqueror, who threw up a castle which was called Rougemont, from the colour of the rock on which it stood. Again in 1137 the town was held for Matilda by Baldwin de Redvers for three months and surrendered, at last, owing to lack of water. Three times subsequently Exeter held out successfully for the king—in 1467 against the Yorkists, in 1497 against Perkin Warbeck, and in 1549 against the men of Cornwall and Devon, who rose in defence of the old religion. During the civil wars the city declared for parliament, but was in 1643 taken by the royalists, who held it until 1646. The only other historical event of importance is the entry of William, prince of Orange, in 1688, shortly after his arrival in England. Exeter was evidently a borough by prescription some time before the Conquest, since the burgesses are mentioned in the Domesday Survey. Its first charter granted by Henry I. gave the burgesses all the free customs which the citizens of London enjoyed, and was confirmed and enlarged by most of the succeeding kings. By 1227 government by a reeve had given place to that by a mayor and four bailiffs, which continued until the Municipal Reform Act of 1835. Numerous trade gilds were incorporated in Exeter, one of the first being the tailors' gild, incorporated in 1466. This by 1482 had become so powerful that it interfered with the government of the town, and was dissolved on the petition of the burgesses. Another powerful gild was that of the merchant adventurers, incorporated in 1559, which is said to have dictated laws to which the mayor and bailiffs submitted. From 1295 to 1885 Exeter was represented in parliament by two members, but in the latter year the number of representatives was reduced to one. Exeter was formerly noted for the manufacture of woollen goods, introduced in Elizabeth's reign, and the value of its exports at one time exceeded half a million sterling yearly. The trade declined partly owing to the stringent laws of the trade gilds, and by the beginning of the 19th century had entirely disappeared, although at the time of its greatest prosperity it had been surpassed in value and importance only by that of Leeds.

See *Victoria County History, Devon*; Richard Izacke, *Antiquities of the City of Exeter* (1677); George Oliver, *The History of the City of Exeter* (1861); and E. A. Freeman, *Exeter* ("Historic Towns" series) (London, 1887), in the preface to which the names of earlier historians of the city are given.

EXETER, a town and one of the county-seats of Rockingham county, New Hampshire, U.S.A., on the Squamscott river, about 12 m. S.W. of Portsmouth and about 51 m. N. by E. of Boston, Mass. Pop. (1890) 4284; (1900) 4922 (1066 foreign-born); (1910) 4897; area, about 17 sq. m. It is served by the Western Division of the Boston & Maine railway. The town has a public library and some old houses built in the colonial period, and is the seat of Phillips Exeter Academy (incorporated in 1781 and opened in 1783). In its charter this institution is described as "an academy for the purpose of promoting piety and virtue, and for the education of youth in the English, Latin and Greek languages, in writing, arithmetic, music and the art of speaking, practical geometry, logic and geography, and such other of the liberal arts and sciences or languages, as opportunity may hereafter permit." It was founded by Dr John Phillips (1719–1795), a graduate of Harvard College, who acquired considerable wealth as a merchant at Exeter and gave nearly all of it to the cause of education. The academy is one of the foremost secondary schools in the country, and among its *alumni* have been Daniel Webster, Edward Everett, Lewis Cass (born in Exeter in a house still standing), John Parker Hale, George Bancroft, Jared Sparks, John Gorham Palfrey, Richard Hildreth and Francis Bowen. The government of the academy is vested in a board of six trustees, regarding whom the founder provided that a majority should be laymen and not inhabitants of Exeter. In 1909–1910 the institution had 20 buildings, 32 acres of recreation grounds, 16 instructors and 488 students, representing 38 states and territories of the United States and 4 foreign countries. At Exeter also is the Robinson female seminary (1867), with 14 instructors and 272 students in 1906–1907. The river furnishes water-power, and among the manufactures of the town are shoes, machinery, cottons, brass, &c.

The town is one of the oldest in the state; it was founded in 1638 by Rev. John Wheelwright, an Antinomian leader who with a number of followers settled here after his banishment from Massachusetts. For their government the settlers adopted (1639) a plantation covenant. There was disagreement from the first, however, with regard to the measure of loyalty to the king, and in 1643, when Massachusetts had asserted her claim to this region and the other three New Hampshire towns had submitted to her jurisdiction, the majority of the inhabitants of Exeter also yielded, while the minority, including the founder, removed from the town. In 1680 the town became a part of the newly created province of New Hampshire. During the French and Indian wars it was usually protected by a garrison, and some of the garrison houses are still standing. From 1776 to 1784 the state legislature usually met at Exeter.

See C. H. Bell, *History of the Town of Exeter* (Exeter, 1888).

EXETER BOOK [*Codex Exoniensis*], an anthology of Anglo-Saxon poetry presented to Exeter cathedral by Leofric,[1] bishop of Exeter, England, from 1050 to 1071, and still in the possession of the dean and chapter. It contains some legal documents, the poems entitled *Crist*, *Guthlac*, *Phoenix*, *Juliana*, *The Wanderer* and others, and concludes with between eighty and ninety riddles. It was first described in Humphrey Wanley's *Catalogus* . . . (1705) in detail but with many inaccuracies; subsequently by J. J. Conybeare, *Account of a Saxon Manuscript* (a paper read in 1812; printed with some extracts from the MS. in *Archaeologia*, vol. xvii. pp. 180-197, 1814). A complete transcript made (1831) by Robert Chambers is in the British Museum (Addit. MS. 9067). It was first printed in 1842 by Benjamin Thorpe for the Soc. of Antiq., London, as *Codex Exoniensis . . . with an English Translation, Notes and Indexes.* More recent editions, chiefly based on Thorpe's text, are:—in Chr. Grein's *Bibliothek der A.S. Poesie* (vol. iii. part 1, ed. R. Wülker, Leipzig, 1897, with a bibliography), J. Schipper in Pfeiffer's *Germania*, vol. xix. pp. 327-339, and Israel Gollancz, *The Exeter Book*, pt. i. (1895), with English translation, for the Early English Text Society.

A detailed account, with bibliographies of the separate poems, is given by R. Wülker, in *Grundriss . . . der A.S. Literatur*, pp. 218-236 (Leipzig, 1885); see also the introduction to *The Crist of Cynewulf* . . ., edited by Prof. A. S. Cook, with introduction, notes and a glossary (Boston, U.S.A., 1900). For the poems contained in the MS. see also CYNEWULF and RIDDLES.

EXHIBITION, a term, meaning in general a public display,[2] which has a special modern sense as applied to public shows of goods for the promotion of trade (Fr. *exposition*). The first exhibition in this sense of which there is any account, in either sacred or profane history, was that held by King Ahasuerus, who, according to the Book of Esther, showed in the third year of his reign "the riches of his glorious kingdom, and the honour of his excellent majesty, many days, even a hundred and four-score days." The locale of this function was Shushan, the palace and the exhibits consisted of "white, green and blue hangings, fastened with cords of fine linen and purple to silver rings and pillars of marble: the beds were of gold and silver, upon a pavement of red, and blue, and white and black marble. And they gave them drink in vessels of gold, the vessels being diverse one from another." The first exhibition since the Christian era was at Venice during the dogeship of Lorenzo Tiepolo, in 1268. On that occasion there was a grand display, consisting of a water fête, a procession of the trades and an industrial exhibition. The various gilds of the Queen City of the Seas marched through the narrow streets to the great square of St Mark, and their leaders asked the dogaressa to inspect the products of their industry. Other medieval exhibitions were the fairs held at Leipzig and Nizhni Novgorod in Europe, at Tanta in Egypt, and in 1689 that by the Dutch at Leiden.

The first modern exhibition was held at London in 1756 by the Society of Arts, which offered prizes for improvements in the manufacture of tapestry, carpets and porcelain, the exhibits being placed side by side. Five years afterwards, in 1761, the same society gave an exhibition of agricultural machinery. In 1797 a collective display of the art factories of France, including those of Sèvres, the Gobelins and the Savonnerie, was made in the palace of St Cloud, and the exhibition was repeated during the following year in the rue de Varennes, Paris. This experiment was so successful that in the last three days of the same year an exhibition under official auspices, at which private exhibitors were allowed to compete, was held in the Champ de Mars. Four years later, in 1801, there was a second official exhibition in the grand court of the Louvre. Upon that occasion juries of practical men examined the objects shown, and the winners of a gold medal were invited to dine with Napoleon, who was at that time First Consul. In the report of the jury the following remarkable sentence appeared:—"There is not an artist or inventor who, once obtaining thus a public recognition of his ability, has not found his reputation and his business largely increased." The third Paris Exhibition, held in 1802, was the first to publish an official catalogue. There were 540 exhibitors, including J. E. Montgolfier, the first aëronaut, and J. M. Jacquard, the inventor of the loom which bears his name. The fourth exhibition was held in 1806 in the esplanade in front of the Hôtel des Invalides, and attracted 1422 exhibitors. There were no more exhibitions till after the fall of the empire, but in 1819 the fifth was held during the reign of Louis XVIII., with 1622 exhibitors. Others were held at Paris at various intervals, that in 1849 having 4500 exhibitors.

Other exhibitions, though on a smaller scale, were held in Dublin, London, and in various parts of Germany and Austria during the first half of the 19th century—that in 1844, held at Berlin, having 3040 exhibitors. Switzerland, Holland, Belgium, Sweden, Russia, Poland, Italy, Spain and Portugal all held exhibitions, and there was a Free Trade Bazaar of British Manufactures at Covent Garden theatre in 1845, which at the time created a great deal of interest. But all these exhibitions were confined to the products of the country in which they took place, and the first great International Exhibition was held in London in 1851 by the Society of Arts, under the presidency of the prince consort. All nations were invited to compete; a site was obtained in Hyde Park, and a building 20 acres in extent was erected, after the design of Sir Joseph Paxton, at a cost of £193,168. The exhibition was open for five months and fifteen days. The receipts amounted to £506,100, and the surplus was £186,000. The number of visitors was 6,039,195, and the money taken at the doors was £423,792. The total number of exhibitors was 13,937, of which Great Britain contributed 6861, the British colonies 520 and foreign countries 6556. The International Exhibition of 1851 was followed by those of New York and Dublin in 1853, Melbourne and Munich in 1854, and Paris in 1855—this latter was held in the Palais d' Industrie, which remained in existence until pulled down to make room for the two Palais des Beaux Arts, which formed one of the attractions of the 1900 exhibition. The exhibitors numbered 20,839 and the visitors 5,162,330. There were national exhibitions during the following years in several European countries, but the next great world's fair was held at London in 1862. The total space roofed in amounted to 988,000 sq. ft., 22·65 acres, the number of visitors was 6,211,103, and the amount received at the doors £408,530. The death of the prince consort had a depressing effect upon the enterprise. In 1865 an exhibition was held at Dublin, the greater proportion of the funds being supplied by Sir Benjamin Lee Guinness. The number of attendances during six months was 900,000, and the exhibition was opened at night. An Italian exhibition was held at Rome in 1862.

The Paris Exhibition of 1867 was upon a far larger scale than that of 1855. It was held, like those that preceded and succeeded it, at the Champ de Mars, and covered 41 acres. The building resembled an exaggerated gasometer. The external ring was devoted to machinery, the internal to the gradual development of civilization, commencing with the stone age and continuing to the present era. A great feature of the exhibition was the park, which was studded with specimens of every style of modern architecture—Turkish mosques, Swedish cottages, English lighthouses, Egyptian palaces and Swiss châlets. The number of attendances was 6,805,969. The exhibitors numbered 43,217, and the total amount received for entrances, concessions, &c., was £420,735. This was the first exhibition at which there were international restaurants. The cost of the exhibition was defrayed partly by the state and partly by private subscriptions.

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[1] For Leofric, see F. E. Warren, *The Leofric Missal* (1883).

[2] An "exhibition," in the sense of a minor scholarship, or annual payment to a student from the funds of a school or college, is a modern survival from the obsolete meaning of "maintenance" or "endowment" (cf. Late Lat. *exhibitio et tegumentum*, *i.e.* food and raiment).

Small exhibitions were held in various parts of Europe between 1867 and 1870, and in the latter year a series of international exhibitions, confined to one or two special descriptions of produce or manufactures, was inaugurated in London at South Kensington. These continued till 1874, but they failed to attract any very large attendance of the public and were abandoned. A medal was given to each exhibitor, and reports on the various exhibits were published, but there was no examination of the exhibits by jurors. In 1873 there was an International Exhibition at Vienna. The main building, a rotunda, was erected in the beautiful park of the Austrian capital. There were halls for machinery and agricultural products, and hundreds of buildings, erected by different nations, were scattered amongst the woodlands of the Prater. Unfortunately, an outbreak of cholera diminished the attendance of visitors, and the receipts were only £206,477, although the visitors were said to have reached 6,740,500, and the number of exhibitors was 25,760.

None of the International Exhibitions held between 1857 and 1873 had attracted as many as 7,000,000 visitors, but the gradual extension of education amongst the masses, and the greater facilities for locomotion, brought about by the growth of the railway system in all portions of the civilized world, largely increased the attendances at subsequent World's Fairs. The Centennial Exhibition of 1876, to celebrate the one-hundredth anniversary of American Independence, was held at Fairmount Park, Philadelphia. The funds were raised partly by private subscriptions, and partly by donations from the city of Philadelphia, from Pennsylvania and some of the neighbouring states. The central government at Washington made a large loan, which was subsequently repaid. The principal buildings, five in number, occupied an area of 48½ acres, and there were several smaller structures, which in the aggregate must have filled half as much space more, the largest being that devoted to the exhibits of the various departments of the United States government, which covered 7 acres. Several novelties in exhibition management were introduced at Philadelphia. Instead of gold, silver and bronze medals, only one description, bronze, was issued, the difference between the merits of the different exhibits being shown by the reports. Season tickets were not issued, and the price of admission, the same on all occasions, was half a dollar, or about 2s. 1d. The exhibition was not open at night or on Sundays, thus following the British, and not the continental, precedent. The number of visitors was 9,892,625, of whom 8,004,214 paid for admission, the balance being exhibitors, officials and attendants. The total receipts amounted to £763,899. Upon one occasion, the Pennsylvania day, 274,919 persons—the largest number that had visited any exhibition up to that date—passed through the turnstiles. The display of machinery was the finest ever made, that of the United States occupying 480,000 sq. ft. The motive-power was obtained from a Corliss engine of 1600 horse-power. At this exhibition the United Kingdom and the British Colonies of Canada, Victoria, New South Wales, New Zealand, Cape Colony and Tasmania made a very fine display, which was only excelled by that of the United States.

The Paris Exhibition of 1878 was upon a far larger scale in every respect than any which had been previously held in any part of the world. The total area covered not less than 66 acres, the main building in the Champ de Mars occupying 54 acres. The French exhibits filled one-half the entire space, the remaining moiety being occupied by the other nations of the world. The United Kingdom, British India, Canada, Victoria, New South Wales, Queensland, South Australia, Cape Colony and some of the British crown colonies occupied nearly one-third of the space set aside for nations outside France. Germany was the only great country which was not represented, but there were a few German paintings. The display of fine arts and machinery was upon a very large and comprehensive scale, and the Avenue des Nations, a street 2400 ft. in length, was devoted to specimens of the domestic architecture of nearly every country in Europe, and of several in Asia, Africa and America. The palace of the Trocadero, on the northern bank of the Seine, was erected for the exhibition. It was a handsome structure, with towers 250 ft. in height and flanked by two galleries. The rules for admission were the same as those at Philadelphia, and every person—exhibitor, journalist or official—who had the right of entrance was compelled to forward two copies of his or her photograph, one of which was attached to the card of entry. The ordinary tickets were not sold at the doors, but were obtainable at various government offices and shops, and from numerous pedlars in all parts of the city and suburbs. The buildings were somewhat unfinished upon the opening day, political complications having prevented the French government and the French people from paying much attention to the exhibition till about six months before it was opened; but the efforts made in April were prodigious, and by June 1st, a month after the opening, the exhibition was complete, and afforded an object-lesson of the recovery of France from the calamities of 1870–1871. The decisions arrived at by the international juries were accompanied by medals of gold, silver and bronze. The expenditure by the United Kingdom was defrayed out of the consolidated revenue, each British colony defraying its own expenses. The display of the United Kingdom was under the control of a royal commission, of which the prince of Wales was president. The number of paying visitors to the exhibition was 13,000,000, and the cost of the enterprise to the French government, which supplied all the funds, was a little less than a million sterling, after allowing for the value of the permanent buildings and the Trocadero Palace, which were sold to the city of Paris. The total number of persons who visited Paris during the time the exhibition was open was 571,792, or 308,974 more than came to the French metropolis during the year 1877, and 46,021 in excess of the visitors during the previous exhibition of 1867. It was stated at the time that, in addition to the impetus given to the trade of France, the revenue of the Republic and of the city of Paris from customs and octroi duties was increased by nearly three millions sterling as compared with the previous year.

Exhibitions on a scale of considerable magnitude were held at Sydney and Melbourne in 1879 and 1880, and many continental and American manufacturers took advantage of them in order to bring the products of their industry directly under the notice of Australian consumers, who had previously purchased their supplies through the instrumentality of British merchants. The United Kingdom and India made an excellent display at both cities, but the effect of the two great Australian exhibitions was to give a decided impetus to German, American, French and Belgian trade. One of the immediate results was that lines of steamers to Melbourne and Sydney commenced to run from Marseilles and Bremen; another, that for the first time in the history of the Australian colonies, branches of French banks were opened in the two principal cities. The whole cost of these exhibitions was defrayed by the local governments.

Exhibitions were held at Turin and Brussels during 1880, and smaller ones at Newcastle, Milan, Lahore, Adelaide, Perth, Moscow, Ghent and Lille during 1881 and 1882, and at Zurich, Bordeaux and Caraccas in Venezuela during 1883. The next of any importance was held at Amsterdam in the latter year. On that occasion a new departure in exhibition management was made. The government of the Netherlands was to a certain extent responsible for the administration of the exhibition, but the funds were obtained from private sources, and a charge was made to each nation represented for the space it occupied. The United Kingdom, India, Victoria and New South Wales took part in the exhibition, but there was no official representation of the mother country. Exhibitions on somewhat similar lines were held at Nice and Calcutta in the winter of 1883 and 1884, and at Antwerp in 1895.

A series of exhibitions, under the presidency of the then prince of Wales, and managed by Sir Cunliffe Owen, was commenced at South Kensington in 1883. The first was devoted to a display of the various industries connected with fishing; the second, in 1884, to objects connected with hygiene; the third, in 1885, to inventions; and the fourth, in 1886, to the British colonies and India. These exhibitions attracted a large number of visitors and realized a substantial profit. They might have been continued indefinitely if it had not been that the buildings in which they were held had become very dilapidated, and that the ground covered by them was required for other purposes. There was no examination of the exhibits by juries, but a tolerably liberal supply of instrumental music was supplied by military and civil bands. The Crystal Palace held a successful International Exhibition in 1884, and there was an Italian Exhibition at Turin, and a Forestry Exhibition at Edinburgh, during the same year. A World's Industrial Fair was held at New Orleans in 1884–1885, and there were universal Exhibitions at Montenegro and Antwerp in 1885, at Edinburgh in 1886, Liverpool, Adelaide, Newcastle and Manchester in 1887, and at Glasgow, Barcelona and Brussels in 1888. Melbourne held an International Exhibition in 1888–1889 to celebrate the Centenary of Australia. Great Britain, Germany, France, Austria and the United States were officially represented, and an expenditure of £237,784 was incurred by the local government.

The Paris Exhibition of 1889 marked an important change in the policy which had previously characterized the management of these gatherings. The funds were contributed partly by the state, which voted 17,000,000 francs, and by the municipality of Paris, which gave 8,000,000. A guarantee fund amounting to 23,124,000 francs was raised, and on this security a sum of 18,000,000 francs was obtained and paid into the coffers of the administration. The bankers who advanced this sum recouped themselves by the issue of 1,200,000 "bons," each of 25 francs. Every bon contained 25 admissions, valued at 1 franc, and certain privileges in the shape of participation in a lottery, the grand prix being £20,000. The calculations of the promoters were tolerably accurate. The attendances reached the then unprecedented number of 32,350,297, of whom 25,398,609 paid in entrance tickets and 2,723,366 entered by season tickets. A sum of 2,307,999 francs was obtained by concessions for restaurants and "side-shows," upon which the administration relied for much of the attractiveness of the exhibition. The total expenditure was 44,000,000 francs, and there was a small surplus. The space covered in the Champ de Mars, the Trocadero, the Palais d'Industrie, the Invalides and the Quai d'Orsay was 72 acres, as compared with 66 acres in 1878 and 41 acres in 1867. Amongst the novelties was the Eiffel Tower, 1000 ft. in height, and a faithful reproduction of a street in Cairo. The system of international juries was continued, but instead of gold, silver and copper medals, diplomas of various merits were granted, each entitling the holder to a uniform medal of bronze. Some of the "side-shows," although perhaps pecuniary successes, did not add to the dignity of the exhibition. The date at which it was held, the Centenary of the French Revolution, did not commend it to several European governments. Austria, Hungary, Belgium, China, Egypt, Spain, Great Britain, Italy, Luxemburg, Holland, Peru, Portugal, Rumania and Russia took part, but not officially, while Germany, Sweden, Turkey and Montenegro were conspicuous by their absence. On the other hand, Argentina, Bolivia, Chile, the United States, Greece, Guatemala, Morocco, Mexico, Nicaragua, Norway, Paraguay, Salvador, the South African Republic, Switzerland, Uruguay and Venezuela sent commissioners, who were accredited to the government of the French Republic. The total number of exhibitors was 61,722, of which France contributed 33,937, and the rest of the world 27,785. The British and colonial section was under the management of the Society of Arts, which obtained a guarantee fund of £16,800, and, in order to recoup itself for its expenditure, made a charge to exhibitors of 5s. per sq. ft. for the space occupied. There were altogether 1149 British exhibitors, of whom 429 were in the Fine Arts section. One of the features of the exhibition was the number of congresses and conferences held in connexion with it.

During the year 1890 there was a Mining Exhibition at the Crystal Palace, and a Military Exhibition in the grounds of Chelsea Hospital; in 1891 a Naval Exhibition at Chelsea and an International at Jamaica. In 1891–1892 there were exhibitions at Palermo and at Launceston in Tasmania; in 1892, a Naval Exhibition at Liverpool, and one of Electrical Appliances at the Crystal Palace. A series of small national exhibitions under private management was held at Earl's Court between 1887 and 1891. The first of the series was that of the United States—Italy followed in 1888, Spain in 1889, France in 1890 and Germany in 1891.

The next exhibition of the first order of magnitude was at Chicago in 1893, and was held in celebration of the 400th anniversary of the discovery of America by Columbus. The financial arrangements were undertaken by a company, with a capital of £2,000,000. The central government at Washington allotted £20,000 for the purposes of foreign exhibits, and £300,000 for the erection and administration of a building for exhibits from the various government departments. The exhibition was held at Jackson Park, a place for public recreation, 580 acres in extent, situated on the shore of Lake Michigan, on the southern side of the city, with which it was connected by railways and tramways. Special provision was made for locomotion in the grounds themselves by a continuous travelling platform and an elevated electric railway. The proximity of the lake, and of some artificial canals which had been constructed, rendered possible the service of electric and steam launches. The exhibition remained open from the 1st of May to the 30th of October, and was visited by 21,477,212 persons, each of whom paid half a dollar (about 2s. 1d.) for admission. The largest number of visitors on any one day was 716,881. In addition to its direct vote of £320,000, Congress granted £500,000 to the exhibition in a special coinage, which sold at an enhanced price. The receipts from admissions were £2,120,000; from concessions, £750,000; and the miscellaneous receipts, £159,000: total, £3,029,000. The total expenses were £5,222,000. Of the sums raised by the Company, £400,000 was returned to the subscribers. Speaking roughly, it may be said that the total outlay on the Chicago Exhibition was six millions sterling, of which three millions were earned by the Fair, two millions subscribed by Chicago and a million provided by the United States government. The sums expended by the participating foreign governments were estimated at £1,440,000. The total area occupied by buildings at Chicago was as nearly as possible 200 acres, the largest building, that devoted to manufactures, being 1687 ft. by 787, and 30·5 acres. The funds for the British commission, which was under the control of the Society of Arts, were provided by the imperial government, which granted £60,000. The number of British exhibitors was 2236, of whom 597 were Industrial, 501 Fine Arts and 1138 Women's work. In this total were included 18 Indian exhibitors. The space occupied by Great Britain was 306,285 sq. ft.; and, in addition, separate buildings were erected in the grounds. These were Victoria House, the headquarters of the British commission; the Indian Pavilion, erected by the Indian Tea Association; the Kiosk of the White Star Steamship Company; and the structure set up by the Maxim-Nordenfelt Company. Canada and New South Wales had separate buildings, which covered 100,140 and 50,951 sq. ft. respectively; and Cape Colony occupied 5250, Ceylon 27,574, British Guiana 3367, Jamaica 4250, Trinidad 3400 and India 3584 sq. ft. in the several buildings. The total space occupied by the British Colonies was therefore 193,660 sq. ft. The system of awards was considered extremely unsatisfactory. Instead of international juries, a single judge was appointed for each class, and the recompenses were all of one grade, a bronze medal and a diploma, on which was stated the reasons which induced the judge to make his decision. Some judges took a high standard, and refused to make awards except to a small proportion of selected exhibits; others took a low one, and gave awards indiscriminately. About 1183 awards were made to British exhibitors. The French refused to accept any awards. The value of the British goods exhibited was estimated, exclusive of Fine Arts, at £430,000, and the expenses of showing them at £200,000. A large expenditure was incurred in the erection of buildings, which were more remarkable for their beauty and grandeur than for their suitableness to the purposes for which they were intended. Considerable areas were devoted to "side-shows," and the Midway Plaisance, as it was termed, resembled a gigantic fair. Every country in the world contributed something. There were sights and shows of every sort from everywhere. The foreign countries represented were Argentina, Austria, Belgium, Bolivia, Brazil, Bulgaria, Chile, Colombia, Costa Rica, Cuba, Curaçoa, Denmark, Danish West Indies, Ecuador, France, Germany, Greece, Guatemala, Honduras, Hayti, Japan, Johore, Korea, Liberia, Mexico, Monaco, Netherlands, Norway, Orange Free State, Paraguay, Persia, Portugal, Russia, Siam, Spain, Sweden, Turkey, United Kingdom and Colonies, Uruguay and Venezuela.

Exhibitions were held at Antwerp, Madrid and Bucharest in 1894; Hobart in 1894–1895; Bordeaux, 1895; Nizhni Novgorod, Berlin and Buda-Pest in 1896; Brussels and Brisbane in 1897. A series of exhibitions, under the management of the London Exhibitions Company, commenced at Earl's Court in 1895 and continued in successive years.

The Paris Exhibition of 1900 was larger than any which had been previously held in Europe. The buildings did not cover so much ground as those at Chicago, but many of those at Paris had two or more floors. In addition to the localities occupied in 1889, additional space was obtained at the Champs Elysées, the park of Vincennes, on the north bank of the Seine between the Place de la Concorde, and at the Trocadero. The total superficial area occupied was as follows: Champ de Mars, 124 acres; Esplanade des Invalides, 30 acres; Trocadero Gardens, 40 acres; Champs Elysées, 37 acres; quays on left bank of Seine, 23 acres; quays on right bank of Seine, 23 acres; park at Vincennes, 270 acres: total, 549 acres. The space occupied by buildings and covered in amounted to 4,865,328 sq. ft., 111½ acres. The French section covered 2,691,000 sq. ft., the foreign 1,829,880, and those at the park of Vincennes 344,448 sq. ft. About one hundred French and seventy-five foreign pavilions and detached buildings were erected in the grounds in addition to the thirty-six official pavilions, which were for the most part along the Quai d'Orsay. Funds were raised upon the same system as that adopted in 1889. The French government granted £800,000, and a similar sum was contributed by the municipality of Paris. £2,400,000 was raised by the issue of 3,250,000 "bons," each of the value of 20 francs, and containing 20 tickets of admission to the exhibition of the face value of one franc each, and a document which gave its holder a right either to a reduced rate for admission to the different "side-shows" or else to a diminution in the railway fare to and from Paris, together with a participation in the prizes, amounting to six million francs, drawn at a series of lotteries. Permission to erect restaurants, and to open places of amusement in buildings erected for that purpose, were sold at high prices, and for these privileges, which only realised 2,307,999 francs in 1889, the concessionaires agreed to pay 8,864,442 francs in 1900. The results did not justify the expectations which had been formed, and the administration finally consented to receive a much smaller sum. The administration calculated that they would have 65,000,000 paying visitors, though there were only 13,000,000 in 1878 and 25,398,609 in 1889. A very few weeks after the opening day, April 15th, it became evident that the estimated figures would not be reached, since a large number of holders of "bons" threw them on the market, and the selling price of an admission ticket declined from the par value of one franc to less than half that amount, or from 30 to 50 centimes. The proprietors of the restaurants and "side-shows" discovered that they had paid too much for their concessions, that the buildings they had erected were far too handsome and costly to be profitable, and that the public preferred the exhibition itself to the so-called attractions. The exhibition was largely visited by foreigners, but various causes kept away many persons of wealth and position. Although many speculators were ruined, the exhibition itself was successful. The attendance was unprecedentedly large, and during the seven months the exhibition was open, 39,000,000 persons paid for admission with 47,000,000 tickets, since from two to five tickets were demanded at certain times of the day and on certain occasions. The entries of exhibitors, attendants and officials totalled 9,000,000. The receipts were 114,456,213 francs (£4,578,249), and the expenditure 116,500,000 (£4,660,000), leaving a deficiency of rather more than two millions of francs (£80,000). It was calculated that the expenditure of the foreign nations which took part in the exhibition was six millions sterling, and of the French exhibitors and concessionaires three millions sterling.

A new plan of classifying exhibits was adopted at Paris, all being displayed according to their nature, and not according to their country of origin, as had been the system at previous exhibitions. One-half the space in each group was allotted to France, so that the exhibitors of that nation were enabled to overwhelm their rivals by the number and magnitude of the objects displayed by them. All the agricultural implements, whatever their nationality, were in one place, all the ceramics in another, so that there was no exclusively British and no exclusively German court. The only exception to this rule was in the Trocadero, where the French, British, Dutch, and Portuguese Colonies, Algeria, Tunis, Siberia, the South African Republic, China and Japan were allowed to erect at their own cost separate pavilions. The greater number of the nationalities represented had palaces of their own in the rue des Nations along the Quai d'Orsay, in which thoroughfare were to be seen the buildings erected by Italy, Turkey, the United States, Denmark, Portugal, Austria, Bosnia, Herzegovina, Peru, Hungary, the United Kingdom, Persia, Belgium, Norway, Luxemburg, Finland, Germany, Spain, Bulgaria, Monaco, Sweden, Rumania, Greece, Servia and Mexico. Scattered about the grounds, in addition to those in the Trocadero, were the buildings of San Marino, Morocco, Ecuador and Korea. Nearly every civilized country in the world was represented at the exhibition, the most conspicuous absentees being Argentina, Brazil, Chile, and some other South and Central American Republics, and a number of the British colonies. The most noteworthy attractions of the exhibition were the magnificent effects produced by electricity in the palace devoted to it in the Château d'Eau and in the Hall of Illusions, the two palaces of the Fine Arts in the Champs Elysées, and the Bridge over the Seine dedicated to the memory of Alexander II. These permanent Fine Art palaces were devoted, the one to modern painting and sculpture, the other to the works of French artists and art workmen who flourished from the dawn of French art up to the end of the 18th century.

The United Kingdom was well but not largely represented both in Fine Arts and Manufactures, the administration of the section being in the hands of a royal commission, presided over by the prince of Wales. The British pavilion contained an important collection of paintings of the British school, chiefly by Reynolds, Gainsborough and their contemporaries, and by Turner and Burne-Jones. Special buildings had been erected by the British colonies and by British India. Canada, West Australia and Mauritius occupied the former, India and Ceylon the latter. For the first time since the war of 1870 Germany took part in a French International Exhibition, and the exhibits showed the great industrial progress which had been made since the foundation of the empire in 1870. The United States made a fine display, and fairly divided the honours with Germany. Remarkable progress was manifested in the exhibits of Canada and Hungary. France maintained her superiority in all the objects in which good taste was the first consideration, but the more utilitarian exhibits were more remarkable for their number than their quality, except those connected with electrical work and display, automobiles and iron-work. The number of exhibitors in the industrial section from the British empire, including India and the colonies, was 1250, who obtained 1647 awards, as many persons exhibited in several classes. There were, in addition, 465 awards for "collaborateurs," that is, assistants, engineers, foremen, craftsmen and workmen who had co-operated in the production of the exhibits. In the British Fine Arts section there were 429 exhibits by 282 exhibitors and 175 awards.

In later years, important international exhibitions have been held at Glasgow, and at Buffalo, New York, in 1901, at St Louis (commemorating the Louisiana purchase) in 1904, at Liége in 1905, at Milan in 1906, at Dublin in 1907, and in London (Franco-British), 1908. In the artistic taste and magnificence of their buildings and the interest of their exhibits these took their cue from the great Paris Exhibition, and even in some cases went beyond it, notably at Buffalo (*q.v.*), St Louis (*q.v.*) and London. And it might well be thought that the evolution of this type of public show had reached its limits. (G. C. L.)

EXHUMATION (from Med. Lat. *exhumare*; *ex*, out of, and *humus*, ground), the act of digging up and removing an object from the ground. The word is particularly applied to the removal of a dead body from its place of burial. For the offence of exhuming a body without legal authority, and the process of obtaining such authority, see Burial and Burial Acts.

EXILARCH, in Jewish history, "Chief or Prince of the Captivity." The Jews of Babylonia, after the fall of the first temple, were termed by Jeremiah and Ezekiel the people of the "Exile." Hence the head of the Babylonian Jews was the exilarch (in Aramaic *Resh Galutha*). The office was hereditary and carried with it considerable power. Some traditions regarded the last king of Davidic descent (Jehoiachin) as the first exilarch, and all the later holders of the dignity claimed to be scions of the royal house of Judah. Under the Arsacids and Sassanids the office continued. In the 6th century an attempt was made to secure by force political autonomy for the Jews, but the exilarch who led the movement (Mar Zuṭra) was executed. For some time thereafter the office was in abeyance, but under Arabic rule there was a considerable revival of its dignity. From the middle of the 7th till the 11th centuries the exilarchs were all descendants of Bostanai, through whom "the splendour of the office was renewed and its political position made secure" (Bacher). The last exilarch of importance was David, son of Zakkai, whose contest with Seadiah (*q.v.*) had momentous consequences. Hezekiah (*c.* 1040) was the last Babylonian exilarch, though the title left its traces in later ages. Benjamin of Tudela (*Itinerary*, p. 61) names an exilarch Daniel b. Ḥisdai in the 12th century. Petaḥiah (*Travels*, p. 17) records that this Daniel's nephew succeeded to the office jointly with a R. Samuel. The latter, according to Petaḥiah, had a learned daughter who "gave instruction, through a window, remaining in the house while the disciples were below, unable to see her."

Our chief knowledge of the position and function of the exilarch concerns the period beginning with the Arabic rule in Persia. In the age succeeding the Mahommedan conquest the exilarch was noted for the stately retinue that accompanied him, the luxurious banquets given at his abode, and the courtly etiquette that prevailed there. A brilliant account has come down of the ceremonies at the installation of a new exilarch. Homage was paid to him by the rabbinical heads of the colleges (each of whom was called Gaon, *q.v.*); rich gifts were presented; he visited the synagogue in state, where a costly canopy had been erected over his seat. The exilarch then delivered a discourse, and in the benediction or doxology (*Qaddish*) his name was inserted. Thereafter he never left his house except in a carriage of state and in the company of a large retinue. He would frequently have audiences of the king, by whom he was graciously received. He derived a revenue from taxes which he was empowered to exact. The exilarch could excommunicate, and no doubt had considerable jurisdiction over the Jews. A spirited description of the glories of the exilarch is given in D'Israeli's novel *Alroy*.

See Neubauer, *Mediaeval Jewish Chronicles*, ii. 68 seq.; Zacuto, *Yuhasin*; Graetz, *Geschichte*, vols. iv.-vi.; Benjamin of Tudela, *Itinerary*, ed. Adler, pp. 39 seq.; Bacher, *Jewish Encyclopaedia*, vol. v. 288. (I. A.)

EXILE (Lat. *exsilium* or *exilium*, from *exsul* or *exul*, which is derived from *ex*, out of, and the root *sal*, to go, seen in *salire*, to leap, *consul*, &c.; the connexion with *solum*, soil, country is now generally considered wrong), banishment from one's native country by the compulsion of authority. In a general sense exile is applied to prolonged absence from one's country either through force of circumstances or when undergone voluntarily. Among the Greeks, in the Homeric age, banishment (φυγή) was sometimes inflicted as a punishment by the authorities for crimes affecting the general interests, but is chiefly known in connexion with cases of homicide. With these the state had nothing to do; the punishment of the murderer was the duty and privilege of the relatives of the murdered man. Unless the relatives could be induced to accept a money payment by way of compensation (ποινή, weregeld; see especially Homer, *Iliad*, xviii. 497), in which case the murderer was allowed to remain in the country, his only means of escaping punishment was flight to a foreign land. If, during his self-imposed exile, the relatives expressed their willingness to accept the indemnity, he was at liberty to return and resume his position in society.

In later times banishment is (1) a legal punishment for particular offences; (2) voluntary.

1. Banishment for life with confiscation of property was inflicted upon those who destroyed or uprooted the sacred olives at Athens; upon those who remained neutral during a sedition (by a law of Solon, which subsequently fell into abeyance); upon those who gave refuge to or received on board ship a man who had fled to avoid punishment; upon those who wounded with intent to kill and those who prompted them to such an act (it is uncertain whether in this case exile was for life or temporary); upon any one who wilfully murdered an alien; for impiety. Certain political crimes were also similarly punished—treason, laconism, sycophancy (see Sycophant), attempts to subvert existing decrees. For the peculiar form of banishment called Ostracism, see separate article.

In cases of voluntary homicide the punishment was death; but (except in cases of parricide) the murderer could leave the country unmolested after the first day of the trial. He was bound to remain outside Attica, and when on foreign soil was not allowed to appear at the public games, to enter the temples or take part in sacrifices; but provided that he adhered to the prescribed regulations, he was accorded a certain amount of protection. Even when a general amnesty was proclaimed, he was not allowed to return; if he did so, he might at once be put to death.

Temporary exile (the period of which is uncertain) without confiscation, was the punishment for involuntary homicide. As soon as the relatives of the deceased became reconciled to the man who had slain him, the latter was permitted to return; further, since banishment was only temporary, it is reasonable to suppose that the law insisted upon such reconciliation.

2. Citizens sometimes voluntarily left the country for other reasons (debt, inability to pay a fine). Since extradition was only demanded in cases of high treason or other serious offences against the state, the fugitive was not interfered with. He was at liberty to return after a certain time had elapsed.

Little is known about exile as it affected Sparta and other Greek towns, but it is probable that the same conditions prevailed as at Athens.

At Rome, in early times, exile was not a punishment, but rather a means of escaping punishment. Before judgment had been finally pronounced it was open to any Roman citizen condemned to death to escape the penalty by voluntary exile (*solum vertere exsilii causa*). To prevent his return, he was interdicted from the use of fire and water; if he broke the interdict and returned, any one had the right to put him to death. The *aquae et ignis* (to which *et tecti* "shelter" is sometimes added) *interdictio* is variously explained as exclusion from the necessaries of life, from the symbols of civic communion, or from "the marks of a pure society, which the criminal would defile by his further use of them." Subsequently (probably at the time of the Gracchi) it became a recognized legal penalty, practically equivalent to "exile," taking the place of capital punishment. The criminal was permitted to withdraw from the city *after* sentence was pronounced; but in order that this withdrawal might as far as possible bear the character of a punishment, his departure was sanctioned by a decree of the people which declared his exile permanent. Authorities are not agreed whether this exile by interdiction entailed loss of *civitas*; according to some this did not ensue until (as in earlier times) the criminal had assumed the citizenship of the state in which he had taken refuge and thereby lost his rights as a citizen of Rome, while others hold that it was not until the time of Tiberius (A.D. 23) that *capitis deminutio media* became the direct consequence of trial and conviction. *Interdictio* was the punishment for treason, murder, arson and other serious offences which came under the cognizance of the *quaestiones perpetuae* (permanent judicial commissions for certain offences); confiscation of property was only inflicted in extreme cases.

Under the Empire *interdictio* gradually fell into disuse and a new form of banishment, introduced by Augustus, called *deportatio*, generally *in insulam*, took its place. For some time the two probably existed side by side. *Deportatio* consisted in transportation for life to an island (or some place prescribed on the mainland, not of Italy), accompanied by loss of *civitas* and all civil rights, and confiscation of property. The most dreaded places of exile were the islands of Gyarus, Sardinia, an oasis in the desert (*quasi in insulam*) of Libya; Crete, Cyprus and Rhodes were considered more tolerable. Large bodies of persons were also transported in this manner; thus Tiberius sent 4000 freedmen to Sardinia for Jewish or Egyptian superstitious practices. *Deportatio* was originally inflicted upon political criminals, but in course of time became more particularly a means of removing those whose wealth and popularity rendered them objects of suspicion. It was also a punishment for the following offences: adultery, murder, poisoning, forgery, embezzlement, sacrilege and certain cases of immorality.

Relegatio was a milder form of *deportatio*. It either excluded the person banished from one specified district only, with permission to choose a residence elsewhere, or the place of exile was fixed. *Relegatio* could be either temporary or for life, but it did not in either case carry with it loss of *civitas* or property, nor was the exile under military surveillance, as in the case of *deportatio*. Thus, Ovid, when in exile at Tomi, says (*Tristia*, v. 11): "he (*i.e.* the emperor) has not deprived me of life, nor of wealth, nor of the rights of a citizen . . . he has simply ordered me to leave my home." He calls himself *relegatus*, not *exsul*.

In later writers the word *exsilium* is used in the sense of all its three forms—*aquae et ignis interdictio*, *deportatio* and *relegatio*.

In England the first enactment legalizing banishment dates from the reign of Elizabeth (39 Eliz. c. 4), which gave power to banish from the realm "such rogues as are dangerous to the inferior people." A statute of Charles II. (18 Car. II. c. 3) gave power to execute or to transport to America for life the moss-troopers of Cumberland and Northumberland. Banishment or transportation for criminal offences was regulated by an act of 1824 (5 Geo. IV. s. 84) and finally abolished by the Penal Servitude Acts 1853 and 1857 (see further DEPORTATION). The word exile has sometimes, though wrongly, been applied to the sending away from a country of those who are not natives of it, but who may be temporary or even permanent residents in it (see ALIEN; EXPATRIATION; EXPULSION).

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EXILI, an Italian chemist and poisoner in the 17th century. His real name was probably Nicolo Egidi or Eggidio. Few authentic details of his life exist. Tradition, however, credits him with having been originally the salaried poisoner at Rome of Olympia Maidalchina, the mistress of Pope Innocent X. Subsequently he became a gentleman in waiting to Queen Christina of Sweden, whose taste for chemistry may have influenced this appointment. In 1663 his presence in France aroused the suspicions of the French government, and he was imprisoned in the Bastille. Here he is said to have made the acquaintance of Godin de Sainte-Croix, the lover of the marquise de Brinvilliers (*q.v.*). After three months' imprisonment, powerful influences secured Exili's release, and he left France for England. In 1681 he was again in Italy, where he married the countess Fantaguzzi, second cousin of Duke Francis of Modena.

EXMOOR FOREST, a high moorland in Somersetshire and Devonshire, England. The uplands of this district are bounded by the low alluvial plain of Sedgemoor on the east, by the lower basin of the Exe on the south, by the basin of the Taw (in part) on the west, and by the Bristol Channel on the north. The area thus defined, however, includes not only Exmoor but the Brendon and Quantock Hills east of it. Excluding these, the total area in the district lying at an elevation exceeding 1000 ft. is about 120 sq. m. The geological formation is Devonian. The ancient forest had an area of about 20,000 acres, and was enclosed in 1815. Large tracts are still uncultivated; and the wild red deer and native Exmoor pony are characteristic of the district. The highest point is Dunkery Beacon in the east (1707 ft.), but Span Head in the south-west is 1618 ft., and a height of 1500 ft. is exceeded at several points. The Exe, Barle, Lyn and other streams, traversing deep picturesque valleys except in their uppermost courses, are in favour with trout fishermen. The few villages, such as Exford, Withypool and Simonsbath, with Lynton and Lynmouth on the coast, afford centres for tourists and sportsmen. Exmoor is noted for its stag hunting. The district has a further fame through Richard Blackmore's novel, *Lorna Doone.*

EXMOUTH, EDWARD PELLEW, 1ST VISCOUNT (1757–1833), English admiral, was descended from a family which came originally from Normandy, but had for many centuries been settled in the west of Cornwall. He was born at Dover, on the 19th of April 1757. At the age of thirteen he entered the navy, and even then his smartness and activity, his feats of daring, and his spirit of resolute independence awakened remark, and pointed him out as one specially fitted to distinguish himself in his profession. He had, however, no opportunity of active service till 1776, when, at the battle of Lake Champlain, his gallantry, promptitude and skill, not only saved the "Carleton"—whose command had devolved upon him during the progress of the battle—from imminent danger, but enabled her to take a prominent part in sinking two of the enemy's ships. For his services on this occasion he obtained a lieutenant's commission, and the command of the schooner in which he had so bravely done his duty. The following year, in command of a brigade of seamen, he shared in the hardships and perils of the American campaign of General Burgoyne. In 1782, in command of the "Pelican," he attacked three French privateers inside the Île de Batz, and compelled them to run themselves on shore—a feat for which he was rewarded by the rank of post-captain. On the outbreak of the French War in 1793, he was appointed to the "Nymphe," a frigate of 36 guns; and, notwithstanding that for the sake of expedition she was manned chiefly by Cornish miners, he captured, after a desperate conflict, the French frigate "La Cléopâtre," a vessel of equal strength. For this act he obtained the honour of knighthood. In 1794 he received the command of the "Arethusa" (38), and in a fight with the French frigate squadron off the Île de Batz he compelled the "Pomona" (44) to surrender. The same year the western squadron was increased and its command divided, the second squadron being given to Sir Edward Pellew in the "Indefatigable" (44). While in command of this squadron he, on several occasions, performed acts of great personal daring;

and for his bravery in boarding the wrecked transport "Dutton," and his promptitude and resolution in adopting measures so as to save the lives of all on board, he was in 1796 created a baronet. In 1798 he joined the channel fleet, and in command of the "Impétueux" (74) took part in several actions with great distinction. In 1802 Sir Edward Pellew was elected member of parliament for Dunstable, and during the time that he sat in the Commons he was a strenuous supporter of Pitt. In 1804 he was made rear-admiral of the blue, and appointed commander-in-chief in India, where, by his vigilance and rapidity of movement, he entirely cleared the seas of French cruisers, and secured complete protection to English commerce. He returned to England in 1809, and in 1810 was appointed commander-in-chief in the North Sea, and in 1811 commander-in-chief in the Mediterranean. In 1814 he was created Baron Exmouth of Canonteign, and in the following year was made K.C.B., and a little later G.C.B. When the dey of Algiers, in 1816, violated the treaty for the abolition of slavery, Exmouth was directed to attack the town. Accordingly, on the 26th of August, he engaged the Algerine battery and fleet, and after a severe action of nine hours' duration, he set on fire the arsenal and every vessel of the enemy's fleet, and shattered the sea defences into ruins. At the close of the action the dey apologized for his conduct, and agreed to a renewal of the treaty, at the same time delivering up over three thousand persons of various nationalities who had been Algerine slaves. For this splendid victory Exmouth was advanced to the dignity of viscount. Shortly before his death, which took place on the 23rd of January 1833, he was made vice-admiral.

He had married Susan (d. 1837), daughter of James Frowde of Knoyle, Wiltshire, who bore him four sons and two daughters. His eldest son, Pownoll Bastard Pellew (1786–1833), became 2nd Viscount Exmouth, and his descendant, Edward Addington Hargreaves Pellew (b. 1890), became the 5th viscount in 1899.

Exmouth's second son, Sir Fleetwood Broughton Reynolds Pellew (1789–1861), was like his father an admiral. The third son was George Pellew (1793–1866), author and divine, who married Frances (d. 1870), daughter of the prime minister, Lord Sidmouth, and wrote his father-in-law's life (*The Life and Correspondence of Henry Addington, 1st Viscount Sidmouth*, 1847).

Exmouth had a brother, Sir Israel Pellew (1758–1832), also an admiral, who was present at the battle of Trafalgar.

A *Life* of the 1st viscount, by Edward Osler, was published in 1835.

EXMOUTH, a market-town, seaport and watering-place in the Honiton parliamentary division of Devonshire, England, at the mouth of the river Exe, 10½ m. S.E. by S. of Exeter by the London & South-Western railway. Pop. of urban district (1901) 10,485. In the 18th century it consisted of a primitive fishing village at the base of Beacon Hill, a height commanding fine views over the estuary and the English Channel. After its more modern terraces were built up the hillside, Exmouth became the first seaside resort in Devon. Its excellent bathing and the beauty of its coast and moorland scenery attract many visitors in summer, while it is frequented in winter by sufferers from pulmonary disease. The climate is unusually mild, as a range of hills shelters the town on the east. A promenade runs along the sea wall; there are golf links and public gardens, and the port is a favourite yachting centre, a regatta being held annually. Near the town is a natural harbour called the Bight. The local industries include fishing, brick-making and the manufacture of Honiton lace. Exmouth was early a place of importance, and in 1347 contributed 10 vessels to the fleet sent to attack Calais. It once possessed a fort or "castelet," designed to command the estuary of the Exe. This fort, which was garrisoned for the king during the Civil War, was blockaded and captured by Colonel Shapcoate in 1646.

EXODUS, BOOK OF, in the Bible, a book of the Old Testament which derives its name, through the Greek, from the event which forms the most prominent feature of the history it narrates, viz. the deliverance of Israel from Egypt. Strictly speaking, however, this title is applicable to the first half only, the historical portion of the book, and takes no account of those chapters which describe the giving of the Law on Mt. Sinai, nor of those which deal with the Tabernacle and its furniture. By the Jews it is usually styled after its opening words וְאֵלֶּה שְׁמוֹת (*We'ēleh Shĕmōth*) or, more briefly, שְׁמוֹת (*Shĕmōth*).

In its present form the book sets forth (*a*) the oppression of the Israelites in Egypt (ch. i.), (*b*) the birth and education of Moses, and his flight to the land of Midian (ch. ii.), (c) the theophany at Mt. Horeb (the Burning Bush), and the subsequent commission of Moses and Aaron (iii. 1–iv. 17), (*d*) the return of Moses to Egypt, and his appeal to Pharaoh which results in the further oppression of Israel (iv. 18–vii. 7), (*e*) the plagues of Egypt (vii. 8–xi. 10), (*f*) the institution of the Passover and of the Feast of Unleavened Cakes, the last plague, and Israel's departure from Egypt (xii. 1–xiii. 16), (*g*) the crossing of the Red Sea and the discomfiture of the Egyptians, the Song of Triumph, the sending of the manna and other incidents of the journeying through the wilderness (xiii. 17–xviii. 27), (*h*) the giving of the Law, including the Decalogue and the so-called Book of the Covenant, on Sinai-Horeb (xix.–xxiv.), (*i*) directions for the building of the Tabernacle and for the consecration of the priests (xxv.–xxxi.), (*j*) the sin of the Golden Calf, and another earlier version of the first legislation (xxxii.–xxxiv.), (*k*) the construction of the Tabernacle and its erection (xxxv.–xl.). The book of Exodus, however, like the other books of the Hexateuch, is a composite work which has passed, so to speak, through many editions; hence the order of events given above cannot lay claim to any higher authority than that of the latest editor. Moreover, the documents from which the book has been compiled belong to different periods in the history of Israel, and each of them, admittedly, reflects the standpoint of the age in which it was written. Hence it follows that the contents of the book are not of equal historical value; and though the claim of a passage to be considered historical is not necessarily determined by the age of the source from which it is derived, yet, in view of the known practice of Hebrew writers, greater weight naturally attaches to the earlier documents in those cases in which the sources are at variance with one another. Any attempt, therefore, at restoring the actual course of history must be preceded by an inquiry into the source of the various contents of the book.

The sources from which the book of Exodus has been compiled are the same as those which form the basis of the book of Genesis, while the method of composition is very similar. Here, too, the strongly marked characteristics of P, or the Priestly Document, as opposed to JE, enable us to determine the extent of that document with comparative ease; but the absence, in some cases, of conclusive criteria prevents any final judgment as to the exact limits of the two strands which have been united in the composite JE. The latter statement applies especially to the legislative portions of the book: in the historical sections the separation of the two sources gives rise to fewer difficulties. It does not, however, lie within the scope of the present article to examine the various sources underlying the narrative with any minuteness, but rather to sum up those results of modern criticism which have been generally accepted by Old Testament scholars. To this end it will be convenient to treat the subject-matter of the book under three main heads: (*a*) the historical portion (ch. i.–xviii.), (*b*) the sections dealing with the giving of the Law (xix.–xxiv., xxxii.–xxxiv.). and (*c*) the construction of the Tabernacle and its furniture (xxv.–xxxi., xxxv.–xl.).

(*a*) *Israel in Egypt and the Exodus* (ch. i.–xviii.). (1) i. 1–vii. 13.—The analysis of these chapters shows that the history, in the main, has been derived from the two sources J and E, chiefly the former, and that a later editor has included certain passages from P, besides introducing a slight alteration of the original order and other redactional changes. The combined narrative of JE sets forth the rise of a new king in Egypt, who endeavoured to check the growing strength of the children of Israel; it thus prepares the way for the birth of Moses, his early life in Egypt, his flight to Midian and marriage with Zipporah, the theophany at Mt. Horeb, and his divine commission to deliver Israel from Egypt.

At the very outset the two sources betray their divergent origin and point of view. According to J (i. 6, 8-12, 20*b*) the Israelites dwell apart in the province of Goshen, and their numbers become so great as to call for severe measures of repression, the method employed being that of forced labour. E, on the other hand (i. 15-20*a*, 21, 22), represents them as living among the Egyptians, and so few in number that two midwives satisfy their requirements. It is to this latter source that we owe the account of the birth of Moses and of his education at the court of Pharaoh (ii. 1-10). On reaching manhood Moses openly displays his sympathy with his brethren by slaying an Egyptian, and has, in consequence, to flee to Midian, where he marries Zipporah, the daughter of the priest of Midian (ii. 11-22). In this section the editor has undoubtedly made use of the parallel narrative of J, though it is impossible to determine the exact point at which J's account is introduced: certainly ii. 15*b*-22 belong to that source.[1] The narrative of the call of Moses is by no means uniform, and shows obvious traces of twofold origin (J iii. 2-4*a*, 5, 7, 8, 16-18; iv. 1-12 (13-16), 29-31; E iii. 1, 4*b*, 6, 9-14, 21, 22; iv. 17, 18, 20*b*, 27, 28). These two sources present striking points of difference, which reappear in the subsequent narrative. According to E, Moses with Aaron is to demand from Pharaoh the release of Israel, which will be effected in spite of his opposition; in assurance thereof the promise is given that they shall serve God upon this mountain; moreover, the people on their departure are to borrow raiment and jewels from their Egyptian neighbours. According to J, on the other hand, the spokesmen are to be Moses and the elders; and their request is for a temporary departure only, viz. "three days' journey into the wilderness"; their departure from Egypt is a hurried one. Yet another difficulty, which disappears as soon as the composite character of the narrative is recognized, is that of the signs. In J three signs are given for the purpose of reassuring Moses, only one of which is wrought with the rod (iv. 1-9), but in iv. 17 (E) the reference is clearly to entirely different signs, probably the plagues of Egypt, which according to E were invariably wrought by "the rod of God." Further, it is questionable if the passage iv. 13-16 really forms part of the original narrative of J, and is not rather to be ascribed to the redactor of JE. The name of Aaron has certainly been introduced by a later hand in J's account of the plague of frogs (viii. 12), and the only passage in J in which Aaron is represented as taking an active part is iv. 29-31, where the mention of his name causes no little difficulty.[2] In E, on the other hand, Aaron is sent by God to meet Moses at Mt. Horeb, after the latter had taken leave of Jethro, and, later on, accompanies him into the presence of Pharaoh. The succeeding narrative (v. 1–vi. 1) is mainly taken from J, though E's account of the first interview with Pharaoh has been partially retained in v. 1, 2, 4. Moses and the elders ask leave to go three days' journey into the wilderness to sacrifice to Yahweh, a request which is met by an increase of the burdensome work of brick-making: henceforward the Israelites have to provide their own straw. The people complain bitterly to Moses, who appeals to Yahweh and is assured by him of the future deliverance of Israel "by a strong hand."

With the exception of the genealogical list (i. 1-5) and the brief notices of the increase of Israel (i. 7) and of its oppression at the hands of the Egyptians (i. 13, 14; ii. 23*b*-25), the narrative so far exhibits no traces of P[3]. But in vi. 2–vii. 13 we are confronted with a narrative which carries us back to ii. 23*b*-25 and gives practically a parallel account to that of JE in ch. iii.–v. Thus the revelation of the divine name, vi. 2 f., finds its counterpart in iii. 10 f., the message to be delivered to Israel (vi. 6 f.) is very similar to that of ch. iii. 16 f., while the demand which is to be addressed to Pharaoh is identical with that which had been already refused in ch. v. No allusion, however, is made by Moses to this previous demand; he merely urges the same objection as that put forward in iv. 10 f. With the resumption[4] of the story in vi. 28 f. Moses reiterates his objection, and is told that Aaron shall be his "prophet" and speak for him, and shall also perform the sign of the rod (cf. iv. 2-4). The sign, however, has no effect on Pharaoh (vii. 13), and we thus reach the same point in the narrative as at vi. 1. Apart from the literary characteristics which clearly differentiate this narrative from the preceding accounts of J and E, the following points of variation are worthy of consideration: (1) The people refuse to listen to Moses; (2) Aaron is appointed to be Moses' spokesman, not with the *people*, but with Pharaoh; (3) *one* sign is given (not *three*) and performed before Pharaoh; (4) the rod is turned into a reptile (*tannīn*), not a serpent (*nāḥāsh*).

(2) vii. 14–xi. 10. *The First Plagues of Egypt.*—In this section the analysis again reveals three main sources, which are clearly marked off from one another both by their linguistic features and by their difference of representation. The principal source is J, from which are derived six plagues, viz. killing of the fish in the river (vii. 14, 16, 17*a*, 18, 21*a*, 24, 25), frogs (viii. 1-4, 8-15*a*), insects (viii. 20-32), murrain (ix. 1-7), hail (ix. 13-18, 23*b*, 24*b*, 25*b*-34), locusts (x. 1*a*, 3-11, 13*b*, 14*b*, 15*a*, *c*-19, 24-26, 28, 29), the threat to slay all the first-born (xi. 4-8). The most striking characteristic of this narrative is that the plagues are represented as mainly due to natural causes and follow a natural sequence. Thus Yahweh smites the river so that the fish die and render the water undrinkable. This is succeeded by a plague of frogs. The swarms of flies and insects, which next appear, are the natural outcome of the decaying masses of frogs, and these, in turn, would form a natural medium for the spread of cattle disease. Destructive hailstorms, again, though rare, are not unknown in Egypt, while the locusts are definitely stated to have been brought by a strong east wind. Other distinctive features of J's narrative are: (1) Moses alone is bidden to interview Pharaoh (vii. 14 f.; viii. 1 f., 20 f.; ix. 1 f., 13 f.; x. 1 f.); (2) on each occasion he makes a formal demand; (3) on Pharaoh's refusal the plague is announced, and takes place at a fixed time without any human intervention; (4) when the plague is sent, Pharaoh sends for Moses and entreats his intercession, promising in most cases to accede in part to his request; when the plague is removed, however, the promise is left unfulfilled, the standing phrase being "and Pharaoh's heart was heavy (כבר)," or "and Pharaoh made heavy (הכביר) his heart"; (5) the plagues do not affect the children of Israel in Goshen. E's account (water turned into blood, vii. 15, 17*b*, 20*b*, 23; hail, ix. 22, 23*a*, 24*a*, 25*a*, 35; locusts, x. 12, 13*a*, 14*a*, 15*b*) is more fragmentary, having been doubtless superseded in most cases by the fuller and more graphic narrative of J, but the plague of darkness (x. 20-23, 27) is found only in this source. As contrasted with J the narrative emphasizes the miraculous character of the plagues. They are brought about by "the rod of God," which Moses wields, the effect being instantaneous and all-embracing. The Israelites are represented as living among the Egyptians, and enjoy no immunity from the plagues, except that of darkness. Their departure from Egypt is deliberate; the people have time to borrow raiment and jewels from their neighbours. E regularly uses the phrase "and Pharaoh's heart was strong (חזק)," or "and Yahweh made strong (חזיק) Pharaoh's heart" and "he would not let the children of Israel (or, them) go." In the priestly narrative (P) the plagues assume the form of a trial of skill between Aaron, who acts at Moses' command, and the Egyptian magicians, and thus connect with vii. 8-13. The magicians succeed in turning the Nile water into blood (vii. 19, 20*a*, 21*b*, 22), and in bringing up frogs (viii. 5-7), but they fail to bring forth lice (viii. 15*b*-19), and are themselves smitten with boils (ix. 8-12): the two last-named plagues have no parallel either in J or E. Throughout the P sections Aaron is associated with Moses, and the regular command given to the latter is "Say unto Aaron"; no demand is ever made to Pharaoh, and the description of the plague is quite short. The formula employed by P is "and Pharaoh's heart was strong (חזק)," or, "and Pharaoh made strong (חזיק) his heart," as in E, but it is distinguished from E's phrase by the addition of "and he hearkened not unto them as Yahweh had spoken."

(3) xii. 1–xiii. 16. *The Last Plague, the Deliverance from Egypt, the Institution of the Passover and of the Feast of Unleavened Cakes, the Consecration of the First-born.*—This section presents the usual phenomena of a composite narrative, viz. repetitions and inconsistencies. Thus J's regulations for the Passover (xii. 21-23, 27*b*) seem at first sight simply to repeat the commands given to Moses and Aaron in xii. 1-13 (P), but in reality they are a parallel and divergent account. In *vv.* 1-13 the choice of the lamb and the manner in which it is to be eaten constitute the essential feature, the smearing with the blood being quite secondary; in *vv.* 21 f. the latter point is all-important, and no regulations are given for the paschal meal (which, possibly, formed no part of J's original account). Similarly the institution of the Feast of *Mazzoth*, or Unleavened Cakes (xiii. 3-10J), does not form the sequel to the regulations laid down in xii.

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[1] The fact that the father-in-law of Moses is called Reuel in *v.* 18, as contrasted with the name Jethro, which occurs in iii. 1 f. and in all subsequent passages from E, cannot be taken as conclusive on this point, since critics are agreed that "Reuel" in this verse is a later addition: had it been original we should have expected the name to be given at *v.* 16 rather than at *v.* 18. But, if no argument can be based on the discrepancy between the two names, we may at least assume that the namelessness of the priest in *v.* 16 f. points to a different source for those verses from that of iii. 1 f. Elsewhere J speaks of "Hobab, the son of Reuel the Midianite, Moses' father-in-law" (Num. x. 29); the addition, "the priest of Midian," only occurs in the (secondary) passages iii. 1, xviii. 1 (E). Probably RJE omitted the name in ii. 16 and added "the priest of Midian" in iii. 1, xviii 1, from harmonizing motives. Further, *vv.* 15*b*-22 speak of *one* son being born to Moses at this period, a statement which is borne out by iv. 20, 25 ("sons" in iv. 20 is obviously a correction), whereas ch. xviii. (E) mentions *two* sons.

The original order of events in J seems to have been as follows: after the death of Pharaoh (ii. 23*a*; the Septuagint repeats this notice before iv. 19) Moses returns to Egypt with his wife and son (iv. 19, 20) in obedience to Yahweh's command. On the way he is seized with a sudden illness, which Zipporah attributes to the fact that he has not been circumcised and seeks to avert by circumcising her son (iv. 24-26). The scene of the theophany, therefore, according to J, is to be placed on the way from Midian to Goshen. Probably the displacement of iv. 19, 20, 24-26 is due to the editor of JE, who was thus enabled to combine the two narratives of the theophany.

[2] Cf. iv. 30; Aaron had received no command to do the signs, and the words "and he did the signs" are most naturally referred to Moses.

[3] The expansion in iii. 8*c*, 15, 17*b*; iv. 22, 23, are probably the work of a Deuteronomistic redactor.

[4] The genealogy of Moses and Aaron (*vv.* 14-27) appears to be a later addition.

14-20 (P), but is independent of them: it omits all reference to the "holy convocations" and to the abstinence from labour, and is obviously simpler and more primitive. J's account, again, makes important exceptions (xiii. 11-13) to the severe enactment of P with reference to the first-born (xiii. 1). The description of the smiting of the first-born of Egypt is derived from J (xii. 29-34, 37-39), who clearly sees in the Feast of *Mazzoth* a perpetual reminder of the haste with which the Israelites fled from Egypt; the editor of JE, however, has included some extracts from E (xii. 31, 35, 36), which point to a more deliberate departure. The section has been worked over by a Deuteronomistic editor, whose hand can be clearly traced in the additions xii. 24-27*a*; xiii. 3*b*, 5, 8, 9, 14-16.

(4) xiii. 17–xv. 21. *The Crossing of the Red Sea.*—According to J the children of Israel departed from Egypt under the guidance of Yahweh, who leads them by day in a pillar of cloud and by night in a pillar of fire (xiii. 21, 22). On hearing of their flight Pharaoh at once starts in pursuit. The Israelites, terrified by the approach of the Egyptians, upbraid Moses, who promises them deliverance by the hand of Yahweh (xiv. 5, 6, 7*b*, 10*a*, 11-14, 19*b*). Yahweh then causes a strong east wind to blow all that night, which drives back the waters from the shallows, and so renders it possible for the host of Israel to cross over. The Egyptians follow, but the progress of their chariots is hindered by the soft sand, and in the morning they are caught by the returning waters (xiv. 21*b*, 24, 25, 27*b*, 28*b*, 30). The story, however, has been combined with the somewhat different account of E, which doubtless covered the same ground, and also with that of P. According to the former, Elohim did not permit the Israelites to take the shorter route to Canaan by the Mediterranean coast, for fear of the Philistines, but led them southwards to the Red Sea, whither they were pursued by the Egyptians (xiii. 17-19). The remainder of E's account has only been preserved in a fragmentary form (xiv. 7*aa*, 10*b*, 15*a*, 19*a*, 20*a*), from which it may be gathered that Moses divided the waters by stretching out his rod, thus presupposing that the crossing took place by day, and that the dark cloud which divided the two hosts was miraculously caused by the angel of God. P also represents the sea as divided by means of Moses' rod, but heightens the effect by describing the crossing as taking place between walls of water (xiii. 20; xiv. 1-4, 8, 9, 15*b*, 16*b*-18, 21*a*, *c*, 22, 23, 26, 27*a*, 28*a*, 29).

J's version of the Song of Moses probably does not extend beyond xv. 1, and has its counterpart in the very similar song of Miriam (E), in *vv.* 20, 21. The rest of the song (*vv.* 2-18) is probably the work of a later writer; for these verses set forth not only the deliverance from Egypt, but also the entrance of Israel into Canaan (*vv.* 13-17), and further presuppose the existence of the temple (*vv.* 13*b*, 17*b*). These phenomena have been explained as due to later expansion, but the poem has all the appearance of being a unity, and the language, style and rhythm all point to a later age. Verse 19 is probably the work of the redactor (R^P) who inserted the song.

(5) xv. 22–xviii. 27. *Incidents in the Wilderness.*—The narrative of the first journeying in the wilderness (xv. 22–xvii. 7) presents a series of difficulties which probably owe their origin to the editorial activity of R^P, who appears to have transferred to the beginning of the wanderings a number of incidents which rightly belong to the end. The concluding verses of ch. xv. contain J's account of the sweetening of the waters of Marah, with which has been incorporated a fragment of E's story of Massah (xv. 25*b*) and a Deuteronomic expansion in *v.* 26. Then follows (ch. xvi.) P's version of the sending of the manna and quails. In its present form, this narrative contains a number of conflicting elements, which can only be the result of editorial activity. Thus *vv.* 6, 7 must originally have preceded *vv.* 11, 12, though the redactor has attempted to evade the difficulty by inserting *v.* 8. Again, the account of the quails, which is obviously incomplete, is undoubtedly derived from Num. xi.; but the latter account, which admittedly belongs to JE, places the incident at the end of the wanderings. Closer examination also of P's narrative of the manna shows that its true position is *after* the departure from Mt. Sinai; cf. the expressions used in *vv.* 9, 10, 33, 34, implying the existence of the ark and the tabernacle. P's account of the manna, however, can hardly have stood originally in close juxtaposition with his account of the quails (cf. Num. xi. 6), but the two narratives were probably combined by R^P before they were transferred to their present position. The same redactor doubtless added *v.* 8 (and possibly *vv.* 17, 18) by way of explanation, and *vv.* 5 and 22-30, which imply that the law of the Sabbath was already known, and introduce a fresh element into the story. A plausible explanation of R^P's action is supplied by the theory that an earlier account of the giving of the manna already existed at this point of the narrative. We know from Deuteronomy viii. 2 f., 16 that JE contained an account of the manna, which included the explanation of Ex. xvi. 15, and also emphasized, as the motive for the gift, Yahweh's desire "to prove thee (*i.e.* test thy disposition) . . . whether thou wouldst keep his commandments, or no." Fragments of this early story of Massah (testing) were incorporated by R^P in his story of the manna and the quails, viz. xv. 25*b*; xvi. 4, 15, 16*a*, 19*b*-21. These verses must be assigned to E, for in xvii. 3, 2*c* (wherefore do ye tempt the Lord?), 7*a* (to *Massah*), *c* (because they tempted . . ., &c.), we find yet another version (J) of the same incident, according to which the people tempted (tested) Yahweh. It was owing to the combination of this latter account with E's further description of the striving of the people for water at Meribah that the double name Massah-Meribah arose, xvii. 1*b*-7 (1*a* belongs to P), though Deut. xxxiii. 8 makes it clear that Massah and Meribah were separate localities (cf. Deut. ix. 22, 2 f., 16, where Massah occurs alone): P's version of striving at Meribah, in which traces of J's account have been preserved, is given at Num. xx. 1-13.

xvii. 8-16. *The Battle with Amalek at Rephidim.*—This incident is derived from E, but is clearly out of place in its present context. Its close connexion with the end of the wanderings is shown by (*a*) the description of Moses as an infirm old man; (*b*) the rôle played by Joshua in contrast with xxiv. 13, xxxiii. 11, where he is introduced as a young man and Moses' minister; and (*c*) the references elsewhere to the home of the Amalekites: according to Num. xiii. 29, xiv. 25, xliii. 45, they dwelt in the S. or S.W. of Judah near Kadesh (cf. 1 Sam. xv. 6 f., 30; Gen. xiv. 7; xxxvi. 12).

Ch. xviii. *The visit of Jethro to Moses and the appointment of judges.*—This story, like the preceding one, is mainly derived from E and is also out of place. Allusions in the chapter itself point unmistakably to a time just before the departure from Sinai-Horeb, and this date is confirmed both by Deut. i. 9-16 and by the parallel account of J in Num. x. 29-32. The narrative, however, displays signs of compilation, and it is not improbable that R^{JE} has incorporated in *vv.* 7-11 part of J's account of the visit of Moses' father-in-law (cf. the use of Yahweh).

(*b*) Ch. xix.–xxiv., xxxii., xxxiv.—The contents of these chapters, which, owing to their contents, form the most important section in the book of Exodus, may be briefly analysed as follows. In ch. xix. we have a twofold description of the theophany on Mt. Sinai (or Horeb), followed by the Decalogue in xx. 1-17. Alongside of this code we find another, dealing in part with the civil and social (xxi. 2–xxii. 17), in part with the religious life of Israel, the so-called Book of the Covenant, xx. 22–xxiii. 19. Ch. xxiv. contains a composite narrative of the ratification of the covenant. In chs. xxxii. and xxxiii. we have again two narratives of the sin of the people and of Moses' intercession, while in ch. xxxiv. we are confronted with yet another early code, which is practically identical with the religious enactments of xx. 22-26; xxii. 29, 30; xxiii. 10-19.

With but few exceptions the *provenance* of the individual sections may be said to have been finally determined by the labours of the critics, but even a cursory examination of their contents makes it evident that the sequence of events, which they now present, cannot be original, but is rather the outcome of a long process of revision, during which the text has suffered considerably from alterations, omissions, dislocations and additions. Yet owing to the method of composition employed by Hebrew editors, or revisers, it is possible in this case, as in others, not only to determine the source of each individual passage, but also to trace with considerable confidence the various stages in the process by which it reached its final form and position. It must, however, be admitted that the evidence at our disposal is, in some cases, capable of more than one interpretation. Hence a final conclusion can hardly be expected, but with certain modifications in detail the following solution of the problem may be accepted as representing the point of view of recent criticism.

Ch. xix. contains two parallel accounts of the theophany on Horeb-Sinai, from E and J respectively, which differ materially from one another. According to the former, Moses is instructed by God (Elohim) to sanctify the *people* against the third day (*vv.* 9*a*, 10, 11*a*). This is done and the people are brought by Moses to the foot of the mountain (Horeb), where they hear the divine voice (14-17, 19). A noticeable feature of this narrative, of which xx. 18-21 forms a natural continuation, is the fact that the theophany is addressed to the *people*, who are too frightened to remain near the mountain itself. In J, on the other hand, it is the *priests* who are sanctified, and great care must be taken to prevent the people from "breaking through to gaze" (20-22). In this account the mountain is called "Sinai" throughout, and "Yahweh" appears instead of "Elohim" (11*b*, 18, 20 f.). Moreover, Moses and Aaron and the priests are summoned to the top of the mount (in *v.* 24*b* render "thou and Aaron with thee, and the priests: but let not the people," &c.). *Vv.* 3*b*-8, which have been expanded by a Deuteronomic editor, have been transferred from their original context after xx. 21; the introductory verses 1, 2*a* form part of P's itinerary.

Of the succeeding legislation in xx.–xxiii., xxxii.–xxxiv., undoubtedly the earlier sections are xx. 22-26; xxii. 29, 30; xxiii. 10-19, and xxxiv. 10-26, which contain regulations with regard to worship and religious festivals, and form the basis of the covenant made by Yahweh with Israel on Sinai-Horeb, as recorded by E and J respectively. The narrative which introduces the covenant laws of J has been preserved partly in its present context, ch. xxxiv., partly in xxiv. 1, 2, 9-11; the narrative of E, on the other hand, has in part disappeared owing to the interpolation of later material, in part has been retained in xxiv. 3-8. J's narrative xxiv. 1 f., 9-11 clearly forms the continuation of xix. 20 f., 11*b*, 13, 25, but the introductory words of *v.* 1, "and unto Moses he said," point to some omission. Originally, no doubt, it included the recital of the divine instructions to the people in accordance with xix. 21 f., 11*b*-13, the statement that Yahweh came down on the third day, and that a long blast was blown on the trumpet (or ram's horn [יֹבֵל, as opposed to שֹׁפָר E]). From xxiv. 1 f. we learn that Moses and Aaron, Nadab and Abihu, and seventy of the elders were summoned to the top of the mountain, but that Moses alone was permitted to approach Yahweh. Then followed the theophany, and, as the text stands, the sacrificial meal (9-11).[1] The conclusion of J's narrative is given in ch. xxxiv.,[2] which describes how Moses hewed two tables of stone at Yahweh's command, and went up to the top of the mountain, where he received the words of the covenant and wrote them on the tables. As it stands, however, this chapter represents the legislation which it contains as a renewal of a former covenant, also written on tables of stone, which had been broken (1*b*, 4*a*). But the document from which the chapter, as a whole, is derived, is certainly J, while the previous references to tables of stone and to Moses' breaking them belong to the parallel narrative of E. Moreover, the covenant here set forth (*v.* 10 f.) is clearly a new one, and contains no hint of any previous legislation, nor of any breach of it by the people. In view of these facts we are forced to conclude that 1*b* (" like unto the first . . . brakest "), 4*a* (" and he hewed . . . the first ") and *v.* 28 (" the ten words ") formed no part of the original narrative,[3] but were inserted by a later Deuteronomic redactor. In the view of this editor the Decalogue alone formed the basis of the covenant at Sinai-Horeb, and in order to retain J's version, he represented it as a renewal of the tables of stone which Moses had broken.[4]

The legislation contained in xxxiv. 10-26, which may be described as the oldest legal code of the Hexateuch, is almost entirely religious. It prohibits the making of molten images (*v.* 17), the use of leaven in sacrifices (25*a*), the retention of the sacrifice until the morning (25*b*),[5] and the seething of a kid in its mother's milk (26*b*); and enjoins the observance of the three annual feasts and the Sabbath (18*a*, 21-23), and the dedication of the first-born (19, 20, derived from xiii. 11-13) and of the first-fruits (26*a*).

The parallel collection of E is preserved in xx. 24-26, xxiii. 10-19, to which we should probably add xxii. 29-31 (for which xxiii. 19*a* was afterwards substituted). The two collections resemble one another so closely, both in form and extent, that they can only be regarded as two versions of the same code. E has, however, preserved certain additional regulations with regard to the building of altars (xx. 24-26) and the observance of the seventh year (xxiii. 10, 11), and omits the prohibition of molten images (xx. 22, 23, appear to be the work of a redactor); xxiii. 20-33, the promises attached to the observance of the covenant, probably formed no part of the original code, but were added by the Deuteronomic redactor; cf. especially *vv.* 23-25*a*, 27, 28, 31*b*-33. The narrative of E relative to the delivery of these laws has disappeared,[6] but xxiv. 3-8 (which manifestly have no connexion with their immediate context) clearly point back to some such narrative. These verses describe how Moses wrote all the words of the Lord in a *book* and recited them to the *people* (*v.* 7) as the basis of a covenant, which was solemnly ratified by the sprinkling of the blood of the accompanying sacrifices.

In the existing text the covenant laws of E (xx. 24-26, xxii. 29-31, xxiii. 10-19) are combined with a mass of civil and other legislation; hence the title " Book of the Covenant " (referred to above, xxiv. 7) has usually been applied to the whole section, xx. 22–xxiii. 33. But this section includes three distinct elements: (*a*) the " words " (הדברים) found in xx. 24-26, xxii. 29-31, xxiii. 1-10; (*b*) the " judgments " (המשפטים), xxi. 2–xxii. 17; and (*c*) a group of moral and ethical enactments, xxii. 18-28, xxiii. 1-9; and an examination of their contents makes it evident that, though the last two groups are unmistakably derived from E, they cannot have formed part of the original " Book of the Covenant "; for the " judgments," which are expressed in a hypothetical form, consist of a number of legal decisions on points of civil law. The cases dealt with fall into five divisions: (1) The rights of slaves, xxi. 2-11; (2) capital offences, xxi. 12-16 (*v.* 17 has probably been added later); (3) injuries inflicted by man or beast, xxi. 18-32; (4) losses incurred by culpable negligence or theft, xxi. 33–xxii. 6; (5) cases arising out of deposits, loans, seduction, xxii. 7-17. It is obvious, from their very nature, that these legal precedents could not have been included in the covenant which the *people* (xxiv. 3) promised to observe, and it is now generally admitted that the words " and the judgments " (which are missing in c. 1 *b*) have been inserted in xxiv. 3*a* by the redactor to whom the present position of the " judgments " is due.[7] The majority of critics, therefore, adopt Kuenen's conjecture that the " judgments " were originally delivered by Moses on the borders of Moab, and that when D's revised version of Ex. xxi.-xxiii. was combined with JE, the older code was placed alongside of E's other legislation at Horeb. The third group of laws (xxii. 18-28, xxiii. 1-9) appears to have been added somewhat later than the bulk of xxi.-xxiii. Some of the regulations are couched in hypothetical form, but their contents are of a different character to the " judgments," *e.g.* xxii. 25 f., xxiii. 4 f.; others, again, are of a similar nature, but differ in form, *e.g.* xxii. 18 f. Lastly, xxii. 20-24, xxiii. 1-3 set forth a number of moral injunctions affecting the individual, which cannot have found place in a civil code. At the same time, these additions must for the most part be prior to D, since many of them are included in Deut. xii.-xxvi., though there are traces of Deuteronomic revision.

Now it is obvious that the results obtained by the foregoing analysis of J and E have an important bearing on the history of the remaining section of E's legislation, viz. the Decalogue (*q.v.*), Ex. xx. 1-17 (=Deut. v. 6-21). At present the " Ten Words " stand in the forefront of E's collection of laws, and it is evident that they were already found in that position by the author of Deuteronomy, who treated them as the sole basis of the covenant at Horeb. The evidence, however, afforded (*a*) by the parallel version of Deuteronomy and (*b*) by the literary analysis of J and E not only fails to support this tradition, but excites the gravest suspicions as to the originality both of the *form* and of the *position* in which the Decalogue now appears. For when compared with Ex. xx. 1-17 the parallel version of Deut. v. 6 ff. is found to exhibit a number of variations, and, in particular, assigns an entirely different reason for the observance of the Sabbath. But these variations are practically limited to the explanatory comments attached to the 2nd, 4th, 5th and 10th commandments; and the majority of critics are now agreed that these comments were added at a later date, and that all the commandments, like the 1st and the 6th to the 9th, were originally expressed in the form of a single short sentence. This view is confirmed by the fact that the additions, or comments, bear, for the most part, a close resemblance to the style of D. They can scarcely, however, have been transferred from Deuteronomy to Exodus (or vice versa), owing to the variations between the two versions: we must rather regard them as the work of a Deuteronomic redactor. But the expansion and revision of the Decalogue were not limited to the Deuteronomic school. Literary traces of J and E in the 2nd, 3rd, 4th and 10th commandments point to earlier activity on the part of RJE, while the addition of *v.* 11, which bases the observance of the Sabbath on P's narrative of the Creation (Gen. ii. 1-3), can only be ascribed to a priestly writer: its absence from Deut. v. 6 ff. is otherwise inexplicable. Thus the Decalogue, as given in Exodus, would seem to have passed through at least three stages before it assumed its present form. But even in its original form it could hardly have formed part of E's Horeb legislation; for (*a*) both J and E have preserved a different collection of laws (or " words ") inscribed by Moses, which are definitely set forth as the basis of the covenant at Sinai-Horeb (Ex. xxxiv. 10, xxiv. 3 f.), and (*b*) the further legislation of E in ch. xx.–xxiii. affords close parallels to all the commandments (except the 7th and the 10th), and a comparison of the two leaves no doubt as to which is the more primitive. Hence we can only conclude that the Decalogue, in its original short form, came into existence during the period after the completion of E, but before the promulgation of Deuteronomy. Its present position is, doubtless, to be ascribed to a redactor who was influenced by the same conception as the author of Deuteronomy. This redactor, however, did not limit the Horeb covenant to the Decalogue, but retained E's legislation alongside of it. The insertion of the Decalogue, or rather the point of view which prompted its insertion, naturally involved certain consequential changes of the existing text. The most important of these, viz. the harmonistic additions to ch. xxxiv., by means of which J's version of the covenant was represented as a renewal of the Decalogue, has already been discussed; other passages which show traces of similar revision are xxiv. 12-15*a*, 18*b*, and xxxiv. 1-6.

The confusion introduced into the legislation by later additions, with the consequent displacement of earlier material, has not been without effect on the narratives belonging to the different sources. Hence the sequence of events after the completion of the covenant on Sinai-Horeb is not always easy to trace, though indications are not wanting in both J and E of the probable course of the history. The two main incidents that precede the departure of the children of Israel from the mountain (Num. x. 29 ff.) are (1) the sin of the people, and (2) the intercession of Moses, of both of which a double account has been preserved.

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[1] Unless we follow Riedel and read simply " and worshipped " (וישתחוו) instead of " and drank " (וישתו), treating " and ate " (ויאכלו) as a later addition; cf. *HDB*, extra vol. p. 631 note.

[2] *Vv.* 6-9 are out of place here: they belong to the story of Moses' intercession in ch. xxxiii.

[3] This view is confirmed by (*a*) a comparison of *v.* 1*b* (" and I will write ") with *vv.* 27, 28; according to the latter, *Moses* wrote the words of the covenant; and (*b*) the tardy mention of Moses in 4*b*; the name would naturally be given at the beginning of the verse.

[4] Others suppose that the present position of ch. xxxiv. is due, in the first instance, to RJE, but in view of the other Deuteronomic expansions in *vv.* 10*b*-16, 23, 24, it is more probable that J's version was discarded by RJE in favour of E's, and was afterwards restored by RD.

[5] Reading " the sacrifice of my feasts " for " the sacrifice of the feast of the Passover."

[6] Unless, with Bacon, we are to regard xxiv. 12-14, 18*b* as original. More probably a later editor has worked up old material of E (of which there are unmistakable traces) in order to include the whole of xx.-xxiii. in the covenant: xxiv. 15-18*a* are an addition from P.

[7] The present text of xxiv. 12 also has probably been transposed in accordance with the view that the " judgment " formed part of the covenant, cf. Deut. v. 31. Originally the latter part of the verse must have run, " That I may give thee the tables of stone which I have written, and may teach thee the law and the commandment." For further details see Bacon, *Triple Tradition of Exodus*, pp. 111 f., 132 f.

(1) *The Sin of the People.*—According to J (xxxii. 25-29) the people, during the absence of Moses, "break loose," *i.e.* mutiny. Their behaviour excites the anger of Moses on his return, and in response to his appeal the sons of Levi arm themselves and slay a large number of the people: as a reward for their services they are bidden to consecrate themselves to Yahweh. The fragmentary form of the narrative—we miss especially a fuller account of the "breaking loose"—is doubtless due to the latter editor, who substituted the story of the golden calf (xxxii. 1-6, 15-24, 35), according to which the sin of the people consisted in direct violation of the 2nd commandment. At the instigation of the people Aaron makes a molten calf out of the golden ornaments brought from Egypt; Moses and Joshua, on their return to the camp, find the people holding festival in honour of the occasion; Moses in his anger breaks the tables of the covenant which he is carrying: he then demolishes the golden calf, and administers a severe rebuke to Aaron. The punishment of the people is briefly recorded in *v.* 35. This latter narrative, which is obviously inconsistent with the story of J, shows unmistakable traces of E. In its present form, however, it can hardly be original, but must have been revised in accordance with the later Deuteronomic conception which represented the sin committed by the people as a breach of the 2nd commandment. Possibly *vv.* 7-14 are also to be treated as a Deuteronomic expansion (cf. Deut. ix. 12-14). Though they show clear traces of J, it is extremely difficult to fit them into that narrative in view of Moses' action in *vv.* 25-29 and of his intercession in ch. xxxiii.; in any case, *vv.* 8 and 13 must be regarded as redactional.

(2) *Moses' Intercession.*—The time for departure from the Sacred Mount had now arrived, and Moses is accordingly bidden to lead the people to the promised land. Yahweh himself refuses to accompany Israel owing to their disobedience, but in response to Moses' passionate appeal finally consents to let his presence go with them. The account of Moses' intercession has been preserved in J, though the narrative has undergone considerable dislocation. The true sequence of the narrative appears to be as follows: Moses is commanded to lead the people to Canaan (xxxiii. 1-3); he pleads that he is unequal to the task (Num. xi. 10*c*, 11, 12, 14, 15), and, presumably, asks for assistance, which is promised (omitted). Moses then asks for a fuller knowledge of Yahweh and his ways (xxxiii. 12, 13): this request also is granted (*v.* 17), and he is emboldened to pray that he may see the glory of Yahweh; Yahweh replies that his prayer can only be granted in part, for "man shall not see me and live"; a partial revelation is then vouchsafed to Moses (xxxiii. 18-23, xxxiv. 6-8): finally, Moses beseeches Yahweh to go in the midst of his people, and is assured that Yahweh's presence shall accompany them (xxxiv. 9, xxxiii. 14-16). The passage from Numbers xi., which is here included, is obviously out of place in its present context (the story of the quails), and supplies in part the necessary antecedent to Ex. xxxiii. 12, 13; the passage is now separated from Ex. xxxiii. by Ex. xxxiv. (J), which has been wrongly transferred to the close of the Horeb-Sinai incidents (see above), and by the priestly legislation of Ex. xxxv.–xl., Leviticus and Num. i.–x.; but originally it must have stood in close connexion with that chapter. A similar displacement has taken place with regard to Ex. xxxiv. 6-9, which clearly forms the sequel to xxxiii. 17-23. The latter passage, however, can hardly represent the conclusion of the interview, which is found more naturally in xxxiii. 14-16. E's account of Moses' intercession seems to have been retained, in part, in xxxii. 30-34, but the passage has probably been revised by a later hand; in any case its position *before* instead of *after* the dismissal would seem to be redactional.

It is a plausible conjecture that the original narratives of J and E also contained directions for the construction of an ark,[1] as a substitute for the personal presence of Yahweh, and also for the erection of a "tent of meeting" outside the camp, and that these commands were omitted by R^P in favour of the more elaborate instructions given in ch. xxv.–xxix. (P). The subsequent narrative of J (Num. x. 33-36, xiv. 44) implies an account of the making of the ark, while the remarkable description in Ex. xxxiii. 7-11 (E) of Moses' practice in regard to the "tent of meeting" points no less clearly to some earlier statement as to the making of this tent.

The history of Exodus in its original form doubtless concluded with the visit of Moses' father-in-law and the appointment of judges (ch. xviii.), the departure from the mountain and the battle with Amalek (xvii. 8-16).

(*c*) *The Construction of the Tabernacle and its Furniture* (ch. xxv.–xxxi., xxxv.–xl.).—It has long been recognized that the elaborate description of the Tabernacle and its furniture, and the accompanying directions for the dress and consecration of the priests, contained in ch. xxv.–xxxi., have no claim to be regarded as an historical presentment of the Mosaic Tabernacle and its service. The language, style and contents of this section point unmistakably to the hand of P; and it is now generally admitted that these chapters form part of an ideal representation of the post-exilic ritual system, which has been transferred to the Mosaic age. According to this representation, Moses, on the seventh day after the conclusion of the covenant, was summoned to the top of the mountain, and there received instructions with regard to (*a*) the furniture of the sanctuary, viz. the ark, the table and the lamp-stand (ch. xxv.); (*b*) the Tabernacle (ch. xxvi.); (*c*) the court of the Tabernacle and the altar of burnt-offering (ch. xxvii.); (*d*) the dress of the priests (ch. xxviii.); (*e*) the consecration of Aaron and his sons (xxix. 1-37); and (*f*) the daily burnt-offering (xxix. 38-42): the section ends with a formal conclusion (xxix. 43-46). The two following chapters contain further instructions relative to the altar of incense (xxx. 1-10), the payment of the half-shekel (11-16), the brazen laver (17-21), the anointing oil (22-33), the incense (34-38), the appointment of Bezaleel and Oholiab (xxxi. 1-11) and the observance of the Sabbath (12-17). It is hardly doubtful, however, that these two chapters formed no part of P's original legislation, but were added by a later hand.[2] For (1) the altar of incense is here mentioned for the first time, and was apparently unknown to the author of ch. xxv.–xxix. Had he known of its existence, he could hardly have failed to include it with the rest of the Tabernacle furniture in ch. xxvi., and must have mentioned it at xxvi. 34 f., where the relative positions of the contents of the Tabernacle are defined: further, the ritual of the Day of Atonement (Lev. xvi. referred to in xxx. 10) ignores this altar, and mentions only *one* altar (cf. "*the* altar," xxvii. 1), viz. that of burnt-offering; (2) the command as to the half-shekel presupposes the census of Num. i., and appears to have been unknown in the time of Nehemiah (Neh. x. 32) (Heb. 33); (3) the instructions as to the brazen laver would naturally be expected alongside of those for the altar of burnt-offering in ch. xxvii.; (4) the following section relating to the anointing oil presupposes the altar of incense (*v.* 28), and further extends the ceremony of anointing to Aaron's sons, though, elsewhere, the ceremony is confined to Aaron (xxix. 7, Lev. viii. 12), cf. the title "anointed priest" applied to the high priest (Lev. iv. 3, &c.); (5) the directions for compounding the incense connect naturally with xxx. 1-10, while (6) the appointment of Bezaleel and Oholiah cannot be separated from the rest of ch. xxx.–xxxi. The concluding section on the Sabbath (xxxi. 12-17) shows marks of resemblance to H (Lev. xvii.–xxvi.), especially in *vv.* 12-14*a*, which appear to have been expanded, very possibly by the editor who inserted the passage. The continuation of P's narrative is given in xxxiv. 29-35, which describe Moses' return from the mount. The subsequent chapters (xxxv.–xl.), however, can hardly belong to the original stratum of P, if only because they presuppose ch. xxx., xxxi., and were probably added at a later stage than the latter chapters. They narrate how the commands of ch. xxv.–xxxi. were carried out, and practically repeat the earlier chapters *verbatim*, merely the tenses being changed, the most noticeable omissions being xxvii. 20 f. (oil for the lamps), xxviii. 30 (Urim and Thummim), xxix. 1-37 (the consecration of the priests, which recurs in Lev. viii.) and xxix. 38-42 (the daily burnt-offering). Apart from the omissions the most striking difference between the two sections is the variation in order, the different sections of ch. xxv.–xxxi. being here set forth in their natural sequence. The secondary character of these concluding chapters receives considerable confirmation from a comparison of the Septuagint text. For this version exhibits numerous cases of variation, both as regards *order* and *contents*, from the Hebrew text; moreover the translation, more particularly of many technical terms, differs from that of ch. xxv.–xxxi., and seems to be the work of different translators. Hence it is by no means improbable that the final recension of these chapters had not been completed when the Alexandrine version was made.

AUTHORITIES.—In addition to the various English and German commentaries on Exodus included under the head of the Pentateuch, the following English works are especially worthy of mention: S. R. Driver, *Introd. to the Literature of the O.T.*, and "Exodus" in the *Camb. Bible*; B. W. Bacon, *The Triple Tradition of the Exodus* (Hartford, U.S.A., 1894), and A. H. McNeile, *The Book of Exodus* (Westminster Commentaries) (1908); also the articles on "Exodus" by G. Harford-Battersby (Hastings, *Dict. Bib.* vol. i.) and by G. F. Moore, *Ency. Biblica*, vol. ii. (J. F. St.)

EXODUS, THE, the name given to the journey (Gr. ἔξοδος) of the Israelites from Egypt into Palestine, under the leadership of Moses and Aaron, as described in the books of the Bible from Exodus to Joshua. These books contain the great national epic of Judaism relating the deliverance of the people from bondage in Egypt, the overthrow of the pursuing Pharaoh and his army, the divinely guided wanderings through the wilderness and the final entry into the promised land. Careful criticism of the narratives[3] has resulted in the separation of later accretions from the earliest records, and the tracing of the elaboration of older traditions under the influence of developing religious and social institutions. In the story of the Exodus there have been incorporated codes of laws and institutions which were to be observed by the descendants of the Israelites in their future home, and these, really of later origin, have thus been thrown back to the earlier period in order to give them the stamp of authority. So, although a certain amount of the narrative *could* date from the days of Moses, the Exodus story has been made the vehicle for the aims and ideals of subsequent ages, and has been adapted from time to time to the requirements of later stages of thought. The work of criticism has brought to light important examples of fluctuating tradition, singular lacunae in some places and unusual wealth of tradition in others, and has demonstrated that much of that which had long been felt to be impossible and incredible was due to writers of the post-exilic age many centuries after the presumed date of the events.

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[1] According to Deut. x. 1 f., which is in the main a *verbal* excerpt from Ex. xxxiv. 1 f., Yahweh ordered Moses to make an ark of acacia wood *before* he ascended the mountain.

[2] To the same hand are to be ascribed also xxvii. 6, 20, 21; xxviii. 41; xxix. 21, 38-41.

[3] See the articles on the books in question.

The book of Genesis closes with the migration of Jacob's family into Egypt to escape the famine in Canaan. Jacob died and was buried in Canaan by his sons, who, however, returned again to the pastures which the Egyptian king had granted them in Goshen. Their brother Joseph on his death-bed promised that God would bring them to the land promised to their forefathers and solemnly adjured them to carry up his bones (Gen. l.). In the book of Exodus the family has become a people.[1] The Pharaoh is hostile, and Yahweh, the Israelite deity, is moved to send a deliverer; on the events that followed see Exodus, Book of; Moses. It has been thought that dynastic changes occasioned the change in Egyptian policy (*e.g.* the expulsion of the Hyksos), but if the Israelites built Rameses and Pithom (Ex. i. 11), cities which, as excavation has shown, belong to the time of Rameses II. (13th century B.C.), earlier dates are inadmissible. On these grounds the Exodus may have taken place under one of his successors, and since Mineptah or Merneptah (son of Rameses), in relating his successes in Palestine, boasts that *Ysiraal* is desolated, it would seem that the Israelites had already returned. On the other hand, it has been suggested that when Jacob and his family entered Egypt, some Israelite tribes had remained behind and that it is to these that Mineptah's inscription refers. The problem is complicated by the fact that, from the Egyptian evidence, not only was there at this time no remarkable emigration of oppressed Hebrews, but Bedouin tribes were then receiving permission to enter Egypt and to feed their flocks upon Egyptian soil. It might be assumed that the Israelites (or at least those who had not remained behind in Palestine) effected their departure at a somewhat later date, and in the time of Mineptah's successor, Seti II., there is an Egyptian report of the pursuit of some fugitive slaves over the eastern frontier. The value of all such evidence will naturally depend largely upon the estimate formed of the biblical narratives, but it is necessary to observe that these have not yet found Egyptian testimony to support them. Although the information which has been brought to bear upon Egyptian life and customs substantiates the general accuracy of the local colouring in some of the biblical narratives, the latter contain several inherent improbabilities, and whatever future research may yield, no definite trace of Egyptian influence has so far been found in Israelite institutions.

No allusions to Israelites in Egypt have yet been found on the monuments; against the view that the Aperiu (or Apury) of the inscriptions were Hebrews, see S. R. Driver in D. G. Hogarth, *Authority and Archaeology*, pp. 56 sqq.; H. W. Hogg, *Ency. Bib.* col. 1310. The plagues of Egypt have been shown to be those to which the land is naturally subject (R. Thomson, *Plagues of Egypt*), but the description of the relations of Moses and Aaron to the court raises many difficult questions (H. P. Smith, *O.T. Hist.* pp. 57-60). Those who reject Ex. i. 11 and hold that 480 years elapsed between the Exodus and the foundation of the temple (1 Kings vi. 1, see Bible: *Chronology*) place the former about the time of Tethmosis (Thothmes) III., and suppose that the hostile Ḥabiri (Khabiri) who troubled Palestine in the 15th century are no other than Hebrews (the equation is philologically sound), *i.e.* the invading Israelites.[2] But although the evidence of the Amarna tablets might thus support the biblical tradition in its barest outlines, the view in question, if correct, would necessitate the rejection of a great mass of the biblical narratives as a whole.

In the absence of external evidence the study of the Exodus of the Israelites must be based upon the Israelite records, and divergent or contradictory views must be carefully noticed. Regarded simply as a journey from Egypt into Palestine it is the most probable of occurrences: the difficulty arises from the actual narratives. The first stage is the escape from the land of Goshen (*q.v.*), the district allotted to the family of Jacob (Gen. xlvi. 28-34, xlvii. 1, 4, 6).[3] As to the route taken across the Red Sea (*Yam Sūph*) scholars are not agreed (see W. M. Müller, *Ency. Bib.* col. 1436 sqq.); it depends upon the view held regarding the second stage of the journey, the road to the mountain of Sinai or Horeb and thence to Kadesh. The last-mentioned place is identified with Ain Kadīs, about 50 m. south of Beersheba; but the identification of the mountain is uncertain, and it is possible that tradition confused two distinct places. According to one favourite view, the journey was taken across the Sinaitic peninsula to Midian, the home of Jethro. Others plead strongly for the traditional site Jebel Mūsā or Serbāl in the south of the peninsula (see J. R. Harris, *Dict. Bible*, iv. pp. 536 sqq.; H. Winckler, *Ency. Bib.* col. 4641). The latter view implies that the oppressed Israelites left Egypt for one of its dependencies, and both theories find only conjectural identifications in the various stations recorded in Num. xxxiii. But this list of forty names, corresponding to the years of wandering, is from a post-exilic source, and may be based merely upon a knowledge of caravan-routes; even if it be of older origin, it is of secondary value since it represents a tradition differing notably from that in the earlier narratives themselves, and these on inspection confirm Judg. xi. 16 seq., where the Israelites proceed immediately to Kadesh.

Ex. xvi.-xviii. presuppose a settled encampment and a law-giving, and thus belong to a stage *after* Sinai had been reached (Ex. xix. sqq.). They are closely related, as regards subject matter, &c., to the narratives in Num. x. 29-xi., xx. 1-13 (Sinai to Kadesh), and the initial step is the recognition that the latter is their original context (see G. F. Moore, *Ency. Bib.* col. 1443 [v.]). Further, internal peculiarities associating events now at Sinai-Horeb with those at Kadesh support the view that Kadesh was their true scene, and it is to be noticed that in Ex. xv. 22 seq. the Israelites already reach the wilderness of Shur and accomplish the three days' journey which had been their original aim (cf. Ex. iii. 18, v. 3, viii. 27). The wilderness of Shur (Gen. xvi. 7, xx. 1; 1 Sam. xv. 7, xxvii. 8) is the natural scene of conflicts with Amalekites (Ex. xvii. 8 sqq.), and its sanctuary of Kadesh or En Mishpat ("well of judgment," Gen. xiv. 7) was doubtless associated with traditions of the giving of statutes and ordinances. The détour to Sinai-Horeb appears to belong to a later stage of the tradition, and is connected with the introduction of laws and institutions of relatively later form. It is foreshadowed by the injunction to avoid the direct way into Palestine (see Ex. xiii. 17-19), since on reaching Kadesh the Israelites would be within reach of hostile tribes, and the conflicts which it was proposed to avoid actually ensued.[4] The forty years of wandering in the wilderness is characteristic of the Deuteronomic and post-exilic narratives; in the earlier sources the fruitful oasis of Kadesh is the centre, and even after the tradition of a détour to Sinai-Horeb was developed, only a brief period is spent at the holy mountain.

From Kadesh spies were sent into Palestine, and when the people were dismayed at their tidings and incurred the wrath of Yahweh, the penalty of the forty years' delay was pronounced

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[1] There is a lacuna between the oldest traditions in Genesis and those in Exodus: the latter beginning simply "and there arose a new king over Egypt which knew not Joseph." The interval between Jacob's arrival in Egypt and the Exodus is given varyingly as 400 or 430 years (Gen. xv. 13, Ex. xii. 40 seq., Acts vii. 6); but the Samaritan and Septuagint versions allow only 215 years (Ex. *loc. cit.*), and a period of only four generations is presupposed in Gen. xv. 16 (cf. the length of the genealogies between the contemporaries of Joseph and those of Moses in Ex. vi. 16-20).

[2] See, *e.g.*, J. Orr, *Problem of the O.T.* pp. 422 sqq.; Ed. Meyer, *Die Israëliten*, pp. 222 sqq. Some, too, find in the Amarna tablets the historical background for Joseph's high position at the Egyptian court (see Cheyne, *Ency. Bib.* art. "Joseph").

[3] For the varying traditions regarding the number of the people and their residence (whether settled apart, cf., *e.g.*, Gen. xlvi. 34, Ex. viii. 22, ix. 26, x. 23, or in the midst of the Egyptians) see the recent commentaries.

[4] See further J. Wellhausen, *Prolegomena*, pp. 342 sqq.; G. F. Moore, *Ency. Bib.* col. 1443; S. A. Cook, *Jew. Quart. Rev.* (1906), pp. 741 sqq. (1907), p. 122, and art. Moses. Ex. xiii. 17-19 forbids the compromise which would place Sinai-Horeb in the neighbourhood of Kadesh (A. E. Haynes, *Pal. Explor. Fund, Quart. Statem.* (1896), pp. 175 sqq.; C. F. Kent [see *Lit.* below], p. 381).

(Num. xiii. seq.). Originally Caleb alone was exempt and for his faith received a blessing; later tradition adds Joshua and in Deut. i. 37 seq. alludes to some unknown offence of Moses. According to Num. xxi. 1-3 the Israelites (a generalizing amplification) captured Hormah, on the way to Beersheba, and subsequently the clan Caleb and the Kenites (the clan of Moses' father-in-law) are found in Judah (Judg. i. 16). Although the traditions regard their efforts as part of a common movement (from Gilgal, see below), it is more probable that these (notably Caleb) escaped the punishment which befell the rest of the Israelites, and made their way direct from Kadesh into the south of Palestine.[1] On the other hand, according to the prevailing tradition, the attempt to break northwards was frustrated by a defeat at Hormah (Num. xiv. 40-45), an endeavour to pass Edom failed, and the people turned back to the *Yam Sūph* (here at the head of the Gulf of Akabah) and proceeded up to the east of Edom and Moab. Conflicting views are represented (on which see Moab), but at length Shittim was reached and preparations were made to cross the Jordan into the promised land. This having been effected, Gilgal became the base for a series of operations in which the united tribes took part. But again the representations disagree, and to the overwhelming campaigns depicted in the book of Joshua most critics prefer the account of the more gradual process as related in the opening chapter of the book of Judges (see Jews: *History*, § 8).

Thus, whatever evidence may be supplied by archaeological research, the problem of the Exodus must always be studied in the light of the biblical narratives. That the religious life of Israel as portrayed therein dates from this remote period cannot be maintained against the results of excavation or against the later history, nor can we picture a united people in the desert when subsequent vicissitudes represent the union as the work of many years, and show that it lasted for a short time only under David and Solomon. During the centuries in which the narratives were taking shape many profound changes occurred to affect the traditions. Developments associated with the Deuteronomic reform and the reorganization of Judaism in post-exilic days can be unmistakably recognized, and it would be unsafe to assume that other vicissitudes have not also left their mark. Allowance must be made for the shifting of boundaries or of spheres of influence (Egypt, Edom, Moab), for the incorporation of tribes and of their own tribal traditions, and in particular for other movements (*e.g.* from Arabia).[2] If certain clans moved direct from Kadesh into Judah, it is improbable that others made the lengthy détour from Kadesh by the Gulf of Akabah, but this may well be an attempt to fuse the traditions of two distinct migrations. Among the Joseph-tribes (Ephraim and Manasseh), the most important of Israelite divisions, the traditions of an ancestor who had lived and died in Egypt would be a cherished possession, but although most writers agree that not all the tribes were in Egypt, it is impossible to determine their number with any certainty. At certain periods, intercourse with Egypt was especially intimate, and there is much in favour of the view that the name Mizraim (Egypt) extended beyond the borders of Egypt proper. Reference has already been made to other cases of geographical vagueness, and one must recognize that in a body of traditions such as this there was room for the inclusion of the most diverse elements which it is almost hopeless to separate, in view of the scantiness of relevant evidence from other sources, and the literary intricacy of the extant narratives. That many different beliefs have influenced the tradition is apparent from what has been said above, and is especially noticeable from a study of the general features. Thus, although the Israelites possessed cattle (Ex. xvii. 3, xix. 13, xxiv. 5, xxxii. 6, xxxiv. 3; Num. xx. 19), allusion is made to their lack of meat in order to magnify the wonders of the journey, and among divinely sent aids to guide and direct the people upon the march not only does Moses require the assistance of a *human* helper (Jethro or Hobab), but the angel, the ark, the pillar of cloud and of fire and the mysterious hornet are also provided.

In addition to the references already given, see J. W. Colenso, *Pentateuch and Book of Joshua* (on internal difficulties); A. Jeremias, *Alte Test. im Lichte d. alt. Orients*^{2} (pp. 402 sqq., on later references in Manetho, &c., with which cf. also R. H. Charles, *Jubilees*, p. 245 seq.); art. "Exodus" in *Ency. Bib.*; Ed. Meyer, *Israëliten* (*passim*); Bönhoff, *Theolog. Stud. u. Krit.* (1907), pp. 159-217; the histories of Israel and commentaries on the book of Exodus. Among the numerous special works, mention may be made of G. Ebers, *Durch Gosen zum Sinai*; E. H. Palmer, *Desert of the Exodus*; O. A. Toffteen, *The Historic Exodus*; fuller information is given in L. B. Paton, *Hist. of Syria and Palestine*, p. 34 (also ch. viii.); and C. F. Kent, *Beginnings of Heb. Hist.* p. 355 seq. (S. A. C.)

EXOGAMY (Gr. ἔξω, outside; and *γάμος*, marriage), the term proposed by J. F. McLennan for the custom compelling marriage "out of the tribe" (or rather "out of the totem"); its converse is endogamy (*q.v.*). McLennan would find an explanation of exogamy in the prevalence of female infanticide, which, "rendering women scarce, led at once to polyandry within the tribe, and the capturing of women from without." Infanticide of girls is, and no doubt ever has been, a very common practice among savages, and for obvious reasons. Among tribes in a primitive stage of social organization girl-children must always have been a hindrance and a source of weakness. They had to be fed and yet they could not take part in the hunt for food, and they offered a temptation to neighbouring tribes. Infanticide, however, is not proved to have been so universal as McLennan suggests, and it is more probable that the reason of exogamy is really to be found in that primitive social system which made the "captured" woman the only wife in the modern sense of the term. In the beginnings of human society children were related only to their mother; and the women of a tribe were common property. Thus no man might appropriate any female or attempt to maintain proprietary rights over her. With women of other tribes it would be different, and a warrior who captured a woman would doubtless pass unchallenged in his claim to possess her absolutely. Infanticide, the evil physical effects of "in-and-in" breeding, the natural strength of the impulse to possess on the man's part, and the greater feeling of security and a tendency to family life and affections on the woman's, would combine to make exogamy increase and marriages within the tribe decrease. A natural impulse would in a few generations tend to become a law or a custom, the violation of which would be looked on with horror. Physical capture, too, as soon as increasing civilization and tribal intercommunication removed the necessity for violence, became symbolic of the more permanent and individual relations of the sexes. An additional explanation of the prevalence of exogamy may be found in the natural tendency of exogamous tribes to increase in numbers and strength at the expense of those communities which moved towards decadence by in-breeding. Thus tradition would harden into a prejudice, strong as a principle of religion, and exogamy would become the inviolable custom it is found to be among many races. In Australia, Sir G. Grey writes: "One of the most remarkable facts connected with the natives is that they are divided into certain great families, all the members of which bear the same name . . . these family names are common over a great portion of the continent and a man cannot marry a woman of his own family name." In eastern Africa, Sir R. Burton says: "The Somal will not marry one of the same, or even of a consanguineous family," and the Bakalahari have the same rule. Paul B. du Chaillu found exogamy the rule and blood marriages regarded as an abomination throughout western Equatorial Africa. In India the Khasias, Juangs, Waralis, Oraons, Hos and other tribes are strictly exogamous. The Kalmucks are divided into hordes, and no man may marry a woman of the same horde. Circassians and Samoyedes have similar rules. The Ostiaks regard endogamy (marriage within the clan) as a crime, as do the Yakuts of Siberia. Among the Indians of America severe rules prescribing exogamy prevail. The Tsimsheean Indians of British Columbia are divided into tribes and totems, or "crests which are common to all the tribes," says one writer. "The crests are the whale, the porpoise, the eagle, the coon, the wolf and the frog. . . . The relationship existing between persons of the same crest is nearer than that between members of the same tribe. . . . Members of the same tribe may marry, but those of the same crest are not allowed to under any circumstances; that is, a whale may not marry a whale, but a whale may marry a frog, &c." The Thlinkeets, the Mayas of Yucatan and the Indians of Guiana are exogamous, observing a custom which is thus seen to exist throughout Africa, in Siberia, China, India, Polynesia and the Americas.

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[1] So B. Stade, Steuernagel, Guthe, G. F. Moore, H. P. Smith, C. F. Kent, &c. See Caleb; Jerahmeel; Judah; Kenites; Levites; and Jews: *History*, §§ 5, 20 (end).

[2] An instructive parallel to the last-mentioned is afforded by Dissard's account of the migration of Arab tribes into Palestine in the 18th century A.D. (*Revue biblique*, July 1905).

Authorities.—J. F. McLennan, *Primitive Marriage* (1865), and *Studies in Anc. Hist.* (1896); Lord Avebury, *Origin of Civilization* (1902); Westermarck, *History of Human Marriage* (1894); A. Lang, *Social Origins* (1903); L. H. Morgan, *Ancient Society* (1877); J. G. Frazer, *Totemism and Exogamy* (1910); see also Totem.

EXORCISM (Gr. ἐξορκίζειν, to conjure out), the expulsion of evil spirits from persons or places by incantations, magical rites or other means. As a corollary of the animistic theory of diseases and of belief in Possession (*q.v.*), we find widely spread customs whose object is to get rid of the evil influences. These customs may take the form of a general expulsion of evils, either once a year or at irregular intervals; the evils, which are often regarded as spirits, sometimes as the souls of the dead, may be expelled, according to primitive philosophy, either immediately by spells, purifications or some form of coercion; or they may be put on the back of a scapegoat or other material vehicle. Among the means of compelling the evil spirits are assaults with warlike weapons or sticks, the noise of musical instruments or of the human voice, the use of masks, the invocation of more powerful good spirits, &c.; both fire and water are used to drive them out, and the use of iron is a common means of holding them at bay.

The term exorcism is applied more especially to the freeing of an individual from a possessing or disease-causing spirit; the means adopted are frequently the same as those mentioned above; in the East Indies the sufferer sometimes dances round a small ship, into which the spirit passes and is then set adrift. The patient may be beaten or means may be employed whose efficiency depends largely on their suggestive nature. Among the Dakota Indians the medicine-man chants *hi-le-li-lah!* at the bed of the sick man and accompanies his chant with the rattle; he then sucks at the affected part till the possessing spirit is supposed to come out and take its flight, when men fire guns at it from the door of the tent. The Zulus believe that they can get rid of the souls of the dead, which cause diseases, by sacrifices of cattle, or by expostulating with the spirits; so too the *shaman* or magician in other parts of the world offers the possessing spirit objects or animals.

The professional exorcist was known among the Jews; in Greece the art was practised by women, and it is recorded that the mothers of Epicurus and Aeschines belonged to this class; both were bitterly reproached, the one by the Stoics, the other by Demosthenes, with having taken part in the practices in question. The prominence of exorcism in the early ages of the Christian church appears from its frequent mention in the writings of the fathers, and by the 3rd century there was an order of exorcists (see Exorcist). The ancient rite of exorcism in connexion with baptism is still retained in the Roman ritual, as is also a form of service for the exorcising of possessed persons. The exorcist signs the possessed person with the figure of the cross, desires him to kneel, and sprinkles him with holy water; after which the exorcist asks the devil his name, and abjures him by the holy mysteries of the Christian religion not to afflict the person possessed any more. Then, laying his right hand on the demoniac's head, he repeats the form of exorcism as follows: "I exorcise thee, unclean spirit, in the name of Jesus Christ; tremble, O Satan, thou enemy of the faith, thou foe of mankind, who hast brought death into the world, who hast deprived men of life, and hast rebelled against justice, thou seducer of mankind, thou root of evil, thou source of avarice, discord and envy." Houses and other places supposed to be haunted by unclean spirits are likewise to be exorcised with similar rites, and in general exorcism has a place in all the ceremonies for consecrating and blessing persons or things (see Benediction).

See Tylor, *Primitive Culture*; Skeat, *Malay Magic*, p. 427 seq.; Frazer, *Golden Bough*, vol. iii. 189; Krafft, *Ausführliche Historie von Exorcismus*; Koldeweg, *Der Exorcismus im Herzogthum Braunschweig*; Brecher, *Das Transcendentale, Magie, etc. im Talmud*, pp. 195-203: *Zeitschr. für Assyriologie* (Dec. 1893, April 1894); Herzog, *Realencykl.*, *s.v.* "Exorcismus"; Waldmeier, *Autobiography*, p. 64; L. W. King, *Babylonian Magic*; Maury, *La Magie*; R. C. Thompson, *Devils and Evil Spirits of Babylonia.*

EXORCIST (Lat. *exorcista*, Gr. ἐξορκίστης), in the Roman Catholic church, the third grade in the minor orders of the clergy, between those of acolyte and reader. The office, which involves the right of ceremonially exorcising devils (see Exorcism), is actually no more than a preliminary stage of the priesthood. The earliest record of the special ordination of exorcists is the 7th canon of the council of Carthage (A.D. 256). "When they are ordained," it runs, "they receive from the hand of the bishop a little book in which the exorcisms are written, receiving power to lay hands on the *energumeni*, whether baptized or catechumens." Whatever its present position, the office of exorcist was, until comparatively recent times, by no means considered a sinecure. "The exorcist a terror to demons" (Paulinus, *Epist.* 24) survived the Reformation among Protestants, with the belief, expressed by Firmilianus in his epistle to St Cyprian, that "through the exorcists, by the voice of man and the power of God, the devil may be whipped, and burnt and tortured."

EXOTIC (Gr. ἐξωτικός, foreign, from ἔξω, outside), of foreign origin, or belonging to another country. The term is now used in the restricted sense of something not indigenous or native, and is mostly applied to plants introduced from foreign countries, which have not become acclimatized. Figuratively, "exotic" is used to convey the sense of something rare, delicate or extravagant.

EXPATRIATION (from Late Lat. *expatriare*, to exile, and *patria*, native land), a term used in a general sense for the banishment of a person from his own country. In international law expatriation is the renunciation or change of allegiance to one's native or adopted country. It may take place either by a voluntary act or by operation of law. Some countries, as France and England, disclaim their subjects if they become naturalized in another country, others, again, passively permit expatriation whether a new nationality has been acquired or not; others, as Germany, make expatriation the consequence of continued absence from their territory. (See Alien; Allegiance; Naturalization.)

EXPERT (Lat. *expertus*, from *experiri*, to try), strictly, skilled, or one who has special knowledge; as used in law, an expert is a person, selected by a court, or adduced by a party to a cause, to give his opinion on some point in issue with which he is peculiarly conversant. In Roman law questions of disputed handwriting were referred to experts; and in France, whenever the court considers that a report by experts is necessary, it is ordered by a judgment clearly setting forth the objects of the *expertise* (Code Proc. Civ. art. 302). Three experts are then to be appointed, unless the parties agree upon one only (art. 303). The experts are required to take an oath (art. 305), but in practice this requirement is frequently dispensed with. They may be challenged on the same grounds as witnesses (art. 310). The necessary documentary and other evidence is laid before them (art. 317), and they make a single report to the court, even if they express different opinions: in that case the grounds only of the different opinions are to be stated, and not the personal opinion of each of the experts (art. 318). If the court is not satisfied with the report, new experts may be appointed (art. 322); the judges are not bound to adopt the opinion of the experts (art. 323). "This procedure in regard to experts is common to both the civil and commercial courts, but it is much more frequently resorted to in the commercial court than in the civil court, and the investigation is usually conducted by special experts officially attached to each of these courts" (Bodington, *French Law of Evidence*, London, 1904, p. 102).

A similar system is to be found in force in many other European countries; see *e.g.* Codes of Civil Procedure of Holland, arts. 222 et seq.; Belgium, arts. 302 et seq.; Italy, arts. 252 et seq.; as well as in those colonies where French law has been followed (Codes of Civil Procedure of Quebec, arts. 392 et seq.; St Lucia, arts. 286 et seq.). In Mauritius the articles of the French law, summarized above, are still nominally in force; but in practice each side calls its own expert evidence, as in England.

There is some evidence that in England the courts were in early times in the habit of summoning to their assistance, apparently as assessors, persons specially qualified to advise upon any scientific or technical question that required to be determined. Thus "in an appeal of maihem (*i.e.* wounding) . . . the court did not know how to adjudge because the wound was new, and then the defendant took issue and prayed the court that the maihem might be examined, on which a writ was sent to the sheriff to cause to come *medicos chirurgieos de melioribus London, ad informandum dominum regem et curiam de his quae eis ex parte domini regis injungerentur* (Year Book, 21 Hen. VII. pl. 30, p. 33). The practice of calling in expert assistance in judicial inquiries was not confined to medico-legal cases. "If matters arise," said Justice Saunders in *Buckley* v. *Rice Thomas* (1554, Plowden, 124 a), "which concern other faculties, we commonly apply for the aid of that science or faculty which it concerns." English procedure, however, being *litigious*, and not, like continental European procedure, *inquisitorial*, in its character, the expert soon became, and still is, simply a witness to speak to matters of opinion.

There is a considerable body of law in England as to expert evidence. Only a few points can be touched upon here. (1) An expert is permitted to refresh his memory in regard to any fact by referring to anything written by himself or under his direction at the time when the fact occurred or at a time when it was fresh in his memory. This is also law generally in the United States (see *e.g.* New York Civil Code, s. 1843). In Scotland, medical and other scientific reports are lodged in process before the trial, and the witness reads them as part of his evidence and is liable to be examined or cross-examined on their contents. (2) In strictness, an expert will not be allowed, in cases of alleged insanity, to say that a litigating or incriminated party is insane or the reverse, and so to usurp the prerogative of the court or jury. But he may be asked whether certain facts or symptoms, *assuming them to be proved*, are or are not indicative of insanity. But in practice this rule is relaxed both in England and in Scotland, and (where it exists) to a still greater extent in America. (3) Foreign law can only be proved in English courts—and the same rule applies in Scotland—(*a*) by obtaining an opinion on the subject from a superior court of the country whose laws are in dispute under the Foreign Law Ascertainment Act 1861 or the British Law Ascertainment Act 1859, or (*b*) by the evidence of a lawyer of the country whose law is in question, or who has studied it *in that country*, or of an official whose position requires, and therefore presumes, a sufficient knowledge of that law. (4) The weight of authority both in England and in America supports the view that an expert is not bound to give evidence as to matters of opinion unless upon an undertaking by the party calling him to pay a reasonable remuneration for his evidence.

Statutory provision has been made in England for the summoning of expert assistance by the legal tribunals in various cases. In the county courts the judge may, if he thinks fit, on the application of either party, call in as assessor one or more persons of skill and experience as to the matters in dispute (County Courts Act 1888, s. 103), and special provision is made for calling in an assessor in employers' liability cases (act of 1880, s. 6) and admiralty matters (see County Courts Admiralty Jurisdiction Acts of 1868 and 1869). In the High Court and court of appeal one or more specially qualified assessors may be called in to assist in the hearing of any cause or matter except a criminal proceeding by the crown (Judicature Acts 1873, s. 56), and a like power is given to both these courts and the judicial committee of the privy council in patent cases (Patents, &c., Act 1883, s. 28). Maritime causes, whether original or on appeal from county courts, are usually taken in the presence of Elder Brethren of the Trinity House, who advise the judge without having any right to control or any responsibility for his decision (see the "Beryl," 1884, 9 P.D. 1), and on appeal in maritime causes nautical assessories are usually called in by the court of appeal, and may be called in by the House of Lords (Judicature Act 1891, s. 3); a like provision is made as to maritime causes in Scottish courts (Nautical Assessors [Scotland] Act 1894). The judicial committee of the privy council, besides its power to call in assessors in patent cases, is authorized to call them in in ecclesiastical causes (Appellate Jurisdiction Act 1876, s. 14).

In addition to the authorities cited in the text, see Taylor, *Law of Evidence* (9th ed., London, 1895); J. D. Lawson, *Law of Expert and Opinion Evidence* (1900).

EXPLOSIVES, a general term for substances which by certain treatment "explode," *i.e.* decompose or change in a violent manner so as to generate force. From the manner and degree of violence of the decomposition they are classified into "propellants" and "detonators," but this classification is not capable of sharp delimitation. In some cases the same substance may be employed for either purpose under altered external conditions; but there are some substances which could not possibly be employed as propellants, and others which can scarcely be induced to explode in the manner known as "detonation." A propellant may be considered as a substance that on explosion produces such a disturbance that neighbouring substances are thrown to some distance; a detonator or disruptor may produce an extremely violent disturbance within a limited area without projecting substances to any great distance. Time is an important, perhaps the most important, factor in this action. A propellant generally acts by *burning* in a more or less rapid and regular manner, producing from a comparatively small volume a large volume of gases; during this action heat is also developed, which, being expended mostly on the gaseous products, causes a further expansion. The noise accompanying an explosion is due to an air wave, and is markedly different in the case of a detonator from a real propellant. Some cases of ordinary combustion can be accelerated into explosions by increasing the area of contact between the combustible and the oxygen supplier, for instance, ordinary gas or dust explosions. Neither temperature nor quantity of heat energy necessarily gives an explosive action. Some metals, *e.g.* aluminium and magnesium, will, in oxidizing, produce a great thermal effect, but unless there be some gaseous products no real explosive action.

Explosives may be mechanical mixtures of substances capable of chemical interaction with the production of large volumes of gases, or definite chemical compounds of a peculiar class known as "endothermic," the decomposition of which is also attended with the evolution of gases in large quantity.

All chemical compounds are either "endothermic" or "exothermic." In endothermic compounds energy, in some form, has been taken up in the act of formation of the compound. Some of this energy has become potential, or rather the compound formed has been raised to a higher potential. This case occurs when two elements can be united only under some compulsion such as a very high temperature, by the aid of an electric current, or spark, or as a secondary product whilst some other reactions are proceeding. For example, oxygen and nitrogen combine only under the influence of an electric spark, and carbon and calcium in the electric furnace. The formation of chlorates by the action of chlorine on boiling potash is a good instance of a complex compound (potassium chlorate), being formed in small quantity as a secondary product whilst a large quantity of primary and simpler products (potassium chloride and water) is forming. In chlorate formation the greater part of the reaction represents a running down of energy and formation of exothermic compounds, with only a small yield of an endothermic substance. Another idea of the meaning of endothermic is obtained from acetylene. When 26 parts by weight of this substance are burnt, the heat produced will warm up 310,450 parts of water 1° C. Acetylene consists of 24 parts of carbon and 2 of hydrogen by weight. The 24 parts of carbon will, if in the form of pure charcoal, heat 192,000 parts of water 1°, and the 2 parts of hydrogen will heat 68,000 parts of water 1°, the total heat production being 260,000 heat units. Thus 26 grams of acetylene give an excess of 50,450 units over the amount given by the constituents. This excess of heat energy[1] is due to some form of potential energy in the compound which becomes actual heat energy at the moment of dissolution of the chemical union. The manner in which a substance is endothermic is of importance as regards the practical employment of explosives. Some particular endothermic state or form results from the mode of formation and the consequent internal structure of the molecule. Physical structure alone can be the cause of a relative endothermic state, as in the glass bulbs known as Rupert's drops, &c., or even in chilled steel. Rupert's drops fly in pieces on being scratched or cut to a certain depth. The cause is undoubtedly to be ascribed to the molecular state of the glass brought about by chilling from the melted state. The molecules have not had time to separate or arrange themselves in easy positions. In steel when melted the carbide of iron is no doubt diffused equally throughout the liquid. When cooled slowly some carbide separates out more or less, and the steel is soft or annealed. When chilled the carbides are retained in solid solution. The volume of chilled glass or steel differs slightly from that in the annealed state.

Superfused substances are probably in a similar state of physical potential or strain. Many metallic salts, and organic compounds especially, will exhibit this state when completely melted and then allowed to cool in a clean atmosphere. On touching with a little of the same substance in a solid state the liquids will begin to crystallize, at the same time becoming heated almost up to their melting-points. The metal gallium shows this excellently well, keeping liquid for years until touched with the solid metal, when there is a considerable rise of temperature as solidification takes place.

All carbon compounds, excepting carbon dioxide, and many if not all compounds of nitrogen, are endothermic. Most of the explosives in common use contain nitrogen in some form.

Exothermic compounds are in a certain sense the reverse of endothermic; they are relatively inert and react but slowly or not at all, unless energy be expended upon them from outside. Water, carbon dioxide and most of the common minerals belong to this class.

The explosives actually employed at the present time include mixtures, such as gunpowders and some chlorate compositions, the ingredients of which separately may be non-explosive; compounds used singly, as guncotton, nitroglycerin (in the form of dynamite), picric acid (as lyddite or melinite), trinitrotoluene, nitrocresols, mercury fulminate, &c.; combinations of some explosive compounds, such as cordite and the smokeless propellants in general use for military purposes; and, finally, blasting and detonating or igniting compositions, some of which contain inert diluting materials as well as one or more high explosives. Many igniting compositions are examples of the last type, consisting of a high explosive diluted with a neutral substance, and frequently containing in addition a composition which is inflamed by the explosion of the diluted high explosive, the flame in turn igniting the actual propellant.

Explosive Mixtures.—The explosive mixture longest known is undoubtedly gunpowder (*q.v.*) in some form—that is, a mixture of charcoal with sulphur and nitre, the last being the oxygen provider. Besides the nitrates of metals and ammonium nitrate, there is a limited number of other substances capable of serving in a sufficiently energetic manner as oxygen providers. A few chlorates, perchlorates, permanganates and chromates almost complete the list. Of these the sodium, potassium and barium chlorates are best known and have been actually tried, in admixture with some combustible substances, as practical explosives. Most other metallic chlorates are barred from practical employment owing to instability, deliquescence or other property.

Of the chlorates those of potassium and sodium are the most stable, and mixtures of either of these salts with sulphur or sulphides, phosphorus, charcoal, sugar, starch, finely-ground cellulose, coal or almost any kind of organic, *i.e.* carbon, compound, in certain proportions, yield an explosive mixture. In many cases these mixtures are not only fired or exploded by heating to a certain temperature, but also by quite moderate friction or percussion. Consequently there is much danger in manufacture and storage, and however these mixtures have been made up, they are quite out of the question as propellants on account of their great tendency to explode in the manner of a detonator. In addition they are not smokeless, and leave a considerable residue which in a gun would produce serious fouling.

Mixtures of chlorates with aromatic compounds such as the nitro- or dinitro-benzenes or even naphthalene make very powerful blasting agents. The violent action of a chlorate mixture is due first to the rapid evolution of oxygen, and also to the fact that a chlorate can be detonated when alone. A drop of sulphuric acid will start the combustion of a chlorate mixture. In admixture with sulphur, sulphides and especially phosphorus, chlorates give extremely sensitive compositions, some of which form the basis of friction tube and firing mixtures.

Potassium and sodium perchlorates and permanganates make similar but slightly less sensitive explosive mixtures with the above-mentioned substances. Finely divided metals such as aluminium or magnesium give also with permanganates, chlorates or perchlorates sensitive and powerful explosives. Bichromates, although containing much available oxygen, form but feeble explosive mixtures, but some compounds of chromic acid with diazo compounds and some acetylides are extremely powerful as well as sensitive. Ammonium bichromate is a self-combustible after the type of ammonium nitrate, but scarcely an explosive.

Explosive Compounds.—Nearly all the explosive compounds in actual use either for blasting purposes or as propellants are nitrogen compounds, and are obtained more or less directly from nitric acid. Most of the propellants at present employed consist essentially of nitrates of some organic compound, and may be viewed theoretically as nitric acid, the hydrogen of which has been replaced by a carbon complex; such compounds are expressed by $M{\cdot}O{\cdot}NO_2$, which indicates that the carbon group is in some manner united by means of oxygen to the nitrogen group. Guncotton and nitroglycerin are of this class. Another large class of explosives is formed by a more direct attachment of nitrogen to the carbon complex, as represented by $M{\cdot}NO_2$. A number of explosives of the detonating type are of this class. They contain the same proportions of oxygen and nitrogen as nitrites, but are not nitrites. They have been termed nitro-derivatives for distinction. One of the simplest and longest-known members of this group is nitrobenzene, $C_6H_5NO_2$, which is employed to some extent as an explosive, being one ingredient in rack-a-rock and other blasting compositions. The dinitrobenzenes, $C_6H_4(NO_2)_2$, made from it are solids which are somewhat extensively employed as constituents of some sporting powders, and in admixture with ammonium nitrate form a blasting powder of a "flameless" variety which is comparatively safe in dusty or "gassy" coal seams.

Picric acid or trinitrophenol, $C_6H_2{\cdot}OH{\cdot}(NO_2)_3$ is employed as a high explosive for shell, &c. It requires, however, either to be enclosed and heated, or to be started by a powerful detonator to develop its full effect. Its compounds with metals, such as the potassium salt, $C_6H_2{\cdot}OK{\cdot}(NO_2)_3$, are when dry very easily detonated by friction or percussion and *always* on heating, whereas picric acid itself will burn very quietly when set fire to under ordinary conditions. Trinitrotoluene, $C_6H_2{\cdot}CH_3{\cdot}(NO_2)_3$, is a high explosive resembling picric acid in the manner of its explosion (to which in fact it is a rival), but differs therefrom in not forming salts with metals. The nitronaphthols, $C_{10}H_6{\cdot}OH{\cdot}NO_2$, and higher nitration products may be counted in the list. Their salts with metals behave much like the picrates.

All these nitro compounds can be reduced by the action of nascent hydrogen to substances called amines (*q.v.*), which are not always explosive in themselves, but in some cases can form nitrates of a self-combustible nature. Aminoacetic acid, for instance, will form a nitrate which burns rapidly but quietly, and might be employed as an explosive. By the action of nitrous acid at low temperatures on aromatic amines, *e.g.* aniline, $C_6H_5NH_2$, diazo compounds are produced. These are all highly explosive, and when in a dry state are for the most part also extremely sensitive to friction, percussion or heat. As many of these diazo compounds contain no oxygen their explosive nature must be ascribed to the peculiar state of union of the nitrogen. This state is attempted to be shown by the formulae such as, for instance, $C_6H_5 \cdot N{:}N \cdot X$, which may be some compound of diazobenzene. Probably the most vigorous high explosive at present known is the substance called hydrazoic acid or azoimide (*q.v.*). It forms salts with metals such as AgN_3, which explode in a peculiar manner. The ammonium compound, NH_4N_3, may become a practical explosive of great value.

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[1] Not necessarily heat energy entirely. A number of substances —acetylides and some nitrogen compounds, such as nitrogen chloride —decompose with extreme violence, but *little heat* is produced.

Mercuric fulminate, $HgC_2N_2O_2$, is one of the most useful high explosives known. It is formed by the action of a solution of mercurous nitrate, containing some nitrous acid, on alcohol. It is a white crystalline substance almost insoluble in cold water and requiring 130 times its weight of boiling water for solution. It may be heated to 180° C. before exploding, and the explosion so brought about is much milder than that produced by percussion. It forms the principal ingredient in cap compositions, in many fuses and in detonators. In many of these compositions the fulminate is diluted by mixture with certain quantities of inert powders so that its sensitiveness to friction or percussion is just so much lowered, or slowed down, that it will fire another mixture capable of burning with a hot flame. For detonating dynamite, guncotton, &c., it is generally employed without admixture of a diluent.

Smokeless Propellants.—Gunpowders and all other explosive mixtures or compounds containing metallic salts must form smoke on combustion. The solids produced by the resolution of the compounds are in an extremely finely-divided state, and on being ejected into the atmosphere become more or less attached to water vapour, which is so precipitated, and consequently adds to the smoke. The simplest examples of propellants of the smokeless class are compressed gases. Compressed air was the propellant for the Zalinski dynamite gun. Liquefied carbon dioxide has also been proposed and used to a slight extent with the same idea. It is scarcely practical, however, because when a quantity of a gas liquefied by pressure passes back again into the gaseous state, there is a great absorption of heat, and any remaining liquid, and the containing vessel, are considerably cooled. Steam guns were tried in the American Civil War in 1864; but a steam gun is not smokeless, for the steam escaping from the long tube or gun immediately condenses on expansion, forming white mist or smoke.

At the earliest stage of the development of guncotton the advantage of its smokeless combustion was fully appreciated (see GUNCOTTON). That it did not at once take its position as *the* smokeless propellant, was simply due to its physical state—a fibrous porous mass—which burnt too quickly or even detonated under the pressure required in fire-arms of any kind. In the early eighties of the 19th century it was found that several substances would partly dissolve or at least gelatinize guncotton, and the moment when guncotton proper was obtained as a colloid or jelly was the real start in the matter of smokeless propellants.

Guncotton is converted into a gelatinous form by several substances, such as esters, *e.g.* ethyl acetate or benzoate, acetone and other ketones, and many benzene compounds, most of which are volatile liquids. On contact with the guncotton a jelly is formed which stiffens as the evaporation of the gelatinizing agent proceeds, and finally hardens when the evaporation is complete. Whilst in a stiff pasty state it may be cut, moulded or pressed into any desired shape without any danger of ignition. In fact guncotton in the colloid state may be hammered on an anvil, and, as a rule, only the portion struck will detonate or fire. Guncotton alone makes a very hard and somewhat brittle mass after treatment with the gelatinizing agent and complete drying, and small quantities of camphor, vaseline, castor oil and other substances are incorporated with the gelatinous guncotton to moderate this hard and brittle state.

All the smokeless powders, of which gelatinized guncottons or nitrated celluloses are the base, are moulded into some conveniently shaped grain, *e.g.* tubes, cords, rods, disks or tablets, so that the rate of burning may be controlled as desired. The Vieille powder, invented in 1887 and adopted in France for a magazine rifle, consisted of gelatinized guncotton with a little picric acid. Later a mixture of two varieties of guncotton gelatinized together was used. In addition to guncottons other explosive or non-explosive substances are contained in some of these powders. Guncotton alone in the colloid state burns very slowly if in moderate-sized pieces, and when subdivided or made into thin rods or strips it is still very mild as an explosive, partly from a chemical reason, viz. there is not sufficient oxygen in it to burn the carbon to dioxide. Many mixtures are consequently in use, and many more have been proposed, which contain some metallic salt capable of supplying oxygen, such as barium or ammonium nitrate, &c., the idea being to accelerate the rate of burning of the guncotton and if possible avoid the production of smoke.

The discovery by A. Nobel that nitroglycerin could be incorporated with collodion cotton to form blasting gelatin (see DYNAMITE) led more or less directly to the invention of ballistite, which differs from blasting gelatin only in the relative amounts of collodion, or soluble nitrated cotton, and nitroglycerin. Ballistite was adopted by the Italian government in 1890 as a military powder. Very many substances and mixtures have been proposed for smokeless powder, but the two substances, guncotton and nitroglycerin, have for the most part kept the field against all other combinations, and for several reasons. Nitroglycerin contains a slight excess of oxygen over that necessary to convert the whole of the carbon into carbon dioxide; it burns in a more energetic manner than guncotton; the two can be incorporated together in any proportion whilst the guncotton is in the gelatinous state; also all the liquids which gelatinize guncotton dissolve nitroglycerin, and, as these gelatinizing liquids evaporate, the nitroglycerin is left entangled in the guncotton jelly, and then shares more or less its colloidal character. In burning the nitroglycerin is protected from detonation by the gelatinous state of the guncotton, but still adds to the rate of burning and produces a higher temperature.

Desirable Qualities.—Smokelessness is one only of the desirable properties of a propellant. All the present so-called smokeless powders produce a little fume or haze, mainly due to the condensation of the steam which forms one of the combustion products. There is often also a little vapour from the substances, such as oils, mineral jelly, vaseline or other hydrocarbon added for lubrication or to render the finished material pliable, &c. The gases produced should neither be very poisonous nor exert a corrosive action on metals, &c. The powder itself should have good keeping qualities, that is, not be liable to chemical changes within ordinary ranges of temperature or in different climates when stored for a few years. In these powders slight chemical changes are generally followed by noticeable ballistic changes. All the smokeless powders of the present day produce some oxide of nitrogen, traces of which hang about the gun after firing and change rapidly into nitrous and nitric acids. Nitrous acid is particularly objectionable in connexion with metals, as it acts as a carrier of oxygen. The fouling from modern smokeless powders is a slight deposit of acid grease, and the remedy consists in washing out the bore of the piece with an alkaline liquid. The castor oil, mineral jelly or camphor, and similar substances added to smokeless powders are supposed to act as lubricants to some extent. They are not as effective in this respect as mineral salts, and the rifling of both small-arms and ordnance using smokeless powders is severely gripped by the metal of the projectile. The alkaline fouling produced by the black and brown powders acted as a preventive of rusting to some extent, as well as a lubricant in the bore.

Danger in Manufacture.—In the case of the old gunpowders, the most dangerous manufacturing operation was incorporation. With the modern colloid propellants the most dangerous operations are the chemical processes in the preparation of nitroglycerin, the drying of guncotton, &c. After once the gelatinizing solvent has been added, all the mechanical operations can be conducted, practically, with perfect safety. This statement appears to be correct for all kinds of nitrated cellulose powders, whether mixed with nitroglycerin or other substances. Should they become ignited, which is possible by a rise of temperature (to say 180°) or contact with a flame, the mixture burns quickly, but does not detonate.

As a rule naval and military smokeless powders are shaped into flakes, cubes, cords or cylinders, with or without longitudinal perforations. All the modifications in shape and size are intended to regulate the rate of burning. Sporting powders are often coloured for trade distinction. Some powders are blackleaded by glazing with pure graphite, as is done with black powders. One object of this glazing is to prevent the grains or pieces becoming joined by pressure; for rods or pieces of some smokeless powders might possibly unite under considerable pressure, producing larger pieces and thus altering the rate of burning. Most smokeless powders are fairly insensitive to shock. All these gelatinized powders are a little less easily ignited than black powders. A slightly different cap composition is required for small-arm cartridges, and cannon cartridges generally require a small primer or starter of powdered black gunpowder.

It is desired that a propellant shall produce the maximum velocity with the minimum pressure. The pressure should start gently so that the inertia of the projectile is overcome without any undue local strain on the breech near the powder chamber, and more especially that as more and more space is given to the gases by the movement of the projectile up the gun to the muzzle, gas should be produced with sufficient rapidity to keep the pressure nearly uniform or slightly increasing along the bore. The leading idea for improvements in relation to propellants is to obtain the greatest possible pressure regularly developed, and at the same time the lowest temperatures. (W. R. E. H.)

Law.—In 1860 an act was passed in England "to amend the law concerning the making, keeping and carriage of gunpowder and compositions of an explosive nature, and concerning the manufacture and use of fireworks" (23 & 24 Vict. c. 139), whereby previous acts on the same subject were repealed, and minute and stringent regulations introduced. Amending acts were passed in 1861 and 1862. In 1875 was passed the Explosives Act (38 & 39 Vict. c. 17), which repealed the former acts, and dealt with the whole subject in a more comprehensive manner. This act, containing 122 sections, and applying to Scotland and Ireland, as well as to England, constitutes, with various orders in council and home office orders, a complete code. The act of 1875 was based on the report of a committee of the House of Commons, public opinion having been greatly excited on the subject by a terrible explosion on the Regent's Canal in 1874. Explosives are thus defined: (1) Gunpowder, nitroglycerin, dynamite, gun-cotton, blasting powders, fulminate of mercury or of other metals, coloured fires, and every other substance, whether similar to those above-mentioned or not, used or manufactured with a view to produce a practical effect by explosion or a pyrotechnic effect, and including (2) fog-signals, fireworks, fuses, rockets, percussion caps, detonators, cartridges, ammunition of all descriptions, and every adaptation or preparation of an explosive as above defined. Part i. deals with gunpowder, providing that it shall be manufactured only at factories lawfully existing or licensed under the act; that it shall be kept (except for private use) only in existing or new magazines or stores, or in registered premises, licensed under the act. Private persons may keep gunpowder for their own use to the amount of thirty pounds. The act also prescribes rules for the proper keeping of gunpowder on registered premises. Part ii. deals with nitro-glycerin and other explosives; part iii. with inspection, accidents, search, &c.; part iv. contains various supplementary provisions. By order in council the term "explosive" may be extended to any substance which appears to be specially dangerous to life or property by reason of its explosive properties, or to any process liable to explosion in the manufacture thereof, and the provisions of the act then extend to such substance just as if it were included in the term "explosive" in the act. The act lays down minute and stringent regulations for the sale of gunpowder, restricting the sale thereof in public thoroughfares or places, or to any child apparently under the age of thirteen; requiring the sale of gunpowder to be in closed packages labelled; it also lays down general rules for conveyance, &c. The act also gives power by order in council to define, from time to time, the composition, quality and character of any explosive, and to classify explosives, and such orders in council are frequently made including new substances; those in force will be found in the *Statutory Rules and Orders*, tit. "explosive substance." The Merchant Shipping Act 1894 imposes restrictions on the carriage of dangerous goods in a British or foreign vessel, "dangerous goods" meaning aquafortis, vitriol, naphtha, benzine, gunpowder, lucifer matches, nitro-glycerin, petroleum and any explosive within the meaning of the Explosives Act 1875. The act is administered by the home office, and an annual report is published containing the proceedings of the inspectors of explosives and an account of the working of the act. Each annual report gives a list of explosives at the time authorized for manufacture or importation, and appendices containing information as to accidents, experiments, &c.

Practically every European country has legislated on the lines of the English act of 1875, Austria taking the lead, in 1877, with an explosives ordinance almost identical with the English act. The United States and the various English colonies also have explosives acts regulating the manufacture, storage and importation of explosives. (See also Petroleum.) (T. A. I.)

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EXPRESS (through the French from the past participle of the Lat. *exprimere*, to press out, by transference used of representing objects in painting or sculpture, or of thoughts, &c. in words), a word signifying that which is clearly and definitely set forth or represented, explicit, and thus used of a meaning, a law, a contract and the like, being specially contrasted with "implied." Thus in law, malice, for which there is actual evidence, as apart from that which may be inferred from the acts of the person charged, is known as "express." The word is most frequently used with the idea of something done with a definite purpose; the term "express train," now meaning one that travels at a high speed over long distances with few intermediate stoppages, was, in the early days of railways, applied to what is now usually called a "special," *i.e.* a train not running according to the ordinary time-tables of the railway company, but for some specific purpose, or engaged by a private person. About 1845 this term became used for a train running to a particular place without stopping. Similarly in the British postal service, express delivery is a special and immediate delivery of a letter, parcel, &c., by an express messenger at a particular increased rate. The system was adopted in 1891.

In the United States of America, express companies for the rapid transmission of parcels and luggage and light goods generally perform the function of the post office or the railways in the United Kingdom and the continent of Europe. Not only do they deliver goods, but by the cash on delivery system (see Cash) the express companies act as agents both for the purchaser and seller of goods. They also serve as a most efficient agency for the transmission of money, the express money order being much more easily convertible than the postal money orders, as the latter can only be redeemed at offices in large and important towns. The system dates back to 1839, when one William Frederick Harnden (1813–1845), a conductor on the Boston and Worcester railway, undertook on his own account the carrying of small parcels and the performance of small commissions. Obliged to leave the company's service or abandon his enterprise, he started an "express" service between Boston and New York, carrying parcels, executing commissions and collecting drafts and bills. Alvin Adams followed in 1840, also between Boston and New York. From 1840 to 1845 the system was adopted by many others between the more important towns throughout the States. The attempt to carry letters also was stopped by the government as interfering with the post office. In 1854 began the amalgamation of many of the companies. Thus under the name of the Adams Express Company the services started by Harnden and Adams were consolidated. The lines connecting the west and east by Albany, Buffalo and the lakes were consolidated in the American Express Company, under the direction of William G. Fargo (*q.v.*), Henry Wells and Johnston Livingston, while another company, Wells, Fargo & Co., operated on the Pacific coast. The celebrated "Pony Express" was started in 1860 between San Francisco and St Joseph, Missouri, the time scheduled being eight days. The service was carried on by relays of horses, with stations 25 m. apart. The charge made for the service was $2.50 per ½ oz. The completion of the Pacific Telegraph Company line in 1861 was followed by the discontinuance of the regular service.

The name "express" is applied to a rifle having high velocity, flat trajectory and long fixed-sight ranges; and an "express-bullet" is a light bullet with a heavy charge of powder used in such a rifle (see RIFLE).

EXPROPRIATION, the taking away or depriving of property (Late Lat. *expropriare*, to take away, *proprium*, *i.e.* that which is one's own). The term is particularly applied to the compulsory acquisition of private property by the state or other public authority.

EXPULSION (Lat. *expulsio*, from *expellere*), the act of driving out, or of removing a person from the membership of a body or the holding of an office, or of depriving him of the right of attending a meeting, &c. In the United Kingdom the House of Commons can by resolution expel a member. Such resolution cannot be questioned by any court of law. But expulsion is only resorted to in cases where members are guilty of offences rendering them unfit for a seat in the House, such as being in open rebellion, being guilty of forgery, perjury, fraud or breach of trust, misappropriation of public money, corruption, conduct unbecoming the character of an officer and a gentleman, &c. It is customary to order the member, if absent, to attend in his place, before an order is made for his expulsion (see May, *Parliamentary Practice*, 1906, p. 56 seq.). Municipal corporations or other local government bodies have no express power to expel a member, except in such cases where the law declares the member to have vacated his seat, or where power is given by statute to declare the member's seat vacant. In the cases of officers and servants of the crown, tenure varies with the nature of the office. Some officials hold their offices *ad vitam aut culpam* or *dum bene se gesserunt*, others can be dismissed at any time and without reason assigned and without compensation. In the case of membership of a voluntary association (club, &c.) the right of expulsion depends upon the rules, and must be exercised in good faith. Courts of justice have jurisdiction to prevent the improper expulsion of the member of a voluntary association where that member has a right of property in the association. In the case of meetings, where the meeting is one of a public body, any person not a member of the body is entitled to be present only on sufferance, and may be expelled on a resolution of the body. In the case of ordinary public meetings those who convene the meeting stand in the position of licensors to those attending and may revoke the licence and expel any person who creates disorder or makes himself otherwise objectionable.

Expulsion of Aliens.—Under the Naturalization Act of 1870, the last of the civil disqualifications affecting aliens in England was removed. The political disqualifications which remained only applied to electoral rights. In the very exceptional cases in which it was retained in the statute book, expulsion was considered to have fallen into desuetude, but it has been revived by the Aliens Act of 1905 (5 Edw. VII. c. 13). Under this act powers are given to the secretary of state to make an order requiring an alien to leave the United Kingdom within a time fixed by the order and thereafter to remain outside the United Kingdom, subject to certain conditions, provided it is certified to him that the alien has been convicted of any felony or misdemeanour or other offence for which the court has power to impose imprisonment without the option of a fine, &c., or that he has been sentenced in a foreign country with which there is an extradition treaty, for a crime not being an offence of a political character. There are also provisions applicable within one year after the alien has entered the United Kingdom in the case of pauper aliens. Precautions are taken to prevent, as far as possible, any abuse of the power of expulsion. Under the French law of expulsion (December 3, 1849) there are no such precautions, the minister of the interior having an absolute discretion to order any foreigner as a measure of public policy to leave French territory and in fact to have him taken immediately to the frontier.

EXTENSION (Lat. *ex*, out; *tendere*, to stretch), in general, the action of straining or stretching out. It is usually employed metaphorically (cf. the phrase an "extension of time," a period allowed in excess of what has been agreed upon). It is used as a technical term in logic to describe the total number of objects to which a given term may be applied; thus the meaning of the term "King" in "extension" means the kings of England, Italy, Spain, &c. (cf. DENOTATION), while in "intension" it means the attributes which taken together make up the idea of kinghood (see CONNOTATION). In psychology the literal sense of extension is retained, *i.e.* "spread-outness." The perception of space by the senses of sight and touch, as opposed to semi-spatial perceptions by smell and hearing, is that of "continuous expanse composed of positions separated and connected by distances" (Stout); to this the term "extension" is applied. The perception of separate objects involves position and distance, but these taken together are not extension, which necessarily implies continuity. To move one's finger along the keys of a piano gives both the position and the distance of the keys; to move it along the frame gives the idea of extension. By expanding this idea we obtain the conception of all space as an extended whole. To this perception are necessary both form and material. It should be observed the actual quality of a stimulus (rough, smooth, dry, &c.) has nothing to do with the spatial perception as such, which is concerned purely with what is known as "local signature." The elementary undifferentiated sensation excited by the stimuli exerted by a continuous whole is known as its "extensive quantity" or "extensity." The term has to do not with the kind of object which excites the sensation, but simply with the vague massiveness of the latter. As such it is distinguishable in thought from extension, though it is not easy to say whether and if so how far the quantitative aspect of space can exist apart from spatial order. Extensity as an element in the complex of extension must be carefully distinguished from intensity. Mere increase of pressure implies increase of intensity of sensation; to increase the extensity the *area*, so to speak, of the exciting stimulus must be increased. Thus the extensity (also called "voluminousness," or "massiveness") of the sensation produced by a roll of thunder is greater than that produced by a whistle or the bark of a dog. It should be observed that this application of the idea of extensity to sensation in general, rather than to the matter which is the exciting stimulus, is only an analogy, an attempt to explain a common psychic phenomenon by terminology which is intrinsically suitable to the physical. As a natural consequence the term represents different shades of meaning in different treatises, verging sometimes towards the physical, sometimes towards the psychic, meaning.

In connexion with extension elaborate psycho-physical experiments have been devised, *e.g.* with the object of comparing the accuracy of tactual and visual perception and discovering what are the least differences which each can observe. At a distance two lights appear as one, just as two stars distinguishable through a telescope are one to the naked eye (see VISION): again if the points of a compass are brought close together and pressed lightly on the skin the sensation, though vague and diffused, is a single one.

See PSYCHOLOGY and works there quoted; also SPACE AND TIME.

EXTENUATING CIRCUMSTANCES. This expression is used in law with reference to crimes, to describe cases in which, though an offence has been committed without legal justification or excuse, its gravity, from the point of view of punishment or moral opprobrium, is mitigated or reduced by reason of the facts leading up to or attending the commission of the offence. According to English procedure, the jury has no power to determine the punishment to be awarded for an offence. The sentence, with certain exceptions in capital cases, is within the sole discretion of the judge, subject to the statutory prescriptions as to the kind and maximum of punishment. It is common practice for juries to add to their verdict, guilty or not guilty, a rider recommending the accused to mercy on the ground of grave provocation received, or other circumstances which in their view should mitigate the penalty. This form of rider is often added on a verdict of guilty of wilful murder, a crime as to which the judge has no discretion as to punishment, but the recommendation is sent to the Home Office for consideration in advising as to exercise of the prerogative of mercy. Quite independently of any recommendation by the jury, the judge is entitled to take into account matters proved during the trial, or laid before him after verdict, as a guide to him in determining the quantum of punishment.

Under the French law (*Code d'instruction criminelle*, art. 345), it is the sole right and the duty of a jury in a criminal case to pronounce whether or not the commission of the offence was attended by extenuating circumstances (*circonstances atténuantes*). They are not bound to say anything about the matter, but the whole or the majority may qualify the verdict by finding extenuation, and if they do, the powers of the court to impose the maximum punishment are taken away and the sentence to be pronounced is reduced in accordance with the scale laid down in art. 463 of the *Code pênal*. The most important result of this rule is to enable a jury to prevent the infliction of capital punishment for murder. In cases of what is termed " crime passionel," French juries, when they do not acquit, almost invariably find extenuation; and a like verdict has become common even in the case of cold-blooded and sordid murders, owing to objections to capital punishment.

EXTERRITORIALITY, a term of international law, used to denominate certain immunities from the application of the rule that every person is subject for all acts done within the boundaries of a state to its local laws. It is also employed to describe the quasi-extraterritorial position, to borrow the phrase of Grotius, of the dwelling-place of an accredited diplomatic agent, and of the public ships of one state while in the waters of another. Latterly its sense has been extended to all cases in which states refrain from enforcing their laws within their territorial jurisdiction. The cases recognized by the law of nations relate to: (1) the persons and belongings of foreign sovereigns, whether incognito or not; (2) the persons and belongings of ambassadors, ministers plenipotentiary, and other accredited diplomatic agents and their suites (but not consuls, except in some non-Christian countries, in which they sometimes have a diplomatic character); (3) public ships in foreign waters. Exterritoriality has also been granted by treaty to the subjects and citizens of contracting Christian states resident within the territory of certain non-Christian states. Lastly, it is held that when armies or regiments are allowed by a foreign state to cross its territory, they necessarily have exterritorial rights. " The ground upon which the immunity of sovereign rulers from process in our courts," said Mr Justice Wills in the case of *Mighell* v. *Sultan of Johore*, 1894, "is recognized by our law, is that it would be absolutely inconsistent with the status of an independent sovereign that he should be subject to the process of a foreign tribunal," unless he deliberately submits to its jurisdiction. It has, however, been held where the foreign sovereign was also a British subject (*Duke of Brunswick* v. *King of Hanover*, 1844), that he is amenable to the jurisdiction of the English Courts in respect of transactions done by him in his capacity as a subject. A " foreign sovereign " may be taken to include the president of a republic, and even a potentate whose independence is not complete. Thus in the case, cited above, of *Mighell* v. *Sultan of Johore*, the sultan was ascertained to have abandoned all right to contract with foreign states, and to have placed his territory under British protection. The court held that he was, nevertheless, a foreign sovereign in so far as immunity from British jurisdiction was concerned. The immunity of a foreign diplomatic agent, as the direct representative of a foreign sovereign (or state), is based on the same grounds as that of the sovereign authority itself. The international practice in the case of Great Britain was confirmed by an act of parliament of the reign of Queen Anne, which is still in force. The preamble to this act states that " turbulent and disorderly persons in a most outrageous manner had insulted the person of the then ambassador of his Czarish Majesty, emperor of Great Russia," by arresting and detaining him in custody for several hours, " in contempt to the protection granted by Her Majesty, contrary to the law of nations, and in prejudice of the rights and privileges which ambassadors and other public ministers, authorized and received as such, have at all times been thereby possessed of, and ought to be kept sacred and inviolable." This preamble has been repeatedly held by our courts to be declaratory of the English common law. The act provides that all suits, writs, processes, against any accredited ambassador or public minister or his domestic servant, and all proceedings and judgments had thereupon, are " utterly null and void," and that any person violating these provisions shall be punished for a breach of the public peace. Thus a foreign diplomatic agent cannot, like the sovereign he represents, waive his immunity by submitting to the British jurisdiction. The diplomatic immunity necessarily covers the residence of the diplomatic agent, which some writers describe as assimilated to territory of the state represented by the agent; but there is no consideration which can justify any extension of the immunity beyond the needs of the diplomatic mission resident within it. It is different with public ships in foreign waters. In their case the exterritoriality attaches to the vessel. Beyond its bulwarks captain and crew are subject to the ordinary jurisdiction of the state upon whose territory they happen to be. By a foreign public ship is now understood any ship in the service of a foreign state. It was even held in the case of the " Parlement Belge " (1880), a packet belonging to the Belgian government, that the character of the vessel as a public ship was not affected by its carrying passengers and merchandise for hire. In a more recent case an action brought by the owners of a Greek vessel against a vessel belonging to the state of Rumania was dismissed, though the agents of the Rumanian government had entered an appearance unconditionally and had obtained the release of the vessel on bail, on the ground that the Rumanian government had not authorized acceptance of the British jurisdiction (The " Jassy," 1906, 75 L.J.P. 93).

Writers frequently describe the exterritoriality of both embassies and ships as absolute. There is, however, this difference, that the exterritoriality of the latter not being, like that of embassies, a derived one, there seems to be no ground for limitation of it. It was, nevertheless, laid down by the arbitrators in the " Alabama " case (Cockburn dissenting), that the privilege of exterritoriality accorded to vessels had not been admitted into the law of nations as an absolute right, but solely as a proceeding founded on the principle of courtesy and mutual deference between different nations, and that it could therefore " never be appealed to for the protection of acts done in violation of neutrality."

The exterritorial settlements in the Far East, the privileges of Christians under the arrangements made with the Ottoman Porte, and other exceptions from local jurisdictions, are subject to the conditions laid down in the treaties by which they have been created. There are also cases in which British communities have grown up in barbarous countries without the consent of any local authority. All these are regulated by orders in council, issued now in virtue of the Foreign Jurisdiction Act 1890, an act enabling the crown to exercise any jurisdiction it may have " within a foreign country " in as ample a manner as if it had been acquired "by cession or conquest of territory." A very exceptional case of exterritoriality is that granted to the pope under a special Italian enactment. (T. BA.)

EXTORTION (Lat. *extorsio*, from *extorquere*, to twist out, to take away by force), in English law the term applied to the exaction by public officers of money or money's worth not due at all, or in excess of what is due, or before it is due. Such exaction, unless made in good faith (*i.e.* in honest mistake as to the sum properly payable), is a misdemeanour by the common law and is punishable by fine and (or) imprisonment. Besides the punishment above stated, an action for twice the value of the thing extorted lies against officers of the king (1275, 3 Edw. I. c. 26). There are numerous provisions for the punishment of particular officers who make illegal exactions or take illegal fees: *e.g.* sheriffs and their officers (Sheriffs Act 1887), county court bailiffs (County Courts Act 1888), clerks of courts of justice, and gaolers who exact fees from prisoners. A gaoler is also punishable for detaining the corpse of a prisoner as security for debt. The term "public officer" is not limited to offices under the crown; and there are old precedents of criminal proceedings for extortion against churchwardens, and against millers and ferrymen who demand tolls in excess of what is customary under their franchise.

The term extortion is also applied to the exaction of money or money's worth by menaces of personal violence or by threats to accuse of crime or to publish defamatory matter about another person. These offences fall partly under the head of robbery and partly under blackmail, or what in French is termed *chantage*.

See *Russell on Crimes* (6th ed., vol. i. p. 423; vol. iii. p. 348).

EXTRACT (from Lat. *extrahere*, to draw out), in pharmacy, the name given to preparations formed by evaporating or concentrating solutions of active principles; *tinctures* are solutions which have not been subjected to any evaporation. "Liquid extracts" are those of a syrupy consistency, and are generally prepared by treating the drug with the solvent (water, alcohol, &c.) and concentrating the solution until it attains the desired consistency. "Ordinary extracts" are thick, tenacious and sometimes even dry preparations; they are obtained by evaporating solutions as obtained above, or the juices expressed from the plants.

Extraction, in chemical technology, is a process for separating one substance from another by taking advantage of the varying solubility of the components in some chosen solvent. The term "lixiviation" is used when water is the solvent. In laboratory practice all the common solvents are employed. With small quantities it may suffice to shake the substance with the solvent, the mixture being heated if necessary, filter and distil or otherwise remove the solvent from the distillate. For larger quantities continuous extraction is advisable. This may be carried out in many forms of apparatus; one of the most convenient is the Soxhlet extractor, in which the extract siphons into the flask containing the solvent, and so maintains the quantity of available solvent practically constant. Continuous extraction is generally the practice in technology. One of the most important applications is in the fat and gelatine industries.

EXTRADITION (Lat. *ex*, out, and *traditio*, handing over), the surrender of an alleged criminal for trial by a foreign state where he has taken refuge, to the state against which the alleged offence has been committed. When a person who has committed an offence in one country escapes to another, what is the duty of the latter with regard to him? Should the country of refuge try him in its own courts according to its own laws, or deliver him up to the country whose laws he has broken? To the general question international law gives no certain answer. Some jurists, Grotius among them, incline to hold that a state is bound to give up fugitive criminals, but the majority appear to deny the obligation as a matter of right, and prefer to put it on the ground of comity. And the universal practice of nations is to surrender criminals only in consequence of some special treaty with the country which demands them.

There are two practical difficulties about extradition which have probably prevented the growth of any uniform rule on the subject. One is the variation in the definitions of crime adopted by different countries. The second is the possibility of the process of extradition being employed to get hold of a person who is wanted by his country, not really for a criminal, but for a political offence. In modern states, and more particularly in England, offences of a political character have always been carefully excluded from the operation of the law of extradition.

1. UNITED KINGDOM.—The Extradition Acts 1870–1873 (33 & 34 Vict. cc. 62, and 36 & 37 Vict. c. 60) and the Fugitive Offenders Act 1881 (44 & 45 Vict. c. 69) deal with different branches of the same subject, the recovery and surrender of fugitive criminals. The Extradition Acts apply in the case of countries with which Great Britain has extradition treaties. The Fugitive Offenders Act applies—(1) as between the United Kingdom and any British possession, (2) as between any two British possessions, and (3) as between the United Kingdom or a British possession and certain foreign countries, such as Turkey and China, in which the crown exercises foreign jurisdiction.

Conditions of Surrender.—In spite of some earlier authorities it has long been settled that in English law there is no power to surrender fugitive criminals to a foreign country without express statutory authority. Such authority is now given by the Extradition Acts 1870–1873, but only in the case of the offences therein specified, and with regard to countries with which an arrangement has been entered into, and to which the acts have been applied by order in council. The acts are further to be applied, subject to such "conditions, exceptions and qualifications as may be deemed expedient" (s. 2); and these conditions, &c., are invariably to be found in the extradition treaty which is set out in the order in council applying the Extradition Acts to a particular country. To support a demand for extradition from Great Britain it is therefore necessary to show that the offence is one of those enumerated in the Extradition Acts, and also in the particular treaty, and that the acts charged amount to the offence according to the laws both of Great Britain and of the state demanding the surrender.

Surrender of Subjects.—A further question arises where a state is called on to surrender one of its own subjects. Some of the treaties, such as those with France and Germany, stipulate that neither contracting party shall surrender its own subjects, and in such cases a British subject cannot be surrendered by his own country. The treaties with Spain, Switzerland and Luxemburg provide for the surrender by Great Britain of her own subjects, but there is no reciprocity. Other treaties, such as those with Austria, Belgium, Russia and the Netherlands, give each party the option of surrendering or refusing to surrender its own subjects in each particular case. Under such treaties British subjects are surrendered unless the secretary of state intervenes to forbid it. Lastly, some treaties, such as that with the United States, contain no restriction of this kind, and the subjects of each power are freely surrendered to the other. Surrender by Great Britain is also subject to the following restrictions contained in s. 3 of the Extradition Act 1870:—(1) that the offence is not of a political character, and the requisition has not been made with a view to try and punish for an offence of a political character; (2) that the prisoner shall not be liable to be tried for any but the specified extradition offences; (3) that he shall not be surrendered until he has been tried and served his sentence for offences committed in Great Britain; and (4) that he shall not be actually given up until fifteen days after his committal for extradition, so as to allow of an application to the courts.

Political Offences.—The question as to what constitutes a political offence is one of some nicety. It was discussed in *In re Castioni* (1890, 1 Q.B. 149), where it was held, following the opinion of Mr Justice Stephen in his *History of the Criminal Law*, that to give an offence a political character it must be "incidental to and form part of political disturbances." Extradition was accordingly refused for homicide committed in the course of an armed rising against the constituted authorities. In the more recent case of *In re Meunier* (1894, 2 Q.B. 415), an Anarchist was charged with causing two explosions in Paris—one at the Café Véry resulting in the death of two persons, and the other at certain barracks. It was not contended that the outrage at the café was a political crime, but it was argued that the explosion at the barracks came within the description. The court, however, held that to constitute a political offence there must be two or more parties in the state, each seeking to impose a government of its own choice on the other, which was not the case with regard to Anarchist crimes. The party of anarchy was the enemy of all governments, and its effects were directed primarily against the general body of citizens. The test applied in the earlier case is perhaps the more satisfactory of the two.

With regard to the provision that surrender shall not be granted if the requisition has in fact been made with a view to try and punish for an offence of a political character, it was decided in the case of *Arton* (1896, 1 Q.B. 108) that a mere suggestion, that after his surrender for a non-political crime, the prisoner would be interrogated on political matters (his alleged complicity in the Panama scandal), and punished for his refusal to answer, was not enough to bring him within the provision. The court also held that it had no jurisdiction to entertain a suggestion that the request of the French government for his extradition was not made in good faith and in the interests of justice.

Extradition Offences.—The following is a list of crimes in respect of which extradition may be provided for under the Extradition Acts 1870–1873, and the Slave Trade Act 1873. *Extradition Act* 1870:—(1) Murder; (2) Attempt to murder; (3) Conspiracy to murder; (4) Manslaughter; (5) Counterfeiting and altering money, uttering counterfeit or altered money; (6) Forgery, counterfeiting, and altering and uttering what is forged or counterfeited or altered; (7) Embezzlement and larceny; (8) Obtaining money or goods by false pretences; (9) Crimes by bankrupts against bankruptcy law; (10) Fraud by a bailee, banker, agent, factor, trustee or director, or member or public officer of any company made criminal by any law for the time being in force; (11) Rape; (12) Abduction; (13) Child-stealing; (14) Burglary and housebreaking; (15) Arson; (16) Robbery with violence; (17) Threats by letter or otherwise with intent to extort; (18) Crimes committed at sea: (*a*) Piracy by the law of nations; (*b*) Sinking or destroying a vessel at sea, or attempting or conspiring to do so; (*c*) Assault on a ship on the high seas, with intent to destroy life or to do grievous bodily harm; (*d*) Revolt, or conspiring to revolt, by two or more persons on board a ship on the high seas against the authority of the master; (19) Bribery. *Extradition Act* 1873:—(20) Kidnapping and false imprisonment; (21) Perjury and subornation of perjury. This act also extends to indictable offences under 24 & 25 Vict. cc. 96, 97, 98, 99, 100, and amending and substituted acts. Among such offences included in various extradition treaties are the following:—(22) Obtaining valuable securities by false pretences; (23) Receiving any money, valuable security or other property, knowing the same to have been stolen or unlawfully obtained; (24) Falsification of accounts (see *In re Arton*, 1896, 1 Q.B. 509); (25) Malicious injury to property, if such offence be indictable; (26) Knowingly making, without lawful authority, any instrument, tool or engine adapted and intended for the counterfeiting of coin of the realm; (27) Abandoning children; exposing or unlawfully detaining them; (28) Any malicious act done with intent to endanger the safety of any person in a railway train; (29) Wounding or inflicting grievous bodily harm; (30) Assault occasioning actual bodily harm; (31) Assaulting a magistrate or peace or public officer; (32) Indecent assault; (33) Unlawful carnal knowledge, or any attempt to have unlawful carnal knowledge, of a girl under age; (34) Bigamy; (35) Administering drugs or using instruments with intent to procure the miscarriage of women; (36) Any indictable offence under the laws for the time being in force in relation to bankruptcy. *Slave Trade Act* 1873 (36 & 37 Vict. c. 88, s. 27):—(37) Dealing in slaves in such manner as to constitute a criminal offence against the laws of both states.

The United Kingdom has extradition treaties with practically all civilized foreign countries; and though it is not practicable to state which of the statutory extradition offences are included in each, it may be said generally that crimes 1 to 17 inclusive are covered in all, though Rumania has reserved the right to refuse, and Portugal does refuse, to surrender for a crime punishable with death.

The act of 1873 provides for the surrender of accessories before and after the fact to extradition crimes, and most of the treaties contain a clause by which extradition is to be granted for participation in any of the crimes specified in the treaty, provided that such participation is punishable by the laws of both countries. Several of the treaties also contain clauses providing for optional surrender in respect of any crime not expressly mentioned for which extradition can be granted by the laws of both countries.

It is further to be noted that the restrictions on surrender in the Extradition Acts apply only to surrenders by Great Britain. Foreign countries may surrender fugitives to Great Britain without any treaty, if they are willing to do so and their law allows of it, and such surrenders have not infrequently been made. But when surrendered for an extradition crime, the prisoner cannot be tried in England for any other crime committed before such surrender, until he has been restored, or has had an opportunity of returning, to the foreign state from which he was extradited.

Procedure.—To obtain from a foreign country the extradition of a fugitive from the United Kingdom, it is necessary to procure a warrant for his arrest, and to send it, or a certified copy, to the home secretary together with such further evidence as is required by the treaty with the country in question. In most cases an information or deposition containing evidence which would justify a committal for trial in Great Britain will be required. The home secretary will then communicate through the foreign secretary and the proper diplomatic channels with the foreign authorities, and in case of urgency will ask them by telegraph for a provisional arrest. For the arrest in the United Kingdom of fugitive criminals whose extradition is requested by a foreign state, two procedures are provided in ss. 7 and 8 of the act of 1870:—(1) On a diplomatic requisition supported by the warrant of arrest and documentary evidence, the home secretary, if he thinks the crime is not of a political character, will order the chief magistrate at Bow Street to proceed; and such magistrate will then issue a warrant of arrest on such evidence as would be required if the offence had been committed in the United Kingdom. (2) More summarily, any magistrate or justice of the peace may issue a provisional warrant of arrest on evidence which would support such a warrant if the crime had been committed within his jurisdiction. In practice a sworn information is required, but this may be based on a telegram from the foreign authorities. The magistrate or justice must then report the issue of the warrant to the home secretary, who may cancel it and discharge the prisoner. When arrested on the provisional warrant, the prisoner will be brought up before a magistrate and remanded to Bow Street, and will then be further remanded until the magistrate at Bow Street is notified that a formal requisition for surrender has been made; and unless such requisition is made in reasonable time the prisoner is entitled to be discharged. The examination of the prisoner prior to his committal for extradition ordinarily takes place at Bow Street. The magistrate is required to hear evidence that the alleged offence is of a political character or is not an extradition crime. If satisfied in these respects, and if the foreign warrant of arrest is duly authenticated, and evidence is given which according to English law would justify a committal for trial, if the prisoner has not yet been tried, or would prove a conviction if he has already been convicted, the magistrate will commit him for extradition. Under the Extradition Act 1895 the home secretary, if of opinion that removal to Bow Street would be dangerous to the prisoner's life, or prejudicial to his health, may order the case to be taken by a magistrate at the place where the prisoner was apprehended, or then is, and the magistrate may order the prisoner to be detained in such place. After committal for extradition, every prisoner has fifteen days in which to apply for *habeas corpus*, and after such period, or at the close of the *habeas corpus* proceedings if they are unsuccessful, the home secretary issues his warrant for surrender, and the prisoner is handed over to the officers of the foreign government.

The Extradition Acts apply to the British colonies, the governor being substituted for the secretary of state. Their operation may, however, be suspended by order in council, as in the case of Canada, where the colony has passed an Extradition Act of its own (see Statutory Rules and Orders).

Fugitive Offenders Act.—There are no extradition treaties with certain countries in which the crown exercises foreign jurisdiction, such as Cyprus, Turkey, Egypt, China, Japan, Corea, Zanzibar, Morocco, Siam, Persia, Somali, &c. In these countries the Fugitive Offenders Act 1881 (44 & 45 Vict. c. 69) has been applied, pursuant to s. 36 of that statute, and the measures for obtaining surrender of a fugitive criminal are the same as in a British colony. The act, however, only applies to persons over whom the crown has jurisdiction in these territories, and generally is expressly restricted to British subjects.

Under this act a fugitive from one part of the king's dominions to another, or to a country where the crown exercises foreign jurisdiction, may be brought back by a procedure analogous to extradition, but applicable only to treason, piracy and offences punishable with twelve months' imprisonment with hard labour or more. The original warrant of arrest must be endorsed by one of several authorities where the offenders happen to be,—in practice by the home secretary in the United Kingdom and by the governor in a colony. Pending the arrival of the original warrant a provisional arrest may be made, as under the Extradition Acts. The fugitive must then be brought up for examination before a local magistrate, who, if the endorsed warrant is duly authenticated, and evidence is produced "which, according to the law administered by the magistrate, raises a strong or probable presumption that the offender committed the offence, and that the act applies to it," may commit him for return. An interval of fifteen days is allowed for *habeas corpus* proceedings, and (s. 10) the court has a large discretion to discharge the prisoner, or impose terms, if it thinks the case frivolous, or that the return would be unjust or oppressive, or too severe a punishment. The next step is for the home secretary in the United Kingdom, and the governor in a colony, to issue a warrant for the return of the prisoner. He must be removed within a month, in the absence of reasonable cause to the contrary. If not prosecuted within six months after arrival, or if acquitted, he is entitled to be sent back free of cost.

In the case of fugitive offenders from one part of the United Kingdom to another, it is enough to get the warrant of arrest backed by a magistrate having jurisdiction in that part of the United Kingdom where the offender happens to be. A warrant issued by a metropolitan police magistrate may be executed, without backing, by a metropolitan police officer anywhere, and there are certain other exceptions, but as a rule a warrant cannot be executed without being backed by a local magistrate. (J. E. P. W.)

2. UNITED STATES.—Foreign extradition is purely an affair of the United States, and not for the individual states themselves. Upon a demand upon the United States for extradition, there is a preliminary examination before a commissioner or judge before there can be a surrender to the foreign government (Revised Statutes, Title LXVI.; 22 Statutes at Large, 215). It is enough to show probable guilt (*Ornelas* v. *Ruiz*, 161 United States Reports, 502). An extradition treaty covers crimes previously committed. If a Power, with which the United States have such a treaty, surrenders a fugitive charged with a crime not included in the treaty, he may be tried in the United States for such crime. Inter-state extradition is regulated by act of Congress under the Constitution of the United States (Article IV. s. 2; United States Revised Statutes, s. 5278). A surrender may be demanded of one properly charged with an act which constitutes a crime under the laws of the demanding state, although it be no crime in the other state. A party improperly surrendered may be released by writ of *habeas corpus*, either from a state or United States court (*Robb* v. *Conolly*, 111 U.S. Reports, 624). On his return to the state from which he fled, he is subject to prosecution for any crime, though on a foreign extradition the law is otherwise (*Lascelles* v. *Georgia*, 148 U.S. Reports, 537). (S. E. B.)

See Sir E. Clarke, *Treatise upon the Law of Extradition* (4th ed., 1904); Biron and Chalmers, *Law and Practice of Extradition* (1903).

EXTRADOS (*extra*, outside, Fr. *dos*, back), the architectural term for the outer boundary of the voussoirs of an arch (*q.v.*).

EXTREME UNCTION, a sacrament of the Roman Catholic Church. In James v. 14 it is ordained that, if any believer is sick, he shall call for the elders of the church; and they shall pray over him, anointing him with oil in the name of the Lord; and the prayer of faith shall save him that is sick, and the Lord shall raise him up; and if he have committed sins, it shall be forgiven him.

Origen reprobated medical art on the ground that the prescription here cited is enough; modern faith-healers and Peculiar People have followed in his wake. The Catholic Church has more wisely left physicians in possession, and elevated the anointing of the sick into a sacrament to be used only in cases of mortal sickness, and even then not to the exclusion of the healing art.

It has been general since the 9th century. The council of Florence A.D. 1439 thus defined it:—

> "The fifth sacrament is extreme unction. Its matter is olive oil, blessed by a bishop. It shall not be given except to a sick person whose death is apprehended. He shall be anointed in the following places: the eyes, ears, nostrils, mouth, hands, feet, reins. The form of the sacrament is this: Through this anointing of thee and through its most pious mercy, be forgiven all thy sins of sight, &c. . . . and so in respect of the other organs. A priest can administer this sacrament. But its effect is to make whole the mind, and, so far as it is expedient, the body as well."

This sacrament supplements that of penance (viz. remission of post-baptismal sin) in the sense that any guilt unconfessed or left over after normal penances imposed by confessors is purged thereby. It was discussed in the 12th century whether this sacrament is indelible like baptism, or whether it can be repeated; and the latter view, that of Peter Lombard, prevailed.

It was a popular opinion in the middle ages that extreme unction extinguishes all ties and links with this world, so that he who has received it must, if he recovers, renounce the eating of flesh and matrimonial relations. A few peasants of Lombardy still believe that one who has received extreme unction ought to be left to die, and that sick people may be starved to death through the withholding of food on superstitious grounds. Such opinions, combated by bishops and councils, were due to the influence of the *consolamentum* of the Cathars (*q.v.*). In both sacraments the death-bed baptism of an earlier age seems to survive, and they both fulfil a deep-seated need of the human spirit.

Some Gnostics sprinkled the heads of the dying with oil and water to render them invisible to the powers of darkness; but in the East generally, where the need to compete with the Cathar sacrament of *Consolatio* was less acutely felt, extreme unction is unknown. The Latinizing Armenians adopted it from Rome in the crusading epoch. At an earlier date, however, it was usual to anoint the dead.

In the Roman Church the bishop blesses the oil of the sick used in extreme unctions on Holy Thursday at the Chrismal Mass,[1] using the following prayer of the sacramentaries of Gelasius and Hadrian:—

> "Send forth, we pray Thee, O Lord, Thy holy spirit, the Paraclete from Heaven, into this fatness of oil, which Thou hast deigned to produce from the green wood for refreshment of mind and body; and through Thy holy benediction may it be for all that anoint, taste, touch, a protection of mind and body, of soul and spirit, unto the easing away of all pain, all weakness, all sickness of mind and body; wherefore Thou hast anointed priest, kings and prophets and martyrs with thy chrism, perfected by Thee, O Lord, blessed and abiding in our bowels in the name of our Lord Jesus Christ."

See L. Duchesne, *Origines du Culte Chrétien* (Paris, 1898).

(F. C. C.)

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[1] The oil left over from the year before is burnt.

EYBESCHÜTZ, JONATHAN (1690–1764), German rabbi, was from 1750 rabbi in Altona. He was a man of erudition, but he owed his fame chiefly to his personality. Few men of the period so profoundly impressed their mark on Jewish life. He became specially notorious because of a curious controversy that arose concerning the amulets which Eybeschütz was suspected of issuing. These amulets recognized the Messianic claims of Sabbatai Sebi (*q.v.*), and a famous rabbinic contemporary of Eybeschütz, Jacob Emden, boldly accused him of heresy. The controversy was a momentous incident in the Jewish life of the period, and though there is insufficient evidence against Eybeschütz, Emden may be credited with having crushed the lingering belief in Sabbatai current even in some orthodox circles. (I. A.)

EYCK, VAN, the name of a family of Flemish painters in whose works the rise and mature development of art in western Flanders are represented. Though bred in the valley of the Meuse, they finally established their professional domicile in Ghent and in Bruges; and there, by skill and inventive genius, they changed the traditional habits of the earlier schools, remodelled the primitive forms of Flemish design, and introduced a complete revolution into the technical methods of execution familiar to their countrymen.

1. Hubert (Huybrecht) van Eyck (? 1366–1426) was the oldest and most remarkable of this race of artists. The date of his birth and the records of his progress are lost amidst the ruins of the earlier civilization of the valley of the Meuse. He was born about 1366, at Maeseyck, under the shelter or protection of a Benedictine convent, in which art and letters had been cultivated from the beginning of the 8th century. But after a long series of wars—when the country became insecure, and the schools which had flourished in the towns decayed—he wandered to Flanders, and there for the first time gained a name. As court painter to the hereditary prince of Burgundy, and as client to one of the richest of the Ghent patricians, Hubert is celebrated. Here, in middle age, between 1410 and 1420, he signalized himself as the inventor of a new method of painting. Here he lived in the pay of Philip of Charolais till 1421. Here he painted pictures for the corporation, whose chief magistrates honoured him with a state visit in 1424. His principal masterpiece, the "Worship of the Lamb," commissioned by Jodocus Vijdts, lord of Pamele, is the noblest creation of the Flemish school, a piece of which we possess all the parts dispersed from St Bavon in Ghent to the galleries of Brussels and Berlin,—one upon which Hubert laboured till he died, leaving it to be completed by his brother. Almost unique as an illustration of contemporary feeling for Christian art, this great composition can only be matched by the "Fount of Salvation," in the museum of Madrid. It represents, on numerous panels, Christ on the judgment seat, with the Virgin and St John the Baptist at His sides, hearing the songs of the angels, and contemplated by Adam and Eve, and, beneath him, the Lamb shedding His blood in the presence of angels, apostles, prophets, martyrs, knights and hermits. On the outer sides of the panels are the Virgin and the angel annunciate, the sibyls and prophets who foretold the coming of the Lord, and the donors in prayer at the feet of the Baptist and Evangelist. After this great work was finished it was placed, in 1432, on an altar in St Bavon of Ghent, with an inscription on the framework describing Hubert as "maior quo nemo repertus," and setting forth, in colours as imperishable as the picture itself, that Hubert began and John afterwards brought it to perfection. John van Eyck certainly wished to guard against an error which ill-informed posterity showed itself but too prone to foster, the error that he alone had composed and carried out an altarpiece executed jointly by Hubert and himself. His contemporaries may be credited with full knowledge of the truth in this respect, and the facts were equally well known to the duke of Burgundy or the chiefs of the corporation of Bruges, who visited the painter's house in state in 1432, and the members of the chamber of rhetoric at Ghent, who reproduced the Agnus Dei as a *tableau vivant* in 1456. Yet a later generation of Flemings forgot the claims of Hubert, and gave the honours that were his due to his brother John exclusively.

The solemn grandeur of church art in the 15th century never found, out of Italy, a nobler exponent than Hubert van Eyck. His representation of Christ as the judge, between the Virgin and St John, affords a fine display of realistic truth, combined with pure drawing and gorgeous colour, and a happy union of earnestness and simplicity with the deepest religious feeling. In contrast with earlier productions of the Flemish school, it shows a singular depth of tone and great richness of detail. Finished with surprising skill, it is executed with the new oil medium, of which Hubert shared the invention with his brother, but of which no rival artists at the time possessed the secret,—a medium which consists of subtle mixtures of oil and varnish applied to the moistening of pigments after a fashion, only kept secret for a time from gildsmen of neighbouring cities, but unrevealed to the Italians till near the close of the 15th century. When Hubert died on the 18th of September 1426 he was buried in the chapel on the altar of which his masterpiece was placed. According to a tradition as old as the 16th century, his arm was preserved as a relic in a casket above the portal of St Bavon of Ghent. During a life of much apparent activity and surprising successes he taught the elements of his art to his brother John, who survived him.

2. John (Jan) van Eyck (? 1385–1440). The date of his birth is not more accurately known than that of his elder brother, but he was born much later than Hubert, who took charge of him and made him his "disciple." Under this tuition John learnt to draw and paint, and mastered the properties of colours from Pliny. Later on, Hubert admitted him into partnership, and both were made court painters to Philip of Charolais. After the breaking up of the prince's household in 1421, John became his own master, left the workshop of Hubert, and took an engagement as painter to John of Bavaria, at that time resident at the Hague as count of Holland. From the Hague he returned in 1424 to take service with Philip, now duke of Burgundy, at a salary of 100 livres per annum, and from that time till his death John van Eyck remained the faithful servant of his prince, who never treated him otherwise than graciously. He was frequently employed in missions of trust; and following the fortunes of a chief who was always in the saddle, he appears for a time to have been in ceaseless motion, receiving extra pay for secret services at Leiden, drawing his salary at Bruges, yet settled in a fixed abode at Lille. In 1428 he joined the embassy sent by Philip the Good to Lisbon to beg the hand of Isabella of Portugal. His portrait of the bride fixed the duke's choice. After his return he settled finally at Bruges, where he married, and his wife bore him a daughter, known in after years as a nun in the convent of Maeseyck. At the christening of this child the duke was sponsor, and this was but one of many distinctions by which Philip the Good rewarded his painter's merits. Numerous altarpieces and portraits now give proof of van Eyck's extensive practice. As finished works of art and models of conscientious labour they are all worthy of the name they bear, though not of equal excellence, none being better than those which were completed about 1432. Of an earlier period, a "Consecration of Thomas à Becket" has been preserved, and may now be seen at Chatsworth, bearing the date of 1421; no doubt this picture would give a fair representation of van Eyck's talents at the moment when he started as an independent master, but that time and accidents of omission and commission have altered its state to such an extent that no conclusive opinion can be formed respecting it. The panels of the "Worship of the Lamb" were completed nine years later. They show that John van Eyck was quite able to work in the spirit of his brother. He had not only the lines of Hubert's compositions to guide him, he had also those parts to look at and to study which Hubert had finished. He continued the work with almost as much vigour as his master. His own experience had been increased by travel, and he had seen the finest varieties of landscape in Portugal and the Spanish provinces. This enabled him to transfer to his pictures the charming scenery of lands

more sunny than those of Flanders, and this he did with accuracy and not without poetic feeling. We may ascribe much of the success which attended his efforts to complete the altarpiece of Ghent to the cleverness with which he reproduced the varied aspect of changing scenery, reminiscent here of the orange groves of Cintra, there of the bluffs and crags of his native valley. In all these backgrounds, though we miss the scientific rules of perspective with which the van Eycks were not familiar, we find such delicate perceptions of gradations in tone, such atmosphere, yet such minuteness and perfection of finish, that our admiration never flags. Nor is the colour less brilliant or the touch less firm than in Hubert's panels. John only differs from his brother in being less masculine and less sternly religious. He excels in two splendid likenesses of Jodocus Vijdts and his wife Catherine Burluuts. The same vigorous style and coloured key of harmony characterizes the small "Virgin and Child" of 1432 at Ince, and the "Madonna," probably of the same date, at the Louvre, executed for Rollin, chancellor of Burgundy. Contemporary with these, the male portraits in the National Gallery, and the "Man with the Pinks," in the Berlin Museum (1432–1434), show no relaxation of power; but later creations display no further progress, unless we accept as progress a more searching delicacy of finish, counterbalanced by an excessive softness of rounding in flesh contours. An unfaltering minuteness of hand and great tenderness of treatment may be found, combined with angularity of drapery and some awkwardness of attitude in the full length portrait couple (John Arnolfini and his wife) at the National Gallery (1434), in which a rare insight into the detail of animal nature is revealed in a study of a terrier dog. A "Madonna with Saints," at Dresden, equally soft and minute, charms us by the mastery with which an architectural background is put in. The bold and energetic striving of earlier days, the strong bright tone, are not equalled by the soft blending and tender tints of the later ones. Sometimes a crude ruddiness in flesh strikes us as a growing defect, an instance of which is the picture in the museum of Bruges, in which Canon van der Paelen is represented kneeling before the Virgin under the protection of St George (1434). From first to last van Eyck retains his ability in portraiture. Fine specimens are the two male likenesses in the gallery of Vienna (1436), and a female, the master's wife, in the gallery of Bruges (1439). His death in 1440/41 at Bruges is authentically recorded. He was buried in St Donat. Like many great artists he formed but few pupils. Hubert's disciple, Jodocus of Ghent, hardly does honour to his master's teaching, and only acquires importance after he has thrown off some of the peculiarities of Flemish teaching. Petrus Cristus, who was taught by John, remains immeasurably behind him in everything that relates to art. But if the personal influence of the van Eycks was small, that of their works was immense, and it is not too much to say that their example, taken in conjunction with that of van der Weyden, determined the current and practice of painting throughout the whole of Europe north of the Alps for nearly a century.

See also Waagen, *Hubert and Johann van Eyck* (1822); Voll, *Werke des Jan van Eyck* (1900); L. Kämmerer on the two families in Knackfuss's *Künstler-Monographien* (1898). (J. A. C.)

EYE, a market-town and municipal borough in the Eye parliamentary division of Suffolk, England; $94\frac{1}{2}$ m. N.E. from London by the Great Eastern railway, the terminus of a branch from the Ipswich-Norwich line. Pop. (1901) 2004. The church of St Peter and St Paul is mainly of Perpendicular flint work, with Early English portions and a fine Perpendicular rood screen. It was formerly attached to a Benedictine priory. Slight fragments of a Norman castle crown a mound of probably earlier construction. There are a town hall, corn exchange, and grammar school founded in 1566. Brewing is the chief industry. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 4410 acres.

Eye (*Heya, Aye*) was once surrounded by a stream, from which it is said to have derived its name. Leland says it was situated in a marsh and had formerly been accessible by river vessels from Cromer, though the river was then only navigable to Burston, 12 m. from Eye. From the discovery of numerous bones and Roman urns and coins it has been thought that the place was once the cemetery of a Roman camp. William I. gave the lordship of Eye to Robert Malet, a Norman, who built a castle and a Benedictine monastery which was at first subordinate to the abbey of Bernay in Normandy. Eye is a borough by prescription. In 1205 King John granted to the townsmen a charter freeing them from various tolls and customs and from the jurisdiction of the shire and hundred courts. Later charters were granted by Elizabeth in 1558 and 1574, by James I. in 1604, and by William III. in 1697. In 1574 the borough was newly incorporated under two bailiffs, ten chief and twenty-four inferior burgesses, and an annual fair on Whit-Monday and a market on Saturday were granted. Two members were returned to each parliament from 1571 till 1832, when the Reform Act reduced the membership to one. By the Redistribution Act of 1885 the representation was merged in the Eye division of the county. The making of pillow-lace was formerly carried on extensively, but practically ceased with the introduction of machinery.

EYE (O. Eng. *eáge*, Ger. *Auge*; derived from an Indo-European root also seen in Lat. *oc-ulus*, the organ of vision (*q.v.*).

Anatomy.—The eye consists of the eyeball, which is the true organ of sight, as well as of certain muscles which move it, and of the lachrymal apparatus which keeps the front of it in a moist condition. The *eyeball* is contained in the front of the orbit and is a sphere of about an inch (24 mm.) in diameter. From the front of this a segment of a lesser sphere projects slightly and forms the *cornea* (fig. 1, *co*). There are three coats to the eyeball, an external (protective), a middle (vascular), and an internal (sensory). There are also three refracting media, the aqueous humour, the lens and the vitreous humour or body.

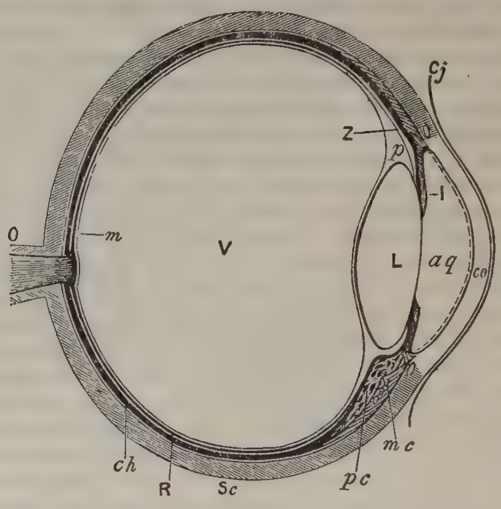

Fig. 1.—Diagrammatic Section through the Eyeball.

cj,	Conjunctiva.
co,	Cornea.
Sc,	Sclerotic.
ch,	Choroid.
pc,	Ciliary processes.
mc,	Ciliary muscle.
O,	Optic nerve.
R,	Retina.
I,	Iris.
aq,	Anterior chamber of aqueous humour.
L,	Lens.
V,	Vitreous body.
Z,	Zonule of Zinn, the ciliary process being removed to show it.
p,	Canal of Petit.
m,	Yellow spot.

The dotted line behind the cornea represents its posterior epithelium.

The protective coat consists of the *sclerotic* in the posterior five-sixths and the cornea in the anterior sixth. The sclerotic (fig. 1, *Sc*) is a firm fibrous coat, forming the "white of the eye," which posteriorly is pierced by the optic nerve and blends with the sheath of that nerve, while anteriorly it is continued into the cornea at the *corneo-scleral junction.* At this point a small canal, known as the *canal of Schlemm*, runs round the margin of the cornea in the substance of the sclerotic (see fig. 1). Between the sclerotic and the subjacent choroid coat is a lymph space traversed by some loose pigmented connective tissue,—the *lamina fusca.* The cornea is quite continuous with the sclerotic but has a greater convexity. Under the microscope it is seen to consist of five layers. Most anteriorly there is a layer of stratified epithelium, then an anterior elastic layer, then the *substantia propria* of the cornea which is fibrous with spaces in which the stellate *corneal corpuscles* lie, while behind this is the posterior elastic layer and then a delicate layer of endothelium. The transparency of the cornea is due to the fact that all these structures have the same refractive index.

The middle or vascular coat of the eye consists of the *choroid*, the *ciliary processes* and the *iris*. The choroid (fig. 1, *ch*) does not come quite as far forward as the corneo-scleral junction; it is composed of numerous blood-vessels and pigment cells bound together by connective tissue and, superficially, is lined by a delicate layer of pigmented connective tissue called the *lamina suprachoroidea* in contact with the already-mentioned perichoroidal lymph space. On the deep surface of the choroid is a structureless basal lamina.

The *ciliary processes* are some seventy triangular ridges, radially arranged, with their apices pointing backward (fig. 1, *pc*), while their bases are level with the corneo-scleral junction. They are as vascular as the rest of the choroid, and contain in their interior the *ciliary muscle*, which consists of radiating and circular fibres. The radiating fibres (fig. 1, *mc*) rise, close to the canal of Schlemm, from the margin of the posterior elastic lamina of the cornea, and pass backward and outward into the ciliary processes and anterior part of the choroid, which they pull forward when they contract. The circular fibres lie just internal to these and are few or wanting in short-sighted people.

The *iris* (fig. 1, *I*) is the coloured diaphragm of the eye, the centre of which is pierced to form the pupil; it is composed of a connective tissue stroma containing blood-vessels, pigment cells and muscle fibres. In front of it is a reflection of the same layer of endothelium which lines the back of the cornea, while behind both it and the ciliary processes is a double layer of epithelium, deeply pigmented, which really belongs to the retina. The pigment in the substance of the iris is variously coloured in different individuals, and is often deposited after birth, so that, in newly-born European children, the colour of the eyes is often slate-blue owing to the black pigment at the back of the iris showing through. White, yellow or reddish-brown pigment is deposited later in the substance of the iris, causing the appearance, with the black pigment behind, of grey, hazel or brown eyes. In blue-eyed people very little interstitial pigment is formed, while in Albinos the posterior pigment is also absent and the blood-vessels give the pink coloration. The muscle fibres of the iris are described as circular and radiating, though it is still uncertain whether the latter are really muscular rather than elastic. On to the front of the iris, at its margin, the posterior layer of the posterior elastic lamina is continued as a series of ridges called the *ligamentum pectinatum iridis*, while between these ridges are depressions known as the *spaces of Fontana*.

The inner or sensory layer of the wall of the eyeball is the *retina*; it is a delicate transparent membrane which becomes thinner as the front of the eye is approached. A short distance behind the ciliary processes the nervous part of it stops and forms a scalloped border called the *ora serrata*, but the pigmented layer is continued on behind the ciliary processes and iris, as has been mentioned, and is known as the *pars ciliaris retinae* and *pars iridica retinae*. Under the microscope the posterior part of the retina is seen to consist of eight layers. In its passage from the lens and vitreous the light reaches these layers in the following order:—(1) Layer of nerve fibres; (2) Layer of ganglion cells; (3) Inner molecular layer; (4) Inner nuclear layer; (5) Outer molecular layer; (6) Outer nuclear layer; (7) Layer of rods and cones; (8) Pigmented layer.

The layer of nerve fibres (fig. 2, *2*) is composed of the axis-cylinders only of the fibres of the optic nerve which pierce the sclerotic, choroid and all the succeeding layers of the retina to radiate over its surface.

The ganglionic layer (fig. 2, *3*) consists of a single stratum of large ganglion cells, each of which is continuous with a fibre of the preceding layer which forms its axon. Each also gives off a number of finer processes (dendrites) which arborize in the next layer.

The inner molecular layer (fig. 2, *4*) is formed by the interlacement of the dendrites of the last layer with those of the cells of the inner nuclear layer which comes next.

The inner nuclear layer (fig. 2, *5*) contains three different kinds of cells, but the most important and numerous are large bipolar cells, which send one process into the inner molecular layer, as has just been mentioned, and the other into the outer molecular layer, where they arborize with the ends of the rod and cone fibres.

The outer molecular layer (fig. 2, *6*) is very narrow and is formed by the arborizations just described. The outer nuclear layer (fig. 2, *7*), like the inner, consists of oval cells, which are of two kinds. The rod granules are transversely striped, and are connected externally with the rods, while internally processes pass into the outer molecular layer to end in a knob around which the arborizations of the inner nuclear cells lie. The cone granules are situated more externally, and are in close contact with the cones; internally their processes form a foot-plate in the outer molecular layer from which arborizations extend.

The layer of rods and cones (fig. 2, *9*) contains these structures, the rods being more numerous than the cones. The rods are spindle-shaped bodies, of which the inner segment is thicker than the outer. The cones are thicker and shorter than the rods, and resemble Indian clubs, the handles of which are directed outward and are transversely striped. In the outer part of the rods the visual purple or rhodopsin is found.

The pigmented layer consists of a single layer of hexagonal cells containing pigment, which is capable of moving towards the rods and cones when the eye is exposed to light and away from them in the dark.

Supporting the delicate nervous structures of the retina are a series of connective tissue rods known as the *fibres of Müller* (fig. 2, *Ct*); these run through the thickness of the retina at right angles to its surface, and are joined together on the inner side of the layer of nerve fibres to form the *inner limiting membrane*. More externally, at the bases of the rods and cones, they unite again to form the outer limiting membrane.

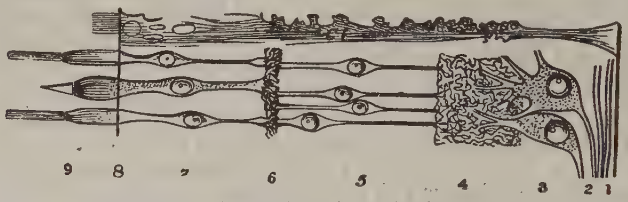

Fig. 2.—Diagrammatic section through the retina to show the several layers, which are numbered as in the text. *Ct*, The radial fibres of the supporting connective tissue.

When the retina is looked at with the naked eye from in front two small marks are seen on it. One of these is an oval depression about 3 mm. across, which, owing to the presence of pigment, is of a yellow colour and is known as the yellow spot (*macula lutea*); it is situated directly in the antero-posterior axis of the eyeball, and at its margin the nerve fibre layer is thinned and the ganglionic layer thickened. At its centre, however, both these layers are wanting, and in the layer of rods and cones only the cones are present. This central part is called the *fovea centralis* and is the point of acutest vision. The second mark is situated a little below and to the inner side of the yellow spot; it is a circular disk with raised margins and a depressed centre and is called the *optic disk*; in structure it is a complete contrast to the yellow spot, for all the layers except that of the nerve fibres are wanting, and consequently, as light cannot be appreciated here, it is known as the "blind spot." It marks the point of entry of the optic nerve, and at its centre the retinal artery appears and divides into branches. An appreciation of the condition of the optic disk is one of the chief objects of the ophthalmoscope.

The *crystalline lens* (fig. 1, *L*) with its ligament separates the aqueous from the vitreous chamber of the eye; it is a biconvex lens the posterior surface of which is more curved than the anterior. Radiating from the anterior and posterior poles are three faint lines forming a Y, the posterior Y being erect and the anterior inverted. Running from these figures are a series of lamellae, like the layers of an onion, each of which is made up of a number of fibrils called the lens fibres. On the anterior surface of the lens is a layer of epithelial cells, which, towards the margin or equator, gradually elongate into lens fibres. The whole lens is enclosed in an elastic structureless membrane, and, like the cornea, its transparency is due to the fact that all its constituents have the same refractive index.

The ligament of the lens is the thickened anterior part of the hyaloid membrane which surrounds the vitreous body; it is closely connected to the iris at the ora serrata, and then splits into two layers, of which the anterior is the thicker and blends with the anterior part of the elastic capsule of the lens, so that, when its attachment to the ora serrata is drawn forward by the ciliary muscle, the lens, by its own elasticity, increases its convexity. Between the anterior and posterior splitting of the hyaloid membrane is a circular lymph space surrounding the margin of the lens known as the *canal of Petit* (fig. 1, *p*).

The *aqueous humour* (fig. 1, *aq*) is contained between the lens and its ligament posteriorly and the cornea anteriorly. It is practically a very weak solution of common salt (chloride of sodium 1·4%). The space containing it is imperfectly divided into a large anterior and a small posterior chamber by a perforated diaphragm—the iris.

The *vitreous body* or *humour* is a jelly which fills all the contents of the eyeball behind the lens. It is surrounded by the hyaloid membrane, already noticed, and anteriorly is concave for the reception of the lens.

From the centre of the optic disk to the posterior pole of the lens a lymph canal formed by a tube of the hyaloid membrane stretches through the centre of the vitreous body; this is the *canal of Stilling*, which in the embryo transmitted the hyaloid artery to the lens. The composition of the vitreous is practically the same as that of the aqueous humour.

The *arteries of the eyeball* are all derived from the ophthalmic branch of the internal carotid, and consist of the retinal which enters the optic nerve far back in the orbit, the two long ciliaries, which run forward in the choroid and join the anterior ciliaries, from muscular branches of the ophthalmic, in the circulus iridis major round the margin of the iris, and the six to twelve short ciliaries which pierce the sclerotic round the optic nerve and supply the choroid and ciliary processes.

The *veins of the eyeball* emerge as four or five trunks rather behind the equator; these are called from their appearance *venae vorticosae*, and open into the superior ophthalmic vein. In addition to these there is a retinal vein which accompanies its artery.

Accessory Structures of the Eye.—The *eyelids* are composed of the following structures from in front backward: (1) Skin; (2) Superficial fascia; (3) Orbicularis palpebrarum muscle; (4) *Tarsal plates* of fibrous tissue attached to the orbital margin by the superior and inferior *palpebral ligaments*, and, at the junction of the eyelids, by the external and internal *tarsal ligaments* of which the latter is also known as the *tendo oculi*; (5) *Meibomian glands*, which are large modified sebaceous glands lubricating the edges of the lids and preventing them adhering, and *Glands of Moll*, large sweat glands which, when inflamed, cause a "sty"; (6) the *conjunctiva*, a layer of mucous membrane which lines the back of the eyelids and is reflected on to the front of the globe, the reflection forming the fornix: on the front of the cornea the conjunctiva is continuous with the layer of epithelial cells already mentioned.

The *lachrymal gland* is found in the upper and outer part of the front of the orbit. It is about the size of an almond and has an upper (orbital) and a lower (palpebral) part. Its six to twelve ducts open on to the superior fornix of the conjunctiva.

The *lachrymal canals* (canaliculi) (see fig. 3, *2* and *3*) are superior and inferior, and open by minute orifices (puncta) on to the free margins of the two eyelids near their inner point of junction. They collect the tears, secreted by the lachrymal gland, which thus pass right across the front of the eyeball, continually moistening the conjunctiva. The two ducts are bent round a small pink tubercle called the *caruncula lachrymalis* (fig. 3, *4*) at the inner angle of the eyelids, and open into the *lachrymal sac* (fig. 3, *5*), which lies in a groove in the lachrymal bone. The sac is continued down into the *nasal duct* (fig. 3, *6*), which is about ¾ inch long and opens into the inferior meatus of the nose, its opening being guarded by a valve.

The orbit contains seven muscles, six of which rise close to the optic foramen. The *levator palpebrae superioris* is the highest, and passes forward to the superior tarsal plate and fornix of the conjunctiva. The *superior* and *inferior recti* are inserted into the upper and lower surfaces of the eyeball respectively; they make the eye look inward as well as up or down. The external and internal recti are inserted into the sides of the eyeball and make it look outward or inward. The superior oblique runs forward to a pulley in the inner and front part of the roof of the orbit, round which it turns to be inserted into the outer and back part of the eyeball. It turns the glance downward and outward. The inferior oblique rises from the inner and front part of the floor of the orbit, and is also inserted into the outer and back part of the eyeball. It directs the glance upward and outward. Of all these muscles the superior oblique is supplied by the fourth cranial nerve, the external rectus by the sixth and the rest by the third.

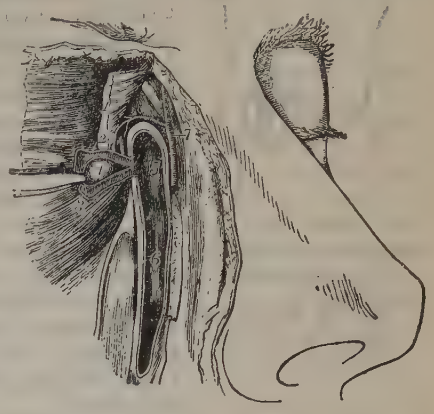

FIG. 3.—Lachrymal Canals and Duct.

1, Orbicular muscle.
2, Lachrymal canal.
3, Punctum.
4, Caruncula.
5, Lachrymal sac.
6, Lachrymal duct.
7, Angular artery.

The posterior part of the eyeball and the anterior parts of the muscles are enveloped in a lymph space, known as the *capsule of Tenon*, which assists their movements.

EMBRYOLOGY.—As is pointed out in the article BRAIN, the *optic vesicles* grow out from the fore-brain, and the part nearest the brain becomes constricted and elongated to form the optic stalk (see figs. 4 and 5, β). At the same time the ectoderm covering the side of the head thickens and becomes invaginated to form the lens vesicle (see figs. 4 and 5, δ), which later loses its connexion with the surface and approaches the optic vesicle, causing that structure to become cupped for its reception, so that what was the optic vesicle becomes the optic cup and consists of an external and an internal layer of cells (fig. 6 β and δ). Of these the outer cells become the retinal pigment, while the inner form the other layers of the retina. The invagination of the optic cup extends, as the *choroidal fissure* (not shown in the diagrams), along the lower and back part of the optic stalk, and into this slit sinks some of the surrounding mesoderm to form the vitreous body and the hyaloid arteries, one of which persists.[1] When this has happened the fissure closes up. The anterior epithelium of the lens vesicle remains, but from the posterior the lens fibres are developed and these gradually fill up the cavity. The superficial layer of head ectoderm, from which the lens has been invaginated and separated, becomes the anterior

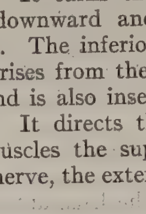

FIG. 4.
Diagram of Developing Eye (1st stage).

α, Forebrain.
β, Optic vesicle.
γ, Superficial ectoderm.
δ, Thickening for lens.

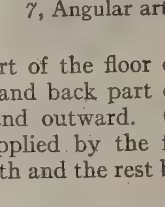

FIG. 5.
Diagram of Developing Eye (2nd stage).

β, Optic cup.
δ, Invagination of lens.
Other letters as in fig. 4.

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[1] Some embryologists regard the vitreous body as formed from the ectoderm (see Quain's *Anatomy*, vol. i., 1908).

epithelium of the cornea (fig. 6, ε), and between it and the lens the mesoderm sinks in to form the cornea, iris and anterior chamber of the eye, while surrounding the optic cup the mesoderm forms the sclerotic and choroid coats (fig. 7, η and ζ). Up to the seventh month the pupil is closed by the *membrana pupillaris*, derived from the capsule of the lens which is part of the mesodermal ingrowth through the choroidal fissure already mentioned. The hyaloid artery remains, as a prolongation of the retinal artery to the lens, until just before birth, but after that its sheath forms the canal of Stilling. Most of the fibres of the optic nerve are centripetal and begin as the axons of the ganglionic cells of the retina; a few, however, are centrifugal and come from the nerve cells in the brain.

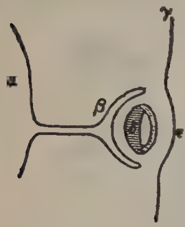


FIG. 6.

Diagram of Developing Eye (3rd stage).

δ, Solid lens.
ε, Corneal epithelium.
Other letters as in figs. 4 and 5.

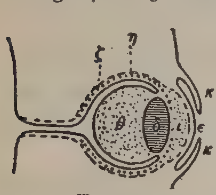


FIG. 7.

Diagram of Developing Eye (4th stage). The mesodermal tissues are dotted.

ζ, Choroid and Iris.
η, Sclerotic and Cornea.
θ, Vitreous.
ε, Aqueous.
κ, Eyelids.

The eyelids are developed as ectodermal folds, which blend with one another about the third month and separate again before birth in Man (fig. 7, κ). The lachrymal sac and duct are formed from solid ectodermal thickenings which later become canalized.

It will thus be seen that the optic nerve and retina are formed from the brain ectoderm; the lens, anterior epithelium of the cornea, skin of the eyelids, conjunctiva and lachrymal apparatus from the superficial ectoderm; while the sclerotic, choroid, vitreous and aqueous humours as well as the iris and cornea are derived from the mesoderm.

See *Human Embryology*, by C. S. Minot (New York); Quain's *Anatomy*, vol. i. (1908); "Entwickelung des Auges der Wirbeltiere," by A. Froriep, in *Handbuch der vergleichenden und experimentellen Entwickelungslehre der Wirbeltiere* (O. Hertwig, Jena, 1905).

COMPARATIVE ANATOMY.—The Acrania, as represented by Amphioxus (the lancelet), have a patch of pigment in the fore part of the brain which is regarded as the remains of a degenerated eye. In the Cyclostomata the hag (Myxine) and larval lamprey (Ammocoetes) have ill-developed eyes lying beneath the skin and devoid of lens, iris, cornea and sclerotic as well as eye muscles. In the adult lamprey (Petromyzon) these structures are developed at the metamorphosis, and the skin becomes transparent, rendering sight possible. Ocular muscles are developed, but, unlike most vertebrates, the inferior rectus is supplied by the sixth nerve while all the others are supplied by the third. In all vertebrates the retina consists of a layer of senso-neural cells, the rods and cones, separated from the light by the other layers which together represent the optic ganglia of the invertebrates; in the latter animals, however, the senso-neural cells are nearer the light than the ganglia.

In fishes the eyeball is flattened in front, but the flat cornea is compensated by a spherical lens, which, unlike that of other vertebrates, is adapted for near vision when at rest. The iris in some bony fishes (Teleostei) is not contractile. In the Teleostei, too, there is a process of the choroid which projects into the vitreous chamber and runs forward to the lens; it is known as the *processus falciformis*, and, besides nourishing the lens, is concerned in accommodation. This specialized group of fishes is also remarkable for the possession of a so-called *choroid gland*, which is really a *rete mirabile* (see ARTERIES) between the choroid and sclerotic. The sclerotic in fishes is usually chondrified and sometimes calcified or ossified. In the retina the rods and cones are about equal in number, and the cones are very large. In the cartilaginous fishes (Elasmobranchs) there is a silvery layer, called the *tapetum lucidum*, on the retinal surface of the choroid.

In the Amphibia the cornea is more convex than in the fish, but the lens is circular and the sclerotic often chondrified. There is no processus falciformis or tapetum lucidum, but the class is interesting in that it shows the first rudiments of the ciliary muscle, although accommodation is brought about by shifting the lens. In the retina the rods outnumber the cones and these latter are smaller than in any other animals. In some Amphibians coloured oil globules are found in connexion with the cones, and sometimes two cones are joined, forming double or twin cones.

In Reptilia the eye is spherical and its anterior part is often protected by bony plates in the sclerotic (Lacertilia and Chelonia). The ciliary muscle is striated, and in most reptiles accommodation is effected by relaxing the ciliary ligament as in higher vertebrates, though in the snakes (Ophidia) the lens is shifted as it is in the lower forms. Many lizards have a vascular projection of the choroid into the vitreous, foreshadowing the pecten of birds and homologous with the processus falciformis of fishes. In the retina the rods are scarce or absent.

In birds the eye is tubular, especially in nocturnal and raptorial forms: this is due to a lengthening of the ciliary region, which is always protected by bony plates in the sclerotic. The pecten, already mentioned in lizards, is a pleated vascular projection from the optic disk towards the lens which in some cases it reaches. In Apteryx this structure disappears. In the retina the cones outnumber the rods, but are not as numerous as in the reptiles. The ciliary muscle is of the striped variety.

In the Mammalia the eye is largely enclosed in the orbit, and bony plates in the sclerotic are only found in the monotremes. The cornea is convex except in aquatic mammals, in which it is flattened. The lens is biconvex in diurnal mammals, but in nocturnal and aquatic it is spherical. There is no pecten, but the numerous hyaloid arteries which are found in the embryo represent it. The iris usually has a circular pupil, but in some ungulates and kangaroos it is a transverse slit. In the Cetacea this transverse opening is kidney-shaped, the hilum of the kidney being above. In many carnivores, especially nocturnal ones, the slit is vertical, and this form of opening seems adapted to a feeble light, for it is found in the owl, among birds. The tapetum lucidum is found in Ungulata, Cetacea and Carnivora. The ciliary muscle is unstriped. In the retina the rods are more numerous than the cones, while the macula lutea only appears in the Primates in connexion with binocular vision.

Among the accessory structures of the eye the retractor bulbi muscle is found in amphibians, reptiles, birds and many mammals; its nerve supply shows that it is probably a derivative of the external or posterior rectus. The nictitating membrane or third eyelid is well-developed in amphibians, reptiles, birds and some few sharks; it is less marked in mammals, and in Man is only represented by the little *plica semilunaris*. When functional it is drawn across the eye by special muscles derived from the retractor bulbi, called the *bursalis* and *pyramidalis*. In connexion with the nictitating membrane the Harderian gland is developed, while the lachrymal gland secretes fluid for the other eyelids to spread over the conjunctiva. These two glands are specialized parts of a row of glands which in the Urodela (tailed amphibians) are situated along the lower eyelid; the outer or posterior part of this row becomes the lachrymal gland, which in higher vertebrates shifts from the lower to the upper eyelid, while the inner or anterior part becomes the Harderian gland. Below the amphibians glands are not necessary, as the water keeps the eye moist.

The lachrymal duct first appears in the tailed amphibians; in snakes and gecko lizards, however, it opens into the mouth.

For literature up to 1900 see R. Wiedersheim's *Vergleichende Anatomie der Wirbeltiere* (Jena, 1902). Later literature is noticed in the catalogue of the Physiological Series of the R. College of Surgeons of England Museum, vol. iii. (London, 1906). (F. G. P.)

EYE DISEASES.—The specially important diseases of the eye are those which temporarily or permanently interfere with sight. In considering the pathology of the eye it may be remembered that (1) it is a double organ, while (2) either eye may have its own trouble.

1. The two eyes act together, under normal conditions, for all practical purposes exactly as if there were but one eye placed in the middle of the face. All impressions made upon either retina, to the one side of a vertical line through the centre, the *fovea centralis*, before giving rise to conscious perception cause a stimulation of the same area in the brain. Impressions formed simultaneously, for instance, on the right side of the right retina and on corresponding areas of the right side of the left retina, are conveyed to the same spots in the right occipital lobe of the brain. Pathological processes, therefore, which are localized in the right or left occipital lobes, or along any part of the course of the fibres which pass from the right or left optic tracts to these "visual centres," cause defects in function of the right or left halves of the two retinae. *Hemianopia*, or half-blindness, arising from these pathological changes, is of very varying degrees of severity, according to the nature and extent of the particular lesion. The blind areas in the two fields of vision, corresponding to the outward projection of the paralysed retinal areas, are always symmetrical both in shape and degree. The central lesion may for instance be very small, but at the same time destructive to the nerve tissue. This will be revealed as a sector-shaped or insular symmetrical complete blindness in the fields of vision to the opposite side. Or a large central area, or an area comprising many or all of the nerve fibres which pass to the visual centre on one side, may be involved in a lesion which causes impairment of function, but no actual destruction of the nerve tissue. There is thus caused a symmetrical weakening of vision (*amblyopia*) in the opposite fields. In such cases the colour vision is so much more evidently affected than the sense of form that the condition has been called *hemiachromatopsia* or half-colour blindness. Hemianopia may be caused by haemorrhage, by embolism, by tumour growth which either directly involves the visual nerve elements or affects them by compression and by inflammation. Transitory hemianopia is rare and is no doubt most frequently of toxic origin.

The two eyes also act as if they were one in accommodating. It is impossible for the two eyes to accommodate simultaneously to different extents, so that where there is, as occasionally happens, a difference in focus between them, this difference remains the same for all distances for which they are adapted. In such cases, therefore, both eyes cannot ever be accurately adapted at the same time, though either may be alone. It often happens as a consequence that the one eye is used to receive the sharpest images of distant, and the other of near objects. Any pathological change which leads to an interference in the accommodating power of one eye alone must have its origin in a lesion which lies peripherally to the nucleus of the third cranial nerve. Such a lesion is usually one of the third nerve itself. Consequently, a unilateral accommodation paresis is almost invariably associated with pareses of some of the oculo-motor muscles. A bilateral accommodation paresis is not uncommon. It is due to a nuclear or more central cerebral disturbance. Unlike a hemianopia, which is mostly permanent, a double accommodation paresis is frequently transitory. It is often a post-diphtheritic condition, appearing alone or associated with other paresis.

Both eyes are also normally intimately associated in their movements. They move in response to a stimulus or a combination of stimuli, emanating from different centres of the brain, but one which is always equally distributed to the corresponding muscles in both eyes, so that the two lines of fixation meet at the succession of points on which attention is directed. The movements are thus associated in the same direction, to the right or left, upwards or downwards, &c. In addition, owing to the space which separates the two eyes, convergent movements, caused by stimuli equally distributed between the two internal recti, are required for the fixation of nearer and nearer-lying objects. These movements would not be necessary in the case of a single eye. It would merely have to accommodate. The converging movements of the double eye occur in association with accommodation, and thus a close connexion becomes established between the stimuli to accommodation and convergence. All combinations of convergent and associated movements are constantly taking place normally, just as if a single centrally-placed eye were moved in all directions and altered its accommodation according to the distance, in any direction, of the object which is fixed.

Associated and convergent movements may be interfered with pathologically in different ways. Cerebral lesions may lead to their impairment or complete abolition, or they may give rise to involuntary spasmodic action, as the result of paralysing or irritating the centres from which the various co-ordinated impulses are controlled or emanate. Lesions which do not involve the centres may prevent the response to associated impulses in one eye alone by interfering with the functional activity of one or more of the nerves along which the stimuli are conveyed. Paralysis of oculo-motor nerves is thus a common cause of defects of association in the movements of the double eye. The great advantage of simultaneous binocular vision—viz. the appreciation of depth, or stereoscopic vision—is thus lost for some, or it may be all directions of fixation. Instead of seeing singly with two eyes, there is then double-vision (*diplopia*). This persists so long as the defect of association continues, or so long as the habit of mentally suppressing the image of the faultily-directed eye is not acquired.

In the absence of any nerve lesions, central or other, interfering with their associated movements, the eyes continue throughout life to respond equally to the stimuli which cause these movements, even when, owing to a visual defect of the one eye, binocular vision has become impossible. It is otherwise, however, with the proper co-ordination of convergent movements. These are primarily regulated by the unconscious desire for binocular vision, and more or less firmly associated with accommodation. When one eye becomes blind, or when binocular vision for other reasons is lost, the impulse is gradually, as it were, unlearnt. This is the cause of *divergent concomitant squint*. Under somewhat similar conditions a degree of convergence, which is in excess of the requirements of fixation, may be acquired from different causes. This gives rise to *convergent concomitant squint*.

For *Astigmatism*, &c., see the article VISION.

2. Taking each eye as a single organ, we find it to be subject to many diseases. In some cases both eyes may be affected in the same way, *e.g.* where the local disease is a manifestation of some general disturbance. Apart from the fibrous coat of the eye, the sclera, which is little prone to disease, and the external muscles and other adnexa, the eye may be looked upon as composed of two elements, (*a*) the dioptric media, and (*b*) the parts more or less directly connected with perception. Pathological conditions affecting either of these elements may interfere with sight.

The dioptric media, or the transparent portions which are concerned in the transmission of light to, and the formation of images upon, the retina, are the following: the *cornea*, the *aqueous humour*, the *crystalline lens* and the *vitreous humour*. Loss of transparency in any of these media leads to blurring of the retinal images of external objects. In addition to loss of transparency the cornea may have its curvature altered by pathological processes. This necessarily causes imperfection of sight. The crystalline lens, on the other hand, may be dislocated, and thus cause image distortion.

The Cornea.—The transparency of the cornea is mainly lost by imflammation (*keratitis*), which causes either an infiltration of its tissues with leucocytes, or a more focal, more destructive ulcerative process.

Inflammation of the cornea may be primary or secondary, *i.e.* the inflammatory changes met with in the corneal tissue may be directly connected with one or more foci of inflammation in the cornea itself or the focus or foci may be in some other part of the eye. Only the very superficial forms of primary keratitis, those confined to the epithelial layer, leave no permanent change;

there is otherwise always a loss of tissue resulting from the inflammation and this loss is made up for by more or less densely intransparent connective tissue (*nebula*, *leucoma*). These according to their site and extent cause greater or less visual disturbance. Primary keratitis may be ulcerative or non-ulcerative, superficial or deep, diffuse or circumscribed, vascularized or non-vascularized. It may be complicated by deeper inflammations of the eye such as iritis and cyclitis. In some cases the anterior chamber is invaded by pus (*hypopyon*). The healing of a corneal ulcer is characterized by the disappearance of pain where this has been a symptom and by the rounding off of its sharp margins as epithelium spreads over them from the surrounding healthy parts. Ulcers tend to extend either in depth or superficially, rarely in both manners at the same time. A deep ulcer leads to perforation with more or less serious consequences according to the extent of the perforation. Often an eye bears permanent traces of a perforation in adhesion of the iris to the back of a corneal scar or in changes in the lens capsule (capsular cataract). In other cases the ulcerated cornea may yield to pressure from within, which causes it to bulge forwards (*staphyloma*).

The principal causes of primary keratitis are traumata and infection from the conjunctiva. Traumata are most serious when the body causing the wound is not aseptic or when micro-organisms from some other source, often the conjunctiva and tear-sac, effect a lodgment before healing of the wound has sufficiently advanced. In infected cases a complication with iritis is not uncommon owing to the penetration of toxines into the anterior chamber.

Inflammations of the cornea are the most important diseases of the eye, because they are among the most frequent, because of the value of the cornea to vision and because much good can often be done by judicious treatment and much harm result from wrong interference and neglect. The treatment of primary keratitis must vary according to the cause. Generally speaking the aim should be to render the ulcerated portions as aseptic as possible without using applications which are apt to cause a great deal of irritation and thus interfere with healing. On this account it is important to be able to recognize when healing is taking place, for as soon as this is the case, rest, along with frequent irrigation of the conjunctiva with sterilized water at the body temperature, and occasionally mild antiseptic irrigation of the nasal mucous membrane is all that is required. It is a common and dangerous mistake to over treat.

Of local antiseptics which are of use may be mentioned the actual cautery, chlorine water, freshly prepared silver nitrate or protargol, and the yellow oxide of mercury. These different agents are of course not all equally applicable in any given case; it depends upon the severity as well as upon the nature of the inflammation which is the most suitable. For instance, the actual cautery is employed only in the case of the deeper septic or malignant ulcers, in which the destruction of tissue is already considerable and tending to spread further. Again the yellow oxide of mercury should only be used in the more superficial, strumous forms of inflammation. Many other substances are also in use, but need not here be referred to.

Secondary keratitis takes the form of an interstitial deposit of leucocytes between the layers of the cornea as well as often of vascularization, sometimes intense, from the deeper network of vessels (anterior ciliary) surrounding the cornea. The duration of a secondary keratitis is usually prolonged, often lasting many months. More or less complete restoration of transparency is the rule, however, eventually.

No local treatment is called for except the shading of the eyes and in most cases the use of a mydriatic to prevent synechiae when the iris is involved. Often it is advisable to do something for the general health. In young people there is probably nothing better than cod-liver oil and syrup of the iodide of iron. Inherited syphilis, tuberculous and other inflammations are the causes of secondary keratitis.

Neuro-paralytic Keratitis.—When the fifth nerve is paralysed there is a tendency for the cornea to become inflamed. Different forms of inflammation may then occur which all, besides anaesthesia, show a marked slowness in healing. The main cause of neuro-paralytic keratitis lies in the greater vulnerability of the cornea. The prognosis is necessarily bad. The treatment consists in as far as possible protecting the eye from external influences, by keeping it tied up, and by frequently irrigating with antiseptic lotions.

Certain non-inflammatory and degenerative changes are met with in the cornea. Of these may be mentioned *keratoconus* or conical cornea, in which, owing to some disturbance of vitality, the nature of which has not been discovered, the normal curvature of the cornea becomes altered to something more of a hyberboloid of revolution, with consequent impairment of vision: *arcus senilis*, a whitish opacity due to fatty degeneration, extending round the corneal margin, varying in thickness in different subjects and usually only met with in old people: *transverse calcareous film*, consisting of a finely punctiform opacity extending, in a tolerably uniformly wide band, occupying the zone of the cornea which is left uncovered when the lids are half closed.

Tumours of the cornea are not common. Those chiefly met with are dermoids, fibromata, sarcomata and epitheliomata.

Scleritis.—Inflammation of the sclera is confined to its anterior part which is covered by conjunctiva. Scleritis may occur in circumscribed patches or may be diffused in the shape of a belt round the cornea. The former is usually more superficial and uncomplicated, the latter deeper and complicated with corneal infiltration, irido-cyclitis and anterior choroiditis. Superficial scleritis or, as it is often called, *episcleritis*, is a long-continued disease which is associated with very varying degrees of discomfort. The chronic nature of the affection depends mainly upon the tendency that the inflammation has to recur in successive patches at different parts of the sclera. Often only one eye at a time is affected. Each patch lasts for a month or two and is succeeded by another after an interval of varying duration. Months or years may elapse between the attacks. The cicatricial site of a previous patch is rarely again attacked. The scleral infiltration causes a firm swelling, often sensitive to touch, over which the conjunctiva is freely movable. The overlying conjunctiva is always injected. The infiltration itself at the height of the process is densely vascularized. Seen through the conjunctiva its vessels have a darker, more purplish hue than the superficial ones. The swelling caused by the infiltration gradually subsides, leaving a cicatrix to which the overlying conjunctiva becomes adherent. The cicatrix has a slaty porcellanous-looking colour. Superficial scleritis occurs in both sexes with about equal frequency. No definite cause for the inflammation is known. The treatment on the whole is unsatisfactory. Burning down the nodules with the actual cautery, and subsequently a visit to such baths as Harrogate, Buxton, Homburg and Wiesbaden, may be recommended.

Deep scleritis with its attendant complications is altogether a more serious disease. Etiologically it is equally obscure. Both eyes are almost always attacked. It more generally occurs in young people, mostly in young women. Deep scleritis is more persistent and less subject to periods of intermission than episcleritis. The deeper and more wide-spread inflammatory infiltrations of the sclera lead eventually to weakening of that coat, and cause it to yield to the intra-ocular pressure. Vision suffers from extension of the infiltration to the cornea, or from iritis with its attendant synechiae, or from anterior choroiditis, and sometimes also from secondary glaucoma. The treatment is on the whole unsatisfactory. Iridectomy, especially if done early in the process, may be of use.

The Aqueous Humour.—Intransparency of the aqueous humour is always due to some exudation. This comes either from the iris or the ciliary processes, and may be blood, pus or fibrin. An exudation in this situation tends naturally to gravitate to the most dependent part, and, in the case of blood or pus, is known as *hyphaema* or *hypopyon*.

The Crystalline Lens Cataract.—Intransparency of the crystalline lens is technically known as *cataract*. Cataract may be idiopathic and uncomplicated, or traumatic, or secondary to disease in the deeper parts of the eye. The modified epithelial structure of which the lens is composed is always being added to throughout life. The older portions of the lens are consequently the more central. They are harder and less elastic. This arrangement seems to predispose to difficulties of nutrition. In many people, in the absence altogether of general or local disease, the transparency of the lens is lost owing to degeneration of the incompletely-nourished fibres. This idiopathic cataract mostly occurs in old people; hence the term *senile cataract*. So-called *senile* cataract is not, however, necessarily associated with any general senile changes. An idiopathic uncomplicated cataract is also met with as a congenital defect due to faulty development of the crystalline lens. A particular and not uncommon form of this kind of cataract, which may also develop during infancy, is *lamellar* or *zonular cataract*. This is a partial and stationary form of cataract in which, while the greater part of the lens retains its transparency, some of the lamellae are intransparent. Traumatic cataract occurs in two ways: by laceration or rupture of the lens capsule, or by nutritional changes consequent upon injuries to the deeper structures of the eye. The transparency of the lens is dependent upon the integrity of its capsule. Penetrating wounds of the eye involving the capsule, or rupture of the capsule from severe blows on the eye without perforation of its coats, are followed by rapidly developing cataract. Severe non-penetrating injuries, which do not cause rupture of the capsule, are sometimes followed, after a time, by slowly-progressing cataract. Secondary cataract is due to abnormalities in the nutrient matter supplied to the lens owing to disease of the ciliary body, choroid or retina. In some diseases, as diabetes, the altered general nutrition tells in the same way on the crystalline lens. Cataract is then rapidly formed. All cases of cataract in diabetes are not, however, necessarily true diabetic cataracts in the above sense. *Dislocations of the lens* are traumatic or congenital. In old-standing disease of the eye the suspensory ligament may yield in part, and thus lead to lens dislocation. The lens is practically always cataractous before this takes place.

The Vitreous Humour.—The vitreous humour loses its transparency owing to exudation from the inflamed ciliary body or choroid. The exudation may be fibrinous or purulent; the latter only as a result of injuries by which foreign bodies or septic matter are introduced into the eye or in metastatic choroiditis. Blood may also be effused into the vitreous from rupture of retinal, ciliary or choroidal vessels. The pathological significance of the various effusions into the vitreous depends greatly upon the cause. In many cases effusion and absorption are constantly taking place simultaneously. The extent of possible clearing depends greatly upon the preponderance of the latter process.

Diseases of the Iris and Ciliary Body.—Inflammation of the iris, *iritis*, arises from different causes. The various idiopathic forms have relations to constitutional disturbances such as rheumatism, gout, albuminuria, tuberculosis, fevers, syphilis, gonorrhoea and others, or they may come from cold alone. Traumatic and infected cases are attributable to accidents, the presence of foreign bodies, operations, &c. In addition, iritis may be secondary to keratitis, scleritis or choroiditis. The beginning of an attack of inflammation of the iris is characterized by alterations in its colour due to hyperaemia and by circumcorneal injection. Later on, exudation takes place into the substance of the iris, causing thickening and also a loss of gloss of its surface. According to the nature and severity of the exudation there may be deposits formed on the back of the cornea, attachments between the iris and lens capsule (synechiae), or even gelatinous-looking coagulations or pus in the anterior chamber.

The subjective symptoms to which the inflammation may give rise are dread of light (*photophobia*), pain, generally most severe at night and often very great, also more or less impairment of sight. Along with the pain and photophobia there is lacrymation. An acute attack of iritis usually lasts about six weeks. Some cases become chronic and last much longer. Others are chronic from the first, and in one clinical type of iritis, in which the ciliary body is also at the same time affected, viz. *iritis serosa*, there is usually comparatively little injection of the eye or pain, so that the patient's attention may only be directed to the eye owing to the gradual impairment of sight which results. In some cases, and more particularly in men, there is a tendency to the recurrence at longer or shorter intervals of attacks of iritis (*recurrent iritis*). In these cases, as well as in all cases of plastic iritis which have not been properly treated, serious consequences to sight are apt to follow from the binding down of the iris to the lens capsule and the occlusion of the pupil by exudation.

Inflammation of the ciliary body, *cyclitis*, is frequently associated with iritis. This association is probable in all cases where there are deposits on the posterior surface of the cornea. It is certain where there are changes in the intra-ocular tension. Often in cyclitis there is a very marked diminution in tension. Cyclitis is also present when the degree of visual disturbance is greater than can be accounted for by the visible changes in the pupil and anterior chamber. The exudation may, as in iritis, be serous, plastic or purulent. It passes from the two free surfaces of the ciliary body into the posterior aqueous, and into the vitreous, chambers. This produces, what is a constant sign of cyclitis, more or less intransparency of the vitreous humour. Where there has been excessive exudation into the vitreous, subsequent shrinking and liquefaction take place, leading to detachment of the retina and consequent blindness.

The treatment of iritis necessarily differs to some extent according to the cause. The general treatment applicable to all cases need only be here considered. What should be aimed at, at the time of the inflammation, is to put the eye as far as possible at rest, to prevent the formation of synechiae and alleviate the pain. An attempt should be made to get the pupil thoroughly dilated with atropine. The dilatation should be kept up as long as any circumcorneal injection lasts. If a case of iritis be left to itself or treated without the use of a mydriatic, posterior synechiae almost invariably form. Some fibrinous exudation may even organize into a membrane stretching across, and more or less completely occluding, the pupil. Synechiae, though not of themselves causing impairment of vision, increase the risk that the eye runs from subsequent attacks of iritis. It should however be remembered that as the main call for a mydriatic is to prevent synechiae, the *raison d'être* for its use no longer exists when, having been begun too late, the pupil cannot properly be dilated by it. Under these conditions it may even do harm. The eyes should also be kept shaded from the light by the use of a shade or neutral-tinted glasses. During an attack any use of the eyes for reading or sewing or work of any kind calling for accommodation must be prohibited. This applies equally to the case of inflammation in one eye alone and in both.

Pain is best relieved by hot fomentations, cocain, and in many cases the internal use of salicin or phenacetin. The treatment sometimes required for cases of old iritis is iridectomy. The operation is called for in two different classes of cases. In the first place, to improve vision where the pupil is small, and to a great extent occluded, though the condition has not so far led to serious nutritive changes; and in the second place, with the object as well of preventing the complete destruction of vision which either the existing condition or the danger of recurrence of the inflammation has threatened. Iridectomy for iritis should be performed when the inflammation has entirely subsided. The portion of iris excised should be large. The operation is urgently called for where the condition of *iris bombans* exists.

Iris tumours, either simple or malignant, are of rare occurrence.

A frequent result of a severe blow on the eye is a separation of a portion of the iris from its peripheral attachment (*iridodialysis*). Of congenital anomalies the most commonly met with are coloboma and more or less persistence of the foetal pupillary membrane. The most serious form of irido-cyclitis is that which may follow penetrating wounds of the eye. Under certain conditions this leads to a similar inflammation in the other eye. This so-called *sympathetic ophthalmitis* is of a malignant type, causing destruction of the sympathizing eye.

The Retina.—Choroidal inflammations are generally patchy, various foci of inflammation being scattered over the choroid. These patches may in course of time become more or less confluent. The effect upon vision depends upon the extent to which the external or percipient elements of the retina become involved. It is especially serious when the more central portions of the retina are thus affected (*choroido-retinitis centralis*).

A peculiar and grave pathological condition of the eye is what is known as *glaucoma*. A characteristic of this condition is increase of the intra-ocular tension, which has a deleterious effect on the optic nerve end and its ramifications in the retina. The cause of the rise of tension is partly congestive, partly mechanical. The effect of glaucoma, when untreated, is to cause ever-increasing loss of sight, although the time occupied by the process before it leads to complete blindness varies within such extraordinary wide limits as from a few hours to many years. The uveal tract may be the site of *sarcoma*.

The retina is subject to inflammation, to detachment from the choroid, to haemorrhages from the blood-vessels and to tumour. Retinal inflammation may primarily affect either the nerve elements or the connective tissue framework. The former is usually associated with some general disease such as albuminuria or diabetes and is bilateral. The tissue changes are oedema, the formation of exudative patches, and haemorrhage. Where the connective tissue elements are primarily affected, the condition is a slow one, similar to *sclerosis* of the central nervous system. The gradual blindness which this causes is due to compression of the retinal nerve elements by the connective tissue hyperplasia, which is always associated with characteristic changes in the disposition of the retinal pigment. This retinal sclerosis is consequently generally known as *retinitis pigmentosa*, a disease to which there is a hereditary predisposition. Besides occurring during inflammation, haemorrhages into the retina are met with in phlebitis of the central retinal vein, which is almost invariably unilateral, and in certain conditions of the blood, as pernicious anaemia, when they are always bilateral.

The optic nerve is subject to inflammation (optic neuritis) and atrophy. Double optic neuritis, affecting, however, only the intra-ocular ends of the nerves, is an almost constant accompaniment of brain tumour. Unilateral neuritis has a different causation, depending upon an inflammation, mainly perineuritic, of the nerve in the orbit. It is analogous to peripheral inflammation of other nerves, such as the third, fourth, sixth and seventh cranial nerves.

Diseases of the Conjunctiva.—These are the most frequent diseases of the eye with which the surgeon has to deal. They generally lead to more or less interference with the functional activity of the eye and often indeed to great impairment of vision owing to the tendency which there is for the cornea to become implicated.

Many different micro-organisms are of pathogenetic importance in connexion with the conjunctiva. Microbes exist in the normal conjunctival sac. These are mostly harmless, though it is usual to find at any rate a small proportion of others which are known to be pyogenetic. This fact is of great importance in connexion both with problems of etiology and the practical question of operations on the eye.

Hyperaemia.—When the conjunctiva becomes hyperaemic its colour is heightened and its transparency lessened. Sometimes too it becomes thickened and its surface altered in appearance. The often marked heightening of colour is due to the very superficial position of the dilated vessels. This is specially the case with that part of the membrane which forms the transition fold between the palpebral and the ocular conjunctiva. Consequently it is there that the redness is most marked, while it is seen to diminish towards the cornea. An important diagnostic mark is thus furnished between purely conjunctival hyperaemia and what is called circumcorneal congestion, which is always an indication of more deep-seated vascular dilatation. It also differs materially from a scleral injection, in which there is a visible dilatation of the superficial scleral vessels.

When a conjunctival hyperaemia has existed for some time the papillae become swollen, and small blebs form on the surface of the membrane: sometimes too, lymph follicles begin to show. The enlargement and compression of adjacent papillae give rise to a velvety appearance of the surface.

Hyperaemia of the conjunctiva where not followed by inflammation causes more or less lacrymation but no alteration in the character of its secretion. The hyperaemia may be acute and transitory or chronic. Much depends upon the cause as well as upon the persistence of the irritation which sets it up.

Traumata, the presence of foreign bodies in the conjunctival sac, or the irritations of superficial chalky infarcts in the Meibomian ducts, cause more or less severe transitory congestion. Continued subjection to irritating particles such as flour, stones, dust, &c., causes a more continued hyperaemia which is often circumscribed and less pronounced. Bad air in schools, barracks, workhouses, &c., also causes a chronic hyperaemia in which it is common to find a follicular hyperplasia. Long exposure to too intense light, astigmatism and other ocular defects which cause asthenopia lead also to chronic hyperaemia. Anaemic individuals are often subject to discomfort from hyperaemia of this nature.

The treatment of conjunctival hyperaemia consists first in the removal of the cause when it can be discovered. Often this is difficult. In addition the application of hot sterilized water is useful and soothing.

Conjunctivitis.—When the conjunctiva is actually inflamed the congested membrane is brought into a condition of heightened secreting action. The secretions become more copious and more or less altered in character. A sufficiently practical though by no means sharply defined clinical division of cases of conjunctivitis is arrived at by taking into consideration the character of the secretion from the inflamed membrane and the visible tissue alterations which the membrane undergoes. The common varieties of conjunctivitis which may thus be distinguished are the following: (α) Catarrhal conjunctivitis, (β) Purulent conjunctivitis, (γ) Phlyctenular conjunctivitis, (δ) Granular conjunctivitis and (ε) Diphtheritic conjunctivitis.

However desirable a truly etiological classification might appear to be, it is doubtful whether such could satisfactorily be made. So much is certain at all events, that not only can identically the same clinical appearance result from the actions of quite different pathogenetic organisms, but that various concomitant circumstances may lead to very different clinical signs being set up by one and the same microbe. As regards *contagion* there is no doubt that the secretion in the case of a true conjunctivitis (*i.e.* not merely a hyperaemia) is always more or less contagious. The degree of virulence varies not only in different cases, but the effect of contagion from the same source may be different in different individuals. Healthy conjunctivae may thus react differently, not only as regards the degree of severity, but even according to different clinical types, when infected by secretion from the same source. There are no doubt different reasons for this, such as the stage at which the inflammation has arrived in the eye from which the secretion is derived, differences in the surroundings and in the susceptibility of the infected individuals, the presence of dormant microbes of a virulent type in the healthy conjunctiva which has been infected, &c. Many points in this connexion are very difficult to investigate and much remains to be elucidated. Contagion usually takes place directly and not through the air. Often in this way one eye is first affected and may in some cases, when sufficient care is afterwards taken, be the only one to suffer.

The treatment in all severer forms of conjunctivitis should be undertaken with the primary object in view of preventing any implication of the cornea.

Catarrhal conjunctivitis, which is characterized by an increased mucoid secretion accompanying the hyperaemia, is usually bilateral and may be either acute or chronic. Acute conjunctivitis lasts as a rule only for a week or two: the chronic type may persist, with or without occasional exacerbations, for years. The subjective symptoms vary in intensity with the severity of the inflammation. There is always more or less troublesome "burning" in the eyes with a tired heavy feeling in the lids. This is aggravated by reading, which is most distressing in a close or smoky atmosphere and by artificial light. In acute cases, indeed, reading is altogether impossible. In all cases of catarrhal conjunctivitis the symptoms are also more marked if the eyes have been tied up, even though this may produce a temporary relief.

A curious variety of acute catarrhal conjunctivitis, in which the hyperaemia and lacrymation are the predominant features, is the so-called *hay-fever*. In this condition the mucous membrane of the nose and throat are similarly affected, and there is at the same time more or less constitutional disturbance. Hay-fever is due to irritation from the pollen of many plants, but principally from that of the different grasses. Some people are so susceptible to it that they invariably suffer every year during the early summer months. Here it is difficult to remove the cause, but many cases can be cured and almost all are alleviated be means of a special antitoxin applied locally.

Other ectogenetic causes of catarrhal conjunctivitis which have been studied are mostly microbic. Of these the most common are the Morax-Axenfeld and the Koch-Weeks conjunctivitis.

The Morax-Axenfeld bacillus sets up a conjunctivitis which affects individuals of all ages and conditions and which is contagious. The inflammation is usually chronic, at most subacute. It is often sufficiently characteristic to be recognized without a microscopical examination of the secretions. In typical cases the lid margin, palpebral conjunctiva, and it may be a patch of ocular conjunctiva at the outer or inner angle are alone hyperaemic: the secretion is not copious and is mostly found as a greyish coagulum lying at the inner lid-margin. The subjective symptoms are usually slight. Complications with other varieties of catarrhal conjunctivitis are not uncommon. This mild form of conjunctivitis generally lasts for many months, subject to more or less complete disappearance followed by recurrences. It can be rapidly cured by the use of an oxide of zinc ointment, which should be continued for some time after the appearances have altogether passed off.

The conjunctivitis caused by the Koch-Weeks microbe is still more common. It is a more acute type, affects mostly children, and is very contagious and often epidemic. Here the hyperaemia involves both the ocular and the palpebral conjunctiva, and usually there is considerable swelling of the lids and a copious secretion. Both eyes are always affected. Occasionally the engorged conjunctival vessels give way, causing numerous small extravasations (ecchymoses). Complications with phlyctenulae (*vide infra*) are common in children. The acute symptoms last for a week or ten days, after which the course is more chronic. Treatment with nitrate of silver in solution is generally satisfactory. Other less frequent microbic causes of catarrhal conjunctivitis yield to the same treatment.

A form of *epidemic muco-purulent conjunctivitis* is not uncommon, in which the swelling of the conjunctival folds and lids is much more marked and the secretions copious. It is less amenable to treatment and also apt to be complicated by corneal ulceration. The microbe which gives rise to this condition has not been definitely established. This inflammation is also known as *school ophthalmia*. This is extremely contagious, so that isolation of cases becomes necessary. The treatment with weak solutions of sub-acetate of lead during the acute stage, provided there be no corneal complication, and subsequently with a weak solution of tannic acid, may be recommended.

Purulent Conjunctivitis.—Some of the severer forms of catarrhal conjunctivitis are accompanied not only by a good deal of swelling of both conjunctiva and lids but also by a decidedly muco-purulent secretion. Nevertheless there is a sufficiently sharply-defined clinical difference between the catarrhal and purulent types of inflammation. In purulent conjunctivitis the oedema of the lids is always marked, often excessive, the hyperaemia of the whole conjunctiva is intense: the membrane is also infiltrated and swollen (chemosis), the papillae enlarged and the secretion almost wholly purulent. Although this variety of conjunctivitis is principally due to infection by gonococci, other microbes, which more frequently set up a catarrhal type, may lead to the purulent form.

All forms are contagious, and transference of the secretion to other eyes usually sets up the same type of severe inflammation. The way in which infection mostly takes place is by direct transference by means of the hands, towels, &c., of secretions containing gonococci either from the eye or from some other mucous membrane. The poison may also sometimes be carried by flies. The dried secretion loses its virulence.

In new-born children (*ophthalmia neonatorum*) infection takes place from the maternal passages during birth. Notwithstanding the great changes which occur during the progress of a purulent conjunctivitis, there is on recovery a complete *restitutio ad integrum* so far as the conjunctiva is concerned. Owing to the tendency to severe ulceration of the cornea, more or less serious destructions of that membrane, and consequently more or less interference with sight, may result before the inflammation has passed off. This is a special danger in the case of adults. For this reason when only one eye is affected the first point to be attended to in the treatment is to secure the second eye from contagion by efficient occlusion. The appliance known as Buller's shield, a watch-glass strapped down by plaster, is the best for this purpose. It not only admits of the patient seeing with the sound eye, but allows the other to remain under direct observation. The treatment otherwise consists in frequent removal of the secretions from the affected eye, and the use of nitrate of silver solution as a bactericide applied directly to the conjunctival surface; sometimes it is necessary to cut away the chemotic conjunctiva immediately surrounding the cornea. When the cornea has become affected efforts may be made with the thermo-cautery or otherwise to limit the area of destruction and thus admit of something being done to improve the vision after all inflammation has subsided. The greatest cleanliness as well as proper antiseptic precautions should of course be observed by every one in any way connected with the treatment of such cases.

Phlyctenular conjunctivitis is an acute inflammation of the ocular conjunctiva, in which little blebs or phlyctenules form, more particularly in the vicinity of the corneal margin, as well as on the epithelial continuation of the conjunctiva which covers the cornea. The inflammation is characterized by being distributed in little circumscribed foci and not diffused as in all other forms of conjunctivitis. In it the conjunctival secretion is not altered, unless there should exist at the same time a complication with some other form of conjunctivitis. This condition is most frequent in children, particularly such as are ill-nourished or are recovering from some illness, *e.g.* measles. The susceptibility occurs in fact mainly where there exists what used to be called a "strumous" diathesis. In many cases, therefore, there is some kind of tubercular basis for the manifestations. This basis has to do with the susceptibility only, at all events to begin with. The local changes are not tuberculous; their exact origin has not been clearly established. They are in all probability produced by staphylococci.

Many children suffering from phlyctenular conjunctivitis get after a short time an eczematous excoriation of the skin of the nostrils. This excoriated, scabby area contains crowds of staphylococci which find a nidus here, where the copious tearflow down the nostrils has excoriated and irritated the skin. Lacrymation is indeed a very common concomitant of phlyctenular conjunctivitis. Another frequently distressing symptom is a pronounced dread of light (*photophobia*), which often leads to convulsive and very persistent closing of the lids (*blepharospasm*). Indeed the relief of the photophobia is often the most important point to be considered in the treatment of phlyctenular conjunctivitis. The photophobia may be very severe when the local changes are slight. The eyes should be shaded but not bandaged. Cocain may be freely used. The best local application is the yellow oxide of mercury used as an ointment.

Phlyctenular conjunctivitis, and the corneal complications with which it is so often associated, constitute a large proportion (from $\frac{1}{4}$ to $\frac{1}{3}$) of all eye affections with which the surgeon has to deal.

Granular Conjunctivitis.—This disease, which also goes by the name of *trachoma*, is characterized by an inflammatory infiltration of the adenoid tissue of the conjunctiva. The inflammation is accompanied by the formation of so-called *granules*, and at the same time by a hyperplasia of the papillae. The changes further lead in the course of time to cicatricial transformations, so that a gradual and progressive atrophy of the conjunctiva results. The disease takes its origin most frequently in the conjunctival fold of the upper lid, but eventually as a rule involves the cornea and the deeper tissues of the lid, particularly the tarsus.

The etiology of trachoma is unknown. Though a perfectly distinctive affection when fully established, the differential diagnosis from other forms of conjunctivitis, particularly those associated with much follicular enlargement or which have begun as purulent inflammation, may be difficult. Trachoma is mostly chronic. When occurring in an acute form it is more amenable to treatment and less likely to end in cicatricial changes. Fully half the cases of trachoma which occur are complicated by *pannus*, which is the name given to the affection when it has spread to the cornea. Pannus is a superficial vascularized infiltration of the cornea. The veiling which it produces causes more or less defect of sight.

Various methods of treatment are in use for trachoma. Expression by means of roller-forceps or repeated grattage are amongst the more effective means of surgical treatment, while local applications of copper sulphate or of alum are certainly useful in suitable cases.

Diphtheritic conjunctivitis is characterized by an infiltration into the conjunctival tissues which, owing to great coagulability, rapidly interferes with the nutrition of the invaded area and thus leads to necrosis of the diphtheritic membrane. Conjunctival diphtheria may or may not be associated with diphtheria of the throat. It is essentially a disease of early childhood, not more than 10% of all cases occurring after the age of four. The cornea is exposed to great risk, more particularly during the first few days, and may be lost by necrosis. Subsequent ulceration is not uncommon, but may often be arrested before complete destruction has taken place. The disease is generally confined to one eye, and complicated by swelling of the preauricular glands of that side. It may prove fatal. In true conjunctival diphtheria the exciting cause is the Klebs-Löffler bacillus. The inflammation occurs in very varying degrees of severity. The secretion is at first thin and scant, afterwards purulent and more copious. In severe cases there is great chemosis with much tense swelling of the lids, which are often of an ashy-grey colour. A streptococcus infection produces somewhat similar and often quite as disastrous results.

The treatment must be both general with antitoxin and local with antiseptics. Of rarer forms of conjunctivitis may be mentioned Parinaud's conjunctivitis and the so-called spring catarrh.

Non-inflammatory Conjunctival Affections.—These are of less importance than conjunctivitis, either on account of their comparative infrequency or because of their harmlessness. The following conditions may be shortly referred to.

Amyloid degeneration, in which waxy-looking masses grow from the palpebral conjunctiva of both lids, often attaining very considerable dimensions. The condition is not uncommon in China and elsewhere in the East.

Essential Shrinking of the Conjunctiva.—This is the result of pemphigus, in which the disease has attacked the conjunctiva and led to its atrophy.

Pterygium is a hypertrophic thickening of the conjunctiva of triangular shape firmly attached by its apex to the superficial layers of the cornea. It is a common condition in warm climates owing to exposure to sun and dust, and often calls for operative interference.

Tumours of the Conjunctiva.—These may be malignant or benign, also syphilitic and tubercular. (G. A. Be.)

EYEMOUTH, a police burgh of Berwickshire, Scotland. Pop. (1901) 2436. It is situated at the mouth of the Eye, 7½ m. N.N.W. of Berwick-on-Tweed by the North British railway via Burnmouth. Its public buildings are the town hall, library and masonic hall. The main industry is the fishing and allied trades. The harbour was enlarged in 1887, and the bay is easily accessible and affords good anchorage. Owing to the rugged character of the coast and its numerous ravines and caves the whole district was once infested with smugglers. The promontory of St Abb's Head is 3 m. to the N.W.

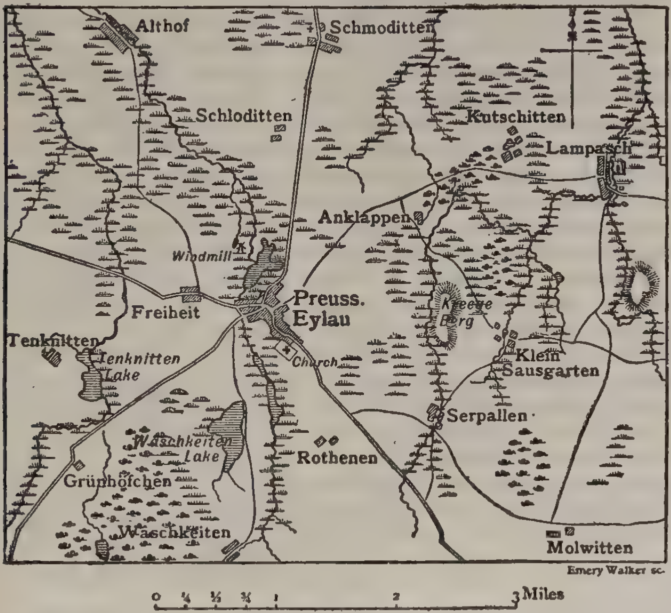
EYLAU (*Preussisch-Eylau*), a town of Germany, in east Prussia, on the Pasmar, 23 m. S. by E. of Königsberg by rail on the line Pillau-Prostken. It has an Evangelical church, a teachers' seminary, a hospital, foundries and saw mills. Pop. 3200. Eylau was founded in 1336 by Arnolf von Eilenstein, a knight of the Teutonic Order. It is famous as the scene of a battle between the army of Napoleon and the Russians and Prussians commanded by General Bennigsen, fought on the 8th of February 1807.

The battle was preceded by a severe general engagement on the 7th. The head of Napoleon's column (cavalry and infantry), advancing from the south-west, found itself opposed at the outlet of the Grünhöfchen defile by a strong Russian rearguard which held the (frozen) lakes on either side of the Eylau road, and attacked at once, dislodging the enemy after a sharp conflict. The French turned both wings of the enemy, and Bagration, who commanded the Russian rearguard, retired through Eylau to the main army, which was now arrayed for battle east of Eylau. Barclay de Tolly made a strenuous resistance in Eylau itself, and in the churchyard, and these localities changed hands several times before remaining finally in possession of the French. It is very doubtful whether Napoleon actually ordered this attack upon Eylau, and it is suggested that the French soldiers were encouraged to a premature assault by the hope of obtaining quarters in the village. There is, however, no reason to suppose that this attack was prejudicial to Napoleon's chance of success, for his own army was intended to pin the enemy in front, while the outlying "masses of manœuvre" closed upon his flanks and rear (see NAPOLEONIC CAMPAIGNS). In this case the vigour of the "general advanced guard" was superfluous, for Bennigsen stood to fight of his own free will.

The foremost line of the French bivouacs extended from Rothenen to Freiheit, but a large proportion of the army spent the night in quarters farther back. The Russian army on the other hand spent the night bivouacked in order of battle, the right at Schloditten and the left at Serpallen. The cold was extreme, 2° F. being registered in the early morning, and food was scarce in both armies. The ground was covered at the time of battle with deep snow, and all the lakes and marshes were frozen, so that troops of all arms could pass everywhere, so far as the snow permitted. Two of Napoleon's corps (Davout and Ney) were still absent, and Ney did not receive his orders until the morning of the 8th. His task was to descend upon the Russian right, and also to prevent a Prussian corps under Lestocq from coming on to the battlefield. Davout's corps advancing from the south-east on Mollwitten was destined for the attack of Bennigsen's left wing about Serpallen and Klein Sausgarten. In the meantime Napoleon with his forces at and about Eylau made the preparations for the frontal attack. His infantry extended from the windmill, through Eylau, to Rothenen, and the artillery was deployed along the whole front; behind each infantry corps and on the wings stood the cavalry. The Guard was in second line south of Eylau, and an army reserve stood near the Waschkeiten lake. Bennigsen's army was drawn up in line from Schloditten to Klein Sausgarten, the front likewise covered by guns, in which arm he was numerically much superior. A detachment occupied Serpallen.

The battle opened in a dense snowstorm. About 8 A.M.

Bennigsen's guns opened fire on Eylau, and after a fierce but undecided artillery fight the French delivered an infantry attack from Eylau. This was repulsed with heavy losses, and the Russians advanced towards the windmill in force. Thereupon Napoleon ordered his centre, the VII. corps of Augéreau, to move forward from the church against the Russian front, the division of St Hilaire on Augéreau's right participating in the attack. If we conceive of this first stage of the battle as the action of the "general advanced guard," Augéreau must be held to have overdone his part. The VII. corps advanced in dense masses, but in the fierce snowstorm lost its direction. St Hilaire attacked directly and unsupported; Augéreau's corps was still less fortunate. Crossing obliquely the front of the Russian line, as if making for Schloditten, it came under a *feu d'enfer* and was practically annihilated. In the confusion the Russian cavalry charged with the utmost fury downhill and with the wind behind them. Three thousand men only out of about fourteen thousand appeared at the evening parade of the corps. The rest were killed, wounded, prisoners or dispersed. The marshal and every senior officer was amongst the killed and wounded, and one regiment, the 14th of the Line, cut off in the midst of the Russians and refusing to surrender, fell almost to a man. The Russian counterstroke penetrated into Eylau itself and Napoleon himself was in serious danger. With the utmost coolness, however, he judged the pace of the Russian advance and ordered up a battalion of the Guard at the exact moment required. In the streets of Eylau the Guard had the Russians at their mercy, and few escaped. Still the situation for the French was desperate and the battle had to be maintained at all costs. Napoleon now sent forward the cavalry along the whole line. In the centre the charge was led by Murat and Bessières, and the Russian horsemen were swept off the field. The Cuirassiers under D'Hautpoult charged through the Russian guns, broke through the first line of infantry and then through the second, penetrating to the woods of Anklappen.



The shock of a second wave of cavalry broke the lines again, and though in the final retirement the exhausted troopers lost terribly, they had achieved their object. The wreck of Augéreau's and other divisions had been reformed, the Guard brought up into first line, and, above all, Davout's leading troops had occupied Serpallen. Thence, with his left in touch with Napoleon's right (St Hilaire), and his right extending gradually towards Klein Sausgarten, the marshal pressed steadily upon the Russian left, rolling it up before him, until his right had reached Kutschitten and his centre Anklappen. By that time the troops under Napoleon's immediate command, pivoting their left on Eylau church, had wheeled gradually inward until the general line extended from the church to Kutschitten. The Russian army was being driven westward, when the advance of Lestocq gave them fresh steadiness. The Prussian corps had been fighting a continuous flank-guard action against Marshal Ney to the north-west of Althof, and Lestocq had finally succeeded in disengaging his main body, Ney being held up at Althof by a small rearguard, while the Prussians, gathering as they went the fugitives of the Russian army, hastened to oppose Davout. The impetus of these fresh troops led by Lestocq and his staff-officer Scharnhorst was such as to check even the famous divisions of Davout's corps which had won the battle of Auerstädt single-handed. The French were now gradually forced back until their right was again at Sausgarten and their centre on the Kreege Berg.

Both sides were now utterly exhausted, for the Prussians also had been marching and fighting all day against Ney. The battle died away at nightfall, Ney's corps being unable effectively to intervene owing to the steadiness of the Prussian detachment left to oppose him, and the extreme difficulty of the roads. A severe conflict between the Russian extreme right and Ney's corps which at last appeared on the field at Schloditten ended the battle. Bennigsen retreated during the night through Schmoditten, Lestocq through Kutschitten. The numbers engaged in the first stage of the battle may be taken as—Napoleon, 50,000, Bennigsen, 67,000, to which later were added on the one side Ney and Davout, 29,000, on the other Lestocq, 7000. The losses were roughly, 15,000 men to the French, 18,000 to the Allies, or 21 and 27% respectively of the troops actually engaged. The French lost 5 eagles and 7 other colours, the Russians 16 colours and 24 guns.

EYRA (*Felis eyra*), a South American wild cat, of weasel-like build, and uniform coloration, varying in different individuals from reddish-yellow to chestnut. It is found in Brazil, Guiana and Paraguay, and extends its range to the Rio del Norte, but is rare north of the isthmus of Panama. Little is known of its habits in a wild state, beyond the fact that it is a forest-dweller, active in movement and fierce in disposition. Several have been exhibited in the London Zoological Gardens, and some have grown gentle in captivity. Don Felix de Azara wrote of one which he kept on a chain that it was "as gentle and playful as any kitten could be." The name is sometimes applied to the jaguarondi.

EYRE, EDWARD JOHN (1815–1901), British colonial governor, the son of a Yorkshire clergyman, was born on the 5th of August 1815. He was intended for the army, but delays having arisen in producing a commission, he went out to New South Wales, where he engaged in the difficult but very necessary undertaking of transporting stock westward to the new colony of South Australia, then in great distress, and where he became magistrate and protector of the aborigines, whose interests he warmly advocated. Already experienced as an Australian traveller, he undertook the most extensive and difficult journeys in the desert country north and west of Adelaide, and after encountering the greatest hardships, proved the possibility of land communication between South and West Australia. In 1845 he returned to England and published the narrative of his travels. In 1846 he was appointed lieutenant-governor of New Zealand, where he served under Sir George Grey. After successively governing St Vincent and Antigua, he was in 1862 appointed acting-governor of Jamaica and in 1864 governor. In October 1865 a negro insurrection broke out and was repressed with laudable vigour, but the unquestionable severity and alleged illegality of Eyre's subsequent proceedings raised a storm at home which induced the government to suspend him and to despatch a special commission of investigation, the effect of whose inquiries, declared by his successor, Sir John Peter Grant, to have been "admirably conducted," was that he should not be reinstated in his office. The government, nevertheless, saw nothing in Eyre's conduct to justify legal proceedings; indictments preferred by amateur prosecutors at home against him and military officers who had acted under his direction, resulted in failure, and he retired upon the pension of a colonial governor. As an explorer Eyre must be classed in the highest rank, but opinions are always likely to differ as to his action in the Jamaica rebellion. He died on the 30th of November 1901.

EYRE, SIR JAMES (1734–1799), English judge, was the son of the Rev. Thomas Eyre, of Wells, Somerset. He was educated at Winchester College and at St John's College, Oxford, which, however, he left without taking a degree. He was called to the bar at Gray's Inn in 1755, and commenced practice in the lord mayor's and sheriffs' courts, having become by purchase one of the four counsel to the corporation of London. He was appointed recorder of London in 1763. He was counsel for the plaintiff in the case of *Wilkes* v. *Wood*, and made a brilliant speech in condemnation of the execution of general search warrants. His refusal to voice the remonstrances of the corporation against the exclusion of Wilkes from parliament earned him the recognition of the ministry, and he was appointed a judge of the exchequer in 1772. From June 1792 to January 1793 he was chief commissioner of the great seal. In 1793 he was made chief justice of the common pleas, and presided over the trials of Horne Tooke, Thomas Crosfield and others, with great ability and impartiality. He died on the 1st of July 1799 and was buried at Ruscombe, Berkshire.

See Howell, *State Trials*, xix. (1154–1155); Foss, *Lives of the Judges*.

EYRIE, the alternative English form of the words Aerie or Aery, the lofty nest of a bird of prey, especially of an eagle, hence any lofty place of abode; the term is also used of the brood of the bird. The word derives from the Fr. *aire*, of the same meaning, which comes from the Lat. *area*, an open space, but was early connected with *aërius*, high in the air, airy, a confusion that has affected the spelling of the word. The forms "eyrie" or "eyry" date from a 17th century attempt to derive the word from the Teutonic *ey*, an egg.

EZEKIEL (יחזקאל, "God strengthens" or "God is strong"; Sept. Ἰεζεκιήλ; Vulg. Ezechiel), son of Buzi, one of the most vigorous and impressive of the older Israelite thinkers. He was a priest of the Jerusalem temple, probably a member of the dominant house of Zadok, and doubtless had the literary training of the cultivated priesthood of the time, including acquaintance with the national historical, legal and ritual traditions and with the contemporary history and customs of neighbouring peoples. In the year 597 (being then, probably, not far from thirty years of age) he was carried off to Babylonia by Nebuchadrezzar with King Jehoiachin and a large body of nobles, military men and artisans, and there, it would seem, he spent the rest of his life. His prophecies are dated from this year ("our captivity," xl. 1), except in i. 1, where the meaning of the date "thirtieth year" is obscure; it cannot refer to his age (which would be otherwise expressed in Hebrew), or to the reform of Josiah, 621 (which is not elsewhere employed as an epoch); possibly the reference is to the era of Nabopolassar (626 according to the Canon of Ptolemy), if chronological inexactness be supposed (34 or 33 years instead of 30), a supposition not at all improbable. That the word "thirtieth" is old, appears from the fact that a scribe has added a gloss (*vv.* 2, 3) to bring this statement into accord with the usual way of reckoning in the book: the "thirtieth" year, he explains, is the fifth year of the captivity of Jehoiachin. The exiles dwelt at Tell-abib ("Hill of the flood"), one of the mounds or ruins made by the great floods that devastated the country,[1] near the "river" Chebar (Kebar), probably a large canal not far south of the city of Babylon. Here they had their own lands, and some form of local government by elders, and appear to have been prosperous and contented; probably the only demand made on them by the Babylonian government was the payment of taxes.

Ezekiel was married (xxiv. 18), had his own house, and comported himself quietly as a Babylonian subject. But he was a profoundly interested observer of affairs at home and among the exiles: as patriot and ethical teacher he deplored alike the political blindness of the Jerusalem government (King Zedekiah revolted in 588) and the immorality and religious superficiality and apostasy of the people. He, like Jeremiah, was friendly to Nebuchadrezzar, regarding him as Yahweh's instrument for the chastisement of the nation. Convinced that opposition to Babylonian rule was suicidal, and interpreting historical events, in the manner of the times, as indications of the temper of the deity, he held that the imminent political destruction of the nation was proof of Yahweh's anger with the people on account of their moral and religious depravity; Jerusalem was hopelessly corrupt and must be destroyed (xxiv.). On the other hand, he was equally convinced that, as his predecessors had taught (Hos. xi. 8, 9; Isa. vii. 3 *al.*), Yahweh's love for his people would not suffer them to perish utterly—a remnant would be saved, and this remnant he naturally found in the exiles in Babylonia, a little band plucked from the burning and kept safe in a foreign land till the wrath should have passed (xi. 14 ff.). This conception of the exiles as the kernel of the restored nation he further set forth in the great vision of ch. i., in which Yahweh is represented as leaving Jerusalem and coming to take up his abode among them in Babylonia for a time, intending, however, to return to his own city (xliii. 7).

This, then, was Ezekiel's political creed—destruction of Jerusalem and its inhabitants, restoration of the exiles, and meantime submission to Babylon. His arraignment of the Judeans is violent, almost malignant (vi. xvi. *al.*). The well-meaning but weak king Zedekiah he denounces with bitter scorn as a perjured traitor (xvii). He does not discuss the possibility of successful resistance to the Chaldeans; he simply assumes that the attempt is foolish and wicked, and, like other prophets, he identifies his political programme with the will of God. Probably his judgment of the situation was correct; yet, in view of Sennacherib's failure at Jerusalem in 701 and of the admitted strength of the city, the hope of the Jewish nobles could not be considered wholly unfounded, and in any case their patriotism (like that of the national party in the Roman siege) was not unworthy of admiration. The prophet's predictions of disaster continued, according to the record, up to the investment of the city by the Chaldean army in 588 (i.-xxiv.); after the fall of the city (586) his tone changed to one of consolation (xxxiii.-xxxix.)—the destruction of the wicked mass accomplished, he turned to the task of reconstruction. He describes the safe and happy establishment of the people in their own land, and gives a sketch of a new constitution, of which the main point is the absolute control of public religion by the priesthood (xl.-xlviii.).

The discourses of the first period (i.-xxiv.) do not confine themselves to political affairs, but contain much interesting ethical and religious material. The picture given of Jerusalemite morals is an appalling one. Society is described as honeycombed with crimes and vices; prophets, priests, princes and the people generally are said to practise unblushingly extortion, oppression, murder, falsehood, adultery (xxii.). This description is doubtless exaggerated. It may be assumed that the social corruption in Jerusalem was such as is usually found in wealthy communities, made bolder in this case, perhaps, by the political unrest and the weakness of the royal government under Zedekiah. No such charges are brought by the prophet against the exiles, in whose simple life, indeed, there was little or no opportunity for flagrant violation of law. Ezekiel's own moral code is that of the prophets, which insists on the practice of the fundamental civic virtues. He puts ritual offences, however, in the same category with offences against the moral law, and he does not distinguish between immorality and practices that are survivals of old recognized customs: in ch. xxii. he mentions "eating with the blood"[2] along with murder, and failure to observe ritual regulations along with oppression of the fatherless and the widow; the old customary law permitted marriage with a half-sister (father's daughter), with a daughter-in-law, and with a father's wife (Gen. xx. 12, xxxviii. 26; 2 Sam. xvi. 21, 22), but the more refined feeling of the later time frowned on the custom, and Ezekiel treats it as adultery.[1] However, notwithstanding the insistence on ritual, natural in a priest, his moral standard is high; following the prescription of Ex. xxii. 21 [20] he regards oppression of resident aliens (a class that had not then received full civil rights) as a crime (xxii. 7), and in his new constitution (xlvii. 22, 23) gives them equal rights with the homeborn. His strongest denunciation is directed against the religious practices of the time in Judea—the worship of the Canaanite local deities (the Baals), the Phoenician Tammuz, and the sun and other Babylonian and Assyrian gods (vi., viii., xvi., xxiii.); he maintained vigorously the prophetic struggle for the sole worship of Yahweh. Probably he believed in the existence of other gods, though he does not express himself clearly on this point; in any case he held that the worship of other deities was destructive to Israel. His conception of Yahweh shows a mingling of the high and the low. On the one hand, he regards him as supreme in power, controlling the destinies of Babylonia and Egypt as well as those of Israel, and as inflexibly just in dealing with ordinary offences against morality. But he conceives of him, on the other hand, as limited locally and morally—as having his special abode in the Jerusalem temple, or elsewhere in the midst of the Israelite people, and as dealing with other nations solely in the interests of Israel. The bitter invectives against Ammon, Moab, Edom, Philistia, Tyre, Sidon and Egypt, put into Yahweh's mouth, are based wholly on the fact that these peoples are regarded as hostile and hurtful to Israel; Babylonia, though nowise superior to Egypt morally, is favoured and applauded because it is believed to be the instrument for securing ultimately the prosperity of Yahweh's people. The administration of the affairs of the world by the God of Israel is represented, in a word, as determined not by ethical considerations but by personal preferences. There is no hint in Ezekiel's writings of the grandiose conception of Isa. xl.-lv., that Israel's mission is to give the knowledge of religious truth to the other nations of the world; he goes so far as to say that Yahweh's object in restoring the fortunes of Israel is to establish his reputation among the nations as a powerful deity (xxxvi. 20-23, xxxvii. 28, xxxix. 23). The prophet regards Yahweh's administrative control as immediate: he introduces no angels or other subordinate supernatural agents—the cherubs and the “ men ” of ix. 2 and xl. 3 are merely imaginative symbols or representations of divine activity. His high conception of God's transcendence, it may be supposed, led him to ignore intermediary agencies, which are common in the popular literature, and later, under the influence of this same conception of transcendence, are freely employed.

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[1] The Assyrian term *abubu* is used of the great primeval deluge (in the Gilgamesh epic), and also of the local floods common in the country.

[2] So we must read (as Robertson Smith has pointed out) in xxii. 9 and xviii. 6, instead of "eating on the mountains."

The relations between the writings of Ezekiel and those of Jeremiah is not clear. They have so much in common that they must have drawn from the same current bodies of thought, or there must have been borrowing in one direction or the other. In one point, however,—the attitude toward the ritual—the two men differ radically. The finer mind of the nation, represented mainly by the prophets from Amos onward, had denounced unsparingly the superficial non-moral popular cult. The struggle between ethical religion and the current worship became acute toward the end of the 7th century. There were two possible solutions of the difficulty. The ritual books of our Pentateuch were not then in existence, and the sacrificial cult might be treated with contempt as not authoritative. This is the course taken by Jeremiah, who says boldly that God requires only obedience (Jer. vii. 21 ff.). On the other hand the better party among the priests, believing the ritual to be necessary, might undertake to moralize it; of such a movement, begun by Deuteronomy, Ezekiel is the most eminent representative. Priest and prophet, he sought to unify the national religious consciousness by preserving the sacrificial cult, discarding its abuses and vitalizing it ethically. The event showed that he judged the situation rightly—the religious scheme announced by him, though not accepted in all its details, became the dominant policy of the later time, and he has been justly called “ the father of Judaism.” He speaks as a legislator, citing no authority; but he formulates, doubtless, the ideas and perhaps the practices of the Jerusalem priesthood. His ritual code (xliii.-xlvi.), which in elaborateness stands midway between that of Deuteronomy and that of the middle books of the Pentateuch (resembling most nearly the code of Lev. xvii.-xxvi.) shows good judgment. Its most noteworthy features are two. Certain priests of idolatrous Judean shrines (distinguished by him as “ Levites ”) he deprives of priestly functions, degrading them to the rank of temple menials; and he takes from the civil ruler all authority over public religion, permitting him merely to furnish material for sacrifices. He is, however, much more than a ritual reformer. He is the first to express clearly the conception of a sacred nation, isolated by its religion from all others, the guardian of divine law and the abode of divine majesty. This kingdom of God he conceives of as moral: Yahweh is to put his own spirit into the people,[2] creating in them a disposition to obey his commandments, which are moral as well as ritual (xxxvi. 26, 27). The conception of a sacred nation controlled the whole succeeding Jewish development; if it was narrow in its exclusive regard for Israel, its intensity saved the Jewish religion to the world.

Text and Authorship.—The Hebrew text of the book of Ezekiel is not in good condition—it is full of scribal inaccuracies and additions. Many of the errors may be corrected with the aid of the Septuagint (*e.g.* the 430—390+40—of iv. 5, 6 is to be changed to 190), and none of them affect the general thought. The substantial genuineness of the discourses is now accepted by the great body of critics. The Talmudic tradition (*Baba Bathra* 14*b*) that the men of the Great Synagogue “ wrote ” Ezekiel, may refer to editorial work by later scholars.[3] There is no validity in the objections of Zunz (*Gottesdienstl. Vortr.*) that the specific prediction concerning Zedekiah (xii. 12 f.) is non-Prophetic, and that the drawing-up of a new constitution soon after the destruction of the city and the mention of Noah, Daniel, Job and Persia are improbable. The prediction in question was doubtless added by Ezekiel after the event; the code belongs precisely in his time, and the constitution was natural for a priest; Noah, Daniel and Job are old legendary Hebrew figures; and it is not probable that the prophet's “ Paras ” is our “ Persia.” Havet's contention (in *La Modernité des prophètes*) that Gog represents the Parthians (40 B.C.) has little or nothing in its support. There are additions made *post eventum*, as in the case mentioned above and in xxix. 17-20, and the description of the commerce of Tyre (xxvii. 9*b*-25*a*), which interrupts the comparison of the city to a ship, looks like an insertion whether by the prophet or by some other; but there is no good reason to doubt that the book is substantially the work of Ezekiel. Ezekiel's style is generally impetuous and vigorous, somewhat smoother in the consolatory discourses (xxxiv., xxxvi., xxxvii.); he produces a great effect by the cumulation of details, and is a master of invective; he is fond of symbolic pictures, proverbs and allegories; his “ visions ” are elaborate literary productions, his prophecies show less spontaneity than those of any preceding prophet (he receives his revelations in the form of a book, ii. 9), and in their present shape were hardly pronounced in public—a fact that seems to be hinted at in the statement that he was “ dumb ” till the fall of Jerusalem (iii. 26, xxxiii. 22); in private interviews the people did not take him seriously (xxxiii. 30-33). His book was accepted early as part of the sacred literature: Ben-Sira (*c.* 180 B.C.) mentions him along with Isaiah and Jeremiah (Ecclus. xlix. 8); he is not quoted directly in the New Testament, but his imagery is employed largely in the Apocalypse and elsewhere. His divergencies from the Pentateuchal code gave rise to serious doubts, but, after prolonged study, the discrepancies were explained, and the book was finally canonized (Shab. 13*b*). According to

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[1] The stricter marriage law is formulated in Lev. xviii. 8-15, xx. 11 ff.

[2] Yahweh's spirit, thought of as Yahweh's vital principle, as man's spirit is man's vital principle, is to be breathed into them, as, in Gen. ii. 7, Yahweh breathes his own breath into the lifeless body. The spirit in the Old Testament is a refined material thing that may come or be poured out on men.

[3] The “ Great Synagogue ” is semi-mythical.

Jerome (Preface to *Comm. on Ezek.*) the Jewish youth were forbidden to read the mysterious first chapter (called the *markaba*, the "chariot") and the concluding section (xl.-xlviii.) till they reached the age of thirty years.

The book divides itself naturally into three parts: the arraignment of Jerusalem (i.-xxiv.); denunciation of foreign enemies (xxv.-xxxii.); consolatory construction of the future (xxxiii.-xlviii.). The opening "vision" (i.), an elaborate symbolic picture, is of the nature of a general preface, and was composed probably late in the prophet's life. Out of the north (the Babylonian sacred mountain) comes a bright cloud, wherein appear four Creatures (formed on the model of Babylonian composite figures), each with four faces (man, lion, bull, eagle) and attended by a wheel; the wheels are full of eyes, and move straight forward, impelled by the spirit dwelling in the Creatures (the spirit of Yahweh). Supported on their heads is something like a crystalline firmament, above which is a form like a sapphire throne (cf. Ex. xxiv. 10), and on the throne a man-like form (Yahweh) surrounded by a rainbow brightness. The wheels symbolize divine omniscience and control, and the whole vision represents the coming of Yahweh to take up his abode among the exiles. The prophet then receives his call (ii., iii.) in the shape of a roll of a book, which he is required to eat (an indication of the literary form now taken by prophecy). He is informed that the people to whom he is sent are rebellious and stiff-necked (this indicates his opinion of the people, and gives the keynote of the following discourses); he is appointed watchman to warn men when they sin, and is to be held responsible for the consequences if he fail in this duty. To this high conception of a preacher's function the prophet was faithful throughout his career. Next follow minatory discourses (iv.-vii.) predicting the siege and capture of Jerusalem—perhaps revised after the event. There are several symbolic acts descriptive of the siege. One of these (iv. 4 ff.) gives the duration of the national punishment in loose chronological reckoning: 40 years (a round number) for Judah, and 150 more (according to the corrected text) for Israel, the starting-point, probably, being the year 722, the date of the capture of Samaria; the procedure described in *v.* 8 is not to be understood literally. In vi. the idolatry of the nation is pictured in darkest colours. Next follows (viii.-xi.) a detailed description, in the form of a vision, of the sin of Jerusalem: within the temple-area elders and others are worshipping beast-forms, Tammuz and the sun (probably actual cults of the time);[1] men approach to defile the temple and slay the inhabitants of the city (ix.). In ch. x. the imagery of ch. i. reappears, and the Creatures are identified with the cherubs of Solomon's temple. This appears to be an independent form of the vision, which has been brought into connexion with that of i. by a harmonizing editor. There follow a symbolic prediction of the exile (xii.) and a denunciation of non-moral prophets and prophetesses (xiii.)—though Yahweh deceive a prophet, yet he and those who consult him will be punished; and so corrupt is the nation that the presence of a few eminently good men will not save it (xiv.).[2] After a comparison of Israel to a worthless wild vine (xv.) come two allegories, one portraying idolatrous Jerusalem as the unfaithful spouse of Yahweh (xvi.), the other describing the fate of Zedekiah (xvii.). The fine insistence on individual moral responsibility in xviii. (cf. Deut. xxiv. 16, Jer. xxxi. 29 f.), while it is a protest against a superficial current view, is not to be understood as a denial of all moral relations between successive generations. This latter question had not presented itself to the prophet's mind; his object was simply to correct the opinion of the people that their present misfortunes were due not to their own faults but to those of their predecessors. A more sympathetic attitude appears in two elegies (xix.), one on the kings Jehoahaz and Jehoiachin, the other on the nation. These are followed by a scathing sketch of Israel's religious career (xx. 1-26), in which, contrary to the view of earlier prophets, it is declared that the nation had always been disobedient. From this point to the end of xxiv. there is a mingling of threat and promise.[3] The allegory of xxiii. is similar to that of xvi., except that in the latter Samaria is relatively treated with favour, while in the former it (Aholah) is involved in the same condemnation as that of Jerusalem. At this point is introduced (xxv.-xxxii.) the series of discourses directed against foreign nations. The description of the king of Tyre (xxviii. 11-19) as dwelling in Eden, the garden of God, the sacred mountain, under the protection of the cherub, bears a curious resemblance to the narrative in Gen. ii., iii., of which, however, it seems to be independent, using different Babylonian material; the text is corrupt. The section dealing with Egypt is one of remarkable imaginative power and rhetorical vigour: the king of Egypt is compared to a magnificent cedar of Lebanon (in xxxi. 3 read: "there was a cedar in Lebanon") and to the dragon of the Nile, and the picture of his descent into Sheol is intensely tragic. Whether these discourses were all uttered between the investment of Jerusalem and its fall, or were here inserted by Ezekiel or by a scribe, it is not possible to say. In xxxiii. the function of the prophet as watchman is described at length (expansion of the description in iii.) and the news of the capture of the city is received. The following chapters (xxxiv.-xxxix.) are devoted to reconstruction: Edom, the detested enemy of Israel, is to be crushed; the nation, politically raised from the dead, with North and South united (xxxvii.), is to be established under a Davidide king; a final assault, made by Gog, is to be successfully met,[4] and then the people are to dwell in their own land in peace for ever; this Gog section is regarded by some as the beginning of Jewish apocalyptic writing. In the last section (xl.-xlviii.), put as a vision, the temple is to be rebuilt, in dimensions and arrangements a reproduction of the temple of Solomon (cf. 1 Kings vi., vii.); the sacrifices and festivals and the functions of priests and prince are prescribed, a stream issuing from under the temple is to vivify the Dead Sea and fertilize the land (this is meant literally), the land is divided into parallel strips and assigned to the tribes. The prophet's thought is summed up in the name of the city: *Yahweh Shammah*, "Yahweh is there," God dwelling for ever in the midst of his people.

LITERATURE.—For the older works see the *Introductions* of J. G. Carpzov (1757) and C. H. H. Wright (1890). For *legends*: Pseud.-Epiphan., *De vit. prophet.*; Benjamin of Tudela, *Itin.*; Hamburger, *Realencycl.*; *Jew. Encycl.* On the Hebrew text; C. H. Cornill, *Ezechiel* (1886) (very valuable for text and ancient versions); H. Graetz, *Emendationes* (1893); C. H. Toy, "Text of Ezek." (1899) in Haupt's *Sacred Books of the Old Test.* Commentaries: F. Hitzig (1847); H. Ewald (1868); E. Reuss (French ed., 1876; Germ. ed., 1892); Currey (1876) in *Speaker's Comm.*; R. Smend (revision of Hitzig) (1880) in *Kurzgefasst. exeget. Handbuch*; A. B. Davidson (1882) in *Cambr. Bible for Schools*; J. Skinner (1895) in *Expos. Bible*; A. Bertholet (1897) in Marti's *Kurz. Hand-Comm.*; C. H. Toy (1899) in Haupt's *Sacr. Bks.* (Eng. ed.); R. Kraetzschmar (1900) in W. Nowack's *Handkommentar*. See also Duhm, *Theol. d. Propheten* (1875); A. Kuenen, *Prophets and Prophecy* (1877); Gautier, *La Mission du prophète Ézéchiel* (1891); Montefiore, *Hibbert Lectures* (1892); A. Bertholet, *Der Verfassungsentwurf des Hesekiel* (1896); articles in Herzog-Hauck, *Realencykl.*; Hastings, *Bibl. Dict.*; Cheyne, *Encycl. Bibl.*, *Jew. Encycl.*; F. Bleek, *Introd.* (Eng. tr., 1875), and Bleek-Wellhausen (Germ.) (1878); Wildeboer, *Letterkunde d. Oud. Verbonds* (1893), and Germ. transl., *Litt. d. Alt. Test.*; Perrot and Chipiez, *Hist. de l'art*, &c., in which, however, the restoration of Ezekiel's temple (by Chipiez) is probably untrustworthy. (C. H. T.*)

EZRA (from a Hebrew word meaning "help"), in the Bible, the famous scribe and priest at the time of the return of the Jews in the reign of the Persian king Artaxerxes I. (458 B.C.). His book and that of Nehemiah form one work (see EZRA AND NEHEMIAH, BOOKS OF), apart from which we have little trustworthy evidence as to his life. Even in the beginning of the 2nd century B.C., when Ben Sira praises notable figures of the exilic and post-exilic age (Zerubbabel, Jeshua and Nehemiah), Ezra is passed over (Ecclesiasticus xlix. 11-13), and he is not mentioned in a still later and somewhat fanciful description of Nehemiah's work (2 Macc. i. 18-36). Already well known as a scribe, Ezra's labours were magnified by subsequent tradition. He was regarded as the father of the scribes and the founder of the Great Synagogue. According to the apocryphal fourth book of Ezra (or 2 Esdras xiv.) he restored the law which had been lost, and rewrote all the sacred records (which had been destroyed) in addition to no fewer than seventy apocryphal works. The former theory recurs elsewhere in Jewish tradition, and may be associated with the representation in Ezra-Nehemiah which connects him with the law. But the story of his many literary efforts, like the more modern conjecture that he closed the canon of the Old Testament, rests upon no ancient basis.

See BIBLE, sect. Old Testament (Canon and Criticism); JEWS (history, § 21 seq.). The apocryphal books, called 1 and 2 Esdras (the Greek form of the name) in the English Bible, are dealt with below as EZRA, THIRD BOOK OF, and EZRA, FOURTH BOOK OF, while the canonical book of Ezra is dealt with under EZRA AND NEHEMIAH.

EZRA, THIRD BOOK OF [1 *Esdras*]. The titles of the various books of the Ezra literature are very confusing. The Greek, the Old Latin, the Syriac, and the English Bible from 1560 onwards designate this book as 1 Esdras, the canonical books Ezra and Nehemiah being 2 Esdras in the Greek. In the Vulgate, however, our author was, through the action of Jerome, degraded into the third place and called 3 Esdras, whereas the canonical books *Ezra* and *Nehemiah* (see EZRA AND NEHEMIAH, BOOKS OF, below) were called 1 and 2 Esdras, and the Apocalypse of Ezra 4 Esdras. Thus the nomenclature of our book follows, and possibly wrongly, the usage of the Vulgate.[1] In the Ethiopic version a different usage prevails. The Apocalyspe is called 1 Esdras, our author 2 Esdras, and Ezra and Nehemiah 3 Esdras, or 3 and 4 Esdras. Throughout this article we shall use the best attested designation of this book, *i.e.* 1 Esdras.

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[1] In viii. 17 the unintelligible expression "they put the branch to their nose" is the rendering of a corrupt Hebrew text; a probable emendation is: "they are sending a stench to my nostrils."

[2] The legendary figure of Daniel (xiv. 14) is later taken by the author of the book of Daniel as his hero.

[3] For a reconstruction of the poem in xxi. 10, 11, see the English Ezekiel in Haupt's *Sacred Books*.

[4] Gog probably represents a Scythian horde (though such an invasion never took place)—certainly not Alexander the Great, who would have been called "king of Greece," and would have been regarded not as an enemy but as a friend.

Contents.—With the exception of one original section, namely, that of Darius and the three young men, our author contains essentially the same materials as the canonical Ezra and some sections of 2 Chronicles and Nehemiah. To the various explanations of this phenomenon we shall recur later. The book may be divided as follows (the verse division is that of the Cambridge LXX):—

Chap. i. = 2 Chron. xxxv. 1–xxxvi. 21.—Great passover of Josiah: his death at Megiddo. His successors down to the destruction of Jerusalem and the Captivity. (Verses i. 21-22 are not found elsewhere, though the LXX of 2 Chron. xxxv. 20 exhibits a very distant parallel.)

Chap. ii. 1-14 = Ezra i.—The edict of Cyrus. Restoration of the sacred vessels through Sanabassar to Jerusalem.

Chap. ii. 15-25 = Ezra iv. 6-24.—First attempt to rebuild the Temple: opposition of the Samaritans. Decree of Artaxerxes: work abandoned till the second year of Darius.

Chap. iii. 1–v. 6.—This section is peculiar to our author. The contest between the three pages waiting at the court of Darius and the victory of the Jewish youth "Zerubbabel," to whom as a reward Darius decrees the return of the Jews and the restoration of the Temple and worship. Partial list of those who returned with "Joachim, son of Zerubbabel."

Chap. v. 7-70 = Ezra ii.–iv. 5.—List of exiles who returned with Zerubbabel. Work on the Temple begun. Offer of the Samaritans' co-operation rejected. Suspension of the work through their intervention till the reign of Darius.

Chap. vi. 1–vii. 9 = Ezra v. 1–vi. 18.—Work resumed in the second year of Darius. Correspondence between Sisinnes and Darius with reference to the building of the Temple. Darius' favourable decree. Completion of the work by Zerubbabel.

Chap. vii. 10-15 = Ezra vi. 19-22.—Celebration of the completion of the Temple.

Chap. viii. 1–ix. 36 = Ezra vii.-x.—Return of the exiles under Ezra. Mixed marriages forbidden.

Chap. ix. 37-55 = Nehemiah vii. 73–viii. 12.—The reading of the Law.

Thus, apart from iii. 1–v. 3, which gives an account of the pages' contest, the contents of the book are doublets of the canonical Ezra and portions of 2 Chronicles and Nehemiah. The beginning of the book seems imperfect, with its abrupt opening "And Josiah held the passover": its conclusion is mutilated, as it breaks off in the middle of a sentence. As Thackeray suggests, it probably continued the history of the feast of Tabernacles described in Neh. viii.—a view that is supported by Joseph. *Ant.* xi. 5. 5, "who describes that feast using an Esdras word ἐπανόρθωσις and . . . having hitherto followed Esdras as his authority passes on to the Book of Nehemiah."

Claims to Canonicity.—It would seem that even greater value was attached to 1 Esdras than to the Hebrew Ezra. (1) For in the best MSS. (BA) it stands before 2 Esdras —the verbal translation of the Hebrew Ezra and Nehemiah. (2) It is used by Josephus, who in fact does not seem aware of the existence of 2 Esdras. (3) 1 Esdras is frequently quoted by the Greek fathers—Clem. Alex., Origen, Eusebius, and by the Latin—Tertullian, Cyprian, Augustine. The adverse judgment of the church is due to Jerome, who, from his firm attachment to the Hebrew Old Testament, declined to translate the "dreams" of 3 and 4 Esdras. This judgment influenced alike the Council of Trent and the Lutheran church in Germany; for Luther also refused to translate Esdras and the Apocalypse of Ezra.

Origin and Relation to the Canonical Ezra.—Various theories have been given as to the relation of the book and the canonical Ezra.

1. Some scholars, as Keil, Bissell and formerly Schürer, regarded 1 Esdras as a free compilation from the Greek of 2 Esdras (2 Chron. and Ezra-Nehemiah). This theory has now given place to others more accordant with the facts of the case.

2. Others, as Ewald, *Hist. of Isr.* v. 126-128, and Thackeray in Hastings' *Bible Dictionary*, assume a lost Greek version of Chronicles, Ezra and Nehemiah, from which were derived 1 Esdras—a free redaction of the former and 2 Esdras. Thackeray claims that we have "a satisfactory explanation of the coincidences in translation and deviation from the Hebrew in 1 Esdras and 2 Esdras, if we suppose both are to some extent dependent on a lost Greek original." But later in the same article Thackeray is compelled to modify this view and admit that 1 Esdras is not a mere redaction of a no longer extant version of the canonical books, but shows not only an independent knowledge of the Hebrew text but also of a Hebrew text superior in not a few passages to the Massoretic text, where 2 Esdras gives either an inaccurate version or a version reproducing the secondary Massoretic text.

3. Others like Michaelis, Trendelenburg, Pohlmann, Herzfeld, Fritzsche hold it to be a direct and independent translation of the Hebrew. There is much to be said in favour of this view. It presupposes in reality two independent recensions of the Hebrew text, such as we cannot reasonably doubt existed at one time of the Book of Daniel. Against this it has been urged that the story of the three pages was written originally in Greek (Ewald, Schürer, Thackeray). The only grounds for this theory are the easiness of the Greek style and the paronomasia in iv. 62 ἄνεσιν καὶ ἄφεσιν. But the former is no real objection, and the latter may be purely accidental. On the other hand there are several undoubted Semiticisms. Thus we have two instances of the split relative οὗ . . . αὐτοῦ iii. 5; οὗ . . . ἐπ' αὐτῷ iv. 63 and the phrase pointed out by Fritzsche τὰ δίκαια ποιεῖ ἀπὸ πάντων = עשה משפט מן. It must, however, be admitted that there are fewer Hebraisms in this section of the book than in the rest.

4. Sir H. H. Howorth in the treatises referred to at the close of this article has shown cogent grounds for regarding 1 Esdras as the original and genuine Septuagint translation, and 2 Esdras as probably that of Theodotion. For this view he adduces among others the following grounds: (i.) Its use by Josephus, who apparently was not acquainted with 2 Esdras. (ii.) Its precedence of 2 Esdras in the great uncials. (iii.) Its origin at a time when Chronicles, Ezra and Nehemiah formed a single work. (iv.) Its preservation of a better Hebrew text in many instances than 2 Esdras. (v.) The fact that 1 Esdras and the Septuagint of Daniel go back to one and the same translator, as Dr Gwynn (*Dict. Christ. Biog.* iv. 977) has pointed out (cf. 1 Esdr. vi. 31, and Dan. ii. 5).

This contention of Howorth has been accepted by Nestle, Cheyne, Bertholet, Ginsburg and other scholars, though they regard the question of an Aramaic original of chapters iii. 1–v. 6 as doubtful. Howorth's further claim that he has established the historical credibility of the book as a whole and its chronological accuracy as against the canonical Ezra has not as yet met with acceptance; but his arguments have not been fairly met and answered.

5. Volz (*Encyc. Bibl.* ii. 1490) thinks that the solution of the problem is to be found in a different direction. The text is of unequal value, and the inequalities are so great as to exclude the supposition that the Greek version was produced *aus einem Guss*. iii. 1–v. 3 is an independent narrative written originally in Greek and itself a composite production, the praise of truth being an addition. vi. 1–vii. 15, ii. 15-25*a* is a fragment of an Aramaic narrative. Some in Josephus (*Ant.* xi. 4. 9) an account of Samaritan intrigues is introduced immediately after 1 Esdras vii. 15, it is natural to infer that something of the same kind

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[1] "At the Council of Trent (when the Septuagint Canon was virtually accepted as authoritative), by a most curious aberration, Esdras iii. and iv. and the Epistle of Manasseh were alone excluded from the canon and remitted to our appendix."—Howorth, "Unconventional Views on the Text of the Bible," in the *P.S.B.A.*, 1901, p. 149.

has fallen out between vi. and ii. 15-25. The Aramaic text behind 1 Esdras here is better than that behind the canonical Ezra. Next, viii.-ix. is from the Ezra document (= Ezra vii.-x.; Neh. vii. 73, viii. 1 sqq.), though implying a different Hebrew text. ii. 1-15; v. 7-73; vii. 2-4, 6-15 are from the Chronicles: likewise i. is from 2 Chron. xxxv.-vi., 2 Esdras being at the same time before the translator.

Date.—The book must be placed between 300 B.C. and A.D. 100, when it was used by Josephus. It is idle to attempt any nearer limits until definite conclusions have been reached on the chief problems of the book.

MSS. and Versions.—The book is found in B and A. The latter seems to have preserved the more ancient form of the text, as it is generally that followed by Josephus. The Old Latin in two recensions is published by Sabatier, *Bibliorum sacrorum Latinae versiones antiquae*, iii. Another Latin translation is given in Lagarde (*Septuag. Studien*, ii., 1892). In Syriac the text is found only in the Syro-Hexaplar of Paul of Tella (A.D. 616). See Walton's Polyglott. There is also an Ethiopic version edited by Dillmann (*Bibl. Vet. Test. Aeth.* v., 1894) and an Armenian.

LITERATURE.—Exegesis: Fritzsche, *Exeget. Handb. zu den Apokr.* (1851); Zöckler, *Die Apokryphen*, 155-161 (1891); Bissell in Lange-Schaff's *Comm.* (1880); Lupton in *Speaker's Comm.* (1888); Ball, notes to 1 Esdr. in the *Variorum Apocrypha.* Introduction and critical Inquiries: Trendelenburg, "Apocr. Esra," in Eichhorn's *Allgem. Bibl. der bibl. Litt.* i. 178-232 (1787); Pohlmann, "Über das Ansehen des apokr. dritten Buchs Esras," in *Tübingen Theol. Quartalschrift*, 257-275 (1859); Sir H. Howorth, "Character and Importance of 1 Esdras," in the *Academy* (1893), pp. 13, 60, 106, 174, 326, 524; and further studies entitled "Some Unconventional Views on the Text of the Bible," in the *Proceedings of the Society of Biblical Archaeology*, 1901, pp. 147-159; 306-330, 1902, June and November. (R. H. C.)

EZRA, FOURTH BOOK (or APOCALYPSE) **OF.** This is the most profound and touching of the Jewish Apocalypses. It stands in the relation of a sister work to the Apocalypse of Baruch, but though the relation is so close, they have many points of divergence. Thus, whereas the former represents the ordinary Judaism of the 1st century of the Christian era, the teaching of 4 Ezra on the Law, Works, Justification, Original Sin and Free Will approximates to the school of Shammai and serves to explain the Pauline doctrines on those subjects; but to this subject we shall return.

Original Language and Versions.—In the Latin version our book consists of sixteen chapters, of which, however, only iii.-xiv. are found in the other versions. To iii.-xiv., accordingly, the present notice is confined. After the example of most of the Latin MSS. we designate the book 4 Ezra (see Bensly-James, *Fourth Book of Ezra*, pp. xxiv-xxvii). In the First Arabic and Ethiopic versions it is called 1 Ezra; in some Latin MSS. and in the English Authorized Version it is 2 Ezra, and in the Armenian 3 Ezra. Chapters i.-ii. are sometimes called 3 Ezra, and xv.-xvi. 5 Ezra. All the versions go back to a Greek text. This is shown by the late Greek apocalypse of Ezra (Tischendorf, *Apocalypses Apocryphae*, 1866, pp. 24-33), the author of which was acquainted with the Greek of 4 Ezra; also by quotations from it in Barn. iv. 4; xii. 1 = 4 Ezra xii. 10 sqq., v. 5; Clem. Alex. *Strom.* iii. 16 (here first expressly cited) = 4 Ezra v. 35, &c. (see Bensly-James, *op. cit.* pp. xxvii-xxxviii. The derivation of the Latin version from the Greek is obvious when we consider its very numerous Graecisms. Thus the genitive is found after the comparative (v. 13) *horum majora*; xi. 29 *duorum capitum majus*, even the genitive absolute as in x. 9, the double negative, *de* and *ex* with the genitive. Peculiar genders can only be accounted for by the influence of the original forms in Greek, as x. 23 *signaculum* (σφραγίς) . . . *tradita est*; xi. 4 *caput* (κεφαλή) . . . *sed et ipsa.* In vi. 25 we have the Greek attraction of the relative—*omnibus istis quibus praedixi tibi.* In his *Messias Judaeorum* (1869), pp. 36-110, Hilgenfeld has given a reconstruction of the Greek text. Till 1896 only Ewald believed that 4 Ezra was written originally in Hebrew. In that year Wellhausen (*Gött. Gel. Anz.* pp. 12-13) and Charles (*Apoc. Bar.* p. lxxii) pointed out that a Hebrew original must be assumed on various grounds; and this view the former established in his *Skizzen u. Vorarbeiten*, vi. 234-240 (1899). Of the numerous grounds for this assumption it will be necessary only to adduce such constructions as "de quo me interrogas de eo," iv. 28, and xiii. 26, "qui per semet ipsum liberabit" (= אֲשֶׁר־בּוֹ) = "through whom he will deliver," or to point to such a mistranslation as vii. 33, "longanimitas congregabitur," where for "congregabitur" (= יאסף) we require "evanescet," which is another and the actual meaning of the Hebrew verb in this passage. The same mistranslation is found in the Vulgate in Hosea iv. 3. Gunkel has adopted this view in his German translation of the book in Kautzsch's *Apok. und Pseud. des A. Testaments*, ii. 332-333, and brought forward in confirmation the following remarkable instance in viii. 23, where though the Latin, Syriac, Ethiopic, Arabic and Armenian Versions read *testificatur*, the Second Arabic version and the Apostolic Constitutions have *μένει εἰς τὸν αἰῶνα*, which are to be explained as translations of עמרת לָעַד (לָעַ). Another interesting case is found in xiv. 3, where the Latin and all other versions but Arabic^2 read *super rubum* and the Arabic^2 *in monte Sinai.* Here there is a corruption of סנה "bush" into סיני "Sinai."

Latin Version.—All the older editions of this version, as those of Fabricius, Sabatier, Volkmar, Hilgenfeld, Fritzsche, as well as in the older editions of the Bible, are based ultimately on only one MS., the Codex Sangermanensis (written A.D. 822), as Gildemeister proved in 1865 from the fact that the large fragment between verses 36 and 37 in chapter vii., which is omitted in all the above editions, originated through the excision of a leaf in this MS. A splendid edition of this version based on MSS. containing the missing fragment, which have been subsequently discovered, has been published by Bensly-James, *op. cit.* This edition has taken account of all the important MSS. known, save one at Leon in Spain.

Syriac Version.—This version, found in the Ambrosian Library in Milan, was translated into Latin by Ceriani, *Monumenta sacra et profana*, II. ii. pp. 99-124 (1866). Two years later this scholar edited the Syriac text, *op. cit.* V. i. pp. 4-111, and in 1883 reproduced the MS. by photo-lithography (*Translatio Syra Peshitto V.T.* II. iv. pp. 553-572). Hilgenfeld incorporated Ceriani's Latin translation in his *Messias Judaeorum.* This translation needs revision and correction.

Ethiopic Version.—First edited and translated by Laurence, *Primi Ezrae libri versio Aethiopica* (1820). Laurence's Latin translation was corrected by Praetorius and reprinted in Hilgenfeld's *Messias Judaeorum.* In 1894 Dillmann's text based on ten MSS. was published—*V.T. Aeth. libri apocryphi*, v. 153-193.

Arabic Versions.—The First Arabic version was translated from a MS. in the Bodleian Library into English by Ockley (in Whiston's *Primitive Christianity*, vol. iv. 1711). This was done into Latin and corrected by Steiner for Hilgenfeld's *Mess. Jud.* The Second Arabic version, which is independent of the first, has been edited from a Vatican MS. and translated into Latin by Gildemeister, 1877.

Armenian Version.—First printed in the Armenian Bible (1805). Translated into Latin by Petermann for Hilgenfeld's *Mess. Jud.*; next with Armenian text and English translation by Issaverdens in the *Uncanonical Writings of the Old Testament*, pp. 488 sqq. (Venice, 1901).

Georgian Version.—According to F. C. Conybeare an accurate Georgian version made from the Greek exists in an 11th-century MS. at Jerusalem.

Relation of the above Versions.—These versions stand in the order of worth as follows: Latin, Syriac, Ethiopic. The remaining versions are paraphrastic and less accurate, and are guilty of additions and omissions. All the versions, save the Second Arabic one, go back to the same Greek version. The Second Arabic version presupposes a second Greek version.

Modern Versions.—All the English versions are now antiquated, except those in the Variorum Apocrypha and the Revised Version of the Apocrypha, and even these are far from satisfactory. Similarly, all the German versions are behindhand, except the excellent version of Gunkel in *Apok. u. Pseud.* ii. 252-401, which, however, needs occasional correction.

Contents.—The book (iii.-xiv.) consists of seven visions or parts, like the apocalypse of Baruch. They are: (1) iii. 1–v. 19; (2) v. 20–vi. 34; (3) vi. 35–ix. 25; (4) ix. 26–x. 60; (5) xi. 1–xii. 51; (6) xiii.; (7) xiv. These deal with (1) religious problems and speculations and (2) eschatological questions. The first three are devoted to the discussion of religious problems affecting in the main the individual. The presuppositions underlying these are in many cases the same as those in the Pauline Epistles. The next three visions are principally concerned with eschatological problems which relate to the nation. The seventh vision is a fragment of the Ezra Saga recounting the rewriting of the Scriptures, which had been destroyed. This has no organic connexion with what precedes.

First Vision. iii.-v. 19.—"In the thirtieth year after the ruin of the city I Salathiel (the same is Ezra) was in Babylon and lay troubled upon my bed." In a long prayer Ezra asks how the desolation of Sion and the prosperity of Babylon can be in keeping with the justice of God. The angel Uriel answers that God's ways are unsearchable and past man's understanding. When Ezra asks when the end will be and what are the signs of it, the angel answers that the end is at hand and enumerates the signs of it.

Second Vision. v. 14–vi. 34.—Phaltiel, chief of the people, reproaches Ezra for forsaking his flock. Ezra fasts, and in his prayer asks why God had given up his people into the hands of the heathen. Uriel replies: "Lovest thou that people better than He that made them?" Man cannot find out God's judgment. The end is at hand; its signs are recounted.

Third Vision. vi. 35–ix. 25.—Ezra recounts the works of creation, and asks why Israel does not possess the world since the world was made for Israel. The answer is that the present state is a necessary stage to the coming one. Then follows an account of the Messianic age and the resurrection: the punishment of the wicked and the blessings of the righteous. There can be no intercession for the departed. Few will be saved—only as it were a grape out of a cluster or a plant out of a forest.

Fourth Vision. ix. 26–x. 60.—Ezra eats of herbs in the field of Ardat, and sees in a vision a woman mourning for her only son. Ezra reminds her of the greater desolation of Sion. Suddenly she is transfigured and vanishes, and in her place appears a city. The woman, Uriel explains, represents Sion.

Fifth Vision. xi. 1–xii. 39.—Vision of an eagle with three heads, twelve wings and eight winglets, which is rebuked by a lion and destroyed. The eagle is the fourth kingdom seen by Daniel, and the lion is the Messiah.

Sixth Vision. xiii.—Vision of a man (*i.e.* the Messiah) arising from the sea, who destroys his enemies who assemble against him, and gathers to him another multitude, *i.e.* the lost Ten Tribes.

Seventh Vision. xiv.—Ezra is told of his approaching translation. He asks for the restoration of the Law, and is enabled by God to dictate in forty days ninety-four books (the twenty-four canonical books of the Old Testament that were lost, and seventy secret books for the wise among the people).

Ezra's translation is found in the Canon only in the Oriental Versions. In the Latin it was omitted when xv.-xvi. were added.

Integrity.—According to Gunkel (*Apok. u. Pseud.* ii. 335-352) the whole book is the work of one writer. Thus down to vii. 16 he deals with the problem of the origin of suffering in the world, and from vii. 17 to ix. 25 with the question who is worthy to share in the blessedness of the next world. As regards the first problem the writer shows, in the first vision, that suffering and death come from sin—no less truly on the part of Israel than of all men, for God created man to be immortal; that the end is nigh, when wrongs will be righted; God's rule will then be recognized. In the second he emphasizes the consolation to be found in the coming time, and in the third he speaks solely of the next world, and then addresses himself to the second problem. The fourth, fifth and sixth visions are eschatological. In these the writer turns aside from the religious problems of the first three visions and concerns himself only with the future national supremacy of Israel. Zion's glory will certainly be revealed (vision four), Israel will destroy Rome (five) and the hostile Gentiles (six). Then the book is brought to a close with the legend of Ezra's restoration of the lost Old Testament Scriptures.

In the course of the above work there are many inconsistencies and contradictions. These Gunkel explains by admitting that the writer has drawn largely on tradition, both oral and written, for his materials. Thus he concedes that eschatological materials in v. 1-13, vi. 18-28, vii. 26 sqq., also ix. 1 sqq., are from this source, and apparently from an originally independent work, as Kabisch urges, but that it is no longer possible to separate the borrowed elements from the text. Again, in the four last visions he is obliged to make the same concession on a very large scale. Vision four is based on a current novel, which the author has taken up and put into an allegorical form. Visions five and six are drawn from oral or written tradition, and relate only to the political expectations of Israel, and seven is a reproduction of a legend, for the independent existence of which evidence is furnished by the quotations in Bensly-James pp. xxxvii-xxxviii. Thus the chief champion of the unity of the book makes so many concessions as to its dependence on previously existing sources that, to the student of eschatology, there is little to choose between his view and that of Kabisch. In fact, if the true meaning of the borrowed materials is to be discovered, the sources must be disentangled. Hence the need of some such analysis as that of Kabisch (*Das vierte Buch Ezra*, 1889): S = an Apocalypse of Salathiel, *c.* A.D. 100, preserved in a fragmentary condition, iii. 1-31, iv. 1-51, v. 13*b*–vi. 10, 30–vii. 25, vii. 45–viii. 62, ix. 13-x. 57, xii. 40-48, xiv. 28-35. E = an Ezra Apocalypse, *c.* 31 B.C., iv. 52–v. 13*a*, vi. 13-28, vii. 26-44, viii. 63–ix. 12. A = an Eagle Vision, *c.* A.D. 90, x. 60–xii. 35. M = a Son-of-Man Vision, xiii. E² = an Ezra fragment, *c.* A.D. 100, xiv. 1-17*a*, 18-27, 36-47. All these, according to Kabisch, were edited by a Zealot, *c.* 120, who supplied the connecting links and made many small additions. In the main this analysis is excellent. If we assume that the editor was also the author of S, and that such a vigorous stylist, as he shows himself to be, recast to some extent the materials he borrowed, there remains but slight difference between the views of Kabisch and Gunkel. Neither view, however, is quite satisfactory, and the problem still awaits solution. Other attempts, such as Ewald's (*Gesch. d. Volkes Israel*³, vii. 69-83) and De Faye's (*Apocalypses juives*, 155-165), make no contribution.

School of the Author.—The author or final redactor of the book was a pessimist, and herein his book stands in strong contrast with the Apocalypse of Baruch. Thus to the question propounded in the New Testament—"Are there few that be saved?" he has no hesitation in answering, "There be many created, but few that be saved" (viii. 3): "An evil heart hath grown up in us which hath led us astray . . . and that not a few only but wellnigh all that have been created" (vii. 48). In the Apocalypse of Baruch on the other hand it is definitely maintained that not a few shall be saved (xxi. 11). Moreover, the sufferings of the wicked are so great in the next world it were better, according to 4 Ezra (as also to the school of Shammai), that man had not been born. "It is much better (for the beasts of the field) than for us; for they expect not a judgment and know not of torments" (vii. 66): yet "it would have been best not to have given a body to Adam, or that being done, to have restrained him from sin; for what profit is there that man should in the present life live in heaviness and after death look for punishment" (vii. 116, 117). In iv. 12 the nexus of life, sin and suffering just referred to, is put still more strongly: "It were better we had not been at all than that we should be born and sin and suffer."[1] The different attitude of these two writers towards this question springs from their respective views on the question of free will. The author of Baruch declares (iv. 15, 19): "For though Adam sinned and brought untimely death upon all, yet of those who were born from him each one of them prepared for his own soul torment to come, and again each one of them has chosen for himself glories to come . . . each one of us has been the Adam of his own soul." Though the writer of Ezra would admit the possibility of a few Israelites attaining to salvation through the most strenuous endeavour, yet he holds that man is all but predoomed through his original evil disposition or through the fall of Adam (vii. 118). "O Adam, what hast thou done: for though it was thou that sinned, the evil is not fallen on thee alone, but upon all of us that come of thee."

Another contrast between the two books is that while Baruch shows some mercy to the Gentiles (lxxii. 4-6) in the Messianic period, none according to 4 Ezra and the Shammaites (Toseph. *Sanh.* xiii. 2) will be extended to them, iii. 30, ix. 22 sq., xii. 34, xiii. 37 sq.).

On the above grounds it is not unreasonable to conclude that whereas the Apocalypse of Baruch owes its leading characteristics to a pupil of Hillel's school, 4 Ezra shows just as clearly its derivation from that of Shammai. Kohler (*Jewish Encyc.*

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[1] In the Apocalypse of Baruch, x. 6, we find a similar expression: "Blessed is he who was not born, or being born has died." But here death is said to be preferable to witnessing the present woes of Jerusalem.

v. 221) points out that the view of 4 Ezra that the Ten Tribes will return was held by the Shammaites, whereas it was denied by Aqiba. The Apocalypse of Baruch is silent on this point.

Time and Place.—The work was written towards the close of the 1st century (iii. 1, 29), and somewhere in the east.

LITERATURE.—In addition to the authorities mentioned above, see Dillmann, Herzog's *Real-Encyk.*^{2} xii. 353 sqq.; Schürer, *Gesch. des jüd. Volkes*^{3}, iii. 246 sqq.; and the articles on 4 Esdras in Hastings' *Bible Dictionary* and the *Encyclopaedia Biblica* by Thackeray and James respectively. (R. H. C.)

EZRA AND NEHEMIAH, BOOKS OF, in the Old Testament. The two canonical books entitled Ezra and Nehemiah in the English Bible[1] correspond to the 1 and 2 Esdras of the Vulgate, to the 2 Esdras of the Septuagint, and to the Ezra and Nehemiah of the Massoretic (Hebrew) text. Though for many centuries they have thus been treated as separate compositions, we have abundant evidence that they were anciently regarded as forming but one book, and a careful examination proves that together with the book of Chronicles they constitute one single work. The two books may therefore be conveniently treated together.

1. *Position and Date.*—Origen (Euseb, *H.E.* vi. 25), expressly enumerating the twenty-two books of the old covenant as acknowledged by the Jews and accepted by the Christian church, names "the First and Second Ezra in one book"; Melito of Sardis (Euseb. *H.E.* iv. 26) in like manner mentions the book of Ezra only. So also the Talmud (in *Bābā bathrā*, 14. 2), nor can it be supposed that Josephus in his enumeration (*c. Ap.* i. 8) reckoned Nehemiah as apart from Ezra. That the Jews themselves recognized no real separation is shown by the fact that no Massoretic notes are found after Ezra x., but at the end of Nehemiah the contents of both are reckoned together, and it is stated that Neh. iii. 22 is the middle verse of the book. Their position in the Hebrew Bible *before* the book of Chronicles is, however, illogical. The introductory verses of Ezra i. are identical with the conclusion of 2 Chron. xxxvi., whilst in the version of 1 Esdras no less than two chapters (2 Chron. xxxv. sq.) overlap. The cause of the separation is probably to be found in the late reception of Chronicles into the Jewish canon. Further proof of the unity of the three is to be found in the general similarity of style and treatment. The same linguistic criteria recur, and the interest in lists and genealogies, in priests and Levites, and in the temple service point unmistakably to the presence of the same hand (the so-called "chronicler") in Chronicles-Ezra-Nehemiah. See BIBLE (sect. *Canon*); CHRONICLES.

The period of history covered by the books of Ezra and Nehemiah extends from the return of the exiles under Zerubbabel in 537-536 B.C. to Nehemiah's second visit to Jerusalem in 432 B.C. In their present form, however, the books are considerably later, and allusions to Nehemiah in the past (Neh. xii. 26, 47), to the days of Jaddua (the grandson of Nehemiah's contemporary Joiada; *ib.* xii. 11), to Darius (Nothus 423 B.C. or rather Codomannus 336 B.C., *ib. v.* 22), and the use of the term "king of Persia," as a distinctive title after the fall of that empire (332 B.C.), are enough to show that, as a whole, they belong to the same age as the book of Chronicles.

2. *Contents.*—Their contents may be divided into four parts:—

(*a*) The events preceding the mission of Ezra (i.-vi.).—In the first year of his reign Cyrus was inspired to grant a decree permitting the Jews to return to build the temple in Jerusalem (i.); a list of families is given (ii.). The altar of burnt-offering was set up, and in the second year of the return the foundations of the new temple were laid with great solemnity (iii.). The "adversaries of Judah and Benjamin" offered to assist but were repulsed, and they raised such opposition to the progress of the work that it ceased until the second year of Darius (521-520 B.C.). Aroused by the prophets Haggai and Zechariah the building was then resumed, and despite fresh attempts to hinder the work it was completed, consecrated and dedicated in the sixth year of that king (vi.). The event was solemnized by the celebration of the Passover (cf. 2 Chron. xxx., Hezekiah; xxxv. Josiah).

(*b*) An interval of fifty-eight years is passed over in silence, and the rest of the book of Ezra comprises his account of his mission to Jerusalem (vii.-x.). Ezra, a scribe of repute, well versed in the laws of Moses, returns with a band of exiles in order to reorganize the religious community. A few months after his arrival (seventh year of Artaxerxes, 458 B.C.) he instituted a great religious reform, viz. the prohibition of intermarriage with the heathen of the land (cf. already vi. 21). In spite of some opposition (x. 15 obscurely worded) the reform was accepted, and the foundations of a new community were laid.

(*c*) Twelve years elapse before the return of Nehemiah, whose description of his work is one of the most interesting pieces of Old Testament narrative (Neh. i.-vi.). In the twentieth year of Artaxerxes (445 B.C.), Nehemiah the royal cup-bearer at Shushan (Susa, the royal winter palace) was visited by friends from Judah and was overcome with grief at the tidings of the miserable condition of Jerusalem and the pitiful state of the Judaean remnant which had escaped the captivity. He obtained permission to return, and on reaching the city made a secret survey of the ruins and called upon the nobles and rulers to assist in repairing them. Much opposition was caused by Sanballat the Horonite (*i.e.* of the Moabite Horonaim or Beth-horon, about 15 m. N.W. of Jerusalem), Tobiah the Ammonite, Geshem (or Gashmu) the Arabian, and the Ashdodites, whose virulence increased as the rebuilding of the walls continued. But notwithstanding attempts upon the city and upon the life of Nehemiah, and in spite of intrigues among certain members of the Judaean section, in fifty-two days the city walls were complete (Neh. vi. 15). The hostility, however, did not cease, and measures were taken to ensure the safety of the city (vi. 16-vii. 4). A valuable account is given of Nehemiah's economical reforms, illustrating the internal social conditions of the period and the general character of the former governors who had been placed in charge (v., cf. the laws codified in Lev. xxv. 35 sqq.).

(*d*) The remaining chapters carry on the story of the labours of *both* Ezra and Nehemiah. The list of those who returned under the decree of Cyrus is repeated (Neh. vii.), and leads up to the reading of the Law by Ezra, a great national confession of guilt, and a solemn undertaking to observe the new covenant, the provisions of which are detailed (x. 28-39). After sundry lists of the families dwelling in Jerusalem and its neighbourhood (xi. 1 sqq., apparently a sequel to vii. 1-4),[2] and of various priests and Levites, an account is given of the dedication of the walls (xii. 27-43), the arrangements for the Levitical organization (*vv.* 44-47), and a fresh separation from the heathen (Moabites and Ammonites, xiii. 1-3; cf. Deut. xxiii. 3 seq.). The book concludes with another extract from Nehemiah's memoirs dealing with the events of a second visit, twelve years later (xiii. 4-31). On this occasion he vindicated the sanctity of the temple by expelling Tobiah, reorganized the supplies for the Levites, took measures to uphold the observance of the Sabbath, and protested energetically against the foreign marriages. In the course of his reforms he thrust out a son of Joiada (son of Eliashib, the high-priest), who had married the daughter of Sanballat, an incident which had an important result (see SAMARITANS).

That these books are the result of compilation (like the book of Chronicles itself) is evident from the many abrupt changes; the inclusion of certain documents written in an Aramaic dialect (Ezr. iv. 8-vi. 18, vii. 12-26)[3]; the character of the name-lists; the lengthy gaps in the history; the use made of two distinct sources, attributed to Ezra and Nehemiah respectively, and from the varying form in which the narratives are cast. The chronicler's hand can usually be readily recognized. There are relatively few traces of it in Nehemiah's memoirs and in the Aramaic documents, but elsewhere the sources are largely coloured, if not written from the standpoint of his age. Examples of artificial arrangement appear notably in Ezr. ii.–iii. 1 compared with Neh. vii. 6–viii. 1 (first clause); in the present position of Ezr. iv. 6-23; and in the dislocation of certain portions of the two memoirs in Neh. viii.–xiii. (see below). It should be noticed that the present order of the narratives involves the theory that some catastrophe ensued after Ezr. x. and before Neh. i.; that the walls had been destroyed and the gates burnt down; that some external opposition (with which, however, Ezra did not have to contend) had been successful; that the main object of Ezra's mission was delayed for twelve years, and, finally, that only through Nehemiah's energy was the work of social and religious reorganization successful. These topics raise serious historical problems (see JEWS: *History*, § 21).

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[1] References to 1 Esdras in this article are to the book discussed above as Ezra, THIRD BOOK OF.

[2] With Neh. xi. 4-19 cf. 1 Chron. ix. 3-17; with the list xii. 1-7 cf. *vv.* 12-21 and x 3-9; and with xii. 10 sq. cf. 1 Chron. vi. 3-15 (to which it forms the sequel). See further Smend, *Listen d. Esra u. Neh.* (1881).

[3] Sometimes wrongly styled Chaldee (*q.v.*); see SEMITIC LANGUAGES.

3. *Criticism of Ezra i.–vi.*—The chronicler's account of the destruction of Jerusalem, the seventy years' interval (2 Chron. xxxvi. 20 sq.; cf. Jer. xxv. 11, xxix. 10, also Is. xxiii. 17), and the return of 42,360 of the exiles (Ezr. ii. 64 sqq.) represent a special view of the history of the period. The totals, as also the detailed figures, in Ezr., Neh. and 1 Esdr. v. vary considerably; the number is extremely large (contrast Jer. lii. 30); it includes the common people (contrast 2 Kings xxiv. 14, xxv. 12), and ignores the fact that Judah was not depopulated, that the Jews were carried off to other places besides Babylon and that many remained behind in Babylon. According to this view, Judah and Jerusalem were practically deserted until the return. The list in Ezr. ii. is that of families which returned "every man unto his city" under twelve leaders (including Nehemiah, Azariah [cf. Ezra], Zerubbabel and Jeshua); it recurs with many variations in a different and apparently more original context in Neh. vii., and in 1 Esdr. v. is ascribed to the time of Darius. The families (to judge from the northwards extension of Judaean territory) are probably those of the population in the later Persian period, hardly those who returned to the precise homes of their ancestors (see C. F. Kent, *Israel's Hist. and Biogr. Narratives*, p. 379). The offerings which are for the temple-service in Neh. vii. 70-72 (cf. 1 Chron. xxix. 6-8) are for the building of the temple in Ezr. ii. 68-70; and since the walls are not yet built, the topographical details in Neh. viii. 1 (see 1 Esdr. v. 47) are adjusted, and the event of the seventh month is not the reading of the Law amid the laments of the people (Neh. viii.; see *vv.* 9-11) but the erection of the altar by Jeshua and Zerubbabel under inauspicious circumstances (cf. Ezr. iii. 3 with 1 Esdr. v. 50).

The chronologically misplaced account of the successful opposition in the time of Ahasuerus (*i.e.* Xerxes) and Artaxerxes (the son and grandson of Darius respectively) breaks the account of the *temple* under Cyrus and Darius, and is concerned with the city walls (iv. 6-23)[1]; there is some obscurity in *vv.* 7-9: Rehum and Shimshai evidently take the lead, Tabeel may be an Aramaized equivalent of Tobiah. A recent return is implied (iv. 12) and the record hints that a new decree may be made (*v.* 21). The account of the unsuccessful opposition to the *temple* in the time of Darius (v. sq.; for another account see Jos. *Ant.* xi. 4, 9) is independent of iv. 7-23, and throws another light upon the decree of Cyrus (vi. 3-5, contrast i. 2-4). It implies that Sheshbazzar, who had been sent with the temple vessels in the time of Cyrus, had laid the foundations and that the work had continued without cessation (v. 16, contrast iv. 5, 24). The beginning of the reply of Darius is wanting (vi. 6 sqq.), and the decree which had been sought in Babylon is found at Ecbatana. Chap. vi. 15 sqq. follow more naturally upon v. 1-2, but *v.* 14 with its difficult reference to Artaxerxes now seems to presuppose the decree in iv. 21 and looks forward to the time of Ezra or Nehemiah. As regards this section (Ezr. i.–vi.) as a whole, there is little doubt that i. iii. 1–iv. 5, vi. 15-22 are from the chronicler, whose free treatment of his material is seen in the use he has made of ch. ii. Notwithstanding the unimpeachable evidence for the tolerant attitude of Persian kings and governors towards the religion of subject races, it is probable that the various decrees incorporated in the book (cf. also 1 Esdr. iv. 42 sqq.) have been reshaped from a Jewish standpoint. A noteworthy example appears in the account of the unique powers entrusted to Ezra (vii. 11-26), the introduction to whose memoirs, at all events, is quite in the style of the chronicler.

4. *Memoirs of Nehemiah and Ezra.*—The memoirs of Ezra and Nehemiah do not appear to have been incorporated without some adjustment. The lapse of time between Neh. i. 1 and ii. 1 is noteworthy, and with the prayer in i. 5-11 cf. Ezr. ix. 6-15, Dan. ix. 4 sqq. (also parallels in Deuteronomy); chap. i. in its present form may be a compiler's introduction. The important topographical list in ch. iii. is probably from another source; the style is different, Nehemiah is absent, and the high-priest is unusually prominent.[2] Chap. v., where Nehemiah reviews his *past* conduct as governor, turns aside to economic reforms and scarcely falls within the fifty-two days of the building of the walls. The chapter is closely associated with the contents of xiii. and breaks the account of the opposition. Anticipated already in ii. 10, the hostility partly arises from the repudiation of Samaritan religious claims (ii. 20; cf. Ezr. iv. 3) and is partly political. It is difficult to follow its progrees clearly, and the account ceases abruptly in vi. 17-19 with the notice of the conspiracy of Tobiah and the nobles of Judah. The chronicler's style can be recognized in vii. 1-5 (in its present form), where steps are taken to protect and to people Jerusalem; the older sequel is now found in ch. xi. Whilst the account of the dedication of the walls is marked by the use of the pronoun "I" (xii. 31, 38, 40), it is probably now due as a whole to the chronicler, and when the more trustworthy memoirs of Nehemiah are resumed (xiii. 4 sqq.) the episodes, although placed twelve years later (ver. 6), are intimately connected with the preceding reforms (cf. xii. 44–xiii. 3 with xiii. 10 sqq., 23 sqq.).[3] Nehemiah's attitude towards intermarriage is markedly moderate in contrast to the drastic measures of Ezra, whose mission and work the simpler and perhaps earlier narratives of Nehemiah originally ignored, and the relation between the two is complicated further by the literary character of the memoir of Ezra.

To the last mentioned are prefixed (*a*) the scribe's genealogy, which traces him back to Aaron and names as his immediate ancestor, Seraiah, who had been slain 130 years previously (Ezr. vii. 1-5), and (*b*) an independent account of the return (*vv.* 6-10) with a reference to Ezra's renown, obviously not from the hand of Ezra himself. Whatever the original prelude to Ezra's thanksgiving may have been (vii. 27 seq.), we now have the essentially Jewish account of the letter of Artaxerxes with its unusual concessions.[4] The list of those who returned amounts to the moderate total of 1496 males (viii., but 1690 in 1 Esdr. viii. 30 sqq.). Ezra's mission was obviously concerned with the Law and Temple service (vii. 6, 10, 14 sqq., 25; viii. 17, 24-30, 33 sq.), but four months elapse between his return in the fifth month (vii. 9) and the preparations for the marriage reforms in the ninth (x. 9), and there is a delay of twelve years before the Law is read (Neh. viii.). The Septuagint version (1 Esdr. ix.; cf. Josephus, *Antiq.* xi. 5. 5 and some modern scholars) would place the latter after Ezr. x., but more probably this event (dated in the seventh month) should precede the great undertaking in Ezr. ix.[1] That the adjustment was attended with considerable revision of the passages appears from a careful comparison of Neh. viii. sq. with Ezr. ix. sq. With Ezra's confession (ix. 6 sqq.) compare the prayer in Neh. ix. 5 sqq., which the Septuagint ascribes to him. In Ezr. x. (written in the third person) the number of those that had intermarried with the heathen is relatively small considering the general trend of the preliminaries, and the list bears a marked resemblance to that in ch. ii. It ends abruptly and obscurely (x. 44; cf. 1 Esdr. ix. 36), and whilst as a whole the memoirs of Ezra point to ideas later than those of Nehemiah, the present close literary connexion between them is seen in the isolated reference to Johanan the son of Eliashib in Ezra x. 6, which seems to be connected with Neh. xiii. 7, and (after W. R. Smith) in the suitability of *ib.* xiii. 1, 2 between Ezr. x. 9 and 10. The list of signatories in Neh. x. 1-27 should be compared with the names in xii. and 1 Chron. xxiv.; the true connexion of ix. 38 is very obscure, and the relation to Ezr. ix. seq. is complicated by the reference to the separation from the heathen in Neh. ix. 2. The description of the covenant (Neh. x. 28 sqq., marked by the use of "we") is closely connected with xii. 43–xiii. 3 (from the same or an allied source), and anticipates the parallel though somewhat preliminary measures detailed in the more genuine memoirs (Neh. xiii. 4 sqq.). Finally, the specific allusion in xiii. 1-3 to Ammon and Moab is possibly intended as an introduction to the references to Tobiah and Sanballat respectively (*vv.* 4 seq., 28).

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[1] Its real position in the history of this period is not certain. Against the supposition that the names refer to Cambyses and Pseudo-Smerdis who reigned after Cyrus and before Darius, see H. E. Ryle, *Camb. Bible*, "Ezra and Neh.," p. 65 sq. Against the view that Darius is D. ii. Nothus of 423–404 B.C., see G. A. Smith, *Minor Prophets*, ii. 191 sqq. The ignorance of the compiler regarding the sequence of the kings finds a parallel in that of the author of the book of Daniel (*q.v.*); see C. C. Torrey, *Amer. Journ. of Sem. Lang.* (1907), p. 178, n. 1.

[2] See further H. G. Mitchell, *Journ. of Bibl. Lit.* (1903), pp. 88 sqq.

[3] The chronological difficulties will be seen from xiii. 6 ("before this"), which would imply that the dedication of the walls was on the occasion of Nehemiah's later visit (see G. A. Smith, *Expositor*, July 1906, p. 12). His previous departure is perhaps foreshadowed in vii. 2.

[4] See *Ency. Bib.* col. 1480. Papyri from a Jewish colony in Elephantine (407 B.C.) clearly show the form which royal permits could take, and what the Jews were prepared to give in return; the points of resemblance are extremely interesting, but compared with the biblical documents the papyri reveal some striking differences.

5. *Summary.*—The literary and historical criticism of Ezra-Nehemiah is closely bound up with that of Chronicles, whose characteristic features it shares. Although the three formed a unit at one stage it may seem doubtful whether two so closely related chapters as 1 Chron. ix. and Neh. xi. would have appeared in one single work, while the repetition of Neh. vii. 6–viii. 1 in Ezr. ii.–iii. 1 is less unnatural if they had originally appeared in distinct sources. Thus other hands apart from the compiler of Chronicles may have helped to shape the narratives, either before their union with that book or after their separation.[2] The present intricacy is also due partly to specific historical theories regarding the post-exilic period. Here the recension in 1 Esdras especially merits attention for its text, literary structure and for its variant traditions.[3] Its account of a return in the time of Darius scarcely arose *after* Ezr. i.–iii. (Cyrus); the reverse seems more probable, and the possibility of some confusion or of an intentional adjustment to the earlier date is emphasized by the relation between the popular feeling in Ezr. iii. 12 (Cyrus) and Hag. ii. 3 (Darius), and between the grant by Cyrus in iii. 7 (it is not certain that he held Phoenicia) and the permit of Darius in 1 Esdr. iv. 47-57 (see *v.* 48). To the latter context belongs the list of names which reappears in Ezr. ii. (Cyrus). But from the independent testimony of Haggai and Zechariah it is doubtful whether the chronicler's account of the return under Cyrus is at all trustworthy. The list in 1 Esdr. v., Ezr. ii., as already observed, appears to be in its more original context in Neh. vii., *i.e.* in the time of Artaxerxes, and it is questionable whether the earliest of the surviving detailed traditions in Ezra–Nehemiah went back before this reign. It is precisely at this age that there is evidence for a return, apparently other than that of Ezra or Nehemiah (see Ezr. iv. 12), yet no account seems to be preserved unless the records were used for the history of earlier periods (cf. generally Ezr. iii. 12 sq. with Neh. viii. 9-11; Ezr. iii. 7 with the special favour enlisted on behalf of the Jews in vi. 7 sq., 13, vii. 21; Neh. ii. 7 sq.). But the account of the events in the reign of Artaxerxes is extremely perplexing. Since the building of the walls of Jerusalem must have begun early in the fifth month (Neh. vi. 15), an allowance of three days (ii. 11) makes the date of Nehemiah's arrival practically the anniversary of Ezra's return (Ezr. vii. 9; viii. 32). Considering the close connexion between the work of the two men this can hardly be accidental. The compiler, however, clearly intends Neh. vi. 15 (25th of sixth month) to be the prelude to the events in Neh. vii. 73, viii. (seventh month), but the true sequence of Neh. vi. sqq. is uncertain, and the possibility of artificiality is suggested by the unembellished statement of Josephus that the building of the walls occupied, not fifty-two days, but two years four months (*Ant.* xi. 5. 8). The present chronological order of Nehemiah's work is confused (cf. § 4, n. 3), and the obscure interval of twelve years in his work corresponds very closely to that which now separates the records of Ezra's labours. However, both the recovery of the compilers' aims and attempted reconstructions are precluded from finality by the scantiness of independent historical evidence. (See further JEWS: *History*, §21 seq.)

BIBLIOGRAPHY.—S. R. Driver, *Lit. of the O. T.* (1909), pp. 540 sqq. and the commentaries of H. E. Ryle (*Camb. Bible*, 1893), C. Siegfried (1901), A. Bertholet (1902), and T. W. Davies (*Cent. Bible*, 1909). Impetus to recent criticism of these books starts with Van Hoonacker (*Neh. et Esd.* [1890]; see also *Expos. Times* [1897], pp. 351-354, and M.-J. Lagrange, *Rev. biblique*, iii. 561-585 [1894], iv. 186-202 [1895]) and W. H. Kosters (Germ. ed., *Wiederherstellung Israëls*, 1895). The latter's important conclusions (for which see his article with Cheyne's additions in *Ency. Bib.* col. 1473 sqq., 3380 sqq.) have been adversely criticized, especially by J. Wellhausen (*Nachrichten* of the Univ. of Göttingen, 1895, pp. 166-186), E. Meyer (*Entstehung d. Judentums*, 1896), J. Nikel (*Wiederherstellung d. jüd. Gemein.*, 1900), and S. Jampel in *Monatsschrift f. Gesch. u. Wissens. d. Judentums*, vols. xlvi.-xlvii. (1902–1903). The negative criticisms of Kosters have, however, been strengthened by his replies (in the Dutch *Theolog. Tijdschrift*), and by the discussions of C. C. Torrey and C. F. Kent (*op. cit*) and of G. Jahn (*Esra u. Neh.* pp. i-lxxviii; 1909), and his general position appears to do more justice to the biblical evidence as a whole. (S. A. C.)

EZZO, or EHRENFRIED (*c.* 954–1024), count palatine in Lorraine, was the son of a certain Hermann (d. *c.* 1000), also a count palatine in Lorraine who had possessions in the neighbourhood of Bonn. Having married Matilda (d. 1025), a daughter of the emperor Otto II., Ezzo came to the front during the reign of his brother-in-law, the emperor Otto III. (983–1002); his power was increased owing to the liberal grant of lands in Thuringia and Franconia which he received with his wife, and some time later his position as count palatine was recognized as an hereditary dignity. Otto's successor, the emperor Henry II., was less friendly towards the powerful count palatine, though there was no serious trouble between them until 1011; but some disturbances in Lorraine quickly compelled the emperor to come to terms, and the assistance of Ezzo was purchased by a gift of lands. Henceforward the relations between Henry and his vassal appear to have been satisfactory. Very little is known about Ezzo's later life, but we are told that he died at a great age at Saalfeld on the 21st of March 1024. He left three sons, among them being Hermann, who was archbishop of Cologne from 1036 to 1056, and Otto, who was for a short time duke of Swabia; and seven daughters, six of whom became abbesses. Ezzo founded a monastery at Brauweiler near Cologne, the place where his marriage had been celebrated. This was dedicated in 1028 by Piligrim, archbishop of Cologne, and here both Ezzo and his wife were buried.

EZZOLIED, or ANEGENGE, an old German poem, written by Ezzo, a scholar of Bamberg. It was written about 1060, but not, as one authority asserts, composed while the author was making a pilgrimage to Jerusalem. The subject of the poem is the life of Christ. Very popular during the later middle ages, the *Ezzolied* had a great influence on the poetry of south Germany, and is valuable as a monument of the poetical literature of the time.

The text is printed in the *Denkmäler deutscher Poesie und Prosa aus dem 8-12. Jahrhundert* (Berlin, 1892) of C. V. Müllenhoff and W. Scherer.

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[1] C. C. Torrey, *Comp. and Hist. Value of Ezra-Neh.* (Beihefte of *Zeit. f. alttest. Wissens.*, 1896), pp. 30-34; C. F. Kent, *Israel's Hist. and Biog. Narratives*, pp. 32, 369. Since Neh. vii. 70-73 is closely joined to viii., the suggested transposition would place its account of the contributions to the temple in a more appropriate context (cf. Ezr. viii. 24-30, 33 sq.).

[2] For linguistic evidence reference should be made to J. Geissler, *Die litterarischen Beziehungen d. Esramemoiren* (Chemnitz, 1899).

[3] See especially Sir Henry Howorth, *Proc. of Society of Bibl. Arch.* (1901–1904), *passim*; C. C. Torrey, *Ezra Studies* (Chicago, 1910). For the text, see A. Klostermann, *Real-Ency. f. prot. Theol.* v. 501 sqq.; H. Guthe in Haupt's *Sacred Books of Old Testament* (1899); and S. A. Cook in R. H. Charles, *Apocrypha and Pseudepigrapha*.

F This is the sixth letter of the English alphabet as it was of the Latin. In the ordinary Greek alphabet the symbol has disappeared, although it survived far into historical times in many Greek dialects as *F*, the digamma, the use of which in early times was inductively proved by Bentley, when comparatively little was known of the local alphabets and dialects of Greece. The so-called *stigma* ϛ, which serves for the numeral 6, is all that remains to represent it. This symbol derives its name from its resemblance in medieval MSS. to the abbreviation for στ. The symbol occupying the same position in the Phoenician alphabet was Vau (𐤅 Y), which seems to be represented by the Greek ϒ, the Latin V, at the end of the early alphabet. Many authorities therefore contend that F is only a modification of the preceding symbol E and has nothing to do with the symbol Vau. In some early Latin inscriptions F is represented by |!, as E is by ||. It must be admitted that the resemblance between the sixth symbol of the Phoenician alphabet and the corresponding symbol of the European alphabet is not striking. But the position of the limbs of symbols in early alphabets often varies surprisingly. In Greek, besides F we find for *f* in Pamphylia (the only Greek district in Asia which possesses the symbol) Ͷ, and in Boeotia, Thessaly, Tarentum, Cumae and on Chalcidian vases of Italy the form ⊏, though except at Cumae and on the vases the form F exists contemporaneously with ⊏ or even earlier. At the little town of Falerii (Civita Castellana), whose alphabet is undoubtedly of the same origin as the Latin, *F* takes the form ↑. Though uncertain, therefore, it seems not impossible that the original symbol of the Phoenician alphabet, which was a consonant like the English *w*, may have been differentiated in Greek into two symbols, one indicating the consonant value *w* and retaining the position of the Phoenician consonant Vau, the other having the vowel value *u*, which ultimately most dialects changed to a modified sound like French *u* or German *ü*. Be this as it may, the value of the symbol *F* in Greek was *w*, a bilabial voiced sound, not the labio-dental unvoiced sound which we call *f*. When the Romans adopted the Greek alphabet they took over the symbols with their Greek values. But Greek had no sound corresponding to the Latin *f*, for ϕ was pronounced *p-h*, like the final sound of *lip* in ordinary English or the initial sound of *pig* in Irish English. Consequently in the very old inscription on a gold fibula found at Praeneste and published in 1887 (see Alphabet) the Latin *f* is represented by FB. Later, as Latin did not use F for the consonant written as *v* in *vis*, &c., H was dropped and F received a new special value in Latin as representative of the unvoiced labio-dental spirant. In the Oscan and Umbrian dialects, whose alphabet was borrowed from Etruscan, a special form appears for *f*, viz. 8, the old form ⊏ being kept for the other consonant *v* (*i.e.* English *w*). The 8 has generally been asserted to be developed out of the second element in the combination FB, its upper and lower halves being first converted into lozenges, 8, which naturally changed to 8 when inscribed without lifting the writing or incising implement. Recent discoveries, however, make this doubtful (see Alphabet). (P. Gi.)

FABBRONI, ANGELO (1732–1803), Italian biographer, was born at Marradi in Tuscany on the 25th of September 1732. After studying at Faenza he entered the Roman college founded for the education of young Tuscans. On the conclusion of his studies he continued his stay in Rome, and having been introduced to the celebrated Jansenist Bottari, received from him the canonry of Santa Teresa in Trastevere. Some time after this he was chosen to preach a discourse in the pontifical chapel before Benedict XIV. and made such a favourable impression that the pontiff settled on him an annuity, with the possession of which Fabbroni was able to devote his whole time to study. He was intimate with Leopold I., grand-duke of Tuscany, but the Jesuits disliked him on account of his Jansenist views. Besides his other literary labours he began at Pisa in 1771 a literary journal, which he continued till 1796. About 1772 he made a journey to Paris, where he formed the acquaintance of Condorcet, Diderot, d'Alembert, Rousseau and most of the other eminent Frenchmen of the day. He also spent four months in London. He died at Pisa on the 22nd of September 1803.

The following are his principal works:—*Vitae Italorum doctrina excellentium qui saeculis XVII. et XVIII. floruerunt* (20 vols., Pisa, 1778–1799, 1804–1805), the last two vols., published posthumously, contain a life of the author; *Laurentii Medicei Magnifici Vita* (2 vols., Pisa, 1784), a work which served as a basis for H. Roscoe's *Life of Lorenzo dei Medici*; *Leonis X. pontificis maximi Vita* (Pisa, 1797); and *Elogi di Dante Alighieri, di Angelo Poliziano, di Lodovico Ariosto, e di Torq. Tasso* (Parma, 1800).

FABER, the name of a family of German lead-pencil manufacturers. Their business was founded in 1760 at Stein, near Nuremberg, by Kaspar Faber (d. 1784). It was then inherited by his son Anton Wilhelm (d. 1819). Georg Leonhard Faber succeeded in 1810 (d. 1839), and the business passed to Johann Lothar von Faber (1817–1896), the great-grandson of the founder. At the time of his assuming control about twenty hands were employed, under old-fashioned conditions, and owing to the invention of the French *crayons Contés* of Nicolas Jacques Conté (*q.v.*) competition had reduced the entire Nuremberg industry to a low ebb (see Pencil). Johann introduced improvements in machinery and methods, brought his factory to the highest state of efficiency, and it became a model for all the other German and Austrian manufacturers. He established branches in New York, Paris, London and Berlin, and agencies in Vienna, St Petersburg and Hamburg, and made his greatest *coup* in 1856, when he contracted for the exclusive control of the graphite obtained from the East Siberian mines. Faber had also branched out into the manufacture of water-colour and oil paints, inks, slates and slate-pencils, and engineers' and architects' drawing instruments, and built additional factories to house his various industries at New York and at Noisy-le-Sec, near Paris, and had his own cedar mills in Florida. For his services to German industry he received a patent of nobility and an appointment as councillor of state. After the death of his widow (1903) the business was inherited by his grand-daughter Countess Otilie von Faber-Castell and her husband, Count Alexander.

FABER, BASIL (1520–*c.* 1576), Lutheran schoolmaster and theologian, was born at Sorau, in lower Lusatia, in 1520. In 1538 he entered the university of Wittenberg, studying as *pauper gratis* under Melanchthon. Choosing the schoolmaster's profession, he became successively rector of the schools at Nordhausen, Tennstadt (1555), Magdeburg (1557) and Quedlinburg (1560). From this last post he was removed in December 1570 as a Crypto-Calvinist. In 1571 he was appointed to the Raths-gymnasium at Erfurt, not as rector, but as director (*Vorsteher*). In this situation he remained till his death in 1575 or 1576. His translation of the first twenty-five chapters of Luther's commentary on Genesis was published in 1557; in other ways he promoted the spread of Lutheran views. He was a contributor to the first four of the *Magdeburg Centuries*. He is best known by his *Thesaurus eruditionis scholasticae* (1571; last edition, improved by J. H. Leich, 1749, folio, 2 vols.); this was followed by his *Libellus de disciplina scholastica* (1572).

See Wagenmann and G. Müller in Herzog-Hauck's *Realencyklopädie* (1898). (A. Go.*)

FABER, FREDERICK WILLIAM (1814–1863), British hymn writer and theologian, was born on the 28th of June 1814 at Calverley, Yorkshire, of which place his grandfather, Thomas Faber, was vicar. He attended the grammar school of Bishop Auckland for a short time, but a large portion of his boyhood was spent in Westmorland. He afterwards went to Harrow and to Balliol College, Oxford. In 1835 he obtained a scholarship at University College; and in 1836 he gained the Newdigate prize for a poem on "The Knights of St John," which elicited special praise from Keble. Among his college friends were Dean Stanley and Roundell Palmer, 1st earl of Selborne. In January 1837 he was elected fellow of University College. Meanwhile he had given up the Calvinistic views of his youth, and had become an enthusiastic follower of John Henry Newman. In 1841 a travelling tutorship took him to the continent; and on his return a book appeared called *Sights and Thoughts in Foreign Churches and among Foreign Peoples* (London, 1842), with a dedication to his friend the poet Wordsworth. He accepted the rectory of Elton in Huntingdonshire, but soon after went again to the continent, in order to study the methods of the Roman Catholic Church; and after a prolonged mental struggle he joined the Roman Catholic communion in November 1845. He founded a religious community at Birmingham, called Wilfridians, which was ultimately merged in the oratory of St Philip Neri, with John Henry Newman as Superior. In 1849 a branch of the oratory—subsequently independent—was established in London, first in King William Street, and afterwards at Brompton, over which Faber presided till his death on the 26th of September 1863. In spite of his weak health, an almost incredible amount of work was crowded into those years. He published a number of theological works, and edited the *Oratorian Lives of the Saints*. He was an eloquent preacher, and a man of great charm of character. It is mainly as a hymn-writer, however, that Faber is remembered. Among his best-known hymns are:—"The Greatness of God," "The Will of God," "The Eternal Father," "The God of my Childhood," "Jesus is God," "The Pilgrims of the Night," "The Land beyond the Sea," "Sweet Saviour, bless us ere we go," "I was wandering and weary," and "The Shadow of the Rock." The hymns are largely used in Protestant collections. In addition to many pamphlets and translations, Faber published the following works: *All for Jesus*; *The Precious Blood*; *Bethlehem*; *The Blessed Sacrament*; *The Creator and the Creature*; *Growth of Holiness*; *Spiritual Conferences*; *The Foot of the Cross* (8 vols., London, 1853–1860).

See his *Life and Letters*, by Father J. E. Bowden (London, 1869), and *A Brief Sketch of the Early Life of the late F. W. Faber, D.D.*, by his brother the Rev. F. A. Faber (London, 1869).

FABER, FABRI or FABRY (surnamed STAPULENSIS), **JACOBUS** [Jacques Lefèvre d'Étaples] (*c.* 1455–*c.* 1536), a pioneer of the Protestant movement in France, was born of humble parents at Étaples, in Pas de Calais, Picardy, about 1455. He appears to have been possessed of considerable means. He had already been ordained priest when he entered the university of Paris for higher education. Hermonymus of Sparta was his master in Greek. He visited Italy before 1486, for he heard the lectures of Argyropulus, who died in that year; he formed a friendship with Paulus Aemilius of Verona. In 1492 he again travelled in Italy, studying in Florence, Rome and Venice, making himself familiar with the writings of Aristotle, though greatly influenced by the Platonic philosophy. Returning to Paris, he became professor in the college of Cardinal Lemoine. Among his famous pupils were F. W. Vatable and Farel; his connexion with the latter drew him to the Calvinistic side of the movement of reform. At this time he began the publication, with critical apparatus, of Boëtius (*De Arithmetica*), and Aristotle's *Physics* (1492), *Ethics* (1497), *Metaphysics* (1501) and *Politics* (1506). In 1507 he took up his residence in the Benedictine Abbey of St Germain des Prés, near Paris; this was due to his connexion with the family of Briçonnet (one of whom was the superior), especially with William Briçonnet, cardinal bishop of St Malo (Meaux). He now began to give himself to Biblical studies, the first-fruit of which was his *Quintuplex Psalterium: Gallicum, Romanum, Hebraicum, Vetus, Conciliatum* (1509); the *Conciliatum* was his own version. This was followed by *S. Pauli Epistolae xiv. ex vulgata editione, adjecta intelligentia ex Graeco cum commentariis* (1512), a work of great independence and judgment. His *De Maria Magdalena et triduo Christi disceptatio* (1517) provoked violent controversy and was condemned by the Sorbonne (1521). He had left Paris during the whole of 1520, and, removing to Meaux, was appointed (May 1, 1523) vicar-general to Bishop Briçonnet, and published his French version of the New Testament (1523). This (contemporary with Luther's German version) has been the basis of all subsequent translations into French. From this, in the same year, he extracted the versions of the Gospels and Epistles "à l'usage du diocèse de Meaux." The prefaces and notes to both these expressed the view that Holy Scripture is the only rule of doctrine, and that justification is by faith alone. He incurred much hostility, but was protected by Francis I. and the princess Margaret. Francis being in captivity after the battle of Pavia (February 25, 1525), Faber was condemned and his works suppressed by commission of the parlement; these measures were quashed on the return of Francis some months later. He issued *Le Psautier de David* (1525), and was appointed royal librarian at Blois (1526); his version of the Pentateuch appeared two years later. His complete version of the Bible (1530), on the basis of Jerome, took the same place as his version of the New Testament. Margaret (now queen of Navarre) led him to take refuge (1531) at Nérac from persecution. He is said to have been visited (1533) by Calvin on his flight from France. He died in 1536 or 1537.

See C. H. Graf, *Essai sur la vie et les écrits* (1842); G. Bonet-Maury, in A. Herzog-Hauck's *Realencyklopädie* (1898). (A. Go.*)

FABER (or LEFÈVRE), **JOHANN** (1478–1541), German theologian, styled from the title of one of his works "Malleus Haereticorum," son of one Heigerlin, a smith (*faber*), was born at Leutkirch, in Swabia, in 1478. His early life is obscure; the tradition that he joined the Dominicans is untenable. He studied theology and canon law at Tübingen and at Freiburg im Breisgau, where he matriculated on the 26th of July 1509, and graduated M.A. and doctor of canon law. He was soon appointed vicar of Lindau and Leutkirch, and shortly afterwards canon of Basel. In 1518 Hugo von Landenberg, bishop of Constance, made him one of his vicars-general, and Pope Leo X. appointed him papal protonotary. He was an advocate of reforms, in sympathy with Erasmus, and corresponded (1519–1520) with Zwingli. While he defended Luther against Eck, he was as little inclined to adopt the position of Luther as of Carlstadt. His journey to Rome in the autumn of 1521 had the result of estranging him from the views of the Protestant leaders. He published *Opus adversus nova quaedam dogmata Lutheri* (1522), and appeared as a disputant against Zwingli at Zürich (1523). Then followed his *Malleus in haeresin Lutheranam* (1524). Among his efforts to stem the tide of Protestant innovation was the establishment of a training-house for the maintenance and instruction of popular preachers, drawn from the lower ranks, to compete with the orators of reform. In 1526 he became court preacher to the emperor Ferdinand, and in 1527 and 1528 was sent by him as envoy to Spain and England. He approved the death by burning of Balthasar Hubmeier, the Baptist, at Vienna on the 10th of March 1528. In 1531 he was consecrated bishop of Vienna, and combined with this (till 1538) the administration of the diocese of Neustadt. He died at Vienna on the 21st of May 1541. His works were collected in three volumes, 1537, 1539 and 1541.

See C. E. Kettner, *Diss. de J. Fabri Vita Scriptisque* (1737); Wagenmann and Egli in Herzog-Hauck's *Realencyklopädie* (1898). (A. Go.*)

FABERT, ABRAHAM DE (1599–1660), marshal of France, was the son of Abraham Fabert, seigneur de Moulins (d. 1638), a famous printer who rendered great services, civil and military, to Henry IV. At the age of fourteen he entered the *Gardes françaises*, and in 1618 received a commission in the Piedmont regiment, becoming major in 1627. He distinguished himself repeatedly in the constant wars of the period, notably in La Rochelle and at the siege of Exilles in 1630. His bravery and engineering skill were again displayed in the sieges of Avesnes and Maubeuge in 1637, and in 1642 Louis XIII. made him governor of the recently-acquired fortress of Sedan. In 1651 he became lieutenant-general, and in 1654 at the siege of Stenay he introduced new methods of siegecraft which anticipated in a measure the great improvements of Vauban. In 1658 Fabert was made a marshal of France, being the first commoner to attain that rank. He died at Sedan on the 17th of May 1660.

See *Histoire du maréchal de Fabert* (Amsterdam, 1697); P. Barre, *Vie de Fabert* (Paris, 1752); A. Feillet, *Le Premier Maréchal de France plébéien* (Paris, 1869); Bourelly, *Le Maréchal Fabert* (Paris, 1880).

FABIAN [Fabianus], **SAINT** (d. 250), pope and martyr, was chosen pope, or bishop of Rome, in January 236 in succession to Anteros. Eusebius (*Hist. Eccl.* vi. 29) relates how the Christians, having assembled in Rome to elect a new bishop, saw a dove alight upon the head of Fabian, a stranger to the city, who was thus marked out for this dignity, and was at once proclaimed bishop, although there were several famous men among the candidates for the vacant position. Fabian was martyred during the persecution under the emperor Decius, his death taking place on the 20th of January 250, and was buried in the catacomb of Calixtus, where a memorial has been found. He is said to have baptized the emperor Philip and his son, to have done some building in the catacombs, to have improved the organization of the church in Rome, to have appointed officials to register the deeds of the martyrs, and to have founded several churches in France. His deeds are thus described in the *Liber Pontificalis*: "Hic regiones dividit diaconibus et fecit vii subdiacones, qui vii notariis imminerent, ut gestas martyrum integro fideliter colligerent, et multas fabricas per cymiteria fieri praecepit." Although there is very little authentic information about Fabian, there is evidence that his episcopate was one of great importance in the history of the early church. He was highly esteemed by Cyprian, bishop of Carthage; Novatian refers to his *nobilissimae memoriae*, and he corresponded with Origen. One authority refers to him as Flavian.

See the article on "Fabian" by A. Harnack in Herzog-Hauck's *Realencyklopädie*, Band v. (Leipzig, 1898).

FABIUS, the name of a number of Roman soldiers and statesmen. The Fabian gens was one of the oldest and most distinguished patrician families of Rome. Its members claimed descent from Hercules and a daughter of the Arcadian Evander. From the earliest times it played a prominent part in Roman history, and was one of the two gentes exclusively charged with the management of the most ancient festival in Rome—the Lupercalia (Ovid, *Fasti*, ii. 375). The chief family names of the Fabian gens or clan, in republican times, were Vibulanus, Ambustus, Maximus, Buteo, Pictor, Dorso, Labeo; with surnames Verrucosus, Rullianus, Gurges, Aemilianus, Allobrogicus (all of the Maximus branch). The most important members of the family are the following:—

1. Marcus Fabius Ambustus, pontifex maximus in the year of the capture of Rome by the Gauls (390). His three sons, Quintus, Numerius and Caeso, although they had been sent as ambassadors to the Gauls when they were besieging Clusium, subsequently took part in hostilities (Livy v. 35). The Gauls thereupon demanded their surrender, on the ground that they had violated the law of nations; the Romans, by way of reply, elected them consular tribunes in the following year. The result was the march of the Gauls upon Rome, the battle of the Allia, and the capture of the city (Livy vi. 1).

2. Q. Fabius Maximus, surnamed *Rullianus* or *Rullus*, master of the horse in the second Samnite War to L. Papirius Cursor, by whom he was degraded for having fought the Samnites contrary to orders (Livy viii. 30), in spite of the fact that he gained a victory. In 315, when dictator, he was defeated by the Samnites at Lautulae (Livy ix. 23). In 310 he defeated the Etruscans at the Vadimonian Lake. In 295, consul for the fifth time, he defeated, at the great battle of Sentinum, the combined forces of the Etrurians, Umbrians, Samnites and Gauls (see Rome: *History*, II. "The Republic"). As censor (304) he altered the arrangement of Appius Claudius Caecus, whereby the freedmen were taken into all the tribes, and limited them to the four city tribes. For this he is said to have received the title of *Maximus*, as the deliverer of the comitia from the rule of the mob (Livy ix. 46), but there is reason to think that this title was first conferred on his grandson. It is probable that his achievements are greatly exaggerated by historians favourable to the Fabian house.

3. Quintus Fabius Maximus, surnamed *Verrucosus* (from a wart on his lip), *Ovicula* ("the lamb," from his mild disposition), and *Cunctator* ("the delayer," from his cautious tactics in the war against Hannibal), grandson of the preceding. He served his first consulship in Liguria (233 B.C.), was censor (230) and consul for the second time (228). In 218 he was sent to Carthage to demand satisfaction for the attack on Saguntum (Livy xxi. 18). According to the well-known story, he held up a fold of his toga and offered the Carthaginians the choice between peace and war. When they declared themselves indifferent, he let fall his toga with the words, "Then take war." After the disastrous campaign on the Trebia, and the defeat on the banks of the Trasimene Lake, Fabius was named dictator (Livy calls him pro-dictator, since he was nominated, not by the consul, but by the people) in 217, and began his tactics of "masterly inactivity." Manœuvring among the hills, where Hannibal's cavalry were useless, he cut off his supplies, harassed him incessantly, and did everything except fight. His steady adherence to his plan caused dissatisfaction at Rome and in his own camp, and aroused the suspicion that he was merely endeavouring to prolong his command. Minucius Rufus, his master of the horse, seized the opportunity, during the absence of Fabius at Rome, to make an attack upon the enemy which proved successful. The people, more than ever convinced that a forward movement was necessary, divided the command between Minucius and Fabius (Livy xxii. 15. 24; Polybius iii. 88). Minucius was led into an ambuscade by Hannibal, and his army was only saved by the opportune arrival of Fabius. Minucius confessed his mistake and henceforth submitted to the orders of Fabius (Livy xxiii. 32). At the end of the legal time of six months Fabius resigned the dictatorship and the war was carried on by the consuls. The result of the abandonment of Fabian tactics was the disaster of Cannae (216). In 215 and 214 (as consul for the third and fourth times) he was in charge of the operations against Hannibal together with Claudius Marcellus (Livy xxiii. 39). He laid siege to Capua, which had gone over to Hannibal after Cannae, and captured the important position of Casilinum; in his fifth consulship (209) he retook Tarentum, which had been occupied by Hannibal for three years (Livy xxvii. 15; Polybius xiii. 4; Plutarch, *Fabius*). He died in 203. Fabius was a strenuous opponent of the new aggressive policy, and did all he could to prevent the invasion of Africa by Scipio. He was distinguished for calmness and prudence, while by no means lacking in courage when it was required. In his later years, however, he became morose, and showed jealousy of rising young men, especially Scipio (*Life* by Plutarch; Livy xx.-xxx.; Polybius iii. 87-106).

4. Q. Fabius Maximus Aemilianus, eldest son of L. Aemilius Paullus, adopted by Fabius Cunctator. He served in the last Macedonian War (168), and, as consul, defeated Viriathus in Spain (Livy, *Epit.* 52). He was the pupil and patron of Polybius (Polybius xviii., xxix. 6, xxxii. 8-10; Livy xliv. 35).

5. Q. Fabius Maximus Allobrogicus, son of the above, consul 121 in Gaul. He obtained his surname from his victory over the Allobroges and Arverni in that year (Vell. Pat. ii. 10; Eutropius iv. 22). As censor (108) he erected the first triumphal arch.

6. Q. Fabius Vibulanus, with his brothers Caeso and Marcus, filled the consulship for seven years in succession (485–479 B.C.). In the last year there was a reaction against the family, in consequence of Caeso espousing the cause of the plebeians. Thereupon the Fabii—to the number, it is said, of 306 patricians, with some 5000 dependents—emigrated from Rome under the leadership of Caeso, and settled on the banks of the Cremera, a few miles above Rome. For two years the exiles continued to be the city's chief defence against the Veientes, until at last they were surprised and cut off. The only survivor of the gens was Quintus, the son of Marcus, who apparently took no part in the battle. The story that he had been left behind at Rome on account of his youth cannot be true, as he was consul ten years afterwards. This Quintus was consul in 467, 465 and 459, and a member of the second decemvirate in 450, on the fall of which he went into voluntary exile (Livy ii. 42, 48-50, iii. 1, 9, 41, 58, vi. 1; Dion. Halic. viii. 82-86, ix. 14-22; Ovid, *Fasti*, ii. 195).

The Fabian name is met with as late as the 2nd century A.D. A complete list of the Fabii will be found in de Vit's *Onomasticon*; see also W. N. du Rieu, *Disputatio de Gente Fabia* (1856), containing an account of 57 members of the family.

FABIUS PICTOR, QUINTUS, the father of Roman history, was born about 254 B.C. He was the grandson of Gaius Fabius, who received the surname *Pictor* for his painting of the temple of Salus (302). He took an active part in the subjugation of the Gauls in the north of Italy (225), and after the battle of Cannae (216) was employed by the Romans to proceed to Delphi in order to consult the oracle of Apollo. He was the earliest prose writer of Roman history. His materials consisted of the *Annales Maximi*, *Commentarii Consulares*, and similar records; the chronicles of the great Roman families; and his own experiences in the Second Punic War. He is also said to have made much use of the Greek historian Diocles of Peparethus. His work, which was written in Greek, began with the arrival of Aeneas in Italy, and ended with the Hannibalic war. Although Polybius and Dionysius of Halicarnassus frequently find fault with him, the first uses him as his chief authority for the Second Punic War. A Latin version of the work was in existence in the time of Cicero, but it is doubtful whether it was by Fabius Pictor or by a later writer with whom he was confused—Q. Fabius Maximus Servilianus (consul 142); or there may have been two annalists of the name of Fabius Pictor.

Fragments in H. Peter, *Historicorum Romanorum Fragmenta* (1883); see also ANNALISTS and LIVY, and Teuffel-Schwabe, *History of Roman Literature*, § 116.

FABLE (Fr. *fable*, Lat. *fabula*). With certain restrictions, the necessity of which will be shown in the course of the article, we may accept the definition of "fable" which Dr Johnson proposes in his *Life of Gay*: "A *fable* or *apologue* seems to be, in its genuine state, a narrative in which beings irrational, and sometimes inanimate (*arbores loquuntur, non tantum ferae*), are, for the purpose of moral instruction, feigned to act and speak with human interests and passions." The description of La Fontaine, the greatest of fabulists, is a poetic rendering of Johnson's definition:

"Fables in sooth are not what they appear;
Our moralists are mice, and such small deer.
We yawn at sermons, but we gladly turn
To moral tales, and so amused we learn."

The fable is distinguished from the myth, which grows and is not made, the spontaneous and unconscious product of primitive fancy as it plays round some phenomenon of natural or historical fact. The literary myth, such as, for instance, the legend of Pandora in Hesiod or the tale of Er in the *Republic* of Plato, is really an allegory, and differs from the fable in so far as it is self-interpreting; the story and the moral are intermingled throughout. Between the parable and the fable there is no clear line of demarcation, and theologians like Trench have unwarrantably narrowed their definition of a parable to fit those of the New Testament. The soundest distinction is drawn by Neander. In the fable human passions and actions are attributed to beasts; in the parable the lower creation is employed only to illustrate the higher life and never transgresses the laws of its kind. But whether Jotham's apologue of the trees choosing a king, perhaps the first recorded in literature, should be classed as a fable or a parable is hardly worth disputing. Lastly, we may point out the close affinity between the fable and the proverb. A proverb is often a condensed or fossilized fable, and not a few fables are amplified or elaborated proverbs.

The history of the fable goes back to the remotest antiquity, and Aesop has even less claim to be reckoned the father of the fable than has Homer to be entitled the father of poetry. The fable has its origin in the universal impulse of men to express their thoughts in concrete images, and is strictly parallel to the use of metaphor in language. It is the most widely diffused if not the most primitive form of literature. Though it has fallen from its high place it still survives, as in J. Chandler Harris's *Uncle Remus* and Rudyard Kipling's *Jungle Book*. The Arab of to-day will invent a fable at every turn of the conversation as the readiest form of argument, and in the *Life* of Coventry Patmore it is told how an impromptu fable of his about the pious dormouse found its way into Catholic books of devotion.

With the fable, as we know it, the moral is indispensable. As La Fontaine puts it, an apologue is composed of two parts, body and soul. The body is the story, the soul the morality. But if we revert to the earliest type we shall find that this is no longer the case. In the primitive beast-fable, which is the direct progenitor of the Aesopian fable, the story is told simply for its own sake, and is as innocent of any moral as the fairy tales of Little Red Riding-Hood and Jack and the Beanstalk. Thus, in a legend of the Flathead Indians, the Little Wolf found in cloud-land his grandsires the Spiders with their grizzled hair and long crooked nails, and they spun balls of thread to let him down to earth; when he came down and found his wife the Speckled Duck, whom the Old Wolf had taken from him, she fled in confusion, and this is why she lives and dives alone to this very day. Such animal myths are as common in the New World as in the Old, and abound from Finland and Kamtchatka to the Hottentots and Australasians. From the story invented, as the one above quoted, to account for some peculiarity of the animal world, or told as a pure exercise of the imagination, just as a sailor spins a yarn about the sea-serpent, to the moral apologue the transition is easy; and that it has been effected by savages unaided by the example of higher races seems sufficiently proved by the tales quoted by E. B. Tylor (*Primitive Culture*, vol. i. p. 411). From the beast-fables of savages we come next to the Oriental apologues, which we still possess in their original form. The East, the land of myth and legend, is the natural home of the fable, and Hindustan was the birthplace, if not of the original of these tales, at least of the oldest shape in which they still exist. The *Pancha Tantra* (2nd century B.C.), or fables of the Brahma Vishnu Sarman, have been translated from Sanskrit into almost every language and adapted by most modern fabulists. The *Kalilah* and *Dimna* (names of two jackals), or fables of Bidpai (or Pilpai), passed from India to western Europe through the successive stages of Pahlavi (ancient Persian), Arabic, Greek, Latin. By the end of the 16th century there were Italian, French and English versions. There is an excellent Arabic edition (Paris, 1816) with an introduction by Sylvestre de Sacy. The *Hitopadesa*, or "friendly instruction," is a modernized form of the same work, and of it there are three translations into English by Dr Charles Wilkins, Sir William Jones and Professor F. Johnson. The *Hitopadesa* is a complete chaplet of fables loosely strung together, but connected so as to form something of a continuous story, with moral reflections freely interspersed, purporting to be written for the instruction of some dissolute young princes. Thus, in the first fable a flock of pigeons see the grains of rice which a fowler has scattered, and are about to descend on them, when the king of the pigeons warns them by telling the fable of a traveller who being greedy of a bracelet was devoured by a tiger. They neglect his warning and are caught in the net, but are afterwards delivered by the king of the mice, who tells the story of the Deer, the Jackal and the Crow, to show that no real friendship can exist between the strong and the weak, the beast of prey and his quarry, and so on to the end of the volume. Another book of Eastern fables is well worthy of notice, *Buddhaghosha's Parables*, a commentary on the *Dhammapada* or *Buddha's Paths of Virtue*. The original is in Pali, but an English translation of the Burmese version was made by Captain T. Rogers, R.E.

From Hindustan the Sanskrit fables passed to China, Tibet and Persia; and they must have reached Greece at an early age, for many of the fables which passed under the name of Aesop are identical with those of the East. Aesop to us is little more than a name, though, if we may trust a passing notice in Herodotus (ii. 134), he must have lived in the 6th century B.C. Probably his fables were never written down, though several are ascribed to him by Xenophon, Aristotle, Plutarch and other Greek writers, and Plato represents Socrates as beguiling his last days by versifying such as he remembered. Aristophanes alludes to them as merry tales, and Plato, while excluding the poets from his ideal republic, admits Aesop as a moral teacher. Of the various versions of *Aesop's Fables*, by far the most trustworthy is that of Babrius or Babrias, a Greek probably of the 3rd century A.D., who rendered them in choliambic verse. These, which were long known in fragments only, were recovered in a MS. found by M. Minas in a monastery on Mount Athos in 1842, now in the British Museum.[1] An inferior version of the same in Latin iambics was made by Phaedrus, a slave of Thracian origin, brought to Rome in the time of Augustus and manumitted by him. Phaedrus professes to polish in senarian verse the rough-hewn blocks from Aesop's quarry; but the numerous allusions to contemporary events, as, for example, his hit at Sejanus in the Frogs and the Sun, which brought upon the author disgrace and imprisonment, show that many of them are original or free adaptations. For some time scholars doubted as to the genuineness of Phaedrus's fables, but their doubts have been lately dispelled by a closer examination of the MSS. and by the discovery of two verses of a fable on a tomb at Apulum in Dacia. Phaedrus's style is simple, clear and brief, but dry and unpoetical; and, as Lessing has pointed out, he often falls into absurdities when he deserts his original. For instance, in Aesop the dog with the meat in his mouth sees his reflection in the water as he passes over a bridge; Phaedrus makes him see it as he swims across the river.

To sum up the characteristics of the Aesopian fable, it is artless, simple and transparent. It affects no graces of style, and we hardly need the text with which each concludes, ὁ μῦθος δηλοῖ ὅτι, κ.τ.λ. The moral inculcated is that of *Proverbial Philosophy* and *Poor Richard's Almanacks*. Aesop is no maker of phrases, but an orator who wishes to gain some point or induce some course of action. It is the Aesopian type that Aristotle has in view when he treats of the fable as a branch of rhetoric, not of poetry.

The Latin race was given to moralizing, and the language lent itself to crisp and pointed narrative, but they lacked the free play of fancy, the childlike "make-believe," to produce a national body of fables. With the doubtful exception of Phaedrus, we possess nothing but solitary examples, such as the famous apologue of Menenius Agrippa to the Plebs and the exquisite Town Mouse and Country Mouse of Horace's *Satires*.

The fables of the rhetorician Aphthonius about A.D. 400 in Greek prose, and those in Latin elegiac verse by Avianus, used for centuries as a text-book in schools, form in the history of the apologue a link between classical and medieval times. In a Latin dress, sometimes in prose, sometimes in regular verse, and sometimes in rhymed stanzas, the fable contributed, with other kinds of narratives, to make up the huge mass of stories which has been bequeathed to us by the monastic libraries. These served more uses than one. They were at once easier and safer reading than the classics. To the lazy monk they stood in place of novels; to the more industrious and gifted they furnished an exercise on a par with Latin verse composition in our public schools; the more original transformed them into *fabliaux*, or embodied them in edifying stories, as in the *Gesta Romanorum*. It is not in the *Speculum Doctrinale* of Vincent de Beauvais, a Dominican of the 12th century, nor in the collection of his contemporary Odo de Cerinton, an English Cistercian, nor in Planudes of the 14th century, whose one distinction is to have added to the fables a life of Aesop, that the direct lineage of La Fontaine must be traced. It is the *fabliaux* that inspired some of his best fables—the Lion's Court, the Young Widow, the Coach and the Fly.

As the supremacy of Latin declined and modern languages began to be turned to literary uses, the fable took a new life. Not only were there numerous adaptations of Aesop, known as Ysopets, but Marie de France in the 13th century composed many original fables, some rivalling La Fontaine's in simplicity and gracefulness. Later, also, fables were not wanting, though not numerous, in the English tongue. Chaucer has given us one, in his Nonne Preste's Tale, which is an expansion of the fable *Don Coc et don Werpil* of Marie de France; another is Lydgate's tale of The Churl and the Bird.

Several of Odo's tales, like Chaucer's story, can be ultimately traced to the History of Reynard the Fox. This great beast-epic has been referred by Grimm as far back as the 10th century, and is known to us in three forms, each with independent episodes, but all woven upon a common basis. The Latin form is probably the earliest, and the poems *Reinardus* and *Ysengrinus* date from the 10th or 11th century. Next come the German versions. The most ancient, that of a minnesinger Heinrich der Glichesaere (probably a Swabian), was analysed and edited by Grimm in 1840. The French poem of more than 30,000 lines, the *Roman du Rénard*, belongs probably to the 13th century. In 1498 appeared *Reynke de Voss*, almost a literal version in Low Saxon of the Flemish poem of the 12th century, *Reinaert de Vos*. Hence the well-known version of Goethe into modern German hexameters was taken. The poem has been well named "an unholy world Bible." In it the Aesopian fable received a development which was in several respects quite original. We have here no short and unconnected stories. Materials, partly borrowed from older apologues, but in a much greater proportion new, are worked up into one long and systematic tale. The moral, so prominent in the fable proper, shrinks so far into the background, that the epic might be considered a work of pure fiction, an animal romance. The attempts to discover in it personal satire have signally failed; some critics deny even the design to represent human conduct at all; and we can scarcely get nearer to its signification than by regarding it as being, in a general way, what Carlyle has called "a parody of human life." It represents a contest maintained successfully, by selfish craft and audacity, against enemies of all sorts, in a half-barbarous and ill-organized society. With his weakest foes, like Chaunteclere the Cock, Reynard uses brute-force; over the weak who are protected, like Kiward the Hare and Belin the Ram, he is victorious by uniting violence with cunning; Bruin, the dull, strong, formidable Bear, is humbled by having greater power than his own enlisted against him; and the most dangerous of all the fox's enemies, Isengrim, the obstinate, greedy and implacable Wolf, after being baffled by repeated strokes of malicious ingenuity, forces Reynard to a single combat, but even thus is not a match for his dexterous adversary. The knavish fox has allies worthy of him in Grimbart the watchful badger, and in his own aunt Dame Rukenawe, the learned She-ape; and he plays at his pleasure on the simple credulity of the Lion-King, the image of an impotent feudal sovereign. The characters of these and other brutes are kept up with a rude kind of consistency, which gives them great liveliness; many of the incidents are devised with much force of humour; and the sly hits at the weak points of medieval polity and manners and religion are incessant and palpable.

It is needless to trace the fable, or illustrations borrowed from fables, that so frequently occur as incidental ornaments in the older literature of England and other countries. It has appeared in every modern nation of Europe, but has nowhere become very important, and has hardly ever exhibited much originality either of spirit or of manner. In English, Prior transplanted from France some of La Fontaine's ease of narration and artful artlessness, while Gay took as his model the *Contes* rather than the *Fables*. Gay's fables are often political satires, but some, like the Fox on his Deathbed, have the true ring, and in the Hare with many Friends there is genuine pathos. To Dryden's spirited remodellings of old poems, romances and *fabliaux*, the name of fables, which he was pleased to give them, is quite inapplicable. In German, Hagedorn and Gellert, both famous in their day and the latter extolled by Goethe, are quite forgotten; and even Lessing's fables are read by few but schoolboys. In Spanish, Yriarte's fables on literary subjects are sprightly and graceful, but the critic is more than the fabulist. A spirited version of the best appeared in *Blackwood's Magazine*, 1839. Among Italians Pignotti is famous for versatility and command of rhythm, as amongst Russians is Kriloff for his keen satire on Russian society. He has been translated into English by Ralston.

France alone in modern times has attained any pre-eminence in the fable, and this distinction is almost entirely owing to one author. Marie de France in the 13th century, Gilles Corrozet, Guillaume Haudent and Guillaume Gueroult in the 16th, are now studied mainly as the precursors of La Fontaine, from whom he may have borrowed a stray hint or the outline of a story. The unique character of his work has given a new word to the French language: other writers of fables are called *fabulistes*, La Fontaine is named *le fablier*. He is a true poet; his verse is exquisitely modulated; his love of nature often reminds us of Virgil, as do his tenderness and pathos (see, for instance, The Two Pigeons and Death and the Woodcutter). He is full of sly fun and delicate humour; like Horace he satirizes without wounding, and "plays around the heart." Lastly, he is a keen observer of men. The whole society of the 17th century, its greatness and its foibles, its luxury and its squalor, from *Le grand monarque* to the poor *manant*, from his majesty the lion to the courtier of an ape, is painted to the life. To borrow his own phrase, La Fontaine's fables are "une ample comédie à cent actes divers." Rousseau did his best to discredit the *Fables* as immoral and corruptors of youth, but in spite of *Émile* they are studied in every French school and are more familiar to most Frenchmen than their breviary. Among the successors of La Fontaine the most distinguished is Florian. He justly estimates his own merits in the pretty apologue that he prefixed to his *Fables*. He asks a sage whether a fabulist writing after La Fontaine would not be wise to consign his work to the flames. The sage replies by a question: "What would you say did some sweet, ingenuous Maid of Athens refuse to let herself be seen because there was once a Helen of Troy?"

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[1] M. Minas professed to have discovered under the same circumstances another collection of ninety-four fables by Babrius. This second part was accepted by Sir G. C. Lewis, but J. Conington conclusively proved it spurious, and probably a forgery. See BABRIUS.

The fables of Lessing represent the reaction against the French school of fabulists. "With La Fontaine himself," says Lessing, "I have no quarrel, but against the imitators of La Fontaine I enter my protest." His attention was first called to the fable by Gellert's popular work published in 1746. Gellert's fables were closely modelled after La Fontaine's, and were a vehicle for lively railings against the fair sex, and hits at contemporary follies. Lessing's early essays were in the same style, but his subsequent study of the history and theory of the fable led him to discard his former model as a perversion of later times, and the "Fabeln," published in 1759, are the outcome of his riper views. Lessing's fables, like all that he wrote, display his vigorous common sense. He has, it is true, little of La Fontaine's *curiosa felicitas*, his sly humour and lightness of touch; and Frenchmen would say that his criticism of La Fontaine is an illustration of the fable of the sour grapes. On the other hand, he has the rare power of looking at both sides of a moral problem; he holds a brief for the stupid and the feeble, the ass and the lamb; and in spite of his formal protest against poetical ornament, there is in not a few of his fables a vein of true poetry, as in the Sheep (ii. 13) and Jupiter and the Sheep (ii. 18). But the monograph which introduced the *Fabeln* is of more inportance than the fables themselves. According to Lessing the ideal fable is that of Aesop. All the elaborations and refinements of later authors, from Phaedrus to La Fontaine, are perversions of this original. The fable is essentially a moral precept illustrated by a single example, and it is the lesson thus enforced which gives to the fable its unity and makes it a work of art. The illustration must be either an actual occurrence or represented as such, because a fictitious case invented *ad hoc* can appeal but feebly to the reader's judgment. Lastly, the fable requires a story or connected chain of events. A single fact will not make a fable, but is only an emblem. We thus arrive at the following definition:—"A fable is a relation of a series of changes which together form a whole. The unity of the fable consists herein, that all the parts lead up to an end, the end for which the fable was invented being the moral precept."

We may notice in passing a problem in connexion with the fable which had long been debated, but never satisfactorily resolved till Lessing took it in hand—Why should animals have been almost universally chosen as the chief *dramatis personae*? The reason, according to Lessing, is that animals have distinct characters which are known and recognized by all. The fabulist who writes of Britannicus and Nero appeals to the few who know Roman history. The Wolf and the Lamb comes home to every one whether learned or simple. But, besides this, human sympathies obscure the moral judgment; hence it follows that the fable, unlike the drama and the epos, should abstain from all that is likely to arouse our prejudices or our passions. In this respect the Wolf and the Lamb of Aesop is a more perfect fable than the Rich Man and the Poor Man's Ewe Lamb of Nathan.

Lessing's analysis and definition of the fable, though he seems himself unconscious of the scope of his argument, is in truth its death-warrant. The beast-fable arose in a primitive age when men firmly believed that beasts could talk and reason, that any wolf they met might be a were-wolf, that a peacock might be a Pythagoras in disguise, and an ox or even a cat a being worthy of their worship. To this succeeded the second age of the fable, which belongs to the same stage of culture as the Hebrew proverbs and the gnomic poets of Greece. That honesty is the best policy, that death is common to all, seemed to the men of that day profound truths worthy to be embalmed in verse or set off by the aid of story or anecdote. Last comes an age of high literary culture which tolerates the trite morals and hackneyed tales for the sake of the exquisite setting, and is amused at the wit which introduces topics and characters of the day under the transparent veil of animal life. Such an artificial product can be nothing more than the fashion of a day, and must, like pastoral poetry, die a natural death. A serious moralist would hardly choose that form to inculcate, like Mandeville in his *Fable of the Bees*, a new doctrine in morals, for the moral of the fable must be such that he who runs may read. A true poet will not care to masquerade as a moral teacher, or show his wit by refurbishing some old-world maxim. Yet Taine in France, Lowell in America, and J. A. Froude in England have proved that the fable as one form of literature is not yet extinct, and is capable of new and unexpected developments.

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FABLIAU. The entertaining tales in eight-syllable rhymed verse which form a marked section of French medieval literature are called *fabliaux*, the word being derived by Littré from *fablel*, a diminutive of *fable*. It is a mistake to suppose, as is frequently done, that every legend of the middle ages is a fabliau. In a poem of the 12th century a clear distinction is drawn between songs of chivalry, war or love, and *fabliaux*, which are recitals of laughter. A fabliau always related an event; it was usually brief, containing not more than 400 lines; it was neither sentimental, religious nor supernatural, but comic and gay. MM. de Montaiglon and Raynaud, who have closely investigated this class of literature, consider that about 150 fabliaux have come down to us more or less intact; a vast number have doubtless disappeared. It appears from a phrase in the writings of the trouvère, Henri d' Andeli, that the fabliau was not thought worthy of being copied out on parchment. The wonder, then, is that so many of these ephemeral compositions have been preserved. Arguments brought forward by M. Joseph Bédier, however, tend to show that we need not regret the disappearance of the majority of the fabliaux, as those which were copied into MSS. were those which were felt to be of the greatest intrinsic value. As early as the 8th century fabliaux must have existed, since the faithful are forbidden to take pleasure in these *fabulas inanes* by the *Paenitentiale* of Egbert. But it appears that all the early examples are lost.

In the opinion of the best scholars, the earliest surviving fabliau is that of *Richeut*, which dates from 1159. This is a rough and powerful study of the coarse life of the day, with little plot, but engaged with a realistic picture of manners.

Such poems, but of a more strictly narrative nature, continued to be produced, mainly in the north and north-east of France, until the middle of the 14th century. Much speculation has been expended on the probable sources of the tales which the trouvères told. The Aryan theory, which saw in them the direct influence of India upon Europe, has now been generally abandoned. It does not seem probable that any ancient or exotic influences were brought to bear upon the French jongleurs, who simply invented or adapted stories of that universal kind which springs unsown from every untilled field of human society. More remarkable than the narratives themselves is the spirit in which they are told. This is full of the national humour and the national irony, the true *esprit gaulois.* A very large section of these popular poems deals satirically with the pretensions of the clergy. Such are the famous *Prêtre aux mûres*, the *Prêtre qui dit la Passion* and *Les Perdrix.* Some of these are innocently merry; others are singularly depraved and obscene. Another class of fabliaux is that which comprises jests against the professions; in this, the most prominent example is *Le Vilain Mire*, a satire on doctors, which curiously predicts the *Médecin malgré lui* of Molière. There are also tales whose purpose is rather voluptuous than witty, and whose aim is to excuse libertinage and render marriage ridiculous. Among these are prominent *Court Mantel* and *Le Dit de Berenger.* Yet another class repeated, with a strain of irony or oddity, such familiar classical stories as those of Narcissus, and Pyramus and Thisbe. It is rarely that any elevation of tone raises these poems above a familiar and even playful level, but there are some that are almost idealistic. Among these the story of a sort of Sisyphus errant, *Le Chevalier de Barizel*, offers an ethical interest which lifts it in certain respects above all other surviving fabliaux. An instance of the pathetic fabliau is *Housse Partie*, a kind of primitive version of the story of King Lear.

In composing these pieces, of very varied character, the jongleurs have practised an art which was in many respects rudimentary, but sincere and simple. The student of language finds the rich vocabulary of the fabliaux much more attractive to him than the conventionality of the serious religious and amatory poems of the same age. The object of the writers was the immediate amusement of their audience; by reference to familiar things, they hoped to arouse a quick and genuine merriment. Hence their incorrectness and their negligence are balanced by a delightful ease and absence of pedantry, and in the fabliaux we get closer than elsewhere to the living diction of medieval France. It is true that if we extend too severe a judgment to these pieces, we may find ourselves obliged to condemn them altogether. An instructed French critic, vexed with their faults, has gone so far as to say that "the subjects of these tales are degrading, their inspiration nothing better than flat and cruel derision, their distinguishing features rascality, vulgarity and platitude of style." From one point of view, this condemnation of the fabliau is hardly too severe. But such scholars as Gaston Paris and Paul Meyer have not failed to emphasize other sides to the question. They have praised, in the general laxity of style and garrulity of the middle ages, the terseness of the jongleurs; in the period of false ornament, their fidelity to nature; in a time of general vagueness, the sharp and picturesque outlines of their art. One feature of the fabliaux, however, cannot be praised and yet must not be overlooked. In no other section of the world's literature is the scorn and hatred of women so prominent. It is difficult to account for the anti-feminine rage which pervades the fabliaux, and takes hideous shapes in such examples as *Le Valet aux deux femmes*, *Le Pêcheur de Pont-sur-Seine* and *Chicheface et Bigorne.* Probably this was a violent reaction against the extravagant cult of woman as expressed in the contemporary *lais* as well as in the legends of saints. The exaggeration was not greater in the one case than in the other, and it is probable that the exaltation was made endurable to those who listened to the trouvères by the corresponding degradation. We must remember, too, that those who listened were not nobles or clerks, they were the common people. The fabliaux were *fabellae ignobilium*, little stories told to amuse persons of low degree, who were irritated by the moral pretensions of their superiors.

The names of about twenty of the authors of fabliaux have been preserved, although in most cases nothing is known of their personal history. The most famous poet of this class of writing is the man whose name, or more probably pseudonym, was Rutebeuf. He wrote *Frère Denyse* and *Le Sacristain*, while to him is attributed the *Dit d'Aristote*, in the course of which Aristotle gives good advice to Alexander. Fabliaux, however, form but a small part of the work of Rutebeuf, who was a satirical poet of wide accomplishment and varied energy. Most of the jongleurs who wrote these merry and indecent tales in octosyllabic verse were persons of less distinction. Henri d'Andeli was an ecclesiastic, attached, it is supposed, to the cathedral of Rouen. Jean de Condé, who flourished in the court of Hainaut from 1310 to 1340, and who is the latest of the genuine writers of fabliaux, lived in comfort and security, but most of the professional jongleurs seem to have spent their years in a Bohemian existence, wandering among the clergy and the merchant class, alternately begging for money and food and reciting their mocking verses.

The principal authorities for the fabliaux are MM. Anatole de Montaiglon and Gaston Raynaud, who published the text, in 6 vols., between 1872 and 1890. This edition corrected and supplemented the very valuable labours of Méon (1808–1823) and Jubinal (1839–1842). The works of Henri d'Andeli were edited by M. A. Héron in 1880, and those of Rutebeuf were made the subject of an exhaustive monograph by M. Léon Clédat in 1891. See also the editions of separate fabliaux by Gaston Paris, Paul Meyer, Ebeling, August Schéler and other modern scholars. M. Joseph Bedier's *Les Fabliaux* (1895) is a useful summary of critical opinion on the entire subject. (E. G.)

FABRE, FERDINAND (1830–1898), French novelist, was born at Bédarieux, in Hérault, a very picturesque district of the south of France, which he made completely his own in literature. He was the son of a local architect, who failed in business, and Ferdinand was brought up by his uncle, the Abbé Fulcran Fabre, at Camplong among the mulberry woods. Of his childhood and early youth he has given a charming account in *Ma Vocation* (1889). He was destined to the priesthood, and was sent for that purpose to the seminary of St Pons de Thomières, where, in 1848, he had, as he believed, an ecstatic vision of Christ, who warned him "It is not the will of God that thou shouldst be a priest." He had now to look about for a profession, and, after attempting medicine at Montpellier, was articled as a lawyer's clerk in Paris. In 1853 he published a volume of verses, *Feuilles de lierre*, broke down in health, and crept back, humble and apparently without ambition, to his old home at Bédarieux. After some eight or nine years of country life he reappeared in Paris, with the MS. of his earliest novel, *Les Courbezon* (1862), in which he treated the subject which was to recur in almost all his books, the daily business of country priests in the Cevennes. This story enjoyed an immediate success with the literary class of readers; George Sand praised it, Sainte-Beuve hailed in its author "the strongest of the disciples of Balzac," and it was crowned by the French Academy. From this time forth Fabre settled down to the production of novels, of which at the time of his death he had published about twenty. Among these the most important were *Le Chevrier* (1868), unique among his works as written in an experimental mixture of Cevenol *patois* and French of the 16th century; *L'Abbé Tigrane, candidat à la papauté* (1873), by common consent the best of all Fabre's novels, a very powerful picture of unscrupulous priestly ambition; *Mon Oncle Célestin* (1881), a study of the entirely single and tender-hearted country abbé; and *Lucifer* (1884), a marvellous gallery of serious clerical portraits. In 1883 Fabre was appointed curator of the Mazarin Library, with rooms in the Institute, where, on 11th February 1898, he died after a brief attack of pneumonia. Ferdinand Fabre occupies in French literature a position somewhat analogous to that of Mr Thomas Hardy amongst English writers of fiction. He deals almost exclusively with the population of the mountain villages of Hérault, and particularly with its priests. He loved most of all to treat of the celibate virtues, the strictly ecclesiastical passions, the enduring tension of the young soul drawn between the spiritual vocation and the physical demands of nature. Although never a priest, he preserved a comprehension of and a sympathy with the clerical character, and he always indignantly denied that he was hostile to the Church, although he stood just outside her borders. Fabre possessed a limited and a monotonous talent, but within his own field he was as original as he was wholesome and charming.

See also J. Lemaître, *Les Contemporains*, vol. ii.; G. Pellissier, *Études de littérature contemporaine* (1898); E. W. Gosse, *French Profiles* (1905). (E. G.)

FABRE D'ÉGLANTINE, PHILIPPE FRANÇOIS NAZAIRE (1750–1794), French dramatist and revolutionist, was born at Carcassonne on the 28th of July 1750. His real name was simple Fabre, the "d'Églantine" being added in commemoration of his receiving the golden eglantine of Clémence Isaure from the academy of the floral games at Toulouse. After travelling through the provinces as an actor, he came to Paris, and produced an unsuccessful comedy entitled *Les Gens de lettres, ou le provincial à Paris* (1787). A tragedy, *Augusta*, produced at the *Théâtre Français*, was also a failure. One only of his plays, *Philinte, ou la suite du Misanthrope* (1790), still preserves its reputation. It professes to be a continuation of Molière's *Misanthrope*, but the hero of the piece is of a different character from the nominal prototype—an impersonation, indeed, of pure and simple egotism. On its publication the play was introduced by a preface, in which the author mercilessly satirizes the *Optimiste* of his rival J. F. Collin d'Harleville, whose *Châteaux en Espagne* had gained the applause which Fabre's *Présomptueux* (1789) had failed to win. The character of Philinte had much political significance. Alceste received the highest praise, and evidently represents the citizen patriot, while Philinte is a dangerous aristocrat in disguise. Fabre was president and secretary of the club of the Cordeliers, and belonged also to the Jacobin club. He was chosen by Danton as his private secretary, and sat in the National Convention. He voted for the king's death, supporting the *maximum* and the law of the suspected, and he was a bitter enemy of the Girondins. After the death of Marat he published a *Portrait de l'Ami du Peuple*. On the abolition of the Gregorian calendar he sat on the committee entrusted with the formation of the republican substitute, and to him was due a large part of the new nomenclature, with its poetic *Prairial* and *Floréal*, its prosaic *Primidi* and *Duodi*. The report which he made on the subject, on the 24th of October, has some scientific value. On the 12th of January 1794 he was arrested by order of the committee of public safety on a charge of malversation and forgery in connexion with the affairs of the Compagnie des Indes. Documents still existing prove that the charge was altogether groundless. During his trial Fabre showed the greatest calmness and sang his own well-known song of *Il pleut, il pleut, bergère, rentre tes blancs moutons*. He was guillotined on the 5th of April 1794. On his way to the scaffold he distributed his manuscript poems to the people.

A posthumous play, *Les Précepteurs*, steeped with the doctrines of Rousseau's *Émile*, was performed on the 17th of September 1794, and met with an enthusiastic reception. Among Fabre's other plays are the gay and successful *Convalescent de qualité* (1791), and *L'Intrigue épistolaire* (1791). In the latter play Fabre is supposed to have drawn a portrait of the painter Jean Baptiste Greuze.

The author's *Œuvres mêlées et posthumes* were published at Paris 1802, 2 vols. See Albert Maurin, *Galerie hist. de la Révolution française*, tome II; Jules Janin, *Hist. de la litt. dram.*; Chénier, *Tableau de la litt. française*; F. A. Aulard in the *Nouvelle Revue* (July 1885).

FABRETTI, RAPHAEL (1618–1700), Italian antiquary, was born in 1618 at Urbino in Umbria. He studied law at Cagli and Urbino, where he took the degree of doctor at the age of eighteen. While in Rome he attracted the notice of Cardinal Lorenzo Imperiali, who employed him successively as treasurer and auditor of the papal legation in Spain, where he remained thirteen years. Meanwhile, his favourite classical and antiquarian studies were not neglected; and on his return journey he made important observations of the relics and monuments of Spain, France and Italy. At Rome he was appointed judge of appellation of the Capitol, which post he left to be auditor of the legation at Urbino. After three years he returned to Rome, on the invitation of Cardinal Carpegna, vicar of Innocent XI., and devoted himself to antiquarian research, examining with minute care the monuments and inscriptions of the Campagna. He always rode a horse which his friends nicknamed "Marco Polo," after the Venetian traveller. By Innocent XII. he was made keeper of the archives of the castle St Angelo, a charge which he retained till his death. He died at Rome on the 7th of January 1700. His collection of inscriptions and monuments was purchased by Cardinal Stoppani, and placed in the ducal palace at Urbino, where they may still be seen.

His work *De Aquis et Aquae-ductibus veteris Romae* (1680), three dissertations on the topography of ancient Latium, is inserted in Graevius's *Thesaurus*, iv. (1677). His interpretation of certain passages in Livy and other classical authors involved him in a dispute with Gronovius, which bore a strong resemblance to that between Milton and Salmasius, Gronovius addressing Fabretti as *Faber Rusticus*, and the latter, in reply, speaking of *Grunnovius* and his *titivilitia*. In this controversy Fabretti used the pseudonym Iasitheus, which he afterwards took as his pastoral name in the Academy of the Arcadians. His other works, *De Columna Trajani Syntagma* (Rome, 1683), and *Inscriptionum Antiquarum Explicatio* (Rome, 1699), throw much light on Roman antiquity. In the former is to be found his explication of a bas-relief, with inscriptions, now in the Capitol at Rome, representing the war and taking of Troy, known as the Iliac table. Letters and other shorter works of Fabretti are to be found in publications of the time, as the *Journal des Savants*.

See Crescimbeni, *Le Vite degli Arcadi illustri*; Fabroni, *Vitae Italorum*, vi. 174; Niceron, iv. 372; J. Lamius, *Memorabilia Italorum eruditione praestantium* (Florence, 1742–1748).

FABRIANI, SEVERINO (1792–1849), Italian author and teacher, was born at Spilamberto, Italy, on the 7th of January 1792. Entering the Church, he took up educational work, but in consequence of complete loss of voice he resolved to devote himself to teaching deaf mutes, and founded a small school specially for them. This school the duke of Modena made into an institute, and by a special authority from the pope a teaching staff of nuns was appointed. Fabriani's method of instruction is summed up in his *Logical Letters on Italian Grammar* (1847). He died on the 27th of April 1849.

FABRIANO, a town of the Marches, Italy, in the province of Ancona, from which it is 44 m. S.W. by rail, 1066 ft. above sea-level. Pop. (1901) town 9586, commune 22,996. It has been noted since the 13th century for its paper mills, which still produce the best paper in Italy. A school of painting arose here, one of the early masters of which is Allegretto Nuzi (1308–1385); and several of the churches contain works by him and other local masters. His pupil, Gentile da Fabriano (1370–1428), was a painter of considerably greater skill and wider knowledge; but there are no important works of his at Fabriano. The sacristy of S. Agostino also contains some good frescoes by Ottaviano Nelli of Gubbio. The municipal picture gallery contains a collection of pictures, and among them are some primitive frescoes, attributable to the 12th century, which still retain traces of Byzantine influence. The Archivio Comunale contains documents on watermarked paper of local manufacture going back to the 13th century. The Ponte dell' Acra, a bridge of the 15th century, is noticeable for the ingenuity and strength of its construction. The hospital of S. Maria Buon Gesu is a fine work of 1456, attributed to Rossellino.

See A. Zonghi, *Antiche Carte Fabrianesi*. (T. As.)

FABRICIUS, GAIUS LUSCINUS (*i.e.* "the one-eyed"), Roman general, was the first member of the Fabrician gens who settled in Rome. He migrated to Rome from Aletrium (Livy ix. 43), one of the Hernican towns which was allowed to retain its independence as a reward for not having revolted. In 285 he was one of the ambassadors sent to the Tarentines to dissuade them from making war on the Romans. In 282 (when consul) he defeated the Bruttians and Lucanians, who had besieged

Thurii (Livy, *Epit.* 12). After the defeat of the Romans by Pyrrhus at Heraclea (280), Fabricius was sent to treat for the ransom and exchange of the prisoners. All attempts to bribe him were unsuccessful, and Pyrrhus is said to have been so impressed that he released the prisoners without ransom (Plutarch, *Pyrrhus,* 18). The story that Pyrrhus attempted to frighten Fabricius by the sight of an elephant is probably a fiction. In 278 Fabricius was elected consul for the second time, and was successful in negotiating terms of peace with Pyrrhus, who sailed away to Sicily. Fabricius afterwards gained a series of victories over the Samnites, the Lucanians and the Bruttians, and on his return to Rome received the honour of a triumph. Notwithstanding the offices he had filled he died poor, and provision had to be made for his daughter out of the funds of the state (Val. Max. iv. 4, 10). Fabricius was regarded by the Romans of later times as a model of ancient simplicity and incorruptible integrity.

FABRICIUS, GEORG (1516–1571), German poet, historian and archaeologist, was born at Chemnitz in upper Saxony on the 23rd of April 1516, and educated at Leipzig. Travelling in Italy with one of his pupils, he made an exhaustive study of the antiquities of Rome. He published the results in his *Roma* (1550), in which the correspondence between every discoverable relic of the old city and the references to them in ancient literature was traced in detail. In 1546 he was appointed rector of the college of Meissen, where he died on the 17th of July 1571. In his sacred poems he affected to avoid every word with the slightest savour of paganism; and he blamed the poets for their allusions to pagan divinities.

Principal works: editions of Terence (1548) and Virgil (1551); *Poëmatum sacrorum libri xxv.* (1560); *Poëtarum veterum ecclesiasticorum opera Christiana* (1562); *De Re Poëtica libri septem* (1565); *Rerum Misnicarum libri septem* (1569); (posthumous) *Originum illustrissimae stirpis Saxonicae libri septem* (1597); *Rerum Germaniae magnae et Saxoniae universae memorabilium mirabiliumque volumina duo* (1609). A life of Georg Fabricius was published in 1839 by D. C. W. Baumgarten-Crusius, who in 1845 also issued an edition of Fabricius's *Epistolae ad W. Meurerum et alios aequales*, with a short sketch *De Vita Ge. Fabricii et de gente Fabriciorum*; see also F. Wachter in Ersch and Gruber's *Allgemeine Encyclopädie.*

FABRICIUS, HIERONYMUS [Fabrizio, Geronimo] (1537–1619), Italian anatomist and embryologist, was surnamed Acquapendente from the episcopal city of that name, where he was born in 1537. At Padua, after a course of philosophy, he studied medicine under G. Fallopius, whose successor as teacher of anatomy and surgery he became in 1562. From the senators of Venice he received numerous honours, and an anatomical theatre was built by them for his accommodation. He died at Venice on the 21st of May 1619. His works include *De visione, voce et auditu* (1600), *De formato foetu* (1600), *De venarum ostiolis* (1603), *De formatione ovi et pulli* (1621). His collected works were published at Leipzig in 1687 as *Opera omnia Anatomica et Physiologica,* but the Leiden edition, published by Albinus in 1738, is preferred as containing a life of the author and the prefaces of his treatises. (See Anatomy; Embryology.)

FABRICIUS, JOHANN ALBERT (1668–1736), German classical scholar and bibliographer, was born at Leipzig on the 11th of November 1668. His father, Werner Fabricius, director of music in the church of St Paul at Leipzig, was the author of several works, the most important being *Deliciae Harmonicae* (1656). The son received his early education from his father, who on his deathbed recommended him to the care of the theologian Valentin Alberti. He studied under J. G. Herrichen, and afterwards at Quedlinburg under Samuel Schmid. It was in Schmid's library, as he afterwards said, that he found the two books, F. Barth's *Adversaria* and D. G. Morhof's *Polyhistor Literarius,* which suggested to him the idea of his *Bibliothecae*, the works on which his great reputation was founded. Having returned to Leipzig in 1686, he published anonymously (two years later) his first work, *Scriptorum recentiorum decas,* an attack on ten writers of the day. His *Decas Decadum, sive plagiariorum et pseudonymorum centuria* (1689) is the only one of his works to which he signs the name Faber. He then applied himself to the study of medicine, which, however, he relinquished for that of theology; and having gone to Hamburg in 1693, he proposed to travel abroad, when the unexpected tidings that the expense of his education had absorbed his whole patrimony, and even left him in debt to his trustee, forced him to abandon his project. He therefore remained at Hamburg in the capacity of librarian to J. F. Mayer. In 1696 he accompanied his patron to Sweden; and on his return to Hamburg, not long afterwards, he became a candidate for the chair of logic and philosophy. The suffrages being equally divided between Fabricius and Sebastian Edzardus, one of his opponents, the appointment was decided by lot in favour of Edzardus; but in 1699 Fabricius succeeded Vincent Placcius in the chair of rhetoric and ethics, a post which he held till his death, refusing invitations to Greifswald, Kiel, Giessen and Wittenberg. He died at Hamburg on the 30th of April 1736.

Fabricius is credited with 128 books, but very many of them were only books which he had edited. One of the most famed and laborious of these is the *Bibliotheca Latina* (1697, republished in an improved and amended form by J. A. Ernesti, 1773). The divisions of the compilation are—the writers to the age of Tiberius; thence to that of the Antonines; and thirdly, to the decay of the language; a fourth gives fragments from old authors, and chapters on early Christian literature. A supplementary work was *Bibliotheca Latina mediae et infimae Aetatis* (1734–1736; supplementary volume by C. Schöttgen, 1746; ed. Mansi, 1754). His *chef-d'œuvre*, however, is the *Bibliotheca Graeca* (1705–1728, revised and continued by G. C. Harles, 1790–1812), a work which has justly been denominated *maximus antiquae eruditionis thesaurus.* Its divisions are marked off by Homer, Plato, Christ, Constantine, and the capture of Constantinople in 1453, while a sixth section is devoted to canon law, jurisprudence and medicine. Of his remaining works we may mention:—*Bibliotheca Antiquaria*, an account of the writers whose works illustrated Hebrew, Greek, Roman and Christian antiquities (1713); *Centifolium Lutheranum*, a Lutheran bibliography (1728); *Bibliotheca Ecclesiastica* (1718). His *Codex Apocryphus* (1703) is still considered indispensable as an authority on apocryphal Christian literature.

The details of the life of Fabricius are to be found in *De Vita et Scriptis J. A. Fabricii Commentarius*, by his son-in-law, H. S. Reimarus, the well-known editor of Dio Cassius, published at Hamburg, 1737; see also C. F. Bähr in Ersch and Gruber's *Allgemeine Encyclopädie*, and J. E. Sandys, *Hist. Class. Schol.* iii. (1908).

FABRICIUS, JOHANN CHRISTIAN (1745–1808), Danish entomologist and economist, was born at Tondern in Schleswig on the 7th of January 1745. After studying at Altona and Copenhagen, he was sent to Upsala, where he attended the lectures of Linnaeus. He devoted his attention professionally to political economy, and, after lecturing on that subject in 1769, was appointed in 1775 professor of natural history, economy and finance at Kiel, in which capacity he wrote various works, chiefly referring to Denmark, and of no special interest. He also published a few other works on general and natural history, botany and travel (including *Reise nach Norwegen,* 1779), and, although his professional stipend was small, he extended his personal researches into every town in northern and central Europe where a natural history museum was to be found. It is as an entomologist that his memory survives, and for many years his great scientific reputation rested upon the system of classification which he founded upon the structure of the mouth-organs instead of the wings. He had a keen eye for specific differences, and possessed the art of terse and accurate description. He died on the 3rd of March 1808.

A complete list of his entomological publications (31) will be found in Hagen's *Bibliotheca Entomologiae*; the following are the chief:—*Systema Entomologiae* (1775); *Genera Insectorum* (1776); *Philosophia Entomologica* (1778); *Species insectorum* (1781); *Mantissa Insectorum* (1787); *Entomologia Systematica* (1792–1794), with a supplement (1798); *Systema Eleutheratorum* (1801), *Rhyngotorum* (1803), *Piezatorum* (1804), and *Antliatorum* (1805). Full particulars of his life will be found, with a portrait, in the *Transactions of the Entomological Society of London* (1845), 4, pp. i-xvi, where his autobiography is translated from the Danish.

FABRIZI, NICOLA (1804–1885), Italian patriot, was born at Modena on the 4th of April 1804. He took part in the Modena insurrection of 1831, and attempted to succour Ancona, but was arrested at sea and taken to Toulon, whence he proceeded to Marseilles. Afterwards he organized with Mazzini the ill-fated Savoy expedition. Taking refuge in Spain, he fought against the Carlists, and was decorated for valour on the battlefield (18th July 1837). At the end of the Carlist War he established a centre of conspiracy at Malta, endeavoured to dissuade Mazzini from the Bandiera enterprise, but aided Crispi in organizing the Sicilian revolution of 1848. With a company of volunteers he distinguished himself in the defence of Venice, afterwards proceeding to Rome, where he took part in the defence of San Pancrazio. Upon the fall of Rome he returned to Malta, accumulating arms and stores, which he conveyed to Sicily, after having, in 1859, worked with Crispi to prepare the Sicilian revolution of 1860. While Garibaldi was sailing from Genoa towards Marsala Fabrizi landed at Pizzolo, and, after severe fighting, joined Garibaldi at Palermo. Under the Garibaldian Dictatorship he was appointed governor of Messina and minister of war. Returning to Malta after the Neapolitan plebiscite, which he had vainly endeavoured to postpone, he was recalled to aid Cialdini in suppressing brigandage. While on his way to Sicily in 1862, to induce Garibaldi to give up the Aspromonte enterprise, he was arrested at Naples by Lamarmora. During the war of 1866 he became Garibaldi's chief of staff, and in 1867 fought at Mentana. In parliament he endeavoured to promote agreement between the chiefs of the Left, and from 1878 onwards worked to secure the return of Crispi to power, but died on the 31st of March 1885, two years before the realization of his object. His whole life was characterized by ardent patriotism and unimpeachable integrity. (H. W. S.)

FABROT, CHARLES ANNIBAL (1580–1659), French jurisconsult, was born at Aix in Provence on the 15th of September 1580. At an early age he made great progress in the ancient languages and in the civil and the canon law; and in 1602 he received the degree of doctor of law, and was made avocat to the parlement of Aix. In 1609 he obtained a professorship in the university of his native town. He is best known by his translation of the *Basilica*, which may be said to have formed the code of the Eastern empire till its destruction. This work was published at Paris in 1647 in 7 vols. fol., and obtained for its author a considerable pension from the chancellor, Pierre Seguier, to whom it was dedicated. Fabrot likewise rendered great service to the science of jurisprudence by his edition of Cujas, which comprised several treatises of that great jurist previously unpublished. He also edited the works of several Byzantine historians, and was besides the author of various antiquarian and legal treatises. He died at Paris on the 16th of January 1659.

FABYAN, ROBERT (d. 1513), English chronicler, belonged to an Essex family, members of which had been connected with trade in London. He was a member of the Drapers company, alderman of Farringdon Without, and served as sheriff in 1493–1494. In 1496 he was one of those appointed to make representations to the king on the new impositions on English cloth in Flanders. Next year he was one of the aldermen employed in keeping watch at the time of the Cornish rebellion. He resigned his aldermanry in 1502, on the pretext of poverty, apparently in order to avoid the expense of mayoralty. He had, however, acquired considerable wealth with his wife Elizabeth Pake, by whom he had a numerous family. He spent his latter years on his estate of Halstedys at Theydon Garnon in Essex. He died on the 28th of February 1513 (*Inquisitiones post mortem for London*, p. 29, edited by G. S. Fry, 1896); his will, dated the 11th of July 1511, was proved on the 12th of July 1513. Fabyan's Chronicle was first published by Richard Pynson in 1516 as *The new chronicles of England and of France.* In this edition it ends with the reign of Richard III., and this probably represents the work as Fabyan left it, though with the omission of an autobiographical note and some religious verses, which form the *Envoi* of his history. The note and verses are first found in the second edition, printed by John Rastell in 1533 with continuations down to 1509. A third edition appeared in 1542, and a fourth in 1559 with additions to that year. The only modern edition is that of Sir Henry Ellis, 1811.

In the note above mentioned Fabyan himself says: "and here I make an ende of the vii. parte and hole werke, the vii. day of November in the yere of our Lord Jesu Christes Incarnacion M.vc. and iiij." This seems conclusive that in 1504 he did not contemplate any extension of his chronicles beyond 1485. The continuations printed by Rastell are certainly not Fabyan's work. But Stow in his *Collections* (ap. *Survey of London*, ii. 305-306, ed. C. L. Kingsford) states that Fabyan wrote "a Chronicle of London, England and of France, beginning at the creation and endynge in the third year of Henry VIII., which both I have in written hand." In his *Survey of London* (i. 191, 209, ii. 55, 116) Stow several times quotes Fabyan as his authority for statements which are not to be found in the printed continuations of Rastell. Some further evidence may be found in other notes of Stow's (ap. *Survey of London*, ii. 280, 283, 365-366), and in the citation by Hakluyt of an unprinted work of Fabyan as the authority for his note of Cabot's voyages. That Fabyan had continued his Chronicle to 1511 may be accepted as certain, but no trace of the manuscript can now be found.

It is only the seventh part of Fabyan's Chronicle, from the Norman Conquest onwards, that possesses any historical value. For his French history he followed chiefly the *Compendium super Francorum gestis* of Robert Gaguin, printed at Paris in 1497. For English history his best source was the old *Chronicles of London*, from which he borrowed also the arrangement of his work in civic form. From 1440 to 1485 he follows, as a rule with great fidelity, the original of the London Chronicle in Cotton MS. Vitellius A. XVI. (printed in *Chronicles of London*, 1905, pp. 153-264).

Fabyan's own merits are little more than those of an industrious compiler, who strung together the accounts of his different authorities without any critical capacity. He says expressly that his work was "gaderyd without understandynge," and speaks of himself as "of cunnynge full destitute." Nevertheless he deserves the praise which he has received as an early worker, and for having made public information which through Hall and Holinshed has become the common property of later historians, and has only recently been otherwise accessible. Bale alleges that the first edition was burnt by order of Cardinal Wolsey because it reflected on the wealth of the clergy; this probably refers to his version of the Lollards Bill of 1410, which Fabyan extracted from one of the London Chronicles.

See further Ellis' *Introduction*; W. Busch, *England under the Tudors* (trans. A. M. Todd, 1895), i. 405-410; and C. L. Kingsford, *Chronicles of London*, pp. xxvi-xxxii (1905). (C. L. K.)

FAÇADE, a French architectural term signifying the external face of a building, but more generally applied to the principal front.

FACCIOLATI, JACOPO (1682–1769), Italian philologist, was born at Torriglia, in the province of Padua, in 1682. He owed his admission to the seminary of Padua to Cardinal Barberigo, who had formed a high opinion of the boy's talents. As professor of logic, and regent of the schools, Facciolati was the ornament of the Paduan university during a period of forty-five years. He published improved editions of several philological works, such as the *Thesaurus Ciceronianus* of Nizolius, and the polyglot vocabulary known under the name of Calepino. The latter work, in which he was assisted by his pupil Egidio Forcellini, he completed in four years—1715 to 1719. It was written in seven languages, and suggested to the editor the idea of his *opus magnum*, the *Totius Latinitatis Lexicon*, which was ultimately published at Cardinal Priole's expense, 4 vols. fol., Padua, 1771 (revised ed. by de Vit, 1858–1887). In the compilation of this work the chief burden seems to have been borne by Facciolati's pupil Forcellini, to whom, however, the lexicographer allows a very scanty measure of justice. Perhaps the best testimony to the learning and industry of the compiler is the well-known observation that the whole body of Latinity, if it were to perish, might be restored from this lexicon. Facciolati's mastery of Latin style, as displayed in his epistles, has been very much admired for its purity and grace. In or about 1739 Facciolati undertook the continuation of Papadopoli's history of the university of Padua, carrying it on to his own day. Facciolati was known over all Europe as one of the most enlightened and zealous teachers of the time; and among the many flattering invitations which he received, but always declined, was one from the king of Portugal, to accept the directorship of a college at

Lisbon for the young nobility. He died in 1769. His history of the university was published in 1757, under the name *Fasti Gymnasii Patavini*. In 1808 a volume containing nine of his *Epistles*, never before published, was issued at Padua.

See J. E. Sandys, *Hist. Class. Schol.* ii. (1908).

FACE (from Lat. *facies*, derived either from *facere*, to make, or from a root *fa-*, meaning "appear"; cf. Gr. *φαίνειν*), a word whose various meanings of surface, front, expression of countenance, look or appearance, are adaptations of the application of the word to the external part of the front portion of the head, usually taken to extend from the top of the forehead to the point of the chin, and from ear to ear (see ANATOMY: *Superficial and Artistic*; and PHYSIOGNOMY).

FACTION (through the French, from Lat. *factio*, a company of persons combined for action, *facere*, to do; from the other French derivative *façon* comes "fashion"), a term, used especially with an opprobrious meaning, for a body of partisans who put their party aims and interests above those of the state or public, and employ unscrupulous or questionable means; it is thus a common term of reciprocal abuse between parties. In the history of the Roman and Later Roman empires the factions (*factiones*) of the circus and hippodrome, at Rome and Constantinople, played a prominent part in politics. The *factiones* were properly the four companies into which the charioteers were divided, and distinguished by the colours they wore. Originally at Rome there were only two, white (*albata*) and red (*russata*), when each race was open to two chariots only; on the increase to four, the green (*prasina*) and blue (*veneta*) were added. At Constantinople the last two absorbed the red and white factions.

For a brilliant description of the factions at Constantinople under Justinian, and the part they played in the celebrated Nika riot in January 532, see Gibbon's *Decline and Fall*, ch. xl.; and J. B. Bury's *Appendix* 10 in vol. iv. of his edition (1898), for a discussion of the relationship between the *factiones* and the demes of Constantinople.

FACTOR (from Lat. *facere*, to make or do), strictly "one who makes"; thus in ordinary parlance, anything which goes to the composition of anything else is termed one of its "factors," and in mathematics the term is used of those quantities which, when multiplied together, produce a given product. In a special sense, however—and that to which this article is devoted—"factor" is the name given to a mercantile agent (of the class known as "general agents") employed to buy or sell goods for a commission. When employed to sell, the possession of the goods is entrusted to him by his principal, and when employed to buy it is his duty to obtain possession of the goods and to consign them to his principal. In this he differs from a *broker* (*q.v.*), who has not such possession, and it is this distinguishing characteristic which gave rise in England to the series of statutes known as the Factors Acts. By these acts, consolidated and extended by the act of 1889, third parties buying or taking pledges from factors are protected as if the factor were in reality owner; but these enactments have in no way affected the contractual relations between the factor and his employer, and it will be convenient to define them before discussing the position of third parties as affected by the act.

I. FACTOR AND PRINCIPAL

A factor is appointed or dismissed in the same way as any other agent. He may be employed for a single transaction or to transact all his principal's business of a certain class during a limited period or till such time as his authority may be determined. A factor's duty is to sell or buy as directed; to carry out with care, skill and good faith any instructions he may receive; to receive or make payment; to keep accounts, and to hand over to his principal the balance standing to his principal's credit, without any deduction save for commission and expenses. All express instructions he must carry out to the full, provided they do not involve fraud or illegality. On any point not covered by his express instructions he must follow the usual practice of his particular business, if not inconsistent with his instructions or his position as factor. Many usages of businesses in which factors are employed have been proved in court, and may now be regarded as legally established. For instance, he may, unless otherwise directed, sell in his own name, give warranties as to goods sold by him, sell by sample (in most businesses), give such credit as is usual in his business, receive payment in cash or as customary, and give receipts in full discharge, sell by indorsement of bills of lading, and insure the goods. It is his duty to clear the goods at the customs, take charge of them and keep them safely, give such notices to his principal and others as may be required, and if necessary take legal proceedings for the protection of the goods. On the other hand, he has not authority to delegate his employment, or to barter; and as between himself and his principal he has no right to pledge the goods, although as between the principal and the pledgee, an unauthorized pledge made by the factor may by virtue of the Factors Act 1889 be binding upon the principal. It is, moreover, inconsistent with his employment as agent that he should buy or sell on his own account from or to his principal. A factor has no right to follow any usage which is inconsistent with the ordinary duties and authority of a factor unless his principal has expressly or impliedly given his consent.

On the due performance of his duties the factor is entitled to his commission, which is usually a percentage on the value of the goods sold or bought by him on account of his principal, regulated in amount by the usages of each business. Sometimes the factor makes himself personally responsible for the solvency of the persons with whom he deals, in order that his principal may avoid the risk entailed by the usual trade credit. In such a case the factor is said to be employed on *del credere* terms, and is entitled to a higher rate of commission, usually 2½% extra. Such an arrangement is not a contract of guarantee within the Statute of Frauds, and therefore need not be in writing. Besides his remuneration, the factor is entitled to be reimbursed by his principal for any expenses, and to be indemnified against any liabilities which he may have properly incurred in the execution of his principal's instructions. For the purpose of enforcing his rights a factor has, without legal proceedings, two remedies. Firstly, by virtue of his general *lien* (*q.v.*) he may hold any of his principal's goods which come to his hands as security for the payment to him of any commission, out-of-pocket expenses, or even general balance of account in his favour. Although he cannot sell the goods, he may refuse to give them up until he is paid. Secondly, where he has consigned goods to his principal but not been paid, he may "*stop in transit*" subject to the same rules of law as an ordinary vendor; that is to say, he must exercise his right before the transit ends; and his right may be defeated by his principal transferring the document of title to the goods to some third person, who takes it in good faith and for valuable consideration (Factors Act 1889, section 10). If the factor does not carry out his principal's instructions, or carries them out so negligently or unskilfully that his principal gets no benefit thereby, the factor loses his commission and his right to reimbursement and indemnity. If by such failure or negligence the principal suffers any loss, the latter may recover it as damages. So too if the factor fails to render proper accounts his principal may by proper legal proceedings obtain an account and payment of what is found due; and threatened breaches of duty may be summarily stopped by an injunction. Criminal acts by the factor in relation to his principal's goods are dealt with by section 78 of the Larceny Act 1860.

II. PRINCIPAL AND THIRD PARTY

(*a*) *At Common Law.*—The actual authority of a factor is defined by the same limits as his duty, the nature of which has been just described; *i.e.* firstly, by his principal's express instructions; secondly, by the rules of law and usages of trade, in view of which those instructions were expressed. But his power to bind his principal as regards third parties is often wider than his actual authority; for it would not be reasonable that third parties should be prejudiced by secret instructions, given in derogation of the authority ordinarily conferred by the custom of trade; and, as regards them, the factor is said to have "*apparent*" or "*ostensible*" authority, or to be *held out* as having authority to do what is customary, even though he may in fact have been expressly forbidden so to do by his principal. But this rule is subject to the proviso that if the third party have notice of the factor's actual instructions, the "apparent" authority will not be greater than the actual. "The general principle of law," said Lord Blackburn in the case of *Cole* v. *North-Western Bank*, 1875, L.R. 10, C.P. 363, "is that when the true owner has clothed any one with apparent authority to act as his agent, he is bound to those who deal with the agent on the assumption that he really is an agent with that authority, to the same extent as if the apparent authority were real." Under such circumstances the principal is for reasons of common fairness precluded, or, in legal phraseology, *estopped*, from denying his agent's authority. On the same principle of estoppel, but not by reason of any trade usages, a course of dealing which has been followed between a factor and a third party with the assent of the principal will give the factor apparent authority to continue dealing on the same terms even after the principal's assent has been withdrawn; provided that the third party has no notice of the withdrawal.

Such apparent authority binds the principal both as to acts done in excess of the actual authority and also when the actual authority has entirely ceased. For instance, A.B. receives goods from C. D. with instructions not to sell below 1s. per lb; A. B. sells at 10½d., the market price; the buyer is entitled to the goods at 10½d., because A. B. had apparent authority, although he exceeded his actual authority. On the same principle the buyer would get a good title by buying from A. B. goods entrusted to him by C. D., even though at the time of the sale C. D. had revoked A. B.'s authority and instructed him not to sell at all. In either case the factor is held out as having authority to sell, and the principal cannot afterwards turn round and say that his factor had no such authority. As in the course of his business the factor must necessarily make representations preliminary to the contracts into which he enters, so the principal will be bound by any such representations as may be within the factor's actual or apparent authority to the same degree as by the factor's contracts.

(*b*) *Under the Factors Act 1889.*—The main object of the Factors Acts, in so far as they relate to transactions carried out by factors, has been to add to the number of cases in which third parties honestly buying or lending money on the security of goods may get a good title from persons in whose possession the goods are with the consent, actual or apparent, of the real owners, thus calling in aid the principle of French law that "*possession vaut titre*" as against the doctrine of the English common law that "*nemo dat quod non habet.*" The chief change in the law relating specially to factors has been to put pledges by factors on the same footing as sales, so as to bind a principal to third parties by his factor's pledge as by his factor's sale. The Factors Act 1889 in part re-enacts and in part extends the provisions of the earlier acts of 1823, 1825, 1842 and 1877; and is, so far as it relates to sales by factors, in large measure merely declaratory of the law as it previously existed. Its most important provisions concerning factors are as follows:—

Section I., s.s. 1. The expression mercantile agent shall mean a mercantile agent having in the customary course of his business as such agent authority either to sell goods, or to consign goods for the purpose of sale, or to buy goods, or to raise money on the security of goods;

2. A person shall be deemed to be in possession of goods or of the documents or title to goods when the goods or documents are in his actual custody or are held by any other person subject to his control or for him on his behalf.

4. The expression "document of title" shall include any bill of lading, dock warrant, warehouse keeper's certificate, and warrant or order for the delivery of goods, and any other document used in the ordinary course of business as proof of the possession or control of goods, or authorizing or purporting to authorize, either by indorsement or by delivery, the possessor of the document to transfer or receive goods thereby represented.

Section II., s.s. 1. Where a mercantile agent is, with the consent of the owner, in possession of goods or of the documents or title to goods, any sale, pledge or other disposition of the goods made by him when acting in the ordinary course of business of a mercantile agent shall, subject to the provisions of this act, be as valid as if he were expressly authorized by the owner of the goods to make the same; provided that the person taking under the disposition acts in good faith, and has not at the time of the disposition notice that the person making the disposition has not authority to make the same.

2. Where a mercantile agent has, with the consent of the owner, been in possession of goods or of the documents of title to goods, any sale, pledge or other disposition which would have been valid if the consent had continued shall be valid notwithstanding the determination of the consent; provided that the person taking under the disposition has not at the time thereof notice that the consent has been determined.

3. Where a mercantile agent has obtained possession of any documents of title to goods by reason of his being or having been, with the consent of the owner, in possession of the goods represented thereby, or of any other documents of title to the goods, his possession of the first-mentioned documents shall, for the purposes of the act, be deemed to be with the consent of the owner.

III. ENFORCEMENT OF CONTRACTS

1. Where a factor makes a contract in the name of his principal and himself signs as agent only, he drops out as soon as the contract is made, and the principal and third party alone can sue or be sued upon it. As factors usually contract in their own name this is not a common case. It is characteristic of brokers rather than of factors.

2. Where a factor makes a contract for the principal without disclosing his principal's name, the third party may, on discovering the principal, elect whether he will treat the factor or his principal as the party to the contract; provided that if the factor contract expressly as factor, so as to exclude the idea that he is personally responsible, he will not be liable. The principal may sue upon the contract, so also may the factor, unless the principal first intervene.

3. Where a factor makes a contract in his own name without disclosing the existence of his principal, the third party may, on discovering the existence of the principal, elect whether he will sue the factor or the principal. Either principal or factor may sue the third party upon the contract. But if the factor has been permitted by the principal to hold himself out as the principal, and the person dealing with the factor has believed that the factor was the principal and has acted on that belief before ascertaining his mistake, then in an action by the principal the third party may set up any defences he would have had against the factor if the factor had brought the action on his own account as principal.

4. Where a factor has a lien upon the goods and their proceeds for advances made to the principal it will be no defence to an action by him for the third party to plead that he has paid the principal, unless the factor by his conduct led the third party to believe that he agreed to a settlement being made with his principal.

5. The factor who acts for a foreign principal will always be personally liable unless it is clear that the third party has agreed to look only to the principal.

6. If a factor contract by deed under seal he alone can sue or be sued upon the contract; but mercantile practice makes contracts by deed uncommon.

AUTHORITIES.—Story, *Commentaries on the Law of Agency* (Boston, 1882); Boyd and Pearson, *The Factors Acts 1823 to 1877* (London, 1884); Blackwell, *The Law relating to Factors* (London, 1897). (L. F. S.)

FACTORY ACTS, the name given generally to a long series of acts constituting one of the most important chapters in the history of English labour legislation (see LABOUR LEGISLATION); the term "factory" itself being short for manufactory, a building or collection of buildings in which men or women are employed in industry.

FACULA (diminutive of *fax*, Lat. for "torch"), in astronomy, a minute shining spot on the sun's disk, markedly brighter than the photosphere in general, usually appearing in groups. Faculae are most frequent in the neighbourhood of spots. (See SUN.)

FACULTY (through the French, from the Lat. *facultas*, ability to do anything, from *facilis*, easy, *facere*, to do; another form of the word in Lat. *facilitas*, facility, ease, keeps the original meaning), power or capacity of mind or body for particular kinds of activity, feeling, &c. In the early history of psychology the term was applied to various mental processes considered as causes or conditions of the mind—a treatment of "class concepts of mental phenomena as if they were real forces producing these phenomena" (G. F. Stout, *Analytic Psychology*, vol. i. p. 17). In medieval Latin *facultas* was used to translate *δύναμις* in the Aristotelian application of the word to a branch of learning or knowledge, and thus it is particularly applied to the various departments of knowledge as taught in a university and to the body of teachers of the particular art or science taught. The principal "faculties" in the medieval universities were theology, canon and civil law, medicine and arts (see UNIVERSITIES). A further extension of this use is to the body of members of any particular profession.

In law, "faculty" is a dispensation or licence to do that which is not permitted by the common law. The word in this sense is used only in ecclesiastical law. A faculty may be granted to be ordained deacon under twenty-three years of age; to hold two livings at once (usually called a licence or dispensation, but granted under the seal of the office of faculties; see BENEFICE); to be married at any place or time (usually called a special licence; see MARRIAGE; LICENCE); to act as a notary public (*q.v.*). Any alteration in a church, such as an addition or diminution in the fabric or the utensils or ornaments of the church, cannot strictly be made without the legal sanction of the ordinary, which can only be expressed by the issue of a faculty. So a faculty would be required for a vault, for the removal of a body, for the purpose of erecting monuments, for alterations in a parsonage house, for brick graves, for the apportionment of a seat, &c. Cathedrals, however, are exempt from the necessity for a faculty before making alterations in the fabric, utensils or ornaments.

The court of faculties is the court of the archbishop for granting faculties. It is a court in which there is no litigation or holding of pleas. Its chief officer is called the master of faculties, and he is one and the same with the judge of the court of arches. Attached to the court of faculties are a registrar and deputy registrars, a chief clerk and record-keeper, and a seal keeper. In Scotland the society of advocates of the court of session, and local bodies of legal practitioners, are described as faculties.

FAED, THOMAS (1826–1900), British painter, born in Kirkcudbrightshire, was the brother of John Faed, R.S.A., and received his art education in the school of design, Edinburgh. He was elected an associate of the Royal Scottish Academy in 1849, came to London three years later, was elected an associate of the Royal Academy in 1861, and academician in 1864, and retired in 1893. He had much success as a painter of domestic genre, and had considerable executive capacity. Three of his pictures, "The Silken Gown," "Faults on Both Sides," and "The Highland Mother," are in the National Gallery of British Art.

See William D. McKay, *The Scottish School of Painting* (1906).

FAENZA (anc. *Faventia*), a city and episcopal see of Emilia, Italy, in the province of Ravenna, from which it is 31 m. S.W. by rail, 110 ft. above sea-level. It is 31 m. S.E. of Bologna by rail, on the line from Bologna to Rimini, and it is the junction of a line to Florence through the Apennines. Pop. (1901) 21,809 (town), 39,757 (commune). The town is surrounded by walls which date from 1456. The cathedral of S. Costanzo stands in the spacious Piazza Vittorio Emanuele in the centre of the town. It was begun in 1474 by Giuliano da Maiano; the façade is, however, incomplete. In the interior is the beautiful early Renaissance tomb of S. Savinus with reliefs showing scenes from his life, of fine and fresh execution, by Benedetto da Maiano; and later tombs by P. Bariloto, a local sculptor. Opposite the cathedral is a fountain with bronze ornamentation of 1583–1621. The clock tower alongside the cathedral belongs to the 17th century. Beyond it is the Palazzo Comunale, formerly the residence of the Manfredi, but entirely reconstructed. The other churches of the town have been mostly restored, but S. Michele (and the Palazzo Manfredi opposite it) are fine early Renaissance buildings in brickwork. The municipal art gallery contains an altar-piece by Girolamo da Treviso (who also painted a fresco in the Chiesa della Commenda), a wooden St Jerome by Donatello, and a bust of the young St John by Antonio Rossellino (?), and some fine specimens of majolica, a variety of which, faience, takes its name from the town. It was largely manufactured in the 15th and 16th centuries, and the industry has been revived in modern times with success.

The ancient Faventia, on the Via Aemilia, was obviously from its name founded by the Romans and had the citizenship before the Social War. It was the scene of the defeat of C. Papirius Carbo and C. Norbanus by Q. Caecilius Metellus Pius in 82 B.C. In the census of Vespasian a woman of Faventia is said to have given her age as 135. Pliny speaks of the whiteness of its linen, and the productiveness of its vines is mentioned. It is noticeable that some of the fields in the territory of the ancient Faventia still preserve the exact size of the ancient Roman *centuria* of 200 *iugeri* (E. Bormann in *Corp. Inscr. Lat.* xi., Berlin, 1888, p. 121). When the exarchate was established, the town became part of it, and in 748 it was taken by Liutprand. Desiderius gave it to the church with the duchy of Ferrara. In the 11th century it began to increase in importance. In the wars of the 12th and 13th centuries it at first took the imperial side, but in 1240 it stood a long siege from Frederick II. and was only taken after eight months. After further struggles between Guelphs and Ghibellines, the Manfredi made themselves masters of the place early in the 14th century, and remained in power until 1501, when the town was taken by Caesar Borgia and the last legitimate members of the house of the Manfredi were drowned in the Tiber; and, after falling for a few years into the hands of the Venetians, it became a part of the states of the church in 1509. (T. As.)

FAEROE (also written FAROE or THE FAEROES, Danish *Faeröerne* or *Färöerne*, "the sheep islands"), a group of islands in the North Sea belonging to Denmark. They are situated between Iceland and the Shetland Islands, about 200 m. N.W. of the latter, about the intersection of 7° E. with 62° N. The total land area of the group is 511 sq. m., and there are twenty-one islands (excluding small rocks and reefs), of which seventeen are inhabited. The population in 1880 amounted to 11,220, and in 1900 to 15,230. The principal islands are Strömö, on which is the chief town, Thorshavn, with a population of 1656; Osterö, Süderö, Vaagö, Sandö and Bordö. They consist throughout of rocks and hills, separated from each other by narrow valleys or ravines; but, though the hills rise abruptly, there are often on their summits, or at different stages of their ascent, plains of considerable magnitude. Almost everywhere they present to the sea perpendicular cliffs, broken into fantastic forms, affording at every turn, to those who sail along the coast, the most picturesque and varied scenery. The highest hills are Slättaretindur in Osterö, and Kopende and Skellingfjeld in Strömö, which rise respectively to 2894, 2592 and 2520 ft. The sea pierces the islands in deep fjords, or separates them by narrow inlets through which tidal currents set with great violence, at speeds up to seven or eight knots an hour; and, as communications are maintained almost wholly by boat, the natives have need of expert watermanship. There are several lakes in which trout are abundant, and char also occur; the largest is Sörvaag Lake in Vaagö, which is close to the sea, and discharges into it by a sheer fall of about 160 ft. Trees are scarce, and there is evidence that they formerly flourished where they cannot do so now.

The fundamental formation is a series of great sheets of columnar basalt, 70 to 100 ft. thick, in which are intercalated thin beds of tuff. Upon the basalt rests the so-called Coal formation, 35 to 50 ft. thick; the lower part of this is mainly fireclay and sandstone, the upper part is weathered clay with thin layers of brown coal and shale. The coal is found in Süderö and in some of the other islands in sufficient quantity to make it a matter of exploitation. Above these beds there are layers of dolerite, 15 to 20 ft. thick, with nodular segregations and abundant cavities which are often lined with zeolites. As the rocks lie in a horizontal position, on most of the islands of the group only the basalts or dolerite are visible. The crater from which the volcanic rocks were outpoured probably lies off the Faeroe Bank some distance to the south-west of Süderö. The basalts are submarine flows which formed the basis of the land upon which grew the vegetation which gave rise to the coals; the effusion of dolerite which covered up the Coal formation was subaerial. The existing land features, with the fjords, are due to ice erosion in the glacial period.[1]

The climate is oceanic; fogs are common, violent storms are frequent at all seasons. July and August are the only true summer months, but the winters are not very severe. It seldom freezes for more than one month, and the harbours are rarely ice-bound. The methods of agriculture are extremely primitive and less than 3 % of the total area is under cultivation. As the plough is ill-suited to the rugged surface of the land, the ground is usually turned up with the spade, care being taken not to destroy the roots of the grass, as hay is the principal crop. Horses and cows are few, and the cows give little milk, in consequence of the coarse hay upon which they are fed. The number of sheep, however, justifies the name of the islands, some individuals having flocks of from three to five hundred, and the total number in the islands considerably exceeds ten thousand. The northern hare (*Lepus alpinus*) is pretty abundant in Strömö and Osterö, having been introduced into the islands about 1840–1850. The catching of the numerous sea-birds which build their nests upon the face of the cliffs forms an important source of subsistence to the inhabitants. Sometimes the fowler is let down from the top of the cliff; at other times he climbs the rocks, or, where possible, is pushed upwards by poles made for the purpose. The birds and the contents of the nests are taken in nets mounted on poles; shooting is not practised, lest it should permanently scare the birds away. Fowling has somewhat decreased in modern times, as the fisheries have risen in importance. The puffin is most commonly taken for its feathers. The cod fishery is especially important, dried fish being exported in large quantity, and the swim-bladders made into gelatine, and also used and exported for food. The whaling industry came into importance towards the close of the 19th century, and stations for the extraction of the oil and whalebone have been established at several points, under careful regulations designed to mitigate the pollution of water, the danger to live-stock from eating the blubber, &c. The finner whale is the species most commonly taken.

The trade of the Faeroe Islands was for some time a monopoly in the hands of a mercantile house at Copenhagen, and this monopoly was afterwards assumed by the Danish government, but by the law of the 21st of March 1855 all restrictions were removed. The produce of the whaling and fishing industries, woollen goods, lamb skins and feathers, are the chief exports, while in Thorshavn the preserving of fish and the manufacture of carpets are carried on to some extent. Thorshavn is situated on the S.E. side of Strömö, upon a narrow tongue of land, having creeks on each side, where ships may be safely moored. It is the seat of the chief government and ecclesiastical officials, and has a government house and a hospital. The houses are generally built of wood and roofed with birch bark covered with turf. The character of the people is marked by simplicity of manners, kindness and hospitality. They are healthy, and the population increases steadily. The Faeroes form an *amt* (county) of Denmark. They have also a local parliament (*lagthing*), consisting of the *amtmann* and nineteen other members. Among other duties, this body elects a representative to the upper house of parliament (*landsthing*) in Denmark; the people choose by vote a representative in the lower house (*folkething*). The islands are included in the Danish bishopric of Zealand.

History.—The early history of the Faeroes is not clear. It appears that about the beginning of the 9th century Grim Kamban, a Norwegian emigrant who had left his country to escape the tyranny of Harold Haarfager, settled in the islands. It is said that a small colony of Irish and Scottish monks were found in Süderö and dispersed by him. The Faeroes then already bore their name of Sheep Islands, as these animals had been found to flourish here exceedingly. Early in the 11th century Sigmund or Sigismund Bresterson, whose family had flourished in the southern islands but had been almost exterminated by invaders from the northern, was sent from Norway, whither he had escaped, to take possession of the islands for Olaf Trygvason, king of Norway. He introduced Christianity, and, though he was subsequently murdered, Norwegian supremacy was upheld, and continued till 1386, when the islands were transferred to Denmark. English adventurers gave great trouble to the inhabitants in the 16th century, and the name of Magnus Heineson, a native of Strömö, who was sent by Frederick II. to clear the seas, is still celebrated in many songs and stories. There was formerly a bishopric at Kirkebö, S. of Thorshavn, where remains of the cathedral may be seen; but it was abolished at the introduction of Protestantism by Christian III. Denmark retained possession of the Faeroes at the peace of Kiel in 1815. The native literature of the islands consists of the *Faereyinga Saga*, dealing with the period of Sigmund Bresterson, and a number of popular songs and legends of early origin.

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FAESULAE (mod. *Fiesole, q.v.*), an ancient city of Etruria, on the height 3 m. to the N.E. of Florentia, 970 ft. above sea-level. Remains of its walls are preserved on all sides, especially on the N.E., in one place to a height of 12 to 14 courses. The blocks are often not quite rectangular, and the courses sometimes change; but the general tendency is horizontal and the walls are not of remote antiquity, the irregularities in them being rather due to the hardness of the material employed, the rock of the hill itself. The courses vary in height from 1 to 3 ft., and some blocks are as long as 12½ ft. In this portion of the wall are two drains, below one of which is a *phallus.* The site of an ancient gate, and the road below it, can be traced; a little farther E. was an archway, conjectured by Dennis to be a gate of the Roman period, destroyed in 1848. The whole circuit of the walls extended for about 1⅔ m. The Franciscan monastery (1130 ft.) occupies the site of the acropolis, once encircled by a triple wall, of which no traces are now visible. Here was also the *Capitolium* of Roman times, as an inscription found here in 1879 records (*Corpus Inscr. Lat.* xi., Berlin, 1888, No. 1545). The Roman theatre, below the cathedral to the N.E., has 19 tiers of stone seats and is 37 yds. in diameter. Above it is an embanking wall of irregular masonry, and below it some remains of Roman baths, including five parallel vaults of concrete. Just outside the town on the E. a reservoir, roofed by the convergence of its sides, which were of large regular blocks, was discovered in 1832, but filled in again. Over 1000 silver denarii, all coined before 63 B.C., were found at Faesulae in 1829. A small museum contains the objects found in the excavations of the theatre.

Though Faesulae was an Etruscan city, we have no record of it in history until 215 B.C., when the Gauls passed near it in their march on Rome. Twelve years later Hannibal seems to have taken this route in his march south after the victory of the Trebia. It appears to have suffered at the hands of Rome in the Social War, and Sulla expelled some of the inhabitants from their lands to make room for his veterans, but some of the latter were soon driven out in their turn by the former occupiers. Both the veterans, who soon wasted what they had acquired, and the dispossessed cultivators joined the partisans of Catiline, and Manlius, one of his supporters, made his headquarters at Faesulae. Under the empire we hear practically nothing of it; in A.D. 405 Radagaisus was crushed in the neighbouring hills, and Belisarius besieged and took it in A.D. 539.

See L. A. Milani, *Rendiconti dei Lincei*, ser. vi. vol. ix. (1900), 289 seq., on the discovery of an archaic altar of the *Locus sacer* of Florence, belonging to Ancharia (Angerona), the goddess of Fiesole.

(T. As.)

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[1] See Hans von Post, "Om Färöarnes uppkomst," *Geologiska Föreningens i Stockholm Förhandlingar*, vol. xxiv. (1902).

FAFNIR, in Scandinavian mythology, the son of the giant Hreidmar. He was the guardian of the hoard of the Nibelungs and was killed by Sigurd.

FAGGING (from "fag," meaning "weary"; of uncertain etymology), in English public schools, a system under which, generally with the full approval of the authorities, a junior boy performs certain duties for a senior. In detail this custom varies slightly in the different schools, but its purpose—the maintenance of discipline among the boys themselves—is the same. Dr Arnold of Rugby defined fagging as "the power given by the supreme authorities of the school to the Sixth Form, to be exercised by them over the lower boys, for the sake of securing a regular government among the boys themselves, and avoiding the evils of anarchy; in other words, of the lawless tyranny of brute force." Fagging was a fully established system at Eton and Winchester in the 16th century, and is probably a good deal older. That the advantages of thus granting the boys a kind of autonomy have stood the test of time is obvious from the fact that in almost all the great public schools founded during the 19th century, fagging has been deliberately adopted by the authorities. The right to fag carries with it certain well-defined duties. The fag-master is the protector of his fags, and responsible for their happiness and good conduct. In cases of bullying or injustice their appeal is to him, not to the form or house master, and, except in the gravest cases, all such cases are dealt with by the fag-master on his own responsibility and without report to the master. Until recent years a fag's duties included such humble tasks as blacking boots, brushing clothes, and cooking breakfasts, and there was no limit as to hours; almost all the fag's spare time being so monopolized. This is now changed. Fagging is now restricted to such light tasks as running errands, bringing tea to the "master's" study, and fagging at cricket or football. At Eton there is no cricket fagging, and at most schools it is made lighter by all the fags taking their turn in regular order for one hour, so that each boy has to "fag" but once in so many weeks. At Rugby there is "study-fagging"—two fags being assigned to each Sixth Form boy and made responsible for the sweeping out and tidying up of his study alternately each week,—and "night-fagging"—running errands for the Sixth between 8.30 and 9.30 every evening,—and each boy can choose whether he will be a study-fag or night-fag. The right to fag is usually restricted to the Sixth Form, but at Eton the privilege is also granted the Fifth, and at Marlborough and elsewhere the Eleven have a right to fag at cricket, whether in the Sixth or not.

FAGGOT, a bundle of sticks used for firewood. The word is adapted from the Fr. *fagot*, and appears in Italian as *fagotto*, the name given to the bassoon (*q.v.*). "Faggot" is frequently used with reference to the burning of heretics, and recanted heretics wore an embroidered faggot on the arm as a symbol of the punishment they had escaped. In the 18th century the word is used of a "dummy" soldier, appearing on the rolls of a regiment. It is this use, coupled with the idea of a bundle of sticks as being capable of subdivision, that appears in the expression "faggot-vote," a vote artificially created by the minute splitting up of property so as to give a bare qualification for the franchise.

FAGNIEZ, GUSTAVE CHARLES (1842–   ), French historian and economist, was born in Paris on the 6th of October 1842. Trained at the École des Chartes and the École des Hautes Études, he made his first appearance in the world of scholarship as the author of an excellent book called *Études sur l'industrie et la classe industrielle à Paris au XIII^e et au XIV^e siècle* (1877). This work, composed almost entirely from documents, many unpublished, opened a new field for historical study. Twenty years later he supplemented this book by an interesting collection of *Documents relatifs à l'histoire de l'industrie et du commerce en France* (2 vols., 1898–1900), and in 1897 he published *L'Économie sociale de la France sous Henri IV*, a volume containing the results of very minute research. He did not, however, confine himself to economic history. His *Le Père Joseph et Richelieu* (1894), though somewhat frigid and severe, is based on a mass of unpublished information, and shows remarkable psychologic grasp. In 1878 his *Journal parisien de Jean de Maupoint, prieur de Ste Catherine-de-la-Couture* was published in vol. iv. of the *Mémoires de la société de l'histoire de Paris et de l'Île de France.* He wrote numerous articles in the *Revue historique* (of which he was co-director with Gabriel Monod for some years) and in other learned reviews, such as the *Revue des questions historiques* and the *Journal des savants*. In 1901 he was elected member of the Académie des Sciences Morales et Politiques.

FAGUET, ÉMILE (1847–   ), French critic and man of letters, was born at La Roche sur Yon on the 17th of December 1847. He was educated at the normal school in Paris, and after teaching for some time in La Rochelle and Bordeaux he came to Paris. After acting as assistant professor of poetry in the university he became professor in 1897. He was elected to the academy in 1900, and received the ribbon of the Legion of Honour in the next year. He acted as dramatic critic to the *Soleil*; from 1892 he was literary critic to the *Revue bleue*; and in 1896 took the place of M. Jules Lemaître on the *Journal des débats.* Among his works are monographs on *Flaubert* (1899), *André Chénier* (1902), *Zola* (1903); an admirably concise *Histoire de la littérature française depuis le XVII^e siècle jusqu'à nos jours*; series of literary studies on the 17th, 18th and 19th centuries; *Questions politiques* (1899); *Propos littéraires* (3 series, 1902–1905); *Le Libéralisme* (1902); and *L'Anticléricalisme* (1906).

See A. Séché, *Émile Faguet* (1904).

FA-HIEN (fl. A.D. 399–414), Chinese Buddhist monk, pilgrim-traveller, and writer, author of one of the earliest and most valuable Chinese accounts of India. He started from Changgan or Si-gan-fu, then the capital of the Tsin empire, and passing the Great Wall, crossed the "River of Sand" or Gobi Desert beyond, that home of "evil demons and hot winds," which he vividly describes,—where the only way-marks were the bones of the dead, where no bird appeared in the air above, no animal on the ground below. Arriving at Khotan, the traveller witnessed a great Buddhist festival; here, as in Yarkand, Afghanistan and other parts thoroughly Islamized before the close of the middle ages, Fa-Hien shows us Buddhism still prevailing. India was reached by a perilous descent of "ten thousand cubits" from the "wall-like hills" of the Hindu Kush into the Indus valley (about A.D. 402); and the pilgrim passed the next ten years in the "central" Buddhist realm,—making journeys to Peshawur and Afghanistan (especially the Kabul region) on one side, and to the Ganges valley on another. His especial concern was the exploration of the scenes of Buddha's life, the copying of Buddhist texts, and converse with the Buddhist monks and sages whom the Brahmin reaction had not yet driven out. Thus we find him at Buddha's birthplace on the Kohana, north-west of Benares; in Patna and on the Vulture Peak near Patna; at the Jetvana monastery in Oudh; as well as at Muttra on the Jumna, at Kanauj, and at Tamluk near the mouth of the Hugli. But now the narrative, which in its earlier portions was primarily historical and geographical, becomes mystical and theological; miracle-stories and meditations upon Buddhist moralities and sacred memories almost entirely replace matters of fact. From the Ganges delta Fa-Hien sailed with a merchant ship, in fourteen days, to Ceylon, where he transcribed all the sacred books, as yet unknown in China, which he could find; witnessed the festival of the exhibition of Buddha's tooth; and remarked the trade of Arab merchants to the island, two centuries before Mahomet. He returned by sea to the mouth of the Yangtse-Kiang, changing vessels at Java, and narrowly escaping shipwreck or the fate of Jonah.

Fa-Hien's work is valuable evidence to the strength, and in many places to the dominance, of Buddhism in central Asia and in India at the time of the collapse of the Roman empire in western Europe. His tone throughout is that of the devout, learned, sensible, rarely hysterical pilgrim-traveller. His record is careful and accurate, and most of his positions can be identified; his devotion is so strong that it leads him to depreciate China as a "border-land," India the home of Buddha being the true "middle kingdom" of his creed.

See James Legge, *Record of Buddhistic Kingdoms, being an account by the Chinese Monk Fâ-hien of his travels in India and Ceylon*; translated and edited, with map, &c. (Oxford, 1886); S. Beal, *Travels of Fah-Hian and Sung-Yun, Buddhist pilgrims from China to India, 400 and 518 A.D.*, translated, with map, &c. (1869); C. R. Beazley, *Dawn of Modern Geography*, vol. i. (1897), pp. 478-485.

FAHLCRANTZ, CHRISTIAN ERIK (1790–1866), Swedish author, was born at Stora Tuna in Sweden on the 30th of August 1790. His brothers, Carl Johan (1774–1861), the landscape-painter, and Axel Magnus (1780–1854), the sculptor, became hardly less distinguished than himself. In 1804 he entered the university of Upsala; in 1821 he became tutor in Arabic, and in 1825 professor of Oriental languages. In 1828 he entered the church, but earlier than this, in 1825, he published his *Noachs Ark*, a successful satire on the literary and social life of his time, followed in 1826 by a second part. In 1835 Fahlcrantz brought out the first part of his epic of *Ansgarius*, which was completed in 1846, in 14 cantos. In 1842 he was made a member of the Swedish Academy, and in 1849 he was made bishop of Vesterås, his next literary work being an archaeological study on the beautiful ancient cathedral of his diocese. In the course of the years 1858–1861 appeared the five volumes of his *Rom förr och nu* (*Rome as it was and is*), a theological polemic, mainly directed against the Jesuits. He died on the 6th of August 1866. His complete works (7 vols., Örebro, 1863–1866) were issued mainly under his own superintendence.

FAHRENHEIT, GABRIEL DANIEL (1686–1736), German physicist, was born at Danzig on the 14th of May 1686. For the most part he lived in England and Holland, devoting himself to the study of physics and making a living, apparently, by the manufacture of meteorological instruments. He was the author of important improvements in the construction of thermometers, and he introduced the thermometric scale known by his name and still extensively used in Great Britain and the United States (see THERMOMETRY). He also invented an improved form of hygrometer, a description of which, together with accounts of various observations and experiments made by him, was published in the *Phil. Trans.* for 1724. He died in Holland on the 16th of September 1736.

FAIDHERBE, LOUIS LÉON CÉSAR (1818–1889), French general and colonial administrator, was born on the 3rd of June 1818, at Lille, received his military education at the École Polytechnique and at Metz, and entered the engineers in 1840. From 1844 to 1847 he served in Algeria, then two years in the West Indies, and again in Algeria, taking part in many expeditions against the Arabs. In 1852 he was transferred to Senegal as sub-director of engineers, and in 1854 was promoted *chef de bataillon* and appointed governor of the colony. He held this post with one brief interval until July 1865. The work he accomplished in West Africa constitutes his most enduring monument. At that time France possessed in Senegal little else than the town of St Louis and a strip of coast. Explorers had, however, made known the riches and possibilities of the Niger regions, and Faidherbe formed the design of adding those countries to the French dominions. He even dreamed of creating a French African empire stretching from Senegal to the Red Sea. To accomplish even the first part of his design he had very inadequate resources, especially in view of the aggressive action of Omar Al-Hadji, the Moslem ruler of the countries of the middle Niger. By boldly advancing the French outposts on the upper Senegal Faidherbe stemmed the Moslem advance, and by an advantageous treaty with Omar in 1860 brought the French possessions into touch with the Niger. He also brought into subjection the country lying between the Senegal and Gambia. When he resigned his post French rule had been firmly established over a very considerable and fertile area and the foundation laid upon which his successors built up the predominant position occupied now by France in West Africa. In 1863 he became general of brigade. From 1867 to the early part of 1870 he commanded the subdivision of Bona in Algeria, and was commanding the Constantine division at the commencement of the Franco-German War. Promoted general of division in November 1870, he was on the 3rd of December appointed by the Government of National Defence to be commander-in-chief of the army of the North. In this post he showed himself to be possessed of the highest military talents, and the struggle between the I. German army and that commanded by Faidherbe, in which were included the hard-fought battles of Pont Noyelles, Bapaume and St Quentin, was perhaps the most honourable to the French army in the whole of the People's War. Even with the inadequate force of which he disposed he was able to maintain a steady resistance up to the end of the war. Elected to the National Assembly for the department of the Nord, he resigned his seat in consequence of its reactionary proceedings. For his services he was decorated with the grand cross, and made chancellor of the order of the Legion of Honour. In 1872 he went on a scientific mission to Upper Egypt, where he studied the monuments and inscriptions. An enthusiastic geographer, philologist and archaeologist, he wrote numerous works, among which may be mentioned *Collection des inscriptions numidiques* (1870), *Épigraphie phénicienne* (1873), *Essai sur la langue poul* (1875); and *Le Zénaga des tribes sénégalaises* (1877), the last a study of the Berber language. He also wrote on the geography and history of Senegal and the Sahara, and *La Campagne de l'armée du Nord* (1872). He was elected a senator in 1879, and, in spite of failing health, continued to the last a close student of his favourite subjects. He died on the 29th of September 1889, and received a public funeral. Statues and monuments to his memory were erected at Lille, Bapaume, St Quentin and St Louis, Senegal.

FAIENCE, properly the French term for the *porzellana di Faenza*, a fine kind of glazed and painted earthenware made at Faenza in Italy, hence a term applied generally to all kinds of pottery other than unglazed pottery or porcelain. It is often particularly applied to the translucent earthenware made in Persia (see CERAMICS).

FAILLY, PIERRE LOUIS CHARLES DE (1810–1892), French general, was born at Rozoy-sur-Serre (Aisne) on the 21st of January 1810, and entered the army from St Cyr in 1828. In 1851 he had risen to the rank of colonel, and Napoleon III., with whom he was a favourite, made him general of brigade in 1854 and general of division in 1855, after which for a time De Failly was his aide-de-camp. In the war of 1859 De Failly commanded a division, and in 1867 he defeated Garibaldi at Mentana, this action being the first in which the chassepot was used. In 1870 De Failly commanded the V. corps. His inactivity at Bitsch on the 6th of August while the I. corps on his right and the II. corps on his left were crushed at Wörth and Spicheren respectively, gave rise to the greatest indignation in France, and his military career ended, after the V. corps had been severely handled at Beaumont on the 30th of August, with the catastrophe of Sedan. The rest of his life was spent in retirement. De Failly wrote *Campaigne de 1870, Opérations et marche du 5^{me} corps jusqu'au 30 août* (Brussels, 1871).

FAIN, AGATHON JEAN FRANÇOIS (1778–1837), French historian, was born in Paris on the 11th of January 1778. Having gained admittance to the offices of the Directory, he became head of a department. Under the Consulate he entered the office of the secretary of state, in the department of the archives. In 1806 he was appointed secretary and archivist to the *cabinet particulier* of the emperor, whom he attended on his campaigns and journeys. He was created a baron of the empire in 1809, and, on the fall of Napoleon, was first secretary of the cabinet and confidential secretary. Compelled by the second Restoration to retire into private life, he devoted his leisure to writing the history of his times, an occupation for which his previous employments well fitted him. He published successively *Manuscrit de 1814, contenant l'histoire des six derniers mois du règne de Napoléon* (1823; new edition with illustrations, 1906); *Manuscrit de 1813, contenant le précis des événements de cette année pour servir à l'histoire de l'empereur Napoléon* (1824); *Manuscrit de 1812* (1827); and *Manuscrit de l'an iii. (1794–1795), contenant les premières transactions de l'Europe avec la république française et le tableau des derniers événements du régime conventionnel* (1828), all of which are remarkable for accuracy and wide range of knowledge, and are a very valuable source for the history of

Napoleon I. Of still greater importance for the history of Napoleon are Fain's *Mémoires*, which were published posthumously in 1908; they relate more particularly to the last five years of the empire, and give a detailed picture of the emperor at work on his correspondence among his confidential secretaries. Immediately after the overthrow of Charles X., King Louis Philippe appointed Fain first secretary of his cabinet (August 1830). Fain was a member of the council of state and deputy from Montargis from 1834 until his death, which occurred in Paris on the 16th of September 1837.

FAIR, a commercial institution, defined as a "greater species of market recurring at more distant intervals": both "fair" and "market" (*q.v.*) have been distinguished by Lord Coke from "mart," which he considers as a greater species of fair; and all three may be defined as periodic gatherings of buyers and sellers in an appointed place, subject to special regulation by law or custom. Thus in England from a strictly legal point of view there can be no fair or market without a franchise; and a franchise of fair or market can only be exercised by right of a grant from the crown, or by the authority of parliament or by prescription presupposing a grant. In the earliest times periodical trading in special localities was necessitated by the difficulties of communication and the dangers of travel. Public gatherings, whether religious, military or judicial, which brought together widely scattered populations, were utilized as opportunities for commerce. At the festivals of Delos and at the Olympic games trade, it is said, found important outlets, while in Etruria the annual general assembly at the temple of Voltumna served at the same time as a fair and was regularly attended by Roman traders. Instances of a similar nature might be multiplied; but it was above all with religious festivals which recurred with regularity and convoked large numbers of persons that fairs, as distinguished from markets, are most intimately associated.

The most commonly accepted derivation of the word "fair" is from the Latin *feria*, a name which the church borrowed from Roman custom and applied to her own festivals. A fair was generally held during the period of a saint's feast and in the precincts of his church or abbey, but in England this desecration of church or churchyard was first forbidden by the Statute of Winton (*c.* Edward I.). Most of the famous fairs of medieval England and Europe, with their tolls or other revenues, and, within certain limits of time and place, their monopoly of trade, were grants from the sovereign to abbots, bishops and other ecclesiastical dignitaries. Their "holy day" associations are preserved in the German word for fairs, *Messen*; as also in the *kirmiss*, "church mass," of the people of Brittany. So very intimate was the connexion between the fair and the feast of the saint that the former has very commonly been regarded as an off-shoot or development of the latter. But there is every reason to suppose that fairs were already existing national institutions, long before the church turned or was privileged to turn them to her own profit.

The first charter of the great fair of Stourbridge, near Cambridge, was granted by King John for the maintenance of a leper hospital; but the origin of the fair itself is ascribed to Carausius, the rebel emperor of Britain, A.D. 207. At all events, it may be seen from the *data* given in Herbert Spencer's *Descriptive Sociology* that the country had then arrived at the stage of development where fairs might have been recognized as a necessity. The Romans also appear to have elaborated a market-law similar to that in force throughout medieval Europe—though it must be observed that the Roman *nundinae*, which some have regarded as fairs, were weekly markets. It has also been supposed that the ancient fairs of Lyons were a special privilege granted by the Roman conquerors; and Sidonius Apollinaris, A.D. 427, alludes to the fairs of the district afterwards known as the county of Champagne, as if they were then familiarly known institutions. Fairs, in a word, would not only have arisen naturally, wherever the means of communication between individual centres of production and consumption were felt to be inadequate to the demand for an interchange of commodities; but, from their very nature, they might be expected to show some essential resemblances, even in points of legislation, and where no international transmission of custom could have been possible. Thus, the fair courts of pre-Spanish Mexico corresponded very closely to those of the Beaucaire fair. They resembled the English courts of piepowder. The Spaniards, when first they saw the Mexican fairs, were reminded of the like institutions in Salamanca and Granada. The great fair or market at the city of Mexico is said to have been attended by about 40,000 or 50,000 persons, and is thus described by Prescott:—

> "Officers patrolled the square, whose business it was to keep the peace, to collect the dues imposed on the various kinds of merchandise, to see that no false measures or fraud of any kind were used, and to bring offenders at once to justice. A court of twelve judges sat in one part of the *tianguez* clothed with those ample and summary powers which, in despotic countries, are often delegated even to petty tribunals. The extreme severity with which they exercised those powers, in more than one instance, proves that they were not a dead letter."

But notwithstanding the great antiquity of fairs, their charters are comparatively modern—the oldest known being that of St Denys, Paris, which Dagobert, king of the Franks, granted (A.D. 642) to the monks of the place "for the glory of God, and the honour of St Denys at his festival."

In England it was only after the Norman conquest that fairs became of capital importance. Records exist of 2800 grants of franchise markets and fairs between the years 1199 and 1483. More than half of these were made during the reigns of John and Henry III., when the power of the church was in ascendancy. The first recorded grant, however, appears to be that of William the Conqueror to the bishop of Winchester, for leave to hold an annual "free fair" at St Giles's hill. The monk who had been the king's jester received his charter of Bartholomew fair, Smithfield, in the year 1133. And in 1248 Henry III. granted a like privilege to the abbot of Westminster, in honour of the "translation" of Edward the Confessor. Sometimes fairs were granted to towns as a means for enabling them to recover from the effects of war and other disasters. Thus, Edward III. granted a "free fair" to the town of Burnley in Rutland, just as, in subsequent times, Charles VII. favoured Bordeaux after the English wars, and Louis XIV. gave fair charters to the towns of Dieppe and Toulon. The importance attached to these old fairs may be understood from the inducements which, in the 14th century, Charles IV. held out to traders visiting the great fair of Frankfort-on-Main. The charter declared that both during the continuance of the fair, and for eighteen days before and after it, merchants would be exempt from imperial taxation, from arrest for debt, or civil process of any sort, except such as might arise from the transactions of the market itself and within its precincts. Philip of Valois's regulations for the fairs of Troyes in Champagne might not only be accepted as typical of all subsequent fair-legislation of the kingdom, but even of the English and German laws on the subject. The fair had its staff of notaries for the attestation of bargains, its court of justice, its police officers, its sergeants for the execution of the market judges' decrees, and its visitors—of whom we may mention the *prud'hommes*,—whose duty it was to examine the quality of goods exposed for sale, and to confiscate those found unfit for consumption. The confiscation required the consent of five or six representatives of the merchant community at the fair. The effect of these great "free fairs" of England and the continent on the development of society was indeed great. They helped to familiarize the western and northern countries with the banking and financial systems of the Lombards and Florentines, who resorted to them under the protection of the sovereign's "firm peace," and the ghostly terrors of the pope. They usually became the seat of foreign agencies. In the names of her streets Provins preserved the memory of her 12th-century intercourse with the agents and merchants of Germany and the Low Countries, and long before that time the Syrian traders at St Denys had established their powerful association in Paris. Like the church on the religious side, the free fairs on the commercial side evoked and cherished the international spirit. And during long ages, when commercial "protection" was regarded as indispensable to a nation's wealth, and the merchant was compelled to "fight his way through a wilderness of taxes," they were the sole and, so far as they went, the complete substitute for the free trade of later days.

Their privileges, however, were, from their very nature, destined to grow more oppressive and intolerable the more the towns were multiplied and the means of communication increased. The people of London were compelled to close their shops during the days when the abbot of Westminster's fair was open. But a more curious and complete instance of such an ecclesiastical monopoly was that of the St Giles's fair, at first granted for the customary three days, which were increased by Henry III. to sixteen. The bishop of Winchester was, as we have seen, the lord of this fair. On the eve of St Giles's feast the magistrates of Winchester surrendered the keys of the city gates to the bishop, who then appointed his own mayor, bailiff and coroner, to hold office until the close of the fair. During the same period, Winchester and Southampton also—though it was then a thriving trading town—were forbidden to transact their ordinary commercial business, except within the bishop's fair, or with his special permission. The bishop's officers were posted along the highways, with power to forfeit to his lordship all goods bought and sold within 7 m. of the fair—in whose centre stood "the pavilion," or bishop's court. It is clear, from the curious record of the *Establishment and Expenses of the Household* of Percy, 5th earl of Northumberland, that fairs were the chief centres of country traffic even as late as the 16th century. They began to decline rapidly after 1759, when good roads had been constructed and canal communication established between Liverpool and the towns of Yorkshire, Cheshire and Lancashire. In the great towns their extinction was hastened in consequence of their evil effects on public morals. All the London fairs were abolished as public nuisances before 1855—the last year of the ever famous fair of St Bartholomew; and the fairs of Paris were swept away in the storm of the Revolution.

English Fairs and Markets.—For the general reasons apparent from the preceding sketch, fairs in England, as in France and Germany, have very largely given way to markets for specialities. Even the live-stock market of the metropolis is being superseded by the dead-meat market, a change which has been encouraged by modern legislation on cattle disease, the movements of home stock and the importation of foreign animals. Agricultural markets are also disappearing before the "agencies" and the corn exchanges in the principal towns. Still there are some considerable fairs yet remaining. Of the English fairs for live stock, those of Weyhill in Hampshire (October 10), St Faith's, near Norwich (October 17), as also several held at Devizes, Wiltshire, are among the largest in the kingdom. The first named stands next to none for its display of sheep. Horncastle, Lincolnshire, is the largest horse fair in the kingdom, and is regularly visited by American and continental dealers. The other leading horse fairs in England are Howden in Yorkshire (well known for its hunters), Woodbridge (on Lady Day) for Suffolk horses, Barnet in Hertfordshire, and Lincoln. Exeter December fair has a large display of cattle, horses and most kinds of commodities. Large numbers of Scotch cattle are also brought to the fairs of Carlisle and Ormskirk. Nottingham has a fair for geese. Ipswich has a fair for lambs on the 1st of August, and for butter and cheese on the 1st of September. Gloucester fair is also famous for the last-named commodity. Falkirk fair, or tryst, for cattle and sheep, is one of the largest in Scotland; and Ballinasloe, Galway, holds a like position among Irish fairs. The Ballinasloe cattle are usually fed for a year in Leinster before they are considered fit for the Dublin or Liverpool markets.

French Fairs.—In France fairs and markets are held under the authority of the prefects, new fairs and markets being established by order of the prefects at the instance of the commune interested. Before the Revolution fairs and markets could only be established by *seigneurs justiciers*, but only two small markets have survived the law of 1790 abolishing private ownership of market rights, namely, the *Marché Ste Catherine* and the *Marché des enfants rouges*, both in Paris. Under the present system markets and fairs are held in most of the towns and villages in France; and at all such gatherings entertainments form an important feature. The great fair of Beaucaire instituted in 1168) has steadily declined since the opening of railway communication, and now ranks with the fairs of ordinary provincial towns. Situated at the junction of the Rhône and the Canal du Midi, and less than 40 m. from the sea, it at one time attracted merchants from Spain, from Switzerland and Germany, and from the Levant and Mediterranean ports, and formed one of the greatest temporary centres of commerce on the continent. One trade firm alone, it is said, rarely did less than 1,000,000 francs worth of business during the fortnight that the fair lasted.

German Fairs.—In Germany the police authorities are considered the market authorities, and to them in most cases is assigned the duty of establishing new fairs and markets, subject to magisterial decision. The three great fairs of Germany are those of Frankfort-on-Main, Frankfort-on-Oder and Leipzig, but, like all the large fairs of Europe, they have declined rapidly in importance. Those of Frankfort-on-Main begin on Easter Tuesday and on the nearest Monday to September 8 respectively, and their legal duration is three weeks, though the limit is regularly extended. The fairs of the second-named city are *Reminiscere*, February or March; *St Margaret*, July; *St Martin*, November. Ordinarily they last fifteen days, which is double the legal term. The greatest of the German fairs are those of Leipzig, whose display of books is famous all over the world. Its three fairs are dated January 1, Easter, Michaelmas. The Easter one is the book fair, which is attended by all the principal booksellers of Germany, and by many more from the adjoining countries. Most German publishers have agents at Leipzig. As many as 5000 new publications have been entered in a single Leipzig catalogue. As in the other instances given, the Leipzig fairs last for three weeks, or nearly thrice their allotted duration. Here no days of grace are allowed, and the holder of a bill must demand payment when due, and protest, if necessary, on the same day, otherwise he cannot proceed against either drawer or endorser.

Russian Fairs.—In Russia fairs are held by local authorities. Landed proprietors may also hold fairs on their estates subject to the sanction of the local authorities; but no private tolls may be levied on commodities brought to such fairs. In Siberia and the east of Russia, where more primitive conditions foster such centres of trade, fairs are still of considerable importance. Throughout Russia generally they are very numerous. The most important, that of Nijni Novgorod, held annually in July and August at the confluence of the rivers Volga and Kama, was instituted in the 17th century by the tsar Michael Fedorovitch. In 1881 it was calculated that trade to the value of 246,000,000 roubles was carried on within the limits of the fair. It still continues to be of great commercial importance, and is usually attended by upwards of 100,000 persons from all parts of Asia and eastern Europe. Other fairs of consequence are those of Irbit in Perm, Kharkoff (January and August), Poltava (August and February), Koreunais in Koursk, Ourloupinsknia in the Don Cossack country, Krolevetz in Tchernigoff, and a third fair held at Poltava on the feast of the Ascension.

Indian Fairs.—The largest of these, and perhaps the largest in Asia, is that of Hurdwar, on the upper course of the Ganges. The visitors to this holy fair number from 200,000 to 300,000; but every twelfth year there occurs a special pilgrimage to the sacred river, when the numbers may amount to a million or upwards. Those who go solely for the purposes of trade are Nepalese, Mongolians, Tibetans, central Asiatics and Mahommedan pedlars from the Punjab, Sind and the border states. Persian shawls and carpets, Indian silks, Kashmir shawls, cottons (Indian and English), preserved fruits, spices, drugs, &c., together with immense numbers of cattle, horses, sheep and camels, are brought to this famous fair.

American Fairs.—The word "fair," as now used in the United States, appears to have completely lost its Old World meaning. It seems to be exclusively applied to industrial exhibitions and to what in England are called fancy bazaars. Thus, during the Civil War, large sums were collected at the "sanitary fairs," for the benefit of the sick and wounded. To the first-named class belong the state and county fairs, as they are called. Among the first and best-known of these was the "New York World's Fair," opened in 1853 by a company formed in 1851. (See EXHIBITION.)

Law of Fairs.—As no market or fair can be held in England without a royal charter, or right of prescription, so any person establishing a fair without such sanction is liable to be sued under a writ of *Quo warranto*, by any one to whose property the said market may be injurious. Nor can a fair or market be legally held beyond the time specified in the grant; and by 5 Edward III. c. 5 (1331) a merchant selling goods after the legal expiry of the fair forfeited double their value. To be valid, a sale must take place in "market-overt" (open market); "it will not be binding if it carries with it a presumption of fraudulence." These regulations satisfied, the sale "transfers a complete property in the thing sold to the vendee; so that however injurious or illegal the title of the vendor may be, yet the vendee's is good against all men except the king." (In Scottish law, the claims of the real owner would still remain valid.) However, by 21 Henry VIII. c. 2 (1529) it was enacted that, "if any felon rob or take away money, goods, or chattels, and be indicted and found guilty, or otherwise attainted upon evidence given by the owner or party robbed, or by any other by their procurement, the owner or party robbed shall be restored to his money, goods or chattels," but only those goods were restored which were specified in the indictment, now could the owner recover from a *bona fide* purchaser in market-overt who had sold the goods before conviction. For obvious reasons the rules of market-overt were made particularly stringent in the case of horses. Thus, by 2 Philip & Mary c. 7 (1555) and 31 Eliz. c. 12 (1589) no sale of a horse was legal which had not satisfied the following conditions:—Public exposure of the animal for at least an hour between sunrise and sunset; identification of the vendor by the market officer, or guarantee for his honesty by "one sufficient and credible person"; entry of these particulars, together with a description of the animal, and a statement of the price paid for it, in the market officer's book. Even if his rights should have been violated in spite of all these precautions, the lawful owner could recover, if he claimed within six months, produced witnesses, and tendered the price paid to the vendor. Tolls were not a "necessary incident" of a fair—*i.e.* they were illegal unless specially granted in the patent, or recognized by custom. As a rule, they were paid only by the vendee, and to the market clerk, whose record of the payment was an attestation to the genuineness of the purchase. By 2 & 3 Philip & Mary c. 7 every lord of a fair entitled to exact tolls was bound to appoint a clerk to collect and enter them. It was also this functionary's business to test measures and weights. Tolls, again, are sometimes held to include "stallage" and "picage," which mean respectively the price for permission to erect stalls and to dig holes for posts in the market grounds. But toll proper belongs to the lord of the market, whereas the other two are usually regarded as the property of the lord of the soil. The law also provided that stallage might be levied on any house situated in the vicinity of a market, and kept open for business during the legal term of the said market. Among modern statutes, one of the chief is the Markets and Fairs Clauses Act 1847, the chief purpose of which was to consolidate previous measures. By the act no proprietors of a new market were permitted to let stallages, take tolls, or in any way open their ground for business, until two justices of the peace certified to the completion of the fair or market. After the opening of the place for public use, no person other than a licensed hawker may sell anywhere within the borough, his own house or shop excepted, any articles in respect of which tolls are legally exigible in the market. A breach of this provision entails a penalty of forty shillings. Vendors of unwholesome meat are liable to a penalty of £5 for each offence; and the "inspectors of provisions" have full liberty to seize the goods and institute proceedings against the owners. They may also enter "at all times of the day, with or without assistance," the slaughter-house which the undertaker of the market may, by the special act, have been empowered to construct. For general sanitary reasons, persons are prohibited from killing animals anywhere except in these slaughter-houses. Again, by the Fairs Act 1873, times of holding fairs are determined by the secretary of state; while the Fairs Act 1871 empowers him to abolish any fair on the representation of the magistrate and with the consent of the owner. The preamble of the act states that many fairs held in England and Wales are both unnecessary and productive of "grievous immorality."

The Fair Courts.—The piepowder courts, the lowest but most expeditious courts of justice in the kingdom, as Chitty calls them, were very ancient. The Conqueror's law *De Emporiis* shows their pre-existence in Normandy. Their name was derived from *pied poudreux, i.e.* "dusty-foot."[1] The lord of the fair or his representative was the presiding judge, and usually he was assisted by a jury of traders chosen on the spot. Their jurisdiction was limited by the legal time and precincts of the fair, and to disputes about contracts, "slander of wares," attestations, the preservation of order, &c.

Authorities.—See Herbert Spencer's *Descriptive Sociology* (1873), especially the columns and paragraphs on "Distribution"; Prescott's *History of Mexico*, for descriptions of fairs under the Aztecs; Giles Jacob's *Law Dictionary* (London, 1809); Joseph Chitty's *Treatise on the Law of Commerce and Manufactures*, vol. ii. chap. 9 (London, 1824); Holinshed's and Grafton's *Chronicles*, for lists, &c., of English fairs; Meyer's *Das grosse Conversations-Lexicon* (1852), under "Messen"; article "Foire" in Larousse's *Dictionnaire universelle du XIX*^{e} *siècle* (Paris, 1866–1874), and its references to past authorities; and especially, the second volume, commercial series, of the *Encyclopédie méthodique* (Paris, 1783); M'Culloch's *Dictionary of Commerce* (1869–1871); Wharton's *History of English Poetry*, pp. 185, 186 of edition of 1870 (London, Murray & Son), for a description of the Winchester Fair, &c.; a note by Professor Henry Morley in p. 498, vol. vii. *Notes and Queries*, second series; the same author's unique *History of the Fair of St Bartholomew* (London, 1859); Wharton's *Law Lexicon* (Will's edition, London, 1876); P. Huvelin's *Essai historique sur le droit des marchés et des foires* (Paris, 1897); *Report of the Royal Commission on Market Rights and Tolls*, vols. i. (1889), xiv. (1891); *Final Report* (1891); Walford's *Fairs, Past and Present* (1883); *The Law relating to Markets and Fairs*, by Pease and Chitty (London, 1899). (J. MA.; EV. C.*)

FAIRBAIRN, ANDREW MARTIN (1838–), British Nonconformist divine, was born near Edinburgh on the 4th of November 1838. He was educated at the universities of Edinburgh and Berlin, and at the Evangelical Union Theological Academy in Glasgow. He entered the Congregational ministry and held pastorates at Bathgate, West Lothian and at Aberdeen. From 1877 to 1886 he was principal of Airedale College, Bradford, a post which he gave up to become the first principal of Mansfield College, Oxford. In the transference to Oxford under that name of Spring Hill College, Birmingham, he took a considerable part, and he has exercised influence not only over generations of his own students, but also over a large number of undergraduates in the university generally. He was granted the degree of M.A. by a decree of Convocation, and in 1903 received the honorary degree of doctor of literature. He was also given the degrees of doctor of divinity of Edinburgh and Yale, and doctor of laws of Aberdeen. His activities were not limited to his college work. He delivered the Muir lectures at Edinburgh University (1878–1882), the Gifford lectures at Aberdeen (1892–1894), the Lyman Beecher lectures at Yale (1891–1892), and the Haskell lectures in India (1898–1899). He was a member of the Royal Commission of Secondary Education in 1894–1895, and of the Royal Commission on the Endowments of the Welsh Church in 1906. In 1883 he was chairman of the Congregational Union of England and Wales. He is a prolific writer on theological subjects. He resigned his position at Mansfield College in the spring of 1909.

Among his works are:—*Studies in the Philosophy of Religion and History* (1876); *Studies in the Life of Christ* (1881); *Religion in History and in Modern Life* (1884; rev. 1893); *Christ in Modern Theology* (1893); *Christ in the Centuries* (1893); *Catholicism Roman and Anglican* (1899); *Philosophy of the Christian Religion* (1902); *Studies in Religion and Theology* (1909).

FAIRBAIRN, SIR WILLIAM, Bart. (1789–1874), Scottish engineer, was born on the 19th of February 1789 at Kelso, Roxburghshire, where his father was a farm-bailiff. In 1803 he obtained work at three shillings a week as a mason's labourer on the bridge then being built by John Rennie at Kelso; but within a few days he was incapacitated by an accident. Later in the same year, his father having been appointed steward on a farm connected with Percy Main Colliery near North Shields, he obtained employment as a carter in connexion with the colliery. In March 1804 he was bound an apprentice to a millwright at Percy Main, and then found time to supplement the deficiencies of his early education by systematic private study. It was at Percy Main that he made the acquaintance of George Stephenson, who then had charge of an engine at a neighbouring colliery. For some years subsequent to the expiry of his apprenticeship in 1811, he lived a somewhat roving life, seldom remaining long in one place and often reduced to very hard straits before he got employment. But in 1817 he entered into partnership with a shopmate, James Lillie, with whose aid he hired an old shed in High Street, Manchester, where he set up a lathe and began business. The firm quickly secured a good reputation, and the improvements in mill-work and water-wheels introduced by Fairbairn caused its fame to extend beyond Manchester to Scotland and even the continent of Europe. The partnership was dissolved in 1832.

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[1] In Med. Lat. *pede-pulverosus* meant an itinerant merchant or pedlar. In Scots borough law "marchand travelland" and "dusty fute" are identical.

In 1830 Fairbairn had been employed by the Forth and Clyde Canal Company to make experiments with the view of determining whether it were possible to construct steamers capable of traversing the canal at a speed which would compete successfully with that of the railway; and the results of his investigation were published by him in 1831, under the title *Remarks on Canal Navigation.* His plan of using iron boats proved inadequate to overcome the difficulties of this problem, but in the development of the use of this material both in the case of merchant vessels and men-of-war he took a leading part. In this way also he was led to pursue extensive experiments in regard to the strength of iron. In 1835 he established, in connexion with his Manchester business, a shipbuilding yard at Millwall, London, where he constructed several hundred vessels, including many for the royal navy; but he ultimately found that other engagements prevented him from paying adequate attention to the management, and at the end of fourteen years he disposed of the concern at a great loss. In 1837 he was consulted by the sultan of Turkey in regard to machinery for the government workshops at Constantinople. In 1845 he was employed, in conjunction with Robert Stephenson, in constructing the tubular railway bridges across the Conway and Menai Straits. The share he had in the undertaking has been the subject of some dispute; his own version is contained in a volume he published in 1849, *An Account of the Construction of the Britannia and Conway Tubular Bridges.* In 1849 he was invited by the king of Prussia to submit designs for the construction of a bridge across the Rhine, but after various negotiations, another design, by a Prussian engineer, which was a modification of Fairbairn's, was adopted. Another matter which engaged much of Fairbairn's attention was steam boilers, in the construction of which he effected many improvements. Amid all the cares of business he found time for varied scientific investigation. In 1851 his fertility and readiness of invention greatly aided an inquiry carried out at his Manchester works by Sir William Thomson (Lord Kelvin) and J. P. Joule, at the instigation of William Hopkins, to determine the melting points of substances under great pressure; and from 1861 to 1865 he was employed to guide the experiments of the government committee appointed to inquire into the "application of iron to defensive purposes." He died at Moor Park, Surrey, on the 18th of August 1874. Fairbairn was a member of many learned societies, both British and foreign, and in 1861 served as president of the British Association. He declined a knighthood in 1861, but accepted a baronetcy in 1869.

His youngest brother, Sir PETER FAIRBAIRN (1799–1861), founded a large machine manufacturing business in Leeds. Starting on a small scale with flax-spinning machinery, he subsequently extended his operations to the manufacture of textile machinery in general, and finally to that of engineering tools. He was knighted in 1858.

See *The Life of Sir William Fairbairn*, partly written by himself and edited and completed by Dr William Pole (1877).

FAIRBANKS, ERASTUS (1792–1864), American manufacturer, was born in Brimfield, Massachusetts, on the 28th of October 1792. He studied law but abandoned it for mercantile pursuits, finally settling in St Johnsbury, Vermont, where in 1824 he formed a partnership with his brother Thaddeus for the manufacture of stoves and ploughs. Subsequently the scales invented by Thaddeus were manufactured extensively. Erastus was a member of the state legislature in 1836–1838, and governor of Vermont in 1852–1853 and 1860–1861, during his second term rendering valuable aid in the equipment and despatch of troops in the early days of the Civil War. His son HORACE (1820–1888) became president of E. & T. Fairbanks & Co. in 1874, and was governor of Vermont from 1876 to 1878.

His brother, THADDEUS FAIRBANKS (1796–1886), inventor, was born at Brimfield, Massachusetts, on the 17th of January 1796. He early manifested a genius for mechanics and designed the models from which he and his brother manufactured stoves and ploughs at St Johnsbury. In 1826 he patented a cast-iron plough which was extensively used. The growing of hemp was an important industry in the vicinity of St Johnsbury, and in 1831 Fairbanks invented a hemp-dressing machine. By the old contrivances then in use, the weighing of loads of hemp-straw was tedious and difficult, and in 1831 Fairbanks invented his famous compound-lever platform scale, which marked a great advance in the construction of machines for weighing bulky and heavy objects. He subsequently obtained more than fifty patents for improvements or innovations in scales and in machinery used in their manufacture, the last being granted on his ninetieth birthday. His firm, eventually known as E. & T. Fairbanks & Co., went into the manufacture of scales of all sizes, in which these inventions were utilized. He, with his brothers, Erastus and Joseph P., founded the St Johnsbury Academy. He died at St Johnsbury on the 12th of April 1886.

The latter's son HENRY, born in 1830 at St Johnsbury, Vermont, graduated at Dartmouth College in 1853 and at Andover Theological Seminary in 1857, and was professor of natural philosophy at Dartmouth from 1859 to 1865 and of natural history from 1865 to 1868. In the following year he patented a grain-scale and thenceforth devoted himself to the scale manufacturing business of his family. Altogether he obtained more than thirty patents for mechanical devices.

FAIRFAX, EDWARD (*c.* 1580–1635), English poet, translator of Tasso, was born at Leeds, the second son of Sir Thomas Fairfax of Denton (father of the 1st Baron Fairfax of Cameron). His legitimacy has been called in question, and the date of his birth has not been ascertained. He is said to have been only about twenty years of age when he published his translation of the *Gerusalemme Liberata*, which would place his birth about the year 1580. He preferred a life of study and retirement to the military service in which his brothers were distinguished. He married a sister of Walter Laycock, chief alnager of the northern counties, and lived on a small estate at Fewston, Yorkshire. There his time was spent in his literary pursuits, and in the education of his children and those of his elder brother, Sir Thomas Fairfax, afterwards baron of Cameron. His translation appeared in 1600,—*Godfrey of Bulloigne, or the Recoverie of Ierusalem, done into English heroicall Verse by Edw. Fairefax, Gent.*, and was dedicated to the queen. It was enthusiastically received. In the same year in which it was published extracts from it were printed in *England's Parnassus.* Edward Phillips, the nephew of Milton, in his *Theatrum Poetarum*, warmly eulogized the translation. Edmund Waller said he was indebted to it for the harmony of his numbers. It is said that it was King James's favourite English poem, and that Charles I. entertained himself in prison with its pages. Fairfax employed the same number of lines and stanzas as his original, but within the limits of each stanza he allowed himself the greatest liberty. Other translators may give a more literal version, but Fairfax alone seizes upon the poetical and chivalrous character of the poem. He presented, says Mr Courthope, "an idea of the chivalrous past of Europe, as seen through the medium of Catholic orthodoxy and classical humanism." The sweetness and melody of many passages are scarcely excelled even by Spenser. Fairfax made no other appeal to the public. He wrote, however, a series of eclogues, twelve in number, the fourth of which was published, by permission of the family, in Mrs Cooper's *Muses' Library* (1737). Another of the eclogues and a *Discourse on Witchcraft, as it was acted in the Family of Mr Edward Fairfax of Fuystone in the county of York in 1621*, edited from the original copy by Lord Houghton, appeared in the *Miscellanies* of the Philobiblon Society (1858–1859). Fairfax was a firm believer in witchcraft. He fancied that two of his children had been bewitched, and he had the poor wretches whom he accused brought to trial, but without obtaining a conviction. Fairfax died at Fewston and was buried there on the 27th of January 1635.

FAIRFAX OF CAMERON, FERDINANDO FAIRFAX, 2ND BARON (1584–1648), English parliamentary general, was a son of Thomas Fairfax of Denton (1560–1640), who in 1627 was created Baron Fairfax of Cameron in the peerage of Scotland. Born on the 29th of March 1584, he obtained his military education in the Netherlands, and was member of parliament for Boroughbridge during the six parliaments which met between 1614 and 1629 and also during the Short Parliament of 1640. In May 1640 he succeeded his father as Baron Fairfax, but being a Scottish peer he sat in the English House of Commons as one of the representatives of Yorkshire during the Long Parliament from 1640 until his death; he took the side of the parliament, but held moderate views and desired to maintain the peace. In the first Scottish war Fairfax had commanded a regiment in the king's army; then on the outbreak of the Civil War in 1642 he was made commander of the parliamentary forces in Yorkshire, with Newcastle as his opponent. Hostilities began after the repudiation of a treaty of neutrality entered into by Fairfax with the Royalists. At first he met with no success. He was driven from York, where he was besieging the Royalists, to Selby; then in 1643 to Leeds; and after beating off an attack at that place he was totally defeated on the 30th of June at Adwalton Moor. He escaped to Hull, which he successfully defended against Newcastle from the 2nd of September till the 11th of October, and by means of a brilliant sally caused the siege to be raised. Fairfax was victorious at Selby on the 11th of April 1644, and joining the Scots besieged York, after which he was present at Marston Moor, where he commanded the infantry and was routed. He was subsequently, in July, made governor of York and charged with the further reduction of the county. In December he took the town of Pontefract, but failed to secure the castle. He resigned his command on the passing of the Self-denying Ordinance, but remained a member of the committee for the government of Yorkshire, and was appointed, on the 24th of July 1645, steward of the manor of Pontefract. He died from an accident on the 14th of March 1648 and was buried at Bolton Percy. He was twice married, and by his first wife, Mary, daughter of Edmund Sheffield, 3rd Lord Sheffield (afterwards 1st earl of Mulgrave), he had six daughters and two sons, Thomas, who succeeded him as 3rd baron, and Charles, a colonel of horse, who was killed at Marston Moor. During his command in Yorkshire, Fairfax engaged in a paper war with Newcastle, and wrote *The Answer of Ferdinando, Lord Fairfax, to a Declaration of William, earl of Newcastle* (1642; printed in Rushworth, pt. iii. vol. ii. p. 139); he also published *A Letter from . . . Lord Fairfax to . . . Robert, Earl of Essex* (1643), describing the victorious sally at Hull.

FAIRFAX OF CAMERON, THOMAS FAIRFAX, 3RD BARON (1612–1671), parliamentary general and commander-in-chief during the English Civil War, the eldest son of the 2nd lord, was born at Denton, near Otley, Yorkshire, on the 17th of January 1612. He studied at St John's College, Cambridge (1626–1629), and then proceeded to Holland to serve as a volunteer with the English army in the Low Countries under Sir Horace (Lord) Vere. This connexion led to one still closer; in the summer of 1637 Fairfax married Anne Vere, the daughter of the general.

The Fairfaxes, father and son, though serving at first under Charles I. (Thomas commanded a troop of horse, and was knighted by the king in 1640), were opposed to the arbitrary prerogative of the crown, and Sir Thomas declared that "his judgment was for the parliament as the king and kingdom's great and safest council." When Charles endeavoured to raise a guard for his own person at York, intending it, as the event afterwards proved, to form the nucleus of an army, Fairfax was employed to present a petition to his sovereign, entreating him to hearken to the voice of his parliament, and to discontinue the raising of troops. This was at a great meeting of the freeholders and farmers of Yorkshire convened by the king on Heworth Moor near York. Charles evaded receiving the petition, pressing his horse forward, but Fairfax followed him and placed the petition on the pommel of the king's saddle. The incident is typical of the times and of the actors in the scene. War broke out, Lord Fairfax was appointed general of the Parliamentary forces in the north, and his son, Sir Thomas, was made lieutenant-general of the horse under him. Both father and son distinguished themselves in the campaigns in Yorkshire (see GREAT REBELLION). Sometimes severely defeated, more often successful, and always energetic, prudent and resourceful, they contrived to keep up the struggle until the crisis of 1644, when York was held by the marquess of Newcastle against the combined forces of the English Parliamentarians and the Scots, and Prince Rupert hastened with all available forces to its relief. A gathering of eager national forces within a few square miles of ground naturally led to a battle, and Marston Moor (*q.v.*) was decisive of the struggle in the north. The younger Fairfax bore himself with the greatest gallantry in the battle, and though severely wounded managed to join Cromwell and the victorious cavalry on the other wing. One of his brothers, Colonel Charles Fairfax, was killed in the action. But the marquess of Newcastle fled the kingdom, and the Royalists abandoned all hope of retrieving their affairs. The city of York was taken, and nearly the whole north submitted to the parliament.

In the south and west of England, however, the Royalist cause was still active. The war had lasted two years, and the nation began to complain of the contributions that were exacted, and the excesses that were committed by the military. Dissatisfaction was expressed with the military commanders, and, as a preliminary step to reform, the Self-denying Ordinance was passed. This involved the removal of the earl of Essex from the supreme command, and the reconstruction of the armed forces of the parliament. Sir Thomas Fairfax was selected as the new lord general with Cromwell as his lieutenant-general and cavalry commander, and after a short preliminary campaign the "New Model" justified its existence, and "the rebels' new brutish general," as the king called him, his capacity as commander-in-chief in the decisive victory of Naseby (*q.v.*). The king fled to Wales. Fairfax besieged Leicester, and was successful at Taunton, Bridgwater and Bristol. The whole west was soon reduced.

Fairfax arrived in London on the 12th of November 1645. In his progress towards the capital he was accompanied by applauding crowds. Complimentary speeches and thanks were presented to him by both houses of parliament, along with a jewel of great value set with diamonds, and a sum of money. The king had returned from Wales and established himself at Oxford, where there was a strong garrison, but, ever vacillating, he withdrew secretly, and proceeded to Newark to throw himself into the arms of the Scots. Oxford capitulated; and by the end of September 1646 Charles had neither army nor garrison in England. In January 1647 he was delivered up by the Scots to the commissioners of parliament. Fairfax met the king beyond Nottingham, and accompanied him during the journey to Holmby, treating him with the utmost consideration in every way. "The general," said Charles, "is a man of honour, and keeps his word which he had pledged to me." With the collapse of the Royalist cause came a confused period of negotiations between the parliament and the king, between the king and the Scots, and between the Presbyterians and the Independents in and out of parliament. In these negotiations the New Model Army soon began to take a most active part. The lord general was placed in the unpleasant position of intermediary between his own officers and parliament. To the grievances, usual in armies of that time, concerning arrears of pay and indemnity for acts committed on duty, there was quickly added the political propaganda of the Independents, and in July the person of the king was seized by Joyce, a subaltern of cavalry—an act which sufficiently demonstrated the hopelessness of controlling the army by its articles of war. It had, in fact, become the most formidable political party in the realm, and pressed straight on to the overthrow of parliament and the punishment of Charles. Fairfax was more at home in the field than at the head of a political committee, and, finding events too strong for him, he sought to resign his commission as commander-in-chief. He was, however, persuaded to retain it. He thus remained the titular chief of the army party, and with the greater part of its objects he was in complete, sometimes most active, sympathy. Shortly before the outbreak of the second Civil War, Fairfax succeeded his father in the barony and in the office of governor of Hull. In the field against the English Royalists in 1648 he displayed his former energy and skill, and his operations culminated in the successful siege of Colchester, after the surrender of which place he approved the execution of the Royalist leaders Sir Charles Lucas and Sir George Lisle, holding that these officers had broken their parole. At the same time Cromwell's great victory of Preston crushed the Scots, and the Independents became practically all-powerful.

Milton, in a sonnet written during the siege of Colchester, called upon the lord general to settle the kingdom, but the crisis was now at hand. Fairfax was in agreement with Cromwell and the army leaders in demanding the punishment of Charles, and he was still the effective head of the army. He approved, if he did not take an active part in, Pride's Purge (December 6th, 1648), but on the last and gravest of the questions at issue he set himself in deliberate and open opposition to the policy of the officers. He was placed at the head of the judges who were to try the king, and attended the preliminary sitting of the court. Then, convinced at last that the king's death was intended, he refused to act. In calling over the court, when the crier pronounced the name of Fairfax, a lady in the gallery called out "that the Lord Fairfax was not there in person, that he would never sit among them, and that they did him wrong to name him as a commissioner." This was Lady Fairfax, who could not forbear, as Whitelocke says, to exclaim aloud against the proceedings of the High Court of Justice. His last service as commander-in-chief was the suppression of the Leveller mutiny at Burford in May 1649. He had given his adhesion to the new order of things, and had been reappointed lord general. But he merely administered the affairs of the army, and when in 1650 the Scots had declared for Charles II., and the council of state resolved to send an army to Scotland in order to prevent an invasion of England, Fairfax resigned his commission. Cromwell was appointed his successor, "captain-general and commander-in-chief of all the forces raised or to be raised by authority of parliament within the commonwealth of England." Fairfax received a pension of £5000 a year, and lived in retirement at his Yorkshire home of Nunappleton till after the death of the Protector. The troubles of the later Commonwealth recalled Lord Fairfax to political activity, and for the last time his appearance in arms helped to shape the future of the country, when Monk invited him to assist in the operations about to be undertaken against Lambert's army. In December 1659 he appeared at the head of a body of Yorkshire gentlemen, and such was the influence of Fairfax's name and reputation that 1200 horse quitted Lambert's colours and joined him. This was speedily followed by the breaking up of all Lambert's forces, and that day secured the restoration of the monarchy. A "free" parliament was called; Fairfax was elected member for Yorkshire, and was put at the head of the commission appointed by the House of Commons to wait upon Charles II. at the Hague and urge his speedy return. Of course the "merry monarch, scandalous and poor," was glad to obey the summons, and Fairfax provided the horse on which Charles rode at his coronation. The remaining eleven years of the life of Lord Fairfax were spent in retirement at his seat in Yorkshire. He must, like Milton, have been sorely grieved and shocked by the scenes that followed—the brutal indignities offered to the remains of his companions in arms, Cromwell and Ireton, the sacrifice of Sir Harry Vane, the neglect or desecration of all that was great, noble or graceful in England, and the flood of immorality which, flowing from Whitehall, sapped the foundations of the national strength and honour. Lord Fairfax died at Nunappleton on the 12th of November 1671, and was buried at Bilborough, near York. As a soldier he was exact and methodical in planning, in the heat of battle "so highly transported that scarce any one durst speak a word to him" (Whitelocke), chivalrous and punctilious in his dealings with his own men and the enemy. Honour and conscientiousness were equally the characteristics of his private and public character. But his modesty and distrust of his powers made him less effectual as a statesman than as a soldier, and above all he is placed at a disadvantage by being both in war and peace overshadowed by his associate Cromwell.

Lord Fairfax had a taste for literature. He translated some of the Psalms, and wrote poems on solitude, the Christian warfare, the shortness of life, &c. During the last year or two of his life he wrote two *Memorials* which have been published—one on the northern actions in which he was engaged in 1642–1644, and the other on some events in his tenure of the chief command. At York and at Oxford he endeavoured to save the libraries from pillage, and he enriched the Bodleian with some valuable MSS. His only daughter, Mary Fairfax, was married to George Villiers, the profligate duke of Buckingham of Charles II.'s court.

His correspondence, edited by G. W. Johnson, was published in 1848–1849 in four volumes (see note thereon in *Dict. Nat. Biogr.*, *s.v.*), and a life of him by Clements R. Markham in 1870. See also S. R. Gardiner, *History of the Great Civil War* (1893).

His descendant Thomas, 6th baron (1692–1782), inherited from his mother, the heiress of Thomas, 2nd Baron Culpepper, large estates in Virginia, U.S.A., and having sold Denton Hall and his Yorkshire estates he retired there about 1746, dying a bachelor. He was a friend of George Washington. Thomas found his cousin William Fairfax settled in Virginia, and made him his agent, and Bryan (1737–1802), the son of William Fairfax, eventually inherited the title, becoming 8th baron in 1793. His claim was admitted by the House of Lords in 1800. But it was practically dropped by the American family, until, shortly before the coronation of Edward VII., the successor in title was discovered in Albert Kirby Fairfax (b. 1870), a descendant of the 8th baron, who was an American citizen. In November 1908 Albert's claim to the title as 12th baron was allowed by the House of Lords.

FAIRFIELD, a township in Fairfield county, Connecticut, U.S.A., near Long Island Sound, adjoining Bridgeport on the E. and Westport on the W. Pop. (1890) 3868; (1900) 4489 (1041 being foreign-born); (1910) 6134. It is served by the New York, New Haven & Hartford railway. The principal villages of the township are Fairfield, Southport, Greenfield Hill and Stratfield. The beautiful scenery and fine sea air attract to the township a considerable number of summer visitors. The township has the well-equipped Pequot and Fairfield memorial libraries (the former in the village of Southport, the latter in the village of Fairfield), the Fairfield fresh air home (which cares for between one and two hundred poor children of New York during each summer season), and the Gould home for self-supporting women. The Fairfield Historical Society has a museum of antiquities and a collection of genealogical and historical works. Among Fairfield's manufactures are chemicals, wire and rubber goods. Truck-gardening is an important industry of the township. In the Pequot Swamp within the present Fairfield a force of Pequot Indians was badly defeated in 1637 by some whites, among whom was Roger Ludlow, who, attracted by the country, founded the settlement in 1639 and gave it its present name in 1645. Within its original limits were included what are now the townships of Redding (separated, 1767), Weston (1787) and Easton (formed from part of Weston in 1845), and parts of the present Westport and Bridgeport. During the colonial period Fairfield was a place of considerable importance, but subsequently it was greatly outstripped by Bridgeport, to which, in 1870, a portion of it was annexed. On the 8th of July 1779 Fairfield was burned by the British and Hessians under Governor William Tryon. Among the prominent men who have lived in Fairfield are Roger Sherman, the first President Dwight of Yale (who described Fairfield in his *Travels* and in his poem *Greenfield Hill*), Chancellor James Kent, and Joseph Earle Sheffield.

See Frank S. Child, *An Old New England Town, Sketches of Life, Scenery and Character* (New York, 1895); and Mrs E. H. Schenck, *History of Fairfield* (2 vols., New York, 1889–1905).

FAIRFIELD, a city and the county-seat of Jefferson county, Iowa, U.S.A., about 51 m. W. by N. of Burlington. Pop. (1890) 3391; (1900) 4689, of whom 206 were foreign-born and 54 were negroes; (1905) 5009; (1910) 4970. Area, about 2·25 sq. m. Fairfield is served by the Chicago, Burlington & Quincy, and the Chicago, Rock Island & Pacific railways. The city is in a blue grass country, in which much live stock is bred; and it is an important market for draft horses. It is the seat of Parsons College (Presbyterian, co-educational, 1875), endowed by Lewis Baldwin Parsons, Sr. (1798–1855), a merchant of Buffalo, N.Y. The college offers classical, philosophical and scientific courses, and has a school of music and an academic department; in 1907–1908 it had 19 instructors and 257 students, of whom 93 were in the college and 97 were in the school of music. Fairfield has a Carnegie library (1892), and a museum with a collection of laces. Immediately E. of the city is an attractive Chautauqua Park, of 30 acres, with an auditorium capable of seating about 4000 persons; and there is an annual Chautauqua assembly. The principal manufactures of Fairfield are farm waggons, farming implements, drain-tile, malleable iron, cotton gloves and mittens and cotton garments. The municipality owns its waterworks and an electric-lighting plant. Fairfield was settled in 1839; was incorporated as a town in 1847; and was first chartered as a city in the same year.

See Charles H. Fletcher, *Jefferson County, Iowa: Centennial History* (Fairfield, 1876).

FAIRHAVEN, a township in Bristol county, Massachusetts, U.S.A., on New Bedford Harbor, opposite New Bedford. Pop. (1890) 2919; (1900) 3567 (599 being foreign-born); (1905, state census) 4235; (1910) 5122. Area, about 13 sq. m. Fairhaven is served by the New York, New Haven & Hartford railway and by electric railway to Mattapoisett and Marion, and is connected with New Bedford by two bridges, by electric railway, and by the New York, New Haven & Hartford ferry line. The principal village is Fairhaven; others are Oxford, Naskatucket and Sconticut Neck. As a summer resort Fairhaven is widely known. Among the principal buildings are the following, presented to the township by Henry H. Rogers (1840–1909), a native of Fairhaven and a large stockholder and long vice-president of the Standard Oil Co.; the town hall, a memorial of Mrs Rogers, the Rogers public schools; the Millicent public library (17,500 vols. in 1908), a memorial to his daughter; and a fine granite memorial church (Unitarian) with parish house, a memorial to his mother; and there is also a public park, of 13 acres, the gift of Mr Rogers. From 1830 to 1857 the inhabitants of Fairhaven were chiefly engaged in whaling, and the fishing interests are still important. Among manufactures are tacks, nails, iron goods, loom-cranks, glass, yachts and boats, and shoes.

Fairhaven, originally a part of New Bedford, was incorporated as a separate township in 1812. On the 5th of September 1778 a fleet and armed force under Earl Grey, sent to punish New Bedford and what is now Fairhaven for their activity in privateering, burned the shipping and destroyed much of New Bedford. The troops then marched to the head of the Acushnet river, and down the east bank to Sconticut Neck, where they camped till the 7th of September, when they re-embarked, having meanwhile dismantled a small fort, built during the early days of the war, on the east side of the river at the entrance to the harbour. On the evening of the 8th of September a landing force from the fleet, which had begun to set fire to Fairhaven, was driven off by a body of about 150 minute-men commanded by Major Israel Fearing; and on the following day the fleet departed. The fort was at once rebuilt and was named Fort Fearing, but as early as 1784 it had become known as Fort Phoenix; it was one of the strongest defences on the New England coast during the war of 1812. The township of Acushnet was formed from the northern part of Fairhaven in 1860.

See James L. Gillingham and others, *A Brief History of the Town of Fairhaven, Massachusetts* (Fairhaven, 1903).

FAIRHOLT, FREDERICK WILLIAM (1814–1866), English antiquary and wood engraver, was born in London in 1814. His father, who was of a German family (the name was originally Fahrholz), was a tobacco manufacturer, and for some years Fairholt himself was employed in the business. For a time he was a drawing-master, afterwards a scene-painter, and in 1835 he became assistant to S. Sly, the wood engraver. Some pen and ink copies made by him of figures from Hogarth's plates led to his being employed by Charles Knight on several of his illustrated publications. His first published literary work was a contribution to Hone's *Year-Book* in 1831. His life was one of almost uninterrupted quiet labour, carried on until within a few days of death. Several works on civic pageantry and some collections of ancient unpublished songs and dialogues were edited by him for the Percy Society in 1842. In 1844 he was elected fellow of the Society of Antiquaries. He published an edition of the dramatic works of Lyly in 1856. His principal independent works are *Tobacco, its History and Association* (1859); *Gog and Magog* (1860); *Up the Nile and Home Again* (1862); many articles and serials contributed to the *Art Journal*, some of which were afterwards separately published, as *Costume in England* (1846); *Dictionary of Terms in Art* (1854). These works are illustrated by numerous cuts, drawn on the wood by his own hand. His pencil was also employed in illustrating Evans's *Coins of the Ancient Britons*, Madden's *Jewish Coinage*, Halliwell's folio *Shakespeare* and his *Sir John Maundeville*, Roach Smith's *Richborough*, the *Miscellanea Graphica* of Lord Londesborough, and many other works. He died on the 3rd of April 1866. His books relating to Shakespeare were bequeathed to the library at Stratford-on-Avon; those on civic pageantry (between 200 and 300 volumes) to the Society of Antiquaries; his old prints and works on costume to the British Museum; his general library he desired to be sold and the proceeds devoted to the Literary Fund.

FAIRMONT, a city and the county-seat of Marion county, West Virginia, U.S.A., on both sides of the Monongahela river, about 75 m. S.E. of Wheeling. Pop. (1890) 1023; (1900) 5655, of whom 283 were negroes and 182 foreign-born; (1910) 9711. It is served by the Baltimore & Ohio railway. Among its manufactures are glass, machinery, flour and furniture, and it is an important shipping point for coal mined in the vicinity. The city is the seat of one of the West Virginia state normal schools. Fairmont was laid out as Middletown in 1819, became the county-seat of the newly established Marion county in 1842, received its present name about 1844, and was chartered as a city in 1899.

FAIR OAKS, a station on a branch of the Southern railway, 6 m. E. of Richmond, Virginia, U.S.A. It is noted as the site of one of the battles of the Civil War, fought on the 31st of May and the 1st of June 1862, between the Union (Army of the Potomac) under General G. B. McClellan and the Confederate forces (Army of Northern Virginia) commanded by General J. E. Johnston. The attack of the Confederates was made at a moment when the river Chickahominy divided the Federal army into two unequal parts, and was, moreover, swollen to such a degree as to endanger the bridges. General Johnston stationed part of his troops along the river to prevent the Federals sending aid to the smaller force south of it, upon which the Confederate attack, commanded by General Longstreet, was directed. Many accidents, due to the inexperience of the staff officers and to the difficulty of the ground, hindered the development of Longstreet's attack, but the Federals were gradually driven back with a loss of ten guns, though at the last moment reinforcements managed to cross the river and re-establish the line of defence. At the close of the day Johnston was severely wounded, and General G. W. Smith succeeded to the command. The battle was renewed on the 1st of June but not fought out. At the close of the action General R. E. Lee took over the command of the Confederates, which he held till the final surrender in April 1865. So far as the victory lay with either side, it was with the Union army, for the Confederates failed to achieve their purpose of destroying the almost isolated left wing of McClellan's army, and after the battle they withdrew into the lines of Richmond. The Union losses were 5031 in killed, wounded and missing; those of the Confederates were 6134. The battle is sometimes known as the battle of Seven Pines.

FAIRŪZĀBĀDĪ [Abū-ṭ-Ṭāhir ibn Ibrahīm Majd ud-Dīn ul-Fairūzābādī] (1329–1414), Arabian lexicographer, was born at Kārazīn near Shiraz. His student days were spent in Shiraz, Wāsiṭ, Bagdad and Damascus. He taught for ten years in

Jerusalem, and afterwards travelled in western Asia and Egypt. In 1368 he settled in Mecca, where he remained for fifteen years. He next visited India and spent some time in Delhi, then remained in Mecca another ten years. The following three years were spent in Bagdad, in Shiraz (where he was received by Timur), and in Ta’iz. In 1395 he was appointed chief cadi (qadi) of Yemen, married a daughter of the sultan, and died at Zabīd in 1414. During this last period of his life he converted his house at Mecca into a school of Mālikite law and established three teachers in it. He wrote a huge lexicographical work of 60 or 100 volumes uniting the dictionaries of Ibn Sīda, a Spanish philologist (d. 1066), and of Sajānī (d. 1252). A digest of or an extract from this last work is his famous dictionary *al-Qāmūs* (“the Ocean”), which has been published in Egypt, Constantinople and India, has been translated into Turkish and Persian, and has itself been the basis of several later dictionaries. (G. W. T.)

FAIRY (Fr. *fée, faerie*; Prov. *fada*; Sp. *hada*; Ital. *fata*; med. Lat. *fatare*, to enchant, from Lat. *fatum*, fate, destiny), the common term for a supposed race of supernatural beings who magically intermeddle in human affairs. Of all the minor creatures of mythology the fairies are the most beautiful, the most numerous, the most memorable in literature. Like all organic growths, whether of nature or of the fancy, they are not the immediate product of one country or of one time; they have a pedigree, and the question of their ancestry and affiliation is one of wide bearing. But mixture and connexion of races have in this as in many other cases so changed the original folk-product that it is difficult to disengage and separate the different strains that have gone to the making or moulding of the result as we have it.

It is not in literature, however ancient, that we must look for the early forms of the fairy belief. Many of Homer’s heroes have fairy lemans, called nymphs, fairies taken up into a higher region of poetry and religion; and the fairy leman is notable in the story of Athamas and his cloud bride Nephelē, but this character is as familiar to the unpoetical Eskimo, and to the Red Indians, with their bird-bride and beaver-bride (see A. Lang’s *Custom and Myth*, “The Story of Cupid and Psyche”). The Gandharvas of Sanskrit poetry are also fairies.

One of the most interesting facts about fairies is the wide distribution and long persistence of the belief in them. They are the chief factor in surviving Irish superstition. Here they dwell in the “raths,” old earth-forts, or earthen bases of later palisaded dwellings of the Norman period, and in the subterranean houses, common also in Scotland. They are an organized people, often called “the army,” and their life corresponds to human life in all particulars. They carry off children, leaving changeling substitutes, transport men and women into fairyland, and are generally the causes of all mysterious phenomena. Whirls of dust are caused by the fairy marching army, as by the being called Kutchi in the Dieri tribe of Australia. In 1907, in northern Ireland, a farmer’s house was troubled with flying stones (see POLTERGEIST). The neighbours said that the fairies caused the phenomenon, as the man had swept his chimney with a bough of holly, and the holly is “a gentle tree,” dear to the fairies. The fairy changeling belief also exists in some districts of Argyll, and a fairy boy dwelt long in a small farm-house in Glencoe, now unoccupied.

In Ireland and the west Highlands neolithic arrow-heads and flint chips are still fairy weapons. They are dipped in water, which is given to ailing cattle and human beings as a sovereign remedy for diseases. The writer knows of “a little lassie in green” who is a fairy and, according to the percipients, haunts the banks of the Mukomar pool on the Lochy. In Glencoe is a fairy hill where the fairy music, vocal and instrumental, is heard in still weather. In the Highlands, however, there is much more interest in second sight than in fairies, while in Ireland the reverse is the case. The best book on Celtic fairy lore is still that of the minister of Aberfoyle, the Rev. Mr Kirk (*ob.* 1692). His work on *The Secret Commonwealth of Elves, Fauns and Fairies*, left in MS. and incomplete (the remainder is in the Laing MSS., Edinburgh University library), was published (a hundred copies) in 1815 by Sir Walter Scott, and in the Bibliothèque de Carabas (Lang) there is a French translation. Mr Kirk is said (though his tomb exists) to have been carried away by fairies. He appeared to a friend and said that he would come again, when the friend must throw a dirk over his shoulder and he would return to this world. The friend, however, lost his nerve and did not throw the dirk. In the same way a woman reappeared to her husband in Glencoe in the last generation, but he was wooing another lass and did not make any effort to recover his wife. His character was therefore lost in the glen.

It is clear that in many respects fairyland corresponds to the pre-Christian abode of the dead. Like Persephone when carried to Hades, or Wainamoïnen in the Hades of the Finns (Manala), a living human being must not eat in fairyland; if he does, he dwells there for ever. Tamlane in the ballad, however, was “fat and fair of flesh,” yet was rescued by Janet: probably he had not abstained from fairy food. He was to be given as the *kane* to Hell, which shows a distinction between the beliefs in hell and in the place of fairies.

It is a not uncommon theory that the fairies survive in legend from prehistoric memories of a pigmy people dwelling in the subterranean earth-houses, but the contents of these do not indicate an age prior to the close of the Roman occupation of Britain; nor are pigmy bones common in neolithic sepulchres. The “people of peace” (*Daoine Shie*) of Ireland and Scotland are usually of ordinary stature, indeed not to be recognized as varying from mankind except by their proceedings (see J. Curtin, *Irish Folk-tales*).

The belief in a species of lady fairies, deathly to their human lovers, was found by R. L. Stevenson to be as common in Samoa (see *Island Nights’ Entertainments*) as in Strathfinlas or on the banks of Loch Awe. In New Caledonia a native friend of J. J. Atkinson (author of *Primal Law*) told him that he had met and caressed the girl of his heart in the forest, that she had vanished and must have been a fairy. He therefore would die in three days, which (Mr Atkinson informs the writer) he punctually did. The Greek sirens of Homer are clearly a form of these deadly fairies, as the Nereids and Oreads and Naiads are fairies of wells, mountains and the sea. The fairy women who come to the births of children and foretell their fortunes (*Fata, Moerae*, ancient Egyptian *Hathors, Fées, Dominae Fatales*), with their spindles, are refractions of the human “spae-women” (in the Scots term) who attend at birth and derive omens of the child’s future from various signs. The custom is common among several savage races, and these women, represented in the spiritual world by *Fata*, bequeath to us the French *fée*, in the sense of fairy. Perrault also uses *fée* for anything that has magical quality; “the key was *fée*,” had *mana*, or *wakan*, savage words for the supposed “power,” or *ether*, which works magic or is the vehicle of magical influences.

Though the fairy belief is universally human, the nearest analogy to the shape which it takes in Scotland and Ireland—the “pixies” of south-western England—is to be found in *Jān* or *Jinnis* of the Arabs, Moors and people of Palestine. In stories which have passed through a literary medium, like *The Arabian Nights*, the *geni* or *Jān* do not so much resemble our fairies as they do in the popular superstitions of the East, orally collected. The *Jān* are now a subterranean commonwealth, now they reside in ruinous places, like the fairies in the Irish raths. Like the fairies they go about in whirls of dust, or the dust-whirls themselves are *Jān*. They carry off men and women “to their own herd,” in the phrase of Mr Kirk, and are kind to mortals who are kind to them. They chiefly differ from our fairies in their greater tendency to wear animal forms; though, like the fairies, when they choose to appear in human shape they are not to be distinguished from men and women of mortal mould. Like the fairies everywhere they have amours with mortals, such as that of the Queen of Faery with Thomas of Ercildoune. The herb rue is potent against them, as in British folk-lore, and a man long captive among the *Jān* escaped from them by observing their avoidance of rue, and by plucking two handfuls thereof. They, like the British brownies (a kind of domesticated fairy), are the causes of strange disappearances of things. To preserve houses from their influences, rue, that "herb of grace," is kept in the apartments, and the name of Allah is constantly invoked. If this is omitted, things are stolen by the *Jān*.

They often bear animal names, and it is dangerous to call a cat or dog without pointing at the animal, for a *Jinni* of the same name may be present and may take advantage of the invocation. A man, in fun, called to a goat to escort his wife on a walk: he did not point at the goat, and the wife disappeared. A *Jinni* had carried her off, and her husband had to seek her at the court of the *Jān*. Euphemistically they are addressed as *mubārakin*, "blessed ones," as we say "the good folk" or "the people of peace." As our fairies give gold which changes into withered leaves, the *Jān* give onion peels which turn into gold. Like our fairies the *Jān* can apply an ointment, kohl, to human eyes, after which the person so favoured can see *Jān*, or fairies, which are invisible to other mortals, and can see treasure wherever it may be concealed (see *Folk-lore of the Holy Land*, by J. E. Hanauer, 1907).

It is plain that fairies and *Jān* are practically identical, a curious proof of the uniformity of the working of imagination in peoples widely separated in race and religion. Fairies naturally won their way into the poetry of the middle ages. They take lovers from among men, and are often described as of delicate, unearthly, ravishing beauty. The enjoyment of their charms is, however, generally qualified by some restriction or compact, the breaking of which is the cause of calamity to the lover and all his race, as in the notable tale of Melusine. This fay by enchantment built the castle of Lusignan for her husband. It was her nature to take every week the form of a serpent from the waist below. The hebdomadal transformation being once, contrary to compact, witnessed by her husband, she left him with much wailing, and was said to return and give warning by her appearance and great shrieks whenever one of the race of Lusignan was about to die. At the birth of Ogier le Danois six fairies attend, five of whom give good gifts, which the sixth overrides with a restriction. Gervaise of Tilbury, writing early in the 13th century, has in his *Otia Imperialia* a chapter, *De lamiis et nocturnis larvis*, where he gives it out, as proved by individuals beyond all exception, that men have been lovers of beings of this kind whom they call *Fadas*, and who did in case of infidelity or infringement of secrecy inflict terrible punishment—the loss of goods and even of life. There seems little in the characteristics of these fairies of romance to distinguish them from human beings, except their supernatural knowledge and power. They are not often represented as diminutive in stature, and seem to be subject to such human passions as love, jealousy, envy and revenge. To this class belong the fairies of Boiardo, Ariosto and Spenser.

There is no good modern book on the fairy belief in general. Keightley's *Fairy Mythology* is full of interesting matter; Rhys's *Celtic Mythology* is especially copious about Welsh fairies, which are practically identical with those of Ireland and Scotland. The works of Mr Jeremiah Curtin and Dr Douglas Hyde are useful for Ireland; for Scotland, Kirk's *Secret Commonwealth* has already been quoted. Scott's dissertation on fairies in *The Border Minstrelsy* is rich in lore, though necessarily Scott had not the wide field of comparative study opened by more recent researches. There is a full description of French fairies of the 15th century in the evidence of Jeanne d'Arc at her trial (1431) in Quicherat's *Procès de Jeanne d'Arc*, vol. i. pp. 67, 68, 187, 209, 212, vol. ii. pp. 390, 404, 450. (A. L.)

FAIRY RING, the popular name for the circular patches of a dark green colour that are to be seen occasionally on permanent grass-land, either lawn or meadow, on which the fairies were supposed to hold their midnight revels. They mark the area of growth of some fungus, starting from a centre of one or more plants. The mycelium produced from the spores dropped by the fungus or from the "spawn" in the soil, radiates outwards, and each year's successive crop of fungi rises from the new growth round the circle. The rich colour of the grass is due to the fertilizing quality of the decaying fungi, which are peculiarly rich in nitrogenous substances. The most complete and symmetrical grass rings are formed by *Marasmius oreades*, the fairy ring champignon, but the mushroom and many other species occasionally form rings, both on grass-lands and in woods. Observations were made on a ring in a pine-wood for a period of nine years, and it was calculated that it increased from centre to circumference about 8½ in. each year. The fungus was never found growing within the circle during the time the ring was under observation, the decaying vegetation necessary for its growth having become exhausted.

FAITHFULL, EMILY (1835–1895), English philanthropist, was the youngest daughter of the Rev. Ferdinand Faithfull, and was born at Headley Rectory, Surrey, in 1835. She took a great interest in the conditions of working-women, and with the object of extending their sphere of labour, which was then painfully limited, in 1860 she set up in London a printing establishment for women. The "Victoria Press," as it was called, soon obtained quite a reputation for its excellent work, and Miss Faithfull was shortly afterwards appointed printer and publisher in ordinary to Queen Victoria. In 1863 she began the publication of a monthly organ, *The Victoria Magazine*, in which for eighteen years she continuously and earnestly advocated the claims of women to remunerative employment. In 1868 she published a novel, *Change upon Change*. She also appeared as a lecturer, and with the object of furthering the interests of her sex, lectured widely and successfully both in England and the United States, which latter she visited in 1872 and 1882. In 1888 she was awarded a civil list pension of £50. She died in Manchester on the 31st of May 1895.

FAITH HEALING, a form of "mind cure," characterized by the doctrine that while pain and disease really exist, they may be neutralized and dispelled by faith in Divine power; the doctrine known as Christian Science (*q.v.*) holds, however, that pain is only an illusion and seeks to cure the patient by instilling into him this belief. In the Christian Church the tradition of faith healing dates from the earliest days of Christianity; upon the miracles of the New Testament follow cases of healing, first by the Apostles, then by their successors; but faith healing proper is gradually, from the 3rd century onwards, transformed into trust in relics, though faith cures still occur sporadically in later times. Catherine of Siena is said to have saved Father Matthew from dying of the plague, but in this case it is rather the healer than the healed who was strong in faith. With the Reformation faith healing proper reappears among the Moravians and Waldenses, who, like the Peculiar People of our own day, put their trust in prayer and anointing with oil. In the 16th century we find faith cures recorded of Luther and other reformers, in the next century of the Baptists, Quakers and other Puritan sects, and in the 18th century the faith healing of the Methodists in this country was paralleled by Pietism in Germany, which drew into its ranks so distinguished a man of science as Stahl (1660–1734). In the 19th century Prince Hohenlohe-Waldenburg-Schillingsfürst, canon of Grosswardein, was a famous healer on the continent; the Mormons and Irvingites were prominent among English-speaking peoples; in the last quarter of the 19th century faith healing became popular in London, and Bethshan homes were opened in 1881, and since then it has found many adherents in England.

Under faith healing in a wider sense may be included (1) the cures in the temples of Aesculapius and other deities in the ancient world; (2) the practice of touching for the king's evil, in vogue from the 11th to the 18th century; (3) the cures of Valentine Greatrakes, the "Stroker" (1629–1683); and (4) the miracles of Lourdes, and other resorts of pilgrims, among which may be mentioned St Winifred's Well in Flintshire, Treves with its Holy Coat, the grave of the Jansenist F. de Paris in the 18th century, the little town of Kevelaer from 1641 onwards, the tombs of St Louis, Francis of Assisi, Catherine of Siena and others.

An animistic theory of disease was held by Pastor J. Ch. Blumhardt, Dorothea Trudel, Boltzius and other European faith healers. Used in this sense faith healing is indistinguishable from much of savage leech-craft, which seeks to cure disease by expelling the evil spirit in some portion of the body. Although it is usually present, faith in the medicine man is not essential for the efficacy of the method. The same may be said of the lineal descendant of savage medicine—the magical leech-craft of European folk-lore; cures for toothache, warts, &c., act in spite of the disbelief of the sufferer; how far incredulity on the part of the healer would result in failure is an open question.

From the psychological point of view all these different kinds of faith healing, as indeed all kinds of mind cure, including those of Christian Science and hypnotism, depend on suggestion (*q.v.*). In faith healing proper not only are powerful direct suggestions used, but the religious atmosphere and the auto-suggestions of the patient co-operate, especially where the cures take place during a period of religious revival or at other times when large assemblies and strong emotions are found. The suggestibility of large crowds is markedly greater than that of individuals, and to this and the greater faith must be attributed the greater success of the fashionable places of pilgrimage.

See A. T. Myers and F. W. H. Myers in *Proc. Soc. Psychical Research*, ix. 160-209, on the miracles of Lourdes, with bibliography; A. Feilding, *Faith Healing and Christian Science*; O. Stoll, *Suggestion und Hypnotismus in der Völkerpsychologie*; article "Greatrakes" in *Dict. Nat. Biog.* (N. W. T.)

FAITHORNE, WILLIAM (1626 or 1627–1691), English painter and engraver, was born in London and was apprenticed to Robert Peake, a painter and printseller, who received the honour of knighthood from Charles I. On the outbreak of the Civil War he accompanied his master into the king's service, and being made prisoner at Basinghouse, he was confined for some time to Aldersgate, where, however, he was permitted to follow his profession of engraver, and among other portraits did a small one of the first Villiers, duke of Buckingham. At the earnest solicitation of his friends he very soon regained his liberty, but only on condition of retiring to France. There he was so fortunate as to receive instruction from Robert Nanteuil. He was permitted to return to England about 1650, and took up a shop near Temple Bar, where, besides his work as an engraver, he carried on a large business as a printseller. In 1680 he gave up his shop and retired to a house in Blackfriars, occupying himself chiefly in painting portraits from the life in crayons, although still occasionally engaged in engraving. It is said that his life was shortened by the misfortunes, dissipation, and early death of his son William. Faithorne is especially famous as a portrait engraver, and among those on whom he exercised his art were a large number of eminent persons, including Sir Henry Spelman, Oliver Cromwell, Henry Somerset, the marquis of Worcester, John Milton, Queen Catherine, Prince Rupert, Cardinal Richelieu, Sir Thomas Fairfax, Thomas Hobbes, Richard Hooker, Robert second earl of Essex, and Charles I. All his works are remarkable for their combination of freedom and strength with softness and delicacy, and his crayon paintings unite to these the additional quality of clear and brilliant colouring. He is the author of a work on engraving (1622).

His son WILLIAM (1656–1686), mezzotint engraver, at an early age gave promise of attaining great excellence, but became idle and dissipated, and involved his father in money difficulties. Among persons of note whose portraits he engraved are Charles II., Mary princess of Orange, Queen Anne when princess of Denmark, and Charles XII. of Sweden.

The best account of the Faithornes is that contained in Walpole's *Anecdotes of Painting*. A life of Faithorne the elder is preserved in the British Museum among the papers of Mr Bayford, librarian to Lord Oxford, and an intimate friend of Faithorne.

FAIZABAD, a town of Afghanistan, capital of the province of Badakshan, situated on the Kokcha river. In 1821 it was destroyed by Murad Beg of Kunduz, and the inhabitants removed to Kunduz. But since Badakshan was annexed by Abdur Rahman, the town has recovered its former importance, and is now a considerable place of trade. It is the chief cantonment for eastern Afghanistan and the Pamir region, and is protected by a fort built in 1904.

FAJARDO, a district and town on the E. coast of Porto Rico, belonging to the department of Humacao. Pop. (1899) of the district, 16,782; and of the town, 3414. The district is highly fertile and is well watered, owing in great measure to its abundant rainfall. Sugar production is its principal industry, but some attention is also given to the growing of oranges and pineapples. The town, which was founded in 1774, is a busy commercial centre standing 1¼ m. from a large and well-sheltered bay, at the entrance to which is the cape called Cabeza de San Juan. It is the market town for a number of small islands off the E. coast, some of which produce cattle for export.

FAKHR UD-DĪN RĀZI (1149–1209), Arabian historian and theologian, was the son of a preacher, himself a writer, and was born at Rai (Rei, Rhagae), near Tehran, where he received his earliest training. Here and at Marāgha, whither he followed his teacher Majd ud-Dīn ul-Jīlī, he studied philosophy and theology. He was a Shafi'ite in law and a follower of Ash'arī (*q.v.*) in theology, and became renowned as a defender of orthodoxy. During a journey in Khwarizm and Mawara'l-nahr he preached both in Persian and Arabic against the sects of Islam. After this tour he returned to his native city, but settled later in Herat, where he died. His dogmatic positions may be seen from his work *Kitāb ul-Muḥassal*, which is analysed by Schmölders in his *Essai sur les écoles philosophiques chez les Arabes* (Paris, 1842). Extracts from his *History of the Dynasties* were published by Jourdain in the *Fundgruben des Orients* (vol. v.), and by D. R. Heinzius (St Petersburg, 1828). His greatest work is the *Mafātiḥ ul-Ghaib* ("The Keys of Mystery"), an extensive commentary on the Koran published at Cairo (8 vols., 1890) and elsewhere; it is specially full in its exposition of Ash'arite theology and its use of early and late Mu'tazilite writings.

For an account of his life see F. Wüstenfeld's *Geschichte der arabischen Ärzte*, No. 200 (Göttingen, 1840); for a list of his works cf. C. Brockelmann's *Gesch. der arabischen Literatur*, vol. 1 (Weimar, 1898), pp. 506 ff. An account of his teaching is given by M. Schreiner in the *Zeitschrift der deutschen morgenländischen Gesellschaft* (vol. 52, pp. 505 ff.). (G. W. T.)

FAKIR (from Arabic *faqīr*, "poor"), a term equivalent to *Dervish* (*q.v.*) or Mahommedan religious mendicant, but which has come to be specially applied to the Hindu devotees and ascetics of India. There are two classes of these Indian Fakirs, (1) the religious orders, and (2) the nomad rogues who infest the country. The ascetic orders resemble the Franciscans of Christianity. The bulk lead really excellent lives in monasteries, which are centres of education and poor-relief; while others go out to visit the poor as Gurus or teachers. Strict celibacy is not enforced among them. These orders are of very ancient date, owing their establishment to the ancient Hindu rule, followed by the Buddhists, that each "twice-born" man should lead in the woods the life of an ascetic. The second class of Fakirs are simply disreputable beggars who wander round extorting, under the guise of religion, alms from the charitable and practising on the superstitions of the villagers. As a rule they make no real pretence of leading a religious life. They are said to number nearly a million. Many of them are known as "Jogi," and lay claim to miraculous powers which they declare have become theirs by the practice of abstinence and extreme austerities. The tortures which some of these wretches will inflict upon themselves are almost incredible. They will hold their arms over their heads until the muscles atrophy, will keep their fists clenched till the nails grow through the palms, will lie on beds of nails, cut and stab themselves, drag, week after week, enormous chains loaded with masses of iron, or hang themselves before a fire near enough to scorch. Most of them are inexpressibly filthy and verminous. Among the filthiest are the Aghoris, who preserve the ancient cannibal ritual of the followers of Siva, eat filth, and use a human skull as a drinking-vessel. Formerly the fakirs were always nude and smeared with ashes; but now they are compelled to wear some pretence of clothing. The natives do not really respect these wandering friars, but they dread their curses.

See John Campbell Oman, *The Mystics, Ascetics and Saints of India* (1903), and Indian Census Reports.

FALAISE, a town of north-western France, capital of an arrondissement in the department of Calvados, on the right bank of the Ante, 19 m. S. by E. of Caen by road. Pop. (1906)

6215. The principal object of interest is the castle, now partly in ruins, but formerly the seat of the dukes of Normandy and the birthplace of William the Conqueror. It is situated on a lofty crag overlooking the town, and consists of a square mass defended by towers and flanked by a small donjon and a lofty tower added by the English in the 15th century; the rest of the castle dates chiefly from the 12th century. Near the castle, in the Place de la Trinité, is an equestrian statue in bronze of William the Conqueror, to whom the town owed its prosperity. The churches of La Trinité and St Gervais combine the Gothic and Renaissance styles of architecture, and St Gervais also includes Romanesque workmanship. A street passes by way of a tunnel beneath the choir of La Trinité. Falaise has populous suburbs, one of which, Guibray, is celebrated for its annual fair for horses, cattle and wool, which has been held in August since the 11th century. The town is the seat of a subprefecture and has tribunals of first instance and commerce, a chamber of arts and manufacture, a board of trade-arbitrators and a communal college. Tanning and important manufactures of hosiery are carried on.

From 1417, when after a siege of forty-seven days it succumbed to Henry V., king of England, till 1450, when it was retaken by the French, Falaise was in the hands of the English.

FALASHAS (*i.e.* exiles; Ethiopic *falas*, a stranger), or "Jews of Abyssinia," a tribe of Hamitic stock, akin to Galla, Somali and Beja, though they profess the Jewish religion. They claim to be descended from the ten tribes banished from the Holy Land. Another tradition assigns them as ancestor Menelek, Solomon's alleged son by the queen of Sheba. There is little or no physical difference between them and the typical Abyssinians, except perhaps that their eyes are a little more oblique; and they may certainly be regarded as Hamitic. It is uncertain when they became Jews: one account suggests in Solomon's time; another, at the Babylonian captivity; a third, during the 1st century of the Christian era. That one of the earlier dates is correct seems probable from the fact that the Falashas know nothing of either the Babylonian or Jerusalem Talmud, make no use of phylacteries (*tefillin*), and observe neither the feast of Purim nor the dedication of the temple. They possess—not in Hebrew, of which they are altogether ignorant, but in Ethiopic (or Geez)—the canonical and apocryphal books of the Old Testament; a volume of extracts from the Pentateuch, with comments given to Moses by God on Mount Sinai; the Te-e-sa-sa Sanbat, or laws of the Sabbath; the Ardit, a book of secrets revealed to twelve saints, which is used as a charm against disease; lives of Abraham, Moses, &c.; and a translation of Josephus called Sana Aihud. A copy of the Orit or Mosaic law is kept in the holy of holies in every synagogue. Various pagan observances are mingled in their ritual: every newly-built house is considered uninhabitable till the blood of a sheep or fowl has been spilt in it; a woman guilty of a breach of chastity has to undergo purification by leaping into a flaming fire; the Sabbath has been deified, and, as the goddess Sanbat, receives adoration and sacrifice and is said to have ten thousand times ten thousand angels to wait on her commands. There is a monastic system, introduced it is said in the 4th century A.D. by Aba Zebra, a pious man who retired from the world and lived in the cave of Hoharewa, in the province of Armatshoho. The monks must prepare all their food with their own hands, and no lay person, male or female, may enter their houses. Celibacy is not practised by the priests, but they are not allowed to marry a second time, and no one is admitted into the order who has eaten bread with a Christian, or is the son or grandson of a man thus contaminated. Belief in the evil eye or shadow is universal, and spirit-raisers, soothsayers and rain-doctors are in repute. Education is in the hands of the monks and priests, and is confined to boys. Fasts, obligatory on all above seven years of age, are held on every Monday and Thursday, on every new moon, and at the passover (the 21st or 22nd of April). The annual festivals are the passover, the harvest feast, the Baala Mazalat or feast of tabernacles (during which, however, no booths are built), the day of covenant or assembly and Abraham's day. It is believed that after death the soul remains in a place of darkness till the third day, when the first sacrifice for the dead is offered; prayers are read in the synagogue for the repose of the departed, and for seven days a formal lament takes place every morning in his house. No coffins are used, and a stone vault is built over the corpse so that it may not come into direct contact with the earth.

The Falashas are an industrious people, living for the most part in villages of their own, or, if they settle in a Christian or Mahommedan town, occupying a separate quarter. They had their own kings, who, they pretend, were descended from David, from the 10th century until 1800, when the royal race became extinct, and they then became subject to the Abyssinian kingdom of Tigré. They do not mix with the Abyssinians, and never marry women of alien religions. They are even forbidden to enter the houses of Christians, and from such a pollution have to be purified before entering their own houses. Polygamy is not practised; early marriages are rare, and their morals are generally better than those of their Christian masters. Unlike most Jews, they have no liking for trade, but are skilled in agriculture, in the manufacture of pottery, ironware and cloth, and are good masons. Their numbers are variously estimated at from one hundred to one hundred and fifty thousand.

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FALCÃO, CHRISTOVÃO DE SOUSA (? 1512–1557), Portuguese poet, came of a noble family settled at Portalegre in the Alemtejo, which had originated with John Falcon or Falconet, one of the Englishmen who went to Portugal in 1386 in the suite of Philippa of Lancaster. His father, João Vaz de Almada Falcão, was an upright public servant who had held the captaincy of Elmina on the West African coast, but died, as he had lived, a poor man. There is a tradition that in boyhood Christovão fell in love with a beautiful child and rich heiress, D. Maria Brandão, and in 1526 married her clandestinely, but parental opposition prevented the ratification of the marriage. Family pride, it is said, drove the father of Christovão to keep his son under strict surveillance in his own house for five years, while the lady's parents, objecting to the youth's small means, put her into the Cistercian convent of Lorvão, and there endeavoured to wean her heart from him by the accusation that he coveted her fortune more than her person. Their arguments and the promise of a good match ultimately prevailed, and in 1534 D. Maria left the convent to marry D. Luis de Silva, captain of Tangier, while the broken-hearted Christovão told his sad story in some beautiful lyrics and particularly in the eclogue *Chrisfal*. He had been the disciple and friend of the poets Bernardim Ribeiro and Sá de Miranda, and when his great disappointment came, Falcão laid aside poetry and entered on a diplomatic career. There is documentary evidence that he was employed at the Portuguese embassy in Rome in 1542, but he soon returned to Portugal, and we find him at court again in 1548 and 1551. The date of his death, as of his birth, is uncertain. Such is the story accepted by Dr Theophilo Braga, the historian of Portuguese literature, but Senhor Guimarães shows that the first part is doubtful, and, putting aside the testimony of a contemporary and grave writer, Diogo do Couto, he even denies the title of poet to Christovão Falcão, arguing from internal and other evidence that *Chrisfal* is the work of Bernardim Ribeiro; his destructive criticism is, however, stronger than his constructive work. The eclogue, with its 104 verses, is the very poem of *saudade*, and its simple, direct language and chaste and tender feeling, enshrined in exquisitely sounding verses, has won for its author lasting fame and a unique position in Portuguese literature. Its influence on later poets has been very considerable, and Camoens used several of the verses as proverbs.

The poetical works of Christovão Falcão were published anonymously, owing, it is supposed, to their personal nature and allusions, and, in part or in whole, they have been often reprinted. There is a modern critical edition of *Chrisfal* and a *Carta* (letter) by A. Epiphanio da Silva Dias under the title *Obras de Christovão Falcão* (Oporto, 1893), and one of the *Cantigas* and *Esparsas* by the same scholar appeared in the *Revista Lusitana*, vol. 4, pp. 142-179 (Lisbon, 1896), under the name *Fragmento de um Cancioneiro do Seculo XVI.* See *Bernardim Ribeiro e o Bucolismo*, by Dr T. Braga (Oporto, 1897), and *Bernardim Ribeiro (O Poeta Crisfal)*, by Delfim Guimarães (Lisbon, 1908). (E. Pr.)

FALCK, ANTON REINHARD (1777–1843), Dutch statesman, was born at Utrecht on the 19th of March 1777. He studied at the university of Leiden, and entered the Dutch diplomatic service, being appointed to the legation at Madrid. Under King Louis Napoleon he was secretary-general for foreign affairs, but resigned office on the annexation of the Batavian republic to France. He took a leading part in the revolt of 1813 against French domination, and had a considerable share in the organization of the new kingdom of the Netherlands. As minister of education under William I. he reorganized the universities of Ghent, Louvain and Liége and the Royal Academy of Brussels. Side by side with his activities in education he directed the departments of trade and the colonies. Falck was called in Holland the king's good genius, but William I. presently tired of his counsels and he was superseded by Van Maanen. He was ambassador in London when the disturbances of 1830 convinced him of the necessity of the separation of Belgium from Holland. He consequently resigned his post and lived in close retirement until 1839, when he became the first Dutch minister at the Belgian court. He died at Brussels on the 16th of March 1843. Besides some historical works he left a correspondence of considerable political interest, printed in *Brieven van A. R. Falck, 1795–1843* (2nd ed. The Hague, 1861), and *Ambtsbrieven van A. R. Falck* (*ibid.* 1878).

FALCÓN, the most northern state of Venezuela, with an extensive coast line on the Caribbean Sea and Gulf of Venezuela. Pop. (1905 est.) 173,968. It lies between the Caribbean on the N. and the state of Lara on the S., with Zulia and the Gulf of Venezuela on the W. Its surface is much broken by irregular ranges of low mountains, and extensive areas on the coast are sandy plains and tropical swamps. The climate is hot, but, being tempered by the trade winds, is not considered unhealthy except in the swampy districts. The state is sparsely settled and has no large towns, its capital, Coro, being important chiefly because of its history, and as the entrepôt for an extensive inland district. The only port in the state is La Vela de Coro, on a small bay of the same name, 7 m. E. of the capital, with which it is connected by railway.

FALCON (Lat. *Falco*;[1] Fr. *Faucon*; Teutonic, *Falk* or *Valken*), a word now restricted to the high-couraged and long-winged birds of prey which take their quarry as it moves; but formerly it had a very different meaning, being by the naturalists of the 18th and even of the 19th century extended to a great number of birds comprised in the genus *Falco* of Linnaeus and writers of his day,[2] while, on the other hand, by falconers, it was, and still is, technically limited to the *female* of the birds employed by them in their vocation (see FALCONRY), whether "long-winged" and therefore "noble," or "short-winged" and "ignoble."

According to modern usage, the majority of the falcons, in the sense first given, may be separated into *five* very distinct groups: (1) the falcons pure and simple (*Falco* proper); (2) the large northern falcons (*Hierofalco*, Cuvier); (3) the "desert falcons" (*Gennaea*, Kaup); (4) the merlins (*Aesalon*, Kaup); and (5) the hobbies (*Hypotriorchis*, Boie). A sixth group, the kestrels (*Tinnunculus*, Vieillot), is often added. This, however, appears to have been justifiably reckoned a distinct genus.

The typical falcon is by common consent allowed to be that almost cosmopolitan species to which unfortunately the English epithet "peregrine" (*i.e.* strange or wandering) has been attached. It is the *Falco peregrinus* of Tunstall (1771) and of most recent ornithologists, though some prefer the specific name *communis* applied by J. F. Gmelin a few years later (1788) to a bird which, if his diagnosis be correct, could not have been a true falcon at all, since it had yellow irides—a colour never met with in the eyes of any bird now called by naturalists a "falcon." This species inhabits suitable localities throughout the greater part of the globe, though examples from North America have by some received specific recognition as *F. anatum* (the "duck-hawk"), and those from Australia have been described as distinct under the name of *F. melanogenys*. Here, as in so many other cases, it is almost impossible to decide as to which forms should, and which should not, be accounted merely local races. In size not surpassing a raven, this falcon (fig. 1) is perhaps the most powerful bird of prey for its bulk that flies, and its courage is not less than its power. It is the species, in Europe, most commonly trained for the sport of hawking (see FALCONRY). Volumes have been written upon it, and to attempt a complete account of it is, within the limits now available, impossible. The plumage of the adult is generally blackish-blue above, and white, with a more or less deep cream-coloured tinge, beneath—the lower parts, except the chin and throat, being barred transversely with black, while a black patch extends from the bill to the ear-coverts, and descends on either side beneath the mandible. The young have the upper parts deep blackish-brown, and the lower white, more or less strongly tinged with ochraceous-brown, and striped longitudinally with blackish-brown. From Port Kennedy, the most northern part of the American continent, to Tasmania, and from the shores of the Sea of Okhotsk to Mendoza in the Argentine territory, there is scarcely a country in which this falcon has not been found. Specimens have been received from the Cape of Good Hope, and it is only a question of the technical differentiation of species whether it does not extend to Cape Horn. Fearless as it is, and adapting itself to almost every circumstance, it will form its eyry equally on the sea-washed cliffs, the craggy mountains, or (though more rarely) the drier spots of a marsh in the northern hemisphere, as on trees (says H. Schlegel) in the forests of Java or the waterless ravines of Australia. In the United Kingdom it was formerly very common, and hardly a high rock from the Shetlands to the Isle of Wight

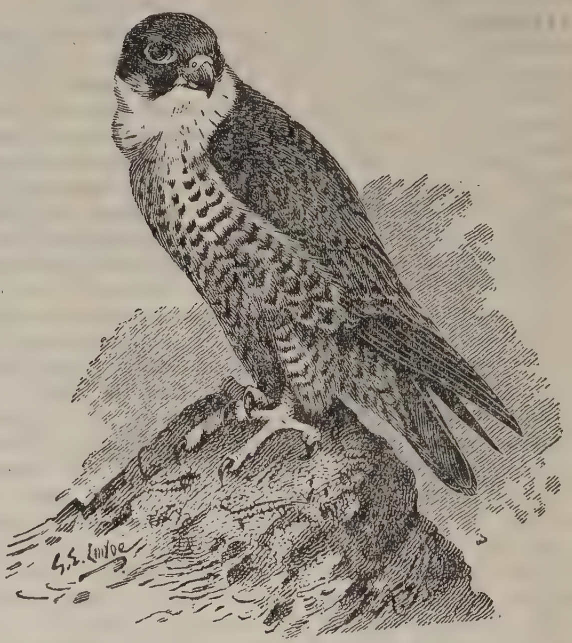

Fig. 1.—Peregrine Falcon.

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[1] Unknown to classical writers, the earliest use of this word is said to be by Servius Honoratus (*circa* A.D. 390–480) in his notes on *Aen.* x. 145. It seems possibly to be the Latinized form of the Teutonic *Falk*, though *falx* is commonly accounted its root.

[2] The nomenclature of nearly all the older writers on this point is extremely confused. What many of them, even so lately as Pennant's time, termed the "gentle falcon" is certainly the bird we now call the goshawk (*i.e.* goose-hawk), which name itself may have been transferred to the *Astur palumbarius* of modern ornithologists, from one of the long-winged birds of prey.

but had a pair as its tenants. But the British gamekeeper has long held the mistaken faith that it is his worst foe, and the number of pairs now allowed to rear their brood unmolested in the British Islands is very small. Yet its utility to the game-preserver, by destroying every one of his most precious wards that shows any sign of infirmity, can hardly be questioned by reason, and G. E. Freeman (*Falconry*) has earnestly urged its claims to protection.[1] Nearly allied to this falcon are several species, such as *F. barbarus* of Mauretania, *F. minor* of South Africa, the Asiatic *F. babylonicus*, *F. peregrinator* of India (the shaheen), and perhaps *F. cassini* of South America, with some others.

Next to the typical falcons comes a group known as the "great northern" falcons (*Hierofalco*). Of these the most remarkable is the gyrfalcon (*F. gyrfalco*), whose home is in the Scandinavian mountains, though the young are yearly visitants to the plains of Holland and Germany. In plumage it very much resembles *F. peregrinus*, but its flanks have generally a bluer tinge, and its superiority in size is at once manifest. Nearly allied to it is the Icelander (*F. islandus*), which externally differs in its paler colouring and in almost entirely wanting the black mandibular patch. Its proportions, however, differ a good deal, its body being elongated. Its country is shown by its name, but it also inhabits south Greenland, and not unfrequently makes its way to the British Islands. Very close to this comes the Greenland falcon (*F. candicans*), a native of north Greenland, and perhaps of other countries within the Arctic Circle. Like the last, the Greenland falcon from time to time occurs in the United Kingdom, but it is always to be distinguished by wearing a plumage in which at every age the prevailing colour is pure white. In north-eastern America these birds are replaced by a kindred form (*F. labradorus*), first detected by Audubon and subsequently recognized by Dresser (*Orn. Miscell.* i. 135). It is at once distinguished by its very dark colouring, the lower parts being occasionally almost as deeply tinted at all ages as the upper.

All the birds hitherto named possess one character in common. The darker markings of their plumage are longitudinal before the first real moult takes place, and for ever afterwards are transverse. In other words, when young the markings are in the form of stripes, when old in the form of bars. The variation of tint is very great, especially in *F. peregrinus*; but the experience of falconers, whose business it is to keep their birds in the very highest condition, shows that a falcon of either of these groups if light-coloured in youth is light-coloured when adult, and if dark when young is also dark when old—age, *after the first moult*, making no difference in the complexion of the bird. The next group is that of the so-called "desert falcons" (*Gennaea*), wherein the difference just indicated does not obtain, for long as the bird may live and often as it may moult, the original style of markings never gives way to any other. Foremost among these are to be considered the lanner and the saker (commonly termed *F. lanarius* and *F. sacer*), both well known in the palmy days of falconry, but only since about 1845 readmitted to full recognition. Both of these birds belong properly to south-eastern Europe, North Africa and south-western Asia. They are, for their bulk, less powerful than the members of the preceding group, and though they may be trained to high flights are naturally captors of humbler game. The precise number of species is very doubtful, but among the many candidates for recognition are especially to be named the lugger (*F. jugger*) of India, and the prairie falcon (*F. mexicanus*) of the western plains of North America.

The systematist finds it hard to decide in what group he should place two somewhat large Australian species (*F. hypoleucus* and *F. subniger*), both of which are rare in collections—the latter especially.

A small but very beautiful group comes next—the merlins[2] (*Aesalon* of some writers, *Lithofalco* of others). The European merlin (*F. aesalon*) is perhaps the boldest of the *Accipitres*, not hesitating to attack birds of twice its own size, and even on occasion threatening human beings. Yet it readily becomes tame, if not affectionate, when reclaimed, and its ordinary prey consists of the smaller *Passeres*. Its "pinion of glossy blue" has become almost proverbial, and a deep ruddy blush suffuses its lower parts; but these are characteristic only of the male—the female maintaining very nearly the sober brown plumage she wore when as a nestling she left her lowly cradle in the heather. Very close to this bird comes the pigeon-hawk (*F. columbarius*) of North America—so close, indeed, that none but an expert ornithologist can detect the difference. The turumti of Anglo-Indians (*F. chicquera*), and its representative from southern Africa (*F. ruficollis*), also belong to this group, but they are considerably larger than either of the former.

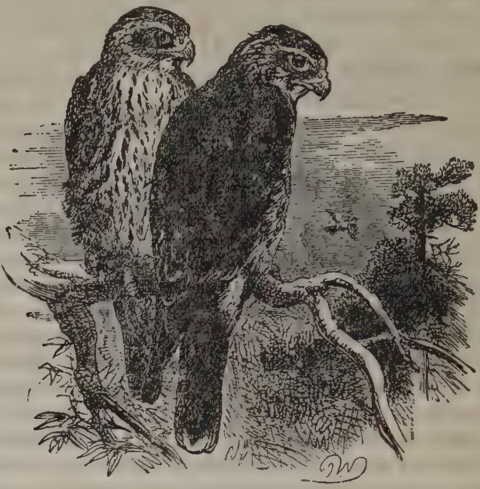

FIG. 2.—Merlin.

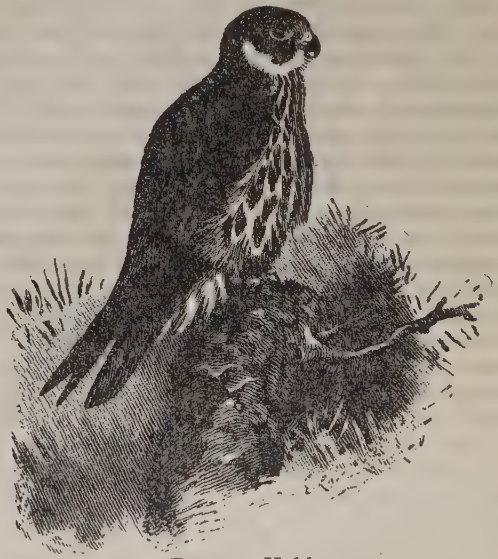

FIG. 3.—Hobby.

Lastly, the Hobbies (*Hypotriorchis*) comprise a greater number of forms—though how many seems to be doubtful. They are in life at once recognizable by their bold upstanding position, and at any time by their long wings. The type of this group is the English hobby (*F. subbuteo*), a bird of great power of flight, chiefly shown in the capture of insects, which form its ordinary food. It is a summer visitant to most parts of Europe, including the British Islands, and is most wantonly and needlessly destroyed by gamekeepers. A second European species of the group is the beautiful *F. eleonorae*, which hardly comes farther north than the countries bordering the Mediterranean, and, though in some places abundant, is an extremely local bird. The largest species of this section seems to be the Neotropical *F. femoralis*, for *F. diroleucus* though often ranked here, is now supposed to belong to the group of typical falcons. (A. N.)

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[1] It is not to be inferred, as many writers have done, that falcons habitually prey upon birds in which disease has made any serious progress. Such birds meet their fate from the less noble *Accipitres* or predatory animals of many kinds. But when a bird is *first* affected by any disorder, its power of taking care of itself is at once impaired, and hence in the majority of cases it may become an easy victim under circumstances which would enable a perfectly sound bird to escape from the attack even of a falcon.

[2] French, *Émerillon*; Icelandic, *Smirill*.

FALCONE, ANIELLO (1600–1665), Italian battle-painter, was the son of a tradesman, and was born in Naples. He showed his artistic tendency at an early age, received some instruction from a relative, and then studied under Ribera (Lo Spagnoletto), of whom he ranks as the most eminent pupil. Besides battle-pictures, large and small, taken from biblical as well as secular history, he painted various religious subjects, which, however, count for little in his general reputation. He became, as a battle-painter, almost as celebrated as Borgognone (Courtois), and was named "L'Oracolo delle Battaglie." His works have animation, variety, truth to nature, and careful colour. Falcone was bold, generous, used to arms, and an excellent fencer. In the insurrection of Masaniello (1647) he resolved to be bloodily avenged for the death, at the hands of two Spaniards, of a nephew and of a pupil in the school of art which he had established in Naples. He and many of his scholars, including Salvator Rosa and Carlo Coppola, formed an armed band named the *Compagnia della Morte* ("Company of Death"; see ROSA, SALVATOR). They scoured the streets by day, exulting in slaughter; at night they were painters again, and handled the brush with impetuous zeal. Peace being restored, they had to decamp. Falcone and Rosa made off to Rome; here Borgognone noticed the works of Falcone, and became his friend, and a French gentleman induced him to go to France, where Louis XIV. became one of his patrons. Ultimately Colbert obtained permission for the painter to return to Naples, and there he died in 1665. Two of his battle-pieces are to be seen in the Louvre and in the Naples museum; he painted a portrait of Masaniello, and engraved a few plates. Among his principal scholars, besides Rosa and Coppola (whose works are sometimes ascribed to Falcone himself), were Domenico Gargiuolo (named Micco Spadaro), Paolo Porpora and Andrea di Lione.

FALCONER, HUGH (1808–1865), British palaeontologist and botanist, descended from an old Scottish family, was born at Forres on the 29th of February 1808. In 1826 he graduated at Aberdeen, where he manifested a taste for the study of natural history. He afterwards studied medicine in the university of Edinburgh, taking the degree of M.D. in 1829; during this period he zealously attended the botanical classes of Prof. R. Graham (1786–1845), and those on geology by Prof. R. Jameson. Proceeding to India in 1830 as assistant-surgeon on the Bengal establishment of the East India Company, he made on his arrival an examination of the fossil bones from Ava in the possession of the Asiatic Society of Bengal, and his description of the collection, published soon afterwards, gave him a recognized position among the scientists of India. Early in 1831 he was appointed to the army station at Meerut, in the North-Western Provinces, but in the same year he was asked to officiate as superintendent of the botanic garden of Saharanpur, during the ill-health and absence of Dr J. F. Royle; and in 1832 he succeeded to this post. He was thus placed in a district that proved to be rich in palaeontological remains; and he set to work to investigate its natural history and geology. In 1834 he published a geological description of the Siwalik hills, in the Tertiary strata of which he had in 1831 discovered bones of crocodiles, tortoises and other animals; and subsequently, with conjoint labourers, he brought to light a sub-tropical fossil fauna of unexampled extent and richness, including remains of *Mastodon*, the colossal ruminant *Sivatherium*, and the enormous tortoise *Colossochelys Atlas*. For these valuable discoveries he and Captain (afterwards Sir Proby T.) Cautley (1802–1871) received in 1837 the Wollaston medal in duplicate from the Geological Society of London. In 1834 Falconer was appointed to inquire into the fitness of India for the growth of the tea-plant, and it was on his recommendation that it was introduced into that country.

He was compelled by illness to leave India in 1842, and during his stay in England he occupied himself with the classification and arrangement of the Indian fossils presented to the British Museum and East India House, chiefly by himself and Sir Proby T. Cautley. He then set to work to edit the great memoir by Cautley and himself, entitled *Fauna Antiqua Sivalensis*, of which Part I. text was issued in 1846, and a series of 107 plates during the years 1846–1849. Unfortunately the work, owing partly to Dr Falconer's absence from England and partly to ill-health, was never completed. He was elected F.R.S. in 1845. In 1847 he was appointed superintendent of the Calcutta botanical garden, and professor of botany in the medical college; and on entering on his duties in the following year he was at once employed by the Indian government and the Agricultural and Horticultural Society as their adviser on all matters connected with the vegetable products of India. He prepared an important report on the teak forests of Tenasserim, and this was the means of saving them from destruction by reckless felling; and through his recommendation the cultivation of the cinchona bark was introduced into the Indian empire. Being compelled by the state of his health to leave India in 1855, he spent the remainder of his life chiefly in examining fossil species in England and the Continent corresponding to those which he had discovered in India, notably the species of mastodon, elephant and rhinoceros; he also described some new mammalia from the Purbeck strata, and he reported on the bone-caves of Sicily, Gibraltar, Gower and Brixham. In the course of his researches he became interested in the question of the antiquity of the human race, and actually commenced a work on "Primeval Man," which, however, he did not live to finish. He died on the 31st of January 1865. Shortly after his death a committee was formed for the promotion of a "Falconer Memorial." This took the shape of a marble bust, which was placed in the rooms of the Royal Society of London, and of a Falconer scholarship of the annual value of £100, open for competition to graduates in science or medicine of the university of Edinburgh.

Dr Falconer's botanical notes, with 450 coloured drawings of Kashmir and Indian plants, have been deposited in the library at Kew Gardens, and his *Palaeontological Memoirs and Notes*, comprising all his papers read before learned societies, have been edited, with a biographical sketch, by Charles Murchison, M.D. (London, 1868). Many reminiscences of Dr Falconer, and a portrait of him, were published by his niece, Grace, Lady Prestwich, in her *Essays descriptive and biographical* (1901).

FALCONER, WILLIAM (1732–1769), British poet, was born in Edinburgh on the 11th of February 1732. His father was a wig-maker, and carried on business in one of the small shops with wooden fronts at the Netherbow Port, an antique castellated structure which remained till 1764, dividing High Street from the Canongate. The old man became bankrupt, then tried business as a grocer, and finally died in extreme poverty. William, the son, having received a scanty education, was put to sea. He served on board a Leith merchant vessel, and in his eighteenth year obtained the appointment of second mate of the "Britannia," a vessel employed in the Levant trade, and sailed from Alexandria for Venice. The "Britannia" was overtaken by a dreadful storm off Cape Colonna and was wrecked, only three of the crew being saved. Falconer was happily one of the three, and the incidents of the voyage and its disastrous termination formed the subject of his poem of *The Shipwreck* (1762). Meanwhile, on his return to England, Falconer, in his nineteenth year, printed at Edinburgh an elegy on Frederick, prince of Wales, and afterwards contributed short pieces to the *Gentleman's Magazine*. Some of these descriptive and lyrical effusions possess merit. The fine naval song of "The Storm" ("Cease, rude Boreas"), reputed to be by George Alexander Stevens, the dramatic writer and lecturer, has been ascribed to Falconer, but apparently on no authority. The duke of York, to whom *The Shipwreck* had been dedicated, advised Falconer to enter the royal navy, and before the end of 1762 the poet-sailor was rated as a midshipman on board the "Royal George." But as this ship was paid off at the peace of 1763, Falconer received an appointment as purser of the "Glory" frigate, a situation which he held until that vessel was laid up on ordinary at Chatham. In 1764 he published a new and enlarged edition of *The Shipwreck*, and in the same year a rhymed political tirade against John Wilkes and Charles Churchill, entitled *The Demagogue*. In 1769 appeared his *Universal Marine Dictionary*, in which *retreat* is defined as a French manœuvre, "not properly a term of the British marine." While engaged on this dictionary, J. Murray, a bookseller in Fleet Street, father of Byron's munificent publisher and correspondent, wished him to join him as a partner in business. The poet declined the offer, and became purser of the "Aurora" frigate, which had been commissioned to carry out to India certain supervisors or superintendents of the East India Company. Besides his nomination as purser, Falconer was promised the post of private secretary to the commissioners. Before sailing he published a third edition of his *Shipwreck*, which had again undergone "correction," but not improvement. The poet sailed in the "Aurora" from Spithead on the 20th of September 1769. The vessel arrived safely at the Cape of Good Hope, and left on the 27th of December. She was never more heard of, having, as is supposed, foundered at sea. *The Shipwreck*, the poem with which Falconer's name is connected, had a great reputation at one time, but the fine passages which pleased the earlier critics have not saved it from general oblivion.

See his *Poetical Works* in the "Aldine Edition" (1836), with a life by J. Mitford.

FALCONET, ÉTIENNE MAURICE (1716–1791), French sculptor, was born in Paris. His parents were poor, and he was at first apprenticed to a carpenter, but some of his clay-figures, with the making of which he occupied his leisure hours, attracted the notice of the sculptor Lemoine, who made him his pupil. He found time to study Greek and Latin, and also wrote several *brochures* on art. His artistic productions are characterized by the same defects as his writings, for though manifesting considerable cleverness and some power of imagination, they display in many cases a false and fantastic taste, the result, most probably, of an excessive striving after originality. One of his most successful statues was one of Milo of Crotona, which secured his admission to the membership of the Academy of Fine Arts in 1754. At the invitation of the empress Catherine he went in 1766 to St Petersburg, where he executed a colossal statue of Peter the Great in bronze. In 1788 he became director of the French Academy of Painting. Many of Falconet's works, being placed in churches, were destroyed at the time of the French Revolution. His "*Nymphe descendant au bain*" is in the Louvre.

Among his writings are *Réflexions sur la sculpture* (Paris, 1768), and *Observations sur la statue de Marc-Aurèle* (Paris, 1771). The whole were collected under the title of *Œuvres littéraires* (6 vols., Lausanne, 1781–1782; 3 vols., Paris, 1787).

FALCONRY (Fr. *fauconnerie*, from Late Lat. *falco*, falcon), the art of employing falcons and hawks in the chase, often termed *Hawking*. Falconry was for many ages one of the principal sports of the richer classes, and, since many more efficacious methods and appliances for the capture of game undoubtedly existed, it is probable that it has always been carried on as a pure sport. The antiquity of falconry is very great. There appears to be little doubt that it was practised in Asia at a very remote period, for which we have the concurrent testimony of various Chinese and Japanese works, some of the latter being most quaintly and yet spiritedly illustrated. It appears to have been known in China some 2000 years B.C., and the records of a king Wen Wang, who reigned over a province of that country 689 B.C., prove that the art was at that time in very high favour. In Japan it appears to have been known at least 600 years B.C., and probably at an equally early date in India, Arabia, Persia and Syria. Sir A. H. Layard, in his *Nineveh and Babylon*, considered that in a bas-relief found by him in the ruins of Khorsabad "there appeared to be a falconer bearing a hawk on his wrist," from which it would appear to have been known there some 1700 years B.C. In all the above-mentioned countries of Asia it is practised at the present day.

Little is known of the early history of falconry in Africa, but from very ancient Egyptian carvings and drawings it seems to have been known there many ages ago. It was probably also in vogue in the countries of Morocco, Oran, Algiers, Tunis and Egypt, at the same time as in Europe. The older writers on falconry, English and continental, often mention Barbary and Tunisian falcons. It is still practised in Egypt.

Perhaps the oldest records of falconry in Europe are supplied by the writings of Pliny, Aristotle and Martial. Although their notices of the sport are slight and somewhat vague, yet they are quite sufficient to show clearly that it was practised in their days—between the years 384 B.C. and A.D. 40. It was probably introduced into England from the continent about A.D. 860, and from that time down to the middle of the 17th century falconry was followed with an ardour that perhaps no English sport has ever called forth, not even fox-hunting. Stringent laws and enactments, notably in the reigns of William the Conqueror, Edward III., Henry VIII. and Elizabeth, were passed from time to time in its interest. Falcons and hawks were allotted to degrees and orders of men according to rank and station—for instance, to the emperor the eagle and vulture, to royalty the jerfalcons, to an earl the peregrine, to a yeoman the goshawk, to a priest the sparrow-hawk, and to a knave or servant the useless kestrel. The writings of Shakespeare furnish ample testimony to the high and universal estimation in which it was held in his days. About the middle of the 17th century falconry began to decline in England, to revive somewhat at the Restoration. It never, however, completely recovered its former favour, a variety of causes operating against it, such as enclosure of waste lands, agricultural improvements, and the introduction of fire-arms into the sporting field, till it fell, as a national sport, almost into oblivion. Yet it has never been even temporarily extinct, and it is successfully practised even at the present day.

In Europe the game or "quarry" at which hawks are flown consists of grouse (confined to the British Isles), black-game, pheasants, partridges, quails, landrails, ducks, teal, woodcocks, snipes, herons, rooks, crows, gulls, magpies, jays, blackbirds, thrushes, larks, hares and rabbits. In former days geese, cranes, kites, ravens and bustards were also flown at. Old German works make much mention of the use of the Iceland falcon for taking the great bustard, a flight scarcely alluded to by English writers. In Asia the list of quarry is longer, and, in addition to all the foregoing, or their Asiatic representatives, various kinds of bustards, sand grouse, storks, ibises, spoonbills, pea-fowl, jungle-fowl, kites, vultures and gazelles are captured by trained hawks. In Mongolia and Chinese Tartary, and among the nomad tribes of central Asia, the sport still flourishes; and though some late accounts are not satisfactory either to the falconer or the naturalist, yet they leave no doubt that a species of eagle is still trained in those regions to take large game, as antelopes and wolves. Mr Atkinson, in his account of his travels in the country of the Amur, makes particular mention of the sport, as does also Mr Shaw in his work on Yarkand; and in a letter from the Yarkand embassy, under Mr Forsyth, C.B., dated Camp near Yarkand, Nov. 27, 1873, the following passage occurs:—"Hawking appears also to be a favourite amusement, the golden eagle taking the place of the falcon or hawk. This novel sport seemed very successful." It is questionable whether the bird here spoken of is the golden eagle. In Africa gazelles are taken, and also partridges and wildfowl.

The hawks used in England are the three great northern falcons, viz. the Greenland, Iceland and Norway falcons, the peregrine falcon, the hobby, the merlin, the goshawk and the sparrow-hawk. In former days the saker, the lanner and the Barbary or Tunisian falcon were also employed. (See FALCON.)

Of the foregoing the easiest to keep, most efficient in the field, and most suitable for general use are the peregrine falcon and the goshawk.

In all hawks, the female is larger and more powerful than the male.

Hawks are divided by falconers all over the world into two great classes. The first class comprises "falcons," *i.e.* "long-winged hawks," or "hawks of the lure," distinguished by Eastern falconers as "dark-eyed hawks." In these the wings are pointed, the second feather in the wing is the longest, and the iris is of a deep, dark-brown hue. Merlins must, however, be excepted; and here it would seem that the Eastern distinction is the better, for though merlins are much more falcons than they are hawks, they differ from falcons in having the third feather in the wing the longest, while they are certainly "dark-eyed hawks."

The second class is that of "hawks," *i.e.* "short-winged hawks," or "hawks of the fist," called by Eastern falconers "yellow (or rose) eyed hawks." In these the wings are rounded, the fourth feather is the longest in the wing, and the iris is yellow, orange or deep-orange.

The following glossary of the principal terms used in falconry may assist the reader in perusing this notice of the practice of the art. Useless or obsolete terms are omitted:—

Austringan.—A falconer.

Bate.—A hawk is said to "bate" when she flutters off from the fist, perch or block, whether from wildness, or for exercise, or in the attempt to chase.

Bewits.—Straps of leather by which the bells are fastened to a hawk's legs.

Bind.—A hawk is said to "bind" when she seizes a bird in the air and clings to it.

Block.—The conical piece of wood, of the form of an inverted flower-pot, used for hawks to sit upon; for a peregrine it should be about 10 to 12 in. high, 5 to 6 in diameter at top, and 8 to 9 in diameter at base.

Brail.—A thong of soft leather used to secure, when desirable, the wing of a hawk. It has a slit to admit the pinion joint, and the ends are tied together.

Cadge.—The wooden frame on which hawks, when numerous, are carried to the field.

Cadger.—The person who carries the cadge.

Calling off.—Luring a hawk (see *Lure*) from the hand of an assistant.

Carry.—A hawk is said to "carry" when she flies away with the quarry on the approach of the falconer.

Cast.—Two hawks which may be used for flying together are called a "cast," not necessarily a pair.

Casting.—The oblong or egg-shaped ball, consisting of feathers, bones, &c., which all hawks (and insectivorous birds) throw up after the nutritious part of their food has been digested. Also the fur or feathers given them to assist the process.

Cere.—The naked wax-like skin above the beak.

Check.—A hawk is said to fly at "check" when she flies at a bird other than the intended object of pursuit.

Clutching.—Taking the quarry in the feet as the short-winged hawks do. Falcons occasionally "clutch."

Come to.—A hawk is said to "come to" when she begins to get tame.

Coping.—Cutting the beak or talons of a hawk.

Crab.—To fight.

Creance.—A long line or string.

Crop, to put away.—A hawk is said to "put away her crop" when the food passes out of the crop into the stomach.

Deck feathers.—The two centre tail-feathers.

Eyas.—A hawk which has been brought up from the nest (nyas, from Fr. *niais*).

Eyry.—The nest of a hawk.

Foot.—A hawk is said to "foot" well or to be a "good footer" when she is successful in killing. Many hawks are very fine fliers without being "good footers."

Frounce.—A disease in the mouth and throat of hawks.

Get in.—To go up to a hawk when she has killed her quarry.

Hack.—The state of partial liberty in which young hawks must always at first be kept.

Haggard.—A wild-caught hawk in the adult plumage.

Hood.—(See fig.)

Hoodshy.—A hawk is said to be "hoodshy" when she is afraid of, or resists, having her hood put on.

Hunger trace.—A mark, and a defect, in the tail feathers, denoting a weak point; generally due to temporary starvation as a nestling.

Imping.—The process of mending broken feathers is called "imping." (See fig.)

Imping needle.—A piece of tough soft iron wire from about $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long, rough filed so as to be three-sided and tapering from the middle to the ends. (See fig.)

Intermewed.—A hawk moulted in confinement is said to be "intermewed."

Jack.—Mate of the merlin.

Jerkin.—Mate of the jerfalcon.

Jesses.—Strips of light but very tough leather, some 6 to 8 in. long, which always remain on a hawk's legs—one on each leg. (See fig.)

Jonk.—To sleep.

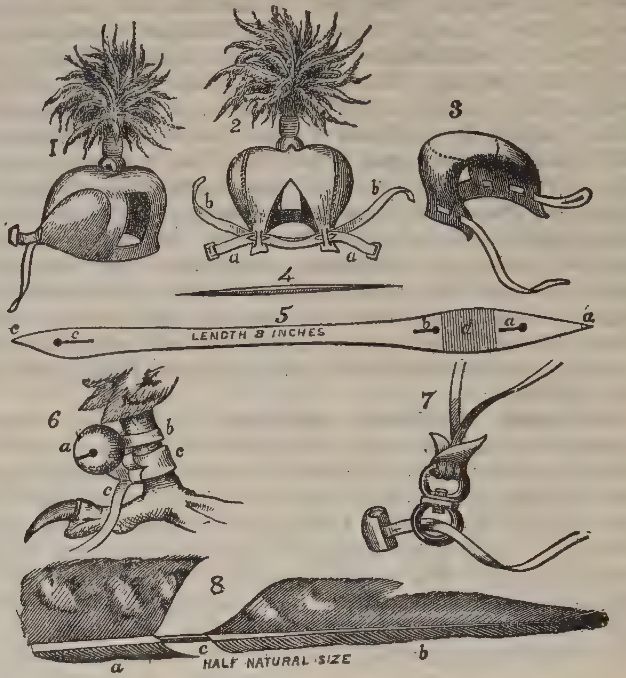
Leash.—A strong leathern thong, some $2\frac{1}{2}$ or 3 ft. long, with a knot or button at one end, used to secure a hawk. (See fig.)

Lure.—The instrument used for calling long-winged hawks—a dead pigeon, or an artificial lure made of leather and feathers or wings of birds, tied to a string, with meat attached to it.

Mail.—The breast feathers.

Make hawk.—A hawk is called a "make hawk" when, as a thoroughly trained and steady hawk, she is flown with young ones to teach them their work.

Man a hawk.—To tame a hawk and accustom her to strangers.



Implements used in Falconry.

1. Hood.
2. Back view of hood, showing braces *a*, *a*, *b*, *b*; by drawing the braces *b*, *b*, the hood, now open, is closed.
3. Rufter hood.
4. Imping-needle.
5. Jess; *d* is the space for the hawk's leg; the point and slit *a*, *a* are brought round the leg, and passed through slit *b*, after which the point *c* and slit *c*, and also the whole remaining length of jess, are pulled through slits *a* and *b*; *c* is the slit to which the upper ring of swivel is attached.
6. Hawk's leg with bell *a*, bewit *b*, jess *c*.
7. Jesses, swivel and leash.
8. Portion of first wing-feather of male peregrine falcon, "tiercel," half natural size, in process of imping; *a*, the living hawk's feather; *b*, piece supplied from another tiercel, with the imping needle *c* pushed half its length into it and ready to be pushed home into the living bird's feather.

Mantle.—A hawk is said to "mantle" when she stretches out a leg and a wing simultaneously, a common action of hawks when at ease; also when she spreads out her wings and feathers to hide any quarry or food she may have seized from another hawk, or from man. In the last case it is a fault.

Mew.—A hawk is said to "mew" when she moults. The place where a hawk was kept to moult was in olden times called her "mew." Buildings where establishments of hawks were kept were called "mews."

Musket.—Male of the sparrow-hawk.

Mutes (*mutings*).—Excrement of hawk.

Pannel.—The stomach of a hawk, corresponding with the gizzard of a fowl, is called her pannel. In it the casting is formed.

Passage.—The line herons take over a tract of country on their way to and from the heronry when procuring food in the breeding season.

Passage hawks.—Hawks captured when on their passage or migration.

Pelt.—The dead body of any quarry the hawk has killed.

Pitch.—The height to which a hawk, when waiting for game to be flushed, rises in the air.

Plume.—A hawk is said to "plume" a bird when she pulls off the feathers.

Point.—A hawk "makes her point" when she rises in the air over the spot where quarry has saved itself from capture by dashing into a hedge, or has otherwise secreted itself.

Pounces.—A hawk's claws.

Pull through the hood.—A hawk is said to pull through the hood when she eats with it on.

Put in.—A bird is said to "put in" when it saves itself from the hawk by dashing into covert or other place of security.

Quarry.—The bird or beast flown at.

Rake out.—A hawk is said to "rake out" when she flies, while "waiting on" (see *Wait on*), too far and wide from her master.

Ramage.—Wild.

Red hawk.—Hawks of the first year, in the young plumage, are called "red hawks."

Ringing.—A bird is said to "ring" when it rises spirally in the air.

Rufter hood.—An easy fitting hood, not, however, convenient for hooding and unhooding—used only for hawks when first captured. (See fig.)

Sails.—The wings of a hawk.

Seeling.—Closing the eyes by a fine thread drawn through the lid of each eye, the threads being then twisted together above the head—a practice long disused in England.

Serving a hawk.—Driving out quarry which has taken refuge, or has "put in."

Stoop.—The hawk's rapid plunge upon the quarry.

Take the air.—A bird is said to "take the air" when it seeks to escape by trying to rise higher than the falcon.

Tiercel.—The male of various falcons, particularly of the peregrine, also *tarcell*, *tassell* or *tercel*; the term is also applied to the male of the goshawk.

Trussing.—A hawk is said to "truss" a bird when she catches it in the air, and comes to the ground with it in her talons: this term is not applied to large quarry. (See *Bind*.)

Varvels.—Small rings, generally of silver, fastened to the end of the jesses, and engraved with the owner's name.

Wait on.—A hawk is said to "wait on" when she flies above her master waiting till game is sprung.

Weathering.—Hawks are "weathered" by being placed unhooded in the open air. Passage hawks which are not sufficiently reclaimed to be left out by themselves unhooded on blocks are "weathered" by being put out for an hour or two under the falconer's eye.

Yarak.—An Eastern term, generally applied to short-winged hawks. When a hawk is keen, and in hunting condition, she is said to be "in yarak."

The training of hawks affords much scope for judgment, experience and skill on the part of the falconer, who must carefully observe the temper and disposition as well as the constitution of each bird. It is through the appetite principally that hawks, like most wild animals, are tamed; but to fit them for use in the field much patience, gentleness and care must be used. Slovenly taming necessitates starving, and low condition and weakness are the result. The aim of the falconer must be to have his hawks always keen, and the appetite when they are brought into the field should be such as would induce the bird in a state of nature to put forth its full powers to obtain its food, with, as near as possible, a corresponding condition as to flesh. The following is an outline of the process of training hawks, beginning with the management of a wild-caught peregrine falcon. When first taken, a rufter hood should be put on her head, and she must be furnished with jesses, swivel, leash and bell. A thick glove or rather gauntlet must be worn on the left hand (Eastern falconers always carry a hawk on the right), and she must be carried about as much as possible, late into the night, every day, being constantly stroked with a bird's wing or feather, very lightly at first. At night she should be tied to a perch in a room with the window darkened, so that no light can enter in the morning. The perch should be a padded pole placed across the room, about 4½ ft. from the ground, with a canvas screen underneath. She will easily be induced to feed in most cases by drawing a piece of beefsteak over her feet, brushing her legs at the time with a wing, and now and then, as she snaps, slipping a morsel into her mouth. Care must be taken to make a peculiar sound with the lips or tongue, or to use a low whistle as she is in the act of swallowing; she will very soon learn to associate this sound with feeding, and it will be found that directly she hears it, she will gripe with her talons, and bend down to feel for food. When the falconer perceives this and other signs of her "coming to," that she no longer starts at the voice or touch, and steps quietly up from the perch when the hand is placed under her feet, it will be time to change her rufter hood for the ordinary hood. This latter should be very carefully chosen—an easy fitting one, in which the braces draw closely and yet easily and without jerking. An old one previously worn is to be recommended. The hawk should be taken into a very dark room—one absolutely dark is best—and the change should be made if possible in total darkness. After this she must be brought to feed with her hood off; at first she must be fed every day in a darkened room, a gleam of light being admitted. The first day, the hawk having seized the food and begun to pull at it freely, the hood must be gently slipped off, and after she has eaten a moderate quantity, it must be replaced as slowly and gently as possible, and she should be allowed to finish her meal through the hood. Next day the hood may be twice removed, and so on; day by day the practice should be continued, and more light gradually admitted, until the hawk will feed freely in broad daylight, and suffer the hood to be taken off and replaced without opposition. Next she must be accustomed to see and feed in the presence of strangers and dogs, &c. A good plan is to carry her in the streets of a town at night, at first where the gas-light is not strong, and where persons passing by are few, unhooding and hooding her from time to time, but not letting her get frightened. Up to this time she should be fed on lean beefsteak with no castings, but as soon as she is tolerably tame and submits well to the hood, she must occasionally be fed with pigeons and other birds. This should be done not later than 3 or 4 P.M., and when she is placed on her perch for the night in the dark room, she must be unhooded and left so, of course being carefully tied up. The falconer should enter the room about 7 or 8 A.M. next day, admitting as little light as possible, or using a candle. He should first observe if she has thrown her casting; if so, he will at once take her to the fist, giving her a bite of food, and re-hood her. If her casting is not thrown it is better for him to retire, leaving the room quite dark, and come in again later. She must now be taught to know the voice—the shout that is used to call her in the field—and to jump to the fist for food, the voice being used every time she is fed. When she comes freely to the fist she must be made acquainted with the lure. Kneeling down with the hawk on his fist, and gently unhooding her, the falconer casts out a lure, which may be either a dead pigeon or an artificial lure garnished with beefsteak tied to a string, to a distance of a couple or three feet in front of her. When she jumps down to it, she should be allowed to eat a little on it—the voice being used—the while receiving morsels from the falconer's hand; and before her meal is finished she must be taken off to the hand, being induced to forsake the lure for the hand by a tempting piece of meat. This treatment will help to check her inclination hereafter to carry her quarry. This lesson is to be continued till the falcon feeds very boldly on the lure on the ground, in the falconer's presence—till she will suffer him to walk round her while she is feeding. All this time she will have been held by the leash only, but in the next step a strong, but light creance must be made fast to the leash, and an assistant holding the hawk should unhood her, as the falconer, standing at a distance of 5 to 10 yds., calls her by shouting and casting out the lure. Gradually day after day the distance is increased, till the hawk will come 30 yds. or so without hesitation; then she may be trusted to fly to the lure at liberty, and by degrees from any distance, say 1000 yds. This accomplished, she should learn to stoop at the lure. Instead of allowing the hawk to seize upon it as she comes up, the falconer should snatch the lure away and let her pass by, and immediately put it out that she may readily seize it when she turns round to look for it. This should be done at first only once, and then progressively until she will stoop backwards and forwards at the lure as often as desired. Next she should be entered at her quarry. Should she be intended for rooks or herons, two or three of these birds should be procured. One should be given her from the hand, then one should be released close to her, and a third at a considerable distance. If she take these keenly, she may be flown at a wild bird. Care must, however, be taken to let her have every possible advantage in her first flights—wind and weather, and the position of the quarry with regard to the surrounding country, must be considered.

Young hawks, on being received by the falconer before they can fly, must be put into a sheltered place, such as an outhouse or shed. Their basket or hamper should be filled with straw. A hamper is best, with the lid so placed as to form a platform for the young hawks to come out upon to feed. This should be fastened to a beam or prop a few feet from the ground. The young hawks must be most plentifully fed on the best fresh food obtainable—good beefsteak and fresh-killed birds; the falconer when feeding them should use his voice as in luring. As they grow old enough they will come out, and perch about the roof of their shed, by degrees extending their flights to neighbouring buildings or trees, never failing to come at feeding time to the place where they are fed. Soon they will be continually on the wing, playing or fighting with one another, and later the falconer will observe them chasing other birds, as pigeons and rooks, which may be passing by. As soon as one fails to come for a meal, it must be at once caught with a bow net or a snare the first time it comes back, or it will be lost. It must be borne in mind that the longer hawks can be left at hack the better they are likely to be for use in the field—those hawks being always the best which have preyed a few times for themselves before being caught. Of course there is great risk of losing hawks when they begin to prey for themselves. When a hawk is so caught she is said to be "taken up" from hack. She will not require a rufter hood, but a good deal of the management described for the passage falcon will be necessary. She must be carefully tamed and broken to the hood in the same manner, and so taught to know the lure; but, as might be expected, very much less difficulty will be experienced. As soon as the eyas knows the lure sufficiently well to come to it sharp and straight from a distance, she must be taught to "wait on." This is effected by letting the hawk loose in an open place, such as a down. It will be found that she will circle round the falconer looking for the lure she has been accustomed to see—perhaps mount a little in the air, and advantage must be taken of a favourable moment when the hawk is at a little height, her head being turned in towards the falconer, to let go a pigeon which she can easily catch. When the hawk has taken two or three pigeons in this way, and mounts immediately in expectation, in short, begins to wait on, she should see no more pigeons, but be tried at game as soon as possible. Young peregrines should be flown at grouse first in preference to partridges, not only because the season commences earlier, but because, grouse being the heavier birds, they are not so much tempted to "carry" as with partridges.

The training of the great northern falcons, as well as that of merlins and hobbies, is conducted much on the above principles, but the jerfalcons (gerfalcons or gyrfalcons) will seldom wait on well, and merlins will not do it at all.

The training of short-winged hawks is a simpler process. They must, like falcons, be provided with jesses, swivel, leash and bell. In these hawks a bell is sometimes fastened to the tail. Sparrow-hawks can, however, scarcely carry a bell big enough to be of any service. The hood is seldom used for short-winged hawks—never in the field. They must be made as tame as possible by carriage on the fist and the society of man, and taught to come to the fist freely when required—at first to jump to it in a room, and then out of doors. When the goshawk comes freely and without hesitation from short distances, she ought to be called from long distances from the hand of an assistant, but not oftener than twice in each meal, until she will come at least 1000 yds., on each occasion being well rewarded with some food she likes very much, as a fresh-killed bird, warm. When she does this freely, and endures the presence of strangers, dogs, &c., a few bagged rabbits should be given to her, and she will be ready to take the field. Some accustom the goshawk to the use of the lure, for the purpose of taking her if she will not come to the fist in the field when she has taken stand in a tree after being baulked of her quarry, but it ought not to be necessary to use it.

Falcons or long-winged hawks are either "flown out of the hood," *i.e.* unhooded and slipped when the quarry is in sight, or they are made to "wait on" till game is flushed. Herons and rooks are always taken by the former method. Passage hawks are generally employed for flying at these birds, though sometimes good eyases are quite equal to the work. For heron-hawking a well-stocked heronry is in the first place necessary. Next an open country which can be ridden over—over which herons are in the constant habit of passing to and from their heronry on their fishing excursions, or making their "passage." A heron found at his feeding-place at a brook or pond affords no sport whatever. If there be little water any peregrine falcon that will go straight at him will seize him soon after he rises. It is sometimes advisable to fly a young falcon at a heron so found, but it should not be repeated. If there be much water the heron will neither show sport nor be captured. It is quite a different affair when he is sighted winging his way at a height in the air over an open tract of country free from water. Though he has no chance whatever of competing with a falcon in straightforward flight, the heron has large concave wings, a very light body proportionately, and air-cells in his bones, and can rise with astonishing rapidity, more perpendicularly, or, in other words, in smaller rings, than the falcon can, with very little effort. As soon as he sees the approach of the falcon, which he usually does almost directly she is cast off, he makes play for the upper regions. Then the falcon commences to climb too to get above him, but in a very different style. She makes very large circles or rings, travelling at a high rate of speed, due to her strength and weight and power of flying, till she rises above the heron. Then she makes her attack by stooping with great force at the quarry, sometimes falling so far below it as the blow is evaded that she cannot spring up to the proper pitch for the next stoop, and has to make another ring to regain her lost command over the heron, which is ever rising, and so on—the "field" meanwhile galloping down wind in the direction the flight is taking till she seizes the heron aloft, "binds" to him, and both come down together. Absurd stories have been told and pictures drawn of the heron receiving the falcon on its beak in the air. It is, however, well known to all practical falconers that the heron has no power or inclination to fight with a falcon in the air; so long as he is flying he seeks safety solely from his wings. When on the ground, however, should the falcon be deficient in skill or strength, or have been mutilated by the coping of her beak and talons, as was sometimes formerly done in Holland with a view to saving the heron's life, the heron may use his dagger-like bill with dangerous effect, though it is very rare for a falcon to be injured. It is never safe to fly the goshawk at a heron of any description. Short-winged hawks do not immediately kill their quarry as falcons do, nor do they seem to know where the life lies, and seldom shift their hold once taken even to defend themselves; and they are therefore easily stabbed by a heron. Rooks are flown in the same manner as herons, but the flight is generally inferior. Although rooks fly very well, they seek shelter in trees or bushes as soon as possible.

For game-hawking eyases are generally used, though undoubtedly passage or wild-caught hawks are to be preferred. The best game hawks we have seen have been passage hawks, but there are difficulties attending the use of them. It may perhaps be fairly said that it is easy to make all passage hawks "wait on" in grand style, but until they have got over a season or two they are very liable to be lost. Among the advantages attending the use of eyases are the following: they are easier to obtain and to train and keep; they also moult far better and quicker than passage hawks, while if lost in the field they will often go home by themselves, or remain about the spot where they were liberated. Experience, and, we must add, some good fortune also, are requisite to make eyases good for waiting on for game. Slight mistakes on the part of the falconer, false points from dogs, or bad luck in serving, will cause a young hawk to acquire bad habits, such as sitting down on the ground, taking stand in a tree, raking out wide, skimming the ground, or lazily flying about at no height. A good game hawk in proper flying order goes up at once to a good pitch in the air—the higher she flies the better—and follows her master from field to field, always ready for a stoop when the quarry is sprung. Hawks that have been successfully broken and judiciously worked become wonderfully clever, and soon learn to regulate their flight by the movements of their master. Eyases were not held in esteem by the old falconers, and it is evident from their writings that these hawks have been very much better understood and managed in the 19th century than in the middle ages. It is probable that the old falconers procured their passage and wild-caught hawks with such facility, having at the same time more scope for their use in days when quarry was more abundant and there was more waste land than there now is, that they did not find it necessary to trouble themselves about eyases. Here may be quoted a few lines from one of the best of the old writers, which may be taken as giving a fair account of the estimation in which eyases were generally held, and from which it is evident that the old falconers did not understand flying hawks at hack. Simon Latham, writing in 1633, says of eyases :

> They will be verie easily brought to familiaritie with the man, not in the house only, but also abroad, hooded or unhooded; nay, many of them will be more gentle and quiet when unhooded than when hooded, for if a man doe but stirre or speake in their hearing, they will crie and bate as though they did desire to see the man. Likewise some of them being unhooded, when they see the man will cowre and crie, shewing thereby their exceeding fondness and fawning love towards him . . . . .
>
> . . . These kind of hawks be all (for the most part) taken out of the nest while verie young, even in the downe, from whence they are put into a close house, whereas they be alwaies fed and familiarly brought up by the man, untill they bee able to flie, when as the summer approaching verie suddenly they are continued and trained up in the same, the weather being alwaies warm and temperate; thus they are still inured to familiaritie with the man, not knowing from whence besides to fetch their relief or sustenance. When the summer is ended they bee commonly put up into a house again, or else kept in some warm place, for they cannot endure the cold wind to blow upon them. . . . But leaving to speak of these kind of scratching hawks that I never did love should come too neere my fingers, and to return unto the faire conditioned haggard faulcon. . . .

The author here describes with accuracy the condition of unhacked eyases, which no modern falconer would trouble himself to keep. Many English falconers in modern times have had eyases which have killed grouse, ducks and other quarry in a style almost equalling that of passage hawks. Rooks also have been most successfully flown, and some herons on passage have been taken by eyases. No sport is to be had at game without hawks that wait on well. Moors, downs, open country where the hedges are low and weak are best suited to game hawking. Pointers or setters may be used to find game, or the hawk may be let go on coming to the ground where game is known to lie, and suffered, if an experienced one, to "wait on" till game is flushed. However, the best plan with most hawks, young ones especially, is to use a dog, and to let the hawk go when the dog points, and to flush the birds as soon as the hawk is at her pitch. It is not by any means necessary that the hawk should be near the birds when they rise, provided she is at a good height, and that she is watching; she will come at once with a rush out of the air at great speed, and either cut one down with the stoop, or the bird will save itself by putting in, when every exertion must be made, especially if the hawk be young and inexperienced, to "serve" her as soon as possible by driving out the bird again while she waits overhead. If this be successfully done she is nearly certain to kill it at the second flight. Perhaps falcons are best for grouse and tiercels for partridges.

Magpies afford much sport. Only tiercels should be used for hunting magpies. A field is necessary—at the very least 4 or 5 runners to beat the magpie out, and perhaps the presence of a horseman is an advantage. Of course in open flight a magpie would be almost immediately caught by a tiercel peregrine, and there would be no sport, but the magpie makes up for his want of power of wing by his cunning and shiftiness; and he is, moreover, never to be found except where he has shelter under his lee for security from a passing peregrine. Once in a hedge or tree he is perfectly safe from the wild falcon, but the case is otherwise when the falconer approaches with his trained tiercel, perhaps a cast of tiercels, waiting on in the air, with some active runners in his field. Then driven from hedge to hedge, from one kind of shelter to another, stooped at every instant when he shows himself ever so little away from cover by the watchful tiercels overhead, his egg-stealing days are brought to an end by a fatal stroke—sometimes not before the field is pretty well exhausted with running and shouting. The magpie always manœuvres towards some thick wood, from which it is the aim of the field to cut him off. At first hawks must be flown in easy country, but when they understand their work well they will kill magpies in very enclosed country—with a smart active field a magpie may even be pushed through a small wood. Magpie hawking affords excellent exercise, not only for those who run to serve the hawks, but for the hawks also; they get a great deal of flying, and learn to hunt in company with men—any number of people may be present. Blackbirds may be hunted with tiercels in the same way. Woodcock afford capital sport where the country is tolerably open. It will generally be found that after a hawk has made one stoop at a woodcock, the cock will at first try to escape by taking the air, and will show a very fine flight. When beaten in the air it will try to get back to covert again, but when once a hawk has outflown a woodcock, he is pretty sure to kill it. Hawks seem to pursue woodcock with great keenness; something in the flight of the cock tempts them to exertion. The laziest and most useless hawks—hawks that will scarcely follow a slow pigeon—will do their best at woodcock, and will very soon, if the sport is continued, be improved in their style of flying. Snipe may be killed by first-class tiercels in favourable localities. Wild duck and teal are only to be flown at when they can be found in small pools or brooks at a distance from much water—where the fowl can be suddenly flushed by men or dogs while the falcon is flying at her pitch overhead. For duck, falcons should be used; tiercels will kill teal well.

The merlin is used for flying at larks, and there does not seem to be any other use to which this pretty little falcon may fairly be put. It is very active, but far from being, as some authors have stated, the swiftest of all hawks. Its flight is greatly inferior in speed and power to that of the peregrine. Perhaps its diminutive size, causing it to be soon lost to view, and a limited acquaintance with the flight of the wild peregrine falcon, have led to the mistake.

The hobby is far swifter than the merlin, but cannot be said to be efficient in the field; it may be trained to wait on beautifully, and will sometimes take larks; it is very much given to the fault of "carrying."

The three great northern falcons are not easy to procure in proper condition for training. They are very difficult to break to the hood and to manage in the field. They are flown, like the peregrine, at herons and rooks, and in former days were used for kites and hares. Their style of flight is magnificent; they are considerably swifter than the peregrine, and are a most deadly "footers." They seem, however, to lack somewhat of the spirit and dash of the peregrine.

For the short-winged hawks an open country is not required; indeed they may be flown in a wood. Goshawks are flown at hares, rabbits, pheasants, partridges and wild-fowl. Only very strong females are able to take hares; rabbits are easy quarry for any female goshawk, and a little too strong for the male. A good female goshawk may kill from 10 to 15 rabbits in a day, or more. For pheasants the male is to be preferred, certainly for partridges; either sex will take duck and teal, but the falconer must get close to them before they are flushed, or the goshawk will stand a poor chance of killing. Rabbit hawking may be practised by ferreting, and flying the hawk as the rabbits bolt, but care must be taken or the hawk will kill the ferret. Where rabbits sit out on grass or in turnip fields, a goshawk may be used with success, even in a wood when the holes are not too near. From various causes it is impossible, or nearly so, to have goshawks in England in the perfection to which they are brought in the East. In India, for instance, there is a far greater variety of quarry suited to them, and wild birds are much more approachable; moreover, there are advantages for training which do not exist in England. Unmolested—and scarcely noticed except perhaps by others of his calling or tastes—the Eastern falconer carries his hawk by day and night in the crowded bazaars, till the bird becomes perfectly indifferent to men, horses, dogs, carriages, and, in short, becomes as tame as the domestic animals.

The management of sparrow-hawks is much the same as that of goshawks, but they are far more delicate than the latter. They are flown in England at blackbirds, thrushes and other small birds; good ones will take partridges well till the birds get too wild and strong with the advancing season. In the East large numbers of quail are taken with sparrow-hawks.

It is of course important that hawks from which work in the field is expected should be kept in the highest health, and they must be carefully fed; no bad or tainted meat must on any account be given to them—at any rate to hawks of the species used in England. Peregrines and the great northern falcons are best kept on beefsteak, with a frequent change in the shape of fresh-killed pigeons and other birds. The smaller falcons, the merlin and the hobby, require a great number of small birds to keep them in good health for any length of time. Goshawks should be fed like peregrines, but rats and rabbits are very good as change of food for them. The sparrow-hawk, like the small falcons, requires small birds. All hawks require castings frequently. It is true that hawks will exist, and often appear to thrive, on good food without castings, but the seeds of probable injury to their health are being sown the whole time they are so kept. If there is difficulty in procuring birds, and it is more convenient to feed the hawks on beefsteak, they should frequently get the wings and heads and necks of game and poultry. In addition to the castings which they swallow, tearing these is good exercise for them, and biting the bones prevents the beaks from overgrowing. Most hawks, peregrines especially, require the bath. The end of a cask, sawn off to give a depth of about 6 in., makes a very good bath. Peregrines which are used for waiting on require a bath at least twice a week. If this be neglected, they will not wait long before going off in search of water to bathe, however hungry they may be.

The most agreeable and the best way, where practicable, of keeping hawks is to have them on blocks on the lawn. Each hawk's block should stand in a circular bed of sand—about 8 ft. in diameter; this will be found very convenient for keeping them clean. Goshawks are generally placed on bow perches, which ought not to be more than 8 or 9 in. high at the highest part of the arc. It will be several months before passage or wild-caught falcons can be kept out of doors; they must be fastened to a perch in a darkened room, hooded, but by degrees as they get thoroughly tame may be brought to sit on the lawn. In England (especially in the south) peregrines, the northern falcons and goshawks may be kept out of doors all day and night in a sheltered situation. In very wild boisterous weather, or in snow or sharp frost, it will be advisable to move them to the shelter of a shed, the floor of which should be laid with sand to a depth of 3 or 4 in. Merlins and hobbies are too tender to be kept much out of doors. An eastern aspect is to be preferred—all birds enjoy the morning sun, and it is very beneficial to them. The more hawks confined to blocks out of doors see of persons, dogs, horses, &c., moving about the better, but of course only when there is no danger of their being frightened or molested, or of food being given to them by strangers. Those who have only seen wretched ill-fed hawks in cages as in zoological gardens or menageries, pining for exercise, with battered plumage, torn shoulders and bleeding ceres, from dashing against their prison bars, and overgrown beaks from never getting bones to break, can have little idea of the beautiful and striking-looking birds to be seen pluming their feathers and stretching their wings at their ease at their blocks on the falconer's lawn, watching with their large bright keen eyes everything that moves in the sky and everywhere else within the limits of their view. Contrary to the prevailing notion, hawks show a good deal of attachment when they have been properly handled. It is true that by hunger they are in a great measure tamed and controlled, and the same may be said of all undomesticated and many domesticated animals. And instinct prompts all wild creatures when away from man's control to return to their former shyness, but hawks certainly retain their tameness for a long time, and their memory is remarkably retentive. Wild-caught hawks have been retaken, either by their coming to the lure or upon quarry, from 2 to 7 days after they had been lost, and eyases after 3 weeks. As one instance of retentiveness of memory displayed by hawks we may mention the case of a wild-caught falcon which was recaptured after being at liberty more than 3 years, still bearing the jesses which were cut short close to the leg at the time she was released; in five days she was flying at the lure again at liberty, and was found to retain the peculiar ways and habits she was observed to have in her former existence as a trained hawk. It is useless to bring a hawk into the field unless she has a keen appetite; if she has not, she will neither hunt effectually nor follow her master. Even wild-caught falcons, however, may sometimes be seen so attached to their owner that, when sitting on their blocks on a lawn with food in their crops, they will on his coming out of the house bate hard to get to him, till he either go up to them and allow them to jump up to his hand or withdraw from their sight. Goshawks are also known to evince attachment to their owner. Another prevailing error regarding hawks is that they are supposed to be lazy birds, requiring the stimulus of hunger to stir them to action. The reverse is the truth; they are birds of very active habits, and exceedingly restless, and the notion of their being lazy has been propagated by those who have seen little or nothing of hawks in their wild state. The wild falcon requires an immense deal of exercise, and to be in wind, in order to exert the speed and power of flight necessary to capture her prey when hungry; and to this end instinct prompts her to spend hours daily on the wing, soaring and playing about in the air in all weathers, often chasing birds merely for play or exercise. Sometimes she takes a siesta when much gorged, but unless she fills her crop late in the evening she is soon moving again—before half her crop is put over. Goshawks and sparrow-hawks, too, habitually soar in the air at about 9 or 10 A.M., and remain aloft a considerable time, but these birds are not of such active habits as the falcons. The frequent bating of thoroughly tame hawks from their blocks, even when not hungry or frightened, proves their restlessness and impatience of repose. So does the wretched condition of the caged falcon (before alluded to), while the really lazy buzzards and kites, which do not in a wild state depend on activity or power of wing for their sustenance, maintain themselves for years, even during confinement if properly fed, in good case and plumage. Such being the habits of the falcon in a state of nature, the falconer should endeavour to give the hawks under his care as much flying as possible, and he should avoid the very common mistake of keeping too many hawks. In this case a favoured few are sure to get all the work, and the others, possibly equally good if they had fair play, are spoiled for want of exercise.

The larger hawks may be kept in health and working order for several years—15 or 20—barring accidents. The writer has known peregrines, shaheens and goshawks to reach ages between 15 and 20 years. Goshawks, however, never fly well after 4 or 5 seasons, when they will no longer take difficult quarry; they may be used at rabbits as long as they live. Shaheens may be seen in the East at an advanced age, killing wild-fowl beautifully. The shaheen is a falcon of the peregrine type, which does not travel, like the peregrine, all over the world. It appears that the jerfalcons also may be worked to a good age. Old Simon Latham tells us of these birds—"I myself have known one of them an excellent Hearnor (killer of herons), and to continue her goodnesse very near twentie yeeres, or full out that time."

Authorities.—Schlegel's *Traité de fauconnerie* contains a very large list of works on falconry in the languages of all the principal countries of the Old World. *Bibliotheca accipitraria*, by J. E.

Harting (1891), gives a complete bibliography. See *Coursing* and *Falconry* in the Badminton Library; and *The Art and Practice of Hawking*, by E. B. Michell (1900), the best modern book on the subject. Perhaps the most useful of the old works are *The Booke of Faulconrie or Hawking*, by George Turberville (1575), and *The Faulcon's Lure and Cure*, by Simon Latham (1633). (E. D. R.)

FALDSTOOL (from the O.H. Ger. *falden* or *falten*, to fold, and *stuol*, Mod. Ger. *Stuhl*, a stool; from the medieval Latin *faldistolium* is derived, through the old form *faudesteuil*, the Mod. Fr. *fauteuil*), properly a folding seat for the use of a bishop when not occupying the throne in his own cathedral, or when officiating in a cathedral or church other than his own; hence any movable folding stool used for kneeling in divine service. The small desk or stand from which the Litany is read is sometimes called a faldstool, and a similar stool is provided for the use of the sovereign at his coronation.

FALERII [mod. *Cività Castellana* (*q.v.*)], one of the twelve chief cities of Etruria, situated about 1 m. W. of the ancient Via Flaminia,[1] 32 m. N. of Rome. According to the legend, it was of Argive origin; and Strabo's assertion that the population, the Falisci (*q.v.*), were of a different race from the Etruscans is proved by the language of the earliest inscriptions which have been found here. Wars between Rome and the Falisci appear to have been frequent. To one of the first of them belongs the story of the schoolmaster who wished to betray his boys to Camillus; the latter refused his offer, and the inhabitants thereupon surrendered the city. At the end of the First Punic War, the Falisci rose in rebellion, but were soon conquered (241 B.C.) and lost half their territory. Zonaras (viii. 18) tells us that the ancient city, built upon a precipitous hill, was destroyed and another built on a more accessible site on the plain. The description of the two sites agrees well with the usual theory that the original city occupied the site of the present Cività Castellana, and that the ruins of Falleri (as the place is now called) are those of the Roman town which was thus transferred 3 m. to the north-west. After this time Falerii hardly appears in history. It became a colony (Junonia Faliscorum) perhaps under Augustus, though according to the inscriptions apparently not until the time of Gallienus. There were bishops of Falerii up till 1033, when the desertion of the place in favour of the present site began, and the last mention of it dates from A.D. 1064.

The site of the original Falerii is a plateau, about 1100 yds. by 400, not higher than the surrounding country (475 ft.) but separated from it by gorges over 200 ft. in depth, and only connected with it on the western side, which was strongly fortified with a mound and ditch; the rest of the city was defended by walls constructed of rectangular blocks of tufa, of which some remains still exist. Remains of a temple were found at Lo Scasato, at the highest point of the ancient town, in 1888, and others have been excavated in the outskirts. The attribution of one of these to Juno Quiritis is uncertain. These buildings were of wood, with fine decorations of coloured terracotta (*Notizie degli scavi*, 1887, p. 92; 1888, p. 414). Numerous tombs hewn in the rock are visible on all sides of the town, and important discoveries have been made in them; many objects, both from the temples and from the tombs, are in the Museo di Villa Giulia at Rome. Similar finds have also been made at Calcata, 6 m. S., and Corchiano, 5 m. N.W. The site of the Roman Falerii is now entirely abandoned. It lay upon a road which may have been (see H. Nissen, *Italische Landeskunde*, ii. 361) the Via Annia, a by-road of the Via Cassia; this road approached it from the south passing through Nepet, while its prolongation to the north certainly bore the name Via Amerina. The circuit of the city is about 2250 yds., its shape roughly triangular, and the walls are a remarkably fine and well-preserved specimen of Roman military architecture. They are constructed of rectangular blocks of tufa two Roman ft. in height; the walls themselves reach in places a height of 56 ft. and are 7 to 9 ft. thick. There were about 80 towers, some 50 of which are still preserved. Two of the gates also, of which there were eight, are noteworthy. Of the buildings within the walls hardly anything is preserved above ground, though the forum and theatre (as also the amphitheatre, the arena of which measured 180 by 108 ft. outside the walls) were all excavated in the 19th century. Almost the only edifice now standing is the 12th-century abbey church of S. Maria. Recent excavations have shown that the plan of the whole city could easily be recovered, though the buildings have suffered considerable devastation (*Notizie degli scavi*, 1903, 14).

See G. Dennis, *Cities and Cemeteries of Etruria* (London, 1883), i. 97; for philology and ethnology see FALISCI. (T. As.)

FALERIO (mod. *Falerone*), an ancient town of Picenum, Italy, about 10 m. S.E. of Urbs Salvia. We know almost nothing of the place except from inscriptions, from which, and from the remains of its buildings, it appears to have been of some importance. It was probably founded as a colony by Augustus after his victory at Actium. A question arose in the time of Domitian between the inhabitants of Falerio and Firmum as to land which had been taken out of the territory of the latter (which was recolonized by the triumvirs), and, though not distributed to the new settlers, had not been given back again to the people of Firmum. The emperor, by a rescript, a copy of which in bronze was found at Falerio, decided in favour of the people of Falerio, that the occupiers of this land should remain in possession of it (Th. Mommsen in *Corp. Inscr. Latin.* ix., Berlin, 1883, No. 5, 420). Considerable remains of a theatre in concrete faced with brickwork, erected, according to an inscription, in 43 B.C., and 161 ft. in diameter, were excavated in 1838 and are still visible; and an amphitheatre, less well preserved, also exists, the arena of which measures about 180 by 150 ft. Between the two is a water reservoir (called Bagno della Regina) connected with remains of baths.

See G. de Minicis in *Giornale Arcadico*, lv. (1832), 160 seq.; *Annali dell' Istituto* (1839), 5 seq. (T. As.)

FALGUIÈRE, JEAN ALEXANDRE JOSEPH (1831–1900), French sculptor and painter, was born at Toulouse. A pupil of the École des Beaux Arts he won the *Prix de Rome* in 1859; he was awarded the medal of honour at the Salon in 1868 and was appointed officer of the Legion of Honour in 1878. His first bronze statue of importance was the "Victor of the Cock-Fight" (1864), and "Tarcisus the Christian Boy-Martyr" followed in 1867; both are now in the Luxembourg Museum. His more important monuments are those to Admiral Courbet (1890) at Abbeville and the famous "Joan of Arc." Among more ideal work are "Eve" (1880), "Diana" (1882 and 1891), "Woman and Peacock," and "The Poet," astride his Pegasus spreading wings for flight. His "Triumph of the Republic" (1881–1886), a vast quadriga for the Arc de Triomphe, Paris, is perhaps more amazingly full of life than others of his works, all of which reveal this quality of vitality in superlative degree. To these works should be added his monuments to "Cardinal Lavigerie" and "General de La Fayette" (the latter in Washington), and his statues of "Lamartine" (1876) and "St Vincent de Paul" (1879), as well as the "Balzac," which he executed for the *Société des gens de lettres* on the rejection of that by Rodin; and the busts of "Carolus-Duran" and "Coquelin cadet" (1896).

Falguière was a painter as well as a sculptor, but somewhat inferior in merit. He displays a fine sense of colour and tone, added to the qualities of life and vigour that he instils into his plastic work. His "Wrestlers" (1875) and "Fan and Dagger" (1882; a defiant Spanish woman) are in the Luxembourg, and other pictures of importance are "The Beheading of St John the Baptist" (1877), "The Sphinx" (1883), "Acis and Galatea" (1885), "Old Woman and Child" (1886) and "In the Bull Slaughter-House." He became a member of the Institute (Académie des Beaux-Arts) in 1882. He died in 1900.

See Léonce Bénédite, *Alexandre Falguière*, Librairie de l'art (Paris).

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[1] The Roman town lay 3 m. farther N.W. on the Via Annia. The Via Flaminia, which did not traverse the Etruscan city, had two post-stations near it, Aquaviva, some 2½ m. S.E., and Aequum Faliscum, 4½ m. N.N.E.; the latter is very possibly identical with the Etruscan site which G. Dennis (*Cities and Cemeteries of Etruria*, London, 1883, i. 121) identified with Fescennium (*q.v.*). See O. Cuntz in *Jahreshefte des österr. arch. Inst.* ii. (1899), 87.

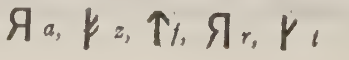
FALIERO (or **Falier**), **MARINO** (1279–1355), doge of Venice, belonged to one of the oldest and most illustrious Venetian families and had served the republic with distinction in various capacities. In 1346 he commanded the Venetian land forces at the siege of Zara, where he was attacked by the Hungarians under King Louis the Great and totally defeated them; this victory led to the surrender of the city. In September 1354, while absent on a mission to Pope Innocent IV. at Avignon, Faliero was elected doge, an honour which apparently he had not sought. His reign began, as it was to end, in disaster, for very soon after his election the Venetian fleet was completely destroyed by the Genoese off the island of Sapienza, while plague and a declining commerce aggravated the situation. Although a capable commander and a good statesman, Faliero possessed a violent temper, and after his election developed great ambition. The constitutional restrictions of the ducal power, which had been further curtailed just before his election, and the insolence of the nobility aroused in him a desire to free himself from all control, and the discontent of the arsenal hands at their treatment by the nobles offered him his opportunity. In concert with a sea-captain named Bertuccio Ixarella (who had received a blow from the noble Giovanni Dandolo), Filippo Calendario, a stonemason, and others, a plot was laid to murder the chief patricians on the 15th of April and proclaim Faliero prince of Venice. But there was much ferment in the city and disorders broke out before the appointed time; some of the conspirators having made revelations, the Council of Ten proceeded to arrest the ringleaders and to place armed guards all over the town. Several of the conspirators were condemned to death and others to various terms of imprisonment. The doge's complicity having been discovered, he was himself arrested; at the trial he confessed everything and was condemned and executed on the 17th of April 1355.

The story of the insult written by Michele Steno on the doge's chair is a legend of which no record is found in any contemporary authority. The motives of Faliero are not altogether clear, as his past record, even in the judgment of the poet Petrarch, showed him as a wise, clear-headed man of no unusual ambition. But possibly the attitude of the aristocracy and the example offered by the tyrants of neighbouring cities may have induced him to attempt a similar policy. The only result of the plot was to consolidate the power of the Council of Ten.

Bibliography.—An account of Marino Faliero's reign is given in S. Romanin's *Storia documentata di Venezia*, lib. ix. cap. ii. (Venice, 1855); M. Sanudo, *Le Vite dei Dogi* in new edition of Muratori fasc., 3, 4, 5 (Città di Castello, 1900). For special works see V. Lazzerini's "Genealogia d. M. Faliero" in the *Archivio Veneto* of 1892; "M. Faliero avanti il Dogado," *ibid.* (1893), and his exhaustive study "M. Faliero, la Congiura," *ibid.* (1897). The most recent essay on the subject is contained in Horatio Brown's *Studies in Venetian History* (London, 1907), wherein all the authorities are set forth. (L. V.*)

FALISCI, a tribe of Sabine origin or connexions, but speaking a dialect closely akin to Latin, who inhabited the town of Falerii (*q.v.*), as well as a considerable tract of the surrounding country, probably reaching as far south as to include the small town of Capena. But at the beginning of the historical period, *i.e.* from the beginning of the 5th century B.C., and no doubt earlier, the dominant element in the town was Etruscan; and all through the wars of the following centuries the town was counted a member, and sometimes a leading member, of the Etruscan league (cf. Livy iv. 23, v. 17, vii. 17).

In spite of the Etruscan domination, the Faliscans preserved many traces of their Italic origin, such as the worship of the deities Juno Quiritis (Ovid, *Fasti*, vi. 49) and Feronia (Livy xxvi. 11), the cult of *Dis Soranus* by the *Hirpi* or fire-leaping priests on Mount Soracte (Pliny, *Nat. Hist.* vii. 2, 19; Servius, *ad Aen.* xi. 785, 787), above all their language. This is preserved for us in some 36 short inscriptions, dating from the 3rd and 2nd centuries B.C., and is written in a peculiar alphabet derived from the Etruscan, and written from right to left, but showing some traces of the influence of the Latin alphabet. Its most characteristic signs are—



As a specimen of the dialect may be quoted the words written round the edge of a picture on a patera, the genuineness of which is established by the fact that they were written before the glaze was put on: "foied vino pipafo, cra carefo," *i.e.* in Latin "hodie vinum bibam, cras carebo" (R. S. Conway, *Italic Dialects*, p. 312, b). This shows some of the phonetic characteristics of the Faliscan dialect, viz.:—

1. The retention of medial *f* which in Latin became *b*;
2. The representation of an initial Ind.-Eur. *gh* by *f* (*foied*, contrast Latin *hodie*);
3. The palatalization of *d*+ consonant *i* into some sound denoted merely by *i*– the central sound of *foied*, from *fo-diēd*;
4. The loss of final *s*, at all events before certain following sounds (*cra* beside Latin *crās*);

Other characteristics, appearing elsewhere, are:

5. The retention of the velars (Fal. *cuando* = Latin *quando*; contrast Umbrian *pan(n)u*);
6. The assimilation of some final consonants to the initial letter of the next word: "pretod de zenatuo sententiad (Conway, *lib. cit.* 321), *i.e.* "praetor de senatus sententia" (*zenatuo* for *senatuos.*, an archaic genitive). For further details see Conway, *ib.* pp. 370 ff., especially pp. 384-385, where the relation of the names *Falisci*, *Falerii* to the local hero *Halaesus* (*e.g.* Ovid, *Fasti*, iv. 73) is discussed, and where reason is given for thinking that the change of initial *f* (from an original *bh* or *dh*) into an initial *h* was a genuine mark of Faliscan dialect.

It seems probable that the dialect lasted on, though being gradually permeated with Latin, till at least 150 B.C.

In addition to the remains found in the graves (see Falerii), which belong mainly to the period of Etruscan domination and give ample evidence of material prosperity and refinement, the earlier strata have yielded more primitive remains from the Italic epoch. A large number of inscriptions consisting mainly of proper names may be regarded as Etruscan rather than Faliscan, and they have been disregarded in the account of the dialect just given. It should perhaps be mentioned that there was a town Feronia in Sardinia, named probably after their native goddess by Faliscan settlers, from some of whom we have a votive inscription found at S. Maria di Falleri (Conway, *ib.* p. 335).

Further information may be sought from W. Deecke, *Die Falisker* (a useful but somewhat uncritical collection of the evidence accessible in 1888); E. Bormann, in *C.I.L.* xi. pp. 465 ff., and Conway, *op. cit.* (R. S. C.)

FALK, JOHANN DANIEL (1768–1826), German author and philanthropist, was born at Danzig on the 28th of October 1768. After attending the gymnasium of his native town, he entered the university of Halle with the view of studying theology, but preferring a non-professional life, gave up his theological studies and went to live at Weimar. There he published a volume of satires which procured him the notice and friendship of Wieland, and admission into literary circles. After the battle of Jena, Falk, on the recommendation of Wieland, was appointed to a civil post under the French official authorities and rendered his townsmen such good service that the duke of Weimar created him a counsellor of legation. In 1813 he established a society for friends in necessity (*Gesellschaft der Freunde in der Not*), and about the same time founded an institute for the care and education of neglected and orphan children, which, in 1829, was taken over by the state and still exists as the *Falksches Institut.* The first literary efforts of Falk took the form chiefly of satirical poetry, and gave promise of greater future excellence than was ever completely fulfilled; his later pieces, directed more against individuals than the general vices and defects of society, gradually degenerated in quality. In 1806 Falk founded a critical journal under the title of *Elysium und Tartarus.* He also contributed largely to contemporary journals. He enjoyed the acquaintance and intimate friendship of Goethe, and his account of their intercourse was posthumously published under the title *Goethe aus näherem persönlichen Umgange dargestellt* (1832) (English by S. Austin). Falk died on the 14th of February 1826.

Falk's *Satirische Werke* appeared in 7 vols. (1817 and 1826); his *Auserlesene Schriften* (3 vols., 1819). See *Johannes Falk: Erinnerungsblätter aus Briefen und Tagebüchern, gesammelt von dessen Tochter Rosalie Falk* (1868); Heinzelmann, *Johannes Falk und die Gesellschaft der Freunde in der Not* (1879); A. Stein, *J. Falk* (1881); S. Schultze, *Falk und Goethe* (1900).

FALK, PAUL LUDWIG ADALBERT (1827–1900), German politician, was born at Matschkau, Silesia, on the 10th of August 1827. In 1847 he entered the Prussian state service, and in 1853 became public prosecutor at Lyck. In 1858 he was elected a deputy, joining the Old Liberal party. In 1868 he became a privy-councillor in the ministry of justice. In 1872 he was made minister of education, and in connexion with Bismarck's policy of the Kultur-kampf he was responsible for the famous May Laws against the Catholics (see GERMANY; *History*). In 1879 his position became untenable, owing to the death of Pius IX. and the change of German policy with regard to the Vatican, and he resigned his office, but retained his seat in the Reichstag till 1882. He was then made president of the supreme court of justice at Hamm, where he died in 1900.

FALKE, JOHANN FRIEDRICH GOTTLIEB (1823–1876), German historian, was born at Ratzeburg on the 20th of April 1823. Entering the university of Erlangen in 1843, he soon began to devote his attention to the history of the German language and literature, and in 1848 went to Munich, where he remained five years, and diligently availed himself of the use of the government library for the purpose of prosecuting his historical studies. In 1856 he was appointed secretary of the German museum at Nuremberg, and in 1859 keeper of the manuscripts. With the aid of the manuscript collections in the museum he now turned his attention chiefly to political history, and, with Johann H. Müller, established an historical journal under the name of *Zeitschrift für deutsche Kulturgeschichte* (4 vols., Nuremberg, 1856–1859). To this journal he contributed a history of German taxation and commerce. On the latter subject he published separately *Geschichte des deutschen Handels* (2 vols., Leipzig, 1859–1860) and *Die Hansa als deutsche See-und Handelsmacht* (Berlin, 1862). In 1862 he was appointed secretary of the state archives at Dresden, and, a little later, keeper. He there began the study of Saxon history, still devoting his attention chiefly to the history of commerce and economy, and published *Die Geschichte des Kurfürsten August von Sachsen in volkswirthschaftlicher Beziehung* (Leipzig, 1868) and *Geschichte des deutschen Zollwesens* (Leipzig, 1869). He died at Dresden on the 2nd of March 1876.

FALKIRK, a municipal and police burgh of Stirlingshire, Scotland. Pop. (1891) 19,769; (1901) 29,280. It is situated on high ground overlooking the fertile Carse of Falkirk, 11 m. S.E. of Stirling, and about midway between Edinburgh and Glasgow. Grangemouth, its port, lies 3 m. to the N.E., and the Forth & Clyde Canal passes to the north, and the Union Canal to the south of the town. Falkirk now comprises the suburbs of Laurieston (E.), Grahamston and Bainsford (N.), and Camelon (W.). The principal structures include the burgh and county buildings, town hall, the Dollar free library and Camelon fever hospital. The present church, with a steeple 146 ft. high, dates only from 1811. In the churchyard are buried Sir John Graham, Sir John Stewart who fell in the battle of 1298, and Sir Robert Munro and his brother, Dr Duncan Munro, killed in the battle of 1746. The town is under the control of a council with provost and bailies, and combines with Airdrie, Hamilton, Lanark and Linlithgow (the Falkirk group of burghs) to return a member to parliament. The district is rich in coal and iron, which supply the predominant industries, Falkirk being the chief seat of the light casting trade in Scotland; but tanning, flour-milling, brewing, distilling and the manufacture of explosives (Nobel's) and chemicals are also carried on. Trysts or sales of cattle, sheep and horses are held thrice a year (August, September and October) on Stenhousemuir, 3 m. N.W. They were transferred hither from Crieff in 1770, and were formerly the most important in the kingdom, but have to a great extent been replaced by the local weekly auction marts. Carron, 2 m. N.N.W., is famous for the iron-works established in 1760 by Dr John Roebuck (1718–1794), whose advising engineers were successively John Smeaton and James Watt. The short iron guns of large calibre designed by General Robert Melville, and first cast in 1779, were called carronades from this their place of manufacture.

Falkirk is a town of considerable antiquity. Its original name was the Gaelic *Eaglais breac*, "church of speckled or mottled stone," which Simeon of Durham (fl. 1130) transliterated as Egglesbreth. By the end of the 13th century appears the form Faukirke (the present local pronunciation), which is merely a translation of the Gaelic *fau* or *faw*, meaning "dun," "pale red." The first church was built by Malcolm Canmore (d. 1093). Falkirk was made a burgh of barony in 1600 and a burgh of regality in 1646, but on the forfeiture of the earl of Linlithgow in 1715, its superiority was vested in the crown. Callender House, immediately to the S., was the seat of the earl and his ancestors. The mansion was visited by Queen Mary, captured by Cromwell, and occupied by Generals Monk and Hawley. The wall of Antoninus ran through the grounds, and the district is rich in Roman remains, Camelon, about 2 m. W., being the site of a Roman settlement; Merchiston Hall, to the N.W., was the birthplace of Admiral Sir Charles Napier. The eastern suburb of Laurieston was first called Langtoune, then Merchistown, and received its present name after Sir Lawrence Dundas of Kerse, who had promoted its welfare. At Polmont, farther east, which gives the title of baron to the duke of Hamilton, is the school of Blair Lodge, besides coal-mines and other industries.

Battles of Falkirk.—The battle of the 22nd of July 1298 was fought between the forces of King Edward I. of England and those of the Scottish national party under Sir William Wallace. The latter, after long baffling the king's attempts to bring him to battle, had taken up a strong position south of the town behind a morass. They were formed in four deep and close masses ("schiltrons") of pikemen, the light troops screening the front and flanks and a body of men-at-arms standing in reserve. It was perhaps hoped that the English cavalry would plunge into the morass, for no serious precautions were taken as to the flanks, but in any case Wallace desired no more than to receive an attack at the halt, trusting wholly to his massed pikes. The English right wing first appeared, tried the morass in vain, and then set out to turn it by a long détour; the main battle under the king halted in front of it, while the left wing under Antony Bec, bishop of Durham, was able to reach the head of the marsh without much delay. Once on the enemy's side of the obstacle the bishop halted to wait for Edward, who was now following him, but his undisciplined barons, shouting "'Tis not for thee, bishop, to teach us war. Go say mass!" drove off the Scottish archers and men-at-arms and charged the nearest square of pikes, which repulsed them with heavy losses. On the other flank the right wing, its flank march completed, charged with the same result. But Edward, who had now joined the bishop with the centre or "main battle," peremptorily ordered the cavalry to stand fast, and, taught by his experience in the Welsh wars, brought up his archers. The longbow here scored its first victory in a pitched battle. Before long gaps appeared in the close ranks of pike heads, and after sufficient preparation Edward again launched his men-at-arms to the charge. The shaken masses then gave way one after the other, and the Scots fled in all directions.

The second battle of Falkirk, fought on the 17th of January 1746 between the Highlanders under Prince Charles and the British forces under General Hawley, resulted in the defeat of the latter. It is remarkable only for the bad conduct of the British dragoons and the steadiness of the infantry. Hawley retreated to Linlithgow, leaving all his baggage, 700 prisoners and seven guns in the enemy's hands.

FALKLAND, LUCIUS CARY, 2nd VISCOUNT (*c.* 1610–1643), son of Sir Henry Cary, afterwards 1st Viscount Falkland (d. 1633), a member of an ancient Devonshire family, who was lord deputy of Ireland from 1622 to 1629, and of Elizabeth (1585–1639), only daughter of Sir Lawrence Tanfield, chief baron of the exchequer, was born either in 1609 or 1610, and was educated at Trinity College, Dublin. In 1625 he inherited from his grandfather the manors of Great Tew and Burford in Oxfordshire, and, about the age of 21, married Lettice, daughter of Sir Richard Morrison, of Tooley Park in Leicestershire. Involved in a quarrel with his father, whom he failed to propitiate by offering to hand over to him his estate, he left England to take service in the Dutch army, but soon returned. In 1633, by the death of his father, he became Viscount Falkland. His mother had embraced the Roman Catholic faith, to which it was now sought to attract Falkland himself, but his studies and reflections led him, under the influence of Chillingworth, to the interpretation of religious problems rather by reason than by tradition or authority. At Great Tew he enjoyed a short but happy period of study, and he assembled round him many gifted and learned men, whom the near neighbourhood of the university and his own brilliant qualities attracted to his house. He was the friend of Hales and Chillingworth, was celebrated by Jonson, Suckling, Cowley and Waller in verse, and in prose by Clarendon, who is eloquent in describing the virtues and genius of the "incomparable" Falkland, and draws a delightful picture of his society and hospitality.

Falkland's intellectual pleasures, however, were soon interrupted by war and politics. He felt it his duty to take part on the king's side as a volunteer under Essex in the campaign of 1639 against the Scots. In 1640 he was returned for Newport in the Isle of Wight to the Short and Long Parliaments, and took an active part on the side of the opposition. He spoke against the exaction of shipmoney on the 7th of December 1640, denouncing the servile conduct of Lord Keeper Finch and the judges.[1] He supported the prosecution of Strafford, at the same time endeavouring on more than one occasion to moderate the measures of the Commons in the interests of justice, and voted for the third reading of the attainder on the 21st of April 1641. On the great question of the church he urged, in the debate of the 8th of February 1641, that the interference of the clergy in secular matters, the encroachments in jurisdiction of the spiritual courts, and the imposition by authority of unnecessary ceremonies, should be prohibited. On the other hand, though he denied that episcopacy existed *jure divino*, he was opposed to its abolition; fearing the establishment of the Presbyterian system, which in Scotland had proved equally tyrannical. Triennial parliaments would be sufficient to control the bishops, if they meditated any further attacks upon the national liberties, and he urged that "where it is not necessary to change, it is necessary not to change." Even Hampden still believed that a compromise with the episcopal principle was possible, and assured Falkland that if the bill taken up to the Lords on the 1st of May 1641, excluding the bishops from the Lords and the clergy from secular offices, were passed, "there would be nothing more attempted to the prejudice of the church." Accordingly the bill was supported by Falkland. The times, however, were not favourable to compromise. The bill was lost in the Lords, and on the 27th of May the Root and Branch Bill, for the total abolition of episcopacy, was introduced in the House of Commons. This measure Falkland opposed, as well as the second bill for excluding the bishops, introduced on the 21st of October. In the discussion on the Grand Remonstrance he took the part of the bishops and the Arminians. He was now opposed to the whole policy of the opposition, and, being reproached by Hampden with his change of attitude, replied "that he had formerly been persuaded by that worthy gentleman to believe many things which he had since found to be untrue, and therefore he had changed his opinion in many particulars as well as to things as to persons."[2]

On the 1st of January 1642, immediately before the attempted arrest of the five members, of which, however, he was not cognizant, he was offered by the king the secretaryship of state, and was persuaded by Hyde to accept it, thus becoming involved directly in the king's policy, though evidently possessing little influence in his counsels. He was one of the peers who signed the protestation against making war, at York on the 15th of June 1642. On the 5th of September he carried Charles's overtures for peace to the parliament, when he informed the leaders of the opposition that the king consented to a thorough reformation of religion. The secret correspondence connected with the Waller plot passed through his hands. He was present with the king at Edgehill and at the siege of Gloucester. By this time the hopelessness of the situation had completely overwhelmed him. The aims and principles of neither party in the conflict could satisfy a man of Falkland's high ideals and intellectual vision. His royalism could not suffer the substitution, as the controlling power in the state, of a parliament for the monarchy, nor his conservatism the revolutionary changes in church and state now insisted upon by the opposite faction. The fatal character and policy of the king, the most incapable of men and yet the man upon whom all depended, must have been by now thoroughly understood by Falkland. Compromise had long been out of the question. The victory of either side could only bring misery; and the prolongation of the war was a prospect equally unhappy. Nor could Falkland find any support or consolation in his own inward convictions or principles. His ideals and hopes were now destroyed, and he had no definite political convictions such as inspired and strengthened Strafford and Pym. In fact his sensitive nature shrank from contact with the practical politics of the day and prevented his rise to the place of a leader or a statesman. Clarendon has recorded his final relapse into despair. "Sitting amongst his friends, often, after a deep silence and frequent sighs (he) would with a shrill and sad accent ingeminate the word *Peace, Peace,* and would passionately profess that the very agony of the war, and the view of the calamities and desolation the kingdom did and must endure, took his sleep from him and would shortly break his heart." At Gloucester he had in vain exposed himself to risks. On the morning of the battle of Newbury, on the 20th of September 1643, he declared to his friends, who would have dissuaded him from taking part in the fight, that "he was weary of the times and foresaw much misery to his own Country and did believe he should be out of it ere night."[3] He served during the engagement as a volunteer under Sir John Byron, and, riding alone at a gap in a hedge commanded by the enemy's fire, was immediately killed.

His death took place at the early age of 33, which should be borne in mind in every estimate of his career and character. He was succeeded in the title by his eldest son Lucius, 3rd Viscount Falkland, his male descent becoming extinct in the person of Anthony, 5th viscount, in 1694, when the viscounty passed to Lucius Henry (1687–1730), a descendant of the first viscount, and the present peer is his direct descendant.

Falkland wrote a *Discourse of Infallibility*, published in 1646 (*Thomason Tracts*, E 361 [1]), reprinted in 1650, in 1651 (E 634 [1]) ed. by Triplet with replies, and in 1660 with the addition of two discourses on episcopacy by Falkland. This is a work of some importance in theological controversy, the general argument being that "to those who follow their reason in the interpretation of the Scriptures God will either give his grace for assistance to find the truth or his pardon if they miss it. And then this supposed necessity of an infallible guide (with the supposed damnation for the want of it) fall together to the ground." Also *A Letter ... 30 Sept. 1642 concerning the late conflict before Worcester* (1642); and *Poems*, in which he shows himself a follower of Ben Jonson, edited by A. B. Grosart in *Miscellanies of the Fuller Worthies Library*, vol. iii. (1871).

The chief interest in Falkland does not lie in his writings or in the incidents of his career, but in his character and the distinction of his intellectual position, in his isolation from his contemporaries seeking reformation in the inward and spiritual life of the church and state and not in its outward and material form, and as the leader and chief of rationalism in an age dominated by violent intolerance and narrow dogmatism. His personal appearance, according to Clarendon, was insignificant, "in no degree attractive or promising. His stature was low and smaller than most men; his motion not graceful ... but that little person and small stature was quickly found to contain a great heart. . . all mankind could not but admire and love him."[4]

AUTHORITIES.—There is a *Life and Times* by J. A. R. Marriott (1907); see also S. R. Gardiner's *Hist. of England*; *Hist. of the Civil War*; the same author's article in the *Dict. of Nat. Biography* and references there given; Clarendon's *Hist. of the Rebellion*, *passim* and esp. vii. 217-234; Clarendon's *Life*; *Rational Theology . . . in the 17th Century*, by John Tulloch (1874), i. 76; *Life of Lady Falkland from a MS. in the imperial library at Lille* (1861); *Life* of the same by Lady Georgiana Fullerton (1883); Jonson's *Ode Pindaric to the memory and friendship of . . . . Sir Lucius Cary and Sir Henry Morrison*; W. J. Courthope, *History of English Poetry* (1903), iii. 291; *Life of Falkland*, by W. H. Trale in the *Englishman's Library*, vol. 22 (1842); D. Lloyd, *Memoires* (1668), 331; and the *Life of Falkland*, by Lady M. T. Lewis in *Lives of the Friends . . . of Lord Chancellor Clarendon*, vol. i. p. 3. John Duncan's account of Lettice, Lady Falkland, was edited in 1908 by M. F. Howard. (P. C. Y.)

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[1] His speeches are in the *Thomason Tracts*, E 196 (9), (26), (36).

[2] Clarendon's *Hist.* iv. 94, note.

[3] Whitelocke, p. 73.

[4] *Life*, i. 37.

FALKLAND, a royal and police burgh of Fifeshire, Scotland. Pop. (1901) 809. It is situated at the northern base of the hill of East Lomond (1471 ft. high), 2½ m. from Falkland Road station (with which there is communication by 'bus), on the North British railway company's main line to Dundee, 21 m. N. of Edinburgh as the crow flies. It is an old-world-looking place, many of the ancient houses still standing. Its industries are chiefly concerned with the weaving of linen and the brewing of ale, for which it was once specially noted; and it has few public buildings save the town hall. The palace of the Stuarts, however—more beautiful than Holyrood and quite as romantic—lends the spot its fame and charm. The older edifice that occupied this site was a hunting-tower of the Macduffs, earls of Fife, and was transferred with the earldom in 1371 to Robert Stewart, earl of Fife and Menteith, afterwards duke of Albany, second son of Robert II. Because of his father's long illness and the incapacity of Robert III., his brother Albany was during many years virtual ruler of Scotland, and, in the hope of securing the crown, caused the heir-apparent—David, duke of Rothesay—to be conveyed to the castle by force and there starved to death, in 1402. The conversion of the Thane's tower into the existing palace was begun by James III. and completed in 1538. The western part had two round towers, similar to those at Holyrood, which were also built by James V., and the southern elevation was ornamented with niches and statues, giving it a close resemblance to the Perpendicular style of the semi-ecclesiastical architecture of England. The palace soon became the favourite summer residence of the Stuarts. From it James V. when a boy fled to Stirling by night from the custody of the earl of Angus, and in it he died in 1542.

Here, too, Queen Mary spent some of her happiest days, playing the country girl in its parks and woods. When the court was held at Falkland the Green was the daily scene of revelry and dance, and "To be Falkland bred" was a proverb that then came into vogue to designate a courtier. James VI. delighted in the palace and especially in the deer. He upset the schemes of the Gowrie conspirators by escaping from Falkland to St Andrews, and it was while His Majesty was residing in the palace that the fifth earl of Bothwell, in 1592, attempted to kidnap him. In September 1596 an intensely dramatic interview took place in the palace between the king and Andrew Melville and other Presbyterian ministers sent by the general assembly at Cupar to remonstrate with him on allowing the Roman Catholic lords to return to Scotland. In 1654 the eastern wing was accidentally destroyed by fire, during its tenancy by the soldiers of Cromwell, by whose orders the fine old oaks in the park were cut down for the building of a fort at Perth. Even in its neglected state the mansion impressed Defoe, who declared the Scottish kings owned more palaces than their English brothers. In 1715 Rob Roy garrisoned the palace and failed not to levy dues on the burgh and neighbourhood. Signs of decay were more evident when Thomas Carlyle saw it, for he likened it to "a black old bit of coffin or protrusive shin-bone striking through the soil of the dead past." But a munificent protector at length appeared in the person of the third marquess of Bute, who acquired the estate and buildings in 1888, and forthwith undertook the restoration of the palace.

Falkland became a royal burgh in 1458 and its charter was renewed in 1595, and before the earlier date it had been a seat of the Templars. It gives the title of viscount to the English family of Cary, the patent having been granted in 1620 by James VI. The town's most distinguished native was Richard Cameron, the Covenanter. His house—a three-storeyed structure with yellow harled front and thatched roof—still stands on the south side of the square in the main street. The Hackstons of Rathillet also had a house in Falkland.

FALKLAND ISLANDS (Fr. *Malouines*; Span. *Malvinas*), a group of islands in the South Atlantic Ocean, belonging to Britain, and lying about 250 m. E. of the nearest point in the mainland of South America, between 51° and 53° S., and 57° 40′ and 61° 25′ W. With the uninhabited dependency of South Georgia Island, to the E.S.E., they form the most southerly colony of the British empire. The islands, inclusive of rocks and reefs, exceed 100 in number and have a total area of 6500 sq. m.; but only two are of considerable size; the largest of these, East Falkland, is 95 m. in extreme length, with an average width of 40 m., and the smaller, West Falkland, is 80 m. long and about 25 m. wide. The area of East Falkland is about 3000 sq. m., and that of West Falkland 2300. Most of the others are mere islets, the largest 16 m. long by 8 m. wide. The two principal islands are separated by Falkland Sound, a narrow strait from 18 to 2½ m. in width, running nearly N.E. and S.W. The general appearance of the islands is not unlike that of one of the outer Hebrides. The general colouring, a faded brown, is somewhat dreary, but the mountain heights and promontories of the west display some grandeur of outline. The coast-line of both main islands is deeply indented and many of the bays and inlets form secure and well-protected harbours, some of which, however, are difficult of access to sailing ships.

East Falkland is almost bisected by two deep fjords, Choiseul and Brenton Sounds, which leave the northern and southern portions connected only by an isthmus a mile and a half wide. The northern portion is hilly, and is crossed by a rugged range, the Wickham Heights, running east and west, and rising in some places to a height of nearly 2000 ft. The remainder of the island consists chiefly of low undulating ground, a mixture of pasture and morass, with many shallow freshwater tarns, and small streams running in the valleys. Two fine inlets, Berkeley Sound and Port William, run far into the land at the north-eastern extremity of the island. Port Louis, formerly the seat of government, is at the head of Berkeley Sound, but the anchorage there having been found rather too exposed, about the year 1844 a town was laid out, and the necessary public buildings were erected on Stanley Harbour, a sheltered recess within Port William. West Falkland is more hilly near the east island; the principal mountain range, the Hornby Hills, runs north and south parallel with Falkland Sound. Mount Adam, the highest hill in the islands, is 2315 ft. high.

The little town of Stanley is built along the south shore of Stanley harbour and stretches a short way up the slope; it has a population of little more than 900. The houses, mostly white with coloured roofs, are generally built of wood and iron, and have glazed porches, gay with fuchsias and pelargoniums. Government House, grey, stone-built and slated, calls to mind a manse in Shetland or Orkney. The government barrack is a rather imposing structure in the middle of the town, as is the cathedral church to the east, built of stone and buttressed with brick. Next to Stanley the most important place on East Falkland is Darwin on Choiseul Sound—a village of Scottish shepherds and a station of the Falkland Island Company.

The Falkland Islands consist entirely, so far as is known, of the older Palaeozoic rocks, Lower Devonian or Upper Silurian, slightly metamorphosed and a good deal crumpled and distorted, in the low grounds clay slate and soft sandstone, and on the ridges hardened sandstone passing into the conspicuous white quartzites. There do not seem to be any minerals of value, and the rocks are not such as to indicate any probability of their discovery. Galena is found in small quantity, and in some places it contains a large percentage of silver. The dark bituminous layers of clay slate, which occur intercalated among the quartzites, have led, here as elsewhere, to the hope of coming upon a seam of coal, but it is contrary to experience that coal of any value should be found in rocks of that age.

Many of the valleys in the Falklands are occupied by pale glistening masses which at a little distance much resemble small glaciers. Examined more closely these are found to be vast accumulations of blocks of quartzite, irregular in form, but having a tendency to a rude diamond shape, from 2 to 20 ft. in length, and half as much in width, and of a thickness corresponding with that of the quartzite ridges on the hills above. The blocks are angular, and rest irregularly one upon another, supported in all positions by the angles and edges of those beneath. The whole mass looks as if it were, as it is, slowly sliding down the valley to the sea. These "stone runs" are looked upon with great wonder by the shifting population of the Falklands, and they are shown to visitors with many strange speculations as to their mode of formation. Their origin is attributed by some to the moraine formation of former glaciers. Another out of many theories[1] is that the hard beds of quartzite are denuded by the disintegration of the softer layers. Their support being removed they break away in the direction of natural joints, and the fragments fall down the slope upon the vegetable soil. This soil is spongy, and, undergoing alternate contraction and expansion from being alternately comparatively dry and saturated with moisture, allows the heavy blocks to slip down by their own weight into the valley, where they become piled up, the valley stream afterwards removing the soil from among and over them.

The Falkland Islands correspond very nearly in latitude in the southern hemisphere with London in the northern, but the climatic influences are very different. The temperature is equable, the average of the two midsummer months being about 47° Fahr., and that of the two midwinter months 37° Fahr. The extreme frosts and heats of the English climate are unknown, but occasional heavy snow-falls occur, and the sea in shallow inlets is covered with a thin coating of ice. The sky is almost constantly overcast, and rain falls, mostly in a drizzle and in frequent showers, on about 250 days in the year. The rainfall is not great, only about 20 in., but the mean humidity for the year is 80, saturation being 100. November is considered the only dry month. The prevalent winds from the west, south-west and south blow continuously, at times approaching the force of a hurricane. "A region more exposed to storms both in summer and winter it would be difficult to mention" (Fitzroy, *Voyages of "Adventure" and "Beagle,"* ii. 228). The fragments of many wrecks emphasize the dangers of navigation, which are increased by the absence of beacons, the only lighthouse being that maintained by the Board of Trade on Cape Pembroke near the principal settlement. Kelp is a natural danger-signal, and the sunken rock, "Uranie," is reputed to be the only one not buoyed by the giant seaweed.

Of aboriginal human inhabitants there is no trace in the Falklands, and the land fauna is very scanty. A small wolf, the *loup-renard* of de Bougainville, is extinct, the last having been seen about 1875 on the West Falkland. Some herds of cattle and horses run wild; but these were, of course, introduced, as were also the wild hogs, the numerous rabbits and the less common hares. All these have greatly declined in numbers, being profitably replaced by sheep. Land-birds are few in kind, and are mostly strays from South America. They include, however, the snipe and military starling, which on account of its scarlet breast is locally known as the robin. Sea-birds are abundant, and, probably from the islands having been comparatively lately peopled, they are singularly tame. Gulls and amphibious birds abound in large variety; three kinds of penguin have their rookeries and breed here, migrating yearly for some months to the South American mainland. Stray specimens of the great king penguin have been observed, and there are also mollymauks (a kind of albatross), Cape pigeons and many carrion birds. Kelp and upland geese abound, the latter being edible; and their shooting affords some sport.

The Falkland Islands form essentially a part of Patagonia, with which they are connected by an elevated submarine plateau, and their flora is much the same as that of Antarctic South America. The trees which form dense forest and scrub in southern Patagonia and in Fuegia are absent, and one of the largest plants on the islands is a gigantic woolly ragweed (*Senecio candicans*) which attains in some places a height of 3 to 4 ft. A half-shrubby veronica (*V. decussata*) is found in some parts, and has also received cultivation. The greater part of the "camp" (the open country) is formed of peat, which in some places is of great age and depth, and at the bottom of the bed very dense and bituminous. The peat is different in character from that of northern Europe: cellular plants enter but little into its composition, and it is formed almost entirely of the roots and stems of *Empetrum rubrum*, a variety of the common crowberry of the Scottish hills with red berries, called by the Falklanders the "diddle-dee" berry; of *Myrtus nummularia*, a little creeping myrtle whose leaves are used by the shepherds as a substitute for tea; of *Caltha appendiculata*, a dwarf species of marsh-marigold; and of some sedges and sedge-like plants, such as *Astelia pumila*, *Gaimardia australis* and *Bostkovia grandiflora*. Peat is largely used as fuel, coal being obtained only at a cost of £3 a ton.

Two vegetable products, the "balsam bog" (*Bolar glebaria*) and the "tussock grass" (*Dactylis caespitosa*) have been objects of curiosity and interest ever since the first accounts of the islands were given. The first is a huge mass of a bright green colour, living to a great age, and when dead becoming of a grey and stony appearance. When cut open, it displays an infinity of tiny leaf-buds and stems, and at intervals there exudes from it an aromatic resin, which from its astringent properties is used by the shepherds as a vulnerary, but has not been converted to any commercial purpose. The "tussock grass" is a wonderful and most valuable natural production, which, owing to the introduction of stock, has become extinct in the two main islands, but still flourishes elsewhere in the group. It is a reed-like grass, which grows in dense tufts from 6 to 10 ft. high from stool-like root-crowns. It forms excellent fodder for cattle, and is regularly gathered for that purpose. It is of beautiful appearance, and the almost tropical profusion of its growth may have led to the early erroneous reports of the densely-wooded nature of these islands.

The population slightly exceeds 2000. The large majority of the inhabitants live in the East Island, and the predominating element is Scottish—Scottish shepherds having superseded the South American Gauchos. In 1867 there were no settlers on the west island, and the government issued a proclamation offering leases of grazing stations on very moderate terms. In 1868 all the available land was occupied. These lands are fairly healthy, the principal drawback being the virulent form assumed by simple epidemic maladies. The occupation of the inhabitants is almost entirely pastoral, and the principal industry is sheep-farming. Wool forms by far the largest export, and tallow, hides, bones and frozen mutton are also exported. Trade is carried on almost entirely with the United Kingdom; the approximate annual value of exports is £120,000, and of imports a little more than half that sum. The Falkland Islands Company, having its headquarters at Stanley and an important station in the camp at Darwin, carries on an extensive business in sheep-farming and the dependent industries, and in the general import trade. The development of this undertaking necessitated the establishment of stores and workshops at Stanley, and ships can be repaired and provided in every way; a matter of importance since not a few vessels, after suffering injury during heavy weather off Cape Horn, call on the Falklands in distress. The maintenance of the requisite plant and the high wages current render such repairs somewhat costly. A former trade in oil and sealskin has decayed, owing to the smaller number of whales and seals remaining about the islands. Communications are maintained on horseback and by water, and there are no roads except at Stanley. There is a monthly mail to and from England, the passage occupying about four weeks.

The Falkland Islands are a crown colony, with a governor and executive and legislative councils. The legislative council consists of the governor and three official and two unofficial nominated members, and the executive of the same, with the exception that there is only one unofficial member. The colony is self-supporting, the revenue being largely derived from the drink duties, and there is no public debt. The Falklands are the seat of a colonial bishop. Education is compulsory. The government maintains schools and travelling teachers; the Falkland Islands Company also maintains a school at Darwin, and there is one for those of the Roman Catholic faith in Stanley. There is also on Keppel Island a Protestant missionary settlement for the training in agriculture of imported Fuegians. Stanley was for some years a naval station, but ceased to be so in 1904.

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[1] See B Stechele, in *Münchener geographische Studien*, xx. (1906), and *Geographical Journal* (December 1907).

The Falkland Islands were first seen by Davis in the year 1592, and Sir Richard Hawkins sailed along their north shore in 1594. The claims of Amerigo Vespucci to a previous discovery are doubtful. In 1598 Sebald de Wert, a Dutchman, visited them, and called them the Sebald Islands, a name which they bear on some Dutch maps. Captain Strong sailed through between the two principal islands in 1690, landed upon one of them, and called the passage Falkland Sound, and from this the group afterwards took its English name. In 1764 the French explorer De Bougainville took possession of the islands on behalf of his country, and established a colony at Port Louis on Berkeley Sound. But in 1767 France ceded the islands to Spain, De Bougainville being employed as intermediary. Meanwhile in 1765 Commodore Byron had taken possession on the part of England on the ground of prior discovery, and had formed a settlement at Port Egmont on the small island of Saunders. The Spanish and English settlers remained in ignorance, real or assumed, of each other's presence until 1769-1770, when Byron's action was nearly the cause of a war between England and Spain, both countries having armed fleets to contest the barren sovereignty. In 1771, however, Spain yielded the islands to Great Britain by convention. As they had not been actually colonized by England, the republic of Buenos Aires claimed the group in 1820, and subsequently entered into a dispute with the United States of America concerning the rights to the products of these islands. On the representations of Great Britain the Buenos Aireans withdrew, and the British flag was once more hoisted at Port Louis in 1833, and since that time the Falkland Islands have been a regular British colony.

In 1845 Mr S. Lafone, a wealthy cattle and hide merchant on the river Plate, obtained from government a grant of the southern portion of the island, a peninsula 600,000 acres in extent, and possession of all the wild cattle on the island for a period of six years, for a payment of £10,000 down, and £20,000 in ten years from January 1, 1852. In 1851 Mr Lafone's interest in Lafonia, as the peninsula came to be called, was purchased for £30,000 by the Falkland Islands Company, which had been incorporated by charter in the same year.

See Pernety, *Journal historique d'une voyage faite aux îles Malouines en 1763 et 1764* (Berlin, 1767); S. Johnson, *Thoughts on the late Transactions respecting Falkland's Islands* (1771); L. A. de Bougainville, *Voyage autour du monde* (1771); T. Falkner, *Description of Patagonia and the Falkland Islands* (1774); B. Penrose, *Account of the last Expedition to Port Egmont in the Falkland Islands* (1775); *Observations on the Forcible Occupation of Malvinas by the British Government in 1833* (Buenos Ayres, 1833); *Reclamacion del Gobierno de las provincias Unidas de la Plata contra el de S.M. Britanica sobre la soverania y possesion de las Islas Malvinas* (London, 1841); Fitzroy, *Narrative of the Surveying Voyage of H.M.S. "Adventure" and "Beagle"* (1839); Darwin, *Voyage of a Naturalist round the World* (1845); S. B. Sullivan, *Description of the Falkland Islands* (1849); W. Hadfield, *Brazil, the Falkland Islands, &c.* (1854); W. Parker Snow, *Two Years' Cruise off the Tierra del Fuego, the Falkland Islands, &c.* (1857); Sir C. Wyville Thomson, *Voyage of the "Challenger"* (1877); C. P. Lucas, *Historical Geography of the British Colonies*, vol. ii. "The West Indies" (Oxford, 1890); *Colonial Reports Annual*; MS. Sloane, 3295.

FALLACY (Lat. *fall-ax*, apt to mislead), the term given generally to any mistaken statement used in argument; in Logic, technically, an argument which violates the laws of correct demonstration. An argument may be fallacious in *matter* (*i.e.* misstatement of facts), in *wording* (*i.e.* wrong use of words), or in the *process of inference*. Fallacies have, therefore, been classified as: I. Material, II. Verbal, III. Logical or Formal; II. and III. are often included under the general description *Logical*, and in scholastic phraseology, following Aristotle, are called fallacies *in dictione* or *in voce*, as opposed to material fallacies *in re* or *extra dictionem*.

I. *Material.*—The classification widely adopted by modern logicians and based on that of Aristotle, *Organon* (*Sophistici elenchi*), is as follows:—(1) *Fallacy of Accident*, *i.e.* arguing erroneously from a general rule to a particular case, without proper regard to particular conditions which vitiate the application of the general rule; *e.g.* if manhood suffrage be the law, arguing that a criminal or a lunatic must, therefore, have a vote; (2) *Converse Fallacy of Accident*, *i.e.* arguing from a special case to a general rule; (3) *Irrelevant Conclusion*, or *Ignoratio Elenchi*, wherein, instead of proving the fact in dispute, the arguer seeks to gain his point by diverting attention to some extraneous fact (as in the legal story of "No case. Abuse the plaintiff's attorney"). Under this head come the so-called *argumentum* (*a*) *ad hominem*, (*b*) *ad populum*, (*c*) *ad baculum*, (*d*) *ad verecundiam*, common in platform oratory, in which the speaker obscures the real issue by appealing to his audience on the grounds of (*a*) purely personal considerations, (*b*) popular sentiment, (*c*) fear, (*d*) conventional propriety. This fallacy has been illustrated by ethical or theological arguments wherein the fear of punishment is subtly substituted for abstract right as the sanction of moral obligation. (4) *Petitio principii* (begging the question) or *Circulus in probando* (arguing in a circle), which consists in demonstrating a conclusion by means of premises which presuppose that conclusion. Jeremy Bentham points out that this fallacy may lurk in a single word, especially in an epithet, *e.g.* if a measure were condemned simply on the ground that it is alleged to be "un-English"; (5) *Fallacy of the Consequent*, really a species of (3), wherein a conclusion is drawn from premises which do not really support it; (6) *Fallacy of False Cause*, or *Non Sequitur* ("it does not follow"), wherein one thing is incorrectly assumed as the cause of another, as when the ancients attributed a public calamity to a meteorological phenomenon; (7) *Fallacy of Many Questions* (*Plurium Interrogationum*), wherein several questions are improperly grouped in the form of one, and a direct categorical answer is demanded, *e.g.* if a prosecuting counsel asked the prisoner "What time was it when you met this man?" with the intention of eliciting the tacit admission that such a meeting had taken place.

II. *Verbal Fallacies* are those in which a false conclusion is obtained by improper or ambiguous use of words. They are generally classified as follows. (1) *Equivocation* consists in employing the same word in two or more senses, *e.g.* in a syllogism, the middle term being used in one sense in the major and another in the minor premise, so that in fact there are *four* not *three* terms ("All fair things are honourable; This woman is fair; therefore this woman is honourable," the second "fair" being in reference to complexion). (2) *Amphibology* is the result of ambiguity of grammatical structure, *e.g.* of the position of the adverb "only" in careless writers ("He only said that," in which sentence, as experience shows, the adverb has been intended to qualify any one of the other three words). (3) *Composition*, a species of (1), which results from the confused use of collective terms ("The angles of a triangle are less than two right angles" might refer to the angles separately or added together). (4) *Division*, the converse of the preceding, which consists in employing the middle term distributively in the minor and collectively in the major premise. (5) *Accent*, which occurs only in speaking and consists of emphasizing the wrong word in a sentence ("He is a fairly good pianist," according to the emphasis on the words, may imply praise of a beginner's progress, or an expert's depreciation of a popular hero, or it may imply that the person in question is a deplorable violinist). (6) *Figure of Speech*, the confusion between the metaphorical and ordinary uses of a word or phrase.

III. The purely *Logical* or *Formal* fallacies consist in the violation of the formal rules of the Syllogism (*q.v.*). They are (*a*) fallacy of Four Terms (*Quaternio terminorum*); (*b*) of Undistributed Middle; (*c*) of Illicit process of the major or the minor term; (*d*) of Negative Premises.

Of other classifications of Fallacies in general the most famous are those of Francis Bacon and J. S. Mill. Bacon (*Novum organum*, Aph. i. 33, 38 sqq.) divided fallacies into four *Idola* (Idols, *i.e.* False Appearances), which summarize the various kinds of mistakes to which the human intellect is prone (see BACON, FRANCIS). With these should be compared the *Offendicula* of Roger Bacon, contained in the *Opus maius*, pt. i. (see BACON, ROGER). J. S. Mill discussed the subject in book v. of his *Logic*, and Jeremy Bentham's *Book of Fallacies* (1824) contains valuable remarks.

See Rd. Whateley's *Logic*, bk. v.; A. de Morgan, *Formal Logic* (1847); A. Sidgwick, *Fallacies* (1883) and other text-books. See also article LOGIC, and for fallacies of Induction, see INDUCTION.

FALLIÈRES, CLÉMENT ARMAND (1841–), president of the French republic, was born at Mézin in the department of Lot-et-Garonne, where his father was clerk of the peace. He studied law and became an advocate at Nérac, beginning his public career there as municipal councillor (1868), afterwards mayor (1871), and as councillor-general of the department of Lot-et-Garonne (1871). Being an ardent Republican, he lost this position in May 1873 upon the fall of Thiers, but in February 1876 was elected deputy for Nérac. In the chamber he sat with the Republican Left, signed the protestation of the 18th of May 1877, and was re-elected in October by his constituency. In 1880 he became under-secretary of state in the department of the interior in the Jules Ferry ministry (May 1880 to November 1881). From the 7th of August 1882 to the 20th of February 1883 he was minister of the interior, and for a month (from the 29th of January 1883) was premier. His ministry had to face the question of the expulsion of the pretenders to the throne of France, owing to the proclamation by Prince Jérome Napoleon (January 1883), and M. Fallières, who was ill at the time, was not able to face the storm of opposition, and resigned when the senate rejected his project. In the following November, however, he was chosen as minister of public instruction by Jules Ferry, and carried out various reforms in the school system. He resigned with the ministry in March 1885. Again becoming minister of the interior in the Rouvier cabinet in May 1887, he exchanged his portfolio in December for that of justice. He returned to the ministry of the interior in February 1889, and finally took the department of justice from March 1890 to February 1892. In June 1890 his department (Lot-et-Garonne) elected him to the senate by 417 votes to 23. There M. Fallières remained somewhat apart from party struggles, although maintaining his influence among the Republicans. In March 1899 he was elected president of the senate, and retained that position until January 1906, when he was chosen by a union of the groups of the Left in both chambers as candidate for the presidency of the republic. He was elected on the first ballot by 449 votes againt 371 for his opponent, Paul Doumer.

FALL-LINE, in American geology, a line marking the junction between the hard rocks of the Appalachian Mountains and the softer deposits of the coastal plain. The pre-Cambrian and metamorphic rocks of the mountain mass form a continuous ledge parallel to the east coast, where they are subject to denudation and form a series of "falls" and rapids in the river courses all along this line. The relief of the land below the falls is very slight, and this low country rarely rises to a height of 200 ft., so that the rivers are navigable up to the falls, while the falls themselves are a valuable source of power. A line of cities may be traced upon the map whose position will thus be readily understood in relation to the economic importance of the fall-line. They are Trenton on the Delaware, Philadelphia on the Schuylkill, Georgetown on the Potomac, Richmond on the James, and Augusta on the Savannah. It will be readily understood that the softer and more recent rocks of the coastal plain have been more easily washed away, while the harder rocks of the mountains, owing to differential denudation, are left standing high above them, and that the trend of the edge of this great lenticular mass of ancient rock is roughly parallel to that of the Appalachian system.

FALLMERAYER, JAKOB PHILIPP (1790–1861), German traveller and historical investigator, best known for his opinions in regard to the ethnology of the modern Greeks, was born, the son of a poor peasant, at Tschötsch, near Brixen in Tirol, on the 10th of December 1790. In 1809 he absconded from the cathedral choir school at Brixen and made his way to Salzburg, where he supported himself by private teaching while he studied theology, the Semitic languages, and history. After a year's study he sought to assure to himself the peace and quiet necessary for a student's life by entering the abbey of Kremsmünster, but difficulties put in his way by the Bavarian officials prevented the accomplishment of this intention. At the university of Landshut, to which he removed in 1812, he first applied himself to jurisprudence, but soon devoted his attention exclusively to history and philology. His immediate necessities were provided for by a rich patron. During the Napoleonic wars he joined the Bavarian infantry as a subaltern in 1813, fought at Hanau (30th October 1813), and served throughout the campaign in France. He remained in the army of occupation on the banks of the Rhine until Waterloo, when he spent six months at Orleans as adjutant to General von Spreti. Two years of garrison life at Lindau on Lake Constance after the peace were spent in the study of modern Greek, Persian and Turkish.

Resigning his commission in 1818, he was successively engaged as teacher in the gymnasium at Augsburg and in the progymnasium and lyceum at Landshut. In 1827 he won the gold medal offered by the university of Copenhagen with his *Geschichte des Kaisertums von Trapezunt*, based on patient investigation of Greek and oriental MSS. at Venice and Vienna. The strictures on priestcraft contained in the preface to this book gave offence to the authorities, and his position was not improved by the liberal views expressed in his *Geschichte der Halbinsel Morea während des Mittelalters* (Stuttgart, 1830–1836, 2 pts.). The three years from 1831 to 1834 he spent in travel with the Russian count Ostermann Tolstoy, visiting Egypt, Palestine, Syria, Cyprus, Rhodes, Constantinople, Greece and Naples. On his return he was elected in 1835 a member of the Royal Bavarian Academy of Sciences, but he soon after left the country again on account of political troubles, and spent the greater part of the next four years in travel, spending the winter of 1839–1840 with Count Tolstoy at Geneva. Constantinople, Trebizond, Athos, Macedonia, Thessaly and Greece were visited by him during 1840–1841; and after some years' residence in Munich he returned in 1847 to the East, and travelled in Palestine, Syria and Asia Minor. The authorities continued to regard him with suspicion, and university students were forbidden to attend the lectures he delivered at Munich. He entered, however, into friendly relations with the crown prince Maximilian, but this intimacy was destroyed by the events following on 1848. At that period he was appointed professor of history in the Munich University, and made a member of the national congress at Frankfort-on-Main. He there joined the left or opposition party, and in the following year he accompanied the rump-parliament to Stuttgart, a course of action which led to his expulsion from his professorate. During the winter of 1849–1850 he was an exile in Switzerland, but the amnesty of April 1850 enabled him to return to Munich. He died on the 26th of April 1861.

His contributions to the medieval history of Greece are of great value, and though his theory that the Greeks of the present day are of Albanian and Slav descent, with hardly a drop of true Greek blood in their veins, has not been accepted in its entirety by other investigators, it has served to modify the opinions of even his greatest opponents. A criticism of his views will be found in Hopf's *Geschichte Griechenlands* (reprinted from Ersch and Gruber's *Encykl.*) and in Finlay's *History of Greece in the Middle Ages*. Another theory which he propounded and defended with great vigour was that the capture of Constantinople by Russia was inevitable, and would lead to the absorption by the Russian empire of the whole of the Balkan and Grecian peninsula; and that this extended empire would constitute a standing menace to the western Germanic nations. These views he expressed in a series of brilliant articles in German journals. His most important contribution to learning remains his history of the empire of Trebizond. Prior to his discovery of the chronicle of Michael Panaretos, covering the dominion of Alexus Comnenus and his successors from 1204 to 1426, the history of this medieval empire was practically unknown.

His works are—*Geschichte des Kaiserthums Trapezunt* (Munich, 1827–1848); *Geschichte der Halbinsel Morea im Mittelalter* (Stuttgart, 1830–1836); *Über die Entstehung der Neugriechen* (Stuttgart, 1835); "Originalfragmente, Chroniken, u.s.w., zur Geschichte des K. Trapezunts" (Munich, 1843), in *Abhandl. der hist. Classe der K. Bayerisch. Akad. v. Wiss.*; *Fragmente aus dem Orient* (Stuttgart, 1845); *Denkschrift über Golgotha und das heilige Grab* (Munich, 1852), and *Das Todte Meer* (1853)—both of which had appeared in the *Abhandlungen* of the Academy; *Das albanesische Element in Griechenland*, iii. parts, in the *Abhandl.* for 1860–1866. After his death there appeared at Leipzig in 1861, under the editorship of G. M. Thomas, three volumes of *Gesammelte Werke*, containing *Neue Fragmente aus dem Orient*, *Kritische Versuche*, and *Studien und Erinnerungen aus meinem Leben*. A sketch of his life will also be found in L. Steub, *Herbsttage in Tyrol* (Munich, 1867).

FALLOPIUS (or Fallopio), **GABRIELLO** (1523–1562), Italian anatomist, was born about 1523 at Modena, where he became a canon of the cathedral. He studied medicine at Ferrara, and, after a European tour, became teacher of anatomy in that city. He thence removed to Pisa, and from Pisa, at the instance of Cosmo I., grand-duke of Tuscany, to Padua, where, besides the chairs of anatomy and surgery and of botany, he held the office of superintendent of the new botanical garden. He died at Padua on the 9th of October 1562. Only one treatise by Fallopius appeared during his lifetime, namely the *Observationes anatomicae* (Venice, 1561). His collected works, *Opera genuina omnia*, were published at Venice in 1584. (See Anatomy.)

FALLOUX, FRÉDÉRIC ALFRED PIERRE, Comte de (1811–1886), French politician and author, was born at Angers on the 11th of May 1811. His father had been ennobled by Charles X., and Falloux began his career as a Legitimist and clerical journalist under the influence of Mme Swetchine. In 1846 he entered the legislature as deputy for Maine-et-Loire, and with many other ultra-Catholics he gave real or pretended support to the revolution of 1848. Louis Napoleon made him minister of education in 1849, but disagreements with the president led to his resignation within a year. He had nevertheless secured the passage of the Loi Falloux (March 15, 1850) for the organization of primary and secondary education. This law provided that the clergy and members of ecclesiastical orders, male and female, might exercise the profession of teaching without producing any further qualification. This exemption was extended even to priests who taught in secondary schools, where a university degree was exacted from lay teachers. The primary schools were put under the management of the curés. Falloux was elected to the French Academy in 1856. His failure to secure re-election to the legislature in 1866, 1869, 1870 and 1871 was due to the opposition of the stricter Legitimists, who viewed with suspicion his attempts to reconcile the Orleans princes with Henri, comte de Chambord. In spite of his failure to enter the National Assembly his influence was very great, and was increased by the intimacy of his personal relations with Thiers. But in 1872 he offended both sections of the monarchical party at a conference arranged in the hope of effecting a fusion between the partisans of the comte de Chambord and of the Orleans princes, divided on the vexed question of the flag. He suggested that the comte de Chambord might recede from his position with dignity at the desire of the National Assembly, and not content with this encroachment on royalist principles, he insinuated the possibility of a transitional stage with the duc d'Aumale as president of the republic. His disgrace was so complete that he was excommunicated by the bishop of Angers in 1876. He died on the 16th of January 1886.

Of his numerous works the best known are his *Histoire de Louis XVI* (1840); *Histoire de Saint Pie* (1845); *De la contre-revolution* (1876); and the posthumous *Mémoires d'un royaliste* (2 vols., 1888).

FALLOW, land ploughed and tilled, but left unsown, usually for a year, in order, on the one hand, to disintegrate, aërate and free it from weeds, and, on the other, to allow it to recuperate. The word was probably early confused with "fallow" (from O. Eng. *fealu*, probably cognate with Gr. πολιός, grey), of a pale-brown or yellow colour, often applied to soil left untilled and unsown, but chiefly seen in the name of the "fallow deer." The true derivation is from the O. Eng. *fealga*, only found in the plural, a harrow, and the ultimate origin is a Teutonic root meaning "to plough," cf. the German *falgen*. The recognition that continuous growing of wheat on the same area of land robs the soil of its fertility was universal among ancient peoples, and the practice of "fallowing" or resting the soil is as old as agriculture itself. The "Sabbath rest" ordered to be given every seventh year to the land by the Mosaic law is a classical instance of the "fallow." Improvements in crop rotations and manuring have diminished the necessity of the "bare fallow," which is uneconomical because the land is left unproductive, and because the nitrates in the soil unintercepted by the roots of plants are washed away in the drainage waters. At the present time bare fallowing is, in general, only advisable on stiff soils and in dry climates. A "green fallow" is land planted with turnips, potatoes or some similar crop in rows, the space between which may be cleared of weeds by hoeing. The "bastard fallow" is a modification of the bare fallow, effected by the growth of rye, vetches, or some other rapidly growing crop, sown in autumn and fed off in spring, the land then undergoing the processes of ploughing, grubbing and harrowing usual in the bare fallow.

FALLOW-DEER (that is, Dun Deer, in contradistinction to the red deer, *Cervus* [*Dama*] *dama*), a medium-sized representative of the family *Cervidae*, characterized by its expanded or palmated antlers, which generally have no bez-tine, rather long tail (black above and white below), and a coat spotted with white in summer but uniformly coloured in winter. The shoulder height is about 3 ft. The species is semi-domesticated in British parks, and occurs wild in western Asia, North Africa, the south of Europe and Sardinia. In prehistoric times it occurred throughout northern and central Europe. One park-breed has no spots. Bucks and does live apart except during the pairing-season; and the doe produces one or two, and sometimes three fawns at a birth. These deer are particularly fond of horse-chestnuts, which the stags are said to endeavour to procure by striking at the branches with their antlers. The Persian fallow-deer (*C.* [*D.*] *mesopotamicus*), a native of the mountains of Luristan, is larger than the typical species, and has a brighter coat, differing in some details of colouring. The antlers have the trez-tine near the small brow-tine, and the palmation beginning near the former. Here may be mentioned the gigantic fossil deer commonly known as the Irish elk, which is perhaps a giant type of fallow-deer, and if so should be known as *Cervus* (*Dama*) *giganteus*. If a distinct type, its title should be *C.* (*Megaceros*) *giganteus*. This deer inhabited Ireland, Great Britain, central and northern Europe, and western Asia in Pleistocene and prehistoric times; and must have stood 6 ft. high at the shoulder. The antlers are greatly palmated and of enormous size, fine specimens measuring as much as 11 ft. between the tips.

FALL RIVER, a city of Bristol county, Massachusetts, U.S.A., situated on Mount Hope Bay, at the mouth of the Taunton river, 49 m. S. of Boston. Pop. (1890) 74,398; (1900) 104,863; (estimated, 1906) 105,942;[1] (1910 census) 119,295. It is the third city in size of the commonwealth. Of the population in 1900, 50,042, or 47·7%, were foreign-born, 90,244 were of foreign parentage (*i.e.* either one or both parents were foreign), and of these 81,721 had both foreign father and foreign mother. Of the foreign-born, 20,172 were French Canadians, 2329 were English Canadians, 12,268 were from England, 1045 were from Scotland, 7317 were from Ireland, 2805 were from Portugal, and 1095 were from Russia, various other countries being represented by smaller numbers. Fall River is served by the New York, New Haven & Hartford railway, and has good steamer connexions with Providence, Newport and New York, notably by the "Fall River Line," which is much used, in connexion with the N.Y., N.H.& H. railway, by travellers between New York and Boston. The harbour is large, deep and easy of access. The city lies on a plateau and on slopes that rise rather steeply from the river, and is irregularly laid out. Granite underlying the city furnishes excellent building material; among the principal buildings are the state armoury, the county court house, the B.M.C. Durfee high school, the custom house, Notre Dame College, the church of Notre Dame, the church of St Anne, the Central Congregational church and the public library. The commonwealth aids in maintaining a textile school (the Bradford Durfee textile school), opened in 1904. The city library contained in 1908 about 78,500 volumes. There is considerable commerce, but it is as a manufacturing centre that Fall River is best known. Above the city, on the plateau, about 2 m. from the bay, are the Watuppa Lakes, 7 m. long and on an average three-fourths of a mile wide, and from them runs the Fall (Quequechan) river, with a constant flow and descending near its mouth through 127 ft. in less than half a mile. The conjunction of water transportation and water power is thus remarkable, and accounts in great part for the city's rapid growth. The waters of the North Watuppa Lake (which is fed by springs and drains out a very small area) are also exceptionally pure and furnish an excellent water-supply. The Fall river runs directly through the city (passing beneath the city hall), and along its banks are long rows of cotton mills; formerly many of these were run by water power, and their wheels were placed directly in the stream bed, but steam power is now used almost exclusively. According to the special census of manufactures of 1905, the value of all factory products for the calendar year 1904 was $43,473,105, of which amount $35,442,581, or 81·5%, consisted of cotton goods and dyeing and finishing, making Fall River the largest producer of cotton goods among American cities.[1] A large hat manufactory (the Marshall Brothers' factory) furnishes the United States army with hats. Until forced by the competition of mills in the Southern states to direct attention to finer products, the cotton manufacturers of Fall River devoted themselves almost exclusively to the making of print cloth, in which respect the city was long distinguished from Lawrence and Lowell, whose products were more varied and of higher grade. The number of spindles increased from 265,328 in 1865 to 1,269,043 in 1875, 3,000,000 in 1900, and to about 3,500,000 in 1906. Excellent drainage and sewerage systems contribute to the city's health. The birth-rate was in 1900 the highest (38·75) of any city in the country of above 30,000 inhabitants (three of the four next highest being Massachusetts towns). The social conditions and labour problems of Fall River have long been exceptional. The mills supplement the public schools in the mingling of races and the work for Americanization, and labour disturbances, for which Fall River was once conspicuous, have become less frequent and less bitter, the great strike of 1904–1905—perhaps the greatest in the history of the textile industry in the United States—being marked by little or no violence. Fall River has become a "city of homes," and tenements are giving way to dwellings for one or two families. The lists of the city's corporation stockholders show more than 10,000 names. The municipal police is controlled (as nowhere else in the state save in Boston) by a state board; this arrangement is generally regarded as having worked for better order. Lowell was about three times as large as Fall River in 1850, and Lawrence was larger until after 1870. Fall River was originally a part of Freetown; it was incorporated as a township in 1803 (being known as "Troy" in 1804–1834), and was chartered as a city in 1854. In 1861 it was increased by certain territory secured from Rhode Island, the city having spread across the state boundary and become subject to a divided jurisdiction. In 1902 the city received a new charter. Its manufactures amounted to little before the War of 1812. A disastrous fire occurred in 1843 (loss above $500,000). In 1904 Fall River became the see of the Roman Catholic diocese of that name.

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[1] The small increase between 1900 and 1906 was due in large part to the emigration of many of the inhabitants during the great strike of 1904–1905.

See H. H. Earl, *Centennial History of Fall River . . . 1656–1876* (New York, 1877); and the report of Carroll D. Wright on *Fall River, Lowell and Lawrence*, in 13th annual report of the Massachusetts Bureau of Statistics of Labor (1882), which, however, was regarded as unjust and partial by the manufacturers of Fall River.

FALMOUTH, a municipal and contributary parliamentary borough and seaport of Cornwall, England, 306 m. W.S.W. of London, on a branch of the Great Western railway. Pop. (1901) 11,789. It is finely situated on the west shore of the largest of the many estuaries which open upon the south coast of the county. This is entered by several streams, of which the largest is the Fal. Falmouth harbour lies within Pendennis Point, which shelters the estuary from the more open Falmouth Bay. The Penryn river, coming in from the north-west, forms one of several shallow, winding arms of the estuary, the main channel of which is known as Carrick Roads. To the east Pendennis Castle stands on its lofty promontory, while on the opposite side of the roads the picturesque inlet of the Porthcuel river opens between Castle Point on the north, with St Mawes' Castle, and St Anthony Head and Zoze Point on the south. The shores of the estuary as a rule slope sharply up to about 250 ft., and are beautifully wooded. The entrance is 1 m. across, and the roads form one of the best refuges for shipping on the south coast, being accessible at all times by the largest vessels. Among the principal buildings and institutions in Falmouth are the town hall, market-house, hall of the Cornwall Polytechnic Society, a meteorological and magnetic observatory, and a submarine mining establishment. The Royal Cornwall Yacht Club has its headquarters here, and in the annual regatta the principal prize is a cup given by the prince of Wales as duke of Cornwall. Engineering, shipbuilding, brewing and the manufacture of manure are carried on, and there are oyster and trawl fisheries, especially for pilchard. The inner harbour, under the jurisdiction partly of commissioners and partly of a dock company, is enclosed between two breakwaters, of which the eastern has 23 ft. of water at lowest tides alongside. The area of the harbour is 42 acres, with nearly 700 lineal yards of quayage. There are two graving docks, and repairing yards. Grain, timber, coal and guano and other manures are imported, and granite, china clay, copper ore, ropes and fish exported. Falmouth is also in favour as a watering-place. The parliamentary borough of Penryn and Falmouth returns one member. The municipal borough is under a mayor, 4 aldermen and 12 councillors. Area, 790 acres.

Falmouth (Falemuth) as a haven and port has had a place in the maritime history of Cornwall from very early times. The site of the town, which is comparatively modern, was formerly known as Smithick and Pennycomequick and formed part of the manor of Arwenack held by the family of Killigrew. The corporations of Penryn, Truro and Helston opposed the undertaking, but the lords in council, to whom the matter was referred, decided in Killigrew's favour. In 1652 the House of Commons considered that it would be advantageous to the Commonwealth to grant a Thursday market to Smithick. This market was confirmed to Sir Peter Killigrew in 1660 together with two fairs, on the 30th of October and the 27th of July, and also a ferry between Smithick and Flushing. By the charter of incorporation granted in the following year the name was changed to Falmouth, and a mayor, recorder, 7 aldermen and 12 burgesses constituted a common council with the usual rights and privileges. Three years later an act creating the borough a separate ecclesiastical parish empowered the mayor and aldermen to assess all buildings within the town at the rate of sixteen pence in the pound for the support of the rector. This rector's rate occasioned much ill-feeling in modern times, and by act of parliament in 1896 was taken over by the corporation, and provision made for its eventual extinction. The disfranchisement of Penryn, which had long been a subject of debate in the House of Commons, was settled in 1832, by uniting Penryn with Falmouth for parliamentary purposes and assigning two members to the united boroughs. By the Redistribution of Seats Act 1885, the number of members was reduced to one. The fairs granted in 1660 are no longer held, and a Saturday market has superseded the chartered market. In the 17th and 18th centuries Falmouth grew in importance owing to its being a station of the Packet Service for the conveyance of mails.

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[1] The above figures do not show adequately the full importance of Fall River as a cotton manufacturing centre, for during six months of the census year the great strike was in progress; this strike, caused by a reduction in wages, lasted from the 25th of July 1904 to the 18th of January 1905.

FALSE POINT, a landlocked harbour in the Cuttack district of Bengal, India. It was reported by the famine commissioners in 1867 to be the best harbour on the coast of India from the Hugli to Bombay. It derives its name from the circumstance that vessels proceeding up the Bay of Bengal frequently mistook it for Point Palmyras, a degree farther north. The anchorage is safe, roomy and completely landlocked, but large vessels are obliged to lie out at some distance from its mouth in an exposed roadstead. The capabilities of False Point as a harbour remained long unknown, and it was only in 1860 that the port was opened. It was rapidly developed, owing to the construction of the Orissa canals. Two navigable channels lead inland across the Mahanadi delta, and connect the port with Cuttack city. The trade of False Point is chiefly with other Indian harbours, but a large export trade in rice and oil-seeds has sprung up with Mauritius, the French colonies and France. False Point is now a regular port of call for Anglo-Indian coasting steamers. Its capabilities were first appreciated during the Orissa famine of 1866, when it afforded almost the only means by which supplies of rice could be thrown into the province. A lighthouse is situated a little to the south of the anchorage, on the point which screens it from the southern monsoon.

FALSE PRETENCES, in English law, the obtaining from any other person by any false pretence any chattel, money or valuable security, with intent to defraud. It is an indictable misdemeanour under the Larceny Act of 1861. The broad distinction between this offence and larceny is that in the former the owner intends to part with his property, in the latter he does not. This offence dates as a statutory crime practically from 1756. At common law the only remedy originally available for an owner who had been deprived of his goods by fraud was an indictment for the crime of cheating, or a civil action for deceit. These remedies were insufficient to cover all cases where money or other properties had been obtained by false pretences, and the offence was first partially created by a statute of Henry VIII. (1541), which enacted that if any person should falsely and deceitfully obtain any money, goods, &c., by means of any false token or counterfeit letter made in any other man's name, the offender should suffer any punishment other than death, at the discretion of the judge. The scope of the offence was enlarged to include practically all false pretences by the act of 1756, the provisions of which were embodied in the Larceny Act 1861.

The principal points to notice are that the pretence must be a false pretence of some existing fact, made for the purpose of inducing the prosecutor to part with his property (*e.g.* it was held not to be a false pretence to promise to pay for goods on delivery), and it may be by either words or conduct. The property, too, must have been actually obtained by the false pretence. The owner must be induced by the pretence to make over the absolute and immediate ownership of the goods, otherwise it is "larceny by means of a trick." It is not always easy, however, to draw a distinction between the various classes of offences. In the case where a man goes into a restaurant and orders a meal, and, after consuming it, says that he has no means of paying for it, it was usual to convict for obtaining food by false pretences. But *R.* v. *Jones*, 1898, L.R. 1 Q.B. 119 decided that it is neither larceny nor false pretences, but an offence under the Debtors Act 1869, of obtaining credit by fraud. (See also CHEATING; FRAUD; LARCENY.)

United States.—American statutes on this subject are mainly copied from the English statutes, and the courts there in a general way follow the English interpretations. The statutes of each state must be consulted. There is no Federal statute, though there are Federal laws providing penalties for false personation of the lawful owner of public stocks, &c., or of persons entitled to pensions, prize money, &c. (U.S. Rev. Stats. § 5435), or the false making of any order purporting to be a money order (*id.* § 5463).

In Arizona, obtaining money or property by falsely personating another is punishable as for larceny (Penal Code, 1901, § 479). Obtaining credit by false pretences as to wealth and mercantile character is punishable by six months' imprisonment and a fine not exceeding three times the value of the money or property obtained (*id.* § 481).

In Illinois, whoever by any false representation or writing signed by him, of his own respectability, wealth or mercantile correspondence or connexions, obtains credit and thereby defrauds any person of money, goods, chattels or any valuable thing, or who procures another to make a false report of his honesty, wealth, &c., shall return the money, goods, &c., and be fined and imprisoned for a term not exceeding one year (Crim. Code, 1903, ch. xxxviii. §§ 96, 97). Obtaining money or property by bogus cheques, the "confidence game" (*Dorr* v. *People*, 1907, § 228, Ill. 216), or "three card monte," sleight of hand, fortune-telling, &c., is punishable by imprisonment for from one to ten years (*id.* §§ 98, 100). Obtaining goods from warehouse, mill or wharf by fraudulent receipt wrongly stating amount of goods deposited—by imprisonment for not less than one nor more than ten years (*id.* § 124). Fraudulent use of railroad passes is a misdemeanour (*id.* 125*a*).

In Massachusetts it is simple larceny to obtain by false pretences the money or personal chattel of another (Rev. Laws, 1902, ch. ccviii. § 26). Obtaining by a false pretence with intent to defraud the signature of a person to a written instrument, the false making whereof would be forgery, is punishable by imprisonment in a state prison or by fine (*id.* § 27).

In New York, obtaining property by false pretences, felonious breach of trust and embezzlement are included in the term "larceny" (Penal Code, § 528; *Paul* v. *Dumar*, 106 N.Y. 508; *People* v. *Tattlekan*, 1907, 104 N.Y. Suppl. 805), but the methods of proof required to establish each crime remain as before the code. Obtaining lodging and food on credit at hotel or lodging house with intent to defraud is a misdemeanour (Pen. Code, § 382). Purchase of property by false pretences as to person's means or ability to pay is not criminal when in writing signed by the party to be charged (Pen. Code, § 544).

FALTICHENI (*Falticeni*), the capital of the department of Suceava, Rumania, situated on a small right-hand tributary of the Sereth, among the hills of north-west Moldavia, and 2 m. S.E. of the frontier of Bukovina. Pop. (1900) 9643, about half being Jews. A branch railway runs for 15 m. to join the main line between Czernowitz in Bukovina, and Galatz. The Suceava department (named after Suceava or Suciava, its former capital, now Suczawa in Bukowina) is densely forested; its considerable timber trade centres in Falticheni. For five weeks, from the 20th July onwards, Russians and Austro-Hungarians, as well as Rumans, attend the fair which is held at Falticheni, chiefly for the sale of horses, carriages and cattle.

FALUN, a town of Sweden, capital of the district (*län*) of Kopparberg, 153 m. N.W. of Stockholm by rail. Pop. (1900) 9606. It is situated in a bare and rocky country near the western shore of lake Runn. Here are the oldest and most celebrated copper mines in Europe. Their produce has gradually decreased since the 17th century, and is now unimportant, but sulphate of copper, iron pyrites, and some gold, silver, sulphur and sulphuric acid, and red ochre are also produced. The mines belong to the Kopparberg Mining Company (*Stora Kopparbergs Bergslags Aktiebolag*, formerly *Kopparbergslagen*). This is the oldest industrial corporation in Sweden, and perhaps the oldest still existing in the world; it is known to have been established before 1347. Since its reorganization as a joint-stock company in 1890 many of the shares have been held by the crown, philanthropic institutions and other public bodies. The company also owns iron mines, limestone and quartz quarries, large iron-works at Domnarfvet and elsewhere, a great extent of forests and saw-mills, and besides the output of the copper mines it produces manufactured iron and steel, timber, wood-pulp, bricks and charcoal. Falun has also railway rolling-stock factories. There are museums of mineralogy and geology, a lower school of mining, model room and scientific library. The so-called "Gothenburg System" of municipal control over the sale of spirits was actually devised at Falun as early as 1850.

FAMA (Gr. Φήμη, Ὄσσα), in classical mythology, the personification of Rumour. The Homeric equivalent *Ossa* (*Iliad*, ii. 93) is represented as the messenger of Zeus, who spreads reports with the rapidity of a conflagration. Homer does not personify *Pheme*, which is merely a presage drawn from human utterances, whereas Ossa (until later times) is associated with the idea of divine origin. A more definite character is given to Pheme by Hesiod (*Works and Days*, 764), who calls her a goddess; in Sophocles (*Oed. Tyr.* 158) she is the immortal daughter of golden Hope and is styled by the orator Aeschines (*Contra Timarchum*, § 128) one of the mightiest of goddesses. According to Pausanias (i. 17. 1) there was a temple of Pheme at Athens, and at Smyrna (*ib.* ix. 11, 7), whose inhabitants were especially fond of seeking the aid of divination, there was a sanctuary of Cledones (sounds or rumours supposed to convey omens).

There does not seem to have been any cult of Fama among the Romans, by whom she was regarded merely as "a figure of poetical religion." The Temple of Fame and Omen (Pheme and Cledon) mentioned by Plutarch (*Moralia*, p. 319) is due to a confusion with Aius Locutius, the divinity who warned the Romans of the coming attack of the Gauls. There are well-known descriptions of Fame in Virgil (*Aeneid*, iv. 173) and Ovid (*Metam.* xii. 39); see also Valerius Flaccus (ii. 116), Statius (*Thebais*, iii. 425). An unfavourable idea gradually became attached to the name; thus Ennius speaks of Fama as the personification of "evil" reputation and the opposite of Gloria (cp. the adjective *famosus*, which is not used in a good sense till the post-Augustan age). Chaucer in his *House of Fame* is obviously imitating Virgil and Ovid, although he is also indebted to Dante's *Divina Commedia*.

FAMAGUSTA (Gr. *Ammochostos*), a town and harbour on the east cost of Cyprus, 2½ m. S. of the ruins of Salamis. The population in 1901 was 818, nearly all being Moslems who live within the walls of the fortress; the Christian population has migrated to a suburb called Varosia (pop. 2948). The foundation of Salamis (*q.v.*) was ascribed to Teucer: it was probably the most important town in early Cyprus. The revolt of the Jews under Trajan, and earthquakes in the time of Constantius and Constantine the Great helped in turn to destroy it. It was restored by Fl. Constantius II. (A.D. 337-361) as Constantia. Another town a little to the south, built by Ptolemy Philadelphus in 274 B.C., and called Arsinoe in honour of his sister, received the refugees driven from Constantia by the Arabs under Mu'awiyah, became the seat of the orthodox archbishopric, and was eventually known as Famagusta. It received a large accession of population at the fall of Acre in 1291; was annexed by the Genoese in 1376; reunited to the throne of Cyprus in 1464; and surrendered, after an investment of nearly a year, to the Turks in 1571. The fortifications, remodelled by the Venetians after 1489, the castle, the grand cathedral church of St Nicolas, and the remains of the palace and many other churches make Famagusta a place of unique interest. Acts ii. and v. of Shakespeare's *Othello* pass there. In 1903 measures were taken to develop the fine natural harbour of Famagusta. Basins were dredged to give depths of 15 and 24 ft. respectively at ordinary low tides, and commodious jetties and quays were constructed.

FAMILIAR (through the Fr. *familier*, from Lat. *familiaris*, of or belonging to the *familia*, family), an adjective, properly meaning belonging to the family or household, but in this sense the word is rare. The more usual meanings are: friendly, intimate, well known; and from its application to the easy relations of intimate friends the term may be used in an invidious sense of "free and easy" conduct on the part of any one not justified by any close relationship, friendship or intimacy. "Familiar" is, however, also used as a substantive, especially of the spirit or demon which attended on a wizard or magician, and was summoned to execute his master's wishes. The idea underlies the notion of the Christian guardian angel and of the Roman *genius natalis* (see DEMONOLOGY; WITCHCRAFT). In the Roman Church the term is applied to persons attached to the household of the pope or of bishops. These must actually do some domestic service. They are supported by their patron, and enjoy privileges which in the case of the papal familiars are considerable. "Familiars of the Holy Office" were lay officers of the Inquisition, whose functions were chiefly those of police, in making arrests, &c., of persons charged.

FAMILISTS, a term of English origin (later adopted in other languages) to denote the members of the *Familia Caritatis* (*Hus der Lieften; Huis der Liefde; Haus der Liebe;* "Family of Love"), founded by Hendrik Niclaes (born on the 9th or 10th of January 1501 or 1502, probably at Münster; died after 1570, not later than 1581, probably in 1580). His calling was that of a merchant, in which he and his son Franz prospered, becoming ultimately wealthy. Not till 1540 did he appear in the character of one divinely endowed with "the spirit of the true love of Jesus Christ." For twenty years (1540–1560) Emden was the headquarters at once of his merchandise and of his propaganda; but he travelled in both interests to various countries, visiting England in 1552 or 1553. To this period belong most of his writings. His primary work was *Den Spegel der Gherechticheit dorch den Geist der Liefden unde den vergodeden Mensch H.N. uth de hemmelische Warheit betüget.* It appeared in an English form with the author's revision, as *An Introduction to the holy Understanding of the Glasse of Righteousness* (1575?; reprinted in 1649). None of his works bear his name in full; his initials were mystically interpreted as standing for *Homo Novus.* His "glass of righteousness" is the spirit of Christ as interpreted by him. The remarkable fact was brought out by G. Arnold (and more fully by F. Nippold in 1862) that the printer of Niclaes's works was Christopher Plantin, of Antwerp, a specially privileged printer of Roman Catholic theology and liturgy, yet secretly a steadfast adherent of Niclaes. It is true that Niclaes claimed to hold an impartial attitude towards all existing religious parties, and his mysticism, derived from David Joris, was undogmatic. Yet he admitted his followers by the rite of adult baptism, and set up a hierarchy among them on the Roman model (see his *Evangelium Regni*, in English *A Joyfull Message of the Kingdom*, 1574?; reprinted, 1652). His pantheism had an antinomian drift; for himself and his officials he claimed impeccability; but, whatever truth there may be in the charge that among his followers were those who interpreted "love" as licence, no such charge can be sustained against the morals of Niclaes and the other leaders of the sect. His chief apostle in England was Christopher Vitel, a native of Delft, an "illuminate elder," living at Colchester and Southwark, who ultimately recanted. The society spread in the eastern counties, in spite of repressive measures; it revived under the Commonwealth, and lingered into the early years of the 18th century; the leading idea of its "service of love" was a reliance on sympathy and tenderness for the moral and spiritual edification of its members. Thus, in an age of strife and polemics, it seemed to afford a refuge for quiet, gentle spirits, and meditative temperaments.

See F. Nippold, "H. Niclaes u. das Haus der Liebe," in *Zeitschrift für die histor. Theol.* (1862); article "H. Niclaes" in A. J. van der Aa, *Biog. Woordenboek der Nederlanden* (1868); article "H. Nicholas," by C, Fell Smith, in *Dict. Nat. Biog.* (1894); article "Familisten," by Loofs, in Herzog-Hauck's *Realencyklopädie* (1898).

(A. Go.*)

FAMILY, a word of which the etymology but partially illustrates the meaning. The Roman *familia*, derived from the Oscan *famel* (*servus*), originally signified the servile property, the thralls, of a master. Next, the term denoted other domestic property, in things as well as in persons. Thus, in the fifth of the laws of the Twelve Tables, the rules are laid down: SI · INTESTATO · MORITUR · CUI · SUUS · HERES · NEC · SIT · ADGNATUS ·

PROXIMUS · FAMILIAM · HABETO, and SI · AGNATUS · NEC · ESCIT · GENTILIS · FAMILIAM · NANCITOR; that is, if a man die intestate, leaving no natural heir who had been under his *potestas*, the nearest agnate, or relative tracing his connexion with the deceased exclusively through males, is to inherit the *familia*, or family fortune of every sort. Failing an agnate, a member of the *gens* of the dead man is to inherit. In a third sense, *familia* was applied to all the persons who could prove themselves to be descended from the same ancestor, and thus the word almost corresponded to our own use of it in the widest meaning, as when we say that a person is "of a good family" (Ulpian, *Dig.* 50, 16, 195 *fin.*).

Old theory.

1. Leaving for awhile the Roman terms, to which it will be necessary to return, we may provisionally define Family, in the modern sense, as the small community formed by the union of one man with one woman, and by the increase of children born to them. These in modern times, and in most European countries, constitute the household, and it has been almost universally supposed that little natural associations of this sort are the germ-cell of early society. The Bible presents the growth of the Jewish nation from the one household of Abraham. His patriarchal family differed from the modern family in being polygamous, but, as female chastity was one of the conditions of the patriarchal family, and as descent through males was therefore recognized as certain, the plurality of wives makes no real difference to the argument. In the same way the earliest formal records of Indian, Greek and Roman society present the family as firmly established, and generally regarded as the most primitive of human associations. Thus, Aristotle derives the first household (οἰκία πρώτη) from the combination of man's possession of property—in the slave or in domesticated animals—with man's relation to woman, and he quotes Hesiod: οἶκον μὲν πρώτιστα γυναῖκά τε βοῦν τ' ἀροτῆρα (*Politics*, i. 2. 5). The village, again, with him is a colony or offshoot of the household, and monarchical government in states is derived from the monarchy of the eldest male member of the family. Now, though certain ancient terms, introduced by Aristotle in the chapters to which we refer, might have led him to imagine a very different origin of society, his theory is, on the face of it, natural and plausible, and it has been almost universally accepted. The beginning of society, it has been said a thousand times, is the family, a natural association of kindred by blood, composed of father, mother and their descendants. In this family, the father is absolute master of his wife, his children and the goods of the little community; at his death his eldest son succeeds him; and in course of time this association of kindred, by natural increase and by adoption, develops into the clan, *gens*, or γένος. As generations multiply, the more distant relations split off into other clans, and these clans, which have not lost the sense of primitive kinship, unite once more into tribes. The tribes again, as civilization advances, acknowledge themselves to be subjects of a king, in whose veins the blood of the original family runs purest. This, or something like this, is the common theory of the growth of society.

Modern criticism.

2. It was between 1866 and 1880 that the common opinion began to be seriously opposed. John Ferguson McLennan, in his *Primitive Marriage* and his essays on *The Worship of Plants and Animals* (see his *Studies in Ancient History*, second series), drew attention to the wide prevalence of the custom of inheriting the kinship name through mothers, not fathers; and to the law of "Exogamy" (*q.v.*). The former usage he attributed to archaic uncertainty as to fatherhood; the natural result of absolute sexual promiscuity, or of Polyandry (*q.v.*). Either practice is inconsistent, prima facie, with the primitive existence of the Family, whether polygamous or monogamous, whether patriarchal or modern. The custom of Exogamy, again,—here taken to mean the unwritten law which makes it incest, and a capital offence, to marry within the real or supposed kin denoted by the common name of the kinship,—pointed to an archaic condition of family affairs all unlike our Table of prohibited degrees. This law of Exogamy was found, among many savage races, associated with Totems, that is plants, animals and other natural objects which give names to the various kinships, and are themselves, in various degrees, reverenced by members of the kinships. (See TOTEM AND TOTEMISM.) Traces of such kinships, and of Totemism, also of alleged promiscuity in ancient times, were detected by McLennan in the legends, folk-lore and institutions of Greece, Rome and India. Later, Prof. Robertson Smith found similar survivals, or possible survivals, among the Semitic races (*Kinship in Early Arabia*). Others have followed the same trail among the Celts (S. Reinach, *Cultes, mythes et religions*, 1904).

If arguments founded on these alleged survivals be valid, it may be that the most civilized races have passed through the stages of Exogamy, Totemism and reckoning descent in the female line. McLennan explained Exogamy as a result of scarcity of women, due to female infanticide. Women being scarce, the men of a group would steal them from other groups, and it would become shameful, and finally a deadly sin, for a man to marry within his own group-name, or name of kinship, say Wolf or Raven. Meanwhile, owing to scarcity of women, one woman would be the mate of many husbands (polyandry); hence, paternity being undetermined, descent would be reckoned through mothers.

McLennan's value.

Such are the outlines of McLennan's theory, which, as a whole, has been attacked by many writers, and is now, perhaps, accepted by none. McLennan's was the most brilliant pioneer work; but his supply of facts was relatively scanty, and his friend Charles Darwin stated objections which to many seem final, as regards the past existence of a stage of sexual promiscuity. C. N. Starcke (*The Primitive Family*, 1889), Edward Alexander Westermarck (*History of Human Marriage*, 1891), Ernest Crawley (*The Mystic Rose*), Herbert Spencer, Emile Durkheim, Lord Avebury and many others, have criticized McLennan, who, however, in coining the term Exogamy, and drawing scientific attention to Totemism, and reckoning of kin through mothers, founded the study of early society. Here it must be observed that "Matriarchate" (*q.v.*) is a misleading term, as is "Gynaecocracy," for the custom of deducing descent on the spindle side. Women among totemistic and exogamous savages are in a degraded position, nor does the deriving and inheriting of the kinship name, or anything else, on the spindle side, imply any ignorance of paternal relations; even where, as among Central Australian tribes, the facts of reproduction are said to be unknown.

Lewis Morgan.

3. Simultaneous with McLennan's researches and speculations were the works of Lewis H. Morgan. He was the discoverer of a custom very important in its bearing on the history of society. In about two-thirds of the globe, persons in addressing a kinsman do not discriminate between grades of relationship. All these grades are merged in large categories. Thus, in what Morgan calls the "Malayan system," "all *consanguinei*, near or far, fall within one of these relationships—grandparent, parent, brother, sister, child and grandchild." No other blood-relationships are recognized (*Ancient Society*). This at once reminds us of the Platonic Republic. "We devised means that no one should ever be able to know his own child, but that all should imagine themselves to be of one family, and should regard as brothers and sisters those who were within a certain limit of age; and those who were of an elder generation they were to regard as parents and grandparents, and those who were of a younger generation as children and grandchildren" (*Timaeus*, 18, Jowett's translation, first edition, vol. ii., 1871). This system prevails in the Polynesian groups and in New Zealand. Next comes what Morgan chooses to call the Turanian system. "It was universal among the North American aborigines," whom he styles Ganowanians. "Traces of it have been found in parts of Africa" (*Ancient Society*), and "it still prevails in South India among the Hindus, who speak the Dravidian language," and also in North India, among other Hindus. The system, Morgan says, "is simply stupendous." It is not exactly the same among all his miscellaneous "Turanians," but, on the whole, assumes the following shapes. Suppose the speaker to be a male, he will style his nephew and

niece in the male line, his brother's children, "son" and "daughter," and his grand-nephews and grand-nieces in the male line, "grandson" and "granddaughter." Here the Turanian and the Malayan systems agree. But change the sex; let the male speaker address his nephews and nieces in the female line,—the children of his sister,—he salutes them as "nephew" and "niece," and they hail him as "uncle." Now, in the Malay system, nephews and nieces on both sides, brother's children or sisters, are alike named "children" of the uncle. If the speaker be a female, using the Turanian style, these terms are reversed. Her sister's sons and daughters are saluted by her as "son" and "daughter," her brother's children she calls "nephew" and "niece." Yet the children of the persons thus styled "nephew" and "niece" are not recognized in conversation as "grand-nephew" and "grand-niece," but as "grandson" and "granddaughter." It is impossible here to do more than indicate these features of the classificatory nomenclature, from which the others may be inferred. The reader is referred for particulars to Morgan's *Systems of Consanguinity and Affinity of the Human Race.*

The existence of the classificatory system is not an entirely novel discovery. Nicolaus Damascenus, one of the inquirers into early society, who lived in the first century of our era, noticed this mode of address among the Galactophagi. Lafitau found it among the Iroquois. To Morgan's perception of the importance of the facts, and to his energetic collection of reports, we owe our knowledge of the wide prevalence of the system. From an examination of the degrees of kindred which seem to be indicated by the "Malayan" and "Turanian" modes of address, he has worked out a theory of the evolution of the modern family. A brief comparison of this with other modern theories will close our account of the family. The main points of the theory are shortly stated in *Systems of Consanguinity*, &c., and in *Ancient Society*. From the latter work we quote the following description of the five different and successive forms of the family:—

> "I. *The Consanguine Family.*—It was founded upon the intermarriage of brothers and sisters, own and collateral, in a group.
>
> "II. *The Punaluan Family.*—It was founded upon the intermarriage of several sisters, own and collateral, with each others' husbands, in a group—the joint husbands not being necessarily kinsmen of each other; also, on the intermarriage of several brothers, own and collateral, with each others' wives in a group—these wives not being necessarily of kin to each other, although often the case in both instances (*sic*). In each case the group of men were conjointly married to the group of women.
>
> "III. *The Syndyasmian or Pairing Family.*—It was founded upon marriage between single pairs, but without an exclusive cohabitation. The marriage continued during the pleasure of the parties.
>
> "IV. *The Patriarchal Family.*—It was founded upon the marriage of one man with several wives, followed in general by the seclusion of the wives.
>
> "V. *The Monogamian Family.*—It was founded upon marriage between single pairs with an exclusive cohabitation.
>
> "Three of these forms, namely, the first, second, and fifth, were radical, because they were sufficiently general and influential to create three distinct systems of consanguinity, all of which still exist in living forms. Conversely, these systems are sufficient of themselves to prove the antecedent existence of the forms of the family and of marriage with which they severally stand connected."

Morgan makes the systems of nomenclature proofs of the existence of the Consanguine and Punaluan families. Unhappily, there is no other proof, and the same systems have been explained on a very different principle (McLennan, *Studies in Ancient History*). Looking at facts, we find the Consanguine family nowhere, and cannot easily imagine how early groups abstained from infringing on each other, and created a systematic marriage of brothers and sisters. St Augustine, however (*De civ. Dei*, xv. 16), and Archinus in his *Thessalica* (*Odyssey*, xi. 7, scholia B, Q) agree more or less with Morgan. Next, how did the Consanguine family change into the Punaluan? Morgan says (*Ancient Society*) brothers ceased to marry their sisters, because "the evils of it could not for ever escape human observation." Thus the Punaluan family was hit upon, and "created a distinct system of consanguinity" (*Ancient Society*), the Turanian. Again, "marriages in Punaluan groups explain the relationships in the system." But Morgan provides himself with another explanation, "the Turanian system owes its origin to marriage in the group *and* to the gentile organization." He calls exogamy "the gentile organization," though, in point of fact, the only gentes we know, the Roman gentes, show scarcely a trace of exogamy. Again, "the change of relationships which resulted from substituting Punaluan in the place of Consanguine marriage turns the Malayan into the Turanian system." On the same page Morgan attributes the change to the "gentile organization," and, still on the same page, uses *both* factors in his working out of the problem. Now, if the Punaluan marriage is a sufficient explanation, we do not need the "gentile organization." Both, in Morgan's opinion, were efforts of conscious moral reform. In *Systems of Consanguinity* the gentile organization (there called tribal), that is, exogamy, is said to have been "designed to work out a reformation in the intermarriage of brothers and sisters." But the Punaluan marriage had done that, otherwise it would not have produced (as Morgan says it did) the change from the Malayan to the Turanian system, the difference in the two systems, as exemplified in Seneca and Tamil, being "in the relationships which depended on the intermarriage or non-intermarriage of brothers and sisters" (*Ancient Society*). Yet the Punaluan family, though itself a reform in morals and in "breeding," "did not furnish adequate motives to reform the Malay system," which, as we have seen, it did reform. The Punaluan family, it is suspected, "frequently involved own brothers and sisters"; had it not been so, there would have been no need of a fresh moral reformation,—"the gentile organization." Yet even in the Punaluan family (*Ancient Society*) "brothers ceased to marry their own sisters." What, then, did the "gentile organization" do for men? As they had already ceased to marry their own sisters, and as, under the gentile organization, they were still able to marry their half-sisters, the reformatory "ingenuity" of the inventors of the organizations was at once superfluous and useless. It is impossible to understand the Punaluan system. Its existence is inferred from a system of nomenclature which it does (and does not) produce; it admits (and excludes) own brothers and sisters. Morgan has intended, apparently, to represent the Punaluan marriage as a long transition to the definite custom of exogamy, but it will be seen that his language is not very clear nor his positions assured. He does not adduce sufficient proof that the Punaluan family ever existed as an institution, even in Hawaii. There is, if possible, a greater absence of historical testimony to the existence of the Consanguine family. It is difficult to believe that exogamy was a conscious moral and social reformation, because, *ex hypothesi*, the savages had no moral data, nothing to cause disgust at relations which seem revolting to us. It is as improbable that they discovered the supposed physical evils of breeding in and in. That discovery could only have been made after a long experience, and in the Consanguine family that experience was impossible. Thus, setting moral reform aside as inconceivable, we cannot understand how the Consanguine families ever broke up. Morgan's ingenious speculations as to a transitional step towards the gens (as he calls what we style the totem-kindred), supposed to be found in the "classes" and marriage laws of the Kamilaroi, are vitiated by the weakness and contradictory nature of the evidence (see Pritchard; J. D. Lang's *Queensland*, Appendix; *Proceedings of American Academy of Arts*, &c., vol. viii. 412; *Nature*, October 29, 1874). Further, though Morgan calls the Australian "gentile organization" "incipient," he admits (*Ancient Society*) that the Narrinyeri have totem groups, in which "the children are of the clan of the father." Far from being "incipient," the gens of the Narrinyeri is on the footing of the ghotra of Hindu custom. Lastly, though Morgan frequently declares that the Polynesians have not the gens (for he thinks them not sufficiently advanced), W. W. Gill (*Myths and Songs from the South Pacific*, London, 1876) has shown that unmistakable traces of the totem survive in Polynesian mythology.

4. Morgan's theory was opposed by McLennan (*Studies in Ancient History*, 1876), who maintained that the names for

Rival theories.

relationships, in the "classificatory system," were merely terms of address, as among ourselves when a preacher calls any adult male "brother," when an old woman is addressed as "mother," when an elder man calls a junior "my son." He also showed that his own system accounted for the terms. The controversy is still alive; one set of writers regarding the savage terms of relationship as indicating a state of things in which human beings dwelt in a "horde," with promiscuous intercourse; another set holding that the terms do not indicate consanguineous kinship, but degrees of age, status, and reciprocal obligations in a local *tribe*, and therefore that they do not yield any presumption that there was a past of promiscuity or of what is called "group marriage." On Morgan's side (not of course accepting all his details) are L. Fison and A. W. Howitt, and Baldwin Spencer and F. J. Gillen. Against him are Starcke, Westermarck, A. Lang, Dr Durkheim, apparently, Crawley and many others.

Evidence of original promiscuity.

5. A second presumption in favour of original promiscuity has been drawn by the eminent Australian students, Baldwin Spencer and F. J. Gillen, and by A. W. Howitt, from the customs of some Australian aborigines. In each tribe, owing to customary laws which are to be examined later, only men and women of a given status are intermarriageable (*nupa, noa, unawa*) with each other. Though child-betrothals are usual, and though the woman is specialized to one man, who protects and nourishes her and all her children, and though their union is immediately preceded by an extended *jus primae noctis* (such as Herodotus describes among the Nasamones), yet, among certain tribes, the following custom prevails. At great meetings the tribal leaders assign a woman as paramour (with what amount of permanence remains obscure) to a man (*pirrauru*); one woman may have several *pirrauru* men, one man several *pirrauru* women, in addition to their regularly betrothed (*tippa malku*) wives and husbands. The husband occasionally shows fight, and bitter jealousies prevail, but, at the great ceremonial meetings, complaisance is enforced under penalty of strangling. Thenceforth, if the husband permits, the male *pirrauru* has matrimonial rights over the other man's *tippa malku* wife when they meet. A symbolic ceremony of union precedes the junction of the *pirrauru* people. This institution, as far as reported, is peculiar to a group of tribes near Lake Eyre, the Dieri, Urabunna, and their congeners,—or perhaps to all who have the same "phratry" names as the Dieri and Urabunna (*Kiraru* and *Mattera*, in various dialectic forms).

Elsewhere the *pirrauru* custom is not known: but almost everywhere there are licentious festivals, in which all marriage rules except those which forbid incest (in our sense of the word, namely between the closest relations) are thrown to the winds. Also a native travelling among alien tribes is lent women of the status into which he may legally marry.

Group marriage.

Baldwin Spencer and F. J. Gillen, and A. W. Howitt, regard *pirrauru* as "group marriage" and as a proof that, at one time, all intermarriageable people were actually husbands and wives, while the other examples of licence are also survivals, in a later stage of decay, of promiscuity, and "group marriage." To this it is replied that "*group* marriage" is a misnomer; that if *pirrauru* be in a sense marriage it is *status*, not *group* marriage. Again, it is urged, *pirrauru* is a modification of *tippa malku*, which comes first; a woman is "specialized" to a man *before* she can be made *pirrauru* to another, and her *tippa malku* husband continues to support her, and to recognize her children as his own, after she has become *pirrauru* to another man or other men. Without the foregoing *tippa malku* union, the *pirrauru* unions are not conceivable; they are mere legalized paramourships, modifying the *tippa malku* marriage (like the Italian cicisbeism), procuring a protector for a woman in her husband's absence, and supplying legal loves for bachelors. The custom is peculiar to a given set of kindred tribes. The festivals are the legalized, restricted and more or less permanent modification of the casual orgies of feasts of licence, or *Saturnalia*, which have their analogies among many people, ancient and modern. *Pirrauru* is no more a survival of and a proof of primitive promiscuity, than is the legalized incest of ancient Egypt or ancient Peru. If these views be correct the argument for primitive promiscuity derived from *pirrauru* falls to the ground.

The historical problem.

6. The questions at issue obviously are, was mankind originally promiscuous, with no objections to marriage between persons of the nearest kin; and was the first step in advance the prohibition of marriage (or of amatory intercourse) between brothers and sisters; or did mankind originally live in very small groups, under a jealous sire, who imposed restrictions on intercourse between the young males, his sons, and all the females of the "hearth-circle," who constituted his harem? The problem has been studied, first, in the institutions of savages, notably of the most backward savages, the black natives of Australia; and next, in the light of the habits of the higher mammalia.

As regards Australian matrimonial institutions, it has been known since the date of the *Journals of two Expeditions of Discovery*, by Sir George Grey (1837–1839), that they are very complex and peculiar, in points strongly resembling the customary laws of the more backward Red Indian tribes of North America. Information came in, while McLennan was working, from G. Taplin (*The Narrinyeri*, 1874), from A. W. Howitt and L. Fison, and many other inquirers (in Brough Smyth's *Aborigines of Victoria*, 1878), from Howitt and Fison again (in *Kamilaroi and Kurnai*, 1880), and many essays by these authors, and finally, in *Native Tribes of Central Australia* (1899) and *Northern Tribes of Central Australia* (1904), by Baldwin Spencer and F. J. Gillen; and in Howitt's *Native Tribes of South-East Australia* (1904), with R. Roth's *North-West Central Queensland Aborigines* (1897). All of these are works of very high merit. Knowledge is now much more wide, minute and securely based than it was when McLennan's *Studies in Ancient History*, second series, was posthumously published (1896). We know with certainty that in Australia, among archaic savages who have neither metals, agriculture, pottery nor domesticated animals, a graduated scale of matrimonial institutions exists. First there are *local* tribes, each tribe having its own dialect; holding a recognized area of territory; and living on friendly terms with neighbouring tribes. Territorial conquest is never attempted. In many cases a knot of tribes of allied dialects and kindred rites may be, or at least is, spoken of as a "nation" by our authorities.

Primitive restrictions on marriage.

7. Customary law is administered by the Seniors, the wise, the magically skilled, who in many cases are "headmen" of local groups or of sets of kindred. As to marriage, persons may wed within the local tribe, or into a neighbouring local tribe, at will, provided that they obey the restrictions of customary law. The local tribe is neither exogamous nor endogamous, any more than is an English county. The restrictions, except where they have become obsolete, fall into six main categories:—

(1) In the most primitive, each tribe consists of two intermarrying and exogamous divisions, which are often styled *phratries*. Each such division has a name, which, when it can be translated, is the name of an animal: in the majority of cases, however, the meaning of the phratry name is lost. In one instance, that of the Euahlayi tribe of north-west New South Wales, the phratry names are said (by Mrs Langloh Parker) to mean "Light Blood" and "Dark Blood." This, as in the theory of the Rev. J. Mathews, *Eagle and Crow*, might be taken to indicate a blending of two distinct *races*.

Taking, for the sake of clearness, tribes whose phratry names mean "Crow" and "Eagle Hawk," every member of the tribe belongs either to Eagle Hawk phratry or to Crow phratry: if to Crow, the man or woman can only marry an Eagle Hawk, if to Eagle Hawk, can only marry a Crow. The children invariably belong to the phratry of the mother, in this most primitive type. Within Eagle Hawk phratry is one set of totem kins, named usually after various species of animals and plants; within Crow phratry is another set of totem kins, named always (except in one region of Central Australia) after a *different* set of plants and animals. With the exception mentioned (that of the Arunta "nation"), in no tribe does the same totem ever occur in both phratries. Totems and totem names are inherited by the children from the mother, in this primitive type. Thus a man, Eagle Hawk by phratry, Snipe by totem, marries a woman Crow by phratry, Black Duck by totem. His children by her are of phratry Crow, of totem Black Duck. Obviously no person can marry another of his or her own totem, because, in the phratry into which he or she *must* marry, no man or woman of his or her totem exists. The prohibition extends to members of alien and remote tribes, if of the same totem name.

The same rules exist in the more primitive North American tribes, but as the phratry there has generally, though not always, decayed, the rule, where this has occurred, merely forbids marriage within the totem kin.

(2) We find this type of organization, where the child inherits phratry and totem from the father, not from the mother.

(3) We find tribes in which phratry and totem are inherited from the mother, but an additional rule prevails: the rule of "Matrimonial Classes." By this device, in phratry "Dilbi," there are two classes, "Muri" and "Kubi." In phratry "Kupathin" are two classes, "Ipai" and "Kumbo" (all these names are of unknown meaning). Each child inherits its mother's phratry name and totem name, and also the name of that class of the two in the mother's phratry to which the mother does *not* belong. No person may marry into his or her own class—practically into his or her own generation: the rule makes parental and filial marriages impossible,—but these never occur even among more primitive tribes which have not the institution of classes. Suppose that the class names are really names of animals and other objects in nature—as in a few cases they actually are. Then the rules, where classes exist, would amount to this: no person may marry another who, by phratry, totem or generation, owns the same hereditary animal name as himself or herself. In practice, where phratries exist, a man who knows a woman's phratry name knows whether or not he may marry her. Where class names exist (even though the phratry name be lost), a man who knows a woman's class name knows whether or not he may marry her. Nothing can be simpler in practice.

(4) The same rules as under (3) exist, but the phratry, totem and class are inherited through the father: the class of the child of course not being the father's, but the linked class in his phratry.

(5) In the fifth category (Central North Australia), while phratry name (if not lost) and totem name are inherited from the father, by a refinement of law which is spreading southwards there are *four* classes in each phratry (or main exogamous division unnamed), and the choice of a partner in life is thus more restricted than in more primitive tribes.

Arunta customs.

(6) Finally we reach the institutions of the group of tribes called, from the name of the most powerful tribe in the set, "the Arunta nation." They occupy the Macdonnell Ranges and other territory in the very centre of Australia. The Arunta reckon kinship in the male line: their phratry names they have forgotten, in place of phratries eight matrimonial classes regulate marriage. In these respects they resemble most of the central and northern tribes, but present this unique peculiarity, that the same totems may and do exist in *both* of the opposed intermarrying exogamous divisions consisting of four classes each. It thus results that a man, in the Arunta tribe, may marry a woman of his own totem, if she be in the class with which he may intermarry. This licence is unknown in every other part of the totemic world, and even in the Kaitish tribe of the Arunta nation intertotemic marriages, in practice, almost never occur.

Among the Arunta the totems are only prominent in magical ceremonies, unknown in South-Eastern Australia. At these ceremonies (Intichiuma) the men of the totem do co-operative magic for the benefit of their plant or animal, as part of the tribal food-supply. The members of the totem taste it sparingly on these occasions, apparently under the belief that to do so increases their magical power: the rest of the tribe eat freely. But, as far as denoting kinship or regulating marriage is concerned, the totems, among the Arunta, have no legally important existence. Men and women of the same totem may intermarry, their children need not belong to the totem of either father or mother.

The process by which Arunta totems came thus to differ from those of all other savages is easily understood. Like the other tribes from the centre to the north (including the Urabunna nation, which reckons descent through women), the Arunta believe that the souls of the primal semi-bestial ancestors of the Alcheringa or "dream time" are perpetually reincarnated. This opinion does not affect by itself the usual exogamous character of totemism among the other tribes. The Arunta nation, however, cultivates an additional myth, namely that the primal ancestors, when they sank into the ground, left behind them certain oval stone slabs, with archaic markings, called *churinga nanja*, or "sacred things of the *nanja*." The *nanja*, again, is a tree or rock, fabled to have risen up to mark the spot where a group of primal ancestors, all of one and the same totem in each case (Cats here, Grubs there, Ducks elsewhere), "went into the ground." The souls of these ancestors haunt such spots, especially they haunt the *nanja* tree or rock, and the stone *churinga nanja*. Each district, therefore, has its own *oknanikilla* (or local totem centre of the ghosts), Cat ghosts, Grub ghosts, Hakea flower ghosts and so on. These spirits enter into women and are reborn as children. When a child comes to birth, the mother names the oknanikilla in which she conceived it, and, whatever the ghost totem of that place may be, it is the child's totem. Its mother may be a Grub, its father may be a Crow, but if the child was conceived in a Duck, or Cat, or Opossum or Kangaroo locality, it is, by totem, a Cat, Opossum, Duck or Kangaroo. The *churinga nanja* of its primal ancestor is sought for at the place of the child's conception, and is put into the sacred repository of such objects.

Thus the child does not inherit its totem from father, or from mother, as everywhere else, but *does* inherit the right to do ceremonies for the paternal totem: a proof that, of old, totems were inherited, as elsewhere, and that in the male line. If totems among the Arunta, as everywhere else, were once arranged on the plan that the same totem never occurs in both exogamous moieties, that arrangement has been destroyed, as was inevitable, by the existing method of allotting totems to children,—not by inheritance,—but at haphazard. By this means (a consequence of the unique Arunta belief about *churinga nanja*) the same totems have got into *both* exogamous moieties, so that persons of the same totem, but of appropriate matrimonial classes, may marry. This licence is absolutely confined to the limited region in which stone *churinga nanja* occur.

The whole system is impossible except where descent is reckoned in the male line, for there alone is *local* totemism possible, and the Arunta system is based on local totemism, *plus* the *churinga nanja* and reincarnation beliefs. With reckoning of descent in the female line, no locality can possibly have its *local* totem: all the totems indiscriminately distributed everywhere: and thus no woman can say in what totemic locality her child was conceived, for there is not and cannot be, with female descent, any totemic *locality*. Now it is admitted that reckoning by female descent is the earlier method, and it is granted that in rites and ceremonies the Arunta are of a relatively advanced and highly organized pattern. Their social organization is local, and they have a kind of local magistracies, hereditary in the male line.

In spite of these facts, Spencer and Gillen conceive that the peculiar totemism of the Arunta is the most primitive type extant (cp. Spencer, *J.A.I.* (N.S.), vol. i. 275-281; and Frazer, *ibid.* 281-288). It is not easy to understand this position, as, without male kinship and consequent local totemism (which are not primitive), and without the *churinga nanja* (which exist only in a strictly limited area), the Arunta system of non-exogamous totems cannot possibly exist. Again, the other tribes cannot have passed through the Arunta stage, for, if they had, their totems would have existed, as among the Arunta, in *both* exogamous moieties, and would there remain when they came to be inherited;

so that the totems of all these tribes would still be non-exogamous, like those of the Arunta. But this is not the case. Once more, it is clear that the Arunta system has but recently reached their neighbours, the Kaitish, for though they have the *churinga nanja* belief, and the haphazard method of acquiring totems by local accident, these things have not yet overcome the old traditional reluctance to marry within the totem name. It is not unlawful among the Kaitish; but it is hardly ever done.

Despite these objections, however, Spencer and Gillen hold, as we have said, that, originally, there were no restrictions (or no known restrictions) on marriage. Totems were merely the result of the formation of co-operative magical societies, in the interest of the tribal food supply. Then, in some unknown way, regulations as to marriage were introduced for some unknown purpose, or were involved in some manner not understood. "The traditions of the Arunta," says Spencer, "point to a very definite introduction of an exogamous system long after the totemic groups were fully developed, and, further, they point very clearly to the fact that the introduction was due to the deliberate action of certain ancestors. Our knowledge of the natives leads us to the opinion that it is quite possible that this really took place, that the exogamic groups were deliberately introduced so as to regulate marital relations."

Thus the wisdom of men living promiscuously as regards marriage, but organized in magical societies for the benefit of the common food supply of the local *tribe* (a complex institution postulated as already in being at this early stage), induced them to institute exogamy. Why they did this, what harm they saw in their promiscuity, we are not informed. Spencer goes on, "by this we do not mean that the regulations had anything whatever to do with the idea of incest, or of any harm accruing from the union of individuals who were regarded as too nearly related. . . . There was felt the need of some kind of organization, and this gradually resulted in the development of exogamous groups." But as "it is quite possible that the exogamous groups were deliberately introduced to regulate marital relations," and as they could only do so by introducing exogamy, we do not see how that system can be the result of the *gradual* development of an organization *quelconque*,—of unknown nature. A magical organization already existed (*Journal of the Anthropological Institute*, New Series, i. pp. 284-285).

The traditions of the Arunta seem here to be first accepted: "quite possibly" they are correct in stating that an exogamic system was purposefully introduced, long after totemic groups had arisen, by "the deliberate action of certain ancestors," and then that myth is rejected, in favour of the *gradual* development of exogamy, "out of some form of organization," unknown.

People who, like the Arunta, have lost memory of the very names of the phratries, cannot conceivably remember the nature of the origin of exogamy. Accustomed as they now are to tribal councils which introduce new rules, they fancy that, in the beginning, new rules were thus introduced.

Conclusion as to Spencer's hypothesis.

Meanwhile the working of magic for the behoof of the totem animals and plants, or rather for the name-giving animals of magical societies, is not known to Howitt among the tribes of primitive social organization, while it is well known among agricultural natives of the Torres Strait Islands and among the advanced Sioux and Omaha of North America. The practice seems to belong rather to the decadence than to the dawn of totemism. On the whole, then, there seem to be insuperable difficulties in the way of Spencer's hypothesis that mankind were promiscuous, as regards marriage, but were organized into co-operative magical groups, athwart which came, in some unexplained way, the rule of exogamy; while, when it did come, all savages except the Arunta arranged matters so that totem kins were exogamous. The reverse was probably the case, totem kins were originally exogamous, and ceased to be so, and even to be kins among the Arunta, in consequence of the *churinga nanja* creed, becoming co-operative magical societies (Hartland, Marett, Durkheim and others).

Origin of exogamy.

8. Spencer and Gillen leave the origin of exogamy an open question. Howitt supposes that, in the shape of the phratriac division of the tribe into two exogamous moieties, the scheme may have been introduced to the tribal headmen by a medicine man "announcing to his fellow headman a command received from some supernatural being . . ." (*Natives of South-East Australia*, pp. 89, 90). The Council, so to speak, of "headmen" accept the divine decree, and the assembled tribe pass the Act. But this explanation explains nothing. Why did the prophet wish to introduce exogamy? Why were names of animals given, in so many cases, to the two exogamous divisions? As Howitt asks (*op. cit.* p. 153), "How was it that men assumed the names of objects, which in fact must have been the commencement of totemism?"

It is apparent that any theory which begins by postulating the existence of early mankind in promiscuous groups or hordes, into which exogamous moieties are introduced by tribal decree, takes for granted that the *tribe*, with its headman, councils and great meetings (not to mention its inspired prophet, with the tribal "All Father" who inspires him), existed before any rules regulating "marital relations" were evolved. Even if all this were probable, we are not told why a promiscuous tribe thought good to establish exogamous divisions. Some native myths attribute the institution to certain wise ancestors; some to the supernatural "All Father," say Baiame; some to a treaty between Eagle Hawk and Crow, beings of cosmogonic legend, who give names to the phratries. Such myths are mere hypotheses. It is impossible to imagine how early savages, *ex hypothesi* promiscuous, saw anything to reform in their state of promiscuity. They now think certain unions wrong, because they are forbidden: they were not forbidden, originally, because they were thought wrong.

Westermarck.

Westermarck has endeavoured to escape the difficulty thus: "Among the ancestors of man, as among other animals, there was no doubt a time when blood relationship was no bar to sexual intercourse. But variations here, as elsewhere, would naturally present themselves, and those of our ancestors who avoided in and in breeding would survive," while the others would die out. This appears to be orthodox evolutionary language, but it carries us no further. Human societies are not animals or plants, in whose structure various favourable "accidents" occur, producing better types, which survive. We ask *why* in human society did "variations present themselves"; *why* did certain sets of human beings "avoid in and in breeding"? We are merely told that some of our ancestors became exogamous and survived, while others remained promiscuous and perished. No light is thrown on the problem,—wherefore did some of our ancestors avoid in and in breeding, and become exogamous? Nothing is gained by saying "thus an instinct would be developed which would be powerful enough, as a rule, to prevent injurious unions." There is no "instinct," there is a tribal law of exogamy. If there had been an "instinct," it might account for the avoidance of "in and in breeding"—that is, it might account for exogamy, *ab initio*. But that is left unaccounted for by the theory which, after maintaining that the avoidance produced the instinct, seems to argue that the instinct produced the avoidance. Westermarck goes on to say that "exogamy, as a natural extension of the instinct, would arise when single families united in small hordes." But, if the single families already had the "instinct," they would not marry within the family: they would be exogamous,—marrying only into other families,—*before* they "united in small hordes." The difficulty of accounting for exogamy does not seem to have been overcome, and no attempt is made to explain the animal names of totem kins and phratries. Westermarck, however, says that "there is no reason why we should assume, as so many anthropologists have done, that primitive men lived in small endogamous groups, practising incest in every degree," although, as he also says, "there was no doubt a time when blood relationship was no bar to sexual intercourse." If there was no bar, people would "practise incest in every degree,"—what was there to prevent them? (*History of Human Marriage*, pp. 352, 353 (1891)).

Durkheim.

So far we have seen no luminous and consistent account of how mankind became exogamous, if they began by being promiscuous. The theories rest on the idea that man, dwelling in an "undivided horde" (except so far as it was divided into co-operative magical societies), bisected it into two exogamous intermarrying moieties. Durkheim has put forward a theory which is not at all points easily understood. He supposes that, "at the beginning of societies of men, incest was not prohibited . . . before each horde (*peuplade*) divided itself into two primitive 'clans' at least" (*L'Année sociologique*, i. pp. 62, 63). Each of the two "clans" claimed descent from a different animal, which was its totem, and its "god." The two clans were exogamous,—out of respect to the blood of their totem (with which every member of the clan is mystically one), and, being hostile, the two clans raided each other for women. Each clan threw off colonies, which took new totems, new "gods," though still owning some regard to their original clan, from which they had seceded, while abandoning its "god." When the two "primary clans" made alliance and *connubium*, they became the phratries in the local tribe, and their colonies became the totem kins within the phratries.

We are not told why the original horde was disrupted into two hostile and intermarrying "clans": we especially wonder why the horde, if it wanted an animal god, did not choose one animal for the whole community; and we may suspect that a difference of taste in animal "gods" caused the hostility of the two clans. Nor do we see why, if things occurred thus, the totem kins should not represent twenty or thirty differences of religious taste, in the original horde, as to the choice of animal gods. If the horde was going to vary in opinion, it is unlikely that only *two* factions put forward animal candidates for divinity. Again, a "clan" (a totem kin, with exogamy and descent derived through mothers) cannot overflow its territorial area and be therefore obliged to send out colonies, for such a clan (as Durkheim himself remarks) has no territorial area to overflow. It is not a *local* institution at all.

While these objections cannot but occur, Durkheim does provide a valid reason for the existence of exogamy. When once the groups (however they got them) had totems, with the usual taboos on any sort of use of the totem by his human kinsfolk, the women of the kin would be tabooed to the men of the same kin. In marrying a maiden of his own totem, a man inevitably violates the sanctity of the blood of the totem (*L'Année sociologique*, i. pp. 47-57. Cf. Reinach, *Cultes, mythes et religions*, vol. i. pp. 162-166).

Here at last we have a theory which accounts for the "religious horror" that attaches to the violation of the rule of totemic exogamy: a mysterious entity, the totem, is hereby offended. But how did totems, animals, plants and so on, come to be mystically *solidaires* with their human namesakes and kinsmen? We do not observe that Dr Durkheim ever explains *why* two divisions of one horde chose each a different animal god, or why the supposed colonies thrown off by these primary clans deserted their animal gods for others, or why, and on what principle, they all chose new "gods,"—fresh animals, plants and other objects. His hereditary totem is, in practice, the last thing that a savage changes. The only case of change on record is a recent attempt to increase the range of legal marriages in a waning Australian tribe, on whose lands certain species of animals are perishing.

Howitt's solution.

Theories based on a supposed primal state of promiscuity certainly encounter, when explaining the social oganization of Australian savages, difficulties which they do not surmount. But Howitt has provided (apparently without fully realizing the merit of his own suggestions) a way out of the perplexities caused by the conception of early mankind dwelling promiscuously in "undivided communes." The way out is practically to say that, in everyday life, they lived in nothing of the sort. Howitt writes (*Native Tribes of South-East Australia*, p. 173): "A study of the evidence . . . has led me to the conclusion that the state of society among the early Australians was that of an 'Undivided Commune.' . . . It is, however, well to guard this expression. I do not desire to imply necessarily the existence of complete and continuous communism between the sexes. The character of the country, the necessity of moving from one point to another in search of game and vegetable food, would cause any Undivided Commune, when it assumed dimensions greater than the immediate locality could provide with food, to break up into two or more Communes of the same character. In addition to this it is clear . . . that in the past as now, individual likes and dislikes must have existed, so that, admitting the existence of common rights between the members of the Commune, these rights would remain in abeyance, so far as the separated parts of the Commune were concerned. But at certain gatherings . . . or on great ceremonial occasions, all the segments of the original Commune would reunite," and would behave in the fashion now common in great licentious festive meetings.

Primitive promiscuity improbable.

In the early ages contemplated, how can we postulate "great ceremonial occasions" or even peaceful assemblies at fruit-bearing spots? How can we postulate a surviving sense of solidarity among the scattered segments of the Commune, obviously very small, owing to lack of supplies, and perpetually disintegrated? But, taking the original groups as very small, and as ruled by likes and dislikes, by affection and jealousy, we are no longer concerned with a promiscuous horde, but with a little knot of human beings, in whom love, parental affection and the jealousy of sires, would promptly make discriminations between this person and that person, as regards sexual privileges. Thus we have edged away from the hypothesis of the promiscuous indiscriminating horde to the opinion of Darwin. "We may conclude," he says, "from what we know of the jealousy of all male quadrupeds, armed as many of them are with special weapons for battling with their rivals, that promiscuous intercourse in a state of Nature is extremely improbable. . . . The most probable view is that Man originally lived in small communities, each (man) with a single wife, or, if powerful, with several, whom he jealously guarded against all other men." But, in a community of this early type, to guard women jealously would mean constant battle, at least when Man became an animal who makes love all the year round. So Darwin adds: "Or man may not have been a social animal, and yet have lived with several wives, like the Gorilla,—for all the natives agree that but one adult male is seen in a band; when the young male grows up a contest takes place for the mastery, and the strongest, by killing or driving out the others, establishes himself as head of the Community. Younger males, being thus expelled and wandering about, would, when at last successful in finding a partner, prevent too close interbreeding within the limits of the same *family*" (*Descent of Man*, ii. pp. 361, 363 (1871)).

Here, then, we have practical Exogamy, as regards unions of brothers and sisters, among man still brutish, while the Sire is husband of the whole harem of females, probably unchecked as regards his daughters.

Atkinson's theory.

On this Darwinian text J. J. Atkinson builds his theory of the evolution of exogamy and of savage society in his *Primal Law* (*Social Origins and Primal Law*, by Lang and Atkinson, 1903). Paternal jealousy "gave birth to Primal Law, prohibitory of marriage between certain members of a family or local group, and thus, in natural sequence, led to *forced* connubial selection *beyond* its circle, that is, led to Exogamy . . . as a *habit*, not as an expressed law. . . ." The "expressed law" was necessarily a later development; conditioned by the circumstances which produced totemism, and sanctioned, as on Durkheim's scheme, by the totemic taboo. Atkinson worked out his theory by a minute study of customs of avoidance between near kin by blood or affinity; by observations on the customs of animals, and by hypotheses as to the very gradual evolution of human restrictions through many modifications. He also gave a theory of the "classificatory" system of names for relationships opposed to that of Morgan. The names are based merely "on reference to relativity of age of a class in relation to the group." The exogamous moieties of a tribe (phratries) are not the result of a reformatory legislative bisection of the tribe, but of the existence of "two intermarrying totem clan groups." The whole treatise, allowing for defects caused by the author's death before the book was printed, is highly original and ingenious. The author, however, did not touch on the evolution of totemism.

Lang's system.

9. The following system, as a means of making intelligible the evolution of Australian totemic society, is proposed by the present writer. We may suggest that men originally lived in the state of "the Cyclopean family" of Atkinson; that is, in Darwin's "family group," containing but one adult male, with the females, the adolescent males being driven out, to find each a female mate, or mates, elsewhere if they can. With increase of skill, improvements in implements and mitigation of ferocity, such groups may become larger, in a given area, but men may retain the habit of seeking mates outside the limits of the group of contiguity; the "avoidance" of brothers and sisters may already have arisen. Among the advanced Arunta, now, a man may speak freely to his elder sisters; to younger sisters, or "tribal sisters," he may not speak, "or only at such a distance that the features are indistinguishable." This archaic rule of avoidance would be a step facilitating the permission to adult males to dwell in their paternal group, avoiding their sisters. Such groups, whether habitually exogamous or not, will require names for each other, and various reasons would yield a preference to names derived from animals. These are easily signalled in gesture language; are easily presented in pictographs and tattooing; are even now, among savages and boys, the most usual sort of *personal* nicknames; and are widely employed as *group* names of villagers in European folk-lore. Among European rustics such group sobriquets are usual, but are resented. The savage, with his ideas of the equality or superiority of animals to himself, sees nothing to resent in an animal sobriquet, and the names, originally group sobriquets, would not find more difficulty in being accepted than "Whig," "Tory," "Huguenot," "Cavalier," "Christian," "Cameronian,"—all of them originally nicknames given from without. Again, "Wry Nose" and "Crooked Mouth" are *derisive* nicknames, but they are the translations of the ancient Celtic clan names Cameron and Campbell. The nicknames "Naked Dogs," "Liars," "Buffalo Dung," "Men who do not laugh," "Big Topknots," have been thoroughly accepted by the "gentes" of the Blackfoot Indians, now passing out of Totemism (Grinnell, *Blackfoot Lodge Tales*, pp. 208-225).

As Howitt writes, "the assumption of the names of objects by men must in fact have been the origin of totemism." Howitt does not admit the theory that the totem names came to arise in this way, but this way is a *vera causa*. Names must be given either from within or from without. A group, in savagery, has no need of a name for itself; "we" are "we," or are "The Men"; for all other adjacent groups names are needed. The name of one totem, *Thaballa*, "The Laughing Boy" totem, among the Warramunga and another tribe, is quite transparently a nickname, as is *Karti*, "The Grown-up Men" (Spencer and Gillen, *Northern Tribes of Central Australia*, p. 207).

There is nothing, prima facie, which renders this origin of animal, plant and other such names for early savage groups at all improbable. They would not even be resented, as now are the animal names for villagers in the Orkneys, the Channel Islands, France, Cornwall and in ancient Israel (for examples see *Social Origins*, pp. 295-301). The names once accepted, and their origin forgotten, would be inevitably regarded as implying a mystic *rapport* between the bestial and the human namesakes, Crow, Eagle Hawk, Grub, Bandicoot, Opossum, Emu, Kangaroo and so on (see NAME). On this subject it is enough to cite J. G. Frazer, in *The Golden Bough* (2nd ed., vol. i. pp. 404-446). Here will be found a rich and satisfactory collection of proof that community of name implies mystic *rapport*. Professor Rhys is quoted for the statement that probably "the whole Aryan race believed at one time not only that the name was a part of the man, but that it was that part of him which is termed the soul." In such a mental stage the men "Crows" identify themselves with the actual Crow species: the birds are now "of their flesh," are fabled to be their ancestors, or the men have been evolved out of the birds. The Crow is sacro-sanct, a friend and protector, and a centre of taboos, one of which is the prohibition preventing a Crow man from intercourse with a Crow woman, "however far apart their hunting grounds may have been." All men and women Crows are recognized as brothers and sisters in the Crow, and are not intermarriageable.

On these lines the prohibition to infringe the totem taboo by marriage within the totem name is intelligible, but the system of phratries has yet to be accounted for. It is obvious that the names could only have been given originally to *local* groups: the people who held this or that local habitation received the name. Suppose that the rule of each such group, or heart circle, had been "no marriage within the local group or camp," as in Atkinson's scheme. When the groups accept their new names, the rule becomes, "no marriage within local group Eagle Hawk, group Crow," and so on. So far the animal giving the group name may not yet have become a revered totem. The result of the rule would inevitably be, in three or four generations, that in groups Crow or Eagle Hawk, there were no Crows or Eagle Hawks *by descent*, if the children took the names of descent from their mothers; for the sake of differentiation: the Ant woman's children in local group Crow being Ants, the Grub woman's children being Grubs, the Eagle Hawk woman's children being Eagle Hawks,—all in local group Crow, and inheriting the names of the local groups whence their mothers were brought into local group Crow.

By this means (indicated first by McLennan) each member of a local group would have a *local* group name, say Eagle Hawk, and a name by *female descent*, say Kangaroo, in addition, as now, to his or her personal name. In this way, all members of each local group would find, in any other local group, people of his name of descent, and, as the totem belief grew to maturity, kinsmen of his in the totem. When this fact was realized, it would inevitably make for peace among all contiguous groups. In place of taking women by force, at the risk of shedding kindred blood, peaceful betrothals between men and women of different local group names and of different names by descent could be arranged. Say that local groups Eagle Hawk and Crow took the lead in this arrangement of alliance and *connubium*, and that (as they would naturally flourish in the strength conferred by union) the other local groups came into it, ranging themselves under Eagle Hawk and Crow, we should have the existing primitive type of organization: Local Groups Eagle Hawk (*Mukwara*) and Crow (*Kilpara*) would have become the widely diffused phratries, *Mukwara* and *Kilpara*, with all the totem kins within them.

But, on these lines, some members of any totem kin, say Cat, would be in phratry Eagle Hawk, some would be in phratry *Kilpara* as now (for the different reason already indicated) among the Arunta. Such persons were in a quandary. By *phratry* law, as being in opposite phratries, a Cat in Eagle Hawk phratry could marry a Cat in Crow phratry. But, by totem law, this was impossible. To avoid the clash of law, all Cats had to go into one phratry or the other, either into Eagle Hawk or into Crow.

Two whole totem kins were in the same unhappy position. The persons who were Eagle Hawks *by descent* could not be in Eagle Hawk local group, now phratry, as we have already shown. They were in Crow phratry, they could not, by phratry law, marry in their own phratry, and to marry in Eagle Hawk was to break the old law, "no marriage within the *local* group name." Their only chance was to return to Eagle Hawk phratry, while Crow totem kin went into Crow phratry, and thus we often find, in fact, that in Australian phratries *Mukwara* (Eagle Hawk) there is a totem kin Eagle Hawk, and in *Kilpara* phratry (Crow) there is a totem kin Crow. This arrangement—the totem kin within the phratry of its own name—has long been known to exist in America. The Thlinkets have Raven phratry, with totem kins Raven, Frog, Goose, &c., and Wolf phratry, with totem kins Wolf, Bear, Eagle, &c. (Frazer, *Totemism*, pp. 61, 62 (1887)). In Australia the fact has hitherto escaped observation, because so many phratry names are not translated, while, though *Mukwara* and *Kilpara* are translated, the Eagle Hawk and Crow totem kins within them bear other names for the same birds, more recent names, or tribal native names, such as *Biliari* and *Waa*, while *Mukwara* and *Kilpara* may have been names borrowed, within the institution of phratries, from some alien tribe now perhaps extinct.

We have now sketched a scheme explanatory of the most primitive type of social organization in Australia. The tendency is for phratries first to lose the meanings of their names, and, next, for their names to lapse into oblivion, as among the Arunta; the work of regulating marriage being done by the opposed Matrimonial Classes.

These classes are obviously an artificial arrangement, intended to restrict marriage to persons on the same level as generations. The meanings of the class names are only known with certainty in two cases, and then are names of animals, while there is reason to suspect that animal names occur in four or five of the eight class-names which, in different dialect forms, prevail in central and northern Australia. Conceivably the new class regulations made use of the old totemic machinery of nomenclature. But until Australian philologists can trace the original meanings of Class names, further speculation is premature.

Breaking up of totemism.

10. Much might be said about the way out of totemism. When once descent and inheritance are traced through males, the social side of totemism begins to break up. One way out is the Arunta way, where totems no longer designate kinships. In parts of America totems are simply fading into heraldry, or into magical societies, while the "gentes," once totemic, have acquired new names, often local, as among the Sioux, or mere sobriquets, as among the Blackfeet. In Melanesia the phratries, whether named or nameless, have survived, while the totems have left but a few traces which some consider disputable (*Social Origins*, pp. 176-184). Among the Bantu of South Africa the *tribes* have sacred animals (*Siboko*), which may be survivals of the totems of the chief local totem group, with male descent in the tribe, the whole of which now bears the name of the sacred animal. Even in Australia, among tribes where there is reckoning of descent in the male line, and where there are no matrimonial classes, the tendency is for totems to dwindle, while exogamy becomes *local*, the rule being to marry out of the *district*, not out of the *kin* (Howitt, *Native Tribes of South-East Australia*, pp. 270-272; cf. pp. 135-137).

The problem as to why, among savages all on the same low level of material culture, one tribe derives descent through women, while its nearest neighbouring tribe, with ceremonies, rites, beliefs and myths like its own, and occupying lands of similar character in a similar climate, traces descent through men, seems totally insoluble. Again, we find that the civilized Lycians, as described by Herodotus (book i. ch. 173), reckoned lineage in the female line, while the naked savages of north and central Australia reckon in the male line. Our knowledge does not enable us to explain the change from female to male tracing of lineage. Yet the change was essential for the formation of the family system of civilized life. The change may be observed taking place in the region of North-West America peopled by the Thlinket, Haida and Salish tribes; the first are pure totemists, the last have arrived, practically, in the south, at the modern family, while a curious intermediate stage pervades the interjacent region.

The best authority on the Family developed in different shapes in North-West America is Charles Hill-Tout (cf. "Origin of the Totemism of the Aborigines of British Columbia," *Transactions of the Royal Society of Canada*, vol. vii. sect. 11, 1901). He, like many American and some English and continental students, applies the term "totem" not only to the hereditary totem of the exogamous kin, but to the animal familiars of individual men or women, called *manitus*, *naguals*, *nyarongs* and *yunbeai*, among North American Indians, in South America, in Borneo and in the Euahlayi tribe of New South Wales. These animal familiars are chosen by individuals, obeying the monition of dreams, or are assigned to them at birth, or at puberty, by the tribal magicians. It has often been suggested that totemism arose when the familiar of an individual became hereditary among his descendants. This could not occur under a system of reckoning descent and inheriting the kin name through women, but as a Tsimshian myth says that a man's sister adopted his animal familiar, the bear, and transmitted it to *her* offspring, Hill-Tout supposes that this may have been the origin of totemism in tribes with reckoning of descent in the female line. Instances, however, are not known to exist in practice, and myths are mere baseless savage hypotheses.

Exogamy, in his opinion, is the result of treaties of political alliance with exclusive *interconnubium* between two sets of kinsfolk by blood, totemism being a mere accidental concomitant. This theory evades the difficulties raised by the hypothesis of deliberate reformatory legislation introducing the bisection of the tribe into exogamous societies.

AUTHORITIES.—The study of the History of the Family has been subject to great fluctuation of opinion, as unexpected evidence has kept pouring in from many quarters. The theory of primal promiscuity, which in 1870 succeeded to Sir Henry Maine's *patriarchal theory*, has endured many attacks, and there is a tendency to return, not precisely to the "patriarchal theory," but to the view that the jealousy of the Sire of the "Cyclopean family," or "Gorilla family" indicated by Darwin, has had much to do with laying the bases of "primal law." The whole subject has been especially studied by English-speaking writers, as the English and Americans are brought most into contact with the most archaic savage societies. Among foreigners, in addition to Starcke, Westermarck and Durkheim, already cited, may be mentioned Professor J. Kohler, *Zur Urgeschichte der Ehe* (Stuttgart, 1897). Professor Kohler is in favour of a remote past of "collective marriage," indicated, as in Morgan's hypothesis, by the existing savage names of relationships, which are expressive of relations of consanguinity. E. S. Hartland (*Primitive Paternity*, 1910) discusses myths of supernatural birth in relation to the history of the Family.

A careful and well-reasoned work by Herr Cunow (*Die Verwandtschafts Organisationen der Australneger*, Stuttgart, 1894) deals with the Matrimonial Classes of Australian tribes. Cunow supposes that descent was originally reckoned in the male line, and that tribes with this organization (such as the Narrinyeri) are the more primitive. In this opinion he has few allies: and on the origin of Exogamy he seems to possess no definite ideas. Pikler's *Ursprung des Totemismus* (Berlin, 1900) explains Totemism as arising from the need of names for early groups of men: names which could be expressed in pictographs and tattooing, to which we may add "gesture language." This is much akin to the theory which we have already suggested, though Pikler seems to think that the pictograph (say of a Crow or an Eagle Hawk) was prior to the group name. But, he remarks, like Howitt, "the germ of Totemism is the naming"; and the community of name between the animal species and the human group led to the belief that there was an important connexion between the men and their name-giving animal.

Other useful sources of information are the annual Reports of the Bureau of Ethnology (Washington), the *Journal of the Institute of the Anthropological Society*, *Folk Lore* (the organ of the Folk Lore Society), and Durkheim's *L'Année sociologique*. *Tabou et totémisme à Madagascar*, by M. A. van Gennep (Leroux, Paris, 1904) is a valuable contribution to knowledge.

For India, where vestiges of totemism linger in the hill tribes, see Risley and Crooke, *Tribes and Castes*, vols. i., ii., iii., iv.; and Crooke, *Popular Religion*; also Crooke in *J.A.I.* (N.S.), vol. i. pp. 232-244. (A. L.)

FAMINE (Lat. *fames*, hunger), extreme and general scarcity of food, causing distress and deaths from starvation among the population of a district or country. Famines have caused widespread suffering in all countries and ages. A list of the chief famines recorded by history is given farther on. The causes of famine are partly natural and partly artificial. Among the natural causes may be classed all failures of crops due to excess or defect of rainfall and other meteorological phenomena, or to the ravages of insects and vermin. Among the artificial causes may be classed war and economic errors in the production, transport and sale of food-stuffs.

The natural causes of famine are still mainly outside our control, though science enables agriculturists to combat them more successfully, and the improvement in means of transport allows a rich harvest in one land to supplement the defective crops in another. In tropical countries drought is the commonest cause of a failure in the harvest, and where great droughts are not uncommon—as in parts of India and Australia—the hydraulic engineer comes to the rescue by devising systems of water-storage and irrigation. It is less easy to provide against the evils of excessive rainfall and of frost, hail and the like. The experience of the French in Algiers shows that it is possible to stamp out a plague of locusts, such as is the greatest danger to the farmer in many parts of Argentina. But the ease with which food can nowadays be transported from one part of the world to another minimizes the danger of famine from natural causes, as we can hardly conceive that the whole food-producing area of the world should be thus affected at once.

The artificial causes of famine have mostly ceased to be operative on any large scale. Chief among them is war, which may cause a shortage of food-supplies, either by its direct ravages or by depleting the supply of agricultural labour. But only local famines are likely to arise from this cause. Legislative interference with agricultural operations or with the distribution of food-supplies, currency restrictions and failure of transport, which have all caused famines in the past, are unlikely thus to operate again; nor is it probable that the modern speculators who attempt to make "corners" in wheat could produce the evil effects contemplated in the old statutes against forestallers and regrators.

Such local famines as may occur in the 20th century will probably be attributable to natural causes. It is impossible to regulate the rainfall of any district, or wholly to supply its failure by any system of water-storage. Irrigation is better able to bring fertility to a naturally arid district than to avert the failure of crops in one which is naturally fertile. The true palliative of famine is to be found in the improvement of methods of transport, which make it possible rapidly to convey food from one district to another. But the efficiency of this preventive stops short at the point of saving human life. It cannot prevent a rise in prices, with the consequent suffering among the poor. Still, every year makes it less likely that the world will see a renewal of the great famines of the past, and it is only the countries where civilization is still backward that are in much danger of even a local famine.

Great Famines.—Amongst the great famines of history may be named the following:—

B.C. 436	Famine at Rome, when thousands of starving people threw themselves into the Tiber.
A.D. 42	Great famine in Egypt.
650	Famine throughout India.
879	Universal famine.
941, 1022 and 1033	Great famines in India, in which entire provinces were depopulated and man was driven to cannibalism.
1005	Famine in England.
1016	Famine throughout Europe.
1064–1072	Seven years' famine in Egypt.
1148–1159	Eleven years' famine in India.
1162	Universal famine.
1344–1345	Great famine in India, when the Mogul emperor was unable to obtain the necessaries for his household. The famine continued for years and thousands upon thousands of people perished of want.
1396–1407	The Durga Devi famine in India, lasting twelve years.
1586	Famine in England which gave rise to the Poor Law system.
1661	Famine in India, when not a drop of rain fell for two years.
1769–1770	Great famine in Bengal, when a third of the population (10,000,000 persons) perished.
1783	The Chalisa famine in India, which extended from the eastern edge of the Benares province to Lahore and Jammu.
1790–1792	The Doji Bara, or skull famine, in India, so-called because the people died in such numbers that they could not be buried. According to tradition this was one of the severest famines ever known. It extended over the whole of Bombay into Hyderabad and affected the northern districts of Madras. Relief works were first opened during this famine in Madras.
A.D. 1838	Intense famine in North-West Provinces (United Provinces) of India; 800,000 perished.
1846–1847	Famine in Ireland, due to the failure of the potato-crop. Grants were made by parliament amounting to £10,000,000.
1861	Famine in North-West India.
1866	Famine in Bengal and Orissa; one million perished.
1869	Intense famine in Rajputana; one million and a half perished. The government initiated the policy of saving life.
1874	Famine in Behar, India. Government relief in excess of the needs of the people.
1876–1878	Famine in Bombay, Madras and Mysore; five millions perish. Relief insufficient.
1877–1878	Severe famine in north China. Nine and a half millions said to have perished.
1887–1889	Famine in China.
1891–1892	Famine in Russia.
1897	Famine in India. Government policy of saving life successful. Mansion House fund £550,000.
1899–1901	Famine in India. One million people perished. Estimated loss to India £50,000,000. The government spent £10,000,000 on relief, and at one time there were 4,500,000 people on the relief works.
1905	Famine in Russia.

Famines in India.—Owing to its tropical situation and its almost entire dependence upon the monsoon rains, India is more liable than any other country in the world to crop failures, which upon occasion deepen into famine. Every year sufficient rain falls in India to secure an abundant harvest if it were evenly distributed over the whole country; but as a matter of fact the distribution is so uneven and so uncertain that every year some district suffers from insufficient rainfall. In fact, famine is, to all intents and purposes, endemic in India, and is a problem to reckon with every year in some portion of that vast area. The people depend so entirely upon agriculture, and the harvest is so entirely destroyed by a single monsoon failure, that wherever a total failure occurs the landless labourer is immediately thrown out of work and remains out of work for the whole year. The question is thus one of lack of employment, rather than lack of food. The food is there, perhaps at a slightly enhanced price, but the unemployed labourer has no money to buy it. The problem is very much the same as that met by the British Poor Law system. Every year in England a poor rate of some £22,000,000 is expended for a population of 40 millions; while it is only in an exceptional year in India that £10,000,000 are spent on a population of 300 millions.

Famines seem to recur in India at periodical intervals, which have been held to be in some way dependent on the sun-spot period. Every five or ten years the annual scarcity widens its area and becomes a recognized famine; every fifty or a hundred years whole provinces are involved, loss of life becomes widespread, and a great famine is recorded. In the 140 years since Warren Hastings initiated British rule in India, there have been nineteen famines and five severe scarcities. For the period preceding British rule the records have not been so well preserved, but there is ample evidence to show that famine was just as frequent in its incidence and infinitely more deadly in its effects under the native rulers of India. In the great Bengal famine of 1769–1770, which occurred shortly after the foundation of British rule, but while the native officials were still in power, a third of the population, or ten millions out of thirty millions, perished. From this it may be guessed what occurred in the centuries under Mogul rule, when for years there was no rain, when famine lasted for three, four or twelve years, and entire cities were left without an inhabitant. In the famine of 1901, the worst of recent years, the loss of life in British districts was 3% of the population affected, as against 33% in the Bengal famine of 1770.

The native rulers of India seem to have made no effort to relieve the sufferings of their subjects in times of famine; and even down to 1866 the British government had no settled famine policy. In that year the Orissa famine awakened the public conscience, and the commission presided over by Sir George Campbell laid down the lines upon which subsequent famine-relief was organized. In the Rajputana famine of 1869 the humane principle of saving every possible life was first enunciated. In the Behar famine of 1874 this principle was even carried to an extreme, the cost was enormous, and the people were in danger of being pauperized. The resulting reaction caused a regrettable loss of life in the Madras and Bombay famine of 1876–1878; and the Famine Commission of 1880, followed by those of 1898 and 1901, laid down the principle that every possible life must be saved, but that the wages on relief works must be so regulated in relation to the market rate of wages as not to undermine the independence of the people. The experience gained in the great famines of 1898 and 1901 has been garnered by these commissions, and stored up in the "famine codes" of each separate province, where rules are provided for the treatment of famine directly a crop failure is seen to be probable. The first step is to open test works; and directly they show the necessity, regular relief works are established, in which the people may earn enough to keep them from starvation, until the time comes to sow the next crop.

As a result of the severe famine of 1878–1879, Lord Lytton's government instituted a form of insurance against famine known as the Famine Insurance Grant. A sum of Rs. 1,500,000 was to be yearly set aside for purposes of famine relief. This scheme has been widely misunderstood; it has been assumed that an entirely separate fund was created, and that in years when the specified sum was not paid into this fund, the purpose of the government was not carried out. But Sir John Strachey, the author of the scheme, explains in his book on India that the original intention was nothing more than the annual application of surplus revenue, of the indicated amount, to purposes of famine relief; and that when the country was free from famine, this sum should be regularly devoted to the discharge of debt, or to the prevention of debt which would otherwise have been incurred for the construction of railways and canals. The sum of 1½ crores is regularly set aside for this purpose, and is devoted as a rule to the construction of protective irrigation works, and for investigating and preparing new projects falling under the head of protective works.

The measures by which the government of India chiefly endeavours to reduce the liability of the country to famine are the promotion of railways; the extension of canal and well irrigation; the reclamation of waste lands, with the establishment of fuel and fodder reserves; the introduction of agricultural improvements; the multiplication of industries; emigration; and finally the improvement where necessary of the revenue and rent systems. In times of famine the function of the railways in distributing the grain is just as important as the function of the irrigation-canals in increasing the amount grown. There is always enough grain within the boundaries of India for the needs of the people; the only difficulty is to transport it to the tract where it is required at a particular moment. Owing to the extension of railways, in the famines of 1898 and 1901 there was never any dearth of food in any famine-stricken tract; and the only difficulty was to find enough rolling-stock to cope with the demand. Irrigation protects large tracts against famine, and has immensely increased the wheat output of the Punjab; the Irrigation Commission of 1903 recommended the addition of 6½ million acres to the irrigated area of India, and that recommendation is being carried out at an annual cost of 1½ millions sterling for twenty years, but at the end of that time the list of works that will return a lucrative interest on capital will be practically exhausted. Local conditions do not make irrigation everywhere possible.

As five-sixths of the whole population of India are dependent upon the land, any failure of agriculture becomes a national calamity. If there were more industries and manufactures in India, the dependence on the land would not be so great and the liability to lack of occupation would not be so uniform in any particular district. The remedy for this is the extension of factories and home industries; but European capital is difficult to obtain in India, and the native capitalist prefers to hoard his rupees. The extension of industries, therefore, is a work of time.

It is sometimes alleged by native Indian politicians that famines are growing worse under British rule, because India is becoming exhausted by an excessive land revenue, a civil service too expensive for her needs, military expenditure on imperial objects, and the annual drain of some £15,000,000 for "home charges." The reply to this indictment is that the British land revenue is £16,000,000 annually, whereas Aurangzeb's over a smaller area, allowing for the difference in the value of the rupee, was £110,000,000; though the Indian Civil Service is expensive, its cost is more than covered by the fact that India, under British guarantee, obtains her loans at 3½% as against 10% or more paid by native rulers; though India has a heavy military burden, she pays no contribution to the British navy, which protects her seaboard from invasion; the drain of the home charges cannot be very great, as India annually absorbs 6 millions sterling of the precious metals; in 1899–1900, a year of famine, the net imports of gold and silver were 130 millions. Finally, it is estimated by the census commissioners that in the famine of 1901 three million people died in the native states and only one million in British territory.

See Cornelius Walford, "On the Famines of the World, Past and Present" (*Journal of the Statistical Society*, 1878–1879); Romesh C. Dutt, *Famines in India* (1900); Robert Wallace, *Famine in India* (1900); George Campbell, *Famines in India* (1769–1788); *Chronological List of Famines for all India* (Madras Administration Report, 1885); J. C. Geddes, *Administrative Experience in Former Famines* (1874); *Statistical Atlas of India* (1895); F. H. S. Merewether, *Through the Famine Districts of India* (1898); G. W. Forrest, *The Famine in India* (1898); E. A. B. Hodgetts, *In the Track of the Russian Famine* (1892); W. B. Steveni, *Through Famine-stricken Russia* (1892); Vaughan Nash, *The Great Famine* (1900); Lady Hope, *Sir Arthur Cotton* (1900); *Lord Curzon in India* (1905); T. W. Holderness, *Narrative of the Famine of 1896–1897* (*c.* 8812 of 1898); the Indian Famine Commission reports of 1880, 1898 and 1900; report of the Indian Irrigation Commission (1901–1903); C. W. McMinn, *Famine Truths, Half-Truths, Untruths* (1902); Theodore Morison, *Indian Industrial Organization* (1906).

FAN (Lat. *vannus*; Fr. *éventail*), in its usually restricted meaning, a light implement used for giving motion to the air in order to produce coolness to the face; the word is, however, also applied to the winnowing fan, for separating chaff from grain, and to various engineering appliances for ventilation, &c. *Ventilabrum* and *flabellum* are names under which ecclesiastical fans are mentioned in old inventories. Fans for cooling the face have been in use in hot climates from remote ages. A bas-relief in the British Museum represents Sennacherib with female figures carrying feather fans. They were attributes of royalty along with horse-hair fly-flappers and umbrellas. Examples may be seen in plates of the Egyptian sculptures at Thebes and other places, and also in the ruins of Persepolis. In the museum of Boulak, near Cairo, a wooden fan handle showing holes for feathers is still preserved. It is from the tomb of Amenhotep, of the 18th dynasty, 17th century B.C. In India fans were also attributes of men in authority, and sometimes sacred emblems. A heart-shaped fan, with an ivory handle, of unknown age, and held in great veneration by the Hindus, was given to King Edward VII. when prince of Wales. Large punkahs or screens, moved by a servant who does nothing else, are in common use in hot countries, and particularly India.

Fans were used in the early middle ages to keep flies from the sacred elements during the celebrations of the Christian mysteries. Sometimes they were round, with bells attached—of silver or silver gilt. Notices of such fans in the ancient records of St Paul's, London, Salisbury cathedral and many other churches exist still. For these purposes they are no longer used in the Western church, though they are retained in some Oriental rites. The large feather fans, however, are still carried in the state processions of the supreme pontiff in Rome, though not used during the celebration of the mass. The fan of Queen Theodolinda (7th century) is still preserved in the treasury of the cathedral of Monza. Fans made part of the bridal outfit, or *mundus muliebris*, of Roman ladies.

Folding fans had their origin in Japan, and were imported thence to China. They were in the shape still used—a segment of a circle of paper pasted on a light radiating framework of bamboo, and variously decorated, some in colours, others of white paper on which verses or sentences are written. It is a compliment in China to invite a friend or distinguished guest to write some sentiment on your fan as a memento of any special occasion, and this practice has continued. A fan that has some celebrity in France was presented by the Chinese ambassador to the comtesse de Clauzel at the coronation of Napoleon I. in 1804. When a site was given in 1635, on an artificial island, for the settlement of Portuguese merchants in Nippo in Japan, the space was laid out in the form of a fan as emblematic of an object agreeable for general use. Men and women of every rank both in China and Japan carry fans, even artisans using them with one hand while working with the other. In China they are often made of carved ivory, the sticks being plates very thin and sometimes carved on both sides, the intervals between the carved parts pierced with astonishing delicacy, and the plates held together by a ribbon. The Japanese make the two outer guards of the stick, which cover the others, occasionally of beaten iron, extremely thin and light, damascened with gold and other metals.

Fans were used by Portuguese ladies in the 14th century, and were well known in England before the close of the reign of Richard II. In France the inventory of Charles V. at the end of the 14th century mentions a folding ivory fan. They were brought into general use in that country by Catherine de' Medici, probably from Italy, then in advance of other countries in all matters of personal luxury. The court ladies of Henry VIII.'s reign in England were used to handling fans. A lady in the "Dance of Death" by Holbein holds a fan. Queen Elizabeth is painted with a round feather fan in her portrait at Gorhambury; and as many as twenty-seven are enumerated in her inventory (1606). Coryat, the English traveller, in 1608 describes them as common in Italy. They also became of general use from that time in Spain. In Italy, France and Spain fans had special conventional uses, and various actions in handling them grew into a code of signals, by which ladies were supposed to convey hints or signals to admirers or to rivals in society. A paper in the *Spectator* humorously proposes to establish a regular drill for these purposes.

The chief seat of the European manufacture of fans during the 17th century was Paris, where the sticks or frames, whether of wood or ivory, were made, and the decorations painted on mounts of very carefully prepared vellum (incorrectly called *chicken skin*)—a material stronger and tougher than paper, which breaks at the folds. Paris makers exported fans unpainted to Madrid and other Spanish cities, where they were decorated by native artists. Many were exported complete; of old fans called Spanish a great number were in fact made in France. Louis XIV. issued edicts at various times to regulate the manufacture. Besides fans mounted with parchment, Dutch fans of ivory were imported into Paris, and decorated by the heraldic painters in the process called "Vernis Martin," after a famous carriage painter and inventor of colourless lac varnish. Fans of this kind belonging to Queen Victoria and the baroness de Rothschild were exhibited in 1870 at Kensington. A fan of the date of 1660, representing sacred subjects, is attributed to Philippe de Champagne, another to Peter Oliver in England in the 17th century. Cano de Arevalo, a Spanish painter of the 17th century, devoted himself to fan painting. Some harsh expressions of Queen Christina to the young ladies of the French court are said to have caused an increased ostentation in the splendour of their fans, which were set with jewels and mounted in gold. Rosalba Carriera was the name of a fan painter of celebrity in the 17th century. Le Brun and Romanelli were much employed during the same period. Klingstet, a Dutch artist, enjoyed a considerable reputation in the latter part of the 17th and the first thirty years of the 18th century.

The revocation of the edict of Nantes drove many fan-makers out of France to Holland and England. The trade in England was well established under the Stuart sovereigns. Petitions were addressed by the fan-makers to Charles II. against the importation of fans from India, and a duty was levied upon such fans in consequence. This importation of Indian fans, according to Savary, extended also to France. During the reign of Louis XV. carved Indian and China fans displaced to some extent those formerly imported from Italy, which had been painted on swanskin parchment prepared with various perfumes.

During the 18th century all the luxurious ornamentation of the day was bestowed on fans as far as they could display it. The sticks were made of mother-of-pearl or ivory, carved with extraordinary skill in France, Italy, England and other countries. They were painted from designs of Boucher, Watteau, Lancret and other "genre" painters; Hébert, Rau, Chevalier, Jean Boquet, Mme. Vérité, are known as fan-painters. These fashions were followed in most countries of Europe, with certain national differences. Taffeta and silk, as well as fine parchment, were used for the mounts. Little circles of glass were let into the stick to be looked through, and small telescopic glasses were sometimes contrived at the pivot of the stick. They were occasionally mounted with the finest point lace. An interesting fan (belonging to Madame de Thiac in France), the work of Le Flamand, was presented by the municipality of Dieppe to Marie Antoinette on the birth of her son the dauphin. From the time of the Revolution the old luxury expended on fans died out. Fine examples ceased to be exported to England and other countries. The painting on them represented scenes or personages connected with political events. At a later period fan mounts were often prints coloured by hand. The events of the day mark the date of many examples found in modern collections. Among the fan-makers of modern days the names of Alexandre, Duvelleroy, Fayet, Vanier became well known in Paris; and the designs of Charles Conder (1868–1909) have brought his name to the front in this art. Painters of distinction often design and paint the mounts, the best designs being figure subjects. A great impulse was given to the manufacture and painting of fans in England after the exhibition which took place at South Kensington in 1870. Modern collections of fans take their date from the emigration of many noble families from France at the time of the Revolution. Such objects were given as souvenirs, and occasionally sold by families in straitened circumstances. A large number of fans of all sorts, principally those of the 18th century, French, English, German, Italian, Spanish, &c., have been bequeathed to the South Kensington (Victoria and Albert) Museum.

The sticks of folding fans are called in French *brins*, the two outer guards *panaches*, and the mount *feuille*.

See also Blondel, *Histoire des éventails* (1875); Octave Uzanne, *L'éventail* (1882); and especially G. Wooliscroft Rhead, *History of the Fan* (1909). (J. H. P.*)

FANCY (a shortened form, dating from the 15th century, of "fantasy," which is derived through the O. Fr. *fantasie*, modern *fantaisie*. from the Latinized form of the Gr. *φαντασία*, *φαντάζειν*, *φαίνειν*, to show), display, showing forth, as a philosophical term, the presentative power of the mind. The word "fancy" and the older form "fantasy," which is now chiefly used poetically, was in its early application synonymous with imagination, the mental faculty of creating representations or images of things not present to the senses; it is more usually, in this sense, applied to the lighter forms of the imagination. "Fancy" also commonly means inclination, whim, caprice. The more learned form "phantasy," as also such words as "phantom" and "phantasm," is chiefly confined to visionary imaginings.

FANG (Fan, Fanwe, Panwe, Pahouin, Paouen, Mpangwe), a powerful African people occupying the Gabun district north of the Ogowé river in French Congo. Their name means "men." They call themselves Pa^{n}we, Fa^{n}we and Fa^{n} with highly nasalized n. They are a finely-made race of chocolate colour; some few are very dark, but these are of slave origin. They have bright expressive oval faces with prominent cheek-bones. Many of them file their teeth to points. Their hair, which is woolly, is worn by the women long, reaching below the nape of the neck. The men wear it in a variety of shapes, often building it up over a wooden base. The growth of the hair appears abundant, but that on the face is usually removed. Little clothing is worn; the men wear a bark waist-cloth, the women a plantain girdle, sometimes with a bustle of dried grass. A chief wears a leopard's skin round the shoulders. Both sexes tattoo and paint the body, and delight in ornaments of every kind. The men, whose sole occupations are fighting and hunting, all carry arms—muskets, spears for throwing and stabbing, and curious throwing-knives with blades broader than they are long. Instead of bows and arrows they use crossbows made of ebony, with which they hunt apes and birds. In battle the Fang used to carry elephant hide shields; these have apparently been discarded.

When first met by T. E. Bowdich (1815) the Paamways, as he calls the Fang, were an inland people inhabiting the hilly plateaus north of the Ogowé affluents. Now they have become the neighbours of the Mpongwe (*q.v.*) of Glass and Libreville on the Komo river, while south of the Gabun they have reached the sea at several points. Their original home is probably to be placed somewhere near the Congo. Their language, according to Sir R. Burton, is soft and sweet and a contrast to their harsh voices, and the vocabularies collected prove it to be of the Bantu-Negroid linguistic family. W. Winwood Reade (*Sketch Book*, i. p. 108) states that "it is like Mpongwe (a pure Bantu idiom) cut in half; for instance, *njina* (gorilla) in Mpongwe is *nji* in Fan." The plural of the tribal name is formed in the usual Bantu way, Ba-Fang.

Morally the Fang are superior to the negro. Mary Kingsley writes: "The Fan is full of fire, temper, intelligence and go, very teachable, rather difficult to manage, quick to take offence, and utterly indifferent to human life." This latter characteristic has made the Fang dreaded by all their neighbours. They are noted cannibals, and ferocious in nature. Prisoners are badly treated and are often allowed to starve. The Fang are always fighting, but the battles are not bloody. After the fall of two or three warriors the bodies are dragged off to be devoured, and their friends disperse. Burton says that their cannibalism is limited to the consumption of slain enemies; that the sick are not devoured; and that the dead are decently buried, except slaves, whose bodies are thrown into the forest. Mary Kingsley, on the other hand, believed their cannibalism was not limited. She writes: "The Fan is not a cannibal for sacrificial motives, like the negro. He will eat his next door neighbour's relation and sell his own deceased to his next door neighbour in return, but he does not buy slaves and fatten them up for his table as some of the middle Congo tribes do. He has no slaves, no prisoners of war, no cemeteries, so you must draw your own conclusions." Among certain tribes the aged alone are permitted to eat human flesh, which is *taboo* for all others. There is no doubt that the cannibalism of the Fang is diminishing before the advance of civilization. Apart from their ferocity, the Fang are an agreeable and industrious people. They are skilful workers in iron and have a curious coinage called *bikĕi*, little iron imitation axeheads tied up in bundles called *ntet*, ten to a bundle; these are used chiefly in the purchase of wives. They are energetic traders and are skilled in pottery and in gardening. Their religion appears to be a combination of primitive animism and ancestor worship, with a belief in sympathetic magic.

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FANO (anc. *Fanum Fortunae*, *q.v.*), a town and episcopal see of the Marches, Italy, in the province of Pesaro and Urbino, 8 m. S.E. of the former by rail, and 46 ft. above sea-level, on the N.E. coast of Italy. Pop. (1901), town 10,535, commune 24,730. The cathedral has a 13th century portal, but the interior is unimportant. The vestibule of S. Francesco contains the tombs of some members of the Malatesta family. S. Croce and S. Maria Nuova contain works by Giovanni Santi, the father of Raphael; the latter has also two works by Perugino, the predella of one of which is attributed to Raphael. S. Agostino contains a painting of S. Angelo Custode ("the Guardian Angel"), which is the subject of a poem by Robert Browning. The fine Gothic Palazzo della Ragione (1299) has been converted into a theatre. The palace of the Malatesta, with fine porticos and Gothic windows, was much damaged by an earthquake in 1874. S. Michele, built against the arch of Augustus, is an early Renaissance building (1475–1490), probably by Matteo Nuzio of Fano, with an ornate portal. The façade has an interesting relief showing the colonnade added by Constantine as an upper storey to the arch of Augustus and removed in 1463.

Fano in the middle ages passed through various political vicissitudes, and in the 14th century became subject to the Malatesta. In 1458 Pius II. added it to the states of the Church. Julius II. established here in 1514 the first printing press with movable Arabic type. The harbour was restored by Paul V. but is now unimportant.

FANSHAWE, SIR RICHARD, Bart. (1608–1666), English poet and ambassador, son of Sir Henry Fanshawe, remembrancer of the exchequer, of Ware Park, Hertfordshire, and of Elizabeth, daughter of Thomas Smith or Smythe, was born early in June 1608, and was educated in Cripplegate by the famous schoolmaster, Thomas Farnaby. In November 1623 he was admitted fellow-commoner of Jesus College, Cambridge, and in January 1626 he entered the Inner Temple; but the study of the law being distasteful to him he travelled in France and Spain. On his return, an accomplished linguist, in 1635, he was appointed secretary to the English embassy at Madrid under Lord Aston. At the outbreak of the Civil War he joined the king, and while at Oxford in 1644 married Anne, daughter of Sir John Harrison of Balls, Hertfordshire. About the same time he was appointed secretary at war to the prince of Wales, with whom he set out in 1645 for the western counties, Scilly, and afterwards Jersey. He compounded in 1646 with the parliamentary authorities, and was allowed to live in London till October 1647, visiting Charles I. at Hampton Court. In 1647 he published his translation of the *Pastor Fido* of Guarini, which he reissued in 1648 with the addition of several other poems, original and translated. In 1648 he was appointed treasurer to the navy under Prince Rupert. In November of this year he was in Ireland, where he actively engaged in the royalist cause till the spring of 1650, when he was despatched by Charles II. on a mission to obtain help from Spain. This was refused, and he joined Charles in Scotland as secretary. On the 2nd of September 1650 he had been created a baronet. He accompanied Charles in the expedition into England, and was taken prisoner at the battle of Worcester on the 3rd of September 1651. After a confinement of some weeks at Whitehall, he was allowed, with restrictions, and under the supervision of the authorities, to choose his own place of residence. He published in 1652 his *Selected Parts of Horace*, a translation remarkable for its fidelity, felicity and elegance. In 1654 he completed translations of two of the comedies of the Spanish poet Antonio de Mendoza, which were published after his death, *Querer per solo querer: To Love only for Love's Sake*, in 1670, and *Fiestas de Aranjuez* in 1671. But the great labour of his retirement was the translation of the *Lusiad*, by Camoens, published in 1655. It is in ottava rima, with the translation prefixed to it of the Latin poem *Furor Petroniensis*. In 1658 he published a Latin version of the *Faithful Shepherdess* of Fletcher.

In April 1659 Fanshawe left England for Paris, re-entered Charles's service and accompanied him to England at the Restoration, but was not offered any place in the administration. In 1661 he was returned to parliament for the university of Cambridge, and the same year was sent to Portugal to negotiate the marriage between Charles II. and the infanta. In January 1662 he was made a privy councillor of Ireland, and was appointed ambassador again to Portugal in August, where he remained till August 1663. He was sworn a privy councillor of England on the 1st of October. In January 1664 he was sent as ambassador to Spain, and arrived at Cadiz in February of that year. He signed the first draft of a treaty on the 17th of December, which offered advantageous concessions to English trade, but of which one condition was that it should be confirmed by his government before a certain date. In January 1666 Fanshawe went to Lisbon to procure the adherence of Portugal to this agreement. He returned to Madrid, having failed in his mission, and was almost immediately recalled by Clarendon on the plea that he had exceeded his instructions. He died very shortly afterwards before leaving Madrid, on the 26th of June 1666. He had a family of fourteen children, of whom five only survived him, Richard, the youngest, succeeding as second baronet and dying unmarried in 1694.

As a translator, whether from the Italian, Latin, Portuguese or Spanish, Fanshawe has a considerable reputation. His *Pastor Fido* and his *Lusiad* have not been superseded by later scholars, and his rendering of the latter is praised by Southey and Sir Richard Burton. As an original poet also the few verses he has left are sufficient evidence of exceptional literary talent.

AUTHORITIES.—*Memoirs of Lady Fanshawe*, written in 1676 and published 1829 (from an inaccurate transcript); these were reprinted from the original manuscript and edited by H. C. Fanshawe (London, 1907); article in the *Dict. of Nat. Biography* and authorities there quoted; *Biographia Brit.* (Kippis); *Original Letters of Sir R. F.* (2 vols., 1724), the earlier edition of 1702 with portrait being only vol. i. of this edition; *Notes Genealogical and Historical of the Fanshawe Family* (1868–1872); funeral sermon by H. Bagshaw; *Nicholas Papers* (Camden Society); *Quarterly Review*, xxvii. 1; *Macmillan's Mag.* lvii. 279; *Camoen's Life and Lusiads*, by Sir F. Burton, i. 135; Clarendon's *State Papers, Calendars of State Papers, Autobiography* and *Hist. of the Rebellion*; *Athenaeum* (1883), i. 121; *Add. MSS. British Museum*, 15,228 (poems); *Harl. MSS. Brit. Mus.* 7010 (letters). (P. C. Y.)

FANTAN, a form of gambling highly popular among the Chinese. The game is simple. A square is marked in the centre of an ordinary table, or a square piece of metal is laid on it, the sides being marked 1, 2, 3 and 4. The banker puts on the table a double handful of small coins—in China "cash"—or similar articles, which he covers with a metal bowl. The players bet on the numbers, setting their stakes on the side of the square which bears the number selected. When all have staked, the bowl is removed, and the banker or croupier with a small stick removes coins from the heap, four at a time, till the final batch is reached. If it contains four coins, the backer of No. 4 wins; if three, the backer of No. 3 wins, and so on. Twenty-five per cent is deducted from the stake by the banker, and the winner receives five times the amount of his stake thus reduced. In Macao, the Monte Carlo of China, play goes on day and night, every day of the week, and bets can be made from 5 cents to 500 dollars, which are the limits.

Fantan is also the name of a card game, played with an ordinary pack, by any number of players up to eight. The deal decided, the cards are dealt singly, any that are left over forming a stock, and being placed face downwards on the table. Each player contributes a fixed stake or "ante." The first player can enter if he has an ace; if he has not he pays an "ante" and takes a card from the stock; the second player is then called upon and acts similarly till an ace is played. This (and the other aces when played) is put face upwards on the table, and the piles are built up from the ace to the king. The pool goes to the player who first gets rid of all his cards. If a player fails to play, having a playable card, he is fined the amount of the ante for every card in the other players' hands.

FANTASIA (Italian for "fantasy," a causing to be seen, from Greek, φαίνειν, to show), a name in music sometimes loosely used for a composition which has little structural form, and appears to be an improvization; and also for a combination or medley of familiar airs connected together with original passages of more or less brilliance. The word, however, was originally applied to more formal compositions, based on the madrigal, for several instruments. Fantasias appear as distinct compositions in Bach's works, and also joined to a fugue, as in the "Great Fantasia and Fugue" in A minor, and the "Fantasia cromatica" in D minor. Brahms used the name for his shorter piano pieces. It is also applied to orchestral compositions "not long enough to be called symphonic poems and not formal enough to be called overtures" (Sir C. Hubert Parry, in Grove's *Dictionary of Music*, ed. 1906). The Italian word is still used in Tunis, Algeria and Morocco, with the meaning of "showing off," for an acrobatic exhibition of horsemanship by the Arabs. The riders fire their guns, throw them and their lances into the air, and catch them again, standing or kneeling in the saddle, all at a full gallop.

FANTI, MANFREDO (1806–1865), Italian general, was born at Carpi and educated at the military college of Modena. In 1831 he was implicated in the revolutionary movement organized by Ciro Menotti (see FRANCIS IV., of Modena), and was condemned to death and hanged in effigy, but escaped to France, where he was given an appointment in the French corps of engineers. In 1833 he took part in Mazzini's abortive attempt to invade Savoy, and in 1835 he went to Spain to serve in Queen Christina's army against the Carlists. There he remained for thirteen years, distinguishing himself in battle and rising to a high staff appointment. But on the outbreak of the war between Piedmont and Austria in 1848 he hurried back to Italy, and although at first his services were rejected both by the Piedmontese government and the Lombard provisional government, he was afterwards given the command of a Lombard brigade. In the general confusion following on Charles Albert's defeat on the Mincio and his retreat to Milan, where the people rose against the unhappy king, Fanti's courage and tact saved the situation. He was elected member of the Piedmontese chamber in 1849, and on the renewal of the campaign he again commanded a Lombard brigade under General Ramorino. After the Piedmontese defeat at Novara (23rd of March) peace was made, but a rising broke out at Genoa, and Fanti with great difficulty restrained his Lombards from taking part in it. But he was suspected as a Mazzinian and a soldier of fortune by the higher Piedmontese officers, and they insisted on his being court-martialled for his operations under Ramorino (who had been tried and shot). Although honourably acquitted, he was not employed again until the Crimean expedition of 1855. In the second Austrian war in 1859 Fanti commanded the 2nd division, and contributed to the victories of Palestro, Magenta and San Martino. After the peace of Villafranca he was sent to organize the army of the Central Italian League (composed of the provisional governments of Tuscany, Modena, Parma and Romagna), and converted it in a few months into a well-drilled body of 45,000 men, whose function was to be ready to intervene in the papal states on the outbreak of a revolution. He showed statesmanlike qualities in steering a clear course between the exaggerated prudence of Baron Ricasoli, who wished to recall the troops from the frontier, and the impetuosity of Garibaldi, his second-in-command, who was anxious to invade Romagna prematurely, even at the risk of Austrian intervention. Fanti's firmness led to Garibaldi's resignation. In January 1860 Fanti became minister of war and marine under Cavour, and incorporated the League's army in that of Piedmont. In the meanwhile Garibaldi had invaded Sicily with his Thousand, and King Victor Emmanuel decided at last that he too must intervene; Fanti was given the chief command of a strong Italian force which invaded the papal states, seized Ancona and other fortresses, and defeated the papal army at Castelfidardo, where the enemy's commander, General Lamoricière, was captured. In three weeks Fanti had conquered the Marche and Umbria and taken 28,000 prisoners. When the army entered Neapolitan territory the king took the chief command, with Fanti as chief of the staff. After defeating a large Neapolitan force at Mola and organizing the siege operations round Gaeta, Fanti returned to the war office at Turin to carry out important army reforms. His attitude in opposing the admission of Garibaldi's 7000 officers into the regular army with their own grades made him the object of great unpopularity for a time, and led to a severe reprimand from Cavour. On the death of the latter (7th of June 1861) he resigned office and took command of the VII. army corps. But his health had now broken down, and after four years' suffering he died in Florence on the 5th of April 1865. His lose was greatly felt in the war of 1866.

See Carandini, *Vita di M. Fanti* (Verona, 1872); A. Di Giorgio, *Il Generale M. Fanti* (Florence, 1906). (L. V.*)

FANTI, a nation of Negroes, inhabiting part of the seaboard of the Gold Coast colony, British West Africa, and about 20,000 sq. m. of the interior. They number about a million. They have many traditions of early migrations. It seems probable that the Fanti and Ashanti were originally one race, driven from the north-east towards the sea by more powerful races, possibly the ancestors of Fula and Hausa. There are many words in Fanti for plants and animals not now existing in the country, but which abound in the Gurunsi and Moshi countries farther north. These regions have been always haunted by slave-raiders, and possibly these latter may have influenced the exodus. At any rate, the Fanti were early driven into the forests from the open plains and slopes of the hills. The name Fanti, an English version of *Mfantsi*, is supposed to be derived from *fan*, a wild cabbage, and *ti*, *di* or *dz*, to eat; the story being that upon the exile of the tribe the only available food was some such plant. They are divided into seven tribes, obviously totemic, and with rules as to exogamy still in force. (1) *Kwonna*, buffalo; (2) *Etchwi*, leopard; (3) *Eso*, bush-cat; (4) *Nitchwa*, dog; (5) *Nnuna*, parrot; (6) *Ebradzi*, lion; and (7) *Abrutu*, corn-stalk; these names are obsolete, though the meanings are known. The tribal marks are three gashes in front of the ear on each side in a line parallel to the jaw-bone. The Fanti language has been associated by A. B. Ellis with the Ashanti speech as the principal descendant of an original language, possibly the Tshi (pronounced **Tchwi**), which is generally considered as the parent of Ashanti, Fanti, Akim, Akwapim and modern Tshi.

The average Fanti is of a dull brown colour, of medium height, with negroid features. Some of the women, when young, are quite pretty. The women use various perfumes, one of the most usual being prepared from the excrement of snakes. There are no special initiatory rites for the youthful Fanti, only a short seclusion for girls when they reach the marriageable age. Marriage is a mere matter of sale, and the maidens are tricked out in all the family finery and walk round the village to indicate that they are ready for husbands. The marriages frequently end in divorce. Polygamy is universally practised. The care of the children is left exclusively to the mothers, who are regarded by the Fanti with deep veneration, while little attention is paid to the fathers. Wives never eat with their husbands, but always with the children. The rightful heir in native law is the eldest nephew, *i.e.* the eldest sister's eldest son, who invariably inherits wives, children and all property. As to tenure of land, the source of ownership of land is derived from the possession of the chief's "stool," which is, like the throne of a king, the symbol of authority, and not even the chief can alienate the land from the stool. Females may succeed to property, but generally only when the acquisition of such property is the result of their succeeding to the stool of a chief. The Fanti are not permanent cultivators of the soil. Three or at most five years will cover the period during which land is continuously cultivated. The commonest native dishes are palm-oil chop, a bowl of palm oil, produced by boiling freshly ground palm nuts, in which a fowl or fish is then cooked; and *fūfū*, "white," a boiled mash of yams or plantains. The Fanti have a taste for shark-flesh, called locally "stink-fish." It is sliced up and partly sun-dried, and is eaten in a putrid state. The Fanti are skilful sailors and fishermen, build excellent canoes, and are expert weavers. Pottery and goldsmithery are trades also followed. Their religion is fetishism, every Fanti having his own "fetish" or familiar spirit, but there is a belief in a beneficent Creative Being. Food is offered the dead, and a ceremony of purification is said to be indulged in at funerals, the bearers and mourners plunging into the sea or river after the interment.

See *Journal of Anthropological Institute of Great Britain*, vol. 26, pp. 128 et seq.; A. B. Ellis, *The Tshi-speaking Peoples of the Gold Coast* (London, 1887).

FANTIN-LATOUR, IGNACE HENRI JEAN THÉODORE (1836–1904), French artist, was born at Grenoble on the 14th of January 1836. He studied first with his father, a pastel painter, and then at the drawing school of Lecoq de Boisbaudran, and later under Couture. He was the friend of Ingres, Dalacroix, Corot, Courbet and others. He exhibited in the Salon of 1861, and many of his more important canvases appeared on its walls in later years, though 1863 found him with Harpignies, Manet, Legros and Whistler in the Salon des Refusés. Whistler introduced him to English artistic circles, and he lived for some time in England, many of his portraits and flower pieces being in English galleries. He died on the 28th of August 1904. His portrait groups, arranged somewhat after the manner of the Dutch masters, are as interesting from their subjects as they are from the artistic point of view. "*Hommage à Delacroix*" showed portraits of Whistler and Legros, Baudelaire, Champfleury and himself; "*Un Atelier à Batignolles*" gave portraits of Monet, Manet, Zola and Renoir, and is now in the Luxembourg; "*Un Coin de table*" presented Verlaine, Rimbaud, Camille Peladan and others; and "*Autour du Piano*" contained portraits of Chabrier, D'Indy and other musicians. His paintings of flowers are perfect examples of the art, and form perhaps the most famous section of his work in England. In his later years he devoted much attention to lithography, which had occupied him as early as 1862, but his examples were then considered so revolutionary, with their strong lights and black shadows, that the printer refused to execute them. After "*L'Anniversaire*" in honour of Berlioz in the Salon of 1876, he regularly exhibited lithographs, some of which were excellent examples of delicate portraiture, others being elusive and imaginative drawings illustrative of the music of Wagner (whose cause he championed in Paris as early as 1864), Berlioz, Brahms and other composers. He illustrated Adolphe Jullien's *Wagner* (1886) and *Berlioz* (1888). There are excellent collections of his lithographic work at Dresden, in the British Museum, and a practically complete set given by his widow to the Louvre. Some were also exhibited at South Kensington in 1898–1899, and at the Dutch gallery in 1904.

A catalogue of the lithographs of Fantin-Latour was drawn up by Germain Hédiard in *Les Maîtres de la lithographie* (1898–1899). A volume of reproductions, in a limited edition, was published (Paris, 1907) as *L'Œuvre lithographique de Fantin-Latour*. See A. Jullien, *Fantin-Latour, sa vie et ses amitiés* (Paris, 1909).

FANUM FORTUNAE (mod. *Fano*), an ancient town of Umbria, Italy, at the point where the Via Flaminia reaches the N.E. coast of Italy. Its name shows that it was of Roman origin, but of its foundation we know nothing. It is first mentioned, with Pisaurum and Ancona, as held by Julius Caesar in 49 B.C. Augustus planted a colony there, and round it constructed a wall (of which some remains exist), as is recorded in the inscription on the triple arch erected in his honour at the entrance to the town (A.D. 9–10), which is still standing. Vitruvius tells us that there was, during Augustus's lifetime, a temple in his honour and a temple of Jupiter, and describes a basilica of which he himself was the architect. The arch of Augustus bears a subsequent inscription in honour of Constantine, added after his death by L. Turcius Secundus, *corrector Flaminiae et Piceni*, who also constructed a colonnade above the arch. Several Roman statues and heads, attributable to members of the Julio-Claudian dynasty, were found in the convent of S. Filippo in 1899. These and other objects are now in the municipal museum (E. Brizio in *Notizie degli scavi*, 1899, 249 seq.). Of the temple of Fortune from which the town took its name no traces have been discovered. (T. As.)

FAN VAULT, in architecture, a method of vaulting used in the Perpendicular style, of which the earliest example is found in the cloisters of Gloucester cathedral, built towards the close of the 14th century. The ribs are all of one curve and equidistant, and their divergency, resembling that of an open fan, has suggested the name. One of the finest examples, though of later date (1640), is the vault over the staircase of Christ Church, Oxford. For the origin of its development see VAULT.

FĀRĀBĪ [Abū Naṣr Muḥammad ibn Tarkhān ul-Fārābī] (*ca.* 870–950), Arabian philosopher, was born of Turkish stock at Fārāb in Turkestan, where also he spent his youth. Thence he journeyed to Bagdad, where he learned Arabic and gave himself to the study of mathematics, medicine and philosophy, especially the works of Aristotle. Later he went to the court of the Ḥamdānid Saif addaula, from whom he received a warm welcome and a small pension. Here he lived a quiet if not an ascetic life.

He died in Damascus, whither he had gone with his patron. His works are very clear in style, though aphoristic rather than systematic in the treatment of subjects. Unfortunately the success of Avicenna seems to have led to the neglect of much of his work. In Europe his compendium of Aristotle's *Rhetoric* was published at Venice, 1484. Two of his smaller works appear in *Alpharabii opera omnia* (Paris, 1638), and two are translated in F. A. Schmölders' *Documenta philosophiae Arabum* (Bonn, 1836). More recently Fr. Dieterici has published at Leiden: *Alfarabi's philosophische Abhandlungen* (1890; German trans. 1892); *Alfarabi's Abhandlung des Musterstaats* (1895; German trans. with an essay "Über den Zusammenhang der arabischen und griechischen Philosophie," 1900); *Die Staatsleitung von Alfarabi* in German, with an essay on "Das Wesen der arabischen Philosophie" (1904).

For Fārābi's life see McG. de Slane's translation of Ibn Khallikān (vol. 3, pp. 307 ff.); and for further information as to his works M. Steinschneider's article in the *Mémoires de l'Académie* (St Petersburg, série 7, tom. 13, No. 4, 1869); and C. Brockelmann's *Gesch. der arab. Litteratur*, vol. i. (Weimar, 1898), pp. 210-213. (G. W. T.)

FARADAY, MICHAEL (1791–1867), English chemist and physicist, was born at Newington, Surrey, on the 22nd of September 1791. His parents had migrated from Yorkshire to London, where his father worked as a blacksmith. Faraday himself became apprenticed to a bookbinder. The letters written to his friend Benjamin Abbott at this time give a lucid account of his aims in life, and of his methods of self-culture, when his mind was beginning to turn to the experimental study of nature. In 1812 Mr Dance, a customer of his master, took him to hear four lectures by Sir Humphry Davy. Faraday took notes of these lectures, and afterwards wrote them out in a fuller form. Under the encouragement of Mr Dance, he wrote to Sir H. Davy, enclosing these notes. "The reply was immediate, kind and favourable." He continued to work as a journeyman bookbinder till the 1st of March 1813, when he was appointed assistant in the laboratory of the Royal Institution of Great Britain on the recommendation of Davy, whom he accompanied on a tour through France, Italy and Switzerland from October 1813 to April 1815. He was appointed director of the laboratory in 1825; and in 1833 he was appointed Fullerian professor of chemistry in the institution for life, without the obligation to deliver lectures. He thus remained in the institution for fifty-four years. He died at Hampton Court on the 25th of August 1867.

Faraday's earliest chemical work was in the paths opened by Davy, to whom he acted as assistant. He made a special study of chlorine, and discovered two new chlorides of carbon. He also made the first rough experiments on the diffusion of gases, a phenomenon first pointed out by John Dalton, the physical importance of which was more fully brought to light by Thomas Graham and Joseph Loschmidt. He succeeded in liquefying several gases; he investigated the alloys of steel, and produced several new kinds of glass intended for optical purposes. A specimen of one of these heavy glasses afterwards became historically important as the substance in which Faraday detected the rotation of the plane of polarization of light when the glass was placed in the magnetic field, and also as the substance which was first repelled by the poles of the magnet. He also endeavoured with some success to make the general methods of chemistry, as distinguished from its results, the subject of special study and of popular exposition. See his work on *Chemical Manipulation*.

But Faraday's chemical work, however important in itself, was soon completely overshadowed by his electrical discoveries. The first experiment which he has recorded was the construction of a voltaic pile with seven halfpence, seven disks of sheet zinc, and six pieces of paper moistened with salt water. With this pile he decomposed sulphate of magnesia (first letter to Abbott, July 12, 1812). Henceforward, whatever other subjects might from time to time claim his attention, it was from among electrical phenomena that he selected those problems to which he applied the full force of his mind, and which he kept persistently in view, even when year after year his attempts to solve them had been baffled.

His first notable discovery was the production of the continuous rotation of magnets and of wires conducting the electric current round each other. The consequences deducible from the great discovery of H. C. Oersted (21st July 1820) were still in 1821 apprehended in a somewhat confused manner even by the foremost men of science. Dr W. H. Wollaston indeed had formed the expectation that he could make the conducting wire rotate on its own axis, and in April 1821 he came with Sir H. Davy to the laboratory of the Royal Institution to make an experiment. Faraday was not there at the time, but coming in afterwards he heard the conversation on the expected rotation of the wire.

In July, August and September of that year Faraday, at the request of R. Phillips, the editor of the *Annals of Philosophy*, wrote for that journal an historical sketch of electro-magnetism, and he repeated almost all the experiments he described. This led him in the beginning of September to discover the method of producing the continuous rotation of the wire round the magnet, and of the magnet round the wire. He did not succeed in making the wire or the magnet revolve on its own axis. This first success of Faraday in electro-magnetic research became the occasion of the most painful, though unfounded, imputations against his honour. Into these we shall not enter, referring the reader to the *Life of Faraday*, by Dr Bence Jones.

We may remark, however, that although the fact of the tangential force between an electric current and a magnetic pole was clearly stated by Oersted, and clearly apprehended by A. M. Ampère, Wollaston and others, the realization of the continuous rotation of the wire and the magnet round each other was a scientific puzzle requiring no mean ingenuity for its original solution. For on the one hand the electric current always forms a closed circuit, and on the other the two poles of the magnet have equal but opposite properties, and are inseparably connected, so that whatever tendency there is for one pole to circulate round the current in one direction is opposed by the equal tendency of the other pole to go round the other way, and thus the one pole can neither drag the other round and round the wire nor yet leave it behind. The thing cannot be done unless we adopt in some form Faraday's ingenious solution, by causing the current, in some part of its course, to divide into two channels, one on each side of the magnet, in such a way that during the revolution of the magnet the current is transferred from the channel in front of the magnet to the channel behind it, so that the middle of the magnet can pass across the current without stopping it, just as Cyrus caused his army to pass dryshod over the Gyndes by diverting the river into a channel cut for it in his rear.

We must now go on to the crowning discovery of the induction of electric currents.

In December 1824 he had attempted to obtain an electric current by means of a magnet, and on three occasions he had made elaborate but unsuccessful attempts to produce a current in one wire by means of a current in another wire or by a magnet. He still persevered, and on the 29th of August 1831 he obtained the first evidence that an electric current can induce another in a different circuit. On the 23rd of September he writes to his friend R. Phillips: "I am busy just now again on electro-magnetism, and think I have got hold of a good thing, but can't say. It may be a weed instead of a fish that, after all my labour, I may at last pull up." This was his first successful experiment. In nine more days of experimenting he had arrived at the results described in his first series of "Experimental Researches" read to the Royal Society on the 24th of November 1841. By the intense application of his mind he had thus brought the new idea, in less than three months from its first development, to a state of perfect maturity.

During his first period of discovery, besides the induction of electric currents, Faraday established the identity of the electrification produced in different ways; the law of the definite electrolytic action of the current; and the fact, upon which he laid great stress, that every unit of positive electrification is related in a definite manner to a unit of negative electrification, so that it is impossible to produce what Faraday called "an absolute charge of electricity" of one kind not related to an equal charge of the opposite kind. He also discovered the difference of the capacities of different substances for taking part in electric induction. Henry Cavendish had before 1773 discovered that glass, wax, rosin and shellac have higher specific inductive capacities than air, and had actually determined the numerical ratios of these capacities, but this was unknown both to Faraday and to all other electricians of his time, since Cavendish's *Electrical Researches* remained unpublished till 1879.

The first period of Faraday's electrical discoveries lasted ten years. In 1841 he found that he required rest, and it was not till 1845 that he entered on his second great period of research, in which he discovered the effect of magnetism on polarized light, and the phenomena of diamagnetism.

Faraday had for a long time kept in view the possibility of using a ray of polarized light as a means of investigating the condition of transparent bodies when acted on by electric and magnetic forces. Dr Bence Jones (*Life of Faraday*, vol. i. p. 362) gives the following note from his laboratory book on the 10th of September 1822:—

> "Polarized a ray of lamplight by reflection, and endeavoured to ascertain whether any depolarizing action (was) exerted on it by water placed between the poles of a voltaic battery in a glass cistern; one Wollaston's trough used; the fluids decomposed were pure water, weak solution of sulphate of soda, and strong sulphuric acid; none of them had any effect on the polarized light, either when out of or in the voltaic circuit, so that no particular arrangement of particles could be ascertained in this way."

Eleven years afterwards we find another entry in his notebook on the 2nd of May 1833 (*Life*, by Dr Bence Jones, vol. ii. p. 29). He then tried not only the effect of a steady current, but the effect on making and breaking contact.

> "I do not think, therefore, that decomposing solutions or substances will be found to have (as a consequence of decomposition or arrangement for the time) any effect on the polarized ray. Should now try non-decomposing bodies, as solid nitre, nitrate of silver, borax, glass, &c., whilst solid, to see if any internal state induced, which by decomposition is destroyed, *i.e.* whether, when they cannot decompose, any state of electrical tension is present. My borate of glass good, and common electricity better than voltaic."

On the 6th of May he makes further experiments, and concludes: "Hence I see no reason to expect that any kind of structure or tension can be rendered evident, either in decomposing or non-decomposing bodies, in insulating or conducting states."

At last, in 1845, Faraday attacked the old problem, but this time with complete success. Before we describe this result we may mention that in 1862 he made the relation between magnetism and light the subject of his very last experimental work. He endeavoured, but in vain, to detect any change in the lines of the spectrum of a flame when the flame was acted on by a powerful magnet.

This long series of researches is an instance of his persistence. His energy is shown in the way in which he followed up his discovery in the single instance in which he was successful. The first evidence which he obtained of the rotation of the plane of polarization of light under the action of magnetism was on the 13th of September 1845, the transparent substance being his own heavy glass. He began to work on the 30th of August 1845 on polarized light passing through electrolytes. After three days he worked with common electricity, trying glass, heavy optical glass, quartz, Iceland spar, all without effect, as on former trials. On the 13th of September he worked with lines of magnetic force. Air, flint, glass, rock-crystal, calcareous spar were examined, but without effect.

> "Heavy glass was experimented with. It gave no effects when the *same magnetic poles* or the *contrary* poles were on opposite sides (as respects the course of the polarized ray), nor when the same poles were on the same side either with the constant or intermitting current. But when contrary magnetic poles were on the same side there was an effect produced on the polarized ray, and thus magnetic force and light were proved to have relations to each other. This fact will most likely prove exceedingly fertile, and of great value in the investigation of the conditions of natural force."

He immediately goes on to examine other substances, but with "no effect," and he ends by saying, "Have got enough for to-day." On the 18th of September he "does an excellent day's work." During September he had four days of work, and in October six, and on the 6th of November he sent in to the Royal Society the nineteenth series of his "Experimental Researches," in which the whole conditions of the phenomena are fully specified. The negative rotation in ferro-magnetic media is the only fact of importance which remained to be discovered afterwards (by M. E. Verdet in 1856).

But his work for the year was not yet over. On the 3rd of November a new horseshoe magnet came home, and Faraday immediately began to experiment on the action in the polarized ray through gases, but with no effect. The following day he repeated an experiment which had given no result on the 6th of October. A bar of heavy glass was suspended by silk between the poles of the new magnet. "When it was arranged, and had come to rest, I found I *could* affect it by the magnetic forces and give it position." By the 6th of December he had sent in to the Royal Society the twentieth, and on the 24th of December the twenty-first, series of his "Researches," in which the properties of diamagnetic bodies are fully described. Thus these two great discoveries were elaborated, like his earlier one, in about three months.

The discovery of the magnetic rotation of the plane of polarized light, though it did not lead to such important practical applications as some of Faraday's earlier discoveries, has been of the highest value to science, as furnishing complete dynamical evidence that wherever magnetic force exists there is matter, small portions of which are rotating about axes parallel to the direction of that force.

We have given a few examples of the concentration of his efforts in seeking to identify the apparently different forces of nature, of his far-sightedness in selecting subjects for investigation, of his persistence in the pursuit of what he set before him, of his energy in working out the results of his discoveries, and of the accuracy and completeness with which he made his final statement of the laws of the phenomenon.

These characteristics of his scientific spirit lie on the surface of his work, and are manifest to all who read his writings. But there was another side of his character, to the cultivation of which he paid at least as much attention, and which was reserved for his friends, his family and his church. His letters and his conversation were always full of whatever could awaken a healthy interest, and free from anything that might rouse ill-feeling. When, on rare occasions, he was forced out of the region of science into that of controversy, he stated the facts and let them make their own way. He was entirely free from pride and undue self-assertion. During the growth of his powers he always thankfully accepted a correction, and made use of every expedient, however humble, which would make his work more effective in every detail. When at length he found his memory failing and his mental powers declining, he gave up, without ostentation or complaint, whatever parts of his work he could no longer carry on according to his own standard of efficiency. When he was no longer able to apply his mind to science, he remained content and happy in the exercise of those kindly feelings and warm affections which he had cultivated no less carefully than his scientific powers.

The parents of Faraday belonged to the very small and isolated Christian sect which is commonly called after Robert Sandeman. Faraday himself attended the meetings from childhood; at the age of thirty he made public profession of his faith, and during two different periods he discharged the office of elder. His opinion with respect to the relation between his science and his religion is expressed in a lecture on mental education delivered in 1854, and printed at the end of his *Researches in Chemistry and Physics*.

> "Before entering upon the subject, I must make one distinction which, however it may appear to others, is to me of the utmost importance. High as man is placed above the creatures around

him, there is a higher and far more exalted position within his view; and the ways are infinite in which he occupies his thoughts about the fears, or hopes, or expectations of a future life. I believe that the truth of that future cannot be brought to his knowledge by any exertion of his mental powers, however exalted they may be; that it is made known to him by other teaching than his own, and is received through simple belief of the testimony given. Let no one suppose for an instant that the self-education I am about to commend, in respect of the things of this life, extends to any considerations of the hope set before us, as if man by reasoning could find out God. It would be improper here to enter upon this subject further than to claim an absolute distinction between religious and ordinary belief. I shall be reproached with the weakness of refusing to apply those mental operations which I think good in respect of high things to the very highest. I am content to bear the reproach. Yet even in earthly matters I believe that 'the invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made, even His eternal power and Godhead'; and I have never seen anything incompatible between those things of man which can be known by the spirit of man which is within him and those higher things concerning his future, which he cannot know by that spirit."

Faraday gives the following note as to this lecture:—

"These observations were delivered as a lecture before His Royal Highness the Prince Consort and the members of the Royal Institution on the 6th of May 1854. They are so immediately connected in their nature and origin with my own experimental life, considered either as cause or consequence, that I have thought the close of this volume not an unfit place for their reproduction."

As Dr Bence Jones concludes—

"His standard of duty was supernatural. It was not founded on any intuitive ideas of right and wrong, nor was it fashioned upon any outward experiences of time and place, but it was formed entirely on what he held to be the revelation of the will of God in the written word, and throughout all his life his faith led him to act up to the very letter of it."

Published Works.—Chemical Manipulation, being Instructions to Students in Chemistry (1 vol., John Murray, 1st ed. 1827, 2nd 1830, 3rd 1842); *Experimental Researches in Electricity*, vols. i. and ii., Richard and John Edward Taylor, vols. i. and ii. (1844 and 1847); vol. iii. (1844); vol. iii. Richard Taylor and William Francis (1855); *Experimental Researches in Chemistry and Physics*, Taylor and Francis (1859); *Lectures on the Chemical History of a Candle* (edited by W. Crookes) (Griffin, Bohn & Co., 1861); *On the Various Forces in Nature* (edited by W. Crookes) (Chatto & Windus, no date).

BIOGRAPHIES.—*Faraday as a Discoverer*, by John Tyndall (Longmans, 1st ed. 1868, 2nd ed. 1870); *The Life and Letters of Faraday*, by Dr Bence Jones, secretary of the Royal Institution, in 2 vols. (Longmans, 1870); *Michael Faraday*, by J. H. Gladstone, Ph.D., F.R.S. (Macmillan, 1872); *Michael Faraday; his Life and Work*, by S. P. Thompson (1898). (J. C. M.)

FARAH, a river of Afghanistan. It rises in the southern slopes of Siah-Koh, which forms the southern wall of the valley of Herat, and after a south-westerly course of about 200 m. falls into the Seistan Hamun. At the town of Farah it has a width of 150 yds. in the dry season with 2 ft. of water and a clear swift stream. It is liable to floods, when it becomes impassable for weeks. The lower valley of the Farah Rud is fertile and well cultivated.

FARAH, a town of Afghanistan. It is situated on the river that bears its name on the main road between Herat and Kandahar, 160 m. S. of Herat and 225 m. W. of Kandahar. It is a place of some strategical importance, as it commands the approaches to India and Seistan from Herat. The town (2460 ft. above sea-level) is a square walled enclosure standing in the middle of the plain, surrounded with a walled rampart. Owing to its unhealthiness it is now almost deserted, being only occupied by the Afghan regiment quartered there. It is a place of great antiquity, being probably the Phra mentioned by Isidore of Charax in the 1st century A.D. It was sacked by the armies of Jenghiz Khan, and the survivors transported to a position farther north, where there are still great ruins. The population returned to the original site after the destruction of the medieval city by Shah Abbas, and the city prospered again until its bloody siege by Nadir Shah. Subsequently under constant attacks it declined, and in 1837 the population amounting to 6000 was carried off to Kandahar. The sole industry of the town at present is the manufacture of gunpowder. In the districts east of Farah are to be found the most fanatical of the Durani Afghan tribes.

FARAZDAQ [Hammām ibn Ghālib ibn Sa'sa', known as al-Farazdaq] (*ca.* 641–*ca.* 728), Arabian poet, was born at Basra. He was of the Dārim, one of the most respected divisions of the bani Tamīm, and his mother was of the tribe of Ḍabba. His grandfather Sa'sa' was a Bedouin of great repute; his father Ghālib followed the same manner of life until Basra was founded, and was famous for his generosity and hospitality. At the age of fifteen Farazdaq was known as a poet, and though checked for a short time by the advice of the caliph Ali to devote his attention to the study of the Koran, he soon returned to making verse. In the true Bedouin spirit he devoted his talent largely to satire and attacked the bani Nahshal and the bani Fuqaim. When Ziyād, a member of the latter tribe, became governor of Basra, the poet was compelled to flee, first to Kufa, and then, as he was still too near Ziyād, to Medina, where he was well received by Sa'īd ibn ul-Āsī. Here he remained about ten years, writing satires on Bedouin tribes, but avoiding city politics. But he lived a prodigal life, and his amorous verses led to his expulsion by the caliph Merwan I. Just at that time he learned of the death of Ziyād and returned to Basra, where he secured the favour of Ziyād's successor 'Obaidallāh ibn Ziyād. Much of his poetry was now devoted to his matrimonial affairs. He had taken advantage of his position as guardian and married his cousin Nawār against her will. She sought help in vain from the court of Basra and from various tribes. All feared the poet's satires. At last she fled to Mecca and appealed to the pretender 'Abdallah ibn Zobair, who, however, succeeded in inducing her to consent to a confirmation of the marriage. Quarrels soon arose again. Farazdaq took a second wife, and after her death a third, to annoy Nawār. Finally he consented to a divorce pronounced by Hasan al-Baṣrī. Another subject occasioned a long series of verses, namely his feud with his rival Jarīr (*q.v.*) and his tribe the bani Kulaib. These poems are published as the *Naka'id of Jarīr and al-Farazdaq* (ed. A. A. Bevan, Leiden, 1906 ff.). In political life Farazdaq was prevented by fear from taking a large part. He seems, however, to have been attached to the house of Ali. During the reign of Moawiya I. he avoided politics, but later gave his allegiance to 'Abdallah ibn Zobair.

The fullest account of his life is contained in J. Hell's *Das Leben Farazdaq nach seinen Gedichten* (Leipzig, 1903); Arabian stories of him in the *Kitab ul-Aghāni* and in Ibn Khallikān. A portion of his poems was edited with French translation by R. Boucher (Paris, 1870); the remainder have been published by J. Hell (Munich, 1900). (G. W. T.)

FARCE, a form of the comic in dramatic art, the object of which is to excite laughter by ridiculous situations and incidents rather than by imitation with intent to ridicule, which is the province of burlesque, or by the delineation of the play of character upon character, which is that of comedy. The history of the word is interesting. Its ultimate origin is the Latin *farcire*, to stuff, and with the meaning of "stuffing" or forcemeat it appears in old cookery books in English. In medieval Latin *farsa* and *farsia* were applied to the expansion of the *Kyrie eleison* in litanies, &c., by interpolating words and phrases between those two words; later, to words, phrases and rhymed verses, sometimes in the vernacular, also interpolated in various parts of the service. The French *farce*, the form to which we owe our word, was originally the "gag" that the actors in the medieval drama inserted into their parts, generally to meet the popular demand for a lightening of humour or buffoonery. It has thus been used for the lighter form of comic drama (see DRAMA), and also figuratively for a piece of idle buffoonery, sham, or mockery.

FAREHAM, a market town in the Fareham parliamentary division of Hampshire, England, 76 m. S.W. from London by the London & South Western railway. Pop. of urban district (1901) 8246. It lies at the head of a creek opening into the north-western corner of Portsmouth harbour. The principal industries are the manufacture of sackings, ropes, bricks, coarse earthenware, terra-cotta, tobacco-pipes and leather. Fareham has a considerable trade in corn, timber and coal; the creek being accessible to vessels of 300 tons. Three miles E. of Fareham, on Portsmouth harbour, are the interesting ruins of Porchester

Castle, an extensive walled enclosure retaining its Norman keep, and exhibiting in its outer walls considerable evidence of Roman workmanship; Professor Haverfield, however, denies that it occupies the site of the Roman *Portus Magnus*. The church of St Mary has some fine Norman portions. It belonged to an Augustinian priory founded by Henry I. At Titchfield, 3 m. W. of Fareham, are ruins of the beautiful Tudor mansion, Place House, built on the site of a Premonstratensian abbey of the 13th century, of which there are also fragments.

The fact that Fareham (Fernham, Ferham) formed part of the original endowment of the see of Winchester fixes its existence certainly as early as the 9th century. It is mentioned in the Domesday Survey as subject to a reduced assessment on account of its exposed position and liability to Danish attacks. There is evidence to show that Fareham had become a borough before 1264, but no charter can be found. It was a mesne borough held of the bishop of Winchester, but it is probable that during the 18th century the privileges of the burgesses were allowed to lapse, as by 1835 it had ceased to be a borough. Fareham returned two members to the parliament of 1306, but two years later it petitioned against representation on the ground of expense. A fair on the 31st of October and the two following days was held under grant of Henry III. The day appears to have been afterwards changed to the 29th of June, and in the 18th century was mainly important for the sale of toys. It was abolished in 1871. Fareham owed its importance in medieval times to its facilities for commerce. It was a free port and had a considerable trade in wool and wine. Later its shipping declined and in the 16th century it was little more than a fishing village. Its commercial prosperity in modern times is due to its nearness to Portsmouth.

FAREL, GUILLAUME (1489–1565), French reformer, was born of a noble family near Gap in Dauphiné in 1489. His parents meant him for the military profession, but his bent being for study he was allowed to enter the university of Paris. Here he came under the influence of Jacobus Faber (Stapulensis), on whose recommendation he was appointed professor in the college of Cardinal Lemoine. In 1521, on the invitation of Bishop Briçonnet, he repaired to Meaux, and took part in efforts of reform within the Roman communion. The persecuting measures of 1523, from which Faber found a refuge at Meaux, determined Farel to leave France. Oecolampadius welcomed him to Basel, where in 1524 he put forth thirteen theses sharply antagonizing Roman doctrine. These he defended with great ability, but with so much heat that Erasmus joined in demanding his expulsion from the city. He thought of going to Wittenberg, but his first halt was at Strassburg, where Bucer and Capito received him kindly. At the call of Duke Ulrich of Württemberg he went as preacher to Montbéliard. Displaying the same qualities which had driven him from Basel, he was forced to leave Montbéliard in the spring of 1525.

He retraced his steps to Strassburg and Basel; and, at the end of 1526, obtained a preacher's post at Aigle, then a dependency of Bern. Deeming it wise to suppress his name, he adopted the pseudonym Ursinus, with reference to his protection by Bern. Despite strenuous opposition by the monastic orders, he obtained in 1528 a licence from the authorities to preach anywhere within the canton of Bern. He extended his labours to the cantons of Neuchâtel and Vaud. His vehement missionary addresses were met by mob violence, but he persevered with undaunted zeal. In October 1530 he broke into the church of Neuchâtel with an iconoclastic mob, thus planting the Reformation in that city. In 1532 he visited the Waldenses. On the return journey he halted at Geneva, then at a crisis of political and religious strife. On the 30th of June 1532 the council of two hundred had ordained that in every church and cloister of the city "the pure Gospel" should be preached; against this order the bishop's vicar led the opposition. Reaching Geneva in October 1532, Farel (described in a contemporary monastic chronicle as "un chétif malheureux prédicant, nommé maistre Guillaume") at once began to preach in a room of his lodging, and soon attracted "un grand nombre de gens qui estoient advertis de sa venue et déjà infects de son hérésie." Summoned before the bishop's vicar, his trial was a scene of insult and clamour, ending in his being violently thrust from the court and bidden to leave the city within three hours. He escaped with difficulty to Orbe by boat. Through the intervention of the government of Bern, liberty of worship was granted on the 28th of March 1533 to the Reformation party in Geneva. Farel, returning, achieved in a couple of years a complete supremacy for his followers. On New Year's Day 1534 the bishop interdicted all preaching unauthorized by himself, and ordered the burning of all Protestant Bibles. This was the signal for public disputations in which Farel took the leading part on the Reformation side, with the result that by decree of the 27th of August 1535 the mass was suppressed and the reformed religion established. Calvin, on his way to Basel for a life of study, touched at Geneva, and by the importunity of Farel was there detained to become the leader of the Genevan Reformation. The severity of the disciplinary measures which followed procured a reaction under which Farel and Calvin were banished the city in 1538. Farel was called to Neuchâtel in July 1538, but his position there was made untenable, though he remained at his post during a visitation of the plague. When (1541) Calvin was recalled to Geneva, Farel also returned; but in 1542 he went to Metz to support the Reformation there. It is said that when he preached in the Dominican church of Metz, the bells were rung to drown his voice, but his voice outdid the bells, and on the next occasion he had three thousand hearers. His work was checked by the active hostility of the duke of Lorraine, and in 1544 he returned to Neuchâtel. No one was more frequently and confidentially consulted by Calvin. When the trial of Servetus was in progress (1553), Calvin was anxious for Farel's presence, but he did not arrive till sentence had been passed. He accompanied Servetus to the stake, vainly urging him to a recantation at the last moment. A coolness with Calvin was created by Farel's marriage, at the age of sixty-nine, with a refugee widow from Rouen, of unsuitable age. By her, six years later, he had one son, who died in infancy. The vigour and fervency of his preaching were unabated by length of years. Calvin's death, in 1564, affected him deeply. Yet in his last year he revisited Metz, preaching amid great enthusiasm, with all his wonted fire. The effort was too much for him; he left the church exhausted, took to his bed, and died at Metz on the 13th of September 1565.

Farel wrote much, but usually in haste, and for an immediate purpose. He takes no rank as a scientific theologian, being a man of activity rather than of speculation or of much insight. His *Sommaire* was re-edited from the edition of 1534 by J. G. Baum in 1867. Others of his works (all in French) were his treatise on purgatory (1534), on the Lord's Prayer (1543), on the Supper (1555). He "was remarkable for boldness and energy both in preaching and prayer" (M. Young, *Life of Paleario*). As an orator, he was denunciatory rather than suasive; thus while on the one hand he powerfully impressed, on the other hand he stimulated opposition. A monument to him was unveiled at Neuchâtel on the 4th of May 1876.

Lives of Farel are numerous; it may suffice to mention C. Ancillon, *Vie de G. Farel* (1691); the article in Bayle; M. Kirchhofer, *Das Leben W. Farels* (1831–1833); Ch. Schmidt, *Études sur Farel* (1834); F. Bevan, *W. Farel* (1893); J. J. Herzog, in Herzog-Hauck's *Realencyklopädie* (1898). (A. Go.*)

FAREY, JOHN (1766–1826), English geologist, was born at Woburn in Bedfordshire in 1766. He was educated at Halifax in Yorkshire, and showed such aptitude in mathematics, drawing and surveying, that he was brought under the notice of John Smeaton (1724–1792). In 1792 he was appointed agent to the duke of Bedford for his Woburn estates. After the decease of the duke, Farey in 1802 removed to London, and settled there as a consulting surveyor and geologist. That he was enabled to take this step was due largely to his acquaintance with William Smith (*q.v.*), who in 1801 had been employed by the duke of Bedford in works of draining and irrigation. The duke, appreciating Smith's knowledge of the strata, commissioned him in 1802 to explore the margin of the chalk-hills south of Woburn in order to determine the true succession of the strata; and he instructed Farey to accompany him. Farey has remarked that Smith was his "Master and Instructor in Mineral Surveying," and his subsequent publications show how well he had profited by the teachings he received. Farey prepared the *General View of the Agriculture and Minerals of Derbyshire* in two vols. (1811–1813) for the Board of Agriculture. In the first of these volumes (1811) he gave an able account of the upper part of the British series of strata, and a masterly exposition of the Carboniferous and other strata of Derbyshire. In this classic work, and in a paper published in the *Phil. Mag.* vol. li. 1818, p. 173, on "Mr Smith's Geological Claims stated," he zealously called attention to the importance of the discoveries of William Smith. Farey died in London on the 6th of January 1826.

See Biographical Notice, by W. S. Mitchell, in *Geol. Mag.* 1873, p. 25.

FARGO, WILLIAM GEORGE (1818–1881), pioneer American expressman, was born in Pompey, New York, on the 20th of May 1818. From the age of thirteen he had to support himself, obtaining little schooling, and for several years he was a clerk in grocery stores in Syracuse. He became a freight agent for the Auburn & Syracuse railway company at Auburn in 1841, an express messenger between Albany and Buffalo a year later, and in 1843 a resident agent in Buffalo. In 1844 he organized, with Henry Wells (1805–1878) and Daniel Dunning, the first express company (Wells & Co.; after 1845 Livingston & Fargo) to engage in the carrying business west of Buffalo. The lines of this company (which first operated only to Detroit, via Cleveland) were rapidly extended to Chicago, St Louis, and other western points. In March 1850, when through a consolidation of competing lines the American Express Company was organized, Wells became president and Fargo secretary. In 1851, with Wells and others, he organized the firm of Wells, Fargo & Company to conduct an express business between New York and San Francisco by way of the Isthmus of Panama and on the Pacific coast, where it long had a virtual monopoly. In 1861 Wells, Fargo & Co. bought and reorganized the Overland Mail Co., which had been formed in 1857 to carry the United States mails, and of which Fargo had been one of the original promoters. From 1862 to 1866 he was mayor of Buffalo, and from 1868 to his death, in Buffalo, on the 3rd of August 1881, he was president of the American Express Company, with which in 1868 the Merchants Union Express Co. was consolidated. He was a director of the New York Central and of the Northern Pacific railways.

FARGO, a city and the county-seat of Cass county, North Dakota, U.S.A., about 254 m. W. of Duluth, Minnesota. Pop. (1890) 5664; (1900) 9589, of whom 2564 were foreign-born; (1910 census) 14,331. It is served by the Northern Pacific, the Great Northern, and the Chicago, Milwaukee & St Paul railways. The city is situated on the W. bank of the Red river of the North, which in 1909 had a navigable depth of only about 2 ft. from Fargo to Grank Forks, and the navigation of which was obstructed at various places by fixed bridges. In the city are Island and Oakgrove parks, the former of which contains a statue (erected by Norwegians in 1908) of Henrik Arnold Wergeland, the Norwegian poet. Fargo is the seat of the North Dakota agricultural college (coeducational), founded in 1890 under the provisions of the Federal "Morrill Act" of 1862; it receives both Federal and state support (the former under the Morrill Act of 1890), and in connexion with it a United States Agricultural Experiment Station is maintained. In 1907–1908 the college had 988 students in the regular courses (including the students in the Academy), 117 in the summer course in steam engineering, and 68 in correspondence courses. At Fargo, also, are Fargo College (nonsectarian, 1887; founded by Congregationalists), which has a college department, a preparatory department, and a conservatory of music, and in 1908 had 310 students, of whom 211 were in the conservatory of music; the Oak Grove Lutheran ladies' seminary (1906) and the Sacred Heart Academy (Roman Catholic). The city is the see of both a Roman Catholic bishop and a Protestant Episcopal bishop; and it is the centre of masonic interests in the state, having a fine masonic temple. There are a public library and a large Y.M.C.A. building. St John's hospital is controlled by Roman Catholic sisters, and St Luke's hospital by the Lutheran Church. Fargo is in a rich agricultural (especially wheat) region, is a busy grain-trading and jobbing centre, is one of the most important wholesale distributing centres for agricultural implements and machinery in the United States, and has a number of manufactures, notably flour. The total value of the city's factory products in 1905 was $1,160,832. Fargo, named in honour of W. G. Fargo of the Wells Fargo Express Company, was first settled as a tent city in 1871, when the Red river was crossed by the Northern Pacific, but was not permanently settled until after the extinction in 1873 of the Indian title to the reservation on which it was situated. It was chartered as a city in 1875. The Milwaukee railway was completed to Fargo in 1884. In June 1893 a large part of the city was destroyed by fire, the loss being more than $3,000,000.

FARIA Y SOUSA, MANUEL DE (1590–1649), Spanish and Portuguese historian and poet, was born of an ancient Portuguese family, probably at Pombeiro, on the 18th of March 1590, attended the university of Braga for some years, and when about fourteen entered the service of the bishop of Oporto. With the exception of about four years from 1631 to 1634, during which he was a member of the Portuguese embassy in Rome, the greater part of his later life was spent at Madrid, and there he died, after much suffering, on the 3rd of June 1649. He was a laborious, peaceful man; and a happy marriage with Catharina Machado, the Albania of his poems, enabled him to lead a studious domestic life, dividing his cares and affections between his children and his books. His first important work, an *Epitome de las historias Portuguezas* (Madrid, 1628), was favourably received; but some passages in his enormous commentary upon *Os Lusiadas*, the poem of Luis de Camoens, excited the suspicion of the inquisitors, caused his temporary incarceration, and led to the permanent loss of his official salary. In spite of the enthusiasm which is said to have prescribed to him the daily task of twelve folio pages, death overtook him before he had completed his greatest enterprise, a history of the Portuguese in all parts of the world. Several portions of the work appeared at Lisbon after his death, under the editorship of Captain Faria y Sousa:—*Europa Portugueza* (1667, 3 vols.); *Asia Portugueza* (1666–1675, 3 vols.); *Africa Portugueza* (1681). As a poet Faria y Sousa was nearly as prolific; but his poems are vitiated by the prevailing Gongorism of his time. They were for the most part collected in the *Noches claras* (Madrid, 1624–1626), and the *Fuente de Aganipe*, of which four volumes were published at Madrid in 1644–1646. He also wrote, from information supplied by P. A. Semmedo, *Imperio de China i cultura evangelica en êl* (Madrid, 1642); and translated and completed the *Nobiliario* of the count of Barcellos.

There are English translations by J. Stevens of the *History of Portugal* (London, 1698), and of *Portuguese Asia* (London, 1695).

FARIBAULT, a city and the county-seat of Rice county, Minnesota, U.S.A., on the Cannon river, at the mouth of the Straight river, about 45 m. S. of St Paul. (Pop. 1890) 6520; (1900) 7868, of whom 1586 were foreign-born; (1905) 8279; (1910) 9001. Faribault is served by the Chicago Great Western, the Chicago, Milwaukee & St Paul, and the Chicago, Rock Island & Pacific railways. The city is attractively situated near a lake region widely known for its summer resorts. Faribault is the seat of the Minnesota institute for defectives, embracing the state school for the deaf (1863), the state school for the blind (1874), and the state school for the feeble-minded (1879); of three institutions under control of the Protestant Episcopal Church—the Seabury divinity school (incorporated 1860), the Shattuck school (1867; incorporated in 1905), a military school for boys, and St Mary's hall (1866), a school for girls, founded by Bishop Whipple; and of the Roman Catholic (Dominican) Bethlehem Academy for girls. In the city are the cathedral of our Merciful Saviour (1868–1869), the first Protestant Episcopal church in the United States built and used as a cathedral from its opening; and the hospital and nurses' training school of the Minnesota District of the Evangelical

Synod. The city has a public library, and owns and operates its own water-supply system. There is a good water power, and among the city's manufactures are flour, beer, shoes, furniture, rattan-ware, warehouse trucks, canned goods, cane syrup, waggons and carriages, gasolene engines, wind-mills, pianos and woollen goods. Faribault, named in honour of Jean Baptiste Faribault, a French fur-trader and pioneer who made his headquarters in the region in the latter part of the 18th century, was permanently settled about 1848, and was chartered as a city in 1872. A French millwright, N. La Croix, introduced here, about 1860, a new process of making flour, which revolutionized the industry in the United States, but his mill was soon destroyed by flood and he removed to Minneapolis, where the process was first successful on a large scale. Faribault was for many years the home of Bishop Henry Benjamin Whipple (1822–1901), the pioneer bishop (1859–1901) of the Protestant Episcopal Church in Minnesota, famous for his missionary work among the Indians.

FARIDKOT, a native state of India in the Punjab. It ranks as one of the Cis-Sutlej states, which came under British influence in 1809. Its area is 642 sq. m., and its population in 1901 was 124,912. It is bounded on the W. and N.E. by the British district of Ferozepore, and on the S. by Nabha state. During the Sikh wars in 1845 the chief, Raja Pahar Singh, exerted himself in the British cause, and was rewarded with an increase of territory. In the Mutiny of 1857, too, his son and successor, Wazir Singh, did good service by guarding the Sutlej ferries, and in attacking a notorious rebel, whose stronghold he destroyed. The estimated gross revenue is £28,300; there is no tribute. The territory is traversed by the Rewari-Ferozepore railway, and also crossed by the Fazilka line, which starts from Kotkapura, the old capital. It is irrigated by a branch of the Sirhind canal. The town of Faridkot has a railway station, 84 m. from Lahore.

FARIDPUR, or Furreedpore, a town and district of British India, in the Dacca division of eastern Bengal and Assam. The town, which has a railway station, stands on an old channel of the Ganges. Pop. (1901) 11,649. There are a Baptist mission and a government high school. The district comprises an area of 2281 sq. m. The general aspect is flat, tame and uninteresting, although in the northern tract the land is comparatively high, with a light sandy soil, covered with water during the rainy season, but dry during the cold and hot weather. From the town of Faridpur the ground slopes, until in the south, on the confines of Backergunje, it becomes one immense swamp, never entirely dry. During the height of the inundations the whole district may be said to be under water. The villages are built on artificially raised sites, or the high banks of the deltaic streams. Along many of the larger rivers the line of hamlets is unbroken for miles together, so that it is difficult to say where one ends and another begins. The huts, however, except in markets and bazaars, are seldom close together, but are scattered amidst small garden plots, and groves of mango, date and betel-nut trees. The plains between the villages are almost invariably more or less depressed towards the centre, where usually a marsh, or lake, or deep lagoon is found. These marshes, however, are gradually filling up by the silt deposited from the rivers; in the north of the district there now only remain two or three large swamps, and in them the process may be seen going on. The climate of Faridpur is damp, like that of the other districts of eastern Bengal; the average annual rainfall is 66 in. and the average mean temperature 76·9° F.

The principal rivers of Faridpur are the Ganges, the Arial Khan and the Haringhata. The Ganges, or Padma as it is locally called, touches the extreme north-west corner of the district, flows along its northern boundary as far as Goalanda, where it receives the waters of the Jamuna or main stream of the Brahmaputra, and whence the united stream turns southwards and forms the eastern boundary of the district. The river is navigable by large cargo boats throughout the year, and has an average breadth during the rainy season of 1600 yds. Rice is the great crop of the district. In 1901 the population was 1,937,646, showing an increase of 6% in the decade. The north of the district is crossed by the line of the Eastern Bengal railway to Goalanda, the port of the Brahmaputra steamers, and a branch runs to Faridpur town. But most of the trade is conducted by river.

FARĪD UD-DĪN ʿATTĀR, or Ferid Eddin-Athar (1119–1229), Persian poet and mystic, was born at Nishapur, 513 A.H. (1119 A.D.), and was put to death 627 A.H. (1229 A.D.), thus having reached the age of 110 years. The date of his death is, however, variously given between the years 1193 and 1235, although the majority of authorities support 1229; it is also probable that he was born later than 1119, but before 1150. His real name was Abu Ṭalib (or Abu Ḥamid) Mahommed ben Ibrahim, and Farīd ud-dīn was simply an honourable title equivalent to Pearl of Religion. He followed for a time his father's profession of druggist or perfumer, and hence the name ʿAttar (one who sold *ʿitr*, otto of roses; hence, simply, dealer in drugs), which he afterwards employed as his poetical designation. According to the account of Dawlatshah, his interest in the great mystery of the higher life of man was awakened in the following way. One day a wandering fakir gazed sadly into his shop, and, when ordered to be gone, replied: "It is nothing for me to go; but I grieve for thee, O druggist, for how wilt thou be able to think of death, and leave all these goods of thine behind thee?" The word was in season; and Mahommed ben Ibrahim the druggist soon gave up his shop and began to study the mystic theosophy of the Sufis under Sheik Rukneddin. So thoroughly did he enter into the spirit of that religion that he was before long recognized as one of its principal representatives. He travelled extensively, visited Mecca, Egypt, Damascus and India, and on his return was invested with the Sufi mantle by Sheik Majd-ud-din of Bagdad. The greater portion of his life was spent in the town of Shadyakh, but he is not unfrequently named Nishapuri, after the city of his boyhood and youth. The story of his death is a strange one. Captured by a soldier of Jenghiz Khan, he was about to be sold for a thousand dirhems, when he advised his captor to keep him, as doubtless a larger offer would yet be made; but when the second bidder said he would give a bag of horse fodder for the old man, he asserted that he was worth no more, and had better be sold. The soldier, irritated at the loss of the first offer, immediately slew him. A noble tomb was erected over his grave, and the spot acquired a reputation for sanctity. Farīd was a voluminous writer, and left no fewer than 120,000 couplets of poetry, though in his later years he carried his asceticism so far as to deny himself the pleasures of poetical composition. His most famous work is the *Mantiḳ uṭṭair*, or language of birds, an allegorical poem containing a complete survey of the life and doctrine of the Sufis. It is extremely popular among Mahommedans both of the Sunnite and Shiite sects, and the manuscript copies are consequently very numerous. The birds, according to the poet, were tired of a republican constitution, and longed for a king. As the lapwing, having guided Solomon through the desert, best knew what a king should be, he was asked whom they should choose. The Simorg in the Caucasus, was his reply. But the way to the Caucasus was long and dangerous, and most of the birds excused themselves from the enterprise. A few, however, set out; but by the time they reached the great king's court, their number was reduced to thirty. The thirty birds (*sī morg*), wing-weary and hunger-stricken, at length gained access to their chosen monarch the Simorg; but only to find that they strangely lost their identity in his presence—that they are he, and he is they. In such strange fashion does the poet image forth the search of the human soul after absorption into the divine.

The text of the *Mantiḳ uṭṭair* was published by Garcin de Tassy in 1857, a summary of its contents having already appeared as *La Poésie philosophique et religieuse chez les Persans* in 1856; this was succeeded by a complete translation in 1863. Among Farīd ud-dīn's other works may be mentioned his *Pandnāma* (Book of Counsel), of which a translation by Silvestre de Sacy appeared in 1819; *Bulbul Nama* (Book of the Nightingale); *Wasalet Nama* (Book of Conjunctions); *Khusru va Gul* (The King and the Rose); and *Tadhkiratu 'l Awliyā* (Memoirs of the Saints) (ed. R. A. Nicholson in

Persian Historical Texts). See Sir Gore Ouseley, *Biographical Notices of Persian Poets* (1846), p. 236; Von Hammer Purgstall, *Geschichte der schönen Redekünste Persiens* (Vienna, 1818), p. 140; the Oriental Collections, ii. (London, 1798), pp. 84, 124, containing translations of part of the *Pandnāma*; E. H. Palmer, *Oriental Mysticism* (1867); E. G. Browne, *Literary History of Persia* (1906).

FARINA, SALVATORE (1846–), Italian novelist, was born in Sardinia, and after studying law at Turin and Pavia devoted himself to a literary life at Milan. Farina has often been compared as a sentimental humorist with Dickens, and his style of writing has given him a special place in modern Italian fiction. His masterpiece is *Il Signor Io* (1880), a delightful portrait of an egoist; *Don Chisciottino*, *Amore bendato*, *Capelli biondi*, *Oro nascosto*, *Il Tesoro di Donnina*, *Amore a cent' occhi*, *Mio figlio*, *Il numero 13*, are some of his other volumes.

FARINATO, PAOLO (1522–1606), Italian painter and architect, was a native of Verona. He is sometimes named Farinato degli Uberti, as he came from the ancient Florentine stock to which the Ghibelline leader Farinata degli Uberti, celebrated in Dante's *Commedia*, belonged. He flourished at the same time that the art of Verona obtained its greatest lustre in the works of Paolo Cagliari (Paul Veronese), succeeded by other members of the Cagliari family, of whom most or all were outlived by Farinato. He was instructed by Niccolò Giolfino, and probably by Antonio Badile and Domenico del Riccio (Brusasorci). Proceeding to Venice, he formed his style partly on Titian and Giorgione, though he was never conspicuous as a colourist, and in form he learned more from the works of Giulio Romano. His nude figures show knowledge of the antique; he affected a bronzed tone in the complexions, harmonizing with the general gravity of his colour, which is more laudable in fresco than in oil-painting. Vasari praised his thronged compositions and merit of draughtsmanship. His works are to be found not only in Venice and principally in Verona, but also in Mantua, Padua and other towns belonging or adjacent to the Venetian territory. He was a prosperous and light-hearted man, and continually progressed in his art, passing from a comparatively dry manner into a larger and bolder one, with much attraction of drapery and of landscape. The "Miracle of the Loaves and Fishes," painted in the church of S. Giorgio in Verona, is accounted his masterpiece; it was executed at the advanced age of seventy-nine, and is of course replete with figures, comprising those of the painter's own family. A saloon was painted by him in S. Maria in Organo, in the same city, with the subjects of "Michael expelling Lucifer" and the "Massacre of the Innocents"; in Piacenza is a "St Sixtus"; in Berlin a "Presentation in the Temple"; and in the communal gallery of Verona one of his prime works, the "Marriage of St Catherine." Farinato executed some sculptures, and various etchings of sacred and mythologic subjects; his works of all kinds were much in request, including the wax models which he wrought as studies for his painted figures. He is said to have died at the same hour as his wife. His son Orazio was also a painter of merit.

FARINELLI (1705–1782), whose real name was CARLO BROSCHI, one of the most extraordinary singers that ever lived, was born on the 24th of January 1705, at Naples. He was the nephew of Cristiano Farinelli, the composer and violinist, whose name he took. Having been prepared for the career of a soprano, he soon acquired, under the instruction of N. A. Porpora, a voice of marvellous beauty, and became famous throughout southern Italy as *il ragazzo* (the boy). In 1722 he made his first appearance at Rome in his master's *Eumene*, creating the greatest enthusiasm by surpassing a popular German trumpet-player, for whom Porpora had written an obligato to one of the boy's songs, in holding and swelling a note of prodigious length, purity and power, and in the variations, roulades and trills which he introduced into the air. In 1724 he appeared at Vienna, and at Venice in the following year, returning to Naples shortly afterwards. He sang at Milan in 1726, and at Bologna in 1727, where he first met and acknowledged himself vanquished by the singer Antonio Bernacchi (b. 1700), to whose instruction he was much indebted. With ever-increasing success and fame Farinelli appeared in nearly all the great cities of Italy; and returned a third time to Vienna in 1731. He now modified his style, it is said on the advice of Charles VI., from mere *bravura* of the Porpora school to one of pathos and simplicity. He visited London in 1734, arriving in time to lend his powerful support to the faction which in opposition to Handel had set up a rival opera with Porpora as composer and Senesino as principal singer. But not even his aid could make the undertaking successful. His first appearance at the Lincoln's Inn Fields theatre was in *Artaserse*, much of the music of which was by his brother, Riccardo Broschi. His success was instantaneous, and the prince of Wales and the court loaded him with favours and presents. Having spent three years in England, Farinelli set out for Spain, staying a few months on the way in France, where he sang before Louis XV. In Spain, where he had only meant to stay a few months, he ended by passing nearly twenty-five years. His voice, employed by the queen to cure Philip V. of his melancholy madness, acquired for him an influence with that prince which gave him eventually the power, if not the name, of prime minister. This power he was wise and modest enough to use discreetly. For ten years, night after night, he had to sing to the king the same six songs, and never anything else. Under Ferdinand VI. he held a similar position, and was decorated (1750) with the cross of Calatrava. He utilized his ascendancy over this king by persuading him to establish an Italian opera. After the accession of Charles III. Farinelli retired with the fortune he had amassed to Bologna, and spent the remainder of his days there in melancholy splendour, dying on the 15th of July 1782. His voice was of large compass, possessing seven or eight notes more than those of ordinary singers, and was sonorous, equal and clear; he also possessed a great knowledge of music.

FARINGDON, properly GREAT FARINGDON, a market town in the Abingdon parliamentary division of Berkshire, England, 17 m. W.S.W. of Oxford by road. Pop. (1901) 2900. It lies on the slope of a low range of hills which borders the valley of the Thames on the south. It is the terminus of a branch of the Great Western railway from Uffington. The church of All Saints is a large cruciform building with low central tower. Its period is mainly Transitional Norman and Early English, and though considerably altered by restoration it contains some good details, with many monuments and brasses. Faringdon House, close to the church, was built by Henry James Pye (1745–1813), poet laureate from 1790 to 1813, who also caused to be planted the conspicuous group of fir-trees on the hill east of the town called Faringdon Clump, or locally (like other similar groups) the Folly. The trade of Faringdon is agricultural.

FARINI, LUIGI CARLO (1812–1866), Italian statesman and historian, was born at Russi, near Ravenna, on the 22nd of October 1812. After completing a brilliant university course at Bologna, which he interrupted to take part in the revolution of 1831 (see CARBONARI), he practised as a physician at Russi and at Ravenna. He acquired a considerable reputation, but in 1843 his political opinions brought him under the suspicion of the police and caused his expulsion from the papal states. He resided successively in Florence and Paris, and travelled about Europe as private physician to Prince Jerome Bonaparte, but when Pius IX. was elected to the Holy See and began his reign with apparently Liberal and nationalist tendencies, Farini returned to Italy and was appointed secretary-general to G. Recchi, the minister of the interior (March 1848). But he held office for little more than a month, since like all the other Italian Liberals he disapproved of the pope's change of front in refusing to allow his troops to fight against Austria, and resigned with the rest of the ministry on the 29th of April. Pius, wishing to counteract the effect of this policy, sent Farini to Charles Albert, king of Sardinia, to hand over the command of the papal contingent to him. Elected member of parliament for Faenza, he was again appointed secretary to the ministry of the interior in the Mamiani cabinet, and later director-general of the public health department. He resigned office on the proclamation of the republic after the flight of the pope to Gaeta in 1849, resumed it for a while when Pius returned to Rome with the protection of French arms, but when a reactionary and priestly policy was instituted, he went into exile and took up his residence at Turin. There he became convinced that it was only through the House of Savoy that Italy could be liberated, and he expounded his views in Cavour's paper *Il Risorgimento*, in *La Frusta* and *Il Piemonte*, of which latter he was at one time editor. He also wrote his chief historical work, *Lo Stato Romano dal 1815 al 1850*, in four volumes (Turin, 1850). In 1851 he was appointed minister of public instruction in the D'Azeglio cabinet, an office which he held till May 1852. As a member of the Sardinian parliament and as a journalist Farini was one of the staunchest supporters of Cavour (*q.v.*), and strongly favoured the proposal that Piedmont should participate in the Cimean War, if indeed he was not actually the first to suggest that policy (see G. B. Ercolani's letter in E. Parri's memoir of Farini). In 1856 and 1857 he published two letters to Mr Gladstone on Italian affairs, which created a sensation, while he continued to propagate his views in the Italian press. When on the outbreak of the war of 1859 Francis V., duke of Modena, was expelled and a provisional government set up, Farini was sent as Piedmontese commissioner to that city; but although recalled after the peace of Villafranca he was determined on the annexation of central Italy to Piedmont and remained behind, becoming a Modenese citizen and dictator of the state. He negotiated an alliance with Parma, Romagna and Tuscany, when other provisional governments had been established, and entrusted the task of organizing an army for this central Italian league to General Fanti (*q.v.*). Annexation to Piedmont having been voted by *plébiscite* and the opposition of Napoleon III. having been overcome, Farini returned to Turin, when the king conferred on him the order of the Annunziata and Cavour appointed him minister of the interior (June 1860), and subsequently viceroy of Naples; but he soon resigned on the score of ill-health. Cavour died in 1861, and the following year Farini succeeded Rattazzi as premier, in which office he endeavoured to carry out Cavour's policy. Over-exertion, however, brought on softening of the brain, which compelled him to resign office on the 24th of March 1863, and ultimately resulted in his death on the 1st of August 1866. He was buried at Turin, but in 1878 his remains were removed to his native village of Russi.

His son Domenico Farini had a distinguished political career and was at one time president of the chamber.

BIBLIOGRAPHY.—Several letters from Farini to Mr Gladstone and Lord John Russell were reprinted in a *Mémoire sur les affaires d'Italie* (1859), and a collection of his political correspondence was published under the title of *Lettres sur les affaires d'Italie* (Paris, 1860). His historical work was translated into English in part by Mr Gladstone and in part under his superintendence. See E. Parri, *Luigi Carlo Farini* (Rome, 1878); L. Carpi in *Il Risorgimento Italiano*, vol. iv. (Milan, 1888); and G. Finali's article, "Il 27 Aprile 1859," in the *Nuova Antologia* for the 16th of May 1903. (L. V.*)

FARM, in the most generally used sense, a portion of land leased or held for the purpose of agriculture; hence "farming" is equivalent to the pursuit of agriculture, and "farmer" to an agriculturist. This meaning is comparatively modern. The origin of the word has perhaps been complicated by an Anglo-Saxon *feorm*, meaning provisions or food supply, and more particularly a payment of provisions for the sustenance of the king, the *cyninges feorm*. In Domesday this appears as a food rent: *firma unius noctis* or *diei*. According to the *New English Dictionary* there is no satisfactory Teutonic origin for the word. It has, however, been sometimes connected with a word which appears in the older forms of some Teutonic languages, meaning "life." The present form "farm" certainly comes, through the French *ferme*, from the medieval Lat. *firma* (*firmus*, fixed), a fixed or certain payment in money or kind. The Anglo-Saxon *feorm* may be not an original Teutonic word but an early adaptation of the Latin. The *feorm*, originally a tax, seems, as the king "booked" his land, to have become a rent (see F. W. Maitland, *Domesday Book and After*, 1897, p. 236 ff., and J. H. Round, *Feudal England*, 1895, p. 109 ff.). The word *firma* is thus used of the composition paid by the sheriff in respect of the dues to be collected from the shire. From the use of the word for the fixed sum paid as rent for a portion of land leased for cultivation, "farm" was applied to the land itself, whether held on lease or otherwise, and always with the meaning of agricultural land. The aspect of the fixity of the sum paid leads to a secondary meaning, that of a certain sum paid by a taxable person, community, state, &c., in respect of the taxes or dues that will be imposed, or to such a sum paid as a rent by a contractor for the right of collecting such taxes. This method of indirect collection of the revenue by contractors instead of directly by the officials of the state is that known as "farming the taxes." The system is best known through the *publicani* of Rome, who formed companies or syndicates to farm not only the indirect taxation of the state, but also other sources of the state revenues, such as mines, fisheries, &c. (see PUBLICANI).

In monarchical Europe, which grew out of the ruins of the Roman empire, the revenue was almost universally farmed, but the system was gradually narrowed down until only indirect taxes became the subject of farming. France from the 16th to the 18th centuries is the most interesting modern example. Owing to the hopeless condition of its revenues, the French government was continually in a state of anticipating its resources, and was thus entirely in the hands of financiers. In 1681 the indirect taxes were farmed collectively to a single company of forty capitalists (*ferme générale*), increased to sixty in 1755, and reduced to the original number in 1780. These farmers-general were appointed by the king for six years, and paid an annual fixed sum every year in advance. The taxes which they collected were the customs (*douanes* or *traites*), the *gabelle* or salt tax, local taxes or octrois (*entrées, &c.*), and various smaller taxes. They were under the management of a controller-general, who had a central office in Paris. The office of farmer-general was the object of keen competition, notwithstanding that the successful candidates had to share a considerable part of the profits of the post with ministers, courtiers, favourites, and even the sovereign, in the shape of gifts (*croupes*) and pensions. The rapacity of the farmers-general was proverbial, and the loss to the revenue by the system was great, while very considerable hardships were inflicted on the poorer contributors by the unscrupulous methods of collection practised by the underlings of the farmers. In addition, the unpopular nature of the taxes caused deep discontent, and the detestation in which the farmers-general were held culminated in the execution of thirty-two of them during the French Revolution and the sweeping away of the system.

See also AGRICULTURE, DAIRY AND DAIRY-FARMING, FRUIT AND FLOWER FARMING, &c.

FARM BUILDINGS. The best laying out of a farm, and the construction of its buildings, are matters which, from the variety of needs and circumstances, involve practical considerations and expert knowledge, too detailed in their nature for more than a brief reference in this work. It may be said generally that the best aspect for farm buildings is S. or S.S.E., and with a view to easy disposal of drainage they should be built on a slight slope. The supply of water, whether it be provided from wells by engine or windmill power, by hydraulic rams or other means, is a prime consideration, and it should if possible be laid on at different suitable points or at any rate the central source of supply should be in the most accessible and convenient place as regards stables and cow-sheds. The buildings should be constructed on or within easy distance of the public road, in order to save the upkeep of private roads, and should be as near as possible to the centre of the farm. On mixed farms of ordinary size (200 to 500 acres) the building may be advantageously planned in one rectangular block, the stock-yards being placed in the centre separated by the cow-sheds, and surrounded by the cart-sheds, stables, stores and barn, cattle-boxes, piggeries and minor buildings. On farms of larger size and on dairy farms special needs must be taken into account, while in all cases the local methods of farming must influence the grouping and arrangement of the steading.

For a more detailed treatment of the subject reference may be made to the following works:—S. Taylor, *Modern Homesteads*.

a Treatise on the Designing of Farm Buildings (London, 1905); A. D. Clarke, *Modern Farm Buildings* (London, 1899); P. Roberts, *The Farmstead*, in the "Rural Science Series" (New York, 1900), and articles in the *Standard Cyclopaedia of Agriculture*, vol. 3, and in the *Cyclopaedia of American Agriculture*, vol. 1.

FARMER, RICHARD (1735–1797), Shakespearian commentator, the son of a rich maltster, was born at Leicester on the 28th of August 1735. He was educated at the free grammar school of his native town, and at Emmanuel College, Cambridge. He graduated in 1757 a senior optime; three years later he proceeded M.A. and became classical tutor, and in 1775 master of his college, in succession to William Richardson, the biographer of the English bishops. In the latter year also he was appointed vice-chancellor, and three years afterwards chief librarian of the university. In 1780 he was appointed to a prebendal stall in Lichfield, and two years later to one at Canterbury; but the second office he exchanged in 1788 for that of a canon residentiary of St Paul's. Cambridge, where he usually resided, was indebted to him for improvements in lighting, paving and watching; but perhaps London and the nation have less reason to be grateful for his zealous advocacy of the custom of erecting monuments to departed worthies in St Paul's. In 1765 he issued a prospectus for a history of the town of Leicester; but this work, based on materials collected by Thomas Staveley, he never even began; it was carried out by the learned printer John Nichols. In 1766 he published his famous *Essay on the Learning of Shakespeare*, in which he proved that the poet's acquaintance with ancient and modern Continental literature was exclusively derived from translations, of which he copied even the blunders. "Shakespeare," he said, "wanted not the stilts of language to raise him above all other men." "He came out of nature's hand, like Pallas out of Jove's head, at full growth and mature." "One might," he said—by way of ridiculing the Shakespearian criticism of the day—"with equal wisdom, study the Talmud for an exposition of *Tristram Shandy*." The essay fully justifies the author's description of himself in the preface to the second edition: "I may consider myself as the pioneer of the commentators; I have removed a deal of learned rubbish, and pointed out to them Shakespeare's track in the very pleasant paths of nature." Farmer died at Cambridge on the 8th of September 1797. He was, it appears, twice offered a bishopric by Pitt, but declined the preferment. Farmer was immensely popular in his own college, and loved, it was said, above all other things, old port, old clothes and old books.

FARMERS' MOVEMENT, in American political history, the general name for a movement between 1867 and 1896 remarkable for a radical socio-economic propaganda that came from what was considered the most conservative class of American society. In this movement there were three periods, popularly known as Granger, Alliance and Populist.

The GRANGE, or Order of the Patrons of Husbandry (the latter the official name of the national organization, while the former was the name of local chapters, including a supervisory National Grange at Washington), was a secret order founded in 1867 to advance the social needs and combat the economic backwardness of farm life. It grew remarkably in 1873–1874, and in the latter year attained a membership of perhaps 800,000. In the causes of its growth—much broader than those that issued in the financial crisis of 1873—a high tariff, railway freight-rates and other grievances were mingled with agricultural troubles like the fall of wheat prices and the increase of mortgages. The condition of the farmer seemed desperate. The original objects of the Grange were primarily educational, but these were soon overborne by an anti-middleman, co-operative movement. Grange agents bought everything from farm machinery to women's dresses; hundreds of grain elevators and cotton and tobacco warehouses were bought, and even steamboat lines; mutual insurance companies were formed and joint-stock stores. Nor was co-operation limited to distributive processes; crop-reports were circulated, co-operative dairies multiplied, flour-mills were operated, and patents were purchased, that the Grange might manufacture farm machinery. The outcome in some states was ruin, and the name Grange became a reproach. Nevertheless these efforts in co-operation were exceedingly important both for the results obtained and for their wider significance. Nor could politics be excluded, though officially tatooed; for economics must be considered by social idealists, and economics everywhere ran into politics. Thus it was with the railway question. Railways had been extended into frontier states; there were heavy crops in sparsely settled regions where freight-rates were high, so that—given the existing distributive system—there were "over production" and waste; there was notorious stock manipulation and discrimination in rates; and the farmers regarded "absentee ownership" of railways by New York capitalists much as absentee ownership of land has been regarded in Ireland. The Grange officially disclaimed enmity to railways; but though the organization did not attack them, the Grangers—through political "farmers' clubs" and the like—did. About 1867 began the efforts to establish regulation of the railways, as common-carriers, by the states. Such laws were known as "Granger laws," and their general principles, soon endorsed (1876) by the Supreme Court of the United States, have become an important chapter in the laws of the land. In a declaration of principles in 1874 Grangers were declared to be "not enemies of railroads," and their cause to stand for "no communism, no agrarianism." To conservatives, however, co-operation seemed communism, and "Grange laws" agrarianism; and thus in 1873–1874 the growth of the movement aroused extraordinary interest and much uneasiness. In 1874 the order was reorganized, membership being limited to persons directly interested in the farmers' cause (there had been a millionaire manufacturers' Grange on Broadway), and after this there were constant quarrels in the order; moreover, in 1875 the National Grange largely lost control of the state Granges, which discredited the organization by their disastrous co-operation ventures. Thus by 1876 it had already ceased to be of national political importance. About 1880 a renascence began, particularly in the Middle States and New England; this revival was marked by a recurrence to the original social and educational objects. The national Grange and state Granges (in all, or nearly all, of the states) were still active in 1909, especially in the old cultural movement and in such economic movements—notably the improvement of highways—as most directly concern the farmers. The initiative and referendum, and other proposals of reform politics in the direction of a democratic advance, also enter in a measure into their propaganda.

The ALLIANCE carried the movement farther into economics. The "National Farmers' Alliance and Industrial Union," formed in 1889, embraced several originally independent organizations formed from 1873 onwards; it was largely confined to the South and was secret. The "National Farmers' Alliance," formed in 1880, went back similarly to 1877, was much smaller, Northern and non-secret. The "Colored Farmers' National Alliance and Co-operative Union" (formed 1888, merged in the above "Southern" Alliance in 1890) was the second greatest organization. With these three were associated many others, state and national, including an annual, non-partisan, deliberative and advisory Farmers' National Congress. The Alliance movement reached its greatest power about 1890, in which year twelve national farmers' organizations were represented in conventions in St Louis, and the six leading ones alone probably had a membership of 5,000,000.[1]

As with the Grange, so in the ends and declarations of the whole later movement, concrete remedial legislation for agricultural or economic ills was mingled with principles of vague radical tendency and with lofty idealism.[2] Among the principles advocated about 1890, practically all the great organizations demanded the abolition of national banks, the free coinage of silver, a "sufficient" issue of government paper money, tariff revision, and a secret ballot (the last was soon realized); only less commonly demanded were an income tax, taxation of evidence of debt, and government loans on lands. All of these were principles of the two great Alliances (the Northern and the Southern), as were also pure food legislation, abolition of landholding by aliens, reclamation of unused or unearned land grants (to railways, *e.g.*), and either rigid federal regulation of railways and other means of communication or government ownership thereof. The "Southern" Alliance put in the forefront a "sub-treasury" scheme according to which cheap loans should be made by government from local sub-treasuries on non-perishable farm products (such as grain and cotton) stored in government warehouses; while the "Northern" Alliance demanded restriction of the liquor traffic and (for a short time) woman suffrage. Still other issues were a modification of the patent laws (*e.g.* to prevent the purchase of patents to stifle competition), postal currency exchange, the eight-hour day, inequitable taxation, the single-tax on land, "trusts," educational qualification for suffrage, direct popular election of federal judges, of senators, and of the president, special-interest lobbying, &c.

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[1] Membership usually included males or females above 16 years of age.

[2] Thus, the "Southern" Alliance in 1890 (the chief platforms were the one at Ocala, Florida, and that of 1889 at St Louis, in conjunction with the Knights of Labor) declared its principles to be: "(1) To labour for the education of the agricultural classes in the science of economical government in a strictly non-partisan way, and to bring about a more perfect union of such classes. (2) To

In 1889–1890 the political (non-partisan) movement developed astonishing strength; it captured the Republican stronghold of Kansas, brought the Democratic Party to vassalage in South Carolina, revolutionized legislatures even in conservative states like Massachusetts, and seemed likely completely to dominate the South and West. All its work in the South was accomplished within the old-party organizations, but in 1890 the demand became strong for an independent third party, for which various consolidations since 1887 had prepared the way, and by 1892 a large part of the strength of the farmers' organizations, with that of various industrial and radical orders, was united in the People's Party (perhaps more generally known as the POPULIST Party), which had its beginnings in Kansas in 1890, and received national organization in 1892. This party emphasized free silver, the income tax, eight-hour day, reclamation of land grants, government ownership of railways, telephones and telegraphs, popular election of federal senators, and the initiative and referendum. In the presidential election of 1892 it cast 1,041,021 votes (in a total of 12,036,089), and elected 22 presidential electors, the first chosen by any third party since 1856. In 1896 the People's Party "fused" with the Democratic Party (*q.v.*) in the presidential campaign, and again in 1900; during this period, indeed, the greatest part of the People's Party was reabsorbed into the two great parties from which its membership had originally been drawn;—in some northern states apparently largely into the Republican ranks, but mainly into the Democratic Party, to which it gave a powerful radical impulse.

The Farmers' movement was much misunderstood, abused and ridiculed. It accomplished a vast amount of good. The movement—and especially the Grange, for on most important points the later movements only followed where it had led—contributed the initial impulse and prepared the way for the establishment of travelling and local rural libraries, reading courses, lyceums, farmers' institutes (a steadily increasing influence) and rural free mail delivery (inaugurated experimentally in 1896 and adopted as part of the permanent postal system of the country in 1902); for agricultural exhibits and an improved agricultural press; for encouragement to and increased profit from the work of agricultural colleges, the establishment (1885) and great services of the United States Department of Agriculture,—in short, for an extraordinary lessening of rural isolation and betterment of the farmers' opportunities; for the irrigation of the semi-arid West, adopted as a national policy in 1902, the pure-food laws of 1906, the interstate-commerce law of 1887, the railway-rate laws of 1903 and 1906, even the great Bureau of Commerce-and-Labor law of 1903, and the Anti-trust laws of 1903 and later. The Alliance and Populist movements were bottomed on the idea of "ethical gains through legislation." In its local manifestations the whole movement was often marked by eccentric ideas, narrow prejudices and weaknesses in economic reasoning. It is not to be forgotten that owing to the movement of the frontier the United States has always been "at once a developed country and a primitive one. The same political questions have been put to a society advanced in some regions and undeveloped in others. . . . On specific political questions each economic area has reflected its peculiar interests" (Prof. F. J. Turner). That this idea must not, however, be over-emphasized, is admirably enforced by observing the great mass of farmer radicalism that has, since about 1896, become an accepted Democratic and Republican principle over the whole country. The Farmers' movement was the beginning of widespread, effective protest against "the menace of privilege" in the United States.

American periodicals, especially in 1890–1892, are particularly informing on the growth of the movement; see F. M. Drew in *Political Science Quarterly* (1891), vi. p. 282; C. W. Pierson in *Popular Science Monthly* (1888), xxxii. pp. 199, 368; C. S. Walker and F. J. Foster in *Annals of American Academy* (1894), iv. p. 790; Senator W. A. Peffer in *Cosmopolitan* (1890), x. p. 694; and on agricultural discontent, *Political Science Quarterly*, iv. (1889), p. 433, by W. F. Mappin; v. (1890), p. 65, by J. P. Dunn; xi. (1896), pp. 433, 601, xii. (1897), p. 93, and xiv. (1899), p. 444, by C. F. Emerick; Prof. E. W. Bemis in *Journal of Political Economy* (1893), i. p. 193; A. H. Peters in *Quarterly Journal of Economics* (1890), iv. p. 18; C. W. Davis in *Forum* (1890), ix. pp. 231, 291, 348.

FARNABY (or FARNABIE), **THOMAS** (*c.* 1575–1647), English grammarian, was the son of a London carpenter; his grandfather, it is said, had been mayor of Truro, his great-grandfather an Italian musician. Between 1590 and 1595 he appears successively as a student of Merton College, Oxford, a pupil in a Jesuit college in Spain, and a follower of Drake and Hawkins. After some military service in the Low Countries "he made shift," says Wood, "to be set on shore in the western part of England; where, after some wandering to and fro under the name of Tho. Bainrafe, the anagram of his sirname, he settled at Martock, in Somersetshire, and taught the grammar school there for some time with success. After he had gotten some feathers at Martock, he took his flight to London," and opened a school in Goldsmiths' Rents, Cripplegate. From this school, which had as many as 300 pupils, there issued, says Wood, "more churchmen and statesmen than from any school taught by one man in England." In the course of his London career "he was made master of arts of Cambridge, and soon after incorporated at Oxon." Such was his success that he was enabled to buy an estate at Otford near Sevenoaks, Kent, to which he retired from London in 1636, still, however, carrying on his profession of schoolmaster. In course of time he added to his Otford estate and bought another near Horsham in Sussex. In politics he was a royalist; and, suspected of participation in the rising near Tunbridge, 1643, he was imprisoned in Ely House, Holborn. He died at Sevenoaks on the 12th of June 1647.

The details of his life were derived by Anthony à Wood from Francis, Farnaby's son by a second marriage (see Wood's *Athenae Oxonienses*, ed. Bliss, iii. 213). His works chiefly consisted of annotated editions of Latin authors—Juvenal, Persius, Seneca, Martial, Lucan, Virgil, Ovid and Terence, which enjoyed extraordinary popularity. His *Systema grammaticum* was published in London in 1641. On the 6th of April 1632, Farnaby was presented with a royal patent granting him, for the space of twenty-one years, the sole right of printing and publishing certain of his works.

FARNBOROUGH, THOMAS ERSKINE MAY, BARON (1815–1886), English Constitutional historian, was born in London on the 8th of February 1815 and educated at Bedford grammar school. In 1831 he was nominated by Manners Sutton, speaker of the House of Commons, to the post of assistant librarian, so that his long connexion with parliament began in his youth.

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demand equal rights to all, and special privileges to none. (3) To endorse the motto: 'In things essential, unity; in all things, charity.' (4) To develop a better state, mentally, morally, socially and financially. . . . (6) To suppress personal, local, sectional and national prejudices." For the Southern farmer a chief concrete evil was the pre-crop mortgages by which cotton farmers remained in debt to country merchants; in the North the farmer attacked a wide range of "capitalistic" legislation that hurt him, he believed, for the benefit of other classes—notably legislation sought by railways.

He studied for the bar, and was called at the Middle Temple in 1838. In 1844 he published the first edition of his *Treatise on the Law, Privilege, Proceedings and Usage of Parliament.* This work, which has passed through many editions, is not only an invaluable mine of information for the historical student, but it is known as the text-book of the law by which parliament governs its proceedings. In 1846 Erskine May was appointed examiner of petitions for private bills, and the following year taxing-master of the House of Commons. He published his *Remarks to Facilitate Public Business in Parliament* in 1849; a work *On the Consolidation of Election Laws* in 1850; and his *Rules, Orders and Forms of the House of Commons* was printed by command of the House in 1854. In 1856 he was appointed clerk assistant at the table of the House of Commons. He received the companionship of the Bath in 1860 for his parliamentary services, and became a knight commander in 1866. His important work, *The Constitutional History of England since the Accession of George III.* (1760–1860), was published in 1861–1863, and it received frequent additions in subsequent editions. In 1871 Sir Erskine May was appointed clerk of the House of Commons. His *Democracy in Europe: a History* appeared in 1877, but it failed to take the same rank in critical esteem as his *Constitutional History*. He retired from the post of clerk to the House of Commons in April 1886, having for fifteen years discharged the onerous duties of the office with as much knowledge and energy as unfailing tact and courtesy. Shortly after his retirement from office he was raised to the peerage under the title of Baron Farnborough of Farnborough, in the county of Southampton, but he only survived to enjoy the dignity for a few days. He died in London on the 17th of May 1886, and as he left no issue the title became extinct.

FARNBOROUGH, an urban district in the Basingstoke parliamentary division of Hampshire, England, 33 m. S.W. by W. from London, on the London & South Western and the South Eastern & Chatham railways. Pop. (1901) 11,500 (including 5070 military). The church of St Peter ranges from Early English to Perpendicular in style. St Michael's Catholic memorial church, erected in 1887 by the ex-empress Eugénie, contains the remains of Napoleon III. and the prince imperial. An adjoining abbey is occupied by Benedictine fathers of the French congregation; the convent is a ladies' boarding-school. Aldershot North Camp is within the parish.

FARNE ISLANDS [also FEARNE, FERN, or THE STAPLES], a group of rocky islands and reefs off the coast of Northumberland, England, included in that county. In 1901 they had only eleven inhabitants. They extend in a line of some 6 m. in a north-easterly direction from the coast, on which the nearest villages are Bamborough and North Sunderland. The Fairway, 1½ m. across, separates the largest island, Farne, or House, from the mainland. Farne is 16 acres in area, and has precipitous cliffs up to 80 ft. in height on the east, but the shore is otherwise low. The other principal islets are Staple, Brownsman, North and South Wamses, Longstone and Big Harcar. On Farne is a small ancient chapel, with a square tower near it built for purposes of defence in the 15th century. The chapel is believed to occupy the site of St Cuthbert's hermitage, whither he retired from the priory on the neighbouring Holy Island or Lindisfarne. He was with difficulty persuaded to leave it on his elevation to the bishopric of Lindisfarne, and returned to it to die (687). Longstone rock, with its lighthouse, is famous as the scene of the bravery of Grace Darling in rescuing some of the survivors of the wreck of the "Forfarshire" (1838). The rocks abound in sea-birds, including eider duck.

FARNESE, the name of one of the most illustrious and powerful Italian families, which besides including eminent prelates, statesmen and warriors among its members, ruled the duchy of Parma for two centuries. The early history of the family is involved in obscurity, but they are first heard of as lords of Farneto or Farnese, a castle near the lake of Bolsena, and they played an important part as consuls and signori of Orvieto. They seem to have always been Guelphs, and in the civil broils of Orvieto they sided with the Monaldeschi faction against the Ghibelline Filippeschi. One Pietro Farnese commanded the papal armies under Paschal II. (1099–1118); another Pietro led the Florentines to victory against the Pisans in 1363. Ranuccio Farnese served Eugene IV. so well that the pope endowed him with large fiefs, and is reported to have said, "The Church is ours because Farnese has given it back to us."

The family derived further advantages at the time of Pope Alexander VI., who was the lover of the beautiful Giulia Farnese, known as Giulia Bella, and created her brother Alessandro a cardinal (1493). The latter was elected pope as Paul III. in 1534, and it is from that moment that the great importance of the family dates. An unblushing nepotist, he alienated immense fiefs belonging to the Holy See in favour of his natural children. Of these the most famous was Pierluigi Farnese (1503–1547), who served in the papal army in various compaigns, but also took part in the sack of Rome in 1527. On his father's elevation to the papacy he was made captain-general of the Church, and received the duchy of Castro in the Maremma, besides Frascati, Nepi, Montalto and other fiefs. A shameless rake and a man of uncontrollable temper, his massacre of the people of Perugia after a rebellion in 1540 and the unspeakable outrage he committed on the bishop of Fano are typical of his character. In 1545 his father conferred on him the duchy of Parma and Piacenza, which likewise belonged to the Holy See, and his rule proved cruel and tyrannical. He deprived the nobles of their privileges, and forced them to dwell in the towns, but to some extent he improved the conditions of the lower classes. Pierluigi being an uncompromising opponent of the emperor Charles V., Don Ferrante Gonzaga, the imperial governor of Milan, was ever on the watch for a pretext to deprive him of Piacenza, which the emperor greatly coveted. When the duke proceeded to build a castle in that town in order to overawe its inhabitants, the nobles were furiously indignant, and a plot to murder him was organized by the marquis Anguissola and others with the support both of Gonzaga and of Andrea Doria (*q.v.*), Charles's admiral, who wished to be revenged on Pierluigi for the part he had played in the Fiesco conspiracy (see FIESCO). The deed was done while the duke was superintending the building of the above-mentioned citadel, and his corpse was flung into the street (December 10th, 1547). Piacenza was thereupon occupied by the imperialists.

Pierluigi had several children, for all of whom Paul made generous provision. One of them, Alessandro (1520–1589), was created cardinal at the age of fourteen; he was a man of learning and artistic tastes, and lived with great splendour surrounded by scholars and artists, among whom were Annibal Caro, Paolo Giovio, Mons. Della Casa, Bembo, Vasari, &c. It was he who completed the magnificent Farnese palace in Rome. He displayed diplomatic ability on various missions to foreign courts, but failed to get elected to the papacy.

Orazio, Pierluigi's third son, was made duke of Castro when his father became duke of Parma, and married Diane, a natural daughter of Henry II. of France. Ottavio, the second son (1521–1586), married Margaret, the natural daughter of Charles V. and widow of Alessandro de' Medici, at the age of fifteen, she being a year older; at first she disliked her youthful bridegroom, but when he returned wounded from the expedition to Algiers in 1541 her aversion was turned to affection (see MARGARET OF AUSTRIA). Ottavio had been made lord of Camerino in 1540, but he gave up that fief when his father became duke of Parma. When, on the murder of the latter in 1547, Piacenza was occupied by the imperialists, Paul determined to make an effort to regain the city; he set aside Ottavio's claims to the succession of Parma, where he appointed a papal legate, giving him back Camerino in exchange, and then claimed Piacenza of the emperor, not for the Farnesi, but for the Church. But Ottavio would not be put off; he attempted to seize Parma by force, and having failed, entered into negotiations with Gonzaga. This unnatural rebellion on the part of one grandson, combined with the fact that it was supported by the other grandson, Cardinal Alessandro, hastened the pope's death, which occurred on the 10th of November 1549. During the interregnum that followed Ottavio again tried to induce the governor of Parma to give up the city to him, but met with no better success; however, on the election of Giovan Maria Ciocchi (Julius III.) the duchy was conferred on him (1551). This did not end his quarrel with the emperor, for Gonzaga refused to give up Piacenza and even threatened to occupy Parma, so that Ottavio was driven into the arms of France. Julius, who was anxious to be on good terms with Charles on account of the council of Trent which was then sitting, ordered Farnese to hand Parma over to the papal authorities once more, and on his refusal hurled censures and admonitions at his head, and deprived him of his Roman fiefs, while Charles did the same with regard to those in Lombardy. A French army came to protect Parma, war broke out, and Gonzaga at once laid siege to the city. But the duke came to an arrangement with his father-in-law, by which he regained Piacenza and his other fiefs. The rest of his life was spent quietly at home, where the moderation and wisdom of his rule won for him the affection of his people. At his death in 1586 he was succeeded by his son Alessandro Farnese (1545–1592), the famous general of Philip II. of Spain, who spent the whole of his reign in the Flemish wars.

The first years of the reign of his son and successor Ranuccio I. (1569–1622), who had shown much spirit in a controversy with Pope Sixtus V., were uneventful, but in 1611 a conspiracy was formed against him by a group of discontented nobles supported by the dukes of Modena and Mantua. The plot was discovered and the conspirators were barbarously punished, many being tortured and put to death, and their estates confiscated. Ranuccio was a reserved and gloomy bigot; he instituted savage persecutions against supposed witches and heretics, and lived in perpetual terror of plots. His eldest son Alessandro being deaf and dumb, the succession devolved on his second son Odoardo (1612–1646), who fought on the French side in the war against Spain. His failure to pay the interest of the money borrowed in Rome, and the desire of Urban VIII. to obtain Castro for his relatives the Barberini (*q.v.*), resulted in a war between that pope and Odoardo. His son and successor Ranuccio II. (1630–1694) also had a war with the Holy See about Castro, which was eventually razed to the ground. His son Francesco Maria (1678–1727) suffered from the wars between Spain and Austria, the latter's troops devastating his territory; but although this obliged him to levy some burdensome taxes, he was a good ruler and practised economy in his administration. Having no children, the succession devolved at his death on his brother Antonio (1679–1731), who was also childless. The powers had agreed that at the death of the latter the duchy should pass to Don Carlos of Bourbon, son of King Philip V. of Spain by Elisabetta Farnese (1692–1766), granddaughter of Ranuccio II. Antonio died in 1731, and with him the line of Farnese came to an end.

The Palazzo Farnese in Rome, one of the finest specimens of Roman Renaissance architecture, was begun under Paul III., while he was cardinal, by Antonio da San Gallo, and completed by his nephew Cardinal Alessandro under the direction of Michelangelo (1526). It was inherited by Don Carlos, afterwards king of Naples and Spain, and most of the pictures were removed to Naples. It now contains the French embassy to the Italian court, as well as the French school of Rome.

Bibliography.—F. Odorici gives a detailed history of the family in P. Litta's *Famiglie celebri italiane*, vol. x. (Milan, 1868), to which an elaborate bibliography is appended, including manuscript sources; a more recent bibliography is S. Lottici and G. Sitti, *Bibliografia generale per la storia parmense* (Parma, 1904); much information will be found in A. von Reumont's *Geschichte der Stadt Rom*, vol. iii. (Berlin, 1868), and in F. Gregorovius's *Geschichte der Stadt Rom* (Stuttgart, 1872). (L. V.*)

FARNESE, ALEXANDER (1545–1592), duke of Parma, general, statesman and diplomatist, governor-general of the Netherlands under Philip II. of Spain, was born at Rome on the 27th of August 1545, and died at the abbey of St Waast, near Arras, on the 3rd of December 1592. He was the son of Ottavio Farnese, duke of Parma, and Margaret of Austria, natural daughter of Charles V. He accompanied his mother to Brussels when she was appointed governor of the Netherlands, and in 1565 his marriage with the princess Maria of Portugal was celebrated in Brussels with great splendour. Alexander Farnese had been brought up in Spain with his cousin, the ill-fated Don Carlos, and his uncle Don John of Austria, both of whom were about the same age as himself, and after his marriage he took up his residence at once at the court of Madrid. He fought with much personal distinction under the command of Don John in 1571 at the battle of Lepanto. It was seven years, however, before he had again an opportunity for the display of his great military talents. In the meantime the provinces of the Netherlands had revolted against the arbitrary and oppressive Spanish rule, and Don John of Austria, who had been sent as governor-general to restore order, had found himself helpless in face of the superior talent and personal influence of the prince of Orange, who had succeeded in uniting all the provinces in common resistance to the civil and religious tyranny of Philip. In the autumn of 1577 Farnese was sent to join Don John at the head of reinforcements, and it was mainly his prompt decision at a critical moment that won the battle of Gemblours (1578). Shortly afterwards Don John, whose health had broken down through disappointment and ill-health, died, and Farnese was appointed to take his place.

It is scarcely possible to exaggerate the difficulties with which he found himself confronted, but he proved himself more than equal to the task. In military ability the prince of Parma was inferior to none of his contemporaries, as a skilful diplomatist he was the match even of his great antagonist William the Silent, and, like most of the leading statesmen of his day, was unscrupulous as to the means he employed so long as he achieved his ends. Perceiving that there were divisions and jealousies in the ranks of his opponents between Catholic and Protestant, Fleming and Walloon, he set to work by persuasion, address and bribery, to foment the growing discord, and bring back the Walloon provinces to the allegiance of the king. He was successful, and by the treaty of Arras, January 1579, he was able to secure the support of the "Malcontents," as the Catholic nobles of the south were styled, to the royal cause. The reply to the treaty of Arras was the Union of Utrecht, concluded a few weeks later between the seven northern provinces, who abjured the sovereignty of King Philip and bound themselves to use all their resources to maintain their independence of Spanish rule.

Farnese, as soon as he had obtained a secure basis of operations in Hainaut and Artois, set himself in earnest to the task of reconquering Brabant and Flanders by force of arms. Town after town fell into his power. Tournai, Maastricht, Breda, Bruges and Ghent opened their gates, and finally he laid siege to the great seaport of Antwerp. The town was open to the sea, was strongly fortified, and was defended with resolute determination and courage by the citizens. They were led by the famous Philip de Marnix, lord of St Aldegonde, and had the assistance of an ingenious Italian engineer, by name Gianibelli. The siege began in 1584 and called forth all the resources of Farnese's military genius. He cut off all access to Antwerp from the sea by constructing a bridge of boats across the Scheldt from Calloo to Oordam, in spite of the desperate efforts of the besieged to prevent its completion. At last, on the 15th of August 1585, Antwerp was compelled by famine to capitulate. Favourable conditions were granted, but all Protestants were required to leave the town within two years. With the fall of Antwerp, for Malines and Brussels were already in the hands of Farnese, the whole of the southern Netherlands was brought once more to recognize the authority of Philip. But Holland and Zeeland, whose geographical position made them unassailable except by water, were by the courage and skill of their hardy seafaring population, with the help of English auxiliaries sent by Queen Elizabeth, able to defy his further advance.

In 1586 Alexander Farnese became duke of Parma by the death of his father. He applied for leave to visit his paternal territory, but Philip would not permit him. He could not replace him in the Netherlands; but while retaining him in his command at the head of a formidable army, the king would not give his sanction to his great general's desire to use it for the reconquest of the Northern Provinces. Never was there a better opportunity than the end of 1586 for an invading army to march through the country almost without opposition. The misgovernment and lack of high statesmanship of the earl of Leicester had caused faction to be rampant in the United Provinces; and on his return to England he left the country without organized forces or experienced generals to oppose an advance of a veteran army under the greatest commander of his time. But Philip's whole thoughts and energies were already directed to the preparation of an Invincible Armada for the conquest of England, and Parma was ordered to collect an enormous flotilla of transports and to keep his army concentrated and trained for the projected invasion of the island realm of Queen Elizabeth. Thus the critical period passed by unused, and when the tempests had finally dispersed the defeated remnants of the Great Armada the Dutch had found a general, in the youthful Maurice of Nassau, worthy to be the rival in military genius even of Alexander of Parma. Moreover, the accession to the throne of France of Henry of Navarre had altogether altered the situation of affairs, and relieved the pressure upon the Dutch by creating a diversion, and placing Parma and his army between hostile forces. The ruinous expenditure upon the Great Armada had also depleted the Spanish treasury and Philip found himself virtually bankrupt. In 1590 the condition of the Spanish troops had become intolerable. Farnese could get no regular supplies of money from the king for the payment of the soldiery, and he had to pledge his own jewels to meet the demand. A mutiny broke out, but was suppressed. In the midst of these difficulties Parma received orders to abandon the task on which he had spent himself for so many years, and to raise the siege of Paris, which was blockaded by Henry IV. He left the Netherlands on the 3rd of August 1590 at the head of 15,000 troops. By brilliant generalship he outwitted Henry and succeeded in relieving Paris; but owing to lack of money and supplies he was compelled immediately to retreat to the Netherlands, abandoning on the march many stragglers and wounded, who were killed by the peasantry, and leaving all the positions he had taken to be recaptured by Henry.

Again in 1591, in the very midst of a campaign against Maurice of Nassau, sorely against his will, the duke of Parma was obliged to give up the engrossing struggle and march to relieve Rouen. He was again successful in his object, but was wounded in the arm before Caudebec, and was finally compelled to withdraw his army with considerable losses through the privations the troops had to undergo. He himself was shattered in health by so many years of continuous campaigning and exposure, and by the cares and disappointments which had befallen him. He died at Arras on the 3rd of December 1592, in the forty-seventh year of his age. The feeling that his immense services had not won for him either the gratitude or confidence of his sovereign hastened his end. He was honoured by a splendid funeral at Brussels, but his body was interred at his own capital city of Parma. He left two sons, Ranuce, who succeeded him, and Edward, who was created a cardinal in 1591 by Pope Gregory XIV. His daughter Margaret married Vincent, duke of Mantua.

See L. P. Gachard, *Correspondance d'Alexandre Farnese, Prince de Parme, gouverneur général des Pays-Bas, avec Philippe II, 1578–1579* (Brussels, 1850); Fra Pietro, *Alessandro Farnese, duca di Parma* (Rome, 1836).

FARNESE, ELIZABETH (1692–1766), queen of Spain, born on the 25th of October 1692, was the only daughter of Odoardo II., prince of Parma. Her mother educated her in strict seclusion, but seclusion altogether failed to tame her imperious and ambitious temper. At the age of twenty-one (1714) she was married by proxy at Parma to Philip V. of Spain. The marriage was arranged by Cardinal Alberoni (*q.v.*), with the concurrence of the Princess des Ursins, the *Camerara Mayor*. On arriving at the borders of Spain, Elizabeth was met by the Princess des Ursins, but received her sternly, and, perhaps in accordance with a plan previously concerted with the king, at once ordered her to be removed from her presence and from Spain. Over the weak king Elizabeth quickly obtained complete influence. This influence was exerted altogether in support of the policy of Alberoni, one chief aim of which was to recover the ancient Italian possessions of Spain, and which actually resulted in the seizure of Sardinia and Sicily. So vigorously did she enter into this policy that, when the French forces advanced to the Pyrenees, she placed herself at the head of one division of the Spanish army. But Elizabeth's ambition was grievously disappointed. The Triple Alliance thwarted her plans, and at length in 1720 the allies made the banishment of Alberoni a condition of peace. Sicily also had to be evacuated. And finally, all her entreaties failed to prevent the abdication of Philip, who in 1724 gave up the throne to his heir, and retired to the palace of La Granja. Seven months later, however, the death of the young king recalled him to the throne. During his later years, when he was nearly imbecile, she directed the whole policy of Spain so as to secure thrones in Italy for her sons. In 1736 she had the satisfaction of seeing her favourite scheme realized in the accession of her son Don Carlos (afterwards Charles III. of Spain) to the throne of the Two Sicilies and his recognition by the powers in the treaty of Vienna. Her second son, Philip, became duke of Parma. Elizabeth survived her husband twenty years, dying in 1766.

See *Mémoires pour servir à l'histoire d'Espagne sous le règne de Philippe V*, by the Marquis de St Philippe, translated by Maudave (Paris, 1756); *Memoirs of Elizabeth Farnese* (London, 1746); and E. Armstrong, *Elizabeth Farnese, the Termagant of Spain* (1892).

FARNHAM, a market town in the Guildford parliamentary division of Surrey, England, 37½ m. S.W. by W. from London by the London & South Western railway. Pop. of urban district (1901) 6124. It lies on the left bank of the river Wey, on the southern slope of a hill rising about 700 ft. above the sea-level. The church of St Andrew is a spacious transitional Norman and Early English building, with later additions, and was formerly a chapel of ease to Waverley Abbey, of which a crypt and fragmentary remains, of Early English date, stand in the park attached to a modern residence of the same name. This was the earliest Cistercian house in England, founded in 1128 by William Gifford, bishop of Winchester. The *Annales Waverlienses*, published by Gale in his *Scriptores* and afterwards in the Record series of *Chronicles*, are believed to have suggested to Sir Walter Scott the name of his first novel. Farnham Castle, on a hill north of the town, the seat of the bishops of Winchester, was first built by Henry de Blois, bishop of Winchester, and brother of King Stephen; but it was razed by Henry III. It was rebuilt and garrisoned for Charles I. by Denham, from whom it was taken in 1642 by Sir W. Waller; and having been dismantled, it was restored by George Morley, bishop of Winchester (1662–1684). Farnham has a town hall and exchange in Italian style (1866), a grammar school of early foundation, and a school of science and art. It was formerly noted for its cloth manufacture. Hops of fine quality are grown in the vicinity. William Cobbett was born in the parish (1766), and is buried in the churchyard of St Andrew's. The neighbouring mansion of Moor Park was the residence of Sir William Temple (d. 1699), and Swift worked here as his secretary. Hester Johnson, Swift's "Stella," was the daughter of Temple's steward, whose cottage still stands. The town has grown in favour as a residential centre from the proximity of Aldershot Camp (3 m. N.E.).

Though there is evidence of an early settlement in the neighbourhood, the town of Farnham (Ferneham) seems to have grown up round the castle of the bishops of Winchester, who possessed the manor at the Domesday Survey. Its position at the junction of the Pilgrim's Way and the road from Southampton to London was important. In 1205 Farnham had bailiffs, and in 1207 it was definitely a mesne borough under the bishops of Winchester. In 1247 the bishop granted the first charter, giving, among other privileges, a fair on All Saints' Day. The burgesses surrendered the proceeds of the borough court and other rights in 1365 in return for respite of the fee farm rent; these were recovered in 1405 and rent again paid. Bishop Waynflete is said to have confirmed the original charter in 1452, and in 1566 Bishop Horne granted a new charter by which the burgesses elected 2 bailiffs and 12 burgesses annually and did service at their own courts every three weeks, the court leet being held twice a year. In resisting an attack made by the bishop in 1660 on their right of toll, the burgesses could only claim Farnham as a borough by prescription as their charters had been mislaid, but the charters were subsequently found, and after some litigation their rights were established. In the 18th century the corporation, a close body, declined, its duties being performed by the vestry, and in 1789 the one survivor resigned and handed over the town papers to the bishop. Farnham sent representatives to parliament in 1311 and 1460, on both occasions being practically the bishop's pocket borough. In accordance with the grant of 1247 a fair was held on All Saints' day and also on Holy Thursday; the former was afterwards held on All Souls' Day. Farnham was early a market of importance, and in 1216 a royal grant changed the market day from Sunday to Thursday in each week. It was famous in the early 17th century for wheat and oats; hop-growing began in 1597.

FARNWORTH, an urban district in the Radcliffe-cum-Farnworth parliamentary division of Lancashire, England, on the Irwell, 3 m. S.E. of Bolton by the Lancashire & Yorkshire railway. Pop. (1901) 25,925. Cotton mills, iron foundries, brick and tile works, and collieries employ the large industrial population.

FARO, the capital of a district bearing the same name, in southern Portugal; at the terminus of the Lisbon-Faro railway, and on the Atlantic Ocean. Pop. (1900) 11,789. Faro is an episcopal see, with a Renaissance cathedral of great size, an ecclesiastical seminary, and a ruined castle surrounded by Moorish fortifications. Its broad but shallow harbour is protected on the south by the long island of Cães, and a number of sandy islets, which, being constantly enlarged by silt from the small river Fermoso, render the entrance of large vessels impossible. Fishing is an important industry, and fish, with wine, fruit, cork, baskets and sumach, are the principal articles of export. Little has been done to develop the mineral resources of the district, which include tin, lead, antimony and auriferous quartz. Faro was taken from the Moors by Alphonso III. of Portugal (1248–1279). It was sacked by the English in 1596, and nearly destroyed by an earthquake in 1755.

The administrative district of Faro coincides with the ancient kingdom and province of Algarve (*q.v.*); pop. (1900) 255,191; area, 1937 sq. m.

FARO (from *Pharaoh*, a picture of the Egyptian king appearing on a card of the old French pack), a game of cards, played with a full pack. Originally the pack was held in the dealer's left hand, but nowadays very elaborate and expensive implements are used. The dealer places the pack, after shuffling and cutting, in a dealing-box face upwards, and the cards are taken from the top of the box in couples through a slit in the side. The exposed card on top is called *soda*, and the last card left in the box is *in hoc*. The implements include counters of various colours and values, a dealing-box, a case or frame manipulated by a "case-keeper," upon which the cards already played are arranged in sight, a shuffling-board, and score-sheets for the players. Upon the table is the "lay-out," a complete suit of spades enamelled on green cloth, upon or near which to place the stakes. The dealer takes two cards from the box, placing the first one near it and the second close beside it. Each deal of two cards is called a *turn*, and there are twenty-five such, *soda* and *hoc* not counting. The players stake upon any card they please, or in such manner as to take in several cards, reducing the amount, but increasing the chances, of winning, as at roulette. The dealer, having waved the hand, after which no more bets may be made, deals the turn, and then proceeds to gather in the stakes won by him, and to pay those he has lost. The chances as between dealer and punters, or players, are equal, except that the banker wins half the money staked on the cards of a turn should they chance to be alike. Faro is played considerably in parts of the United States, whither it is said to have been taken from France, where it had a great vogue during the reign of Louis XIV. Owing to the dishonest methods of many gambling "clubs" the game is in disrepute.

FARQUHAR, GEORGE (1677–1707), British dramatist, son of William Farquhar, a clergyman, was born in Londonderry, Ireland, in 1677. When he was seventeen he was entered as a sizar at Trinity College, Dublin, under the patronage of Dr Wiseman, bishop of Dromore. He did not long continue his studies, being, according to one account, expelled for a profane joke. Thomas Wilkes, however, states that the abrupt termination of his studies was due to the death of his patron. He became an actor on the Dublin stage, but in a fencing scene in Dryden's *Indian Emperor* he forgot to exchange his sword for a foil, with results which narrowly escaped being fatal to a fellow-actor. After this accident he never appeared on the boards. He had met Robert Wilks, the famous comedian, in Dublin. Though he did not, as generally stated, go to London with Wilks, it was at his suggestion that he wrote his first play, *Love and a Bottle*, which was performed at Drury Lane, perhaps through Wilks's interest, in 1698. He received from the earl of Orrery a lieutenancy in his regiment, then in Ireland, but in two letters of his dated from Holland in 1700 he says nothing of military service. His second comedy, *The Constant Couple: or a Trip to the Jubilee* (1699), ridiculing the preparations for the pilgrimage to Rome in the Jubilee year, met with an enthusiastic reception. Wilks as Sir Harry Wildair contributed substantially to its success. In 1701 Farquhar wrote a sequel, *Sir Harry Wildair*. Leigh Hunt says that Mrs Oldfield, like Wilks, played admirably well in it, but the original Lady Lurewell was Mrs Verbruggen. Mrs Oldfield is said to have been the "Penelope" of Farquhar's letters. In 1702 Farquhar published a slight volume of miscellanies—*Love and Business; in a Collection of Occasionary Verse and Epistolary Prose*—containing, among other things, "A Discourse on Comedy in reference to the English Stage," in which he defends the English neglect of the dramatic unities. "The rules of English comedy," he says, "don't lie in the compass of Aristotle or his followers, but in the pit, box and galleries." In 1702 he borrowed from Fletcher's *Wild Goose Chase, The Inconstant, or the Way to win Him*, in which he followed his original fairly closely except in the last act. In 1703 he married, in the expectation of a fortune, but found too late that he was deceived. It is said that he never reproached his wife, although the marriage increased his liabilities and the rest of his life was a constant struggle against poverty. His other plays are: *The Stage Coach* (1704), a one-act farce adapted from the French of Jean de la Chapelle in conjunction with Peter Motteux; *The Twin Rivals* (Drury Lane, 1702); *The Recruiting Officer* (Drury Lane, 1706); and *The Beaux' Stratagem* (Haymarket, 1707). *The Recruiting Officer* was suggested to him by a recruiting expedition (1705) in Shropshire, and is dedicated to his "friends round the Wrekin." *The Beaux' Stratagem* is the best of all his plays, and long kept the stage. Genest notes nineteen revivals up to 1828. Two embarrassed gentlemen travel in the country disguised as master and servant in the hope of mending their fortune. The play gives vivid pictures of the Lichfield inn with its rascally landlord, and of the domestic affairs of the Sullens. Archer, the supposed valet, whose adventurous spirit secures full play, was one of Garrick's best parts.

Meanwhile one of his patrons, said to have been the duke of Ormond, had advised Farquhar to sell out of his regiment, and had promised to give him a captaincy in his own. Farquhar sold his commission, but the duke's promise remained unfulfilled. Before he had finished the second act of *The Beaux' Stratagem* he knew that he was stricken with a mortal illness, but it was necessary to persevere and to be "consumedly lively to the end." He had received in advance £30 for the copyright from Lintot the bookseller. The play was staged on the 8th of March, and Farquhar lived to have his third night, and there was an extra benefit on the 29th of April, the day of his death. He left his two children to the care of his friend Wilks. Wilks obtained a benefit at the theatre for the dramatist's widow, but he seems to have done little for the daughters. They were apprenticed to a mantua-maker, and one of them was, as late as 1764, in receipt of a pension of £20 solicited for her by Edmund Chaloner, a patron of Farquhar. She was then described as a maidservant and possessed of sentiments "fitted to her humble situation."

The plots of Farquhar's comedies are ingenious in conception and skilfully conducted. He has no pretensions to the brilliance of Congreve, but his amusing dialogue arises naturally out of the situation, and its wit is never strained. Sergeant Kite in the *Recruiting Officer*, Scrub, Archer and Boniface in *The Beaux' Stratagem* are distinct, original characters which had a great success on the boards, and the unexpected incidents and adventures in which they are mixed up are represented in an irresistibly comic manner by a man who thoroughly understood the resources of the stage. The spontaneity and verve with which his adventurous heroes are drawn have suggested that in his favourite type he was describing himself. His own disposition seems to have been most lovable, and he was apparently a much gayer person than the reader might be led to suppose from the "Portrait of Himself" quoted by Leigh Hunt. The code of morals followed by these characters is open to criticism, but they are human and genial in their roguery, and compare far from unfavourably with the cynical creations of contemporary drama. The advance which he made on his immediate predecessors in dramatic construction and in general moral tone is more striking when it is remembered that he died before he was thirty.

Farquhar's dramatic works were published in 1728, 1742 and 1772, and by Thomas Wilkes with a biography in 1775. They were included in the *Dramatic Works of Wycherley, Congreve, Vanbrugh and Farquhar* (1849), with biographical and critical notices, by Leigh Hunt. See also *The Dramatic Works of George Farquhar, with Life and Notes*, by A. C. Ewald (2 vols., 1892); *The Best Plays of George Farquhar* (Mermaid series, 1906), with biographical and critical introductions, by William Archer; *The Beaux' Stratagem*, edited (1898) by H. Macaulay Fitzgibbon for "The Temple Dramatists"; and D. Schmid, "George Farquhar, sein Leben und seine Original-Dramen" (1904) in *Wiener Beiträge zur engl. Philol.*

FARR, WILLIAM (1807–1883), English statistician, was born at Kenley, in Shropshire, on the 30th of November 1807. When nineteen he became the pupil of a doctor in Shrewsbury, also acting as dresser in the infirmary there. He then went to Paris to study medicine, but after two years returned to London, where, in 1832, he qualified as L.S.A. Next year he began to practise, but without very brilliant results, for five years later he definitely abandoned the exercise of his profession on accepting the post of compiler of abstracts in the registrar-general's office. The commissioners for the 1841 census consulted him on several points, but did not in every case follow his advice. For the next two decennial censuses he acted as assistant-commissioner; for that of 1871 he was a commissioner, and he wrote the greater part of the reports of all. He had an ambition to become registrar-general; and when that post became vacant in 1879, he was so disappointed at the selection of Sir Brydges Henniker instead of himself, that he refused to stay any longer in the registrar's office. He died of paralysis of the brain a year or two later, on the 14th of April 1883. A great part of Farr's literary production is to be found in the papers which, from 1839 to 1880, he wrote for each annual report of the registrar-general on the cause of the year's deaths in England. He was also the author of many papers on general statistics and on life-tables for insurance, some read before the Royal Statistical Society, of which he was president in 1871 and 1872, some contributed to the *Lancet* and other periodicals. A selection from his statistical writings was published in 1885 under the editorship of Mr Noël Humphreys.

FARRAGUT, DAVID GLASGOW (1801–1870), first admiral of the United States navy, was the son of Major George Farragut, a Catalan by descent, a Minorquin by birth, who had emigrated to America in 1776, and, after the peace, had married a lady of Scottish family and settled near Knoxville, in Tennessee; there Farragut was born on the 5th of July 1801. At the early age of nine he entered the navy, under the protection of his name-father, Captain David Porter, with whom he served in the "Essex" during her cruise in the Altantic in 1812, and afterwards in the Pacific, until her capture by the "Phoebe," in Valparaiso Bay, on the 28th of March 1814. He afterwards served on board the "Washington" (74) carrying the broad pennant of Commodore Chauncey in the Mediterranean, and pursued his professional and other studies under the instruction of the chaplain, Charles Folsom, with whom he contracted a lifelong friendship. Folsom was appointed from the "Washington" as U.S. consul at Tunis, and obtained leave for his pupil to pay him a lengthened visit, during which he studied not only mathematics, but also French and Italian, and acquired a familiar knowledge of Arabic and Turkish. He is said to have had a great natural aptitude for languages and in after years to have spoken several fluently.

After more than four years in the Mediterranean, Farragut returned to the States in November 1820. He then passed his examination, and in 1822 was appointed for service in what was called the "mosquito" fleet, against the pirates, who then infested the Caribbean Sea. The service was one of great exposure and privation; for two years and a half, Farragut wrote, he never owned a bed, but lay down to rest wherever he found the most comfortable berth. By the end of that time the joint action of the British and American navies had driven the pirates off the sea, and when they took to marauding on shore the Spanish governors did the rest. In 1825 he was promoted to the rank of lieutenant, whilst serving in the navy yard at Norfolk, where, with some breaks in sea-going ships, he continued till 1832; he then served for a commission on the coast of Brazil, and was again appointed to the yard at Norfolk.

It is needless to trace the ordinary routine of his service step by step. The officers of the U.S. navy have one great advantage which British officers are without; when on shore they are not necessarily parted from the service, but are employed in their several ranks in the different dockyards, escaping thus not only the private grievance and pecuniary difficulties of a very narrow half-pay, but also, what from a public point of view is much more important, the loss of professional aptitude, and of that skill which comes from unceasing practice. On the 8th of September 1841 Farragut was promoted to the rank of commander, and on the 14th of September 1855 to that of captain. At this time he was in charge of the navy yard, Mare Island, California, from which post he was recalled in 1858, and appointed to the "Brooklyn" frigate, the command of which he held for the next two years. When the war of secession broke out in 1861, he was "waiting orders" at Norfolk. By birth and marriage he was a Southerner, and the citizens of Norfolk counted on his throwing in his lot with them; but professional pride, and affection for the flag under which he had served for more than fifty years, held him true to his allegiance; he passionately rejected the proposals of his fellow-townsmen, and as it was more than hinted to him that his longer stay in Norfolk might be dangerous, he hastily quitted that place, and offered his services to the government at Washington. These were at once accepted; he was requested to sit on the Naval Retiring Board—a board then specially constituted for clearing the navy of unfit or disloyal officers—and a few months later was appointed to the command of the "Western Gulf Blockading Squadron," with the rank of flag-officer, and ordered to proceed forthwith, in the "Hartford," to the Gulf of Mexico, to collect such vessels as could be spared from the blockade, to proceed up the Mississippi, to reduce the defences which guarded the approaches to New Orleans, and to take and hold the city. All this Farragut executed to the letter, with a skill and caution that won for him the love of his followers, and with a dash and boldness that gained him the admiration of the public and the popular name of "Old Salamander." The passage of the Mississippi was forced on the 24th of April 1862, and New Orleans surrendered on the 26th; this was immediately followed by the operations against Vicksburg, from which, however, Farragut was compelled to withdraw, having relearnt the old lesson that against heavy earthworks, crowning hills of sufficient height, a purely naval attack is unavailing; it was not till the following summer, and after a long siege, that Vicksburg surrendered to a land force under General Grant. During this time the service on the Mississippi continued both difficult and irksome; nor until the river was cleared could

Farragut seriously plan operations against Mobile, a port to which the fall of New Orleans had given increased importance. Even then he was long delayed by the want of monitors with which to oppose the ironclad vessels of the enemy. It was the end of July 1864 before he was joined by these monitors; and on the 5th of August, undismayed by the loss of his leading ship, the monitor "Tecumseh," sunk by a torpedo, he forced the passage into the bay, destroyed or captured the enemy's ships, including the ram "Tennessee" bearing Admiral Buchanan's flag, and took possession of the forts. The town was not occupied till the following April, but with the loss of its harbour it ceased to have any political or strategical importance.

With this Farragut's active service came to an end; for though in September 1864 he was offered the command of the force intended for the reduction of Wilmington, the state of his health, after the labours and anxieties of the past three years, in a trying climate, compelled him to decline it and to ask to be recalled. He accordingly returned to New York in December, and was received with the wildest display of popular enthusiasm. It was then that the Government instituted the rank of vice-admiral, previously unknown in the American service. Farragut was promoted to it, and in July 1866 was further promoted to the rank of admiral. In 1867, with his flag flying in the "Franklin," he visited Europe. The appointment was an honourable distinction without political or naval import: the "Franklin" was, to all intents, for the time being, a yacht at Farragut's disposal; and her arrival in the different ports was the signal for international courtesies, entertainments and social gaiety. She returned to America in 1868, and Farragut retired into private life. Two years later, on the 14th of August 1870, he died at Portsmouth, New Hampshire.

Farragut was twice married, and left, by his second wife, a son, Loyall Farragut, who, in 1878, published a *Life* of his father "embodying his Journal and Letters." Another *Life* (1892), by Captain A. T. Mahan, though shorter, has a greater value from the professional point of view, by reason of the critical appreciation of Farragut's services. (J. K. L.)

FARRANT, RICHARD, composer of English church music, flourished during the 16th century. Very little is known about him. Fétis gives 1530 as the date of his birth, but on what authority does not appear. He became a gentleman of the Chapel Royal in the reign of Edward VI., but resigned his post in 1564 on being appointed master of the children of St George's chapel, Windsor. In this capacity he presented a play before the queen at Shrovetide 1568, and again at Christmas of the same year, receiving on each occasion the sum of £6: 13: 4d. In November 1569 he was reinstated as gentleman of the Chapel Royal. It is stated by Hawkins (*History of Music*, vol. iii. 279) that Farrant was also one of the clerks and organists of St George's chapel, Windsor, and that he retained these posts till his death. Many of his compositions are printed in the collections of Barnard and Boyce. Among the most admired of them are a service in G minor, and the anthems "Call to remembrance" and "Hide not thou thy face." It is doubtful whether Farrant is entitled to the credit of the authorship of the beautiful anthem "Lord, for thy tender mercies' sake." No copy of the music under his name appeared in print till 1800, although it had been earlier attributed to him. Some writers have named John Hilton, and others Thomas Tallis, as the composer. From entries in the *Old Check Book of the Chapel Royal* (edited for the Camden Society by Dr Rimbault) it appears that Farrant died, not in 1585, as Hawkins states, but on the 30th of November 1580 or 1581.

FARRAR, FREDERIC WILLIAM (1831–1903), English divine, was born on the 7th of August 1831, in the Fort of Bombay, where his father, afterwards vicar of Sidcup, Kent, was then a missionary. His early education was received in King William's College, Castletown, Isle of Man, a school whose external surroundings are reproduced in his popular schoolboy tale, *Eric; or, Little by Little*. In 1847 he entered King's College, London. Through the influence of F.D. Maurice he was led to the study of Coleridge, whose writings had a profound influence upon his faith and opinions. He proceeded to Trinity College, Cambridge, in October 1851, and in the following year took the degree of B.A. at the university of London. In 1854 he took his degree as fourth junior optime, and fourth in the first class of the classical tripos. In addition to other college prizes he gained the chancellor's medal for the English prize poem on the search for Sir John Franklin in 1852, the Le Bas prize and the Norrisian prize. He was elected fellow of Trinity College in 1856.

On leaving the university Farrar became an assistant-master under G. E. L. Cotton at Marlborough College. In November 1855 he was appointed an assistant-master at Harrow, where he remained for fifteen years. He was elected a fellow of the Royal Society in 1864, university preacher in 1868, honorary chaplain to the queen in 1869 and Hulsean lecturer in 1870. In 1871 he was appointed headmaster of Marlborough College, and in the following year he became chaplain-in-ordinary to the queen. In 1876 he was appointed canon of Westminster and rector of St Margaret's, Westminster. He took his D.D. degree in 1874, the first under the new regulations at Cambridge. Farrar began his literary labours with the publication of his schoolboy story *Eric* in 1858, succeeded in the following year by *Julian Home* and *Lyrics of Life*, and in 1862 by *St Winifred's; or the World of School*. He had already published a work on *The Origin of Language*, and followed it up by a series of works on grammar and scholastic philology, including *Chapters on Language* (1865); *Greek Grammar Rules* (1865); *Greek Syntax* (1866); and *Families of Speech* (1869). He edited *Essays on a Liberal Education* in 1868; and published *Seekers after God* in the Sunday Library (1869). It was by his theological works, however, that Farrar attained his greatest popularity. His Hulsean lectures were published in 1870 under the title of *The Witness of History to Christ*. *The Life of Christ*, which was published in 1874, speedily passed through a great number of editions, and is still in much demand. It reveals considerable powers of imagination and eloquence, and was partly inspired by a personal knowledge of the sacred localities depicted. In 1877 appeared *In the Days of My Youth*, sermons preached in the chapel of Marlborough College; and during the same year his volume of sermons on *Eternal Hope*—in which he called in question the dogma of everlasting punishment—caused much controversy in religious circles and did much to mollify the harsh theology of an earlier age. There is little doubt that his boldness and liberality of thought barred his elevation to the episcopate. In 1879 appeared *The Life and Works of St Paul*, and this was succeeded in 1882 by *The Early Days of Christianity*. Then came in order of publication the following works: *Everyday Christian Life; or, Sermons by the Way* (1887); *Lives of the Fathers* (1888); *Sketches of Church History* (1889); *Darkness and Dawn*, a story of the Neronic persecution (1891); *The Voice from Sinai* (1892); *The Life of Christ as Represented in Art* (1894); a work on Daniel (1895); *Gathering Clouds*, a tale of the days of Chrysostom (1896); and *The Bible, its Meaning and Supremacy* (1896). Farrar was a copious contributor of articles to various magazines, encyclopaedias and theological commentaries. In 1883 he was made archdeacon of Westminster and rural dean; in 1885 he was appointed Bampton lecturer at Oxford, and took for his subject "The History of Interpretation." He was appointed dean of Canterbury in 1895. From 1890 to 1895 he was chaplain to the speaker of the House of Commons, and in 1894 he was appointed deputy-clerk of the closet to Queen Victoria. He died at Canterbury on the 22nd of March 1903.

As a theologian Farrar occupied a position midway between the Evangelical party and the Broad Church; while as a somewhat rhetorical preacher and writer he exerted a commanding influence over wide circles of readers. He was an ardent temperance and social reformer, and was one of the founders of the institution known as the Anglican Brotherhood, a religious band with modern aims and objects.

See his *Life*, by his son R. Farrar (1904).

FARREN, ELIZABETH (*c.* 1759–1829), English actress, was the daughter of George Farren, an actor. Her first London appearance was in 1777 as Miss Hardcastle in *She Stoops to Conquer*. Subsequent successes established her reputation and she became the natural successor to Mrs Abington when the latter left Drury Lane in 1782. The parts of Hermione, Olivia, Portia and Juliet were in her repertory, but her Lady Betty Modish, Lady Townly, Lady Fanciful, Lady Teazle and similar parts were her favourites. In 1797 she married Edward, 12th earl of Derby (1752–1834).

FARREN, WILLIAM (1786–1861), English actor, was born on the 13th of May 1786, the son of an actor (b. 1725) of the same name, who played leading rôles from 1784 to 1795 at Covent Garden. His first appearance on the stage was at Plymouth at the Theatre Royal, then under the management of his brother, in *Love à la mode*. His first London appearance was in 1818 at Covent Garden as Sir Peter Teazle, a part with which his name is always associated. He played at Covent Garden every winter until 1828, and began in 1824 a series of summer engagements at the Haymarket which also lasted some years. At these two theatres he played an immense variety of comedy characters. From 1828 until 1837 he was at Drury Lane, where he essayed a wider range, including Polonius and Caesar. He was again at Covent Garden for a few years, and next joined Benjamin Webster at the Haymarket, as stage-manager as well as actor. In 1843 at the close of his performance of the title-part in Mark Lemon's *Old Parr*, he was stricken with paralysis on the stage. He was, however, able to reappear the following year, and he remained at the Haymarket ten years more, though his acting never again reached its former level. For a time he managed the Strand, and, 1850–1853, was lessee of the Olympic. During his later years he confined himself to old men parts, in which he was unrivalled. In 1855 he made his final appearance at the Haymarket, as Lord Ogleby in a scene from the *Clandestine Marriage*. He died in London on the 24th of September 1861. In 1825 he had married the actress Mrs Faucit, mother of Miss Helena Saville Faucit (Lady Martin), and he left two sons, Henry (1826–1860) and William (1825–1908), both actors. The former was the father of Ellen [Nellie] Farren (1848–1904), long famous for boy's parts in Gaiety musical burlesques, in the days of Edward Terry and Fred Leslie. As Jack Sheppard, and in similar rôles, she had a unique position at the Gaiety, and was an unrivalled public favourite. From 1892 her health failed, and her retirement, coupled with Fred Leslie's death, brought to an end the type of Gaiety burlesque associated with them.

FARRER, THOMAS HENRY FARRER, 1st Baron (1819–1899), English civil servant and statistician, was the son of Thomas Farrer, a solicitor in Lincoln's Inn Fields. Born in London on the 24th of June 1819, he was educated at Eton and Balliol College, Oxford, where he graduated in 1840. He was called to the bar at Lincoln's Inn in 1844, but retired from practice in the course of a few years. He entered the public service in 1850 as secretary to the naval (renamed in 1853 the marine) department of the Board of Trade. In 1865 he was promoted to be one of the joint secretaries of the Board of Trade, and in 1867 became permanent secretary. His tenure of this office, which he held for upwards of twenty years, was marked by many reforms and an energetic administration. Not only was he an advanced Liberal in politics, but an uncompromising Free-trader of the strictest school. He was created a baronet for his services at the Board of Trade in 1883, and in 1886 he retired from office. During the same year he published a work entitled *Free Trade versus Fair Trade*, in which he dealt with an economic controversy then greatly agitating the public mind. He had already, in 1883, written a volume on *The State in its Relation to Trade*. In 1889 he was co-opted by the Progressives an alderman of the London County Council, of which he became vice-chairman in 1890. His efficiency and ability in this capacity were warmly recognized; but in the course of time divergencies arose between his personal views and those of many of his colleagues. The tendency towards socialistic legislation which became apparent was quite at variance with his principles of individual enterprise and responsibility. He consequently resigned his position. In 1893 he was raised to the peerage. From this time forward he devoted much of his energy and leisure to advocating his views at the Cobden Club, the Political Economy Club, on the platform, and in the public press. Especially were his efforts directed against the opinions of the Fair Trade League, and upon this and other controversies on economic questions he wrote able, clear, and uncompromising letters, which left no doubt that he still adhered to the doctrines of free trade as advocated by its earliest exponents. In 1898 he published his *Studies in Currency*. He died at Abinger Hall, Dorking, on the 11th of October 1899. He was succeeded in the title by his eldest son Thomas Cecil (b. 1859).

FARRIER, and **FARRIERY** (from Lat. *ferrarius*, a blacksmith, *ferrum*, iron). Farrier is the name given generally either to the professional shoer of horses or in a more extended sense to a practitioner of the veterinary art; and farriery is the term for his business. Primarily the art of farriery is identical with that of the blacksmith, in so far as he makes and fixes shoes on horses (see Horse-Shoes); he is liable in law for negligence, as one who holds himself out as skilled; and he has a lien on the animal for his expenses. William the Conqueror is supposed to have introduced horse-shoeing into England, and the art had an important place through the middle ages, the days of chivalry, and the later developments of equitation. In modern times it has been closely allied with the general progress in veterinary science, and in the knowledge of the anatomy and physiology of the horse's foot and hoof.

See Fisher, *The Farrier* (1893); Lungwitz, *Text-Book of Horse-shoeing* (Eng. trans., 1898).

FARS (the name *Farsistan* is not used), one of the five *mamlikats* (great provinces) of Persia, extending along the northern shore of the Persian Gulf and bounded on the west by Arabistan, on the north by Isfahan and on the east by Kerman. It lies between 49° 30′ and 56° 10′ E. and 26° 20′ and 31° 45′ N. and has an area of nearly 60,000 sq. m. Fars is the same word as the Greek *Persis*, and, originally the name of only a part of the Persian empire (Iran), has become the name which Europeans have applied to the whole (see Persis). The province is popularly, but not for administrative purposes, divided according to climate into *germsīr* and *sardsīr*, or the warm and cold regions. The former extends from the sea to the central chain of hills and contains all the lowlands and many mountainous districts, some of the latter rising to an elevation of between 3000 and 4000 ft. and the *sardsīr* comprises the remaining and northern districts of the province.

In Arrian's relation of the voyage of Nearchus (*Indica*, 40), these two regions are well described. "The first part of Persis which lies along the Persian Gulf is hot, sandy and barren and only the date palm thrives there. The other part comprehends inner Persis lying northwards; it enjoys a pleasant climate and has fertile and well-watered plains, gardens with trees of all kinds, rich pasturages and forests abounding with game; with the exception of the olive all fruits are produced in profusion, particularly the vine. Horses and other draught animals are reared in the province, and there are several lakes frequented by water-fowl, and streams of clear water flow through it, as for instance the Kyros (Kur) formed by the junction of the Medos and Araxes."

The mountains of Fars may be considered as a continuation of the Zagros and run parallel to the shores of the Persian Gulf. They comprise several ranges which the roads from the sea to the interior have to cross at right angles, thereby rendering communication and transport very difficult. The highest of the mountains of Fars (14,000 ft.) is the Kuh Dinā in the north-western part of the province. Of the rivers of Fars only three important ones flow into the sea: (1) the Mand (Arrian's Sitakos), Karaaghach in its upper course; (2) the Shapur or Khisht river (Granis); (3) the Tab (Oroatis). Some rivers, notably the Kur (Kyros, Araxes) which flows into the Bakhtegan lake east of Shiraz, drain into inland depressions or lakes.

The capital of the province is Shiraz, and the subdivision in districts, the chief places of the districts and their estimated population, and the number of inhabited villages in each as they appear in lists dated 1884 and 1905 are shown on the following page.

	Name of District.	Chief Place or Seat of Government.		Number of inhabited Villages in District.
		Name.	Population.	
1	Abādeh Iklīd	Abādeh	4,000	33
2	Abādeh-Tashk	Tashk	600	8
3	Abarj	Dashtek	2,000	6
4	Abbāsi			
	(1) Bander Abbāsi[1] and villages	Bander Abbāsi	10,000	14
	(2) Issīn and Taziān	Issīn		6
	(3) Shamil	Shamil	1,000	18
	(4) Moghistan	Ziarat		10
	(5) Mināb	Mināb	4,000	23
5	Afzar	Nīmdeh		12
6	'Alemrūd	Sabzpushan	1,000	16
7	Arb'ah (the four)			
	(1) Deh Rūd	Deh Ram	1,500	19
	(2) Deh Ram			
	(3) Hengam			
	(4) Rudbāl			
8	Ardakān	Ardakān	5,000	10
9	Arsinjan	Arsinjan	5,000	25
10	Asīr	Asīr	500	10
11	Baiza	Baiza	2,000	55
12	Bīdshahr and Juvīm	Bīdshahr	3,000	23
13	Bovanāt	Suriān	500	23
14	Darāb	Darāb	5,000	62
15	Dashti			
	(1) Bardistan	Bander Dair	1,000	28
	(2) Buluk	Bushgān		18
	(3) Māndistan	Kāki	1,500	40
	(4) Tassūj	Tang Bagh	500	11
	(5) Shumbeh	Shumbeh		15
16	Dashtistān			
	(1) Angāli	Haftjūsh		10
	(2) Ahrom	Ahrom	1,500	5
	(3) Borazjan	Borazjan	4,000	19
	(4) Bushire[1]	Bushire	25,000	20
	(5) Daliki	Daliki	1,500	7
	(6) Gonāvah	Gonāvah	1,000	12
	(7) Hayāt Daūd	Bander Rig	1,000	6
	(8) Khurmuj	Khurmuj	1,000	5
	(9) Rūd Hillah	Kelat Sukhteh		10
	(10) Shaban Kareh	Deh Kohneh		27
	(11) Tangistan	Tangistan	1,000	31
	(12) Zengeneh	Samal	750	4
	(13) Zirāh	Zirāh		6
17	Dizkurd	Cherkes	500	6
18	Famur	Pagah	300	3
19	Ferrashband	Ferrashband	1,000	14
20	Fessa	Fessa	5,000	40
21	Firuzabad	Firuzabad	4,000	20
22	Gillehdār	Gillehdār	1,000	43
23	Hūmeh of Shiraz	Zerkān	1,000	89
24	Istahbanat	Istahbanat	10,000	12
25	Jahrum	Jahrum	10,000	33
26	Jireh	Ishfāyikān		23
27	Kamfiruz	Palangeri		34
28	Kamin	Kalilek		11
29	Kazerun	Kazerun	8,000	46
30	Kavār	Kavār		26
31	Kir and Karzīn	Kir	1,000	23
32	Khafr	Khafr	1,000	41
33	Khajeh	Zanjiran	500	15
34	Khisht	Khisht	2,500	25
35	Khunj	Khunj	1,500	27
36	Kongān	Bander Kongān		12
37	Kuh Gilū and Behbahan	Behbahan	10,000	182
38	Kurbāl	Gavkan	600	67
39	Kuh i Marreh Shikeft	Shikeft		41
40	Kunkuri	Kazian		29
41	Laristan			
	(1) Lar	Lar	8,000	34
	(2) Bikhah Ihsham	Bairam		11
	(3) Bikhah Fal	Ishkenān		10
	(4) Jehāngiriyeh	Bastak	4,000	30
	(5) Shib Kūh	Bander Chārak		36
	(6) Fūmistan or Gavbandi	Gāvbandi		13
	(7) Kauristān	Kauristān		4
	(8) Lingah[1]	Bander Lingah	10,000	11
	(9) Mazāyijan	Mazāyijan		6
42	Mahūr Milāti	Jemalgird		5
43	Maimand	Maimand	5,000	14
44	Maliki	Bander Assalu	1,000	25
45	Mamasenni (Shūlistan)			
	(1) Bekesh	Kal'ah Safid		8
	(2) Javīdi or Jāvi			6
	(3) Dushmanziaris			16
	(4) Rustami			26
	(5) Fahlian			7
	(6) Kākān			5
46	Māyin	Māyin		8
47	Mervast and Herāt	Mervast		14
48	Mervdasht			
	(1) Upper Khafrek	Fathabad	1,250	14
	(2) Lower Khafrek			16
	(3) Mervdasht			22
49	Meshhed Mader Sulimān	Murghāb	800	6
50	Nīrīz	Nīrīz	9,000	24
51	Ramjird	Jashian		36
52	Rūdan and Ahmedī	Dehbariz		21
53	Sab'ah (the seven)			
	(1) Bīvunj (Bīvanej)	Durz		14
	(2) Hasanabad	Hasanabad		7
	(3) Tarom	Tarun	2,000	15
	(4) Fāraghān	Fāraghān	1,500	13
	(5) Forg	Forg	3,000	18
	(6) Fīn and Guhrah	Fīn		13
	(7) Gileh Gāh (abandoned)	Ziaret	1,000	11
54	Sarchahān			
55	Sarhad Chahār Dungeh			
	(1) Dasht Ujān	Kūshk Zard		31
	(2) Dasht Khosro va Shirīn			
	(3) Dasht Khūngasht			
	(4) Dasht Kushk Zard			
56	Sarhad Shesh Nahīyeh			
	(1) Pādinā (foot of Mount Dinā)	Khūr		24
	(2) Hennā	Hennā		
	(3) Samiram	Samiram		
	(4) Felārd	Felārd		
	(5) Vardasht	Germabad		
	(6) Vank	Vank		
57	Sarvistan	Sarvistan	4,500	23
58	Shiraz (town) in 1884		53,607[2]	..
59	Siyākh	Darinjān		13
60	Simkān	Dūzeh		28

The above sixty districts are grouped into eighteen sub-provinces under governors appointed by the governor-general of Fars, but the towns of Bushire, Lingah and Bander Abbasi, together with the villages in their immediate neighbourhood, form a separate government known as that of the "Persian Gulf Ports" (Benādir i Khalij i Fars), under a governor appointed from Teheran. The population of the province has been estimated at 750,000 and the yearly revenue it pays to the state amounts to about £150,000. Many districts are fertile, but some, particularly those in the south-eastern part of the province, do not produce sufficient grain for the requirements of the sparse population. In consequence of droughts, ravages of locusts and misgovernment by local governors the province has been much impoverished and hundreds of villages are in ruins and deserted. About a third of the population is composed of turbulent and lawless nomads who, when on the march between their winter and summer camping grounds, frequently render the roads insecure and occasionally plunder whole districts, leaving the inhabitants without means of subsistence.

The province produces much wheat, barley, rice, millet, cotton, but the authorities every now and then prohibiting the export of cereals, the people generally sow just as much as they think will suffice for their own wants. Much tobacco of excellent quality, principally for consumption in Persia, is also grown (especially in Fessa, Darab and Jahrom) and a considerable quantity of opium, much of it for export to China, is produced. Salt, lime and gypsum are abundant. There are also some oil wells at Daliki, near Bushire, but several attempts to tap the oil have been unsuccessful. There are no valuable oyster-banks in Persian waters, and all the Persian Gulf pearls are obtained from banks on the coast of Arabia and near Bahrein. (A. H.-S.)

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[1] Are forming separate administrative division of "Persian Gulf Ports."

[2] Persian census in 1884; 25,284 males, 28,323 females.

FARTHING (A.S. *feórtha*, fourth, *+ing*, diminutive), the smallest English coin, equal to the fourth of a penny. It became a regular part of the coinage from the reign of Edward I., and was, up to the reign of Mary, a silver coin. No farthing was struck in the reign of Elizabeth, but a silver three-farthing piece was issued in that reign, with a profile bust of the queen crowned, with a rose behind her head, and inscribed "E.D.G. Rosa sine spina." The copper farthing was first introduced in the reign of James I., a patent being given to Lord Harington of Exton in 1613 for the issue of copper tokens of this denomination. It was nominally of six grains' weight, but was usually heavier. Properly, however, the copper farthing dates from the reign of Charles II., in whose reign also was issued a tin farthing, with a small copper plug in the centre, and an inscription on the edge, "Nummorum famulus 1684." No farthings were actually issued in the reign of Queen Anne, though a number of patterns were prepared (see Numismatics: *medieval section, England*). In 1860 the copper farthing was superseded by one struck in bronze. In 1842 a proclamation was issued giving currency to half-farthings, and there were several issues, but they were demonetized in 1869. In 1897 the practice was adopted of darkening farthings before issue, to prevent their being mistaken for half-sovereigns.

FARTHINGALE (from the O. Fr. *verdagalle*, or *vertugalle*, a corruption of the Spanish name of the article, *verdagado*, from *verdago*, a rod or stick), a case or hoop, originally of bent rods, but afterwards made of whalebone, upon which were hung the voluminous skirts of a woman's dress. The fashion was introduced into England from Spain in the 16th century. In its most exaggerated shape, at the beginning of the 17th century, the top of the farthingale formed a flat circular surface projecting at right angles to the bodice (see Costume).

FARUKHABAD, Farrakhabad, or Furruckabad, a city and district of British India in the Agra division of the United Provinces. The city is near the right bank of the Ganges, 87 m. by rail from Cawnpore. It forms a joint municipality with Fatehgarh, the civil headquarters of the district with a military cantonment. Pop. (1901) 67,338. At Fatehgarh is the government gun-carriage factory; and other industries include cotton-printing and the manufacture of gold lace, metal vessels and tents.

The District of Farukhabad has an area of 1685 sq. m. It is a flat alluvial plain in the middle Doab. The principal rivers are: the Ganges, which has a course of 87 m. either bordering on or passing through the district, but is not at all times navigable by large boats throughout its entire course; the Kali-nadi (84 m.) and the Isan-nadi (42 m.), both tributaries of the Ganges; and the Arind-nadi, which, after a course of 20 m. in the south of the district, passes into Cawnpore. The principal products are rice, wheat, barley, millets, pulses, cotton, sugar-cane, potatoes, &c. The grain crops, however, are insufficient for local wants, and grain is largely imported from Oudh and Rohilkhand. The district is, therefore, liable to famine, and it was severely visited by this calamity six times during the 19th century—in 1803–1804, 1815–1816, 1825–1826, 1837–1838, 1868–1869 and 1899–1900. Farukhabad is one of the healthiest districts in the Doab, but fevers are prevalent during August and September. The average annual mean temperature is almost 80° F.; the average annual rainfall, 29·4 in.

In the early part of the 18th century, when the Mogul empire was breaking up, Mahommed Khan, a Bangash Afghan from a village near Kaimganj, governor of Allahabad and later of Malwa, established a considerable state of which the present district of Farukhabad was the nucleus, founding the city of Farukhabad in 1714. After his death in 1743, his son and successor Kaim Khan was embroiled by Safdar Jang, the nawab wazir of Oudh, with the Rohillas, in battle with whom he lost his life in 1749. In 1750 his brother, Ahmad Khan, recovered the Farukhabad territories; but Safdar Jang called in the Mahrattas, and a struggle for the possession of the country began, which ended in 1771, on the death of Ahmad Khan, by its becoming tributary to Oudh. In 1801 the nawab wazir ceded to the British his lands in this district, with the tribute due from the nawab of Farukhabad, who gave up his sovereign rights in 1802. In 1804 the Mahrattas, under Holkar, ravaged this tract, but were utterly routed by Lord Lake at the town of Farukhabad. During the mutiny Farukhabad shared the fate of other districts, and passed entirely out of British hands for a time. The native troops, who had for some time previously evinced a seditious spirit, finally broke into rebellion on the 18th of June 1857, and placed the titular nawab of Farukhabad on the throne. The English military residents took shelter in the fort, which they held until the 4th of July, when, the fort being undermined, they endeavoured to escape by the river. One boat succeeded in reaching Cawnpore, but only to fall into the hands of Nana. Its occupants were made prisoners, and perished in the massacre of the 10th of July. The other boat was stopped on its progress down the river, and all those in it were captured or killed, except four who escaped. The prisoners were conveyed back to Fatehgarh, and murdered there by the nawab on the 19th of July. The rebels were defeated in several engagements, and on the 3rd of January 1858 the English troops recaptured Fatehgarh fort; but it was not till May that order was thoroughly re-established. In 1901 the population was 925,812, showing an increase of 8% in one decade. Part of the district is watered by distributaries of the Ganges canal; it is traversed throughout its length by the Agra-Cawnpore line of the Rajputana railway, and is also served by a branch of the East Indian system. Tobacco, opium, potatoes and fruit, cotton-prints, scent and saltpetre are among the principal exports.

FASCES, in Roman antiquities, bundles of elm or birch rods from which the head of an axe projected, fastened together by a red strap. Nothing is known of their origin, the tradition that represents them as borrowed by one of the kings from Etruria resting on insufficient grounds. As the emblem of official authority, they were carried by the lictors, in the left hand and on the left shoulder, before the higher Roman magistrates; at the funeral of a deceased magistrate they were carried behind the bier. The lictors and the fasces were so inseparably connected that they came to be used as synonymous terms. The fasces originally represented the power over life and limb possessed by the kings, and after the abolition of the monarchy, the consuls, like the kings, were preceded by twelve fasces. Within the precincts of the city the axe was removed, in recognition of the right of appeal (*provocatio*) to the people in a matter of life and death; outside Rome, however, each consul retained the axe, and was preceded by his own lictors, not merely by a single *accensus* (supernumerary), as was originally the case within the city when he was not officiating. Later, the lictors preceded the officiating consul, and walked behind the other. Valerius Publicola, the champion of popular rights, further established the custom that the fasces should be lowered before the people, as the real representatives of sovereignty (Livy ii. 7; Florus i. 9; Plutarch, *Publicola*, 10); lowering the fasces was also the manner in which an inferior saluted a superior magistrate. A dictator, as taking the place of the two consuls, had 24 fasces (including the axe even within the city); most of the other magistrates had fasces varying in number, with the exception of the censors, who, as possessing no executive authority, had none. Fasces were given to the Flamen Dialis and (after 42 B.C.) even to the Vestals. During the times of the republic, a victorious general, who had been saluted by the title of imperator by his soldiers, had his fasces crowned with laurel (Cicero, *Pro Ligario*, 3). Later, under the empire, when the emperor received the title for life on his accession, it became restricted to him, and the laurel was regarded as distinctive of the imperial fasces (see Mommsen, *Römisches Staatsrecht*, i., 1887, p. 373).

FASCIA (Latin for a bandage or fillet), a term used for many objects which resemble a band in shape; thus in anatomy it is applied to the layers of fibrous connective tissue which sheathe

the muscles or cover various parts or organs in the body, and in zoology, and particularly in ornithology, to bands or stripes of colour. In architecture the word is used of the bands into which the architrave of the Ionic and Corinthian orders is subdivided; their origin would seem to have been derived from the superimposing of two or more beams of timber to span the opening between columns and to support a superincumbent weight; the upper beam projected slightly in front of the lower, and similar projections were continued in the stone or marble beam though in one block. In the Roman Corinthian order the fasciae, still projecting one in front of the other, were subdivided by small mouldings sometimes carved. The several bands are known as the first or upper fascia, the second or middle fascia and the third or lower fascia. The term is sometimes applied to flat projecting bands in Renaissance architecture when employed as string courses. It is also used, though more commonly in the form "facia," of the band or plate over a shop-front, on which the name and occupation of the tradesman is written.

FASCINATION (from Lat. *fascinare*, to bewitch, probably connected with the Gr. *βασκαίνειν*, to speak ill of, to bewitch), the art of enchanting or bewitching, especially through the influence of the "evil eye," and so properly of the exercise of an evil influence over the reason or will. The word is thus used of the supposed paralysing attraction exercised by some reptiles on their victims. It is also applied to a particular hypnotic condition, marked by muscular contraction, but with consciousness and power of remembrance left. In a quite general sense, fascination means the exercise of any charm or strong attraction.

FASCINE (from the Lat. *fascina*, *fascis*, a bundle of sticks), a large faggot of brushwood used in the revetments of earthworks and for other purposes of military engineering. The British service pattern of fascine is 18 ft. long; it is tied as tightly as possible at short intervals, and the usual diameter is 9 in. Similar bundles of wood formed part of the foundations of the early lake-dwellings, and in modern engineering fascines are used in making rough roads over marshy ground and in building river and sea walls and breakwaters.

FASHION (adapted from Fr. *façon*, Lat. *factio*, making, *facere*, to do or make), the action of making, hence the shape or form which anything takes in the process of making. It is thus used in the sense of the pattern, kind, sort, manner or mode in which a thing is done. It is particularly used of the common or customary way in which a thing is done, and so is applied to the manner or custom prevalent at or characteristic of a particular period, especially of the manner of dress, &c., current at a particular period in any rank of society, for which the French term is *modes* (see COSTUME).

FASHODA (renamed, 1904, KODOK), a post on the west bank of the Upper Nile, Anglo-Egyptian Sudan, in 9° 53′ N., 32° 8′ E., 459 m. S., by river, of Khartum. It is the headquarters of the mudiria (province) of the Upper Nile. The station is built on a flat peninsula connected by a narrow strip of land with a ridge which runs parallel with the river. The surrounding country is mostly deep swamp and the station is most unhealthy; mosquitoes are present in millions. The climate is always damp and the temperature rarely below 98° in the shade. The government offices are well-built brick structures. In front of the station is a long low island, and when the Nile is at its lowest this channel becomes dry. Several roads from Kordofan converge on the Nile at this point, and near the station is the residence of the *mek*, or king, of the Shilluk tribe, whose designation of the post was adopted when it was decided to abandon the use of Fashoda. At Lul, 18 m. farther up stream, is an Austrian Roman Catholic mission station.

An Egyptian military post was established at Fashoda in 1865. It was then a trading station of some importance, slaves being the chief commodity dealt in. In 1883–1884 the place fell into the hands of the Mahdists. On the 10th of July 1898 it was occupied by a French force from the Congo under Commandant J. B. Marchand, a circumstance which gave rise to a state of great tension between Great Britain and France. On the 11th of December following the French force withdrew, returning home via Abyssinia (see AFRICA, § 5, and EGYPT: *History*, and *Military Operations*).

FAST AND LOOSE, a cheating game played at fairs by sharpers. A strap, usually in the form of a belt, is rolled or doubled up with a loop in the centre, and laid edgewise on a table. The swindler then bets that the loop cannot be caught with a stick or skewer as he unrolls the belt. As this looks to be easy to do the bet is often taken, but the sharper unrolls the belt in such a manner as to make the catching of the loop practically impossible. Centuries ago it was much practised by gipsies, a circumstance alluded to by Shakespeare in *Anthony and Cleopatra* (iv. 12):

> "Like a right gipsy, hath, at fast and loose,
> Beguiled me to the very heart of loss."

From this game is taken the colloquial expression "to play fast and loose." At the present day it is called "prick the garter" or "prick the loop."

FASTI, in Roman antiquities, plural of the Latin adjective *fastus*, but more commonly used as a substantive, derived from *fas*, meaning what is binding, or allowable, by divine law, as opposed to *jus*, or human law. *Fasti dies* thus came to mean the days on which law business might be transacted without impiety, corresponding to our own "lawful days"; the opposite of the *dies fasti* were the *dies nefasti*, on which, on various religious grounds, the courts could not sit. The word *fasti* itself then came to be used to denote lists or registers of various kinds, which may be divided into two great classes.

1. *Fasti Diurni*, divided into *urbani* and *rustici*, a kind of official year-book, with dates and directions for religious ceremonies, court-days, market-days, divisions of the month, and the like. Until 304 B.C. the lore of the *calendaria* remained the exclusive and lucrative monopoly of the priesthood; but in that year Gnaeus Flavius, a pontifical secretary, introduced the custom of publishing in the forum tables containing the requisite information, besides brief references to victories, triumphs, prodigies, &c. This list was the origin of the public Roman calendar, in which the days were divided into weeks of eight days each, and indicated by the letters A-H. Each day was marked by a certain letter to show its nature; thus the letters F., N., N.P., F.P., Q. Rex C.F., C., EN., stood for *fastus*, *nefastus*, *nefastus* in some unexplained sense, *fastus priore*, *quando rex* (*sacrorum*) *comitiavit fastus*, *comitialis* and *intercisus*. The *dies intercisi* were partly *fasti* and partly *nefasti*. Ovid's *Fasti* is a poetical description of the Roman festivals of the first six months, written to illustrate the Fasti published by Julius Caesar after he remodelled the Roman year. Upon the cultivators fewer feasts, sacrifices, ceremonies and holidays were enjoined than on the inhabitants of cities; and the rustic fasti contained little more than the ceremonies of the calends, nones and ides, the fairs, signs of zodiac, increase and decrease of the days, the tutelary gods of each month, and certain directions for rustic labours to be performed each month.

2. *Fasti Magistrales*, *Annales* or *Historici*, were concerned with the several feasts, and everything relating to the gods, religion and the magistrates; to the emperors, their birthdays, offices, days consecrated to them, with feasts and ceremonies established in their honour or for their prosperity. They came to be denominated *magni*, by way of distinction from the bare calendar, or *fasti diurni*. Of this class, the *fasti consulares*, for example, were a chronicle or register of time, in which the several years were denoted by the respective consuls, with the principal events which happened during their consulates. The *fasti triumphales* and *sacerdotales* contained a list in chronological order of persons who had obtained a triumph, together with the name of the conquered people, and of the priests. The word *fasti* thus came to be used in the general sense of "annals" or "historical records." A famous specimen of the same class are the *fasti Capitolini*, so called because they were deposited in the Capitol by Alexander Farnese, after their excavation from the Roman forum in 1547. They are chiefly a nominal list of statesmen, victories, triumphs, &c., from the expulsion of the kings to the death of Augustus. A considerable number of fasti

of the first class have also been discovered; but none of them appear to be older than the time of Augustus. The Praenestine calendar, discovered in 1770, arranged by the famous grammarian Verrius Flaccus, contains the months of January, March, April and December, and a portion of February. The tablets give an account of festivals, as also of the triumphs of Augustus and Tiberius. There are still two complete calendars in existence, an official list by Furius Dionysius Philocalus (A.D. 354), and a Christian version of the official calendar, made by Polemius Silvius (A.D. 448). But some kinds of fasti included under the second general head were, from the very beginning, written for publication. The *Annales Pontificum*—different from the *calendaria* properly so called—were "annually exhibited in public on a white table, on which the memorable events of the year, with special mention of the prodigies, were set down in the briefest possible manner." Any one was allowed to copy them. Like the pontifices, the augurs also had their books, *libri augurales*. In fact, all the state offices had their fasti corresponding in character to the consular fasti named above.

For the best text and account of the fragments of the Fasti see *Corpus Inscriptionum Latinarum*, i. (2nd ed.); on the subject generally, Teuffel-Schwabe, *Hist. of Roman Literature*, §§ 74, 75, and article by Bouché-Leclercq in Daremberg and Saglio, *Dictionnaire des antiquités*.

FASTING (from "fast," derived from old Teutonic *fastêjan*; synonyms being the Gr. *νηστεύειν*, late Lat. *jejunare*), an act which is most accurately defined as an abstention from meat, drink and all natural food for a determined period. So it is defined by the Church of England, in the 16th homily, on the authority of the Council of Chalcedon[1] and of the primitive church generally. In a looser sense the word is employed to denote abstinence from certain kinds of food merely; and this meaning, which in ordinary usage is probably the more prevalent, seems also to be at least tolerated by the Church of England when it speaks of "fast or abstinence days," as if fasting and abstinence were synonymous.[2] More vaguely still, the word is occasionally used as an equivalent for moral self-restraint generally. This secondary and metaphorical sense (*νηστεύειν κακότητος*) occurs in one of the fragments of Empedocles. For the physiology of fasting, see DIETETICS; NUTRITION; also CORPULENCE.

Starvation itself (see also HUNGER AND THIRST) is of the nature of a disease which may be prevented by diet; nevertheless there are connected with it a few peculiarities of scientific and practical interest. "Inedia," as it is called in the nomenclature of diseases by the London College of Physicians, is of two kinds, arising from *want of food* and from *want of water*. When entirely deprived of nutriment the human body is ordinarily capable of supporting life under ordinary circumstances for little more than a week. In the spring of 1869 this was tried on the person of a "fasting girl" in South Wales. The parents made a show of their child, decking her out like a bride on a bed, and asserting that she had eaten no food for two years. Some reckless enthusiasts for truth set four trustworthy hospital nurses to watch her; the Celtic obstinacy of the parents was roused, and in defence of their imposture they allowed death to take place in eight days. Their trial and conviction for manslaughter may be found in the daily periodicals of the date; but, strange to say, the experimental physiologists and nurses escaped scot-free. There is no doubt that in this instance the unnatural quietude, the grave-like silence, and the dim religious light in which the victim was kept contributed to deter death.

One thing which remarkably prolongs life is a supply of water. Dogs furnished with as much as they wished to drink were found by M. Chossat (*Sur l'inanition*, Paris, 1843) to live three times as long as those who were deprived of solids and liquids at the same time. Even wetting the skin with sea-water has been found useful by shipwrecked sailors. Four men and a boy of fourteen who got shut in the Tynewydd mine near Porth, in South Wales, in the winter of 1876–1877 for ten days without food, were not only alive when released, but several of them were able to walk, and all subsequently recovered. The thorough saturation of the narrow space with aqueous vapour, and the presence of drain water in the cutting, were probably their chief preservatives—assisted by the high even temperature always found in the deeper headings of coal mines, and by the enormous compression of the confined air. This doubtless prevented evaporation, and retarded vital processes dependent upon oxidation. The accumulation of carbonic acid in the breathed air would also have a similar arrestive power over destructive assimilation. These prisoners do not seem to have felt any of the severer pangs of hunger, for they were not tempted to eat their candles. With the instinctive feeling that darkness adds a horror to death, they preferred to use them for light. At the wreck of the "Medusa" frigate in 1816, fifteen people survived on a raft for thirteen days without food.

It is a paradoxical fact, that the supply of the stomach even from the substance of the starving individual's body should tend to prolong life. In April 1874 a case was recorded of exposure in an open boat for 32 days of three men and two boys, with only ten days' provisions, exclusive of old boots and jelly-fish. They had a fight in their delirium, and one was severely wounded. As the blood gushed out he lapped it up; and instead of suffering the fatal weakness which might have been expected from the haemorrhage, he seems to have done well. Experiments were performed by a French physiologist, M. Anselmier (*Archives gén. de médecine*, 1860, vol. i. p. 169), with the object of trying to preserve the lives of dogs by what he calls "artificial autophagy." He fed them on the blood taken from their own veins daily, depriving them of all other food, and he found that the fatal cooling incident to starvation was thus postponed, and existence prolonged. Life lasted till the emaciation had proceeded to six-tenths of the animal's weight, as in Chossat's experiments, extending to the fourteenth day, instead of ending on the tenth day, as was the case with other dogs which were not bled.

Various people have tried, generally for exhibition purposes, how long they could fast from food with the aid merely of water or some medicinal preparation; but these exhibitions cannot be held to have proved anything of importance. A man named Jacques in this way fasted at Edinburgh for thirty days in 1888, and in London for forty-two days in 1890, and for fifty days in 1891; and an Italian named Succi fasted for forty days in 1890.

Religious Fasts.—Fasting is of special interest when considered as a discipline voluntarily submitted to for moral and religious ends. As such it is very widely diffused. Its modes and motives vary considerably according to climate, race, civilization and other circumstances; but it would be difficult to name any religious system of any description in which it is wholly unrecognized.[3] The origin of the practice is very obscure.[4] In his *Principles of Sociology* Herbert Spencer collected, from the accounts we have of various savage tribes in widely separated parts of the globe, a considerable body of evidence, from which he suggested that it may have arisen out of the custom of providing refreshments for the dead, either by actually feeding the corpse, or by leaving eatables and drinkables for its use. It is suggested that the fasting which was at first the natural and inevitable result of such sacrifice on behalf of the dead may eventually have come to be regarded as an indispensable concomitant of all sacrifice, and so have survived as a well-established usage long after the original cause had ceased to operate.[1] But this theory is repudiated by the best authorities; indeed its extreme precariousness at once becomes evident when it is remembered that, now at least, it is usual for religious fasts to precede rather than to follow sacrificial and funeral feasts, if observed at all in connexion with these. Spencer himself (p. 284) admits that "probably the practice arises in more ways than one," and proceeds to supplement the theory already given by another—that adopted by E. B. Tylor—to the effect that it originated in the desire of the primitive man to bring on at will certain abnormal nervous conditions favourable to the seeing of those visions and the dreaming of those dreams which are supposed to give the soul direct access to the objective realities of the spiritual world.[2] Probably, if we leave out of sight the very numerous and obvious cases in which fasting, originally the natural reflex result of grief, fear or other strong emotion, has come to be the usual conventional symbol of these, we shall find that the practice is generally resorted to, either as a means of somehow exalting the higher faculties at the expense of the lower, or as an act of homage to some object of worship. The axiom of the Amazulu, that "the continually stuffed body cannot see secret things," meets even now with pretty general acceptance; and if the notion that it is precisely the food which the worshipper foregoes that makes the deity more vigorous to do battle for his human friend be confined only to a few scattered tribes of savages, the general proposition that "fasting is a work of reverence toward God" may be said to be an article of the Catholic faith.[3]

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[1] "The Fathers assembled there . . . decreed in that council that every person, as well in his private as public fast, should continue all the day without meat and drink, till after the evening prayer. And whosoever did eat or drink before the evening prayer was ended should be accounted and reputed not to consider the purity of his fast. This canon teacheth so evidently how fasting was used in the primitive church as by words it cannot be more plainly expressed" (*Of Good Works; and first, of Fasting.*)

[2] As indeed they are, etymologically; but, prior to the Reformation, a conventional distinction between *abstinentia* and *jejunium naturale* had long been recognized. "Exceptio eduliorum quorundam portionale jejunium est" (Tertullian).

[3] Confucianism ought perhaps to be named as one. Zoroastrianism is frequently given as another, but hardly corrrectly. In the Liber *Sad-der*, indeed (Porta xxv.), we read, "Cavendum est tibi a jejunio; nam a mane ad vesperam nihil comedere non est bonum in religione nostra"; but according to the Père de Chinon (Lyons, 1671) the Parsee religion enjoins, upon the priesthood at least, no fewer than five yearly fasts. See Hyde, *Veterum Persarum religio*, pp. 449, 548 (ed. 1700).

[4] During the middle ages the prevalent notion was that it had its origin in paradise. The germ at least of this idea is to be found in Tertullian, who says: "Acceperat Adam a Deo legem non gustandi de arbore agnitionis boni et mali, moriturus si gustasset; verum et ipse tunc in psychicum reversus . . . facilius ventri quam Deo cessit, pabulo potius quam praecepto annuit, salutem gula vendidit, manducavit denique et periit, salvus alioquin si uni arbusculae jejunare maluisset" (*De jejuniis*, c. 3).

Although fasting as a religious rite is to be met with almost everywhere, there are comparatively few religions, and those only of the more developed kind, which appoint definite public fasts, and make them binding at fixed seasons upon all the faithful. Brahmanism, for example, does not appear to enforce any stated fast upon the laity.[4] Among the ancient Egyptians fasting seems to have been associated with many religious festivals, notably with that of Isis (Herod. ii. 40), but it does not appear that, so far as the common people were concerned, the observance of these festivals (which were purely local) was compulsory. The νηστεία on the third day of the Thesmophoria at Athens was observed only by the women attending the festival (who were permitted to eat cakes made of sesame and honey). It is doubtful whether the fast mentioned by Livy (xxxvi. 37) was intended to be general or sacerdotal merely.

Jewish Fasts.—While remarkable for the cheerful, non-ascetic character of their worship, the Jews were no less distinguished from all the nations of antiquity by their annual solemn fast appointed to be observed on the 10th day of the 7th month (Tisri), the penalty of disobedience being death. The rules, as laid down in Lev. xvi. 29-34, xxiii. 27-32 and Numb. xxix. 7-11, include a special injunction of strict abstinence ("ye shall afflict your souls"[5]) from evening to evening. This fast was intimately associated with the chief feast of the year. Before that feast could be entered upon, the sins of the people had to be confessed and (sacramentally) expiated. The fast was a suitable concomitant of that contrition which befitted the occasion. The practice of stated fasting was not in any other case enjoined by the law; and it is generally understood to have been forbidden on Sabbath.[6] At the same time, private and occasional fasting, being regarded as a natural and legitimate instinct, was regulated rather than repressed. The only other provision about fasting in the Pentateuch is of a regulative nature, Numb. xxx. 14 (13), to the effect that a vow made by a woman "to afflict the soul" may in certain circumstances be cancelled by her husband.

The history of Israel from Moses to Ezra furnishes a large number of instances in which the fasting instinct was obeyed both publicly and privately, locally and nationally, under the influence of sorrow, or fear, or passionate desire. See, for example, Judg. xx. 26; 1 Sam. vii. 6 (where the national fast was conjoined with the ceremony of pouring out water before the Lord); Jer. xxxvi. 6, 9; and 2 Sam. xii. 16.[7] Sometimes the observance of such fasts extended over a considerable period of time, during which, of course, the stricter *jejunium* was conjoined with *abstinentia* (Dan. x. 2). Sometimes they lasted only for a day. In Jonah iii. 6, 7, we have an illustrative example of the rigour with which a strict fast might be observed; and such passages as Joel ii. and Isa. lviii. 5 enable us to picture with some vividness the outward accompaniments of a Jewish fast day before the exile.

During the exile many occasional fasts were doubtless observed by the scattered communities, in sorrowful commemoration of the various sad events which had issued in the downfall of the kingdom of Judah. Of these, four appear to have passed into general use—the fasts of the 10th, 4th, 5th and 7th months—commemorating the beginning of the siege of Jerusalem, the capture of the city, the destruction of the temple, the assassination of Gedaliah. As time rolled on they became invested with increasing sanctity; and though the prophet Zechariah, when consulted about them at the close of the exile (Zech. viii. 19), had by no means encouraged the observance of them, the rebuilding of the temple does not appear to have been considered an achievement of sufficient importance to warrant their discontinuance. It is worthy of remark that Ezekiel's prophetic legislation contains no reference to any fast day; the book of Esther (ix. 31), on the other hand, records the institution of a new fast on the 13th of the 12th month.

In the post-exile period private fasting was much practised by the pious, and encouraged by the religious sentiment of the time (see Judith viii. 6; Tob. xii. 8, and context; Sirach xxxiv. 26; Luke ii. 37 and xviii. 12). The last reference contains an allusion to the weekly fasts which were observed on the 2nd and 5th days of each week, in commemoration, it was said, of the ascent and descent of Moses at Sinai. The real origin of these fasts and the date of their introduction are alike uncertain; it is manifest, however, that the observance of them was voluntary, and never made a matter of universal obligation. It is probable that the Sadducees, if not also the Essenes, wholly neglected them. The second book (*Seder Moed*) of the Mishna contains two tractates bearing upon the subject of fasting. One (*Yoma*, "the day") deals exclusively with the rites which were to be observed on the great day of expiation or atonement the other (*Taanith*, "fast") is devoted to the other fasts, and deals especially with the manner in which occasional fasting is to be gone about if no rain shall have fallen on or before the 17th day of Marcheschwan. It is enacted that in such a case the rabbis shall begin with a light fast of three days (Monday, Thursday, Monday), *i.e.* a fast during which it is lawful to work, and also to wash and anoint the person. Then, in the event of a continued drought, fasts of increasing intensity are ordered; and as a last resort the ark is to be brought into the street and sprinkled with ashes, the heads of the Nasi and Ab-beth-din being at the same time similarly sprinkled.[1] In no case was any fast to be allowed to interfere with new-moon or other fixed festival. Another institution treated with considerable fulness in the treatise *Taanith* is that of the אנשי מעמר (*viri stationis*), who are represented as having been laymen severally representing the twenty-four classes or families into which the whole commonwealth of the laity was divided. They used to attend the temple in rotation, and be present at the sacrifices; and as this duty fell to each in his turn, the men of the class or family which he represented were expected in their several cities and places of abode to engage themselves in religious exercises, and especially in fasting. The suggestion will readily occur that here may be the origin of the Christian *stationes*. But neither Tertullian nor any other of the fathers seems to have been aware of the existence of any such institution among the Jews; and very probably the story about it may have been a comparatively late invention. It ought to be borne in mind that the Aramaic portion of the *Megillath Taanith* (a document considerably older than the treatises in the Mishna) gives a catalogue only of the days on which fasting was forbidden. The Hebrew part (commented on by Maimonides), in which numerous fasts are recommended, is of considerably later date. See Reland, *Antiq. Hebr.* p. iv. c. 10; Derenbourg, *Hist. de Palestine*, p. 439.

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[1] *Principles of Sociology*, i. pp. 170, 284, 285. Compare the passage in the appendix from Hanusch, *Slavischer Mythus*, p. 408.

[2] Spencer, *Prin. of Sociology*, i. 256, &c.; E. B. Tylor, *Primitive Culture*, i. 277, 402; ii. 372, &c.

[3] Hooker, *E.P.* v. 72. In the Westminster Assembly's Larger Catechism fasting is mentioned among the duties required by the second commandment.

[4] The Brahmans themselves on the eleventh day after the full moon and the eleventh day after the new "abstain for sixty hours from every kind of sustenance"; and some have a special fast every Monday in November. See Picart, *The Religion and Manners of the Brahmins*.

[5] נֶפֶשׁ is here to be taken as substantially equivalent to "desire," "appetite."

[6] See Judith viii. 6. "And yet it may be a question whether they (the Jews) did not always fast upon Sabbath," says Hooker (*E.P.* v. 72, 7), who gives a curious array of evidence pointing in this direction. He even makes use of Neh. viii. 9-12, which might be thought to tell the other way. Justinian's phrase, "Sabbata Judaeorum a Mose in omne aevum jejunio dicata" (l. xxxvi. c. 2; comp. Suetonius, *Augustus*, 76) may be accounted for by the fact that the day of atonement is called Sabbat Sabbatôn ("a perfect Sabbath").

[7] There is, as Graf (*Gesch. Bücher des A.T.* p. 41) has pointed out, no direct evidence that the fast on the 10th of the 7th month was ever observed before the exile. But the inference which he draws from this silence of the historical books is manifestly a precarious one at best. Bleek calls Lev. xvi. "ein deutliches Beispiel Mosaïscher Abfassung" (*Einleitung*, p. 31, ed. 1878).

Practice of the Early Christian Church.—Jesus Himself did not inculcate asceticism in His teaching, and the absence of that distinctive element from His practice was sometimes a subject of hostile remark (Matt. xi. 19). We read, indeed, that on one occasion He fasted forty days and forty nights; but the expression, which is an obscure one, possibly means nothing more than that He endured the privations ordinarily involved in a stay in the wilderness. While we have no reason to doubt that He observed the one great national fast prescribed in the written law of Moses, we have express notice that neither He nor His disciples were in the habit of observing the other fasts which custom and tradition had established. See Mark ii. 18, where the correct reading appears to be—"The disciples of John, and the Pharisees, were fasting" (some customary fast). He never formally forbade fasting, but neither did He ever enjoin it. He assumed that, in certain circumstances of sorrow and need, the fasting instinct would sometimes be felt by the community and the individual; what He was chiefly concerned about was to warn His followers against the mistaken aims which His contemporaries were so apt to contemplate in their fasting (Matt. vi. 16-18). In one passage, indeed, He has been understood as practically commanding resort to the practice in certain circumstances. It ought to be noted, however, that Matt. xvii. 21 is probably spurious; and that in Mark ix. 29 the words "and fasting" are omitted by Westcott and Hort as well as by Tischendorf on the evidence of the Cod. Sinaiticus (first hand) and Cod. Vaticanus.[2] The reference to "the fast" in Acts xxvii. 9 has generally been held to indicate that the apostles continued to observe the yearly Jewish fast. But this inference is by no means a necessary one. According to Acts xiii. 2, 3, xiv. 23, they conjoined fasting with prayer at ordinations, and doubtless also on some other solemn occasions; but at the same time the liberty of the Christian "in respect of an holiday, or of the new moon, or of the Sabbath" was strongly insisted on, by one of them at least, who declared that meat whether taken or abstained from commendeth not to God (Col. ii. 16-23; 1 Cor. viii. 8; Rom. xiv. 14-22; 1 Tim. iv. 3-5). The fastings to which the apostle Paul alludes in 2 Cor. vi. 5, xi. 27, were rather of the nature of inevitable hardships cheerfully endured in the discharge of his sacred calling. The words which appear to encourage fasting in 1 Cor. vii. 5 are absent from all the oldest manuscripts and are now omitted by all critics;[3] and on the whole the precept and practice of the New Testament, while recognizing the propriety of occasional and extraordinary fasts, seem to be decidedly hostile to the imposition of any of a stated, obligatory and general kind.

The usage of the Christian church during the earlier centuries was in this, as in so many other matters, influenced by traditional Jewish feeling, and by the force of old habit, quite as much as by any direct apostolic authority or supposed divine command. Habitual temperance was of course in all cases regarded as an absolute duty; and "the bridegroom" being absent, the present life was regarded as being in a sense one continual "fast." Fasting in the stricter sense was not unknown; but it is certain that it did not at first occupy nearly so prominent a place in Christian ritual as that to which it afterwards attained. There are early traces of the customary observance of the Wednesday and Friday fasts—the *dies stationum* (Clem. Alex. *Strom.* vii. 877), and also of a "quadragesimal" fast before Easter. But the very passage which proves the early origin of "quadragesima," conclusively shows how uncertain it was in its character, and how unlike the Catholic "Lent." Irenaeus, quoted by Eusebius (v. 24), informs us with reference to the customary yearly celebration of the mystery of the resurrection of our Lord, that disputes prevailed not only with respect to the day, but also with respect to the manner of fasting in connexion with it. "For some think that they ought to fast only one day, some two, some more days; some compute their day as consisting of *forty hours* night and day; and this diversity existing among those that observe it is not a matter that has just sprung up in our times, but long ago among those before us." It was not pretended that the apostles had legislated on the matter, but the general and natural feeling that the anniversaries of the crucifixion and the resurrection of Christ ought to be celebrated by Christians took expression in a variety of ways according to the differing tastes of individuals. No other stated fasts, besides those already mentioned, can be adduced from the time before Irenaeus; but there was also a tendency—not unnatural in itself, and already sanctioned by Jewish practice—to fast by way of preparation for any season of peculiar privilege. Thus, according to Justin Martyr (*Apol.* ii. 93), catechumens were accustomed to fast before baptism, and the church fasted with them. To the same feeling the quadragesimal fast which (as already stated) preceded the joyful feast of the resurrection, is to be, in part at least, attributed. As early as the time of Tertullian it was also usual for communicants to prepare themselves by fasting for receiving the eucharist. But that Christian fasts had not yet attained to the exaggerated importance which they afterwards assumed is strikingly shown in the well-known *Shepherd of Hermas* (lib. iii. sim. v.), where it is declared that "with merely outward fasting nothing is done for true virtue"; the believer is exhorted chiefly to abstain from evil and seek to cleanse himself from feelings of covetousness, and impurity, and revenge; "on the day that thou fastest content thyself with bread, vegetables and water, and thank God for these. But reckon up on this day what thy meal would otherwise have cost thee, and give the amount that it comes to to some poor widow or orphan, or to the poor." The right of bishops to ordain special fasts, "ex aliqua sollicitudinis ecclesiasticae causa" (Tertullian), was also recognized.

Later Practice of the Church.—According to an expression preserved by Eusebius (*H.E.* v. 18), Montanus was the first to give laws (to the church) on fasting. Such language, though rhetorical in form, is substantially correct. The treatise of Tertullian,—*Concerning Fasting: against the Carnal,*—written as it was under Montanistic influence, is doubly interesting, first as showing how free the practice of the church down to that time had been, and then as foreshadowing the burdensome legislation which was destined to succeed. In that treatise (c. 15) he approves indeed of the church practice of not fasting on Saturdays and Sundays (as elsewhere, *De corona*, c. 3, he had expressed his concurrence in the other practice of observing the entire period between Easter and Pentecost as a season of joy); but otherwise he evinces great dissatisfaction with the indifference of the church as to the number, duration and severity of her fasts.[1] The church thus came to be more and more involved in discussions as to the number of days to be observed, especially in "Lent," as fast days, as to the hour at which a fast ought to terminate (whether at the 3rd or at the 9th hour), as to the rigour with which each fast ought to be observed (whether by abstinence from flesh merely, *abstinentia*, or by abstinence from lacticinia, *xerophagia*, or by literal *jejunium*), and as to the penalties by which the laws of fasting ought to be enforced. Almost a century, however, elapsed between the composition of the treatise of Tertullian (*cir.* 212) and the first recorded instances of ecclesiastical legislation on the subject. These, while far from indicating that the church had attained unanimity on the points at issue, show progress in the direction of the later practice of catholicism. About the year 306 the synod of Illiberis in its 26th canon decided in favour of the observance of the Saturday fast.[2] The council of Ancyra in 314, on the other hand, found it necessary to legislate in a somewhat different direction,—by its 14th canon enjoining its priests and clerks at least to taste meat at the love feasts.[3] The synod of Laodicea framed several rules with regard to the observance of "Lent," such as that "during Lent the bread shall not be offered except on Saturday and Sunday" (can. 49), that "the fast shall not be relaxed on the Thursday of the last week of Lent, thus dishonouring the whole season; but the fast shall be kept throughout the whole period" (can. 50), that "during the fast no feasts of the martyrs shall be celebrated" (can. 51), and that "no wedding or birthday feasts shall be celebrated during Lent" (can. 52). The synod of Hippo (393 A.D.) enacted that the sacrament of the altar should always be taken fasting, except on the Thursday before Easter. Protests in favour of freedom were occasionally raised, not always in a very wise manner, or on very wise grounds, by various individuals such as Eustathius of Sebaste (*c.* 350), Aerius of Pontus (*c.* 375), and Jovinian, a Roman monk (*c.* 388). Of the Eustathians, for example (whose connexion with Eustathius can hardly be doubted), the complaint was made that "they fast on Sundays, but eat on the fast-days of the church." They were condemned by the synod of Gangra in Paphlagonia in the following canons:—Can. 19, "If any one fast on Sunday, let him be anathema."[4] Can. 20, "If any one do not keep the fasts universally commanded and observed by the whole church, let him be anathema." Jovinian was very moderate. He "did not allow himself to be hurried on by an inconsiderate zeal to condemn fasting, the life of celibacy, monachism, considered purely in themselves. . . . He merely sought to show that men were wrong in recommending so highly and indiscriminately the life of celibacy and fasting, though he was ready to admit that both under certain circumstances might be good and useful" (Neander). He was nevertheless condemned (390) both by Pope Siricius at a synod in Rome, and by Ambrose at another in Milan. The views of Aerius, according to the representations of his bitter opponent Epiphanius (*Haer.* 75, "Adv. Aerium"), seem on this head at least, though unpopular, to have been characterized by great wisdom and sobriety. He did not condemn fasting altogether, but thought that it ought to be resorted to in the spirit of gospel freedom according as each occasion should arise. He found fault with the church for having substituted for Christian liberty a yoke of Jewish bondage.[5]

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[1] The allusion to the ark warns us to be cautious in assuming the laws of the Mishna to have been ever in force.

[2] The idea, however, is found in the *Clementine Homilies*, ix. 9. Compare Tertullian *De jejuniis*, c. 8: "Docuit etiam adversus diriora daemonia jejuniis praeliandum."

[3] On the manuscript evidence the words "I was fasting," in Acts x. 30, must also be regarded as doubtful. They are rejected by Lachmann, Tregelles and Tischendorf.

Towards the beginning of the 5th century we find Socrates (439) enumerating (*H.E.* v. 22) a long catalogue of the different fasting practices of the church. The Romans fasted three weeks continuously before Easter (Saturdays and Sundays excepted). In Illyria, Achaia and Alexandria the quadragesimal fast lasted six weeks. Others (the Constantinopolitans) began their fasts seven weeks before Easter, but fasted only on alternate weeks, five days at a time. Corresponding differences as to the manner of abstinence occurred. Some abstained from all living creatures; others ate fish; others fish and fowl. Some abstained from eggs and fruit; some confined themselves to bread; some would not take even that. Some fasted till three in the afternoon, and then took whatever they pleased. "Other nations," adds the historian, "observe other customs in their fasts, and that for various reasons. And since no one can show any written rule about this, it is plain the apostles left this matter free to every one's liberty and choice, that no one should be compelled to do a good thing out of necessity and fear." When Leo the Great became pope in 440, a period of more rigid uniformity began. The imperial authority of Valentinian helped to bring the whole West at least into submission to the see of Rome; and ecclesiastical enactments had, more than formerly, the support of the civil power. Though the introduction of the four Ember seasons was not entirely due to him, as has sometimes been asserted, it is certain that their widespread observance was due to his influence, and to that of his successors, especially of Gregory the Great. The tendency to increased rigour may be discerned in the 2nd canon of the synod of Orleans (541), which declares that every Christian is bound to observe the fast of Lent, and, in case of failure to do so, is to be punished according to the laws of the church by his spiritual superior; in the 9th canon of the synod of Toledo (653), which declares the eating of flesh during Lent to be a mortal sin; in Charlemagne's law for the newly conquered Saxony, which attaches the penalty of death to wanton disregard of the holy season.[6] Baronius mentions that in the 11th century those who ate flesh during Lent were liable to have their teeth knocked out. But it ought to be remembered that this severity of the law early began to be tempered by the power to grant dispensations. The so-called Butter Towers (*Tours de beurre*) of Rouen, 1485–1507, Bourges and other cities, are said to have been built with money raised by sale of dispensations to eat *lacticinia* on fast days.

It is probable that the apparent severity of the medieval Latin Church on this subject was largely due to the real strictness of the Greek Church, which, under the patriarch Photius in 864, had taken what was virtually a new departure in its fasting praxis. The rigour of the fasts of the modern Greek Church is well known; and it can on the whole be traced back to that comparatively early date. Of the nine fundamental laws of that church (ἐννέα παραγγέλματα τῆς ἐκκλησίας) two are concerned with fasting. Besides fasts of an occasional and extraordinary nature, the following are recognized as of stated and universal obligation:—(1) The Wednesday and Friday fasts throughout the year (with the exception of the period between Christmas and Epiphany, the Easter week, the week after Whitsunday, the third week after Epiphany); (2) The great yearly fasts, viz. that of Lent, lasting 48 days, from the Monday of Sexagesima to Easter eve; that of Advent, 39 days, from November 15 to Christmas eve; that of the Theotokos (νηστεία τῆς Θεοτόκου), from August 1 to August 15; that of the Holy Apostles, lasting a variable number of days from the Monday after Trinity; (3) The minor yearly fasts before Epiphany, before Whitsunday, before the feasts of the transfiguration, the invention of the cross, the beheading of John the Baptist. During even the least rigid of these the use of flesh and lacticinia is strictly forbidden; fish, oil and wine are occasionally conceded, but not before two o'clock in the afternoon. The practice of the Coptic church is almost identical with this. A week before the Great Fast (Lent), a fast of three days is observed in commemoration of that of the Ninevites, mentioned in the book of Jonah. Some of the Copts are said to observe it by total abstinence during the whole period. The Great Fast continues fifty-five days; nothing is eaten except bread and vegetables, and that only in the afternoon, when church prayers are over. The Fast of the Nativity lasts for twenty-eight days before Christmas; that of the Apostles for a variable number of days from the Feast of the Ascension; and that of the Virgin for fifteen days before the Assumption. All Wednesdays and Fridays are also fast days except those that occur in the period between Easter and Whitsunday. The Armenians are equally strict; but (adds Rycaut) "the times seem so confused and without rule that they can scarce be recounted, unless by those who live amongst them, and strictly observe them, it being the chief care of the priest, whose learning principally consists in knowing the appointed times of fasting and feasting, the which they never omit on Sundays to publish unto the people."[1]

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[1] Quinam isti (adversarii) sint, semel nominabo: exteriores et interiores botuli psychicorum . . . Arguunt nos quod *jejunia propria* custodiamus, quod stationes plerumque in vesperam *producamus*, quod etiam *xerophagias* observemus, siccantes cibum ab omni carne et omni jurulentia et uvidioribus quibusque pomis, nec quid vinositatis vel edamus vel potemus; lavacri quoque abstinentiam congruentem arido victui.

[2] The language of the canon is ambiguous; but this interpretation seems to be preferable, especially in view of canon 23, which enacts that *jejunii superpositiones* are to be observed in all months except July and August. See Hefele, *Councils*, i. 148 (Engl. trs.).

[3] Compare the 52nd [51st] of the Apostolical canons. "If any bishop or presbyter or deacon, or indeed any one of the sacerdotal catalogue, abstains from flesh and wine, not for his own exercise but out of hatred of the things, forgetting that all things were very good . . . either let him reform, or let him be deprived and be cast out of the church. So also a layman." To this particular canon Hefele is disposed to assign a very early date.

[4] Compare canon 64 of the (supposed) fourth synod of Carthage: "He who fasts on Sunday is not accounted a Catholic" (Hefele, ii. 415).

[5] Priscillian, whose widespread heresy evoked from the synod of Saragossa (418) the canon, "No one shall fast on Sunday, nor may any one absent himself from church during Lent and hold a festival of his own," appears, on the question of fasting, not to have differed from the Encratites and various other sects of Manichean tendency (c. 406).

[6] Cap. iii. pro partib. Saxoniae: "Si quis sanctum quadragesimale jejunium pro despectu Christianitatis contempserit et carnem comederit, morte moriatur. Sed tamen consideretur a sacerdote ne forte causa necessitatis hoc cuilibet proveniat, ut carnem comedat." See Augusti, *Christliche Archäologie*, x. p. 374.

At the council of Trent no more than a passing allusion was made to the subject of fasting. The faithful were simply enjoined to submit themselves to church authority on the subject; and the clergy were exhorted to urge their flocks to the observance of frequent jejunia, as conducive to the mortification of the flesh, and as assuredly securing the divine favour. R. F. R. Bellarmine (*De jejunio*) distinguishes *jejunium spirituale* (*abstinentia a vitiis*), *jejunium morale* (*parsimonia et temperantia cibi et potus*), *jejunium naturale* (*abstinentia ab omni prorsus cibo et potu, quacunque ratione sumpto*), and *jejunium ecclesiasticum*. The last he defines simply as an abstinence from food in conformity with the rule of the church. It may be either voluntary or compulsory; and compulsory either because of a vow or because of a command. But the definition given by Alexander Halensis, which is much fuller, still retains its authority:—"Jejunium est abstinentia a cibo et potu secundum formam ecclesiae, intuitu satisfaciendi pro peccato et acquirendi vitam aeternam." It was to this last clause that the Reformers most seriously objected. They did not deny that fasting might be a good thing, nor did they maintain that the church or the authority might not ordain fasts, though they deprecated the imposition of needless burdens on the conscience. What they protested against was the theory of the opus operatum et meritorium as applied to fasting. As matter of fact, the Reformed churches in no case gave up the custom of observing fast days, though by some churches the number of such days was greatly reduced. In many parts of Germany the seasons of Lent and Advent are still marked by the use of emblems of mourning in the churches, by the frequency of certain phrases (Kyrie eleison, Agnus Dei) and the absence of others (Hallelujah, Gloria in excelsis) in the liturgical services, by abstinence from some of the usual social festivities, and by the non-celebration of marriages. And occasional fasts are more or less familiar. The Church of England has retained a considerable list of fasts; though Hooker (*E.P.* v. 72) had to contend with some who, while approving of fastings undertaken "of men's own free and voluntary accord as their particular devotion doth move them thereunto," yet "yearly or weekly fasts such as ours in the Church of England they allow no further than as the temporal state of the land doth require the same for the maintenance of seafaring men and preservation of cattle; because the decay of the one and the waste of the other could not well be prevented but by a politic order appointing some such usual change of diet as ours is."

In the practice of modern Roman Catholicism the following are recognized as fasting days, that is to say, days on which one meal only, and that not of flesh, may be taken in the course of twenty-four hours:—The forty days of Lent (Sundays excepted), all the Ember days, the Wednesdays and Fridays in Advent, and the vigils of certain feasts, namely, those of Whitsuntide, of St Peter and St Paul, of the Assumption of the Blessed Virgin Mary, of All Saints and of Christmas day. The following are simply days of abstinence, that is to say, days on which flesh at all events must not be eaten:—The Sundays in Lent, the three Rogation days, the feast of St Mark (unless it falls in Easter week), and all Fridays which are not days of fasting. In the Anglican Church, the "days of fasting or abstinence" are the forty days of Lent, the Ember days, the Rogation days, and all the Fridays in the year, except Christmas day. The evens or vigils before Christmas, the Purification of the Blessed Virgin Mary, the Annunciation of the Blessed Virgin Mary, Easter day, Ascension day, Pentecost, St Matthias, the Nativity of St John Baptist, St Peter, St James, St Bartholomew, St Matthew, St Simon and St Jude, St Andrew, St Thomas, and All Saints are also recognized as "fast days." By the 64th canon it is enacted that "every parson, vicar or curate, shall in his several charge declare to the people every Sunday at the time appointed in the communion-book [which is, after the Nicene creed has been repeated] whether there be any holy-days or fast-days the week following." The 72nd canon ordains that "no minister or ministers shall, without licence and direction of the bishop under hand and seal, appoint or keep any solemn fasts, either publicly or in any private houses, other than such as by law are or by public authority shall be appointed, nor shall be wittingly present at any of them under pain of suspension for the first fault, of excommunication for the second, and of deposition from the ministry for the third." While strongly discouraging the arbitrary multiplication of public or private fasts, the English Church seems to leave to the discretion of the individual conscience every question as to the manner in which the fasts she formally enjoins are to be observed. In this connexion the homily *Of Fasting* may be again referred to. By a statute of the reign of Queen Elizabeth it was enacted that none should eat flesh on "fish days" (the Wednesdays, Fridays and Saturdays throughout the year) without a licence, under a penalty. In the Scottish Presbyterian churches days of "fasting, humiliation and prayer" are observed by ecclesiastical appointment in each parish once or twice every year on some day of the week preceding the Sunday fixed for the administration of the sacrament of the Lord's Supper. In some of the New England States, it has been usual for the governor to appoint by proclamation at some time in spring a day of fasting, when religious services are conducted in the churches. National fasts have more than once been observed on special occasions both in this country and in the United States of America.

On the subject of fasting the views of Aerius are to a large extent shared by modern Protestant moralists. R. Rothe, for example, who on this point may be regarded as a representative thinker, rejects the idea that fasting is a thing meritorious in itself, and is very doubtful of its value even as an aid to devotional feeling. Of course when bodily health and other circumstances require it, it becomes a duty; and as a means of self-discipline it may be used with due regard to the claims of other duties, and to the fitness of things. In this last aspect, however, habitual temperance will generally be found to be much more beneficial than occasional fasting. It is extremely questionable, in particular, whether fasting be so efficient as it is sometimes supposed to be in protecting against temptation to fleshly sin. The practice has a well-ascertained tendency to excite the imagination; and in so far as it disturbs that healthy and well-balanced interaction of body and mind which is the best or at least the normal condition for the practice of virtue, it is to be deprecated rather than encouraged (*Theologische Ethik*, sec. 873-875).

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[1] See Fink's article "Fasten" in Ersch and Gruber's *Encyclopädie*; Lane, *Modern Egyptians*; and Rycaut, *Present State of the Armenian Church*.

Mahommedan Fasts.—Among the Mahommedans, the month Ramadan, in which the first part of the Koran is said to have been received, is by command of the prophet observed as a fast with extraordinary rigour. No food or drink of any kind is permitted to be taken from daybreak until the appearance of the stars at nightfall. Extending as it does over the whole "month of raging heat," such a fast manifestly involves considerable self-denial; and it is absolutely binding upon all the faithful whether at home or abroad. Should its observance at the appointed time be interfered with by sickness or any other cause, the fast must be kept as soon afterwards as possible for a like number of days. It is the only one which Mahommedanism enjoins; but the doctors of the law recommend a considerable number of voluntary fasts, as for example on the tenth day of the month Moharram. This day, called the "Yom Ashoora," is held sacred on many accounts:—"because it is believed to be the day on which the first meeting of Adam and Eve took place after they were cast out of paradise; and that on which Noah went out from the ark; also because several other great events are said to have happened on this day; and because the ancient Arabs, before the time of the prophet, observed it by fasting. But what, in the opinion of most modern Moslems, and especially the Persians, confers the greatest sanctity on the day of Ashoora is the fact of its being that on which El-Hoseyn, the prophet's grandson, was slain a martyr at the battle of the plain of Karbala." It is the practice of many Moslems to fast on this day, and some do so on the preceding day also. Mahomet himself called fasting the "gate of religion," and forbade it only on the two great festivals, namely, on that which immediately follows Ramadan and on that which succeeds the pilgrimage. (See Lane, *Modern Egyptians*, chaps. iii., xxiv.)

FASTOLF, SIR JOHN (d. 1459), English soldier, has enjoyed a more lasting reputation as in some part the prototype of Shakespeare's Falstaff. He was son of a Norfolk gentleman, John Fastolf of Caister, is said to have been squire to Thomas Mowbray, duke of Norfolk, before 1398, served with Thomas of Lancaster in Ireland during 1405 and 1406, and in 1408 made a fortunate marriage with Millicent, widow of Sir Stephen Scrope of Castle Combe in Wiltshire. In 1413 he was serving in Gascony, and took part in all the subsequent campaigns of Henry V. in France. He must have earned a good repute as a soldier, for in 1423 he was made governor of Maine and Anjou, and in February 1426 created a knight of the Garter. But later in this year he was superseded in his command by John Talbot. After a visit to England in 1428, he returned to the war, and on the 12th of February 1429 when in charge of the convoy for the English army before Orleans defeated the French and Scots at the "battle of herrings." On the 18th of June of the same year an English force under the command of Fastolf and Talbot suffered a serious defeat at Patay. According to the French historian Waurin, who was present, the disaster was due to Talbot's rashness, and Fastolf only fled when resistance was hopeless. Other accounts charge him with cowardice, and it is true that John of Bedford at first deprived him of the Garter, though after inquiry he was honourably reinstated. This incident was made unfavourable use of by Shakespeare in *Henry VI.* (pt. i. act iv. sc. i.). Fastolf continued to serve with honour in France, and was trusted both by Bedford and by Richard of York. He only came home finally in 1440, when past sixty years of age. But the scandal against him continued, and during Cade's rebellion in 1451 he was charged with having been the cause of the English disasters through minishing the garrisons of Normandy. It is suggested that he had made much money in the war by the hire of troops, and in his later days he showed himself a grasping man of business. A servant wrote of him:—"cruel and vengible he hath been ever, and for the most part without pity and mercy" (*Paston Letters*, i. 389). Besides his share in his wife's property he had large estates in Norfolk and Suffolk, and a house at Southwark, where he also owned the Boar's Head Inn. He died at Caister on the 5th of November 1459. There is some reason to suppose that Fastolf favoured Lollardry, and this circumstance with the tradition of his braggart cowardice may have suggested the use of his name for the boon companion of Prince Hal, when Shakespeare found it expedient to drop that of Oldcastle. In the first two folios the name of the historical character in the first part of *Henry VI.* is given as "Falstaffe" not Fastolf. Other points of resemblance between the historic Fastolf and the Falstaff of the dramatist are to be found in their service under Thomas Mowbray, and association with a Boar's Head Inn. But Falstaff is in no true sense a dramatization of the real soldier.

The facts of Fastolf's early career are to be found chiefly in the chronicles of Monstrelet and Waurin. For his later life there is much material, including a number of his own letters, in the *Paston Letters.* There is a full life by W. Oldys in the *Biographia Britannica* (1st ed., enlarged by Gough in Kippis's edition). See also Dawson Turner's *History of Caister Castle*, Scrope's *History of Castle Combe*, J. Gairdner's essay *On the Historical Element in Shakespeare's Falstaff*, ap. *Studies in English History*, Sidney Lee's article in the *Dictionary of National Biography*, and D. W. Duthie, *The Case of Sir John Fastolf and other Historical Studies* (1907). (C. L. K.)

FAT (O.E. *fǽtt*; the word is common to Teutonic languages, cf. Dutch *vet*, Ger. *Fett*, &c., and may be ultimately related to Greek *πίων* and *πιαρός*, and Sanskrit *pivan*), the name given to certain animal and vegetable products which are oily solids at ordinary temperatures, and are chemically distinguished as being the glyceryl esters of various fatty acids, of which the most important are stearic, palmitic, and oleic; it is to be noticed that they are non-nitrogenous. Fat is a normal constituent of animal tissue, being found even before birth; it occurs especially in the intra-muscular, the abdominal and the subcutaneous connective tissues. In the vegetable kingdom fats especially occur in the seeds and fruits, and sometimes in the roots. Physiological subjects concerned with the part played by fats in living animals are treated in the articles CONNECTIVE TISSUES; NUTRITION; CORPULENCE; METABOLIC DISEASES. The fats are chemically similar to the fixed oils, from which they are roughly distinguished by being solids and not liquids (see OILS). While all fats have received industrial applications, foremost importance must be accorded to the fats of the domestic animals—the sheep, cow, ox and calf. These, which are extracted from the bones and skins in the first operation in the manufacture of glue, are the raw materials of the soap, candle and glycerin industries.

FATALISM (Lat. *fatum*, that which is spoken, decreed), strictly the doctrine that all things happen according to a prearranged fate, necessity or inexorable decree. It has frequently been confused with determinism (*q.v.*), which, however, differs from it categorically in assigning a certain function to the will. The essence of the fatalistic doctrine is that it assigns no place at all to the initiative of the individual, or to rational sequence of events. Thus an oriental may believe that he is fated to die on a particular day; he believes that, whatever he does and in spite of all precautions he may take, nothing can avert the disaster. The idea of an omnipotent fate overruling all affairs of men is present in various forms in practically all religious systems. Thus Homer assumes a single fate (Μοῖρα), an impersonal power which makes all human concerns subject to the gods: it is not powerful over the gods, however, for Zeus is spoken of as weighing out the fate of men (*Il.* xxii. 209, viii. 69). Hesiod has three Fates (Μοῖραι), daughters of Night, Clotho, Lachesis and Atropos. In Aeschylus fate is powerful even over the gods. The Epicureans regarded fate as blind chance, while to the Stoics everything is subject to an absolute rational law.

The doctrine of fate appears also in what are known as the higher religions, *e.g.* Christianity and Mahommedanism. In the former the ideas of personality and infinite power have vanished, all power being conceived as inherent in God. It is recognized that the moral individual must have some kind of initiative, and yet since God is omnipotent and omniscient man must be conceived as in some sense foreordained to a certain moral, mental and physical development. In the history of the Christian church emphasis has from time to time been laid specially on the latter aspect of human life (cf. the doctrines of election, foreordination, determinism). Even those theologians, however, who have laid special stress on the limitations of the human will have repudiated the strictly fatalistic doctrine which is characteristic of Oriental thought and is the negation of all human initiative (see PREDESTINATION; AUGUSTINE, SAINT; WILL). In Islam fate is an absolute power, known as *Kismet*, or *Nasib*, which is conceived as inexorable and transcending all the physical laws of the universe. The most striking feature of the Oriental fatalism is its complete indifference to material circumstances: men accept prosperity and misfortune with calmness as the decree of fate.

FATE, in Roman mythology, the spoken word (*fatum*) of Jupiter, the unalterable will of heaven. The plural (*Fata*, the Fates) was used for the "destinies" of individuals or cities, and then for the three goddesses who controlled them. Thus, Fata Scribunda were the goddesses who wrote down a man's destiny at his birth. In this connexion, however, Fata may be singular, the masculine and feminine *Fatus, Fata*, being the usual forms in popular and ceremonial language. The Fates were also called Parcae, the attributes of both being the same as those of the Greek Moerae.

FATEHPUR, FATHIPUR or FUTTEHPOOR, a town and district of British India, in the Allahabad division of the United Provinces. The town is 73 m. by rail N.W. of Allahabad. Pop. (1901) 19,281. The district has an area of 1618 sq. m. It is situated in the extreme south-eastern corner of the Doab or tract of country between the Ganges and the Jumna, which respectively mark its northern and southern boundaries. The whole district consists of an alluvial plain formed by the deposits of the two great rivers. The central part is almost perfectly level, and consists of highly cultivated land interspersed with jungle and with tracts impregnated with saltpetre (*usar*). A ridge of higher land, forming the watershed of the district, runs along it from east to west at an average distance of about 5 m. from the Ganges. Fatehpur therefore consists of two inclined planes, the one 5 m. broad, sloping down rapidly to the Ganges, and the other from 15 to 20 m. broad, falling gradually to the Jumna. The country near the banks of the two rivers is cut up into ravines and nullahs running in all directions, and is almost entirely uncultivable. Besides the Ganges and Jumna the only rivers of importance are the Pandu, a tributary of the Ganges, and the Arind and Nun, which both fall into the Jumna. The climate is more humid than in the other districts of the Doab, and although fevers are common, it is not considered an unhealthy district. The average annual rainfall is 34 in.

The tract in which this district is comprised was conquered in 1194 by the Pathans; but subsequently, after a desperate resistance, it was wrested from them by the Moguls. In the 18th century it formed a part of the *subah* of Korah, and was under the government of the wazir of Oudh. In 1736 it was overrun by the Mahrattas, who retained possession of it until, in 1750, they were ousted by the Pathans of Fatehpur. In 1753 it was reconquered by the nawab of Oudh. In 1765, by a treaty between the East India Company and the nawab, Korah was made over to the Delhi emperor, who retained it till 1774, when it was again restored to the nawab wazir's dominions. Finally in 1801, the nawab, by treaty, reconveyed it to the Company in commutation of the amount which he had stipulated to pay in return for the defence of his country. In June 1857 the district rose in rebellion, and the usual murders of Europeans took place. Order was established after the fall of Lucknow, on the return of Lord Clyde's army to Cawnpore. In 1901 the population was 686,391, showing a decrease of 2 % in the decade. The district is traversed by the main line of the East Indian railway from Allahabad to Cawnpore. Trade is mainly agricultural, but the town of Fatehpur is noted for the manufacture of ornamental whips, and Jafarganj for artistic curtains, &c.

FATEHPUR SIKRI, a town in the Agra district in the United Provinces of India, on the road from Agra to Jaipur. Pop. (1901) 7147. It is a ruined city, and is interesting only from an archaeological point of view. It was founded by Akbar in 1569 as a thank-offering for the birth of a son, Selim, afterwards the emperor Jahangir, foretold by Selim Chisti, a famous Mahommedan saint. The principal building is the great mosque, which is said by Fergusson to be hardly surpassed by any in India. "It measures 550 ft. east and west by 470 ft. north and south, over all. The mosque itself, 250 ft. by 80 ft., is crowned by three domes. In its courtyard, which measures 350 ft. by 440 ft., stand two tombs. One is that of Selim Chisti, built of white marble, and the windows with pierced tracery of the most exquisite geometrical patterns. It possesses besides a deep cornice of marble, supported by brackets of the most elaborate design. The other tomb, that of Nawab Islam Khan, is soberer and in excellent taste, but quite eclipsed by its surroundings. Even these parts, however, are surpassed in magnificence by the southern gateway. As it stands on a rising ground, when looked at from below its appearance is noble beyond that of any portal attached to any mosque in India, perhaps in the whole world." Among other more noteworthy buildings the following may be mentioned. The palace of Jodh Bai, the Rajput wife of Akbar, consists of a courtyard surrounded by a gallery, above which rise buildings roofed with blue enamel. A rich gateway gives access to a terrace on which are the "houses of Birbal and Miriam"; and beyond these is another courtyard, where are Akbar's private apartments and the exquisite palace of the Turkish sultana. Here are also the Panch Mahal or five-storeyed building, consisting of five galleries in tiers, and the audience chamber. The special feature in the architecture of the city is the softness of the red sandstone, which could be carved almost as easily as wood, and so lent itself readily to the elaborate Hindu embellishment. Fatehpur Sikri was a favourite residence of Akbar throughout his reign, and his establishment here was of great magnificence. After Akbar's death Fatehpur Sikri was deserted within 50 years of its foundation. The reason for this was that frequent cause in the East, lack of water. The only water obtainable was so brackish and corroding as to cause great mortality among the inhabitants. The buildings are situated within an enclosure, walled on three sides and about 7 m. in circumference. They are all now more or less in ruins, and their elaborate painting and other decoration has largely perished, but some modern restoration has been effected.

See E. B. Havell, *A Handbook to Agra and the Taj, Sikandra, Fatehpur Sikri*, &c. (1904).

FATHER, the begetter of a child, the male parent. The word is common to Teutonic languages, and, like the other words for close family relationship, mother, brother, son, sister, daughter, appears in most Indo-European languages. The O. Eng. form is *fæder*, and it appears in Ger. *Vater*, Dutch *vader*, Gr. *πατήρ*, Lat. *pater*, whence Romanic Fr. *père*, Span. *padre*, &c. The word is used of male ancestors more remote than the actual male parent, and of ancestors in general. It is applied to God, as the Father of Jesus Christ, and as the Creator of the world, and is thus the orthodox term for the First Person of the Trinity. Of the transferred uses of the word many have religious reference; thus it is used of the Christian writers, usually confined to those of the first five centuries, the Fathers of the Church (see below), of whom those who flourished at the end of, or just after the age of, the apostles are known as the Apostolic Fathers. One who stands as a spiritual parent to another is his "father," *e.g.* godfather, or in the title of bishops or archbishops, Right or Most Reverend Father in God. The pope is, in the Roman Church, the Holy Father. In the Roman Church, father is strictly applied to a "regular," a member of one of the religious orders, and so always in Europe, in English usage, often applied to a confessor, whether regular or secular, and to any Roman priest, and sometimes used of sub-members of a religious society or fraternity in the English Church. Of transferred uses, other than religious, may be mentioned the application to the first founders of an institution, constitution, epoch, &c. Thus the earliest settlers of North America are the Pilgrim Fathers, and the framers of the United States constitution are the Fathers of the Constitution. In ancient Rome the members of the senate are the *Patres conscripti*, the "Conscript fathers." The senior member or doyen of a society is often called the father. Thus the member of the English House of Commons, and similarly, of the House of Representatives in the United States, America, who has sat for the longest period uninterruptedly, is the Father of the House.

FATHERS OF THE CHURCH. The use of the word "father" as a title of respect is found in the Old Testament, where it is applied to patriarchs (Gen. l. 24 (Septuagint); Exod. iii. 13, 15; Deut. i. 8), priests (Judg. xvii. 10, xviii. 19), prophets (2 Kings ii. 12, vi. 21, xiii. 14), and distinguished ancestors (*Ecclus.* xliv. 1). In the time of our Lord the scribes claimed the name with an arrogance which He disapproved (Matt. xxiii. 9); in the rabbinic literature "the fathers" are the more eminent of the earlier rabbis whose sayings were handed down for the guidance of posterity.[1] The Christian Church, warned perhaps by the words of Christ, appears at first to have avoided a similar use of the term, while St Paul, St Peter and St John speak of their converts as spiritual children (1 Cor. iv. 14 f., Gal. iv. 19, 1 Pet. v. 13, 1 John ii. 12); they did not assume, so far as we know, the official style of "fathers in God." Nor is this title found in the age which succeeded to that of the apostles. When Polycarp, bishop of Smyrna, was martyred (A.D. 155), the crowd shouted, "This is the father of the Christians"[2]; but the words were probably prompted by the Jews, who took a prominent part in the martyrdom, and who naturally viewed Polycarp in the light of a great Christian rabbi, and gave him the title which their own teachers bore. In the next century members of the episcopal order were sometimes addressed in this manner: thus Cyprian is styled *papas* or *papa* by his Roman correspondents.[3] The bishops who sat in the great councils of the 4th century were known as "the 318 fathers" of Nicaea, and "the 150 fathers" of Constantinople. Meanwhile the custom was growing up of appealing to eminent Church writers of a past generation under this name. Thus Athanasius writes (*ad Afros* vi.): "We have the testimony of fathers (the two Dionysii, bishops of Alexandria and Rome, who wrote in the previous century) for the use of the word ὁμοούσιος." Such quotations were multiplied, as theologians learnt to depend increasingly upon their predecessors, until the testimony of "our holy father" Athanasius, or Gregory the Divine, or John the Golden-mouthed, came to be regarded as decisive in reference to controverted points of faith and practice.

In the narrower sense thus indicated the "fathers" of the Church are the great bishops and other eminent Christian teachers of the earlier centuries, who were conspicuous for soundness of judgment and sanctity of life, and whose writings remained as a court of appeal for their successors. A list of fathers drawn up on this principle will begin with the Christian writers of the 1st century whose writings are not included in the New Testament: where it ought to end is a more difficult point to determine. Perhaps the balance of opinion is in favour of regarding Gregory the Great (d. 604) as the last of the Latin fathers, and John of Damascus (d. *c.* 760) as the last of the fathers of the Greek Church. A more liberal estimate might include John Scotus Erigena or even Anselm or Bernard of Clairvaux in the West and Photius in the East. The abbé Migne carried his Latin patrology down to the time of Innocent III. (d. 1216), and his Greek patrology to the fall of Constantinople (1453); but, while this large extension of the field is much to the advantage of his readers, it undoubtedly stretches the meaning of *patrologia* far beyond its natural limits. For ordinary purposes it is best to make the patristic period conterminous with the life of the ancient Catholic Church. In the West the Church enters the medieval stage of its history with the death of Gregory, while in the East even John of Damascus is rather a compiler of patristic teaching than a true "father."

A further question arises. Are all the Christian writers of a given period to be included among the "fathers," or those only who wrote on religious subjects, and of whose orthodoxy there is no doubt? Migne, following the example of the editors of *bibliothecae patrum* who preceded him, swept into his great collection all the Christian writings which fell within his period; but he is careful to state upon his title-page that his patrologies include the ecclesiastical writers as well as the fathers and doctors of the Church. For a comprehensive use of the term "ecclesiastical writers" he has the authority of Jerome, who enumerates among them[4] such heresiarchs or leaders of schism as Tatian, Bardaisan, Novatus, Donatus, Photinus and Eunomius. This may not be logical, but long usage has made it permissible or even necessary. It is often difficult, if not impracticable, to draw the line between orthodox writers and heterodox; on which side, it might be asked, is Origen to be placed? and in the case of a writer like Tertullian who left the Church in middle life, are we to admit certain of his works into our patrology and refuse a place to others? It is clear that in the circumstances the terms "father," "patristic," "patrology" must be used with much elasticity, since it is now too late to substitute for them any more comprehensive terms.

By the "fathers," then, we understand the whole of extant Christian literature from the time of the apostles to the rise of scholasticism or the beginning of the middle ages. However we may interpret the lower limit of this period, the literature which it embraces is immense. Some method of subdivision is necessary, and the simplest and most obvious is that which breaks the whole into two great parts, the ante-Nicene and the post-Nicene. This is not an arbitrary cleavage; the Council of Nicaea (A.D. 325) is the watershed which actually separates two great tracts of Christian literature. The ante-Nicene age yields priceless records of the early struggles of Christianity; from it we have received specimens of the early apologetic and the early polemic of the Church, the first essays of Christian philosophy, Christian correspondence, Christian biblical interpretation: we owe to it the works of Justin, Irenaeus, the Alexandrian Clement, Origen, Tertullian, Cyprian. In these products of the 2nd and 3rd centuries there is much which in its own way was not surpassed by any of the later patristic writings. Yet the post-Nicene literature, considered as literature, reaches a far higher level. Both in East and West, the 4th and 5th centuries form the golden age of dogmatic theology, of homiletic preaching, of exposition, of letter-writing, of Church history, of religious poetry. Two causes may be assigned for this fact. The conversion of the empire gave the members of the Church leisure and opportunities for the cultivation of literary taste, and gradually drew the educated classes within the pale of the Christian society. Moreover, the great Christological controversies of the age tended to encourage in Christian writers and preachers an intellectual acuteness and an accuracy of thought and expression of which the earlier centuries had not felt the need.

The ante-Nicene period of patristic literature opens with the "apostolic fathers,"[5] *i.e.* the Church writers who flourished toward the end of the apostolic age and during the half century that followed it, including Clement of Rome, Ignatius of Antioch, Polycarp of Smyrna and the author known as "Barnabas." Their writings, like those of the apostles, are epistolary; but editions of the apostolic fathers now usually admit also the early Church order known as the *Didachē*, the allegory entitled the *Shepherd*, and a short anonymous apology addressed to one Diognetus. A second group, known as the "Greek Apologists," embraces Aristides, Justin, Tatian, Athenagoras and Theophilus; and a third consists of the early polemical writers, Irenaeus and

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[1] See Buxtorf, *s.v. Abh*, and cf. the title of the tract *Pirke Aboth* (ed. Taylor, p. 3).

[2] *Polyc. Mart.* 8.

[3] *Studia biblica*, iv. p. 273.

[4] In his book *De viris illustribus*.

[5] The term *patres apostolici* is due to the patristic scholars of the 17th century: see Lightfoot, *St Clement of Rome*, i. p. 3. "Subapostolic" is perhaps a more accurate designation.

Hippolytus. Next come the great Alexandrians, Clement, Origen, Dionysius; the Carthaginians, Tertullian and Cyprian; the Romans, Minucius Felix and Novatian; the last four laid the foundations of a Latin Christian literature. Even the stormy days of the last persecution yielded some considerable writers, such as Methodius in the East and Lactantius in the West. This list is far from complete; the principal collections of the ante-Nicene fathers include not a few minor and anonymous writers, and the fragments of many others whose works as a whole have perished.

In the post-Nicene period the literary output of the Church was greater. Only the more representative names can be mentioned here. From Alexandria we get Athanasius, Didymus and Cyril; from Cyrene, Synesius; from Antioch, Theodore of Mopsuestia, John Chrysostom and Theodoret; from Palestine, Eusebius of Caesarea and Cyril of Jerusalem; from Cappadocia, Basil, Gregory of Nyssa and Gregory of Nazianzus. The Latin West was scarcely less productive; it is enough to mention Hilary of Poitiers, Ambrose of Milan, Augustine of Hippo, Leo of Rome, Jerome, Rufinus, and a father lately restored to his place in patristic literature, Niceta of Remesiana.[1] Gaul alone has a goodly list of Christian authors to show: John Cassian, Vincent of Lerins, Hilary of Arles, Prosper of Aquitaine, Salvian of Marseilles, Sidonius Apollinaris of Auvergne, Caesarius of Arles, Gregory of Tours. The period ends in the West with two great Italian names, Cassiodorus and Pope Gregory I., after Leo the greatest of papal theologians.

The reader to whom the study is new will gain some idea of the bulk of the extant patristic literature, if we add that in Migne's collection ninety-six large volumes are occupied with the Greek fathers from Clement of Rome to John of Damascus, and seventy-six with the Latin fathers from Tertullian to Gregory the Great.[2]

For a discussion of the more important fathers the student is referred to the articles which deal with them separately. In this place it is enough to consider the general influence of the patristic writings upon Christian doctrine and biblical interpretation. Can any authority be claimed for their teaching or their exegesis, other than that which belongs to the best writers of every age. The decree of the council of Trent[3] (*ut nemo . . . contra unanimum consensum patrum ipsam scripturam sacram interpretari audeat*) is studiously moderate, and yet it seems to rule that under certain circumstances it is not permitted to the Church of later times to carry the science of biblical interpretation beyond the point which it had reached at the end of the patristic period. Roman Catholic writers,[4] however, have explained the prohibition to apply to matters of faith only, and in that case the Tridentine decree is little else than another form of the Vincentian canon which has been widely accepted in the Anglican communion: *curandum est ut id teneamus quod ubique, quod semper, quod ab omnibus creditum est.* The fathers of the first six or seven centuries, so far as they agree, may be fairly taken to represent the main stream of Christian tradition and belief during the period when the apostolic teaching took shape in the great creeds and dogmatic decisions of Christendom. The English reformers realized this fact; and notwithstanding their insistence on the unique authority of the canon of Scripture, their appeal to the fathers as representatives of the teaching of the undivided Church was as wholehearted as that of the Tridentine divines. Thus the English canon of 1571 directs preachers "to take heed that they do not teach anything in their sermons as though they would have it completely held and believed by the people, save what is agreeable to the doctrine of the Old and New Testaments, and what the Catholic Fathers and ancient Bishops have gathered from that doctrine." Depreciation of the fathers was characteristic, not of the Anglican reformation, but of the revolt against some of its fundamental principles which was led by the Puritan reaction.[5]

Now that the smoke of these controversies has passed away, it is possible to form a clearer judgment upon the merits of the patristic writings. They are no longer used as an armoury from which opposite sides may draw effective weapons, offensive or defensive; nor on the other hand are they cast aside as the rubbish of an ignorant and superstitious age. All patristic students now recognize the great inequality of these authors, and admit that they are not free from the faults of their times; it is not denied that much of their exegesis is untenable, or that their logic is often feeble and their rhetoric offensive to modern taste. But against these disadvantages may be set the unique services which the fathers still render to Christian scholars. Their works comprise the whole literature of our faith during the decisive centuries which followed the apostolic age. They are important witnesses to the text of the New Testament, to the history of the canon, and to the history of interpretation. It is to their pages that we owe nearly all that we know of the life of ancient Christianity. We see in them the thought of the ancient Church taking shape in the minds of her bishops and doctors; and in many cases they express the results of the great doctrinal controversies of their age in language which leaves little to be desired.[6]

AUTHORITIES.—The earliest writer on patristics was Jerome, whose book *De viris illustribus* gives a brief account of one hundred and thirty-five Church writers, beginning with St Peter and ending with himself. Jerome's work was continued successively by Gennadius of Marseilles, Isidore of Seville, and Ildefonsus of Toledo; the last-named writer brings the list down to the middle of the 7th century. Since the revival of learning books on the fathers have been numerous; among the more recent and most accessible of these we may mention Smith and Wace's *Dictionary of Christian Biography*, Hauck-Herzog's *Realencyklopädie*, Bardenhewer's *Patrologie* and *Geschichte der altkirchlichen Litteratur*, Harnack's *Geschichte der altchristlichen Litteratur bei Eusebius* and Ehrard's *Die altchristliche Litteratur und ihre Erforschung*. A record of patristic collections and editions down to 1839 may be found in Dowling's *Notitia Scriptorum SS. Patrum.* The contents of the volumes of Migne's patrologies are given in the *Catalogue général des livres de l'abbé Migne*, and a useful list in alphabetical order of the writers in the Greek *Patrologia* has been compiled by Dr J. B. Pearson (Cambridge, 1882). Migne's texts are not always satisfactory, but since the completion of his great undertaking two important collections have been begun on critical lines—the Vienna edition of the Latin Church writers,[7] and the Berlin edition of the Greek writers of the ante-Nicene period.[8]

For English readers there are three series of translations from the fathers, which cover much of the ground; the Oxford *Library of the Fathers*, the *Ante Nicene Christian Library* and the *Select Library of Nicene and Post-Nicene Fathers*. Satisfactory lexicons of patristic Greek and Latin are still a desideratum: but assistance may be obtained in the study of the Greek fathers from Suicer's *Thesaurus*, the *Lexicon of Byzantine Greek* by E. A. Sophocles, and the *Lexicon Graecum suppletorium et dialecticum* of Van Herwerden; whilst the new great *Latin Lexicon*, published by the Berlin Academy, is calculated to meet the needs of students of Latin patristic literature. For a fuller list of books useful to the reader of the Greek and Latin fathers see H. B. Swete's *Patristic Study* (2nd ed., 1902). (H. B. S.)

FATHOM (a word common, in various forms, to Scandinavian and Teutonic languages; cf. Danish *favn*, Dutch *vaam* and Ger. *Faden*, and meaning "the arms extended"; the ultimate origin is a root *pet*, seen in the Gr. πεταννύναι, to spread), a measure of length, being the distance from the tip of one middle finger to the tip of the other, when the arms are stretched out to their widest extent. This length has been standardized to a measure of 6 ft., and as such is used mainly in soundings as a unit for measuring the depth of the sea. "Fathom" is also used in the measurement of timber, when it is equivalent to 6 ft. sq.; similarly, in mining, a fathom is a portion of ground running the whole thickness of the vein of ore, and is 6 ft. in breadth and thickness. The verb "to fathom," *i.e.* to sound or measure with a fathom-line, is used figuratively, meaning to go into a subject deeply, to penetrate, or to explore thoroughly.

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[1] The *editio princeps* of Niceta's works was published by Dr A. E. Burn in 1905.

[2] The Greek patrology contains, however, besides the text, a Latin translation, and in both patrologies there is much editorial matter.

[3] Sess. iv.

[4] E. G. Möhler, *Symbolism* (E. tr.) § 42.

[5] See J. J. Blunt, *Right Use of the Fathers*, p. 15 ff.

[6] See Stanton, *Place of Authority in Religion*, p. 165 f.

[7] *Corpus scriptorum ecclesiasticorum Latinorum.*

[8] *Griechischen christlichen Schriftstellern der ersten drei Jahrhunderte.*

FATIMITES, or FATIMIDES, the name of a dynasty called after Fatima, daughter of the prophet Mahomet, from whom and her husband the caliph Ali, son of Abu Talib, they claimed descent. The dynasty is also called ‘Obaidi (Ubaidī) after ‘Obaidallah, the first sovereign, and ‘Alawī, a title which it shares with other dynasties claiming the same ancestry. For a list of sovereigns see EGYPT, section *History* (Mahommedan period); three, however, must be prefixed who reigned in north-western Africa before the annexation of Egypt: al-Mahdī ‘Obaidallah 297 (909); al-Qā’im Mahommed 322 (934); al-Mansūr Ismā‘īl 334 (945).

The dynasty owed its rise to the attachment to the family of the prophet which was widespread in the Moslem world, and the belief that the sovereignty was the right of one of its members. Owing, however, to the absence of the principle of primogeniture there was difference of opinion as to the person whose claim should be enforced, and a number of sects arose maintaining the rights of different branches of the family. The Fatimites were supported by those who regarded the sovereignty as vested in Ismā‘īl, son of Ja‘far al-Sādiq, great-great-grandson of Alī, through his second son Hosain (Ḥusain). Of this Ismā‘īl the first Fatimite caliph was supposed to be the great-grandson. The line of ancestors between him and Ismā‘īl is, however, variously given, even his father's name being quite uncertain, and in some of the pedigrees even Ismā‘īl does not figure. Apparently when the family first became of political importance their Alid descent was not disputed at Bagdad, and the poet al-Sharīf al-Radī (d. A.H. 406: A.D. 1015), in whose family the office of Naqīb (registrar of the Alids) was hereditary, appears to have acknowledged it (*Dīwān*, ed. Beirut, p. 972). When their success became a menace to the caliphs of Bagdad, genealogists were employed to demonstrate the falsity of the claim, and a considerable literature, both official and unofficial, rose in consequence. The founder of the dynasty was made out to be a scion of a family of heretics from whom the terrible Carmathian sect had originated: later on (perhaps owing to the rôle played by Jacob, son of Killis, in bringing the Fatimites to Egypt), the founder was made out to have been a Jew, either as having been adopted by the heretic supposed to be his father, or as having been made to personate the real ‘Obaidallah, who had been killed in captivity. While the stories that make him of either Jewish or Carmathian origin may be neglected, as the product of malice, the uncertainty of the genealogies offered by their partisans renders any positive solution of the problem impossible. What seems to be clear is that secretly within the Abbasid empire propaganda was carried on in favour of one or other Alid aspirant, and the danger which any such aspirant incurred by coming forward openly led to his whereabouts being concealed except from a very few adherents. What is known then is that towards the end of the 3rd Islamic century the leader of the sect of Ismā‘īlites (Assassins, *q.v.*) who afterwards mounted a throne, lived at Salamia, near Emesa (Homs), having agents spread over Arabia, Persia and Syria, and frequently receiving visits from pious adherents, who had been on pilgrimage to the grave of Hosain (Ḥusain). Such visitors received directions and orders such as are usual in secret societies. One of these agents, Abū Abdallah al-Hosain called al-Shī‘ī, said to have filled the office of censor (*muhtasib*) at Basra, received orders to carry on a mission in Arabia, and at Mecca is said to have made the acquaintance of some members of the Berber tribe Kutama, south of the bay of Bougie. These persons persuaded him to travel home with them in the character of teacher of the Koran, but according to some authorities the ground had already been prepared there for a political mission. He arrived in the Kutama country in June 893, and appears very soon to have been made chief, thereby exciting the suspicion of the Aghlabite ruler of Kairawān, Ibrāhīm b. Aḥmad, which, however, was soon allayed. His success provoked a civil war among the Berbers, but he was protected by a chief named Ḥasan b. Hārūn, and displayed sufficient military ability to win respect. Nine years after his arrival he made use of the unrest following on the death of the Aghlabite Ibrāhīm to attack the town of Mila, which he took by treachery, and turned into his capital; the son and successor of Ibrāhīm, Abu'l-‘Abbās ‘Abdallah, sent his son al-Aḥwal to deal with the new power, and he defeated al-Shī‘ī in some battles, but in 903 al-Aḥwal was recalled by his brother Ziyādatallah, who had usurped the throne, and put to death.

At some time after his first successes al-Shī‘ī sent a messenger (apparently his brother) to the head of his sect at Salamia, bidding him come to the Kutama country, and place himself at the head of affairs, since al-Shī‘ī's followers had been taught to pay homage to a Mahdī who would at some time be shown them. It is said that ‘Obaidallah, who now held this post, was known to the court at Bagdad, and that on the news of his departure orders were sent to the governor of Egypt to arrest him: but by skilful simulation ‘Obaidallah succeeded in escaping this danger, and with his escort reached Tripoli safely. Instructions had by this time reached the Aghlabite Ziyādatallah to be on the watch for the Mahdī, who was finally arrested at Sijilmāsa (Tafilalt) in the year A.H. 292 (A.D. 905); his companion, al-Shī‘ī's brother, had been arrested at an earlier point, and the Mahdī's journey to the south-west must have been to elude pursuit.

The invitation to the Mahdī turned out to have been premature; for Ziyādatallah had sent a powerful army to oppose al-Shī‘ī, which, making Constantine its headquarters, had driven al-Shī‘ī into the mountains: after six months al-Shī‘ī secured an opportunity for attacking it, and won a complete victory. Early in 906 another army was sent to deal with al-Shī‘ī, and an earnest appeal came from the caliph Muqtafī (Moktafi), addressed to all the Moslems of Africa, to aid Ziyādatallah against the usurper. The operations of the Aghlabite prince were unproductive of any decided result, and by September 906 al-Shī‘ī had got possession of the important fortress Tubna and some others. Further forces were immediately sent to the front by Ziyādatallah, but these were defeated by al-Shī‘ī and his officers, to whom other towns capitulated, till Ziyādatallah found it prudent to retire from Al-Urbus or Laribus, which had been his headquarters, and entrench himself in Raqqāda, one of the two capitals of his kingdom, Kairawān being the other. Ziyādatallah is charged by the chroniclers with dissoluteness and levity, and even cowardice: after his retreat the fortresses and towns in what now constitute the department of Constantine and in Tunisia fell fast into al-Shī‘ī's hands, and he was soon able to threaten Raqqāda itself.

By March 909 Raqqāda had become untenable, and Ziyādatallah resolved to flee from his kingdom; taking with him his chief possessions, he made for Egypt, and thence to ‘Irak: his final fate is uncertain. The cities Raqqāda and Kairawān were immediately occupied by Al-Shī‘ī, who proceeded to send governors to the other places of importance in what had been the Aghlabite kingdom, and to strike new coins, which, however, bore no sovereign's name. Orders were given that the Shī‘ite peculiarities should be introduced into public worship.

In May 909 al-Shī‘ī led a tremendous army westwards to the kingdom of Tahert, where he put an end to the Rustamite dynasty, and appointed a governor of his own: he thence proceeded to Sijilmāsa where ‘Obaidallah lay imprisoned, with the intention of releasing him and placing him on the throne. After a brief attempt at resistance, the governor fled, and al-Shī‘ī entered the city, released ‘Obaidallah and presented him to the army as the long-promised Imām. The day is given as the 26th of August 909. ‘Obaidallah had been in prison more than three years. Whether his identity with the Mahdī for whom al-Shī‘ī had been fighting was known to the governor of Sijilmāsa is uncertain. If it was, the governor and his master the Aghlabite sovereign might have been expected to make use of their knowledge and outwit al-Shī‘ī by putting his Mahdī to death. Opponents of the Fatimites assert that this was actually done, and that the Mahdī presented to the army was not the real ‘Obaidallah, but (as usual) a Jewish captive, who had been suborned to play the rôle.

The chief command was now assumed by ‘Obaidallah, who took the title "al-Mahdī, Commander of the Faithful," thereby claiming the headship of the whole Moslem world: Raqqāda was at the first made the seat of the court, and the Shīʽite doctrines were enforced on the inhabitants, not without encountering some opposition. Revolts which arose in different parts of the Aghlabite kingdom were, however, speedily quelled.

The course followed by ʽObaidallah in governing independently of al-Shīʽī soon led to dissatisfaction on the part of the latter, who, urged on it is said by his brother, decided to dethrone their Mahdī, and on the occasion of an expedition to Ténès, which al-Shīʽī commanded, organized a conspiracy with that end. The conspiracy was betrayed to ʽObaidallah, who took steps to defeat it, and on the last day of July 911 contrived to assassinate both al-Shīʽī and his brother. Thus the procedure which had characterized the accession of the ʽAbbāsid dynasty was repeated. It has been conjectured that these assassinations lost the Fatimites the support of the organization that continued to exist in the East, whence the Carmathians figure as an independent and even hostile community, though they appear to have been amenable to the influence of the African caliph.

ʽObaidallah had now to face the dissatisfaction of the tribes whose allegiance al-Shīʽī had won, especially the Kutāma, Zenāta and Lawāta: the uprising of the first assumed formidable proportions, and they even elected a Mahdī of their own, one Kādū b. Muʽārik al-Māwatī, who promulgated a new revelation for their guidance. They were finally defeated by ʽObaidallah's son Abu'l-Qāsim Mahommed, who took Constantine, and succeeded in capturing the new Mahdī, whom he brought to Raqqāda. Other opponents were got rid of by ʽObaidallah by ruthless executions. By the middle of the year 913 by his own and his son's efforts he had brought his kingdom into order. After the style of most founders of dynasties he then selected a site for a new capital, to be called after his title Mahdia (*q.v.*), on a peninsula called Ḥamma (Cape Africa) S.S.E. of Kairawān. Eight years were spent in fortifying this place, which in 921 was made the capital of the empire.

After defeating internal enemies ʽObaidallah turned his attention to the remaining ʽAbbāsid possessions in Africa, and his general Habāsah b. Yūsuf in the year 913 advanced along the northern coast, taking various places, including the important town of Barca, his progress, it is said, being marked by great cruelty. He then advanced towards Egypt, and towards the end of July 914, being reinforced by Abu'l-Qāsim, afterwards al-Qā'im, entered Alexandria. The danger led to measures of unusual energy being taken by the Bagdad caliph Moqtadir, an army being sent to Egypt under Muʽnis, and a special post being organized between that country and Bagdad to convey messages uninterruptedly. The Fatimite forces were defeated, partly owing to the insubordination of the general Habāsah, in the winter of 914, and returned to Barca and Kairawān with great loss.

A second expedition was undertaken against Egypt in the year 919, and on the 10th of July Alexandria was entered by Abu'l-Qāsim, who then advanced southward, seizing the Fayum and Ushmūnain (Eshmunain). He was presently reinforced by a fleet, which, however, was defeated at Rosetta in March of the year 920 by a fleet despatched from Tarsus by the ʽAbbāsid caliph Moqtadir, most of the vessels being burned. Through the energetic measures of the caliph, who sent repeated reinforcements to Fostat, Abu'l-Qāsim was compelled in the spring of 921 to evacuate the places which he had seized, and return to the west with the remains of his army, which had suffered much from plague as well as defeat on the field. On his return he found that the court had migrated from Raqqāda to the new capital Mahdia (*q.v.*). Meanwhile other expeditions had been despatched by ʽObaidallah towards the west, and Nekor (Nakur) and Fez had been forced to acknowledge his sovereignty.

The remaining years of ʽObaidallah's reign were largely spent in dealing with uprisings in various parts of his dominions, the success of which at times reduced the territory in which he was recognized to a small area.

ʽObaidallah died on the 4th of March 933, and was succeeded by Abu'l-Qāsim, who took the title al-Qā'im biamr allah. He immediately after his accession occupied himself with the reconquest of Fez and Nekor, which had revolted during the last years of the former caliph. He also despatched a fleet under Yaʽqūb b. Isḥāq, which ravaged the coast of France, took Genoa, and plundered the coast of Calabria before returning to Africa. A third attempt made by him to take Egypt resulted in a disastrous defeat at Dhāt al-Humān, after which the remains of the expedition retreated in disorder to Barca.

The later years of the reign of Qā'im were troubled by the uprising of Abū Yazīd Makhlad al-Zenātī, a leader who during the former reign had acquired a following among the tribes inhabiting the Jebel Aures, including adherents of the ʽIbādī sect. After having fled for a time to Mecca, this person returned in 937 to Tauzar (Touzer), the original seat of his operations, and was imprisoned by Qā'im's order. His sons, aided by the powerful tribe Zenāta, succeeded in forcing the prison, and releasing their father, who continued to organize a conspiracy on a vast scale, and by the end of 943 was strong enough to take the field against the Fatimite sovereign, whom he drove out of Kairawān. Abū Yazīd proclaimed himself a champion of Sunnī doctrine against the Shīʽis, and ordered the legal system of Mālik to be restored in place of that introduced by the Fatimites. Apparently the doctrines of the latter has as yet won little popularity, and Abū Yazīd won an enormous following, except among the Kutāma, who remained faithful to Qā'im. On the last day of October 944, an engagement was fought between Kairawān and Mahdia at a place called al-Akhawān, which resulted in the rout of Qā'im's forces, and the caliph's being shortly after shut up in his capital, the suburbs of which he defended by a trench. Abū Yazīd's forces were ill-suited to maintain a protracted siege, and since, owing to the former caliph's forethought, the capital was in a condition to hold out for a long time, many of them deserted and the besiegers gained no permanent advantage. After the siege had lasted some ten months Abū Yazīd was compelled to raise it (September 945); the struggle, however, did not end with that event, and for a time the caliph and Abū Yazīd continued to fight with varying fortune, while anarchy prevailed over most of the caliph's dominions. On the 13th of January 946, Abū Yazīd shut up Qā'im's forces in Susa which he began to besiege, and attempted to take by storm.

On the 18th of May 945, while Abū Yazīd was besieging Susa, the caliph al-Qā'im died at Mahdia, and was succeeded by his son Ismāʽīl, who took the title Manṣūr. He almost immediately relieved Susa by sending a fleet, which joining with the garrison inflicted a severe defeat on Abū Yazīd, who had to evacuate Kairawān also; but though the cities were mainly in the hands of Fatimite prefects, Abū Yazīd was able to maintain the field for more than two years longer, while his followers were steadily decreasing in numbers, and he was repeatedly driven into fastnesses of the Sahara. In August 947 his last stronghold was taken, and he died of wounds received in defending it. His sons carried on some desultory warfare against Manṣūr after their father's death. A town called Manṣūra or Ṣabrā was built adjoining Kairawān to celebrate the decisive victory over Abū Yazīd, which, however, did not long preserve its name. The exhausted condition of north-west Africa due to the protracted civil war required some years of peace for recuperation, and further exploits are not recorded for Manṣūr, who died on the 19th of March 952.

His son, Abū Tamīm Maʽadd, was twenty-two years of age at the time, and succeeded his father with the title Moʽizz lidīn allah. His authority was acknowledged over the greater part of the region now constituting Morocco, Algeria and Tunisia, as well as Sicily, and he appears to have had serious thoughts of endeavouring to annex Spain. At an early period in his reign he made Jauhar, who had been secretary under the former caliph, commander of the forces, and the services rendered by this person to the dynasty made him count as its second founder after al-Shīʽī. In the years 958 and 959 he was sent westwards to reduce Fez and other places where the authority of the Fatimite caliph had been repudiated, and after a successful expedition advanced as far as the Atlantic. As early as 966 the plan of attempting a fresh invasion of Egypt was conceived, and preparations made for its execution; but it was delayed, it is said at the request of the caliph's mother, who wished to make a pilgrimage to Mecca first; and her honourable treatment by Kāfūr when she passed through Egypt induced the caliph to postpone the invasion till that sovereign's death.

In August 972 Moʿizz resolved to follow Jauhar's pressing invitation to enter his new capital Cairo. With his arrival there the centre of the Fatimite power was transferred from Mahdia and Kairawān to Egypt, and their original dominion became a province called al-Maghrib, which immediately fell into the hands of a hereditary dynasty, the Zeirids, acknowledging Fatimite suzerainty. The first sovereign was Bulukkīn, also called Abu'l-Futūḥ Yūsuf, appointed by Moʿizz as his viceroy on the occasion of his departure for Egypt: separate prefects were appointed for Sicily and Tripoli; and at the first the minister of finance was to be an official independent of the governor of the Maghrib. On the death of Bulukkīn in 984 he was succeeded by a son who took the royal title al-Manṣūr, under whose rule an attempt was made by the Kutāma, instigated by the caliph, to shake off the yoke of the Zeirids, who originated from the Sanhaja tribe. This attempt was defeated by the energy of Manṣūr in 988; and the sovereignty of the Fatimites in the Maghrib became more and more confined to recognition in public prayer and on coins, and the payment of tribute and the giving of presents to the viziers at Cairo. The fourth ruler of the Zeirid dynasty, called Moʿizz, endeavoured to substitute ʿAbbāsid suzerainty for Fatimite: his land was invaded by Arab colonies sent by the Fatimite caliph, with whom in 1051 Moʿizz fought a decisive engagement, after which the dominion of the Zeirids was restricted to the territory adjoining Mahdia; a number of smaller kingdoms rising up around them. The Zeirids were finally overthrown by Roger II. of Sicily in 1148.

After the death of al-Ādid, the last Fatimite caliph in Egypt, some attempts were made to place on the throne a member of the family, and at one time there seemed a chance of the Assassins, who formed a branch of the Fatimite sect, assisting in this project. In 1174 a conspiracy for the restoration of the dynasty was organized by ʿUmarah of Yemen, a court poet, with the aid of eight officials of the government: it was discovered and those who were implicated were executed. Two persons claiming Fatimite descent took the royal titles al-Moʿtaṣim billah and al-Ḥāmid lillah in the years 1175 and 1176 respectively; and as late as 1192 we hear of pretenders in Egypt. Some members of the family are traceable till near the end of the 7th century of Islam.

The doctrines of the Fatimites as a sect, apart from their claim to the sovereignty in Islam, are little known, and we are not justified in identifying them with those of the Assassins, the Carmathians or the Druses, though all these sects are connected with them in origin. A famous account is given by Maqrīzī of a system of education by which the neophyte had doubts gently instilled into his mind till he was prepared to have the allegorical meaning of the Koran set before him, and to substitute some form of natural for revealed religion. In most accounts of the early days of the community it is stated that the permission of wine-drinking and licentiousness, and the community of wives and property formed part of its tenets. There is little in the recorded practice of the Fatimite state to confirm or justify these assertions; and they appear to have differed from orthodox Moslems rather in small details of ritual and law than in deep matters of doctrine.

Authorities.—F. Wüstenfeld, *Geschichte der Fatimiden Chalifen* (Göttingen, 1881); E. Mercier, *Histoire de l'Afrique Septentrionale* (Paris, 1888); M. J. de Goeje, *Mémoire sur les Carmathes de Bahrain et les Fatimides* (2nd ed., Leiden, 1886); P. Casanova, "Mémoire sur les derniers Fatimides," *Mém. Miss. archéologique au Caire*, vol. vi.; for the lives of ʿObaidallah and Abū Yazīd, Cherbonneau in the *Journal Asiatique*, sér. iv. vol. 20, and sér. v. vol. 5. See also Egypt: *History*, sect. Mahommedan. (D. S. M.*)

FAUBOURG, the French name for a portion of a town which lies outside the walls, hence properly a suburb. The name survives in certain parts of Paris, such as the Faubourg St Antoine, and the Faubourg St Germain, &c., which have long since ceased to be suburbs and have become portions of the town itself. The origin of the word is doubtful. The earlier spelling *faux-bourg*, and the occurrence in medieval Latin of *falsus-burgus* (see Ducange, *Glossarium*, s.v. "Falsus-Burgus"), was taken as showing its obvious origin and meaning, the sham or quasi-borough. The generally accepted derivation is from *fors*, outside (Lat. *foris*, outside the gates), and *bourg*. It is suggested that the word is the French adaptation of the Ger. *Pfahlbürger*, the burghers of the pale, *i.e.* outside the walls but within the pale.

FAUCES (a Latin plural word for "throat"; the singular *faux* is rarely found), in anatomy, the hinder part of the mouth, which leads into the pharynx; also an architectural term given by Vitruvius to narrow passages on either side of the tablinum, through which access could be obtained from the atrium to the peristylar court in the rear.

FAUCHER, LÉONARD JOSEPH [Léon] (1803–1854), French politician and economist, was born at Limoges on the 8th of September 1803. When he was nine years old the family removed to Toulouse, where the boy was sent to school. His parents were separated in 1816, and Léon Faucher, who resisted his father's attempts to put him to a trade, helped to support himself and his mother during the rest of his school career by designing embroidery and needlework. As a private tutor in Paris he continued his studies in the direction of archaeology and history, but with the revolution of 1830 he was drawn into active political journalism on the Liberal side. He was on the staff of the *Temps* from 1830 to 1833, when he became editor of the *Constitutionnel* for a short time. A Sunday journal of his own, *Le Bien public*, proved a disastrous financial failure; and his political independence having caused his retirement from the *Constitutionnel*, he joined in 1834 the *Courrier français*, of which he was editor from 1839 until 1842, when the paper changed hands. Faucher belonged in policy to the dynastic Left, and consistently preached moderation to the more ardent Liberals. On resigning his connexion with the *Courrier français* he gave his attention chiefly to economic questions. He advocated a customs union between the Latin countries to counterbalance the German Zollverein, and in view of the impracticability of such a measure narrowed his proposal in 1842 to a customs union between France and Belgium. In 1843 he visited England to study the English social system, publishing the results of his investigations in a famous series of *Études sur l'Angleterre* (2 vols., 1845), published originally in the *Revue des deux mondes*. He helped to organize the Bordeaux association for free-trade propaganda, and it was as an advocate of free trade that he was elected in 1847 to the chamber of deputies for Reims. After the revolution of 1848 he entered the Constituent Assembly for the department of Marne, where he opposed many Republican measures—the limitation of the hours of labour, the creation of the national relief works in Paris, the abolition of the death penalty and others. Under the presidency of Louis Napoleon he became minister of public works, and then minister of the interior, but his action in seeking to influence the coming elections by a circular letter addressed to the prefects was censured by the Constituent Assembly, and he was compelled to resign office on the 14th of May 1849. In 1851 he was again minister of the interior until Napoleon declared his intention of resorting to universal suffrage. After the *coup d'état* of December he refused a seat in the consultative commission instituted by Napoleon. He had been elected a member of the Academy of Moral and Political Science in 1849, and his retirement from politics permitted a return to his writings on economics. He had been to Italy in search of health in 1854, and was returning to Paris on business when he was seized by typhoid at Marseilles, where he died on the 14th of December 1854.

His miscellaneous writings were collected (2 vols., 1856) as *Mélanges d'économie politique et de finance*, and his speeches in the legislature are printed in vol. ii. of *Léon Faucher, biographie et correspondance* (2 vols., 2nd ed., Paris, 1875).

FAUCHET, CLAUDE (1530–1601), French historian and antiquary, was born at Paris on the 3rd of July 1530. Of his early life few particulars are known. He applied himself to the study of the early French chroniclers, and proposed to publish extracts which would throw light on the first periods of the monarchy. During the civil wars he lost a large part of his books and manuscripts in a riot, and was compelled to leave Paris. He then settled at Marseilles. Attaching himself afterwards to Cardinal de Tournon, he accompanied him in 1554 to Italy, whence he was several times sent on embassies to the king, with reports on the siege of Siena. His services at length procured him the post of president of the chambre des monnaies, and thus enabled him to resume his literary studies. Having become embarrassed with debt, he found it necessary, at the age of seventy, to sell his office; but the king, amused with an epigram, gave him a pension, with the title of historiographer of France. Fauchet has the reputation of an impartial and scrupulously accurate writer; and in his works are to be found important facts not easily accessible elsewhere. He was, however, entirely uncritical, and his style is singularly inelegant. His principal works (1579, 1599) treat of Gaulish and French antiquities, of the dignities and magistrates of France, of the origin of the French language and poetry, of the liberties of the Gallican church, &c. A collected edition was published in 1610. Fauchet took part in a translation of the *Annals* of Tacitus (1582). He died at Paris about the close of 1601.

FAUCHET, CLAUDE (1744–1793), French revolutionary bishop, was born at Dornes (Nièvre) on the 22nd of September 1744. He was a curate of the church of St Roch, Paris, when he was engaged as tutor to the children of the marquis of Choiseul, brother of Louis XV.'s minister, an appointment which proved to be the first step to fortune. He was successively grand vicar to the archbishop of Bourges, preacher to the king, and abbot of Montfort-Lacarre. The "philosophic" tone of his sermons caused his dismissal from court in 1788 before he became a popular speaker in the Parisian sections. He was one of the leaders of the attack on the Bastille, and on the 5th of August 1789 he delivered an eloquent discourse by way of funeral sermon for the citizens slain on the 14th of July, taking as his text the words of St Paul, "Ye have been called to liberty." He blessed the tricolour flag for the National Guard, and in September was elected to the Commune, from which he retired in October 1790. During the next winter he organized within the Palais Royal the "Social Club of the Society of the Friends of Truth," presiding over crowded meetings under the self-assumed title of *procureur général de la vérité*. Nevertheless, events were marching faster than his opinions, and the last occasion on which he carried his public with him was in a sermon preached at Notre Dame on the 14th of February 1791. In May he became constitutional bishop of Calvados, and was presently returned by the department to the Legislative Assembly, and afterwards to the Convention. At the king's trial he voted for the appeal to the people and for the penalty of imprisonment. He protested against the execution of Louis XVI. in the *Journal des amis* (January 26, 1793), and next month was denounced to the Convention for prohibiting married priests from the exercise of the priesthood in his diocese. He remained secretary to the Convention until the accusation of the Girondists in May 1793. In July he was imprisoned on the charge of supporting the federalist movement at Caen, and of complicity with Charlotte Corday, whom he had taken to see a sitting of the Convention on her arrival in Paris. Of the second of these charges he was certainly innocent. With the Girondist deputies he was brought before the revolutionary tribunal on the 30th of October, and was guillotined on the following day.

See *Mémoires . . . ou Lettres de Claude Fauchet* (5th ed., 1793); *Notes sur Claude Fauchet* (Caen, 1842).

FAUCIT, HELENA SAVILLE (1817–1898), English actress, the daughter of John Saville Faucit, an actor, was born in London. Her first London appearance was made on the 5th of January 1836 at Covent Garden as Julia in *The Hunchback*. Her success in this was so definitely confirmed by her subsequent acting of Juliet, Lady Teazle, Beatrice, Imogen and Hermione, that within eighteen months she was engaged by Macready as leading lady at Covent Garden. There, besides appearing in several Shakespearian characters, she created the heroine's part in Lytton's *Duchess de la Vallière* (1836), *Lady of Lyons* (1838), *Richelieu* (1839), *The Sea Captain* (1839), *Money* (1840), and Browning's *Strafford* (1837). After a visit to Paris and a short season at the Haymarket, she joined the Drury Lane company under Macready early in 1842. There she played Lady Macbeth, Constance in *King John*, Desdemona and Imogen, and took part in the first production of Westland Marston's *Patrician's Daughter* (1842) and Browning's *Blot on the Scutcheon* (1843). Among her successful tours was included a visit to Paris in 1844–1845, where she acted with Macready in several Shakespearian plays. In 1851 she was married to Mr (afterwards Sir) Theodore Martin, but still acted occasionally for charity. One of her last appearances was as Beatrice, on the opening of the Shakespeare Memorial at Stratford-on-Avon on the 23rd of April 1879. In 1881 there appeared in *Blackwood's Magazine* the first of her *Letters on some of Shakespeare's Heroines*, which were published in book form as *On Some of Shakespeare's Female Characters* (1885). Lady Martin died at her home near Llangollen in Wales on the 31st of October 1898. There is a tablet to her in the Shakespeare Memorial with a portrait figure, and the marble pulpit in the Shakespeare church—with her portrait as Saint Helena—was given in her memory by her husband.

See Sir Theodore Martin's *Helena Faucit* (1900).

FAUJAS DE SAINT-FOND, BARTHÉLEMY (1741–1819), French geologist and traveller, was born at Montélimart on the 17th of May 1741. He was educated at the Jesuits' College at Lyons; afterwards he went to Grenoble, applied himself to the study of law, and was admitted advocate to the parliament. He rose to be president of the seneschal's court (1765), a post which he honourably filled, but the duties of which became irksome, as he had early developed a love of nature and his favourite relaxation was found in visits to the Alps. There he began to study the forms, structure, composition and superposition of rocks. In 1775 he discovered in the Velay a rich deposit of pozzuolana, which in due course was worked by the government. In 1776 he put himself in communication with Buffon, who was not slow to perceive the value of his labours. Invited by Buffon to Paris, he quitted the law, and was appointed by Louis XVI. assistant naturalist to the museum, to which office was added some years later (1785, 1788) that of royal commissioner for mines. One of the most important of his works was the *Recherches sur les volcans éteints du Vivarais et du Velay*, which appeared in 1778. In this work, rich in facts and observations, he developed his theory of the origin of volcanoes. In his capacity of commissioner for mines Faujas travelled in almost all the countries of Europe, everywhere devoting attention to the nature and constituents of the rocks. It was he who first recognized the volcanic nature of the basaltic columns of the cave of Fingal (Staffa), although the island was visited in 1772 by Sir Joseph Banks, who remarked that the stone "is a coarse kind of *Basaltes*, very much resembling the Giants' Causeway in Ireland" (Pennant's *Tour in Scotland and Voyage to the Hebrides*). Faujas's *Voyage en Angleterre, en Écosse et aux Îles Hébrides* (1797) is full of interest—containing anecdotes of Sir Joseph Banks and Dr John Whitehurst, and an amusing account of "The Dinner of an Academic Club" (the Royal Society), and has been translated into English (2 vols., 1799). Having been nominated in 1793 professor at the Jardin des Plantes, he held this post till he was nearly eighty years of age, retiring in 1818 to his estate of Saint-Fond in Dauphiné. Faujas took a warm interest in the balloon experiments of the brothers Montgolfier, and published a very complete *Description des expériences de la machine aérostatique de MM. Montgolfier*, &c. (1783, 1784). He contributed many scientific memoirs to the *Annales* and the *Mémoires* of the museum of natural history. Among his separate works, in addition to those already named are—*Histoire naturelle de la province de Dauphiné* (1781, 1782); *Minéralogie des volcans*

(1784); and *Essai de géologie* (1803–1809). Faujas died on the 18th of July 1819.

FAULT (Mid. Eng. *faute*, through the French, from the popular Latin use of *fallere*, to fail; the original *l* of the Latin being replaced in English in the 15th century), a failing, mistake or defect.

In geology, the term is given to a plane of dislocation in a portion of the earth's crust; synonyms used in mining are "trouble," "throw" and "heave"; the German equivalent is *Verwerfung*, and the French *faille*. Faults on a small scale are sometimes sharply-defined planes,[1] as if the rocks had been sliced through and fitted together again after being shifted (fig. 1). In such cases, however, the harder portions of the dislocated rocks will usually be found "slickensided." More frequently some disturbance has occurred on one or both sides of the fault. Sometimes in a series of strata the beds on the side which has been pushed up are bent down against the fault, while those on the opposite side are bent up (fig. 2). Most commonly the rocks on both sides are considerably broken, jumbled and crumpled, so that the line of fracture is marked by a belt or wall-like mass of fragmentary rock, *fault-rock*, which may be several yards in breadth. Faults are to be distinguished from joints and fissures by the fact that there must have been a movement of the rock on one side of the fault-plane relatively to that on the other side. The trace of a fault-plane at the surface of the earth is a line (or belt of fault-rock), which in geological mapping is often spoken of as a "fault-line" or "line of fault." Fig. 3 represents the plan of a simple fault; quite frequently, however, the main fault subdivides at the extremities into a number of minor faults (fig. 4), or the main fault may be accompanied by lateral subordinate faults (fig. 5), some varieties of which have been termed *flaws* or *Blatts*.

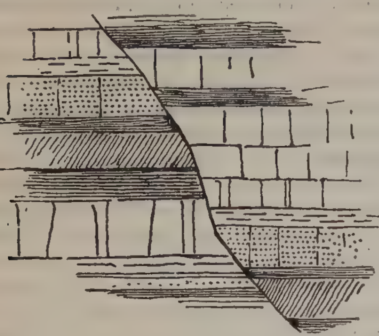

FIG. 1.—Section of clean-cut fault.

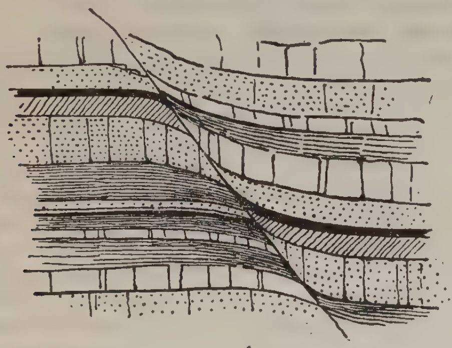

FIG. 2.—Section of strata, bent at a line of fault.

FIG. 3.—Plan of simple fault.

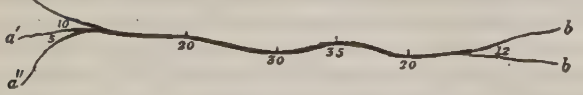

FIG. 4.—Plan of a fault splitting into minor faults.

"Fault-planes" are sometimes perpendicular to the horizon, but more usually they are inclined at a greater or lesser angle. The angle made by the fault-plane with the vertical is the *hade* of the fault (if the angle of inclination were measured from the horizon, as in determining the "dip" of strata, this would be expressed as the "dip of the fault"). In figs. 1 and 2 the faults are hading towards the right of the reader. The amount of dislocation as measured along a fault-plane is the *displacement* of the fault (for an illustration of these terms see fig. 18, where they are applied to a thrust fault); the vertical displacement is the *throw* (Fr. *rejet*); the horizontal displacement, which even with vertical movement must arise in all cases where the faults are not perpendicular to the horizon and the strata are not horizontal, is known as the *heave*. In fig. 6 the displacement is equal to the throw in the fault A; in the fault B the displacement is more than twice as great as in A, while the throw is the same in both; the fault A has no heave, in B it is considerable. The rock on that side of a fault which has dropped relatively to the rock on the other is said to be upon the downthrow side of the fault; conversely, the relatively uplifted portion is the upthrow side. The two fault faces are known as the "hanging-wall" and the "foot-wall."

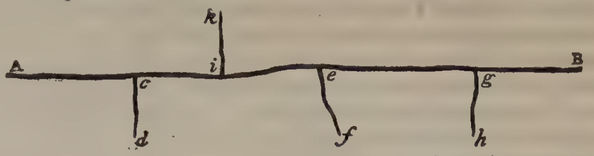

FIG. 5.—Plan of main fault, with branches.

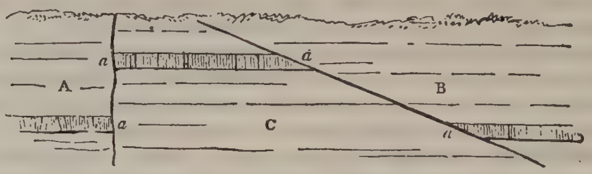

FIG. 6.—Section of a vertical and inclined fault.

The relationship that exists between the hade and the direction of throw has led to the classification of faults into "normal faults," which hade under the downthrow side, or in other words, those in which the hanging-wall has dropped; and "reversed faults," which hade beneath the upthrow side, that is to say, the foot-wall exhibits a relative sinking. Normal faults are exemplified in figs. 1, 2, and 6; in the latter the masses A and B are on the downthrow sides, C is upthrown. Fig. 7 represents a small reversed fault. Normal faults are so called because they are more generally prevalent than the other type; they are sometimes designated "drop" or "gravity" faults, but these are misleading expressions and should be discountenanced. Normal faults are regarded as the result of stretching of the crust, hence they have been called "tension" faults as distinguished from reversed faults, which are assumed to be due to pressure. It is needful, however, to exercise great caution in accepting this view except in a restricted and localized sense, for there are many instances in which the two forms are intimately associated (see fig. 8), and a whole complex system of faults may be the result of horizontal (tangential) pressure alone or even of direct vertical uplift. It is often tacitly assumed

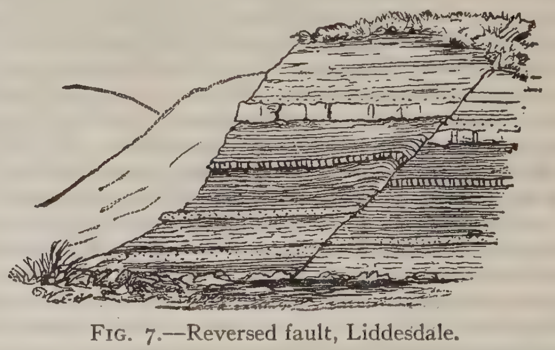

FIG. 7.—Reversed fault, Liddesdale.

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[1] The *fault-plane* is not a plane surface in the mathematical sense; it may curve irregularly in more than one direction.

that most normal and reversed faults are due to simple vertical movements of the fractured crust-blocks; but this is by no means the case. What is actually observed in examining a fault is the *apparent* direction of motion; but the present position of the dislocated masses is the result of *real* motion or series of motions, which have taken place along the fault-plane at various angles from horizontal to vertical; frequently it can be shown that these movements have been extremely complicated. The striations and "slickensides" on the faces of a fault indicate only the direction of the last movement.

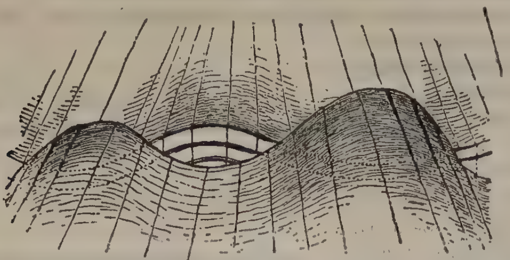


Fig. 8.—Diagram of gently undulating strata cut by a fault, with alternate throw in opposite directions.

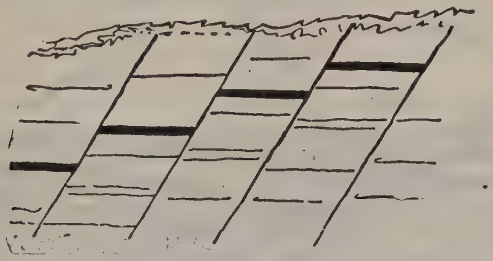


Fig. 9.—Section of strata cut by step faults.

A broad monoclinal fold is sometimes observed to pass into a fault of gradually increasing throw; such a fault is occasionally regarded as pivoted at one end. Again, a faulted mass may be on the downthrow side towards one end, and on the upthrow side towards the other, the movement having taken place about an axis approximately normal to the fault-plane, the "pivot" in this case being near the centre. From an example of this kind it is evident that the same fault may at the same time be both "normal" and "reversed" (see fig. 8). When the principal movement along a highly inclined fault-plane has been approximately horizontal, the fault has been variously styled a *lateral-shift, transcurrent fault, transverse thrust* or a *heave fault*. The horizontal component in faulting movements is more common than is often supposed.

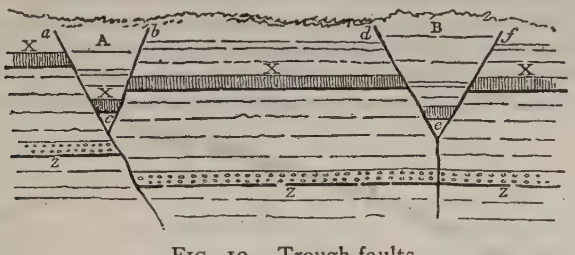


Fig. 10.—Trough faults.

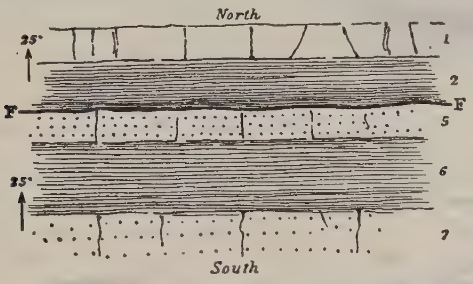


Fig. 11.—Plan of a strike fault.

A single normal fault of large throw is sometimes replaced by a series of close parallel faults, each throwing a small amount in the same direction; if these subordinate faults occur within a narrow width of ground they are known as *distribution faults*; if they are more widely separated they are called *step faults* (fig. 9). Occasionally two normal faults hade towards one another and intersect, and the rock mass between them has been let down; this is described as a *trough fault* (fig. 10). A fault running parallel to the strike of bedded rocks is a *strike fault*; one which runs along the direction of the dip is a *dip fault*; a so-called *diagonal fault* takes a direction intermediate between these two directions. Although the effects of these types of fault upon the outcrops of strata differ, there are no intrinsic differences between the faults themselves.

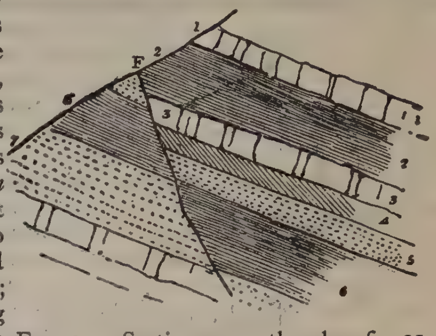


Fig. 12.—Section across the plan, fig. 11.

The effect of normal faults upon the outcrop may be thus briefly summarized:—a strike fault that hades with the direction of the dip may cause beds to be cut out at the surface on the upthrow side; if it hades against the dip direction it may repeat some of the beds on the upthrow side (figs. 11 and 12). With dip faults the crop is carried forward (down the dip) on the upthrow side. The perpendicular distance between the crop of the bed (dike or vein) on opposite sides of the fault is the "offset." The offset decreases with increasing angle of dip and increases with increase in the throw of the fault (fig. 13).

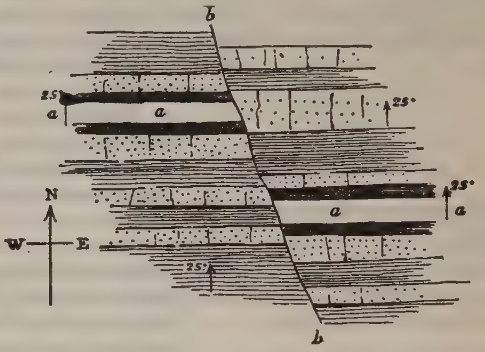


Fig. 13.—Plan of strata cut by a dip fault.

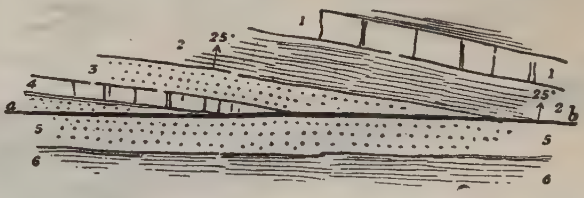


Fig. 14.—Plan of strata traversed by a diminishing strike fault.

Faults which run obliquely across the direction of dip, if they hade with the dip of the strata, will produce offset with "gap" between the outcrops; if they hade in the opposite direction to the dip, offset with "overlap" is caused: in the latter case the crop moves forward (down dip) on the denuded upthrow side, in the former it moves backward. The effect of a strike fault of diminishing throw is seen in fig. 14. Faults crossing folded strata cause the outcrops to approach on the upthrow side of a syncline and tend to separate the outcrops of an anticline (figs. 15, 16, 17).

In the majority of cases the upthrown side of a fault has been so reduced by denudation as to leave no sharp upstanding ridge; but examples are known where the upthrown side still exists as a prominent cliff-like face of rock, a "fault-scarp"; familiar instances occur in the Basin ranges of Utah, Nevada, &c., and many smaller examples have been observed in the areas affected by recent earthquakes in Japan, San Francisco and other places. But although there may be no sharp cliff, the effect of faulting upon topographic forms is abundantly evident wherever a harder series of strata has been brought in juxtaposition to softer rocks. By certain French writers, the upstanding side of a faulted piece of ground is said to have a *regard*, thus the faults of the Jura Mountains have a "*regard français*," and in the same region it has been observed that in curved faults the convexity is directed the same way as the *regard*. Occasionally one or more parallel faults have let down an intervening strip of rock, thereby forming "fault valleys" or *Graben* (*Grabensenken*); the Great Rift Valley is a striking example. On the other hand, a large area of rock is sometimes lifted up, or surrounded by a system of faults, which have let down the encircling ground; such a fault-block is known also as a *horst*; a considerable area of Greenland stands up in this manner.

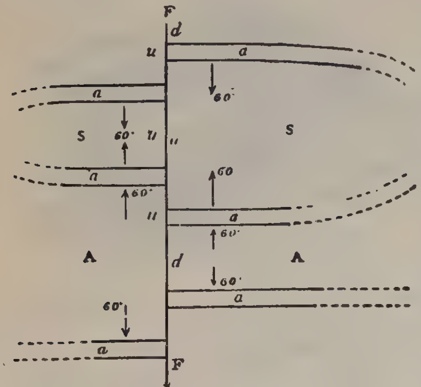


FIG. 15.—Plan of an anticline (A) and syncline (S), dislocated by a fault.

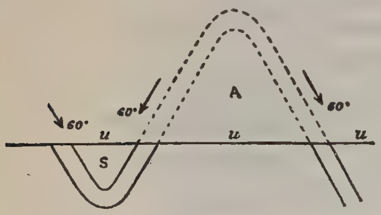


FIG. 16.—Section along the upcast side of the fault in fig. 15.

Faults have often an important influence upon water-supply by bringing impervious beds up against pervious ones or vice versa, thus forming underground dams or reservoirs, or allowing water to flow away that would otherwise be conserved. Springs often rise along the outcrop of a fault. In coal and metal mining it is evident from what has already been said that faults must act sometimes beneficially, sometimes the reverse. It is a common occurrence for fault-fissures and fault-rock to appear as valuable mineral lodes through the infilling or impregnation of the spaces and broken ground with mineral ores.

In certain regions which have been subjected to very great crustal disturbance a type of fault is found which possesses a very low hade—sometimes only a few degrees from the horizontal—and, like a reversed fault, hades beneath the upthrown mass; these are termed *thrusts*, *overthrusts*, or *overthrust faults* (Fr. *recouvrements*, *failles de chevauchement*, *charriages*; Ger. *Überschiebungen*, *Übersprünge*, *Wechsel*, *Fallenverwerfungen*). Thrusts should not be confused with reversed faults, which have a strong hade. Thrusts play a very important part in the N.W. highlands of Scotland, the Scandinavian highlands, the western Alps, the Appalachians, the Belgian coal region, &c. By the action of thrusts enormous masses of rock have been pushed almost horizontally over underlying rocks, in some cases for several miles. One of the largest of the Scandinavian thrust

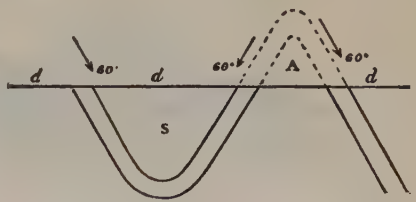
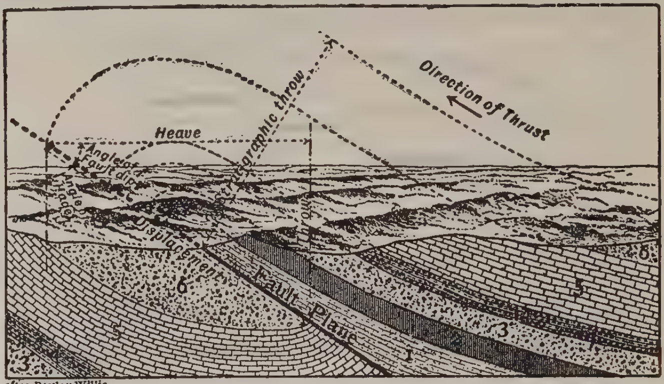
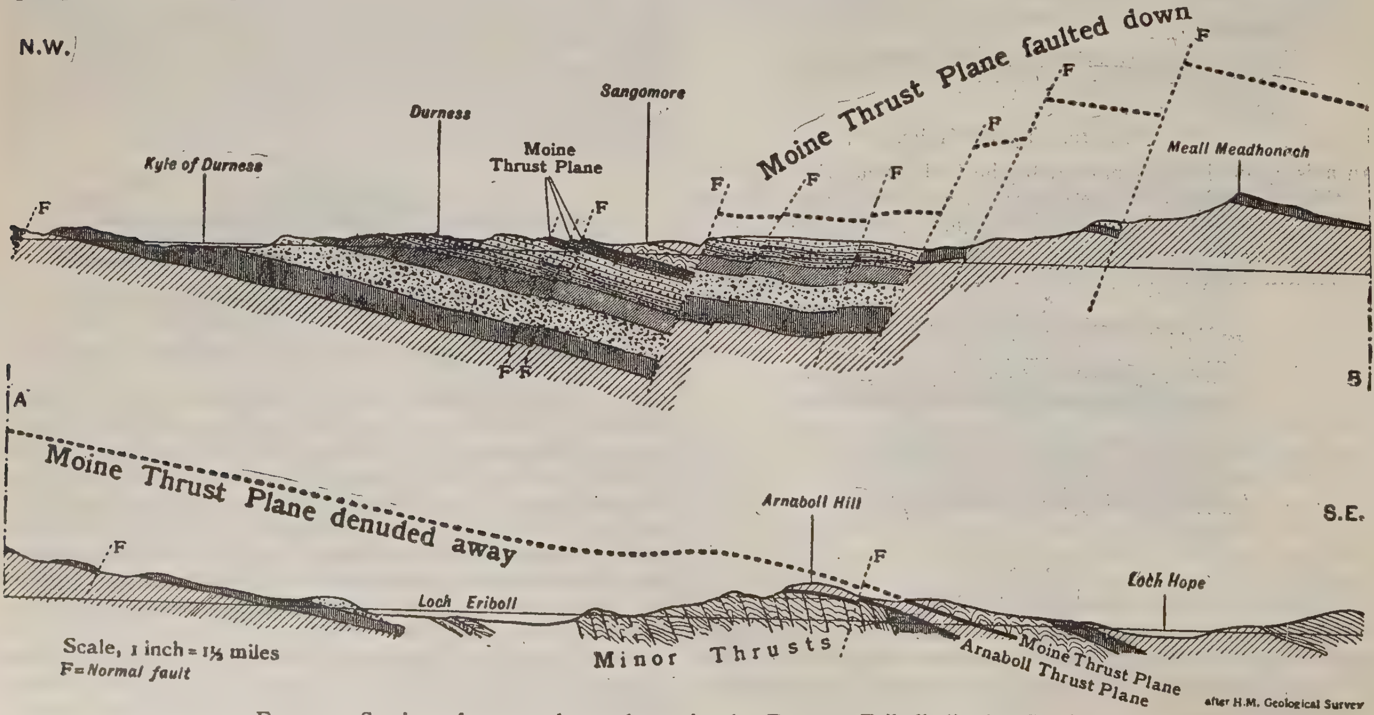


FIG. 17.—Section along the downcast side of same fault.


Heave
Angle of Fault dip
Angle of Hade
Stratigraphic throw
Direction of Thrust
Displacement
Fault Plane
1
2
3
5
6

after Bayley Willis.

FIG. 18.—Diagram to illustrate the terminology of faults and thrusts.


N.W.
Kyle of Durness
Durness
Sangomore
Moine Thrust Plane
F
Moine Thrust Plane faulted down
Meall Meadhonach
A
B
Moine Thrust Plane denuded away
Arnaboll Hill
S.E.
Loch Eriboll
Loch Hope
Minor Thrusts
Moine Thrust Plane
Arnaboll Thrust Plane

Scale, 1 inch = 1⅓ miles
F=Normal fault

after H.M. Geological Survey

FIG. 19.—Section of a very large thrust in the Durness Eriboll district, Scotland.

masses is 1120 m. long, 80 m. broad, and 5000 ft. thick. In Scotland three grades of thrusts are recognized, maximum, major, and minor thrusts; the last have very generally been truncated by those of greater magnitude. Some of these great thrusts have received distinguishing names, *e.g.* the Moine thrust (fig. 19) and the Ben More thrust; similarly in the coal basin of Mons and Valenciennes we find the *faille de Boussu* and the *Grande faille du midi*. Overturned folds are frequently seen passing into thrusts. Bayley Willis has classified thrusts as (1) Shear thrusts, (2) Break thrusts, (3) Stretch thrusts, and (4) Erosion thrusts.

Dr J. E. Marr ("Notes on the Geology of the English Lake District," *Proc. Geol. Assoc.*, 1900) has described a type of fault which may be regarded as the converse of a thrust fault. If we consider a series of rock masses A, B, C—of which A is the oldest and undermost—undergoing thrusting, say from south to north, should the mass C be prevented from moving forward as rapidly as B, a low-hading fault may form between C and B and the mass C may lag behind; similarly the mass B may lag behind A. Such faults Dr Marr calls "lag faults." A mass of rock suffering thrusting or lagging may yield unequally in its several parts, and those portions tending to travel more rapidly than the adjoining masses in the same sheet may be cut off by fractures. Thus the faster-moving blocks will be separated from the slower ones by faults approximately normal to the plane of movement: these are described as "tear faults."

Faults may occur in rocks of all ages; small local dislocations are observable even in glacial deposits, alluvium and loess. A region of faulting may continue to be so through more than one geological period. Little is known of the mechanism of faulting or of the causes that produce it; the majority of the text-book explanations will not bear scrutiny, and there is room foı extended observation and research. The sudden yielding of the strata along a plane of faulting is a familiar cause of earthquakes.

See E. de Margerie and A. Heim, *Les Dislocations de l'écorce terrestre* (Zürich, 1888); A. Rothpletz, *Geotektonische Probleme* (Stuttgart, 1894); B. Willis, "The Mechanics of Appalachian Structure," *13th Ann. Rep. U.S. Geol. Survey* (1891–1892, pub. 1893). A prolonged discussion of the subject is given in *Economic Geology*, Lancaster, Pa., U.S.A., vols. i. and ii. (1906, 1907). (A. Ge.; J. A. H.)

FAUNA, the name, in Roman mythology, of a country goddess of the fields and cattle, known sometimes as the sister, sometimes as the wife of the god Faunus; hence the term is used collectively for all the animals in any given geographical area or geological period, or for an enumeration of the same. It thus corresponds to the term "flora" in respect to plant life.

FAUNTLEROY, HENRY (1785–1824), English banker and forger, was born in 1785. After seven years as a clerk in the London bank of Marsh, Sibbald & Co., of which his father was one of the founders, he was taken into partnership, and the whole business of the firm was left in his hands. In 1824 the bank suspended payment. Fauntleroy was arrested on the charge of appropriating trust funds by forging the trustees' signatures, and was committed for trial, it being freely rumoured that he had appropriated £250,000, which he had squandered in debauchery. He was tried at the Old Bailey, and, the case against him having been proved, he admitted his guilt, but pleaded that he had used the misappropriated funds to pay his firm's debts. He was found guilty and sentenced to be hanged. Seventeen merchants and bankers gave evidence as to his general integrity at the trial, and after his conviction powerful influence was brought to bear on his behalf, and his case was twice argued before judges on points of law. An Italian named Angelini even offered to take Fauntleroy's place on the scaffold. The efforts of his many friends were, however, unavailing, and he was executed on the 30th of November 1824. A wholly unfounded rumour was widely credited for some time subsequently to the effect that he had escaped strangulation by inserting a silver tube in his throat, and was living comfortably abroad.

See A. Griffith's *Chronicles of Newgate*, ii. 294-300, and Pierce Egan's *Account of the Trial of Mr Fauntleroy*.

FAUNUS (*i.e.* the "kindly," from Lat. *favere*, or the "speaker," from *fari*), an old Italian rural deity, the bestower of fruitfulness on fields and cattle. As such he is akin to or identical with Inuus ("fructifier") and Lupercus (see LUPERCALIA). Faunus also revealed the secrets of the future by strange sounds from the woods, or by visions communicated to those who slept within his precincts in the skin of sacrificed lambs; he was then called Fatuus, and with him was associated his wife or daughter Fatua. Under Greek influence he was identified with Pan, and just as there was supposed to be a number of Panisci, so the existence of many Fauni was assumed—misshapen and mischievous goblins of the forest, with pointed ears, tails and goat's feet, who loved to torment sleepers with hideous nightmares. In poetical tradition Faunus is an old king of Latium, the son of Picus (Mars) and father of Latinus, the teacher of agriculture and cattle-breeding, and the introducer of the religious system of the country, honoured after death as a tutelary divinity. Two festivals called Faunalia were celebrated in honour of Faunus, one on the 13th of February in his temple on the island in the Tiber, the other in the country on the 5th of December (Ovid, *Fasti*, ii. 193; Horace, *Odes*, iii. 18. 10). At these goats were sacrificed to him with libations of wine and milk, and he was implored to be propitious to fields and flocks. The peasants and slaves at the same time amused themselves with dancing in the meadows.

FAURE, FRANÇOIS FÉLIX (1841–1899), President of the French Republic, was born in Paris on the 30th of January 1841, being the son of a small furniture maker. Having started as a tanner and merchant at Havre, he acquired considerable wealth, was elected to the National Assembly on the 21st of August 1881, and took his seat as a member of the Left, interesting himself chiefly in matters concerning economics, railways and the navy. In November 1882 he became under-secretary for the colonies in M. Ferry's ministry, and retained the post till 1885. He held the same post in M. Tirard's ministry in 1888, and in 1893 was made vice-president of the chamber. In 1894 he obtained cabinet rank as minister of marine in the administration of M. Dupuy. In the January following he was unexpectedly elected president of the Republic upon the resignation of M. Casimir-Périer. The principal cause of his elevation was the determination of the various sections of the moderate republican party to exclude M. Brisson, who had had a majority of votes on the first ballot, but had failed to obtain an absolute majority. To accomplish this end it was necessary to unite among themselves, and union could only be secured by the nomination of some one who offended nobody. M. Faure answered perfectly to this description. His fine presence and his tact on ceremonial occasions rendered the state some service when in 1896 he received the Tsar of Russia at Paris, and in 1897 returned his visit, after which meeting the momentous Franco-Russian alliance was publicly announced. The latter days of M. Faure's presidency were embittered by the Dreyfus affair, which he was determined to regard as *chose jugée*. But at a critical moment in the proceedings his death occurred suddenly, from apoplexy, on the 16th of February 1899. With all his faults, and in spite of no slight amount of personal vanity, President Faure was a shrewd political observer and a good man of business. After his death, some alleged extracts from his private journals, dealing with French policy, were published in the Paris press.

See E. Maillard, *Le Président F. Faure* (Paris, 1897); P. Bluysen, *Félix Faure intime* (1898); and F. Martin-Ginouvier, *F. Faure devant l'histoire* (1895).

FAURÉ, GABRIEL (1845–), French musical composer, was born at Pamiers on the 13th of May 1845. He studied at the school of sacred music directed by Niedermeyer, first under Dietsch, and subsequently under Saint-Saëns. He became "maître de chapelle" at the church of the Madeleine in 1877, and organist in 1896. His works include a symphony in D minor (Op. 40), two quartets for piano and strings (Opp. 15 and 45), a suite for orchestra (Op. 12), sonata for violin and piano (Op. 13), concerto for violin (Op. 14), berceuse for violin, élégie for violoncello, pavane for orchestra, incidental music for Alexandre Dumas' *Caligula* and De Haraucourt's *Shylock*, a requiem, a cantata, *The Birth of Venus*, produced at the Leeds festival in 1898, a quantity of piano music, and a large number of songs. Fauré occupies a place by himself among modern French composers. He delights in the *imprévu*, and loves to wander through labyrinthine harmonies. There can be no denying the intense fascination and remarkable originality of his music. His muse is essentially aristocratic, and suggests the surroundings of the boudoir and the perfume of the hot-house.

FAURIEL, CLAUDE CHARLES (1772–1844), French historian, philologist and critic, was born at St Étienne on the 21st of October 1772. Though the son of a poor joiner, he received a good education in the Oratorian colleges of Tournon and Lyons. He was twice in the army—at Perpignan in 1793, and in 1796–1797 at Briançon, as private secretary to General J. Servan de Gerbey (1741–1808); but he preferred the civil service and the companionship of his friends and his books. In 1794 he returned to St Étienne, where, but only for a short period, he filled a municipal office; and from 1797 to 1799 he devoted himself to strenuous study, more especially of the literature and history, both ancient and modern, of Greece and Italy. Having paid a visit to Paris in 1799, he was introduced to Fouché, minister of police, who induced him to become his private secretary. Though he discharged the duties of this office to Fouché's satisfaction, his strength was overtasked by his continued application to study, and he found it necessary in 1801 to recruit his health by a three months' trip in the south. In resigning his office in the following year he was actuated as much by these considerations as by the scruples he put forward in serving longer under Napoleon, when the latter, in violation of strict republican principles, became consul for life. This is clearly shown by the fragments of Memoirs discovered by Ludovic Lalanne and published in 1886.

Some articles which Fauriel published in the *Décade philosophique* (1800) on a work of Madame de Staël's—*De la littérature considerée dans ses rapports avec les institutions sociales*—led to an intimate friendship with her. About 1802 he contracted with Madame de Condorcet a liaison which lasted till her death (1822). It was said of him at the time that he gave up all his energies to love, friendship and learning. The salon of Mme de Condorcet was throughout the Consulate and the first Empire a rallying point for the dissentient republicans. Fauriel was introduced by Madame de Staël to the literary circle of Auteuil, which gathered round Destutt de Tracy. Those who enjoyed his closest intimacy were the physiologist Cabanis (Madame de Condorcet's brother-in-law), the poet Manzoni, the publicist Benjamin Constant, and Guizot. Later Tracy introduced to him Aug. Thierry (1821) and perhaps Thiers and Mignet. During his connexion with Auteuil, Fauriel's attention was naturally turned to philosophy, and for some years he was engaged on a history of Stoicism, which was never completed, all the papers connected with it having accidentally perished in 1814. He also studied Arabic, Sanskrit and the old South French dialects. He published in 1810 a translation of the *Parthenaïs* of the Danish poet Baggesen, with a preface on the various kinds of poetry; in 1823 translations of two tragedies of Manzoni, with a preface "*Sur la théorie de l'art dramatique*"; and in 1824–1825 his translation of the popular songs of modern Greece, with a "*Discours préliminaire*" on popular poetry.

The Revolution of July, which put his friends in power, opened to him the career of higher education. In 1830 he became professor of foreign literature at the Sorbonne. The *Histoire de la Gaule méridionale sous la domination des conquerants germains* (4 vols., 1836) was the only completed section of a general history of southern Gaul which he had projected. In 1836 he was elected a member of the Academy of Inscriptions, and in 1837 he published (with an introduction the conclusions of which would not now all be endorsed) a translation of a Provençal poem on the Albigensian war. He died on the 15th of July 1844. After his death his friend Mary Clarke (afterwards Madame J. Möhl) published his *Histoire de la littérature provençale* (3 vols., 1846)—his lectures for 1831–1832. Fauriel was biased in this work by his preconceived and somewhat fanciful theory that Provence was the cradle of the *chansons de geste* and even of the Round Table romances; but he gave a great stimulus to the scientific study of Old French and Provençal. *Dante et les origines de la langue et de la littérature italiennes* (2 vols.) was published in 1854.

Fauriel's *Mémoires*, found with Condorcet's papers, are in the Institute library. They were written at latest in 1804, and include some interesting fragments on the close of the consulate, Moreau, &c. Though anonymous, Lalanne, who published them (*Les Derniers Jours du Consulat*, 1886), proved them to be in the same handwriting as a letter of Fauriel's in 1803. The same library has Fauriel's correspondence, catalogued by Ad. Régnier (1900). Benjamin Constant's letters (1802–1823) were published by Victor Glachant in 1906. For Fauriel's correspondence with Guizot see *Nouvelle Rev.* (Dec. 1, 1901, by V. Glachant), and for his love-letters to Miss Clarke (1822–1844) the *Revue des deux mondes* (1908–1909) by E. Rod.) See further Sainte-Beuve, *Portraits contemporains*, ii.; Antoine Guillois, *Le Salon de Mme Helvétius* (1894) and *La Marquise de Condorcet* (1897); O'Meara, *Un Salon à Paris: Mme Möhl* (undated); and J. B. Galley, *Claude Fauriel* (1909).

FAUST, or FAUSTUS, the name of a magician and charlatan of the 16th century, famous in legend and in literature. The historical Faust forms little more than the nucleus round which a great mass of legendary and imaginative material gradually accumulated. That such a person existed there is, however, sufficient proof.[1] He is first mentioned in a letter, dated August 20, 1507, of the learned Benedictine Johann Tritheim or Trithemius (1462–1516), abbot of Spanheim, to the mathematician and astrologer Johann Windung, at Hasfurt, who had apparently written about him. Trithemius, himself reputed a magician, and the author of a mystical work (published at Darmstadt in 1621 under the title of *Steganographica* and burnt by order of the Spanish Inquisition), speaks contemptuously of Faust, who called himself Magister Georgius Sabellicus Faustus Junior, as a fool rather than a philosopher (*fatuum non philosophum*), a vain babbler, vagabond and mountebank who ought to be whipped, and who had fled from the city rather than confront him. The insane conceit of the man was proved by his boast that, were all the works of Aristotle and Plato blotted from the memory of men, he could restore them with greater elegance, and that Christ's miracles were nothing to marvel at, since he could do the like whenever and as often as he pleased; his debased character by the fact that he had been forced to flee from the school of which he had been appointed master by the discovery of his unnatural crimes. The same unflattering estimate is contained in the second extant notice of Faust, in a letter of the jurist and canon Konrad Mudt (Mutianus Rufus), of the 3rd of October 1513, to Heinrich Urbanus. Mudt, like Trithemius, simply regards Faust as a charlatan. Similar is the judgment of another contemporary, Philipp Begardi, who in the fourth chapter of his *Index sanitatis* (Worms, 1539) ranks Faust, with Theophrastus Paracelsus, among the "wicked, cheating, useless and unlearned doctors."

It was Johann Gast (d. 1572), a worthy Protestant pastor of Basel, who like Mudt claims to have come into personal contact with Faust, who in his *Sermones convivales* (Basel, 1543) first credited the magician with genuine supernatural qualities. Gast, a man of some learning and much superstition, believed Faust to be in league with the devil, by whom about 1525 he was ultimately carried off, and declared the performing horse and dog by which the necromancer was accompanied to be familiar and evil spirits. Further information was given to the world by Johann Mannel or Manlius (d. 1560), councillor and historian to the emperor Maximilian II., in his *Locorum communium collectanea* (Basel, undated). Manlius reports a conversation of Melanchthon, which there is no reason to suspect of being other than genuine, in which the Reformer speaks of Faust as "a disgraceful beast and sewer of many devils," as having been born at Kundling (Kundlingen or Knittlingen), a little town near his own native town (of Bretten), and as having studied magic at Cracow. The rest of the information given can hardly be regarded as historical, though Melanchthon, who, like Luther, was no whit less superstitious than most people of his time, evidently believed it to be so. According to him, among other marvels, Faust was killed by the devil wringing his neck. While he lived he had taken about with him a dog, which was really a devil. A similar opinion would seem to have been held of Faust by Luther also, who in Widmann's Faust-book is mentioned as having declared that, by God's help, he had been able to ward off the evils which Faust with his sorceries had sought to put upon him. The passage, with the omission of Faust's name, occurs word for word in Luther's Table-talk (ed. C. E. Förstemann, vol. i. p. 50). It is not improbable, then, that Widmann, in supplying the name of the necromancer omitted in the Table-talk, may be giving a fuller account of the conversation. Bullinger also, in his *Theatrum de beneficiis* (Frankf., 1569) mentions Faust as one of those "of whom the Scriptures speak, in various places, calling them *magi*." Lastly Johann Weiher, Wierus or Piscinarius (1515–1588)—a pupil of Cornelius Agrippa, body physician to the duke of Cleves and a man of enlightenment, who opposed the persecution of witches—in his *De praestigiis daemonum* (Basel, 1563, &c.), speaks of Faust as a drunken vagabond who had studied magic at Cracow, and before 1540 had practised "this beautiful art shamelessly up and down Germany, with unspeakable deceit, many lies and great effect." He goes on to tell how the magician had revenged himself on an unhappy parish priest, who had refused to supply him any longer with drink, by giving him a depilatory which removed not only the beard but the skin, and further, how he had insulted a poor wretch, for no better reason than that he had a black beard, by greeting him as his cousin the devil. Of his superhuman powers Weiher evidently believes nothing, but he tells the tale of his being found dead with his neck wrung, after the whole house had been shaken by a terrific din.

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[1] The opinion, long maintained by some, that he was identical with Johann Fust, the printer, is now universally rejected.

The sources above mentioned, which were but the first of numerous works on Faust, of more or less value, appearing throughout the next two centuries, give a sufficient picture of the man as he appeared to his contemporaries: a wandering charlatan who lived by his wits, cheiromantist, astrologer, diviner, spiritualist medium, alchemist, or, to the more credulous, a necromancer whose supernatural gifts were the outcome of a foul pact with the enemy of mankind. Whatever his character, his efforts to secure a widespread notoriety had, by the time of his death, certainly succeeded. By the latter part of the 16th century he had become the necromancer *par excellence*, and all that legend had to tell about the great wizards of the middle ages, Virgil, Pope Silvester, Roger Bacon, Michael Scot, or the mythic Klingsor, had become for ever associated with his name. When in 1587, the oldest Faust-book was published, the Faust legend was, in all essential particulars, already complete.

The origin of the main elements of the legend must be sought far back in the middle ages and beyond. The idea of a compact with the devil, for the purpose of obtaining superhuman power or knowledge, is of Jewish origin, dating from the centuries immediately before and after the Christian era which produced the Talmud, the Kabbalah and such magical books as that of Enoch. In the mystical rites—in which blood, as the seat of life, played a great part—that accompanied the incantations with which the Jewish magicians evoked the Satanim—the lowest grade of those elemental spirits (shedim) who have their existence beyond the dimensions of time and space—we have the prototypes and originals of all the ceremonies which occupy the books of magic down to the various versions of the *Höllenzwang* ascribed to Faust. The other principle underlying the Faust legend, the belief in the essentially evil character of purely human learning, has existed ever since the triumph of Christianity set divine revelation above human science. The legend of Theophilus—a Cilician archdeacon of the 6th century, who sold his soul to Satan for no better reason than to clear himself of a false charge brought against him by his bishop—was immensely popular throughout the middle ages, and in the 8th century formed the theme of a poem in Latin hexameters by the nun Hroswitha of Gandersheim, who, especially in her description of the ritual of Satan's court, displays a sufficiently lively and original imagination. Equally widespread were the legends which gathered round the great name of Gerbert (Pope Silvester II.). Gerbert's vast erudition, like Roger Bacon's so far in advance of his age, naturally cast upon him the suspicion of traffic with the infernal powers; and in due course the suspicion developed into the tale, embellished with circumstantial and harrowing details, of a compact with the arch-fiend, by which the scholar had obtained the summit of earthly ambition at the cost of his immortal soul. These are but the two most notable of many similar stories,[1] and, in an age when the belief in witchcraft and the ubiquitous activity of devils was still universal, it is natural that they should have been retold in all good faith of a notorious wizard who was himself at no pains to deny their essential truth. The Faust legend, however, owes something of its peculiar significance also to the special conditions of the age which gave it birth: the age of the Renaissance and the Reformation. The opinion that the religious reformers were the champions of liberty of thought against the obscurantism of Rome is the outgrowth of later experience. To themselves they were the protagonists of "the pure Word of God" against the corruptions of a church defiled by the world and the devil, and the sceptical spirit of Italian humanism was as abhorrent to them as to the Catholic reactionaries by whom it was again trampled under foot. If then, in Goethe's drama, Faust ultimately develops into the type of the unsatisfied yearning of the human intellect for "more than earthly meat and drink," this was because the great German humanist deliberately infused into the old story a spirit absolutely opposed to that by which it had originally been inspired. The Faust of the early Faust-books, of the ballads, the dramas and the puppet-plays innumerable which grew out of them, is irrevocably damned because he deliberately prefers human to "divine" knowledge; "he laid the Holy Scriptures behind the door and under the bench, refused to be called doctor of Theology, but preferred to be styled doctor of Medicine." The orthodox moral of the earliest versions is preserved to the last in the puppet-plays. The Voice to the right cries: "Faust! Faust! desist from this proposal! Go on with the study of Theology, and you will be the happiest of mortals." The Voice to the left answers: "Faust! Faust! leave the study of Theology. Betake you to Necromancy, and you will be the happiest of mortals!" The Faust legend was, in fact, the creation of orthodox Protestantism; its moral, the inevitable doom which follows the wilful revolt of the intellect against divine authority as represented by the Holy Scriptures and its accredited interpreters. Faust, the contemner of Holy Writ, is set up as a foil to Luther, the champion of the new orthodoxy, who with well-directed inkpot worsted the devil when he sought to interrupt the sacred work of rendering the Bible into the vulgar tongue.

It was doubtless this orthodox and Protestant character of the Faust story which contributed to its immense and immediate popularity in the Protestant countries. The first edition of the *Historia von D. Johann Fausten*, by an unknown compiler, published by Johann Spies at Frankfort in 1587, sold out at once. Though only placed on the market in the autumn, before the year was out it had been reprinted in four pirated editions. In the following year a rhymed version was printed at Tübingen, a second edition was published by Spies at Frankfort and a version in low German by J. J. Balhorn at Lübeck. Reprints and amended versions continued to appear in Germany every year, till they culminated in the pedantic compilation of Georg Rudolf Widmann, who obscured the dramatic interest of the story by an excessive display of erudition and by his well-meant efforts to elaborate the orthodox moral. Widmann's version of 1599 formed the basis of that of Johann Nicholaus Pfitzer, published at Nuremberg in 1674, which passed through six editions, the last appearing in 1726. Like Widmann, Pfitzer was more zealous for imparting information than for perfecting a work of art, though he had the good taste to restore the episode of the evocation of Helen, which Widmann had expunged as unfit for Christian readers. Lastly there appeared, about

[1] Many are given in Kiesewetter's *Faust*, p. 112, &c.

1712, what was to prove the most popular of all the Faust-books: *The League with the Devil established by the world-famous Arch-necromancer and Wizard Dr Johann Faust. By a Christian Believer* (*Christlich Meynenden*). This version, which bore the obviously false date of 1525, passed through many editions, and was circulated at all the fairs in Germany. Abroad the success of the story was scarcely less striking. A Danish version appeared in 1588; in England the *History of the Damnable Life and Deserved Death of Dr John Faustus* was published some time between 1588 and 1594; in France the translation of Victor Palma Cayet was published at Paris in 1592 and, in the course of the next two hundred years, went through fifteen editions; the oldest Dutch and Flemish versions are dated 1592; and in 1612 a Czech translation was published at Prague.

Besides the popular histories of Faust, all more or less founded on the original edition of Spies, numerous ballads on the same subject were also soon in circulation. Of these the most interesting for the English reader is *A Ballad of the life and death of Dr Faustus the great congerer*, published in 1588 with the imprimatur of the learned Aylmer, bishop of London. This ballad is supposed to have preceded the English version of Spies's Faust-book, mentioned above, on which Marlowe's drama was founded.

To Christopher Marlowe, it would appear, belongs the honour of first realizing the great dramatic possibilities of the Faust legend. *The Tragicall History of D. Faustus as it hath bene acted by the Right Honourable the Earle of Nottingham his servants* was first published by Thomas Bushall at London in 1604. As Marlowe died in 1593, the play must have been written shortly after the appearance of the English version of the Faust story on which it was based. The first recorded performance was on the 30th of September 1594.

As Marlowe's *Faustus* is the first, so it is incomparably the finest of the Faust dramas which preceded Goethe's masterpiece. Like most of Marlowe's work it is, indeed, very unequal. At certain moments the poet seems to realize the great possibilities of the story, only to sacrifice them to the necessity for humouring the prevailing public taste of the age. Faustus, who in one scene turns disillusioned from the ordinary fountains of knowledge, or flies in a dragon-drawn chariot through the Empyrean to search out the mysteries of the heavens, in another is made to use his superhuman powers to satisfy the taste of the groundlings for senseless buffoonery, to swindle a horse-dealer, or cheat an ale-wife of her score; while Protestant orthodoxy is conciliated by irrelevant insults to the Roman Church and by the final catastrophe, when Faustus pays for his revolt against the Word of God by the forfeit of his soul. This conception, which followed that of the popular Faust histories, underlay all further developments of the Faust drama for nearly two hundred years. Of the serious stage plays founded on this theme, Marlowe's *Faustus* remains the sole authentic example until near the end of the 18th century; but there is plenty of evidence to prove that in Germany the *Comedy of Dr Faust*, in one form or another, was and continued to be a popular item in the repertories of theatrical companies until far into the 18th century. It is supposed, with good reason, that the German versions were based on those introduced into the country by English strolling players early in the 17th century. However this may be, the dramatic versions of the Faust legend followed much the same course as the prose histories. Just as these gradually degenerated into chap-books hawked at fairs, so the dramas were replaced by puppet-plays, handed down by tradition through generations of showmen, retaining their original broad characteristics, but subject to infinite modification in detail. In this way, in the puppet-shows, the traditional Faust story retained its popularity until far into the 19th century, long after, in the sphere of literature, Goethe had for ever raised it to quite another plane.

It was natural that during the literary revival in Germany in the 18th century, when German writers were eagerly on the look-out for subjects to form the material of a truly national literature, the Faust legend should have attracted their attention. Lessing was the first to point out its great possibilities;[1] and he himself wrote a Faust drama, of which unfortunately only a fragment remains, the MS. of the completed work having been lost in the author's lifetime. None the less, to Lessing, not to Goethe, is due the new point of view from which the story was approached by most of those who, after about the year 1770, attempted to tell it. The traditional Faust legend represented the sternly orthodox attitude of the Protestant reformers. Even the mitigating elements which the middle ages had permitted had been banished by the stern logic of the theologians of the New Religion. Theophilus had been saved in the end by the intervention of the Blessed Virgin; Pope Silvester, according to one version of the legend, had likewise been snatched from the jaws of hell at the last moment. Faust was irrevocably damned, since the attractions of the *studium theologicum* proved insufficient to counteract the fascinations of the classic Helen. But if he was to become, in the 18th century, the type of the human intellect face to face with the deep problems of human life, it was intolerable that his struggles should issue in eternal reprobation. Error and heresy had ceased to be regarded as crimes; and stereotyped orthodoxy, to the age of the Encyclopaedists, represented nothing more than the atrophy of the human intellect. *Es irrt der Mensch so lang er strebt*, which sums up in one pregnant line the spirit of Goethe's *Faust*, sums up also the spirit of the age which killed with ridicule the last efforts of persecuting piety, and saw the birth of modern science. Lessing, in short, proclaimed that the final end of Faust must be, not his damnation, but his salvation. This revolutionary conception is the measure of Goethe's debt to Lessing. The essential change which Goethe himself introduced into the story is in the nature of the pact between Faust and Mephistopheles, and in the character of Mephistopheles himself. The Mephistopheles of Marlowe, as of the old Faust-books, for all his brave buffoonery, is a melancholy devil, with a soul above the unsavoury hell in which he is forced to pass a hopeless existence. "Tell me," says Faust, in the puppet-play, to Mephistopheles, "what would you do if you could attain to everlasting salvation?" And the devil answers, "Hear and despair! Were I able to attain everlasting salvation, I would mount to heaven on a ladder, though every rung were a razor edge!" Goethe's Mephistopheles would have made no such reply. There is nothing of the fallen angel about him; he is perfectly content with his past, his present and his future; and he appears before the throne of God with the same easy insolence as he exhibits in Dame Martha's back-garden. He is, in fact, according to his own definition, the Spirit of Denial, the impersonation of that utter scepticism which can see no distinction between high and low, between good and bad, and is therefore without aspiration because it knows no "divine discontent." And the compact which Faust makes with this spirit is from the first doomed to be void. Faustus had bartered away his soul for a definite period of pleasure and power. The conception that underlies the compact of Faust with Mephistopheles is far more subtle. He had sought happiness vainly in the higher intellectual and spiritual pursuits; he is content to seek it on a lower plane since Mephistopheles gives him the chance; but he is confident that nothing that "such a poor devil" can offer him could give him that moment of supreme satisfaction for which he craves. He goes through the traditional mummery of signing the bond with scornful submission; for he knows that his damnation will not be the outcome of any formal compact, but will follow inevitably, and only then, when his soul has grown to be satisfied with what Mephistopheles can purvey him.

"Canst thou with lying flattery rule me
  Until self-pleased myself I see,
Canst thou with pleasure mock and fool me,
  Let that hour be the last for me!
When thus I hail the moment flying:
  'Ah, still delay, thou art so fair!'
Then bind me in thy chains undying,
  My final ruin then declare!"[2]

It is because Mephistopheles fails to give him this self-satisfaction or to absorb his being in the pleasures he provides, that the compact comes to nothing. When, at last, Faust cries to the passing moment to remain, it is because he has forgotten self in enthusiasm for a great and beneficent work, in a state of mind the very antithesis of all that Mephistopheles represents. In the old Faust-books, Faust had been given plenty of opportunity for repentance, but the inducements had been no higher than the exhibition of a throne in heaven on the one hand and the tortures of hell on the other. Goethe's *Faust*, for all its Christian setting, departs widely from this orthodox standpoint. Faust shows no signs of "repentance"; he simply emerges by the innate force of his character from a lower into a higher state. The triumph, foretold by "the Lord" in the opening scene, was inevitable from the first, since, though

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[1] In the *Literaturbrief* of Feb. 16, 1759.

[2] Bayard Taylor's trans.

"'Man errs so long as he is striving,
A good man through obscurest aspiration
Is ever conscious of the one true way.'"

A man, in short, must be judged not by the sins and follies which may be but accidents of his career, but by the character which is its essential outcome.

This idea, which inspired also the kindred theme of Browning's *Paracelsus*, is the main development introduced by Goethe into the Faust legend. The episode of Gretchen, for all its tragic interest, does not belong to the legend at all; and it is difficult to deny the pertinency of Charles Lamb's criticism, "What has Margaret to do with Faust?" Yet in spite of all that may be said of the irrelevancies, and of the discussions of themes of merely ephemeral interest, with which Goethe overloaded especially the second part of the poem, his *Faust* remains for the modern world the final form of the legend out of which it grew, the magnificent expression of the broad humanism which, even in spheres accounted orthodox, has tended to replace the peculiar *studium theologicum* which inspired the early Faust-books.

See Karl Engel, *Zusammenstellung der Faust-Schriften vom 16. Jahrhundert bis Mitte 1884*—a second edition of the *Bibliotheca Faustiana* (1874)—(Oldenburg, 1885), a complete bibliography of all published matter concerned, even somewhat remotely, with Faust; Goethe's *Faust*, with introduction and notes by K. J. Schröer (2nd ed., Heilbronn, 1886); Carl Kiesewetter, *Faust in der Geschichte und Tradition* (Leipzig, 1893). The last book, besides being a critical study of the material for the historical and legendary story of Faust, aims at estimating the relation of the Faust-legend to the whole subject of occultism, ancient and modern. It is a mine of information on necromancy and its kindred subjects, as well as on eminent theurgists, wizards, crystal-gazers and the like of all ages. (W. A. P.)

FAUSTINA, ANNIA GALERIA, the younger, daughter of Antoninus Pius, and wife of Marcus Aurelius Antoninus. She is accused by Dio Cassius and Capitolinus of gross profligacy, and was reputed to have instigated the revolt of Avidius Cassius against her husband. She died in 175 or 176 (so Clinton, *Fasti rom.*) at Halala, near Mount Taurus, in Cappadocia, whither she had accompanied Aurelius. Charitable schools for orphan girls (hence called *Faustinianae*) were founded in her honour, like those established by her father Antoninus in honour of his wife, the elder Faustina. Her statue was placed in the temple of Venus, and she was numbered among the tutelary deities of Rome. From the fact that Aurelius was always devoted to her and was heartbroken at her death, it has been inferred that the unfavourable estimate of the historians is prejudiced or at least mistaken.

See Capitolinus, *Marcus Aurelius*; Dio Cassius lxxi. 22, lxxiv. 3; E. Renan, in *Mélanges d'histoire et des voyages*, 169-195.

FAVARA, a town of Sicily, in the province of Girgenti, 5 m. E. of Girgenti by road. Pop. (1901) 20,398. It possesses a fine castle of the Chiaramonte family, erected in 1280. The town has a considerable agricultural trade, and there are sulphur and other mines in the neighbourhood.

FAVART, CHARLES SIMON (1710–1792), French dramatist, was born in Paris on the 13th of November 1710, the son of a pastry-cook. He was educated at the college of Louis-le-Grand, and after his father's death carried on the business for a time. His first success in literature was *La France délivrée par la Pucelle d'Orléans*, a poem which obtained a prize of the Académie des Jeux Floraux. After the production of his first vaudeville, *Les Deux Jumelles* (1734), circumstances enabled him to relinquish business and devote himself entirely to the drama. He provided many pieces anonymously for the lesser theatres, and first put his name to *La Chercheuse d'esprit*, which was produced in 1741. Among his most successful works were *Annette et Lubin*, *Le Coq du village* (1743), *Ninette à la cour* (1753), *Les Trois Sultanes* (1761) and *L'Anglais à Bordeaux* (1763). Favart became director of the Opéra Comique, and in 1745 married Marie Justine Benoîte Duronceray (1727–1772), a beautiful young dancer, singer and actress, who as "Mlle Chantilly" had made a successful début the year before. By their united talents and labours the Opéra Comique rose to such a height of success that it aroused the jealousy of the rival Comédie Italienne and was suppressed. Favart, left thus without resources, accepted the proposal of Maurice de Saxe, and undertook the direction of a troupe of comedians which was to accompany his army into Flanders. It was part of his duty to compose from time to time impromptu verses on the events of the campaign, amusing and stimulating the spirits of the men. So popular were Favart and his troupe that the enemy became desirous of hearing his company and sharing his services, and permission was given to gratify them, battles and comedies thus curiously alternating with each other. But the marshal, who was an admirer of Mme Favart, began to persecute her with his attentions. To escape him she went to Paris, and the wrath of Saxe fell upon the husband. A *lettre de cachet* was issued against him, but he fled to Strassburg and found concealment in a cellar. Mme Favart meanwhile had been established by the marshal in a house at Vaugirard; but as she proved a fickle mistress she was suddenly arrested and confined in a convent, where she was brought to unconditional surrender in the beginning of 1750. Before the year was out the marshal died, and Mme Favart reappeared at the Comédie Italienne, where for twenty years she was the favourite actress. To her is largely due the beginnings of the change in this theatre to performances of a lyric type adapted from Italian models, which developed later into the genuine French comic opera. She was also a bold reformer in matters of stage costume, playing the peasant with bare arms, in wooden shoes and linen dress, and not, as heretofore, in court costume with enormous hoops, diamonds and long white kid gloves. With her husband, and other authors, she collaborated in a number of successful pieces, and one—*La Fille mal gardée*—she produced alone.

Favart survived his wife twenty years. After the marshal's death in 1750 he had returned to Paris, and resumed his pursuits as a dramatist. It was at this time that the abbé de Voisenon became intimate with him and took part in his labours, to what extent is uncertain. He had grown nearly blind in his last days, and died in Paris on the 12th of May 1792. His plays have been several times republished in various editions and selections (1763–1772, 12 vols.; 1810, 3 vols.; 1813; 1853). His correspondence (1759–1763) with Count Durazzo, director of theatres at Vienna, was published in 1808 as *Mémoires et correspondance littéraire, dramatique et anecdotique de C. S. Favart*. It furnishes valuable information on the state of the literary and theatrical worlds in the 18th century.

Favart's second son, Charles Nicolas Joseph Justin Favart (1749–1806), was an actor of moderate talent at the Comédie Française for fifteen years. He wrote a number of successful plays:—*Le Diable boiteux* (1782), *Le Mariage singulier* (1787) and, with his father, *La Vieillesse d'Annette* (1791). His son Antoine Pierre Charles Favart (1780–1867) was in the diplomatic service, and assisted in editing his grandfather's memoirs; he was a playwright and painter as well.

FAVERSHAM, a market town and river-port, member of the Cinque Port of Dover, and municipal borough in the Faversham parliamentary division of Kent, England, on a creek of the Swale, 9 m. W.N.W. of Canterbury on the South-Eastern & Chatham railway. Pop. (1901) 11,290. The church of St Mary of Charity, restored by Sir G. G. Scott in 1874, is of Early English architecture, and has some remains on one of the columns of frescoes of the same period, while the 14th-century paintings in the chancel are in better preservation. Some of the brasses are very fine, and there is one commemorating King Stephen, as well as a tomb said to be his. He was buried at the abbey he founded here, of which only a wall and the foundations below ground remain. At Davington, close to Faversham, there are remains, incorporated in a residence, of the cloisters and other parts of a Benedictine priory founded in 1153. Faversham has a free grammar school founded in 1527 and removed to its present site in 1877. Faversham Creek is navigable up to the town for vessels of 200 tons. The shipping trade is considerable, chiefly in coal, timber and agricultural produce. The oyster fisheries are important, and are managed by a very ancient gild, the Company of Free Dredgermen of the Hundred and Manor of Faversham. Brewing, brickmaking and the manufacture of cement are also carried on, and there are several large powder mills in the vicinity. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 686 acres.

There was a Romano-British village on the site of Faversham. The town (Fauresfeld, Faveresham) owed its early importance to its situation as a port on the Swale, to the fertile country surrounding it, and to the neighbourhood of Watling Street. In 811 it was called the king's town, and a witenagemot was held here under Æthelstan. In 1086 it was assessed as royal demesne, and a market was held here at this date. An abbey was built by Stephen in 1147, in which he and Matilda were buried. They had endowed it with the manor and hundred of Faversham; this grant caused many disputes between the abbot and men of Faversham concerning the abbot's jurisdiction. Faversham was probably a member of Dover from the earliest association of the Cinque Ports, certainly as early as Henry III., who in 1252 granted among other liberties of the Cinque Ports that the barons of Faversham should plead only in Shepway Court, but ten years later transferred certain pleas to the abbot's court. In this reign also the abbot appointed the mayor, but from the reign of Edward I. he was elected by the freemen and then installed by the abbot. The corporation was prescriptive, and a hallmote held in 1293 was attended by a mayor and twelve jurats. All the liberties of the Cinque Ports were granted to the barons of Faversham by Edward I. in 1302, and confirmed by Edward III. in 1365, and by later monarchs. The governing charter till 1835 was that of Henry VIII., granted in 1545 and confirmed by Edward VI.

FAVORINUS (2nd century A.D.), Greek sophist and philosopher, flourished during the reign of Hadrian. A Gaul by birth, he was a native of Arelate (Arles), but at an early age began his lifelong travels through Greece, Italy and the East. His extensive knowledge, combined with great oratorical powers, raised him to eminence both in Athens and in Rome. With Plutarch, who dedicated to him his treatise Περὶ τοῦ πρώτου ψυχροῦ, with Herodes Atticus, to whom he bequeathed his library at Rome, with Demetrius the Cynic, Cornelius Fronto, Aulus Gellius, and with Hadrian himself, he lived on intimate terms; his great rival, whom he violently attacked in his later years, was Polemon of Smyrna. It was Favorinus who, on being silenced by Hadrian in an argument in which the sophist might easily have refuted his adversary, subsequently explained that it was foolish to criticize the logic of the master of thirty legions. When the servile Athenians, feigning to share the emperor's displeasure with the sophist, pulled down a statue which they had erected to him, Favorinus remarked that if only Socrates also had had a statue at Athens, he might have been spared the hemlock. Of the very numerous works of Favorinus, we possess only a few fragments (unless the Κορινθιακὸς λόγος attributed to his tutor Dio Chrysostom is by him), preserved by Aulus Gellius, Diogenes Laërtius, Philostratus, and Suïdas, the second of whom borrows from his Παντοδαπὴ ἱστορία (miscellaneous history) and his Ἀπομνημονεύματα (memoirs). As a philosopher, Favorinus belonged to the sceptical school; his most important work in this connexion appears to have been Πυρρώνειοι τρόποι (the Pyrrhonean Tropes) in ten books, in which he endeavours to show that the methods of Pyrrho were useful to those who intended to practise in the law courts.

See Philostratus, *Vitae sophistarum*, i. 8; Suïdas, *s.v.*; frags. in C. W. Müller, *Frag. Hist. Graec.* iii. 4; monographs by L. Legré (1900), T. Colardeau (1903).

FAVRAS, THOMAS DE MAHY, MARQUIS DE (1744–1790), French royalist, was born on the 26th of March 1744, at Blois. He belonged to a poor family whose nobility dated from the 12th century. At seventeen he was a captain of dragoons, and saw some service in the closing campaign of the Seven Years' War. In 1772 he became first lieutenant of the Swiss guards of the count of Provence (afterwards Louis XVIII.). Unable to meet the expenses of his rank, which was equivalent to the grade of colonel in the army, he retired in 1775. He married in 1776 Victoria Hedwig Caroline, princess of Anhalt-Bernburg-Schaumburg, whose mother, deserted by her husband Prince Carl Ludwig in 1749, had found refuge with her daughter in the house of Marshal Soubise. After his marriage he went to Vienna to press the restitution of his wife's rights, and spent some time in Warsaw. In 1787 he was authorized to raise a patriotic legion to help the Dutch against the stadtholder William IV. and his Prussian allies. Returning to Paris at the outbreak of the Revolution, he became implicated in schemes for the escape of Louis XVI. from Paris and the dominance of the National Assembly. He was commissioned by the count of Provence through one of his gentlemen, the comte de la Châtre, to negotiate a loan of two million francs from the bankers Schaumel and Sartorius. Favras took into his confidence certain officers by whom he was betrayed; and, with his wife, he was arrested on Christmas Eve 1789 and imprisoned in the Abbaye. A fortnight later they were separated, Favras being removed to the Châtelet. It was stated in a leaflet circulated throughout Paris that Favras had organized a plot of which the count of Provence was the moving spirit. A force of 30,000 was to be raised, La Fayette and Bailly, the mayor of Paris, were to be assassinated, and Paris was to be starved into submission by cutting off supplies. The count hastened publicly to disavow Favras in a speech delivered before the commune of Paris and in a letter to the National Assembly, although there is no reasonable doubt of his complicity in the plot that did exist. In the course of a trial of nearly two months' duration the witnesses disagreed, and even the editor of the *Révolutions de Paris* (No. 30) admitted that the evidence was insufficient but an armed attempt of the Royalists on the Châtelet on the 26th of January, which was defeated by La Fayette, roused the suspicious temper of the Parisians to fury, and on the 18th of February 1790, in spite of the courageous defence of his counsel, Favras was condemned to be hanged. He refused to give any information of the alleged plot, and the sentence was carried out on the Place de Grève the next day, to the delight of the populace, since it was the first instance when no distinction in the mode of execution was allowed between noble and commoner. Favras was generally regarded as a martyr to his refusal to implicate the count of Provence, and Madame de Favras was pensioned by Louis XVI. She left France, and her son Charles de Favras served in the Austrian and the Russian armies. He received an allowance from Louis XVIII. Her daughter Caroline married Rüdiger, Freiherr von Stillfried Ratènic, in 1805.

The official *dossier* of Favras's trial for high treason against the nation disappeared from the Châtelet, but its substance is preserved in the papers of a clerk.

BIBLIOGRAPHY.—For particulars see A. Tuetey, *Répertoire général des sources manuscrites de l'histoire de Paris pendant la Révolution Française* (vol. i., 1890, pp. 175-177); M. Tourneux, *Bibl. de l'histoire de Paris pendant la Révolution Française* (vol. i. pp. 196-198, 1890). His brother, M. Mahy de Cormère, published a *Mémoire justificatif* in 1790 and a *Justification* in 1791. See also a memoir by Eduard, Freiherr v. Stillfried Ratènic (Vienna, 1881), and an article by Alexis de Valon in the *Revue des deux mondes* (15th June 1851).

FAVRE, JEAN ALPHONSE (1815–1890), Swiss geologist, was born at Geneva on the 31st of March 1815. He was for many years professor of geology in the academy at Geneva, and afterwards president of the Federal Commission with charge of the geological map of Switzerland. One of his earliest papers was *On the Anthracites of the Alps* (1841), and later he gave special attention to the geology of Savoy and of Mont Blanc, and to the ancient glacial phenomena of those Alpine regions. His elucidation of the geological structure demonstrated that certain anomalous occurrences of fossils were due to repeated interfoldings of the strata and to complicated overthrust faults. In 1867 he published *Recherches géologiques dans les parties de la Savoie, du Piémont et de la Suisse voisines du Mont Blanc.* He died at Geneva in June 1890.

His son ERNEST FAVRE (b. 1845) has written on the palaeontology and geology of Galicia, Savoy and the Fribourg Alps, and of the Caucasus and Crimea.

FAVRE, JULES CLAUDE GABRIEL (1809–1880), French statesman, was born at Lyons on the 21st of March 1809, and began his career as an advocate. From the time of the revolution of 1830 he openly declared himself a republican, and in political trials he seized the opportunity to express his opinions. After the revolution of 1848 he was elected deputy for Lyons to the Constituent Assembly, where he sat among the moderate republicans, voting against the socialists. When Louis Napoleon was elected President of France, Favre made himself conspicuous by his opposition, and on the 2nd of December 1851 he tried with Victor Hugo and others to organize an armed resistance in the streets of Paris. After the *coup d'état* he withdrew from politics, resumed his profession, and distinguished himself by his defence of Felice Orsini, the perpetrator of the attack against the life of Napoleon III. In 1858 he was elected deputy for Paris, and was one of the "Five" who gave the signal for the republican opposition to the Empire. In 1863 he became the head of his party, and delivered a number of addresses denouncing the Mexican expedition and the occupation of Rome. These addresses, eloquent, clear and incisive, won him a seat in the French Academy in 1867. With Thiers he opposed the declaration of war against Prussia in 1870, and at the news of the defeat of Napoleon III. at Sedan he demanded from the Legislative Assembly the deposition of the emperor. In the government of National Defence he became vice-president under General Trochu, and minister of foreign affairs, with the onerous task of negotiating peace with victorious Germany. He proved to be less adroit as a diplomat than he had been as an orator, and committed several irreparable blunders. His famous statement on the 6th of September 1870 that he "would not yield to Germany an inch of territory nor a single stone of the fortresses" was a piece of oratory which Bismarck met on the 19th by his declaration to Favre that the cession of Alsace and of Lorraine was the indispensable condition of peace. He also made the mistake of not having an assembly elected which would have more regular powers than the government of National Defence, and of opposing the removal of the government from Paris during the siege. In the peace negotiations he allowed Bismarck to get the better of him, and arranged for the armistice of the 28th of June 1871 without knowing the situation of the armies, and without consulting the government at Bordeaux. By a grave oversight he neglected to inform Gambetta that the army of the East (80,000 men) was not included in the armistice, and it was thus obliged to retreat to neutral territory. He gave no proof whatever of diplomatic skill in the negotiations for the treaty of Frankfort, and it was Bismarck who imposed all the conditions. He withdrew from the ministry, discredited, on the 2nd of August 1871, but remained in the chamber of deputies. Elected senator on the 30th of January 1876, he continued to support the government of the republic against the reactionary opposition, until his death on the 20th of January 1880.

His works include many speeches and addresses, notably *La Liberté de la Presse* (1849), *Défense de F. Orsini* (1866), *Discours de réception à l'Académie française* (1868), *Discours sur la liberté intérieure* (1869). In *Le Gouvernement de la Défense Nationale*, 3 vols., 1871–1875, he explained his rôle in 1870–1871. After his death his family published his speeches in 8 volumes.

See G. Hanotaux, *Histoire de la France contemporaine* (1903, &c.); also E. Benoît-Lévy, *Jules Favre* (1884).

FAVUS (Lat. for honeycomb), a disease of the scalp, but occurring occasionally on any part of the skin, and even at times on mucous membranes. The uncomplicated appearance is that of a number of yellowish, circular, cup-shaped crusts (scutula) grouped in patches like a piece of honeycomb, each about the size of a split pea, with a hair projecting in the centre. These increase in size and become crusted over, so that the characteristic lesion can only be seen round the edge of the scab. Growth continues to take place for several months, when scab and scutulum come away, leaving a shining bare patch destitute of hair. The disease is essentially chronic, lasting from ten to twenty years. It is caused by the growth of a fungus, and pathologically is the reaction of the tissues to the growth. It was the first disease in which a fungus was discovered—by J. L. Schönlein in 1839; the discovery was published in a brief note of twenty lines in *Müllers Archiv* for that year (p. 82), the fungus having been subsequently named by R. Remak *Achorion Schönleinii* after its discoverer. The achorion consists of slender, mycelial threads matted together, bearing oval, nucleated gonidia either free or jointed. The spores would appear to enter through the unbroken cutaneous surface, and to germinate mostly in and around the hair-follicle and sometimes in the shaft of the hair. In 1892 two other species of the fungus were described by P. G. Unna and Frank, the *Favus griseus*, giving rise to greyish-yellow scutula, and the *Favus sulphureus celerior*, causing sulphur-yellow scutula of a rapid growth. Favus is commonest among the poorer Jews of Russia, Poland, Hungary, Galicia and the East, and among the same class of Mahommedans in Turkey, Asia Minor, Syria, Persia, Egypt, Algiers, &c. It is not rare in the southern departments of France, in some parts of Italy, and in Scotland. It is spread by contagion, usually from cats, often, however, from mice, fowls or dogs. Lack of personal cleanliness is an almost necessary factor in its development, but any one in delicate health, especially if suffering from phthisis, seems especially liable to contract it. Before treatment can be begun the scabs must be removed by means of carbolized oil, and the head thoroughly cleansed with soft soap. The cure is then brought about by the judicious use of parasiticides. If the nails are affected, avulsion will probably be needed before the disease can be reached.

FAWCETT, HENRY (1833–1884), English politician and economist, was born at Salisbury on the 25th of August 1833. His father, William Fawcett, a native of Kirkby Lonsdale, in Westmorland, started life as a draper's assistant at Salisbury, opened a draper's shop on his own account in the market-place there in 1825, married a solicitor's daughter of the city, became a prominent local man, took a farm, developed his north-country sporting instincts, and displayed his shrewdness by successful speculations in Cornish mining. His second son, Henry, inherited a full measure of his shrewdness, along with his masculine energy, his straightforwardness, his perseverance and his fondness for fishing. The father was active in electioneering matters, and his wife was an ardent reformer. Henry Fawcett was educated locally and at King's College school, London, and proceeded to Peterhouse, Cambridge, in October 1852, migrating in 1853 to Trinity Hall. He was seventh wrangler in 1856, and was elected to a fellowship at his college.

He had already attained some prominence as an orator at the Cambridge Union. Before he left school he had formed the ambition of entering parliament, and, being a poor man, he resolved to approach the House of Commons through a career at the bar. He had already entered Lincoln's Inn. His prospects, however, were shattered by a calamity which befell him in September 1858, when two stray pellets from his father's fowling-piece passed through the glasses he was wearing and blinded him for life. Within ten minutes after his accident he had made up his mind "to stick to his old pursuits as much as possible." He kept up all recreations contributing to the enjoyment of life; he fished, rowed, skated, took abundant walking and horse exercise, and learnt to play cards with marked packs. Soon after his accident he established his headquarters at Trinity Hall, Cambridge, entered cordially into the social life of the college, and came to be regarded by many as a typical Cambridge man. He gave up mathematics (for which he had little aptitude), and specialized in political economy. He paid comparatively little attention to economic history, but he was in the main a devout believer in economic theory, as represented by Ricardo and his school. The later philosophy of the subject he believed to be summed up in one book, Mill's *Principles of Political Economy*, which he regarded as the indispensable "vade mecum" of every politician. He was not a great reader, and Mill probably never had a serious rival in his regard, though he was much impressed by Buckle's *History of Civilization* and Darwin's *Origin of Species* when they severally appeared. He made a great impression in 1859 with a paper at the British Association, and he soon became a familiar figure there and at various lecture halls in the north as an exponent of orthodox economic theory. Of the sincerity of his faith he gave the strongest evidence by his desire at all times to give a practical application to his views and submit them to the test of experiment. Among Mill's disciples he was, no doubt, far inferior as an economic thinker to Cairnes, but as a popularizer of the system and a demonstrator of its principles by concrete examples he had no rival. His power of exposition was illustrated in his *Manual of Political Economy* (1863), of which in twenty years as many as 20,000 copies were sold. Alexander Macmillan had suggested the book, and it appeared just in time to serve as a credential, when, in the autumn of 1863, Fawcett stood and was elected for the Chair of Political Economy at Cambridge. The appointment attached him permanently to Cambridge, gave him an income, and showed that he was competent to discharge duties from which a blind man is often considered to be debarred. He was already a member of the Political Economy Club, and was becoming well known in political circles as an advanced Radical. In January 1863, after a spirited though abortive attempt in Southwark, he was only narrowly beaten for the borough of Cambridge. Early in 1864 he was adopted as one of the Liberal candidates at Brighton, and at the general election of 1865 he was elected by a large majority. Shortly after his election he became engaged to Millicent, daughter of Mr Newson Garrett of Aldeburgh, Suffolk, and in 1867 he was married. Mrs Fawcett (b. 1847) became well known for her social and literary work, and especially as an advocate, in the press and on the platform, of women's suffrage and the higher education and independent employment of women. And after her husband's death, as well as during his lifetime, she was a prominent leader in these movements.

Fawcett entered parliament just in time to see the close of Palmerston's career and to hail the adoption by Gladstone of a programme of reform to which most of the *laissez-faire* economists gave assent. He was soon known as a forcible speaker, and quickly overcame the imputation that he was academic and doctrinaire, though it is true that a certain monotony in delivery often gave a slightly too didactic tone to his discourses. But it was as the uncompromising critic of the political shifts and expedients of his leaders that he attracted most attention. He constantly insisted upon the right of exercising private judgment, and he especially devoted himself to the defence of causes which, as he thought, were neglected both by his official leaders and by his Radical comrades. Re-elected for Brighton to the parliament of 1868–1874, he greatly hampered the government by his persistence in urging the abolition of clerical fellowships and the payment of election expenses out of the rates, and by opposing the "permissive compulsion" clauses of the Elementary Education Bill, and the exclusion of agricultural children from the scope of the act. His hatred of weak concessions made him the terror of parliamentary wirepullers, and in 1871 he was not undeservedly spoken of in *The Times* as the most "thorough Radical now in the House." His liberal ideals were further shocked by the methods by which Gladstone achieved the abolition of Army Purchase. His disgust at the supineness of the cabinet in dealing with the problems of Indian finance and the growing evil of Commons Enclosures were added to the catalogue of grievances which Fawcett drew up in a powerful article, "On the Present Position of the Government," in the *Fortnightly Review* for November 1871. In 1867 he had opposed the expenses of a ball given to the sultan at the India office being charged upon the Indian budget. In 1870 he similarly opposed the taxation of the Indian revenue with the cost of presents distributed by the duke of Edinburgh in India. In 1871 he went alone into the lobby to vote against the dowry granted to the princess Louise. The soundness of his principles was not impeached, but his leaders looked askance at him, and from 1871 he was severely shunned by the government whips. Their suspicion was justified when in 1873 Fawcett took a leading share in opposing Gladstone's scheme for university education in Ireland as too denominational, and so contributed largely to a conclusive defeat of the Gladstone ministry.

From 1869 to 1880 Fawcett concentrated his energies upon two important subjects which had not hitherto been deemed worthy of serious parliamentary attention. The first of these was the preservation of commons, especially those near large towns; and the second was the responsibility of the British government for the amendment of Indian finance. In both cases the success which he obtained exhibited the sterling sense and shrewdness which made up such a great part of Fawcett's character. In the first case Fawcett's great triumph was the enforcement of the general principle that each annual Enclosure Act must be scrutinized by parliament and judged in the light of its conformity to the interests of the community at large. Probably no one did more than he did to prevent the disafforestation of Epping Forest and of the New Forest. From 1869 he regularly attended the meetings of the Commons Preservation Society, and he remained to the end one of its staunchest supporters. His intervention in the matter of Indian finance, which gained him the sobriquet of the "member for India," led to no definite legislative achievements, but it called forth the best energies of his mind and helped to rouse an apathetic and ignorant public to its duties and responsibilities. Fawcett was defeated at Brighton in February 1874. Two months later, however, he was elected for Hackney, and retained the seat during his life. He was promptly replaced on the Indian Finance Committee, and continued his searching inquiries with a view to promote a stricter economy in the Indian budget, and a more effective responsibility in the management of Indian accounts.

As an opponent of the Disraeli government (1874–1880) Fawcett came more into line with the Liberal leaders. In foreign politics he gave a general adhesion to Gladstone's views, but he continued to devote much attention to Indian matters, and it was during this period that he produced two of his best publications. His *Free Trade and Protection* (1878) illustrated his continued loyalty to Cobdenite ideas. At the same time his admiration for Palmerston and his repugnance to schemes of Home Rule show that he was not by any means a peace-at-any-price man. He thought that the Cobdenites had deserved well of their country, but he always maintained that their foreign politics were biased to excess by purely commercial considerations. As befitted a writer whose linguistic gifts were of the slenderest, Fawcett's English was a sound homespun, clear and unpretentious. In a vigorous employment of the vernacular he approached Cobbett, whose writing he justly admired. The second publication was his *Indian Finance* (1880), three essays reprinted from the *Nineteenth Century*, with an introduction and appendix. When the Liberal party returned to power in 1880 Gladstone offered Fawcett a place in the new government as postmaster-general (without a seat in the cabinet). On Egyptian and other questions of foreign policy Fawcett was often far from being in full harmony with his leaders, but his position in the government naturally enforced reserve. He was, moreover, fully absorbed by his new administrative functions. He gained the sympathy of a class which he had hitherto done little to conciliate, that of public officials, and he showed himself a most capable head of a public department. To his readiness in adopting suggestions, and his determination to push business through instead of allowing it to remain permanently in the stage of preparation and circumlocution, the public is mainly indebted for five substantial postal reforms:—(1) The parcels post, (2) postal orders, (3) sixpenny telegrams, (4) the banking of small savings by means of stamps, (5) increased facilities for life insurance and annuities. In connexion with these last two improvements Fawcett, in 1880, with the assistance of Mr James Cardin, took great pains in drawing up a small pamphlet called *Aids to Thrift*, of which over a million copies were circulated gratis. A very useful minor innovation of his provided for the announcement on every pillar-box of the time of the "next collection." In the post office, as elsewhere, he was a strong advocate of the employment of women. Proportional representation and the extension of franchise to women were both political doctrines which he adopted very early in his career, and never abandoned. Honours were showered upon him during his later years. He was made an honorary D.C.L. of Oxford, a fellow of the Royal Society, and was in 1883 elected lord rector of Glasgow University. But the stress of departmental work soon began to tell upon his health. In the autumn of 1882 he had a sharp attack of diphtheria complicated by typhoid, from which he never properly recovered. He resumed his activities, but on the 6th of November 1884 he succumbed at Cambridge to an attack of congestion of the lungs. He was buried in Trumpington churchyard, near Cambridge, and to his memory were erected a monument in Westminster Abbey, a statue in Salisbury market-place, and a drinking fountain on the Thames embankment.

In economic matters Fawcett's position can best be described as transitional. He believed in co-operation almost as a panacea. In other matters he clung to the old *laissez-faire* theorists, and was a strong anti-socialist, with serious doubts about free education, though he supported the Factory Acts and wished their extension to agriculture. Apparent inconsistencies were harmonized to a great extent by his dominating anxiety to increase the well-being of the poor. One of his noblest traits was his kindliness and genuine affection for the humble and oppressed, country labourers and the like, for whom his sympathies seemed always on the increase. Another was his disposition to interest himself in and to befriend younger men. In the great affliction of his youth Fawcett bore himself with a fortitude which it would be difficult to parallel. The effect of his blindness was, as the event proved, the reverse of calamitous. It brought the great aim and purpose of his life to maturity at an earlier date than would otherwise have been possible, and it had a mellowing influence upon his character of an exceptional and beneficent kind. As a youth he was rough and canny, with a suspicion of harshness. The kindness evoked by his misfortune, a strongly reciprocated family affection, a growing capacity for making and keeping friends—these and other causes tended to ripen all that was best, and apparently that only, in a strong but somewhat stern character. His acerbity passed away, and in later life was reserved exclusively for official witnesses before parliamentary committees. Frank, helpful, conscientious to a fault, a shrewd gossip, and a staunch friend, he was a man whom no one could help liking. Several of his letters to his father and mother at different periods of his career are preserved in Leslie Stephen's admirable *Life* (1885), and show a goodness of heart, together with a homely simplicity of nature, which is most touching. In appearance Fawcett was gaunt and tall, over 6 ft. 3 in. in height, large of bone, and massive in limb. (T. Se.)

FAWCETT, JOHN (1768–1837), English actor and playwright, was born on the 29th of August 1768, the son of an actor of the same name (d. 1793). At the age of eighteen he ran away from school and appeared at Margate as Courtall in *The Belle's Stratagem*; afterwards he joined Tate Wilkinson's company and turned from tragedy to low comedy parts. In 1791 he appeared at Covent Garden, and in 1794 at the Haymarket. Colman, then manager of that house, wrote a number of parts designed to suit his talents, and two of Fawcett's greatest successes were as Dr. Pangloss in *The Heir at Law* (1797) and as Dr Ollapod in *The Poor Gentleman* (1798). He retired from the stage in 1830.

FAWKES, FRANCIS (1720–1777), English poet and divine, was born at Warmsworth, near Doncaster, Yorkshire, where his father was rector, and was baptized on the 4th of April 1720. After studying at Jesus College, Cambridge, where he graduated M.A. in 1745, he took holy orders, and was successively curate of Bramham, curate of Croydon, vicar of Orpington, and rector of Hayes, and finally was made one of the chaplains to the princess of Wales. His first publication is said to have been *Bramham Park, a Poem*, in 1745; a volume of poems and translations appeared in 1761; and *Partridge Shooting*, an eclogue, in 1764. His translations of the minor Greek poets—Anacreon, Sappho, Bion and Moschus, Musaeus, Theocritus and Apollonius—acquired for him considerable fame, but they are less likely to be remembered than his fine song, "Dear Tom, this brown jug, that now foams with mild ale." Fawkes died on the 26th of August 1777.

FAWKES, GUY (1570–1606), English "gunpowder plot" conspirator, son of Edward Fawkes of York, a member of a good Yorkshire family and advocate of the archbishop of York's consistory court, was baptized at St Michael le Belfrey at York on the 16th of April 1570. His parents were Protestants, and he was educated at the free school at York, where, it is said, John and Christopher Wright and the Jesuit Tesimond *alias* Greenway, afterwards implicated in the conspiracy, were his schoolfellows. On his father's death in 1579 he inherited his property. Soon afterwards his mother married, as her second husband, Dionis Baynbrigge of Scotton in Yorkshire, to which place the family removed. Fawkes's stepfather was connected with many Roman Catholic families, and was probably a Roman Catholic himself, and Fawkes himself became a zealous adherent of the old faith. Soon after he had come of age he disposed of his property, and in 1593 went to Flanders and enlisted in the Spanish army, assisting at the capture of Calais by the Spanish in 1596 and gaining some military reputation. According to Father Greenway he was "a man of great piety, of exemplary temperance, of mild and cheerful demeanour, an enemy of broils and disputes, a faithful friend and remarkable for his punctual attendance upon religious observances," while his society was "sought by all the most distinguished in the archduke's camp for nobility and virtue." He is described as "tall, with brown hair and auburn beard."

In 1604 Thomas Winter, at the instance of Catesby, in whose mind the gunpowder plot had now taken definite shape, introduced himself to Fawkes in Flanders, and as "a confident gentleman," "best able for this business," brought him on to England as assistant in the conspiracy. Shortly afterwards he was initiated into the plot, after taking an oath of secrecy, meeting Catesby, Thomas Winter, Thomas Percy and John Wright at a house behind St Clement's (see GUNPOWDER PLOT and CATESBY, ROBERT). Owing to the fact of his being unknown in London, to his exceptional courage and coolness, and probably to his experience in the wars and at sieges, the actual accomplishment of the design was entrusted to Fawkes, and when the house adjoining the parliament house was hired in Percy's name, he took charge of it as Percy's servant, under the name of Johnson. He acted as sentinel while the others worked at the mine in December 1604, probably directing their operations, and on the discovery of the adjoining cellar, situated immediately beneath the House of Lords, he arranged in it the barrels of gunpowder, which he covered over with firewood and coals and with iron bars to increase the force of the explosion. When all was ready in May 1605 Fawkes was despatched to Flanders to acquaint Sir William Stanley, the betrayer of Deventer, and the intriguer Owen with the plot. He returned in August and brought fresh gunpowder into the cellars to replace any which might be spoilt by damp. A slow match was prepared which would give him a quarter of an hour in which to escape from the explosion. On Saturday, the 26th of October, Lord Monteagle (*q.v.*) received the mysterious letter which revealed the conspiracy and of which the conspirators received information the following day. They, nevertheless, after some hesitation, hoping that the government would despise the warning, determined to proceed with their plans, and were encouraged in their resolution by Fawkes, who visited the cellar on the 30th and reported that nothing had been moved or touched. He returned accordingly to his lonely and perilous vigil on the 4th of November. On that day the earl of Suffolk, as lord chamberlain, visited the vault, accompanied by Monteagle, remarked the quantity of faggots, and asked Fawkes, now described as "a very tall and desperate fellow," who it was that rented the cellar. Percy's name, which Fawkes gave, aroused fresh suspicions and they retired to inform the king. At about ten o' clock Robert Keyes brought Fawkes from Percy a watch, that he might know how the anxious hours were passing, and very shortly afterwards he was arrested, and the gunpowder discovered, by Thomas Knyvett, a Westminster magistrate. Fawkes was brought into the king's bedchamber, where the ministers had hastily assembled, at one o'clock. He maintained an attitude of defiance and of "Roman resolution," smiled scornfully at his questioners, making no secret of his intentions, replied to the king, who asked why he would kill him, that the pope had excommunicated him, that "dangerous diseases require a desperate remedy," adding fiercely to the Scottish courtiers who surrounded him that "one of his objects was to blow back the Scots into Scotland." His only regret was the failure of the scheme. "He carrieth himself," writes Salisbury to Sir Charles Cornwallis, ambassador at Madrid, "without any feare or perturbation . . . ; under all this action he is noe more dismayed, nay scarce any more troubled than if he was taken for a poor robbery upon the highway," declaring "that he is ready to die, and rather wisheth 10,000 deaths, than willingly to accuse his master or any other." He refused stubbornly on the following days to give information concerning his accomplices; on the 8th he gave a narrative of the plot, but it was not till the 9th, when the fugitive conspirators had been taken at Holbeche, that torture could wring from him their names. His imperfect signature to his confession of this date, consisting only of his Christian name and written in a faint and trembling hand, is probably a ghastly testimony to the severity of the torture ("*per gradus ad ima*") which James had ordered to be applied if he would not otherwise confess and the "gentler tortures" were unavailing,—a horrible practice unrecognized by the law of England, but usually employed and justified at this time in cases of treason to obtain information. He was tried, together with the two Winters, John Grant, Ambrose Rokewood, Robert Keyes and Thomas Bates, before a special commission in Westminster Hall on the 27th of January 1606. In this case there could be no defence and he was found guilty. He suffered death in company with Thomas Winter, Rokewood and Keyes on the 31st, being drawn on a hurdle from the Tower to the Parliament House, opposite which he was executed. He made a short speech on the scaffold, expressing his repentance, and mounted the ladder last and with assistance, being weak from torture and illness. The usual barbarities practised upon him after he had been cut down from the gallows were inflicted on a body from which all life had already fled.

Bibliography.—*Hist. of England*, by S. R. Gardiner, vol. i.; and the same author's *What Gunpowder Plot was* (1897); *What was the Gunpowder Plot?* by J. Gerard (1897); *The Gunpowder Plot*, by D. Jardine (1857); *Calendar of State Pap. Dom. 1603–1610; State Trials*, vol. ii.; *Archaeologia*, xii. 200; R. Winwood's *Memorials*; *Notes and Queries*, vi. ser. vii. 233, viii. 136; *The Fawkeses of York in the 16th Century*, by R. Davies (1850); *Dict. of Nat. Biog.* and authorities cited there. The official account (untrustworthy in details) is the *True and Perfect Relation of the Whole Proceedings against the late most Barbarous Traitors* (1606), reprinted by Bishop Barlow of Lincoln as *The Gunpowder Treason* (1679). See also Gunpowder Plot.

The lantern said to be Guy Fawkes's is in the Bodleian library at Oxford. (P. C. Y.)

FÁY, ANDRÁS (1786–1864), Hungarian poet and author, was born on the 30th of May 1786, at Kohány in the county of Zemplin, and was educated for the law at the Protestant college of Sárospatak. His *Mesêk* (*Fables*), the first edition of which appeared at Vienna in 1820, evinced his powers of satire and invention, and won him the well-merited applause of his countrymen. These fables, which, on account of their originality and simplicity, caused Fáy to be regarded as the Hungarian Aesop, were translated into German by Petz (Raab, 1825); and partly into English by E. D. Butler, *Hungarian Poems and Fables* (London, 1877). Fáy wrote also numerous poems, the chief of which are to be found in the collections *Bokrêta* (*Nosegay*) (Pest, 1807), and *Fris Bokrêta* (*Fresh Nosegay*) (Pest, 1818). He also composed plays and romances and tales. In 1835 Fáy was elected to the Hungarian diet, and was for a time the leader of the opposition party. It is to him that the Pest Savings Bank owes its origin, and he was one of the chief founders of the Hungarian National theatre. He died on the 26th of July 1864. His earlier works were collected at Pest (1843–1844, 8 vols.). The most noteworthy of his later works is a humorous novel entitled *Jávor orvos és Bakator Ambrus szolgáia* (*Jávor the Doctor and his servant Ambrose Bakator*), (Pest 1855, 2 vols.).

FAYAL (*Faicl*), a Portuguese island in the Atlantic Ocean, forming part of the Azores archipelago. Pop. (1900) 22,262; area, 63 sq. m. Fayal, *i.e.* "the beech wood," was so called from the former abundance of the *Myrica faya*, which its discoverers mistook for beech trees. It is one of the most frequented of the Azores, for it lies directly in the track of vessels crossing the Atlantic, and has an excellent harbour at Horta (*q.v.*), a town of 6574 inhabitants. Cedros (3278) and Fételra (2002) are the other chief towns. The so-called "Fayal wine," which was largely exported from the Azores in the 19th century, was really the produce of Pico, a larger island lying to the east. The women of Fayal manufacture fine lace from the agave thread. They also execute carvings in snow-white fig-tree pith, and carry on the finer kinds of basket-making. A small valley, called Flemengos, perpetuates the name of the Flemish settlers, who have left their mark on the physical appearance of the inhabitants. (See Azores.)

FAYETTEVILLE, a city and the county-seat of Washington county, Arkansas, U.S.A., about 150 m. N.W. of Little Rock. Pop. (1890) 2942; (1900) 4061; (1910) 4471. It is served by the St Louis & San Francisco railway. The city lies about 1400 ft. above the sea, in the Ozark Mountain region. There is much fine scenery in the neighbourhood, there are mineral springs near by, and the place has become known as a summer resort. Fayetteville is the seat of the University of Arkansas (incorporated 1871; opened 1872; co-educational), which includes the following departments: at Fayetteville, a college of liberal arts, science and engineering, a conservatory of music and art, a preparatory school, and an agricultural college and agricultural experiment station; at Little Rock, a medical school and a law school, and at Pine Bluff, the Branch Normal College for negroes. In 1908 the university had 122 instructors and a total enrolment of 1725 students. In Fayetteville there are a National cemetery with 1236 soldiers' graves (782 "unknown") and a Confederate cemetery with 725 graves and a memorial monument. In the vicinity of Fayetteville there are deposits of coal; and the city is in a fine fruit-growing region, apples being the principal crop. Much of the surrounding country is still covered with timber. Among manufactures are lumber, spokes, handles, waggons, lime, evaporated fruit and flour.

The first settlement on the site of what is now Fayetteville was made between 1820 and 1825; when Washington county was created in 1828 the place became the county-seat, and it was called Washington Court-house until 1829, when it received its present name. The citizens of Fayetteville were mainly Confederate sympathizers; Fayetteville was raided by Federal cavalry on the 14th of July 1862, and was permanently occupied by Federal troops in the autumn of the same year. Confederate cavalry under Brigadier-General William Lewis Cabell attacked the city on the 18th of April 1863, but were driven off. The town was burned in August 1863, and shelled on the 3rd of November 1864, after the battle of Pea Ridge, by a detachment of General Price's army. Fayetteville was incorporated as a town in 1841, and in 1859 received a city charter, which was abolished by act of the Legislature in 1867; under a general law of 1869 the town was re-incorporated; and in 1906 it became a city of the first class.

FAYETTEVILLE, a city and the county-seat of Cumberland county, North Carolina, U.S.A., on the W. bank of the Cape Fear river (at the head of steamboat navigation), about 80 m. N.W. of Wilmington. Pop. (1890) 4222; (1900) 4670, including 2221 negroes; (1910) 7045. It is served by the Atlantic Coast Line railway and the short Raleigh & Southport railway, and by steamboat lines to Wilmington. A scheme was set on foot for the improvement by canalization of the Cape Fear river above Wilmington under a Federal project of 1902, which provided for a channel 8 ft. deep at low water from Wilmington to Fayetteville. Below Wilmington the improvement of the river channel, 270 ft. wide and 16 ft. deep, was completed in 1889, and the project of 1889 provided for an increase in depth to 20 ft. Pine forests surround the town, and oaks and elms of more than a century's growth shade its streets. Fayetteville has two hospitals (each with a training school for nurses), and is the seat of a state coloured normal school and of the Donaldson military school. Several creeks and the upper Cape Fear river furnish considerable water-power, and in or near Fayetteville are manufactories of cotton goods, silk, lumber, wooden-ware, turpentine, carriages, wagons, ploughs, edge tools and flour. In the earlier half of the 19th century Fayetteville was a great inland market for the western part of the state, for eastern Tennessee and for south-western Virginia. There is a large vineyard in the vicinity; truck-gardening is an important industry in the surrounding country; and Fayetteville is a shipping centre for small fruits and vegetables, especially lettuce, melons and berries. The municipality owns its water-works and its electric-lighting plant. The vicinity was settled between 1729 and 1747 by Highlanders, the settlement called Cross Creek lying within the present limits of Fayetteville. In 1762, by an act of the assembly, a town was laid out including Cross Creek, and was named Campbelltown (or "Campbeltown"); but in 1784, when Lafayette visited the town, its name was changed in his honour to Fayetteville, though the name Cross Creek continued to be used locally for many years. Flora McDonald, the famous Scottish heroine, came to Campbelltown in April 1775 with her husband and children, and here she seems to have lived during the remainder of that year. The general assembly of the state met at Fayetteville in 1787, 1788 and 1789 (Newbern, Tarboro, Hillsboro and Fayetteville all being rivals at this time for the honour of becoming the permanent capital); and in 1789 the Federal constitution was here ratified for North Carolina. In 1831 most of the town was burned. At the outbreak of the Civil War, the state authorities seized the United States Arsenal at Fayetteville, which contained 37,000 muskets and a complete equipment for a battery of light artillery. In March 1865 General W. T. Sherman and his army took possession of the town, destroyed the arsenal, and did considerable damage to property. Fayetteville was chartered as a city in 1893. A serious flood occurred in August 1908.

FAYRER, SIR JOSEPH, Bart. (1824–1907), English physician, was born at Plymouth on the 6th of December 1824. After studying medicine at Charing Cross hospital, London, he was in 1847 appointed medical officer of H.M.S. "Victory," and soon afterwards accompanied the 3rd Lord Mount-Edgcumbe on a tour through Europe, in the course of which he saw fighting at Palmero and Rome. Appointed an assistant surgeon in Bengal in 1850, he went through the Burmese campaign of 1852 and was political assistant and Residency surgeon at Lucknow during the Mutiny. From 1859 to 1872 he was professor of surgery at the Medical College of Calcutta, and when the prince of Wales made his tour in India he was appointed to accompany him as physician. Returning from India, he acted as president of the Medical Board of the India office from 1874 to 1895, and in 1896 he was created a baronet. Sir Joseph Fayrer, who became a fellow of the Royal Society in 1877, wrote much on subjects connected with the practice of medicine in India, and was especially known for his studies on the poisonous snakes of that country and on the physiological effects produced by their virus (*Thanatophidia of India*, 1872). In 1900 appeared his *Recollections of my Life*. He died at Falmouth on the 21st of May 1907.

FAYUM, a mudiria (province) of Upper Egypt, having an area of 490 sq. m. and a population (1907) of 441,583. The capital, Medinet-el-Fayum, is 81 m. S.S.W. of Cairo by rail. The Fayum proper is an oasis in the Libyan Desert, its eastern border being about 15 m. west of the Nile. It is connected with that river by the Bahr Yusuf, which reaches the oasis through a gap in the hills separating the province from the Nile Valley. South-west of the Fayum, and forming part of the mudiria, is the Gharak depression. Another depression, entirely barren, the Wadi Rayan, covering 280 sq. m., lies west of the Gharak. The whole region is below sea-level, and save for the gap mentioned is encircled by the Libyan hills. The lowest part of the province, the north-west end, is occupied by the Birket el Kerun, or Lake of the Horns, whose surface level is 140 ft. below that of the sea. The lake covers about 78 sq. m.

Differing from the typical oasis, whose fertility depends on water obtained from springs, the cultivated land in the Fayum is formed of Nile mud brought down by the Bahr Yusuf. From this channel, 15 m. in length from Lahun, at the entrance of the gap in the hills, to Medina, several canals branch off and by these the province is irrigated, the drainage water flowing into the Birket el Kerun. Over 400 sq. m. of the Fayum is cultivated, the chief crops being cereals and cotton. The completion of the Assuan dam by ensuring a fuller supply of water enabled 20,000 acres of land, previously unirrigated and untaxed, to be brought under cultivation in the three years 1903–1905. Three crops are obtained in twenty months. The province is noted for its figs and grapes, the figs being of exceptionally good quality. Olives are also cultivated. Rose trees are very numerous and most of the attar of roses of Egypt is manufactured in the province. The Fayum also possesses an excellent breed of sheep. Lake Kerun abounds in fish, notably the *bulti* (Nile carp), of which considerable quantities are sent to Cairo.

Medinet el-Fayum (or Medina), the capital of the province, is a great agricultural centre, with a population which increased from 26,000 in 1882 to 37,320 in 1907, and has several large bazaars, mosques, baths and a much-frequented weekly market. The Bahr Yusuf runs through the town, its banks lined with houses. There are two bridges over the stream: one of three arches, which carries the main street and bazaar, and one of two arches over which is built the Kait Bey mosque. Mounds north of the town mark the site of Arsinoë, earlier Crocodilopolis, where was worshipped the sacred crocodile kept in the Lake of Moeris. Besides Medina there are several other towns in the province, among them Senuris and Tomia to the north of Medina and Senaru and Abuksa on the road to the lake, all served by railways. There are also, especially in the neighbourhood of the lake, many ruins of ancient villages and cities. The Fayum is the site of the Lake of Moeris (*q.v.*) of the ancient Egyptians—a lake of which Birket el Kerun is the shrunken remnant.

See *The Fayum and Lake Moeris*, by Major (Sir) R. H. Brown, R.E. (London, 1892), a valuable contribution as to the condition of the province at that date, its connexion with Lake Moeris and its possibilities in the future; *The Assuân Reservoir and Lake Moeris* (London, 1904), by Sir William Willcocks—with text in English, French and Arabic—a consideration of irrigation possibilities; *The Topography and Geology of the Fayum Province of Egypt*, by H. J. L. Beadnell (Cairo, 1905).

FAZOGLI, or FAZOKL, a district of the Anglo-Egyptian Sudan, cut by 11° N. and bounded E. and S. by Abyssinia. It forms part of the foot-hills of the Abyssinian plateau and is traversed by the Blue Nile and its affluent the Tumat. Immediately south is the auriferous Beni Shangul country. The chief gold-washings lie (in Abyssinian territory) on the west slope of the hills draining to the White Nile. Here is the steep Jebel-Dul, which appears to contain rich gold-bearing reefs, as gold is found in all the ravines on its flanks. The auriferous region extends into Sudanese territory, gold dust being found in all the khors coming from Jebel Faronge on the S.E. frontier. The inhabitants of Fazogli, who are governed, under the Sudan administration, by their own meks or kings, are Berta and other Shangalla tribes with an admixture of Funj blood, the country having been conquered by the Funj rulers of Sennar at the close of the 15th century. There are also Arab settlements. Fazogli, the residence of the principal mek, is a straggling town built some 800 yds. from the left bank of the Blue Nile near the Tumat confluence, 434 m. by river above Khartum and opposite Famaka, the headquarters of the Egyptians in this region between 1839 and 1883. Above Famaka and near the Abyssinian frontier is the prosperous town of Kiri, while Abu Shaneina on the Nile below Fazogli is the spot where the trade route from Beni Shangul strikes the river. The chief imports from Abyssinia are coffee, cattle, transport animals and gold. Durra and tobacco are the principal crops. The local currency includes rings of gold, specially made as a circulating medium.

FEA, CARLO (1753–1836), Italian archaeologist, was born at Pigna in Piedmont on the 2nd of February 1753, and studied law in Rome. He received the degree of doctor of laws from the university of La Sapienza, but archaeology gradually absorbed his attention, and with the view of obtaining better opportunities for his researches in 1798 he took orders. For political reasons he was obliged to take refuge in Florence; on his return in 1799 he was imprisoned by the Neapolitans, at that time in occupation of Rome, as a Jacobin, but shortly afterwards liberated and appointed Commissario delle Antichità and librarian to Prince Chigi. He died at Rome on the 18th of March 1836.

Fea revised, with notes, an Italian translation of J. J. Winckelmann's *Geschichte der Kunst*, and also added notes to some of G. L. Bianconi's works. Among his original writings the principal are:—*Miscellanea filologica, critica, e antiquaria*; *L'Integrità del Panteone rivendicata a M. Agrippa*; *Frammenti di fasti consolari*; *Iscrizioni di monumenti pubblichi*; and *Descrizione di Roma*.

FEARNE, CHARLES (1742–1794), English jurist, son of Charles Fearne, judge-advocate of the admiralty, was born in London in 1742, and was educated at Westminster school. He adopted the legal profession, but, though well fitted by his talents to succeed as a barrister, he neglected his profession and devoted most of his attention and his patrimony to the prosecution of scientific experiments, with the vain hope of achieving discoveries which would reward him for his pains and expense. He died in 1794, leaving his widow and family in necessitous circumstances. His *Essay on the Learning of Contingent Remainders and Executory Devises*, the work which has made his reputation as a legal authority, and which has passed through numerous editions, was called forth by a decision of Lord Mansfield in the case of *Perrin* v. *Blake*, and had the effect of reversing that decision.

A volume entitled *Fearne's Posthumous Works* was published by subscription in 1797 for the benefit of his widow.

FEASTS AND FESTIVALS. A festival or feast[1] is a day or series of days specially and publicly set apart for religious observances. Whether its occurrence be casual or periodic, whether its ritual be grave or gay, carnal as the orgies of Baal and Astarte, or spiritual as the worship of a Puritan Sabbath, it is to be regarded as a festival or "holy day" as long as it is professedly held in the name of religion.

To trace the festivals of the world through all their variations would be to trace the entire history of human religion and human civilization. Where no religion is, there can of course be no feasts; and without civilization any attempt at festival-keeping must necessarily be fitful and comparatively futile. But as religion develops, festivals develop with it, and assume their distinctive character; and an advancing civilization, at least in its earlier stages, will generally be found to increase their number, enrich their ritual, fix more precisely the time and order of their recurrence, and widen the area of their observance.

Some uncivilized tribes, such as the Juángs of Bengal, the Fuegians and the Andamanese, have been described as having no word for God, no idea of a future state, and consequently no religious ceremonies of any kind whatever. But such cases, doubtful at the best, are confessedly exceptional. In the vast majority of instances observed and recorded, the religiosity of the savage is conspicuous. Even when incapable of higher manifestations, it can at least take the form of reverence for the dead; the grave-heap can become an altar on which offerings of food for the departed may be placed, and where in acts of public and private worship the gifts of survivors may be accompanied with praises and with prayers. That the custom of ghost-propitiation by some sort of sacrifice is even now very widely diffused among the lower races at least, and that there are also many curious "survivals" of such a habit to be traced among highly civilized modern nations, has been abundantly shown of late by numerous collectors of folk-lore and students of sociology; and indications of the same phenomena can be readily pointed out in the Rig-Veda, the Zend-Avesta and the Pentateuch, as well as in the known usages of the ancient Egyptians, Greeks and Romans.[2] In many cases the ceremonial observed is of the simplest; but it ever tends to become more elaborate; and above all it calls for repetition, and repetition, too, at regular intervals. Whenever this last demand has made itself felt, a calendar begins to take shape. The simplest calendar is obviously the lunar. "The Naga tribes of Assam celebrate their funeral feasts month by month, laying food and drink on the graves of the departed." But it soon comes to be combined with the solar. Thus the Karens, "while habitually making oblations, have also annual feasts for the dead, at which they ask the spirits to eat and drink." The natives of the Mexican valley in November lay animals, edibles and flowers on the graves of their dead relatives and friends. The common people in China have a similar custom on the arrival of the winter solstice. The ancient Peruvians had the custom of periodically assembling the embalmed bodies of their dead emperors in the great square of the capital to be feasted in company with the people. The Athenians had their annual Νεκύσια or Νεμέσεια and the Romans their *Feralia* and *Lemuralia*. The Egyptians observed their three "festivals of the seasons," twelve "festivals of the month," and twelve "festivals of the half month," in honour of their dead. The Parsees, too, were required to render their afringans (blessings which were to be recited over a meal to which an angel or the spirit of a deceased person was invited) at each of the six seasons of the year, and also on certain other days.[3]

In the majority of recorded instances, the religious feeling of the savage has been found to express itself in other forms besides that of reverence towards the dead. The oldest literatures of the world, at all events, whether Aryan or Semitic, embody a religion of a much higher type than ancestor worship. The hymns of the Rig-Veda, for example, while not without traces of the other, yet indicate chiefly a worship of the powers of nature, connected with the regular recurrence of the seasons. Thus in iv. 57 we have a hymn designed for use at the commencement of the ploughing time;[4] and in the *Aitareya-Brâhmana*, the earliest treatise on Hindu ceremonial, we already find a complete series of sattras or sacrificial sessions exactly following the course of the solar year. They are divided into two distinct sections, each consisting of six months of thirty days each. The sacrifices are allowed to commence only at certain lucky constellations and in certain months. So, for instance, as a rule, no great sacrifice can commence during the sun's southern progress. The great sacrifices generally take place in spring, in the months of April and May.[5] In the Parsee Scriptures[6] the year is divided into six seasons or gahanbârs of two months each, concluding with February, the season at which "great expiatory sacrifices were offered for the growth of the whole creation in the last two months of the year." We have no means of knowing precisely what were the arrangements of the Phoenician calendar, but it is generally admitted that the worship was solar, the principal festivals taking place in spring and in autumn. Among the most characteristic celebrations of the Egyptians were those which took place at the ἀφανισμός or disappearance of Osiris in October or November, at the search for his remains, and their discovery about the winter solstice, and at the date of his supposed entrance into the moon at the beginning of spring. The Phrygian festivals were also arranged on the theory that the deity was asleep during the winter and awake during the summer; in the autumn they celebrated his retiring to rest, and in spring with mirth and revelry they roused him from his slumbers.[1] The seasonal character of the Teutonic Ostern, the Celtic Beltein and the Scandinavian Yule is obvious. Nor was the habit of observing such festivals peculiar to the Aryan or the Semitic race. The Mexicans, who were remarkable for the perfection of their calendar, in addition to this had an elaborate system of movable and immovable feasts distributed over the entire year; the principal festivals, however, in honour of their chief gods, Tezcatlipoca, Huitzilopochtli and Tlaloc, were held in May, June and December. Still more plainly connected with the revolutions of the seasons was the public worship of the ancient Peruvians, who, besides the ordinary feast at each new moon, observed four solar festivals annually. Of these the most important was the Yntip-Raymi (Sun-feast), which, preceded by a three days' fast, began with the summer solstice, and lasted for nine days. Its ceremonies have been often described. A similar but less important festival was held at the winter solstice. The Cusqui-Raymi, held after seedtime, as the maize began to appear, was celebrated with sacrifices and banquets, music and dancing. A fourth great festival, called Citua, held on the first new moon after the autumnal equinox, was preceded by a strict fast and special observances intended for purposes of purification and expiation, after which the festivities lasted until the moon entered her second quarter.

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[1] "To feast" is simply to keep a festum or festival. The etymology of the word is uncertain; but probably it has no connexion with the Gr. ἑστιᾶν.

[2] See Spencer, *Principles of Sociology*, i. 170, 280, 306.

[3] Haug, *Parsis*, 224, 225.

[4] "May the heavens, the waters, the firmament, be kind to us; may the lord of the field be gracious to us . . . . May the oxen (draw) happily, the men labour happily; may the traces bind happily, wield the goad happily" (Wilson's translation, iii. 224).

[5] See Haug's *Aitareya-brâhmanam of the Rig-Veda*; Max Müller's *Chips from a German Workshop*, i. 115.

[6] Visperad. See Haug, *Parsis*, 192; Richardson's *Dissertation on the Language, &c., of Eastern Nations*, p. 184; Morier's *Journey through Persia*.

Greek Festivals.—Perhaps the annual Attic festival in honour of Erechtheus alluded to in the *Iliad* (ii. 550) ought to be regarded as an instance of ancestor-worship; but the seasonal character of the ἑορτή or new-moon feast in *Od.* xx. 156, and of the θαλύσια or harvest-festival in *Il.* ix. 533, is generally acknowledged. The older Homeric poems, however, give no such express indications of a fully-developed system of festivals as are to be met with in the so-called "Homeric" hymns, in the *Works and Days* of Hesiod, in the pages of Herodotus, and so abundantly in most authors of the subsequent period; and it is manifest that the calendar of Homer or even of Herodotus must have been a much simpler matter than that of the Tarentines, for example, came to be, of whom we are told by Strabo that their holidays were in excess of their working days. Each demos of ancient Greece during the historical period had its own local festivals (ἑορταὶ δημοτικαί), often largely attended and splendidly solemnized, the usages of which, though essentially alike, differed very considerably in details. These details have in many cases been wholly lost, and in others have reached us only in a very fragmentary state. But with regard to the Athenian calendar, the most interesting of all, our means of information are fortunately very copious. It included some 50 or 60 days on which all business, and especially the administration of justice, was by order of the magistrates suspended. Among these ἱερομηνίαι were included—in Gamelion (January), the *Lenaea* or festival of vats in honour of Dionysus; in Anthesterion (February), the *Anthesteria*, also in honour of Dionysus, lasting three days (Pithoigia, Choes and Chytri); the *Diasia* in honour of Zeus, and the lesser *Eleusinia*; in Elaphebolion (March), the *Pandia* (? of Zeus), the *Elaphebolia* of Artemis, and the greater *Dionysia*; in Munychion, the *Munychia* of Artemis as the moon goddess (Μουνυχία) and the *Delphinia* of Apollo; in Thargelion (May), the *Thargelia* of Apollo and the *Plynteria* and *Callynteria* of Athena; in Scirophorion (June), the *Diipolia* of Zeus and the *Scirophoria* of Athena; in Hekatombaion, hecatombs were offered to Apollo the summer-god, and the *Cronia* of Cronus and the *Panathenaea* of Athena were held; in Metageitnion, the *Metageitnia* of Apollo; in Boëdromion, the *Boëdromia* of Apollo the helper,[2] the *Nekusia* or *Nemeseia* (the festival of the dead), and the greater *Eleusinia*; in Pyanepsion, the *Pyanepsia* of Apollo, the *Oschophoria* of Dionysus (probably), the *Chalkeia* or *Athenaea* of Athena, the *Thesmophoria* of Demeter, and the *Apaturia*; in Maimacterion, the *Maimacteria* of Zeus; and in Poseideon (December), the lesser *Dionysia*.

Of these some are commemorative of historical events, and one at least may perhaps be regarded as a relic of ancestor-worship; but the great majority are nature-festivals, associating themselves in the manner that has already been indicated with the phenomena of the seasons, the equinoxes and the solstices.[3] In addition to their numerous public festivals, the Greeks held various family celebrations, also called ἑορταί, in connexion with weddings, births and similar domestic occurrences. For the great national πανηγύρεις—Olympian, Pythian, Nemean and Isthmian—see the article GAMES, CLASSICAL.

Roman Festivals.—For the purpose of holding *comitia* and administering justice, the days of the Roman year were regarded as being either *dies fasti* or *dies nefasti*—the *dies fasti* being the days on which it was lawful for the praetors to administer justice in the public courts, while on the *dies nefasti* neither courts of justice nor meetings of *comitia* were allowed to be held. Some days were *fasti* during one portion and *nefasti* during another; these were called *dies intercisi*. For the purposes of religion a different division of the year was made; the days were treated as *festi* or as *profesti*,—the former being consecrated to acts of public worship, such as sacrifices, banquets and games, while the latter (whether *fasti* or *nefasti*) were not specially claimed for religious purposes. The *dies festi* or *feriae publicae*[4] were either *stativae*, *conceptivae* or *imperativae*. The *stativae* were such as were observed regularly, each on a definite day; the *conceptivae* were observed annually on days fixed by the authorities for the time being; the *imperativae* were publicly appointed as occasion called for them. In the Augustan age the *feriae stativae* were very numerous, as may be seen from what we possess of the *Fasti* of Ovid. The number was somewhat fluctuating. Festivals frequently fell into desuetude or were revived, were increased or diminished, were shortened or prolonged at the will of the emperor, or under the caprice of the popular taste. Thus Augustus restored the Compitalia and Lupercalia; while Marcus Antoninus in his turn found it expedient to diminish the number of holidays.

The following is an enumeration of the stated festivals as given by Ovid and contemporary writers. The first day of January was observed somewhat as is the modern New Year's day: clients sent presents to their patrons, slaves to their masters, friends and relatives to one another. On the 9th the *Agonalia* were held, apparently in honour of Janus. On the 11th the *Carmentalia* were kept as a half-holiday, but principally by women; so also on the 15th. On the 13th of February were the *Faunalia*, on the 15th the *Lupercalia*, on the 17th the *Quirinalia*, on the 18th the *Feralia*, on the 23rd (at one time the last day of the Roman year) the *Terminalia*, on the 24th the *Regifugium* or *Fugalia*, and on the 27th the *Equiria* (of Mars). On the 1st of March were the *Matronalia*, on the 14th a repetition of the *Equiria*, on the 15th the festival of Anna Perenna, on the 17th the *Liberalia* or *Agonalia*, and from the 19th to the 23rd the *Quinquatria* (of Minerva). On the 4th of April were the *Megalesia* (of Cybele), on the 12th the *Cerealia*, on the 21st the *Palilia*, on the 23rd the *Vinalia*, on the 25th the *Robigalia*, and on the 28th the *Floralia*. The 1st of May was the festival of the *Lares Praestites*; on the 9th, 11th and 13th the *Lemuria* were celebrated; on the 12th the *Ludi Martiales*, and on the 15th those of Mercury. June 5 was sacred to *Semo Sancus*; the *Vestalia* occurred on the 9th, the *Matralia* on the 11th, and the

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[1] Plutarch, *De Iside et Osiride*; Macrobius, *Saturnalia*, i. 21.

[2] In this month the anniversaries of the battle of Marathon, and of the downfall of the thirty tyrants, were also publicly celebrated.

[3] See Schoemann, *Griechische Altertümer*, ii. 439 seq.; Mommsen, *Heortologie*.

[4] *Feriae privatae*, such as anniversaries of births, deaths and the like, were observed by separate clans, families or individuals.

Quinquatrus Minusculae on the 13th. The *Ludi Apollinares* were on the 5th, and the *Neptunalia* on the 23rd of July. On the 13th of August were the *Nemoralia*, in honour of Diana; on the 18th the *Consualia*, on the 19th the *Vinalia Rustica*, and on the 23rd the *Vulcanalia*. The *Ludi Magni*, in honour of Jupiter, Juno and Minerva, began on September 4. The *Meditrinalia* (new wine) were on the 11th of October, the *Faunalia* on the 13th, and the *Equiria* on the 15th. The *Epulum Jovis* was on 13th November. The December festivals were—on the 5th *Faunalia*, and towards the close *Opalia*, *Saturnalia*, *Larentalia*.

The calendar as it stood at the Augustan age was known to contain many comparatively recent accessions, brought in under the influence of two "closely allied powers, the foreign priest and the foreign cook" (Mommsen). The *Megalesia*, for example, had been introduced 204 B.C. The *Ludi Apollinares* could not be traced farther back than 208 B.C. The *Floralia* and *Cerealia* had not come in much earlier. Among the oldest feasts were undoubtedly the *Lupercalia*, in honour of Lupercus, the god of fertility; the *Equiria*, in honour of Mars; the *Palilia*; the great September festival; and the *Saturnalia*.

Among the feriae conceptivae were the very ancient *feriae Latinae*, held in honour of Jupiter on the Alban Mount, and attended by all the higher magistrates and the whole body of the senate. The time of their celebration greatly depended on the state of affairs at Rome, as the consuls were not allowed to take the field until they had held the *Latinae*, which were regarded as days of a sacred truce. The *feriae sementivae* were held in the spring, and the *Ambarvalia* in autumn, both in honour of Ceres. The *Paganalia* of each *pagus*, and the *Compitalia* of each *vicus* were also *conceptivae*. Of *feriae imperativae*,—that is to say, festivals appointed by the senate, or magistrates, or higher priests to commemorate some great event or avert some threatened disaster,—the best known is the *Novendiale*, which used to be celebrated as often as stones fell from heaven (Livy xxi. 62, xxv. 7, &c.). In addition to all those already mentioned, there occasionally occurred *ludi votivi*, which were celebrated in fulfilment of a vow; *ludi funebres*, sometimes given by private persons; and *ludi seculares*, to celebrate certain periods marked off in the Etrusco-Roman religion.

Feasts of the Jews.—By Old Testament writers a festival or feast is generally called either חַג (compare the Arabic Hadj), from חָגַג to rejoice, or מוֹעֵד, from יָעַד, to appoint. The words שַׁבָּת and מִקְרָא קֹדֶשׁ are also occasionally used. In the Talmud the three principal feasts are called רְגָלִים, after Exod. xxiii. 14. Of the Jewish feasts which are usually traced to a pre-Mosaic origin the most important and characteristic was the weekly Sabbath, but special importance was also attached from a very early date to the lunar periods. It is probable that other festivals also, of a seasonal character, were observed (see Exod. v. 1). In common with most others, the Mosaic system of annual feasts groups itself readily around the vernal and autumnal equinoxes. In Lev. xxiii., where the list is most fully given, they seem to be arranged with a conscious reference to the sacred number seven (compare Numb. xxviii.). Those belonging to the vernal equinox are three in number; a preparatory day, that of the Passover, leads up to the principal festival, that of unleavened bread, which again is followed by an after-feast, that of Pentecost (see PASSOVER, PENTECOST). Those of the autumnal equinox are four; a preparatory day on the new moon of the seventh month (the Feast of Trumpets) is followed by a great day of rest, the day of Atonement (which, however, was hardly a *festival* in the stricter sense of the word), by the Feast of Tabernacles, and by a great concluding day (Lev. xxiii. 36; John vii. 37). If the feast of the Passover be excepted, it will be seen that all these celebrations or commemorations associate themselves more readily with natural than with historical events.[1] There was also a considerable number of post-Mosaic festivals, of which the principal were that of the Dedication (described in 1 Macc. iv. 52–59; comp. John x. 22) and that of Purim, the origin of which is given in the book of Esther (ix. 20 seq.). It has probably no connexion with the Persian festival Furdigân (see ESTHER).[2]

Earlier Christian Festivals.—While making it abundantly manifest that Christ and his disciples observed the appointed Jewish feasts, the New Testament nowhere records the formal institution of any distinctively Christian festival. But we have unambiguous evidence of the actual observance, from a very early period, of the first day of the week as a holy day (John xx. 19, 26; 1 Cor. xvi. 2; Acts xx. 7; Rev. i. 10). Pliny in his letter to Trajan describes the Christians of Bithynia as meeting for religious purposes on a set day; that this day was Sunday is put beyond all reasonable doubt by such a passage as that in the *Apology* of Justin Martyr, where he says that "on Sunday (τῇ τοῦ ἡλίου λεγομένῃ ἡμέρᾳ) all the Christians living either in the city or the country met together." The Jewish element, in some churches at least, and especially in the East, was strong enough to secure that, along with the *dies dominica*, the seventh day should continue to be kept holy. Thus in the *Apostolic Constitutions* (ii. 59) we find the Saturday specially mentioned along with the Sunday as a day for the assembling of the church; in v. 15 it is ordained that there shall be no fasting on Saturday, while in viii. 33 it is added that both on Saturday and Sunday slaves are to have rest from their labours. The 16th canon of the council of Laodicea almost certainly means that solemn public service was to be held on Saturday as well as on Sunday. In other quarters, however, the tendency to regard both days as equally sacred met with considerable resistance. The 36th canon of the council of Illiberis, for example, deciding that Saturday should be observed as a fast-day, was doubtless intended to enforce the distinction between Saturday and Sunday. At Milan in Ambrose's time Saturday was observed as a festival; but Pope Innocent is found writing to the bishop of Eugubium to urge that it should be kept as a fast. Ultimately the Christian church came to recognize but one weekly festival.

The numerous yearly festivals of the later Christian church, when historically investigated, can be traced to very small beginnings. Indeed, while it appears to be tolerably certain that Jewish Christians for the most part retained all the festivals which had been instituted under the old dispensation, it is not at all probable that either they or their Gentile brethren recognized any yearly feasts as of distinctively Christian origin or obligation. It cannot be doubted, however, that gradually, in the course of the 2nd century, the universal church came to observe the anniversaries of the death and resurrection of Christ—the πάσχα σταυρώσιμον and the πάσχα ἀναστάσιμον, as they were respectively called (see EASTER and GOOD FRIDAY). Not long afterwards Whitsunday also came to be fixed in the usage of Christendom as a great annual festival. Even Origen (in the 8th book *Against Celsus*) enumerates as Christian festivals the Sunday, the παρασκευή, the Passover with the feast of the Resurrection, and Pentecost; under which latter term, however, he includes the whole period between Easter and Whitsuntide. About Cyprian's time we find individual Christians commemorating their departed friends, and whole churches commemorating their martyrs; in particular, there are traces of a local and partial observance of the feast of the Innocents. Christmas day and Epiphany were among the later introductions, the feast of the Epiphany being somewhat the earlier of the two. Both are alluded to indeed by Clemens Alexandrinus (i. 340), but only in a way which indicates that even in his time the precise date of Christ's birth was unknown, that its anniversary was not usually observed, and that the day of his baptism was kept as a festival only by the followers of Basilides (see EPIPHANY).

When we come down to the 4th century we find that, among the 50 days between Easter and Pentecost, Ascension Day has come into new prominence. Augustine, for example, enumerates as anniversaries celebrated by the whole church those of Christ's passion, resurrection and ascension, along with that of the outpouring of the Holy Ghost, while he is silent with regard to Christmas and Epiphany. The general tendency of this and the following centuries was largely to increase the festivals of the Church, and by legislation to make them more fixed and uniform. Many passages, indeed, could be quoted from Chrysostom, Jerome and Augustine to show that these fathers had not by any means forgotten that comparative freedom with regard to outward observances was one of the distinctive excellences of Christianity as contrasted with Judaism and the various heathen systems (compare Socrates, *H.E.* v. 22). But there were many special circumstances which seemed to the leaders of the Church at that time to necessitate the permission and even legislative sanction of a large number of new feasts. The innovations of heretics sometimes seemed to call for rectification by the institution of more orthodox observances; in other instances the propensity of rude and uneducated converts from paganism to cling to the festal rites of their forefathers proved to be invincible, so that it was seen to be necessary to seek to adapt the old usages to the new worship rather than to abolish them altogether;[1] moreover, although the empire had become Christian, it was manifestly expedient that the old holidays should be recognized as much as possible in the new arrangements of the calendar. Constantine soon after his conversion enacted that on the *dies dominica* there should be no suits or trials in law; Theodosius the Great added a prohibition of all public shows on that day, and Theodosius the younger extended the prohibition to Epiphany and the anniversaries of martyrdoms, which at that time included the festivals of St Stephen, and of St Peter and St Paul, as also that of the Maccabees. In the 21st canon of the council of Agde (506), besides Easter, Christmas, Epiphany, Ascension and Pentecost, we find the Nativity of John the Baptist already mentioned as one of the more important festivals on which attendance at church was regarded as obligatory. To these were added, in the centuries immediately following, the feasts of the Annunciation, the Purification, and the Assumption of the Virgin; as well as those of the Circumcision, of St Michael and of All Saints.

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[1] In the "parallel" passages, there is considerable variety in the designation and arrangement of these feasts. While Ex. xii. approximates most closely to Lev. xxiii. and Num. xxviii., Ex. xxiii. has stronger affinities with Deut. xvi. The relations of these passages are largely discussed by Graf, *Die geschichtlichen Bücher des A. T.*, pp. 34-41, and by other recent critics.

[2] On the whole subject of Jewish festivals see Reland, *Antiq. Hebr.*; Knobel, *Leviticus* (c. 23); George, *Die jüdischen Feste*; Edersheim, *The Temple; its Ministry and Services*; Ewald, *Altertümer des Volkes Israël*; articles in Bible dictionaries.

Festivals were in practice distinguished from ordinary days in the following ways: all public and judicial business was suspended,[2] as well as every kind of game or amusement which might interfere with devotion; the churches were specially decorated; Christians were expected to attend public worship, attired in their best dress; love feasts were celebrated, and the rich were accustomed to show special kindness to the poor; fasting was strictly forbidden, and public prayers were said in a standing posture.

Later Practice.—In the present calendar of the Roman Catholic Church the number of feast days is very large. Each is celebrated by an appropriate office, which, according to its character, is either duplex, semi-duplex or simplex. A duplex again may be either of the first class or of the second, or a major or a minor. The distinctions of ritual for each of these are given with great minuteness in the general rubrics of the breviary; they turn chiefly on the number of Psalms to be sung and of lessons to be read, on the manner in which the antiphons are to be given and on similar details. The duplicia of the first class are the Nativity, the Epiphany, Easter with the three preceding and two following days, the Ascension, Whitsunday and the two following days, Corpus Christi, the Nativity of John Baptist, Saints Peter and Paul, the Assumption of the Virgin, All Saints, and, for each church, the feast proper to its patron or title and the feast of its dedication. The duplicia of the second class are the Circumcision, the feast of the Holy Name of Jesus, of the Holy Trinity, and of the Most Precious Blood of Christ, the feasts of the Purification, Annunciation, Visitation, Nativity and Conception of the Virgin, the Natalitia of the Twelve Apostles, the feasts of the Evangelists, of St Stephen, of the Holy Innocents, of St Joseph and of the Patrocinium of Joseph, of St Lawrence, of the Invention of the Cross and of the Dedication of St Michael. The Dominicae majores of the first class are the first Sunday in Advent, the first in Lent, Passion Sunday, Palm Sunday, Easter Sunday, Dominica in Albis, Whitsunday and Trinity Sunday; the Dominicae majores of the second class are the second, third and fourth in Advent, Septuagesima, Sexagesima and Quinquagesima Sundays, and the second, third and fourth Sundays in Lent.

In the canons and decrees of the council of Trent repeated allusions are made to the feast days, and their fitness, when properly observed, to promote piety. Those entrusted with the cure of souls are urged to see that the feasts of the Church be devoutly and religiously observed, the faithful are enjoined to attend public worship on Sundays and on the greater festivals at least, and parish priests are bidden to expound to the people on such days some of the things which have been read in the office for the day. Since the council of Trent the practice of the Church with respect to the prohibition of servile work on holidays has varied considerably in different Catholic countries, and even in the same country at different times. Thus in 1577, in the diocese of Lyons, there were almost forty annual festivals of a compulsory character. By the concordat of 1802 the number of such festivals was for France reduced to four, namely, Christmas day, Ascension day, the Assumption of the Virgin, and All Saints day.

The calendar of the Greek Church is even fuller than that of the Latin, especially as regards the ἑορταὶ τῶν ἁγιῶν. Thus on the last Sunday in Advent the feast of All Saints of the Old Covenant is celebrated; while Adam and Eve, Job, Elijah, Isaiah, &c., have separate days. The distinctions of ritual are analogous to those in the Western Church. In the Coptic Church there are seven great festivals, Christmas, Epiphany, the Annunciation, Palm Sunday, Easter Sunday, Ascension and Whitsunday, on all of which the Copts "wear new clothes (or the best they have), feast and give alms" (Lane). They also observe, as minor festivals, Maundy Thursday, Holy Saturday, the feast of the Apostles (11th July), and that of the Discovery of the Cross.

In common with most of the churches of the Reformation, the Church of England retained a certain number of feasts besides all Sundays in the year. They are, besides Monday and Tuesday both in Easter-week and Whitsun-week, as follows: the Circumcision, the Epiphany, the Conversion of St Paul, the Purification of the Blessed Virgin, St Matthias the Apostle, the Annunciation of the Blessed Virgin, St Mark the Evangelist, St Philip and St James (Apostles), the Ascension, St Barnabas, the Nativity of St John Baptist, St Peter the Apostle, St James the Apostle, St Bartholomew, St Matthew, St Michael and all Angels, St Luke the Evangelist, St Simon and St Jude, All Saints, St Andrew, St Thomas, Christmas, St Stephen, St John the Evangelist, the Holy Innocents. The 13th canon enjoins that all manner of persons within the Church of England shall from henceforth celebrate and keep the Lord's day, commonly called Sunday, and other holy days, according to God's holy will and pleasure, and the orders of the Church of England prescribed in that behalf, that is, in hearing the Word of God read and taught, in private and public prayers, in acknowledging their offences to God and amendment of the same, in reconciling themselves charitably to their neighbours where displeasure hath been, in oftentimes receiving the communion of the body and blood of Christ, in visiting of the poor and sick, using all godly and sober conversation. (Compare Hooker, *E.P.* v. 70.) In the *Directory for the Public Worship of God* which was drawn up by the Westminster Assembly, and accepted by the Church of Scotland in 1645, there is an appendix which declares that there is no day commanded in Scripture to be kept holy under the gospel but the Lord's day, which is the Christian Sabbath; festival days, vulgarly called holy-days, having no warrant in the Word of God, are not to be continued; nevertheless it is lawful and necessary, upon special emergent occasions, to separate a day or days for public fasting or thanksgiving, as the several eminent and extraordinary dispensations of God's providence shall administer cause and opportunity to his people.

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[1] As, at a later period (601), Gregory the Great instructed his Anglo-Saxon missionaries so to Christianize the temples, festivals, &c., of the heathen "ut durae mentes gradibus vel passibus, non autem saltibus, eleventur."

[2] Manumission, however, was lawful on any day.

Several attempts have been made at various times in western Europe to reorganize the festival system on some other scheme than the Christian. Thus at the time of the French Revolution, during the period of Robespierre's ascendancy, it was proposed to substitute a tenth day (Décadi) for the weekly rest, and to introduce the following new festivals: that of the Supreme Being and of Nature, of the Human Race, of the French people, of the Benefactors of Mankind, of Freedom and Equality, of the Martyrs of Freedom, of the Republic, of the Freedom of the World, of Patriotism, of Hatred of Tyrants and Traitors, of Truth, of Justice, of Modesty, of Fame and Immortality, of Friendship, of Temperance, of Heroism, of Fidelity, of Unselfishness, of Stoicism, of Love, of Conjugal Fidelity, of Filial Affection, of Childhood, of Youth, of Manhood, of Old Age, of Misfortune, of Agriculture, of Industry, of our Forefathers, of Posterity and Felicity. The proposal, however, was never fully carried out, and soon fell into oblivion.

Mahommedan Festivals.—These are chiefly two—the 'Eed es-Sagheer (or minor festival) and the 'Eed el-Kebeer (or great festival), sometimes called 'Eed el-Kurban. The former, which lasts for three days, immediately follows the month Ramadan, and is generally the more joyful of the two; the latter begins on the tenth of Zu-l-Heggeh (the last month of the Mahommedan year), and lasts for three or four days. Besides these festivals they usually keep holy the first ten days of Moharram (the first month of the year), especially the tenth day, called Yom Ashoora; the birthday of the prophet, on the twelfth day of the third month; the birthday of El-Hoseyn, in the fourth month; the anniversary of the prophet's miraculous ascension into heaven, in the seventh month; and one or two other anniversaries. Friday, called the day of El-Gumah (the assembly), is a day of public worship; but it is not usual to abstain from public business on that day except during the time of prayer.

Hindu and Buddhist Festivals.—In modern India the leading popular festivals are the Holí, which is held in March or April and lasts for five days, and the Dasahara, which occurs in October. Although in its origin Buddhism was a deliberate reaction against all ceremonial, it does not now refuse to observe festivals. By Buddhists in China, for example, three days in the year are especially observed in honour of the Buddha,—the eighth day of the second month, when he left his home; the eighth day of the fourth month, the anniversary of his birthday; and the eighth of the twelfth, when he attained to perfection and entered Nirvāna. In Siam the eighth and fifteenth days of every month are considered holy, and are observed as days for rest and worship. At Trut, the festival of the close of the year, visiting and play-going are universal. The new year (January) is celebrated for three days; in February is another holiday; in April is a sort of Lent, ushering in the rainy season; on the last day of June presents are made of cakes of the new rice; in August is the festival of the angel of the river, "whose forgiveness is then asked for every act by which the waters of the Meinam have been rendered impure." See Bowring's *Siam* and Carné's *Travels in Indo-China and the Chinese Empire*. Copious details of the elaborate festival-system of the Chinese may be found in Doolittle's *Social Life of the Chinese*.

LITERATURE.—For Christian feasts see K. A. H. Kellner, *Heortologie* (Freiburg im Breisgau, 1906); Hippolyte Delehaye, *Les Légendes hagiographiques* (Brussels, 1905); J. Rendel Harris, *The Cult of the Heavenly Twins* (Cambridge, 1906); de Rossi-Duchesne, *Martyrologium Hieronymianum*.

FEATHER (O. Eng. *fether*, Ger. *Feder*, from an Indo-European root seen also in Gr. πτερόν, and πέτεσθαι, to fly), a horny outgrowth of the skin of birds homologous with the scale of the reptile. The body-covering of birds is, without exception, comprised of feathers, and by this character alone birds may be distinguished from all other animals.

The most perfect form of feather is made up of a long, tapering rod, fringed on either side, for the greater part of its length, by a secondary series of slender and tapering rods forming a more or less acute angle with the central axis. This fringe is known as the *vexillum* or "vane" (fig. 1 *a*). The central axis is divisible into two distinct parts,—a hollow, cylindrical, transparent *calamus*, or "quill," the base of which is inserted into the skin, and a solid, quadrangular *rhachis* or "shaft" which supports the vane. At the lower end of the quill is a small hole—the lower *umbilicus*—through which the nutritive pulp passes during the growth of the feather; while at the upper end, where it passes into the shaft, a similar hole will be found,—the upper *umbilicus*—and from this the last remains of the capsules which contained the nutritive pulp may sometimes be seen protruding. If the quill is cut open a series of these capsules will be found fitting one into the other throughout the whole length of the tubular chamber.

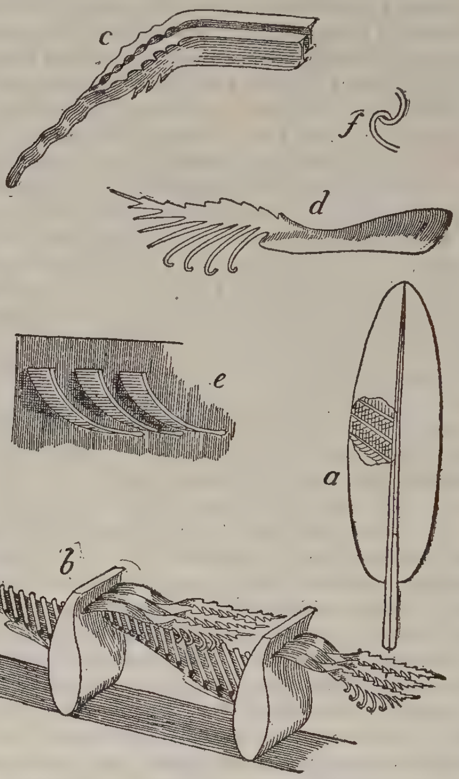

FIG. 1.—Diagrams of Feather-Barbs.

a, Outline of a feather showing the relation of the barbs and barbules to the central axis or shaft.
b, Section across two of the barbs shown in *a*, highly magnified.
c, Two barbules of the posterior series—seen only in cross-section in *b*.
d, A barbule of the anterior series.
e, Section across the base of three anterior barbules showing attachment to barb.
f, A portion of the hooklet of the anterior series showing the method of interlocking with the barbules of the posterior series.

The rods comprising the lateral fringe, or vane, are known as the *rami* or the "barbs," and will be found, on microscopic examination, to be lath-shaped and to taper to a point. Further, each barb supports a double series of smaller outgrowths known as the *radii*, or "barbules"; so that each barb may be likened to a feather in miniature. These "barbules," however, differ markedly in structure on the two sides of the barb, those pointing towards the tip of the feather—the "anterior barbules"—being ribbon-shaped from the base outwards for about half their length, when they become cut up to form a series of long and very delicate hooklets (fig. 1 *d*). On the opposite side of the barb the barbules are also ribbon-shaped for about half their length, but the ribbon is curved trough-fashion, so that the whole series of posterior barbules forms a number of deep valleys, and into these the hooklets are thrust so as to catch hold of the upper edges of the troughs, which are set so that the upper edge is towards the upper, and the lower edge towards the under surface of the feather. The manner in which this beautiful mechanism works may be seen in fig. 1 *b*.

In one of the primary or "quill" feathers of the wing of a crane, each barb of the inner side of the vane was found to bear about 600 pairs of barbules, which would make about 800,000 barbules for the inner web of the vane alone, or more than a million for the whole feather (H. F. Gadow). It is to the agency of these hooklets alone that the closely-knit, elastic vanes of the flight feathers and the body feathers are due. Where these hooklets are wanting the barbs do not adhere together, resulting in a loose "discontinuous" vane such as, for example, is found in the plumes of the ostrich.

Many feathers, in addition to the main axis, bear a second, generally much shorter axis, supporting a loose discontinuous vane; this shorter branch is known as the "aftershaft" and arises from the under surface of the feather. Only in the cassowary and emu among adult birds is the aftershaft as large as the main shaft.

There are several different kinds of feathers—contour feathers, semiplumes, down-feathers, filoplumes and powder-down. Contour feathers, as their name implies, are those which form the contour or outline of the body, and are all that can generally be seen. Those which form the "flight feathers" of the wing, and the tail feathers, are the most perfectly developed. Semiplumes are degenerate contour feathers. The down-feathers are generally completely hidden by the contour feathers: they form in many birds, such as gulls and ducks, a thick underclothing comparable to the under-fur of mammals such as the seals. In all cases they are of a loose, soft, "fluffy" structure, the barbs being of great length and slenderness, while the barbules are often long and provided with knob-like thickenings answering to the hooklets of the more perfectly developed contour feathers; these thickenings help to "felt" the separate down-feathers together, the barbs of one down-feather interlocking with those of its neighbour. Down-feathers differ from semiplumes both in their relation to contour feathers and in that they do not possess a main axis, all the barbs arising from a common centre.

Filoplumes are degenerate structures having a superficial resemblance to hairs, but they always bear a minute vane at the tip. They occur in all birds, in clusters of varying number, about the bases of contour feathers. In some birds they attain a great length, and may project beyond the contour feathers, sometimes forming conspicuous white patches, as for example in the necks of cormorants. In their early stages of development they often possess a large aftershaft made up of a number of barbs, but these quickly disappear, leaving only the degenerate main shaft. The eyelashes and bristles round the mouth found in many birds appear to be akin to filoplumes.

Powder-down feathers are degenerate down-feathers which appear to secrete a dry, waxy kind of powder. This powder rapidly disintegrates and becomes distributed over the plumage, adding thereto a quite peculiar bloom. In birds of the heron tribe powder-down feathers have reached a high degree of development, forming large patches in the breast and thighs, while in some hawks, and in the parrots, these mysterious feathers are scattered singly over the greater part of the body.

Nestling down.

The nature of the covering of nestling birds is of a more complex character than has hitherto been suspected. The majority of young birds, as is well known, either emerge from the egg clothed in down-feathers, or they develop these within a day or two afterwards. But this covering, though superficially similar in all, may, as a matter of fact, differ widely in its constitution, even in closely related forms, while only in a very few species can the complete history of these feathers be made out.

The brown or tawny owl (*Syrnium aluco*) is one of these. At hatching, the young of this species is thickly clad in white, woolly down-feathers, of the character known as umbelliform—that is to say, the central axis or main shaft is wanting, so that the barbs all start from a common centre. These feathers occupy the position of the ultimate contour feathers. They are shortly replaced by a second down-like covering, superficially resembling, and generally regarded as, true down. But they differ in that their barbs spring from a central axis as in typical contour feathers. Feathers of this last description indeed have now made their appearance in the shape of the "flight" or quill feathers (*remiges*) and of the tail feathers. This plumage is worn until the autumn, when the downy feathers give place to the characteristic adult plumage. The down feathers which appear at hatching-time are known as *pre-pennae*, or *pre-plumulae*, as the case may be; the first generation of pre-pennae, in the case of the tawny owl for example, is made up of *protoptyles*, while the succeeding plumage is made up of *mesoptyles*, and these in turn give place to the *teleoptyles* or adult feathers. The two forms of nestling plumage—pre-pennae and pre-plumulae—may be collectively called "neossoptyles," a term coined by H. F. Gadow to distinguish the plumage of the nestling from that of the adult—the "teleoptyle" plumage.

As a rule the nestling develops but one of these generations of neossoptyles, and this generally answers to the mesoptyle plumage, though this is of a degenerate type. In some birds, as in the Megapodes, the "protoptyle" or first of these two generations of pre-pennae is developed and shed while the chick is yet in the shell, so that at hatching the mesoptyle plumage is well developed. But in the majority of birds, probably, the mesoptyle plumage only is developed, while the earlier, and apparently more degenerate, dress is suppressed. In the penguins both of these nestling plumages are developed, but the mesoptyle dress has degenerated so that umbelliform feathers now take the place of feathers having a central axis.

The Anatidae show traces of the earlier, first generation of feathers in one or two species only, *e.g. Cloëphaga rubidiceps*. In all the remaining species mesoptyles only occur. And this is true also of the game-birds. In both the Tinamous, the duck-tribe and the game-birds this mesoptyle plumage shows, in different species, every gradation between feathers having a well-developed main shaft and aftershaft, and those which are mere umbelliform tufts.

As development proceeds and the contour feathers make their appearance they thrust the mesoptyle feathers out of their follicles—the pockets in the skin in which they were rooted—and these will often be found adhering to the tips of the contour feathers for many weeks after the bird has left the nest. This occurs because the development of the contour feather begins before that of the mesoptyles has completed.

The plumage in nestling birds is still futher complicated by the fact that it may be almost, or entirely, composed of pre-plumulae; that is to say, of down-feathers which are later succeeded by adult *down-feathers*. This is the case among the accipitrine birds for example, and thereby it differs entirely from that of the owls, which develop neither pre-plumulae nor adult down. The cormorants are, so far as is known, the only birds which have a nestling plumage composed entirely of pre-plumulae.

The colours of feathers.

In variety and brilliancy the colours of birds are not surpassed by those of any other group of animals. Yet the pigments to which these colours are due are but few in number, while a large number of the most resplendent hues are produced by structural peculiarities of the colourless horny surface of the feathers, and hence are known as subjective or optical colours.

The principal colour pigments are (*a*) *melanin* pigments, derived possibly from the haemoglobin of the blood, but more probably from the blood plasma, and (*b*) *lipochrome* or "fat" pigments, which are regarded as reserve products; though in the case of birds it is exceedingly doubtful whether they have this significance.

The melanin pigments (*zoomelanin*) occur in the form of granules and give rise to the black, brown and grey tones; or they may combine with those of the lipochrome series.

The lipochrome pigments (*zoonerythrin* and *zooxanthin*) tend to be diffused throughout the substance of the feather, and give rise respectively to the red and yellow colours.

In addition to these must be reckoned *turacin*, a reddish-purple pigment consisting of the same elements as zoomelanin, but remarkable for the fact that it contains from 5 to 8% of copper, which can be extracted by a weak alkaline solution, such as ammonia, and with the addition of acetic acid it can be filtered off as a metallic red or blue powder. The presence of metallic copper is indicated by the green flame of these red feathers when burnt. Turacin was discovered by Sir A. H. Church in the quill-feathers of the wings of Touracoes or "plantain eaters." These feathers, he showed, lose their colour after they have become wet, but regain it on drying. But turacin is not, as was supposed, confined to the feathers of the plantain eaters, since it has been obtained from a cuckoo, *Dasylophus superciliosus*.

What effect food may have on colour in birds in a wild state we have no means of knowing, but it is significant that flamingoes and linnets in confinement never regain their bright hues after their first moult in captivity. If cayenne pepper be mixed with the food of certain strains of canaries, from the time the birds are hatched onwards, the yellow colour of the feathers becomes intensified, till it takes on a deep orange hue. Bullfinches, if fed on hemp-seed, turn black. According to Darwin, the natives of the Amazonian region feed the common green parrot on the fat of large Siluroid fishes, and as a result the feathers become beautifully variegated with red and yellow. Similarly, in the Malay Archipelago, the natives of Gilolo change the colours of another parrot.

With but rare exceptions bright colours are confined to the exposed portions of the plumage, but in some of the Bustards the down is of a bright pink colour.

Structural colours.

Structural colours include all metallic or prismatic colours, blue, green, white, some yellows, and, in part, glossy black. In metallic feathers the radii (barbules) are modified in various ways, frequently to form flattened, overlapping plates or tiles, while the surfaces of the plates are either smooth, finely striated or pitted. But, save only in the case of white feathers, beneath this colourless, glazed outer coat there is always a layer of pigment.

The only green pigment known to occur in feathers is *turacoverdin*, found in the feathers of the plantain eaters; it contains a relatively large amount of iron, but no copper. In all other cases the green colour of feathers is due to yellow, orange or greyish-brown pigment occurring with a special superstructure consisting of narrow ridges, as in some parrots and pittas (ant-thrushes), or the surface of the barbs and barbules is smooth and transparent, while between it and the pigment there exists a layer of small polygonal, colourless bodies having highly refractory, and often striated, surfaces.

Blue is unknown as a pigment in feathers. Blue feathers contain only orange or brownish pigment (Gadow), the blue colour being caused by the combination of pigment corpuscles and colourless striated polygonal bodies, as in green feathers.

While in many birds the coloration takes the form either of a uniform hue or of bands and patches of colour more or less brilliant, in others the coloration is sombre, and made up of dark longitudinal stripes or transverse bars on a lighter ground. The latter is the more primitive, and there seems good reason to believe that longitudinal stripes preceded transverse bars. This is indicated by the fact that the nestlings of the more primitive groups are longitudinally striped, and that young hawks in their first plumage are so striped, while the adults are barred.

There is also evidence to show that the evolution of brilliant plumage began with the males, and has, in many cases, been more or less perfectly acquired by the females, and also by the young, as for example in the kingfishers, where parents and offspring wear the same livery. Often, where the parents are alike in plumage, the young wear a different and duller livery, as in the case of the common starling (*Sturnus vulgaris*). But where the female differs from the male in coloration the young resemble the female parent.

The physiological explanation of complete disappearance of pigment in adult life, *e.g.* gannet, is not yet apparent.

Moulting.

At least once annually birds renew their feathers completely by a process known as a moult. Until the new feathers have attained at least half their full length they are invested in a soft sheath, and, as development proceeds, the sheath breaks up from the tip of the feather downwards, so that for a time the new feathers have almost a brush-like appearance. Generally this replacement takes place gradually, new and old feathers occurring side by side, and on this account it is not always possible to see whether a moult is proceeding without raising the old feathers.

The "quill" feathers of the wing and tail are renewed in pairs, so that flight is little, if at all, impaired, the change taking place in the wing from the region of the wrist inwards, as to the primaries, and from the body outwards, towards the tip of the wing, as to the secondaries. In certain birds, however, as in the duck tribe and the rails, for example, all the quill-feathers of the wing are shed at once, so that for some time flight is impossible.

In the penguins this simultaneous method of moulting is carried still further. That is to say, the old feathers covering the body are not replaced gradually, but *en masse*. This method of ecdysis is, however, still further remarkable in that the old feathers do not drop out, to be succeeded by spine-like stumps which, later, split at the tip, liberating the barbs of the new feathers. They are, on the contrary, thrust out upon the tips of the new feathers, the barbs of which are never enclosed within an envelope such as that just described. When their growth has practically completed, and not till then, the old feathers are removed in large patches by the aid of the bird's beak; exposing thereby a perfectly developed plumage. In the cassowary, and emeu, the old feathers similarly adhere for a time to the tips of the new; but in these birds the feathers are moulted singly as in other birds.

Some birds moult twice within the year, the additional moult taking place in the spring, as in the case of the "warblers" (Sylviidae) and Limicolae, for example. But when this is the case the spring moult is only partial, since the quill feathers of the wings and the tail feathers are not renewed.

At this spring moult a special "nuptial" plumage is often assumed, as for example in many of the Limicolae, *e.g.* godwits, knots, dunlin, ruff.

The sequel to this habit of assuming a nuptial dress is an interesting one. Briefly, this plumage, at first assumed at the mating period by the males only, and doffed soon after the young appear, has become retained for longer and longer periods, so that the succeeding plumage, often conspicuously dull compared with the nuptial dress, is worn only for a few weeks, instead of many months, as in the case of many of the ducks, for example; wherein the males, as soon as the young are hatched, assume what C. Waterton has aptly called an "eclipse" dress. This, instead of being worn till the following spring, as in the waders, is shed again in the autumn and replaced by what answers to the waders' "nuptial" dress. In the game-birds but a trace of this "eclipse" plumage remains; and this, apparently, only in jungle-fowl, the common grey partridge (*Perdix cinerea*) and the blackcock (*Lyrurus*), in whose case the head and neck for a short period following the breeding season are clothed only by dull feathers. Further, this more highly developed plumage becomes transferred, first to the female, then to the young, so that, in many groups, the dull phase of plumage is entirely eliminated.

But the assumption at the breeding season of a conspicuously brilliant plumage is not always due to a moult. In many birds, notably many Passerines, this change is brought about by shedding the tips of the feathers, which are of a duller hue than the rest of the feather. In this way the bright rose pink of the linnet's breast, the blue and black head of the chaffinch, and the black throat and chestnut-and-black markings of the back of the sparrow, are assumed—to mention but a few instances. These birds moult but once a year, in the autumn, when the new feathers have broad brown fringes; as the spring advances these drop off, and with them the barbicels from the barbules of the upper surface of the feather, thus revealing the hidden tints.

According to some authorities, however, some birds acquire a change of colour without a moult by the ascent of pigment from the base of the feather. The black head assumed by many gulls in the spring is, for example, said to be gained in this way. There is, however, not only no good evidence in support of the contention, but the whole structure of the feather is against the probability of any such change taking place.

The development of feathers.

Feathers correspond with the scales of reptiles rather than with the hairs of mammals, as is shown by their development. They make their first appearance in the developing chick at about the sixth day of incubation, in the shape of small papillae. In section each papilla is found to be made up of a cluster of dermal cells—that is to say, of cells of the deeper layer of the skin—capped by cells of the epidermis. These last form a single superficial layer of flattened cells—the *epitrichium*—overlaying the cells of the Malpighian layer, which are cylindrical in shape and rapidly increase to form several layers. As development proceeds the papillae assume a cone-shape with its apex directed backwards, while the base of this cone sinks down into the skin, or rather is carried down by the growth of the Malpighian cells, so that the cone is now sunk in a deep pit. Thereby these Malpighian cells become divided into two portions: (1) those taking part in the formation of the walls of the pit or "feather follicle," and (2) those enclosed within the cone. These last surround the central mass or core formed by the dermis. This mass constitutes the nutritive pulp for the development of the growing feather, and is highly vascular. The cells of the Malpighian layer within the cone now become differentiated into three layers. (1) An inner, extremely thin, forming a delicate sheath for the pulp, and found in the fully developed feather in the form of a series of hollow, transparent caps enclosed within the calamus; (2) a thick layer which forms the feather itself; and (3) a thin layer which forms the investing sheath of the feather. It is this sheath which gives the curious spine-covered character to many nestling birds and birds in moult. As growth proceeds the cells of this middle layer arrange themselves in longitudinal rows to form the barbs, while the barbules are formed by a secondary splitting. At their bases these rudimentary barbs meet to form the calamus. Finally the tips of the barbs break through the investing sheath and the fully formed down-feather emerges.

A part of the pulp and Malpighian cells remains over after the complete growth of the down-feather, and from this succeeding generations of feathers are developed. The process of this development differs from that just outlined chiefly in this: that of the longitudinal rows which in the down-feather form the barbs, two on the dorsal and two on the ventral aspect of the interior of the cylinder become stronger than the rest, combining to form the main- and after-shaft respectively. The remainder of the rods form the barbs and barbules as in the down-feather.

The reproductive power of the feather follicle appears to be almost inexhaustible, since it is not diminished appreciably by age, nor restricted to definite moulting periods, as is shown by the cruel and now obsolete custom of plucking geese alive, no less than three times annually, for the sake of their feathers. The growth of the feathers is, however, certainly affected by the general health of the bird, mal-nutrition causing the appearance of peculiar transverse V-shaped grooves, at more or less regular intervals, along the whole length of the feather. These are known as "hunger-marks," a name given by falconers, to whom this defect was well known.

It would seem that while the feather germ may be artificially stimulated to produce three successive generations of feathers within a year, it may, on the other hand, be induced artificially to maintain a continuous activity extending over long periods. That is to say, the normal quiescent period, and periodic moult, may be suspended, so that the feather maintains a steady and continuous growth till it attains a length of several feet. The only known instance of this kind is that furnished by a domesticated breed of jungle-fowl known as the "Japanese long-tailed fowls" or as "Yokohamas." In this breed the upper tail coverts are in some way, as yet unknown to Europeans, induced to go on growing until they have attained a length of from 12 to 18 or even 20 ft.! In this abnormal growth the "hackles" of the lower part of the back also share, though they do not attain a similar length.

The feathers of birds are not uniformly distributed over the body, but grow only along certain definite tracts known as *pterylae*, leaving bare spaces or *apteria*. These pterylae differ considerably in their conformation in different groups of birds, and hence are of service in systematic ornithology.

The principal pterylae are as follows:—

(1) The head tract (*pt. capitis*), which embraces the head only.

(2) The spinal tract (*pt. spinalis*), which extends the whole length of the vertical column. It is one of the most variable in its modifications, especially in so far as the region from the base of the neck to the tail is concerned. In its simplest form it runs down the back in the form of a band of almost uniform width, but generally it expands considerably in the lumbar region, as in Passeres. Frequently it is divided into two portions; an upper, terminating in the region of the middle of the back in a fork, and a lower, which commences either as a fork, *e.g.* plover, barbet, or as a median band, *e.g.* swallow. Very commonly the dorsal region of this tract encloses a more or less extensive featherless space (*apterion*), *e.g.* swift, auk. While, as a rule, the dorsal region of this tract is relatively narrow, it is in some of great breadth, *e.g.* grebe, pigeon, coly.

(3) The ventral tract (*pt. ventralis*), which presents almost as many variations as the spinal tract.

In its simplest form it runs from the throat backwards in the form of a median band as far as the base of the neck where it divides, sending a branch to each side of the breast. This branch commonly again divides into a short, broad outer branch which lodges the "flank" feathers, and a long, narrow, inner branch which runs backwards to join its fellow of the opposite side in front of the cloacal aperture. This branch lodges the abdominal feathers. The median space which divides the inner branches of the tract may be continued forwards as far as the middle of the neck, or even up to the throat, *e.g.* plover. Only in a few cases is the neck continuously covered by the fusion of the dorsal and ventral tracts, *e.g.* flamingo, Anseres, Ciconidae, Pygopodes.

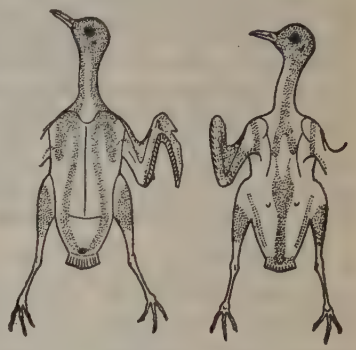

FIG. 2.—Pterylosis of the plover.

For convenience sake the cervical portions of the spinal and ventral tracts are generally regarded as separate tracts, the *pt. colli dorsalis* and *pt. colli ventralis* respectively.

(4) The humeral tract (*pt. humeralis*), which gives rise to the "scapular" feathers.

(5) The femoral tract (*pt. femoralis*), which forms an oblique band across the thigh.

(6) The crural tract (*pt. cruralis*), which clothes the rest of the leg.

(7) The tail tract (*pt. caudalis*), including the tail feathers and their coverts; and

(8) The wing tract (*pt. alaris*). The wing tract presents many peculiar features. Each segment—arm, forearm and hand—bears feathers essential to flight, and these are divided into *remiges*, or "quill" feathers, and *tectrices*, or "coverts."

The remiges of the arm, more commonly described as "tertiaries," are, technically, collectively known as the *parapteron* and *hypopteron*, and are composed respectively of long, quill-like feathers forming a double series, the former arranged along the upper, and the latter along the lower aspect of the humerus. They serve to fill up the gap which, in long-winged birds, would otherwise occur during flight between the quill-feathers of the forearm and the body, a gap which would make flight impossible. In short-winged birds these two series are extremely reduced.

The remiges range in number from 16, as in humming-birds, to 48 as in the albatross, according, in short, to the length of the wing. But these numerical differences depend, in flying birds, rather upon the length of the forearm, since the quills of the hand never exceed 12 and never fall below 10, though the tenth may be reduced to a mere vestige.

The quills of the forearm are known as "secondaries," those of the hand as "primaries." The former are attached by their bases at relatively wide distances apart to the ulna, while the primaries are crowded close together and attached to the skeleton of the hand. The six or seven which rest upon the fused metacarpals II.–III. are known as "metacarpals." The next succeeding feather is borne by the phalanx of digit III. and hence is known as the addigital. Phalanx i. of digit II. always supports two quills, the "middigitals," while the remaining feathers—one or two—are borne by the last phalanx of digit II. and are known as pre-digitals, while the whole series of primaries are known as the metacarpo-digitals.

In their relation one to another the remiges, it must be noted, are always so placed that they overlap one another, the free edge of each, when the wing is seen from its upper surface, being turned towards the tip of the wing. Thus, in flight, the air passes through the wing as it is raised, while in the downstroke the feathers are forced together to form a homogeneous surface.

Birds which fly much have the outer primaries of great length, giving the wing a pointed shape, as in swifts, while in species which fly but little, or frequent thickets, the outer primaries are very short, giving the wing a rounded appearance. This adaptation to environment is commonly lost sight of by taxonomers, who not infrequently use the form of the wing as a factor in classification.

The tectrices, or covert feathers of the wing, are arranged in several series, decreasing in size from behind forwards. The number of rows on the dorsal aspect and the method of their overlap, afford characters of general importance in classification.

The first row of the series is formed by the *major coverts*; these, like the primaries, have their free-edges directed towards the tip of the wing, and hence are said to have a distal overlap. The next row is formed by the *median coverts*. These, on the forearm, commonly overlap as to the outer half of the row distally, and as to the inner half proximally. On the hand this series is incomplete. Beyond the median are four or five rows of coverts known as the *minor coverts*. These may have either a proximal or a distal overlap. The remaining rows of small feathers are known as the *marginal coverts*, and they always have a distal overlap.

The three or four large quill-like feathers borne by the thumb form what is known as the "bastard-wing," *ala spuria*.

The coverts of the under follow an arrangement similar to that of the upper surface, but the minor coverts are commonly but feebly developed, leaving a more or less bare space which is covered by the great elongation of the marginal series.

One noteworthy fact about the coverts of the under side of the wing is that all save the major and median coverts have what answers to the dorsal surfaces of the feather turned towards the body, and what answers to the ventral surface of the feather turned towards the under surface of the wing. In the major and median coverts, however, the ventral surfaces of these feathers are turned ventralwards, that is to say, in the extended wing they, like the remiges, have the ventral surfaces turned downwards or towards the body in the closed wing.

But the most remarkable fact in connexion with the pterylosis of the wing is the fact that in all, save the Passerine and Galliform types, and some few other isolated exceptions, the secondary series of remiges appears always to lack the fifth remex, counting from the wrist inwards, inasmuch as, when such wings are examined, there is always found, in the place of the fifth remex, a pair of major coverts only, while throughout the rest of the series each such pair of coverts embraces a quill.

This extraordinary fact was first discovered by the French naturalist Z. Gerbe, and was later rediscovered by R. S. Wray. Neither of these, however, was able to offer any explanation thereof. This, however, has since been attempted, simultaneously, by P. C. Mitchell and W. P. Pycraft. The former has aptly coined the word *diastataxic* to denote the gap in the series, and *eutaxic* to denote such wings as have an uninterrupted series of quills. While both authors agree that there is no evidence of any loss in the number of the quills in diastataxic wings, they differ in the interpretation as to which of the two conditions is the more primitive and the means by which the gap has been brought about.

According to Mitchell the diastataxic is the more primitive condition, and he has conclusively shown a way in which diastataxic wings may become eutaxic. Pycraft on the other hand contends that the diastataxic wing has been derived from the eutaxic type, and has produced evidence showing, on the one hand, the method by which this transition is effected, and on the other that by which the diastataxic wing may again recover the eutaxic condition, though in this last particular the evidence adduced by Mitchell is much more complete. The matter is, however, one of considerable difficulty, but is well worth further investigation.

The wings of struthious birds differ from those of the Carinatae, just described, in many ways. All are degenerate and quite useless as organs of flight. In some cases indeed they have become reduced to mere vestiges.

Those of the ostrich and Rhea are the least degraded.

In the ostrich ankylosis has prevented the flexion of the hand at the wrist joint so that the quills—primaries and secondaries—form an unbroken series of about forty in number. Of these sixteen belong to the primary or metacarpo-digital series, a number exceeding that of any other bird. What the significance of this may be with regard to the primitive wing it is impossible to say at present. The coverts, in their disposition, bear a general resemblance to those of Carinate wings; but they differ on account of the great length of the feathers and the absence of any definite overlap.

The wing of the South American Rhea more nearly resembles that of flying birds since the hand can be flexed at the wrist joint, and the primaries are twelve in number, as in grebes, and some storks, for example.

The coverts, as in the African ostrich, are remarkable for their great length, those representing the major series being as long as the remiges, a fact probably due to the shortening of the latter. They are not, however, arranged in quincunx, as is the rule among the Carinatae, but in parallel, transverse rows, in which respect they resemble the owls.

In both ostrich and Rhea, as well as in all the other struthious birds, the under surface of the wing is entirely bare.

The wing of the cassowary, emeu and apteryx has undergone complete degeneration; so much so that only a vestige of the hand remains.

Remiges in the cassowary are represented by a few spine-like shafts—three primaries and two secondaries. These are really hypertrophied calami. This is shown by the fact that in the nestling these remiges have a normal calamus, rhachis and vane; but as development proceeds the rhachis with its vane sloughs off, while the calamus becomes enormously lengthened and solid.

In the emeu the wing is less atrophied than in the cassowary, but is not yet completely degenerate. Altogether seventeen remiges are represented, of which seven correspond to primaries. Since, however, these feathers have each an aftershaft as long as the main shaft—like the rest of the body feathers—it may be that they answer not to remiges, but to major coverts.

The wing of apteryx, like that of the cassowary, has become extremely reduced. The remiges are thirteen in number, four of which answer to primaries. These feathers are specially interesting, inasmuch as they retain throughout life a stage corresponding to that seen in the very young cassowary, the calamus being greatly swollen, and supporting a very degenerate rhachis and vane.

The penguins afford another object-lesson in degeneration of this kind. Here the wing has become transformed into a paddle, clothed on both sides with a covering of small, close-set feathers. A pollex is wanting, as in the cassowary, emeu and apteryx, while it is impossible to say whether remiges are represented or not.

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Commercial Applications of Feathers.—The chief purposes for which feathers become commercially valuable may be comprehended under four divisions:—(1) bed and upholstery feathers; (2) quills for writing; (3) ornamental feathers; and (4) miscellaneous uses of feathers.

Bed and Upholstery Feathers.—The qualities which render feathers available for stuffing beds, cushions, &c., are lightness, elasticity, freedom from matting and softness. These are combined in the most satisfactory degree in the feathers of the goose and of several other allied aquatic birds, whose bodies are protected with a warm downy covering. Goose feathers and down, when plucked in spring from the living bird, are most esteemed, being at once more elastic, cleaner and less liable to taint than those obtained from the bodies of killed geese. The down of the eider duck, *Anas mollissima*, is valued above all other substances for lightness, softness and elasticity; but it has some tendency to mat, and is consequently more used for quilts and in articles of clothing than unmixed for stuffing beds. The feathers of swans, ducks and of the common domestic fowl are also largely employed for beds; but in the case of the latter bird, which is of course non-aquatic, the feathers are harsher and less downy than are those of the natatorial birds generally. Feathers which possess strong or stiff shafts cannot without some preliminary preparation be used for stuffing purposes, as the stiff points they present would not only be highly uncomfortable, but would also pierce and cause the escape of the feathers from any covering in which they might be enclosed. The barbs are therefore stripped or cut from these feathers, and when so prepared they, in common with soft feathers and downs, undergo a careful process of drying and cleaning, without which they would acquire an offensive smell, readily attract damp, and harbour vermin. The drying is generally done in highly heated apartments or stoves, and subsequently the feathers are smartly beaten with a stick, and shaken in a sieve to separate all dust and small debris.

Quills for Writing.—The earliest period at which the use of quill feathers for writing purposes is recorded is the 6th century; and from that time till the introduction of steel pens in the early part of the 19th century they formed the principal writing implements of civilized communities. It has always been from the goose that quills have been chiefly obtained, although the swan, crow, eagle, owl, hawk and turkey all have more or less been laid under contribution. Swan quills, indeed are better and more costly than are those from the goose, and for fine lines crow quills have been much employed. Only the five outer wing feathers of the goose are useful for writing, and of these the second and third are the best, while left-wing quills are also generally more esteemed than those of the right wing, from the fact that they curve outward and away from the writer using them. Quills obtained in spring, by plucking or otherwise, from living birds are by far the best, those taken from dead geese, more especially if fattened, being comparatively worthless. To take away the natural greasiness to remove the superficial and internal pellicles of skin, and to give the necessary qualities of hardness and elasticity, quills require to undergo some processes of preparation. The essential operation consists in heating them, generally in a fine sand-bath, to from 130° to 180° F. according to circumstances, and scraping them under pressure while still soft from heat, whereby the outer skin is removed and the inner shrivelled up. If the heating has been properly effected, the quills are found on cooling to have become hard, elastic and somewhat brittle. While the quills are soft and hot, lozenge-shaped patterns, ornamental designs, and names are easily and permanently impressed on them by pressure with suitable instruments or designs in metal stamps.

Ornamental Feathers.—Feathers do not appear to have been much used, in Europe at least, for ornamental purposes till the close of the 13th century. They are found in the conical caps worn in England during the reigns of Edward III. and Richard II.; but not till the period of Henry V. did they take their place as a part of military costume. Towards the close of the 15th century the fashion of wearing feathers in both civil and military life was carried to an almost ludicrous excess. In the time of Henry VIII. they first appeared in the bonnets of ladies; and during Elizabeth's reign feathers began to occupy an important place as head-dress ornaments of women. From that time down to the present, feathers of endless variety have continued to be leading articles of ornamentation in female head-attire; but, except for military plumes, they have long ceased to be worn in ordinary male costume. At the present day, the feathers of numerous birds are, in one way or another, turned to account by ladies for the purpose of personal ornament. Ostrich feathers, however, hold, as they have always held, a pre-eminent position among ornamental feathers; and the ostrich is the only bird which may be said to be reared exclusively for the sake of its feathers. Ostrich farming is one of the established industries of South Africa, and is also practised in Kordofan and other semi-desert regions of North Africa, in Argentina, and in Arizona and California in North America. The feathers are generally plucked from the living animal—a process which does not appear to cause any great inconvenience. In the male bird, the long feathers of the rump and wings are white, and the short feathers of the body are jet black; while the rump and wing feathers of the female are white tinged with a dusky grey, the general body colour being the latter hue. The feathers of the male are consequently much more valuable than those of the female, and they are separately classified in commerce. The art of the plumassier embraces the cleaning, bleaching, dyeing, curling and making up of ostrich and other plumes and feathers. White feathers are simply washed in bundles in hot soapy water, run through pure warm water, exposed to sulphurous fumes for bleaching, thereafter blued with indigo solution, rinsed in pure cold water, and hung up to dry. When dry the shafts are pared or scraped down to give the feathers greater flexibility, and the barbs are curled by drawing them singly over the face of a blunt knife or by the cautious application of a heated iron. Dull-coloured feathers are usually dyed black. Feathers which are dyed light colours are first bleached by exposure in the open air. Much ingenuity is displayed in the making up of plumes, with the general result of producing the appearance of full, rich, and long feathers from inferior varieties and from scraps and fragments of ostrich feathers; and so dexterously can factitious plumes be prepared that only an experienced person is able to detect the fabrication.

In addition to those of the ostrich, the feathers of certain other birds form articles of steady commercial demand. Among these are the feathers of the South American ostrich, *Rhea americana*, the marabout feathers of India obtained from *Leptoptilos argala and L. javanica*, the aigrettes of the heron, the feathers of the various species of birds of paradise, and of numerous species of humming-birds. Swan-down and the skins of various penguins and grebes and of the albatross are used, like fur, for muffs and collarettes.

The Chinese excel in the preparation of artificial flowers and other ornaments from bright natural-coloured or dyed feathers; and the French also skilfully work fragments of feathers into bouquets of artificial flowers, imitation butterflies, &c.

Miscellaneous Applications of Feathers.—Quills of various sizes are extensively employed as holders for the sable and camel hair brushes used by artists, &c. Feather brushes and dusters are made from the wing-feathers of the domestic fowl and other birds; those of a superior quality, under the name of vulture dusters, being really made of American ostrich feathers. A minor application of feathers is found in the dressing of artificial fly-hooks for fishing. As steel pens came into general use it became an object of considerable importance to find applications for the supplanted goose-quills, and a large field of employment for them was found in the preparation of toothpicks. (J. Pa; W. P. P.)

FEATHERSTONE, an urban district in the Osgoldcross parliamentary division of the West Riding of Yorkshire, England, 6 m. E. of Wakefield on the Lancashire & Yorkshire railway. Pop. (1901) 12,093. The industrial population is employed in large collieries in the vicinity; and here, on the 7th of September 1893, serious riots during a strike resulted in the destruction of some of the colliery works belonging to Lord Masham, and were not quelled without military intervention and some bloodshed.

FEATLEY (or Fairclough) **DANIEL** (1582–1645), English divine, was born at Charlton, Oxfordshire, on the 15th of March 1582. He was a scholar of Corpus Christi College, Oxford, and probationer fellow in 1602, after which he went to France as chaplain to the English ambassador. For some years he was domestic chaplain to George Abbot, archbishop of Canterbury, and held also the rectories of Lambeth (1619), Allhallows, Bread Street (*c.* 1622), and Acton (1627), this last after leaving the archbishop's service in 1625. His varied activities included a "scholastick duel" with James I. in 1625, and the publication of (1) the report of a conference with some Jesuits in 1624, (2) a devotional manual entitled *Ancilla Pietatis* (1626), (3) *Mystica Clavis, a Key opening divers Difficult Texts of Scripture in 70 Sermons* (1636). He was appointed provost of Chelsea College in 1630, and in 1641 was one of the sub-committee "to settle religion." In the course of this work he had a disputation with four Baptists at Southwark which he commemorated in his book

Καταβαπτισταὶ καταπτυστοί, *The Dippers dipt or the Anabaptists duckt and plunged over head and ears* (1645). He sat in the Westminster Assembly 1643, and was the last of the Episcopal members to remain. For revealing its proceedings he was expelled and imprisoned. He died at Chelsea on the 17th of April 1645.

FEBRONIANISM, the name given to a powerful movement within the Roman Catholic Church in Germany, in the latter part of the 18th century, directed towards the "nationalizing" of Catholicism, the restriction of the monarchical power usurped by the papacy at the expense of the episcopate, and the reunion of the dissident churches with Catholic Christendom. It was thus, in its main tendencies, the equivalent of what in France is known as Gallicanism (*q.v.*). The name is derived from the pseudonym of "Justinus Febronius" adopted by Johann Nikolaus von Hontheim (*q.v.*), coadjutor bishop of Treves (Trier), in publishing his work *De statu ecclesiae et legitima potestate Romani pontificis*. This book, which roused a vast amount of excitement and controversy at the time, exercised an immense influence on opinion within the Roman Catholic Church, and the principles it proclaimed were put into practice by the rulers of that Church in various countries during the latter part of the 18th and the beginning of the 19th century.

The main propositions defended by "Febronius" were as follows. The constitution of the Church is not, by Christ's institution, monarchical, and the pope, though entitled to a certain primacy, is subordinate to the universal Church. Though as the "centre of unity" he may be regarded as the guardian and champion of the ecclesiastical law, and though he may *propose* laws, and send legates on the affairs of his primacy, his sovereignty (*principatus*) over the Church is not one of jurisdiction, but of order and collaboration (*ordinis et consociationis*). The Roman (ultramontane) doctrine of papal infallibility is not accepted "by the other Catholic Churches" and, moreover, "has no practical utility." The Church is based on the one episcopacy common to all bishops, the pope being only *primus inter pares*. It follows that the pope is subject to general councils, in which the bishops are his colleagues (*conjudices*), not merely his consultors; nor has he the exclusive right to summon such councils. The decrees of general councils need not be confirmed by the pope nor can they be altered by him; on the other hand, appeal may be made from papal decisions to a general council. As for the rights of the popes in such matters as appeals, reservations, the confirmation, translation and deposition of bishops, these belong properly to the bishops in provincial synods, and were usurped by the papacy gradually as the result of a variety of causes, notably of the False Decretals. For the health of the Church it is therefore necessary to restore matters to their condition before the False Decretals, and to give to the episcopate its due authority. The main obstacle to this is not the pope himself, but the Curia, and this must be fought by all possible means, especially by thorough popular education (*primum adversus abusum ecclesiasticae potestatis remedium*), and by the assembling of national and provincial synods, the neglect of which is the main cause of the Church's woes. If the pope will not move in the matter, the princes, and notably the emperor, must act in co-operation with the bishops, summon national councils even against the pope's will, defy his excommunication, and in the last resort refuse obedience in those matters over which the papacy has usurped jurisdiction.

It will be seen that the views of Febronius had but little originality. In the main they were those that predominated in the great general councils of Constance and Basel in the 15th century; but they were backed by him with such a wealth of learning, and they fitted so well into the intellectual and political conditions of the time, that they found a widespread acceptance. The book, indeed, was at once condemned at Rome (February 1764), and by a brief of the 21st of May the pope commanded all the bishops of Germany to suppress it. The papal condemnation met with a very mixed reception; in some dioceses the order to prohibit the book was ignored, in others action upon it was postponed pending an independent examination, in yet others (nine in all) it was at once obeyed "for political reasons," though even in these the forbidden book became the "breviary of the governments." The Febronian doctrine, in fact, exactly fitted the views of the German bishops, which were by no means disinterested. It must be remembered that the bishops were at this time great secular princes rather than Catholic prelates; with rare exceptions, they made no pretence of carrying out their spiritual duties; they shared to the full in the somewhat shallow "enlightenment" of the age. As princes of the Empire they had asserted their practical independence of the emperor; they were irked by what they considered the unjustifiable interference of the Curia with their sovereign prerogatives, and wished to establish their independence of the pope also. In the ranks of the hierarchy, then, selfish motives combined with others more respectable to secure the acceptance of the Febronian position. Among secular rulers the welcome given to it was even less equivocal. Even so devout a sovereign as Maria Theresa refused to allow "Febronius" to be forbidden in the Habsburg dominions; her son, the emperor Joseph II., applied the Febronian principles with remorseless thoroughness. In Venice, in Tuscany, in Naples, in Portugal, they inspired the vigorous efforts of "enlightened despots" to reform the Church from above; and they gave a fresh impetus to the movement against the Jesuits, which, under pressure of the secular governments, culminated in the suppression of the Society by Pope Clement XIV. in 1773. "Febronius," too, inspired the proceedings of two notable ecclesiastical assemblies, both held in the year 1786. The reforming synod which met at Pistoia under the presidency of the bishop, Scipione de' Ricci, is dealt with elsewhere (see Pistoia). The other was the so-called congress of Ems, a meeting of the delegates of the four German archbishops, which resulted, on the 25th of August, in the celebrated "Punctation of Ems," subsequently ratified and issued by the archbishops. This document was the outcome of several years of controversy between the archbishops and the papal nuncios, aroused by what was considered the unjustifiable interference of the latter in the affairs of the German dioceses. In 1769 the three archbishop-electors of Mainz, Cologne and Treves (Trier) had drawn up in thirty articles their complaints against the Curia, and after submitting them to the emperor Joseph II., had forwarded them to the new pope, Clement XIV. These articles, though "Febronius" was prohibited in the archdioceses, were wholly Febronian in tone; and, indeed, Bishop von Hontheim himself took an active part in the diplomatic negotiations which were their outcome. In drawing up the "Punctation" he took no active part, but it was wholly inspired by his principles. It consisted of XXIII. articles, which may be summarized as follows. Bishops have, in virtue of their God-given powers, full authority within their dioceses in all matters of dispensation, patronage and the like; papal bulls, briefs, &c., and the decrees of the Roman Congregations are only of binding force in each diocese when sanctioned by the bishop; nunciatures, as hitherto conceived, are to cease; the oath of allegiance to the pope demanded of bishops since Gregory VII.'s time is to be altered so as to bring it into conformity with episcopal rights; annates and the fees payable for the pallium and confirmation are to be lowered and, in the event of the pallium or confirmation being refused, German archbishops and bishops are to be free to exercise their office under the protection of the emperor; with the Church tribunals of first and second instance (episcopal and metropolitan) the nuncios are not to interfere, and, though appeal to Rome is allowed under certain "national" safe-guards, the opinion is expressed that it would be better to set up in each archdiocese a final court of appeal representing the provincial synod; finally the emperor is prayed to use his influence with the pope to secure the assembly of a national council in order to remove the grievances left unredressed by the council of Trent.

Whether this manifesto would have led to a reconstitution of the Roman Catholic Church on permanently Febronian lines must for ever remain doubtful. The French Revolution intervened; the German Church went down in the storm: and in

1803 the secularizations carried out by order of the First Consul put an end to the temporal ambitions of its prelates. Febronianism indeed, survived. Karl Theodor von Dalberg, prince primate of the Confederation of the Rhine, upheld its principles throughout the Napoleonic epoch and hoped to establish them in the new Germany to be created by the congress of Vienna. He sent to this assembly, as representative of the German Church, Bishop von Wessenberg, who in his diocese of Constance had not hesitated to apply Febronian principles in reforming, on his own authority, the services and discipline of the Church. But the times were not favourable for such experiments. The tide of reaction after the Revolutionary turmoil was setting strongly in the direction of traditional authority, in religion as in politics; and that ultramontane movement which, before the century was ended, was to dominate the Church, was already showing signs of vigorous life. Moreover, the great national German Church of which Dalberg had a vision—with himself as primate—did not appeal to the German princes, tenacious of their newly acquired status as European powers. One by one these entered into concordats with Rome, and Febronianism from an aggressive policy subsided into a speculative opinion. As such it survived strongly, especially in the universities (Bonn especially had been, from its foundation in 1774, very Febronian), and it reasserted itself vigorously in the attitude of many of the most learned German prelates and professors towards the question of the definition of the dogma of papal infallibility in 1870. It was, in fact, against the Febronian position that the decrees of the Vatican Council were deliberately directed, and their promulgation marked the triumph of the ultramontane view (see VATICAN COUNCIL, ULTRAMONTANISM, PAPACY). In Germany, indeed, the struggle against the papal monarchy was carried on for a while by the governments on the so-called *Kulturkampf*, the Old Catholics representing militant Febronianism. The latter, however, since Bismarck "went to Canossa," have sunk into a respectable but comparatively obscure sect, and Febronianism, though it still has some hold on opinion within the Church in the chapters and universities of the Rhine provinces, is practically extinct in Germany. It's revival under the guise of so-called Modernism drew from Pope Pius X. in 1908 the scathing condemnation embodied in the encyclical *Pascendi gregis*.

AUTHORITIES.—See Justinus Febronius, *De statu ecclesiae et legitima potestae Romani pontificis* (Bullioni, 1765), second and enlarged edition, with new prefaces addressed to Pope Clement XIII., to Christian kings and princes, to the bishops of the Catholic Church, and to doctors of theology and canon law; three additional volumes, published in 1770, 1772 and 1774 at Frankfort, are devoted to vindications of the original work against the critics. In the *Revue des deux mondes* for July 1903 (tome xvi. p. 266) is an interesting article under the title of "L'Allemagne Catholique," from the papal point of view, by Georges Goyau. For the congress of Ems see Herzog-Hauck, *Realencyklopädie* (Leipzig, 1898), s.v. "Emser Kongress." Further references are given in the article on Hontheim (*q.v.*). (W. A. P.)

FEBRUARY, the second month of the modern calendar. In ordinary years it contains 28 days; but in bissextile or leap year, by the addition of the intercalary day, it consists of 29 days. This month was not in the Romulian calendar. In the reign of Numa two months were added to the year, namely, January at the beginning, and February at the end; and this arrangement was continued until 452 B.C., when the decemvirs placed February after January. The ancient name of *Februarius* was derived from *februare*, to purify, or from *Februa*, the Roman festival of general expiation and lustration, which was celebrated during the latter part of this month. In February also the Lupercalia were held, and women were purified by the priests of Pan Lyceus at that festival. The Anglo-Saxons called this month Sprout-Kale from the sprouting of the cabbage at this season. Later it was known as *Solmonath*, because of the return of the sun from the low latitudes. The most generally noted days of February are the following:—the 2nd, Candlemas day, one of the fixed quarter days used in Scotland; the 14th, St Valentine's day; and the 24th, St Matthias. The church festival of St Matthias was formerly observed on the 25th of February in bissextile years, but it is now invariably celebrated on the 24th.

FEBVRE, ALEXANDRE FRÉDÉRIC (1835–), French actor, was born in Paris, and after the usual apprenticeship in the provinces and in several Parisian theatres in small parts, was called to the Comédie Française in 1866, where he made his début as Philip II. in *Don Juan d'Autriche*. He soon became the most popular leading man in Paris, not only in the classical répertoire, but in contemporary novelties. In 1894 he toured the principal cities of Europe, and, in 1895, of America. He was also a composer of light music for the piano, and published several books of varying merit. He married Mdlle Harville, daughter of one of his predecessors at the Comédie Française, herself a well-known actress.

FÉCAMP, a seaport and bathing resort of northern France, in the department of Seine-Inférieure, 28 m. N.N.E. of Havre on the Western railway. Pop. (1906) 15,872. The town, which is situated on the English Channel at the mouth of the small river Fécamp, consists almost entirely of one street upwards of 2 m. in length. It occupies the bottom and sides of a narrow valley opening out towards the sea between high cliffs. The most important building is the abbey church of La Trinité, dating for the most part from 1175 to 1225. The central tower and the south portal (13th century) are the chief features of its simple exterior; in the interior, the decorative work, notably the chapel-screens and some fine stained glass, is remarkable. The hotel-de-ville with a municipal museum and library occupy the remains of the abbey buildings (18th century). The church of St Étienne (16th century) and the Benedictine liqueur distillery,[1] a modern building which also contains a museum, are of some interest. A tribunal and chamber of commerce, a board of trade-arbitrators and a nautical school, are among the public institutions. The port consists of an entrance channel nearly 400 yds. long leading to a tidal harbour and docks capable of receiving ships drawing 26 ft. at spring-tide, 19 ft. at neap-tide. Fishing for herring and mackerel is carried on and the town equips a large fleet for the codbanks of Newfoundland and Iceland. The chief exports are oil-cake, flint, cod and Benedictine liqueur. Imports include coal, timber, tar and hemp. Steam sawing, metal-founding, fish-salting, shipbuilding and repairing, and the manufacture of ship's-biscuits and fishing-nets are among the industries.

The town of Fécamp grew up round the nunnery founded in 658 to guard the relic of the True Blood which, according to the legend, was found in the trunk of a fig-tree drifted from Palestine to this spot, and which still remains the most precious treasure of the church. The original convent was destroyed by the Northmen, but was re-established by Duke William Longsword as a house of canons regular, which shortly afterwards was converted into a Benedictine monastery. King Richard I. greatly enlarged this, and rebuilt the church. The town achieved some prosperity under the dukes of Normandy, who improved its harbour, but after the annexation of Normandy to France it was overshadowed by the rising port of Havre.

FECHNER, GUSTAV THEODOR (1801–1887), German experimental psychologist, was born on the 19th of April 1801 at Gross-Särchen, near Muskau, in Lower Lusatia, where his father was pastor. He was educated at Sorau and Dresden and at the university of Leipzig, in which city he spent the rest of his life. In 1834 he was appointed professor of physics, but in 1839 contracted an affection of the eyes while studying the phenomena of colour and vision, and, after much suffering, resigned. Subsequently recovering, he turned to the study of mind and the relations between body and mind, giving public lectures on the subjects of which his books treat. He died at Leipzig on the 18th of November 1887. Among his works may be mentioned: *Das Büchlein vom Leben nach dem Tode* (1836, 5th ed., 1903), which has been translated into English; *Nanna, oder über das Seelenleben der Pflanzen* (1848, 3rd ed., 1903); *Zendavesta, oder*

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[1] The liqueur is said to have been manufactured by the Benedictine monks of the abbey as far back as 1510; since the Revolution it has been produced commercially by a secular company. The familiar legend D. O. M. (*Deo Optimo Maximo*) on the bottles preserves the memory of its original makers.

über die Dinge des Himmels und des Jenseits (1851, 2nd ed. by Lasswitz, 1901); *Über die physikalische und philosophische Atomenlehre* (1853, 2nd ed., 1864); *Elemente der Psychophysik* (1860, 2nd ed., 1889); *Vorschule der Ästhetik* (1876, 2nd ed., 1898); *Die Tagesansicht gegenüber der Nachtansicht* (1879). He also published chemical and physical papers, and translated chemical works by J. B. Biot and L. J. Thénard from the French. A different but essential side of his character is seen in his poems and humorous pieces, such as the *Vergleichende Anatomie der Engel* (1825), written under the pseudonym of "Dr Mises." Fechner's epoch-making work was his *Elemente der Psychophysik* (1860). He starts from the Spinozistic thought that bodily facts and conscious facts, though not reducible one to the other, are different sides of one reality. His originality lies in trying to discover an exact mathematical relation between them. The most famous outcome of his inquiries is the law known as Weber's or Fechner's law which may be expressed as follows:—"In order that the intensity of a sensation may increase in arithmetical progression, the stimulus must increase in geometrical progression." Though holding good within certain limits only, the law has been found immensely useful. Unfortunately, from the tenable theory that the intensity of a sensation increases by definite additions of stimulus, Fechner was led on to postulate a unit of sensation, so that any sensation S might be regarded as composed of *n* units. Sensations, he argued, thus being representable by numbers, psychology may become an "exact" science, susceptible of mathematical treatment. His general formula for getting at the number of units in any sensation is $S = C \log R$, where S stands for the sensation, R for the stimulus numerically estimated, and C for a constant that must be separately determined by experiment in each particular order of sensibility. This reasoning of Fechner's has given rise to a great mass of controversy, but the fundamental mistake in it is simple. Though stimuli are composite, sensations are not. "Every sensation," says Professor James, "presents itself as an indivisible unit; and it is quite impossible to read any clear meaning into the notion that they are masses of units combined." Still, the idea of the exact measurement of sensation has been a fruitful one, and mainly through his influence on Wundt, Fechner was the father of that "new" psychology of laboratories which investigates human faculties with the aid of exact scientific apparatus. Though he has had a vast influence in this special department, the disciples of his general philosophy are few. His world-conception is highly animistic. He feels the thrill of life everywhere, in plants, earth, stars, the total universe. Man stands midway between the souls of plants and the souls of stars, who are angels. God, the soul of the universe, must be conceived as having an existence analogous to men. Natural laws are just the modes of the unfolding of God's perfection. In his last work Fechner, aged but full of hope, contrasts this joyous "daylight view" of the world with the dead, dreary "night view" of materialism. Fechner's work in aesthetics is also important. He conducted experiments to show that certain abstract forms and proportions are naturally pleasing to our senses, and gave some new illustrations of the working of aesthetic association. Fechner's position in reference to predecessors and contemporaries is not very sharply defined. He was remotely a disciple of Schelling, learnt much from Herbart and Weisse, and decidedly rejected Hegel and the monadism of Lotze.

See W. Wundt, *G. Th. Fechner* (Leipzig, 1901); A. Elsas, "Zum Andenken G. Th. Fechners," in *Grenzbote*, 1888; J. E. Kuntze, *G. Th. Fechner* (Leipzig, 1892); Karl Lasswitz, *G. Th. Fechner* (Stuttgart, 1896 and 1902); E. B. Titchener, *Experimental Psychology* (New York, 1905); G. F. Stout, *Manual of Psychology* (1898), bk. ii. ch. vii.; R. Falckenberg, *Hist. of Mod. Phil.* (Eng. trans., 1895), pp. 601 foll.; H. Höffding, *Hist. of Mod. Phil.* (Eng. trans., 1900), vol. ii. pp. 524 foll.; Liebe, *Fechners Metaphysik, im Umriss dargestellt* (1903). (H. St.)

FECHTER, CHARLES ALBERT (1824–1879), Anglo-French actor, was born, probably in London, on the 23rd of October 1824, of French parents, although his mother was of Piedmontese and his father of German extraction. The boy would probably have devoted himself to a sculptor's life but for the accident of a striking success made in some private theatricals. The result was an engagement in 1841 to play in a travelling company that was going to Italy. The tour was a failure, and the company broke up; whereupon Fechter returned home and worked assiduously at sculpture. At the same time he attended classes at the Conservatoire with the view of gaining admission to the Comédie Française. Late in 1844 he won the grand medal of the Académie des Beaux-Arts with a piece of sculpture, and was admitted to make his début at the Comédie Française as Seide in Voltaire's *Mahomet* and Valère in Molière's *Tartuffe*. He acquitted himself with credit; but, tired of the small parts he found himself condemned to play, returned again to his sculptor's studio in 1846. In that year he accepted an engagement to play with a French company in Berlin, where he made his first decisive success as an actor. On his return to Paris in the following year he married the actress Eléonore Rabut (d. 1895). Previously he had appeared for some months in London, in a season of French classical plays given at the St James's theatre. In Paris for the next ten years he fulfilled a series of successful engagements at various theatres, his chief triumph being his creation at the Vaudeville on the 2nd of February 1852 of the part of Armand Duval in *La Dame aux camélias*. For nearly two years (1857–1858) Fechter was manager of the Odéon, where he produced *Tartuffe* and other classical plays. Having received tempting offers to act in English at the Princess's theatre, London, he made a diligent study of the language, and appeared there on the 27th of October 1860 in an English version of Victor Hugo's *Ruy Blas*. This was followed by *The Corsican Brothers* and *Don César de Bazan*; and on the 20th of March 1861 he first attempted *Hamlet*. The result was an extraordinary triumph, the play running for 115 nights. This was followed by *Othello*, in which he played alternately the Moor and Iago. In 1863 he became lessee of the Lyceum theatre, which he opened with *The Duke's Motto*; this was followed by *The King's Butterfly*, *The Mountebank* (in which his son Paul, a boy of seven, appeared), *The Roadside Inn*, *The Master of Ravenswood*, *The Corsican Brothers* (in the original French version, in which he had created the parts of Louis and Fabian dei Franchi) and *The Lady of Lyons*. After this he appeared at the Adelphi (1868) as Obenreizer in *No Thoroughfare*, by Charles Dickens and Wilkie Collins, as Edmond Dantes in *Monte Cristo*, and as Count de Leyrac in *Black and White*, a play in which the actor himself collaborated with Wilkie Collins. In 1870 he visited the United States, where (with the exception of a visit to London in 1872) he remained till his death. His first appearance in New York was at Niblo's Garden in the title rôle of *Ruy Blas*. He played in the United States between 1870 and 1876 in most of the parts in which he had won his chief triumphs in England, making at various times attempts at management, rarely successful, owing to his ungovernable temper. The last three years of his life were spent in seclusion on a farm which he had bought at Rockland Centre, near Quakertown, Pennsylvania, where he died on the 5th of August 1879. A bust of the actor by himself is in the Garrick Club, London.

FECKENHAM, JOHN (*c.* 1515–1584), English ecclesiastic, last abbot of Westminster, was born at Feckenham, Worcestershire, of ancestors who, by their wills, seem to have been substantial yeomen. The family name was Howman, but, according to the English custom, Feckenham, on monastic profession, changed it for the territorial name by which he is always known. Learning his letters first from the parish priest, he was sent at an early age to the claustral school at Evesham and thence, in his eighteenth year, to Gloucester Hall, Oxford, as a Benedictine student. After taking his degree in arts, he returned to the abbey, where he was professed; but he was at the university again in 1537 and took his B.D. on the 11th of June 1539. Returning to Evesham he was there when the abbey was surrendered to the king (27th of January 1540); and then, with a pension of £10 a year, he once more went back to Oxford, but soon after became chaplain to Bishop Bell of Worcester and then served Bonner in that same capacity from 1543 to 1549.

In 1544 Bonner gave him the living of Solihull; and Feckenham established a reputation as a preacher and a disputant of keen intellect but unvarying charity. About 1549 Cranmer sent him to the Tower of London, and while there "he was borrowed out of prison" to take part in seven public disputations against Hooper, Jewel and others. Released by Queen Mary (5th of September 1553), he returned to Bonner and became prebendary of St Paul's, rector of Finchley, then of Greenford Magna, chaplain and confessor to the queen, and dean of St Paul's (10th of March 1554). He took part, with much charity and mildness, in the Oxford disputes against Cranmer, Latimer and Ridley; but he had no liking for the fierce bigotry and bloody measures then in force against Protestants. Feckenham used all his influence with Mary "to procure pardon of the faults or mitigation of the punishment for poor Protestants" (Fuller), and he was sent by the queen to prepare Lady Jane Grey for death. When Elizabeth was sent to the Tower (18th of March 1554), Feckenham interceded for her life and liberty, even at the cost of displeasing the queen.

The royal abbey of Westminster having been restored to its primitive use, Feckenham was appointed abbot, and the old life began again within its hallowed walls on the 21st of November 1556. The abbey school was reopened and the shrine of St Edward restored. On the accession of Elizabeth Feckenham consistently opposed all the legislation for changes in religion, and, when the hour of trial came, he refused the oath of supremacy, rejecting also Elizabeth's offer to remain with his monks at Westminster if he would conform to the new laws. The abbey was dissolved (12th of July 1559), and within a year Feckenham was sent by Archbishop Parker to the Tower (20th of May 1560), according to Jewel, "for having obstinately refused attendance on public worship and everywhere declaiming and railing against that religion which we now profess" (Parker Society, first series, p. 79). Henceforth, except for some brief periods when he was a prisoner at large, Feckenham spent the rest of his life in confinement either in some recognized prison, or in the more distasteful and equally rigorous keeping of the bishops of Winchester and Ely. After fourteen years' confinement, he was released on bail and lived in Holborn, where his benevolence was shown by all manner of works of charity. "He relieved the poor wheresoever he came, so that flies flock not thicker to spilt honey than beggars constantly crowd about him" (Fuller). He set up a public aqueduct in Holborn, and a hospice for the poor at Bath; he distributed every day to the sick the milk of twelve cows, took care of orphans, and encouraged manly sports on Sundays among the youth of London by giving prizes. In 1577 he was committed to the care of Cox of Ely with strict rules for his treatment; and the bishop (1578) could find no fault with him except that "he was a gentle person but in the popish religion too, too obstinate." In 1580 he was removed to Wisbeach Castle, and there exercised such an influence of charity and peace among his fellow-prisoners that was remembered when, in after years, the notorious Wisbeach Stirs broke out under the Jesuit Weston. Even here Feckenham found a means of doing public good; at his own cost he repaired the road and set up a market cross in the town. After twenty-four years of suffering for his conscience he died in prison and was buried in an unknown grave in the parish church at Wisbeach on the 16th of October 1584.

The fullest account of Feckenham is to be found in E. Taunton's *English Black Monks of St Benedict* (London, 1897), vol. i. pp. 160-222. (E. Tn.)

FEDCHENKO, ALEXIS PAVLOVICH (1844–1873), Russian naturalist and traveller, well known for his explorations in central Asia, was born at Irkutsk, in Siberia, on the 7th of February 1844; and, after attending the gymnasium of his native town, proceeded to the university of Moscow, for the study more especially of zoology and geology. In 1868 he travelled through Turkestan, the district of the lower Syr-Darya and Samarkand; and shortly after his return he set out for Khokand, where he visited a large portion of territory till then unknown. Soon after his return to Europe he perished on Mont Blanc while engaged in an exploring tour in Switzerland, on the 15th of September 1873.

Accounts of the explorations and discoveries of Fedchenko have been published by the Russian government,—his *Journeys in Turkestan* in 1874, *In the Khanat of Khokand* in 1875, and *Botanical Discoveries* in 1876. See Petermann's *Mittheilungen* (1872–1874).

FEDERAL GOVERNMENT (Lat. *foedus*, a league), a form of government of which the essential principle is that there is a union of two or more states under one central body for certain permanent common objects. In the most perfect form of federation the states agree to delegate to a supreme federal government certain powers or functions inherent in themselves in their sovereign or separate capacity, and the federal government, in turn, in the exercise of those specific powers acts directly, not only on the communities making up the federation, but on each individual citizen. So far as concerns the residue of powers unallotted to the central or federal authority, the separate states retain unimpaired their individual sovereignty, and the citizens of a federation consequently owe a double allegiance, one to the state, and the other to the federal government. They live under two sets of laws, the laws of the state and the laws of the federal government (J. Bryce, *Studies in History and Jurisprudence*, ii. 490). The word "confederation," as distinct from "federation" has been sometimes, though not universally, used to distinguish from such a federal state (*Bundesstaat*) a mere union of states (*Staatenbund*) for mutual aid, and the promotion of interests common to all (see Confederation).

The history of federal government practically begins with Greece. This, however, is due to the fact that the Greek federations are the only ones of which we have any detailed information. The obvious importance, especially to scattered villages or tribes, of systematic joint action in the face of a common danger makes it reasonable to infer that federation in its elementary forms was a widespread device. This view is strengthened by what we can gather of the conditions obtaining in such districts as Aetolia, Acarnania and Samnium, as in modern times among primitive peoples and tribes. The relatively detailed information which we possess concerning the federal governments of Greece makes it necessary to pay special attention to them.

In ancient Greece the most striking tendency of political development was the maintenance of separate city states, each striving for absolute autonomy, though all spoke practically the same language and shared to some extent in the same traditions, interests and dangers. This centrifugal tendency is most marked in the cases of the more important states, Athens, Sparta, Argos, Corinth, but Greek history is full of examples of small states deliberately sacrificing what must have been obvious commercial advantage for the sake of a precarious autonomy. Such examples as existed of even semi-federal union were very loose in structure, and the selfishness of the component units was the predominant feature. Thus the Spartan hegemony in the Peloponnese was not really a federation except in the broadest sense. The states did, it is true, meet occasionally for discussion, but their relation, which had no real existence save in cases of immediate common danger, was really that between a paramount leader and unwilling and suspicious allies. The Athenian empire again was a thinly disguised autocracy. The synod (see Delian League) of the "allies" soon degenerated into a mere form; of comprehensive united policy there was none, at all events after the League had achieved its original purpose of expelling the Persians from Europe.

None the less it is possible, even in the early days of political development in Greece, to find some traces of a tendency towards united action. Thus the unions of individual villages, known as synoecisms, such as took place in Attica and Elis in early times were partly of a federal character: they resulted in the establishment of a common administration, and no doubt in some degree of commercial and military unity. On the other hand, it is likely that these unions lacked the characteristic of federation in that the units could hardly be described as having any sovereign power: at the most they had some municipal autonomy as in the case of the Cleisthenic demes. The union was rather national than federal. Again the Amphictyonic unions had one of the characteristic elements of federation, namely that they were free sovereign states combining for a particular purpose with an elaborate system of representation (see AMPHICTYONY). But these unions, at all events in historic times, were mainly concerned with religion, and the authority of the councils did not seriously affect the autonomy of the individual states.

Thus among the city-states as well as among scattered villages the principle of cohesion was not unknown. On the other hand the golden mean between an easily dissoluble relationship, more like an alliance than a federation, and a national system resulting from synoecism was practically never attained in early Greek history. There are, however, examples in Greece proper, and one, Lycia in Asia Minor, of real federal unions. The chief Greek federations were those of Thessaly, Boeotia, Acarnania, Olynthus, Arcadia, Aetolia, Achaea, the most important as well as the most complete in respect of organization being the Aetolian League and the Achaean League.

1. The Thessalian League originated in the deliberate choice by village aristocracies of a single monarch who belonged from time to time to several of the so-called Heracleid families. Soon after the Persian War this monarchy (dynasty of the Aleuadae, Herod. v. 63 and vii. 6) disappeared, and in 424 we find Athens in alliance with a sort of democratic federal council representing *τὸ κοινὸν Θετταλῶν* (cf. Thuc. i. 102, ii. 22, iv. 78), and probably composed of delegates from the towns. The local feudal nobles, however, seem to have put an end to this government by council, and a dictator (*tagus*) was appointed, with authority over the whole military force of the federation. Three such officers, Lycophron, Jason and Alexander, all of Pherae, endeavoured vainly to administer the collective affairs of the federation, the last by means of a revived republican council. The final failure of this scheme coincided with the disappearance of Thessaly as a sovereign state (see THESSALY).

2. The form and the history of the Boeotian federation are treated fully under Boeotia (*q.v.*). It may probably have originated in religious associations, but the guiding power throughout was the imperial policy of Thebes, especially during its short-lived supremacy after 379 B.C.

3. The federation of Acarnania is of peculiar interest as being formed by scattered villages or tribes, without settled, still less fortified, habitation. In the early part of the 4th century a *κοινὸν τῶν Ἀκαρνάνων* met at Stratus (Xen. *Hell.* iv. 6. 4). Late in the same century towns began to form, without, however, disturbing the federation, which existed as late as the 2nd century B.C., governed by a representative council (*βουλά*), and a common assembly (*κοινόν*) at which any citizen might be present.

4. The foundation of the Olynthian federation was due to the need of protection against the northern invaders (see OLYNTHUS). It was in many respects based on liberal principles, but Olynthus did not hesitate to exercise force against recalcitrants such as Acanthus.

5. The 4th century Arcadian league, which was no doubt a revival of an older federation, was the result of the struggle for supremacy between Thebes and Sparta. The defeat of Sparta at Leuctra removed the pressure which had kept separate the Arcadian tribes, and *τὸ κοινὸν τῶν Ἀρκάδων* was established in the new city, Megalopolis (*q.v.*, also ARCADIA).

6 and 7. The Aetolian and Achaean leagues (see AETOLIA, and ACHAEAN LEAGUE) were in all respects more important than the preceding and constitute a new epoch in European politics. Both belong to a period in Greek history when the great city states had exhausted themselves in the futile struggle against Macedon and Rome, and both represent a conscious popular determination in the direction of systematic government. This characteristic is curious in the Aetolian tribes which were famous in all time for habitual brigandage; there was, however, among them the strong link of a racial feeling. The governing council (*τὸ κοινὸν τῶν Αἰτωλῶν*) was the permanent representative body; there was also a popular assembly (*παναιτωλικόν*), partly of a primary, partly of a representative kind, any one being free to attend, but each state having only one official representative and one vote. Of all the federal governments of Greece, this league was the most certainly democratic in constitution. There was a complete system of federal officers, at the head of whom was a Strategus entrusted with powers both military and civil. This officer was annually elected, and, though the chief executive authority, was strictly limited in the federal deliberations to presidential functions (cf. Livy xxxv. 25, "ne praetor, quum de bello consuluisset, ipse sententiam diceret"). The Achaean League was likewise highly organized; joint action was strictly limited, and the individual cities had sovereign power over internal affairs. There were federal officers, all the military forces of the cities were controlled by the league, and federal finance was quite separate from city finance.

8. Of the Lycian federation, its origin and duration, practically nothing is known. We know of it in 188–168 B.C. as dependent on Rhodes, and, from 168 till the time when the emperor Claudius absorbed it in the provincial system, as an independent state under Roman protection. The federation was a remarkable example of a typical Hellenic development among a non-Hellenic people. Strabo (p. 665) informs us that the federation, composed of twenty-three cities, was governed by a council (*κοινὸν συνέδριον*) which assembled from time to time at that city which was most convenient for the purpose in hand. The cities were represented according to size by one, two or three delegates, and bore proportionate shares in financial responsibility. The Lycian league was, therefore, in this respect rather national than federal.

Of ancient federal government outside Greece we know very little. The history of Italy supplies a few examples, of which the chief is perhaps the league of the cities of Latium (*q.v.*; see also ETRURIA).

See E. A. Freeman, *Federal Government in Greece and Rome* (2nd ed., 1893, J. B. Bury), and works quoted in the special articles.

Among the later European confederations the Swiss republic is one of the most interesting. As now constituted it consists of twenty-two sovereign states or cantons. The government is vested in two legislative chambers, a senate or council of state (*Ständerat*), and a national council (*Nationalrat*), constituting unitedly the federal assembly. The executive council (*Bundesrat*) of seven members elects the president and vice-president for a term of three years (see SWITZERLAND: *Government*). Before the French Revolution the German empire was a complex confederation, with the states divided into electoral colleges, consisting—(1) of the ecclesiastical electors and of the secular electors, including the king of Bohemia; (2) of the spiritual and temporal princes of the empire next in rank to the electors; and (3) of the free imperial cities. The emperor was elected by the first college alone. This imposing confederation came to an end by the conquests of Napoleon; and the Confederation of the Rhine was established in 1806 with the French emperor as protector. But in 1815 the Germanic confederation (*Deutscher Bund*) was established by the congress of Vienna, which in its turn has been displaced by the present German empire. This, in its new organization, conferred on Germany the long-coveted unity and coherence the lack of which had been a source of weakness. The constitution dates, in its latest form, from the treaties entered into at Versailles in 1871. A federation was then organized with the king of Prussia as president, under the hereditary title of German emperor. Delegates of the various federated governments form the Bundesrath; the Reichstag, or popular assembly, is directly chosen by the people by universal suffrage; and the two assemblies constitute the federal parliament. This body has power to legislate for the whole empire in reference to all matters connected with the army, navy, postal service, customs, coinage, &c., all political laws affecting citizens, and all general questions of commerce, navigation, passports, &c. The emperor represents the federation in all international relations, with the chancellor as first minister of the empire, and has power, with consent of the Bundesrath, to declare war in name of the empire.

The United States of America more nearly resembles the Swiss confederacy, though retaining marks of its English origin. The original thirteen states were colonies wholly independent of each other. By the Articles of Confederation and Perpetual Union adopted by the Continental Congress in 1777, and in effect in 1781–1789, the states bound themselves in a league of common defence. By the written Constitution, drafted in 1787 and in operation since 1789, a stronger and more centralized union was established—in theory a federal republic formed by the voluntary combination of sovereign states. A common citizenship was recognized for the whole union; but the federal government was to exercise only such powers as were expressly delegated to it (Amendment of 1791). The powers of the central government are entrusted to three distinct authorities—executive, legislative and judicial. The president, elected for a term of four years by electors chosen for that purpose by each state, is the executive head of the republic. The vice-president, *ex officio* president of the Senate, assumes the presidency in case of resignation or death. Legislative power is vested in a Congress, consisting of two Houses: a Senate, composed of two members elected by each state for a term of six years; and a House of Representatives, consisting of representatives in numbers proportionate to the population of each state, holding their seats for two years. The supreme judicial authority is vested in a Supreme Court, which consists of a chief justice and eight associate justices, all appointed for life by the president, subject to confirmation by the Senate.

The extension of responsible constitutional government by Great Britain to her chief colonies, under a governor or viceregal representative of the crown, has been followed in British North America by the union of the Canadian, maritime and Pacific provinces under a federal government—with a senate, the members of which are nominated by the crown, and a house of commons elected by the different provinces according to their relative population. The governor-general is appointed by the crown for a term of five years, and represents the sovereign in all matters of federal government. The lieutenant-governors of the provinces are nominated by him; and all local legislation is carried on by the provincial parliaments. The remarkable federation of the Dominion of Canada which was thus originated presented the unique feature of a federal union of provinces practically exercising sovereign rights in relation to all local self-government, and sustaining a constitutional autonomy, while cherishing the colonial relationship to Great Britain.

The Commonwealth of Australia (*q.v.*), proclaimed in 1901, is another interesting example of self-governing states federating into a united whole. There is, however, a striking difference to be observed in the powers of the federal governments of Canada and Australia. The federal parliament of Canada has jurisdiction over all matters not specially assigned to the local legislatures, while the federal parliament of Australia has only such jurisdiction as is expressly vested in it or is not expressly withdrawn from the local legislatures. This jurisdiction is undoubtedly extensive, comprising among others, power to legislate concerning trade and industry, criminal law, taxation, quarantine, marriage and divorce, weights and measures, legal tender, copyrights and patents, and naturalization and aliens. There was also an early attempt to federate the South African colonies, and an act was passed for that purpose (South African Act 1877), but it expired on the 18th of August 1882, without having been brought into effect by the sovereign in council; in 1908, however, the Closer Union movement (see South Africa) ripened, and in 1909 a federating Act was successfully passed.

See also Bluntschli, *The Theory of the State*; W. Wilson, *The State*; Wheaton, *International Law*.

FEDERALIST PARTY, in American politics, the party that organized the national government of the United States under the constitution of 1787. It may be regarded as, in various important respects, the lineal predecessor of the American Whig and Republican parties. The name *Federalists* (see Anti-Federalists) was first given to those who championed the adoption of the Constitution. They brought to the support of that instrument "the areas of intercourse and wealth" (Libby), the influence of the commercial towns, the greater planters, the army officers, creditors and property-holders generally,—in short, of interests that had felt the evils of the weak government of the Confederation,—and also of some few true nationalists (few, because there was as yet no general national feeling), actuated by political principles of centralization independently of motives of expediency and self-interest. Most of the Federalists of 1787–1788 became members of the later Federalist Party.

The Federalist Party, which may be regarded as definitely organized practically from 1791, was led, leaving Washington aside, by Alexander Hamilton (*q.v.*) and John Adams. A nationalization of the new central government to the full extent warranted by a broad construction of the powers granted to it by the constitution, and a correspondingly strict construction of the powers reserved to the states and the citizens, were the basic principles of Hamilton's policy. The friends of individual liberty and local government naturally found in the assumption by the central government of even the minimum of its granted powers constant stimulus to their fears (see Democratic Party); while the financial measures of Hamilton—whose wish for extreme centralization was nowise satisfied by the government actually created in 1787—were calculated to force an immediate and firm assumption by that government, to the limit, of every power it could be held to possess. To the Republicans (Democratic Republicans) they seemed intended to cause a usurpation of powers ungranted. Hence these measures became the issues on which the first American parties were formed. Their effect was supplemented by the division into French and British sympathizers; the Republicans approving the aims and condoning the excesses of the French Revolution, the Federalists siding with British reaction against French democracy. The Federalists controlled the government until 1801. They, having the great opportunity of initiative, organized it in all its branches, giving it an administrative machinery that in the main endures to-day; established the doctrine of national neutrality toward European conflicts (although the variance of Federalist and Republican opinion on this point was largely factitious); and fixed the practice of a liberal construction of the Constitution,[1]—not only by Congress, but above all by the United States Supreme Court, which, under the lead of John Marshall (who had been appointed chief-justice by Pres. John Adams), impressed enduringly on the national system large portions of the Federalist doctrine. These are the great claims of the party to memory. After 1801 it never regained power. In attempts to do so, alike in national and in state politics, it impaired its morale by internal dissension, by intrigues, and by inconsistent factious opposition to Democratic measures on grounds of ultra-strict construction. It took up, too, the Democratic weapon of states' rights, and in New England carried sectionalism dangerously near secession in 1808, and in 1812–1814, during the movement, in opposition to the war of 1812, which culminated in the Hartford Convention (see Hartford). It lost, more and more, its influence and usefulness, and by 1817 was practically dead as a national party, although in Massachusetts it lingered in power until 1823. It is sometimes said that Federalism died because the Republicans took over its principles of nationality. Rather it fell because its great leaders, John Adams and Alexander Hamilton, became bitter enemies; because neither was even distantly comparable to Jefferson as a party leader; because the party could not hold the support of its original commercial, manufacturing and general business elements; because the party opposed sectionalism to a growing nationalism on the issues that ended in the war of 1812; and, above all, because the principles of the party's leaders (*e.g.* of Hamilton) were out of harmony, in various respects, with American ideals. Their conservatism became increasingly a reactionary fear of democracy; indeed, it is not a strained construction of the times to regard the entire Federalist period from the American point of view as reactionary—a reaction against the doctrines of natural rights, individualism, and states' rights, and the financial looseness of the period of the War of Independence and the succeeding years of the Confederation. The Federalists were charged by the Republicans with being aristocrats and monarchists, and it is certain that their leaders

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[1] Even the Democratic party has generally been liberal; although less so in theory (hardly less so in practice) than its opponents.

(who were really a very remarkable body of men) distrusted democratic government; that their Sedition Law was outrageous in itself, and (as well as the Alien Law) bad as a party measure; that in disputes with Great Britain they were true English Tories when contrasted with the friendly attitude toward America held by many English Liberals; and that they persisted in New England as a pro-British, aristocratic social-cult long after they lost effective political influence. In short, the country was already thoroughly democratic in spirit, while Federalism stood for obsolescent social ideas and was infected with political "Toryism" fatally against the times.

Besides the standard general histories see O. G. Libby, *Geographical Distribution of the Vote of the Thirteen States on the Federal Constitution, 1787–1788* (Madison, Wis., 1894); the *Memoirs* of Oliver Wolcott (ed. by Gibbs); C. D. Hazen, *Contemporary American Opinion of the French Revolution* ("J.H.U. Studies," Baltimore, 1897); Henry Adams, *Documents relating to New England Federalism, 1800–1815* (Boston, 1878); A. E. Morse, *The Federalist Party in Massachusetts* (Princeton, N.J., 1909); and the biographies and writings of George Cabot, Fisher Ames, Gouverneur Morris, John Jay, Rufus King, Timothy Pickering, Theodore Sedgwick, C. C. Pinckney and J. A. Bayard.

FEDERICI, CAMILLO (1749–1802), Italian dramatist and actor, was born at Garessio, a small town in Piedmont, on the 9th of April 1749. His real name was Giovanni Battista Viassolo, and that by which he is now known and which he transmitted to his children was taken from the title of one of his first pieces, *Camillo e Federico*. He was educated at Turin, and showed at an early age a great fondness for literature and especially for the theatre. The praises bestowed on his early attempts determined his choice of a career, and he obtained engagements with several companies both as writer and actor. He made a happy marriage in 1777, and soon after left the stage and devoted himself entirely to composition. He settled at Padua, and the reputation of his numerous comedies rapidly spread in Italy, and for a time seemed to eclipse that of his predecessors. Most of his pieces were of the melodramatic class, and he too often resorted to the same means of exciting interest and curiosity. He caught, however, something of the new spirit which was manifesting itself in German dramatic literature in the works of Schiller, Iffland and Kotzebue, and the moral tone of his plays is generally healthy. Fortune did not smile upon him; but he found a helpful friend in a wealthy merchant of Padua, Francis Barisan, for whose private theatre he wrote many pieces. He was attacked in 1791 with a dangerous malady which disabled him for several years; and he had the misfortune to see his works, in the absence of any copyright law, published by others without his permission. At length, in 1802, he undertook to prepare a collected edition; but of this four volumes only were completed when he was again attacked with illness, and died at Padua (December 23).

The publication of his works was completed in 14 volumes in 1816. Another edition in 26 volumes was published at Florence in 1826–1827. A biographical memoir of Federici by Neymar appeared at Venice in 1838.

FEE, an estate in land held of a superior lord on condition of the performance of homage or service (see FEUDALISM). In English law "fee" signifies an estate of inheritance (*i.e.* an estate descendable to the heirs of the grantee so long as there are any in existence) as opposed to an estate for life. It is divisible into three species: (1) fee simple; (2) conditional fee; (3) fee tail. (See ESTATE.) A fee farm rent is the rent reserved on granting a fee farm, *i.e.* land in fee simple, to be held by the tenant and his heirs at a yearly rent. It is generally at least one-fourth of the value of the land at the time of its reservation. (See RENT.)

The word "fee" has also the sense of remuneration for services, especially the *honorarium* paid to a doctor, lawyer or member of any other profession. It is also used of a fixed sum paid for the right to enter for an examination, or on admission to membership of a university or other society. This sense of the word is taken by the *New English Dictionary* to be due to a use of "fee" in its feudal sense, and to represent a sum paid to the holder of an office "in fee."

The etymology of the Med. Lat. *feudum, feodum* or *feum*, of its French equivalent *fief*, and English "fee," in Scots law "feu" (*q.v.*), is extremely obscure. (See the *New English Dictionary, s.v.* "Fee.") There is a common Teutonic word represented in Old English as *feoh* or *féo*, in Old High German as *fehu*, meaning property in the shape of cattle (cf. modern Ger. *Vieh*, Dutch *vee*). The old Aryan *pêku* gives Sanskrit *paçu*, Lat. *pecus*, cattle, whence *pecunia*, money. The O. Eng. *feoh*, in the sense of money, possibly survives in "fee," honorarium, though this is not the view of the *New English Dictionary*. The common explanation of the Med. Lat. *feudum* or *feodum*, of which Ducange (*Glossarium, s.v.*) gives an example from a constitution of the emperor Charles the Fat of the year 884, is that it is formed from the Teutonic *fehu*, property, and *ôd*, wealth (cf. ALLODIUM and UDAL). This would apparently restrict the original meaning to movable property, while the early applications of *feudum* are to the enjoyment of something granted in return for service (*beneficium*). Another theory takes the origin to be *fehu* alone, in a particular sense of wages, payment for services. This leaves the *d-* of *feudum* unexplained. Some have taken the origin to be a verbal form *feudare=feum dare*. Another theory finds the source in the O. High Ger. *fehôn*, to eat, feed upon, "take for one's enjoyment."

FEHLING, HERMANN VON (1812–1885), German chemist, was born at Lübeck on the 9th of June 1812. With the intention of taking up pharmacy he entered Heidelberg University about 1835, and after graduating went to Giessen as *prêparateur* to Liebig, with whom he elucidated the composition of paraldehyde and metaldehyde. In 1839 on Liebig's recommendation he was appointed to the chair of chemistry in the polytechnic at Stuttgart, and held it till within three years of his death, which happened at Stuttgart on the 1st of July 1885. His earlier work included an investigation of succinic acid, and the preparation of phenyl cyanide (benzonitrile), the simplest nitrile of the aromatic series; but later his time was mainly occupied with questions of technology and public health rather than with pure chemistry. Among the analytical methods worked up by him the best known is that for the estimation of sugars by "Fehling's solution," which consists of a solution of cupric sulphate mixed with alkali and potassium-sodium tartrate (Rochelle salt). He was a contributor to the *Handwörterbuch* of Liebig, Wöhler and Poggendorff, and to the Graham-Otto *Textbook of Chemistry*, and for many years was a member of the committee of revision of the *Pharmacopoeia Germanica*.

FEHMARN, an island of Germany, belonging to the Prussian province of Schleswig-Holstein, in the Baltic, separated from the north-east corner of Holstein by a strait known as the Fehmarn-Sund, less than a quarter of a mile in breadth. It is a gently undulating tract of country, about 120 sq. m. in area, bare of forest but containing excellent pasture-land, and rears cattle in considerable numbers. Pop. 10,000.

FEHMIC COURTS (Ger. *Femgerichte*, or *Vehmgerichte*, of disputed origin, but probably, according to J. Grimm, from O. High Ger. *feme* or *feime*, a court of justice), certain tribunals which, during the middle ages, exercised a powerful and sometimes sinister jurisdiction in Germany, and more especially in Westphalia. Their origin is uncertain, but is traceable to the time of Charlemagne and in all probability to the old Teutonic free courts. They were, indeed, also known as free courts (*Freigerichte*), a name due to the fact that all free-born men were eligible for membership and also to the fact that they claimed certain exceptional liberties. Their jurisdiction they owed to the emperor, from whom they received the power of life and death (*Blutbann*) which they exercised in his name. The sessions were often held in secret, whence the names of secret court (*heimliches Gericht, Stillgericht*, &c.); and these the uninitiated were forbidden to attend, on pain of death, which led to the designation forbidden courts (*verbotene Gerichte*). Legend and romance have combined to exaggerate the sinister reputation of the Fehmic courts; but modern historical research has largely discounted this, proving that they never employed torture, that their sittings were only sometimes secret, and that their meeting-places were always well known. They were, in fact, a survival of an ancient and venerable German institution; and if, during a certain period, they exercised something like a reign of terror over a great part of Germany, the cause of this lay in the sickness of the times, which called for some powerful organization to combat the growing feudal anarchy. Such an organization the Westphalian free courts, with their discipline of terror and elaborate system of secret service, were well calculated to supply. Everywhere else the power of life and death, originally reserved to the emperor alone, had been usurped by the territorial nobles; only in Westphalia, called "the Red Earth" because here the imperial blood-ban was still valid, were capital sentences passed and executed by the Fehmic courts in the emperor's name alone.

The system, though ancient, began to become of importance only after the division of the duchy of Saxony on the fall of Henry the Lion, when the archbishop of Cologne, duke of Westphalia from 1180 onwards, placed himself as representative of the emperor at the head of the Fehme. The organization now rapidly spread. Every free man, born in lawful wedlock, and neither excommunicate nor outlaw, was eligible for membership. Princes and nobles were initiated; and in 1429 even the emperor Sigismund himself became "a true and proper *Freischöffe* of the Holy Roman Empire." By the middle of the 14th century these *Freischöffen* (Latin *scabini*), sworn associates of the Fehme, were scattered in thousands throughout the length and breadth of Germany, known to each other by secret signs and pass-words, and all of them pledged to serve the summons of the secret courts and to execute their judgment.

The organization of the Fehme was elaborate. The head of each centre of jurisdiction (*Freistuhl*), often a secular or spiritual prince, sometimes a civic community, was known as the *Stuhlherr*, the archbishop of Cologne being, as stated above, supreme over all (*Oberststuhlherr*). The actual president of the court was the *Freigraf* (free count) chosen for life by the *Stuhlherr* from among the *Freischöffen*, who formed the great body of the initiated. Of these the lowest rank were the *Fronboten* or *Freifronen*, charged with the maintenance of order in the courts and the duty of carrying out the commands of the *Freigraf*. The immense development of the Fehme is explained by the privileges of the *Freischöffen*; for they were subject to no jurisdiction but those of the Westphalian courts, whether as accused or accuser they had access to the secret sessions, and they shared in the discussions of the general chapter as to the policy of the society. At their initiation these swore to support the Fehme with all their powers, to guard its secrets, and to bring before its tribunal anything within its competence that they might discover. They were then initiated into the secret signs by which members recognized each other, and were presented with a rope and with a knife on which were engraved the mystic letters S.S.G.G., supposed to mean *Strick*, *Stein*, *Gras*, *Grün* (rope, stone, grass, green).

The procedure of the Fehmic courts was practically that of the ancient German courts generally. The place of session, known as the *Freistuhl* (free seat), was usually a hillock, or some other well-known and accessible spot. The *Freigraf* and *Schöffen* occupied the bench, before which a table, with a sword and rope upon it, was placed. The court was held by day and, unless the session was declared secret, all freemen, whether initiated or not, were admitted. The accusation was in the old German form; but only a *Freischöffe* could act as accuser. If the offence came under the competence of the court, *i.e.* was punishable by death, a summons to the accused was issued under the seal of the *Freigraf*. This was not usually served on him personally, but was nailed to his door, or to some convenient place where he was certain to pass. Six weeks and three days' grace were allowed, according to the old Saxon law, and the summons was thrice repeated. If the accused appeared, the accuser stated the case, and the investigation proceeded by the examination of witnesses as in an ordinary court of law. The judgment was put into execution on the spot if that was possible. The secret court, from whose procedure the whole institution has acquired its evil reputation, was closed to all but the initiated, although these were so numerous as to secure quasi-publicity; any one not a member on being discovered was instantly put to death, and the members present were bound under the same penalty not to disclose what took place. Crimes of a serious nature, and especially those that were deemed unfit for ordinary judicial investigation—such as heresy and witchcraft—fell within its jurisdiction, as also did appeals by persons condemned in the open courts, and likewise the cases before those tribunals in which the accused had not appeared. The accused if a member could clear himself by his own oath, unless he had revealed the secrets of the Fehme. If he were one of the uninitiated it was necessary for him to bring forward witnesses to his innocence from among the initiated, whose number varied according to the number on the side of the accuser, but twenty-one in favour of innocence necessarily secured an acquittal. The only punishment which the secret court could inflict was death. If the accused appeared, the sentence was carried into execution at once; if he did not appear, it was quickly made known to the whole body, and the *Freischöffe* who was the first to meet the condemned was bound to put him to death. This was usually done by hanging, the nearest tree serving for gallows. A knife with the cabalistic letters was left beside the corpse to show that the deed was not a murder.

That an organization of this character should have outlived its usefulness and issued in intolerable abuses was inevitable. With the growing power of the territorial sovereigns and the gradual improvement of the ordinary process of justice, the functions of the Fehmic courts were superseded. By the action of the emperor Maximilian and of other German princes they were, in the 16th century, once more restricted to Westphalia, and here, too, they were brought under the jurisdiction of the ordinary courts, and finally confined to mere police duties. With these functions, however, but with the old forms long since robbed of their impressiveness, they survived into the 19th century. They were finally abolished by order of Jerome Bonaparte, king of Westphalia, in 1811. The last *Freigraf* died in 1835.

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FEHRBELLIN, a town of Germany, in the kingdom of Prussia, on the Rhine, 40 m. N.W. from Berlin on the railway to Neu-Ruppin. Pop. (1905) 1602. It has a Protestant and a Roman Catholic church and some small industries, among them that of wooden shoes. Fehrbellin is memorable in history as the scene of the famous victory gained, on the 18th of June 1675, by the great elector, Frederick William of Prussia, over the Swedes under Field-Marshal Wrangel. A monument was erected in 1879 on the field of battle, near the village of Hakenberg, to commemorate this great feat of arms.

See A. von Witzleben and P. Hassel, *Zum 200-jährigen Gedenktag von Fehrbellin* (Berlin, 1875); G. Sello, "Fehrbellin," in *Deutsche Zeitschrift für Geschichtswissenschaften*, vii.; M. Jähns, "Der Grosse Kurfürst bei Fehrbellin, &c.," in *Hohenzollern Jahrbuch*, i.

FEIJÓO Y MONTENEGRO, BENITO JERÓNIMO (1676–1764), Spanish monk and scholar was born at Santa María de Melias, near Orense, on the 8th of October 1676. At the age of twelve he entered the Benedictine order, devoted himself to study, and waged war against the superstition and ignorance of his countrymen in the *Teatro crítico* (1726–1739) and the *Cartas eruditas* (1742–1760). These exposures of a retrograde system called forth embittered protests from narrow-minded patriots like Salvador José Maner, and others; but the opposition was futile, and Feijóo's services to the cause of knowledge were universally recognized long before his death, which took place at Oviedo on the 26th of September 1764. He was not a great genius, nor a writer of transcendent merit; his name is connected with no important discovery, and his style is undistinguished. But he uprooted many popular errors, awakened an interest in scientific methods, and is justly regarded as the initiator of educational reform in Spain.

FEITH, RHIJNVIS (1753–1824), Dutch poet, was born of an aristocratic family at Zwolle, the capital of the province Overijssel, on the 7th of February 1753. He was educated at Harderwijk and at the university of Leiden, where he took his degree in 1770. In 1772 he settled at his birthplace, and married. In 1780, in his twenty-seventh year, he became burgomaster of Zwolle. He built a luxurious villa, which he named Boschwijk, in the outskirts of the town, and there he lived in the greatest comfort. His first important production was *Julia*, in 1783, a novel written in emulation of *Werther*, and steeped in *Weltschmerz* and despair. This was followed by the tragedy of *Thirsa* (1784); *Ferdinand and Constantia* (1785), another *Werther* novel; and *The Patriots* (1784), a tragedy. Bilderdijk and other writers attacked his morbid melancholy, and Johannes Kinker (1764–1845) parodied his novels, but his vogue continued. In 1791 he published a tragedy of *Lady Jane Grey*; in 1792 a didactic poem, *The Grave*, in four cantos; in 1793 *Inez de Castro*; in 1796 to 1814 five volumes of *Odes and Miscellaneous Poems*; and in 1802 *Old Age*, in six cantos. He died at Zwolle on the 8th of February 1824.

His works were collected (Rotterdam, 11 vols.) in 1824, with a biographical notice by N. G. van Kampen.

FEJÉR, GYORGY (1766–1851), Hungarian author, was born on the 23rd of April 1766, at Keszthely, in the county of Zala. He studied philosophy at Pest, and theology at Pressburg; eventually, in 1808, he obtained a theological professorship at Pest University. Ten years later (1818) he became chief director of the educational circle of Raab, and in 1824 was appointed librarian to the university of Pest. Fejér's works, which are nearly all written either in Latin or Hungarian, exceed one hundred and eighty in number. His most important work, *Codex diplomaticus Hungariae ecclesiasticus ac civilis*, published from 1829 to 1844, in eleven so-called tomes, really exceeds forty volumes. It consists of old documents and charters from A.D. 104 to the end of 1439, and forms an extraordinary monument of patient industry. This work and many others relating to Hungarian national history have placed Fejér in the foremost rank of Hungarian historians. He died on the 2nd of July 1851. His latest works were *A Kunok eredete* (*The Origin of the Huns*), and *A politikai forradalmak okai* (*The Causes of Political Revolutions*), both published in 1850. The latter production, on account of its liberal tendencies, was suppressed by the Austrian government.

See *Magyar Irók: Életrajz-gyüjtemény* (Pest, 1856), and *A magyar nemzeti irodalomtörténet vázlata* (Pest, 1861).

FELANITX, or **Felaniche**, a town of Spain, in the south-east of the island of Majorca, Balearic Islands; about 5 m. inland from its harbour, Puerto Colon. Pop. (1900) 11,294. A range of low hills intervenes between Felanitx and the Mediterranean; upon one summit, the Puig de San Sebastian, stands a Moorish castle with a remarkable series of subterranean vaults. From the 3rd century B.C., and possibly for a longer period, earthenware water-coolers and other pottery have been manufactured in the town, and many of the vessels produced are noteworthy for their beauty of form and antiquity of design. There is a thriving trade in wine, fruit, wheat, cattle, brandy, chalk and soap.

FELDKIRCH, a small town in the Austrian province of the Vorarlberg, some 20 m. S. of the S. end of the Lake of Constance. It is situated in a green hollow, on the Ill river, between the two narrow rocky gorges through which it flows out into the broad valley of the Rhine. Hence, though containing only about 4000 inhabitants (German-speaking and Romanist), the town is of great military importance, since it commands the entrance into Tirol from the west, over the Arlberg Pass (5912 ft.), and has been the scene of many conflicts, the last in 1799, when the French, under Oudinot and Masséna, were driven back by the Austrians under Hotze and Jellachich. It is a picturesque little town, overshadowed by the old castle of Schattenburg (now a poor-house), built about 1200 by the count of Montfort, whose descendant in 1375 sold it to the Habsburgs. The town contains many administrative offices, and is the residence of a suffragan bishop, who acts as vicar-general of the diocesan, the bishop of Brixen. Among the principal buildings are the parish church, dating from 1487, and possessing a "Descent from the Cross" (1521), which has been attributed to Holbein, the great Jesuit educational establishment called "Stella Matutina," and a Capuchin convent and church. There is a considerable amount of transit trade at Feldkirch, which by rail is 11 m. from Buchs (Switzerland), through the principality of Liechtenstein, 24 m. from Bregenz, and 99½ m. from Innsbruck by tunnel beneath the Arlberg Pass. The town also possesses numerous industrial establishments, such as factories for cotton-spinning, weaving, bell-founding, dyeing, &c. (W. A. B. C.)

FÉLIBIEN, ANDRÉ (1619–1695), sieur des Avaux et de Javercy, French architect and historiographer, was born at Chartres in May 1619. At the age of fourteen he went to Paris to continue his studies; and in 1647 he was sent to Rome in the capacity of secretary of embassy to the Marquis de Marueil. His residence at Rome he turned to good account by diligent study of its ancient monuments, by examination of the literary treasures of its libraries, and by cultivating the acquaintance of men eminent in literature and in art, with whom he was brought into contact through his translation of Cardinal Barberini's *Life of Pius V*. Among his friends was Nicholas Poussin, whose counsels were of great value to him. On his return to France he married, and was ultimately induced, in the hope of employment and honours, to settle in Paris. Both Fouquet and Colbert in their turn recognized his abilities; and he was one of the first members (1663) of the Academy of Inscriptions. Three years later Colbert procured him the appointment of historiographer to the king. In 1671 he was named secretary to the newly-founded Academy of Architecture, and in 1673 keeper of the cabinet of antiques in the palace of Brion. To these offices was afterwards added by Louvois that of deputy controller-general of roads and bridges. Félibien found time in the midst of his official duties for study and research, and produced many literary works. Among these the best and the most generally known is the *Entretiens sur les vies et sur les ouvrages des plus excellents peintres anciens et modernes*, which appeared in successive livraisons, the first in 1666, and the fifth in 1688. It was republished with several additions at Amsterdam in 1706, and again at Trévoux in 1725. Félibien wrote also *Origine de la peinture* (1660), *Principes de l'architecture, de la sculpture, de la peinture*, &c. (1676–1690), and descriptions of Versailles, of La Trappe, and of the pictures and statues of the royal residences. Among other literary works, he edited the *Conférences* of the Academy of Painting, and translated the *Castle of the Soul* from the Spanish of St Theresa. His personal character commanded the highest esteem, agreeing with the motto which he adopted—*Bene facere et vera dicere*. He died in Paris on the 11th of June 1695.

His son, Jean François Félibien (*c.* 1658–1733), was also an architect who left a number of works on his subject; and a younger son, Michel Félibien (c. 1666–1719), was a Benedictine of Saint Germain-des-Prés whose fame rests on his *Histoire de l'abbaye royale de S. Denys en France*, and also his *L'Histoire de la ville de Paris* in 5 vols., a work indispensable to the student of Paris.

FELIX, the name of five popes.

Felix I., pope from January 269 until his death in January 274. He has been claimed as a martyr, and as such his name is given in the Roman calendar and elsewhere, but his title to this honour is by no means proved, and he has been probably confused with another bishop of the same name. He appears in connexion with the dispute in the church of Antioch between Paul of Samosata, who had been deprived of his bishopric by a council of bishops for heresy, and his successor Domnus. Paul refused to give way, and in 272 the emperor Aurelian was asked to decide between the rivals. He ordered the church building to be given to the bishop who was "recognized by the bishops of Italy and of the city of Rome" (Felix). See Eusebius, *Hist. Ecc.* vii. 30.

Felix II., antipope, was in 356 raised from the archdeaconate of Rome to the papal chair, when Liberius was banished by the emperor Constantius for refusing to subscribe the sentence of condemnation against Athanasius. His election was contrary to the wishes both of the clergy and of the people, and the consecration ceremony was performed by certain prelates belonging to the court. In 357 Constantius, at the urgent request of an influential deputation of Roman ladies, agreed to the release of Liberius on condition that he signed the semi-Arian creed. Constantius also issued an edict to the effect that the two bishops should rule conjointly, but Liberius, on his entrance into Rome in the following year, was received by all classes with so much enthusiasm that Felix found it necessary to retire at once from Rome. Regarding the remainder of his life little is known, and the accounts handed down are contradictory, but he appears to have spent the most of it in retirement at his estate near Porto. He died in 365.

Felix III., pope, was descended from one of the most influential families of Rome, and was a direct ancestor of Gregory the Great. He succeeded Simplicius in the papal chair on the 2nd of March 483. His first act was to repudiate the Henoticon, a deed of union, originating, it is supposed, with Acacius, patriarch of Constantinople, and published by the emperor Zeno with the view of allaying the strife between the Monophysites and their opponents in the Eastern church. He also addressed a letter of remonstrance to Acacius; but the latter proved refractory, and sentence of deposition was passed against him. As Acacius, however, had the support of the emperor, a schism arose between the Eastern and Western churches, which lasted for 34 years. Felix died in 492.

Felix IV., pope, a native of Beneventum, was, on the death of John in 526, raised to the papal chair by the emperor Theodoric in opposition to the wishes of the clergy and people. His election was followed by serious riots. To prevent a recrudescence of these, Felix, on his death-bed, thought it advisable to nominate his own successor. His choice fell upon the archdeacon Boniface (pope as Boniface II.). But this proceeding was contrary to all tradition and roused very serious opposition. Out of two old buildings adapted by him to Christian worship, Felix made the church of SS. Cosimo and Damiano, near the Via Sacra. He died in September 530.

Felix V., the name taken by Amadeus (1383–1451), duke of Savoy, when he was elected pope in opposition to Eugenius IV. in 1439. Amadeus was born at Chambéry on the 4th of December 1383, and succeeded his father, Amadeus VII., as count of Savoy in 1391. Having added largely to his patrimonial possessions he became very powerful, and in 1416 the German king Sigismund erected Savoy into a duchy; after this elevation Amadeus added Piedmont to his dominions. Then suddenly, in 1434, the duke retired to a hermitage at Ripaille, near Thonon, resigning his duchy to his son Louis (d. 1465), although he seems to have taken some part in its subsequent administration. It is said, but some historians doubt the story, that, instead of leading a life of asceticism, he spent his revenues in furthering his own luxury and enjoyment. In 1439, when Pope Eugenius IV. was deposed by the council of Basel, Amadeus, although not in orders, was chosen as his successor, and was crowned in the following year as Felix V. In the stormy conflict between the rival popes which followed, the German king, Frederick IV., after some hesitation sided with Eugenius, and having steadily lost ground Felix renounced his claim to the pontificate in 1449 in favour of Nicholas V., who had been elected on the death of Eugenius. He induced Nicholas, however, to appoint him as apostolic vicar-general in Savoy, Piedmont and other parts of his own dominions, and to make him a cardinal. Amadeus died at Geneva on the 7th of January 1451.

FELIX, a missionary bishop from Burgundy, sent into East Anglia by Honorius of Canterbury (630–631). Under King Sigebert his mission was successful, and he became first bishop of East Anglia, with a see at Dunwich, where he died and was buried, 647–648. It is noteworthy that the Irish monk Furseus preached in East Anglia at the same time, and Bede notices the admiration of Felix for Aidan.

See Bede, *Hist. Eccl.* (Plummer), ii. 15, iii. 18, 20, 25; *Saxon Chronicle* (Earle and Plummer), s.a. 636.

FELIX, of Urgella (fl. 8th century), Spanish bishop, the friend of Elipandus and the propagator of his views in the great Adoptian Controversy (see Adoptianism).

FELIX, of Valois (1127–1212), one of the founders of the monastic order of Trinitarians or Redemptionists, was born in the district of Valois, France, on the 19th of April 1127. In early manhood he became a hermit in the forest of Galeresse, where he remained till his sixty-first year, when his disciple Jean de Matha (1160–1213) suggested to him the idea of establishing an order of monks who should devote their lives to the redemption of Christian captives from the Saracens. They journeyed to Rome about the end of 1197, obtained the sanction of the pope, and on their return to France founded the monastery of Cerfroi in Picardy. Felix remained to govern and propagate the order, while Jean de Matha superintended the foreign journeys. A subordinate establishment was also founded by Felix in Paris near a chapel dedicated to St Mathurin, on which account his monks were also called St Mathurins. He died at Cerfroi on the 4th of November 1212, and was canonized.

FELIX, ANTONIUS, Roman procurator of Judaea (A.D. 52–60), in succession to Ventidius Cumanus. He was a freedman either of the emperor Claudius—according to which theory Josephus (*Antiq.* xx. 7) calls him Claudius Felix—or more probably of the empress Antonia. On entering his province he induced Drusilla, wife of Azizus of Homs (Emesa), to leave her husband and live with him as his wife. His cruelty and licentiousness, coupled with his accessibility to bribes, led to a great increase of crime in Judaea. To put down the Zealots he favoured an even more violent sect, the Sicarii ("Dagger-men"), by whose aid he contrived the murder of the high-priest Jonathan. The period of his rule was marked by internal feuds and disturbances, which he put down with severity. The apostle Paul, after being apprehended in Jerusalem, was sent to be judged before Felix at Caesarea, and kept in custody for two years (Acts xxiv.). On returning to Rome, Felix was accused of having taken advantage of a dispute between the Jews and Syrians of Caesarea to slay and plunder the inhabitants, but through the intercession of his brother, the freedman Pallas, who had great influence with the emperor Nero, he escaped unpunished.

See Tacitus, *Annals*, xx. 54, *Hist.* v. 9; Suetonius, *Claudius*, 28; E. Schürer, *History of the Jewish People* (1890–1891); article in Hastings' *Dict. of the Bible* (A. Robertson); commentaries on the Acts of the Apostles; Sir W. M. Ramsay, *St Paul the Traveller*; Carl v. Weizsäcker, *Apostolic Age* (Eng. trans., 1894); art. Jews.

FÉLIX, LIA (1830–), French actress, was the third sister and the pupil of the great Rachel. She had hardly been given any trial when, by chance, she was called on to create the leading woman's part in Lamartine's *Toussaint Louverture* at the Porte St Martin on the 6th of April 1850. The play did not make a hit, but the young actress was favourably noticed, and several important parts were immediately entrusted to her. She soon came to be recognized as one of the best comediennes in Paris. Rachel took Lia to America with her to play second parts, and on returning to Paris she played at several of the principal theatres, although her health compelled her to retire for several years. When she reappeared at the Gaîté in the title-rôle of Jules Barbier's *Jeanne d'Arc* she had an enormous success.

FELIXSTOWE, a seaside resort of Suffolk, England; fronting both to the North Sea and to the estuary of the Orwell, where there are piers. Pop. of urban district of Felixstowe and Walton (1901), 5815. It is 85 m. N.E. by E. from London by a branch line from Ipswich of the Great Eastern railway; and is in the Woodbridge parliamentary division of the county. It has good golf links, and is much frequented by visitors for its bracing climate and sea-bathing. There is a small dock, and phosphate of lime is extensively dug in the neighbourhood and exported for use as manure. The neighbouring village of Walton, a short distance inland, receives many visitors. The vicinity has yielded numerous Roman remains, and there was a Roman fort in the neighbourhood (now destroyed by the sea), forming part of the coast defence of the Litus Saxonicum in the 4th century.

FELL, JOHN (1625–1686), English divine, son of Samuel Fell, dean of Christ Church, Oxford, was born at Longworth in Berkshire and received his first education at the free school at Thame in Oxfordshire. In 1636 he obtained a studentship at Christ Church, and in 1640 he was specially allowed by Archbishop Laud on account of his "known desert," when wanting one term's residence, to proceed to his degree of B. A. He obtained his M.A. in 1643 and took holy orders (deacon 1647, priest 1649). During the Civil War he bore arms for the king and held a commission as ensign. In 1648 he was deprived of his studentship by the parliamentary visitors, and during the next few years he resided chiefly at Oxford with his brother-in-law, Dr T. Willis, at whose house opposite Merton College he and his friends Allestree and Dolben kept up the service of the Church of England through the Commonwealth.

At the Restoration Fell was made prebendary of Chichester, canon of Christ Church (July 27, 1660), dean (Nov. 30), master of St Oswald's hospital, Worcester, chaplain to the king, and D.D. He filled the office of vice-chancellor from 1666 to 1669, and was consecrated bishop of Oxford, in 1676, retaining his deanery *in commendam*. Some years later he declined the primacy of Ireland. Fell showed himself a most capable and vigorous administrator in his various high employments, and a worthy disciple of Archbishop Laud. He restored in the university the good order instituted by the archbishop, which in the Commonwealth had given place to anarchy and a general disregard of authority. He ejected the intruders from his college or else "fixed them in loyal principles." "He was the most zealous man of his time for the Church of England," says Wood, "and none that I yet know of did go beyond him in the performance of the rules belonging thereunto." He attended chapel four times a day, restored to the services, not without some opposition, the organ and surplice, and insisted on the proper academical dress which had fallen into disuse. He was active in recovering church property, and by his directions a children's catechism was drawn up by Thomas Marshall for use in his diocese. "As he was among the first of our clergy," says Burnet, "that apprehended the design of bringing in popery, so he was one of the most zealous against it." He was forward in making converts from the Roman Catholics and Nonconformists. On the other hand, it is recorded to his honour that he opposed successfully the incorporation of Titus Oates as D.D. in the university in October 1679; and according to the testimony of William Nichols, his secretary, he disapproved of the Exclusion Bill. He excluded the undergraduates, whose presence had been irregularly permitted, from convocation. He obliged the students to attend lectures, instituted reforms in the performances of the public exercises in the schools, kept the examiners up to their duties, and himself attended the examinations. He encouraged the students to act plays. He entirely suppressed "*coursing*," *i.e.* disputations in which the rival parties "ran down opponents in arguments," and which commonly ended in blows and disturbances. He was an excellent disciplinarian and possessed a special talent for the education of young men, many of whom he received into his own family and watched over their progress with paternal care. Tom Browne, author of the *Dialogues of the Dead*, about to be expelled from Oxford for some offence, was pardoned by Fell on the condition of his translating extempore the 33rd epigram from Martial:—

> "Non amo te, Sabidi, nec possum dicere quare;
> Hoc tantum possum dicere, non amo te."

To which he immediately replied with the well-known lines:—

> "I do not love you, Dr Fell,
> But why, I cannot tell,
> But this I know full well,
> I do not love you, Dr Fell." [1]

Delinquents, however, were not always treated thus mildly by Fell, and Acton Cremer, for the crime of courting a wife while only a bachelor of arts, was set as an imposition the translation into English of the whole of Scheffer's history of Lapland. As vice-chancellor, Fell himself visited the drinking taverns and ordered out the students. In the university elections he showed great energy in suppressing corruption.

Fell's building operations almost rivalled the plans of the great ecclesiastical architects of the middle ages. In his own college he completed in 1665 the north side of Wolsey's great quadrangle, already begun by his father but abandoned during the Commonwealth; he rebuilt in 1672 the east side of the Chaplain's quadrangle "with a straight passage under it leading from the cloister into the field," occupied now by the new Meadow Buildings; the lodgings of the canon of the 3rd stall in the passage uniting the Tom and Peckwater quadrangles (*c.* 1674); a long building joining the Chaplain's quadrangle on the east side in 1677–1678; and lastly the great tower gate, begun in June 1681 on the foundation laid by Wolsey and finished in November 1682, to which the bell "great Tom," after being recast, was transferred from the cathedral in 1683. In 1670 he planted and laid out the Broad Walk. He spent large sums of his own on these works, gave £500 for the restoration of Banbury church, erected a church at St Oswald's, Worcester, and the parsonage house at Woodstock at his own expense, and rebuilt Cuddesdon palace. Fell disapproved of the use of St Mary's church for secular purposes, and promoted the building of the Sheldonian theatre by Archbishop Sheldon. He was treasurer during its construction, presided at the formal opening on the 9th of July 1669, and was nominated with Wren curator in July 1670. In the theatre was placed the University Press, the establishment of which had been a favourite project of Laud, which now engaged a large share of Fell's energy and attention, and which as curator he practically controlled. "Were it not you ken Mr Dean extraordinarily well," writes Sir L. Jenkins to J. Williamson in 1672, "it were impossible to imagine how assiduous and drudging he is about his press." [2] He sent for type and printers from Holland, declaring that "the foundation of all success must be laid in doing things well, which I am sure will not be done with English letters." Many works, including a Bible, editions of the classics and of the early fathers, were produced under his direction and editing, and his press became noted not only in England but abroad. He published annually one work, generally a classical author annotated by himself, which he distributed to all the students of his college on New Year's day. On one occasion he surprised the Press in printing surreptitiously Aretino's *Postures*, when he seized and destroyed the plates and impressions. Ever "an eager defender and maintainer of the university and its privileges," he was hostile to the Royal Society, which he regarded as a possible rival, and in 1686 he gave an absolute refusal to Obadiah Walker, afterwards the Roman Catholic master of University College, though licensed by James II., to print books, declaring he would as soon "part with his bed from under him" as his press. He conducted it on strict business principles, and to the criticism that more great works were not produced replied that they would not sell. He was, however, not free from fads, and his new spelling (of which one feature was the substitution of *i* for *y* in such words as *eies, daies, maiest*) met with great disapproval.

Fell also did much to encourage learning in the university. While still a young man at Christ Church he had shown both his zeal and his charity by reading gratuitously with the poor and neglected students of the college. He bore himself a high reputation as a Grecian, a Latinist and a philologist, and he found time, in spite of his great public employments, to bring out with the collaboration of others his great edition of St Cyprian in 1682, an English translation of *The Unity of the Church* in 1681, editions of *Nemesius of Emesa* (1671), of *Aratus* and of *Eratosthenes* (1672), *Theocritus* (1676), *Alcinous on Plato* (1677), *St Clement's Epistles to the Corinthians* (1677), *Athenagoras* (1682), *Clemens Alexandrinus* (1683), *St Theophilus of Antioch* (1684),

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[1] J. T. Browne, *Works* (9th ed. by J. Drake), iv. 99-100; T. Forde, *Virtus rediviva* (1661), 106.

[2] *Cal. of State Pap. Dom.*, 1672, p. 478, and 1670, p. 26.

Grammatica rationis sive institutiones logicae (1673 and 1685), and a critical edition of the New Testament in 1675. The first volumes of *Rerum Anglicarum scriptores* and of *Historiae Britannicae*, &c. were compiled under his patronage in 1684. He had the MSS. of St. Augustine in the Bodleian and other libraries at Oxford generously collated for the use of the Benedictines at Paris, then preparing a new edition of the father.

Fell spent such large sums in his building, in his noble patronage of learning, and in charities, that sometimes there was little left for his private use. Occasionally in his schemes he showed greater zeal than prudence. He was the originator of a mission to India which was warmly taken up by the East India Company. He undertook himself to train as missionaries four scholars at Oxford, procured a set of Arabic types, and issued from these the Gospels and Acts in the Malay language in 1677. But this was scarcely the best method of communicating the gospel to the natives of India, and the mission collapsed. He affected to despise public opinion, and was masterful and despotic in his dealings with others, especially with those upon whom he was conferring favours. Having generously undertaken at his own charge to publish a Latin version of Wood's *History and Antiquities of the University of Oxford*, with the object of presenting the history of the university in a manner worthy of the great subject to European readers, and of extending its fame abroad, he arrogated to himself the right of editing the work. "He would correct, alter, dash out what he pleased. . . .He was a great man and carried all things at his pleasure." In particular he struck out all the passages which Wood had inserted in praise of Hobbes, and substituted some disparaging epithets. He called the philosopher's *Leviathan* "monstrosissimus" and "publico damno notissimus." To the printed remonstrance of Hobbes, Fell inserted an insulting reply in the *History* to "irritabile illud et vanissimum Malmesburiense animal," and to the complaint of Wood at this usage answered only that Hobbes "was an old man, had one foot in the grave; that he should mind his latter end, and not trouble the world any more with his papers." In small things as in great he loved to rule and direct. "Let not Fell," writes R. South to R. Bathurst, "have the fingering and altering of them (*i.e.* his Latin verses), for I think that, bating the want of *siquidems* and *quinetiams*, they are as good as his Worship can make." Wood styles him "a valde vult person." He was not content with ruling his own college, but desired to govern the whole university. He prevented Gilbert Ironside, who "was not pliable to his humour," from holding the office of vice-chancellor. He "endeavoured to carry all things by a high hand; scorn'd in the least to court the Masters when he had to have anything pass'd the convocation. Severe to other colleges, blind as to his own, very partiall and with good words, and flatterers and tell-tales could get anything out of him." According to Bishop Burnet, who praises his character and his administration, Fell was "a little too much heated in the matter of our disputes with the dissenters." "He had much zeal for reforming abuses, and managed it perhaps with too much heat and in too peremptory a way." "But," he adds, "we have so little of that among us that no wonder if such men are censured by those who love not such patterns nor such severe task-masters." And Wood, whose adverse criticism must be discounted a little on account of the personal dispute,—after declaring that Fell "was exceeding partial in his government even to corruption; went thro' thick and thin; grasped at all yet did nothing perfect or effectually; cared not what people said of him, was in many things very rude and in most pedantic and pedagogical,"—concludes with the acknowledgment, "yet still aimed at the public good." Roger North, who paid Fell a visit at Oxford, speaks of him in terms of enthusiasm:—"The great Dr Fell, who was truly great in all his circumstances, capacities, undertakings and learning, and above all for his superabundant public spirit and goodwill. . . .O the felicity of that age and place when his authority swayed!"

In November 1684, at the command of the king, Fell deprived Locke, who had incurred the royal displeasure by his friendship with Shaftesbury, and was suspected as the author of certain seditious pamphlets, of his studentship at Christ Church, summarily and without hearing his defence. Fell had in former years cultivated Locke's friendship, had kept up a correspondence with him, and in 1663 had written a testimonial in his favour; and the ready compliance of one who could on occasion offer a stout resistance to any invasion of the privileges of the university has been severely criticised. It must, however, be remembered in extenuation that the legal status of a person on the foundation of a collegiate body had not then been decided in the law-courts. With regard to the justice of the proceeding Fell had evidently some doubts, and he afterwards expressed his regret for the step which he was now compelled to take. But such scruples, however strong, would, with a man of Fell's political and religious opinions, yield immediately to an order from the sovereign, who possessed special authority in this case as a visitor to the college; and such subservience, however strange to modern notions, would probably only be considered natural and proper at that period.

Fell, who had never married, died on the 10th of July 1686, worn out, according to Wood, by his overwhelming public duties. He was buried in the divinity chapel in the cathedral, below the seat which he had so often occupied when living, where a monument and an epitaph, now moved elsewhere, were placed to his memory. "His death," writes John Evelyn, "was an extraordinary losse to the poore church at this time"; but for himself Fell was fortunate in the time of his departure; for a few months more of life would have necessitated a choice, most painful to a man of his character and creed, between fidelity to his sovereign and to his church. With all his faults, which were the defects which often attend eminent qualities such as his, Fell was a great man, "the greatest governor," according to Speaker Onslow, "that has ever been since his time in either of the universities," and of his own college, to which he left several exhibitions for the maintenance of poor scholars, he was a second founder. He was a worthy upholder of the Laudian tradition at Oxford, an enlightened and untiring patron of learning, and a man of exemplary morals and great piety which remained unsullied in the midst of a busy life and much contact with the world. A sum of money was left by John Cross to perpetuate Fell's memory by an annual speech in his praise, but the *Felii laudes* have been discontinued since 1866. There are two interesting pictures of Fell at Christ Church, one where he is represented with his two friends Allestree and Dolben, and another by Vandyck. The statue placed on the N.E. angle of the Great Quadrangle bears no likeness to the bishop, who is described by Hearne as a "thin grave man."

Besides the learned works already mentioned Fell wrote the lives of his friends Dr Henry Hammond (1661), Richard Allestree, prefixed to his edition of the latter's sermons (1684), and Dr Thomas Willis, in Latin. His *Seasonable advice to Protestants showing the necessity of maintaining the Established Religion in opposition to Popery* was published in 1688. Some of his sermons, which Evelyn found dull, were printed, including *Character of the Last Daies*, preached before the king, 1675, and a *Sermon preached before the House of Peers Dec. 22, 1680. The Interest of England stated* (1659), advocating the restoration of the king,[1] and *The Vanity of Scoffing* (1674), are also attributed to him. Fell probably had some share in the composition of *The Whole Duty of Man*, and in the subsequent works published under the name of the author of *The Whole Duty*, which included *Reasons of the Decay of Christian Piety, The Ladies Calling, The Gentleman's Calling, The Government of the Tongue, The Art of Contentment*, and *The Lively Oracles given us*, all of which were published in one volume with notes and a preface by Fell in 1684.

AUTHORITIES.—Wood's *Athenae Oxonienses* and *Fasti* (ed. Bliss); Wood's *Life and Times*, ed. by A. Clark; Burnet's *Hist. of His Own Time*, ed. 1833; J. Welch, *Alumni Westmonasterienses*; Thomas Hearne, *Collections*, ed. by C. E. Doble and others; *History of the Univ. of Oxford* (1814); *Christ Church*, by Rev. H. L. Thompson; *Fortnightly Review*, lix. 689 (May 1896); *Macmillan's Magazine* (Aug. 1875); *A Specimen of the several sorts of Letter given to the*

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[1] F. Maseres, *Tracts of the Civil War*, ii. 673.

University by Dr J. F(ell) (1695); *Notes and Queries*, ser. vi. 2, and ser. vii. 166; *Calendars of State Papers, Dom. Series* (1660–1675). Fell's books and papers were bequeathed by his nephew Henry Jones to the Bodleian library. A few of his letters are to be found in *Add. MSS.* Brit. Mus. 11046, and some are printed in *Life of James II.*, by Ch. J. Fox, *Appendix*; *Gent. Mag.* 77, p. 633; *Academy*, 8, p. 141; *Athenaeum* for 1887 (2), p. 311; J. Gutch, *Collectanea Curiosa*, i. 269; and in *Cal. of State Papers, Dom. Series.* (P. C. Y.)

FELL. (1) (Through the O. Fr. *fel*, from Low Lat. *fello*, felon), savage, ruthless, deadly; only used now in poetry. (2) (Of Scandinavian origin, cf. Danish *fjeld*, probably connected with a Teutonic root appearing in German *fels*, rock), a hill, as in the names of mountains in the Lake District in England, *e.g.* Scawfell; also a lofty moorland down. (3) (A word common to Teutonic languages, cf. Ger. *fell*, and Dutch *vel*, cognate with Lat. *pellis*, skin), the pelt or hide of an animal, with the hair or wool and skin; also used of any thick shaggy covering, like a matted fleece. (4) To cause to "fall," a word common to Teutonic languages and akin to the root of the Lat. *fallere* and Gr. *σφάλλειν*, to cause to stumble, to deceive. As a substantive "fell" is used of a flat seam laid level with the surface of the fabric; also, in weaving, of the end of the web.

FELLAH (pl. Fellahin), Arabic for "ploughman" or "tiller," the word used in Arabic-speaking countries to designate peasantry. It is employed especially of the peasantry of Egypt, "Fellahin" in modern English usage being almost equivalent to "Egyptians." In Egypt the name is applied to the peasantry as opposed to the Arabs of the desert (and even those who have settled on the land), the Turks and the townsfolk. Fellah is used by the Arabs as a term of reproach, somewhat like the English "boor," but rather implying a slavish disposition; the fellahin, however, are not ashamed of the name and may pride themselves on being of good fellah descent, as a "fellah of a fellah." They may be classified as Hamito-Semites, and preserve to some extent the blood of the ancient Egyptians. They form the bulk of the population of Egypt and are mainly Mahommedan, though some villages in Upper Egypt are almost exclusively Copt (Christian). Their hybridism is well shown by their great divergence of colour, fellahin in the Delta being sometimes lighter than Arabs, while in Upper Egypt the prevailing complexion is dark brown. The average fellah is somewhat above medium height, big-boned, of clumsy but powerful build, with head and face of fine oval shape, cheek-bones high, forehead broad, short flattish nose with wide nostrils, and black but not woolly hair. The eyebrows are always straight and smooth, never bushy. The mouth is thick-lipped and large but well formed. The eyes are large and black, and are remarkable for the closeness of the eyelashes. The women and girls are particularly noted for their graceful and slender figures and their fine carriage, due to the custom of carrying burdens, especially water-jars, on their heads. The men's heads are usually shaved. The women are not as a rule closely veiled: they generally paint the lips a deep blue, and tattoo a floral device on the chin, sometimes on the forehead and other parts of the body. All but the poorest wear necklaces of cheap pearls, coins or gilt disks. The men wear a blue or brown cotton shirt, linen drawers and a plain skull-cap, or on occasion the tarbush or fez, round which sometimes a turban is wound; the women wear a single cotton smock. The common fellah's home is a mere mud hut, roofed with durra straw. Inside are a few mats, a sheepskin, baskets and some earthenware and wooden vessels. He lives almost entirely on vegetables, millet bread, beans, lentils, dates and onions. But some of the sheikhs are wealthy, and have large houses built of crude brick and whitewashed with lime, with courtyard, many apartments and good furniture. The fellah is laborious in the fields, and abominates absence from his occupations, which generally means loss of money to him. Military service on the old oriental plan was both ruinous and distasteful to him; hence voluntary mutilations to avoid conscription were formerly common and the ingrained prejudice against military service remains. Trained by British officers the fellahin make, however, excellent soldiers, as was proved in the Sudan campaigns of 1896–98. The fellah is intelligent, cheerful and sober, and as hospitable as his poverty allows. (See COPTS and EGYPT.)

FELLENBERG, PHILIPP EMANUEL VON (1771–1844), Swiss educationist, was born on the 27th of June 1771 at Bern, in Switzerland. His father was of patrician family, and a man of importance in his canton, and his mother was a granddaughter of the Dutch admiral Van Tromp. From his mother and from Pfeffel, the blind poet of Colmar, he received a better education than falls to the lot of most boys, while the intimacy of his father with Pestalozzi gave to his mind that bent which it afterwards followed. In 1790 he entered the university of Tübingen, where he distinguished himself by his rapid progress in legal studies. On account of his health he afterwards undertook a walking tour in Switzerland and the adjoining portions of France, Swabia and Tirol, visiting the hamlets and farmhouses, mingling in the labours and occupations of the peasants and mechanics, and partaking of their rude fare and lodging. After the downfall of Robespierre, he went to Paris and remained there long enough to be assured of the storm impending over his native country. This he did his best to avert, but his warnings were disregarded, and Switzerland was lost before any efficient means could be taken for its safety. Fellenberg, who had hastily raised a levy *en masse*, was proscribed; a price was set upon his head, and he was compelled to fly into Germany. Shortly afterwards, however, he was recalled by his countrymen, and sent on a mission to Paris to remonstrate against the rapacity and cruelty of the agents of the French republic. But in this and other diplomatic offices which he held for a short time, he was witness to so much corruption and intrigue that his mind revolted from the idea of a political life, and he returned home with the intention of devoting himself wholly to the education of the young. With this resolution he purchased in 1799 the estate of Hofwyl, near Bern, intending to make agriculture the basis of a new system which he had projected, for elevating the lower and rightly training the higher orders of the state, and welding them together in a closer union than had hitherto been deemed attainable. For some time he carried on his labours in conjunction with Pestalozzi, but incompatibility of disposition soon induced them to separate. The scheme of Fellenberg at first excited a large amount of ridicule, but gradually it began to attract the notice of foreign countries; and pupils, some of them of the highest rank, began to flock to him from every country in Europe, both for the purpose of studying agriculture and to profit by the high moral training which he associated with his educational system. For forty-five years Fellenberg, assisted by his wife, continued his educational labours, and finally raised his institution to the highest point of prosperity and usefulness. He died on the 21st of November 1844.

See Hamm, *Fellenberg's Leben und Wirken* (Bern, 1845); and Schoni, *Der Stifter von Hofwyl, Leben und Wirken Fellenberg's.*

FELLER, FRANÇOIS XAVIER DE (1735–1802), Belgian author, was born at Brussels on the 18th of August 1735. In 1752 he entered a school of the Jesuits at Reims, where he manifested a great aptitude for mathematics and physical science. He commenced his novitiate two years afterwards, and in testimony of his admiration for the apostle of India added Xavier to his surname. On the expiry of his novitiate he became professor at Luxembourg, and afterwards at Liége. In 1764 he was appointed to the professorship of theology at Tyrnau in Hungary, but in 1771 he returned to Belgium and continued to discharge his professorial duties at Liége till the suppression of the Jesuits in 1773. The remainder of his life he devoted to study, travel and literature. On the invasion of Belgium by the French in 1794 he went to Paderborn, and remained there two years, after which he took up his residence at Ratisbon, where he died on the 23rd of May 1802.

Feller's works exceed 120 volumes. In 1773 he published, under the assumed name Flexier de Reval (an anagram of Xavier de Feller), his *Catéchisme philosophique*; and his principal work, *Dictionnaire historique et littéraire* (published in 1781 at Liége in 8 volumes, and afterwards several times reprinted and continued down to 1848), appeared under the same name. Among his other works the most important are *Cours de morale chrétienne et de littérature religieuse* and his *Coup d'œil sur congrès d'Ems*. The *Journal historique et littéraire*, published at Luxembourg and Liége from 1774 to 1794 in 70 volumes, was edited and in great part written by him.

FELLING, an urban district in the Jarrow parliamentary division of Durham, England, forming an eastern suburb of Gateshead. Pop. (1901) 22,467. Its large industrial population is employed in the neighbouring collieries and the various attendant manufactures.

FELLOE, the outer rim of a wheel, to which the spokes are attached. The word is sometimes spelled and usually pronounced "felly." It is a Teutonic word, in O. Eng. *felg*, cognate with Dutch *velge*, Ger. *Felge*; the original Teutonic root from which these are derived probably meant "to fit together."

FELLOW, properly and by origin a partner or associate, hence a companion, comrade or mate, as in "fellow-man," "fellow-countryman," &c. The word from the 15th century has also been applied, generally and colloquially, to any male person, often in a contemptuous or pitying sense. The Old English *féolage* meant a partner in a business, *i.e.* one who lays (*lag*) money or property (*féoh*, fee) together for a common purpose. The word was, therefore, the natural equivalent for *socius*, a member of the foundation of an incorporated college, as Eton, or a college at a university. In the earlier history of universities both the senior and junior members of a college were known as "scholars," but later, as now, "scholar" was restricted to those members of the foundation still *in statu pupillari*, and "fellow" to those senior graduate members who have been elected to the foundation by the corporate body, sharing in the government and receiving a fixed emolument out of the revenues of the college. It is in this sense that "fellow" is used at the universities of Oxford and Cambridge and Trinity, Dublin. At these universities the college teaching is performed by those fellows who are also "tutors." At other universities the term is applied to the members of the governing body or to the holders of certain sums of money for a fixed number of years to be devoted to special study or research. By analogy the word is also used of the members of various learned societies and institutions.

FELLOWS, SIR CHARLES (1799–1860), British archaeologist, was born in August 1799 at Nottingham, where his family had an estate. When fourteen he drew sketches to illustrate a trip to the ruins of Newstead Abbey, which afterwards appeared on the title-page of Moore's *Life of Lord Byron*. In 1820 he settled in London, where he became an active member of the British Association. In 1827 he discovered the modern ascent of Mont Blanc. After the death of his mother in 1832 he passed the greater portion of his time in Italy, Greece and the Levant. The numerous sketches he executed were largely used in illustrating *Childe Harold*. In 1838 he went to Asia Minor, making Smyrna his headquarters. His explorations in the interior and the south led him to districts practically unknown to Europeans, and he thus discovered ruins of a number of ancient cities. He entered Lycia and explored the Xanthus from the mouth at Patara upwards. Nine miles from Patara he discovered the ruins of Xanthus, the ancient capital of Lycia, finely situated on hills, and abounding in magnificent remains. About 15 m. farther up he came upon the ruins of Tlos. After taking sketches of the most interesting objects and copying a number of inscriptions, he returned to Smyrna through Caria and Lydia. The publication of *A Journal written during an Excursion in Asia Minor* (London, 1839) roused such interest that Lord Palmerston, at the request of the British Museum authorities, asked the British consul at Constantinople to get leave from the sultan to ship a number of the Lycian works of art. Late in 1839 Fellows, under the auspices of the British Museum, again set out for Lycia, accompanied by George Scharf, who assisted him in sketching. This second visit resulted in the discovery of thirteen ancient cities, and in 1841 appeared *An Account of Discoveries in Lycia, being a Journal kept during a Second Excursion in Asia Minor*. A third visit was made late in 1841, after Fellows had obtained a *firman* by personal application at Constantinople. He shipped a number of works of art for England, and in the fourth and most famous expedition (1844) twenty-seven cases of marbles were despatched to the British Museum. His chief discoveries were at Xanthus, Pinara, Patara, Tlos, Myra and Olympus. In 1844 he presented to the British Museum his portfolios, accounts of his expeditions, and specimens of natural history illustrative of Lycia. In 1845 he was knighted "as an acknowledgment of his services in the removal of the Xanthian antiquities to this country." He paid his own expenses in all his journeys and received no public reward. Fellows was twice married. He died in London on the 8th of November 1860.

In addition to the works above mentioned, Fellows published the following: *The Xanthian Marbles; their Acquisition and Transmission to England* (1843), a refutation of false statements that had been published; *An Account of the Ionic Trophy Monument excavated at Xanthus* (1848); a cheap edition of his two *Journals*, entitled *Travels and Researches in Asia Minor, particularly in the Province of Lycia* (1852); and *Coins of Ancient Lycia before the Reign of Alexander; with an Essay on the Relative Dates of the Lycian Monuments in the British Museum* (1855). See C. Brown's *Lives of Nottinghamshire Worthies* (1882), pp. 352-353, and *Journ. of Roy. Geog. Soc.*, 1861.

FELO DE SE (M.L. a felon, *i.e.* murderer, of himself), one who commits murder upon himself. The technical conditions of murder apply to this crime; *e.g.*, "if one commits any unlawful malicious act, the consequence of which is his own death, as if attempting to kill another he runs upon his antagonist's sword, or shooting at another the gun bursts and kills himself," he is a *felo de se*. The horror inspired by this crime led to the revolting punishment of an "ignominious burial on the highway, with a stake driven through the body." This was abolished by an act of 1823, which ordered the burial of the body of a person found to be *felo de se* within 24 hours after the coroner's inquest, between the hours of 9 and 12 at night, and without Christian rites of sepulture. This act was again superseded in 1882 by the Interments (*Felo de se*) Act, which permits the interment of any *felo de se* in the churchyard or other burial ground of the parish or place in which by the law or custom of England he might have been interred but for the verdict. The interment is carried out in accordance with the Burial Laws Amendment Act 1880 (see Burial and Burial Acts). The act does not authorize the performance of any of the rites of Christian burial, but a special form of service may be used. Formerly the goods and chattels, but not the land, of a *felo de se* were forfeited to the crown, but such forfeitures were abolished by the Forfeiture Act 1870. (See also Suicide.)

FELONY (O. Fr. *felonie*, from *felon*, a word meaning "wicked," common to Romanic languages, cf. Italian *fello*, *fellone*, the ultimate origin of which is obscure, but is possibly connected either with Lat. *fel*, gall, or *fallere*, to deceive. The English "fell" cruel or fierce, is also connected; and the Greek *φῆλυς*, an impostor, has also been suggested). Legal writers have sought to throw light on the nature of felony by examining the supposed etymology of the word. Coke says it is *crimen animo felleo perpetratum* [a crime committed with malicious or evil intent (*fee lohn*)]. Spelman connects it with the word *fee*, signifying fief or feud; and felony in this way would be equivalent to *pretium feudi*, an act for which a man lost or gave up his fee (see Stephen's *Commentaries*, vol. iv. p. 7). And acts involving forfeiture were styled felonies in feudal law, although they had nothing of a criminal character about them. A breach of duty on the part of the vassal, neglect of service, delay in seeking investiture, and the like were felonies: so were injuries by the lord against the vassal. Modern writers are now disposed to accept Coke's definition. In English law, crimes are usually classified as treason, felony, misdemeanour and summary offence. Some writers—and with some justice—treat treason merely as a grave form of felony and it is so dealt with in the Juries Detention Act 1897. But owing to legislation in and since the time of William and Mary, the procedure for the trial of most forms of treason differs from that of felony. The expression summary offence is ambiguous. Many offences which are at common law or by statute felonies, or misdemeanours indictable at common law or by statute, may under certain conditions be tried by a court of summary jurisdiction (*q.v.*), and many merely statutory offences which would ordinarily be punishable summarily may at the election of the accused be tried by a jury on indictment (Summary Jurisdiction Act 1879, s. 17).

The question whether a particular offence is felony or misdemeanour can be answered only by reference to the history of the offence and not by any logical test. For instance, killing a horse in an unlicensed place is still felony under a statute of 1786. But most crimes described as felonies are or have been capital offences at common law or by statute, and have also entailed on the offender attaint and forfeiture of goods. A few felonies were not punishable by death, *e.g.* petty larceny and mayhem. Where an offence is declared a felony by statute, the common law punishments and incidents of trial attach, unless other statutory provision is made (Blackstone, *Commentaries*, iv. 94).

The chief common law *felonies* are: homicide, rape, larceny (*i.e.* in ordinary language, theft), robbery (*i.e.* theft with violence), burglary and kindred offences. Counterfeiting the coin has been made a felony instead of being treason; and forgery of most documents has been made a felony instead of being, as it was at common law, a misdemeanour. At the beginning of the 19th century felony was almost equivalent to capital crime; but during that century capital punishment was abolished as to all felonies, except wilful murder, piracy with violence (7 W. IV. & 1 Vict. c. 88, s. 2) and offences against the Dockyards, &c., Protection Act 1772; and by the Forfeiture Act 1870, a felon no longer forfeits land or goods on conviction, though forfeiture on outlawry is not abolished. The usual punishment for felony under the present law is penal servitude or imprisonment with or without hard labour. "Every person convicted of any felony for which no punishment is specially provided by the law in force for the time being is liable upon conviction thereof to be sentenced to penal servitude for any period not exceeding seven years, or to be imprisoned with or without hard labour for any term not exceeding two years" (Stephen, *Dig. Cr. Law* (6th ed.), art 18, Penal Servitude Act 1891). A felon may not be fined or whipped on conviction nor put under recognizance to keep the peace or be of good behaviour except under statutory provision. (See Offences against the Person Act 1861, ss. 5. 71.)

The result of legislative changes is that at the present time the only practical distinctions between felony and misdemeanour are:—

1. That a private person may arrest a felon without judicial authority and that bail on arrest is granted as a matter of discretion and not as of right. Any one who has obtained a drove of oxen or a flock of sheep by false pretences may go quietly on his way and no one, not even a peace officer, can apprehend him without a warrant, but if a man offers to sell another a bit of dead fence supposed to have been stolen, he not only may but is required to be apprehended by that person (Greaves, *Criminal Law Consolidation Acts*). (See ARREST, BAIL.)

2. That on an indictment for felony counts may not be joined for different felonies unless they form part of the same transaction. (See INDICTMENT.)

3. That on a trial for felony the accused has a right peremptorily to challenge, or object to, the jurors called to try him, up to the number of twenty. (See JURY.)

4. That a felon cannot be tried *in absentia*, and that the jury who try him may not separate during the trial without leave of the court, which may not be given in cases of murder.

5. That a special jury cannot be empanelled to try a felony.

6. That peers charged with felony are tried in a special manner. (See PEERAGE.)

7. That the costs of prosecuting all felonies (except treason felony) are paid out of public funds: and that a felon may be condemned to pay the costs of his prosecution and to compensate up to £100 for any loss of property suffered by any person through or by means of the felony. In the Criminal Code Bills of 1878–1880 it was proposed to abolish the term felony altogether: and in the Queensland Criminal Code 1899 the term "crime" is substituted, and within its connotation are included not only treason and piracy but also perjury.

8. That a sentence of a felon to death, or to penal servitude or imprisonment with hard labour or for over twelve months, involves loss of and disqualification for certain offices until the sentence has been served or a free pardon obtained. (Forfeiture Act 1870.)

It is a misdemeanour (i.) to compound a felony or to agree for valuable consideration not to prosecute or to show favour in such prosecution; (ii.) to omit to inform the authorities of a felony known to have been committed (see MISPRISION), and, (iii.) not to assist in the arrest of a felon at the call of an officer of the law. (See CRIMINAL LAW; MISDEMEANOUR; MISPRISION.)

FELSITE, in petrology, a term which has long been generally used by geologists, especially in England, to designate fine-grained igneous rocks of acid (or subacid) composition. As a rule their ingredients are not determinable by the unaided eye, but they are principally felspar and quartz as very minute particles. The rocks are pale-coloured (yellowish or reddish as a rule), hard, splintery, much jointed and occasionally nodular. Many felsites contain porphyritic crystals of clear quartz in rounded blebs, more or less idiomorphic felspar, and occasionally biotite. Others are entirely fine-grained and micro- or cryptocrystalline. Occasionally they show a fluxional banding; they may also be spherulitic or vesicular. Those which carry porphyritic quartz are known as quartz-felsites; the term soda-felsites has been applied to similar fine-grained rocks rich in soda-felspar.

Although there are few objections to the employment of felsite as a field designation for rocks having the above characters, it lacks definiteness, and has been discarded by many petrologists as unsuited for the exact description of rocks, especially when their microscopic characters are taken into consideration. The felsites accordingly are broken up into "granite-porphyries," "orthophyres" and "orthoclase-porphyries," "felsitic-rhyolites," "keratophyres," "granophyres," "microgranites," &c. But felsite or microfelsite is still the generally accepted designation for that very fine-grained, almost cryptocrystalline substance which forms the ground-mass of so many rhyolites, dacites and porphyries.

In the hand specimen it is a dull, lustreless, stony-looking aggregate. Under the microscope even with high powers and the very thinnest modern sections, it often cannot be resolved into its components. In places it may contain determinable minute crystals of quartz; less commonly it may show grains which can be proved to be felspar, but usually it consists of an ultra-microscopic aggregate of fibres, threads and grains, which react to polarized light in a feeble and indefinite manner. Spherulitic, spotted, streaky and fluidal structures may appear in it, and many different varieties have been established on such characters as these but without much validity.

Its association with the acid rocks, its hardness, method of weathering and chemical composition, indicate that it is an intermixture of quartz and acid felspar, and the occasional presence of these two minerals in well-defined grains confirms this. Moreover, in many dikes, while the ground-mass is microcrystalline and consists of quartz and felspar near the centre of the mass, towards the margins, where it has been rapidly chilled by contact with the cold surrounding rocks, it is felsitic. The very great viscosity of acid magmas prevents their molecules, especially when cooling takes place suddenly, from arranging themselves to form discrete crystals, and is the principal cause of the production of felsitic ground-masses. In extreme cases these conditions hinder crystallization altogether, and glassy rocks result. Some rocks are felsitic in parts but elsewhere glassy; and it is not always clear whether the felsite is an original substance or has arisen by the devitrification of primary glass. The presence of perlitic structure in some of these felsites points to the latter conclusion, and the results of an examination of ancient glasses and of artificial glass which has been slowly cooled are in accordance with this view. It has been argued that felsite is a eutectic mixture of quartz and felspar, such that when solidification takes place and the excess of felspar (or quartz) has crystallized out it remains liquid till the temperature has fallen to its freezing point, and then consolidates simultaneously. This may be so, but analyses show that it has not always the same composition and consequently that the conditions which determine its formation are not quite simple. Felsitic rocks are sometimes silicified and have their matrix replaced by granular aggregates of cloudy quartz. (J. S. F.)

FELSPAR, or Feldspar, a name applied to a group of mineral silicates of much importance as rock-constituents. The name, taken from the Ger. *Feldspath*, was originally written with a "d" but in 1794 it was written "felspar" by R. Kirwan, on the assumption that it denoted a mineral of the "fels" rather than of the "field," and this corrupted form is now in common use in England. By some of the earlier mineralogists it was written "feltspar," from the Swedish form *fältspat*.

The felspar-group is divided into two subgroups according to the symmetry of the crystals. Although the crystals of all felspars present a general resemblance in habit, they are usually regarded as belonging to two systems, some felspars being monoclinic and others anorthic. Figures of the crystals are given in the articles on the different species. Two cleavages are generally well marked. In the monoclinic or monosymmetric felspars these, being parallel to the basal pinacoid and clinopinacoid, necessarily make an angle of 90°, whence the name orthoclase applied to these minerals; whilst in the anorthic or asymmetric felspars the corresponding angle is never exactly 90°, and from this obliquity of the principal cleavages they are termed plagioclase (see Orthoclase and Plagioclase). There are consequently two series of felspars, one termed orthoclastic or orthotomous, and the other plagioclastic or clinotomous. F. E. Mallard suggested that all felspars are really asymmetric, and that orthoclase presents only a pseudo-monosymmetric habit, due to twinning. Twin-crystals are very common in all the felspars, as explained under their respective headings.

The two divisions of the felspar-group founded on differences of crystalline symmetry are subdivided according to chemical composition. All the felspars are silicates containing aluminium with some other metallic base or bases, generally potassium, sodium or calcium, rarely barium, but never magnesium or iron. The monoclinic series includes common potash-felspar or orthoclase ($KAlSi_3O_8$) and hyalophane, a rare felspar containing barium ($K_2BaAl_4Si_8O_{24}$). The anorthic series includes at one end the soda-felspar albite ($NaAlSi_3O_8$) and at the other extremity the lime-felspar anorthite ($CaAl_2Si_2O_8$). It was suggested by G. Tschermak in 1864 that the other plagioclastic felspars are isomorphous mixtures in various proportion of albite (Ab) and anorthite (An). These intermediate members are the lime-soda felspars known as oligoclase, andesine, labradorite and bytownite. There are also placed in the anorthic class a potash-felspar called microcline, and a rare soda-potash-felspar known as anorthoclase.

The specific gravity of the felspars has been shown by G. Tschermak and V. Goldschmidt to vary according to their chemical composition, rising steadily from 2·57 in orthoclase to 2·75 in anorthite. All the felspars have a hardness of 6 to 6·5, being therefore rather less hard than quartz. Pure felspar is colourless, but the mineral is usually white, yellow, red or green. Certain felspars are used as ornamental stones on account of their colour (see Amazon Stone). Other felspars are prized for their pearly opalescence (see Moonstone), or for their play of iridescent colours (see Labradorite), or for their spangled appearance, like aventurine (see Sun-stone).

Felspar is much used in the manufacture of porcelain by reason of its fusibility. In England the material employed is mostly orthoclase from Scandinavia, often known as "Swedish spar." The high translucency of "ivory porcelain" depends on the large proportion of felspar in the body. The mineral is also an important constituent of most ceramic glazes. The melting points of felspars have been investigated by Prof. J. Joly, Prof. C. A. Doelter y Cisterich and especially by A. L. Day and E. T. Allen in the Geophysical Laboratory of the Carnegie Institute at Washington.

Among the applications of felspar is that of pure orthoclase in the manufacture of artificial teeth.

Felspar readily suffers chemical alteration, yielding kaolin (*q.v.*). The turbidity of orthoclase is usually due to partial kaolinization. Secondary mica is also a common result of alteration, and among other products are pinite, epidote, saussurite, chlorite, wollastonite and various zeolites.

See Albite, Amazon Stone, Andesine, Anorthite, Bytownite, Labradorite, Microcline, Moonstone, Oligoclase, Orthoclase, Plagioclase, Sun-stone.

FELSTED, or Felstead, a village of Essex, England, between Dunmow and Braintree, and 10 m. from Chelmsford; with a station on the Great Eastern railway. Felsted is only noteworthy by reason of its important public school, dating back to its foundation as a grammar school in 1564 by Richard 1st Baron Rich, who as lord chancellor and chancellor of the court of augmentations had enriched himself with the spoil of the adjoining abbey and priory of Little Leez at the dissolution of the monasteries. It became a notable educational centre for Puritan families in the 17th century, numbering a hundred or more pupils, under Martin Holbeach (1600–1670), headmaster from 1627–1649, and his successors C. Glasscock (from 1650 to 1690), and Simon Lydiatt (1690 to 1702). John Wallis and Isaac Barrow were educated here, and also four sons of Oliver Cromwell, Robert, Oliver, Richard (the Protector), and Henry. Another era of prosperity set in under the headmastership of William Trivett (1745–1830) between 1778 and 1794; but under his successors W. J. Carless (from 1794 to 1813) and E. Squire (from 1813 to 1829) the numbers dwindled. As the result of the discovery by T. Surridge (headmaster 1835–1850), from research among the records, that a larger income was really due to the foundation, a reorganization took place by act of parliament, and in 1851, under the headmastership of Rev. A. H. Wratislaw, the school was put under a new governing body (a revised scheme coming into operation in 1876). The result under Rev. W. S. Grignon (1823–1907), the headmaster from 1856 to 1875, who may be considered almost the second founder, was the rapid development of Felsted into one of the regular public schools of the modern English type. New buildings on an elaborate scale arose, the numbers increased to more than 200, and a complete transformation took place, which was carried on under his successors D. S. Ingram (from 1875 to 1890), H. A. Dalton (to 1906), and F. Stephenson, under whom large extensions to the buildings and playing-fields were made.

See John Sargeaunt, *History of Felsted School* (1889); and *Alumni Felstedienses*, by R. J. Beevor, E. T. Roberts and others (1903).

FELT (cognate with Ger. *Filz*, Du. *vilt*, Swed. and Dan. *filt*; the root is unknown; the word has given Med. Lat. *filtrum*, "filter"), a fabric produced by the "matting" or "felting" together of fibrous materials such as wools, hairs, furs, &c. Most textile fibres (see Fibres) possess the quality of matting to some extent, but wools, furs and some few hairs are the only fibres which can be felted satisfactorily. It is probable that the quality of felting must be attributed to the scale structure and waviness of the wools, furs and hairs referred to. When it is desired to incorporate non-felting fibres in felt cloths, wool must be employed to "carry" them.

There are two distinct classes of felts, viz. woven or "thread-structure" felts, and "fibre" or true felts. In the manufacture of thread-structure felts, wools possessing the quality of felting in a high degree are naturally selected, carefully scoured so that the felting quality is not seriously damaged, spun into woollen yarn possessing the necessary fibre arrangement and twist, woven into cloth of such a character that subsequently satisfactory shrinking or felting may be effected, and finally scoured, milled in the stocks of machine of both, dyed and finished on the lines of an ordinary woven fabric. The lighter styles of woven felts may be composed of a single cloth only, but for the heavier styles two or more cloths are woven, one on top of the other, at one and the same time, arrangements being made to stitch the cloths together during the weaving operation.

Fibre felts are exceedingly interesting from the historical point of view. It is now generally admitted that the art of weaving preceded that of spinning, and it must further be conceded that the art of felting preceded that of weaving, so that the felt fabric is probably one of the oldest of the various styles of recognized fabrics. The inhabitants of the middle and northern regions of Asia seem to have employed felt from time immemorial, as clothing and also as a covering for their habitations. Most of the classical writers refer to it and some of them actually describe its manufacture. Felt was also largely employed by the ancients for their hats, outer garments, and sometimes as a species of armour.

Fibre felts may be divided into three classes, viz. ordinary felts; hat felts; and impregnated felts. As all felts are based upon the ordinary felt, the process of manufacture of this will first be described. Of the wools employed the principal are:—East Indian, German or mid-European, New Zealand crossbreds, and Australian, Cape and Buenos Aires merinos. Vegetable fibres and silk are also employed, but wool must be used to "carry" them; thus a good felting wool may be made to carry its own weight of cotton, hemp, &c. Hairs and furs are principally used in the hat felts. The average loss upon the wool from the raw state to the finished felt is 40 to 50%. The order of the manufacturing processes is as follows:—mixing, willowing, teasing, scribbling and carding. It is interesting to note that it is not usual to scour felting wools. This is not because they are really clean—some are dirty—but because the felting property is liable to be interfered with in the scouring operation. Some wools, however, must be scoured to ensure satisfactory working in the machines. From the card the wool is delivered as a gossamer-like film from 50 to 60 in. wide on to an endless sheet from 30 to 60 yds. long, upon which the felt is built up film upon film until the required thickness—perhaps 4 in.—is obtained. To harden this somewhat tender sheet of felt it is now passed through an ironing process, effected by either steam-heated rollers—to which a rotatory and vibratory motion is given—playing upon the continually drawn-through cloth; or a huge vibrating flat-iron, to which the cloth is automatically fed, held in position and then wound up while the following length to be treated is drawn under the iron. Soaping, fulling or "felting" and the ordinary finishing operations—including dyeing and printing if desirable—now follow, so that ultimately a strong firm fabric is turned out. It must be admitted, however, that the strength is much greater lengthwise than cross-wise, owing to the parallelization of the fibres induced in the scribbling and carding operations. Of course, the true felting or contraction occurs in the fulling or felting stock, the fabric being perpetually "hammered" in the presence of fulling agents such as soap, fuller's earth, &c., for a considerable time. The reduction in width, length and thickness is remarkable. This may be controlled within certain limits. The principal styles of ordinary fibre-felts are—linings for coats, furniture and rubber shoes; saddlery; seatings for carriages and pews; carpets, surrounds and under-felts for carpets; mantles, dresses and table-cloths; felt-slippers; mattress felts; chest-preservers, and shoulder-pads; steam-engine packing, motor-car and anti-vibration felts, shipbuilding felts; drawing-roller felts and gun-wad felts.

Hat felts may be divided into two classes, viz. those made from wool and fur respectively. Wool "bodies" used for the lower quality hats are manufactured in the same way as ordinary felts, but the "shape" upon which the film issuing from the carder is built up takes the form of a double cone and thus approximates to the shape of the two hats ultimately formed. The shape is further controlled and developed in the fulling or felting operation. In the fur hat felts an air-blast is employed to carry the finely separated fibres on to the shape required, upon which shape the fibres are held in position by suction until the required thickness is obtained. The structure is then further developed and "stiffened," *i.e.* impregnated with certain stiffening agents according to requirements. If desirable the exterior fibres blown on to any shape may be of a different material from the body fabric.

Impregnated felts are simply felts made in the ordinary way but subsequently impregnated with certain agents which give a special quality to the fabric. Messrs McNeill & Co., of London, were the originators of "asphalted-felt" for roofing and, among other styles, place on the market sheathing felt, inodorous felt, dry hair felt, foundation felt, &c., &c. A later development, however, is the impregnated iron-felt manufactured by Messrs Mitchells, Ashworth, Stansfield & Co., of Waterfoot, near Manchester, who not only produce from 70 to 80 % of the ordinary felts manufactured in Great Britain, but also place on the market several specialties of which this "iron-felt" is largely used in the construction of bridges, &c., and as a substitute for rubber, it being apparently more durable. (A. F. B.)

FELTHAM, or **Felltham, OWEN** (d. 1668), English moralist, was the son of Thomas Feltham or Felltham of Mutford in Suffolk. The date of his birth is given variously as 1602 and 1609. Hs is famous chiefly as the author of a volume entitled *Resolves, Divine, Moral and Political*, containing one hundred short and pithy essays. To later issues of the *Resolves* Feltham appended *Lusoria*, a collection of forty poems. Hardly anything is known of his life except that T. Randolph, the adopted "son" of Ben Jonson, addressed a poem of compliment to him, and became his friend, and that Feltham attacked Ben Jonson in an ode shortly before the aged poet's death, but contributed a flattering elegy to the *Jonsonus Virbius* in 1638. Early in life Feltham visited Flanders, and published observations in 1652 under the title of *A Brief Character of the Low Countries*. He was a strict high-churchman and a royalist; he even described Charles I. as "Christ the Second." Hallam stigmatized Feltham as one of our worst writers. He has not, indeed, the elegance of Bacon, whom he emulated, and he is often obscure and affected; but his copious imagery and genuine penetration give his reflections a certain charm. To the middle classes of the 17th century he seemed a heaven-sent philosopher and guide, and was only less popular than Francis Quarles the poet.

Eleven editions of the *Resolves* appeared before 1700. Later editions by James Cumming (London, 1806; much garbled; has account of Feltham's life and writings), and O. Smeaton in "Temple Classics" series (London, 1904).

FELTON, CORNELIUS CONWAY (1807–1862), American classical scholar, was born on the 6th of November 1807, in West Newbury, Massachusetts. He graduated at Harvard College in 1827, having taught school in the winter vacations of his sophomore and junior years. After teaching in the Livingstone high school of Geneseo, New York, for two years, he became tutor at Harvard in 1829, university professor of Greek in 1832, and Eliot professor of Greek literature in 1834. In 1860 he succeeded James Walker as president of Harvard, which position he held until his death, at Chester, Pennsylvania, on the 26th of February 1862. Dr Felton edited many classical texts. His annotations on Wolf's text of the *Iliad* (1833) are especially valuable. *Greece, Ancient and Modern* (2 vols., 1867), forty-nine lectures before the Lowell Institute, is scholarly, able and suggestive of the author's personality. Among his miscellaneous publications are the American edition of Sir William Smith's *History of Greece* (1855); translations of Menzel's *German Literature* (1840), of Munk's *Metres of the Greeks and Romans* (1844), and of Guyot's *Earth and Man* (1849); and *Familiar Letters from Europe* (1865).

FELTON, JOHN (*c.* 1595–1628), assassin of the 1st duke of Buckingham, was a member of an old Suffolk family established at Playford. The date of his birth and the name of his father are unknown, but his mother was Eleanor, daughter of William Wright, mayor of Durham. He entered the army, and served as lieutenant in the expedition to Cadiz commanded by Sir Edward Cecil in 1625. His career seems to have been ill-starred and unfortunate from the beginning. His left hand was early disabled by a wound, and a morose temper rendered him unpopular and prevented his advancement. Every application made to Buckingham for his promotion was refused, on account of an enmity, according to Sir Simonds D'Ewes, which existed between Felton and Sir Henry Hungate, a favourite of Buckingham. To his personal application that he could not live without a captaincy Buckingham replied harshly "that he might hang." Whether he took part in the expedition to Rhé in 1627 is uncertain, but there is no doubt that he continued to be refused promotion, and that even his scanty pay earned during the Cadiz adventure was not received. Exasperated by his ill-treatment, his discontent sharpened by poverty, and his hatred of Buckingham intensified by a study of the Commons "Remonstrances" of the previous June, and by a work published by Eglesham, the physician of James I., in which Buckingham was accused of poisoning the king, Felton determined to effect his assassination. He bought a tenpenny knife on Tower Hill, and on his way through Fleet Street he left his name in a church to be prayed for as "a man much discontented in mind." He arrived at Portsmouth at 9 o'clock in the morning of the 23rd of August 1628, and immediately proceeded to No. 10 High Street, where Buckingham was lodged. Here mingling with the crowd of applicants and unnoticed he stabbed the duke, who immediately fell dead. Though escape would have been easy he confessed the deed and was seized and conveyed to the Tower, his journey thither, such was the unpopularity of the duke, being accompanied by cries of "God bless thee" from the people. Charles and Laud desired he should be racked, but the illegal torture was prevented by the judges. He was tried before the king's bench on the 27th of November, pleaded guilty, and was hanged the next day, his body being exposed in chains subsequently at Portsmouth.

FELTRE, MORTO DA, Italian painter of the Venetian school, who worked at the close of the 15th century and beginning of the 16th. His real name appears to have been Pietro Luzzo; he is also known by the name Zarato or Zarotto, either from the place of his death or because his father, a surgeon, was in Zara during the son's childhood; whether he was termed Morto (dead) from his joyless temperament is a disputed point. He may probably have studied painting first in Venice, but under what master is uncertain. At an early age he went to Rome, and investigated the ancient, especially the subterranean remains, and thence to Pozzuoli, where he painted from the decorations of antique crypts or "grotte." The style of fanciful arabesque which he formed for himself from these studies gained the name of "grottesche," whence comes the term "grotesque"; not, indeed, that Morto was the first painter of arabesque in the Italian Renaissance, for art of this kind had, apart from his influence, been fully developed, both in painting and in sculpture, towards 1480, but he may have powerfully aided its diffusion southwards. His works were received with much favour in Rome. He afterwards went to Florence, and painted some fine grotesques in the Palazzo Pubblico. Returning to Venice towards 1505, he assisted Giorgione in painting the Fondaco dei Tedeschi, and seems to have remained with him till 1511. If we may trust Ridolfi, Morto eloped with the mistress of Giorgione, whose grief at this transaction brought him to the grave; the allegation, however, is hardly reconcilable with other accounts. It may have been in 1515 that Morto returned to his native Feltre, then in a very ruinous condition from the ravages of war in 1509. There he executed various works, including some frescoes, still partly extant, and considered to be almost worthy of the hand of Raphael, in the loggia beside San Stefano. Towards the age of forty-five, Morto, unquiet and dissatisfied, abandoned painting and took to soldiering in the service of the Venetian republic. He was made captain of a troop of two hundred men; and fighting valorously, he is said to have died at Zara in Dalmatia, in 1519. This story, and especially the date of it, are questionable: there is some reason to think that Morto was painting as late as 1522. One of his pictures is in the Berlin museum, an allegorical subject of "Peace and War." Andrea Feltrini was his pupil and assistant as a decorative painter.

FELTRE (anc. *Feltria*), a town and episcopal see of Venetia, Italy, in the province of Belluno, 20 m. W.S.W. of it by rail, situated on an isolated hill, 885 ft. above sea-level. Pop. (1901) 5468 (town), 15,243 (commune). The cathedral has a fine polygonal apse of the 16th century. The Palazzo del Consiglio, now a theatre, is attributed to Palladio. At one end of the chief square of the town, the Piazza Maggiore, is the cistern by which the town is supplied with water, and a large fountain. There are some remains of the medieval castle. The ancient Feltria, which lay on the road (Via Claudia) from Opitergium to Tridentum, does not seem to have been a place of any importance under the Romans. Vittorino dei Rambaldoni da Feltre (1378–1446) was a famous educator and philosopher of his time.

FELUCCA (an Italian word; in forms like the Span. *faluca*, Fr. *felouque*, it appears in other languages; it is probably of Arabic origin, cf. *fulk*, a ship, and *falaka*, to be round; the modern Arabic form is *falūkah*), a type of vessel used in the Mediterranean for coasters or fishing-boats. It is a long, low and narrow undecked vessel, built for speed, and propelled by oars or sails. The sails are lateen-shaped and carried on one or two masts placed far forward (see Boat).

FEMALE, the correlative of "male," the sex which performs the function of conceiving and bearing as opposed to the begetting of young. The word in Middle English is *femelle*, adopted from the French from the Lat. *femella*, which is a diminutive, and in classical Latin used strictly as such, of *femina*, a woman. The present termination in English is due to a connexion in ideas with "male." In various mechanical devices, where two corresponding parts work within the other, the receiving part is often known as the "female," as for example in the "male" and "female screw." The O. Fr. *feme*, modern *femme*, occurs in legal phraseology in *feme covert*, a married woman, *i.e.* one protected or covered by a husband, and in *feme sole*, one not so protected, a widow or spinster (see Women and Husband and Wife).

FEMERELL, properly Fumerell (from O. Fr. *fumeraille*, Lat. *fumus*, smoke), the old English term given to the lantern in the ridge of a hall roof for the purpose of letting out the smoke of the fire kindled on a central hearth.

FENCING. If by "fencing"—the art of fence, *i.e.* of defence or offence—were meant generally the dexterous use of the sword, the subject would be wide indeed; as wide, in fact, as the history of the sword (*q.v.*) itself. But, in its modern acceptation, the meaning of the word has become considerably restricted. The scope of investigation must therefore be confined to one kind of swordsmanship only: to that which depends on the regulated, artificial conditions of "single combat." It is indeed this play, hemmed in by many restrictions, which we have come to mean more specially by "fencing." It differs, of course, in many respects, from what may be called the art of fighting in the light of nature. But as its restrictions are among the very elements which work to the perfection of the play, it is undoubtedly in the history of swordsmanship as applied to duelling (see Duel) that we shall trace the higher development of the art.

It may be said that the history of fencing, therefore, would be tantamount to the history of private duelling. Now, this is an ethical subject; one, again, which would carry the investigation too far; and it need not be taken up farther back than the middle of the 16th century, when, on the disuse of the medieval wager of battle, the practice of *private duelling* began to take an assured footing in a warlike society. It is curious to mark that the first cultivation of refined cunning in fence dates from that period, which corresponds chronologically with the general disuse of armour, both in battle and in more private encounters. It is still more curious to note that, in order to fit himself to meet what was an illegal but aristocratic obligation, the gallant of those days had to appeal to a class of men hitherto little considered: to those plebeian adepts, in fact, who for generations had cultivated skill in the use of hand weapons, on foot and without armour. Thus it came to pass that the earliest masters of fence in all countries, namely, the masters of the art of conducting skilfully what was essentially considered as an honourable encounter, were almost invariably to be found among a somewhat dishonoured gentry—gladiators, free companions, professional champions, more or less openly recognized, or bravoes of the most uncompromising character.

In Germany, which may be considered the cradle of systematic swordsmanship, these teachers of the sword had, as early as the 15th century, formed themselves into gilds; among which the best known were the *Marxbrüder*, or the Associates of St Marcus of Löwenberg, who had their headquarters at Frankfort, and branches in all the more important towns. Similarly, in Spain and in northern Italy, professional swordsmen were at various times allowed to form themselves into recognized or at least tolerated associations.

In England "swordmen" had been looked upon with especial disfavour by the powers that were, until Henry VIII., who was a great lover of all manly exercises, found it likewise advisable to turn their obnoxious existence to a disciplined and profitable channel by regularizing their position. The most redoubtable masters were allowed to form themselves into a company, with powers to increase their numbers with suitable and duly tried men, in imitation of the world-famed German *Marxbrüder* or *Marcusbrüder.* Under these conditions they were granted the lucrative monopoly of teaching the art of fight in England. The enormous privileges that the king, in course of time, conferred on his Corporation of Masters of Defence very soon enabled it to put down or absorb all the more ferocious of independent swashbucklers, and thereby to impart to the profession a moderate degree of respectability under the coat of arms granted by the royal heralds: gules a sword pendant argent.

It was in the midst of such corporations and in the fighting dens of independent swordsmen, therefore, that sprouted the first buds of systematic swordsmanship. Among the professional fencers, curiously and happily for the historian, there seem to have been a few with a literary turn of mind.

The oldest manuscripts of fence belong to Italy and Germany. They deal with the methods of carrying out single combats on foot, with any of the most generally accepted weapons—long sword and short sword, dagger and every kind of knives, mace, long and short staff, axes, &c.,—and with the tricks of wrestling recommendable therefor. Among the most comprehensive in their scope may be mentioned *Il Fior di battaglia di Maestro Fiore dei Liberi da Premariaco*; a work which, although illustrated with truly Italian taste and grace, shows, as far as its fighting style is concerned, unmistakable marks of German influence. The text of the MS. bears the date 1410, but the writer was known to be flourishing as a master of fence as early as 1383. A reprint of this invaluable codex has been published, under the care of Francesco Donati, by the *Istituto Italiano d' Arti Grafiche.* Another is the better known *Thalhofer's Fecht Buch, gerichtliche und andere Zweykämpfe darstellend* (1467), a reprint of which, with its 268 plates in facsimile, was brought out by Gustave Hergsell in Prague. The oldest printed book is likewise German: *Ergründung der ritterlicher Kunst der Fechterei, von Andreas Paurnfeindt, Freifechter zu Wien* (1516). This work, which is exceedingly rare, is a very complete exponent of the ways of wielding long and short blades to the utmost of their lethal capacity. It was reproduced (under various titles, very confusing to the bibliographer) in Frankfort, Augsburg, Strassburg, and finally done into French under the name of *La Noble science des joueurs d'épée*, published in Paris and Antwerp, 1535.

Following the Germans, the oldest printed books of fence are Italian. The first French book on the sword is known to be a translation from the German. Curiously enough, the second, and one of the most notable, *Le Traité de l'épée seule, mère de toutes armes*, of the Sieur de St Didier, published in Paris in 1573, can be shown to be a transparent adaptation of two Italian treatises, the *Trattato di scienza d' arme* of Camillo Agrippa, and Grassi's *Ragione di adoperar sicuramente l'arme*, &c.

It is about this time, namely, the latter half of the 16th century, that swordsmanship pure and simple may be said to find its origin; for then a great change is perceptible in the nature and tendency of fence books: they dissociate themselves from indecorous wrestling tricks, and approximate more and more to the consideration of what we understand by swordsmanship. The older works expounded the art of fighting generally; taught the reader a number of valuable, if not "gentlemanlike," dodges for overcoming an adversary *at all manner of weapons*: now the lucubrations of fence-masters deal almost exclusively with the walking sword, that is, the duelling weapon—with the rapier in fact, both with and without its lieutenant, the dagger.

It must be remembered that at this period private duelling and cavalier quarrelsomeness amounted to a perfect mania. The fencing master was no longer merely a teacher of efficacious, if rascally, tricks; he was becoming a model of gallant deportment; in many cases he was even a recognized arbiter on matters of honour. He was often a gentleman himself: at all events he posed as such.

Although the Germans were always redoubtable adepts at the rougher games of swordsmanship, it is in Italy that is to be found development of that nimbler, more regulated, more cunning, better controlled, kind of play which we have learned to associate with the term "fencing." It was from Italy that the art of fence first spread over Europe: not from Spain, as it has been asserted by many writers. The Italians—if we take their early books as evidence, and the fact that their phraseology was adopted by all Europe—were the first to perceive (as soon as the problem of armour-breaking ceased to be the most important one in fight) the superior efficiency of the point. They accordingly reduced the breadth of their sword, modified the hilt portion thereof to admit of readier thrust action, and relegated the cut to quite a secondary position in their system. With this lighter weapon they devised in course of time that brilliant cunning play known as rapier fence.

The rapier was ultimately adopted everywhere by men of courtly habit; but, in England at least, it was not accepted without murmur and vituperation from the older fighting class of swordsmen, especially from the members and admirers of the English Corporation of Defence Masters. As a body Englishmen were as conservative then as they are now. They knew the value of what they had as their own, and distrusted innovations, especially from foreign quarters. The old sword and the buckler were reckoned as your true English weapons: they always went together—in fact sword and buckler play in the 16th century was evidently held to be as national a game as boxing came to be in a later age. Many are the allusions in contemporary dramatic literature to this characteristic national distrust of continental innovations. There is the well-known passage in Porter's play, *The Two Angry Women of Abingdon*, for instance: "Sword and buckler fight," says a sturdy Briton (in much the same tone of disgust as a British lover of fisticuffs might now assume when talking of a French "Mounseer's" foil play), "begins to grow out of use. I am sorry for it. I shall never see good manhood again. If it be once gone, this poking fight with rapier and dagger will come up. Then the tall man (that is, a courageous man and a good sword-and-buckler man) will be spitted like a cat or a rabbit!" The long-sword, that is, the two-hander, was also an essentially national weapon. It was a right-down pleasing and sturdy implement, recalling in good steel the vernacular quarter-staff of old. It required thews and sinews, and, incidentally, much beef and ale. The long-sword man looked perhaps with even greater disfavour than the smaller swashbuckler upon the new-fangled "bird-spit." "Tut, man," says Justice Shallow, typical *laudator* of the good bygone days, on hearing of the ridiculous Frenchman's skill with his rapier, "I could have told you more. In these times you stand on distance, your passes, stoccadoes, and I know not what; 'tis the heart, Master Page; 'tis here, 'tis here. I have seen the time, with my long-sword, I would have made you four tall fellows skip like rats."

Now, sword-and-buckler and long-sword play was no doubt a manly pursuit and a useful. But, as an every-day companion, the long-sword was incongruous to a fastidious cavalier; and, again, the buckler, indispensable adjunct to the broad swashing blade of home production, was hardly more suitable. In Elizabethan days it soon became obvious that the buckler was inadmissible as an item of gentlemanly attire. It was accordingly left to the body attendant; and the gallant took kindly to the fine rapier of Milanese or Toledan make. On the other hand, it is not difficult to understand the rapid popularity gained among the gentry by this nimble rapier, so much reviled by the older fighting men. The rapier, in fact, came in with the taste for "cavaliero" style, and may be looked upon as its fit outward symbol already in the days of Queen Mary. In Elizabeth's reign it was firmly established as your only gentlemanlike weapon.

The rapier was decidedly a foreigner; yet it suited the Elizabethan age, for it was decorative as well as practical. Its play was picturesque, fantastic—almost euphuistic, one might say—in comparison with the matter-of-fact hanger of older days. Its phraseology had a quaint, rich, southern smack, which connoted outlandish experience and gave those conversant with its intricate distinctions that marvellous character, at once precious and ruffling, which was so highly appreciated by the cavalier youth of the time. The rapier in its heyday was an admirable weapon to look at, a delicious one to wield. And, besides, in proper hands, it was undoubtedly one that was most conclusive. It was, in short, as elegant and deadly as its predecessors were sturdy and brutal.

By the time that the most perfect, namely, the Italian, rapier fence came to be generally taught in England—that is, during the last third of Elizabeth's reign—the theory of swordsmanship, as applied to a single combat, after having passed through many phases of imperfection, was already tolerably simple and practical. (The exact story of its evolution may be found in a work now included in Bohn's Libraries, *Schools and Masters of Fence*.) What may be considered as one of the cardinal actions of regulated sword-play on foot, namely, the lunge, had already been discovered. Although a great many movements which, according to modern notions, would be considered not only unnecessary but actually pernicious, still formed part of the system, it may be doubted whether, considering the character of the weapon, anything very much better could be devised, even in our present state of knowledge.

For it must be remembered that the evolution of the forms of the sword and of the theories concerning its most efficient use are closely connected. It is, in fact, sometimes difficult to decide whether the change in the shape of the weapon was the result of a development of a theory; or whether new theories were elaborated to fit alterations in these shapes due to fashion or any other reason.

When systematic fence came over to England it was already much simplified (it should be noted that improvement in the art, from its earliest days down to the present time, seems always to have been in the direction of simplification); yet, for more than a century from the appearance of the first real treatise, simplification never reached that point which would render impossible a belief in the undoubted efficacy of those "secret thrusts," of that "universal parry," of those ineluctable passes, which every master professed to teach. These precious secrets remain long, among a certain shady class of swordsmen, an object of untiring study, carried on with much the same faith and zest as the quest of the alchemist for his powder of projection, or of the Merchant Adventurer for El Dorado. There can, of course, be no such thing as an insuperable pass, a secret thrust or parry; every attack *can* be parried, every parry can be deceived by suitable movements. Yet there was some justification for the belief in the existence of secrets of swordsmanship in days when, as a rule, lessons of fence were given in jealous privacy; constant practice at one particular pass, especially with the long rapier, which required a great deal of muscular strength, might render any peculiarly fierce, sudden and audacious stroke excessively dangerous to one who did not happen to have opposed that stroke before. Undoubtedly there was little in Elizabethan fencing-schools of what we understand in modern days by loose-play between the pupils; practice was almost invariably conducted between scholar and teacher in private; and thus the opportunities for watching or testing any particular fencer's play were few. Such an opportunity would, as a rule, only occur on occasions of an earnest fight; and the possessor of a specially handy thrust (if it came off at all) would of course take good care that his opponent should not live to ponder over the secret. The secret, such as it was, remained. In this guise it was inevitable that an almost superstitious belief in "secret foynes," in the *botte secrète* of certain practised duellists, should arise.

Be that as it may, there is no doubt that towards the end of the 16th century there were many free-lances in the field of arms who professed to teach, in exchange for much gold, strokes that were not to be parried. From one truculent personage, whom Brantôme mentions, Tappa the Milanese, you could learn how to cut (if it so took your fancy) both eyes out of your adversary's face with a *rinverso tondo*, or circular "reverse of the point." From Caizo, another Italian teacher, at one time much favoured by the French court, lessons were to be had in the special art of ham-stringing. Caizo's *botte secrète* seems to have been nothing more nor less than a *falso manco*, that is, a left-handed drawing cut, at the inside of the knee. But, as practised and taught by him, it was infallible. This stroke has come down to us as *le coup de Jarnac*—a stroke, be it said, which, notwithstanding its bad name, was quite as fair as any in rapier fence. One Le Flamand, a French master in Paris, was reputed the inventor of a jerky time-thrust at the adversary's brows, which was a certainty. This special foyne, which was merely an *imbrocata* at the head, has become legendary in the fencing world as *la botte de Nevers*. English fencers have their own legends about "the very butcher of a silk button," and this brings us to the first writer on the rapier in England, Vincenzio Saviolo, the great expounder of that Italianated fence which was so obnoxious to the old masters, withal so much admired of Elizabethan courtiers; the man, in short, who—there seems to be much internal evidence to show it—was Shakespeare's fencing master.

Vincenzio was not the only foreign master of note established in London during the latter part of Elizabeth's reign. One, Signor Rocco, had, we hear, a very gorgeously appointed academy in Warwick Lane, near St Paul's, where he coined money rapidly at the expense of gulls and gallants alike. But this man came to grief ultimately in an encounter with the long-sword with an old-fashioned English master of defence. Another popular teacher was a certain "Geronimo"; but he also met with a melancholy and premature end by the hands of one Cheefe, "a tall man in his fight and natural English," says George Silver, the champion of the Corporation of Masters of Defence. Saviolo, however, seems to have remained unconquered. In his work (*Vincentio Saviolo, his practise, in two bookes, the first intreating of the use of the Rapier and Dagger, the second of Honor and honorable quarrels*. London. Printed by John Wolfe, 1595) are expounded in a most typical manner the principles of rapier play.

The fencing phraseology of Elizabethan times is highly picturesque, but with difficulty intelligible in the absence of practical demonstration. Without going into technical details it may be pointed out that the long Elizabethan rapier, however admirably balanced it might otherwise be, was still too heavy to admit of quick parries with the blade itself. Thrusts, as a rule, had to be avoided by body movements, by ducking, or by a vault aside (*incartata*), or beaten away with the left hand, the hand being protected with a gauntlet or armed with a dagger. In fact, one may say that the chief characteristic of Elizabethan sword-play was the concerted action of the left hand parrying while the right delivered the attack. Benvolio's description of Tybalt's fight is graphic:—

> "With piercing steel he tilts at bold Mercutio's breast,
> Who, all as hot, turns deadly point to point,
> And with a martial scorn, with one hand beats
> Cold death aside, and with the other
> Sends it back to Tybalt, whose dexterity
> Retorts it . . ."

Of these body movements, in Saviolo's days, the most approved were: the *incartata*, just mentioned; the pass (the "passado," in the ruffling Anglo-Italian jargon), that is, passing of one foot in front of the other whilst delivering the attack; the *botta lunga*, or lunge; and the *caricado*, which was a far-reaching combination of the two. Of systematic sword movements there were six: *stocata*, a thrust delivered with nails upwards; *imbrocata*, with nails down; *punta-reversa*, any thrust delivered from the left side of the body; *mandritto*, a cut from the right; *rinverso*, one from the left; *stramazone*, a right-down blow with the point of the sword.

The new art of fence, as systematized by the principles of rapier play, was on the whole already accepted in England during the last decade of the 16th century, and was, as we know, destined to endure. Nevertheless, there were still many partisans of the older school: lovers of the national short-sword and the buckler. Their tenets are to be found embodied, in very strenuous language, by the George Silver mentioned above, a member, it would seem, of the now dwindling company of Masters of Defence, in his small work: *Paradoxe of Defence, wherein is proved the true ground of fight to be in the short ancient weapons, etc.* Printed in London, 1599. (The work has been reprinted by Messrs George Bell & Sons.)

The Italians were undoubtedly the leaders in sword-play; but, towards the beginning of the 17th century, the Spaniards developed a peculiar school of their own, which for a short while was all the mode in England as well as in France. The last trace, be it stated, of that school is now extinct. Yet the Spaniard of cavalier days was undoubtedly a formidable duellist; that was no doubt owing to the quality of the man, not of his art. The Italian's fence was artistic; the Spaniard's dexterity was essentially scientific. In Spain were to be found typically those "Captains of Complements," who not only understood in their most intricate mazes the proper "dependencies" for the cartel, but also the mathematical certainties for the "reason demonstrative." These Spanish books are marvellously pedantic; one may as well say it, frankly ridiculous. Spanish masters instructed their scholars on mathematical lines, with the help of diagrams drawn on the floor within a circle, the radius of which bore certain cryptic proportions to length of human arms and Spanish swords. The circle was inscribed in squares and intersected by sundry chords bearing occult but, it was held, incontrovertible relations to probabilities of strokes and parries. The scholar was to step from certain intersections to certain others. If this stepping was correctly done the result was a foregone victory. "A villain," exclaims Mercutio, indignantly, "who fights by the book of arithmetic." Elizabethan comedies bring us many an echo of its great expounder of mathematical swordsmanship, the magnificent Carranza, the *primer inventor de la Ciencia de las Armas*, the writer of treatises so abstruse on "the first and second cause," in questions of honour and sword-ing, that they have never been quite understood to this day.

Perhaps the most curious matter in connexion with the Spanish fence is that the most splendid treatise of the sword published in the French language is in reality purely Spanish (we have seen that the first was German, and the second an adaptation of Italian treatises). This third work, *Académie de l'épée de Girard Thibault, d'Anvers, etc.*, is indeed a monument; one of the biggest books ever printed, and beyond compare the biggest book of fence. It was issued in 1628 by the Leiden Elzevirs, and took fifteen years to complete. Nine reigning princes and a vast number of private gentlemen subscribed to meet its stupendous expenses.

This work was spoken of as a "monument." It may, in some respects, be looked upon as the funeral monument of the old rapier fence; for soon after that period rose an entirely new school, one adapted to the use of a less portentous weapon, the small-sword of French pattern; a school destined to endure, and to lead to the perfection of our modern *escrime*.

The evolution of this new school is an instance of the influence of fashion upon the shape of the sword, and hence upon theories concerning its use. The French school of fencing may be said to owe its origin to the adoption, under Louis XIV., of the short court-sword in place of the over-long wide-hilted rapier of the older style. With a weapon of such reduced dimensions, of such reduced weight, the advantage of the dagger as a fencing adjunct at once ceased to be felt. The dagger, last Gothic remnant, disappeared accordingly; and there arose rapidly a new system of play, in which most of the defensive actions were performed by the blade alone; in which, at the same time (the reduction in the size and weight of the weapon rendering the efficiency of the edge almost nugatory in comparison with that of the point), all cutting action was ultimately discarded.

It is from that date, namely, from the last third of the 17th century, that the sword, as a fighting implement, becomes differentiated into two very different directions. The military weapon becomes the back-sword or sabre; the walking companion and duelling weapon becomes what we now understand by the small-sword. Two utterly different kinds of fence are practised: one, that of the back-sword; the other, what we would now call foil-play.

The magnificent old cut and thrust rapier still flourished, it is true, in parts of Italy and Spain; but by the end of the 17th century it had already become an object of ridicule in the eyes of all persons addicted to *bon ton*—and it must be remembered that *bon ton*, on the Continent everywhere and even in England, at that time, was French *ton*. The walking sword, fit for a gentleman's side, was therefore the small-sword of Versailles pattern. Its use had to be learnt from French masters of deportment; the old magniloquent Italo-Spanish rapier jargon was forgotten; French terms, barbarized into *carte*, *tierce*, *sagoon*, *flanquonade*, and so forth, were alone understood. In fact, French fencing became as indispensable an accomplishment to the Georgian gentlemen as the fine Italianated foyning had been to the Elizabethan.

The new French sword-play was, it must be owned, very neat, quiet, precise, and, if anything, even more deadly than the old fence. It was perfect as a decorous mode of fight, and as well suited to the lace ruffles, to the high perruque and the red heels of the "beau" as the long cup-hilted rapier had been to the booted and spurred "cavalier." The essence of its play was nimbleness of wrist; it required quickness of spirit rather than muscular vigour. It is to be noted, however, that the same sort of popular opposition met the invasion of French fencing, in post-Restoration days, that had been offered to the new-fangled Italian rapier a century earlier. During the Parliamentary period the rapier and its attendant dagger had practically disappeared; they were not true warlike weapons, their chief virtue was for duelling or sudden encounters. But the stout English back-sword survived; and with it a very definite school of back-sword play. Under Charles II., the amusement of stage or prize-fighting with swords had become *à la mode*. Courteous assaults at many weapons, of course rebated, had been frequent functions under the auspices of the Corporation of Masters of Defence during the second half of the 16th century; it is (be it remarked) in such sword-matches on the scaffold that we find the origin of our modern prize-fights at fisticuffs. The first instance known of a challenge at sharps on the fighting stage is seen in a cartel sent by George Silver and Toby his son, as champions of the Corporation of Masters of Defence, to the obnoxious "Signors" Saviolo and Geronimo. As a matter of fact, the latter, having apparently no wish to improve their excellent social position or to risk forfeiting it, declined this invitation to a public trial of skill. But the idea was right martial and pleasing to the English mind, and the fashion of prize-fighting took the firm hold it retained on English minds till stringent legislation, not so very long ago, was brought to bear upon it. Be it as it may, this prize-fighting with swords endured until middle Georgian days; when, under the impetus given to fistic displays then by the renowned Figg (who was at one and the same time the most formidable of English fencers and the first on the long list of English pugilistic champions), back-swording became relegated to the provinces, and ultimately dwindled into our bastard "single-stick."

Fencing, in its restricted sense of purely thrusting play, was always an "academic" art in England. The first great advocate and exponent of the new small-sword fence, as taught by the new French school, was Sir William Hope of Balcomy, at one time deputy governor of Edinburgh Castle, who wrote a great number of quaint treatises of great interest to the "operative" as well as to the "speculative" fencer. Yet, oddly enough, Sir William Hope was instrumental in endeavouring to push through parliament a bill for the establishment of a court of honour, the office of which was to have been the deciding of honourable quarrels, whenever possible, without appeal to fencing skill. The House, however, being at the time excited and busy on the question of the union of Scotland and England, the bill never became act.

To resume: since it began to be practised as a regulated art one may say broadly that sword play has already passed through four main phases. The first belongs to the early Tudor days, of sword and buckler encounters, whereof, if the best theoretical treatises appeared in Italy, the sturdiest practical exponents were most probably found in the British Isles. Then came the age of the rapier, coeval with the general disuse of the buckler. There may be discerned the dawn of fencing proper, which will fully arise when, in Caroline times, the outrageous length of the tucke will at last be sufficiently reduced no longer to require the dagger as a helpmate. The third was the age of the small-sword. With its light, elegant and deadly practice we enter a new atmosphere, so to speak, on fencing ground. Suppleness of wrist and precision of fingering replace the ramping and traversing, the heavy forcing play, of the Elizabethan. If the rapier age was well exemplified by Vincent Saviolo, this one was typified, albeit perhaps at a time when it was already somewhat on the wane, by the admirable Angelo Tremamondo Malevolti.

In the early days of the small-sword age men still fenced in play as they fought in earnest. But presently there appeared on the scene (during the last years of the 18th century) an implement destined to revolutionize the art and hopelessly to divide the practice of the school from that of the field: that was the fencing mask. Before this invention, small-sword play in the master's room was perforce comparatively cautious, correct, sure and above all deliberate. The long, excited, argumentative phrases of modern assaults were unknown; and so was the almost inevitably consequent scrimmage. But under the protection of the fencing mask a new school of foil-play was evolved, one in which swiftness and inveteracy of attack and parry, of *riposte*, *remise*, *counter-riposte* and *reprise*, assumed an all-important character. With the new style began to assert itself that utter recklessness of "chance hits" which in our days so markedly differentiates foil-practice from actual duelling. And this brings us to the fourth phase, the fencing art, to what may be called the age of the foil.

If anything were required to demonstrate that foil-play has nowadays passed into the state of what may be called fine art in athleticism, it would be found in the rise of the method which French masters particularize as *le jeu du terrain*, as duelling play in fact; a play which differs as completely from academic foil-fencing as cross-country riding in an unknown district from the *haute école* of horsemanship in the *manège*. By fencing, nowadays, that is by foil-play, we have come to mean not simply fighting for hits, but a strictly regulated game which, being quite conventional, does not take accidental hits into consideration at all. This game requires for its perfect display a combination of artificial circumstances, such as even floors, featherweight weapons, and an unconditional acceptance of a number of traditional conventions. Now, for the more utilitarian purposes of duelling, the major part of the foil fencer's special achievement and brilliancy has to be uncompromisingly sacrificed in the presence of the brutal fact that thrusts in the face, or below the waist, *do* count, insomuch as they may kill; that *accidental* hits in the arm or the leg cannot be disregarded, for they may, and generally do, put a premature stop to the bout. The "rub on the green" must be accepted, perforce, and indeed often plays as important a part in the issue of the game as the player's skill. The fact, however, that in earnest encounters all conventionalities which determine the value of a hit vanish, does not in any way justify the notion, prevalent among many, that a successful hit justifies any method of planting the same; and that the mere discarding of all convention in practical sword-play is sufficient to convert a bad fencer into a dangerous duellist.

It is the recognition of this fact (which, oddly enough, only came to be generally admitted, and not without reluctance, by the masters of the art during the last quarter of the 19th century) which has led to the elaboration of the modified system of small-sword fence now known as *épée* play. The new system, after passing through various rather extravagant phases of its own, gradually returned to the main principle of sound foil-play, but shorn of all futile conventions as to the relative values of hits. In *épée* play a hit is a hit, whether correctly delivered or reckless, whether intentional or the result of mere chance, and must, at the cost of much caution and patience, be guarded against.

Per contra the elaboration by the devotees of the *épée* of a really practical system of fence, that is, one applicable to trials in earnest, has reacted upon the teaching of foil-play by the best masters of the present day—a teaching which, without ceasing to be academical up to a certain point, takes now cognisance of the necessity of defending every part of the body as sedulously as the target of the breast, and, moreover, of warding the many possibilities of chance hits in *contretemps*.

In both plays—in the highly refined, complicated and brilliant fence of the first-class "foil," as well as in the simpler and more cautious operations of the practised duellist—the one golden rule remains, that one so quaintly expressed by M. Jourdain's *maître d'armes* in Molière's comedy: "Tout le secret des armes ne consiste qu'en deux choses, à donner et à ne point recevoir."

The point most usually lost sight of by sanguine and self-reliant scorners of conventionalities is that, although with the sword it may be comparatively easy at any time "to give," it is by no means easy to make sure of "giving without receiving." The mutual simultaneous hit—the *coup-double*—is, in fact, the dread pitfall of all sword-play. For this reason, in courteous bouts, a hit has no real value, not only when it is actually cancelled by a counter, but when it is delivered in such a way as to admit of a counter. In short, the experience of ages and the careful consideration of probabilities have given birth to the various make-believes and restrictions that go to make sound foil-play. These restrictions are destined to act in the same direction as the warning presence of a sharp point instead of a button; and thus, as far as possible, to prevent those mutual hits—the *contretemps* of the old masters—which mar the greater number of assaults. The proper observance of those conventions, other things being equal, distinguishes the good from the indifferent swordsman, the man who uses his head from him who rushes blindly where angels fear to tread. So much for foil-play.

In modern sword-play, on the other hand, is seen the usual tendency of arts which have reached their climax of complication to return to comparative simplicity. With reference to actual duelling, it is a recognized thing that it would be the height of folly to attempt, sword in hand, the complex attacks, the full-length lunges, the neat but somewhat weak parries of the foil; so much so, that many have been led to assert that, for its ultimate practical purpose (which logically is that of duelling), the refined art of the foil, requiring so many years of assiduous and methodical work, is next to useless. It is alleged, as a proof, that many successful duellists have happened to be indifferent performers on the fencing floor. Some even maintain that a few weeks' special work in that restricted—very restricted—play, which alone can be considered safe on the field of honour, will produce as good a practical swordsman as any who have walked the schools for years. Nothing can be further from the truth: were it but on the ground that the greater includes the less; that the foil-fencer of standing who can perform with ease and accuracy all the intricate movements of the assault, who has trained his hand and eye to the lightning speed of the well-handled foil, must logically prove more than a match for the more purely practical but less trained devotees of the *épée de combat*. The only difference for him in the two plays is that the latter is incomparably slower in action, simpler; that it demands above all things patience and caution; and especially that, instead of protecting his breast only, the *épée* fencer must beware of the wily attack, or the chance hit, at *every* part of his body, especially at his sword-hand.

The difference which still exists between the French and Italian schools of small-sword fence—by no means so wide, in point of theory, as popularly supposed—is mainly due to the dissimilarity of the weapons favoured by the two countries. The quillons, which are retained to this day in the Italian *fioretto* and *spada*, conduce to a freer use of wrist-play and a straight arm. The French, on the other hand, having long ago adopted the plain grip both for *fleuret* and *épée*, have come to rely more upon finger-play and a semi-bent arm. Both schools have long laid claims to an overwhelming superiority, on theoretical ground, over their rivals—claims which were unwarrantable. Indeed, of later days, especially since the evolution of a special "duelling play," the two schools show a decided tendency, notwithstanding the difference in the grip of the weapons, towards a mutual assimilation of principles.

As a duelling weapon—as one, that is to say, the practice of which under the restrictive influence of conventions could become elaborated into an art—the sabre (see Sabre-fencing) returned to favour in some countries at the close of the Napoleonic wars. Considered from the historical point of view, the modern sabre, albeit now a very distant cousin of the small-sword, is as direct a descendant as the latter itself of the old cut-and-thrust rapier. It is curious, therefore, to note that, just as the practice of the "small" or thrusting sword gave rise to two rival schools, the French and the Italian, that of the sabre or cutting sword (it can hardly be called the broadsword, the blade, for the purposes of duelling play, having been reduced to slenderest proportions) became split up into two main systems, Italian and German. And further it is remarkable that the leading characteristics of the latter should still be, in a manner, "severity" and steadfastness; and that the former, the Italian, should rely, as of yore, specially upon agility and insidious cunning.

Concerning the latter-day evolution of that special and still more conventional system of fence, the *Schläger* or *Hau-rapier* play favoured by the German student, from that of the ancestral rapier, the curious will find a critical account in an article entitled "*Schlägerei*" which appeared in the *Saturday Review*, 5th of December 1885.

See also the separate articles on Cane-Fencing (*canne*); Épée-de-Combat; Foil-Fencing; Sabre-Fencing; and Single-stick.

Authorities.—The bibliography of fencing is a copious subject; but it has been very completely dealt with in the following works: *Bibliotheca dimicatoria*, in the "Fencing, Boxing and Wrestling" volume of the Badminton library (Longmans); *A Bibliography of Fencing and Duelling*, by Carl A. Thimm (John Lane). For French works more especially: *La Bibliographie de l'escrime*, by Vigeant (Paris, Motteroz); and *Ma Collection d'escrime*, by the same (Paris, Quantin). For Italian books: *Bibliografia generale della scherma*, by Gelli (Firenza, Niccolai). For Spain and Portugal: *Libros de esgrima españoles y portugueses*, by Leguina (Madrid, Los Huérfanos). Both M. Vigeant's and Cav. Gelli's works deal with the subject generally; but their entries are only critical, or even tolerably accurate, in the case of books belonging to their own countries. Concerning the history of the art, Egerton Castle's *Schools and Masters of Fence* (George Bell); Hutton's *The Sword and the Centuries* (Grant Richards); and Letainturier-Fradin's *Les Joueurs d'épée à travers les âges* (Paris, Flammarion) cover the ground, technically and ethically. As typical exponents of the French and Italian schools respectively may be mentioned here: *La Théorie de l'escrime*, by Prévost (Paris, de Brunhof) (this is the work which was adopted in the Badminton volume on Fencing), and *Trattato teorico-pratico della scherma*, by Parise (Rome, Voghera). (E. Ca.)

FENDER, a metal guard or defence (whence the name) for a fire-place. When the open hearth with its logs burning upon dogs or andirons was replaced by the closed grate, the fender was devised as a finish to the smaller fire-places, and as a safeguard against the dropping of cinders upon the wooden floor, which was now much nearer to the fire. Fenders are usually of steel, brass or iron, solid or pierced. Those made of brass in the latter part of the 18th and the earlier part of the 19th centuries are by far the most elegant and artistic. They usually had three claw feet, and the pierced varieties were often cut into arabesques or conventional patterns. The lyre and other motives of the Empire style were much used during the prevalence of that fashion. The modern fender is much lower and is often little more than a kerb; it is now not infrequently of stone or marble, fixed to the floor.

FÉNELON, BERTRAND DE SALIGNAC, seigneur de la Mothe (1523–1589), French diplomatist, came of an old family of Périgord. After serving in the army he was sent ambassador to England in 1568. At the request of Charles IX. he endeavoured to excuse to Elizabeth the massacre of St. Bartholomew as a necessity caused by a plot which had been laid against the life of the king of France. For some time after the death of Charles IX. Fénelon was continued in his office, but he was recalled in 1575 when Catherine de' Medici wished to bring about a marriage between Elizabeth and the duke of Alençon, and thought that another ambassador would have a better chance of success in the negotiation. In 1582 Fénelon was charged with a new mission to England, then to Scotland, and returned to France in 1583. He opposed the Protestants until the end of the reign of Henry III., but espoused the cause of Henry IV. He died in 1589. His nephew in the sixth degree was the celebrated archbishop of Cambrai.

Fénelon is the author of a number of writings, among which those of general importance are *Mémoires touchant l'Angleterre et la Suisse, ou Sommaire de la négociation faite en Angleterre, l'an 1571* (containing a number of the letters of Charles and his mother, relating to Queen Elizabeth, Queen Mary and the Bartholomew massacre), published in the *Mémoires* of Castelnau (Paris, 1659); *Négociations de la Mothe Fénelon el de Michel, sieur de Mauvissière, en Angleterre*; and *Dépêches de M. de la Mothe Fénelon, Instructions au sieur de la Mauvissière*, both contained in the edition of Castelnau's *Mémoires*, published at Brussels in 1731. The correspondence of Fénelon was published at Paris in 1838–1841, in 7 vols. 8vo.

See "Lettres de Catherine de' Médicis," edited by Hector de la Ferrière (1880 seq.) in the *Collection de documents inédits sur l'histoire de France.*

FÉNELON, FRANÇOIS DE SALIGNAC DE LA MOTHE (1651–1715), French writer and archbishop of Cambrai, was born at the château of Fénelon in Périgord on the 6th of August 1651. His father, Pons, comte de Fénelon, was a country gentleman of ancient lineage, large family and small estate. Owing to his delicate health the boy's early education was carried on at home; though he was able to spend some time at the neighbouring university of Cahors. In 1666 he came to Paris, under charge of his father's brother, Antoine, marquis de Fénelon, a retired soldier of distinction, well known for his religious zeal. Three years later he entered the famous theological college of Saint Sulpice. Here, while imbibing the somewhat mystical piety of the house, he had an excellent chance of carrying on his beloved classical studies; indeed, at one time he proposed to couple sacred and profane together, and go on a missionary journey to the Levant. "There I shall once more make the Apostle's voice heard in the Church of Corinth. I shall stand on that Areopagus where St. Paul preached to the sages of this world an unknown God. But I do not scorn to descend thence to the Piraeus, where Socrates sketched the plan of his republic. I shall mount to the double summit of Parnassus; I shall revel in the joys of Tempe." Family opposition, however, put an end to this attractive prospect. Fénelon remained at Saint Sulpice till 1679, when he was made "superior" of a "New Catholic" sisterhood in Paris—an institution devoted to the conversion of Huguenot ladies. Of his work here nothing is known for certain. Presumably it was successful; since in the winter of 1685, just after the revocation of the edict of Nantes, Fénelon was put at the head of a number of priests, and sent on a mission to the Protestants of Saintonge, the district immediately around the famous Huguenot citadel of La Rochelle. To Fénelon such employment was clearly uncongenial; and if he was rather too ready to employ unsavoury methods—such as bribery and espionage—among his proselytes, his general conduct was kindly and statesmanlike in no slight degree. But neither in his actions nor in his writings is there the least trace of that belief in liberty of conscience ascribed to him by 18th-century philosophers. Tender-hearted he might be in practice; but toleration he declares synonymous with "cowardly indulgence and false compasssion."

Meanwhile the marquis de Fénelon had introduced his nephew into the devout section of the court, dominated by Mme de Maintenon. He became a favourite disciple of Bossuet, and at the bishop's instance undertook to refute certain metaphysical errors of Father Malebranche. Followed thereon an independent philsophical *Treatise on the Existence of God*, wherein Fénelon rewrote Descartes in the spirit of St Augustine. More important were his *Dialogues on Eloquence*, wherein he entered an eloquent plea for greater simplicity and naturalness in the pulpit, and urged preachers to take the scriptural, natural style of Bossuet as their model, rather than the coldly analytic eloquence of his great rival, Bourdaloue. Still more important was his *Treatise on the Education of Girls*, being the first systematic attempt ever made to deal with that subject as a whole. Hence it was probably the most influential of all Fénelon's books, and guided French ideas on the question all through the 18th century. It holds a most judicious balance between the two opposing parties of the time. On the one side were the *précieuses*, enthusiasts for the "higher" education of their sex; on the other were the heavy Philistines, so often portrayed by Molière, who thought that the less girls knew the better they were likely to be. Fénelon sums up in favour of the cultivated house-wife; his first object was to persuade the mothers to take charge of their girls themselves, and fit them to become wives and mothers in their turn.

The book brought its author more than literary glory. In 1689 Fénelon was gazetted tutor to the duke of Burgundy, eldest son of the dauphin, and eventual heir to the crown. The character of this strange prince has been drawn once for all by Saint-Simon. Shortly it may be said that he was essentially a mass of contradictions—brilliant, passionate to the point of mania, but utterly weak and unstable, capable of developing into a saint or a monster, but quite incapable of becoming an ordinary human being. Fénelon assailed him on the religious side, and managed to transform him into a devotee, exceedingly affectionate, earnest and religious, but woefully lacking in tact and common sense. In justice, however, it should be added that his health was being steadily undermined by a mysterious internal complaint, and that Fénelon's tutorship came to an end on his disgrace in 1697, before the pupil was fifteen. The abiding result of his tutorship is a code of carefully graduated moral lessons—the *Fables*, the *Dialogues of the Dead* (a series of imaginary conversations between departed heroes), and finally *Télémaque*, where the adventures of the son of Ulysses in search of a father are made into a political novel with a purpose. Not, indeed, that Fénelon meant his book to be the literal paper Constitution some of his contemporaries thought it. Like other Utopias, it is an easy-going compromise between dreams and possibilities. Its one object was to broaden Burgundy's mind, and ever keep before his eyes the "great and holy maxim that kings exist for the sake of their subjects, not subjects for the sake of kings." Here and there Fénelon carries his philanthropy to lengths curiously prophetic of the age of Rousseau—fervid denunciation of war, belief in nature and fraternity of nations. And he has a truly 18th-century belief in the all-efficiency of institutions. Mentor proposes to "change the tastes and habits of the whole people, and build up again from the very foundations." Fénelon is on firmer ground when he leads a reaction against the "mercantile system" of Colbert, with its crushing restrictions on trade; or when he sings the praises of agriculture, in the hope of bringing back labour to the land, and thereby ensuring the physical efficiency of the race. Valuable and far-sighted as were these ideas, they fitted but ill into the scheme of a romance. Seldom was Voltaire wider of the mark than when he called *Télémaque* a Greek poem in French prose. It is too *motivé*, too full of ingenious contrivances, to be really Greek. As, in Fénelon's own opinion, the great merit of Homer was his "amiable simplicity," so the great merit of *Télémaque* is the art that gives to each adventure its hidden moral, to each scene some sly reflection on Versailles. Under stress of these preoccupations, however, organic unity of structure went very much to the wall, and *Télémaque* is a grievous offender against its author's own canons of literary taste. Not that it altogether lost thereby. There is a curious richness in this prose, so full of rhythm and harmony, that breaks at every moment into verse, as it drags itself along its slow and weary way, half-fainting under an overload of epithets. And although no single feature of the book is Greek, there hangs round it a moral fragrance only to be called forth by one who had fulfilled the vow of his youth, and learnt to breathe, as purely as on "the double summit of Parnassus," the very essence of the antique.

Télémaque was published in 1699. Four years before, Fénelon had been appointed archbishop of Cambrai, one of the richest benefices in France. Very soon afterwards, however, came the great calamity of his life. In the early days of his tutorship he had met the Quietist apostle, Mme Guyon (*q.v.*), and had been much struck by some of her ideas. These he developed along lines of his own, where Christian Neoplatonism curiously mingles with theories of chivalry and disinterestedness, borrowed from the *précieuses* of his own time. His mystical principles are set out at length in his *Maxims of the Saints*, published in 1697 (see QUIETISM). Here he argues that the more love we have for ourselves, the less we can spare for our Maker. Perfection lies in getting rid of self-hood altogether—in never thinking of ourselves, or even of the relation in which God stands to us. The saint does not love Christ as *his* Redeemer, but only as *the* Redeemer of the human race. Bossuet (*q.v.*) attacked this position as inconsistent with Christianity. Fénelon promptly appealed to Rome, and after two years of bitter controversy his book was condemned by Innocent XII. in 1699. As to the merits of the controversy opinion will always be divided. On the point of doctrine all good judges agree that Fénelon was wrong; though many still welcome the *obiter dictum* of Pope Innocent, that Fénelon erred by loving God too much, and Bossuet by loving his neighbour too little. Of late years, however, Bossuet has found powerful defenders; and if they have not cleared his character from reproach, they have certainly managed to prove that Fénelon's methods of controversy were not much better than his. One of the results of the quarrel was Fénelon's banishment from court; for Louis XIV. had ardently taken Bossuet's side, and brought all the batteries of French influence to bear on the pope. Immediately on the outbreak of the controversy, Fénelon was exiled to his diocese, and during the last eighteen years of his life he was only once allowed to leave it.

To Cambrai, accordingly, all his energies were now directed. Even Saint-Simon allows that his episcopal duties were perfectly performed. Tours of inspection, repeated several times a year, brought him into touch with every corner of his diocese. It was administered with great strictness, and yet on broad and liberal lines. There was no bureaucratic fussiness, no seeking after popularity; but every man, whether great or small, was treated exactly as became his station in the world. And Saint-Simon bears the same witness to his government of his palace. There he lived with all the piety of a true pastor, yet with all the dignity of a great nobleman, who was still on excellent terms with the world. But his magnificence made no one angry, for it was kept up chiefly for the sake of others, and was exactly proportionate to his place. With all its luxuries and courtly ease, his house remained a true bishop's palace, breathing the strictest discipline and restraint. And of all this chastened dignity the archbishop was himself the ever-present, ever-inimitable model—in all that he did the perfect churchman, in all the high-bred noble, in all things, also, the author of *Télémaque*.

The one great blot on this ideal existence was his persecution of the Jansenists (see JANSENISM). His theories of life were very different from theirs; and they had taken a strong line against his *Maxims of the Saints*, holding that visionary theories of perfection were ill-fitted for a world where even the holiest could scarce be saved. To suppress them, and to gain a better market for his own ideas, he was even ready to strike up an alliance with the Jesuits, and force on a reluctant France the doctrine of papal infallibility. His time was much better employed in fitting his old pupil, Burgundy, for a kingship that never came. Louis XIV. seldom allowed them to meet, but for years they corresponded; and nothing is more admirable than the mingled tact and firmness with which Fénelon spoke his mind about the prince's faults. This exchange of letters became still more frequent in 1711, when the wretched dauphin died and left Burgundy heir-apparent to the throne. Fénelon now wrote a series of memorable criticisms on the government of Louis XIV., accompanied by projects of reform, not always quite so wise. For his practical political service was to act as an alarm-bell. Much more clearly than most men, he saw that the Bourbons were tottering to their fall, but how to prevent that fall he did not know.

Not that any amount of knowledge would have availed. In 1712 Burgundy died, and with him died all his tutor's hopes of reform. From this moment his health began to fail, though he mustered strength enough to write a remarkable *Letter to the French Academy* in the autumn of 1714. This is really a series of general reflections on the literary movement of his time. As in his political theories, the critical element is much stronger than the constructive. Fénelon was feeling his way away from the rigid standards of Boileau to "a Sublime so simple and familiar that all may understand it." But some of his methods were remarkably erratic; he was anxious, for instance, to abolish verse, as unsuited to the genius of the French. In other respects, however, he was far before his age. The 17th century has treated literature as it treated politics and religion; each of the three was cooped up in a water-tight compartment by itself. Fénelon was one of the first to break down these partition-walls, and insist on viewing all three as products of a single spirit, seen at different angles.

A few weeks after the *Letter* was written, Fénelon met with a carriage-accident, and the shock proved too much for his enfeebled frame. On the 7th of January 1715 he died at the age of 63. Ever since, his character has been a much-discussed enigma. Bossuet can only be thought of as the high-priest of authority and common-sense; but Fénelon has been made by turns into a sentimentalist, a mystical saint, an 18th-century *philosophe*, an ultramontane churchman and a hysterical hypocrite. And each of these views, except the last, contains an element of truth. More than most men, Fénelon "wanders between two worlds—one dead, the other powerless to be born." He came just at a time when the characteristic ideas of the 17th century—the ideas of Louis XIV., of Bossuet and Boileau—had lost their savour, and before another creed could arise to take their place. Hence, like most of those who break away from an established order, he seems by turns a revolutionist and a reactionary. Such a man expresses his ideas much better by word of mouth than in the cold formality of print; and Fénelon's contemporaries thought far more highly of his conversation than his books. That downright, gossiping German princess, the duchess of Orleans, cared little for the *Maxims*; but she was enraptured by their author, and his "ugly face, all skin and bone, though he laughed and talked quite unaffectedly and easily." An observer of very different mettle, the great lawyer d'Aguesseau, dwells on the "noble singularity, that gave him an almost prophetic air. Yet he was neither passionate nor masterful. Though in reality he governed others, it was always by seeming to give way; and he reigned in society as much by the attraction of his manners as by the superior virtue of his parts. Under his hand the most trifling subjects gained a new importance; yet he treated the gravest with a touch so light that he seemed to have invented the sciences rather than learnt them, for he was always a creator, always original, and himself was imitable of none." Still better is Saint-Simon's portrait of Fénelon as he appeared about the time of his appointment to Cambrai—tall, thin, well-built, exceedingly pale, with a great nose, eyes from which fire and genius poured in torrents, a face curious and unlike any other, yet so striking and attractive that, once seen, it could not be forgotten. There were to be found the most contradictory qualities in perfect agreement with each other—gravity and courtliness, earnestness and gaiety, the man of learning, the noble and the bishop. But all centred in an air of high-bred dignity, of graceful, polished seemliness and wit—it cost an effort to turn away one's eyes.

Authorities.—The best complete edition of Fénelon was brought out by the abbé Gosselin of Saint Sulpice (10 vols., Paris, 1851). Gosselin also edited the *Histoire de Fénelon*, by Cardinal Bausset (4 vols., Paris, 1850). Modern authorities are *Fénelon à Cambrai* (Paris, 1885), by Emmanuel de Broglie; *Fénelon*, by Paul Janet (Paris, 1892); *Bossuet et Fénelon*, by L. Crouslé (2 vols., Paris, 1894); J. Lemaître, *Fénelon* (1910). In English there are: *Fénelon, his Friends and Enemies*, by E. K. Sanders (1901); and *François de Fénelon*, by Lord St Cyres (1906); see also the *Quarterly Review* for January 1902, and M. Masson, *Fénelon et Madame Guyon* (1907). (St. C.)

FENESTELLA, Roman historian and encyclopaedic writer, flourished in the reign of Tiberius. If the notice in Jerome be correct, he lived from 52 B.C. to A.D. 19 (according to others 35 B.C.–A.D. 36). Taking Varro for his model, Fenestella was one of the chief representatives of the new style of historical writing which, in the place of the brilliant descriptive pictures of Livy, discussed curious and out-of-the-way incidents and customs of political and social life, including literary history. He was the author of an *Annales*, probably from the earliest times down to his own days. The fragments indicate the great variety of subjects discussed: the origin of the appeal to the people (*provocatio*); the use of elephants in the circus games; the wearing of gold rings; the introduction of the olive tree; the material for making the toga; the cultivation of the soil; certain details as to the lives of Cicero and Terence. The work was very much used (mention is made of an abridged edition) by Pliny the elder, Asconius Pedianus (the commentator on Cicero), Nonius, and the philologists.

Fragments in H. Peter, *Historicorum Romanorum fragmenta* (1883); see also monographs by L. Mercklin (1844) and J. Poeth (1849); M. Schanz, *Geschichte der röm. Litt.* ed. 2 (1901); Teuffel, *Hist. of Roman Literature*, p. 259. A work published under the name of L. Fenestella (*De magistratibus et sacerdotiis Romanorum*, 1510) is really by A. D. Fiocchi, canon and papal secretary, and was subsequently published as by him (under the latinized form of his name, Floccus), edited by Aegidius Witsius (1561).

FENESTRATION (from O. Fr. *fenestre*, modern *fenêtre*, Lat. *fenestra*, a window, connected with Gr. φαίνειν, to show), an architectural term applied to the arrangement of windows on the front of a building, more especially when, in the absence of columns or pilasters separating them, they constitute its chief architectural embellishment. The term "fenestral" is given to a frame or "chassis" on which oiled paper or thin cloth was strained to keep out wind and rain when the windows were not glazed.

FENIANS, or Fenian Brotherhood, the name of a modern Irish-American revolutionary secret society, founded in America by John O'Mahony (1816–1877) in 1858. The name was derived from an anglicized version of *fiann*, *féinne*, the legendary band of warriors in Ireland led by the hero Find Mac Cumaill (see Finn Mac Cool; and Celt: *Celtic Literature: Irish*); and it was given to his organization of conspirators by O'Mahony, who was a Celtic scholar and had translated Keating's *History of Ireland* in 1857. After the collapse of William Smith O'Brien's attempted rising in 1848, O'Mahony, who was concerned in it, escaped abroad, and since 1852 had been living in New York. James Stephens, another of the "men of 1848," had established himself in Paris, and was in correspondence with O'Mahony and other disaffected Irishmen at home and abroad. A club called the Phoenix National and Literary Society, with Jeremiah Donovan (afterwards known as O'Donovan Rossa) among its more prominent members, had recently been formed at Skibbereen; and under the influence of Stephens, who visited it in May 1858, it became the centre of preparations for armed rebellion. About the same time O'Mahony in the United States established the "Fenian Brotherhood," whose members bound themselves by an oath of "allegiance to the Irish Republic, now virtually established," and swore to take up arms when called upon and to yield implicit obedience to the commands of their superior officers. The object of Stephens, O'Mahony and other leaders of the movement was to form a great league of Irishmen in all parts of the world against British rule in Ireland. The organization was modelled on that of the French Jacobins at the Revolution; there was a "Committee of Public Safety" in Paris, with a number of subsidiary committees, and affiliated clubs; its operations were conducted secretly by unknown and irresponsible leaders; and it had ramifications in every part of the world, the "Fenians," as they soon came to be generally called, being found in Australia, South America, Canada, and above all in the United States, as well as in the large centres of population in Great Britain such as London, Manchester and Glasgow. It is, however, noteworthy that Fenianism never gained much hold on the tenant-farmers or agricultural labourers in Ireland, although the scurrilous press by which it was supported preached a savage vendetta against the landowners, who were to be shot down "as we shoot robbers and rats."[1] The movement was denounced by the priests of the Catholic Church.

It was, however, some few years after the foundation of the Fenian Brotherhood before it made much headway, or at all events before much was heard of it outside the organization itself, though it is probable that large numbers of recruits had enrolled themselves in its "circles." The Phoenix Club conspiracy in Kerry was easily crushed by the government, who had accurate knowledge from an informer of what was going on. Some twenty ringleaders were put on trial, including Donovan, and when they pleaded guilty were, with a single exception, treated with conspicuous leniency. But after a convention held at Chicago under O'Mahony's presidency in November 1863 the movement began to show signs of life. About the same time the *Irish People*, a revolutionary journal of extreme violence, was started in Dublin by Stephens, and for two years was allowed without molestation by the government to advocate armed rebellion, and to appeal for aid to Irishmen who had had military training in the American Civil War. At the close of that war in 1865 numbers of Irish who had borne arms flocked to Ireland, and the plans for a rising matured. The government, well served as usual by informers, now took action. In September 1865 the *Irish People* was suppressed, and several of the more prominent Fenians were sentenced to terms of penal servitude; Stephens, through the connivance of a prison warder, escaped to France. The Habeas Corpus Act was suspended in the beginning of 1866, and a considerable number of persons were arrested. Stephens issued a bombastic proclamation in America announcing an imminent general rising in Ireland; but he was himself soon afterwards deposed by his confederates, among whom dissension had broken out. A few Irish-American officers, who landed at Cork in the expectation of commanding an army against England, were locked up in gaol; some petty disturbances in Limerick and Kerry were easily suppressed by the police.

In the United States, however, the Fenian Brotherhood, now under the presidency of W. R. Roberts, continued plotting. They raised money by the issue of bonds in the name of the "Irish Republic," which were bought by the credulous in the expectation of their being honoured when Ireland should be "a nation once again." A large quantity of arms was purchased, and preparations were openly made for a raid into Canada, which the United States government took no steps to prevent. It was indeed believed that President Andrew Johnson was not indisposed to turn the movement to account in the settlement of the Alabama claims. The Fenian "secretary for war" was General T. W. Sweeny (1820–1892), who temporarily (Jan. 1865–Nov. 1866) was struck off the American army list. The command of the expedition was entrusted to John O'Neill, who crossed the Niagara river at the head of some 800 men on the 1st of June 1866, and captured Fort Erie. But large numbers of his men deserted, and at Ridgeway the Fenians were routed by a battalion of Canadian volunteers. On the 3rd of June the remnant surrendered to the American warship "Michigan"; and the tardy issue of President Johnson's proclamation enforcing the laws of neutrality brought the raid to an ignominious end; the prisoners were released, and the arms taken from the raiders were, according to Henri Le Caron, "returned to the Fenian organization, only to be used for the same purpose some four years later." In December 1867, John O'Neill became president of the Brotherhood in America, which in the following year held a great convention in Philadelphia attended by over 400 properly accredited delegates, while 6000 Fenian soldiers, armed and in uniform, paraded the streets. At this convention a second invasion of Canada was determined upon; while the news of the Clerkenwell explosion in London (see below) was a strong incentive to a vigorous policy. Le Caron (*q.v.*), who, while acting as a secret agent of the English government, held the position of "inspector-general of the Irish Republican Army," asserts that he "distributed fifteen thousand stands of arms and almost three million rounds of ammunition in the care of the many trusted men stationed between Ogdensburg and St Albans," in preparation for the intended raid. It took place in April 1870, and proved a failure not less rapid or complete than the attempt of 1866. The Fenians under O'Neill's command crossed the Canadian frontier near Franklin, Vt., but were dispersed by a single volley from Canadian volunteers; while O'Neill himself was promptly arrested by the United States authorities acting under the orders of President Grant.

Meantime in Ireland, after the suppression of the *Irish People*, disaffection had continued to smoulder, and during the latter part of 1866 Stephens endeavoured to raise funds in America for a fresh rising planned for the following year. A bold move on the part of the Fenian "circles" in Lancashire had been concerted in co-operation with the movement in Ireland. An attack was to be made on Chester, the arms stored in the castle were to be seized, the telegraph wires cut, the rolling stock on the railway to be appropriated for transport to Holyhead, where shipping was to be seized and a descent made on Dublin before the authorities should have time to interfere. This scheme was frustrated by information given to the government by the informer John Joseph Corydon, one of Stephens's most trusted agents. Some insignificant outbreaks in the south and west of Ireland brought "the rebellion of 1867" to an ignominious close. Most of the ringleaders were arrested, but although some of them were sentenced to death none was executed. On the 11th of September 1867, Colonel Thomas J. Kelly, "deputy central organizer of the Irish Republic," one of the most dangerous of the Fenian conspirators, was arrested in Manchester, whither he had gone from Dublin to attend a council of the English "centres," together with a companion, Captain Deasy. A plot to effect the rescue of these prisoners was hatched by Edward O'Meaher Condon with other Manchester Fenians; and on the 18th of September, while Kelly and Deasy were being conveyed through the city from the court-house, the prison van was attacked by Fenians armed with revolvers, and in the scuffle police-sergeant Brett, who was seated inside the van, was shot dead. Condon, Allen, Larkin, Maguire and O'Brien, who had taken a prominent part in the rescue, were arrested. All five were sentenced to death; but Condon, who was an American citizen, was respited at the request of the United States government, his sentence being commuted to penal servitude for life, and Maguire was granted a pardon. Allen, Larkin, and O'Brien were hanged on the 23rd of November for the murder of Brett. Attempts were made at the time, and have since been repeated, to show that these men were unjustly sentenced, the contention of their sympathizers being, first, that as "political offenders" they should not have been treated as ordinary murderers; and, secondly, that as they had no deliberate intention to kill the police-sergeant, the shot that caused his death having been fired for the purpose of breaking open the lock of the van, the crime was at worst that of manslaughter. But even if these pleas rest on a correct statement of the facts they have no legal validity, and they afford no warrant for the title of the "Manchester martyrs" by which these criminals are remembered among the more extreme nationalists in Ireland and America. Kelly and Deasy escaped to the United States, where the former obtained employment in the New York custom-house.

In the same month, November 1867, one Richard Burke, who had been employed by the Fenians to purchase arms in Birmingham, was arrested and lodged in Clerkenwell prison in London. While he was awaiting trial a wall of the prison was blown down by gunpowder, the explosion causing the death of twelve persons, and the maiming of some hundred and twenty others. This outrage, for which Michael Barrett suffered the death penalty, powerfully influenced W. E. Gladstone in deciding that the Protestant Church of Ireland should be disestablished as a concession to Irish disaffection. In 1870, Michael Davitt (*q.v.*) was sentenced to fifteen years' penal servitude for participation in the Fenian conspiracy; and before he was released on ticket of leave the name Fenian had become practically obsolete, though the "Irish Republican Brotherhood" and other organizations in Ireland and abroad carried on the same tradition and pursued the same policy in later years. In 1879, John Devoy, a member of the Fenian Brotherhood, promoted a "new departure" in America, by which the "physical force party" allied itself with the "constitutional movement" under the leadership of C. S. Parnell (*q.v.*); and the political conspiracy of the Fenians was combined with the agrarian revolution inaugurated by the Land League.

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[1] William O'Connor Morris, *Ireland 1798–1898*, p. 195.

See William O'Connor Morris, *Ireland from 1798 to 1898* (London, 1898); *Two Centuries of Irish History, 1691–1870*, edited by R. Barry O'Brien (London, 1907); Henri Le Caron, *Twenty-five Years in the Secret Service* (London, 1892); Patrick J. P. Tynan, *The Irish National Invincibles and their Times* (London, 1896); Justin M'Carthy, *A History of our own Times* (4 vols., London, 1880). (R. J. M.)

FENNEL, *Foeniculum vulgare* (also known as *F. capillaceum*), a perennial plant of the natural order Umbelliferae, from 2 to 3 or (when cultivated) 4 ft. in height, having leaves three or four times pinnate, with numerous linear or awl-shaped segments, and glaucous compound umbels of about 15 or 20 rays, with no involucres, and small yellow flowers, the petals incurved at the tip. The fruit is laterally compressed, five-ridged, and has a large single resin-canal or "vitta" under each furrow. The plant appears to be of south European origin, but is now met with in various parts of Britain and the rest of temperate Europe, and in the west of Asia. The dried fruits of cultivated plants from Malta have an aromatic taste and odour, and are used for the preparation of fennel water, valued for its carminative properties. It is given in doses of 1 to 2 oz., the active principle being a volatile oil which is probably the same as oil of anise. The shoots of fennel are eaten blanched, and the seeds are used for flavouring. The fennel seeds of commerce are of several sorts. Sweet or Roman fennel seeds are the produce of a tall perennial plant, with umbels of 25-30 rays, which is cultivated near Nismes in the south of France; they are elliptical and arched in form, about ⅖ in. long and a quarter as broad, and are smooth externally, and of a colour approaching a pale green. Shorter and straighter fruits are obtained from the annual variety of *F. vulgare* known as *F. Panmorium* (*Panmuhuri*) or Indian fennel, and are employed in India in curries, and for medicinal purposes. Other kinds are the German or Saxon fruits, brownish-green in colour, and between ⅕ and ¼ in. in length, and the broader but smaller fruits of the wild or bitter fennel of the south of France. A variety of fennel, *F. dulce*, having the stem compressed at the base, and the umbel 6-8 rayed, is grown in kitchen-gardens for the sake of its leaves.

Giant fennel is the name applied to the plant *Ferula communis*, a member of the same natural order, and a fine herbaceous plant, native in the Mediterranean region, where the pith of the stem is used as tinder. Hog's or sow fennel is the species *Peucedanum officinale*, another member of the Umbelliferae.

FENNER, DUDLEY (*c.* 1558–1587), English puritan divine, was born in Kent and educated at Cambridge University. There he became an adherent of Thomas Cartwright (1535–1603), and publicly expounded his presbyterian views, with the result that he was obliged to leave Cambridge without taking his degree. For some months he seems to have assisted the vicar of Cranbrook, Kent, but it is doubtful whether he received ordination. He next followed Cartwright to Antwerp, and, having received ordination according to rite of the Reformed church, assisted Cartwright for several years in preaching to the English congregation there. The leniency shown by Archbishop Grindal to puritans encouraged him to return to England, and he became curate of Cranbrook in 1583. In the same year, however, he was one of seventeen Kentish ministers suspended for refusing to sign an acknowledgment of the queen's supremacy and of the authority of the Prayer Book and articles. He was imprisoned for a time, but eventually regained his liberty and spent the remainder of his life as chaplain in the Reformed church at Middleburgh.

A list of his authentic works is given in Cooper's *Athenae Cantabrigienses* (Cambridge, 1858–1861). They rank among the best expositions of the principles of puritanism.

FENNY STRATFORD, a market town in the Buckingham parliamentary division of Buckinghamshire, England, 48 m. N.W. by N. of London on a branch of the London & North-Western railway. Pop. of urban district (1901), 4799. It lies in an open valley on the west (left) bank of the Ouzel, where the great north-western road from London, the Roman Watling Street, crosses the stream, and is 1 m. E. of Bletchley, an important junction on the main line of the North-Western railway. The church of St Martin was built (*c.* 1730) on the site of an older church at the instance of Dr Browne Willis, an eminent antiquary (d. 1760), buried here; but the building has been greatly enlarged. A custom instituted by Willis on St Martin's Day (November 11th) includes a service in the church, the firing of some small cannon called the "Fenny Poppers," and other celebrations. The trade of the town is mainly agricultural.

FENRIR, or **FENRIS**, in Scandinavian mythology, a water-demon in the shape of a huge wolf. He was the offspring of Loki and the giantess Angurboda, who bore two other children, Midgard the serpent, and Hel the goddess of death. Fenrir grew so large that the gods were afraid of him and had him chained up. But he broke the first two chains. The third, however, was made of the sound of a cat's footsteps, a man's beard, the roots of a mountain, a fish's breath and a bird's spittle. This magic bond was too strong for him until Ragnarok (Judgment Day), when he escaped and swallowed Odin and was in turn slain by Vidar, the latter's son.

FENS,[1] a district in the east of England, possessing a distinctive history and peculiar characteristics. It lies west and south of the Wash, in Lincolnshire, Huntingdonshire, Cambridgeshire and Norfolk, and extends over more than 70 m. in length (Lincoln to Cambridge) and some 35 m. in maximum breadth (Stamford to Brandon in Suffolk), its area being considerably over half a million acres. Although low and flat, and seamed by innumerable water-courses, the entire region is not, as the Roman name of *Metaris Aestuarium* would imply, a river estuary, but a bay of the North Sea, silted up, of which the Wash is the last remaining portion. Hydrographically, the Fens embrace the lower parts of the drainage-basins of the rivers Witham, Welland, Nene and Great Ouse; and against these streams, as against the ocean, they are protected by earthen embankments, 10 to 15 ft. high. As a rule the drainage water is lifted off the Fens into the rivers by means of steam-pumps, formerly by windmills.

General History.—According to fairly credible tradition, the first systematic attempt to drain the Fens was made by the Romans. They dug a catchwater drain (as the artificial fenland water-courses are called), the Caer or Car Dyke, from Lincoln to Ramsey (or, according to Stukeley, as far as Cambridge), along the western edge of the Fens, to carry off the precipitation of the higher districts which border the fenland, and constructed alongside the Welland and on the seashore earthen embankments, of which some 150 m. survive. Mr S. H. Miller is disposed to credit the native British inhabitants of the Fens with having executed certain of these works. The Romans also carried causeways over the country. After their departure from Britain in the first half of the 5th century the Fens fell into neglect; and despite the preservation of the woodlands for the purposes of the chase by the Norman and early Plantagenet kings, and the unsuccessful attempt which Richard de Rulos, chamberlain of William the Conqueror, made to drain Deeping Fen, the fenland region became almost everywhere waterlogged, and relapsed to a great extent into a state of nature. In addition to this it was ravaged by serious inundations of the sea, for example, in the years 1178, 1248 (or 1250), 1288, 1322, 1335, 1467, 1571. Yet the fenland was not altogether a wilderness of reed-grown marsh and watery swamp. At various spots, more particularly in the north and in the south, there existed islands of firmer and higher ground, resting generally on the boulder clays of the Glacial epochs and on the inter-Glacial gravels of the Palaeolithic age. In these isolated localities members of the monastic orders (especially at a later date the Cistercians) began to settle after about the middle of the 7th century. At Medeshampstead (*i.e.* Peterborough), Ely, Crowland, Ramsey, Thorney, Spalding, Peakirk, Swineshead, Tattershall, Kirkstead, Bardney, Sempringham, Bourne and numerous other places, they made settlements and built churches, monasteries and abbeys. In spite of the incursions of the predatory Northmen and Danes in the 9th and 10th centuries, and of the disturbances consequent upon the establishment of the Camp of Refuge by Hereward the Wake in the fens of the Isle of Ely in the 11th century, these scattered outposts continued to shed rays of civilization across the lonely Fenland down to the dissolution of the monasteries in the reign of Henry VIII. Then they, too, were partly overtaken by the fate which befell the rest of the Fens; and it was only in the end of the 18th and the beginning of the 19th century that the complete drainage and reclamation of the Fen region was finally effected. Attempts on a considerable scale were indeed made to reclaim them in the 17th century, and the work as a whole forms one of the most remarkable chapters of the industrial history of England. Thus, the reclamation of the Witham Fens was taken up by Sir Anthony Thomas, the earl of Lindsey, Sir William Killigrew, King Charles I., and others in 1631 and succeeding years; and that of the Deeping or Welland Fens in 1638 by Sir W. Ayloff, Sir Anthony Thomas and other "adventurers," after one Thomas Lovell had ruined himself in a similar attempt in the reign of Queen Elizabeth. The earl of Lindsey received 24,000 acres for his work. Charles I., declaring himself the "undertaker" of the Holland Fen, claimed 8000 out of its 22,000 acres as his share.

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[1] The word "fen," a general term for low marshy land or bog, is common to Teutonic languages, cf. Dutch *ven* or *veen*, Ger. *Fenne*, *Fehn*, Goth. *fani*, mud; the Indo-European root is seen in Gr. πῆλος, mud, Lat. *palus*, marsh. The word "bog" is from the Irish or Gaelic *bogach*, formed from Celtic *bog*, soft, and meaning therefore soft, swampy ground.

A larger work than these, however, was the drainage of the fens of the Nene and the Great Ouse, comprehending the wide tract known as the Bedford level. This district took name from the agreement of Francis, earl of Bedford, the principal landholder, and thirteen other adventurers, with Charles I. in 1634, to drain the level, on condition of receiving 95,000 acres of the reclaimed land. A partial attempt at drainage had been made (1478-1490) by John Morton, when bishop of Ely, who constructed Morton's Leam, from Peterborough to the sea, to carry the waters of the Nene, but this also proved a failure. An act was passed, moreover, in 1602 for effecting its reclamation; and Lord Chief-Justice Popham (whose name is preserved in Popham's Eau, S.E. of Wisbech) and a company of Londoners began the work in 1605; but the first effectual attempt was that of 1634. The work was largely directed by the Dutch engineer Cornelius Vermuyden, who had begun work in the Fens in 1621, and was knighted in 1628.

Three years after the agreement of the earl of Bedford and his partners with the king, after an outlay of £100,000 on the part of the company, the contract was annulled, on the fraudulent plea that the works were insufficient; and an offer was made by King Charles to undertake its completion on condition of receiving 57,000 acres in addition to the amount originally agreed on. This unjust attempt was frustrated by the breaking out of the civil war; and no further attempt at drainage was made until 1649, when the parliament reinstated the earl of Bedford's successor in his father's rights. After an additional outlay of £300,000, the adventurers received 95,000 acres of reclaimed land, according to the contract, which, however, fell far short of repaying the expense of the undertaking. In 1664 a royal charter was obtained to incorporate the company, which still exists, and carries on the concern under a governor, 6 bailiffs, 20 conservators, and a commonalty, each of whom must possess 100 acres of land in the level, and has a voice in the election of officers. The conservators must each possess not less than 280 acres, the governor and bailiffs each 400 acres. The original adventurers had allotments of land according to their interest of the original 95,000 acres; but Charles II., on granting the charter, took care to secure to the crown a lot of 12,000 acres out of the 95,000, which, however, is held under the directors, whereas the allotments are not held in common, though subject to the laws of the corporation. The level was divided in 1697 into three parts, called the North, Middle, and South Levels—the second being separated from the others by the Nene and Old Bedford rivers.

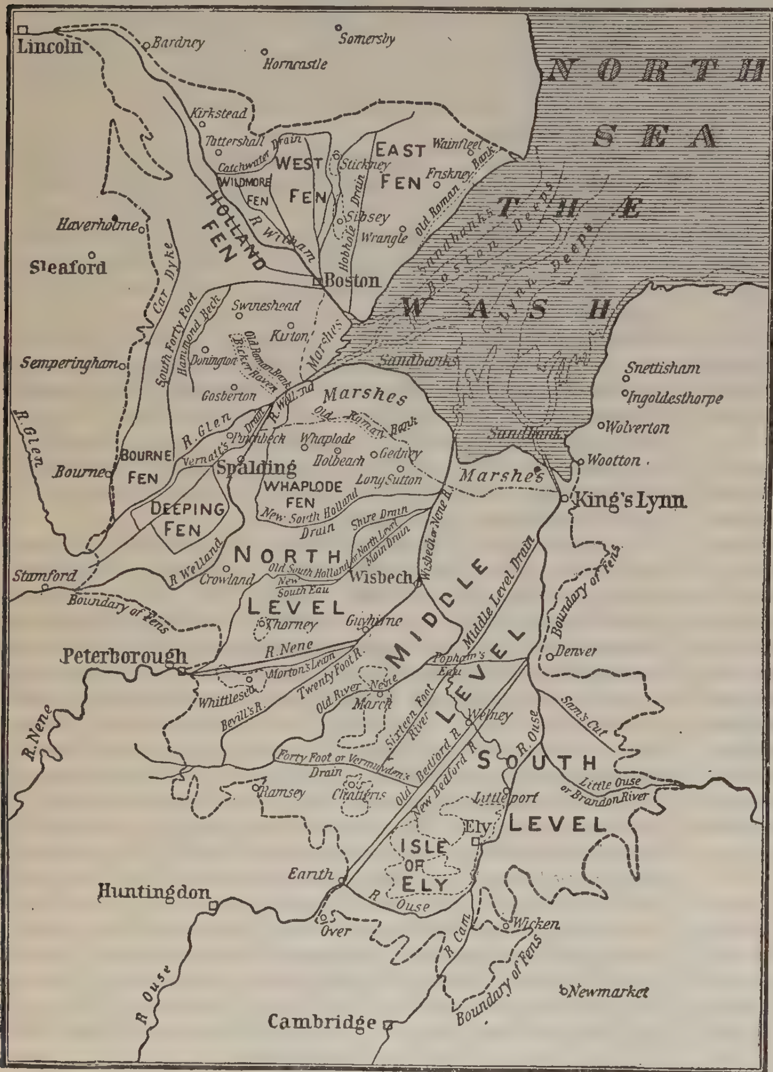
These attempts failed owing to the determined opposition of the native fenmen ("stilt-walkers"), whom the drainage and appropriation of the unenclosed fenlands would deprive of valuable and long-enjoyed rights of commonage, turbary (turf-cutting), fishing, fowling, &c. Oliver Cromwell is said to have put himself at their head and succeeded in stopping all the operations. When he became Protector, however, he sanctioned Vermuyden's plans, and Scottish prisoners taken at Dunbar, and Dutch prisoners taken by Blake in his victory over Van Tromp, were employed as the workers. Vermuyden's system, however, was exclusively Dutch; and while perfectly suited to Holland it did not meet all the necessities of East Anglia. He confined his attention almost exclusively to the inland draining and embankments, and did not provide sufficient outlet for the waters themselves into the sea.

Holland and other Fens on the west side of the Witham were finally drained in 1767, although not without much rioting and lawlessness; and a striking account of the wonderful improvements effected by a generation later is recorded in Arthur Young's *General View of the Agriculture of the County of Lincoln* (London, 1799). The East, West and Wildmore Fens on the east side of the Witham were drained in 1801–1807 by John Rennie, who carried off the precipitation which fell on the higher grounds by catch-water drains, on the principle of the Roman Car Dyke, and improved the outfall of the river, so that it might the more easily discharge the Fen water which flowed or was pumped into it. The Welland or Deeping Fens were drained in 1794, 1801, 1824, 1837 and other years. Almost the only portion of the original wild Fens now remaining is Wicken Fen, which lies east of the river Cam and south-east of the Isle of Ely.

The Fen Rivers.—The preservation of the Fens depends in an intimate and essential manner upon the preservation of the rivers, and especially of their banks. The Witham, known originally as the Grant Avon, also called the Lindis by Leyland (*Itinerary*, vol. vii. p. 41), and in Jean Ingelow's *High Tide on the Lincolnshire Coast*, is some 80 m. long, and drains an area of 1079 sq. m. It owes its present condition to engineering works carried out in the years 1762–1764, 1865, 1881, and especially in 1880–1884. In 1500 the river was dammed immediately above Boston by a large sluice, the effect of which was not only to hinder free navigation up to Lincoln (to which city sea-going vessels used to penetrate in the 14th and 15th centuries), but also to choke the channel below Boston with sedimentary matter. The sluice, or rather a new structure made in 1764–1766, remains; but the river below Boston has been materially improved (1880-1884), first by the construction of a new outfall, 3 m. in length, whereby the channel was not only straightened, but its current carried directly into deep water, without having to battle against the often shifting sandbanks of the Wash; and secondly, by the deepening and regulation of the river-bed up to Boston. The Welland, which is about 70 m. long, and drains an area of 760 sq. m., was made to assume its present shape and direction in 1620, 1638, 1650, 1794, and 1835 and following years. The most radical alteration took place in 1794, when a new outfall was made from the confluence of the Glen (30 m. long) to the Wash, a distance of nearly 3 m. The Nene, 90 m. long, and draining an area of some 1077 sq. m., was first regulated by Bishop Morton, and it was further improved in 1631, 1721, and especially, under plans by Rennie and Telford, in 1827-1830 and 1832. The work done from 1721 onward consisted in straightening the lower reaches of the stream and in directing and deepening the outfall. The Ouse (*q.v.*) or Great Ouse, the largest of the fenland rivers, seems to have been deflected, at some unknown period, from a former channel connecting via the Old Croft river with the Nene, into the Little Ouse below Littleport; and the courses of the two streams are now linked together by an elaborate network of artificial drains, the results of the great engineering works carried out in the Bedford Level in the 17th century. The old channel, starting from Earith, and known as the Old West river, carries only a small stream until, at a point above Ely, it joins the

Cam. The salient features of the plan executed by Vermuyden[1] for the earl of Bedford in the years 1632–1653 were as follows: taking the division of the area made in 1697–1698 into (i.) the North Level, between the river Welland and the river Nene; (ii.) the Middle Level, between the Nene and the Old Bedford river (which was made at this time, *i.e.* 1630); and (iii.) the South Level, from the Old Bedford river to the south-eastern border of the fenland. In the North Level the Welland was embanked, the New South Eau, Peakirk Drain, and Shire Drain made, and the existing main drains deepened and regulated. In the Middle Level the Nene was embanked from Peterborough to Guyhirn, also the Ouse from Earith to Over, both places at the south-west edge of the fenland; the New Bedford river was made from Earith to Denver, and the north side of the Old Bedford river and the south side of the New Bedford river were embanked, a long narrow "wash," or overflow basin, being left between them; several large feeding-drains were dug, including the Forty Foot or Vermuyden's Drain, the Sixteen Foot river, Bevill's river, and the Twenty Foot river; and a new outfall was made for the Nene, and Denver sluice (to dam the old circuitous Ouse) constructed. In the South Level Sam's Cut was dug and the rivers were embanked. Since that period the mouth of the Ouse has been straightened above and below King's Lynn (1795–1821), a new straight cut made between Ely and Littleport, the North Level Main Drain and the Middle Level Drain constructed, and the meres of Ramsey, Whittlesey (1851–1852), &c., drained and brought under cultivation. A considerable barge traffic is maintained on the Ouse below St Ives, on the Cam up to Cambridge, the Lark and Little Ouse, and the network of navigable cuts between the New Bedford river and Peterborough. The Nene, though locked up to Northampton, and connected from that point with the Grand Junction canal, is practically unused above Wansford, and traffic is small except below Wisbech.

The effect of the drainage schemes has been to lower the level of the fenlands generally by some 18 in., owing to the shrinkage of the peat consequent upon the extraction of so much of its contained water; and this again has tended, on the one hand, to diminish the speed and erosive power of the fenland rivers, and, on the other, to choke up their respective outfalls with the sedimentary matters which they themselves sluggishly roll seawards.


Lincoln
Bardney
Somersby
Horncastle
NORTH SEA
Kirkstead
Tattershall
Catchwater Drain
WILDMORE FEN
WEST FEN
Stickney
EAST FEN
Wainfleet
Friskney
Old Roman Bank
HOLLAND FEN
R. Witham
Hobhole Drain
Sibsey
Wrangle
THE WASH
Sandbanks
Boston Deeps
Lynn Deeps
Haverholme
Sleaford
Car Dyke
Boston
South Forty Foot
Hammond Beck
Swineshead
Kirton
Old Roman Bank
Bicker Haven
Marshes
Donington
Semperingham
Gosberton
R. Welland
Marshes
Old Roman Bank
Sandbanks
Snettisham
Ingoldesthorpe
Wolverton
R. Glen
R. Glen
Vernatt's Drain
Pinchbeck
Whaplode
Holbeach
Gedney
BOURNE FEN
Bourne
Spalding
WHAPLODE FEN
Long Sutton
Marshes
Wootton
King's Lynn
DEEPING FEN
New South Holland Drain
Shire Drain
North Level Main Drain
Wisbech or Nene R.
NORTH LEVEL
Stamford
R. Welland
Crowland
Old South Holland
New South Eau
Wisbech
Boundary of Fens
Thorney
Guyhirne
MIDDLE LEVEL
Middle Level Drain
Boundary of Fens
Peterborough
R. Nene
Morton's Leam
Twenty Foot R.
Popham's Eau
Denver
Whittlesea
Bevill's R.
Old River Nene
March
Sixteen Foot River
Welney
Sam's Cut
R. Nene
Forty Foot or Vermuyden's Drain
Old Bedford R.
New Bedford R.
R. Ouse
SOUTH LEVEL
Little Ouse or Brandon River
Ramsey
Chatteris
Littleport
Ely
ISLE OF ELY
Earith
Huntingdon
R. Ouse
Over
R. Cam
Wicken
R. Ouse
Boundary of Fens
Newmarket
Cambridge

Map of the Fens.

The Wash.—From this it will be plain that the Wash (*q.v.*) is being silted up by riverine detritus. The formation of new dry land, known at first as "marsh," goes on, however, but slowly. During the centuries since the Romans are believed to have constructed the sea-banks which shut out the ocean, it is computed that an area of not more than 60,000 to 70,000 acres has been won from the Wash, embanked, drained and brought more or less under cultivation. The greatest gain has been at the direct head of the bay, between the Welland and the Great Ouse, where the average annual accretion is estimated at 10 to 11 lineal feet. On the Lincolnshire coast, farther north, the average annual gain has been not quite 2 ft.; whilst on the opposite Norfolk coast it has been little more than 6 in. annually. On the whole, some 35,000 acres were enclosed in the 17th century, about 19,000 acres during the 18th, and about 10,000 acres during the 19th century.

The first comprehensive scheme for regulating the outfall channels and controlling the currents of the Fen rivers seems to be that proposed by Nathaniel Kinderley in 1751. His idea[2] was to link the Nene with the Ouse by means of a new cut to be made through the marshland, and guide the united stream through a further new cut "under Wotten and Wolverton through the Marshes till over against Inglesthorp or Snetsham, and there discharge itself immediately into the Deeps of Lyn Channel." In a similar way the Witham, "when it has received the Welland from Spalding," was to be carried "to some convenient place over against Wrangle or Friskney, where it may be discharged into Boston Deeps." This scheme was still further improved upon by Sir John Rennie, who, in a report which he drew up in 1839, recommended that the outfalls of all four rivers should be directed by means of fascined channels into one common outfall, and that the land lying between them should be enclosed as rapidly as it consolidated. By this means he estimated that 150,000 acres would be won to cultivation. But beyond one or two abortive or half-hearted attempts, *e.g.* by the Lincolnshire Estuary Company in 1851, and in 1876 and subsequent years by the Norfolk Estuary Company, no serious effort has ever been made to execute either of these schemes.

Climate.—The annual mean temperature, as observed at Boston, in the period 1864–1885, is 48·7° F.; January, 36·5°; July, 62·8°; and as observed at Wisbech, for the period 1861–1875, 49·1°. The average mean rainfall for the seventy-one years 1830–1900, at Boston, was 22·9 in.; at Wisbech for the fifteen years 1860–1875, 24·2 in., and for the fifteen years 1866–1880, 26·7 in.; and at Maxey near Peterborough, 21·7 for the nineteen years 1882–1900. Previous to the drainage of the Fens, ague, rheumatism, and other ailments incidental to a damp climate were widely prevalent, but at the present day the Fen country is as healthy as the rest of England; indeed, there is reason to believe that it is conducive to longevity.

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[1] The principles upon which he proceeded are set forth in his *Discourse touching the Draining of the Great Fennes* (1642), reprinted in *Fenland Notes and Queries* (1898), pp. 26-38 and 81-87.

[2] Set forth in *The Present State of the Navigation of the Towns of Lyn, Wisbeach, Spalding and Boston* (2nd ed., London, 1851), pp. 82 seq.

Historical Notes.—The earliest inhabitants of this region of whom we have record were the British tribes of the Iceni confederation; the Romans, who subdued them, called them Coriceni or Coritani. In Saxon times the inhabitants of the Fens were known (*e.g.* to Bede) as Gyrvii, and are described as traversing the country on stilts. Macaulay, writing of the year 1689, gives to them the name of Breedlings, and describes them as "a half-savage population . . . who led an amphibious life, sometimes wading, sometimes rowing, from one islet of firm ground to another." In the end of the 18th century those who dwelt in the remoter parts were scarcely more civilized, being known to their neighbours by the expressive term of "Slodgers." These rude fen-dwellers have in all ages been animated by a tenacious love of liberty. Boadicea, queen of the Iceni, the worthy foe of the Romans; Hereward the Saxon, who defied William the Conqueror; Cromwell and his Ironsides, are representative of the fenman's spirit at its best. The fen peasantry showed a stubborn defence of their rights, not only when they resisted the encroachments and selfish appropriations of the "adventurers" in the 17th century, in the Bedford Level, in Deeping Fen, and in the Witham Fens, and again in the 18th century, when Holland Fen was finally enclosed, but also in the Peasants' Rising of 1381, and in the Pilgrimage of Grace in the reign of Henry VIII. So long as the Fens were unenclosed and thickly studded with immense "forests" of reeds, and innumerable marshy pools and "rows" (channels connecting the pools), they abounded in wild fowl, being regularly frequented by various species of wild duck and geese, garganies, polchards, shovelers, teals, widgeons, peewits, terns, grebes, coots, water-hens, water-rails, red-shanks, lapwings, god-wits, whimbrels, cranes, bitterns, herons, swans, ruffs and reeves. Vast numbers of these were taken in decoys[1] and sent to the London markets. At the same time equally vast quantities of tame geese were reared in the Fens, and driven by road[2] to London to be killed at Michaelmas. Their down, feathers and quills (for pens) were also a considerable source of profit. The Fen waters, too, abounded in fresh-water fish, especially pike, perch, bream, tench, rud, dace, roach, eels and sticklebacks. The Witham, on whose banks so many monasteries stood, was particularly famous for its pike; as were certain of the monastic waters in the southern part of the Fens for their eels. The soil of the reclaimed Fens is of exceptional fertility, being almost everywhere rich in humus, which is capable not only of producing very heavy crops of wheat and other corn, but also of fattening live-stock with peculiar ease. Lincolnshire oxen were famous in Elizabeth's time, and are specially singled out by Arthur Young,[3] the breed being the shorthorn. Of the crops peculiar to the region it must suffice to mention the old British dye-plant woad, which is still grown on a small scale in two or three parishes immediately south of Boston; hemp, which was extensively grown in the 18th century, but is not now planted; and peppermint, which is occasionally grown, *e.g.* at Deeping and Wisbech. In the second half of the 19th century the Fen country acquired a certain celebrity in the world of sport from the encouragement it gave to speed skating. Whenever practicable, championship and other racing meetings are held, chiefly at Littleport and Spalding. The little village of Welney, between Ely and Wisbech, has produced some of the most notable of the typical Fen skaters, *e.g.* "Turkey" Smart and "Fish" Smart.

Apart from fragmentary ruins of the former monastic buildings of Crowland, Kirkstead and other places, the Fen country of Lincolnshire (division of Holland) is especially remarkable for the size and beauty of its parish churches, mostly built of Barnack rag from Northamptonshire. Moreover, in the possession of such buildings as Ely cathedral and the parish church of King's Lynn, other parts of the Fens must be considered only less rich in ecclesiastical architecture. Using these fine opportunities, the Fen folk have long cultivated the science of campanology.

Dialect.—Owing to the comparative remoteness of their geographical situation, and the relatively late period at which the Fens were definitely enclosed, the Fenmen have preserved several dialectal features of a distinctive character, not the least interesting being their close kinship with the classical English of the present day. Professor E. E. Freeman (*Longman's Magazine*, 1875) reminded modern Englishmen that it was a native of the Fens, "a Bourne man, who gave the English language its present shape." This was Robert Manning, or Robert of Brunne, who in or about 1303 wrote *The Handlynge Synne.* Tennyson's dialect poems, *The Northern Farmer*, &c., do not reproduce the pure Fen dialect, but rather the dialect of the Wold district of mid Lincolnshire.

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FENTON, EDWARD (d. 1603), English navigator, son of Henry Fenton and brother of Sir Geoffrey Fenton (*q.v.*), was a native of Nottinghamshire. In 1577 he sailed, in command of the "Gabriel," with Sir Martin Frobisher's second expedition for the discovery of the north-west passage, and in the following year he took part as second in command in Frobisher's third expedition, his ship being the "Judith." He was then employed in Ireland for a time, but in 1582 he was put in charge of an expedition which was to sail round the Cape of Good Hope to the Moluccas and China, his instructions being to obtain any knowledge of the north-west passage that was possible without hindrance to his trade. On this unsuccessful voyage he got no farther than Brazil, and throughout he was engaged in quarrelling with his officers, and especially with his lieutenant, William Hawkins, the nephew of Sir John Hawkins, whom he had in irons when he arrived back in the Thames. In 1588 he had command of the "Mary Rose," one of the ships of the fleet that was formed to oppose the Armada. He died fifteen years afterwards.

FENTON, ELIJAH (1683–1730), English poet, was born at Shelton near Newcastle-under-Lyme, of an old Staffordshire family, on the 25th of May 1683. He graduated from Jesus College, Cambridge, in 1704, but was prevented by religious scruples from taking orders. He accompanied the earl of Orrery to Flanders as private secretary, and on returning to England became assistant in a school at Headley, Surrey, being soon afterwards appointed master of the free grammar school at Sevenoaks in Kent. In 1710 he resigned his appointment in the expectation of a place from Lord Bolingbroke, but was disappointed. He then became tutor to Lord Broghill, son of his patron Orrery. Fenton is remembered as the coadjutor of Alexander Pope in his translation of the *Odyssey.* He was responsible for the first, fourth, nineteenth and twentieth books, for which he received £300. He died at East Hampstead, Berkshire, on the 16th of July 1730. He was buried in the parish church, and his epitaph was written by Pope.

Fenton also published *Oxford and Cambridge Miscellany Poems* (1707); *Miscellaneous Poems* (1717); *Mariamne*, a tragedy (1723); an edition (1725) of Milton's poems, and one of Waller (1729) with elaborate notes. See W. W. Lloyd, *Elijah Fenton, his Poetry and Friends* (1894).

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[1] For descriptions of these see Oldfield, Appendix, pp. 2-4, of *A Topographical and Historical Account of Wainfleet* (London, 1829); and Miller and Skertchly, *The Fenland*, pp. 369-375.

[2] See De Foe's account in *A Tour through the Eastern Counties, 1722* (1724–1725).

[3] *General View*, pp. 174-194 and 288-304.

FENTON, SIR GEOFFREY (*c.* 1539–1608), English writer and politician, was the son of Henry Fenton, of Nottinghamshire. He was brother of Edward Fenton the navigator. He is said to have visited Spain and Italy in his youth; possibly he went to Paris in Sir Thomas Hoby's train in 1566, for he was living there in 1567, when he wrote *Certaine tragicall discourses written oute of Frenche and Latin.* This book is a free translation of François de Belleforest's French rendering of Matteo Bandello's *Novelle.* Till 1579 Fenton continued his literary labours, publishing *Monophylo* in 1572, *Golden epistles gathered out of Guevarae's workes as other authors* . . . 1575, and various religious tracts of strong protestant tendencies. In 1579 appeared the *Historie of Guicciardini, translated out of French by G. F.* and dedicated to Elizabeth. Through Lord Burghley he obtained, in 1580, the post of secretary to the new lord deputy of Ireland, Lord Grey de Wilton, and thus became a fellow worker with the poet, Edmund Spenser. From this time Fenton abandoned literature and became a faithful if somewhat unscrupulous servant of the crown. He was a bigoted protestant, longing to use the rack against "the diabolicall secte of Rome," and even advocating the assassination of the queen's most dangerous subjects. He won Elizabeth's confidence, and the hatred of all his fellow-workers, by keeping her informed of every one's doings in Ireland. In 1587 Sir John Perrot arrested Fenton, but the queen instantly ordered his release. Fenton was knighted in 1589, and in 1590–1591 he was in London as commissioner on the impeachment of Perrot. Full of dislike of the Scots and of James VI. (which he did not scruple to utter), on the latter's accession Fenton's post of secretary was in danger, but Burghley exerted himself in his favour, and in 1604 it was confirmed to him for life, though he had to share it with Sir Richard Coke. Fenton died in Dublin on the 19th of October 1608, and was buried in St Patrick's cathedral. He married in June 1585, Alice, daughter of Dr Robert Weston, formerly lord chancellor of Ireland, and widow of Dr Hugh Brady, bishop of Meath, by whom he had two children, a son, Sir William Fenton, and a daughter, Catherine, who in 1603 married Richard Boyle, 1st earl of Cork.

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FENTON, LAVINIA (1708–1760), English actress, was probably the daughter of a naval lieutenant named Beswick, but she bore the name of her mother's husband. Her first appearance was as Monimia in Otway's *Orphans*, in 1726 at the Haymarket. She then joined the company of players at the theatre in Lincoln's Inn Fields, where her success and beauty made her the toast of the beaux. It was in Gay's *Beggar's Opera*, as Polly Peachum, that Miss Fenton made her greatest success. Her pictures were in great demand, verses were written to her and books published about her, and she was the most talked-of person in London. Hogarth's picture shows her in one of the scenes, with the duke of Bolton in a box. After appearing in several comedies, and then in numerous repetitions of the *Beggar's Opera*, she ran away with her lover Charles Paulet, 3rd duke of Bolton, a man much older than herself, who, after the death of his wife in 1751, married her. Their three children all died young. The duchess survived her husband and died on the 24th of January 1760.

FENTON, a town of Staffordshire, England, on the North Staffordshire railway, adjoining the east side of Stoke-on-Trent, in which parliamentary and municipal borough it is included. Pop. (1891) 16,998; (1901) 22,742. The manufacture of earthenware common to the district (the Potteries) employs the bulk of the large industrial population.

FENUGREEK, in botany, *Trigonella Foenum-graecum* (so called from the name given to it by the ancients, who used it as fodder for cattle), a member of a genus of leguminous herbs very similar in habit and in most of their characters to the species of the genus *Medicago.* The leaves are formed of three obovate leaflets, the middle one of which is stalked; the flowers are solitary, or in clusters of two or three, and have a campanulate, 5-cleft calyx; and the pods are many-seeded, cylindrical or flattened, and straight or only slightly curved. The genus is widely diffused over the south of Europe, West and Central Asia, and the north of Africa, and is represented by several species in Australia. Fenugreek is indigenous to south-eastern Europe and western Asia, and is cultivated in the Mediterranean region, parts of central Europe, and in Morocco, and largely in Egypt and in India. It bears a sickle-shaped pod, containing from 10 to 20 seeds, from which 6% of a fetid, fatty and bitter oil can be extracted by ether. In India the fresh plant is employed as an esculent. The seed is an ingredient in curry powders, and is used for flavouring cattle foods. It was formerly much esteemed as a medicine, and is still in repute in veterinary practice.

FENWICK, SIR JOHN (*c.* 1645–1697), English conspirator, was the eldest son of Sir William Fenwick, or Fenwicke, a member of an old Northumberland family. He entered the army, becoming major-general in 1688, but before this date he had been returned in succession to his father as one of the members of parliament for Northumberland, which county he represented from 1677 to 1687. He was a strong partisan of King James II., and in 1685 was one of the principal supporters of the act of attainder against the duke of Monmouth; but he remained in England when William III. ascended the throne three years later. He began at once to plot against the new king, for which he underwent a short imprisonment in 1689. Renewing his plots on his release, he publicly insulted Queen Mary in 1691, and it is practically certain that he was implicated in the schemes for assassinating William which came to light in 1695 and 1696. After the seizure of his fellow-conspirators, Robert Charnock and others, he remained in hiding until the imprudent conduct of his friends in attempting to induce one of the witnesses against him to leave the country led to his arrest in June in 1696. To save himself he offered to reveal all he knew about the Jacobite conspiracies; but his confession was a farce, being confined to charges against some of the leading Whig noblemen, which were damaging, but not conclusive. By this time his friends had succeeded in removing one of the two witnesses, and in these circumstances it was thought that the charge of treason must fail. The government, however, overcame this difficulty by introducing a bill of attainder, which after a long and acrimonious discussion passed through both Houses of Parliament. His wife persevered in her attempts to save his life, but her efforts were fruitless, and Fenwick was beheaded in London on the 28th of January 1697, with the same formalities as were usually observed at the execution of a peer. By his wife, Mary (d. 1708), daughter of Charles Howard, 1st earl of Carlisle, he had three sons and one daughter. Macaulay says that "of all the Jacobites, the most desperate characters not excepted, he (Fenwick) was the only one for whom William felt an intense personal aversion"; and it is interesting to note that Fenwick's hatred of the king is said to date from the time when he was serving in Holland, and was reprimanded by William, then prince of Orange.

FEOFFMENT, in English law, during the feudal period, the usual method of granting or conveying a freehold or fee. For the derivation of the word see Fief and Fee. The essential elements were *livery of seisin* (delivery of possession), which consisted in formally giving to the feoffee on the land a clod or turf, or a growing twig, as a symbol of the transfer of the land, and words by the feoffor declaratory of his intent to deliver possession to the feoffee with a "limitation" of the estate intended to be transferred. This was called livery *in deed.* Livery *in law* was made not on but in sight of this land, the feoffor saying to the feoffee, "I give you that land; enter and take possession." Livery in law, in order to pass the estate, had to be perfected by entry by the feoffee during the joint lives of himself and the feoffor. It was usual to evidence the feoffment by writing in a charter or deed of feoffment; but writing was not essential until the Statute of Frauds; now, by the Real Property Act 1845, a conveyance of real property is void unless evidenced by deed, and thus feoffments have been rendered unnecessary and superfluous. All corporeal hereditaments were by that act declared to be *in grant* as well as *livery*, *i.e.* they could be granted by deed without livery. A feoffment might be a tortious conveyance, *i.e.* if a person attempted to give to the feoffee a greater estate than he himself had in the land, he forfeited the estate of which he was seised. (See CONVEYANCING; REAL PROPERTY.)

FERDINAND (Span. *Fernando* or *Hernando*; Ital. *Ferdinando* or *Ferrante*; in O. H. Ger. *Herinand*, *i.e.* "brave in the host," from O. H. G. *Heri*, "army," A.S. *here*, Mod. Ger. *Heer*, and the Goth. *nanþjan*, "to dare"), a name borne at various times by many European sovereigns and princes, the more important of whom are noticed below in the following order: emperors, kings of Naples, Portugal, Spain (Castile, Leon and Aragon) and the two Sicilies; then the grand duke of Tuscany, the prince of Bulgaria, the duke of Brunswick and the elector of Cologne.

FERDINAND I. (1503–1564), Roman emperor, was born at Alcalá de Henares on the 10th of March 1503, his father being Philip the Handsome, son of the emperor Maximilian I., and his mother Joanna, daughter of Ferdinand and Isabella, king and queen of Castile and Aragon. Philip died in 1506 and Ferdinand, educated in Spain, was regarded with especial favour by his maternal grandfather who wished to form a Spanish-Italian kingdom for his namesake. This plan came to nothing, and the same fate attended a suggestion made after the death of Maximilian in 1519 that Ferdinand, and not his elder brother Charles, afterwards the emperor Charles V., should succeed to the imperial throne. Charles, however, secured the Empire and the whole of the lands of Maximilian and Ferdinand, while the younger brother was perforce content with a subordinate position. Yet some provision must be made for Ferdinand. In April 1521 the emperor granted to him the archduchies and duchies of upper and lower Austria, Carinthia, Styria and Carniola, adding soon afterwards the county of Tirol and the hereditary possessions of the Habsburgs in south-western Germany. About the same time the archduke was appointed to govern the duchy of Württemberg, which had come into the possession of Charles V.; and in May 1521 he was married at Linz to Anna (d. 1547), a daughter of Ladislaus, king of Hungary and Bohemia, a union which had been arranged some years before by the emperor Maximilian. In 1521 also he was made president of the council of regency (*Reichsregiment*), appointed to govern Germany during the emperor's absence, and the next five years were occupied with imperial business, in which he acted as his brother's representative, and in the government of the Austrian lands.

In Austria and the neighbouring duchies Ferdinand sought at first to suppress the reformers and their teaching, and this was possibly one reason why he had some difficulty in quelling risings in the districts under his rule after the Peasants' War broke out in 1524. But a new field was soon opened for his ambition. In August 1526 his childless brother-in-law, Louis II., king of Hungary and Bohemia, was killed at the battle of Mohacs, and the archduke at once claimed both kingdoms, both by treaty and by right of his wife. Taking advantage of the divisions among his opponents, he was chosen king of Bohemia in October 1526, and crowned at Prague in the following February, but in Hungary he was less successful. John Zapolya, supported by the national party and soon afterwards by the Turks, offered a sturdy resistance, and although Ferdinand was chosen king at Pressburg in December 1526, and after defeating Zapolya at Tokay was crowned at Stuhlweissenburg in November 1527, he was unable to take possession of the kingdom. The Bavarian Wittelsbachs, incensed at not securing the Bohemian throne, were secretly intriguing with his foes; the French, after assisting spasmodically, made a formal alliance with Turkey in 1535; and Zapolya was a very useful centre round which the enemies of the Habsburgs were not slow to gather. A truce made in 1533 was soon broken, and the war dragged on until 1538, when by the treaty of Grosswardein, Hungary was divided between the claimants. The kingly title was given to Zapolya, but Ferdinand was to follow him on the throne. Before this, in January 1531, he had been chosen king of the Romans, or German king, at Cologne, and his coronation took place a few days later at Aix-la-Chapelle. He had thoroughly earned this honour by his loyalty to his brother, whom he had represented at several diets. In religious matters the king was now inclined, probably owing to the Turkish danger, to steer a middle course between the contending parties, and in 1532 he agreed to the religious peace of Nuremberg, receiving in return from the Protestants some assistance for the war against the Turks. In 1534, however, his prestige suffered a severe rebuff. Philip, landgrave of Hesse, and his associates had succeeded in conquering Württemberg on behalf of its exiled duke, Ulrich (*q.v.*), and, otherwise engaged, neither Charles nor Ferdinand could send much help to their lieutenants. They were consequently obliged to consent to the treaty of Cadan, made in June 1534, by which the German king recognized Ulrich as duke of Württemberg, on condition that he held his duchy under Austrian suzerainty.

In Hungary the peace of 1538 was not permanent. When Zapolya died in July 1540 a powerful faction refused to admit the right of Ferdinand to succeed him, and put forward his young son John Sigismund as a candidate for the throne. The cause of John Sigismund was espoused by the Turks and by Ferdinand's other enemies, and, unable to get any serious assistance from the imperial diet, the king repeatedly sought to make peace with the sultan, but his envoys were haughtily repulsed. In 1544, however, a short truce was made. This was followed by others, and in 1547 one was concluded for five years, but only on condition that Ferdinand paid tribute for the small part of Hungary which remained in his hands. The struggle was renewed in 1551 and was continued in the same desultory fashion until 1562, when a truce was made which lasted during the remainder of Ferdinand's lifetime. During the war of the league of Schmalkalden in 1546 and 1547 the king had taken the field primarily to protect Bohemia, and after the conclusion of the war he put down a rising in this country with some rigour. He appears during these years to have governed his lands with vigour and success, but in imperial politics he was merely the representative and spokesman of the emperor. About 1546, however, he began to take up a more independent position. Although Charles had crushed the league of Schmalkalden he had refused to restore Württemberg to Ferdinand; and he gave further offence by seeking to secure the succession of his son Philip, afterwards king of Spain, to the imperial throne. Ferdinand naturally objected, but in 1551 his reluctant consent was obtained to the plan that, on the proposed abdication of Charles, Philip should be chosen king of the Romans, and should succeed Ferdinand himself as emperor. Subsequent events caused the scheme to be dropped, but it had a somewhat unfortunate sequel for Charles, as during the short war between the emperor and Maurice, elector of Saxony, in 1552 Ferdinand's attitude was rather that of a spectator and mediator than of a partisan. There seems, however, to be no truth in the suggestion that he acted treacherously towards his brother, and was in alliance with his foes. On behalf of Charles he negotiated the treaty of Passau with Maurice in 1552, and in 1555 after the conduct of imperial business had virtually been made over to him, and harmony had been restored between the brothers, he was responsible for the religious peace of Augsburg. Early in 1558 Charles carried out his intention to abdicate the imperial throne, and on the 24th of March Ferdinand was crowned as his successor at Frankfort. Pope Paul IV. would not recognize the new emperor, but his successor Pius IV. did so in 1559 through the mediation of Philip of Spain. The emperor's short reign was mainly spent in seeking to settle the religious differences of Germany, and in efforts to prosecute the Turkish war more vigorously. His hopes at one time centred round the council of Trent which resumed its sittings in 1562, but he was unable to induce the Protestants to be represented. Although he held firmly to the Roman Catholic Church he sought to obtain tangible concessions to her opponents; but he refused to conciliate the Protestants by abrogating the clause concerning ecclesiastical reservation in the peace of Augsburg, and all his efforts to bring about reunion were futile. He did indeed secure the privilege of communion in both kinds from Pius IV. for the laity in Bohemia and in various parts of Germany, but the hearty support which he gave the Jesuits shows that he had no sympathy with Protestantism, and was only anxious to restore union in the Church. In November 1562 he obtained the election of his son Maximilian as king of the Romans, and having arranged a partition of his lands among his three surviving sons, died in Vienna on the 25th of July 1564. His family had consisted of six sons and nine daughters.

In spite of constant and harassing engagements Ferdinand was fairly successful both as king and emperor. He sought to consolidate his Austrian lands, reformed the monetary system in Germany, and reorganized the Aulic council (*Reichshofrat*). Less masterful but more popular than his brother, whose character overshadows his own, he was just and tolerant, a good Catholic and a conscientious ruler.

See the article on CHARLES V. and the bibliography appended thereto. Also, A. Ulloa, *Vita del potentissimo e christianissimo imperatore Ferdinando primo* (Venice, 1565); S. Schard, *Epitome rerum in variis orbis partibus a confirmatione Ferdinandi I.* (Basel, 1574); F. B. von Bucholtz, *Geschichte der Regierung Ferdinands des Ersten* (Vienna, 1831–1838); K. Oberleitner, *Österreichs Finanzen und Kriegswesen unter Ferdinand I.* (Vienna, 1859); A. Rezek, *Geschichte der Regierung Ferdinands I. in Böhmen* (Prague, 1878); E. Rosenthal, *Die Behördenorganisation Kaiser Ferdinands I.* (Vienna, 1887); and W. Bauer, *Die Anfänge Ferdinands I.* (Vienna, 1907).

FERDINAND II. (1578–1637), Roman emperor, was the eldest son of Charles, archduke of Styria (d. 1590), and his wife Maria, daughter of Albert IV., duke of Bavaria and a grandson of the emperor Ferdinand I. Born at Gratz on the 9th of July 1578, he was trained by the Jesuits, finishing his education at the university of Ingolstadt, and became the pattern prince of the counter-reformation. In 1596 he undertook the government of Styria, Carinthia and Carniola, and after a visit to Italy began an organized attack on Protestantism which under his father's rule had made great progress in these archduchies; and although hampered by the inroads of the Turks, he showed his indifference to the material welfare of his dominions by compelling many of his Protestant subjects to choose between exile and conversion, and by entirely suppressing Protestant worship. He was not, however, unmindful of the larger interest of his family, or of the Empire which the Habsburgs regarded as belonging to them by hereditary right. In 1606 he joined his kinsmen in recognizing his cousin Matthias as the head of the family in place of the lethargic Rudolph II.; but he shrank from any proceedings which might lead to the deposition of the emperor, whom he represented at the diet of Regensburg in 1608; and his conduct was somewhat ambiguous during the subsequent quarrel between Rudolph and Matthias.

In the first decade of the 17th century the house of Habsburg seemed overtaken by senile decay, and the great inheritance of Charles V. and Ferdinand I. to be threatened with disintegration and collapse. The reigning emperor, Rudolph II., was inert and childless; his surviving brothers, the archduke Matthias (afterwards emperor), Maximilian (1558–1618) and Albert (1559–1621), all men of mature age, were also without direct heirs; the racial differences among its subjects were increased by their religious animosities; and it appeared probable that the numerous enemies of the Habsburgs had only to wait a few years and then to divide the spoil. In spite of the recent murder of Henry IV. of France, this issue seemed still more likely when Matthias succeeded Rudolph as emperor in 1612. The Habsburgs, however, were not indifferent to the danger, and about 1615 it was agreed that Ferdinand, who already had two sons by his marriage with his cousin Maria Anna (d. 1616), daughter of William V., duke of Bavaria, should be the next emperor, and should succeed Matthias in the elective kingdoms of Hungary and Bohemia. The obstacles which impeded the progress of the scheme were gradually overcome by the energy of the archduke Maximilian. The elder archdukes renounced their rights in the succession; the claims of Philip III. and the Spanish Habsburgs were bought off by a promise of Alsace; and the emperor consented to his supercession in Hungary and Bohemia. In 1617 Ferdinand, who was just concluding a war with Venice, was chosen king of Bohemia, and in 1618 king of Hungary; but his election as German king, or king of the Romans, delayed owing to the anxiety of Melchior Klesl (*q.v.*) to conciliate the protestant princes, had not been accomplished when Matthias died in March 1619. Before this event, however, an important movement had begun in Bohemia. Having been surprised into choosing a devoted Roman Catholic as their king, the Bohemian Protestants suddenly realized that their religious, and possibly their civil liberties, were seriously menaced, and deeds of aggression on the part of Ferdinand's representatives showed that this was no idle fear. Gaining the upper hand they declared Ferdinand deposed, and elected the elector palatine of the Rhine, Frederick V., in his stead; and the struggle between the rivals was the beginning of the Thirty Years' War. At the same time other difficulties confronted Ferdinand, who had not yet secured the imperial throne. Bethlen Gabor, prince of Transylvania, invaded Hungary, while the Austrians rose and joined the Bohemians; but having seen his foes retreat from Vienna, Ferdinand hurried to Frankfort, where he was chosen emperor on the 28th of August 1619.

To deal with the elector palatine and his allies the new emperor allied himself with Maximilian I., duke of Bavaria, and the Catholic League, who drove Frederick from Bohemia in 1620, while Ferdinand's Spanish allies devastated the Palatinate. Peace having been made with Bethlen Gabor in December 1621, the first period of the war ended in a satisfactory fashion for the emperor, and he could turn his attention to completing the work of crushing the Protestants, which had already begun in his archduchies and in Bohemia. In 1623 the Protestant clergy were expelled from Bohemia; in 1624 all worship save that of the Roman Catholic church was forbidden; and in 1627 an order of banishment against all Protestants was issued. A new constitution made the kingdom hereditary in the house of Habsburg, gave larger powers to the sovereign, and aimed at destroying the nationality of the Bohemians. Similar measures in Austria led to a fresh rising which was put down by the aid of the Bavarians in 1627, and Ferdinand could fairly claim that in his hereditary lands at least he had rendered Protestantism innocuous.

The renewal of the Thirty Years' War in 1625 was caused mainly by the emperor's vigorous championship of the cause of the counter-reformation in northern and north-eastern Germany. Again the imperial forces were victorious, chiefly owing to the genius of Wallenstein, who raised and led an army in this service, although the great scheme of securing the southern coast of the Baltic for the Habsburgs was foiled partly by the resistance of Stralsund. In March 1629 Ferdinand and his advisers felt themselves strong enough to take the important step towards which their policy in the Empire had been steadily tending. Issuing the famous edict of restitution, the emperor ordered that all lands which had been secularized since 1552, the date of the peace of Passau, should be restored to the church, and prompt measures were taken to enforce this decree. Many and powerful interests were vitally affected by this proceeding, and the result was the outbreak of the third period of the war, which was less favourable to the imperial arms than the preceding ones. This comparative failure was due, in the initial stages of the campaign, to Ferdinand's weakness in assenting in 1630 to the demand of Maximilian of Bavaria that Wallenstein should be deprived of his command, and also to the genius of Gustavus Adolphus; and in its later stages to his insistence on the second removal of Wallenstein, and to his complicity in the assassination of the general. This deed was followed by the peace of Prague, concluded in 1635, primarily with John George I., elector of Saxony, but soon assented to by other princes; and this treaty, which made extensive concessions to the Protestants, marks the definite failure of Ferdinand to crush Protestantism in the Empire, as he had already done in Austria and Bohemia. It is noteworthy, however, that the emperor refused to allow the inhabitants of his hereditary dominions to share in the benefits of the peace. During these years Ferdinand had also been menaced by the secret or open hostility of France. A dispute over the duchies of Mantua and Monferrato was ended by the treaty of Cherasco in 1631, but the influence of France was employed at the imperial diets and elsewhere in thwarting the plans of Ferdinand and in weakening the power of the Habsburgs. The last important act of the emperor was to secure the election of his son Ferdinand as king of the Romans. An attempt in 1630 to attain this end had failed, but in December 1636 the princes, meeting at Regensburg, bestowed the coveted dignity upon the younger Ferdinand. A few weeks afterwards, on the 15th of February 1637, the emperor died at Vienna, leaving, in addition to the king of the Romans, a son Leopold William (1614–1662), bishop of Passau and Strassburg. Ferdinand's reign was so occupied with the Thirty Years' War and the struggle with the Protestants that he had little time or inclination for other business. It is interesting to note, however, that this orthodox and Catholic emperor was constantly at variance with Pope Urban VIII. The quarrel was due principally, but not entirely, to events in Italy, where the pope sided with France in the dispute over the succession to Mantua and Monferrato. The succession question was settled, but the enmity remained; Urban showing his hostility by preventing the election of the younger Ferdinand as king of the Romans in 1630, and by turning a deaf ear to the emperor's repeated requests for assistance to prosecute the war against the heretics. Ferdinand's character has neither individuality nor interest, but he ruled the Empire during a critical and important period. Kind and generous to his dependents, his private life was simple and blameless, but he was to a great extent under the influence of his confessors.

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FERDINAND III. (1608–1657), Roman emperor, was the elder son of the emperor Ferdinand II., and was born at Gratz on the 13th of July 1608. Educated by the Jesuits, he was crowned king of Hungary in December 1625, and king of Bohemia two years later, and soon began to take part in imperial business. Wallenstein, however, refused to allow him to hold a command in the imperial army; and henceforward reckoned among his enemies, the young king was appointed the successor of the famous general when he was deposed in 1634; and as commander-in-chief of the imperial troops he was nominally responsible for the capture of Regensburg and Donauwörth, and the defeat of the Swedes at Nördlingen. Having been elected king of the Romans, or German king, at Regensburg in December 1636, Ferdinand became emperor on his father's death in the following February, and showed himself anxious to put an end to the Thirty Years' War. He persuaded one or two princes to assent to the terms of the treaty of Prague; but a general peace was delayed by his reluctance to grant religious liberty to the Protestants, and by his anxiety to act in unison with Spain. In 1640 he had refused to entertain the idea of a general amnesty suggested by the diet at Regensburg; but negotiations for peace were soon begun, and in 1648 the emperor assented to the treaty of Westphalia. This event belongs rather to the general history of Europe, but it is interesting to note that owing to Ferdinand's insistence the Protestants in his hereditary dominions did not obtain religious liberty at this settlement. After 1648 the emperor was engaged in carrying out the terms of the treaty and ridding Germany of the foreign soldiery. In 1656 he sent an army into Italy to assist Spain in her struggle with France, and he had just concluded an alliance with Poland to check the aggressions of Charles X. of Sweden when he died on the 2nd of April 1657. Ferdinand was a scholarly and cultured man, an excellent linguist and a composer of music. Industrious and popular in public life, his private life was blameless; and although a strong Roman Catholic he was less fanatical than his father. His first wife was Maria Anna (d. 1646), daughter of Philip III. of Spain, by whom he had three sons: Ferdinand, who was chosen king of the Romans in 1653, and who died in the following year; Leopold, who succeeded his father on the imperial throne; and Charles Joseph (d. 1664), bishop of Passau and Breslau, and grand-master of the Teutonic order. The emperor's second wife was his cousin Maria (d. 1649), daughter of the archduke Leopold; and his third wife was Eleanora of Mantua (d. 1686). His musical works, together with those of the emperors Leopold I. and Joseph I., have been published by G. Adler (Vienna, 1892–1893).

See M. Koch, *Geschichte des deutschen Reiches unter der Regierung Ferdinands III.* (Vienna, 1865–1866).

FERDINAND I. (1793–1875), emperor of Austria, eldest son of Francis I. and of Maria Theresa of Naples, was born at Vienna on the 19th of April 1793. In his boyhood he suffered from epileptic fits, and could therefore not receive a regular education. As his health improved with his growth and with travel, he was not set aside from the succession. In 1830 his father caused him to be crowned king of Hungary, a pure formality, which gave him no power, and was designed to avoid possible trouble in the future. In 1831 he was married to Anna, daughter of Victor Emmanuel I. of Sardinia. The marriage was barren. When Francis I. died on the 2nd of March 1835, Ferdinand was recognized as his successor. But his incapacity was so notorious that the conduct of affairs was entrusted to a council of state, consisting of Prince Metternich (*q.v.*) with other ministers, and two archdukes, Louis and Francis Charles. They composed the *Staatsconferenz*, the ill-constructed and informal regency which led the Austrian dominions to the revolutionary outbreaks of 1846–1849. (See AUSTRIA-HUNGARY.) The emperor, who was subject to fits of actual insanity, and in his lucid intervals was weak and confused in mind, was a political nullity. His personal amiability earned him the affectionate pity of his subjects, and he became the hero of popular stories which did not tend to maintain the dignity of the crown. It was commonly said that having taken refuge on a rainy day in a farmhouse he was so tempted by the smell of the dumplings which the farmer and his family were eating for dinner, that he insisted on having one. His doctor, who knew them to be indigestible, objected, and thereupon Ferdinand, in an imperial rage, made the answer:—"Kaiser bin i', und Knüdel müss i' haben" (I am emperor, and will have the dumpling)—which has become a Viennese proverb. His popular name of *Der Gütige* (the good sort of man) expressed as much derision as affection. Ferdinand had good taste for art and music. Some modification of the tight-handed rule of his father was made by the *Staatsconferenz* during his reign. In the presence of the revolutionary troubles, which began with agrarian riots in Galicia in 1846, and then spread over the whole empire, he was personally helpless. He was compelled to escape from the disorders of Vienna to Innsbruck on the 17th of May 1848. He came back on the invitation of the diet on the 12th of August, but soon had to escape once more from the mob of students and workmen who were in possession of the city. On the 2nd of December he abdicated at Olmütz in favour of his nephew, Francis Joseph. He lived under supervision by doctors and guardians at Prague till his death on the 29th of June 1875.

See Krones von Marchland, *Grundriss der österreichischen Geschichte* (Vienna, 1882), which gives an ample bibliography; Count F. Hartig, *Genesis der Revolution in Österreich* (Leipzig, 1850);—an enlarged English translation will be found in the 4th volume of W. Coxe's *House of Austria* (London, 1862).

FERDINAND I. (1423–1494), also called Don Ferrante, king of Naples, the natural son of Alphonso V. of Aragon and I. of Sicily and Naples, was born in 1423. In accordance with his father's will, he succeeded him on the throne of Naples in 1458, but Pope Calixtus III. declared the line of Aragon extinct and the kingdom a fief of the church. But although he died before he could make good his claim (August 1458), and the new Pope Pius II. recognized Ferdinand, John of Anjou, profiting by the discontent of the Neapolitan barons, decided to try to regain the throne conquered by his ancestors, and invaded Naples. Ferdinand was severely defeated by the Angevins and the rebels at Sarno in July 1460, but with the help of Alessandro Sforza and of the Albanian chief, Skanderbeg, who chivalrously came to the aid of the prince whose father had aided him, he triumphed over his enemies, and by 1464 had re-established his authority in the kingdom. In 1478 he allied himself with Pope Sixtus IV. against Lorenzo de' Medici, but the latter journeyed alone to Naples when he succeeded in negotiating an honourable peace with Ferdinand. In 1480 the Turks captured Otranto, and massacred the majority of the inhabitants, but in the following year it was retaken by his son Alphonso, duke of Calabria. His oppressive government led in 1485 to an attempt at revolt on the part of the nobles, led by Francesca Coppola and Antonello Sanseverino and supported by Pope Innocent VIII.; the rising having been crushed, many of the nobles, notwithstanding Ferdinand's promise of a general amnesty, were afterwards treacherously murdered at his express command. In 1493 Charles VIII. of France was preparing to invade Italy for the conquest of Naples, and Ferdinand realized that this was a greater danger than any he had yet faced. With almost prophetic instinct he warned the Italian princes of the calamities in store for them, but his negotiations with Pope Alexander VI. and Ludovico il Moro, lord of Milan, having failed, he died in January 1494, worn out with anxiety. Ferdinand was gifted with great courage and real political ability, but his method of government was vicious and disastrous. His financial administration was based on oppressive and dishonest monopolies, and he was mercilessly severe and utterly treacherous towards his enemies.

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FERDINAND II. (1469–1496), king of Naples, was the grandson of the preceding, and son of Alphonso II. Alphonso finding his tenure of the throne uncertain on account of the approaching invasion of Charles VIII. of France and the general dissatisfaction of his subjects, abdicated in his son's favour in 1495, but notwithstanding this the treason of a party in Naples rendered it impossible to defend the city against the approach of Charles VIII. Ferdinand fled to Ischia; but when the French king left Naples with most of his army, in consequence of the formation of an Italian league against him, he returned, defeated the French garrisons, and the Neapolitans, irritated by the conduct of their conquerors during the occupation of the city, received him back with enthusiasm; with the aid of the great Spanish general Gonzalo de Cordova he was able completely to rid his state of its invaders shortly before his death, which occurred on the 7th of September 1496.

For authorities see under FERDINAND I. of Naples; for the exploits of Gonzalo de Cordova see H. P. del Pulgar, *Crónica del gran capitano don Gonzalo de Cordoba* (new ed., Madrid, 1834).

FERDINAND IV. (1751–1825), king of Naples (III. of Sicily, and I. of the Two Sicilies), third son of Don Carlos of Bourbon, king of Naples and Sicily (afterwards Charles III. of Spain), was born in Naples on the 12th of January 1751. When his father ascended the Spanish throne in 1759 Ferdinand, in accordance with the treaties forbidding the union of the two crowns, succeeded him as king of Naples, under a regency presided over by the Tuscan Bernardo Tanucci. The latter, an able, ambitious man, wishing to keep the government as much as possible in his own hands, purposely neglected the young king's education, and encouraged him in his love of pleasure, his idleness and his excessive devotion to outdoor sports. Ferdinand grew up athletic, but ignorant, ill-bred, addicted to the lowest amusements; he delighted in the company of the *lazzaroni* (the most degraded class of the Neapolitan people), whose dialect and habits he affected, and he even sold fish in the market, haggling over the price.

His minority ended in 1767, and his first act was the expulsion of the Jesuits. The following year he married Maria Carolina, daughter of the empress Maria Theresa. By the marriage contract the queen was to have a voice in the council of state after the birth of her first son, and she was not slow to avail herself of this means of political influence. Beautiful, clever and proud, like her mother, but cruel and treacherous, her ambition was to raise the kingdom of Naples to the position of a great power; she soon came to exercise complete sway over her stupid and idle husband, and was the real ruler of the kingdom. Tanucci, who attempted to thwart her, was dismissed in 1777, and the Englishman Sir John Acton (1736), who in 1779 was appointed director of marine, succeeded in so completely winning the favour of Maria Carolina, by supporting her in her scheme to free Naples from Spanish influence and securing a *rapprochement* with Austria and England, that he became practically and afterwards actually prime minister. Although not a mere grasping adventurer, he was largely responsible for reducing the internal administration of the country to an abominable system of espionage, corruption and cruelty. On the outbreak of the French Revolution the Neapolitan court was not hostile to the movement, and the queen even sympathized with the revolutionary ideas of the day. But when the French monarchy was abolished and the royal pair beheaded, Ferdinand and Carolina were seized with a feeling of fear and horror and joined the first coalition against France in 1793. Although peace was made with France in 1796, the demands of the French Directory, whose troops occupied Rome, alarmed the king once more, and at his wife's instigation he took advantage of Napoleon's absence in Egypt and of Nelson's victories to go to war. He marched with his army against the French and entered Rome (29th of November), but on the defeat of some of his columns he hurried back to Naples, and on the approach of the French, fled on board Nelson's ship the "Vanguard" to Sicily, leaving his capital in a state of anarchy. The French entered the city in spite of the fierce resistance of the *lazzaroni*, who were devoted to the king, and with the aid of the nobles and bourgeois established the Parthenopaean Republic (January 1799). When a few weeks later the French troops were recalled to the north of Italy, Ferdinand sent an expedition composed of Calabrians, brigands and gaol-birds, under Cardinal Ruffo, a man of real ability, great devotion to the king, and by no means so bad as he has been painted, to reconquer the mainland kingdom. Ruffo was completely successful, and reached Naples in May. His army and the *lazzaroni* committed nameless atrocities, which he honestly tried to prevent, and the Parthenopaean Republic collapsed.

The savage punishment of the Neapolitan Republicans is dealt with in more detail under NAPLES, NELSON and CARACCIOLO, but it is necessary to say here that the king, and above all the queen, were particularly anxious that no mercy should be shown to the rebels, and Maria Carolina made use of Lady Hamilton, Nelson's mistress, to induce him to execute her own spiteful vengeance. Her only excuse is that as a sister of Marie Antoinette the very name of Republican or Jacobin filled her with loathing. The king returned to Naples soon afterwards, and ordered wholesale arrests and executions of supposed Liberals, which continued until the French successes forced him to agree to a treaty in which amnesty for members of the French party was included. When war broke out between France and Austria in 1805, Ferdinand signed a treaty of neutrality with the former, but a few days later he allied himself with Austria and allowed an Anglo-Russian force to land at Naples. The French victory at Austerlitz enabled Napoleon to despatch an army to southern Italy. Ferdinand with his usual precipitation fled to Palermo (23rd of January 1806), followed soon after by his wife and son, and on the 14th of February the French again entered Naples. Napoleon declared that the Bourbon dynasty had forfeited the crown, and proclaimed his brother Joseph king of Naples and Sicily. But Ferdinand continued to reign over the latter kingdom under British protection. Parliamentary institutions of a feudal type had long existed in the island, and Lord William Bentinck (*q.v.*), the British minister, insisted on a reform of the constitution on English and French lines. The king indeed practically abdicated his power, appointing his son Francis regent, and the queen, at Bentinck's instance, was exiled to Austria, where she died in 1814.

After the fall of Napoleon, Joachim Murat, who had succeeded Joseph Bonaparte as king of Naples in 1808, was dethroned, and Ferdinand returned to Naples. By a secret treaty he had bound himself not to advance further in a constitutional direction than Austria should at any time approve; but, though on the whole he acted in accordance with Metternich's policy of preserving the *status quo*, and maintained with but slight change Murat's laws and administrative system, he took advantage of the situation to abolish the Sicilian constitution, in violation of his oath, and to proclaim the union of the two states into the kingdom of the Two Sicilies (December 12th, 1816). He was now completely subservient to Austria, an Austrian, Count Nugent, being even made commander-in-chief of the army; and for four years he reigned as a despot, every tentative effort at the expression of liberal opinion being ruthlessly suppressed. The result was an alarming spread of the influence and activity of the secret society of the Carbonari (*q.v.*), which in time affected a large part of the army. In July 1820 a military revolt broke out under General Pepe, and Ferdinand was terrorized into subscribing a constitution on the model of the impracticable Spanish constitution of 1812. On the other hand, a revolt in Sicily, in favour of the recovery of its independence, was suppressed by Neapolitan troops.

The success of the military revolution at Naples seriously alarmed the powers of the Holy Alliance, who feared that it might spread to other Italian states and so lead to that general European conflagration which it was their main preoccupation to avoid (see Europe: *History*). After long diplomatic negotiations, it was decided to hold a congress *ad hoc* at Troppau (October 1820). The main results of this congress were the issue of the famous Troppau Protocol, signed by Austria, Prussia and Russia only, and an invitation to King Ferdinand to attend the adjourned congress at Laibach (1821), an invitation of which Great Britain approved "as implying negotiation" (see Troppau, Laibach, *Congresses of*). At Laibach Ferdinand played so sorry a part as to provoke the contempt of those whose policy it was to re-establish him in absolute power. He had twice sworn, with gratuitous solemnity, to maintain the new constitution; but he was hardly out of Naples before he repudiated his oaths and, in letters addressed to all the sovereigns of Europe, declared his acts to have been null and void. An attitude so indecent threatened to defeat the very objects of the reactionary powers, and Gentz congratulated the congress that these sorry protests would be buried in the archives, offering at the same time to write for the king a dignified letter in which he should express his reluctance at having to violate his oaths in the face of irresistible force! But, under these circumstances, Metternich had no difficulty in persuading the king to allow an Austrian army to march into Naples "to restore order."

The campaign that followed did little credit either to the Austrians or the Neapolitans. The latter, commanded by General Pepe (*q.v.*), who made no attempt to defend the difficult defiles of the Abruzzi, were defeated, after a half-hearted struggle at Rieti (March 7th, 1821), and the Austrians entered Naples. The parliament was now dismissed, and Ferdinand inaugurated an era of savage persecution, supported by spies and informers, against the Liberals and Carbonari, the Austrian commandant in vain protesting against the savagery which his presence alone rendered possible.

Ferdinand died on the 4th of January 1825. Few sovereigns have left behind so odious a memory. His whole career is one long record of perjury, vengeance and meanness, unredeemed by a single generous act, and his wife was a worthy helpmeet and actively co-operated in his tyranny.

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FERDINAND I., king of Portugal (1345–1383), sometimes referred to as *el Gentil* (the Gentleman), son of Pedro I. of Portugal (who is not to be confounded with his Spanish contemporary Pedro the Cruel), succeeded his father in 1367. On the death of Pedro of Castile in 1369, Ferdinand, as great-grandson of Sancho IV. by the female line, laid claim to the vacant throne, for which the kings of Aragon and Navarre, and afterwards the duke of Lancaster (married in 1370 to Constance, the eldest daughter of Pedro), also became competitors. Meanwhile Henry of Trastamara, the brother (illegitimate) and conqueror of Pedro, had assumed the crown and taken the field. After one or two indecisive campaigns, all parties were ready to accept the mediation of Pope Gregory XI. The conditions of the treaty, ratified in 1371, included a marriage between Ferdinand and Leonora of Castile. But before the union could take place the former had become passionately attached to Leonora Tellez, the wife of one of his own courtiers, and having procured a dissolution of her previous marriage, he lost no time in making her his queen. This strange conduct, although it raised a serious insurrection in Portugal, did not at once result in a war with Henry; but the outward concord was soon disturbed by the intrigues of the duke of Lancaster, who prevailed on Ferdinand to enter into a secret treaty for the expulsion of Henry from his throne. The war which followed was unsuccessful; and peace was again made in 1373. On the death of Henry in 1379, the duke of Lancaster once more put forward his claims, and again found an ally in Portugal; but, according to the Continental annalists, the English proved as offensive to their companions in arms as to their enemies in the field; and Ferdinand made a peace for himself at Badajoz in 1382, it being stipulated that Beatrix, the heiress of Ferdinand, should marry King John of Castile, and thus secure the ultimate union of the crowns. Ferdinand left no male issue when he died on the 22nd of October 1383, and the direct Burgundian line, which had been in possession of the throne since the days of Count Henry (about 1112), became extinct. The stipulations of the treaty of Badajoz were set aside, and John, grand-master of the order of Aviz, Ferdinand's illegitimate brother, was proclaimed. This led to a war which lasted for several years.

FERDINAND I., *El Magno* or "the Great," king of Castile (*d.* 1065), son of Sancho of Navarre, was put in possession of Castile in 1028, on the murder of the last count, as the heir of his mother Elvira, daughter of a previous count of Castile. He reigned with the title of king. He married Sancha, sister and heiress of Bermudo, king of Leon. In 1038 Bermudo was killed in battle with Ferdinand at Tamaron, and Ferdinand then took possession of Leon by right of his wife, and was recognized in Spain as emperor. The use of the title was resented by the emperor Henry IV. and by Pope Victor II. in 1055, as implying a claim to the headship of Christendom, and as a usurpation on the Holy Roman Empire. It did not, however, mean more than that Spain was independent of the Empire, and that the sovereign of Leon was the chief of the princes of the peninsula. Although Ferdinand had grown in power by a fratricidal strife with Bermudo of Leon, and though at a later date he defeated and killed his brother Garcia of Navarre, he ranks high among the kings of Spain who have been counted religious. To a large extent he may have owed his reputation to the victories over the Mahommedans, with which he began the period of the great reconquest. But there can be no doubt that Ferdinand was profoundly pious. Towards the close of his reign he sent a special embassy to Seville to bring back the body of Santa Justa. The then king of Seville, Motadhid, one of the small princes who had divided the caliphate of Cordova, was himself a sceptic and poisoner, but he stood in wholesome awe of the power of the

Christian king. He favoured the embassy in every way, and when the body of Santa Justa could not be found, helped the envoys who were also aided by a vision seen by one of them in a dream, to discover the body of Saint Isidore, which was reverently carried away to Leon. Ferdinand died on the feast of Saint John the Evangelist, the 24th of June 1065, in Leon, with many manifestations of ardent piety—having laid aside his crown and royal mantle, dressed in the frock of a monk and lying on a bier, covered with ashes, which was placed before the altar of the church of Saint Isidore.

FERDINAND II., king of Leon only (*d.* 1188), was the son of Alphonso VII. and of Berenguela, of the house of the counts of Barcelona. On the division of the kingdoms which had obeyed his father, he received Leon. His reign of thirty years was one of strife marked by no signal success or reverse. He had to contend with his unruly nobles, several of whom he put to death. During the minority of his nephew Alphonso VIII. of Castile he endeavoured to impose himself on the kingdom as regent. On the west he was in more or less constant strife with Portugal, which was in process of becoming an independent kingdom. His relations to the Portuguese house must have suffered by his repudiation of his wife Urraca, daughter of Alphonso I. of Portugal. Though he took the king of Portugal prisoner in 1180, he made no political use of his success. He extended his dominions southward in Estremadura at the expense of the Moors. Ferdinand, who died in 1188, left the reputation of a good knight and hard fighter, but did not display political or organizing faculty.

FERDINAND III., *El Santo* or "the Saint," king of Castile (1199–1252), son of Alphonso IX. of Leon, and of Berengaria, daughter of Alphonso VIII. of Castile, ranks among the greatest of the Spanish kings. The marriage of his parents, who were second cousins, was dissolved as unlawful by the pope, but the legitimacy of the children was recognized. Till 1217 he lived with his father in Leon. In that year the young king of Castile, Henry, was killed by accident. Berengaria sent for her son with such speed that her messenger reached Leon before the news of the death of the king of Castile, and when he came to her she renounced the crown in his favour. Alphonso of Leon considered himself tricked, and the young king had to begin his reign by a war against his father and a faction of the Castilian nobles. His own ability and the remarkable capacity of his mother proved too much for the king of Leon and his Castilian allies. Ferdinand, who showed himself docile to the influence of Berengaria, so long as she lived, married the wife she found for him, Beatrice, daughter of the emperor Philip (of Hohenstaufen), and followed her advice both in prosecuting the war against the Moors and in the steps which she took to secure his peaceful succession to Leon on the death of his father in 1231. After the union of Castile and Leon in that year he began the series of campaigns which ended by reducing the Mahommedan dominions in Spain to Granada. Cordova fell in 1236, and Seville in 1248. The king of Granada did homage to Ferdinand, and undertook to attend the cortes when summoned. The king was a severe persecutor of the Albigenses, and his formal canonization was due as much to his orthodoxy as to his crusading by Pope Clement X. in 1671. He revived the university first founded by his grandfather Alphonso VIII., and placed it at Salamanca. By his second marriage with Joan (d. 1279), daughter of Simon, of Dammartin, count of Ponthieu, by right of his wife Marie, Ferdinand was the father of Eleanor, the wife of Edward I. of England.

FERDINAND IV., *El Emplazado* or "the Summoned," king of Castile (*d.* 1312), son of Sancho El Bravo, and his wife Maria de Molina, is a figure of small note in Spanish history. His strange title is given him in the chronicles on the strength of a story that he put two brothers of the name of Carvajal to death tyrannically, and was given a time, a *plazo*, by them in which to answer for his crime in the next world. But the tale is not contemporary, and is an obvious copy of the story told of Jacques de Molay, grand-master of the Temple, and Philippe Le Bel. Ferdinand IV. succeeded to the throne when a boy of six. His minority was a time of anarchy. He owed his escape from the violence of competitors and nobles, partly to the tact and undaunted bravery of his mother Maria de Molina, and partly to the loyalty of the citizens of Avila, who gave him refuge within their walls. As a king he proved ungrateful to his mother, and weak as a ruler. He died suddenly in his tent at Jaen when preparing for a raid into the Moorish territory of Granada, on the 7th of September 1312.

FERDINAND I., king of Aragon (1373–1416), called "of Antequera," was the son of John I. of Castile by his wife Eleanor, daughter of the third marriage of Peter IV. of Aragon. His surname "of Antequera" was given him because he was besieging that town, then in the hands of the Moors, when he was told that the cortes of Aragon had elected him king in succession to his uncle Martin, the last male of the old line of Wilfred the Hairy. As infante of Castile Ferdinand had played an honourable part. When his brother Henry III. died at Toledo, in 1406, the cortes was sitting, and the nobles offered to make him king in preference to his nephew John. Ferdinand refused to despoil his brother's infant son, and even if he did not act on the moral ground he alleged, his sagacity must have shown him that he would be at the mercy of the men who had chosen him in such circumstances. As co-regent of the kingdom with Catherine, widow of Henry III. and daughter of John of Gaunt by his marriage with Constance, daughter of Peter the Cruel and Maria de Padilla, Ferdinand proved a good ruler. He restrained the follies of his sister-in-law, and kept the realm quiet, by firm government, and by prosecuting the war with the Moors. As king of Aragon his short reign of two years left him little time to make his mark. Having been bred in Castile, where the royal authority was, at least in theory, absolute, he showed himself impatient under the checks imposed on him by the *fueros*, the chartered rights of Aragon and Catalonia. He particularly resented the obstinacy of the Barcelonese, who compelled the members of his household to pay municipal taxes. His most signal act as king was to aid in closing the Great Schism in the Church by agreeing to the deposition of the antipope Benedict XIV., an Aragonese. He died at Ygualada in Catalonia on the 2nd of April 1416.

FERDINAND V. of Castile and Leon, and **II.** of Aragon (1452–1516), was the son of John I. of Aragon by his second marriage with Joanna Henriquez, of the family of the hereditary grand admirals of Castile, and was born at Sos in Aragon on the 16th of March 1452. Under the name of "the Catholic" and as the husband of Isabella, queen of Castile, he played a great part in Europe. His share in establishing the royal authority in all parts of Spain, in expelling the Moors from Granada, in the conquest of Navarre, in forwarding the voyages of Columbus, and in contending with France for the supremacy in Italy, is dealt with elsewhere (see SPAIN: *History*). In personal character he had none of the attractive qualities of his wife. It may fairly be said of him that he was purely a politician. His marriage in 1469 to his cousin Isabella of Castile was dictated by the desire to unite his own claims to the crown, as the head of the younger branch of the same family, with hers, in case Henry IV. should die childless. When the king died in 1474 he made an ungenerous attempt to procure his own proclamation as king without recognition of the rights of his wife. Isabella asserted her claims firmly, and at all times insisted on a voice in the government of Castile. But though Ferdinand had sought a selfish political advantage at his wife's expense, he was well aware of her ability and high character. Their married life was dignified and harmonious; for Ferdinand had no common vices, and their views in government were identical. The king cared for nothing but dominion and political power. His character explains the most ungracious acts of his life, such as his breach of his promises to Columbus, his distrust of Ximenez and of the Great Captain. He had given wide privileges to Columbus on the supposition that the discoverer would reach powerful kingdoms. When islands inhabited by feeble savages were discovered, Ferdinand appreciated the risk that they might become the seat of a power too strong to be controlled, and took measures to avert the danger. He feared that Ximinez and the

Great Captain would become too independent, and watched them in the interest of the royal authority. Whether he ever boasted, as he is said to have boasted, that he had deceived Louis XII. of France twelve times, is very doubtful; but it is certain that when Ferdinand made a treaty, or came to an understanding with any one, the contract was generally found to contain implied meanings favourable to himself which the other contracting party had not expected. The worst of his character was prominently shown after the death of Isabella in 1504. He endeavoured to lay hands on the regency of Castile in the name of his insane daughter Joanna, and without regard to the claims of her husband Philip of Habsburg. The hostility of the Castilian nobles, by whom he was disliked, baffled him for a time, but on Philip's early death he reasserted his authority. His second marriage with Germaine of Foix in 1505 was apparently contracted in the hope that by securing an heir male he might punish his Habsburg son-in-law. Aragon did not recognize the right of women to reign, and would have been detached together with Catalonia, Valencia and the Italian states if he had had a son. This was the only occasion on which Ferdinand allowed passion to obscure his political sense, and lead him into acts which tended to undo his work of national unification. As king of Aragon he abstained from inroads on the liberties of his subjects which might have provoked rebellion. A few acts of illegal violence are recorded of him—as when he invited a notorious demagogue of Saragossa to visit him in the palace, and caused the man to be executed without form of trial. Once when presiding over the Aragonese cortes he found himself sitting in a thorough draught and ordered the window to be shut, adding in a lower voice, "If it is not against the *fueros*." But his ill-will did not go beyond such sneers. He was too intent on building up a great state to complicate his difficulties by internal troubles. His arrangement of the convention of Guadalupe, which ended the fierce Agrarian conflicts of Catalonia, was wise and profitable to the country, though it was probably dictated mainly by a wish to weaken the landowners by taking away their feudal rights. Ferdinand died at Madrigalejo in Estremadura on the 23rd of February 1516.

The lives of the kings of this name before Ferdinand V. are contained in the chronicles, and in the *Anales de Aragon* of Zurita, and the History of Spain by Mariana. Both deal at length with the life of Ferdinand V. Prescott's *History of the Reign of Ferdinand and Isabella*, in any of its numerous editions, gives a full life of him with copious references to authorities.

FERDINAND VI., king of Spain (1713–1759), second son of Philip V., founder of the Bourbon dynasty, by his first marriage with Maria Louisa of Savoy, was born at Madrid on the 23rd of September 1713. His youth was depressed. His father's second wife, Elizabeth Farnese, was a managing woman, who had no affection except for her own children, and who looked upon her stepson as an obstacle to their fortunes. The hypochondria of his father left Elizabeth mistress of the palace. Ferdinand was married in 1729 to Maria Magdalena Barbara, daughter of John V. of Portugal. The very homely looks of his wife were thought by observers to cause the prince a visible shock when he was first presented to her. Yet he became deeply attached to his wife, and proved in fact nearly as uxorious as his father. Ferdinand was by temperament melancholy, shy and distrustful of his own abilities. When complimented on his shooting, he replied, "It would be hard if there were not something I could do." As king he followed a steady policy of neutrality between France and England, and refused to be tempted by the offers of either into declaring war on the other. In his life he was orderly and retiring, averse from taking decisions, though not incapable of acting firmly, as when he cut short the dangerous intrigues of his able minister Ensenada by dismissing and imprisoning him. Shooting and music were his only pleasures, and he was the generous patron of the famous singer Farinelli (*q.v.*), whose voice soothed his melancholy. The death of his wife Barbara, who had been devoted to him, and who carefully abstained from political intrigue, broke his heart. Between the date of her death in 1758 and his own on the 10th of August 1759 he fell into a state of prostration in which he would not even dress, but wandered unshaven, unwashed and in a nightgown about his park. The memoirs of the count of Fernan Nuñez give a shocking picture of his death-bed.

A good account of the reign and character of Ferdinand VI. will be found in vol. iv. of Coxe's *Memoirs of the Kings of Spain of the House of Bourbon* (London, 1815). See also *Vida de Carlos III.*, by the count of Fernan Nuñez, ed. M. Morel Fatio and Don A. Paz y Melia (1898).

FERDINAND VII., king of Spain (1784–1833), the eldest son of Charles IV., king of Spain, and of his wife Maria Louisa of Parma, was born at the palace of San Ildefonso near Balsain in the Somosierra hills, on the 14th of October 1784. The events with which he was connected were many, tragic and of the widest European interest. In his youth he occupied the painful position of an heir apparent who was carefully excluded from all share in government by the jealousy of his parents, and the prevalence of a royal favourite. National discontent with a feeble government produced a revolution in 1808 by which he passed to the throne by the forced abdication of his father. Then he spent years as the prisoner of Napoleon, and returned in 1814 to find that while Spain was fighting for independence in his name a new world had been born of foreign invasion and domestic revolution. He came back to assert the ancient doctrine that the sovereign authority resided in his person only. Acting on this principle he ruled frivolously, and with a wanton indulgence of whims. In 1820 his misrule provoked a revolt, and he remained in the hands of insurgents till he was released by foreign intervention in 1823. When free, he revenged himself with a ferocity which disgusted his allies. In his last years he prepared a change in the order of succession established by his dynasty in Spain, which angered a large part of the nation, and made a civil war inevitable. We have to distinguish the part of Ferdinand VII. in all these transactions, in which other and better men were concerned. It can confidently be said to have been uniformly base. He had perhaps no right to complain that he was kept aloof from all share in government while only heir apparent, for this was the traditional practice of his family. But as heir to the throne he had a right to resent the degradation of the crown he was to inherit, and the power of a favourite who was his mother's lover. If he had put himself at the head of a popular rising he would have been followed, and would have had a good excuse. His course was to enter on dim intrigues at the instigation of his first wife, Maria Antonietta of Naples. After her death in 1806 he was drawn into other intrigues by flatterers, and, in October 1807, was arrested for the conspiracy of the Escorial. The conspiracy aimed at securing the help of the emperor Napoleon. When detected, Ferdinand betrayed his associates, and grovelled to his parents. When his father's abdication was extorted by a popular riot at Aranjuez in March 1808, he ascended the throne—not to lead his people manfully, but to throw himself into the hands of Napoleon, in the fatuous hope that the emperor would support him. He was in his turn forced to make an abdication and imprisoned in France, while Spain, with the help of England, fought for its life. At Valançay, where he was sent as a prisoner of state, he sank contentedly into vulgar vice, and did not scruple to applaud the French victories over the people who were suffering unutterable misery in his cause. When restored in March 1814, on the fall of Napoleon, he had just cause to repudiate the impracticable constitution made by the cortes without his consent. He did so, and then governed like an evil-disposed boy—indulging the merest animal passions, listening to a small *camarilla* of low-born favourites, changing his ministers every three months, and acting on the impulse of whims which were sometimes mere buffoonery, but were at times lubricous, or ferocious. The autocratic powers of the Grand Alliance, though forced to support him as the representative of legitimacy in Spain, watched his proceedings with disgust and alarm. "The king," wrote Gentz to the hospodar Caradja on the 1st of December 1814, "himself enters the houses of his first ministers, arrests them, and hands them over to their cruel enemies"; and again, on the 14th of January 1815, "The king has so debased himself that he has become no more than the leading police agent and gaoler of his country." When at last the inevitable revolt came in 1820 he grovelled to the insurgents as he had done to his parents, descending to the meanest submissions while fear was on him, then intriguing and, when detected, grovelling again. When at the beginning of 1823, as a result of the congress of Verona, the French invaded Spain,[1] "invoking the God of St Louis, for the sake of preserving the throne of Spain to a descendant of Henry IV., and of reconciling that fine kingdom with Europe," and in May the revolutionary party carried Ferdinand to Cadiz, he continued to make promises of amendment till he was free. Then, in violation of his oath to grant an amnesty, he revenged himself for three years of coercion by killing on a scale which revolted his "rescuers," and against which the duke of Angoulême, powerless to interfere, protested by refusing the Spanish decorations offered him for his services. During his last years Ferdinand's energy was abated. He no longer changed ministers every few months as a sport, and he allowed some of them to conduct the current business of government. His habits of life were telling on him. He became torpid, bloated and horrible to look at. After his fourth marriage in 1829 with Maria Christina of Naples, he was persuaded by his wife to set aside the law of succession of Philip V., which gave a preference to all the males of the family in Spain over the females. His marriage had brought him only two daughters. When well, he consented to the change under the influence of his wife. When ill, he was terrified by priestly advisers, who were partisans of his brother Don Carlos. What his final decision was is perhaps doubtful. His wife was mistress by his death-bed, and she could put the words she chose into the mouth of a dead man—and could move the dead hand at her will. Ferdinand died on the 29th of September 1833. It had been a frequent saying with the more zealous royalists of Spain that a king must be wiser than his ministers, for he was placed on the throne and directed by God. Since the reign of Ferdinand VII. no one has maintained this unqualified version of the great doctrine of divine right.

King Ferdinand VII. kept a diary during the troubled years 1820–1823, which has been published by the count de Casa Valencia.

FERDINAND II. (1810-1859), king of the Two Sicilies, son of Francis I., was born at Palermo on the 12th of January 1810. In his early years he was credited with Liberal ideas and he was fairly popular, his free and easy manners having endeared him to the *lazzaroni*. On succeeding his father in 1830, he published an edict in which he promised to "give his most anxious attention to the impartial administration of justice," to reform the finances, and to "use every effort to heal the wounds which had afflicted the kingdom for so many years"; but these promises seem to have been meant only to lull discontent to sleep, for although he did something for the economic development of the kingdom, the existing burden of taxation was only slightly lightened, corruption continued to flourish in all departments of the administration, and an absolutism was finally established harsher than that of all his predecessors, and supported by even more extensive and arbitrary arrests. Ferdinand was naturally shrewd, but badly educated, grossly superstitious and possessed of inordinate self-esteem. Though he kept the machinery of his kingdom fairly efficient, and was a patriot to the extent of brooking no foreign interference, he made little account of the wishes or welfare of his subjects. In 1832 he married Cristina, daughter of Victor Emmanuel I., king of Sardinia, and shortly after her death in 1836 he took for a second wife Maria Theresa, daughter of archduke Charles of Austria. After his Austrian alliance the bonds of despotism were more closely tightened, and the increasing discontent of his subjects was manifested by various abortive attempts at insurrection; in 1837 there was a rising in Sicily in consequence of the outbreak of cholera, and in 1843 the Young Italy Society tried to organize a general rising, which, however, only manifested itself in a series of isolated outbreaks. The expedition of the Bandiera brothers (*q.v.*) in 1844, although it had no practical result, aroused great ill-feeling owing to the cruel sentences passed on the rebels. In January 1848 a rising in Sicily was the signal for revolutions all over Italy and Europe; it was followed by a movement in Naples, and the king granted a constitution which he swore to observe. A dispute, however, arose as to the nature of the oath which should be taken by the members of the chamber of deputies, and as neither the king nor the deputies would yield, serious disturbances broke out in the streets of Naples on the 15th of May; so the king, making these an excuse for withdrawing his promise, dissolved the national parliament on the 13th of March 1849. He retired to Gaeta to confer with various deposed despots, and when the news of the Austrian victory at Novara (March 1849) reached him, he determined to return to a reactionary policy. Sicily, whence the Royalists had been expelled, was subjugated by General Filangieri (*q.v.*), and the chief cities were bombarded, an expedient which won for Ferdinand the epithet of "King Bomba." During the last years of his reign espionage and arbitrary arrests prevented all serious manifestations of discontent among his subjects. In 1851 the political prisoners of Naples were calculated by Mr Gladstone in his letters to Lord Aberdeen (1851) to number 15,000 (probably the real figure was nearer 40,000), and so great was the scandal created by the prevailing reign of terror, and the abominable treatment to which the prisoners were subjected, that in 1856 France and England made diplomatic representations to induce the king to mitigate his rigour and proclaim a general amnesty, but without success. An attempt was made by a soldier to assassinate Ferdinand in 1856. He died on the 22nd of May 1856, just after the declaration of war by France and Piedmont against Austria, which was to result in the collapse of his kingdom and his dynasty. He was bigoted, cruel, mean, treacherous, though not without a certain *bonhomie*; the only excuse that can be made for him is that with his heredity and education a different result could scarcely be expected.

See *Correspondence respecting the Affairs of Naples and Sicily, 1848–1849, presented to both Houses of Parliament by Command of Her Majesty*, 4th May 1849; *Two Letters to the Earl of Aberdeen*, by the Right Hon. W. E. Gladstone, 1st ed., 1851 (an edition published in 1852 and the subsequent editions contain an *Examination of the Official Reply of the Neapolitan Government*); N. Nisco, *Ferdinando II. il suo regno* (Naples, 1884); H. Remsen Whitehouse, *The Collapse of the Kingdom of Naples* (New York, 1899); R. de Cesare, *La Caduta d' un Regno*, vol. i. (Città di Castello, 1900), which contains a great deal of fresh information, but is badly arranged and not always reliable. (L. V.*)

FERDINAND III. (1769–1824), grand duke of Tuscany, and archduke of Austria, second son of the emperor Leopold II., was born on the 6th of May 1769. On his father becoming emperor in 1790, he succeeded him as grand duke of Tuscany. Ferdinand was one of the first sovereigns to enter into diplomatic relations with the French republic (1793); and although, a few months later, he was compelled by England and Russia to join the coalition against France, he concluded peace with that power in 1795, and by observing a strict neutrality saved his dominions from invasion by the French, except for a temporary occupation of Livorno, till 1799, when he was compelled to vacate his throne, and a provisional Republican government was established at Florence. Shortly afterwards the French arms suffered severe reverses in Italy, and Ferdinand was restored to his territories; but in 1801, by the peace of Lunéville, Tuscany was converted into the kingdom of Etruria, and he was again compelled to return to Vienna. In lieu of the sovereignty of Tuscany, he obtained in 1802 the electorship of Salzburg, which he exchanged by the peace of Pressburg in 1805 for that of Würzburg. In 1806 he was admitted as grand duke of Würzburg to the confederation of the Rhine. He was restored to the throne of Tuscany after the abdication of Napoleon in 1814 and was received with enthusiasm by the people, but had again to vacate his capital for a short time in 1815, when Murat proclaimed war against Austria. The final overthrow of the French supremacy at the battle of Waterloo secured him, however, in the undisturbed possession of his grand duchy during the remainder of his life. The restoration in Tuscany was not accompanied by the reactionary excesses which characterized it elsewhere, and a large part of the French legislation was retained. His prime minister was Count V. Fossombroni (*q.v.*). The mild rule of Ferdinand, his solicitude for the welfare of his subjects, his enlightened patronage of art and science, his encouragement of commerce, and his toleration render him an honourable exception to the generality of Italian princes. At the same time his paternal despotism tended to emasculate the Tuscan character. He died in June 1824, and was succeeded by his son Leopold II. (*q.v.*).

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[1] Louis XVIII.'s speech from the throne, Jan. 28, 1823.

Bibliography.—A. von Reumont, *Geschichte Toscanas* (Gotha, 1877); and "Federico Manfredini e la politica Toscana nei primi anni di Ferdinando III." (in the *Archivio Storico Italiano*, 1877); Emmer, *Erzherzog Ferdinand III., Grossherzog von Toskana* (Salzburg, 1871); C. Tivaroni, *L' Italia durante il dominio francese*, ii. 1-44 (Turin, 1889), and *L' Italia durante il dominio austriaco*, ii. 1-18 (Turin, 1893). See also under Fossombroni; Vittorio; and Capponi, Gino.

FERDINAND, MAXIMILIAN KARL LEOPOLD MARIA, king of Bulgaria (1861–), fifth and youngest son of Prince Augustus of Saxe-Coburg and Gotha, was born on the 26th of February 1861. Great care was exercised in his education, and every encouragement given to the taste for natural history which he exhibited at an early age. In 1879 he travelled with his brother Augustus to Brazil, and the results of their botanical observations were published at Vienna, 1883–1888, under the title of *Itinera Principum S. Coburgi*. Having been appointed to a lieutenancy in the 2nd regiment of Austrian hussars, he was holding this rank when, by unanimous vote of the National Assembly, he was elected prince of Bulgaria, on the 7th of July 1887, in succession to Prince Alexander, who had abdicated on the 7th of September preceding. He assumed the government on the 14th of August 1887, for Russia for a long time refused to acknowledge the election, and he was accordingly exposed to frequent military conspiracies, due to the influence or attitude of that power. The firmness and vigour with which he met all attempts at revolution were at length rewarded, and his election was confirmed in March 1896 by the Porte and the great powers. On the 20th of April 1893 he married Marie Louise de Bourbon (d. 1899), eldest daughter of Duke Robert of Parma, and in May following the Grand Sobranye confirmed the title of Royal Highness to the prince and his heir. The prince adhered to the Roman Catholic faith, but his son and heir, the young Prince Boris, was received into the Orthodox Greek Church on the 14th of February 1896. Prince Boris, to whom the tsar Nicholas III. became godfather, accompanied his father to Russia in 1898, when Prince Ferdinand visited St Petersburg and Moscow, and still further strengthened the bond already existing between Russia and Bulgaria. In 1908 Ferdinand married Eleanor (b. 1860), a princess of the house of Reuss. Later in the year, in connexion with the Austrian annexation of Bosnia-Herzegovina and the crisis with Turkey, he proclaimed the independence of Bulgaria, and took the title of king or tsar. (See Bulgaria, and Europe: *History*.)

FERDINAND, duke of Brunswick (1721–1792), Prussian general field marshal, was the fourth son of Ferdinand Albert, duke of Brunswick, and was born at Wolfenbüttel on the 12th of January 1721. He was carefully educated with a view to a military career, and in his twentieth year he was made chief of a newly-raised Brunswick regiment in the Prussian service. He was present in the battles of Mollwitz and Chotusitz. In succession to Margrave Wilhelm of Brandenburg, killed at Prague (1744), Ferdinand received the command of Frederick the Great's *Leibgarde* battalion, and at Sohr (1745) he distinguished himself so greatly at the head of his brigade that Frederick wrote of him, "le Prince Ferdinand s'est surpassé." The height which he captured was defended by his brother Ludwig as an officer of the Austrian service, and another brother of Duke Ferdinand was killed by his side in the charge. During the ten years' peace he was in the closest touch with the military work of Frederick the Great, who supervised the instruction of the guard battalion, and sought to make it a model of the whole Prussian army. Ferdinand was, moreover, one of the most intimate friends of the king, and thus he was peculiarly fitted for the tasks which afterwards fell to his lot. In this time he became successively major-general and lieutenant-general. In the first campaign of the Seven Years' War Ferdinand commanded one of the Prussian columns which converged upon Dresden, and in the operations which led up to the surrender of the Saxon army at Pirna (1756), and at the battle of Lobositz, he led the right wing of the Prussian infantry. In 1757 he was present, and distinguished himself, at Prague, and he served also in the campaign of Rossbach. Shortly after this he was appointed to command the allied forces which were being organized for the war in western Germany. He found this army dejected by a reverse and a capitulation, yet within a week of his taking up the command he assumed the offensive, and thus began the career of victory which made his European reputation as a soldier. His conduct of the five campaigns which followed (see Seven Years' War) was naturally influenced by the teachings of Frederick, whose pupil the duke had been for so many years. Ferdinand, indeed, approximated more closely to Frederick in his method of making war than any other general of the time. Yet his task was in many respects far more difficult than that of the king. Frederick was the absolute master of his own homogeneous army, Ferdinand merely the commander of a group of contingents, and answerable to several princes for the troops placed under his control. The French were by no means despicable opponents in the field, and their leaders, if not of the first grade, were cool and experienced veterans. In 1758 he fought and won the battle of Crefeld, several marches beyond the Rhine, but so advanced a position he could not well maintain, and he fell back to the Lippe. He resumed a bold offensive in 1759, only to be repulsed at Bergen (near Frankfort-on-Main). On the 1st of August of this year Ferdinand won the brilliant victory of Minden (*q.v.*). Vellinghausen, Wilhelmsthal, Warburg and other victories attested the increasing power of Ferdinand in the following campaigns, and Frederick, hard pressed in the eastern theatre of war, owed much of his success in an almost hopeless task to the continued pressure exerted by Ferdinand in the west. In promoting him to be a field marshal (November 1758) Frederick acknowledged his debt in the words, "Je n'ai fait que ce que je dois, mon cher Ferdinand." After Minden, King George II. gave the duke the order of the Garter, and the thanks of the British parliament were voted on the same occasion to the "Victor of Minden." After the war he was honoured by other sovereigns, and he received the rank of field marshal and a regiment from the Austrians. During the War of American Independence there was a suggestion, which came to nothing, of offering him the command of the British forces. He exerted himself to compensate those who had suffered by the Seven Years' War, devoting to this purpose most of the small income he received from his various offices and the rewards given to him by the allied princes. The estrangement of Frederick and Ferdinand in 1766 led to the duke's retirement from Prussian service, but there was no open breach between the old friends, and Ferdinand visited the king in 1772, 1777, 1779 and 1782. After 1766 he passed the remainder of his life at his castle of Veschelde, where he occupied himself in building and other improvements, and became a patron of learning and art, and a great benefactor of the poor. He died on the 3rd of July 1792. The merits, civil and military, of the prince were recognized by memorials not only in Prussia and Hanover, but also in Denmark, the states of western Germany and England. The Prussian memorials include an equestrian statue at Berlin (1863).

See E. v. L. Knesebeck, *Ferdinand, Herzog von Braunschweig und Lüneburg, während des Siebenjährigen Kriegs* (2 vols., Hanover, 1857–1858); Von Westphalen, *Geschichte der Feldzüge des Herzogs Ferdinands von Braunschweig-Lüneburg* (5 vols., Berlin, 1859–1872); v. d. Osten, *Tagebuch des Herzogl. Gen. Adjutanten v. Reden* (Hamburg, 1805); v. Schafer, *Vie militaire du maréchal Prince Ferdinand* (Magdeburg, 1796; Nuremberg, 1798); also the *Œuvres* of Frederick the Great, *passim*, and authorities for the Seven Years' War.

FERDINAND (1577–1650), elector and archbishop of Cologne, son of William V., duke of Bavaria, was born on the 7th of October 1577. Intended for the church, he was educated by the Jesuits at the university of Ingolstadt, and in 1595 became coadjutor archbishop of Cologne. He became elector and archbishop in 1612 on the death of his uncle Ernest, whom he also succeeded as bishop of Liége, Munster and Hildesheim. He endeavoured resolutely to root out heresy in the lands under his rule, and favoured the teaching of the Jesuits in every possible way. He supported the league founded by his brother Maximilian I., duke of Bavaria, and wished to involve the leaguers in a general attack on the Protestants of north Germany. The cool political sagacity of the duke formed a sharp contrast to the impetuosity of the archbishop, and he refused to accede to his brother's wish; but, in spite of these temporary differences, Ferdinand sent troops and money to the assistance of the league when the Thirty Years' War broke out in 1619. The elector's alliance with the Spaniards secured his territories to a great extent from the depredations of the war until the arrival of the Swedes in Germany in 1630, when the extension of the area of the struggle to the neighbourhood of Cologne induced him to enter into negotiations for peace. Nothing came of these attempts until 1647, when he joined his brother Maximilian in concluding an armistice with France and Sweden at Ulm. The elector's later years were marked by a conflict with the citizens of Liége; and when the peace of Westphalia freed him from his enemies, he was able to crush the citizens and deprive them of many privileges. Ferdinand, who had held the bishopric of Paderborn since 1618, died at Arnsberg on the 13th of September 1650, and was buried in the cathedral at Cologne.

See L. Ennen, *Frankreich und der Niederrhein oder Geschichte von Stadt und Kurstadt Köln seit dem 30jährigen Kriege*, Band i. (Cologne, 1855–1856).

FERENTINO (anc. *Ferentinum*, to be distinguished from Ferentum or Ferentinum in Etruria), a town and episcopal see of Italy, in the province of Rome, from which it is 48 m. E.S.E. by rail. Pop. (1901) 7957 (town), 12,279 (commune). It is picturesquely situated on a hill 1290 ft. above sea-level, and still possesses considerable remains of ancient fortifications. The lower portion of the outer walls, which probably did not stand free, is built of roughly hewn blocks of a limestone which naturally splits into horizontal layers; above this in places is walling of rectangular blocks of tufa. Two gates, the Porta Sanguinaria (with an arch with tufa voussoirs), and the Porta S. Maria, a double gate constructed entirely of rectangular blocks of tufa, are preserved. Outside this gate is the tomb of A. Quinctilius Priscus, a citizen of Ferentinum, with a long inscription cut in the rock. See Th. Mommsen in *Corp. Inscrip. Lat.* x. (Berlin, 1883), No. 5853.

The highest part of the town, the acropolis, is fortified also; it has massive retaining walls similar to those of the lower town. At the eastern corner, under the present episcopal palace, the construction is somewhat more careful. A projecting rectangular terrace has been erected, supported by walls of quadrilateral blocks of limestone arranged almost horizontally; while upon the level thus formed a building of rectangular blocks of local travertine was raised. The projecting cornice of this building bears two inscriptions of the period of Sulla, recording its construction by two censors (local officials); and in the interior, which contains several chambers, there is an inscription of the same censors over one of the doors, and another over a smaller external side door. The windows lighting these chambers come immediately above the cornice, and the wall continues above them again. The whole of this construction probably belongs to one period (Mommsen, *op. cit.* No. 5837 seq.). The cathedral occupies a part of the level top of the ancient acropolis; it was reconstructed on the site of an older church in 1099–1118; the interior was modernized in 1693, but was restored to its original form in 1902. It contains a fine canopy in the "Cosmatesque" style (see *Relazione dei lavori eseguiti dall' ufficio tecnico per la conservazione dei monumenti di Rome a provincia*, Rome, 1903, 175 seq.). The Gothic church of S. Maria Maggiore, in the lower town (13th-14th century), has a very fine exterior; the interior, the plan of which is a perfect rectangle, has been spoilt by restoration. There are several other Gothic churches in the town.

Ferentinum was the chief town of the Hernici; it was captured from them by the Romans in 364 B.C. and took no part in the rising of 306 B.C. The inhabitants became Roman citizens after 195 B.C., and the place later became a *municipium*. It lay just above the Via Latina and, being a strong place, served for the detention of hostages. Horace praises its quietness, and it does not appear much in later history. (T. As.)

See further Ashby, *Röm. Mitteil.* xxiv. (1909).

FERENTUM, or FERENTINUM, an ancient town of Etruria, about 6 m. N. of Viterbo (the ancient name of which is unknown) and 3½ m. E. of the Via Cassia. It was the birthplace (32 A.D.) of the emperor Otho, was destroyed in the 11th century, and is now entirely deserted, though it retains its ancient name. It occupied a ridge running from east to west, with deep ravines on three sides. There are some remains of the city walls, and of various Roman structures, but the most important ruin is that of the theatre. The stage front is still standing; it is pierced by seven openings with flat arches, and shows traces of reconstruction. The necropolis was on the hill called Talone on the north-east.

See G. Dennis, *Cities and Cemeteries of Etruria* (London, 1883), i. 156; *Notizie degli scavi*, 1900, 401; 1902, 84; 1905, 31.

FERETORY (from Lat. *feretrum*, a bier, from *ferre*, to bear), in architecture, the enclosure or chapel within which the "fereter" shrine, or tomb (as in Henry VII.'s chapel), was placed.

FERGHANA, or FERGANA, a province of Russian Turkestan, formed in 1876 out of the former khanate of Khokand. It is bounded by the provinces of Syr-darya on the N. and N.W., Samarkand on the W., and Semiryechensk on the N.E., by Chinese Turkestan (Kashgaria) on the E., and by Bokhara and Afghanistan on the S. Its southern limits, on the Pamirs, were fixed by an Anglo-Russian commission in 1885, from Zor-kul (Victoria Lake) to the Chinese frontier; and Shignan, Roshan and Wakhan were assigned to Bokhara in exchange for part of Darvaz (on the left bank of the Panj), which was given to Afghanistan. The area amounts to some 53,000 sq. m., of which 17,600 sq. m. are on the Pamirs. The most important part of the province is a rich and fertile valley (1200-1500 ft.), opening towards the S.W. Thence the province stretches northwards across the mountains of the Tian-shan system and southwards across the Alai and Trans-Alai Mts., which reach their highest point in Peak Kaufmann (23,000 ft.), in the latter range. The valley owes its fertility to two rivers, the Naryn and the Kara-darya, which unite within its confines, near Namangan, to form the Syr-darya or Jaxartes. These streams, and their numerous mountain affluents, not only supply water for irrigation, but also bring down vast quantities of sand, which is deposited alongside their courses, more especially alongside the Syr-darya where it cuts its way through the Khojent-Ajar ridge, forming there the Karakchikum. This expanse of moving sands, covering an area of 750 sq. m., under the influence of south-west winds, encroaches upon the agricultural districts. The climate of this valley is dry and warm. In March the temperature reaches 68° F., and then rapidly rises to 95° in June, July and August. During the five months following April no rain falls, but it begins again in October. Snow and frost (down to −4° F.) occur in December and January.

Out of some 3,000,000 acres of cultivated land, about two-thirds are under constant irrigation and the remaining third under partial irrigation. The soil is admirably cultivated, the principal crops being wheat, rice, barley, maize, millet, lucerne, tobacco, vegetables and fruit. Gardening is conducted with a high degree of skill and success. Large numbers of horses, cattle and sheep are kept, and a good many camels are bred. Over 17,000 acres are planted with vines, and some 350,000 acres are under cotton. Nearly 1,000,000 acres are covered with forests. The government maintains a forestry farm at Marghelan, from which 120,000 to 200,000 young trees are distributed free every year amongst the inhabitants of the province.

Silkworm breeding, formerly a prosperous industry, has decayed, despite the encouragement of a state farm at New Marghelan. Coal, iron, sulphur, gypsum, rock-salt, lacustrine salt and naphtha are all known to exist, but only the last two are extracted. Some seventy or eighty factories are engaged in cotton cleaning; while leather, saddlery, paper and cutlery are the principal products of the domestic industries. A considerable trade is carried on with Russia; raw cotton, raw silk, tobacco, hides, sheepskins, fruit and cotton and leather goods are exported, and manufactured wares, textiles, tea and sugar are imported and in part re-exported to Kashgaria and Bokhara. The total trade of Ferghana reaches an annual value of nearly £3,500,000. A new impulse was given to trade by the extension (1899) of the Transcaspian railway into Ferghana and by the opening of the Orenburg-Tashkent railway (1906). The routes to Kashgaria and the Pamirs are mere bridle-paths over the mountains, crossing them by lofty passes. For instance, the passes of Kara-kazyk (14,400 ft.) and Tenghiz-bai (11,200 ft.), both passable all the year round, lead from Marghelan to Karateghin and the Pamirs, while Kashgar is reached via Osh and Gulcha, and then over the passes of Terek-davan (12,205 ft.; open all the year round), Taldyk (11,500 ft.), Archat (11,600 ft.), and Shart-davan (14,000 ft.). Other passes leading out of the valley are the Jiptyk (12,460 ft.), S. of Khokand; the Isfairam (12,000 ft.), leading to the glen of the Surkhab, and the Kavuk (13,000 ft.), across the Alai Mts.

The population numbered 1,571,243 in 1897, and of that number 707,132 were women and 286,369 were urban. In 1906 it was estimated at 1,796,500. Two-thirds of the total are Sarts and Uzbegs (of Turkic origin). They live mostly in the valley; while the mountain slopes above it are occupied by Kirghiz, partly nomad and pastoral, partly agricultural and settled. The other races are Tajiks, Kashgarians, Kipchaks, Jews and Gypsies. The governing classes are of course Russians, who constitute also the merchant and artizan classes. But the merchants of West Turkestan are called all over central Asia Andijanis, from the town of Andijan in Ferghana. The great mass of the population are Mussulmans (1,039,115 in 1897). The province is divided into five districts, the chief towns of which are New Marghelan, capital of the province (8977 inhabitants in 1897), Andijan (49,682 in 1900), Khokand (86,704 in 1900), Namangan (61,906 in 1897), and Osh (37,397 in 1900); but Old Marghelan (42,855 in 1900) and Chust (13,686 in 1897) are also towns of importance. For the history, see KHOKAND. (P. A. K.; J. T. BE.)

FERGUS FALLS, a city and the county-seat of Otter Tail county, Minnesota, U.S.A., on the Red river, 170 m. N.W. of Minneapolis. Pop. (1890) 3772; (1900) 6072, of whom 2131 were foreign-born; (1905) 6692; (1910) 6887. A large part of the population is of Scandinavian birth or descent. Fergus Falls is served by the Great Northern and the Northern Pacific railways. Situated in the celebrated "park region" of the state, the city possesses great natural beauty, which has been enhanced by a system of boulevards and well-kept private lawns. Lake Alice, in the residential district, adds to the city's attractions. The city has a public library, a county court house, St Luke's hospital, the G. B. Wright memorial hospital, and a city hall. It is the seat of a state hospital for the insane (1887) with about 1600 patients, of a business college, of the Park Region Luther College (Norwegian Lutheran, 1892), and of the North-western College (Swedish Lutheran; opened in 1901). It has one of the finest water-powers in the state. Flour is the principal product; among others are woollen goods, foundry and machine-shop products, wooden ware, sash, doors and blinds, caskets, shirts, wagons and packed meats. The city owns and operates its water-works and its electric-lighting plant. Fergus Falls was settled about 1859 and was incorporated in 1863.

FERGUSON, ADAM (1723–1816), Scottish philosopher and historian, was born on the 20th of June 1723, at Logierait, Perthshire. He was educated at Perth grammar school and the university of St Andrews. In 1745, owing to his knowledge of Gaelic, he was appointed deputy chaplain of the 43rd (afterwards the 42nd) regiment (the Black Watch), the licence to preach being granted him by special dispensation, although he had not completed the required six years of theological study. At the battle of Fontenoy (1745) Ferguson fought in the ranks throughout the day, and refused to leave the field, though ordered to do so by his colonel. He continued attached to the regiment till 1754, when, disappointed at not obtaining a living, he abandoned the clerical profession and resolved to devote himself to literary pursuits. In January 1757 he succeeded David Hume as librarian to the faculty of advocates, but soon relinquished this office on becoming tutor in the family of Lord Bute.

In 1759 Ferguson was appointed professor of natural philosophy in the university of Edinburgh, and in 1764 was transferred to the chair of "pneumatics" (mental philosophy) "and moral philosophy." In 1767, against Hume's advice, he published his *Essay on the History of Civil Society*, which was well received and translated into several European languages. In 1776 appeared his (anonymous) pamphlet on the American revolution in opposition to Dr Price's *Observations on the Nature of Civil Liberty*, in which he sympathized with the views of the British legislature. In 1778 Ferguson was appointed secretary to the commission which endeavoured, but without success, to negotiate an arrangement with the revolted colonies. In 1783 appeared his *History of the Progress and Termination of the Roman Republic*; it was very popular, and went through several editions. Ferguson was led to undertake this work from a conviction that the history of the Romans during the period of their greatness was a practical illustration of those ethical and political doctrines which were the object of his special study. The history is written in an agreeable style and a spirit of impartiality, and gives evidence of a conscientious use of authorities. The influence of the author's military experience shows itself in certain portions of the narrative. Finding himself unequal to the labour of teaching, he resigned his professorship in 1785, and devoted himself to the revision of his lectures, which he published (1792) under the title of *Principles of Moral and Political Science*.

When in his seventieth year, Ferguson, intending to prepare a new edition of the history, visited Italy and some of the principal cities of Europe, where he was received with honour by learned societies. From 1795 he resided successively at the old castle of Neidpath near Peebles, at Hallyards on Manor Water and at St Andrews, where he died on the 22nd of February 1816.

In his ethical system Ferguson treats man throughout as a social being, and illustrates his doctrines by political examples. As a believer in the progression of the human race, he placed the principle of moral approbation in the attainment of perfection. His speculations were carefully criticized by Cousin (see his *Cours d'histoire de la philosophie morale au dix-huitième siècle*, pt. ii., 1839–1840):—"We find in his method the wisdom and circumspection of the Scottish school, with something more masculine and decisive in the results. The principle of *perfection* is a new one, at once more rational and comprehensive than benevolence and sympathy, which in our view places Ferguson as a moralist above all his predecessors." By this principle Ferguson endeavours to reconcile all moral systems. With Hobbes and Hume he admits the power of self-interest or utility, and makes it enter into morals as the law of self-preservation. Hutcheson's theory of universal benevolence and Smith's idea of sympathy he combines under the law of society. But, as these laws are the means rather than the end of human destiny, they are subordinate to a supreme end, and this supreme end is perfection. In the political part of his system Ferguson follows Montesquieu, and pleads the cause of well-regulated liberty and free government. His contemporaries, with the exception of Hume, regarded his writings as of great importance; in point of fact they are superficial. The facility of their style and the frequent occurrence of would-be weighty epigrams blinded his critics to the fact that, in spite of his recognition of the importance of observation, he made no real contribution to political theory (see Sir Leslie Stephen, *English Thought in the Eighteenth Century*, x. 89-90).

The chief authority for Ferguson's life is the *Biographical Sketch* by John Small (1864); see also *Public Characters* (1799–1800); *Gentleman's Magazine*, i. (1816 supp.); W. R. Chambers's *Biographical Dictionary of Eminent Scotsmen*; memoir by Principal Lee in early editions of the *Encyclopaedia Britannica*; J. McCosh, *The Scottish Philosophy* (1875); articles in *Dictionary of National Biography* and *Edinburgh Review* (January 1867); Lord Henry Cockburn, *Memorials of his Time* (1856).

FERGUSON, JAMES (1710–1776), Scottish mechanician and astronomer, was born near Rothiemay in Banffshire on the 25th of April 1710, of parents in very humble circumstances. He first learned to read by overhearing his father teach his elder brother, and with the help of an old woman was "able," he says in his autobiography, "to read tolerably well before his father thought of teaching him." After receiving further instruction in reading from his father, who also taught him to write, he was sent at the age of seven for three months to the grammar school at Keith. His taste for mechanics was about this time accidentally awakened on seeing his father making use of a lever to raise a part of the roof of his house—an exhibition of seeming strength which at first "excited his terror as well as wonder." In 1720 he was sent to a neighbouring farm to keep sheep, where in the daytime he amused himself by making models of mills and other machines, and at night in studying the stars. Afterwards, as a servant with a miller, and then with a doctor, he met with hardships which rendered his constitution feeble through life. Being compelled by his weak health to return home, he there amused himself with making a clock having wooden wheels and a whalebone spring. When slightly recovered he showed this and some other inventions to a neighbouring gentleman, who engaged him to clean his clocks, and also desired him to make his house his home. He there began to draw patterns for needlework, and his success in this art led him to think of becoming a painter. In 1734 he went to Edinburgh, where he began to take portraits in miniature, by which means, while engaged in his scientific studies, he supported himself and his family for many years. Subsequently he settled at Inverness, where he drew up his *Astronomical Rotula* for showing the motions of the planets, places of the sun and moon, &c., and in 1743 went to London, which was his home for the rest of his life. He wrote various papers for the Royal Society, of which he became a fellow in 1763, devised astronomical and mechanical models, and in 1748 began to give public lectures on experimental philosophy. These he repeated in most of the principal towns in England. His deep interest in his subject, his clear explanations, his ingeniously constructed diagrams, and his mechanical apparatus rendered him one of the most successful of popular lecturers on scientific subjects. It is, however, as the inventor and improver of astronomical and other scientific apparatus, and as a striking instance of self-education, that he claims a place among the most remarkable men of science of his country. During the latter years of his life he was in receipt of a pension of £50 from the privy purse. He died in London on the 17th of November 1776.

Ferguson's principal publications are *Astronomical Tables* (1763); *Lectures on Select Subjects* (1st ed., 1761, edited by Sir David Brewster in 1805); *Astronomy explained upon Sir Isaac Newton's Principles* (1756, edited by Sir David Brewster in 1811); and *Select Mechanical Exercises, with a Short Account of the Life of the Author, written by himself* (1773). This autobiography is included in a *Life* by E. Henderson, LL.D. (1st ed., 1867; 2nd, 1870), which also contains a full description of Ferguson's principal inventions, accompanied with illustrations. See also *The Story of the Peasant-Boy Philosopher*, by Henry Mayhew (1857).

FERGUSON, ROBERT (*c.* 1637–1714), British conspirator and pamphleteer, called the "Plotter," was a son of William Ferguson (d. 1699) of Badifurrow, Aberdeenshire, and after receiving a good education, probably at the university of Aberdeen, became a Presbyterian minister. According to Bishop Burnet he was cast out by the Presbyterians; but whether this be so or not, he soon made his way to England and became vicar of Godmersham, Kent, from which living he was expelled by the Act of Uniformity in 1662. Some years later, having gained meanwhile a reputation as a theological controversialist and become a person of importance among the Nonconformists, he attracted the notice of the earl of Shaftesbury and the party which favoured the exclusion of the duke of York (afterwards King James II.) from the throne, and he began to write political pamphlets just at the time when the feeling against the Roman Catholics was at its height. In 1680 he wrote "A Letter to a Person of Honour concerning the 'Black Box,'" in which he supported the claim of the duke of Monmouth to the crown against that of the duke of York; returning to the subject after Charles II. had solemnly denied the existence of a marriage between himself and Lucy Waters. He took an active part in the controversy over the Exclusion Bill, and claimed to be the author of the whole of the pamphlet "No Protestant Plot" (1681), parts of which are usually ascribed to Shaftesbury. Ferguson was deeply implicated in the Rye House Plot, although he asserted that he had frustrated both this and a subsequent attempt to assassinate the king, and he fled to Holland with Shaftesbury in 1682, returning to England early in 1683. For his share in another plot against Charles II. he was declared an outlaw, after which he entered into communication with Argyll, Monmouth and other malcontents. Ferguson then took a leading part in organizing the rising of 1685. Having overcome Monmouth's reluctance to take part in this movement, he accompanied the duke to the west of England and drew up the manifesto against James II., escaping to Holland after the battle of Sedgemoor. He landed in England with William of Orange in 1688, and aided William's cause with his pen; but William and his advisers did not regard him as a person of importance, although his services were rewarded with a sinecure appointment in the Excise. Chagrined at this treatment, Ferguson was soon in correspondence with the exiled Jacobites. He shared in all the plots against the life of William, and after his removal from the Excise in 1692 wrote violent pamphlets against the government. Although he was several times arrested on suspicion, he was never brought to trial. He died in great poverty in 1714, leaving behind him a great and deserved reputation for treachery. It has been thought by Macaulay and others that Ferguson led the English government to believe that he was a spy in their interests, and that his frequent escapes from justice were due to official connivance. In a proclamation issued for his arrest in 1683 he is described as "a tall lean man, dark brown hair, a great Roman nose, thin-jawed, heat in his face, speaks in the Scotch tone, a sharp piercing eye, stoops a little in the shoulders." Besides numerous pamphlets Ferguson wrote: *History of the Revolution* (1706); *Qualifications requisite in a Minister of State* (1710); and part of the *History of all the Mobs, Tumults and Insurrections in Great Britain* (London, 1715).

See James Ferguson, *Robert Ferguson, the Plotter* (Edinburgh, 1887), which gives a favourable account of Ferguson.

FERGUSON, SIR SAMUEL (1810–1886), Irish poet and antiquary, was born at Belfast, on the 10th of March 1810. He was educated at Trinity College, Dublin, was called to the Irish bar in 1838, and was made Q.C. in 1859, but in 1867 retired from practice upon his appointment as deputy-keeper of the Irish records, then in a much neglected condition. He was an excellent civil servant, and was knighted in 1878 for his services to the department. His spare time was given to general literature, and in particular to poetry. He had long been a leading contributor to the *Dublin University Magazine* and to *Blackwood*, where he had published his two literary masterpieces, "The Forging of the Anchor," one of the finest of modern ballads, and the humorous prose extravaganza of "Father Tom and the Pope." He published *Lays of the Western Gael* in 1865, *Poems* in 1880, and in 1872 *Congal*, a metrical narrative of the heroic age of Ireland, and, though far from ideal perfection, perhaps the most successful attempt yet made by a modern Irish poet to revivify the spirit of the past in a poem of epic proportions. Lyrics have succeeded better in other hands; many of Ferguson's pieces on modern themes, notably his "Lament for Thomas Davis" (1845), are, nevertheless, excellent. He was an extensive contributor on antiquarian subjects to the *Transactions of the Royal Irish Academy*, and was elected its president in 1882. His manners were delightful, and his hospitality was boundless. He died at Howth on the 9th of August 1886. His most important antiquarian work, *Ogham Inscriptions in Ireland, Wales, Scotland*, was published in the year after his death.

See *Sir Samuel Ferguson in the Ireland of his Day* (1896), by his wife, Mary C. Ferguson; also an article by A. P. Graves in *A Treasury of Irish Poetry in the English Tongue* (1900), edited by Stopford Brooke and T. W. Rolleston.

FERGUSSON, JAMES (1808–1886), Scottish writer on architecture, was born at Ayr on the 22nd of January 1808. His father was an army surgeon. After being educated first at the Edinburgh high school, and afterwards at a private school at Hounslow, James went to Calcutta as partner in a mercantile house. Here he was attracted by the remains of the ancient architecture of India, little known or understood at that time. The successful conduct of an indigo factory, as he states in his own account, enabled him in about ten years to retire from business and settle in London. The observations made on Indian architecture were first embodied in his book on *The Rock-cut Temples of India*, published in 1845. The task of analysing the historic and aesthetic relations of this type of ancient buildings led him further to undertake a historical and critical comparative survey of the whole subject of architecture in *The Handbook of Architecture*, a work which first appeared in 1855. This did not satisfy him, and the work was reissued ten years later in a much more extended form under the title of *The History of Architecture.* The chapters on Indian architecture, which had been considered at rather disproportionate length in the *Handbook*, were removed from the general *History*, and the whole of this subject treated more fully in a separate volume, *The History of Indian and Eastern Architecture*, which appeared in 1876, and, although complete in itself, formed a kind of appendix to *The History of Architecture.* Previously to this, in 1862, he issued his *History of Modern Architecture*, in which the subject was continued from the Renaissance to the present day, the period of "modern architecture" being distinguished as that of revivals and imitations of ancient styles, which began with the Renaissance. The essential difference between this and the spontaneously evolved architecture of preceding ages Fergusson was the first clearly to point out and characterize. His treatise on *The True Principles of Beauty in Art*, an early publication, is a most thoughtful metaphysical study. Some of his essays on special points in archaeology, such as the treatise on *The Mode in which Light was introduced into Greek Temples*, included theories which have not received general acceptance. His real monument is his *History of Architecture* (later edition revised by R. Phenê Spiers), which, for grasp of the whole subject, comprehensiveness of plan, and thoughtful critical analysis, stands quite alone in architectural literature. He received the gold medal of the Royal Institute of British Architects in 1871. Among his works, besides those already mentioned, are: *A Proposed New System of Fortification* (1849), *Palaces of Nineveh and Persepolis restored* (1851), *Mausoleum at Halicarnassus restored* (1862), *Tree and Serpent Worship* (1868), *Rude Stone Monuments in all Countries* (1872), and *The Temples of the Jews and the other Buildings in the Haram Area at Jerusalem* (1878). The sessional papers of the Institute of British Architects include papers by him on *The History of the Pointed Arch, Architecture of Southern India, Architectural Splendour of the City of Beejapore, On the Erechtheum* and on the *Temple of Diana at Ephesus*.

Although Fergusson never practised architecture he took a keen interest in all the professional work of his time. He was adviser with Austen Layard in the scheme of decoration for the Assyrian court at the Crystal Palace, and indeed assumed in 1856 the duties of general manager to the Palace Company, a post which he held for two years. In 1847 Fergusson had published an "Essay on the Ancient Topography of Jerusalem," in which he had contended that the "Mosque of Omar" was the identical church built by Constantine the Great over the tomb of our Lord at Jerusalem, and that it, and not the present church of the Holy Sepulchre, was the genuine burial-place of Jesus. The burden of this contention was further explained by the publication in 1860 of his *Notes on the Site of the Holy Sepulchre at Jerusalem;* and *The Temples of the Jews and the other Buildings in the Haram Area at Jerusalem*, published in 1878, was a still completer elaboration of these theories, which are said to have been the origin of the establishment of the Palestine Exploration fund. His manifold activities continued till his death, which took place in London on the 9th of January 1886.

FERGUSSON, ROBERT (1750-1774), Scottish poet, son of Sir William Fergusson, a clerk in the British Linen Company, was born at Edinburgh on the 5th of September 1750. Robert was educated at the grammar school of Dundee, and at the university of St Andrews, where he matriculated in 1765. His father died while he was still at college; but a bursary enabled him to complete his four years of study. He refused to study for the church, and was too nervous to study medicine as his friends wished. He quarrelled with his uncle, John Forbes of Round Lichnot, Aberdeenshire, and went to Edinburgh, where he obtained employment as copying clerk in a lawyer's office. In this humble occupation he passed the remainder of his life. While at college he had written a clever elegy on Dr David Gregory, and in 1771 he began to contribute verses regularly to Ruddiman's *Weekly Magazine.* He was a member of the Cape Club, celebrated by him in his poem of "Auld Reekie." "The Knights of the Cape" assembled at a tavern in Craig's Close, in the vicinity of the Cross; each member had a name and character assigned to him, which he was required to maintain at all gatherings of the order. David Herd (1732–1810), the collector of the classic edition of *Ancient and Modern Scottish Songs* (1776), was sovereign of the Cape (in which he was known as "Sir Scrape") when Fergusson was dubbed a knight of the order, with the title of "Sir Precentor," in allusion to his fine voice. Alexander Runciman, the historical painter, his pupil Jacob More, and Sir Henry Raeburn were all members. The old minute books of the club abound with pencilled sketches by them, one of the most interesting of which, ascribed to Runciman's pencil, is a sketch of Fergusson in his character of "Sir Precentor."

Fergusson's gaiety and wit made him an entertaining companion, and he indulged too freely in the convivial habits of the time. After a meeting with John Brown of Haddington he became, however, very serious, and would read nothing but his Bible. A fall by which his head was severely injured aggravated symptoms of mental aberration which had begun to show themselves; and after about two months' confinement in the old Darien House—then the only public asylum in Edinburgh—the poet died on the 16th of October 1774.

Fergussons' poems were collected in the year before his death. The influence of his writings on Robert Burns is undoubted. His "Leith Races" unquestionably supplied the model for the "Holy Fair." Not only is the stanza the same, but the Mirth who plays the part of conductor to Fergusson, and the Fun who renders a like service to Burns, are manifestly conceived on the same model. "The Mutual Complaint of Plainstanes and Causey" probably suggested "The Brigs of Ayr"; "On seeing a Butterfly in the Street" has reflections in it which strikingly correspond with "To a Mouse"; nor will a comparison of "The Farmer's Ingle" of the elder poet with "The Cottar's Saturday Night" admit of a doubt as to the influence of the city-bred poet's muse on that exquisite picturing of homely peasant life. Burns was himself the first to render a generous tribute to the merits of Fergusson; on his visit to Edinburgh in 1787 he sought out the poet's grave, and petitioned the authorities of the Canongate burying-ground for permission to erect the memorial stone which is preserved in the existing monument. The date there assigned for his birth differs from the one given above, which rests on the authority of his younger sister Margaret.

The first edition of Fergusson's poems was published by Ruddiman at Edinburgh in 1773, and a supplement containing additional poems, in 1779. A second edition appeared in 1785. There are later editions, by Robert Chambers (1850) and Dr A. B. Grosart (1851). A life of Fergusson is included in Dr David Irving's *Lives of the Scottish Poets*, and in Robert Chambers's *Lives of Illustrious and Distinguished Scotsmen.*

FERGUSSON, SIR WILLIAM, Bart. (1808–1877), British surgeon, the son of James Fergusson of Lochmaben, Dumfriesshire, was born at Prestonpans, East Lothian, on the 20th of March 1808. After receiving his early education at Lochmaben and the high school of Edinburgh, he entered the university of Edinburgh with the view of studying law, but soon afterwards abandoned his intention and became a pupil of the anatomist Robert Knox (1791–1862) whose demonstrator he was appointed at the age of twenty. In 1836 he succeeded Robert Liston as surgeon to the Edinburgh Royal Infirmary, and coming to London in 1840 as professor of surgery in King's College, and surgeon to King's College Hospital, he acquired a commanding position among the surgeons of the metropolis. He revived the operation for cleft-palate, which for many years had fallen into disrepute, and invented a special mouth-gag for the same. He also devised many other surgical instruments, chief among which, and still in use to-day, are his bone forceps, lion forceps and vaginal speculum. In 1866 he was created a baronet. He died in London on the 10th of February 1877. As a surgeon Fergusson's greatest merit is that of having introduced the practice of "conservative surgery," by which he meant the excision of a joint rather than the amputation of a limb. He made his diagnosis with almost intuitive certainty; as an operator he was characterized by self-possession in the most critical circumstances, by minute attention to details and by great refinement of touch, and he relied more on his mechanical dexterity than on complicated instruments. He was the author of *The Progress of Anatomy and Surgery in the Nineteenth Century* (1867), and of a *System of Practical Surgery* (1842), which went through several editions.

FERINGHI, or FERINGHEE, a Frank (Persian, *Farangi*). This term for a European is very old in Asia, and was originally used in a purely geographical sense, but now generally carries a hostile or contemptuous significance. The combatants on either side during the Indian Mutiny called each other Feringhies and Pandies.

FERISHTA, MAHOMMED KASIM (*c.* 1570–*c.* 1611), Persian historian, was born at Astrabad, on the shores of the Caspian Sea. While he was still a child his father was summoned away from his native country into Hindostan, where he held high office in the Deccan; and by his influence the young Ferishta received court promotion. In 1589 Ferishta removed to Bijapur, where he spent the remainder of his life under the immediate protection of the shah Ibrahim Adil II., who engaged him to write a history of India. At the court of this monarch he died about 1611. In the introduction to his work a *résumé* is given of the history of Hindostan prior to the times of the Mahommedan conquest, and also of the victorious progress of the Arabs through the East. The first ten books are each occupied with a history of the kings of one of the provinces; the eleventh book gives an account of the Mussulmans of Malabar; the twelfth a history of the Mussulman saints of India; and the conclusion treats of the geography and climate of India. Ferishta is reputed one of the most trustworthy of the Oriental historians, and his work still maintains a high place as an authority. Several portions of it have been translated into English; but the best as well as the most complete translation is that published by General J. Briggs under the title of *The History of the Rise of the Mahometan Power in India* (London, 1829, 4 vols. 8vo). Several additions were made by Briggs to the original work of Ferishta, but he omitted the whole of the twelfth book, and various other passages which had been omitted in the copy from which he translated.

FERMANAGH, a county of Ireland, in the province of Ulster, bounded N.W. by Donegal, N.E. by Tyrone, E. by Monaghan and S.W. by Cavan and Leitrim. The area is 457,369 acres or about 715 sq. m. The county is situated mostly in the basin of the Erne, which divides the county into two nearly equal sections. Its surface is hilly, and its appearance (in many parts) somewhat sterile, though in the main, and especially in the neighbourhood of Lough Erne, it is picturesque and attractive. The climate, though moist, is healthy, and the people are generally tall and robust. The chief mountains are Cuilcagh (2188 ft.), partly in Leitrim and Cavan, Belmore (1312), Glenkeel (1223), North Shean (1135), Tappahan (1110), Carnmore (1034). Tossett or Toppid and Turaw mountains command extensive prospects, and form striking features in the scenery of the county. But the most distinguishing features of Fermanagh are the Upper and Lower Loughs Erne, which occupy a great extent of its surface, stretching for about 45 m. from S.E. to N.W. These lakes are expansions of the river Erne, which enters the county from Cavan at Wattle Bridge. It passes Belturbet, the Loughs Erne, Enniskillen and Belleek, on its way to the Atlantic, into which it descends at Ballyshannon. At Belleek it forms a considerable waterfall and is here well known to sportsmen for its good salmon fishing. Trout are taken in most of the loughs, and pike of great size in the Loughs Erne. There are several mineral springs in the county, some of them chalybeate, others sulphurous. At Belcoo, near Enniskillen, there is a famous well called Daragh Phadric, held in repute by the peasantry for its cure of paralytic and other diseases; and 4 m. N.W. of the same town, at a place called "the Daughton," are natural caves of considerable size.

This county includes in the north an area of the gneiss that is discussed under county Donegal, and, west of Omagh, a metamorphic region that stretches in from the central axis of Tyrone. A fault divides the latter from the mass of red-brown Old Red Sandstone that spreads south nearly to Enniskillen. Lower Carboniferous sandstone and limestone occur on the north of Lower Lough Erne. The limestone forms fine scarps on the southern side of the lake, capped by beds regarded as the Yoredale series. The scenery about the two Loughs Macnean is carved out in similarly scarped hills, rising to 2188 ft. in Cuilcagh on the south. The "Marble Arch" cave near Florencecourt, with its emerging river, is a characteristic example of the subterranean waterways in the limestone. Upper Lough Erne is a typical meandering lake of the limestone lowland, with outliers of higher Carboniferous strata forming highlands north-east and south-west of it.

With the exception of the pottery works at Belleek, where iridescent ware of good quality is produced, Fermanagh has no distinguishing manufactures. It is chiefly an agricultural county. The proportion of tillage to pasture is roughly as 1 to 2½. Cattle and poultry are the principal classes of live stock. Oats and potatoes are the crops most extensively cultivated. The north-western division of the Great Northern railway passes through the most populous portion of the county, one branch connecting Enniskillen with Clones, another connecting Enniskillen with Londonderry via Omagh, and a third connecting Bundoran Junction with Bundoran, in county Donegal. The Sligo, Leitrim & Northern Counties railway connects with the Great Northern at Enniskillen, and the Clogher Valley light railway connects southern county Tyrone with the Great Northern at Maguiresbridge.

The population (74,170 in 1891; 65,430 in 1901; almost wholly rural) shows a decrease among the most serious of the county populations of Ireland. It includes 55% of Roman Catholics and about 35% of Protestant Episcopalians. Enniskillen (the county town, pop. 5412) is the only town of importance, the rest being little more than villages. The principal are Lisnaskea, Irvinestown (formerly Lowtherstown), Maguiresbridge, Tempo, Newtownbutler, Belleek, Derrygonnelly and Kesh, at which fairs are held. Garrison, a fishing station on the wild Lough Melvin, and Pettigo, near to the lower Lough Erne, are market villages. Fermanagh returns two members to parliament, one each for the north and south divisions. It comprises eight baronies and nineteen civil parishes. The assizes are held at Enniskillen, quarter sessions at Enniskillen and Newtownbutler. The headquarters of the constabulary are at Enniskillen. Ecclesiastically it belongs to the Protestant and Roman Catholic dioceses of Clogher and Kilmore.

By the ancient Irish the district was called *Feor-magh-Eanagh*, or the "country of the lakes" (lit. "the mountain-valley marsh district"); and also Magh-uire, or "the country of the waters." A large portion was occupied by the *Guarii*, the ancestors of the MacGuires or Maguires, a name still common in the district. This family was so influential that for centuries the county was called after it Maguire's Country, and one of the towns still existing bears its name, Maguiresbridge. Fermanagh was formed into a county on the shiring of Ulster in 1585 by Sir John Perrot, and was included in the well-known scheme of colonization of James I., the Plantation of Ulster. In 1689 battles were fought between William III.'s army and the Irish under Macarthy (for James II.), Lisnaskea (26th July) and Newtownbutler (30th July). The chief place of interest to the antiquary is Devenish Island in Lough Erne, about 2½ m. N.W. from Enniskillen (*q.v.*), with its ruined abbey, round tower and cross. In various places throughout the county may be seen the ruins of several ancient castles, Danish raths or encampments, and tumuli, in the last of which urns and stone coffins have sometimes been found. The round tower on Devenish Island is one of the finest examples in the country.

FERMAT, PIERRE DE (1601–1665), French mathematician, was born on the 17th of August 1601, at Beaumont-de-Lomagne near Montauban. While still young, he, along with Blaise Pascal, made some discoveries in regard to the properties of numbers, on which he afterwards built his method of calculating probabilities. He discovered a simpler method of quadrating parabolas than that of Archimedes, and a method of finding the greatest and the smallest ordinates of curved lines analogous to that of the then unknown differential calculus. His great work *De maximis et minimis* brought him into conflict with René Descartes, but the dispute was chiefly due to a want of explicitness in the statement of Fermat (see INFINITESIMAL CALCULUS). His brilliant researches in the theory of numbers entitle him to rank as the founder of the modern theory. They originally took the form of marginal notes in a copy of Bachet's *Diophantus*, and were published in 1670 by his son Samuel, who incorporated them in a new edition of this Greek writer. Other theorems were published in his *Opera Varia*, and in John Wallis's *Commercium epistolicum* (1658). He died in the belief that he had found a relation which every prime number must satisfy, namely $2^{2^n}+1=$ a prime. This was afterwards disproved by Leonhard Euler for the case when $n=5$. *Fermat's Theorem*, if p is prime and a is prime to p then $a^{p-1}-1$ is divisible by p, was first given in a letter of 1640. *Fermat's Problem* is that $x^n+y^n=z^n$ is impossible for integral values of x, y and z when n is greater than 2.

Fermat was for some time councillor for the parliament of Toulouse, and in the discharge of the duties of that office he was distinguished both for legal knowledge and for strict integrity of conduct. Though the sciences were the principal objects of his private studies, he was also an accomplished general scholar and an excellent linguist. He died at Toulouse on the 12th of January 1665. He left a son, Samuel de Fermat (1630–1690) who published translations of several Greek authors and wrote certain books on law in addition to editing his father's works.

The *Opera mathematica* of Fermat were published at Toulouse, in 2 vols. folio, 1670 and 1679. The first contains the "Arithmetic of Diophantus," with notes and additions. The second includes a "Method for the Quadrature of Parabolas," and a treatise "on Maxima and Minima, on Tangents, and on Centres of Gravity," containing the same solutions of a variety of problems as were afterwards incorporated into the more extensive method of fluxions by Newton and Leibnitz. In the same volume are treatises on "Geometric Loci, or Spherical Tangencies," and on the "Rectification of Curves," besides a restoration of "Apollonius's Plane Loci," together with the author's correspondence addressed to Descartes, Pascal, Roberval, Huygens and others. The *Œuvres* of Fermat have been re-edited by P. Tannery and C. Henry (Paris, 1891–1894).

See Paul Tannery, "Sur la date des principales découvertes de Fermat," in the *Bulletin Darboux* (1883); and "Les Manuscrits de Fermat," in the *Annales de la faculté des lettres de Bordeaux*.

FERMENTATION. The process of fermentation in the preparation of wine, vinegar, beer and bread was known and practised in prehistoric times. The alchemists used the terms fermentation, digestion and putrefaction indiscriminately; any reaction in which chemical energy was displayed in some form or other—such, for instance, as the effervescence occasioned by the addition of an acid to an alkaline solution—was described as a fermentation (Lat. *fervere*, to boil); and the idea of the "Philosopher's Stone" setting up a fermentation in the common metals and developing the essence or germ, which should transmute them into silver or gold, further complicated the conception of fermentation. As an outcome of this alchemical doctrine the process of fermentation was supposed to have a purifying and elevating effect on the bodies which had been submitted to its influence. Basil Valentine wrote that when yeast was added to wort "an internal inflammation is communicated to the liquid, so that it raises in itself, and thus the segregation and separation of the feculent from the clear takes place." Johann Becher, in 1669, first found that alcohol was formed during the fermentation of solutions of sugar; he distinguished also between fermentation and putrefaction. In 1697 Georg Stahl admitted that fermentation and putrefaction were analogous processes, but that the former was a particular case of the latter.

The beginning of definite knowledge on the phenomenon of fermentation may be dated from the time of Antony Leeuwenhoek, who in 1680 designed a microscope sufficiently powerful to render yeast cells and bacteria visible; and a description of these organisms, accompanied by diagrams, was sent to the Royal Society of London. This investigator just missed a great discovery, for he did not consider the spherical forms to be living organisms but compared them with starch granules. It was not until 1803 that L. J. Thénard stated that yeast was the cause of fermentation, and held it to be of an animal nature, since it contained nitrogen and yielded ammonia on distillation, nor was it conclusively proved that the yeast cell was the originator of fermentation until the researches of C. Cagniard de la Tour, T. Schwann and F. Kützing from 1836 to 1839 settled the point. These investigators regarded yeast as a plant, and Meyer gave to the germs the systematic name of "Saccharomyces" (sugar fungus). In 1839–1840 J. von Liebig attacked the doctrine that fermentation was caused by micro-organisms, and enunciated his theory of mechanical decomposition. He held that every fermentation consisted of molecular motion which is transmitted from a substance in a state of chemical motion—that is, of decomposition—to other substances, the elements of which are loosely held together. It is clear from Liebig's publications that he first regarded yeast as a lifeless, albuminoid mass; but, although later he considered they were living cells, he would never admit that fermentation was a physiological process, the chemical aspect being paramount in the mind of this distinguished investigator.

In 1857 Pasteur decisively proved that fermentation was a physiological process, for he showed that the yeast which produced fermentation was no dead mass, as assumed by Liebig, but consisted of living organisms capable of growth and multiplication. His own words are: "The chemical action of fermentation is essentially a correlative phenomenon of a vital act, beginning and ending with it. I think that there is never any alcoholic fermentation without there being at the same time organization, development and multiplication of globules, or the continued consecutive life of globules already formed." Fermentation, according to Pasteur, was caused by the growth and multiplication of unicellular organisms out of contact with free oxygen, under which circumstance they acquire the power of taking oxygen from chemical compounds in the medium in which they are growing. In other words "fermentation is life without air, or life without oxygen." This theory of fermentation was materially modified in 1892 and 1894 by A. J. Brown, who described experiments which were in disagreement with Pasteur's dictum. A. J. Brown writes: "If for the theory 'life without air' is substituted the consideration that yeast cells can use oxygen in the manner of ordinary aërobic fungi, and probably do require it for the full completion of their life-history, but that the exhibition of their fermentative functions is independent of their environment with regard to free oxygen, it will be found that there is nothing contradictory in Pasteur's experiments to such a hypothesis."

Liebig and Pasteur were in agreement on the point that fermentation is intimately connected with the presence of yeast in the fermenting liquid, but their explanations concerning the mechanism of fermentation were quite opposed. According to M. Traube (1858), the active cause of fermentation is due to the action of different enzymes contained in yeast and not to the yeast cell itself. As will be seen later this theory was confirmed by subsequent researches of E. Fischer and E. Buchner.

In 1879 C. Nägeli formulated his well-known molecular-physical theory, which supported Liebig's chemical theory on the one hand and Pasteur's physiological hypothesis on the other: "Fermentation is the transference of the condition of motion of the molecules, atomic groups and atoms of the various compounds constituting the living plasma, to the fermenting material, in consequence of which equilibrium in the molecules of the latter is destroyed, the result being their disintegration." He agreed with Pasteur that the presence of living cells is essential to the transformation of sugar into alcohol, but dissented from the view that the process occurs within the cell. This investigator held that the decomposition of the sugar molecules takes place outside the cell wall. In 1894 and 1895, Fischer, in a remarkable series of papers on the influence of molecular structure upon the action of the enzyme, showed that various species of yeast behave very differently towards solutions of sugars. For example, some species hydrolyse cane sugar and maltose, and then carry on fermentation at the expense of the simple sugars (hexoses) so formed. *Saccharomyces Marxianus* will not hydrolyse maltose, but it does attack cane sugar and ferment the products of hydrolysis. Fischer next suggested that enzymes can only hydrolyse those sugars which possess a molecular structure in harmony with their own, or to use his ingenious analogy, "the one may be said to fit into the other as a key fits into a lock." The preference exhibited by yeast cells for sugar molecules is shared by mould fungi and soluble enzymes in their fermentative actions. Thus, Pasteur showed that *Penicillium glaucum*, when grown in an aqueous solution of ammonium racemate, decomposed the dextro-tartrate, leaving the laevo-tartrate, and the solution which was originally inactive to polarized light became dextro-rotatory. Fischer found that the enzyme "invertase," which is present in yeast, attacks methyl-*d*-glucoside but not methyl-*l*-glucoside.

In 1897 Buchner submitted yeast to great pressure, and isolated a nitrogenous substance, enzymic in character, which he termed "zymase." This body is being continually formed in the yeast cell, and decomposes the sugar which has diffused into the cell. The freshly-expressed yeast juice causes concentrated solutions of cane sugar, glucose, laevulose and maltose to ferment with the production of alcohol and carbon dioxide, but not milk-sugar and mannose. In this respect the plasma behaves in a similar manner towards the sugars as does the living yeast cell. Pasteur found that, when cane sugar was fermented by yeast, 49·4% of carbonic acid and 51·1% of alcohol were produced; with expressed yeast juice cane sugar yields 47% of carbonic acid and 47·7% of alcohol. According to Buchner the fermentative activity of yeast-cell juice is not due to the presence of living yeast cells, or to the action of living yeast protoplasm, but it is caused by a soluble enzyme. A. Macfadyen, G. H. Morris and S. Rowland, in repeating Buchner's experiments, found that zymase possessed properties differing from all other enzymes, thus: dilution with twice its volume of water practically destroys the fermentative power of the yeast juice. These investigators considered that differences of this nature cannot be explained by the theory that it is a soluble enzyme, which brings about the alcoholic fermentation of sugar. The remarkable discoveries of Fischer and Buchner to a great extent confirm Traube's views, and reconcile Liebig's and Pasteur's theories. Although the action of zymase may be regarded as mechanical, the enzyme cannot be produced by any other than living protoplasm.

Pasteur's important researches mark an epoch in the technical aspect of fermentation. His investigations on vinegar-making revolutionized that industry, and he showed how, instead of waiting two or three months for the elaboration of the process, the vinegar could be made in eight or ten days by exposing the vats containing the mixture of wine and vinegar to a temperature of 20° to 25° C., and sowing with a small quantity of the acetic organism. To the study of the life-history of the butyric and acetic organisms we owe the terms "anaërobic" and "aërobic." His researches from 1860 and onwards on the then vexed question of spontaneous generation proved that, in all cases where spontaneous generation appeared to have taken place, some defect or other was in the experiment. Although the direct object of Pasteur was to prove a negative, yet it was on these experiments that sterilization as known to us was developed. It is only necessary to bear in mind the great part played by sterilization in the laboratory, and pasteurization on the fermentation industries and in the preservation of food materials. Pasteur first formulated the idea that bacteria are responsible for the diseases of fermented liquids; the corollary of this was a demand for pure yeast. He recommended that yeast should be purified by cultivating it in a solution of sugar containing tartaric acid, or, in wort containing a small quantity of phenol. It was not recognized that many of the diseases of fermented liquids are occasioned by foreign yeasts; moreover, this process, as was shown later by Hansen, favours the development of foreign yeasts at the expense of the good yeast.

About this time Hansen, who had long been engaged in researches on the biology of the fungi of fermentation, demonstrated that yeast free from bacteria could nevertheless occasion diseases in beer. This discovery was of great importance to the zymo-technical industries, for it showed that bacteria are not the only undesirable organisms which may occur in yeast. Hansen set himself the task of studying the properties of the varieties of yeast, and to do this he had to cultivate each variety in a pure state. Having found that some of the commonest diseases of beer, such as yeast turbidity and the objectionable changes in flavour, were caused not by bacteria but by certain species of yeast, and, further, that different species of good brewery yeast would produce beers of different character, Hansen argued that the pitching yeast should consist only of a single species—namely, that best suited to the brewery in question. These views met with considerable opposition, but in 1890 Professor E. Duclaux stated that the yeast question as regards low fermentation has been solved by Hansen's investigations. He emphasized the opinion that yeast derived from one cell was of no good for top fermentation, and advocated Pasteur's method of purification. But in the course of time, notwithstanding many criticisms and objections, the reform spread from bottom fermentation to top fermentation breweries on the continent and in America. In the United Kingdom the employment of brewery yeasts selected from a single cell has not come into general use; it may probably be accounted for in a great measure by conservatism and the wrong application of Hansen's theories.

Pure Cultivation of Yeasts.—The methods which were first adopted by Hansen for obtaining pure cultures of yeast were similar in principle to one devised by J. Lister for isolating a pure culture of lactic acid bacterium. Lister determined the number of bacteria present in a drop of the liquid under examination by counting, and then diluted this with a sufficient quantity of sterilized water so that each drop of the mixture should contain, on an average, less than one bacterium. A number of flasks containing a nutrient medium were each inoculated with one drop of this mixture; it was found that some remained sterile, and Lister assumed that the remaining flasks each contained a pure culture. This method did not give very certain results, for it could not be guaranteed that the growth in the inoculated flask was necessarily derived from a single bacterium. Hansen counted the number of yeast cells suspended in a drop of liquid diluted with sterilized water. A volume of the diluted yeast was introduced into flasks containing sterilized wort, the degree of dilution being such that only a small proportion of the flasks became infected. The flasks were then well shaken, and the yeast cell or cells settled to the bottom, and gave rise to a separate yeast speck. Only those cultures which contained a single yeast speck were assumed to be pure cultivations. By this method several races of *Saccharomycetes* and brewery yeasts were isolated and described.

The next important advance was the substitution of solid for liquid media; due originally to Schroter. R. Koch subsequently improved the method. He introduced bacteria into liquid sterile nutrient gelatin. After being well shaken, the liquid was poured into a sterile glass Petrie dish and covered with a moist and sterile bell-jar. It was assumed that each separate speck contained a pure culture. Hansen pointed out that this was by no means the case, for it is more difficult to separate the cells from each other in the gelatin than in the liquid. To obtain an absolutely pure culture with certainty it is necessary, even when the gelatin method is employed, to start from a single cell. To effect this some of the nutrient gelatin containing yeast cells is placed on the under-surface of the cover-glass of the moist chamber. Those cells are accurately marked, the position of which is such that the colonies, to which they give rise, can grow to their full size without coming into contact with other colonies. The growth of the marked cells is kept under observation for three or four days, by which time the colonies will be large enough to be taken out of the chamber and placed in flasks. The contents of the flasks can then be introduced into larger flasks, and finally into an apparatus suitable for making enough yeast for technical purposes. Such, in brief, are the methods devised by that brilliant investigator Hansen; and these methods have not only been the basis on which our modern knowledge of the *Saccharomycetes* is founded, but are the only means of attack which the present-day observer has at his disposal.

From the foregoing it will be seen that the term fermentation has now a much wider significance than when it was applied to such changes as the decomposition of must or wort with the production of carbon dioxide and alcohol. Fermentation now includes all changes in organic compounds brought about by ferments elaborated in the living animal or vegetable cell. There are two distinct types of fermentation: (1) those brought about by living organisms (organized ferments), and (2) those brought about by non-living or unorganized ferments (enzymes). The first class include such changes as the alcoholic fermentation of sugar solutions, the acetic acid fermentation of alcohol, the lactic acid fermentation of milk sugar, and the putrefaction of animal and vegetable nitrogenous matter. The second class include all changes brought about by the agency of enzymes, such as the action of diastase on starch, invertase on cane sugar, glucase on maltose, &c. The actions are essentially hydrolytic.

Biological Aspect of Yeast.—The Saccharomycetes belong to that division of the Thallophyta called the Hyphomycetes or Fungi (*q.v.*). Two great divisions are recognized in the Fungi: (i.) the *Phycomycetes* or Algal Fungi, which retain a definitely sexual method of reproduction as well as asexual (vegetative) methods, and (ii.) the *Mycomycetes*, characterized by extremely reduced or very doubtful sexual reproduction. The Mycomycetes may be divided as follows: (A) forms bearing both sporangia and conidia (see FUNGI), (B) forms bearing conidia only, *e.g.* the common mushroom. Division A comprises (*a*) the true *Ascomycetes*, of which the moulds Eurotium and Penicillium are examples, and (*b*) the *Hemiasci*, which includes the yeasts. The gradual disappearance of the sexual method of reproduction, as we pass upwards in the fungi from the points of their departure from the Algae, is an important fact, the last traces of sexuality apparently disappearing in the ascomycetes.

With certain rare exceptions the Saccharomycetes have three methods of asexual reproduction:—

1. The most common.—The formation of *buds* which separate to form new cells. A portion of the nucleus of the parent cell makes its way through the extremely narrow neck into the daughter cell. This method obtains when yeast is vigorously fermenting a saccharine solution.

2. A division by *fission* followed by Endogenous spore formation, characteristic of the Schizosaccharomycetes. Some species show fermentative power.

3. *Endospore* formation, the conditions for which are as follows: (1) suitable temperature, (2) presence of air, (3) presence of moisture, (4) young and vigorous cells, (5) a food supply in the case of one species at least is necessary, and is in no case prejudicial. In some cases a sexual act would appear to precede spore formation. In most cases four spores are formed within the cell by free formation. These may readily be seen after appropriate staining.

In some of the true Ascomycetes, such as *Penicillium glaucum*, the conidia if grown in saccharine solutions, which they have the power of fermenting, develop single cell yeast-like forms, and do not—at any rate for a time—produce again the characteristic branching mycelium. This is known as the *Torula* condition. It is supposed by some that Saccharomyces is a very degraded Ascomycete, in which the Torula condition has become fixed.

The yeast plant and its allies are saprophytes and form no chlorophyll. Their extreme reduction in form and loss of sexuality may be correlated with the saprophytic habit, the proteids and other organic material required for the growth and reproduction being appropriated ready synthesized, the plant having entirely lost the power of forming them for itself, as evidenced by the absence of chlorophyll. The beer yeast *S. cerevisiae*, is never found wild, but the wine yeasts occur abundantly in the soil of vineyards, and so are always present on the fruit, ready to ferment the expressed juice.

Chemical Aspect of Alcoholic Fermentation.—Lavoisier was the first investigator to study fermentation from a quantitative standpoint. He determined the percentages of carbon, hydrogen and oxygen in the sugar and in the products of fermentation, and concluded that sugar in fermenting breaks up into alcohol, carbonic acid and acetic acid. The elementary composition of sugar and alcohol was fixed in 1815 by analyses made by Gay-Lussac, Thénard and de Saussure. The first-mentioned chemist proposed the following formula to represent the change which takes place when sugar is fermented:—

$$\underset{\text{Sugar.}}{C_6H_{12}O_6} = \underset{\text{Carbon dioxide.}}{2CO_2} + \underset{\text{Alcohol.}}{2C_2H_6O}$$

This formula substantially holds good to the present day, although a number of definite bodies other than carbon dioxide and alcohol occur in small and varying quantities, according to the conditions of the fermentation and the medium fermented. Prominent among these are glycerin and succinic acid. In this connexion Pasteur showed that 100 parts of cane sugar on inversion gave 105·4 parts of invert sugar, which, when fermented, yielded 51·1 parts alcohol, 49·4 carbonic acid, 0·7 succinic acid, 3·2 glycerin and 1·0 unestimated. A. Béchamp and E. Duclaux found that acetic acid is formed in small quantities during fermentation; aldehyde has also been detected. The higher alcohols such as propyl, isobutyl, amyl, capryl, oenanthyl and caproyl, have been identified; and the amount of these vary according to the different conditions of the fermentation. A number of esters are also produced. The characteristic flavour and odour of wines and spirits is dependent on the proportion of higher alcohols, aldehydes and esters which may be produced.

Certain yeasts exercise a reducing action, forming sulphuretted hydrogen, when sulphur is present. The "stinking fermentations" occasionally experienced in breweries probably arise from this, the free sulphur being derived from the hops. Other yeasts are stated to form sulphurous acid in must and wort. Another fact of considerable technical importance is, that the various races of yeast show considerable differences in the amount and proportion of fermentation products other than ethyl alcohol and carbonic acid which they produce. From these remarks it will be clear that to employ the most suitable kind of yeast for a given alcoholic fermentation is of fundamental importance in certain industries. It is beyond the scope of the present article to attempt to describe the different forms of budding fungi (Saccharomyces), mould fungi and bacteria which are capable of fermenting sugar solutions. Thus, six species isolated by Hansen, *Saccharomyces cerevisiae*, *S. Pasteurianus* I.,[1] II., III., and *S. ellipsoideus*, contained invertase and maltase, and can invert and subsequently ferment cane sugar and maltose. *S. exiguus* and *S. Ludwigii* contain only invertase and not maltase, and therefore ferment cane sugar but not maltose. *S. apiculatus* (a common wine yeast) contains neither of these enzymes, and only ferments solutions of glucose or laevulose.

Previously to Hansen's work the only way of differentiating yeasts was by studying morphological differences with the aid of the microscope. Max Reess distinguished the species according to the appearance of the cells thus, the ellipsoidal cells were designated *Saccharomyces ellipsoideus*, the sausage-shaped *Saccharomyces Pasteurianus*, and so on. It was found by Hansen that the same species of yeast can assume different shapes; and it therefore became necessary to determine how the different varieties of yeast could be distinguished with certainty. The formation of spores in yeast (first discovered by T. Schwann in 1839) was studied by Hansen, who found that each species only developed spores between certain definite temperatures. The time taken for spore formation varies greatly; thus, at 52° F., *S. cerevisiae* takes 10, *S. Pasteurianus* I. and II. about 4, *S. Pasteurianus* III. about 7, and *S. ellipsoideus* about 4½ days. The formation of spores is used as an analytical method for determining whether a yeast is contaminated with another species,—for example: a sample of yeast is placed on a gypsum or porcelain block saturated with water; if in ten days at a temperature of 52° F. no spores make their appearance, the yeast in question may be regarded as *S. cerevisiae*, and not associated with *S. Pasteurianus* or *S. ellipsoideus*.

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[1] Hansen found there were three species of spore-bearing Saccharomycetes and that these could be subdivided into varieties. Thus, *S. cerevisiae* I., *S. cerevisiae* II., *S. Pasteurianus* I., &c.

The formation of films on fermented liquids is a well-known phenomenon and common to all micro-organisms. A free still surface with a direct access of air are the necessary conditions. Hansen showed that the microscopic appearance of film cells of the same species of Saccharomycetes varies according to the temperature of growth; the limiting temperatures of film formation, as well as the time of its appearance for the different species, also vary.

In the zymo-technical industries the various species of yeast exhibit different actions during fermentations. A well-known instance of this is the "top" and "bottom" brewery fermentations (see BREWING). In a top fermentation—typical of English breweries—the yeast rises, in a bottom fermentation, as the phrase implies, it settles in the vessel. Sometimes a bottom yeast may for a time exhibit signs of a top fermentation. It has not, however, been possible to transform a typical top yeast into a permanent typical bottom yeast. There appear to be no true distinctive characteristics for these two types. Their selection for a particular purpose depends upon some special quality which they possess; thus for brewing certain essentials are demanded as regards stability, clarification, taste and smell; whereas, in distilleries, the production of alcohol and a high multiplying power in the yeast are required. Culture yeasts have also been successfully employed in the manufacture of wine and cider. By the judicious selection of a type of yeast it is possible to improve the bouquet, and from an inferior must obtain a better wine or cider than would otherwise be produced.

Certain acid fermentations are of common occurrence. The *Bacterium acidi lacti* described by Pasteur decomposes milk sugar into lactic acid. *Bacillus amylobacter* usually accompanies the lactic acid organism, and decomposes lactic and other higher acids with formation of butyric acid. Moulds have been isolated which occasion the formation of citric acid from glucose. The production of acetic acid from alcohol has received much attention at the hands of investigators, and it has an important technical aspect in the manufacture of vinegar. The phenomenon of nitrification (see BACTERIOLOGY, AGRICULTURE and MANURE), *i.e.* the formation of nitrites and nitrates from ammonia and its compounds in the soil, was formerly held to be a purely chemical process, until Schloesing and Müntz suggested in 1877 that it was biological. It is now known that the action takes place in two stages; the ammonium salt is first oxidized to the nitrite stage and subsequently to the nitrate. (J. L. B.)

FERMO (anc. *Firmum Picenum*), a town and archiepiscopal see of the Marches, Italy, in the province of Ascoli Piceno, on a hill with a fine view, 1046 ft. above sea-level, on a branch from Porto S. Giorgio on the Adriatic coast railway. Pop. (1901) town, 16,577, commune 20,542. The summit of the hill was occupied by the citadel until 1446. It is crowned by the cathedral, reconstructed in 1227 by Giorgio da Como; the fine facade and campanile of this period still remain, and the side portal is good; the beautiful rose-window over the main door dates from 1348. In the porch are several good tombs, including one of 1366 by Tura da Imola, and also the modern monument of Giuseppe Colucci, a famous writer on the antiquities of Picenum. The interior has been modernized. The building is now surrounded by a garden, with a splendid view. Against the side of the hill was built the Roman theatre; scanty traces of an amphitheatre also exist. Remains of the city wall, of rectangular blocks of hard limestone, may be seen just outside the Porta S. Francesco; whether the walling under the Casa Porti belongs to them is doubtful. The medieval battlemented walls superposed on it are picturesque. The church of S. Francesco has a good tower and choir in brickwork of 1240, the rest having been restored in the 17th century. Under the Dominican monastery is a very large Roman reservoir in two storeys, belonging to the imperial period, divided into many chambers, at least 24 on each level, each 30 by 20 ft.; for filtration (see G. de Minicis in *Annali dell' Istituto*, 1846, p. 46; 1858, p. 125). The piazza contains the Palazzo Comunale, restored in 1446, with a statue of Pope Sixtus V. in front of it. The Biblioteca Comunale contains a collection of inscriptions and antiquities. Porto S. Giorgio has a fine castle of 1269, blocking the valley which leads to Fermo.

The ancient Firmum Picenum was founded as a Latin colony in 264 B.C., after the conquest of the Picentes, as the local headquarters of the Roman power, to which it remained faithful. It was originally governed by five quaestors. It was made a colony with full rights after the battle of Philippi, the 4th legion being settled there. It lay at the junction of roads to Pausulae, Urbs Salvia and Asculum, being connected with the coast road by a short branch road from Castellum Firmanum (Porto S. Giorgio). In the 10th century it became the capital of the *Marchia Firmana*. In 1199 it became a free city, and remained independent until 1550, when it became subject to the papacy. (T. As.)

FERMOY, a market town in the east riding of Co. Cork, Ireland, in the north-east parliamentary division, 21 m. by road N.E. of Cork, and 14 m. E. of Mallow by a branch of the Great Southern & Western railway. Pop. of urban district (1901) 6126. It is situated on the river Blackwater, which divides the town into two parts, the larger of which is on the southern bank, and there the trade of the town, which is chiefly in flour and agricultural produce, is mainly carried on. The town has several good streets and some noteworthy buildings. Of the latter, the most prominent are the military barracks on the north bank of the river, the Protestant church, the Roman Catholic cathedral and St Colman's Roman Catholic college. Fermoy rose to importance only at the beginning of the 19th century, owing entirely to the devotion of John Anderson, a citizen, on becoming landlord. The town is a centre for salmon and trout fishing on the Blackwater and its tributary the Funshion. The neighbouring scenery is attractive, especially in the Glen of Araglin, once famed for its ironworks.

FERN (from O. Eng. *fearn*, a word common to Teutonic languages, cf. Dutch *varen*, and Ger. *Farn*; the Indo-European root, seen in the Sanskrit *parna*, a feather, shows the primary meaning; cf. Gr. *πτερόν*, feather, *πτερίς*, fern), a name often used to denote the whole botanical class of Pteridophytes, including both the true ferns, Filicales, by far the largest group of this class in the existing flora, and the fern-like plants, Equisetales, Sphenophyllales, Lycopodiales (see PTERIDOPHYTA).

FERNANDEZ, ALVARO, one of the leading Portuguese explorers of the earlier 15th century, the age of Henry the Navigator. He was brought up (as a page or esquire) in the household of Prince Henry, and while still "young and audacious" took an important part in the discovery of "Guinea." He was a nephew of João Gonçalvez Zarco, who had rediscovered the Madeira group in Henry's service (1418–1420), and had become part-governor of Madeira and commander of Funchal; when the great expedition of 1445 sailed for West Africa he was entrusted by his uncle with a specially fine caravel, under particular injunctions to devote himself to discovery, the most cherished object of his princely master, so constantly thwarted.

Fernandez, as a pioneer, outstripped all other servants of the prince at this time. After visiting the mouth of the Senegal, rounding Cape Verde, and landing in Goree (?), he pushed on to the "Cape of Masts" (Cabo dos Matos, or Mastos, so called from its tall spindle-palms); probably between Cape Verde and the Gambia, the most southerly point till then attained. Next year (1446) he returned, and coasted on much farther, to a bay one hundred and ten leagues "south" (*i.e.* S.S.E.) of Cape Verde, perhaps in the neighbourhood of Konakry and the Los Islands, and but little short of Sierra Leone. This record was not broken till 1461, when Sierra Leone was sighted and named. A wound, received from a poisoned arrow in an encounter with natives, now compelled Fernandez to return to Portugal, where he was received with distinguished honour and reward by Prince Henry and the regent of the kingdom, Henry's brother Pedro.

See Gomes Eannes de Azurara, *Chronica de . . . Guiné*, chs. lxxv., lxxxvii.; João de Barros, *Asia*, Decade I., bk. i. chs. xiii., xiv.

FERNANDEZ, DIEGO, a Spanish adventurer and historian of the 16th century. Born at Palencia, he was educated for the church, but about 1545 he embarked for Peru, where he served in the royal army under Alonzo de Alvarado. Andres Hurtado de Mendoza, marquess of Cañeté, who became viceroy of Peru in 1655, bestowed on Fernandez the office of chronicler of Peru; and in this capacity he wrote a narrative of the insurrection of Francisco Hernandez Giron, of the rebellion of Gonzalo Pizarro, and of the administration of Pedro de la Gasca. The whole work, under the title *Primera y segunda parte de la Historia del Piru*, was published at Seville in 1571 and was dedicated to King Philip II. It is written in a clear and intelligible style, and with more art than is usual in the compositions of the time. It gives copious details, and, as he had access to the correspondence and official documents of the Spanish leaders, it is, although necessarily possessing bias, the fullest and most authentic record existing of the events it relates.

A notice of the work will be found in W. H. Prescott's *History of the Conquest of Peru* (new ed., London, 1902).

FERNANDEZ, JOHN (*João, Joam*), Portuguese traveller of the 15th century. He was perhaps the earliest of modern explorers in the upland of West Africa, and a pioneer of the European slave- and gold-trade of Guinea. We first hear of him (before 1445) as a captive of the Barbary Moors in the western Mediterranean; while among these he acquired a knowledge of Arabic, and probably conceived the design of exploration in the interior of the continent whose coasts the Portuguese were now unveiling. In 1445 he volunteered to stay in Guinea and gather what information he could for Prince Henry the Navigator; with this object he accompanied Antam Gonçalvez to the "River of Gold" (Rio d'Ouro, Rio de Oro) in 23° 40′ N., where he landed and went inland with some native shepherds. He stayed seven months in the country, which lay just within Moslem Africa, slightly north of Pagan Negroland (W. Sudan); he was taken off again by Antam Gonçalvez at a point farther down the coast, near the "Cape of Ransom" (Cape Mirik), in 19° 22′ 14″; and his account of his experiences proved of great interest and value, not only as to the natural features, climate, fauna and flora of the south-western Sahara, but also as to the racial affinities, language, script, religion, nomad habits, and trade of its inhabitants. These people—though Mahommedans, maintaining a certain trade in slaves, gold, &c., with the Barbary coast (especially with Tunis), and classed as "Arabs," "Berbers," and "Tawny Moors"—did not then write or speak Arabic. In 1446 and 1447 John Fernandez accompanied other expeditions to the Rio d'Ouro and other parts of West Africa in the service of Prince Henry. He was personally known to Gomes Eannes de Azurara, the historian of this early period of Portuguese expansion; and from Azurara's language it is clear that Fernandez' revelation of unknown lands and races was fully appreciated at home.

See Azurara, *Chronica de . . . Guiné*, chs. xxix., xxxii., xxxiv., xxxv., lxxvii., lxxviii., xc., xci., xciii.

FERNANDEZ, JUAN (fl. *c.* 1570), Spanish navigator and discoverer. While navigating the coasts of South America it occurred to him that the south winds constantly prevailing near the shore, and retarding voyages between Peru and Chile, might not exist farther out at sea. His idea proved correct, and by the help of the trade winds and some currents at a distance from the coast he sailed with such rapidity (thirty days) from Callao to Chile that he was apprehended on a charge of sorcery. His inquisitors, however, accepted his natural explanation of the marvel. During one of his voyages in 1563 (from Lima to Valdivia) Fernandez discovered the islands which now bear his name. He was so enchanted with their beauty and fertility that he solicited the concession of them from the Spanish government. It was granted in 1572, but a colony which he endeavoured to establish at the largest of them (Isla Mas-a-Tierra) soon broke up, leaving behind the goats, whose progeny were hunted by Alexander Selkirk. In 1574 Fernandez discovered St Felix and St Ambrose islands (in 27° S., 82° 7′ W.); and in 1576, while voyaging in the southern ocean, he is said to have sighted not only Easter Island, but also a continent, which was probably Australia or New Zealand if the story (rejected by most critics, but with reservations as to Easter Island) is to be accepted.

See J. L. Arias, *Memoir recommending to the king the conversion of the new discovered islands* (in Spanish, 1609; Eng. trans., 1773); Ulloa, *Relacion del Viaje*, bk. ii. ch. iv.; Alexander Dalrymple, *An Historical Collection of the several Voyages and Discoveries in the South Pacific Ocean* (London, 1769–1771); Fréville, *Voyages de la Mer du Sud par les Espagnols.*

FERNANDEZ, LUCAS, Spanish dramatist, was born at Salamanca about the middle of the 15th century. Nothing is known of his life, and he is represented by a single volume of plays, *Farsas y églogas al modo y estilo pastoril* (1514). In his secular pieces—a *comedia* and two *farsas*—he introduces few personages, employs the simplest possible action, and burlesques the language of the uneducated class; the secular and devout elements are skilfully intermingled in his two *Farsas del nascimiento de Nuestro Señor Jesucristo*. But the best of his dramatic essays is the *Auto de la Pasión*, a devout play intended to be given on Maundy Thursday. It is written in the manner of Encina, with less spontaneity, but with a sombre force to which Encina scarcely attained.

Fernandez' plays were reprinted by the Spanish Academy in 1867.

FERNANDINA, a city, a port of entry, and the county-seat of Nassau county, Florida, U.S.A., a winter and summer resort, in the N.E. part of the state, 36 m. N.E. of Jacksonville, on Amelia Island (about 22 m. long and from ½ m. to 1½ m. wide), which is separated from the mainland by an arm of the sea, known as Amelia river and bay. Pop. (1900) 3245; (1905, state census), 4959 (2957 negroes); (1910) 3482. Fernandina is served by the Seaboard Air Line railway, and by steamship lines connecting with domestic and foreign ports; its harbour, which has the deepest water on the E. coast of Florida, opens on the N. to Cumberland Sound, which was improved by the Federal government, beginning in 1879, reducing freight rates at Fernandina by 25 to 40%. Under an act of 1907 the channel of Fernandina harbour, 1300 ft. wide at the entrance and about 2 m. long, was dredged to a depth of 20 to 24 ft. at mean low water with a width of 400 to 600 ft. The "inside" water-route between Savannah, Georgia and Fernandina is improved by the Federal government (1892 sqq.) and has a 7-ft. channel. The principal places of interest are "Amelia Beach," more than 20 m. long and 200 ft. wide, connected with the city by a compact shell road nearly 2 m. long and by electric line; the Amelia Island lighthouse, in the N. end of the island, established in 1836 and rebuilt in 1880; Fort Clinch, at the entrance to the harbour; Cumberland Island, in Georgia, N. of Amelia Island, where land was granted to General Nathanael Greene after the War of American Independence by the state of Georgia; and Dungeness, the estate of the Carnegie family. Ocean City, on Amelia Beach, is a popular pleasure resort. The principal industries are the manufacture of lumber, cotton, palmetto fibres, and cigars, the canning of oysters, and the building and repair of railway cars. The foreign exports, chiefly lumber, railway ties, cotton, phosphate rock, and naval stores, were valued at $9,346,704 in 1907; and the imports in 1907 at $116,514.

The harbour of Fernandina was known to the early explorers of Florida, and it was here that Dominic de Gourgues landed when he made his expedition against the Spanish at San Mateo in 1568. An Indian mission was established by Spanish priests later in the same century, but it was not successful. When Georgia was founded, General James Oglethorpe placed a military guard on Amelia Island to prevent sudden attack upon his colony by the Spanish, and the first blood shed in the petty warfare between Georgia and Florida was the murder of two unarmed members of the guard by a troop of Spanish soldiers and Indians in 1739. The first permanent settlement was made by the Spanish in 1808, at what is now the village of Old Fernandina, about 1 m. from the city. The island was a centre for smuggling during the period of the embargo and non-importation acts preceding the war of 1812. This was the pretext for General George Matthews (1738–1812) to gather a band of adventurers at St Mary's, Georgia, invade the island, and capture Fernandina in 1812. In the following year the American forces were withdrawn. In 1817 Gregor MacGregor, a filibuster who had aided the Spanish provinces of South America in their revolt against Spain, fitted out an expedition in Baltimore and seized Fernandina, but departed soon after. Later in the same year Louis Aury, another adventurer, appeared with a small force from Texas, and took possession of the place in the name of the Republic of Mexico. In the following year Aury was expelled by United States troops, who held Fernandina in trust for Spain until Florida was finally ceded to the United States in 1821. Fernandina was first incorporated in 1859. In 1861 Fort Clinch was seized by the Confederates, and Fernandina harbour was a centre of blockade running in the first two years of the Civil War. In 1862 the place was captured by a Federal naval force from Port Royal, South Carolina, commanded by Commodore S. F. Du Pont.

FERNANDO DE NORONHA [*Fernão de N.*], an island in the South Atlantic, 125 m. from the coast of Brazil, to which country it belongs, in 3° 50′ S., 32° 25′ W. It is about 7 m. long and 1½ wide, and some other islets lie adjacent to it. Its surface is rugged, and it contains a number of rocky hills from 500 to 700 ft. high, and one peak towering to the height of 1089 ft. It is formed of basalt, trachyte and phonolite, and the soil is very fertile. The climate is healthy. It is defended by forts, and serves as a place of banishment for criminals from Brazil. The next largest island of the group is about a mile in circumference, and the others are small barren rocks. The population is about 2000, all males, including some 1400 criminals, and a garrison of 150. Communication is maintained by steamer with Pernambuco. The island takes name from its Portuguese discoverer (1503), the count of Noronha.

FERNANDO PO, or FERNANDO PÓO, a Spanish island on the west coast of Africa, in the Bight of Biafra, about 20 m. from the mainland, in 3° 12′ N. and 8° 48′ E. It is of volcanic origin, related to the Cameroon system of the adjacent mainland, is the largest island in the Gulf of Guinea, is 44 m. long from N.N.E. to S.S.W., about 20 m. broad, and has an area of about 780 sq. m. Fernando Po is noted for its beautiful aspect, seeming from a short distance to be a single mountain rising from the sea, its sides covered with luxuriant vegetation. The shores are steep and rocky and the coast plain narrow. This plain is succeeded by the slopes of the mountains which occupy the rest of the island and culminate in the magnificent cone of Clarence Peak or Pico de Santa Isabel (native name Owassa). Clarence Peak, about 10,000 ft. high,[1] is in the north-central part of the island. In the south Musolo Mt. attains a height of 7400 ft. There are numerous other peaks between 4000 and 6000 ft. high. The mountains contain craters and crater lakes, and are covered, most of them to their summits, with forests. Down the narrow intervening valleys rush torrential streams which have cut deep beds through the coast plains. The trees most characteristic of the forest are oil palms and tree ferns, but there are many varieties, including ebony, mahogany and the African oak. The undergrowth is very dense; it includes the sugar-cane and cotton and indigo plants. The fauna includes antelopes, monkeys, lemurs, the civet cat, porcupine, pythons and green tree-snakes, crocodiles and turtles. The climate is very unhealthy in the lower districts, where malarial fever is common. The mean temperature on the coast is 78° Fahr. and varies little, but in the higher altitudes there is considerable daily variation. The rainfall is very heavy except during November-January, which is considered the dry season.

The inhabitants number about 25,000. In addition to about 500 Europeans, mostly Spaniards and Cubans, they are of two classes, the Bubis or Bube (formerly also called Ediya), who occupy the interior, and the coast dwellers, a mixed Negro race, largely descended from slave ancestors with an admixture of Portuguese and Spanish blood, and known to the Bubis as "Portos"—a corruption of Portuguese. The Bubis are of Bantu stock and early immigrants from the mainland. Physically they are a finely developed race, extremely jealous of their independence and unwilling to take service of any kind with Europeans. They go unclothed, smearing their bodies with a kind of pomatum. They stick pieces of wood in the lobes of their ears, wear numerous armlets made of ivory, beads or grass, and always wear hats, generally made of palm leaves. Their weapons are mainly of wood; stone axes and knives were in use as late as 1858. They have no knowledge of working iron. Their villages are built in the densest parts of the forest, and care is taken to conceal the approach to them. The Bubis are sportsmen and fishermen rather than agriculturists. The staple foods of the islanders generally are millet, rice, yams and bananas. Alcohol is distilled from the sugar-cane. The natives possess numbers of sheep, goats and fowls.

The principal settlement is Port Clarence (pop. 1500), called by the Spaniards Santa Isabel, a safe and commodious harbour on the north coast. In its graveyard are buried Richard Lander and several other explorers of West Africa. Port Clarence is unhealthy, and the seat of government has been removed to Basile, a small town 5 m. from Port Clarence and over 1000 ft. above the sea. On the west coast are the bay and port of San Carlos, on the east coast Concepcion Bay and town. The chief industry until the close of the 19th century was the collection of palm-oil, but the Spaniards have since developed plantations of cocoa, coffee, sugar, tobacco, vanilla and other tropical plants. The kola nut is also cultivated. The cocoa plantations are of most importance. The amount of cocoa exported in 1905 was 1800 tons, being 370 tons above the average export for the preceding five years. The total value of the trade of the island (1900-1905) was about £250,000 a year.

History.—The island was discovered towards the close of the 15th century by a Portuguese navigator called Fernão do Po, who, struck by its beauty, named it Formosa, but it soon came to be called by the name of its discoverer.[2] A Portuguese colony was established in the island, which together with Annobon was ceded to Spain in 1778. The first attempts of Spain to develop the island ended disastrously, and in 1827, with the consent of Spain, the administration of the island was taken over by Great Britain, the British "superintendent" having a Spanish commission as governor. By the British Fernando Po was used as a naval station for the ships engaged in the suppression of the slave trade. The British headquarters were named Port Clarence and the adjacent promontory Cape William, in honour of the duke of Clarence (William IV.). In 1844 the Spaniards reclaimed the island, refusing to sell their rights to Great Britain. They did no more at that time, however, than hoist the Spanish flag, appointing a British resident, John Beecroft, governor. Beecroft, who was made British consul in 1849, died in 1854. During the British occupation a considerable number of Sierra Leonians, West Indians and freed slaves settled in the island, and English became and remains the common speech of the coast peoples. In 1858 a Spanish governor was sent out, and the Baptist missionaries who had laboured in the island since 1843 were compelled to withdraw. They settled in Ambas Bay on the neighbouring mainland (see CAMEROON). The Jesuits who succeeded the Baptists were also expelled, but mission and educational work is now carried on by other Roman Catholic agencies, and (since 1870) by the Primitive Methodists. In 1879 the Spanish government recalled its officials, but a few years later, when the partition of Africa was being effected, they were replaced and a number of Cuban political prisoners were deported thither. Very little was done to develop the resources of the island until after the loss of the Spanish colonies in the West Indies and the Pacific, when Spain turned her attention to her African possessions. Stimulated by the success of the Portuguese cocoa plantations in the neighbouring island of St Thomas, the Spaniards started similar plantations, with some measure of success. The strategical importance and commercial possibilities of the island caused Germany and other powers to approach Spain with a view to its acquisition, and in 1900 the Spaniards gave France, in return for territorial concessions on the mainland, the right of pre-emption over the island and her other West African possessions.

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[1] The heights given by explorers vary from 9200 to 10,800 ft.

[2] Some authorities maintain that another Portuguese seaman, Lopes Gonsalves, was the discoverer of the island. The years 1469, 1471 and 1486 are variously given as those of the date of the discovery.

The administration of the island is in the hands of a governor-general, assisted by a council, and responsible to the ministry of foreign affairs at Madrid. The governor-general has under his authority the sub-governors of the other Spanish possessions in the Gulf of Guinea, namely, the Muni River Settlement, Corisco and Annobon (see those articles). None of these possessions is self-supporting.

See E. d'Almonte, "Someras Notas . . . de la isla de Fernando Póo y de la Guinea continental española," in *Bol. Real. Soc. Geog.* of Madrid (1902); and a further article in the *Riv. Geog. Col.* of Madrid (1908); E. L. Vilches, "Fernando Póo y la Guinea española," in the *Bol. Real. Soc. Geog.* (1901); San Javier, *Tres Años en Fernando Póo* (Madrid, 1875); O. Baumann, *Eine africanische Tropeninsel: Fernando Póo und die Bube* (Vienna, 1888); Sir H. H. Johnston, *George Grenfell and the Congo . . . and Notes on Fernando Pô* (London, 1908); Mary H. Kingsley, *Travels in West Africa*, ch. iii. (London, 1897); T. J. Hutchinson, sometime British Consul at Fernando Po, *Impressions of Western Africa*, chs. xii. and xiii. (London, 1858), and *Ten Years' Wanderings among the Ethiopians*, chs. xvii. and xviii. (London, 1861). For the Bubi language see J. Clarke, *The Adeeyah Vocabulary* (1841), and *Introduction to the Fernandian Tongue* (1848). Consult also *Wanderings in West Africa* (1863) and other books written by Sir Richard Burton as the result of his consulship at Fernando Po, 1861–1865, and the works cited under MUNI RIVER SETTLEMENTS.

FERNEL, JEAN FRANÇOIS (1497–1558), French physician, was born at Clermont in 1497, and after receiving his early education at his native town, entered the college of Sainte-Barbe, Paris. At first he devoted himself to mathematical and astronomical studies; his *Cosmotheoria* (1528) records a determination of a degree of the meridian, which he made by counting the revolutions of his carriage wheels on a journey between Paris and Amiens. But from 1534 he gave himself up entirely to medicine, in which he graduated in 1530. His extraordinary general erudition, and the skill and success with which he sought to revive the study of the old Greek physicians, gained him a great reputation, and ultimately the office of physician to the court. He practised with great success, and at his death in 1558 left behind him an immense fortune. He also wrote *Monalosphaerium, sive astrolabii genus, generalis horarii structura et usus* (1526); *De proportionibus* (1528); *De evacuandi ratione* (1545); *De abditis rerum causis* (1548); and *Medicina ad Henricum II.* (1554).

FERNIE, an important city in the east Kootenay district of British Columbia. Pop. about 4000. It is situated on the Crow's Nest branch of the Canadian Pacific railway, at the junction of Coal Creek with the Elk river, and owes its importance to the extensive coal mines in its vicinity. There are about 500 coke ovens in operation at Fernie, which supply most of the smelting plants in southern British Columbia with fuel.

FERNOW, KARL LUDWIG (1763–1808), German art-critic and archaeologist, was born in Pomerania on the 19th of November 1763. His father was a servant in the household of the lord of Blumenhagen. At the age of twelve he became clerk to a notary, and was afterwards apprenticed to a druggist. While serving his time he had the misfortune accidentally to shoot a young man who came to visit him; and although through the intercession of his master he escaped prosecution, the untoward event weighed heavily on his mind, and led him at the close of his apprenticeship to quit his native place. He obtained a situation at Lübeck, where he had leisure to cultivate his natural taste for drawing and poetry. Having formed an acquaintance with the painter Carstens, whose influence was an important stimulus and help to him, he renounced his trade of druggist, and set up as a portrait-painter and drawing-master. At Ludwigslust he fell in love with a young girl, and followed her to Weimar; but failing in his suit, he went next to Jena. There he was introduced to Professor Reinhold, and in his house met the Danish poet Baggesen. The latter invited him to accompany him to Switzerland and Italy, a proposal which he eagerly accepted (1794) for the sake of the opportunity of furthering his studies in the fine arts. On Baggesen's return to Denmark, Fernow, assisted by some of his friends, visited Rome and made some stay there. He now renewed his intercourse with Carstens, who had settled at Rome, and applied himself to the study of the history and theory of the fine arts and of the Italian language and literature. Making rapid progress, he was soon qualified to give a course of lectures on archaeology, which was attended by the principal artists then at Rome. Having married a Roman lady, he returned in 1802 to Germany, and was appointed in the following year professor extraordinary of Italian literature at Jena. In 1804 he accepted the post of librarian to Amelia, duchess-dowager of Weimar, which gave him the leisure he desired for the purpose of turning to account the literary and archaeological researches in which he had engaged at Rome. His most valuable work, the *Römische Studien*, appeared in 3 vols. (1806–1808). Among his other works are—*Das Leben des Künstlers Carstens* (1806), *Ariosto's Lebenslauf* (1809), and *Francesco Petrarca* (1818). Fernow died at Weimar, December 4, 1808.

A memoir of his life by Johanna Schopenhauer, mother of the philosopher, Arthur Schopenhauer, appeared in 1810, and a complete edition of his works in 1829.

FEROZEPUR, or FIROZPUR, a town and district of British India, in the Jullundur division of the Punjab. The town is a railway junction connecting the North-Western and Rajputana railways, and is situated about 4 m. from the present south bank of the Sutlej. Pop. (1901) 49,341. The arsenal is the largest in India, and Ferozepur is the headquarters of a brigade in the 3rd division of the northern army corps. British rule was first established at Ferozepur in 1835, when, on the failure of heirs to the Sikh family who possessed it, a small territory 86 m. in extent became an escheat to the British government, and the present district has been gradually formed around this nucleus. The strategic importance of Ferozepur was at this time very great; and when, in 1839, Captain (afterwards Sir Henry) Lawrence took charge of the station as political officer, it was the outpost of British India in the direction of the Sikh power. Ferozepur accordingly became the scene of operations during the first Sikh War. The Sikhs crossed the Sutlej in December 1845, and were defeated successively at Mudki, Ferozepur, Aliwal and Sobraon; after which they withdrew into their own territory, and peace was concluded at Lahore. At the time of the mutiny Ferozepur cantonments contained two regiments of native infantry and a regiment of native cavalry, together with the 61st Foot and two companies of European artillery. One of the native regiments, the 57th, was disarmed; but the other, the 45th, broke into mutiny, and, after an unsuccessful attempt to seize the magazine, which was held by the Europeans, proceeded to join the rebel forces in Delhi. Throughout the mutiny Ferozepur remained in the hands of the English.

Ferozepur has rapidly advanced in material prosperity of late years, and is now a very important seat of commerce, trade being mainly in grain. The main streets of the city are wide and well paved, and the whole is enclosed by a low brick wall. Great improvements have been made in the surroundings of the city. The cantonment lies 2 m. to the south of the city, and is connected with it by a good metalled road.

The DISTRICT OF FEROZEPUR comprises an area of 4302 sq. m. The surface is level, with the exception of a few sand-hills in the south and south-east. The country consists of two distinct tracts, that liable to annual fertilizing inundations from the Sutlej, known as the *bhet*, and the *rohi* or upland tract. The only river is the Sutlej, which runs along the north-western boundary. The principal crops are wheat, barley, millet, gram, pulses, oilseeds, cotton, tobacco, &c. The manufactures are of the humblest kind, consisting chiefly of cotton and wool-weaving, and are confined entirely to the supply of local wants. The Lahore and Ludhiāna road runs for 51 m. through the district, and forms an important trade route. The North-Western, the Southern Punjab, and a branch of the Rajputana-Malwa railways serve the district. The other important towns and seats of commerce are Fazilka (pop. 8505), Dharmkot (6731), Moga (6725), and Muktsar (6389). Owing principally to the dryness of its climate, Ferozepur has the reputation of being an exceptionally healthy district. In September and October, however, after the annual rains, the people suffer a good deal from remittent fever. In 1901 the population was 958,072. Distributaries of the Sirhind canal water the whole district.

FEROZESHAH, a village in the Punjab, India, notable as the scene of one of the chief battles in the first Sikh War. The battle immediately succeeded that of Mudki, and was fought on the 21st and 22nd of December 1845. During its course Sir Hugh Gough, the British commander, was overruled by the governor-general, Lord Hardinge, who was acting as his second in command (see SIKH WARS). At the end of the first day's fighting the British had occupied the Sikh position, but had not gained an undisputed victory. On the following morning the battle was resumed, and the Sikhs were reinforced by a second army under Tej Singh; but through cowardice or treachery Tej Singh withdrew at the critical moment, leaving the field to the British. In the course of the fight the British lost 694 killed and 1721 wounded, the vast majority being British troops, while the Sikhs lost 100 guns and about 5000 killed and wounded.

FERRAND, ANTOINE FRANÇOIS CLAUDE, COMTE (1751–1825), French statesman and political writer, was born in Paris on the 4th of July 1751, and became a member of the parlement of Paris at eighteen. He left France with the first party of emigrants, and attached himself to the prince of Condé; later he was a member of the council of regency formed by the comte de Provence after the death of Louis XVI. He lived at Regensburg until 1801, when he returned to France, though he still sought to serve the royalist cause. In 1814 Ferrand was made minister of state and postmaster-general. He countersigned the act of sequestration of Napoleon's property, and introduced a bill for the restoration of the property of the emigrants, establishing a distinction, since become famous, between royalists of *la ligne droite* and those of *la ligne courbe.* At the second restoration Ferrand was again for a short time postmaster-general. He was also made a peer of France, member of the privy council, grand-officer and secretary of the orders of Saint Michel and the Saint Esprit, and in 1816 member of the Academy, He continued his active support of ultra-royalist views until his death, which took place in Paris on the 17th of January 1825.

Besides a large number of political pamphlets, Ferrand is the author of *L'Esprit de l'histoire, ou Lettres d'un père à son fils sur la manière d'étudier l'histoire* (4 vols., 1802), which reached seven editions, the last number in 1826 having prefixed to it a biographical sketch of the author by his nephew Héricart de Thury; *Éloge historique de Madame Élisabeth de France* (1814); *Œuvres dramatiques* (1817); *Théorie des révolutions rapprochée des événements qui en ont été l'origine, le développement, ou la suite* (4 vols., 1817); and *Histoire des trois démembrements de la Pologne, pour faire suite à l'Histoire de l'anarchie de Pologne par Rulhière* (3 vols., 1820).

FERRAR, NICHOLAS (1592–1637), English theologian, was born in London in 1592 and educated at Clare Hall, Cambridge, graduating in 1610. He was obliged for some years to travel for his health, but on returning to England in 1618 became actively connected with the Virginia Company. When this company was deprived of its patent in 1623 Ferrar turned his attention to politics, and was elected to parliament. But he soon decided to devote himself to a religious life; he purchased the manor of Little Gidding in Huntingdonshire, where he organized a small religious community. Here, in 1626, he was ordained a deacon by Laud, and declining preferment, he lived an austere, almost monastic life of study and good works. He died on the 4th of December 1637, and the house was despoiled and the community broken up ten years later. There are extant a number of "harmonies" of the Gospel, printed and bound by the community, two of them by Ferrar himself. One of the latter was made for Charles I. on his request, after a visit in 1633 to see the "Arminian Nunnery at Little Gidding," which had been the subject of some scandalous—and undeserved—criticism.

FERRAR, ROBERT (d. 1555), bishop of St David's and martyr, born about the end of the 15th century of a Yorkshire family, is said to have been educated at Cambridge, whence he proceeded to Oxford and became a canon regular of St Augustine. He came under the influence of Thomas Gerrard and Lutheran theology, and was compelled to bear a faggot with Anthony Dalaber and others in 1528. He graduated B.D. in 1533, accompanied Bishop Barlow on his embassy to Scotland in 1535, and was made prior of St Oswald's at Nostell near Pontefract. At the dissolution he surrendered his priory without compunction to the crown, and received a liberal pension. For the rest of Henry's reign his career is obscure; perhaps he fled abroad on the enactment of the Six Articles. He certainly married, and is said to have been made Cranmer's chaplain, and bishop of Sodor and Man; but he was never consecrated to that see.

After the accession of Edward VI., Ferrar was, probably through the influence of Bishop Barlow, appointed chaplain to Protector Somerset, a royal visitor, and bishop of St David's on Barlow's translation to Bath and Wells in 1548. He was the first bishop appointed by letters patent under the act passed in 1547 without the form of capitular election; and the service performed at his consecration was also novel, being in English; he also preached at St Paul's on the 11th of November clad only as a priest and not as a bishop, and inveighed against vestments and altars. At St David's he had trouble at once with his singularly turbulent chapter, who, finding that he was out of favour at court since Somerset's fall in 1549, brought a long list of fantastic charges against him. He had taught his child to whistle, dined with his servants, talked of "worldly things such as baking, brewing, enclosing, ploughing and mining," preferred walking to riding, and denounced the debasement of the coinage. He seems to have been a kindly, homely, somewhat feckless person like many an excellent parish priest, who did not conceal his indignation at some of Northumberland's deeds. He had voted against the act of November 1549 for a reform of the canon law, and on a later occasion his nonconformity brought him into conflict with the Council; he was also the only bishop who satisfied Hooper's test of sacramental orthodoxy. The Council accordingly listened to the accusations of Ferrar's chapter, and in 1552 he was summoned to London and imprisoned on a charge of *praemunire* incurred by omitting the king's authority in a commission which he issued for the visitation of his diocese.

Imprisonment on such a charge under Northumberland might have been expected to lead to liberation under Mary. But Ferrar had been a monk and was married. Even so, it is difficult to see on what legal ground he was kept in the queen's bench prison after July 1553; for Mary herself was repudiating the royal authority in religion. Ferrar's marriage accounts for the loss of his bishopric in March 1554, and his opinions for his further punishment. As soon as the heresy laws and ecclesiastical jurisdiction had been re-established, Ferrar was examined by Gardiner, and then with signal indecency sent down to be tried by Morgan, his successor in the bishopric of St David's. He appealed from Morgan's sentence to Pole as papal legate, but in vain, and was burnt at Caermarthen on the 30th of March 1555. It was perhaps the most wanton of all Mary's acts of persecution; Ferrar had been no such protagonist of the Reformation as Cranmer, Ridley, Hooper and Latimer; he had had nothing to do with Northumberland's or Wyatt's conspiracy. He had taken no part in politics, and, so far as is known, had not said a word or raised a hand against Mary. He was burnt simply because he could not change his religion with the law and would not pretend that he could; and his execution is a complete refutation of the idea that Mary only persecuted heretics because and when they were traitors.

See *Dictionary of National Biography*, xviii. 380-382, and authorities there cited. Also Acts of the Privy Council (1550–1554); H. A. L. Fisher, *Political History of England*, vol. vi. (A. F. P.)

FERRARA, a city and archiepiscopal see of Emilia, Italy, capital of the province of Ferrara, 30 m. N.N.E. of Bologna, situated 30 ft. above sea-level on the Po di Vomano, a branch channel of the main stream of the Po, which is 3½ m. N. Pop. (1901) 32,968 (town), 86,392 (commune). The town has broad streets and numerous palaces, which date from the 16th century, when it was the seat of the court of the house of Este, and had, it is said, 100,000 inhabitants.

The most prominent building is the square castle of the house of Este, in the centre of the town, a brick building surrounded by a moat, with four towers. It was built after 1385 and partly restored in 1554; the pavilions on the top of the towers date from the latter year. Near it is the hospital of S. Anna, where Tasso was confined during his attack of insanity (1579–1586). The Palazzo del Municipio, rebuilt in the 18th century, was the earlier residence of the Este family. Close by is the cathedral of S. Giorgio, consecrated in 1135, when the Romanesque lower part of the main façade and the side façades were completed. It was built by Guglielmo degli Adelardi (d. 1146), who is buried in it. The upper part of the main façade, with arcades of pointed arches, dates from the 13th century, and the portal has recumbent lions and elaborate sculptures above. The interior was restored in the baroque style in 1712. The campanile, in the Renaissance style, dates from 1451–1493, but the last storey was added at the end of the 16th century. Opposite the cathedral is the Gothic Palazzo della Ragione, in brick (1315–1326), now the law-courts. A little way off is the university, which has faculties of law, medicine and natural science (hardly 100 students in all); the library has valuable MSS., including part of that of the *Orlando Furioso* and letters by Tasso. The other churches are of less interest than the cathedral, though S. Francesco, S. Benedetto, S. Maria in Vado and S. Cristoforo are all good early Renaissance buildings. The numerous early Renaissance palaces, often with good terra-cotta decorations, form quite a feature of Ferrara; few towns of Italy have so many of them proportionately, though they are mostly comparatively small in size. Among them may be noted those in the N. quarter (especially the four at the intersection of its two main streets), which was added by Ercole (Hercules) I. in 1492–1505, from the plans of Biagio Rossetti, and hence called the "Addizione Erculea." The finest of these is the Palazzo de' Diamanti, so called from the diamond points into which the blocks of stone with which it is faced are cut. It contains the municipal picture gallery, with a large number of pictures of artists of the school of Ferrara. This did not require prominence until the latter half of the 15th century, when its best masters were Cosimo Tura (1432–1495), Francesco Cossa (d. 1480) and Ercole dei Roberti (d. 1496). To this period are due famous frescoes in the Palazzo Schifanoia, which was built by the Este family; those of the lower row depict the life of Borso of Este, in the central row are the signs of the zodiac, and in the upper are allegorical representations of the months. The vestibule was decorated with stucco mouldings by Domenico di Paris of Padua. The building also contains fine choir-books with miniatures, and a collection of coins and Renaissance medals. The simple house of Ariosto, erected by himself after 1526, in which he died in 1532, lies farther west. The best Ferrarese masters of the 16th century of the Ferrara school were Lorenzo Costa (1460–1535), and Dosso Dossi (1479–1542), the most eminent of all, while Benvenuto Tisi (Garofalo, 1481–1559) is somewhat monotonous and insipid.

The origin of Ferrara is uncertain, and probabilities are against the supposition that it occupies the site of the ancient Forum Alieni. It was probably a settlement formed by the inhabitants of the lagoons at the mouth of the Po. It appears first in a document of Aistulf of 753 or 754 as a city forming part of the exarchate of Ravenna. After 984 we find it a fief of Tedaldo, count of Modena and Canossa, nephew of the emperor Otho I. It afterwards made itself independent, and in 1101 was taken by siege by the countess Matilda. At this time it was mainly dominated by several great families, among them the Adelardi. In 1146 Guglielmo, the last of the Adelardi, died, and his property passed, as the dowry of his niece Marchesella, to Azzolino d' Este. There was considerable hostility between the newly entered family and the Salinguerra, but after considerable struggles Azzo Novello was nominated perpetual podestà in 1242; in 1259 he took Ezzelino of Verona prisoner in battle. His grandson, Obizzo II. (1264–1293), succeeded him, and the pope nominated him captain-general and defender of the states of the Church; and the house of Este was from henceforth settled in Ferrara. Niccolò III. (1393–1441) received several popes with great magnificence, especially Eugene IV., who held a council here in 1438. His son Borso received the fiefs of Modena and Reggio from the emperor Frederick III. as first duke in 1452 (in which year Girolamo Savonarola was born here), and in 1470 was made duke of Ferrara by Pope Paul II. Ercole I. (1471–1505) carried on a war with Venice and increased the magnificence of the city. His son Alphonso I. married Lucrezia Borgia, and continued the war with Venice with success. In 1509 he was excommunicated by Julius II., and attacked the pontifical army in 1512 outside Ravenna, which he took. Gaston de Foix fell in the battle, in which he was supporting Alphonso. With the succeeding popes he was able to make peace. He was the patron of Ariosto from 1518 onwards. His son Ercole II. married Renata, daughter of Louis XII. of France; he too embellished Ferrara during his reign (1534–1559). His son Alphonso II. married Barbara, sister of the emperor Maximilian II. He raised the glory of Ferrara to its highest point, and was the patron of Tasso and Guarini, favouring, as the princes of his house had always done, the arts and sciences. He had no legitimate male heir, and in 1597 Ferrara was claimed as a vacant fief by Pope Clement VIII., as was also Comacchio. A fortress was constructed by him on the site of the castle of Tedaldo, at the W. angle of the town. The town remained a part of the states of the Church, the fortress being occupied by an Austrian garrison from 1832 until 1859, when it became part of the kingdom of Italy.

A considerable area within the walls of Ferrara is unoccupied by buildings, especially on the north, where the handsome Renaissance church of S. Cristoforo, with the cemetery, stands; but modern times have brought a renewal of industrial activity. Ferrara is on the main line from Bologna to Padua and Venice, and has branches to Ravenna and Poggio Rusco (for Suzzara).

See G. Agnelli, *Ferrara e Pomposa* (Bergamo, 1902); E. G. Gardner, *Dukes and Poets of Ferrara* (London, 1904).

FERRARA-FLORENCE, COUNCIL OF (1438 ff.). The council of Ferrara and Florence was the culmination of a series of futile medieval attempts to reunite the Greek and Roman churches. The emperor, John VI. Palaeologus, had been advised by his experienced father to avoid all serious negotiations, as they had invariably resulted in increased bitterness; but John, in view of the rapid dismemberment of his empire by the Turks, felt constrained to seek a union. The situation was, however, complicated by the strife which broke out between the pope (Eugenius IV.) and the oecumenical council of Basel. Both sides sent embassies to the emperor at Constantinople, as both saw the importance of gaining the recognition and support of the East, for on this practically depended the victory in the struggle between papacy and council for the supreme jurisdiction over the church (see COUNCILS). The Greeks, fearing the domination of the papacy, were at first more favourably inclined toward the conciliar party; but the astute diplomacy of the Roman representatives, who have been charged by certain Greek writers with the skilful use of money and of lies, won over the emperor.

With a retinue of about 700 persons, entertained in Italy at the pope's expense, he reached Ferrara early in March 1438. Here a council had been formally opened in January by the papal party, a bull of the previous year having promptly taken advantage of the death of the Emperor Sigismund by ordering the removal of the council of Basel to Ferrara; and one of the first acts of the assemblage at Ferrara had been to excommunicate the remnant at Basel. A month after the coming of the Greeks, the Union Synod was solemnly inaugurated on the 9th of April 1438. After six months of negotiation, the first formal session was held on the 8th of October, and on the 14th the real issues were reached. The time-honoured question of the *filioque* was still in the foreground when it seemed for several reasons advisable to transfer the council to Florence: Ferrara was threatened by condottieri, the pest was raging; Florence promised a welcome subvention, and a situation further inland would make it more difficult for uneasy Greek bishops to flee the synod.

The first session at Florence and the seventeenth of the union council took place on the 26th of February 1439; there ensued long debates and negotiations on the *filioque*, in which Markos Eugenikos, archbishop of Ephesus, spoke for the irreconcilables; but the Greeks under the leadership of Bessarion, archbishop of Nicaea, and Isidor, metropolitan of Kiev, at length made a declaration on the *filioque* (4th of June), to which all save Markos Eugenikos subscribed. On the next topic of importance, the primacy of the pope, the project of union nearly suffered shipwreck; but here a vague formula was finally constructed which, while acknowledging the pope's right to govern the church, attempted to safeguard as well the rights of the patriarchs. On the basis of the above-mentioned agreements, as well as of minor discussions as to purgatory and the Eucharist, the decree of union was drawn up in Latin and in Greek, and signed on the 5th of July by the pope and the Greek emperor, and all the members of the synod save Eugenikos and one Greek bishop who had fled; and on the following day it was solemnly published in the cathedral of Florence. The decree explains the *filioque* in a manner acceptable to the Greeks, but does not require them to insert the term in their symbol; it demands that celebrants follow the custom of their own church as to the employment of leavened or unleavened bread in the Eucharist. It states essentially the Roman doctrine of purgatory, and asserts the world-wide primacy of the pope as the " true vicar of Christ and the head of the whole Church, the Father and teacher of all Christians "; but, to satisfy the Greeks, inconsistently adds that all the rights and privileges of the Oriental patriarchs are to be maintained unimpaired. After the consummation of the union the Greeks remained in Florence for several weeks, discussing matters such as the liturgy, the administration of the sacraments, and divorce; and they sailed from Venice to Constantinople in October.

The council, however, desirous of negotiating unions with the minor churches of the East, remained in session for several years, and seems never to have reached a formal adjournment. The decree for the Armenians was published on the 22nd of November 1439; they accepted the *filioque* and the Athanasian creed, rejected Monophysitism and Monothelitism, agreed to the developed scholastic doctrine concerning the seven sacraments, and conformed their calendar to the Western in certain points. On the 26th of April 1441 the pope announced that the synod would be transferred to the Lateran; but before leaving Florence a union was negotiated with the Oriental Christians known as Jacobites, through a monk named Andreas, who, at least as regards Abyssinia, acted in excess of his powers. The *Decretum pro Jacobitis*, published on the 4th of February 1442, is, like that for the Armenians, of high dogmatic interest, as it summarizes the doctrine of the great medieval scholastics on the points in controversy. The decree for the Syrians, published at the Lateran on the 30th of September 1444, and those for the Chaldeans (Nestorians) and the Maronites (Monothelites), published at the last known session of the council on the 7th of August 1445, added nothing of doctrinal importance. Though the direct results of these unions were the restoration of prestige to the absolutist papacy and the bringing of Byzantine men of letters, like Bessarion, to the West, the outcome was on the whole disappointing. Of the complicated history of the " United " churches of the East it suffices to say that Rome succeeded in securing but fragments, though important fragments, of the greater organizations. As for the Greeks, the union met with much opposition, particularly from the monks, and was rejected by three Oriental patriarchs at a synod of Jerusalem in 1443; and after various ineffective attempts to enforce it, the fall of Constantinople in 1453 put an end to the endeavour. As Turkish interests demanded the isolation of the Oriental Christians from their western brethren, and as the orthodox Greek nationalists feared Latinization more than Mahommedan rule, a patriarch hostile to the union was chosen, and a synod of Constantinople in 1472 formally rejected the decisions of Florence.

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FERRARI, GAUDENZIO (1484–1549), Italian painter and sculptor, of the Milanese, or more strictly the Piedmontese, school, was born at Valduggia, Piedmont, and is said (very dubiously) to have learned the elements of painting at Vercelli from Girolamo Giovenone. He next studied in Milan, in the school of Scotto, and some say of Luini; towards 1504 he proceeded to Florence, and afterwards (it used to be alleged) to Rome. His pictorial style may be considered as derived mainly from the old Milanese school, with a considerable tinge of the influence of Da Vinci, and later on of Raphael; in his personal manner there was something of the demonstrative and fantastic. The gentler qualities diminished, and the stronger intensified, as he progressed. By 1524 he was at Varallo in Piedmont, and here, in the chapel of the Sacro Monte, the sanctuary of the Piedmontese pilgrims, he executed his most memorable work. This is a fresco of the Crucifixion, with a multitude of figures, no less than twenty-six of them being modelled in actual relief, and coloured; on the vaulted ceiling are eighteen lamenting angels, powerful in expression. Other leading examples are the following. In the Royal Gallery, Turin, a " Pietà," an able early work. In the Brera Gallery, Milan, " St Katharine miraculously preserved from the Torture of the Wheel," a very characteristic example, hard and forcible in colour, thronged in composition, turbulent in emotion; also several frescoes, chiefly from the church of Santa Maria della Pace, three of them being from the history of Joachim and Anna. In the cathedral of Vercelli, the choir, the " Virgin with Angels and Saints under an Orange Tree." In the refectory of San Paolo, the " Last Supper." In the church of San Cristoforo, the transept (in 1532–1535), a series of paintings in which Ferrari's scholar Lanini assisted him; by Ferrari himself are the " Birth of the Virgin," the " Annunciation," the " Visitation," the " Adoration of the Shepherds and Kings," the " Crucifixion," the " Assumption of the Virgin," all full of life and decided character, though somewhat mannered.

In the Louvre, "St Paul Meditating." In Varallo, convent of the Minorites (1507), a "Presentation in the Temple," and "Christ among the Doctors," and (after 1510) the "History of Christ," in twenty-one subjects; also an ancona in six compartments, named the "Ancona di San Gaudenzio." In Santa Maria di Loreto, near Varallo (after 1527), an "Adoration." In the church of Saronno, near Milan, the cupola (1535), a "Glory of Angels," in which the beauty of the school of Da Vinci alternates with bravura of foreshortenings in the mode of Correggio. In Milan, Santa Maria delle Grazie (1542), the "Scourging of Christ," an "Ecce Homo" and a "Crucifixion." The "Scourging," or else a "Last Supper," in the Passione of Milan (unfinished), is regarded as Ferrari's latest work. He was a very prolific painter, distinguished by strong expression, animation and fulness of composition, and abundant invention; he was skilful in painting horses, and his decisive rather hard colour is marked by a partiality for shot tints in drapery. In general character, his work appertains more to the 15th than the 16th century. His subjects were always of the sacred order. Ferrari's death took place in Milan. Besides Lanini, already mentioned, Andrea Solario, Giambattista della Cerva and Fermo Stella were three of his principal scholars. He is represented to us as a good man, attached to his country and his art, jovial and sometimes facetious, but an enemy of scandal. The reputation which he enjoyed soon after his death was very great, but it has not fully stood the test of time. Lomazzo went so far as to place him seventh among the seven prime painters of Italy.

See G. Bordiga, two works concerning *Gaudenzio Ferrari* (1821 and 1835); G. Colombo, *Vita ed opere di Gaudenzio Ferrari* (1881); Ethel Halsey, *Gaudenzio Ferrari* (in the series *Great Masters*, 1904).

There was another painter nearly contemporary with Gaudenzio, Difendente Ferrari, also of the Lombard school. His celebrity is by no means equal to that of Gaudenzio; but *Kugler* (1887, as edited by Layard) pronounced him to be "a good and original colourist, and the best artist that Piedmont has produced." (W. M. R.)

FERRARI, GIUSEPPE (1812–1876), Italian philosopher, historian and politician, was born at Milan on the 7th of March 1812, and died in Rome on the 2nd of July 1876. He studied law at Pavia, and took the degree of doctor in 1831. A follower of Romagnosi (d. 1835) and Giovan Battista Vico (*q.v.*), his first works were an article in the *Biblioteca Italiana* entitled "Mente di Gian Domenico Romagnosi" (1835), and a complete edition of the works of Vico, prefaced by an appreciation (1835). Finding Italy uncongenial to his ideas, he went to France and, in 1839, produced in Paris his *Vico et l'Italie*, followed by *La Nouvelle Religion de Campanella* and *La Théorie de l'erreur*. On account of these works he was made Docteur-ès-lettres of the Sorbonne and professor of philosophy at Rochefort (1840). His views, however, provoked antagonism, and in 1842 he was appointed to the chair of philosophy at Strassburg. After fresh trouble with the clergy, he returned to Paris and published a defence of his theories in a work entitled *Idées sur la politique de Platon et d'Aristote*. After a short connexion with the college at Bourges, he devoted himself from 1849 to 1858 exclusively to writing. The works of this period are *Les Philosophes Salariés*, *Machiavel juge des révolutions de notre temps* (1849), *La Federazione repubblicana* (1851), *La Filosofia della rivoluzione* (1851), *L' Italia dopo il colpo di Stato* (1852), *Histoire des révolutions, ou Guelfes et Gibelins* (1858; Italian trans., 1871–1873). In 1859 he returned to Italy, where he opposed Cavour, and upheld federalism against the policy of a single Italian monarchy. In spite of this opposition, he held chairs of philosophy at Turin, Milan and Rome in succession, and during several administrations represented the college of Gavirate in the chamber. He was a member of the council of education and was made senator on the 15th of May 1876. Amongst other works may be mentioned *Histoire de la raison d'état, La China et l' Europa, Corso d' istoria degli scrittori politici italiani*. A sceptic in philosophy and a revolutionist in politics, rejoicing in controversy of all kinds, he was admired as a man, as an orator, and as a writer.

See Marro Macchi, *Annuario istorico italiano* (Milan, 1877); Mazzoleni, *Giuseppe Ferrari*; Werner, *Die ital. Philosophie des 19. Jahrh.* vol. 3 (Vienna, 1885); Überweg, *History of Philosophy* (Eng. trans. ii. 461 foll.).

FERRARI, PAOLO (1822–1889), Italian dramatist, was born at Modena. After producing some minor pieces, in 1852 he made his reputation as a playwright with *Goldoni e le sue sedici commedie*. Among numerous later plays his comedy *Parini e la satira* (1857) had considerable success. Ferrari may be regarded as a follower of Goldoni, modelling himself on the French theatrical methods. His collected plays were published in 1877–1880.

FERREIRA, ANTONIO (1528–1569), Portuguese poet, was a native of Lisbon; his father held the post of *escrivão de fazenda* in the house of the duke of Coimbra at Setubal, so that he must there have met the great adventurer Mendes Pinto. In 1547–1548 he went to the university of Coimbra, and on the 16th of July 1551 took his bachelor's degree. The Sonnets forming the First Book in his collected works date from 1552 and contain the history of his early love for an unknown lady. They seem to have been written in Coimbra or during vacations in Lisbon; and if some are dry and stilted, others, like the admirable No. 45, are full of feeling and tears. The Sonnets in the Second Book were inspired by D. Maria Pimentel, whom he afterwards married, and they are marked by that chastity of sentiment, seriousness and ardent patriotism which characterized the man and the writer. Ferreira's ideal, as a poet, was to win "the applause of the good," and, in the preface to his poems, he says, "I am content with this glory, that I have loved my land and my people." He was intimate with princes, nobles and the most distinguished literary men of the time, such as the scholarly Diogo de Teive and the poets Bernardes, Caminha and Corte-Real, as well as with the aged Sá de Miranda, the founder of the classical school of which Ferreira became the foremost representative.

The death in 1554 of Prince John, the heir to the throne, drew from him, as from Camoens, Bernardes and Caminha, a poetical lament, which consisted of an elegy and two eclogues, imitative of Virgil and Horace, and devoid of interest. On the 14th of July 1555 he took his doctor's degree, an event which was celebrated, according to custom, by a sort of Roman triumph, and he stayed on as a professor, finding Coimbra with its picturesque environs congenial to his poetical tastes and love of a country life. The year 1557 produced his sixth elegy, addressed to the son of the great Albuquerque, a poem of noble patriotism expressed in eloquent and sonorous verse, and in the next year he married. After a short and happy married life, his wife died, and the ninth sonnet of Book 2 describes her end in moving words. This loss lent Ferreira's verse an added austerity, and the independence of his muse is remarkable when he addresses King Sebastian and reminds him of his duties as well as his rights. On the 14th of October 1567 he became *Disembargador da Casa do Civel*, and had to leave the quiet of Coimbra for Lisbon. His verses tell how he disliked the change, and how the bustle of the capital, then a great commercial emporium, made him sad and almost tongue-tied for poetry. The intrigues and moral twists of the courtiers and traders, among whom he was forced to live, hurt his fine sense of honour, and he felt his mental isolation the more, because his friends were few and scattered in that great city which the discoveries and conquests of the Portuguese had made the centre of a world empire. In 1569 a terrible epidemic of carbunculous fever broke out and carried off 50,000 inhabitants of Lisbon, and, on the 29th of November, Ferreira, who had stayed there doing his duty when others fled, fell a victim.

Horace was his favourite poet, erudition his muse, and his admiration of the classics made him disdain the popular poetry of the Old School (*Escola Velha*) represented by Gil Vicente. His national feeling would not allow him to write in Latin or Spanish, like most of his contemporaries, but his Portuguese is as Latinized as he could make it, and he even calls his poetical works *Poemas Lusitanos*. Sá de Miranda had philosophized in the familiar *redondilha*, introduced the epistle and founded the comedy of learning. It was the beginning of a revolution, which Ferreira completed by abandoning the hendecasyllable for the Italian decasyllable, and by composing the noble and austere

Roman poetry of his letters, odes and elegies. It was all done of set purpose, for he was a reformer conscious of his mission and resolved to carry it out. The gross realism of the popular poetry, its lack of culture and its carelessness of form, offended his educated taste, and its picturesqueness and ingenuity made no appeal to him. It is not surprising, however, that though he earned the applause of men of letters he failed to touch the hearts of his countrymen. Ferreira wrote the Terentian prose comedy *Bristo*, at the age of twenty-five (1553), and dedicated it to Prince John in the name of the university. It is neither a comedy of character nor manners, but its *vis comica* lies in its plot and situations. The *Cioso*, a later product, may almost be called a comedy of character. *Castro* is Ferreira's most considerable work, and, in date, is the first tragedy in Portuguese, and the second in modern European literature. Though fashioned on the great models of the ancients, it has little plot or action, and the characters, except that of the prince, are ill-designed. It is really a splendid poem, with a chorus which sings the sad fate of Ignez in musical odes, rich in feeling and grandeur of expression. Her love is the chaste, timid affection of a wife and a vassal rather than the strong passion of a mistress, but Pedro is really the man history describes, the love-fettered prince whom the tragedy of Ignez's death converted into the cruel tyrant. King Alfonso is little more than a shadow, and only meets Ignez once, his son never; while, stranger still, Pedro and Ignez never come on the stage together, and their love is merely narrated. Nevertheless, Ferreira merits all praise for choosing one of the most dramatic episodes in Portuguese history for his subject, and though it has since been handled by poets of renown in many differenc languages, none has been able to surpass the old master.

The *Castro* was first printed in Lisbon in 1587, and it is included in Ferreira's *Poemas*, published in 1598 by his son. It has been translated by Musgrave (London, 1825), and the chorus of Act I. appeared again in English in the *Savoy* for July 1896. It has also been done into French and German. The *Bristo* and *Cioso* first appeared with the comedies of Sá de Miranda in Lisbon in 1622. There is a good modern edition of the Complete Works of Ferreira (2 vols., Paris, 1865). See Castilho's *Antonio Ferreira* (3 vols., Rio, 1865), which contains a full biographical and critical study with extracts. (E. Pr.)

FERREL'S LAW, in physical geography. "If a body moves in any direction on the earth's surface, there is a deflecting force arising from the earth's rotation, which deflects it to the right in the northern hemisphere and to the left in the southern hemisphere." This law applies to every body that is set in motion upon the surface of the rotating earth, but usually the duration of the motion of any body due to a single impulse is so brief, and there are so many frictional disturbances, that it is not easy to observe the results of this deflecting force. The movements of the atmosphere, however, are upon a scale large enough to make this observation easy, and the simplest evidence is obtained from a study of the direction of the air movements in the great wind systems of the globe. (See METEOROLOGY.)

FERRERS, the name of a great Norman-English feudal house, derived from Ferrières-St-Hilaire, to the south of Bernay, in Normandy. Its ancestor Walkelin was slain in a feud during the Conqueror's minority, leaving a son Henry, who took part in the Conquest. At the time of the Domesday survey his fief extended into fourteen counties, but the great bulk of it was in Derbyshire and Leicestershire, especially the former. He himself occurs in Worcestershire as one of the royal commissioners for the survey. He established his chief seat at Tutbury Castle, Staffordshire, on the Derbyshire border, and founded there a Cluniac priory. As was the usual practice with the great Norman houses, his eldest son succeeded to Ferrières, and, according to Stapleton, he was ancestor of the Oakham house of Ferrers, whose memory is preserved by the horseshoes hanging in the hall of their castle. Robert, a younger son of Henry, inherited his vast English fief, and, for his services at the battle of the Standard (1138), was created earl of Derby by Stephen. He appears to have died a year after.

Both the title and the arms of the earls have been the subject of much discussion, and they seem to have been styled indifferently earls of Derby or Nottingham (both counties then forming one shrievalty) or of Tutbury, or simply (de) Ferrers. Robert, the 2nd earl, who founded Merevale Abbey, was father of William, the 3rd earl, who began the opposition of his house to the crown by joining in the great revolt of 1173, when he fortified his castles of Tutbury and Duffield and plundered Nottingham, which was held for the king. On his subsequent submission his castles were razed. Dying at the siege of Acre, 1190, he was succeeded by his son William, who attacked Nottingham on Richard's behalf in 1194, but whom King John favoured and confirmed in the earldom of Derby, 1199. A claim that he was heir to the honour of Peveral of Nottingham, which has puzzled genealogists, was compromised with the king, whom the earl thenceforth stoutly supported, being with him at his death and witnessing his will, with his brother-in-law the earl of Chester, and with William Marshal, earl of Pembroke, whose daughter married his son. With them also he acted in securing the succession of the young Henry, joining in the siege of Mountsorrel and the battle of Lincoln. But he was one of those great nobles who looked with jealousy on the rising power of the king's favourites. In 1227 he was one of the earls who rose against him on behalf of his brother Richard and made him restore the forest charters, and in 1237 he was one of the three counsellors forced on the king by the barons. His influence had by this time been further increased by the death, in 1232, of the earl of Chester, whose sister, his wife, inherited a vast estate between the Ribble and the Mersey. On his death in 1247, his son William succeeded as 5th earl, and inherited through his wife her share of the great possessions of the Marshals, earls of Pembroke. By his second wife, a daughter of the earl of Winchester, he was father of Robert, 6th and last earl. Succeeding as a minor in 1254, Robert had been secured by the king, as early as 1249, as a husband for his wife's niece, Marie, daughter of Hugh, count of Angoulême, but, in spite of this, he joined the opposition in 1263 and distinguished himself by his violence. He was one of the five earls summoned to Simon de Montfort's parliament, though, on taking the earl of Gloucester's part, he was arrested by Simon. In spite of this he was compelled on the king's triumph to forfeit his castles and seven years' revenues. In 1266 he broke out again in revolt on his own estates in Derbyshire, but was utterly defeated at Chesterfield by Henry "of Almain," deprived of his earldom and lands and imprisoned. Eventually, in 1269, he agreed to pay £50,000 for restoration, and to pledge all his lands save Chartley and Holbrook for its payment. As he was not able to find the money, the lands passed to the king's son, Edmund, to whom they had been granted on his forfeiture.

The earl's son John succeeded to Chartley, a Staffordshire estate long famous for the wild cattle in its chase, and was summoned as a baron in 1299, though he had joined the baronial opposition in 1297. On the death, in 1450, of the last Ferrers lord of Chartley, the barony passed with his daughter to the Devereux family and then to the Shirleys, one of whom was created Earl Ferrers in 1711. The barony has been in abeyance since 1855.

The line of Ferrers of Groby was founded by William, younger brother of the last earl, who inherited from his mother Margaret de Quinci her estate of Groby in Leicestershire, and some Ferrers manors from his father. His son was summoned as a baron in 1300, but on the death of his descendant, William, Lord Ferrers of Groby, in 1445, the barony passed with his granddaughter to the Grey family and was forfeited with the dukedom of Suffolk in 1554. A younger son of William, the last lord, married the heiress of Tamworth Castle, and his line was seated at Tamworth till 1680, when an heiress carried it to a son of the first Earl Ferrers. From Sir Henry, a younger son of the first Ferrers of Tamworth, descended Ferrers of Baddesley Clinton, seated there in the male line till towards the end of the 19th century. The line of Ferrers of Wemme was founded by a younger son of Lord Ferrers of Chartley, who married the heiress of Wemme, Co. Salop, and was summoned as a baron in her right; but it ended with their son. There are doubtless male descendants of this great Norman house still in existence.

Higham Ferrers, Northants, and Woodham Ferrers, Essex, take their names from this family. It has been alleged that they bore horseshoes for their arms in allusion to Ferrières (*i.e.* ironworks); but when and why they were added to their coat is a moot point.

See Dugdale's *Baronage*; J. R. Planché's *The Conqueror and his Companions*; G. E. C(okayne)'s *Complete Peerage*; *Chronicles and Memorials* (Rolls Series); T. Stapleton's *Rotuli Scaccarii Normannie*. (J. H. R.)

FERRERS, LAURENCE SHIRLEY, 4TH EARL (1720–1760), the last nobleman in England to suffer a felon's death, was born on the 18th of August 1720. There was insanity in his family, and from an early age his behaviour seems to have been eccentric, and his temper violent, though he was quite capable of managing his business affairs. In 1758 his wife obtained a separation from him for cruelty. The Ferrers estates were then vested in trustees, the Earl Ferrers secured the appointment of an old family steward, Johnson, as receiver of rents. This man faithfully performed his duty as a servant to the trustees, and did not prove amenable to Ferrer's personal wishes. On the 18th of January 1760, Johnson called at the earl's mansion at Staunton Harold, Leicestershire, by appointment, and was directed to his lordship's study. Here, after some business conversation, Lord Ferrers shot him. In the following April Ferrers was tried for murder by his peers in Westminster Hall. His defence, which he conducted in person with great ability, was a plea of insanity, and it was supported by considerable evidence, but he was found guilty. He subsequently said that he had only pleaded insanity to oblige his family, and that he had himself always been ashamed of such a defence. On the 5th of May 1760, dressed in a light-coloured suit, embroidered with silver, he was taken in his own carriage from the Tower of London to Tyburn and there hanged. It has been said that as a concession to his order the rope used was of silk.

See Peter Burke, *Celebrated Trials connected with the Aristocracy in the Relations of Private Life* (London, 1849); Edward Walford, *Tales of our Great Families* (London, 1877); *Howell's State Trials* (1816), xix. 885-980.

FERRET, a domesticated, and frequently albino breed of quadruped, derived from the wild polecat (*Putorius foetidus*, or *P. putorius*), which it closely resembles in size, form, and habits, and with which it interbreeds. It differs in the colour of its fur, which is usually yellowish-white, and of its eyes, which are pinky-red. The "polecat-ferret" is a brown breed, apparently the product of the above-mentioned cross. The ferret attains a length of about 14 in., exclusive of the tail, which measures 5 in. Although exhibiting considerable tameness, it seems incapable of attachment, and when not properly fed, or when irritated, is apt to give painful evidence of its ferocity. It is chiefly employed in destroying rats and other vermin, and in driving rabbits from their burrows. The ferret is remarkably prolific, the female bringing forth two broods annually, each numbering from six to nine young. It is said to occasionally devour its young immediately after birth, and in this case produces another brood soon after. The ferret was well known to the Romans, Strabo stating that it was brought from Africa into Spain, and Pliny that it was employed in his time in rabbit-hunting, under the name *Viverra*; the English name is not derived from this, but from Fr. *furet*, Late Lat. *furo*, robber. The date of its introduction into Great Britain is uncertain, but it has been known in England for at least 600 years.

The ferret should be kept in dry, clean, well-ventilated hutches, and fed twice daily on bread, milk, and meat, such as rabbits' and fowls' livers. When used to hunt rabbits it is provided with a muzzle, or, better and more usual, a cope, made by looping and knotting twine about the head and snout, in order to prevent it killing its quarry, in which case it would gorge itself and go to sleep in the hole. As the ferret enters the hole the rabbits flee before it, and are shot or caught by dogs as they break ground. A ferret's hold on its quarry is as obstinate as that of a bulldog, but can easily be broken by a strong pressure of the thumb just above the eyes. Only full-grown ferrets are "worked to" rats. Several are generally used at a time and without copes, as rats are fierce fighters.

See *Ferrets*, by Nicholas Everitt (London, 1897).

FERRI, CIRO (1634–1689), Roman painter, the chief disciple and successor of Pietro da Cortona. He was born in the Roman territory, studied under Pietro, to whom he became warmly attached, and, at an age a little past thirty, completed the painting of the ceilings and other internal decorations begun by his instructor in the Pitti palace, Florence. He also co-operated in or finished several other works by Pietro, both in Florence and in Rome, approaching near to his style and his particular merits, but with less grace of design and native vigour, and in especial falling short of him in colour. Of his own independent productions, the chief is an extensive series of scriptural frescoes in the church of S. Maria Maggiore in Bergamo; also a painting (rated as Ferri's best work) of St Ambrose healing a sick person, the principal altarpiece in the church of S. Ambrogio della Massima in Rome. The paintings of the cupola of S. Agnese in the same capital might rank even higher than these; but this labour remained uncompleted at the death of Ferri, and was marred by the performances of his successor Corbellini. He executed also a large amount of miscellaneous designs, such as etchings and frontispieces for books; and he was an architect besides. Ferri was appointed to direct the Florentine students in Rome, and Gabbiani was one of his leading pupils. As regards style, Ferri ranks as chief of the so-called Machinists, as opposed to the school founded by Sacchi, and continued by Carlo Maratta. He died in Rome—his end being hastened, as it is said, by mortification at his recognized inferiority to Bacciccia in colour.

FERRI, LUIGI (1826–1895), Italian philosopher, was born at Bologna on the 15th of June 1826. His education was obtained mainly at the École Normale in Paris, where his father, a painter and architect, was engaged in the construction of the Théâtre Italien. From his twenty-fifth year he began to lecture in the colleges of Evreux, Dieppe, Blois and Toulouse. Later, he was lecturer at Annecy and Casal-Montferrat, and became head of the education department under Mamiani in 1860. Three years later he was appointed to the chair of philosophy at the Istituto di Perfezionamento at Florence, and, in 1871, was made professor of philosophy in the university of Rome. On the death of Mamiani in 1885 he became editor of the *Filosofia delle scuole italiane*, the title of which he changed to *Rivista italiana di filosofia*. He wrote both on psychology and on metaphysics, but is known especially as a historian of philosophy. His original work is eclectic, combining the psychology of his teachers, Jules Simon, Saisset and Mamiani, with the idealism of Rosmini and Gioberti. Among his works may be mentioned *Studii sulla coscienza*; *Il Fenomeno nelle sue relazioni con la sensazione*; *Della idea del vero*; *Della filosofia del diritto presso Aristotile* (1885); *Il Genio di Aristotile*; *La Psicologia di Pietro Pomponazzi* (1877), and, most important, *Essai sur l'histoire de la philosophie en Italie au XIXe siècle* (Paris, 1869), and *La Psychologie de l'association depuis Hobbes jusqu'à nos jours.*

FERRIER, ARNAUD DU (*c.* 1508–1585), French jurisconsult and diplomatist, was born at Toulouse about 1508, and practised as a lawyer first at Bourges, afterwards at Toulouse. Councillor to the *parlement* of the latter town, and then to that of Rennes, he later became president of the *parlement* of Paris. He represented Charles IX., king of France, at the council of Trent in 1562, but had to retire in consequence of the attitude he had adopted, and was sent as ambassador to Venice, where he remained till 1567, returning again in 1570. On his return to France he came into touch with the Calvinists whose tenets he probably embraced, and consequently lost his place in the privy council and part of his fortune. As compensation, Henry, king of Navarre, appointed him his chancellor. He died in the end of October 1585.

See also E. Frémy, *Un Ambassadeur libéral sous Charles IX et Henri III, Arnaud du Ferrier* (Paris, 1880).

FERRIER, JAMES FREDERICK (1808–1864), Scottish metaphysical writer, was born in Edinburgh on the 16th of

June 1808, the son of John Ferrier, writer to the signet. His mother was a sister of John Wilson (Christopher North). He was educated at the university of Edinburgh and Magdalen College, Oxford, and subsequently, his metaphysical tastes having been fostered by his intimate friend, Sir William Hamilton, spent some time at Heidelberg studying German philosophy. In 1842 he was appointed professor of civil history in Edinburgh University, and in 1845 professor of moral philosophy and political economy at St Andrews. He was twice an unsuccessful candidate for chairs in Edinburgh, for that of moral philosophy on Wilson's resignation in 1852, and for that of logic and metaphysics in 1856, after Hamilton's death. He remained at St Andrews till his death on the 11th of June 1864. He married his cousin, Margaret Anne, daughter of John Wilson. He had five children, one of whom became the wife of Sir Alexander Grant.

Ferrier's first contribution to metaphysics was a series of articles in *Blackwood's Magazine* (1838–1839), entitled *An Introduction to the Philosophy of Consciousness.* In these he condemns previous philosophers for ignoring in their psychological investigations the fact of consciousness, which is the distinctive feature of man, and confining their observation to the so-called "states of the mind." Consciousness comes into manifestation only when the man has used the word "I" with full knowledge of what it means. This notion he must originate within himself. Consciousness cannot spring from the states which are its object, for it is in antagonism to them. It originates in the will, which in the act of consciousness puts the "I" in the place of our sensations. Morality, conscience, and responsibility are necessary results of consciousness. These articles were succeeded by a number of others, of which the most important were *The Crisis of Modern Speculation* (1841), *Berkeley and Idealism* (1842), and an important examination of Hamilton's edition of Reid (1847), which contains a vigorous attack on the philosophy of common sense. The perception of matter is pronounced to be the *ne plus ultra* of thought, and Reid, for presuming to analyse it, is declared to be a representationist in fact, although he professed to be an intuitionist. A distinction is made between the "perception of matter" and "our apprehension of the perception of matter." Psychology vainly tries to analyse the former. Metaphysic shows the latter alone to be analysable, and separates the subjective element, "our apprehension," from the objective element, "the perception of matter,"—not matter *per se*, but the perception of matter is the existence independent of the individual's thought. It cannot, however, be independent of thought. It must belong to some mind, and is therefore the property of the Divine Mind. There, he thinks, is an indestructible foundation for the *a priori* argument for the existence of God.

Ferrier's matured philosophical doctrines find expression in the *Institutes of Metaphysics* (1854), in which he claims to have met the twofold obligation resting on every system of philosophy, that it should be reasoned and true. His method is that of Spinoza, strict demonstration, or at least an attempt at it. All the errors of natural thinking and psychology must fall under one or other of three topics:—Knowing and the Known, Ignorance, and Being. These are all-comprehensive, and are therefore the departments into which philosophy is divided, for the sole end of philosophy is to correct the inadvertencies of ordinary thinking.

The problems of knowing and the known are treated in the "Epistemology or Theory of Knowing." The truth that "along with whatever any intelligence knows it must, as the ground or condition of its knowledge, have some cognizance of itself," is the basis of the whole philosophical system. Object+subject, thing+me, is the only possible knowable. This leads to the conclusion that the only independent universe which any mind can think of is the universe in synthesis with some *other* mind or *ego*.

The leading contradiction which is corrected in the "Agnoiology or Theory of Ignorance" is this: that there can be an ignorance of that of which there can be no knowledge. Ignorance is a defect. But there is no defect in not knowing what cannot be known by any intelligence (*e.g.* that two and two make five), and therefore there can be an ignorance only of that of which there can be a knowledge, *i.e.* of some-object-*plus*-some-subject. The knowable alone is the ignorable. Ferrier lays special claim to originality for this division of the *Institutes.*

The "Ontology or Theory of Being" forms the third and final division. It contains a discussion of the origin of knowledge, in which Ferrier traces all the perplexities and errors of philosophers to the assumption of the absolute existence of matter. The conclusion arrived at is that the only true real and independent existences are minds-together-with-that-which-they-apprehend, and that the one strictly necessary absolute existence is a supreme and infinite and everlasting mind in synthesis with all things.

Ferrier's works are remarkable for an unusual charm and simplicity of style. These qualities are especially noticeable in the *Lectures on Greek Philosophy*, one of the best introductions on the subject in the English language. A complete edition of his philosophical writings was published in 1875, with a memoir by E. L. Lushington; see also monograph by E. S. Haldane in the Famous Scots Series.

FERRIER, PAUL (1843–), French dramatist, was born at Montpellier on the 29th of March 1843. He had already produced several comedies when in 1873 he secured real success with two short pieces, *Chez l'avocat* and *Les Incendies de Massoulard.* Others of his numerous plays are *Les Compensations* (1876); *L'Art de tromper les femmes* (1890), with M. Najac. One of Ferrier's greatest triumphs was the production with Fabrice Carré of *Joséphine vendue par ses sœurs* (1886), an *opéra bouffe* with music by Victor Roger. His opera libretti include *La Marocaine* (1879), music of J. Offenbach; *Le Chevalier d'Harmental* (1896) after the play of Dumas père, for the music of A. Messager; *La Fille de Tabarin* (1901), with Victorien Sardou, music of Gabriel Pierné.

FERRIER, SUSAN EDMONSTONE (1782–1854), Scottish novelist, born in Edinburgh on the 7th of September 1782, was the daughter of James Ferrier, for some years factor to the duke of Argyll, and at one time one of the clerks of the court of session with Sir Walter Scott. Her mother was a Miss Coutts, the beautiful daughter of a Forfarshire farmer. James Frederick Ferrier, noticed above, was Susan Ferrier's nephew.

Miss Ferrier's first novel, *Marriage*, was begun in concert with a friend, Miss Clavering, a niece of the duke of Argyll; but this lady only wrote a few pages, and *Marriage*, completed by Miss Ferrier as early as 1810, appeared in 1818. It was followed in 1824 by *The Inheritance*, a better constructed and more mature work; and the last and perhaps best of her novels, *Destiny*, dedicated to Sir Walter Scott (who himself undertook to strike the bargain with the publisher Cadell), appeared in 1831. All these novels were published anonymously; but, with their clever portraiture of contemporary Scottish life and manners, and even recognizable caricatures of some social celebrities of the day, they could not fail to become popular north of the Tweed. "Lady MacLaughlan" represents Mrs Seymour Damer in dress and Lady Frederick Campbell, whose husband, Lord Ferrier, was executed in 1760, in manners. Mary, Lady Clark, well known in Edinburgh, figured as "Mrs Fox" and the three maiden aunts were the Misses Edmonstone. Many were the conjectures as to the authorship of the novels. In the *Noctes Ambrosianae* (November 1826), James Hogg is made to mention *The Inheritance*, and adds, "which I aye thought was written by Sir Walter, as weel's *Marriage*, till it spunked out that it was written by a leddy." Scott himself gave Miss Ferrier a very high place indeed among the novelists of the day. In his diary (March 27, 1826), criticizing a new work which he had been reading, he says, "The women do this better. Edgeworth, Ferrier, Austen, have all given portraits of real society far superior to anything man, vain man, has produced of the like nature." Another friendly recognition of Miss Ferrier is to be found at the conclusion of his *Tales of my Landlord*, where Scott calls her his "sister shadow," the still anonymous author of "the very lively work entitled *Marriage*." Lively, indeed, all Miss Ferrier's works are,—written in clear, brisk English, and with an inexhaustible fund of humour. It is true her books portray the eccentricities, the follies, and foibles of the society in which she lived, caricaturing with terrible exactness its hypocrisy, boastfulness, greed, affectation, and undue subservience to public opinion. Yet Miss Ferrier wrote less to reform than to amuse. In this she is less like Miss Edgeworth than Miss Austen. Miss Edgeworth was more of a moralist; her wit is not so involuntary, her caricatures not always so good-natured. But Miss Austen and Miss Ferrier were genuine humorists, and with Miss Ferrier especially a keen sense of the ludicrous was always dominant. Her humorous characters are always her best. It was no doubt because she felt this that in the last year of her life she regretted not having devoted her talents more exclusively to the service of religion. But if she was not a moralist, neither was she a cynic; and her wit, even where it is most caustic, is never uncharitable.

Miss Ferrier's mother died in 1797, and from that date she kept house for her father until his death in 1829. She lived quietly at Morningside House and in Edinburgh for more than twenty years after the publication of her last work. The pleasantest picture that we have of her is in Lockhart's description of her visit to Scott in May 1831. She was asked there to help to amuse the dying master of Abbotsford, who, when he was not writing *Count Robert of Paris*, would talk as brilliantly as ever. Only sometimes, before he had reached the point in a narrative, "it would seem as if some internal spring had given way." He would pause, and gaze blankly and anxiously round him. "I noticed," says Lockhart, "the delicacy of Miss Ferrier on such occasions. Her sight was bad, and she took care not to use her glasses when he was speaking; and she affected to be also troubled with deafness, and would say, 'Well, I am getting as dull as a post; I have not heard a word since you said so-and-so,'—being sure to mention a circumstance behind that at which he had really halted. He then took up the thread with his habitual smile of courtesy—as if forgetting his case entirely in the consideration of the lady's infirmity."

Miss Ferrier died on the 5th of November 1854, at her brother's house in Edinburgh. She left among her papers a short unpublished article, entitled "Recollections of Visits to Ashestiel and Abbotsford." This is her own very interesting account of her long friendship with Sir Walter Scott, from the date of her first visit to him and Lady Scott at Ashestiel, where she went with her father in the autumn of 1811, to her last sad visit to Abbotsford in 1831. It contains some impromptu verses written by Scott in her album at Ashestiel.

Miss Ferrier's letters to her sister, which contained much interesting biographical matter, were destroyed at her particular request, but a volume of her correspondence with a memoir by her grand-nephew, John Ferrier, was published in 1898.

FERROL [*El Ferrol*], a seaport of north-western Spain, in the province of Corunna; situated 12 m. N.E. of the city of Corunna, and on the Bay of Ferrol, an inlet of the Atlantic Ocean. Pop. (1900) 25,281. Together with San Fernando, near Cadiz, and Cartagena, Ferrol is governed by an admiral, with the special title of captain-general; and it ranks beside these two ports as one of the principal naval stations of Spain. The town is beautifully situated on a headland overlooking the bay, and is surrounded by rocky hills which render it invisible from the sea. Its harbour, naturally one of the best in Europe, and the largest in Spain except those of Vigo and Corunna, is deep, capacious and secure; but the entrance is a narrow strait about 2 m. long, which admits only one vessel at a time, and is commanded by modern and powerfully armed forts, while the neighbouring heights are also crowned by defensive works. Ferrol is provided with extensive dockyards, quays, warehouses and an arsenal; most of these, with the palace of the captain-general, the bull-ring, theatres, and other principal buildings, were built or modernized between 1875 and 1905. The local industries are mainly connected with the shipping trade, or the refitting of warships. Owing to the lack of railway communication, and the competition of Corunna at so short a distance, Ferrol is not a first-class commercial port; and in the early years of the 20th century its trade, already injured by the loss to Spain of Cuba and Porto Rico in 1898, showed little prospect of improvement. The exports are insignificant, and consist chiefly of wooden staves and beams for use as pit-props; the chief imports are coal, cement, timber, iron and machinery. In 1904, 282 vessels of 155,881 tons entered the harbour. In the same year the construction of a railway to the neighbouring town of Betanzos was undertaken, and in 1909 important shipbuilding operations were begun.

Ferrol was a mere fishing village until 1752, when Ferdinand VI. began to fit it for becoming an arsenal. In 1799 the British made a fruitless attempt to capture it, but on the 4th of November 1805 they defeated the French fleet in front of the town, which they compelled to surrender. On the 27th of January 1809 it was through treachery delivered over to the French, but it was vacated by them on the 22nd of July. On the 15th of July 1823 another blockade was begun by the French, and Ferrol surrendered to them on the 27th of August.

FERRUCCIO, or FERRUCCI, **FRANCESCO** (1489–1530), Florentine captain. After spending a few years as a merchant's clerk he took to soldiering at an early age, and served in the *Bande Nere* in various parts of Italy, earning a reputation as a daring fighter and somewhat of a swashbuckler. When Pope Clement VII. and the emperor Charles V. decided to reinstate the Medici in Florence, they made war on the Florentine republic, and Ferruccio was appointed Florentine military commissioner at Empoli, where he showed great daring and resource by his rapid marches and sudden attacks on the Imperialists. Early in 1530 Volterra had thrown off Florentine allegiance and had been occupied by an Imperialist garrison, but Ferruccio surprised and recaptured the city. During his absence, however, the Imperialists captured Empoli by treachery, thus cutting off one of the chief avenues of approach to Florence. Ferruccio proposed to the government of the republic that he should march on Rome and terrorize the pope by the threat of a sack into making peace with Florence on favourable terms, but although the war committee appointed him commissioner-general for the operations outside the city, they rejected his scheme as too audacious. Ferruccio then decided to attempt a diversion by attacking the Imperialists in the rear and started from Volterra for the Apennines. But at Pisa he was laid up for a month with a fever—a misfortune which enabled the enemy to get wind of his plan and to prepare for his attack. At the end of July Ferruccio left Pisa at the head of about 4000 men, and although the besieged in Florence, knowing that a large part of the Imperialists under the prince of Orange had gone to meet Ferruccio, wished to co-operate with the latter by means of a sortie, they were prevented from doing so by their own traitorous commander-in-chief, Malatesta Baglioni. Ferruccio encountered a much larger force of the enemy on the 3rd of August at Gavinana; a desperate battle ensued, and at first the Imperialists were driven back by Ferruccio's fierce onslaught and the prince of Orange himself was killed, but reinforcements under Fabrizio Maramaldo having arrived, the Florentines were almost annihilated and Ferruccio was wounded and captured. Maramaldo out of personal spite despatched the wounded man with his own hand. This defeat sealed the fate of the republic, and nine days later Florence surrendered. Ferruccio was one of the great soldiers of the age, and his enterprise is the finest episode of the last days of the Florentine republic. See also under FLORENCE and MEDICI.

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FERRULE, a small metal cap or ring used for holding parts of a rod, &c., together, and for giving strength to weakened materials, or especially, when attached to the end of a stick, umbrella, &c., for preventing wearing or splitting. The word is properly *verrel* or *verril*, in which form it was used till the 18th century, and is derived through the O. Fr. *virelle*, modern *virole*, from a Latin diminutive *viriola* of *viriae*, bracelets. The form in which the word is now known is due to the influence of Latin *ferrum*, iron. "Ferrule" must be distinguished from "ferule" or "ferula," properly the Latin name of the "giant fennel." From the use of the stalk of this plant as a cane or rod for punishment, comes the application of the word to many instruments used in chastisement, more particularly a short flat piece of wood or leather shaped somewhat like the sole of a boot, and applied to the palms of the hand. It is the common form of disciplinary instrument in Roman Catholic schools; the pain inflicted is exceedingly sharp and immediate, but the effects are momentary and leave no chance for any dangerous results. The word is sometimes applied to the ordinary cane as used by schoolmasters.

FERRY, JULES FRANÇOIS CAMILLE (1832–1893), French statesman, was born at Saint Dié (Vosges) on the 5th of April 1832. He studied law, and was called to the bar at Paris, but soon went into politics, contributing to various newspapers, particularly to the *Temps*. He attacked the Empire with great violence, directing his opposition especially against Baron Haussmann, prefect of the Seine. Elected republican deputy for Paris in 1869, he protested against the declaration of war with Germany, and on the 6th of September 1870 was appointed prefect of the Seine by the government of national defence. In this position he had the difficult task of administering Paris during the siege, and after the Commune was obliged to resign (5th of June 1871). From 1872–1873 he was sent by Thiers as minister to Athens, but returned to the chamber as deputy for the Vosges, and became one of the leaders of the republican party. When the first republican ministry was formed under W. H. Waddington on the 4th of February 1879, he was one of its members, and continued in the ministry until the 30th of March 1885, except for two short interruptions (from the 10th of November 1881 to the 30th of January 1882, and from the 29th of July 1882 to the 21st of February 1883), first as minister of education and then as minister of foreign affairs. He was twice premier (1880–1881 and 1883–1885). Two important works are associated with his administration, the non-clerical organization of public education, and the beginning of the colonial expansion of France. Following the republican programme he proposed to destroy the influence of the clergy in the university. He reorganized the committee of public education (law of the 27th of February 1880), and proposed a regulation for the conferring of university degrees, which, though rejected, aroused violent polemics because the 7th article took away from the unauthorized religious orders the right to teach. He finally succeeded in passing the great law of the 28th of March 1882, which made primary education in France free, non-clerical and obligatory. In higher education the number of professors doubled under his ministry. After the military defeat of France by Germany in 1870, he formed the idea of acquiring a great colonial empire, not to colonize it, but for the sake of economic exploitation. He directed the negotiations which led to the establishment of a French protectorate in Tunis (1881), prepared the treaty of the 17th of December 1885 for the occupation of Madagascar; directed the exploration of the Congo and of the Niger region; and above all he organized the conquest of Indo-China. The excitement caused at Paris by an unimportant reverse of the French troops at Lang-son caused his downfall (30th of March 1885), but the treaty of peace with China (9th of June 1885) was his work. He still remained an influential member of the moderate republican party, and directed the opposition to General Boulanger. After the resignation of President Grévy (2nd of December 1887), he was a candidate for the presidency of the republic, but the radicals refused to support him, and he withdrew in favour of Sadi Carnot. The violent polemics aroused against him at this time caused a madman to attack him with a revolver, and he died from the wound, on the 17th of March 1893. The chamber of deputies voted him a state funeral.

See Edg. Zevort, *Histoire de la troisième République*; A. Rambaud, *Jules Ferry* (Paris, 1903).

FERRY (from the same root as that of the verb "to fare," to journey or travel, common to Teutonic languages, cf. Ger. *fahren*; it is connected with the root of Gr. *πόρος*, way, and Lat. *portare*, to carry), a place where boats ply regularly across a river or arm of the sea for the conveyance of goods and persons. The word is also applied to the boats employed (ferry boats). In a car-ferry or train-ferry railway cars or complete trains are conveyed across a piece of water in vessels which have railway lines laid on their decks, so that the vehicles run on and off them on their own wheels. In law the right of ferrying persons or goods across a particular river or strait, and of exacting a reasonable toll for the service, belongs, like the right of fair and market, to the class of rights known as franchises. Its origin must be by statute, royal grant, or prescription. It is wholly unconnected with the ownership or occupation of land, so that the owner of the ferry need not be proprietor of the soil on either side of the water over which the right is exercised. He is bound to maintain safe and suitable boats ready for the use of the public, and to employ fit persons as ferrymen. As a correlative of this duty he has a right of action, not only against those who evade or refuse payment of toll when it is due, but also against those who disturb his franchise by setting up a new ferry, so as to diminish his custom, unless a change of circumstances, such as an increase of population near the ferry, justify other means of passage, whether of the same kind or not. See also Water Rights.

FERSEN, FREDRIK AXEL, Count von (1719–1794), Swedish politician, was a son of Lieutenant-General Hans Reinhold Fersen and entered the Swedish Life Guards in 1740, and from 1743 to 1748 was in the French service (*Royal-Suédois*), where he rose to the rank of brigadier. In the Seven Years' War Fersen distinguished himself during the operations round Usedom and Wollin (1759), when he inflicted serious loss on the Prussians. But it is as a politician that he is best known. At the diet of 1755–1756 he was elected *landtmarskalk*, or marshal of the diet, and from henceforth, till the revolution of 1772, led the Hat party (see Sweden: *History*). In 1756 he defeated the projects of the court for increasing the royal power; but, after the disasters of the Seven Years' War, gravitated towards the court again and contributed, by his energy and eloquence, to uphold the tottering Hats for several years. On the accession of the Caps to power in 1766, Fersen assisted the court in its struggle with them by refusing to employ the Guards to keep order in the capital when King Adolphus Frederick, driven to desperation by the demands of the Caps, publicly abdicated, and a seven days' interregnum ensued. At the ensuing diet of 1769, when the Hats returned to power, Fersen was again elected marshal of the diet; but he made no attempt to redeem his pledges to the crown prince Gustavus, as to a very necessary reform of the constitution, which he had made before the elections, and thus involuntarily contributed to the subsequent establishment of absolutism. When Gustavus III. ascended the throne in 1772, and attempted to reconcile the two factions by a composition which aimed at dividing all political power between them, Fersen said he despaired of bringing back, in a moment, to the path of virtue and patriotism a people who had been running riot for more than half a century in the wilderness of political licence and corruption. Nevertheless he consented to open negotiations with the Caps, and was the principal Hat representative on the abortive composition committee. During the revolution of August 1772, Fersen remained a passive spectator of the overthrow of the constitution, and was one of the first whom Gustavus summoned to his side after his triumph. Yet his relations with the king were never cordial. The old party-leader could never forget that he had once been a power in the state, and it is evident, from his *Historiska Skrifter*, how jealous he was of Gustavus's personal qualities. There was a slight collision between them as early as the diet of 1778; but at the diet of 1786 Fersen boldly led the opposition against the king's financial measures (see Gustavus III.) which were consequently rejected; while in private interviews, if his own account of them is to be trusted, he addressed his sovereign with outrageous insolence. At the diet of 1789 Fersen marshalled the nobility around him for a combat *à outrance* against the throne and that, too, at a time when Sweden was involved in two dangerous foreign wars, and national unity was absolutely indispensable. This tactical blunder cost him his popularity and materially assisted the secret operations of the king. Obstruction was Fersen's chief weapon, and he continued to postpone the granting of subsidies by the house of nobles for some weeks. But after frequent stormy scenes in the diet, which were only prevented from becoming mêlées by Fersen's moderation, or hesitation, at the critical moment, he and twenty of his friends of the nobility were arrested (17th February 1789) and the opposition collapsed. Fersen was speedily released, but henceforth kept aloof from politics, surviving the king two years. He was a man of great natural talent, with an imposing presence, and he always bore himself like the aristocrat he was. But his haughtiness and love of power are undeniable, and he was perhaps too great a party-leader to be a great statesman. Yet for seventeen years, with very brief intervals, he controlled the destinies of Sweden, and his influence in France was for some time pretty considerable. His *Historiska Skrifter*, which are a record of Swedish history, mainly autobiographical, during the greater part of the 18th century, is excellent as literature, but somewhat unreliable as an historical document, especially in the later parts.

See C. G. Malmström, *Sveriges politiska Historia* (Stockholm, 1855–1865); R. N. Bain, *Gustavus III.* (London, 1895); C. T. Odhner, *Sveriges politiska Historia under Gustaf III.'s Regering* (Stockholm, 1885, &c.); F. A. Fersen, *Historiska Skrifter* (Stockholm, 1867–1872). (R. N. B.)

FERSEN, HANS AXEL, Count von (1755–1810), Swedish statesman, was carefully educated at home, at the Carolinum at Brunswick and at Turin. In 1779 he entered the French military service (*Royal-Bavière*), accompanied General Rochambeau to America as his adjutant, distinguished himself during the war with England, notably at the siege of Yorktown, 1781, and in 1785 was promoted to be *colonel propriétaire* of the regiment *Royal-Suédois*. The young nobleman was, from the first, a prime favourite at the French court, owing, partly to the recollection of his father's devotion to France, but principally because of his own amiable and brilliant qualities. The queen, Marie Antoinette, was especially attracted by the grace and wit of *le beau Fersen*, who had inherited his full share of the striking handsomeness which was hereditary in the family.

It is possible that Fersen would have spent most of his life at Versailles, but for a hint from his own sovereign, then at Pisa, that he desired him to join his suite. He accompanied Gustavus III. in his Italian tour and returned home with him in 1784. When the war with Russia broke out, in 1788, Fersen accompanied his regiment to Finland, but in the autumn of the same year was sent to France, where the political horizon was already darkening. It was necessary for Gustavus to have an agent thoroughly in the confidence of the French royal family, and, at the same time, sufficiently able and audacious to help them in their desperate straits, especially as he had lost all confidence in his accredited minister, the baron de Stael. With his usual acumen, he fixed upon Fersen, who was at his post early in 1790. Before the end of the year he was forced to admit that the cause of the French monarchy was hopeless so long as the king and queen of France were nothing but captives in their own capital, at the mercy of an irresponsible mob. He took a leading part in the flight to Varennes. He found most of the requisite funds at the last moment. He ordered the construction of the famous carriage for six, in the name of the baroness von Korff, and kept it in his hotel grounds, rue Matignon, that all Paris might get accustomed to the sight of it. He was the coachman of the *fiacre* which drove the royal family from the Carrousel to the Porte Saint-Martin. He accompanied them to Bondy, the first stage of their journey.

In August 1791, Fersen was sent to Vienna to induce the emperor Leopold to accede to a new coalition against revolutionary France, but he soon came to the conclusion that the Austrian court meant to do nothing at all. At his own request, therefore, he was transferred to Brussels, where he could be of more service to the queen of France. In February 1792, at his own mortal peril, he once more succeeded in reaching Paris with counterfeit credentials as minister plenipotentiary to Portugal. On the 13th he arrived, and the same evening contrived to steal an interview with the queen unobserved. On the following day he was with the royal family from six o'clock in the evening till six o'clock the next morning, and convinced himself that a second flight was physically impossible. On the afternoon of the 21st he succeeded in paying a third visit to the Tuileries, stayed there till midnight and succeeded, with great difficulty, in regaining Brussels on the 27th. This perilous expedition, a monumental instance of courage and loyalty, had no substantial result. In 1797 Fersen was sent to the congress of Rastatt as the Swedish delegate, but in consequence of a protest from the French government, was not permitted to take part in it.

During the regency of the duke of Sudermania (1792–1796) Fersen, like all the other Gustavians, was in disgrace; but, on Gustavus IV. attaining his majority in 1796, he was welcomed back to court with open arms, and reinstated in all his offices and dignities. In 1801 he was appointed *Riksmarskalk* (= earl-marshal). On the outbreak of the war with Napoleon, Fersen accompanied Gustavus IV. to Germany to assist him in gaining fresh allies. He prevented Gustavus from invading Prussia in revenge for the refusal of the king of Prussia to declare war against France, and during the rest of the reign was in semi-disgrace, though generally a member of the government when the king was abroad.

Fersen stood quite aloof from the revolution of 1809. (See Sweden: *History*.) His sympathies were entirely with Prince Gustavus, son of the unfortunate Gustavus IV., and he was generally credited with the desire to see him king. When the newly elected successor to the throne, the highly popular prince Christian Augustus of Augustenburg, died suddenly in Skåne in May 1810, the report spread that he had been poisoned, and that Fersen and his sister, the countess Piper, were accessories. The source of this equally absurd and infamous libel has never been discovered. But it was eagerly taken up by the anti-Gustavian press, and popular suspicion was especially aroused by a fable called "The Foxes" directed against the Fersens, which appeared in *Nya Posten*. When, then, on the 20th of June 1810, the prince's body was conveyed to Stockholm, and Fersen, in his official capacity as *Riksmarskalk*, received it at the barrier and led the funeral cortège into the city, his fine carriage and his splendid robes seemed to the people an open derision of the general grief. The crowd began to murmur and presently to fling stones and cry "murderer!" He sought refuge in a house in the Riddarhus Square, but the mob rushed after him, brutally maltreated him and tore his robes to pieces. To quiet the people and save the unhappy victim, two officers volunteered to conduct him to the senate house and there place him in arrest. But he had no sooner mounted the steps leading to the entrance than the crowd, which had followed him all the way beating him with sticks and umbrellas, made a rush at him, knocked him down, and kicked and trampled him to death. This horrible outrage, which lasted more than an hour, happened, too, in the presence of numerous troops, drawn up in the Riddarhus Square, who made not the slightest effort to rescue the Riksmarskalk from his tormentors. In the circumstances, one must needs adopt the opinion of Fersen's contemporary, Baron Gustavus Armfelt, "One is almost tempted to say that the government wanted to give the people a victim to play with, just as when one throws something to an irritated wild beast to distract its attention. The more I consider it all, the more I am certain that the mob had the least to do with it. . . . But in God's name what were the troops about? How could such a thing happen in broad daylight during a procession, when troops and a military escort were actually present?" The responsibility certainly rests with the government of Charles XIII., which apparently intended to intimidate the Gustavians by the removal of one of their principal leaders. Armfelt escaped in time, so Fersen fell the victim.

See R. M. Klinckowström, *Le Comte de Fersen et la cour de France* (Paris, 1877; Eng. ed., London, 1902); *Historia om Axel von Fersens mord* (Stockholm, 1844); R. N. Bain, *Gustavus III.*, vol. ii. (London, 1895); P. Gaulot, *Un Ami de la reine* (Paris, 1892); F. F. Flach, *Grefve Hans Axel von Fersen* (Stockholm, 1896); E. Tegner, *Gustaf Mauritz Armfelt*, vol. iii. (Stockholm, 1883–1887). (R. N. B.)

FESCA, FREDERIC ERNEST (1789–1826), German violinist and composer of instrumental music, was born on the 15th of February 1789 at Magdeburg, where he received his early musical education. He completed his studies at Leipzig under Eberhard Müller, and at the early age of fifteen appeared before the public with several concerti for the violin, which were received with general applause, and resulted in his being appointed leading violinist of the Leipzig orchestra. This position he occupied till 1806, when he became concert-master to the duke of Oldenburg. In 1808 he was appointed solo-violinist by King Jerome of Westphalia at Cassel, and there he remained till the end of the French occupation (1814), when he went to Vienna, and soon afterwards to Carlsruhe, having been appointed concert-master to the grand-duke of Baden. His failing health prevented him from enjoying the numerous and well-deserved triumphs he owed to his art, and in 1826 he died of consumption at the early age of thirty-seven. As a virtuoso Fesca ranks amongst the best masters of the German school of violinists, the school subsequently of Spohr and of Joachim. Especially as leader of a quartet he is said to have been unrivalled with regard to classic dignity and simplicity of style. Amongst his compositions, his quartets for stringed instruments and other pieces of chamber music are the most remarkable. His two operas, *Cantemira* and *Omar and Leila*, were less successful, lacking dramatic power and originality. He also wrote some sacred compositions, and numerous songs and vocal quartets.

FESCENNIA, an ancient city of Etruria, which is probably to be placed immediately to the N. of the modern Corchiano, 6 m. N.W. of Civita Castellana (see Falerii). The Via Amerina traverses it. G. Dennis (*Cities and Cemeteries of Etruria*, London, 1883, i. 115 proposed to place it at the Riserva S. Silvestro, 3 m. E. of Corchiano, nearer the Tiber, where remains of Etruscan walls exist. At Corchiano itself, however, similar walls may be traced, and the site is a strong and characteristic one—a triangle between two deep ravines, with the third (west) side cut off by a ditch. Here, too, remains of two bridges may be seen, and several rich tombs have been excavated.

See A. Buglione, "Conte di Monale," in *Römische Mitteilungen* (1887), p. 21 seq.

FESCENNINE VERSES (*Fescennina carmina*), one of the earliest kinds of Italian poetry, subsequently developed into the Satura and the Roman comic drama. Originally sung at village harvest-home rejoicings, they made their way into the towns, and became the fashion at religious festivals and private gatherings—especially weddings, to which in later times they were practically restricted. They were usually in the Saturnian metre and took the form of a dialogue, consisting of an interchange of extemporaneous raillery. Those who took part in them wore masks made of the bark of trees. At first harmless and good-humoured, if somewhat coarse, these songs gradually outstripped the bounds of decency; malicious attacks were made upon both gods and men, and the matter became so serious that the law intervened and scurrilous personalities were forbidden by the Twelve Tables (Cicero, *De re publica*, iv. 10). Specimens of the Fescennines used at weddings are the Epithalamium of Manlius (Catullus, lxi. 122) and the four poems of Claudian in honour of the marriage of Honorius and Maria; the first, however, is distinguished by a licentiousness which is absent in the latter. Ausonius in his *Cento nuptialis* mentions the Fescennines of Annianus Faliscus, who lived in the time of Hadrian. Various derivations have been proposed for *Fescennine*. According to Festus, they were introduced from Fescennia in Etruria, but there is no reason to assume that any particular town was specially devoted to the use of such songs. As an alternative Festus suggests a connexion with *fascinum*, either because the Fescennina were regarded as a protection against evil influences (see Munro, *Criticisms and Elucidations of Catullus*, p. 76) or because *fascinum* (= *phallus*), as the symbol of fertility, would from early times have been naturally associated with harvest festivals. H. Nettleship, in an article on "The Earliest Italian Literature" (*Journal of Philology*, xi. 1882), in support of Munro's view, translates the expression "verses used by charmers," assuming a noun *fescennus*, connected with *fas fari*.

The *locus classicus* in ancient literature is Horace, *Epistles*, ii. 1. 139; see also Virgil, *Georgics*, ii. 385; Tibullus ii. 1. 55; E. Hoffmann, "Die Fescenninen," in *Rheinisches Museum*, li. p. 320 (1896); art. Latin Literature.

FESCH, JOSEPH (1763–1839), cardinal, was born at Ajaccio on the 3rd of January 1763. His father, a Swiss officer in the service of the Genoese Republic, had married the mother of Laetitia Bonaparte, after the decease of her first husband. Fesch therefore stood almost in the relation of an uncle to the young Bonapartes, and after the death of Lucien Bonaparte, archdeacon of Ajaccio, he became for a time the protector and patron of the family. In the year 1789, when the French Revolution broke out, he was archdeacon of Ajaccio, and, like the majority of the Corsicans, he felt repugnance for many of the acts of the French government during that period; in particular he protested against the application to Corsica of the act known as the "Civil Constitution of the Clergy" (July 1790). As provost of the "chapter" in that city he directly felt the pressure of events; for on the suppression of religious orders and corporations, he was constrained to retire into private life.

Thereafter he shared the fortunes of the Bonaparte family in the intrigues and strifes which ensued. Drawn gradually by that family into espousing the French cause against Paoli and the Anglophiles, he was forced to leave Corsica and to proceed with Laetitia and her son to Toulon, in the early part of the autumn of 1793. Failing to find clerical duties at that time (the period of the Terror), he entered civil life, and served in various capacities, until on the appointment of Napoleon Bonaparte to the command of the French "Army of Italy" he became a commissary attached to that army. This part of his career is obscure and without importance. His fortunes rose rapidly on the attainment of the dignity of First Consul by his former charge, Napoleon, after the *coup d'état* of Brumaire (November 1799). Thereafter, when the restoration of the Roman Catholic religion was in the mind of the First Consul, Fesch resumed his clerical vocation and took an active part in the complex negotiations which led to the signing of the Concordat with the Holy See on the 15th of July 1801. His reward came in the prize of the archbishopric of Lyons, on the duties of which he entered in August 1802. Six months later he received a still more signal reward for his past services, being raised to the dignity of cardinal.

In 1804 on the retirement of Cacault from the position of French ambassador at Rome, Fesch received that important appointment. He was assisted by Châteaubriand, but soon sharply differed with him on many questions. Towards the close of the year 1804 Napoleon entrusted to Fesch the difficult task of securing the presence of Pope Pius VII. at the forthcoming coronation of the emperor at Notre Dame, Paris (Dec. 2nd, 1804). His tact in overcoming the reluctance of the pope to be present at the coronation (it was only eight months after the execution of the duc d'Enghien) received further recognition. He received the grand cordon of the Legion of Honour, became grand-almoner of the empire and had a seat in the French senate. He was to receive further honours. In 1806 one of the most influential of the German clerics, Karl von Dalberg, then prince bishop of Regensburg, chose him to be his coadjutor and designated him as his successor.

Events, however, now occurred which overclouded his prospects. In the course of the years 1806–1807 Napoleon came into sharp collision with the pope on various matters both political and religious. Fesch sought in vain to reconcile the two potentates. Napoleon was inexorable in his demands, and Pius VII. refused to give way where the discipline and vital interests of the church seemed to be threatened. The emperor on several occasions sharply rebuked Fesch for what he thought to be weakness and ingratitude. It is clear, however, that the cardinal went as far as possible in counselling the submission of the spiritual to the civil power. For a time he was not on speaking terms with the pope; and Napoleon recalled him from Rome.

Affairs came to a crisis in the year 1809, when Napoleon issued at Vienna the decree of the 17th of May, ordering the annexation of the papal states to the French empire. In that year Napoleon conferred on Fesch the archbishopric of Paris, but he refused the honour. He, however, consented to take part in an ecclesiastical commission formed by the emperor from among the dignitaries of the Gallican Church, but in 1810 the commission was dissolved. The hopes of Fesch with respect to Regensburg were also damped by an arrangement of the year 1810 whereby Regensburg was absorbed in Bavaria.

In the year 1811 the emperor convoked a national council of Gallican clerics for the discussion of church affairs, and Fesch was appointed to preside over their deliberations. Here again, however, he failed to satisfy the inflexible emperor and was dismissed to his diocese. The friction between uncle and nephew became more acute in the following year. In June 1812, Pius VII. was brought from his first place of detention, Savona, to Fontainebleau, where he was kept under surveillance in the hope that he would give way in certain matters relating to the Concordat and in other clerical affairs. Fesch ventured to write to the aged pontiff a letter which came into the hands of the emperor. His anger against Fesch was such that he stopped the sum of 150,000 florins which had been accorded to him. The disasters of the years 1812–1813 brought Napoleon to treat Pius VII. with more lenity and the position of Fesch thus became for a time less difficult. On the first abdication of Napoleon (April 11th, 1814) and the restoration of the Bourbons, he, however, retired to Rome where he received a welcome. The events of the Hundred Days (March-June, 1815) brought him back to France; he resumed his archiepiscopal duties at Lyons and was further named a member of the senate. On the second abdication of the emperor (June 22nd, 1815) Fesch retired to Rome, where he spent the rest of his days in dignified ease, surrounded by numerous masterpieces of art, many of which he bequeathed to the city of Lyons. He died at Rome on the 13th of May 1839.

See J. B. Monseigneur Lyonnet, *Le Cardinal Fesch* (2 vols., Lyons, 1841); Ricard, *Le Cardinal Fesch* (Paris, 1893); H. Welschinger, *Le Pape et l'empereur* (Paris, 1905); F. Masson, *Napoléon et sa famille* (4 vols., Paris, 1897–1900).

FESSA, a town and district of Persia in the province of Fars. The town is situated in a fertile plain in 29° N. and 90 m. from Shiraz, and has a population of about 5000. The district has forty villages and extends about 40 m. north-south from Runiz to Nassīrabad and 16 m. east-west from Vāsilabad to Deh Dasteh (Dastajah); it produces much grain, dates, tobacco, opium and good fruit.

FESSENDEN, WILLIAM PITT (1806–1869), American statesman and financier, was born in Boscawen, New Hampshire, on the 16th of October 1806. After graduating at Bowdoin College in 1823, he studied law, and in 1827 was admitted to the bar, eventually settling in Portland, Maine, where for two years he was associated in practice with his father, Samuel Fessenden (1784–1869), a prominent lawyer and anti-slavery leader. In 1832 and in 1840 Fessenden was a representative in the Maine legislature, and in 1841–1843 was a Whig member of the national House of Representatives. When his term in this capacity was over, he devoted himself unremittingly and with great success to the law. He became well known, also, as an eloquent advocate of slavery restriction. In 1845–1846 and 1853–1854 he again served in the state House of Representatives, and in 1854 was chosen by the combined votes of Whigs and Anti-Slavery Democrats to the United States Senate. Within a fortnight after taking his seat he delivered a speech in opposition to the Kansas-Nebraska Bill, which at once made him a force in the congressional anti-slavery contest. From then on he was one of the most eloquent and frequent debaters among his colleagues, and in 1859, almost without opposition, he was re-elected to the Senate as a member of the Republican party, in the organization of which he had taken an influential part. He was a delegate in 1861 to the Peace Congress, but after the actual outbreak of hostilities he insisted that the war should be prosecuted vigorously. As chairman of the Senate Committee on Finance, his services were second in value only to those of President Lincoln and Secretary Salmon P. Chase in efforts to provide funds for the defence of the Union; and in July 1864 Fessenden succeeded Chase as secretary of the treasury. The finances of the country in the early summer of 1864 were in a critical condition; a few days before leaving office Secretary Chase had been compelled to withdraw from the market $32,000,000 of 6% bonds, on account of the lack of acceptable bids; gold had reached 285 and was fluctuating between 225 and 250, while the value of the paper dollar had sunk as low as 34 cents. It was Secretary Fessenden's policy to avoid a further increase of the circulating medium, and to redeem or consolidate the temporary obligations outstanding. In spite of powerful pressure the paper currency was not increased a dollar during his tenure of the office. As the sales of bonds and treasury notes were not sufficient for the needs of the Treasury, interest-bearing certificates of indebtedness were issued to cover the deficits; but when these began to depreciate the secretary, following the example of his predecessors, engaged the services of the Philadelphia banker Jay Cooke (*q.v.*) and secured the consent of Congress to raise the balance of the $400,000,000 loan authorized on the 30th of June 1864 by the sale of the so-called "seven-thirty" treasury notes (*i.e.* notes bearing interest at 7·3% payable in currency in three years or convertible at the option of the holder into 6% 5-20 year gold bonds). Through Cooke's activities the sales became enormous; the notes, issued in denominations as low as $50, appealed to the patriotic impulses of the people who could not subscribe for bonds of a higher denomination. In the spring of 1865 Congress authorized an additional loan of $600,000,000 to be raised in the same manner, and for the first time in four years the Treasury was able to meet all its obligations. After thus securing ample funds for the enormous expenditures of the war, Fessenden resigned the treasury portfolio in March 1865, and again took his seat in the Senate, serving till his death. In the Senate he again became chairman of the finance committee, and also of the joint committee on reconstruction. He was the author of the report of this last committee (1866), in which the Congressional plan of reconstruction was set forth and which has been considered a state paper of remarkable power and cogency. He was not, however, entirely in accord with the more radical members of his own party, and this difference was exemplified in his opposition to the impeachment of President Johnson and subsequently in his voting for Johnson's acquittal. He bore with calmness the storm of reproach from his party associates which followed, and lived to regain the esteem of those who had attacked him. He died at Portland, Maine, on the 6th of September 1869.

See Francis Fessenden, *Life and Public Services of William Pitt Fessenden* (2 vols., Boston, 1907).

FESSLER, IGNAZ AURELIUS (1756–1839), Hungarian ecclesiastic, historian and freemason, was born on the 18th of May 1756 at the village of Zurány in the county of Moson. In 1773 he joined the order of Capuchins, and in 1779 was ordained priest. He had meanwhile continued his classical and philological studies, and his liberal views brought him into frequent conflict with his superiors. In 1784, while at the monastery of Mödling, near Vienna, he wrote to the emperor Joseph II., making suggestions for the better education of the clergy and drawing his attention to the irregularities of the monasteries. The searching investigation which followed raised up against him many implacable enemies. In 1784 he was appointed professor of Oriental languages and hermeneutics in the university of Lemberg, when he took the degree of doctor of divinity; and shortly afterwards he was released from his monastic vows on the intervention of the emperor. In 1788 he brought out his tragedy of *Sidney*, an *exposé* of the tyranny of James II. and of the fanaticism of the papists in England. This was attacked so violently as profane and revolutionary that he was compelled to resign his office and seek refuge in Silesia. In Breslau he met with a cordial reception from G. W. Korn the publisher, and was, moreover, subsequently employed by the prince of Carolath-Schönaich as tutor to his sons. In 1791 Fessler was converted to Lutheranism and next year contracted an unhappy marriage, which was dissolved in 1802, when he married again. In 1796 he went to Berlin, where he founded a humanitarian society, and was commissioned by the freemasons of that city to assist Fichte in reforming the statutes and ritual of their lodge. He soon after this obtained a government appointment in connexion with the newly-acquired Polish provinces, but in consequence of the battle of Jena (1806) he lost this office, and remained in very needy circumstances until 1809, when he was summoned to St Petersburg by Alexander I., to fill the post of court councillor, and the professorship of oriental languages and philosophy at the Alexander-Nevski Academy. This office, however, he was soon obliged to resign, owing to his alleged atheistic tendencies, but he was subsequently nominated a member of the legislative commission. In 1815 he went with his family to Sarepta, where he joined the Moravian community and again became strongly orthodox. This cost him the loss of his salary, but it was restored to him in 1817. In November 1820 he was appointed consistorial president of the evangelical communities at Saratov and subsequently became chief superintendent of the Lutheran communities in St Petersburg. Fessler's numerous works are all written in German. In recognition of his important services to Hungary as a historian, he was in 1831 elected a corresponding member of the Hungarian Academy of Sciences. He died at St Petersburg on the 15th of December 1839.

Fessler was a voluminous writer, and during his life exercised great influence; but, with the possible exception of the history of Hungary, none of his books has any value now. He did not pretend to any critical treatment of his materials, and most of his historical works are practically historical novels. He did much, however, to make the study of history popular. His most important works are—*Die Geschichten der Ungarn und ihrer Landsassen* (10 vols. Leipzig, 1815–1825); *Marcus Aurelius* (3 vols., Breslau, 1790–1792; 3rd edition, 4 vols., 1799); *Aristides und Themistokles* (2 vols., Berlin, 1792; 3rd edition, 1818); *Attila, König der Hunnen* (Breslau, 1794); *Mathias Corvinus* (2 vols., Breslau, 1793–1794); and *Die drei grossen Könige der Hungarn aus dem Arpadischen Stamme* (Breslau, 1808).

See Fessler's *Rückblicke auf seine siebzigjährige Pilgerschaft* (Breslau, 1824; 2nd edition, Leipzig, 1851).

FESTA, CONSTANZO (*c.* 1495–1545), Italian singer and musical composer, became a member of the Pontifical choir in Rome in 1517, and soon afterwards *maestro* at the Vatican. His motets and madrigals (the first book of which appeared in 1537) excited Dr Burney's warm praise in his *History of Music*; and, among other church music, his *Te Deum* (published in 1596) is still sung at important services in Rome. His madrigal, called in English "Down in a flow'ry vale," is well known.

FESTINIOG (or Ffestiniog), a town of Merionethshire, North Wales, at the head of the Festiniog valley, 600 ft. above the sea, in the midst of rugged scenery, near the stream Dwyryd, 31 m. from Conway. Pop. of urban district (1901), 11,435. There are many large slate quarries in this parish, especially at Blaenau Festiniog, the junction of three railways, London & North Western, Great Western and Festiniog, a narrow-gauge line between Portmadoc and Duffws. This light railway runs at a considerable elevation (some 700 ft.), commanding a view across the valley and lake of Tan y Bwlch. Lord Lyttelton's letter to Mr Bower is a well-known panegyric on Festiniog. Thousands of workmen are employed in the slate quarries. The Cynfael falls are famous. Near are *Beddau gwyr Ardudwy* (the graves of the men of Ardudwy), memorials of a fight to recover women of the Clwyd valley from the men of Ardudwy. Near, too, is a rock named "Hugh Lloyd's pulpit" (Lloyd lived in the time of Charles I., Cromwell and Charles II.).

FESTOON (from Fr. *feston*, Ital. *festone*, from a Late Lat. *festo*, originally a "festal garland," Lat. *festum*, feast), a wreath or garland, and so in architecture a conventional arrangement of flowers, foliage or fruit bound together and suspended by ribbons, either from a decorated knot, or held in the mouths of lions, or suspended across the back of bulls' heads as in the Temple of Vesta at Tivoli. The "motif" is sometimes known as a "swag." It was largely employed both by the Greeks and Romans and formed the principal decoration of altars, friezes and panels. The ends of the ribbons are sometimes formed into bows or twisted curves; when in addition a group of foliage or flowers is suspended it is called a "drop." Its origin is probably due to the representation in stone of the garlands of natural flowers, &c., which were hung up over an entrance doorway on fête days, or suspended round the altar.

FESTUS (? Rufus or Rufius), one of the Roman writers of *breviaria* (epitomes of Roman history). The reference to the defeat of the Goths at Noviodunum (A.D. 369) by the emperor Valens, and the fact that the author is unaware of the constitution of Valentia as a province (which took place in the same year) are sufficient indication to fix the date of composition. Mommsen identifies the author with Rufius Festus, proconsul of Achaea (366), and both with Rufius Festus Avienus (*q.v.*), the translator of Aratus. But the absence of the name Rufius in the best MSS. is against this. Others take him to be Festus of Tridentum, *magister memoriae* (secretary) to Valens and proconsul of Asia, where he was sent to punish those implicated in the conspiracy of Theodorus, a commission which he executed with such merciless severity that his name became a byword. The work itself (*Breviarium rerum gestarum populi Romani*) is divided into two parts—one geographical, the other historical. The chief authorities used are Livy, Eutropius and Florus. It is extremely meagre, but the fact that the last part is based on the writer's personal recollections makes it of some value for the history of the 4th century.

Editions by W. Förster (Vienna, 1873) and C. Wagener (Prague, 1886); see also R. Jacobi, *De Festi breviarii fontibus* (Bonn, 1874), and H. Peter, *Die geschichtliche Litt. über die römische Kaiserzeit*, ii. p. 133 (1897), where the epitomes of Festus, Aurelius Victor and Eutropius are compared.

FESTUS, SEXTUS POMPEIUS, Roman grammarian, probably flourished in the 2nd century A.D. He made an epitome of the celebrated work *De verborum significatu*, a valuable treatise alphabetically arranged, written by M. Verrius Flaccus, a freedman and celebrated grammarian who flourished in the reign of Augustus. Festus gives the etymology as well as the meaning of every word; and his work throws considerable light on the language, mythology and antiquities of ancient Rome. He made a few alterations, and inserted some critical remarks of his own. He also omitted such ancient Latin words as had long been obsolete; these he discussed in a separate work now lost, entitled *Priscorum verborum cum exemplis*. Of Flaccus's work only a few fragments remain, and of Festus's epitome only one original copy is in existence. This MS., the Codex Festi Farnesianus at Naples, only contains the second half of the work (M-V) and that not in a perfect condition. It has been published in facsimile by Thewrewk de Ponor (1890). At the close of the 8th century Paulus Diaconus abridged the abridgment. From his work and the solitary copy of the original attempts have been made with the aid of conjecture to reconstruct the treatise of Festus.

Of the early editions the best are those of J. Scaliger (1565) and Fulvius Ursinus (1581); in modern times, those of C. O. Müller (1839, reprinted 1880) and de Ponor (1889); see J. E. Sandys, *History of Classical Scholarship*, vol. i. (1906).

FÉTIS, FRANÇOIS JOSEPH (1784–1871), Belgian composer and writer on music, was born at Mons in Belgium on the 25th of March 1784, and was trained as a musician by his father, who followed the same calling. His talent for composition manifested itself at the age of seven, and at nine years old he was an organist at Sainte-Waudru. In 1800 he went to Paris and completed his studies at the conservatoire under such masters as Boieldieu, Rey and Pradher. In 1806 he undertook the revision of the Roman liturgical chants in the hope of discovering and establishing their original form. In this year he married the granddaughter of the Chevalier de Kéralio, and also began his *Biographie universelle des musiciens*, the most important of his works, which did not appear until 1834. In 1821 he was appointed professor at the conservatoire. In 1827 he founded the *Revue musicale*, the first serious paper in France devoted exclusively to musical matters. Fétis remained in the French capital till in 1833, at the request of Leopold I., he became director of the conservatoire of Brussels and the king's chapel-master. He also was the founder, and, till his death, the conductor of the celebrated concerts attached to the conservatoire of Brussels, and he inaugurated a free series of lectures on musical history and philosophy. He produced a large quantity of original compositions, from the opera and the oratorio down to the simple *chanson*. But all these are doomed to oblivion. Although not without traces of scholarship and technical ability, they show total absence of genius. More important are his writings on music. They are partly historical, such as the *Curiosités historiques de la musique* (Paris, 1850), and the *Histoire universelle de musique* (Paris, 1869–1876); partly theoretical, such as the *Méthode des méthodes de piano* (Paris, 1837), written in conjunction with Moscheles. Fétis died at Brussels on the 26th of March 1871. His valuable library was purchased by the Belgian government and presented to the Brussels conservatoire. His work as a musical historian was prodigious in quantity, and, in spite of many inaccuracies and some prejudice revealed in it, there can be no question as to its value for the student.

FETISHISM, an ill-defined term, used in many different senses: (*a*) the worship of inanimate objects, often regarded as peculiarly African; (*b*) negro religion in general; (*c*) the worship of inanimate objects conceived as the residence of spirits not inseparably bound up with, nor originally connected with, such objects; (*d*) the doctrine of spirits embodied in, or attached to, or conveying influence through, certain material objects (Tylor); (*e*) the use of charms, which are not worshipped, but derive their magical power from a god or spirit; (*f*) the use as charms of objects regarded as magically potent in themselves. A further extension is given by some writers, who use the term as synonymous with the religions of primitive peoples, including under it not only the worship of inanimate objects, such as the sun, moon or stars, but even such phases of primitive philosophy as totemism. Comte applied the term to denominate the view of nature more commonly termed animism.

Derivation.—The word fetish (or fetich) was first used in connexion with Africa by the Portuguese discoverers of the last half of the 15th century; relics of saints, rosaries and images were then abundant all over Europe and were regarded as possessing magical virtue; they were termed by the Portuguese *feiticos* (*i.e.* charms). Early voyagers to West Africa applied this term to the wooden figures, stones, &c., regarded as the temporary residence of gods or spirits, and to charms. There is no reason to suppose that the word *feitico* was applied either to an animal or to the local spirit of a river, hill or forest. *Feitico* is sometimes interpreted to mean artificial, made by man, but the original sense is more probably "magically active or artful." The word was probably brought into general use by C. de Brosses, author of *Du culte des dieux fétiches* (1760), but it is frequently used by W. Bosman in his *Description of Guinea* (1705), in the sense of "the false god, Bossum" or "Bohsum," properly a tutelary deity of an individual.

Definition.—The term fetish is commonly understood to mean the worship of or respect for material, inanimate objects, conceived as magically active from a virtue inherent in them, temporarily or permanently, which does not arise from the fact that a god or spirit is believed to reside in them or communicate virtue to them. Taken in this sense fetishism is probably a mark of decadence. There is no evidence of any such belief in Africa or elsewhere among primitive peoples. It is only after a certain grade of culture has been attained that the belief in luck appears; the fetish is essentially a mascot or object carried for luck.

Ordinary Usage.—In the sense in which Dr Tylor uses the term the fetish is (1) a "god-house" or (2) a charm derived from a tutelary deity or spirit, and magically active in virtue of its association with such deity or spirit. In the first of these senses the word is applied to objects ranging from the unworked stone to the pot or the wooden figure, and is thus hardly distinguishable from idolatry. (*a*) The *bohsum* or tutelary deity of a particular section of the community is derived from the local gods through the priests by the performance of a certain series of rites. The priest indicates into what object the *bohsum* will enter and proceeds to the abode of the local god to procure the object in question. After making an offering the object is carried to an appropriate spot and a "fetish" tree set up as a shade for it, which is sacred so long as the *bohsum* remains beneath it. The fall of the tree is believed to mark the departure of the spirit. A *bohsum* may also be procured through a dream; but in this case, too, it is necessary to apply to the priest to decide whether the dream was veridical. (*b*) The *suhman* or tutelary deity of an individual is not an object selected at random to be the residence of the spirit. It is only procurable at the residence of a Sasabonsum, a malicious non-human being. Various ceremonies are performed, and a spirit connected with the Sasabonsum is finally asked to enter an object. This is then kept for three days; if no good fortune results it is concluded either that the spirit did not enter the object selected, or that it is disinclined to extend its protection. In either case the ceremonies must be commenced afresh. Otherwise offerings and even human sacrifices in exceptional cases are made to the *suhman*. It is commonly believed that the negro claims the power of coercing his tutelary deity. This is denied by Colonel Ellis. It is certain that coercion of deities is not unknown, but further evidence is required that the negro uses it when his deity is refractory.

The *suhman* can, it is believed, communicate a part of his powers to various objects in which he does not dwell; these are also termed *suhman* by the natives and may have given rise to the belief that the practices commonly termed fetishism are not animistic. These charms are many in number; offerings of food and drink are made, *i.e.* to the portion of the power of the *suhman* which resides in them. These charms can only be made by the possessor of the *suhman*.

On the Guinea Coast the spirit implanted in the object is usually, if not invariably, non-human. Farther south on the Congo the "fetish" is inhabited by human souls also. The priest goes into the forest and cuts an image; when a party enters a wood for this purpose they may not mention the name of any living being unless they wish him to die and his soul to enter the fetish. The right person having been selected, his name is mentioned; and he is believed to die within ten days, his soul passing into the *nkissi*. It is into these figures that the nails are driven, in order to procure the vengeance of the indwelling spirit on some enemy.

In many cases the fetish spirit is believed to leave the "god-house" and pass for the time being into the body of the priest, who manifests the phenomena of possession (*q.v.*). It is a common error to suppose that the whole of African religion is embraced in the practices connected with these tutelary deities; so far from this being the case, belief in higher gods, not necessarily accompanied with worship or propitiation, is common in many parts of Africa, and there is no reason to suppose that it had been derived in every case, perhaps not in any case, from Christian or Mahommedan missionaries.

See A. B. Ellis, *Tshi-speaking Peoples*, chs. vii., viii. and xii.; Waitz, *Anthropologie der Naturvölker*, ii. 174; R. E. Dennett in *Folklore*, vol. xvi.; R. H. Nassau, *Fetichism in West Africa* (1904); also Tylor, *Primitive Culture*, ii. 143, and M. H. Kingsley, *West African Studies* (2nd ed., 1901), where the term is used in a more extended sense. (N. W. T.)

FETTERCAIRN, a burgh of barony of Kincardineshire, Scotland, 4½ m. N.W. of Laurencekirk. Pop. of parish (1901) 1390. The chief structures include a public hall, library and reading-room, and the arch built to commemorate the visit of Queen Victoria in 1861. The most interesting relic, however, is the market cross, which originally belonged to the extinct town of Kincardine. To the S.W. is Balbegno Castle, dating from 1509, and planned on a scale that threatened to ruin its projector. It contains a lofty hall of fine proportions. Two miles N. is Fasque, the estate of the Gladstones, which was acquired in 1831 by Sir John Gladstone (1764–1851), the father of W. E. Gladstone. The castle, which stands in beautiful grounds, was built in 1809. Sir John Gladstone's tomb is in the Episcopal church of St Andrew, which he erected and endowed. In the immediate vicinity are the ruins of the royal castle of Kincardine, where, according to tradition, Kenneth III. was assassinated in 1005, although he is more generally said to have been slain in battle at Monzievaird, near Crieff in Perthshire.

FETTERS AND HANDCUFFS, instruments for securing the feet and hands of prisoners under arrest, or as a means of punishment. The old names were manacles, shackbolts or shackles, gyves and swivels. Until within recent times handcuffs were of two kinds, the figure-8 ones which confined the hands close together either in front or behind the prisoner, or the rings from the wrists were connected by a short chain much on the model of the handcuffs in use by the police forces of to-day. Much improvement has been made in handcuffs of late. They are much lighter and they are adjustable, fitting any wrist, and thus the one pair will serve a police officer for any prisoner. For the removal of gangs of convicts an arrangement of handcuffs connected by a light chain is used, the chain running through a ring on each fetter and made fast at both ends by what are known as *end-locks.* Several recently invented appliances are used as handcuffs, *e.g.* snaps, nippers, twisters. They differ from handcuffs in being intended for one wrist only, the other portion being held by the captor. In the snap the smaller circlet is snapped to on the prisoner's wrist. The nippers can be instantly fastened on the wrist. The twister, not now used in England as being liable to injure prisoners seriously, is a chain attached to two handles; the chain is put round the wrist and the two handles twisted till the chain is tight enough.

Leg-irons are anklets of steel connected by light chains long enough to permit of the wearer walking with short steps. An obsolete form was an anklet and chain to the end of which was attached a heavy weight, usually a round shot. The Spanish used to secure prisoners in bilboes, shackles round the ankles secured by a long bar of iron. This form of leg-iron was adopted in England, and was much employed in the services during the 17th and 18th centuries. An ancient example is preserved in the Tower of London. The French marine still use a kind of leg-iron of the bilbo type.

FEU, in Scotland, the commonest mode of land tenure. The word is the Scots variant of "fee" (*q.v.*). The relics of the feudal system still dominate Scots conveyancing. That system has recognized as many as seven forms of tenure—ward, socage, mortification, feu, blench, burgage, booking. Ward, the original military holding, was abolished in 1747 (20 G. II. c. 20), as an effect of the rising of 1745. Socage and mortification have long since disappeared. Booking is a conveyance peculiar to the borough of Paisley, but does not differ essentially from feu. Burgage is the system by which land is held in royal boroughs. Blench holding is by a nominal payment, as of a penny Scots, or a red rose, often only to be rendered upon demand. In feu holding there is a substantial annual payment in money or in kind in return for the enjoyment of the land. The crown is the first overlord or superior, and land is held of it by crown vassals, but they in their turn may "feu" their land, as it is called, to others who become *their* vassals, whilst they themselves are mediate overlords or superiors; and this process of sub-infeudation may be repeated to an indefinite extent. The Conveyancing Act of 1874 renders any clause in a disposition against sub-infeudation null and void. In England on the other hand, since 1290, when the statute *Quia Emptores* was passed, sub-infeudation is impossible, as the new holder simply effaces the grantor, holding by the same title as the grantor himself. Casualties, which are a feature of land held in feu, are certain payments made to the superior, contingent on the happening of certain events. The most important was the payment of an amount equal to one year's feu-duty by a new holder, whether heir or purchaser of the feu. The Conveyancing Act of 1874 abolished casualties in all feus after that date, and power was given to redeem this burden on feus already existing. If the vassal does not pay the feu-duty for two years, the superior, among other remedies, may obtain by legal process a decree of irritancy, whereupon *tinsel* or forfeiture of the feu follows. Previously to 1832 only the vassals of the crown had votes in parliamentary elections for the Scots counties, and this made in favour of sub-infeudation as against sale outright. In Orkney and Shetland land is still largely possessed as udal property, a holding derived or handed down from the time when these islands belonged to Norway. Such lands may be converted into feus at the will of the proprietor and held from the crown or Lord Dundas. At one time the system of conveyancing by which the transfer of feus was effected was curious and complicated, requiring the presence of parties on the land itself and the symbolical handing over of the property, together with the registration of various documents. But legislation since the middle of the 19th century has changed all that. The system of feuing in Scotland, as contrasted with that of long leaseholds in England, has tended to secure greater solidity and firmness in the average buildings of the northern country.

See Erskine's *Principles*; Bell's *Principles*; Rankine, *Law of Landownership in Scotland.*

FEUCHÈRES, SOPHIE, BARONNE DE (1795–1840), Anglo-French adventuress, was born at St Helens, Isle of Wight, in 1795, the daughter of a drunken fisherman named Dawes. She grew up in the workhouse, went up to London as a servant, and became the mistress of the duc de Bourbon, afterwards prince de Condé. She was ambitious, and he had her well educated not only in modern languages but, as her exercise books—still extant—show, in Greek and Latin. He took her to Paris and, to prevent scandal and to qualify her to be received at court, had her married in 1818 to Adrien Victor de Feuchères, a major in the Royal Guards. The prince provided her dowry, made her husband his aide-de-camp and a baron. The baroness, pretty and clever, became a person of consequence at the court of Louis XVIII. De Feuchères, however, finally discovered the relations between his wife and Condé, whom he had been assured was her father, left her—he obtained a legal separation in 1827—and told the king, who thereupon forbade her appearance at court. Thanks to her influence, however, Condé was induced in 1829 to sign a will bequeathing about ten million francs to her, and the rest of his estate—more than sixty-six millions—to the duc d'Aumale, fourth son of Louis Philippe. Again she was in high favour. Charles X. received her at court, Talleyrand visited her, her niece married a marquis and her nephew was made a baron. Condé, wearied by his mistress's importunities, and but half pleased by the advances made him by the government of July, had made up his mind to leave France secretly. When on the 27th of August 1830 he was found hanging dead from his window, the baroness was suspected and an inquiry was held, but the evidence of death being the result of any crime appearing insufficient, she was not prosecuted. Hated as she was alike by legitimatists and republicans, life in Paris was no longer agreeable for her, and she returned to London, where she died in December 1840.

FEUCHTERSLEBEN, ERNST, FREIHERR VON (1806–1849), Austrian physician, poet and philosopher, was born in Vienna on the 29th of April 1806; of an old Saxon noble family. He attended the "Theresian Academy" in his native city, and in 1825 entered its university as a student of medicine. In 1833 he obtained the degree of doctor of medicine, settled in Vienna as a practising surgeon, and in 1834 married. The young doctor kept up his connexion with the university, where he lectured, and in 1844 was appointed dean of the faculty of medicine. He cultivated the acquaintance of Franz Grillparzer, Heinrich Laube, and other intellectual lights of the Viennese world, interested himself greatly in educational matters, and in 1848, while refusing the presidency of the ministry of education, accepted the appointment of under secretary of state in that department. His health, however, gave way, and he died at Vienna on the 3rd of September 1849. He was not only a clever physician, but a poet of fine aesthetical taste and a philosopher. Among his medical works may be mentioned: *Über das Hippokratische erste Buch von der Diät* (Vienna, 1835), *Ärzte und Publicum* (Vienna, 1848) and *Lehrbuch der ärztlichen Seelenkunde* (1845). His poetical works include *Gedichte* (Stutt. 1836), among which is the well-known beautiful hymn, which Mendelssohn set to music. "*Es ist bestimmt in Gottes Rat.*" As a philosopher he is best known by his *Zur Diätetik der Seele* [Dietetics of the soul] (Vienna, 1838), which attained great popularity, and the tendency of which, in contrast to Hufeland's *Makrobiotik* (On the Art of Prolonging Life), is to show the true way of rendering life harmonious and lovely. This work had by 1906 gone into fifty editions. Noteworthy also is his *Beiträge zur Litteratur-, Kunst- und Lebenstheorie* (Vienna, 1837–1841), and an anthology, *Geist der deutschen Klassiker* (Vienna, 1851; 3rd ed. 1865–1866).

His collected works (with the exception of the purely medical ones) were published in 7 vols. by Fr. Hebbel (Vienna, 1851–1853). See M. Necker, "Ernst von Feuchtersleben, der Freund Grillparzers," in the *Jahrbuch der Grillparzer Gesellschaft*, vol. iii. (Vienna, 1893).

FEUD, animosity, hatred, especially a permanent condition of hostilities between persons, and hence applied to a state of private warfare between tribes, clans or families, a "vendetta." The word appears in Mid. Eng. as *fede*, which came through the O. Fr. from the O. High Ger. *fehida*, modern *Fehde*. The O. Teutonic *faiho*, an adjective, the source of *fehida*, gives the O. Eng. *fâh*, foe. "Fiend," originally an enemy (cf. Ger. *Feind*), hence the enemy of mankind, the devil, and so any evil spirit, is probably connected with the same source. The word *fede* was of Scottish usage, but in the 16th century took the form *foode*, *fewd* in English. The *New English Dictionary* points out that "feud, fee (Lat. *feudum*) could not have influenced the change, for it appears fifty years later than the first instances of *foode*, &c., and was only used by writers on feudalism." For the etymology of "feud" (*feudum*) see FEE, and for its history see FEUDALISM.

FEUDALISM (from Late Lat. *feodum* or *feudum*, a fee or fiel; see FEE). In every case of institutional growth in history two things are to be clearly distinguished from the beginning for a correct understanding of the process and its results. One of these is the change of conditions in the political or social environment which made growth necessary. The other is the already existing institutions which began to be transformed to meet the new needs. In studying the origin and growth of political feudalism, the distinction is easy to make. The all-prevailing need of the later Roman and early medieval society was protection—protection against the sudden attacks of invading tribes or revolted peasants, against oppressive neighbours, against the unwarranted demands of government officers, or even against the legal but too heavy exactions of the government itself. In the days of the decaying empire and of the chaotic German settlement, the weak freeman, the small landowner, was exposed to attack in almost every relation of life and on every side. The protection which normally it is the business of government to furnish he could no longer obtain. He must seek protection elsewhere wherever he could get it, and pay the price demanded for it. This is the great social fact—the failure of government to perform one of its most primary duties, the necessity of finding some substitute in private life—extending in greater or less degree through the whole formative period of feudalism, which explains the transformation of institutions that brought it into existence. Similar conditions have produced an organization which may be called feudal, in various countries, and in widely separated periods of history. While these different feudal systems have shown a general similarity of organization, there has been also great variation in their details, because they have started from different institutions and developed in different ways. The feudal system with which history most concerns itself is that of medieval western Europe, and it is that which will be here described.

Roman origins.

The institutions which the need of protection seized upon when it first began to turn away from the state were twofold. They had both long existed in the private, not public, relations of the Romans, and they had up to this time shown no tendency to grow. One of them related to the person, to the man himself, without reference to property, the other related to land. There are thus distinguished at the beginning those two great sides of feudalism which remained to the end of its history more or less distinct, the personal relation and the land relation. The personal institution needs little description. It was the Roman patron and client relationship which had remained in existence into the days of the empire, in later times less important perhaps legally than socially, and which had been reinforced in Gaul by very similar practices in use among the Celts before their conquest. The description of this institution which has come down to us from Roman sources of the days when feudalism was beginning is not so detailed as we could wish, but we can see plainly enough that it met a frequent need, that it was called by a new name, the *patrocinium*, and that it was firmly enough entrenched in usage to survive the German conquest, and to be taken up and continued by the conquerors. In its new use, alike in the later Roman and the early German state, the landless freeman who could not support himself went to some powerful man, stated his need, and offered his services, those proper to a freeman, in return for shelter and support. This transaction, which was called commendation, gave rise in the German state to a written contract which related the facts and provided a penalty for its violation. It created a relationship of protection and support on one side, and of free service on the other.

The other institution, relating to land, was that known to the Roman law as the *precarium*, a name derived from one of its essential features through all its history, the prayer of the suppliant by which the relationship was begun. The *precarium* was a form of renting land not intended primarily for income, but for use when the lease was made from friendship for example, or as a reward, or to secure a debt. Legally its characteristic feature was that the lessee had no right of any kind against the grantor. The owner could call in his land and terminate the relation at any time, for any reason, or for none at all. Even a definite understanding at the outset that the lease might be enjoyed to a specified date was no protection.[1] It followed of course that the heir had no right in the land which his father held in this way, nor was the heir of the donor bound by his father's act. The legal character of this transaction is summed up in a well-known passage in the *Digest*:—*Interdictum de precariis merito introductum est, quia nulla eo nomine juris civilis actio esset, magis enim ad donationes et beneficii causam, quam ad negotii contracti spectat precarii conditio.*[2] This may be paraphrased as follows:—The *precarium* tenant may employ the interdict against a third party, because he cannot use the ordinary civil action, his holding being not a matter of business but rather of favour and kindness. It should be noted that from its very beginning the land relationship of feudalism was not created primarily for the grantor's income, but that it emphasized in the most striking way his continued ownership.

As used for protection in later Roman days the *precarium* gave rise to what was called the commendation of lands, *patrocinium fundorum*. The poor landowner, likely to lose all that he had from one kind of oppression or another, went to the great landowner, his neighbour, whose position gave him immunity from attack or the power to prevent official abuses, and begged to be protected. The rich man answered, I can only protect my own. Of necessity the poor man must surrender to his powerful neighbour the ownership of his lands, which he then received back as a *precarium*—gaining protection during his lifetime at the cost of his children, who were left without legal claim and compelled to make the best terms they could.[1] Applied to this use the *precarium* found extensive employment in the last age of the empire. The government looked on the practice with great disfavour, because it transferred large areas from the easy access of the state to an ownership beyond its reach. The laws repeatedly forbade it under increasing penalties, but clearly it could not be stopped. The motive was too strong on both sides—the need of protection on one side, the natural desire to increase large possessions and means of self-defence on the other.

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[1] *Digest*, xliii. 26. 12.

[2] *Ibid.* xliii. 26. 14, and cf. 17.

Frankish development.

These practices the Frankish conquerors of Gaul found in full possession of society when they entered into that province. They seem to have understood them at once, and, like much else Roman, to have made them their own without material change. The *patrocinium* they were made ready to understand by the existence of a somewhat similar institution among themselves, the *comitatus*, described by Tacitus. In this institution the chief of the tribe, or of some plainly marked division of the tribe, gathered about himself a band of chosen warriors, who formed a kind of private military force and body-guard. The special features of the institution were the strong tie of faith and service which bound the man, the support and rewards given by the lord, and the pride of both in the relationship. The *patrocinium* might well seem to the German only a form of the *comitatus*, but it was a form which presented certain advantages in his actual situation. The chief of these was perhaps the fact that it was not confined to king or tribal chief, but that every noble was able in the Roman practice to surround himself with his organized private army. Probably this fact, together with the more general fact of the absorption in most things of the German in the Roman, accounts for the substitution of the *patrocinium* for the *comitatus* which took place under the Merovingians.

This change did not occur, however, without some modification of the Roman customs. The *comitatus* made contributions of its own to future feudalism, to some extent to its institutional side, largely to the ideas and spirit which ruled in it. Probably the ceremony which grew into feudal homage, and the oath of fealty, certainly the honourable position of the vassal and his pride in the relationship, the strong tie which bound lord and man together, and the idea that faith and service were due on both sides in equal measure, we may trace to German sources. But we must not forget that the origin of the vassal relationship, as an institution, is to be found on Roman and not on German soil. The *comitatus* developed and modified, it did not originate. Nor was the feudal system established in any sense by the settlement of the *comitatus* group on the conquered land. The uniting of the personal and the land sides of feudalism came long after the conquest, and in a different way.

To the *precarium* German institutions offered no close parallel. The advantages, however, which it afforded were obvious, and this side of feudalism developed as rapidly after the conquest as the personal. The new German noble was as eager to extend the size of his lands and to increase the numbers of his dependants as the Roman had been. The new German government furnished no better protection from local violence, nor was it able any more effectively to check the practices which were creating feudalism; indeed for a long time it made no attempt to do so. *Precarium* and *patrocinium* easily passed from the Roman empire to the Frankish kingdom, and became as firmly rooted in the new society as they had ever been in the old. Up to this point we have seen only the small landowner and the landless man entering into these relations. Feudalism could not be established, however, until the great of the land had adopted them for themselves, and had begun to enter the clientage of others and to hold lands by the *precarium* tenure. The first step towards this result was easily and quickly taken. The same class continued to furnish the king's men, and to form his household and body-guard whether the relation was that of the *patrocinium* or the *comitatus*, and to be made noble by entering into it. It was later that they became clients of one another, and in part at least as a result of their adoption of the *precarium* tenure. In this latter step the influence of the Church rather than of the king seems to have been effective. The large estates which pious intentions had bestowed on the Church it was not allowed to alienate. It could most easily make them useful to gain the influence and support which it needed, and to provide for the public functions which fell to its share, by employing the *precarium* tenure. On the other side, the great men coveted the wide estates of bishop and abbot, and were ready without persuasion to annex portions of them to their own on the easy terms of this tenure, not always indeed observed by the holder, or able to be enforced by the Church. The employment of the *precarium* by the Church seems to have been one of the surest means by which this form of landholding was carried over from the Romans to the Frankish period and developed into new forms. It came to be made by degrees the subject of written contract, by which the rights of the holder were more definitely defined and protected than had been the case in Roman law. The length of time for which the holding should last came to be specified, at first for a term of years and then for life, and some payment to the grantor was provided for, not pretending to represent the economic value of the land, but only to serve as a mark of his continued ownership.

These changes characterize the Merovingian age of Frankish history. That period had practically ended, however, before these two institutions showed any tendency to join together as they were joined in later feudalism. Nor had the king up to that time exerted any apparent influence on the processes that were going forward. Grants of land of the Merovingian kings had carried with them ownership and not a limited right, and the king's *patrocinium* had not widened in extent in the direction of the later vassal relation. It was the advent of the Carolingian princes and the difficulties which they had to overcome that carried these institutions a stage further forward. Making their way up from a position among the nobility to be the rulers of the land, and finally to supplant the kings, the Carolingians had especial need of resources from which to purchase and reward faithful support. This need was greatly increased when the Arab attack on southern Gaul forced them to transform a large part of the old Frankish foot army into cavalry.[2] The fundamental principle of the Frankish military system, that the man served at his own expense, was still unchanged. It had indeed begun to break down under the strain of frequent and distant campaigns, but it was long before it was changed as the recognized rule of medieval service. If now, in addition to his own expenses, the soldier must provide a horse and its keeping, the system was likely to break down altogether. It was this problem which led to the next step. To solve it the early Carolingian princes, especially Charles Martel, who found the royal domains exhausted and their own inadequate, grasped at the land of the Church. Here was enough to endow an army, if some means could be devised to permit its use. This means was found in the *precarium* tenure. Keeping alive, as it did, the fact of the grantor's ownership, it did not in form deprive the Church of the land. Recognizing that ownership by a small payment only, not corresponding to the value of the land, it left the larger part of the income to meet the need which had arisen. At the same time undoubtedly the new holder of the land, if not already the vassal of the prince, was obliged to become so and to assume an obligation of service with a mounted force when called upon.[3] This expedient seems to have solved the problem. It gave rise to the numerous *precariae verbo regis*, of the Church records, and to the condemnation of Charles Martel in the visions of the clergy to worse difficulties in the future life than he had overcome in this. The most important consequences of the expedient, however, were not intended or perceived at the time. It brought together the two sides of feudalism, vassalage and benefice, as they were now commonly called, and from this age their union into what is really a single institution was rapid;[1] it emphasized military service as an essential obligation of the vassal; and it spread the vassal relation between individual proprietors and the sovereign widely over the state.

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[1] Salvian, *De gub. Dei*, v. 8, ed. Halm, p. 62.

[2] H. Brunner, *Zeitschr. der sav. Stift. für Rechtsgeschichte*, Germ. Abth. viii. 1-38 (1887). Also in his *Forschungen*, 39-74 (1894).

[3] See F. Dahn, *Könige der Germanen*, viii. 2, 90 ff.

In the period that followed, the reign of Charlemagne and the later Carolingian age, continued necessities, military and civil, forced the kings to recognize these new institutions more fully, even when standing in a position between the government and the subject, intercepting the public duties of the latter. The incipient feudal baron had not been slow to take advantage of the break-down of the old German military system. As in the last days of the Roman empire the poor landowner had found his only refuge from the exactions of the government in the protection of the senator, who could in some way obtain exemptions, so the poor Frank could escape the ruinous demands of military service only by submitting himself and his lands to the count, who did not hesitate on his side to force such submission. Charlemagne legislated with vigour against this tendency, trying to make it easier for the poor freeman to fulfil his military duties directly to the state, and to forbid the misuse of power by the rich, but he was not more successful than the Roman government had been in a like attempt. Finally the king found himself compelled to recognize existing facts, to lay upon the lord the duty of producing his men in the field and to allow him to appear as their commander. This solved the difficulty of military service apparently, but with decisive consequences. It completed the transformation of the army into a vassal army; it completed the recognition of feudalism by the state, as a legitimate relation between different ranks of the people; and it recognized the transformation in a great number of cases of a public duty into a private obligation.

In the meantime another institution had grown up in this Franco-Roman society, which probably began and certainly assisted in another transformation of the same kind. This is the immunity. Suggested probably by Roman practices, possibly developed directly from them, it received a great extension in the Merovingian period, at first and especially in the interest of the Church, but soon of lay land-holders. By the grant of an immunity to a proprietor the royal officers, the count and his representatives, were forbidden to enter his lands to exercise any public function there. The duties which the count should perform passed to the proprietor, who now represented the government for all his tenants free and unfree. Apparently no modification of the royal rights was intended by this arrangement, but the beginning of a great change had really been made. The king might still receive the same revenues and the same services from the district held by the lord as formerly, but for their payment a private person in his capacity as overlord was now responsible. In the course of a long period characterized by a weak central government, it was not difficult to enlarge the rights which the lord thus obtained, to exclude even the king's personal authority from the immunity, and to translate the duties and payments which the tenant had once owed to the state into obligations which he owed to his lord, even finally into incidents of his tenure. The most important public function whose transformation into a private possession was assisted by the growth of the immunity was the judicial. This process had probably already begun in a small way in the growth of institutions which belong to the economic side of feudalism, the organization of agriculture on the great estates. Even in Roman days the proprietor had exercised a jurisdiction over the disputes of his unfree tenants. Whether this could by its own growth have been extended over his free tenants and carried so far as to absorb a local court, like that of the hundred, into private possession, is not certain. It seems probable that it could. But in any case, the immunity easily carried the development of private jurisdiction through these stages. The lord's court took the place of the public court in civil, and even by degrees in criminal cases. The plaintiff, even if he were under another lord, was obliged to sue in the court of the defendant's lord, and the portion of the fine

It is now possible perhaps to get some idea of the way in which the government of a feudal country was operated. The early German governments whose chief functions, military, judicial, financial, legislative, were carried on by the freemen of the nation because they were members of the body politic, and were performed as duties owed to the community for its defence and sustenance, no longer existed. New forms of organization had arisen in which indeed these conceptions had not entirely disappeared, but in which the vast majority of cases a wholly different idea of the ground of service and obligation prevailed. Superficially, for example, the feudal court differed but little from its Teutonic predecessor. It was still an assembly court. Its procedure was almost the same as the earlier. It often included the same classes of men. Saxon Witenagemot and Norman *Curia regis* seem very much alike. But the members of the feudal court met, not to fulfil a duty owed to the community, but a private obligation which they had assumed in return for the fiefs they held, and in the history of institutions it is differences of this sort which are the determining principles. The feudal state was one in which, as it has been said, private law had usurped the place of public law. Public duty had become private obligation. To understand the feudal state it is essential to make clear to one's mind that all sorts of services, which men ordinarily owe to the public or to one another, were translated into a form of rent paid for the use of land, and defined and enforced by a private contract. In every feudal country, however, something of the earlier conception survived. A general military levy was occasionally made. Something like taxation occasionally occurred, though the government was usually sustained by the scanty feudal payments, by the proceeds of justice and by the income of domain manors. About the office of king more of this earlier conception gathered than elsewhere in the state, and gradually grew, aided not merely by traditional ideas, but by the active influence of the Bible, and soon of the Roman law. The kingship formed the nucleus of new governments as the feudal system passed away.

Actual government in the feudal age was primitive and undifferentiated. Its chief and almost only organ, for kingdom and barony alike, was the *curia*—a court formed of the vassals. This acted at once and without any consciousness of difference of function, as judiciary, as legislature, in so far as there was any in the feudal period, and as council, and it exercised final supervision and control over revenue and administration. Almost all the institutions of modern states go back to the *curia regis*, branching off from it at different dates as the growing complexity of business forced differentiation of function and personnel. In action it was an assembly court, deciding all questions by discussion and the weight of opinion, though its decisions obtained their legal validity by the formal pronunciation of the presiding member, *i.e.* of the lord whose court it was. It can readily be seen that in a government of this kind the essential operative element was the baron. So long as the government remained dependent on the baron, it remained feudal in its character. When conditions so changed that government could free itself from its dependence on the baron, feudalism disappeared as the organization of society; when a professional class arose to form the judiciary, when the increased circulation of money made regular taxation possible and enabled the government to buy military and other services, and when better means of intercommunication and the growth of common ideas made a wide centralization possible and likely to be permanent. Feudalism had performed a great service, during an age of disintegration, by maintaining a general framework of government, while allowing the locality to protect and care for itself. When the function of protection and local supervision could be resumed by the general government the feudal age ended. In nearly all the states of Europe this end was reached during, or by the close of, the 13th century.

At the moment, however, when feudalism was disappearing as the organization of society, it gave rise to results which in a sense continued it into after ages and even to our own day. One of these results was the system of law which it created.

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[1] F. Dahn, *Könige der Germanen*, viii. 2, 197.

at the cost of his children, who were left without legal claim and compelled to make the best terms they could.[1] Applied to this use the *precarium* found extensive employment in the last age of the empire. The government looked on the practice with great disfavour, because it transferred large areas from the easy access of the state to an ownership beyond its reach. The laws repeatedly forbade it under increasing penalties, but clearly it could not be stopped. The motive was too strong on both sides—the need of protection on one side, the natural desire to increase large possessions and means of self-defence on the other.

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This change did not occur, however, without some modification of the Roman customs. The *comitatus* made contributions of its own to future feudalism, to some extent to its institutional side, largely to the ideas and spirit which ruled in it. Probably the ceremony which grew into feudal homage, and the oath of fealty, certainly the honourable position of the vassal and his pride in the relationship, the strong tie which bound lord and man together, and the idea that faith and service were due on both sides in equal measure, we may trace to German sources. But we must not forget that the origin of the vassal relationship, as an institution, is to be found on Roman and not on German soil. The *comitatus* developed and modified, it did not originate. Nor was the feudal system established in any sense by the settlement of the *comitatus* group on the conquered land. The uniting of the personal and the land sides of feudalism came long after the conquest, and in a different way.

To the *precarium* German institutions offered no close parallel. The advantages, however, which it afforded were obvious, and this side of feudalism developed as rapidly after the conquest as the personal. The new German noble was as eager to extend the size of his lands and to increase the numbers of his dependants as the Roman had been. The new German government furnished no better protection from local violence, nor was it able any more effectively to check the practices which were creating feudalism; indeed for a long time it made no attempt to do so. *Precarium* and *patrocinium* easily passed from the Roman empire to the Frankish kingdom, and became as firmly rooted in the new society as they had ever been in the old. Up to this point we have seen only the small landowner and the landless man entering into these relations. Feudalism could not be established, however, until the great of the land had adopted them for themselves, and had begun to enter the clientage of others and to hold lands by the *precarium* tenure. The first step towards this result was easily and quickly taken. The same class continued to furnish the king's men, and to form his household and body-guard whether the relation was that of the *patrocinium* or the *comitatus*, and to be made noble by entering into it. It was later that they became clients of one another, and in part at least as a result of their adoption of the *precarium* tenure. In this latter step the influence of the Church rather than of the king seems to have been effective. The large estates which pious intentions had bestowed on the Church it was not allowed to alienate. It could most easily make them useful to gain the influence and support which it needed, and to provide for the public functions which fell to its share, by employing the *precarium* tenure. On the other side, the great men coveted the wide estates of bishop and abbot, and were ready without persuasion to annex portions of them to their own on the easy terms of this tenure, not always indeed observed by the holder, or able to be enforced by the Church. The employment of the *precarium* by the Church seems to have been one of the surest means by which this form of landholding was carried over from the Romans to the Frankish period and developed into new forms. It came to be made by degrees the subject of written contract, by which the rights of the holder were more definitely defined and protected than had been the case in Roman law. The length of time for which the holding should last came to be specified, at first for a term of years and then for life, and some payment to the grantor was provided for, not pretending to represent the economic value of the land, but only to serve as a mark of his continued ownership.

These changes characterize the Merovingian age of Frankish history. That period had practically ended, however, before these two institutions showed any tendency to join together as they were joined in later feudalism. Nor had the king up to that time exerted any apparent influence on the processes that were going forward. Grants of land of the Merovingian kings had carried with them ownership and not a limited right, and the king's *patrocinium* had not widened in extent in the direction of the later vassal relation. It was the advent of the Carolingian princes and the difficulties which they had to overcome that carried these institutions a stage further forward. Making their way up from a position among the nobility to be the rulers of the land, and finally to supplant the kings, the Carolingians had especial need of resources from which to purchase and reward faithful support. This need was greatly increased when the Arab attack on southern Gaul forced them to transform a large part of the old Frankish foot army into cavalry.[2] The fundamental principle of the Frankish military system, that the man served at his own expense, was still unchanged. It had indeed begun to break down under the strain of frequent and distant campaigns, but it was long before it was changed as the recognized rule of medieval service. If now, in addition to his own expenses, the soldier must provide a horse and its keeping, the system was likely to break down altogether. It was this problem which led to the next step. To solve it the early Carolingian princes, especially Charles Martel, who found the royal domains exhausted and their own inadequate, grasped at the land of the Church. Here was enough to endow an army, if some means could be devised to permit its use. This means was found in the *precarium* tenure. Keeping alive, as it did, the fact of the grantor's ownership, it did not in form deprive the Church of the land. Recognizing that ownership by a small payment only, not corresponding to the value of the land, it left the larger part of the income to meet the need which had arisen. At the same time undoubtedly the new holder of the land, if not already the vassal of the prince, was obliged to become so and to assume an obligation of service with a mounted force when called upon.[3] This expedient seems to have solved the problem. It gave rise to the numerous *precariae verbo regis*, of the Church records, and to the condemnation of Charles Martel in the visions of the clergy to worse difficulties in the future life than he had overcome in this. The most important consequences of the expedient, however, were not intended or perceived at the time. It brought together the two sides of feudalism, vassalage and benefice, as they were now commonly called, and from this age their union into what is really a single institution was rapid;[1] it emphasized military service as an essential obligation of the vassal; and it spread the vassal relation between individual proprietors and the sovereign widely over the state.

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[1] Salvian, *De gub. Dei*, v. 8, ed. Halm, p. 62.

[2] H. Brunner, *Zeitschr. der sav. Stift. für Rechtsgeschichte*, Germ. Abth. viii. 1-38 (1887). Also in his *Forschungen*, 39-74 (1894).

[3] See F. Dahn, *Könige der Germanen*, viii. 2, 90 ff.

In the period that followed, the reign of Charlemagne and the later Carolingian age, continued necessities, military and civil, forced the kings to recognize these new institutions more fully, even when standing in a position between the government and the subject, intercepting the public duties of the latter. The incipient feudal baron had not been slow to take advantage of the break-down of the old German military system. As in the last days of the Roman empire the poor landowner had found his only refuge from the exactions of the government in the protection of the senator, who could in some way obtain exemptions, so the poor Frank could escape the ruinous demands of military service only by submitting himself and his lands to the count, who did not hesitate on his side to force such submission. Charlemagne legislated with vigour against this tendency, trying to make it easier for the poor freeman to fulfil his military duties directly to the state, and to forbid the misuse of power by the rich, but he was not more successful than the Roman government had been in a like attempt. Finally the king found himself compelled to recognize existing facts, to lay upon the lord the duty of producing his men in the field and to allow him to appear as their commander. This solved the difficulty of military service apparently, but with decisive consequences. It completed the transformation of the army into a vassal army; it completed the recognition of feudalism by the state, as a legitimate relation between different ranks of the people; and it recognized the transformation in a great number of cases of a public duty into a private obligation.

In the meantime another institution had grown up in this Franco-Roman society, which probably began and certainly assisted in another transformation of the same kind. This is the immunity. Suggested probably by Roman practices, possibly developed directly from them, it received a great extension in the Merovingian period, at first and especially in the interest of the Church, but soon of lay land-holders. By the grant of an immunity to a proprietor the royal officers, the count and his representatives, were forbidden to enter his lands to exercise any public function there. The duties which the count should perform passed to the proprietor, who now represented the government for all his tenants free and unfree. Apparently no modification of the royal rights was intended by this arrangement, but the beginning of a great change had really been made. The king might still receive the same revenues and the same services from the district held by the lord as formerly, but for their payment a private person in his capacity as overlord was now responsible. In the course of a long period characterized by a weak central government, it was not difficult to enlarge the rights which the lord thus obtained, to exclude even the king's personal authority from the immunity, and to translate the duties and payments which the tenant had once owed to the state into obligations which he owed to his lord, even finally into incidents of his tenure. The most important public function whose transformation into a private possession was assisted by the growth of the immunity was the judicial. This process had probably already begun in a small way in the growth of institutions which belong to the economic side of feudalism, the organization of agriculture on the great estates. Even in Roman days the proprietor had exercised a jurisdiction over the disputes of his unfree tenants. Whether this could by its own growth have been extended over his free tenants and carried so far as to absorb a local court, like that of the hundred, into private possession, is not certain. It seems probable that it could. But in any case, the immunity easily carried the development of private jurisdiction through these stages. The lord's court took the place of the public court in civil, and even by degrees in criminal cases. The plaintiff, even if he were under another lord, was obliged to sue in the court of the defendant's lord, and the portion of the fine

It is now possible perhaps to get some idea of the way in which the government of a feudal country was operated. The early German governments whose chief functions, military, judicial, financial, legislative, were carried on by the freemen of the nation because they were members of the body politic, and were performed as duties owed to the community for its defence and sustenance, no longer existed. New forms of organization had arisen in which indeed these conceptions had not entirely disappeared, but in which the vast majority of cases a wholly different idea of the ground of service and obligation prevailed. Superficially, for example, the feudal court differed but little from its Teutonic predecessor. It was still an assembly court. Its procedure was almost the same as the earlier. It often included the same classes of men. Saxon Witenagemot and Norman *Curia regis* seem very much alike. But the members of the feudal court met, not to fulfil a duty owed to the community, but a private obligation which they had assumed in return for the fiefs they held, and in the history of institutions it is differences of this sort which are the determining principles. The feudal state was one in which, as it has been said, private law had usurped the place of public law. Public duty had become private obligation. To understand the feudal state it is essential to make clear to one's mind that all sorts of services, which men ordinarily owe to the public or to one another, were translated into a form of rent paid for the use of land, and defined and enforced by a private contract. In every feudal country, however, something of the earlier conception survived. A general military levy was occasionally made. Something like taxation occasionally occurred, though the government was usually sustained by the scanty feudal payments, by the proceeds of justice and by the income of domain manors. About the office of king more of this earlier conception gathered than elsewhere in the state, and gradually grew, aided not merely by traditional ideas, but by the active influence of the Bible, and soon of the Roman law. The kingship formed the nucleus of new governments as the feudal system passed away.

Actual government in the feudal age was primitive and undifferentiated. Its chief and almost only organ, for kingdom and barony alike, was the *curia*—a court formed of the vassals. This acted at once and without any consciousness of difference of function, as judiciary, as legislature, in so far as there was any in the feudal period, and as council, and it exercised final supervision and control over revenue and administration. Almost all the institutions of modern states go back to the *curia regis*, branching off from it at different dates as the growing complexity of business forced differentiation of function and personnel. In action it was an assembly court, deciding all questions by discussion and the weight of opinion, though its decisions obtained their legal validity by the formal pronunciation of the presiding member, *i.e.* of the lord whose court it was. It can readily be seen that in a government of this kind the essential operative element was the baron. So long as the government remained dependent on the baron, it remained feudal in its character. When conditions so changed that government could free itself from its dependence on the baron, feudalism disappeared as the organization of society; when a professional class arose to form the judiciary, when the increased circulation of money made regular taxation possible and enabled the government to buy military and other services, and when better means of intercommunication and the growth of common ideas made a wide centralization possible and likely to be permanent. Feudalism had performed a great service, during an age of disintegration, by maintaining a general framework of government, while allowing the locality to protect and care for itself. When the function of protection and local supervision could be resumed by the general government the feudal age ended. In nearly all the states of Europe this end was reached during, or by the close of, the 13th century.

At the moment, however, when feudalism was disappearing as the organization of society, it gave rise to results which in a sense continued it into after ages and even to our own day. One of these results was the system of law which it created.

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[1] F. Dahn, *Könige der Germanen*, viii. 2, 197.

As feudalism passed from its age of supremacy into its age of decline, its customs tended to crystallize into fixed forms.

Decline and survivals.

At the same time a class of men arose interested in these forms for their own sake, professional lawyers or judges, who wrote down for their own and others' use the feudal usages with which they were familiar. The great age of these codes was the 13th century, and especially the second half of it. The codes in their turn tended still further to harden these usages into fixed forms, and we may date from the end of the 13th century an age of feudal law regulating especially the holding and transfer of land, and much more uniform in character than the law of the feudal age proper. This was particularly the case in parts of France and Germany where feudalism continued to regulate the property relations of lords and vassals longer than elsewhere, and where the underlying economic feudalism remained in large part unchanged. In this later pseudo-feudalism, however, the political had given way to the economic, and customs which had once had no economic significance came to have that only.

Feudalism formed the starting-point also of the later social nobilities of Europe. They drew from it their titles and ranks and many of their regulative ideas, though these were formed into more definite and regular systems than ever existed in feudalism proper. It was often the policy of kings to increase the social privileges and legal exemptions of the nobility while taking away all political power, so that it is necessary in the history of institutions to distinguish sharply between these nobilities and the feudal baronage proper. It is only in certain backward parts of Europe that the terms feudal and baronage in any technical sense can be used of the nobility of the 15th century. (G. B. A.)

BIBLIOGRAPHY.—For more detailed information the reader is referred to the articles ENGLISH LAW; FRANCE: *French Law and Institutions*, VILLENAGE; MANOR; SCUTAGE; KNIGHT SERVICE; HIDE. For a general sketch of Feudalism the chapters in tome ii. of the *Histoire générale* of Lavisse and Rambaud should be consulted. Other general works are J. T. Abdy, *Feudalism* (1890); Paul Roth, *Feudalität und Unterthanverband* (Weimar, 1863); and *Geschichte des Beneficialwesens* (1850); M. M. Kovalevsky, *Ökonomische Entwickelung Europas* (1902); E. de Laveleye, *De la propriété et de ses formes primitives* (1891); and *The Origin of Property in Land*, a translation by M. Ashley from the works of N. D. Fustel de Coulanges, with an introductory chapter by Professor W. J. Ashley. Two other works of value are Sir H. S. Maine, *Village Communities in the East and West* (1876); and Léon Gautier, *La Chevalerie* (Paris, 1884; Eng. trans. by Henry Frith, *Chivalry*, London, 1891).

For feudalism in England see the various constitutional histories, especially W. Stubbs, *Constitutional History of England*, vol. i. (ed. 1897). Very valuable also are the writings of Mr J. H. Round, of Professor F. W. Maitland and of Professor P. Vinogradoff. Among Round's works may be mentioned *Feudal England* (1895); *Geoffrey de Mandeville* (1892); and *Studies on the Red Book of the Exchequer* (1898). Maitland's *Domesday Book and Beyond* (Cambridge, 1897) is indispensable; and the same remark applies to his *History of English Law before the time of Edward I.* (Cambridge, 1895), written in conjunction with Sir Frederick Pollock. Vinogradoff has illuminated the subject in his *Villainage inEngland* (1892) and his *English Society in the 11th century* (1908). See also J. F. Baldwin, *The Scutage and Knight Service in England* (Chicago, 1897); Rudolf Gneist, *Adel und Ritterschaft in England* (1853); and F. Seebohm, *The English Village Community* (1883).

For feudalism in France see N. D. Fustel de Coulanges, *Histoire des institutions politiques de l'ancienne France* (*Les Origines du système féodal*, 1890; *Les Transformations de la royauté pendant l'époque carolingienne*, 1892); A. Luchaire, *Histoire des institutions monarchiques de la France sous les premiers Capétiens, 987–1180* (2nd ed., 1890); and *Manuel des institutions françaises: période des Capétiens directs* (1892); J. Flach, *Les Origines de l'ancienne France* (1886–1893); Paul Viollet, *Droit public: Histoires des institutions politiques et administratives de la France* (1890–1898); and Henri Sée, *Les classes rurales et le régime domanial* (1901).

For Germany see G. Waitz, *Deutsche Verfassungsgeschichte* (Kiel and Berlin, 1844 foll.); H. Brunner, *Grundzüge der deutschen Rechtsgeschichte* (Leipzig, 1901); V. Menzel, *Die Entstehung des Lebenswesens* (Berlin, 1890); and G. L. von Maurer's works on the early institutions of the Germans.

FEUERBACH, ANSELM (1829–1880), German painter, born at Spires, the son of a well-known archaeologist, was the leading classicist painter of the German 19th-century school. He was the first to realize the danger arising from contempt of technique, that mastery of craftsmanship was needed to express even the loftiest ideas, and that an ill-drawn coloured cartoon can never be the supreme achievement in art. After having passed through the art schools of Düsseldorf and Munich, he went to Antwerp and subsequently to Paris, where he benefited by the teaching of Couture, and produced his first masterpiece, "Hafiz at the Fountain" in 1852. He subsequently worked at Karlsruhe, Venice (where he fell under the spell of the greatest school of colourists), Rome and Vienna. He was steeped in classic knowledge, and his figure compositions have the statuesque dignity and simplicity of Greek art. Disappointed with the reception given in Vienna to his design of "The Fall of the Titans" for the ceiling of the Museum of Modelling, he went to live in Venice, where he died in 1880. His works are to be found at the leading public galleries of Germany; Stuttgart has his "Iphigenia"; Karlsruhe, the "Dante at Ravenna"; Munich, the "Medea"; and Berlin, "The Concert," his last important picture. Among his chief works are also "The Battle of the Amazons," "Pietà," "The Symposium of Plato," "Orpheus and Eurydice" and "Ariosto in the Park of Ferrara."

FEUERBACH, LUDWIG ANDREAS (1804–1872), German philosopher, fourth son of the eminent jurist (see below), was born at Landshut in Bavaria on the 28th of July 1804. He matriculated at Heidelberg with the intention of pursuing an ecclesiastical career. Through the influence of Prof. Daub he was led to an interest in the then predominant philosophy of Hegel and, in spite of his father's opposition, went to Berlin to study under the master himself. After two years' discipleship the Hegelian influence began to slacken. "Theology," he wrote to a friend, "I can bring myself to study no more. I long to take nature to my heart, that nature before whose depth the faint-hearted theologian shrinks back; and with nature man, man in his entire quality." These words are a key to Feuerbach's development. He completed his education at Erlangen with the study of natural science. His first book, published anonymously, *Gedanken über Tod und Unsterblichkeit* (1830, 3rd ed. 1876), contains an attack upon personal immortality and an advocacy of the Spinozistic immortality of reabsorption in nature. These principles, combined with his embarrassed manner of public speaking, debarred him from academic advancement. After some years of struggling, during which he published his *Geschichte der neueren Philosophie* (2 vols., 1833–1837, 2nd ed. 1844), and *Abälard und Heloise* (1834, 3rd ed. 1877), he married in 1837 and lived a rural existence at Bruckberg near Nuremberg, supported by his wife's share in a small porcelain factory. In two works of this period, *Pierre Bayle* (1838) and *Philosophie und Christentum* (1839), which deal largely with theology, he held that he had proved "that Christianity has in fact long vanished not only from the reason but from the life of mankind, that it is nothing more than a fixed idea" in flagrant contradiction to the distinctive features of contemporary civilization. This attack is followed up in his most important work, *Das Wesen des Christentums* (1841), which was translated into English (*The Essence of Religion*, by George Eliot, 1853, 2nd ed. 1881), French and Russian. Its aim may be described shortly as an effort to humanize theology. He lays it down that man, so far as he is rational, is to himself his own object of thought. Religion is consciousness of the infinite. Religion therefore is "nothing else than the consciousness of the infinity of the consciousness; or, in the consciousness of the infinite, the conscious subject has for his object the infinity of his own nature." Thus God is nothing else than man: he is, so to speak, the outward projection of man's inward nature. In part 1 of his book he develops what he calls the "true or anthropological essence of religion." Treating of God in his various aspects "as a being of the understanding," "as a moral being or law," "as love" and so on, Feuerbach shows that in every aspect God corresponds to some feature or need of human nature. "If man is to find contentment in God, he must find himself in God." In part 2 he discusses the "false or theological essence of religion," *i.e.* the view which regards God as having a separate existence over against man. Hence arise various mistaken beliefs, such as the belief in revelation which not only injures the moral sence, but also "poisons, nay destroys, the divinest feeling in man, the sense of truth," and the belief in sacraments such as the Lord's Supper, a piece of religious materialism of which "the necessary consequences are superstition and immorality." In spite of many admirable qualities both of style and matter the *Essence of Christianity* has never made much impression upon British thought. To treat the actual forms of religion as expressions of our various human needs is a fruitful idea which deserves fuller development than it has yet received; but Feuerbach's treatment of it is fatally vitiated by his subjectivism. Feuerbach denied that he was rightly called an atheist, but the denial is merely verbal: what he calls "theism" is atheism in the ordinary sense. Feuerbach labours under the same difficulty as Fichte; both thinkers strive in vain to reconcile the religious consciousness with subjectivism.

During the troubles of 1848–1849 Feuerbach's attack upon orthodoxy made him something of a hero with the revolutionary party; but he never threw himself into the political movement, and indeed had not the qualities of a popular leader. During the period of the diet of Frankfort he had given public lectures on religion at Heidelberg. When the diet closed he withdrew to Bruckberg and occupied himself partly with scientific study, partly with the composition of his *Theogonie* (1857). In 1860 he was compelled by the failure of the porcelain factory to leave Bruckberg, and he would have suffered the extremity of want but for the assistance of friends supplemented by a public subscription. His last book, *Gottheit, Freiheit und Unsterblichkeit*, appeared in 1866 (2nd ed., 1890). After a long period of decay he died on the 13th of September 1872.

Feuerbach's influence has been greatest upon the anti-Christian theologians such as D. F. Strauss, the author of the *Leben Jesu*, and Bruno Bauer, who like Feuerbach himself had passed over from Hegelianism to a form of naturalism. But many of his ideas were taken up by those who, like Arnold Ruge, had entered into the struggle between church and state in Germany, and those who, like F. Engels and Karl Marx, were leaders in the revolt of labour against the power of capital. His work was too deliberately unsystematic ("keine Philosophie ist meine Philosophie") ever to make him a power in philosophy. He expressed in an eager, disjointed, but condensed and laboured fashion, certain deep-lying convictions—that philosophy must come back from unsubstantial metaphysics to the solid facts of human nature and natural science, that the human body was no less important than the human spirit ("Der Mensch ist was er isst") and that Christianity was utterly out of harmony with the age. His convictions gained weight from the simplicity, uprightness and diligence of his character; but they need a more effective justification than he was able to give them.

His works appeared in 10 vols. (Leipzig, 1846–1866); his correspondence has been edited with an indifferent biography by Karl Grün (1874). See A. Lévy, *La Philosophie de Feuerbach* (1904); M. Meyer, *L. Feuerbach's Moralphilosophie* (Berlin, 1899); E. v. Hartmann, *Geschichte d. Metaphysik* (Leipzig, 1899–1900), ii. 437-444; F. Engels, *L. Feuerbach und d. Ausgang d. class. deutsch. Philos.* (2nd ed., 1895). (H. St.)

FEUERBACH, PAUL JOHANN ANSELM, RITTER VON (1775–1833), German jurist and writer on criminal law, was born at Hainichen near Jena on the 14th of November 1775. He received his early education at Frankfort on Main, whither his family had removed soon after his birth. At the age of sixteen, however, he ran away from home, and, going to Jena, was helped by relations there to study at the university. In spite of poor health and the most desperate poverty, he made rapid progress. He attended the lectures of Karl Leonhard Reinhold and Gottlieb Hufeland, and soon published some literary essays of more than ordinary merit. In 1795 he took the degree of doctor in philosophy, and in the same year, though he only possessed 150 thalers (£22 : 10s.), he married. It was this step which led him to success and fame, by forcing him to turn from his favourite studies of philosophy and history to that of law, which was repugnant to him, but which offered a prospect of more rapid advancement. His success in this new and uncongenial sphere was soon assured. In 1796 he published *Kritik des natürlichen Rechts als Propädeutik zu einer Wissenschaft der natürlichen Rechte*, which was followed, in 1798, by *Anti-Hobbes, oder über die Grenzen der bürgerlichen Gewalt*, a dissertation on the limits of the civil power and the right of resistance on the part of subjects against their rulers, and by *Philosophische, juristische Untersuchungen über das Verbrechen des Hochverraths.* In 1799 he obtained the degree of doctor of laws. Feuerbach, as the founder of a new theory of penal law, the so-called "psychological-coercive or intimidation theory," occupied a prominent place in the history of criminal science. His views, which he first made known in his *Revision der Grundsätze und Grundbegriffe des positiven peinlichen Rechts* (1799), were further elucidated and expounded in the *Bibliothek für die peinliche Rechtswissenschaft* (1800–1801), an encyclopaedic work produced in conjunction with Karl L. W. G. Grolmann and Ludwig Harscher von Almendingen, and in his famous *Lehrbuch des gemeinen in Deutschland geltenden peinlichen Rechts* (1801). These works were a powerful protest against vindictive punishment, and did much towards the reformation of the German criminal law. The *Carolina* (the penal code of the emperor Charles V.) had long since ceased to be respected. What in 1532 was an inestimable blessing, as a check upon the arbitrariness and violence of the effete German procedure, had in the course of time outlived its usefulness and become a source of evils similar to those it was enacted to combat. It availed nothing that, at the commencement of the 18th century, a freer and more scientific spirit had been breathed into Roman law; it failed to reach the criminal law. The administration of justice was, before Feuerbach's time, especially distinguished by two characteristics: the superiority of the judge to all law, and the blending of the judicial and executive offices, with the result that the individual was practically at the mercy of his prosecutors. This state of things Feuerbach set himself to reform, and using as his chief weapon the *Revision der Grundbegriffe* above referred to, was successful in his task. His achievement in the struggle may be summed up as: *nullum crimen, nulla poena sine lege* (no wrong and no punishment without a remedy). In 1801 Feuerbach was appointed extraordinary professor of law without salary, at the university of Jena, and in the following year accepted a chair at Kiel, where he remained two years. In 1804 he removed to the university of Landshut; but on being commanded by King Maximilian Joseph to draft a penal code for Bavaria (*Strafgesetzbuch für das Königreich Bayern*), he removed in 1805 to Munich, where he was given a high appointment in the ministry of justice and was ennobled in 1808. Meanwhile the practical reform of penal legislation in Bavaria was begun under his influence in 1806 by the abolition of torture. In 1808 appeared the first volume of his *Merkwürdige Criminalfälle*, completed in 1811—a work of deep interest for its application of psychological considerations to cases of crime, and intended to illustrate the inevitable imperfection of human laws in their application to individuals. In his *Betrachtungen über das Geschworenengericht* (1811) Feuerbach declared against trial by jury, maintaining that the verdict of a jury was not adequate legal proof of a crime. Much controversy was aroused on the subject, and the author's view was subsequently to some extent modified. The result of his labours was promulgated in 1813 as the Bavarian penal code. The influence of this code, the embodiment of Feuerbach's enlightened views, was immense. It was at once made the basis for new codes in Württemberg and Saxe-Weimar; it was adopted in its entirety in the grand-duchy of Oldenburg; and it was translated into Swedish by order of the king. Several of the Swiss cantons reformed their codes in conformity with it. Feuerbach had also undertaken to prepare a civil code for Bavaria, to be founded on the Code Napoléon. This was afterwards set aside, and the Codex Maximilianus adopted as a basis. But the project did not become law. During the war of liberation (1813–1814) Feuerbach showed himself an ardent patriot, and published several political brochures which, from the writer's position, had almost the weight of state manifestoes. One of these is entitled *Über deutsche Freiheit und Vertretung deutsche Volker durch Landstände* (1814). In 1814 Feuerbach was appointed second president of the court of appeal at Bamberg, and three years later he became first president of the court of appeal at Anspach. In 1821 he was deputed by the government to visit France, Belgium, and the Rhine provinces for the purpose of investigating their juridical institutions. As the fruit of this visit, he published his treatises *Betrachtungen über Öffentlichkeit und Mündigkeit der Gerechtigkeitspflege* (1821) and *Über die Gerichtsverfassung und das gerichtliche Verfahren Frankreichs* (1825). In these he pleaded unconditionally for publicity in all legal proceedings. In his later years he took a deep interest in the fate of the strange foundling Kaspar Hauser (*q.v.*), which had excited so much attention in Europe; and he was the first to publish a critical summary of the ascertained facts, under the title of *Kaspar Hauser, ein Beispiel eines Verbrechens am Seelenleben* (1832). Shortly before his death appeared a collection of his *Kleine Schriften* (1833). Feuerbach, still in the full enjoyment of his intellectual powers, died suddenly at Frankfort, while on his way to the baths of Schwalbach, on the 29th of May 1833. In 1853 was published the *Leben und Wirken Ans. von Feuerbachs*, 2 vols., consisting of a selection of his letters and journals, with occasional notes by his fourth son Ludwig, the distinguished philosopher.

See also, for an estimate of Feuerbach's life and work, Marquardtsen, in *Allgemeine deutsche Biographie*, vol. vi.; and an "in memoriam" notice in *Die allgemeine Zeitung* (Augsburg), 15th Nov. 1875, by Professor Dr Karl Binding of Leipzig University.

FEUILLANTS, CLUB OF THE, a political association which played a prominent part during the French Revolution. It was founded on the 16th of July 1791 by several members of the Jacobin Club, who refused to sign a petition presented by this body, demanding the deposition of Louis XVI. Among the dissident members were B. Barère and E. J. Sieyès, who were later joined by other politicians, among them being Dupont de Nemours. The name of Feuillants was popularly given to this group of men, because they met in the fine buildings which had been occupied by the religious order bearing this name, in the rue Saint-Honoré, near the Place Vendôme, in Paris. The members of the club preserved the title of *Amis de la Constitution*, as being a sufficient indication of the line they intended to pursue. This consisted in opposing everything not contained in the Constitution; in their opinion, the latter was in need of no modification, and they hated alike all those who were opposed to it, whether *émigrés* or Jacobins; they affected to avoid all political discussion, and called themselves merely a "conservative assembly."

This attitude they maintained after the Constituent Assembly had been succeeded by the Legislative, but not many of the new deputies became members of the club. With the rapid growth of extreme democratic ideas the Feuillants soon began to be looked upon as reactionaries, and to be classed with "aristocrats." They did, indeed, represent the aristocracy of wealth, for they had to pay a subscription of four louis, a large sum at that time, besides six livres for attendance. Moreover, the luxury with which they surrounded themselves, and the restaurant which they had annexed to their club, seemed to mock the misery of the half-starved proletariat, and added to the suspicion with which they were viewed, especially after the popular triumphs of the 20th of June and the 10th of August 1792 (see FRENCH REVOLUTION). A few days after the insurrection of the 10th of August, the papers of the Feuillants were seized, and a list was published containing the names of 841 members proclaimed as suspects. This was the death-blow of the club. It had made an attempt, though a weak one, to oppose the forward march of the Revolution, but, unlike the Jacobins, had never sent out branches into the provinces. The name of Feuillants, as a party designation, survived the club. It was applied to those who advocated a policy of "cowardly moderation," and *feuillantisme* was associated with *aristocratie* in the mouths of the sansculottes.

The act of separation of the Feuillants from the Jacobins was published in a pamphlet dated the 16th of July 1791, beginning with the words, *Les Membres de l'assemblée nationale* . . . (Paris, 1791). The statutes of the club were also published in Paris. See also A. Aulard, *Histoire politique de la Révolution française* (Paris, 1903), 2nd ed., p. 153.

FEUILLET, OCTAVE (1821–1890), French novelist and dramatist, was born at Saint-Lô, Manche, on the 11th of August 1821. He was the son of a Norman gentleman of learning and distinction, who would have played a great part in politics "sans ses diables de nerfs," as Guizot said. This nervous excitability was inherited, though not to the same excess, by Octave, whose mother died in his infancy and left him to the care of the hypersensitive invalid. The boy was sent to the lycée Louis-le Grand, in Paris, where he achieved high distinction, and was destined for the diplomatic service. In 1840 he appeared before his father at Saint-Lô, and announced that he had determined to adopt the profession of literature. There was a stormy scene, and the elder Feuillet cut off his son, who returned to Paris and lived as best he could by a scanty journalism. In company with Paul Bocage he began to write for the stage, and not without success; at all events, he continued to exist until, three years after the quarrel, his father consented to forgive him. Enjoying a liberal allowance, he now lived in Paris in comfort and independence, and he published his early novels, none of which is quite of sufficient value to retain the modern reader. The health and spirits of the elder M. Feuillet, however, having still further declined, he summoned his son to leave Paris and bury himself as his constant attendant in the melancholy château at Saint-Lô. This was to demand a great sacrifice, but Octave Feuillet cheerfully obeyed the summons. In 1851 he married his cousin, Mlle Valérie Feuillet, who helped him to endure the mournful captivity to which his filial duty bound him. Strangely enough, in this exile—rendered still more irksome by his father's mania for solitude and by his tyrannical temper—the genius of Octave Feuillet developed. His first definite success was gained in the year 1852, when he published the novel *Bellah* and produced the comedy *La Crise*. Both were reprinted from the *Revue des deux mondes*, where many of his later novels also appeared. He wrote books which have long held their place, *La Petite Comtesse* (1857), *Dalila* (1857), and in particular that universal favourite, *Le Roman d'un jeune homme pauvre* (1858). He himself fell into a nervous state in his "prison," but he was sustained by the devotion and intelligence of his wife and her mother. In 1857, having been persuaded to make a play of the novel of *Dalila*, he brought out this piece at the Vaudeville, and enjoyed a brilliant success; on this occasion he positively broke through the *consigne* and went up to Paris to see his play rehearsed. His father bore the shock of his temporary absence, and the following year Octave ventured to make the same experiment on occasion of the performance of *Un Jeune Homme pauvre.* To his infinite chagrin, during this brief absence his father died. Octave was now, however, free, and the family immediately moved to Paris, where they took part in the splendid social existence of the Second Empire. The elegant and distinguished young novelist became a favourite at court; his pieces were performed at Compiègne before they were given to the public, and on one occasion the empress Eugénie deigned to play the part of Mme de Pons in *Les Portraits de la Marquise*. Feuillet did not abandon the novel, and in 1862 he achieved a great success with *Sibylle*. His health, however, had by this time begun to decline, affected by the sad death of his eldest son. He determined to quit Paris, where the life was far too exciting for his nerves, and to regain the quietude of Normandy. The old château of the family had been sold, but he bought a house called "Les Paillers" in the suburbs of Saint-Lô, and there he lived, buried in his roses, for fifteen years. He was elected to the French Academy in 1862, and in 1868 he was made librarian of Fontainebleau palace, where he had to reside for a month or two in each year. In 1867 he produced his masterpiece of *Monsieur de Camors*, and in 1872 he wrote *Julia de Trécœur*, which is hardly less admirable. His last years, after the sale of "Les Paillers," were passed in a ceaseless wandering, the result of the agitation of his nerves. He was broken by sorrow and by ill-health, and when he passed away in Paris on the 29th of December 1890, his death was a release. His last book was *Honneur d'artiste* (1890). Among the too-numerous writings of Feuillet, the novels have lasted longer than the dramas;

of the former three or four seem destined to retain their charm as classics. He holds a place midway between the romanticists and the realists, with a distinguished and lucid portraiture of life which is entirely his own. He drew the women of the world whom he saw around him with dignity, with indulgence, with extraordinary penetration and clairvoyance. There is little description in his novels, which sometimes seem to move on an almost bare and colourless stage, but, on the other hand, the analysis of motives, of emotions, and of "the fine shades" has rarely been carried further. Few have written French with greater purity than Feuillet, and his style, reserved in form and never excessive in ornament, but full of wit and delicate animation, is in admirable uniformity with his subjects and his treatment. It is probably in *Sibylle* and in *Julia de Trécœur* that he can now be studied to most advantage, though *Monsieur de Camors* gives a greater sense of power, and though *Le Roman d'un jeune homme pauvre* still preserves its popularity.

See also Sainte-Beuve, *Nouveaux Lundis*, vol. v.; F. Brunetière, *Nouveaux Essais sur la littérature contemporaine* (1895). (E. G.)

FEUILLETON (a diminutive of the Fr. *feuillet*, the leaf of a book), originally a kind of supplement attached to the political portion of French newspapers. Its inventor was Bertin the elder, editor of the *Débats*. It was not usually printed on a separate sheet, but merely separated from the political part of the newspaper by a line, and printed in smaller type. In French newspapers it consists chiefly of non-political news and gossip, literature and art criticism, a chronicle of the fashions, and epigrams, charades and other literary trifles; and its general characteristics are lightness, grace and sparkle. The *feuilleton* in its French sense has never been adopted by English newspapers, though in various modern journals (in the United States especially) the sort of matter represented by it is now included. But the term itself has come into English use to indicate the instalment of a serial story printed in one part of a newspaper.

FEUQUIÈRES, ISAAC MANASSÈS DE PAS, Marquis de (1590–1640), French soldier, came of a distinguished family of which many members held high command in the civil wars of the 16th century. He entered the Royal army at the age of thirty, and soon achieved distinction. In 1626 he served in the Valtelline, and in 1628–1629 at the celebrated siege of La Rochelle, where he was taken prisoner. In 1629 he was made *Maréchal de Camp*, and served in the fighting on the southern frontiers of France. After occupying various military positions in Lorraine, he was sent as an ambassador into Germany, where he rendered important services in negotiations with Wallenstein. In 1636 he commanded the French corps operating with the duke of Weimar's forces (afterwards Turenne's "Army of Weimar"). With these troops he served in the campaigns of 1637 (in which he became lieutenant-general), 1638 and 1639. At the siege of Thionville (Diedenhofen) he received a mortal wound. His *lettres inédites* appeared (ed. Gallois) in Paris in 1845.

His son Antoine Manassès de Pas, Marquis de Feuquières (1648–1711), was born at Paris in 1648, and entered the army at the age of eighteen. His conduct at the siege of Lille in 1667, where he was wounded, won him promotion to the rank of captain. In the campaigns of 1672 and 1673 he served on the staff of Marshal Luxemburg, and at the siege of Oudenarde in the following year the king gave him command of the Royal Marine regiment, which he held until he obtained a regiment of his own in 1676. In 1688 he served as a brigadier at the siege of Philipsburg, and afterwards led a ravaging expedition into south Germany, where he acquired much booty. Promoted *Maréchal de Camp*, he served under Catinat against the Waldenses, and in the course of the war won the nickname of the "Wizard." In 1692 he made a brilliant defence of Speierbach against greatly superior forces, and was rewarded with the rank of lieutenant-general. He bore a distinguished part in Luxemburg's great victory of Neerwinden or Landen in 1693. Marshal Villeroi impressed him less favourably than his old commander Luxemburg, and the resumption of war in 1701 found him in disfavour in consequence. The rest of his life, embittered by the refusal of the marshal's baton, he spent in compiling his celebrated memoirs, which, coloured as they were by the personal animosities of the writer, were yet considered by Frederick the Great and the soldiers of the 18th century as the standard work on the art of war as a whole. He died in 1711. The *Mémoires sur la guerre* appeared in the same year and new editions were frequently published (Paris 1711, 1725, 1735, &c., London 1736, Amsterdam subsequently). An English version appeared in London 1737, under the title *Memoirs of the Marquis de Feuquières*, and a German translation (*Feuquières geheime Nachrichten*) at Leipzig 1732, 1738, and Berlin 1786. They deal in detail with every branch of the art of war and of military service.

FÉVAL, PAUL HENRI CORENTIN (1817–1887), French novelist and dramatist, was born on the 27th of September 1817, at Rennes in Brittany, and much of his best work deals with the history of his native province. He was educated for the bar, but after his first brief he went to Paris, where he gained a footing by the publication of his "Club des phoques" (1841) in the *Revue de Paris*. The *Mystères de Londres* (1844), in which an Irishman tries to avenge the wrongs of his countrymen by seeking the annihilation of England, was published under the ingenious pseudonym "Sir Francis Trolopp." Others of his novels are: *Le Fils du diable* (1846); *Les Compagnons du silence* (1857); *Le Bossu* (1858); *Le Poisson d'or* (1863); *Les Habits noirs* (1863); *Jean le diable* (1868), and *Les Compagnons du trésor* (1872). Some of his novels were dramatized, *Le Bossu* (1863), in which he had M. Victorien Sardou for a collaborator, being especially successful in dramatic form. His chronicles of crime exercised an evil influence, eventually recognized by the author himself. In his later years he became an ardent Catholic, and occupied himself in revising his earlier works from his new standpoint and in writing religious pamphlets. Reverses of fortune and consequent overwork undermined his mental and bodily health, and he died of paralysis in the monastery of the Brothers of Saint John in Paris on the 8th of March 1887.

His son, Paul Féval (1860–), became well known as a novelist and dramatist. Among his works are *Nouvelles* (1890), *Maria Laura* (1891), and *Chantepie* (1896).

FEVER (Lat. *febris*, connected with *fervere*, to burn), a term generally used to include all conditions in which the normal temperature of the animal body is markedly exceeded for any length of time. When the temperature reaches as high a point as 106° F. the term hyperpyrexia (excessive fever) is applied, and is regarded as indicating a condition of danger; while, if it exceeds 107° or 108° for any length of time, death almost always results. The diseases which are called specific fevers, because of its being a predominant factor in them, are discussed separately under their ordinary names. Occasionally in certain specific fevers and febrile diseases the temperature may attain the elevation of 110°-112° prior to the fatal issue. For the treatment of fever in general, see Therapeutics.

Pathology.—Every rise of temperature is due to a disturbance in the heat-regulating mechanism, the chief variable in which is the action of the skin in eliminating heat (see Animal Heat). Although for all practical purposes this mechanism works satisfactorily, it is not by any means perfect, and many physiological conditions cause a transient rise of temperature; *e.g.* severe muscular exercise, in which the cutaneous eliminating mechanism is unable at once to dispose of the increased amount of heat produced in the muscles. Pathologically, the heat-regulating mechanism may be disturbed in three different ways: 1st, by mechanical interference with the nervous system; 2nd, by interference with heat elimination; 3rd, by the action of various poisons.

1. In the human subject, fever the result of *mechanical interference* with the nervous system rarely occurs, but it can readily be produced in the lower animals by stimulating certain parts of the great brain, *e.g.* the anterior portion of the corpus striatum. This leads to a rise of temperature with increased heat production. The high temperature seems to cause distintegration of cell protoplasm and increased excretion of nitrogen and of carbonic acid. Possibly some of the cases of high temperature recorded

after injuries to the nervous system may be caused in this way; but some may also be due to stimulation of vaso-constrictor fibres to the cutaneous vessels diminishing heat elimination. So far the pathology of this condition has not been studied with the same care that has been devoted to the investigation of the third type of fever.

2. Fever may readily be produced by *interference with heat elimination.* This has been done by submitting dogs to a temperature slightly below that of the rectum, and it is seen in man in *Sunstroke.* The typical nervous symptoms of fever are thus produced, and the rate of chemical change in the tissues is accelerated, as is shown by the increased excretion of carbonic acid. The protoplasm is also injured and the proteids are broken down, and thus an increased excretion of nitrogen is produced and the cells undergo degenerative changes.

3. The products of various micro-organisms have a toxic action on the protoplasm of a large number of animals, and among the symptoms of this toxic action one of the most frequent is a rise in temperature. While this is by no means a necessary accompaniment, its occurrence is so general that the term *Fever* has been applied to the general reaction of the organism to the microbial poison. Toxins which cause a marked rise of temperature in men may cause a fall in other animals. It is not the alteration of temperature which is the great index of the severity of the struggle between the host and the parasite, but the death and removal to a greater or lesser extent of the protoplasm of the host. In this respect fever resembles poisoning with phosphorus and arsenic and other similar substances. The true measure of the intensity of a fever is the extent of disintegration of protoplasm, and this may be estimated by the amount of nitrogen excreted in the urine. The increased disintegration of protoplasm is also indicated by the rise in the excretion of sulphur and phosphorus and by the appearance in the urine of acetone, aceto-acetic and β-oxybutyric acids (see NUTRITION). Since the temperature is generally proportionate to the intensity of the toxic action, its height is usually proportionate to the excretion of nitrogen. But sometimes the rise of temperature is not marked, while the excretion of nitrogen is very decidedly increased. When the temperature is sufficiently elevated, the heat has of itself an injurious action on the protoplasm, and tends to increase disintegration just as when heat elimination is experimentally retarded. But the increase due to rise of temperature is small compared to that produced by the destructive action of the microbial products. In the beginning of a fever the *activity of the metabolism* is not increased to any marked extent, and any increase is necessarily largely due to the greater activity of the muscles of the heart and respiratory mechanism, and to the muscular contractions which produce the initial rigors. Thus the excretion of carbon dioxide—the great measure of the activity of metabolism—is not usually increased, and there is no evidence of an increased combustion. In the later stages the increased temperature may bring about an acceleration in the rate of chemical change; but this is comparatively slight, less in fact than the increase observed on taking muscular exercise after rest. The *rise of temperature* is primarily due to diminished heat elimination. This diminished giving off of heat was demonstrated by means of the calorimeter by I. Rosenthal, while E. Maragliano showed that the cutaneous vessels are contracted. Even in the later stages, until defervescence occurs, heat elimination is inadequate to get rid of the heat produced.

The toxic action is manifested not only by the increased disintegration of protoplasm, but also by disturbances in the functions of the various organs. The activity of the *digestive glands* is diminished and appetite is lost. Food is therefore not taken, although when taken it appears to be absorbed in undiminished quantities. As a result of this the patient suffers from inanition, and lives largely on his own fats and proteids, and for this reason rapidly emaciates. The functions of the *liver* are also diminished in activity. Glycogen is not stored in the cells, and the bile secretion is modified, the essential constituents disappearing almost entirely in some cases. The production of urea is also interfered with, and the proportion of nitrogen in the urine not in the urea increases. This is in part due to the increased disintegration of proteids setting free sulphur and phosphorus, which, oxidized into sulphuric and phosphoric acids, combine with the ammonia which would otherwise have been changed to urea. Thus the proportion of ammonia in the urine is increased. Concurrently with these alterations in the functions of the liver-cells, a condition of granular degeneration and probably a state of fatty degeneration makes its appearance. That the functional activity of the *kidneys* is modified, is shown by the frequent appearance of proteoses or of albumen and globulin in the urine. Frequently the toxin acts very markedly on the protoplasm of the kidney epithelium, and causes a shedding of the cells and sometimes inflammatory reaction. The *muscles* are weakened, but so far no satisfactory study has been made of the influence of microbial poisons on muscular contraction. A granular and fatty degeneration supervenes, and the fibres waste. The *nervous structures*, especially the nerve-cells, are acted upon, and not only is their functional activity modified, but they also undergo structural changes of a chromatolytic nature. The *blood* shows two important changes—first, a fall in the alkalinity due to the products of disintegration of protoplasm; and, secondly, an increase in the number of leucocytes, and chiefly in the polymorpho-nuclear variety. This is best marked in pneumonia, where the normal number is often increased twofold and sometimes more than tenfold, while it is altogether absent in enteric fever.

An interesting general modification in the metabolism is the enormous fall in the excretion of chlorine, a fall far in excess of what could be accounted for by inanition, and out of all proportion to the fall in the sodium and potassium with which the chlorine is usually combined in the urine. The fevered animal in fact stores chlorine in its tissues, though in what manner and for what reason is not at present known.

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FEYDEAU, ERNEST-AIMÉ (1821–1873), French author, was born in Paris, on the 16th of March 1821. He began his literary career in 1844, by the publication of a volume of poetry, *Les Nationales*. Either the partial failure of this literary effort, or his marriage soon afterwards to a daughter of the economist Blanqui, caused him to devote himself to finance and to archaeology. He gained a great success with his novel *Fanny* (1858), a success due chiefly to the cleverness with which it depicted and excused the corrupt manners of a certain portion of French society. This was followed in rapid succession by a series of fictions, similar in character, but wanting the attraction of novelty; none of them enjoyed the same vogue as *Fanny*. Besides his novels Feydeau wrote several plays, and he is also the author of *Histoire générale des usages funèbres et des sépultures des peuples anciens* (3 vols., 1857–1861); *Le Secret du bonheur* (sketches of Algerian life) (2 vols., 1864); and *L'Allemagne en 1871* (1872), a clever caricature of German life and manners. He died in Paris on the 27th of October 1873.

See Sainte-Beuve, *Causeries du lundi*, vol. xiv., and Barbey d'Aurevilly, *Les Œuvres et les hommes au XIX^e siècle*.

FEZ (*Fās*), the chief city of Morocco, into which empire it was incorporated in 1548. It lies in 34° 6′ 3″ N., 4° 38′ 15″ W., about 230 m. N.E. of Marrākesh, 100 m. E. from the Atlantic and 85 m. S. of the Mediterranean. It is beautifully situated in a deep valley on the Wad Fās, an affluent of the Wad Sebu, which divides the town into two parts—the ancient town, Fās el Bali, on the right bank, and the new, Fās el Jadīd, on the left.

Like many other Oriental cities, Fez from a distance appears a very attractive place. It stretches out between low hills, crowned by the ruins of ancient fortresses, and though there is nothing imposing, there is something particularly impressive in the sight of that white-roofed conglomeration of habitations, broken only by occasional mosque towers or, on the outskirts, by luxuriant foliage. Except on the south side the city is surrounded by hills, interspersed with groves of orange, pomegranate and other fruit trees, and large olive gardens.

From its peculiar situation Fez has a drainage superior to that of most Moorish towns. When the town becomes very dirty, the water is allowed to run down the streets by opening lids for the purpose in the conduits and closing the ordinary exits, so that it overflows and cleanses the pavements. The Fasis as a rule prefer to drink the muddy river water rather than that of the pure springs which abound in certain quarters of the town. But the assertion that the supply and drainage system are one is a libel, since the drainage system lies below the level of the fresh river water, and was organized by a French renegade, under Mohammed XVI., about the close of the 18th century. The general dampness of the town renders it unhealthy, however, as the pallid faces of the inhabitants betoken, but this is considered a mark of distinction and is jealously guarded.

Most of the streets are exceedingly narrow, and as the houses are high and built in many cases over the thoroughfares these are often very dark and gloomy, though, since wooden beams, rough stones and mortar are used in building, there is less of that ruined, half-decayed appearance so common in other Moorish towns where mud concrete is the material employed.

As a commercial town Fez is a great depot for the trade of Barbary and wares brought from the east and south by caravans. The manufactures still carried on are those of yellow slippers of the famous Morocco leather, fine white woollen and silk haiks, of which it is justly proud, women's embroidered sashes, various coarse woollen cloths and blankets, cotton and silk handkerchiefs, silk cords and braids, swords and guns, saddlery, brass trays, Moorish musical instruments, rude painted pottery and coloured tiles. Until recent times the city had a monopoly of the manufacture of Fez caps, for it was supposed that the dye which imparts the dull crimson hue of these caps could not be procured elsewhere; they are now, however, made both in France and Turkey. The dye is obtained from the juice of a berry which grows in large quantities near the town, and is also used in the dyeing of leather. Some gold ornaments are made, the gold being brought from the interior by caravans which trade regularly with Timbuktu.

As in other capitals each trade has a district or street devoted chiefly to its activities. Old Fez is the business portion of the town, new Fez being occupied principally by government quarters and the Jews' mellah. The tradesman usually sits cross-legged in a corner of his shop with his goods so arranged that he can reach most of them without moving.

In the early days of Mahommedan rule in Morocco, Fez was the seat of learning and the empire's pride. Its schools of religion, philosophy and astronomy enjoyed a great reputation in Africa and also in southern Europe, and were even attended by Christians. On the expulsion of the Moors from Spain, refugees of all kinds flocked to Fez, and brought with them some knowledge of arts, sciences and manufactures, and thither flocked students to make use of its extensive libraries. But its glories were brief, and though still "the university town" of Morocco, it retains but a shadow of its greatness. Its library, estimated by Gerhard Rohlfs in 1861 to contain 5000 volumes, is open on Fridays, and any Moor of known respectability may borrow volumes on getting an order and signing a receipt for them. There are about 1500 students who read at the Karueein. They pay no rents, but buy the keys of the rooms from the last occupants, selling them again on leaving.

The Karueein is celebrated as the largest mosque in Africa, but it is by no means the most magnificent. On account of the vast area covered, the roof, supported by three hundred and sixty-six pillars of stone, appears very low. The side chapel for services for the dead contains twenty-four pillars. All these columns support horse-shoe arches, on which the roof is built, long vistas of arches being seen from each of the eighteen doors of the mosque. The large lamp is stated to weigh 1763 lb and to have 509 lights, but it is very seldom lit. The total number of lights in the Karueein is given as seventeen hundred, and they are said to require 3½ cwt. of oil for one filling. The mosque of Mulai Idris, built by the founder of Fez about the year 810, is considered so sacred that the streets which approach its entrance are forbidden to Jews, Christians or four-footed beasts. The sanctity of the shrine in particular is esteemed very great, and this accounts for the crowds which daily flock to it. The Tumiat door leading to it was once very fine, but is now much faded. Opposite to it is a refuge for friendless sharifas—the female descendants of Mahomet—built by Mohammed XVII.

It is believed that the foundation stone of Fez was laid in 808 by Idris II. Since then its history has been chequered, as it was successfully besieged no fewer than eight times in the first five hundred years of its existence, yet only once knew foreign masters, when in 1554 the Turks took possession of it without a siege and held it for a short time. Fez became the chief residence of the Filali dynasty, who obtained possession of the town in 1649 (see further MOROCCO: *History*).

The population has been very varyingly estimated; probably the inhabitants number under one hundred thousand, even when the court is in residence.

See H. Gaillard, *Une Ville de l'Islam. Fès* (Paris, 1905); C. René-Leclerc, "Le commerce et l'industrie à Fez" in *Renseignements col. comité afrique française* (1905).

FEZZAN (the ancient *Phazania*, or country of the Garamantes), a region of the Sahara, forming a "kaimakamlik" of the Ottoman vilayet of Tripoli (*q.v.*). Its frontiers, ill-defined, run from Bonjem, within 50 m. of the Mediterranean on the north, south-westward to the Akakus range of hills, which separates Fezzan from Ghat, thence eastward for over 400 m., and then turn north and west to Bonjem again, embracing an area of about 156,000 sq. m.

Physical Features.—The general form of the country is determined by the ranges of hills, including the Jebel-es-Suda (highest peak about 4000 ft.), the Haruj-el-Aswad and the Haruj-el-Abiad, which between 14° and 19° E. and 27° and 29° N. form the northern edge of a broad desert plateau, and shut off the northern region draining to the Mediterranean from the depressions in which lie the oases of Fezzan proper in the south. The central depression of Hofra ("ditch"), as it is called, lies in about 26° N. It does not form a continuous fertile tract, but consists of a monotonous sandy expanse somewhat more thickly studded with oases than the surrounding wastes. The Hofra at its lowest part is not more than 600 ft. above the sea-level, and in this hollow is situated the capital Murzuk. It has a general east to west direction. North-west of the Hofra is a long narrow valley, the Wadi-el-Gharbi, which trends north-east and is the most fertile district of Fezzan. It contains several perennial springs and lake-like basins. One of these basins, the saline Bahr-el-Dud ("Sea of Worms"), has an extent of 600 sq. m., and is in places 26 ft. deep. Southwards the Hofra rises to a height of 2000 ft., and in this direction lies the oasis of Gatron, followed by Tejerri on the verge of the desert, which marks the southern limit of the date and the northern of the dum palm. Beyond Tejerri the Saharan plateau rises continuously to the Tibesti highlands. (See further TRIPOLI.)

Climate.—The average temperature of Murzuk was found by Rohlfs to be 70° F. Frost is not uncommon in the winter months. The climate is a very regular one, and is in general healthy, the dryness of the air in summer making the heat more bearable than on the sea coast. An almost perpetual blue sky overhangs the desert, and the people of Fezzan are so unaccustomed to and so ill-prepared for wet weather that, as in Tuat and Tidikelt, they pray to be spared from rain. Water is found almost everywhere at small depths.

Flora and Fauna.—The date-palm is the characteristic tree of Fezzan, and constitutes the chief wealth of the land. Many different kinds of date-palms are found in the oases: in that of Murzuk alone more than 30 varieties are counted, the most esteemed being named the Tillis, Tuati and Auregh. In all Fezzan the date is the staple food, not only for men, but for camels, horses and dogs. Even the stones of the fruit are softened and given to the cattle. The huts of the poorer classes are entirely made of date-palm leaves, and the more substantial habitations consist chiefly of the same material. The produce of the tree is small, 100 full-grown trees yielding only about 40 cwt. of dates. Besides the date there are numerous olive, fig and almond trees. Various grains are cultivated. Wheat and barley are sown in winter, and in spring, summer and autumn several kinds of durra, especially ksob and gafoli. Cotton flourishes, is perennial for six or seven years, and gives large pods of moderate length of staple.

There are no large carnivora in Fezzan. In the uninhabited oases gazelles and antelopes are occasionally found. The most important animal is the camel, of which there are two varieties, the Tebu or Sudan camel and the Arabian, differing very much in size, form and capabilities. Horses and cattle are not numerous. Among birds are ostriches, falcons, vultures, swallows and ravens; in summer wild pigeons and ducks are numerous, but in winter they seek a warmer climate. There are no remarkable insects or snakes. A species of *Artemia* or brine shrimp, about a quarter of an inch in length, of a colour resembling the bright hue of the gold fish, is fished for with cotton nets in the "Sea of Worms," and mixed with dates and kneaded into a paste, which has the taste and smell of salt herring, is considered a luxury by the people of Fezzan.

Inhabitants.—The total population is estimated at between 50,000 and 80,000. The inhabitants are a mixed people, derived from the surrounding Teda and Bornu on the south, Tuareg of the plateaus on the west, Berbers and Arabs from the north. The primitive inhabitants, called by their Arab conquerors Berāuna, are believed to have been of Negro origin. They no longer persist as a distinct people. In colour the present inhabitants vary from black to white, but the prevailing hue of skin is a Malay-like yellow, the features and woolly hair being Negro. The chief languages are the Kanuri or Bornu language and Arabic. Many understand Targish, the Teda and the Hausa tongues. If among such a mixed people there can be said to be any national language, it is that of Bornu, which is most widely understood and spoken. The people of Sokna, north of the Jebel-es-Suda, have a peculiar Berber dialect which Rohlfs found to be very closely allied to that of Ghadames. The men wear a haik or barakan like those of Tripoli, and a fez; short hose, and a large loose shirt called mansarīa, with red or yellow slippers, complete their toilet. Yet one often sees the large blue or white *tobe* of Bornu, and the *litham* or shawl-muffler of the Tuareg, wound round the mouth to keep out the blown sand of the desert. The women, who so long as they are young have very plump forms, and who are generally small, are more simply dressed, as a rule, in the barakan, wound round their bodies; they seldom wear shoes, but generally have sandals made of palm leaf. Like the Arab women they load arms and legs with heavy metal rings, which are of silver among the more wealthy. The hair, thickly greased with butter, soon catching the dust which forms a crust over it, is done up in numberless little plaits round the head, in the same fashion as in Bornu and the Hausa countries. Children run about naked until they attain the age of puberty, which comes very early, for mothers of ten or twelve years of age are not uncommon. The Fezzani are of a gay disposition, much given to music and dancing.

Towns and Trade.—Murzuk, the present capital, which is in telegraphic communication with the town of Tripoli, lies in the western corner of the Hofra depression, in 25° 55′ N. and 14° 10′ E. It was founded about 1310, about which time the *kasbah* or citadel was built. The Turks repaired it, as well as the town-wall, which has, however, again fallen into a ruinous condition. Murzuk, which had in 1906 some 3000 inhabitants, is cut in two by a wide street, the *dendal*. The citadel and most of the houses are built of salt-saturated dried mud. Sokna, about midway between Tripoli and Murzuk, situated on a great gravel plain north of the Suda range, has a population of about 2500. Garama (Jerma-el-Kedima), the capital under the Garamantes and the Romans, was in the Wadi-el-Gharbi. It was a flourishing town at the time of the Arab conquest but is now deserted. Among the ruins is a well-preserved stone monument marking the southern limit of the Roman dominions in this part of Africa. The modern Jerma is a small place a little north of the site of Garama. Zuila, the capital under the Arabs, lies in a depression called the Sherguia east of Murzuk on the most direct caravan route to Barca and Egypt. Of Traghen, the capital under the Nesur dynasty, which was on the same caravan route and between Zuila and Murzuk, little besides the ruined kasbah remains.

Placed roughly midway between the countries of the central Sudan and Tripoli, Fezzan serves as a depot for caravans crossing the Sahara; its commerce is unimportant. Its most important export is that of dates. Slave dealing, formerly the most lucrative occupation of the people, is moribund owing to the stoppage of slave raiding by the European governments in their Sudan territories.

History.—The country formed part of the territory of the Garamantes, described by Herodotus as a very powerful people. Attempts have been made to identify the Garamantes with the Berāuna of the Arabs of the 7th century, and to the period of the Garamantes Duveyrier assigns the remains of remarkable hydraulic works, and certain tombs and rock sculptures—indications, it is held, of a Negro civilization of ancient date which existed in the northern Sahara. The Garamantes, whether of Libyan or Negro origin, had certainly a considerable degree of civilization when in the year 19 B.C. they were conquered by the proconsul L. Cornelius Balbus Minor and their country added to the Roman empire. By the Romans it was called Phazania, whence the present name Fezzan. After the Vandal invasion Phazania appears to have regained independence and to have been ruled by a Berāuna dynasty. At this time the people were Christians, but in 666 the Arabs conquered the country and all traces of Christianity seem speedily to have disappeared. Subject at first to the caliphs, an independent Arab dynasty, that of the Beni Khattab, obtained power early in the 10th century. In the 13th century the country came under the rule of the king of Kanem (Bornu), but soon afterwards the Nesur, said to have been a native or Berāuna dynasty, were in power. More probably the Nesur were hereditary governors originally appointed by the rulers of Kanem. In the 14th century the Nesur were conquered and dethroned by an Arab tribe, that of Khorman, who reduced the people of Fezzan to a state of slavery, a position from which they were rescued about the middle of the 16th century by a sherif of Morocco, Montasir-b.-Mahommed, who founded the dynasty of Beni Mahommed. This dynasty, which came into frequent conflict with the Turks, who had about the same time that Montasir secured Fezzan established themselves in Tripoli, gradually extended its borders as far as Sokna in the north. It was the Beni Mahommed who chose Murzuk as their capital. They became intermittently tributary to the pasha of Tripoli, but within Fezzan the power of the sultans was absolute. They maintained a bodyguard of mamelukes, mostly Europeans—Greeks, Genoese, or their immediate descendants. The annual tribute was paid to the pasha either in money or in gold, senna or slaves. The last of the Beni Mahommed sultans was killed in the vicinity of Traghen in 1811 by El-Mukkeni, one of the lieutenants of Yusef Pasha, the last sovereign but one of the independent Karamanli dynasty of Tripoli. El-Mukkeni now made himself sultan of Fezzan, and became notorious by his slaving expeditions into the central Sudan, in which he advanced as far as Bagirmi. In 1831, Abd-el-Jelil, a chief of the Walid-Sliman Arabs, usurped the sovereign authority. After a troublous reign of ten years he was slain in battle by a Turkish force under Bakir Bey, and Fezzan was added to the Turkish empire. Towards the end of the 19th century the Turks, alarmed at the increase of French influence in the neighbouring countries, reinforced their garrison in Fezzan. The kaimakamlik is said to yield an annual revenue of £6000 only to the Tripolitan treasury.

AUTHORITIES.—The most notable of the European travellers who have visited Fezzan, and to whose works reference should be made for more detailed information regarding it, are, taking them in the order of date, as follows: F. Hornemann, 1798; G. F. Lyon, 1819; D. Denham, H. Clapperton and W. Oudney, 1822; J. Richardson, 1845; H. Barth, 1850–1855; E. Vogel, 1854; H. Duveyrier, 1859–1861; M. von Beurmann, 1862; G. Rohlfs, 1865; G. Nachtigal, 1869; P. L. Monteil, 1892; H. Vischer, 1906. Nachtigal's *Sahara und Sudan*, vol. i. (Berlin, 1879), gathers up much of the information in earlier works, and a list of the Beni Mahommed sovereigns is given in A. M. H. J. Stokvis, *Manuel d'histoire*, vol. i. (Leiden, 1888), p. 471. Miss Tinné (*q.v.*), who travelled with Nachtigal as far as Murzuk, was shortly afterwards murdered at the Sharaba wells on the road to Ghat.

FIACRE, SAINT (Celt. *Fiachra*), an anchorite of the 7th century, of noble Irish descent. We have no information concerning his life in his native country. His *Acta*, which have scarcely any historical value, relate that he left Ireland, and came to France with his companions. He approached St Faro, the bishop of Meaux, to whom he made known his desire to live a life of solitude in the forest. St Faro assigned him a spot called Prodilus (Brodolium), the modern Breuil, in the province of Brie. There St Fiacre built a monastery in honour of the Holy Virgin, and to it added a small house for guests, to which he himself withdrew. Here he received St Chillen (? Killian), who was returning from a pilgrimage to Rome, and here he remained until his death, having acquired a great reputation for miracles. His remains rested for a long time in the place which he had sanctified. In 1568, at the time of the religious troubles, they were transferred to the cathedral of Meaux, where his shrine may still be seen in the sacristy. Various relics of St Fiacre were given to princes and great personages. His festival is celebrated on the 30th of August. He is the patron of Brie, and gardeners invoke him as their protector. French hackney-coaches received the name of *fiacre* from the Hôtel St Fiacre, in the rue St Martin, Paris, where one Sauvage, who was the first to provide cabs for hire, kept his vehicles.

See *Acta Sanctorum*, Augusti vi. 598-620; J. O'Hanlon, *Lives of the Irish Saints*, viii. 421-447 (Dublin, 1875–1904); J. C. O'Meagher, "Saint Fiacre de la Brie," in *Proceedings of the Royal Irish Academy*, 3rd series, ii. 173-176. (H. De.)

FIARS PRICES, in the law of Scotland, the average prices of each of the different sorts of grain grown in each county, as fixed annually by the sheriff, usually after the verdict of a jury; they serve as a rule for ascertaining the value of the grain due to feudal superiors, to the clergy or to lay proprietors of teinds, to landlords as a part or the whole of their rents and in all cases where the price of grain has not been fixed by the parties. It is not known when or how the practice of "striking the fiars," as it is called, originated. It probably was first used to determine the value of the grain rents and duties payable to the crown. In confirmation of this view it seems that at first the duty of the sheriffs was merely to make a return to the court of exchequer of the prices of grain within their counties, the court itself striking the fiars; and from an old case it appears that the fiars were struck above the true prices, being regarded rather as punishments to force the king's tenants to pay their rents than as the proper equivalent of the grain they had to pay. Co-existent, however, with these fiars, which were termed sheriffs' fiars, there was at an early period another class called commissaries' fiars, by which the values of teinds were regulated. They have been traced back to the Reformation, and were under the management of the commissary or consistorial courts, which then took the place of the bishops and their officials. They have now been long out of use, but they were perhaps of greater antiquity than the sheriffs' fiars, and the model upon which these were instituted. In 1723 the court of session passed an Act of Sederunt for the purpose of regulating the procedure in fiars courts. Down to that date the practice of striking the fiars was by no means universal over Scotland; and even in those counties into which it had been introduced, there was, as the preamble of the act puts it, "a general complaint that the said fiars are struck and given out by the sheriffs without due care and inquiry into the current and just prices." The act in consequence provided that all sheriffs should summon annually, between the 4th and the 20th of February, a competent number of persons, living in the shire, of experience in the prices of grain within its bounds, and that from these they should choose a jury of fifteen, of whom at least eight were to be heritors; that witnesses and other evidence as to the price of grain grown in the county, especially since the 1st of November preceding until the day of inquiry, were to be brought before the jury, who might also proceed on "their own proper knowledge"; that the verdict was to be returned and the sentence of the sheriff pronounced by the 1st of March; and further, where custom or expediency recommended it, the sheriff was empowered to fix fiars of different values according to the different qualities of the grain. It cannot be said that this act has remedied all the evils of which it complained. The propriety of some of its provisions has been questioned, and the competency of the court to pass it has been doubted, even by the court itself. Its authority has been entirely disregarded in one county—Haddingtonshire—where the fiars are struck by the sheriff alone, without a jury; and when this practice was called in question the court declined to interfere, observing that the fiars were better struck in Haddingtonshire than anywhere else. The other sheriffs have in the main followed the act, but with much variety of detail, and in many instances on principles the least calculated to reach the true average prices. Thus in some counties the averages are taken on the number of transactions, without regard to the quantities sold. In one case, in 1838, the evidence was so carelessly collected that the second or inferior barley fiars were 2s. 4d. higher than the first. Formerly the price was struck by the boll, commonly the Linlithgowshire boll; now the imperial quarter is always used.

The origin of the plural word fiars (feors, feers, fiers) is uncertain. Jamieson, in his *Dictionary*, says that it comes from the Icelandic *fe*, wealth; Paterson derives it from an old French word *feur*, an average; others connect it with the Latin *forum* (*i.e.* market). The *New English Dictionary* accepts the two latter connexions. On the general subject of fiars prices see Paterson's *Historical Account of the Fiars in Scotland* (Edin., 1852); Connell, *On Tithes*; Hunter's *Landlord and Tenant*.

FIBRES (or FIBERS, in American spelling; from Lat. *fibra*, apparently connected either with *filum*, thread, or *findere*, to split), the general term for certain structural components of animal and vegetable tissue utilized in manufactures, and in respect of such uses, divided for the sake of classification into textile, paper-making, brush and miscellaneous fibres.

I. *Textile Fibres* are mostly products of the organic world, elaborated in their elongated form to subserve protective functions in animal life (as wool and epidermal hairs, &c.) or as structural components of vegetable tissues (flax, hemp and wood cells). It may be noted that the inorganic world provides an exception to this general statement in the fibrous mineral asbestos (*q.v.*), which is spun or twisted into coarse textiles. Other silicates are also transformed by artificial processes into fibrous forms, such as "glass," which is fused and drawn or spun to a continuous fibre, and various "slags" which, in the fused state, are transformed into "slag wool." Lastly, we note that a number of metals are drawn down to the finest dimensions, in continuous lengths, and these are woven into cloth or gauze, such metallic cloths finding valuable applications in the arts. Certain metals in the form of fine wire are woven into textile fabrics used as dress materials. Such exceptional applications are of insignificant importance, and will not be further considered in this article.

The common characteristics of the various forms of matter comprised in the widely diversified groups of textile fibres are those of the colloids. Colloidal matter is intrinsically devoid of structure, and in the mass may be regarded as homogeneous; whereas crystalline matter in its proximate forms assumes definite and specific shapes which express a complex of internal stresses. The properties of matter which condition its adaptation to structural functions, first as a constituent of a living individual, and afterwards as a textile fibre, are homogeneous continuity of substance, with a high degree of interior cohesion, and associated with an irreducible minimum of elasticity or extensibility. The colloids show an infinite diversity of variations in these essential properties: certain of them, and notably cellulose (*q.v.*), maintain these characteristics throughout a cycle of transformations such as permit of their being brought into a soluble plastic form, in which condition they may be drawn into filaments in continuous length. The artificial silks or lustra-celluloses are produced in this way, and have already taken an established position as staple textiles. For a more detailed account of these products see CELLULOSE.

The animal fibres are composed of nitrogenous colloids of which the typical representatives are the albumens, fibrines and gelatines. They are of highly complex constitution and their characteristics have only been generally investigated. The vegetable fibre substances are celluloses and derivatives of celluloses, also typically colloidal bodies. The broad distinction between the two groups is chiefly evident in their relationship to alkalis. The former group are attacked, resolved and finally dissolved, under conditions of action by no means severe. The celluloses, on the other hand, and therefore the vegetable fibres, are extraordinarily resistant to the action of alkalis.

The animal fibres are relatively few in number but of great industrial importance. They occur as detached units and are of varying dimensions; sheep's wool having lengths up to 36 in., the fleeces being shorn for textile uses at lengths of 2 to 16 in.; horse hair is used in lengths of 4 to 24 in., whereas the silks may be considered as being produced in continuous length, "reeled silks" having lengths measured in hundreds of yards, but "spun silks" are composed of silk fibres purposely broken up into short lengths.

The vegetable fibres are extremely numerous and of very diversified characteristics. They are individualized units only in the case of seed hairs, of which cotton is by far the most important; with this exception they are elaborated as more or less complex aggregates. The bast tissues of dicotyledonous annuals furnish such staple materials as flax, hemp, rhea or ramie and jute. The bast occurs in a peripheral zone, external to the wood and beneath the cortex, and is mechanically separated from the stem, usually after steeping, followed by drying.

The commercial forms of these fibres are elongated filaments composed of the elementary bast cells (ultimate fibres) aggregated into bundles. The number of these as any part of the filament may vary from 3 to 20 (see figs.). In the processes of refinement preparatory to the spinning (hackling, scutching) and in the spinning process itself, the fibre-bundles are more or less subdivided, and the divisibility of the bundles is an element in the textile value of the raw material. But the value of the material is rather determined by the length of the ultimate fibres (for, although not the spinning unit, the tensile strength of the yarn is ultimately limited by the cohesion of these fibres), qualified by the important factor of uniformity.

Thus, the ultimate fibre of flax has a length of 25 to 35 mm.; jute, on the other hand, 2 to 3 mm.; and this disparity is an essential condition of the difference of values of these fibres. Rhea or ramie, to cite another typical instance, has an ultimate fibre of extraordinary length, but of equally conspicuous variability, viz. from 50 to 200 mm. The variability is a serious impediment in the preparation of the material for spinning, and this defect, together with low drawing or spinning quality, limits the applications of this fibre to the lower counts or grades of yarn.

The monocotyledons yield still more complex fibre aggregates, which are the fibro-vascular bundles of leaves and stems. These complex structures as a class do not yield to the mechanical treatment by which the bast fibres are subdivided, nor is there any true spinning quality such as is conditioned by bringing the ultimate fibres into play under the drawing process, which immediately precedes the twisting into yarn. Such materials are therefore only used for the coarsest textiles, such as string or rope. An exception to be noted in passing is to be found in the pine apple (*Ananassa Sativa*) the fibres of which are worked into yarns and cloth of the finest quality. The more important fibres of this class are manila, sisal, phormium. A heterogeneous mass of still more complex fibre aggregates, in many cases the entire stem (cereal straws, esparto), in addition to being used in plaited form, *e.g.* in hats, chairs, mats, constitute the staple raw material for paper manufacturers, requiring a severe chemical treatment for the separation of the ultimate fibres.

In this class we must include the woods which furnish wood pulps of various classes and grades. Chemical processes of two types, (*a*) acid and (*b*) alkaline, are also employed in resolving the wood, and the resolution not only effects a complete isolation of the wood cells, but, by attacking the hydrolysable constituents of the wood substance (lignocellulose), the cells are obtained in the form of cellulose. These cellulose pulps are known in commerce as "sulphite pulps" and "soda pulps" respectively. In addition to these raw materials or "half stuffs" the papermaker employs the rejecta of the vegetable and textile industries, scutching, spinning and cloth wastes of all kinds, which are treated by chemical (boiling) and mechanical means (beating) to separate the ultimate fibres and reduce them to the suitable dimensions (0·5-2·0 mm.). These papermaking fibres have also to be reckoned with as textile raw materials, in view of a new and growing industry in "pulp yarns" (*Papierstoffgarn*), a coarse textile obtained by treating paper as delivered in narrow strips from the paper machine; the strips are reeled, dried to retain 30-40% moisture, and in this condition subjected to the twisting operation, which confers the cylindrical form and adds considerably to the strength of the fibrous strip. The following are the essential characteristics of the economically important fibres.

Animal.—A. Silk. (*a*) The true silks are produced by the *Bombyx Mori*, the worm feeding on the leaves of the mulberry. The fibre is extruded as a viscous liquid from the glands of the worm, and solidifies to a cylindrical thread. The cohesion of these threads in pairs gives to raw silk the form of a dual cylinder (Plate I. fig. 2). For textile purposes the thread is reeled from the cocoon, and several units, five and upwards, are brought together and suitably twisted. (*b*) The "Wild" silks are produced by a large variety of insects, of which the most important are the various species of Antherea, which yield the Tussore silks. These silks differ in form and composition from the true silks. While they consist of a "dual" thread, each unit of these is complex, being made up of a number of fibrillae. This unit thread is quadrangular in section, and of larger diameter than the true silk, the mean breadth being 0·052 mm., as compared with 0·018, the mean diameter of the true silks. The variations in structure as well as in dimensions are, however, very considerable.

B. Epidermal hairs. Of these (*a*) wool, the epidermal protective covering of sheep, is the most important. The varying species of the animal produce wools of characteristic qualities, varying considerably in fineness, in length of staple, in composition and in spinning quality. Hence the classing of the fleeces or raw wool followed by the elaborate processes of selection, *i.e.* "sorting" and preparation, which precede the actual spinning or twisting of the yarn. These consist in entirely freeing the fibres and sorting them mechanically (combing, &c.), thereafter forming them into continuous lengths of parallelized units. This is followed by the spinning process which consists in a simultaneous drawing and twisting, and a continuous production of the yarn with the structural characteristics of *worsted* yarns. The shorter staple—from 5 to 25% of average fleeces—is prepared by the "carding" process for the spinning operation, in which drawing and twisting are simultaneous, the length spun being then wound up, and the process being consequently intermittent. This section of the industry is known as "woollen spinning" in contrast to the former or "worsted spinning."

(*b*) An important group of raw material closely allied to the wools are the epidermal hairs of the Angora goat (mohair), the llama, alpaca. Owing to their form and the nature of the substance of which they are composed, they possess more lustre than the wools. They present structural differences from sheep wools which influence the processes by which they are prepared or spun, and the character of the yarns; but the differences are only of subordinate moment.

(*c*) Various animal hairs, such as those of the cow, camel

FIBRES

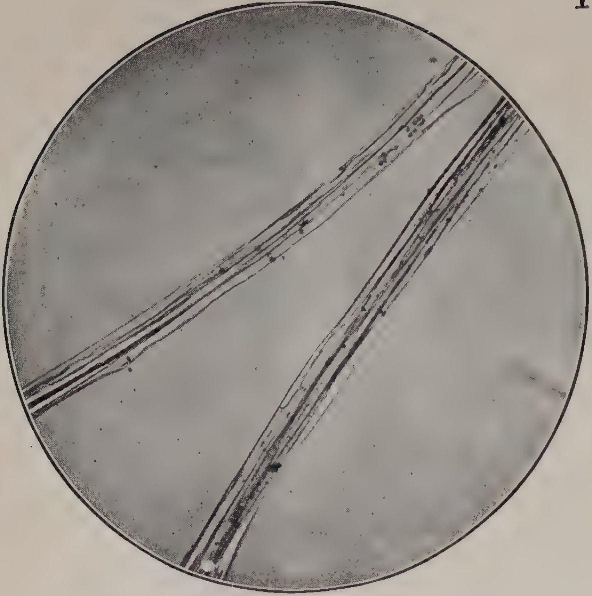


FIG. 1.—RAW SILK. *Bombyx mori.* Filament of bave, viewed in length. × 110.

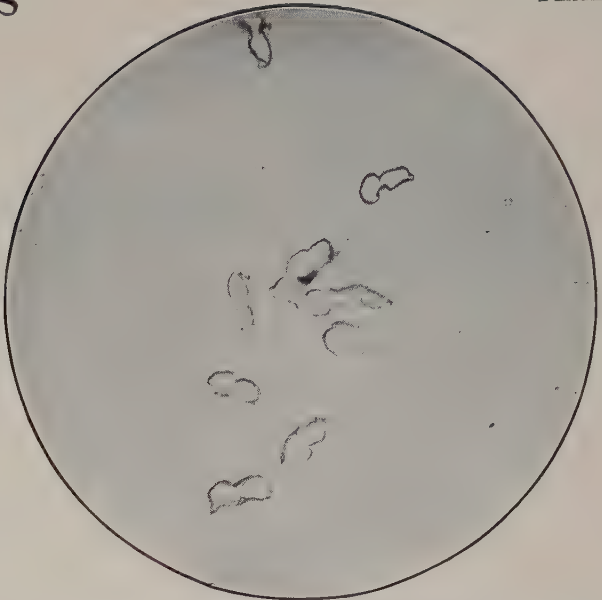


FIG. 2.—RAW SILK. *Bombyx mori.* Single fibres in transverse section showing each fibre or "bave" as dual cylinder. × 235.

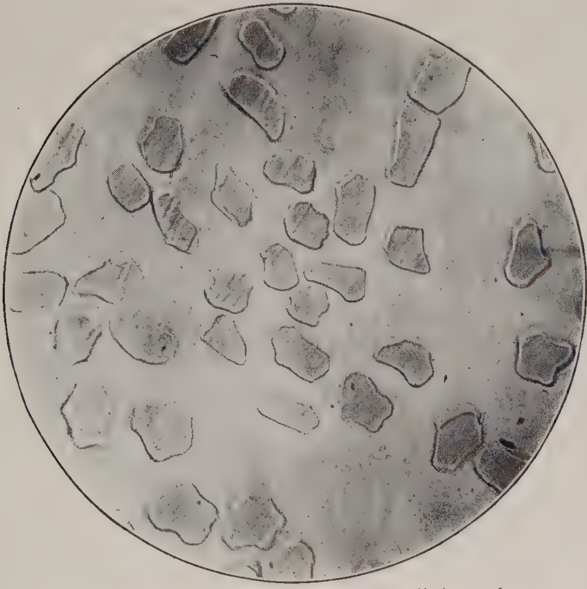


FIG 3—ARTIFICIAL "SILK" Lustra-cellulose viscose process, single fibres in transverse section × 235 Normal type—polygon of 5 sides—with concave sides due to contact of the component units of textile filament

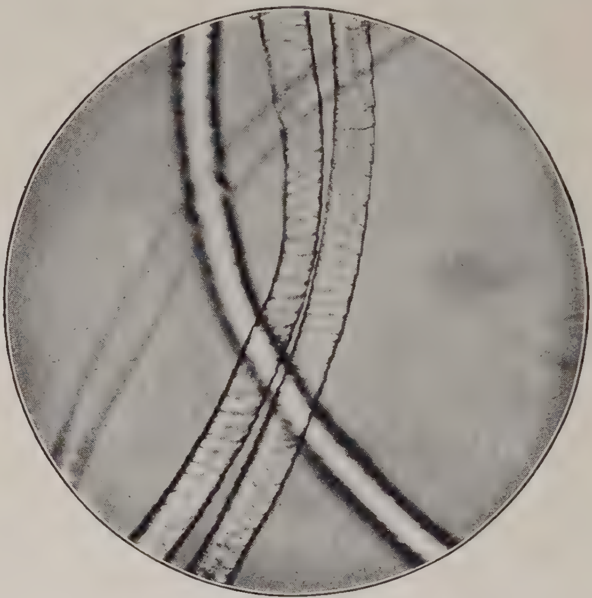


FIG. 4.—WOOL FIBRES. Australian merino viewed in length, × 235. Surface imbrications—the structural cause of true felting properties.

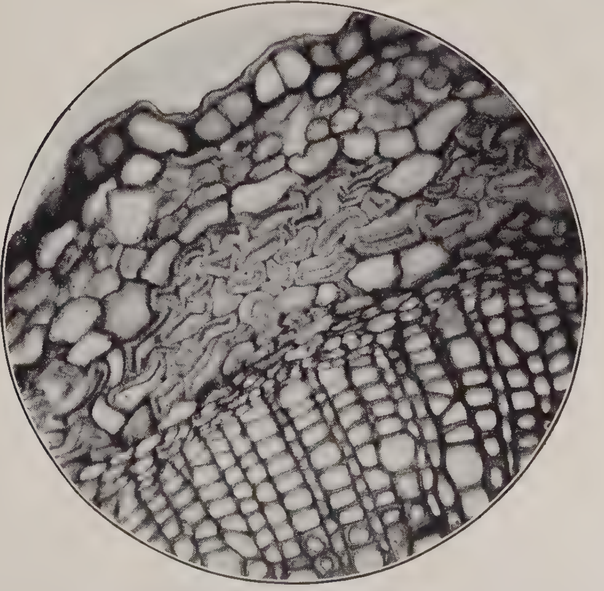


FIG 5.—FLAX STEM *Linum usitatissimum*, tranverse section of stem, × 235, showing bast fibres occupying central zone.

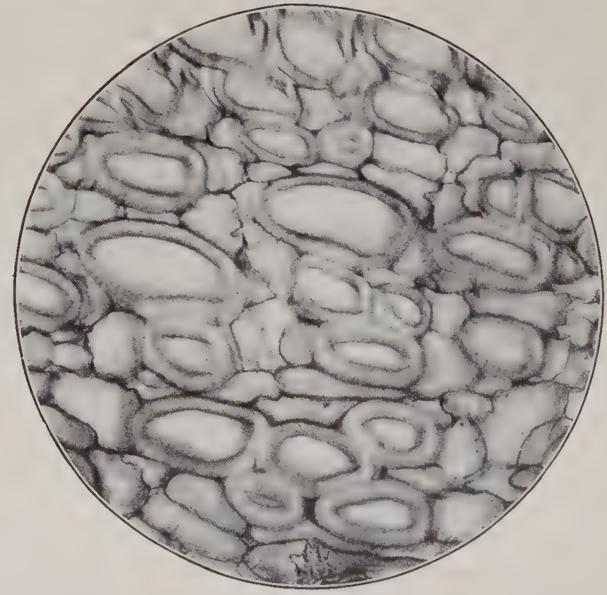


FIG. 6.—RAMIE. Section of bast region, × 235. Showing bast fibres bundles but only slightly occurring as individuals.

Plate II.

FIBRES

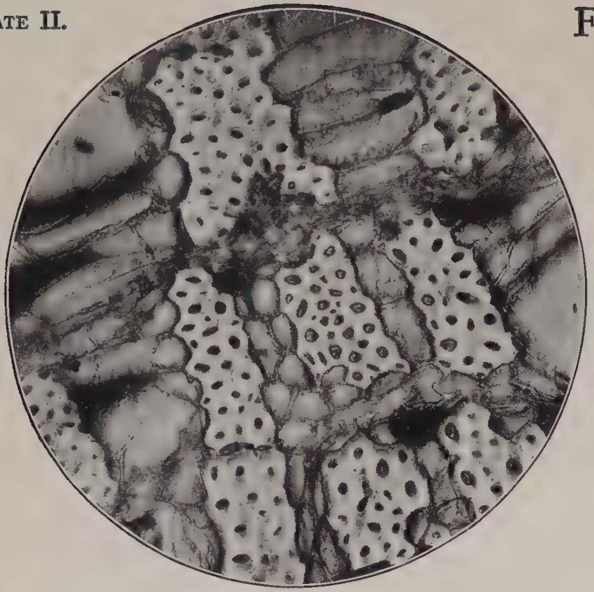


Fig. 7.—JUTE. Bast bundles. Section of bast region, × 235, showing agglomerated bundles of bast fibre, each bundle representing a spinning unit or filament.

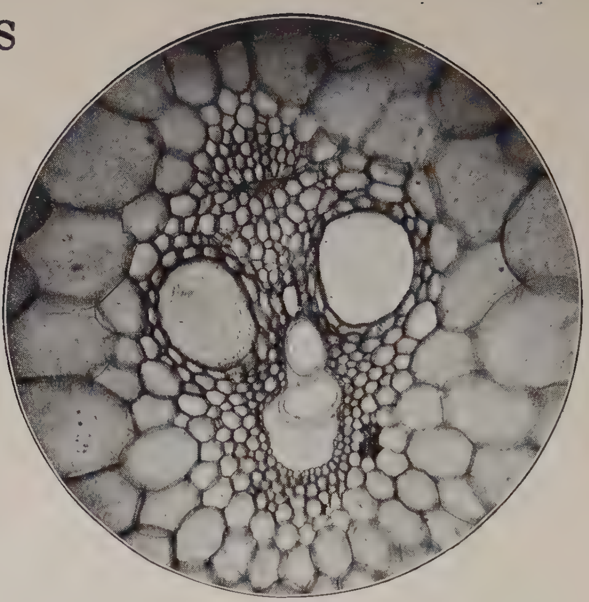
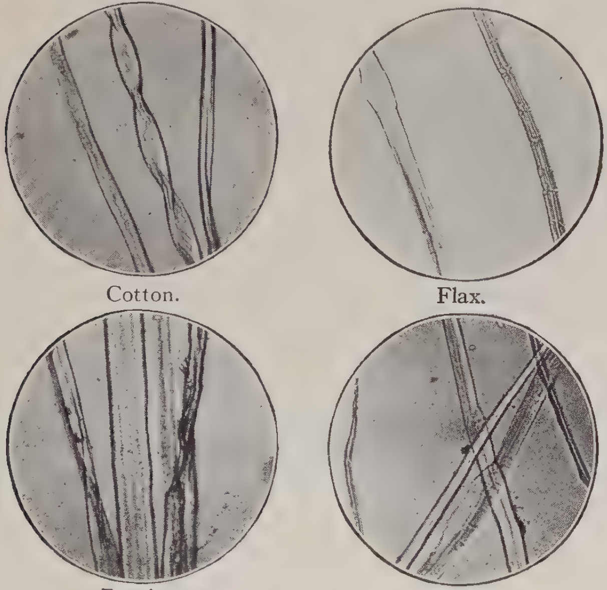


Fig. 8.—MAIZE STEM. *Zea mais.* Fibro-vascular bundle in section, × 110, typical of monocotyledonous structure.



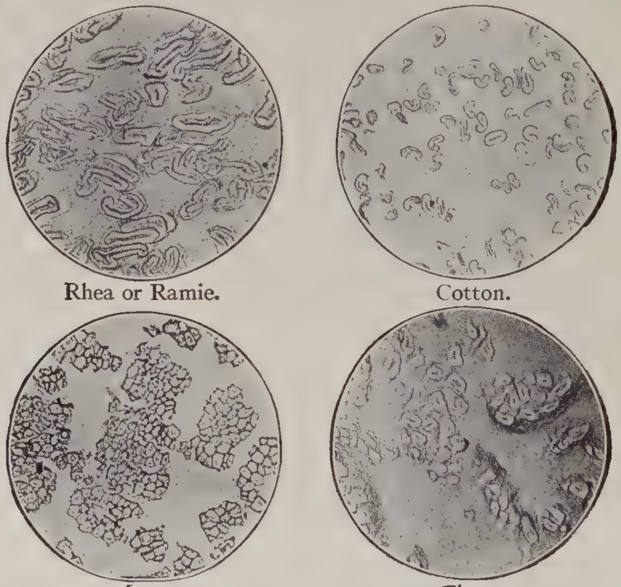
Cotton.

Flax.

Ramie.

Jute

Fig. 9.—COTTON. FLAX. RAMIE. JUTE. Ultimate fibres in the length, × 110. Portions selected to show typical structural characteristics.



Rhea or Ramie.

Cotton.

Jute.

Flax.

Fig. 10.—COTTON. FLAX. RAMIE. JUTE. Ultimate fibres—transverse section, × 110. Note similarity of ramie to cotton and jute to flax.

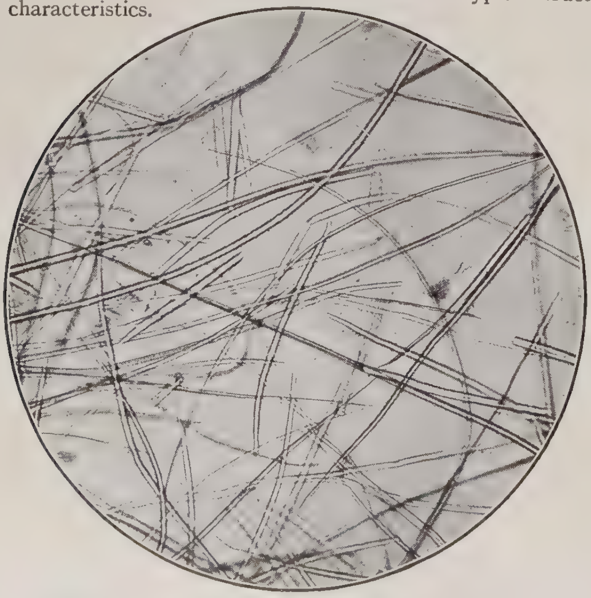


Fig 11.—ESPARTO. Cellulose. Ultimate fibres of paper making pulp Typical fusiform bast fibres. × 65.

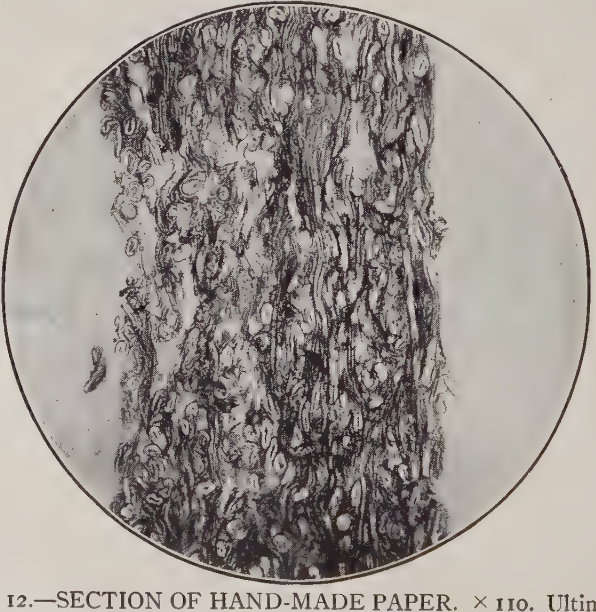


Fig. 12.—SECTION OF HAND-MADE PAPER. × 110. Ultimate component fibres disposed in every plane.

and rabbit, are also employed; the latter is largely worked into the class of fabrics known as felts. In these the hairs are compacted together by taking advantage of the peculiarity of structure which causes the imbrications of the surface.

(*d*) Horse hair is employed in its natural form as an individual filament or monofil.[1]

Vegetable Fibres.—The subjoined scheme of classification sets out the morphological structural characteristics of the vegetable fibres:—

Produced from

Dicotyledons.	*Monocotyledons.*
A. Seed hairs.	D. Fibro-vascular bundles.
B. Bast fibres.	E. Entire leaves and stems.
C. Bast aggregates.	

In the list of the more important fibrous raw materials subjoined, the capital letter immediately following the name refers the individual to its position in this classification. In reference to the important question of chemical composition and the actual nature of the fibre substance, it may be premised that the vegetable fibres are composed of cellulose, an important representative of the group of carbohydrates, of which the cotton fibre substance is the chemical prototype, mixed and combined with various derivatives belonging to the subgroups. (*a*) Carbohydrates. (*b*) Unsaturated compounds of benzenoid and furfuroid constitutions. (*c*) "Fat and wax" derivatives, *i.e.* groups belonging to the fatty series, and of higher molecular dimensions—of such compound celluloses the following are the prototypes:—

(*a*) Cellulose combined and mixed with "pectic" bodies (*i.e.* pecto-celluloses), flax, rhea.
(*b*) Cellulose combined with unsaturated groups or ligno-celluloses, jute and the woods.
(*c*) Cellulose combined and mixed with higher fatty acids, alcohols, ethers, cuto-celluloses, protective epidermal covering of leaves.

The letters *a*, *b*, *c* in the table below and following the capitals, which have reference to the structural basis of classification, indicate the main characteristics of the fibre substances. (See also CELLULOSE.)

Miscellaneous.—Various species of the family Palmaceae yield fibrous products of value, of which mention must be made of the following. *Raffia*, epidermal strips of the leaves of *Raphia ruffia* (Madagascar), *R. taedigera* (Japan), largely employed as binder twine in horticulture, replacing the "bast" (linden) formerly employed. *Coir*, the fibrous envelope of the fruit of the *Cocos nucifera*, extensively used for matting and other coarse textiles. *Carludovica palmata* (Central America) yields the raw material for Panama hats, the *Corypha australis* (Australia) yields a similar product. The leaves of the date palm, *Phoenix dactylifera*, are employed locally in making baskets and mats, and the fibro-vascular bundles are isolated for working up into coarse twine and rope; similarly, the leaves of the *Elaeis guineensis*, the fruit of which yields the "palm oil" of commerce, yield a fibre which finds employment locally (Africa) for special purposes. *Chamaerops humilis*, the dwarf palm, yields the well-known "Crin d'Afrique." Locally (Algiers) it is twisted into ropes, but its more general use, in Europe, is in upholstery as a stuffing material. The cereal straws are used in the form of plait in the making of hats and mats. Esparto grass is also used in the making of coarse mats.

The processes by which the fibres are transformed into textile fabrics are in the main determined by their structural features. The following are the distinctive types of treatment.

A. The fibre is in virtually continuous lengths. The textile yarn is produced by assembling together the unit threads, which are wound together and suitably twisted (silk; artificial silk).

B. The fibres in the form of units of variable short dimensions are treated by more or less elaborate processes of scutching, hackling, combing, with the aim of producing a mass of free parallelized units of uniform dimensions; these are then laid together and drawn into continuous bands of sliver and roving, which are finally drawn and twisted into yarns. In this group are comprised the larger number of textile products, such as

	Botanical Identity. Genus and Order.	Country of Origin.	Dimensions of Ultimate.	Textile Uses.
Cotton, A.*a*	Gossypium Malvaceae	Tropical and subtropical countries	12-40 mm. 0·019-0·025. Av. 28 mm.	Universal. Also as a raw material in chemical industries, notably explosives, celluloid.
Flax, B.*a*	Linum Linaceae	Temperate (and subtropical) countries, chiefly European	6-60 mm. 0·011-0·025. Av. 28 mm.	General. Special effects in lustre damasks. In India and America plants grown for seed (linseed).
Hemp, B.*a*	Cannabis Cannabineae	Temperate countries, chiefly Europe	5-55 mm. 0·016-0·050. Av. 22. mm. Av. 0·022	Coarser textiles, sail-cloth, rope and twine.
Ramie, B.*a*	Boehmeria Urticaceae	Tropical countries (some temperate)	60-200 mm. 0·03-0·08. Av. 120 mm. Av. 0·050	Coarse textiles. Cost of preparation for fine textiles prohibitive.
Jute, B.*b*	Corchorus Tiliaceae	Tropical countries, chiefly India	1·5-5 mm. 0·020-0·025. Av. 2·5 mm. Av. 0·022	Coarse textiles, chiefly "Hessians" and sacking. "Line" spun yarns used in cretonne and furniture textiles.
B.*b*	Crotalaria Leguminosae	India	4·0-12·0. 0·025-0·050. Av. 7·5. Av. 0·022	Twine and rope. Coarse textiles.
Hibiscus, B.*b*	Hibiscus	Tropical, chiefly India	2-6 mm. 0·014-0·033. Av. 4 mm. Av. 0·021	Coarse textiles. *H. Elams* has been extensively used in making mats.
Sida, B.*b*	Sida Malvaceae	Tropical and subtropical	1·5-4 mm. 0·013-0·02. Av. 2 mm. Av. 0·015	Coarse textiles. Appears capable of substituting jute.
Lime or Linden, C.*b*	Tilia Tiliaceae	European countries, chiefly Russia	1·5 mm. 0·014-0·020. Av. 2 mm. Av. 0·016	Matting and binder twine.
Mulberry, C.	Broussonetia Moraceae	Far East	5-31 mm. 0·02-0·04. Av. 15 mm. Av. 0·03	Paper and paper cloths.
Monocotyledons—				
Manila, D	Musa Musaceae	Tropical countries, chiefly Philippine Islands	3-12 mm. 0·016-0·032. Av. 6 mm. Av. 0·024	Twine and ropes. Produces papers of special quality.
Sisal, D	Agave Amaryllideae	Tropical countries, chiefly Central America	1·5-4 mm. 0·020-0·032. Av. 2·5. Av. 0·024	Twine and ropes.
	Yucca Liliaceae	do.	0·5-6 mm. 0·01-0·02.	do.
	Sansevieria Liliaceae	East Indies, Ceylon, East Africa	1·5-6 mm. 0·015-0·026. Av. 3 mm. Av. 0·020	do.
Phormium, D	Phormium tenax Liliaceae	New Zealand	5·0-15 mm. 0·010-0·020. Av. 9 mm. Av. 0·016	Twine and ropes. Distinguished by high yield of fibre from green leaf.
Pine-apple, D	Ananassa Bromeliaceae	Tropical East and West Indies	3·0-9·0 mm. 0·004-0·008. Av. 5. Av. 0·006	Textiles of remarkable fineness. Exceptional fineness of ultimate fibre.

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[1] See also ALPACA, FELT, MOHAIR, SHODDY and WOOL.

cotton, wool, flax and jute, and it also includes at the other extreme the production of coarse textiles, such as twine and rope.

C. The fibres of still shorter dimensions are treated in various ways for the production of a fabric in continuous length.

The distinction of type of manufacturing processes in which the relatively short fibres are utilized, either as disintegrated units or comminuted long fibres, follows the lines of division into long and short fibres; the long fibres are worked into yarns by various processes, whereas the shorter fibres are agglomerated by both dry and wet processes to felted tissues or felts. It is obvious, however, that these distinctions do not constitute rigid dividing lines. Thus the principles involved in felting are also applied in the manipulation of long fibre fabrics. For instance, woollen goods are closed or shrunk by milling, the web being subjected to a beating or hammering treatment in an apparatus known as "the Stocks," or is continuously run through squeezing rollers, in weak alkaline liquids. Flax goods are "closed" by the process of beetling, a long-continued process of hammering, under which the ultimate fibres are more or less subdivided, and at the same time welded or incorporated together. As already indicated, paper, which is a web composed of units of short dimensions produced by deposition from suspension in water and agglomerated by the interlacing of the component fibres in all planes within the mass, is a species of textile. Further, whereas the silks are mostly worked up in the extreme lengths of the cocoon, there are various systems of spinning silk wastes of variable short lengths, which are similar to those required for spinning the fibres which occur naturally in the shorter lengths.

The fibres thus enumerated as commercially and industrially important have established themselves as the result of a struggle for survival, and each embodies typical features of ultility. There are innumerable vegetable fibres, many of which are utilized in the locality or region of their production, but are not available for the highly specialized applications of modern competitive industry to qualify for which a very complex range of requirements has to be met. These include primarily the factors of production and transport summed up in cost of production, together with the question of regularity of supply; structural characteristics, form and dimensions, including uniformity of ultimate unit and adaptability to standard methods of preparing and spinning, together with tenacity and elasticity, lustre. Lastly, composition, which determines the degree of resistance to chemical disintegrating influences as well as subsidiary questions of colour and relationship to colouring matters. The quest for new fibres, as well as modified methods of production of those already known, require critical investigation from the point of view of established practice. The present perspective outline of the group will be found to contain the elements of a grammar of the subject. But those who wish to pursue the matter will require to amplify this outlined picture by a study of the special treatises which deal with general principles, as well as the separate articles on the various fibres.

Analysis and Identification.—For the analysis of textile fabrics and the identification of component fibre, a special treatise must be consulted. The following general facts are to be noted as of importance.

All animal fibres are effectively dissolved by 10% solution of caustic potash or soda. The fabric or material is boiled in this solution for 10 minutes and exhaustively washed. Any residue will be vegetable or cellulose fibre. It must not be forgotten that the chemical properties of the fibre substances are modified more or less by association in combination with colouring matters and mordants. These may, in many cases, be removed by treatments which do not seriously modify the fibre substances.

Wool is distinguished from silk by its relative resistance to the action of sulphuric acid. The cold concentrated acid rapidly dissolves silk as well as the vegetable fibres. The attack on wool is slow, and the epidermal scales of wool make their appearance. The true silks are distinguished from the wild silks by the action of concentrated hydrochloric acid in the cold, which reagent dissolves the former, but has only a slight effect on Tussore silk. After preliminary resolution by these group reagents, the fabric is subjected to microscopical analysis for the final identification of its component fibres (see H. Schlichter, *Journal Soc. Chem. Ind.*, 1890, p. 241).

A scheme for the commercial analysis or assay of vegetable fibres, originally proposed by the author,[1] and now generally adopted, includes the following operations:—

1. Determination of moisture.
2. Determination of ash left after complete ignition.
3. Hydrolysis:
    (*a*) loss of weight after boiling the raw fibre with a 1% caustic soda solution for five minutes;
    (*b*) loss after boiling for one hour.
4. Determination of cellulose: the white residue after
    (*a*) boiling for five minutes with 1% caustic soda,
    (*b*) exposure to chlorine gas for one hour,
    (*c*) boiling with basic sodium sulphite solution.
5. Mercerizing: the loss of weight after digestion with a 20% solution of sodium hydrate for one hour in the cold.
6. Nitration: the weight of the product obtained after digestion with a mixture of equal volumes of sulphuric and nitric acids for one hour in the cold.
7. Acid purification: treatment of the raw fibre with 20% acetic acid for one minute, the product being washed with water and alcohol, and then dried.
8. Determination of the total carbon by combustion.

II. *Papermaking.*—The papermaking industry (see PAPER) employs as raw materials a large proportion of the vegetable fibre products already enumerated, and, for the reasons incidentally mentioned, they may be, and are, employed in a large variety of forms: in fact any fibrous material containing over 30% "cellulose" and yielding ultimate fibres of a length exceeding 1 mm. can be used in this industry. Most important staples are cotton and flax; these are known to the paper-maker as "rag" fibres, rags, *i.e.* cuttings of textile fabrics, new and old, being their main source of supply. These are used for writing and drawing papers. In the class of "printings" two of the most important staples are wood pulp, prepared by chemical treatment from both pine and foliage woods, and in England esparto cellulose, the cellulose obtained from esparto grass by alkali treatment; the cereal straws are also used and are resolved into cellulose by alkaline boiling followed by bleaching. In the class of "wrappings" and miscellaneous papers a large number of other materials find use, such as various residues of manufacturing and preparing processes, scutching wastes, ends of rovings and yarns, flax, hemp and manila rope waste, adansonia bast, and jute wastes, raw (cuttings) and manufactured (bagging). Other materials have been experimentally tried, and would no doubt come into use on their papermaking merits, but as a matter of fact the actually suitable raw materials are comprised in the list above enumerated, and are limited in number, through the influence of a number of factors of value or utility.

III. *Brush Fibres, &c.*—In addition to the textile industries there are manufactures which utilize fibres of both animal and vegetable character. The most important of these is brushmaking. The familiar brushes of everyday use are extremely diversified in form and texture. The supplies of animal fibres are mainly drawn from the badger, hog, bear, sable, squirrel and horse. These fibres and bristles cover a large range of effects. Brushes required for cleansing purposes are composed of fibres of a more or less hard and resilient character, such as horse hairs, and other tail hairs and bristles. For painting work brushes of soft quality are employed, graduating for fine work into the extreme softness of the "camel hair" pencil. Of vegetable fibres the following are used in this industry. The *Caryota urens* furnishes the Kittul fibre, obtained from the base of the leaf stalks. Piassava is obtained from the *Attalea funifera*, also from the *Leopoldina piassaba* (Brazil). Palmyra fibre is obtained from the *Borassus flabellifer*. These are all members of the natural order of the Palmaceae. Mexican fibre, or Istle, is obtained from the agave. The fibre known as Whisk, largely used for dusting brushes, is obtained from various species of the Gramineae; the "Mexican Whisk" from *Epicampeas macroura*; and "Italian Whisk" from *Andropogon.* The *coir* fibre mentioned above in connexion with coarse textiles is also extensively used in brush-making. Aloe and Agave fibres in their softer forms are also used for plasterers's brushes. Many of the whitewashes and cleansing solutions used in house decoration are alkaline in character, and for such uses advantage is taken of the specially resistant character of the cellulose group of materials.

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[1] Col. Ind. Exhibition, 1886, *Miscellaneous Reports.*

Stuffing and Upholstery.—Another important use for fibrous materials is for filling or stuffing in connexion with the seats and cushions in upholstery. In the large range of effects required, a corresponding number and variety of products find employment. One of the most important is the floss or seed-hair of the *Eriodendron anfractuosum*, known as Kapok, the use of which in Europe was created by the Dutch merchants who drew their supplies from Java. The fibre is soft, silky and elastic, and maintains its elasticity in use. Many fibres when used in the mass show, on the other hand, a tendency to become matted and compressed in use, and to restore them to their original state the fibre requires to be removed and subjected to a teasing or carding process. This defect limits the use of other "flosses" or seed hairs in competition with Kapok. Horse hair is extensively used in this industry, as are also wool flocks and other short animal hairs and wastes.

Hats and Matting.—For these manufactures a large range of the fibrous products above described are employed, chiefly in their natural or raw state.

BIBLIOGRAPHY.—The list of works appended comprises only a small fraction of the standard literature of the subject, but they are sufficiently representative to enable the specialist, by referring to them, to cover the subject-matter. F. H. Bowman, *The Structure of the Wood Fibre* (1885), *The Structure of Cotton Fibre* (1882); Cross, Bevan and King, *Indian Fibres and Fibrous Substances* (London, 1887); C. F. Cross, *Report on Miscellaneous Fibres*, Colonial Indian Exhibition, 1886 (London, 1887); Cross and Bevan, *Cellulose, Researches on Cellulose*, i. and ii. (London, 1895–1905); C. R. Dodge, *A Descriptive Catalogue of Useful Fibre Plants of the World* (Report No. 9, U.S. Dept. of Agriculture, Washington, 1897); von Höhmel, *Die Mikroskopie der technisch verwendeten Faserstoffe* (Leipzig, 1905); J. J. Hummel, *The Dyeing of Textile Fabrics* (London, 1885); J. M. Matthews, *The Textile Fibres, their Physical, Microscopical and Chemical Properties* (New York, 1904); H. Müller, *Die Pflanzenfaser* (Braunschweig, 1877); H. Schlichter, "The Examination of Textile Fibres and Fabrics" (*Jour. Soc. Chem. Ind.*, 1890, 241); M. Vetillart, *Études sur les fibres végétales textiles* (Paris, 1876); Sir T. H. Wardle, *Silk and Wild Silks*, original memoirs in connexion with Col. Ind. Ex., 1886, Jubilee Ex. Manchester, 1887; Sir G. Watt, *Dictionary of Economic Products of India* (London, 1891); Wiesner, *Die Rohstoffe des Pflanzenreichs* (Leipzig, 1873); O. N. Witt, *Chemische Technologie der Gespinnstfasern* (Braunschweig, 1888); *Kew Bulletin*; *The Journal of the Imperial Institute*; *The Journal of the Society of Arts*; W. I. Hannam, *The Textile Fibres of Commerce* (London, 1902); J. Jackson, *Commercial Botany*; J. Zipser, *Die Textilen Rohmaterialien* (Wien, 1895); F. Zetzsche, *Die wichtigsten Faserstoffe der europäischen Industrie* (Leipzig, 1895). (C. F. C.)

FIBRIN, or FIBRINE, a protein formed by the action of the so-called fibrin-ferment on fibrinogen, a constituent of the blood-plasma of all vertebrates. This change takes place when blood leaves the arteries, and the fibrin thus formed occasions the clotting which ensues (see BLOOD). To obtain pure coagulated fibrin it is best to heat blood-plasma (preferably that of the horse) to 56° C. The usual method of beating a blood-clot with twigs and removing the filamentous fibrin which attaches itself to them yields a very impure product containing haemoglobin and much globulin; moreover, it is very difficult to purify. Fibrin is a very voluminous, tough, strongly elastic, jelly-like substance; when denaturalized by heat, alcohol or salts, it behaves as any other coagulated albumin.

FICHTE, IMMANUEL HERMANN (originally HARTMANN) **VON** (1797–1879), German philosopher, son of J. G. Fichte, was born at Jena on the 18th of July 1797. Having held educational posts at Saarbrücken and Düsseldorf, in 1836 he became extraordinary professor of philosophy at Bonn, and in 1840 full professor. In 1842 he received a call to Tübingen, retired in 1867, and died at Stuttgart on the 8th of August 1879. The most important of his comprehensive writings are: *System der Ethik* (1850–1853), *Anthropologie* (1856, 3rd ed. 1876), *Psychologie* (1864–1873), *Die theistische Weltansicht* (1873). In 1837 he had founded the *Zeitschrift für Philosophie* as an organ of his views, more especially on the subject of the philosophy of religion, where he was in alliance with C. H. Weisse; but, whereas Weisse thought that the Hegelian structure was sound in the main, and that its imperfections might be mended, Fichte held it to be incurably defective, and spoke of it as a "masterpiece of erroneous consistency or consistent error." Fichte's general views on philosophy seem to have changed considerably as he advanced in years, and his influence has been impaired by certain inconsistencies and an appearance of eclecticism, which is strengthened by his predominantly historical treatment of problems, his desire to include divergent systems within his own, and his conciliatory tone. His philosophy is an attempt to reconcile monism (Hegel) and individualism (Herbart) by means of theism (Leibnitz). He attacks Hegelianism for its pantheism, its lowering of human personality, and imperfect recognition of the demands of the moral consciousness. God, he says, is to be regarded not as an absolute but as an Infinite Person, whose nature it is that he should realize himself in finite persons. These persons are objects of God's love, and he arranges the world for their good. The direct connecting link between God and man is the "genius," a higher spiritual individuality existing in man by the side of his lower, earthly individuality. Fichte, in short, advocates an ethical theism, and his arguments might easily be turned to account by the apologist of Christianity. In his conception of finite personality he recurs to something like the monadism of Leibnitz. His insistence on moral experience is connected with his insistence on personality. One of the tests by which Fichte discriminates the value of previous systems is the adequateness with which they interpret moral experience. The same reason that made him depreciate Hegel made him praise Krause (panentheism) and Schleiermacher, and speak respectfully of English philosophy. It is characteristic of Fichte's almost excessive receptiveness that in his latest published work, *Der neuere Spiritualismus* (1878), he supports his position by arguments of a somewhat occult or theosophical cast, not unlike those adopted by F. W. H. Myers. He also edited the complete works and literary correspondence of his father, including his life.

See R. Eucken, "Zur Erinnerung I. H. F.," in *Zeitschrift für Philosophie*, cx. (1897); C. C. Scherer, *Die Gotteslehre von I. H. F.* (1902); article by Karl Hartmann in *Allegemeine deutsche Biographie* xlviii. (1904). Some of his works were translated by J. D. Morell under the title of *Contributions to Mental Philosophy* (1860).

FICHTE, JOHANN GOTTLIEB (1762–1814), German philosopher, was born at Rammenau in Upper Lusatia on the 19th of May 1762. His father, a ribbon-weaver, was a descendant of a Swedish soldier who (in the service of Gustavus Adolphus) was left wounded at Rammenau and settled there. The family was distinguished for piety, uprightness, and solidity of character. With these qualities Fichte himself combined a certain impetuosity and impatience probably derived from his mother, a woman of a somewhat querulous and jealous disposition.

At a very early age the boy showed remarkable mental vigour and moral independence. A fortunate accident which brought him under the notice of a neighbouring nobleman, Freiherr von Miltitz, was the means of procuring him a more excellent education than his father's circumstances would have allowed. He was placed under the care of Pastor Krebel at Niederau. After a short stay at Meissen he was entered at the celebrated school at Pforta, near Naumburg. In 1780 he entered the university of Jena as a student of theology. He supported himself mainly by private teaching, and during the years 1784–1787 acted as tutor in various families of Saxony. In 1787, after an unsuccessful application to the consistory for pecuniary assistance, he seems to have been driven to miscellaneous literary work. A tutorship at Zürich was, however, obtained in the spring of 1788, and Fichte spent in Switzerland two of the happiest years of his life. He made several valuable acquaintances, among others Lavater and his brother-in-law Hartmann Rahn, to whose daughter, Johanna Maria, he became engaged.

Settling at Leipzig, still without any fixed means of livelihood, he was again reduced to literary drudgery. In the midst of this work occurred the most important event of his life, his introduction to the philosophy of Kant. At Schulpforta he had read with delight Lessing's *Anti-Goeze*, and during his Jena days had studied the relation between philosophy and religion. The outcome of his speculations, *Aphorismen über Religion und Deismus* (unpublished, date 1790; *Werke*, i. 1-8), was a species of Spinozistic determinism, regarded, however, as lying altogether outside the boundary of religion. It is remarkable that even for a time fatalism should have been predominant in his reasoning, for in character he was opposed to such a view, and, as he has said, "according to the man, so is the system of philosophy he adopts."

Fichte's *Letters* of this period attest the influence exercised on him by the study of Kant. It effected a revolution in his mode of thinking; so completely did the Kantian doctrine of the inherent moral worth of man harmonize with his own character, that his life becomes one effort to perfect a true philosophy, and to make its principles practical maxims. At first he seems to have thought that the best method for accomplishing his object would be to expound Kantianism in a popular, intelligible form. He rightly felt that the reception of Kant's doctrines was impeded by their phraseology. An abridgment of the *Kritik der Urtheilskraft* was begun, but was left unfinished.

Fichte's circumstances had not improved. It had been arranged that he should return to Zürich and be married to Johanna Rahn, but the plan was overthrown by a commercial disaster which affected the fortunes of the Rahn family. Fichte accepted a post as private tutor in Warsaw, and proceeded on foot to that town. The situation proved unsuitable; the lady, as Kuno Fischer says, "required greater submission and better French" than Fichte could yield, and after a fortnight's stay Fichte set out for Königsberg to see Kant. His first interview was disappointing; the coldness and formality of the aged philosopher checked the enthusiasm of the young disciple, though it did not diminish his reverence. He resolved to bring himself before Kant's notice by submitting to him a work in which the principles of the Kantian philosophy should be applied. Such was the origin of the work, written in four weeks, the *Versuch einer Kritik aller Offenbarung* (Essay towards a Critique of all Revelation). The problem which Fichte dealt with in this essay was one not yet handled by Kant himself, the relations of which to the critical philosophy furnished matter for surmise. Indirectly, indeed, Kant had indicated a very definite opinion on theology: from the *Critique of Pure Reason* it was clear that for him speculative theology must be purely negative, while the *Critique of Practical Reason* as clearly indicated the view that the moral law is the absolute content or substance of any religion. A *critical* investigation of the conditions under which religious belief was possible was still wanting. Fichte sent his essay to Kant, who approved it highly, extended to the author a warm reception, and exerted his influence to procure a publisher. After some delay, consequent on the scruples of the theological censor of Halle, who did not like to see miracles rejected, the book appeared (Easter, 1792). By an oversight Fichte's name did not appear on the title-page, nor was the preface given, in which the author spoke of himself as a beginner in philosophy. Outsiders, not unnaturally, ascribed the work to Kant. The *Allgemeine Literatur-Zeitung* went so far as to say that no one who had read a line of Kant's writings could fail to recognize the eminent author of this new work. Kant himself corrected the mistake, at the same time highly commending the work. Fichte's reputation was thus secured at a stroke.

The *Critique of Revelation* marks the culminating point of Fichte's Kantian period. The exposition of the conditions under which revealed religion is possible turns upon the absolute requirements of the moral law in human nature. Religion itself is the belief in this moral law as divine, and such belief is a practical postulate, necessary in order to add force to the law. It follows that no revealed religion, so far as matter or substance is concerned, can contain anything beyond this law; nor can any fact in the world of experience be recognized by us as supernatural. The supernatural element in religion can only be the divine character of the moral law. Now, the revelation of this divine character of morality is possible only to a being in whom the lower impulses have been, or are, successful in overcoming reverence for the law. In such a case it is conceivable that a revelation might be given in order to add strength to the moral law. Religion ultimately then rests upon the practical reason, and expresses some demand or want of the pure ego. In this conclusion we can trace the prominence assigned by Fichte to the practical element, and the tendency to make the requirements of the ego the ground for all judgment on reality. It was not possible that having reached this point he should not press forward and leave the Kantian position.

This success was coincident with an improvement in the fortunes of the Rahn family, and the marriage took place at Zürich in October 1793. The remainder of the year he spent at Zürich, slowly perfecting his thoughts on the fundamental problems left for solution in the Kantian philosophy. During this period he published anonymously two remarkable political works, *Zurückforderung der Denkfreiheit von den Fürsten Europas* and *Beiträge zur Berichtigung der Urtheile des Publicums über die französische Revolution.* Of these the latter is much the more important. The French Revolution seemed to many earnest thinkers the one great outcry of modern times for the liberty of thought and action which is the eternal heritage of every human being. Unfortunately the political condition of Germany was unfavourable to the formation of an unbiassed opinion on the great movement. The principles involved in it were lost sight of under the mass of spurious maxims on social order which had slowly grown up and stiffened into system. To direct attention to the true nature of revolution, to demonstrate how inextricably the right of liberty is interwoven with the very existence of man as an intelligent agent, to point out the inherent progressiveness of state arrangements, and the consequent necessity of reform or amendment, such are the main objects of the *Beiträge*; and although, as is often the case with Fichte, the arguments are too formal and the distinctions too wire-drawn, yet the general idea is nobly conceived and carried out. As in the *Critique of Revelation* so here the rational nature of man and the conditions necessary for its manifestation or realization become the standard for critical judgment.

Towards the close of 1793 Fichte received an invitation to succeed K. L. Reinhold as extraordinary professor of philosophy at Jena. This chair, not in the ordinary faculty, had become, through Reinhold, the most important in the university, and great deliberation was exercised in selecting his successor. It was desired to secure an exponent of Kantianism, and none seemed so highly qualified as the author of the *Critique of Revelation.* Fichte, while accepting the call, desired to spend a year in preparation; but as this was deemed inexpedient he rapidly drew out for his students an introductory outline of his system, and began his lectures in May 1794. His success was instantaneous and complete. The fame of his predecessor was altogether eclipsed. Much of this success was due to Fichte's rare power as a lecturer. In oral exposition the vigour of thought and moral intensity of the man were most of all apparent, while his practical earnestness completely captivated his hearers. He lectured not only to his own class, but on general moral subjects to all students of the university. These general addresses, published under the title *Bestimmung des Gelehrten* (Vocation of the Scholar), were on a subject dear to Fichte's heart, the supreme importance of the highest intellectual culture and the duties incumbent on those who had received it. Their tone is stimulating and lofty.

The years spent at Jena were unusually productive; indeed, the completed Fichtean philosophy is contained in the writings of this period. A general introduction to the system is given in the tractate *Über den Begriff der Wissenschaftslehre* (On the Notion of the Theory of Science), 1794, and the theoretical portion is worked out in the *Grundlage der gesammten Wissenschaftslehre* (Foundation of the whole Theory of Science, 1794) and *Grundriss des Eigenthümlichen d. Wissenschaftslehre* (Outline of what is peculiar in the Theory of Science, 1794). To these were added in 1797 a *First* and a *Second Introduction to the Theory of Science*, and an *Essay towards a new Exposition of the Theory of Science*. The *Introductions* are masterly expositions. The practical philosophy was given in the *Grundlage des Naturrechts* (1796) and *System der Sittenlehre* (1798). The last is probably the most important of all Fichte's works; apart from it, his theoretical philosophy is unintelligible.

During this period Fichte's academic career had been troubled by various storms, the last so violent as to put a close to his professorate at Jena. The first of them, a complaint against the delivery of his general addresses on Sundays, was easily settled. The second, arising from Fichte's strong desire to suppress the *Landsmannschaften* (students' orders), which were productive of much harm, was more serious. Some misunderstanding caused an outburst of ignorant ill-feeling on the part of the students, who proceeded to such lengths that Fichte was compelled to reside out of Jena. The third storm, however, was the most violent. In 1798 Fichte, who, with F. I. Niethammer (1766–1848), had edited the *Philosophical Journal* since 1795, received from his friend F. K. Forberg (1770–1848) an essay on the "Development of the Idea of Religion." With much of the essay he entirely agreed, but he thought the exposition in so many ways defective and calculated to create an erroneous impression, that he prefaced it with a short paper *On the Grounds of our Belief in a Divine Government of the Universe*, in which God is defined as the moral order of the universe, the eternal law of right which is the foundation of all our being. The cry of atheism was raised, and the electoral government of Saxony, followed by all the German states except Prussia, suppressed the *Journal* and confiscated the copies found in their universities. Pressure was put by the German powers on Charles Augustus, grand-duke of Saxe-Weimar, in whose dominions Jena university was situated, to reprove and dismiss the offenders. Fichte's defences (*Appellation an das Publicum gegen die Anklage des Atheismus*, and *Gerichtliche Verantwortung der Herausgeber der phil. Zeitschrift*, 1799), though masterly, did not make it easier for the liberal-minded grand-duke to pass the matter over, and an unfortunate letter, in which he threatened to resign in case of reprimand, turned the scale against him. The grand-duke accepted his threat as a request to resign, passed censure, and extended to him permission to withdraw from his chair at Jena; nor would he alter his decision, even though Fichte himself endeavoured to explain away the unfortunate letter.

Berlin was the only town in Germany open to him. His residence there from 1799 to 1806 was unbroken save for a course of lectures during the summer of 1805 at Erlangen, where he had been named professor. Surrounded by friends, including Schlegel and Schleiermacher, he continued his literary work, perfecting the *Wissenschaftslehre*. The most remarkable of the works from this period are—(1) the *Bestimmung des Menschen* (Vocation of Man, 1800), a book which, for beauty of style, richness of content, and elevation of thought, may be ranked with the *Meditations* of Descartes; (2) *Der geschlossene Handelsstaat*, 1800 (The Exclusive or Isolated Commercial State), a very remarkable treatise, intensely socialist in tone, and inculcating organized protection; (3) *Sonnenklarer Bericht an das grössere Publicum über die neueste Philosophie*, 1801. In 1801 was also written the *Darstellung der Wissenschaftslehre*, which was not published till after his death. In 1804 a set of lectures on the *Wissenschaftslehre* was given at Berlin, the notes of which were published in the *Nachgelassene Werke*, vol. ii. In 1804 were also delivered the noble lectures entitled *Grundzüge des gegenwärtigen Zeitalters* (Characteristics of the Present Age, 1804), containing a most admirable analysis of the *Aufklärung*, tracing the position of such a movement of thought in the natural evolution of the general human consciousness, pointing out its inherent defects, and indicating as the ultimate goal of progress the life of reason in its highest aspect as a belief in the divine order of the universe. The philosophy of history sketched in this work has something of value with much that is fantastic. In 1805 and 1806 appeared the *Wesen des Gelehrten* (Nature of the Scholar) and the *Anweisung zum seligen Leben oder Religionslehre* (Way to a Blessed Life), the latter the most important work of this Berlin period. In it the union between the finite self-consciousness and the infinite ego or God is handled in an almost mystical manner. The knowledge and love of God is the end of life; by this means only can we attain blessedness (*Seligkeit*), for in God alone have we a permanent, enduring object of desire. The infinite God is the all; the world of independent objects is the result of reflection or self-consciousness, by which the infinite unity is broken up. God is thus over and above the distinction of subject and object; our knowledge is but a reflex or picture of the infinite essence. Being is not thought.

The diasters of Prussia in 1806 drove Fichte from Berlin. He retired first to Stargard, then to Königsberg (where he lectured for a time), then to Copenhagen, whence he returned to the capital in August 1807. From this time his published writings are practical in character; not till after the appearance of the *Nachgelassene Werke* was it known in what shape his final speculations had been thrown out. We may here note the order of these posthumous writings as being of importance for tracing the development of Fichte's thought. From the year 1806 we have the remarkable *Bericht über die Wissenschaftslehre* (*Werke*, vol. viii.), with its sharp critique of Schelling; from 1810 we have the *Thatsachen des Bewusstseyns*, published in 1817, of which another treatment is given in lectures of 1813 (*Nachgel. Werke*, vol. i.). Of the *Wissenschaftslehre* we have, in 1812–1813, four separate treatments contained in the *Nachgel. Werke*. As these consist mainly of notes for lectures, couched in uncouth phraseology, they cannot be held to throw much light on Fichte's views. Perhaps the most interesting are the lectures of 1812 on *Transcendental Logic* (*Nach. Werke*, i. 106-400).

From 1812 we have notes of two courses on practical philosophy, *Rechtslehre* (*Nach. Werke*, vol. ii.) and *Sittenlehre* (*ib.* vol. iii.). A finished work in the same department is the *Staatslehre*, published in 1820. This gives the Fichtean utopia organized on principles of pure reason; in too many cases the proposals are identical with principles of pure despotism.

During these years, however, Fichte was mainly occupied with public affairs. In 1807 he drew up an elaborate and minute plan for the proposed new university of Berlin. In 1807–1808 he delivered at Berlin, amidst danger and discouragement, his noble addresses to the German people (*Reden an die deutsche Nation*). Even if we think that in these pure reason is sometimes overshadowed by patriotism, we cannot but recognize the immense practical value of what he recommended as the only true foundation for national prosperity.

In 1810 he was elected rector of the new university founded in the previous year. This post he resigned in 1812, mainly on account of the difficulties he experienced in his endeavour to reform the student life of the university.

In 1813 began the great effort of Germany for national independence. Debarred from taking an active part, Fichte made his contribution by way of lectures. The addresses on the idea of a true war (*Über den Begriff eines wahrhaften Kriegs*, forming part of the *Staatslehre*) contain a very subtle contrast between the positions of France and Germany in the war.

In the autumn of 1813 the hospitals of Berlin were filled with sick and wounded from the campaign. Among the most devoted in her exertions was Fichte's wife, who, in January 1814, was attacked with a virulent hospital fever. On the day after she was pronounced out of danger Fichte was struck down. He lingered for some days in an almost unconscious state, and died on the 27th of January 1814.

The philosophy of Fichte, worked out in a series of writings, and falling chronologically into two distinct periods, that of Jena and that of Berlin, seemed in the course of its development to undergo a change so fundamental that many critics have sharply separated and opposed to one another an earlier and a later phase. The ground of the modification, further, has been sought and apparently found in quite external influences, principally that of

Schelling's *Naturphilosophie*, to some extent that of Schleiermacher. But as a rule most of those who have adopted this view have done so without the full and patient examination which the matter demands; they have been misled by the difference in tone and style between the earlier and later writings, and have concluded that underlying this was a fundamental difference of philosophic conception. One only, Erdmann, in his *Entwicklung d. deut. Spek. seit Kant*, § 29, seems to give full references to justify his opinion, and even he, in his later work, *Grundriss der Gesch. der Philos.* (ed. 3), § 311, admits that the difference is much less than he had at the first imagined. He certainly retains his former opinion, but mainly on the ground, in itself intelligible and legitimate, that, so far as Fichte's philosophical reputation and influence are concerned, attention may be limited to the earlier doctrines of the *Wissenschaftslehre*. This may be so, but it can be admitted neither that Fichte's views underwent radical change, nor that the *Wissenschaftslehre* was ever regarded as in itself complete, nor that Fichte was unconscious of the apparent difference between his earlier and later utterances. It is demonstrable by various passages in the works and letters that he never looked upon the *Wissenschaftslehre* as containing the whole system; it is clear from the chronology of his writings that the modifications supposed to be due to other thinkers were from the first implicit in his theory; and if one fairly traces the course of thought in the early writings, one can see how he was inevitably led on to the statement of the later and, at first sight, divergent views. On only one point, the position assigned in the *Wissenschaftslehre* to the absolute ego, is there any obscurity; but the relative passages are far from decisive, and from the early work, *Neue Darstellung der Wissenchaftslehre*, unquestionably to be included in the Jena period, one can see that from the outset the doctrine of the absolute ego was held in a form differing only in statement from the later theory.

Fichte's system cannot be compressed with intelligibility. We shall here note only three points:—(*a*) the origin in Kant; (*b*) the fundamental principle and method of the *Wissenschaftslehre*; (*c*) the connexion with the later writings. The most important works for (*a*) are the "Review of Aenesidemus," and the *Second Introduction to the Wissenschaftslehre*; for (*b*) the great treatises of the Jena period; for (*c*) the *Thatsachen des Bewusstseyns* of 1810.

(*a*) The Kantian system had for the first time opened up a truly fruitful line of philosophic speculation, the transcendental consideration of knowledge, or the analysis of the conditions under which cognition is possible. To Kant the fundamental condition was given in the synthetical unity of consciousness. The primitive fact under which might be gathered the special conditions of that synthesis which we call cognition was this unity. But by Kant there was no attempt made to show that the said special conditions were necessary from the very nature of consciousness itself. Their necessity was discovered and proved in a manner which might be called empirical. Moreover, while Kant in a quite similar manner pointed out that intuition had special conditions, space and time, he did not show any link of connexion between these and the primitive conditions of pure cognition. Closely connected with this remarkable defect in the Kantian view—lying, indeed, at the foundation of it—was the doctrine that the matter of cognition is altogether *given*, or thrown into the *form* of cognition from without. So strongly was this doctrine emphasized by Kant, that he seemed to refer the *matter* of knowledge to the action upon us of a non-ego or *Ding-an-sich*, absolutely beyond consciousness. While these hints towards a completely intelligible account of cognition were given by Kant, they were not reduced to system, and from the way in which the elements of cognition were related, could not be so reduced. Only in the sphere of practical reason, where the intelligible nature prescribed to itself its own laws, was there the possibility of systematic deduction from a single principle.

The peculiar position in which Kant had left the theory of cognition was assailed from many different sides and by many writers, specially by Schultze (Aenesidemus) and Maimon. To the criticisms of the latter, in particular, Fichte owed much, but his own activity went far beyond what they supplied to him. To complete Kant's work, to demonstrate that all the necessary conditions of knowledge can be deduced from a single principle, and consequently to expound the complete system of reason, that is the business of the *Wissenschaftslehre*. By it the theoretical and practical reason shall be shown to coincide; for while the categories of cognition and the whole system of pure thought can be expounded from one principle, the ground of this principle is scientifically, or to cognition, inexplicable, and is made conceivable only in the practical philosophy. The ultimate basis for the activity of cognition is given by the will. Even in the practical sphere, however, Fichte found that the contradiction, insoluble to cognition, was not completely suppressed, and he was thus driven to the higher view, which is explicitly stated in the later writings though not, it must be confessed, with the precision and scientific clearness of the *Wissenschaftslehre*.

(*b*) What, then, is this single principle, and how does it work itself out into system? To answer this one must bear in mind what Fichte intended by designating all philosophy *Wissenschaftslehre*, or theory of science. Philosophy is to him the rethinking of actual cognition, the *theory* of knowledge, the complete, systematic exposition of the principles which lie at the basis of all reasoned cognition. It traces the necessary acts by which the cognitive consciousness comes to be what it is, both in form and in content. Not that it is a natural history, or even a *phenomenology* of consciousness; only in the later writings did Fichte adopt even the genetic method of exposition; it is the complete statement of the pure principles of the understanding in their rational or necessary order. But if complete, this *Wissenschaftslehre* must be able to deduce the whole organism of cognition from certain fundamental axioms, themselves unproved and incapable of proof; only thus can we have a *system* of reason. From these primary axioms the whole body of necessary thoughts must be developed, and, as Socrates would say, the argument itself will indicate the path of the development.

Of such primitive principles, the absolutely necessary conditions of possible cognition, only three are thinkable—one perfectly unconditioned both in form and matter; a second, unconditioned in form but not in matter; a third, unconditioned in matter but not in form. Of these, evidently the first must be the fundamental; to some extent it conditions the other two, though these cannot be deduced from it or proved by it. The statement of these principles forms the introduction to *Wissenschaftslehre*.

The method which Fichte first adopted for stating these axioms is not calculated to throw full light upon them, and tends to exaggerate the apparent airiness and unsubstantiality of his deduction. They may be explained thus. The primitive condition of all intelligence is that the ego shall posit, affirm or be aware of itself. The ego is the ego; such is the first pure act of conscious intelligence, that by which alone consciousness can come to be what it is. It is what Fichte called a Deed-act (*Thathandlung*); we cannot be aware of the process,—the ego *is* not until it has affirmed itself,—but we are aware of the result, and can see the necessity of the act by which it is brought about. The ego then posits itself as real. What the ego posits is real. But in consciousness there is equally given a primitive act of op-positing, or contra-positing, formally distinct from the act of position, but materially determined, in so far as what is op-posited must be the negative of that which was posited. The non-ego—not, be it noticed, the world as we know it—is op-posed in consciousness to the ego. The ego is not the non-ego. How this act of op-positing is possible and necessary, only becomes clear in the practical philosophy, and even there the inherent difficulty leads to a higher view. But third, we have now an absolute antithesis to our original thesis. Only the ego is real, but the non-ego is posited in the ego. The contradiction is solved in a higher synthesis, which takes up into itself the two opposites. The ego and non-ego *limit* one another, or determine one another; and, as limitation is negation of part of a divisible quantum, in this third act, the divisible ego is op-posed to a divisible non-ego.

From this point onwards the course proceeds by the method already made clear. We progress by making explicit the oppositions contained in the fundamental synthesis, by uniting these opposites, analysing the new synthesis, and so on, until we reach an ultimate pair. Now, in the synthesis of the third act two principles may be distinguished:—(1) the non-ego determines the ego; (2) the ego determines the non-ego. As determined the ego is theoretical, as determining it is practical; ultimately the opposed principles must be united by showing how the ego is both determining and determined.

It is impossible to enter here on the steps by which the theoretical ego is shown to develop into the complete system of cognitive categories, or to trace the deduction of the processes (productive imagination, intuition, sensation, understanding, judgment, reason) by which the quite indefinite non-ego comes to assume the appearance of definite objects in the forms of time and space. All this evolution is the necessary consequence of the determination of the ego by the non-ego. But it is clear that the non-ego cannot really determine the ego. There is no reality beyond the ego itself. The contradiction can only be suppressed if the ego itself opposes to itself the non-ego, places it as an *Anstoss* or plane on which its own activity breaks and from which it is reflected. Now, this op-positing of the *Anstoss* is the necessary condition of the practical ego, of the will. If the ego be a striving power, then of necessity a limit must be set by which its striving is manifest. But how can the infinitely active ego posit a limit to its own activity? Here we come to the *crux* of Fichte's system, which is only partly cleared up in the *Rechtslehre* and *Sittenlehre*. If the ego be pure activity, free activity, it can only become aware of itself by positing some limit. We cannot possibly have any cognition of how such an act is possible. But as it is a free act, the ego cannot be determined to it by anything beyond itself; it cannot be aware of its own freedom otherwise than as determined by other free egos. Thus in the *Rechtslehre* and *Sittenlehre*, the multiplicity of egos is deduced, and with this deduction the first form of the *Wissenschaftslehre* appeared to end.

(*c*) But in fact deeper questions remained. We have spoken of the ego as becoming aware of its own freedom, and have shown how the existence of other egos and of a world in which these egos may act are the necessary conditions of consciousness of freedom. But all this is the work of the ego. All that has been expounded follows if the ego comes to consciousness. We have therefore to consider that the absolute ego, from which spring all the individual egos, is not subject to these conditions, but freely determines itself to them.

How is this absolute ego to be conceived? As early as 1797 Fichte had begun to see that the ultimate basis of his system was the absolute ego, in which is no difference of subject and object; in 1800 the *Bestimmung des Menschen* defined this absolute ego as the infinite moral will of the universe, God, in whom are all the individual egos, from whom they have sprung. It lay in the nature of the thing that more precise utterances should be given on this subject, and these we find in the *Thatsachen des Bewusstseyns* and in all the later lectures. God in them is the absolute Life, the absolute One, who becomes conscious of himself by self-diremption into the individual egos. The individual ego is only possible as opposed to a non-ego, to a world of the senses; thus God, the infinite will, manifests himself in the individual, and the individual has over against him the non-ego or thing. "The individuals do not make part of the being of the one life, but are a pure form of its absolute freedom." "The individual is not conscious of himself, but the Life is conscious of itself in individual form and as an individual." In order that the Life may act, though it is not necessary that it *should act*, individualization is necessary. "Thus," says Fichte, "we reach a final conclusion. Knowledge is not mere knowledge of itself, but of being, and of the one being that truly is, viz. God. . . . This one possible object of knowledge is never known in its purity, but ever broken into the various forms of knowledge which are and can be shown to be necessary. The demonstration of the necessity of these forms is philosophy or *Wissenschaftslehre*" (*Thats. des Bewuss. Werke*, ii. 685). This ultimate view is expressed throughout the lectures (in the *Nachgel. Werke*) in uncouth and mystical language.

It will escape no one (1) how the idea and method of the *Wissenschaftslehre* prepare the way for the later Hegelian dialectic, and (2) how completely the whole philosophy of Schopenhauer is contained in the later writings of Fichte. It is not to the credit of historians that Schopenhauer's debt should have been allowed to pass with so little notice.

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(R. AD.; X.)

FICHTELGEBIRGE, a mountain group of Bavaria, forming the centre from which various mountain ranges proceed,—the Elstergebirge, linking it to the Erzgebirge, in a N.E., the Frankenwald in a N.W., and the Böhmerwald in a S.E. direction. The streams to which it gives rise flow towards the four cardinal points,—*e.g.* the Eger eastward and the Saale northward, both to the Elbe; the Weisser Main westward to the Rhine, and the Naab southward to the Danube. The chief points of the mass are the Schneeberg and the Ochsenkopf, the former having a height of 3448, and the latter of 3356 ft. The whole district is pretty thickly populated, and there is great abundance of wood, as well as of iron, vitriol, sulphur, copper, lead and many kinds of marble. The inhabitants are employed chiefly in the iron mines, at forges and blast furnaces, and in charcoal burning and the manufacture of blacking from firewood. Although surrounded by railways and crossed by the lines Nuremberg-Eger and Regensburg-Oberkotzau, the Fichtelgebirge, owing principally to its raw climate and bleakness, is not much visited by strangers, the only important points of interest being Alexandersbad (a delightfully situated watering-place) and the granite labyrinth of Luisenburg.

See A. Schmidt, *Führer durch das Fichtelgebirge* (1899); Daniel, *Deutschland*; and Meyer, *Conversations-Lexikon* (1904).

FICINO, MARSILIO (1433–1499), Italian philosopher and writer, was born at Figline, in the upper Arno valley, in the year 1433. His father, a physician of some eminence, settled in Florence, and attached himself to the person of Cosimo de' Medici. Here the young Marsilio received his elementary education in grammar and Latin literature at the high school or studio pubblico. While still a boy, he showed promise of rare literary gifts, and distinguished himself by his facility in the acquisition of knowledge. Not only literature, but the physical sciences, as then taught, had a charm for him; and he is said to have made considerable progress in medicine under the tuition of his father. He was of a tranquil temperament, sensitive to music and poetry, and debarred by weak health from joining in the more active pleasures of his fellow-students. When he had attained the age of eighteen or nineteen years, Cosimo received him into his household, and determined to make use of his rare disposition for scholarship in the development of a long-cherished project. During the session of the council for the union of the Greek and Latin churches at Florence in 1439, Cosimo had made acquaintance with Gemistos Plethon, the Neo-Platonic sage of Mistra, whose discourses upon Plato and the Alexandrian mystics so fascinated the learned society of Florence that they named him the second Plato. It had been the dream of this man's whole life to supersede both forms of Christianity by a semi-pagan theosophy deduced from the writings of the later Pythagoreans and Platonists. When, therefore, he perceived the impression he had made upon the first citizen of Florence, Gemistos suggested that the capital of modern culture would be a fit place for the resuscitation of the once so famous Academy of Athens. Cosimo took this hint. The second half of the 15th century was destined to be the age of academies in Italy, and the regnant passion for antiquity satisfied itself with any imitation, however grotesque, of Greek or Roman institutions. In order to found his new academy upon a firm basis Cosimo resolved not only to assemble men of letters for the purpose of Platonic disputation at certain regular intervals, but also to appoint a hierophant and official expositor of Platonic doctrine. He hoped by these means to give a certain stability to his projected institution, and to avoid the superficiality of mere enthusiasm. The plan was good; and with the rare instinct for character which distinguished him, he made choice of the right man for his purpose in the young Marsilio.

Before he had begun to learn Greek, Marsilio entered upon the task of studying and elucidating Plato. It is known that at this early period of his life, while he was yet a novice, he wrote voluminous treatises on the great philosopher, which he afterwards, however, gave to the flames. In the year 1459 John Argyropoulos was lecturing on the Greek language and literature at Florence, and Marsilio became his pupil. He was then about twenty-three years of age. Seven years later he felt himself a sufficiently ripe Greek scholar to begin the translation of Plato, by which his name is famous in the history of scholarship, and which is still the best translation of that author Italy can boast. The MSS. on which he worked were supplied by his patron Cosimo de' Medici and by Amerigo Benci. While the translation was still in progress Ficino from time to time submitted its pages to the scholars, Angelo Poliziano, Cristoforo Landino, Demetrios Chalchondylas and others; and since these men were all members of the Platonic Academy, there can be no doubt that the discussions raised upon the text and Latin version greatly served to promote the purpose of Cosimo's foundation. At last the book appeared in 1482, the expenses of the press being defrayed by the noble Florentine, Filippo Valori. About the same time Marsilio completed and published his treatise on the Platonic doctrine of immortality (*Theologia Platonica de immortalitate animae*), the work by which his claims to take rank as a philosopher must be estimated. This was shortly followed by the translation of Plotinus into Latin, and by a voluminous commentary, the former finished in 1486, the latter in 1491, and both published at the cost of Lorenzo de' Medici just one month after his death. As a supplement to these labours in the field of Platonic and Alexandrian philosophy, Marsilio next devoted his energies to the translation of Dionysius the Areopagite, whose work on the celestial hierarchy, though recognized as spurious by the Neapolitan humanist, Lorenzo Valla, had supreme attraction for the mystic and uncritical intellect of Ficino.

It is not easy to value the services of Marsilio Ficino at their proper worth. As a philosopher, he can advance no claim to originality, his laborious treatise on Platonic theology being little better than a mass of ill-digested erudition. As a scholar, he failed to recognize the distinctions between different periods of antiquity and various schools of thought. As an exponent of Plato he suffered from the fatal error of confounding Plato with the later Platonists. It is true that in this respect he did not differ widely from the mass of his contemporaries. Lorenzo Valla and Angelo Poliziano, almost alone among the scholars of that age, showed a true critical perception. For the rest, it was enough that an author should be ancient to secure their admiration. The whole of antiquity seemed precious in the eyes of its discoverers; and even a thinker so acute as Pico di Mirandola dreamed of the possibility of extracting the essence of philosophical truth by indiscriminate collation of the most divergent doctrines. Ficino was, moreover, a firm believer in planetary influences. He could not separate his philosophical from his astrological studies, and caught eagerly at any fragment of antiquity which seemed to support his cherished delusions. It may here be incidentally mentioned that this superstition brought him into trouble with the Roman Church. In 1489 he was accused of magic before Pope Innocent VIII., and had to secure the good offices of Francesco Soderini, Ermolao Barbaro, and the archbishop Rinaldo Orsini, in order to purge himself of a most perilous imputation. What Ficino achieved of really solid, was his translation. The value of that work cannot be denied; the impulse which it gave to Platonic studies in Italy, and through them to the formation of the new philosophy in Europe, is indisputable. Ficino differed from the majority of his contemporaries in this that, while he felt the influence of antiquity no less strongly than they did, he never lost his faith in Christianity, or contaminated his morals by contact with paganism. For him, as for Petrarch, St Augustine was the model of a Christian student. The cardinal point of his doctrine was the identity of religion and philosophy. He held that philosophy consists in the study of truth and wisdom, and that God alone is truth and wisdom,—so that philosophy is but religion, and true religion is genuine philosophy. Religion, indeed, is common to all men, but its pure form is that revealed through Christ; and the teaching of Christ is sufficient to a man in all circumstances of life. Yet it cannot be expected that every man should accept the faith without reasoning; and here Ficino found a place for Platonism. He maintained that the Platonic doctrine was providentially made to harmonize with Christianity, in order that by its means speculative intellects might be led to Christ. The transition from this point of view to an almost superstitious adoration of Plato was natural; and Ficino, we know, joined in the hymns and celebrations with which the Florentine Academy honoured their great master on the day of his birth and death. Those famous festivals in which Lorenzo de' Medici delighted had indeed a pagan tone appropriate to the sentiment of the Renaissance; nor were all the worshippers of the Athenian sage so true to Christianity as his devoted student.

Of Ficino's personal life there is but little to be said. In order that he might have leisure for uninterrupted study, Cosimo de' Medici gave him a house near S. Maria Nuova in Florence, and a little farm at Montevecchio, not far from the villa of Careggi. Ficino, like nearly all the scholars of that age in Italy, delighted in country life. At Montevecchio he lived contentedly among his books, in the neighbourhood of his two friends, Pico at Querceto, and Poliziano at Fiesole, cheering his solitude by playing on the lute, and corresponding with the most illustrious men of Italy. His letters, extending over the years 1474–1494, have been published, both separately and in his collected works. From these it may be gathered that nearly every living scholar of note was included in the list of his friends, and that the subjects which interested him were by no means confined to his Platonic sudies. As instances of his close intimacy with illustrious Florentine families, it may be mentioned that he held the young Francesco Guicciardini at the font, and that he helped to cast the horoscope of the Casa Strozzi in the Via Tornabuoni.

At the age of forty Ficino took orders, and was honoured with a canonry of S. Lorenzo. He was henceforth assiduous in the performance of his duties, preaching in his cure of Novoli, and also in the cathedral and the church of the Angeli at Florence. He used to say that no man was better than a good priest, and none worse than a bad one. His life corresponded in all points to his principles. It was the life of a sincere Christian and a real sage,—of one who found the best fruits of philosophy in the practice of the Christian virtues. A more amiable and a more harmless man never lived; and this was much in that age of discordant passions and lawless licence. In spite of his weak health, he was indefatigably industrious. His tastes were of the simplest; and while scholars like Filelfo were intent on extracting money from their patrons by flattery and threats, he remained so poor that he owed the publication of all his many works to private munificence. For his old patrons of the house of Medici Ficino always cherished sentiments of the liveliest gratitude. Cosimo he called his second father, saying that Ficino had given him life, but Cosimo new birth,—the one had devoted him to Galen, the other to the divine Plato,—the one was physician of the body, the other of the soul. With Lorenzo he lived on terms of familiar, affectionate, almost parental intimacy. He had seen the young prince grow up in the palace of the Via Larga, and had helped in the development of his rare intellect. In later years he did not shrink from uttering a word of warning and advice, when he thought that the master of the Florentine republic was too much inclined to yield to pleasure. A characteristic proof of his attachment to the house of Medici was furnished by a yearly custom which he practised at his farm at Montevecchio. He used to invite the contadini who had served Cosimo to a banquet on the day of Saints Cosimo and Damiano (the patron saints of the Medici), and entertained them with music and singing. This affection was amply returned. Cosimo employed almost the last hours of his life in listening to Ficino's reading of a treatise on the highest good; while Lorenzo, in a poem on true happiness, described him as the mirror of the world, the nursling of sacred muses, the harmonizer of wisdom and beauty in complete accord. Ficino died at Florence in 1499.

Besides the works already noticed, Ficino composed a treatise on the Christian religion, which was first given to the world in 1476, a translation into Italian of Dante's *De monarchia*, a life of Plato, and numerous essays on ethical and semi-philosophical subjects. Vigour of reasoning and originality of view were not his characteristics as a writer; nor will the student who has raked these dust-heaps of miscellaneous learning and old-fashioned mysticism discover more than a few sentences of genuine enthusiasm and simple-hearted aspiration to repay his trouble and reward his patience. Only in familiar letters, prolegomena, and prefaces do we find the man Ficino, and learn to know his thoughts and sentiments unclouded by a mist of citations; these minor compositions have therefore a certain permanent value, and will continually be studied for the light they throw upon the learned circle gathered round Lorenzo in the golden age of humanism.

The student may be referred for further information to the following works:—*Marsilii Ficini opera* (Basileae, 1576); *Marsilii Ficini vita*, auctore Corsio (ed. Bandini, Pisa, 1771); Roscoe's *Life of Lorenzo de' Medici*; Pasquale Villari, *La Storia di Girolamo Savonarola* (Firenze, Le Monnier, 1859); Von Reumont, *Lorenzo de' Medici* (Leipzig, 1874). (J. A. S.)

FICKSBURG, a town of Orange Free State 110 m. by rail E. by N. of Bloemfontein. Pop. (1904) 1954, of whom 1021 were whites. The town is situated near the north bank of the Caledon river and is the capital of one of the finest agricultural and stock-raising regions of the province. It has direct railway communication with Natal and an extensive trade. In the neighbourhood are petroleum wells and a diamond mine. In the fossilized ooze of the Wonderkop, a table mountain of the adjacent Wittebergen, are quantities of petrified fish.

FICTIONS, or legal fictions, in law, the term used for false averments, the truth of which is not permitted to be called in question. English law as well as Roman law abounds in fictions. Sometimes they are merely the condensed expression of a rule of law,—*e.g.*, the fiction of English law that husband and wife were one person, and the fiction of Roman law that the wife was the daughter of the husband. Sometimes they must be regarded as reasons invented in order to justify a rule of law according to an implied ethical standard. Of this sort seems to be the fiction or presumption that every one knows the law, which reconciles the rule that ignorance is no excuse for crime with the moral commonplace that it is unfair to punish a man for violating a law of whose existence he was unaware. Again, some fictions are deliberate falsehoods, adopted as true for the purpose of establishing a remedy not otherwise attainable. Of this sort are the numerous fictions of English law by which the different courts obtained jurisdiction in private business, removed inconvenient restrictions in the law relating to land, &c.

What to the scientific jurist is a stumbling-block is to the older writers on English law a beautiful device for reconciling the strict letter of the law with common sense and justice. Blackstone, in noticing the well-known fiction by which the court of king's bench established its jurisdiction in common pleas (viz. that the defendant was in custody of the marshal of the court), says, "These fictions of law, though at first they may startle the student, he will find upon further consideration to be highly beneficial and useful; especially as this maxim is ever invariably observed, that no fiction shall extend to work an injury; its proper operation being to prevent a mischief or remedy an inconvenience that might result from the general rule of law. So true it is that *in fictione juris semper subsistit aequitas*." Austin, on the other hand, while correctly assigning as the cause of many fictions the desire to combine the necessary reform with some show of respect for the abrogated law, makes the following harsh criticism as to others:—"Why the plain meanings which I have now stated should be obscured by the fictions to which I have just adverted I cannot conjecture. A wish on the part of the authors of the fictions to render the law as *uncognoscible* as may be is probably the cause which Mr Bentham would assign. I judge not, I confess, so uncharitably; I rather impute such fictions to the sheer imbecility (or, if you will, to the active and sportive fancies) of their grave and venerable authors, than to any deliberate design, good or evil." Bentham, of course, saw in fictions the instrument by which the great object of his abhorrence, *judiciary law*, was produced. It was the means by which judges usurped the functions of legislators. "A fiction of law," he says, "may be defined as a wilful falsehood, having for its object the stealing legislative powers by and for hands which could not or durst not openly claim it, and but for the delusion thus produced could not exercise it." A partnership, he says, was formed between the kings and the judges against the interests of the people. "Monarchs found force, lawyers fraud; thus was the capital found" (*Historical Preface to the second edition of the Fragment on Government*).[1]

Sir H. Maine (*Ancient Law*) supplies the historical element which is always lacking in the explanations of Austin and Bentham. Fictions form one of the agencies by which, in progressive societies, positive law is brought into harmony with public opinion. The others are equity and statutes. Fictions in this sense include, not merely the obvious falsities of the English and Roman systems, but any assumption which conceals a change of law by retaining the old formula after the change has been made. It thus includes both the case law of the English and the *Responsa Prudentum* of the Romans. "At a particular stage of social progress they are invaluable expedients for overcoming the rigidity of law; and, indeed, without one of them, the fiction of adoption, which permits the family tie to be artificially created, it is difficult to understand how society would ever have escaped from its swaddling clothes, and taken its first steps towards civilization."

The bolder remedial fictions of English law have been to a large extent removed by legislation, and one great obstacle to any reconstruction of the legal system has thus been partially removed. Where the real remedy stood in glaring contrast to the nominal rule, it has been openly ratified by statute. In ejectment cases the mysterious sham litigants have disappeared. The bond of entail can be broken without having recourse to the collusive proceedings of fine and recovery. Fictions have been almost entirely banished from the procedure of the courts. The action for damages on account of seduction, which is still nominally an action by the father for loss of his daughter's services, is perhaps the only fictitious action now remaining.

Fictions which appear in the form of principles are not so easily dealt with by legislation. To expel them formally from the system would require the re-enactment of vast portions of law. A change in legal modes of speech and thought would be more effective. The legal mind instinctively seizes upon concrete aids to abstract reasoning. Many hard and revolting fictions must have begun their career as metaphors. In some cases the history of the change may still almost be traced. The conception that a man-of-war is a floating island, or that an ambassador's house is beyond the territorial limits of the country in which he resides, was originally a figure of speech designed to set a rule of law in a striking light. It is then gravely accepted as true in fact, and other rules of law are deduced from it. Its beginning is to be compared with such phrases as "an Englishman's house is his castle," which have had no legal offshoots and still remain mere figures of speech.

Constitutional law is of course honeycombed with fictions. Here there is hardly ever anything like direct legislative change, and yet real change is incessant. The rules defining the sovereign power and fixing the authority of its various members are in most points the same as they were at the last revolution,—in many points they have been the same since the beginning of parliamentary government. But they have long ceased to be true in fact; and it would hardly be too much to say that the entire series of formal propositions called the constitution is merely a series of fictions. The legal attributes of the king, and even of the House of Lords, are fictions. If we could suppose that the effects of the Reform Acts had been brought about, not by legislation, but by the decisions of law courts and the practice of House of Commons committees—by such assumptions as that freeholder includes lease-holder and that ten means twenty—we should have in the legal constitution of the House of Commons the same kind of fictions that we find in the legal statement of the attributes of the crown and the House of Lords. Here, too, fictions have been largely resorted to for the purpose of supporting particular theories,—popular or monarchical,—and such have flourished even more vigorously than purely legal fictions.

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[1] In the same essay Bentham notices the comparative rarity of fictions in Scots law. As to fiction in particular, compared with the work done by it in English law, the use made of it by the Scottish lawyers is next to nothing. No need have they had of any such clumsy instrument. They have two others "of their own making, by which things of the same sort have been done with much less trouble. *Nobile officium* gives them the creative power of legislation; this and the word desuetude together the annihilative." And he notices aptly enough that, while the English lawyers declared that James II. had abdicated the throne (which everybody knew to be false), the Scottish lawyers boldly said he had forfeited it.

FIDDES, RICHARD (1671–1725), English divine and historian, was born at Hunmanby and educated at Oxford. He took orders, and obtained the living of Halsham in Holderness in 1696. Owing to ill-health he applied for leave to reside at Wickham, and in 1712 he removed to London on the plea of poverty, intending to pursue a literary career. In London he met Swift, who procured him a chaplaincy at Hull. He also became chaplain to the earl of Oxford. After losing the Hull chaplaincy through a change of ministry in 1714, he devoted himself to writing. His best book is a *Life of Cardinal Wolsey* (London, 1724), containing documents which are still valuable for reference; of his other writings the *Prefatory Epistle containing some remarks to be published on Homer's Iliad* (London, 1714), was occasioned by Pope's proposed translation of the *Iliad*, and his *Theologia speculativa* (London, 1718), earned him the degree of D.D. at Oxford. In his own day he had a considerable reputation as an author and man of learning.

FIDDLE (O. Eng. *fithele*, *fidel*, &c., Fr. *vièle*, *viole*, *violon*; M. H. Ger. *videle*, mod. Ger. *Fiedel*), a popular term for the violin, derived from the names of certain of its ancestors. The word fiddle antedates the appearance of the violin by several centuries, and in England did not always represent an instrument of the same type. The word has first been traced in 1205 in Layamon's *Brut* (7002), "of harpe, of salteriun, of fithele and of coriun." In Chaucer's time the fiddle was evidently a well-known instrument:

> "For him was lever have at his beddes hed
> A twenty bokes, clothed in black or red,
> Of Aristotle and his Philosophie,
> Than robes riche or fidel or sautrie."
> (*Prologue*, v. 298.)

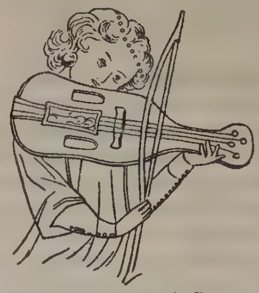
The origin of the fiddle is of the greatest interest; it will be found inseparable from that of the violin both as regards the instruments and the etymology of the words; the remote common ancestor is the *ketharah* of the Assyrians, the parent of the Greek cithara. The Romans are responsible for the word fiddle, having bestowed upon a kind of cithara—probably then in its first transition—the name of *fidiculae* (more rarely *fidicula*), a diminutive form of *fides*. In Alain de Lille's *De planctu naturae* against the word *lira* stands as equivalent *vioel*, with the definition "Lira est quoddam genuē citharae vel fitola alioquin de reot. Hoc instrumentum est multum vulgare." This is a marginal note in writing of the 13th century.[1]

Some of the transitions from *fidicula* to fiddle are made evident in the accompanying table:

Latin	fidiculae
Medieval Latin	vitula, fitola.
French	vièle, vielle, viole.
Provençal	viula.
Spanish	viguela, vihuela, vigolo.
Old High German	fidula.
Middle High German	videle.
German	fiedel, violine.
Italian	viola, violino.
Dutch	vedel.
Danish	fiddel.
Anglo-Saxon	fithele.
Old English	fithele, fythal, fithel, fythylle, fidel, fidylle, (south) vithele.

For the descent of the guitar-fiddle, the first bowed ancestor of the violin, through many transitions from the cithara, see Cithara, Guitar and Guitar-Fiddle.

In the minnesinger and troubadour fiddles, of which evidences abound during the 12th, 13th and 14th centuries, are to be observed the structural characteristics of the violin and its ancestors in the course of evolution. The principal of these are first of all the shallow sound-chest, composed of belly and back, almost flat, connected by ribs (also present in the cithara), with incurvations more or less pronounced, an arched bridge, a finger-board and strings (varying in number), vibrated by means of a bow. The central rose sound-holes of stringed instruments whose strings are plucked by fingers or plectrum have given place to smaller lateral sound-holes placed on each side of the strings. It is in Germany,[1] where contemporary drawings of fiddles of the 13th and 14th centuries furnish an authoritative clue, and in France, that the development may best be followed. The German minnesinger fiddle with sloping shoulders was the prototype of the viols, whereas the guitar-fiddle produced the violin through the intermediary of the Italian bowed *Lyra*.


From Julius Rühlmann's *Geschichte der Bogeninstrumente*.

Minnesinger Fiddle. Germany, 13th Century, from the Manesse MSS.

The fiddle of the Carolingian epoch,—such, for instance, as that mentioned by Otfrid of Weissenburg[2] in his *Harmony of the Gospels* (*c.* 868),

> "Sih thar ouch al ruarit
> This organo fuarit
> Lira joh *fidula*," &c.,—

was in all probability still an instrument whose strings were plucked by the fingers, a cithara in transition. (K. S.)

FIDENAE, an ancient town of Latium, situated about 5 m. N. of Rome on the Via Salaria, which ran between it and the Tiber. It was for some while the frontier of the Roman territory and was often in the hands of Veii. It appears to have fallen under the Roman sway after the capture of this town, and is spoken of by classical authors as a place almost deserted in their time. It seems, however, to have had some importance as a post station. The site of the *arx* of the ancient town is probably to be sought on the hill on which lies the Villa Spada, though no traces of early buildings or defences are to be seen: pre-Roman tombs are to be found in the cliffs to the north. The later village lay at the foot of the hill on the eastern edge of the high-road, and its *curia*, with a dedicatory inscription to M. Aurelius by the *Senatus Fidenatium*, was excavated in 1889. Remains of other buildings may also be seen.

See T. Ashby in *Papers of the British School at Rome*, iii. 17.

FIDUCIARY (Lat. *fiduciarius*, one in whom trust, *fiducia*, is reposed), of or belonging to a position of trust, especially of one who stands in a particular relationship of confidence to another. Such relationships are, in law, those of parent and child, guardian and ward, trustee and *cestui que trust*, legal adviser and client, spiritual adviser, doctor and patient, &c. In many of these the law has attached special obligations in the case of gifts made to the "fiduciary," on whom is laid the onus of proving that no "undue influence" has been exercised. (See Contract; Children, Law Relating to; Infant; Trust.)

FIEF, a feudal estate in land, land held from a superior (see Feudalism). The word is the French form, which is represented in Medieval Latin as *feudum* or *feodum*, and in English as "fee" or "feu" (see Fee). The A.Fr. *feoffer*, to invest with a fief or fee, has given the English law terms "feoffee" and "feoffment" (*q.v.*).

FIELD, CYRUS WEST (1819–1892), American capitalist, projector of the first Atlantic cable, was born at Stockbridge, Massachusetts, on the 30th of November 1819. He was a brother of David Dudley Field. At fifteen he became a clerk in the store of A. T. Stewart & Co., of New York, and stayed there three years; then worked for two years with his brother, Matthew Dickinson Field, in a paper-mill at Lee, Massachusetts; and in 1840 went into the paper business for himself at Westfield, Massachusetts, but almost immediately became a partner in E. Root & Co., wholesale paper dealers in New York City, who failed in the following year. Field soon afterwards formed with a brother-in-law the firm of Cyrus W. Field & Co., and in 1853 had accumulated $250,000, paid off the debts of the Root company and retired from active business, leaving his name and $100,000 with the concern. In the same year he travelled with Frederick E. Church, the artist, through South America. In 1854 he became interested, through his brother Matthew, a civil engineer, in the project of Frederick Newton Gisborne (1824–1892) for a telegraph across Newfoundland; and he was attracted by the idea of a trans-Atlantic telegraphic cable, as to which he consulted S. F. B. Morse and Matthew F. Maury, head of the National Observatory at Washington. With Peter Cooper, Moses Taylor (1806–1882), Marshall Owen Roberts (1814–1880) and Chandler White, he formed the New York, Newfoundland & London Telegraph Company, which procured a more favourable charter than Gisborne's, and had a capital of $1,500,000. Having secured all the practicable landing rights on the American side of the ocean, he and John W. Brett, who was now his principal colleague, approached Sir Charles Bright (*q.v.*) in London, and in December 1856 the Atlantic Telegraph Company was organized by them in Great Britain, a government grant being secured of £14,000 annually for government messages, to be reduced to £10,000 annually when the cable should pay a 6% yearly dividend; similar grants were made by the United States government. Unsuccessful attempts to lay the cable were made in August 1857 and in June 1858, but the complete cable was laid between the 7th of July and the 5th of August 1858; for a time messages were transmitted, but in October the cable became useless, owing to the failure of its electrical insulation. Field, however, did not abandon the enterprise, and finally in July 1866, after a futile attempt in the previous year, a cable was laid and brought successfully into use. From the Congress of the United States he received a gold medal and a vote of thanks, and he received many other honours both at home and abroad. In 1877 he bought a controlling interest in the New York Elevated Railroad Company, controlling the Third and Ninth Avenue lines, of which he was president in 1877–1880. He worked with Jay Gould for the completion of the Wabash railway, and at the time of his greatest stock activity bought *The New York Evening Express* and *The Mail* and combined them as *The Mail and Express*, which he controlled for six years. In 1879 Field suffered financially by Samuel J. Tilden's heavy sales (during Field's absence in Europe) of "Elevated" stock, which forced the price down from 200 to 164; but Field lost much more in the great "Manhattan squeeze" of the 24th of June 1887, when Jay Gould and Russell Sage, who had been supposed to be his backers in an attempt to bring the Elevated stock to 200, forsook him, and the price fell from 156½ to 114 in half an hour. Field died in New York on the 12th of July 1892.

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[1] See C. E. H. de Coussemaker, *Mémoire sur Hucbald* (Paris, 1841).

[1] See the Manesse MSS. reproduced in part by F. H. von der Hagen, *Heldenbilder* (Leipzig and Berlin, 1855) and *Bildersaal*. The fiddles are reproduced in J. Rühlmann's *Geschichte der Bogeninstrumente* (Brunswick, 1882), plates.

[2] See Schiller's *Thesaurus antiq. Teut.* vol. i. p. 379.

See the biography by his daughter, Isabella (Field) Judson, *Cyrus W. Field, His Life and Work* (New York, 1896); H. M. Field, *History of the Atlantic Telegraph* (New York, 1866); and Charles Bright, *The Story of the Atlantic Cable* (New York, 1903).

FIELD, DAVID DUDLEY (1805–1894), American lawyer and law reformer, was born in Haddam, Connecticut, on the 13th of February 1805. He was the oldest of the four sons of the Rev. David Dudley Field (1781–1867), a well-known American clergyman and author. He graduated at Williams College in 1825, and settled in New York City, where he studied law, was admitted to the bar in 1828, and rapidly won a high position in his profession. Becoming convinced that the common law in America, and particularly in New York state, needed radical changes in respect to the unification and simplification of its procedure, he visited Europe in 1836 and thoroughly investigated the courts, procedure and codes of England, France and other countries, and then applied himself to the task of bringing about in the United States a codification of the common law procedure. For more than forty years every moment that he could spare from his extensive practice was devoted to this end. He entered upon his great work by a systematic publication of pamphlets and articles in journals and magazines in behalf of his reform, but for some years he met with a discouraging lack of interest. He appeared personally before successive legislative committees, and in 1846 published a pamphlet, "The Reorganization of the Judiciary," which had its influence in persuading the New York State Constitutional Convention of that year to report in favour of a codification of the laws. Finally in 1847 he was appointed as the head of a state commission to revise the practice and procedure. The first part of the commission's work, consisting of a code of civil procedure, was reported and enacted in 1848, and by the 1st of January 1850 the complete code of civil and criminal procedure was completed, and was subsequently enacted by the legislature. The basis of the new system, which was almost entirely Field's work, was the abolition of the existing distinction in forms of procedure between suits in law and equity requiring separate actions, and their unification and simplification in a single action. Eventually the civil code with some changes was adopted in twenty-four states, and the criminal code in eighteen, and the whole formed a basis of the reform in procedure in England and several of her colonies. In 1857 Field became chairman of a state commission for the reduction into a written and systematic code of the whole body of law of the state, excepting those portions already reported upon by the Commissioners of Practice and Pleadings. In this work he personally prepared almost the whole of the political and civil codes. The codification, which was completed in February 1865, was adopted only in small part by the state, but it has served as a model after which most of the law codes of the United States have been constructed. In 1866 he proposed to the British National Association for the Promotion of Social Science a revision and codification of the laws of all nations. For an international commission of lawyers he prepared *Draft Outlines of an International Code* (1872), the submission of which resulted in the organization of the international Association for the Reform and Codification of the Laws of Nations, of which he became president. In politics Field was originally an anti-slavery Democrat, and he supported Van Buren in the Free Soil campaign of 1848. He gave his support to the Republican party in 1856 and to the Lincoln administration throughout the Civil War. After 1876, however, he returned to the Democratic party, and from January to March 1877 served out in Congress the unexpired term of Smith Ely, elected mayor of New York City. During his brief Congressional career he delivered six speeches, all of which attracted attention, introduced a bill in regard to the presidential succession, and appeared before the Electoral Commission in Tilden's interest. He died in New York City on the 13th of April 1894.

Part of his numerous pamphlets and addresses were collected in his *Speeches, Arguments and Miscellaneous Papers* (3 vols., 1884–1890). See also the *Life of David Dudley Field* (New York, 1898), by Rev. Henry Martyn Field.

FIELD, EUGENE (1850–1895), American poet, was born at St Louis, Missouri, on the 2nd of September 1850. He spent his boyhood in Vermont and Massachusetts; studied for short periods at Williams and Knox Colleges and the University of Missouri, but without taking a degree; and worked as a journalist on various papers, finally becoming connected with the Chicago *News*. *A Little Book of Profitable Tales* appeared in Chicago in 1889 and in New York the next year; but Field's place in later American literature chiefly depends upon his poems of Christmas-time and childhood (of which "Little Boy Blue" and "A Dutch Lullaby" are most widely known), because of their union of obvious sentiment with fluent lyrical form. His principal collections of poems are: *A Little Book of Western Verse* (1889); *A Second Book of Verse* (1892); *With Trumpet and Drum* (1892); and *Love Songs of Childhood* (1894). Field died at Chicago on the 4th of November 1895.

His works were collected in ten volumes (1896), at New York. His prose *Love-affairs of a Bibliomaniac* (1896) contains a Memoir by his brother Roswell Martin Field (b. 1851). See also Slason Thompson, *Eugene Field: a study in heredity and contradictions* (2 vols., New York, 1901).

FIELD, FREDERICK (1801–1885), English divine and biblical scholar, was born in London and educated at Christ's hospital and Trinity College, Cambridge, where he obtained a fellowship in 1824. He took orders in 1828, and began a close study of patristic theology. Eventually he published an emended and annotated text of Chrysostom's *Homiliae in Matthaeum* (Cambridge, 1839), and some years later he contributed to Pusey's *Bibliotheca Patrum* (Oxford, 1838–1870), a similarly treated text of Chrysostom's homilies on Paul's epistles. The scholarship displayed in both of these critical editions is of a very high order. In 1839 he had accepted the living of Great Saxham, in Suffolk, and in 1842 he was presented by his college to the rectory of Reepham in Norfolk. He resigned in 1863, and settled at Norwich, in order to devote his whole time to study. Twelve years later he completed the *Origenis Hexaplorum quae supersunt* (Oxford, 1867–1875), now well known as *Field's Hexapla*, a text reconstructed from the extant fragments of Origen's work of that name, together with materials drawn from the *Syro-hexaplar* version and the *Septuagint* of Holmes and Parsons (Oxford, 1798–1827). Field was appointed a member of the Old Testament revision company in 1870.

FIELD, HENRY MARTYN (1822–1907), American author and clergyman, brother of Cyrus Field, was born at Stockbridge, Massachusetts, on the 3rd of April 1822; he graduated at Williams College in 1838, and was pastor of a Presbyterian church in St Louis, Missouri, from 1842 to 1847, and of a Congregational church in West Springfield, Massachusetts, from 1850 to 1854. The interval between his two pastorates he spent in Europe. From 1854 to 1898 he was editor and for many years he was also sole proprietor of *The Evangelist*, a New York periodical devoted to the interests of the Presbyterian church. He spent the last years of his life in retirement at Stockbridge, Mass., where he died on the 26th of January 1907. He was the author of a series of books of travel, which achieved unusual popularity. His two volumes descriptive of a trip round the world in 1875–1876, entitled *From the Lakes of Killarney to the Golden Horn* (1876) and *From Egypt to Japan* (1877), are almost classic in their way, and have passed through more than twenty editions. Among his other publications are *The Irish Confederates and the Rebellion of 1798* (1850), *The History of the Atlantic Telegraph* (1866), *Faith or Agnosticism? the Field-Ingersoll Discussion* (1888), *Old Spain and New Spain* (1888), and *Life of David Dudley Field* (1898).

He is not to be confused with another HENRY MARTYN FIELD, the gynaecologist, who was born in 1837 at Brighton, Mass., and graduated at Harvard in 1859 and at the College of Physicians and Surgeons in New York City in 1862; he was professor of Materia Medica and therapeutics at Dartmouth from 1871 to 1887 and of therapeutics from 1887 to 1893.

FIELD, JOHN (1782–1837), English musical composer and pianist, was born at Dublin in 1782. He came of a musical family, his father being a violinist, and his grandfather the organist in one of the churches of Dublin. From the latter the boy received his first musical education. When a few years later the family settled in London, Field became the favourite pupil of the celebrated Clementi, whom he accompanied to Paris, and later, in 1802, on his great concert tour through France, Germany and Russia. Under the auspices of his master Field appeared in public in most of the great European capitals, especially in St Petersburg, and in that city he remained when Clementi returned to England. During his stay with the great pianist Field had to suffer many privations owing to Clementi's all but unexampled parsimony; but when the latter left Russia his splendid connexion amongst the highest circles of the capital became Field's inheritance. His marriage with a French lady of the name of Charpentier was anything but happy, and had soon to be dissolved. Field made frequent concert tours to the chief cities of Russia, and in 1820 settled permanently in Moscow. In 1831 he came to England for a short time, and for the next four years led a migratory life in France, Germany and Italy, exciting the admiration of amateurs wherever he appeared in public. In Naples he fell seriously ill, and lay several months in the hospital, till a Russian family discovered him and brought him back to Moscow. There he lingered for several years till his death on the 11th of January 1837. Field's training and the cast of his genius were not of a kind to enable him to excel in the larger forms of instrumental music, and his seven concerti for the pianoforte are now forgotten. Neither do his quartets for strings and pianoforte hold their own by the side of those of the great masters. But his "nocturnes," a form of music highly developed if not actually created by him, remain all but unrivalled for their tenderness and dreaminess of conception, combined with a continuous flow of beautiful melody. They were indeed Chopin's models. Field's execution on the pianoforte was nearly allied to the nature of his compositions, beauty and poetical charm of touch being one of the chief characteristics of his style. Moscheles, who heard Field in 1831, speaks of his "enchanting legato, his tenderness and elegance and his beautiful touch."

FIELD, MARSHALL (1835–1906), American merchant, was born at Conway, Massachusetts, on the 18th of August 1835. Reared on a farm, he obtained a common school and academy education, and at the age of seventeen became a clerk in a dry goods store at Pittsfield, Mass. In 1856 he removed to Chicago, where he became a clerk in the large mercantile establishment of Cooley, Wadsworth & Company. In 1860 the firm was reorganized as Cooley, Farwell & Company, and he was admitted to a junior partnership. In 1865, with Potter Palmer (1826–1902) and Levi Z. Leiter (1834–1904), he organized the firm of Field, Palmer & Leiter, which subsequently became Field, Leiter & Company, and in 1881 on the retirement of Leiter became Marshall Field & Company. Under Field's management the annual business of the firm increased from $12,000,000 in 1871 to more than $40,000,000 in 1895, when it ranked as one of the two or three largest mercantile establishments in the world. He died in New York city on the 16th of January 1906. He had married, for the second time, in the previous year. Field's public benefactions were numerous; notable among them being his gift of land valued at $300,000 and of $100,000 in cash to the University of Chicago, an endowment fund of $1,000,000 to support the Field Columbian Museum at Chicago, and a bequest of $8,000,000 to this museum.

FIELD, NATHAN (1587–1633), English dramatist and actor, was baptized on the 17th of October 1587. His father, the rector of Cripplegate, was a Puritan divine, author of a *Godly Exhortation* directed against play-acting, and his brother Theophilus became bishop of Hereford. Nat. Field early became one of the children of Queen Elizabeth's chapel, and in that capacity he played leading parts in Ben Jonson's *Cynthia's Revels* (in 1600), in the *Poetaster* (in 1601), and in *Epicoene* (in 1608), and the title rôle in Chapman's *Bussy d'Ambois* (in 1606). Ben Jonson was his dramatic model, and may have helped his career. The two plays of which he was author were probably both written before 1611. They are boisterous, but well-constructed comedies of contemporary London life; the earlier one, *A Woman is a Weathercock* (printed 1612), dealing with the inconstancy of woman, while the second, *Amends for Ladies* (printed 1618), was written with the intention, as the title indicates, of retracting the charge. From Henslowe's papers it appears that Field collaborated with Robert Daborne and with Philip Massinger, one letter from all three authors being a joint appeal for money to free them from prison. In 1614 Field received £10 for playing before the king in *Bartholomew Fair*, a play in which Jonson records his reputation as an actor in the words "which is your Burbadge now? . . . Your best actor, your Field?" He joined the King's Players some time before 1619, and his name comes seventeenth on the list prefixed to the Shakespeare folio of 1623 of the "principal actors in all these plays." He retired from the stage before 1625, and died on the 20th of February 1633. Field was part author with Massinger in the *Fatal Dowry* (printed 1632), and he prefixed commendatory verses to Fletcher's *Faithful Shepherdess*.

His two plays were reprinted in J. P. Collier's *Five Old Plays* (1833), in Hazlitt's edition of *Dodsley's Old Plays*, and in *Nero and other Plays* (Mermaid series, 1888), with an introduction by Mr A. W. Verity.

FIELD, STEPHEN JOHNSON (1816–1899), American jurist, was born at Haddam, Connecticut, on the 4th of November 1816. He was the brother of David Dudley Field, Cyrus W.

Field and Henry M. Field. At the age of thirteen he accompanied his sister Emilia and her husband the Rev. Josiah Brewer (the parents of the distinguished judge of the Supreme Court, David J. Brewer) to Smyrna, Turkey, for the purpose of studying Oriental languages, but after three years he returned to the United States, and in 1837 graduated at Williams College at the head of his class. He then studied law in his elder brother's office, and in 1841 he was admitted to the New York bar. He was associated in practice there with his brother until 1848, and early in 1849 removed to California, settling soon afterward at Marysville, of which place, in 1850, he became the first alcalde or mayor. In the same year he was chosen a member of the first state legislature of California, in which he drew up and secured the enactment of two bodies of law known as the Civil and Criminal Practices Acts, based on the similar codes prepared by his brother David Dudley for New York. In the former act he embodied a provision regulating and giving authority to the peculiar customs, usages, and regulations voluntarily adopted by the miners in various districts of the state for the adjudication of disputed mining claims. This, as Judge Field truly says, "was the foundation of the jurisprudence respecting mines in the country," having greatly influenced legislation upon this subject in other states and in the Congress of the United States. He was elected, in 1857, a justice of the California Supreme Court, of which he became chief justice in 1859, on the resignation of Judge David S. Terry to fight the duel with the United States senator David C. Broderick which ended fatally for the latter. Field held this position until 1863, when he was appointed by President Lincoln a justice of the United States Supreme Court. In this capacity he was conspicuous for fearless independence of thought and action in his opinion in the test oath case, and in his dissenting opinions in the legal tender, conscription and "slaughter house" cases, which displayed unusual legal learning, and gave powerful expression to his strict constructionist theory of the implied powers of the Federal constitution. Originally a Democrat, and always a believer in states' rights, his strong Union sentiments caused him nevertheless to accept Lincoln's doctrine of coercion, and that, together with his anti-slavery sympathies, led him to act with the Republican party during the period of the Civil War. He was a member of the commission which revised the California code in 1873 and of the Electoral Commission in 1877, voting in favour of Tilden. In 1880 he received sixty-five votes on the first ballot for the presidential nomination at the Democratic National Convention at Cincinnati. In August 1889, as a result of a ruling in the course of the Sharon-Hill litigation, a notorious conspiracy case, he was assaulted in a California railway station by Judge David S. Terry, who in turn was shot and killed by a United States deputy marshall appointed to defend Justice Field against the carrying out of Terry's often-expressed threats. He retired from the Supreme Court on the 1st of December 1897 after a service of thirty-four years and six months, the longest in the court's history, and died in Washington on the 9th of April 1899.

His *Personal Reminiscences of Early Days in California*, originally privately printed in 1878, was republished in 1893 with George C. Gorham's *Story of the Attempted Assassination of Justice Field.*

FIELD, WILLIAM VENTRIS FIELD, BARON (1813–1907), English judge, second son of Thomas Flint Field, of Fielden, Bedfordshire, was born on the 21st of August 1813. He was educated at King's school, Bruton, Somersetshire, and entered the legal profession as a solicitor. In 1843, however, he ceased to practise as such, and entered at the Inner Temple, being called to the bar in 1850, after having practised for some time as a special pleader. He joined the Western circuit, but soon exchanged it for the Midland. He obtained a large business as a junior, and became a queen's counsel and bencher of his inn in 1864. As a Q.C. he had a very extensive common law practice, and had for some time been the leader of the Midland circuit, when in February 1875, on the retirement of Mr Justice Keating, he was raised to the bench as a justice of the queen's bench. Mr Justice Field was an excellent puisne judge of the type that attracts but little public attention. He was a first-rate lawyer, had a good knowledge of commercial matters, great shrewdness and a quick intellect, while he was also painstaking and scrupulously fair. When the rules of the Supreme Court 1883 came into force in the autumn of that year, Mr Justice Field was so well recognized an authority upon all questions of practice that the lord chancellor selected him to sit continuously at Judges' Chambers, in order that a consistent practice under the new rules might as far as possible be established. This he did for nearly a year, and his name will always, to a large extent, be associated with the settling of the details of the new procedure, which finally did away with the former elaborate system of "special pleading." In 1890 he retired from the bench and was raised to the peerage as Baron Field of Bakeham, becoming at the same time a member of the privy council. In the House of Lords he at first took part, not infrequently, in the hearing of appeals, and notably delivered a carefully-reasoned judgment in the case of the *Bank of England* v. *Vagliano Brothers* (5th of March 1891), in which, with Lord Bramwell, he differed from the majority of his brother peers. Before long, however, deafness and advancing years rendered his attendances less frequent. Lord Field died at Bognor on the 23rd of January 1907, and as he left no issue the peerage became extinct.

FIELD (a word common to many West German languages, cf. Ger. *Feld*, Dutch *veld*, possibly cognate with O.E. *folde*, the earth, and ultimately with root of the Gr. πλατός, broad), open country as opposed to woodland or to the town, and particularly land for cultivation divided up into separate portions by hedges, banks, stone walls, &c.; also used in combination with words denoting the crop grown on such a portion of land, such as corn-field, turnip-field, &c. The word is similarly applied to a region with particular reference to its products, as oil-field, gold-field, &c. For the "open" or "common field" system of agriculture in village communities see COMMONS. Generally with a reference to their "wild" as opposed to their "domestic" nature "field" is applied to many animals, such as the "field-mouse." There are many applications of the word; thus from the use of the term for the place where a battle is fought, and widely of the whole theatre of war, come such phrases as to "take the field" for the opening of a campaign, "in the field" of troops that are engaged in the operations of a campaign. It is frequently used figuratively in this sense, of the subject matter of a controversy, and also appears in military usage, in field-fortification, field-day and the like. A "field-officer" is one who ranks above a captain and below a general (see OFFICERS); a field marshal is the highest rank of general officer in the British and many European armies (see MARSHAL). "Field" is used in many games, partly with the idea of an enclosed space, partly with the idea of the ground of military operations, for the ground in which such games as cricket, football, baseball and the like are played. Hence it is applied to those players in cricket and baseball who are not "in," and "to field" is to perform the functions of such a player—to stop or catch the ball played by the "in" side. "The field" is used in hunting, &c., for those taking part in the sport, and in racing for all the horses entered for a race, and, in such expressions as "to back the field," is confined to all the horses with the exception of the "favourite." A common application of the word is to a surface, more or less wide, as of the sky or sea, or of such physical phenomena as ice or snow, and particularly of the ground, of a special "tincture," on which armorial bearings are displayed (see HERALDRY); it is thus used also of the "ground" of a flag, thus the white ensign of the British navy has a red St George's cross on a white "field." In scientific usage the word is also used of the sphere of observation or of operations, and has come to be almost equivalent to a department of knowledge. In physics, a particular application is that to the area which is influenced by some agent, as in the magnetic or electric field. The field of observation or view is the area within which objects can be seen through any optical instrument at any one position. A "field-glass" is the name given to a binocular glass used in the field (see BINOCULAR INSTRUMENT); the older form of field-glass was a small achromatic telescope with joints. This terms is also applied, in an astronomical telescope or compound microscope, to that one of the two lenses of the "eye-piece" which is next to the object-glass; the other is called the "eye-glass."

FIELDFARE (O.E. *fealo-for* = fallow-farer), a large species of thrush, the *Turdus pilaris* of Linnaeus—well known as a regular and common autumnal visitor throughout the British Islands and a great part of Europe, besides western Asia, and even reaching northern Africa. It is the *Veldjakker* and *Veld-lyster* of the Dutch, the *Wachholderdrossel* and *Kramtsvogel* of Germans, the *Litorne* of the French, and the *Cesena* of Italians. This bird is of all thrushes the most gregarious in habit, not only migrating in large bands and keeping in flocks during the winter, but even commonly breeding in society—200 nests or more having been seen within a very small space. The birch-forests of Norway, Sweden and Russia are its chief resorts in summer, but it is known also to breed sparingly in some districts of Germany. Though its nest has been many times reported to have been found in Scotland, there is perhaps no record of such an incident that is not open to doubt; and unquestionably the missel-thrush (*T. viscivorus*) has been often mistaken for the fieldfare by indifferent observers. The head, neck, upper part of the back and the rump are grey; the wings, wing-coverts and middle of the back are rich hazel-brown; the throat is ochraceous; and the breast reddish-brown—both being streaked or spotted with black, while the belly and lower wing-coverts are white, and the legs and toes very dark-brown. The nest and eggs resemble those of the blackbird (*T. merula*), but the former is usually built high up in a tree. The fieldfare's call-note is harsh and loud, sounding like *t'chat-t'chat*: its song is low, twittering and poor. It usually arrives in Britain about the middle or end of October, but sometimes earlier, and often remains till the middle of May before departing for its northern breeding-places. In hard weather it throngs to the berry-bearing bushes which then afford it sustenance, but in open winters the flocks spread over the fields in search of animal food—worms, slugs and the larvae of insects. In very severe seasons it will altogether leave the country, and then return for a shorter or longer time as spring approaches. From *William of Palerne* (translated from the French *c.* 1350) to the writers of our own day the fieldfare has occasionally been noticed by British poets with varying propriety. Thus Chaucer's association of its name with frost is as happy as true, while Scott was more than unlucky in his well-known reference to its "lowly nest" in the Highlands.

Structurally very like the fieldfare, but differing greatly in many other respects, is the bird known in North America as the "robin"—its ruddy breast and familiar habits reminding the early British settlers in the New World of the household favourite of their former homes. This bird, the *Turdus migratorius* of Linnaeus, has a wide geographical range, extending from the Atlantic to the Pacific, and from Greenland to Guatemala, and, except at its extreme limits, is almost everywhere a very abundant species. As its scientific name imports, it is essentially a migrant, and gathers in flocks to pass the winter in the south, though a few remain in New England throughout the year. Yet its social instincts point rather in the direction of man than of its own kind, and it is not known to breed in companies, while it affects the homesteads, villages and even the parks and gardens of the large cities, where its fine song, its attractive plumage, and its great services as a destroyer of noxious insects, combine to make it justly popular. (A. N.)

FIELDING, ANTHONY VANDYKE COPLEY (1787–1855), commonly called Copley Fielding, English landscape painter (son of a portrait painter), became at an early age a pupil of John Varley. He took to water-colour painting, and to this he confined himself almost exclusively. In 1810 he became an associate exhibitor in the Water-colour Society, in 1813 a full member, and in 1831 president of that body. He also engaged largely in teaching the art, and made ample profits. His death took place at Worthing in March 1855. Copley Fielding was a painter of much elegance, taste and accomplishment, and has always been highly popular with purchasers, without reaching very high in originality of purpose or of style: he painted in vast number all sorts of views (occasionally in oil-colour) including marine subjects in large proportion. Specimens of his work are to be seen in the water-colour gallery of the Victoria and Albert Museum, of dates ranging from 1829 to 1850. Among the engraved specimens of his art is the *Annual of British Landscape Scenery*, published in 1839. (W. M. R.)

FIELDING, HENRY (1707–1754), English novelist and playwright, was born at Sharpham Park, near Glastonbury, Somerset, on the 22nd of April 1707. His father was Lieutenant Edmund Fielding, third son of John Fielding, who was canon of Salisbury and fifth son of the earl of Desmond. The earl of Desmond belonged to the younger branch of the Denbigh family, who, until lately, were supposed to be connected with the Habsburgs. To this claim, now discredited by the researches of Mr J. Horace Round (*Studies in Peerage*, 1901, pp. 216-249), is to be attributed the famous passage in Gibbon's *Autobiography* which predicts for *Tom Jones*—"that exquisite picture of human manners"—a diuturnity exceeding that of the house of Austria. Henry Fielding's mother was Sarah Gould, daughter of Sir Henry Gould, a judge of the king's bench. It is probable that the marriage was not approved by her father, since, though she remained at Sharpham Park for some time after that event, his will provided that her husband should have nothing to do with a legacy of £3000 left her in 1710. About this date the Fieldings moved to East Stour in Dorset. Two girls, Catherine and Ursula, had apparently been born at Sharpham Park; and three more, together with a son, Edmund, followed at East Stour. Sarah, the third of the daughters, born November 1710, and afterwards the author of *David Simple* and other works, survived her brother.

Fielding's education up to his mother's death, which took place in April 1718 at East Stour, seems to have been entrusted to a neighbouring clergyman, Mr Oliver of Motcombe, in whom tradition traces the uncouth lineaments of "Parson Trulliber" in *Joseph Andrews*. But he must have contrived, nevertheless, to prepare his pupil for Eton, to which place Fielding went about this date, probably as an oppidan. Little is known of his school-days. There is no record of his name in the college lists; but, if we may believe his first biographer, Arthur Murphy, by no means an unimpeachable authority, he left "uncommonly versed in the Greek authors, and an early master of the Latin classics,"—a statement which should perhaps be qualified by his own words to Sir Robert Walpole in 1730:—

> "Tuscan and French are in my head;
> Latin I write, and Greek—I read."

But he certainly made friends among his class-fellows—some of whom continued friends for life. Winnington and Hanbury-Williams were among these. The chief, however, and the most faithful, was George, afterwards Sir George, and later Baron Lyttelton of Frankley.

When Fielding left Eton is unknown. But in November 1725 we hear of him definitely in what seems like a characteristic escapade. He was staying at Lyme (in company with a trusty retainer, ready to "beat, maim or kill" in his young master's behalf), and apparently bent on carrying off, if necessary by force, a local heiress, Miss Sarah Andrew, whose fluttered guardians promptly hurried her away, and married her to some one else (*Athenaeum*, 2nd June 1883). Her baffled admirer consoled himself by translating part of Juvenal's sixth satire into verse as "all the Revenge taken by an injured Lover." After this he must have lived the usual life of a young man about town, and probably at this date improved the acquaintance of his second cousin, Lady Mary Wortley Montagu, to whom he inscribed his first comedy, *Love in Several Masques*, produced at Drury Lane in February 1728. The moment was not particularly favourable, since it succeeded Cibber's *Provok'd Husband*, and was contemporary with Gay's popular *Beggar's Opera*. Almost immediately afterwards (March 16th) Fielding entered himself as "Stud. Lit." at Leiden University. He was still there in February 1729. But he had apparently left before the annual registration of February 1730, when his name is absent from the books (*Macmillan's Magazine*, April 1907); and in January 1730 he brought out a second comedy at the newly-opened theatre in Goodman's Fields. Like its predecessor, the *Temple*

Beau was an essay in the vein of Congreve and Wycherley, though, in a measure, an advance on *Love in Several Masques*.

With the *Temple Beau* Fielding's dramatic career definitely begins. His father had married again; and his Leiden career had been interrupted for lack of funds. Nominally, he was entitled to an allowance of £200 a year; but this (he was accustomed to say) "any body might pay that would." Young, handsome, ardent and fond of pleasure, he began that career as a hand-to-mouth playwright around which so much legend has gathered—and gathers. Having—in his own words—no choice but to be a hackney coachman or a hackney writer, he chose the pen; and his inclinations, as well as his opportunities, led him to the stage. From 1730 to 1736 he rapidly brought out a large number of pieces, most of which had merit enough to secure their being acted, but not sufficient to earn a lasting reputation for their author. His chief successes, from a critical point of view, the *Author's Farce* (1730) and *Tom Thumb* (1730, 1731), were burlesques; and he also was fortunate in two translations from Molière, the *Mock Doctor* (1732) and the *Miser* (1733). Of the rest (with one or two exceptions, to be mentioned presently) the names need only be recorded. They are *The Coffee-House Politician*, a comedy (1730); *The Letter Writers*, a farce (1731); *The Grub-Street Opera*, a burlesque (1731); *The Lottery*, a farce (1732); *The Modern Husband*, a comedy (1732); *The Covent Garden Tragedy*, a burlesque (1732); *The Old Debauchees*, a comedy (1732); *Deborah; or, a Wife for you all*, an after-piece (1733); *The Intriguing Chambermaid* (from Regnard), a two-act comedy (1734); and *Don Quixote in England*, a comedy, which had been partly sketched at Leiden.

Don Quixote was produced in 1734, and the list of plays may be here interrupted by an event of which the date has only recently been ascertained, namely, Fielding's first marriage. This took place on the 28th of November 1734 at St Mary, Charlcombe, near Bath (*Macmillan's Magazine*, April 1907), the lady being a Salisbury beauty, Miss Charlotte Cradock, of whom he had been an admirer, if not a suitor, as far back as 1730. This is a fact which should be taken into consideration in estimating the exact Bohemianism of his London life, for there is no doubt that he was devotedly attached to her. After a fresh farce entitled *An Old Man taught Wisdom*, and the comparative failure of a new comedy, *The Universal Gallant*, both produced early in 1735, he seems for a time to have retired with his bride, who came into £1500, to his old home at East Stour. Around this rural seclusion fiction has freely accreted. He is supposed to have lived for three years on the footing of a typical 18th-century country gentleman; to have kept a pack of hounds; to have put his servants into impossible yellow liveries; and generally, by profuse hospitality and reckless expenditure, to have made rapid duck and drake of Mrs Fielding's modest legacy. Something of this is demonstrably false; much, grossly exaggerated. In any case, he was in London as late as February 1735 (the date of the "Preface" to *The Universal Gallant*); and early in March 1736 he was back again managing the Haymarket theatre with a so-called "*Great Mogul's* Company of *English* Comedians."

Upon this new enterprise fortune, at the outset, seemed to smile. The first piece (produced on the 5th of March) was *Pasquin, a Dramatick Satire on the Times* (a piece akin in its plan to Buckingham's *Rehearsal*), which contained, in addition to much admirable burlesque, a good deal of very direct criticism of the shameless political corruption of the Walpole era. Its success was unmistakable; and when, after bringing out the remarkable *Fatal Curiosity* of George Lillo, its author followed up *Pasquin* by the *Historical Register for the Year 1736*, of which the effrontery was even more daring than that of its predecessor, the ministry began to bethink themselves that matters were going too far. How they actually effected their object is obscure: but grounds were speedily concocted for the Licensing Act of 1737, which restricted the number of theatres, rendered the lord chamberlain's licence an indispensable preliminary to stage representation, and—in a word—effectually put an end to Fielding's career as a dramatist.

Whether, had that career been prolonged to its maturity, the result would have enriched the theatrical repertoire with a new species of burlesque, or reinforced it with fresh variations on the "wit-traps" of Wycherley and Congreve, is one of those inquiries that are more academic than profitable. What may be affirmed is, that Fielding's plays, as we have them, exhibit abundant invention and ingenuity; that they are full of humour and high spirits; that, though they may have been hastily written, they were by no means thoughtlessly constructed; and that, in composing them, their author attentively considered either managerial hints, or the conditions of the market. Against this, one must set the fact that they are often immodest; and that, whatever their intrinsic merit, they have failed to rival in permanent popularity the work of inferior men. Fielding's own conclusion was, "that he left off writing for the stage, when he ought to have begun"—which can only mean that he himself regarded his plays as the outcome of imitation rather than experience. They probably taught him how to construct *Tom Jones*; but whether he could ever have written a comedy at the level of that novel, can only be established by a comparison which it is impossible to make, namely, a comparison with *Tom Jones* of a comedy written at the same age, and in similar circumstances.

Tumble-Down Dick; or, Phaeton in the Suds, *Eurydice* and *Eurydice hissed* are the names of three occasional pieces which belong to the last months of Fielding's career as a Haymarket manager. By this date he was thirty, with a wife and daughter. As a means of support, he reverted to the profession of his maternal grandfather; and, in November 1737, he entered the Middle Temple, being described in the books of the society as "of East Stour in Dorset." That he set himself strenuously to master his new profession, is admitted; though it is unlikely that he had entirely discarded the irregular habits which had grown upon him in his irresponsible bachelorhood. He also did a good deal of literary work, the best known of which is contained in the *Champion*, a "News-Journal" of the *Spectator* type undertaken with James Ralph, whose poem of "Night" is made notorious in the *Dunciad*. That the *Champion* was not without merit is undoubted; but the essay-type was for the moment out-worn, and neither Fielding nor his coadjutor could lend it fresh vitality. Fielding contributed papers from the 15th of November 1739 to the 19th of June 1740. On the 20th of June he was called to the bar, and occupied chambers in Pump Court. It is further related that, in the diligent pursuit of his calling, he travelled the Western Circuit, and attended the Wiltshire sessions.

Although, with the *Champion*, he professed, for the time, to have relinquished periodical literature, he still wrote at intervals, a fact which, taken in connexion with his past reputation as an effective satirist, probably led to his being "unjustly censured" for much that he never produced. But he certainly wrote a poem "Of True Greatness" (1741); a first book of a burlesque epic, the *Vernoniad*, prompted by Vernon's expedition of 1739; a vision called the *Opposition*, and, perhaps, a political sermon entitled the *Crisis* (1741). Another piece, now known to have been attributed to him by his contemporaries (*Hist. MSS. Comm.*, *Rept.* 12, App. Pt. ix., p. 204), is the pamphlet entitled *An Apology for the Life of Mrs Shamela Andrews*, a clever but coarse attack upon the prurient side of Richardson's *Pamela*, which had been issued in 1740, and was at the height of its popularity. *Shamela* followed early in 1741. Richardson, who was well acquainted with Fielding's four sisters, at that date his neighbours at Hammersmith, confidently attributed it to Fielding (*Corr.* 1804, iv. 286, and unpublished letter at South Kensington); and there are suggestive points of internal evidence (such as the transformation of *Pamela's* "Mr B." into "Mr Booby") which tend to connect it with the future *Joseph Andrews*. Fielding, however, never acknowledged it, or referred to it; and a great deal has been laid to his charge that he never deserved ("Preface" to *Miscellanies*, 1743).

But whatever may be decided in regard to the authorship of *Shamela*, it is quite possible that it prompted the more memorable

Joseph Andrews, which made its appearance in February 1742, and concerning which there is no question. Professing, on his title-page, to imitate Cervantes, Fielding set out to cover *Pamela* with Homeric ridicule by transferring the heroine's embarrassments to a hero, supposed to be her brother. Allied to this purpose was a collateral attack upon the slipshod *Apology* of the playwright Colley Cibber, with whom, for obscure reasons, Fielding had long been at war. But the avowed object of the book fell speedily into the background as its author warmed to his theme. His secondary speedily became his primary characters, and Lady Booby and Joseph Andrews do not interest us now as much as Mrs Slipslop and Parson Adams—the latter an invention that ranges in literature with Sterne's "Uncle Toby" and Goldsmith's "Vicar." Yet more than these and others equally admirable in their round veracity, is the writer's penetrating outlook upon the frailties and failures of human nature. By the time he had reached his second volume, he had convinced himself that he had inaugurated a new fashion of fiction; and in a "Preface" of exceptional ability, he announced his discovery. Postulating that the epic might be "comic" or "tragic," prose or verse, he claimed to have achieved what he termed the "Comic Epos in Prose," of which the action was "ludicrous" rather than "sublime," and the personages selected from society at large, rather than the restricted ranks of conventional high life. His plan, it will be observed, was happily adapted to his gifts of humour, satire, and above all, irony. That it was matured when it began may perhaps be doubted, but it was certainly matured when it ended. Indeed, except for the plot, which, in his picaresque first idea, had not preceded the conception, *Joseph Andrews* has all the characteristics of *Tom Jones*, even (in part) to the initial chapters.

Joseph Andrews had considerable success, and the exact sum paid for it by Andrew Millar, the publisher, according to the assignment now at South Kensington, was £183 : 11s., one of the witnesses being the author's friend, William Young, popularly supposed to be the original of Parson Adams. It was with Young that Fielding undertook what, with exception of "a very small share" in the farce of *Miss Lucy in Town* (1742), constituted his next work, a translation of the *Plutus* of Aristophanes, which never seems to have justified any similar experiments. Another of his minor works was a *Vindication of the Dowager Duchess of Marlborough* (1742), then much before the public by reason of the *Account of her Life* which she had recently put forth. Later in the same year, Garrick applied to Fielding for a play; and a very early effort, *The Wedding Day*, was hastily patched together, and produced at Drury Lane in February 1743 with no great success. It was, however, included in Fielding's next important publication, the three volumes of *Miscellanies* issued by subscription in the succeeding April. These also comprised some early poems, some essays, a Lucianic fragment entitled a *Journey from this World to the Next*, and, last but not least, occupying the entire final volume, the remarkable performance entitled the *History of the Life of the late Mr Jonathan Wild the Great.*

It is probable that, in its composition, *Jonathan Wild* preceded *Joseph Andrews*. At all events it seems unlikely that Fielding would have followed up a success in a new line by an effort so entirely different in character. Taking for his ostensible hero a well-known thief-taker, who had been hanged in 1725, he proceeds to illustrate, by a mock-heroic account of his progress to Tyburn, the general proposition that greatness without goodness is no better than badness. He will not go so far as to say that all "Human Nature is Newgate with the Mask on"; but he evidently regards the description as fairly applicable to a good many so-called great people. Irony (and especially Irony neat) is not a popular form of rhetoric; and the remorseless pertinacity with which Fielding pursues his demonstration is to many readers discomforting and even distasteful. Yet—in spite of Scott—*Jonathan Wild* has its softer pages; and as a purely intellectual conception it is not surpassed by any of the author's works.

His actual biography, both before and after *Jonathan Wild*, is obscure. There are evidences that he laboured diligently at his profession; there are also evidences of sickness and embarrassment. He had become early a martyr to the malady of his century—gout, and the uncertainties of a precarious livelihood told grievously upon his beautiful wife, who eventually died of fever in his arms, leaving him for the time so stunned and bewildered by grief that his friends feared for his reason. For some years his published productions were unimportant. He wrote "Prefaces" to the *David Simple* of his sister Sarah in 1744 and 1747; and, in 1745–1746 and 1747–1748, produced two newspapers in the ministerial interest, the *True Patriot* and the *Jacobite's Journal*, both of which are connected with, or derive from, the rebellion of 1745, and were doubtless, when they ceased, the pretext of a pension from the public service money (*Journal of a Voyage to Lisbon*, "Introduction"). In November 1747 he married his wife's maid, Mary Daniel, at St Bene't's, Paul's Wharf; and in December 1748, by the interest of his old school-fellow, Lyttelton, he was made a principal justice of peace for Middlesex and Westminster, an office which put him in possession of a house in Bow Street, and £300 per annum "of the dirtiest money upon earth" (*ibid.*), which might have been more had he condescended to become what was known as a "trading" magistrate.

For some time previously, while at Bath, Salisbury, Twickenham and other temporary resting-places, he had intermittently occupied himself in composing his second great novel, *Tom Jones; or, the History of a Foundling.* For this, in June 1748, Millar had paid him £600, to which he added £100 more in 1749. In the February of the latter year it was published with a dedication to Lyttelton, to whose pecuniary assistance to the author during the composition it plainly bears witness. In *Tom Jones* Fielding systematically developed the "new Province of Writing" he had discovered incidentally in *Joseph Andrews.* He paid closer attention to the construction and evolution of the plot; he elaborated the initial essays to each book which he had partly employed before, and he compressed into his work the flower and fruit of his forty years' experience of life. He has, indeed, no character quite up to the level of Parson Adams, but his Westerns and Partridges, his Allworthys and Blifils, have the inestimable gift of life. He makes no pretence to produce "models of perfection," but pictures of ordinary humanity, rather perhaps in the rough than the polished, the natural than the artificial, and his desire is to do this with absolute truthfulness, neither extenuating nor disguising defects and shortcomings. One of the results of this unvarnished naturalism has been to attract more attention to certain of the episodes than their inventor ever intended. But that, in the manners of his time, he had chapter and verse for everything he drew is clear. His sincere purpose was, he declared, "to recommend goodness and innocence," and his obvious aversions are vanity and hypocrisy. The methods of fiction have grown more sophisticated since his day, and other forms of literary egotism have taken the place of his once famous introductory essays, but the traces of *Tom Jones* are still discernible in most of our manlier modern fiction.

Meanwhile, its author was showing considerable activity in his magisterial duties. In May 1749, he was chosen chairman of quarter sessions for Westminster; and in June he delivered himself of a weighty charge to the grand jury. Besides other pamphlets, he produced a careful and still readable *Enquiry into the Causes of the late Increase of Robbers*, &c. (1751), which, among its other merits, was not ineffectual in helping on the famous Gin Act of that year, a practical result to which the "Gin Lane" and "Beer Street" of his friend Hogarth also materially contributed. These duties and preoccupations left their mark on his next fiction, *Amelia* (1752), which is rather more taken up with social problems and popular grievances than its forerunners. But the leading personage, in whom, as in the Sophia Western of *Tom Jones*, he reproduced the traits of his first wife, is certainly, as even Johnson admitted, "the most pleasing heroine of all the romances." The minor characters, too, especially Dr Harrison and Colonel Bath, are equal to any in *Tom Jones*. The book nevertheless shows signs, not of failure but of fatigue, perhaps of haste—a circumstance heightened by the absence of those "prolegomenous" chapters over which the author had lingered so lovingly in *Tom Jones*. In 1749 he had been dangerously ill, and his health was visibly breaking. The £1000 which Millar is said to have given for *Amelia* must have been painfully earned.

Early in 1752 his still indomitable energy prompted him to start a third newspaper, the *Covent Garden Journal*, which ran from the 4th of January to the 25th of November. It is an interesting contemporary record, and throws a good deal of light on his Bow Street duties. But it has no great literary value, and it unhappily involved him in harassing and undignified hostilities with Smollett, Dr John Hill, Bonnell Thornton and other of his contemporaries. To the following year belong pamphlets on "Provision for the Poor," and the case of the strange impostor, Elizabeth Canning (1734–1773).[1] By 1754 his own case, as regards health, had grown desperate; and he made matters worse by a gallant and successful attempt to break up a "gang of villains and cut-throats," who had become the terror of the metropolis. This accomplished, he resigned his office to his half-brother John (afterwards Sir John) Fielding. But it was now too late. After fruitless essay both of Dr Ward's specifics and the tar-water of Bishop Berkeley, it was felt that his sole chance of prolonging life lay in removal to a warmer climate. On the 26th of June 1754 he accordingly left his little country house at Fordhook, Ealing, for Lisbon, in the "Queen of Portugal," Richard Veal master. The ship, as often, was tediously wind-bound, and the protracted discomforts of the sick man and his family are narrated at length in the touching posthumous tract entitled the *Journal of a Voyage to Lisbon*, which, with a fragment of a comment on Bolingbroke's then recently issued essays, was published in February 1755 "for the Benefit of his [Fielding's] Wife and Children." Reaching Lisbon at last in August 1754, he died there two months later (8th October), and was buried in the English cemetery, where a monument was erected to him in 1830. *Luget Britannia gremio non dari fovere natum* is inscribed upon it.

His estate, including the proceeds of a fair library, only covered his just debts (*Athenaeum*, 25th Nov. 1905); but his family, a daughter by his first, and two boys and a girl by his second wife, were faithfully cared for by his brother John, and by his friend Ralph Allen of Prior Park, Bath, the Squire Allworthy of *Tom Jones*. His will (undated) was printed in the *Athenaeum* for the 1st of February 1890. There is but one absolutely authentic portrait of him, a familiar outline by Hogarth, executed from memory for Andrew Millar's edition of his works in 1762. It is the likeness of a man broken by ill-health, and affords but faint indication of the handsome Harry Fielding who in his salad days "warmed both hands before the fire of life." Far too much stress, it is now held, has been laid by his first biographers upon the unworshipful side of his early career. That he was always profuse, sanguine and more or less improvident, is as probable as that he was always manly, generous and sympathetic. But it is also plain that, in his later years, he did much, as father, friend and magistrate, to redeem the errors, real and imputed, of a too-youthful youth.

As a playwright and essayist his rank is not elevated. But as a novelist his place is a definite one. If the *Spectator* is to be credited with foreshadowing the characters of the novel, Defoe with its earliest form, and Richardson with its first experiments in sentimental analysis, it is to Henry Fielding that we owe its first accurate delineation of contemporary manners. Neglecting, or practically neglecting, sentiment as unmanly, and relying chiefly on humour and ridicule, he set out to draw life precisely as he saw it around him, without blanks or dashes. He was, it may be, for a judicial moralist, too indulgent to some of its frailties, but he was merciless to its meaner vices. For reasons which have been already given, his high-water mark is *Tom Jones*, which has remained, and remains, a model in its way of the kind he inaugurated.

An essay on Fielding's life and writings is prefixed to Arthur Murphy's edition of his works (1762), and short biographies have been written by Walter Scott and William Roscoe. There are also lives by Watson (1807), Lawrence (1855), Austin Dobson ("Men of Letters," 1883, 1907) and G. M. Godden (1909). An annotated edition of the *Journal of a Voyage to Lisbon* is included in the "World's Classics" (1907). (A. D.)

FIELDING, WILLIAM STEVENS (1848–   ), Canadian journalist and statesman, was born in Halifax, Nova Scotia, on the 24th of November 1848. From 1864 to 1884 he was one of the staff of the *Morning Chronicle*, the chief Liberal paper of the province, and worked at all departments of newspaper life. In 1882 he entered the local legislature as Liberal member for Halifax, and from 1884 to 1896 was premier and provincial secretary of the province, but in the latter year became finance minister in the Dominion administration of Sir Wilfrid Laurier, and was elected to the House of Commons for Shelburne and Queen's county. He opposed Confederation in 1864–1867, and as late as 1886 won a provincial election on the promise to advocate the repeal of the British North America Act. His administration as finance minister of Canada was important, since in 1897 he introduced a new tariff, granting to the manufactures of Great Britain a preference, subsequently increased; and later he imposed a special surtax on German imports owing to unfriendly tariff legislation by that country. In 1902 he represented Canada at the Colonial Conference in London.

FIELD-MOUSE, the popular designation of such mouse-like British rodents as are not true or "house" mice. The term thus includes the long-tailed field mouse, *Mus* (*Micromys*) *sylvaticus*, easily recognized by its white belly, and sometimes called the wood-mouse; and the two species of short-tailed field-mice, *Microtus agrestis* and *Evotomys glareolus*, together with their representatives in Skomer island and the Orkneys (see MOUSE and VOLE).

FIELD OF THE CLOTH OF GOLD, the French *Camp du drap d'or*, the name given to the place between Guînes and Ardres where Henry VIII. of England met Francis I. of France in June 1520. The most elaborate arrangements were made for the accommodation of the two monarchs and their large retinues; and on Henry's part especially no efforts were spared to make a great impression in Europe by this meeting. Before the castle of Guînes a temporary palace, covering an area of nearly 12,000 sq. yds., was erected for the reception of the English king. It was decorated in the most sumptuous fashion, and like the chapel, served by thirty-five priests, was furnished with a profusion of golden ornaments. Some idea of the size of Henry's following may be gathered from the fact that in one month 2200 sheep and other viands in a similar proportion were consumed. In the fields beyond the castle, tents to the number of 2800 were erected for less distinguished visitors, and the whole scene was one of the greatest animation. Ladies gorgeously clad, and knights, showing by their dress and bearing their anxiety to revive the glories and the follies of the age of chivalry, jostled mountebanks, mendicants and vendors of all kinds.

Journeying from Calais Henry reached his headquarters at Guînes on the 4th of June 1520, and Francis took up his residence at Ardres. After Cardinal Wolsey, with a splendid train had visited the French king, the two monarchs met at the Val Doré, a spot midway between the two places, on the 7th. The following days were take up with tournaments, in which both kings took part, banquets and other entertainments, and after Wolsey had said mass the two sovereigns separated on the 24th. This meeting made a great impression on contemporaries, but its political results were very small.

The *Ordonnance* for the *Field* is printed by J. S. Brewer in the *Calendar of State Papers, Henry VIII.* vol. iii. (1867). See also J. S. Brewer, *Reign of Henry VIII.* (1884).

FIELDS, JAMES THOMAS (1817–1881), American publisher and author, was born in Portsmouth, New Hampshire, on the 31st of December 1817. At the age of seventeen he went to Boston as clerk in a bookseller's shop. Afterwards he wrote for the newspapers, and in 1835 he read an anniversary poem entitled "Commerce" before the Boston Mercantile Library

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[1] For a full account of this celebrated case see Howell, *State Trials* (1813), vol. xix.

Association. In 1839 he became junior partner in the publishing and bookselling firm known after 1846 as Ticknor & Fields, and after 1868 as Fields, Osgood & Company. He was the publisher of the foremost contemporary American writers, with whom he was on terms of close personal friendship, and he was the American publisher of some of the best-known British writers of his time, some of whom, also, he knew intimately. The first collected edition of De Quincey's works (20 vols., 1850–1855) was published by his firm. As a publisher he was characterized by a somewhat rare combination of keen business acumen and sound, discriminating literary taste, and as a man he was known for his geniality and charm of manner. In 1862–1870, as the successor of James Russell Lowell, he edited the *Atlantic Monthly*. In 1871 Fields retired from business and from his editorial duties, and devoted himself to lecturing and to writing. Of his books the chief were the collection of sketches and essays entitled *Underbrush* (1877) and the chapters of reminiscence composing *Yesterdays with Authors* (1871), in which he recorded his personal friendship with Wordsworth, Thackeray, Dickens, Hawthorne and others. He died in Boston on the 24th of April 1881.

His second wife, ANNIE ADAMS FIELDS (b. 1834), whom he married in 1854, published *Under the Olive* (1880), a book of verses; *James T. Fields: Biographical Notes and Personal Sketches* (1882); *Authors and Friends* (1896); *The Life and Letters of Harriet Beecher Stowe* (1897); and *Orpheus* (1900).

FIENNES, NATHANIEL (*c.* 1608–1669) English politician, second son of William, 1st Viscount Saye and Sele, by Elizabeth, daughter of John Temple, of Stow in Buckinghamshire, was born in 1607 or 1608, and educated at Winchester and at New College, Oxford, where as founder's kin he was admitted a perpetual fellow in 1624. After about five years' residence he left without taking a degree, travelled abroad, and in Switzerland imbibed or strengthened those religious principles and that hostility to the Laudian church which were to be the chief motive in his future political career. He returned to Scotland in 1639, and established communications with the Covenanters and the Opposition in England, and as member for Banbury in both the Short and Long Parliaments he took a prominent part in the attacks upon the church. He spoke against the illegal canons on the 14th of December 1640, and again on the 9th of February 1641 on the occasion of the reception of the London petition, when he argued against episcopacy as constituting a political as well as a religious danger and made a great impression on the House, his name being added immediately to the committee appointed to deal with church affairs. He took a leading part in the examination into the army plot; was one of the commissioners appointed to attend the king to Scotland in August 1641; and was nominated one of the committee of safety in July 1642. On the outbreak of hostilities he took arms immediately, commanded a troop of horse in the army of Lord Essex, was present at the relief of Coventry in August, and at the fight at Worcester in September, where he distinguished himself, and subsequently at Edgehill. Of the last two engagements he wrote accounts, viz. *True and Exact Relation of both the Battles fought by . . . Earl of Essex . . . against the Bloudy Cavaliers* (1642). (See also *A Narrative of the Late Battle before Worcester taken by a Gentleman of the Inns of Court from the mouth of Master Fiennes*, 1642). In February 1643 Fiennes was sent down to Bristol, arrested Colonel Essex the governor, executed the two leaders of a plot to deliver up the city, and received a commission himself as governor on the 1st of May 1643. On the arrival, however, of Prince Rupert on the 22nd of July the place was in no condition to resist an attack, and Fiennes capitulated. He addressed to Essex a letter in his defence (Thomason Tracts E. 65, 26), drew up for the parliament a *Relation concerning the Surrender . . .* (1643), answered by Prynne and Clement Walker accusing him of treachery and cowardice, to which he opposed *Col. Fiennes his Reply. . . .* He was tried at St Albans by the council of war in December, was pronounced guilty of having surrendered the place improperly, and sentenced to death. He was, however, pardoned, and the facility with which Bristol subsequently capitulated to the parliamentary army induced Cromwell and the generals to exonerate him completely. His military career nevertheless now came to an end. He went abroad, and it was some time before he reappeared on the political scene. In September 1647 he was included in the army committee, and on the 3rd of January 1648 he became a member of the committee of safety. He was, however, in favour of accepting the king's terms at Newport in December, and in consequence was excluded from the House by Pride's Purge. An opponent of church government in any form, he was no friend to the rigid and tyrannical Presbyterianism of the day, and inclined to Independency and Cromwell's party. He was a member of the council of state in 1654, and in June 1655 he received the strange appointment of commissioner for the custody of the great seal, for which he was certainly in no way fitted. In the parliament of 1654 he was returned for Oxford county and in that of 1656 for the university, while in January 1658 he was included in Cromwell's House of Lords. He was in favour of the Protector's assumption of the royal title and urged his acceptance of it on several occasions. His public career closes with addresses delivered in his capacity as chief commissioner of the great seal at the beginning of the sessions of January 20, 1658, and January 2, 1659, in which the religious basis of Cromwell's government is especially insisted upon, the feature to which Fiennes throughout his career had attached most value. On the reassembling of the Long Parliament he was superseded; he took no part in the Restoration, and died at Newton Tony in Wiltshire on the 16th of December 1669. Fiennes married (1), Elizabeth, daughter of the famous parliamentarian Sir John Eliot, by whom he had one son, afterwards 3rd Viscount Saye and Sele; and (2), Frances, daughter of Richard Whitehead of Tuderley, Hants, by whom he had three daughters.

Besides the pamphlets already cited, a number of his speeches and other political tracts were published (see Gen. Catalogue, British Museum). Wood also attributed to him *Monarchy Asserted* (1660) (reprinted in Somers Tracts, vi. 346 [ed. Scott]), but there seems no reason to ascribe to him with Clement Walker the authorship of Sprigge's *Anglia Rediviva*.

FIERI FACIAS, usually abbreviated *fi. fa.* (Lat. "that you cause to be made"), in English law, a writ of execution after judgment obtained in action of debt or damages. It is addressed to the sheriff, and commands him to make good the amount out of the goods of the person against whom judgment has been obtained. (See EXECUTION.)

FIESCHI, GIUSEPPE MARCO (1790–1836), the chief conspirator in the attempt on the life of Louis Philippe in July 1835, was a native of Murato in Corsica. He served under Murat, then returned to Corsica, where he was condemned to ten years' imprisonment and perpetual surveillance by the police for theft and forgery. After a period of vagabondage he eluded the police and obtained a small post in Paris by means of forged papers; but losing it on account of his suspicious manner of living, he resolved to revenge himself on society. He took lodgings on the Boulevard du Temple, and there, with two members of the Société des Droits de l'Homme, Morey and Pépin by name, contrived an "infernal machine," constructed with twenty gun barrels, to be fired simultaneously. On the 28th of July 1835, as Louis Philippe was passing along the boulevard to the Bastille, accompanied by his three sons and a numerous staff, the machine was exploded. A ball grazed the king's forehead, and his horse, with those of the duke of Nemours and of the prince de Joinville, was shot; Marshal Mortier was killed, with seventeen other persons, and many were wounded; but the king and the princes escaped as if by miracle. Fieschi himself was severely wounded by the discharge of his machine, and vainly attempted to escape. The attentions of the most skilful physicians were lavished upon him, and his life was saved for the stroke of justice. On his trial he named his accomplices, displayed much bravado, and expected or pretended to expect ultimate pardon. He was condemned to death, and was guillotined on the 19th of February 1836. Morey and Pépin were also executed, another accomplice was sentenced to twenty years' imprisonment and one was acquitted. No less than seven plots against the life of Louis Philippe had been discovered by the police within the year, and apologists were not wanting in the revolutionary press for the crime of Fieschi.

See *Procès de Fieschi, précédé de sa vie privée, sa condamnation par la Cour des Pairs et celles de ses complices* (2 vols., 1836); also P. Thureau-Dangin, *Hist. de la monarchie de Juillet* (vol. iv. ch. xii., 1884).

FIESCO (DE' FIESCHI), **GIOVANNI LUIGI** (*c.* 1523–1547), count of Lavagna, was descended from one of the greatest families of Liguria, first mentioned in the 10th century. Among his ancestors were two popes (Innocent IV. and Adrian V.), many cardinals, a king of Sicily, three saints, and many generals and admirals of Genoa and other states. Sinibaldo Fiesco, his father, had been a close friend of Andrea Doria (*q.v.*), and had rendered many important services to the Genoese republic. On his death in 1532 Giovanni found himself at the age of nine the head of the family and possessor of immense estates. He grew up to be a handsome, intelligent youth, of attractive manners and very ambitious. He married Eleonora Cibò, marchioness of Massa, in 1540, a woman of great beauty and family influence. There were many reasons which inspired his hatred of the Doria family; the almost absolute power wielded by the aged admiral and the insolence of his nephew and heir Giannettino Doria, the commander of the galleys, were galling to him as to many other Genoese, and it is said that Giannettino was the lover of Fiesco's wife. Moreover, the Fiesco belonged to the French or popular party, while the Doria were aristocrats and Imperialists. When Fiesco determined to conspire against Doria he found friends in many quarters. Pope Paul III. was the first to encourage him, while both Pier Luigi Farnese, duke of Parma, and Francis I. of France gave him much assistance and promised him many advantages. Among his associates in Genoa were his brothers Girolamo and Ottobuono, Verrina and R. Sacco. A number of armed men from the Fiesco fiefs were secretly brought to Genoa, and it was agreed that on the 2nd of January 1547, during the interregnum before the election of the new doge, the galleys in the port should be seized and the city gates held. The first part of the programme was easily carried out, and Giannettino Doria, aroused by the tumult, rushed down to the port and was killed, but Andrea escaped from the city in time. The conspirators attempted to gain possession of the government, but unfortunately for them Giovanni Luigi, while crossing a plank from the quay to one of the galleys, fell into the water and was drowned. The news spread consternation among the Fiesco faction, and Girolamo Fiesco found few adherents. They came to terms with the senate and were granted a general amnesty. Doria returned to Genoa on the 4th thirsting for revenge, and in spite of the amnesty he confiscated the Fiesco estates; Girolamo had shut himself up, with Verrina and Sacco and other conspirators, in his castle of Montobbia, which the Genoese at Doria's instigation besieged and captured. Girolamo Fiesco and Verrina were tried, tortured and executed; all their estates were seized, some of which, including Torriglia, Doria obtained for himself. Ottobuono Fiesco, who had escaped, was captured eight years afterwards and put to death by Doria's orders.

There are many accounts of the conspiracy, of which perhaps the best is contained in E. Petit's *André Doria* (Paris, 1887), chs. xi. and xii., where all the chief authorities are quoted; see also Calligari, *La Congiura del Fiesco* (Venice 1892), and Gavazzo, *Nuovi documenti sulla congiura del conte Fiesco* (Genoa, 1886); E. Bernabò-Brea, in his *Sulla congiura di Giovanni Luigi Fieschi*, publishes many important documents, while L. Capelloni's *Congiura del Fiesco*, edited by Olivieri, and A. Mascardi's *Congiura del conte Giovanni Luigi de' Fieschi* (Antwerp, 1629) may be commended among the earlier works. The Fiesco conspiracy has been the subject of many poems and dramas, of which the most famous is that by Schiller. See also under DORIA, ANDREA; FARNESE. (L. V.*)

FIESOLE (anc. *Faesulae*, *q.v.*), a town and episcopal see of Tuscany, Italy, in the province of Florence, from which it is 3 m. N.E. by electric tramway. Pop. (1901) town 4951, commune 16,816. It is situated on a hill 970 ft. above sea-level, and commands a fine view. The cathedral of S. Romolo is an early and simple example of the Tuscan Romanesque style; it is a small basilica, begun in 1028 and restored in 1256. The picturesque battlemented campanile belongs to 1213. The tomb of the bishop Leonardo Salutati (d. 1466). with a beautiful portrait bust by the sculptor Mino da Fiesole (1431–1484), is fine. The 13th-century Palazzo Pretorio contains a small museum of antiquities. The Franciscan monastery commands a fine view. The church of S. Maria Primerana has some works of art, and S. Alessandro, which is attributed to the 6th century, contains fifteen ancient columns of cipollino. The inhabitants of Fiesole are largely engaged in straw-plaiting.

Below Fiesole, between it and Florence, lies San Domenico di Fiesole (485 ft.); in the Dominican monastery the painter, Fra Giovanni Angelico da Fiesole (1387–1455), lived until he went to S. Marco at Florence. Here, too, is the Badia di Fiesole, founded in 1028 and re-erected about 1456–1466 by a follower of Brunelleschi. It is an irregular pile of buildings, in fine and simple early Renaissance style; a small part of the original façade of 1028 in black and white marble is preserved. The interior of the Church is decorated with sculptures by pupils of Desiderio da Settignano. The slopes of the hill on which Fiesole stands are covered with fine villas. To the S.E. of Fiesole lies Monte Ceceri (1453 ft.), with quarries of grey *pietra serena*, largely used in Florence for building. To the E. of this lies the 14th-century castle of Vincigliata restored and fitted up in the medieval style.

FIFE, an eastern county of Scotland, bounded N. by the Firth of Tay, E. by the North Sea, S. by the Firth of Forth, and W. by the shires of Perth, Kinross and Clackmannan. The Isle of May, Inchkeith, Inchcolm, Inchgarvie and the islet of Oxcar belong to the shire. It has an area of 322,844 acres or 504 sq. m. Its coast-line measure 108 m. The Lomond Hills to the S. and S.W. of Falkland, of which West Lomond is 1713 ft. high and East Lomond 1471 ft., Saline Hill (1178 ft.) to the N.W. of Dunfermline, and Benarty (1131 ft.) on the confines of Kinross are the chief heights. Of the rivers the Eden is the longest; formed on the borders of Kinross-shire by the confluence of Beattie Burn and Carmore Burn, it pursues a wandering course for 25 m. N.E., partly through the Howe, or Hollow of Fife, and empties into the North Sea. There is good trout fishing in its upper waters, but weirs prevent salmon from ascending it. The Leven drains the loch of that name and enters the Forth at the town of Leven after flowing eastward for 15 m. There are numerous factories at various points on its banks. The Ore, rising not far from Roscobie Hills to the north of Dunfermline, follows a mainly north-easterly course for 15 m. till it joins the Leven at Windygates. The old loch of Ore which was an expansion of its water was long ago reclaimed. Motray Water finds its source in the parish of Kilmany, a few miles W. by N. of Cupar, makes a bold sweep towards the north-east, and then, taking a southerly turn, enters the head-waters of St Andrews Bay, after a course of 12 m. The principal lochs are Loch Fitty, Loch Gelly, Loch Glow and Loch Lindores; they are small but afford some sport for trout, perch and pike. "Freshwater mussels" occur in Loch Fitty. There are no glens, and the only large valley is the fertile Stratheden, which supplies part of the title of the combined baronies of Stratheden (created 1836) and Campbell (created 1841).

Geology.—Between Damhead and Tayport on the northern side of the low-lying Howe of Fife the higher ground is formed of Lower Old Red Sandstone volcanic rocks, consisting of red and purple porphyrites and andesites and some coarse agglomerates, which, in the neighbourhood of Auchtermuchty, are rounded and conglomeratic. These rocks have a gentle dip towards the S.S.E. They are overlaid unconformably by the soft red sandstones of the Upper Old Red series which underlie the Howe of Fife from Loch Leven to the coast. The quarries in these rocks in Dura Den are famous for fossil fishes. Following the Old Red rocks conformably are the Carboniferous formations which occupy the remainder of the county, and are well exposed on the coast and in the numerous quarries. The Carboniferous rocks include, at the base, the Calciferous Sandstone series of dark shales with thin limestones, sandstones and coals. They are best developed around Fife Ness, between St Andrews and Elie, and again around Burntisland between Kirkcaldy and Inverkeithing Bay. In the Carboniferous Limestone series, which comes next in upward succession, are the valuable gas-coals and ironstones worked in the coal-fields of Dunfermline, Saline, Oakley, Torryburn, Kirkcaldy and Markinch. The true Coal Measures lie in the district around Dysart and Leven, East Wemyss and Kinglassie, and they are separated from the coal-bearing Carboniferous Limestone series by the sandstones and conglomerates of the Millstone Grit. Fourteen seams of coal are found in the Dysart Coal Measures, associated with sandstones, shales and clay ironstones. Fife is remarkably rich in evidences of former volcanic activity. Besides the Old Red Sandstone volcanic rocks previously mentioned, there are many beds of contemporaneous basaltic lavas and tuffs in the Carboniferous rocks; Saline Hill and Knock Hill were the sites of vents, which at that time threw out ashes; these interbedded rocks are well exposed on the shore between Burntisland and Seafield Tower. There were also many intrusive sheets of dolerite and basalt forced into the lower Carboniferous rocks, and these now play an important part in the scenery of the county. They form the summits of the Lomond Hills and Benarty, and they may be followed from Cult Hill by the Cleish Hills to Blairadam; and again near Dunfermline, Burntisland, Torryburn, Auchtertool and St Andrews. Later, in Permian times, eastern Fife was the seat of further volcanic action, and great numbers of "necks" or vents pierce the Carboniferous rocks; Largo Law is a striking example. In one of these necks on the shore at Kincraig Point is a fine example of columnar basalt; the "Rock and Spindle" near St Andrews is another. Last of all in Tertiary times, east and west rifts in the Old Red Sandstone were filled by basalt dikes. Glacial deposits, ridges of gravel and sand, boulder clay, &c., brought from the N. W., cover much of the older rocks, and traces of old raised beaches are found round the coast and in the Howe of Fife. In the 25-ft. beach in the East Neuk of Fife is an island sea-cliff with small caves.

Climate and Agriculture.—Since the higher hills all lie in the west, most of the county is exposed to the full force of the east winds from the North Sea, which often, save in the more sheltered areas, check the progress of vegetation. At an elevation of 500 or 600 ft. above the sea harvests are three or four weeks later than in the valleys and low-lying coast-land. The climate, on the whole, is mild, proximity to the sea qualifying the heat in summer and the cold in winter. The average annual rainfall is 31 in., rather less in the East Neuk district and around St Andrews, somewhat more as the hills are approached, late summer and autumn being the wet season. The average temperature for January is 38° F., for July 59·5°, and for the year 47·6°. Four-fifths of the total area is under cultivation, and though the acreage under grain is smaller than it was, the yield of each crop is still extraordinarily good, oats, barley, wheat being the order of acreage. Of the green crops most attention is given to turnips. Potatoes also do well. The acreage under permanent pasture and wood is very considerable. Cattle are mainly kept for feeding purposes, and dairy farming, though attracting more notice, has never been followed more than to supply local markets. Sheep-farming, however, is on the increase, and the raising of horses, especially farm horses, is an important pursuit. They are strong, active and hardy, with a large admixture, or purely, of Clydesdale blood. The ponies, hunters and carriage horses so bred are highly esteemed. The strain of pigs has been improved by the introduction of Berkshires. North of the Eden the soil, though generally thin, is fertile, but the sandy waste of Tents Moor is beyond redemption. From St Andrews southwards all along the coast the land is very productive. That adjacent to the East Neuk consists chiefly of clay and rich loam. From Leven to Inverkeithing it varies from a light sand to a rich clayey loam. Excepting Stratheden and Strathleven, which are mostly rich, fertile loam, the interior is principally cold and stiff clay or thin loam with strong clayey subsoil. Part of the Howe of Fife is light and shingly and covered with heather. Some small peat mosses still exist, and near Lochgelly there is a tract of waste, partly moss and partly heath. The character of the farm management may be judged by its results. The best methods are pursued, and houses, steadings and cottages are all in good order, commodious and comfortable. Rabbits, hares, pheasants and partridges are common in certain districts; roe deer are occasionally seen; wild geese, ducks and teal haunt the lochs; pigeon-houses are fairly numerous; and grouse and blackcock are plentiful on the Lomond moors. The shire is well suited for fox-hunting, and there are packs in both the eastern and the western division of Fife.

Mining.—Next to Lanarkshire, Fife is the largest coal-producing county in Scotland. The coal-field may roughly be divided into the Dunfermline basin (including Halbeath, Lochgelly and Kelty), where the principal house coals are found, and the Wemyss or Dysart basin (including Methil and the hinterland), where gas-coal of the best quality is obtained. Coal is also extensively worked at Culross, Carnock, Falfield, Donibristle, Ladybank, Kilconquhar and elsewhere. Beds of ironstone, limestone, sandstone and shale lie in many places contiguous to the coal. Blackband ironstone is worked at Lochgelly and Oakley, where there are large smelting furnaces. Oil shale is worked at Burntisland and Airdrie near Crail. Among the principal limestone quarries are those at Charlestown, Burntisland and Cults. Freestone of superior quality is quarried at Strathmiglo, Burntisland and Dunfermline. Whinstone of unusual hardness and durability is obtained in nearly every district. Lead has been worked in the Lomond Hills and copper and zinc have been met with, though not in paying quantities. It is of interest to note that in the trap tufa at Elie there have been found pyropes (a variety of dark-red garnet), which are regarded as the most valuable of Scottish precious stones and are sold under the name of Elie rubies.

Other Industries.—The staple manufacture is linen, ranging from the finest damasks to the coarsest ducks and sackings. Its chief seats are at Kirkcaldy and Dunfermline, but it is carried on at many of the inland towns and villages, especially those situated near the Eden and Leven, on the banks of which rivers, as well as at Kirkcaldy, Dunfermline and Ceres, are found the bleaching-greens. Kirkcaldy is famous for its oil-cloth and linoleum. Most of the leading towns possess breweries and tanneries, and the largest distilleries are at Cameron Bridge and Burntisland. Woollen cloth is made to a small extent in several towns, and fishing-net at Kirkcaldy, Largo and West Wemyss. Paper is manufactured at Guardbridge, Markinch and Leslie; earthenware at Kirkcaldy; tobacco at Dunfermline and Kirkcaldy; engineering works and iron foundries are found at Kirkcaldy and Dunfermline; and shipbuilding is carried on at Kinghorn, Dysart, Burntisland, Inverkeithing and Tayport. From Inverkeithing all the way round the coast to Newburgh there are harbours at different points. They are mostly of moderate dimensions, the principal port being Kirkcaldy. The largest salmon fisheries are conducted at Newburgh and the chief seat of the herring fishery is Anstruther, but most of the coast towns take some part in the fishing either off the shore, or at stations farther north, or in the deep sea.

Communications.—The North British railway possesses a monopoly in the shire. From the Forth Bridge the main line follows the coast as far as Dysart and then turns northwards to Ladybank, where it diverges to the north-east for Cupar and the Tay Bridge. From Thornton Junction a branch runs to Dunfermline and another to Methil, and here begins also the coast line for Leven, Crail and St Andrews which touches the main line again at Leuchars Junction; at Markinch a branch runs to Leslie; at Ladybank there are branches to Mawcarse Junction, and to Newburgh and Perth; and at Leuchars Junction a loop line runs to Tayport and Newport, joining the main at Wormit. From the Forth Bridge the system also connects, via Dunfermline, with Alloa and Stirling in the W. and with Kinross and Perth in the N. From Dunfermline there is a branch to Charlestown, which on that account is sometimes called the port of Dunfermline.

Population and Government.—The population was 190,365 in 1891, and 218,840 in 1901, when 844 persons spoke Gaelic and English and 3 Gaelic only. The chief towns are the Anstruthers (pop. in 1901, 4233), Buckhaven (8828), Burntisland (4846), Cowdenbeath (7908), Cupar (4511), Dunfermline (25,250), Dysart (3562), Kelty (3986), Kirkcaldy (34,079), Leslie (3587), Leven (5577), Lochgelly (5472), Lumphinnans (2071), Newport (2869), St Andrews (7621), Tayport (3325) and Wemyss (2522). For parliamentary purposes Fife is divided into an eastern and a western division, each returning one member. It also includes the Kirkcaldy district of parliamentary burghs (comprising Burntisland, Dysart, Kinghorn and Kirkcaldy), and the St Andrews district (the two Anstruthers, Crail, Cupar, Kilrenny, Pittenweem and St Andrews); while Culross, Dunfermline and Inverkeithing are grouped with the Stirling district. As regards education the county is under school-board jurisdiction, and in respect of higher education its equipment is effective. St Andrews contains several excellent schools; at Cupar there is the Bell-Baxter school; at Dunfermline and Kirkclady there are high schools and at Anstruther there is the Waid Academy.

History.—In remote times the term Fife was applied to the peninsula lying between the estuaries of the Tay and Forth and separated from the rest of the mainland by the Ochil Hills. Its earliest inhabitants were Picts of the northern branch and their country was long known as Pictavia. Doubtless it was owing to the fact that the territory was long subject to the rule of an independent king that Fife itself came to be called distinctively The Kingdom, a name of which the natives are still proud. The Romans effected no settlement in the province, though it is probable that they temporarily occupied points here and there. In any case the Romans left no impression on the civilization of the natives. With the arrival of the missionaries—especially St Serf, St Kenneth, St Rule, St Adrian, St Moran and St Fillan—and conversion of the Picts went on apace. Interesting memorials of these devout missionaries exist in the numerous coast caves between Dysart and St Andrews and in the crosses and sculptured stones, some doubtless of pre-Christian origin, to be seen at various places. The word Fife, according to Skene, seems to be identical with the Jutland *Fibh* (pronounced *Fife*) meaning "forest," and was probably first used by the Frisians to describe the country behind the coasts of the Forth and Tay, where Frisian tribes are supposed to have settled at the close of the 4th century. The next immigration was Danish, which left lasting traces in many place-names (such as the frequent use of *law* for hill). An ancient division of the Kingdom into Fife and Fothrif survived for a period for ecclesiastical purposes. The line of demarcation ran from Leven to the east of Cults, thence to the west of Collessie and thence to the east of Auchtermuchty. To the east of this line lay Fife proper. In 1426 the first shire of Kinross was formed, consisting of Kinross and Orwell, and was enlarged to its present dimensions by the transference from Fife of the parishes of Portmoak, Cleish and Tulliebole. Although the county has lain outside of the main stream of Scottish history, its records are far from dull or unimportant. During the reigns of the earlier Stuarts, Dunfermline, Falkland and St Andrews were often the scene of solemn pageantry and romantic episodes. Out of the seventy royal burghs in Scotland no fewer than eighteen are situated in the shire. However, notwithstanding the marked preference of the Stuarts, the Kingdom did not hesitate to play the leading part in the momentous dramas of the Reformation and the Covenant, and by the 18th century the people had ceased to regard the old royal line with any but sentimental interest, and the Jacobite risings of 1715 and 1745 evoked only the most lukewarm support.

See Sir Robert Sibbald, *History of the Sheriffdoms of Fife and Kinross*; Rev. J. W. Taylor, *Historical Antiquities of Fife* (1875); A. H. Millar, *Fife, Pictorial and Historical* (Cupar, 1895); Sheriff Aeneas Mackay, sketch of the *History of Fife* (Edinburgh, 1890); *History of Fife and Kinross* (Scottish County History series) (Edinburgh, 1896); John Geddie, *The Fringe of Fife* (Edinburgh, 1894).

FIFE (Fr. *fifre*; Med. Ger. *Schweizerpfeiff, Feldpfeiff*; Ital. *ottavino*), originally the small primitive cylindrical transverse flute, now the small B♭ military flute, usually conoidal in bore, used in a drum and fife band. The pitch of the fife lies between that of the concert flute and piccolo. The fife, like the flute, is an open pipe, for although the upper end is stopped by means of a cork, an outlet is provided by the embouchure which is never entirely closed by the lips. The six finger-holes of the primitive flute, with the open end of the tube for a key-note, gave the diatonic scale of the fundamental octave; the second octave was produced by overblowing the notes of the fundamental scale an octave higher; part of a third octave was obtained by means of the higher harmonics produced by using certain of the finger-holes as vent-holes. The modern fife has, in addition to the six finger-holes, 4, 5 or 6 keys. Mersenne describes and figures the fife, which had in his day the compass of a fifteenth.[1] The fife, which, he states, differed from the German flute only in having a louder and more brilliant tone and a shorter and narrower bore, was the instrument used by the Swiss with the drum. The sackbut, or serpent, was used as its bass, for, as Mersenne explains, the bass instrument could not be made long enough, nor could the hands reach the holes, although some flutes were actually made with keys and had the tube doubled back as in the bassoon.[2]

The words *fife* and the Fr. *fifre* were undoubtedly derived from the Ger. *Pfeiff*, the fife being called by Praetorius[3] *Schweizerpfeiff* and *Feldpfeiff*, while Martin Agricola,[4] writing a century earlier (1529), mentions the transverse flute by the names of *Querchpfeiff* or *Schweizerpfeiff*, which Sebastian Virdung[5] writes *Zwerchpfeiff*. The Old English spelling was *phife, phiphe* or *ffyffe*. The fife was in use in England in the middle of the 16th century, for at a muster of the citizens of London in 1540, *droumes* and ffyffes are mentioned. At the battle of St Quentin (1557) the list of the English army[6] employed states that one trumpet was allowed to each cavalry troop of 100 men, and a drum and fife to each hundred of foot. A *drumme* and *phife* were also employed at one shilling per diem for the "Trayne of Artillery."[7] This was the nucleus of the modern military band, and may be regarded as the first step in its formation. In England the adoption of the fife as a military instrument was due to the initiative of Henry VIII., who sent to Vienna for ten good drums and as many fifers.[8] Ralph Smith[9] gives rules for drummers and fifers who, in addition to the duty of giving signals in peace and war to the company, were expected to be brave, secret and ingenious, and masters of several languages, for they were oft sent to parley with the enemy and were entrusted with honourable but dangerous missions. In 1585 the drum and fife formed part of the furniture for war among the companies of the city of London.[10] Queen Elizabeth (according to Michaud, *Biogr. universelle*, tome xiii. p. 60) had a peculiar taste for noisy music, and during meals had a concert of twelve trumpets, two kettledrums, with fifes and drums. The fife became such a favourite military instrument during the 16th and 17th centuries in England that it displaced the bagpipe; it was, however, in turn superseded early in the 18th century by the hautboy (see OBOE), introduced from France. In the middle of the 18th century the fife was reintroduced into the British army band by the duke of Cumberland[11] in the Guards in 1745, commemorated by William Hogarth's picture of the "March of the Guards towards Scotland in 1745," in which are seen a drummer and fifer; and by Colonel Bedford into the royal regiment of artillery in 1748, at the end of the war, when a Hanoverian fifer, John Ulrich, was brought over from Flanders as instructor.[12] In 1747 the 19th regiment, known as Green Howards, also had the advantage of a Hanoverian fifer as teacher, a youth presented by his colonel to Lieutenant-Colonel Williams commanding the regiment at Bois-le-Duc. Drum and fife bands in a short time became common in all infantry regiments, while among the cavalry the trumpet prevailed.

For the acoustics, construction and origin of the fife see FLUTE. Illustrations of the fife may be seen in Cowdray's picture of an encampment at Portsmouth in 1548; in Sandford's "Coronation Procession of James II.," and in C. R. Day's *Descriptive Catalogue*, pl. i. (F) (description No. 42, p. 27). (K. S.)

FIFTH MONARCHY MEN, the name of a Puritan sect in England which for a time supported the government of Oliver Cromwell in the belief that it was a preparation for the "fifth monarchy," that is for the monarchy which should succeed the Assyrian, the Persian, the Greek and the Roman, and during which Christ should reign on earth with His saints for a thousand years. These sectaries aimed at bringing about the entire abolition of the existing laws and institutions, and the substitution of a simpler code based upon the law of Moses. Disappointed at the delay in the fulfilment of their hopes, they soon began to agitate against the government and to vilify Cromwell; but the arrest of their leaders and preachers, Christopher Feake, John Rogers and others, cooled their ardour, and they were, perforce, content to cherish their hopes in secret until after the Restoration. Then, on the 6th of January 1661, a band of fifth monarchy men, headed by a cooper named Thomas Venner, who was one of their preachers, made an attempt to obtain possession of London. Most of them were either killed or taken prisoners, and on the 19th and 21st of January Venner and ten others were executed for high treason. From that time the special doctrines of the sect either died out, or became merged in a milder form of millenarianism, similar to that which exists at the present day.

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[1] *Harmonie universelle* (Paris, 1636), bk. v. prop. 9, pp. 241-244.

[2] For an illustration of one of these bass flutes see article FLUTE, fig. 2.

[3] *Syntagma musicum* (Wolfenbüttel, 1618), pp. 40-41 of Reprint.

[4] *Musica instrumentalis* (Wittenberg, 1529).

[5] *Musica getutscht und auszgezogen* (Basel, 1511).

[6] See Sir S. D. Scott, *The British Army*, vol. ii. p. 396.

[7] See H. G. Farmer, *Memoirs of the Royal Artillery Band* (London, 1904).

[8] *Id.* [9] *Id.* [10] Stowe's *Chronicles*, p. 702.

[11] Grose, *Military Antiquities* (London, 1801), vol. ii.

[12] See Colonel P. Forbes Macbean, *Memoirs of the Royal Regiment of Artillery*.

For the proceedings of the sect see S. R. Gardiner, *History of the Commonwealth and Protectorate*, *passim* (London, 1894–1901); and for an account of the rising of 1661 see Sir John Reresby, *Memoirs, 1634–1689*, edited by J. J. Cartwright (London, 1875).

FIG, the popular name given to plants of the genus *Ficus*, an extensive group, included in the natural order Moraceae, and characterized by a remarkable development of the pear-shaped receptacle, the edge of which curves inwards, so as to form a nearly closed cavity, bearing the numerous fertile and sterile flowers mingled on its surface. The figs vary greatly in habit,—some being low trailing shrubs, others gigantic trees, among the most striking forms of those tropical forests to which they are chiefly indigenous. They have alternate leaves, and abound in a milky juice, usually acrid, though in a few instances sufficiently mild to be used for allaying thirst. This juice contains caoutchouc in large quantity.

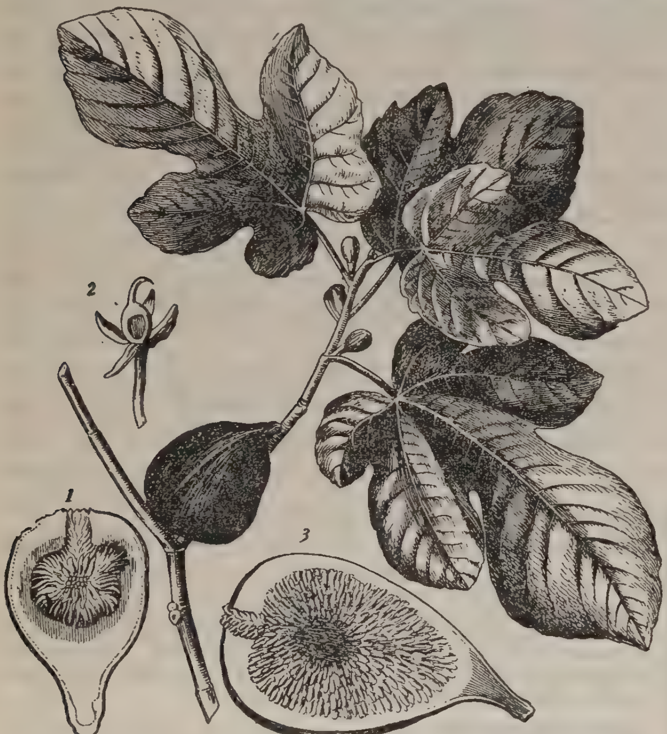

FIGURE 1.—Fruiting Branch of Fig, *Ficus Carica*; about $\frac{2}{7}$ nat. size.
1. Unripe fruit cut lengthwise; about $\frac{1}{2}$ nat. size. 2. Female flower taken from 1; enlarged. 3. Ripe fruit cut lengthwise; about $\frac{1}{2}$ nat. size.

Ficus Carica (figure 1), which yields the well-known figs of commerce, is a bush or small tree—rarely more than 18 or 20 ft. high,—with broad, rough, deciduous leaves, very deeply lobed in the cultivated varieties, but in the wild plant sometimes nearly entire. The green, rough branches bear the solitary, nearly sessile receptacles in the axils of the leaves. The male flowers are placed chiefly in the upper part of the cavity, and in most varieties are few in number. As it ripens, the receptacle enlarges greatly, and the numerous single-seeded pericarps or true fruits become imbedded in it. The fruit of the wild fig never acquires the succulence of the cultivated kinds. The fig seems to be indigenous to Asia Minor and Syria, but now occurs in a wild state in most of the countries around the Mediterranean. From the ease with which the nutritious fruit can be preserved, it was probably one of the earliest objects of cultivation, as may be inferred from the frequent allusions to it in the Hebrew Scriptures.[1] From a passage in Herodotus the fig would seem to have been unknown to the Persians in the days of the first Cyrus; but it must have spread in remote ages over all the districts around the Aegean and Levant. The Greeks are said to have received it from Caria (hence the specific name); but the fruit so improved under Hellenic culture that Attic figs became celebrated throughout the East, and special laws were made to regulate their exportation. From the contemptuous name given to informers against the violation of those enactments, *συκοφάνται* (*σῦκον, φαίνω*), our word sycophant is usually derived. The fig was one of the principal articles of sustenance among the Greeks; the Spartans especially used it largely at their public tables. From Hellas, at some prehistoric period, it was transplanted to Italy and the adjacent islands. Pliny enumerates many varieties, and alludes to those from Ebusus (the modern Iviza) as most esteemed by Roman epicures; while he describes those of home growth as furnishing a large portion of the food of the slaves, particularly those employed in agriculture, by whom great quantities were eaten in the fresh state at the periods of fig-harvest. In Latin myths the plant plays an important part. Held sacred to Bacchus, it was employed in religious ceremonies; and the fig-tree that overshadowed the twin founders of Rome in the wolf's cave, as an emblem of the future prosperity of the race, testified to the high value set upon the fruit by the nations of antiquity. The tree is now cultivated in all the Mediterranean countries, but the larger portion of our supply of figs comes from Asia Minor, the Spanish Peninsula and the south of France. Those of Asiatic Turkey are considered the best. The varieties are extremely numerous, and the fruit is of various colours, from deep purple to yellow, or nearly white. The trees usually bear two crops,—one in the early summer from the buds of the last year, the other in the autumn from those on the spring growth; the latter forms the chief harvest. Many of the immature receptacles drop off from imperfect fertilization, which circumstance has led, from very ancient times, to the practice of *caprification*.[2] Branches of the wild fig in flower are placed over the cultivated bushes. Certain hymenopterous insects, of the genera *Blastophaga* and *Sycophaga*, which frequent the wild fig, enter the minute orifice of the receptacle, apparently to deposit their eggs; conveying thus the pollen more completely to the stigmas, they ensure the fertilization and consequent ripening of the fruit. By some the nature of the process has been questioned, and the better maturation of the fruit attributed merely to the stimulus given by the puncture of the insect, as in the case of the apple; but the arrangement of the unisexual flowers in the fig renders the first theory the more probable. In some districts a straw or small twig is thrust into the receptacle with a similar object. When ripe the figs are picked, and spread out to dry in the sun,—those of better quality being much pulled and extended by hand during the process. Thus prepared, the fruit is packed closely in barrels, rush baskets, or wooden boxes, for commerce. The best kind, known as elemi, are shipped at Smyrna, where the pulling and packing of figs form one of the most important industries of the people.

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[1] Of these the case of the Barren Fig-tree (Mark. xi. 12-14, 20-21: compare Matt. xxi. 18-20), which Jesus cursed and which then withered away, has been much discussed among theologians. The difficulty is in Mark xi. 13: "And seeing a fig-tree afar off having leaves, he came, if haply he might find anything thereon; and when he came to it he found nothing but leaves, for the time of figs was not yet." These last words obviously raise the question whether the expectation of Jesus of finding figs, and his cursing of the tree on finding none, were not unreasonable. Many ingenious solutions have been propounded, by suggested emendations of the text and otherwise, for which consult M'Clintock and Strong's *Cyclopaedia of Biblical Literature* (*sub* "Fig") and the *Encyclopaedia Biblica* ("Fig-tree"); the former demurs to the unreasonableness, and contends that the appearance of the leaves at this season (March) indicated a pretentious precocity in this particular fig-tree, so that Jesus was entitled to expect that it would also have fruit, even though the season had not arrived; the *Ency. Biblica*, on the other hand, supposes that some "early Christian," confounding parable with history, has misunderstood the parable in Luke xiii. 6-9, and, forgetting that the season was not one for figs, has transformed it here into the narrative of an act of Jesus. The probability seems to be that the words "for the time of figs was not yet" are an unintelligent gloss by an early reader, which has made its way into the text. For authorities see the works mentioned above.

[2] From Lat. *caprificus*, a wild fig; O. Eng. *caprifig*.

This fruit still constitutes a large part of the food of the natives of western Asia and southern Europe, both in the fresh and dried state. A sort of cake made by mashing up the inferior kinds serves in parts of the Archipelago as a substitute for bread. Alcohol is obtained from fermented figs in some southern countries; and a kind of wine, still made from the ripe fruit, was known to the ancients, and mentioned by Pliny under the name of *sycites*. Medicinally the fig is employed as a gentle laxative, when eaten abundantly often proving useful in chronic constipation; it forms a part of the well-known "confection of senna." The milky juice of the stems and leaves is very acrid, and has been used in some countries for raising blisters. The wood is porous and of little value; though a piece, saturated with oil and spread with emery, is in France a common substitute for a hone.

The fig is grown for its fresh fruit (eaten as an article of dessert) in all the milder parts of Europe, and in the United States, with protection in winter, succeeds as far north as Pennsylvania. The fig was introduced into England by Cardinal Pole, from Italy, early in the 16th century. It lives to a great age, and along the southern coast of England bears fruit abundantly as a standard; but in Scotland and in many parts of England a south wall is indispensable for its successful cultivation out of doors.

Fig trees are propagated by cuttings, which should be put into pots, and placed in a gentle hotbed. They may be obtained more speedily from layers, which should consist of two or three years old shoots, and these, when rooted, will form plants ready to bear fruit the first or second year after planting. The best soil for a fig border is a friable loam, not too rich, but well drained; a chalky subsoil is congenial to the tree, and, to correct the tendency to over-luxuriance of growth, the roots should be confined within spaces surrounded by a wall enclosing an area of about a square yard. The sandy soil of Argenteuil, near Paris, suits the fig remarkably well; but the best trees are those which grow in old quarries, where their roots are free from stagnant water, and where they are sheltered from cold, while exposed to a very hot sun, which ripens the fruit perfectly. The fig succeeds well planted in a paved court against a building with a south aspect.

The fig tree naturally produces two sets of shoots and two crops of fruit in the season. The first shoots generally show young figs in July and August, but these in the climate of England very seldom ripen, and should therefore be rubbed off. The late or midsummer shoots likewise put forth fruit-buds, which, however, do not develop themselves till the following spring; and these form the only crop of figs on which the British gardener can depend.

The fig tree grown as a standard should get very little pruning, the effect of cutting being to stimulate the buds to push shoots too vigorous for bearing. When grown against a wall, it has been recommended that a single stem should be trained to the height of a foot. Above this a shoot should be trained to the right, and another to the left; from these principals two other subdivisions should be encouraged, and trained 15 in. apart; and along these branches, at distances of about 8 in., shoots for bearing, as nearly as possible of equal vigour, should be encouraged. The bearing shoots produced along the leading branches should be trained in at full length, and in autumn every alternate one should be cut back to one eye. In the following summer the trained shoots should bear and ripen fruit, and then be cut back in autumn to one eye, while shoots from the bases of those cut back the previous autumn should be trained for succession. In this way every leading branch will be furnished alternately with bearing and successional shoots.

When protection is necessary, as it may be in severe winters, though it is too often provided in excess, spruce branches have been found to answer the purpose exceedingly well, owing to the fact that their leaves drop off gradually when the weather becomes milder in spring, and when the trees require less protection and more light and air. The principal part requiring protection is the main stem, which is more tender than the young wood.

In forcing, the fig requires more heat than the vine to bring it into leaf. It may be subjected to a temperature of 50° at night, and from 60° to 65° in the day, and this should afterwards be increased to 60° and 65° by night, and 70° to 75° by day, or even higher by sun heat, giving plenty of air at the same time. In this temperature the evaporation from the leaves is very great, and this must be replaced and the wants of the swelling fruit supplied by daily watering, by syringing the foliage, and by moistening the floor, this atmospheric moisture being also necessary to keep down the red spider. When the crop begins to ripen, a moderately dry atmosphere should be maintained, with abundant ventilation when the weather permits.

The fig tree is easily cultivated in pots, and by introducing the plants into heat in succession the fruiting season may be considerably extended. The plants should be potted in turfy loam mixed with charcoal and old mortar rubbish, and in summer top-dressings of rotten manure, with manure water two or three times a week, will be beneficial. While the fruit is swelling, the pots should be plunged in a bed of fermenting leaves.

The following are a few of the best figs; those marked F. are good forcing sorts, and those marked W. suitable for walls:—

Agen: brownish-green, turbinate.
Brown Ischia, F.: chestnut-coloured, roundish-turbinate.
Brown Turkey (Lee's Perpetual), F., W.: purplish-brown, turbinate.
Brunswick, W.: brownish-green, pyriform.
Col di Signora Bianca, F.: greenish-yellow, pyriform.
Col di Signora Nero: dark chocolate, pyriform.
Early Violet, F.: brownish-purple, roundish.
Grizzly Bourjassotte: chocolate, round.
Grosse Monstreuse de Lipari: pale chestnut, turbinate.
Negro Largo, F.: black, long pyriform.
White Ischia, F.: greenish-yellow, roundish-obovate.
White Marseilles, F., W.: pale green, roundish-obovate.

The sycamore fig, *Ficus Sycomorus*, is a tree of large size, with heart-shaped leaves, which, from their fancied resemblance to those of the mulberry, gave origin to the name Συκόμορος. From the deep shade cast by its spreading branches, it is a favourite tree in Egypt and Syria, being often planted along roads and near houses. It bears a sweet edible fruit, somewhat like that of the common fig, but produced in racemes on the older boughs. The apex of the fruit is sometimes removed, or an incision made in it, to induce earlier ripening. The ancients, after soaking it in water, preserved it like the common fig. The porous wood is only fit for fuel.

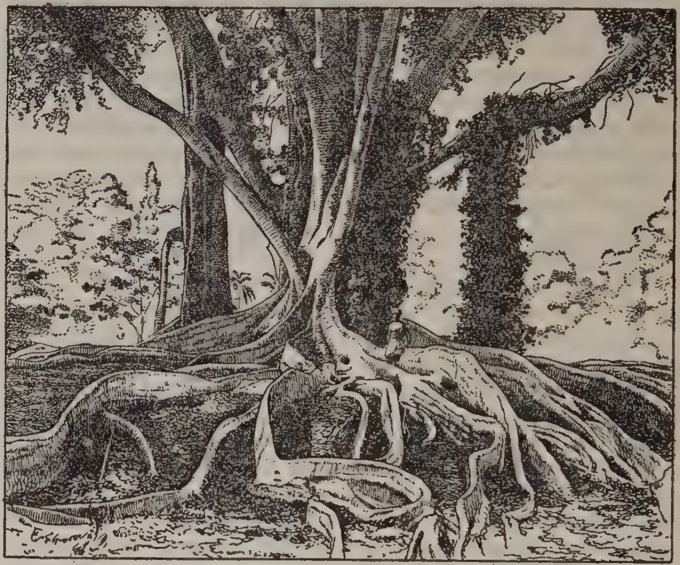


FIGURE 2.—India-rubber Tree, *Ficus elastica*, showing spreading woody roots.

The sacred fig, peepul, or bo, *Ficus religiosa*, a large tree with heart-shaped, long-pointed leaves on slender footstalks, is much grown in southern Asia. The leaves are used for tanning, and afford lac, and a gum resembling caoutchouc is obtained from the juice; but in India it is chiefly planted with a religious object, being regarded as sacred by both Brahmans and Buddhists. The former believe that the last avatar of Vishnu took place beneath its shade. A gigantic bo, described by Sir J. Emerson Tennent as growing near Anarajapoora, in Ceylon, is, if tradition may be trusted, one of the oldest trees in the world. It is said to have been a branch of the tree under which Gautama Buddha became endued with his divine powers, and has always been held in the greatest veneration. The figs, however, hold as important a place in the religious fables of the East as the ash in the myths of Scandinavia.

Ficus elastica, the India-rubber tree (figure 2), the large, oblong, glossy leaves, and pink buds of which are so familiar in our greenhouses, furnishes most of the caoutchouc obtained from the East Indies. It grows to a large size, and is remarkable for the snake-like roots that extend in contorted masses around the base of the trunk. The small fruit is unfit for food.

Ficus bengalensis, or the Banyan, wild in parts of northern India, but generally planted throughout the country, has a woody stem, branching to a height of 70 to 100 ft. and of vast extent with heart-shaped entire leaves terminating in acute points. Every branch from the main body throws out its own roots, at first in small tender fibres, several yards from the ground; but these continually grow thicker until they reach the surface, when they strike in, increase to large trunks, and become parent trees, shooting out new branches from the top, which again in time suspend their roots, and these, swelling into trunks, produce other branches, the growth continuing as long as the earth contributes her sustenance. On the banks of the Nerbudda stood a celebrated tree of this kind, which is supposed to be that described by Nearchus, the admiral of Alexander the Great. This tree once covered an area so immense, that it was known to shelter no fewer than 7000 men, and though much reduced in size by the destructive power of the floods, the remainder was described by James Forbes (1749–1819), in his *Oriental Memoirs* (1813–1815) as nearly 2000 ft. in circumference, while the trunks large and small exceeded 3000 in number. The tree usually grows from seeds dropped by birds on other trees. The leaf-axil of a palm forms a frequent receptacle for their growth, the palm becoming ultimately strangled by the growth of the fig, which by this time has developed numerous daughter stems which continue to expand and cover ultimately a large area. The famous tree in the Royal Botanic Gardens, Calcutta, began its growth at the end of the 18th century on a sacred date-palm. In 1907 it had nearly 250 aerial roots, the parent trunk was 42 ft. in girth, and its leafy crown had a circumference of 857 ft.; and it was still growing vigorously. Both this tree and *F. religiosa* cause destruction to buildings, especially in Bengal, from seeds dropped by birds germinating on the walls. The tree yields an inferior rubber, and a coarse rope is prepared from the bark and from the aerial roots.

FIGARO, a famous dramatic character first introduced on the stage by Beaumarchais in the *Barbier de Séville*, the *Mariage de Figaro*, and the *Folle Journée*. The name is said to be an old Spanish and Italian word for a wigmaker, connected with the verb *cigarrar*, to roll in paper. Many of the traits of the character are to be found in earlier comic types of the Roman and Italian stage, but as a whole the conception was marked by great originality; and Figaro soon seized the popular imagination, and became the recognized representative of daring, clever and nonchalant roguery and intrigue. Almost immediately after its appearance, Mozart chose the *Marriage of Figaro* as the subject of an opera, and the *Barber of Seville* was treated first by Paisiello, and afterwards in 1816 by Rossini. In 1826 the name of the witty rogue was taken by a journal which continued till 1833 to be one of the principal Parisian periodicals, numbering among its contributors such men as Jules Janin, Paul Lacroix, Léon Gozlan, Alphonse Karr, Dr Veron, Jules Sandeau and George Sand. Various abortive attempts were made to restore the *Figaro* during the next twenty years; and in 1854 the efforts of M. de Villemessant were crowned with success (see NEWSPAPERS: *France*).

See Marc Monnier, *Les Aieux de Figaro* (1868); H. de Villemessant, *Mémoires d'un journaliste* (1867).

FIGEAC, a town of south-western France, capital of an arrondissement in the department of Lot, 47 m. E.N.E. of Cahors on the Orléans railway. Pop. (1906) 4330. It is enclosed by an amphitheatre of wooded and vine-clad hills, on the right bank of the Célé, which is here crossed by an old bridge. It is ill-built and the streets are narrow and dirty; on the outskirts shady boulevards have taken the place of the ramparts by which it was surrounded. The town is very rich in old houses of the 13th and 14th centuries; among them may be mentioned the Hôtel de Balène, of the 14th century, used as a prison. Another house, dating from the 15th century, was the birthplace of the Egyptologist J. F. Champollion, in memory of whom the town has erected an obelisk. The principal church is that of St Sauveur, which once belonged to the abbey of Figeac. It was built at the beginning of the 12th century, but restored later; the façade in particular is modern. Notre-Dame du Puy, in the highest part of the town, belongs to the 12th and 13th centuries. It has no transept and its aisles extend completely round the interior. The altar-screen is a fine example of carved woodwork of the end of the 17th century. Of the four obelisks which used to mark the limits of the authority of the abbots of Figeac, those to the south and the west of the town remain. Figeac is the seat of a subprefect and has a tribunal of first instance, and a communal college. Brewing, tanning, printing, cloth-weaving and the manufacture of agricultural implements are among the industries. Trade is in cattle, leather, wool, plums, walnuts and grain, and there are zinc mines in the neighbourhood.

Figeac grew up round an abbey founded by Pippin the Short in the 8th century, and throughout the middle ages it was the property of the monks. At the end of the 16th century the lordship was acquired by King Henry IV.'s minister, the duke of Sully, who sold it to Louis XIII. in 1622.

FIGUEIRA DA FOZ, or FIGUEIRA, a seaport of central Portugal, in the district of Coimbra, formerly included in the province of Beira; on the north bank of the river Mondego, at its mouth, and at the terminus of the Lisbon-Figueira and Guarda-Figueira railways. Pop. (1900) 6221. Figueira da Foz is an important fishing-station, and one of the headquarters of the coasting trade in grain, fruit, wine, olive oil, cork and coal; but owing to the bar at the mouth of the Mondego large ships cannot enter. Glass is manufactured, and the city attracts many visitors by its excellent climate and sea-bathing. A residential suburb, the Bairro Novo, exists chiefly for their accommodation, to the north-west of the old town. Figueira is connected by a tramway running 4 m. N.W. with Buarcos (pop. 5033) and with the coal-mines of Cape Mondego. Lavos (pop. 7939), on the south bank of the Mondego, was the principal landing-place of the British troops which came, in 1808, to take part in the Peninsular War. Figueira da Foz received the title and privileges of city by a decree dated the 20th of September 1882.

FIGUERAS, a town of north-eastern Spain, in the province of Gerona, 14 m. S. of the French frontier, on the Barcelona-Perpignan railway. Pop. (1900) 10,714. Figueras is built at the foot of the Pyrenees, and on the northern edge of El Ampurdan, a fertile and well-irrigated plain, which produces wine, olives and rice, and derives its name from the seaport of Ampurias, the ancient Emporiae. The castle of San Fernando, 1 m.N.W., is an irregular pentagonal structure, built by order of Ferdinand VI. (1746–1759), on the site of a Capuchin convent. Owing to its situation, and the rocky nature of the ground over which a besieger must advance, it is still serviceable as the key to the frontier. It affords accommodation for 16,000 men and is well provided with bomb-proof cover. In 1794 Figueras was surrendered to the French, but it was regained in 1795. During the Peninsular War it was taken by the French in 1808, recaptured by the Spaniards in 1811, and retaken by the French in the same year. In 1823, after a long defence, it was once more captured by the French. An annual pilgrimage from Figueras to the chapel of Nuestra Señora de Requesens, 15 m. N., commemorates the deliverance of the town from a severe epidemic of fever in 1612.

FIGULUS, PUBLIUS NIGIDIUS (*c.* 98–45 B.C.), Roman savant, next to Varro the most learned Roman of the age. He was a friend of Cicero, to whom he gave his support at the time of the Catilinarian conspiracy (Plutarch, *Cicero*, 20; Cicero, *Pro Sulla*, xiv. 42). In 58 he was praetor, sided with Pompey in the Civil War, and after his defeat was banished by Caesar, and died in exile. According to Cicero (*Timaeus*, 1), Figulus endeavoured with some success to revive the doctrines of Pythagoreanism. With this was included mathematics, astronomy and astrology, and even the magic arts. According to Suetonius (*Augustus*, 94) he foretold the greatness of the future emperor on the day of his birth, and Apuleius (*Apologia*, 42) records that, by the employment of "magic boys" (*magici pueri*), he helped to find a sum of money that had been lost. Jerome (the authority for the date of his death) calls him *Pythagoricus et magus*. The abstruse nature of his studies, the mystical character of his writings, and the general indifference of the Romans to such subjects, caused his works to be soon forgotten. Amongst his scientific, theological and grammatical works mention may be made of *De diis*, containing an examination of various cults and ceremonials; treatises on divination and the interpretation of dreams; on the sphere, the winds and animals. His *Commentarii grammatici* in at least 29 books was an ill-arranged collection of linguistic, grammatical and antiquarian notes. In these he expressed the opinion that the meaning of words was natural, not fixed by man. He paid especial attention to orthography, and sought to differentiate the meanings of cases of like ending by distinctive marks (the apex to indicate a long vowel is attributed to him). In etymology he endeavoured to find a Roman explanation of words where possible (according to him *frater* was =*fere alter*). Quintilian (*Instit. orat.* xi. 3. 143) speaks of a rhetorical treatise *De gestu* by him.

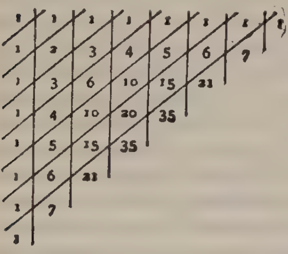
See Cicero, *Ad Fam.* iv. 13; scholiast on Lucan i. 639; several references in Aulus Gellius; Teuffel, *Hist. of Roman Literature*, 170; M. Hertz, *De N. F. studiis atque operibus* (1845); *Quaestiones Nigidianae* (1890), and edition of the fragments (1889) by A. Swoboda.

FIGURATE NUMBERS, in mathematics. If we take the sum of n terms of the series $1+1+1+\dots$, *i.e.* n, as the nth term of a new series, we obtain the series $1+2+3+\dots$, the sum of n terms of which is $\frac{1}{2}n\,.\,n+1$. Taking this sum as the nth term, we obtain the series $1+3+6+10+\dots$, which has for the sum of n terms $n(n+1)(n+2)/3!$[1] This sum is taken as the nth term of the next series, and proceeding in this way we obtain series having the following nth terms:—

$1, n, n(n+1)/2!, n(n+1)(n+2)/3!, \dots n(n+1)\dots(n+r-2)/(r-1)!$.

The numbers obtained by giving n any value in these expressions are of the first, second, third, . . . or rth order of figurate numbers.

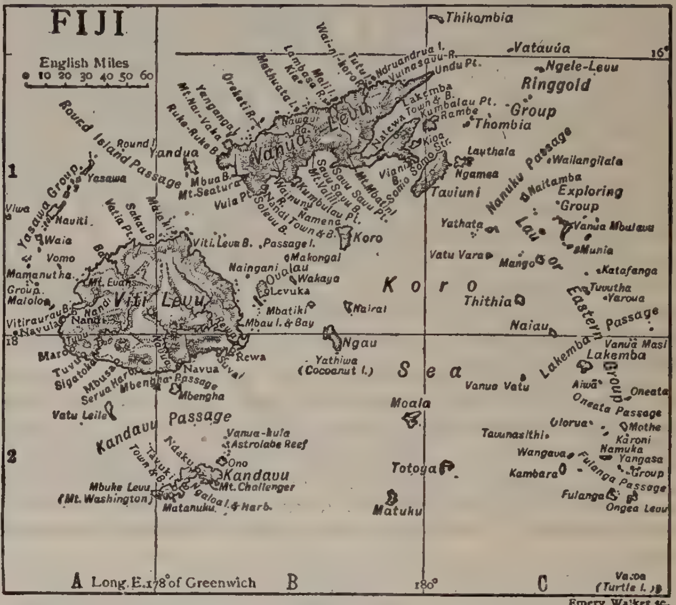
Pascal treated these numbers in his *Traité du triangle arithmetique* (1665), using them to develop a theory of combinations and to solve problems in probability. His table is here shown in its simplest form. It is to be noticed that each number is the sum of the numbers immediately above and to the left of it; and that the numbers along a line, termed a *base*, which cuts off an equal number of units along the top row and column are the coefficients in the binomial expansion of $(1+x)^{r-1}$, where r represents the number of units cut off.



1	1	1	1	1	1	1	1
1	2	3	4	5	6	7	
1	3	6	10	15	21		
1	4	10	20	35			
1	5	15	35				
1	6	21					
1	7						
1							

FIJI (*Viti*), a British colony consisting of an archipelago in the Pacific Ocean, the most important in Polynesia, between 15° and 20° S., and on and about the meridian of 180°. The islands number about 250, of which some 80 are inhabited. The total land area is 7435 sq. m. (thus roughly equalling that of Wales), and the population is about 121,000. The principal island is Viti Levu, 98 m. in length (E. to W.) and 67 in extreme breadth, with an area of 4112 sq. m. Forty miles N.E. lies Vanua Levu, measuring 117 m. by 30, with an area of 2432 sq. m. Close off the south-eastern shore of Vanua Levu is Taviuni, 26 m. in length by 10 in breadth; Kandavu or Kadavu, 36 m. long and very narrow, is 41 m. S. of Viti Levu, and the three other main islands, lying east of Viti Levu in the Koro Sea, are Koro, Ngau or Gau, and Ovalau. South-east from Vanua Levu a loop of islets extends nearly to 20° S., enclosing the Koro Sea. North-west of Viti Levu lies another chain, the Yasawa or western group; and, finally, the colony includes the island of Rotumah (*q.v.*), 300 m. N.W. by N. of Vanua Levu.

The formation of the larger islands is volcanic, their surface rugged, their vegetation luxuriant, and their appearance very beautiful; their hills rise often above 3000, and, in the case of a few summits, above 4000 ft., and they contrast strongly with the low coral formation of the smaller members of the group. There is not much level country, except in the coral islets, and certain rich tracts along the coasts of the two large islands, especially near the mouths of the rivers. The large islands have a considerable extent of undulating country, dry and open on their lee sides. Streams and rivers are abundant, the latter very large in proportion to the size of the islands, affording a waterway to the rich districts along their banks. These and the extensive mud flats and deltas at their mouths are often flooded, by which their fertility is increased, though at a heavy cost to the cultivator. The Rewa, debouching through a wide delta at the south-east of Viti Levu, is navigable for small vessels for 40 m. There are also in this island the Navua and Sigatoka (flowing S.), the Nandi (W.), and the Ba (N.W.). The Dreketi, flowing W., is the chief stream of Vanua Levu. It breaches the mountains in a fine valley; for this island consists practically of one long range, whereas the main valleys and ranges separating them in Viti Levu radiate for the most part from a common centre. With few exceptions the islands are surrounded by barriers of coral, broken by openings opposite the mouths of streams. Viti Levu is the most important island not only from its size, but from its fertility, variety of surface, and population, which is over one-third of that of the whole group. The town of Suva lies on an excellent harbour at the south-east of the island, and has been the capital of the colony since 1882, containing the government buildings and other offices. Vanua Levu is less fertile than Viti Levu; it has good anchorages along its entire southern coast. Of the other islands, Taviuni, remarkable for a lake (presumably a crater-lake) at the top of its lofty central ridge, is fertile, but exceptionally devoid of harbours; whereas the well-timbered island of Kandavu has an excellent one. On the eastern shore of Ovalau, an island which contains in a small area a remarkable series of gorge-like valleys between commanding hills, is the town of Levuka, the capital until 1882. It stands partly upon the narrow shore, and partly climbs the rocky slope behind. The chief islands on the west of the chain enclosing the Koro Sea are Koro, Ngau, Moala and Totoya, all productive, affording good anchorage, elevated and picturesque. The eastern islands of the chain are smaller and more numerous, Vanua Batevu (one of the Exploring Group) being a centre of trade. Among others, Mago is remarkable for a subterranean outlet of the waters of the fertile valley in its midst.


FIJI
English Miles
0 10 20 30 40 50 60
Round Island Passage
Round I.
Yandua
Yasawa
Yasawa Group
Viwa
Nauiti
Waia
Vomo
Mamanutha Group
Malolo
Vitiraurau B.
Navula
Nandi
Mt. Evans
Viti Levu
Ba
Vatia Pt.
Sakau B.
Mala-ki
Viti Leve B.
Passage I.
Makongai
Naingani
Ovalau
Wakaya
Levuka
Mbatiki
Nairai
Mbau I. & Bay
Rewa
Tuvu
Maro
Sigatoka
Mbusa
Serua Harb.
Mbengha
Mbengha Passage
Navua
Suva
Ngau
Yathiwa
(Cocoanut I.)
Vatu Leile
Kandavu Passage
Vanua-kula
Astrolabe Reef
Ono
Kandavu
Mt. Challenger
Ndaku
Tavuki Town & B.
Ngaloa I. & Harb.
Mbuke Levu
(Mt. Washington)
Matanuku
Mbua B.
Mt. Seatura
Vula Pt.
Nandi R.
Soleuu B.
Wainunu R.
Kumbulau Pt.
Mt. Valili
Namena
Nandi Town & B.
Koro
Ruke-Ruke B.
Mt. Nai-Vaka
Yanganga I.
Dreketi R.
Mathuata I.
Lambasa R.
Kia
Mali I.
Wai-ni-koro R.
Tutu I.
Ndruandrua I.
Vuinasauu-R.
Undu Pt.
Nawaur
Ba
Vanua Levu
Savu Savu B.
Savu Savu Pt.
Mt. Mbatini
Natewa
Lakemba Town & B.
Kumbalau Pt.
Rambe
Kioa
Somo Somo Str.
Viani B.
Taviuni
Thikombia
Vatauua
Ngele-Levu
Ringgold Group
Thombia
Lauthala
Ngamea
Nanuku Passage
Wailangilala
Naitamba
Exploring Group
Vanua Mbalavu
Munia
Yathata
Lau
Vatu Vara
Mango
Or
Katafanga
Tuvutha
Yaroua
Eastern Passage
Thithia
Naiau
Koro Sea
Lakemba
Vanua Masi
Lakemba Group
Vanua Vatu
Aiwa
Oneata
Oneata Passage
Moala
Olorua
Mothe
Tavunasithi
Karoni
Namuka
Yangasa Group
Wangava
Kambara
Fulanga Passage
Fulanga
Ongea Levu
Totoya
Matuku
Vatoa
(Turtle I.)
16°
18
1
2
A
B
C
Long. E. 178° of Greenwich
180°

Emery Walker sc.

The land is of recent geological formation, the principal ranges being composed of igneous rock, and showing traces of much volcanic disturbance. There are boiling springs in Vanua

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[1] The notation $n!$ denotes the product $1\,.\,2\,.\,3\,.\,\dots\,.\,n$, and is termed "factorial n."

Levu and Ngau, and slight shocks of earthquake are occasionally felt. The tops of many of the mountains, from Kandavu in the S.W., through Nairai and Koro, to the Ringgold group in the N.E., have distinct craters, but their activity has long ceased. The various decomposing volcanic rocks—tufas, conglomerates and basalts—mingled with decayed vegetable matter, and abundantly watered, form a very fertile soil. Most of the high peaks on the larger islands are basaltic, and the rocks generally are igneous, with occasional upheaved coral found sometimes over 1000 ft. above the sea; but certain sedimentary rocks observed on Viti Levu seem to imply a nucleus of land of considerable age. Volcanic activity in the neighbourhood is further shown by the quantities of pumice-stone drifted on to the south coasts of Kandavu and Viti Levu; malachite, antimony and graphite, gold in small quantities, and specular iron-sand occur.

Climate.—The colony is beyond the limits of the perpetual S.E. trades, while not within the range of the N.W. monsoons. From April to November the winds are steady between S.E. and E.N.E., and the climate is cool and dry, after which the weather becomes uncertain and the winds often northerly, this being the wet warm season. In February and March heavy gales are frequent, and hurricanes sometimes occur, causing scarcity by destroying the crops. The rainfall is much greater on the windward than on the lee sides of the islands (about 110 in. at Suva), but the mean temperature is much the same, viz., about 80° F. In the hills the temperature sometimes falls below 50°. The climate, especially from November to April, is somewhat enervating to the Englishman, but not unhealthy. Fevers are hardly known. Dysentery, which is common, and the most serious disease in the islands, is said to have been unknown before the advent of Europeans.

Fauna.—Besides the dog and the pig, which (with the domestic fowl) must have been introduced in early times, the only land mammals are certain species of rats and bats. Insects are numerous, but the species few. Bees have been introduced. The avifauna is not remarkable. Birds of prey are few; the parrot and pigeon tribes are better represented. Fishes, of an Indo-Malay type, are numerous and varied; Mollusca, especially marine, and Crustaceae are also very numerous. These three form an important element in the food supply.

Flora.—The vegetation is mostly of a tropical Indo-Malayan character—thick jungle with great trees covered with creepers and epiphytes. The lee sides of the larger islands, however, have grassy plains suitable for grazing, with scattered trees, chiefly *Pandanus*, and ferns. The flora has also some Australian and New Zealand affinities (resembling in this respect the New Caledonia and New Hebrides groups), shown especially in these western districts by the *Pandanus*, by certain acacias and others. At an elevation of about 2000 ft. the vegetation assumes a more mountainous type. Among the many valuable timber trees are the vesi (*Afzelia bijuga*); the dilo (*Calophyllum Inophyllum*), the oil from its seeds being much used in the islands, as in India, in the treatment of rheumatism; the dakua (*Dammara Vitiensis*), allied to the New Zealand kauri, and others. The dakua or Fiji pine, however, has become scarce. Most of the fruit trees are also valuable as timber. The native cloth (*masi*) is beaten out from the bark of the paper mulberry cultivated for the purpose. Of the palms the cocoanut is by far the most important. The yasi or sandal-wood was formerly a valuable product, but is now rarely found. There are various useful drugs, spices and perfumes; and many plants are cultivated for their beauty, to which the natives are keenly alive. Among the plants used as pot-herbs are several ferns, and two or three Solanums, one of which, *S. anthropophagorum*, was one of certain plants always cooked with human flesh, which was said to be otherwise difficult of digestion. The use of the kava root, here called yanggona, from which the well-known national beverage is made, is said to have been introduced from Tonga. Of fruit trees, besides the cocoanut, there may be mentioned the many varieties of the bread-fruit, of bananas and plantains, of sugar-cane and of lemon; the wi (*Spondias dulcis*), the kavika (*Eugenia malaccensis*), the ivi or Tahitian chestnut (*Inocarpus edulis*), the pine-apple and others introduced in modern times. Edible roots are especially abundant. The chief staple of life is the yam, the names of several months in the calendar having reference to its cultivation and ripening. The natives use no grain or pulse, but make a kind of bread (*mandrai*) from this, the taro, and other roots, as well as from the banana (which is the best), the bread-fruit, the ivi, the kavika, the arrowroot, and in times of scarcity the mangrove. This bread is made by burying the materials for months, till the mass is thoroughly fermented and homogeneous, when it is dug up and cooked by baking or steaming. This simple process, applicable to such a variety of substances, is a valuable security against famine.

People.—The Fijians are a people of Melanesian (Papuan) stock much crossed with Polynesians (Tongans and Samoans). They occupy the extreme east limits of Papuan territory and are usually classified as Melanesians; but they are physically superior to the pure examples of that race, combining their dark colour, harsh hirsute skin, crisp hair, which is bleached with lime and worn in an elaborately trained mop, and muscular limbs, with the handsome features and well proportioned bodies of the Polynesians. They are tall and well built. The features are strongly marked, but not unpleasant, the eyes deep set, the beard thick and bushy. The chiefs are fairer, much better-looking, and of a less negroid type of face than the people. This negroid type is especially marked on the west coasts, and still more in the interior of Viti Levu. The Fijians have other characteristics of both Pacific races, *e.g.* the quick intellect of the fairer, and the savagery and suspicion of the dark. They wear a minimum of covering, but, unlike the Melanesians, are strictly decent, while they are more moral than the Polynesians. They are cleanly and particular about their personal appearance, though, unlike other Melanesians, they care little for ornament, and only the women are tattooed. A partial circumcision is practised, which is exceptional with the Melanesians, nor have these usually an elaborate political and social system like that of Fiji. The status of the women is also somewhat better, those of the upper class having considerable freedom and influence. If less readily amenable to civilizing influences than their neighbours to the eastward, the Fijians show greater force of character and ingenuity. Possessing the arts of both races they practise them with greater skill than either. They understand the principle of division of labour and production, and thus of commerce. They are skilful cultivators and good boat-builders, the carpenters being an hereditary caste; there are also tribes of fishermen and sailors; their mats, baskets, nets, cordage and other fabrics are substantial and tasteful; their pottery, made, like many of the above articles, by women, is far superior to any other in the South Seas; but many native manufactures have been supplanted by European goods.

The Fijians were formerly notorious for cannibalism, which may have had its origin in religion, but long before the first contact with Europeans had degenerated into gluttony. The Fijian's chief table luxury was human flesh, euphemistically called by him "long pig," and to satisfy his appetite he would sacrifice even friends and relatives. The Fijians combined with this greediness a savage and merciless natures. Human sacrifices were of daily occurrence. On a chief's death wives and slaves were buried alive with him. When building a chief's house a slave was buried alive in the hole dug for each foundation post. At the launching of a war-canoe living men were tied hand and foot between two plantain stems making a human ladder over which the vessel was pushed down into the water. The people acquiesced in these brutal customs, and willingly met their deaths. Affection and a firm belief in a future state, in which the exact condition of the dying is continued, are the Fijians' own explanations of the custom, once universal, of killing sick or aged relatives. Yet in spite of this savagery the Fijians have always been remarkable for their hospitality, open-handedness and courtesy. They are a sensitive, proud, if vindictive, and boastful people, with good conversational and reasoning powers, much sense of humour, tact and perception of character. Their code of social etiquette is minute and elaborate, and the graduations of rank well marked. These are (1) chiefs, greater and lesser; (2) priests; (3) *Mata ni Vanua* (lit., eyes of the land), employés, messengers or counsellors; (4) distinguished warriors of low birth; (5) common people; (6) slaves.

The family is the unit of political society. The families are grouped in townships or otherwise (*qali*) under the lesser chiefs, who again owe allegiance to the supreme chief of the *matanitu* or tribe. The chiefs are a real aristocracy, excelling the people in physique, skill, intellect and acquirements of all sorts; and the reverence felt for them, now gradually diminishing, was very great, and had something of a religious character. All that a man had belonged to his chief. On the other hand, the chief's property practically belonged to his people, and they were as ready to give as to take. In a time of famine, a chief would declare the contents of the plantations to be common property. A system of feudal service-tenures (*lala*) is the institution on which their social and political fabric mainly depended. It allowed the chief to call for the labour of any district, and to employ it in planting, house or canoe-building, supplying food on the occasion of another chief's visit, &c. This power was often used with much discernment; thus an unpopular chief would redeem his character by calling for some customary service and rewarding it liberally, or a district would be called on to supply labour or produce as a punishment. The privilege might, of course, be abused by needy or unscrupulous chiefs, though they generally deferred somewhat to public opinion; it has now, with similar customary exactions of cloth, mats, salt, pottery, &c. been reduced within definite limits. An allied custom, *solevu*, enabled a district in want of any particular article to call on its neighbours to supply it, giving labour or something else in exchange. Although, then, the chief is lord of the soil, the inferior chiefs and individual families have equally distinct rights in it, subject to payment of certain dues; and the idea of permanent alienation of land by purchase was never perhaps clearly realized. Another curious custom was that of *vasu* (lit. nephew). The son of a chief by a woman of rank had almost unlimited rights over the property of his mother's family, or of her people. In time of war the chief claimed absolute control over life and property. Warfare was carried on with many courteous formalities, and considerable skill was shown in the fortifications. There were well-defined degrees of dependence among the different tribes or districts: the first of these, *bati*, is an alliance between two nearly equal tribes, but implying a sort of inferiority on one side, acknowledged by military service; the second, *qali*, implies greater subjection, and payment of tribute. Thus A, being bati to B, might hold C in qali, in which case C was also reckoned subject to B, or might be protected by B for political purposes.

The former religion of the Fijians was a sort of ancestor-worship, had much in common with the creeds of Polynesia, and included a belief in a future existence. There were two classes of gods—the first immortal, of whom Ndengei is the greatest, said to exist eternally in the form of a serpent, but troubling himself little with human or other affairs, and the others had usually only a local recognition. The second rank (who, though far above mortals, are subject to their passions, and even to death) comprised the spirits of chiefs, heroes and other ancestors. The gods entered and spoke through their priests, who thus pronounced on the issue of every enterprise, but they were not represented by idols; certain groves and trees were held sacred, and stones which suggest phallic associations. The priesthood usually was hereditary, and their influence great, and they had generally a good understanding with the chief. The institution of Taboo existed in full force. The *mburê* or temple was also the council chamber and place of assemblage for various purposes.

The weapons of the Fijians are spears, slings, throwing clubs and bows and arrows. Their houses, of which the framework is timber and the rest lattice and thatch, are ingeniously constructed, with great taste in ornamentation, and are well furnished with mats, mosquito-curtains, baskets, fans, nets and cooking and other utensils. Their canoes, sometimes more than 100 ft. long, are well built. Ever excellent agriculturists, their implements were formerly digging sticks and hoes of turtlebone or flat oyster-shells. In irrigation they showed skill, draining their fields with built watercourses and bamboo pipes. Tobacco, maize, sweet potatoes, yams, kava, taro, beans and pumpkins, are the principal crops.

Fijians are fond of amusements. They have various games, and dancing, story-telling and songs are especially popular. Their poetry has well-defined metres, and a sort of rhyme. Their music is rude, and is said to be always in the major key. They are clever cooks, and for their feasts preparations are sometimes made months in advance, and enormous waste results from them. Mourning is expressed by fasting, by shaving the head and face, or by cutting off the little finger. This last is sometimes done at the death of a rich man in the hope that his family will reward the compliment; sometimes it is done vicariously, as when one chief cuts off the little finger of his dependent in regret or in atonement for the death of another.

A steady, if not a very rapid, decrease in the native population set in after 1875. A terrible epidemic of measles in that year swept away 40,000, or about one-third of the Fijians. Subsequent epidemics have not been attended by anything like this mortality, but there has, however, been a steady decrease, principally among young children, owing to whooping-cough, tuberculosis and croup. Every Fijian child seems to contract yaws at some time in its life, a mistaken notion existing on the part of the parents that it strengthens the child's physique. Elephantiasis, influenza, rheumatism, and a skin disease, *thoko*, also occur. One per cent of the natives are lepers. A commission appointed in 1891 to inquire into the causes of the native decrease collected much interesting anthropological information regarding native customs, and provincial inspectors and medical officers were specially appointed to compel the natives to carry out the sanitary reforms recommended by the commission. A considerable sum was also spent in laying on good water to the native villages. The Fijians show no disposition to intermarry with the Indian coolies. The European half-castes are not prolific *inter se*, and they are subject to a scrofulous taint. The most robust cross in the islands is the offspring of the African negro and the Fijian. Miscegenation with the Micronesians, the only race in the Pacific which is rapidly increasing, is regarded as the most hopeful manner of preserving the native Fijian population. There is a large Indian immigrant population.

Trade, Administration, &c.—The principal industries are the cultivation of sugar and fruits and the manufacture of sugar and copra, and these three are the chief articles of export trade, which is carried on almost entirely with Australia and New Zealand. The fruits chiefly exported are bananas and pineapples. There are also exported maize, vanilla and a variety of fruits in small quantities; pearl and other shells and bêche-de-mer. There is a manufacture of soap from coconut oil; a fair quantity of tobacco is grown, and among other industries may be included boat-building and saw-milling. Regular steamship communications are maintained with Sydney, Auckland and Vancouver. Good bridle-tracks exist in all the larger islands, and there are some macadamized roads, principally in Viti Levu. There is an overland mail service by native runners. The export trade is valued at nearly £600,000 annually, and the imports at £500,000. The annual revenue of the colony is about £140,000 and the expenditure about £125,000. The currency and weights and measures are British. Besides the customs and stamp duties, some £18,000 of the annual revenue is raised from native taxation. The seventeen provinces of the colony (at the head of which is either a European or a *roko tui* or native official) are assessed annually by the legislative council for a fixed tax in kind. The tax on each province is distributed among districts under officials called *bulis*, and further among villages within these districts. Any surplus of produce over the assessment is sold to contractors, and the money received is returned to the natives.

Under a reconstruction made in 1904 there is an executive council consisting of the governor and four official members. The legislative council consists of the governor, ten official, six elected and two native members. The native chiefs and provincial representatives meet annually under the presidency of the governor, and their recommendations are submitted for sanction to the legislative council. Suva and Levuka have each a municipal government, and there are native district and village councils. There is an armed native constabulary; and a volunteer and cadet corps in Suva and Levuka.

The majority of the natives are Wesleyan Methodists. The Roman Catholic missionaries have about 3000 adherents; the Church of England is confined to the Europeans and *kanakas* in the towns; the Indian coolies are divided between Mahommedans and Hindus. There are public schools for Europeans and half-castes in the towns, but there is no provision for the education of the children of settlers in the out-districts. By an ordinance of 1890 provision was made for the constitution of school boards, and the principle was first applied in Suva and Levuka. The missions have established schools in every native village, and most natives are able to read and write their own language. The government has established a native technical school for the teaching of useful handicrafts. The natives show themselves very slow in adopting European habits in food, clothing and house-building.

History.—A few islands in the north-east of the group were first seen by Abel Tasman in 1643. The southernmost of the group, Turtle Island, was discovered by Cook in 1773. Lieutenant Bligh, approaching them in the launch of the "Bounty," 1789, had a hostile encounter with natives. In 1827 Dumont d'Urville in the "Astrolabe" surveyed them much more accurately, but the first thorough survey was that of the United States exploring expedition in 1840. Up to this time, owing to the evil reputation of the islanders, European intercourse was very limited. The labours of the Wesleyan missionaries, however, must always have a prominent place in any history of Fiji. They came from Tonga in 1835 and naturally settled first in the eastern islands, where the Tongan element, already familiar to them, preponderated. They perhaps identified themselves too closely with their Tongan friends, whose dissolute, lawless, tyrannical conduct led to much mischief; but it should not be forgotten that their position was difficult, and it was mainly through their efforts that many terrible heathen practices were stamped out.

About 1804 some escaped convicts from Australia and runaway sailors established themselves around the east part of Viti Levu, and by lending their services to the neighbouring chiefs probably led to their preponderance over the rest of the group. Na Ulivau, chief of the small island of Mbau, established before his death in 1829 a sort of supremacy, which was extended by his brother Tanoa, and by Tanoa's son Thakombau, a ruler of considerable capacity. In his time, however, difficulties thickened. The Tongans, who had long frequented Fiji (especially for canoe-building, their own islands being deficient in timber), now came in larger numbers, led by an able and ambitious chief, Maafu, who, by adroitly taking part in Fijian quarrels, made himself chief in the Windward group, threatening Thakombau's supremacy. He was harassed, too, by an arbitrary demand for £9000 from the American government, for alleged injuries to their consul. Several chiefs who disputed his authority were crushed by the aid of King George of Tonga, who (1855) had opportunely arrived on a visit; but he afterwards, taking some offence, demanded £12,000 for his services. At last Thakombau, disappointed in the hope that his acceptance of Christianity (1854) would improve his position, offered the sovereignty to Great Britain (1859) with the fee simple of 100,000 acres, on condition of her paying the American claims. Colonel Smythe, R.A., was sent out to report on the question, and decided against annexation, but advised that the British consul should be invested with full magisterial powers over his countrymen, a step which would have averted much subsequent difficulty.

Meanwhile Dr B. Seemann's favourable report on the capabilities of the islands, followed by a time of depression in Australia and New Zealand, led to a rapid increase of settlers—from 200 in 1860 to 1800 in 1869. This produced fresh complications, and an increasing desire among the respectable settlers for a competent civil and criminal jurisdiction. Attempts were made at self-government, and the sovereignty was again offered, conditionally, to England, and to the United States. Finally, in 1871, a "constitutional government" was formed by certain Englishmen under King Thakombau; but this, after incurring heavy debt, and promoting the welfare of neither whites nor natives, came after three years to a deadlock, and the British government felt obliged, in the interest of all parties, to accept the unconditional cession now offered (1874). It had besides long been thought desirable to possess a station on the route between Australia and Panama; it was also felt that the Polynesian labour traffic, the abuses in which had caused much indignation, could only be effectually regulated from a point contiguous to the recruiting field, and the locality where that labour was extensively employed. To this end the governor of Fiji was also created "high commissioner for the western Pacific." Rotumah (*q.v.*) was annexed in 1881.

At the time of the British annexation the islands were suffering from commercial depression, following a fall in the price of cotton after the American Civil War. Coffee, tea, cinchona and sugar were tried in turn, with limited success. The coffee was attacked by the leaf disease; the tea could not compete with that grown by the cheap labour of the East; the sugar machinery was too antiquated to withstand the fall in prices consequent on the European sugar bounties. In 1878 the first coolies were imported from India and the cultivation of sugar began to pass into the hands of large companies working with modern machinery. With the introduction of coolies the Fijians began to fall behind in the development of their country. Many of the coolies chose to remain in the colony after the termination of their indentures, and began to displace the European country traders. With a regular and plentiful supply of Indian coolies, the recruiting of *kanaka* labourers practically ceased. The settlement of European land claims, and the measures taken for the protection of native institutions, caused lively dissatisfaction among the colonists, who laid the blame of the commercial depression at the door of the government; but with returning prosperity this feeling began to disappear. In 1900 the government of New Zealand made overtures to absorb Fiji. The Aborigines Society protested to the colonial office, and the imperial government refused to sanction the proposal. [illegible]

See Smyth, *Ten Months in the Fiji Islands* (London, 1864); B. Seemann, *Flora Vitiensis* (London, 1865); and *Viti: Account of a Government Mission in the Vitian or Fijian Islands* (1860–1861); W. T. Pritchard, *Polynesian Reminiscences* (London, 1866); H. Forbes, *Two Years in Fiji* (London, 1875); Commodore Goodenough, *Journal* (London, 1876); H. N. Moseley, *Notes of a Naturalist in the "Challenger"* (London, 1879); Sir A. H. Gordon, *Story of a Little War* (Edinburgh, privately printed, 1879); J. W. Anderson, *Fiji and New Caledonia* (London, 1880); C. F. Gordon-Cumming, *At Home in Fiji* (Edinburgh, 1881); John Horne, *A Year in Fiji* (London, 1881); H. S. Cooper, *Our New Colony, Fiji* (London, 1882); S. E. Scholes, *Fiji and the Friendly Islands* (London, 1882): Princes Albert Victor and George of Wales, *Cruise of H. M. S. "Bacchante"* (London, 1886); A. Agassiz, *The Islands and Coral Reefs of Fiji* (Cambridge, Mass., U.S., 1899); H. B. Guppy, *Observations of a Naturalist in the Pacific* (1896–1899), vol. i.; *Vanua Levu, Fiji* (Phys. Geog. and Geology) (London, 1903); Lorimer Fison, *Tales from Old Fiji* (folk-lore, &c.) (London, 1904); B. Thomson, *The Fijians* (London, 1908).

FILANDER, the name by which the Aru Island wallaby (*Macropus brunii*) was first described. It occurs in a translation of C. de Bruyn's *Travels* (ii. 101) published in 1737.

FILANGIERI, CARLO (1784–1867), prince of Satriano, Neapolitan soldier and statesman, was the son of Gaetano Filangieri (1752–1788), a celebrated philosopher and jurist. At the age of fifteen he decided on a military career, and having obtained an introduction to Napoleon Bonaparte, then first consul, was admitted to the Military Academy at Paris. In 1803 he received a commission in an infantry regiment, and took part in the campaign of 1805 under General Davoust, first in the Low Countries, and later at Ulm, Maria Zell and Austerlitz, where he fought with distinction, was wounded several times and promoted. He returned to Naples as captain on Masséna's staff to fight the Bourbons and the Austrians in 1806, and subsequently went to Spain, where he followed Jerome Bonaparte in his retreat from Madrid. In consequence of a fatal duel he was sent back to Naples; there he served under Joachim Murat with the rank of general, and fought against the Anglo-Sicilian forces in Calabria and at Messina. On the fall of Napoleon he took part in Murat's campaign against Eugène Beauharnais, and later in that against Austria, and was severely wounded at the battle of the Panaro (1815). On the restoration of the Bourbon king Ferdinand IV. (I.), Filangieri retained his rank and command, but found the army utterly disorganized and impregnated with Carbonarism. In the disturbances of 1820 he adhered to the Constitutionalist party, and fought under General Pepe (*q.v.*) against the Austrians. On the re-establishment of the autocracy he was dismissed from the service, and retired to Calabria where he had inherited the princely title and estates of Satriano. In 1831 he was recalled by Ferdinand II. and entrusted with various military reforms. On the outbreak of the troubles of 1848 Filangieri advised the king to grant the constitution, which he did in February 1848, but when the Sicilians formally seceded from the Neapolitan kingdom Filangieri was given the command of an armed force with which to reduce the island to obedience. On the 3rd of September he landed near Messina, and after very severe fighting captured the city. He then advanced southwards, besieged and took Catania, where his troops committed many atrocities, and by May 1849 he had conquered the whole of Sicily, though not without much bloodshed. He remained in Sicily as governor until 1855, when he retired into private life, as he could not carry out the reforms he desired owing to the hostility of Giovanni Cassisi, the minister for Sicily. On the death of Ferdinand II. (22nd of May 1859) the new king Francis II. appointed Filangieri premier and minister of war. He promoted good relations with France, then fighting with Piedmont against the Austrians in Lombardy, and strongly urged on the king the necessity of an alliance with Piedmont and a constitution as the only means whereby the dynasty might be saved. These proposals being rejected, Filangieri resigned office. In May 1860, Francis at last promulgated the constitution, but it was too late, for Garibaldi was in Sicily and Naples was seething with rebellion. On the advice of Liborio Romano, the new prefect of police, Filangieri was ordered to leave Naples. He went to Marseilles with his wife and subsequently to Florence, where at the instance of General La Marmora he undertook to write an account of the Italian army. Although he adhered to the new government he refused to accept any dignity at its hands, and died at his villa of San Giorgio a Cremano near Naples on the 9th of October 1867.

Filangieri was a very distinguished soldier, and a man of great ability; although he changed sides several times he became really attached to the Bourbon dynasty, which he hoped to save by freeing it from its reactionary tendencies and infusing a new spirit into it. His conduct in Sicily was severe and harsh, but he was not without feelings of humanity, and he was an honest man and a good administrator.

His biography has been written by his daughter Teresa Filangieri Fieschi-Ravaschieri, *Il Generale Carlo Filangieri* (Milan, 1902), an interesting, although somewhat too laudatory volume based on the general's own unpublished memoirs; for the Sicilian expedition see V. Finocchiaro, *La Rivoluzione siciliana del 1848–49* (Catania, 1906, with bibliography), in which Filangieri is bitterly attacked; see also under NAPLES; FERDINAND IV.; FRANCIS I.; FERDINAND II.; FRANCIS II. (L. V.*)

FILANGIERI, GAETANO (1752–1788), Italian publicist, was born at Naples on the 18th of August 1752. His father, Caesar, prince of Arianiello, intended him for a military career, which he commenced at the early age of seven, but soon abandoned for the study of the law. At the bar his knowledge and eloquence early secured his success, while his defence of a royal decree reforming abuses in the administration of justice gained him the favour of the king, Charles, afterwards Charles III. of Spain, and led to several honourable appointments at court. The first two books of his great work, *La Scienza della legislazione*, appeared in 1780. The first book contained an exposition of the rules on which legislation in general ought to proceed, while the second was devoted to economic questions. These two books showed him an ardent reformer, and vehement in denouncing the abuses of his time. He insisted on unlimited free trade, and the abolition of the medieval institutions which impeded production and national well-being. Its success was great and immediate not only in Italy, but throughout Europe at large. In 1783 he married, resigned his appointments at court, and retiring to Cava, devoted himself steadily to the completion of his work. In the same year appeared the third book, relating entirely to the principles of criminal jurisprudence. The suggestion which he made in it as to the need for reform in the Roman Catholic church brought upon him the censure of the ecclesiastical authorities, and it was condemned by the congregation of the Index in 1784. In 1785 he published three additional volumes, making the fourth book of the projected work, and dealing with education and morals. In 1787 he was appointed a member of the supreme treasury council by Ferdinand IV., but his health, impaired by close study and over-work in his new office, compelled his withdrawal to the country at Vico Equense. He died somewhat suddenly on the 21st of July 1788, having just completed the first part of the fifth book of his *Scienza*. He left an outline of the remainder of the work, which was to have been completed in six books.

La Scienza della legislazione has gone through many editions, and has been translated into most of the languages of Europe. The best Italian edition is in 5 vols. 8vo. (1807). The Milan edition (1822) contains the *Opusculi scelti* and a life by Donato Tommasi. A French translation appeared in Paris in 7 vols. 8vo (1786–1798); it was republished in 1822–1824, with the addition of the *Opuscles* and notes by Benjamin Constant. *The Science of Legislation* was translated into English by Sir R. Clayton (London, 1806).

FILARIASIS, the name of a disease due to the nematode *Filaria sanguinis hominis*. A milky appearance of the urine, due to the presence of a substance like chyle, which forms a clot, had been observed from time to time, especially in tropical and subtropical countries; and it was proved by Dr Wucherer of Bahia, and by Dr Timothy Lewis, that this peculiar condition is uniformly associated with the presence in the blood of minute eel-like worms, visible only under the microscope, being the embryo forms of a *Filaria* (see NEMATODA). Sometimes the discharge of lymph takes place at one or more points of the surface of the body, and there is in other cases a condition of naevoid elephantiasis of the scrotum, or lymph-scrotum. More or less of blood may occur along with the chylous fluid in the urine. Both the chyluria and the presence of filariae in the blood are curiously intermittent; it may happen that not a single filaria is to be seen during the daytime, while they swarm in the blood at night, and it has been ingeniously shown by Dr S. Mackenzie that they may be made to disappear if the patient sits up all night, reappearing while he sleeps through the day.

Sir P. Manson proved that mosquitoes imbibe the embryo filariae from the blood of man; and that many of these reach full development within the mosquito, acquiring their freedom when the latter resorts to water, where it dies after depositing its eggs. Mosquitoes would thus be the intermediate host of the filariae, and their introduction into the human body would be through the medium of water (see PARASITIC DISEASES).

FILDES, SIR LUKE (1844–), English painter, was born at Liverpool, and trained in the South Kensington and Royal Academy schools. At first a highly successful illustrator, he took rank later among the ablest English painters, with "The Casual Ward" (1874), "The Widower" (1876), "The Village Wedding" (1883), "An Al-fresco Toilette" (1889); and "The Doctor" (1891), now in the National Gallery of British Art. He also painted a number of pictures of Venetian life and many notable portraits, among them the coronation portraits of King Edward VII. and Queen Alexandra. He was elected an associate of the Royal Academy in 1879, and academician in 1887; and was knighted in 1906.

See David Croal Thomson, *The Life and Work of Luke Fildes, R.A.* (1895).

FILE. 1. A bar of steel having sharp teeth on its surface, and used for abrading or smoothing hard surfaces. (The O. Eng. word is *fēol*, and cognate forms appear in Dutch *vijl*, Ger. *Feile*, &c.; the ultimate source is usually taken to be an Indo-European root meaning to mark or scratch, and seen in the Lat. *pingere*, to paint.) Some uncivilized tribes polish their weapons with such things as rough stones, pieces of shark skin or fishes' teeth. The operation of filing is recorded in 1 Sam. xiii. 21; and, among other facts, the similarity of the name for the filing instrument among various European peoples points to an early practice of the art. A file differs from a *rasp* (which is chiefly used for working wood, horn and the like) in having its teeth cut with a chisel whose straight edge extends across its surface, while the teeth of the rasp are formed by solitary indentations of a pointed chisel. According to the form of their teeth, files may be *single-cut* or *double-cut*; the former have only one set of parallel ridges (either at right angles or at some other angle with the length); the latter (and more common) have a second set cut at an angle with the first. The double-cut file presents sharp angles to the filed surface, and is better suited for hard metals. Files are classed according to the fineness of their teeth (see TOOL), and their shapes present almost endless varieties. Common forms are—the *flat* file, of parallelogram section, with uniform breadth and thickness, or tapering, or "bellied"; the *four-square* file, of square section, sometimes with one side "safe," or left smooth; and the so-called *three-square* file, having its cross section an equilateral triangle, the *half-round* file, a segment of a circle, the *round* or *rat-tail* file, a circle, which are generally tapered. The *float* file is like the *flat*, but single-cut. There are many others. Files vary in length from three-quarters of an inch (watchmakers') to 2 or 3 ft. and upwards (engineers'). The length is reckoned exclusively of the spike or tang which enters the handle. Most files are tapered; the *blunt* are nearly parallel, with larger section near the middle; a few are parallel. The *rifflers* of sculptors and a few other files are curvilinear in their central line.

In manufacturing files, steel blanks are forged from bars which have been sheared or rolled as nearly as possible to the sections required, and after being carefully annealed are straightened, if necessary, and then rendered clean and accurate by grinding or filing. The process of cutting them used to be largely performed by hand, but machines are now widely employed. The hand-cutter, holding in his left hand a short chisel (the edge of which is wider than the width of the file), places it on the blank with an inclination from the perpendicular of 12° or 14°, and beginning near the farther end (the blank is placed with the tang or handle end towards him) strikes it sharply with a hammer. An indentation is thus made, and the steel, slightly thrown up on the side next the tang, forms a ridge. The chisel is then transferred to the uncut surface and slid away from the operator till it encounters the ridge just made; the position of the next cut being thus determined, the chisel is again struck, and so on. The workman seeks to strike the blows as uniformly as possible, and he will make 60 or 80 cuts a minute. If the file is to be single-cut, it is now ready to be hardened, but if it is to be double-cut he proceeds to make the second series or course of cuts, which are generally somewhat finer than the first. Thus the surface is covered with teeth inclined towards the point of the file. If the file is flat and is to be cut on the other side, it is turned over, and a thin plate of pewter placed below it to protect the teeth. Triangular and other files are supported in grooves in lead. In cutting round and half-round files, a straight chisel is applied as tangent to the curve. The round face of a half-round file requires eight, ten or more courses to complete it. Numerous attempts were made, even so far back as the 18th century, to invent machinery for cutting files, but little success was attained till the latter part of the 19th century. In most of the machines the idea was to arrange a metal arm and hand to hold the chisel with a hammer to strike the blow, and so to imitate the manual process as closely as possible. The general principle on which the successful forms are constructed is that the blanks, laid on a moving table, are slowly traversed forward under a rapidly reciprocating chisel or knife.

The filing of a flat surface perfectly true is the test of a good filer; and this is no easy matter to the beginner. The piece to be operated upon is generally fixed about the level of the elbow, the operator standing, and, except in the case of small files, grasping the file with both hands, the handle with the right, the farther end with the left. The great point is to be able to move the file forward with pressure in horizontal straight lines; from the tendency of the hands to move in arcs of circles, the heel and point of the file are apt to be alternately raised. This is partially compensated by the bellied form given to many files (which also counteracts the frequent warping effect of the hardening process, by which one side of a flat file may be rendered concave and useless). In bringing back the file for the next thrust it is nearly lifted off the work. Further, much delicacy and skill are required in adapting the pressure and velocity, ascertaining if foreign matters or filings remain interposed between the file and the work, &c. Files can be cleaned with a piece of the so-called *cotton-card* (used in combing cotton wool) nailed to a piece of wood. In *draw-filing*, which is sometimes resorted to to give a neat finish, the file is drawn sideways to and fro over the work. New files are generally used for a time on brass or cast-iron, and when partially worn they are still available for filing wrought iron and steel.

2. A string or thread (through the Fr. *fil* and *file*, from Lat. *filum*, a thread); hence used of a device, originally a cord, wire or spike on which letters, receipts, papers, &c., may be strung for convenient reference. The term has been extended to embrace various methods for the preservation of papers in a particular order, such as expanding books, cabinets, and ingenious improvements on the simple wire file which enable any single document to be readily found and withdrawn without removing the whole series. From the devices used for filing the word is transferred to the documents filed, and thus is used of a catalogue, list, or collection of papers, &c. File is also employed to denote a row of persons or objects arranged one behind the other. In military usage a "file" is the opposite of a "rank," that is, it is composed of a (variable) number of men aligned from front to rear one behind the other, while a rank contains a number of men aligned from right to left abreast. Thus a British infantry company, in line two deep, one hundred strong, has two ranks of fifty men each, and fifty "files" of two men each. Up to about 1600 infantry companies or battalions were often sixteen deep, one front rank man and the fifteen "coverers" forming a file. The number of ranks and, therefore, of men in the file diminished first to ten (1600), then to six (1630), then to three (1700), and finally to two (about 1808 in the British army, 1888 in the German). Denser formations when employed have been formed, not by altering the order of men within the unit, but by placing several units, one closely behind the other ("doubling" and "trebling" the line of battle, as it used to be called). In the 17th century a file formed a small command under the "file leader," the whole of the front rank consisting therefore of old soldiers or non-commissioned officers. This use of the word to express a unit of command gave rise to the old-fashioned term "file firing," to imply a species of fire (equivalent to the modern "independent") in which each man in the file fired in succession after the file leader, and to-day a corporal or sergeant is still ordered to take one or more files under his charge for independent work. In the above it is to be understood that the men are facing to the front or rear. If they are turned to the right or left so that the company now stands two men broad and fifty deep, it is spoken of as being "in file." From this come such phrases as "single file" or "Indian file" (one man leading and the rest following singly behind him).[1] The use of verbs "to file" and "to defile," implying the passage from fighting to marching formation, is to be derived from this rather than from the resemblance of a marching column to a long flexible thread, for in the days when the word was first used the infantry company whether in battle or on the march was a solid rectangle of men, a file often containing even more men than a rank.

FILE-FISH, or TRIGGER-FISH, the names given to fishes of the genus *Balistes* (and *Monacanthus*) inhabiting all tropical and subtropical seas. Their body is compressed and not covered with ordinary scales, but with small juxtaposed scutes. Their other principal characteristics consist in the structure of their first dorsal fin (which consists of three spines) and in their peculiar dentition. The first of the three dorsal spines is very strong, roughened in front like a file, and hollowed out behind to receive the second much smaller spine, which, besides, has a projection in front, at its base, fitting into a notch of the first. Thus these two spines can only be raised or depressed simultaneously, in such a manner that the first cannot be forced down unless the second has been previously depressed. The latter has been compared to a trigger, hence the name of Trigger-fish. Also the generic name *Balistes* and the Italian name of "Pesce balistra" refer to this structure. Both jaws are armed with eight strong incisor-like and sometimes pointed teeth, by which these fishes are enabled, not only to break off pieces of madrepores and other corals on which they feed, but also to chisel a hole into the hard shells of Mollusca, in order to extract the soft parts. In this way, they destroy an immense number of molluscs, and become most injurious to the pearl-fisheries. The gradual failure of those fisheries in Ceylon has been ascribed to this cause, although evidently other agencies must have been at work at the same time. The *Monacanthi* are distinguished from the *Balistes* in having only one dorsal spine and a velvety covering of the skin. Some 30 different species are known of *Balistes* and about 50 of *Monacanthus*. Two species (*B. maculatus* and *capriscus*), common in the Atlantic, sometimes wander to the British coasts.

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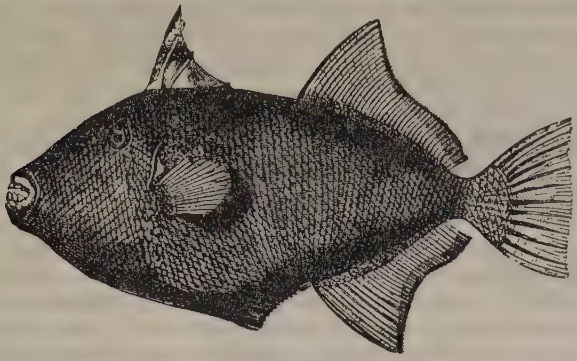
[1] This may also be understood as meaning simply "a single file," but the explanation given above is more probable, as it is essentially a marching and not a fighting formation that is expressed by the phrase.



Balistes vidua.

FILELFO, FRANCESCO (1398–1481), Italian humanist, was born in 1398 at Tolentino, in the March of Ancona. When he appeared upon the scene of human life, Petrarch and the students of Florence had already brought the first act in the recovery of classic culture to conclusion. They had created an eager appetite for the antique, had disinterred many important Roman authors, and had freed Latin scholarship to some extent from the barbarism of the middle ages. Filelfo was destined to carry on their work in the field of Latin literature, and to be an important agent in the still unaccomplished recovery of Greek culture. His earliest studies in grammar, rhetoric and the Latin language were conducted at Padua, where he acquired so great a reputation for learning that in 1417 he was invited to teach eloquence and moral philosophy at Venice. According to the custom of that age in Italy, it now became his duty to explain the language, and to illustrate the beauties of the principal Latin authors, Cicero and Virgil being considered the chief masters of moral science and of elegant diction. Filelfo made his mark at once in Venice. He was admitted to the society of the first scholars and the most eminent nobles of that city; and in 1419 he received an appointment from the state, which enabled him to reside as secretary to the consul-general (*baylo*) of the Venetians in Constantinople. This appointment was not only honourable to Filelfo as a man of trust and general ability, but it also gave him the opportunity of acquiring the most coveted of all possessions at that moment for a scholar—a knowledge of the Greek language. Immediately after his arrival in Constantinople, Filelfo placed himself under the tuition of John Chrysoloras, whose name was already well known in Italy as relative of Manuel, the first Greek to profess the literature of his ancestors in Florence. At the recommendation of Chrysoloras he was employed in several diplomatic missions by the emperor John Palaeologus. Before very long the friendship between Filelfo and his tutor was cemented by the marriage of the former to Theodora, the daughter of John Chrysoloras. He had now acquired a thorough knowledge of the Greek language, and had formed a large collection of Greek manuscripts. There was no reason why he should not return to his native country. Accordingly, in 1427 he accepted an invitation from the republic of Venice, and set sail for Italy, intending to resume his professorial career. From this time forward until the date of his death, Filelfo's history consists of a record of the various towns in which he lectured, the masters whom he served, the books he wrote, the authors he illustrated, the friendships he contracted, and the wars he waged with rival scholars. He was a man of vast physical energy, of inexhaustible mental activity, of quick passions and violent appetites; vain, restless, greedy of gold and pleasure and fame; unable to stay quiet in one place, and perpetually engaged in quarrels with his compeers.

When Filelfo arrived at Venice with his family in 1427, he found that the city had almost been emptied by the plague, and that his scholars would be few. He therefore removed to Bologna; but here also he was met with drawbacks. The city was too much disturbed with political dissensions to attend to him; so Filelfo crossed the Apennines and settled in Florence. At Florence began one of the most brilliant and eventful periods of his life. During the week he lectured to large audiences of young and old on the principal Greek and Latin authors, and on Sundays he explained Dante to the people in the Duomo. In addition to these labours of the chair, he found time to translate portions of Aristotle, Plutarch, Xenophon and Lysias from the Greek. Nor was he dead to the claims of society. At first he seems to have lived with the Florentine scholars on tolerably good terms; but his temper was so arrogant that Cosimo de' Medici's friends were not long able to put up with him. Filelfo hereupon broke out into open and violent animosity; and when Cosimo was exiled by the Albizzi party in 1433, he urged the signoria of Florence to pronounce upon him the sentence of death. On the return of Cosimo to Florence, Filelfo's position in that city was no longer tenable. His life, he asserted, had been already once attempted by a cut-throat in the pay of the Medici; and now he readily accepted an invitation from the state of Siena. In Siena, however, he was not destined to remain more than four years. His fame as a professor had grown great in Italy, and he daily received tempting offers from princes and republics. The most alluring of these, made him by the duke of Milan, Filippo Maria Visconti, he decided on accepting; and in 1440 he was received with honour by his new master in the capital of Lombardy.

Filelfo's life at Milan curiously illustrates the multifarious importance of the scholars of that age in Italy. It was his duty to celebrate his princely patrons in panegyrics and epics, to abuse their enemies in libels and invectives, to salute them with encomiastic odes on their birthdays, and to compose poems on their favourite themes. For their courtiers he wrote epithalamial and funeral orations; ambassadors and visitors from foreign states he greeted with the rhetorical lucubrations then so much in vogue. The students of the university he taught in daily lectures, passing in review the weightiest and lightest authors of antiquity, and pouring forth a flood of miscellaneous erudition. No satisfied with these outlets for his mental energy, Filelfo went on translating from the Greek, and prosecuted a paper warfare with his enemies in Florence. He wrote, moreover, political pamphlets on the great events of Italian history; and when Constantinople was taken by the Turks, he procured the liberation of his wife's mother by a message addressed in his own name to the sultan. In addition to a fixed stipend of some 700 golden florins yearly, he was continually in receipt of special payments for the orations and poems he produced; so that, had he been a man of frugal habits or of moderate economy, he might have amassed a considerable fortune. As it was, he spent his money as fast as he received it, living in a style of splendour ill befitting a simple scholar, and indulging his taste for pleasure in more than questionable amusements. In consequence of this prodigality, he was always poor. His letters and his poems abound in impudent demands for money from patrons, some of them couched in language of the lowest adulation, and others savouring of literary brigandage.

During the second year of his Milanese residence Filelfo lost his first wife, Theodora. He soon married again; and this time he chose for his bride a young lady of good Lombard family, called Orsina Osnaga. When she died he took in wedlock for the third time a woman of Lombard birth, Laura Magiolini. To all his three wives, in spite of numerous infidelities, he seems to have been warmly attached; and this is perhaps the best trait in a character otherwise more remarkable for arrogance and heat than for any amiable qualities.

On the death of Filippo Maria Visconti, Filelfo, after a short hesitation, transferred his allegiance to Francesco Sforza, the new duke of Milan; and in order to curry favour with this parvenu, he began his ponderous epic, the *Sforziad*, of which 12,800 lines were written, but which was never published. When Francesco Sforza died, Filelfo turned his thoughts towards Rome. He was now an old man of seventy-seven years, honoured with the friendship of princes, recognized as the most distinguished of Italian humanists, courted by pontiffs, and decorated with the laurel wreath and the order of knighthood by kings. Crossing the Apennines and passing through Florence, he reached Rome in the second week of 1475. The terrible Sixtus IV. now ruled in the Vatican; and from this pope Filelfo had received an invitation to occupy the chair of rhetoric with good emoluments. At first he was vastly pleased with the city and court of Rome; but his satisfaction ere long turned to discontent, and he gave vent to his ill-humour in a venomous satire on the pope's treasurer, Milliardo Cicala. Sixtus himself soon fell under the ban of his displeasure; and when a year had passed he left Rome never to return. Filelfo reached Milan to find that his wife had died of the plague in his absence, and was already buried. His own death followed speedily. For some time past he had been desirous of displaying his abilities and adding to his fame in Florence. Years had healed the breach between him and the Medicean family; and on the occasion of the Pazzi conspiracy against the life of Lorenzo de' Medici, he had sent violent letters of abuse to his papal patron Sixtus, denouncing his participation in a plot so dangerous to the security of Italy. Lorenzo now invited him to profess Greek at Florence, and thither Filelfo journeyed in 1481. But two weeks after his arrival he succumbed to dysentery, and was buried at the age of eighty-three in the church of the Annunziata.

Filelfo deserves commemoration among the greatest humanists of the Italian Renaissance, not for the beauty of his style, not for the elevation of his genius, not for the accuracy of his learning, but for his energy, and for his complete adaptation to the times in which he lived. His erudition was large but ill-digested; his knowledge of the ancient authors, if extensive, was superficial; his style was vulgar; he had no brilliancy of imagination, no pungency of epigram, no grandeur of rhetoric. Therefore he has left nothing to posterity which the world would not very willingly let die. But in his own days he did excellent service to learning by his untiring activity, and by the facility with which he used his stores of knowledge. It was an age of accumulation and preparation, when the world was still amassing and cataloguing the fragments rescued from the wrecks of Greece and Rome. Men had to receive the very rudiments of culture before they could appreciate its niceties. And in this work of collection and instruction Filelfo excelled, passing rapidly from place to place, stirring up the zeal for learning by the passion of his own enthusiastic temperament, and acting as a pioneer for men like Poliziano and Erasmus.

All that is worth knowing about Filelfo is contained in Carlo de' Rosmini's admirable *Vita di Filelfo* (Milan, 1808); see also W. Roscoe's *Life of Lorenzo de' Medici*, Vespasiano's *Vite di uomini illustri*, and J. A. Symonds's *Renaissance in Italy* (1877).

(J. A. S.)

A complete edition of Filelfo's Greek letters (based on the Codex Trevulzianus) was published for the first time, with French translation, notes and commentaries, by E. Legrand in 1892 at Paris (C. xii. of *Publications de l'école des lang. orient.*). For further references, especially to monographs, &c., on Filelfo's life and work, see Ulysse Chevalier, *Répertoire des sources hist., bio-bibliographie* (Paris, 1905), s. v. *Philelphe, François.*

FILEY, a seaside resort in the Buckrose parliamentary division of the East Riding of Yorkshire, England, 9½ m. S.E. of Scarborough by a branch of the North Eastern railway. Pop. of urban district (1901) 3003. It stands upon the slope and summit of the cliffs above Filey Bay, which is fringed by a fine sandy beach. The northern horn of the bay is formed by Filey Brigg, a narrow and abrupt promontory, continued seaward by dangerous reefs. The coast-line sweeps hence south-eastward to the finer promontory of Flamborough Head, beyond which is the watering-place of Bridlington. The church of St Oswald at Filey is a fine cruciform building with central tower, Transitional Norman and Early English in date. There are pleasant promenades and good golf links, also a small spa which has fallen into disuse. Filey is in favour with visitors who desire a quiet resort without the accompaniment of entertainment common to the larger watering-places. Roman remains have been discovered on the cliff north of the town; the site was probably important, but nothing is certainly known about it.

FILIBUSTER, a name originally given to the buccaneers (*q.v.*). The term is derived most probably from the Dutch *vry buiter*, Ger. *Freibeuter*, Eng. *freebooter*, the word changing first into *fribustier*, and then into Fr. *flibustier*, Span. *filibustero*. *Flibustier* has passed into the French language, and *filibustero* into the Spanish language, as a general name for a pirate. The term "filibuster" was revived in America to designate those adventurers who, after the termination of the war between Mexico and the United States, organized expeditions within the United States to take part in West Indian and Central American revolutions. From this has sprung the modern use of the word to imply one who engages in private, unauthorized and irregular warfare against any state. In the United States it is colloquially applied to legislators who practise obstruction.

FILICAJA, VINCENZO DA (1642–1707), Italian poet, sprung from an ancient and noble family of Florence, was born in that city on the 30th of December 1642. From an incidental notice in one of his letters, stating the amount of house rent paid during his childhood, his parents must have been in easy circumstances, and the supposition is confirmed by the fact that he enjoyed all the advantages of a liberal education, first under the Jesuits of Florence, and then in the university of Pisa.

At Pisa his mind became stored, not only with the results of patient study in various branches of letters, but with the great historical associations linked with the former glory of the Pisan republic, and with one remarkable institution of which Pisa was the seat. To the tourist who now visits Pisa the banners and emblems of the order of St Stephen are mere matter of curiosity, but they had a serious significance two hundred years ago to the young Tuscan, who knew that these naval crusaders formed the main defence of his country and commerce against the Turkish, Algerine and Tunisian corsairs. After a five years' residence in Pisa he returned to Florence, where he married Anna, daughter of the senator and marquis Scipione Capponi, and withdrew to a small villa at Figline, not far from the city. Abjuring the thought of writing amatory poetry in consequence of the premature death of a young lady to whom he had been attached, he occupied himself chiefly with literary pursuits, above all the composition of Italian and Latin poetry. His own literary eminence, the opportunities enjoyed by him as a member of the celebrated Academy Della Crusca for making known his critical taste and classical knowledge, and the social relations within the reach of a noble Florentine so closely allied with the great house of Capponi, sufficiently explain the intimate terms on which he stood with such eminent men of letters as Magalotti, Menzini, Gori and Redi. The last-named, the author of *Bacchus in Tuscany*, was not only one of the most brilliant poets of his time, and a safe literary adviser; he was the court physician, and his court influence was employed with zeal and effect in his friend's favour. Filicaja's rural seclusion was owing even more to his straitened means than to his rural tastes. If he ceased at length to pine in obscurity, the change was owing not merely to the fact that his poetical genius, fired by the deliverance of Vienna from the Turks in 1683, poured forth the right strains at the right time, but also to the influence of Redi, who not only laid Filicaja's verses before his own sovereign, but had them transmitted with the least possible delay to the foreign princes whose noble deeds they sung. The first recompense came, however, not from those princes, but from Christina, the ex-queen of Sweden, who, from her circle of savants and courtiers at Rome, spontaneously and generously announced to Filicaja her wish to bear the expense of educating his two sons, enhancing her kindness by the delicate request that it should remain a secret.

The tide of Filicaja's fortunes now turned. The grand-duke of Tuscany, Cosmo III., conferred on him an important office, the commissionership of official balloting. He was named governor of Volterra in 1696, where he strenuously exerted himself to raise the tone of public morality. Both there and at Pisa, where he was subsequently governor in 1700, his popularity was so great that on his removal the inhabitants of both cities petitioned for his recall. He passed the close of his life at Florence; the grand-duke raised him to the rank of senator, and he died in that city on the 24th of September 1707. He was buried in the family vault in the church of St Peter, and a monument was erected to his memory by his sole surviving son Scipione Filicaja. In the six celebrated odes inspired by the great victory of Sobieski, Filicaja took a lyrical flight which has placed him at moments on a level with the greatest Italian poets. They are, however, unequal, like all his poetry, reflecting in some passages the native vigour of his genius and purest inspirations of his tastes, whilst in others they are deformed by the affectations of the *Seicentisti*. When thoroughly natural and spontaneous—as in the two sonnets "Italia, Italia, o tu cui feo la sorte" and "Dov' è, Italia, il tuo braccio? e a che ti serve;" in the verses "Alla beata Vergine," "Al divino amore;" in the sonnet "Sulla fede nelle disgrazie"—the truth and beauty of thought and language recall the verse of Petrarch.

Besides the poems published in the complete Venice edition of 1762, several other pieces appeared for the first time in the small Florence edition brought out by Barbera in 1864.

FILIGREE (formerly written *filigrain* or *filigrane*; the Ital. *filigrana*, Fr. *filigrane*, Span. *filigrana*, Ger. *Drahtgeflecht*), jewel work of a delicate kind made with twisted threads usually of gold and silver. The word, which is usually derived from the Lat. *filum*, thread, and *granum*, grain, is not found in Ducange, and is indeed of modern origin. According to Prof. Skeat it is derived from the Span. *filigrana*, from "*filar*, to spin, and *grano*, the grain or principal fibre of the material." Though filigree has become a special branch of jewel work in modern times it was anciently part of the ordinary work of the jeweller. Signor A. Castellani states, in his *Memoir on the Jewellery of the Ancients* (1861), that all the jewelry of the Etruscans and Greeks (other than that intended for the grave, and therefore of an unsubstantial character) was made by soldering together and so building up the gold rather than by chiselling or engraving the material.

The art may be said to consist in curling, twisting and plaiting fine pliable threads of metal, and uniting them at their points of contact with each other, and with the ground, by means of gold or silver solder and borax, by the help of the blowpipe. Small grains or beads of the same metals are often set in the eyes of volutes, on the junctions, or at intervals at which they will set off the wire-work effectively. The more delicate work is generally protected by framework of stouter wire. Brooches, crosses, earrings and other personal ornaments of modern filigree are generally surrounded and subdivided by bands of square or flat metal, giving consistency to the filling up, which would not otherwise keep its proper shape. Some writers of repute have laid equal stress on the *filum* and the *granum*, and have extended the use of the term filigree to include the granulated work of the ancients, even where the twisted wire-work is entirely wanting. Such a wide application of the term is not approved by current usage, according to which the presence of the twisted threads is the predominant fact.

The Egyptian jewellers employed wire, both to lay down on a background and to plait or otherwise arrange *à jour*. But, with the exception of chains, it cannot be said that filigree work was much practised by them. Their strength lay rather in their cloisonné work and their moulded ornaments. Many examples, however, remain of round plaited gold chains of fine wire, such as are still made by the filigree workers of India, and known as Trichinopoly chains. From some of these are hung smaller chains of finer wire with minute fishes and other pendants fastened to them. In ornaments derived from Phoenician sites, such as Cyprus and Sardinia, patterns of gold wire are laid down with great delicacy on a gold ground, but the art was advanced to its highest perfection in the Greek and Etruscan filigree of the 6th to the 3rd centuries B.C. A number of earrings and other personal ornaments found in central Italy are preserved in the Louvre and in the British Museum. Almost all of them are made of filigree work. Some earrings are in the form of flowers of geometric design, bordered by one or more rims each made up of minute volutes of gold wire, and this kind of ornament is varied by slight differences in the way of disposing the number or arrangement of the volutes. But the feathers and petals of modern Italian filigree are not seen in these ancient designs. Instances occur, but only rarely, in which filigree devices in wire are self-supporting and not applied to metal plates. The museum of the Hermitage at St Petersburg contains an amazingly rich collection of jewelry from the tombs of the Crimea. Many bracelets and necklaces in that collection are made of twisted wire, some in as many as seven rows of plaiting, with clasps in the shape of heads of animals of beaten work. Others are strings of large beads of gold, decorated with volutes, knots and other patterns of wire soldered over the surfaces. (See the *Antiquités du Bosphore Cimmérien*, by Gille, 1854; reissued by S. Reinach, 1892, in which will be found careful engravings of these objects.) In the British Museum a sceptre, probably that of a Greek priestess, is covered with plaited and netted gold wire, finished with a sort of Corinthian capital and a boss of green glass.

It is probable that in India and various parts of central Asia filigree has been worked from the most remote period without any change in the designs. Whether the Asiatic jewellers were influenced by the Greeks settled on that continent, or merely trained under traditions held in common with them, it is certain that the Indian filigree workers retain the same patterns as those of the ancient Greeks, and work them in the same way, down to the present day. Wandering workmen are given so much gold, coined or rough, which is weighed, heated in a pan of charcoal, beaten into wire, and then worked in the courtyard or verandah of the employer's house according to the designs of the artist, who weighs the complete work on restoring it and is paid at a specified rate for his labour. Very fine grains or beads and spines of gold, scarcely thicker than coarse hair, projecting from plates of gold are methods of ornamentation still used.

Passing to later times we may notice in many collections of medieval jewel work (such as that in the South Kensington Museum) reliquaries, covers for the gospels, &c., made either in Constantinople from the 6th to the 12th centuries, or in monasteries in Europe, in which Byzantine goldsmiths' work was studied and imitated. These objects, besides being enriched with precious stones, polished, but not cut into facets, and with enamel, are often decorated with filigree. Large surfaces of gold are sometimes covered with scrolls of filigree soldered on; and corner pieces of the borders of book covers, or the panels of reliquaries, are not unfrequently made up of complicated pieces of plaited work alternating with spaces encrusted with enamel. Byzantine filigree work occasionally has small stones set amongst the curves or knots. Examples of such decoration can be seen in the South Kensington and British Museums.

In the north of Europe the Saxons, Britons and Celts were from an early period skilful in several kinds of goldsmiths' work. Admirable examples of filigree patterns laid down in wire on gold, from Anglo-Saxon tombs, may be seen in the British Museum—notably a brooch from Dover, and a sword-hilt from Cumberland.

The Irish filigree work is more thoughtful in design and more varied in pattern than that of any period or country that could be named. Its highest perfection must be placed in the 10th and 11th centuries. The Royal Irish Academy in Dublin contains a number of reliquaries and personal jewels, of which filigree is the general and most remarkable ornament. The "Tara" brooch has been copied and imitated, and the shape and decoration of it are well known. Instead of fine curls or volutes of gold thread, the Irish filigree is varied by numerous designs in which one thread can be traced through curious knots and complications, which, disposed over large surfaces, balance one another, but always with special varieties and arrangements difficult to trace with the eye. The long thread appears and disappears without breach of continuity, the two ends generally worked into the head and the tail of a serpent or a monster. The reliquary containing the "Bell of St Patrick" is covered with knotted work in many varieties. A two-handled chalice, called the "Ardagh cup," found near Limerick in 1868, is ornamented with work of this kind of extraordinary fineness. Twelve plaques on a band round the body of the vase, plaques on each handle and round the foot of the vase have a series of different designs of characteristic patterns, in fine filigree wire work wrought on the front of the repoussé ground. (See a paper by the 3rd earl of Dunraven in *Transactions of Royal Irish Academy*, xxiv. pt. iii. 1873.)

Much of the medieval jewel work all over Europe down to the 15th century, on reliquaries, crosses, croziers and other ecclesiastical goldsmiths' work, is set off with bosses and borders of filigree. Filigree work in silver was practised by the Moors of Spain during the middle ages with great skill, and was introduced by them and established all over the Peninsula, whence it was carried to the Spanish colonies in America. The Spanish filigree work of the 17th and 18th centuries is of extraordinary complexity (examples in the Victoria and Albert Museum), and silver filigree jewelry of delicate and artistic design is still made in considerable quantities throughout the country. The manufacture spread over the Balearic Islands, and among the populations that border the Mediterranean. It is still made all over Italy, and in Malta, Albania, the Ionian Islands and many other parts of Greece. That of the Greeks is sometimes on a large scale, with several thicknesses of wires alternating with larger and smaller bosses and beads, sometimes set with turquoises, &c., and mounted on convex plates, making rich ornamental headpieces, belts and breast ornaments. Filigree silver buttons of wire-work and small bosses are worn by the peasants in most of the countries that produce this kind of jewelry. Silver filigree brooches and buttons are also made in Denmark, Norway and Sweden. Little chains and pendants are added to much of this northern work.

Some very curious filigree work was brought from Abyssinia after the capture of Magdala—arm-guards, slippers, cups, &c., some of which are now in the South Kensington Museum. They are made of thin plates of silver, over which the wire-work is soldered. The filigree is subdivided by narrow borders of simple pattern, and the intervening spaces are made up of many patterns, some with grains set at intervals.

A few words must be added as to the granulated work which, as stated above, some writers have classed under the term of filigree, although the twisted wires may be altogether wanting. Such decoration consists of minute globules of gold, soldered to form patterns on a metal surface. Its use is rare in Egypt. (See J. de Morgan, *Fouilles à Dahchour*, 1894–1895, pl. xii.) It occurs in Cyprus at an early period, as for instance on a gold pendant in the British Museum from Enkomi in Cyprus (10th century B.C.). The pendant is in the form of a pomegranate, and has upon it a pattern of triangles, formed by more than 3000 minute globules separately soldered on. It also occurs on ornaments of the 7th century B.C. from Camirus in Rhodes. But these globules are large, compared with those which are found on Etruscan jewelry. Signor Castellani, who had made the antique jewelry of the Etruscans and Greeks his special study, with the intention of reproducing the ancient models, found it for a long time impossible to revive this particular process of delicate soldering. He overcame the difficulty at last, by the discovery of a traditional school of craftsmen at St Angelo in Vado, by whose help his well-known reproductions were executed.

For examples of antique work the student should examine the gold ornament rooms of the British Museum, the Louvre and the collection in the Victoria and Albert Museum. The last contains a large and very varied assortment of modern Italian, Spanish, Greek and other jewelry made for the peasants of various countries. It also possesses interesting examples of the modern work in granulated gold by Castellani and Giuliano. The Celtic work is well represented in the Royal Irish Academy in Dublin.

FILLAN, SAINT, or FAELAN, the name of the two Scottish saints, of Irish origin, whose lives are of a purely legendary character The St Fillan whose feast is kept on the 20th of June had churches dedicated to his honour at Ballyheyland, Queen's county, Ireland, and at Loch Earn, Perthshire. The other, who is commemorated on the 9th of January, was specially venerated at Cluain Mavscua, Co. Westmeath, Ireland, and so early as the 8th or 9th century at Strathfillan, Perthshire, Scotland, where there was an ancient monastery dedicated to him, which, like most of the religious houses of early times, was afterwards secularized. The lay-abbot, who was its superior in the reign of William the Lion, held high rank in the Scottish kingdom. This monastery was restored in the reign of Robert Bruce, and became a cell of the abbey of canons regular at Inchaffray. The new foundation received a grant from King Robert, in gratitude for the aid which he was supposed to have obtained from a relic of the saint on the eve of the great victory of Bannockburn. Another relic was the saint's staff or crozier, which became known as the coygerach or quigrich, and was long in the possession of a family of the name of Jore or Dewar, who were its hereditary guardians. They certainly had it in their custody in the year 1428, and their right was formally recognized by King James III. in 1487. The head of the crozier, which is of silver-gilt with a smaller crozier of bronze inclosed within it, is now deposited in the National Museum of the Society of Antiquaries of Scotland.

The legend of the second of these saints is given in the Bollandist *Acta SS.* (1643), 9th of January, i. 594-595; A. P. Forbes, *Kalendars of Scottish Saints* (Edinburgh, 1872), pp. 341-346; D. O'Hanlon's, *Lives of Irish Saints* (Dublin), n.d. pp. 134-144. See also *Historical Notices of St Fillan's Crozier*, by Dr John Stuart (Aberdeen, 1877).

FILLET (through Fr. *filet*, from the med. Lat. *filettum*, diminutive of *filum*, a thread), a band or ribbon used for tying the hair, the Lat. *vitta*, which was used as a sacrificial emblem, and also worn by vestal virgins, brides and poets. The word is thus applied to anything in the shape of a band or strip, as, in coining, to the metal ribbon from which the blanks are punched. In architecture, a "fillet" is a narrow flat band, sometimes called a "listel," which is used to separate mouldings one from the other, or to terminate a suite of mouldings as at the top of a cornice. In the fluted column of the Ionic and Corinthian Orders the fillet is employed between the flutes. It is a very important feature in Gothic work, being frequently worked on large mouldings; when placed on the front and sides of the moulding of a rib it has been termed the "keel and wings" of the rib.

In cooking, "fillet" is used of the "undercut" of a sirloin of beef, or of a thick slice of fish or meat; more particularly of a boned and rolled piece of veal or other meat, tied by a "fillet" or string.

FILLMORE, MILLARD (1800–1874), thirteenth president of the United States of America, came of a family of English stock, which had early settled in New England. His father, Nathaniel, in 1795, made a clearing within the limits of what is now the town of Summerhill, Cayuga county, New York, and there Millard Fillmore was born, on the 7th of February 1800. Until he was fifteen he could have acquired only the simplest rudiments of education, and those chiefly from his parents. At that age he was apprenticed to a fuller and clothier, to card wool, and to dye and dress the cloth. Two years before the close of his term, with a promissory note for thirty dollars, he bought the remainder of his time from his master, and at the age of nineteen began to study law. In 1820 he made his way to Buffalo, then only a village, and supported himself by teaching school and aiding the postmaster while continuing his studies.

In 1823 he was admitted to the bar, and began practice at Aurora, New York, to which place his father had removed. Hard study, temperance and integrity gave him a good reputation and moderate success, and in 1827 he was made an attorney and, in 1829, counsellor of the supreme court of the state. Returning to Buffalo in 1830 he formed, in 1832, a partnership with Nathan K. Hall (1810–1874), later a member of Congress and postmaster-general in his cabinet. Solomon G. Haven (1810–1861), member of Congress from 1851 to 1857, joined them in 1836. The firm met with great success. From 1829 to 1832 Fillmore served in the state assembly, and, in the single term of 1833–1835, in the national House of Representatives, coming in as anti-Jackson, or in opposition to the administration. From 1837 to 1843, when he declined further service, he again represented his district in the House, this time as a member of the Whig party. In Congress he opposed the annexation of Texas as slave territory, was an advocate of internal improvements and a protective tariff, supported J. Q. Adams in maintaining the right of offering anti-slavery petitions, advocated the prohibition by Congress of the slave trade between the states, and favoured the exclusion of slavery from the District of Columbia. His speech and tone, however, were moderate on these exciting subjects, and he claimed the right to stand free of pledges, and to adjust his opinions and his course by the development of circumstances. The Whigs having the ascendancy in the Twenty-Seventh Congress, he was made chairman of the House Committee of Ways and Means. Against a strong opposition he carried an appropriation of $30,000 to Morse's telegraph, and reported from his committee the Tariff Bill of 1842. In 1844 he was the Whig candidate for the governorship of New York, but was defeated. In November 1847 he was elected comptroller of the state of New York, and in 1848 he was elected vice-president of the United States on the ticket with Zachary Taylor as president. Fillmore presided over the senate during the exciting debates on the "Compromise Measures of 1850."

President Taylor died on the 9th of July 1850, and on the next day Fillmore took the oath of office as his successor. The cabinet which he called around him contained Daniel Webster, Thomas Corwin and John J. Crittenden. On the death of Webster in 1852, Edward Everett became secretary of state. Unlike Taylor, Fillmore favoured the "Compromise Measures," and his signing one of them, the Fugitive Slave Law, in spite of the vigorous protests of anti-slavery men, lost him much of his popularity in the North. Few of his opponents, however, questioned his own full persuasion that the Compromise Measures were vitally necessary to pacify the nation. In 1851 he interposed promptly but ineffectively in thwarting the projects of the "filibusters," under Narciso Lopez for the invasion of Cuba. Commodore Matthew Calbraith Perry's expedition, which opened up diplomatic relations with Japan, and the exploration of the valley of the Amazon by Lieutenants William L. Herndon (1813–1857) and Lardner Gibbon also occurred during his term. In the autumn of 1852 he was an unsuccessful candidate for nomination for the presidency by the Whig National Convention, and he went out of office on the 4th of March 1853. In February 1856, while he was travelling abroad, he was nominated for the presidency by the American or Know Nothing party, and later this nomination was also accepted by the Whigs; but in the ensuing presidential election, the last in which the Know Nothings and the Whigs as such took any part, he received the electoral votes of only one state, Maryland. Thereafter he took no public share in political affairs. Fillmore was twice married: in 1826 to Abigail Powers (who died in 1853, leaving him with a son and daughter), and in 1858 to Mrs. Caroline C. McIntosh. He died at Buffalo on the 8th of March 1874.

In 1907 the Buffalo Historical Society, of which Fillmore was one of the founders and the first president, published the *Millard Fillmore Papers* (2 vols., vol. x. and xi. of the Society's publications; edited by F. H. Severance), containing miscellaneous writings and speeches, and official and private correspondence. Most of his correspondence, however, was destroyed in pursuance of a direction in his son's will.

FILMER, SIR ROBERT (d. 1653), English political writer, was the son of Sir Edward Filmer of East Sutton in Kent. He studied at Trinity College, Cambridge, where he matriculated in 1604. Knighted by Charles I. at the beginning of his reign, he was an ardent supporter of the king's cause, and his house is said to have been plundered by the parliamentarians ten times. He died on the 26th of May 1653.

Filmer was already a middle-aged man when the great controversy between the king and the Commons roused him into literary activity. His writings afford an exceedingly curious example of the doctrines held by the most extreme section of the Divine Right party. Filmer's theory is founded upon the statement that the government of a family by the father is the true original and model of all government. In the beginning of the world God gave authority to Adam, who had complete control over his descendants, even as to life and death. From Adam this authority was inherited by Noah; and Filmer quotes as not unlikely the tradition that Noah sailed up the Mediterranean and allotted the three continents of the Old World to the rule of his three sons. From Shem, Ham and Japheth the patriarchs inherited the absolute power which they exercised over their families and servants; and from the patriarchs all kings and governors (whether a single monarch or a governing assembly) derive their authority, which is therefore absolute, and founded upon divine right. The difficulty that a man "by the secret will of God may unjustly" attain to power which he has not inherited appeared to Filmer in no way to alter the nature of the power so obtained, for "there is, and always shall be continued to the end of the world, a natural right of a supreme father over every multitude." The king is perfectly free from all human control. He cannot be bound by the acts of his predecessors, for which he is not responsible; nor by his own, for "impossible it is in nature that a man should give a law unto himself"—a law must be imposed by another than the person bound by it. With regard to the English constitution, he asserted, in his *Freeholder's Grand Inquest touching our Sovereign Lord the King and his Parliament* (1648), that the Lords only give counsel to the king, the Commons only "perform and consent to the ordinances of parliament," and the king alone is the maker of laws, which proceed purely from his will. It is monstrous that the people should judge or depose their king, for they would then be judges in their own cause.

The most complete expression of Filmer's opinions is given in the *Patriarcha*, which was published in 1680, many years after his death. His position, however, was sufficiently indicated by the works which he published during his lifetime: the *Anarchy of a Limited and Mixed Monarchy* (1648), an attack upon a treatise on monarchy by Philip Hunton (1604?–1682), who maintained that the king's prerogative is not superior to the authority of the houses of parliament; the pamphlet entitled *The Power of Kings, and in particular of the King of England* (1648), first published in 1680; and his *Observations upon Mr Hobbes's Leviathan, Mr Milton against Salmasius, and H. Grotius De jure belli et pacis, concerning the Originall of Government* (1652). Filmer's theory, owing to the circumstances of the time, obtained a recognition which it is now difficult to understand. Nine years after the publication of the *Patriarcha*, at the time of the Revolution which banished the Stuarts from the throne, Locke singled out Filmer as the most remarkable of the advocates of Divine Right, and thought it worth while to attack him expressly in the first part of the *Treatise on Government*, going into all his arguments *seriatim*, and especially pointing out that even if the first steps of his argument be granted, the rights of the eldest born have been so often set aside that modern kings can claim no such inheritance of authority as he asserted.

FILMY FERNS, a general name for a group of ferns with delicate much-divided leaves and often moss-like growth, belonging to the genera *Hymenophyllum*, *Todea* and *Trichomanes*. They require to be kept in close cases in a cool fernery, and the stones and moss amongst which they are grown must be kept continually moist so that the evaporated water condenses on the very numerous divisions of the leaves.

FILON, PIERRE MARIE AUGUSTIN (1841–   ), French man of letters, son of the historian Charles Auguste Désiré Filon (1800–1875), was born in Paris in 1841. His father became professor of history at Douai, and eventually "*inspecteur d'académie*" in Paris; his principal works were *Histoire comparée* *de France et de l'Angleterre* (1832), *Histoire de l'Europe au XVI^e^ siècle* (1838), *La Diplomatie française sous Louis XV* (1843), *Histoire de l'Italie méridionale* (1849), *Histoire du sénat romain* (1850), *Histoire de la démocratie athénienne* (1854). Educated at the École normale, Augustin Filon was appointed tutor to the prince imperial and accompanied him to England, where he remained for some years. He is the author of *Guy Patin, sa vie, sa correspondance* (1862); *Nos grands-pères* (1887); *Prosper Mérimée* (1894); *Sous la tyrannie* (1900). On English subjects he has written chiefly under the pseudonym of Pierre Sandrié, *Les Mariages de Londres* (1875); *Histoire de la littérature anglaise* (1883); *Le Théâtre anglais* (1896), and *La Caricature en Angleterre* (1902).

FILOSA (A. Lang), one of the two divisions of Rhizopoda, characterized by protoplasm granular at the surface, and fine pseudopodia branching and usually acutely pointed at the tips.

FILTER (a word common in various forms to most European languages, adapted from the medieval Lat. *filtrum*, felt, a material used as a filtering agent), an arrangement for separating solid matter from liquids. In some cases the operation of filtration is performed for the sake of removing impurities from the filtrate or liquid filtered, as in the purification of water for drinking purposes; in others the aim is to recover and collect the solid matter, as when the chemist filters off a precipitate from the liquid in which it is suspended.

In regard to the purification of water, filtration was long looked upon as merely a mechanical process of straining out the solid particles, whereby a turbid water could be rendered clear. In the course of time it was noticed that certain materials, such as charcoal, had the power to some extent also of softening hard water and of removing organic matter, and at the beginning of the 19th century charcoal, both animal and vegetable, came into use for filtering purposes. Porous carbon blocks, made by strongly heating a mixture of powdered charcoal with oil, resin, &c., were introduced about a generation later, and subsequently various preparations of iron (spongy iron, magnetic oxide) found favour. Innumerable forms of filters made with these and other materials were put on the market, and were extolled as removing impurities of every kind from water, and as affording complete protection against the communication of disease. But whatever merits they had as clarifiers of turbid water, the advent of bacteriology, and the recognition of the fact that the bacteria of certain diseases may be water-borne, introduced a new criterion of effectiveness, and it was perceived that the removal of solid particles, or even of organic impurities (which were realized to be important not so much because they are dangerous to health *per se* as because their presence affords grounds for suspecting that the water in which they occur has been exposed to circumstances permitting contamination with infective disease), was not sufficient; the filter must also prevent the passage of pathogenic organisms, and so render the water sterile bacteriologically. Examined from this point of view the majority of domestic filters were found to be gravely defective, and even to be worse than useless, since unless they were frequently and thoroughly cleansed, they were liable to become favourable breeding-places for microbes. The first filter which was more or less completely impermeable to bacteria was the Pasteur-Chamberland, which was devised in Pasteur's laboratory, and is made of dense biscuit porcelain. The filtering medium in this, as in other filters of the same kind, takes the form of a hollow cylinder or "candle," through the walls of which the water has to pass from the outside to the inside, the candles often being arranged so that they may be directly attached to a tap, whereby the rate of flow, which is apt to be slow, is accelerated by the pressure of the main. But even filters of this type, if they are to be fully relied upon, must be frequently cleaned and sterilized, and great care must be taken that the joints and connexions are watertight, and that the candles are without cracks or flaws. In cases where the water supply is known to be infected, or even where it is merely doubtful, it is wise to have recourse to sterilization by boiling, rather than trust to any filter. Various machines have been constructed to perform this operation, some of them specially designed for the use of troops in the field; those in which economy of fuel is studied have an exchange-heater, by means of which the incoming cold water receives heat from the outgoing hot water, which thus arrives at the point of outflow at a temperature nearly as low as that of the supply. Chemical methods of sterilization have also been suggested, depending on the use of iodine, chlorine, bromine, ozone, potassium permanganate, copper sulphate or chloride and other substances. For the sand-filtration of water on a large scale, in which the presence of a surface film containing zooglaea of bacteria is an essential feature, see Water Supply.

Filtration in the chemical laboratory is commonly effected by the aid of a special kind of unsized paper, which in the more expensive varieties is practically pure cellulose, impurities like feric oxide, alumina, lime, magnesia and silica having been removed by treatment with hydrochloric and hydrofluoric acids. A circular piece of this paper is folded twice upon itself so as to form a quadrant, one of the folds is pulled out, and the cone thus obtained is supported in a glass or porcelain funnel having an apical angle of 60°. The liquid to be filtered is poured into the cone, preferably down a glass rod upon the sides of the funnel to prevent splashing and to preserve the apex of the filter-paper, and passes through the paper, upon which the solid matter is retained. In the case of liquids containing strong acids or alkalis, which the paper cannot withstand, a plug of carefully purified asbestos or glass-wool (spun glass) is often employed, contained in a bulb blown as an enlargement on a narrow "filter-tube." To accelerate the rate of filtration various devices are resorted to, such as lengthening the tube below the filtering material, increasing the pressure on the liquid being filtered, or decreasing it in the receiver of the filtrate. R. W. Bunsen may be regarded as the originator of the second method, and it was he who devised the small cone of platinum foil, sometimes replaced by a cone of parchment perforated with pinholes, arranged at the apex of the funnel to serve as a support for the paper, which is apt to burst under the pressure differences. In the so-called "Buchner funnel," the filtering vessel is cylindrical, and the paper receives support by being laid upon its flat perforated bottom. In filtering into a vacuum the flask receiving the filtrate should be connected to the exhaust through a second flask. The suction may be derived from any form of air-pump; a form often employed where water at fair pressure is available is the jet-pump, which in consequence is known as a filter-pump. Another method of filtering into a vacuum is to immerse a porous jar ("Pukall cell") in the liquid to be filtered, and attach a suction-pipe to its interior. A filtering arrangement devised by F. C. Gooch, which has come into common use in quantitative analysis where the solid matter has to be submitted to heating or ignition, consists of a crucible having a perforated bottom. By means of a piece of stretched rubber tubing, this crucible is supported in the mouth of an ordinary funnel which is connected with an exhausting apparatus; and water holding in suspension fine scrapings of asbestos, purified by boiling with strong hydrochloric acid and washing with water, is run through it, so that the perforated bottom is covered with a layer of felted asbestos. The crucible is then removed from the rubber support, weighed and replaced; the liquid is filtered through in the ordinary way; and the crucible with its contents is again removed, dried, ignited and weighed. A perforated cone, similarly coated with asbestos and fitted into a conical funnel, is sometimes employed.

In many processes of chemical technology filtration plays an important part. A crude method consists of straining the liquid through cotton or other cloth, either stretched on wooden frames or formed into long narrow bags ("bag-filters"). Occasionally filtration into a vacuum is practised, but more often, as in filter-presses, the liquid is forced under pressure, either hydrostatic or obtained from a force-pump or compressed air, into a series of chambers partitioned off by cloth, which arrests the solids, but permits the passage of the liquid portions. For separating liquids from solids of a fibrous or crystalline character "hydro-extractors" or "centrifugals" are frequently employed. The material is placed in a perforated cage or "basket," which is enclosed in an outer casing, and when the cage is rapidly rotated by suitable gearing, the liquid portions are forced out into the external casing.

FIMBRIA, GAIUS FLAVIUS (d. 84 B.C.), Roman soldier and a violent partisan of Marius. He was sent to Asia in 86 B.C. as legate to L. Valerius Flaccus, but quarrelled with him and was dismissed. Taking advantage of the absence of Flaccus at Chalcedon and the discontent aroused by his avarice and severity, Fimbria stirred up a revolt and slew Flaccus at Nicomedia. He then assumed the command of the army and obtained several successes against Mithradates, whom he shut up in Pitane on the coast of Aeolis, and would undoubtedly have captured him had Lucullus co-operated with the fleet. Fimbria treated most cruelly all the people of Asia who had revolted from Rome or sided with Sulla. Having gained admission to Ilium by declaring that, as a Roman, he was friendly, he massacred the inhabitants and burnt the place to the ground. But in 84 Sulla crossed over from Greece to Asia, made peace with Mithradates, and turned his arms against Fimbria, who, seeing that there was no chance of escape, committed suicide. His troops were made to serve in Asia till the end of the third Mithradatic War.

See ROME: *History*; and arts. on SULLA and MARIUS.

FIMBRIATE (from Lat. *fimbriae*, fringe), a zoological and botanical term, meaning fringed. In heraldry, "fimbriate" or "fimbriated" refers to a narrow edge or border running round a bearing.

FINALE (Ital. for "end"), a term in music for the concluding movement in an instrumental composition, whether symphony, concerto or sonata, and, in dramatic music, the concerted piece which ends each act. Of instrumental finales, the great choral finale to Beethoven's 9th symphony, and of operatic finales, that of Mozart's *Nozze di Figaro*, to the second act, and to the last act of Verdi's *Falstaff* may be mentioned. In the Wagnerian opera the finale has no place.

FINANCE. The term "finance," which comes into English through French, in its original meaning denoted a payment (*finatio*). In the later middle ages, especially in Germany, it acquired the sense of usurious or oppressive dealing with money and capital. The specialized use of the word as equivalent to the management of the public expenditure and receipts first became prominent in France during the 16th century and quickly spread to other countries. The plural form (*Les Finances*) was particularly reserved for this application, while the singular came to denote business activity in respect to monetary dealings (as in the expression *la haute finance*). For the Germans the phrase "science of finance" (*Finanzwissenschaft*) refers exclusively to the economy of the state. English and American writers are less definite in their employment of the term, which varies with the convenience of the author.

A work on "finance" may deal with the Money Market or the Stock Exchange; it may treat of banking and credit organization, or it may be devoted to state revenue and expenditure, which is on the whole the prevailing sense. The expressions "science of finance" and "public finance" have been suggested as suitable to delimit the last mentioned application. At all events, the broad sense is quite intelligible. "Financial" means what is concerned with business, and the idea of a balance between effort and return is also prominent. In the present article attention will be directed to "public finance"; for the other aspects of the subject reference may be made (*inter alia*) to the following:—BANKS AND BANKING; COMPANY; EXCHANGE; MARKET; STOCK EXCHANGE. See also ENGLISH FINANCE, and the sections on finance under headings of countries.

Finance, regarded as state house-keeping, or "political economy" (see ECONOMICS) in the older sense of the term, deals with (1) the expenditure of the state; (2) state revenues; (3) the balance between expenditure and receipts; (4) the organization which collects and applies the public funds. Each of these large divisions presents a series of problems of which the practical treatment is illustrated in the financial history of the great nations of the world. Thus the amount and character of public expenditure necessarily depends on the functions that the state undertakes to perform—national defence, the maintenance of internal order, and the efficient equipment of the state organization; such are the tasks that all governments have to discharge, and for their cost due provision has to be made. The widening sphere of state activity, so marked a characteristic of modern civilization, involves outlay for what may be best described as "developmental" services. Education, relief of distress, regulation of labour and trade, are duties now in great part performed by public agencies, and their increasing prominence involves augmented expense. The first problem on this side of expenditure is the due balancing of outlay by income. The financier has to "cover" his outlay. There is, further, the duty of establishing a proper proportion between the several forms of expenditure. Not only has there to be a strict control over the total national expense; supervision has to be carried into each department of the state. No one branch of public activity is entitled to make unlimited calls on the state's revenue. The claims of the "expert" require to be carefully scrutinized. The great financiers have made their reputation quite as much by rigorous control over extravagance in expenditure as by dexterity in devising new forms of revenue. Unfortunately they have not been able to reduce their methods to rule. As yet no more definite principle has been discovered than the somewhat obvious one of measuring the proposed items of outlay (1) against each other, (2) against the sacrifice that additional taxation involves. Of almost equal importance is the rule that the utmost return is to be obtained for the given outlay. The canon of *economy* is as fundamental in regard to public expenditure as it will appear, later, to be in respect to revenue. Just application of the outlay of the state, so that no class receives undue advantage, and the use of public funds for "reproductive," in preference to "unproductive" objects, are evident general principles whose difficulty lies in their application to the circumstances of each particular case.

Far greater progress has been made in the formulation of general canons as to the nature, growth and treatment of the public revenues. Historically, there is, first, the tendency towards increase in state income to balance the advance in outlay. A second general feature is the relative decline of the receipts from state property and industries in contrast to the expansion of taxation. Regarded as an organized system, the body of receipts has to be made conformable to certain general conditions. Thus there should be revenue sufficient to meet the public requirements. Otherwise the financial organization has failed in one of its essential purposes. In order continuously to attain this end, the revenue must be flexible, or, as is often said, elastic enough to vary in response to pressure. Frequently recurring deficits are, in themselves, a condemnation of the methods under which they are found. Again, the rule of "economy" in raising revenue, or, in other words, taking as little as possible from the contributors over and above what the state receives, holds good for the whole and for each part of public revenue. In like manner the principle of formal justice has the same claim in respect to revenue as to expenditure. No class of person should bear more than his or its proper share. In fact the special maxims usually placed under the head of taxation have really a wider scope as governing the whole financial system. The recognition of even the most elementary rules has been a very slow process, as the course of financial history abundantly proves. Until the 18th century no scientific treatment of financial problems was attained, though there had been great advances on the administrative side.

A brief description of the historical evolution of the earlier financial forms will be the most effective illustration of this statement. The theory of well-organized public finance is also discussed under TAXATION and NATIONAL DEBT.

The earliest forms of public revenue are those obtained from the property of the chief or ruler. Land, cattle and slaves are the principal kinds of wealth, and they are all constituents of the king's revenue; enforced work contributed by members of the community, and the furnishing commodities on requisition, further aid in the maintenance of the primitive state. Financial organization makes its earliest appearance in the great Eastern monarchies, in which tribute was regularly collected and the oldest and most general form of taxation—that levied on the produce of land—was established. In its normal shape this impost consisted in a given proportion of the yield, or of certain portions of the yield, of the soil; one-fourth as in India, one-fifth as in Egypt, or two separate levies of a tenth as in Palestine, are examples of what may from the last instance be called the "tithe" system. Dues of various kinds were gradually added to the land revenue, until, as in the later Egyptian monarchy, the forms of revenue reached a bewildering complexity. But no Eastern state advanced beyond the condition generally characterized as the "patrimonial," *i.e.* an organization on the model of the household. The part played by money economy was small, and it is noticeable that the revenues were collected by the monarch's servants, the farming out of taxes being completely unknown. Tribute, however, was paid by subject communities as a whole, and was collected by them for transmission to the conquerors.

Ancient Greek.

A much higher stage was reached in the financial methods of the Greek states, or more correctly speaking of Athens, the best-known specimen of the class. Instead of the comparatively simple expedients of the barbarian monarchies, as indicated above, the Athenian city state by degrees developed a rather complex revenue system. Some of the older forms are retained. The city owned public land which was let on lease and the rents were farmed out by auction. A specially valuable property of Athens was the possession of the silver mines at Laurium, which were worked on lease by slave labour. The produce, at first distributed amongst the citizens, was later a part of the state income, and forms the subject of some of the suggestions respecting the revenue in the treatise formerly ascribed to Xenophon. The reverence that attached to the precious metals caused undue exaltation of the services rendered by this property.

One of the characteristics of the ancient state was its extensive control over the persons and property of its citizens. In respect to finance this authority was strikingly manifested in the burdens imposed on wealthy citizens by the requirements of the "liturgies" (λειτουργίαι), which consisted in the provision of a chorus for theatrical performances, or defraying the expenses of the public games, or, finally, the equipment of a ship, "the trierarchy," which was economically and politically the most important. Athenian statesmanship in the time of Demosthenes was gravely exercised to make this form of contribution more effective. The grouping into classes and the privilege of exchanging property, granted to the contributor against any one whom he believed entitled to take his place, are marks of the defective economic and financial organization of the age.

Amongst taxes strictly so called were the market dues or tolls, which in some cases approximated to excise duties, though in their actual mode of levy they were closely similar to the *octrois* of modern times. Of greater importance were the customs duties on imports and exports. These at the great period of Athenian history were only 2%. The prohibition of export of corn was an economic rather than a financial provision. In the treatment of her subject allies Athens was more rigorous, general import and export duties of 5% being imposed on their trade. The high cost of carriage, and the need of encouraging commerce in a community relying on external sources for its food supply, help to explain the comparatively low rates adopted. Neither as financial nor as protective expedients were the custom duties of classical societies of much importance.

Direct taxation received much greater expansion. A special levy on the class of resident aliens (μετοίκιον), probably paralleled by a duty on slaves, was in force. A far more important source of revenue was the general tax on property (εἰσφορά), which according to one view existed as early as the time of Solon, who made it a part of his constitutional system. Modern inquiry, however, tends towards the conclusion that it was under the stress of the Peloponnesian War that this impost was introduced (428 B.C.). At first it was only levied at irregular intervals; afterwards, in 378 B.C., it became a permanent tax based on elaborate valuation under which the richer members paid on a larger quota of their capital; in the case of the wealthiest class the taxable quota was taken as one-fifth, smaller fractions being adopted for those belonging to the other divisions. The assessment (τίμημα) included all the property of the contributor, whose accuracy in making full returns was safeguarded by the right given to other citizens to proceed against him for fraudulent under-valuation. A further support was provided in the reform of 378 B.C. by the establishment of the symmories, or groups of tax-paying citizens; the wealthier members of each group being responsible for the tax payments of all the members.

The scanty and obscure references to finance, and to economic matters generally, in classical literature do not elucidate all the details of the system; but the analogies of other countries, *e.g.* the mode of levying the *taille* in 18th century France and the "tenth and fifteenth" in medieval England, make it tolerably plain that in the 4th century B.C. the Athenian state had developed a mode of taxation on property which raised those questions of just distribution and effective valuation that present themselves in the latest tax systems of the modern world. Taken together with the liturgies, the "eisphora" placed a very heavy burden on the wealthier citizens, and this financial pressure accounts in great part for the hostility of the rich towards the democratic constitution that facilitated the imposition of graduated taxation and super-taxes—to use modern terms—on the larger incomes. The normal yield of the property tax is reported as 60 talents (£14,400); but on special occasions it reached 200 talents (£48,000), or about one-sixth of the total receipts.

On the administrative side also remarkable advances were made by the entrusting of military expenditure to the "generals," and in the 4th century B.C. by the appointment of an administrator whose duty it was to distribute the revenue of the state under the directions of the assembly. The absence of settled public law and the influence of direct democracy made a complete ministry of finance impossible.

The Athenian "hegemony" in its earlier and later phases had an important financial side. The confederacy of Delos made provision for the collection of a revenue (φόρος) from the members of the league, which was employed at first for defence against Persian aggression, but afterwards was at the disposal of Athens as the ruling state. The annual collection of 460 talents (£110,400) shows sufficiently the magnitude of the league.

Too little is known of the financial methods of the other Greek states and of the Macedonian kingdoms to allow of any definite account of their position. In the latter, particularly in Egypt, the methods of the earlier rulers probably survived. Their finance, like their social life generally, exhibited a blending of Hellenic and barbarian elements. The older land-taxes were probably accompanied by import dues and taxes on property.

Roman.

In the infancy of the Roman republic its revenues were of the kind usual in such communities. The public land yielded receipts which may indifferently be regarded as rents or taxes; the citizens contributed their services or commodities, and dues were raised on certain articles coming to market. With the progress of the Roman dominion the financial organization grew in extent. In order to meet the cost of the early wars a special contribution from property (*tributum ex censu*) was levied at times of emergency, though it was in some cases regarded as an advance to be repaid when the occasion of expense was over. Owing to the great military successes, and the consequent increase of the other sources of revenue, it became feasible to suspend the *tributum* in 167 B.C., and it was not again levied till after the death of Julius Caesar. From this date the expenses of the Roman state "were undisguisedly supported by the taxation of the provinces." Neither the state monopolies nor the public land in Italy afforded any appreciable revenue. The other charges that affected Italy were the 5% duty on manumissions, and customs dues on seaborne imports. But with the acquisition of the important provinces of Sicily, Spain and Africa, the formation of a tax system based on the tributes of the dependencies became possible. To a great extent the pre-existing forms of revenue were retained, but were gradually systematized. In legal theory the land of conquered communities passed into the ownership of the Roman state; in practice a revenue was obtained through land taxes in the form of either tithes (*decumae*) or money payments (*stipendia*). To the latter were adjoined capitation and trade taxes (the *tributum capitis*). For pasture land a special rent was paid. In some provinces (*e.g.* Sicily) payment in produce was preferred, as affording the supply needed for the free distribution of corn at Rome.

The great form of indirect taxation consisted in the customs dues (*portoria*), which were collected at the provincial boundaries and varied in amount, though the maximum did not exceed 5%. Under the same head were included the town dues (or *octrois*). Further, the local administration was charged on the district concerned, and requisitions for the public service were frequently made on the provincial communities. Supplies of grain, ships and timber for military use were often demanded.

The methods of levy may be regarded as an additional tax. "Vexation," as Adam Smith remarks, "though not strictly speaking expense, is certainly equivalent to the expense at which every man would be willing to redeem himself from it"; and the Roman system was extraordinarily vexatious. From an early date the collection of the taxes had been farmed out to companies of contractors (*societates vectigales*), who became a by-word for rapacity. Being bound to pay a stated sum to the public authorities these *publicani* naturally aimed at extracting the largest possible amount from the unfortunate provincials, and, as they belonged to the Roman capitalist class, they were able to influence the provincial governors. Undue claims on the part of the tax collectors were aggravated by the extortion of the public officials. The defects of the financial organization were a serious influence in the complex of causes that brought about the fall of the Republic.

One of the reasons that induced the subject populations to accept with pleasure the establishment of the Empire was the improvement in financial treatment that it secured. The corrupt and uneconomical method of farming out the collection of the revenue was, to a great extent, replaced by collection through the officials of the imperial household. The earlier Roman treasury (*aerarium*) was formally retained for the receipt of revenue from the senatorial provinces, but the officials were appointed by the Princeps and became gradually mere municipal officers. The real centre of finance was the *fiscus* or imperial treasury, which was under the exclusive control of the ruler ("res fiscales," says Ulpian, "quasi propriae et privatae principis sunt"), and was administered by officials of his household. Under the Republic the Senate had been the financial authority, with the Censors as finance ministers and the Quaestors as secretaries of the treasury. Never very precise, this system in the 1st century B.C. fell into extreme decay. By means of his freedmen the emperor introduced the more rigorous economy of the Roman household into public finance. The census as a method of valuation was revived; the important and productive land taxes were placed on a more definite footing; while, above all, the substitution of direct collection by state officials for the letting out by auction of the tax-collection to the companies of *publicani* was made general. Thus some of the most valuable lessons as to the normal evolution of a system of finance are to be learned in this connexion. Of equal, or even greater moment is the failure of the administrative reforms of the Empire to secure lasting improvement, a result due to the absence of constitutional guarantees. The close relation between finance and general policy is most impressively illustrated in this failure of benevolent autocracy.

Viewed broadly, the financial resources of the earlier Empire were obtained from (1) the public land alike of the state and the Princeps; (2) the monopolies, principally of minerals; (3) the land tax; (4) the customs; (5) the taxes on inheritances, on sales and on the purchase of slaves (*vectigalia*). One result of the establishment of the Principate was the consolidation of the public domain. The old "public land" in Italy had nearly disappeared; but the royal possessions in the conquered provinces and the private properties of the emperor became ultimately a part of the property of the Fiscus. Such land was let either on five-year leases or in perpetuity to coloni. Mines were also taken over for public use and worked by slaves or, in later times, by convict labour. The tendency towards state monopoly became more marked in the closing days of the Empire, the 4th and 5th centuries A.D. Perhaps the most comprehensive of the fiscal reforms of the Empire was the reconstruction of the land tax, based on a census or (to use the French term) *cadastre*, in which the area, the modes of cultivation and the estimated productiveness of each holding were stated, the average of ten preceding years being taken as the standard. After the reconstruction under Diocletian at the end of the 3rd century A.D., fifteen years (the *indictio*)—though probably used as early as the time of Hadrian—was recognized as the period for revaluation. With the growing needs of the state this taxation became more rigorous and was one of the great grievances of the population, especially of the sections that were declining in status and passing into the condition of villenage. The *portoria*, or customs, received a better organization, though the varying rates for different provinces continued. By degrees the older maximum of 5% was exceeded, until in the 4th century 12½% was in some cases levied. Even at this higher rate the facilities for trade were greater than in medieval or (until the revolution in transport) modern times. In spite of certain prejudices against the import of luxuries and the export of gold, there is little indication of the influence of mercantilist or protectionist ideas. The nearest approach to excise was the duty of 1% on all sales, a tax that in Gibbon's words "has ever been the occasion of clamour and discontent." The higher charge of 4% on the purchase of slaves, and the still heavier 5% on successions after death, were likewise established at the beginning of the Empire and specially applied to the full citizens. Escheats and lapsed legacies (*caduca*) were further miscellaneous sources of gain to the state.

Taken as a whole, the financial system of Imperial Rome shows a very high elaboration in *form*. The *patrimonium*, the *tributa* and the *vectigalia* are divisions parallel to the *domaine*, the *contributions directes* and the *contributions indirectes* of modern French administration; or the English "non-tax" revenue, inland revenue and "customs and excise." The careful regulations given in the Codes and the Digest show the observance of technical conditions as to assessment and accounting. In substance and spirit, however, Roman finance was essentially backward. Without altogether accepting Merivale's judgment that "their principles of finance were to the last rude and unphilosophical," it may be granted that Roman statesmen never seriously faced the questions of just distribution and maximum productiveness in the tax system. Still less did they perceive the connexion between these two aspects of finance. Mechanical uniformity and minute regulation are inadequate substitutes for observance of the canons of equality, certainty and economy in the operation of the tax system. Whether (as has been suggested) an Adam Smith in power could have saved the Empire is doubtful; but he would certainly have remodelled its finance. The most glaring fault was plainly the undue and increasing pressure on the productive classes. Each century saw heavier burdens imposed on the actual workers and on their employers, while expenditure was chiefly devoted to unproductive purposes. The distribution was also unfair as between the different territorial divisions. The capital and certain provincial towns were favoured at the expense of the provinces and the country districts. Again, the cost of collection, though less than under the farming-out system, was far too great. Some alleviation was indeed obtained by the apportionment of contributions amongst the districts liable, leaving to the community to decide as it thought best between its members. The allotment of the land-tax to units (*juga*) of equal value whatever might be the area, was a contrivance similar in character.

The gradual way in which the several provinces were brought under the general tax system, and the equally gradual extension of Roman citizenship, account further for the irregularity and increased weight of the taxes; as the absence of publicity and the growth of autocracy explain the sense of oppression and the hopelessness of resistance so vividly indicated in the literature of the later Empire. Exemptions at first granted to the citizens were removed, while the cost of local government which continually increased was placed on the middle-class of the towns as represented by the *decuriones*, or members of the municipalities.

The fact that no ingenuity of modern research has been able to construct a real budget of expenditure and receipt for any part of the long centuries of the Empire is significant as to the secrecy that surrounded the finances, especially in the later period. For at the beginning of the principate Augustus seems to have aimed at a complete estimate of the financial situation, though this may be regarded as due to the influence of the freer republican traditions which the reverence that soon attached to the emperor's dignity completely extinguished.

In addition to its value as illustrating the difficulties and defects that beset the development of a complex financial organization from the simpler forms of the city and the province, Roman finance is of special importance in consequence of its place as supplying a model or rather a guide for the administration of the states that arose on its ruins. The barbarian invaders, though they were accustomed to contributions to their chiefs and to the payment of commodities as tributes or as penalties, had no acquaintance with the working of a regular system of taxation. The more astute rulers utilized the machinery that they inherited from the Roman government. Under the Franks the land tax and the provincial customs continued as forms of revenue, while beside them the gifts and court fees of Teutonic origin took their place. Similar conditions appear in Theodoric's administration of Italy. The maintenance of Roman forms and terms is prominent in fiscal administration. But institutions that have lost their life and animating spirit can hardly be preserved for any length of time. All over western Europe the elaborate devices of the *census* and the stations for the collection of customs crumbled away; taxation as such disappeared, through the hostility of the clergy and the exemptions accorded to powerful subjects. This process of disintegration spread out over centuries. The efforts made from time to time by vigorous rulers to enforce the charges that remained legally due, proved quite ineffectual to restore the older fiscal system. The final result was a complete transformation of the ingredients of revenue. The character of the change may be best indicated as a substitution of private claims for public rights. Thus, the land-tax disappears in the 7th century and only comes into notice in the 9th century in the shape of private customary dues. The customs duties become the tolls and transit charges levied by local potentates on the diminishing trade of the earlier middle ages. This revolution is in accordance with—indeed it is one side of—the movement towards feudalism which was the great feature of this period. Finance is essentially a part of *public* law and administration. It could, therefore, hold no prominent place in a condition of society which hardly recognized the state, as distinct from the members of the community, united by feudal ties. The same conception may be expressed in another way, viz. by the statement that the kingdoms which succeeded the Roman Empire were organized on the patrimonial basis (*i.e.* the revenues passed into the hands of the king or, rather, his domestic officials), and thus in fact returned to the condition of pre-classical times. Notwithstanding the differing features in the several countries, retrogression is the common characteristic of European history from the 5th to the 10th century, and it was from the ruder state that this decline created that the re-building of social and political organization had to be accomplished. On the financial side the work, as already suggested, was aided by the ideas and institutions inherited from the Roman Empire. This influence was common to all the continental states and indirectly was felt even in England. Each of the great realms has, however, worked out its financial system on lines suitable to its own particular conditions, which are best considered in connexion with the separate national histories.

Running through the different national systems there are some common elements the result not of inheritance merely but still more of necessity, or at the lowest of similarity in environment. Over and above the details of financial development there is a thread of connexion which requires treatment under Finance taken as a whole. As the great aim of this side of public activity is to secure funds for the maintenance of the state's life and working, the administration which operates for this end is the true nucleus of all national finance. The first sign of revival from the catastrophe of the invasions is the reorganization of the Imperial household under Charlemagne with the intention of establishing a more exact collection of revenue. The later German empire of Otto and the Frederics; the French Capetian monarchy and, in a somewhat different sphere, the medieval Italian and German cities show the same movement. The treasury is the centre towards which the special receipts of the ruler or rulers should be brought, and from it the public wants should be supplied. Feudalism, as the antithesis of this orderly treatment, had to be overthrown before national finance could become established. The development can be traced in the financial history of England, France and the German states; but the advance in the French financial organization of the 15th and 16th centuries affords the best illustration. The gradual unification operates on all the branches of finance,—expenditure, revenue, debt and methods of control. In respect to the first head there is a well-marked "integration" of the modes for meeting the cost of the public services. What were semi-private duties become public tasks, which, with the growing importance of "money-economy," have to be defrayed by state payments. Thus, the creation of the standing army in France by Charles VII. marks a financial change of the first order. The English navy, though more gradually developed, is an equally good illustration of the movement. All outlay by the state is brought into due co-ordination, and it becomes possible for constitutional government to supervise and direct it. This improvement, due to English initiative, has been adopted amongst the essential forms of financial administration on the continent. The immense importance of this view of public expenditure as representing the consumption of the state in its unified condition is obvious; it has affected, for the most part unconsciously, the conception of all modern peoples as to the functions of the state and the right of the people to direct them.

On the side of receipts a similar unifying process has been accomplished. The almost universal separation between "ordinary" and "extraordinary" receipts, taxation being put under the latter head, has completely ceased. It was, however, the fundamental division for the early French writers on finance, and it survives for England as late as Blackstone's *Commentaries*. The idea that the ruler possessed a normal income in certain rents and dues of a quasi-private character, which on emergency he might supplement by calls on the revenues of his subjects, was a bequest of feudalism which gave way before the increasing power of the state. In order to meet the unified public wants, an equally unified public fund was requisite. The great economic changes which depreciated the value of the king's domain contributed towards the result. Only by well-adjusted taxation was it possible to meet the public necessities. In respect to taxation also there has been a like course of re-adjustment. Separate charges, assigned for distinct purposes, have been taken into the national exchequer and come to form a part of the general revenue. There has been—taking long periods—a steady absorption of special taxes into more general categories. The replacement of the four direct taxes by the income tax in France, as proposed in 1909, is a very recent example. Equally important is the growth of "direct" taxation. As tax contributions have taken the places of the revenue from land and fees, so, it would seem, are the taxes on commodities likely to be replaced or at least exceeded by the imposts levied on income as such, in the shape either of income taxes proper or of charges on accumulated wealth. The recent history of the several financial systems of the world is decisive on this point. A clearer perception of the conditions under which the effective attainment of revenue is possible is another outcome of financial development. Security, and in particular the absence of arbitrary impositions, combined with convenient modes of collection, have come to be recognized as indispensable auxiliaries in financial administration which further aims at the selection of really productive forms of charge. Unproductiveness is, according to modern standard, the cardinal fault of any particular tax. How great has been the progress in these aspects is best illustrated in the case of English finance, but both French and German fiscal history can supply many instructive examples.

In a third direction the co-ordination of finance has been just as remarkable. Financial adjustment implies the conception of a balance, and this should be found in the relation of outlay and income. Under the pressure of war and other emergencies it has been found impossible to maintain this desirable equilibrium. But the use of the system of credit, and the general establishment of constitutional government, have enabled the difficulty to be surmounted by the creation on a vast scale of national debts. Apart from the special problems that this system of borrowing raises, there is the general one of its aid in making national finance continuous and orderly. Deficits can be transferred to the capital account, and the country's resources employed most usefully by repaying liabilities contracted in times of extreme need. The growth of this department, parallel with the general progress of finance, is significant of its function.

Finally, in all countries though with diversities due to national peculiarities, the modes of account and control have been brought into a more effective condition. Previous legislative sanction for both expenditure and receipts in all their particular forms is absolutely necessary; so is thorough scrutiny of the actual application of the funds provided. Either by administrative survey or by judicial examination care is taken to see that there has been no improper diversion from the designed purposes. It is only when the varied systems of financial organization are studied in their general bearing, and with regard to what may be called their frame-work, that their essential resemblance is thoroughly realized. Such a real underlying unity is the reason and justification for regarding "public finance" as a distinct subject of study and as an independent division of political science.

Local Finance.—One of the most remarkable features of modern financial development has been the growth of the complementary system of local finance, which in extent and complication bids to rival that of the central authority. Under the constraining power of the Roman Empire the older city states were reduced to the position of municipalities, and their financial administration became dependent on the control of the Emperor—as is abundantly illustrated in the correspondence of Pliny and Trajan. After the fall of the Western Empire, a partial revival of city life, particularly in Italy and Germany, gave some scope for a return to the type of finance presented by the Athenian state. Florence affords an instructive specimen; but the passage from feudalism to the national state under the authority of monarchy made the cities and country districts parts of a larger whole. It is in this condition of subordination that the finance of localities has been framed and effectively organized. Though each great state has adopted its own methods, influenced by historical circumstances and by ideas of policy, there are general resemblances that furnish material for scientific treatment and allow of important generalizations being made.

Amongst these the first to be noticed is the essential *subordination* of local finance. Alike in expenditure, in forms of receipt, and in methods of administration the central government has the right of directing and supervising the work of municipal and provincial agencies. The modes employed are various, but they all rest on the sovereignty of the state, whether exercised by the central officials or by the courts. A second characteristic is the predominance of the *economic* element in the several tasks that local administrations have to perform, and the consequent tendency to treat the charges of local finance as payments for services rendered, or, in the usual phrase, to apply the "benefits" principle, in contrast to that of "ability," which rightly prevails in national finance. Over a great part of municipal administration—particularly that engaged in supplying the needs of the individual citizens—the finance may be assimilated to that of the joint-stock company, with of course the necessary differences, viz. that the association is compulsory; and that dividends are paid, not in money, but in social advantage. The great expansion in recent years of what is known as *Municipal Trading* has brought this aspect of local finance into prominence. Water supply, transport and lighting have become public services, requiring careful financial management, and still retaining traces of their earlier private character.

Corresponding to the mainly economic nature of local expenditure there is the further limitation imposed on the side of revenue. Unlike the state in this, localities are limited in respect to the amount and form of their taxation. Several distinct influences combine to produce this result. The needs of the central government lead to its retention of the more profitable modes of procuring revenue. No modern country can surrender the chief direct and indirect taxes to the local administrations. Another limiting condition is found in the practical impossibility of levying by local agencies such imposts as the customs and the income-tax in their modern forms. The elaborate machinery that is requisite for covering the national area and securing the revenue against loss can only be provided by an authority that can deal with the whole territory. Hence the very general limitation of local revenues to certain typical forms. Though in some cases municipal taxation is imposed on commodities in the form of *octrois* or entry duties—as is notably the case in France—yet the prevailing tendency is towards the levy of direct charges on immovable property, which cannot escape by removal outside the tax jurisdiction. In addition to these "land" and "house" taxes, the employment of licence duties on trades, particularly those that are in special need of supervision, is a favourite method. Closely akin are the payments demanded for privileges to industrial undertakings given as "franchises," very often in connexion with monopolies, *e.g.* gas-works and tramways. Over and above the peculiar revenues of local bodies there is the further resource—which emphasizes the subordinate position of local finance—of obtaining supplemental revenue from the central treasury, either by taxes additional to the charges of the state, and collected at the same time; or by donations from its funds, in the shape of grants for special services, or assignments of certain parts of the state's receipts. Great Britain, France and Prussia furnish good examples of these different modes of preserving local administration from financial collapse.

The broad resemblance between the two parts of the entire system of public finance is seen in another direction. To national debts there has been added a great mass of municipal and local indebtedness, which seems likely to equal, or even exceed in magnitude the liabilities of the central governments. But here also the essential limitations of the newer form are easily perceptible. The sovereignty of the state enables it to deal as it thinks best with the public creditor. In its methods of borrowing, in its plans for repayment, or, in extremity, in its power of repudiation it is independent of external control. Local debt on the other hand can only be contracted under the sanction of the appropriate administrative organ of the state. The creditor has the right of claiming the aid of the law against the defaulting municipality; and the amounts, the terms, and the time of duration of local debt are supervised in order to prevent injustice to particular persons or improvidence with regard to the revenue and property of the local units. The chief reason for contracting local debt being the establishment of works that are, directly or indirectly, reproductive, the governing conditions are evidently to be found in the character and probable yield of those businesses. The principles of company investments are fully applicable: the creation of sinking-funds, the fixing the term of each loan to the time at which the return from its employment ceases, and the avoidance of the formation of fictitious capital, become guiding rules from this part of finance, and indicate the connexion with what the commercial world calls "financial operations."

Finally, there is the same set of problems in respect to accounting and control in local as in central finance. Though the materials are simpler, the need for a well-prepared budget is existent in the case of the city, county or department, if there is to be clear and accurate financial management. Perhaps the greatest weakness of local finance lies in this direction. The public opinion that affects the national budget is unfortunately too often lacking in the most important towns, not excluding those in which political life is highly developed.

Bibliography.—The English literature on finance is rather unsatisfactory; for public finance the available text-books are: Adams, *Science of Finance* (New York, 1898); Bastable, *Public Finance* (London, 1892; 3rd ed., 1903); Daniels, *Public Finance* (New York, 1899), and Plehn, *Public Finance* (3rd ed., New York, 1909). In French, Leroy-Beaulieu, *Traité de la science des finances* (1877; 3rd ed., 1908), is the standard work. The German literature is abundant. Roscher, 5th ed. (edited by Gerlach), 1901; Wagner (4 vols.), incomplete; Cohn (1889) and Eheberg (9th ed., 1908) have published works entitled *Finanzwissenschaft*, dealing with all the aspects of state finance. For Greek financial history Boekh, *Staatshaushaltung der Athenen* (ed. Fränkel, 1887), is still a standard work. For Rome, Marquardt, *Römische Staatsverwaltung*, vol. ii., and Humbert, *Les Finances et la comptabilité publique chez les Romains*, are valuable. Clamageran, *Histoire de l'impôt en France* (1876), gives the earlier development of French finance. R. H. Patterson, *Science of Finance* (London, 1868), C. S. Meade, *Trust Finance* (1903), and E. Carroll, *Principles and Practice of Finance*, deal with finance in the wider sense of business transactions. (C. F. B.)

FINCH, FINCH-HATTON. This old English family has had many notable members, and has contributed in no small degree to the peerage. Sir Thomas Finch (d. 1563), who was knighted for his share in suppressing Sir T. Wyatt's insurrection against Queen Mary, was a soldier of note, and was the son and heir of Sir William Finch, who was knighted in 1513. He was the father of Sir Moyle Finch (d. 1614), who was created a baronet in 1611, and whose widow Elizabeth (daughter of Sir Thomas Heneage) was created a peeress as countess of Maidstone in 1623 and countess of Winchilsea in 1628; and also of Sir Henry Finch (1558–1625), whose son John, Baron Finch of Fordwich (1584–1660), is separately noticed. Thomas, eldest son of Sir Moyle, succeeded his mother as first earl of Winchilsea; and Sir Heneage, the fourth son (d. 1631), was the speaker of the House of Commons, whose son Heneage (1621–1682), lord chancellor, was created earl of Nottingham in 1675. The latter's second son Heneage (1649–1719) was created earl of Aylesford in 1714. The earldoms of Winchilsea and Nottingham became united in 1729, when the fifth earl of Winchilsea died, leaving no son, and the title passed to his cousin the second earl of Nottingham, the earldom of Nottingham having since then been held by the earl of Winchilsea. In 1826, on the death of the ninth earl of Winchilsea and fifth of Nottingham, his cousin George William Finch-Hatton succeeded to the titles, the additional surname of Hatton (since held in this line) having been assumed in 1764 by his father under the will of an aunt, a daughter of Christopher, Viscount Hatton (1632–1706), whose father was related to the famous Sir Christopher Hatton.

FINCH OF FORDWICH, JOHN FINCH, Baron (1584–1660), generally known as Sir John Finch, English judge, a member of the old family of Finch, was born on the 17th of September 1584, and was called to the bar in 1611. He was returned to parliament for Canterbury in 1614, and became recorder of the same place in 1617. Having attracted the notice of Charles I., who visited Canterbury in 1625, and was received with an address by Finch in his capacity as recorder, he was the following year appointed king's counsel and attorney-general to the queen and was knighted. In 1628 he was elected speaker of the House of Commons, a post which he retained till its dissolution in 1629. He was the speaker who was held down in his chair by Holles and others on the occasion of Sir John Eliot's resolution on tonnage and poundage. In 1634 he was appointed chief justice of the court of common pleas, and distinguished himself by the active zeal with which he upheld the king's prerogative. Notable also was the brutality which characterized his conduct as chief justice, particularly in the cases of William Prynne and John Langton. He presided over the trial of John Hampden, who resisted the payment of ship-money, and he was chiefly responsible for the decision of the judges that ship-money was constitutional. As a reward for his services he was, in 1640, appointed lord keeper, and was also created Baron Finch of Fordwich. He had, however, become so unpopular that one of the first acts of the Long Parliament, which met in the same year was his impeachment. He took refuge in Holland, but had to suffer the sequestration of his estates. When he was allowed to return to England is uncertain, but in 1660 he was one of the commissioners for the trial of the regicides, though he does not appear to have taken much part in the proceedings. He died on the 27th of November 1660 and was buried in St Martin's church near Canterbury, his peerage becoming extinct.

See Foss, *Lives of the Judges*; Campbell, *Lives of the Chief Justices*.

FINCH (Ger. *Fink*, Lat. *Fringilla*), a name applied (but almost always in composition—as bullfinch, chaffinch, goldfinch, hawfinch, &c.) to a great many small birds of the order *Passeres*, and now pretty generally accepted as that of a group or family—the *Fringillidae* of most ornithologists. Yet it is one the extent of which must be regarded as being uncertain. Many writers have included in it the buntings (*Emberizidae*), though these seem to be quite distinct, as well as the larks (*Alaudidae*), the tanagers (*Tanagridae*), and the weaver-birds (*Ploceidae*). Others have separated from it the crossbills, under the title of *Loxiidae*, but without due cause. The difficulty which at this time presents itself in regard to the limits of the *Fringillidae* arises from our ignorance of the anatomical features, especially those of the head, possessed by many exotic forms.

Taken as a whole, the finches, concerning which no reasonable doubt can exist, are not only little birds with a hard bill, adapted in most cases for shelling and eating the various seeds that form the chief portion of their diet when adult, but they appear to be mainly forms which predominate in and are highly characteristic of the Palaearctic Region; moreover, though some are found elsewhere on the globe, the existence of but very few in the Notogaean hemisphere can as yet be regarded as certain.

But even with this limitation, the separation of the undoubted *Fringillidae* [1] into groups is a difficult task. Were we merely to consider the superficial character of the form of the bill, the genus *Loxia* (in its modern sense) would be easily divided not only from the other finches, but from all other birds. The birds of this genus—the crossbills—when their other characters are taken into account, prove to be intimately allied on the one hand to the grosbeaks (*Pinicola*) and on the other through the redpolls (*Aegiothus*) to the linnets (*Linota*)—if indeed these two can be properly separated. The linnets, through the genus *Leucosticte*, lead to the mountain-finches (*Montifringilla*), and the redpolls through the siskins (*Chrysomitris*) to the goldfinches (*Carduelis*); and these last again to the hawfinches, one group of which (*Coccothraustes*) is apparently not far distant from the chaffinches (*Fringilla* proper), and the other (*Hesperiphona*) seems to be allied to the greenfinches (*Ligurinus*). Then there is the group of serins (*Serinus*), to which the canary belongs, that one is in doubt whether to refer to the vicinity of the greenfinches or that of the redpolls. The mountain-finches may be regarded as pointing first to the rock-sparrows (*Petronia*) and then to the true sparrows (*Passer*); while the grosbeaks pass into many varied forms and throw out a very well marked form—the bullfinches (*Pyrrhula*). Some of the modifications of the family are very gradual, and therefore conclusions founded on them are likely to be correct; others are further apart, and the links which connect them, if not altogether missing, can but be surmised. To avoid as much as possible prejudicing the case, we shall therefore take the different groups of *Fringillidae* which it is convenient to consider in this article in an alphabetical arrangement.

Of the Bullfinches the best known is the familiar bird (*Pyrrhula*

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[1] About 200 species of these have been described, and perhaps 150 may really exist.

europaea). The varied plumage of the cock—his bright red breast and his grey back, set off by his coal-black head and quills—is naturally attractive; while the facility with which he is tamed, with his engaging disposition in confinement, makes him a popular cage-bird,—to say nothing of the fact (which in the opinion of so many adds to his charms) of his readily learning to "pipe" a tune, or some bars of one. By gardeners the bullfinch has long been regarded as a deadly enemy, from its undoubted destruction of the buds of fruit-trees in spring-time, though whether the destruction is really so much of a detriment is by no means so undoubted. Northern and eastern Europe is inhabited by a larger form (*P. major*), which differs in nothing but size and more vivid tints from that which is common in the British Isles and western Europe. A very distinct species (*P. murina*), remarkable for its dull coloration, is peculiar to the Azores, and several others are found in Asia from the Himalayas to Japan. A bullfinch (*P. cassini*) has been discovered in Alaska, being the first recognition of this genus in the New World.

The Canary (*Serinus canarius*) is indigenous to the islands whence it takes its name, as well, apparently, as to the neighbouring groups of the Madeiras and Azores, in all of which it abounds. It seems to have been imported into Europe at least as early as the first half of the 16th century,[1] and has since become the commonest of cage-birds. The wild stock is of an olive-green, mottled with dark brown above, and greenish-yellow beneath. All the bright-hued examples we now see in captivity have been induced by carefully breeding from any chance varieties that have shown themselves; and not only the colour, but the build and stature of the bird have in this manner been greatly modified. The ingenuity of "the fancy," which might seem to have exhausted itself in the production of topknots, feathered feet, and so forth, has brought about a still further change from the original type. It has been found that by a particular treatment, in which the mixing of large quantities of vegetable colouring agents with the food plays an important part, the ordinary "canary yellow" may be intensified so as to verge upon a more or less brilliant flame colour.[2]

Very nearly resembling the canary, but smaller in size, is the Serin (*Serinus hortulanus*), a species which not long since was very local in Europe, and chiefly known to inhabit the countries bordering on the Mediterranean. It has pushed its way towards the north, and has even been several times taken in England (Yarrell's *Brit. Birds*, ed. 4, ii. pp. 111-116). A closely allied species (*S. canonicus*) is peculiar to Palestine.

The Chaffinches are regarded as the type-form of *Fringillidae*. The handsome and sprightly *Fringilla coelebs*[3] is common throughout the whole of Europe. Conspicuous by his variegated plumage, his peculiar call note[4] and his glad song, the cock is almost everywhere a favourite. In Algeria the British chaffinch is replaced by a closely-allied species (*F. spodogenia*), while in the Atlantic Islands it is represented by two others (*F. tintillon* and *F. teydea*)—all of which, while possessing the general appearance of the European bird, are clothed in soberer tints.[5] Another species of true *Fringilla* is the brambling (*F. montifringilla*), which has its home in the birch forests of northern Europe and Asia, whence it yearly proceeds, often in flocks of thousands, to pass the winter in more southern countries. This bird is still more beautifully coloured than the chaffinch—especially in summer, when, the brown edges of the feathers being shed, it presents a rich combination of black, white and orange. Even in winter, however, its diversified plumage is sufficiently striking.

With the exception of the single species of bullfinch already noticed as occurring in Alaska, all the above forms of finches are peculiar to the Palaearctic Region. (A. N.)

FINCHLEY, an urban district in the Hornsey parliamentary division of Middlesex, England, 7 m. N.W. of St Paul's cathedral, London, on a branch of the Great Northern railway. Pop. (1891) 16,647; (1901) 22,126. A part, adjoining Highgate on the north, lies at an elevation between 300 and 400 ft., while a portion in the Church End district lies lower, in the valley of the Dollis Brook. The pleasant, healthy situation has caused Finchley to become a populous residential district. Finchley Common was formerly one of the most notorious resorts of highwaymen near London; the Great North Road crossed it, and it was a haunt of Dick Turpin and Jack Sheppard, and was still dangerous to cross at night at the close of the 18th century. Sheppard was captured in this neighbourhood in 1724. The Common has not been preserved from the builder. In 1660 George Monk, marching on London immediately before the Restoration, made his camp on the Common, and in 1745 a regular and volunteer force encamped here, prepared to resist the Pretender, who was at Derby. The gathering of this force inspired Hogarth's famous picture, the "March of the Guards to Finchley."

FINCK, FRIEDRICH AUGUST VON (1718–1766), Prussian soldier, was born at Strelitz in 1718. He first saw active service in 1734 on the Rhine, as a member of the suite of Duke Anton Ulrich of Brunswick-Wolfenbüttel. Soon after this he transferred to the Austrian service, and thence went to Russia, where he served until the fall of his patron Marshal Münnich put an end to his prospects of advancement. In 1742 he went to Berlin, and Frederick the Great made him his aide-de-camp, with the rank of major. Good service brought him rapid promotion in the Seven Years' War. After the battle of Kolin (June 18th, 1757) he was made colonel, and at the end of 1757 major-general. At the beginning of 1759 Finck became lieutenant-general, and in this rank commanded a corps at the disastrous battle of Kunersdorf, where he did good service both on the field of battle and (Frederick having in despair handed over to him the command) in the rallying of the beaten Prussians. Later in the year he fought in concert with General Wunsch a widespread combat, called the action of Korbitz (Sept. 21st) in which the Austrians and the contingents of the minor states of the Empire were sharply defeated. For this action Frederick gave Finck the Black Eagle (Seyfarth, *Beilagen*, ii. 621–630). But the subsequent catastrophe of Maxen (see SEVEN YEARS' WAR) abruptly put an end to Finck's active career. Dangerously exposed, and with inadequate forces, Finck received the king's positive order to march upon Maxen (a village in the Pirna region of Saxony). Unfortunately for himself the general dared not disobey his master, and, cut off by greatly superior numbers, was forced to surrender with some 11,000 men (21st Nov. 1759). After the peace, Frederick sent him before a court-martial, which sentenced him to be cashiered and to suffer a term of imprisonment in a fortress. At the expiry of this term Finck entered the Danish service as general of infantry. He died at Copenhagen in 1766.

He left a work called *Gedanken über militärische Gegenstände* (Berlin, 1788). See *Denkwürdigkeiten der militärischen Gesellschaft*, vol. ii. (Berlin, 1802–1805), and the report of the Finck court-martial in *Zeitschrift für Kunst, Wissenschaft und Geschichte des Krieges*, pt. 81 (Berlin, 1851). There is a life of Finck in MS. in the library of the Great General Staff.

FINCK, HEINRICH (d. *c.* 1519), German musical composer, was probably born at Bamberg, but nothing is certainly known either of the place or date of his birth. Between 1492 and 1506 he was a musician in, and later possibly conductor of the court orchestra of successive kings of Poland at Warsaw. He held the post of conductor at Stuttgart from 1510 till about 1519, in which year he probably died. His works, mostly part songs and other vocal compositions, show great musical knowledge, and amongst the early masters of the German school he holds a high position. They are found scattered amongst ancient and modern collections of songs and other musical pieces (see R. Eitner, *Bibl. der Musiksammelwerke des 16. und 17. Jahrh.*, Berlin, 1877). The library of Zwickau possesses a work containing a collection of fifty-five songs by Finck, printed about the middle of the 16th century.

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[1] The earliest published description seems to be that of Gesner in 1555 (*Orn.* p. 234), but he had not seen the bird, an account of which was communicated to him by Raphael Seiler of Augsburg, under the name of *Suckeruögele*.

[2] See also *The Canary Book*, by Robert L. Wallace; *Canaries and Cage Birds*, by W. A. Blackston; and Darwin's *Animals and Plants under Domestication*, vol. i. p. 295. An excellent monograph on the wild bird is that by Dr Carl Bolle (*Journ. für Orn.*, 1858, pp. 125-151).

[3] This fanciful trivial name was given by Linnaeus on the supposition (which later observations do not entirely confirm) that in Sweden the hens of the species migrated southward in autumn, leaving the cocks to lead a celibate life till spring. It is certain, however, that in some localities the sexes live apart during the winter.

[4] This call-note, which to many ears sounds like "pink" or "spink," not only gives the bird a name in many parts of Britain, but is also obviously the origin of the German *Fink* and the English *Finch*. The similar Celtic form *Pinc* is said to have given rise to the Low Latin *Pincio*, and thence come the Italian *Pincione*, the Spanish *Pinzon*, and the French *Pinson*.

[5] This is especially the case with *F. teydea* of the Canary Islands, which from its dark colouring and large size forms a kind of parallel to the Azorean *Pyrrhula murina*.

FINCK, HERMANN (1527–1558), German composer, the great-nephew of Heinrich Finck, was born on the 21st of March 1527 in Pirna, and died at Wittenberg on the 28th of December 1558. After 1553 he lived at Wittenberg, where he was organist, and there, in 1555, was published his collection of "wedding songs." Few details of his life have been preserved. His theoretical writing was good, particularly his observations on the art of singing and of making ornamentations in song. His most celebrated work is entitled *Practica musica, exempla variorum signorum, proportionum, et canonum, judicium de tonis ac quaedam de arte suaviter et artificiose cantandi continens* (Wittenberg, 1556). It is of great historic value, but very rare.

FINDEN, WILLIAM (1787–1852), English line engraver, was born in 1787. He served his apprenticeship to one James Mitan, but appears to have owed far more to the influence of James Heath, whose works he privately and earnestly studied. His first employment on his own account was engraving illustrations for books, and among the most noteworthy of these early plates were Smirke's illustrations to Don Quixote. His neat style and smooth finish made his pictures very attractive and popular, and although he executed several large plates, his chief work throughout his life was book illustration. His younger brother, Edward Finden, worked in conjunction with him, and so much demand arose for their productions that ultimately a company of assistants was engaged, and plates were produced in increasing numbers, their quality as works of art declining as their quantity rose. The largest plate executed by William Finden was the portrait of King George IV. seated on a sofa, after the painting by Sir Thomas Lawrence. For this work he received two thousand guineas, a sum larger than had ever before been paid for an engraved portrait. Finden's next and happiest works on a large scale were the "Highlander's Return" and the "Village Festival," after Wilkie. Later in life he undertook, in co-operation with his brother, aided by their numerous staff, the publication as well as the production of various galleries of engravings. The first of these, a series of landscape and portrait illustrations to the life and works of Byron, appeared in 1833 and following years, and was very successful. But by his *Gallery of British Art* (in fifteen parts, 1838–1840), the most costly and best of these ventures, he lost the fruits of all his former success. Finden's last undertaking was an engraving on a large scale of Hilton's "Crucifixion." The plate was bought by the Art Union for £1470. He died in London on the 20th of September 1852.

FINDLATER, ANDREW (1810–1885), Scottish editor, was born in 1810 near Aberdour, Aberdeenshire, the son of a small farmer. By hard study in the evening, after his day's work on the farm was finished, he qualified himself for entrance at Aberdeen University, and after graduating as M.A. he attended the Divinity classes with the idea of entering the ministry. In 1853 he began that connexion with the firm of W. & R. Chambers which gave direction to his subsequent activity. His first engagement was the editing of a revised edition of their *Information for the People* (1857). In this capacity he gave evidence of qualities and acquirements that marked him as a suitable editor for *Chambers's Encyclopaedia*, then projected, and his was the directing mind that gave it its character. Many of the more important articles were written by him. This work occupied him till 1868, and he afterwards edited a revised edition (1874). He also had charge of other publications for the same firm, and wrote regularly for the *Scotsman*. In 1864 he was made LL.D. of Aberdeen University. In 1877 he gave up active work for Chambers, but his services were retained as consulting editor. He died in Edinburgh on the 1st of January 1885.

FINDLAY, SIR GEORGE (1829–1893), English railway manager, was of pure Scottish descent, and was born at Rainhill, in Lancashire, on the 18th of May 1829. For some time he attended Halifax grammar school, but left at the age of fourteen, and began to learn practical masonry on the Halifax railway, upon which his father was then employed. Two years later he obtained a situation on the Trent Valley railway works, and when that line was finished in 1847 went up to London. There he was for a short time among the men employed in building locomotive sheds for the London & North-Western railway at Camden Town, and years afterwards, when he had become general manager of that railway, he was able to point out stones which he had dressed with his own hands. For the next two or three years he was engaged in a higher capacity as supervisor of the mining and brickwork of the Harecastle tunnel on the North Staffordshire line, and of the Walton tunnel on the Birkenhead, Lancashire & Cheshire Junction railway. In 1850 the charge of the construction of a section of the Shrewsbury & Hereford line was entrusted to him, and when the line was opened for traffic T. Brassey, the contractor, having determined to work it himself, installed him as manager. In the course of his duties he was brought for the first time into official relations with the London & North-Western railway, which had undertaken to work the Newport, Abergavenny & Hereford line, and he ultimately passed into the service of that company, when in 1862, jointly with the Great Western, it leased the railway of which he was manager. In 1864 he was moved to Euston as general goods manager, in 1872 he became chief traffic manager, and in 1880 he was appointed full general manager; this last post he retained until his death, which occurred on the 26th of March 1893 at Edgware, Middlesex. He was knighted in 1892. Sir George Findlay was the author of a book on the *Working and Management of an English Railway* (London, 1889), which contains a great deal of information, some of it not easily accessible to the general public, as to English railway practice about the year 1890.

FINDLAY, JOHN RITCHIE (1824–1898), Scottish newspaper owner and philanthropist, was born at Arbroath on the 21st of October 1824, and was educated at Edinburgh University. He entered first the publishing office and then the editorial department of the *Scotsman*, became a partner in the paper in 1868, and in 1870 inherited the greater part of the property from his great uncle, John Ritchie, the founder. The large increase in the influence and circulation of the paper was in a great measure due to his activity and direction, and it brought him a fortune, which he spent during his lifetime in public benefaction. He presented to the nation the Scottish National Portrait Gallery, opened in Edinburgh in 1889, and costing over £70,000; and he contributed largely to the collections of the Scottish National Gallery. He held numerous offices in antiquarian, educational and charitable societies, showing his keen interest in these matters, but he avoided political office and refused the offer of a baronetcy. The freedom of Edinburgh was given him in 1896. He died at Aberlour, Banffshire, on the 16th of October 1898.

FINDLAY, a city and the county-seat of Hancock county, Ohio, U.S.A., on Blanchard's Fork of the Auglaize river, about 42 m. S. by W. of Toledo. Pop. (1890) 18,553; (1900) 17,613, (1051 foreign-born); (1910) 14,858. It is served by the Cleveland, Cincinnati, Chicago & St Louis, the Cincinnati, Hamilton & Dayton, the Lake Erie & Western, and the Ohio Central railways, and by three interurban electric railways. Findlay lies about 780 ft. above sea-level on gently rolling ground. The city is the seat of Findlay College (co-educational), an institution of the Church of God, chartered in 1882 and opened in 1886; it has collegiate, preparatory, normal, commercial and theological departments, a school of expression, and a conservatory of music, and in 1907 had 588 students, the majority of whom were in the conservatory of music. Findlay is the centre of the Ohio natural gas and oil region, and lime and building stone abound in the vicinity. Among manufactures are refined petroleum, flour and grist-mill products, glass, boilers, bricks, tile, pottery, bridges, ditching machines, carriages and furniture. The total value of the factory product in 1905 was $2,925,309, an increase of 73·6% since 1900. The municipality owns and operates the water-works. Findlay was laid out as a town in 1821, was incorporated as a village in 1838, and was chartered as a city in 1890. The city was named in honour of Colonel James Findlay (*c.* 1775–1835), who built a fort here during the war of 1812; he served in this war under General William Hull, and from 1825 to 1833 was a Democratic representative in Congress.

FINE, a word which in all its senses goes back to the Lat. *finire*, to bring to an end (*finis*). Thus in the common adjectival meanings of elegant, thin, subtle, excellent, reduced in size, &c., it is in origin equivalent to "finished." In the various substantival meanings in law, with which this article deals, the common idea underlying them is an end or final settlement of a matter.

A fine, in the ordinary sense, is a pecuniary penalty inflicted for the less serious offences. Fines are necessarily discretionary as to amount; but a maximum is generally fixed when the penalty is imposed by statute. And it is an old constitutional maxim that fines must not be unreasonable. In Magna Carta, c. 111, it is ordained "*Liber homo non amercietur pro parvo delicto nisi secundum modum ipsius delicti, et pro magno delicto secundum magnitudinem delicti.*"

The term is also applied to payments made to the lord of a manor on the alienation of land held according to the custom of the manor, to payments made by a lessee on a renewal of a lease, and to other similar payments.

Fine also denotes a fictitious suit at law, which played the part of a conveyance of landed property. "A fine," says Blackstone, "may be described to be an amicable composition or agreement of a suit, either actual or fictitious, by leave of the king or his justices, whereby the lands in question become or are acknowledged to be the right of one of the parties. In its original it was founded on an actual suit commenced at law for the recovery of the possession of land or other hereditaments; and the possession thus gained by such composition was found to be so sure and effectual that fictitious actions were and continue to be every day commenced for the sake of obtaining the same security." Freehold estates could thus be transferred from one person to another without the formal delivery of possession which was generally necessary to a feoffment. This is one of the oldest devices of the law. A statute of 18 Edward I. describes it as the most solemn and satisfactory of securities, and gives a reason for its name—"Qui quidem finis sic vocatur, eo quod finis et consummatio omnium placitorum esse debet, et hac de causa providebatur." The action was supposed to be founded on a breach of covenant: the defendant, owning himself in the wrong,[1] makes overtures of compromise, which are authorized by the *licentia concordandi*; then followed the concord, or the compromise itself. These, then were the essential parts of the performance, which became efficient as soon as they were complete; the formal parts were the *notes*, or abstract of the proceedings, and the *foot* of the fine, which recited the final agreement. Fines were said to be of four kinds, according to the purpose they had in view, as, for instance, to convey lands in pursuance of a covenant, to grant revisionary interest only, &c. In addition to the formal record of the proceedings, various statutes required other solemnities to be observed, the great object of which was to give publicity to the transaction. Thus by statutes of Richard III. and Henry VII. the fine had to be openly read and proclaimed in court no less than sixteen times. A statute of Elizabeth required a list of fines to be exposed in the court of common pleas and at assizes. The reason for these formalities was the high and important nature of the conveyance, which, according to the act of Edward I. above mentioned, "precludes not only those which are parties and privies to the fine and their heirs, but all other persons in the world who are of full age, out of prison, of sound memory, and within the four seas, the day of the fine levied, unless they put in their claim on the foot of the fine within a year and a day." This barring by *non-claim* was abolished in the reign of Edward III., but restored with an extension of the time to five years in the reign of Henry VII. The effect of this statute, intentional according to Blackstone, unintended and brought about by judicial construction according to others, was that a tenant-in-tail could bar his issue by a fine. A statute of Henry VIII. expressly declares this to be the law. Fines, along with the kindred fiction of recoveries, were abolished by the Fines and Recoveries Act 1833, which substituted a deed enrolled in the court of chancery.

Fines are so generally associated in legal phraseology with recoveries that it may not be inconvenient to describe the latter in the present place. A recovery was employed as a means for evading the strict law of entail. The purchaser or alienee brought an action against the tenant-in-tail, alleging that he had no legal title to the land. The tenant-in-tail brought a third person into court, declaring that he had warranted his title, and praying that he might be ordered to defend the action. This person was called the *vouchee*, and he, after having appeared to defend the action, takes himself out of the way. Judgment for the lands is given in favour of the plaintiff; and judgment to recover lands of equal value from the vouchee was given to the defendant, the tenant-in-tail. In real action, such lands when recovered would have fallen under the settlement of entail; but in the fictitious recovery the vouchee was a man of straw, and nothing was really recovered from him, while the lands of the tenant-in-tail were effectually conveyed to the successful plaintiff. A recovery differed from a fine, as to *form*, in being an action carried through to the end, while a fine was settled by compromise, and as to effect, by barring all reversions and remainders in estates tail, while a fine barred the issue only of the tenant. (See also EJECTMENT; PROCLAMATION.)

FINE ARTS, the name given to a whole group of human activities, which have for their result what is collectively known as Fine Art. The arts which constitute the group are the five greater arts of architecture, sculpture, painting, music and poetry, with a number of minor or subsidiary arts, of which dancing and the drama are among the most ancient and universal. In antiquity the fine arts were not explicitly named, nor even distinctly recognized, as a separate class. In other modern languages besides English they are called by the equivalent name of the beautiful arts (*belle arti, beaux arts, schöne Künste*). The fine or beautiful arts then, it is usually said, are those among the arts of man which minister, not primarily to his material necessities or conveniences, but to his love of beauty; and if any art fulfils both these purposes at once, still as fulfilling the latter only is it called a fine art. Thus architecture, in so far as it provides shelter and accommodation, is one of the useful or mechanical arts, and one of the fine arts only in so far as its structures impress or give pleasure by the aspect of strength, fitness, harmony and proportion of parts, by disposition and contrast of light and shade, by colour and enrichment, by variety and relation of contours, surfaces and intervals. But this, the commonly accepted account of the matter, does not really cover the ground. The idea conveyed by the words "love of beauty," even stretched to its widest, can hardly be made to include the love of caricature and the grotesque; and these are admittedly modes of fine art. Even the terrible, the painful, the squalid, the degraded, in a word every variety of the significant, can be so handled and interpreted as to be brought within the province of fine art. A juster and more inclusive, although clumsier, account of the matter might put it that the fine arts are those among the arts of man which spring from his impulse to do or make certain things in certain ways for the sake, first, of a special kind of pleasure, independent of direct utility, which it gives him so to do or make them, and next for the sake of the kindred pleasure which he derives from witnessing or contemplating them when they are so done or made by others.

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[1] Hence called *cognizor*; the other party, the purchaser, is the *cognizee.*

The nature of this impulse, and the several grounds of these pleasures, are subjects which have given rise to a formidable body of speculation and discussion, the chief phases of which will be found summarized under the heading AESTHETICS. In the present article we have only to attend to the concrete processes and results of the artistic activities of man; in other words, we shall submit (1) a definition of fine art in general, (2) a definition and classification of the principal fine arts severally, (3) some observations on their historical development.

I. *Of Fine Art in General.*

Premeditation essential to art.

According to the popular and established distinction between art and nature, the idea of Art (*q.v.*) only includes phenomena of which man is deliberately the cause; while the idea of Nature includes all phenomena, both in man and in the world outside him, which take place without forethought or studied initiative of his own. Art, accordingly, means every regulated operation or dexterity whereby we pursue ends which we know beforehand; and it means nothing but such operations and dexterities. What is true of art generally is of course also true of the special group of the fine arts. One of the essential qualities of all art is premeditation; and when Shelley talks of the skylark's profuse strains of "unpremeditated art," he in effect lays emphasis on the fact that it is only by a metaphor that he uses the word art in this case at all; he calls attention to that which (if the songs of birds are as instinctive as we suppose) precisely makes the difference between the skylark's outpourings and his own. We are slow to allow the title of fine art to natural eloquence, to charm or dignity of manner, to delicacy and tact in social intercourse, and other such graces of life and conduct, since, although in any given case they may have been deliberately cultivated in early life, or even through ancestral generations, they do not produce their full effect until they are so ingrained as to have become unreflecting and spontaneous. When the exigencies of a philosophic scheme lead some writers on aesthetics to include such acts or traits of beautiful and expressive behaviour among the deliberate artistic activities of mankind, we feel that an essential distinction is being sacrificed to the exigencies of a system. That distinction common parlance very justly observes, with its opposition of "art" to "nature" and its phrase of "second nature" for those graces which have become so habitual as to seem instinctive, whether originally the result of discipline or not. When we see a person in all whose ordinary movements there are freedom and beauty, we put down the charm of these with good reason to inherited and inbred aptitudes of which the person has never thought or long since ceased to think, and could not still be thinking without spoiling the charm by self-consciousness; and we call the result a gift of nature. But when we go on to notice that the same person is beautifully and appropriately dressed, since we know that it is impossible to dress without thinking of it, we put down the charm of this to judicious forethought and calculation and call the result a work of art.

The active and the passive pleasures of fine art.

The processes then of fine art, like those of all arts properly so called, are premeditated, and the property of every fine art is to give to the person exercising it a special kind of active pleasure, and a special kind of passive or receptive pleasure to the person witnessing the results of such exercise. This latter statement seems to imply that there exist in human societies a separate class producing works of fine art and another class enjoying them. Such an implication, in regard to advanced societies, is near enough the truth to be theoretically admitted (like the analogous assumption in political economy that there exist separate classes of producers and consumers). In developed communities the gifts and calling of the artist constitute in fact a separate profession of the creators or purveyors of fine art, while the rest of the community are its enjoyers or recipients. In the most primitive societies, apparently, this cannot have been so, and we can go back to an original or rudimentary stage of almost every fine art at which the separation between a class of producers or performers and a class of recipients hardly exists. Such an original or rudimentary stage of the dramatic art is presented by children, who will occupy themselves for ever with mimicry and make-believe for their own satisfaction, with small regard or none to the presence or absence of witnesses. The original or rudimentary type of the profession of imitative sculptors or painters is the cave-dweller of prehistoric ages, who, when he rested from his day's hunting, first took up the bone handle of his weapon, and with a flint either carved it into the shape, or on its surface scratched the outlines, of the animals of the chase. The original or rudimentary type of the architect, considered not as a mere builder but as an artist, is the savage who, when his tribe had taken to live in tents or huts instead of caves, first arranged the skins and timbers of his tent or hut in one way because it pleased his eye, rather than in some other way which was as good for shelter. The original type of the artificer or adorner of implements, considered in the same light, was the other savage who first took it into his head to fashion his club or spear in one way rather than another for the pleasure of the eye only and not for any practical reason, and to ornament it with tufts or markings. In none of these cases, it would seem, can the primitive artist have had much reason for pleasing anybody but himself. Again, the original or rudimentary type of lyric song and dancing arose when the first reveller clapped hands and stamped or shouted in time, in honour of his god, in commemoration of a victory, or in mere obedience to the blind stirring of a rhythmic impulse within him. To some very remote and solitary ancestral savage the presence or absence of witnesses at such a display may in like manner have been indifferent; but very early in the history of the race the primitive dancer and singer joined hands and voices with others of his tribe, while others again sat apart and looked on at the performance, and the rite thus became both choral and social. A primitive type of the instrumental musician is the shepherd who first notched a reed and drew sounds from it while his sheep were cropping. The father of all artists in dress and personal adornment was the first wild man who tattooed himself or bedecked himself with shells and plumes. In both of these latter instances, it may be taken as certain, the primitive artist had the motive of pleasing not himself only, but his mate, or the female whom he desired to be his mate, and in the last instance of all the further motive of impressing his fellow-tribesmen and striking awe or envy into his enemies. The tendency of recent speculation and research concerning the origins of art has been to ascribe the primitive artistic activities of man less and less to individual and solitary impulse, and more and more to social impulse and the desire of sharing and communicating pleasure. (The writer who has gone furthest in developing this view, and on grounds of the most careful study of evidence, has been Dr Yrjö Hirn of Helsingfors.) Whatever relative parts the individual and the social impulses may have in fact played at the outset, it is clear that what any one can enjoy or admire by himself, whether in the way of mimicry, of rhythmical movements or utterances, of imitative or ornamental carving and drawing, of the disposition and adornment of dwelling-places and utensils—the same things, it is clear, others are able also to enjoy or admire with him. And so, with the growth of societies, it came about that one class of persons separated themselves and became the ministers or producers of this kind of pleasures, while the rest became the persons ministered to, the participators in or recipients of the pleasures. Artists are those members of a society who are so constituted as to feel more acutely than the rest certain classes of pleasures which all can feel in their degree. By this fact of their constitution they are impelled to devote their active powers to the production of such pleasures, to the making or doing of some of those things which they enjoy so keenly when they are made and done by others. At the same time the artist does not, by assuming these ministering or creative functions, surrender his enjoying or receptive functions. He continues to participate in the pleasures of which he is himself the cause, and remains a conscious member of his own public. The architect, sculptor, painter, are able respectively to stand off from and appreciate the results of their own labours; the singer enjoys the sound of his own voice, and the musician of his own instrument; the poet, according to his temperament, furnishes the most enthusiastic or the most fastidious reader for his own stanzas. Neither, on the other hand, does the person who is a habitual recipient from others of the pleasures of fine art forfeit the privilege of producing them according to his capabilities, and of becoming, if he has the power, an *amateur* or occasional artist.

Pleasures of fine art disinterested.

Most of the common properties which have been recognized by consent as peculiar to the group of fine arts will be found on examination to be implied in, or deducible from, the one fundamental character generally claimed for them, namely, that they exist independently of direct practical necessity or utility. Let us take, first, a point relating to the frame of mind of the recipient, as distinguished from the producer, of the pleasures of fine art. It is an observation as old as Aristotle that such pleasures differ from most other pleasures of experience in that they are disinterested, in the sense that they are not such as nourish a man's body nor add to his riches; they are not such as can gratify him, when he receives them, by the sense of advantage or superiority over his fellow-creatures; they are not such as one human being can in any sense receive exclusively from the object which bestows them. Thus it is evidently characteristic of a beautiful building that its beauty cannot be monopolized, but can be seen and admired by the inhabitants of a whole city and by all visitors for all generations. The same thing is true of a picture or a statue, except in so far as an individual possessor may choose to keep such a possession to himself, in which case his pride in exclusive ownership is a sentiment wholly independent of his pleasure in artistic contemplation. Similarly, music is composed to be sung or played for the enjoyment of many at a time, and for such enjoyment a hundred years hence as much as to-day. Poetry is written to be read by all readers for ever who care for the ideas and feelings of the poet, and can apprehend the meaning and melody of his language. Hence, though we can speak of a class of the producers of fine art, we cannot speak of a class of its consumers, only of its recipients or enjoyers. If we consider other pleasures which might seem to be analogous to those of fine art, but to which common consent yet declines to allow that character, we shall see that one reason is that such pleasures are not in their nature thus disinterested. Thus the sense of smell and taste have pleasures of their own like the senses of sight and hearing, and pleasures neither less poignant nor very much less capable of fine graduation and discrimination than those. Why, then, is the title of fine art not claimed for any skill in arranging and combining them? Why are there no recognized arts of savours and scents corresponding in rank to the arts of forms, colours and sounds—or at least none among Western nations, for in Japan, it seems, there is a recognized and finely regulated social art of the combination and succession of perfumes? An answer commonly given is that sight and hearing are intellectual and therefore higher senses, that through them we have our avenues to all knowledge and all ideas of things outside us; while taste and smell are unintellectual and therefore lower senses, through which few such impressions find their way to us as help to build up our knowledge and our ideas. Perhaps a more satisfactory reason why there are no fine arts of taste and smell—or let us in deference to Japanese modes leave out smell, and say of taste only—is this, that savours yield only private pleasures, which it is not possible to build up into separate and durable schemes such that every one may have the benefit of them, and such as cannot be monopolized or used up. If against this it is contended that what the programme of a performance is in the musical art, the same is a *menu* in the culinary, and that practically it is no less possible to serve up a thousand times and to a thousand different companies the same dinner than the same symphony, we must fall back upon that still more fundamental form of the distinction between the aesthetic and non-aesthetic bodily senses, upon which the physiological psychologists of the English school lay stress. We must say that the pleasures of taste cannot be pleasures of fine art, because their enjoyment is too closely associated with the most indispensable and the most strictly personal of utilities, eating and drinking. To pass from these lower pleasures to the highest; consider the nature of the delight derived from the contemplation, by the person who is their object, of the signs and manifestations of love. That at least is a beautiful experience; why is the pleasure which it affords not an artistic pleasure either? Why, in order to receive an artistic pleasure from human signs and manifestations of this kind, are we compelled to go to the theatre and see them exhibited in favour of a third person who is not really their object any more than ourselves? This is so, for one reason, evidently, because of the difference between art and nature. Not to art, but to nature and life, belongs love where it is really felt, with its attendant train of vivid hopes, fears, passions and contingencies. To art belongs love displayed where it is not really felt; and in this sphere, along with reality and spontaneousness of the display, and along with its momentous bearings, there disappear all those elements of pleasure in its contemplation which are not disinterested—the elements of personal exultation and self-congratulation, the pride of exclusive possession or acceptance, all these emotions, in short, which are summed up in the lover's triumphant monosyllable, "Mine." Thus, from the lowest point of the scale to the highest, we may observe that the element of personal advantage or monopoly in human gratifications seems to exclude them from the kingdom of fine art. The pleasures of fine art, so far as concerns their passive or receptive part, seem to define themselves as pleasures of gratified contemplation, but of such contemplation only when it is disinterested—which is simply another way of saying, when it is unconcerned with ideas of utility.

An objection and its answer.

Modern speculation has tended in some degree to modify and obscure this old and established view of the pleasures of fine art by urging that the hearer or spectator is not after all so free from self-interest as he seems; that in the act of artistic contemplation he experiences an enhancement or expansion of his being which is in truth a gain of the egoistic kind; that in witnessing a play, for instance, a large part of his enjoyment consists in sympathetically identifying himself with the successful lover or the virtuous hero. All this may be true, but does not really affect the argument, since at the same time he is well aware that every other spectator or auditor present may be similarly engaged with himself. At most the objection only requires us to define a little more closely, and to say that the satisfactions of the ego excluded from among the pleasures of fine art are not these ideal, sympathetic, indirect satisfactions, which every one can share together, but only those which arise from direct, private and incommunicable advantage to the individual.

Fine arts cannot be practised by rule and precept.

Next, let us consider another generally accepted observation concerning the nature of the fine arts, and one, this time, relating to the disposition and state of mind of the practising artist himself. While for success in other arts it is only necessary to learn their rules and to apply them until practice gives facility, in the fine arts, it is commonly and justly said, rules and their application will carry but a little way towards success. All that can depend on rules, on knowledge, and on the application of knowledge by practice, the artist must indeed acquire, and the acquisition is often very complicated and laborious. But outside of and beyond such acquisitions he must trust to what is called genius or imagination, that is, to the spontaneous working together of an incalculably complex group of faculties, reminiscences, preferences, emotions, instincts in his constitution. This characteristic of the activities of the artist is a direct consequence or corollary of the fundamental fact that the art he practices is independent of utility. A utilitarian end is necessarily a determinate and prescribed end, and to every end which is determinate and prescribed there must be one road which is the best. Skill in any useful art means knowing practically, by rules and the application of rules, the best road to the particular ends of that art. Thus the farmer, the engineer, the carpenter, the builder so far as he is not concerned with the look of his buildings, the weaver so far as he is not concerned with the designing of the patterns which he weaves, possesses each his peculiar skill, but a skill to which fixed problems are set, and which, if it indulges in new inventions and combinations at all, can indulge them only for the sake of an improved solution of those particular problems. The solution once found, the invention once made, its rules can be written down, or at any rate its practice can be imparted to others who will apply it in their turn. Whereas no man can write down, in a way that others can act upon, how Beethoven conquered unknown kingdoms in the world of harmony, or how Rembrandt turned the aspects of gloom, squalor and affliction into pictures as worthy of contemplation as those into which the Italians before him had turned the aspects of spiritual exaltation and shadowless day. The reason why the operations of the artist thus differ from the operations of the ordinary craftsman or artificer is that his ends, being ends other than useful, are not determinate nor fixed as theirs are. He has large liberty to choose his own problems, and may solve each of them in a thousand different ways according to the prompting of his own ordering or creating instincts. The musical composer has the largest liberty of all. Having learned what is learnable in his art, having mastered the complicated and laborious rules of musical form, having next determined the particular class of the work which he is about to compose, he has then before him the whole inexhaustible world of appropriate successions and combinations of emotional sound. He is merely directed and not fettered, in the case of song, cantata, oratorio or opera, by the sense of the words which he has to set. The value of the result depends absolutely on his possessing or failing to possess powers which can neither be trained in nor communicated to any man. And this double freedom, alike from practical service and from the representation of definite objects, is what makes music in a certain sense the typical fine art, or art of arts. Architecture shares one-half of this freedom. It has not to copy or represent natural objects; for this service it calls in sculpture to its aid; but architecture is without the other half of freedom altogether. The architect has a sphere of liberty in the disposition of his masses, lines, colours, alternations of light and shadow, of plain and ornamented surface, and the rest; but upon this sphere he can only enter on condition that he at the same time fulfils the strict practical task of supplying the required accommodation, and obeys the strict mechanical necessities imposed by the laws of weight, thrust, support, resistance and other properties of solid matter. The sculptor again, the painter, the poet, has each in like manner his sphere of necessary facts, rules and conditions corresponding to the nature of his task. The sculptor must be intimately versed both in the surface aspects and the inner mechanism of the human frame alike in rest and motion, and in the rules and conditions for its representation in solid form; the painter in a much more extended range of natural facts and appearances, and the rules and conditions for representing them on a plane surface; the poet's art of words has its own not inconsiderable basis of positive and disciplined acquisition. So far as rules, precepts, formulas and other communicable laws or secrets can carry the artist, so far also the spectator can account for, analyse, and, so to speak, tabulate the effects of his art. But the essential character of the artist's operation, its very bloom and virtue, lies in those parts of it which fall outside this range of regulation on the one hand and analysis on the other. His merit varies according to the felicity with which he is able, in that region, to exercise his free choice and frame his individual ideal, and according to the tenacity with which he strives to grasp and realize his choice, or to attain perfection according to that ideal.

In this connexion the question naturally arises, In what way do the progress and expansion of mechanical art affect the power and province of fine art? The great practical movement of the world in our age is a movement for the development of mechanical inventions and multiplication of mechanical products. So far as these inventions are applied to purposes purely useful, and so far as their products to not profess to offer anything delightful to contemplation, this movement in no way concerns our argument. But there is a vast multitude of products which do profess qualities of pleasantness, and upon which the ornaments intended to make them pleasurable are bestowed by machinery; and in speaking of these we are accustomed to the phrases art-industry, industrial art, art manufactures and the like. In these cases the industry or ingenuity which directs the machine is not fine art at all, since the object of the machine is simply to multiply as easily and as perfectly as possible a definite and prescribed impress or pattern. This is equally true whether the machine is a simple one, like the engraver's press, for producing and multiplying impressions from an engraved plate, or a highly complex one, like the loom, in which elaborate patterns of carpet or curtain are set for weaving. In both cases there exists behind the mechanical industry an industry which is one of fine art in its degree. In the case of the engraver's press, there exists behind the industry of the printer the art of the engraver, which, if the engraver is also the free inventor of the design, is then a fine art, or, if he is but the interpreter of the invention of another, is then in its turn a semi-mechanical skill applied in aid of the fine art of the first inventor. In the case of the weaver's loom there is, behind the mechanical industry which directs the loom at its given task, the fine art, or what ought to be the fine art, of the designer who has contrived the pattern. In the case of the engraving, the mechanical industry of printing only exists for the sake of bringing out and disseminating abroad the fine art employed upon the design. In the case of the carpet or curtain, the fine art is often only called in to make the product of the useful or mechanical industry of the loom acceptable, since the eye of man is so constituted as to receive pleasure or the reverse of pleasure from whatever it rests upon, and it is to the interest of the manufacturer to have his product so made as to give pleasure if it can. Whether the machine is thus a humble servant to the artist, or the artist a kind of humble purveyor to the machine, the fine art in the result is due to the former alone; and in any case it reaches the recipient at second-hand, having been put in circulation by a medium not artistic but mechanical.

Fine arts and machinery: "art manufactures."

Again, with reference not to the application of mechanical contrivances but to their invention; is not, it may be inquired, the title of artist due to the inventor of some of the astonishingly complex and astonishingly efficient machines of modern times? Does he not spend as much thought, labour, genius as any sculptor or musician in perfecting his construction according to his ideal, and is not the construction when it is done—so finished, so responsive in all its parts, so almost human—is not that worthy to be called a work of fine art? The answer is that the inventor has a definite and practical end before him; his ideal is not *free*; he deserves all credit as the perfector of a particular instrument for a prescribed function, but an artist, a free follower of the fine arts, he is not; although we may perhaps have to concede him a narrow sphere for the play of something like an artistic sense when he contrives the proportion, arrangement, form or finish of the several parts of his machine in one way rather than another, not because they work better so but simply because their look pleases him better.

Perfected machines: are they works of fine art?

Fine arts called a kind of play.

Returning from this digression, let us consider one common observation more on the nature of the fine arts. They are activities, it is said, which were put forth not because they need but because they like. They have the activity to spare, and to put it forth in this way pleases them. Fine art is to mankind what play is to the individual, a free and arbitrary vent for energy which is not needed to be spent upon tasks concerned with the conservation, perpetuation or protection of life. To insist on the superfluous or optional character of the fine arts, to call them the play or pastime of the human race as distinguished from its inevitable and sterner tasks, is obviously only to reiterate our fundamental distinction between the fine arts and the useful or necessary. But the distinction, as expressed in this particular form, has been interpreted in a great variety of ways and followed out to an infinity of conclusions, conclusions regarding both the nature of the activities themselves and the character and value of their results.

The play idea as worked out by the English associationists.

For instance, starting from this saying that the aesthetic activities are a kind of play, the English psychology of association goes back to the spontaneous cries and movements of children, in which their superfluous energies find a vent. It then enumerates pleasures of which the human constitution is capable apart from direct advantage or utility. Such are the primitive or organic pleasures of sight and hearing, and the secondary or derivative pleasures of association or unconscious reminiscence and inference that soon become mixed up with these. Such are also the pleasures derived from following any kind of mimicry, or representation of things real or like reality. The association psychology describes the grouping within the mind of predilections based upon these pleasures; it shows how the growing organism learns to govern its play, or direct its superfluous energies, in obedience to such predilections, till in mature individuals, and still more in mature societies, a highly regulated and accomplished group of leisure activities are habitually employed in supplying to a not less highly cultivated group of disinterested sensibilities their appropriate artistic pleasures. It is by Herbert Spencer that this view has been most fully and systematically worked out.

By Plato.

Again, in the views of an ancient philosopher, Plato, and a modern poet, Schiller, the consideration that the artistic activities are in the nature of play, and the manifestations in which they result independent of realities and utilities, has led to judgments so differing as the following. Plato held that the daily realities of things in experience are not realities, indeed, but only far-off shows or reflections of the true realities, that is, of certain ideal or essential forms which can be apprehended as existing by the mind. Holding this, Plato saw in the works of fine art but the reflections of reflections, the shows of shows, and depreciated them according to their degree of remoteness from the ideal, typical or sense-transcending existences. He sets the arts of medicine, agriculture, shoemaking and the rest above the fine arts, inasmuch as they produce something serious or useful (σπουδαῖόν τι). Fine art, he says, produces nothing useful, and makes only semblances (εἰδωλοποιϊκή), whereas what mechanical art produces are utilities, and even in the ordinary sense realities (αὐτοποιητική).

By Schiller.

In another age, and thinking according to another system, Schiller, so far from holding thus cheap the kingdom of play and show, regarded his sovereignty over that kingdom as the noblest prerogative of man. Schiller wrote his famous *Letters on the Aesthetic Education of Man* in order to throw into popular currency, and at the same time to modify and follow up in a particular direction, certain metaphysical doctrines which had lately been launched upon the schools by Kant. The spirit of man, said Schiller after Kant, is placed between two worlds, the physical world or world of sense, and the moral world or world of will. Both of these are worlds of constraint or necessity. In the sensible world, the spirit of man submits to constraint from without; in the moral world, it imposes constraint from within. So far as man yields to the importunities of sense, in so far he is bound and passive, the subject of outward shocks and victim of irrational forces. So far as he asserts himself by the exercise of will, imposing upon sense and outward things the dominion of the moral law within him, in so far he is free and active, the rational lord of nature and not her slave. Corresponding to these two worlds, he has within him two conflicting impulses or impulsions of his nature, the one driving him towards one way of living, the other towards another. The one, or sense-impulsion (*Stofftrieb*), Schiller thinks of as that which enslaves the spirit of man as the victim of matter, the other or moral impulsion (*Formtrieb*) as that which enthrones it as the dictator of form. Between the two the conflict at first seems inveterate. The kingdom of brute nature and sense, the sphere of man's subjection and passivity, wages war against the kingdom of will and moral law, the sphere of his activity and control, and every conquest of the one is an encroachment upon the other. Is there, then, no hope of truce between the two kingdoms, no ground where the two contending impulses can be reconciled? Nay, the answer comes, there is such a hope; such a neutral territory there exists. Between the passive kingdom of matter and sense, where man is compelled blindly to feel and be, and the active kingdom of law and reason, where he is compelled sternly to will and act, there is a kingdom where both sense and will may have their way, and where man may give the rein to all his powers. But this middle kingdom does not lie in the sphere of practical life and conduct. It lies in the sphere of those activities which neither subserve any necessity of nature nor fulfil any moral duty. Towards activities of this kind we are driven by a third impulsion of our nature not less essential to it than the other two, the impulsion, as Schiller calls it, of Play (*Spieltrieb*). Relatively to real life and conduct, play is a kind of harmless show; it is that which we are free to do or leave undone as we please, and which lies alike outside the sphere of needs and duties. In play we may do as we like, and no mischief will come of it. In this sphere man may put forth all his powers without risk of conflict, and may invent activities which will give a complete ideal satisfaction to the contending faculties of sense and will at once, to the impulses which bid him feel and enjoy the shocks of physical and outward things, and the impulse which bids him master such things, control and regulate them. In play you may impose upon Matter what Form you choose, and the two will not interfere with one another or clash. The kingdom of Matter and the kingdom of Form thus harmonized, thus reconciled by the activities of play and show, will in other words be the kingdom of the Beautiful. Follow the impulsion of play, and to the beautiful you will find your road; the activities you will find yourself putting forth will be the activities of aesthetic creation—you will have discovered or invented the fine arts. "Midway"—these are Schiller's own words—"midway between the formidable kingdom of natural forces and the hallowed kingdom of moral laws, the impulse of aesthetic creation builds up a third kingdom unperceived, the gladsome kingdom of play and show, wherein it emancipates man from all compulsion alike of physical and of moral forces." Schiller, the poet and enthusiast, thus making his own application of the Kantian metaphysics, goes on to set forth how the fine arts, or activities of play and show, are for him the typical, the ideal activities of the race, since in them alone is it possible for man to put forth his whole, that is his ideal self. "Only when he plays is man really and truly man." "Man ought only to play with the beautiful, and he ought to play with the beautiful only." "Education in taste and beauty has for its object to train up in the utmost attainable harmony the whole sum of the powers both of sense and spirit." And the rest of Schiller's argument is addressed to show how the activities of artistic creation, once invented, react upon other departments of human life, how the exercise of the play impulse prepares men for an existence in which the inevitable collision of the two other impulses shall be softened or averted more and more. That harmony of the powers which clash so violently in man's primitive nature, having first been found possible in the sphere of the fine arts, reflects itself, in his judgment, upon the whole composition of man, and attunes him, as an aesthetic being, into new capabilities for the conduct of his social existence.

The strong points of Schiller's theory.

Our reasons for dwelling on this wide and enthusiastic formula of Schiller's are both its importance in the history of reflection—it remained, indeed, for nearly a century a formula almost classical—and the measure of positive value which it still retains. The notion of a sphere of voluntary activity for the human spirit, in which, under no compulsion of necessity or conscience, we order matters as we like them apart from any practical end, seems coextensive with the widest conception of fine art and the fine arts as they exist in civilized and developed communities.

It insists on and brings into the light the free or optional character of these activities, as distinguished from others to which we are compelled by necessity or duty, as well as the fact that these activities, superfluous as they may be from the points of view of necessity and of duty, spring nevertheless from an imperious and a saving instinct of our nature. It does justice to the part which is, or at any rate may be, filled in the world by pleasures which are apart from profit, and by delights for the enjoyment of which men cannot quarrel. It claims the dignity they deserve for those shows and pastimes in which we have found a way to make permanent all the transitory delights of life and nature, to turn even our griefs and yearnings, by their artistic utterance, into sources of appeasing joy, to make amends to ourselves for the confusion and imperfection of reality by conceiving and imaging forth the semblances of things clearer and more complete, since in contriving them we incorporate with the experiences we have had the better experiences we have dreamed of and longed for.

Its weak points.

One manifestly weak point of Schiller's theory is that though it asserts that man ought only to play with the beautiful, and that he is his best or ideal self only when he does so, yet it does not sufficiently indicate what kinds of play are beautiful nor why we are moved to adopt them. It does not show how the delights of the eye and spirit in contemplating forms, colours and movements, of the ear and spirit in apprehending musical and verbal sounds, or of the whole mind at once in following the comprehensive current of images called up by poetry—it does not clearly show how delights like these differ from those yielded by other kinds of play or pastime, which are by common consent excluded from the sphere of fine art.

Kinds of play which are not fine art.

The chase, for instance, is a play or pastime which gives scope for any amount of premeditated skill; it has pleasures, for those who take part in it, which are in some degree analogous to the pleasures of the artist; we all know the claims made on behalf of the noble art of venerie (following true medieval precedent) by the knights and woodmen of Sir Walter Scott's romances. It is an obvious reply to say that though the chase is play to us, who in civilized communities follow it on no plea of necessity, yet to a not remote ancestry it was earnest; in primitive societies hunting does not belong to the class of optional activities at all, but is among the most pressing of utilitarian needs. But this reply loses much of its force since we have learnt how many of the fine arts, however emancipated from direct utility now, have as a matter of history been evolved out of activities primarily utilitarian. It would be more to the point to remark that the pleasures of the sportsman are the only pleasures arising from the chase; his exertions afford pain to the victim, and no satisfaction to any class of recipients but himself; or at least the sympathetic pleasures of the lookers-on at a hunt or at a battle are hardly to be counted as pleasures of artistic contemplation. The issue which they witness is a real issue; the skilled endeavours with which they sympathize are put forth for a definite practical result, and a result disastrous to one of the parties concerned.

What then, it may be asked, about athletic games and sports, which hurt nobody, have no connexion with the chase, and give pleasure to thousands of spectators? Here the difference is, that the event which excites the spectator's interest and pleasure at a race or match or athletic contest is not a wholly unreal or simulated event; it is less real than life, but it is more real than art. The contest has no momentous practical consequences, but it is a contest, an ἄθλος, all the same, in which competitors put forth real strength, and one really wins and others are defeated. Such a struggle, in which the exertions are real and the issue uncertain, we follow with an excitement and a suspense different in kind from the feelings with which we contemplate a fictitious representation. For example, let the reader recall the feelings with which he may have watched a real fencing bout, and compare them with those with which he watches the simulated fencing bout in Shakespeare's *Hamlet*. The instance is a crucial one, because in the fictitious case the excitement is heightened by the introduction of the poisoned foil, and by the tremendous consequences which we are aware will turn, in the representation, on the issue. Yet because the fencing scene in *Hamlet* is a representation, and not real, we find ourselves watching it in a mood quite different from that in which we watch the most ordinary real fencing-match with vizors and blunt foils; a mood more exalted, if the representation is good, but amid the aesthetic emotions of which the fluctuations of strained, if trivial, suspense and the eagerness of sympathetic participation find no place. "The delight of tragedy," says Johnson, "proceeds from our consciousness of fiction; if we thought murders and treasons real, they would please no more." So does the peculiar quality of our pleasure in watching the fencing-match in *Hamlet*, or the wrestling-match in *As You Like It*, depend on our consciousness of fiction: if we thought the matches real they might please us still, but please us in a different way. Again, of athletics in general, they are pursuits to a considerable degree definitely utilitarian, having for their specific end the training and strengthening of individual human bodies. Nevertheless, in some systems the title of fine arts has been consistently claimed, if not for athletics technically so called, and involving the idea of competition and defeat, at any rate for gymnastics, regarded simply as a display of the physical frame of man cultivated by exercise—as, for instance, it was cultivated by the ancient Greeks—to an ideal perfection of beauty and strength.

The play theory in the light of anthropological research.

But apart from criticisms like these on the theory of Schiller, the Kantian doctrine of a metaphysical opposition between the senses and the reason has for most minds of to-day lost its validity, and with it falls away Schiller's derivative theory of a *Stofftrieb* and a *Formtrieb* contending like enemies for dominion over the human spirit, with a neutral or reconciling *Spieltrieb* standing between them. Even taking the existence of the *Spieltrieb*, or play-impulse, by itself as a plain and indubitable fact in human nature, the theory that this impulse is the general or universal source of the artistic activities of the race, which seemed adequate to thinkers so far apart as Schiller and Herbert Spencer, is found no longer to hold water. The tendency of recent thought and study on these subjects has been to abandon the abstract or dialectical method in favour of the methods of historical and anthropological inquiry. In the light of these methods it is claimed that the artistic activities of the race spring in point of fact from no single source but from a number of different sources. It is admitted that the play-impulse is one of these, and the allied and overlapping, but not identical, impulse of mimicry or imitation another. But it is urged at the same time that these twin impulses, rooted as they both are among the primordial faculties both of men and animals, are far from existing merely to provide a vent whereby the superfluous energies of sentient beings may discharge themselves at pleasure, but are indispensable utilitarian instincts, by which the young are led to practise and rehearse in sport those activities the exercise of which in earnest will be necessary to their preservation in the adult state. (The researches of Professor Karl Groos in this field seem to be conclusive.) A third impulse innate in man, though scarcely so primordial as the other two, and one which the animals cannot share with him, is the impulse of record or commemoration. Man instinctively desires, alike for safety, use and pleasure, to perpetuate and hand on the memory of his deeds and experiences whether by words or by works of his hands contrived for permanence. This impulse of record is the most stimulating ally of the impulse of mimicry or imitation, and perhaps a large part of the arts usually put down as springing from the love of imitation ought rather to be put down as springing from the commemorative or recording impulse, using imitation as its necessary means. Granting the existence in primitive man of these three allied impulses of play, of mimicry, and of record, it is urged that they are so many distinct though contiguous sources from which whole groups of the fine arts have sprung, and that all three in their origin served ends primarily or in great part utilitarian. Examining any of the rudimentary artistic activities of primitive man already mentioned: the decoration of the person with tattooings or strings of shells or teeth or feathers had primarily the object of attracting or impressing the opposite sex, or terrifying an enemy, or indicating the tribal relations of the person so adorned; some of the same purposes were served by the scratches and tufts and markings on weapons or utensils; the *graffiti* or outline drawings of animals incised by cave-dwellers on bones are surmised to have sprung in like manner from the desire of conveying information, combined, probably, sometimes with that of obtaining magic power over the things represented; the erection of memorial shrines and images of all kinds, from the rudest upwards, had among other purposes the highly practical one of propitiating the spirits of the departed; and so on through the whole range of kindred activities. It is contended, next, that such activities only take on the character of rudimentary fine arts at a certain stage of their evolution. Before they can assume that character, they must come under the influence and control of yet another rooted and imperious impulse in mankind. That is the impulse of emotional self-expression, the instinct which compels us to seek relief under the stimulus of pent-up feeling; an instinct, it is added, second only in power to those which drive us to seek food, shelter, protection from enemies, and satisfaction for sexual desires. According to a law of our constitution, the argument goes on, this need for emotional self-expression finds itself fully satisfied only by certain modes of activity; those, namely, which either have in themselves, or impress on their products, the property of rhythm, that is, of regular interval and recurrence, flow, order and proportion. Leaping, shouting, and clapping hands is the human animal's most primitive way of seeking relief under the pressure of emotion; so soon as one such animal found out that he both expressed and relieved his emotions best, and communicated them best to his fellows, when he moved in regular rhythm and shouted in regular time and with regular changes of pitch, he ceased to be a mere excited savage and became a primitive dancer, singer, musician—in a word, artist. So soon as another found himself taking pleasure in certain qualities of regular interval, pattern and arrangement of lines, shapes and colours, apart from all questions of purpose or utility, in his tattooings and self-adornments, his decoration of tools or weapons or structures for shelter or commemoration, he in like manner became a primitive artist in ornamental and imitative design.

The special qualities of pleasure felt and communicated by doing things in one way rather than another, independently of direct utility, which we indicated at the outset as characteristic of the whole range of the fine arts, appear on this showing to be dependent primarily on the response of our organic sensibilities of nerve and muscle, eye, ear and brain to the stimulus of rhythm (using the word in its widest sense) imparted either to our own actions and utterances or to the works of our hands. Such pleasures would seem to have been first experienced by man directly, in the endeavour to find relief with limbs and voice from states of emotional tension, and then incidentally, as a kind of by-product arising and affording similar relief in the development of a wide range of utilitarian activities. Into the nature of those organic sensibilities, and the grounds of the relief they afford us when gratified, it is the province of physiological and psychological aesthetics to inquire: our business here is only with the activities directed towards their satisfaction and the results of those activities in the works of fine art. On the whole the account of the matter yielded by the method of anthropological research, and here very briefly summarized, may be accepted as answering more closely to the complex nature of the facts than any of the accounts hitherto current; and so we may expand our first tentative suggestion of a definition into one more complete, which from the nature of the case cannot be very brief or simple and must run somehow thus: *Fine art is everything which man does or makes in one way rather than another, freely and with premeditation, in order to express and arouse emotion, in obedience to laws of rhythmic movement or utterance or regulated design, and with results independent of direct utility and capable of affording to many permanent and disinterested delight.*

II. *Of the Fine Arts severally.*

Modes in which the five greater arts have been classified.

Architecture, sculpture, painting, music and *poetry* are by common consent, as has been said at the outset, the five principal or greater fine arts practised among developed communities of men. It is possible in thought to group these five arts in as many different orders as there are among them different kinds of relation or affinity. One thinker fixes his attention upon one kind of relations as the most important, and arranges his group accordingly; another upon another; and each, when he has done so, is very prone to claim for his arrangement the virtue of being the sole essentially and fundamentally true. For example, we may ascertain one kind of relations between the arts by inquiring which is the simplest or most limited in its effects, which next simplest, which another degree less simple, which least simple or most complex of them all. This, the relation of progressive complexity or comprehensiveness between the fine arts, is the relation upon which Auguste Comte fixed his attention, and it yields in his judgment the following order:—Architecture lowest in complexity, because both of the kinds of effects which it produces and of the material conditions and limitations under which it works; sculpture next; painting third; then music; and poetry highest, as the most complex or comprehensive art of all, both in its own special effects and in its resources for ideally calling up the effects of all the other arts as well as all the phenomena of nature and experiences of life. A somewhat similar grouping was adopted, though from the consideration of a wholly different set of relations, by Hegel. Hegel fixed his attention on the varying relations borne by the idea, or spiritual element, to the embodiment of the idea, or material element, in each art. Leaving aside that part of his doctrine which concerns, not the phenomena of the arts themselves, but their place in the dialectical world-plan or scheme of the universe, Hegel said in effect something like this. In certain ages and among certain races, as in Egypt and Assyria, and again in the Gothic age of Europe, mankind has only dim ideas for art to express, ideas insufficiently disengaged and realized, of which the expression cannot be complete or lucid, but only adumbrated and imperfect; the characteristic art of those ages is a symbolic art, with its material element predominating over and keeping down its spiritual; and such a symbolic art is architecture. In other ages, as in the Greek age, the ideas of men have come to be definite, disengaged, and clear; the characteristic art of such an age will be one in which the spiritual and material elements are in equilibrium, and neither predominates over nor keeps down the other, but a thoroughly realized idea is expressed in a thoroughly adequate and lucid form; this is the mode of expression called classic, and the classic art is sculpture. In other ages, again, and such are the modern ages of Europe, the idea grows in power and becomes importunate; the spiritual and material elements are no longer in equilibrium, but the spiritual element predominates; the characteristic arts of such an age will be those in which thought, passion, sentiment, aspiration, emotion, emerge in freedom, dealing with material form as masters or declining its shackles altogether; this is the romantic mode of expression, and the romantic arts are painting, music and poetry. A later systematizer, Lotze, fixed his attention on the relative degrees of freedom or independence which the several arts enjoy—their freedom, that is, from the necessity of either imitating given facts of nature or ministering, as part of their task, to given practical uses. In his grouping, instead of the order architecture, sculpture, painting, music, poetry, music comes first, because it has neither to imitate any natural facts nor to serve any practical end; architecture next, because, though it is tied to useful ends and material conditions, yet it is free from the task of imitation, and pleases the eye in its degree, by pure form, light and shade, and the rest, as music pleases the ear by pure sound; then, as arts all tied to the task of imitation, sculpture, painting and poetry, taken in progressive order according to the progressing comprehensiveness of their several resources.

Place of the minor or subordinate fine arts.

The thinker on these subjects has, moreover, to consider the enumeration and classification of the lesser or subordinate fine arts. Whole clusters or families of these occur to the mind at once; such as *dancing*, an art subordinate to music, but quite different in kind; *acting*, an art auxiliary to *poetry*, from which in kind it differs no less; *eloquence* in all kinds, so far as it is studied and not merely spontaneous; and among the arts which fashion or dispose material objects, *embroidery* and the weaving of patterns, *pottery, glassmaking, goldsmith's work* and *jewelry, joiner's work, gardening* (according to the claim of some), and a score of other dexterities and industries which are more than mere dexterities and industries because they add elements of beauty and pleasure to elements of serviceableness and use. To decide whether any given one of these has a right to the title of fine art, and, if so, to which of the greater fine arts it should be thought of as appended and subordinate, or between which two of them intermediate, is often no easy task.

No one classification final or sufficient.

The weak point of all classifications of the kind of which we have above given examples is that each is intended to be final, and to serve instead of any other. The truth is, that the relations between the several fine arts are much too complex for any single classification to bear this character. Every classification of the fine arts must necessarily be provisional, according to the particular class of relations which it keeps in view. And for practical purposes it is requisite to bear in mind not one classification but several. Fixing our attention, not upon complicated or problematical relations between the various arts, but only upon their simple and undisputed relations, and giving the first place in our consideration to the five greater arts of architecture, sculpture, painting, music and poetry, we shall find at least three principal modes in which every fine art either resembles or differs from the rest.

First classification: the shaping and the speaking arts.

1. *The Shaping and the Speaking Arts (or Arts of Form and Arts of Utterance, or Arts of Space and Arts of Time).*—Each of the greater arts either makes something or not which can be seen and handled. The arts which make something which can be seen and handled are architecture, sculpture and painting. In the products or results of all these arts external matter is in some way or another manually put together, fashioned or disposed. But music and poetry do not produce any results of this kind. What music produces is something that can be heard, and what poetry produces is something that can be either heard or read—which last is a kind of ideal hearing, having for its avenue the eye instead of the ear, and for its material, written signs for words instead of the spoken words themselves. Now what the eye sees from any one point of view, it sees all at once; in other words, the parts of anything we see fill or occupy not time but space, and reach us from various points in space at a single simultaneous perception. If we are at the proper distance we see at one glance a house from the ground to the chimneys, a statue from head to foot, and in a picture at once the foreground and background, and everything that is within the four corners of the frame. There is, indeed, this distinction to be drawn, that in walking round or through a temple, church, house or any other building, new parts and proportions of the building unfold themselves to view; and the same thing happens in walking round a statue or turning it on a turntable: so that the spectator, by his own motions and the time it takes to effect them, can impart to architecture and sculpture something of the character of time arts. But their products, as contemplated from any one point of view, are in themselves solid, stationary and permanent in space. Whereas the parts of anything we hear, or, reading, can imagine that we hear, fill or occupy not space at all but time, and can only reach us from various points in time through a continuous series of perceptions, or, in the case of reading, of images raised by words in the mind. We have to wait, in music, while one note follows another in a theme, and one theme another in a movement; and in poetry, while one line with its images follows another in a stanza, and one stanza another in a canto, and so on. It is a convenient form of expressing both aspects of this difference between the two groups of arts, to say that architecture, sculpture and painting are arts which give shape to things in space, or, more briefly, shaping arts; and music and poetry arts which give utterance to things in time, or, more briefly, speaking arts. These simple terms of the *shaping* and the *speaking* arts (the equivalent of the Ger. *bildende und redende Künste*) are not usual in English; but they seem appropriate and clear; the simplest alternatives for their use is to speak of the *manual* and the *vocal* arts, or the arts of *space* and the arts of *time*. This is practically, if not logically, the most substantial and vital distinction upon which a classification of the fine arts can be based. The arts which surround us in space with stationary effects for the eye, as the house we live in, the pictures on the walls, the marble figure in the vestibule, are stationary, hold a different kind of place in our experience—not a greater or a higher place, but essentially a different place—from the arts which provide us with transitory effects in time, effects capable of being awakened for the ear or mind at any moment, as a symphony is awakened by playing and an ode by reading, but lying in abeyance until we bid that moment come, and passing away when the performance or the reading is over. Such, indeed, is the practical force of the distinction that in modern usage the expression *fine art*, or even *art*, is often used by itself in a sense which tacitly excludes music and poetry, and signifies the group of manual or shaping arts alone.

Intermediate class of arts of motion.

As between three of the five greater arts and the other two, the distinction on which we are now dwelling is complete. Buildings, statues, pictures, belong strictly to sight and space; to time and to hearing, real through the ear, or ideal through the mind in reading, belong music and poetry. Among the lesser or subordinate arts, however, there are several in which this distinction finds no place, and which produce, in space and time at once, effects midway between the stationary or stable, and the transitory or fleeting. Such is the *dramatic* art, in which the actor makes with his actions and gestures, or several actors make with the combination of their different actions and gestures, a kind of shifting picture, which appeals to the eyes of the witnesses while the sung or spoken words of the drama appeal to their ears; thus making of them spectators and auditors at once, and associating with the pure time art of words the mixed time-and-space art of bodily movements. As all movement whatsoever is necessarily movement through space, and takes time to happen, so every other fine art which is wholly or in part an act of movement partakes in like manner of this double character. Along with acting thus comes *dancing*. Dancing, when it is of the mimic character, may itself be a kind of acting; historically, indeed, the dancer's art was the parent of the actor's; whether apart from or in conjunction with the mimic element, dancing is an art in which bodily movements obey, accompany, and, as it were, express or accentuate in space the time effects of music. *Eloquence* or oratory in like manner, so far as its power depends on studied and premeditated gesture, is also an art which to some extent enforces its primary appeal through the ear in time by a secondary appeal through the eye in space. So much for the first distinction, that between the shaping or space arts and the speaking or time arts, with the intermediate and subordinate class of arts which, like acting, dancing, oratory, add to the pure time element a mixed time-and-space element. These last can hardly be called shaping arts, because it is his own person, and not anything outside himself, which the actor, the dancer, the orator disposes or adjusts; they may perhaps best be called arts of motion, or moving arts.

Second classification: the imitative and non-imitative arts.

2. *The Imitative and the Non-Imitative Arts.*—Each art either does or does not represent or imitate something which exists already in nature. Of the five greater fine arts, those which thus represent objects existing in nature are sculpture, painting and poetry. Those which do not represent anything so existing are music and architecture. On this principle we get a new grouping. Two shaping or space arts and one speaking or time art now form the imitative group of sculpture, painting and poetry; while one space art and one time art form the non-imitative group of music and architecture. The mixed space-and-time arts of the actor, and of the dancer, so far as he or she is also a mimic, belong, of course, by their very name and nature, to the imitative class.

The imitative functions of art according to Aristotle.

It was the imitative character of the fine arts which chiefly occupied the attention of Aristotle. But in order to understand the art theories of Aristotle it is necessary to bear in mind the very different meanings which the idea of imitation bore to his mind and bears to ours. For Aristotle the idea of imitation or representation (*mimēsis*) was extended so as to denote the expressing, evoking or making manifest of anything whatever, whether material objects or ideas or feelings. Music and dancing, by which utterance or expression is given to emotions that may be quite detached from all definite ideas or images, are thus for him varieties of imitation. He says, indeed, *most* music and dancing, as if he was aware that there were exceptions, but he does not indicate what the exceptions are; and under the head of imitative music, he distinctly reckons some kinds of instrumental music without words. But in our own more restricted usage, to imitate means to copy, mimic or represent some existing phenomenon, some definite reality of experience; and we can only call those imitative arts which bring before us such things, either directly by showing us their actual likeness, as sculpture does in solid form, and as painting does by means of lines and colours on a plane surface, or else indirectly, by calling up ideas or images of them in the mind, as poetry and literature do by means of words. It is by a stretch of ordinary usage that we apply the word imitation even to this last way of representing things; since words are no true likeness of, but only customary signs for, the thing they represent. And those arts we cannot call imitative at all, which by combinations of abstract sound or form express and arouse emotions unattended by the recognizable likeness, idea or image of any definite thing.

Non-imitative character of music.

Now the emotions of music when music goes along with words, whether in the shape of actual song or even of the instrumental accompaniment of song, are no doubt in a certain sense attended with definite ideas; those, namely, which are expressed by the words themselves. But the same ideas would be conveyed to the mind equally well by the same words if they were simply spoken. What the music contributes is a special element of its own, an element of pure emotion, aroused through the sense of hearing, which heightens the effect of the words upon the feelings without helping to elucidate them for the understanding. Nay, it is well known that a song well sung produces its intended effect upon the feelings almost as fully though we fail to catch the words or are ignorant of the language to which they belong. Thus the view of Aristotle cannot be defended on the ground that he was familiar with music only in an elementary form, and principally as the direct accompaniment of words, and that in his day the modern development of the art, as an art for building up constructions of independent sound, vast and intricate fabrics of melody and harmony detached from words, was a thing not yet imagined. That is perfectly true; the immense technical and intellectual development of music, both in its resources and its capacities, is an achievement of the modern world; but the essential character of musical sound is the same in its most elementary as in its most complicated stage. Its privilege is to give delight, not by communicating definite ideas, or calling up particular images, but by appealing to certain organic sensibilities in our nerves of hearing, and through such appeal expressing on the one part and arousing on the other a unique kind of emotion. The emotion caused by music may be altogether independent of any ideas conveyable by words. Or it may serve to intensify and enforce other emotions arising at the same time in connexion with the ideas conveyed by words; and it was one of the contentions of Richard Wagner that in the former phase the art is now exhausted, and that only in the latter are new conquests in store for it. But in either case the music is the music, and *is like nothing else*; it is no representation or similitude of anything whatsoever.

An objection and its answer.

But does not instrumental music, it will be said, sometimes really imitate the sounds of nature, as the piping of birds, the whispering of woods, the moaning of storms or explosion of thunder; or does it not, at any rate, suggest these things by resemblances so close that they almost amount in the strict sense to imitation? Occasionally, it is true, music does allow itself these playful excursions into a region of quasi-imitation or mimicry. It modifies the character of its abstract sounds into something, so to speak, more concrete, and, instead of sensations which are like nothing else, affords us sensations which recognizably resemble those we receive from some of the sounds of nature. But such excursions are hazardous, and to make them often is the surest proof of vulgarity in a musician. Neither are the successful effects of the great composers in evoking ideas of particular natural phenomena generally in the nature of real imitations or representations; although passages such as the notes of the dove and nightingale in Haydn's *Creation*, and of the cuckoo in Beethoven's *Pastoral Symphony*, the bleating of the sheep in the *Don Quixote* symphony of Richard Strauss, must be acknowledged to be exceptions. Again, it is a recognized fact concerning the effect of instrumental music on those of its hearers who try to translate such effect into words, that they will all find themselves in tolerable agreement as to the meaning of any passage so long as they only attempt to describe it in terms of vague emotion, and to say such and such a passage expresses, as the case may be, dejection or triumph, effort or the relaxation of effort, eagerness or languor, suspense or fruition, anguish or glee. But their agreement comes to an end the moment they begin to associate, in their interpretation, definite ideas with these vague emotions; then we find that what suggests in idea to one hearer the vicissitudes of war will suggest to another, or to the same at another time, the vicissitudes of love, to another those of spiritual yearning and aspiration, to another, it may be, those of changeful travel by forest, field and ocean, to another those of life's practical struggle and ambition. The infinite variety of ideas which may thus be called up in different minds by the same strain of music is proof enough that the music is not *like* any particular thing. The torrent of varied and entrancing emotion which it pours along the heart, emotion latent and undivined until the spell of sound begins, that is music's achievement and its secret. It is this effect, whether coupled or not with a trained intellectual recognition of the highly abstract and elaborate nature of the laws of the relation, succession and combinations of sounds on which the effect depends, that has caused some thinkers, with Schopenhauer at their head, to find in music the nearest approach we have to a voice from behind the veil, a universal voice expressing the central purpose and deepest essence of things, unconfused by fleeting actualities or by the distracting duty of calling up images of particular and perishable phenomena. "Music," in Schopenhauer's own words, "reveals the innermost essential being of the world, and expresses the highest wisdom in a language the reason does not understand."

Definition of music.

Aristotle endeavoured to frame a classification of the arts, in their several applications and developments, on two grounds—the nature of the objects imitated by each, and the means or instruments employed in the imitation. But in the case of music, as it exists in the modern world, the first part of this endeavour falls to the ground, because the object imitated has, in the sense in which we now use the word imitation, no existence. The means employed by music are successions and combinations of vocal or instrumental sounds regulated according to the three conditions of time and pitch (which together make up melody) and harmony, or the relations of different strains of time and tone cooperant but not parallel. With these means, music either creates her independent constructions, or else accompanies, adorns, enforces the imitative art of speech—but herself imitates not; and may be best defined simply as *a speaking or time art, of which the business is to express and arouse emotion by successions and combinations of regulated sound.*

Non-imitative character of architecture.

That which music is thus among the speaking or time-arts, architecture is among the shaping or space-arts. As music appeals to our faculties for taking pleasure in non-imitative combinations of transitory sound, so architecture appeals to our faculties for taking pleasure in non-imitative combinations of stationary mass. Corresponding to the system of ear-effects or combinations of time, tone and harmony with which music works, architecture works with a system of eye-effects or combinations of mass, contour, light and shade, colour, proportion, interval, alternation of plain and decorated parts, regularity and variety in regularity, apparent stability, vastness, appropriateness and the rest. Only the materials of architecture are not volatile and intangible like sound, but solid timber, brick, stone, metal and mortar, and the laws of weight and force according to which these materials have to be combined are much more severe and cramping than the laws of melody and harmony which regulate the combinations of music. The architect is further subject, unlike the musician, to the dictates and precise prescriptions of utility. Even in structures raised for purposes not of everyday use and necessity, but of commemoration or worship, the rules for such commemoration and such worship have prescribed a more or less fixed arrangement and proportion of the parts or members, whether in the Egyptian temple or temple-tomb, the Greek temple or herōon, or in the churches of the middle ages and Renaissance in the West.

Analogies of architecture and music.

Hence the effects of architecture are necessarily less full of various, rapturous and unforeseen enchantment than the effects of music. Yet for those who possess sensibility to the pleasures of the eye and the perfections of shaping art, the architecture of the great ages has yielded combinations which, so far as comparison is permissible between things unlike in their materials, fall little short of the achievements of music in those kinds of excellence which are common to them both. In the virtues of lucidity, of just proportion and organic interdependence of the several parts or members, in the mathematic subtlety of their mutual relations, and of the transitions from one part or member to another, in purity and finish of individual forms, in the character of one thing growing naturally out of another and everything serving to complete the whole—in these qualities, no musical combination can well surpass a typical Doric temple such as the Parthenon at Athens. None, again, can well surpass some of the great cathedrals of the middle ages in the qualities of sublimity, of complexity, in the power both of expressing and suggesting spiritual aspiration, in the invention of intricate developments and ramifications about a central plan, in the union of majesty in the main conception with fertility of adornment in detail. In fancifulness, in the unexpected, in capricious and far-sought opulence, in filling the mind with mingled enchantments of east and west and south and north, music can hardly do more than a building like St Mark's at Venice does with its blending of Byzantine elements, Italian elements, Gothic elements, each carried to the utmost pitch of elaboration and each enriched with a hundred caprices of ornament, but all working together, all in obedience to a law, and "all beginning and ending with the Cross."

Exceptional and limited admission of imitative forms in architecture.

In the case of architecture, however, as in the case of music, the non-imitative character must not be stated quite without exception or reserve. There have been styles of architecture in which forms suggesting or imitating natural or other phenomena have held a place among the abstract forms proper to the art. Often the mode of such suggestions is rather symbolical to the mind than really imitative to the eye; as when the number and relations of the heavenly planets were imaged by that race of astronomers, the Babylonians, in the seven concentric walls of their great temple, and in many other architectural constructions; or as when the shape of the cross was adopted, with innumerable slight varieties and modifications, for the ground plan of the churches of Christendom. Passing to examples of imitation more properly so called, it may be true, and was, at any rate, long believed, that the aisles of Gothic churches, when once the use of the pointed arch had been evolved as a principle of construction, were partly designed to evoke the idea of the natural aisles of the forest, and that the upsoaring forest trunks and meeting branches were more or less consciously imaged in their piers and vaultings. In the temple-palaces of Egypt, one of the regular architectural members, the sustaining pier, is often systematically wrought in the actual likeness of a conventionalized cluster of lotus stems, with lotus flowers for the capital. When we come to the fashion, not rare in Greek architecture, of carving this same sustaining member, the column, in complete human likeness, and employing caryatids, canephori, atlases or the like, to support the entablature of a building, it then becomes difficult to say whether we have to do with a work of architecture or of sculpture. The case, at any rate, is different from that in which the sculptor is called in to supply surface decoration to the various members of a building, or to fill with the products of his own art spaces in the building specially contrived and left vacant for that purpose. When the imitative feature is in itself an indispensable member of the architectural construction, to architecture rather than sculpture we shall probably do best to assign it.

Definition of architecture.

Defining architecture, then (apart from its utility, which for the present we leave out of consideration), as *a shaping art, of which the function is to express and arouse emotion by combinations of ordered and decorated mass*, we pass from the characteristics of the non-imitative to those of the imitative group of arts, namely sculpture, painting and poetry.

The imitative arts are arts of record using imitation as their means.

If we keep in mind the source and origin of these arts, we must remember what has already been observed, that they spring by no means from man's love of imitation alone, but from his desire to record and commemorate experience, using the faculty of imitation as his means. Mnemosyne (Memory) was in Greek tradition the mother of the Muses; imitation, in the sense above defined, is but their instrument. Hence we might think "arts of record" a better name for this group than arts of imitation. The answer is—but a large part of pure architecture is also commemorative; from the pyramids and obelisks of Egypt down there are many monuments in which the impulse of men to perpetuate their own or others' memories has worked without any aid of imitation. Hence as the definition of a class of arts contrasted with architecture and music the name "arts of record" would fail; and we have to fall back on the current and established name of the "imitative arts." In considering them we cannot do better than follow that Aristotelian division which describes each art according, first, to the objects which it imitates, and, secondly, to the means it employs.

Sculpture as an imitative art.

Taking sculpture first, as imitating a smaller range of objects than the other two, and imitating them more completely: sculpture may have for the objects of its imitation the shapes of whatever things possess length, breadth and magnitude. For its means or instruments it has solid form, which the sculptor either carves out of a hard substance, as in the case of wood and stone, or models in a yielding substance, as in the case of clay and wax, or casts in a dissolved or molten substance, as in the case of plaster and of metal in certain uses, or beats, draws or chases in a malleable and ductile substance, as in the case of metal in other uses, or stamps from dies or moulds, a method sometimes used in all soft or fusible materials. Thus a statue or statuette may either be carved straight out of a block of stone or wood, or first modelled in clay or wax, then moulded in plaster or some equivalent material, and then carved in stone or cast in bronze. A gem is wrought in stone by cutting and grinding. Figures in jeweller's work are wrought by beating and chasing; a medallion by beating and chasing or else by stamping from a die; a coin by stamping from a die; and so forth. The process of modelling (Gr. πλάττειν) in a soft substance being regarded as the typical process of the sculptor, the name *plastic art* has been given to his operations in general.

Sculpture in the round and in relief.

In general terms, the task of sculpture is to imitate solid form with solid form. But sculptured form may be either completely or incompletely solid. Sculpture in completely solid form exactly reproduces, whether on the original or on a different scale, the relations or proportions of the object imitated in the three dimensions of length, breadth and depth or thickness. Sculpture in incompletely solid form reproduces the proportions of the objects with exactness only so far as concerns two of its dimensions, namely, those of length and breadth; while the third dimension, that of depth or thickness, it reproduces in a diminished proportion, leaving it to the eye to infer, from the partial degree of projection given to the work, the full projection of the object imitated. The former, or completely solid kind of sculpture, is called sculpture in the round; its works stand free, and can be walked round and seen from all points. The latter, or incompletely solid kind of sculpture, is called sculpture in relief; its works do not stand free, but are engaged in or attached to a background, and can only be seen from in front. According, in the latter kind of sculpture, to its degree of projection from the background, a work is said to be in high or in low relief. Sculpture in the round and sculpture in relief are alike in this, that the properties of objects which they imitate are their external forms as defined by their outlines—that is, by the boundaries and circumscriptions of their masses—and their light and shade—the lights and shadows, that is, which diversify the curved surfaces of the masses in consequence of their alternations and gradations of projection and recession. But the two kinds of sculpture differ in this. A work of sculpture in the round imitates the whole of the outlines by which the object imitated is circumscribed in the three dimensions of space, and presents to the eye, as the object itself would do, a new outline succeeding the last every moment as you walk round it. Whereas a work of sculpture in relief imitates only one outline of any object; it takes, so to speak, a section of the object as seen from a particular point, and traces on the background the boundary-line of that particular section; merely suggesting, by modelling the surface within such boundary according to a regular, but a diminished, ratio of projection, the other outlines which the object would present if seen from all sides successively.

Subjects proper for sculpture in the round.

As sculpture in the round reproduces the real relations of a solid object in space, it follows that the only kind of object which it can reproduce with pleasurable effect according to the laws of regulated or rhythmical design must be one not too vast or complicated, one that can afford to be detached and isolated from its surroundings, and of which all the parts can easily be perceived and apprehended in their organic relations. Further, it will need to be an object interesting enough to mankind in general to make them take delight in seeing it reproduced with all its parts in complete imitation. And again, it must be such that some considerable part of the interest lies in those particular properties of outline, play of surface, and light and shade which it is the special function of sculpture to reproduce. Thus a sculptured representation in the round, say, of a mountain with cities on it, would hardly be a sculpture at all; it could only be a model, and as a model might have value; but value as a work of fine art it could not have, because the object imitated would lack organic definiteness and completeness; it would lack universality of interest, and of the interest which it did possess, a very inconsiderable part would depend upon its properties of outline, surface, and light and shade. Obviously there is no kind of object in the world that so well unites the required conditions for pleasurable imitation in sculpture as the human body. It is at once the most complete of organisms, and the shape of all others the most subtle as well as the most intelligible in its outlines; the most habitually detached in active or stationary freedom; the most interesting to mankind, because its own; the richest in those particular effects, contours and modulations, contrasts, harmonies and transitions of modelled surface and circumscribing line, which it is the prerogative of sculpture to imitate. Accordingly the object of imitation for this art is pre-eminently the body of man or woman. That it has not been for the sake of representing men and women as such, but for the sake of representing gods in the likeness of men and women, that the human form has been most enthusiastically studied, does not affect this fact in the theory of the art, though it is a consideration of great importance in its history. Besides the human form, sculpture may imitate the forms of those of the lower animals whose physical endowments have something of a kindred perfection, with other natural or artificial objects as may be needed merely by way of accessory or symbol. The body must for the purposes of this art be divested of covering, or covered only with such tissues as reveal, translate or play about without concealing it. Chiefly in lands and ages where climate and social use have given the sculptor the opportunity of studying human forms so draped or undraped has this art attained perfection, and become exemplary and enviable to that of other races.

Subjects proper for sculpture in relief.

Relief sculpture is more closely connected with architecture than the other kind, and indeed is commonly used in subordination to it. But if its task is thus somewhat different from that of sculpture in the round, its principal objects of imitation are the same. The human body remains the principal theme of the sculptor in relief; but the nature of his art allows, and sometimes compels, him to include other objects in the range of his imitation. As he has not to represent the real depth or projection of things, but only to suggest them according to a ratio which he may fix himself, so he can introduce into the third or depth dimension, thus arbitrarily reduced, a multitude of objects for which the sculptor in the round, having to observe the real ratio of the three dimensions, has no room. He can place one figure in slightly raised outline emerging from behind the more fully raised outline of another, and by the same system can add to his representation rocks, trees, nay mountains and cities and birds on the wing. But the more he uses this liberty the less will he be truly a sculptor. Solid modelling, and real light and shade, are the special means or instruments of effect which the sculptor alone among imitative artists enjoys. Single outlines and contours, the choice of one particular section and the tracing of its circumscription, are means which the sculptor enjoys in common with the painter or draughtsman. And indeed, when we consider works executed wholly or in part in very low relief, whether Assyrian battle-pieces and hunting-pieces in alabaster or bronze, or the backgrounds carved in bronze, marble or wood by the Italian sculptors who followed the example set by Ghiberti at the Renaissance, we shall see that the principle of such work is not the principle of sculpture at all. Its effect depends little on qualities of surface-light and shadow, and mainly on qualities of contour, as traced by a slight line of shadow on the side away from the light, and a slight line of light on the side next to it. And we may fairly hesitate whether we shall rank the artist who works on this principle, which is properly a graphic rather than a plastic principle, among sculptors or among draughtsmen. The above are cases in which the relief sculptor exercises his liberty in the introduction of other objects besides human figures into his sculptured compositions. But there is another kind of relief sculpture in which the artist has less choice. That is, the kind in which the sculptor is called in to decorate with carved work parts of an architectural construction which are not adapted for the introduction of figure subjects, or for their introduction only as features in a scheme of ornament that comprises many other elements. To this head belongs most of the carving of capitals, mouldings, friezes (except the friezes of Greek temples), bands, cornices, and, in the Gothic style, of doorway arches, niches, canopies, pinnacles, brackets, spandrels and the thousand members and parts of members which that style so exquisitely adorned with true or conventionalized imitations of natural forms. This is no doubt a subordinate function of the art; and it is impossible, as we have seen already, to find a precise line of demarcation between carving, in this decorative use, which is properly sculpture, and that which belongs properly to architecture.

Definition of sculpture.

Leaving such discussions, we may content ourselves with the definition of sculpture as *a shaping art, of which the business is to express and arouse emotion by the imitation of natural objects, and principally the human body, in solid form, reproducing either their true proportions in three dimensions, or their proportions in the two dimensions of length and breadth only, with a diminished proportion in the third dimension of depth or thickness.*

Painting as an imitative art.

In considering bas-relief as a form of sculpture, we have found ourselves approaching the confines of the second of the shaping imitative arts, the graphic art or art of painting. Painting, as to its means or instruments of imitation, dispenses with the third dimension altogether. It imitates natural objects by representing them as they are represented on the retina of the eye itself, simply as an assemblage of variously shaped and variously shaded patches of colour on a flat surface. Painting does not reproduce the third dimension of reality by any third dimension of its own whatever; but leaves the eye to infer the solidity of objects, their recession and projection, their nearness and remoteness, by the same perspective signs by which it also infers those facts in nature, namely, by the direction of their several boundary lines, the incidence and distribution of their lights and shadows, the strength or faintness of their tones of colour.

Range of objects imitable by painting.

Hence this art has an infinitely greater range and freedom than any form of sculpture. Near and far is all the same to it, and whatever comes into the field of vision can come also into the field of a picture; trees as well as persons, and clouds as well as trees, and stars as well as clouds; the remotest mountain snows, as well as the violet of the foreground, and far-off multitudes of people as well as one or two near the eye. Whatever any man has seen, or can imagine himself as seeing, that he can also fix by painting, subject only to one great limitation,—that of the range of brightness which he is able to attain in imitating natural colour illuminated by light. In this particular his art can but correspond according to a greatly diminished ratio with the effects of nature. But excepting this it can do for the eye almost all that nature herself does; or at least all that nature would do if man had only one eye since the three dimensions of space produce upon our binocular machinery of vision a particular stereoscopic effect of which a picture, with its two dimensions only, is incapable. The range of the art being thus almost unbounded, its selections have naturally been dictated by the varying interest felt in this or that subject of representation by the societies among whom the art has at various times been practised. As in sculpture, so in painting, the human form has always held the first place. For the painter, the intervention of costume between man and his environment is not a misfortune in the same degree as it is for the sculptor. For him, clothes of whatever fashion or amplitude have their own charm; they serve to diversify the aspect of the world, and to express the characters and stations, if not the physical frames, of his personages; and he is as happy or happier among the brocades of Venice as among the bare limbs of the Spartan palaestra. Along with man, there come into painting all animals and vegetation, all man's furniture and belongings, his dwelling-places, fields and landscape; and in modern times also landscape and nature for their own sakes, skies, seas, mountains and wildernesses apart from man.

The chief forms or modes of painting: line, light-and-shade and colour.

Besides the two questions about any art, what objects does it imitate, and by the use of what means or instruments, Aristotle proposes (in the case of poetry) the further question, which of several possible forms does the imitation in any given case assume? We may transfer very nearly the same inquiry to painting, and may ask, concerning any painter, according to which of three possible systems he works. The three possible systems are (1) that which attends principally to the configuration and relations of natural objects as indicated by the direction of their boundaries, for defining which there is a convention in universal use, the convention, that is, of line; this may be called for short the system of *line*; (2) that which attends chiefly to their configuration and relations as indicated by the incidence and distribution of their lights and shadows—this is the system of *light-and-shade* or *chiaroscuro*; and (3) that which attends chiefly, not to their configuration at all, but to the distribution, qualities and relations of local colours upon their surface—this is the system of *colour*. It is not possible for a painter to imitate natural objects to the eye at all without either defining their boundaries by outlines, or suggesting the shape of their masses by juxtapositions of light and dark or of local colours. In the complete art of painting, of course, all three methods are employed at once. But in what is known as outline drawing and outline engraving, one of the three methods only is employed, line; in monochrome pictures, and in shaded drawings and engravings, two only, line with light-and-shade; and in the various shadeless forms of decorative painting and colour-printing, two only, line with colour. Even in the most accomplished examples of the complete art of painting, as was pointed out by Ruskin, we find that there almost always prevails a predilection for some one of these three parts of painting over the other two. Thus among the mature Italians of the Renaissance, Titian is above all things a painter in colour, Michelangelo in line, Leonardo in light-and-shade. Many academic painters in their day tried to combine the three methods in equal balance; to the impetuous spirit of the great Venetian, Tintoretto, it was alone given to make the attempt with a great measure of success. A great part of the effort of modern painting has been to get rid of the linear convention altogether, to banish line and develop the resources of the oil medium in imitating on canvas, more strictly than the early masters attempted, the actual appearance of things on the retina as an assemblage of coloured streaks and patches modified and toned in the play of light-and-shade and atmosphere.

Technical varieties of the painter's craft.

It remains to consider, for the purpose of our classification, what are the technical varieties of the painter's craft. Since we gave the generic name of painting to all imitation of natural objects by the assemblage of lines, colours and lights and darks on a single plane, we must logically include as varieties of painting not only the ordinary crafts of spreading or laying pictures on an opaque surface in fresco, oil, distemper or water-colour, but also the craft of arranging a picture to be seen by the transmission of light through a transparent substance, in glass painting; the craft of fitting together a multitude of solid cubes or cylinders so that their united surface forms a picture to the eye, as in mosaic; the craft of spreading vitreous colours in a state of fusion so that they form a picture when hardened, as in enamel; and even, it would seem, the crafts of weaving, tapestry, and embroidery, since these also yield to the eye a plane surface figured in imitation of nature. As drawing we must also count incised or engraved work of all kinds representing merely the outlines of objects and not their modellings, as for instance the *graffiti* on Greek and Etruscan mirror-backs and dressing-cases; while raised work in low relief, in which outlines are plainly marked and modellings neglected, furnishes, as we have seen, a doubtful class between sculpture and painting. In all figures that are first modelled in the solid and then variously coloured, sculpture and painting bear a common share; and by far the greater part both of ancient and medieval statuary was in fact tinted so as to imitate or at least suggest the colours of life. But as the special characteristic of sculpture, solidity in the third dimension, is in these cases present, it is to that art and not to painting that we shall still ascribe the resulting work.

Definition of painting.

With these indications we may leave the art of painting defined in general terms as a *shaping or space art, of which the business is to express and arouse emotion by the imitation of all kinds of natural objects, reproducing on a plane surface the relations of their boundary lines, lights and shadows, or colours, or all three of these appearances together.*

Poetry as an imitative art.

The next and last of the imitative arts is the speaking art of poetry. The transition from sculpture and painting to poetry is, from the point of view not of our present but of our first division among the fine arts, abrupt and absolute. It is a transition from space into time, from the sphere of material forms to the sphere of immaterial images. Following Aristotle's method, we may define the objects of poetry's imitation or evocation, as everything of which the idea or image can be called up by words, that is, every force and phenomenon of nature, every operation and result of art, every fact of life and history, or every imagination of such a fact, every thought and feeling of the human spirit, for which mankind in the course of its long evolution has been able to create in speech an explicit and appropriate sign. The means or instruments of poetry's imitation are these verbal signs or words, arranged in lines, strophes or stanzas, so that their sounds have some of the regulated qualities and direct emotional effect of music.

The chief forms or modes of poetry.

The three chief modes or forms of the imitation may still be defined as they were defined by Aristotle himself. First comes the *epic* or narrative form, in which the poet speaks alternately for himself and his characters, now describing their situations and feelings in his own words, and anon making each of them speak in the first person for himself. Second comes the *lyric* form, in which the poet speaks in his own name exclusively, and gives expression to sentiments which are purely personal. Third comes the *dramatic* form, in which the poet does not speak for himself at all, but only puts into the mouths of each of his personages successively such discourse as he thinks appropriate to the part. The last of these three forms of poetry, the dramatic, calls, if it is merely read, on the imagination of the reader to fill up those circumstances of situation, action and the rest, which in the first or epic form are supplied by the narrative between the speeches, and for which in the lyric or personal form there is no occasion. To avoid making this call upon the imagination, to bring home its effects with full vividness, dramatic poetry has to call in the aid of several subordinate arts, the shaping or space art of the scene-painter, the mixed time and space arts of the actor and the dancer. Occasionally also, or in the case of opera throughout, dramatic poetry heightens the emotional effect of its words with music. A play or drama is thus, as performed upon the theatre, not a poem merely, but a poem accompanied, interpreted, completed and brought several degrees nearer to reality by a combination of auxiliary effects of the other arts. Besides the narrative, the lyric and dramatic forms of poetry, the *didactic*, that is the teaching or expository form, has usually been recognized as a fourth. Aristotle refused so to recognize it, regarding a didactic poem in the light not so much of a poem as of a useful treatise. But from the *Works and Days* down to the *Loves of the Plants* there has been too much literature produced in this form for us to follow Aristotle here. We shall do better to regard didactic poetry as a variety corresponding, among the speaking arts, to architecture and the other manual arts of which the first purpose is use, but which are capable of accompanying and adorning use by a pleasurable appeal to the emotions.

Definition of poetry.

We shall hardly make our definition of poetry, considered as an imitative art, too extended if we say that it is *a speaking or time art, of which the business is to express and arouse emotion by imitating or evoking all or any of the phenomena of life and nature by means of words arranged with musical regularity.*

Relation of poetry as an imitative art to painting and sculpture.

Neither the varieties of poetical form, however, nor the modes in which the several forms have been mixed up and interchanged—as such mixture and interchange are implied, for instance, by the very title of a group of Robert Browning's poems, the *Dramatic Lyrics*,—the observation of neither of these things concerns us here so much as the observation of the relations of poetry in general, as an art of representation or imitation, to the other arts of imitation, painting and sculpture. Verbal signs have been invented for innumerable things which cannot be imitated or represented at all either in solid form or upon a coloured surface. You cannot carve or paint a sigh, or the feeling which finds utterance in a sigh; you can only suggest the idea of the feeling, and that in a somewhat imperfect and uncertain way, by representing the physical aspect of a person in the act of breathing the sigh. Similarly you cannot carve or paint any movement, but only figures or groups in which the movement is represented as arrested in some particular point of time; nor any abstract idea, but only figures or groups in which the abstract idea, as for example release, captivity, mercy, is symbolized in the concrete shape of allegorical or illustrative figures. The whole field of thought, of propositions, arguments, injunctions and exhortations is open to poetry but closed to sculpture and painting. Poetry, by its command over the regions of the understanding, of abstraction, of the movement and succession of things in time, by its power of instantaneously associating one image with another from the remotest regions of the mind, by its names for every shade of feeling and experience, exercises a sovereignty a hundred times more extended than that of either of the two arts of manual imitation. But, on the other hand, words do not as a rule bear any sensible resemblance to the things of which they are the signs. There are few things that words do not stand for or cannot call up; but they stand for things symbolically and at second hand, and call them up only in idea, and not in actual presentment to the senses. In strictness, the business of poetry should not be called imitation at all, but rather evocation. The strength of painting and sculpture lies in this, that though there are countless phenomena which they cannot represent at all, and countless more which they can only represent by symbolism and suggestion more or less ambiguous, yet there are a few which each can represent more fully and directly than poetry can represent any thing at all. These are, for sculpture, the forms or configurations of things, which that art represents directly to the senses both of sight and touch; and for painting the forms and colours of things and their relations to each other in space, air and light, which the art represents to the sense of sight, directly so far as regards surface appearance, and indirectly so far as regards solidity. For many delicate qualities and differences in these visible relations of things there are no words at all—the vocabulary of colours, for instance, is in all languages surprisingly scanty and primitive. And those visible qualities for which words exist, the words still call up indistinctly and at second hand. Poetry is almost as powerless to bring before the mind's eye with precision a particular shade of red or blue, a particular linear arrangement or harmony of colour-tones, as sculpture is to relate a continuous experience, or painting to enforce an exhortation or embellish an abstract proposition. The wise poet, as has been justly remarked, when he wants to produce a vivid impression of a visible thing, does not attempt to catalogue or describe its stationary beauties. Shakespeare, when he wants to make us realize the perfections of Perdita, puts into the mouth of Florizel, not, as a bad poet would have done, a description of her lilies and carnations, and the other charms which a painter could make us realize better, but the praises of her ways and movements; and with the final touch,

> " When you do dance, I wish you
> A wave o' the sea, that you might ever do
> Nothing but that,"

he evokes a twofold image of beauty in motion, of which one half might be the despair of those painters who designed the dancing maidens of the walls of Herculaneum, and the other half the despair of all artists who in modern times have tried to fix upon their canvas the buoyancy and grace of dancing waves. In representing the perfections of form in a bride's slender foot, the speaking art, poetry, would find itself distanced by either of the shaping arts, painting or sculpture. Suckling calls up the charm of such a foot by describing it not at rest but in motion, and in the feet which

> " Beneath the petticoat,
> Like little mice, went in and out,"

leaves us an image which baffles the power of the other arts. Keats, when he tells of Madeline unclasping her jewels on St Agnes's Eve, does not attempt to conjure up their lustre to the eye, as a painter would have done, and a less poetical poet might have tried to do, but in the words " her warmed jewels " evoked instead a quality, breathing of the very life of the wearer, which painting could not even have remotely suggested.

General law of the relative means and capacities of the several imitative arts: sculpture.

The differences between the means and capacities of representation proper to the shaping arts of sculpture and painting and those proper to the speaking art of poetry were for a long while overlooked or misunderstood. The maxim of Simonides, that poetry is a kind of articulate painting, and painting a kind of mute poetry, was vaguely accepted until the days of Lessing, and first overthrown by the famous treatise of that writer on the Laocoön. Following in the main the lines laid down by Lessing, other writers have worked out the conditions of representation or imitation proper not only to sculpture and painting as distinguished from poetry, but to sculpture as distinguished from painting. The chief points established may really all be condensed under one simple law, *that the more direct and complete the imitation effected by any art, the less is the range and number of phenomena which that art can imitate.* Thus sculpture in the round imitates its objects much more completely and directly than any other single art, reproducing one whole set of their relations which no other art attempts to reproduce at all, namely, their solid relations in space. Precisely for this reason, such sculpture is limited to a narrow class of objects. As we have seen, it must represent human or animal figures; nothing else has enough either of universal interest or of organic beauty and perfection. Sculpture in the round must represent such figures standing free in full clearness and detachment, in combinations and with accessories comparatively simple, on pain of teasing the eye with a complexity and entanglement of masses and lights and shadows; and in attitudes comparatively quiet, on pain of violating, or appearing to violate, the conditions of mechanical stability. Being a stationary or space-art, it can only represent a single action, which it fixes and perpetuates for ever; and it must therefore choose for that action one as significant and full of interest as is consistent with due observation of the above laws of simplicity and stability. Such actions, and the facial expressions accompanying them, should not be those of sharp crisis or transition, because sudden movement or flitting expression, thus arrested and perpetuated in full and solid imitation by bronze or marble, would be displeasing and not pleasing to the spectator. They must be actions and expressions in some degree settled, collected and capable of continuance, and in their collectedness must at the same time suggest to the spectator as much as possible of the circumstances which have led up to them and those which will next ensue. These conditions evidently bring within a very narrow range the phenomena with which this art can deal, and explain why, as a matter of fact, the greater number of statues represent simply a single figure in repose, with the addition of one or two symbolic or customary attributes. Paint a statue (as the greater part both of Greek and Gothic statuary was in fact painted), and you bring it to a still further point of imitative completeness to the eye; but you do not thereby lighten the restrictions laid upon the art by its material, so long as it undertakes to reproduce in full the third or solid dimension of bodies. You only begin to lighten its restrictions when you begin to relieve it of that duty. We have traced how sculpture in relief, which is satisfied with only a partial reproduction of the third dimension, is free to introduce a larger range of objects, bringing forward secondary figures and accessories, indicating distant planes, indulging even in considerable violence and complexity of motion, since limbs attached to a background do not alarm the spectator by any idea of danger of fragility. But sculpture in the round has not this licence. It is true that the art has at various periods made efforts to escape from its natural limitations. Several of the later schools of antiquity, especially that of Pergamus in the 3rd and 2nd centuries B.C., strove hard both for violence of expression and complexity of design, not only in relief-sculptures, like the great altar-friezes now at Berlin, but in detached groups, such as (*pace* Lessing) the Laocoön itself. Many modern *virtuosi* of sculpture since Bernini have misspent their skill in trying to fix in marble both the restlessness of momentary actions and the flimsiness of fluttering tissues. In latter days Auguste Rodin, an innovating master with a real genius for his art, has attacked many problems of complicated grouping, more or less in the nature of the Greek *symplegmata*, but keeps these interlocked or contorted actions circumscribed within strict limiting lines, so that they do not by jutting or straggling suggest a kind of acrobatic challenge to the laws of gravity. The same artist and others inspired by him have further sought to emancipate sculpture from the necessity of rendering form in clear and complete definition, and to enrich it with a new power of mysterious suggestion, by leaving his figures wrought in part to the highest finish and vitality of surface, while other parts (according to a precedent set in some unfinished works of Michelangelo) remain scarcely emergent from the rough-hewn or unhewn block. But it may be doubted whether such experiments and expedients can permanently do much to enlarge the scope of the art.

Means and capacities of painting.

Next we arrive at painting, in which the third dimension is dismissed altogether, and nothing is actually reproduced, in full or partially, except the effect made by the appearance of natural objects upon the retina of the eye. The consequence is that this art can range over distance and multitude, can represent complicated relations between its various figures and groups of figures, extensive backgrounds, and all those infinite subtleties of appearance in natural things which depend upon local colours and their modification in the play of light and shade and enveloping atmosphere. These last phenomena of natural things are in our experience subject to change in a sense in which the substantial or solid properties of things are not so subject. Colours, shadows and atmospheric effects are naturally associated with ideas of transition, mystery and evanescence. Hence painting is able to extend its range to another kind of facts over which sculpture has no power. It can suggest and perpetuate in its imitation, without breach of its true laws, many classes of facts which are themselves fugitive and transitory, as a smile, the glance of an eye, a gesture of horror or of passion, the waving of hair in the wind, the rush of horses, the strife of mobs, the whole drama of the clouds, the toss and gathering of ocean waves, even the flashing of lightning across the sky. Still, any long or continuous series of changes, actions or movements is quite beyond the means of this art to represent. Painting remains, in spite of its comparative width of range, tied down to the inevitable conditions of a space-art: that is to say, it has to delight the mind by a harmonious variety in its effects, but by a variety apprehended not through various points of time successively, but from various points in space at the same moment. The old convention which allowed painters to indicate sequence in time by means of distribution in space, dispersing the successive episodes of a story about the different parts of a single picture, has been abandoned since the early Renaissance; and Wordsworth sums up our modern view of the matter when he says that it is the business of painting

> " to give
> To one blest moment snatched from fleeting time
> The appropriate calm of blest eternity."

Means and capacities of poetry.

Lastly, a really unfettered range is only attained by the art which does not give a full and complete reproduction of any natural fact at all, but evokes or brings natural facts before the mind merely by the images which words convey. The whole world of movement, of continuity, of cause and effect, of the successions, alternations and interaction of events, characters and passions of everything that takes time to happen and time to declare, is open to poetry as it is open to no other art. As an imitative or, more properly speaking, an evocative art, then, poetry is subject to no limitations except those which spring from the poverty of human language, and from the fact that its means of imitation are indirect. Poetry's account of the visible properties of things is from these causes much less full, accurate and efficient than the reproduction or delineation of the same properties by sculpture and painting. And this is the sum of the conditions concerning the respective functions of the three arts of imitation which had been overlooked, in theory at least, until the time of Lessing.

The acted drama no real exception to the general law.

To the above law, in the form in which we have expressed it, it may perhaps be objected that the acted drama is at once the most full and complete reproduction of nature which we owe to the fine arts, and that at the same time the number of facts over which its imitation ranges is the greatest. The answer is that our law applies to the several arts only in that which we may call their pure or unmixed state. Dramatic poetry is in that state only when it is read or spoken like any other kind of verse. When it is witnessed on the stage, it is in a mixed or impure state; the art of the actor has been called in to give actual reproduction to the gestures and utterances of the personages, that of the costumier to their appearances and attire, that of the stage-decorator to their furniture and surroundings, that of the scene-painter to imitate to the eye the dwelling-places and landscapes among which they move; and only by the combination of all these subordinate arts does the drama gain its character of imitative completeness or reality.

Things unknown shadowed forth by imitation of things known.

Throughout the above account of the imitative and non-imitative groups of fine arts, we have so far followed Aristotle as to allow the name of imitation to all recognizable representation or evocation of realities,—using the word " realities " in no metaphysical sense, but to signify the myriad phenomena of life and experience, whether as they actually and literally exist to-day, or as they may have existed in the past, or may be conceived to exist in some other world not too unlike our own for us to conceive and realize in thought. When we find among the ruins of a Greek temple the statue of a beautiful young man at rest, or above the altar of a Christian church the painting of one transfixed with arrows, we know that the statue is intended to bring to our minds no mortal youth, but the god Hermes or Apollo, the transfixed victim no simple captive, but Sebastian the holy saint. At the same time we none the less know that the figures in either case have been studied by the artist from living models before his eyes. In like manner, in all the representations alike of sculpture, painting and poetry the things and persons represented may bear symbolic meanings and imaginary names and characters; they may be set in a land of dreams, and grouped in relations and circumstances upon which the sun of this world never shone; in point of fact, through many ages of history they have been chiefly used to embody human ideas of supernatural powers; but it is from real things and persons that their lineaments and characters have been taken in the first instance, in order to be attributed by the imagination to another and more exalted order of existences.

Imitation by art necessarily an idealized imitation.

The law which we have last laid down is a law defining the relations of sculpture, painting and poetry, considered simply as arts having their foundations at any rate in reality, and drawing from the imitation of reality their indispensable elements and materials. It is a law defining the range and character of those elements or materials in nature which each art is best fitted, by its special means and resources, to imitate. But we must remember that, even in this fundamental part of its operations, none of these arts proceeds by imitation or evocation pure and simple. None of them contents itself with seeking to represent realities, however literally taken, exactly as those realities are. A portrait in sculpture or painting, a landscape in painting, a passage of local description in poetry, may be representations of known things taken literally or for their own sakes, and not for the sake of carrying out thoughts to the unknown; but none of them ought to be, or indeed can possibly be, a representation of all the observed parts and details of such a reality on equal terms and without omissions. Such a representation, were it possible, would be a mechanical inventory and not a work of fine art.

Completeness not the test of value in a pictorial imitation.

Hence the value of a pictorial imitation is by no means necessarily in proportion to the number of facts which it records. Many accomplished pictures, in which all the resources of line, colour and light-and-shade have been used to the utmost of the artist's power for the imitation of all that he could see in nature, are dead and worthless in comparison with a few faintly touched outlines or lightly laid shadows or tints of another artist who could see nature more vitally and better. Unless the painter knows how to choose and combine the elements of his finished work so that it shall contain in every part suggestions and delights over and above the mere imitation, it will fall short, in that which is the essential charm of fine art, not only of any scrap of a great master's handiwork, such as an outline sketch of a child by Raphael or a colour sketch of a boat or a mackerel by Turner, but even of any scrap of the merest journeyman's handiwork produced by an artistic race, such as the first Japanese drawing in which a water-flag and kingfisher, or a spray of peach or almond blossom across the sky, is dashed in with a mere hint of colour, but a hint that tells a whole tale to the imagination. That only, we know, is fine art which affords keen and permanent delight to contemplation. Such delight the artist can never communicate by the display of a callous and pedantic impartiality in presence of the facts of life and nature. His representation of realities will only strike or impress others in so far as it concentrates their attention on things by which he has been struck and impressed himself. To arouse emotion, he must have felt emotion; and emotion is impossible without partiality. The artist is one who instinctively tends to modify and work upon every reality before him in conformity with some poignant and sensitive principle of preference or selection in his mind. He instinctively adds something to nature in one direction and takes away something in another, overlooking this kind of fact and insisting on that, suppressing many particulars which he holds irrelevant in order to insist on and bring into prominence others by which he is attracted and arrested.

Nature of the idealizing process.

The instinct by which an artist thus prefers, selects and brings into light one order of facts or aspects in the thing before him rather than the rest, is part of what is called the *idealizing* or *ideal* faculty. Interminable discussion has been spent on the questions,—What is the ideal, and how do we idealize? The answer has been given in one form by those thinkers (*e.g.* Vischer and Lotze) who have pointed out that the process of aesthetic idealization carried on by the artist is only the higher development of a process carried on in an elementary fashion by all men, from the very nature of their constitution. The physical organs of sense themselves do not retain or put on record all the impressions made upon them. When the nerves of the eye receive a multitude of different stimulations at once from different points in space, the sense of eyesight, instead of being aware of all these stimulations singly, only abstracts and retains a total impression of them together. In like manner we are not made aware by the sense of hearing of all the several waves of sound that strike in a momentary succession upon the nerves of the ear; that sense only abstracts and retains a total impression from the combined effect of a number of such waves. And the office which each sense thus performs singly for its own impressions, the mind performs in a higher degree for the impressions of all the senses equally, and for all the other parts of our experience. We are always dismissing or neglecting a great part of our impressions, and abstracting and combining among those which we retain. The ordinary human consciousness works like an artist up to this point; and when we speak of the ordinary or inartistic man as being impartial in the retention or registry of his daily impressions, we mean, of course, in the retention or registry of his impressions as already thus far abstracted and assorted in consciousness. The artistic man, whose impressions affect him much more strongly, has the faculty of carrying much farther these same processes of abstraction, combination and selection among his impressions.

Subjective and objective ideals.

The possession of this faculty is the artist's most essential gift. To attempt to carry farther the psychological analysis of the gift is outside our present object; but it is worth while to consider somewhat closely its modes of practical operation. One mode is this: the artist grows up with certain innate or acquired predilections which become a part of his constitution whether he will or no,—predilections, say, if he is a dramatic poet, for certain types of plot, character and situation; if he is a sculptor, for certain proportions and a certain habitual carriage and disposition of the limbs; if he is a figure painter, for certain schemes of composition and moulds of figure and airs and expressions of countenance; if a landscape painter, for a certain class of local character, sentiment and pictorial effect in natural scenery. To such predilections he cannot choose but make his representations of reality in large measure conform. This is one part of the transmuting process which the data of life and experience have to undergo at the hands of artists, and may be called the subjective or purely personal mode of idealization. But there is another part of that work which springs from an impulse in the artistic constitution not less imperious than the last named, and in a certain sense contrary to it. As an imitator or evoker of the facts of life and nature, the artist must recognize and accept the character of those facts with which he has in any given case to deal. All facts cannot be of the cast he prefers, and in so far as he undertakes to deal with those of an opposite cast he must submit to them; he must study them as they actually are, must apprehend, enforce and bring into prominence their own dominant tendencies. If he cannot find in them what is most pleasing to himself, he will still be led by the abstracting and discriminating powers of his observation to discern what is most expressive and significant in *them*, he will emphasize and put on record this, idealizing the facts before him not in his direction but in their own. This is the second or objective half of the artist's task of idealization. It is this half upon which Taine dwelt almost exclusively, and on the whole with a just insight into the principles of the operation, in his well-known treatise *On the Ideal in Art*. Both these modes of idealization are legitimate; that which springs from inborn and overmastering personal preference in the artist for particular aspects of life and nature, and that which springs from his insight into the dominant and significant character of the phenomena actually before him, and his desire to emphasize and disengage them. But there is a third mode of idealizing which is less vital and genuine than either of these, and therefore less legitimate, though unfortunately far more common. This mode consists in making things conform to a borrowed and conventional standard of beauty and taste, which corresponds neither to any strong inward predilection of the artist nor to any vital characteristic in the objects of his representation. Since the rediscovery of Greek and Roman sculpture in the Renaissance, a great part of the efforts of artists have been spent in falsifying their natural instincts and misrepresenting the facts of nature in pursuit of a conventional ideal of abstract and generalized beauty framed on a false conception and a shallow knowledge of the antique. School after school from the 16th century downwards has been confirmed in this practice by academic criticism and theory, with resulting insipidities and insincerities of performance which have commonly been acclaimed in their day, but from which later generations have sooner or later turned away with a wholesome reaction of distaste.

Examples of the two modes and of their reconciliation.

The two genuine modes of idealization, the subjective and the objective, are not always easy to be reconciled. The greatest artist is no doubt he who can combine the strongest personal instincts of preference with the keenest power of observing characteristics as they are, yet in fact we find few in whom both these elements of the ideal faculty have been equally developed. To take an example among Florentine painters, Sandro Botticelli is usually thought of as one who could never escape from the dictation of his own personal ideals, in obedience to which he is supposed to have invested all the creations of his art with nearly the same conformation of brows, lips, cheeks and chin, nearly the same looks of wistful yearning and dejection. There is some truth in this impression, though it is largely based on the works not of the master himself, but of pupils who exaggerated his mannerisms. Leonardo da Vinci was strong in both directions; haunted in much of his work by a particular human ideal of intellectual sweetness and alluring mystery, he has yet left us a vast number of exercises which show him as an indefatigable student of objective characteristics and psychological expressions of an order the most opposed to this. And in this case again followers have over-emphasized the master's predilections, Luini, Sodoma and the rest borrowing and repeating the mysterious smile of Leonardo till it becomes in their work an affectation cloying however lovely. Among latter-day painters, Burne-Jones will occur to every reader as the type of an artist always haunted and dominated by ideals of an intensely personal cast partly engendered in his imagination by sympathy with the early Florentines. If we seek for examples of the opposite principle, of that idealism which idealizes above all things objectively, and seeks to disengage the very inmost and individual characters of the thing or person before it, we think naturally of certain great masters of the northern schools, as Dürer, Holbein and Rembrandt. Dürer's endeavour to express such characters by the most searching intensity of linear definition was, however, hampered and conditioned by his inherited national and Gothic predilection for the strained in gesture and the knotted and the gnarled in structure, against which his deliberate scholarly ambition to establish a canon of ideal proportion contended for the most part in vain. And Rembrandt's profound spiritual insight into human character and personality did not prevent him from plunging his subjects, ever deeper and deeper as his life advanced, into a mysterious shadow-world of his own imagination, where all local colours were broken up and crumbled, and where amid the struggle of gloom and gleam he could make his intensely individualized men and women breathe more livingly than in plain human daylight.

Caricature and the grotesque as modes of the ideal.

It is by the second mode of operation chiefly, that is by imaginatively discerning, disengaging and forcing into prominence their inherent significance, that the idealizing faculty brings into the sphere of fine art deformities and degeneracies to which the name beautiful or sublime can by no stretch of usage be applied. Hence arise creations like the *Stryge* of Notre-Dame and a thousand other grotesques of Gothic architectural carving. Hence, although on a lower plane and interpreted with a less transmuting intensity of insight and emphasis, the snarling or jovial grossness of the peasants of Adrian Brauwer and the best of his Dutch compeers. Hence Shakespeare's Caliban and figures like those of Quilp and Quasimodo in the romances of Dickens and Hugo; hence the cynic grimness of Goya's Caprices and the profound and bitter impressiveness of Daumier's caricatures of Parisian bourgeois life; or again, in an angrier and more insulting and therefore less understanding temper, the brutal energy of the political drawings of Gilray.

Unidealized imitation not fine art.

Sculpture, painting and poetry, then, are among the greater fine arts those which express and arouse emotion by imitating or evoking real and known things, either for their own sakes literally, or for the sake of shadowing forth things not known but imagined. In either case they represent their originals, not indiscriminately as they are, but sifted, simplified, enforced and enhanced to our apprehensions partly by the artist's power of making things conform to his own instincts and preferences, partly by his other power of interpreting and emphasizing the significant characters of the facts before him. Any imitation that does not do one or other or both of these things in full measure fails in the quality of emotional expression and emotional appeal, and in so failing falls short, taken merely as imitation, of the standard of fine art.

The appeal of the imitative arts depends partly on non-imitative elements.

But we must remember that idealized imitation, as such, is not the whole task of these arts nor their only means of appeal. There is another part of their task, logically though not practically independent of the relations borne by their imitations to the original phenomena of nature, and dependent on the appeal made through the eye and ear to our primal organic sensibilities by the properties of rhythm, pattern and regulated design in the arrangement of sounds, lines, masses, colours and light-and-shade. That appeal we noted as lying at the root of the art impulse in its most elementary stage. In its most developed stage every fine art is bound still to play upon the same sensibilities. In a work of sculpture the contours and interchanges of light and shadow are bound to be such as would please the eye, whether the statue or relief represented the figure of anything real in the world or not. The flow and balance of line, and the distribution of colours and light-and-shade, in a picture are bound to be such as would make an agreeable pattern although they bore no resemblance to natural fact (as, indeed, many subordinate applications of this art, in decorative painting and geometrical and other ornaments, do, we know, give pleasure though they represent nothing). The sound of a line or verse in poetry is bound to be such as would thrill the physical ear in hearing, or the mental ear in reading, with a delightful excitement even though the meaning went for nothing. If the imitative arts are to touch and elevate the emotions, if they are to afford permanent delight of the due pitch and volume, it is not a more essential law that their imitation, merely as such, should be of the order which we have defined as ideal, than that they should at the same time exhibit these independent effects which they share with the non-imitative group.

Necessity of due balance between conception and technique: the non-imitative arts and their technique.

So far we have assumed, without asserting, the necessity that the artist in whatever kind should possess a power of execution, or technique as it is called in modern phrase, adequate to the task of embodying and giving shape to his ideals. In thought it is possible to separate the conception of a work of art from its execution; in practice it is not possible, and half the errors in criticism and speculation about the fine arts spring from failing to realize that an artistic conception can only be brought home to us through and by its appropriate embodiment. Whatever the artist's cast of imagination or degree of sensibility may be in presence of the materials of life, it is essential that he should be able to express himself appropriately in the material of his particular art. To quote the writer (R. A. M. Stevenson) who has enforced this point most clearly and vividly, perhaps with some pardonable measure of over-statement: "It is a sensitiveness to the special qualities of some visible or audible medium of art which distinguishes the species artist from the genus man." And again: "There are as many separate faculties of imagination as there are separate mediums in which to conceive an image—clay, words, paint, notes of music." . . . "Technique differs as the material of each art differs—differs as marble, pigments, musical notes and words differ." The artist who does not enjoy and has not with delighted labour mastered the effects of his own chosen medium will never be a master; the hearer, reader or spectator who cannot appreciate the qualities of skill, vitality and charm in the handling of the given material, or who fails to feel their absence when they are lacking, or who looks in one material primarily for the qualities appropriate to another, will never make a critic. The technique of the space-arts differs radically from that of the time-arts. So again do those of the imitative and the non-imitative arts differ among themselves. The non-imitative arts of music and architecture are in a certain degree alike in this, that the artist is in neither case his own executant (this at least is true of music so far as concerns its modern concerted and orchestral developments); the musical composer and the architect each imagines and composes a design in the medium of his own art which it is left for others to carry out under his direction. The technique in each case consists not in mastery of an instrument (though the musical composer may be, and often is, a master of some one of the instruments whose effects he in his mind's ear co-ordinates and combines); it lies in the power of knowing and conjuring up all the emotional resources and effects of the various materials at his command, and of conceiving and designing to their last detail vast and ordered structures, to be raised by subordinate executants from those materials, which shall adequately express his temperament and embody his ideals.

The imitative arts and their technique: painting and sculpture.

In the imitative arts, on the other hand, the sculptor, unless he is a fraud, must be wholly his own executant in the original task of modelling his design in the soft material of clay or wax, though he must accept the aid of assistants whether in the casting of his work in bronze or in first roughing it out from the block in marble. Too many sculptors have been inclined further to trust to trained mechanical help in finishing their work with the chisel; with the result that the surface loses the touch which is the expression of personal temperament and personal feeling for the relations of his material to nature. The artist in love with the vital qualities of form, or those of his own handiwork in expressing such qualities in modelling-clay, will never stop until he learns how to translate them for himself in marble. Proceeding to that imitative art which leaves out the third dimension of nature, and by so doing enormously increases the range of objects and effects which come within its power—proceeding to the art of painting, the painter is in theory exclusively his own executant, and in practice mainly so, though in certain schools and periods the great artists have been accustomed to surround themselves with pupils to whom they have imparted their methods and who have helped them in the subordinate and preparatory parts of their work. But the painter fit to teach and lead can by no means escape the necessity of being himself a master of his material, and his handling of it must needs bear the immediate impress of his temperament. His emotional preferences among the visible facts of nature, his feeling for the relative importance and charm of line, colour, light and shade, used whether for the interpretation and heightening of natural fact or for producing a pattern in itself harmonious and suggestive to the eye, his sense of the special modes of handling most effective for communicating the impression he desires, all these together inevitably appear in, and constitute, his style and technique. If he is careless or inexpert or conventional, or cold or without delight, in technique, though he may be animated by the noblest purposes and the loftiest ideas, he is a failure as a painter. At certain periods in the history of painting, as in the 13th and 14th centuries in Italy, the technique seems indeed to modern eyes wholly immature; but that was because there were many aspects of visible things which the art had not yet attempted or desired to portray, not because it did not put forth with delight its best traditional or newly acquired skill in portraying the special aspects with which it had so far attempted to grapple. At certain other periods, as in the later 16th and 17th centuries in the same country, the elements of inherited technical facility and academic pride of skill outweigh the sincerity and freshness of interest taken in the aspects of things to be portrayed, and the true balance is lost. At other times, as in much of the work of the 19th century, especially in England, painters have been diverted from their true task, and lost hold of intelligent and living technique altogether, in trying to please a public blind to the special qualities of their art, and prone to seek in it the effects, frivolous or serious, which are appropriate not to paint and canvas but to literature.

Technique in poetry: the magic of words.

Lastly, the poet and literary artist must obviously be the exclusive master of his own technique. No one can help him: all depends on the keenness of his double sensibility to the thrill of life and to that of words, and to his power of maintaining a just balance between the two. If he is truly and organically sensitive to words alone, and has learnt life only through their medium and not through the energies of his own imagination, nor through personal sensibility to the impact of things and thoughts and passions and experience, then his work may be a miracle of accomplished verbal music, and may entrance the ear for the moment, but will never live to illuminate and sustain and console. If, on the other hand, he has imagination and sensibility in full measure, and lacks the inborn love of and gift for words and their magic, he will be but a dumb or stammering poet all his days. There is no better witness on this point than Wordsworth. His own prolonged lapses from verbal felicity, and continual habit of solemn meditation on themes not always inspiring, might make us hesitate to choose him as an example of that particular love and gift. But Wordsworth could never have risen to his best and greatest self had he not truly possessed the sensibilities which he attributes to himself in the Prelude:

> "Twice five years
> Or less I might have seen, when first my mind
> With conscious pleasure opened to the charm
> Of words in tuneful order, found them sweet
> For their own sakes, a passion, and a power;
> And phrases pleased me chosen for delight,
> For pomp, or love."

And again, expressing better than any one else the relation which words in true poetry hold to things, he writes:

> "Visionary power
> Attends the motions of the viewless winds,
> Embodied in the mystery of words;
> There darkness makes abode, and all the host
> Of shadowy things work endless changes,—there,
> As in a mansion like their proper home,
> Even forms and substances are circumfused
> By that transparent veil with light divine,
> And, through the turnings intricate of verse,
> Present themselves as objects recognized,
> In flashes, and with glory not their own."

Third classification: the serviceable and the non-serviceable arts.

3. *The Serviceable and the Non-Serviceable Arts.*—It has been established from the outset that, though the essential distinction of fine art as such is to minister not to material necessity or practical use, but to delight, yet there are some among the arts of men which do both these things at once and are arts of direct use and of beauty or emotional appeal together. Under this classification a survey of the field of art at different periods of history would yield different results. In ruder times, we have seen, the utilitarian aim was still the predominant aim of art, and most of what we now call fine arts served in the beginning to fulfil the practical needs of individual and social life; and this not only among primitive or savage races. In ancient Egypt and Assyria the primary purpose of the relief-sculptures on palace and temple walls was the practical one of historical record and commemoration. Even as late as the middle ages and early Renaissance the primary business of the painter was to give instruction to the unlearned in Bible history and in the lives of the saints, and to rouse him to moods of religious and ethical exaltation. The pleasures of fine art proper among the manual-imitative group—the pleasures, namely, of producing and contemplating certain arrangements rather than others of design, proportion, pattern, colour and light and shade, and of putting forth and appreciating certain qualities of skill, truth and significance in idealized imitation,—these were, historically speaking, by-products that arose gradually in the course of practice and development. As time went on, the conscious aim of ministering to such pleasures displaced and threw into the background the utilitarian ends for which the arts had originally been practised, and the pleasures became ends in themselves.

But even in advanced societies the double qualities of use and

Among the greater arts, architecture alone exists primarily for service.

beauty still remain inseparable, among the five greater arts, in architecture. We build in the first instance for the sake of necessary shelter and accommodation, or for the commemoration, propitiation or worship of spiritual powers on whom we believe our welfare to depend. By and by we find out that the aspect of our constructions is pleasurable or the reverse. Architecture is the art of building at once as we need and as we like, and a practical treatise on architecture must treat the beauty and the utility of buildings as bound up together. But for our present purpose it has been proper to take into account one half only of the vocation of architecture, the half by which it impresses, gives delight and belongs to that which is the subject of our study, to fine art; and to neglect the other half of its vocation, by which it belongs to what is not the subject of our study, to useful or mechanical art. It is plain, however, that the presence or absence of this foreign element, the element of practical utility, constitutes a fair ground for a new and separate classification of the fine arts. If we took the five greater arts as they exist in modern times by themselves, architecture would on this ground stand alone in one division, as the directly useful or serviceable fine art; with sculpture, painting, music and poetry together in the other division, as fine arts unassociated with such use or service. Not that the divisions would, even thus, be quite sharply and absolutely separated. Didactic poetry, we have already acknowledged, is a branch of the poetic art which aims at practice and utility. Again, the hortatory and patriotic kinds of lyric poetry, from the strains of Tyrtaeus to those of Arndt or Rouget de Lisle or Wordsworth's sonnets written in war-time, may fairly be said to belong to a phase of fine art which aims directly at one of the highest utilities, the stimulation of patriotic feeling and self-devotion. So may the strains of music which accompany such poetry. The same practical character, as stimulating and attuning the mind to definite ends and actions, might indeed have been claimed for the greater part of the whole art of music as that art was practised in antiquity, when each of several prescribed and highly elaborated moods, or modes, of melody was supposed to have a known effect upon the courage and moral temper of the hearer. Compare Milton, when he tells of the Dorian mood of flutes and soft recorders which assuaged the sufferings and renewed the courage of Satan and his legions as they marched through hell. In modern music, of which the elements, much more complex in themselves than those of ancient music, have the effect of stirring our fibres to moods of rapturous contemplation rather than of action, military strains in march time are in truth the only purely instrumental variety of the art which may still be said to retain this character.

Other and minor arts of service subordinate to architecture.

To reinforce, however, the serviceable or useful division of fine arts in our present classification, it is not among the greater arts that we must look. We must look among the lesser or auxiliary arts of the manual or shaping group. The weaver, the joiner, the potter, the smith, the goldsmith, the glass-maker, these and a hundred artificers who produce wares primarily for use, produce them in a form or with embellishments that have the secondary virtue of giving pleasure both to the producer and the user. Much ingenuity has been spent to little purpose in attempting to group and classify these lesser shaping arts under one or other of the greater shaping arts, according to the nature of the means employed in each. Thus the potter's art has been classed under sculpture, because he moulds in solid form the shapes of his cups, plates and ewers; the art of the joiner under that of the architect, because his tables, seats and cupboards are fitted and framed together, like the houses they furnish, out of solid materials previously prepared and cut; and the weaver and embroiderer, from the point of view of the effects produced by their art, among painters. But the truth is, that each one of these auxiliary handicrafts has its own materials and technical procedure, which cannot, without forcing and confusion, be described by the name proper to the materials and technical procedure of any of the greater arts. The only satisfactory classification of these handicrafts is that now before us, according to which we think of them all together in the same group with architecture, not because any one or more of them may be technically allied to that art, but because, like it, they all yield products capable of being practically useful and beautiful at the same time. Architecture is the art which fits and frames together, of stone, brick, mortar, timber or iron, the abiding and assembling places of man, all his houses, palaces, temples, monuments, museums, workshops, roofed places of meeting and exchange, theatres for spectacle, fortresses of defence, bridges, aqueducts, and ships for seafaring. The wise architect having fashioned any one of these great constructions at once for service and beauty in the highest degree, the lesser or auxiliary manual arts (commonly called "industrial" or "applied" arts) come in to fill, furnish and adorn it with things of service and beauty in a lower degree, each according to its own technical laws and capabilities; some, like pottery, delighting the user at once by beauty of form, delicacy of substance, and pleasantness of imitative or non-imitative ornament; some, like embroidery, by richness of tissue, and by the same twofold pleasantness of ornament; some, like goldsmith's work, by exquisiteness of fancy and workmanship proportionate to the exquisiteness of the material. To this vast group of workmen, whose work is at the same time useful and fine in its degree, the ancient Greek gave the place which is most just and convenient for thought, when he classed them all together under the name of τέκτονες, or artificers, and called the builder by the name of ἀρχιτέκτων, arch-artificer or artificer-in-chief. Modern usage has adopted the phrase "arts and crafts" as a convenient general name for their pursuits.

III. *Of the History of the Fine Arts.*

Current generalizations on the history of fine art: Hegel.

Students of human culture have concentrated a great deal of attentive thought upon the history of fine art, and have put forth various comprehensive generalizations intended at once to sum up and to account for the phases and vicissitudes of that history. The most famous formulae are those of Hegel, who regarded particular arts as being characteristic of and appropriate to particular forms of civilization and particular ages of history. For him, architecture was the symbolic art appropriate to ages of obscure and struggling ideas, and characteristic of the Egyptian and the Asiatic races of old and of the medieval age in Europe. Sculpture was the classical art appropriate to ages of lucid and self-possessed ideas, and characteristic of the Greek and Roman period. Painting, music and poetry were the romantic arts, appropriate to the ages of complicated and overmastering ideas, and characteristic of modern humanity in general. In the working out of these generalizations Hegel brought together a mass of judicious and striking observations; and that they contain on the whole a preponderance of truth may be admitted. It has been objected against them, from the philosophical point of view, that they too much mix up the definition of what the several arts theoretically are with considerations of what in various historical circumstances they have practically been. From the historical point of view there can be taken what seems a more valid objection, that these formulae of Hegel tend too much to fix the attention of the student upon the one dominant art chosen as characteristic of any period, and to give him false ideas of the proportions and relations of the several arts at the same period—of the proportions and relations which poetry, say, really bore to sculpture among the Greeks and Romans, or sculpture to architecture among the Christian nations of the middle age. The truth is, that the historic survey gained over any field of human activity from the height of generalizations so vast in scope as these are must needs, in the complexity of earthly affairs, be a survey too distant to give much guidance until its omissions are filled up by a great deal of nearer study; and such nearer study is apt to compel the student in the long run to qualify the theories with which he has started until they are in danger of disappearing altogether.

Herbert Spencer and the evolution theory.

Another systematic exponent of the universe, whose system is very different from that of Hegel, Herbert Spencer, brought the doctrine of evolution to bear, not without interesting results, upon the history of the fine arts and their development. Herbert Spencer set forth how the manual group of fine arts, architecture, sculpture and painting, were in their first rudiments bound up together, and how each of them in the course of history has liberated itself from the rest by a gradual process of separation. These arts did not at first exist in the distinct and developed forms in which we have above described them. There were no statues in the round, and no painted panels or canvases hung upon the wall. Only the rudiments of sculpture and painting existed, and that only as ornaments applied to architecture, in the shape of tiers of tinted reliefs, representing in a kind of picture-writing the exploits of kings upon the walls of their temple-palaces. Gradually sculpture took greater salience and roundness, and tended to disengage itself from the wall, while painting found out how to represent solidity by means of its own, and dispensed with the raised surface upon which it was first applied. But the old mixture and union of the three arts, with an undeveloped art of painting and an undeveloped art of sculpture still engaged in or applied to the works of architecture, continued on the whole to prevail through the long cycles of Egyptian and Assyrian history. In the Egyptian palace-temple we find a monument at once political and religious, upon the production of which were concentrated all the energies and faculties of all the artificers of the race. With its incised and pictured walls, its half-detached colossi, its open and its colonnaded chambers, the forms of the columns and their capitals recalling the stems and blossoms of the lotus and papyrus, with its architecture everywhere taking on the characters and covering itself with the adornments of immature sculpture and painting—this structure exhibits within its single fabric the origins of the whole subsequent group of shaping arts. From hence it is a long way to the innumerable artistic surroundings of later Greek and Roman life, the many temples with their detached and their engaged statues, the theatres, the porticoes, the baths, the training-schools, the stadiums, with free and separate statues both of gods and men adorning every building and public place, the frescoes upon the walls, the panel pictures hung in temples and public and private galleries. In the terms of the Spencerian theory of evolution, the advance from the early Egyptian to the later Greek stage is an advance from the one to the manifold, from the simple to the complex, from the homogeneous to the heterogeneous, and affords a striking instance of that vast and ceaseless process of differentiation and integration which it is the law of all things to undergo. In the Christian monuments of the early middle age, again, the arts, owing to the political and social cataclysm in which Roman civilization went down, have gone back to the rudimentary stage, and are once more attached to and combined with each other. The single monument, the one great birth of art, in that age, is the Gothic church. In this we find the art of applied sculpture exercised in fashions infinitely rich and various, but entirely in the service and for the adornment of the architecture; we find painting exercised in fashions more rudimentary still, principally in the forms of translucent imagery in the chancel windows and tinted decorations on the walls and vaultings. From this stage again the process of the differentiation of the arts is repeated. It is by a new evolution or unfolding, and by one carried to much further and more complicated stages than the last had reached, that the arts since the middle age have come to the point where we find them to-day; when architecture is applied to a hundred secular and civil uses with not less magnificence, or at least not less desire of magnificence, than that with which it fulfilled its two only uses in the middle age, the uses of worship and of defence; when detached sculptures adorn, or are intended to adorn, all our streets and commemorate all our likenesses; when the subjects of painting have been extended from religion to all life and nature, until this one art has been dividied into the dozen branches of history, landscape, still life, genre, anecdote and the rest. Such being in brief the successive stages, and such the reiterated processes, of evolution among the shaping or space arts, the action of the same law can be traced, it is urged, in the growth of the speaking or time arts also. Originally poetry and music, the two great speaking arts, were not separated from each other and from the art of bodily motion, dancing. The father of song, music and dancing, all three, was that primitive man of whom so much has already been said, he who first clapped hands and leapt and shouted in time at some festival of his tribe. From the clapping, or rudimentary rhythmical noise, has been evolved the whole art of instrumental music, down to the entrancing complexity of the modern symphony. From the shout, or rudimentary emotional utterance, has proceeded by a kindred evolution the whole art of vocal music down to the modern opera or oratorio. From the leap, or rudimentary expression of emotion by rhythmical movements of the body, has descended every variety of dancing, from the stately figures of the tragic chorus of the Greeks to the *kordax* of their comedy or the complexities of the modern ballet.

Weak and strong points of Spencer's generalization.

That the theory of evolution serves usefully to group and to interpret many facts in the history of art we shall not deny, though it would be easy to show that Herbert Spencer's instances and applications are not sufficient to sustain all the conclusions that he seems to draw from them. Thus, it is perfectly true that the Egyptian or Assyrian palace wall is an instance of rudimentary painting and rudimentary sculpture in subservience to architecture. But it is not less true that races who had no architecture at all, but lived in caverns of the earth, exhibit, as we have already had occasion to notice, excellent rudiments of the other two shaping arts in a different form, in the carved or incised handles of their weapons. And it is almost certain that, among the nations of oriental antiquity themselves, the art of decorating solid walls so as to please the eye with patterns and presentations of natural objects was borrowed from the precedent of an older art which works in easier materials, namely, the art of the weaver. It would be in the perished textile fabrics of the earliest dwellers in the valleys of the Euphrates and the Nile that we should find, if anywhere, the origins of the systems of surface design, whether conventional or imitative, which those races afterwards applied to the decoration of their solid constructions. Not, therefore, in any one exclusive type of primitive artistic activity, but in a score of such types equally, varying according to race, region and circumstances, shall we find so many germs or nuclei from which whole families of fine arts have in the course of the world's history differentiated and unfolded themselves. And more than once during that history, a cataclysm of political and social forces has not only checked the process of the evolution of the fine arts, but from an advanced stage of development has thrown them back again to a primitive stage. Recent research has shown how the Minoan and Mycenaean civilizations in the Mediterranean basin, with their developed fine arts, must have perished and been effaced before the second growth of art from new rudiments took place in Greece. The great instance of the downfall of the Roman civilization need not be requoted. By Spencer's application of the theory of evolution, not less than by Hegel's theory of the historic periods, attention is called to the fact that Christian Europe, during several centuries of the middle age, presents to our study a civilization analogous to the civilization of the old oriental empires in this respect, that its ruling and characteristic manual art is architecture, to which sculpture and painting are, as in the oriental empires, once more subjugated and attached. It does not of course follow that such periods of fusion or mutual dependence among the arts are periods of bad art. On the contrary, each stage of the evolution of any art has its own characteristic excellence. The arts can be employed in combination, and yet be all severally excellent. When music, dancing, acting and singing were combined in the performance of the Greek chorus, the combination no doubt presented a relative perfection of each of the four elements analogous to the combined perfection, in the contemporary Doric temple, of pure architectural form, sculptured enrichment of spaces specially contrived for sculpture in the pediments and frieze, and coloured decoration over all. The extreme differentiation of any art from every other art, and of the several branches of one art among themselves, does not by any means tend to the perfection of that art. The process of evolution among the fine arts may go, and indeed in the course of history has gone, much too far for the health of the arts severally. Thus an artist of our own day is usually either a painter only or a sculptor only; but yet it is acknowledged that the painter who can model a statue, or the sculptor who can paint a picture, is likely to be the more efficient master of both arts; and in the best days of Florentine art the greatest men were generally painters, sculptors, architects and goldsmiths all at once. In like manner a landscape painter who paints landscape only is apt not to paint it so well as one who paints the figure too; and in recent times the craft of engraving had almost ceased to be an art from the habit of allotting one part of the work, as skies, to one hand, another part, as figures, to a second, and another part, as landscape, to a third. This kind of continually progressing subdivision of labour, which seems to be the necessary law of industrial processes, is fatal to any skill which demands, as skill in the fine arts, we have seen, demands, the free exercise and direction of a highly complex cluster both of faculties and sensibilities.

Reaction against over-evolution amongst the fine arts.

In the second half of the 19th century a reaction set in against such over-differentiation of the several manual arts and crafts. This reaction is chiefly identified in England with the name of William Morris, who insisted by precept and example that one form of artistic activity was as worthy as another, and himself both practised and trained others in the practice of glass-painting, weaving, embroidery, furniture and wall-paper designing, and book decoration alike. His example has been to some extent followed in most European countries, and efforts have been made to reunite the functions of artist and craftsman, and to set a limit to the process of differentiation among the various manual arts. In the vocal or time arts also, a reformer of high genius and force of character, Richard Wagner, rose to contend that in music the process of evolution and differentiation had gone much too far. Music, he urged, as separated from words and actions, independent orchestral and instrumental music, had reached its utmost development, and its further advance could only be an advance into the inane; while operatic music had broken itself up into a number of set and separate forms, as aria, scena, recitative, which corresponded to no real varieties of instinctive emotional utterance, and in the aimless production of which the art was in danger of paralysing and stultifying itself. This process, he declared, must be checked; music and words must be brought back again into close connexion and mutual dependence; the artificial opera forms must be abolished, and a new and homogeneous music-drama be created, of which the author must combine in himself the functions of poet, composer, inventor, and director of scenery and stage appliances, so that the entire creation should bear the impress of a single mind; to the creation of such a music-drama he accordingly devoted all the energies of his being.

Taine's philosophy or natural history of the fine arts.

It is thus evident that the evolution theory, though it furnishes us with some instructive points of view for the history of the fine arts as for other things, is far from being the whole key to that history. Another key, employed with results perhaps less really luminous than they are certainly showy and attractive, is that supplied by Taine. Taine's philosophy, which might perhaps be better called a natural history, of fine art consists in regarding the fine arts as the necessary result of the general conditions under which they are at any time produced —conditions of race and climate, of religion, civilization and manners. Acquaint yourself with these conditions as they existed in any given people at any given period, and you will be able to account for the characters assumed by the arts of that people at that period, and to reason from one to the other, as a botanist can account for the flora of any given locality, and can reason from its soil, exposure and temperature, to the orders of vegetation which it will produce. This method of treating the history of the fine arts, again, is one which can be pursued with profit in so far as it makes the student realize the connexion of fine arts with human culture in general, and teaches him how the arts of any age and country are not an independent or arbitrary phenomenon, but are essentially an outcome, or efflorescence, to use a phrase of Ruskin's, of deep-seated elements in the civilization which produces them. But it is a method which, rashly used, is very apt to lead to a hasty and one-sided handling both of history and of art. It is easy to fasten on certain obvious relations of fine art to general civilization when you know a few of the facts of both, and to say, the cloudy skies and mongrel industrial population of Protestant Amsterdam at such and such a date had their inevitable reflection in the art of Rembrandt; the wealth and pomp of the full-fleshed burghers and burgesses of Catholic Antwerp had theirs in the art of Rubens. But to do this in the precise and conclusive manner of Taine's treatises on the philosophy of art always means to ignore a large range of conditions or causes for which no corresponding effect is on the surface apparent, and generally also a large number of effects for which appropriate causes cannot easily be discovered at all.

Criticisms and counter-criticisms on Taine's methods.

These considerations have resulted in a reaction against Taine's theories which goes probably too far. It is no complete confutation of his philosophy of art-history to contend, as has been done somewhat contemptuously by Professor Ernst Grosse and others, that the great artist, so far from representing the general tendencies of his time and environment, is commonly a solitary innovator and revolutionist, and has to educate and create his own public, often through years of obloquy or neglect. This is sometimes true when the traditions and ideals of art are undergoing revolution or swift experimental change, but hardly ever true in times of stable tradition and accepted ideals; and when true it only shows that the tendencies the innovating genius represents are tendencies which have till his time been working underground, and which he is born to bring into light and evidence. A new and revolutionary impulse in art, as in thought or politics, is like a yeast or ferment working at first secretly, affecting for a while only a few spirits, as a new epidemic may for a while only affect a few constitutions, and then gradually ripening and strengthening till it communicates itself to thousands. In its inception such a ferment is not, indeed, one of the obvious phenomena of the society in which it takes root, but it is none the less one of the most vital and significant phenomena. The truth is, that this particular efflorescence of human culture depends for its character at any given time upon combinations of causes which are by no means simple, but generally highly complex, obscure and nicely balanced. For instance, the student who should try to reason back from the holy and beatified character which prevails in much of the devotional painting of the Italian schools down to the Renaissance would be much mistaken were he to conclude, "like art, like life, thoughts and manners." He would not understand the relation of the art to the general civilization of those days unless he were to remember that one of the chief functions of the imagination is to make up for the shortcomings of reality, and to supply to contemplation images of that which is most lacking in actual life; so that the visions at once peaceful and ardent embodied by the religious schools of art in the Italian cities are to be explained, not by the peace, but rather in great part by the dispeace, of contemporary existence, and by the longing of the human spirit to escape into happier and more calm conditions.

Difficulty of combining the study of the manual with that of the vocal group of fine arts.

Any one of the three modes of generalization to which we have referred might no doubt yield, however, supposing in the student the due gifts of patience and of caution, a working clue to guide him through that immense region of research, the history of the fine arts. But it is hardly possible to pursue to any purpose the history of the two great groups, the shaping group and the speaking group, together. At some stages of the world's history the manual and the monumental arts have flourished, as in Egypt and Assyria, when there was no fine art of words at all, and the only literature was that of records cut in hieroglyph or cuneiform on palace walls and temples, and on tablets, seals and cylinders. At other times and in other communities there has existed a great tradition and inheritance of poetry and song when the manual arts were only beginning to emerge again from the wreck of an old civilization, as in the Homeric age of Greece, or where they had never flourished at all except by imitation and importation, as in Palestine. In historic Greece all three divisions of the art of poetry, the epic, lyric and the dramatic, had been perfected, and two of them had again declined, before sculpture had reached maturity or painting had passed beyond the stage of its early severity. The European poetry of the middle ages, abundant and rich as it was alike in France and Provence, in Germany and Scandinavia, can yet not take rank, among the creations of human genius, beside the great masterpieces of Romanesque and Gothic architecture; it was in Italy only that Dante, before the end of that age, carried poetry to a place of equality if not of primacy among the arts. Taking the England of the Elizabethan age, we find the great outburst of our national genius in poetry contemporary with nothing more interesting in the manual arts than the gradual and only half-intelligent transformation of late Gothic architecture by the adoption of Italian Renaissance forms imported principally by way of Flanders or France, together with a fine native skill shown in the art of miniature portrait-painting, and none at all worth mentioning in other branches of painting or in sculpture. If the course of poetry and that of the manual arts have thus run independently throughout almost the whole field of history, those of music and the manual arts have been more widely separated still. In ancient Greece music and poetry were, we know, most intimately connected, but of the true nature of Greek music we know but little, of that of the earlier middle ages less still, and throughout the later middle ages and the earlier Renaissance the art remained undeveloped, whether in the service of the church or in secular and popular use, and in both cases in strict subservience to words. The growth of independent music is entirely the work of the modern world, and will probably rank in the esteem of posterity as its highest spiritual achievement and claim to gratitude, when the mechanical inventions and applications of applied science, which now occupy so disproportionate a part of the attention of humanity, have become a normal and unregarded part of its existence.

Moments in history there have no doubt been when literature and the manual arts, and even music, have been swept simultaneously along a single stream of ideas and feelings. Such a moment was experienced in France in 1830 and the following years, when (to choose only a few of the greatest names) Hugo in poetry, Delacroix in painting, and Berlioz in music were roused to a high pitch of consentaneous inspiration by the new ideas and feelings of romanticism. But such moments are rare and exceptional. On the other hand, it is very possible to take the whole of the shaping or manual group of fine arts together and to pursue their history connectedly throughout the course of civilization. By the history of art what is usually meant is indeed the history of these three arts with that of some of their subordinate and connected crafts. Leaving aside the arts of the races of the farther East, which, profoundly interesting as they are, have but gradually and late become known to us, and the relations of which with the arts of the nearer East and the Mediterranean are still quite obscure—leaving these aside, the history of the manual arts of architecture, painting and sculpture falls naturally into several great periods or divisions to some extent overlapping each other but in the main consecutive.

These periods are roughly as follows:—

Main divisions of the history of art.

1. The period of the great civilizations of Mesopotamia and the Nile, beginning approximately about 5000 B.C. and ending, roughly speaking (but some of them much earlier), with the spread of Greek power and Greek ideas under Alexander. On the main characteristics of the art of these empires we have already had occasion to touch.

2. The Minoan and Mycenaean period, partly contemporary with the above and dating probably from about 2500 to about 1000 B.C.; our knowledge of this is due entirely to quite recent researches, confined at present to certain points in Greece and Asia Minor, in Crete and other islands in the Mediterranean basin; enough has already been revealed to prove the existence of an original and highly developed palace-architecture and of forms of relief-painting and of all the minor and decorative arts more free and animated than anything known to Egypt or Assyria. (See CRETE and AEGEAN CIVILIZATION.)

3. The Greek and Roman period, from about 700 B.C. to the final triumph of Christianity, say A.D. 400. During the first two or three centuries of this period the Hellenic race, beginning again after the cataclysm which had swallowed up the earlier Mediterranean civilizations, carried to perfection its most characteristic art, that of sculpture, in the endeavour to embody worthily its ideas of the supernatural powers governing the world. Putting aside the monstrous gods of Egypt and the East, it found its ideals in varieties of the human form as presented by the most harmoniously developed specimens of the race under conditions of the greatest health, activity and grace. In the figures of Greek sculpture, both decorative and independent, and no doubt in Greek painting also (but of that we can only judge from such specimens of the minor handicrafts, chiefly vase-paintings, as have come down to us)—in these were set for the whole Western world the types and standards of human beauty, and in their grouping and arrangement the types and standards of rhythmical composition and design. Gradually human portraiture and themes of everyday life took their place beside representations of the gods and heroes. New schools struck out new tendencies within certain limits. But in the general standards of form and design there was in the imitative arts relatively little change, though towards the end there was much failure of skill, throughout the whole period. The one great change was in architecture. Greece had been content with the constructive system of columns and horizontal entablature, and under that system had invented and perfected her three successive modes or orders of architecture—the Doric, Ionic and Corinthian. The genius of Rome invented the round arch, and by help of that system erected throughout her subject world a thousand vast constructions—temple, palace, bath, amphitheatre, forum, aqueduct, triumphal gate and the rest—on a scale of monumental grandeur such as Greece had never known.

4. The Christian period, from about 400 to about 1400. The decay or petrifaction of the imitative arts which had set in during the latter days of Rome continued during all the earlier centuries of the Christian period, while the Western world was in process of remaking. Free painting and free sculpture practically ceased to exist. Roman architecture underwent modifications under the influence of the church and of the new conditions of life; the Byzantine form, touched at certain times and places with oriental influences, developed itself wherever the Eastern Empire still stood erect in decay; the Romanesque form, as it is called, in the barbarian-conquered regions of the west and north. Sculpture existed for centuries only in rudimentary and subordinate forms as applied to architecture; painting only in forms of rigid though sometimes impressive hieratic imagery, whether as mosaic in the apses and vaults of churches, as rude illumination in MSS. and service-books, or as still ruder altar-painting carried on according to a frozen mechanical tradition. As time went on and medieval institutions developed themselves, a gradual vitality dawned in all these arts. In architecture the introduction of the pointed or Gothic arch at the beginning of the 13th century led to almost as great a revolution as that brought about by the use of the round or vaulted arch among the Romans. The same vital impulse that informed the new Gothic architecture breathed into the still quite subordinate arts of sculpture and painting (the latter now including the craft of glass-painting for church windows) a new spirit whether of devotional intensity or sweetness, or of human pathos or rugged humour, with a new technical skill for its embodiment. We have not set down, as is usually done, a specifically Gothic period in art, for this reason. The characteristic of the whole Christian period is that its dominant art is architecture, chiefly employed in the service of the church, with painting and sculpture only subordinately introduced for its enrichment. It makes no essential difference that from the 5th to the 12th century the forms of this art were derived with various modifications from the round-arched architecture of the Empire, and that by the 13th century new forms both of construction and decoration, in which the round arch was replaced by the pointed, had been invented in France, and from thence spread abroad to Germany and Scandinavia, Great Britain, Spain, and last and most superficially to Italy. The essential difference only begins when the imitative arts, sculpture and painting, begin to emancipate and detach themselves, to exist and strive after perfection on their own account. This happened first and very partially in Italy with the artificers of the 13th and 14th centuries—with the sculptors Nicola, Giovanni, and Andrea Pisano; the Sienese group of painters, Duccio, Simone Martini, and the Lorenzetti; and the Florentine group, Cimabue (if Cimabue is not a myth), Giotto and the Giotteschi. The

development of the rapid and flowing craft of fresco in place of the laborious and piecemeal craft of mosaic (henceforth for several centuries almost lost) was a great aid to this movement. After a period of something like stagnation, the movement received a vigorous fresh impulse soon after 1400, at about which date in Italy (not till near a century later in northern Europe) the beginning of the Renaissance is usually fixed.

5. The Renaissance period, from about 1400 to about 1600. The passion for classic literature, stimulated by the influence of Greek scholars into Italy after the fall of Constantinople; the enthusiastic revival of classic forms of architecture by architects like Brunelleschi and Alberti; the achievements in sculpture and painting of masters like Donatello and Masaccio, based on a new and impassioned study of nature and the antique together; these are the outstanding and universally known symptoms of the Italian Renaissance in the second and third quarters of the 15th century. Promptly and contemptuously in Italy, much more gradually and incompletely in the north, Gothic principles of construction and decoration were cast aside for classical principles, as reformulated by eager spirits from a combined study of Roman remains and of the text of Vitruvius. To the ideal types of devout and prayer-worn, ascetic and spiritualized humanity (tempered in certain subjects with elements of the homely and the grotesque), which the spirit of the middle ages had dictated to the sculptor and the painter, succeeded ideals of physical power, beauty and grace rivalling the Hellenic. The personages of the Christian faith and story were brought into visible kindred with those of ancient paganism. In the hands of certain artists a fortunate blending of the two ideals yielded results of a poignant and unique charm, which for us, who are the heirs both of antiquity and the middle ages, is far from being yet exhausted. At the same time, the love alike of republics, great princes, churchmen, nobles and merchants for works of art gave employment to sculptors and painters on themes other than ecclesiastical. The taste for civic or personal commemoration, for portraiture, for illustrations of allegory, romance and classic fable, covered with pictures the walls of council halls, of public and private palaces, and of villas. The invention of the oil medium by the painters of Flanders, and its gradual adoption by the Venetians and other schools of Italy for all purposes except the external decorations of buildings, added enormously to the resources of the art in rivalry with nature, and to the splendour of its results as objects of pride and luxury. The glories of matured Italian art reacted, not always favourably, on the north. The great days of Flemish painting had been from about 1430 to 1500, before any appreciable influence of the Renaissance had touched the schools of Brussels, of Bruges or of Antwerp. By about 1520 the artists of those schools had begun, except in portraiture, to lose their native vigour and originality by contact with the alien south. Among the great artists of Germany in the first half of the 16th century the work of one or two, like Burgkmair and Holbein, shows Italian influence reconciled not unsuccessfully with native instinct; but Dürer, the greatest of them, remained in all essentials Gothic and German to the end. During the last half of the century, the Netherlands and Germany alike yielded little but work of mongrel Teutonized Italian or Italianized Teutonic type, until towards its close Rubens accomplished, in the fire of his prodigious temperament, a true fusion of Flemish and Venetian qualities, at the same time closing gloriously the Renaissance period properly so called, and handing on an example which irresistibly affected a great part of modern painting.

6. Modern period, from about 1600 to the present time. During this period architecture remained in all European countries, until the 19th century, more or less completely under the influence of the Italian Renaissance. The principles of the classical revival had during a century or more of transition been gradually absorbed, first by France, then by Germany, the Low Countries, and Spain, and last by England, each country modifying the style according to its degree of knowledge or ignorance, its needs, instincts and traditions. Sculpture, which in the hands of the great masters of the earlier and later Renaissance in Italy had almost equalled its ancient glories, nay, in those of Michelangelo had actually surpassed them in the qualities at least of superhuman energy and intellectual expression—sculpture lost the sense of its true limitations, and entered, with the work of Bernini and even earlier, into an extravagant or "baroque" period of relaxed and bulging line, of exaggerated and ostentatious virtuosity. In this it followed the lead given by Italian architecture, by Jesuit church architecture especially, at and after the height of the Catholic reaction. From the monumental and memorial purposes which sculpture principally serves, it remained still, except in purely iconic uses, attached to or dependent on architecture. Not so painting, which asserted its independence more and more. In Protestant countries the old ecclesiastical patronage of the art had quite died out; in those that remained Catholic it continued, and even received a new stimulus from the anti-Protestant reaction. The demand for religious art was supplied with abundance of traditional facility, of technical accomplishment and devotional display, but with a loss of the old sincerity and inspiration. Almost all painting, even for the most extensive and monumental phases of decoration in church or palace or civic hall, was on canvas stretched over or fitted into its allotted space in the architecture, and the art of fresco, even in Venice, its last stronghold, was for a time neglected or forgotten. Portable paintings for princely or private galleries and cabinets became the chief and most characteristic products of the art. The subjects of painting multiplied themselves. All manner of new aspects of life and nature were brought within the technical compass of the painter. Besides devotional and classical subjects and portraiture, daily life in all its phases, down to the homeliest and grossest, the life of the parlour and the tavern, of field and shore and sea, with landscape in all its varieties, took their place as material for the painter. The truths of indoor and outdoor atmosphere were translated on canvas for the first time. The Dutchmen from about 1620 to 1670 were the most active innovators and path-breakers of modern art along all these lines. The greatest of them, Rembrandt, dealt, as has been said, like a master and a magician with the problems of human individuality as revealed in a mysterious colour and shadow world of his own invention. At the same time a painter of no less power in Spain, Velazquez, viewing the world in the natural light of every day, showed for the first time how vitally and subtly paint could render the relief and mutual values of figures and objects in space, the essential truth of their visible relations and reactions in the enveloping atmosphere. The achievement of these two victorious innovators has only come to be fully understood in our own day. The simultaneous conquest of Claude le Lorrain, on the other hand, over the atmospheric glow of summer and sunset on the Roman Campagna and the adjacent hills and coasts, found acceptance instantly, less perhaps for its own sake than because of the classical associations of the scenery which he depicted. The vast widening of the field of the painter's art and multiplication of its subjects, which thus took place at the dawn of the modern period, were gains attended by one drawback, the loss, namely, of the sense of high seriousness and universal appeal which belonged to the art while its themes had been those of religion and classic story almost exclusively.

Classical and romantic revivals.

During the three hundred or so years of the modern period, academical schools attempting, more or less unsuccessfully, to carry on the great Italian and classical traditions of the Renaissance have not ceased to exist side by side with those which have striven to express new ways of seeing and feeling. Sometimes, as in France first under Louis XIV., and again for forty years from the beginning of the Revolution to the dawn of romanticism, such schools have succeeded in crushing out and discrediting all efforts in other directions. Between these two epochs, say from 1710 to 1780, French 18th-century ideals of social elegance and brilliant frivolity expressed themselves in forms of great accomplishment and vivacity both in poetry and sculpture, from the days of Watteau to those of Fragonard and Clodion.

At the same time England produced one of the finest and at the same time most national and downright masters of the brush in Hogarth; two of the greatest aristocratic portrait-painters of the world in Reynolds and Gainsborough, each of whom modified according to his own instincts the tradition imported in the previous century by Van Dyck, the greatest pupil of Rubens (Reynolds fusing with this influence those of Rembrandt and the Venetians in almost equal shares). Pastoral landscape in the hands of Gainsborough, classical, following Claude, in those of Wilson—these together with the humble but wholesome discipline of topographical illustration led on to the ambitious, wide-ranging and often inspired experiments of Turner, and to the narrower but more secure achievements of Constable in the same field, and made this country the acknowledged pioneer of modern landscape art. In the meantime the wave of classical enthusiasm which passed over Europe in the later years of the 18th century had produced in architecture generally a return to severer principles and purer lines, in reaction from the baroque and the rococo Renaissance styles of the preceding century and a half. In Italian sculpture, the same movement inspired during the Napoleonic period the over-honeyed accomplishment of Canova and his school; in northern sculpture, the more truly antique but almost wholly imitative work of Thorwaldsen, and the pure and rhythmic grace of the English Flaxman, a true master of design though scarcely of sculpture strictly so called. The same movement again was partly responsible in English painting and illustration from about 1770 to 1820 for much pastoral and idyllic work of agreeable but shallow elegance. In French painting the classic movement struck deeper. Along with much would-be Roman attitudinizing there was much real, if rigid, power in the work of David, much accomplished purity and sweetness in that of Prud'hon. The last and truest classic of France, and at the same time in portraiture the greatest realist, Ingres, held high the standard of his cause even through and past the great romantic revival which began with Géricault and culminated in Delacroix and the school of landscape painters who had received their inspiration from Constable. The main instincts embodied in the Romantic movement were the awakening of the human spirit to an eager retrospective love of the past, and especially of the medieval past, and simultaneously to a new passion for the beauties of nature, and especially of wild nature. Germany and England preceded France in this double awakening; in both countries the movement inspired a fine literature, but in neither did it express itself so fully and self-consciously through literature and the other arts together as it did in France when the hour struck. The revival of medieval sentiment in Germany had inspired comparatively early in the century the learned but somewhat aridly ascetic and essentially unpainterlike work of the group of artists who styled themselves *Nazarener.* In England the same revival expressed itself during a great part of the Victorian age in an enthusiastic return to the early Gothic ecclesiastical styles of architecture, a return unsuccessful upon the whole, because in pursuit of archaeological and grammatical detail the root qualities of right proportion and organic design were too often neglected.

The pre-Raphaelites.

Allied with this Gothic revival, and stimulated like it by the persuasive conviction and brilliant resource of Ruskin in criticism was the pre-Raphaelite movement in painting. Among the artists identified with this movement there was little really in common except in impatience of the prevailing modes of empty academic convention or anecdotic frivolity. The name covered for a while the essentially divergent aims of a vigorous unintellectual craftsman like Millais, fired for a few years in youth by contact with more imaginative temperaments, of a strenuous imitator of unharmonized local colours and unsubordinated natural facts like Holman Hunt, and of born poets and impassioned medievalists like Rossetti and after him Burne-Jones. Meantime in France, putting aside the work of the great Delacroix, the impulse of 1830 expressed itself best and most lastingly in the monumental work of Daumier both in caricature and romance, the impressive and significant treatment of peasant life and labour by J. F. Millet, the vitally truthful pastoral and landscape work of Troyon, Corot, Daubigny and the rest.

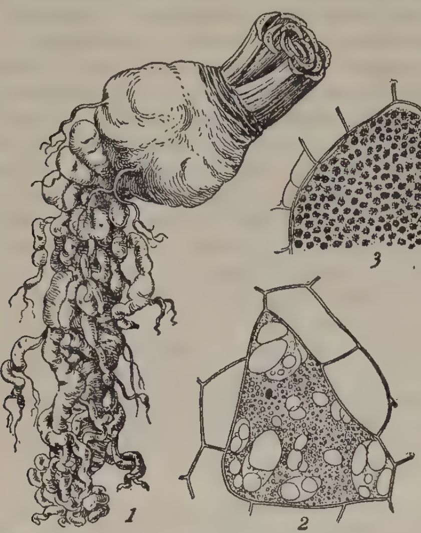
Contemporary tendencies.

Since the exhaustion of the Romantic movement, the other movements that have been taking place in European art have been too numerous and too rapid to be touched on here to any purpose. Both in sculpture and painting France has taken and held the lead. Mention has already been made of the special tendency in recent sculpture identified with the name and influence of Rodin. In painting there has been the fertilizing and transforming influence of Japan on the decorative ideals of the West; there have been successively the Realist movement, the movements of the Impressionists, the Luminists, the Neo-impressionists, the Independents, movements initiated almost always in Paris, and in other countries eagerly adopted and absorbed, or angrily controverted and denounced, or simply neglected and ignored according to the predilection of this or that group of artists and critics; there has been a vast amount of heterogeneous, hurried, confident and clamant innovating activity in this direction and in that, much of it perhaps doomed to futility in the eyes of posterity, but at any rate there has not been stagnation.

BIBLIOGRAPHY.—To attempt in this place anything like a full bibliography covering so vast a field would be idle. Many of the books necessary to a first-hand study of the subject are cited in the article AESTHETICS. The following are some of the most important writings actually referred to in the text, English translations being mentioned where they exist: Aristotle, *Poetics*, edited with critical notes and a translation by S. H. Butcher (1898); S. H. Butcher, *Aristotle's Theory of Poetry and Fine Art*, with a critical text and a translation of the *Poetics* (1902); Plato, *Republic*, bk. x. 596 ff., 600 ff. (Grote, iii. 117 ff.; Jowett, iii. 489 ff.); B. Bosanquet, *Introduction to Hegel's Philosophy of Fine Art* (*Ästhetik*), translation with notes and prefatory essay (1896); *The Philosophy of Art, an Introduction to the Science of Aesthetics*, by Hegel and C. L. Michelet, trans. Hastie (1886); Schiller, *Briefe über die ästhetische Erziehung des Menschen* (trans. by G. J. Weiss, with preface by J. Chapman, 1845; also in Bohn's Standard Library, 1846); Herbert Spencer, *First Principles*, ch. xxii.; Gottfried Semper, *Der Stil* (1860–1863); Hippolyte Taine, *De l'idéal dans l'art* (1867), *Philosophie de l'art en Grèce* (1869), *Philosophie de l'art en Italie*, *Philosophie de l'art dans les Pays-Bas* (translations in 5 vols. by J. Durand, New York, 1889); Karl Groos, *Die Spiele der Menschen* (1899; trans. by E. L. Baldwin, 1901), and *Die Spiele der Tiere* (2nd ed., 1907; trans. by E. L. Baldwin, 1898); Ernst Grosse, *Die Anfänge der Kunst* (1894; trans. in the Anthropological Series, 1894); Yrjö Hirn, *The Origins of Art* (1900); G. Baldwin Brown, *The Fine Arts* (2nd ed., 1902); Felix Clay, *The Origins of the Sense of Beauty* (1908). For a general history of the manual or shaping group of arts, C. J. F. Schnasse, *Geschichte der bildenden Künste* (2nd ed., 1866–1879), though in parts obsolete, is still unsuperseded. A very summary general view is given in Salomon Reinach, *The Story of Art through the Ages* (trans. by Florence Simmonds, 1904); a general history of the same group was undertaken by Giulio Carotti (English translation by Alice Todd, 1909). (S. C.)

FINGER, one of the five members with which the hand is terminated, a digit; sometimes the word is restricted to the four digits other than the thumb. The word is common to Teutonic languages, cf. Dutch *vinger* and Ger. *Finger*; probably the ultimate origin is to be found in the root of the words appearing in Greek πέντε, Lat. *quinque*, five. (See SKELETON: *Appendicular.*)

FINGER-AND-TOE, CLUB ROOT or ANBURY, a destructive plant-disease known botanically as *Plasmodiophora Brassicae*, which attacks cabbages, turnips, radishes and other cultivated and wild members of the order Cruciferae. It is one of the so-called Slime-fungi or Myxogastres. The presence of the disease is indicated by nodules or warty outgrowths on the root, which sometimes becomes much swollen and ultimately rots, emitting an unpleasant smell. The disease is contracted from spores present in the soil, which enter the root. The parasite develops within the living cells of the plant, forming a glairy mass of protoplasm known as the *plasmodium*, the form of which alters from time to time. The cells which have been attacked increase enormously in size and the disease spreads from cell to cell. Ultimately the plasmodium becomes resolved into numerous minute round spores which, on the decay of the root, are set free in the soil. A preventive is quicklime, the application of which destroys the spores in the soil. It is important that diseased plants should be burned, also that cruciferous weeds, such as shepherd's purse, charlock, &c., should not be allowed to grow in places where plants of the same order are in cultivation.



Finger-and-Toe (*Plasmodiophora Brassicae*).

1, Turnip attacked by the disease, reduced.
2, A cell of the tissue containing the plasmodium; the smaller cells at the sides are unaffected.
3, Infected cell, showing spore formation. 2, 3, highly magnified.

FINGER-PRINTS. The use of finger-prints as a system of identification (*q.v.*) is of very ancient origin, and was known from the earliest days in the East when the impression of his thumb was the monarch's sign-manual. A relic of this practice is still preserved in the formal confirmation of a legal document by "delivering" it as one's "act and deed." The permanent character of the finger-print was first put forward scientifically in 1823 by J. E. Purkinje, an eminent professor of physiology, who read a paper before the university of Breslau, adducing nine standard types of impressions and advocating a system of classification which attracted no great attention. Bewick, the English draughtsman, struck with the delicate qualities of the lineation, made engravings of the impression of two of his finger-tips and used them as signatures for his work. Sir Francis Galton, who laboured to introduce finger-prints, points out that they were proposed for the identification of Chinese immigrants when registering their arrival in the United States. In India, Sir William Herschel desired to use finger-prints in the courts of the Hugli district to prevent false personation and fix the identity upon the executants of documents. The Bengal police under the wise administration of Sir E. R. Henry, afterwards chief commissioner of the London metropolitan police, usefully adopted finger-prints for the detection of crime, an example followed in many public departments in India. A transfer of property is attested by the thumb-mark, so are documents when registered, and advances made to opium-growers or to labourers on account of wages, or to contracts signed under the emigration law, or medical certificates to vouch for the persons examined, all tending to check the frauds and impostures constantly attempted.

The prints depend upon a peculiarity seen in the human hand and to some extent in the human foot. The skin is traversed in all directions by creases and ridges, which are ineradicable and show no change from childhood to extreme old age. The persistence of the markings of the finger-tips has been proved beyond all question, and this universally accepted quality has been the basis of the present system of identification. The impressions, when examined, show that the ridges appear in certain fixed patterns, from which an alphabet of signs or a system of notation has been arrived at for convenience of record. As the result of much experiment a fourfold scheme of classification has been evolved, and the various types employed are styled "arches," "loops," "whorls" and "composites." There are seven subclasses, and all are perfectly distinguishable by an expert, who can describe each by its particular symbol in the code arranged, so that the whole "print" can be read as a distinct and separate expression. Very few, and the simplest, appliances are required for taking the print—a sheet of white paper, a tin slab, and some printer's ink. Scars or malformations do not interfere with the result.

The unchanging character of the finger-prints has repeatedly helped in the detection of crime. We may quote the case of the thief who broke into a residence and among other things helped himself to a glass of wine, leaving two finger-prints upon the tumbler which were subsequently found to be identical with those of a notorious criminal who was arrested, pleaded guilty and was convicted. Another burglar effected entrance by removing a pane of glass from a basement window, but, unhappily for him, left his imprints, which were referred to the registry and found to agree exactly with those of a convict at large; his address was known, and when visited some of the stolen property was found in his possession. In India a murderer was identified by the brown mark of a blood-stained thumb he had left when rummaging amongst the papers of the deceased. This man was convicted of theft but not of the murder.

The keystone to the whole system is the central office where the register or index of all criminals is kept for ready reference. The operators need no special gifts or lengthy training; method and accuracy suffice, and abundant checks exist to obviate incorrect classification and reduce the liability to error.

Authorities.—F. Galton, *Finger Prints* (1892), *Fingerprint Directories* (1895); E. R. Henry, *Classification and Uses of Finger Prints*; A. Yvert, *L'Identification par les empreintes digitales palmaires* (1905); K. Windt, R. S. Kodicek, *Daktyloskopie. Verwertung von Fingerabdrücken zu Identifizierungszwecken* (Vienna, 1904); E. Loeard, *La Dactyloscopie. Identification des récidivistes par les empreintes digitales* (1904); H. Faulds, *Guide to Finger-Print Identification* (1905); H. Gross, *Criminal Investigation* (trans. J. and J. C. Adam, 1907). (A. G.)

FINGO, or Fengu (*Ama-Fengu*, "wanderers"), a Bantu-Negro people, allied to the Zulu family, who have given their name to the district of Fingoland, the S.W. portion of the Transkei division of the Cape province. The Fingo tribes were formed from the nations broken up by Chaka and his Zulu; after some years of oppression by the Xosa they appealed to the Cape government in 1835, and were permitted by Sir Benjamin D'Urban to settle on the banks of the Great Fish river. They have been always loyal to the British, and have steadily advanced in social respects. They have largely adapted themselves to western culture, wearing European clothes, supporting their schools by voluntary contributions, editing newspapers, translating English poetry, and setting their national songs to correct music. The majority call themselves Christians and many of them have intermarried with Europeans. (See Kaffirs.)

FINIAL (a variant of "final"; Lat. *finis*, end), an architectural term for the termination of a pinnacle, gable end, buttress, or canopy, consisting of a bunch of foliage, which bears a close affinity to the crockets (*q.v.*) running up the gables, turrets or spires, and in some cases may be formed by uniting four or more crockets together. Sometimes the term is incorrectly applied to a small pinnacle of which it is only the termination (see Epi).

FINIGUERRA, MASO [*i.e.* Tommaso] (1426–1464), Florentine goldsmith, draughtsman, and engraver, whose name is distinguished in the history of art and craftsmanship for reasons which are partly mythical. Vasari represents him as having been the first inventor of the art of engraving (using that word in its popular sense of taking impressions on paper from designs engraved on metal plates), and Vasari's account was universally accepted and repeated until recent research proved it erroneous. What we actually know from contemporary documents of Finiguerra, his origin, his life, and his work, is as follows. He was the son of Antonio, and grandson of Tommaso Finiguerra or Finiguerri, both goldsmiths of Florence, and was born in Sta Lucia d'Ognissanti in 1426. He was brought up to the hereditary profession of goldsmith and was early distinguished for his work in niello. In his twenty-third year (1449) we find note of a sulphur cast from a niello of his workmanship being handed over by the painter Alessio Baldovinetti to a customer in payment or exchange for a dagger received. In 1452 Maso delivered and was paid for a niellated silver pax commissioned for the baptistery of St John by the consuls of the gild of merchants or Calimara. By this time he seems to have left his father's workshop: and we know that he was in partnership with Piero di Bartolommeo di Salì and the great Antonio Pollaiuolo in 1457, when the firm had an order for a pair of fine silver candlesticks for the church of San Jacopo at Pistoia. In 1459 we find Finiguerra noted in the house-book of Giovanni Rucellai as one of several distinguished artists with whose works the Casa Rucellai was adorned. In 1462 he is recorded as having supplied another wealthy Florentine, Cino di Filippo Rinuccini, with waist-buckles, and in the years next following with forks and spoons for christening presents. In 1463 he drew cartoons, the heads of which were coloured by Alessio Baldovinetti, for five or more figures for the sacristy of the duomo, which was being decorated in wood inlay by a group of artists with Giuliano da Maiano at their head. On the 14th of December 1464 Maso Finiguerra made his will, and died shortly afterwards.

These documentary facts are supplemented by several writers of the next generation with statements more or less authoritative. Thus Baccio Bandinelli says that Maso was among the young artists who worked under Ghiberti on the famous gates of the baptistery; Benvenuto Cellini that he was the finest master of his day in the art of niello engraving, and that his masterpiece was a pax of the Crucifixion in the baptistery of St John; that being no great draughtsman, he in most cases, including that of the above-mentioned pax, worked from drawings by Antonio Pollaiuolo. Vasari, on the other hand, allowing that Maso was a much inferior draughtsman to Pollaiuolo, mentions nevertheless a number of original drawings by him as existing in his own collection, "with figures both draped and nude, and histories drawn in water-colour." Vasari's account was confirmed and amplified in the next century by Baldinucci, who says that he has seen many drawings by Finiguerra much in the manner of Masaccio; adding that Maso was beaten by Pollaiuolo in competition for the reliefs of the great silver altar-table commission by the merchants' gild for the baptistery of St John (this famous work is now preserved in the Opera del Duomo). But the paragraph of Vasari which has chiefly held the attention of posterity is that in which he gives this craftsman the credit of having been the first to print off impressions from niello plates on sulphur casts and afterwards on sheets of paper, and of having followed up this invention by engraving copper-plates for the express purpose of printing impressions from them, and thus became the inventor and father of the art of engraving in general. Finiguerra, adds Vasari, was succeeded in the practice of engraving at Florence by a goldsmith called Baccio Baldini, who, not having much invention of his own, borrowed his designs from other artists and especially from Botticelli. In the last years of the 18th century Vasari's account of Finiguerra's invention was held to have received a decisive and startling confirmation under the following circumstances. There was in the baptistery at Florence (now in the Bargello) a beautiful 15th-century niello pax of the Coronation of the Virgin. The Abate Gori, a savant and connoisseur of the mid-century, had claimed this conjecturally for the work of Finiguerra; a later and still more enthusiastic virtuoso, the Abate Zani, discovered first, in the collection of Count Seratti at Leghorn, a sulphur cast from the very same niello (this cast is now in the British Museum), and then, in the National library at Paris, a paper impression corresponding to both. Here, then, he proclaimed, was the actual material first-fruit of Finiguerra's invention and proof positive of Vasari's accuracy.

Zani's famous discovery, though still accepted in popular art histories and museum guides, is now discredited among serious students. For one thing, it has been proved that the art of printing from engraved copper-plates had been known in Germany, and probably in Italy also, for years before the date of Finiguerra's alleged invention. For another, Maso's pax for the baptistery, if Cellini is to be trusted, represented not a Coronation of the Virgin but a Crucifixion. In the next place, its recorded weight does not at all agree with that of the pax claimed by Gori and Zani to be his. Again, and perhaps this is the strongest argument of any, all authentic records agree in representing Finiguerra as a close associate in art and business of Antonio Pollaiuolo. Now nothing is more marked than the special style of Pollaiuolo and his group; and nothing is more unlike it than the style of the Coronation pax, the designer of which must obviously have been trained in quite a different school, namely that of Filippo Lippi. So this seductive identification has to be abandoned, and we have to look elsewhere for traces of the real work of Finiguerra. The only fully authenticated specimens which exist are the above-mentioned tarsia figures, over half life-size, executed from his cartoons for the sacristy of the duomo. But his hand has lately been conjecturally recognized in a number of other things: first in a set of drawings of the school of Pollaiuolo at the Uffizi, some of which are actually inscribed "Maso Finiguerra" in a 17th-century writing, probably that of Baldinucci himself; and secondly in a very curious and important book of nearly a hundred drawings by the same hand, acquired in 1888 for the British Museum. The Florence series depicts for the most part figures of the studio and the street, to all appearance members of the artist's own family and workshop, drawn direct from life. The museum volume, on the other hand, is a picture-chronicle, drawn from imagination, and representing parallel figures of sacred and profane history, in a chronological series from the Creation to Julius Caesar, dressed and accoutred with inordinate richness according to the quaint pictures which Tuscan popular fancy in the mid-15th century conjured up to itself of the ancient world. Except for the differences naturally resulting from the difference of subject, and that the one series are done from life and the other from imagination, the technical style and handling of the two are identical and betray unmistakably a common origin. Both can be dated with certainty, from their style, costumes, &c., within a few years of 1460. Both agree strictly with the accounts of Finiguerra's drawings left us by Vasari and Baldinucci, and disagree in no respect with the character of the inlaid figures of the sacristy. That the draughtsman was a goldsmith is proved on every page of the picture-chronicle by his skill and extravagant delight in the ornamental parts of design—chased and jewelled cups, helmets, shields, breastplates, scabbards and the like,—as well as by the symmetrical metallic forms into which he instinctively conventionalizes plants and flowers. That he was probably also an engraver in niello appears from the fact that figures from the Uffizi series of drawings are repeated among the rare anonymous Florentine niello prints of the time (the chief collection of which, formerly belonging to the marquis of Salamanca, is now in the cabinet of M. Edmond de Rothschild in Paris). That he was furthermore an engraver on copper seems certain from the fact that the general style and many particular figures and features of the British Museum chronicle drawings are exactly repeated in some of those primitive 15th-century Florentine prints which used to be catalogued loosely under the names of Baldini or Botticelli, but have of late years been classed more cautiously as anonymous prints in the "fine manner" (in contradistinction to another contemporary group of prints in the "broad manner"). The fine-manner group of primitive Florentine engravings itself falls into two divisions, one more archaic, more vigorous and original than the other, and consisting for the most part of larger and more important prints. It is this division which the drawings of the Chronicle series most closely resemble; so closely as almost to compel the conclusion that drawings and engravings are by the same hand. The later division of fine-manner prints represent a certain degree of technical advance from the earlier, and are softer in style, with elements of more classic grace and playfulness; their motives moreover are seldom original, but are borrowed from various sources, some from German engravings, some from Botticelli or a designer closely akin to him, some from the pages of the British Museum Chronicle-book itself, with a certain softening and attenuating of their rugged spirit; as though the book, after the death of the original draughtsman-engraver, had remained in his workshop and continued to be used by his successors. We thus find ourselves in presence of a draughtsman of the school of Pollaiuolo, some of whose drawings bear an ancient attribution to Finiguerra, while all agree with what is otherwise known of him, and one or two are exactly repeated in extant works of niello, the craft which was peculiarly his own; others being intimately related to the earliest or all but the earliest works of Florentine engraving, the kindred craft which tradition avers him to have practised, and which Vasari erroneously believed him to have invented. Surely, it has been confidently argued, this draughtsman must be no other than the true Finiguerra himself. The argument has not yet been universally accepted, but neither has any competent criticism appeared to shake it; so that it may be regarded for the present as holding the field.

Bibliography.—See Bandinelli in Bottari, *Raccolta di lettere* (1754), i. p. 75; Vasari (ed. Milanesi), i. p. 209, iii. p. 206; Benvenuto Cellini, *I Trattati dell' orificeria*, &c. (ed. Lemonnier), pp. 7, 12, 13, 14; Baldinucci, *Notizie dei professori di disegno* (1845), i. pp. 518, 519, 533; Zani, *Materiali per servire*, &c. (1802); Duchesne, *Essai sur les nielles* (1824); Dutuit, *Manuel de l' amateur d'estampes*, vol. i. pref. and vol. ii.; and for a full discussion of the whole question, with quotations from earlier authorities and reproductions of the works discussed, Sidney Colvin, *A Florentine Picture Chronicle* (1898). (S. C.)

FINISHING. The term *finishing*, as specially applied in the textile industries, embraces the process or processes to which bleached, dyed or printed fabrics of any description are subjected, with the object of imparting a characteristic appearance to the surface of the fabric, or of influencing its handle or feel. Strictly speaking, certain operations might be classed under this heading which are conducted previous to bleaching, dyeing, &c.; *e.g.* mercerizing (*q.v.*), stretching and crabbing, singeing (see Bleaching); but as these are not undertaken by the finisher, only those will be dealt with here which are not mentioned under other headings. By the various treatments to which the fabric is subjected in finishing, it is often so altered in appearance that it is impossible to recognize in it the same material that came from the loom or from the bleacher or dyer. On the other hand, one and the same fabric, subjected to different processes of finishing, may be made to represent totally different classes of material. In other cases, however, the appearance of the finished article differs but slightly from that of the piece on leaving the loom.

All processes of finishing are purely mechanical in character, and the most important of them depend upon the fact that in their ordinary condition (*i.e.* containing their normal amount of moisture), or better still in a damp state, the textile fibres are plastic, and consequently yield to pressure or tension, ultimately assuming the shape imparted to them. The old-fashioned box press, formerly largely used for household linen, owed its efficacy to this principle. At elevated temperatures the damp fibres become very much more plastic than at the ordinary temperature, the simplest form of finishing appliance based on this fact being the ordinary flat iron. Indeed it may safely be stated that most of the modern finishing processes have been evolved from the household operations of washing (milling), brushing, starching, mangling, ironing and pressing.

Cotton Pieces.—In the ordinary process of bleaching, cotton goods are subjected during the various operations to more or less continual longitudinal tension, and while becoming elongated, shrink more or less considerably in width. In order to bring them back to their original width, they are stretched or "stentered" by means of specially constructed machines. The most effective of these is the so-called stentering frame, which consists essentially of two slightly diverging endless chains carrying clips or pins which hold the piece in position as it traverses the machine. The length of a frame may vary from 20 to 30 yds. On the upper part of the frame the chains run in slots, and by means of set screws the distance between the two chains can be set within the required limits. The pieces are fed on to one end of the machine in the damp state by hand and are then naturally slack. But before they have travelled many yards they become taut, the stretching increasing as they travel along. Simultaneously with the stretching, the pieces are dried by a current of hot air which is blown through from below, so that on arriving at the end of the machine they are not only stretched to the required degree but are also dry. The machine used for stentering is more fully described under Mercerizing (*q.v.*). In case the goods come straight from the loom to be finished, stentering is not necessary.

Pieces intended to receive a "pure" finish pass on without further treatment to the ordinary finishing processes such as calendering, hot pressing, raising, &c. But in the majority of cases they are previously impregnated, according to the finish desired, with stiffening or softening agents, weighting materials, &c. Usually, starch constitutes the main stiffening agent, with additions of china clay, barium compounds, &c., for weighting purposes, and Turkey red oil, with or without the addition of some vegetable oil or fat, as the softening agent. Magnesium sulphate is also largely used in order to give "body" to the cloth, which it does by virtue of its property of crystallizing in fine felted needle-shaped crystals throughout the mass of the fabric. When starch is used in filling, it is advisable to add some antiseptic, such as zinc chloride, sodium silicofluoride, phenol or salicylic acid, in order to prevent or retard subsequent development of mildew. The impregnation of the pieces with the filling is effected in two ways, viz. either throughout the thickness of the cloth or on one surface only (back starching). When the whole piece is to be impregnated the operation is conducted in a starching mangle, which is similar in construction to an ordinary household mangle, though naturally larger and more elaborate in construction. The pieces run at full width through a trough situated immediately below the bowls and containing the filling (starch paste, &c.), then between the bowls, the pressure ("nip") of which regulates the amount of filling taken up, and thence over a range of steam-heated drying cylinders (see Bleaching). In case one side only of the goods is to be stiffened—and this is usually necessary in the case of printed goods,—a so-called back-starching mangle is employed.

The construction of the machine varies, but the simplest form consists essentially of a wooden bowl *a* (fig. 1) which runs in the starch paste contained in trough *t*. The pieces pass from the batch-roller B, through scrimp rails S and over the bowl under tension, touching the surface from which they gather the starch paste. By means of the fixed "doctor" blade *d*, which extends across the piece, the paste is levelled on the surface of the fabric and excess scraped off, falling back into the trough. The goods are then dried with the face side to the cylinders.

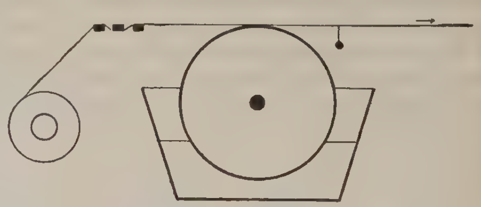


Fig. 1.—Principle of Back-Starching Machine.

Some goods come into the market with no further treatment after starching other than running through a mangle with a little softening and then drying, but in the great majority of cases they are subjected to further operations.

Damping.—When deprived of their natural moisture by drying on the cylinder drying machine, cotton goods are not in a fit condition to undergo the subsequent operations of calendering, beetling, &c., since the fibres in the dry state have lost their plasticity. The pieces are consequently damped to the desired degree, and this is usually effected in a damping machine in passing through which they meet with a fine spray of water.

A simple and effective device for this purpose is shown in section in fig. 2. It consists essentially of a brass roller *r* running in water contained in a trough or box *t*. Touching the brass roller is a brush roller *b* which revolves at a high speed, thus spraying the water, which it takes up continuously from the wet revolving brass roller in all directions, and consequently also against the piece which passes in a stretched condition over the top of the box, being drawn from the batch roller B, over scrimp rails S, and batched again on the other side on roller R. The level of the water in the trough is kept constant.

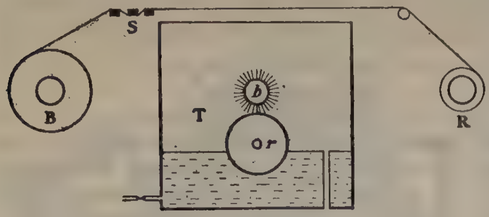


FIG. 2.—Principle of Damping Machine.

Calendering.—The calender may be regarded as an elaboration of the ordinary mangle, from which, however, it differs essentially inasmuch as one or more of the rollers or bowls are made of steel or iron and can be treated either by gas or steam; the other bowls are made of compressed cotton or paper. Three distinct forms of calender are in use, viz. the ordinary calender, the friction calender and the embossing calender.

The number of bowls in an ordinary calender varies between two and six according to the character of the finish for which it is intended. In a modern five-bowl calender the bottom bowl is made of cast iron, the second of compressed cotton or paper, the third of iron being hollow and fitted with steam heating apparatus. The fourth bowl is made of compressed cotton, and the fifth of cast iron. The pieces are simply passed through for "swissing," *i.e.* for the production of an ordinary plain finish. The same calender may also be used for "chasing," in which two pieces are passed through, face to face, in order to produce an imitation linen finish. Moiré or "watered" effects are produced in a similar way, but these effects are frequently imitated in the embossing calender.

The friction calender, the object of which is to produce a high gloss on the fabric, differs from the ordinary calender inasmuch as one of the bowls is caused to revolve at a greater speed than the others. In an ordinary three-bowl friction calender the bottom bowl is made of cast iron, the middle one of compressed cotton or paper, and the top one (the friction bowl) of highly polished chilled iron. The last-named bowl, which has a greater peripheral speed than the others, is hollow and can be heated either by steam or gas.

The embossing calender is usually constructed of two bowls, one of which is of steel and the other of compressed cotton or paper. The steel roller, which is hollow and can be heated either by steam or gas, is engraved with the pattern which it is desired to impart to the piece. If the pattern is deep, as is the case in the production of book cloths, it is necessary to run the machine empty under pressure until the pattern of the steel bowl has impressed itself into the cotton or paper bowls, but if the effect desired only consists of very fine lines, this is not necessary; for instance, in the production of the Schreiner finish, which is intended to give the pieces (especially after mercerizing) the appearance of silk, the steel roller is engraved with fine diagonal lines which are so close together (about 250 to the in.) as to be undistinguishable by the naked eye.

Beetling is a process by which a peculiar linen-like appearance and a leathery feel or handle are imparted to cotton fabrics, the process being also employed for improving the appearance of linen goods. For the best class of beetle finish, the pieces are first impregnated with sago starch and the other necessary ingredients (softening, &c.) and are dried on cylinders. They are then damped on a water mangle, and beamed on to the heavy iron bowl of the beetling machine.

A beetling machine of the kind, with four sets of "fallers," is shown in fig. 3. The fallers are made of beech wood, are about 8 ft. long, 5½ in. deep and 4 in. wide, and are kept in their vertical position by two pairs of guide rails. Each faller is provided with a tappet or wooden peg driven in at one side, which engages with the teeth or "wipers" of the revolving shaft in the front of the machine. The effect of this mechanism is to lift the faller a distance of about 13 in. and then let it drop on to the cloth wound on the beam. This lifting and dropping of the fallers on to the beam takes place in rhythmical and rapid succession. To ensure even treatment the beam turns slowly round and also has a to-and-fro movement imparted to it. The treatment may last, according to the finish which it is desired to obtain, from one to sixty hours.

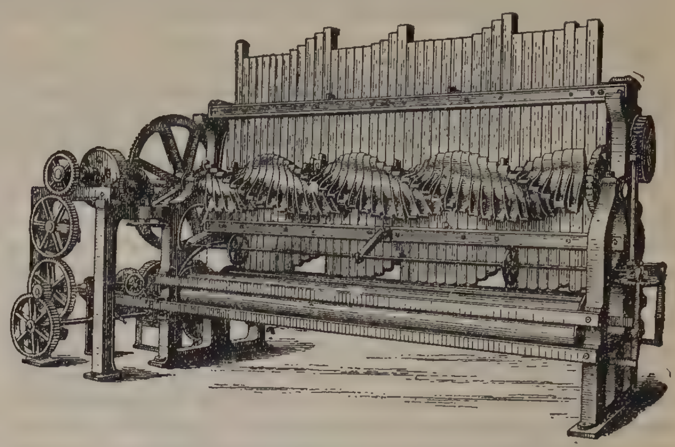


FIG. 3.—Beetling Machine (Edmeston & Sons).

Beetling was originally used for linen goods, but to-day is almost entirely applied to cotton for the production of so-called *linenettes*.

Hot-pressing is used to a limited extent in order to obtain a soft finish on cotton goods, but as this operation is more used for wool, it will be described below.

Raising.—This operation, which was formerly only used for woollen goods (teasing), has come largely into use for cotton pieces, partly in consequence of the introduction of the direct cotton colours by which the cotton is dyed evenly throughout (see DYEING), and partly in consequence of new and improved machinery having been devised for the purpose. Starting with a plain bleached, dyed or printed fabric, the process consists in principle in raising or drawing out the ends of individual fibres from the body of the cloth, so as to produce a nap or soft woolly surface on the face.

This is effected by passing the fabric slowly round a large drum D, which is surrounded, as shown in the diagram (fig. 4), by a number of small cylinders or rollers, *r*, covered with steel wire brushes or "carding," such as is used in carding engines (see COTTON-SPINNING MACHINERY).

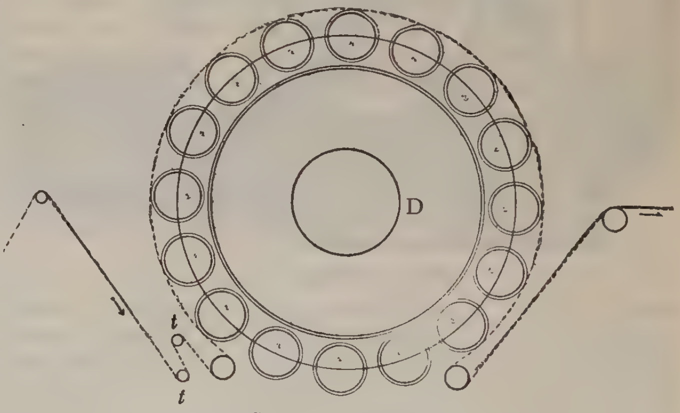


FIG. 4.—Raising.

The rollers *r*, which are all driven by one and the same belt (not shown in the figure), revolve at a high rate of speed, and can be made to do so either in the same direction as that followed by the piece as it travels through the machine or in the opposite one. In addition to their revolving round their own axes, the raising rollers may be either kept stationary or may be moved round the drum D in either direction.

In the more modern machines there are two sets of raising rollers, of which each alternate one is caused to revolve in the direction followed by the piece, while the other is made to revolve in the opposite direction. By passing through an arrangement of this kind several times, or through several such machines in succession, the ends of the fibres are gradually drawn out to the desired extent.

After raising, the pieces are sheared (for better class work) in order to produce greater regularity in the length of the nap. The raised style of finishing is used chiefly for the production of uniformly white or coloured flannelettes but is also used for such as are dyed in the yarn, and to a limited extent for printed fabrics.

Woollen and Worsted Pieces.—Although both of these classes of material are made from wool, their treatment in finishing differs so materially that it is necessary to deal with them separately. *Unions* or fabrics consisting of a cotton warp with a worsted weft are in general treated like worsteds.

In the finishing of woollen pieces the most important operation is that of *milling*, which consists in subjecting the pieces to mechanical friction, usually in an alkaline medium (soap or soap and soda) but sometimes in an acid (sulphuric acid) medium, in order to bring about felting and consequent "fulling" of the fabric. This felting of the wool is due to the peculiar structure of the fibre, the scales of which all protrude in one direction, so that the individual fibres can slip past each other in one direction more readily than in the opposite one and thus become more and more interlocked as the milling proceeds. If the pieces contain *burrs* these are usually removed by a process known as "carbonizing," which generally, but not necessarily, precedes the milling. Their removal depends upon the fact that the burrs, which consist in the main of cellulose, are disintegrated at elevated temperatures by dilute mineral acids. The pieces are run through sulphuric acid of from 4° to 6° Tw., squeezed or hydro-extracted, and dried over cylinders and then in stoves. The acid is thus concentrated and attacks the burrs, which fall to dust, while leaving the wool intact. For the removal of the acid the fabric is first washed in water and then in weak soda. Carbonizing is also sometimes used for worsteds.

Milling was formerly all done in milling or fulling stocks (see fig. 5), in which the cloth saturated with a strong solution of soap (with or without other additions such as stale urine, potash, fuller's earth, &c.) is subjected to the action of heavy wooden hammers, which are raised by the cams attached to the wheel (E) on the revolving shaft, and fall with their own weight on to the bundles of cloth. The shape of the hammer-head causes the cloth to turn slowly in the cavity in which the milling takes place. Occasionally, the cloth is taken out, straightened, washed if necessary, and then returned to the stocks to undergo further treatment, the process being continued until the material is uniformly shrunk or milled to the desired degree.

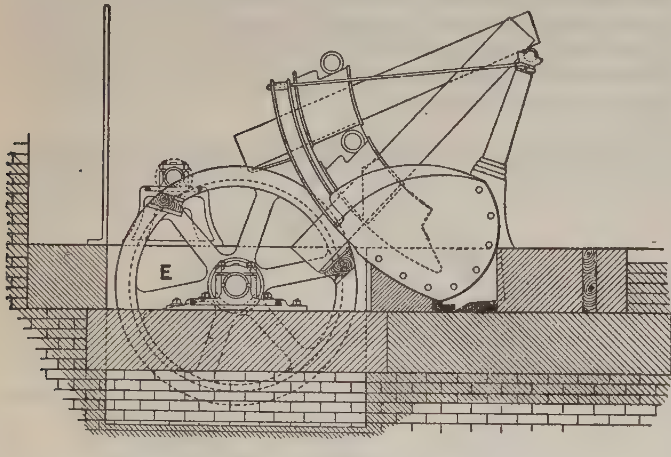
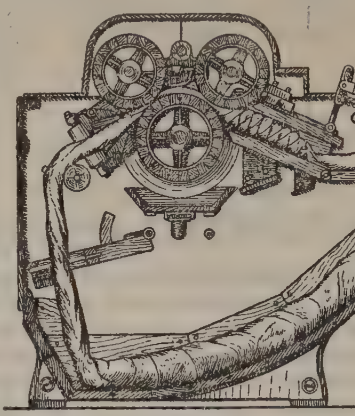


Fig. 5.—Milling Stocks.

In the more modern forms of milling machines the principle adopted is to draw the pieces in rope form, saturated with soap solution and sewn together end to end so as to form an endless band, between two or more rollers, on leaving which they are forced down a closed trough ending in an aperture the size of which can be varied, but which in any case is sufficiently small to cause a certain amount of force to be necessary to push the pieces through. A machine of this kind is shown in fig. 6. It is evident that for coloured goods which have to be milled only such colouring matters must be chosen for dyeing that are absolutely fast to soap.

After the pieces have been milled down to the desired degree, they present an uneven and undesirable appearance on the surface, the ends of many of the fibres which previously projected having been turned and thus become embedded in the body of the cloth. In order to bring these hairs to the surface again, the fabric is subjected to *teasing* or *raising*, an operation identical in principle with one which has already been noticed under the finishing of cotton. In place of the steel wire brushes it is the usual practice to employ teasels for the treatment of woollen goods.



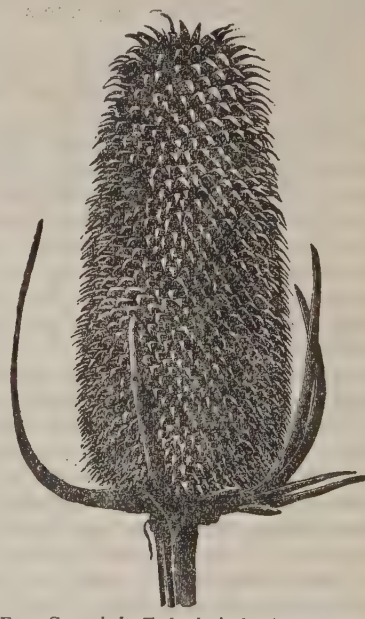
From Ganswindt, *Technologie der Appretur.*

Fig. 6.—Roller Milling Machine.

The teasel (see fig. 7) is the dried head (fruit) of a kind of thistle (*Dipsacus fuliorum*), the horny sharp spikes of which turn downwards at their extremity, and, while possessing the necessary sharpness and strength for raising the fibres, are not sufficiently rigid to cause any material damage to the cloth. For raising, the teasels are fixed in rows on a large revolving drum, and the piece to be treated is drawn lengthways underneath the drum, being guided by rollers or rods so as to just touch the teasels as they sweep past. In the raising of woollen goods it is necessary that the pieces should be damp or moist while undergoing this treatment.

After teasing, the pieces are stretched and dried. At this stage they still have an irregular appearance, for although the raising has brought all the loose ends of the fibres to the surface, these vary considerably in length and thus give rise to an uneven nap.

By the next operation of *shearing* or *cropping*, the long hairs are cut off and a uniform surface is thus obtained. Shearing was in former times done by hand, by means of shears, but is to-day universally effected by means of a cutting device which works on the same principle as an ordinary lawn-mower, in which a number of spiral blades set on the surface of a rapidly revolving roller pass continuously over a straight fixed blade underneath, the roller being set so that the spiral blades just touch the fixed blade. Before the piece comes to the shearing device the nap is raised by means of a rotary brush. Shearing may be effected either transversely, in which case the fixed blade is parallel to the warp, or longitudinally with the fixed blade parallel to the weft. In the first case, the piece being stretched on a table, over which the cutter, carried on rails, travels from selvedge to selvedge. The length of the piece that can be shorn in one operation will naturally depend upon the length of the blade, but in any case the process is necessarily intermittent, many operations being required before the whole piece is shorn. In



From Ganswindt, *Technologie der Appretur.*

Fig. 7.—Teasel used for Raising.

the longitudinal shearing machines the process is continuous, the pieces passing from the beam in the stretched condition over the rotary brush, under the fixed blade, and then being again brushed before being beamed on the other side of the machine. Shearing once is generally insufficient, and for this reason many of the modern machines are constructed with duplicate arrangements so as to effect the shearing twice in the same operation. In the finishing of certain woollen goods the pieces, after having been milled, raised and sheared, go through these operations again in the same sequence.

After these operations the goods are pressed either in the hydraulic press or in the continuous press, and according to the character of the material and the finish desired may or may not be steamed under pressure, all of which operations are described below.

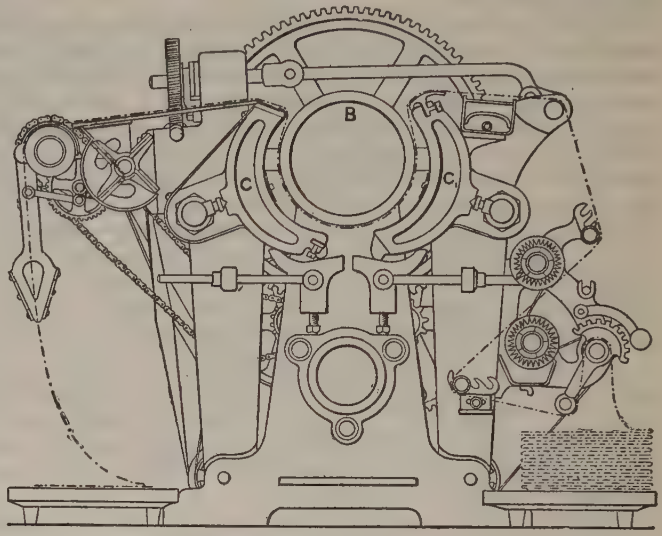
New cloth, as it comes into the hands of the tailor, frequently shows an undesirable gloss or sheen, which is removed before making up by a process known as shrinking, in which the material is simply damped or steamed.

Worsteds and Unions.—The pieces are first singed by gas or hot plate (see BLEACHING), and are then usually subjected to a process known as "crabbing," the object of which is to "set" the wool fibres. If this operation is omitted, especially in the case of unions, the fabric will "cockle," or assume an uneven surface on being wetted. In crabbing the pieces are drawn at full breadth and under as much tension as they will stand through boiling water, and are wound or beamed on to a roller under the pressure of a superposed heavy iron roller, the operation being conducted two or three times as required. From the crabbing machine the pieces are wound on to a perforated shell or steel cylinder which is closed at one end. The open end is then attached to a steam pipe, and steam, at a pressure of 30 to 45 lb, is allowed to enter until it makes its way through all the layers of cloth to the outside, when the steam is turned off and the whole allowed to cool. Since those layers of the cloth which are nearest the shell are acted upon for a longer period than those at the outside, it is necessary to re-wind and repeat the operation, the outside portions coming this time nearest to the shell. The principle of the process depends upon the fact that at elevated temperatures moist wool becomes plastic, and then easily assumes the shape imparted to it by the great tension under which the pieces are wound. On cooling the shape is retained, and since the temperature at which the pieces were steamed under tension exceeds any to which they are submitted in the subsequent processes, the "setting" of the fibres is permanent. After crabbing, the pieces are washed or "scoured" in soap either on the winch or at full width. In some cases the crabbing precedes the scouring. The goods are then dyed and finished.

The nature of the finishing process will vary considerably according to the special character of the goods under treatment. Thus, for certain classes of goods cold pressing is sufficient, while in other cases the pieces are steamed under pressure in a manner analogous to the treatment after crabbing ("decatizing"). The treatment in most common use for worsteds and unions is hot pressing, which may be effected either in the hydraulic press or in the continuous press, but in most cases in the former.

In pressing in the hydraulic press the pieces are folded down by hand on a table, a piece of press paper (thin hand-made cardboard with a glossed and extremely hard surface) being inserted between each lap. After a certain number of laps, a steel or iron press plate is inserted, and the folding proceeds in this way until the pile is sufficiently high, when it is placed in the press. The press being filled, the hydraulic ram is set in motion until the reading on the gauge shows that the desired amount of pressure has been obtained. The heating of the press plates was formerly done in ovens, previous to their insertion in the piece, but although this practice is still in vogue in rare instances, the heating is now effected either by means of steam which is caused to circulate through the hollow steel plates, or in the more modern forms of presses by means of an electric current. After the pieces have thus been subjected to the combined effects of heat and pressure for the desired length of time, they are allowed to cool in the press. It is evident that portions of the pieces, viz. the folds, thus escape the finishing process, and for this reason it is necessary to repeat the process, the folds now being made to lie in the middle of the press papers.

The continuous press, which is used for certain classes of worsteds, but more especially for woollen goods, consists in principle of a polished steam-heated steel cylinder against which either one or two steam-heated chilled iron cheeks are set by means of levers and adjusting screws. The pieces to be pressed are drawn slowly between the cheeks and the bowl. A machine of the kind is shown in section in fig. 8. In working, the cheeks C, C_1 are pressed against the bowl B. The course followed by the cloth to be finished is shown by the dotted line, the finished material being mechanically folded down on the left-hand side of the machine. The pieces thus acquire a certain amount of finish which is, however, not comparable with that produced in the hydraulic press.



From Ganswindt, *Technologie der Appretur.*

FIG. 8.—Continuous Press.

Pile Fabrics, such as velvets, velveteens, corduroys, plushes, sealskins, &c., require a special treatment in finishing, and great care must be taken in all operations to prevent the pile being crushed or otherwise damaged. Velveteens and corduroys are singed before boiling or bleaching. Velveteens dyed in black or in dark shades are brushed with an oil colour (*e.g.* Prussian blue for blacks), and dried over-night in a hot stove in order to give them a characteristic bloom. Regularity in the pile and gloss are obtained by shearing and brushing. Corduroys are stiffened at the back by the application of "bone-size" (practically an impure form of glue) in a machine similar to that used for back-starching. The face of the fabric is waxed with beeswax by passing the piece under a revolving drum, on the surface of which bars of this material are fixed parallel to the axis. The bars just touch the surface of the fabric as it passes through the machine. The gloss is then obtained by brushing with circular brushes which run partly in the direction of the piece and partly diagonally. In the finishing of velvets, shearing and brushing are the most important operations. The same applies to sealskins and other long pile fabrics, but with these an additional operation, viz. that of "batting," is employed after dyeing and before shearing and brushing, which consists in beating the back of the stretched fabric with sticks in order to shake out the pile and cause it to stand erect.

For the finishing of silk pieces the operations and machinery employed are similar in character to some of those used for cotton and worsteds. Most high-class silks require no further treatment other than simple damping and pressing after they leave the loom. Inferior qualities are frequently filled or back-filled with glue, sugar, gum tragacanth, dextrin, &c., after which they are dried, damped and given a light calender finish. Moiré or watered effects are produced by running two pieces face to face through a calender or by means of an embossing calender. In the latter case the pattern repeats itself. For the production of silk crape the dyed (generally black) piece is impregnated with a solution of shellac in methylated spirit and dried. It is then "goffered," an operation which is practically identical with embossing (see above), and may either be done on an embossing calender or by means of heated brass plates in which the design is engraved to the desired depth and pattern.

The measuring, wrapping, doubling, folding, &c., of piece goods previous to making up are done in the works by specially constructed machinery.

Finishing of Yarn.—The finishing of yarn is not nearly so important as the finishing of textiles in the piece, and it will suffice to draw attention to the main operations. Cotton yarns are frequently "gassed," *i.e.* drawn through a gas flame, in order to burn or singe off the projecting fibres and thus to produce a clean thread which is required for the manufacture of certain classes of fabrics. The most important finishing process for cotton yarn is "mercerizing" (*q.v.*), by means of which a permanent silk-like gloss is obtained. The "polishing" of cotton yarn, by means of which a highly glazed product, similar in appearance to horsehair, is obtained, is effected by impregnating the yarn with a paste consisting essentially of starch, beeswax or paraffin wax and soap, and then subjecting the damp material to the action of revolving brushes until dry. Woollen yarn is not subjected to any treatment, but worsted yarns (especially twofold) have to be "set" before scouring and dyeing in order to prevent curling. This is effected by stretching the yarn tight on a frame, which is immersed in boiling water and then allowing it to cool in this condition.

A peculiar silk-like gloss and feel is sometimes imparted to yarns made from lustre wool by a treatment with a weak solution of chlorine (bleaching powder and hydrochloric acid) followed by a treatment with soap.

Worsted and mohair yarns intended for the manufacture of braids are singed by gas, a process technically known as "Genapping."

Silk yarn is subjected to various mechanical processes before weaving. The most important of these are stretching, shaking, lustreing and glossing. Stretching and shaking are simple operations the nature of which is sufficiently indicated by their names, and by these means the hanks are stretched to their original length and straightened out by hand or on a specially devised machine. In *lustreing*, the yarn is stretched slightly beyond its original length between two polished revolving cylinders (one of which is steam heated) contained in a box or chest into which steam is admitted. In *glossing*, the yarn is twisted tight, first in one direction and then in the other, on a machine, this alternating action being continued until the maximum gloss is obtained.

The so-called "scrooping" process, which gives to silk a peculiar feel and causes it to crackle or crunch when compressed by the hand, is a very simple operation, and consists in treating the yarn after dyeing in a bath of dilute acid (acetic, tartaric or sulphuric) and then drying without washing. Heavily weighted black silks are passed after dyeing through an emulsion of olive oil in soap and dried without washing, in order to give additional lustre to the material or rather to restore some of the lustre which has been lost in weighting. (E. K.)

FINISTÈRE, or FINISTERRE, the most western department of France, formed from part of the old province of Brittany. Pop. (1906) 795,103. Area, 2713 sq. m. It is bounded W. and S. by the Atlantic Ocean, E. by the departments of Côtes-du-Nord and Morbihan, and N. by the English Channel. Two converging chains of hills run from the west towards the east of the department and divide it into three zones conveying the waters in three different directions. North of the Arrée, or more northern of the two chains, the waters of the Douron, Penzé and Flèche flow northward to the sea. The Elorn, however, after a short northerly course, turns westward and empties into the Brest roads. South of the Montagnes Noires, the Odet, Aven, Isole and Ellé flow southward; while the waters of the Aulne, flowing through a region enclosed by the two chains with a westward declination, discharge into the Brest roads. The rivers are all small, and none of the hills attain a height of 1300 ft. The coast is generally steep and rocky and at some points dangerous, notably off Cape Raz and the Île de Sein; it is indented with numerous bays and inlets, the chief of which—the roadstead of Brest and the Bays of Douarnenez and Audierne—are on the west. The principal harbours are those of Brest, Concarneau, Morlaix, Landerneau, Quimper and Douarnenez. Off the coast lie a number of islands and rocks, the principal of which are Ushant (*q.v.*)N.W. of Cape St Mathieu, and Batz off Roscoff. The climate is temperate and equable, but humid; the prevailing winds are the W., S.W. and N.W. Though more than a third of the department is covered by heath, waste land and forest, it produces oats, wheat, buckwheat, rye and barley in quantities more than sufficient for its population. In the extreme north the neighbourhood of Roscoff, and farther south the borders of the Brest roadstead, are extremely fertile and yield large quantities of asparagus, artichokes and onions, besides melons and other fruits. The cider apple is abundant and furnishes the chief drink of the inhabitants. Hemp and flax are also grown. The farm and dairy produce is plentiful, and great attention is paid to the breeding and feeding of cattle and horses. The production of honey and wax is considerable. The fisheries of the coast, particularly the pilchard fishery, employ a great many hands and render this department an excellent nursery of seamen for the French navy. Coal, though found in Finistère, is not mined; there are quarries of granite, slate, potter's clay, &c. The lead mines of Poullaouen and Huelgoat, which for several centuries yielded a considerable quantity of silver, are no longer worked. The preparation of sardines is carried on on a large scale at several of the coast-towns. The manufactures include linens, woollens, sail-cloth, ropes, agricultural implements, paper, leather, earthenware, soda, soap, candles, and fertilizers and chemicals derived from seaweed. Brest has important foundries and engineering works; and shipbuilding is carried on there and at other seaports. Brest and Morlaix are the most important commercial ports. Trade is in fish, vegetables and fruit. Coal is the chief import. The department is served by the Orléans and Western railways. The canal from Nantes to Brest has 51 m. of its length in the department. The Aulne is navigable for 17 m., and many of the smaller rivers for short distances.

Finistère is divided into the arrondissements of Quimperlé, Brest, Châteaulin, Morlaix and Quimper (43 cantons, 294 communes), the town of Quimper being the capital of the department and the seat of a bishopric. The department belongs to the region of the XI. army corps and to the archiepiscopal province and académie (educational division) of Rennes, where its court of appeal is also situated.

The more important places are Quimper, Brest, Morlaix, Quimperlé, St Pol-de-Léon, Douarnenez, Concarneau, Roscoff, Penmarc'h and Pont-l'Abbé. Finistère abounds in menhirs and other megalithic monuments, of which those of Penmarc'h, Plouarzal and Crozon are noted. The two religious structures characteristic of Brittany—calvaries and charnel-houses—are frequently met with. The calvaries of Plougastel-Daoulas, Pleyben, St Thégonnec, Lampaul-Guimiliau, which date from the 17th century, and that of Guimiliau (16th century), and the charnel-houses of Sizun and St Thégonnec (16th century) and of Guimiliau (17th century) may be instanced as the most remarkable. Daoulas has the remains of a fine church and cloister in the Romanesque style. The chapel of St Herbot (16th century) near Loqueffret, the churches of St Jean-du-Doigt and Locronan, which belong to the 15th and 16th centuries, those of Ploaré, Roscoff, Penmarc'h and Pleyben of the 16th century, that of Le Folgoët (14th and 16th centuries), and the huge château of Kerjean (16th century) are of architectural interest. Religious festivals, and processions known as "pardons," are held in many places, notably at Locronan, St Jean-du-Doigt, St Herbot and Le Faou.

FINLAND (Finnish, *Suomi* or *Suomenmaa*), a grand-duchy governed subject to its own constitution by the emperor of Russia as grand-duke of Finland. It is situated between the gulfs of Bothnia and Finland, and includes, moreover, a large territory in Lapland. It touches at its south-eastern extremity the government of St Petersburg, includes the northern half of Lake Ladoga, and is separated from the Russian governments of Arkhangelsk and Olonets by a sinuous line which follows, roughly speaking, the water-parting between the rivers flowing into the Baltic Sea and the White Sea. In the north of the Gulf of Bothnia it is separated from Sweden and Norway by a broken line which takes the course of the valley of the Torneå river up to its sources, thus falling only 21 m. short of reaching the head of Norwegian Lyngen-fjord; then it runs south-east and north-east down the Tana and Pasis-joki, but does not reach the Artic Ocean, and 13 m. from the Varanger-fjord it turns southwards. Finland includes in the south-west the Åland archipelago—its frontier approaching within 8 m. from the Swedish coast—as well as the islands of the Gulf of Finland, Hogland, Tytärs, &c. Its utmost limits are: 59° 48′—70° 6′ N., and 19° 2′—32° 50′ E. The area of Finland, in square miles, is as follows (*Altas de Finlande*, 1899):—

Government.	Continent.	Islands in Lakes.	Islands in Seas.	Lakes.	Total.
Nyland . . .	4,062	24	210	286	4,582
Åbo-Björneborg .	7,594	8	1331	400	9,333
Tavastehus . .	6,837	97	. .	1,400	8,334
Viborg . . .	11,630	362	130	4,502	16,624
St Michel . . .	5,652	1018	. .	2,149	8,819
Kuopio . . .	13,160	643	. .	2,696	16,499
Vasa	14,527	62	203	1,313	16,105
Uleåborg . . .	60,348	171	94	3,344	63,957
Total . .	123,810	2385	1968	16,090	144,253

Orography.—A line drawn from the head of the Gulf of Bothnia to the eastern coast of Lake Ladoga divides Finland into two distinct parts, the lake region and the nearly uninhabited hilly tracts belonging to the Kjölen mountains, to the plateau of the Kola peninsula, and to the slopes of the plateau which separates Finland proper from the White Sea. At the head-waters of the Torneå, Finland penetrates as a narrow strip into the heart of the highlands of Kjölen (the Keel), where the Haldefjäll (Lappish, Halditjokko) reaches 4115 ft. above the sea, and is surrounded by other *fjälls*, or flat-topped summits, of from 3300 to 3750 ft. of altitude. Extensive plateaus (1500–1750 ft.), into which Lake Enare, or Inari, and the valleys of its tributaries are deeply sunk, and which take the character of a mountain region in the Saariselkä (highest summit, 2360 ft.), occupy the remainder of Lapland. Along the eastern border the dreary plateaus of Olonets reach on Finnish territory altitudes of from 700 to 1000 ft. Quite different is the character of the pentagonal space comprised between the Gulfs of Bothnia and Finland, Lake Ladoga, and the above-mentioned line traced through the lakes Uleå and Piellis. The meridional ridges which formerly used to be traced here along the main water-partings do not exist in reality, and the country appears on the hypsometrical map in the *Atlas de Finlande* as a plateau of 350 ft. of average altitude, covered with countless lakes, lying at altitudes of from 250 to 300 ft. The three main lake-basins of Näsi-järvi, Päjäne and Saima are separated by low and flat hills only; but one sees distinctly appearing on the map a line of flat elevations running south-west to north-east along the north-west border of the lake regions from Lauhanvuori to Kajana, and reaching from 650 to 825 ft. of altitude. A regular gentle slope leads from these hills to the Gulf of Bothnia (Osterbotten), forming vast prairie tracts in its lower parts.

A notable feature of Finland are the *åsar* or narrow ridges of morainic deposits, more or less reassorted on their surfaces. Some of them are relics of the longitudinal moraines of the ice-sheet, and they run north-west to south-east, parallel to the striation of the rocks and to the countless parallel troughs excavated by the ice in the hard rocks in the same direction; while the Lojo ås, which runs from Hangöudd to Vesi-järvi, and is continued farther east under the name of Salpausselkä, parallel to the shore of the Gulf of Finland, are remainders of the frontal moraines, formed at a period when the ice-sheet remained for some time stationary during its retreat. As a rule these forest-clothed *åsar* rise from 30 to 60 and occasionally 120 ft. above the level of the surrounding country, largely adding to the already great picturesqueness of the lake region; railways are traced in preference along them.

Lakes and Rivers.—A labyrinth of lakes, covering 11% of the aggregate territory, and connected by short and rapid streams (*fjården*), covers the surface of South Finland, offering great facilities for internal navigation, while the connecting streams supply an enormous amount of motive-power. The chief lakes are: Lake Ladoga, of which the northern half belongs to Finland; Saima (three and a half times larger than Lake Leman), whose outlet, the Vuoksen, flows into Lake Ladoga, forming the mighty Imatra rapids, while the lake itself is connected by means of a sluiced canal with the Gulf of Finland; the basins of Pyhä-selkä, Ori-vesi and Piellis-järvi; Päjäne, surrounded by hundreds of smaller lakes, and the waters of which are discharged into the lower gulf through the Kymmene river; Näsi-järvi and Pyhä-järvi, whose outflow is the Kumo-elf, flowing into the Gulf of Bothnia; Uleå-träsk, discharged by the Uleå into the same gulf; and Enare, belonging to the basin of the Arctic Ocean. Two large rivers, Kemi and Torneå, enter the head of the Gulf of Bothnia, while the Uleå is now navigable throughout, owing to improvements in its channel.

Geology.—Cambrian, Silurian, Devonian and Carboniferous deposits are found on the coasts of the Gulf of Finland and Lake Ladoga, and also along the coasts of the Arctic Ocean (probably Devonian), and in the Kjölen. Eruptive rocks of Palaeozoic age are met with in the Kola peninsula (nepheline-syenites) and at Kuusamo (syenite). The remainder of Finland is built up of the oldest known crystalline rocks belonging to the Archaeozoic or Algonkian period. The most ancient of these seem to be the granites of East Finland. The denudation and destruction of the granites gave rise to the *Ladoga schists* and various deposits of the same period, which were subsequently strongly folded. Then the country came once more under the sea, and the debris of the previous formations, mixed with fragments from the volcanoes then situated in West Finland, formed the so-called *Bothnian series.* New masses of granites protruded next from underneath, and the Bothnian deposits underwent foldings in their turn, while denudation was again at work on a grand scale. A new series of *Jatulian deposits* was formed and a new system of foldings followed; but these were the last in this part of the globe. The *Jotnian series*, which were formed next, remain still undisturbed. It is to this series that the well-known Rapakivi granite of Åland, Nystad and Viborg belongs. No marine deposits younger than those just mentioned—all belonging to a pre-Cambrian epoch—are found in the central portion of Finland; and the greater part of the country has probably been dry land since Palaeozoic times. The whole of Finland is covered with Glacial and post-Glacial deposits. The former of these, representing the bottom-moraine of the ice-sheet, are covered with Glacial and post-Glacial clays (partly of lacustrine and partly of marine origin) only in the peripheral coast-region—or in separate areas in the interior depressions. Some Finnish geologists—Sederholm for one—consider it probable that during the Glacial period an Arctic sea (*Yoldia* sea) covered all southern Finland and also Scania (Skåne) in Sweden, thus connecting the Atlantic Ocean with the Baltic and the White Sea by a broad channel; but no fossils from that sea have been found anywhere in Finland. Conclusive proofs, however, of a later submergence under a post-Glacial Littorina sea (containing shells now living in the Baltic) are found up to 150 ft. along the Gulf of Finland, and up to 260, or perhaps 330 ft., in Osterbotten. Traces of a large inner post-Glacial lake, similar to Lake Agassiz of North America, have been discovered. The country is still continuing to rise, but at an unequal rate; of nearly 3·3 ft. in a century in the Gulf of Bothnia (Kvarken), from 1·4 to 2 ft. in the south, and nearly zero in the Baltic provinces.

Climate.—Owing to the prevalence of moist west and south-west winds the climate of Finland is less severe than it is farther east in corresponding latitudes. The country lies thus between the annual isotherms of 41° and 28° Fahr., which run in a W.N.W.-E.S.E. direction. In January the average monthly temperature varies from 9° Fahr. about Lake Enare to 30° along the south coast; while in July the difference between the monthly averages is only eight degrees, being 53° in the north and 61° in the south-east. Everywhere, and especially in the interior, the winter lasts very long, and early frosts (June 12-14 in 1892) often destroy the crops. The amount of rain and snow is from 25½ in. along the south coast to 13·8 in. in the interior of southern Finland.

Flora, Forests, Fauna.—The flora of Finland has been most minutely explored, especially in the south, and the Finnish botanists were enabled to divide the country into twenty-eight different provinces, giving the numbers of phanerogam species for each province. These numbers vary from 318 to 400 species in Lapland, from 508 to 651 in Karelia, and attain 752 species for Finland proper; while the total for all Finland attains 1132 species. Alpine plants are not met with in Finland proper, but are represented by from 32 to 64 species in the Kola peninsula. The chief forest trees of Finland are the Scotch fir (*Pinus sylvestris*, L.), the fir (*Picea excelsa*, Link.); two species of birch (*B. verrucosa*, Ehrh., and *B. odorata*, Bechst.), as well as the birch-bush (*B. nana*); two species of *Alnus* (*glutinosa* and *incana*); the oak (*Q. pedunculata*, Ehrh.), which grows only on the south coast; the poplar (*Populus tremula*); and the Siberian larch, introduced in culture in the 18th century. Over 6,000,000 trees are cut every year to be floated to thirty large saw-mills, and about 1,000,000 to be transformed into paper pulp. The total export of timber was valued in 1897 at 82,160,000 marks. It is estimated, however, that the domestic use of wood (especially for fuel) represents nearly five times as many cubic feet as the wood used for export in different shapes. The total area under forests is estimated at 63,050,000 acres, of which 34,662,000 acres belong to the state. The fauna has been explored in great detail both as regards the vertebrates and the invertebrates, and specialists will find the necessary bibliographical indications in *Travaux géographiques en Finlande*, published for the London Geographical Congress of 1895.

Population.—The population of Finland, which was 429,912 in 1751, 832,659 in 1800, 1,636,915 in 1850, and 2,520,437 in 1895, was 2,712,562 in 1904, of whom 1,370,480 were women and 1,342,082 men. Of these only 341,602 lived in towns, the remainder in the country districts. The distribution of population in various provinces was as follows:—

1904.	Population.	Density per sq. kilometre.
Åbo-Björneborg	447,098	20·3
Kuopio	313,951	8·9
Nyland	297,813	29·3
St Michel	189,360	11·1
Tavastehus.	301,272	17·7
Uleåborg	280,899	1·9
Viborg	421,610	14·6
Vasa	460,460	12·5
Total	2,712,562	8·6

The number of births in 1904 was 90,253 and the deaths 50,227, showing an excess of births over deaths of 40,026. Emigration was estimated at about three thousand every year before 1898, but it largely increased then owing to Russian encroachments on Finnish autonomy. In 1899 the emigrants numbered 12,357; 10,642 in 1900; 12,659 in 1901; and 10,952 in 1904.

The bulk of the population are Finns (2,352,990 in 1904) and Swedes (349,733). Of Russians there were only 5939, chiefly in the provinces of Viborg and Nyland. Both Finns and Swedes belong to the Lutheran faith, there being only 46,466 members of the Greek Orthodox Church and 755 Roman Catholics.

The leading cities of Finland are: Helsingfors, capital of the grand-duchy and of the province (*län*) of Nyland, principal seaport (111,654 inhabitants); Åbo, capital of the Åbo-Björneborg province and ancient capital of Finland (42,639); Tammerfors, the leading manufacturing town of the grand-duchy (40,261); Viborg, chief town of province of same name, important seaport (34,672); Uleåborg, capital of province (17,737); Vasa, or Nikolaistad, capital of Vasa län (18,028); Björneborg (16,053); Kuopio, capital of province (13,519); and Tavastehus, capital of province of the same name (5545).

Industries.—Agriculture gives occupation to the large majority of the population, but of late the increase of manufactures has been marked. Dairy-farming is also on the increase, and the foreign exports of butter rose from 1930 cwt. in 1900 to 3130 cwt. in 1905. Measures have been taken since 1892 for the improvement of agriculture, and the state keeps twenty-six agronomists and instructors for that purpose. There are two high schools, one experimental station, twenty-two middle schools and forty-eight lower schools of agriculture, besides ten horticultural schools. Agricultural societies exist in each province.

Fishing is an important item of income. The value of exports of fish, &c., was £140,000 in 1904, but fish was also imported to the value of £61,300. The manufacturing industries (wood-products, metallurgy, machinery, textiles, paper and leather) are of modern development, but the aggregate production approaches one and a half millions sterling in value.

Some gold is obtained in Lapland on the Ivalajoki, but the output, which amounted in 1871 to 56,692 grammes, had fallen in 1904 to 1951 grammes. There is also a small output of silver, copper and iron. The last is obtained partly from mines, but chiefly from the lakes. In 1904 22,050 tons of cast iron were obtained. The textile industries are making rapid progress, and their produce, notwithstanding the high duties, is exported to Russia. The fabrication of paper out of wood is also rapidly growing. As to the timber trade, there are upwards of 500 saw-mills, employing 21,000 men, and with an output valued at over £3,000,000 annually.

Communications.—The roads, attaining an aggregate length of 27,500 m., are kept as a rule in very good order. The first railway was opened in 1862, and the next, from Helsingfors to St Petersburg, in 1870 (cost only £4520 per mile). Railways of a lighter type began to be built since 1877, and now Finland has about 2100 m. of railway, mostly belonging to the state. The gross income from the state railways is 26,607,622, and the net income 4,684,856 marks. Finland has an extensive and well-kept system of canals, of which the sluiced canal connecting Lake Saima with the Gulf of Finland is the chief one. It permits ships navigating the Baltic to penetrate 270 m. inland, and is passed every year by from 4980 to 5200 vessels. Considerable works have also been made to connect the different lakes and lake-basins for inland navigation, a sum of £1,000,000 having been spent for that purpose.

The telegraphs chiefly belong to Russia. Telephones have an enormous extension both in the towns and between the different towns of southern Finland; the cost of the yearly subscription varies from 40 to 60 marks,[1] and is only 10 marks in the smaller towns.

Commerce.—The foreign trade of Finland increases steadily, and reached in 1904 the following values:—

	From or to Russia.	From or to other Countries.	Totals.
Imports .	£4,036,000	£6,488,000	£10,524,000
Exports .	2,332,000	6,292,000	8,624,000

The chief trade of Finland is with Russia, and next with Great Britain, Germany, Denmark, France and Sweden. The main imports are: cereals and flour (to an annual value exceeding £3,000,000), metals, machinery, textile materials and textile products. The chief articles of export are: timber and wood articles (£5,250,000), paper and paper pulp, some tissues, metallic goods, leather, &c. The chief ports are Helsingfors, Åbo, Viborg, Hangö and Vasa.

Education.—Great strides have been made since 1866, when a new education law was passed. Rudimentary teaching in reading, occasionally writing, and the first principles of Lutheran faith are given in the maternal house, or in "maternal schools," or by ambulatory schools under the control of the clergy, who make the necessary examination in the houses of every parish. All education above that level is in the hands of the educational department and school boards elected in each parish, each rural parish being bound (since 1898) to be divided into a proper number of school districts and to have a school in each of them, the state contributing to these expenses 800 marks a year for each male and 600 marks for each female teacher, or 25% of the total cost in urban communes. Secondary education, formerly instituted on two separate lines, classical and scientific, has been reformed so as to give more prominence to scientific education, even in the classical (linguistic) lyceums or gymnasia. For higher education there is the university of Helsingfors (formerly the Åbo Academy), which in 1906 had 1921 students (328 women) and 141 professors and docents. Besides the Helsingfors polytechnic there are a number of higher and lower technical, commercial and navigation schools. Finland has several scientific societies enjoying a world-wide reputation, as the Finnish Scientific Society, the Society for the Flora and Fauna of Finland, several medical societies, two societies of literature, the Finno-Ugrian Society, the Historical and Archaeological Societies, one juridical, one technical and two geographical societies. All of these, as also the Finnish Geological Survey, the Forestry Administration, &c., issue publications well known to the scientific world. The numerous local branches of the Friends of the Folk-School and the Society for Popular Education display great activity, the former by aiding the smaller communes in establishing schools, and the latter in publishing popular works, starting their own schools as well as free libraries (in nearly every commune), and organizing lectures for the people. The university students take a lively part in this work.

Government and Administration.—From the time of its union with Russia at the Diet of Borgå in 1809 till the events of 1899 (see *History*) Finland was practically a separate state, the emperor of Russia as grand-duke governing by means of a nominated senate and a diet elected on a very narrow franchise, and meeting at distant and irregular intervals. This diet was on the old Swedish model, consisting of representatives of the four estates—nobility, clergy, burghers and peasants—sitting and voting in separate "Houses." The government of the country was practically carried on by the senate, which communicated with St Petersburg through a Finnish secretary attached to the Russian government. War and foreign affairs were entirely in the hands of Russia, and a Russian governor had his residence in Helsingfors. The senate also controlled the administration of the law. The constitutional conflict of 1899–1905 brought about something like a revolution in Finland. For some years the country was subject to a practically arbitrary form of government, but the disasters of the Russo-Japanese War and the growing anarchy in Russia resulted in 1905 in a complete and peaceful victory for the defenders of the Finnish constitution. As a Finnish writer puts it: "just as the calamities which had befallen Finland came from Russia, so was her deliverance to come from Russia." The *status quo ante* was restored, the diet met in extraordinary session, and proceeded to the entire recasting of the Finnish government. Freedom of the press was voted, and the diet next proceeded to reform its own constitution.

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[1] The Finnish mark, *markka*, of 100 *penni*, equals about 9½d.

Far-reaching changes were voted. The new diet, instead of being composed of four estates sitting separately, consists of a single chamber of 200 members elected directly by universal suffrage, women being eligible. By the new constitution the grand-duchy was to be divided into not less than twelve and not more than eighteen constituencies, electing members in proportion to population. A scheme of "proportional representation," the votes being counted in accordance with the system invented by G. M. d'Hondt, a Belgian, was also adopted. The executive was to consist of a minister-secretary of state and of the members of the senate, who were entitled to attend and address the diet and who might be the subject of interpellations. The members of the senate were made responsible to the diet as well as to the emperor-grand-duke for their acts. The diet has power to consider and decide upon measures proposed by the government. After a measure has been approved by the diet it is the duty of the senate to report upon it to the sovereign. But the senate is not obliged to accept the decision of the majority of the diet, nor, apparently, is the sovereign bound to accept the advice of the senate. The first elections, April 1907, resulted in the election to the diet of about 40% representatives of the Social Democratic party, and nineteen women members. The budget of Finland in 1905 was £4,273,970 of "ordinary" revenue. The "ordinary" expenditure was £3,595,300. The public debt amounted at the end of 1905 to £5,611,170.

History.—It was probably at the end of the 7th or the beginning of the 8th century that the Finns took possession of what is now Finland, though it was only when Christianity was introduced, about 1157, that they were brought into contact with civilized Europe. They probably found the Lapps in possession of the country. The early Finlanders do not seem to have had any governmental organization, but to have lived in separate communities and villages independent of each other. Their mythology consisted in the deification of the forces of nature, as "Ukko," the god of the air, "Tapio," god of the forests, "Ahti," the god of water, &c. These early Finlanders seem to have been both brave and troublesome to their neighbours, and their repeated attacks on the coast of Sweden drew the attention of the kings of that country. King Eric IX. (St Eric), accompanied by the bishop of Upsala, Henry (an Englishman, it is said), and at the head of a considerable army, invaded the country in 1157, when the people were conquered and baptized. King Eric left Bishop Henry with his priests and some soldiers behind to confirm the conquest and complete the conversion. After a time he was killed, canonized, and as St Henry became the patron saint of Finland. As Sweden had to attend to her own affairs, Finland was gradually reverting to independence and paganism, when in 1209 another bishop and missionary, Thomas (also an Englishman), arrived and recommenced the work of St Henry. Bishop Thomas nearly succeeded in detaching Finland from Sweden, and forming it into a province subject only to the pope. The famous Birger Jarl undertook a crusade in Finland in 1249, compelling the Tavastians, one of the subdivisions of the Finlanders proper, to accept Christianity, and building a castle at Tavestehus. It was Torkel Knutson who conquered and connected the Karelian Finlanders in 1293, and built the strong castle of Viborg. Almost continuous wars between Russia and Sweden were the result of the conquest of Finland by the latter. In 1323 it was settled that the river Rajajoki should be the boundary between Russia and the Swedish province. After the final conquest of the country by the Swedes, they spread among the Finlanders their civilization, gave them laws, accorded them the same civil rights as belonged to themselves, and introduced agriculture and other beneficial arts. The Reformed religion was introduced into Finland by Gustavus Vasa about 1528, and King John III. raised the country to the dignity of a grand-duchy. It continued to suffer, sometimes deplorably, in most of the wars waged by Sweden, especially with Russia and Denmark. His predecessor having created an order of nobility,—counts, barons and nobles, Gustavus Adolphus in the beginning of the 17th century established the diet of Finland, composed of the four orders of the nobility, clergy, burghers and peasants. Gustavus and his successor did much for Finland by founding schools and gymnasia, building churches, encouraging learning and introducing printing. During the reign of Charles XI. (1692–1696) the country suffered terribly from famine and pestilence; in the diocese of Åbo alone 60,000 persons died in less than nine months. Finland has been visited at different periods since by these scourges; so late as 1848 whole villages were starved during a dreadful famine. Peter the Great cast an envious eye on Finland and tried to wrest it from Sweden; in 1710 he managed to obtain possession of the towns of Kexholm and Villmanstrand; and by 1716 all the country was in his power. Meantime the sufferings of the people had been great; thousands perished in the wars of Charles XII. By the peace of Nystad in 1721 the province of Viborg, the eastern division of Finland, was finally ceded to Russia. But the country had been laid very low by war, pestilence and famine, though it recovered itself with wonderful rapidity. In 1741 the Swedes made an effort to recover the ceded province, but through wretched management suffered disaster, and were compelled to capitulate in August 1742, ceding by the peace of Åbo, next year, the towns of Villmanstrand and Fredrikshamn. Nothing remarkable seems to have occurred till 1788, under Gustavus III., who began to reign in 1771, and who confirmed to Finland those "fundamental laws" which they have succeeded in maintaining against kings and tsars for over two centuries. The country was divided into six governments, a second superior court of justice was founded at Vasa, many new towns were built, commerce flourished, and science and art were encouraged. Latin disappeared as the academic language, and Swedish was adopted. In 1788 war again broke out between Sweden and Russia, and was carried on for two years without much glory or gain to either party, the main aim of Gustavus being to recover the lost Finnish province. In 1808, under Gustavus IV., peace was again broken between the two countries, and the war ended by the cession in 1809 of the whole of Finland and the Åland Islands to Russia. Finland, however, did not enter Russia as a conquered province, but, thanks to the bravery of her people after they had been abandoned by an incompetent monarch and treacherous generals, and not less to the wisdom and generosity of the emperor Alexander I. of Russia, she maintained her free constitution and fundamental laws, and became a semi-independent grand-duchy with the emperor as grand-duke. The estates were summoned to a free diet at Borgå and accepted Alexander as grand-duke of Finland, he on his part solemnly recognizing the Finnish constitution and undertaking to preserve the religion, laws and liberties of the country. A senate was created and a governor-general named. The province of Viborg was reunited to Finland in 1811, and Åbo remained the capital of the country till 1821, when the civil and military authorities were removed to Helsingfors, and the university in 1827. The diet, which had not met for 56 years, was convoked by Alexander II. at Helsingfors in 1863. Under Alexander II. Finland was on the whole prosperous and progressive, and his statue in the great square in front of the cathedral and the senate house in Helsingfors testifies to the regard in which his memory is cherished by his Finnish subjects. Unfortunately his successor soon fell under the influence of the reactionary party which had begun to assert itself in Russia even before the assassination of Alexander II. One of Alexander III.'s first acts was to confirm "the constitution which was granted to the grand-duchy of Finland by His Majesty the emperor Alexander Pavlovich of most glorious memory, and developed with the consent of the estates of Finland by our dearly beloved father of blessed memory the emperor Alexander Nicolaievich." But the Slavophil movement, with its motto, "one law, one church, one tongue," acquired great influence in official circles, and its aim was, in defiance of the pledges of successive tsars, to subject Finland to Orthodoxy and autocracy. It is unnecessary to follow in detail the seven years' struggle between the Russian bureaucracy and the defenders of the Finnish constitution. Politics in Finland were complicated by the rivalry between the Swedish party, which had hitherto been dominant in Finland, and the Finnish "nationalist" party which, during the latter half of the 19th century, had been determinedly asserting itself linguistically and politically. With some exceptions, however, the whole country united in defence of its constitution; "Fennoman" and "Svecoman," recognizing that their common liberties were at stake, suspended their feud for a season. With the accession of Nicholas II. (see RUSSIA) the constitutional conflict became acute, and the "February manifesto" (February 15th, 1899) virtually abrogated the legislative power of the Finnish diet. A new military law, practically amalgamating the Finnish with the Russian forces, followed in July 1901; Russian officials and the Russian language were forced on Finland wherever possible, and in April 1903 the Russian governor, General Bobrikov, was invested with practically dictatorial powers. The country was flooded with spies, and a special Russian police force was created, the expenses being charged to the Finnish treasury. The Russian system was now in full swing; domiciliary visits, illegal arrests and banishments, and the suppression of newspapers, were the order of the day. To all this the people of Finland opposed a dogged and determined resistance, which culminated in November 1905 in a "national strike." The strike was universal, all classes joining in the movement, and it spread to all the industrial centres and even to the rural districts. The railway, steamship, telephone and postal services were practically suspended. Helsingfors was without tramcars, cabs, gas and electricity; no shops except provision shops were open; public departments, schools and restaurants were closed. After six days the unconstitutional government—already much shaken by events in Russia and Manchuria—capitulated. In an imperial manifesto dated the 7th of November 1905 the demands of Finland were granted, and the *status quo ante* 1899 was restored.

But the reform did not rest here. The old Finnish constitution, although precious to those whose only protection it was, was an antiquated and not very efficient instrument of government. Popular feeling had been excited by the political conflict, advanced tendencies had declared themselves, and when the new diet met it proceeded as explained above to remodel the constitution, on the basis of universal suffrage, with freedom of the press, speech, meeting and association.

In 1908–10 friction with Russia was again renewed. The Imperial government insisted that the decision in all Finnish questions affecting the Empire must rest with them; and a renewed attempt was made to curtail the powers of the Finnish Diet.

Ethnology.—The term Finn has a wider application than Finland, being, with its adjective Finnic or Finno-Ugric (*q.v.*) or Ugro-Finnic, the collective name of the westernmost branch of the Ural-Altaic family, dispersed throughout Finland, Lapland, the Baltic provinces (Esthonia, Livonia, Curland), parts of Russia proper (south of Lake Onega), both banks of middle Volga, Perm, Vologda, West Siberia (between the Ural Mountains and the Yenissei) and Hungary.

Originally nomads (hunters and fishers), all the Finnic people except the Lapps and Ostyaks have long yielded to the influence of civilization, and now everywhere lead settled lives as herdsmen, agriculturists, traders, &c. Physically the Finns (here to be distinguished from the Swedish-speaking population, who retain their Scandinavian qualities) are a strong, hardy race, of low stature, with almost round head, low forehead, flat features, prominent cheek bones, eyes mostly grey and oblique (inclining inwards), short and flat nose, protruding mouth, thick lips, neck very full and strong, so that the occiput seems flat and almost in a straight line with the nape; beard weak and sparse, hair no doubt originally black, but, owing to mixture with other races, now brown, red and even fair; complexion also somewhat brown. The Finns are morally upright, hospitable, faithful and submissive, with a keen sense of personal freedom and independence, but also somewhat stolid, revengeful and indolent. Many of these physical and moral characteristics they have in common with the so-called "Mongolian" race, to which they are no doubt ethnically, if not also linguistically, related.

Considerable researches have been accomplished since about 1850 in the ethnology and archaeology of Finland, on a scale which has no parallel in any other country. The study of the prehistoric population of Finland—Neolithic (no Palaeolithic finds have yet been made)—of the Age of Bronze and the Iron Age has been carried on with great zeal. At the same time the folklore, Finnish and partly Swedish, has been worked out with wonderful completeness (see *L'Œuvre demi-séculaire de la Société de Littérature finnoise et le mouvement national finnois*, by Dr E. G. Palmén, Helsingfors, 1882, and K. Krohn's report to the London Folklore Congress of 1891). The work that was begun by Porthan, Z. Topelius, and especially E. Lönnrot (1802–1884), for collecting the popular poetry of the Finns, was continued by Castrén (1813–1852), Europaeus (1820–1884), and V. Porkka (1854–1889), who extended their researches to the Finns settled in other parts of the Russian empire, and collected a considerable number of variants of the Kalewala and other popular poetry and songs. In order to study the different eastern kinsfolk of the Finns, Sjögren (1792–1855) extended his journeys to North Russia, and Castrén to West and East Siberia (*Nordische Reisen und Forschungen*), and collected the materials which permitted himself and Schiefner to publish grammatical works relative to the Finnish, Lappish, Zyrian, Tcheremiss, Ostiak, Samoyede, Tungus, Buryat, Karagas, Yenisei-Ostiak and Kott languages. Ahlqvist (1826–1889), and a phalanx of linguists, continued their work among the Vogules, the Mordves and the Obi-Ugrians. And finally, the researches of Aspelin (*Foundations of Finno-Ugrian Archaeology*, in Finnish, and *Atlas of Antiquities*) led the Finnish ethnologists to direct more and more their attention to the basin of the Yenisei and the Upper Selenga. A series of expeditions (of Aspelin, Snellman and Heikel) were consequently directed to those regions, especially since the discovery by Yadrintseff of the remarkable Orkhon inscriptions (see TURKS, p. 473), which finally enabled the Danish linguist, V. Thomsen, to decipher these inscriptions, and to discover that they belonged to the Turkish Iron Age. (See *Inscriptions de l'Iénissei recueillies et publiées par la Société Finl. d'Archéologie*, 1889, and *Inscriptions de l'Orkhon*, 1892.)

AUTHORITIES.—The general history of Finland is fully treated by Yrjö Koskinen (1869–1873) and M. G. Schybergson (1887–1889). Both works have been translated into German. The constitutional conflict gave rise to a host of books and pamphlets in various languages. Mechelin, Danielson and Hermanson were the leading writers on the Finnish side, and M. Ordin on the Russian. Most of the political documents have been published and translated. A finely illustrated book, *Finland in the Nineteenth Century*, by various Finnish writers, gives an excellent account of the country; also Reuter's *Finlandia*, a very complete work with an exhaustive bibliography. The constitutional question was fully discussed in English in *Finland and the Tsars*, by J. R. Fisher (2nd ed., 1900). The *Atlas de Finlande*, published in 1899 by the Geographical Society of Finland, is a remarkably well executed and complete work. *The Statistical Annual for Finland—Statistisk Arsbok för Finland*—published annually by the Central Statistical Bureau in Helsingfors, gives the necessary figures. (P. A. K.; J. S. K.; J. R. F.*)

Finnish Literature.

The earliest writer in the Finnish vernacular was Michael Agricola (1506–1557), who published an *A B C Book* in 1544, and, as bishop of Abo, a number of religious and educational works. A version of the New Testament in Finnish was printed by Agricola in 1548, and some books of the Old Testament in 1552. A complete Finnish Bible was published at Stockholm in 1642. The dominion of the Swedes was very unfavourable to the development of anything like a Finnish literature, the poets of Finland preferring to write in Swedish and so secure a wider audience. It was not until, in 1835, the national epos of Finland, the *Kalewala* (*q.v.*), was introduced to readers by the exertions of Elias Lönnrot (*q.v.*), that the Finnish language was used for literary composition. Lönnrot also collected and edited the works of the peasant-poets P. Korhonen (1775–1840) and Pentti Lyytinen, with an anthology containing the improvisations of eighteen other rustic bards. During the last quarter of the 19th century there was an ever-increasing literary activity in Finland, and it took the form less and less of the publication of Swedish works, but more and more that of examples of the aboriginal vernacular. At the present time, in spite of the political troubles, books in almost every branch of research are found in the language, mainly translations or adaptations. We meet with, during the present century, a considerable number of names of poets and dramatists, no doubt very minor, as also painters, sculptors and musical composers. At the Paris International Exhibition of 1878 several native Finnish painters and sculptors exhibited works which would do credit to any country; and both in the fine and applied arts Finland occupied a position thoroughly creditable. An important contribution to a history of Finnish literature is Krohn's *Suomenkielinen runollisuns ruotsinvallan aikana* (1862). Finland is wonderfully rich in periodicals of all kinds, the publications of the Finnish Societies of Literature and of Sciences and other learned bodies being specially valuable. A great work in the revival of an interest in the Finnish language was done by the *Suomalaisen Kirjallisuuden Seura* (the Finnish Literary Society), which from the year 1841 has published a valuable annual, *Suomi*. The Finnish Literary Society has also published a new edition of the works of the father of Finnish history, Henry Gabriel Porthan (died 1804). A valuable handbook of Finnish history was published at Helsingfors in 1869–1873, by Yrjö Koskinen, and has been translated into both Swedish and German. The author was a Swede, Georg Forsman, the above form being a Finnish translation. Other works on Finnish history and some inportant works in Finnish geography have also appeared. In language we have Lönnrot's great Finnish-Swedish dictionary, published by the Finnish Literary Society. Dr Otto Donner's *Comparative Dictionary of the Finno-Ugric Languages* (Helsingfors and Leipzig) is in German. In imaginative literature Finland has produced several important writers of the vernacular. Alexis Stenwall ("Kiwi") (1834–1872), the son of a village tailor, was the best poet of his time; he wrote popular dramas and an historical romance, *The Seven Brothers* (1870). Among recent playwrights Mrs Minna Canth (1844–1897) has been the most successful. Other dramatists are E. F. Johnsson (1844–1895), P. Cajander (b. 1846), who translated Shakespeare into Finnish, and Karl Bergbom (b. 1843). Among lyric poets are J. H. Erkko (b. 1849), Arwi Jännes (b. 1848) and Yrjö Weijola (b. 1875). The earliest novelist of Finland, Pietari Päivärinta (b. 1827), was the son of a labourer; he is the author of a grimly realistic story, *His Life*. Many of the popular Finnish authors of our day are peasants. Kauppis Heikki was a wagoner; Alkio Filander a farmer; Heikki Maviläinen a smith; Juhana Kokko (Kyösti) a gamekeeper. The most gifted of the writers of Finland, however, is certainly Juhani Aho (b. 1861), the son of a country clergyman. His earliest writings were studies of modern life, very realistically treated. Aho then went to reside in France, where he made a close study of the methods of the leading French novelists of the newer school. About the year 1893 he began to publish short stories, some of which, such as *Enris*, *The Fortress of Matthias*, *The Old Man of Korpela* and *Finland's Flag*, are delicate works of art, while they reveal to a very interesting degree the temper and ambitions of the contemporary Finnish population. It has been well said that in the writings of Juhani Aho can be traced all the idiosyncrasies which have formed the curious and pathetic history of Finland in recent years. A village priest, Juho Reijonen (b. 1857), in tales of somewhat artless form, has depicted the hardships which poverty too often entails upon the Finn in his country life. Tolstoy has found an imitator in Arwid Järnefelt (b. 1861). Santeri Ingman (b. 1866) somewhat naïvely, but not without skill, has followed in the steps of Aho. It would be an error to exaggerate either the force or the originality of these early developments of a national Finnish literature, which, moreover, are mostly brief and unambitious in character. But they are eminently sincere, and they have the great merit of illustrating the local aspects of landscape and temperament and manners.

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FINLAY, GEORGE (1799–1875), British historian, was born of Scottish parents at Faversham, Kent, on the 21st of December 1799. He studied for the law in Glasgow, and about 1821 went to Göttingen. He had already begun to feel a deep interest in the Greek struggle for independence, and in 1823 he resolved to visit the country. In November he arrived in Cephalonia, where he was kindly received by Lord Byron. Shortly afterwards he landed at Pyrgos, and during the next fourteen months he improved his knowledge of the language, history and antiquities of the country. Though he formed an unfavourable opinion of the Greek leaders, both civil and military, he by no means lost his enthusiasm for their cause. A severe attack of fever, however, combined with other circumstances, induced him to spend the winter of 1824–1825 and the spring of 1825 in Rome, Naples and Sicily. He then returned to Scotland, and, after spending a summer at Castle Toward, Argyllshire, went to Edinburgh, where he passed his examination in civil law at the university, with a view to being called to the Scottish bar. His enthusiasm, however, carried him back to Greece, where he resided almost uninterruptedly till his death. He took part in the unsuccessful operations of Lord Cochrane and Sir Richard Church for the relief of Athens in 1827. When independence had been secured in 1829 he bought a landed estate in Attica, but all his efforts for the introduction of a better system of agriculture ended in failure, and he devoted himself to the literary work which occupied the rest of his life. His first publications were *The Hellenic Kingdom and the Greek Nation* (1836); *Essai sur les principes de banque appliqués à l'état actuel de la Grèce* (Athens, 1836); and *Remarks on the Topography of Oropia and Diacria, with a map* (Athens, 1838). The first instalment of his great historical work appeared in 1844 (2nd ed., 1857) under the title *Greece under the Romans; a Historical View of the Condition of the Greek Nation from the time of its Conquest by the Romans until the Extinction of the Roman Empire in the East*. Meanwhile he had been qualifying himself still further by travel as well as by reading; he undertook several tours to various quarters of the Levant; and as the result of one of them he published a volume *On the Site of the Holy Sepulchre; with a plan of Jerusalem* (1847). The *History of the Byzantine and Greek Empires from 716–1453* was completed in 1854. It was speedily followed by the *History of Greece under the Ottoman and Venetian Domination* (1856), and by the *History of the Greek Revolution* (1861). In weak health, and conscious of failing energy, he spent his last years in revising his history. From 1864 to 1870 he was also correspondent of *The Times* newspaper, his letters to which attracted considerable attention, and, appearing in the Greek newspapers, exercised a distinct influence on Greek politics. He was a member of several learned societies; and in 1854 he received from the university of Edinburgh the honorary degree of LL.D. He died at Athens on the 26th of January 1875. A new edition of his *History*, edited by the Rev. H. F. Tozer, was issued by the Oxford Clarendon press in 1877. It includes a brief but extremely interesting fragment of an autobiography of the author, almost the only authority for his life.

As an historian, Finlay had the merit of entering upon a field of research that had been neglected by English writers, Gibbon alone being a partial exception. As a student, he was laborious; as a scholar he was accurate; as a thinker, he was both acute and profound; and in all that he wrote he was unswerving in his loyalty to the principles of constitutional government and to the cause of liberty and justice.

FINN MAC COOL (in Irish FIND MAC CUMAILL), the central figure of the later heroic cycle of Ireland, commonly called Ossianic or Fenian. In Scotland Find usually goes by the name of Fingal. This appears to be due to a misunderstanding of the title assumed by the Lord of the Isles, Rí Fionnghall, *i.e.* king of the Norse. Find's father, Cumall mac Trénmóir, was uncle to Conn

Cētchathach, High King of Ireland, who died in A.D. 157. Cumall carried off Murna Munchaem, the daughter of a Druid named Tadg mac Nuadat, and this led to the battle of Cnucha, in which Cumall was slain by Goll mac Morna (A.D. 174). Find was born after his father's death and was at first called Demni. He is leader of the *fiann* or *féinne* (English "Fenians"), a kind of militia or standing army which was drawn from all quarters of Ireland. His father had held the same office before him, but after his death it passed to his enemy Goll mac Morna, who retained it until Find came to man's estate. Find usually resided at Almu (Allen) in Co. Kildare, where he was surrounded by some of the contingents of the fiann, the rest being scattered throughout Ireland to ward off enemies, particularly those coming from over the sea. In times of invasion Find collected his forces, overcame the foe, and pursued him to Scotland or Lochlann (Scandinavia) as the case might be. When not engaged in war the fiann gave themselves up to the chase or love-adventures. We are informed in great detail as to the conditions of admission to this privileged band, which were at once singular and exacting. The foremost heroes in Find's train were his son Ossian, his grandson Oscar, Cailte mac Ronain, and Diarmait O'Duibne, whose elopement with Find's destined bride Grainne, daughter of the High-King Cormac mac Airt (A.D. 227–266), forms the subject of a celebrated story. These, like Find, were all of the Ua Baisgne branch, with which was allied the Ua Morna, with whom they were generally at variance. The latter hailed from Connaught, chief among them being Goll and Conan. By the annalists Find is represented as having met with death by treachery either in 252 or 283. Under Coirpre Lifeochair, successor to Cormac mac Airt, the power of the fiann became intolerable. The monarch accordingly took up arms against them and utterly crushed them at the battle of Gabra (A.D. 283). Very few survived the defeat, but the story makes Ossian and Cailte live on until after the arrival of St Patrick in 432.

It is incredible that such a band as the fiann should have existed in the 2nd and 3rd centuries. A number of sagas older in date than the Ossianic stories have been preserved, which deal with events happening in the reigns of Art son of Conn (166–196), Lugaid mac Con (196–227), and Cormac mac Airt (227–266), but none of these in their oldest shape contain any allusion whatsoever to Find and his warriors. In the history of the Boroma, contained in the book of Leinster, Find is merely a Leinster chieftain who assists Bressal the king of Leinster against Coirpre Lifeochair. It can be shown that Find was originally a figure in Leinster-Munster tradition previous to the Viking age, but we have no documentary evidence concerning him at this time. He seems primarily to have been regarded as a poet and magician. Later he appears to have been transformed into a petty chief, and Zimmer even tried to show that his personality was developed in Leinster and Munster local tradition out of stories clustering round the figure of the Viking leader Ketill Hviti (Caittil Find), who was slain in 857. By the year 1000 Find was certainly connected in the minds of the people with the reign of Cormac mac Airt, but the process is obscure. Recently John MacNeill has pointed out that in the oldest genealogies Find is always connected with the Ui Tairrsigh of Failge (Offaley, a district comprising the present county of Kildare and parts of King's and Queen's counties). The Ui Tairrsigh were undoubtedly of Firbolg origin, and MacNeill would account in this manner for the slow acceptance of the stories by the conquering Milesians. Whilst the Ulster epic was fashionable at court, the subject races clung to the Fenian cycle. For the last 800 years Find has been the national hero of the Gaelic-speaking populations of Ireland, the Scottish Highlands and the Isle of Man. See also CELT (subsection *Irish Literature*).

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FINNO-UGRIAN, or FINNO-UGRIC, the designation of a division of the Ural-Altaic family of languages and their speakers. The first part is the name given by their neighbours, though not used by themselves, to the inhabitants of the eastern shores of the Baltic. It is probably the same word as the Fenni of Tacitus and Φίννοι of Ptolemy, though it is not certain that those races were Finns in the modern sense. It possibly means people of the fens or marshes, and corresponds to the native word *Suomi*, which appears to be derived from *suo*, a marsh. Finn and Finnish are used not only of the inhabitants of Finland but also in a more extended sense of similar tribes found in Russia and sometimes called Baltic Finns and Volga Finns. In this sense the Esthonian tribes (Baltic), the Laps, the Cheremis and Mordvins (Volga), and the Permian tribes are all Finns. The name is not, however, extended to the Ostiaks, Voguls and Magyars, who, though allied, form a separate subdivision called Ugrian, a name derived from Yura or Ugra, the country on either side of the Ural Mountains, and first used by Castrén in a scientific sense.

The name Finno-Ugric is primarily linguistic and must not be pressed as indicating a community of physical features and customs. But making allowance for the change of language by some tribes, the Finno-Ugrians form, with the striking exception of the Hungarians, a moderately homogeneous whole. They are nomads, but, unlike the Turks, Mongols and Manchus, have hardly ever shown themselves warlike and have no power of political organization. Those of them who have not come under European influence live under the simplest form of patriarchal government, and states, kings or even great chiefs are almost unknown among them.

Their headquarters are in Russia. From the Baltic to south Siberia extends a vast plain broken only by the Urals. Large parts of it are still wooded, and the proportion of forest land and marsh was no doubt much greater formerly. The Finno-Ugric tribes seem to shun the open steppes but are widely spread in the wooded country, especially on the banks of lakes and rivers. Their want of political influence renders them obscure, but they form a considerable element in the population of the northern, middle and eastern provinces of Russia, but are not found much to the south of Moscow (except in the east) or in the west (except in the Baltic provinces). The difference of temperament between the Great Russians and the purer Slavs such as the Little Russians is partly due to an infusion of Finnish blood.

Physically the Finno-Ugric races are as a rule solidly built and, though there is considerable variation in height and the cephalic index, are mostly of small or medium stature, somewhat squat, and brachy- or mesocephalic. As a rule the skin is greyish or olive coloured, the eyes grey or blue, the hair light, the beard scanty. Most of them seem deficient in energy and liveliness, both mental and physical; they are slow, heavy, conservative, somewhat suspicious and vindictive, inclined to be taciturn and melancholy. On the other hand they are patient, persevering, industrious, faithful and honest. When their natural mistrust of strangers is overcome they are kindly and hospitable.

I. *Tribes and Nations.*—The Ugrian subdivision, which seems to be in many respects the more primitive, consists of three peoples standing on very different levels of civilization, the Ostiaks and Voguls and the Hungarians.

Ostiaks.

Voguls.

The *Ostiaks* (Ostyaks or Ostjaks) are a tribe of nomadic fishermen and hunters inhabiting at present the government of Tobolsk and the banks of the Obi. They formerly extended into the government of Perm on the European side of the Ural Mountains. The so-called Ostiaks of the Yenisei appear to be a different race and not to belong to the Finno-Ugrian group. The Ostiaks are still partially pagan and worship the River Obi. Allied to them are the *Voguls*, a similar nomadic tribe found on both sides of the Urals, and formerly extending at least as far as the government of Vologda. The languages of the Ostiaks and Voguls are allied, though not mere dialects of one another, and form a small group separated from the languages of the Finns both Western and Eastern.

For further details of these and other tribes see under the separate headings.

Magyars or Hungarians.

According to the legend, Nimrod had two sons, Hunyor and Magyor. They married daughters of the prince of the Alans and became the ancestors of the two kindred nations, Huns and Magyars or Hungarians. This story corresponds with what can be ascertained scientifically about the origin of these peoples. It is probable that the Huns and Magyars were allied tribes of mixed descent comprising both Turkish and Finno-Ugrian elements. The language is indisputably Finno-Ugrian, but the name Hungarian seems to lead back to the form Un-ugur, and to suggest Turkish connexions which are confirmed by the warlike habits of the Huns and Magyars. The same name possibly occurs in the form Hiung-nu as far east as the frontiers of China, but recent authorities are of opinion that the tribes from whom the present Hungarians are descended were formed originally in the Terek-Kuban country to the north of the Caucasus, where a mixture of Turkish and Ugrian blood took place, a Ugrian language but Turkish mode of life predominating. They were also influenced by Iranians and the various tribes of the Caucasus. Both Huns and Magyars moved westwards, but the Huns invaded Europe in the 5th century and made no permanent settlement in spite of the devastation they caused, whereas the Magyars remained for some centuries near the banks of the Don. According to tradition they were compelled to leave a country called Lebedia under the pressure of nomadic tribes, and moved westward under the leadership of seven dukes. They conquered Hungary in the years 884–895, and the first king of their new dominions was called Árpád. For the chequered and often tragic history of the country see HUNGARY. The Magyars were converted to Christianity in the 11th century and adhered to the Roman not the Eastern Church. They have in all probability entirely lost their ancient physique, but have retained their language, and traces of their older life may be seen in their fondness for horses and flocks.

Permians and Syryenians.

The following are the principal Finnish peoples. The *Permians* and *Syryenians* may be treated as one tribe. The latter name is very variously spelt as Syrjenian, Sirianian, Zyrjenian, Zirian, &c. They both call themselves Komi and speak a mutually intelligible language, allied to Votiak. The name Bjarmisch is sometimes applied to this sub-group. Both Permians and Syryenians are found chiefly in the governments of Perm, Vologda and Archangel, but there are a few Syryenians on the Siberian side of the Urals. The Syryenian headquarters are at the town of Ishma on the Pechora, whereas the name Permian is more correctly restricted to the inhabitants of the right bank of the upper Kama. Both probably extended much farther to the west in former times. The Syryenians are said to be more intelligent and active than most Finnish tribes and to make considerable journeys for trading purposes. They are possibly a mixed race.

Votiaks.

The *Votiaks* are a tribe of about a quarter of a million persons dwelling chiefly in the south-eastern part of the government of Viatka. Their language indicates that they have borrowed a good deal from the Tatars and Chuvashes, and they seem to have little individuality, being described as weak both mentally and physically. They call themselves Ud-murt or Urt-murt. About the 16th century some of them migrated, doubtless under the pressure of Russian advance, into the government of Ufa and, the country being more fertile, are said to have improved in physique.

Cheremissians.

The *Cheremissians*, or Tcheremissians or Cheremis, who call themselves Mari, inhabit the banks of the Volga, chiefly in the neighbourhood of Kazan. Those inhabiting the right bank of the Volga are physically stronger and are known as Hill Cheremiss. The evidence of place names makes it probable that their present position is the result of their being driven northwards by the Mordvins and then southwards by the Russians. There is some discrepancy between their language and their physical characteristics. The former shows affinities to both Mordvinian and the Permian group, but their crania are said to be mainly dolichocephalic, and it has been suggested that they are connected with the neolithic dolichocephalic population of Lake Ladoga. They are gentle and honest, but neither active nor intelligent.

Mordvinians.

The *Mordvinians*, also called Mordvá, Mordvins and Mordvs, are scattered over the provinces near the middle Volga, especially Nizhniy Novgorod, Kazan, Penza, Tambov, Simbirsk, Ufa and even Orenburg. Though not continuous, their settlements are considerable both in extent and population. They are the most important of the Eastern Finns, and their traditions speak of a capital and of a king who fought with the Tatars. They are mentioned as Mordens as early as the 6th century, but do not now use the name, calling themselves after one of their two divisions, Moksha or Erza. Their country is still covered with forest to a large extent. Their language is on the one side allied to Cheremissian. On the other it shows a nearer approach to Finnish (Suomi) than the other Eastern languages of the family, but it has also constructions peculiar to itself.

Lapps.

The *Lapps* are found in Norway, Sweden and Finland. They call themselves Sabme, but are called Finns by the Norwegians. They are the shortest and most brachycephalic race in Europe. The majority are nomads who live by pasturing reindeer, and are known as Mountain Lapps, but others have become more or less settled and live by hunting or fishing. From ancient times the Lapps have had a great reputation among the Finns and other neighbouring nations for skill in sorcery.

Esthonians.

The *Esthonians* are the peasantry of the Russian province Esthonia and the neighbouring districts. They were serfs until 1817 when they were liberated, but their condition remained unsatisfactory and led to a serious rebellion in 1859. They are practically a branch of the Finns, and are hardly separable from the other Finnish tribes inhabiting the Baltic provinces. The name Est or Ehst, by which they are known to foreigners, appears to be the same as the Aestii of Tacitus, and to have properly belonged to quite a different tribe. They call themselves Mā mēs, or country people, and their land Rahwama or Wiroma (cf. Finnish, Virolaiset, Esthonians.) Though not superior to other tribes in general intelligence, they have become more civilized owing to their more intimate connexion with the Russian and German population around them.

Livonians.

Livs, *Livlanders* or *Livonians* is the name given to the old Finnish-speaking population of west Livland or Livonia and north Kurland. We hear of them as a warlike and predatory pagan tribe in the middle ages, and it is possible that they were a mixed Letto-Finnish race from the beginning. In modern times they have become almost completely absorbed by Letts, and their language is only spoken in a few places on the coast of Kurland. It has indeed been disputed if it still exists. It is known as Livish or Livonian and is allied to Esthonian.

Votes.

The *Votes* (not to be confounded with the Votiaks), also called southern Chudes and Vatjalaiset, apparently represent the original inhabitants of Ingria, the district round St Petersburg, but have decreased before the advance of the Russians and also of Karelians from the north. They are heard of in the 11th century, but now occupy only about thirty parishes in north-west Ingria.

Vepsas.

The *Vepsas* or *Vepses*, also called Northern Chudes, are another tribe allied to the Esthonians, but are more numerous than the Votes. They are found in the district of Tikhvinsk and other parts of the government of Old Novgorod, and apparently extended farther east into the government of Vologda in former times. Linguistically both the Votes and Vepsas are closely related to the Esthonians.

Finns.

The *Finns* proper or Suomi, as they call themselves, are the most important and civilized division of the group. They inhabit at present the grand duchy of Finland and the adjacent governments, especially Olonetz, Tver and St Petersburg. Formerly a tribe of them called Kainulaiset was also found in Sweden, whence the Swedes call the Finns

Qven. At present there are two principal subdivisions of Finns, the Tavastlanders or Hämäläiset, who occupy the southern and western parts of the grand duchy, and the Karelians or Karjalaiset found in the east and north, as far as Lake Onega and towards the White Sea.

The former, and generally speaking, all the inhabitants of the grand duchy have undergone a strong Swedish influence. There is a considerable admixture of Swedish blood; the language is full of Swedish words; Christianity is universal; and the upper classes and townspeople are mainly Swedish in their habits and speech, though of late a persistent attempt has been made to Russify the country. The Finns have much the same mental and moral characteristics as the other allied tribes, but have reached a far higher intellectual and literary stage. Several collections of their popular and mythological poetry have been made, the most celebrated of which is the *Kalewala*, compiled by Lönnrot about 1835, and there is a copious modern literature. The study of the national languages and antiquities is prosecuted in Helsingfors and other towns with much energy: several learned societies have been formed and considerable results published, partly in Finnish. It is clear that this scientific activity, though animated by a patriotic Finnish spirit, owes much to Swedish training in the past. Besides the literary language there are several dialects, the most important of which is that of Savolaks.

Karelians. The *Karelians* are not usually regarded as separate from the Finns, though they are a distinct tribe as much as the Vepsas and Votes. Living farther east they have come less under Swedish and more under Russian influence than the inhabitants of West Finland; but, since many of the districts which they inhabit are out of the way and neglected, this influence has not been strong, so that they have adopted less of European civilization, and in places preserved their own customs more than the Westerners. They are of a slighter and better proportioned build than the Finns, more enterprising, lively and friendly, but less persevering and tenacious. They number about 260,000, of whom about 63,000 live in Olonetz and 195,000 in Tver and Novgorod, but in the southern districts are less distinguished from the Russian population. They belong to the Russian Church, whereas the Finns of the grand duchy are Protestants. There also appear to be authentic traces of a Karelian population in Kaluga, Yaroslavl, Vladimir, Vologda and Tambov. It was among them that the *Kalewala* was collected, chiefly in East Finland and Olonetz.

Samoyedes. There is some difference of opinion as to whether the *Samoyedes* should be included among the Finno-Ugrian tribes or be given the rank of a separate division equivalent to Finno-Ugrian and Turkish. The linguistic question is discussed below. The Samoyedes are a nomad tribe who wander with their reindeer over the treeless plains which border on the White and Kara seas on either side of the Urals. In culture and habits they resemble the Finno-Ugrian tribes, and there seems to be no adequate reason for separating them.

Other Inclusions. Various other peoples have been referred to the Finno-Ugrian group, but some doubt must remain as to the propriety of the classification, either because they are now extinct, or because they are suspected of having changed their language.

The original Bulgarians, who had their home on the Volga before they invaded the country which now bears their name, were probably a tribe similar to the Magyars, though all record of their language is lost. It has been disputed whether the Khazars, who in the middle ages occupied parts of south Russia and the shores of the Caspian, were Finno-Ugrians or Turks, and there is the same doubt about the Avars and Pechenegs, which without linguistic evidence remains insoluble. Nor is the difference ethnographically important. The formation of hordes of warlike bodies, half tribes, half armies, composed of different races, was a characteristic of Central Asia, and it was probably often a matter of chance what language was adopted as the common speech.

At the present day the Bashkirs, Meshchers and Tepters, who speak Tatar languages, are thought to be Finnish in origin, as are also the Chuvashes, whose language is Tatar strongly modified by Finnish influence. The little known Soyots of the headwaters of the Yenisei are also said to be Finno-Ugrians.

The name Chude appears to be properly applied to the Vepsas and Votes but is extended by popular usage in Russia to all Finno-Ugrian tribes, and to all extinct tribes of whatever race who have left tombs, monuments or relics of mining operations in European Russia or Siberia. Some Russian archaeologists use it specifically of the Permian group. But its extension is so vague that it is better to discard it as a scientific term.

II. *Languages.*—The Finno-Ugric languages are generally considered as a division of the Ural-Altaic group, which consists of four families: Turkish, Mongol, Manchu and Finno-Ugric, including Samoyede unless it is reckoned separately as a fifth. The chief character of the group is that agglutination, or the addition of suffixes, is the only method of word-formation, prefixes and significant change of vowels being unknown, as is also gender. This suggests an affinity with many other languages, such as the ancient Accadian or Sumerian, and Japanese. A connexion between the Finno-Ugric and Dravidian languages has also been suggested. On the other hand, the more highly developed agglutinative languages, such as Finnish, approach the inflected Aryan type, so that the Aryan languages may have been developed from an ancestor not unlike the Ural-Altaic group.

The Finno-Ugrian languages are distinguished from the other divisions of the Ural-Altaic group both in grammar and vocabulary. Compared with Mongol and Manchu they have a much greater wealth of forms, both in declension and conjugation; the suffixes form one word with the root and are not wholly or partially detachable postpositions; the pronominal element is freely represented in the suffixes added to both verbs and nouns. These features are also found in the Turkish languages, but Finno-Ugrian has a much greater variety of cases denoting position or motion, and the union of the case termination with the noun is more complete; in some languages the object can be incorporated in the verb, which does not occur in Turkish, but the negative is rarely (Cheremissian) thus incorporated after the Turkish fashion (*e.g. yazmak*, "to write"; *yazmamak*, "not to write"), and in some languages takes pronominal suffixes (Finnish *en tule, et tule, eivät tule*, "I, you, they do not come"). Vowel-harmony is completely observed in Finnish and Magyar, but in the other languages is imperfectly developed, or has been lost under Russian influence. Relative pronouns and particles exist and are fully developed in some languages. The tendency to form compounds, which is not characteristic of Turkish, is very marked in Finnish and Hungarian, and is said also to be found in Samoyede, Cheremissian and Syryenian. The original order in the sentence seems to be that the governing word follows the word governed, but there are many exceptions to this, particularly in Hungarian where the arrangement is very free.

In vocabulary the pronouns agree fairly well with those of Turkish, Mongol and Manchu, but there is little resemblance between the numbers. Many of the languages contain numerous Tatar and Turkish loan-words, but with this exception the resemblance of vocabulary is not striking and indicates an ancient separation. But the similarity in the process of word-building and of the elements used, even if they have not the same sense, as well as analogies in the general construction of sentences and in some details (*e.g.* the use of the infinitive or verbal substantive), seem to justify the hypothesis of an original relationship with the Turkish languages, which in their turn have connexions with the other groups.

Samoyede is classed by some as a separate group and by some among the Finno-Ugrian languages, but it at any rate displays a far closer resemblance to them in both grammar and vocabulary than do any of the Turkish languages. The numerals are different, but the personal and interrogative pronouns and many common words (*e.g. joha*, "river," Finn. *joki; sava*, "good," Finn. *hywä; kole*, "fish," Finn. *kala*) show a considerable resemblance. The inflection of nouns is very like that found in Finno-Ugrian but that of the verb differs, verb and noun being imperfectly differentiated. In detail, however, the verbal suffixes show analogies to those of Finno-Ugrian. Vowel-harmony and weakening of consonants occur as in Finnish.

Excluding Samoyede, the Finno-Ugrian languages may be divided into two sections: (1) Ugrian, comprising Ostiak, Vogul and Magyar; and (2) Finnish. The Permian languages (Syryenian, Permian and Votiak) form a distinct group within this latter section, and the remainder may be divided into the Volga group (Cheremissian and Mordvinian) and the West Finnish (Lappish, Esthonian and Finnish proper).

The Ugrian languages appear to have separated from the Finnish branch before the systems of declension or conjugation were developed. Their case suffixes seem to be later formations, though we find, *t*, *tl* or *k* for the plural and traces of *l* as a local suffix. Ostiak and Vogul, like Samoyede, have a dual. Moods and tenses are less numerous but the number of verbal forms is increased by those in which the pronominal object is incorporated. Hungarian has naturally advanced enormously beyond the stage reached by Ostiak and Vogul, and shows marks of strong European influence, but also retains primitive features. Vowel-harmony is observed (*várok*, "I await," but *verek*, "I strike"). The verb has two sets of terminations, according as it is transitive or intransitive, and the pronominal object is sometimes incorporated. Alone among Finno-Ugrian languages it has developed an article, and the adjective is inflected when used as a predicate though not as an attribute (*Jó emberek*, "good men," but *Az emberek jók*, "the men are good"). There is great freedom in the order of words and, as in Finnish, a tendency to form long compounds.

The Finnish languages are not divided from the Ugrian by any striking differences, but show greater resemblances to one another in details. None of them have a dual and only Mordvinian an objective conjugation. The case system is elaborate and generally comprises twelve or fifteen forms. The negative conjugation is peculiar; there are negative adjectives ending in *tem* or *tom* and abessive cases (*e.g.* Finnish *syyttä*, without a cause, *tiedotta*, without knowledge).

Permian, Syryenian and Votiak exhibit this common development less fully than the more western languages. They are less completely inflected than the Finnish languages and more thoroughly agglutinative in the strict sense. In vocabulary, *e.g.* the numerals, they show resemblances to the Ugrian division. Syryenian has older literary remains than any Finno-Ugrian language except Hungarian. In the latter part of the 14th century Russian missionaries composed in it various manuals and translations, using a special alphabet for the purpose.

Unlike the Finnish and Esthonian branch, the languages of the Volga Finns (Mordvinian and Cheremissian) have been influenced by Russian and Tatar rather than by Scandinavian, and hence show apparent differences. But Mordvinian has points of detailed resemblance to Finnish which seem to point to a comparatively late separation, *e.g.* the use of *kemen* for ten, *–nza* as the possessive suffix of the third personal pronoun, the regular formation of the imperfect with *i*, the infinitive with *ma*, and the participle with *f* (Finnish *va*). On the other hand it has many peculiarities. It retains an objective conjugation like the Ugrian languages, and has developed two forms of declension, the definite and indefinite.

Cheremissian has affinities to both the Permian languages and Mordvinian. It resembles Syryenian in its case terminations and also in marking the plural by interposing a distinct syllable (Syry. *yas*, Cher. *vlya*) between the singular and the case suffixes. Most of the numerals are like Syryenian but *kändekhsye*, *indekhsye*, for eight and nine, recall Finnish forms (*kahdeksan*, *yhdeksän*), as do also the pronouns.

The connexion between the various West Finnish languages is more obvious than between those already discussed. Lappish (or Lapponic) forms a link between them and Mordvinian. Its pronouns are remarkably like the Mordvinian equivalents, but the general system of declension and conjugation, both positive and negative, is much as in Finnish. Superficially, however, the resemblance is somewhat obscured by the difference in phonetics, for Lappish has an extraordinary fondness for diphthongs and also an unusually ample provision of consonants.

The affinity of Esthonian (together with Votish, Vepsish and Livish) to Finnish is obvious not only to the philologist but to the casual learner. In a few cases it shows older forms than Finnish, but on the whole is less primitive and has assumed under foreign influence the features of a European language even more thoroughly. The vowel-harmony is found only in the Dorpat dialect and there imperfectly, the pronominal affixes are not used, and the negative has become an unvarying particle, though in Vepsish and Votish it takes suffixes as in Finnish. On the other hand, the laws for the change of consonants, the general system of phonetics, the declension, the pronouns and the positive conjugation of the verb all closely resemble Finnish. Esthonian has two chief dialects, those of Reval and Dorpat, and a certain amount of literary culture, the best-known work being the national epic or *Kalewi-poeg*.

Finnish proper is divided into two chief dialects, the Karelian or Eastern, and the Tavastland or Western. The spoken language of the Karelians is corrupt and mixed with Russian, but the *Kalewala* and their other old songs are written in a pure Finnish dialect, which has come to be accepted as the ordinary language of poetry throughout modern Finland, just as the Homeric dialect was used by the Greeks for epic poetry. It is more archaic than the Tavastland dialect and preserves many old forms which have been lost elsewhere, but its utterance is softer and it sometimes rejects consonants which are retained in ordinary speech, *e.g.* *saa'a*, *kosen* for *saada*, *kosken*.

The affinity of Finnish to the more eastern languages of the group is clear, but it has been profoundly influenced by Scandinavian and in its present form consists of non-Aryan material recast in an Aryan and European mould. Not only are some of the simplest words borrowed from Scandinavian, but the grammar has been radically modified. Un-Aryan peculiarities have been rejected, though perhaps less than in Esthonian. The various forms of nouns and verbs are not merely roots with a string of obvious suffixes attached, but the termination forms a whole with the root as in Greek and Latin inflections; the adjective is declined and compared and agrees with its substantive; compound tenses are formed with the aid of the auxiliary verb, and there is a full supply of relative pronouns and particles.

Finnish and Hungarian together with Turkish are interesting examples of non-Aryan languages trying to participate, by both translation and imitation, in the literary life of Europe, but it may be doubted if the experiment is successful. The sense of effort is felt less in Hungarian than in the other languages; though they are admirable instruments for terse conversation or popular poetry, there appears to be some deep-seated difference in the force of the verb and the structure of phrases which renders them clumsy and complicated when they attempt to express sentences of the type common in European literature.

III. *Civilization and Religion.*—The Finno-Ugric tribes have not been equally progressive; some, such as the Finns and Magyars, have adopted, at least in towns, the ordinary civilization of Europe; others are agriculturists; others still nomadic. The wilder tribes, such as the Ostiaks, Voguls and Lapps, mostly consist of one section which is nomadic and another which is settling down. The following notes apply to traces of ancient conditions which survive sporadically but are nowhere universal. Few except the Hungarians have shown themselves warlike, though we read of conflicts with the Russians in the middle ages as they advanced among this older population. But most Finno-Ugrians are astute and persevering hunters, and the Ostiaks still shoot game with a bow. The tribes are divided into numerous small clans which are exogamous. Marriage by capture is said to survive among the Cheremiss, who are still polygamous in some districts, but purchase of the bride is the more general form. Women are treated as servants and often excluded from pagan religious ceremonies. The most primitive form of house consists of poles inclined towards one another and covered with skins or sods, so as to form a circular screen round a fire; winter houses are partly underground. Long snow-shoes are used in winter and boats are largely employed in summer. The Finns in particular are very good seamen. The Ostiaks and Samoyedes still cast tin ornaments in wooden moulds. The variation of the higher numerals in the different languages, which are sometimes obvious loan words, shows that the original system did not extend beyond seven, and the aptitude for calculating and trading is not great. Several thousands of the Ostiaks, Voguls and Cheremiss are still unbaptized, and much paganism lingers among the nominal Christians, and in poetry such as the *Kalewala*. The deities are chiefly nature spirits and the importance of the several gods varies as the tribes are hunters, fishermen, &c. Sun or sky worship is found among the Samoyedes and *Jumala*, the Finnish word for god, seems originally to mean sky. The Ostiaks worship a water-spirit of the river Obi and also a thunder-god. We hear of a forest-god among the Finns, Lapps and Cheremiss. There are also clan gods worshipped by each clan with special ceremonies. Traces of ancestor-worship are also found. The Samoyedes and Ostiaks are said to sacrifice to ghosts, and the Ostiaks to make images of the more important dead, which are tended and honoured, as if alive, for some years. Images are found in the tombs and barrows of most tribes, and the Samoyedes, Ostiaks and Voguls still use idols, generally of wood. Animal sacrifices are offered, and the lips of the idol sometimes smeared with blood. Quaint combinations of Christianity and paganism occur; thus the Cheremiss are said to sacrifice to the Virgin Mary. The idea that disease is due to possession by an evil spirit, and can be both caused and cured by spells, seems to prevail among all tribes, and in general extraordinary power is supposed to reside in incantations and magical formulae. This belief is conspicuous in the *Kalewala*, and almost every tribe has its own collection of prayers, healing charms and spells to be used on the most varied occasions. A knowledge of these formulae is possessed by wizards (Finnish *noita*) corresponding to the Shamans of the Altaic peoples. They are exorcists and also mediums who can ascertain the will of the gods; a magic drum plays a great part in their invocations, and their office is generally hereditary. The non-Buddhist elements of Chinese and Japanese religion present the same features as are found among the Finno-Ugrians—nature-worship, ancestor-worship and exorcism—but in a much more elaborate and developed form.

IV. *History.*—Most of the Finno-Ugrian tribes have no history or written records, and little in the way of traditions of their past. In their later period the Hungarians and Finns enter to some extent the course of ordinary European history. For the earlier period we have no positive information, but the labours of investigators, especially in Finland, have collected a great number of archaeological and philological data from which an account of the ancient wanderings of these tribes may be constructed. Barrows containing skulls and ornaments may mark the advance of a special form of culture, and language may be of assistance; if we find, for instance, a language with loan words of an archaic type, we may conclude that it was in contact with the other language from which it borrowed at the time when such forms were current. But clearly all such deductions contain a large element of theory, and the following sketch is given with all reserve.

The Finno-Ugrian tribes originally lived together east of the Urals and spoke a common language. It is not certain if they were all of the same physical type, for the association of different races speaking one language is common in central Asia. They were hunters and fishermen, not agriculturists. At an unknown period the Finns, still undivided, moved into Europe and perhaps settled on the Volga and Oka. They had perhaps arrived there before 1500 B.C., learned some rudiments of agriculture, and developed their system of numbers up to ten. They were still in the neolithic stage. About 600 B.C. they came in contact with an Iranian people, from whom they learned the use of metals, and borrowed numerals for a hundred (Finnish *sata*, Ostiak *sāt*, Magyar *szaz*; cf. Zend *sata*) and a thousand (Magyar *ezer*; cf. *hazañra* and *hazar*). Magyar and some other languages also borrowed a word for ten (*tíz*, cf. *das*). This Iranian race may perhaps have been the Scythians, who are believed by many authorities to have been Iranians and to be represented by the Osetians of the Caucasus. There was probably a trade route up the Volga in the 4th century B.C. About that time the Western Finns must have broken away from the Mordvinians and wandered north-westwards. At a period not much later than the Christian era, they must have come in contact with Letto-Lithuanian peoples in the Baltic provinces, and also with Scandinavians. Whether they came in contact with the latter first in the Baltic provinces or in Finland itself is disputed, as there may have been Scandinavians in the Baltic provinces. But the distribution of tombs and barrows seems to indicate that they entered Finland not from the east through Karelia but from the Baltic provinces by sea to Satakunta and the south-east coast, whence they extended eastwards. From both Lithuanians and Scandinavians they borrowed an enormous quantity of culture-words and probably the ideas and materials they indicate. Thus the Finnish words for gold, king and everything concerned with government are of Scandinavian origin. Their migration to Finland was probably complete about A.D. 800. Meanwhile the Slav tribes known later as Russians were coming up from the south and pressed the Finns northwards, overwhelming but not annihilating them in the country between St Petersburg and Moscow. The same movement tended to drive the Eastern Finns and Ugrians backwards towards the east. The Finns know the Russians by the name of *Venäjä*, or Wends, and as this name is not used by Slavs themselves but by Scandinavians and Teutons, it seems clear that they arrived among the Finns as greater strangers than the Scandinavians and known by a foreign name. Christianity was perhaps first preached to the Finns as early as A.D. 1000, but there was a long political and religious struggle with the Swedes. At the end of the 13th century Finland was definitely converted and annexed to Sweden, remaining a dependency of that country until 1809, when it was ceded to Russia.

The Ugrians and Eastern Finns took no part in the westward movement and did not fall under western influences but came into contact with Tatar tribes and were more or less Tatarized. In some cases this took the form of the adoption of a Tatar language, in others (Mordvin, Cheremis and Votiak) a large number of Tatar words were borrowed. We also know that there were considerable settlements of these tribes, perhaps amounting to states, on the Volga and in south-eastern Russia. Such was Great Bulgaria, which continued until destroyed by the Mongols in 1238. The pressure of tribes farther east acting on these settlements dislodged sections of them from time to time and created the series of invasions which devastated the East Roman empire from the 5th century onwards. But we do not know what were the languages spoken by the Huns, Bulgarians, Pechenegs and Avars, so that we cannot say whether they were Turks, Finns or Ugrians, nor does it follow that a horde speaking a Ugrian language were necessarily Ugrians by race. An inspection of the performances of the various tribes, as far as we can distinguish them, suggests that the Turks or Tatars were the warlike element. The names Hun and Hungarian may possibly be the same as Hiung-nu, but we cannot assume that this tribe passed across Asia unchanged in language and physique. The Hungarians entered on their present phase at the end of the 9th century of this era, when they crossed the Carpathians and conquered the old Pannonia and Dacia. For half a century or so before this invasion they are said to have inhabited Atelkuzu, probably a district between the Dnieper and the Danube. The isolated groups of Hungarians now found in Transylvania and called Szeklers are considered the purest descendants of the invading Magyars. Those who settled in the plains of Hungary probably mingled there with remnants of Huns, Avars and earlier invaders, and also with subsequent invaders, such as Pechenegs and Kumans.

Bibliography.—Among the older writers may be mentioned Strahlenberg (*Das nord- und östliche Theil von Europa und Asia*, 1730), Johann Gottlieb Georgi (*Description de toutes les nations de l'empire de la Russie*, French tr., St Petersburg, 1777), but especially the various works of Matthias A. Castrén (1852–1853) and W. Schott (1858). Modern scientific knowledge of the Finno-Ugrians and their languages was founded by these two authors. Among newer works some of the most important separate publications are: J. R. Aspelin, *Antiquités du nord finno-ougrien* (1877–1884); J. Abercromby, *Pre- and Proto-historic Finns* (1898); and A. Hackmann, *Die ältere Eisenzeit in Finnland* (1905).

The recent literature on the origin, customs, antiquities and languages of these races is voluminous, but is contained chiefly not in separate books but in special learned periodicals. Of these there are several: *Journal de la Société Finno-ougrienne* (Helsingfors) (*Suomalais-Ugrilaisen Seuran Aikakauskirja*); *Finnisch-Ugrische Forschungen* (Helsingfors and Leipzig); *Mitteilungen der archäologischen, historischen und ethnographischen Gesellschaft der Kais. Universität zu Kasan*; *Keleti Szemle* or *Revue orientale pour les études ouralo-altaïques* (Budapest). In all of these will be found numerous valuable articles by such authors as Ahlqvist, Halévy, Heikel, Krohn, Muncácsi, Paasonen, Setälä, Smurnow, Thomsen and Vambéry.

The titles of grammars and dictionaries will be found under the headings of the different languages. For general linguistic questions may be consulted the works of Castrén, Schott and Otto Donner, also such parts of the following as treat of Finno-Ugric languages: Byrne, *Principles of the Structure of Language*, vol. i. (1892); Friedrich Müller, *Grundriss der Sprachwissenschaft II.*, Band ii., Abth. 1882; Steinthal and Misleli, *Abriss der Sprachwissenschaft* (1893). (C. El.)

FINSBURY, a central metropolitan borough of London, England, bounded N. by Islington, E. by Shoreditch, S. by the city of London and W. by Holborn and St Pancras. Pop. (1901) 101,463. The principal thoroughfares are Pentonville Road, from King's Cross east to the Angel, Islington, continuing E. and S. in City Road and S. again to the City in Moorgate Street; Clerkenwell Road and Old Street, crossing the centre from W. to E.; King's Cross Road running S.E. into Farringdon Road, and so to the City; St John Street and Road and Goswell Road (the residence of Dickens' Pickwick) running S. from the Angel towards the City; and Rosebery Avenue running S.W. from St John Street into Holborn. The commercial character of the City extends into the southern part of the borough; the residential houses are mostly those of artisans. Local industries include working in precious metals, watch-making, printing and paper-making.

An early form of the name is Vynesbury, but the derivation is not known. The place was supposed by some to take name from an extensive fen, a part of which, commonly known as Moorfields (cf. Moorgate Street), was drained in the 16th century and subsequently laid out as public grounds. It was a frequent resort of Pepys, who mentions its houses of entertainment and the wrestling and other pastimes carried on, also that it furnished a refuge for many of those whose houses were destroyed in the fire of London in 1666. Bookstalls and other booths were numerous at a somewhat later date. The borough includes the parish of Clerkenwell (*q.v.*), a locality of considerable historic interest, including the former priory of St John, Clerkenwell, of which the gateway and other traces remain. Among several other sites and buildings of historical interest the Charterhouse (*q.v.*) west of Aldersgate Street, stands first, originally a Carthusian monastery, subsequently a hospital and a school out of which grew the famous public school at Godalming. Bunhill Fields, City Road, was used by the Dissenters as a burial-place from the middle of the 17th century until 1832. Among eminent persons interred here are John Bunyan, Daniel Defoe, Susanna, mother of John and Charles Wesley, and George Fox, founder of the Society of Friends. A neighbouring chapel is intimately associated with the Wesleys, and the house of John Wesley is opened as a museum bearing his name. Many victims of the plague were buried in a pit neighbouring to these fields, near the junction of Goswell Road and Old Street. To the south of the fields lies the Artillery Ground, the training ground of the Honourable Artillery Company, so occupied since 1641, with barracks and armoury. Sadler's Wells theatre, Rosebery Avenue, dating as a place of entertainment from 1683, preserves the name of a fashionable medicinal spring, music room and theatre, the last most notable in its connexion with the names of Joseph Grimaldi the clown and Samuel Phelps. Other institutions are the technical college, Leonard Street, and St Mark's, St Luke's and the Royal chest hospitals. At Mount Pleasant is the parcels department of the general post office, and at Clerkenwell Green the sessions house for the county of London (north side of the Thames). Adjacent to Rosebery Avenue are reservoirs of the New River Head. The municipal borough coincides with the east and central divisions of the parliamentary borough of Finsbury, each returning one member. The borough council consists of a mayor, 9 aldermen and 54 councillors. Area, 589·1 acres.

FINSTERWALDE, a town of Germany, in the kingdom of Prussia, on the Schackebach, a tributary of the Little Elster, 28 m. W.S.W. of Cottbus by rail. Pop. (1905) 10,726. The town has a Gothic church (1581), a château, schools, cloth and cigar factories, iron-foundries, flour and saw mills and factories for machine building. The town, which is first mentioned in 1288, came into the possession of electoral Saxony in 1635 and of Prussia in 1815.

FIORENZO DI LORENZO (*c.* 1440–1522), Italian painter, of the Umbrian school, lived and worked at Perugia, where most of his authentic works are still preserved in the Pinacoteca. There is probably no other Italian master of importance of whose life and work so little is known. In fact the whole edifice that modern scientific criticism has built around his name is based on a single signed and dated picture (1487) in the Pinacoteca of Perugia—a niche with lunette, two wings and predella—and on the documentary evidence that he was decemvir of that city in 1472, in which year he entered into a contract to paint an altarpiece for Santa Maria Nuova—the pentatych of the "Madonna and Saints" now in the Pinacoteca. Of his birth and death and pupilage nothing is known, and Vasari does not even mention Fiorenzo's name, though he probably refers to him when he says that Cristofano, Perugino's father, sent his son to be the shop drudge of a painter in Perugia, "who was not particularly distinguished in his calling, but held the art in great veneration and highly honoured the men who excelled therein." Certain it is that the early works both of Perugino and of Pinturicchio show certain mannerisms which point towards Fiorenzo's influence, if not to his direct teaching. The list of some fifty pictures which modern critics have ascribed to Fiorenzo includes works of such widely varied character that one can hardly be surprised to find great divergence of opinion as regards the masters under whom Fiorenzo is supposed to have studied. Pisanello, Verrocchio, Benozzo Gozzoli, Antonio Pollaiuolo, Benedetto Bonfigli, Mantegna, Squarcione, Filippo Lippi, Signorelli and Ghirlandajo have all been credited with this distinguished pupil, who was the most typical Umbrian painter that stands between the primitives and Perugino; but the probability is that he studied under Bonfigli and was indirectly influenced by Gozzoli. Fiorenzo's authentic works are remarkable for their sense of space and for the expression of that peculiar clear, soft atmosphere which is so marked a feature in the work of Perugino. But Fiorenzo has an intensity of feeling and a power of expressing character which are far removed from the somewhat affected grace of Perugino. Of the forty-five pictures bearing Fiorenzo's name in the Pinacoteca of Perugia, the eight charming St Bernardino panels are so different from his well-authenticated works, so Florentine in conception and movement, that the Perugian's authorship is very questionable. On the other hand the beautiful "Nativity," the "Adoration of the Magi," and the "Adoration of the Shepherds" in the same gallery, may be accepted as the work of his hand, as also the fresco of SS. Romano and Rocco at the church of S. Francesco at Deruta. The London National Gallery, the Berlin and the Frankfort museums contain each a "Madonna and Child" ascribed to the master, but the attribution is in each case open to doubt.

See Jean Carlyle Graham, *The Problem of Fiorenzo di Lorenzo* (Perugia, 1903); Edward Hutton, *The Cities of Umbria* (London). (P. G. K.)

FIORENZUOLA D'ARDA, a town of Emilia, Italy, in the province of Piacenza, from which it is 14 m. S.E. by rail, 270 ft. above sea-level. Pop. (1901) 7792. It is traversed by the Via Aemilia, and has a picturesque piazza with an old tower in the centre. The Palazzo Grossi also is a fine building. Alseno lies 4 m. to the S.E., and near it is the Cistercian abbey of Chiaravalle della Colomba, with a fine Gothic church and a large and beautiful cloister (in brick and Verona marble), of the 12th-14th century.

FIORILLO, JOHANN DOMINICUS (1748–1821), German painter and historian of art, was born at Hamburg on the 13th of October 1748. He received his first instructions in art at an academy of painting at Bayreuth; and in 1761, to continue his studies, he went first to Rome, and next to Bologna, where he distinguished himself sufficiently to attain in 1769 admission to the academy. Returning soon after to Germany, he obtained the appointment of historical painter to the court of Brunswick. In 1781 he removed to Göttingen, occupied himself as a drawing-master, and was named in 1784 keeper of the collection of prints at the university library. He was appointed professor extraordinary in the philosophical faculty in 1799, and ordinary professor in 1813. During this period he had made himself known as a writer by the publication of his *Geschichte der zeichnenden Künste*, in 5 vols. (1798–1808). This was followed in 1815 to 1820 by the *Geschichte der zeichnenden Künste in Deutschland und den vereinigten Niederlanden*, in 4 vols. These works, though not attaining to any high mark of literary excellence, are esteemed for the information collected in them, especially on the subject of art in the later middle ages. Fiorillo practised his art almost till his death, but has left no memorable masterpiece. The most noticeable of his painting is perhaps the "Surrender of Briseis." He died at Göttingen on the 10th of September 1821.

FIR, the Scandinavian name originally given to the Scotch pine (*Pinus sylvestris*), but at present not infrequently employed as a general term for the whole of the true conifers (*Abietineae*); in a more exact sense, it has been transferred to the "spruce" and "silver firs," the genera *Picea* and *Abies* of most modern botanists.

The firs are distinguished from the pines and larches by having their needle-like leaves placed singly on the shoots, instead of growing in clusters from a sheath on a dwarf branch. Their cones are composed of thin, rounded, closely imbricated scales, each with a more or less conspicuous bract springing from the base. The trees have usually a straight trunk, and a tendency to a conical or pyramidal growth, throwing out each year a more or less regular whorl of branches from the foot of the leading shoot, while the buds of the lateral boughs extend horizontally.

In the spruce firs (*Picea*), the cones are pendent when mature and their scales persistent; the leaves are arranged all round the shoots, though the lower ones are sometimes directed laterally. In the genus *Abies*, the silver firs, the cones are erect, and their scales drop off when the seed ripens; the leaves spread in distinct rows on each side of the shoot.

The most important of the firs, in an economic sense, is the Norway spruce (*Picea excelsa*), so well known in British plantations, though rarely attaining there the gigantic height and grandeur of form it often displays in its native woods. Under favourable conditions of growth it is a lofty tree, with a nearly straight, tapering trunk, throwing out in somewhat irregular whorls its widespreading branches, densely clothed with dark, clear green foliage. The boughs and their side-branches, as they increase in length, have a tendency to droop, the lower tier, even in large trees, often sweeping the ground—a habit that, with the jagged sprays, and broad, shadowy, wave-like foliage-masses, gives a peculiarly graceful and picturesque aspect to the Norway spruce. The slender, sharp, slightly curved leaves are scattered thickly around the shoots; the upper one pressed towards the stem, and the lower directed sideways, so as to give a somewhat flattened appearance to the individual sprays. The elongated cylindrical cones grow chiefly at the ends of the upper branches; they are purplish at first, but become afterwards green, and eventually light brown; their scales are slightly toothed at the extremity; they ripen in the autumn, but seldom discharge their seeds until the following spring.

The tree is very widely distributed, growing abundantly on most of the mountain ranges of northern and central Europe; while in Asia it occurs at least as far east as the Lena, and in latitude extends from the Altaic ranges to beyond the Arctic circle. On the Swiss Alps it is one of the most prevalent and striking of the forest trees, its dark evergreen foliage often standing out in strong contrast to the snowy ridges and glaciers beyond. In the lower districts of Sweden it is the predominant tree in most of the great forests that spread over so large a portion of that country. In Norway it constitutes a considerable part of the dense woods of the southern dales, flourishing, according to Franz Christian Schübeler, on the mountain slopes up to an altitude of from 2800 to 3100 ft., and clothing the shores of some of the fjords to the water's edge; in the higher regions it is generally mingled with the pine. Less abundant on the western side of the fjelds, it again forms woods in Nordland, extending in the neighbourhood of the coast nearly to the 67th parallel; but it is, in that arctic climate, rarely met with at a greater elevation than 800 ft. above the sea, though in Swedish Lapland it is found on the slope of the Sulitelma as high as 1200 ft., its upper limit being everywhere lower than that of the pine. In all the Scandinavian countries it is known as the *Gran* or *Grann*. Great tracts of low country along the southern shores of the Baltic and in northern Russia are covered with forests of spruce. It everywhere shows a preference for a moist but well-drained soil, and never attains its full stature or luxuriance of growth upon arid ground, whether on plain or mountain—a peculiarity that should be remembered by the planter. In a favourable soil and open situation it becomes the tallest and one of the stateliest of European trees, rising sometimes to a height of from 150 to 170 ft., the trunk attaining a diameter of from 5 to 6 ft. at the base. But when it grows in dense woods, where the lower branches decay and drop off early, only a small head of foliage remaining at the tapering summit, its stem, though frequently of great height, is rarely more than 1½ or 2 ft. in thickness. Its growth is rapid, the straight leading shoot, in the vigorous period of the tree, often extending 2½ or even 3 ft. in a single season. In its native habitats it is said to endure for several centuries; but in those countries from which the commercial supply of its timber is chiefly drawn, it attains perfection in from 70 to 90 years, according to soil and situation.

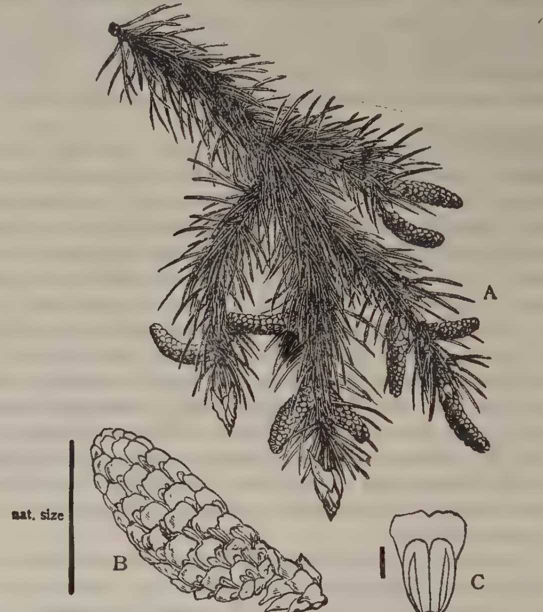
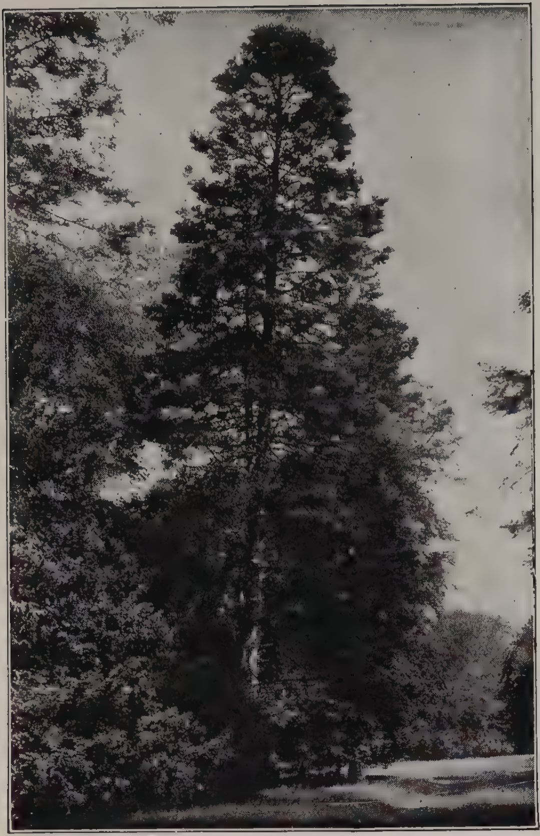
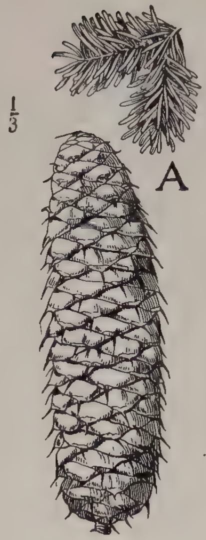


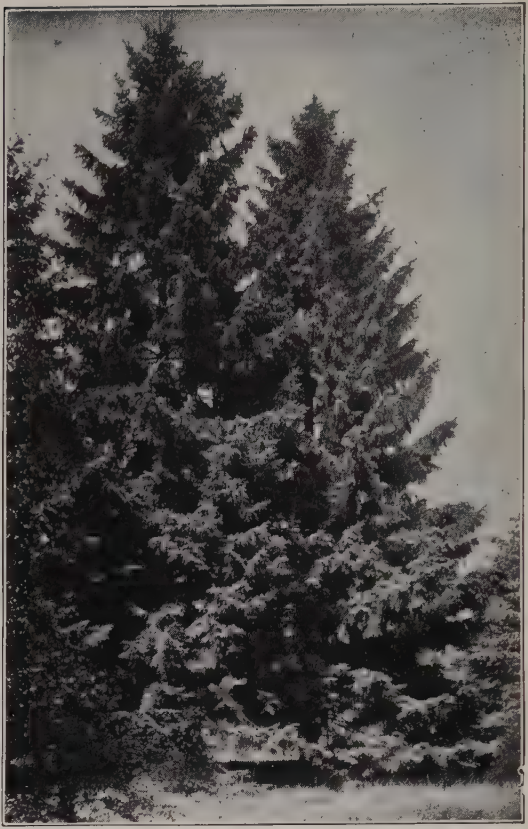
Fig. 1.—Norway Spruce (*Picea excelsa*). Male Flowers. A, branch bearing male cones, reduced; B, single male cone, enlarged; C, single stamen, enlarged.

FIR

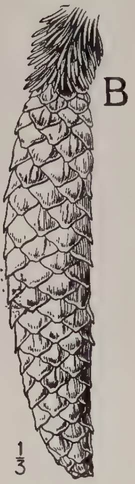


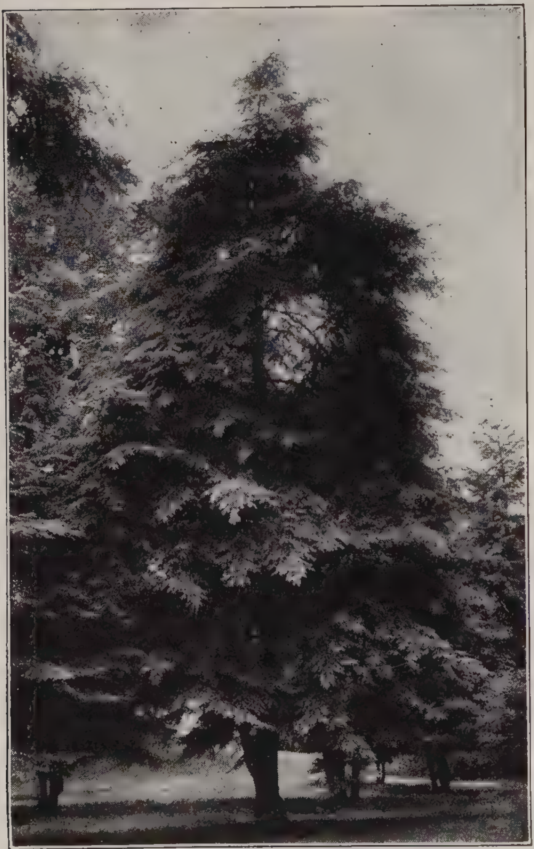
SILVER FIR (*Abies pectinata*).
A, Cone and foliage.



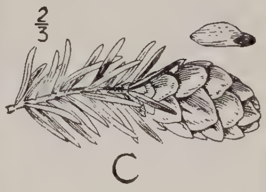


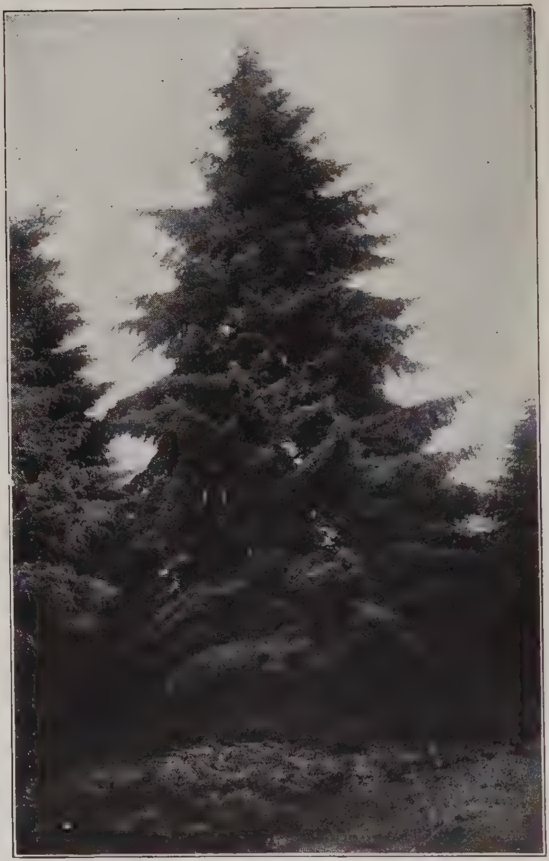
SPRUCE FIR (*Picea excelsa*).
B, Cone and foliage.



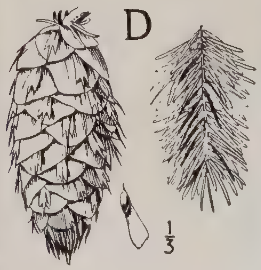


HEMLOCK SPRUCE (*Tsuga canadensis*).
C, Cone, seed and foliage.





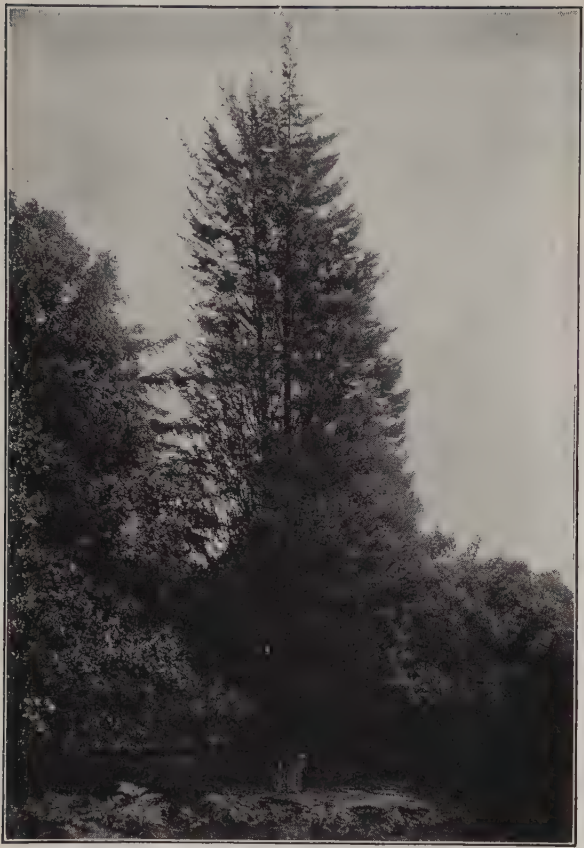
DOUGLAS FIR (*Pseudotsuga Douglasii*).
D, Cone, seed and foliage.



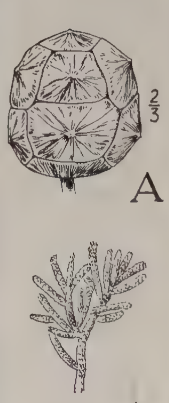
Photos by Henry Irving.

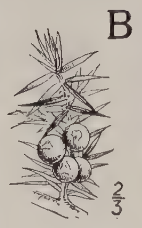
PLATE II.

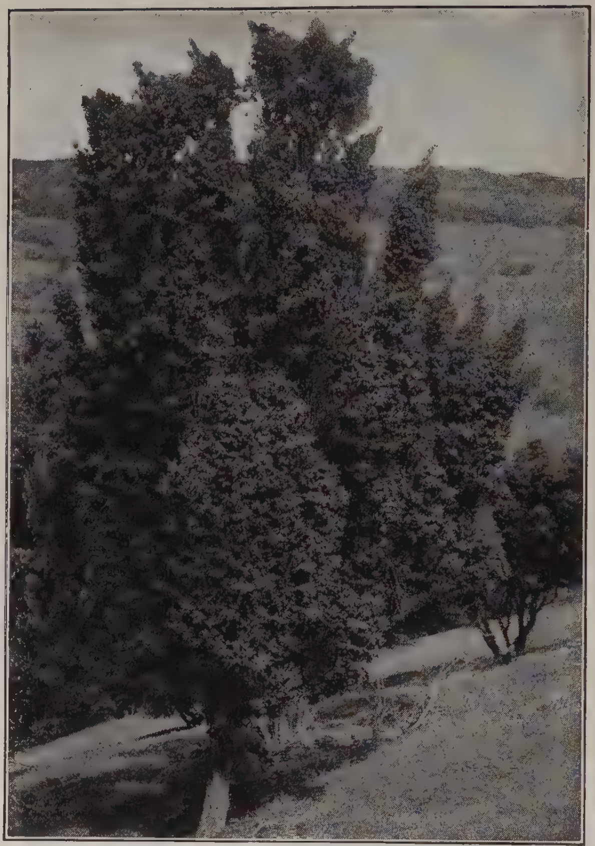
OTHER CONIFERS



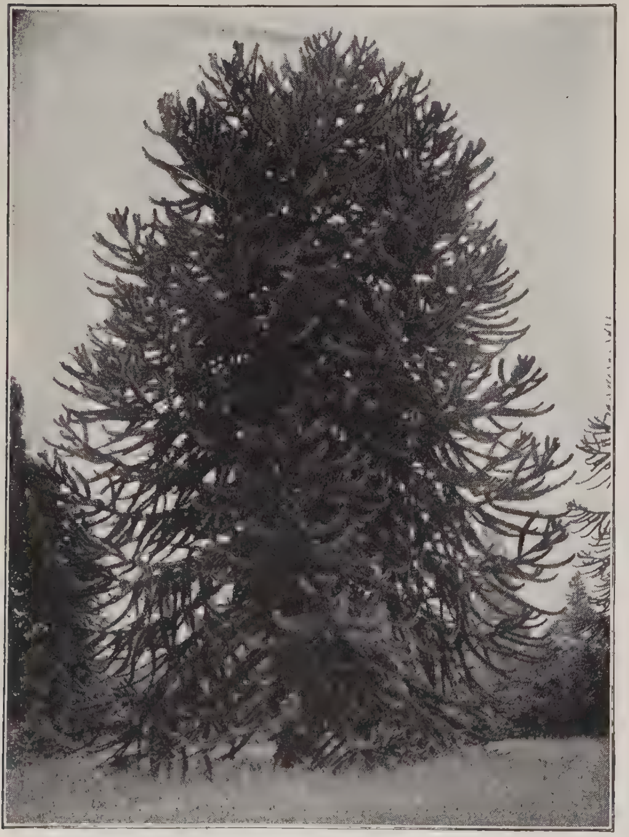
CYPRESS (*Cupressus sempervirens*).
A, Cone and branchlets.



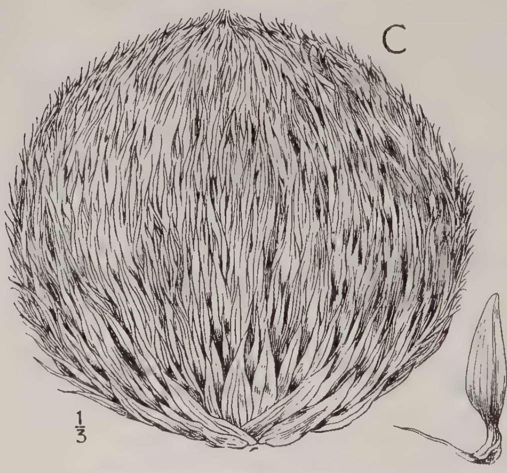


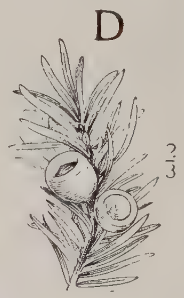


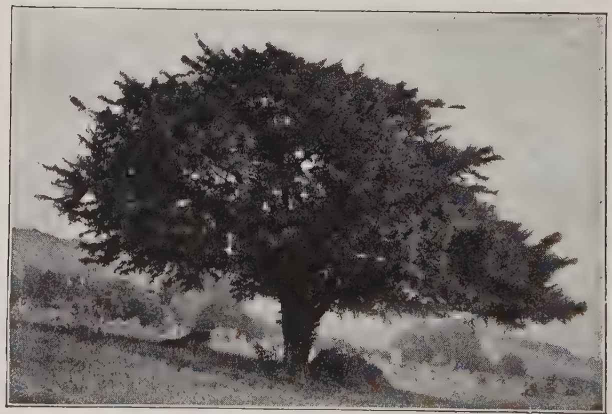
JUNIPER (*Juniperus communis*).
B, Fruit and foliage.



ARAUCARIA (*A. imbricata*, Chile pine or monkey-puzzle).
C, Seed-bearing cone and a single scale with seed.







YEW (*Taxus baccata*).
D, Seed and foliage.

Photos by Henry Irving.

In the most prevalent variety of the Norway spruce the wood is white, apt to be very knotty when the tree has grown in an open place, but, as produced in the close northern forests, often of fine and even grain. Immense quantities are imported into Britain from Norway, Sweden and Prussia, under the names of “ white Norway,” “ Christiania ” and “ Danzig deal.” The larger trees are sawn up into planks and battens, much used for the purposes of the builder, especially for flooring, joists and rafters. Where not exposed to the weather the wood is probably as lasting as that of the pine, but, not being so resinous, appears less adapted for out-door uses. Great quantities are sent from Sweden in a manufactured state, in the form of door and window-frames and ready-prepared flooring, and much of the cheap “ white deal ” furniture is made of this wood. The younger and smaller trees are remarkably durable, especially when the bark is allowed to remain on them; and most of the poles imported into Britain for scaffolding, ladders, mining-timber and similar uses are furnished by this fir. Small masts and spars are often made of it, and are said to be lighter than those of pine. The best poles are obtained in Norway from small, slender, drawn-up trees, growing under the shade of the larger ones in the thick woods, these being freer from knots, and tougher from their slower growth. A variety of the spruce, abounding in some parts of Norway, produces a red heartwood, not easy to distinguish from that of the Norway pine (Scotch fir), and imported with it into England as “ red deal ” or “ pine.” This kind is sometimes seen in plantations, where it may be recognized by its shorter, darker leaves and longer cones. The smaller branches and the waste portion of the trunks, left in cutting up the timber, are exported as fire-wood, or used for splitting into matches. The wood of the spruce is also employed in the manufacture of wood-pulp for paper.

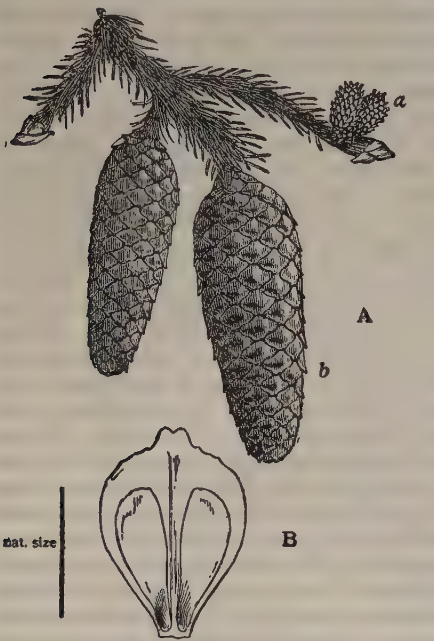


Fig. 2.—Norway Spruce (*Picea excelsa*). Cones; scale with seeds. A, Branch bearing (*a*) young female cones, (*b*) ripe cones, reduced. B, Ripe cone scale with seeds, enlarged.

The resinous products of the Norway spruce, though yielded by the tree in less abundance than those furnished by the pine, are of considerable economic value. In Scandinavia a thick turpentine oozes from cracks or fissures in the bark, forming by its congelation a fine yellow resin, known commercially as “ spruce rosin,” or “ frankincense ”; it is also procured artificially by cutting off the ends of the lower branches, when it slowly exudes from the extremities. In Switzerland and parts of Germany, where it is collected in some quantity for commerce, a long strip of bark is cut out of the tree near the root; the resin that slowly accumulates during the summer is scraped out in the latter part of the season, and the slit enlarged slightly the following spring to ensure a continuance of the supply. The process is repeated every alternate year, until the tree no longer yields the resin in abundance, which under favourable circumstances it will do for twenty years or more. The quantity obtained from each fir is very variable, depending on the vigour of the tree, and greatly lessens after it has been subjected to the operation for some years. Eventually the tree is destroyed, and the wood rendered worthless for timber, and of little value even for fuel. From the product so obtained most of the better sort of “ Burgundy pitch ” of the druggists is prepared. By the peasantry of its native countries the Norway spruce is applied to innumerable purposes of daily life. The bark and young cones afford a tanning material, inferior indeed to oak-bark, and hardly equal to that of the larch, but of value in countries where substances more rich in tannin are not abundant. In Norway the sprays, like those of the juniper, are scattered over the floors of churches and the sitting-rooms of dwelling-houses, as a fragrant and healthful substitute for carpet or matting. The young shoots are also given to oxen in the long winters of those northern latitudes, when other green fodder is hard to obtain. In times of scarcity the Norse peasant-farmer uses the sweetish inner bark, beaten in a mortar and ground in his primitive mill with oats or barley, to eke out a scanty supply of meal, the mixture yielding a tolerably palatable though somewhat resinous substitute for his ordinary *flad-brod*. A decoction of the buds in milk or whey is a common household remedy for scurvy; and the young shoots or green cones form an essential ingredient in the spruce-beer drank with a similar object, or as an occasional beverage. The well-known “ Danzig-spruce ” is prepared by adding a decoction of the buds or cones to the wort or saccharine liquor before fermentation. Similar preparations are in use wherever the spruce fir abounds. The wood is burned for fuel, its heat-giving power being reckoned in Germany about one-fourth less than that of beech. From the wide-spreading roots string and ropes are manufactured in Lapland and Bothnia: the longer ones which run near the surface are selected, split through, and then boiled for some hours in a ley of wood-ashes and salt, which, dissolving out the resin, loosens the fibres and renders them easily separable, and ready for twisting into cordage. Light portable boats are sometimes made of very thin boards of fir, sewn together with cord thus manufactured from the roots of the tree.

The Norway spruce seems to have been the “ Picea ” of Pliny, but is evidently often confused by the Latin writers with their “ Abies,” the *Abies pectinata* of modern botanists. From an equally loose application of the word “ fir ” by our older herbalists, it is difficult to decide upon the date of introduction of this tree into Britain; but it was commonly planted for ornamental purposes in the beginning of the 17th century. In places suited to its growth it seems to flourish nearly as well as in the woods of Norway or Switzerland; but as it needs for its successful cultivation as a timber tree soils that might be turned to agricultural account, it is not so well adapted for economic planting in Britain as the Scotch fir or larch, which come to perfection in more bleak and elevated regions, and on comparatively barren ground, though it may perhaps be grown to advantage on some moist hill-sides and mountain hollows. Its great value to the English forester is as a “ nurse ” for other trees, for which its dense leafage and tapering form render it admirably fitted, as it protects, without overshading, the young saplings, and yields saleable stakes and small poles when cut out. For hop-poles it is not so well adapted as the larch. As a picturesque tree, for park and ornamental plantation, it is among the best of the conifers, its colour and form contrasting yet harmonizing with the olive green and rounded outline of oaks and beeches, or with the red trunk and glaucous foliage of the pine. When young its spreading boughs form good cover for game. The fresh branches, with their thick mat of foliage, are useful to the gardener for sheltering wall-fruit in the spring. In a good soil and position the tree sometimes attains an enormous size: one in Studley Park, Yorkshire, attained nearly 140 ft. in height, and the trunk more than 6 ft. in thickness near the ground. The spruce bears the smoke of great cities better than most of the *Abietineae*; but in suburban localities after a certain age it soon loses its healthy appearance, and is apt to be affected with blight (*Eriosoma*), though not so much as the Scotch fir and most of the pines.

The black spruce (*Picea nigra*) is a tree of more formal growth than the preceding. The branches grow at a more acute angle and in more regular whorls than those of the Norway spruce; and, though the lower ones become bent to a horizontal position, they do not droop, so that the tree has a much less elegant appearance. The leaves, which grow very thickly all round the stem, are short, nearly quadrangular, and of a dark greyish-green. The cones, produced in great abundance, are short and oval in shape, the scales with rugged indented edges; they are deep purple when young, but become brown as they ripen. The tree also occurs in the New England states and extends over nearly the whole of British North America, its northern limit occurring at about 67° N. lat., often forming a large part of the dense forests, mostly in the swampy districts. A variety with lighter foliage and reddish bark is common in Newfoundland and some districts on the mainland adjacent. The trees usually grow very close together, the slender trunks rising to a great height bare of branches; but they do not attain the size of the Norway spruce, being seldom taller than 60 or 70 ft., with a diameter of 1½ or 2 ft. at the base. This species prefers a peaty soil, and often grows luxuriantly in very moist situations. The wood is strong, light and very elastic, forming an excellent material for small masts and spars, for which purpose the trunks are used in America, and exported largely to England. The sawn timber is inferior to that of *P. excelsa*, besides being of a smaller size. In the countries in which it abounds, the log-houses of the settlers are often built of the long straight trunks. The spruce-beer of America is generally made from the young shoots of this tree. The small twigs, tied in bundles, are boiled for some time in water with broken biscuit or roasted grain; the resulting decoction is then poured into a cask with molasses or maple sugar and a little yeast, and left to ferment. It is often made by the settlers and fishermen of the St Lawrence region, being esteemed as a preventive of scurvy. The American "essence of spruce," occasionally used in England for making spruce-beer, is obtained by boiling the shoots and buds and concentrating the decoction. The resinous products of the tree are of no great value. It was introduced into Britain at the end of the 17th century.

The white spruce (*Picea alba*), sometimes met with in English plantations, is a tree of lighter growth than the black spruce, the branches being more widely apart; the foliage is of a light glaucous green; the small light-brown cones are more slender and tapering than in *P. nigra*, and the scales have even edges. It is of comparatively small size, but is of some importance in the wilds of the Canadian dominion, where it is found to the northern limit of tree-vegetation growing up to at least 69°; the slender trunks yield the only useful timber of some of the more desolate northern regions. In the woods of Canada it occurs frequently mingled with the black spruce and other trees. The fibrous tough roots, softened by soaking in water, and split, are used by the Indians and voyageurs to sew together the birch-bark covering of their canoes; and a resin that exudes from the bark is employed to varnish over the seams. It was introduced to Great Britain at the end of the 17th century and was formerly more extensively planted than at present.

The hemlock spruce (*Tsuga canadensis*) is a large tree, abounding in most of the north-eastern parts of America up to Labrador; in lower Canada, New Brunswick and Nova Scotia it is often the prevailing tree. The short leaves are flat, those above pressed close to the stem, and the others forming two rows; they are of a rather light green tint above, whitish beneath. The cones are very small, ovate and pointed. The large branches droop, like those of the Norway spruce, but the sprays are much lighter and more slender, rendering the tree one of the most elegant of the conifers, especially when young. When old, the branches, broken and bent down by the winter snows, give it a ragged but very picturesque aspect. The trunk is frequently 3 ft. thick near the base. The hemlock prefers rather dry and elevated situations, often forming woods on the declivities of mountains. The timber is very much twisted in grain, and liable to warp and split, but is used for making plasterers' laths and for fencing; "shingles" for roofing are sometimes made of it. The bark, split off in May or June, forms one of the most valuable tanning substances in Canada. The sprays are sometimes used for making spruce-beer and essence of spruce. It was introduced into Great Britain in about the year 1736.

The Douglas spruce (*Pseudo-tsuga Douglasii*), one of the finest conifers, often rises to a height of 200 ft. and sometimes considerably more, while the gigantic trunk frequently measures 8 or 10 ft. across. The yew-like leaves spread laterally, and are of a deep green tint; the cones are furnished with tridentate bracts that project far beyond the scales. It forms extensive forests in Vancouver Island, British Columbia and Oregon, whence the timber is exported, being highly prized for its strength, durability and even grain, though very heavy; it is of a deep yellow colour, abounding in resin, which oozes from the thick bark. It was introduced into Britain soon after its rediscovery by David Douglas in 1827, and has been widely planted, but does not flourish well where exposed to high winds or in too shallow soil.

Of the *Abies* group, the silver fir (*A. pectinata*), may be taken as the type,—a lofty tree, rivalling the Norway spruce in size, with large spreading horizontal boughs curving upward toward the extremities. The flat leaves are arranged in two regular, distinct rows; they are deep green above, but beneath have two broad white lines, which, as the foliage in large trees has a tendency to curl upwards, give it a silvery appearance from below. The large cones stand erect on the branches, are cylindrical in shape, and have long bracts, the curved points of which project beyond the scales. When the tree is young the bark is of a silvery grey, but gets rough with age. This tree appears to have been the true "Abies" of the Latin writers—the "pulcherrima abies" of Virgil. From early historic times it has been held in high estimation in the south of Europe, being used by the Romans for masts and all purposes for which timber of great length was required. It is abundant in most of the mountain ranges of southern and central Europe, but is not found in the northern parts of that continent. In Asia it occurs on the Caucasus and Ural, and in some parts of the Altaic chain. Extensive woods of this fir exist on the southern Alps, where the tree grows up to nearly 4000 ft.; in the Rhine countries it forms great part of the extensive forest of the Hochwald, and occurs in the Black Forest and in the Vosges; it is plentiful likewise on the Pyrenees and Apennines. The wood is inferior to that of *Picea excelsa*, but, being soft and easily worked, is largely employed in the countries to which it is indigenous for all the purposes of carpentry. Articles of furniture are frequently made of it, and it is in great esteem for carving and for the construction of stringed instruments. Deficient in resin, the wood is more perishable than that of the spruce fir when exposed to the air, though it is said to stand well under water. The bark contains a large amount of a fine, highly-resinous turpentine, which collects in tumours on the trunk during the heat of summer. In the Alps and Vosges this resinous semi-fluid is collected by climbing the trees and pressing out the contents of the natural receptacles of the bark into horn or tin vessels held beneath them. After purification by straining, it is sold as "Strasburg turpentine," much used in the preparation of some of the finer varnishes. Burgundy pitch is also prepared from it by a similar process as that from *Picea excelsa*. A fine oil of turpentine is distilled from the crude material; the residue forms a coarse resin. Introduced into Britain at the beginning of the 17th century, the silver fir has become common there as a planted tree, though, like the Norway spruce, it rarely comes up from seed scattered naturally. There are many fine trees in Scotland; one near Roseneath, figured by Strutt in his *Sylva Britannica*, then measured more than 22 ft. round the trunk. In the more southern parts of the island it often reaches a height of 90 ft., and specimens exist considerably above that size; but the young shoots are apt to be injured in severe winters, and the tree on light soils is also hurt by long droughts, so that it usually presents a ragged appearance; though, in the distance, the lofty top and horizontal boughs sometimes stand out in most picturesque relief above the rounded summits of the neighbouring trees. The silver fir flourishes in a deep loamy soil, and will grow even upon stiff clay, when well drained—a situation in which few conifers will succeed. On such lands, where otherwise desirable, it may sometimes be planted with profit. The cones do not ripen till the second year.

The silver fir of Canada (*A. balsamea*), a small tree resembling the last species in foliage, furnishes the "Canada balsam"; it abounds in Quebec and the adjacent provinces.

Numerous other firs are common in gardens and shrubberies, and some furnish valuable products in their native countries; but they are not yet of sufficient economic or general interest to demand mention here.

For further information see Veitch's *Manual of Coniferae* (2nd ed., 1900).

FIRDOUSĪ, Firdausī or Firdusī, Persian poet. Abu 'l Kāsim Mansur (or Hasan), who took the *nom de plume* of Firdousī, author of the epic poem the *Shāhnāma*, or "Book of Kings," a complete history of Persia in nearly 60,000 verses, was born at Shadab, a suburb of Tūs, about the year 329 of the Hegira (941 A.D.), or earlier. His father belonged to the class of *Dihkans* (the old native country families and landed proprietors of Persia, who had preserved their influence and status under the Arab rule), and possessed an estate in the neighbourhood of Tūs (in Khorasan). Firdousī's own education eminently qualified him for the gigantic task which he subsequently undertook, for he was profoundly versed in the Arabic language and literature and had also studied deeply the Pahlavi or Old Persian, and was conversant with the ancient historical records which existed in that tongue.

The *Shāhnāma* of Firdousī (see also Persia: *Literature*) is perhaps the only example of a poem produced by a single author which at once took its place as the national epic of the people. The nature of the work, the materials from which it was composed, and the circumstances under which it was written are, however, in themselves exceptional, and necessarily tended to this result. The grandeur and antiquity of the empire and the vicissitudes through which it passed, their long series of wars and the magnificent monuments erected by their ancient sovereigns, could not fail to leave numerous traces in the memory of so imaginative a people as the Persians. As early as the 5th century of the Christian era we find mention made of these historical traditions in the work of an Armenian author, Moses of Chorene (according to others, he lived in the 7th or 8th century). During the reign of Chosroes I. (Anushirvan) the contemporary of Mahomet, and by order of that monarch, an attempt had been made to collect, from various parts of the kingdom, all the popular tales and legends relating to the ancient kings, and the results were deposited in the royal library. During the last years of the Sassanid dynasty the work was resumed, the former collection being revised and greatly added to by the Dihkan Danishwer, assisted by several learned mobeds. His work was entitled the *Khoda'ināma*, which in the old dialect also meant the "Book of Kings." On the Arab invasion this work was in great danger of perishing at the hands of the iconoclastic caliph Omar and his generals, but it was fortunately preserved; and we find it in the 2nd century of the Hegira being paraphrased in Arabic by Abdallah ibn el Mokaffa, a learned Persian who had embraced Islam. Other Guebres occupied themselves privately with the collection of these traditions; and, when a prince of Persian origin, Yakūb ibn Laith, founder of the Saffarid dynasty, succeeded in throwing off his allegiance to the caliphate, he at once set about continuing the work of his illustrious predecessors. His "Book of Kings" was completed in the year 260 of the Hegira, and was freely circulated in Khorasan and Irak. Yakūb's family did not continue long in power; but the Samanid princes who succeeded applied themselves zealously to the same work, and Prince Nūh II., who came to the throne in 365 A.H. (A.D. 976), entrusted it to the court poet Dakiki, a Guebre by religion. Dakiki's labours were brought to a sudden stop by his own assassination, and the fall of the Samanian house happened not long after, and their kingdom passed into the hands of the Ghaznevids. Mahmūd ibn Sabuktagin, the second of the dynasty (998–1030), continued to make himself still more independent of the caliphate than his predecessors, and, though a warrior and a fanatical Moslem, extended a generous patronage to Persian literature and learning, and even developed it at the expense of the Arabic institutions. The task of continuing and completing the collection of the ancient historical traditions of the empire especially attracted him. With the assistance of neighbouring princes and of many of the influential Dihkans, Mahmud collected a vast amount of materials for the work, and after having searched in vain for a man of sufficient learning and ability to edit them faithfully, and having entrusted various episodes for versification to the numerous poets whom he had gathered round him, he at length made choice of Firdousī. Firdousī had been always strongly attracted by the ancient Pahlavi records, and had begun at an early age to turn them into Persian epic verse. On hearing of the death of the poet Dakiki, he conceived the ambitious design of himself carrying out the work which the latter had only just commenced; and, although he had not then any introduction to the court, he contrived, thanks to one of his friends, Mahommed Lashkari, to procure a copy of the Dihkan Danishwer's collection, and at the age of thirty-six commenced his great undertaking. Abu Mansur, the governor of Tūs, patronized him and encouraged him by substantial pecuniary support. When Mahmud succeeded to the throne, and evinced such active interest in the work, Firdousī was naturally attracted to the court of Ghazni. At first court jealousies and intrigues prevented Firdousī from being noticed by the sultan; but at length one of his friends, Mahek, undertook to present to Mahmud his poetic version of one of the well-known episodes of the legendary history. Hearing that the poet was born at Tūs, the sultan made him explain the origin of his native town, and was much struck with the intimate knowledge of ancient history which he displayed. Being presented to the seven poets who were then engaged on the projected epic, Abu 'l Kāsim was admitted to their meetings, and on one occasion improvised a verse, at Mahmud's request, in praise of his favourite Ayāz, with such success that the sultan bestowed upon him the name of Firdousī, saying that he had converted his assemblies into paradise (*Firdous*). During the early days of his sojourn at court an incident happened which contributed in no small measure to the realization of his ambition. Three of the seven poets were drinking in a garden when Firdousī approached, and wishing to get rid of him without rudeness, they informed him who they were, and told him that it was their custom to admit none to their society but such as could give proof of poetical talent. To test his acquirements they proposed that each should furnish an extemporary line of verse, his own to be the last, and all four ending in the same rhyme. Firdousī accepted the challenge, and the three poets having previously agreed upon three rhyming words to which a fourth could not be found in the Persian language, 'Ansari began—

> "Thy beauty eclipses the light of the sun";

Farrakhi added—

> "The rose with thy cheek would comparison shun";

'Asjadi continued—

> "Thy glances pierce through the mailed warrior's johsun";[1]

and Firdousī, without a moment's hesitation, completed the quatrain—

> "Like the lance of fierce Giv in his fight with Poshun."

The poets asked for an explanation of this allusion, and Firdousī recited to them the battle as described in the *Shāhnāma*, and delighted and astonished them with his learning and eloquence.

Mahmud now definitely selected him for the work of compiling and versifying the ancient legends, and bestowed upon him such marks of his favour and munificence as to elicit from the poet an enthusiastic panegyric, which is inserted in the preface of the *Shāhnāma*, and forms a curious contrast to the bitter satire which he subsequently prefixed to the book. The sultan ordered his treasurer, Khojah Hasan Maimandi, to pay to Firdousī a thousand gold pieces for every thousand verses; but the poet preferred allowing the sum to accumulate till the whole was finished, with the object of amassing sufficient capital to construct a dike for his native town of Tūs, which suffered greatly from defective irrigation, a project which had been the chief dream of his childhood. Owing to this resolution, and to the jealousy of Hasan Maimandi, who often refused to advance him sufficient for the necessaries of life, Firdousī passed the later portion of his life in great privation, though enjoying the royal favour and widely extended fame. Amongst other princes whose liberal presents enabled him to combat his pecuniary difficulties, was one Rustam, son of Fakhr Addaula, the Dailamite, who sent him a thousand gold pieces in acknowledgment of a copy of the episode of Rustam and Isfendiar which Firdousī had sent him, and promised him a gracious reception if he should ever come to his court. As this prince belonged, like Firdousī, to the Shiah sect, while Mahmud and Maimandi were Sunnites, and as he was also politically opposed to the sultan, Hasan Maimandi did not fail to make the most of this incident, and accused the poet of disloyalty to his sovereign and patron, as well as of heresy. Other enemies and rivals also joined in the attack, and for some time Firdousī's position was very precarious, though his pre-eminent talents and obvious fitness for the work prevented him from losing his post. To add to his troubles he had the misfortune to lose his only son at the age of 37.

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[1] A sort of cuirass.

At length, after thirty-five years' work, the book was completed (1011), and Firdousī entrusted it to Ayāz, the sultan's favourite, for presentation to him. Mahmud ordered Hasan Maimandi to take the poet as much gold as an elephant could carry, but the jealous treasurer persuaded the monarch that it was too generous a reward, and that an elephant's load of silver would be sufficient. 60,000 silver dirhems were accordingly placed in sacks, and taken to Firdousī by Ayāz at the sultan's command, instead of the 60,000 gold pieces, one for each verse, which had been promised. The poet was at that moment in the bath, and seeing the sacks, and believing that they contained the expected gold, received them with great satisfaction, but finding only silver he complained to Ayāz that he had not executed the sultan's order. Ayāz related what had taken place between Mahmud and Hasan Maimandi, and Firdousī in a rage gave 20 thousand pieces to Ayāz himself, the same amount to the bath-keeper, and paid the rest to a beer seller for a glass of beer (*fouka*), sending word back to the sultan that it was not to gain money that he had taken so much trouble. On hearing this message, Mahmud at first reproached Hasan with having caused him to break his word, but the wily treasurer succeeded in turning his master's anger upon Firdousī to such an extent that he threatened that on the morrow he would "cast that Carmathian (heretic) under the feet of his elephants." Being apprised by one of the nobles of the court of what had taken place, Firdousī passed the night in great anxiety; but passing in the morning by the gate that led from his own apartments into the palace, he met the sultan in his private garden, and succeeded by humble apologies in appeasing his wrath. He was, however, far from being appeased himself, and determined at once upon quitting Ghazni. Returning home he tore up the draughts of some thousands of verses which he had composed and threw them in the fire, and repairing to the grand mosque of Ghazni he wrote upon the walls, at the place where the sultan was in the habit of praying, the following lines:—

> "The auspicious court of Mahmud, king of Zabulistan, is like a sea. What a sea! One cannot see its shore. If I have dived therein without finding any pearls it is the fault of my star and not of the sea."

He then gave a sealed paper to Ayāz, begging him to hand it to the sultan in a leisure moment after 20 days had elapsed, and set off on his travels with no better equipment than his staff and a dervish's cloak. At the expiration of the 20 days Ayāz gave the paper to the sultan, who on opening it found the celebrated satire which is now always prefixed to copies of the *Shāhnāma*, and which is perhaps one of the bitterest and severest pieces of reproach ever penned. Mahmud, in a violent rage, sent after the poet and promised a large reward for his capture, but he was already in comparative safety. Firdousī directed his steps to Mazandaran, and took refuge with Kabus, prince of Jorjan, who at first received him with great favour, and promised him his continued protection and patronage; learning, however, the circumstances under which he had left Ghazni, he feared the resentment of so powerful a sovereign as Mahmud, who he knew already coveted his kingdom, and dismissed the poet with a magnificent present. Firdousī next repaired to Bagdad, where he made the acquaintance of a merchant, who introduced him to the vizier of the caliph, al-Qadir, by presenting an Arabic poem which the poet had composed in his honour. The vizier gave Firdousī an apartment near himself, and related to the caliph the manner in which he had been treated at Ghazni. The caliph summoned him into his presence, and was so much pleased with a poem of a thousand couplets, which Firdousī composed in his honour, that he at once received him into favour. The fact of his having devoted his life and talents to chronicling the renown of fire-worshipping Persians was, however, somewhat of a crime in the orthodox caliph's eyes; in order therefore to recover his prestige, Firdousī composed another poem of 9000 couplets on the theme borrowed from the Koran of the loves of Joseph and Potiphar's wife—*Yūsuf and Zuleikha* (edited by H. Ethé, Oxford, 1902; complete metrical translation by Schlechta-Wssehrd, Vienna, 1889). This poem, though rare and little known, is still in existence—the Royal Asiatic Society possessing a copy. But Mahmud had by this time heard of his asylum at the court of the caliph, and wrote a letter menacing his liege lord, and demanding the surrender of the poet. Firdousī, to avoid further troubles, departed for Ahwaz, a province of the Persian Irak, and dedicated his *Yūsuf and Zuleikha* to the governor of that district. Thence he went to Kohistan, where the governor, Nasir Lek, was his intimate and devoted friend, and received him with great ceremony upon the frontier. Firdousī confided to him that he contemplated writing a bitter exposition of his shameful treatment at the hands of the sultan of Ghazni; but Nasir Lek, who was a personal friend of the latter, dissuaded him from his purpose, but himself wrote and remonstrated with Mahmud. Nasir Lek's message and the urgent representations of Firdousī's friends had the desired effect; and Mahmud not only expressed his intention of offering full reparation to the poet, but put his enemy Maimandi to death. The change, however, came too late; Firdousī, now a broken and decrepit old man, had in the meanwhile returned to Tūs, and, while wandering through the streets of his native town, heard a child lisping a verse from his own satire in which he taunts Mahmud with his slavish birth:—

> "Had Mahmud's father been what he is now
> A crown of gold had decked this aged brow;
> Had Mahmud's mother been of gentle blood,
> In heaps of silver knee-deep had I stood."

He was so affected by this proof of universal sympathy with his misfortunes that he went home, fell sick and died. He was buried in a garden, but Abu'l Kasim Jurjani, chief sheikh of Tūs, refused to read the usual prayers over his tomb, alleging that he was an infidel, and had devoted his life to the glorification of fire-worshippers and misbelievers. The next night, however, having dreamt that he beheld Firdousī in paradise dressed in the sacred colour, green, and wearing an emerald crown, he reconsidered his determination; and the poet was henceforth held to be perfectly orthodox. He died in the year 411 of the Hegira (1020 A.D.), aged about eighty, eleven years after the completion of his great work. The legend goes that Mahmud had in the meanwhile despatched the promised hundred thousand pieces of gold to Firdousī, with a robe of honour and ample apologies for the past. But as the camels bearing the treasure reached one of the gates of the city, Firdousī's funeral was leaving it by another. His daughter, to whom they brought the sultan's present, refused to receive it; but his aged sister remembering his anxiety for the construction of the stone embankment for the river of Tūs, this work was completed in honour of the poet's memory, and a large caravanserai built with the surplus.

Much of the traditional life, as given above, which is based upon that prefixed to the revised edition of the poem, undertaken by order of Baisingar Khan, grandson of Timur-i-Leng (Timur), is rejected by modern scholars (see T. Nöldeke, "Das iranische Nationalepos," in W. Geiger's *Grundriss der iranischen Philologie*, ii. pp. 150-158).

The *Shāhnāma* is based, as we have seen, upon the ancient legends current among the populace of Persia, and collected by the Dihkans, a class of men who had the greatest facilities for this purpose. There is every reason therefore to believe that Firdousi adhered faithfully to these records of antiquity, and that the poem is a perfect storehouse of the genuine traditions of the country.

The entire poem (which only existed in MS. up to the beginning of the 19th century) was published (1831–1868) with a French translation in a magnificent folio edition, at the expense of the French government, by the learned and indefatigable Julius von Mohl. The size and number of the volumes, however, and their great expense, made them difficult of access, and Frau von Mohl published the French translation (1876–1878) with her illustrious husband's critical notes and introduction in a more convenient and cheaper form. Other editions are by Turner Macan (Calcutta, 1829), J. A. Vullers and S. Landauer (unfinished; Leiden, 1877–1883). There is an English abridgment by J. Atkinson (London, 1832; reprinted 1886, 1892); there is a verse-translation, partly rhymed and partly unrhymed, by A. G. and E. Warner (1905 foll.), with an introduction containing an account of Firdousī and the Shāhnāma; the version by A. Rogers (1907) contains the greater part of the work. The episode of Sohrab and Rustam is well known to English readers from Matthew Arnold's poem. The only complete translation is *Il Libro dei Rei*, by I. Pizzi (8 vols., Turin, 1886–1888), also the author of a history of Persian poetry.

See also E. G. Browne's *Literary History of Persia*, i., ii. (1902–1906); T. Nöldeke (as above) for a full account of the Shāhnāma, editions, &c.; and H. Ethé, "Neupersische Litteratur," in the same work. (E. H. P.; X.)

FIRE (in O. Eng. *fýr*; the word is common to West German languages, cf. Dutch *vuur*, Ger. *Feuer*; the pre-Teutonic form is seen in Sanskrit *pū*, *pāvaka*, and Gr. *πῦρ*; the ultimate origin is usually taken to be a root meaning to purify, cf. Lat. *purus*), the term commonly used for the visible effect of combustion (see Flame), operating as a heating or lighting agency.

So general is the knowledge of fire and its uses that it is a question whether we have any authentic instance on record of a tribe altogether ignorant of them. A few notices indeed are to be found in the voluminous literature of travel which would decide the question in the affirmative; but when they are carefully investigated, their evidence is found to be far from conclusive. The missionary Krapf was told by a slave of a tribe in the southern part of Shoa who lived like monkeys in the bamboo jungles, and were totally ignorant of fire; but no better authority has been found for the statement, and the story, which seems to be current in eastern Africa, may be nothing else than the propagation of fables about the Pygmies whom the ancients located around the sources of the Nile. Lieut. Charles Wilkes, commander of the United States exploring expedition of 1838–42, says that in Fakaafo or Bowditch Island "there was no sign of places for cooking nor any appearance of fire," and that the natives felt evident alarm at the sparks produced by flint and steel and the smoke emitted by those with cigars in their mouths. The presence of the word *afi*, fire, in the Fakaafo vocabulary supplied by Hale the ethnographer of the expedition, though it might perhaps be explained as equivalent only to solar light and heat, undoubtedly invalidates the supposition of Wilkes; and the Rev. George Turner, in an account of a missionary voyage in 1859, not only repeats the word *afi* in his list for Fakaafo, but relates the native legend about the origin of fire, and describes some peculiar customs connected with its use. Alvaro de Saavedra, an old Spanish traveller, informs us that the inhabitants of Los Jardines, an island of the Pacific, showed great fear when they saw fire—which they did not know before. But that island has not been identified with certainty by modern explorers. It belongs, perhaps, to the Ladrones or Marianas Archipelago, where fire was unknown, says Padre Gobien, "till Magellan, wroth at the pilferings of the inhabitants, burnt one of their villages. When they saw their wooden huts ablaze, their first thought was that fire was a beast which eats up wood. Some of them having approached the fire too near were burnt, and the others kept aloof, fearing to be torn or poisoned by the powerful breath of that terrible animal." To this Freycinet objects that these Ladrone islanders made pottery before the arrival of Europeans, that they had words expressing the ideas of flame, fire, oven, coals, roasting and cooking. Let us add that in their country numerous graves and ruins have been found, which seem to be remnants of a former culture. Thus the question remains in uncertainty: though there is nothing impossible in the supposition of the existence of a fireless tribe, it cannot be said that such a tribe has been discovered.

It is useless to inquire in what way man first discovered that fire was subject to his control, and could even be called into being by appropriate means. With the natural phenomenon and its various aspects he must soon have become familiar. The volcano lit up the darkness of night and sent its ashes or its lava down into the plains; the lightning or the meteor struck the tree, and the forest was ablaze; or some less obvious cause produced some less extensive ignition. For a time it is possible that the grand manifestations of nature aroused no feelings save awe and terror; but man is quite as much endowed with curiosity as with reverence or caution, and familiarity must ere long have bred confidence if not contempt. It is by no means necessary to suppose that the practical discovery of fire was made only at one given spot and in one given way; it is much more probable indeed that different tribes and races obtained the knowledge in a variety of ways.

It has been asserted of many tribes that they would be unable to rekindle their fires if they were allowed to die out. Travellers in Australia and Tasmania depict the typical native woman bearing always about with her a burning brand, which it is one of her principal duties to protect and foster; and it has been supposed that it was only ignorance which imposed on her the endless task. This is absurd. The Australian methods of producing fire by the friction of two pieces of wood are perfectly well known, and are illustrated in Howitt's *Native Tribes of South-East Australia*, pp. 771-773. To carry a brand saves a little trouble to the men.

The methods employed for producing fire vary considerably in detail, but are for the most part merely modified applications of concussion or friction. Lord Avebury has remarked that the working up of stone into implements must have been followed sooner or later by the discovery of fire; for in the process of chipping sparks were elicited, and in the process of polishing heat was generated. The first or concussion method is still familiar in the flint and steel, which has hardly passed out of use even in the most civilized countries. Its modifications are comparatively few and unimportant. The Alaskans and Aleutians take two pieces of quartz, rub them well with native sulphur, strike them together till the sulphur catches fire, and then transfer the flame to a heap of dry grass over which a few feathers have been scattered. Instead of two pieces of quartz the Eskimos use a piece of quartz and a piece of iron pyrites. Mr Frederick Boyle saw fire produced by striking broken china violently against a bamboo, and Bastian observed the same process in Burma, and Wallace in Ternate. In Cochin China two pieces of bamboo are considered sufficient, the silicious character of the outside layer rendering it as good as native flint. The friction methods are more various. One of the simplest is what E. B. Tylor calls the stick and groove—"a blunt pointed stick being run along a groove of its own making in a piece of wood lying on the ground." Much, of course, depends on the quality of the woods and the expertness of the manipulator. In Tahiti Charles Darwin saw a native produce fire in a few seconds, but only succeeded himself after much labour. The same device was employed in New Zealand, the Sandwich Islands, Tonga, Samoa and the Radak Islands. Instead of rubbing the movable stick backwards and forwards other tribes make it rotate rapidly in a round hole in the stationary piece of wood—thus making what Tylor has happily designated a fire-drill. This device has been observed in Australia, Kamchatka, Sumatra and the Carolines, among the Veddahs of Ceylon, throughout a great part of southern Africa, among the Eskimo and Indian tribes of North America, in the West Indies, in Central America, and as far south as the Straits of Magellan. It was also employed by the ancient Mexicans, and

Tylor gives a quaint picture of the operation from a Mexican MS.—a man half kneeling on the ground is causing the stick to rotate between the palms of his hands. This simple method of rotation seems to be very generally in use; but various devices have been resorted to for the purpose of diminishing the labour and hastening the result. The Gaucho of the Pampas takes " an elastic stick about 18 in. long, presses one end to his breast and the other in a hole in a piece of wood, and then rapidly turns the curved part like a carpenter's centre-bit." In other cases the rotation is effected by means of a cord or thong wound round the drill and pulled alternately by this end and that. In order to steady the drill the Eskimo and others put the upper end in a socket of ivory or bone which they hold firmly in their mouth. A further advance was made by the Eskimo and neighbouring tribes, who applied the principle of the bow-drill; and the still more ingenious pump-drill was used by the Onondaga Indians. For full descriptions of these instruments and a rich variety of details connected with fire-making we must refer the reader to Tylor's valuable chapter in his *Researches.* These methods of producing fire are but rarely used in Europe, and only in connexion with superstitious observances. We read in Wuttke that some time ago the authorities of a Mecklenburg village ordered a " wild fire " to be lit against a murrain amongst the cattle. For two hours the men strove vainly to obtain a spark, but the fault was not to be ascribed to the quality of the wood, or to the dampness of the atmosphere, but to the stubbornness of an old lady, who, objecting to the superstition, would not put out her night lamp; such a fire, to be efficient, must burn alone. At last the strong-minded female was compelled to give in; fire was obtained—but of bad quality, for it did not stop the murrain.

It has long been known that the rays of the sun might be concentrated by a lens or concave mirror. Aristophanes mentions the burning-lens in *The Clouds*, and the story of Archimedes using a mirror to fire the ships at Syracuse is familiar to every schoolboy. If Garcilasso de la Vega can be trusted as an authority the Virgins of the Sun in Peru kindled the sacred fire with a concave cup set in a great bracelet. In China the burning-glass is in common use.

To the inquiry how mankind became possessed of fire, the cosmogonies, those records of pristine speculative thought, do not give any reply which would not be found in the relations of travellers and historians.

They say in the Tonga Islands that the god of the earthquakes is likewise the god of fire. At Mangaïa it is told that the great Maui went down to hell, where he surprised the secret of making fire by rubbing two pieces of wood together. The Maoris tell the tale differently. Maui had the fire given to him by his old blind grandmother, Mahuika, who drew it from the nails of her hands. Wishing to have a stronger one, he pretended that it had gone out, and so he obtained fire from her great toe. It was so fierce that every thing melted before the glow; even Maui and the grandmother herself were already burning when a deluge, sent from heaven, saved the hero and the perishing world; but before the waters extinguished all the blaze, Mahuika shut a few sparks into some trees, and thence men draw it now. The Maoris have also the legend that thunder is the noise of Tawhaki's footsteps, and that lightnings flash from his armpits. At Western Point, Victoria, the Australians say the good old man Pundyil opened the door of the sun, whose light poured then on earth, and that Karakorok, the good man's good daughter, seeing the earth to be full of serpents, went everywhere destroying serpents; but before she had killed them all, her staff snapped in two, and while it broke, a flame burst out of it. Here the serpent-killer is a fire-bringer. In the Persian *Shahnama* also fire was discovered by a dragon-fighter. Hushenk, the powerful hero, hurled at the monster a prodigious stone, which, evaded by the snake, struck a rock and was splintered by it. " Light shone from the dark pebble, the heart of the rock flashed out in glory, and fire was seen for the first time in the world." The snake escaped, but the mystery of fire had been revealed.

North American legends narrate how the great buffalo, careering through the plains, makes sparks flit in the night, and sets the prairie ablaze by his hoofs hitting the rocks. We meet the same idea in the Hindu mythology, which conceives thunder to have been, among many other things, the clatter of the solar horses on the Akmon or hard pavement of the sky. The Dakotas claim that their ancestor obtained fire from the sparks which a friendly panther struck with its claws, as it scampered upon a stony hill.

Tohil, who gave the Quiches fire by shaking his sandals, was, like the Mexican Quetzelcoatl, represented by a flint stone. Guamansuri, the father of the Peruvians, produced the thunder and the lightning by hurling stones with his sling. The thunderbolts are his children. Kudai, the great god of the Altaian Tartars, disclosed " the secret of the stone's edge and the iron's hardness." The Slavonian god of thunder was depicted with a silex in his hand, or even protruding from his head. The Lapp Tiermes struck with his hammer upon his own head; the Scandinavian Thor held a mallet in one hand, a flint in the other. Taranis, the Gaul, had upon his head a huge mace surrounded by six little ones. Finnish poems describe how " fire, the child of the sun, came down from heaven, where it was rocked in a tub of yellow copper, in a large pail of gold." Ukko, the Esthonian god, sends forth lightnings, as he strikes his stone with his steel. According to the Kalewala, the same mighty Ukko struck his sword against his nail, and from the nail issued the " fiery babe." He gave it to the Wind's daughter to rock it, but the unwary maiden let it fall in the sea, where it was swallowed by the great pike, and fire would have been lost for ever if the child of the sun had not come to the rescue. He dragged the great pike from the water, drew out his entrails, and found there the heavenly spark still alive. Prometheus brought to earth the torch he had lighted at the sun's chariot.

Human culture may be said to have begun with fire, of which the uses increased in the same ratio as culture itself. To save the labour expended on the initial process of procuring light, or on carrying it about constantly, primitive men hit on the expedient of a fire which should burn night and day in a public building. The Egyptians had one in every temple, the Greeks, Latins and Persians in all towns and villages. The Natchez, the Aztecs, the Mayas, the Peruvians had their " national fires " burning upon large pyramids. Of these fires the " eternal lamps " in the synagogues, in the Byzantine and Catholic churches, may be a survival. The " Regia," Rome's sacred centre, supposed to be the abode of Vesta, stood close to a fountain; it was convenient to draw from the same spot the two great requisites, fire and water. All civil and political interests grouped themselves around the prytaneum which was at once a temple, a tribunal, a town-hall, and a gossiping resort: all public business and most private affairs were transacted by the light and in the warmth of the common fire. No wonder that its flagstones should become sacred. Primitive communities consider as holy everything that ensures their existence and promotes their welfare, material things such as fire and water not less than others. Thus the prytaneum grew into a religious institution. And if we hear a little more of fire worship than of water worship, it is because fire, being on the whole more difficult to obtain, was esteemed more precious. The prytaneum and the state were convertible terms. If by chance the fire in the Roman temple of Vesta was extinguished, all tribunals, all authority, all public or private business had to stop immediately. The connexion between heaven and earth had been broken, and it had to be restored in some way or other—either by Jove sending down divine lightning on his altars, or by the priests making a new fire by the old sacred method of rubbing two pieces of wood together, or by catching the rays of the sun in a concave mirror. No Greek or Roman army crossed the frontier without carrying an altar where the fire taken from the prytaneum burned night and day. When the Greeks sent out colonies the emigrants took with them living coals from the altar of Hestia, and had in their new country a fire lit as a representative of that burning in the mother country.[1] Not before the three curiae united their fires into one could Rome become powerful; and

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[1] Curiously enough we see the same institution obtaining among the Damaras of South Africa, where the chiefs, who sway their people with a sort of priestly authority, commit to their daughters the care of a so-called eternal fire. From its hearth younger scions separating from the parent stock take away a burning brand to their new home. The use of a common prytaneum, of circular form, like the Roman temple of Vesta, testified to the common origin of the North American Assinais and Maichas. The Mobiles, the Chippewas, the Natchez, had each a corporation of Vestals. If the Natchez let their fire die out, they were bound to renew it from the Mobiles. The Moquis, Pueblos and Comanches had also their perpetual fires. The Redskins discussed important affairs of state at the " council fires," around which each *sachem* marched three times, turning to it all the sides of his person. " It was a saying among our ancestors," said an Iroquois chief in 1753, " that when the fire goes out at Onondaga "—the Delphi of the league—" we shall no longer be a people."

Athens became a shining light to the world only, we are told, when the twelve tribes of Attica, led by Theseus, brought each its brand to the altar of Athene Polias. All Greece confederated, making Delphi its central hearth; and the islands congregated around Delos, whence the new fire was fetched every year.

Periodic Fires.—Because the sun loses its force after noon, and after midsummer daily shortens the length of its circuit, the ancients inferred, and primitive populations still believe, that, as time goes on, the energies of fire must necessarily decline. Therefore men set about renewing the fires in the temples and on the hearth on the longest day of summer or at the beginning of the agricultural year. The ceremony was attended with much rejoicing, banqueting and many religious rites. Houses were thoroughly cleansed; people bathed, and underwent lustrations and purifications; new clothes were put on; quarrels were made up; debts were paid by the debtor or remitted by the creditor; criminals were released by the civil authorities in imitation of the heavenly judges, who were believed to grant on the same day a general remission of sins. All things were made new; each man turned over a new page in the book of his existence. Some nations, like the Etruscans in the Old World and the Peruvians and Mexicans in the New, carried these ideas to a high degree of development, and celebrated with magnificent ceremonies the renewal of the *saecula*, or astronomic periods, which might be shorter or longer than a century. Some details of the festival among the Aztecs have been preserved. On the last night of every period (52 years) every fire was extinguished, and men proceeded in solemn procession to some sacred spot, where, with awe and trembling, the priests strove to kindle a new fire by friction. It was as if they had a vague idea that the cosmos, with its sun, moon and stars, had been wound up like a clock for a definite period of time. And had they failed to raise the vital spark, they would have believed that it was because the great fire was being extinguished at the central hearth of the world. The Stoics and many other ancient philosophers thought that the world was doomed to final extinction by fire. The Scandinavian bards sung the end of the world, how at last the wolf Fenrir would get loose, how the cruel fire of Loki would destroy itself by destroying everything. The Essenes enlarged upon this doctrine, which is also found in the Sibylline books and appears in the Apocrypha (2 Esdras xvi. 15).

See Dupuis, *Origine de tous les cultes* (1794); Burnouf, *Science des religions*; Grimm, *Deutsche Mythologie*, cap. xx. (1835); Adalbert Kuhn, *Die Herabkunft des Feuers und des Göttertranks* (1859); Steinthal, *Über die ursprüngliche Form der Sage von Prometheus* (1861); Albert Reville, "Le Mythe de Prométhée," in *Revue des deux mondes* (August 1862); Michel Bréal, *Hercule et Cacus* (1863); Tylor, *Researches into the Early History of Mankind*, ch. ix. (1865); Bachofen, *Die Sage von Tanaquil* (1870); Lord Avebury, *Prehistoric Times* (6th ed., 1900); Haug, *Religion of the Parsis* (1878). (E. Re.)

FIRE AND FIRE EXTINCTION. Fire is considered in this article, primarily, from the point of view of the protection against fire that can be accorded by preventive measures and by the organization of fire extinguishing establishments.

History is full of accounts of devastation caused by fires in towns and cities of nearly every country in the civilized world. The following is a list of notable fires of early days:—

Great Britain and Ireland

798. *London*, nearly destroyed.
982. ,, greater part of the city burned.
1086. ,, all houses and churches from the east to the west gate burned.
1212. ,, greater part of the city burned.
1666. ,, "The Great Fire," September 2–6.

It began in a wooden house in Pudding Lane, and burned for three days, consuming the buildings on 436 acres, 400 streets, lanes, &c., 13,200 houses, with St Paul's church, 86 parish churches, 6 chapels, the guild-hall, the royal exchange, the custom-house, many hospitals and libraries, 52 companies' halls, and a vast number of other stately edifices, together with three of the city gates, four stone bridges, and the prisons of Newgate, the Fleet, and the Poultry and Wood Street Compters. The fire swept from the Tower to Temple church, and from the N.E. gate to Holborn bridge. Six persons were killed. The total loss of property was estimated at the time to be £10,730,500.

1794. *London*, 630 houses destroyed at Wapping. Loss above £1,000,000.
1834. ,, Houses of Parliament burned.
1861. ,, Tooley Street wharves, &c., burned. Loss estimated at £2,000,000.
1873. ,, Alexandra palace destroyed.
1137. *York*, totally destroyed.
1184. *Glastonbury*, town and abbey burned.
1292. *Carlisle*, destroyed.
1507. *Norwich*, nearly destroyed; 718 houses burned.
1544. *Leith*, burned.
1598. *Tiverton*, 400 houses and a large number of horses burned; 33 persons killed. Loss, £150,000.
1612. ,, 600 houses burned. Loss over £200,000.
1731. ,, 300 houses burned.
1700. *Edinburgh*, "the Great Fire."
1612. *Cork*, greater part burned, and again in 1622.
1613. *Dorchester*, nearly destroyed. Loss, £200,000.
1614. *Stratford-on-Avon*, burned.
1644. *Beaminster*, burned. Again in 1684 and 1781.
1675. *Northampton*, almost totally destroyed.
1683. *Newmarket*, large part of the town burned.
1694. *Warwick*, more than half burned; rebuilt by national contribution.
1707. *Lisburn*, burned.
1727. *Gravesend*, destroyed.
1738. *Wellingborough*, 800 houses burned.
1743. *Crediton*, 450 houses destroyed.
1760. *Portsmouth*, dockyard burned. Loss, £400,000.
1770. ,, ,, ,, Loss, £100,000.
1802. *Liverpool*, destructive fire. Loss, £1,000,000.
1827. *Sheerness*, 50 houses and much property destroyed.
1854. *Gateshead*, 50 persons killed. Loss, £1,000,000.
1875. *Glasgow*. Great fire. Loss, £300,000.

France

59. *Lyons*, burned to ashes. Nero offers to rebuild it.
1118. *Nantes*, greater part of the city destroyed.
1137. *Dijon*, burned.
1524. *Troyes*, nearly destroyed.
1720. *Rennes*, on fire from December 22 to 29. 850 houses burned.
1784. *Brest*. Fire and explosion in dockyard. Loss, £1,000,000.
1862. *Marseilles*, destructive fire.
1871. *Paris*. Communist devastations. Property destroyed, £32,000,000.

Central and Southern Europe

64. *Rome* burned during 8 days. 10 of the 14 wards of the city were destroyed.
1106. *Venice*, greater part of the city was burned.
1577. ,, fire at the arsenal, greater part of the city ruined by an explosion.
1299. *Weimar*, destructive fire; also in 1424 and 1618.
1379. *Memel* was in large part destroyed, and again in 1457, 1540, 1678, 1854.
1405. *Bern* was destroyed.
1420. *Leipzig* lost 400 houses.
1457. *Dort*, cathedral and large part of the town burned.
1491. *Dresden* was destroyed.
1521. *Oviedo*, large part of the city destroyed.
1543. *Komorn* was burned.
1634. *Fürth* was burned by Austrian Croats.
1680. *Fürth* was again destroyed.
1686. *Landau* was almost destroyed.
1758. *Pirna* was burned by Prussians. 260 houses destroyed.
1762. *Munich* lost 200 houses.
1764. *Königsberg*, public buildings, &c., burned. Loss, £600,000.
1769. ,, almost destroyed.
1784. *Rokitzan* (Bohemia) was totally destroyed. Loss, £300,000.
1801. *Brody*, 1500 houses destroyed.
1859. ,, 1000 houses destroyed.
1803. *Posen*, large part of older portion of city burned.
1811. Forest fires in Tyrol destroyed 64 villages and hamlets.
1818. *Salzburg* was partly destroyed.
1842. *Hamburg*. A fire raged for 100 hours, May 5–7.

During the fire the city was in a state of anarchy. 4219 buildings, including 2000 dwellings, were destroyed. One-fifth of the population was made homeless, and 100 persons lost their lives. The total loss amounted to £7,000,000. After the fire, contributions from all Germany came in to help to rebuild the city.

1861. *Glarus* (Switzerland), 500 houses burned.

Northern Europe

1530. *Aalborg*, almost entirely destroyed.
1541. *Aarhuus*, almost entirely destroyed, and again in 1556.
1624. *Opslo*, nearly destroyed. Christiania was built on the site.
1702. *Bergen*, greater part of the town destroyed.
1728. *Copenhagen*, nearly destroyed. 1650 houses burned, 77 streets.
1794. ,, royal palace with contents burned.
1795. ,, 50 streets, 1563 houses burned.

1751. *Stockholm*, 1000 houses destroyed.

1759. „ 250 houses burned. Loss, 2,000,000 crowns.

1775. *Abo*, 200 houses and 15 mills burned.

1827. „ 780 houses burned, with the university.

1790. *Carlscrona*, 1087 houses, churches, warehouses, &c., destroyed.

1802. *Gothenburg*, 178 houses burned.

1858. *Christiania*. Loss estimated at £250,000.

1865. *Carlstadt* (Sweden), everything burned except the bishop's residence, hospital and jail. 10 lives lost.

Russia

1736. *St Petersburg*, 2000 houses burned.

1862. „ great fire. Loss, £1,000,000.

1752. *Moscow*, 18,000 houses burned.

1812. „ The Russians fired the city on September 14 to drive out the army of Napoleon. The fire continued five days. Nine-tenths of the city was destroyed. Number of houses burned, 30,800. Loss, £30,000,000.

1753. *Archangel*, 900 houses burned.

1793. „ 3000 buildings and the cathedral burned.

1786. *Tobolsk*, nearly destroyed.

1788. *Mitau*, nearly destroyed.

1812. *Riga*, partly destroyed.

1834. *Tula*, destructive fire.

1848. *Orel*, large part of the town destroyed.

1850. *Cracow*, large part of the town burned.

1864. *Novgorod*, large amount of property destroyed.

Turkey

The following fires have occurred at *Constantinople*:—

1729. A great fire destroyed 12,000 houses and 7000 people.

1745. A fire lasted five days.

1750. In January, 10,000 houses burned; in April, property destroyed estimated from £1,000,000 to £3,000,000. Later in the year 10,000 houses were destroyed.

1751. 4000 houses were burned.

1756. 15,000 houses and 100 people destroyed. During the years 1761, 1765 and 1767 great havoc was made by fire.

1769. July 17. A fire raged for twelve hours, extending nearly 1 m. in length. Many of the palaces, some small mosques and nearly 650 houses were destroyed.

1771. A fire lasting 15 hours consumed 2500 houses and shops.

1778. 2000 houses were burned.

1782. August 12. A fire burned three days: 10,000 houses, 50 mosques and 100 corn mills destroyed; 100 lives lost. In February, 600 houses burned; in June, 7000 more.

1784. August 5. A fire burned for 26 hours and destroyed 10,000 houses, most of which had been rebuilt since the fires of 1782. In the same year, March 13, a fire in the suburb of Pera destroyed two-thirds of that quarter. Loss estimated at 2,000,000 florins.

1791. Between March and July 32,000 houses are said to have been burned, and as many in 1795.

1799. In the suburb of Pera 13,000 houses were burned and many magnificent buildings.

1816. August 16. 12,000 houses and 3000 shops in the finest quarter were destroyed.

1818. August 13. A fire destroyed several thousand houses.

1826. A fire destroyed 6000 houses.

1848. 500 houses and 2000 shops destroyed. Loss estimated at £3,000,000.

1865. A great fire destroyed 2800 houses, public buildings, &c. Over 22,000 people were left homeless.

1870. June 5. The suburb of Pera, occupied by the foreign population and native Christians, was swept by a fire which destroyed over 7000 buildings, many of them among the best in the city, including the residence of the foreign legations. Loss estimated at nearly £5,000,000.

1797. *Scutari*, the town of 3000 houses totally destroyed.

1763. *Smyrna*, 2600 houses consumed. Loss, £200,000.

1772. „ 3000 dwellings burned. 3000 to 4000 shops, &c. consumed. Loss, £4,000,000.

1796. „ 4000 shops, mosques, magazines, &c., burned.

1841. „ 12,000 houses were burned.

India

1631. *Rajmahal*. Palace and great part of the town burned.

1799. *Manilla*, vast storehouses were burned.

1833. „ 10,000 huts were burned, March 26. 30,000 people rendered homeless, and 50 lives lost.

1803. *Madras*, more than 1000 houses burned.

1803. *Bombay*. Loss by fire of £600,000.

China and Japan

1822. *Canton* was nearly destroyed by fire.

1866. *Yokohama*, two-thirds of the native town and one-sixth of the foreign settlement destroyed.

1872. *Yeddo*. A fire occurred in April during a gale of wind, destroying buildings covering a space of 6 sq. m. 20,000 persons were made homeless.

1873. „ A fire destroyed 10,000 houses.

United States

1679. *Boston*. All the warehouses, 80 dwellings, and the vessels in the dockyards were consumed. Loss, £200,000.

1760. „ A fire caused a loss estimated at £100,000.

1787. „ A fire consumed 100 buildings, February 20.

1794. „ 96 buildings were burned. Loss, £42,000.

1872. „ Great fire, November 9–10. By this fire the richest quarter of Boston was destroyed.

The fire commenced at the corner of Summer and Kingston streets. The area burned over was 65 acres. 776 buildings, comprising the largest granite and brick warehouses of the city, filled with merchandise, were burned. The loss was about £15,000,000. Before the end of the year 1876 the burned district had been rebuilt more substantially than ever.

1778. *Charleston* (S.C.). A fire caused the loss of £100,000.

1796. „ 300 houses were burned.

1838. „ One-half the city was burned on April 27. 1158 buildings destroyed. Loss, £600,000.

1802. *Portsmouth* (N.H.), 102 buildings destroyed.

1813. „ 397 buildings destroyed.

1820. *Savannah*, 463 buildings were burned. Loss, £800,000.

1835. *New York*. The great fire of New York began in Merchant Street, December 16, and burned 530 buildings in the business part of the city. 1000 mercantile firms lost their places of business. The area burned over was 52 acres. The loss was £3,000,000.

1845. „ A fire in the business part of the city, July 20, destroyed 300 buildings. The loss was £1,500,000. 35 persons were killed.

1845. *Pittsburg*. A large part of the city burned, April 11. 20 squares, 1100 buildings destroyed. Loss, £2,000,000.

1846. *Nantucket* was almost destroyed.

1848. *Albany*. 600 houses burned, August 17. Area burned over 37 acres, one-third of the city. Loss, £600,000.

1849. *St Louis*. 23 steamboats at the wharves, and the whole or part of 15 blocks of the city burned, May 17. Loss, £600,000.

1851. „ More than three-quarters of the city was burned, May 4. 2500 buildings. Loss, £2,200,000.

1851. „ 500 buildings burned. Loss, £600,000.

1850. *Philadelphia*. 400 buildings burned, July 9. 30 lives lost. Loss, £200,000.

1865. „ 50 buildings burned, February 8. 20 persons killed. Loss, £100,000.

1851. *Washington*. Part of the Capitol and the whole of the Congressional Library were burned.

1851. *San Francisco*. On May 4–5 a fire destroyed 2500 buildings. A number of lives lost. More than three-fourths of the city destroyed. Loss, upwards of £2,000,000. In June another fire burned 500 buildings. Loss estimated at £600,000.

1857. *Chicago*. A fire destroyed over £100,000. 14 lives lost.

1859. „ Property destroyed worth £100,000, Sept. 15.

1866. „ Two fires on August 10 and November 18. Loss, £100,000 each.

1871. „ The greatest fire of modern times.

It began in a barn on the night of the 8th of October and raged until the 10th. The area burned over was 2124 acres, or 3⅓ sq. m., of the very heart of the city. 250 lives were lost, 98,500 persons were made homeless, and 17,430 buildings were consumed. The buildings were one-third in number and one-half in value of the buildings of the city. Before the end of 1875 the whole burned district had been rebuilt. The loss was estimated at £39,000,000.

1862. *Troy* (N.Y.) was nearly destroyed by fire.

1866. *Portland* (Maine). Great fire on July 4. One-half of the city was burned; 200 acres were ravaged; 50 buildings were blown up to stop the progress of the fire. Loss, £2,000,000 to £2,250,000.

1871. October. Forest and prairie fires in Wisconsin and Michigan. 15,000 persons were made homeless; 1000 lives lost. Loss estimated at £600,000.

British North America

1815. *Quebec* was injured to the extent of £260,000.

1845. „ 1650 houses were burned, May 28. One-third of the population made homeless. Loss from £400,000 to £750,000. Another fire, on June 28, consumed 1300 dwellings. 6000 persons were made homeless. 30 streets destroyed. Insurance losses, £60,770.

1866. „ 2500 houses and 17 churches in French quarter burned.

1825. *New Brunswick*. A tract of 4,000,000 acres, more than 100 m. in length, was burned over; it included many towns. 160 persons killed, and 875 head of cattle. 590 buildings burned. Loss, about £60,000. Towns of Newcastle, Chatham and Douglastown destroyed.

1837. *St John* (New Brunswick). 115 houses burned, January 13, and nearly all the business part of the city. Loss, £1,000,000.

1877. *St. John.* Great fire on June 21. The area burned over was 200 acres. 37 streets and squares totally or in part destroyed; 10 m. of streets; 1650 dwellings. 18 lives lost. Total loss, £2,500,000. Two-fifths of the city burned.
1846. *St John's* (Newfoundland) was nearly destroyed, June 9. Two whole streets burned upwards of 1 m. long. Loss estimated at £1,000,000.
1850. *Montreal.* A fire destroyed the finest part of the city on June 7. 200 houses were burned.
1852. „ A fire on July 9 rendered 10,000 people destitute. The space burned was 1 m. in length by ½ m. in width, including 1200 houses. Loss, £1,000,000.

South America

1536. *Cuzco* was nearly consumed.
1861. *Mendoza.* A great fire followed an earthquake which had destroyed 10,000 people.
1862. *Valparaiso* was devastated by fire.
1863. *Santiago.* Fire in the Jesuit church; 2000 persons, mostly women and children, perished.

West Indies

1752. *Pierre* (Martinique) had 700 houses burned.
1782. *Kingston* (Jamaica) had 80 houses burned. Loss, £500,000.
1795. *Montego Bay* (Jamaica). Loss by fire of £400,000.
1805. *St Thomas.* 900 warehouses consumed. Loss, £6,000,000.
1808. *Spanish Town* (Trinidad) was totally destroyed. Loss estimated at £1,500,000.
1828. *Havana* lost 350 houses; 2000 persons reduced to poverty.
1843. *Port Republicain* (Haiti). Nearly one-third of the town was burned.

Since this list was compiled, there have been further notable fires, more particularly in North America, the great conflagrations at Chicago, Baltimore and San Francisco being terrible examples. But speaking generally, these conflagrations, extensive as they were, only repeated the earlier lessons as to the necessity of combating the general negligence of the public by attaching far greater importance to the development of fire-preventive measures even than to the better organization of the fire-fighting establishments.

It may be of interest to mention notable fires in the British empire, and London in particular, during the decade 1890 to 1899:—

Port of Spain (Trinidad)	March 4, 1895
New Westminster (British Columbia)	Sept. 10, 1898
Toronto (Ontario)	Jan. 6, 10, and March 3, 1895
Windsor (Nova Scotia)	Oct. 17, 1897
St John's (Newfoundland)	July 8, 1892
London—Charterhouse Square	Dec. 25, 1889
„ St Mary Axe	July 18, 1893
„ Old Bailey and Fleet Street	Nov. 15, 1893
„ Tabernacle Street, Finsbury	June 21, 1894
„ Bermondsey Leather Market	Sept. 13, 1894
„ „ „ „	May 17, 1895
„ Minories	Nov. 10, 1894
„ South-West India Docks	Feb. 8, 1895
„ Charlotte and Leonard Streets, Finsbury	June 10, 1896
„ Cripplegate	Nov. 19, 1897
Nottingham	Nov. 17, 1894
Sheffield	Dec. 21, 1893
Bradford	Nov. 30, 1896
Sunderland	July 18, 1898
Dublin	May 4, 1894
Glasgow—Anderston Quay	Jan. 16, 1897
„ Dunlop Street	April 25, 1898

As to fires in any one specific class of building, the extraordinary number of fires that occurred in theatres and similar places of public entertainment up to the close of the 19th century calls for mention. Since that time, however, there has been a considerable abatement in this respect, owing to the adoption of successful measures of fire prevention. A list of some 1100 fires was published by Edwin O. Sachs in 1897 (*Fires at Public Entertainments*), and the results of these fires analysed. They involved a recorded loss of life to the extent of 9350 souls. About half of them (584) occurred in Europe, and the remainder in other parts of the world. Since the publication of that list extraordinary efforts have been made in all countries to reduce the risk of fires in public entertainments. The only notable disaster that has occurred since was that at the Iroquois Theatre at Chicago.

The annual drain in loss of life and in property through fires is far greater than is generally realized, and although the loss of life and property is being materially reduced from year to year, mainly by the fire-preventive measures that are now making themselves felt, the annual fire wastage of the world still averages quite £50,000,000 sterling. It is extremely difficult to obtain precise data as to the fire loss, insured and uninsured, but it may be assumed that in Great Britain the annual average loss by fire, towards the end of the 19th century (say 1897), was about £17,000,000 sterling, and that this had been materially reduced by 1909 to probably somewhere about £12,000,000 sterling. This extraordinary diminution in the fire waste of Great Britain,—in spite of the daily increasing number of houses, and the increasing amount of property in buildings—is in the main owing to the fire-preventive measures, which have led to a better class of new building and a great improvement in existing structures, and further, to a greater display of intelligence and interest in general fire precautionary measures by the public.

Notable improvements in the fire service have been effected, more particularly in London and in the country towns of the south of England since 1903. The International Fire Exhibition held in 1903 at Earl's Court, and the Fire Prevention Congress of the same year, may be said to have revolutionized thought on the subject of fire brigade organization and equipment in the British empire; but, for all that, the advance made by the fire service has not been so rapid as the development of the fire-preventive side of fire protection.

Fire Protection.—The term "Fire Protection" is often misunderstood. Fire-extinguishing—in other words, fire brigade work—is what the majority understand by it, and many towns consider themselves well protected if they can boast of an efficiently manned fire-engine establishment. The fire brigade as such, however, has but a minor rôle in a rational system of protection. Really well-protected towns owe their condition in the first place to properly applied preventive legislation, based on the practical experience and research of architects, engineers, fire experts and insurance and municipal officials. Fire protection is a combination of fire prevention, fire combating and fire research.

Under the heading of "Fire Prevention" should be classed all preventive measures, including the education of the public; and under the heading "Fire Combating" should be classed both self-help and outside help.

Preventive measures may be the result of private initiative, but as a rule they are defined by the local authority, and contained partly in Building Acts, and partly in separate codes of fire-survey regulations—supplemented, if necessary, by special rules as to the treatment of extraordinary risks, such as the storage of petroleum, the manufacture of explosives, and theatrical performances. The education of the public may be simply such as can be begun informally at school and continued by official or semi-official warnings, and a judicious arrangement with the newspapers as to the tendency of their fire reports.

Such forms of training have already been successfully introduced. There are English towns where the authorities have, for instance, had some of the meaningless fables of the old elementary school *Standard Reader* replaced by more instructive ones, which warn children not to play with matches, and teach them to run for help in case of an emergency. Instructive copy-book headings have been arranged in place of the meaningless sentences so often used in elementary schools. There are a number of municipalities where regular warnings are issued every December as to the dangerous Christmas-tree. In such places every inhabitant has at least an opportunity of learning how to throw a bucket of water properly, and how to trip up a burning woman and roll her up without fanning the flames. The householder is officially informed where the nearest fire-call point is, and how long he must expect to wait till the first engine can reach his house. If he is a newspaper reader, he will also have ample opportunity of knowing the resources of his town, and the local reporter's fire report will give him much useful information based on facts or hints supplied by the authorities.

Both self-help and outside help must be classed under the heading of "Fire Combating." Self-help mainly deals with the protection of large risks, such as factories, stores and public places of amusement, which lend themselves to regulation.

The requirements of the fire survey code may allow for hydrants or sprinklers in certain risks, and also for their regular inspection, and the means for self-help may thus be given. These means will, however, probably not be properly employed unless some of the employés engaged on the risk are instructed as to their purpose, and have confidence in the apparatus at their disposal. The possibility of proper self-help in dangerous risks may be encouraged by enforcing regular drills for the employés, and regular inspections to test their efficiency. There are towns where great reliance is placed on the efforts of such amateur firemen. In some cities they even receive extra pay and are formed into units, properly uniformed and equipped, and retained by the fire brigade as a reserve force for emergencies.

Self-help for the shopkeeper, the lodger or the householder can scarcely be regulated. The opportunities already mentioned for the education of the public, if properly utilized, would assure intelligent behaviour on the part of a large percentage of the community. There are places where, without any regulation being attempted, and thanks entirely to the influence referred to, most residences can boast of a hand-pump, a bucket, and a crowbar, the proper use of which is known to most of the household. Self-help in small risks may, however, be distinctly encouraged by the authorities, without any irksome interference with personal liberty, simply by the provision of street pillar-boxes, with the necessaries of first aid, including perhaps a couple of scaling ladders, and, further, by opportunities being given to householders to learn how to handle them. If a street pillar-box of this kind be put in a fire-station, and certain afternoons in the year be reserved on which this elementary instruction will be given, and the students afterwards shown over the fire-station or treated to a "turn-out," a considerable number will be found to take advantage of the opportunity. No matter whether curiosity or real interest brings them, the object in view will be attained.

Under "outside" help should be understood what is organized, and not simply such as is tendered by the casual passer-by or by a neighbour. The link between self-help and outside help is the fire-call.

The Fire-Call.—The efficiency of the fire-call depends not only on the instrument employed and its position, but also on its conspicuous appearance, and the indications by which its situation may be discovered. These indications are quite as important as the instruments themselves. The conspicuousness of the instrument alone does not suffice. Of the official notifications given in the press, those in regard to the position of the call-points are among the most useful. An indication at every street corner as to the direction to take to reach the point—or perhaps better, the conspicuous advertisement of the nearest call-point over every post pillar-box and inside every front door—may enable the veriest stranger to call assistance, and minimize the chances of time being lost in search of the instrument. It is immaterial for the moment whether the helpers are called by bell outside a fire-station, by a messenger from some special messenger service, by a call through a telephone, or by an electric or automatic appliance. Any instrument will do that ensures the call being transmitted with maximum speed and certainty and in full accord with the requirements of the locality.

Outside Help.—Organized outside help may not be limited simply to the attendance of the fire brigade. Special arrangements can be made for the attendance of the local police force, a public or private salvage corps, an ambulance, or, in some cases, a military guard. Then in some instances arrangements are made for the attendance of the water and gas companies' servants, and even officials from the public works office, insurance surveyors, and the Press. There are places where the salvage corps arrives on the scene almost simultaneously with the fire brigade, and others where the police are generally on the spot in good force five minutes after the arrival of the first engines. There are several cities where the ambulance wagon and the steamers arrive together, and another city where the military authorities always send a fire piquet which can be turned out in a few minutes.

If all these helpers come together, no matter how high the rank of the individual commanders, the senior officer of the fire brigade, even if he holds only non-commissioned officer's rank, should have control, and his authority be fully recognized. Unfortunately, there are not many countries where this is the case. The efficiency of outside help depends in the first instance on the clear definition of the duties and powers of all concerned—on the legal foundation, in fact; then on the organization, the theoretically as well as practically correct executive; and, last, but by no means least, on the prestige, the social standing, the education of commanders and their ability to handle men. Among the rank and file of the brigade, clear-headedness, pluck, smartness and agility will be as invaluable as reckless dare-devilry; showy acrobatism, or an unhealthy ambition for public applause, will be dangerous.

Research.—Under the heading "Fire Research" should be included theoretical and experimental investigation as to materials and construction, combined with the chronicling of practical experience in fires, then the careful investigation and chronicling of the causes of fires, assisted where necessary by a power for holding fire inquests in interesting, suspicious or fatal cases. Experimental investigation as to natural and accidental causes as distinct from criminal causes can be included. Research in criminal cases may be assisted not only by a fire inquest, but also by immediate formal inquiries held on the spot, by the senior fire brigade and police officers present, or by immediate government investigations held on the same lines as inquiries into explosions and railway accidents.[1] As to general research work, there are several cities which contribute substantially towards the costs of fire tests at independent testing stations. Some towns also have special commissions of experts who visit all big fires occurring within easy travelling distance, take photographs and sketches, and issue reports as to how the materials were affected. Then there are the usual statistics as to outbreaks, their recurrence and causes, and in some places such tables are supplemented by reports on experiments with oil lamps, their burners and wicks, electric wiring, and the like.

The British Fire Prevention Committee.—The British Fire Prevention Committee is an organization founded a few days after the great Cripplegate (London) fire in 1897, and incorporated in February 1899. It comprises some 500 members and subscribers. The members include civil engineers, public officials holding government appointments, fire chiefs, insurance surveyors and architects, whilst the subscribers in the main include the great public departments, such as the admiralty and war office, and municipalities, such as the important corporations of Glasgow, Liverpool and the like. Colonial government departments and municipalities are also on the roll, together with a certain number of colonial members. New Zealand has formed a special section having its own local honorary secretary. The ordinary work of the committee is carried out by a council and an executive, and the necessary funds are provided by the subscription of members and subscribers. The services of the members of council and executive are given gratuitously, no out-of-pocket expenses of any kind being refunded. Whilst the routine work deals mainly with questions of regulations, rules and publications of general technical interest, the tests are probably what have brought the committee into prominence and given it an international reputation. They are not only the recognized fire tests of Great Britain, but they rank as universal standard tests for the whole of the civilized world, and Americans, just as much as Danes, Germans or Austrians, pride themselves when some product of their country has passed the official procedure of a test by the committee. The reports of the tests, which state facts only without giving criticisms or recommendations, are much appreciated by all who have the control of public works or the specification of appliances. The committee does not limit itself solely to testing proprietary forms of construction or appliances, but has a number of tests—quite equal to the proprietary tests— of articles in general use. The ordinary concrete floor or the ordinary wooden joist floor protected by asbestos boards or slag wool receives as much attention as a patent floor;

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[1] In the United States a special officer called a "fire-marshal" has for some time been allocated to this work in many cities, and in 1894 state fire-marshals were authorized in Massachusetts and in Maryland, this example being followed by Ohio (1900), Connecticut (1901), and Washington (1902); and in other states laws have been passed making official inquiry compulsory. In England the question has been mooted whether coroners, even where no death has occurred, should hold similar inquiries, but though this has been done in recent years in the City of London no regular system exists.

and similarly the ordinary everyday hydrant receives equal attention with the patent hydrant, or ordinary bucket of water with the special fire extinguisher. The door tests of the committee, which cover some thirty different types of doors, deal with no less than twenty ordinary wooden doors that can be made by any ordinary builder or cabinet-maker. These so-called non-proprietary tests are made at the expense of the general funds of the committee, whilst for the proprietary tests the owners have to pay about two-thirds of the expenses incurred in the form of a testing fee. The expenses incurred in a test, of course, not only comprise the actual testing operation of testing, but also the expense of producing the report, which is always a very highly finished publication with excellent blocks. The expense incurred also includes the establishment expenses of the testing station at Regent's Park.

The British Fire Prevention Committee organized the great Fire Exhibition and International Fire Congress of London in 1903, in both of which it enjoyed the support and assistance of the National Fire Brigades Union and the Association of Professional Fire Chiefs. It from time to time despatches special commissions to the continent of Europe, and these visits are followed by the issue of official reports, well illustrated, presenting the appliances, rules and methods of the countries visited, and serving as most useful reference publications.

Taken generally, the whole of the work of the committee, both in respect of scientific investigations and propagandism, has been most beneficial. Fire waste has been materially reduced, regardless of the fact of the greater fire hazards and the ever-growing amount of property. In Great Britain alone the sum saved in fire wastage annually is about £5,000,000. This great annual saving has been obtained at an expenditure in research work, as far as the British Fire Prevention Committee is concerned, of about £23,000, of which more than half was provided by the membership in voluntary contributions or subscriptions.

There is no similar institution anywhere in the world, although several government laboratories occasionally undertake fire tests, notably the Gross Lichterfelde laboratory near Berlin, and several insurance corporations have testing plants, notably the American Underwriters at Chicago. The efforts at research work outside Great Britain have, however, been spasmodic and in no way compare with the systematic series of inquiries conducted without any substantial state aid in London.

Distribution of Losses.—Property destroyed by fire is practically an absolute loss. This loss may actually only affect the owner, or it may be distributed among a number of people, who are taxed for it in the form of a contribution to their national or local fire fund, a share in some mutual insurance "ring," or the more usual insurance companies' premium. In the first two cases some expenses have also to be met in connexion with the management of the fund, "tariff" organization, or "ring." In the last case, not only the expenses of management have to be covered, but also the costs incurred in running the insurance enterprise as such, and then a further amount for division amongst those who share the risk of the venture—namely, the insurance company's shareholders.

It is well to distinguish between loss and mere expenditure. The sinking fund of the large property owner should cover a loss with a minimum extra expense; insurance in an extravagantly managed company paying large dividends will cover a loss, but with an unnecessarily large extra outlay. In every case the loss remains; and as property may always be considered part of the community, the province or nation, as the case may be, suffers. It is always in the interest of a nation to minimize its national losses, no matter whether they fall on one individual's shoulders or on many, and whether such losses are good for certain trades or not. With a suitable system of fire protection it is possible to bring these losses to a minimum, but this minimum would probably only be reached by an extra expense, which would fall heavier on the insurers' pockets in the form of municipal rates than the higher premium for the greater risk. A practical minimum is all that can be attempted, and that practical minimum varies according to circumstances.

Practical protection must mean smaller annual insurance dues, and the actual extra cost of this protection should be something less than the saving off these dues. Then not only has the nation a smaller dead loss, but the owner also has a smaller annual expenditure for his combined contributions toward the losses, the management of his insurance, and the protective measures. Where there is mutual insurance or municipal insurance in its best sense, the losses by fire and the costs of the protection are often booked in one account, and the better protection up to a certain point should mean a smaller individual annual share. Where there is company insurance the municipal rates are increased to cover the cost of extra protection, while a proportionate decrease is expected in the insurance premiums. Competition and public opinion generally impose this decrease of the insurance rates as soon as there is a greater immunity from fire. Where the insurance companies are well managed and the shareholders are satisfied with reasonable dividends, practical protection can be said to find favour with all concerned, but if the protection is arranged for and the companies do not moderate their charges accordingly, the reverse is the case.

The position of insurance companies subscribing towards the maintenance of a fire brigade should here be referred to, as there is considerable misunderstanding on the subject. The argument which municipalities or fire brigade organizations often use is to the effect that the insurance companies derive all the profit from a good fire service, and should contribute towards its cost. Where properly managed companies have the business, a better fire service, however, means a smaller premium to the ratepayer. If the ratepayer has to pay for extra protection in the form of an increased municipal rate, or in the form of an increased premium raised to meet the contribution levied, this is simply juggling with figures.

Cost.—As to the cost of a practical system of fire protection, better and safer building from the fire point of view means better and more valuable structures of longer life from the economic aspect. Such better and safer constructional work pays for itself and cannot be considered in the light of an extra tax on the building owner. The compilation and administration of the fire protective clauses in a Building Act would be attended to by the same executive authorities as would in any case superintend general structural matters, and the additional work would at the most require some increased clerical aid. If the execution of the fire survey regulations were delegated to the same authority there would again simply be some extra clerical aid to pay for, and the salaries of perhaps a few extra surveyors. To make the inspections thoroughly efficient, it has been found advisable in several instances to form parties of three for the rounds. The second man would, in this case, be a fire brigade officer, and the third probably a master chimney-sweep, who would have to receive a special retaining fee.

The cost of the public training referred to would be small, as the elementary part would simply be included in the schoolmaster's work, and the Press matters could be easily managed in the fire brigade office. Payments would have only to be made for advertisements, such as the official warnings, lists for fire-call points, &c., and perhaps for the publication of semi-official hints. Self-help, as far as inspection and drills for amateurs are concerned would be under the control of the fire brigade. There would, however, be an extra expense for the purchase and maintenance of the street first-aid appliances referred to.

The most expensive items in the system of fire protection undoubtedly come under the headings "Fire-Call" and "Fire Brigade." As to the former, there are a number of cities where the cost is modified by having the whole of the electrical service for the police force, the ambulance and fire brigade, managed by a separate department. The same wires call up each of these services, and, as the same staff attend to their maintenance, the fire protection of a city need only be debited with perhaps a third of the outlay it would occasion if managed independently. The combined system has also the great advantage of facilitating the mutual working of the different services in case of an emergency. The indicators which have been referred to involve an outlay; but here again, if the three services work together, the expenses on the count of fire protection can be lessened. The money rewards given in some cities to the individuals who first call the fire-engines may become a heavy item. Their utility is doubtful, and they have formed an inducement for arson.

As to the outlay on fire brigade establishment, a strong active force should be provided, supported by efficient reserves. The latter should be as inexpensive as possible, but should at least constitute a part-paid and disciplined body which could be easily called in for emergencies. Fire brigade budgets cannot allow for an active force being ready for such coincidences as an unusual number of large fires starting simultaneously, but they must allow for an ample strength always being forthcoming for the ordinary emergencies, and this with all due consideration for men's rest and possible sickness. An undermanned fire brigade is an anomaly which is generally fatal, not only to the property owner, but also to the whole efficiency and esprit of the force. The budget must also allow for an attractive rate of pay, as the profession is one which requires men who have a maximum of the sterling qualities which we look for in the pick of a nation. It must also not be forgotten that the fire service is one of the few where a system of pensions is the only fair way of recognizing the risks of limb and health, and at the same time securing that stability in which practical experience from long service is so essential a factor. The budget must allow for an ample reserve of appliances.

Whether or not a fire brigade should be so strong as to permit of its having a separate section for salvage corps purposes depends on circumstances. Economically a salvage corps is required, and should be part and parcel of the municipal brigade and organized on the same lines with a reserve, no matter whether the insurance of the locality be managed by the authorities or by companies. If a corps is necessary, it matters little whether it be paid for out of premiums or out of rates.

Of further expenses which have to be considered, there are items for fire research and fire inquest. If managed economically, due confidence being placed in the opinions of the fire officers and surveyors, there is no reason why the outlay should be great. The statistical work would only require some clerical aid. Where special coroners are retained for criminal cases some extra money will of course be required; but even here the costs need not be excessive, as there are many retired fire brigade officers and fire surveyors who are well suited for the work, and would be satisfied with a small emolument.

As to the cost of the water supply, there are but few places where special fire high-pressure mains are laid on in the interests of fire protection. As a rule the costs which are debited to the heading "Fire Protection" have simply to cover the maintenance of hydrants and tablets, or at the most the cost of the water actually used for fire-extinguishing purposes. Sometimes the cost of hydrants is shared with the scavenging department or the commission of sewers, which also have the use of them. Where the provision of water and hydrants falls to a private water company, the property owners will be paying their share for them, indirectly, in the form of water rates.

The protective measures referred to will serve both for life-saving and for the protection of property. It should be remembered that a good staircase and a ladder are often as useful for the manœuvring of the firemen as for life-saving purposes, and that they are practically as essential for the saving of property as for saving life. No distinction need be made between the two risks when speaking of fire protection in general; but as the safety of the most valueless life is generally classed higher than that of the most valuable property, it may be well to give life-saving the first place when alluding to the two separately.

Criminal fire-raising only prevails where the fire-protective system is defective. With good construction and a fire survey, the quick arrival of the firemen, and careful inquests, the risks of detection are as a rule far too great to encourage its growth.

Saving of Life.—Under "Fire Prevention" special requirements in the Building Act can greatly influence the safety of life by requiring practical exits and sufficient staircase accommodation. The risks in theatres and assembly halls require separate legislation. In ordinary structures no inmate of a building should be more than sixty feet away from a staircase, and preferably there should be two staircases at his disposal in the event of one being blocked. Generally, attention is only given to the construction of staircases; but it must be pointed out that their ventilation is equally important. Smoke is even a greater danger than fire, and may hamper the helpers terribly. The possibility of opening a window has saved many a life.

Safety of Property.—As far as the protection of property is concerned, the prevention of outbreaks can be influenced by the careful construction of flues, hearths, stoves, and in certain classes of buildings by the construction of floors and ceilings, the arrangement of skylights, shutters and lightning conductors. Then comes the prevention of the fire spreading, first, by the division of risks, and secondly, by the materials used in construction.

The legislator's first ambition must be to prevent a fire in one house from spreading to another, and a stranger's property, so to say, from being endangered. This is quite possible, given good party walls carried well over the roof to a height regulated by the nature of the risk, the provision of the shutters to windows where necessary, and the use of fire-resisting glass. Again, a thoroughly good roof—or still better, a fire-resisting attic floor —can do much. If the locality has a fire brigade and the force is efficiently handled, "spreads" from one house to another should never occur. Narrow thoroughfares and courts are, however, a source of danger which may baffle all efforts to localize a fire. This should be remembered by those responsible for street improvements.

The division of a building or large "risk" into a number of minor ones is only possible to a certain extent. There is no need to spend enormous sums to make each of the minor "risks" impregnable. The desire should be simply to try to retard the spread for a certain limited time after the flames have really taken hold of the contents. In those minutes most fires will have been discovered, and, where there is an efficient fire-extinguishing establishment, a sufficient number of firemen can be on the spot to localize the outbreak and prevent the conflagration from becoming a big one. In the drawing-room of an ordinary well-built house, for example, if the joists are strong and the boards grooved, if some light pugging be used and the plastering properly done, if the doors are made well-fitting and fairly strong, a very considerable amount of furniture and fittings can remain well alight for half an hour before there is a spread. In a warehouse or factory "risk" the same holds good. With well-built wooden floors, thickly pugged, and the ceilings perhaps run on wire netting or on metal instead of on laths, with ordinary double ledged doors safely hung, at the most perhaps lined with sheet iron or asbestos cloth, a very stiff blaze can be imprisoned for a considerable time. Many of the recent forms of "patent" flooring are exceedingly useful for the division of "risks," and with their aid a fire can be limited to an individual storey of a building, but it should not be forgotten that even the best of flooring is useless if carried by unprotected iron girders supported, say, by some light framing or weak partition. The general mistake made in using expensive iron and concrete construction is the tendency to allow some breach to be made (for lifts, shafting, &c.), through which the fire spreads, or to forget that the protection of the supports and girder-work requires most careful attention.

Of the various systems of "patent" flooring, as a rule the simpler forms are the more satisfactory. It should, however, always be remembered that any specific form of flooring alone does not prevent a fire breaking from one "risk" to another. They should go hand in hand with general good construction, and naked ironwork must be non-existent. Some of the modern fire-resisting floors are too expensive to permit their introduction for fire protection alone. In considering their introduction, the general advantages which they afford as to spans, thickness, general stability, &c., should be taken into account. A practical installation of floors, partitions, doors, &c., should, first, not increase the cost of a building more than 5%, and secondly should add to the general value of the structure by giving it a more substantial character.

The danger of lift wells, skylights and shaft openings should not be forgotten. The last should be as small as possible, well armed with shutters, the skylights should have fire-resisting glass, and the lifts not only vertical doors, but also horizontal flaps, cutting up the well into sections. The question of light partitions must also not be neglected.

Division of "risks," common-sense construction, and proper staircase accommodation are really all that fire protection requires, and where the special Building Act clauses have been kept within the lines indicated, there has been little friction and discontent. It is only as a rule when the authorities are eccentric in their demands that the building owner considers himself harassed by protective measures.

Fire survey regulations should mainly aim at preventing the actual outbreak of fire. In certain classes of risks fire survey can also increase the personal safety of the inmates and lessen the possibility of a fire spreading. The provision of fire-escapes or ladders, and a regular inspection of their efficiency, will do much. The examination of a rusty door-catch may save a building. The actual preventive work of the surveyor will, however, mostly consist in warning property owners against temporary stoves standing on ordinary floor boards, sooty chimneys, badly hung lamps, dangerous burners and gas brackets fixed in risky positions. Self-help will be greatly facilitated by the judicious arrangement of fire-extinguishing gear, and a like inspection of its efficiency. Hydrants and cocks must not rust, nor must the hose get so stiff that the water cannot pass through it, or sprinklers choked. Hand pumps and pails must always stand ready filled. One of the greatest errors generally made in distributing such apparatus is disregard of the fact that the amateur likes to have an easy retreat if his efforts are unsuccessful, and if this is not the case, he may not, perhaps, use the gear at all.

With regard to regulations governing "special risks," so far as the safety of the public in theatres and public assembly halls is concerned, attention should be chiefly given to the exits. Spread of fire, and even its outbreak, are secondary considerations. A panic caused by the suspicion of a fire can be quite as fatal as that caused by the actual start of a conflagration. In the storage of petroleum in shops, direct communication should be prevented between the shop or cellar and the main staircase or the living rooms. The sale of dangerous lamps and burners should be prohibited.

Fire-resisting Materials.—One of the greatest misnomers in connexion with fire prevention was originally the description of certain materials and systems of construction as being "fire-proof." This has seriously affected the development of the movement towards fire prevention, for, having regard to the fact that nothing described as "fire-proof" could be fire-proof in the true sense, confidence was lost in everything so described, and in fact everything described as "fire-proof" came to be looked on with suspicion. In order to decrease this suspicion and obtain a better understanding on the subject, the International Fire Prevention Congress of London in 1903, at which some 800 representatives of government departments and municipalities were present, discussed this matter at considerable length, and they arrived at conclusions which, in consideration of their importance in affecting the whole development of fire-resisting construction, are published below. It is the classification of fire resistance adopted by this congress in 1903 that has been utilized by all concerned throughout the British empire, and in numerous other countries, since that date.

The resolutions adopted by the congress embodied the recommendations contained in the following statement issued by the British Fire Prevention Committee:—

The executive of the British Fire Prevention Committee having given their careful consideration to the common misuse of the term "fire-proof," now indiscriminately and often most unsuitably applied to many building materials and systems of building construction in use in Great Britain, have come to the conclusion that the avoidance of this term in general business, technical, and legislative vocabulary is essential.

The executive consider the term "fire-resisting" more applicable for general use, and that it more correctly describes the varying qualities of different materials and systems of construction intended to resist the effect of fire for shorter or longer periods, at high or low temperatures, as the case may be, and they advocate the general adoption of this term in place of "fire-proof."

Further, the executive, fully realizing the great variations in the fire-resisting qualities of materials and systems of construction, consider that the public, the professions concerned, and likewise the authorities controlling building operations, should clearly discriminate between the amount of protection obtainable or, in fact, requisite for different classes of property. For instance, the city warehouse filled with highly inflammable goods of great weight requires very different protection from the tenement house of the suburbs.

The executive are desirous of discriminating between fire-resisting materials and systems of construction affording *temporary* protection, *partial* protection, and *full* protection against fire, and to classify all building materials and systems of construction under these three headings. The exact and definite limit of these three classes is based on the experience obtained from numerous investigations and tests, combined with the experience obtained from actual fires, and after due consideration of the limitations of building practice and the question of cost.

The executive's minimum requirements of fire-resistance for building materials or systems of construction will be seen from the standard tables appended for—

I. Fire-resisting floors and ceilings,
II. Fire-resisting partitions,
III. Fire-resisting doors,

but they could be popularly summarized as follows:—

(*a*) That temporary protection implies resistance against fire for at least three-quarters of an hour.

(*b*) That partial protection implies resistance against a fierce fire for at least one hour and a half.

(*c*) That full protection implies resistance against a fierce fire for at least two hours and a half.

The conditions under this resistance should be obtainable, the actual minimum temperatures, thickness, questions of load, and the application of water can be appreciated from the annexed tables by all technically interested, but for the popular discrimination—which the executive are desirous of encouraging—the time standard alone should suffice.

It is desirable that these standards become the universal standards in this country, on the continent and in the United States, so that the same standardization may in future be common to all countries, and the preliminary arrangements for this universal standardization are already in hand.

Fire Combating.—As to self-help, complication must always be avoided. The amateur fireman must be drilled on the simplest lines. One thing which must be instilled into him is not to waste water—a sure sign of lack of training. Of course the drills must be on the same lines as those of the local brigade, and on no account should other gear be used for self-help than is generally

Standard Table for Fire-resisting Floors and Ceilings.

Classification.	Sub-Class.	Duration of Test. At Least	Minimum Temperature.	Load per Superficial Foot Distributed (per Sq. Metre).	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Press.
Temporary Protection	Class A	45 mins.	1500° F. (815·5° C.)	Optional	100 sq. ft. (9·290 sq. m.)	2 mins.
	Class B	60 mins.	1500° F. (815·5° C.)	Optional	200 sq. ft. (18·580 sq. m.)	2 mins.
Partial Protection	Class A	90 mins.	1800° F. (982·2° C.)	112 ℔ (546·852 kg.)	100 sq. ft. (9·290 sq. m.)	2 mins.
	Class B	120 mins.	1800° F. (982·2° C.)	168 ℔ (820·278 kg.)	200 sq. ft. (18·580 sq. m.)	2 mins.
Full Protection	Class A	150 mins.	1800° F. (982·2° C.)	224 ℔ (1093·706 kg.)	100 sq. ft. (9·290 sq. m.)	2 mins.
	Class B	240 mins.	1800° F. (982·2° C.)	280 ℔ (1367·130 kg.)	200 sq. ft. (18·580 sq. m.)	5 mins.

kg. = kilogramme.

Standard Table for Fire-resisting Partitions.

Classification.	Sub-class.	Duration of Test. At Least	Minimum Temperature.	Thickness of Material.	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Press.
Temporary Protection	Class A	45 mins.	1500° F. (815·5° C.)	2 in. and under (·051 m.)	80 sq. ft. (7·432 sq. m.)	2 mins.
	Class B	60 mins.	1500° F. (815·5° C.)	Optional	80 sq. ft. (7·432 sq. m.)	2 mins.
Partial Protection	Class A	90 mins.	1800° F. (982·2° C.)	2½ in. and under (·063 m.)	80 sq. ft. (7·432 sq. m.)	2 mins.
	Class B	120 mins.	1800° F. (982·2° C.)	Optional	80 sq. ft. (7·432 sq. m.)	2 mins.
Full Protection	Class A	150 mins.	1800° F. (982·2° C.)	2½ in. and under (·063 m.)	80 sq. ft. (7·432 sq. m.)	2 mins.
	Class B	240 mins.	1800° F. (982·2° C.)	Optional	80 sq. ft. (7·432 sq. m.)	5 mins.

Standard Table for Fire-resisting Single Doors, with or without Frames.

Classification.	Sub-class.	Duration of Test. At Least	Minimum Temperature.	Thickness of Material.	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Press.
Temporary Protection	Class A	45 mins.	1500° F. (815·5° C.)	2 in. and under (·051 m.)	20 sq. ft. (1·858 sq. m.)	2 mins.
	Class B	60 mins.	1500° F. (815·5° C.)	Optional	20 sq. ft. (1·858 sq. m.)	2 mins.
Partial Protection	Class A	90 mins.	1800° F. (982·2° C.)	2½ in. and under (·063 m.)	20 sq. ft. (1·858 sq. m.)	2 mins.
	Class B	120 mins.	1800° F. (982·2° C.)	Optional	20 sq. ft. (1·858 sq. m.)	2 mins.
Full Protection	Class A	150 mins.	1800° F. (982·2° C.)	½ in. and under (·018 m.)	25 sq. ft. (2·322 sq. m.)	2 mins.
	Class B	240 mins.	1800° F. (982·2° C.)	Optional	25 sq. ft. (2·322 sq. m.)	5 mins.

customary in that force. When volunteers and regulars work together, the former should always remember that the paid force are experts, though the regulars must never have that contempt for volunteer work so often noticeable. Volunteers are often men who are probably experts in some other vocation outside fire-fighting, and have not had the opportunities which a professional fire-fighter has had.

Transmission of Fire-Calls.—There are several methods of transmitting the message of a fire-call. The simplest is, of course, to run direct to the nearest fire-station; but this is only possible where the distance is short. In one or two cities, however, the number of fire-stations is so great that they are very close to one another, and hence "direct" calls are generally recorded.

Then comes the system of special messengers. The fire is reported at some public office, police-station or guard-room, where there are always runners ready to start off to the nearest fire-station. The special runner is here practically a makeshift for the more modern telegraph or telephone line, and it is believed that the only city in which this system is employed is one where the unsettled political atmosphere has compelled the authorities to prohibit the construction of any telegraph lines other than those for the use of the general postal service. Similar messenger services have, however, also been introduced in connexion with the telegraphic signalling system. Private enterprises known as "general messenger" or "call-boy" services, which are organized for business purposes, have the advantage of including the fire-call and the police-call. In the same way that a cab can be signalled, a call may come for a fire-engine, and the ever-ready runner makes off to the fire-station instead of to the cab rank. As a rule, these messenger offices are near the fire-station. The combination is rather a curious one, as it embraces the most advanced notions of giving every "risk" its own fire-call, and the somewhat ancient one of the special runner.

Another system for facilitating the fire-call relies entirely on the public telephone system, the terms of subscription to which may compel holders to forward fire messages if required to do so. This system allows for such development as the payment of retaining fees to porters in public and other buildings which have a night service, on condition that the fire-call shall be promptly despatched. The telephones are, perhaps, even provided free, if they are not forthcoming; but it should be remembered that the service always goes through a general telephone exchange, which is, of course, open day and night.

In the special telephone line system special wires are laid from buildings which are practically open all the year round direct to their nearest fire-stations, and some payment is again made for prompt attention. Sometimes the telegraph takes the place of the telephone, but this requires the porter or attendant to be specially trained to the work. To simplify matters, the buildings are sometimes provided with automatic fire-calls instead of telephones; but the principle of the system remains the same. In districts where there are few public offices, the list of buildings at which messages can be handed in has been frequently augmented by a set of bakeries or apothecaries' shops, where night service is not unusual.

What may be termed semi-public street alarms come next. Automatic fire-calls are put up in the street, but their handles are under lock and key, and the keys are distributed only among policemen, watchmen or householders, and the messages can, therefore, only be given by persons known to the authorities.

The public automatic street-call is the simplest system next to the direct message. Private automatic fire-calls or telephones can be laid on from dangerous risks, and there has even been an instance where an attempt was made to give every householder a private fire-call. This system is, however, unfortunately too extreme for the municipal purse. If in connexion with some other paying enterprise, as in the case of the messenger services referred to, it would be a different matter, though it should also not be forgotten that too great a number of call points means a probable repetition of signals of the same fire, and a risk of too many sections of the fire brigade being on the road to it.

Besides these forms of "call," there is also the private alarm. Dangerous buildings are frequently provided with telephones, alarm-posts, or even automatic temperature indicators, by which a call can be given direct from the "risk" involved.

Call points should be not only conspicuous, but also in most frequented positions. Possibly, in some towns, a point in front of a church would be the best; in others, the front of a public-house. It should always be remembered that every facility should be given to enable as many people as possible to know the whereabouts of the call points without any distinct effort on their part. Red paint may make a call pillar conspicuous by day, and a coloured lamp by night.

As to the indication of call points, a plate on every letter-box stating the position of the nearest call-point is perhaps one of the best methods. The letter-box is one of the instruments most in use in a modern city, and hence the plate is read by many. In an oriental town the public fountain would, however, take the place of the letter-box. Plates put up inside every front door are somewhat extreme measures. In one city red darts are painted on the glass of every street lamp, indicating the direction to be taken to find a street alarm. This sign, however, has the disadvantage of requiring a previous knowledge of its meaning, and is generally useless to a stranger in the town.

Rewards paid to messengers vary from one shilling to half a sovereign. In some places every call is rewarded—even those to chimney fires—and this often results in an abuse of the privilege. Rogues light fires on the top of a chimney and then run to call the engines. If a reward be given, a limitation should be made. In one town no relation or employé of the owner receives a reward. In other cities no rewards are given for calls to a fire in a dust-bin or a chimney.

No true fireman would be annoyed at a false alarm given by mistake. The possibility of a fire, or the suspicion of one, is a bona fide reason for a call which should not be discouraged. Malicious alarms should, however, be treated with the utmost rigour, as the absence of firemen from their stations always means an extra risk to life and property. Combined "lynch law" and imprisonment has generally been adopted with good effect. The rascal should first be put when caught over the pole of the engine and thrashed with a broad fireman's belt, and after that handed to the police.

The fire-call should, if possible, also be so constructed as to facilitate intercommunication between the scene of a fire and the headquarters of the fire brigade. Where the runner is employed or the telephone is used no special arrangements are required, but where the telegraph or automatic call point has been introduced, the apparatus must be adapted for this contingency. At some automatic fire-call points a few signals can be given, at others a telegraphic or telephonic transmitter can be applied. Much valuable time may be saved in this way when more assistance is required.

Fire Brigades.—The organization of fire brigades varies greatly. There are brigades where officers and men are practically constantly ready to attend a fire, and others where they are ready on alternate days, two days out of every three, or three days out of every four, and the off day is entirely their own, or at the most, only partially used by the authorities for some light work. The men off duty are only expected to attend a fire if there is a great emergency, the brigade being strong enough without them for ordinary eventualities. Both systems can be worked with or without part-paid or volunteer service, which would be only called out for great calamities. They could be organized as a practically independent reserve force, or the reserve men might be attached to sections of the regulars and mixed with them when the occasion arises. The reserves can consist either of retired firemen who have a few regular drills, or of amateurs who go through a special course of training, and have some series of drills at intervals, with preferably a short spell of service every year with the regulars. For the regulars, forty-eight hours on duty to every twenty-four off has given the most satisfactory results.

The division of the active force may be on a system of a number of small parties of twos and threes backed by one or more strong bodies. Another system allows for subdivision into sections of equal strength, ranging from parties of, say, five men with a non-commissioned officer to thirty non-commissioned officers and men with an officer. The force can, of course, also simply be divided up into parties or sections of different strengths not governed by a system of military units. The sections either can work independently, as units, simply governed by one central authority, or there can be a grouping of the units into minor or major bodies or districts, each duly officered, and as a whole individually responsible to headquarters.

The officers may be all taken from the ranks, or they may be "officers and gentlemen" in the military sense, or have only temporarily done work with the rank and file when in training. There could also be a combination of these two systems. Only the captain and deputy-captain might be officers in the military sense, the sections or divisions being officered by "non-coms." Some cities have an officer to every thirty "non-coms" and men, whilst others put a division of as many as two hundred under a fireman who has risen from the ranks. Where protection is treated as a science, and where those in charge of a brigade have really to act as advisers to their employers, officers in the military sense have been found essential. They have also been found advantageous where their scope is limited to fire extinguishing. The prestige of the fire service has been raised everywhere where the officers, besides being fire experts, are educated men of social standing. There are cities where the officers of the fire brigade are in every way recognized as equal to army or navy men, their social position is the same, and their mess fulfils the same functions as a regimental mess. The fire brigade officer is recognized at court, and there is no ceremonial without him. On the other hand, there are also cities with brigades several hundred strong where the captain's social standing is beneath that of a petty officer or colour-sergeant. As to the primary training of a fire brigade officer, the best men have generally had some experience in another profession, such as the army, the navy, or the architectural and engineering professions, previous to their entering the fire service. Some brigades recruit from army officers only, and preferably from the engineers or artillery regiments; others recruit from among architects and engineers, subject to their having at least had some military experience in the reserve forces or the volunteers. Some cities only take engineers or architects, and make a point of it that they should have no previous military experience. Some previous experience in the handling of men is essential.

As to the men, there are cities where only trained soldiers are taken as firemen; others where the engines are manned by sailors. In some towns the building trades supply the recruits; in others, all trades are either discriminately or indiscriminately represented. A combination from the army or navy on the one side and the building trades on the other is most satisfactory. The knowledge of building construction in the ranks stands the force in good stead, and has often saved both lives and property. Where a brigade can boast of a few men of each important trade, much money has been saved the ratepayers by the men doing their own repairs and refitting, but the number of men from sedentary trades should not be excessive. Where there are only men of one trade or calling, there is often too great a tendency to one-sidedness, and a great amount of prejudice.

Physical strength and perfect constitution are requisite for both officers and men. As to the height of the men, small, wiry men are very useful. First-class eyes, ears and nose are necessary, also a good memory. Fat men are entirely out of place in a brigade, and should be transferred to some other service if the fatness be developed during their engagement with a brigade. Many brigades take only single men, "non-coms" and officers only being allowed to marry. There are many brigades where twenty-two and forty are the limits of age for the privates, fifty for the "non-coms," and sixty for the officers.

As to the equipment, there are brigades which have all their sections or units provided with practically the same gear; others where each unit has a double or treble set, one of which is used according to circumstances. The section may have a manual engine, a steamer and a ladder truck at its disposal, and may turn out with either. There are towns where the units are differently equipped, and steamer or manual sections called out, as the case may be. In a few extreme cases, where the sections are very strong, they may be equipped with a set of engines and trucks, and the unit, in every case, turns out complete with (say) a chemical engine, a steamer and a horsed escape. The contrast to this will be found in the small parties of twos or threes, whose turn-out would only consist of a small hose trolley or an escape. Of course, there are all kinds of combinations, the most important of which allows a section to have one or more independent subsections. Though practically belonging to the "unit," the subsections work independently in charge of a certain gear. This may be a hose-reel, a long ladder, or a smoke helmet, according to circumstances. The subsections may act as outposts or simply as specialist parties, which are only called out for particular work.

As for the housing of the units or sections, simple street stations are provided for the small parties referred to. In a few cases two small parties are housed under the same roof. The large bodies that back them are generally quartered together in extensive barracks, from which any number of engines and men can be turned out according to the nature of the call. Then there are cities where every section has its own well-built station; others where one or two sections are housed together, according to circumstances, and perhaps as many as half a dozen located at headquarters. If groups are formed, the headquarters of the group or district has, perhaps, two sections, while each of the other stations has only one. The general headquarters may be the central station of a district at the same time. The actual working of the district headquarters would, however, then be kept separate from the working of the headquarters staff. The latter would, perhaps, have some sections ready to send anywhere besides the trucks, &c., necessary for the officers, the general extra gear, &c., that might be required. It is usual to combine workshops, stores, hose-drying towers, &c., with the headquarters station, and, in some cases, also with the district centres.

In the distribution of the stations, the formation of districts, &c., various systems have been adopted. The most satisfactory results have been obtained where a fully-equipped section (not simply a hose-car or escape-party) can reach any building in the city within six minutes from the time of the call reaching the station, the six minutes including both turn-out and run. Where there are exceptionally large or dangerous risks, this time has had to be shortened to four minutes, and the possibility of an attendance from a second station assured within six minutes. In dividing up districts, the most satisfactory results have been obtained where every house can be reached from the district centre within fifteen minutes from the call. Headquarters would naturally have a central position in the city. In one or two instances the headquarters offices are located in a separate building, which in no way serves as a fire-station, but simply as a centre through which all orders and business pass.

The different stations must be in connexion with each other. The special runner or rider is practically disappearing. The telegraph and telephone have taken his place. Some cities favour Morse telegraphy, which certainly had great advantages over the telephone at one time, as messages could be easily transmitted to several stations with the same effort, but telephone distributors have now been successfully introduced. Errors are less frequent by telegraph than by telephone, and there is always a record of every message. The most modern forms of telephone communication are, however, more suitable for the fire service than the telegraph. Headquarters should be in direct communication with every station, but every station should be able to communicate with its neighbour directly, as well as through the headquarters office, and there should be a direct wire to its district station if it has one. There should be three routes of communication, so that two should be always ready for use in case of one breaking down. Either headquarters or the district centres would be in touch with the various auxiliaries referred to, as well as the general telegraph office and the telephone exchange.

As to the attendance at fires, some cities turn out but one unit to answer the first call if they have no particulars, others always turn out two or three sections, and there are several cities where the district centre would at least send an officer and a few men as well. In one brigade, headquarters is always represented by either the chief or the second officer in the case of a call of this kind. The idea is that it is always better to have too strong a force quickly in attendance than too small a number of men, and that it is most important that the first arrival should be well handled. Further, if two sections answer a call and one breaks down on the road, there is no chance of there being too great a delay in the arrival of organized help. It should, however, not be forgotten that further calls in the same district to other fires are not unusual, and that the absence of too many engines, on account of a first call, is dangerous. In some cities, when a call reaches the firemen one or two of the nearest stations turn out, and if more help is required other sections will be called up individually. In others the reinforcements are not called up separately, but the fires are divided into three classes—small, medium and large; and on the message arriving of a more extensive conflagration at a certain point, the section already know beforehand whether they must attend or not. First calls to certain classes of risks, *e.g.* to theatres or public offices, may always be considered to be for medium or large fires; and the same message will then simultaneously turn out the stronger body without any further detailed instructions being necessary. In some towns the fire-call automata are so arranged that the messenger can at once call for the different classes of fire. This, however, is not to be recommended, as a messenger will probably consider the smallest fire to be a gigantic blaze, and will bring out too many engines.

Equipment.—The following are characteristic features in the equipment of brigades. First, where there is a high-pressure water supply, some brigades simply attend with hose-cars, life-saving gear and ladders; or, instead of the hose-cars, take their manuals, which they practically never use and which serve only as vehicles to carry men and hose. Others take, and make a point of using, the manuals, and have a barrel with them ready to supply the first gallons of water necessary. No time is thus lost in connecting with the nearest hydrant or plug; and in case of a hydrant being out of order, there is always sufficient water at hand until the second hydrant has been found. Many cities have introduced chemical engines to take the place of this combination of water barrel and manual engine. A supply of water is carried on the chemical engine. Some cities always have an attendance of steamers, which are, however, only used in urgent cases. In other instances the steamer is at once used in the same way as the manual, and this quite independently of the pressure there is in the water service. Where there is no good water service, manuals or steamers have, of course, to be sent out, and are supplied either from the low-pressure service or from the natural waterways or wells. There are still a large number of cities where the suburbs have no proper water service, and the water barrel is then very handy for water porterage. Attempts have also been made at the chemical treatment of water which is to be thrown on to a fire, with the view of increasing its effect, or at the use of chemicals instead of water. In certain localities fire appliances are still run out to fires by hand, especially where there is a high pressure water system and hose carts only are required. Generally the appliances are horsed. Motor traction is, however, now rapidly superseding horse traction for reasons of economy and the wider and more rapid range of efficiency.

As to life saving and manœuvring gear, some brigades rely almost entirely on hook ladders, others almost entirely depend on scaling ladders or telescopic escapes. In some great confidence is placed in the jumping-sheet; in another, chutes are much used; and there are a few where wonderful work is done with life-lines. To indicate the diversity with which any one appliance can be treated, made or handled, in the fire service, it may be mentioned that there are quite ten different ways in which a jumping-sheet can be held. Then there is the material of the jumping-sheet to be considered; the size and the shape—whether round, oblong, square or rectangular; then the means of holding it, the way to fold it, how and where to stow it, and at what distance from the endangered building the sheet is to be held. Last, but not least, come the words of command.

Working of Brigades.—In some forces all possible attention is given to the rapidity of the actual turn out, while in others the speed at which engines run to the fire is considered to be of primary importance. Other brigades, again, give equal attention to both. There are brigades which work entirely on military lines, each man having certain duties marked out for him beforehand for every possible occasion, and there are others where happy-go-lucky working is preferred. Of course there are combinations in the same way as regards command. Some chief officers arrive at a fire with a staff of adjutants and orderlies, and control the working of the brigade from a position of vantage at a distance. Other chiefs delight to be in the thick of a fire, perhaps at the branch itself, or on some gallant life-saving exploit where they no doubt do good work as a fireman, but in no way fulfil the office of commanders. Officers must remember that they are officers, and not rank and file; and this is generally very difficult to those who have advanced from the ranks. Superintendents, however smart, must leave acts of bravery to their men, and chief officers, without going to extremes, must always be in a good position where they can superintend everything pertaining to the outbreak in question. Some brigades seem to make a point of working quietly, and shouting is absolutely forbidden, all commands being given by shrill whistles. In some brigades all commands are given by word of mouth, and there is much bawling. In others commands, besides being bawled, are even repeated on horns, and the noise becomes trying. As a rule, quiet working is a sign of efficiency.

Some brigades work as close as possible to the fire, others are satisfied with putting water on or about the fire from a distance. Some attack the fire direct, others only try to protect what surrounds the seat of the flames. Several brigades are ordered always to try to attack by the natural routes of the front door and the staircases. In others, the men always have to attempt some more unnatural entrance, with the aid of ladders—through windows, for instance. Some brigades carefully extinguish a fire, some simply swamp it. Some brigades boast of never having damaged property unnecessarily. They have, for instance, had the patience to suffocate a cellar fire, instead of putting the whole cellar under water. In certain classes of property the bucket, the mop, and the hand-pump have been far more effective in minimizing actual destruction than the branch and hose. It is one of the easiest signs by which to judge the training and handling of a fire brigade—to see what damage they do. Even an inconsiderate smashing of doors and windows, when there is absolutely no need for it, can be avoided, where every man in the force feels that his first duty is to prevent damage and loss and his second to extinguish the fire.

Where the brigade includes a salvage division, it is generally stationed at headquarters; where this division is split up into sections, there would also be a distribution among the district centres; the salvage men are simply part of the force, told off on special duty. Where there are private salvage corps, their stations are generally near the headquarters or district centres of the brigade, from which they receive notice of the fire. In some cities the salvage corps work quite independently; in others, they work under the chief of the brigade directly they arrive at the fire.

As to the working of allied civilian forces in conjunction with the fire service, the advantages of firemen having plenty of room to work in is now fully recognized, and the police are at once called out and often brought on to the scene in an incredibly short time. The value of these measures should not be underrated, especially in cities where rowdyism exists. In many cities the ambulance service is also turned out to fires. Where no independent ambulance corps exists, some of the firemen should be trained to work as ambulance men. Turncocks and gasmen are also frequently brought to all fires. Lastly, in many garrison towns the military turn out to assist the fire brigade.

National Fire Brigades' Union.—The National Fire Brigades' Union, which is the representative Fire Service Society for Great Britain, originated in a national demonstration of volunteer fire brigades held at Oxford in celebration of Queen Victoria's jubilee on the 30th of May 1887, when 82 fire brigades with 916 firemen were present. Next day a meeting of the officers was held at the Guildhall, Oxford, and it was then resolved to form the National Fire Brigades Union. Alderman Green, the chief officer of the Oxford fire brigade, was appointed the first chairman. Sir Eyre Massey Shaw was appointed first president in 1888, and on his retirement in 1896 through ill-health he was succeeded by the duke of Marlborough. When the union offered to provide ambulance firemen and stretcher bearers for his regiment the duke accepted the offer, and two fully equipped corps were sent out to the Imperial Yeomanry hospital at Deelfontein, South Africa, under Colonel Sloggett, who specially mentioned the services rendered by the firemen in his despatches.

The union is divided into seventeen districts, each having its own council, and sending one delegate for every ten brigades to the central council. The districts are:—Eastern, Midlands, South Coast, South-Eastern, West Midland, North-Eastern, North-Western, South Western, Surrey, South Midlands, Southern, South Wales, North Wales, Cornish, Yorkshire, Central and South Africa (formed in 1902). There are also seventy-five foreign members and correspondents in America, Australia, Austria, Belgium, Canada, Denmark, France, Germany, Holland, Italy, New Zealand, Russia, South Africa, India and the Federated Malay Straits. The total strength of the union is 667 fire brigades and members with nearly 12,000 firemen. Every member of the union gives his time and services for the benefit of the country; all appointments are honorary, with the exception that a small allowance is made for clerical assistance. A drill book is issued by the union, and the fourth edition was published in 1902. Over 60,000 of these books have been issued to brigades all over the world.

The ambulance department is under the charge of medical officers. All members have to come up for re-examination every three years, else they are not entitled to wear the red cross, and the examination is more stringent than that held by the St John Ambulance Association. This department has proved to be a great benefit to provincial fire brigades, who are often called upon to undertake ambulance work. A very useful and instructive manual has been issued by the union entitled *First Aid in the Fire Service*, by Chief Officer William Ettles, M.D.

The union organized and took part in the International Fire Exhibitions, at the Royal Agricultural Hall, London, in 1893 and 1896, and it was represented at the International Fire Congresses at Antwerp, Brussels, Ghent, Paris, Lyons, Havre and Berlin. It has also held a review before the German emperor at the Crystal Palace, and before Queen Victoria in Windsor Park.

Fire Brigade Organization.

Below are given examples of the organization of different fire brigades. The brigades so described have been selected not so much on account of their intrinsic importance, as because they represent classes or types of brigades and fire brigade organization which it may be useful to refer to. In respect of the London fire brigade, however, historical data are also presented, as it is only with the aid of these that the extraordinary development of that force can be properly realized.

With regard to modern views as to the functions of the fire brigade, the resolutions of the Fire Prevention Congress of 1903 are reprinted below. As they indicate, the general feeling amongst all interested in fire protection from an economic point of view is that fire brigades should not be merely fire extinguishing organizations but should utilize their influence in a much wider sense.

The Congress considered:—

1. That public authorities should encourage fire brigade officers to take an active interest in the preventive aspect of fire protection, inasmuch as the result of the fire brigade officers' experience in actual fire practice, if suitably applied in conjunction with the work of architects, engineers and public officials, would be most useful for the organization and development of precautionary measures.

2. That fire brigade societies, associations and unions should encourage amongst the brigades affiliated to these bodies the study of questions of fire prevention.

3. That fire brigades should be placed on a sound legal basis, and that it is advisable that their efficiency be supervised by a government department.

4. That an official investigation should be made of all fires. That on the occurrence of every fire an investigation should be immediately made by an official, duly qualified and empowered to ascertain the cause and circumstances connected therewith, reporting the result of such investigation to a public department for tabulation and publication.

5. That the whole or part of the cost of such inquiry should be charged to the occupier of the premises where the fire occurred, as may appear desirable in the circumstances of each case.

6. That the press should from time to time publish technical reports on fires so that the public may benefit from the knowledge and experience gained.

London.—In the early part of the 19th century the methods in vogue for the suppression of outbreaks of fire in the metropolis were of the most crude and disjointed character, in striking contrast with the highly elaborated system now put into practice by the London County Council through its fire brigade; and it was not until the second half of the 19th century was well advanced that anything approaching an adequate and satisfactory organization was brought into existence. Until the passing of the Metropolitan Fire Brigade Act 1865, the only acts relating to the suppression of outbreaks of fire in London were the Lighting and Watching Act (3 & 4 William IV., c. 90), and "an act (14 Geo. III., c. 78) for the further and better Regulation of Buildings and Party Walls, and for the more effectually preventing Mischiefs by Fire within the Cities of London and Westminster, and the Liberties thereof, and other the Parishes, Precincts and Places within the Weekly Bills of Mortality, the Parishes of Marylebone, Paddington, St Pancras, and St Luke's at Chelsea, in the County of Middlesex." The clauses in the latter act relating to protection against fire remained in force till the passing of the act of 1865. They provided that every parish should keep "one large engine and one small, called a hand engine, a leathern pipe, and a certain number of ladders." The Lighting and Watching Act contained a clause which extended to England and Wales and so covered the area "without the bills of mortality," enabling the inspectors appointed under that act to provide and keep up two fire-engines; and certain of the parishes in the metropolitan district, without the bills of mortality, availed themselves of this provision.

The select committee of fires in the metropolis, which sat in 1862, reported that it was difficult to ascertain how far the act of George III. was attended to, or when it ceased to be considered practically of importance, but that, at the time of the report, the arrangements generally made by the parishes under the act were not only entirely useless, but in many cases produced injurious results, as the system under the act frequently conferred a reward for the first useless parochial engine, whereas the efficient engine which might be on the spot a few minutes later derived no pecuniary advantages. There were, however, exceptions to the general rule. At Hackney, for example, a "very efficient" fire brigade was maintained at an expense of about £500 a year, or about one halfpenny in the pound on the rating of the parish. The select committee were unable to ascertain with any accuracy the total amount paid by the metropolitan parishes for the maintenance, "however inefficient," of their fire-engines, but it was estimated to be about £10,000.

For many years previous to 1832, the principal fire insurance offices in London kept fire brigades at their individual expense; to these brigades were attached a considerable number of men usually occupied as Thames watermen, retained in the service of the different Fire Offices, who received payment only on the occurrence of fires, and who wore the livery and badge of the respective companies. These fire brigades were, to quote the report of the select committee of 1862, considered as giving notoriety to the different insurance companies, and a considerable rivalry was maintained, which was productive naturally of good as well as of some considerable evil on occasions of fires.

The large expenses thus incurred by the companies induced an attempt to be made, which was effectually carried out in the year 1832, by R. Bell Forde, a leading director of the Sun Fire Office, to form one brigade for the purpose of promoting economy as well as greater efficiency. Thus the first organized fire brigade for London began its operations under the united sanction of, and from funds contributed by, most of the leading insurance offices in London. The force thus formed was known as the London Fire Engine Establishment. The annual expense was at first £8000, the number of stations 19, the number of men employed 80. By 1862 the annual cost had grown to £25,000, the number of stations had become 20, and the number of men 127.

It is interesting to note that the chief station of the Fire Engine Establishment was the Watling-Street station, in substitution for which the new Cannon-Street station has been built. The following is a list of the other stations of the establishment:—

School House-lane, Shadwell
Wellclose Square
Jeffrey's Square
Whitecross Street
Farringdon Street
Holborn
Chandos Street
Tooley Street
Lucas Street, Rotherhithe
Crown Street, Soho
Wells Street
Baker Street
King Street, Golden Square
Horseferry Road
Waterloo Road
Southwark Bridge Road
Southwark Bridge (floating)
Rotherhithe (floating)

The work of this force was carried out in an efficient manner as far as its limited equipment and strength would permit, but it was universally admitted that the staff, engines and stations were totally inadequate for the general protection of London from fire. The directors of the insurance offices themselves admitted this, but they considered their brigade sufficient for the protection of that part of London in which the largest amount of insured property was located, and contended that it was not their business to provide fire stations in the more outlying districts where, if a fire occurred, it was not likely to involve their offices in serious loss.

From 1836 the work of the brigade maintained by the fire offices was supplemented by the "Society for the Protection of Life from Fire." This society was managed by a committee of which the lord mayor was president. It was supported entirely by voluntary contributions, and, at a cost of about £7000 a year, maintained fire-escapes at from 80 to 90 stations in different parts of the most central districts in London. Its most outlying station was only 4 m. from the Royal Exchange, and it maintained no stations in such localities as Greenwich, Peckham, Deptford and New Cross. It did much useful work, though its equipment was quite inadequate to cope with the needs of the metropolis.

In 1834, two years after the institution of the London Fire Engine Establishment, the Houses of Parliament were destroyed by fire, and the attention of the government was consequently directed to the inadequacy of the existing conditions for fire extinction. It was suggested, at the time, that the parochial engines should be placed under the inspection of the commissioners of police, but this proposal was not adopted, and the existing state of matters was allowed to continue for another thirty years. The select committee of 1862 recommended that a fire brigade should be created under the superintendence of the commissioners of police, and should form part of the general establishment of the metropolitan police. In 1865, however, the Metropolitan Fire Brigade Act was passed, under which the responsibility for the provision and maintenance of an efficient fire brigade was laid upon the Metropolitan Board of Works. Under the provisions of the act, the board took over the staff, stations and equipment of the Fire Engine Establishment; the engines maintained by the various parochial authorities, and the men in charge of them were also absorbed by the new organization, as were the fire-escapes and staff of the Society for the Protection of Life from Fire.

The funds provided by the Fire Brigade Act for the maintenance of the brigade were: (1) the produce of a halfpenny rate on all the rateable property in London; (2) contributions by the fire insurance companies at the rate of £35 per million of the gross amount insured by them in respect of property in London; and (3) a contribution of £10,000 a year by the government. Although the revenue allotted increased year by year, its increase was far from keeping pace with the constant calls from all parts of London for protection from fire. Some temporary financial relief was afforded by the Metropolitan Board of Works (Loans) Act 1869, which (1) authorized the interest on borrowed money to be paid, and the principal to be redeemed out of the proceeds of the Metropolitan Consolidated rate, apart from the halfpenny allocated for fire brigade purposes; and (2) provided that the amount to be raised for the annual working expenditure on the brigade should be equal to what would be produced by a halfpenny in the pound on the gross annual value of property, instead of, as before, on the rateable value. One result of the passing of the Local Government Act 1888 (by which the London County Council was constituted), under which a county rate for all purposes is levied, was virtually to repeal the limitation of the amount which might be raised from the ratepayers for fire brigade purposes. Since that time the expenditure on the brigade has therefore, like that of other departments of the council's service, been determined solely by what the council has judged to be the requirements of the case.

When the council came into existence early in 1889 the fire brigade was admittedly not large enough properly to protect the whole of London, the provision in various suburban districts being notoriously inadequate to the requirements. A plan for enlarging and improving old stations, and for carrying out a scheme of additional protection laid down after careful consideration of the needs of London as a whole, was approved on the 8th of February 1898 (and somewhat enlarged in 1901); it provided for the placing of horsed escapes at existing fire stations, for the establishment of some 22 additional stations provided with horsed escapes, and for the discontinuance of nearly all the fire-escape and hose-cart stations in the public thoroughfares.

Since it came into existence the London County Council has established additional fire stations at Dulwich, New Cross, Kingsland, Whitefriars, Lewisham, Shepherd's Bush, West Hampstead, East Greenwich, Perivale, Homerton, Highbury, Vauxhall, Pageant's Wharf (Rotherhithe), Streatham, Kilburn, Bayswater, Eltham, Burdett Road (Mile End), Wapping, Northcote Road (Battersea), Herne Hill, Lee Green and North End (Fulham). Of these, Vauxhall, Kilburn, Bayswater, Eltham, Burdett Road, Herne Hill and North End stations are sub-stations. New stations have been erected, in substitution for small and inconvenient buildings, at Wandsworth, Shoreditch, Fulham, Brompton, Islington, Paddington, Redcross Street (City), Euston Road, Clapham, Mile End, Deptford, Old Kent Road, Millwall, Kensington, Westminster, Brixton and Cannon Street (City), and the existing stations at Kennington, Rotherhithe, Clerkenwell, Hampstead, Battersea, Whitechapel, Greenwich and Stoke Newington have been considerably enlarged. Two small stations without horses have been established in Battersea Park Road and North Woolwich respectively. A building has been erected at Rotherhithe for the accommodation of the staff of the Cherry-garden river station; and another building has been erected at Battersea for the accommodation of the staff of a river station which has been established there.

In 1909 new stations in substitution for existing stations were in course of erection at Knightsbridge and Tooting, and additional sub-stations were being erected at Plumstead and Hornsey Rise. The Bethnal Green station was being considerably altered and enlarged. The council had also determined to erect new stations in substitution for existing inconvenient buildings at Holloway, Waterloo Road, Shooter's Hill and North End, Fulham; and to build additional sub-stations at Charlton, Caledonian Road, Brixton Hill, Camberwell New Road, Roehampton, Balham, Brockley and Earlsfield.

Budapest.—There is a combination of a professional force and a volunteer force at Budapest, and in addition an auxiliary service of factory fire brigades. The professional fire brigade possesses a central station and eight sub-stations, two minor stations, and permanent theatre-watchrooms at the royal theatres. The staff (in 1901) of the professional brigade consisted of a chief officer, an inspector, a senior adjutant and two junior adjutants, a clerk, and further 23 warrant officers, 3 engineers, 15 foremen, 154 firemen and 30 coachmen with 62 horses. There have been some slight increases since. The apparatus at their disposal consists of 6 steam fire-engines, 22 manual engines, 27 small manual engines, 11 water carts, 13 traps, 4 tenders, 26 hose reels and hose carts, 5 long ladders, 9 ordinary extension ladders, 34 hook ladders, 12 smoke helmets and 22,000 metres of hose. The various stations are connected with the central station by private telephone lines. There are 149 telephonic fire alarms distributed throughout the city. They are on radial lines connected up with their respective nearest stations, and on a single radial line there are from three to seventeen call-points.

The volunteer brigade has an independent constitution and comprises some eighty members. Its equipment is housed with that of the professional brigade, and is bought and maintained by the municipality. This volunteer brigade is a comparatively wealthy institution, having a capital of 100,000 crowns, whilst receiving a special subsidy annually from the municipality. Though legally an entirely independent institution, the brigade voluntarily puts itself under the command of the chief officer of the professional brigade. It further puts daily at the disposal of the professional fire chief ten men who do duty every night and "turn out" when called upon to render service. This volunteer brigade stands as a kind of model to the other volunteer brigades, and it is in connexion with this volunteer brigade that the educational classes referred to above are held and facilities accorded to the officers undergoing instruction to gain experience at the Budapest fires.

The Budapest professional fire brigade, even if assisted by the volunteer force, would scarcely be of adequate strength to deal with the great factory risks of that city were it not that the Budapest factories and mills have a splendidly organized service of factory fire brigades. These brigades—forty-four in number—are essentially private institutions, intended to render self-help in the factories to which they belong, but they are well organized, and have a mutual understanding whereby the neighbouring brigades of any one factory immediately turn out and assist in case of need. These factory brigades have a total staff of 1600 men. They are equipped with 1 steam fire-engine, 57 large manuals, 136 small manuals, and have a very considerable amount of small gear, including 15 smoke helmets.

Cologne.—The Cologne professional fire brigade is 153 strong (1906), with a chief officer, a second officer, and two divisional officers, a warrant officer, a telegraph superintendent and 16 foremen. The brigade has 26 horses, of which 2, however, are used for ambulance purposes. The brigade has three large stations and a minor station, and has a permanent fire-watch at the two municipal theatres. Men are told off for duty as coachmen among the firemen. The staff do forty-eight hours of duty to twenty-four hours of rest.

A peculiarity of the Cologne organization is its auxiliary retained fire brigade in two sections, comprising a superintendent, 2 deputy superintendents, 5 foremen, and 51 men, with 2 horses, who are retained men housed in municipal buildings (tenements), and available as an immediate reserve force. The first section of the reserve force are housed centrally.

There is a further system of suburban volunteer fire brigades manned by volunteers but equipped by the municipality, and horsed from the municipal stables or municipal tramways. Three of these volunteer brigades, which have large suburban districts, comprise each a superintendent, 2 senior foremen and 3 junior foremen, with 50 firemen and 3 coachmen. The minor outlying suburbs have several such brigades, each having one senior foreman, 3 junior foremen, 20 firemen and 2 coachmen. The combined force of the suburban volunteer brigades is 295, all ranks.

The Cologne fire service thus comprises a combination of professional brigade with a retained auxiliary brigade and a system of suburban volunteer brigades. Of the three stations, the central one is still an old building, and the other two are in modern buildings; the extra sub-station (near the river stores) is also a modern building. The brigade has about 150 fires to attend per annum. Its printed matter, in the form of an annual detailed report, is exceptionally well prepared. The brigade does permanent "fire-watch" duty at the municipal theatres which are strengthened of an evening. It provides additional watches during performances at all other theatres and public entertainments. Such duties are provided in part by an auxiliary brigade and partly by the professional brigade. A number of the professional brigade are always utilized for doing general work in the workshops of the brigade. The first or central section of the auxiliary brigade drills eleven times per annum, and is additionally turned out eleven times per annum (without drill). Men newly attached to the auxiliary force have to go through a four weeks' recruit drill.

Nuremberg.—The Nuremberg fire service stands as the most economically organized efficient fire service in Central Europe, and its form of organization is peculiar and exceptional. In 1902 the entire fire-service cost the city 126,000 marks (£6300). The total of inhabitants in 1900 was 261,000. For this small amount of money the city gets a highly-trained retained fire brigade of 156 men (1907), and two volunteer fire brigades of 130 and 224 men respectively. Further, it has an auxiliary of eighteen suburban volunteer fire brigades (1080 men) and two private factory fire brigades (71 men). The whole service stands under a professional chief officer and professional second officer. There are 8 telegraph clerks, 6 watchmen and 17 coachmen attached to the retained brigade. The service has been in existence for fifty years. It has gradually developed and has worked remarkably well, and may, in fact, be taken as a model institution for municipal economy, with due regard to up-to-dateness and efficiency. The retained fire brigade comprises entirely municipal employés, regularly engaged in the municipal workshops, scavenging and works department. The municipal workshops are located alongside the fire-brigade stations. There is a headquarters station for the retained brigade and volunteer brigade in the centre of the town, a modern district station in the western district, and a third district station is in course of erection for the eastern district, which is at present only served by a small branch station.

At headquarters station there are on immediate duty by day 14 firemen (chiefly smiths and carpenters) of the retained brigade. Nine men of the retained brigade are on duty at headquarters at night, together with 8 men of the volunteer fire brigade. At the west district station, 14 men of the retained brigade are on duty by day, and the same number at night.

The headquarters can turn out in succession four complete units of the following strength, namely:—

First unit, a large chemical engine, and a mechanical long ladder.

Second unit, a trap with hose reel, a special gear-cart and a long ladder.

Third unit, a trap with hose-cart and manual, and a long ladder.

Fourth unit, a steam fire-engine, and hose-and coal-tender trap.

From the west district station three units can be turned out in rotation, namely:—

First unit, large chemical engine, large trap and a long ladder.

Second unit, a trap with hose-reel and manual engine.

Third unit, a steam fire-engine and a hose-tender and coal-tender trap.

The equipment of the eastern sub-station at present comprises a turn-out of a trap and a long ladder.

The brigade can thus turn out immediately, in rapid succession, these horsed appliances, well organized and fully manned. It further has a reserve of 4 manual engines and 2 long ladders.

The suburban volunteer brigades have besides at their disposal 25 manual engines, 9 fire-escapes and 18 hose-reels. The whole of the hose for all brigades is of uniform pattern and make, with bayonet pattern standard couplings. The brigade posts an evening "fire watch" at the theatres. The men of the retained brigade get modest extra pay for fire brigade duty, but this pay is intended rather to cover disbursements or expenses than to be considered as wages. The brigade uses the municipal horses, all of which are stabled in proximity to the fire stations, and a number of which are kept on duty for fire brigade purposes in the actual stations. For all practical purposes the retained brigade is the professional brigade in which the men do municipal work in the municipal workshops, and elsewhere, *i.e.* in training, drill and general efficiency they are quite up to the best professional standard. The volunteer brigade is well drilled and includes the best of the younger townsmen, who do duty at night by rotation. The brigade's responsibilities are clearly defined, and the position of the professional chief and second officer clearly laid down by by-laws. There are 129 fire-call points. During the fifty years' existence of the service, 85 firemen received the twenty-five years' long-service medal, of whom 32 belonged to the suburban volunteer brigades.

Venice.—The Venice fire brigade is a section of the force of "Vigili" or municipal watchmen, which body does general duty in preserving order and rendering assistance to the community. In other words, this force performs the duties of the civil police (rather than governmental or criminal police), fire, patrol watch service, and public control in a general sense. The force, which in all its sections made a most excellent impression, has a commandant, under whom the two primary sections work, namely (*a*) the civil police section and the (*b*) fire brigade section; each section in turn having its own principal officers. The police section comprises some 108 of all ranks, and the fire brigade section some 73 of all ranks (1908). The commandant of the whole force is a retired military officer, and the chief of the fire service section is a civil engineer, and these two officers, together with the chief of the civil police section, are the three superior officers of the force. The police section serve as auxiliaries to the fire brigade section in case of any great fire, and, of course, generally work very much hand in hand on all occasions. The fire brigade section has 3 superintendents, 6 foremen, 6 sub-foremen, 6 corporals and 40 file. The section is well equipped with appliances, both hand and steam, having a large modern petrol-propelled float, constructed in London, a large old type steam-float, two 35-ft. old steam-floats, and several small petrol motor-floats or first turnout appliances. The manual-engines, ladders, &c., which are in considerable number, are carried in a large fleet of swift gondolas. Fire-escape work is done with Roman ladders, which are usually planted on two gondolas flung together barge-form, or, if the depth of the canal permits, the lower length is buried in the canal bottom. Hook ladders are also used.

Men are distributed in six companies of varying strength, the headquarters company being stationed at the town hall, with a strength of 22, and most of the steam and petrol floats lie opposite the station. The fire brigade does theatre watch duty. As a fire station of considerable interest, should be mentioned the one at the Doge's palace; the large vaults occupying a portion of the ground floor facing St Mark's Square have been adapted for fire station purposes in a very simple yet artistic manner, and the old gear of the brigade has been used to form emblems, &c.

Vienna.—In 1892 the Vienna fire service was reconstituted on modern lines owing to the area of the Vienna municipality having been greatly extended. The professional brigade was somewhat strengthened and entirely re-equipped, and the various existing volunteer brigades of the outlying districts were transformed into suburban volunteer fire brigades, equipped and controlled by the municipality and standing under the general command of the fire brigade headquarters. The principle involved was the utilization of the splendid volunteer force around Vienna for the purpose of strengthening the municipal brigade, a principle of great economic advantage, as the professional brigade would otherwise have had to be materially strengthened, probably trebled. These suburban volunteer fire brigades number no fewer than 34, and have 1200 firemen of all ranks. They are practically independent institutions as far as the election of officers and administration is concerned, but their equipment and uniforms and their fire stations are provided by the municipality, and in certain districts a staff of professional firemen detached from headquarters are attached to their stations as telegraph clerks and drill-instructors.

The suburban volunteer brigades turn out to fires in their own districts, and further, assist in other districts when so ordered by headquarters. They form a strong reserve for great fires in the city proper. Headquarters, of course, renders assistance at large suburban fires. These suburban volunteer fire brigades are very perfectly equipped with appliances, generally of the same type as those used in the central professional brigade. Some of these brigades are equipped with combined chemical engines with 15-metres long ladders attached. They have smoke helmets, and everything that may be termed modern.

The men are volunteers in the truest sense of the word, *i.e.* do not take pay of any description or make any charges for attendance at fires or refreshments at fires.

The Vienna "professional brigade," as it is generally called, has a personnel (1906) consisting of 8 officers, 5 officials and 475 men. Of stations there is the headquarters, a district station, 4 branch stations with steam fire engines, 9 small branch stations, and 2 "watches" in public buildings. The officers of the brigade consist of the commandant, chief inspector and six inspectors. The officers, of whom four are on duty daily, are all quartered at headquarters. There are three telegraph superintendents. The rank and file is composed of 8 drill-sergeants, 40 telegraph clerks (three classes), 53 foremen (two classes), 22 engineers and stokers, 248 men (three classes). Twenty-four telegraph clerks and engineers are detailed for duty with the suburban volunteer brigades. There are 78 coachmen.

The following are the fire-extinguishing and life-saving apparatus and service vehicles of all kinds standing ready to "turn out":—2 open and 2 officers' service carriages (at headquarters), 6 "traps" for the first "turn-out" (5 at headquarters and 1 at the district fire station), each manned by one officer in charge and nine men, and equipped with 3 hook-ladders, a portable extension ladder and jumping sheet, a life-saving chute, an ambulance chest, 3 tool-boxes, a jack, tools, torches, 2 smoke-helmets, with hand-pump and a hose-reel attached; five special gear-carts (4 at headquarters and 1 at the district station), each manned by seven firemen and equipped like the "traps" with the exception that, instead of the life-saving chute, the carts carry with them a sliding-sheet, two petroleum torches each, an extension ladder (15 metres long) and some spare coal for the steam fire-engines; 4 pneumatic extension ladders each 25 metres long, and 3 extension turn-table ladders each 25 metres long (at headquarters and at two of the substations); each of the pneumatic ladders has three men, and each turn-table ladder five men; 18 chemical engines (3 at headquarters and 1 each in the other stations), each having five men with 3 hook-ladders, a jointed ladder (in four sections), a hose-reel, a hand-engine, a smoke helmet, a jumping sheet, an ambulance chest, a tool box, torches, &c.; 8 steam fire-engines (3 at headquarters and one each in the district fire station and the 4 steam-engine stations), each with an engineer and stoker.

The reserve of appliances includes 12 manual engines, 15 large chemical engines, 17 steel water-carts (with 1000 litre reservoirs). The total number of oxygen smoke helmets in the brigade is 68, and there are 15 ordinary smoke helmets with hand-pumps. The total number of horses is 132. One electrically-driven trap and two electrically-driven chemical engines are being tried. The fire telegraphic and telephonic installation, including the lines in the volunteer brigades' districts kept up by the professional brigade, comprises 47 telegraph stations, 249 telephone stations, with altogether 161 Morse instruments and 536 semi-public fire-call points.

Zürich.—Zürich covers about 12,000 English acres, 1500 of which are built over with some 15,000 houses, the whole of the buildings being subject to the local building regulations and the State Insurance Association's rules, in which they are compulsorily insured. The brigade is a compulsory militia brigade, placed under the control of the head of the department of police under a law of 1898. The same municipal officer is head of a special municipal committee of nine, entrusted with the safety of the town from fire. The executive officer of the committee is known as the inspector, and acts as captain of the fire brigade. His office is at the fire-brigade headquarters, where he has a small permanent staff both for brigade work and correspondence. Every male inhabitant of Zürich is compelled to do some service for the prevention of, or protection against, fire, from the age of twenty to fifty years. The duty may be fulfilled (1) by active service, or (2) in the case of an able-bodied citizen, who for some reason is not found suited to be a member of the brigade, or has been dismissed from the brigade, by the payment of a tax, which tax is fixed on the basis of his income. Certain citizens, however, are *ipso facto* exempt from active service, namely members of parliament, members of council of the Polytechnic school, of the Cantonal government, of the High Court of Justice, and of the Town Council; also clergymen and schoolmasters, the officials of railways, tramway and steamboat companies, of the post-office and telephone department, students of the Polytechnic school and other educational institutions and municipal officials, with whose duties fire brigade service is incompatible. Exemption from active service can also be accorded on a testimonial of a medical board. Exemption from active service, however, in no case exempts from the tax, the total of which amounts to between £4000 and £5000. In making the selection of men for active service only, men particularly fitted for the work are taken, namely, men who are personally keen, who have a good physique, and who are preferably of the building or allied trades. The officers of the brigade are appointed by the municipal committee. The men's drills are by the chief officer, and the men are liable to fines and to imprisonment (up to four days) for not attending their drills. The whole of the brigade is insured against accidents and illness with the Swiss Fire Brigade Union at the expense of the city, and the city in addition provides a fund for families in cases of death of firemen on duty. There is also a sick fund provided for the brigade by the municipality, which also accords a scale of compensation.

The fire brigade comprises the very large complement of fifteen companies with 120 men each. Each company has three sections, namely, a fire service section, a life-saving section, and a police section, the last being utilized for keeping the ground and attending to salvage. Each company is supposed to be able, as a rule, to deal with the fire in its own district without calling upon the company of an adjoining district, and it is only in the case of a very serious fire that additional companies are turned out. There is thus a system of decentralization and independence of companies in this brigade not often met with elsewhere. Firemen are paid one franc for each drill of two hours. For fires, two francs for two hours, and fifty centimes per hour afterwards. Refreshments are provided. Any telephone can be used free by law for an alarm. The brigade has at its disposal an extension telephone service, but the men are not all connected up with the telephone of their respective districts, and thus the alarm is given mainly with horns sounded by men who are on the telephone. No section of the brigade has less than ten men on the telephone.

The water-supply is of a most excellent character. The appliances in the main comprise hydrants and hose-reels with ladder trucks, and each section has not less than 3000 ft. of hose. They are mainly housed in small temporary corrugated iron sheds with roller shutter doors, to which all the firemen have keys. There are some sixty of these hydrant houses distributed round the city, the larger appliances being at headquarters and at some depots.

Apart from the fact of there being the inspector or chief officer for the whole district, with a certain permanent staff, each company might be considered as a separate brigade, having its own chief officer and staff, and independent organization, the organization of the companies, however, being identical. A company comprises 1 chief officer, 1 second officer, 1 doctor, 2 ambulance men and 6 orderlies, a staff in charge, and the three sections have respectively 1 lieutenant, 1 deputy-lieutenant and 40 men for the fire service section; 1 lieutenant, 1 deputy-lieutenant and 40 men for the life-saving section, and 1 lieutenant, 1 deputy-lieutenant and 20 men for the police section. Only in the case of sections 1 and 2 is there some slight variation in the organization, namely, 1 and 2 sections have been combined as a joint section, with an additional senior officer. At Zürich, as in all Swiss fire brigades, there is an extraordinary uniformity of drills, rules, regulations and instructions in all its sections. In 1908 the brigade comprised 2268 in all ranks. There were about 70 fires in that year. (E. O. S.)

United States.

Fire service in the United States has developed on so large a scale that in 1902 it was estimated by P. G. Hubert ("Fire Fighting To-Day and To-Morrow," *Scribner's Magazine*, 1902, 32, pp 448 sqq.) that in proportion to population the fire force of America was nearly four times that of Germany or France and about three times that of England. The many fires consequent on wooden construction even in the large cities; the bad effect of sudden climatic changes—drying, parching heat being followed by weather so cold as to require artificial heating; the less safe character of heating appliances; and, especially in tenements, the more inflammable character of furniture, are some of the reasons assigned for greater fire frequency in America. Fire-fighting service in the United States is in no way connected with the military as it is on the continent of Europe; the association of volunteer with paid firemen is uncommon except in the suburban parts of the large cities, and in the smaller cities and towns, where volunteers serving for a certain term are, during that term and thereafter, exempt from jury duty.

New York.—The fire department of New York City is the result of gradual development. The first record of municipal action in regard to fire prevention dates from 1659, when 250 leather buckets and a supply of fire-ladders and hooks were purchased, and a tax of one guilder for fire apparatus was imposed on every chimney; in 1676 fire-wells were ordered to be dug; in 1686 every dwelling-house with two chimneys was required to provide one bucket (if with more than two hearths, two), and bakers and brewers had to provide three and six buckets respectively; in 1689 "brent-masters" or fire-marshals were appointed; in 1695 every dwelling-house had to provide one fire-bucket at least; in 1730 two Richard Newsham hand-engines were ordered from England, and soon afterwards a superintendent of fire-engines was appointed on a small salary; in 1736 an engine-house was built near the watch-house in Broad Street, and an act of the provincial legislature authorized the appointment of twenty-four firemen exempt from constable or militia duty. Early in the 19th century volunteer fire companies increased rapidly in numbers and in importance, especially political; and success in a fire company was a sure path to success in politics, the best-known case being that of Richard Croker, a member of "Americus 6," commonly called "Big Six," of which William M. Tweed was organizer and foreman. Parades of fire companies, chowder parties and picnics (predecessors of the present "ward leader's outing") under the auspices of the volunteer organizations, annual balls after 1829, water-throwing contests, often over liberty poles, and bitter fights between different companies (sometimes settled by fist duels between selected champions), improved the organization of these companies as political factors if not as fire-fighters. So devoted were the volunteers to their leaders that in 1836, when James Gulick, chief engineer since 1831, was removed from office for political reasons, the news of his removal coming when the volunteers were fighting a fire caused them all to stop their work, and they began again only when Gulick assured them that the news was false; almost all the firemen resigned until Gulick was reinstated. The type of the noisy, rowdy New York volunteer fire hero was made famous in 1848–1849 by Frank S. Chanfrau's playing of the part Mose in Benjamin Baker's play, *A Glance at New York*. The Ellsworth Zouaves of New York were raised entirely from volunteer firemen of the city.

In 1865, when the volunteer service was abolished, it consisted of 163 companies (52 engines, 54 hose; 57 hook and ladder) manned by 3521 men (engines averaging 40 to 60 men, hose-carts about 25, and hook and ladder companies about 40); the chief engineer, elected with assistants for terms of five or three years by ballots of the firemen, received a salary of $3000 a year; and three bell-ringers in each of eight district watch-towers, who watched for smoke and gave alarms, received $600 a year. The legislature in March 1865 created a Metropolitan Fire District and established therein a Fire Department, headed by four commissioners, who with the mayor and comptroller constituted a board of estimate.

This organization was practically unchanged until 1898, when the Greater New York was chartered and the present system was introduced. At its head is a commissioner who receives $7500 a year. The more immediate head of the firemen is a chief (annual salary $10,000), the only member of the force not appointed on the basis of a civil service examination; the chief has a deputy in Manhattan (for Manhattan, Bronx and Richmond boroughs) and another for Brooklyn and Queens, each receiving an annual salary of $5000.

In December 1908 there were: 14 deputy chiefs (eight in Manhattan, Bronx and Richmond, and six in Brooklyn and Queens); 59 chiefs of battalion (31 in Manhattan, Bronx and Richmond, and 28 in Brooklyn and Queens); 248 foremen or captains (137 in Manhattan, Bronx and Richmond, and 111 in Brooklyn and Queens), 365 assistant foremen (221 in Manhattan, Bronx and Richmond; and 144 in Brooklyn and Queens); 431 engineers of steamers (247 in Manhattan, Bronx and Richmond, and 184 in Brooklyn and Queens) and 2933 firemen (1772 in Manhattan, Bronx and Richmond, and 1161 in Brooklyn and Queens); and the total uniformed force was 4107. At the close of 1908 there were 88 engine companies in Manhattan and the Bronx, including 6 fire-boat companies —at East 99th St., Battery Park, Grand St. (East River), West 35th St., Gansevoort St. and West 132nd St.; and in Manhattan and the Bronx there were 38 hook and ladder companies; in Brooklyn and Queens there were 70 engine companies, including two fire-boat companies—at 42nd St. and at North 8th St. The appropriations for the year 1906 were $4,777,687 for Manhattan, Bronx and Richmond, and $3,147,033 for Brooklyn and Queens; and the department expenses were $3,980,535 for Manhattan, Bronx and Richmond, and $2,565,849 for Brooklyn and Queens.

The first high-pressure main system in the city was installed at Coney Island in 1905, gas-engines working the pumps. Electrically driven centrifugal pumps are used in Brooklyn (protected area, 1360 acres) and in Manhattan, where the system was introduced in 1908, and where the protected district (1454 acres) reaches from the City Hall to 25th St. and from the Hudson east to Second Avenue and East Broadway, being the "Dry Goods District"; water is pumped either from city mains or from the river, and the change may be made instantaneously. The fire watch-tower system was abolished in 1869; the present system is that of red box electric telegraph alarms, which register at headquarters (East 67th St.), where an operator sends out the alarm to that engine-house nearest to the fire which is ready to respond, and a chart informing him of the absence from the engine-house of apparatus. There are volunteer forces (about 2700 men) in Queens and Richmond boroughs and in other outlying districts.

Boston.—The Boston fire department (reorganized after the great fire of 1872) is officered by a commissioner (annual salary, $5000), a chief (annual salary, $4000), a senior deputy ($2400), and a junior deputy ($2200), twelve district chiefs ($2000 each), a superintendent and an assistant superintendent of fire-alarms, and a superintendent and an assistant superintendent of the repair shop. In 1909 the force numbered 877 regulars and 8 call men. There were 53 steam fire-engines, 14 chemical engines, 3 water-towers, 3 combination chemical engines and hose-wagons (one being motor-driven), 3 fire-boats (built in 1889, 1895 and 1909 respectively), 29 ladder-trucks and 49 hose-wagons. The auxiliary salt-water main service was established in 1893. The earliest suggestion of the application of the electric telegraph to a fire-alarm system was made in Boston in 1845 by Dr Wm. F. Channing; in 1847–1848 Moses G. Farmer, then a telegraph operator at Framingham, made a practicable electric telegraph alarm; and in 1851–1855 Farmer became superintendent of the Boston fire-alarm system, a plant being installed in 1852.[1]

Chicago.—The Chicago organization practically dates from the fire of 1871, though there was a paid department as early as 1858. Its principal officers are a fire-marshal and chief of brigade (salary $8000), four assistant fire-marshals, a department inspector, eighteen battalion chiefs, a superintendent of machinery, a veterinary and assistant, and about one hundred each of captains, lieutenants, engineers and assistant engineers; the total regular force in 1908 was 1799 men with an auxiliary volunteer force of 71 in Riverdale, Norwood Park, Hansen Park and Ashburn Park. In the business part of the city there is a patrol of seven companies employed by the Board of Fire Underwriters. Since 1895 all men in the uniformed force (except the chief of brigade) are under civil service rules. In 1908 the equipment included 117 engine companies, 34 hook and ladder companies, including one water-tower, 15 chemical engines and one hose company; and there were 5 fire-boats (4 active and 1 reserve). The first fire-boat was built in 1883. The initial installation of high-pressure mains was completed in 1902, and was greatly enlarged in 1908.

Fire Appliances.

Fire-Alarms.—Most large cities possess a system of electrical fire-alarms, consisting of call boxes placed at frequent intervals along the streets. Any one wishing to give notice of a fire either opens the door of one of these boxes or breaks the glass window with which it is fitted, and then pulls the handle inside, thus causing the particular number allocated to the box, which of course indicates its position, to be electrically telegraphed to the nearest fire station, or elsewhere as thought advisable. Sometimes a telephone is fixed in each call-box. Automatic fire-alarms consist of arrangements whereby an electric circuit is closed when the surrounding air reaches a certain temperature. The electric circuit may be used to start an alarm bell or to give warning to a watchman or central office, and the devices for closing it are of the most varied kinds—the expansion of mercury in a thermometer tube, the sagging of a long wire suspended between horizontal supports, the unequal expansion of the brass in a curved strip of brass and steel welded together, &c.

Fire-Engines.—The earliest method of applying water to the extinction of fires was by means of buckets, and these long remained the chief instruments employed for the purpose, though Hero of Alexandria about 150 B.C. described a fire-engine with two cylinders and pistons worked by a reciprocating lever, and Pliny refers to the use of fire-engines in Rome. In the 16th century (as at Augsburg in 1518) we hear of fire squirts or syringes worked by hand, and towards the end of the same century Cyprien Lucar described a very large one operated by a screw handle. The fire squirts used in London about the time of the Great Fire were 3 or 4 ft. long by 2½ or 3 in. in diameter, and three men were required to manipulate them. The next stage of development was to mount a cistern or reservoir on wheels so that it was portable, and to provide it with pumps which forced out the water contained in it through a fixed delivery pipe in the middle of the machine. An important advance was made in 1672 when two Dutchmen, Jan van der Heyde, senior and junior, made flexible hose by sewing together the edges of a strip of leather, and applied it for both suction and delivery, so that the engines could be continuously supplied with water and the stream could be more readily directed on the seat of the fire. For many years manual engines were the only ones employed, and they came to be made of great size, requiring as many as 40 or 50 men to work them; but now they are superseded by power-driven engines, at least for all important services. The first practical steam fire-engine was made by John Braithwaite about 1829, but though it proved useful in various fires in London for several years after that date, it was objected to by the men of the fire brigade and its use was abandoned. A generation later, however, steam fire-engines began to come into vogue. At first they were usually drawn by horses to the scene of the fire, though exceptionally their engines could be geared to the wheels so that they became self-propelled; and it was not till the beginning of the 20th century that motor fire-engines were employed to any extent. Steam, petrol and electricity have all been used. Such engines have the advantage that they can reach a fire much more rapidly than a horse-drawn vehicle, especially in hilly districts, and they can if necessary be made of greater power, since their size need not be limited by considerations of the weight that can be drawn by horses. Petrol-propelled engines can be started off from a station within a few seconds of the receipt of an alarm, and their pumps are ready to work immediately the fire is reached; steam-propelled engines possess the same advantage, if they are kept always standing under steam, though this involves expense that is avoided with petrol engines, which cost nothing for maintenance except while they are actually working. Motor engines are made with a capacity to deliver 1000 gallons of water a minute or even more, but the sizes than can deal with 400 or 500 gallons a minute are probably those most commonly used.

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[1] See Thomas C. Martin, *Municipal Electric Fire Alarm and Police Patrol Systems* (Washington, 1904), Bulletin 11 of the Bureau of the Census, Department of Commerce and Labour. The next plant was installed in Philadelphia in 1855; one in St Louis was completed in 1858; and work was begun in New Orleans and Baltimore in 1860.

In towns standing on a navigable water-way fire-boats are often provided for extinguishing fires in buildings, in docks and along the waterside. The capacity of these may rise to 6000 gallons a minute. Steam is the power most commonly used in them, both for propulsion and for pumping, but in one built for Spezia by Messrs Merryweather & Sons of London in 1909, an 80 H. P. petrol engine was fitted for propulsion, while a steam engine was employed for pumping. The boiler was fired with oil-fuel, and steam could be raised in a few minutes while the boat was on its way to a fire. The pumps could throw a 1½-in. jet to a height of nearly 200 ft. In some places, as at Boston, Mass., the fire-boats are utilized for service at some distance from the water. Fire-mains laid through the streets terminate in deep water at points accessible to the boats, the pumps of which can be connected to them and made to fill them with water at high pressure. In cities where a high-pressure hydraulic supply system is available, a relatively small quantity of the pressure water can be used, by means of Greathead hydrants or similar devices, to draw a much larger quantity from the ordinary mains and force it in jets to considerable heights and distances, without the intervention of any engine.

The water is conducted from the engines or hydrants in hose-pipes, which are made either of leather fastened with brass or copper rivets, or of canvas (woven from flax) which has the merit of lightness but is liable to rot, or of rubber jacketed with canvas (or in America with cotton). For directing the water on the fire, nozzles of various forms are employed, some throwing a plain solid jet, others producing spray, and others again combining jet and spray, the spray being useful to drive away smoke and protect the firemen. Various devices are employed to enable the upper storeys of buildings to be effectively reached. A line of hose may be attached to a telescopic ladder, the extensions of which are pulled out by a wire rope until the top rests on the wall of the building at the required height. Water-towers enable the jet to be delivered at a considerable height independently of any support from the building. A light, stiff, lattice steel frame is mounted on a truck, on which it lies horizontally while being drawn to a fire, but when it has to be used it is turned to an upright position, often by the aid of compressed gas, and then an extensible tube is drawn out to a still greater height. The direction of the stream delivered at the top may be controlled from below by means of gearing which enables the nozzle to be moved both horizontally and vertically. The pipe up the tower may be of large diameter, so that it can carry a huge volume of water, and at the bottom it may terminate in a reservoir into which several fire-engines may pump simultaneously.

Another class of fire-engines, known in the smaller portable sizes as fire-extinguishers or "extincteurs," and in the larger ones as "chemical engines," throw a jet of water charged with gas, commonly carbon dioxide, which does not support combustion. Essentially they consist of a closed metal tank, filled with a solution of some carbonate and also containing a small vessel of sulphuric acid. Under normal conditions the acid is kept separate from the solution, but when the machine has to be used they are mixed together; in some cases there is a plunger projecting externally, which when struck a sharp blow breaks the bottle of acid, while in others the act of inverting the apparatus breaks the bottle or causes it to fall against a sharp pricker which pierces the metallic capsule that closes it. As soon as the acid comes into contact with the carbonate solution carbon dioxide is formed, and a stream of gas and liquid mixed issues under considerable pressure from the attached nozzle or hose-pipe. Hand appliances of this kind, holding a few gallons, are often placed in the corridors of hotels, public buildings, &c., and if they are well-constructed, so that they do not fail to act when they are wanted, they are useful in the early stages of a fire, because they enable a powerful jet to be quickly brought to bear: but it is doubtful whether the stream of mixed gas and liquid they emit is much more efficacious than plain water, and too much importance can easily be attached to spectacular displays of their power to extinguish artificial blazes of wood soused with petrol, which have been burning only a few seconds. Chemical engines, up to 60 or 70 gallons capacity, are used by fire brigades as first-aid appliances, being mounted on a horsed or motor vehicle and often combined with a fire-escape, a reel of hose, and other appliances needed by the firemen, and even with pumps for throwing powerful jets of ordinary water. Large buildings, such as hotels and warehouses, where a competent watchman is assumed to be always on duty, may be protected by a large chemical engine placed in the basement and connected by pipes to hydrants placed at convenient points on the various floors. At each hose-station a handle is provided which when pulled actuates a device that effects the mixing of the acid and carbonate solution in the machine, so that in a minute or so a stream is available at the hydrants.

Automatic Sprinklers.—Factories, warehouses and other buildings in which the fire risks are great, are sometimes fitted with automatic sprinklers which discharge water from the ceiling of a room as soon as the temperature rises to a certain point. Lines of pipes containing water under pressure are carried through the building near the ceilings at distances of 8 or 10 ft. apart, and to these pipes are attached sprinkler heads at intervals such that the water from them is distributed all over the room. The valves of the sprinklers are normally kept closed by a device the essential feature of which is a piece of fusible metal; this as soon as it is softened (at a temperature of about 160° F.) by the heat from an incipient fire, gives way and releases the water, which striking against a deflecting plate is spread in a shower. In situations where the water is liable to freeze, the ceiling pipes are filled only with air at a pressure of say 10 lb per sq. in. When the sprinkler head opens under the influence of the heat from a fire, the compressed air escapes, and the consequent loss of pressure in the pipes is arranged to operate a system of levers that opens the water-valve of the main-feed pipe. The idea of automatic sprinklers is an old one, and a system was patented by Sir William Congreve in 1812; but in their present development they are specially associated with the name of Frederick Grinnell, of Providence, Rhode Island.

Fire-Escapes.—The best kind of fire-escape, because it is always in place, and always ready for use, is an external iron staircase, reaching from the top of a building to the ground, and connected with balconies accessible from the windows on each floor. In many towns the building by-laws require such staircases to be provided on buildings exceeding a certain height and containing more than a certain number of persons. Of non-fixed escapes, designed to enable the inmates of an upper room to reach the ground through the window, numberless forms have been invented, from simple knotted ropes and folding ladders to slings and baskets suspended by a rope over sheaves fixed permanently outside the windows, and provided with brakes by which the occupant can regulate the speed of his descent, and to "chutes" or canvas tubes down which he slides. Fire brigades are provided with telescopic ladders, mounted on a wheeled carriage, up which the firemen climb; sometimes the persons rescued are sent down a chute attached to the apparatus, but many fire brigades think it preferable to rely on carrying down those who are unable to descend the ladder unaided. Jumping sheets or nets, held by a number of men, are provided to catch those whose only chance of escape is by jumping from an upper window. (X.)

FIREBACK, the name given to the ornamented slab of cast iron protecting the back of a fireplace. The date at which firebacks became common probably synchronizes with the removal of the fire from the centre to the side or end of a room. They never became universal, since the proximity of deposits of iron ore was essential to their use. In England they were confined chiefly to the iron districts of Sussex and Surrey, and appear to have ceased being made when the ore in those counties was exhausted. They are, however, occasionally found in other parts of the country, and it is reasonable to suppose that there was a certain commerce in an appliance which gradually assumed an interesting and even artistic form. The earlier examples were commonly rectangular, but a shaped or gabled top eventually became common. English firebacks may roughly be separated into four chronological divisions—those moulded from more than one movable stamp; armorial backs; allegorical, mythological and biblical slabs with an occasional portrait; and copies of 17th and 18th century continental designs, chiefly Netherlandish. The fleur-de-lys, the rosette, and other motives of detached ornament were much used before attempts were made to elaborate a homogeneous design, but by the middle of the 17th century firebacks of a very elaborate type were being produced. Thus we have representations of the Crucifixion, the death of Jacob, Hercules slaying the hydra, and the plague of serpents. Coats of arms were very frequent, the royal achievement being used extensively—many existing firebacks bear the arms of the Stuarts. About the time of Elizabeth the coats of private families began to be used, the earliest instances remaining bearing those of the Sackvilles, who were lords of a large portion of the forest of Anderida, which furnished the charcoal for the smelting operations in our ancient iron-fields. To the armorial shields the date was often added, together with the initials of the owner. The method of casting firebacks was to cut the design upon a thick slab of oak which was impressed face downwards upon a bed of sand, the molten metal being ladled into the impression. Firebacks were also common in the Netherlands and in parts of France, notably in Alsace. At Strassburg and Metz there are several private collections, and there are also many examples in public museums. The museum of the Porte de Hal at Brussels contains one of the finest examples in existence with an equestrian portrait of the emperor Charles V., accompanied by his arms and motto. When monarchy was first destroyed in France the possession of a *plaque de cheminée* bearing heraldic insignia was regarded as a mark of disaffection to the republic, and on the 13th of October 1793 the National Convention issued a decree giving the owners and tenants of houses a month in which to turn such firebacks with their face to the wall, pending the manufacture by the iron foundries of a sufficient number of backs less offensive to the instinct of equality. Very few of the old plaques were however removed, and to this day the old châteaux of France contain many with their backs outward. Reproductions of ancient chimney backs are now not infrequently made, and the old examples are much prized and collected.

FIRE BRAT, a small insect (*Thermobia* or *Thermophila furnorum*) related to the silverfish, and found in bakehouses, where it feeds upon bread and flour.

FIREBRICK.—Under this term are included all bricks, blocks and slabs used for lining furnaces, fire-mouths, flues, &c., where the brickwork has to withstand high temperature (see BRICK).

The conditions to which firebricks are subjected in use vary very greatly as regards changes of temperature, crushing strain, corrosive action of gases, scouring action of fuel or furnace charge, chemical action of furnace charge and products of combustion, &c., and in order to meet these different conditions many varieties of firebricks are manufactured.

Ordinary firebricks are made from fireclays, *i.e.* from clays which withstand a high temperature without fusion, excessive shrinkage or warping. Many clays fulfil these conditions although the term "fireclay" is generally restricted in use to certain shales from the Coal Measures, which contain only a small percentage of soda, potash and lime, and are consequently highly refractory. There is no fixed standard of refractoriness for these clays, but no clay should be classed as a fireclay which has a fusion point below 1600° C.

Fireclays vary considerably in chemical composition, but generally the percentage of alumina and silica (taken together) is high, and the percentage of oxide of iron, magnesia, lime, soda and potash (taken together) is low. Other materials, such as lime, bauxite, &c., are also used for the manufacture of firebricks where special chemical or other properties are necessary.

The suitability of a fireclay for the manufacture of the various fireclay goods depends upon its physical character as well as upon its refractoriness, and it is often necessary to mix with the clay a certain proportion of ground firebrick, ganister, sand or some similar refractory material in order to obtain a suitable brick. Speaking generally, fireclay goods used for lining furnaces where the firing is continuous, or where the lining is in contact with molten metal or other flux, are best made from fine-grained plastic clays; whereas firebricks used in fire-mouths and other places which are subjected to rapid changes of temperature must be made from coarser-grained and consequently less plastic clays. In all cases care should be taken to obtain a texture and also, as far as possible, by selection and mixing, to obtain a chemical composition suitable for the purpose to which the goods are to be applied. The Coal Measure clays often contain nodules of siderite in addition to the carbonate of iron disseminated in fine particles throughout the mass, and these nodules are carefully picked out as far as practicable before the clay is used.

A firebrick suitable for ordinary purposes should be even and rather open in texture, fairly coarse in grain, free from cracks or warping, strong enough to withstand the pressure to which it may be subjected when in use, and sufficiently fired to ensure practically the full contraction of the material. Very few fireclays meet all these requirements, and it is usual to mix a certain proportion of ground firebrick, ganister, sand or clay with the fireclay before making up. The fireclay or shale or other materials are ground either between rollers or on perforated pans, and then passed through sieves to ensure a certain size and evenness of grain, after which the clay and other materials are mixed in suitable proportion in the dry state, water being generally added in the mixing mill, and the bricks made up from plastic or semi-plastic clay in the ordinary way.

The proportion of ground firebrick, &c., used depends on the nature of the clay and the purpose for which the material is required, but generally speaking the more plastic clays require a higher percentage of a plastic material than the less plastic clays, the object being to produce a clay mixture which shall dry and fire without cracking, warping or excessive shrinkage, and which shall retain after firing a sufficiently open and even texture to withstand alternate heatings and coolings without cracking or flaking. For special purposes special mixtures are required and many expedients are used to obtain fireclay goods having certain specific qualities. In preparing clay for the manufacture of ordinary fire-grate backs, &c., where the temperature is very variable but never very high, a certain percentage of sawdust is often mixed with the fireclay, which burns out on firing and ensures a very open or porous texture. Such material is much less liable to splitting or flaking in use than one having a closer texture, but it is useless for furnace lining and similar work, where strength and resistance to wear and tear are essential. For the construction of furnaces, fire-mouths, &c., the firebrick used must be sufficiently strong and rigid to withstand the crushing strain of the superimposed brickwork, &c., at the highest temperature to which they are subjected.

The wearing out of a firebrick used in the construction of furnaces, &c., takes place in various ways according to the character of the brick and the particular conditions to which it is subjected. The firebrick may waste by crumbling—due to excessive porosity or openness of texture; it may waste by shattering, due to the presence of large pebbles, pieces of limestone, &c.; it may gradually wear away by the friction of the descending charge in the furnace, of the solid particles carried by the flue gases and of the flue gases themselves; it may waste by the gradual vitrification of the surface through contact with fluxing materials: in cases where it is subjected to very high temperature it will gradually vitrify and contract and so split and fall away from the setting. It is a well-recognized fact that successive firings to a temperature approaching the fusion point, or long continued heating near that temperature, will gradually produce vitrification, which brings about a very dense mass and close texture, and entirely alters the properties of the brick.

Where firebricks are in contact with the furnace charge it is necessary that the texture shall be fairly close, and that the chemical composition of the brick shall be such as to retard the formation of fusible double silicates as much as possible. Where the furnace charge is basic the firebrick should, generally speaking, be basic or aluminous and not siliceous, *i.e.* it should be made from a fireclay containing little free silica, or from such a fireclay to which a high percentage of alumina, lime, magnesia, or iron oxide has been added. For such purposes firebricks are often made from materials containing little or no clay, as for example mixtures of calcined and uncalcined magnesite; mixtures of lime and magnesia and their carbonates; mixtures of bauxite and clay; mixtures of bauxite, clay and plumbago; bauxite and oxide of iron, &c.

In certain cases it is necessary to use an acid brick, and for the manufacture of these a highly siliceous mineral, such as chert or ganister, is used, mixed if necessary with sufficient clay to bind the material together. Dinas fireclay, so-called, and the ganisters of the south Yorkshire coal-fields are largely used for making these siliceous firebricks, which may be also used where the brickwork does not come in contact with basic material, as in the arches, &c., of many furnaces. It is evident that no particular kind of firebrick can be suitable for all purposes, and the manufacturer should endeavour to make his bricks of a definite composition, texture, &c., to meet certain definite requirements, recognizing that the materials at his disposal may be ill-adapted or entirely unsuitable for making firebricks for other purposes. In setting firebricks in position, a thin paste of fireclay and water or of material similar to that of which the brick is composed, must be used in place of ordinary mortar, and the joints should be as close as possible, only just sufficient of the paste being used to enable the bricks to "bed" on one another.

It has long been the practice on certain works to wash the face of firebrick work with a thin paste of some very refractory material—such as kaolin—in order to protect the firebricks from the direct action of the flue gases, &c., and quite recently a thin paste of carborundum and clay, or carborundum and silicate of soda has been more extensively used for the same purpose. So-called carborundum bricks have been put on the market, which have a coating of carborundum and clay fired on to the firebrick, and which are said to have a greatly extended life for certain purposes. It is probable that the carborundum gradually decomposes in the firing, leaving a thin coating of practically pure silica which forms a smooth, impervious and highly-refractory facing. (J. B.*; W. B.*)

FIREFLY, a term popularly used for certain tropical American click-beetles (*Pyrophorus*), on account of their power of emitting light. The insects belong to the family *Elateridae*, whose characters are described under Coleoptera (*q.v.*). The genus *Pyrophorus* contains about ninety species, and is entirely confined to America and the West Indies, ranging from the southern United States to Argentina and Chile. Its species are locally known as *cucujos*. Except for a few species in the New Hebrides, New Caledonia and Fiji, the luminous *Elateridae* are unknown in the eastern hemisphere. The light proceeds from a pair of conspicuous smooth ovoid spots on the pronotum and from an area beneath the base of the abdomen. Beneath the cuticle of these regions are situated the luminous organs, consisting of layers of cells which may be regarded as a specialized portion of the fat-body. Both the male and female fireflies emit light, as well as their larvae and eggs, the egg being luminous even while still in the ovary. The inhabitants of tropical America sometimes keep fireflies in small cages for purposes of illumination, or make use of the insects for personal adornment.

The name "firefly" is often applied also to luminous beetles of the family *Lampyridae*, to which the well-known glow-worm belongs.

FIRE-IRONS, the implements for tending a fire. Usually they consist of poker, tongs and shovel, and they are most frequently of iron, steel, or brass, or partly of one and partly of another. The more elegant brass examples of the early part of the 19th century are much sought after for use with the brass fenders of that date. They were sometimes hung from an ornamental brass stand. The fire-irons of our own times are smaller in size and lighter in make than those of the best period.

FIRENZUOLA, AGNOLO (1493–*c.* 1545), Italian poet and littérateur, was born at Florence on the 28th of September 1493. The family name was taken from the town of Firenzuola, situated at the foot of the Apennines, its original home. The grandfather of Agnolo had obtained the citizenship of Florence and transmitted it to his family. Agnolo was destined for the profession of the law, and pursued his studies first at Siena and afterwards at Perugia. There he became the associate of the notorious Pietro Aretino, whose foul life he was not ashamed to make the model of his own. They met again at Rome, where Firenzuola practised for a time the profession of an advocate, but with little success. It is asserted by all his biographers that while still a young man he assumed the monastic dress at Vallombrosa, and that he afterwards held successively two abbacies. Tiraboschi alone ventures to doubt this account, partly on the ground of Firenzuola's licentiousness, and partly on the ground of absence of evidence; but his arguments are not held to be conclusive. Firenzuola left Rome after the death of Pope Clement VII., and after spending some time at Florence, settled at Prato as abbot of San Salvatore. His writings, of which a collected edition was published in 1548, are partly in prose and partly in verse, and belong to the lighter classes of literature. Among the prose works are—*Discorsi degli animali*, imitations of Oriental and Aesopian fables, of which there are two French translations; *Dialogo delle bellezze delle donne*, also translated into French; *Ragionamenti amorosi*, a series of short tales in the manner of Boccaccio, rivalling him in elegance and in licentiousness; *Discacciamento delle nuove lettere*, a controversial piece against Trissino's proposal to introduce new letters into the Italian alphabet; a free version or adaptation of *The Golden Ass* of Apuleius, which became a favourite book and passed through many editions; and two comedies, *I Lucidi*, an imitation of the *Menaechmi* of Plautus, and *La Trinuzia*, which in some points resembles the *Calandria* of Cardinal Bibbiena. His poems are chiefly satirical and burlesque. All his works are esteemed as models of literary excellence, and are cited as authorities in the vocabulary of the Accademia della Crusca. The date of Firenzuola's death is only approximately ascertained. He had been dead several years when the first edition of his writings appeared (1548).

His works have been very frequently republished, separately and in collected editions. A convenient reprint of the whole was issued at Florence in 2 vols. in 1848.

FIRESHIP, a vessel laden with combustibles, floated down on an enemy to set him on fire. Fireships were used in antiquity, and in the middle ages. The highly successful employment of one by the defenders of Antwerp when besieged by the prince of Parma in 1585 brought them into prominent notice, and they were used to drive the Armada from its anchorage at Gravelines in 1588. They continued to be used, sometimes with great effect, as late as the first quarter of the 19th century. Thus in 1809 fireships designed by Lord Cochrane (earl of Dundonald) were employed against the French ships at anchor in the Basque Roads; and in the War of Greek Independence the successes of the Greek fireships against the Ottoman navy, and the consequent demoralization of the ill-disciplined Turkish crews, largely contributed to secure for the insurgents the command of the sea. In general, however, it was found that fireships hampered the movements of a fleet, were easily sunk by an enemy's fire, or towed aside by his boats, while a premature explosion was frequently fatal to the men who had to place them in position. They were made by building "a fire chamber" between the decks from the forecastle to a bulkhead constructed abaft the mainmast. This space was filled with resin, pitch, tallow and tar, together with gunpowder in iron vessels. The gunpowder and combustibles were connected by trains of powder, and by bundles of brushwood called "bavins." When a fireship was to be used, a body of picked men steered her down on the enemy, and when close enough set her alight, and escaped in a boat which was towed astern. As the service was peculiarly dangerous a reward of £100, or in lieu of it a gold chain with a medal to be worn as a mark of honour, was granted in the British navy to the successful captain of a fireship. A rank of *capitaine de brûlot* existed in the French navy of Louis XIV., and was next to the full captain—or *capitaine de vaisseau.*

FIRE-WALKING, a religious ceremony common to many races. The origin and meaning of the custom is very obscure, but it is shown to have been widespread in all ages. It still survives in Bulgaria, Trinidad, Fiji Islands, Tahiti, India, the Straits Settlements, Mauritius, and it is said Japan. The details of its ritual and its objects vary in different lands, but the essential feature of the rite, the passing of priests, fakirs, and devotees barefoot over heated stones or smouldering ashes is always the same. Fire-walking was usually associated with the spring festivals and was believed to ensure a bountiful harvest. Such was the Chinese vernal festival of fire. In the time of Kublai Khan the Taoist Buddhists held great festivals to the "High Emperor of the Sombre Heavens" and walked through a great fire barefoot, preceded by their priests bearing images of their gods in their arms. Though they were severely burned, these devotees held that they would pass unscathed if they had faith. J. G. Frazer (*Golden Bough*, vol. iii. p. 307) describes the ceremony in the Chinese province of Fo-kien. The chief performers are labourers who must fast for three days and observe chastity for a week. During this time they are taught in the temple how they are to perform their task. On the eve of the festival a huge brazier of charcoal, often twenty feet wide, is prepared in front of the temple of the great god. At sunrise the next morning the brazier is lighted. A Taoist priest throws a mixture of salt and rice into the flames. The two exorcists, barefooted and followed by two peasants, traverse the fire again and again till it is somewhat beaten down. The trained performers then pass through with the image of the god. Frazer suggests that, as the essential feature of the rite is the carrying of the deity through the flames, the whole thing is sympathetic magic designed to give to the coming spring sunshine (the supposed divine emanation), that degree of heat which the image experiences. Frazer quotes Indian fire-walks, notably that of the Dosadhs, a low Indian caste in Behar and Chota Nagpur. On the fifth, tenth, and full moon days of three months in the year, the priest walks over a narrow trench filled with smouldering wood ashes. The Bhuiyas, a Dravidian tribe of Mirzapur, worship their tribal hero Bir by a like performance, and they declare that the walker who is really "possessed" by the hero feels no pain. For fire-walking as observed in the Madras presidency see *Indian Antiquary*, vii. (1878) p. 126; iii. (1874) pp. 6-8; ii. (1873) p. 190 seq. In Fiji the ceremony is called *vilavilarevo*, and according to an eyewitness a number of natives walk unharmed across and among white-hot stones which form the pavement of a huge native oven. In Tahiti priests perform the rite. In April 1899 an Englishman saw a fire-walk in Tokio (see *The Field*, May 20th, 1899). The fire was six yards long by six wide. The rite was in honour of a mountain god. The fire-walkers in Bulgaria are called *Nistinares* and the faculty is regarded as hereditary. They dance in the fire on the 21st of May, the feast of SS. Helena and Constantine. Huge fires of faggots are made, and when these burn down the *Nistinares* (who turn blue in the face) dance on the red-hot embers and utter prophecies, afterwards placing their feet in the muddy ground where libations of water have been poured.

The interesting part of fire-walking is the alleged immunity of the performers from burns. On this point authorities and eyewitnesses differ greatly. In a case in Fiji a handkerchief was thrown on to the stones when the first man leapt into the oven, and what remained of it snatched up as the last left the stones. Every fold that touched the stone was charred! In some countries a thick ointment is rubbed on the feet, but this is not usual, and the bulk of the reports certainly leave an impression that there is something still to be explained in the escape of the performers from shocking injuries. S. P. Langley, who witnessed a fire-walk in Tahiti, declares, however, that the whole rite as there practised is a mere symbolic farce (*Nature* for August 22nd, 1901).

For a full discussion of the subject with many eyewitnesses' reports *in extenso*, see A. Lang, *Magic and Religion* (1901). See also Dr Gustav Oppert, *Original Inhabitants of India*, p. 480; W. Crooke, *Introd. to Popular Religion and Folklore of Northern India*, p. 10 (1896); *Folklore Journal* for September 1895 and for 1903, vol. xiv. p. 87.

FIREWORKS. In modern times this term is principally associated with the art of "pyrotechny" (Gr. πῦρ, fire, and τέχνη, art), and confined to the production of pleasing scenic effects by means of fire and inflammable and explosive substances. But the history of the evolution of such displays is bound up with that of the use of such substances not only for scenic display but for exciting fear and for military purposes; and it is consequently complicated by our lack of exact knowledge as to the materials at the disposal of the ancients prior to the invention of gunpowder (see also the article GREEK FIRE). For the following historical account the term "fireworks" is therefore used in a rather general sense.

History.—It is usually stated that from very ancient times fireworks were known in China; it is, however, difficult to assign dates or quote trustworthy authorities. Pyrotechnic displays were certainly given in the Roman circus. While a passage in Manilius,[1] who lived in the days of Augustus, seems to bear this interpretation, there is the definite evidence of Vopiscus[2] that fireworks were performed for the emperor Carinus and later for the emperor Diocletian; and Claudian,[3] writing in the 4th century, gives a poetical description of a set piece, where whirling wheels and dropping fountains of fire were displayed upon the *pegma*, a species of movable framework employed in the various spectacles presented in the circus. After the fall of the Western empire no mention of fireworks can be traced until the Crusaders carried back with them to Europe a knowledge of the incendiary compounds of the East, and gunpowder had made its appearance. Biringuccio,[4] writing in 1540, says that at an anterior period it had been customary at Florence and Siena to represent a fable or story at the Feast of St John or at the Assumption, and that on these occasions stage properties, including effigies with wooden bodies and plaster limbs, were grouped upon lofty pedestals, and that these figures gave forth flames, whilst round about tubes or pipes were erected for projecting fire-balls into the air: but he adds that these shows were never heard of in his time except at Rome when a pope was elected or crowned. But if relinquished in Italy, fire festivals on the eve of St John were observed both in England and France; the custom was a very old one in the days of Queen Elizabeth,[5] while De Frezier,[6] writing in 1707, says it was commonly adhered to in his time, and that on one occasion the king of France himself set a light to the great Paris bonfire. Survivals of these curious rites have been noted quite recently in Scotland and Ireland.[7] Early use also of fireworks was made in plays and pageants. Hell or hell's mouth was represented by a gigantic head out of which flames were made to issue:[1] in the river procession on the occasion of the marriage of Henry VII. and Elizabeth (1487) the "Bachelors' Barge" carried a dragon spouting flames, and Hall relates that at the marriage of Anne Boleyn (1538) "there went before the lord mayor's barge a foyst or wafter full of ordnance, which foyst also carried a great red dragon that spouted out wild fyre and round about were terrible monstrous and wild men casting fire and making a hideous noise."[2] These individuals were known as "green men." Their clothing was green, they wore fantastic masks, and carried "fire clubs." They were sometimes employed to clear the way at processions.[3]

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[1] Manilius, *Astronomica*, lib. v., 438-443.
[2] Vopiscus, *Carus, Numerianus et Carinus*, ch. xix.
[3] Claudianus, *De consulatu Manlii Theodori*, 325-330.
[4] Vanuzzio Biringuccio, *Pyrotechnia.*
[5] Strutts, *Sports and Pastimes of the English People.*
[6] De Frezier, *Traité des feux d'artifice* (1707 and 1747).
[7] *Notes and Queries*, series 5, vol. ix. p. 140, and series 8, vol. ii. pp. 145 and 254.

Soon after the introduction of gunpowder the gunner and fireworker came into existence; at first they were not soldiers, but civilians who sometimes exercised military functions, and part of their duties was intimately connected with the preparation of fireworks both for peace and war. The emperor Charles V. brought his fireworks under definite regulations in 1535,[4] and eventually other countries did the same. The *ignes triumphales* were an early form of public fireworks. Scaffold poles were erected with trophies at their summits, while fixed around them were tiers of casks filled with combustibles, so that they presented the appearance of huge flaming trees; at their bases crouched dragons or other mythical beasts. With such a display Antwerp welcomed the archduke of Austria in 1550.[5] Then the "fire combat" came into fashion. Helmets from which flames would issue were provided for the performers; there were also swords and clubs that would give out sparks at every stroke, lances with fiery points, and bucklers that when struck gave forth a detonation and a flame. A picture of a combat with weapons such as these will be found in Hanzelet's *Recueil de machines militaires* (1620). In addition, the fireworker grew to be somewhat of a scenic artist who could devise a romantic background and fill it with shapes bizarre, beautiful or terrific; he had to make his castle, his cave or his rocky ravine, and people his stage with distressed damsel, errant knight or devouring dragon. Furthermore he had to give motion to the inanimate persons of the drama; thus his dragon would run down an incline on hidden wheels, be actuated by a rope, or be propelled by a rocket.[6] In 1613 at the marriage of the prince palatine to the daughter of James, the pyrotechnic display was confided to four of the king's gunners, who provided a fiery drama which included a giant, a dragon, a lady, St George, a conjurer, and an enchanted castle, jumbled up together after the approved fashion of the Spenserian legends.[7] As time went on a more refined taste rejected the bizarre features of the old displays, artistic merit began to creep into the designs, and an effort was made to introduce something appropriate to the occasion. Thus Clarmer of Nuremberg, a well-known fire-worker, celebrated the capture of Rochelle (1613) by an adaptation of the Andromeda legend, where Rochelle was the rock, Andromeda the Catholic religion, the monster Heresy, and Perseus on his Pegasus the all-conquering Louis XIII.[8] In the first half of the 17th century many books[9] on fireworks appeared, which avoided the old grotesque ideas and advocated skill and finesse. "It is a rare thing," says Nye (1648), "to represent a tree or fountain in the air." The most celebrated work of them all was the *Great Art of Artillery* by Siemienowitz, which was considered important enough to be translated into English by order of the Board of Ordnance, nearly eighty years after it had appeared.[10] The classic façade now came into fashion; on it and about it were placed emblematic figures, and disposed around were groups of rockets, Roman candles, &c., musket barrels for projecting stars, and mortars from which were fired shells called balloons, which were full of combustibles. The figures were carved out of wood which was soaped or waxed over and covered with papier mâché so that a skin was formed: this was cut vertically into two parts, removed from the wood, formed into a hollow figure, and filled with fireworks.

National fireworks now assumed a stately and dignified appearance, and for two centuries played a conspicuous part all over Europe in the public expression of thanksgiving or of triumph. Representations and sometimes accounts will be found in the British Museum[11] of the more important English displays, from the coronation of James II. down to the peace rejoicings of 1856, during which period national fireworks were provided by the officials of the Ordnance. But since the days of Ranelagh and Vauxhall fireworks have become a subject of private enterprise, and the triumphs of such firms as Messrs Brock or Messrs Pain at the Crystal Palace and elsewhere have been without an official rival. (J. R. J. J.)

Modern Fireworks.—In modern times the art of pyrotechny has been gradually improved by the work of specialists, who have had the advantage of being guided by the progress of scientific chemistry and mechanics. As in all such cases, however, science is useless without the aid of practical experience and acquired manual dexterity.

Many substances have a strong tendency to combine with oxygen, and will do so, in certain circumstances, so energetically as to render the products of the combination (which may be solid matter or gas) intensely hot and luminous. This is the general cause of the phenomenon known as fire. Its special character depends chiefly on the nature of the substances burned and on the manner in which the oxygen is supplied to them. As is well known, our atmosphere contains oxygen gas diluted with about four times its volume of nitrogen; and it is this oxygen which supports the combustion of our coal and candles. But it is not often that the pyrotechnist depends wholly upon atmospheric oxygen for his purposes; for the phenomena of combustion in it are too familiar, and too little capable of variation, to strike with wonder. Two cases, however, where he does so may be instanced, viz. the burning of magnesium powder and of lycopodium, both of which are used for the imitation of lightning in theatres. Nor does the pyrotechnist resort much to the use of pure oxygen, although very brilliant effects may be produced by burning various substances in glass jars filled with the gas. Indeed, the art could never have existed in anything like its present form had not certain solid substances become known which, containing oxygen in combination with other elements, are capable of being made to evolve large volumes of it at the moment it is required. The best examples of these solid *oxidizing agents* are potassium nitrate (nitre or saltpetre) and chlorate; and these are of the first importance in the manufacture of fireworks. If a portion of one of these salts be thoroughly powdered and mixed with the correct quantity of some suitable combustible body, also reduced to powder, the resulting mixture is capable of burning with more or less energy without any aid from atmospheric oxygen, since each small piece of fuel is in close juxtaposition to an available and sufficient store of the gas. All that is required is that the liberation of the oxygen from the solid particles which contain it shall be started by the application of heat from without, and the action then goes on unaided. This, then, is the fundamental fact of pyrotechny—that, with proper attention to the chemical nature of the substances employed, solid mixtures (*compositions* or *fuses*) may be prepared which contain within themselves all that is essential for the production of fire.

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[1] J. B. Nichols & Sons, *London Pageants.*

[2] Hall's *Chronicles.*

[3] J. Bate, *Mysteries of Nature and Art* (1635). This contains a picture of a green man.

[4] *Geschichte des Feuerwerkswesen* (Berlin, 1887). The Jubilee pamphlet of the Brandenburg Artillery.

[5] See "Fairholts' Collection" bequeathed to the Royal Society of Antiquaries.

[6] *Journal* of the Royal Artillery, vol. xxxii. No. 11.

[7] Somers' *Tracts*, vol. iii.

[8] De Frezier.

[9] Diego Ufano, *Artillery*, in Spanish (1614); Master Gunner Norton, *The Gunner* and *The Gunner's Dialogue* (1628); F. de Malthe (Malthus), *Artificial Fireworks*, in French and English (1628); "Hanzelet," *Recueil de plusieurs machines militaires et feux artificiels pour la guerre et récréation* (1620 and 1630); Furttenback, master gunner of Bavaria, *Halinitro Pyrobolio*, in German (1627); (John Babington Matross, *Pyrotechnia*, 1635); Nye, master gunner of Worcester, *Art of Gunnery* (Worcester, 1648); Casimir Siemienowitz, lieut.-general of the Ordnance to the king of Poland, *The Great Art of Artillery*, in French (1650).

[10] Translated by George Shelvocke, 1727, by order of the surveyor-general of the Ordnance.

[11] "Crace Collection" in the print-room; the King's Prints and Drawings in the library. See also "The Connection of the Ordnance Department with National and Royal Fireworks," *R. A. Journal*, vol. xxii. No. 11.

If nitre and potassium chlorate, with other salts of nitric and chloric acids and a few similar compounds, be grouped together as oxidizing agents, most of the other materials used in making firework compositions may be classed as *oxidizable substances.* Every composition must contain at least one sample of each class: usually there are present more than one oxidizable substance, and very often more than one oxidizing agent. In all cases the proportions by weight which the ingredients of a mixture bear to one another is a matter of much importance, for it greatly affects the manner and rate of combustion. The most important oxidizable substances employed are charcoal and sulphur. These two, it is well known, when properly mixed in certain proportions with the oxidizing agent nitre, constitute gunpowder; and gunpowder plays an important part in the construction of most fireworks. It is sometimes employed alone, when a strong explosion is required; but more commonly it is mixed with one or more of its own ingredients and with other matters. In addition to charcoal and sulphur, the following oxidizable substances are more or less employed:—many compounds of carbon, such as sugar, starch, resins, &c.; certain metallic compounds of sulphur, such as the sulphides of arsenic and antimony; a few of the metals themselves, such as iron, zinc, magnesium, antimony, copper. Of these metals iron (cast-iron and steel) is more used than any of the others. They are all employed in the form of powder or small filings. They do not contribute much to the burning power of the composition; but when it is ignited they become intensely heated and are discharged into the air, where they oxidize more or less completely and cause brilliant sparks and scintillations.

Sand, potassium sulphate, calomel and some other substances, which neither combine with oxygen nor supply it, are sometimes employed as ingredients of the compositions in order to influence the character of the fire. This may be modified in many ways. Thus the rate of combustion may be altered so as to give anything from an instantaneous explosion to a slow fire lasting many minutes. The flame may be clear, smoky, or charged with glowing sparks. But the most important characteristic of a fire—one to which great attention is paid by pyrotechnists—is its *colour,* which may be varied through the different shades and combinations of yellow, red, green and blue. These colours are imparted to the flame by the presence in it of the heated vapours of certain metals, of which the following are the most important:—sodium, which gives a yellow colour; calcium, red; strontium, crimson; barium, green; copper, green or blue, according to circumstances. Suitable salts of these metals are much used as ingredients of fire mixtures; and they are decomposed and volatilized during the process of combustion. Very often the chlorates and nitrates are employed, as they serve the double purpose of supplying oxygen and of imparting colour to the flame.

The number of fire mixtures actually employed is very great, for the requirements of each variety of firework, and of almost each size of each variety, are different. Moreover, every pyrotechnist has his own taste in the matter of compositions. They are capable, however, of being classified according to the nature of the work to which they are suited. Thus there are rocket-fuses, gerbe-fuses, squib-fuses, star-compositions, &c.; and, in addition, there are a few which are essential in the construction of most fireworks, whatever the main composition may be. Such are the *starting-powder,* which first catches the fire, the *bursting-powder,* which causes the final explosion, and the *quick-match* (cotton-wick, dried after being saturated with a paste of gunpowder and starch), employed for connecting parts of the more complicated works and carrying the fire from one to another. Of the general nature of fuses an idea may be had from the following two examples, which are selected at hazard from among the numerous recipes for making, respectively, tourbillion fire and green stars:—

Tourbillion.

Meal gunpowder	24	parts.
Nitre	10	,,
Sulphur	7	,,
Charcoal	4	,,
Steel filings	8	,,

Green Stars.

Potassium chlorate	16	parts.
Barium nitrate	48	,,
Sulphur	12	,,
Charcoal	1	,,
Shellac	5	,,
Calomel	8	,,
Copper sulphide	2	,,

Although the making of compositions is of the first importance, it is not the only operation with which the pyrotechnist has to do; for the construction of the *cases* in which they are to be packed, and the actual processes of packing and finishing, require much care and dexterity. These cases are made of paper or pasteboard, and are generally of a cylindrical shape. In size they vary greatly, according to the effect which it is desired to produce. The relations of length to thickness, of internal to external diameter, and of these to the size of the openings for discharge, are matters of extreme importance, and must always be attended to with almost mathematical exactness and considered in connexion with the nature of the composition which is to be used.

There is one very important property of fireworks that is due more to the mechanical structure of the cases and the manner in which they are filled than to the precise chemical character of the composition, *i.e.* their power of *motion.* Some are so constructed that the piece is kept at rest and the only motion possible is that of the flame and sparks which escape during combustion from the mouth of the case. Others, also fixed, contain, alternately with layers of some more ordinary compositions, balls or blocks of a special mixture cemented by some kind of varnish; and these *stars,* as they are called, shot into the air, one by one, like bullets from a gun, blaze and burst there with striking effect. But in many instances motion is imparted to the firework as a whole—to the case as well as to its contents. This motion, various as it is in detail, is almost entirely one of two kinds—*rotatory* motion round a fixed point, which may be in the centre of gravity of a single piece or that of a whole system of pieces, and *free ascending* motion through the air. In all cases the cause of motion is the same, viz. that large quantities of gaseous matter are formed by the combustion, that these can escape only at certain apertures, and that a backward pressure is necessarily exerted at the point opposite to them. When a large gun is discharged, it recoils a few feet. Movable fireworks may be regarded as very light guns loaded with heavy charges; and in them the recoil is therefore so much greater as to be the most noticeable feature of the discharge; and it only requires proper contrivances to make the piece fly through the air like a sky-rocket or revolve round a central axis like a Catherine wheel. Beauty of motion is hardly less important in pyrotechny than brilliancy of fire and variety of colour.

The following is a brief description of some of the forms of firework most employed:—

Fixed Fires.—Theatre fires consist of a slow composition which may be heaped in a conical pile on a tile or a flagstone and lit at the apex. They require no cases. Usually the fire is coloured—green, red or blue; and beautiful effects are obtained by illuminating buildings with it. It is also used on the stage; but, in that case, the composition must be such as to give no suffocating or poisonous fumes. *Bengal lights* are very similar, but are piled in saucers, covered with gummed paper, and lit by means of pieces of match. *Marroons* are small boxes wrapped round several times with lind cord and filled with a strong composition which explodes with a loud report. They are generally used in *batteries,* or in combination with some other form of firework. *Squibs* are straight cylindrical cases about 6 in. long, firmly closed at one end, tightly packed with a strong composition, and capped with touch-paper. Usually a little bursting-powder is put in before the ordinary composition, so that the fire is finished by an explosion. The character of the fire is, of course, susceptible of great variation in colour, &c. *Crackers* are characterized by the cases being doubled backwards and forwards several times, the folds being pressed close and secured by twine. One end is primed; and when this is lit the cracker burns with a hissing noise, and a loud report occurs every time the fire reaches a bend. If the cracker is placed on the ground, it will give a jump at each report; so that it cannot quite fairly be classed among the fixed fireworks. *Roman candles* are straight cylindrical cases filled with layers of composition and *stars* alternately. These stars are simply balls of some special composition, usually containing metallic filings, made up with gum and spirits of wine, cut to the required size and shape, dusted with gunpowder and dried. They are discharged like blazing bullets several feet into the air, and produce a beautiful effect, which may be enhanced by packing stars of differently coloured fire in one case. *Gerbes* are choked cases, not unlike Roman candles, but often of much larger size. Their fire spreads like a sheaf of wheat. They may be packed with variously coloured stars, which will rise 30 ft. or more. *Lances* are small straight cases charged with compositions like those used for making stars. They are mostly used in complex devices, for which purpose they are fixed with wires on suitable wooden frames. They are connected by *leaders, i.e.* by quick-match enclosed in paper tubes, so that they can be regulated to take fire all at the same time, singly, or in detachments, as may be desired. The devices and "set pieces" constructed in this way are often of an extremely elaborate character; and they include all the varieties of *lettered designs*, of *fixed suns*, *fountains*, *palm-trees*, *waterfalls*, *mosaic work*, *Highland tartan*, *portraits*, *ships*, &c.

Rotating Fireworks.—Pin or *Catherine wheels* are long paper cases filled with a composition by means of a funnel and packing-wire and afterwards wound round a disk of wood. This is fixed by a pin, sometimes vertically and sometimes horizontally; and the outer primed end of the spiral is lit. As the fire escapes the recoil causes the wheel to revolve in an opposite direction and often with considerable velocity. *Pastiles* are very similar in principle and construction. Instead of the case being wound in a spiral and made to revolve round its own centre point, it may be used as the engine to drive a wheel or other form of framework round in a circle. Many varied effects are thus produced, of which the *fire-wheel* is the simplest. Straight cases, filled with some fire-composition, are attached to the end of the spokes of a wheel or other mechanism capable of being rotated. They are all pointed in the same direction at an angle to the spokes, and they are connected together by leaders, so that each, as it burns out, fires the one next it. The pieces may be so chosen that brilliant effects of changing colour are produced; or various fire-wheels of different colours may be combined, revolving in different planes and different directions—some fast and some slowly. *Bisecting wheels*, *plural wheels*, *caprice wheels*, *spiral wheels*, are all more or less complicated forms; and it is possible to produce, by mechanism of this nature, a model in fire of the solar system.

Ascending Fireworks.—Tourbillions are fireworks so constructed as to ascend in the air and rotate at the same time, forming beautiful spiral curves of fire. The straight cylindrical case is closed at the centre and at the two ends with plugs of plaster of Paris, the composition occupying the intermediate parts. The fire finds vent by six holes pierced in the case. Two of these are placed close to the end , but at opposite sides, so that one end discharges to the right and the other to the left; and it is this which imparts the rotatory motion. The other holes are placed along the middle line of what is the under-surface of the case when it is laid horizontally on the ground; and these, discharging downwards, impart an upward motion to the whole. A cross piece of wood balances the tourbillion; and the quick-match and touch-paper are so arranged that combustion begins at the two ends simultaneously and does not reach the holes of ascension till after the rotation is fairly begun. The *sky-rocket* is generally considered the most beautiful of all fireworks; and it certainly is the one that requires most skill and science in its construction. It consists essentially of two parts,—the body and the head. The body is a straight cylinder of strong pasted paper and is choked at the lower end, so as to present only a narrow opening for the escape of the fire. The composition does not fill up the case entirely, for a central hollow conical bore extends from the choked mouth up the body for three-quarters of its length. This is an essential feature of the rocket. It allows of nearly the whole composition being fired at once; the result of which is that an enormous quantity of heated gases collects in the hollow bore, and the gases, forcing their way downwards through the narrow opening, urge the rocket up through the air. The top of the case is closed by a plaster-of-Paris plug. A hole passes through this and is filled with a fuse, which serves to communicate the fire to the head after the body is burned out. This head, which is made separately and fastened on after the body is packed, consists of a short cylindrical paper chamber with a conical top. It serves the double purpose of cutting a way through the air and of holding the *garniture* of stars, sparks, crackers, serpents, gold and silver rain, &c., which are scattered by bursting fire as soon as the rocket reaches the highest point of its path. A great variety of beautiful effects may be obtained by the exercise of ingenuity in the choice and construction of this garniture. Many of the best results have been obtained by unpublished methods which must be regarded as the secrets of the trade. The *stick* of the sky-rocket serves the purpose of guiding and balancing it in its flight; and its size must be accurately adapted to the dimensions of the case. In *winged* rockets the stick is replaced by cardboard wings, which act like the feathers of an arrow. A *girandole* is the simultaneous discharge of a large number of rockets (often from one hundred to two hundred), which either spread like a peacock's tail or pierce the sky in all directions with rushing lines of fire. This is usually the final feat of a great pyrotechnic display.

See Chertier, *Sur les feux d'artifice* (Paris, 1841; 2nd ed., 1854); Mortimer, *Manual of Pyrotechny* (London, 1856); Tessier, *Chimie pyrotechnique, ou traité pratique des feux colorés* (Paris, 1858); Richardson and Watts, *Chemical Technology, s.v.* "Pyrotechny" (London, 1863–1867); Thomas Kentish, *The Pyrotechnist's Treasury* (London, 1878); Websky, *Luftfeuerwerkkunst* (Leipzig, 1878).

(O. M.)

FIRM, an adjective originally indicating a dense or close consistency, hence steady, unshaken, unchanging or fixed. This word, in M. Eng. *ferme*, is derived through the French, from Lat. *firmus*. The medieval Latin substantive *firma* meant a fixed payment, either in the way of rent, composition for periodic payments, &c.; and this word, often represented by "firm" in translations of medieval documents, has produced the English "farm" (*q.v.*). From a late Latin use of *firmare*, to confirm by signature, *firma* occurs in many Romanic languages for a signature, and the English "firm" was thus used till the 18th century. From a transferred use came the meaning of a business house. In the Partnership Act 1890, persons who have entered into partnership with one another are called collectively a firm, and the name under which their business is carried on is called the firm-name.

FIRMAMENT, the sky, the heavens. In the Vulgate the word *firmamentum*, which means in classical Latin a strengthening or support (*firmare*, to make firm or strong) was used as the equivalent of *στερέωμα* (*στερεόειν*, to make firm or solid) in the LXX., which translates the Heb. *rāqīyaʿ*. The Hebrew probably signifies literally "expanse," and is thus used of the expanse or vault of the sky, the verb from which it is derived meaning "to beat out." In Syriac the verb means "to make firm," and is the direct source of the Gr. *στερέωμα* and the Lat. *firmamentum*. In ancient astronomy the firmament was the eighth sphere containing the fixed stars surrounding the seven spheres of the planets.

FIRMAN (an adaptation of the Per. *fermān*, a mandate or patent, cognate with the Sanskrit *pramāna*, a measure, authority), an edict of an oriental sovereign, used specially to designate decrees, grants, passports, &c., issued by the sultan of Turkey and signed by one of his ministers. A decree bearing the sultan's sign-manual and drawn up with special formalities is termed a *hatti-sherif*, Arabic words meaning a line, writing or command, and lofty, noble. A written decree of an Ottoman sultan is also termed an *irade*, the word being taken from the Arab. *irādā*, will, volition, order.

FIRMICUS, MATERNUS JULIUS, a Latin writer, who lived in the reign of Constantine and his successors. About the year 346 he composed a work entitled *De erroribus profanarum religionum*, which he inscribed to Constantius and Constans, the sons of Constantine, and which is still extant. In the first part (chs. 1-17) he attacks the false objects of worship among the Oriental cults; in the second (chs. 18-29) he discusses a number of formulae and rites connected with the mysteries. The whole tone of the work is fanatical and declamatory rather than argumentative, and is thus in such sharp contrast with the eight books on astronomy (Libri VIII. *Matheseos*) bearing the same author's name, that the two works have usually been attributed to different writers. Mommsen (*Hermes* vol. 29, pp. 468-472) has, however, shown that the astronomy—a work interfused with an urbane Neoplatonic spirit—was composed about 336 and not in 354 as was formerly held. When we add to this the similarity of style, and the fact that each betrays a connexion with Sicily, there is the strongest reason for claiming the same author for the two books, though it shows that in the 4th century acceptance of Christianity did not always mean an advance in ethical standpoint.

The Christian work is preserved in a Palatine MS. in the Vatican library. It was first printed at Strassburg in 1562, and has been reprinted several times, both separately and along with the writings of Minucius Felix, Cyprian or Arnobius. The most correct editions are those by Conr. Bursian (Leipzig, 1856), and by C. Halm, in his *Minucius Felix* (*Corp. Scr. Eccl. Lat.* ii.), (Vienna, 1867). The Neoplatonist work was first printed by Aldus Manutius in 1501, and has often been reprinted. For full discussions see G. Ebert, *Gesch. der chr. lat. Litt.*, ed. 1889, p. 129 ff.; O. Bardenhewer, *Patrologie*, ed. 1901, p. 354.

FIRMINY, a town of central France in the department of Loire, 8 m. S.W. of St Etienne by rail. Pop. (1906) 15,778. It has important coal mines known since the 14th century and extensive manufactures of iron and steel goods, including railway material, machinery and cannon. Fancy woollen hosiery is also manufactured.

FIRST-FOOT, in British folklore, especially that of the north and Scotland, the first person who crosses the threshold on Christmas or New Year's Eve. Good or ill luck is believed to be brought the house by First-Foot, and a female First-Foot is regarded with dread. In Lancashire a light-haired man is as unlucky as a woman, and it became a custom for dark-haired males to hire themselves out to "take the New Year in." In Worcestershire luck is ensured by stopping the first carol-singer who appears and leading him through the house. In Yorkshire it must always be a male who enters the house first, but his fairness is no objection. In Scotland first-footing was always more elaborate than in England, involving a subsequent entertainment.

FIRST OF JUNE, Battle of the. By this name we call the great naval victory won by Lord Howe over the French fleet of Admiral Villaret-Joyeuse, on the 1st of June 1794. No place name can be given to it, because the battle was fought 429 m. to the west of Ushant.

The French people were suffering much distress from the bad harvest of the previous year, and a great convoy of merchant ships laden with corn was expected from America. Admiral Vanstabel of the French navy had been sent to escort it with two ships of the line in December of 1793. He sailed with his charge from the Chesapeake on the 11th of April 1794. On the previous day six French ships of the line left Brest to meet Vanstabel in mid ocean. The British force designed to intercept the convoy was under Lord Howe, then in command of the channel fleet. He sailed from Spithead on the 2nd of May with 34 sail of the line and 15 smaller vessels, having under his charge nearly a hundred merchant ships which were to be seen clear of the Channel. On the 4th, when off the Lizard, the convoy was sent on its way protected by 8 line of battle ships and 6 or 7 frigates. Two of the line of battle ships were to accompany them throughout the voyage. The other six under Rear-admiral Montagu were to go as far as Cape Finisterre, and were then to cruise on the look-out for the French convoy between Cape Ortegal and Belle Isle. These detachments reduced the force under Lord Howe's immediate command to 26 of the line and 7 frigates. On the 5th of May he was off Ushant, and sent frigates to reconnoitre the harbour of Brest. They reported to him that the main French fleet, which was under the command of Villaret-Joyeuse, and was of 25 sail of the line, was lying at anchor in the roads. Howe then sailed to the latitude on which the convoy was likely to be met with, knowing that if the French admiral came out it would be to meet the ships with the food and cover them from attack. To seek the convoy was therefore the most sure way of forcing Villaret-Joyeuse to action. Till the 18th the British fleet continued cruising in the Bay of Biscay. On the 19th Lord Howe returned to Ushant and again reconnoitred Brest. It was then seen that Villaret-Joyeuse had gone to sea. He had sailed with his whole force on the 16th and had passed close to the British fleet on the 17th, unseen in a fog. On the 19th the French admiral was informed by the "Patriote" (74) that Nielly had fallen in with, and had captured, the British frigate "Castor" (32), under Captain Thomas Troubridge, together with a convoy from Newfoundland. On the same day Villaret-Joyeuse captured part of a Dutch convoy of 53 sail from Lisbon. On the 19th a frigate detached by Admiral Montagu joined Howe. It brought information that Montagu had recaptured part of the Newfoundland convoy, and had learnt that Nielly was to join Vanstabel at sea, and that their combined force would be 9 sail of the line. Montagu himself had steered to cruise on the route of the convoy between the 45th and 47th degrees of north latitude. Howe now steered to meet his subordinate who, he considered, would be in danger from the main French fleet. On the 21st he recaptured some of the Dutch ships taken by Villaret-Joyeuse. From them he learnt that on the 19th the French fleet had been in latitude 47° 46′ N. and in longitude 11° 22′ N. and was steering westward. Judging that Montagu was too far to the south to be in peril from Villaret-Joyeuse, and considering him strong enough to perform the duty of intercepting the convoy, Lord Howe decided to pursue the main French fleet. The wind was changeable and the weather hazy. It was not till the 28th of May at 6.30 A.M. that the British fleet caught sight of the enemy in 47° 34′ N. and 13° 39′ W.

The wind was from the south-east, and the French were to windward. Villaret-Joyeuse bore down to a distance of 10 m. from the British, and then hauled to the wind on the port tack. It was difficult for the British fleet to force an action from leeward if the French were unwilling to engage. Lord Howe detached a light squadron of four ships, the "Bellerophon" (74), "Russel" (74), "Marlborough" (74), and "Thunderer" (74) under Rear-admiral Thomas Pasley, to attack the rear of the French line. Villaret-Joyeuse stood on and endeavoured to work to windward. In the course of the afternoon Rear-admiral Pasley's ships began to come up with the last of the French line, the "Révolutionnaire" (110). A partial action took place which went on till after dark; other British vessels joined. The "Révolutionnaire" was so damaged that she was compelled to leave her fleet, and the British "Audacious" (74) was also crippled and compelled to return to port. The "Révolutionnaire" was accompanied by another liner. During the night the two fleets continued on the same course, and next day Howe renewed his attempts to force an action from leeward. He tacked his fleet in succession—his first ship tacking first and the rest in order—in the hope that he would be able to cut through the French rear and gain the weather-gage. Villaret-Joyeuse then turned all his ships together and again headed in the same direction as the British. This movement brought him nearer the British fleet, and another partial action took place between the van of each force. Seeing that the French admiral was not disposed to charge home, Howe at noon once more ordered his fleet to tack in succession. His signal was poorly obeyed by the van, and his object, which was to cut through the French line, was not at once achieved. But the admiral himself finally set an example by tacking his flagship, the "Queen Charlotte" (100), and passing through the French, two ships from the end of their line. He was followed by his fleet, and Villaret-Joyeuse, seeing the peril of the ships in his rear, wore all his ships together to help them. Both forces had been thrown into considerable confusion by these movements, but the British had gained the weather-gage. Villaret-Joyeuse was able to save the two ships cut off, but he had fallen to leeward and the power to force on a battle had passed to Lord Howe. During the 30th the fleets lost sight of one another for a time. The French, who had four ships crippled, had been joined by four others, and were again 26 in number, including the "Patriote."

The 31st of May passed without a hostile meeting and in thick weather, but by the evening the British were close to windward of the French. As Howe, who had not full confidence in all his captains, did not wish for a night battle, he waited till the following morning, keeping the French under observation by frigates. On the 1st of June they were in the same relative positions, and at about a quarter past eight Howe bore down on the French, throwing his whole line on them at once from end to end, with orders to pass through from windward to leeward, and so to place the British ships on the enemy's line of retreat. It was a very bold departure from the then established methods of fighting, and most honourable in a man of sixty-eight, who had been trained in the old school. Its essential merit was that it produced a close *mêlée*, in which the better average gunnery and seamanship of the British fleet would tell. Lord Howe's orders were not fully obeyed by all his captains, but a signal victory was won,—six of the French line of battle ships were taken, and one, the "Vengeur," sunk. The convoy escaped capture, having passed over the spot on which the action of the 29th May was fought, on the following day, and it anchored at

Brest on the 3rd of June. Its safe arrival went far to console the French for their defeat. The failure to stop it was forgotten in England in the pleasure given by the victory.

See James's *Naval History*, vol. i. (1837); and Tronde, *Batailles navales de la France* (1867). (D. H.)

FIRTH, CHARLES HARDING (1857–), British historian, was born at Sheffield on the 16th of March 1857, and was educated at Clifton College and at Balliol College, Oxford. At his university he took the Stanhope prize for an essay on the marquess Wellesley in 1877, became lecturer at Pembroke College in 1887, and fellow of All Souls College in 1901. He was Ford's lecturer in English history in 1900, and became regius professor of modern history at Oxford in succession to F. York Powell in 1904. Firth's historical work was almost entirely confined to English history during the time of the Great Civil War and the Commonwealth; and although he is somewhat overshadowed by S. R. Gardiner, a worker in the same field, his books are of great value to students of this period. The chief of them are: *Life of the Duke of Newcastle* (1886); *Scotland and the Commonwealth* (1895); *Scotland and the Protectorate* (1899); *Narrative of General Venables* (1900); *Oliver Cromwell* (1900); *Cromwell's Army* (1902); and the standard edition of *Ludlow's Memoirs* (1894). He also edited the *Clarke Papers* (1891–1901), and Mrs Hutchinson's *Memoirs of Colonel Hutchinson* (1885), and wrote an introduction to the *Stuart Tracts* (1903), besides contributions to the *Dictionary of National Biography*. In 1909 he published *The Last Years of the Protectorate*.

FIRTH, MARK (1819–1880), English steel manufacturer and philanthropist, was born at Sheffield on the 25th of April 1819, the son of a steel smelter. At the age of fourteen Mark, with his brother, left school to join their father in the foundry where he was employed, and ten years later the three together started a six-hole furnace of their own. The venture proved successful, and besides an extensive home business, they soon established a large American connexion. Their huge Norfolk works were erected at Sheffield in 1849, and still greater were afterwards acquired at Whittington in Derbyshire and others at Clay Wheels near Wadsley. The manufacture of steel blocks for ordnance was the principal feature of their business, and they produced also shot and heavy forgings. They also installed a plant for the production of steel cores for heavy guns, and for some time they supplied nearly all the metal used for gun making by the British government and a large proportion of that used by the French. On the death of his father in 1848 Mark Firth became the head of the firm. In 1869 he built and endowed "Mark Firth's Almshouses" at Ranmoor near Sheffield, and in 1875, when mayor, he presented to his native place a freehold park of thirty-six acres. He founded and endowed Firth College, for lectures and classes in connexion with the extension of university education, which was opened in 1879. He died on the 28th of November 1880, and was accorded a public funeral.

FIRŪZABAD, a town of Persia, in the province of Fars, 72 m. S. of Shiraz, in 28° 51′ N. Pop. about 3000. It is situated in a fertile plain, 15 m. long and 7 m. broad, well watered by the river Khoja which flows through it from north to south. The town is surrounded by a mud wall and ditch. Three or four miles north-west of the town are the ruins of the ancient city and of a large building popularly known as the fire-temple of Ardashir, and beyond them on the face of the rock in the gorge through which the river enters the plain are two Sassanian bas-reliefs.

The river leaves the plain by a narrow gorge at the southern end, and according to Persian history it was there that Alexander the Great, when unable to capture the ancient city, built a dike across the gorge, thus damming up the water of the river and turning the plain into a lake and submerging the city and villages. The lake remained until the beginning of the 3rd century, when Ardashir, the first Sassanian monarch, drained it by destroying the dike. He built a new city, called it Gūr, and made it the capital of one of the five great provinces or divisions of Fars. Firuz (or Peroz, *q.v.*), one of Ardashir's successors, called the district after his name Firūzabad ("the abode of Firuz"), but the name of the city remained Gūr until Azud ed Dowleh (Adod addaula) (949–982) changed it to its present name. He did this because he frequently resided at Gūr, and the name meaning also "a grave" gave rise to unpleasant allusions, for instance, "People who go to Gūr (grave) never return alive; our king goes to Gūr (the town) several times a year and is not dead yet."

The district has twenty villages and produces much wheat and rice. It is said that the rice of Firūzabad bears sixty-fold. (A. H.-S.)

FIRŪZKŪH, a small province of Persia, with a population of about 5000, paying a yearly revenue of about £500. Its chief place is a village of the same name picturesquely situated in a valley of the Elburz, about 90 m. east of Teheran, at an elevation of 6700 ft. and in 35° 46′ N. and 52° 48′ E. It has post and telegraph offices and a population of 2500. A precipitous cliff on the eastern side of the valley is surmounted by the ruins of an ancient fort popularly ascribed to Alexander the Great.

FISCHART, JOHANN (*c.* 1545–1591), German satirist and publicist, was born, probably at Strassburg (but according to some accounts at Mainz), in or about the year 1545, and was educated at Worms in the house of Kaspar Scheid, whom in the preface to his *Eulenspiegel* he mentions as his "cousin and preceptor." He appears to have travelled in Italy, the Netherlands, France and England, and on his return to have taken the degree of *doctor juris* at Basel. From 1575 to 1581, within which period most of his works were written, he lived with, and was probably associated in the business of, his sister's husband, Bernhard Jobin, a printer at Strassburg, who published many of his books. In 1581 Fischart was attached, as advocate to the Reichskammergericht (imperial court of appeal) at Spires, and in 1583, when he married, was appointed *Amtmann* (magistrate) at Forbach near Saarbrücken. Here he died in the winter of 1590–1591. Fischart wrote under various feigned names, such as Mentzer, Menzer, Reznem, Huldrich Elloposkleros, Jesuwalt Pickhart, Winhold Alkofribas Wüstblutus, Ulrich Mansehr von Treubach, and Im Fischen Gilt's Mischen; and it is partly owing to this fact that there is doubt whether some of the works attributed to him are really his. More than 50 satirical works, however, both in prose and verse, remain authentic, among which are—*Nachtrab oder Nebelkräh* (1570), a satire against one Jakob Rabe, who had become a convert to the Roman Catholic Church; *Von St Dominici des Predigermönchs und St Francisci Barfüssers artlichem Leben* (1571), a poem with the expressive motto "Sie haben Nasen vnd riechen's nit" (Ye have noses and smell it not), written to defend the Protestants against certain wicked accusations, one of which was that Luther held communion with the devil; *Eulenspiegel Reimensweis* (written 1571, published 1572); *Aller Praktik Grossmutter* (1572), after Rabelais's *Prognostication Pantagrueline*; *Flöh Haz, Weiber Traz* (1573), in which he describes a battle between fleas and women; *Affentheuerliche und ungeheuerliche Geschichtschrift vom Leben, Rhaten und Thaten der . . . Helden und Herren Grandgusier Gargantoa und Pantagruel*, also after Rabelais (1575, and again under the modified title, *Naupengeheurliche Geschichtklitterung*, 1577); *Neue künstliche Figuren biblischer Historien* (1576); *Anmahnung zur christlichen Kinderzucht* (1576); *Das glückhafft Schiff von Zürich* (1576, republished 1828, with an introduction by the poet Ludwig Uhland), a poem commemorating the adventure of a company of Zürich arquebusiers, who sailed from their native town to Strassburg in one day, and brought, as a proof of this feat, a kettleful of *Hirsebrei* (millet), which had been cooked in Zürich, still warm into Strassburg, and intended to illustrate the proverb "perseverance overcomes all difficulties"; *Podagrammisch Trostbüchlein* (1577); *Philosophisch Ehzuchtbüchlein* (1578); the celebrated *Bienenkorb des heiligen römischen Immenschwarms*, &c., a modification of the Dutch *De roomsche Byen-Korf*, by Philipp Marnix of St Aldegonde, published in 1579 and reprinted in 1847; *Der heilig Brotkorb* (1580), after Calvin's *Traité des reliques*; *Das vierhörnige Jesuiterhütlein*, a rhymed satire against the Jesuits (1580); and a number of smaller poems.

To Fischart also have been attributed some "Psalmen und geistliche Lieder" which appeared in a Strassburg hymn-book of 1576.

Fischart had studied not only the ancient literatures, but also those of Italy, France, the Netherlands and England. He was a lawyer, a theologian, a satirist and the most powerful Protestant publicist of the counter-reformation period; in politics he was a republican. Above all, he is a master of language, and was indefatigable with his pen. His satire was levelled mercilessly at all perversities in the public and private life of his time—at astrological superstition, scholastic pedantry, ancestral pride, but especially at the papal dignity and the lives of the priesthood and the Jesuits. He indulged in the wildest witticisms, the most abandoned caricature; but all this he did with a serious purpose. As a poet, he is characterized by the eloquence and picturesqueness of his style and the symbolical language he employed. Thirty years after Fischart's death his writings, once so popular, were almost entirely forgotten. Recalled to the public attention by Johann Jakob Bodmer and Gotthold Ephraim Lessing, it is only recently that his works have come to be a subject of investigation, and his position in German literature to be fully understood.

Freiherr von Meusebach, whose valuable collection of Fischart's works has passed into the possession of the royal library in Berlin, deals in his *Fischartstudien* (Halle, 1879) with the great satirist. Fischart's poetical works were published by Hermann Kurz in three volumes (Leipzig, 1866–1868); and selections by K. Goedeke (Leipzig, 1800) and by A. Hauffen in Kürschner's *Deutsche Nationalliteratur* (Stuttgart, 1893); *Die Geschichtklitterung* and some minor writings appeared in Scheible's *Kloster*, vols. 7 and 10 (Stuttgart, 1847–1848). *Das glückhafft Schiff* has been frequently reprinted, critical edition by J. Baechtold (1880). See for further biographical details, Erich Schmidt in the *Allgemeine deutsche Biographie*, vol. 7; A. F. C. Vilmar in Ersch and Gruber's *Encyclopaedie*; W. Wackernagel, *Johann Fischart von Strassburg und Basels Anteil an ihm* (2nd ed., Basel, 1875); P. Besson, *Étude sur Jean Fischart* (Paris, 1889); and A. Hauffen, "Fischart-Studien" (in *Euphorion*, 1896–1909).

FISCHER, EMIL (1852–   ), German chemist, was born at Euskirchen, in Rhenish Prussia, on the 9th of October 1852, his father being a merchant and manufacturer. After studying chemistry at Bonn, he migrated to Strassburg, where he graduated as Ph.D. in 1874. He then acted as assistant to Adolf von Baeyer at Munich for eight years, after which he was appointed to the chair of chemistry successively at Erlangen (1882) and Würzburg (1885). In 1892 he succeeded A. W. von Hofmann as professor of chemistry at Berlin. Emil Fischer devoted himself entirely to organic chemistry, and his investigations are characterized by an originality of idea and readiness of resource which make him the master of this branch of experimental chemistry. In his hands no substance seemed too complex to admit of analysis or of synthesis; and the more intricate and involved the subjects of his investigations the more strongly shown is the conspicuous skill in pulling, as it were, atom from atom, until the molecule stood revealed, and, this accomplished, the same skill combined atom with atom until the molecule was regenerated. His *forte* was to enter fields where others had done little except break the ground; and his researches in many cases completely elucidated the problem in hand, and where the solution was not entire, his methods and results almost always contained the key to the situation.

In 1875, the year following his engagement with von Baeyer, he published his discovery of the organic derivatives of a new compound of hydrogen and nitrogen, which he named hydrazine (*q.v.*). He investigated both the aromatic and aliphatic derivatives, establishing their relation to the diazo compounds, and he perceived the readiness with which they entered into combination with other substances, giving origin to a wealth of hitherto unknown compounds. Of such condensation products undoubtedly the most important are the hydrazones, which result from the interaction with aldehydes and ketones. His observations, published in 1886, that such hydrazones, by treatment with hydrochloric acid or zinc chloride, yielded derivatives of indol, the pyrrol of the benzene series and the parent substance of indigo, were a valuable confirmation of the views advanced by his master, von Baeyer, on the subject of indigo and the many substances related to it. Of greater moment was his discovery that phenyl hydrazine reacted with the sugars to form substances which he named osazones, and which, being highly crystalline and readily formed, served to identify such carbohydrates more definitely than had been previously possible. He next turned to the rosaniline dyestuffs (the magenta of Sir W. H. Perkin), and in collaboration with his cousin Otto Fischer (b. 1852), then at Munich and afterwards professor at Erlangen, who has since identified himself mainly with the compounds of this and related groups, he published papers in 1878 and 1879 which indubitably established that these dyestuffs were derivatives of triphenyl methane. Fischer's next research was concerned with compounds related to uric acid. Here the ground had been broken more especially by von Baeyer, but practically all our knowledge of the so-called purin group (the word *purin* appears to have been suggested by the phrase *purum uricum*) is due to Fischer. In 1881–1882 he published papers which established the formulae of uric acid, xanthine, caffeine, theobromine and some other compounds of this group. But his greatest work in this field was instituted in 1894, when he commenced his great series of papers, wherein the compounds above mentioned were all referred to a nitrogenous base, purin (*q.v.*). The base itself was obtained, but only after much difficulty; and an immense series of derivatives were prepared, some of which were patented in view of possible therapeutical applications.[1] These researches were published in a collected form in 1907 with the title *Untersuchungen in der Puringruppe* (1882–1906). The first stage of his purin work successfully accomplished, he next attacked the sugar group. Here the pioneer work was again of little moment, and Fischer may be regarded as the prime investigator in this field. His researches may be taken as commencing in 1883; and the results are unparalleled in importance in the history of organic chemistry. The chemical complexity of these carbohydrates, and the difficulty with which they could be got into a manageable form—they generally appeared as syrups—occasioned much experimental difficulty; but these troubles were little in comparison with the complications due to stereochemical relations. However, Fischer synthesized fructose, glucose and a great number of other sugars, and having showed how to deduce, for instance, the formulae of the 16 stereoisomeric glucoses, he prepared several stereoisomerides, thereby completing a most brilliant experimental research, and simultaneously confirming the van't Hoff theory of the asymmetric carbon atom (see STEREO-ISOMERISM). The study of the sugars brought in its train the necessity for examining the nature, properties and reactions of substances which bring about the decomposition known as fermentation (*q.v.*). Fischer attacked the problem presented by ferments and enzymes, and although we as yet know little of this complex subject, to Fischer is due at least one very important discovery, viz. that there exists some relation between the chemical constitution of a sugar and the ferment and enzyme which breaks it down. The magnitude of his researches in this field may be gauged by his collected papers, *Untersuchungen über Kohlenhydrate und Fermente* (1884–1908), pp. viii.+912 (Berlin, 1909).

From the sugars and ferments it is but a short step to the subject of the proteins, substances which are more directly connected with life processes than any others. The chemistry of the proteins, a subject which bids fair to be Fischer's great lifework, presents difficulties which are probably without equal in the whole field of chemistry, partly on account of the extraordinary chemical complexity of the substances involved, and partly upon the peculiar manner in which chemical reactions are brought about in the living organism. But by the introduction of new methods, Fischer succeeded in breaking down the complex albuminoid substances into amino acids and other nitrogenous compounds, the constitutions of most of which have been solved; and by bringing about the recombination of these units, appropriately chosen, he prepared synthetic peptides which approximate to the natural products. His methods led to the preparation of an octadeca-peptide of the molecular weight 1213, exceeding that of any other synthetic compound; but even this compound falls far short of the simplest natural peptide, which has a molecular weight of from 2000 to 3000. He considers, however, that the synthesis of more complex products is only a matter of trouble and cost. His researches made from 1899 to 1906 have been published with the title *Untersuchungen über Aminosauren, Polypeptides und Proteine* (Berlin, 1907). The extraordinary merit of his many researches has been recognized by all the important scientific societies in the world, and he was awarded the Nobel prize for chemistry in 1902. Under his control the laboratory at Berlin became one of the most important in existence, and has attracted to it a constant stream of brilliant pupils, many of whom are to be associated with much of the experimental work indissolubly connected with Fischer.

FISCHER, ERNST KUNO BERTHOLD (1824–1907), German philosopher, was born at Sandewalde in Silesia, on the 23rd of July 1824. After studying philosophy at Leipzig and Halle, he became a privat-docent at Heidelberg in 1850. The Baden government in 1853 laid an embargo on his teaching owing to his Liberal ideas, but the effect of this was to rouse considerable sympathy for his views, and in 1856 he obtained a professorship at Jena, where he soon acquired great influence by the dignity of his personal character. In 1872, on Zeller's removal to Berlin, Fischer succeeded him as professor of philosophy and the history of modern German literature at Heidelberg, where he died on the 4th of July 1907. His part in philosophy was that of historian and commentator, for which he was especially qualified by his remarkable clearness of exposition; his point of view is in the main Hegelian. His *Geschichte der neuern Philosophie* (1852–1893, new ed. 1897) is perhaps the most accredited modern book of its kind, and he made valuable contributions to the study of Kant, Bacon, Shakespeare, Goethe, Spinoza, Lessing, Schiller and Schopenhauer.

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[1] For a brief review of the pharmacology of purin derivatives see F. Francis and J. M. Fortescue-Brinkdale, *The Chemical Basis of Pharmacology* (1908).

Some of his numerous works have been translated into English: *Francis Bacon of Verulam*, by J. Oxenford (1857); *The Life and Character of Benedict Spinoza*, by Frida Schmidt (1882); *A Commentary on Kant's Kritik of Pure Reason*, by J. P. Mahaffy (1866); *Descartes and his School*, by J. P. Gordy (1887); *A Critique of Kant*, by W. S. Hough (1888); see also H. Falkenheim, *Kuno Fischer und die litterar-historische Methode* (1892); and bibliography in J. M. Baldwin's *Dictionary of Philosophy and Psychology* (1905).

FISH, HAMILTON (1808–1893), American statesman, was born in New York City on the 3rd of August 1808. His father, Nicholas Fish (1758–1833), served in the American army during the War of American Independence, rising to the rank of lieutenant-colonel. The son graduated at Columbia College in 1827, and in 1830 was admitted to the bar, but practised only a short time. In 1843–1845 he was a Whig representative in Congress. He was the Whig candidate for lieutenant-governor of New York in 1846, and was defeated by Addison Gardner (Democrat); but when in 1847 Gardner was appointed a judge of the state court of appeals, Fish was elected (November 1847) to complete the term (to January 1849). He was governor of New York state from 1849 to 1851, and was United States senator in 1851–1857, acting with the Republicans during the last part of his term. In 1861–1862 he was associated with John A. Dix, William M. Evarts, William E. Dodge, A. T. Stewart, John Jacob Astor, and other New York men, on the Union Defence Committee, which (from April 22, 1861, to April 30, 1862) co-operated with the municipal government in the raising and equipping of troops, and disbursed more than a million dollars for the relief of New York volunteers and their families. Fish was secretary of state during President Grant's two administrations (1869–1877). He conducted the negotiations with Great Britain which resulted in the treaty of the 8th of May 1871, under which (Article 1) the "Alabama claims" were referred to arbitration, and the same disposition (Article 34) was made of the "San Juan Boundary Dispute," concerning the Oregon boundary line. In 1871 Fish presided at the Peace Conference at Washington between Spain and the allied republics of Peru, Chile, Ecuador and Bolivia, which resulted in the formulation (April 12) of a general truce between those countries, to last indefinitely and not to be broken by any one of them without three years' notice given through the United States; and it was chiefly due to his restraint and moderation that a satisfactory settlement of the "Virginius Affair" was reached by the United States and Spain (1873). Fish was vice-president-general of the Society of the Cincinnati from 1848 to 1854, and president-general from 1854 until his death. He died in Garrison, New York, on the 7th of September 1893.

His son, NICHOLAS FISH (1846–1902), was appointed second secretary of legation at Berlin in 1871, became secretary in 1874, and was *chargé d'affaires* at Berne in 1877–1881, and minister to Belgium in 1882–1886, after which he engaged in banking in New York City.

FISH (O. Eng. *fisc*, a word common to Teutonic languages, cf. Dutch *visch*, Ger. *Fisch*, Goth. *fisks*, cognate with the Lat. *piscis*), the common name of that class of vertebrate animals which lives exclusively in water, breathes through gills, and whose limbs take the form of fins (see ICHTHYOLOGY). The article FISHERIES deals with the subject from the economic and commercial point of view, and ANGLING with the catching of fish as a sport. The constellation and sign of the zodiac known as "the fishes" is treated under PISCES.

The fish was an early symbol of Christ in primitive and medieval Christian art. The origin is to be found in the initial letters of the names and titles of Jesus in Greek, viz. Ἰησοῦς Χριστός, Θεοῦ Ὑιός, Σώτηρ, Jesus Christ, Son of God, Saviour, which together spell the Greek word for "fish," ἰχθύς. The fish is also said to be represented in the oval-shaped figure, pointed at both ends, and formed by the intersection of two circles. This figure, also known as the *vesica piscis*, is common in ecclesiastical seals and as a glory or aureole in paintings of sculpture, surrounding figures of the Trinity, saints, &c. The figure is, however, sometimes referred to the almond, as typifying virginity; the French name for the symbol is *Amande mystique*.

The word "fish" is used in many technical senses. Thus it is used of the purchase used in raising the flukes of an anchor to the bill-board; of a piece of wood or metal used to strengthen a sprung mast or yard; and of a plate of metal used, as in railway construction, for the strengthening of the meeting-place of two rails. This word is of doubtful origin, but it is probably an adaptation of the Fr. *fiche*, that which "fixes," a peg. This word also appears in the English form "fish," in the metal, pearl or bone counters, sometimes made in the form of fish, used for scoring points, &c., in many games.

FISHER, ALVAN (1792–1863), American portrait-painter, was born at Needham, Massachusetts, on the 9th of August 1792. At the age of eighteen he was a clerk in a country shop, and subsequently was employed by the village house painter, but at the age of twenty-two he began to paint portrait heads, alternating with rural scenes and animals, for which he found patrons at modest prices. In ten years he had saved enough to go to Europe, studying at the Paris schools and copying in the galleries of the Louvre. Upon his return he became one of the recognized group of Massachusetts portrait-painters. Along with Doughty, Harding and Alexander, in 1831, he held an exhibition of his work in Boston—perhaps the first joint display by painters ever held in that city. Though he had considerable talent for landscape, a lack of patronage for such work caused him to confine himself to portraiture, in which he was moderately successful. He died at Dedham, Mass., on the 16th of February 1863.

FISHER, GEORGE PARK (1827–1909), American theologian, was born at Wrentham, Massachusetts, on the 10th of August 1827. He graduated at Brown University in 1847, and at the Andover Theological Seminary in 1851, spent three years in study in Germany, was college preacher and professor of divinity at Yale College in 1854–1861, and was Titus Street professor of ecclesiastical history in the Yale Divinity School in 1861–1901, when he was made professor *emeritus*. He was president of the American Historical Association in 1897–1898. His writings have given him high rank as an authority on ecclesiastical history. They include *Essays on the Supernatural Origin of Christianity* (1865); *History of the Reformation* (1873), republished in several revisions; *The Beginnings of Christianity* (1877); *Discussions in History and Theology* (1880); *Outlines of Universal History* (1886); *History of the Christian Church* (1887); *The Nature and Method of Revelation* (1890); *Manual of Natural Theology* (1893); *A History of Christian Doctrine*, in the "International Theological Library" (1896); and *A Brief History of Nations* (1896). He died on the 20th of December 1909.

FISHER, JOHN (*c.* 1469–1535), English cardinal and bishop of Rochester, born at Beverly, received his first education at the collegiate church there. In 1484 he went to Michael House, Cambridge, where he took his degrees in arts in 1487 and 1491, and, after filling several offices in the university, became master of his college in 1499. He took orders; and his reputation for learning and piety attracted the notice of Margaret Beaufort, mother of Henry VII., who made him her confessor and chaplain. In 1501 he became vice-chancellor; and later on, when chancellor, he was able to forward, if not to initiate entirely, the beneficent schemes of his patroness in the foundations of St. John's and Christ's colleges, in addition to two lectureships, in Greek and Hebrew. His love for Cambridge never waned, and his own benefactions took the form of scholarships, fellowships and lectures. In 1503 he was the first Margaret professor at Cambridge; and the following year was raised to the see of Rochester, to which he remained faithful, although the richer sees of Ely and Lincoln were offered to him. He was nominated as one of the English prelates for the Lateran council (1512), but did not attend. A man of strict and simple life, he did not hesitate at the legatine synod of 1517 to censure the clergy, in the presence of the brilliant Wolsey himself, for their greed of gain and love of display; and in the convocation of 1523 he freely opposed the cardinal's demand for a subsidy for the war in Flanders. A great friend of Erasmus, whom he invited to Cambridge, whilst earnestly working for a reformation of abuses, he had no sympathy with those who attacked doctrine; and he preached at Paul's Cross (12th of May 1521) at the burning of Luther's books. Although he was not the author of Henry's book against Luther, he joined with his friend, Sir Thomas More, in writing a reply to the scurrilous rejoinder made by the reformer. He retained the esteem of the king until the divorce proceedings began in 1527; and then he set himself sternly in favour of the validity of the marriage. He was Queen Catherine's confessor and her only champion and advocate. He appeared on her behalf before the legates at Blackfriars; and wrote a treatise against the divorce that was widely read.

Recognizing that the true aim of the scheme of church reform brought forward in parliament in 1529 was to put down the only moral force that could withstand the royal will, he energetically opposed the reformation of abuses, which doubtless under other circumstances he would have been the first to accept. In convocation, when the supremacy was discussed (11th of February 1531), he declared that acceptance would cause the clergy "to be hissed out of the society of God's holy Catholic Church"; and it was his influence that brought in the saving clause, *quantum per legem Dei licet.* By listening to the revelations of the "Holy Maid of Kent," the nun Elizabeth Barton (*q.v.*), he was charged with misprision of treason, and was condemned to the loss of his goods and to imprisonment at the king's will, penalties he was allowed to compound by a fine of £300 (25th of March 1534). Fisher was summoned (13th of April) to take the oath prescribed by the Act of Succession, which he was ready to do, were it not that the preamble stated that the offspring of Catherine were illegitimate, and prohibited all faith, trust and obedience to any foreign authority or potentate. Refusing to take the oath, he was committed (15th of April) to the Tower, where he suffered greatly from the rigours of a long confinement. On the passing of the Act of Supremacy (November 1534), in which the saving clause of convocation was omitted, he was attainted and deprived of his see. The council, with Thomas Cromwell at their head, visited him on the 7th of May 1535, and his refusal to acknowledge Henry as supreme head of the church was the ground of his trial. The constancy of Fisher, while driving Henry to a fury that knew no bounds, won the admiration of the whole Christain world, where he had been long known as one of the most learned and pious bishops of the time. Paul III., who had begun his pontificate with the intention of purifying the curia, was unaware of the grave danger in which Fisher lay; and in the hope of reconciling the king with the bishop, created him (20th of May 1535) cardinal priest of St Vitalis. When the news arrived in England it sealed his fate. Henry, in a rage, declared that if the pope sent Fisher a hat there should be no head for it. The cardinal was brought to trial at Westminster (17th of June 1535) on the charge that he did "openly declare in English that the king, our sovereign lord, is not supreme head on earth of the Church of England," and was condemned to a traitor's death at Tyburn, a sentence afterwards changed. He was beheaded on Tower Hill on the 22nd of June 1535, after saying the *Te Deum* and the psalm *In te Domine speravi.* His body was buried first at All Hallows, Barking, and then removed to St. Peter's *ad vincula* in the Tower, where it lies beside that of Sir Thomas More. His head was exposed on London Bridge and then thrown into the river. As a champion of the rights of conscience, and as the only one of the English bishops that dared to resist the king's will, Fisher commends himself to all. On the 9th of December 1886 he was beatified by Pope Leo XIII.

Fisher's Latin works are to be found in the *Opera J. Fisheri quae hactenus inveniri potuerunt omnia* (Würzburg, 1595), and some of his published English works in the Early English Text Society (Extra series, No. 27, part i. 1876). There are others in manuscript at the *P.R.O.* (27, Henry VIII., No. 887). Besides the State papers, the main sources for his biography are *The Life and Death of that renowned John Fisher, Bishop of Rochester* (London, 1655), by an anonymous writer, the best edition being that of Van Ortroy (Brussels, 1893); Bridgett's *Life of Blessed John Fisher, Bishop of Rochester* (London, 1880 and 1890); and Thureau, *Le bienheureux Jean Fisher* (Paris, 1907). (E. Tn.)

FISHER, JOHN ARBUTHNOT FISHER, 1st Baron (1841–), British admiral, was born on the 25th of January 1841, and entered the navy in June 1854. He served in the Baltic during the Crimean War, and was engaged as midshipman on the "Highflyer," "Chesapeake" and "Furious," in the Chinese War, in the operations required by the occupations of Canton, and of the Peiho forts in 1859. He became sub-lieutenant on the 25th of January 1860, and lieutenant on the 4th of November of the same year. The cessation of naval wars, at least of wars at sea in which the British navy had to take a part, after 1860, allowed few officers to gain distinction by actual services against the enemy. But they were provided with other ways of proving their ability by the sweeping revolution which transformed the construction, the armament, and the methods of propulsion of all the navies of the world, and with them the once accepted methods of combat. Lieutenant Fisher began his career as a commissioned officer in the year after the launching of the French "Gloire" had set going the long duel in construction between guns and armour. He early made his mark as a student of gunnery, and was promoted commander on the 2nd of August 1869, and post-captain on the 30th of October 1874. In this rank he was chosen to serve as president of the committee appointed to revise "The Gunnery Manual of the Fleet." It was his already established reputation which pointed Captain Fisher out for the command of H.M.S. "Inflexible," a vessel which, as the representative of a type, had supplied matter for much discussion. As captain of the "Inflexible" he took part in the bombardment of Alexandria (11th July 1882). The engagement was not arduous in itself, having been carried out against forts of inferior construction, indifferently armed, and worse garrisoned, but it supplied an opportunity for a display of gunnery, and it was conspicuous in the midst of a long naval peace. The "Inflexible" took a prominent part in the action, and her captain had the command of the naval brigade landed in Alexandria, where he adapted the ironclad train and commanded it in various skirmishes with the enemy. After the Egyptian campaign, he was, in succession, director of Naval Ordnance and Torpedoes (from October 1886 to May 1891); A.D.C. to Queen Victoria (18th June, 1887, to 2nd August 1890, at which date he became rear-admiral); admiral superintendent of Portsmouth dockyard (1891 to 1892); a lord commissioner of the navy and comptroller of the navy (1892 to 1897), and vice-admiral (8th May 1896); commander-in-chief on the North American and West Indian station (1897). In 1899 he acted as naval expert at the Hague Peace Conference, and on the 1st of July 1899 was appointed commander-in-chief in the Mediterranean. From the Mediterranean command, Admiral Fisher passed again to the admiralty as second sea lord in 1902, and became commander-in-chief at Portsmouth on the 31st of August 1903, from which post he passed to that of first sea lord. Besides holding the foreign Khedivial and Osmanieh orders, he was created K.C.B. in 1894 and G.C.B. in 1902. As first sea lord, during the years 1903–1909, Sir John Fisher had a predominant influence in all the far-reaching new measures of naval development and internal reform; and he was also one of the committee, known as Lord Esher's committee, appointed in 1904 to report on the measures necessary to be taken to put the administration and organization of the British army on a sound footing. The changes in naval administration made under him were hotly canvassed among critics, who charged him with autocratic methods, and in 1906–1909 with undue subservience to the government's desire for economy; and whatever the efficiency of his own methods at the admiralty, the fact was undeniable that for the first time for very many years the navy suffered, as a service, from the party-spirit which was aroused. It was notorious that Admiral Lord Charles Beresford in particular was acutely hostile to Sir John Fisher's administration; and on his retirement in the spring of 1909 from the position of commander-in-chief of the Channel fleet, he put his charges and complaints before the government, and an inquiry was held by a small committee under the Prime Minister. Its report, published in August, was in favour of the Admiralty, though it encouraged the belief that some important suggestions as to the organization of a naval "general staff" would take effect. On the 9th of November Sir John Fisher was created a peer as Baron Fisher of Kilverstone, Norfolk. He retired from the Admiralty in January 1910.

FISHERIES,[1] a general term for the various operations engaged in for the capture of such aquatic creatures as are useful to man. From time immemorial fish have been captured by various forms of spears, nets, hooks and more elaborate apparatus, and a historical description of the methods and appliances that have been used would comprise a considerable portion of a treatise on the history of man. For the most part the operations of fishing have been comparable with those of primitive hunting rather than with agriculture; they have taken the least possible account of considerations affecting the supply; when one locality has been fished out, another has been resorted to. The increasing pressure on every source of food, and the enormous improvements in the catching power of the engines involved, has made some kind of regulation and control inevitable, with the result that in practically every civilized country there exists some authority for the investigation and regulation of fisheries.

The annexed table shows the department of state and the approximate expenditure on fisheries in some of the chief countries of the world. The figures are only approximate and are based on the expenditure for 1907. In the case of England and Wales the expenditure is not complete, as under the Sea Fisheries Regulation Act of 1888 the whole of the coast of England and Wales could be placed under local fisheries committees with power to levy rates for fishery purposes, and in a certain number of districts advantage has been taken of this act. But even with this addition, British expenditure on fisheries is less than that undertaken by most of the countries of northern Europe, although British fisheries are much more valuable than those of all the rest of Europe together.

Administration of Fisheries.

	Norway.	Sweden.	Denmark.	Germany.	Holland.	Belgium.
Department of State	Trade and Industry and Agriculture.	Agriculture.	Agriculture.	Imperial Department of Interior.	Agriculture.	Agriculture and Woods and Forests.
Approximate Annual Expenditure—						
1. Administration	£15,000	£5,500	£10,200	Conducted by Maritime States	£12,500	..
2. Scientific Fishery Research	5,000	4,500	6,300	£27,750	2,500	£1,000

	Canada.	U.S. America.	England and Wales.	Scotland.	Ireland.
Department of State	Marine and Fisheries.	Bureau of Fisheries under Commerce and Labour.	Agriculture and Fisheries.	Fishery Board.	Agriculture and Technical Instruction.
Approximate Annual Expenditure—					
1. Administration	£159,000	Conducted by Coastal States	£8,000	£13,000	£10,000
2. Scientific Fishery Research	48,000	£141,000	14,000 (expended through agents)	800	..

The early years of the 20th century witnessed another great expansion of the sea fisheries of the United Kingdom. The herring fishery has been revolutionized partly by the successful introduction of steam drifters, which have markedly increased the aggregate catching power, and partly by the prosecution of the fishery on one part or other of the British coasts during the greater part of the year. The crews of many Scottish vessels which formerly worked at the herring and line fisheries in alternate seasons of the year now devote their energies almost entirely to the herring fishery, which they pursue in nomad fleets around all the coasts of Great Britain. The East Anglian drifters carry on their operations at different seasons of the year from Shetland in the north (for herrings) to Newlyn in the west (for mackerel). In Scotland the value of the nets employed on steam drifters has increased from £3000 in 1899 to £61,000 in 1906, and the average annual catch of herrings has increased from about four to about five million cwts. during the past ten years. In England also the annual catch of herrings, which reached a total of two million cwts. for the first time in 1899, has exceeded three millions in each year from 1902 to 1905.

In steam trawling also great enterprise has been shown. In 1906 Messrs Hellyer of Hull launched a new steam trawling fleet of 50 vessels for working the North Sea grounds, and the delivery of new steam trawlers at Grimsby was greater than at any previous period, these vessels being designed more especially to exploit the distant fishing grounds, the range of which has been extended from Morocco to the White Sea. About 100 vessels were added to the Grimsby fleet in the course of twelve months. These new vessels measure about 140 ft. in length and over 20 ft. in beam, and exceed 250 tons gross tonnage, the accommodation both for fish and crews being considerably in excess of that provided in vessels of this class hitherto.

Returns of the steam trawlers registered in 1907 in the chief European countries show the expanse of this industry, and the enormous preponderance of Great Britain. The numbers are as follows:—

Belgium	23
Denmark	5
France	224
Germany	239
Netherlands	81
Norway	20
Portugal	13
Spain	12–18
Sweden	11
Scotland	292
Ireland	6
England and Wales	1317

A simultaneous development of the sea fisheries has been manifested in other maritime countries of Europe, particularly in Germany and Holland, but the total number of steam trawlers belonging to those countries in 1905 scarcely exceeded the mere additions to the British fishing fleet in 1906.

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[1] For fisheries in the cases of Coral, Oyster, Pearl, Salmon, Sponges and Whale, see these articles; for fishing as a sport see Angling.

The relative magnitude of British fisheries may best be gauged by a comparison with the proceeds of the chief fisheries of other European countries. The following table is based upon official returns and mainly derived from the *Bulletin Statistique* of the International Council for the Study of the Sea. It represents in pounds sterling the value of the produce of the various national fisheries during the year 1904, except in the case of France, for which country the latest available figures are those for 1902.

Values in Thousands of £.

	Herring.	Cod.	Plaice.	Other Fish.	Total.
British Isles .	1870	1015	1100	5496	9,481,000
Norway . . .	352	834	. .	443	1,629,000
Denmark . .	117	60	171	223	571,000
Germany . .	220	64[1]	40[1]	512[1]	836,000
Holland . . .	575	53	58	311	997,000
France (1902) .	635	851[2]	. .	3562	5,048,000

The total value of the sea fisheries in the three chief subdivisions of the British Isles in the year 1905, according to the official returns, was as follows:

Fish landed in	Excluding Shellfish.	Including Shellfish.
England and Wales	£7,200,644	£7,502,768
Scotland	2,649,148	2,719,810
Ireland	360,577	414,364
Total . .	£10,210,369	£10,636,942

These figures show an increase of £1,000,000 as compared with the total value in 1900, and of more than £3,000,000 as compared with 1895 (cf. Table I. at end).

In England and Wales the trawl fisheries for cod, haddock, and flat fish yielded about three-quarters of the total, and the drift fisheries for herring and mackerel nearly the whole of the remaining quarter. The line fisheries in England and Wales are now relatively insignificant and yield only about one-fortieth of the total (cf. Table VIII. at end).

In Scotland, on the other hand, there is not so much difference in the relative importance of the three chief fisheries. In 1905 herrings and other net-caught fish yielded rather more than one-half of the total, the trawl fisheries nearly three-eighths, and the line fisheries one-eighth (cf. Table X.).

Fishery.	Trawl and Line.		Drift and Stake-nets.		Shellfish.
	Thousands of cwt.	Thousands of £.	Thousands of cwt.	Thousands of £.	Thousands of £.
England and Wales, 1905—					
East Coast . . .	6017	4713	3042	1145	202
South Coast . . .	303	245	728	268	64
West Coast . . .	1002	720	219	111	36
Scotland, 1906—					
East Coast . . .	2296	1202	2709	819	25
Orkney and Shetland .	114	42	1735	642	10
West Coast . . .	148	62	591	210	38
Ireland, 1905—					
North Coast . . .	9	5	177	70	7
East Coast . . .	79	70	110	32	18
South and West Coast .	46	35	577	148	28

In Ireland the mackerel and herring fisheries provide nearly three-quarters of the total yield, the mackerel forming the chief item in the south and west, and the herring on the north and east coasts. The remaining quarter is mainly derived from the trawl fisheries, the headquarters of which are at Dublin, Howth and Balbriggan on the east, and at Galway and Dingle on the west coast.

The value of the fishing boats and gear employed in the Scottish fisheries during 1905 is returned as nearly £4,120,000. Upon a moderate estimate, the total value of the boats and gear employed in the fisheries of Great Britain and Ireland cannot be less than £12,000,000.

The relative yield and value of the various fisheries on the separate coasts of the British Isles is illustrated in the table of landings from the latest data available.

From these figures it is manifest that the yield and value of the east coast fisheries of England and Scotland preponderate enormously over those of the western coasts, whether attention be paid to the drift-net fisheries for surface fish or to the fisheries for bottom fish with trawls and lines.

The preceding statistics and remarks, as well as the supplementary tables at the end of this article, indicate that the British fishing industry has enjoyed a period of unexampled prosperity. The community at large has benefited by the more plentiful supply, and the merchant by the general lowering of prices at the ports of landing (see Tables I.-IV. at end). But it is to be noted that this wave of prosperity, as on previous occasions, has been attained by the application of increased and more powerful means of capture and by the exploitation of new fishing grounds in distant waters, and not by any increase, natural or artificial, in the productivity of the home waters,—unless perhaps the abundance of herrings is to be ascribed to the destruction of their enemies by trawling. British fisheries are still pursued as a form of hunting rather than of husbandry. In 1892 the Iceland and Bay of Biscay trawling banks were discovered, in 1898 the Faroe banks, in 1905 rich plaice grounds in the White Sea. In 1905 one-half of the cod and a quarter of the haddock and plaice landed at east coast ports of England were caught in waters beyond the North Sea.

Table showing, in Thousands of Cwt., the Quantity of Fish landed by Steam Trawlers on the East Coast of England from Fishing Grounds within and beyond the North Sea respectively.

Year.	Within the North Sea.				Beyond the North Sea.			
	Cod.	Haddock.	Plaice.	All Kinds.	Cod.	Haddock.	Plaice.	All Kinds.
1903	729	2301	812	4776	470	389	114	1189
1904	637	2032	658	4228	447	429	284	1389
1905	640	1560	621	3739	603	518	244	1682

The statistics of the English Board of Agriculture and Fisheries have distinguished since 1903 between the catch of fish within and beyond the North Sea, and between the catch of trawlers and liners. Neglecting the catch of the liners as relatively insignificant, and of the sailing trawlers as relatively small and practically constant during the three years in question, we see from the board's figures (see table above) that the total catch of English steam trawlers within the North Sea during 1904 and 1905 was in each year 500,000 cwt. less than in the year before, amounting to a gross decrease of more than 25% in 1905 as compared with 1903, and, in relation to the catching power employed, to an average decrease of 2½ cwt. per boat per diem. This decrease may be largely explained by the occurrence in 1903 of one of those periodic "floods" of small cod and haddock which take place in the North Sea from time to time; but the steady decline in the number of North Sea voyages by English steam trawlers—from 29,300 in 1903 to 26,700 in 1905—affords a clear indication of the fact that many of our trawling skippers are deserting the North Sea for more profitable fishing grounds. The number of Scottish steam trawlers "employed" at Scottish North Sea ports has

[1] Estimated as regards about one-third of the total.

[2] Including the Newfoundland fishery.

also declined during the same period from 240 in 1903 to 228 in 1905.

The following table shows the number of British and foreign steam trawlers registered at North Sea ports, and for English vessels the number of fishing voyages made within and beyond the North Sea respectively:—

Year.	Boats Registered.	English Steam Trawlers. Voyages.[1]		Scottish. Employed.	German, Dutch and Belgian. Registered.
		Within North Sea.	Beyond North Sea.		
1903	1060	29,328	1822	240	181
1904	1049	28,589	2120	233	199
1905	1064	26,670	2671	228	228

Unfortunately the North Sea gains no rest from this withdrawal of British trawlers, since the place of the latter is filled year after year by increasing numbers of continental fishing boats. The number of fishing steamers (practically all trawlers) registered at North Sea ports in Germany and Holland was 159 in 1903, 177 in 1904, 205 in 1905, and 330 in 1907.

It is satisfactory under these circumstances to note the increased attention which has been paid in recent years to the acquisition of more exact knowledge upon the actual state of the fisheries and upon the biological and other factors which influence the supply.

A comprehensive programme of co-operative investigations, both scientific and statistical, was put into execution in the course of 1902 under the International Council for the Study of the Sea (see below). The Fishery Board for Scotland and the Marine Biological Association for England were commissioned to carry out the work at sea allotted to Great Britain, and the English fishery department was equipped soon afterwards with the means for collecting more adequate statistics.

Trawling investigations and the quantitative collection of fish eggs have located important spawning grounds of cod, haddock, plaice, sole, eel, &c.; marking experiments with cod, plaice and eel have thrown much light upon the migrations of these fishes; and the rate of growth of plaice, cod and herring has been elucidated in different localities. The percentage of marked plaice annually recaptured in the North Sea has been found to be remarkably high (from 25 to 50 %), and throws a significant light on the intensity of fishing under modern conditions. It seems probable that the impoverishment of the stock of plaice on the central grounds of the North Sea is mainly attributable to the excessive rate of capture of plaice during their annual off-shore migrations from the coast. On the other hand, it has been shown that the growth-rate of plaice on the Dogger Bank is constantly and markedly greater (five- or six-fold in weight) than on the coastal grounds where these fish are reared,—facts which open up the possibility of increasing the permanent supply of plaice from the North Sea by the adoption of some plan of commercial transplantation (see PISCICULTURE).

History.—A brief review may now be given of the history of the administration of British sea-fisheries since 1860, and of the steps which have been taken for the attainment of scientific and statistical information in relation thereto.

In 1860 a royal commission, consisting of Professor Huxley, Mr (afterwards Sir) John Caird, and Mr G. Shaw-Lefevre (afterwards Lord Eversley), was appointed to inquire into the condition of the British sea-fisheries, the harmfulness or otherwise of existing methods of fishing, and the necessity or otherwise of the existing legislation. The important report of this commission, issued in 1866, embodied the following main conclusions and recommendations:—(1) the total supply of fish obtained upon the British coasts is increasing and admits of further augmentation; (2) beam-trawling in the open sea is not a wastefully destructive mode of fishing; (3) all acts of parliament which profess to regulate or restrict the modes of fishing pursued in the open sea should be repealed and “unrestricted freedom of fishing be permitted hereafter”; (4) all fishing boats should be lettered and numbered as a condition of registration and licence.

In 1868 full effect was given to these recommendations by the passing of the Sea Fisheries Act. Regulations for the registration of fishing boats were issued by order in council in the following year. (New regulations were introduced in 1902.)

In 1878 a commission was given to Messrs Buckland and Walpole to inquire into the alleged destruction of the spawn and fry of sea fish, especially by the use of the beam-trawl and ground seine. Their report is an excellent summary of the condition of the sea fisheries at the time, and shows how little was then known with regard to the eggs and spawning habits of our marine food fishes.

In 1882 the former Board of British White Herring was dissolved and the Fishery Board for Scotland instituted, the latter being empowered to take such measures for the improvement of the fisheries as the funds under their administration might admit of. Arrangements were made in the following year with Professor M‘Intosh of St Andrews which enabled the latter to fit up a small marine laboratory and to begin a series of studies on the eggs and larvae of sea fishes, which have contributed greatly to the development of more exact knowledge concerning the reproduction of fishes. Under the Sea Fisheries (Scotland) Amendment Act of 1885 the board closed the Firth of Forth and St Andrews Bay against trawlers as an experiment for the purpose of ascertaining the result of such prohibition on the supply of fish on the grounds so protected. The treasury also, by a further grant of £3000, enabled the board to purchase the steam-yacht “Garland” as a means of carrying out regular experimental trawlings over the protected grounds. Reports on the results of these experiments have been annually published, and were summarized at the end of ten years' closure in the board's report for 1895. Dr Fulton's summary showed that “no very marked change took place in the abundance of food-fishes generally, either in the closed or open waters of the Firth of Forth or St Andrews Bay,” as a consequence of the prohibition of trawling. Nevertheless, among flat fishes, plaice and lemon soles, which spawn off-shore, were reported to have decreased in numbers in all the areas investigated, whether closed or open, while dabs and long rough dabs showed a preponderating, if not quite universal, increase.

The results of this classical experiment point strongly to the presumptions (1) that trawling operations in the open sea have now exceeded the point at which their effect on the supply of eggs and fry for the upkeep of the flat fisheries is inappreciable; and (2) that protection of in-shore areas alone is insufficient to check the impoverishment caused by over-fishing off-shore. (For critical examinations of Dr Fulton's account see M‘Intosh, *Resources of the Sea*, London, 1889; Garstang, “The Impoverishment of the Sea,” *Journ. Mar. Biol. Ass.* vol. vi., 1900; and Archer, *Report of Ichthyological Committee*, Cd. 1312, 1902.)

A laboratory and sea-fish hatchery were subsequently established by the board at Dunbar in 1893, but removed to Aberdeen in 1900.

In 1883 a royal commission, under the chairmanship of the late earl of Dalhousie, was appointed to inquire into complaints against the practice of beam-trawling on the part of line and drift-net fishermen. A small sum of money (£200) was granted to the commission for the purpose of scientific trawling experiments, which were carried out by Professor M‘Intosh.

The report of this commission was an important one, and its recommendations resulted in the institution of fishery statistics for England, Scotland and Ireland (1885–1887).

In 1884 the Marine Biological Association of the United Kingdom was founded for the scientific study of marine zoology and botany, especially as bearing upon the food, habits and life-conditions of British food-fishes, crustacea and molluscs. Professor Huxley was its first president, and Professor Ray

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[1] Excluding the voyages of the fleeting trawlers which supply London by means of carriers.

Lankester, who initiated the movement, succeeded him. A large and well-equipped laboratory was erected at Plymouth, and formally opened for work in 1888. The work of the association has been maintained by annual grants of £400 from the Fishmongers' Company and £1000 from H. M. treasury, and by the subscriptions of the members. The association publishes a half-yearly journal recording the results of its investigations.

In 1886 a fishery department of the Board of Trade was organized under the Salmon and Freshwater Fisheries Act of that year. The department publishes annually a return of statistics of sea-fish landed, a report on salmon fisheries (transferred from the home office), and a report on sea fisheries. It consists of several inspectors under an assistant secretary of the board; it has no power to make scientific investigations or bye-laws and regulations affecting the sea-fisheries. In 1894 the administration of the acts relating to the registration of fishing vessels, &c., was transferred to the fisheries department.

In 1888 the Sea Fisheries Regulation Act provided for the constitution (by provisional order of the Board of Trade) of local fisheries committees having, within defined limits, powers for the regulation of coast fisheries in England and Wales. The powers of district committees were extended under Part II. of the Fisheries Act 1891, and again under the Fisheries (Shell Fish) Regulation Act 1894. Sea-fisheries districts have now been created round nearly the whole coast of England and Wales. Under bye-laws of these committees steam-trawling has been prohibited in nearly all the territorial waters of England and Wales, and trawling by smaller boats has been placed under a variety of restrictions. Local scientific investigations have been initiated under several of the committees, especially in Lancashire by Professor Herdman of Liverpool and his assistants.

In 1890 an important survey of the fishing grounds off the west coast of Ireland was undertaken by the Royal Dublin Society, with assistance from the government, and in the hands of Mr E. W. L. Holt led to the acquisition of much valuable information concerning the spawning habits of fishes and the distribution of fish on the Atlantic seaboard.

In 1892, under powers conferred by the Herring Fishery (Scotland) Act of 1889, the Fishery Board for Scotland closed the whole of the Moray Firth—including a large tract of extra-territorial waters—against trawling, in order to test experimentally the effect of protecting certain spawning grounds in the outer parts of the firth. The closure has given rise to a succession of protests from the leaders of the trawling industry in Aberdeen and England. It seems that the difficulty of policing so large an area, as well as the absence of any power to enforce the restriction on foreign vessels, have defeated the original intention; and the bye-law appears to be now retained mainly in deference to the wishes of the local line-fishermen, the decadence of whose industry—from economic causes which have been alluded to above—is manifest from the figures in Table X. below. The controversy has had the effect of causing the transference of a number of English trawlers to foreign flags, especially the Norwegian.

Statistics.—The following tables summarize the official statistics of fish landed on the coasts of England and Wales, Scotland and Ireland, and give some information relative to the numbers of fishing-boats and fishermen in the three countries.

Table I.—*Summary of Statistics of Fish landed, imported and exported for the United Kingdom.*

Year.	Fish landed (excluding Shell-fish).		Net Imports.	Exports of British Fish.
	Cwt.			
1890	12,774,010	£6,361,487	£2,315,572	£1,795,267
1895	14,068,641	7,168,025	2,453,676	2,282,406
1900	14,671,070	9,242,491	2,937,486	3,000,852
1905	20,164,276	10,210,369	2,250,259	4,164,869

Note.—Imported fish afterwards re-exported (consisting chiefly of salted or cured fish to the value of over £900,000 in 1905) are not included in the above values of imports and exports. The exports consist mainly of herrings.

Table II.—*Quantity and Average Landing Value of Flat Fishes landed on the Coasts of England and Wales (all caught with Trawl-nets, except Halibut in part).*

Year.	Quantity (in Thousands of Cwt.).					Average Price (per Cwt.).				
	Sole.	Turbot.	Brill.	Plaice.	Halibut.	Sole.	Turbot.	Brill.	Plaice.	Halibut.
						£ s.	£ s.	£ s.	£ s.	£ s.
1890	72·1	51·9	15·4	623	95	6 7	3 13	2 8	0 19	1 10
1895	82·8	77·9	19·0	789	114	6 16	3 17	2 11	1 1	1 15
1900	75·3	60·7	20·7	752	136	7 11	4 3	2 14	1 4	1 14
1905	80·1	89·5	22·4	1074	120	5 18	3 11	2 11	0 19	1 17

Table III.—*Quantity and Average Landing Value of Round Fishes, caught with Trawls and Lines, landed on the Coasts of England and Wales.*

Year.	Quantity (in Thousands of Cwt.).					Average Price (per Cwt.)				
	Cod.	Haddock.	Hake.	Ling.	Sundries.	Cod.	Haddock.	Hake.	Ling.	Sundries.
						s. d.	s. d.	s. d.	s. d.	s. d.
1890	363	1585	..	96	1151	13 10	9 7	...	14 3	14 0
1895	496	2433	132	114	1013	12 5	9 9	16 2	11 8	13 7
1900	589	2487	233	100	1190	14 8	13 8	15 10	12 10	14 10
1905	1423	2148	484	165	1425	12 4	12 5	13 4	11 3	9 8

Table IV.—*Quantity and Average Landing Value of Surface Fishes landed on the Coasts of England and Wales (caught with Drift-, Seine-, and Stow-nets).*

Year.	Quantity (in Thousands of Cwt.).				Average Price (per Cwt.).			
	Mackerel.	Herring.	Pilchard.	Sprat.	Mackerel.	Herring.	Pilchard.	Sprat.
					s. d.	s. d.	s. d.	s. d.
1890	509	1332	61	99	15 5	7 2	5 10	3 0
1895	375	1437	65	91	16 3	5 10	5 3	3 1
1900	321	2425	106	73	15 9	7 8	4 6	4 11
1905	682	3062	169	75	8 11	7 7	5 0	3 6

Table V.—*Quantity and Average Landing Value of Shell-fish landed on the Coasts of England and Wales.*

Year.	Number.				Average Price.			
	Thousands.		Mills.	Thousands of Cwt.	Per Hundred.			Per Cwt.
	Crabs.	Lobsters.	Oysters.	Sundries.	Crabs.	Lobsters.	Oysters.	Sundries.
					£ s.	£ s.	s. d.	s. d.
1890	4808	922	47·6	505	1 4	4 18	6 1	5 0
1895	4501	677	25·3	590	1 4	4 8	6 2	4 11
1900	5177	654	37·8	539	1 2	4 7	7 0	5 8
1905	5106	503	35·4	423	1 3	4 15	5 9	5 6

Table VI.—*Total Quantity of the more important Fishes and Shell-fish landed in Scotland.*

Year.	In Thousands of Cwt.									Cwt.	Number (Thousands).		
	Herring.	Lemon Sole.	Flounder, Plaice, and Brill.	Halibut.	Cod.	Ling.	Haddock.	Whiting.	Skate.	Mussels.	Crabs.	Lobsters.	Oysters.
1890	3980	17	81	20	449	170	754	75	54	181	2882	643	350
1895	4077	19	80	29	459	165	1001	43	59	194	2548	610	239
1900	3520	21	102	26	434	157	761	75	72	143	3128	680	796
1905	5343	31	56[1]	36	677	1 1	932	184	100	103	1990	760	218

[1] Plaice only.

TABLE VII.—*Total Quantity of the more important Fishes and Shell-fish returned as landed on the Irish Coasts.*

Year.	In Thousands of Cwt.									Number (Thousands).		
	Mackerel.	Herring.	Sole.	Turbot.	Cod.	Ling.	Haddock.	Whiting.	Hake.	Oysters.	Crabs.	Lobsters.
1890	502	85	4·5	1·4	39·6	14·8	16·4	13·5	25·3	576	228	238
1895	339	171	1·8	1·0	43·6	29·7	30·9	11·9	18·7	563	240	276
1900	278	284	3·1	1·5	33·6	11·9	12·4	11·9	16·3	236	202	286
1905	505	354	3·5	0·8	18·6	9·1	11·3	18·3	7·1	348	175	236

Note.—The Irish statistics of shell-fish are very incomplete, owing to the inadequate means at the disposal of the authorities for collecting statistics over large sections of the coast.

TABLE VIII.—*Classified List of British Fishing Boats on the Register for 1905, omitting 2nd Class Steamers and Vessels under 18 Ft. Keel or Navigated by Oars only and Vessels unemployed.*

Mode of Fishing.	England and Wales.			Scotland.			Ireland.		
	Steamers. 1st Cl.	Sailing. 1st Cl.	Sailing. 2nd Cl.	Steamers. 1st Cl.	Sailing. 1st Cl.	Sailing. 2nd Cl.	Steamers. 1st Cl.	Sailing. 1st Cl.	Sailing. 2nd Cl.
Trawling .	1173	904	586	244	..	68	10	142	283
Drift-nets	263	562	539	..	..	..	..	..	..
Lines .	56	29	685	209	3403	2910	..	229	2776
Various .	21	215	2277	..	..	..	..	..	..
Total . .	1513	1710	4087	453	3403	2978	10	371	3059

Note.—1st class = steamers of at least 15 tons gross tonnage, and other boats of at least 15 tons registered tonnage (in Scotland exceeding 30 ft. keel).
2nd class = less than 15 tons tonnage, or from 18 to 30 ft. keel.

TABLE IX.—*Number (A) of Men and Boys constantly employed and (B) of other Persons occasionally employed in Fishing.*

Year.	England and Wales.		Scotland.		Ireland.		United Kingdom.	
	A.	B.	A.	B.	A.	B.	A.	B.
1890	32,503	9312	34,319	20,829	10,121	13,981	78,450	46,337
1895	32,229	8995	31,044	12,329	8,692	18,218	73,090	41,230
1900	31,589	7994	27,288	10,288	8,677	18,982	68,708	37,814
1905	34,318	8132	29,064	10,487	8,744	17,079	73,293	36,131

TABLE X.—*Catch and Value of Line-caught and Trawled Fish landed in Scotland.*

Year.	Line-caught Fish.		Trawled Fish.	
	Cwt.		Cwt.	
1890	1,577,299	£591,059	291,812	£203,620
1895	1,479,654	548,629	531,695	291,165
1900	757,416	371,173	1,077,082	703,427
1905	735,654	348,610	1,745,431	948,117

In 1893 a select committee of the House of Commons took evidence as to the expediency of adopting measures for the preservation of the sea-fisheries in the seas around the British Islands, with especial reference to the alleged wasteful destruction of under-sized fish. They recommended the adoption of a size-limit of 8 in. for soles and plaice, and 10 in. for turbot and brill, below which the sale of these fishes should be prohibited, on the ground that these limits would approximate to those already adopted by foreign countries.

In 1899 the Agriculture and Technical Instruction (Ireland) Act transferred the powers and duties of the inspectors of Irish fisheries to the Department of Agriculture and Technical Instruction for Ireland. The department is provided with a steam cruiser, the "Helga," 375 tons, fully equipped for fishery research, as well as with a floating marine laboratory. Mr Holt, formerly of the Marine Biological Association, was appointed to take charge of the scientific work.

In 1900 another select committee of the House of Commons was appointed to consider and take evidence on the proposals of the Sea Fisheries Bill, which had been framed in accordance with the recommendations of the select committee of 1893, but had failed to pass in several sessions of parliament. Owing to marked divergencies of opinion on the question whether the low size-limits proposed would be effectual in keeping the trawlers from working on the grounds where small fish congregated, the committee reported against the bill, and urged the immediate equipment of the government departments with means for undertaking the necessary scientific investigations.

In 1901 an international conference of representatives of all the countries bordering upon the North and Baltic Seas met at Christiania to revise proposals which had been drafted at Stockholm in 1899 for a scientific exploration of these waters in the interest of the fisheries, to be undertaken concurrently by all the participating countries. The British government was represented by Sir Colin Scott-Moncrieff, K.C.M G., with Professor D'Arcy W. Thompson, Mr (afterwards Professor) W. Garstang and Dr H. R. Mill as advisers. The proposals were subsequently accepted, with some restrictions, and an international council of management was appointed by the participating governments. The Fishery Board for Scotland and the Marine Biological Association from England were commissioned in 1902 to carry out the work at sea allotted to Great Britain, and a special grant of £5500 per annum was made to each body by the Treasury for this purpose. Two steamers, the "Huxley" and the "Goldseeker," were chartered for the investigations and began work in 1902 and 1903 from Lowestoft and Aberdeen respectively. Reports on the work of the first five years were published in 1909.

In 1901 the Board of Trade appointed a committee (the Committee on Ichthyological Research) to inquire and report as to the best means by which scientific fishery research could be organized and assisted in relation to the state or local authorities. The committee consisted of Sir Herbert Maxwell, M.P. (chairman), Mr W. F. Archer, Mr Donald Crawford, Rev. W. S. Green, Professor W. A. Herdman, Hon. T. H. W. Pelham, Mr S. E. Spring Rice and Professor J. A. Thomson. Sir Herbert Maxwell resigned his chairmanship before the report was drawn up (September 1902), and was succeeded by Sir Colin Scott-Moncrieff. The committee recommended the provision of more complete statistics; the provision and maintenance of five special steamers (where not already existing) to work in connexion with as many marine laboratories, viz. one for each of the three coasts of England and Wales, and one each for Scotland and Ireland; the provision of three biological assistants at each laboratory; the grant of statutory powers to local sea-fisheries committees to expend money on fishery research; the constitution of a fishery council for England and Wales, and of a conference of representatives of the central authorities in England, Scotland and Ireland. In 1903 the fishery department of the Board of Trade was transferred to the Board of Agriculture, Mr W. E. Archer, chief inspector of fisheries, becoming an assistant secretary of the new Board of Agriculture and Fisheries.

In 1907 a departmental treasury committee was appointed to inquire into the scientific and statistical investigations carried on in relation to the fishing industry of the United Kingdom. The committee consisted of Mr H. J. Tennant, M.P. (chairman), Lord Nunburnholme, Sir Reginald MacLeod, Mr N. W. Helms, M.P., Mr A. Williamson, M.P., Dr P. Chalmers Mitchell, F.R.S., Mr J. S. Gardiner, F.R.S., the Rev. W. S. Green, Mr R. H. Rew and Mr L. S. Hewby. This committee reviewed the work that had already been done and urged its continuation and extension under the direction of a central council composed of representatives of the government departments concerned with fishery matters in England, Scotland and Ireland, with a scientific chairman and director, and further insisted on the need of international co-operation in the investigations.

United States Fisheries.—The administration of the fisheries of the United States of America is under the control of the several coastal states, but the Bureau of Fisheries at Washington, which reports to the secretary of commerce and labour, conducts a vast amount of scientific fishery investigation, issues admirable statistical and biological reports, and conducts on a very large scale work on the replenishment of the fishing stations by artificial means (see PISCICULTURE). Although in recent years Canada has given an increasing amount of state support to the investigation, control and assistance of her fisheries, an amount actually and relatively far exceeding that given in Great Britain, the fishing industry of the United States still far exceeds that of Canada. A considerable bulk of fish, taken by American ships from the Newfoundland coasts and from those of other British provinces, is landed at American ports, but as the following recent table shows, it is much less than that taken from American waters.

Quantities and Values of Fish landed by American Vessels at Boston and Gloucester, Mass., in 1905.

	Quantities.	Value.
(*a*) From fishing grounds off U.S. coasts	152,241,139	£669,640
(*b*) From fishing grounds off Newfoundland	17,165,083	103,145
(*c*) From fishing grounds off other British provinces	32,608,343	192,517

The fisheries of the United States show a substantial increase from year to year. There has been a decline in some important branches owing to indiscreet fishing and to the inevitable effects of civilization on certain kinds of animal life and in certain restricted areas. Such diminution has been more than compensated for by growth resulting from the invasion of new fishing grounds made possible by increase in the sea-going capacity of the vessels employed, by improvement in the preservation and handling of the catch, and by the greater utilization of products which until comparatively recently were disregarded or considered without economic value. The annual value of the water products taken and sold by the United States fishermen now amounts to over £11,000,000, and this sum does not include the very large quantities taken by the fishermen for home consumption or captured by sportsmen and amateurs. Between two and three hundred thousand persons make a livelihood by the industry, and the capital involved exceeds £16,000,000.

The oyster is the most valuable single product, and the output of the United States industry exceeds the combined output of all other countries in the world. The most notable feature of this fishery is that nearly half the total yield now comes from cultivated grounds, so that the business is being placed on a secure basis. Virginia has now taken the first rank as an oyster-producing state, oyster farming being now highly developed with an annual yield of nearly nine million bushels.

The high-sea fisheries for cod, haddock, hake, halibut, mackerel, herring, and so forth are on the whole not increasing in prosperity, the annual value being between one and two million pounds. The lobster fishery shows a markedly diminishing yield, the diminution having been progressive since about 1890, and being attributed to over-fishing and violation of the restrictive regulations. At present a large part of the lobsters consumed in the United States comes from Nova Scotia, but there is evidence of useful results coming from the extensive cultural operations now being carried out.

The whale fishery, at one time the leading fishing industry of the country, is now conducted chiefly in the North Pacific and Arctic oceans, but is decaying, being now expensive, uncertain and often unremunerative. The annual value of the take is now under £200,000.

The important group of anadromous fishes (those like salmon, shad, alewife, striped bass and sea perches, which ascend the rivers from the ocean) has continued to provide an increasing source of income to fishermen, the combined value of the catch on the Atlantic and Pacific seaboards now amounting to over £3,000,000 annually. The fisheries of the Great Lakes yield about £600,000 annually. (W. GA.; P. C. M.)

FISHERY (LAW OF). This subject has (1) its international aspect; (2) its municipal aspect. On the high seas outside territorial waters the right of fishery is now recognized as common to all nations. Claims were made in former times by single nations to the exclusive right of fishing in tracts of open sea; such as that set up by Denmark in respect of the North Sea, as lying between its possessions of Norway and Iceland, against England in the 17th century, and against England and Holland in the 18th century, when she prohibited any foreigners fishing within 15 German miles of the shores of Greenland and Iceland. This claim, however, was always effectively resisted on the ground stated in Queen Elizabeth's remonstrance to Denmark on the subject in 1602, that "the law of nations alloweth of fishing in the sea everywhere, even in seas where a nation hath propertie of command." The enunciation of this principle is to be found, also, in the award of the arbitration court which decided the question of the fur-seal fishery in Bering Sea in 1894. (See BERING SEA ARBITRATION; ARBITRATION, INTERNATIONAL.) The right of nations to take fish in the sea may, however, be restrained or regulated by treaty or custom; and Great Britain has entered into conventions with other nations with regard to fishing in certain parts of the sea. The provisions of such conventions are made binding on British subjects by statutes.

Instances of these are the conventions of 1818 and 1872 between Great Britain and the United States as to the fisheries on the eastern coasts of British North America and the United States within certain limits, and the award of the Bering Sea arbitration tribunal under the treaty of 1892; the conventions between Great Britain and France in 1839 and 1867 as regards fishing in the seas adjoining these countries, the latter of which will come into force on the repeal of the former; the agreement of 1904 with respect to the Newfoundland fisheries (see NEWFOUNDLAND); the convention of 1882 between Belgium, Denmark, France, Germany, Great Britain and Holland, regarding the North Sea fisheries; that of 1887 between the same parties concerning the liquor traffic in the North Sea; and the declaration regarding the same waters made between Great Britain and Belgium for the settlement of differences between their fishermen subjects in such extra-territorial waters. At the instance of the Swedish government the British parliament also passed an act in 1875 to establish a close time for the seal fishery in the seas adjacent to the eastern coasts of Greenland.

Cases have come before British courts with regard to the whale fishery in northern and southern seas; and the customs proved to exist among the whaling ships of the nations engaged in a particular trade have been upheld if known to the parties to the action. In territorial waters, on the other hand, fishery is a right exclusively belonging to the subjects of the country owning such waters, and no foreigners can fish there except by convention.

(*a*) *Tidal Waters.*—In British territorial waters, it may be stated, as the general rule, that fishery is a right incidental to the soil covered by the waters in which that right is exercised.

The bed of all navigable rivers where the tide flows and reflows, and of all estuaries or arms of the sea, is vested in the crown; and therefore, in Lord Chief Justice Hale's words, "the right of the fishery in the sea and the creeks and arms thereof is originally lodged in the crown, as the right of depasturing is originally lodged in the owner of the waste whereof he is lord, or as the right of fishing belongs to him that is the owner of a private or inland river." "But," he continues, "though the king is the owner of this great waste, and as a consequent of his propriety hath the primary right of fishing in the sea and the creeks and arms thereof, yet the common people of England have regularly a liberty of fishing therein as a public common of piscary, and may not without injury to their right be restrained of it unless in such places or creeks or navigable rivers where either the king or some particular subject hath gained a propriety exclusive of that common liberty" (*De Jure Maris*, ch. iv.).

This right extends to all fish floating in the sea or left on the seashore, except certain fish known as royal fish, which, when taken in territorial waters, belong to the crown or its grantee, though caught by another person. These are whales, sturgeons and porpoises; and grampuses are also sometimes added (whales, porpoises and grampuses being "fishes" only in a legal sense). In Scotland only whales which are of large size can be so claimed;

but the rights of salmon fishing in the sea and in public and private rivers, and those of mussel and oyster fishing, except in private rivers, are *inter regalia*, and are only enjoyable by the crown or persons deriving title under it. As salmon fishery was formerly practised by nets and engines on the shore, and the mussel and oyster fisheries were necessarily carried on on the shore, the opinion was held at one time that angling for salmon was a public right, but the later decisions have established that the right of salmon fishing by whatever means is a *jus regale* in Scotland. In England the crown in early times made frequent grants of fisheries to subjects in tidal waters, and instances of such fisheries belonging to persons and corporations are very common at the present day: but by Magna Carta the crown declared that " no rivers shall be defended from henceforth, but such as were in defence in the time of King Henry, our grandfather, by the same places and the same bounds as they were wont to be in his time "; and thus bound itself not to create a private fishery in any navigable tidal river. Judicial decision and commentators having interpreted this statute according to the spirit and not the letter, at the present day the right of fishery in tidal waters prima facie belongs to the public, and they can only be excluded by a particular person or corporation on proof of an exclusive right to fish there not later in its origin than Magna Carta; and for this it is necessary either to prove an actual grant from the crown of that date to the claimant's predecessor in title, or a later grant or immemorial custom or prescription to that effect, from which such an original grant may be presumed. This exclusive right of fishing may be either a franchise derived from the crown, or may arise by virtue of ownership of the soil covered by the waters.

In Lord Hale's words: " Fishing may be of two kinds ordinarily, viz. fishing with a net, which may be either as a liberty without the soil, or as a liberty arising by reason of and in concomitance with the soil or an interest or propriety of it; or otherwise it is a local fishing that ariseth by or from the propriety of the soil,—such are *gurgites*, wears, fishing-places, *borachiae*, *stachiae*, which are the very soil itself, and so frequently agreed by our books. And such as these a subject may have by usage; either in gross, as many religious houses had, or as parcel of or appurtenant to their manors, as both corporations and others have had; and this not only in navigable rivers and arms of the sea but in creeks and ports and havens, yea, and in certain known limits in the open sea contiguous to the shore. And these kinds of fishings are not only for small sea-fish, such as herrings, &c., but for great fish, as salmons, and not only for them but for royal fish.... Most of the precedents touching such rights of fishing in the sea, and the arms and creeks thereof belonging by usage to subjects, appear to be by reason of the propriety of the very water and soil wherein the fishing is, and some of them even within parts of the seas " (*De Jure Maris*, ch. v.)

An instance of the former kind of fishery is to be found in the old case of *Royal Fishery of the River Bann* (temp. James I., Davis 655), and the modern one of *Wilson* v. *Crossfield*, 1885, 1 T.L.R. 601, where a right of fishery in gross was established; but the latter kind, as Hale says, is much more common, and the presumption is always in its favour; *à fortiori* where the fishing is proved to have been carried on by means of engines or structures fixed in the soil. In England the public have not at common law, as incidental to their right of fishing in tidal waters, the right to make use of the banks or shores for purposes incidental to the fishery, such as beaching their boats upon them, landing there, or drying their nets there (though they can do so by proving a custom from which such a grant may be presumed); but statutes relating to particular parts of the realm, such as Cornwall for the pilchard fishery, give them such rights. In Scotland a right of salmon fishing separate from land implies the right of access to and use of the banks, foreshores or beach for the purposes of the fishing; and so does white fishing by statute. But otherwise there is no right to do so, *e.g.* in a public river for trout fishing. A similar privilege is given to Irish fishermen for the purpose of sea fishery by special statute. There is no property in fish in the sea, and they belong to the first taker; and the custom of the trade decides when a fish is taken or not, *e.g.* in the whale fishery the question whether a fish is " loose " or not has come before English courts.

(*b*) *Fresh Waters.*—In non-tidal waters in England and Ireland, for the reason given above, the presumption is in favour of the fishery in such waters belonging to the owners of the adjacent lands; " fresh waters of what kind soever do of common right belong to the owners of the soil adjacent, so that the owners of the one side have of common right the property of the soil, and consequently the right of fishing *usque ad filum aquae*, and the owners of the other side the right of soil or ownership and fishing unto the *filum aquae* on their side; and if a man be owner of the land on both sides, in common presumption he is owner of the whole river, and hath the right of fishing according to the extent of his land in length " (Hale, ch. i.). There is a similar presumption that the owner of the bed of a river has the exclusive right of fishery there, and this is so even though he does not own the banks; but these presumptions may be displaced by proof of a different state of things, *e.g.* where the banks of a stream are separately owned the owner of one bank may show by acts of ownership exercised over the whole stream that he has the fishery over it all. The crown prerogative of fishery, never it seems, extended to non-tidal waters flowing over the land of a subject, and it could not therefore grant such a franchise to a subject, nor has it any right *de jure* to the soil or fisheries of an inland lake such as Lough Neagh (*Bristow* v. *Cormican*, 1878, 3 App. Cas. 641). The public cannot acquire the right to fish in fresh waters by prescription or otherwise although they are navigable; such a right is unknown to law, because a profit *à prendre in alieno solo* is neither to be acquired by custom nor by prescription under the Prescription Act. It has been decided that the " dwellers " in a parish cannot acquire such a right, being of too vague a class; but the commoners in a manor may have it by custom; and the " free inhabitants of ancient tenements " in a borough have been held capable of acquiring a right to dredge for oysters in a fishery belonging to the corporation of the borough on certain days in each year by giving proof of uninterrupted enjoyment of it from time immemorial, on the presumption that this was a condition to which the grant made to the corporation was subject.

In Scotland the law is similar. The right to fish for trout in private streams is a pertinent of the land adjacent, and owners of opposite banks may fish *usque ad medium filum aquae;* and where two owners own land round a private loch, both have a common of fishing over it. The public cannot prescribe for it, for a written title either to adjacent lands or to the fishery is necessary. A right of way along the bank of a river or loch does not give it, nor does the right of the public to be on or at a navigable but non-tidal river. The right of salmon fishing carries with it the right of trout fishing: and eel fishing passes in the same way.

In England and Ireland private fisheries have been divided into (*a*) several (*separalis*), (*b*) free (*libera*), (*c*) common of piscary (*communis*), whether in tidal or non-tidal waters. The distinction between several and free fisheries has always been uncertain. Blackstone's opinion was that several fishery implied a fishery in right of the soil under the water, while free fishery was confined to a public river and did not necessarily comprehend the soil. He is supported by later writers, such as Woolrych and Paterson. On the other hand, the opinions of Coke and Hale are opposed to this view. " A man may prescribe to have a several fishery in such a water, and the owner shall not fish there; but if he claim to have common of fishery or free fishery the owner of the soil shall fish there " (Co Littl. 122 A); " one man may have the river and others the soil adjacent: or one man may have the river and soil thereof, and another the free or several fishing in that river " (*De Jure Maris*, ch. i.). Lord Holt, though in one instance he distinguished them, in a later case thought that they were " all one." Later decisions have established the latter view, and it is now settled that although the owner of the several fishery is prima facie owner of the soil of the waters, this presumption may be displaced by showing that the terms of the grant only convey an incorporeal hereditament, and that the words " sole and exclusive fishery " give a several fishery *in alieno solo*. In the words of Mr Justice Willes, " the only substantial distinction is between an exclusive right of fishery, usually called 'several,' and sometimes 'free,' as in 'free warren,' and a right in common with others, usually called 'common of fishery,' and sometimes 'free,' as in 'free port.' A several fishery means an exclusive right to fish in a given place, either with or without the property in the soil" (*Malcolmson* v. *O'Dea*, 1863, 10 H.L.). A common of piscary, or "a right to fish in common with certain other persons in a particular stream," is usually found in manors, the commoners of which may have the right to enjoy it to an extent sufficient for the sustenance of their tenements; but they cannot, except by immemorial special prescription, exclude the lord of the manor therefrom, and have no rights over the soil itself. Decisions also establish that a grant of "fishery" will prima facie pass an exclusive fishery; a grant of soil covered by water or a lease of lands including water will pass the fishery therein; a several fishery will not merge on being resumed by the crown; and a fishery situate within a manor is presumed to belong to the owners of adjacent land, and not to the lord. A several fishery, as already seen, being an incorporeal hereditament, can only be transferred by deed, and therefore cannot be abandoned, and so acquired by the public, even on proof that the public have, as far back as living memory, exercised the right of fishing in the *locus in quo* to the knowledge of and without interruption from the claimant of the fishery. But to establish a title to a several fishery, a "paper title," *i.e.* one founded on documentary evidence only, is not sufficient; it must be supported by evidence of acts of ownership in recent times, for otherwise it will be presumed that a person other than the alleged owner is the real owner. If the waters of a tidal river leave their old channel and flow into another, the owner of a several fishery in the old channel cannot claim to have it in the new one; but, on the other hand, the owner of a several fishery can take advantage of a gradual encroachment by the river upon and into the land of a riparian owner, the limits of whose land are ascertained. The owner of an exclusive fishery, whether in tidal or fresh waters, has the right to take as many fish as he can, and may do so by means of fixed engines or dredging, provided that in navigable waters he does not interfere with the right of navigation, and that in navigable and other waters he does not interfere with the fishing rights of his neighbours or infringe the provisions made by old or modern statutes as to the methods of taking the fish, *e.g.* by weirs. These were forbidden in rivers by Magna Carta and later statutes, and on the seashore by a statute of James I.; but all weirs in navigable fresh waters traceable to a date not later than 25 Edward III. are lawful, for the statutes forbidding weirs do not apply to navigable waters. It seems, however, that at common law any fixed structures put up by the owner of a fishery in his part of a river, which at all prevent the free passage of fish to the waters above or below, give the owners of fisheries therein a right of action against him. So the grantee of an exclusive fishery with rod and line in an unnavigable river can prevent any person from polluting the river higher up and so damaging the fishery. At common law there is no property in fish when enjoying their natural liberty; the taker is entitled to keep them unless they are caught from a tank or small pond; or except in the case of salmon by statute.

Modern statutes now regulate all fisheries, sea or fresh, in territorial or inland waters. As regards sea fishery in England, the Board of Agriculture and Fisheries has (since 1903, when it took it over from the Board of Trade) power by order to create sea fisheries districts, comprising any part of the sea within which British subjects have, by international law, the exclusive right of fishing, and to provide for the constitution of a local fisheries committee to regulate the sea fisheries in such district, which can make by-laws for that purpose. It appoints fishery officers to enforce them, prescribes a close time for sea fish (which does not include salmon as defined in the Salmon Act), has summary jurisdiction over offences committed on the sea coast or at sea beyond the ordinary jurisdiction of a court of summary jurisdiction, can enforce the Sea Fisheries Acts, or regulate, protect and develop fisheries for all or any kind of shell fish. Special provision is also made by statute for the oyster fishery and herring fishery (applicable also to Scotland), and that of mussels, cockles, lobsters and crabs (applicable to all the United Kingdom). In Scotland the Fishery Board can constitute sea fishery districts, and boards with like powers to those in England, and has general control over the coast and deep-sea fisheries of Scotland; and there are acts relative to herring, mussel and oyster fisheries, and allowing the appropriation of money intended to relieve local distress and taxation towards the encouragement of sea fisheries, and marine superintendence and enforcement of Scottish sea fisheries laws. In Ireland the sea fisheries are under the direction of the inspectors of Irish fisheries, who have replaced the former fishery commissioners and special commissioners for Irish fisheries; special statutes, besides the general ones applying to all the United Kingdom, deal with oyster fisheries and mussel fisheries; and money is also appropriated for sea fisheries under the head of technical instruction. In all three component parts of the United Kingdom there are also special statutes relative to salmon and freshwater fish: for England, the Salmon and Freshwater Fisheries Acts 1861–1907, and the Freshwater Fisheries Acts 1878–1886; for Scotland the chief Salmon Acts are those of 1862–1868, and for trout and freshwater fish those of 1845–1902; for Ireland, the Fisheries (Ireland) Acts 1842–1901. A similar scheme is adopted in each case, namely, fishery districts and district boards are set up which regulate the fishing by by-laws and protect the fish by fixing a close time, and prescribing passes, licences, inspection and the like, breaches of which are punishable by courts of summary jurisdiction. The supreme authorities in each case are—for England the Board of Agriculture and Fisheries, for Scotland the Fishery Board, and for Ireland the inspectors of fisheries, and in England a certain official number of conservators on such boards are appointed by the county councils. The Salmon and Freshwater Fisheries Act 1907 gives the Board of Agriculture and Fisheries power to make provisional orders for the regulation of salmon fisheries or freshwater fisheries within any area on the application of any board of conservators, or of a county council, or of the owners of one-fourth in value of private fisheries. There are also special acts dealing with the fishing in certain rivers, such as the Thames, Medway, Severn, Tweed and Esk. (The act of 1907 applies, however, to the Esk, but not otherwise to Scotland nor to Ireland.) Throughout the United Kingdom the use of dynamite or other explosive substance to catch or destroy fish in any public fishery is prohibited, as it is also in England in any private waters subject to the Salmon and Freshwater Fisheries Acts 1878, in which it is also forbidden to use poison or other noxious substance for destroying fish. Officers in the army or marines are forbidden (under penalty) to kill fish without written leave from the person entitled to grant it. There are also provisions of the criminal law dealing with the protection of fisheries generally, as well as the provisions of the acts already mentioned dealing with special kinds of fish.

Special provision is made by the Merchant Shipping Acts 1894–1906 for sea-fishing boats (except in Scotland and the colonies), relating to their registration, carrying official papers, carrying boats in proportion to their tonnage, the punishment of offences on board, the wages of their crews, and keeping record of all casualties, punishments and the like on board. As regards trawlers, especially in the case of those of 25 tons and upwards, a statutory form of agreement with the crew is prescribed, as well as accounts of wages and discharges; and skippers and second hands must have certificates of competency, which are granted under similar conditions to those required in the case of seagoing ships and are registered with the Board of Trade. Scottish fishing boats are regulated by a special statute of 1886 (except as regards agreements to pay crew by share of profits, dealt with by the above act) and by the Sea Fisheries Act of 1868, which applies to all British fishing boats. Particular lights must be carried by fishing boats in navigation. An act of 1908 (The Cran Measures Act) legalized the use of cran measures in connexion with trading in fresh herrings in England and Wales, the Board of Agriculture and Fisheries being empowered to make regulations under the act.

Authorities.—Green, *Encyclopaedia of Scots Law* (Edinburgh, 1896); Stewart, *Law of Fishing in Scotland* (Edinburgh, 1869); Woolrych, *Waters* (London, 1851); Paterson, *Fishery Laws of the United Kingdom* (London and Cambridge, 1863); Stuart Moore, *Foreshore* (London, 1888); Phillimore, *International Law* (3rd ed., London, 1879); Martens, *Causes célèbres du droit des gens* (Leipzig, 1827); Selwyn, *Nisi Prius, Fishery* (London, 1869). (G. G. P.*)

FISHGUARD (*Abergwaun*), a market town, urban district, contributory parliamentary borough and seaport of Pembrokeshire, Wales, near the mouth of the river Gwaun, which here flows into Fishguard Bay of St George's Channel. Pop. (1901) 2002. Its railway station, which is the chief terminus of the South Wales system of the Great Western railway, is at the hamlet of Goodwick across the bay, a mile distant to the south-west. Fishguard Bay is deep and well sheltered from all winds save those of the N. and N.E., and its immense commercial value has long been recognized. After many years of labour and at a great expenditure of money the Great Western railway has constructed a fine breakwater and railway pier at Goodwick across the lower end of the bay, and an important passenger and goods traffic with Rosslare on the opposite Irish coast was inaugurated in 1906.

The importance of Fishguard is due to the local fisheries and the excellence of its harbour, and its early history is obscure. The chief historical interest of the town centres round the so-called "Fishguard Invasion" of 1797, in which year on the 22nd of February three French men-of-war with troops on board, under the command of General Tate, an Irish-American adventurer, appeared off Carreg Gwastad Point in the adjoining parish of Llanwnda. To the great alarm of the inhabitants a body of about 1400 men disembarked, but it quickly capitulated, practically without striking a blow, to a combined force of the local militias under Sir Richard Philipps, Lord Milford and John Campbell, Lord Cawdor; the French frigates meanwhile sailing away towards Ireland. For many years the castles and prisons of Haverfordwest and Pembroke were filled to overflowing with French prisoners of war. Close to the banks of the Gwaun is the pretty estate of Glyn-y-mel, for many years the residence of Richard Fenton (1746–1821), the celebrated antiquary and historian of Pembrokeshire.

FISHKILL LANDING, or Fishkill-on-the-Hudson, a village of Fishkill township, Dutchess county, New York, U.S.A., about 58 m. N. of New York City, on the E. bank of the Hudson river, opposite Newburgh. Pop. (1890) 3617; (1900) 3673, of whom 540 were foreign-born; (1905) 3939; (1910) 3902, of Fishkill township (1890) 11,840; (1900) 13,016; (1905) 13,183; (1910) 13,858. In the township are also the villages of Matteawan (*q.v.*), Fishkill and Glenham. Fishkill Landing is served by the New York Central & Hudson River and the New York, New Haven & Hartford railways; by railway ferry and passenger ferries to Newburgh, connecting with the West Shore railway; by river steamboats and by electric railway to Matteawan. Four miles farther N. on Fishkill Creek is the village of Fishkill (incorporated in 1899), pop. (1905) 579. In this village are two notable old churches, Trinity (1769), and the First Dutch Reformed (1731), in which the New York Provincial Congress met in August and September 1776. At the old Verplanck mansion in Fishkill Landing the Society of the Cincinnati was organized in 1783. Among the manufactures of Fishkill Landing are rubber-goods, engines (Corliss) and other machinery, hats, silks, woollens, and brick and tile. The village of Fishkill Landing was incorporated in 1864. The first settlement in the township was made about 1690. The township of Fishkill was, like Newburgh, an important military post during the War of Independence, and was a supply depot for the northern Continental Army.

FISK, JAMES (1834–1872), American financier, was born at Bennington, Vermont, on the 1st of April 1834. After a brief period in school he ran away and joined a circus. Later he became a hotel waiter, and finally adopted the business of his father, a pedlar. He then became a salesman for a Boston dry goods firm, his aptitude and energy eventually winning for him a share in the business. By his shrewd dealing in army contracts during the Civil War, and it is said by engaging in cotton smuggling, he accumulated a considerable capital which he soon lost in speculation. In 1864 he became a stockbroker in New York and was employed by Daniel Drew as a buyer. He aided Drew in his war against Vanderbilt for the control of the Erie railway, and as a result of the compromise that was reached he and Jay Gould became members of the Erie directorate. The association with Gould thus began continued until his death. Subsequently by a well-planned "raid," Fisk and Gould obtained control of the road. They carried financial "buccaneering" to extremes, their programme including open alliance with the Tweed "ring," the wholesale bribery of legislatures and the buying of judges. Their attempt to corner the gold market culminated in the fateful Black Friday of the 24th of September 1869. Fisk was shot and killed in New York City by E. S. Stokes, a former business associate, on the 6th of January 1872.

FISK, WILBUR (1792–1839), American educationist, was born in Brattleboro, Vermont, on the 31st of August 1792. He studied at the university of Vermont in 1812–1814, and then entered Brown University, where he graduated in 1815. He studied law, and in 1817 came under the influence of a religious revival in Vermont, where at Lyndon in the following year he was licensed as a local preacher and was admitted to the New England conference. His influence with the conference turned that body from its opposition to higher education as immoral in tendency to the establishment of secondary schools and colleges. Upon the removal in 1824 of the conference's academy at New Market, New Hampshire, to Wilbraham, Massachusetts, Fisk became one of its agents and trustees, and in 1826 its principal. He drafted the report of the committee on education to the general conference in 1828, at which time he declined the bishopric of the Canada conference. He was first president of Wesleyan University from the opening of the university in 1831 until his death on the 22nd of February 1839 in Middletown, Connecticut. His successful administration of the Wesleyan Academy at Wilbraham and of Wesleyan University were remarkable. He was an able controversialist, and in the interests of Arminianism attacked both New England Calvinism and Unitarianism; he published in 1837 *The Calvinistic Controversy*. He also wrote *Travels on the Continent of Europe* (1838).

See *Life and Writings of Wilbur Fisk* (New York, 1842), edited by Joseph Holdich, and the biography by George Prentice (Boston, 1890), in the *American Religious Leaders Series*; also a sketch in *Memoirs of Teachers and Educators* (New York, 1861), edited by Henry Barnard.

FISKE, JOHN (1842–1901), American historical, philosophical and scientific writer, was born in Hartford, Connecticut, on the 30th of March 1842, and died at Gloucester, Massachusetts, on the 4th of July 1901. His name was originally Edmund Fiske Green, but in 1855 he took the name of a great-grandfather, John Fiske. His boyhood was spent with a grandmother in Middletown, Connecticut; and prior to his entering college he had read widely in English literature and history, had surpassed most boys in the extent of his Greek and Latin work, and had studied several modern languages. He graduated at Harvard in 1863, continuing to study languages and philosophy with zeal; spent two years in the Harvard law school, and opened an office in Boston; but soon devoted the greater portion of his time to writing for periodicals. With the exception of one year, he resided at Cambridge, Massachusetts, from the time of his graduation until his death. In 1869 he gave a course of lectures at Harvard on the Positive Philosophy; next year he was history tutor; in 1871 he delivered thirty-five lectures on the Doctrine of Evolution, afterwards revised and expanded as *Outlines of Cosmic Philosophy* (1874); and between 1872 and 1879 he was assistant-librarian. After that time he devoted himself to literary work and lecturing on history. Nearly all of his books were first given to the public in the form of lectures or magazine articles, revised and collected under a general title, such as *Myths and Myth-Makers* (1872), *Darwinism and Other Essays* (1879), *Excursions of an Evolutionist* (1883), and *A Century of Science* (1899). He did much, by the thoroughness of his learning and the lucidity of his style, to spread a knowledge of Darwin and Spencer in America. His *Outlines of Cosmic*

Philosophy, while setting forth the Spencerian system, made psychological and sociological additions of original matter, in some respects anticipating Spencer's later conclusions. Of one part of the argument of this work Fiske wrote in the preface of one of his later books (*Through Nature to God*, 1899): "The detection of the part played by the lengthening of infancy in the genesis of the human race is my own especial contribution to the Doctrine of Evolution." In *The Idea of God as affected by Modern Knowledge* (1885) Fiske discusses the theistic problem, and declares that the mind of man, as developed, becomes an illuminating indication of the mind of God, which as a great immanent cause includes and controls both physical and moral forces. More original, perhaps, is the argument in the immediately preceding work, *The Destiny of Man, viewed in the Light of his Origin* (1884), which is, in substance, that physical evolution is a demonstrated fact; that intellectual force is a later, higher and more potent thing than bodily strength; and that, finally, in most men and some "lower animals" there is developed a new idea of the advantageous, a moral and non-selfish line of thought and procedure, which in itself so transcends the physical that it cannot be identified with it or be measured by its standards, and may or must be enduring, or at its best immortal.

It is principally, however, through his work as a historian that Fiske's reputation will live. His historical writings, with the exception of a small volume on *American Political Ideas* (1885), an account of the system of *Civil Government in the United States* (1890), *The Mississippi Valley in the Civil War* (1900), a school history of the United States, and an elementary story of the American Revolution, are devoted to studies, in a unified general manner, of separate yet related episodes in American history. The volumes have not appeared in chronological order of subject, but form a nearly complete colonial history, as follows: *The Discovery of America, with some Account of Ancient America, and the Spanish Conquest* (1892, 2 vols.); *Old Virginia and her Neighbours* (1897, 2 vols.); *The Beginnings of New England; or, The Puritan Theocracy in its Relations to Civil and Religious Liberty* (1889); *Dutch and Quaker Colonies in America* (1899); *The American Revolution* (1891, 2 vols.); and *The Critical Period of American History, 1783–1789* (1888). Of these the most original and valuable is the *Critical Period* volume, a history of the consolidation of the states into a government, and of the formation of the constitution. (C. F. R.)

FISKE, MINNIE MADDERN (1865–), American actress, was born in New Orleans, the daughter of Thomas Davey. As a child she played, under her mother's name of Maddern, with several well-known actors. In 1882 she first appeared as a "star," but in 1890 she married Harrison Grey Fiske and was absent from the stage for several years. In 1893 she reappeared in *Hester Crewe*, a play written by her husband, and afterwards acted a number of Ibsen's heroines, and in *Becky Sharp*, a dramatization of Thackeray's *Vanity Fair*. In 1901 she opened, in opposition to the American theatrical "trust," an independent theatre in New York, the Manhattan. She won a considerable reputation in the United States as an emotional actress.

FISTULA (Lat. for a pipe or tube), a term in surgery used to designate an abnormal communication leading either from the surface of the body to a normal cavity or canal, or from one normal cavity or canal to another. These communications are the result of disease or injury. They receive different names according to their situation: *lachrymal fistula* is the small opening left after the bursting of an abscess in the upper part of the tear-duct, near the root of the nose; *salivary fistula* is an opening into the salivary duct on the cheek; *anal fistula*, or *fistula in ano*, is a suppurating track near the outlet of the bowel; *urethral fistula* is the result of a giving way of the tissues behind a stricture. These are examples of the variety of the first kind of fistula; while *recto-vesical fistula*, a communication between the rectum and bladder, and *vesico-vaginal fistula*, a communication between the bladder and vagina, are examples of the second. The abnormal passage may be straight or tortuous, of considerable diameter or of narrow calibre. Fistulae may be caused by an obstruction of the normal channel, the result of disease or injury, which prevents, for example, the tears, saliva or urine, as the case may be, from escaping; their retention gives rise to inflammation and ulceration in order that an exit may be obtained by the formation of an abscess, which bursts, for example, into the gut or through the skin; the cavity does not close, and a fistula is the result. The fistulous channel remains open as long as the contents of the cavity or canal with which it is connected can pass through it. To obliterate the fistula one must remove the obstruction and encourage the flow along the natural channel; for example, one must open up the nasal duct so as to allow the tears to reach the nasal cavity, and the *lachrymal fistula* will close; and so also in the *salivary* and *urethral* fistulae. Sometimes it may be necessary to lay the channel freely open, to scrape out the unhealthy material which lines the track, and to encourage it to fill up from its deepest part, as in *anal fistula*; in other cases it may be necessary to pare the edges of the abnormal opening and stitch them together. (E. O.*)

FIT, a word with several meanings. (1) A portion or division of a poem, a canto, in this sense often spelled "fytte." (2) A sudden but temporary seizure or attack of illness, particularly one with convulsive paroxysms accompanied by unconsciousness, especially an attack of apoplexy or epilepsy, but also applied to a transitory attack of gout, of coughing, fainting, &c., also of an outburst of tears, of merriment or of temper. In a transferred sense, the word is also used of any temporary or irregular periods of action or inaction, and hence in such expressions as "by fits and starts." (3) As an adjective, meaning suitable, proper, becoming, often with the idea of having necessary qualifications for a specific purpose, "a fit and proper person"; and also as prepared for, or in a good condition for, any enterprise. The verb "to fit" is thus used intransitively and transitively, to be adapted for, to suit, particularly to be of the right measurement or shape, of a dress, of parts of a mechanism, &c., and to make or render a thing in such a condition. Hence the word is used as a substantive.

The etymology of the word is difficult; the word may be one in origin, or may be a homonymous term, one in sound and spelling but with different origin in each different meaning. In Skeat's *Etymological Dictionary* (ed. 1898) (1) and (2) are connected and derived from the root of "foot," which appears in Lat. *pes, pedis*. The evolution of the word is: step, a part of a poem, a struggle, a seizure. (3) A word of Scandinavian origin, with the idea of "knitted together" (cf. Ice. *fitja*, to knit together, Goth. *fetjan*, to adorn); the ultimate origin is a Teutonic root meaning to seize (cf. "fetch"). The *New English Dictionary* suggests that this last root may be the origin of all the words, and that the underlying meaning is junction, meeting; the early use of "fit" (2) is that of conflict. It is also pointed out that the meanings of "fit," suitable, proper, have been modified by "feat," which comes through Fr. *fait*, from Lat. *factum*, *facere*, to do, make.

FITCH, JOHN (1743–1798), American pioneer of steam navigation, was born at Windsor, Connecticut, on the 21st of January 1743. He was the son of a farmer, and received the usual common school education. At the age of seventeen he went to sea, but he discontinued his sailor life after a few voyages and became successively a clockmaker, a brassfounder and a silversmith. During the War of Independence he was a sutler to the American troops, and amassed in that way a considerable sum of money, with which he bought land in Virginia. He was appointed deputy-surveyor for Kentucky in 1780, and when returning to Philadelphia in the following year he was captured by the Indians, but shortly afterwards regained his liberty. About this time he began an exploration of the north-western regions, with the view of preparing a map of the district; and while sailing on the great western rivers, the idea occurred to him that they might be navigated by steam. He endeavoured by the sale of his map to find money for the carrying out of his projects, but was unsuccessful. He next applied for assistance to the legislatures of different states, but though each reported in favourable terms of his invention, none of them would agree to grant him any pecuniary assistance. He was successful, however, in 1786, in forming a company for the prosecution of his enterprise, and shortly afterwards a steam-packet of his invention was launched on the Delaware. His claim to be the inventor of steam-navigation was disputed by James Rumsey of Virginia, but Fitch obtained exclusive rights in steam-navigation in New Jersey, Pennsylvania and Delaware, while a similar privilege was granted to Rumsey in Virginia, Maryland and New York. A steam-boat built by Fitch conveyed passengers for hire on the Delaware in the summer of 1790, but the undertaking was a losing one, and led to the dissolution of the company. In 1793 he endeavoured to introduce his invention into France, but met with no success. On his return to America he found his property overrun by squatters, and reaping from his invention nothing but disappointment and poverty, he committed suicide at Bardstown, Kentucky, on the 2nd of July 1798.

He left behind him a record of his adventures and misfortunes, "inscribed to his children and future posterity"; and from this a biography was compiled by Thompson Westcott (Philadelphia, 1857.)

FITCH, SIR JOSHUA GIRLING (1824–1903), English educationist, second son of Thomas Fitch, of a Colchester family, was born in Southwark, London, in 1824. His parents were poor but intellectually inclined, and at an early age Fitch started work as an assistant master in the British and Foreign School Society's elementary school in the Borough Road, founded by Thomas Lancaster. But he continued to educate himself by assiduous reading and attending classes at University College; he was made headmaster of another school at Kingsland; and in 1850 he took his B.A. degree at London University, proceeding M.A. two years later. In 1852 he was appointed by the British and Foreign School Society to a tutorship at their Training College in the Borough Road, soon becoming vice-principal and in 1856 principal. He had previously done some occasional teaching there, and he was thoroughly imbued with the Lancasterian system. In 1863 he was appointed a government inspector of schools for the York district, from which, after intervals in which he was detached for work as an assistant commissioner (1865–1867) on the Schools Inquiry Commission, as special commissioner (1869), and as an assistant commissioner under the Endowed Schools Act (1870–1877), he was transferred in 1877 to East Lambeth. In 1883 he was made a chief inspector, to superintend the eastern counties, and in 1885 chief inspector of training colleges, a post he held till he retired in 1894. In the course of an extraordinarily active career, he acquired a unique acquaintance with all branches of education, and became a recognized authority on the subject, his official reports, lectures and books having a great influence on the development of education in England. He was a strong advocate and supporter of the movement for the higher education of women, and he was constantly looked to for counsel and direction on every sort of educational subject; his wide knowledge, safe judgment and amiable character made his co-operation of exceptional value, and after he retired from official life his services were in active request in inquiries and on boards and committees. In 1896 he was knighted; and besides receiving such academic distinctions as the LL.D. degree from St Andrews University, he was made a chevalier of the French Legion of Honour in 1889. He was a constant contributor to the leading reviews; he published an important series of *Lectures on Teaching* (1881), *Educational Aims and Methods, Notes on American Schools and Colleges* (1887), and an authoritative criticism of *Thomas and Matthew Arnold, and their Influence on English Education* (see also the article on ARNOLD, MATTHEW) in 1901; and he wrote the article on EDUCATION in the supplementary volumes (10th edition) of this encyclopaedia (1902). He died on the 14th of July 1903 in London. A civil list pension was given to his widow, whom, as Miss Emma Wilks, he had married in 1856.

See also *Sir Joshua Fitch*, by the Rev. A. L. Lilley (1906).

FITCH, RALPH (fl. 1583–1606), London merchant, one of the earliest English travellers and traders in Mesopotamia, the Persian Gulf and Indian Ocean, India proper and Indo-China. In January 1583 he embarked in the "Tiger" for Tripoli and Aleppo in Syria (see Shakespeare, *Macbeth*, Act I. sc. 3), together with J. Newberie, J. Eldred and two other merchants or employees of the Levant Company. From Aleppo he reached the Euphrates, descended the river from Bir to Fallujah, crossed southern Mesopotamia to Bagdad, and dropped down the Tigris to Basra (May to July 1583). Here Eldred stayed behind to trade, while Fitch and the rest sailed down the Persian Gulf to Ormuz, where they were arrested as spies (at Venetian instigation, as they believed) and sent prisoners to the Portuguese viceroy at Goa (September to October). Through the sureties procured by two Jesuits (one being Thomas Stevens, formerly of New College, Oxford, the first Englishman known to have reached India by the Cape route in 1579) Fitch and his friends regained their liberty, and escaping from Goa (April 1584) travelled through the heart of India to the court of the Great Mogul Akbar, then probably at Agra. In September 1585 Newberie left on his return journey overland via Lahore (he disappeared, being presumably murdered, in the Punjab), while Fitch descended the Jumna and the Ganges, visiting Benares, Patna, Kuch Behar, Hugli, Chittagong, &c. (1585–1586), and pushed on by sea to Pegu and Burma. Here he visited the Rangoon region, ascended the Irawadi some distance, acquired a remarkable acquaintance with inland Pegu, and even penetrated to the Siamese Shan states (1586–1587). Early in 1588 he visited Malacca; in the autumn of this year he began his homeward travels, first to Bengal; then round the Indian coast, touching at Cochin and Goa, to Ormuz; next up the Persian Gulf to Basra and up the Tigris to Mosul (Nineveh); finally via Urfa, Bir on the Euphrates, Aleppo and Tripoli, to the Mediterranean. He reappeared in London on the 29th of April 1591. His experience was greatly valued by the founders of the East India Company, who specially consulted him on Indian affairs (*e.g.* 2nd of October 1600; 29th of January 1601; 31st of December 1606).

See Hakluyt, *Principal Navigations* (1599), vol. ii. part i. pp. 245-271, esp. 250-268; Linschoten, *Voyages* (*Itineraris*), part i. ch. xcii. (vol. ii. pp. 158-169, &c., Hakluyt Soc. edition); Stevens and Birdwood, *Court Records of the East India Company 1599–1603* (1886), esp. pp. 26, 123; *State Papers, East Indies*, &c., *1513–1616* (1862), No. 36; Pinkerton, *Voyages and Travels* (1808–1814), ix. 406-425.

FITCHBURG, a city and one of the county-seats of Worcester county, Massachusetts, U.S.A., situated, at an altitude varying from about 433 ft. to about 550 ft., about 23 m. N. of Worcester and about 45 m. W.N.W. of Boston. Pop. (1880) 12,429; (1890) 22,037; (1900) 31,531, of whom 10,917 were foreign-born, including 4063 French Canadians, 836 English Canadians, 2306 Irish and 963 Finns; (1910 census) 37,826. Fitchburg is traversed by the N. branch of the Nashua river, and is served by the Boston & Maine, and the New York, New Haven & Hartford railways, and by three interurban electric lines. The city area (27·7 sq.m.) is well watered, and is very uneven, with hill spurs running in all directions, affording picturesque scenery. The court house and the post office (in a park presented by the citizens) are the principal public buildings. Fitchburg is the seat of a state normal school (1895), with model and training schools; has a free public library (1859; in the Wallace library and art building), the Burbank hospital, the Fitchburg home for old ladies, and an extensive system of parks, in one of which is a fine fountain, designed by Herbert Adams. Fitchburg has large mercantile and financial interests, but manufacturing is the principal industry. The principal manufactures are paper and wood pulp, cotton and woollen goods, yarn and silk, machinery, saws, horn goods, and bicycles and firearms (the Iver Johnson Arms and Cycle Works being located here). In 1905 the city's total factory product was valued at $15,390,507, of which $3,019,118 was the value of the paper and wood pulp product, $2,910,572 was the value of the cotton goods, and $1,202,421 was the value of the foundry and machine shop products. The municipality owns and operates its (gravity) water works system. Fitchburg was included in Lunenburg until 1764, when it was incorporated as a township and was named in honour of John Fitch, a citizen who did much to secure incorporation; it was chartered as a city in 1872.

See W. A. Emerson, *Fitchburg, Massachusetts, Past and Present* (Fitchburg, 1887).

FITTIG, RUDOLF (1835–), German chemist, was born at Hamburg on the 6th of December 1835. He studied chemistry at Göttingen, graduating as Ph.D. with a dissertation on acetone in 1858. He subsequently held several appointments at Göttingen, being privat docent (1860), and extraordinary professor (1870). In 1870 he obtained the chair at Tübingen, and in 1876 that at Strassburg, where the laboratories were erected from his designs. Fittig's researches are entirely in organic chemistry, and cover an exceptionally wide field. The aldehydes and ketones provided material for his earlier work. He observed that aldehydes and ketones may suffer reduction in neutral, alkaline, and sometimes acid solution to secondary and tertiary glycols, substances which he named pinacones; and also that certain pinacones when distilled with dilute sulphuric acid gave compounds, which he named pinacolines. The unsaturated acids also received much attention, and he discovered the internal anhydrides of oxyacids, termed lactones. In 1863 he introduced the reaction known by his name. In 1855 Adolph Wurtz had shown that when sodium acted upon alkyl iodides, the alkyl residues combined to form more complex hydrocarbons; Fittig developed this method by showing that a mixture of an aromatic and alkyl haloid, under similar treatment, yielded homologues of benzene. His investigations on Perkin's reaction led him to an explanation of its mechanism which appeared to be more in accordance with the facts. The question, however, is one of much difficulty, and the exact course of the reaction appears to await solution. These researches incidentally solved the constitution of coumarin, the odoriferous principle of woodruff. Fittig and Erdmann's observation that phenyl isocrotonic acid readily yielded α-naphthol by loss of water was of much importance, since it afforded valuable evidence as to the constitution of naphthalene. They also investigated certain hydrocarbons occurring in the high boiling point fraction of the coal tar distillate and solved the constitution of phenanthrene. We also owe much of our knowledge of the alkaloid piperine to Fittig, who in collaboration with Ira Remsen established its constitution in 1871. Fittig has published two widely used text-books; he edited several editions of Wohler's *Grundriss der organischen Chemie* (11th ed., 1887) and wrote an *Unorganische Chemie* (1st ed., 1872; 3rd, 1882). His researches have been recognized by many scientific societies and institutions, the Royal Society awarding him the Davy medal in 1906.

FITTON, MARY (*c.* 1578–1647), identified by some writers with the "dark lady" of Shakespeare's sonnets, was the daughter of Sir Edward Fitton of Gawsworth, Cheshire, and was baptized on the 24th of June 1578. Her elder sister, Anne, married John Newdigate in 1587, in her fourteenth year. About 1595 Mary Fitton became maid of honour to Queen Elizabeth. Her father recommended her to the care of Sir William Knollys, comptroller of the queen's household, who promised to defend the "innocent lamb" from the "wolfish cruelty and fox-like subtlety of the tame beasts of this place." Sir William was fifty and already married, but he soon became suitor to Mary Fitton, in hope of the speedy death of the actual Lady Knollys, and appears to have received considerable encouragement. There is no hint in her authenticated biography that she was acquainted with Shakespeare. William Kemp, who was a clown in Shakespeare's company, dedicated his *Nine Daies Wonder* to Mistress Anne (perhaps an error for Mary) Fitton, "Maid of Honour to Elizabeth"; and there is a sonnet addressed to her in an anonymous volume, *A Woman's Woorth defended against all the Men in the World* (1599). In 1600 Mary Fitton led a dance in court festivities at which William Herbert, later earl of Pembroke, is known to have been present; and shortly afterwards she became his mistress. In February 1601 Pembroke was sent to the Fleet in connexion with this affair, but Mary Fitton, whose child died soon after its birth, appears to have simply been dismissed from court. Mary Fitton seems to have gone to her sister, Lady Newdigate, at Arbury. A second scandal has been fixed on Mary Fitton by George Ormerod, author of *History of Cheshire*, in a MS. quoted by Mr. T. Tyler (*Academy*, 27th Sept. 1884). Ormerod asserted, on the strength of the MSS. of Sir Peter Leycester, that she had two illegitimate daughters by Sir Richard Leveson, the friend and correspondent of her sister Anne. He also gives the name of her first husband as Captain Logher, and her second as Captain Polwhele, by whom she had a son and daughter. Polwhele died in 1609 or 1610, about three years after his marriage. But Ormerod was mistaken in the order of Mary Fitton's husbands, for her second husband, Logher, died in 1636. Her own will, which was proved in 1647, gives her name as "Mary Lougher." In Gawsworth church there is a painted monument of the Fittons, in which Anne and Mary are represented kneeling behind their mother. It is stated that from what remains of the colouring Mary was a dark woman, which is of course essential to her identification with the lady of the sonnets, but in the portraits at Arbury described by Lady Newdigate-Newdegate in her *Gossip from a Muniment Room* (1897) she has brown hair and grey eyes.

The identity of the Arbury portrait with Mary Fitton was challenged by Mr Tyler and by Dr Furnivall. For an answer to their remarks see an appendix by C. G. O. Bridgeman in the 2nd edition of Lady Newdigate-Newdegate's book.

The suggestion that Mary Fitton should be regarded as the false mistress of Shakespeare's sonnets rests on a very thin chain of reasoning, and by no means follows on the acceptance of the theory that William Herbert was the addressee of the sonnets, though it of course fails with the rejection of that supposition. Mr William Archer (*Fortnightly Review*, December 1897) found some support for Mary Fitton's identification with the "dark lady" in the fact that Sir William Knollys was also her suitor, thus numbering three "Wills" among her admirers. This supplies a definite interpretation, whether right or wrong, to the initial lines of Sonnet 135:—

> "Whoever hath her wish, thou hast thy 'Will,'
> And 'Will' to boot, and 'Will' in overplus."

Arguments in favour of her adoption into the Shakespeare circle will be found in Mr Thomas Tyler's *Shakespeare's Sonnets* (1890, pp. 73-92), and in the same writer's *Herbert-Fitton Theory of Shakespeare's Sonnets* (1898).

FITTON, WILLIAM HENRY (1780–1861), British geologist was born in Dublin in January 1780. Educated at Trinity College, in that city, he gained the senior scholarship in 1798, and graduated in the following year. At this time he began to take interest in geology and to form a collection of fossils. Having adopted the medical profession he proceeded in 1808 to Edinburgh, where he attended the lectures of Robert Jameson, and thenceforth his interest in natural history and especially in geology steadily increased. He removed to London in 1809, where he further studied medicine and chemistry. In 1811 he brought before the Geological Society of London a description of the geological structure of the vicinity of Dublin, with an account of some rare minerals found in Ireland. He took a medical practice at Northampton in 1812, and for some years the duties of his profession engrossed his time. He was admitted M.D. at Cambridge in 1816. In 1820, having married a lady of means, he settled in London, and devoted himself to the science of geology with such assiduity and thoroughness that he soon became a leading authority, and in the end, as Murchison said, "one of the British worthies who have raised modern geology to its present advanced position." His "Observations on some of the Strata between the Chalk and the Oxford Oolite, in the South-east of England" (*Trans. Geol. Soc.* ser. 2, vol. iv.) embodied a series of researches extending from 1824 to 1836, and form the classic memoir familiarly known as Fitton's "Strata below the Chalk." In this great work he established the true succession and relations of the Upper and Lower Greensand, and of the Wealden and Purbeck formations, and elaborated their detailed structure. He had been elected F.R.S. in 1815, and he was president of the Geological Society of London 1827–1829. His house then became a meeting place for scientific workers, and during his presidency he held a conversazione open on Sunday evenings to all fellows of the Geological Society. From 1817 to 1841 he contributed to the *Edinburgh Review* many admirable essays on the progress of geological science; he also wrote "Notes on the

Progress of Geology in England" for the *Philosophical Magazine* (1832–1833). His only independent publication was *A Geological Sketch of the Vicinity of Hastings* (1833). He was awarded the Wollaston medal by the Geological Society in 1852. He died in London on the 13th of May 1861.

Obituary by R. I. Murchison in *Quart. Journ. Geol. Soc.*, vol. xviii., 1862, p. xxx.

FITZBALL, EDWARD (1792–1873), English dramatist, whose real patronymic was Ball, was born at Burwell, Cambridgeshire, in 1792. His father was a well-to-do farmer, and Fitzball, after receiving his schooling at Newmarket, was apprenticed to a Norwich printer in 1809. He produced some dramatic pieces at the local theatre, and eventually the marked success of his *Innkeeper of Abbeville, or The Ostler and the Robber* (1820), together with the friendly acceptance of one of his pieces at the Surrey theatre by Thomas Dibdin, induced him to settle in London. During the next twenty-five years he produced a great number of plays, most of which were highly successful. He had a special talent for nautical drama. His *Floating Beacon* (Surrey theatre, 19th of April 1824) ran for 140 nights, and his *Pilot* (Adelphi, 1825) for 200 nights. His greatest triumph in melodrama was perhaps *Jonathan Bradford, or the Murder at the Roadside Inn* (Surrey theatre, 12th of June 1833). He was at one time stock dramatist and reader of plays at Covent Garden, and afterwards at Drury Lane. He had a considerable reputation as a song-writer and as a librettist in opera. The last years of his life were spent in retirement at Chatham, where he died on the 27th of October 1873.

His autobiography, *Thirty-Five Years of a Dramatic Author's Life* (2 vols., 1859), is a naïve record of his career. Numbers of his plays are printed in *Cumberland's Minor British Theatre*, *Dick's Standard Plays* and *Lacy's Acting Edition of Plays*.

FITZGERALD, the name of an historic Irish house, which descends from Walter, son of Other, who at the time of the Domesday Survey (1086) was castellan of Windsor and a tenant-in-chief in five counties. From his eldest son William, known as "de Windsor," descended the Windsors of Stanwell, of whom Andrew Windsor was created Lord Windsor of Stanwell (a Domesday possession of the house) by Henry VIII., which barony is now vested in the earl of Plymouth, his descendant in the female line. Of Walter's younger sons, Robert was given by Henry I. the barony of Little Easton, Essex; Maurice obtained the stewardship (*dapiferatus*) of the great Suffolk abbey of Bury St Edmunds; Reinald the stewardship to Henry I.'s queen, Adeliza; and Gerald (also a *dapifer*) became the ancestor of the FitzGeralds. As constable and captain of the castle that Arnulf de Montgomery raised at Pembroke, Gerald strengthened his position in Wales by marrying Nesta, sister of Griffith, prince of South Wales, who bore to him famous children, "by whom the southern coast of Wales was saved for the English and the bulwarks of Ireland stormed." Of these sons William, the eldest, was succeeded by his son Odo, who was known as "de Carew," from the fortress of that name at the neck of the Pembroke peninsula, the eldest son Gerald having been slain by the Welsh. The descendants of Odo held Carew and the manor of Moulsford, Berks, and some of them acquired lands in Ireland. But the wild claims of Sir Peter Carew, under Queen Elizabeth, to vast Irish estates, including half of "the kingdom of Cork," were based on a fictitious pedigree. Odo de Carew's brothers, Reimund "Fitz William" (known as "Le Gros") and Griffin "Fitz William," took an active part in the conquest of Ireland.

Returning to Gerald and Nesta, their son David "Fitz Gerald" became bishop of St David's (1147–1176), and their daughter Angharat mother of Gerald de Barri (Giraldus Cambrensis, *q.v.*), the well-known historian and the eulogist of his mother's family. A third son, Maurice, obtained from his brother the stewardship (*dapiferatus*) of St David's, *c.* 1174, and having landed in Ireland in 1169, on the invitation of King Dermod, founded the fortunes of his house there, receiving lands at Wexford, where he died and was buried in 1176. His eventual territory, however, was the great barony of the Naas in Ophaley (now in Kildare), which Strongbow granted him with Wicklow Castle; but his sons were forced to give up the latter. His eldest son William succeeded him as baron of the Naas and steward of St David's, but William's granddaughter carried the Naas to the Butlers and so to the Loundreses. Gerald, a younger son of Maurice, who obtained lands in Ophaley, was father of Maurice "Fitz Gerald," who held the great office of justiciar of Ireland from 1232 to 1245. In 1234 he fought and defeated his overlord, the earl marshal, Richard, earl of Pembroke, and he also fought for his king against the Irish, the Welsh, and in Gascony, dying in 1257. He held Maynooth Castle, the seat of his descendants.

Much confusion follows in the family history, owing to the justiciar leaving a grandson Maurice (son of his eldest son Gerald) and a younger son Maurice, of whom the latter was justiciar for a year in 1272, while the former, as heir male and head of the race, inherited the Ophaley lands, which he is said to have bequeathed at his death (1287) to John "Fitz Thomas," whose fighting life was crowned by a grant of the castle and town of Kildare, and of the earldom of Kildare to him and the heirs male of his body (May 14th, 1316). Dying shortly after, he was succeeded by his son Thomas, son-in-law of Richard (de Burgh) the "red earl" of Ulster, who received the hereditary shrievalty of Kildare in 1317, and was twice (1320, 1327) justiciar of Ireland for a year. His younger son Maurice "Fitz Thomas," 4th earl (1331–1390), was frequently appointed justiciar, and was great-grandfather of Thomas, the 7th earl (1427–1477), who between 1455 and 1475 was repeatedly in charge of the government of Ireland as "deputy," and who founded the "brotherhood of St George" for the defence of the English Pale. He was also made lord chancellor of Ireland in 1463. His son Gerald, the 8th earl (1477–1513), called "More" (the Great), was deputy governor of Ireland from 1481 for most of the rest of his life, though imprisoned in the Tower two years (1494–1496) on suspicion as a Yorkist. He was mortally wounded while fighting the Irish as "deputy." Gerald, the 9th earl (1513–1534), followed in his father's steps as deputy, fighting the Irish, till the enmity of the earl of Ormonde, the hereditary rival of his house, brought about his deposition in 1520. In spite of temporary restorations he finally died a prisoner in the Tower.

In his anger at his rival's successes the 9th earl had been led, it was suspected, into treason, and while he was a prisoner in England his son Lord Thomas Fitzgerald, "Silken Thomas," broke out into open revolt (1534), and declared war on the government; his followers slew the archbishop of Dublin and laid siege to Dublin Castle. Meanwhile he made overtures to the native Irish, to the pope and to the emperor; but the Butlers took up arms against him, an English army laid siege to his castle of Maynooth, and, though its fall was followed by a long struggle in the field, the earl, deserted by O'Conor, had eventually to surrender himself to the king's deputy. He was sent to the Tower, where he was subsequently joined by his five uncles, arrested as his accomplices. They were all six executed as traitors in February 1537, and acts of attainder completed the ruin of the family.

But the earl's half-brother, Gerald (whose sister Elizabeth was the earl of Surrey's "fair Geraldine"), a mere boy, had been carried off, and, after many adventures at home and abroad, returned to England after Henry VIII.'s death, and to propitiate the Irish was restored to his estates by Edward VI. (1552). Having served Mary in Wyat's rebellion, he was created by her earl of Kildare and Lord Offaley, on the 13th of May 1554, but the old earldom (though the contrary is alleged) remained under attainder. Although he conformed to the Protestant religion under Elizabeth and served against the Munster rebels and their Spanish allies, he was imprisoned in the Tower on suspicion of treason in 1583. But the acts attainting his family had been repealed in 1569, and the old earldom was thus regained. In 1585 he was succeeded by his son Henry ("of the Battleaxes"), who was mortally wounded when fighting the Tyrone rebels in 1597. On the death of his brother in 1599 the earldom passed to their cousin Gerald, whose claim to the estates was opposed by Lettice, Lady Digby, the heir-general. She obtained the ancestral castle of Geashill with its territory and was recognized in 1620 as Lady Offaley for life. George, the 16th earl (1620–1660), had his castle of Maynooth pillaged by the Roman Catholics in 1642, and after its subsequent occupation by them in 1646 it was finally abandoned by the family.

The history of the earls after the Restoration was uneventful, save for the re-acquisition in 1739 of Carton, which thenceforth became the seat of the family, until James the 20th earl (1722–1773), who obtained a viscounty of Great Britain in 1747, built Leinster House in Dublin, and formed a powerful party in the Irish parliament. In 1756 he was made lord deputy; in 1760 he raised the royal Irish regiment of artillery; and in 1766 he received the dukedom of Leinster, which remained the only Irish dukedom till that of Abercorn was created in 1868. His wealth and connexions secured him a commanding position. Of his younger children one son was created Lord Lecale; another was the well-known rebel, Lord Edward Fitzgerald; another was the ancestor of Lord De Ros; and a daughter was created Baroness Rayleigh. William Robert, the 2nd duke (1749–1804), was a cordial supporter of the Union, and received nearly £30,000 for the loss of his borough influence. In 1883 the family was still holding over 70,000 acres in Co. Kildare; but, after a tenure of nearly 750 years, arrangements were made to sell them to the tenants under the recent Land Purchase Acts. In 1893 Maurice Fitzgerald (b. 1887) succeeded his father Gerald, the 5th duke (1851–1893), as 6th duke of Leinster.

The other great Fitzgerald line was that of the earls of Desmond, who were undoubtedly of the same stock and claimed descent from Maurice, the founder of the family in Ireland, through a younger son Thomas. It would seem that Maurice, grandson of Thomas, was father of Thomas "Fitz Maurice" *Nappagh* ("of the ape"), justice of Ireland in 1295, who obtained a grant of the territory of "Decies and Desmond" in 1292, and died in 1298. His son Maurice Fitz Thomas or Fitzgerald, inheriting vast estates in Munster, and strengthening his position by marrying a daughter of Richard de Burgh, earl of Ulster, was created earl of Desmond (*i.e.* south Munster) on the 22nd of August 1329, and Kerry was made a palatine liberty for him. The greatest Irish noble of his day, he led the Anglo-Irish party against the English representatives of the king, and was attacked as the king's enemy by the viceroy in 1345. He surrendered in England to the king and was imprisoned, but eventually regained favour, and was even made viceroy himself in 1355. He died, however, the following year. Two of his sons succeeded in turn, Gerald, the 3rd earl (1359–1398), being appointed justiciar (*i.e.* viceroy) in 1367, despite his adopting his father's policy which the crown still wished to thwart. But he was superseded two years later, and defeated and captured by the native king of Thomond shortly after. Yet his sympathies were distinctly Irish. The remote position of Desmond in the south-west of Ireland tended to make the succession irregular on native lines, and a younger son succeeded as 6th or 7th earl about 1422. His son Thomas, the next earl (1462–1467), governed Ireland as deputy from 1463 to 1467, and upheld the endangered English rule by stubborn conflict with the Irish. Yet Tiptoft, who superseded him, procured his attainder with that of the earl of Kildare, on the charge of alliance with the Irish, and he was beheaded on the 14th of February 1468, his followers in Munster avenging his death by invading the Pale. His younger son Maurice, earl from 1487 to 1520, was one of Perkin Warbeck's Irish supporters, and besieged Waterford on his behalf. His son James (1520–1529) was proclaimed a rebel and traitor for conspiring with the French king and with the emperor. At his death the succession reverted to his uncle Thomas (1529–1534), then an old man, at whose death there was a contest between his younger brother Sir John "of Desmond" and his grandson James, a court page of Henry VIII. Old Sir John secured possession till his death (1536), when his son James succeeded *de facto*, and *de jure* on the rightful earl being murdered by the usurper's younger brother in 1540. Intermarriage with Irish chieftains had by this time classed the earls among them, but although this James looked to their support before 1540, he thenceforth played so prudent a part that in spite of the efforts of the Butlers, the hereditary foes of his race, he escaped the fate of the Kildare branch and kept Munster quiet and in order for the English till his death in 1558. His four marriages produced a disputed succession and a break-up of the family. His eldest son Thomas "Roe" (the Red) was disinherited, and failed to obtain the earldom, which was confirmed by Elizabeth to his half-brother Gerald "the rebel earl" (1558–1582), but Gerald had other enemies in his uncle Maurice (the murderer of 1540) and his son especially, the famous James "Fitz Maurice" Fitz Gerald. Gerald's turbulence and his strife with the Butlers led to his detention in England (1562–1564) and again in 1565–1566. In 1567 Sidney imprisoned him in Dublin Castle, whence, with his brother, Sir John "of Desmond," he was sent to England and the Tower, and not allowed to return to Ireland till 1573. Meanwhile the above James, in spite of the protests of Thomas "Roe," had usurped his position in his absence and induced the natives to choose him as "captain" or chieftain of Desmond. He formed a strong Irish Catholic party and broke into revolt in 1569. Suppressed by Sidney, he rebelled again, till crushed by Perrot in 1573. As Earl Gerald on his return would not join James in revolt, the latter withdrew to France. But Gerald himself, after some trimming, rose in rebellion (July 1574), though he soon submitted to the queen's forces. On the continent James Fitz Maurice offered the crown of Ireland in succession to France and to Spain, and finally to the nephew of Pope Gregory XIII. With the papal nuncio and a few troops he landed at Dingle in Kerry (June 1579) and called on the earls of Kildare and Desmond to join him, but the latter assured the English government of his loyalty, and James was killed in a skirmish. Yet Desmond was viewed with suspicion and finally forced, by being proclaimed as a traitor (Nov. 1st, 1579), into a miserable rebellion. His castles were soon captured, and he was hunted as a fugitive, till surprised and beheaded on the 11th of November 1583, after long wanderings, his head being fixed on London Bridge. His ruin is attributable to his restless turbulence and lack of settled policy. The vast estates of the earls, estimated at 600,000 acres, were forfeited by act of parliament.

But the influence of his mighty house was still great among the Irish. The disinherited Thomas "Roe" left a son James "Fitz Thomas," who, succeeding him in 1595 and finding that the territory of the earls would never be restored, assumed the earldom and joined O'Neill's rebellion in 1598, at the head of 8000 of his men. Long sheltered from capture by the fidelity of the peasantry, he was eventually seized (1601) by his kinsman the White Knight, Edmund Fitz Gibbon, whose sister-in-law he had married, and sent to the Tower. The "sugan" (sham) earl lingered there obscurely as "James M'Thomas" till his death. In consequence of his rebellion and the devotion of the Irish to his race, James, son of Gerald "the rebel earl," who had remained in the Tower since his father's death (1583), was restored as earl of Desmond and sent over to Munster in 1600, but he, known as "the queen's earl," could, as a Protestant, do nothing, and he died unmarried in 1601. The "sugan" earl's brother John, who had joined in his rebellion, escaped into Spain, and left a son Gerald, who appears to have assumed the title and was known as the Conde de Desmond. He was killed in the service of the emperor Ferdinand in 1632. The common origin of the earls of Desmond and of Kildare had never been forgotten, and intermarriage had cemented the bond. Just before his death the exile wrote as "Desmond *alias* Gerratt Fitz Gerald" to his "Most Noble Cosen" the earl of Kildare, that "wee must not be oblivious of the true amity and love that was inviolably observed betweene our antenates and elders."

There can be no doubt that the house of Fitzmaurice was also of this stock, although their actual origin, in the 12th century, is doubtful. From a very early date they were feudal lords of Kerry, and their dignity was recognized as a peerage by Henry VII. in 1489. The isolated position of their territory ("Clanmaurice") threw them even more among the Irish than the earls of Desmond, and they often adopted the native form of their name, "MacMorrish." Under Elizabeth the lords of Kerry narrowly escaped sharing the ruin of the earls. The conduct of Thomas in the rebellion of James "Fitz Maurice" was suspicious, and his sons joined in that of the earl of Desmond, while he himself was a rebel in 1582. Patrick, his successor (1590–1600), was captured in rebellion (1587), and when free, joined the revolt of 1598, as did his son and heir Thomas, who continued in the field till he obtained pardon and restoration in 1603, though suspect till his death in 1630. His grandson withdrew to France with James II., but the next peer became a supporter of the Whig cause, married the eventual heiress of Sir William Petty, and was created earl of Kerry in 1723. From him descend the family of Petty-Fitzmaurice, who obtained the marquessate of Lansdowne (*q.v.*) in 1818, and still hold among their titles the feudal barony of Kerry together with vast estates in that county.

From the three sons by a second wife of one of the earls of Desmond's ancestors, descended the hereditary White Knights, Knights of Glin and Knights of Kerry, these feudal dignities having, it is said, been bestowed upon them by their father, as Lord of Decies and Desmond. Glin Castle, county Limerick, is still the seat of the (Fitzgerald) Knight of Glin. Valencia Island is now the seat of the Knights of Kerry, who received a baronetcy in 1880.

AUTHORITIES.—Calendars of Irish documents and state papers and Carew papers; Gilbert's *Viceroys of Ireland*; Lord Kildare's *Earls of Kildare*; G. E. C[okayne]'s *Complete Peerage*; Haymond Graves, *Unpublished Geraldine Documents*; *Annals of the Four Masters*; Calendar of the duke of Leinster's MSS. in 9th *Report on Historical MSS.*, part ii.; Ware's *Annals*; J. H. Round's "Origin of the Fitzgeralds" and "Origin of the Carews" in the *Ancestor*; his "Earldom of Kildare and Barony of Offaley" in *Genealogist*, ix., and "Barons of the Naas" in *Genealogist*, xv.; and his "Decies and Desmond" in *Eng. Hist. Rev.* xviii. (J. H. R.)

FITZGERALD, EDWARD (1809–1883), English writer, the poet of Omar Khayyám, was born as EDWARD PURCELL, at Bredfield House, in Suffolk, on the 31st of March 1809. His father, John Purcell, who had married a Miss FitzGerald, assumed in 1818 the name and arms of his wife's family. From 1816 to 1821 the FitzGeralds lived at St Germain and at Paris, but in the latter year Edward was sent to school at Bury St Edmunds. In 1826 he proceeded to Trinity College, Cambridge, where, some two years later, he became acquainted with Thackeray and W. H. Thompson. With Tennyson, "a sort of Hyperion," his intimacy began about 1835. In 1830 he went to live in Paris, but in 1831 was in a farm-house on the battlefield of Naseby. He adopted no profession, and lived a perfectly stationary and rustic life, presently moving into his native county of Suffolk, and never again leaving it for more than a week or two. Until 1835 the FitzGeralds lived at Wherstead; from that year until 1853 the poet resided at Boulge, near Woodbridge; until 1860 at Farlingay Hall; until 1873 in the town of Woodbridge; and then until his death at his own house hard by, ealled Little Grange.

During most of this time FitzGerald gave his thoughts almost without interruption to his flowers, to music and to literature. He allowed friends like Tennyson and Thackeray, however, to push on far before him, and long showed no disposition to emulate their activity. In 1851 he published his first book, *Euphranor*, a Platonic dialogue, born of memories of the old happy life at Cambridge. In 1852 appeared *Polonius*, a collection of "saws and modern instances," some of them his own, the rest borrowed from the less familiar English classics. FitzGerald began the study of Spanish poetry in 1850, when he was with Professor E. B. Cowell at Elmsett and that of Persian in Oxford in 1853. In the latter year he issued *Six Dramas of Calderon*, freely translated. He now turned to Oriental studies, and in 1856 he anonymously published a version of the *Salámán and Absál* of Jámi in Miltonic verse. In March 1857 the name with which he has been so closely identified first occurs in FitzGerald's correspondence—"Hafiz and *Omar Khayyám* ring like true metal." On the 15th of January 1859 a little anonymous pamphlet was published as *The Rubáiyát of Omar Khayyám*. In the world at large, and in the circle of FitzGerald's particular friends, the poem seems at first to have attracted no attention. The publisher allowed it to gravitate to the fourpenny or even (as he afterwards boasted) to the penny box on the bookstalls. But in 1860 Rossetti discovered it, and Swinburne and Lord Houghton quickly followed. The *Rubáiyát* became slowly famous, but it was not until 1868 that FitzGerald was encouraged to print a second and greatly revised edition. Meanwhile he had produced in 1865 a version of the *Agamemnon*, and two more plays from Calderon. In 1880–1881 he issued privately translations of the two Oedipus tragedies; his last publication was *Readings in Crabbe*, 1882. He left in manuscript a version of Attar's *Mantic-Uttair* under the title of *The Bird Parliament*.

From 1861 onwards FitzGerald's greatest interest had centred in the sea. In June 1863 he bought a yacht, "The Scandal," and in 1867 he became part-owner of a herring-lugger, the "Meum and Tuum." For some years, till 1871, he spent the months from June to October mainly in "knocking about somewhere outside of Lowestoft." In this way, and among his books and flowers, FitzGerald gradually became an old man. On the 14th of June 1883 he passed away painlessly in his sleep. He was "an idle fellow, but one whose friendships were more like loves." In 1885 a stimulus was given to the steady advance of his fame by the fact that Tennyson dedicated his *Tiresias* to FitzGerald's memory, in some touching reminiscent verses to "Old Fitz." This was but the signal for that universal appreciation of Omar Khayyám in his English dress, which has been one of the curious literary phenomena of recent years. The melody of FitzGerald's verse is so exquisite, the thoughts he rearranges and strings together are so profound, and the general atmosphere of poetry in which he steeps his version is so pure, that no surprise need be expressed at the universal favour which the poem has met with among critical readers. But its popularity has gone much deeper than this; it is now probably better known to the general public than any single poem of its class published since the year 1860, and its admirers have almost transcended common sense in the extravagance of their laudation. FitzGerald married, in middle life, Lucy, the daughter of Bernard Barton, the Quaker poet. Of FitzGerald as a man practically nothing was known until, in 1889, Mr W. Aldis Wright, his intimate friend and literary executor, published his *Letters and Literary Remains* in three volumes. This was followed in 1895 by the *Letters to Fanny Kemble*. These letters constitute a fresh bid for immortality, since they discovered that FitzGerald was a witty, picturesque and sympathetic letter-writer. One of the most unobtrusive authors who ever lived, FitzGerald has, nevertheless, by the force of his extraordinary individuality, gradually influenced the whole face of English *belles-lettres*, in particular as it was manifested between 1890 and 1900.

The Works of Edward FitzGerald appeared in 1887. See also a chronological list of FitzGerald's works (Caxton Club, Chicago, 1899); notes for a bibliography by Col. W. F. Prideaux, in *Notes and Queries* (9th series, vol. vi.), published separately in 1901; *Letters and Literary Remains* (ed. W. Aldis Wright, 1902–1903); and the *Life of Edward FitzGerald*, by Thomas Wright (1904), which contains a bibliography (vol. ii. pp. 241-243) and a list of sources (vol. i. pp. xvi.-xvii.). The volume on FitzGerald in the "English Men of Letters" series is by A. C. Benson. The FitzGerald centenary was celebrated in March 1909. See the *Centenary Celebrations Souvenir* (Ipswich, 1909) and *The Times* for March 25, 1909. (E. G.)

FITZGERALD, LORD EDWARD (1763–1798), Irish conspirator, fifth son of James, 1st duke of Leinster, by his wife Emilia Mary, daughter of Charles Lennox, 2nd duke of Richmond, was born at Carton House, near Dublin, on the 15th of October 1763. In 1773 the duke of Leinster died, and his widow soon afterwards married William Ogilvie, who superintended Lord Edward's early education. Joining the army in 1779, Lord Edward served with credit in America on the staff of Lord Rawdon (afterwards marquess of Hastings), and at the battle of Eutaw Springs (8th of September 1781) he was severely wounded, his life being saved by a negro named Tony, whom Lord Edward retained in his service till the end of his life. In 1783 Fitzgerald returned to Ireland, where his brother, the duke of Leinster, had procured his election to the Irish parliament as member for Athy. In parliament he acted with the small

Opposition group led by Grattan (*q.v.*), but took no prominent part in debate. After spending a short time at Woolwich to complete his military education, he made a tour through Spain in 1787; and then, dejected by unrequited love for his cousin Georgina Lennox (afterwards Lady Bathurst), he sailed for New Brunswick to join the 54th regiment with the rank of major. The love-sick mood and romantic temperament of the young Irishman found congenial soil in the wild surroundings of unexplored Canadian forests, and the enthusiasm thus engendered for the "natural" life of savagery may have been already fortified by study of Rousseau's writings, for which at a later period Lord Edward expressed his admiration. In February 1789, guided by compass, he traversed the country, practically unknown to white men, from Frederickstown to Quebec, falling in with Indians by the way, with whom he fraternized; and in a subsequent expedition he was formally adopted at Detroit by the Bear tribe of Hurons as one of their chiefs, and made his way down the Mississippi to New Orleans, whence he returned to England.

Finding that his brother had procured his election for the county of Kildare, and desiring to maintain political independence, Lord Edward refused the command of an expedition against Cadiz offered him by Pitt, and devoted himself for the next few years to the pleasures of society and his parliamentary duties. He was on terms of intimacy with his relative C. J. Fox, with R. B. Sheridan and other leading Whigs. According to Thomas Moore, Lord Edward Fitzgerald was the only one of the numerous suitors of Sheridan's first wife whose attentions were received with favour; and it is certain that, whatever may have been its limits, a warm mutual affection subsisted between the two. His Whig connexions combined with his transatlantic experiences to predispose Lord Edward to sympathize with the doctrines of the French Revolution, which he embraced with ardour when he visited Paris in October 1792. He lodged with Thomas Paine, and listened to the debates in the Convention. At a convivial gathering on the 18th of November he supported a toast to "the speedy abolition of all hereditary titles and feudal distinctions," and gave proof of his zeal by expressly repudiating his own title—a performance for which he was dismissed from the army. While in Paris Fitzgerald became enamoured of a young girl whom he chanced to see at the theatre, and who is said to have had a striking likeness to Mrs Sheridan. Procuring an introduction he discovered her to be a *protégée* of Madame de Sillery, comtesse de Genlis. The parentage of the girl, whose name was Pamela (?1776–1831), is uncertain; but although there is some evidence to support the story of Madame de Genlis that Pamela was born in Newfoundland of parents called Seymour or Sims, the common belief that she was the daughter of Madame de Genlis herself by Philippe (Égalité), duke of Orleans, was probably well founded. On the 27th of December 1792 Fitzgerald and Pamela were married at Tournay, one of the witnesses being Louis Philippe, afterwards king of the French; and in January 1793 the couple reached Dublin.

Discontent in Ireland was now rapidly becoming dangerous, and was finding a focus in the Society of the United Irishmen, and in the Catholic Committee, an organization formed a few years previously, chiefly under the direction of Lord Kenmare, to watch the interests of the Catholics. French revolutionary doctrines had become ominously popular, and no one sympathized with them more warmly than Lord Edward Fitzgerald, who, fresh from the gallery of the Convention in Paris, returned to his seat in the Irish parliament and threw himself actively into the work of opposition. Within a week of his arrival he denounced in the House of Commons a government proclamation, which Grattan had approved, in language so violent that he was ordered into custody and required to apologize at the bar of the House. As early as 1794 the government had information that placed Lord Edward under suspicion; but it was not till 1796 that he joined the United Irishmen, whose aim after the recall of Lord Fitzwilliam in 1795 was avowedly the establishment of an independent Irish republic. In May 1796 Theobald Wolfe Tone was in Paris endeavouring to obtain French assistance for an insurrection in Ireland. In the same month Fitzgerald and his friend Arthur O'Connor proceeded to Hamburg, where they opened negotiations with the Directory through Reinhard, French minister to the Hanseatic towns. The duke of York, meeting Pamela at Devonshire House on her way through London with her husband, had told her that "all was known" about his plans, and advised her to persuade him not to go abroad. The proceedings of the conspirators at Hamburg were made known to the government in London by an informer, Samuel Turner. Pamela was entrusted with all her husband's secrets and took an active part in furthering his designs; and she appears to have fully deserved the confidence placed in her, though there is reason to suppose that at times she counselled prudence. The result of the Hamburg negotiations was Hoche's abortive expedition to Bantry Bay in December 1796. In September 1797 the government learnt from the informer MacNally that Lord Edward was among those directing the conspiracy of the United Irishmen, which was now quickly maturing. He was specially concerned with the military organization, in which he held the post of colonel of the Kildare regiment and head of the military committee. He had papers showing that 280,000 men were ready to rise. They possessed some arms, but the supply was insufficient, and the leaders were hoping for a French invasion to make good the deficiency and to give support to a popular uprising. But French help proving dilatory and uncertain, the rebel leaders in Ireland were divided in opinion as to the expediency of taking the field without waiting for foreign aid. Lord Edward was among the advocates of the bolder course. His opinions and his proposals for action were alike violent. He was on intimate terms with apologists for assassination; there is some evidence that he favoured a project for the massacre of the Irish peers while in procession to the House of Lords for the trial of Lord Kingston in May 1798. It was probably abhorrence of such measures that converted Thomas Reynolds from a conspirator to an informer; at all events, by him and several others the authorities were kept posted in what was going on, though lack of evidence producible in court delayed the arrest of the ringleaders. But on the 12th of March 1798 Reynolds' information led to the seizure of a number of conspirators at the house of Oliver Bond. Lord Edward Fitzgerald, warned by Reynolds, was not among them. The government were anxious to save him from the consequences of his own folly; and Lord Clare said to a member of his family, "for God's sake get this young man out of the country; the ports shall be thrown open, and no hindrance whatever offered." Fitzgerald with chivalrous recklessness refused to desert others who could not escape, and whom he had himself led into danger. On the 30th of March a proclamation establishing martial law and authorizing the military to act without orders from the civil magistrate, which was acted upon with revolting cruelty in several parts of the country, precipitated the crisis.

The government had now no choice but to secure if possible the person of Lord Edward Fitzgerald, whose social position more than his abilities made him the most important factor in the conspiracy. On the 11th of May a reward of £1000 was offered for his apprehension. The 23rd of May was the date fixed for the general rising. Since the arrest at Bond's, Fitzgerald had been in hiding, latterly at the house of one Murphy, a feather dealer, in Thomas Street, Dublin. He twice visited his wife in disguise; was himself visited by his stepfather, Ogilvie, and generally observed less caution than his situation required. The conspiracy was honeycombed with treachery, and it was long a matter of dispute to whose information the government were indebted for Fitzgerald's arrest; but it is no longer open to doubt that the secret of his hiding place was disclosed by a Catholic barrister named Magan, to whom the stipulated reward was ultimately paid through Francis Higgins, another informer. On the 19th of May Major Swan and a Mr. Ryan proceeded to Murphy's house with Major H. C. Sirr and a few soldiers. Lord Edward was discovered in bed. A desperate scuffle took place, Ryan being mortally wounded by Fitzgerald with a dagger, while Lord Edward himself was only secured after Sirr had disabled him with a pistol bullet in the shoulder. He was conveyed to Newgate gaol, where by the kindness of Lord Clare he was visited by two of his relatives, and where he died of his wound on the 4th of June 1798. An Act of Attainder (repealed in 1819) was passed, confiscating his property; and his wife—against whom the government probably possessed sufficient evidence to secure a conviction for treason—was compelled to leave the country before her husband had actually expired.

Pamela, who was scarcely less celebrated than Lord Edward himself, and whose remarkable beauty made a lasting impression on Robert Southey, repaired to Hamburg, where in 1800 she married J. Pitcairn, the American consul. Since her marriage with Lord Edward she had been greatly beloved and esteemed by the whole Fitzgerald family; and although after her second marriage her intimacy with them ceased, there is no sufficient evidence for the tales that represented her subsequent conduct as open to grave censure. She remained to the last passionately devoted to the memory of her first husband; and she died in Paris in November 1831. A portrait of Pamela is in the Louvre. She had three children by Lord Edward Fitzgerald: Edward Fox (1794–1863); Pamela, afterwards wife of General Sir Guy Campbell; and Lucy Louisa, who married Captain Lyon, R.N.

Lord Edward Fitzgerald was of small stature and handsome features. His character and career have been made the subject of eulogies much beyond their merits. He had, indeed, a winning personality, and a warm, affectionate and generous nature, which made him greatly beloved by his family and friends; he was humorous, light-hearted, sympathetic, adventurous. But he was entirely without the weightier qualities requisite for such a part as he undertook to play in public affairs. Hot-headed and impulsive, he lacked judgment. He was as conspicuously deficient in the statesmanship as he was in the oratorical genius of such men as Flood, Plunket or Grattan. One of his associates in conspiracy described him as "weak and not fit to command a sergeant's guard, but very zealous." Reinhard, who considered Arthur O'Connor "a far abler man," accurately read the character of Lord Edward Fitzgerald as that of a young man "incapable of falsehood or perfidy, frank, energetic, and likely to be a useful and devoted instrument; but with no experience or extraordinary talent, and entirely unfit to be chief of a great party or leader in a difficult enterprise."

See Thomas Moore, *Life and Death of Lord Edward Fitzgerald* (2 vols., London, 1832), also a revised edition entitled *The Memoirs of Lord Edward Fitzgerald*, edited with supplementary particulars by Martin MacDermott (London, 1897); R. R. Madden, *The United Irishmen* (7 vols., Dublin, 1842–1846); C. H. Teeling, *Personal Narrative of the Irish Rebellion of 1798* (Belfast, 1832); W. J. Fitzpatrick, *The Sham Squire, The Rebellion of Ireland and the Informers of 1798* (Dublin, 1866), and *Secret Service under Pitt* (London, 1892); J. A. Froude, *The English in Ireland in the Eighteenth Century* (3 vols., London, 1872–1874); W. E. H. Lecky, *History of England in the Eighteenth Century*, vols. vii. and viii. (London, 1896); Thomas Reynolds the younger, *The Life of Thomas Reynolds* (London, 1839); *The Life and Letters of Lady Sarah Lennox*, edited by the countess of Ilchester and Lord Stavordale (London, 1901); Ida A. Taylor, *The Life of Lord Edward Fitzgerald* (London, 1903), which gives a prejudiced and distorted picture of Pamela. For particulars of Pamela, and especially as to the question of her parentage, see Gerald Campbell, *Edward and Pamela Fitzgerald* (London, 1904); *Memoirs of Madame de Genlis* (London, 1825); Georgette Ducrest, *Chroniques populaires* (Paris, 1855); Thomas Moore, *Memoirs of the Life of R. B. Sheridan* (London, 1825). (R. J. M.)

FITZGERALD, RAYMOND, or REDMOND (d. *ca.* 1182), surnamed Le Gros, was the son of William Fitzgerald and brother of Odo de Carew. He was sent by Strongbow to Ireland in 1170, and landed at Dundunnolf, near Waterford, where he was besieged in his entrenchments by the combined Irish and Ostmen, whom he repulsed. He was Strongbow's second in command, and had the chief share in the capture of Waterford and in the successful assault on Dublin. He was sent to Aquitaine to hand over Strongbow's conquests to Henry II., but was back in Dublin in July 1171, when he led one of the sallies from the town. Strongbow offended him later by refusing him the marriage of his sister Basilea, widow of Robert de Quenci, constable of Leinster. Raymond then retired to Wales, and Hervey de Mountmaurice became constable in his place. At the outbreak of a general rebellion against the earl in 1174 Raymond returned with his uncle Meiler Fitz Henry, after receiving a promise of marriage with Basilea. Reinstated as constable he secured a series of successes, and with the fall of Limerick in October 1175 order was restored. Mountmaurice meanwhile obtained Raymond's recall on the ground that his power threatened the royal authority, but the constable was delayed by a fresh outbreak at Limerick, the earl's troops refusing to march without him. On the death of Strongbow he was acting governor until the arrival of William Fitz Aldhelm, to whom he handed over the royal fortresses. He was deprived of his estates near Dublin and Wexford, but the Geraldines secured the recall of Fitz Aldhelm early in 1183, and regained their power and influence. In 1182 he relieved his uncle Robert Fitzstephen, who was besieged in Cork. The date of his death, sometimes stated to be 1182, is not known.

FITZGERALD, LORD THOMAS (10th earl of Kildare), (1513–1537), the eldest son of Gerald Fitzgerald, 9th earl of Kildare, was born in London in 1513. He spent much of his youth in England, but in 1534 when his father was for the third time summoned to England to answer for his maladministration as lord deputy of Ireland, Thomas, at the council held at Drogheda, in February was made vice-deputy. In June the Ormond faction spread a report in Ireland that the earl had been executed in the Tower, and that his son's life was to be attempted. Inflamed with rage at this apparent treachery, Thomas rode at the head of his retainers[1] into Dublin, and before the council for Ireland (the 11th of June 1534) formally renounced his allegiance to the king and proclaimed a rebellion. His enemies, including Archbishop John Allen (of Dublin), who had been set by Henry VIII. to watch Fitzgerald, took refuge in Dublin Castle. In attempting to escape to England, Allen was taken by the rebels, and on the 28th of July 1534, was murdered by Fitzgerald's servants in his presence, but whether actually by his orders is uncertain. In any case he sent to the pope for absolution, but was solemnly excommunicated by the Irish Church. Leaving part of his army (with the consent of the citizens) to besiege Dublin Castle, Fitzgerald himself went against Piers Butler, earl of Ossory, and succeeded at first in making a truce with him. But the citizens of Dublin now rose against him, Ossory invaded Kildare, and the approach of an English army forced Fitzgerald to raise the siege. Part of the English army landed on the 17th of October, the rest a week later, but taking advantage of the inactivity of the new lord deputy, Sir William Skeffington, Fitzgerald from his stronghold at Maynooth ravaged Kildare and Meath throughout the winter. He had now succeeded to the earldom of Kildare, his father having died in the Tower on the 13th of December 1534, but he does not seem to have been known by that title. In March Skeffington stormed the castle, the stronghold of the Geraldines, which was defended, and some said betrayed, by Christopher Parese, Fitzgerald's foster-brother. It fell on the 23rd of March 1535, and most of the garrison were put to the sword. This proved the final blow to the rebellion. The news of what is known as the "pardon of Maynooth" reached Fitzgerald as he was returning from levying fresh troops in Offaley; his men fell away from him, and he retreated to Thomond, intending to sail for Spain. Changing his mind he spent the next few months in raids against the English and their allies, but his party gradually deserting him, on the 18th of August 1535 he surrendered himself to Lord Leonard Grey (d. 1541). It seems likely that he made some conditions, but what they were is very uncertain. He was taken to England and placed in the Tower. In February 1536 his five uncles were also, some of them with great injustice, seized and brought to England. The six Geraldines were hanged at Tyburn on the 3rd of February 1537. Acts of attainder against them and Gerald the 9th earl were passed by both the

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[1] Fitzgerald was known by the sobriquet of "Silken Thomas," either from the silken fringes on his helmet, or from his distinguished manners.

Irish and English parliaments; but the family estates were restored by Edward VI. to Gerald, 11th earl of Kildare (step-brother of Thomas), and the attainder was repealed by Queen Elizabeth. Lord Thomas Fitzgerald married Frances, youngest daughter of Sir Adrian Fortescue, but had no children.

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FITZHERBERT, SIR ANTHONY (1470–1538), English jurist, was born at Norbury, Derbyshire. After studying at Oxford, he was called to the English bar, and in 1523 became justice of the Court of Common Pleas, the duties of which office he continued to discharge till within a short time of his death in 1538. As a judge he left behind him a high reputation for fairness and integrity, and his legal learning is sufficiently attested by his published works.

He is the author of *La Graunde Abridgement*, a digest of important legal cases written in Old French, first printed in 1514; *The Office and Authority of Justices of the Peace*, first printed in 1538 (last ed. 1794); the *New Natura Brevium* (1534, last ed. 1794), with a commentary ascribed to Sir Matthew Hale. To Fitzherbert are sometimes attributed the *Book of Husbandry* (1523), the first published work on agriculture in the English language, and the *Book of Surveying and Improvements* (1523) (see AGRICULTURE).

FITZHERBERT, THOMAS (1552–1640), English Jesuit, was the eldest son and heir of William Fitzherbert of Swynnerton in Staffordshire, and grandson of Sir Anthony Fitzherbert, judge of the common pleas. He was educated at Oxford, where, at the age of twenty, he was imprisoned for recusancy. On his release he went to London, where he was a member of the association of young men founded in 1580 to assist the Jesuits Edmund Campion and Robert Parsons. In 1582 he withdrew to the continent, where he was active in the cause of Mary, queen of Scots. He married in this year Dorothy, daughter of Edward East of Bledlow in Buckinghamshire. After the death of his wife (1588) he went to Spain, where on the recommendation of the duke of Feria he received a pension from the king. He continued his intrigues against the English government, and in 1598 he was charged with complicity in a plot to poison Queen Elizabeth. After this he was for a short while in the service of the duke of Feria at Milan, then went to Rome, where he was ordained priest (1601–1602) and became agent for the English clergy. He was unpopular with them, however, owing to his subserviency to the Jesuits, and resigned the agency in 1607 owing to the remonstrances of the English arch-priest George Birkhead. In 1613 he joined the Society of Jesus, and was appointed superior of the English mission at Brussels in 1616, and in 1618 rector of the English college at Rome. He held this post to within a year of his death, which occurred at Rome on the 7th of August (O.S.) 1640.

Father Fitzherbert, who is described as "a person of excellent parts, a notable politician, and of graceful behaviour and generous spirit," wrote many controversial works, a list of which is given in the article on him by Mr Thompson Cooper in the *Dictionary of National Biography*, together with authorities for his life.

FITZ NEAL or (FITZ NIGEL), **RICHARD** (d. 1198), treasurer of Henry II. and Richard I. of England, and bishop of London, belonged to a great administrative family whose fortunes were closely linked with those of Henry I., Henry II. and Richard I. The founder of the family was Roger, bishop of Salisbury, the great minister of Henry I. Before the death of that sovereign (1135) the care of the treasury passed from Roger to his nephew, Nigel, bishop of Ely (d. 1169), who held that office until the whole family were disgraced by Stephen (1139). Becoming a partisan of the empress, Nigel reaped his reward at the accession of her son, Henry II., who made him at first chancellor and then treasurer. Nigel's son, Richard, who was born before his father's elevation to the episcopate (1133), succeeded to the office of treasurer in 1158, and held it continuously for forty years. His name appears in the lists of itinerant justices for 1179 and 1194, but these are the only occasions on which he exercised that office. Before 1184 he became dean of Lincoln, and was in that year presented by the chapter of Lincoln among three select candidates for the vacant see. The king passed him over in favour of Hugh of Avalon, having resolved on this occasion to make a disinterested appointment. Richard I., however, rewarded the treasurer's services with the see of London (1189).

Richard Fitz Neal is best remembered as an author. He lacked the broad statesmanship of his father and great-uncle; he avoided any connexion with political parties; he is only once mentioned as taking part in a debate of the Great Council (1193), and then spoke, in his character as a bishop, to support a royal demand for a special aid. But his work *De necessariis observantiis Scaccarii dialogus*, commonly called the *Dialogus de Scaccario*, is of unique interest to the historian. It is an account, in two books, of the procedure followed by the exchequer in the author's time. Richard handles his subject with the more enthusiasm because, as he explains, the "course" of the exchequer was largely the creation of his own family. When read in connexion with the Pipe Rolls the *Dialogus* furnishes a most faithful and detailed picture of English fiscal arrangements under Henry II. The speakers in the dialogue are Richard himself and an anonymous pupil. The latter puts leading questions which Richard answers in elaborate fashion. The date of the conversation is given in the prologue as 1176–1177. This probably marks the date at which the book was begun; it was not completed before 1178 or 1179. Soon after the author's death we find it already recognized as the standard manual for exchequer officials. It was frequently transcribed and has been used by English antiquarians of every period. Hence it is the more necessary to insist that the historical statements which the treatise contains are sometimes demonstrably erroneous; the author appears to have relied excessively upon oral tradition. But, as the work is only known to us through transcripts, it is possible that some of the blunders which it now contains are due to the misdirected zeal of editors. Richard Fitz Neal also compiled in his earlier years a register or chronicle of contemporary affairs, arranged in three parallel columns. This was preserved in the exchequer at the time when he wrote the *Dialogus*, but has since disappeared. Stubbs' conjectural identification of this *Liber tricolumnis* with the first part of the *Gesta Henrici* (formerly attributed to Benedictus Abbas) is now abandoned as untenable.

See Madox's edition in his *History of the Exchequer* (1769); and that of A. Hughes, C. G. Crump and C. Johnson (Oxford, 1902). F. Liebermann's *Einleitung in den Dialogus de Scaccario* (Göttingen, 1875) contains the fullest account of the author. (H. W. C. D.)

FITZ-OSBERN, ROGER (fl. 1070), succeeded to the earldom of Hereford and the English estate of William Fitz-Osbern in 1071. He did not keep on good terms with William the Conqueror, and in 1075, disregarding the king's prohibition, married his sister Emma to Ralph Guader, earl of Norfolk, at the famous bridal of Norwich. Immediately afterwards the two earls rebelled. But Roger, who was to bring his force from the west to join the earl of Norfolk, was held in check at the Severn by the Worcestershire fyrd which the English bishop Wulfstan brought into the field against him. On the collapse of his confederate's rising, Roger was tried before the Great Council, deprived of his lands and earldom, and sentenced to perpetual imprisonment; but he was released, with other political prisoners, at the death of William I. in 1087.

FITZ-OSBERN, WILLIAM, Earl of Hereford (d. 1071), was an intimate friend of William the Conqueror, and the principal agent in preparing for the invasion of England. He received the earldom of Hereford with the special duty of pushing into Wales. During William's absence in 1067, Fitz-Osbern was left as his deputy in central England, to guard it from the Welsh on one side, and the Danes on the other. He also acted as William's lieutenant during the rebellions of 1069. In 1070 William sent him to assist Queen Matilda in the government of Normandy. But Richilde, widow of Baldwin VI. of Flanders, having offered to marry him if he would protect her son Arnulf against Robert the Frisian, Fitz-Osbern accepted the proposal and joined Richilde in Flanders. He was killed, fighting against Robert, at Cassel in 1071.

See Freeman, *Norman Conquest*, vols. iii. and iv.; Sir James Ramsay, *Foundations of England*, vol. ii.

FITZ OSBERT, WILLIAM (d. 1196), was a Londoner of good position who had served in the Third Crusade, and on his return took up the cause of the poorer citizens against the magnates who monopolized the government of London and assessed the taxes, as he alleged, with gross partiality. It is affirmed that he entered on this course of action through a quarrel with his elder brother who had refused him money. But this appears to be mere scandal; the chronicler Roger of Hoveden gives Fitz Osbert a high character, and he was implicitly trusted by the poorer citizens. He attempted to procure redress for them from the king; but the city magistrates persuaded the justiciar Hubert Walter that Fitz Osbert and his followers meditated plundering the houses of the rich. Troops were sent to seize the demagogue. He was smoked out of the sanctuary of St Mary le Bow, in which he had taken refuge, and summarily dragged to execution at Tyburn.

FITZ PETER, GEOFFREY (d. 1213), earl of Essex and chief justiciar of England, began his official career in the later years of Henry II., whom he served as a sheriff, a justice itinerant and a justice of the forest. During Richard's absence on Crusade he was one of the five justices of the king's court who stood next in authority to the regent, Longchamp. It was at this time (1190) that Fitz Peter succeeded to the earldom of Essex, in the right of his wife, who was descended from the famous Geoffrey de Mandeville. In attempting to assert his hereditary rights over Walden priory Fitz Peter came into conflict with Longchamp, and revenged himself by taking an active part in the baronial agitation through which the regent was expelled from his office. The king, however, forgave Fitz Peter for his share in these proceedings; and, though refusing to give him formal investiture of the Essex earldom, appointed him justiciar in succession to Hubert Walter (1198). In this capacity Fitz Peter continued his predecessor's policy of encouraging foreign trade and the development of the towns; many of the latter received, during his administration, charters of self-government. He was continued in his office by John, who found him a useful instrument and described him in an official letter as "indispensable to the king and kingdom." He proved himself an able instrument of extortion, and profited to no small extent by the spoliation of church lands in the period of the interdict. But he was too closely connected with the baronage to be altogether trusted by the king. The contemporary *Histoire des ducs* describes Fitz Peter as living in constant dread of disgrace and confiscation. In the last years of his life he endeavoured to act as a mediator between the king and the opposition. It was by his mouth that the king promised to the nation the laws of Henry I. (at the council of St Albans, August 4th, 1213). But Fitz Peter died a few weeks later (Oct. 2), and his great office passed to Peter des Roches, one of the unpopular foreign favourites. Fitz Peter was neither a far-sighted nor a disinterested statesman; but he was the ablest pupil of Hubert Walter, and maintained the traditions of the great bureaucracy which the first and second Henries had founded.

See the original authorities specified for the reigns of Richard I. and John. Also Miss K. Norgate's *Angevin England*, vol. ii. (1887), and *John Lackland* (1902); A. Ballard in *English Historical Review*, xiv. p. 93; H. W. C. Davis' *England under the Normans and Angevins* (1905). (H. W. C. D.)

FITZROY, ROBERT (1805–1865), English vice-admiral, distinguished as a hydrographer and meteorologist, was born at Ampton Hall, Suffolk, on the 5th of July 1805, being a grandson, on the father's side, of the third duke of Grafton, and on the mother's, of the first marquis of Londonderry. He entered the navy from the Royal Naval College, then a school for cadets, on the 19th of October 1819, and on the 7th of September 1824 was promoted to the rank of lieutenant. After serving in the "Thetis" frigate in the Mediterranean and on the coast of South America, under the command of Sir John Phillimore and Captain Bingham, he was in August 1828 appointed to the "Ganges," as flag-lieutenant to Rear-Admiral Sir Robert Otway, the commander-in-chief on the South American station; and on the death of Commander Stokes of the "Beagle," on the 13th of November 1828, was promoted to the vacant command. The "Beagle," a small brig of about 240 tons, was then, and had been for the two previous years, employed on the survey of the coasts of Patagonia and Tierra del Fuego, under the orders of Commander King in the "Adventure," and, together with the "Adventure," returned to England in the autumn of 1830. Fitzroy had brought home with him four Fuegians, one of whom died of smallpox a few weeks after arriving in England; to the others he endeavoured, with but slight success, to impart a rudimentary knowledge of religion and of some useful handicrafts; and, as he had pledged himself to restore them to their native country, he was making preparations in the summer of the following year to carry them back in a merchant ship bound to Valparaiso, when he received his reappointment to the "Beagle," to continue the survey of the same wild coasts. The "Beagle" sailed from Plymouth on the 27th of December 1831, carrying as a supernumerary Charles Darwin, the afterwards famous naturalist. After an absence of nearly five years, and having, in addition to the survey of the Straits of Magellan and a great part of the coast of South America, run a chronometric line round the world, thus fixing the longitude of many secondary meridians with sufficient exactness for all the purposes of ordinary navigation, the "Beagle" anchored at Falmouth on the 2nd of October 1836. In 1835 Fitzroy had been advanced to the rank of captain and was now for the next few years principally employed in reducing and discussing his numerous observations. In 1837 he was awarded the gold medal of the Royal Geographical Society; and in 1839 he published, in two thick 8vo volumes, the narrative of the voyage of the "Adventure" and "Beagle," 1826–1830, and of the "Beagle," 1831–1836, with a third volume by Darwin—a book familiarly known as a record of scientific travel. Of Fitzroy's work as a surveyor, carried on under circumstances of great difficulty, with scanty means, and with an outfit that was semi-officially denounced as "shabby," Sir Francis Beaufort, the Hydrographer to the Admiralty, wrote, in a report to the House of Commons, 10th of February 1848, that "from the equator to Cape Horn, and from thence round to the river Plata on the eastern side of America, all that is *immediately* wanted has been already achieved by the splendid survey of Captain Robert Fitzroy." This was written before steamships made the Straits of Magellan a high-road to the Pacific. The survey that was sufficient then became afterwards very far from sufficient.

In 1841 Fitzroy unsuccessfully contested the borough of Ipswich, and in the following year was returned to parliament as member for Durham. About the same time he accepted the post of conservator of the Mersey, and in his double capacity obtained leave to bring in a bill for improving the condition and efficiency of officers in the mercantile marine. This was not proceeded with at the time, but gave rise to the "voluntary certificate" instituted by the Board of Trade in 1845, and furnished some important clauses to the Mercantile Marine Act of 1850.

Early in 1843 Fitzroy was appointed governor and commander-in-chief of New Zealand, then recently established as a colony. He arrived in his government in December, whilst the excitement about the Wairau massacre was still fresh, and the questions relating to the purchase of land from the natives were in a very unsatisfactory state. The early settlers were greedy and unscrupulous; Fitzroy, on the other hand, had made no secret of his partiality for the aborigines. Between such discordant elements agreement was impossible: the settlers insulted the governor; the governor did not conciliate the settlers, who denounced his policy as adverse to their interests, as unjust and illegal; colonial feeling against him ran very high; petition after petition for his recall was sent home, and the government was compelled to yield to the pressure brought to bear on it. Fitzroy was relieved by Sir George Grey in November 1845.

In September 1848 he was appointed acting superintendent of the dockyard at Woolwich, and in the following March to the command of the "Arrogant," one of the early screw frigates which had been fitted out under his supervision, and with which it was desired to carry out a series of experiments and trials. When these were finished he applied to be superseded, on account at once of his health and of his private affairs. In February 1850 he was accordingly placed on half-pay; nor did he ever serve again, although advanced in due course by seniority to the ranks of rear- and vice-admiral on the retired list (1857, 1863). In 1851 he was elected a fellow of the Royal Society, and in 1854, after serving for a few months as private secretary to his uncle, Lord Hardinge, then commander-in-chief of the army, he was appointed to the meteorological department of the Board of Trade, with, in the first instance, the peculiar title of "Meteorological Statist."

From the date of his joining the "Beagle" in 1828 he had paid very great attention to the different phenomena foreboding or accompanying change of weather, and his narratives of the voyages of the "Adventure" and "Beagle" are full of interesting and valuable details concerning these. Accordingly, when in 1854 Lord Wrottesley, the president of the Royal Society, was asked by the Board of Trade to recommend a chief for its newly forming meteorological department, he, almost without hesitation, nominated Fitzroy, whose name and career became from that time identified with the progress of practical meteorology. His *Weather Book*, published in 1863, embodies in broad outline his views, far in advance of those then generally held; and in spite of the rapid march of modern science, it is still worthy of careful attention and exact study. His storm warnings, in their origin, indeed, liable to a charge of empiricism, were gradually developed on a more scientific basis, and gave a high percentage of correct results. They were continued for eighteen months after his death by the assistants he had trained, and though stopped when the department was transferred to the management of a committee of the Royal Society, they were resumed a few months afterwards; and under the successive direction of Dr R. H. Scott and Dr W. N. Shaw, have been developed into what we now know them. But though it is perhaps by these storm warnings that Fitzroy's name has been most generally known, seafaring men owe him a deeper debt of gratitude, not only for his labours in reducing to a more practical form the somewhat complicated wind charts of Captain Maury, but also for his great exertions in connexion with the life-boat association. Into this work, in its many ramifications, he threw himself with the energy of an excitable temperament, already strained by his long and anxious service in the Straits of Magellan. His last years were fully and to an excessive degree occupied by it; his health, both of body and mind, threatened to give way; but he refused to take the rest that was prescribed. In a fit of mental aberration he put an end to his existence on the 30th of April 1865.

Besides his works already named mention may be made of *Remarks on New Zealand* (1846); *Sailing Directions for South America* (1848); his official reports to the Board of Trade (1857–1865); and occasional papers in the journal of the Royal Geographical Society and of the Royal United Service Institution. (J. K. L.)

FITZROY, a city of Bourke county, Victoria, Australia, 2 m. by rail N.E. of and suburban to Melbourne. Pop. (1901) 31,610. It is a prosperous manufacturing town, well served with tramways and containing many fine residences.

FITZ STEPHEN, ROBERT (fl. 1150), son of Nesta, a Welsh princess and former mistress of Henry I., by Stephen, constable of Cardigan, whom Robert succeeded in that office, took service with Dermot of Leinster when that king visited England (1167). In 1169 Robert led the vanguard of Dermot's Anglo-Welsh auxiliaries to Ireland, and captured Wexford, which he was then allowed to hold jointly with Maurice Fitz Gerald. Taken prisoner by the Irish in 1171, he was by them surrendered to Henry II., who appointed him lieutenant of the justiciar of Ireland, Hugh de Lacy. Robert rendered good service in the troubles of 1173, and was rewarded by receiving, jointly with Miles Cogan, a grant of Cork (1177). He had difficulty in maintaining his position and was nearly overwhelmed by a rising of Desmond in 1182. The date of his death is uncertain.

FITZ STEPHEN, WILLIAM (d. *c.* 1190), biographer of Thomas Becket and royal justice, was a Londoner by origin. He entered Becket's service at some date between 1154 and 1162. The chancellor employed Fitz Stephen in legal work, made him sub-deacon of his chapel and treated him as a confidant. Fitz Stephen appeared with Becket at the council of Northampton (1164) when the disgrace of the archbishop was published to the world; but he did not follow Becket into exile. He joined Becket's household again in 1170, and was a spectator of the tragedy in Canterbury cathedral. To his pen we owe the most valuable among the extant biographies of his patron. Though he writes as a partisan he gives a precise account of the differences between Becket and the king. This biography contains a description of London which is our chief authority for the social life of the city in the 12th century. Despite his connexion with Becket, William subsequently obtained substantial preferment from the king. He was sheriff of Gloucestershire from 1171 to 1190, and a royal justice in the years 1176–1180 and 1189–1190.

See his "Vita S. Thomae" in J. C. Robertson's *Materials for the History of Thomas Becket*, vol. iii. (Rolls series, 1877). Sir T. D. Hardy, in his *Catalogue of Materials*, ii. 330 (Rolls series, 1865), discusses the manuscripts of this biography and its value. W. H. Hutton, *St Thomas of Canterbury*, pp. 272-274 (1889), gives an account of the author. (H. W. C. D.)

FITZ THEDMAR, ARNOLD (d. 1274), London chronicler and merchant, was born in London on the 9th of August 1201. Both his parents were of German extraction. The family of his mother migrated to England from Cologne in the reign of Henry II.; his father, Thedmar by name, was a citizen of Bremen who had been attracted to London by the privileges which the Plantagenets conferred upon the Teutonic Hanse. Arnold succeeded in time to his father's wealth and position. He held an honourable position among the Hanse traders, and became their "alderman." He was also, as he tells us himself, alderman of a London ward and an active partisan in municipal politics. In the Barons' War he took the royal side against the populace and the mayor Thomas Fitz Thomas. The popular party planned, in 1265, to try him for his life before the folk-moot, but he was saved by the news of the battle of Evesham which arrived on the very day appointed for the trial. Even after the king's triumph Arnold suffered from the malice of his enemies, who contrived that he should be unfairly assessed for the tallages imposed upon the city. He appealed for help to Henry III., and again to Edward I., with the result that his liability was diminished. In 1270 he was one of the four citizens to whose keeping the muniments of the city were entrusted. To this circumstance we probably owe the compilation of his chronicle. *Chronica Maiorum et Vicecomitum*, which begins at the year 1188 and is continued to 1274. From 1239 onwards this work is a mine of curious information. Though municipal in its outlook, it is valuable for the general history of the kingdom, owing to the important part which London played in the agitation against the misrule of Henry III. We have the king's word for the fact that Arnold was a consistent royalist; but this is apparent from the whole tenor of the chronicle. Arnold was by no means blind to the faults of Henry's government, but preferred an autocracy to the mob-rule which Simon de Montfort countenanced in London. Arnold died in 1274; the last fact recorded of him is that, in this year, he joined in a successful appeal to the king against the illegal grants which had been made by the mayor, Walter Hervey.

The *Chronica Maiorum et Vicecomitum*, with the other contents of Arnold's common-place book, were edited for the Camden Society by T. Stapleton (1846), under the title *Liber de Antiquis Legibus*. Our knowledge of Arnold's life comes from the *Chronica* and his own biographical notes. Extracts, with valuable notes, are edited in G. H. Pertz's *Mon. Germaniae historica, Scriptores*, vol. xxviii. See also J. M. Lappenberg's *Urkundliche Geschichte des Hansischen Stahlhofes zu London* (Hamburg, 1851). (H. W. C. D)

FITZWALTER, ROBERT (d. 1235), leader of the baronial opposition against King John of England, belonged to the official aristocracy created by Henry I. and Henry II. He served John in the Norman wars, and was taken prisoner by Philip of France, and forced to pay a heavy ransom. He was implicated in the baronial conspiracy of 1212. According to his own statement the king had attempted to seduce his eldest daughter; but Robert's account of his grievances varied from time to time. The truth seems to be that he was irritated by the suspicion with which John regarded the new baronage. Fitzwalter escaped a trial by flying to France. He was outlawed, but returned under a special amnesty after John's reconciliation with the pope. He continued, however, to take the lead in the baronial agitation against the king, and upon the outbreak of hostilities was elected "marshal of the army of God and Holy Church" (1215). To his influence in London it was due that his party obtained the support of the city and used it as their base of operations. The famous clause of Magna Carta (§ 39) prohibiting sentences of exile, except as the result of a lawful trial, refers more particularly to his case. He was one of the twenty-five appointed to enforce the promises of Magna Carta; and his aggressive attitude was one of the causes which contributed to the recrudescence of civil war (1215). His incompetent leadership made it necessary for the rebels to invoke the help of France. He was one of the envoys who invited Louis to England, and was the first of the barons to do homage when the prince entered London. Though slighted by the French as a traitor to his natural lord, he served Louis with fidelity until captured at the battle of Lincoln (May 1217). Released on the conclusion of peace he joined the Damietta crusade of 1219, but returned at an early date to make his peace with the regency. The remainder of his career was uneventful; he died peacefully in 1235.

See the list of chronicles for the reign of John. The *Histoire des ducs de Normandie et des rois d'Angleterre* (ed. F. Michel, Paris, 1840) gives the fullest account of his quarrel with the king. Miss K. Norgate's *John Lackland* (1902), W. McKechnie's *Magna Carta* (1905), and Stubbs's *Constitutional History*, vol. i. ch. xii. (1897), should also be consulted.

FITZWILLIAM, SIR WILLIAM (1526–1599), lord deputy of Ireland, was the eldest son of Sir William Fitzwilliam (d. 1576) of Milton, Northamptonshire, where he was born, and grandson of another Sir William Fitzwilliam (d. 1534), alderman and sheriff of London, who was also treasurer and chamberlain to Cardinal Wolsey, and who purchased Milton in 1506. On his mother's side Fitzwilliam was related to John Russell, 1st earl of Bedford, a circumstance to which he owed his introduction to Edward VI. In 1559 he became vice-treasurer of Ireland and a member of the Irish House of Commons; and between this date and 1571 he was (during the absences of Thomas Radclyffe, earl of Sussex, and of his successor, Sir Henry Sidney) five times lord justice of Ireland. In 1571 Fitzwilliam himself was appointed lord deputy, but like Elizabeth's other servants he received little or no money, and his period of government was marked by continuous penury and its attendant evils, inefficiency, mutiny and general lawlessness. Moreover, the deputy quarrelled with the lord president of Connaught, Sir Edward Fitton (1527–1579), but he compelled the earl of Desmond to submit in 1574. He disliked the expedition of Walter Devereux, earl of Essex; he had a further quarrel with Fitton, and after a serious illness he was allowed to resign his office. Returning to England in 1575 he was governor of Fotheringhay Castle at the time of Mary Stuart's execution. In 1588 Fitzwilliam was again in Ireland as lord deputy, and although old and ill he displayed great activity in leading expeditions, and found time to quarrel with Sir Richard Bingham (1528–1599), the new president of Connaught. In 1594 he finally left Ireland, and five years later he died at Milton. From Fitzwilliam, whose wife was Anne, daughter of Sir William Sidney, were descended the barons and earls Fitzwilliam.

See R. Bagwell, *Ireland under the Tudors*, vol. ii. (1885).

FITZWILLIAM, WILLIAM WENTWORTH FITZWILLIAM, 2ND EARL (1748–1833), English statesman, was the son of the 1st earl (peerage of the United Kingdom), who died in 1756. The English family of Fitzwilliam claimed descent from a natural son of William the Conqueror, and among its earlier members were a Sir William Fitzwilliam (1460–1534), sheriff of London, who in 1506 acquired the family seat of Milton Manor in Northamptonshire, and his grandson Sir William Fitzwilliam (see above). The latter's grandson was made an Irish baron in 1620; and in later generations the Irish titles of Viscount Milton and Earl Fitzwilliam (1716) and the English titles of Baron Milton (1742) and Viscount Milton and Earl Fitzwilliam (1746), were added. These were all in the English house of the Fitzwilliams of Milton Manor. They were distinct from the Irish Fitzwilliams of Meryon, who descended from a member of the English family who went to Ireland with Prince John at the end of the 12th century, and whose titles of Baron and Viscount Fitzwilliam died out with the 8th viscount in 1833; the best known of these was Richard, 7th viscount (1745–1816), who left the Fitzwilliam library and a fund for creating the Fitzwilliam Museum to Cambridge University.

The 2nd earl inherited not only the Fitzwilliam estates in Northamptonshire, but also, on the death of his uncle the marquess of Rockingham in 1782, the valuable Wentworth estates in Yorkshire, and thus became one of the wealthiest noblemen of the day. He had been at Eton with C. J. Fox, and became an active supporter of the Whig party; and in 1794, with the duke of Portland, Windham and other "old Whigs" he joined Pitt's cabinet, becoming president of the council. At the end of the year, however, he was sent to Ireland as viceroy. Fitzwilliam, however, had set his face against the jobbery of the Protestant leaders, and threw himself warmly into Grattan's scheme for admitting the Catholics to political power; and in March 1795 he was recalled, his action being disavowed by Pitt, the result of a series of misunderstandings which appeared to Fitzwilliam to give him just cause of complaint. The quarrel was, however, made up, and in 1798 Fitzwilliam was appointed lord-lieutenant of the West Riding of Yorkshire. He continued to take an active part in politics, and in 1806 was president of the council, but his Whig opinions kept him mainly in opposition. He died in February 1833, his son, Charles William Wentworth, the 3rd earl (1786–1857), and later earls, being notable figures in the politics and social life of the north of England.

FIUME (Slav. *Rjeka*, *Rieka* or *Reka*, Ger. *St Veit am Flaum*), a royal free town and port of Hungary; situated at the northern extremity of the Gulf of Quarnero, an inlet of the Adriatic, and on a small stream called the Rjeka, Recina or Fiumara, 70 m. by rail S.E. of Trieste. Pop. (1900) 38,955; including 17,354 Italians, 14,885 Slavs (Croats, Serbs and Slovenes), 2482 Hungarians and 1945 Germans. Geographically, Fiume belongs to Croatia; politically the town, with its territory of some 7 sq. m., became a part of Hungary in August 1870. The picturesque old town occupies an outlying ridge of the Croatian Karst; while the modern town, with its wharves, warehouses, electric light and electric trams, is crowded into the amphitheatre left between the hills and the shore. On the north-west there is a fine public garden. The most interesting buildings are the cathedral church of the Assumption, founded in 1377, and completed with a modern façade copied from that of the Pantheon in Rome; the church of St Veit, on the model of Santa Maria della Salute in Venice; and the Pilgrimage church, hung with offerings from shipwrecked sailors, and approached by a stairway of 400 steps. In the old town is a Roman triumphal arch, said to have been erected during the 3rd century A.D. in honour of the emperor Claudius II. Fiume also possesses a theatre and a music-hall; palaces for the governor and the Austrian emperor; a high court of justice for commerce and marine; a chamber of commerce; an asylum for lunatics and the aged poor; an industrial home for boys; and several large schools, including the marine academy (1856) and the school of seamanship (1903). Municipal affairs are principally managed by the Italians, who sympathize with the Hungarians against the Slavs.

Fiume is the only seaport of Hungary, with which country it was connected, in 1809, by the Maria Louisa road, through Karlstadt. It has two railways, opened in 1873; one a branch of the southern railway from Vienna to Trieste, the other of the

Hungarian state railway from Karlstadt. There are several harbours, including the *Porto Canale*, for coasting vessels; the *Porto Baross*, for timber; and the *Porto Grande*, sheltered by the *Maria Theresia* mole and breakwater, besides four lesser moles, and flanked by the quays, with their grain-elevators. The development of the *Porto Grande*, originally named the *Porto Nuovo*, was undertaken in 1847, and carried on at intervals as trade increased. In 1902, arrangements were made for the construction of a new mole and an enlargement of the quays and breakwater; these works to be completed within 5 years, at a cost of £420,000. The exports, worth £6,460,000 in 1902, chiefly consisted of grain, flour, sugar, timber and horses; the imports, worth £3,678,000 in the same year, of coal, wine, rice, fruit, jute and various minerals, chemicals and oils. A large share in the carrying trade belongs to the Cunard, Adria, Ungaro-Croat and Austrian Lloyd Steamship Companies, subsidized by the state. A steady stream of Croatian and Hungarian emigrants, officially numbered in 1902 at 7500, passes through Fiume. Altogether 11,550 vessels, of 1,963,000 tons, entered at Fiume in 1902; and 11,535, of 1,956,000, cleared. Foremost among the industrial establishments are Whitehead's torpedo factory, Messrs Smith & Meynie's paper-mill, the royal tobacco factory, a chemical factory, and several flour-mills, tanneries and rope manufactories. In 1902 the last shipbuilding yard was closed. The soil of the surrounding country is stony, but the climate is warm, and wine is extensively produced. The Gulf of Quarnero yields a plentiful supply of fish, and the tunny trade with Trieste and Venice is of considerable importance. Steamboats ply daily from Fiume to the Istrian health-resort of Abbazia, the Croatian port of Buccari, and the islands of Veglia and Cherso.

Fiume is supposed to occupy the site of the ancient Liburnian town *Tersatica*; later it received the name of *Vitopolis*, and eventually that of *Fanum Sancti Viti ad Flumen*, from which its present name is derived. It was destroyed by Charlemagne in 799, from which time it probably long remained under the dominion of the Franks. It was held in feudal tenure from the patriarch of Aquileia by the bishop of Pola, and afterwards, in 1139, by the counts of Duino, who retained it till the end of the 14th century. It next passed into the hands of the counts of Wallsee, by whom it was surrendered in 1471 to the emperor Frederick III., who incorporated it with the dominions of the house of Austria. From this date till 1776 Fiume was ruled by imperial governors. In 1723 it was declared a free port by Charles VI., in 1776 united to Croatia by the empress Maria Theresa, and in 1779 declared a *corpus separatum* of the Hungarian crown. In 1809 Fiume was occupied by the French; but it was retaken by the British in 1813, and restored to Austria in the following year. It was ceded to Hungary in 1822, but after the revolution of 1848–1849 was annexed to the crown lands of Croatia, under the government of which it remained till it came under Hungarian control in 1870.

FIVES, a ball-game played by two or four players in a court enclosed on three or four sides, the ball being struck with the hand, usually protected by a glove, whence the game is known in America as "handball." The origin of the game is probably the French *jeu de paume*, tennis played with the hand, the hand in that case being eventually superseded by the racquet. Fives and racquets are probably both descended from the *jeu de paume*, of which they are simplified forms. The name fives may be derived from *la longue paume*, in which five on a side played, or from the five fingers, or from the fact that five points had to be made by the winners (in modern times the game consists of fifteen points). Fives is played in Great Britain principally at the schools and universities, although its encouragement is included in the functions of the Tennis Racquets and Fives Association, founded in 1908. In America it is much affected for training purposes by professional athletes and boxers. There are two forms of fives—the Eton game and the Rugby game—which require separate notice, though the main features of the two games are the serving of the ball to the taker of the service, the necessity of hitting the ball before the second bounce, and of hitting it above a line and within the limits of the court.

Eton Fives.—The peculiar features of the Eton court arose from the fact that in early times the game was played against the chapel-wall, so that buttresses formed side walls and the balustrade of the chapel-steps projected into the court, while a step divided the court latitudinally. These were reproduced in the regular courts, the buttress being known as the "pepper-box" and the space between it and the step as the "hole." The riser of the step is about 5 in. The floor of the court is paved; there is no back wall. On the front wall is a ledge, known as the "line," 4 ft. 6 in. from the floor, and a vertical line, painted, 3 ft. 8 in. from the right-hand wall. Four people usually play, two against two; one of each pair plays in the forward court, the other in the back court. The server stands on the left of the forward court, his partner in the right-hand corner of the back court; the taker of the service by the right wall of the forward court, his partner at the left-hand corner of the back court. The forward court is known as "on-wall," the other as "off-wall." The server must toss the ball gently against the front wall, above the line, so that it afterwards hits the right wall and falls on the "off-wall," but the server's object is not, as at tennis and racquets, to send a service that cannot be returned. At fives he must send a service that hand-out can take easily; indeed hand-out can refuse to take any service that he does not like, and if he fails to return the ball above the line no stroke is counted. After the service has been returned either of the opponents returns the ball if he can, and so on, each side and either member of it returning the ball above the line alternately till one side or the other hits it below the line or out of court. Only hand-in can score. If hand-in wins a stroke, his side scores a point; if he misses a stroke he loses his innings and his partner becomes server, unless he has already served in this round, in which case the opponents become hand-in. The game is fifteen points. If the score is "13 all," the out side may "set" the game to 5 or 3; *i.e.* the game becomes one of 5 or 3 points; at "14 all" it may be set to three. The game and its terminology being somewhat intricate, can best be learnt in the court. No apparatus is required except padded gloves and fives-balls, which are covered with white leather tightly stretched over a hard foundation of cork, strips of leather and twine. The Eton balls are 1¾ in. in diameter and weigh about 1¼ oz. apiece.

Rugby Fives is much less complicated owing to the simpler form of the court. The rules as to service, taking the balls, &c., are the same as in Eton Fives. The balls are rather smaller. The courts are larger, measuring about 34 ft. by 19 ft. 6 in. and may be roofed or open. The side walls slope from 20 ft. to 12 ft. Some courts have a dwarf back wall, some have none. The back wall, when there is one, is 5 ft. 8 in. in height. In some courts the side walls are plain; in others, where there is no back wall, a projection about 3 in. deep is built at right angles to the two side walls; in others a buttress, similar to the *tambour* of the tennis-court, is built out from the left-hand wall about 10 ft. from the front wall, and continued to the end of the court. The line is generally a board fixed across the front wall, its upper edge 34 in. from the ground, but the height varies slightly.

Handball, of ancient popularity in Ireland and much played in the United States, is practically identical with fives, though there are minor differences. The usual American court is about 60 ft. long, 24½ ft. wide and 35 ft. high at the front, tapering to 33 ft. at the back wall. The front wall is of brick faced with marble, the sides of cement and the floor of white pine laid on beams 10 in. apart. These are the dimensions of the Brooklyn court of the former American champion, Phil Casey (d. 1904), which has been extensively copied. Twenty-one aces constitute a game and gloves are not usually worn. The American ball is a trifle larger and softer than the Irish, which is called a "red ace" when made of solid red rubber, and "black ace" when made of black rubber. Baggs of Tipperary, who was in his prime about 1855, was the most celebrated Irish handball player. In his day nearly every village tavern in Ireland had a court. Browning and Lawlor, who won the Irish championship in 1885, were his most prominent successors. In America Phil Casey and Michael Egan are the best-known names.

See A. Tait's *Fives* in the All England Series: "Fives" in the *Encyclopaedia of Sport*; and *Official Handball Guide* in Spalding's Athletic Library.

FIX, THÉODORE (1800–1846), French journalist and economist, was born at Soleure in Switzerland in 1800. His father was a French physician whose ancestors had been expatriated by the revocation of the edict of Nantes. At first a land surveyor, he in 1830 became connected with the *Bulletin universal des sciences*, to which he contributed most of the geographical articles. In 1833 he founded the *Revue mensuelle d'économie politique*, which he edited during the three years of its existence. He then became engaged in journalistic work, till his essay on *L'Association des douanes allemandes* won him a prize from the Académie des Sciences Morales et Politiques in 1840, and also procured him work on the report on the progress of sciences since the Revolution, which the Institute was preparing. A few months before his death he published *Observations sur les classes ouvrières*, in which he argued against all attempts to regulate artificially the rate of wages, and attributed the condition of the working classes to their own thriftlessness and intemperance. He died suddenly at Paris on the 31st of July 1846.

FIXTURES (Lat. *figere*, to fix), in law, chattels which have been so fixed or attached to land (as it is expressed in English law, "so annexed to the freehold"), as to become, in contemplation of law, a part of it. All systems of law make a marked distinction for certain purposes, between immovables and movables, between real and personal property, between land and all other things. In the case of fixtures the question arises under which set of rights they are to fall—under those of real or of personal property. The general rule of English law is that everything attached to the land goes with the land—*quicquid plantatur solo, solo cedit*. This, like many other rules of English law, is all in favour of the freeholder; but its hardship has been modified by a large number of exceptions formulated from time to time by the courts as occasion arose.

In order to constitute a fixture there must be some degree of annexation to the land, or to a building which forms part of it. Thus it has been held that a barn laid on blocks of timber, but not fixed to the ground itself, is not a fixture; and the onus of showing that articles not otherwise attached to the land than by their own weight have ceased to be chattels, rests with those who assert the fact. On the other hand, an article, even slightly affixed to the land, is to be considered part of it, unless the circumstances show that it was intended to remain a chattel. The question is one of fact in each case—depending mainly on the mode, degree and object of the annexation, and the possibility of the removal of the article without injury to itself or the freehold. In certain cases the courts have recognized a constructive annexation, when the articles, though not fixed to the soil, pass with the freehold as if they were, *e.g.* the keys of a house, the stones of a dry wall, and the detached or duplicate portions of machines.

Questions as to the property in fixtures principally arise—(1) between landlord and tenant, (2) between heir and executor, (3) between executor and remainder-man or reversioner, (4) between seller and buyer.

1. At common law, if the tenant has affixed anything to the freehold during his occupation, he cannot remove it without the permission of his landlord. But an exception was established in favour of *trade fixtures*. In a case before Lord Holt it was held that a soap-boiler might, *during his term*, remove the vats he had set up for trade purposes, and that not by virtue of any special custom, but "by the common law in favour of trade, and to encourage industry," and it may be stated as a general rule that things which a tenant has fixed to the freehold for the purpose of trade or manufacture may be taken away by him, whenever the removal is not contrary to any prevailing practice, or the particular terms of the contract of tenancy, and can be effected without causing material injury to the estate or destroying the essential character of the articles themselves (*Lambourn* v. *McLellan*, 1903, 2 Ch. 269). Agricultural tenants are not entitled, at common law, to remove trade fixtures. But the Landlord and Tenant Act 1851 granted such a right of removal in the case of buildings or machinery erected by a tenant at his own expense, and with his landlord's consent in writing, provided that the freehold was not injured or that any injury was made good, and that before removal a month's written notice was given to the landlord, who had an option of purchase. Under the Agricultural Holdings Act 1883 the tenant might, under similar conditions, remove fixtures, although the landlord had not consented to their erection. The Agricultural Holdings Act 1900 extended this provision to fixtures or buildings acquired, although not annexed or erected, by the tenant. Similar rights were created by the Allotments Compensation Act 1887, and by the Market Gardeners' Compensation Act 1895. All these provisions were re-enacted by the Agricultural Holdings Act 1908.

Again, *ornamental* fixtures, set up by the tenant for ornament and convenience, such as hangings and looking-glasses, tapestry, iron-backs to chimneys, wainscot fixed by screws, marble chimney-pieces, are held to belong to the tenant, and to be removable without the landlord's consent. Here again the extent of the privilege has been a matter of some uncertainty.

In all these cases the fixtures must be removed during the term. If the tenant gives up possession of the premises without removing the fixtures, it will be presumed, it appears, that he has made a gift of them to the landlord, and that presumption probably could not be rebutted by positive evidence of a contrary intention. His right to the fixtures is not, however, destroyed by the mere expiry of the term, if he still remains in possession; but if he has once left the premises he cannot come back and claim his fixtures. In one case where the fixtures had actually been severed from the freehold after the end of the term, it was held that the tenant had no right to recover them.

2. As between heir and executor or administrator. The question of fixtures arises between these parties on the death of a person owning land. The executor has no right to remove trade fixtures, set up for the benefit of the inheritance. As regards ornamental objects, the rule *quicquid plantatur solo, solo cedit* was in early times somewhat relaxed in favour of the executor. As far back as 1701, it was held that hangings fixed to a wall for ornament passed to the executor; and, although the effect of this relaxation was subsequently cut down, it is supported by the decisions of the courts affirming the executor's right to valuable tapestries affixed by a tenant for life to the walls of a house for ornament and their better enjoyment as chattels (*Leigh* v. *Taylor*, 1902, App. Cas. 157); and the same has been held as to statues and bronze groups set on pedestals in the grounds of a mansion house.

3. When a tenant for life of land dies, the question of fixtures arises between his representatives and the persons next entitled to the estate (the remainder-man or reversioner). The remainder-man is not so great a favourite of the law as the heir, and the right to fixtures is construed more favourably for executors than in the preceding cases between heir and executor. Whatever are executor's fixtures against the heir would therefore be executor's fixtures against the remainder-man. And the result of the cases seems to be that, as against the remainder, the executor of the tenant for life would be certainly entitled to trade fixtures. Agricultural fixtures are not removable by the executor of a tenant for life.

4. As between seller and buyer, a purchase of the lands includes a purchase of all the fixtures. But here the intention of the parties is of great importance. Similar questions may arise in other cases, *e.g.* as between mortgagor and mortgagee. When land is mortgaged the fixtures pass with it, unless a contrary intention is expressed in the conveyance; and this even where the chattels affixed are the subject of a hire purchase agreement (*Reynolds* v. *Ashby*, 1903, 1 K.B. 87). Again, in reference to bills of sale the question arises. Bills of sale are dispositions of personal property similar to mortgages, the possession remaining with the person selling them. To make them valid they must be registered, and so the question has arisen whether deeds conveying fixtures ought not to have been registered as bills of sale. Unless it was the intention of the parties to make the fixtures a distinct security, it seems that a deed of mortgage embracing them does not require to be registered as a bill of sale. The question of what is or is not a fixture must also often be considered in questions of rating or assessment.

The law of Scotland as to fixtures is the same as that of England. The Agricultural Holdings (Scotland) Acts 1883 (ss. 35, 42) and 1900 (as to market gardens) give a similar statutory right of removal. The law of Ireland has been the subject of the special legislation sketched in the article LANDLORD AND TENANT. The French Code Civil recognizes the right of the usufructuary to remove articles attached by him to the subject of his estate on the expiry of his term, on making good the place from which they were taken (Art. 599); and there are similar provisions in the Civil Codes of Italy (Art. 495), Spain (Arts. 487, 489), Portugal (Art. 2217) and Germany (Arts. 1037, 1049).

The law of the United States as to fixtures is substantially identical with English common law. Constructive, as well as actual, annexation is recognized. The same relaxations (from the common law rule *quicquid plantatur solo, solo cedit*) as regards trade fixtures, and ornamental fixtures, such as tapestry, have been recognized.

In Mauritius the provisions of the Code Civil are in force without modification. In Quebec (Civil Code, Arts. 374 et seq.) and St Lucia (Civil Code, Arts. 368 et seq.) they have been re-enacted in substance. Some of the British colonies have conferred a statutory right to remove fixtures on tenants (cf. Tasmania, Landlord and Tenant Act 1874). In certain of the colonies acquired by cession or settlement (*e.g.* New Zealand) the English Landlord and Tenant Act 1851 is in force.

AUTHORITIES.—English law: Amos and Ferard, *Law of Fixtures* (3rd ed., London, 1883); Brown, *Law of Fixtures* (3rd ed., London, 1875); Ryde, on *Rating* (2nd ed., London, 1905). Scots Law: Hunter, *Landlord and Tenant*; Erskine's *Principles* (20th ed., Edin., 1903). American Law: Bronson, *Law of Fixtures* (St Paul, 1904); Reeves, *Real Property* (Boston, 1904); *Ruling Cases* (London and Boston, 1894–1901), Tit. "Fixtures" (American Notes).

(A. W. R.)

FIZEAU, ARMAND HIPPOLYTE LOUIS (1819–1896), French physicist, was born at Paris on the 23rd of September 1819. His earliest work was concerned with improvements in photographic processes; and then, in association with J. B. L. Foucault, he engaged in a series of investigations on the interference of light and heat. In 1849 he published the first results obtained by his method for determining the speed of propagation of light (see LIGHT), and in 1850 with E. Gounelle measured the velocity of electricity. In 1853 he described the employment of the condenser as a means for increasing the efficiency of the induction-coil. Subsequently he studied the expansion of solids by heat, and applied the phenomena of interference of light to the measurement of the dilatations of crystals. He died at Venteuil on the 18th of September 1896. He became a member of the French Academy in 1860 and of the Bureau des Longitudes in 1878.

FJORD, or FIORD, the anglicized Norwegian word for a long narrow arm of the sea running far inland, with more or less precipitous cliffs on each side. These "sea-lochs," as they are sometimes called, present many peculiar features. They differ entirely from an estuary in the fact that they are bounded seawards by a rocky sill, covered by shallow water, and they deepen inland for some distance before the bottom again curves up to the surface. They are thus true rock basins drowned in sea-water. It is pointed out by Dr H. R. Mill that Loch Morar on the west coast of Scotland, a fresh-water basin 178 fathoms deep, with its surface 30 ft. above sea-level, which is connected with the sea by a short river, is exactly similar in configuration to Loch Etive, 80 fathoms deep, filled with sea-water which pours over the seaward sill in a waterfall with the retreating tide; that Loch Nevis with a depth of 70 fathoms has its sill 8 fathoms below the surface, while the gigantic Sogne Fjord in Norway, more than 100 m. in length, is a rock basin with a maximum depth of 700 fathoms. Any inland rock basin such as Loch Morar would become a fjord if the seaward portion sank below sea-level. The origin of these rock basins has not yet been satisfactorily determined. Recent work upon somewhat similar basins in the high Alps has suggested local weathering of surface rock in fracture belts or faulted areas, or dikes, where material is easily eroded, thus producing a trough bounded by high walls in which a lake forms under favourable conditions. But investigations in such regions as the Rocky Mountains and the Yosemite Valley, where there is frequently a "reversed grade" similar to that near the seaward end of rock basins and fjords, seem to show, in some cases at least, that such a formation may be due to the "gouging" effect of a glacier coming down the valley which it constantly deepens where the ice pressure and the supply of eroding material are greatest. There may be several causes, but the results are the same in all these drowned valleys. The mass of sea-water in the depth of the basin is either unaffected by the seasonal changes in surface temperature, which in Norway penetrate no deeper than 200 fathoms, or else, as in Loch Goil, the fresher film of surface water responds quickly to seasonal changes, while the heat of advancing summer penetrates so slowly to the depth of the basin that it takes six months to reach the bottom, arriving there in winter. It has been found that where the fresher surface water has been frozen over, the temperature may be as much as 45° F. at a few fathoms from the surface. When the surface is warmest, on the other hand, the depths are coldest.

FLACCUS, a cognomen in the plebeian gens Fulvia, one of the most illustrious in ancient Rome. Cicero and Pliny state that the family came from Tusculum, where some were still living in the middle of the 1st century B.C. Of the Fulvii Flacci the most important were the following:

QUINTUS FULVIUS FLACCUS, son of the first of the family, Marcus, who was consul with Appius Claudius Caudex in 264. He especially distinguished himself during the second Punic War. He was consul four times (237, 224, 212, 209), censor (231) pontifex maximus (216), praetor urbanus (215). During his first consulships he did good service against the Ligurians, Gauls and Insubrians. In 212 he defeated Hanno near Beneventum, and with his colleague Appius Claudius Pulcher began the siege of Capua. The capture of this place was considered so important that their imperium was prolonged, but on condition that they should not leave Capua until it had been taken. Hannibal's unexpected diversion against Rome interfered with the operations for the moment, but his equally unexpected retirement enabled Flaccus, who had been summoned to Rome to protect the city, to return, and bring the siege to a successful conclusion. He punished the inhabitants with great severity, alleging in excuse that they had shown themselves bitterly hostile to Rome. He was nominated dictator to hold the consular elections at which he was himself elected (209). He was appointed to the command of the army in Lucania and Bruttium, where he crushed all further attempts at rebellion. Nothing further is known of him. The chief authority for his life is the part of Livy dealing with the period (see PUNIC WARS).

His brother GNAEUS was convicted of gross cowardice against Hannibal near Herdoniae in 210, and went into voluntary exile at Tarquinii. His son, QUINTUS, waged war with signal success against the Celtiberians in 182–181, and the Ligurians in 179. Having vowed to build a temple to Fortuna Equestris, he dismantled the temple of Juno Lacinia in Bruttium of its marble slabs. This theft became known and he was compelled to restore them, though they were never put back in their places. Subsequently he lost his reason and hanged himself.

MARCUS FULVIUS FLACCUS, grandnephew of the first Quintus, lived in the times of the Gracchi, of whom he was a strong supporter. After the death of Tiberius Gracchus (133 B.C.) he was appointed in his place one of the commission of three for the distribution of the land. He was suspected of having had a hand in the sudden death of the younger Scipio (129), but there was no direct evidence against him. When consul in 125, he proposed to confer the Roman citizenship on all the allies, and to allow even those who had not acquired it the right of appeal to the popular assembly against penal judgments. This proposal, though for the time successfully opposed by the senate, eventually led to the Social War. The attack made upon the Massilians (who were allies of Rome) by the Salluvii (Salyes) afforded a convenient excuse for sending Flaccus out of Rome. After his return in triumph, he was again sent away (122), this time with Gaius Gracchus to Carthage to found a colony, but did not remain absent long. In 121 the disputes between the optimates and the party of Gracchus culminated in open hostilities, during which Flaccus was killed, together with Gracchus and a number of his supporters. It is generally agreed that Flaccus was perfectly honest in his support of the Gracchan reforms, but his hot-headedness did more harm than good to the cause. Cicero (*Brutus*, 28) speaks of him as an orator of moderate powers, but a diligent student.

See Livy, *Epit.* 59-61; Val. Max. ix. 5. 1; Vell. Pat. ii. 6; Appian, *Bell. Civ.* i. 18, 21, 24-26; Plutarch, *C. Gracchus*, 10. 13; also A. H. J. Greenidge, *Hist. of Rome* (1904), and authorities quoted under GRACCHUS.

FLACH, GEOFROI JACQUES (1846–), French jurist and historian, was born at Strassburg, Alsace, on the 16th of February 1846, of a family known at least as early as the 16th century, when Sigismond Flach was the first professor of law at Strassburg University. G. J. Flach studied classics and law at Strassburg, and in 1869 took his degree of doctor of law. In his theses as well as in his early writings—such as *De la subrogation réelle*, *La Bonorum possessio*, and *Sur la durée des effets de la minorité* (1870)—he endeavoured to explain the problems of laws by means of history, an idea which was new to France at that time. The Franco-German War engaged Flach's activities in other directions, and he spent two years (described in his *Strasbourg après le bombardement*, 1873) at work on the rebuilding of the library and the museum, which had been destroyed by Prussian shells. When the time came for him to choose between Germany and France, he settled definitely in Paris, where he completed his scientific training at the École des Chartes and the École des Hautes Études. Having acted for some time as secretary to Jules Sénard, ex-president of the Constituent Assembly, he published an original paper on artistic copyright, but as soon as possible resumed the history of law. In 1879 he became assistant to the jurist Edouard Laboulaye at the Collège de France, and succeeded him in 1884 in the chair of comparative legislation. Since 1877 he had been professor of comparative law at the free school of the political sciences. To qualify himself for these two positions he had to study the most diverse civilizations, including those of the East and Far East (*e.g.* Hungary, Russia and Japan) and even the antiquities of Babylonia and other Asiatic countries. Some of his lectures have been published, particularly those concerning Ireland: *Histoire du régime agraire de l'Irlande* (1883); *Considérations sur l'histoire politique de l'Irlande* (1885); and *Jonathan Swift, son action politique en Irlande* (1886).

His chief efforts, however, were concentrated on the history of ancient French law. A celebrated lawsuit in Alsace, pleaded by his friend and compatriot Ignace Chauffour, aroused his interest by reviving the question of the origin of the feudal laws, and gradually led him to study the formation of those laws and the early growth of the feudal system. His great work, *Les Origines de l'ancienne France*, was produced slowly. In the first volume, *Le Régime seigneurial* (1886), he depicts the triumph of individualism and anarchy, showing how, after Charlemagne's great but sterile efforts to restore the Roman principle of sovereignty, the great landowners gradually monopolized the various functions in the state; how society modelled on antiquity disappeared; and how the only living organisms were vassalage and clientship. The second volume, *Les Origines communales, la féodalité et la chevalerie* (1893), deals with the reconstruction of society on new bases which took place in the 10th and 11th centuries. It explains how the Gallo-Roman *villa* gave place to the village, with its fortified castle, the residence of the lord; how new towns were formed by the side of old, some of which disappeared; how the townspeople united in corporations; and how the communal bond proved to be a powerful instrument of cohesion. At the same time it traces the birth of feudalism from the germs of the Gallo-Roman personal *comitatus*; and shows how the bond that united the different parties was the contract of the fief; and how, after a slow growth of three centuries, feudalism was definitely organized in the 12th century. In 1904 appeared the third volume, *La Renaissance de l'état*, in which the author describes the efforts of the Capetian kings to reconstruct the power of the Frankish kings over the whole of Gaul; and goes on to show how the clergy, the heirs of the imperial tradition, encouraged this ambition; how the great lords of the kingdom (the "princes," as Flach calls them), whether as allies or foes, pursued the same end; and how, before the close of the 12th century, the Capetian kings were in possession of the organs and the means of action which were to render them so powerful and bring about the early downfall of feudalism.

In these three volumes, which appeared at long intervals, the author's theories are not always in complete harmony, nor are they always presented in a very luminous or coherent manner, but they are marked by originality and vigour. Flach gave them a solid basis by the wide range of his researches, utilizing charters and cartularies (published and unpublished), chronicles, lives of saints, and even those dangerous guides, the *chansons de geste*. He owed little to the historians of feudalism who knew what feudalism was, but not how it came about. He pursued the same method in his *L'Origine de l'habitation et des lieux habités en France* (1899), in which he discusses some of the theories circulated by A. Meitzen in Germany and by Arbois de Jubainville in France. Following in the footsteps of the jurist F. C. von Savigny, Flach studied the teaching of law in the middle ages and the Renaissance, and produced *Cujas, les glossateurs et les Bartolistes* (1883), and *Études critiques sur l'histoire du droit romain au moyen âge, avec textes inédits* (1890).

FLACIUS (Ger. *Flach*; Slav. *Vlakich*), **MATTHIAS** (1520–1575), surnamed ILLYRICUS, Lutheran reformer, was born at Albona, in Illyria, on the 3rd of March 1520. Losing his father in childhood, he was in early years self-educated, and made himself able to profit by the instructions of the humanist, Baptista Egnatius in Venice. At the age of seventeen he decided to join a monastic order, with a view to sacred learning. His intention was diverted by his uncle, Baldo Lupetino, provincial of the Franciscans, in sympathy with the Reformation, who induced him to enter on a university career, from 1539, at Basel, Tübingen and Wittenberg. Here he was welcomed (1541) by Melanchthon, being well introduced from Tübingen, and here he came under the decisive influence of Luther. In 1544 he was appointed professor of Hebrew at Wittenberg. He married in the autumn of 1545, Luther taking part in the festivities. He took his master's degree on the 24th of February 1546, ranking first among the graduates. Soon he was prominent in the theological discussions of the time, opposing strenuously the "Augsburg Interim," and the compromise of Melanchthon known as the "Leipzig Interim" (see ADIAPHORISTS). Melanchthon wrote of him with venom as a renegade ("aluimus in sinu serpentem"), and Wittenberg became too hot for him. He removed to Magdeburg (Nov. 9, 1551), where his feud with Melanchthon was patched up. On the 17th of May 1557 he was appointed professor of New Testament theology at Jena; but was soon involved in controversy with Strigel, his colleague, on the synergistic question (relating to the function of the will in conversion). Affirming the natural inability of man, he unwittingly fell into expressions consonant with the Manichaean view of sin, as not an accident of human nature, but involved in its substance, since the Fall. Resisting ecclesiastical censure, he left Jena (Feb. 1562) to found an academy at Regensburg. The project was not successful, and in October 1566 he accepted a call from the Lutheran community at Antwerp. Thence he was driven (Feb. 1567) by the exigencies of war, and betook himself to Frankfort, where the authorities set their faces against him. He proceeded to Strassburg, was well received by the superintendent Marbach, and hoped he had found an asylum. But here also his religious views stood in his way; the authorities eventually ordering him to leave the city by Mayday 1573. Again betaking himself to Frankfort, the prioress, Catharina von Meerfeld, of the convent of White Ladies, harboured him and his family in despite of the authorities. He fell ill at the end of 1574; the city council ordered him to leave by Mayday 1575; but death released him on the 11th of March 1575. His first wife, by whom he had twelve children, died in 1564; in the same year he remarried and had further issue. His son Matthias was professor of philosophy and medicine at Rostock. Of a life so tossed about the literary fruit was indeed remarkable. His polemics we may pass over; he stands at the fountain-head of the scientific study of church history, and—if we except, a great exception, the work of Laurentius Valla—of hermeneutics also. No doubt his impelling motive was to prove popery to be built on bad history and bad exegesis. Whether that be so or not, the extirpation of bad history and bad exegesis is now felt to be of equal interest to all religionists. Hence the permanent and continuous value of the principles embodied in Flacius' *Catalogus testium veritatis* (1556; revised edition by J. C. Dietericus, 1672) and his *Clavis scripturae sacrae* (1567), followed by his *Glossa compendiaria in N. Testamentum* (1570). His characteristic formula, "historia est fundamentum doctrinae," is better understood now than in his own day.

See J. B. Ritter, *Flacius's Leben u. Tod* (1725); M. Twesten, *M. Flacius Illyricus* (1844); W. Preger, *M. Flacius Illyricus u. seine Zeit* (1859–1861); G. Kawerau, in Herzog-Hauck's *Realencyklopädie* (1899). (A. Go.*)

FLACOURT, ÉTIENNE DE (1607–1660), French governor of Madagascar, was born at Orleans in 1607. He was named governor of Madagascar by the French East India Company in 1648. Flacourt restored order among the French soldiers, who had mutinied, but in his dealings with the natives he was less successful, and their intrigues and attacks kept him in continual harassment during all his term of office. In 1655 he returned to France. Not long after he was appointed director general of the company; but having again returned to Madagascar, he was drowned on his voyage home on the 10th of June 1660. He is the author of a *Histoire de la grande isle Madagascar* (1st edition 1658, 2nd edition 1661).

See A. Malotet, *Ét. de Flacourt, ou les origines de la colonisation française à Madagascar (1648–1661)*, (Paris, 1898).

FLAG (or "Flagge," a common Teutonic word in this sense, but apparently first recorded in English), a piece of bunting or similar material, admitting of various shapes and colours, and waved in the wind from a staff or cord for use in display as a standard, ensign or signal. The word may simply be derived onomatopoeically, or transferred from the botanical "flag"; or an original meaning of "a piece of cloth" may be connected with the 12th-century English "flage," meaning a baby's garment; the verb "to flag," *i.e.* droop, may have originated in the idea of a pendulous piece of bunting, or may be connected with the O. Fr. *flaguir*, to become flaccid. It is probable that almost as soon as men began to collect together for common purposes some kind of conspicuous object was used, as the symbol of the common sentiment, for the rallying point of the common force. In military expeditions, where any degree of organization and discipline prevailed, objects of such a kind would be necessary to mark out the lines and stations of encampment, and to keep in order the different bands when marching or in battle. In addition, it cannot be doubted that flags or their equivalents have often served, by reminding men of past resolves, past deeds and past heroes, to arouse to enthusiasm those sentiments of *esprit de corps*, of family pride and honour, of personal devotion, patriotism or religion, upon which, as well as upon good leadership, discipline and numerical force, success in warfare depends.

History.—Among the remains of the people which has left the earliest traces of civilization, the records of the forms of objects used as ensigns are frequently to be found. From their carvings and paintings, supplemented by ancient writers, it appears that several companies of the Egyptian army had their own particular standards. These were formed of such objects as, there is reason to believe, were associated in the minds of the men with feelings of awe and devotion. Sacred animals, boats, emblems or figures, a tablet bearing a king's name, fan and feather-shaped symbols, were raised on the end of a staff as standards, and the office of bearing them was looked upon as one of peculiar privilege and honour (fig. 1). Somewhat similar seem to have been the customs of the Assyrians and Jews. Among the sculptures unearthed by Layard and others at Nineveh, only two different designs have been noticed for standards: one is of a figure drawing a bow and standing on a running bull, the other of two bulls running in opposite directions (fig. 2). These may resemble the emblems of war and peace which were attached to the yoke of Darius's chariot. They are borne upon and attached to chariots; and this method of bearing such objects was the custom also of the Persians, and prevailed during the middle ages. That the custom survived to a comparatively modern period is proved from the fact that the "Guns," which are the "standards" of the artillery, have from time immemorial been entitled to all the parade honours prescribed by the usages of war for the flag, that is, the symbol of authority. In days comparatively recent there was a "flag gun," usually the heaviest piece, which emblemized authority and served also as the "gun of direction" in the few concerted movements then attempted. No representations of Egyptian or Assyrian naval standards have been found, but the sails of ships were embroidered and ornamented with devices, another custom which survived into the middle ages.

In both Egyptian and Assyrian examples, the staff bearing the emblem is frequently ornamented immediately below with flag-like streamers. Rabbinical writers have assigned the different devices of the different Jewish tribes, but the authenticity of their testimony is extremely doubtful. Banners, standards and ensigns are frequently mentioned in the Bible. "Every man of the children of Israel shall pitch by his standard, with the ensign of their father's house" (Num. ii. 2). "Who is she that looketh forth as the morning, fair as the moon, clear as the sun, terrible as an army with banners?" (Cant. vi. 10. See also Num. ii. 10, x. 14; Ps. xx. 5, lx. 4; Cant. ii. 4; Is. v. 26, x. 18, lix. 19; Jer. iv. 21).

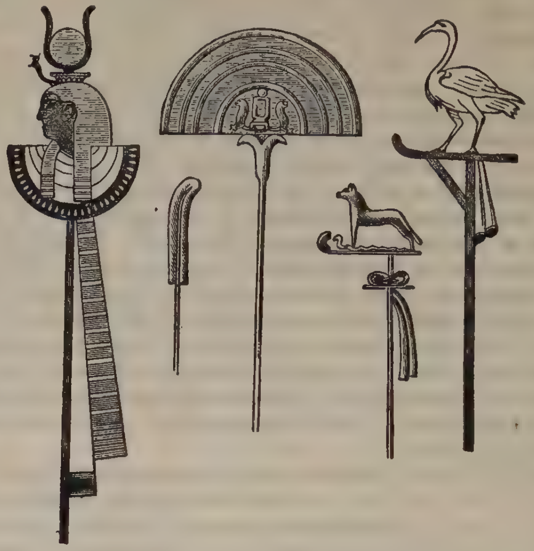


Fig. 1.—Egyptian Standards.

The Persians bore an eagle fixed to the end of a lance, and the sun, as their divinity, was also represented upon their standards, which appear to have been formed of some kind of textile, and were guarded with the greatest jealousy by the bravest men of the army. The Carian soldier who slew Cyrus, the brother of Artaxerxes, was allowed the honour of carrying a golden cock at the head of the army, it being the custom of the Carians to wear that bird as a crest on their helmets. The North American Indians carried poles fledged with feathers from the wings of eagles, and similar customs seem to have prevailed among other semi-savage peoples.

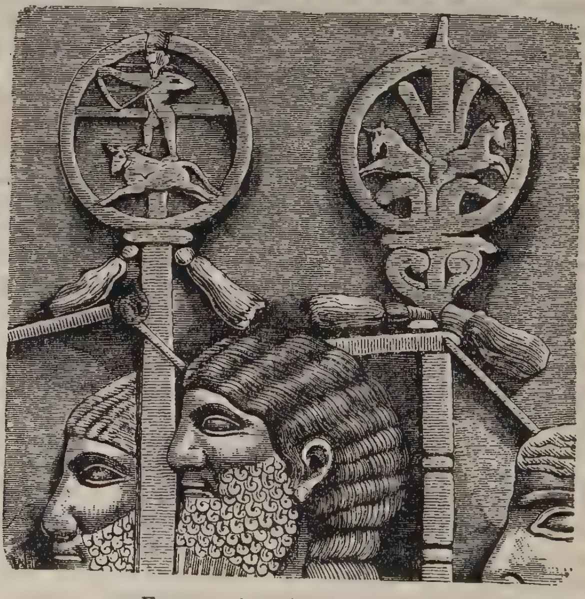


Fig. 2.—Assyrian Standards.

The Greeks bore a piece of armour upon a spear in early times; afterwards the several cities bore sacred emblems or letters chosen for their particular associations—the Athenians the olive and the owl, the Corinthians a pegasus, the Thebans a sphinx, in memory of Oedipus, the Messenians their initial M, and the Lacedaemonians Λ. A purple dress was placed on the end of a spear as the signal to advance. The Dacians carried a standard representing a contorted serpent, while the dragon was the military sign of many peoples—of the Chinese, Dacians and Parthians among others—and was probably first used by the Romans as the ensign of barbarian auxiliaries (see fig. 3).

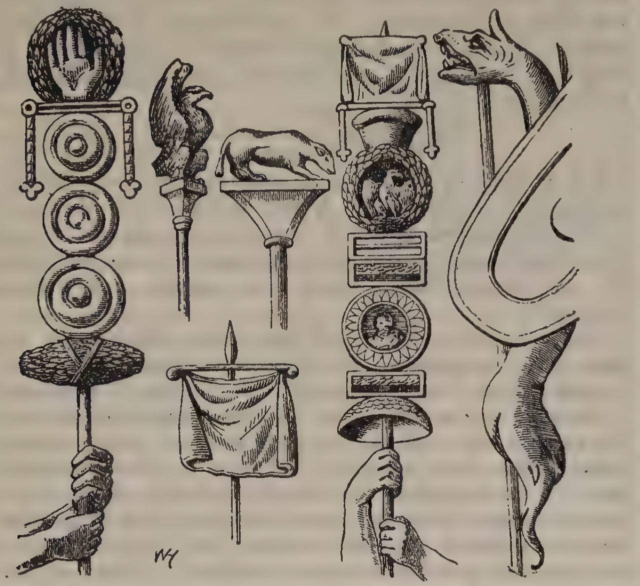


FIG. 3.—Roman Standards.

The question of the *signa militaria* of the Romans is a wide and very important one, having direct bearing on the history of heraldry, and on the origin of national, family and personal devices. With them the custom was reduced to system. "Each century, or at least each maniple," says Meyrick, "had its proper standard and standard-bearer." In the early days of the republic a handful of hay was borne on a pole, whence probably came the name *manipulus* (Lat. *manus*, a hand). The forms of standards in later times were very various; sometimes a cross piece of wood was placed at the end of a spear and surmounted by the figure of a hand in silver, below round or oval discs, with figures of Mars or Minerva, or in later times portraits of emperors or eminent generals (fig. 3). Figures of animals, as the wolf, horse, bear and others, were borne, and it was not till a later period that the eagle became the special standard of the legion. According to Pliny, it was Gaius Marius who, in his second consulship, ordained that the Roman legions should only have the eagle for their standard; "for before that time the eagle marched foremost with four others—wolves, minotaurs, horses and bears—each one in its proper order. Not many years passed before the eagle alone began to be advanced in battle, and the rest were left behind in the camp. But Marius rejected them altogether, and since this it is observed that scarcely is there a camp of a legion wintered at any time without having a pair of eagles."

The *vexillum*, which was the cavalry flag, is described by Livy as a square piece of cloth fastened to a piece of wood fixed crosswise to the end of a spear, somewhat resembling the medieval *gonfalon*. Examples of these vexilla are to be seen on various Roman coins and medals, on the sculptured columns of Trajan and Antoninus, and on the arch of Titus. The *labarum*, which was the imperial standard of later emperors, resembled in shape and fixing the vexillum. It was of purple silk richly embroidered with gold, and sometimes was not suspended as the vexillum from a horizontal crossbar, but displayed as our modern flags, that is to say, by the attachment of one of its sides to a staff. After Constantine, the labarum bore the monogram of Christ (fig. 5, A). It is supposed that the small scarf, which in medieval days was often attached to the pastoral staff or crook of a bishop, was derived from the labarum of the first Christian emperor, Constantine the Great. The Roman standards were guarded with religious veneration in the temples at Rome; and the reverence of this people for their ensigns was in proportion to their superiority to other nations in all that tends to success in war. It was not unusual for a general to order a standard to be cast into the ranks of the enemy, to add zeal to the onset of his soldiers by exciting them to recover what to them was perhaps the most sacred thing the earth possessed. The Roman soldier swore by his ensign.

Although in earlier times drapery was occasionally used for standards, and was often appended as ornament to those of other material, it was probably not until the middle ages that it became the special material of military and other ensigns; and perhaps not until the practice of heraldry had attained to definite nomenclature and laws does anything appear which is in the modern sense a flag.

Early flags were almost purely of a religious character. In Bede's description of the interview between the heathen king Æthelberht and the Roman missionary Augustine, the followers of the latter are said to have borne banners on which silver crosses were displayed. The national banner of England for centuries—the red cross of St George—was a religious one; in fact the aid of religion seems ever to have been sought to give sanctity to national flags, and the origin of many can be traced to a sacred banner, as is notably the case with the oriflamme of France and the Dannebrog of Denmark. Of the latter the legend runs that King Waldemar of Denmark, leading his troops to battle against the enemy in 1219, saw at a critical moment a cross in the sky. This was at once taken as an answer to his prayers, and an assurance of celestial aid. It was forthwith adopted as the Danish flag and called the "Dannebrog," *i.e.* the strength of Denmark. Apart from all legend, this flag undoubtedly dates from the 13th century, and the Danish flag is therefore the oldest now in existence.

The ancient kings of France bore the blue hood of St Martin upon their standards. The Chape de St Martin was originally in the keeping of the monks of the abbey of Marmoutier, and the right to take this blue flag into battle with them was claimed by the counts of Anjou. Clovis bore this banner against Alaric in 507, for victory was promised him by a verse of the Psalms which the choir were chanting when his envoy entered the church of St Martin at Tours. Charlemagne fought under it at the battle of Narbonne, and it frequently led the French to victory. At what precise period the oriflamme, which was originally simply the banner of the abbey of St Denis, supplanted the Chape de St Martin as the sacred banner of all France is not known. Probably, however, it gradually became the national flag after the kings of France had transferred the seat of government to Paris, where the great local saint, St Denis, was held in high honour, and the banner hung over the tomb of the saint in the abbey church. The king of France himself was one of the vassals of the abbey of St Denis for the fief of the Vexin, and it was in his quality of count of Vexin that Louis VI., le Gros, bore this banner from the abbey to battle, in 1124. He is credited with having been the first French king to have taken the banner to war, and it appeared for the last time on the field of fight at Agincourt in 1415. The accounts also of its appearance vary considerably. Guillaume Guiart, in his *Chronicle* says:—

"Oriflambe est une bannière
De cendal voujoiant et simple
Sans portraiture d'autre affaire."

It would, therefore, seem to have been a plain scarlet flag; whilst an English authority states "the celestial auriflamb, so by the French admired, was but of one colour, a square redde banner." The *Chronique de Flandres* describes it as having three points with tassels of green silk attached. The banner of William the Conqueror was sent to him by the pope, and the early English kings fought under the banners of Edward the Confessor and St Edmund; while the blended crosses of St George, St Andrew and St Patrick still form the national ensign of the united kingdoms of England, Scotland and Ireland, whose patron saints they severally were.

The Bayeux tapestry, commemorating the Norman conquest of England, contains abundant representations of the flags of the period borne upon the lances of the knights of William's army. They appear small in size, and pointed, frequently indented into three points and bearing pales, crosses and roundels. One, a Saxon pennon, is triangular, and roundly indented into four points; one banner is of segmental shape and rayed, and bears the figure of a bird, which has been supposed to represent the raven of the war-flag of the Scandinavian Vikings (fig. 4). In all, thirty-seven pennons borne on lances by various knights are represented in the Bayeux tapestry, and of these twenty-eight have triple points, whilst others have two, four or five. The devices on these pennons are very varied and distinctive, although the date is prior to the period in which heraldry became definitely established. In fact, the flags and their charges are probably not really significant of the people bearing them; for, even admitting that personal devices were used at the time, the figures may have been placed without studied intention, and so give the general figure only of such flags as happened to have come under the observation of the artists. The figures are probably rather ornamental and symbolic than strictly heraldic,—that is, personal devices, for the same insignia do not appear on the shields of the several bearers. The dragon standard which he is known to have borne is placed near Harold; but similar figures appear on the shields of Norman warriors, which fact has induced a writer in the *Journal of the Archaeological Association* (vol. xiii. p. 113) to suppose that on the spears of the Saxons they represent only trophies torn from the shields of the Normans, and that they are not ensigns at all. Standards in form much resembling these dragons appear on the Arch of Titus and the Trajan column as the standards of barbarians.

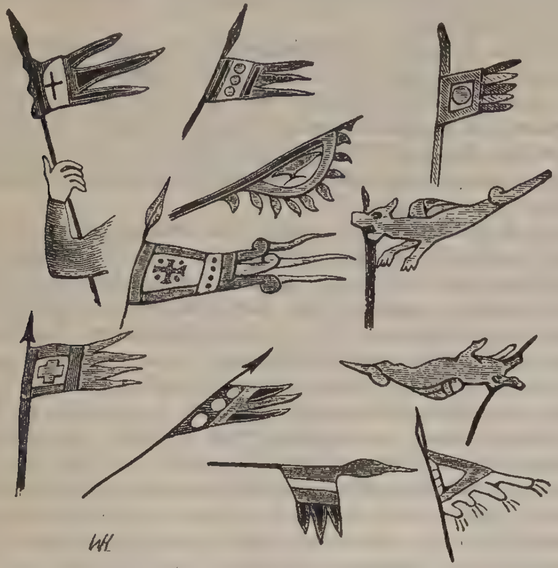


FIG. 4.—Pennons and Standards from the Bayeux Tapestry.

At the battle of the Standard in 1138 the English standard was formed of the mast of a ship, having a silver pyx at the top and bearing three sacred banners, dedicated severally to St Peter, St John of Beverley and St Wilfrid of Ripon, the whole being fastened to a wheeled vehicle. Representations of three-pointed, cross-bearing pennons are found on seals of as early date as the Norman era, and the warriors in the first crusade bore three-pointed pennons. It is possible that the three points with the three roundels and cross, which so often appear on these banners, have some reference to the faith of the bearers in the Trinity and in the Crucifixion, for in contemporary representations of Christ's resurrection and descent into hell he bears a three-pointed banner with cross above. The triple indentation so common on the flags of this period has been supposed to be the origin of one of the honourable ordinaries—the pile. The "pile," it may be explained, is in the form of a wedge, and unless otherwise specified in the blazon, occupies the central portion of the escutcheon, issuing from the middle chief. It may, however, issue from any other extremity of the shield, and there may be more than one. More secular characters were, however, not uncommon. In 1244 Henry III. gave order for a "dragon to be made in fashion of a standard of red silk sparkling all over with fine gold, the tongue of which should be made to resemble burning fire and appear to be continually moving, and the eyes of sapphires or other suitable stones." *The Siege of Carlaverock*, an Anglo-Norman poem of the 14th century, describes the heraldic bearings on the banners of the knights at the siege of that fortress. Of the king himself the writer says:—

> "En sa bannière trois luparte
> De or fin estoient mis en rouge;"

and he goes on to describe the kingly characteristics these may be supposed to symbolize. A MS. in the British Museum (one of Sir Christopher Barker's heraldic collection, Harl. 4632) gives drawings of the standards of English kings from Edward III. to Henry VIII., which are roughly but artistically coloured.

The principal varieties of flags borne during the middle ages were the pennon, the banner and the standard. The "guydhommes" or "guidons," "banderolls," "pennoncells," "streamers" or pendants, may be considered as minor varieties. The pennon (fig. 5, B) was a purely personal ensign, sometimes pointed, but more generally forked or swallow-tailed at the end. It was essentially the flag of the knight simple, as apart from the knight banneret, borne by him on his lance, charged with his personal armorial bearings so displayed that they stood in true position when he couched his lance for action. A MS. of the 16th century (Harl. 2358) in the British Museum, which gives minute particulars as to the size, shape and bearings of the standards, banners, pennons, guydhommes, pennoncells, &c., says "a pennon must be two yards and a half long, made round at the end, and conteyneth the armes of the owner," and warns that "from a standard or streamer a man may flee but not from his banner or pennon bearing his arms."

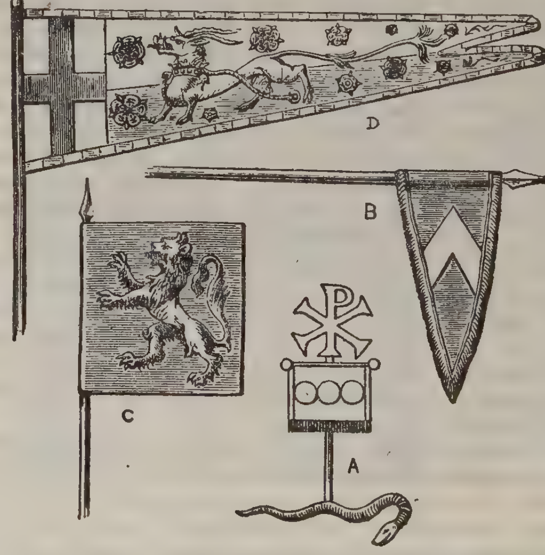


FIG. 5.—A, Labarum from medallion of Constantine; B, Medieval Pennon; C, Medieval Banner; D, Standard of Henry V.

A pennoncell (or penselle) was a diminutive pennon carried by the esquires. Flags of this character were largely used on any special occasion of ceremony, and more particularly at state funerals. For instance, we find "XII. doz. penselles" amongst the items that figured at the funeral of the duke of Norfolk in 1554, and in the description of the lord mayor's procession in the following year we read of "ij goodly pennes (state barges) deckt with flages and stremers, and a m (1000) penselles." Amongst the items that ran the total cost of the funeral of Oliver Cromwell up to an enormous sum of money, we find mention of thirty dozen of pennoncells a foot long and costing twenty shillings a dozen, and twenty dozen of the same kind of flags at twelve shillings a dozen.

The banner was, in the earlier days of chivalry, a square flag, though at a later date it is often found greater in length than in depth, precisely as is the case in the ordinary national flags of to-day. In some very early examples it is found considerably longer in the depth on the staff than in its outward projection from the staff. The banner was charged in a manner exactly similar to the shield of the owner, and it was borne by knights banneret and all above them in rank. As a rough guide it may be taken that the banner of an emperor was 6 ft. square; of a king, 5 ft.; of a prince or duke, 4 ft.; of a marquis, earl, viscount or baron, 3 ft. square. As the function of the banner was to display the armorial bearings of the dignitary who had the right to carry it, it is evident that the square form was the most convenient and akin to the shield of primal heraldry. In fact, flags were originally heraldic emblems, though in modern devices the strict laws of heraldry have often been departed from.

The rank of knights bannerets was higher than that of ordinary knights, and they could be created on the field of battle only. To create a knight banneret, the king or commander-in-chief in person tore off the fly of the pennon on the lance of the knight, thus turning it roughly into the square flag or banner, and so making the knight a banneret. The date in which this dignity originated is uncertain, but it was probably about the period of Edward I. John Chandos is said to have been made a banneret by the Black Prince and the king of Castile at Najara on the 3rd of April 1367; John of Copeland was made a banneret in the reign of Edward III., he having taken prisoner David Bruce, the Scottish king, at the battle of Durham. In more modern times Captain John Smith, of Lord Bernard Stuart's troop of the King's Guards, who saved the royal banner from the parliamentary troops at Edgehill, was made a knight banneret by Charles I. From this time the custom of creating knights banneret ceased until it was revived by George II. after Dettingen in 1743, when the dignity was again conferred. It is true, however, that, when in 1763 Sir William Erskine presented to George III. sixteen stands of colours captured by his regiment [now the 15th (king's) Hussars] at Emsdorf, he was raised to the dignity of knight banneret, but as the ceremony was not performed on the field of battle, the creation was considered irregular, and his possession of the rank was not generally recognized.

The banner was therefore not only a personal ensign, but it also denoted that he who bore it was the leader of a military force, large or small according to his degree or estate. It was, in fact, the battle flag of the leader who controlled the particular force that followed it into the fight. Every baron who in time of war had furnished the proper number of men to his liege was entitled to charge with his arms the banner which they followed. There could indeed be at present found no better representative of the medieval "banner" than what we now term the "royal standard"; it is essentially the personal battle flag of the king of the United Kingdom of Great Britain and Ireland. It and other royal and imperial standards have now become "standards," inasmuch as they are to-day used for display in the same fashion, and for the same purposes as was the "standard" of old. The "gonfalon" or "gonfannon" was a battle flag differing from the ordinary banner in that it was not attached to the pole but hung from it crosswise, and was not always square in shape but serrated, so that the lower edge formed streamers. The gonfalon was in action borne close to the person of the commander-in-chief and denoted his position. In certain of the Italian cities chief magistrates had the privilege of bearing a gonfalon, and for this reason were known as "gonfaloniere."

The standard (fig. 5, D) was a flag of noble size, long, tapering towards the fly (the "fly" is that portion of the flag farther from the pole, the "hoist" the portion of the flag attached to the pole), the edges of the flag fringed or bordered, and with the ends split and rounded off. The shape was not, however, by any means uniform during the middle ages nor were there any definite rules as to its charges. It varied in size according to the rank of the owner. The Tudor MS. mentioned above says of the royal standard of that time—"the Standard to be sett before the king's pavilion or tente, and not to be borne in battayle; to be in length eleven yards." A MS. of the time of Henry VII. gives the following dimensions for standards: "The King's had a length of eight yards; that of a duke, seven; a marquis, six and a half; an earl, six; a viscount, five and a half; a baron, five; a knight banneret, four and a half; and a knight four yards." The standard was, in fact, from its size, and as its very name implies, not meant to be carried into action, as was the banner, but to denote the actual position of its possessor on occasions of state ceremonial, or on the tilting ground, and to denote the actual place occupied by him and his following when the hosts were assembled in camp preparatory for battle. It was essentially a flag denoting position, whereas the banner was the rallying point of its followers in the actual field. Its uses are now fulfilled, as far as royalties are concerned, by the "banner" which has now become the "royal standard," and which floats over the palace where the king is in residence, is hoisted at the saluting point when he reviews his troops, and is broken from the mainmast of any ship in his navy the moment that his foot treads its deck. The essential condition of the standard was that it should always have the cross of St. George conspicuous in the innermost part of the hoist immediately contiguous to the staff; the remainder of the flag was then divided fesse-wise by two or more stripes of colours exactly as the heraldic "ordinary" termed "fesse" crosses the shield horizontally. The colours used as stripes, as also those used in the fringe or bordering of the standard, were those which prevailed in the arms of the bearer or were those of his livery. The standard here depicted (fig. 5, D) is that of Henry V.; the colours white and blue, a white antelope standing between two red roses, and in the interspaces more red roses. To quote again from the Harleian MS. above mentioned: "Every standard and guidon to have in the chief the cross of St George, the beast or crest with his devyce and word, and to be slitt at the end." The motto indeed usually figured on most standards, though occasionally it was missing. An excellent type of the old standard is that of the earls of Percy, which bore the blue lion, the crescent, and the fetterlock—all badges of the family—whilst, as tokens of matrimonial alliances with the families of Poynings, Bryan and Fitzpayne, a silver key, a bugle-horn and a falchion were respectively displayed. There was also the historic Percy motto, *Espérance en Dieu*. No one, whatsoever his rank, could possess more than one banner, since it displayed his heraldic arms, which were unchangeable. A single individual, however, might possess two or three standards since this flag displayed badges that he could multiply at discretion, and a motto that he could at any time change. For example, the standards of Henry VII., mostly green and white—the colours of the Tudor livery—had in one "a red firye dragon," in another "a donne kowe," in a third "a silver greyhound and two red roses." The standard was always borne by an eminent person, and that of Henry V. at Agincourt is supposed to have been carried upon a car that preceded the king. At Nelson's funeral his banner and standard were borne in the procession, and around his coffin were the banderolls—square, bannerlike flags bearing the various arms of his family lineage. Nelson's standard bore his motto, *Palmam qui meruit ferat*, but, in lieu of the cross of St George, it bore the union of the crosses of St George, St Andrew and St Patrick, the medieval England having expanded into the United Kingdom of Great Britain and Ireland. Again, at the funeral of the duke of Wellington we find amongst the flags his personal banner and standard, and ten banderolls of the duke's pedigree and descent.

The guidon, a name derived from the Fr. *Guyd-homme*, was somewhat similar to the standard, but without the cross of St George, rounded at the end, less elongated and altogether less ornate. It was borne by a leader of horse, and according to a medieval writer "must be two and a half yards or three yards long, and therein shall no armes be put, but only the man's crest, cognisance, and devyce."

The streamer, so called in Tudor days but now better known as the pennant or pendant, was a long, tapering flag, which it was directed "shall stand in the top of a ship or in the forecastle, and therein be put no armes, but the man's cognisance or devyce, and may be of length twenty, thirty, forty or sixty yards, and is slitt as well as a guidon or standard." Amongst the fittings of the ship that took Beauchamp, earl of Warwick, to France in the reign of Henry VII. was a "grete stremour for the shippe xl yardes in length viij yardes in brede." In the hoist was "a grete bere holding a raggid staffe," and the rest of the fly "powdrid full of raggid staves."

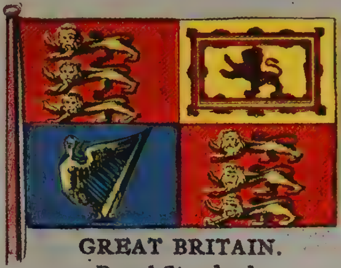
NATIONAL FLAGS.—*British.* The royal standard of England was, when it was hoisted on the Tower on the 1st of January 1801, thus heraldically described:—"Quarterly; first and fourth, gules, three lions passant gardant, in pale, or, for England; second, or, a lion rampant, gules, within a double tressure flory counter flory of the last, for Scotland; third, azure, a harp or, stringed argent, for Ireland." The present standard connects in direct descent from the arms of the Conqueror. These were two leopards passant on a red field, and remained the same until the reign of Henry II., when lions were substituted for leopards, and a third added. The next change that took place was in the reign of Edward III. when the royal arms were for the first time quartered; *fleurs-de-lis* in the first and fourth quarters, and the three lions of England in the second and third. The *fleurs-de-lis* were assumed in token of the monarch's claim to the throne of France. In the "coats" of Edward III. and the two monarchs that succeeded him, the *fleurs-de-lis* were powdered over a blue ground, but under Henry V. the *fleurs-de-lis* were reduced in number to three, and the "coat" so devised remained the same until the death of Queen Elizabeth. The lion of Scotland and the Irish harp were added to the flag on the accession of James I., and the flag then had the French and English arms quartered in the first and fourth quarters, the lion of Scotland, red on a yellow ground, in the second quarter, and the harp of Ireland, gold on a blue ground, in the third quarter. With the exception of the period of the Commonwealth, to which reference will be made later, the flag remained thus until the accession of William III., who imposed upon the Stuart standard a central shield carrying the arms of Nassau. Queen Anne made further alterations; the first and fourth quarters were subdivided, the three lions of England being in one half, the lion of Scotland in the other. The *fleurs-de-lis* were in the second quarter; the Irish harp in the third. Under George I. and George II. the first, second and third quarters remained the same, the arms of Hanover being placed in the fourth quarter, and this continued to be the royal standard until 1801, when the standard was re-arranged as first described with the addition of the Hanoverian arms displayed on a shield in the centre. On the accession of Queen Victoria, the Hanoverian arms were removed, and the flag remained as it to-day exists. It is worthy of note, however, that in the royal standard of King Edward VII. which hangs in the chapel of St George at Windsor, the ordinary "winged woman" form of the harp in the Irish third quartering is altered to a harp of the old Irish pattern. At King Edward's accession this banner replaced that of Queen Victoria which for sixty-two years had hung in this, the chapel of the order of the Garter.

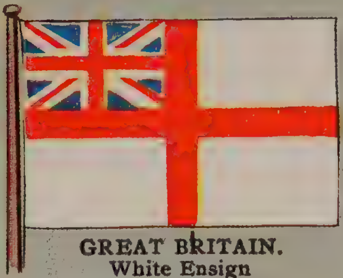
Up to the time of the Stuarts it had been the custom of the lord high admiral or person in command of the fleet to fly the royal standard as deputy of the sovereign. When royalty ceased to be, a new flag was devised by the council of state for the Commonwealth, which comprised the "arms of England and Ireland in two several escutcheons in a red flag within a compartment." In other words, it was a red flag containing two shields, the one bearing the cross of St George, red on a white ground, the other the harp, gold on a blue ground, and round the shields was a wreath of palm and shamrock leaves. One of these flags is still in existence at Chatham dockyard, where it is kept in a wooden chest which was taken out of a Spanish galleon at Vigo by Admiral Sir George Rooke in 1704. When Cromwell became protector of the commonwealth of England, Scotland and Ireland, he devised for himself a personal standard. This had the cross of St George in the first and fourth quarters, the cross of St Andrew, a white saltire on a blue ground, in the second, and the Irish harp in the third. His own arms—a lion on a black shield—were imposed on the centre of the flag. No one but royalty has a right to fly the royal standard, and though it is constantly seen flying for purposes of decoration its use is irregular. There has, however, always been one exception, namely, that the lord high admiral when in executive command of a fleet has always been entitled to fly the royal standard. For example, Lord Howard flew it from the mainmast of the "Ark Royal" when he defeated the Spanish Armada; the duke of Buckingham flew it as lord high admiral in the reign of Charles I., and the duke of York fought under it when he commanded during the Dutch Wars.

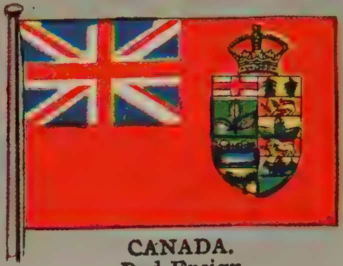
The national flag of the British empire is the Union Jack in which are combined in union the crosses of St George, St Andrew and St Patrick. St George had long been a patron saint of England, and his banner, argent, a cross gules, its national ensign. St Andrew in the same way was the patron saint of Scotland, and his banner, azure, a saltire argent, the national ensign of Scotland. On the union of the two crowns James I. issued a proclamation ordaining that "henceforth all our subjects of this Isle and Kingdom of Greater Britain and the members thereof, shall bear in their main-top the red cross commonly called St George's cross, and the white cross commonly called St Andrew's cross, joined together according to a form made by our heralds, and sent by us to our admiral to be published to our said subjects; and in their fore-top our subjects of south Britain shall wear the red cross only, as they were wont, and our subjects of north Britain in their fore-top, the white cross only as they were accustomed." This was the first Union Jack, as it is generally termed, though strictly the name of the flag is the "Great Union," and it is only a "Jack" when flown on the jackstaff of a ship of war. Probably the name of the Stuart king "Jacques," which James I. always signed, gave the name to the flag, and then to the staff at which it was hoisted. At the death of Charles I., the union with Scotland being dissolved, the ships of the parliament reverted to the simple cross of St George, but the union flag was restored when Cromwell became protector, with the Irish harp imposed upon its centre. On the Restoration, Charles II. removed the harp and so the original union flag was restored, and continued as described until the year 1801, when, on the legislative union with Ireland, the cross of St Patrick, a saltire gules, on a field argent, was incorporated in the union flag. To so combine these three crosses without losing the distinctive features of each was not easy; each cross must be distinct, and retain equally distinct its fimbriation, or bordering, which denotes the original ground. In the first union flag, the red cross of St George with the white fimbriation that represented the original white field was simply imposed upon the white saltire of St Andrew with its blue field. To place the red saltire of St Patrick on the white saltire of St Andrew would have been to obliterate the latter, nor would the red saltire have its proper bordering denoting its original white field; even were the red saltire narrowed in width the portion of the white saltire that would appear would not be the St Andrew saltire, but only the fimbriation appertaining to the saltire of St Patrick. The difficulty has been got over by making the white broader on one side of the red than the other. In fact, the continuity of direction of the arms of the St Patrick red saltire has been broken by its portions being removed from the centre of the oblique points that form the St Andrew's saltire. Thus both the Irish and Scottish saltires can be easily distinguished from one another, whilst the red saltire has its due white fimbriation.

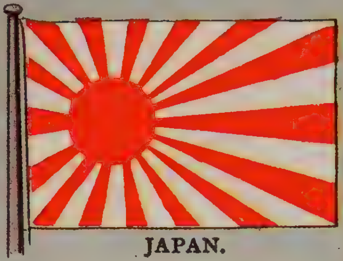
The Union Jack is the most important of all British ensigns, and is flown by representatives of the empire all the world over. It flies from the jackstaff of every man-of-war in the navy. With the Irish harp on a blue shield displayed in the centre, it is flown by the lord-lieutenant of Ireland. When flown by the

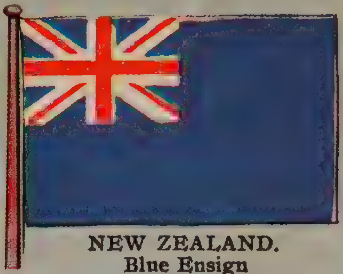
FLAGS

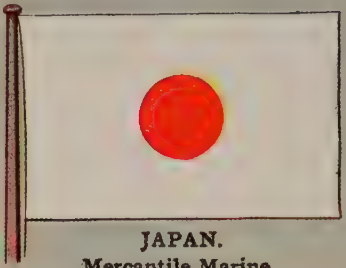

GREAT BRITAIN.
Royal Standard.

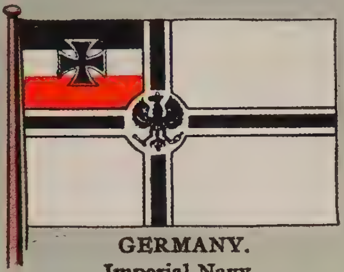

GREAT BRITAIN.
White Ensign
(Royal Navy).

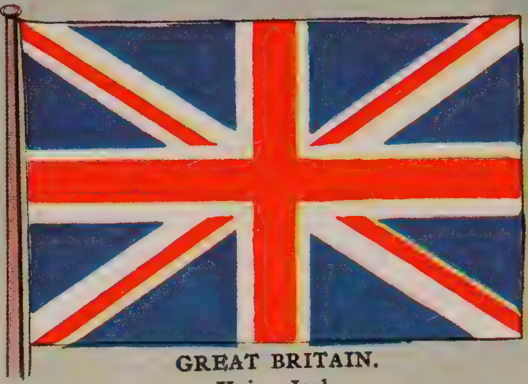

CANADA.
Red Ensign
(Mercantile Marine).

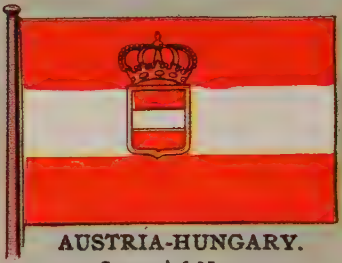

JAPAN.
Imperial Navy.

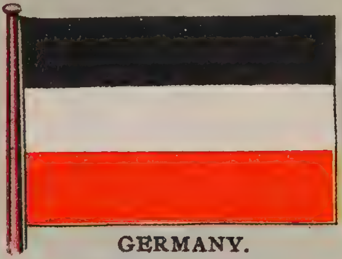

NEW ZEALAND.
Blue Ensign
(Government).

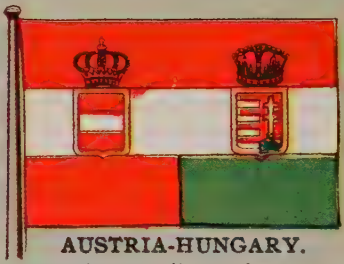

JAPAN.
Mercantile Marine.


GERMANY.
Imperial Navy.


GREAT BRITAIN.
Union Jack.


AUSTRIA-HUNGARY.
Imperial Navy.


GERMANY.
Mercantile Marine.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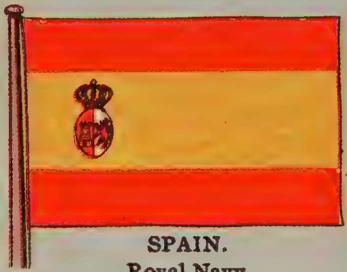
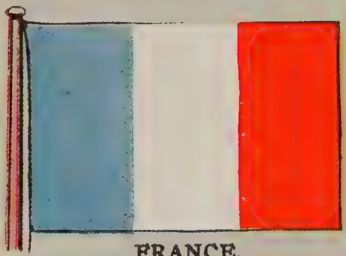
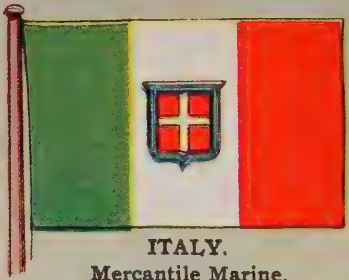
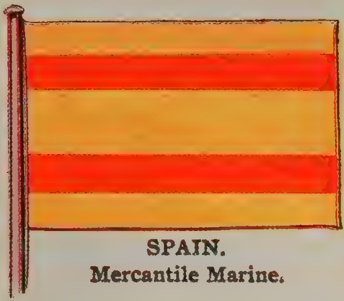
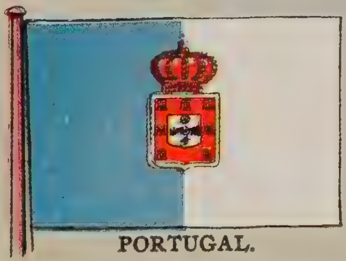
Mercantile Marine.

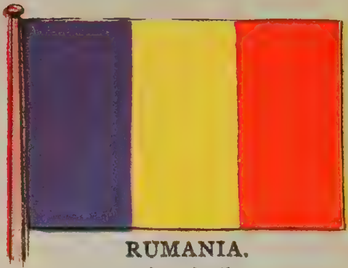

SPAIN.
Royal Navy.


FRANCE.
National Flag.


ITALY.
Mercantile Marine.


SPAIN.
Mercantile Marine.


PORTUGAL.
National Flag.


RUMANIA.
National Flag.

governor-general of India the star and device of the order of the Star of India are borne in the centre. Colonial governors fly it with the badge of their colony displayed in the centre. Diplomatic representatives use it with the royal arms in the centre. As a military flag, it is flown over fortresses and headquarters, and on all occasions of military ceremonial. Hoisted at the mainmast of a man-of-war it is the flag of an admiral of the fleet.

Military flags in the shape of regimental standards and colours, and flags used for signalling, are described elsewhere, and it will here be only necessary to deal with the navy and admiralty flags.

The origin of the three ensigns—the red, white, and blue—had its genesis in the navy. In the days of huge fleets, such as prevailed in the Tudor and Stuart navies, there were, besides the admiral in supreme command, a vice-admiral as second in command, and a rear-admiral as third in command, each controlling his own particular group or squadron. These were designated centre, van, and rear, the centre almost invariably being commanded by the admiral, the vice-admiral taking the van and the rear-admiral the rear squadron. In order that any vessel in any group could distinguish its own admiral's ship, the flagships of centre, van, and rear flew respectively a plain red, white, or blue flag, and so came into being those naval ranks of admiral, vice-admiral, and rear-admiral of the red, white, and blue which continued down to as late as 1864. As the admiral in supreme command flew the union at the main, there was no rank of admiral of the red, and it was not until November 1805 that the rank of admiral of the red was added to the navy as a special compliment to reward Trafalgar. About 1652, so that each individual ship in the squadron should be distinguishable as well as the flagships, each vessel carried a large red, white, or blue flag according as to whether she belonged to the centre, van, or rear, each flag having in the left-hand upper corner a canton, as it is termed, of white bearing the St George's cross. These flags were called ensigns, and it is, of course, due to the fact that the union with Scotland was for the time dissolved that they bore only the St George's cross. Even when the restoration of the Stuarts restored the *status quo* the cross of St George still remained alone on the ensign, and it was not altered until 1707 when the bill for the Union of England and Scotland passed the English parliament. In 1801, when Ireland joined the Union, the flag, of course, became as we know it to-day. All these three ensigns belonged to the royal navy, and continued to do so until 1864, but as far back as 1707 ships of the mercantile marine were instructed to fly the red ensign. As ironclads replaced the wooden vessels and fleets became smaller the inconvenience of three naval ensigns was manifest, and in 1864 the grades of flag officer were reduced again to admiral, vice-admiral, and rear-admiral, and the navy abandoned the use of the red and blue ensigns, retaining only the white ensign as its distinctive flag. The mercantile marine retained the red ensign which they were already using, whilst the blue ensign was allotted to vessels employed on the public service whether home or colonial.

The white ensign is therefore essentially the flag of the royal navy. It should not be flown anywhere or on any occasion except by a ship (or shore establishment) of the royal navy, with but one exception. By a grant of William IV. dating from 1829 vessels belonging to the Royal Yacht Squadron, the chief of all yacht clubs, are allowed to fly the white ensign. From 1821 to 1829 ships of the squadron flew the red ensign, as that of highest dignity, but as it was also used by merchant ships, they then obtained the grant of the white ensign as being more distinctive. Some few other yacht clubs flew it until 1842, when the privilege was withdrawn by an admiralty minute. By some oversight the order was not conveyed to the Royal Western of Ireland, whose ships flew the white ensign until in 1857 the usage was stopped. Since that date the Royal Yacht Squadron has alone had the privilege. Any vessel of any sort flying the white ensign, or pennant, of the navy is committing a grave offence, and the ship can be boarded by any officer of His Majesty's service, the colours seized, the vessel reported to the authorities, and a penalty inflicted on the owners or captain or both. The penalty incurred is £500 fine for each offence, as laid down in the 73rd section of the Merchant Shipping Act 1894. In 1883 Lord Annesley's yacht, belonging to the Royal Yacht Squadron, was detained at the Dardanelles in consequence of her flying the white ensign of the royal navy which brought her under the category of a man-of-war, and no foreign man-of-war is allowed to pass the Dardanelles without first obtaining an imperial *irade*. Since then owners belonging to the squadron have been warned that they must either sail their ships through the straits under the red ensign common to all ships British owned, or obtain imperial permission if they wish to display the white ensign.

Besides the white ensign the ship of war flies a long streamer from the maintopgallant masthead. This, which is called a pennant, is flown only by ships in commission; it is, in fact, the sign of command, and is first hoisted when a captain commissions his ship. The pennant, which was really the old "pennoncell," was of three colours for the whole of its length, and towards the end left separate in two or three tails, and so continued till the end of the great wars in 1816. Now, however, the pennant is a long white streamer with the St George's cross in the inner portion close to the mast. Pennants have been carried by men-of-war from the earliest times, prior to 1653 at the yard-arm, but since that date at the maintopgallant masthead.

The blue ensign is exclusively the flag of the public service other than the royal navy, and is as well the flag of the royal naval reserve. It is flown also by certain authorized vessels of the British mercantile marine, the conditions governing this privilege being that the captain and a certain specified portion of the officers and crew shall belong to the ranks of the royal naval reserve. When flown by ships belonging to British government offices the seal or badge of the office is displayed in the fly. For example, hired transports fly it with the yellow anchor in the fly; the marine department of the Board of Trade has in the fly the device of a ship under sail; the telegraph branch of the post-office shows in the fly a device representing Father Time with his hour-glass shattered by lightning; the ordnance department displays upon the fly a shield with a cannon and cannon balls upon it. Certain yacht clubs are also authorized by special admiralty warrant to fly the blue ensign. Some of these display it plain; others show in the fly the distinctive badge of the club. Consuls-general, consuls and consular agents also have a right to fly the blue ensign, the distinguishing badge in their case being the royal arms.

The red ensign is the distinguishing flag of the British merchant service, and special orders to this effect were issued by Queen Anne in 1707, and again by Queen Victoria in 1864. The order of Queen Anne directed that merchant vessels should fly a red flag "with a Union Jack described in a canton at the upper corner thereof next the staff," and this is probably the first time that the term "Union Jack" was officially used. In some cases those yacht clubs which fly the red ensign change it slightly from that flown by the merchant service, for they are allowed to display the badge of the club in the fly. Colonial merchantmen usually display the ordinary red ensign, but, provided they have a warrant of authorization from the admiralty, they can use the ensign with the badge of the colony in the fly.

In regard to ensigns it is important to remember that they are purely maritime flags, and though the rule is more honoured in the breach than in the observance, the only flag that a private individual or a corporation has a right to display on shore is the national flag, the Union Jack, in its plain condition and without any emblazonment.

There are two other British sea flags which are worthy of brief notice. These are the admiralty flag and the flag of the master of Trinity House. The admiralty flag is a plain red flag with a clear anchor in the centre in yellow. In a sense it is a national flag, for the sovereign hoists it when afloat in conjunction with the royal standard and the Union Jack. It would appear to have been first used by the duke of York as lord high admiral, who flew it when the sovereign was afloat and had the royal standard flying in another ship. When a board of commissioners was appointed to execute the office of lord high admiral this was the flag adopted, and in 1691 we find the admiralty, minuting the navy board, then a subordinate department, "requiring and directing it to cause a fitting red silk flag, with the anchor and cable therein, to be provided against Tuesday morning next, for the barge belonging to this board." In 1725, presumably as being more pretty and artistic, the cable in the device was twisted round the stock of the anchor. It was thus made into a "foul anchor," the thing of all others that a sailor most hates, and this despite the fact that the first lord at the time, the earl of Berkeley, was himself a sailor. The anchor retained its unseamanlike appearance, and was not "cleared" till 1815, and even to this day the buttons of the naval uniform bear a "foul anchor." The "anchor" flag is solely the emblem of an administrative board; it does not carry the executive or combatant functions which are vested in the royal standard, the union or an admiral's flag, but on two occasions it has been made use of as an executive flag. In 1719 the earl of Berkeley, who at the time was not only first lord of the admiralty, but vice-admiral of England, obtained the special permission of George I. to hoist it at the main instead of the union flag. Again in 1869, when Mr Childers, then first lord, accompanied by some members of his board, went on board the "Agincourt" he hoisted the admiralty flag and took command of the combined Mediterranean and Channel squadrons, thus superseding the flags of the two distinguished officers who at the time were in command of these squadrons. It is hardly necessary to add that throughout the navy there was a very distinct feeling of dissatisfaction at the innovation. When the admiralty flag is flown by the sovereign it is hoisted at the fore, his own standard being of course at the main, and the union at the mizzen.

The flag of the master of the Trinity House is the red cross of St George on its white ground, but with an ancient ship on the waves in each quarter; in the centre is a shield with a precisely similar device and surmounted by a lion.

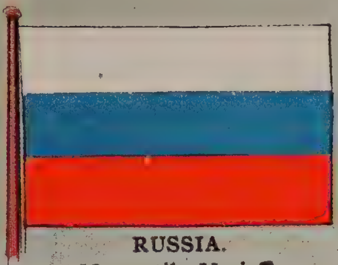
The sign of a British admiral's command afloat is always the same. It is the St George's cross. Of old it was borne on the main, the fore, or the mizzen, according as to whether the officer to whom it pertained was admiral, vice-admiral, or rear-admiral, but, as ironclads superseded wooden ships, and a single pole mast took the place of the old three masts, a different method of indicating rank was necessitated. To-day the flag of an admiral is a square one, the plain St George's cross. When flown by a vice-admiral it bears a red ball on the white ground in the upper canton next to the staff; if flown by a rear-admiral there is a red ball in both the upper and lower cantons. As nowadays most battleships have two masts, the admiral's flag is hoisted at the one which has no masthead semaphore. The admiral's flag is always a square one, but that of a commodore is a broad white pennant with the St George's cross. If the commodore be first class the flag is plain; if of the second class the flag has a red ball in the upper canton next to the staff. The same system of differentiating rank prevails in most navies, though very often a star takes the place of the ball. In some cases, however, the indications of rank are differently shown. For instance, both in the Russian and Japanese navies the distinction is made by a line of colour on the upper or lower edges of the flag.

The flags of the British colonies are the same as those of the mother country, but differentiated by the badge of the colony being placed in the centre of the flag if it is the Union Jack, or in the fly if it be the blue or red ensign. Examples of these are shown in the Plate, where the blue ensign illustrated is that of New Zealand, the device of the colony being the southern cross in the fly. Precisely the same flag, with a large six-pointed star, emblematic of the six states immediately under the union, forms the flag of the federated commonwealth of Australia. The red ensign shown is that of the Dominion of Canada, the device in the fly being the armorial bearings of the Dominion. As the lord-lieutenant of Ireland, as the representative of royalty, flies the Union Jack with a harp in the centre, or the viceroy of India flies the same flag with, in the centre, the badge of the order of the Star of India, so too colonial governors or high commissioners fly the union flag with the arms of the colony they preside over on a white shield in the centre and surrounded by a laurel wreath. In the case of Canada the wreath, however, is not of laurel but of maple, which is the special emblem of the Dominion.

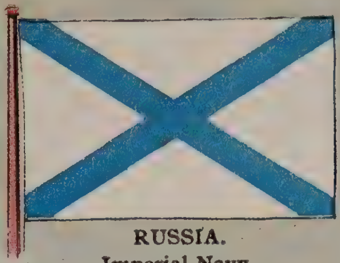
French.—To come to flags of other countries, nowhere have historical events caused so much change in the standards and national ensigns of a country as in the case of France. The oriflamme and the Chape de St Martin were succeeded at the end of the 16th century, when Henry III., the last of the house of Valois, came to the throne, by the white standard powdered with *fleurs-de-lis*. This in turn gave place to the famous tricolour. The tricolour was introduced at the time of the Revolution, but the origin of this flag and its colours is a disputed question. Some maintain that the intention was to combine in the flag the blue of the Chape de St Martin, the red of the oriflamme, and the white flag of the Bourbons. By others the colours are said to be those of the city of Paris. Yet again, other authorities assert that the flag is copied from the shield of the Orleans family as it appeared after Philippe Égalité had knocked off the *fleurs-de-lis*. The tricolour is divided vertically into three parts of equal width—blue, white and red, the red forming the fly, the white the middle, and the blue the hoist of the flag. During the first and second empires the tricolour became the imperial standard, but in the centre of the white stripe was placed the eagle, whilst all three stripes were richly powdered over with the golden bees of the Napoleons. The tricolour is now the sole flag of France.

American.—Before the Declaration of Independence the flags of those colonies which now form the United States of America were very various. In the early days of New England the Puritans objected to the red cross of St George, not from any disloyalty to the mother country, but from a conscientious objection to what they deemed an idolatrous symbol. By the year 1700 most of the colonies had devised badges to distinguish their vessels from those of England and of each other. In the early stages of the revolution each state adopted a flag of its own; thus, that of Massachusetts bore a pine tree, South Carolina displayed a rattlesnake, New York had a white flag with a black beaver, and Rhode Island a white flag with a blue anchor upon it. Even after the Declaration of Independence, and the introduction of the stars and stripes, the latter underwent many changes in the manner of their arrangement before taking the position at present established. In 1775 a committee was appointed to consider the question of a single flag for the thirteen states. It recommended that the union be retained in the upper corner next to the staff, the remainder of the field of the flag to be of thirteen horizontally disposed stripes, alternately red and white. This flag, curiously enough, was precisely the same as the flag of the old Honourable East India Company. On the 14th of June 1777 congress resolved "that the flag of the United States be thirteen stripes, alternate red and white; that the Union be thirteen stars, white in a blue field, representing a new constellation." This was the origin of the national flag, but at first, as the number of the stripes were unequal, the flag very often varied, sometimes having seven white and six red stripes, and at other times seven red and six white, and it was not for some considerable time that it was authoritatively laid down that the latter arrangement was the one to be adopted. It has also been held that the stars and stripes of the American national flag, as well as the eagle, were suggested by the crest and arms of the Washingon family. The latter supposition is absurd, for the Washington crest was a raven. The Washington arms were a white shield having two horizontal red bars, and above these a row of three red stars. This might, by a stretch of imagination, be supposed to have inspired the original idea of the flag which was that each state in the Union should be represented in the national flag by a star

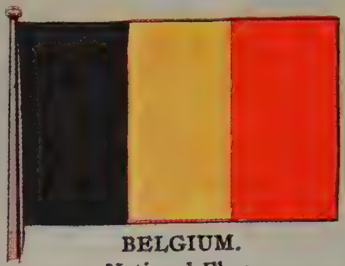
FLAGS



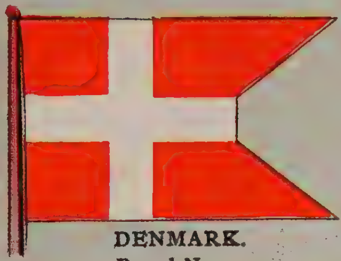
RUSSIA.
Mercantile Marine.



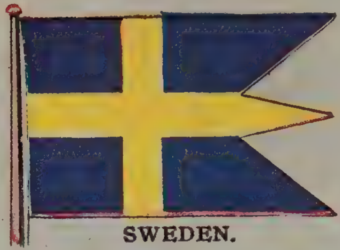
RUSSIA.
Imperial Navy.



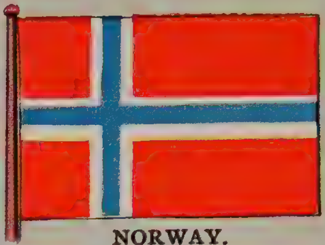
BELGIUM.
National Flag.



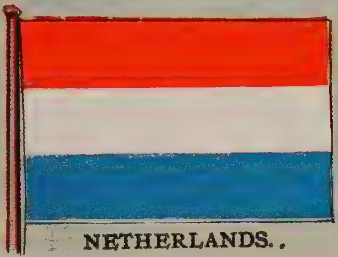
DENMARK.
Royal Navy.



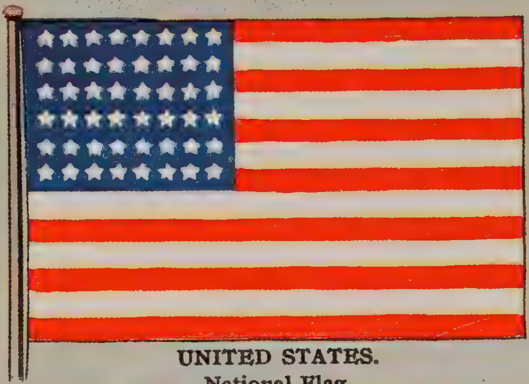
SWEDEN.
Royal Navy.



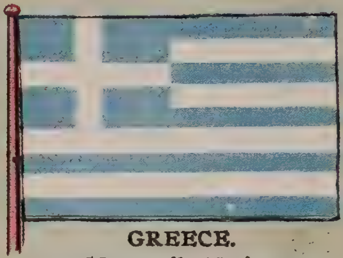
NORWAY.
Mercantile Marine.



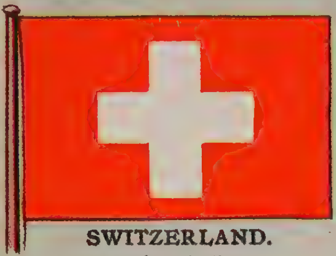
NETHERLANDS.
National Flag.



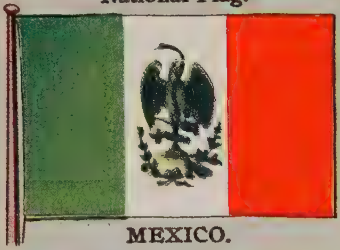
UNITED STATES.
National Flag.



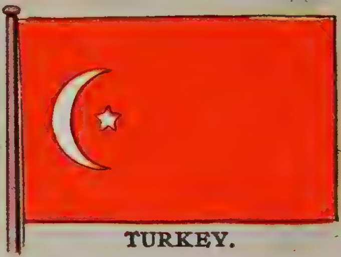
GREECE.
Mercantile Marine.



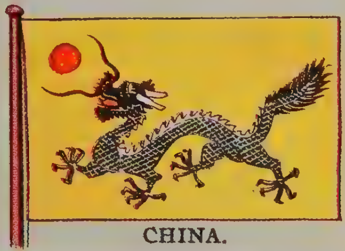
SWITZERLAND.
National Flag.



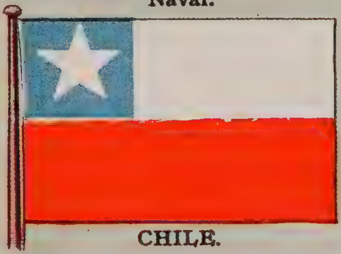
MEXICO.
Naval.



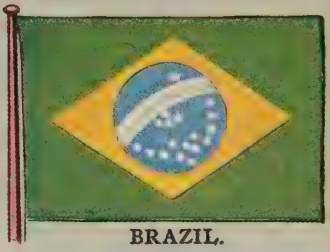
TURKEY.
National Flag.



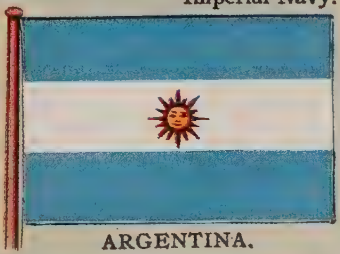
CHINA.
Imperial Navy.



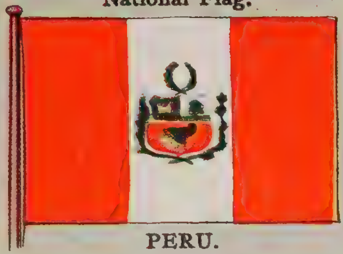
CHILE.
National Flag.



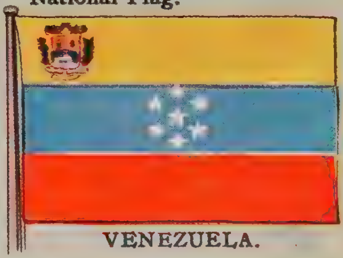
BRAZIL.
National Flag.



ARGENTINA.
Naval.



PERU.
Naval.



VENEZUELA.
Naval.

and stripe. Naturally other states coming into the Union expected the same privilege. After Vermont in 1790 and Kentucky in 1792 had entered the Union, the stars and stripes were changed in number from thirteen to fifteen. Later on other states joined, and soon the flag came to consist of twenty stars and stripes. It was, however, found objectionable to be constantly altering the national flag, and in the year 1818 it was determined to go back to the original thirteen stripes, but to place a star for each state in the blue union canton in the top corner of the flag next the staff. Thus the stars always show the exact number of states that are in the Union, whilst the stripes denote the original number of the states that formed the union.[1] The presidential flag of the president of the United States is an eagle on a blue field, bearing on its breast a shield displaying stripes, and above the national motto *E pluribus unum*, and a design of the stars of the original thirteen states of the union.

Other Countries.—The most general and important of the various national flags are figured in the Plate. In the top line representing Great Britain are shown the royal standard, the Union Jack (the national flag), the white ensign of the royal navy, the blue ensign of government service, and the red ensign of the commercial marine, colonial flags being shown in the case of the two latter ensigns. The two Japanese flags shown are the man-of-war ensign—a rising sun, generally known as the sun-burst—and the flag of the mercantile marine, in which the red ball is used without the rays and placed in the centre of the white field. The imperial standard of Japan is a golden chrysanthemum on a red field. It is essential that the chrysanthemum should invariably have sixteen petals. Heraldry in Japan is of a simpler character than that of Europe, and is practically limited to the employment of "Mon," which correspond very nearly to the "crests" of European heraldry. The great families of Japan possess at least one, and in many cases even three, "Mon." The imperial family use two, the one *Kiku no go Mon* (the august chrysanthemum crest) and *Kiri no go Mon* (the august Kiri crest). The first represents the sixteen-petalled chrysanthemum, and, although the use of the chrysanthemum flower as a badge is not necessarily confined to the imperial family, they alone have the right to use the sixteen-petalled form. If used by any other family, or society or corporation, it must be with a number of petals less or more than sixteen. The second imperial "Mon" is composed of three leaves and three flower spikes of the Kiri (*Paulownia imperialis*). This, however, is not displayed as an official emblem, that being reserved for the chrysanthemum. The Kiri is used for more private purposes. For example, the chrysanthemum figures in the imperial standard, and the Kiri "Mon" adorns the harness of the emperor's horses. It is very probable that the chrysanthemum crest did not originally represent the chrysanthemum flower at all but the sun with sixteen rays, and it will be noticed that in the "sun-burst" flag the sun's rays are sixteen in number. The use of the number sixteen is probably traceable to Chinese geomantic ideas.

The German imperial navy and mercantile marine flags are next depicted. The "iron cross" in the navy flag is that of the Teutonic Order, and dates from the close of the 12th century. For five centuries black and white have been the Hohenzollern colours, and the first verse of the German war song, *Ich bin ein Preusse*, runs:—

> "I am a Prussian! Know ye not my banner?
> Before me floats my flag of black and white!
> My fathers died for freedom, 'twas their manner,
> So say these colours floating in your sight."

The mercantile marine tricolour of black, white and red is emblematic of the joining of the Hohenzollern black and white with the red and white, which was the ensign of the Hanseatic League. This flag came into being when the North German Confederacy was established (November 25th, 1867) at the close of the Austro-Prussian War.

The German imperial standard has the iron cross with its white border displayed on a yellow field, diapered over in each of the four quarters with three black eagles and a crown. In the centre of the cross is a shield bearing the arms of Prussia surmounted by a crown, and surrounded by a collar of the Order of the Black Eagle. In the four arms of the crown are the legend *Gott mit uns 1870*. The United States flag and the tricolour of France have already been fully dealt with, and in both countries the one flag is common to both men-of-war and ships of the mercantile marine.

The next depicted are the imperial navy and the mercantile marine flags of the Austro-Hungarian empire. In the latter the introduction of the green half stripe denotes the combination of the Austrian red, white and red with the Hungarian red, white and green. The shields with which the flag is charged contain respectively the arms of Austria and of Hungary. The former shield only is borne on the man-of-war ensign, and displays the heraldic device of the ancient dukes of Austria, which dates back to the year 1191. The Austrian imperial standard has, on a yellow ground, the black double-headed eagle, on the breast and wings of which are imposed shields bearing the arms of the provinces of the empire. The flag is bordered all round, the border being composed of equal-sided triangles with their apices alternately inwards and outwards, those with their apices pointing inwards being alternately yellow and white, the others alternately scarlet and black.

The green, white and red Italian tricolour was adopted in 1805, when Napoleon I. formed Italy into one kingdom. It was adopted again in 1848 by the Nationalists of the peninsula, accepted by the king of Sardinia, and, charged by him with the arms of Savoy, it became the flag of a united Italy. The man-of-war flag is precisely similar to that of the mercantile marine, except that in the case of the former the shield of Savoy is surmounted by a crown. The royal standard is a blue flag. In the centre is a black eagle crowned and displaying on its breast the arms of Savoy, the whole surrounded by the collar of the Most Sacred Annunziata, the third in rank of all European orders. In each corner of the flag is the royal crown.

For Portugal the flag is one of the few national flags that are parti-coloured. It is half blue, half white, with, in the centre, the arms of Portugal surmounted by the royal crown, and it is the same both in the mercantile marine and in the Portuguese navy. The royal standard of Portugal is an all-red flag charged in the centre with the royal arms, as shown in the national flag.

In the Spanish ensigns red and yellow are the prevailing colours, and here again the arrangement differs from that generally used. The navy flag has a yellow central stripe, with red above and below. To be correct the yellow should be half the width of the flag, and each of the red stripes a quarter of the width of the flag. The central yellow stripe is charged in the hoist with an escutcheon containing the arms of Castile and Leon, and surmounted by the royal crown. In the mercantile flag the yellow centre is without the escutcheon, and is one-third of the entire depth of the flag, the remaining thirds being divided into equal stripes of red and yellow, the yellow above in the upper part of the flag, the red in the lower. Of all royal standards that of Spain is the most elaborate, for it contains quarterings of the Spanish royal escutcheon, many of the bearings being as much an anachronism as if the royal arms of England were to-day to be quartered with the *fleur-de-lis*. In all, the quarterings displayed are those of Leon, Castile, Aragon, Sicily, Austria, Burgundy, Flanders, Antwerp, Brabant, Portugal and France. The flag is usually depicted as composed entirely of the quarterings. We believe, however, that it is more correctly a purple flag in the centre of which the quarterings are displayed on an oval shield surmounted by a crown and encircled by the collar of the order of the Golden Fleece.

The flag of the Russian mercantile marine is a horizontal tricolour of white, blue and red. Originally, it was a tricolour of blue, white and red, and it is said that the idea of its colouring was taken by Peter the Great when learning shipbuilding in Holland, for as the flag then stood it was simply the Dutch ensign reversed. Later, to make it more distinctive, the blue and white stripes changed places, leaving the tricolour as it stands to-day. The flag of the Russian navy is the blue saltire of St Andrew on a white ground. St Andrew is the patron saint of Russia, from whence the emblem. The imperial standard is of a character akin to that of Austria; the ground is yellow, and the centre bears the imperial double-headed eagle, a badge that dates back to 1472, when Ivan the Great married a niece of Constantine Palaeologus and assumed the arms of the Greek empire. On the breast of the eagle is an escutcheon charged with the emblem of St George and the Dragon on a red ground, and this is surrounded by the collar of the order of St Andrew. On the splayed wings of the eagle are small shields bearing the arms of the various provinces of the empire.

The Rumanian flag is a blue, yellow and red tricolour, the stripes vertical, with the blue stripe forming the fly. The Servian flag is a horizontal tricolour, the top stripe red, the middle blue and the lower white. When these tricolours are flown as royal standards the royal arms are displayed on the central stripe. The flag of Montenegro is a horizontal tricolour, the top stripe red, the centre blue, the lowermost white. The Bulgarian flag is a similar tricolour, white, green and red, the white stripe uppermost, but when flown as a war ensign there is a canton in the upper corner of the hoist in which is a golden lion on a red ground.

The flags of all the three Scandinavian kingdoms are somewhat similar in design. That of Denmark, the Dannebrog, has been already alluded to, and it is shown in our illustration as flown by the Danish navy. The mercantile marine flag is precisely similar, but rectangular instead of being swallow-tailed. The Swedish flag is a yellow cross on a blue ground. When flown from a man-of-war it is forked as in the Danish, but the longer arm of the cross is not cut off but pointed, thus making it a three-pointed flag as illustrated. For the mercantile marine the flag is rectangular. When Norway separated from Denmark in 1814, the first flag was red with a white cross on it, and the arms of Norway in the upper corner of the hoist, but as this was found to resemble too closely the Danish flag, a blue cross with a white border was substituted for the white cross. This, it will be seen, is the Danish flag with a blue cross imposed upon the white one. For a man-of-war the flag is precisely similar to that of Sweden in shape; that is to say, converted from the rectangular into the three-pointed design. While Sweden and Norway remained united the flag of each remained distinct, but each bore in the top canton of the hoist a union device, being the combination of the Norwegian and Swedish national colours and crosses. In each of the three above nationalities the flag used for a royal standard is the man-of-war flag with the royal arms imposed on the centre of the cross.

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[1] By the admission of Oklahoma as a state in 1907 the number of stars became 46, arranged from the top in horizontal rows thus: 8, 7, 8, 7, 8, 8=46.

The Belgian tricolour is vertical, the stripes being black next the hoist, yellow in the centre and red in the fly. That of the Netherlands is a horizontal tricolour, red above, white in the centre and blue below. In both countries the same flag is common to both navy and mercantile marine, but when the flag is used as a royal standard the royal arms are displayed in the central stripe. The black, yellow and red of the Belgian flag are the colours of the duchy of Brabant, and were adopted in 1831 when the monarchy was founded. The original Dutch colours adopted when Holland declared its independence were orange, white and blue, the colours of the house of Orange, and when and how the orange became red is not quite clear, though it was certainly prior to 1643.

The blue and white which form the colouring of the Greek flag shown in our illustration are the colours of the house of Bavaria, and were adopted in 1832, when Prince Otho of Bavaria was elected to the throne of Greece. The stripes are nine in number—five blue and four white—with, in the upper corner of the hoist, a canton bearing a white cross on a blue ground. The flag for the royal navy is similar to that flown by the mercantile marine, with the exception that it has the addition of a golden crown in the centre of the cross. The royal standard is a blue flag with a white cross, on the centre of which the royal arms are imposed. The cross is exactly similar to that in the Danish flag, that is to say, the arms of the cross are not of equal length, the shorter end being in the hoist of the flag.

The very simple flag of Switzerland is one of great antiquity, for it was the emblem of the nation as far back as 1339, and probably considerably earlier. In addition to the national flag of the Swiss confederation, each canton has its own cantonal colours. In each case the flag has its stripes disposed horizontally. Basel, for instance, is half black, half white; Berne, half black, half red; Glarus, red, black and white, &c., &c.

The Turkish crescent moon and star were the device adopted by Mahomet II. when he captured Constantinople in 1453. Originally they were the symbol of Diana, the patroness of Byzantium, and were adopted by the Ottomans as a triumph, for they had always been the special emblem of Constantinople, and even now in Moscow and elsewhere the crescent emblem and the cross may be seen combined in Russian churches, the crescent badge, of course, indicating the Byzantine origin of the Russian church. The symbol originated at the time of the siege of Constantinople by Philip the father of Alexander the Great, when a night attempt of the besiegers to undermine the walls was betrayed by the light of a crescent moon, and in acknowledgment of their escape the Byzantines raised a statue to Diana, and made her badge the symbol of the city. Both the man-of-war and mercantile marine flags are the same, but the imperial standard of the sultan is scarlet, and bears in its centre the device of the reigning sovereign. This device is known as the "Tughra," and consists of the name of the sultan, the title of khan, and the epithet *al-Muzaffar Daima*, which means "the ever victorious." The origin of the "Tughra" is that the sultan Murad I., who was not of scholarly parts, signed a treaty by wetting his open hand with ink, and pressing it on the paper, the first, second and third fingers making smears close together, the thumb and fourth finger leaving marks apart. Within the marks thus made the scribes wrote in the name of Murad, his title, and the epithet above quoted. The "Tughra" dates from the latter part of the 14th century. The smaller characters in the "Tughra" change, of course, on the accession of every fresh sovereign, but the leading form of the device always remains the same, namely, rounded lines to the left denoting the thumb, lines to the right denoting where the little finger made impression, and three upright lines indicating the other fingers.

The Mahommedan states tributary to Turkey also display the crescent and star. Morocco, Muscat and other Arab states where they use an ensign display a red flag, that of the Zanzibar protectorate having the British union in the centre of the red field.

The Persian flag is white with a border, green on the upper edge of the flag and in the fly, and red in the hoist and on the lower edge. On the white ground are the lion and sun.

The flag of Siam is a white elephant on a red ground. That of Korea, a white flag with, in the centre, a ball, half red, half blue, the colours being curiously intermixed, the whole being precisely as if two large commas of equal size, one red and the other blue, were united to form a complete circle.

The Chinese flag is a yellow one, bearing on it the emblem of the dragon devouring the sun. As at present used, it is a square flag, but an earlier version was a triangular right-angled flag, hoisted with the right-angle in the base of the hoist. The merchant flag is red with a yellow ball in the centre.

Among the South American republics the Brazilian flag is peculiar inasmuch as it is the only national flag which carries a motto.

Mexico flies precisely the same tricolour as Italy, but plain in the case of the merchant ensign, and charged on the central stripe with the Mexican arms (as illustrated) when flown as a man-of-war ensign.

The Argentine flag is as illustrated flown by the navy, but, when used by the mercantile marine, the sun emblazoned on the central white stripe is omitted, the flag otherwise being precisely the same.

The Venezuelan flag shown is also that of the navy. The flag of the mercantile marine is the same, but the shield bearing the arms of the state is not introduced into the yellow top stripe in the corner near the hoist, as in the naval flag.

The Chilean ensign illustrated is used alike by men-of-war and vessels in the mercantile marine, but, when flown as the standard of the president, the Chilean arms and supporters are placed in the centre of the flag.

The plain red, white, red in vertical stripes, is the flag of the mercantile marine of Peru, and becomes the naval ensign when charged on the central stripe with the Peruvian arms as shown in our illustration. In fact, in nearly every case with the South American republics, the ordinary mercantile marine flag becomes that of the war navy by the addition of the national arms, and in some cases is used in the same way as a presidential flag.

In nearly every case the flags of the lesser American republics are tricolours, and in a very great many of them the flags are by no means such combinations as would meet with the approval of European heralds. All flag devising should be in accordance with heraldic laws, and one of the most important of these is that colour should not be placed on colour, nor metal on metal, yellow in blazonry being the equivalent of gold and white of silver. Hence, properly devised tricolours are such as, for example, those of France, where the red and blue are divided by white, or Belgium, where the black and red are divided by yellow. On the other hand, the yellow, blue, red of Venezuela is heraldically an abomination.

Manufacture and Miscellaneous Uses.—Flags, the manufacture of which is quite a large industry, are almost invariably made from bunting, a very light, tough and durable woollen material. The regulation bunting as used in the navy is made in 9 in. widths, and the flag classes in size according to the number of breadths of bunting of which it is composed. The great centre of the manufacture of flags, as far as the royal navy is concerned, is the dockyard at Chatham. Ensigns and Jacks are made in different sizes; the largest ensign made is 33 ft. long by 16½ ft. in width; the largest Jack issued is 24 ft. long and 12 ft. wide.

The dimensions of a flag according to heraldry should be either square or in the proportion of two to one, and it is this latter dimension that is used in the navy and generally.

Signalling flags are dealt with elsewhere (see SIGNAL), and here it will only be necessary to make brief allusion to some international customs with regard to the use of flags to indicate certain purposes. For long a blood-red flag has always been used as a symbol of mutiny or of revolution. The black flag was in days gone by the symbol of the pirate; to-day, in the only case in which it survives, it is flown after an execution to indicate that the requirements of the law have been duly carried out. All over the world a yellow flag is the signal of infectious illness. A ship hoists it to denote that there are some on board suffering from yellow fever, cholera or some such infectious malady, and it remains hoisted until she has received quarantine. This flag is also hoisted on quarantine stations. The white flag is universally used as a flag of truce.

At the sea striking of the flag denotes surrender. When the flag of one country is placed over that of another the victory of the former is denoted, hence in time of peace it would be an insult to hoist the flag of one friendly nation above that of another. If such were done by mistake, say in "dressing ship" for instance, an apology would have to be made. This custom of hoisting the flag of the vanquished beneath that of the victor is of comparatively modern date, as up to about a century ago the sign of victory was to trail the enemy's flag over the taffrail in the water.

Each national flag must be flown from its own flagstaff, and this is often seen when the allied forces of two or more powers are in joint occupation of a town or territory. To denote honour and respect a flag is "dipped." Ships at sea salute each other by "dipping" the flag, that is to say, by running it smartly down from the masthead, and then as quickly replacing it. When troops parade before the sovereign the regimental flags are lowered as they salute him. A flag flying half-mast high is the universal symbol of mourning. When a ship has to make the signal of distress, this is done by hoisting the national ensign reversed, that is to say, upside down. If it is wished to accentuate the imminence of the danger it is done by making the flag into a "weft," that is, by knotting it in the middle. This means of showing distress at sea is of very ancient usage, for in naval works written as far back as the reign of James I. we find the "weft" mentioned as a method of showing distress.

We have already alluded to the Union Jack as used for denoting nationality, and as a flag of command, but it also serves many other purposes. For instance, if a court-martial is being held on board any ship the Union Jack is displayed while the court is sitting, its hoisting being accompanied by the firing of a gun. In a fleet in company the ship that has the guard for the day flies it. With a white border it forms the signal for a pilot, and in this case is known as a Pilot Jack. In all combinations of signalling flags which denote a ship's name the Union Jack forms a unit. Lastly, it figures as the pall of every sailor or soldier of the empire who receives naval or military honours at his funeral.

BIBLIOGRAPHY.—See *Flags: Some Account of their History and Uses*, by A. MacGeorge (1881); *National Banners: Their History and Construction*, by W. Bland (1892) (one of a series of Heraldic Tracts, 1850–1892, Br. Museum Library, No. 9906, b. 9; this pamphlet gives the design of the national banners of St George, St Andrew and St Patrick, and illustrates and tells the story of the composition of the three flags into the great union flag, commonly known as the Union Jack); *Our Flags: Their Origin, Use and Traditions*, by Rear-Admiral S. Eardley-Wilmot (1901), an excellent treatise, historical and narrative, on all the flags of the British empire; *A History of the Flag of the United States* (Boston, 1872), by G. H. Preble; *Flags of the World: Their History, Blazonry and Associations*, by Edward Hulme, F.L.S., F.S.A. (1897), a most complete monograph on the subject, illustrated with a very complete series of plates; *Admiralty Book of Flags of all Nations*, printed for H.M. Stationery office, 1889, kept up to date by the publication periodically of *Errata*, officially issued under an admiralty covering letter; *Flags of Maritime Nations*, prepared by the Bureau of Equipment department of the navy, printed by authority (Washington, 1899). The last two works have no letterpress beyond titles, but contain, to scale, delineations of all the flags at present used officially by all nations. Between the two there are no discrepancies, and the delineation of a flag taken from either may be assumed as absolutely correct. Both are respectively the guides for flag construction in the royal navy and the United States navy. (H. L. S.)

FLAGELLANTS (from Lat. *flagellare*, to whip), in religion, the name given to those who scourge themselves, or are scourged, by way of discipline or penance. Voluntary flagellation, as a form of exalted devotion, occurs in almost all religions. According to Herodotus (ii. 40. 61), it was the custom of the ancient Egyptians to beat themselves during the annual festival in honour of their goddess Isis. In Sparta children were flogged before the altar of Artemis Orthia till the blood flowed (Plutarch, *Instit. Laced.* 40). At Alea, in the Peloponnese, women were flogged in the temple of Dionysus (Pausanias, *Arcad.* 23). The priests of Cybele, or *archigalli*, submitted to the discipline in the temple of the goddess (Plutarch, *Adv. Colot.* p. 1127; Apul., *Metam.* viii. 173). At the Roman Lupercalia women were flogged by the celebrants to avert sterility or as a purificatory ceremony (W. Mannhardt, *Mythol. Forsch.*, Strassburg, 1884, p. 72 seq.).

Ritual flagellation existed among the Jews, and, according to Buxtorf (*Synagoga judaica*, Basel, 1603), was one of the ceremonies of the day of the Great Pardon. In the Christian church flagellation was originally a punishment, and was practised not only by parents and schoolmasters, but also by bishops, who thus corrected offending priests and monks (St Augustine, *Ep. 159 ad Marcell.*; cf. *Conc. Agd.* 506, can. ii.). Gradually, however, voluntary flagellation appeared in the *libri poenitentiales* as a very efficacious means of penance. In the 11th century this new form of devotion was extolled by some of the most ardent reformers in the monastic houses of the west, such as Abbot Popon of Stavelot, St Dominic Loricatus (so called from his practice of wearing next his skin an iron *lorica*, or cuirass of thongs), and especially Cardinal Pietro Damiani. Damiani advocated the substitution of flagellation for the recitation of the penitential psalms, and drew up a scale according to which 1000 strokes were equivalent to ten psalms, and 15,000 to the whole psalter. The majority of these reformers exemplified their preaching in their own persons, and St Dominic gained great renown by inflicting upon himself 300,000 strokes in six days. The custom of collective flagellation was introduced into the monastic houses, the ceremony taking place every Friday after confession.

The early Franciscans flagellated themselves with characteristic rigour, and it is no matter of surprise to find the Franciscan, St Anthony of Padua, preaching the praises of this means of penance. It is incorrect, however, to suppose that St Anthony took any part in the creation of the flagellant fraternities, which were the result of spontaneous popular movements, and later than the great Franciscan preacher; while Ranieri, a monk of Perugia, to whom the foundation of these strange communities has been attributed, was merely the leader of the flagellant brotherhood in that region. About 1259 these fraternities were distributed over the greater part of northern Italy. The contagion spread very rapidly, extending as far as the Rhine provinces, and, across Germany, into Bohemia. Day and night, long processions of all classes and ages, headed by priests carrying crosses and banners, perambulated the streets in double file, reciting prayers and drawing the blood from their bodies with leathern thongs. The magistrates in some of the Italian towns, and especially Uberto Pallavicino at Milan, expelled the flagellants with threats, and for a time the sect disappeared. The disorders of the 14th century, however, the numerous earthquakes, and the Black Death, which had spread over the greater part of Europe, produced a condition of ferment and mystic fever which was very favourable to a recrudescence of morbid forms of devotion. The flagellants reappeared, and made the state of religious trouble in Germany, provoked by the struggle between the papacy and Louis of Bavaria, subserve their cause. In the spring of 1349 bands of flagellants, perhaps from Hungary, began their propaganda in the south of Germany. Each band was under the command of a leader, who was assisted by two lieutenants; and obedience to the leader was enjoined upon every member on entering the brotherhood. The flagellants paid for their own personal maintenance, but were allowed to accept board and lodging, if offered. The penance lasted 33½ days, during which they flogged themselves with thongs fitted with four iron points. They read letters which they said had fallen from heaven, and which threatened the earth with terrible punishments if men refused to adopt the mode of penance taught by the flagellants. On several occasions they incited the populations of the towns through which they passed against the Jews, and also against the monks who opposed their propaganda. Many towns shut their gates upon them; but, in spite of discouragement, they spread from Poland to the Rhine, and penetrated as far as Holland and Flanders. Finally, a band of 100 marched from Basel to Avignon to the court of Pope Clement VI., who, in spite of the sympathy shown them by several of his cardinals, condemned the sect as constituting a menace to the priesthood. On the 20th of October 1349 Clement published a bull commanding the bishops and inquisitors to stamp out the growing heresy, and in pursuance of the pope's orders numbers of the sectaries perished at the stake or in the cells of the inquisitors and the episcopal justices. In 1389 the leader of a flagellant band in Italy called the *bianchi* was burned by order of the pope, and his following dispersed. In 1417, however, the Spanish Dominican St Vincent Ferrer pleaded the cause of the flagellants with great warmth at the council of Constance, and elicited a severe reply from John Gerson

(*Epistola ad Vincentium*), who declared that the flagellants were showing a tendency to slight the sacramental confession and penance, were refusing to perform the *cultus* of the martyrs venerated by the church, and were even alleging their own superiority to the martyrs.

The justice of Gerson's protest was borne out by events. In Germany, in 1414, there was a recrudescence of the epidemic of flagellation, which then became a clearly-formulated heresy. A certain Conrad Schmidt placed himself at the head of a community of Thuringian flagellants, who took the name of Brethren of the Cross. Schmidt gave himself out as the incarnation of Enoch, and prophesied the approaching fall of the Church of Rome, the overthrow of the ancient sacraments, and the triumph of flagellation as the only road to salvation. Numbers of Beghards joined the Brethren of the Cross, and the two sects were confounded in the rigorous persecution conducted in Germany by the inquisitor Eylard Schöneveld, who almost annihilated the flagellants. This mode of devotion, however, held its ground among the lower ranks of Catholic piety. In the 16th century it subsisted in Italy, Spain and southern France. Henry III. of France met with it in Provence, and attempted to acclimatize it at Paris, where he formed bands divided into various orders, each distinguished by a different colour. The king and his courtiers joined in the processions in the garb of penitents, and scourged themselves with ostentation. The king's encouragement seemed at first to point to a successful revival of flagellation; but the practice disappeared along with the other forms of devotion that had sprung up at the time of the league, and Henry III.'s successor suppressed the Paris brotherhood. Flagellation was occasionally practised as a means of salvation by certain Jansenist convulsionaries in the 18th century, and also, towards the end of the 18th century, by a little Jansenist sect known as the Fareinists, founded by the brothers Bonjour, *curés* of Fareins, near Trévoux (Ain). In 1820 a band of flagellants appeared during a procession at Lisbon; and in the Latin countries, at the season of great festivals, one may still see brotherhoods of penitents flagellating themselves before the assembled faithful.

For an account of flagellation in antiquity see S. Reinach, *Cultes, mythes et religions* (vol. i. pp. 173-183, 1906), which contains a bibliography of the subject. For a bibliography of the practice in medieval times, see M. Röhricht, "Bibliographische Beiträge zur Gesch. der Geissler" in *Briegers Zeitschrift für Kirchengeschichte*, i. 313. (P. A.)

FLAGELLATA, the name given to the Protozoa whose dominant phase is a "flagellula," or cell-body provided with one, few or rarely many long actively vibratile, cytoplasmic processes. Nutrition is variable:—(1) "Holozoic"; food taken in by ingestion, by amoeboid action either unspecialized or at one or more well-defined oral spots, or through an aperture (mouth); (2) "Saprophytic"; food taken in in solution through the general surface of the body; (3) "Holophytic"; food-material formed in the coloured plasm by fixation of carbon from the medium, with liberation of oxygen, in presence of light, as in green plants. Fission in the "active" state occurs and is usually longitudinal. Multiple fission rarely occurs save in a sporocyst, and produces microzoospores, which in some cases may conjugate with others as isogametes or with larger forms (megagametes). "Hypnocysts" to tide over unfavourable conditions are not infrequent, but have no necessary relation to reproduction. Many have a firm pellicle which may form a hard shell: again a distinct cell-wall of chitin or cellulose may be formed: finally, an open cup, "theca," of firm or gelatinous material may be present, with or without a stalk: such a cup and stalk are often found in colonial species, and are subject to much the same conditions as in Infusoria. The nucleus is simple in most cases; but in Haemoflagellates it is connected with a second nucleus, which again is in immediate relation with the motile apparatus; the former is termed the "trophonucleus," the latter the "kineto-nucleus."

As reserves the protoplasm may contain oil, starch, paramylum, leucosin (a substance soluble in water, and of doubtful composition), proteid granules. In the holophytic forms the cytoplasm contains specialized parts of more or less definite form,

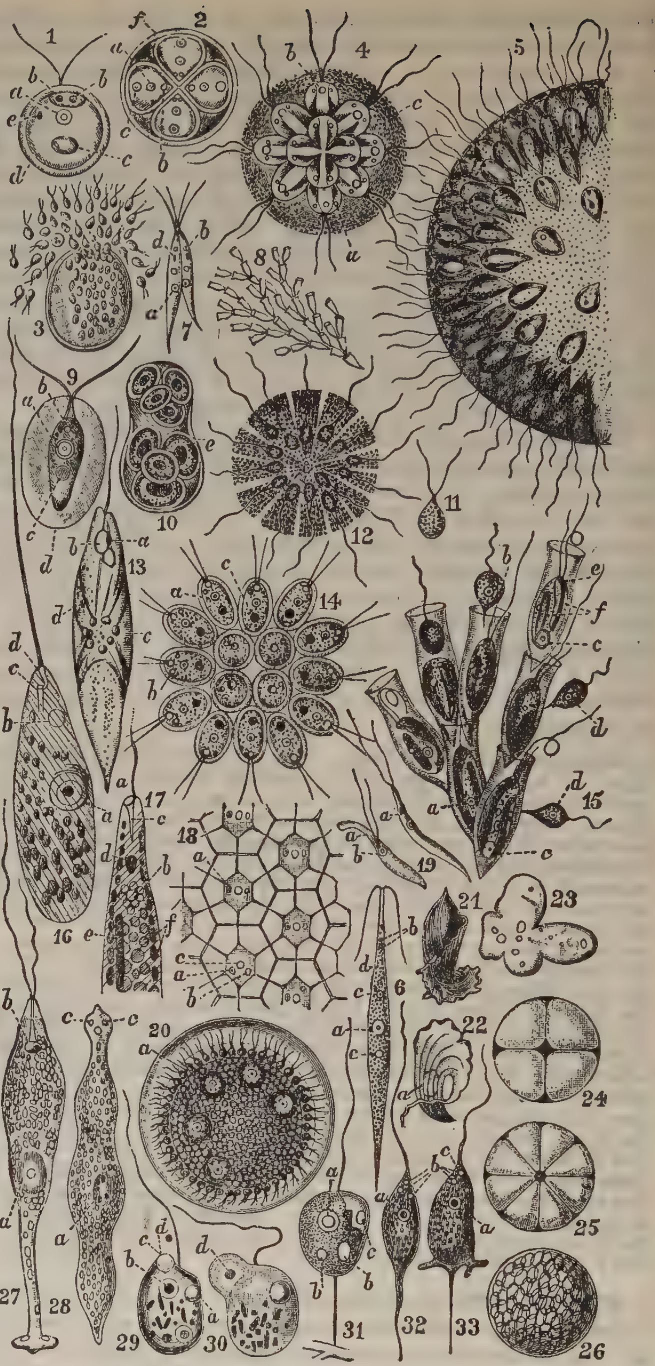

Fig. 1.—Flagellata.

1. *Chlamydomonas pulvisculus*, Ehr. (*Chlamydomonadidae*) free-swimming individual.
   a = nucleus.
   b = contractile vacuole.
   c = starch corpuscle.
   d = cellulose investment.
   e = stigma (eye-spot).

2. Resting stage of the same, with fourfold division of the cell-contents. Letters as before.

3. Breaking up of the cell-contents into minute biflagellate swarm-spores, which escape, and whose history is not further known.

4. *Syncrypta volvox*, Ehr. (*Chrysomonadidae*). A colony enclosed by a common gelatinous test *c*.
   a = stigma.
   b = vacuole (non-contractile).

5. *Uroglena volvox*, Ehr. (*Chrysomonadidae*). Half of a large colony, the flagellates embedded in a common jelly.

6. *Chlorogonium euchlorum*, Ehr. (*Chlamydomonadidae*).
   a = nucleus.
   b = contractile vacuole.
   c = starch grain.
   d = eye-spot.

7. *Chlorogonium euchlorum*, Ehr. (*Chlamydomonadidae*). Copulation of two liberated microgonidia.
   a = nucleus.
   b = contractile vacuole.
   d = eye-spot (so-called).

8. Colony of *Dinobryon sertularia*, Ehr. (*Chrysomonadidae*).

9. *Haematococcus palustris*, Girod (= *Chlamydococcus*, Braun, *Protococcus*, Cohn), one of the

Chrysomonadidae; ordinary individual with widely separated test.
a = nucleus.
b = contractile vacuole.
c = amylon nucleus (pyrenoid).

10. Dividing resting stage of the same, with eight fission products in the common test *e*.

11. A microgonidium of the same.

12. *Phalansterium consociatum*, Cienk. (*Choanoflagellata*); ×325. Disk-like colony.

13. *Euglena viridis*, Ehr.; × 300 (*Euglenidae*).
a = pigment spot (stigma).
b = clear space.
c = paramylum granules.
d = chromatophor (endochrome plate).

14. *Gonium pectorale*, O. F. Müller (*Volvocineae*). Colony seen from the flat side; × 300.
a = nucleus.
b = contractile vacuole.
c = amylon nucleus.

15. *Dinobryon sertularia*, Ehr. (*Chrysomonadidae*).
a = nucleus.
b = contractile vacuole.
c = amylon nucleus.
d = free colourless flagellates, probably not belonging to Dinobryon.
e = stigma (eye-spot).
f = chromatophors.

16. *Peranema trichophorum*, Ehr. (*Peranemidae*), creeping individual seen from the back; × 140.
c = pharynx.
d = mouth.

17. Anterior end of *Euglena acus*, Ehr., in profile.
a = mouth.
b = vacuoles.
c = pharynx.
d = stigma (eye-spot).
e = paramylum-body.
f = chlorophyll corpuscles.

18. Part of the surface of a colony of *Volvox globator*, L. (*Volvocidae*), showing the intercellular connective fibrils.
a = nucleus.
b = contractile vacuole.
c = starch granule.

19. Two microgametes (spermatozoa) of *Volvox globator*, L.
a = nucleus.
b = contractile vacuole.

20. Ripe asexually produced daughter-individual of *Volvox minor*, Stein, still enclosed in the cyst of the partheno-gonidium.
a = young, partheno-gonidia.

21, 22. *Trypanosoma sanguinis*, Gruby (*Haematoflagellates*), from the blood of *Rana esculenta*.
a = nucleus; × 500.

23-26. Reproduction of *Bodo caudatus*, Duj. (*Bodonidae*), after Dallinger and Drysdale:—23, fusion of several individuals (plasmodium); 24, encysted fusion-product dividing into four; 25, later into eight; 26, cyst filled with swarm-spores.

27. *Distigma proteus*, Ehbg., O. F. Müller (*Euglenidae*); ×440. Individual with the two flagella, and strongly contracting hinder region of the body.

28. The same devoid of flagella.
c, *c* = the two dark pigment spots (so-called eyes) near the mouth.

29. *Oicomonas termo* (*Monas termo*) Ehr. (one of the *Oicomonadidae*).
c = food-ingesting vacuole.
d = food-particle; ×440.

30. The food-particle *d* has now been ingested by the vacuole.

31. *Oicomonas mutabilis*, Kent (*Oicomonadidae*), with adherent stalk.
a = nucleus.
b = contractile vacuole.
c = food-particle in food vacuole.

32, 33. *Cercomonas crassicauda*, Duj. (*Oicomonadidae*), showing two conditions of the pseudopodium-protruding tail.
a = nucleus.
b = contractile vacuoles.
c = mouth.

known generally as "plastids" or "chromatophores" impregnated with a lipochrome pigment, whether green (chlorophyll), yellow or brown (diatomin or some allied pigment), or again red (chlorophyll with phycoerythrin). In the active condition of such coloured holophytic forms there is usually at least one anterior "eye-spot," of a refractive globule embedded behind in a collection of red pigment granules. The single anterior "flagellum tractellum" of so many of the larger forms acts by the bending over of its free end in consecutive meridians, so as to describe a hollow cone with its apex backwards: we may imitate this by bending the head of a slender sapling round and round while it is implanted in the soil; and the result is to push the water backwards, or in other words to pull the body forwards, the whole rotating on its longitudinal axis as it moves on (Y. Delage). An anterior lateral trailing flagellum may modify this axial rotation, and help in steering. When the animal is at rest—attached by its base or with its body so curved as to resist onward motion—the current produced by the tractellum will bring suspended particles up against the protoplasm at its base of insertion. As noted by E. R. Lankester, the posterior flagellum of many Haemoflagellates, like that of the spermatozoon of Metazoa, propels the cell by a sculling motion behind; he terms it a "pulsellum." Such flagellar motion is distinct from that of cilia, which always move backwards and forwards, with a swift downstroke and a slower recovery in the same plane; though where the flagella are numerous they may behave in this way, and indeed flagella agree with cilia in being mere vibratory extensions of cytoplasm. Symmetrically placed flagella may have a symmetrical reciprocating motion like that of cilia.

Many of the Flagellata are parasitic (some haematozoic); the majority live in the midst of putrefying organic matter in sea and fresh waters, but are not known to be active as agents of putrefaction. Dallinger and Drysdale have shown that the spores of *Bodo* and others will survive an exposure to a higher temperature than do any known Schizomycetes (Bacteria), viz. 250° to 300° Fahr., for ten minutes, although the adults are killed at 180°.

The Flagellata are for the most part very minute; the Protomastigopoda rarely exceeding 20 μ in length. The Euglenaceae contain the largest species, up to 130 μ in length, exclusive of the flagellum.

Our classification is modified from those of Senn (in Engler and Prantl, *Pflanzenfamilien*) and Hartog (in *Cambridge Natural History*).

I. RHIZOFLAGELLATA (PANTOSTOMATA)

Food taken in by pseudopodia at any part of the body.

Order 1.—**HOLOMASTIGACEAE.** Body homaxial with uniform flagella. *Multicilia* (Cienkowski); *Grassia* (Fisch, in frog's blood and gastric mucus).

Order 2.—**RHIZOMASTIGACEAE.** Flagellum 1, 2 or few, diverging from anterior end. *Mastigamoeba* (F. E. Schulze).

II. EUFLAGELLATA

Food taken in at one or more definite mouth-spots, or by a true mouth, or by absorption; or nutrition holophytic.

Order 1.—**PROTOMASTIGACEAE.** Contractile vacuole simple, one or more, or absent; either holozoic, ingesting food by a mouth-spot (or 2 or more), saprophytic, or parasitic.

Family 1.—OICOMONADIDAE. Flagellum 1, sometimes with a tail-like posterior prominence passing into a temporary flagellum, but without other cytoplasmic processes. *Oicomonas* (Kent); *Cercomonas* (Dujardin) (fig. 1, *32*, *33*); *Codonoeca* (James-Clark), with a gelatinous theca.

Family 2.—BICOECIDAE. Differs from *Oicomonadidae* in a unilateral proboscidiform process next the flagellum; often thecate and stalked, forming branched colonies, like Choanoflagellates in habit. *Bicoeca* (J.-Cl.), *Poteriodendron*.

Family 3.—CHOANOFLAGELLIDAE (Choanoflagellata, Kent; Craspedomonadina, Stein). As in previous families, but with flagellum surrounded by an obconical or cylindrical rim of cytoplasm, at the base of which is the ingestive area. The cells of this group have the morphology of the flagellate cells (choanocytes) of sponges. They are often colonial, and in the gelatinous colony of *Proterospongia*, the more internal cells (fig. 2, *15*) pass into a definite "reproductive state." Many stalked forms are epizoic on Entomostracan Crustacea.

(*a*) Naked forms often stalked: *Monosiga* (Kent), stalked solitary; *Codosiga* (Kent) (fig. 2, *3*), stalked social; *Desmarella* (Kent), unstalked, and *Astrosiga* (Kent), stalked, form floating colonies.

(*b*) Forms enclosed in a vase-like shell: *Salpingoeca* (J.-Cl.); (fig. 2, *1*, *6*, *7*) recalling the habit of *Monosiga* and *Codosiga*; *Polyoeca* forming a branched free swimming colony.

(*c*) Forms surrounded by a gelatinous sheath: *Proterospongia* (Kent) (fig. 2, *15*); *Phalansterium* (Cienk.) (fig. 1, *12*), has a slender cylindrical collar, and a branching tubular stalk.

Family 4.—HAEMOFLAGELLIDAE. Forms with a complex nuclear apparatus, and a muscular undulating membrane with which one or two flagella are connected, parasitic in Metazoa (often in the blood). *Trypanosoma* (Gruby) (fig. 1, *21*, *22*), *Herpetomonas* (Kent), *Treponema* (Vuillemin) (= *Spirochaete*, auctt., nec. Ehrbg.).

Family 5.—AMPHIMONADIDAE. Flagella 2 anterior, both directed forward, equal and similar; in stalk sheath, &c., often recalling Choanoflagellata, *Amphimonas* (Kent), *Diplomitus* (Kent); *Spongomonas* (St.), with thick branching gelatinous sheath.

Family 6.—MONADIDAE. Flagella 2 (3), anterior all directed forwards, one long the other (or 2) accessory, short.

Monas (St.); *Anthophysa* (Bory) (fig. 2, *12*, *13*), with the stalk composed of the accumulation of faeces at the hinder end of the cells of the colony.

Family 7.—BODONIDAE. Flagella 2 (or 3) 1 anterior, the other (1 or 2) antero-lateral and trailing or becoming fixed at the end to form a temporary anchor.

Bodo (Ehrb.) (figs. 1, *23-26* and 2, *10*). *B. lens* is the "hooked" and *B. saltans* the "springing monad" of Dallinger and Drysdale; *Dallingeria* (Kent) with a pair of

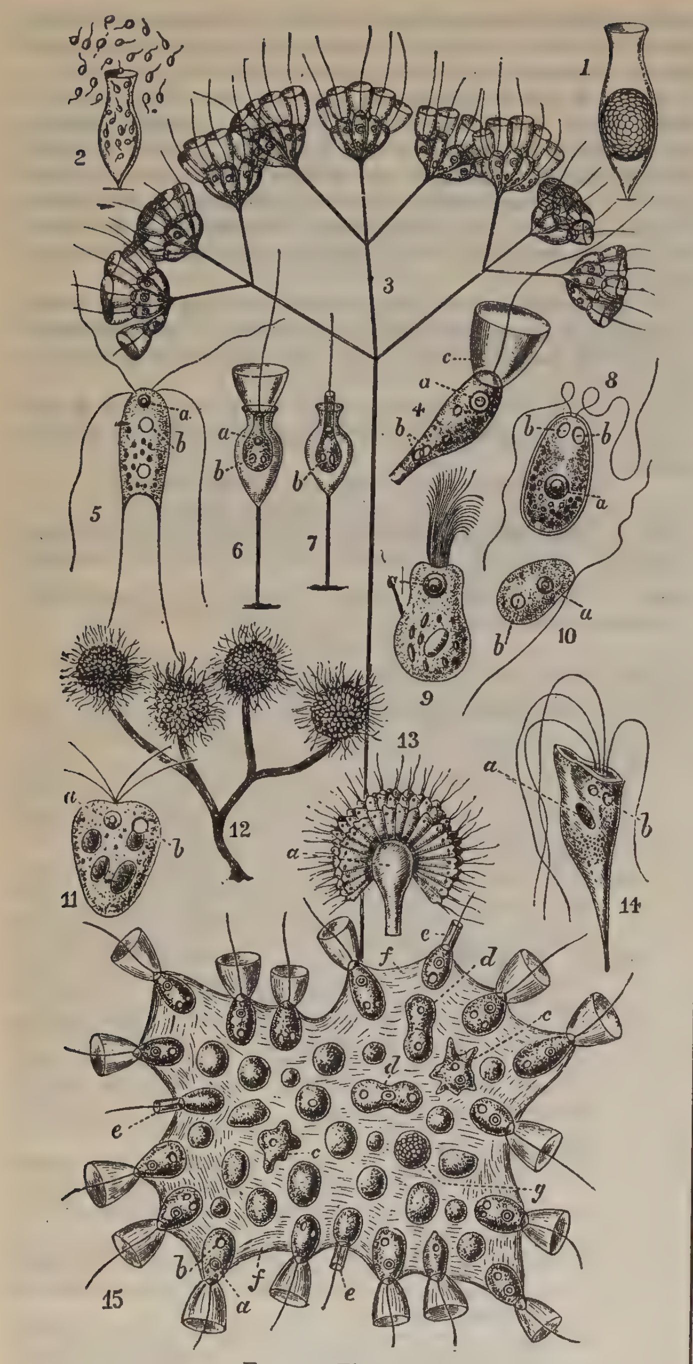

FIG. 2.—Flagellata.

1. *Salpingoeca fusiformis*, S. Kent (Choanoflagellata). The protoplasmic body is drawn together within the goblet-shaped shell, and divided into numerous spores.

2. Escape of the spores of the same as monoflagellate and swarm-spores.

3. *Codosiga umbellata*, Tatem (Choanoflagellata); adult colony formed by dichotomous growth.

4. A single zooid of the same.

a = nucleus.
b = contractile vacuole.
c = the characteristic "collar" of naked streaming protoplasm.

5. *Hexamita inflata*, Duj. (*Distomatidae*); normal adult.

6, 7. *Salpingoeca urceolata*, S. Kent (Choanoflagellata):—6, with collar extended; 7, with collar retracted within the stalked cup.

8. *Polytoma uvella*, Müll. sp. (*Chlamydomonadidae*).

9. *Lophomonas blattarum*, Stein (*Trichonymphidae*) from the intestine of *Blatta orientalis*.

10. *Bodolens*, Müll. (*Bodonidae*), the wavy filament is a tractellum, the straight one is a trailing thread.

11. *Tetramitus sulcatus*, Stein (*Tetramitidae*).

12. *Anthophysa vegetans*, O. F. Müller (*Monadidae*). A typical, erect, shortly-branching colony stock with four terminal monad-clusters.

13. Monad cluster of the same in optical section, showing the relation of the individual monads or flagellate zooids to the stem *d*.

14. *Tetramitus rostratus*, Perty (*Tetramitidae*).

a = nucleus.
b = contractile vacuole.

15. *Proterospongia Haeckeli*, Saville Kent (Choanoflagellata); A social colony of about forty flagellate zooids.

a = nucleus.
b = contractile vacuole.
c = amoebiform cell sunk within the colonial gelatinous test compared by S. Kent to a mesoderm cell of the sponges.
d = similar cell reproducing by transverse fission.
e = normal cells, with their collars contracted.
f = substance of test.
g = individual reproducing by multiple fission, producing microzoospores, comparable to the spermatozoa of sponges.

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antero-lateral flagella; *Costia necatrix* (Leclerq) is also 3-flagellate; causes destructive epidemics in fish-hatcheries.

Family 8.—TETRAMITIDAE. Body pyriform, the pointed end posterior; flagella 4 anterior.

Tetramitus (Perty) (*T. calycinus* of Kent, fig. 2, *11*, *14*), is the "calycine monad" of Dallinger and Drysdale; *Trichomonas*, Donné, possesses a longitudinal undulating membrane, and is an innocuous human parasite; it is possibly related to Haemoflagellates on one hand and to *Trichonymphidae* on the other.

Family 9.—DISTOMATIDAE. Mouth-spots two, or one, with a distinct construction; flagella symmetrically arranged; nucleus bilobed or geminate. *Hexamitus* (Duj.) (fig. 2, *5*), saprophytic and parasitic; *Trepomonas* (Duj.), freshwater; *Megastoma* (Grassi) (= *Lamblia* of Blanchard), with constricted mouth-spot and blepharoplast (kinetonucleus) parasitic in the small intestine of Mammals, including Man.

Family 10.—TRICHONYMPHIDAE. Flagella numerous, sometimes accompanied by one or more undulating membranes; cytoplasm highly differentiated; contractile vacuole absent; all parasitic in insects (all except *Lophomonas* in Termites—the so-called White Ants.)

Lophomonas (St.) (fig. 2, *9*); parasitic in the cockroach; *Dinenympha* (Leidy), *Pyrsonympha* (Leidy); *Trichonympha* (Leidy) (fig. 3, *1*).

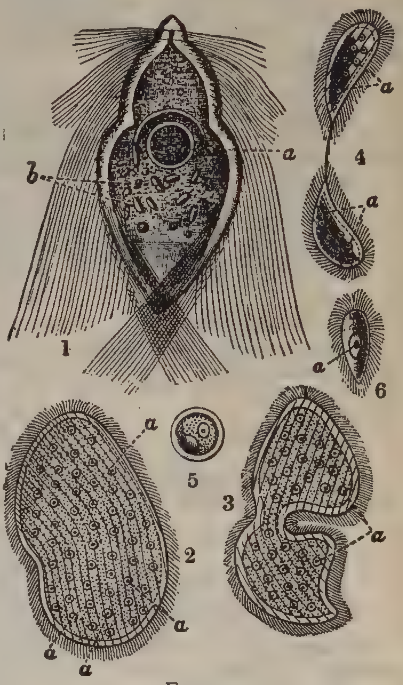


FIG. 3.

1. *Trichonympha agilis*, Leidy, from gut of White Ant (Termite).

2. *Opalina ranarum*, Purkinje parasitic in frog rectum multinucleate adult.

3, 4. Binary fissions of same, 1-nucleat individual at final stage of fission.

5. Same encysted dejected from rectum to be swallowed by tadpole.

6. Young 1-nucleate individual emerged from cyst, destined to grow, proliferating its nuclei to adult form.

a = nucleus.
b = food (?) particles in fig. 1.

Family 11.—OPALINIDAE. Flagella short, numerous, ciliform, uniformly distributed over the flat oval body; nuclei small, numerous, uniform.

Only genus, *Opalina* (Purkinje and Valentin) (fig. 3, *2-6*), in bladder and cloaca of the frog (usually regarded as an aberrant ciliate, but E. R. Lankester expressed doubts as to its position in the 9th edition of this encyclopaedia).

Order 2.—**CHRYSOMONADACEAE.** Contractile vacuole simple (in fresh-water forms) or absent; plastids yellow or brown always present; reserves fat.

Family 1.—CHRYSOMONADIDAE. Body naked, often amoeboid in active state, or sometimes with a cup-like theca, a gelatinous investment, a firm cuticle, or silicified shell; reserves fat or leucosin (starch in *Zooxanthella*); eye-spot present. *Chromulina* (Cienk.) often forms a golden scum on tanks; *Chrysamoeba* (Klebs); *Hydrurus* (Agardh), theca of colony forming branching tubes, simulating a yellow Conferva in mountain torrents; *Dinobryon* (Ehrb.) (fig. 1, *8*, *15*); *Stylochrysalis* (St.); *Uroglena* (Ehrb.); *Syncrypta* (Ehrb.), and *Synura* (Ehrb.) (fig. 1, *5*) form floating spherical colonies; *Zooxanthella* (Brandt), symbiotic as "yellow cells" in Radiolaria *Foraminifera*, *Millepora*, and many Actinozoa.

Family 2.—COCCOLITHOPHORIDAE. Body invested in a spherical test strengthened by calcareous elements, tangential circular plates, "coccoliths," "discoliths," "cyatholiths," or radiating rods "rhabdoliths." These are often found in Foraminiferal ooze and its fossil condition, chalk; when coherent as in the complete test, they are known as "coccospheres" and "rhabdospheres." *Coccolithophora* (Lohmann), *Rhabdosphaera* (Haeckel).

Order 3.—**CRYPTOMONADACEAE.** Contractile vacuole (in fresh-water forms) simple; plastids green, more rarely red, brown or absent; reserves starch; holophytic or saprophytic. *Cryptomonas* (Ehrb.); *Paramoeba* (Greeff) has yellow plastids and shows two cycles, in the one amoeboid, finally encysting to produce a brood of flagellulae; in the other flagellate, and multiplying by longitudinal fission (it differs from *Mastigamoeba* in possessing no flagellum in the amoeboid state, though it takes in food amoeba-fashion); *Chilomonas* (Ehrb.).

Order 4.—**CHLOROMONADACEAE.** Contractile vacuoles 1-3, a complex of variable arrangement; pellicle delicate; plastids discoid chlorophyll-bodies; reserves oil; eye-spot absent even in active state; holophytic or saprophytic, though with an anterior blind tubular depression simulating a pharynx. *Coelomonas* (St.), *Vacuolaria* (Cienk.).

Order 5.—**EUGLENACEAE.** Vacuole large, a reservoir for one or more accessory vacuoles, contractile and opening to the surface by a canal ("pharynx") in which are planted one or two strong flagella; pellicle strong often striated; nucleus large, chromatophores green, complex or absent; reserves paramylum granules of definite shape, and oil; nutrition variable; body stiff or "metabolic," never amoeboid. Among the true Flagellates these are the largest, few being below 40 μ and several attaining 130 μ in length of cell-body (excluding flagellum). Encysted condition common; the green forms sometimes multiply in this state and simulate unicellular Algae.

Family 1.—EUGLENIDAE. Radial (monaxial) forms; nutrition saprophytic or holophytic, mostly one flagellate. (1) Chromatophore large; eye-spot conspicuous. *Euglena* (Ehrb.) (fig. 1, *13*, *17*), with flexible cuticle and metabolic movements (this is probably Priestley's "green matter" through which he obtained oxygen gas)—a very common genus; *Colacium* (Ehbg.), in its resting state epizoic on Copepoda, which it colours green; *Eutreptia* (Perty), biflagellate; *Ascoglena* (St.); *Trachelomonas* (Ehrb.), with a hard brown cuticle; *Phacus* (Nitszche), with a firm rigid pellicle, often symmetrically flattened; *Cryptoglena* (Ehbg.). (2) Chromatophores absent. *Astasia* (Duj.), body metabolic; *Menoidium* (Perty), body not metabolic, somewhat inflected and crescentic; *Sphenomonas* (Stein), with a short accessory trailing flagellum in front peeled; *Distigma* (Ehbg.) (fig. 1, *27*, *28*), very metabolic, with two unequal flagella and two dark pigment spots.

Family 2.—PERANEMIDAE. Bilaterally symmetrical, often creeping, pharynx highly developed, with a firm rod-like skeleton, sometimes protrusible; nutrition saprophytic and holozoic. *Peranema* (Ehbg.) and *Urceolus* (Mereschowsky), uni-flagellate creeping, very metabolic. *Petalomonas* (St.), uni-flagellate flattened with a deep ventral groove, not metabolic; *Heteronema* (Duj.) and *Tropidoscyphus* (St.), with a small accessory anterior trailing flagellum; *Anisonema* (Duj.) and *Entosiphon* (St.), with the trailing flagellum as long as the tractellum or even much longer.

Order 6.—**VOLVOCACEAE.** Contractile vacuole simple anterior; cell always enclosed in a cellulose wall (sometimes gelatinous) perforated by the two (more rarely four, five) diverging anterior flagella; reserves starch; chlorophyll almost always present, except in *Polytoma*, sometimes masked by a red pigment; nutrition usually holophytic, rarely saprophytic, never holozoic. Brood-division in active state common, radial.

Family 1.—CHLAMYDOMONADIDAE. Cell-wall firm not gelatinous, rarely forming colonies. Fore-end of the body with two or four (seldom five) flagella. Almost always green in consequence of the presence of a very large single chromatophore. Generally a delicate shell-like envelope of membranous consistence. 1 to 2 simple contractile vacuoles at the base of the flagella. Usually one eye-speck. Division of the protoplasm within the envelope may produce four, eight or more new individuals. This may occur in the swimming or in a resting stage. Also by more continuous fission microgametes of various sizes are formed. Conjugation is frequent.

Genera.—*Chlorangium* (Stein), lacking green chlorophyll; *Chlorogonium* (Ehr.) (fig. 1, *6*, *7*); *Polytoma* (Ehr.) (fig. 2, *8*); *Chlamydomonas* (Ehr.) (fig. 1, *1*, *2*, *3*); *Haematococcus* (Agardh) (= *Chlamydococcus*, A. Braun, Stein); *Protococcus* (Cohn, Huxley and Martin); *Chlamydomonas* (Cienkowski), causes red snow and "bloody rain"; *Carteria* (Diesing), quadri-flagellate; *Spondylomorum* (Ehrb.), forming floating colonies; *Coccomonas* (St.); *Phacotus* (Perty); *Zoochlorella* (Brandt), is the name given to undetermined Chlamydomonads found multiplying in the resting state within and in symbiotic relation to other Protozoa, to the fresh-water sponge, *Ephydatia*, *Hydra viridis*, and to the Turbellarian, *Convoluta viridis* (in which last species the active form has been recognized as a *Carteria*).

Family 2.—VOLVOCIDAE. Cell-wall gelatinous; always associated in colonies; cells, as in Family 1. The number of individuals united to form a colony varies very much, as does the shape of the colony. Reproduction by the continuous division of all or of only certain individuals of the colony, resulting in the production of a daughter colony (from each such individual). In some, probably in all, at certain times copulation of the individuals of distinct sexual colonies takes place, without or with a differentiation of the colonies and of the copulating cells as male and female. The result of the copulation is a resting zygospore (also called zygote or oospermo or fertilized egg), which after a time develops itself into one or more new colonies.

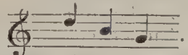
Genera.—*Gonium* (O. F. Müller) (fig. 1, *14*); *Stephanosphaera* (Cohn); *Pandorina* (Bory de Vinc.); *Eudorina* (Ehr.); *Volvox* (Ehr.) (fig. 1, *18*, *20*).

The sexual reproduction of the colonies of the Volvocaceae is one of the most important phenomena presented by the Protozoa. In some families of Flagellata full-grown individuals become amoeboid, fuse, encyst, and then break up into flagellate spores which develop simply to the parental form (fig. 1, *23* to *26*). In the *Chlamydomonadidae* a single adult individual by division produces small individuals, so-called "microgametes." These conjugate with one another or with similar microgametes formed by other adults (as in Chlorogonium, fig. 1, *7*); or more rarely in certain genera a microgamete conjugates with an ordinary individual megagamete. The result in either case is a "zygote," a cell formed by fusion of two which divides in the usual way to produce new individuals. The microgamete in this case is the male element and equivalent to a spermatozoon; the megagamete is the female and equivalent to an egg-cell. The zygote is a "fertilized egg," or oosperm. In some colony-building forms we find that only certain cells produce by division microgametes; and, regarding the colony as a multicellular individual, we may consider these cells as testis-cells and their microgametes as spermatozoa.

CYSTOFLAGELLATA (RHYNCHOFLAGELLATA of E. R. Lankester) and DINOFLAGELLATA are scarcely more than subdivisions of Flagellata; but, following O. Bütschli, we describe them separately; the three groups being united into his MASTIGOPHORA.

Further Remarks on the Flagellates.—Besides the work of special Protozoologists, such as F. Cienkowski, O. Bütschli, F. v. Stein, F. Schaudinn, W. Saville Kent, &c., the Flagellates have been a favourite study with botanists, especially algologists: we may cite N. Pringsheim, F. Cohn, W. C. Williamson, W. Zopf, P. A. Dangeard, G. Klebs, G. Senn, F. Schütt; the reason for this is obvious. They present a wide range of structure, from the simple amoeboid genera to the highly differentiated cells of Euglenaceae, and the complex colonies of *Proterospongia* and *Volvox*. By some they are regarded as the parent-group of the whole of the Protozoa—a position which may perhaps better be assigned to the Proteomyxa; but they seem undoubtedly ancestral to Dinoflagellates and to Cystoflagellates, as well as to Sporozoa, and presumably to Infusoria. Moreover, the only distinction between the *Chlamydomonadidae* and the true green Algae or Chlorophyceae is that when the former divide in the resting condition, or are held together by gelatinization of the older cell-walls (*Palmella* state), they round off and separate, while the latter divide by a "party wall" so as to give rise either to a cylindrical filament when the partitions are parallel and the axis of growth constant (*Conferva* type), or to a plate of tissue when the directions alternate in a plane. The same holds good for the Chrysomonadaceae and Cryptomonadaceae, so that these little groups are included in all text-books of botany. Again among Fungi, the zoospores of the Zoosporous Phycomycetes (Chytrydiaceae, Peronosporaceae, Saprolegniaceae) have the characters of the *Bodonidae*. Thus in two directions the Flagellates lead up to undoubted Plants. Probably also the Chlamydomonads have an ancestral relation to the Conjugatae in the widest sense, and the Chrysomonadaceae to the Diatomaceae; both groups of obscure affinity, since even the reproductive bodies have no special organs of locomotion. For these reasons the Volvocaceae, Chloromonadaceae, Chrysomonadaceae and Cryptomonadaceae have been united as Phytoflagellates; and the Euglenaceae might well be added to these. It is easy to understand the relation of the saprophytic and the holophytic Flagellates to true plants. The capacity to absorb nutritive matter in solution (as contrasted with the ingestion of solid matter) renders the encysted condition compatible with active growth, and what in holozoic forms is a true hypnocyst, a state in which all functions are put to sleep, is here only a rest from active locomotion, nutrition being only limited by the supply of nutritive matter from without, and—in the case of holophytic species—by the illumination: this latter condition naturally limits the possible growth in thickness in holophytes with undifferentiated tissues. The same considerations apply indeed to the larger parasitic organisms among Sporozoa, such as Gregarines and Myxosporidia and Dolichosporidia, which are giants among Protozoa.

LITERATURE.—W. S. Kent, *Manual of the Infusoria*, vol. i. Protozoa (1880–1882); O. Bütschli, *Die Flagellaten* (in Bronn's *Thierreich*, vol. i. Protozoa, 1885); these two works contain full bibliographies of the antecedent authors. See also J. Goroschankin (on Chlamydomonads) in *Bull. Soc. Nat.* (Moscow, iv. v., 1890–1891); G. Klebs, "Flagellatenstudien" in *Zeitsch. Wiss. Zool.* lv. (1892); Doflein, *Protozoen als Krankheitserreger* (1900); Senn, "Flagellaten," in Engler and Prantl's *Pflanzenfamilien*, 1 Teil, Abt. 1a (1900); R. Francé, *Der Organismus der Craspedomonaden* (1897); Grassi and Sandias, "Trichonymphidae," in *Quart. J. Micr. Sci.* xxxix.-xl. (1897); Bezzenberger, "Opa inidae" in *Arch. Protist*, iii. (1903); Marcus Hartog, "Protozoa," in *Cambridge Nat. Hist.* vol. i. (1906). (M. HA.)

FLAGEOLET, in music, a kind of *flûte-à-bec* with a new fingering, invented in France at the end of the 16th century, and in vogue in England from the end of the 17th to the beginning of the 19th century. The instrument is described and illustrated by Mersenne,[1] who states that the most famous maker and player in his day was Le Vacher. The flageolet differed from the recorder in that it had four finger-holes in front and two thumb-holes at the back instead of seven finger-holes in front and one thumb-hole at the back. This fingering has survived in the French flageolet still used in the provinces of France in small orchestras and for dance music. The arrangement of the holes was as follows: 1, left thumb-hole at the back near mouthpiece; 2 and 3, finger-holes stopped by the left hand; 4, finger-hole stopped by right hand; 5, thumb-hole at the back; 6, hole near the open end. According to Dr Burney (*History of Music*) the flageolet was invented by the Sieur Juvigny, who played it in the *Ballet comique de la Royne*, 1581. Dr Edward Browne,[2] writing to his father from Cologne on the 20th of June 1673, relates, "We have with us here one . . . and Mr Hadly upon the flagelet, which instrument he hath so improved as to invent large ones and outgoe in sweetnesse all the basses whatsoever upon any other instrument." About the same time was published Thomas Greeting's *Pleasant Companion; or New Lessons and Instructions for the Flagelet* (London, 1675 or 1682), a rare book of which the British Museum does not possess a copy. The instrument retained its popularity until the beginning of the 19th century, when Bainbridge constructed double and triple flageolets.[3] The three tubes were bored parallel through one piece of wood communicating near the mouthpiece which was common to all three. The lowest notes of the respective tubes were .

The word flageolet was undoubtedly derived from the medieval Fr. *flajol*, the primitive whistle-pipe. (K. S.)

FLAGSHIP, the vessel in a fleet which carries the flag, the symbol of authority of an admiral.

FLAHAUT DE LA BILLARDERIE, AUGUSTE CHARLES JOSEPH, COMTE DE (1785–1870), French general and statesman, son of Alexandre Sébastien de Flahaut de la Billarderie, comte de Flahaut, beheaded at Arras in February 1793, and his wife Adélaide Filleul, afterwards Mme de Souza (*q.v.*), was born in Paris on the 21st of April 1785. Charles de Flahaut was generally recognized to be the offspring of his mother's liaison with Talleyrand, with whom he was closely connected throughout his life. His mother took him with her into exile in 1792, and they remained abroad until 1798. He entered the army as a volunteer in 1800, and received his commission after the battle of Marengo. He became aide-de-camp to Murat, and was wounded at the battle of Landbach in 1805. At Warsaw he met Anne Poniatowski, Countess Potocka, with whom he rapidly became intimate. After the battle of Friedland he received the Legion of Honour, and returned to Paris in 1807. He served in Spain in 1808, and then in Germany. Meanwhile the Countess Potocka had established herself in Paris, but Charles de Flahaut had by this time entered on his liaison with Hortense de Beauharnais, queen of Holland. The birth of their son was registered in Paris on the 21st of October 1811 as Charles Auguste Louis Joseph Demorny, known later as the duc de Morny. Flahaut fought with distinction in the Russian campaign of 1812, and in 1813 became general of brigade, aide-de-camp to the emperor, and, after the battle of Leipzig, general of division. After Napoleon's abdication in 1814 he submitted to the new government, but was placed on the retired list in September. He was assiduous in his attendance on Queen Hortense until the Hundred Days brought him into active service again. A mission to Vienna to secure the return of Marie Louise resulted in failure. He was present at Waterloo, and afterwards sought to place Napoleon II. on the throne. He was saved from exile by Talleyrand's influence, but was placed under police surveillance. Presently he elected to retire to Germany, and thence to England, where he married Margaret, daughter of Admiral George Keith Elphinstone, Lord Keith, and after the latter's death Baroness Keith in her own right. The French ambassador opposed the marriage, and Flahaut resigned his commission. His eldest daughter, Emily Jane, married Henry, 4th marquess of Lansdowne. The Flahauts returned to France in 1827, and in 1830 Louis Philippe gave the count the grade of lieutenant-general and made him a peer of France. He remained intimately associated with Talleyrand's policy, and was, for a short time in 1831, ambassador at Berlin. He was afterwards attached to the household of the duke of Orleans, and in 1841 was sent as ambassador to Vienna, where he remained until 1848, when he was dismissed and retired from the army. After the *coup d'état* of 1851 he was again actively employed, and from 1860 to 1862 was ambassador at the court of St James's. He died on the 1st of September 1870. The comte de Flahaut is perhaps better remembered for his exploits in gallantry, and the elegant manners in which he had been carefully trained by his mother, than for his public services, which were not, however, so inconsiderable as they have sometimes been represented to be.

See A. de Haricourt, *Madame de Souza et sa famille* (1907).

FLAIL (from Lat. *flagellum*, a whip or scourge, but used in the Vulgate in the sense of "flail"; the word appears in Dutch *vlegel*, Ger. *Flegel*, and Fr. *fléau*), a farm hand-implement formerly used for threshing corn. It consists of a short thick club called a "swingle" or "swipple" attached by a rope or leather thong to a wooden handle in such a manner as to enable it to swing freely. The "flail" was a weapon used for military purposes in the middle ages. It was made in the same way as a threshing-flail but much stronger and furnished with iron spikes. It also took the form of a chain with a spiked iron ball at one end swinging free on a wooden or iron handle. This weapon was known as the "morning star" or "holy water sprinkler." During the panic over the Popish plot in England from 1678 to 1681, clubs, known as "Protestant flails," were carried by alarmed Protestants (see GREEN RIBBON CLUB).

FLAMBARD, RANULF, or RALPH (d. 1128), bishop of Durham and chief minister of William Rufus, was the son of a Norman parish priest who belonged to the diocese of Bayeux. Migrating at an early age to England, the young Ranulf entered the chancery of William I. and became conspicuous as a courtier. He was disliked by the barons, who nicknamed him Flambard in reference to his talents as a mischief-maker; but he acquired the reputation of an acute financier and appears to have played an important part in the compilation of the Domesday survey. In that record he is mentioned as a clerk by profession, and as holding land both in Hants and Oxfordshire. Before the death of the old king he became chaplain to Maurice, bishop of London, under whom he had formerly served in the chancery. But early in the next reign Ranulf returned to the royal service. He is usually described as the chaplain of Rufus; he seems in that capacity to have been the head of the chancery and the custodian of the great seal. But he is also called treasurer;

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[1] *Harmonie universelle* (Paris, 1636), bk. v. pp. 232-237.

[2] See Sir Thomas Browne's *Works*, vol. i. p. 206.

[3] See Capt. C. R. Day, *Descriptive Catalogue of Musical Instruments* (London, 1891), pp. 18-22 and pl. 4; also *Complete Instructions for the Double Flageolet* (London, 1825); and *The Preceptor, or a Key to the Double Flageolet* (London, 1815).

and there can be no doubt that his services were chiefly of a fiscal character. His name is regularly connected by the chroniclers with the ingenious methods of extortion from which all classes suffered between 1087 and 1100. He profited largely by the tyranny of Rufus, farming for the king a large proportion of the ecclesiastical preferments which were illegaly kept vacant, and obtaining for himself the wealthy see of Durham (1099). His fortunes suffered an eclipse upon the accession of Henry I., by whom he was imprisoned in deference to the popular outcry. A bishop, however, was an inconvenient prisoner, and Flambard soon succeded in effecting his escape from the Tower of London. A popular legend represents the bishop as descending from the window of his cell by a rope which friends had conveyed to him in a cask of wine. He took refuge with Robert Curthose in Normandy and became one of the advisers who pressed the duke to dispute the crown of England with his younger brother; Robert rewarded the bishop by entrusting him with the administration of the see of Lisieux. After the victory of Tinchebrai (1106) the bishop was among the first to make his peace with Henry, and was allowed to return to his English see. At Durham he passed the remainder of his life. His private life was lax; he had at least two sons, for whom he purchased benefices before they had entered on their teens; and scandalous tales are told of the entertainments with which he enlivened his seclusion. But he distinguished himself, even among the bishops of that age, as a builder and a pious founder. He all but completed the cathedral which his predecessor, William of St Carilef, had begun; fortified Durham; built Norham Castle; founded the priory of Mottisfout and endowed the college of Christchurch, Hampshire. As a politician he ended his career with his submission to Henry, who found in Roger of Salisbury a financier not less able and infinitely more acceptable to the nation. Ranulf died on the 5th of September 1128.

See Orderic Vitalis, *Historia ecclesiastica*, vols. iii. and iv. (ed. le Prévost, Paris, 1845); the first continuation of Symeon's *Historia Ecclesiae Dunelmensis* (Rolls ed., 1882); William of Malmesbury in the *Gesta pontificum* (Rolls ed., 1870); and the *Peterborough Chronicle* (Rolls ed., 1861). Of modern writers E. A. Freeman in his *William Rufus* (Oxford, 1882) gives the fullest account. See also T. A. Archer in the *English Historical Review*, ii. p. 103; W. Stubbs's *Constitutional History of England*, vol. i. (Oxford, 1897); J. H. Round's *Feudal England* (London, 1895). (H. W. C. D.)

FLAMBOROUGH HEAD, a promontory on the Yorkshire coast of England, between the Filey and Bridlington bays of the North Sea. It is a lofty chalk headland, and the resistance it offers to the action of the waves may be well judged by contrast with the low coast of Holderness to the south. The cliffs of the Head, however, are pierced with caverns and fringed with rocks of fantastic outline. Remarkable contortion of strata is seen at various points in the chalk. Sea-birds breed abundantly on the cliffs. A lighthouse marks the point, in 54° 7′ N., 0° 5′ W.

FLAMBOYANT STYLE, the term given to the phase of Gothic architecture in France which corresponds in period to the Perpendicular style. The word literally means "flowing" or "flaming," in consequence of the resemblance to the curved lines of flame in window tracery. The earliest examples of flowing tracery are found in England in the later phases of the Decorated style, where, in consequence of the omission of the enclosing circles of the tracery, the carrying through of the foliations resulted in a curve of contrary flexure of ogee form and hence the term flowing tracery. In the minster and the church of St Mary at Beverley, dating from 1320 and 1330, are the earliest examples in England; in France its first employment dates from about 1460, and it is now generally agreed that the flamboyant style was introduced from English sources. One of the chief characteristics of the flamboyant style in France is that known as "interpenetration," in which the base mouldings of one shaft are penetrated by those of a second shaft of which the faces are set diagonally. This interpenetration, which was in a sense a *tour de force* of French masons, was carried to such an extent that in a lofty rood-screen the mouldings penetrating the base-mould would be found to be those of a diagonal buttress situated 20 to 30 ft. above it. It was not limited, however, to internal work; in late 15th and early 16th century ecclesiastical architecture it is found on the façades of some French cathedrals, and often on the outside of chapels added in later times.

FLAME (Lat. *flamma*; the root *flag-* appears in *flagrare*, to burn, blaze, and Gr. φλέγειν). There is no strict scientific definition of flame, but for the purpose of this article it will be regarded as a name for gas which is temporarily luminous in consequence of chemical action. It is well known that the luminosity of gases can be induced by the electrical discharge, and with rapidly alternating high-tension discharges in air an oxygen-nitrogen flame is produced which is long and flickering, can be blown out, yields nitrogen peroxide, and is in fact indistinguishable from an ordinary flame except by its electrical mode of maintenance. The term "flame" is also applied to solar protuberances, which, according to the common view, consist of gases whose glow is of a purely thermal origin. Even with the restricted definition given above, difficulties present themselves. It is found, for example, with a hydrogen flame that the luminosity diminishes as the purity of the hydrogen is increased and as the air is freed from dust, and J. S. Stas declared that under the most favourable conditions he was only able, even in a dark room, to localize the flame by feeling for it, an observation consistent with the fact that the line spectrum of the flame lies wholly in the ultra-violet. On the other hand, there are many examples of chemical combination between gases where the attendant radiation is below the pitch of visibility, as in the case of ethylene and chlorine. It will be obvious from these facts that a strict definition of flame is hardly possible. The common distinction between luminous and non-luminous flames is, of course, quite arbitrary, and only corresponds to a rough estimate of the degree of luminosity.

The chemical energy necessary for the production of flame may be liberated during combination or decomposition. A single substance like gun-cotton, which is highly endothermic and gives gaseous products, will produce a bright flame of decomposition if a single piece be heated in an evacuated flask. Combination is the more common case, and this means that we have two separate substances involved. If they be not mixed *en masse* before combination, the one which flows as a current into the other is called conventionally the "combustible," but the simple experiment of burning air in coal gas suffices to show the unreality of this distinction between combustible and supporter of combustion, which, in fact, is only one of the many partial views that are explained and perhaps justified by the dominance of oxygen in terrestrial chemistry.

Although hydrocarbon flames are the commonest and most interesting, it will be well to consider simpler flames first in order to discuss some fundamental problems. In hydrocarbon flames the complexity of the combustible, its susceptibility to change by heating, and the possibilities of fractional oxidation, create special difficulties. In the flame of hydrogen and oxygen or carbon monoxide and oxygen we have simpler conditions, though here, too, things may be by no means so simple as they seem from the equations $2H_2 + O_2 = 2H_2O$ and $2CO + O_2 = 2CO_2$. The influence of water vapour on both these actions is well known, and the molecular transactions may in reality be complicated. We shall, however, assume for the sake of clearness that in these cases we have a simple reaction taking place throughout the mass of flame. There are various ways in which a pair of gases may be burned, and these we shall consider separately. Let us first suppose the two gases to have been mixed *en masse* and a light to be applied to the stationary mixture. If the mixture be made within certain limiting proportions, which vary for each case, a flame spreads from the point where the light is applied, and the flame traverses the mixture. This flame may be very slow in its progress or it may attain a velocity of the order of one or two thousand metres per second. Until comparatively recent times great misunderstanding prevailed on this subject. The slow rate of movement of flame in short lengths of gaseous mixtures was taken to be the velocity of explosion, but more recent researches by M. P. E. Berthelot,

E. Mallard and H. L. le Chatelier and H. B. Dixon have shown that a distinction must be made between the slow *initial rate of inflammation* of gaseous mixtures and the *rapid rate of detonation,* or rate of the *explosive wave,* which in many cases is subsequently set up. We shall here deal only with the slow movements of flame. The development of a flame in such a gaseous mixture requires that a small portion of it should be raised to a temperature called the *temperature of ignition.* Here again considerable misunderstanding has prevailed. The temperature of ignition has often been regarded as the temperature at which chemical combination begins, whereas it is really the temperature at which combination has reached a certain rate. The combination of hydrogen and oxygen begins at temperatures far below that of ignition. It may indeed be supposed that the combination occurs with extreme slowness even at ordinary temperatures, and that as the temperature is raised the velocity of the reaction increases in accordance with the general expression according to which an increase of 10° C. will approximately double the rate. However that may be, it has been proved experimentally by J. H. van't Hoff, Victor Meyer and others that the combination of hydrogen and oxygen proceeds at perceptible rates far below the temperature of ignition. The phenomenon appears to be greatly influenced by the solid surfaces which are present; thus in a plain glass vessel the combination only began to be perceptible at 448°, whilst in a silvered glass vessel it would be detected at 182° C.

The same kind of thing is true for most oxidizable substances, including ordinary combustibles. We must look upon the application of heat to a combustible mixture as resulting in an increase of the rate of combination locally. Let us suppose that we are dealing with a stratum of the mixture in small contiguous sections. If we raise the temperature of the first section $a°$ C., an increased rate of combination is set up. The heat produced by this combination will be dissipated by conduction and radiation, and we will suppose that it does not quite suffice to raise the adjacent section of the mixture to $a°$ C. The combination in that section, therefore, will not be as rapid as in the first one, and so evidently the impulse to combination will go on abating as we pass along the stratum. Suppose now we start again and heat the first section of the mixture to a temperature $c°$ C., such that the rate of combination is very rapid and the heat developed by combination suffices to raise the adjacent section of the mixture to a temperature higher than $c°$ C. The rate of combination will then be greater than in the first section, and the impulse to combination will be intensified in the same way from section to section along the stratum until a maximum temperature is reached. It is obvious that there must be a temperature of $b°$ C. between $a°$ and $c°$ which will satisfy this condition, that the heat which results from the combination stimulated in the first section just suffices to raise the temperature of the second section to $b°$. This temperature $b°$ is the temperature of ignition of the mixture; so soon as it is attained by a portion of the mixture the combustion becomes self-sustaining and flame spreads through the mixture. Ignition temperature may be defined briefly as the temperature at which the initial loss of heat due to conduction, &c., is equal to the heat evolved in the same time by the chemical reaction (van't Hoff). From the above considerations we see that the temperature of ignition will vary not only when the gases are varied, but when the proportions of the same gases are varied, and also when the pressure is varied. We can see also that outside certain limiting proportions a mixture of gases will have no practicable ignition temperature, that is to say, the cooling effect of the gas which is in excess will carry off so much heat that no attainable initial heating will suffice to set up the transmission of a constant temperature. Thus in the case of hydrogen and air, mixtures containing less than 5 and more than 72% of hydrogen are not inflammable. The theory of ignition temperature enables us to understand why in an explosive mixture a very small electric spark may not suffice to induce explosion. Combination will indeed take place in the path of the spark, but the amount of it is not sufficient to meet the loss of heat by conduction, &c. It must be added that the theory of ignition temperatures given above does not explain all the observed facts. F. Emich states that the inflammability of gaseous mixtures is not necessarily greatest when the gases are mixed in the proportions theoretically required for complete combination, and the influence of foreign gases does not appear to follow any simple law. The presence of a small quantity of a gas may exercise a profound influence on the ignition temperature as in the case of the addition of ethylene to hydrogen (Sir Edward Frankland), and again when a mixture of methane and air is raised to its ignition temperature a sensible interval (about 10 seconds) elapses before inflammation occurs.

The rate at which a flame will traverse a mixture of two gases which has been ignited depends on the proportions in which the gases are mixed. Fig. 1 (Bunte) represents this relationship for several common gases.

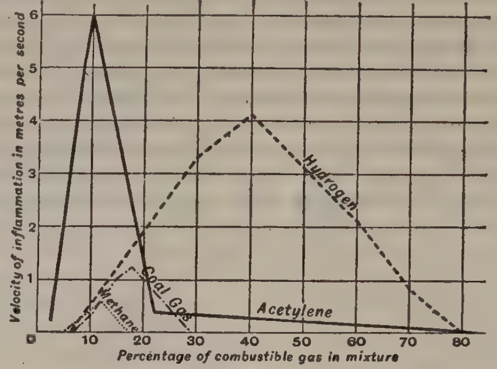


FIG. 1.—Rates of inflammation of combustible gases with air.

If a ready-made gaseous mixture is to be used for the production of a steady flame, it may be forced through a tube and ignited at the end; it is obvious that the velocity of efflux must be greater than the initial rate of inflammation of the mixture, for otherwise the mixture would fire back down the tube. If the velocity of efflux be considerably greater than the rate of inflammation, the flame will be separated from the end of the tube, and only appear as a flickering crown where the velocity and inflammability of the issuing gas have been diminished by admixture with air. With much increased velocity of efflux the flame will be blown out. J. B. A. Dumas used to show the experiment of blowing out a candle with electrolytic gas. A steady flame formed by burning a ready-made gaseous mixture at the end of a tube of circular section has the form shown in fig. 2. The small internal cone marks the lower limiting surface of the flame; it is the locus of all points where the velocity of efflux is just equal to the velocity of inflammation, and its conical form is explained by the fact that the rate of efflux of gas is greatest in the vertical axis of the tube where the flow is not retarded by friction with the walls, as well as by the further fact that the gas issuing from such an orifice spreads outwards, the inflammation proceeding directly against it. The flame, it will be seen, is of considerable thickness. If the gaseous mixture be hydrogen and oxygen, or carbon monoxide and oxygen, it will have no obvious features of structure beyond those shown in the figure; that is to say, the shaded region of burning gas has the appearance of homogeneity and uniform colour which might be expected to accompany a uniform chemical condition. Some admixture of the external air will, of course, take place, especially in the upper parts of the flame, and detectable quantities of oxides of nitrogen may be found in the products of combustion, but this is an inconsiderable feature. The flame just described is essentially that of a blowpipe.

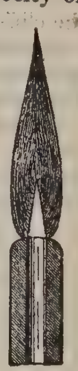


FIG. 2.

A second way of producing a flame is the more common one of allowing one gas to stream into the other. Using the same gases as before, hydrogen or carbon monoxide with oxygen, we find again that the flame is conical in form and uniform in colour, but in this case, if the velocity of efflux be not immoderate, the burning gas only extends over a comparatively thin shell, limited on the inside by the pure combustible and on the outside by a mixture of the products of combustion with oxygen. The combustible gas has to make its own inflammable mixture with the circumambient oxygen, and we may suppose the column of gas to be burned through as it ascends. The core of unburned gas thus becomes thinner as it ascends and the flame tapers to a point. The external surface of a flame of this kind will for the same consumption of gas be larger than that of a flame where the ready-made mixture of gases is used. If a jet of one gas be sent with a sufficient velocity into another, turbulent admixture takes place and an unsteady sheet of flame of uniform colour is obtained.

A third way of forming a flame is to allow the whole of one gas, mixed with a less quantity of the second than is sufficient for complete combustion, to issue into an atmosphere of the second. This is the case with what are generally known as atmospheric burners, of which the Bunsen burner is the prototype. The development of a flame of this kind can be well studied in the case of carbon monoxide and air. The carbon monoxide is fed into a Bunsen burner with closed air-valve, the burner-tube being prolonged by affixing a glass tube to it by means of a cork. The flame consists of a single conical blue sheet. If now the air-valve be opened very slightly, an internal cone of the same blue colour makes its appearance. The air which has entered through the air-valve (" primary " air) has become mixed with the carbon monoxide and so oxidizes its quota in an internal cone, the rest of the carbon monoxide (diluted now, of course, with carbon dioxide and nitrogen) wandering into the external atmosphere to burn (with " secondary " air) in a second cone. The existence of the internal cone and the subsequent thermal effect lead to slight convexity of surface in the outer cone. If the quantity of primary air be increased more internal combustion can take place. This, however, does not lead to an enlargement of the inner cone, for the increase of air increases the rate of inflammation of the mixture, and the inner cone (which only maintains its stability because the rate of efflux of the mixture is greater than the velocity of inflammation) contracts, and will, as the proportion of primary air is increased, soon evince a tendency to enter the burner-tube. At this stage an interesting phenomenon is to be noticed. When we have reached the point of aeration where the velocity of inflammation of the mixture just surpasses the velocity of efflux, the inner cone enters the burner-tube as a disk and descends, but this downward motion checks the suction flow of air through the valve at the base of the burner, whilst it does not appreciably check the pressure flow of the carbon monoxide through the gas nozzle. The result is that a stratum of gas-mixture poor in air, and therefore of low rate of inflammation, is formed, and when the descending disk of flame meets it, the descent is arrested and the disk returns to the top of the tube, reproducing the inner cone. The full air suction is now restored and the course of events is repeated. This oscillatory action can be maintained almost indefinitely long if the pressure and other conditions be maintained constant. With still more primary air the inner cone of flame simply fires back to the burner nozzle, or, in the last stage, we may have enough air entering to produce a flame of the blast blowpipe type, namely, one where the carbon monoxide mixed with an *excess* of primary air burns with a single cone in a steady flame.

By means of a simple contrivance devised by A. Smithells a two-coned flame of the kind described may be resolved into its components. The apparatus is like a half-extended telescope made of two glass tubes, and it is evident that the velocity of a mixture of gases flowing through it must be greater in the narrow tube than in the wider one. If the end of the narrower tube be fixed to a Bunsen burner and the flame be formed at the end of the wider one, then when the air-supply is increased to a certain point the inner cone will descend into the wide tube and attach itself to the upper end of the narrower one. This occurs when the velocity of inflammation is just greater than the upward velocity of the gaseous stream in the wide tube and less than the upward velocity in the narrow tube. If the outer tube be now drawn down, a two-coned flame burns at the end of the inner tube; if the outer tube be slid up again, it detaches the outer cone and carries it upward. This apparatus has been of use in investigating the progress of combustion in various flames.

Temperature of Flames.—The term " flame-temperature " is used very vaguely and has no clear meaning unless qualified by some description. It it least ambiguous when used in reference to flames where the combining gases are mixed in theoretical proportions before issuing from the burner. The flame in such a case has considerable thickness and uniformity, and, though the temperature is not constant throughout, flames of this type given by different combustibles admit of comparison. In other flames where the shells of combustion are thin and envelop large regions of unburned or partly-burned gas, it is not clear how temperature should be specified. An ordinary gas-flame will not, from the point of view of the practical arts, give a sufficient temperature for melting platinum, yet a very thin platinum wire may be melted at the edge of the lower part of such a flame. The maximum temperature of the flame is therefore not in any serious sense an available temperature. It will suffice to point out here that in order to burn a gas so that it may have the highest available temperature, we must burn it with the smallest external flame-surface obtainable. This is done when the combining gases are completely mixed before issuing from the burner. Where this is impracticable we may employ a burner of the Bunsen type, and arrange matters so that a large amount of primary air is supplied. It is in this direction that modern improvements have been made with a view to obtaining hot flames for heating the Welsbach mantle. The Kern burner, for example, employs the principle of the Venturi tube. Where much primary air is drawn in it is usual to provide for it being well mixed with the gas, otherwise an unsteady flame may be produced with a great tendency to light back. The burner head is therefore usually provided with a mixing chamber and the mixture issues through a slit or a mesh. A great many modified Bunsen burners have been produced, the aim in all of them being to produce a flame which shall combine steadiness with the smallest attainable external surface.

To estimate the temperature of flames several methods have been employed. The method of calculation, based on the supposition that the whole heat of combustion is localized in the product (or products) of combustion and heats it to a temperature depending on its specific heat, cannot be applied in a simple way. Apart from the assumption (which there is reason to suppose incorrect) that none of the chemical energy assumes the radiant form directly, we have to regard the possible change of specific heat at high temperatures, the likelihood of dissociation and the time of reaction. Any practical consideration of temperature must have regard to a large assemblage of molecules and not to a single one, and therefore any influence which means delay in combination will result in reduction of temperature by radiation and conduction. It can hardly be maintained that in the present state of knowledge we have the requisite data for the calculation of flame temperature, though good approximations may be made. Many attempts have been made to determine flame temperatures by means of thermo-electric couples and by radiation pyrometers. The couple most employed is that known as H. L. le Chatelier's, consisting of two wires, one of platinum and the other an alloy of 90% platinum and 10% of rhodium. When all possible precautions are taken it is possible by means of such thermo-couples to measure local flame temperatures with a considerable degree of accuracy. Subjoined are some results obtained at different times and by different observers with regard to the maximum temperatures of flames:—

Coal gas in Bunsen burner	(Waggener, 1896) . . .	1770° C.
,, ,, ,, ,,	(Berkenbusch, 1899) .	1830°
,, ,, ,, ,,	(White & Traver, 1902) .	1780°
,, ,, ,, ,,	(Féry, 1905)	1871°

The following are given by Féry:—

Acetylene	2548° C.
Alcohol	1705°
Hydrogen (in air)	1900°
Oxy-hydrogen	2420°
Oxy-coal gas blowpipe	2200°

Source of Light in Flames.—We may consider first those flames where solid particles are out of the question; for example, the flame of carbon monoxide in air. The old idea that the luminosity was due to the thermal glow of the highly heated product of combustion has been challenged independently by a number of observers, and the view has been advanced that the emission of light is due to radiation attendant upon a kind of discharge of chemical energy between the reacting molecules. E. Wiedemann proposed the name "chemi-luminescence" for radiation of this kind. The fact is that colourless gases cannot be made to glow by any purely thermal heating at present available, and products of combustion heated to the average temperature of the flames in which they are produced are non-luminous. On the other hand, it must be remembered that in a mass of burning gas only a certain proportion of the molecules are engaged at one instant in the act of chemical combination, and that the energy liberated in such individual transactions, if localized momentarily as heat, would give individual molecules a unique condition of temperature far transcending that of the average, and the distribution of heat in a flame would be very different from that existing in the same mixture of gases heated from an external source to the same average temperature. The view advocated by Smithells is that in the chemical combination of gases the initial phase of the formation of the new molecule is a vibratory one, which directly furnishes light, and that the damping down of this vibration by colliding molecules is the source of that translatory motion which is evinced as heat. This, it will be seen, is an exact reversal of the older view.

The view of Sir H. Davy that "whenever a flame is remarkably brilliant and dense it may always be concluded that some solid matter is produced in it" can be no longer entertained. The flames of phosphorus in oxygen and of carbon disulphide in nitric oxide contain only gaseous products, and Frankland showed that the flames of hydrogen and carbon monoxide became highly luminous under pressure. From his experiments Frankland was led to the generalization that high luminosity of flames is associated with high density of the gases, and he does not draw a distinction in this respect between high density due to high molecular weight and high density due to the close packing of lighter molecules. The increased luminosity of a compressed flame is not difficult to understand from the kinetic theory of gases, but no explanation has appeared of the luminosity considered by Frankland to be due merely to high molecular weight. It is possible that the electron theory may ultimately afford a better understanding of these phenomena.

Structure of Flame.—The vagueness of the term structure, as applied to flames, is to be seen from the very conflicting accounts which are current as to the number of differentiated parts in different flames. Unless this term is restricted to sharp differences in appearance, there is no limit to the number of parts which may be selected for mention. The flame of carbon monoxide, when the gas is not mixed with air before it issues from the burner, shows no clearly differentiated structure, but is a shell of blue luminosity of shaded intensity—a hollow cone if the orifice of the burner be circular and the velocity of the gas not immoderate, or a double sheet of fan shape if the burner have a slit or two inclined pores which cause the jets of issuing gas to spread each other out. Such a flame has but one single distinct feature, and this is not surprising, as there is no reason to suppose that there is any difference in the chemical process or processes that are occurring in different quarters of the flame. The amount of materials undergoing this transformation in different parts of the flame may and does vary; the gases become diluted with products of combustion, and the molecular vibrations gradually die down. These things may cause a variation in the intensity of the light in different quarters, but the differences induced are not sharp or in any proper sense structural. A flame of this kind may develop a secondary feature of structure. If carbon monoxide be burnt in oxygen which is mixed or combined with another element there may be an additional chemical process that will give light; flames in air are sometimes surrounded by a faintly luminous fringe of a greenish cast, apparently associated with the combination of nitrogen with oxygen (H. B. Dixon). Carbon monoxide on being strongly heated begins to dissociate into carbon and carbon dioxide; if the unburnt carbon monoxide within a flame of that gas were so highly heated by its own burning walls as to reach the temperature of dissociation, we might expect to see a special feature of structure due to the separated carbon. Such a temperature does not, however, appear to be reached.

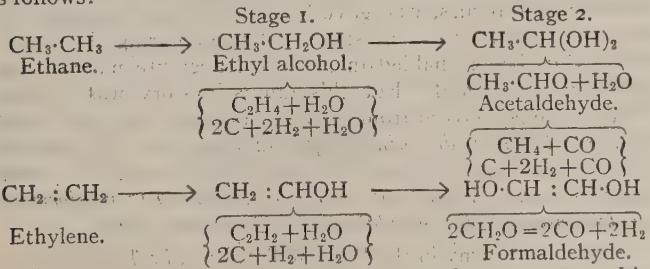
Apart from hydrocarbon flames not much has been published in reference to the structure of flames. The case of cyanogen is of peculiar interest. The beautiful flame of this gas consists of an almost crimson shell surrounded by a margin of bright blue. Investigations have shown that these two colours correspond to two steps in the progress of the combustion, in the first of which the carbon of the cyanogen is oxidized to carbon monoxide and in the second the carbon monoxide oxidized to carbon dioxide.

The inversion of combustion may bring new features of structure into existence; thus when a jet of cyanogen is burnt in oxygen no solid carbon can be found in the flame, but when a jet of oxygen is burnt in cyanogen solid carbon separates on the edge of the flame.

Hydrocarbon Flames.—As already stated the flames of carbon compounds and especially of hydrocarbons have been much more studied than any other kind, as is natural from their common use and practical importance. The earliest investigations were made with coal gas, vegetable oils and tallow, and the composite and complex nature of these substances led to difficulties and confusion in the interpretation of results. One such difficulty may be illustrated by the fact, often overlooked, that when a mixed gaseous combustible issues into air the individual component gases will separate spontaneously in accordance with their diffusibilities: hydrogen will thus tend to get to the outer edge of a flame and heavy hydrocarbons to lag behind.

The features of structure in a hydrocarbon flame depend of course on the manner in which the air is supplied. The extreme cases are (i.) when the issuing gas is supplied before it leaves the burner with sufficient air for complete combustion, as in the blast blowpipe, in which case we have a sheet of blue undifferentiated flame; and (ii.) when the gas has to find all the air it requires after leaving the burner. The intermediate stage is when the issuing gas is supplied before leaving the burner with a part of the air that is required. In this case a two-coned flame is produced. The general theory of such phenomena has already been discussed. It must be remarked that the transition of one kind of flame into the others can be effected gradually, and this is seen with particular ease and distinctness by burning benzene vapour admixed with gradually increasing quantities of air. The key to the explanation of the structure of an ordinary luminous flame, such as that of a candle, is to be found, according to Smithells, by observing the changes undergone by a well-aerated Bunsen flame as the "primary" air is gradually cut off by closing the air-ports at the base of the burner. It is then seen that the two cones of flame evolve or degenerate into the two recognizable blue parts of an ordinary luminous flame, whilst the appearance of the bright yellow luminous patch becomes increasingly emphasized as a hollow dome lying within the upper part of the blue sheath. There are thus three recognizable features of structure in an ordinary luminous flame, each region being as it were a mere shell and the interior of the flame filled with gas which has not yet entered into active combustion. If, as is suggested, the blue parts of an ordinary luminous flame are the relics of the two cones of a Bunsen flame, the chemistry of a Bunsen flame may be appropriately considered first. What happens chemically when a hydrocarbon is burned in a Bunsen burner? The air sent in with the gas is insufficient for complete combustion so that the inner cone of the flame may be considered as air burning in an excess of coal gas. What will be the products of this combustion? This question has been answered at different times in very different ways. There are many conceivable answers: part of the hydrocarbon might be wholly oxidized and the rest left unaltered to mix with the outside air and burn as the outer cone; on the other hand, there might be (as has been so commonly assumed) a selective oxidation in the inner cone whereby the hydrogen was fully oxidized and the carbon set free or oxidized to carbon monoxide; or again the carbon might be oxidized to carbon dioxide or monoxide and the hydrogen set free. There might of course be other intermediate kinds of action. Now it is important at this point to insist upon a distinction between what can be found by direct analysis as to the products of partial combustion, and what can be imagined or inferred as the transitory existence of substances of which the products actually found in analysis are the outcome. We shall consider only in the first instance what substances are found by analysis. Earlier experiments on the Bunsen burner in which coal gas was used, and the gases withdrawn directly from the flame by aspiration, gave no very clear results, but the introduction of the cone-separating apparatus and the use of single hydrocarbons led to more definite conclusions. The analysis of the inter-conal gases from an ethylene flame gave the following numbers:—carbon dioxide = 3·6; water = 9·5; carbon monoxide = 15·6; hydrocarbons = 1·3; hydrogen = 9·4; nitrogen = 60·6.

It appears therefore, and it may be stated as a fact, that a considerable amount of hydrogen is left unoxidized, whilst practically all the carbon is converted into monoxide or dioxide. As the gases have cooled down before analysis and as the reaction $CO + H_2O \rightleftarrows CO_2 + H_2$ is reversible, it may be objected that the inter-conal gases may have a composition when they are hot very different from what they show when cold. Experiments made to test this question have not sustained the objection. Subsequent experiments on the oxidation of hydrocarbons have made it appear undesirable to use the expression "preferential combustion" or "selective combustion" in connexion with the facts just stated; but for the purpose of describing in brief the chemistry of a hydrocarbon flame it is necessary to say that in the inner cone of a Bunsen flame hydrogen and carbon monoxide are the result of the limited oxidation, and that the combustion of these gases with the external air generates the outer cone of the flame. As to the actual stages in the limited oxidation of a hydrocarbon a large amount of very valuable work has been carried out by W. A. Bone and his collaborators. Different hydrocarbons mixed with oxygen have been circulated continuously through a vessel heated to various temperatures, beginning with that (about 250° C.) at which the rate of oxidation is easily appreciable. Proceeding in this way, Bone, without effecting a complete transformation of the hydrocarbon into partially oxidized substances, has isolated large quantities of such products, and concludes that the oxidation of a hydrocarbon involves nothing in the nature of a selective or preferential oxidation of either the hydrogen or the carbon. He maintains that it occurs in several well-defined stages during which oxygen enters into and is incorporated with the hydrocarbon molecule, forming oxygenated intermediate products among which are alcohols and aldehydes. The reactions between ethane and ethylene with an equal volume of oxygen would be represented as follows:—



$$\begin{array}{ccccc}
 & & \text{Stage 1.} & & \text{Stage 2.} \\
\underset{\text{Ethane.}}{CH_3\cdot CH_3} & \longrightarrow & \underbrace{\substack{CH_3\cdot CH_2OH \\ \text{Ethyl alcohol.}}}_{\left\{\substack{C_2H_4+H_2O \\ 2C+2H_2+H_2O}\right\}} & \longrightarrow & \underbrace{CH_3\cdot CH(OH)_2}_{\underbrace{\substack{CH_3\cdot CHO+H_2O \\ \text{Acetaldehyde.}}}_{\left\{\substack{CH_4+CO \\ C+2H_2+CO}\right\}}} \\
\underset{\text{Ethylene.}}{CH_2 : CH_2} & \longrightarrow & \underbrace{CH_2 : CHOH}_{\left\{\substack{C_2H_2+H_2O \\ 2C+H_2+H_2O}\right\}} & \longrightarrow & \underbrace{HO\cdot CH : CH\cdot OH}_{\substack{2CH_2O=2CO+2H_2 \\ \text{Formaldehyde.}}}
\end{array}$$

The affinity between the hydrocarbon and oxygen at a high temperature is so great that, when the supply of oxygen is sufficient to carry the oxidation as far as the second stage, practically no decomposition of the monohydroxy molecule formed in the first stage occurs. This is especially the case with unsaturated hydrocarbons.

As a crucial test decisive against the hypothesis of preferential carbon oxidation, Bone cites the experiment of firing a mixture of equal volumes of ethane and oxygen sealed up in a glass bulb. In such a case a lurid flame fills the vessel, accompanied by a black cloud of carbon particles and considerable condensation of water. About 10% of methane is also found. It is impossible within the limits of this article to give a more extended account of these later researches on the oxidation of hydrocarbons. They make it evident that the relative oxidizability of carbon and hydrogen cannot form the basis of a general theory of the combustion of hydrocarbons, and that both the a priori view that hydrogen is the more oxidizable element, and the inference from the behaviour of ethylene when exploded with its own volume of oxygen, viz. that carbon is the more oxidizable element in hydrocarbons, are not in harmony with experimental facts.

The view that the bright luminosity of hydrocarbon flames is due "to the deposition of solid charcoal" was first put forward by Sir Humphry Davy in 1816. In explaining the origin of this charcoal, Davy used somewhat ambiguous language, stating that it "might be owing to a decomposition of a part of the gas towards the interior of the flame where the air was in smallest quantity." This statement was interpreted commonly as implying that the charcoal became free by the preferential combustion of the hydrogen, and such an interpretation was given explicitly by Faraday. Whatever may have been Davy's view with regard to this part of the theory, his conclusion that finely divided carbon was the cause of luminosity in hydrocarbon flames was not questioned until 1867, when E. Frankland, in connexion with researches already alluded to, maintained that the luminosity of such flames was not due in any important degree to solid particles of carbon, but to the incandescence of dense hydrocarbon vapours. Among the arguments adduced against this view the most decisive is furnished by the optical test first used by J. L. Soret. If the image of the sun be focussed upon the glowing part of a hydrocarbon flame the scattered light is found to be polarized, and it is indisputable that the luminous region is pervaded by a cloud of finely divided solid matter. The quantity of this solid (estimated by H. H. C. Bunte to be 0·1 milligram in a coal-gas flame burning 5 cub. ft. per hour) is sufficient to account for the luminosity, so that Davy's original view may be said to be now universally accepted.

The remaining question with regard to the luminosity of a hydrocarbon flame relates to the manner in which the carbon is set free. The fact that hydrocarbons when strongly heated in absence of air will deposit carbon has long been known and is daily evident in the operation of coal-gas making, when gas carbon accumulates as a hard deposit in the highly-heated crown of the retorts. There is no difficulty in supposing therefore that the carbon in a flame is separated from the hydrocarbon within it by the purely thermal action of the blue burning walls of the flame. Many experiments might be adduced to confirm this view. It is sufficient to name two. If a ring of metal wire be so disposed in a small flame as to make a girdle within the blue walls towards the base, the withdrawal of heat is rapid enough to prevent the maintenance of a temperature sufficient to cause a separation of carbon, and the bright luminosity disappears. Again, if the flame of a Bunsen burner be fed through the air-ports not with air but with some neutral gas such as nitrogen, carbon dioxide or steam, the dilution of the burning gas and the hydrocarbon within it becomes so great that the temperature of separation is not attained, no carbon is separated and the flame consists of a single blue shell.

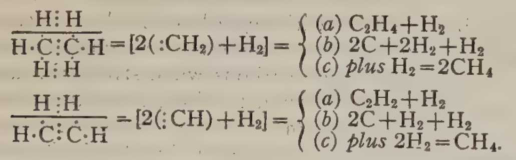
Whilst it is thus easy to understand generally why carbon becomes separated as a solid within a flame, it is not easy to trace the processes by which the carbon becomes separated in the case of a given hydrocarbon. According to M. P. E. Berthelot, who made prolonged and elaborate researches on the pyrogenetic relationships of hydrocarbons, these compounds only liberate carbon by a process of the continual coalescence of hydrocarbon molecules with the elimination of hydrogen, until there is left the limiting solid hydrocarbon hardly distinguishable from carbon itself and constituting the glowing soot of flames.

V. B. Lewes, on the other hand, basing his conclusions on a study of the thermal decomposition of hydrocarbons, on temperature measurements of flames and analysis of their gases, has more recently developed a theory of flame luminosity in which the formation and sudden exothermic decomposition of acetylene are regarded as the essential incidents productive of carbon separation and luminosity. Smithells has disputed the evidence on which this theory is based and it appears to have gained no adherence from those who have worked in the same field; but as it has not been formally disavowed by the author and has found its way into some text-books, it is mentioned here.

W. A. Bone and H. F. Coward (*Journ. Chem. Soc.*, 1908) published the results of a very careful study of the decomposition of hydrocarbons when heated in a stationary condition and when continually circulated through hot vessels. Their results disclose once more the great difficulty of tracing the processes of decomposition and of arriving at a generalization of wide applicability, but they appear to be conclusive against the views both of Berthelot and of Lewes.

They do not think that the decomposition of hydrocarbons can be adequately represented by ordinary chemical equations owing to the complexity of the changes which really take place. Methane, which is the most stable of the hydrocarbons, appears to be resolved at high temperatures directly into carbon and hydrogen, but the phenomenon is dependent mainly on surface action; ethane, ethylene and acetylene undergo decomposition throughout the body of the gas (*loc. cit.* p. 1197 et seq.).

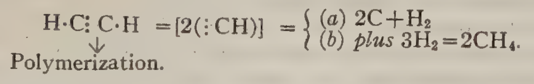
"In the cases of ethane and ethylene it may be supposed that the *primary* effect of high temperature is to cause an elimination of hydrogen with a simultaneous loosening or dissolution of the bond between the carbon atoms, giving rise to (in the event of dissolution) residues such as $:\mathrm{CH_2}$ and $\vdots\,\mathrm{CH}$. These residues, which can only have a very fugitive separate existence, may either (*a*) form $\mathrm{H_2C:CH_2}$ and $\mathrm{HC\vdots CH}$, as the result of encounters with other similar residues, or (*b*) break down directly into carbon and hydrogen, or (*c*) be directly hydrogenized to methane in an atmosphere rich in hydrogen. These three possibilities may all be realized simultaneously in the same decomposing gas in proportions dependent on the temperature, pressure and amount of hydrogen present. The whole process may be represented by the following scheme, the dotted line indicating the tendency to dissolve a bond between the carbon atoms which becomes actually effective at higher temperatures:—



$$\begin{array}{c}\mathrm{H:H}\\ \hline \mathrm{H{\cdot}C\vdots C{\cdot}H}\\ \mathrm{H:H}\end{array} = [2(:\mathrm{CH_2})+\mathrm{H_2}] = \begin{cases}(a)\ \mathrm{C_2H_4+H_2}\\ (b)\ \mathrm{2C+2H_2+H_2}\\ (c)\ \textit{plus}\ \mathrm{H_2=2CH_4}\end{cases}$$

$$\begin{array}{c}\mathrm{H:H}\\ \hline \mathrm{H{\cdot}C\vdots C{\cdot}H}\end{array} = [2(\vdots\,\mathrm{CH})+\mathrm{H_2}] = \begin{cases}(a)\ \mathrm{C_2H_2+H_2}\\ (b)\ \mathrm{2C+H_2+H_2}\\ (c)\ \textit{plus}\ \mathrm{2H_2=CH_4}.\end{cases}$$

"In the case of acetylene, the main primary change may be either one of polymerization or of dissolution according to the temperature, and if the latter, it may be supposed that the molecule breaks down across the triple bond between the carbon atoms, giving rise to $2(\vdots\,\mathrm{CH})$, and that these residues are subsequently either resolved into carbon and hydrogen or "hydrogenized," according to circumstances, thus:—



$$\underset{\substack{\downarrow\\ \text{Polymerization.}}}{\mathrm{H{\cdot}C\vdots C{\cdot}H}} = [2(\vdots\,\mathrm{CH})] = \begin{cases}(a)\ \mathrm{2C+H_2}\\ (b)\ \textit{plus}\ \mathrm{3H_2=2CH_4}.\end{cases}$$

"Acetylene is, moreover, distinguished by its power of polymerization at moderate temperatures so that whether it is the gas initially heated or whether it is a prominent product of the decomposition of another hydrocarbon polymerization will occur to an extent dependent on temperature."

We may describe briefly the view to which we are led as to the genesis of an ordinary luminous hydrocarbon flame:—

The gaseous hydrocarbon issues from the burner or wick, let us suppose, in a cylindrical column. This column is not sharply marked off from the air but is so penetrated by it that we must suppose a gradual transition from the pure hydrocarbon in the centre of column to the pure air on the outside. Let us take a thin transverse slice of the flame, near the lower part of the wick or close to the burner tube. At what lateral distance from the centre will combustion begin? Clearly, where enough oxygen has penetrated the column to give such partial combustion as takes place in the inner cone of a Bunsen burner. This then defines the blue region. Outside this the combustion of the carbon monoxide, hydrogen and any hydrocarbons which pass from the blue region takes place in a faintly luminous fringe. These two layers form a sheath of active combustion, surrounding and intensely heating the enclosed hydrocarbons in the middle of the column. These heated hydrocarbons rise and are heated to a higher temperature as they ascend. They are accordingly decomposed with separation of carbon in the higher parts of the flame, giving the region of bright yellow luminosity. There remains a central core in which neither is there any oxygen for combustion nor a sufficiently high temperature to cause carbon separation. This constitutes the dark interior region of the flame. We thus account for the different parts of the flame. It is to be noted, however, that the bright blue layer only surrounds the lower part of the flame, whilst the pale, faintly-luminous fringe surrounds the whole flame. The flame also is conical and not cylindrical. The foregoing explanation is therefore not quite complete. Let us suppose that the changes have gone on in the small section of the flame exactly as described and consider how the processes will differ in parts above this section. The central core of unburned gases will pass upwards and we may treat it as a new cylindrical column which will undergo changes just as the original one, leaving, however, a smaller core of unburned gases, or, in other words, each succeeding section of the flame will be of smaller diameter. This gives us the conical form of the flame. Again, the higher we ascend the flame the greater proportionally is the amount of separated carbon, for we have not only the heat of laterally outlying combustion to effect decomposition, but also that of the lower parts of the flame. The lower part of a luminous flame accordingly contains less separated carbon than the upper. Where the hydrocarbon is largely decomposed before combustion we have no longer the conditions of the Bunsen flame, and so in the upper parts of a luminous flame the bright blue part fades away. The luminous fringe would, however, be continued, for the separated hydrogen has still to burn. In this way then we may reasonably account for the existence, position and relative sizes of the four regions of an ordinary luminous flame. (A. S.)

FLAMEL, NICOLAS (*c.* 1330–1418), reputed French alchemist and scrivener to the university of Paris, was born in Paris or Pontoise about 1330, and died in Paris in 1418, bequeathing the bulk of his property to the church of Saint-Jacques-la-Boucherie, where he was buried. During his life he contributed freely to charitable and religious purposes from the considerable wealth he amassed either by the practice of his craft, or, as some surmise without definite proof, by fortunate speculation or money lending, or, as legend has it, by alchemy. According to a document purporting to be written by himself in 1413 (printed in Waite's *Lives of the Alchemystical Philosophers*, London, 1888), there fell into his hands in 1357, at the cost of two florins, a book on alchemy by Abraham the Jew, which taught in plain words the transmutation of metals. It did not, however, explain the *materia prima*, but merely figured or depicted it, and for more than 20 years Flamel strove in vain to find out the secret. Then, returning from a journey to Spain, he fell in with a Christian Jew, named Canches, who gave him the explanation, and after three more years' work he succeeded in preparing the *materia prima*, thus being enabled in 1382 to transmute mercury into both silver and gold. But this fantastic story was disposed of by the facts, derived from parish records, set forth in Vilain's *Essai sur l'histoire de Saint-Jacques-la-Boucherie*, 1758, and his *Histoire critique de Nicolas Flamel et de Pernelle sa femme, recueillie d'actes anciens qui justifient l'origine et la médiocrité de leur fortune contre les imputations des alchimistes*, 1761.

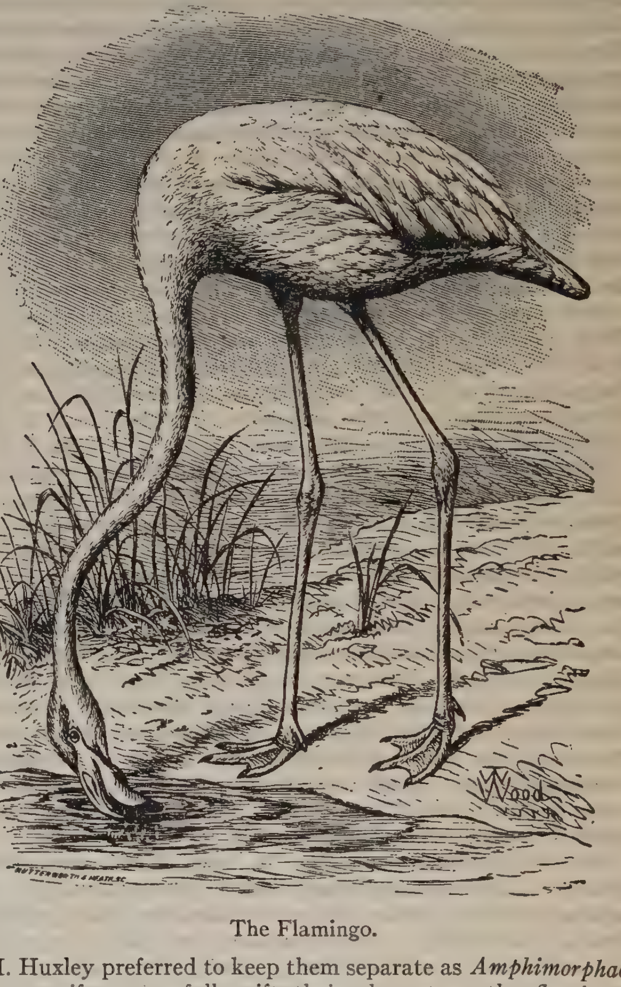
A book on alchemy in the Paris Bibliothèque, *Le Trésor de philosophie*, professing to be written and illuminated by Flamel with his own hand, is of very doubtful authenticity, and other treatises bearing his name, such as the *Sommaire philosophique de Nicolas Flamel*, published in 1561 in a collection of alchemist treatises entitled *Transformation métallique*, are certainly spurious.

FLAMEN (from *flare*, "to blow up" the altar fire), a Roman sacrificial priest. The flamens were subject to the pontifex (*q.v.*) maximus, and were consecrated to the service of some particular deity. The highest in rank were the *flamen Dialis*, *flamen Martialis* and *flamen Quirinalis*, who were always selected from among the patricians. Their institution is generally ascribed to Numa. When the number of flamens was raised from three to fifteen, those already mentioned were entitled *majores*, in contradistinction to the other twelve, who were called *minores*, as connected with less important deities, and were chosen from the plebs. Towards the end of the republic the number of the lesser flamens seems to have diminished. The flamens were held to be elected for life, but they might be compelled to resign office for neglect of duty, or on the occurrence of some ill-omened event (such as the cap falling off the head) during the performance of their rites. The characteristic dress of the flamens in general was the *apex*, a white conical cap, the *laena* or mantle, and a laurel wreath. The official insignia of the *flamen Dialis* (of Jupiter), the highest of these priests, were the white cap (*pileus*, *albogalerus*), at the top of which was an olive branch and a woollen thread; the *laena*, a thick woollen *toga praetexta* woven by his wife; the sacrificial knife; and a rod to keep the people from him when on his way to offer sacrifice. He was never allowed to appear without these emblems of office, every day being considered a holy day for him. By virtue of his office he was entitled to a seat in the senate and a curule chair. The sight of fetters being forbidden him, his toga was not allowed to be tied in a knot but was fastened by means of clasps, and the only kind of ring permitted to be worn on his finger was a broken one. If a person in fetters took refuge in his house he was immediately loosed from his bonds; and if a criminal on his way to the scene of his punishment met him and threw himself at his feet he was respited for that day. The *flamen Dialis* was not allowed to leave the city for a single night, to ride or even touch a horse (a restriction which incapacitated him for the consulship), to swear an oath, to look at an army, to touch anything unclean, or to look upon people working. His marriage, which was obliged to be performed with the ceremonies of *confarreatio* (*q.v.*), was dissoluble only by death, and on the death of his wife (called *flaminica Dialis*) he was obliged to resign his office. The *flaminica Dialis* assisted her husband at the sacrifices and other religious duties which he performed. She wore long woollen robes; a veil and a kerchief for the head, her hair being plaited up with a purple band in a conical form (*tutulus*); and shoes made of the leather of sacrificed animals; like her husband, she carried the sacrificial knife. The main duty of the flamens was the offering of daily sacrifices; on the 1st of October the three major flamens drove to the Capitol and sacrificed to *Fides Publica* (the Honour of the People). Some of the municipal towns in Italy had flamens as well as Rome.

We may mention, as distinct from the above, the *flamen curialis*, who assisted the *curio*, the priest who attended to the religious affairs of each curia (*q.v.*); the flamens of various sacerdotal corporations, such as the Arval Brothers; the *flamen Augustalis*, who superintended the worship of the emperor in the provinces.

See Marquardt, *Römische Staatsverwaltung*, iii. (1885), pp. 326-336, 473; H. Dessau, in *Ephemeris epigraphica*, iii. (1877); and the exhaustive article by C. Jullian in Daremberg and Saglio, *Dictionnaire des antiquités*.

FLAMINGO (Port. *Flamingo*, Span. *Flamenco*), one of the tallest and most beautiful birds, conspicuous for the bright flame-coloured or scarlet patch upon its wings, and long known by its classical name *Phoenicopterus*, as an inhabitant of most of the countries bordering the Mediterranean Sea. Flamingos have a very wide distribution, and the sole genus comprises only a few species. *Ph. roseus* or *antiquorum*, white, with a rosy tinge above, and with scarlet wing-coverts, while the remiges are black (as in all species), ranges from the Cape Verde Islands to India and Ceylon, north as far as Lake Baikal; southwards through Africa and Madagascar, eventually as *P. minor*. *P. ruber*, entirely light vermilion, extends from Florida to Para and the Galapagos; *P. chilensis* s. *ignipalliatus*, from Peru to Patagonia, more resembles the classical species; while *P. andinus*, the tallest of all, which lacks the hallux, inhabits the salt lakes of the elevated desert of Atacama, whence it extends into Chile and Argentina. Fossil remains of flamingos have been described from the Lower Miocene of France as *P. croizeti*, and from the Pliocene of Oregon. From the Mid-Miocene to the Oligocene of France are known several species of *Palaelodus*, *Elornis* and *Agnopterus*, which have relatively shorter legs, longer toes and a complicated hypotarsus, and represent an earlier family, less specialized although not directly ancestral to the flamingos. *Palaelodidae* and *Phoenicopteridae* together form the larger group Phoenicopteri. These are in many respects exactly intermediate between Anserine and stork-like birds, so much so in fact that T. H. Huxley preferred to keep them separate as *Amphimorphae*. However, if we carefully sift their characters, the flamingos obviously reveal themselves as much nearer related to the *Ciconiae*, especially to *Platalea* and *Ibis*, than to the Anseres. This is the opinion arrived at by W. F. R. Weldon, M. Fuerbringer and Gadow, while others prefer the goose-like voice and the webbed toes as reliable characters. (For a detailed analysis of this instructive question see Bronn's *Thierreich*, Aves Syst. p. 146.)



The Flamingo.

The food of the flamingo seems to consist chiefly of small aquatic invertebrate animals whch live in the mud of lagoons, for instance Mollusca, but also of Confervae and other low salt-water algae. Whilst feeding, the bird wades about, stirs up the mud with its feet, and, reversing the ordinary position of its head so as to hold the crown downwards and to look backwards, sifts the mud through its bill. This is abruptly bent down in the middle, as if broken; the upper jaw is rather flat and narrow, while the lower jaw is very roomy and furnished with numerous lamellae, which, together with the thick and large tongue, act like a sieve, an arrangement enhanced by the considerable movability of the upper jaw. Then the bird erects its long neck to swallow the selected food. When flying, flamingos present a striking and beautiful sight, with legs and neck stretched out straight, looking like white and rosy or scarlet crosses with black arms. Not less fascinating is a flock of these sociable birds when at rest, standing on one or both legs, with their long necks twisted or coiled upon the body in any conceivable position.

The nest is likewise peculiar. It is built of mud, a somewhat conical structure rising above the water according to the depth, of which the cone is from a few inches to 2 ft. in height. If, as often happens, the water-level sinks, the nests stand out higher. On the top is a shallow cup for the reception of the one or two eggs, which have a bluish-white shell with chalky incrustation. Of course the hen sits with her legs doubled up under her, as does any other long-legged bird. It seems strange that many ornithologists should have given credence to W. Dampier's statement of the mode of incubation (*New Voyage round the World*, ed. 2, i. p. 71, London, 1699): "And when they lay their eggs, or hatch them, they stand all the while, not on the hillock, but close by it with their legs on the ground and in the water, resting themselves against the hillock, and covering the hollow nest upon it with their rumps," &c. P. S. Pallas (*Zoograph. Rosso-Asiatica*, ii. p. 208) tried to improve upon this by stating that the standing bird leans upon the nest with its breast! The young, which are hatched after about four weeks' incubation, look very different from the adult. The small bill is still quite straight and the legs are short. The whole body is covered with a thick coat of short nestling feathers, pure white in colour. These *neossoptiles* or first feathers bear no resemblance to those of the Anseriform birds, but agree in detail with those of spoonbills, the young of which the little flamingos resemble to a striking extent, but they leave the nest soon after their birth to shift for themselves like ducks and geese. (H. F. G.)

FLAMINIA, VIA, an ancient high road of Italy, constructed by C. Flaminius during his censorship (220 B.C.). It led from Rome to Ariminum, and was the most important route to the north. We hear of frequent improvements being made in it during the imperial period. Augustus, when he instituted a general restoration of the roads of Italy, which he assigned for the purpose among various senators, reserved the Flaminia for himself, and rebuilt all the bridges except the Pons Mulvius, by which it crosses the Tiber, 2 m. N. of Rome (built by M. Scaurus in 109 B.C.), and an unknown Pons Minucius. Triumphal arches were erected in his honour on the former bridge and at Ariminum, the latter of which is still preserved. Vespasian constructed a new tunnel through the pass of Intercisa, modern Furlo, in A.D. 77 (see CALES), and Trajan, as inscriptions show, repaired several bridges along the road.

The Via Flaminia runs due N. from Rome, considerable remains of its pavement being extant in the modern high road, passing slightly E. of the site of the Etruscan Falerii, through Ocriculi and Narnia. Here it crossed the Nar by a splendid four-arched bridge to which Martial alludes (*Epigr*. vii. 93, 8), one arch of which and all the piers are still standing; and went on, followed at first by the modern road to Sangemini which passes over two finely preserved ancient bridges, past Carsulae to Mevania, and thence to Forum Flaminii. Later on a more circuitous route from Narnia to Forum Flaminii was adopted, passing by Interamna, Spoletium and Fulginium (from which a branch diverged to Perusia), and increasing the distance by 12 m. The road thence went on to Nuceria (whence a branch road ran to Septempeda and thence either to Ancona or to Tolentinum and Urbs Salvia) and Helvillum, and then crossed the main ridge of the Apennines, a temple of Jupiter Apenninus standing at the summit of the pass. Thence it descended to Cales (where it turned N.E.), and through the pass of Intercisa to Forum Sempronii (Fossombrone) and Forum Fortunae, where it reached the coast of the Adriatic. Thence it ran N.W. through Pisaurum to Ariminum. The total distance from Rome was 210 m. by the older road and 222 by the newer. The road gave its name to a juridical district of Italy from the 2nd century A.D. onwards, the former territory of the Senones, which was at first associated with Umbria (with which indeed under Augustus it had formed the sixth region of Italy), but which after Constantine was always administered with Picenum. (T. As.)

FLAMININUS, TITUS QUINCTIUS (*c.* 228–174 B.C.), Roman general and statesman. He began his public life as a military tribune under M. Claudius Marcellus, the conqueror of Syracuse. In 199 he was quaestor, and the next year, passing over the regular stages of aedile and praetor, he obtained the consulship.

Flamininus was one of the first and most successful of the rising school of Roman statesmen, the opponents of the narrow patriotism of which Cato was the type, the disciples of Greek culture, and the advocates of a wide imperial policy. His winning manners, his polished address, his knowledge of men, his personal fascination, and his intimate knowledge of Greek, all marked him out as the fittest representative of Rome in the East. Accordingly, the province of Macedonia, and the conduct of the war with Philip V. of Macedon, in which, after two years, Rome had as yet gained little advantage, were assigned to him. Flamininus modified both the policy and tactics of his predecessors. After an unsuccessful attempt to come to terms, he drove the Macedonians from the valley of the Aous by skilfully turning an impregnable position. Having thus practically made himself master of Macedonia, he proceeded to Greece, where Philip still had allies and supporters. The Achaean League (*q.v.*) at once deserted the cause of Macedonia, and Nabis, the tyrant of Sparta, entered into an alliance with Rome; Acarnania and Boeotia submitted in less than a year, and, with the exception of the great fortresses, Flamininus had the whole of Greece under his control. The demand of the Greeks for the expulsion of Macedonian garrisons from Demetrias, Chalcis and Corinth, as the only guarantee for the freedom of Greece, was refused, and negotiations were broken off. Hostilities were renewed in the spring of 197, and Flamininus took the field supported by nearly the whole of Greece. At Cynoscephalae the Macedonian phalanx and the Roman legion for the first time met in open fight, and the day decided which nation was to be master of Greece and perhaps of the world. It was a victory of superior tactics. The left wing of the Roman army was retiring in confusion before the Macedonian right led by Philip in person, when Flamininus, leaving them to their fate, boldly charged the left wing under Nicanor, which was forming on the heights. Before the left wing had time to form, Flamininus was upon them, and a massacre rather than a fight ensued. This defeat was turned into a general rout by a nameless tribune, who collected twenty companies and charged in the rear the victorious Macedonian phalanx, which in its pursuit had left the Roman right far behind. Macedonia was now at the mercy of Rome, but Flamininus contented himself with his previous demands. Philip lost all his foreign possessions, but retained his Macedonian kingdom almost entire. He was required to reduce his army, to give up all his decked ships except five, and to pay an indemnity of 1000 talents (£244,000). Ten commissioners arrived from Rome to regulate the final terms of peace, and at the Isthmian games a herald proclaimed to the assembled crowds that "the Roman people, and T. Quinctius their general, having conquered King Philip and the Macedonians, declare all the Greek states which had been subject to the king henceforward free and independent." Flamininus's last act before returning home was characteristic. Of the Achaeans, who vied with one another in showering upon him honours and rewards, he asked but one personal favour, the redemption of the Italian captives who had been sold as slaves in Greece during the Hannibalic War. These, to the number of 1200, were presented to him on the eve of his departure (spring, 194), and formed the chief ornament of his triumph.

In 192, on the rupture between the Romans and Antiochus III. the Great, Flamininus returned to Greece, this time as the civil representative of Rome. His personal influence and skilful diplomacy secured the wavering Achaean states, cemented the alliance with Philip, and contributed mainly to the Roman victory at Thermopylae (191). In 183 he undertook an embassy to Prusias, king of Bithynia, to induce him to deliver up Hannibal, who forestalled his fate by taking poison. Nothing more is known of Flamininus, except that, according to Plutarch, his end was peaceful and happy.

There seems no doubt that Flamininus was actuated by a genuine love of Greece and its people. To attribute to him a Machiavellian policy, which foresaw the overthrow of Corinth fifty years later and the conversion of Achaea into a Roman province, is absurd and disingenuous. There is more force in the charge that his Hellenic sympathies prevented him from seeing the innate weakness and mutual jealousies of the Greek states of that period, whose only hope of peace and safety lay in submitting to the protectorate of the Roman republic. But if the event proved that the liberation of Greece was a political mistake, it was a noble and generous mistake, and reflects nothing but honour on the name of Flamininus, "the liberator of the Greeks."

His life has been written by Plutarch, and in modern times by F. D. Gerlach (1871); see also Mommsen, *Hist. of Rome* (Eng. tr.), bk. iii. chs. 8, 9.

FLAMINIUS, GAIUS, Roman statesman and general, of plebeian family. During his tribuneship (232 B.C.), in spite of the determined opposition of the senate and his own father, he carried a measure for distributing among the plebeians the *ager Gallicus Picenus*, an extensive tract of newly-acquired territory to the south of Ariminum (Cicero, *De senectute*, 4, *Brutus*, 14). As praetor in 227, he gained the lasting gratitude of the people of his province (Sicily) by his excellent administration. In 223, when consul with P. Furius Philus, he took the field against the Gauls, who were said to have been roused to war by his agrarian law. Having crossed the Po to punish the Insubrians, he at first met with a severe check and was forced to capitulate. Reinforced by the Cenomani, he gained a decisive victory on the banks of the Addua. He had previously been recalled by the optimates, but ignored the order. The victory seems to have been due mainly to the admirable discipline and fighting qualities of the soldiers, and he obtained the honour of a triumph only after the decree of the senate against it had been overborne by popular clamour. During his censorship (220) he strictly limited the freedmen to the four city tribes (see COMITIA). His name is further associated with two great works. He erected the Circus Flaminius on the Campus Martius, for the accommodation of the plebeians, and continued the military road from Rome to Ariminum, which had hitherto only reached as far as Spoletium (see FLAMINIA, VIA). He probably also instituted the "plebeian" games. In 218, as a leader of the democratic opposition, Flaminius was one of the chief promoters of the measure brought in by the tribune Quintus Claudius, which prohibited senators and senators' sons from possessing sea-going vessels, except for the transport of the produce of their own estates, and generally debarred them from all commercial speculation (Livy xxi. 63). His effective support of this measure vastly increased the popularity of Flaminius with his own order, and secured his second election as consul in the following year (217), shortly after the defeat of T. Sempronius Longus at the Trebia. He hastened at once to Arretium, the termination of the western high road to the north, to protect the passes of the Apennines, but was defeated and killed at the battle of the Trasimene lake (see PUNIC WARS).

The testimony of Livy (xxi., xxii.) and Polybius (ii., iii.)—no friendly critics—shows that Flaminius was a man of ability, energy and probity. A popular and successful democratic leader, he cannot, however, be ranked among the great statesmen of the republic. As a general he was headstrong and self-sufficient and seems to have owed his victories chiefly to personal boldness favoured by good fortune.

His son, GAIUS FLAMINIUS, was quaestor under P. Scipio Africanus the elder in Spain in 210, and took part in the capture of New Carthage. Fourteen years later, when curule aedile, he distributed large quantities of grain among the citizens at a very low price. In 193, as praetor, he carried on a successful war against the insubordinate populations of his recently constituted province of Hispania Citerior. In 187 he was consul with M. Aemilius Lepidus, and subjugated the warlike Ligurian tribes. In the same year the branch of the Via Aemilia connecting Bononia with Arretium was constructed by him. In 181 he founded the colony of Aquileia. The chief authority for his life is the portion of Livy dealing with the history of the period.

FLAMSTEED, JOHN (1646–1719), English astronomer, was born at Denby, near Derby, on the 19th of August 1646. The only son of Stephen Flamsteed, a maltster, he was educated at the free school of Derby, but quitted it finally in May 1662, in consequence of a rheumatic affection of the joints, due to a chill caught while bathing. Medical aid having proved of no avail, he went to Ireland in 1665 to be "stroked" by Valentine Greatrakes, but "found not his disease to stir." Meanwhile, he solaced his enforced leisure with astronomical studies. Beginning with J. Sacrobosco's *De sphaera*, he read all the books on the subject that he could buy or borrow; observed a partial solar eclipse on the 12th of September 1662; and attempted the construction of measuring instruments. A tract on the equation of time, written by him in 1667, was published by Dr John Wallis with the *Posthumous Works* of J. Horrocks (1673); and a paper embodying his calculations of appulses to stars by the moon, which appeared in the *Philosophical Transactions* (iv. 1099), signed *In Mathesi a sole fundes*, an anagram of "Johannes Flamsteedius," secured for him, from 1670, general scientific recognition.

On his return from a visit to London in 1670 he became acquainted with Isaac Newton at Cambridge, entered his name at Jesus college, and took, four years later, a degree of M.A. by letters-patent. An essay composed by him in 1673 on the true and apparent diameters of the planets furnished Newton with data for the third book of the *Principia*, and he fitted numerical elements to J. Horrocks's theory of the moon. In 1674, and again in 1675, he was invited to London by Sir Jonas Moore, governor of the Tower, who proposed to establish him in a private observatory at Chelsea, but the plan was anticipated by the determination of Charles II. to have the tables of the heavenly bodies corrected, and the places of the fixed stars rectified "for the use of his seamen," and Flamsteed was appointed "astronomical observator" by a royal warrant dated 4th of March 1675. His salary of £100 a year was cut down by taxation to £90; he had to provide his own instruments, and to instruct, into the bargain, two boys from Christ's hospital. Sheer necessity drove him, in addition, to take many private pupils; but having been ordained in 1675, he was presented by Lord North in 1684 to the living of Burstow in Surrey; and his financial position was further improved by a small inheritance on his father's death in 1688. He now ordered, at an expense of £120, a mural arc from Abraham Sharp, with which he began to observe systematically on the 12th of September 1689 (see ASTRONOMY: *History*). The latter part of Flamsteed's life passed in a turmoil of controversy regarding the publication of his results. He struggled to withhold them until they could be presented in a complete form; but they were urgently needed for the progress of science, and the astronomer-royal was a public servant. Sir Isaac Newton, who depended for the perfecting of his lunar theory upon "places of the moon" reluctantly doled out from Greenwich, led the movement for immediate communication; whence arose much ill-feeling between him and Flamsteed. At last, in 1704, Prince George of Denmark undertook the cost of printing; a committee of the Royal Society was appointed to arrange preliminaries, and Flamsteed, protesting and exasperated, had to submit. The work was only partially through the press when the prince died, on the 28th of October 1708, and its completion devolved upon a board of visitors to the observatory endowed with ample powers by a royal order of the 12th of December 1712. As the upshot, the *Historia coelestis*, embodying the first Greenwich star-catalogue, together with the mural arc observations made 1689-1705, was issued under Edmund Halley's editorship in 1712. Flamsteed denounced the production as surreptitious; he committed to the flames three hundred copies, of which he obtained possession through the favour of Sir Robert Walpole; and, in defiance of bodily infirmities, vigorously prosecuted his designs for the entire and adequate publication of the materials he continued to accumulate. They were but partially executed when he died on the 31st of December 1719. The preparation of his monumental work, *Historia coelestis Britannica* (3 vols. folio, 1725), was finished by his assistant, Joseph Crosthwait, aided by Abraham Sharp. The first two volumes included the whole of Flamsteed's observations at Derby and Greenwich; the third contained the *British Catalogue* of nearly 3000 stars. Numerous errors in this valuable record having been detected by Sir William Herschel, Caroline Herschel drew up a list of 560 stars observed, but not catalogued, while 111 of those catalogued proved to have never been observed (*Phil. Trans.* lxxxvii. 293; see also F. Baily, *Memoirs Roy. Astr. Society*, iv. 129). The appearance of the *Atlas coelestis*, corresponding to the *British Catalogue*, was delayed until 1729. A portrait of Flamsteed, painted by Thomas Gibson in 1712, hangs in the rooms of the Royal Society. The extent and quality of his performance were the more remarkable considering his severe physical sufferings, his straitened means, and the antagonism to which he was exposed. Estimable in private life, he was highly susceptible in professional matters, and hence failed to keep on terms with his contemporaries.

Francis Baily's *Account of the Rev. John Flamsteed* (1835) is the leading authority for his life. It comprises an autobiographical narrative pieced together from various sources, a large collection of Flamsteed's letters, a revised and enlarged edition of the *British Catalogue*, besides authoritative and detailed introductory discussions. Some clamour was raised by a publication in which blame for harsh dealings was freely imputed to Newton, but W. Whewell vindicated his character in *Flamsteed and Newton* (1836).

See also *General Dictionary*, vol. v. (1737), from materials supplied by James Hodgson, Flamsteed's nephew-in-law; *Biographia Britannica*, iii. 1943 (1750); S. Rigaud's *Correspondence of Scientific Men*; Cunningham's *Lives of Eminent Englishmen*, iv. 366 (1835); Mark Noble's Continuation of James Granger's *Biog. Hist. of England*, ii. 132; R. Grant's *Hist. of Phys. Astronomy*, p. 467; W. Whewell's *Hist. of the Inductive Sciences*, ii. 162; J. S. Bailly's *Hist. de l'astronomie moderne*, ii. 423, 589, 650; J. Delambre's *Hist. de l'astronomie au XVIII*^{e} *siècle*, p. 93; *Observatory*, xv. 355, 379, 382. (A. M. C.)

FLANDERS (Flem. *Vlaanderen*), a territorial name for part of the Netherlands, Europe. Originally it applied only to Bruges and the immediate neighbourhood. In the 8th and 9th centuries it was gradually extended to the whole of the coast region from Calais to the Scheldt. In the middle ages this was divided into two parts, one looking to Bruges as its capital, and the other to Ghent. The name is retained in the two Belgian provinces of West and East Flanders.

1. West Flanders is the portion bordering the North Sea, and its coast-line extends from the French to the Dutch frontier for a little over 40 m. Its capital is Bruges, and the principal towns of the province are Ostend, Courtrai, Ypres and Roulers. Agriculture is the chief occupation of the population, and the country is under the most careful and skilful cultivation. The admiration of the foreign observer for the Belgian system of market gardening is not diminished on learning that the subsoil of most of this tract is the sand of the "dunes." Fishing employs a large proportion of the coast population. The area of West Flanders is officially computed at 808,667 acres or 1263 sq. m. In 1904 the population was 845,732, giving an average of 669 to the sq. m.

2. East Flanders lies east and north-east of the western province, and extends northwards to the neighbourhood of Antwerp. It is still more productive and richer than Western Flanders, and is well watered by the Scheldt. The district of Waes, land entirely reclaimed within the memory of man, is supposed to be the most productive district of its size in Europe. The principal towns are Ghent (capital of the province), St Nicolas, Alost, Termonde, Eecloo and Oudenarde. The area is given at 749,987 acres or 1172 sq. m. In 1904 the population was 1,073,507, showing an average of 916 per sq. m.

History.—The ancient territory of Flanders comprised not only the modern provinces known as East and West Flanders, but the southernmost portion of the Dutch province of Zeeland and a considerable district in north-western France. In the time of Caesar it was inhabited by the Morini, Atrebates and other Celtic tribes, but in the centuries that followed the land was repeatedly overrun by German invaders, and finally became a part of the dominion of the Franks. On the break-up of the Carolingian empire the river Scheldt was by the treaty of Verdun (843) made the line of division between the kingdom of East Francia (Austrasia) under the emperor Lothaire, and the kingdom of West Francia (Neustria) under Charles the Bald. In virtue of this compact Flanders was henceforth attached to the West Frankish monarchy (France). It thus acquired a position unique among the provinces of the territory known in later times as the Netherlands, all of which were included in that northern part of Austrasia assigned on the death of the emperor Lothaire (855) to King Lothaire II., and from his name called Lotharingia or Lorraine.

The first ruler of Flanders of whom history has left any record is Baldwin, surnamed *Bras-de-fer* (Iron-arm). This man, a brave and daring warrior under Charles the Bald, fell in love with the king's daughter Judith, the youthful widow of two English kings, married her, and fled with his bride to Lorraine. Charles, though at first very angry, was at last conciliated, and made his son-in-law margrave (*Marchio Flandriae*) of Flanders, which he held as an hereditary fief. The Northmen were at this time continually devastating the coast lands, and Baldwin was entrusted with the possession of this outlying borderland of the west Frankish dominion in order to defend it against the invaders. He was the first of a line of strong rulers, who at some date early in the 10th century exchanged the title of margrave for that of count. His son, Baldwin II.—the Bald—from his stronghold at Bruges maintained, as did his father before him, a vigorous defence of his lands against the incursions of the Northmen. On his mother's side a descendant of Charlemagne, he strengthened the dynastic importance of his family by marrying Aelfthryth, daughter of Alfred the Great. On his death in 918 his possessions were divided between his two sons Arnulf the Elder and Adolphus, but the latter survived only a short time and Arnulf succeeded to the whole inheritance. His reign was filled with warfare against the Northmen, and he took an active part in the struggles in Lorraine between the emperor Otto I. and Hugh Capet. In his old age he placed the government in the hands of Baldwin, his son by Adela, daughter of the count of Vermandois, and the young man, though his reign was a very short one, did a great deal for the commercial and industrial progress of the country, establishing the first weavers and fullers at Ghent, and instituting yearly fairs at Ypres, Bruges and other places.

On Baldwin III.'s death in 961 the old count resumed the control, and spent the few remaining years of his life in securing the succession of his grandson Arnulf II.—the Younger. The reign of Arnulf was terminated by his death in 989, and he was followed by his son Baldwin IV., named *Barbatus* or the Bearded. This Baldwin fought successfully both against the Capetian king of France and the emperor Henry II. Henry found himself obliged to grant to Baldwin IV. in fief Valenciennes, the burgraveship of Ghent, the land of Waes, and Zeeland. The count of Flanders thus became a feudatory of the empire as well as of the French crown. The French fiefs are known in Flemish history as Crown Flanders (*Kroon-Vlaanderen*), the German fiefs as Imperial Flanders (*Rijks-Vlaanderen*). Baldwin's son—afterwards Baldwin V.—rebelled in 1028 against his father at the instigation of his wife Adela, daughter of Robert II. of France; but two years later peace was sworn at Oudenaarde, and the old count continued to reign till his death in 1036. Baldwin V. proved a worthy successor, and acquired from the people the surname of *Débonnaire*. He was an active enterprising man, and greatly extended his power by wars and alliances. He obtained from the emperor Henry IV. the territory between the Scheldt and the Dender as an imperial fief, and the margraviate of Antwerp. So powerful had he become that the Flemish count on the decease of Henry I. of France in 1060 was appointed regent during the minority of Philip I. (see

France). Before his death he saw his eldest daughter Matilda (d. 1083) sharing the English throne with William the Conqueror, his eldest son Baldwin of Mons in possession of Hainaut in right of his wife Richilde, heiress of Regnier V. (d. 1036) and widow of Hermann of Saxony (d. 1050/1) (see Hainaut), and his second son Robert the Frisian regent (*voogd*) of the county of Holland during the minority of Dirk V., whose mother, Gertrude of Saxony, widow of Floris I. of Holland (d. 1061), Robert had married (see Holland). On his death in 1067 his son Baldwin of Mons, already count of Hainaut, succeeded to the countship of Flanders. Baldwin V. had granted to Robert the Frisian on his marriage in 1063 his imperial fiefs. His right to these was disputed by Baldwin VI., and war broke out between the two brothers. Baldwin was killed in battle in 1070. Robert now claimed the tutelage of Baldwin's children and obtained the support of the emperor Henry IV., while Richilde, Baldwin's widow, appealed to Philip I. of France. The contest was decided at Ravenshoven, near Cassel, on the 22nd of February 1071, where Robert was victorious. Richilde was taken prisoner and her eldest son Arnulf III. was slain. Robert obtained from Philip I. the investiture of Crown Flanders, and from Henry IV. the fiefs which formed Imperial Flanders.

The second son of Richilde was recognized as count of Hainaut (see Hainaut), which was thus after a brief union separated from Flanders. Robert died in 1093, and was succeeded by his son Robert II., who acquired great renown by his exploits in the first crusade, and won the name of the Lance and Sword of Christendom. His fame was second only to that of Godfrey of Bouillon. Robert returned to Flanders in 1100. He fought with his suzerain Louis the Fat of France against the English, and was drowned in 1111 by the breaking of a bridge. His son and successor, Baldwin VII., or Baldwin with the Axe, also fought against the English in France. He died at the age of twenty-seven from the wound of an arrow, in 1119, leaving no heir. He nominated as his successor his cousin Charles, son of Knut IV. of Denmark and of Adela, daughter of Robert the Frisian. Charles tried his utmost to put down oppression and to promote the welfare of his subjects, and obtained the surname of "the Good." His determination to enforce the right made him many enemies, and he was foully murdered on Ash Wednesday, 1127, at Bruges. He died childless, and there were no less than six candidates to the countship. The contest lay between two of these, William Clito, son of Robert of Normandy and grandson of William the Conqueror and Matilda of Flanders, and Thierry or Dirk of Alsace, whose mother Gertrude was a daughter of Robert the Frisian. William Clito, through the support of Louis of France, was at first accepted by the Flemish nobles as count, but he gave offence to the communes, who supported Thierry. A struggle ensued and William was killed before Alost. Thierry then became count without further opposition. He married the widow of Charles the Good, Marguerite of Clermont, and proved himself at home a wise and prudent prince, encouraging the growth of popular liberty and of commerce. In 1146 he took part in the second crusade and distinguished himself by his exploits. In 1157 he resigned the countship to his son Philip of Alsace and betook himself once more to Jerusalem. On his return from the East twenty years later Thierry retired to a monastery to die in his own land.

Count Philip of Alsace was a strong and able man. He did much to promote the growth of the municipalities for which Flanders was already becoming famous. Ghent, Bruges, Ypres, Lille and Douai under him made much progress as flourishing industrial towns. He also conferred rights and privileges on a number of ports, Hulst, Nieuwport, Sluis, Dunkirk, Axel, Damme, Gravelines and others. But while encouraging the development of the communes and "free towns," Philip sternly repressed any spirit of independence or attempted uprisings against his authority. This count was a powerful prince. He acted for a time as regent in France during the minority of his godson Philip Augustus, and married his ward to his niece Isabella of Hainaut (1180). Philip took part in the third crusade, and died in the camp before Acre of the pestilence in 1191.

As he had no children, the succession passed to Baldwin of Hainaut, who had married Philip's sister Margaret. The countships of Flanders and Hainaut were thus united under the same ruler. Baldwin did not obtain possession of Flanders without strong opposition on the part of the French king, and he was obliged to cede Artois, St Omer, Lens, Hesdin and a great part of southern Flanders to France, and to allow Matilda of Portugal, the widow of Philip of Alsace, to retain certain towns in right of her dowry. Margaret died in 1194 and Baldwin the following year, and their eldest son Baldwin IX. succeeded to both countships. Baldwin IX. is famous in history as the founder of the Latin empire at Constantinople. He perished in Bulgaria in 1206. The emperor's two daughters were both under age, and the government was carried on by their uncle Philip, marquess of Namur, whom Baldwin had appointed regent on his departure to Constantinople. Philip proved faithless to his charge, and he allowed his nieces to fall into the hands of Philip Augustus, who married the elder sister Johanna of Constantinople to his nephew Ferdinand of Portugal. The Flemings were averse to the French king's supremacy, and Ferdinand, who acted as governor in the name of his wife, joined himself to the confederacy formed by Germany, England, and the leading states of the Netherlands against Philip Augustus. Ferdinand was, however, taken prisoner at the disastrous battle of Bouvines (1214) and was kept for twelve years a prisoner in the Louvre. The countess Johanna ruled the united countships with prudence and courage. On Ferdinand's death she married Thomas of Savoy, but died in 1244, leaving no heirs. She was succeeded in her dignities by her younger sister Margaret of Constantinople, commonly known amongst her contemporaries as "Black Meg" (*Zwarte Griet*). Margaret had been twice married. Her first husband was (1212) Buchard of Avesnes, one of the first of Hainaut's nobles and a man of knightly prowess, but originally destined for the church. On this ground he was excommunicated by Innocent III. and imprisoned by the countess Johanna, with the result that Margaret at last was driven to repudiate him. She married in second wedlock (1225) William of Dampierre. Two sons were the issue of the first marriage, three sons and three daughters of the second.

When Margaret in 1244 became countess of Flanders and Hainaut, she wished her son William of Dampierre to be acknowledged as her successor. John of Avesnes, her eldest son, strongly protested against this and was supported by the French king. A civil war ensued, which ended in a compromise (1246), the succession to Flanders being granted to William of Dampierre, that of Hainaut to John of Avesnes. Margaret, however, ruled with a strong hand for many years and survived both her sons, dying at the age of eighty in 1280. On her death her grandson, John II. of Avesnes, became count of Hainaut: Guy of Dampierre, her second son by her second marriage, count of Flanders.

The two counties were once more under separate dynasties. The government of Guy of Dampierre was unfortunate. It was the interest of the Flemish weavers to be on good terms with England, the wool-producing country, and Guy entered into an alliance with Edward I. against France. This led to an invasion and conquest of Flanders by Philip the Fair. Guy with his sons and the leading Flemish nobles were taken prisoners to Paris, and Flanders was ruled as a French dependency. But though in the principal towns, Ghent, Bruges and Ypres, there was a powerful French faction—known as *Leliaerts* (adherents of the lily)—the arbitrary rule of the French governor and officials stirred up the mass of the Flemish people to rebellion. The anti-French partisans (known as *Clauwaerts*) were strongest at Bruges under the leadership of Peter de Conync, master of the cloth-weavers, and John Breydel, master of the butchers. The French garrison at Bruges were massacred (May 19th, 1302), and on the following 11th of July a splendid French army of invasion was utterly defeated near Courtray. Peace was concluded in 1305, but owing to Guy of Dampierre, and the leading Flemish nobles being in the hands of the French king, on terms very disadvantageous to Flanders. Very shortly afterwards the aged count Guy died, as did also Philip the Fair. Robert of Bethune, his son and successor, had continual difficulties with France during the whole of his reign, the Flemings offering a stubborn resistance to all attempts to destroy their independence. Robert was succeeded in 1322 by his grandson Louis of Nevers. Louis had been brought up at the French court, and had married Margaret of France. His sympathies were entirely French, and he made use of French help in his contests with the communes.

Under Louis of Nevers Flanders was practically reduced to the status of a French province. In his time the long contest between Flanders and Holland for the possession of the island of Zeeland was brought to an end by a treaty signed on the 6th of March 1323, by which West Zeeland was assigned to the count of Holland, the rest to the count of Flanders. The latter part of the reign of Louis of Nevers was remarkable for the successful revolt of the Flemish communes, now rapidly advancing to great material prosperity under Jacob van Artevelde (see ARTEVELDE, JACOB VAN). Artevelde allied himself with Edward III. of England in his contest with Philip of Valois for the French crown, while Louis of Nevers espoused the cause of Philip. He fell at the battle of Crécy (1346). He was followed in the countship by his son Louis II. or Mâle. The reign of this count was one long struggle with the communes, headed by the town of Ghent, for political supremacy. Louis was as strong in his French sympathies as his father, and relied upon French help in enforcing his will upon his refractory subjects, who resented his arbitrary methods of government, and the heavy taxation imposed upon them by his extravagance and love of display. Had the great towns with their organized gilds and great wealth held together in their opposition to the count's despotism, they would have proved successful, but Ghent and Bruges, always keen rivals, broke out into open feud. The power of Ghent reached its height under Philip van Artevelde (see ARTEVELDE, PHILIP VAN) in 1382. He defeated Louis, took Bruges and was made *ruward* of Flanders. But the triumph of the White Hoods, as the popular party was called, was of short duration. On the 27th of November 1382 Artevelde suffered a crushing defeat from a large French army at Roosebeke and was himself slain. Louis of Mâle died two years later, leaving an only daughter Margaret, who had married in 1369 Philip the Bold, duke of Burgundy.

Flanders now became a portion of the great Burgundian domain, which in the reign of Philip the Good, Margaret's grandson, had absorbed almost the whole of the Netherlands (see BURGUNDY; NETHERLANDS). The history of Flanders as a separate state ceases from the time of the acquisition of the countship by the Burgundian dynasty. There were revolts from time to time of great towns against the exactions even of these powerful princes, but they were in vain. The conquest and humiliation of Bruges by Philip the Good in 1440, and the even more relentless punishment inflicted on rebellious Ghent by the emperor Charles V. exactly a century later are the most remarkable incidents in the long-continued but vain struggle of the Flemish communes to maintain and assert their privileges. The Burgundian dukes and their successors of the house of Habsburg were fully alive to the value to them of Flanders and its rich commercial cities. It was Flanders that furnished to them no small part of their resources, but for this very reason, while fostering the development of Flemish industry and trade, they were the more determined to brook no opposition which sought to place restrictions upon their authority.

The effect of the revolt of the Netherlands and the War of Dutch Independence which followed was ruinous to Flanders. Albert and Isabel on their accession to the sovereignty of the southern Netherlands in 1599 found "the great cities of Flanders and Brabant had been abandoned by a large part of their inhabitants; agriculture hardly in a less degree than commerce and industry had been ruined." In 1633 with the death of Isabel, Flanders reverted to Spanish rule (1633). By the treaty of Munster the north-western portion of Flanders, since known as States (or Dutch) Flanders, was ceded by Philip IV. to the United Provinces (1648). By a succession of later treaties—of the Pyrenees (1659), Aix-la-Chapelle (1668), Nijmwegen (1679) and others—a large slice of the southern portion of the old county of Flanders became French territory and was known as French Flanders.

From 1795 to 1814 Flanders, with the rest of the Belgic provinces, was incorporated in France, and was divided into two departments—*département de l'Escaut* and *département de la Lys*. This division has since been retained, and is represented by the two provinces of East Flanders and West Flanders in the modern kingdom of Belgium. The title of count of Flanders was revived by Leopold I. in 1840 in favour of his second son, Philip Eugene Ferdinand (d. 1905). (G. E.)

FLANDRIN, JEAN HIPPOLYTE (1809–1864), French painter, was born at Lyons in 1809. His father, though brought up to business, had great fondness for art, and sought himself to follow an artist's career. Lack of early training, however, disabled him for success, and he was obliged to take up the precarious occupation of a miniature painter. Hippolyte was the second of three sons, all painters, and two of them eminent, the third son Paul (b. 1811) ranking as one of the leaders of the modern landscape school of France. Auguste (1804–1842), the eldest, passed the greater part of his life as professor at Lyons, where he died. After studying for some time at Lyons, Hippolyte and Paul, who had long determined on the step and economized for it, set out to walk to Paris in 1829, to place themselves under the tuition of Hersent. They chose finally to enter the atelier of Ingres, who became not only their instructor but their friend for life. At first considerably hampered by poverty, Hippolyte's difficulties were for ever removed by his taking, in 1832, the Grand Prix de Rome, awarded for his picture of the "Recognition of Theseus by his Father." This allowed him to study five years at Rome, whence he sent home several pictures which considerably raised his fame. "St Clair healing the Blind" was done for the cathedral of Nantes, and years after, at the exhibition of 1855, brought him a medal of the first class. "Jesus and the Little Children" was given by the government to the town of Lisieux. "Dante and Virgil visiting the Envious Men struck with Blindness," and "Euripides writing his Tragedies," belong to the museum at Lyons. Returning to Paris through Lyons in 1838 he soon received a commission to ornament the chapel of St John in the church of St Séverin at Paris, and reputation increased and employment continued abundant for the rest of his life. Besides the pictures mentioned above, and others of a similar kind, he painted a great number of portraits. The works, however, upon which his fame most surely rests are his monumental decorative paintings. Of these the principal are those executed in the following churches:—in the sanctuary of St Germain des Prés at Paris (1842–1844), in the choir of the same church (1846–1848), in the church of St Paul at Nismes (1848–1849), of St Vincent de Paul at Paris (1850–1854), in the church of Ainay at Lyons (1855), in the nave of St Germain des Prés (1855–1861). In 1856 Hippolyte Flandrin was elected to the Académie des Beaux-Arts. In 1863 his failing health, rendered worse by incessant toil and exposure to the damp and draughts of churches, induced him again to visit Italy. He died of smallpox at Rome on the 21st of March 1864. As might naturally be expected in one who looked upon painting as but the vehicle for the expression of spiritual sentiment, he had perhaps too little pride in the technical qualities of his art. There is shown in his works much of that austerity and coldness, expressed in form and colour, which springs from a faith which feels itself in opposition to the tendencies of surrounding life. He has been compared to Fra Angelico; but the faces of his long processions of saints and martyrs seem to express rather the austerity of souls convicted of sin than the joy and purity of never-corrupted life which shines from the work of the early master.

See Delaborde, *Lettres et pensées de H. Flandrin* (Paris, 1865); Beulé, *Notice historique sur H. F.* (1869).

FLANNEL, a woollen stuff of various degrees of weight and fineness, made usually from loosely spun yarn. The origin of the word is uncertain, but in the 16th century flannel was a well-known production of Wales, and a Welsh origin has been suggested. The French form *flanelle* was used late in the 17th century, and the Ger. *Flanell* early in the 18th century. Baize, a kind of coarse flannel with a long nap, is said to have been first introduced to England about the middle of the 16th century by refugees from France and the Netherlands. The manufacture of flannel has naturally undergone changes, and, in some cases, deteriorations. Flannels are frequently made with an admixture of silk or cotton, and in low varieties cotton has tended to become the predominant factor. Formerly a short staple wool of fine quality from a Southdown variety of the Sussex breed was principally in favour with the flannel manufacturers of Rochdale, who also used largely the wool from the Norfolk breed, a cross between the Southdown and Norfolk sheep. In Wales the short staple wool of the mountain sheep was used, and in Ireland that of the Wicklow variety of the Cottagh breed, but now the New Zealand, Cape and South American wools are extensively employed, and English wools are not commonly used alone. Over 2000 persons are employed in flannel manufacture in Rochdale alone, which is the historic seat of the industry, and a good deal of flannel is now made in the Spen Valley district, Yorkshire. Blankets, which constitute a special branch of the flannel trade, are largely made at Bury in Lancashire and Dewsbury in Yorkshire. Welsh flannels have a high reputation, and make an important industry in Montgomeryshire. There are also flannel manufactories in Ireland.

A moderate export trade in flannel is done by Great Britain. The following table gives the quantities exported during three years:—

	1904.	1905.	1906.
Yards	9,758,300	9,220,500	8,762,200

In 1877 the export was 9,273,429 yds., so it appears that this trade has varied comparatively little. The imports of flannel are not very large.

Many so-called flannels have been made with a large admixture of cotton, but the Merchandise Marks Act has done something to limit the indiscriminate use of names. Unquestionably the development of the flannel trade has been checked by the great increase in the production of flannelettes, the better qualities of which have become formidable competitors with flannel. There must, however, be a regular and large demand for flannel while theory and experience confirm its value as a clothing particularly suitable for immediate contact with the body.

FLANNELETTE, a cotton cloth made to imitate flannel. The word seems to have been first used in the early 'eighties, and there is a reference in the *Daily News* of 1887 to "a poverty-stricken article called flannelette." Now it is used very extensively for underclothing, night gear, dresses, dressing-gowns, shirts, &c. It is usually made with a much coarser weft than warp, and its flannel-like appearance is obtained by the raising or scratching up of this weft, and by various finishing processes. Some kinds are raised equally on both sides, and the nap may be long or short according to the purpose for which the cloth is required. A considerable trade is done in plain cloths dyed, and also in woven coloured stripes and checks, but almost any heavy or coarse cotton cloth can be made into flannelette. It is now largely used by the poorer classes of the community, and the flimsier kinds have been a frequent source of accident by fire. It is, however, when used discreetly and in a fair quality, a cheap and useful article. A flannelette, patented under the title of "Non-flam," has been made with fire-resisting properties, but its sale has been more in the better qualities than in the lower and more dangerous ones. Flannelette is made largely on the continent of Europe, and in the United States as well as in Great Britain.

FLASK, in its earliest meaning in Old English a vessel for carrying liquor, made of wood or leather. The principal applications in current usage are (1) to a vessel of metal or wood, formerly of horn, used for carrying gunpowder; (2) to a long-necked, round-bodied glass vessel, usually covered with plaited straw or maize leaves, containing olive or other oil or Italian wines—it is often known as a "Florence flask": similarly shaped vessels are used for experiments, &c., in a laboratory; (3) to a small metal or glass receptacle for spirits, wine or other liquor, of a size and shape to fit into a pocket or holster, usually covered with leather, basket-work or other protecting substance, and with a detachable portion of the case shaped to form a cup. "Flask" is also used in metal-founding of a wooden frame or case to contain part of the mould. The word "flagon," which is by derivation a doublet of "flask," is usually applied to a larger type of vessel for holding liquor, more particularly to a type of wine-bottle with a short neck and circular body with flattened sides. The word is also used of a jug-shaped vessel with a handle, spout and lid, into which wine may be decanted from the bottle for use at table, and of a similarly shaped vessel to contain the Eucharistic wine till it is poured into the chalice. "Flask" (in O. Eng. *flasce* or *flaxe*) is represented both in Teutonic and Romanic languages. The earliest examples are found in Med. Lat. *flasco, flasconis*, whence come Ital. *fiascone*, O. Fr. *flascon* (mod. *flacon*), adapted in the Eng. "flagon." Another Lat. form is *flasca*, this gave a Fr. *flasque*, which in the sense of "powder flask" remained in use till later than the 16th century. In Teutonic languages the word, in its various forms, is the common one for "bottle," so in Ger. *Flasche*, Dutch *flesch*, &c. If the word is of Romanic origin it is probably a metathesized form of the Lat. *vasculum*, diminutive of *vas*, vessel. There is no very satisfactory etymology if the word is of Teutonic origin; the New English Dictionary considers a connexion with "flat" probable phonetically, but finds no evidence that the word was used originally for a flat-shaped vessel.

FLAT (a modification of O. Eng. *flet*, an obsolete word of Teutonic origin, meaning the ground beneath the feet), a term commonly used as an adjective, signifying level in surface, level with the ground, and so, figuratively, fallen, dead, inanimate, tasteless, dull; or, by another transference, downright; or, in music, below the true pitch. In a substantival form, the term is used in physical geography for a level tract.

The word is also generally applied by modern usage to a self-contained residence or separate dwelling (in Scots law, the term *flatted house* is still used), consisting of a suite of rooms which form a portion, usually on a single floor, of a larger building, called the tenement house, the remainder being similarly divided. The approach to it is over a hall, passage and stairway, which are common to all residents in the building, but from which each private flat is divided off by its own outer door (Clode, *Tenement Houses and Flats*, pp. 1, 2).

There is in England a considerable body of special law applicable to flats. The following points deserve notice:—(i.) The occupants of distinct suites of rooms in a building divided into flats are generally, and subject, of course, to any special terms in their agreements, not lodgers but tenants with exclusive possession of separate dwelling-houses placed one above the other. They are, therefore, liable to distress by the immediate landlord, and each flat is separately rateable, though as a general rule by the contract of tenancy the rates are payable by the landlord. Flats used solely for business purposes are exempt from house tax, by the Customs and Inland Revenue Act 1878 (see *Grant*, v. *Langston*, 1900, A.C. 383); and, by the Revenue Act 1903 (s. 11), provision is made for excluding from assessment or for assessing at a low rate buildings used for providing separate dwellings at rents not exceeding £60 a year. It appears that tenants of a flat would not come within the meaning of "lodger" for the purposes of the Lodgers' Goods Protection Act 1871. (ii.) The owner of an upper storey, without any express grant or enjoyment for any given time, has a right to the support of the lower storey (*Dalton* v. *Angus*, 1881, 6 A.C. 740, 793). The owner of the lower storey, however, so long as he does nothing actively in the way of withdrawing its support, is not bound to repair, in the absence of a special covenant imposing that obligation upon him. The right of support being an easement in favour of the owner of the upper storey, it is for him to repair. He is in law entitled to enter on the lower storey for the purpose of doing the necessary repairs. It appears, however, that there is an implied obligation by the landlord to the tenants to keep the common stair and the lift or elevator in repair, and, for breach of this duty, he will be liable to a third party who, while visiting a tenant in the course of business, is injured by its defective condition (*Miller* v. *Hancock*, 1893, 2 Q.B. 177). No such liability would be involved in a mere licence to the tenants to use a part of the building not essential to the enjoyment of their flats. (iii.) In case of the destruction of the flat by fire, the rent abates *pro tanto* and an apportionment is made; *pari ratione*, where a flat is totally destroyed, the rent abates altogether (Clode, p. 14); unless the tenant has entered into an express and unqualified agreement to pay rent, when he will remain liable till the expiration of his tenancy. (iv.) Where the agreements for letting the flats in a single building are in common form, an agreement by the lessor not to depart from the kind of building there indicated may be held to be implied. Thus an injunction has been granted to restrain the conversion into a club of a large part of a building, adapted to occupation in residential flats, at the instance of a tenant who held under an agreement in a common form binding the tenants to rules suitable only for residential purposes (*Hudson* v. *Cripps*, 1896, 1 Ch. 265). (v.) The porter is usually appointed and paid by the landlord, who is liable for his acts while engaged on his general duties; while engaged on any special duty for any tenant the porter is the servant of the latter, who is liable for his conduct within the scope of his employment.

In Scots law the rights and obligations of the lessors and lessees of flats, or—as they are called—"flatted houses," spring partly from the exclusive possession by each lessee of his own flat, partly from the common interest of all in the tenement as a whole. The "law of the tenement" may be thus summed up. The *solum* on which the flatted house stands, the area in front and the back ground are presumed to belong to the owner of the lowest floor or the owners of each floor severally, subject to the common right of the other proprietors to prevent injury to their flats, especially by depriving them of light. The external walls belong to each owner in so far as they enclose his flat; but the other owners can prevent operations on them which would endanger the security of the building. The roof and uppermost storey belong to the highest owner or owners, but he or they may be compelled to keep them in repair and to refrain from injuring them. The gables are common to the owner of each flat, so far as they bound his property, and to the owner of the adjoining house; but he and the other owners in the building have cross rights of common interest to prevent injury to the stability of the building. The floor and ceiling of each flat are divided in ownership by an ideal line drawn through the middle of the joists; they may be used for ordinary purposes, but may not be weakened or exposed to unusual risk from fire. The common passages and stairs are the common property of all to whose premises they form an access, and the walls which bound them are the common property of those persons and of the owners on their farther side.

In the United States the term "apartment-house" is applied to what in England are called flats. The general law is the same as in England. The French Code Civil provides (Art. 664) that where the different storeys of a house belong to different owners the main walls and roof are at the charge of all the owners, each one in proportion to the value of the storey belonging to him. The proprietor of each storey is responsible for his own flooring. The proprietor of the first storey makes the staircase which leads to it, the proprietor of the second, beginning from where the former ended, makes the staircase leading to his and so on. There are similar provisions in the Civil Codes of Belgium (Art. 664), Quebec (Art. 521), St Lucia (Art. 471).

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FLATBUSH, formerly a township of Kings county, Long Island, New York, U.S.A., annexed to Brooklyn in 1894, and after the 1st of January 1898 a part of the borough of Brooklyn, New York City. The first settlement was made here by the Dutch about 1651, and was variously called "Midwout," "Midwoud" and "Medwoud" (from the Dutch words, *med*, "middle" and *woud*, "wood") for about twenty years, when it became more commonly known as Vlachte Bos (*vlachte*, "wooded"; *bos*, "plain") or Flackebos, whence, by further corruption, the present name. Farming was the chief occupation of the early settlers. On the 23rd of August 1776 the village was occupied by General Cornwallis's division of the invading force under Lord Howe, and on the 27th, at the disastrous battle of Long Island (or "battle of Flatbush," as it is sometimes called), "Flatbush Pass," an important strategic point, was vigorously defended by General Sullivan's troops.

FLAT-FISH (*Pleuronectidae*), the name common to all those fishes which swim on their side, as the halibut, turbot, brill, plaice, flounder, sole, &c. The side which is turned towards the bottom, and in some kinds is the right, in others the left, is generally colourless, and called "blind," from the absence of an eye on this side. The opposite side, which is turned upwards and towards the light, is variously, and in some tropical species even vividly, coloured, both eyes being placed on this side of the head. All the bones and muscles of the upper side are more strongly developed than on the lower; but it is noteworthy that these fishes when hatched, and for a short time afterwards, are symmetrical like other fishes.

Assuming that they are the descendants of symmetrical fishes, the question has been to determine which group of Teleosteans may be regarded as the ancestors of the flat-fishes. The old notion that they are only modified Gadids (Anacanthini) was the result of the artificial classification of the past and is now generally abandoned. The condition of the caudal fin, which in the cod tribe departs so markedly from that of ordinary Teleosteans, is in itself a sufficient reason for dismissing the idea of the homocercal flat-fishes being derived from the Anacanthini, and the whole structure of the two types of fishes speaks against such an assumption. On the other hand it has been shown, as noticed in the article DORY, that considerable, deep-seated resemblances exist between the Zeidae or John Dories and the more generalized of the Pleuronectidae; and that a fossil fish from the Upper Eocene, *Amphistium paradoxum*, evidently allied to the Zeidae, appears to realize in every respect the prototype of the Pleuronectidae before they had assumed the asymmetry which characterizes them as a group. In accordance with these views the flat-fishes are placed by G. A. Boulenger in the suborder Acanthopterygii, in a division called *Zeorhombi*. The three families included in that division can be traced back to the Upper Eocene, and their common ancestors will probably be found in the Upper Cretaceous associated with the *Berycidae*, to which they will no doubt prove to be related. The very young are transparent and symmetrical, with an eye on each side, and swim in a vertical position. As they grow, the eye of one side moves by degrees to the other side, where it becomes the upper eye. If at that age the dorsal fin does not extend to the frontal region, the migrating eye simply moves over the line of the profile, temporarily assuming the position which it preserves in some of the less modified genera, such as *Psettodes*; in other genera, the dorsal fin has already extended to the snout before the migration takes place, and the eye, passing between the frontal bone and the tissues supporting the fin, appears to make its way from side to side through the head, as was believed by some of the earlier observers.

About 500 species of flat-fish are known, mostly marine, a few species allied to the sole being confined to the fresh waters of South America, West Africa, and the Malay Archipelago, whilst a few others, such as the English flounder, ascend streams, though still breeding in the sea. They range from the Arctic Circle to the southern coasts of the southern hemisphere and may occur at great depths. (G. A. B.)

FLATHEADS, a tribe of North American Indians of Salishan stock. They formerly occupied the mountains of north-western Montana and the country around. They have always been friendly to the whites. Curiously enough they have not the custom, so general among American tribes, of flattening the heads of their infants. Father P. J. de Smet in 1841 founded among them a mission which proved the most successful in the north-west. With the Pend d'Oreille tribe and some Kutenais they are on a reservation in Montana, and number a few hundreds.

FLAUBERT, GUSTAVE (1821–1880), French novelist, was born at Rouen on the 12th of December 1821. His father, of whom many traits are reproduced in Flaubert's character of Charles Bovary, was a surgeon in practice at Rouen; his mother was connected with some of the oldest Norman families. He was educated in his native city, and did not leave it until 1840, when he came up to Paris to study law. He is said to have been idle at school, but to have been occupied with literature from the age of eleven. Flaubert in his youth "was like a young Greek," full of vigour of body and a certain shy grace, enthusiastic, intensely individual, and apparently without any species of ambition. He loved the country, and Paris was extremely distasteful to him. He made the acquaintance of Victor Hugo, and towards the close of 1840 he travelled in the Pyrenees and Corsica. Returning to Paris, he wasted his time in sombre dreams, living on his patrimony. In 1846, his mother being left quite alone through the deaths of his father and his sister Caroline, Flaubert gladly abandoned Paris and the study of the law together, to make a home for her at Croisset, close to Rouen. This estate, a house in a pleasant piece of ground which ran down to the Seine, became Flaubert's home for the remainder of his life. From 1846 to 1854 he carried on relations with the poetess, Mlle Louise Colet; their letters have been preserved, and according to M. Émile Faguet, this was the only sentimental episode of any importance in the life of Flaubert, who never married. His principal friend at this time was Maxime du Camp, with whom he travelled in Brittany in 1846, and through the East in 1849. Greece and Egypt made a profound impression upon the imagination of Flaubert. From this time forth, save for occasional visits to Paris, he did not stir from Croisset.

On returning from the East, in 1850, he set about the composition of *Madame Bovary*. He had hitherto scarcely written anything, and had published nothing. The famous novel took him six years to prepare, but was at length submitted to the *Revue de Paris*, where it appeared in serial form in 1857. The government brought an action against the publisher and against the author, on the charge of immorality, but both were acquitted; and when *Madame Bovary* appeared in book-form it met with a very warm reception. Flaubert paid a visit to Carthage in 1858, and now settled down to the archaeological studies which were required to equip him for *Salammbô*, which, however, in spite of the author's ceaseless labours, was not finished until 1862. He then took up again the study of contemporary manners, and, making use of many recollections of his youth and childhood, wrote *L'Éducation sentimentale*, the composition of which occupied him seven years; it was published in 1869. Up to this time the sequestered and laborious life of Flaubert had been comparatively happy, but misfortunes began to gather around him. He felt the anguish of the war of 1870 so keenly that the break-up of his health has been attributed to it; he began to suffer greatly from a distressing nervous malady. His best friends were taken from him by death or by fatal misunderstanding; in 1872 he lost his mother, and his circumstances became greatly reduced. He was very tenderly guarded by his niece, Mme Commonville; he enjoyed a rare intimacy of friendship with George Sand, with whom he carried on a correspondence of immense artistic interest, and occasionally he saw his Parisian acquaintances, Zola, A. Daudet, Tourgenieff, the Goncourts; but nothing prevented the close of Flaubert's life from being desolate and melancholy. He did not cease, however, to work with the same intensity and thoroughness. *La Tentation de Saint-Antoine*, of which fragments had been published as early as 1857, was at length completed and sent to press in 1874. In that year he was subjected to a disappointment by the failure of his drama *Le Candidat*. In 1877 Flaubert published, in one volume, entitled *Trois contes*, *Un Cœur simple*, *La Légende de Saint-Julien-l'Hospitalier* and *Hérodias*. After this something of his judgment certainly deserted him; he spent the remainder of his life in the toil of building up a vast satire on the futility of human knowledge and the omnipresence of mediocrity, which he left a fragment. This is the depressing and bewildering *Bouvard et Pécuchet* (posthumously printed, 1881), which, by a curious irony, he believed to be his masterpiece. Flaubert had rapidly and prematurely aged since 1870, and he was quite an old man when he was carried off by a stroke of apoplexy at the age of only 58, on the 8th of May 1880. He died at Croisset, but was buried in the family vault in the cemetery of Rouen. A beautiful monument to him by Chapu was unveiled at the museum of Rouen in 1890.

The personal character of Flaubert offered various peculiarities. He was shy, and yet extremely sensitive and arrogant; he passed from silence to an indignant and noisy flow of language. The same inconsistencies marked his physical nature; he had the build of a guardsman, with a magnificent Viking head, but his health was uncertain from childhood, and he was neurotic to the last degree. This ruddy giant was secretly gnawn by misanthropy and disgust of life. His hatred of the "bourgeois" began in his childhood, and developed into a kind of monomania. He despised his fellow-men, their habits, their lack of intelligence, their contempt for beauty, with a passionate scorn which has been compared to that of an ascetic monk. Flaubert's curious modes of composition favoured and were emphasized by these peculiarities. He worked in sullen solitude, sometimes occupying a week in the completion of one page, never satisfied with what he had composed, violently tormenting his brain for the best turn of a phrase, the most absolutely final adjective. It cannot be said that his incessant labours were not rewarded. His private letters show that he was not one of those to whom easy and correct language is naturally given; he gained his extraordinary perfection with the unceasing sweat of his brow. One of the most severe of academic critics admits that "in all his works, and in every page of his works, Flaubert may be considered a model of style." That he was one of the greatest writers who ever lived in France is now commonly admitted, and his greatness principally depends upon the extraordinary vigour and exactitude of his style. Less perhaps than any other writer, not of France, but of modern Europe, Flaubert yields admission to the inexact, the abstract, the vaguely inapt expression which is the bane of ordinary methods of composition. He never allowed a *cliché* to pass him, never indulgently or wearily went on, leaving behind him a phrase which "almost" expressed his meaning. Being, as he is, a mixture in almost equal parts of the romanticist and the realist, the marvellous propriety of his style has been helpful to later writers of both schools, of every school. The absolute exactitude with which he adapts his expression to his purpose is seen in all parts of his work, but particularly in the portraits he draws of the figures in his principal romances. The degree and manner in which, since his death, the fame of Flaubert has extended, form an interesting chapter of literary history. The publication of *Madame Bovary* in 1857 had been followed by more scandal than admiration; it was not understood at first that this novel was the beginning of a new thing, the scrupulously truthful portraiture of life. Gradually this aspect of his genius was accepted, and began to crowd out all others. At the time of his death he was famous as a realist, pure and simple. Under this aspect Flaubert exercised an extraordinary influence over É. de Goncourt, Alphonse Daudet and M. Zola. But even since the decline of the realistic school Flaubert has not lost prestige; other facets of his genius have caught the light. It has been perceived that he was not merely realistic, but real; that his clairvoyance was almost boundless; that he saw certain phenomena more clearly than the best of observers had done. Flaubert is a writer who must always appeal more to other authors than to the world at large, because the art of writing, the indefatigable pursuit of perfect expression, were always before him, and because he hated the lax felicities of improvization as a disloyalty to the most sacred procedures of the literary artist.

His *Œuvres complètes* (8 vols., 1885) were printed from the original manuscripts, and included, besides the works mentioned already, the two plays, *Le Candidat* and *Le Château des cœurs*. Another edition (10 vols.) appeared in 1873–1885. Flaubert's correspondence with George Sand was published in 1884 with an introduction by Guy de Maupassant. Other posthumous works are *Par les champs et par les grèves* (1885), the result of a tour in Brittany; and four volumes of *Correspondance* (1887–1893). See also Paul Bourget, *Essais de psychologie contemporaine* (1883); Émile Faguet, *Flaubert* (1899); Henry James, *French Poets and Novelists* (1878); Émile Zola, *Les Romanciers naturalistes* (1881); C. A. Sainte-Beuve, *Causeries du lundi*, vol. xiii., *Nouveaux lundis*, vol. iv.; and the *Souvenirs littéraires* (2 vols., 1882–1883) of Maxime du Camp. (E. G.)

FLAVEL, JOHN (*c.* 1627–1691), English Presbyterian divine, was born at Bromsgrove in Worcestershire, probably in 1627. He was the elder son of Richard Flavel, described in contemporary records as "a painful and eminent minister." After receiving his early education, partly at home and partly at the grammar-schools of Bromsgrove and Haslar, he entered University College, Oxford. Soon after taking orders in 1650 he obtained a curacy at Diptford, Devon, and on the death of the vicar he was appointed to succeed him. From Diptford he removed in 1656 to Dartmouth. He was ejected from his living by the passing of the Act of Uniformity in 1662, but continued to preach and administer the sacraments privately till the Five Mile Act of 1665, when he retired to Slapton, 5 m. away. He then lived for a time in London, but returned to Dartmouth, where he laboured till his death in 1691. He was married four times. He was a vigorous and voluminous writer, and not without a play of fine fancy.

His principal works are his *Navigation Spiritualized* (1671); *The Fountain of Life, in forty-two Sermons* (1672); *The Method of Grace* (1680); *Pneumatologia, a Treatise on the Soul of Man* (1698); *A Token for Mourners; Husbandry Spiritualized* (1699). Collected editions appeared throughout the 18th century, and in 1823 Charles Bradley edited a 2 vol. selection.

FLAVIAN I. (d. 404), bishop or patriarch of Antioch, was born about 320, most probably in Antioch. He inherited great wealth, but resolved to devote his riches and his talents to the service of the church. In association with Diodorus, afterwards bishop of Tarsus, he supported the Catholic faith against the Arian Leontius, who had succeeded Eustathius as bishop of Antioch. The two friends assembled their adherents outside the city walls for the observance of the exercises of religion; and, according to Theodoret, it was in these meetings that the practice of antiphonal singing was first introduced in the services of the church. When Meletius was appointed bishop of Antioch in 361 he raised Flavian to the priesthood, and on the death of Meletius in 381 Flavian was chosen to succeed him. The schism between the two parties was, however, far from being healed; the bishop of Rome and the bishops of Egypt refused to acknowledge Flavian, and Paulinus, who by the extreme Eustathians had been elected bishop in opposition to Meletius, still exercised authority over a portion of the church. On the death of Paulinus in 383, Evagrius was chosen as his successor, but after the death of Evagrius (*c.* 393) Flavian succeeded in preventing his receiving a successor, though the Eustathians still continued to hold separate meetings. Through the intervention of Chrysostom, soon after his elevation to the patriarchate of Constantinople (398), and the influence of the emperor Theodosius, Flavian was acknowledged in 399 as legitimate bishop of Antioch by the Church of Rome; but the Eustathian schism was not finally healed till 415. Flavian, who died in February 404, is venerated in both the Western and Eastern churches as a saint.

See also the article Meletius of Antioch, and the article "Flavianus von Antiochien" by Loofs in Herzog-Hauck's *Realencyklop.* (ed. 3). For the Meletian schism see also A. Harnack's, *Hist. of Dogma*, iv. 95.

FLAVIAN II. (d. 518), bishop or patriarch of Antioch, was chosen by the emperor Anastasius I. to succeed Palladius, most probably in 498. He endeavoured to please both parties by steering a middle course in reference to the Chalcedon (*q.v.*) decrees, but was induced after great hesitation to agree to the request of Anastasius that he should accept the Henoticon, or decree of union, issued by the emperor Zeno. His doing so, while it brought upon him the anathema of the patriarch of Constantinople, failed to secure the favour of Anastasius, who in 511 found in the riots which were occurring between the rival parties in the streets of Antioch a pretext for deposing Flavian, and banishing him to Petra, where he died in 518. Flavian was soon after his death enrolled among the saints of the Greek Church, and after some opposition he was also canonized by the Latin Church.

FLAVIAN (d. 449), bishop of Constantinople, and an adherent of the Antiochene school, succeeded Proclus in 447. He presided at the council which deposed Eutyches (*q.v.*) in 448, but in the following year he was deposed by the council of Ephesus (the "robber synod"), which reinstated Eutyches in his office. Flavian's death shortly afterwards was attributed, by a pious fiction, to ill treatment at the hands of his theological opponents. The council of Chalcedon canonized him as a martyr, and in the Latin Church he is commemorated on the 18th of February.

FLAVIGNY, a town of eastern France, in the department of Côte-d'Or, situated on a promontory overlooking the river Ozerain, 33 m. W.N.W. of Dijon by road. Pop. (1906) 725. Among its antiquities are the remains of an abbey of the 8th century, which has been rebuilt as a factory for the manufacture of anise, an industry connected with the town as early as the 17th century. There is also a church of the 13th and 15th centuries, containing carved stalls (15th century) and a fine rood-screen (early 16th century). A Dominican convent, some old houses and ancient gateways are also of interest. About 3 m. north-west of Flavigny rises Mont Auxois, the probable site of the ancient Alesia, where Caesar in A.D. 52 defeated the Gallic chieftain Vercingetorix, to whom a statue has been erected on the summit of the height. Numerous remains of the Gallo-Roman period have been discovered on the hill.

FLAVIN (Lat. *flavus*, yellow), the commercial name for an extract or preparation of quercitron bark (*Quercus tinctoria*), which is used as a yellow dye in place of the ground and powdered bark (see Quercitron).

FLAX. The terms flax or lint (Ger. *Flachs*, Fr. *lin*, Lat. *linum*) are employed at once to denote the fibre so called, and the plant from which it is prepared. The flax plant (*Linum usitatissimum*) belongs to the natural order *Linaceae*, and, like most plants which have been long under cultivation, it possesses numerous varieties, while its origin is doubtful. As cultivated it is an annual with an erect stalk rising to a height of from 20 to 40 in., with alternate, sessile, narrowly lance-shaped leaves, branching only at the top, each branch or branchlet ending in a bright blue flower. The flowers are regular and symmetrical, having five sepals, tapering to a point and hairy on the margin, five petals which speedily fall, ten stamens, and a pistil bearing five distinct styles. The fruit or boll is round, containing five cells, each of which is again divided into two, thus forming ten divisions, each of which contains a single seed. The seeds of the flax plant, well known as linseed, are heavy, smooth, glossy and of a bright greenish-brown colour. They are oval in section, but their maximum contour represents closely that of a pear with the stalk removed. The contents are of an oily nature, and when liquefied are of great commercial value.

The earliest cultivated flax was *Linum angustifolium*, a smaller plant with fewer and narrower leaves than *L. usitatissimum*, and usually perennial. This is known to have been cultivated by the inhabitants of the Swiss lake-dwellings, and is found wild in south and west Europe (including England), North Africa, and western Asia. The annual flax (*L. usitatissimum*) has been cultivated for at least four or five thousand years in Mesopotamia, Assyria and Egypt, and is wild in the districts included between the Persian Gulf, the Caspian Sea and the Black Sea. This annual flax appears to have been introduced into the north of Europe by the Finns, afterwards into the west of Europe by the western Aryans, and perhaps here and there by the Phoenicians; lastly, into Hindustan by the eastern Aryans after their separation from the European Aryans. (De Candolle, *Origin of Cultivated Plants.*)

The cultivation and preparation of flax are among the most ancient of all textile industries, very distinct traces of their existence during the stone age being preserved to the present day. "The use of flax," says Ferdinand Keller (*Lake Dwellings of Switzerland*, translated by J. E. Lee), "reaches back to the very earliest periods of civilization, and it was most extensively and variously applied in the lake-dwellings, even in those of the stone period. But of the mode in which it was planted, steeped, heckled, cleansed and generally prepared for use, we can form no idea any more than we can of the mode or tools employed by the settlers in its cultivation. . . . Rough or unworked flax is found in the lake-dwellings made into bundles, or what are technically called heads, and, as much attention was given to this last operation, it was perfectly clean and ready for use." As to its applications at this early period, Keller remarks: "Flax was the material for making lines and nets for fishing and catching wild animals, cords for carrying the earthenware vessels and other heavy objects; in fact, one can hardly imagine how navigation could be carried on, or the lake-dwellings themselves be erected, without the use of ropes and cords; and the erection of memorial stones (menhirs, dolmens), at whichever era, and to whatever people these monuments may belong, would be altogether impracticable without the use of strong ropes."

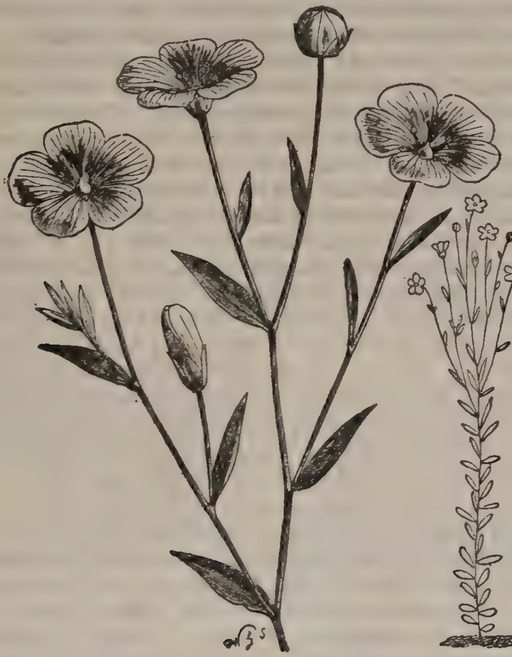

FIG. 1.—Flax Plant (*Linum usitatissimum*).

Manufacture.—That flax was extensively cultivated and was regarded as of much importance at a very early period in the world's history there is abundant testimony. Especially in ancient Egypt the fibre occupied a most important place, linen having been there not only generally worn by all classes, but it was the only material the priestly order was permitted to wear, while it was most extensively used as wrappings for embalmed bodies and for general purposes. In the Old Testament we are told that Pharaoh arrayed Joseph "in vestures of fine linen" (Gen. xlii. 42), and among the plagues of Egypt that of hail destroyed the flax and barley crops, "for the barley was in the ear, and the flax was bolled" (Exod. ix. 31). Further, numerous pictorial representations of flax culture and preparation exist to the present day on the walls of tombs and in Egypt. Sir J. G. Wilkinson in his description of ancient Egypt shows clearly the great antiquity of the ordinary processes of preparing flax. "At Beni Hassan," he says, "the mode of cultivating the plant, in the same square beds now met with throughout Egypt (much resembling our salt pans), the process of beating the stalks and making them into ropes, and the manufacture of a piece of cloth are distinctly pointed out." The preparation of the fibre as conducted in Egypt is illustrated by Pliny, who says: "The stalks themselves are immersed in water, warmed by the heat of the sun, and are kept down by weights placed upon them, for nothing is lighter than flax. The membrane, or rind, becoming loose is a sign of their being sufficiently macerated. They are then taken out and repeatedly turned over in the sun until perfectly dried, and afterwards beaten by mallets on stone slabs. That which is nearest the rind is called *stupa* ['tow'], inferior to the inner fibres, and fit only for the wicks of lamps. It is combed out with iron hooks until the rind is all removed. The inner part is of a whiter and finer quality. Men are not ashamed to prepare it" (Pliny, *N.H.* xix. 1). For many ages, even down to the early part of the 14th century, Egyptian flax occupied the foremost place in the commercial world, being sent into all regions with which open intercourse was maintained. Among Western nations it was, without any competitor, the most important of all vegetable fibres till towards the close of the 18th century, when, after a brief struggle, cotton took its place as the supreme vegetable fibre of commerce.

Flax prospers most when grown upon land of firm texture resting upon a moist subsoil. It does well to succeed oats or potatoes, as it requires the soil to be in fresh condition without being too rich. Lands newly broken up from pasture suit it well, as these are generally freer from weeds than those that have been long under tillage. It is usually inexpedient to apply manure directly to the flax crop, as the tendency of this is to produce over-luxuriance, and thereby to mar the quality of the fibre, on which its value chiefly depends. For the same reason it must be thickly seeded, the effect of this being to produce tall, slender stems, free from branches. The land, having been ploughed in autumn, is prepared for sowing by working it with the grubber, harrow and roller, until a fine tilth is obtained. On the smooth surface the seed is sown broadcast by hand or machine, at the rate of 3 bushels per acre, and covered in the same manner as clover seeds. It is advisable immediately to hand-rake it with common hay-rakes, and thus to remove all stones and clods, and to secure a uniform close cover of plants. When these are about 2 to 3 in. long the crop must be carefully hand-weeded. This is a tedious and expensive process, and hence the importance of sowing the crop on land as free as possible from weeds of all kinds. The weeders, faces to the wind, move slowly on hands and knees, and should remove every vestige of weed in order that the flax plants may receive the full benefit of the land. When flax is cultivated primarily on account of the fibre, the crop ought to be pulled before the capsules are quite ripe, when they are just beginning to change from a green to a pale-brown colour, and when the stalks of the plant have become yellow throughout about two-thirds of their height.

The various operations through which the crop passes from this point till flax ready for the market is produced are—(1) Pulling, (2) Rippling, (3) Retting, (4) Drying, (5) Rolling, (6) Scutching.

Pulling and *rippling* may be dismissed very briefly. Flax is always pulled up by the root, and under no circumstances is it cut or shorn like cereal crops. The pulling ought to be done in dry clear weather; and care is to be taken in this, as in all the subsequent operations, to keep the root-ends even and the stalks parallel. At the same time it is desirable to have, as far as possible, stalks of equal length together,—all these conditions having considerable influence on the quality and appearance of the finished sample. As a general rule the removal of the "bolls" or capsules by the process of rippling immediately follows the pulling, the operation being performed in the field; but under some systems of cultivation, as, for example, the Courtrai method, alluded to below, the crop is made up into sheaves, dried and stacked, and is only bolled and retted in the early part of the next ensuing season. The best rippler, or apparatus for separating the seed capsules from the branches, consists of a kind of comb having, set in a wooden frame, iron teeth made of round-rod iron $\frac{3}{16}$ths of an inch asunder at the bottom, and half an inch at the top, and 18 in. long, to allow a sufficient spring, and save much breaking of flax. The points should begin to taper 3 in. from the top. A sheet or other cover being spread on the field, the apparatus is placed in the middle of it, and two ripplers sitting opposite each other, with the machine between them, work at the same time. It is unadvisable to ripple the flax so severely as to break or tear the delicate fibres at the upper part of the stem. The two valuable commercial products of the flax plant, the seeds and the stalk, are separated at this point. We have here to do with the latter only.

Retting or *rotting* is an operation of the greatest importance, and one in connexion with which in recent years numerous experiments have been made, and many projects and processes put forth, with the view of remedying the defects of the primitive system or altogether supplanting it. From the earliest times two leading processes of retting have been practised, termed respectively water-retting and dew-retting; and as no method has yet been introduced which satisfactorily supersedes these operations, they will first be described.

Water-retting.—For this—the process by which flax is generally prepared—pure soft water, free from iron and other materials which might colour the fibre, is essential. Any water much impregnated with lime is also specially objectionable. The dams or ponds in which the operation is conducted are of variable size, and usually between 4 and 5 ft. in depth. The rippled stalks are tied in small bundles and packed, roots downwards, in the dams till they are quite full; over the top of the upper layer is placed a stratum of rushes and straw, or sods with the grassy side downwards, and above all stones of sufficient weight to keep the flax submerged. Under favourable circumstances a process of fermentation should immediately be set up, which soon makes itself manifest by the evolution of gaseous bubbles. After a few days the fermentation subsides; and generally in from ten days to two weeks the process ought to be complete. The exact time, however, depends upon the weather and upon the particular kind of water in which the flax is immersed. The immersion itself is a simple matter; the difficulty lies in deciding when the process is complete. If allowed to remain under water too long, the fibre is weakened by what is termed "over-retting," a condition which increases the amount of codilla in the scutching process; whilst "under-retting" leaves part of the gummy or resinous matter in the material, which hinders the subsequent process of manufacture. As the steeping is such a critical operation, it is essential that the stalks be frequently examined and tested as the process nears completion. When it is found that the fibre separates readily from the woody "shove" or core, the beets or small bundles are ready for removing from the dams. It is drained, and then spread, evenly and equally, over a grassy meadow to dry. The drying, which takes from a week to a fortnight, must be uniform, so that all the fibres may spin equally well. To secure this uniformity, it is necessary to turn the material over several times during the process. It is ready for gathering when the core cracks and separates easily from the fibre. At this point advantage is taken of fine dry weather to gather up the flax, which is now ready for scutching, but the fibre is improved by stooking and stacking it for some time before it is taken to the scutching mill.

Dew-retting is the process by which all the Archangel flax and a large portion of that sent out from St Petersburg are prepared. By this method the operation of steeping is entirely dispensed with, and the flax is, immediately after pulling, spread on the grass where it is under the influence of air, sunlight, night-dews and rain. The process is tedious, the resulting fibre is brown in colour, and it is said to be peculiarly liable to undergo heating (probably owing to the soft heavy quality of the flax) if exposed to moisture and kept close packed with little access of air. Archangel flax is, however, peculiarly soft and silky in structure, although in all probability water-retting would result in a fibre as good or even better in quality.

The theory of retting, according to the investigations of J. Kolb, is that a peculiar fermentation is set up under the influence of heat and moisture, resulting in a change of the intercellular substance—pectose or an analogue of that body—into pectin and pectic acid. The former, being soluble, is left in the water; but the latter, an insoluble body, is in part attached to the fibres, from which it is only separated by changing into soluble metapectic acid under the action of hot alkaline ley in the subsequent process of bleaching.

To a large extent retting continues to be conducted in the primitive fashions above described, although numerous and persistent attempts have been made to improve upon it, or to avoid the process altogether. The uniform result of all experiments has only been to demonstrate the scientific soundness of the ordinary process of water-retting, and all the proposed improvements of recent times seek to obviate the tediousness, difficulties and uncertainties of the process as carried on in the open air. In the early part of the 19th century much attention was bestowed, especially in Ireland, on a process invented by Mr James Lee. He proposed to separate the fibre by purely mechanical means without any retting whatever; but after the Irish Linen Board had expended many thousands of pounds and much time in making experiments and in erecting his machinery, his entire scheme ended in complete failure. About the year 1851 Chevalier Claussen sought to revive a process of "cottonizing" flax—a method of proceeding which had been suggested three-quarters of a century earlier. Claussen's process consisted in steeping flax fibre or tow for twenty-four hours in a weak solution of caustic soda, next boiling it for about two hours in a similar solution, and then saturating it in a solution containing 5% of carbonate of soda, after which it was immersed in a vat containing water acidulated with $\frac{1}{2}$% of sulphuric acid. The action of the acid on the carbonate of soda with which the fibre was impregnated caused the fibre to split up into a fine cotton-like mass, which it was intended to manufacture in the same manner as cotton. A process to turn good flax into bad cotton had, however, on the face of it, not much to recommend it to public acceptance; and Claussen's process therefore remains only as an interesting and suggestive experiment.

The only modification of water-retting which has hitherto endured the test of prolonged experiment, and taken a firm position as a distinct improvement, is the warm-water retting patented in England in 1846 by an American, Robert B. Schenck. For open pools and dams Schenck substitutes large wooden vats under cover, into which the flax is tightly packed in an upright position. The water admitted into the tanks is raised to and maintained at a temperature of from 75° to 95° F. during the whole time the flax is in steep. In a short time a brisk fermentation is set up, gases at first of pleasant odour, but subsequently becoming very repulsive, being evolved, and producing a frothy scum over the surface of the water. The whole process occupies only from 50 to 60 hours. A still further improvement, due to Mr Pownall, comes into operation at this point, which consists of immediately passing the stalks as they are taken out of the vats between heavy rollers over which a stream of pure water is kept flowing. By this means, not only is all the slimy glutinous adherent matter thoroughly separated, but the subsequent processes of breaking and scutching are much facilitated.

A process of retting by steam was introduced by W. Watt of Glasgow in 1852, and subsequently modified and improved by J. Buchanan. The system possessed the advantages of rapidity, being completed in about ten hours, and freedom from any noxious odour; but it yielded only a harsh, ill-spinning fibre, and consequently failed to meet the sanguine expectations of its promoters.

In connexion with improvements in retting, Mr Michael Andrews, secretary of the Belfast Flax Supply Association, made some suggestions and experiments which deserve close attention. In a paper contributed to the International Flax Congress at Vienna in 1873 he entered into details regarding an experimental rettery he had formed, with the view of imitating by artificial means the best results obtained by the ordinary methods. In brief, Mr Andrews' method consists in introducing water at the proper temperature into the retting vat, and maintaining that temperature by keeping the air of the chamber at a proper degree of heat. By this means the flax is kept at a uniform temperature with great certainty, since even should the heat of the air vary considerably through neglect, the water in the vat only by slow degrees follows such fluctuations. "It may be remarked," says Mr Andrews, "that the superiority claimed for this method of retting flax over what is known as the 'hot-water steeping' is uniformity of temperature; in fact the experiments have demonstrated that an absolute control can be exercised over the means adopted to produce the artificial climate in which the vats containing the flax are situated."

Several other attempts have been made with a view of obtaining a quick and practical method of retting flax. The one by Messrs Doumer and Deswarte appears to have been well received in France, but in Ireland the invention of Messrs Loppens and Deswarte has recently received the most attention. The apparatus consists of a tank with two chambers, the partition being perforated. The flax is placed in the upper chamber and covered by two sets of rods or beams at right angles to each other. Fresh water is allowed to enter the lower chamber immediately under the perforated partition. As the tank fills, the water enters the upper chamber and carries with it the flax and the beams, the latter being prevented from rising too high. The soluble substances are dissolved by the water, and the liquid thus formed being heavier than water, sinks to the bottom of the tank where it is allowed to escape through an outlet. By this arrangement the flax is almost continually immersed in fresh water, a condition which hastens the retting. The flow of the liquids, in and out, can be so arranged that the motion is very slow, and hence the liquids of different densities do not mix. When the operation is completed, the whole of the water is run off, and the flax remains on the perforated floor, where it drains thoroughly before being removed to dry.

The Department of Agriculture and Technical Instruction for Ireland, and the Belfast Flax Supply Association, have jointly made some experiments with this method, and the following extract from the Association's report for 1905 shows the success which attended their efforts:—

> "By desire of the department (which has taken up the position of an impartial critic of the experiment) a quantity of flax straw was divided into two equal lots. One part was retted at Millisle by the patent-system of Loppens and Deswarte; the other was sent to Courtrai and steeped in the Lys. Both lots when retted and scutched were examined by an inspector of the department and by several flax spinners. That which was retted at Millisle was pronounced superior to the other" . . .
>
> "To summarise results up to date—
>
> 1. It has been proved that flax can be thoroughly dried in the field in Ireland.
> 2. That the seed can be saved, and is of first quality.
> 3. That the system of retting (Loppens and Deswarte's patent) is at least equal to the Lys, as to quality and yield of fibre produced."

Since these results appear to be satisfactory, it is natural to expect further attempts with the same object of supplanting the ordinary steeping. A really good chemical, mechanical or other method would probably be the means of reviving the flax industry in the remote parts of the British Isles.

Scutching is the process by which the fibre is freed from its woody core and rendered fit for the market. For ordinary water-retted flax two operations are required, first breaking and then scutching, and these are done either by hand labour or by means of small scutching or lint mills, driven either by water or steam power. Hand labour, aided by simple implements, is still much used in continental countries; also in some parts of Ireland where labour is cheap or when very fine material is desired; but the use of scutching mills is now very general, these being more economical. The breaking is done by passing the stalks between grooved or fluted rollers of different pitches; these rollers, of which there may be from 5 to 7 pairs, are sometimes arranged to work alternately forwards and backwards in order to thoroughly break the woody material or "boon" of the straw, while the broken "shoves" are beaten out by suspending the fibre in a machine fitted with a series of revolving blades, which, striking violently against the flax, shake out the bruised and broken woody cores. A great many modified scutching machines and processes have been proposed and introduced with the view of promoting economy of labour and improving the turn-out of fibre, both in respect of cleanness and in producing the least proportion of codilla or scutching tow.

The celebrated Courtrai flax of Belgium is the most valuable staple in the market, on account of its fineness, strength and particularly bright colour. There the flax is dried in the field, and housed or stacked during the winter succeeding its growth, and in the spring of the following year it is retted in crates sunk in the sluggish waters of the river Lys. After the process has proceeded a certain length, the crates are withdrawn, and the sheaves taken out and stooked. It is thereafter once more tied up, placed in the crates, and sunk in the river to complete the retting process; but this double steeping is not invariably practised. When finally taken out, it is unloosed and put up in cones, instead of being grassed, and when quite dry it is stored for some time previous to undergoing the operation of scutching. In all operations the greatest care is taken, and the cultivators being peculiarly favoured as to soil, climate and water, Courtrai flax is a staple of unapproached excellence.

An experiment made by Professor Hodges of Belfast on 7770 ℔ of air-dried flax yielded the following results. By rippling he separated 1946 ℔ of bolls which yielded 910 ℔ of seed. The 5824 ℔ (52 cwt.) of flax straw remaining lost in steeping 13 cwt., leaving 39 cwt. of retted stalks, and from that 6 cwt. 1 qr. 2 ℔ (702 ℔) of finished flax was procured. Thus the weight of the fibre was equal to about 9% of the dried flax with the bolls, 12 % of the bolled straw, and over 16% of the retted straw. One hundred tons treated by Schenck's method gave 33 tons bolls, with 27·50 tons of loss in steeping; 32·13 tons were separated in scutching, leaving 5·90 tons of finished fibre, with 1·47 tons of tow and pluckings. The following analysis of two varieties of heckled Belgian flax is by Dr Hugo Müller (Hoffmann's *Berichte über die Entwickelung der chemischen Industrie*):—

Ash	0·70	1·32
Water	8·65	10·70
Extractive matter	3·65	6·02
Fat and wax	2·39	2·37
Celluiose	82·57	71·50
Intercellular substance and pectose bodies	2·74	9·41

According to the determinations of Julius Wiesner (*Die Rohstoffe des Pflanzenreiches*), the fibre ranges in length from 20 to 140 centimetres, the length of the individual cells being from 2·0 to 4·0 millimetres, and the limits of breadth between 0·012 and 0·025 mm., the average being 0·016 mm.

Among the circumstances which have retarded improvement both in the growing and preparing of flax, the fact that, till comparatively recent times, the whole industry was conducted only on a domestic scale has had much influence. At no very remote date it was the practice in Scotland for every small farmer and cotter not only to grow "lint" or flax in small patches, but to have it retted, scutched, cleaned, spun, woven, bleached and finished entirely within the limits of his own premises, and all by members or dependents of the family. The same practice obtained and still largely prevails in other countries. Thus the flax industry was long kept away from the most powerful motives to apply to it labour-saving devices, and apart from the influence of scientific inquiry for the improvement of methods and processes. As cotton came to the front, just at the time when machine-spinning and power-loom weaving were being introduced, the result was that in many localities where flax crops had been grown for ages, the culture gradually drooped and ultimately ceased. The linen manufacture by degrees ceased to be a domestic industry, and began to centre in and become the characteristic factory employment of special localities, which depended, however, for their supply of raw material primarily on the operations of small growers, working, for the most part, on the poorer districts of remote thinly populated countries. The cultivation of the plant and the preparation of the fibre have therefore, even at the present day, not come under the influence (except in certain favoured localities) of scientific knowledge and experience.

Cultivation.—The approximate number of acres (1905) under cultivation in the principal flax-growing countries is as follows:—

Russia	3,500,000 acres.
Caucasia	450,000 „
Austria	175,000 „
Italy	120,000 „
Poland	95,000 „
Rumania	80,000 „
Germany	75,000 „
France	65,000 „
Belgium	53,000 „
Hungary	50,000 „
Ireland	46,000 „
Holland	38,000 „

Although the amount grown in Russia exceeds considerably the combined quantity grown in the rest of the above-mentioned countries, the quality of the fibre is inferior. The fibre is cultivated in the Russian provinces of Archangel, Courland, Esthonia, Kostroma, Livonia, Novgorod, Pskov, Smolensk, Tver, Vyatka, Vitebsk, Vologda and Yaroslav or Jaroslav, while the bulk of the material is exported through the Baltic ports. Riga and St Petersburg (including Cronstadt) are the principal ports, but flax is also exported from Revel, Windau, Pernau, Libau, Narva and Konigsberg. Sometimes it is exported from Archangel, but this port is frost-bound for a great period of the year; moreover, most of the districts are nearer to the Baltic.

The raw flax is almost invariably known by the same name as the district in which it is grown, and it is further classified by special marks. The following names amongst others are given to the fibre:—Archangel, Bajetsky, Courish, Dorpat, Drogobusher, Dunaberg, Fabrichnoi, Fellin, Gjatsk, Glazoff, Griazourtz, Iwashkower, Jaransk, Janowitz, Jaropol, Jaroslav, Kama, Kashin, Konigsberg, Kostroma, Kotelnitch, Kowns, Krasnoholm, Kurland (Courland), Latischki, Livonian Crowns, Malmuish, Marienberg, Mochenetz, Mologin, Newel, Nikolsky, Nolinsk, Novgorod, Opotchka, Ostroff, Ostrow, Otbornoy, Ouglitch, Pernau, Pskoff, Revel, Riga, Rjeff, St Petersburg, Seretz, Slanitz, Slobodskoi, Smolensk, Sytcheffka, Taroslav, Tchesna, Totma, Twer, Ustjuga, Viatka, Vishni, Vologda, Werro, Wiasma, Witebsk.

These names indicate the particular district in which the flax has been grown, but it is more general to group the material into classes such as Livonian Crowns, Rija Crowns, Hoffs, Wracks, Drieband, Zins, Ristens, Pernau, Archangel, &c.

The quotations for the various kinds of flaxes are made with one or other special mark termed a base mark; this usually, but not necessarily, indicates the lowest quality. The September–October 1906 quotations appeared as under:—

Livonian	basis K	£26 to £27	per ton.
Hoffs	„ HD	£21 to £22	„
Pernau	„ D	£28 to £28 : 10	„
Dorpat	„ D cleaned.	£32 to £32 : 10	„

It will, of course, be understood that the base mark is subject to variation, the ruling factors being the amount of crop, quality and demand.

The marks in the Crown flaxes have the following signification:—

K means Crown and is usually the base mark.
H „ Light and represents a rise of about £1
P „ Picked „ „ „ £3
G „ Grey „ „ „ £3
S „ Superior „ „ „ £4
W „ White „ „ „ £4
Z „ Zins „ „ „ £10

Each additional mark means a rise in the price, but it must be understood that it is quite possible for a quality denoted by two letters to be more valuable than one indicated by three or more, since every mark has not the same value.

If we take £25 as the value of the base mark, the value per ton for the different groups would be:—

K	£25	HSPK	£33
HK	£26	GSPK	£35
PK	£28	WSPK	£36
HPK	£29	ZK	£35
GPK	£31	HZK	£36
SPK	£32	GZK	£38, &c.

The Hoffs flaxes are reckoned in a similar way. Here H is for Hoffs, D for Drieband, P for picked, F for fine, S for superior, and R for Risten. In addition to these marks, an X may appear before, after or in both places. With £20 as base mark we have:—

HD	£20 per ton.
PHD	£23 „ „
FPHD	£26 „ „
SFPHD	£29 „ „
XHDX	£32 „ „
XRX	£35 „ „

The following Prices, taken from the Dundee Year Books, show the Change in Price of a few well-known Varieties.

	Dec. 1897.	Dec. 1898.	Dec. 1899.	Dec. 1900.	Dec. 1901.	Dec. 1902.	Dec. 1903.	Dec. 1904.	Dec. 1905.	Dec. 1906.
	£	£	£	£	£	£	£	£	£	£
Riga—										
SPK	23½	21 to 22	28 to 32	42	28 to 32	32	39	33	35	32
XHDX	27	26½	32½ to 33	43½	34	35	42	34	36	33
W	16 to 16¼	15½ to 16	22½ to 24	31	18 to 19	22	29	23	24	24
St Petersburg—										
Bajetsky	28 to 29	26 to 27	32 to 32½	46	37	33	49	36	42	38
Jaropol	24 to 25	23 to 23½	30	42	32	30	42	33	35	33
Tows—										
Mologin	24 to 24¼	23 to 23½	24½ to 25	31½	32	32	42	32	34	32½
Novgorod	[1] 23½ to 24¼	[1] 23	[1] 26 to 26½	33	31½	32½	41	31½	37	34½
Archangel—										
½ and ½ tow	25	24 to 24½	26 to 27	32	31	32	41	31½	32½	31
2nd Codilla	25	24 to 24½	25½ to 26	32	31	32	41	32	33	31

Of the lower qualities of Riga flax the following may be named:

W, Wrack flax.	PW, Picked wrack flax.
WPW, White picked wrack.	GPW, Grey picked wrack flax.
D, Dreiband (Threeband).	PD, Picked Dreiband flax.
LD, Livonian Dreiband.	PLD, Picked Livonian Dreiband.
SD, Slanitz Dreiband.	PSD, Picked Slanitz Dreiband.

The last-named (SD and PSD) are dew-retted qualities shipped from Riga either as Lithuanian Slanitz, Wellish Slanitz or Wiasma Slanitz, showing from what district they come, as there are differences in the quality of the produce of each district. The lowest quality of Riga flax is marked DW, meaning Dreiband Wrack.

Another Russian port from which a large quantity of flax is imported is Pernau, where the marks in use are comparatively few. The leading marks are:—

LOD,	indicating	Low Ordinary Dreiband (Threeband).
OD,	„	Ordinary Dreiband.
D,	„	Dreiband.
HD,	„	Light Dreiband.
R,	„	Risten.
G,	„	Cut.
M,	„	Marienburg.

Pernau flax is shipped as Livonian and Fellin sorts, the latter being the best.

Both dew-retted and water-retted flax are exported from St Petersburg, the dew-retted or Slanitz flax being marked 1st, 2nd, 3rd and 4th Crown, also Zebrack No. 1 and Zebrack No. 2, while all the Archangel flax is dew-retted.

Some idea of the extent of the Russian flax trade may be gathered from the fact that 233,000 tons were exported in 1905. Out of this quantity a little over 53,000 tons came to the United Kingdom. The chief British ports for the landing of flax are:—Belfast, Dundee, Leith, Montrose, London and Arbroath, the two former being the chief centres of the flax industry.

The following table, taken from the annual report of the Belfast Flax Supply Association, shows the quantities received from all sources into the different parts of the United Kingdom:—

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[1] 8 and 2, which means 80 % of one quality and 20 % of another. Sometimes other proportions obtain, while it is not unusual to have quotations for flaxes containing four different kinds.

Year.	Imports to the United Kingdom.	Imports to Ireland.	Imports to England and Scotland.
	Tons.	Tons.	Tons.
1895	102,622	33,506	67,116
1896	95,199	36,650	58,549
1897	98,802	37,715	61,087
1898	97,253	34,440	62,813
1899	99,052	40,145	58,907
1900	71,586	31,563	40,023
1901	75,565	28,785	46,780
1902	73,611	29,727	43,884
1903	94,701	38,168	56,533
1904	74,917	33,024	41,893
1905	90,098	40,063	50,035

The extent of flax cultivation in Ireland is considerable, but the acreage has been gradually diminishing during late years. In 1864 it reached the maximum, 301,693 acres; next year it fell to 251,433. After 1869 it declined, there being 229,252 acres in flax crop that year, and only 122,003 in 1872. From this year to 1889 it fluctuated considerably, reaching 157,534 acres in 1880 and dropping to 89,225 acres in 1884. Then for five successive years the acreage was above 108,000. From 1890 to 1905 it only once reached 100,000, while the average in 1903, 1904 and 1905 was a little over 45,000 acres. (T. Wo.)

FLAXMAN, JOHN (1755–1826), English sculptor and draughtsman, was born on the 6th of July 1755, during a temporary residence of his parents at York. The name John was hereditary in the family, having been borne by his father after a forefather who, according to the family tradition, had fought on the side of parliament at Naseby, and afterwards settled as a carrier or farmer, or both, in Buckinghamshire. John Flaxman, the father of the sculptor, carried on with repute the trade of a moulder and seller of plaster casts at the sign of the Golden Head, New Street, Covent Garden, London. His wife's maiden name was See, and John was their second son. Within six months of his birth the family returned to London, and in his father's back shop he spent an ailing childhood. His figure was high-shouldered and weakly, the head very large for the body. His mother having died about his tenth year, his father took a second wife, of whom all we know is that her maiden name was Gordon, and that she proved a thrifty housekeeper and kind stepmother. Of regular schooling the boy must have had some, since he is reputed as having remembered in after life the tyranny of some pedagogue of his youth; but his principal education he picked up for himself at home. He early took delight in drawing and modelling from his father's stock-in-trade, and early endeavoured to understand those counterfeits of classic art by the light of translations from classic literature.

Customers of his father took a fancy to the child, and helped him with books, advice, and presently with commissions. The two special encouragers of his youth were the painter Romney, and a cultivated clergyman, Mr Mathew, with his wife, in whose house in Rathbone Place the young Flaxman used to meet the best "blue-stocking" society of those days, and, among associates of his own age, the artists Blake and Stothard, who became his closest friends. Before this he had begun to work with precocious success in clay as well as in pencil. At twelve years old he won the first prize of the Society of Arts for a medal, and became a public exhibitor in the gallery of the Free Society of Artists; at fifteen he won a second prize from the Society of Arts and began to exhibit in the Royal Academy, then in the second year of its existence. In the same year, 1770, he entered as an Academy student and won the silver medal. But all these successes were followed by a discomfiture. In the competition for the gold medal of the Academy in 1772, Flaxman, who had made sure of victory, was defeated, the prize being adjudged by the president, Sir Joshua Reynolds, to another competitor named Engleheart. But this reverse proved no discouragement, and indeed seemed to have had a wholesome effect in curing the successful lad of a tendency to conceit and self-sufficiency which made Thomas Wedgwood say of him in 1775: "It is but a few years since he was a most supreme coxcomb."

He continued to ply his art diligently, both as a student in the schools and as an exhibitor in the galleries of the Academy, occasionally also attempting diversions into the sister art of painting. To the Academy he contributed a wax model of Neptune (1770); four portrait models in wax (1771); a terracotta bust, a wax figure of a child, a figure of History (1772); a figure of Comedy, and a relief of a Vestal (1773). During these years he received a commission from a friend of the Mathew family, for a statue of Alexander. But by heroic and ideal work of this class he could, of course, make no regular livelihood. The means of such a livelihood, however, presented themselves in his twentieth year, when he first received employment from Josiah Wedgwood and his partner Bentley, as a modeller of classic and domestic friezes, plaques, ornamental vessels and medallion portraits, in those varieties of "jasper" and "basalt" ware which earned in their day so great a reputation for the manufacturers who had conceived and perfected the invention. In the same year, 1775, John Flaxman the elder moved from New Street, Covent Garden, to a more commodious house in the Strand (No. 420). For twelve years, from his twentieth to his thirty-second (1775–1787), Flaxman subsisted chiefly by his work for the firm of Wedgwood. It may be urged, of the minute refinements of figure outline and modelling which these manufacturers aimed at in their ware, that they were not the qualities best suited to such a material; or it may be regretted that the gifts of an artist like Flaxman should have been spent so long upon such a minor and half-mechanical art of household decoration; but the beauty of the product it would be idle to deny, or the value of the training which the sculptor by this practice acquired in the delicacies and severities of modelling in low relief and on a minute scale.

By 1780 Flaxman had begun to earn something in another branch of his profession, which was in the future to furnish his chief source of livelihood, viz. the sculpture of monuments for the dead. Three of the earliest of such monuments by his hand are those of Chatterton in the church of St Mary Redcliffe at Bristol (1780), of Mrs Morley in Gloucester cathedral (1784), and of the Rev. T. and Mrs Margaret Ball in the cathedral at Chichester (1785). During the rest of Flaxman's career memorial bas-reliefs of the same class occupied a principal part of his industry; they are to be found scattered in many churches throughout the length and breadth of England, and in them the finest qualities of his art are represented. The best are admirable for pathos and simplicity, and for the alliance of a truly Greek instinct for rhythmical design and composition with that spirit of domestic tenderness and innocence which is one of the secrets of the modern soul.

In 1782, being twenty-seven years old, Flaxman was married to Anne Denman, and had in her the best of helpmates until almost his life's end. She was a woman of attainments in letters and to some extent in art, and the devoted companion of her husband's fortunes and of his travels. They set up house at first in Wardour Street, and lived an industrious life, spending their summer holidays once and again in the house of the hospitable poet Hayley, at Eartham in Sussex. After five years, in 1787, they found themselves with means enough to travel, and set out for Rome, where they took up their quarters in the Via Felice. Records more numerous and more consecutive of Flaxman's residence in Italy exist in the shape of drawings and studies than in the shape of correspondence. He soon ceased modelling himself for Wedgwood, but continued to direct the work of other modellers employed for the manufacture at Rome. He had intended to return after a stay of a little more than two years, but was detained by a commission for a marble group of a Fury of Athamas, a commission attended in the sequel with circumstances of infinite trouble and annoyance, from the notorious Comte-Évêque, Frederick Hervey, earl of Bristol and bishop of Derry. He did not, as things fell out, return until the summer of 1794, after an absence of seven years,—having in the meantime executed another ideal commission (a "Cephalus and Aurora") for Mr Hope, and having sent home models for several sepulchral monuments, including one in relief for the poet Collins in Chichester cathedral, and one in the round for Lord Mansfield in Westminster Abbey.

But what gained for Flaxman in this interval a general and European fame was not his work in sculpture proper, but those outline designs to the poets, in which he showed not only to what purpose he had made his own the principles of ancient design in vase-paintings and bas-reliefs, but also by what a natural affinity, better than all mere learning, he was bound to the ancients and belonged to them. The designs for the *Iliad* and *Odyssey* were commissioned by Mrs Hare Naylor; those for Dante by Mr Hope; those for Aeschylus by Lady Spencer; they were all engraved by Piroli, not without considerable loss of the finer and more sensitive qualities of Flaxman's own lines.

During their homeward journey the Flaxmans travelled through central and northern Italy. On their return they took a house, which they never afterwards left, in Buckingham Street, Fitzroy Square. Immediately afterwards we find the sculptor publishing a spirited protest against the scheme already entertained by the Directory, and carried out five years later by Napoleon, of equipping at Paris a vast central museum of art with the spoils of conquered Europe.

The record of Flaxman's life is henceforth an uneventful record of private affection and contentment, and of happy and tenacious industry, with reward not brilliant but sufficient, and repute not loud but loudest in the mouths of those whose praise was best worth having—Canova, Schlegel, Fuseli. He took for pupil a son of Hayley's, who presently afterwards sickened and died. In 1797 he was made an associate of the Royal Academy. Every year he exhibited work of one class or another: occasionally a public monument in the round, like those of Paoli (1798), or Captain Montague (1802) for Westminster Abbey, of Sir William Jones for St Mary's, Oxford (1797–1801), of Nelson or Howe for St Paul's; more constantly memorials for churches, with symbolic Acts of Mercy or illustrations of Scripture texts, both commonly in low relief [Miss Morley, Chertsey (1797), Miss Cromwell, Chichester (1800), Mrs Knight, Milton, Cambridge (1802), and many more]; and these pious labours he would vary from time to time with a classical piece like those of his earliest predilection. Soon after his election as associate, he published a scheme, half grandiose, half childish, for a monument to be erected on Greenwich Hill, in the shape of a Britannia 200 ft. high, in honour of the naval victories of his country. In 1800 he was elected full Academician. During the peace of Amiens he went to Paris to see the despoiled treasures collected there, but bore himself according to the spirit of protest that was in him. The next event which makes any mark in his life is his appointment to a chair specially created for him by the Royal Academy—the chair of Sculpture: this took place in 1810. We have ample evidence of his thoroughness and judiciousness as a teacher in the Academy schools, and his professorial lectures have been often reprinted. With many excellent observations, and with one singular merit—that of doing justice, as in those days justice was hardly ever done, to the sculpture of the medieval schools—these lectures lack point and felicity of expression, just as they are reported to have lacked fire in delivery, and are somewhat heavy reading. The most important works that occupied Flaxman in the years next following this appointment were the monument to Mrs Baring in Micheldever church, the richest of all his monuments in relief (1805–1811); that for the Worsley family at Campsall church, Yorkshire, which is the next richest; those to Sir Joshua Reynolds for St Paul's (1807); to Captain Webbe for India (1810); to Captains Walker and Beckett for Leeds (1811); to Lord Cornwallis for Prince of Wales's Island (1812); and to Sir John Moore for Glasgow (1813). At this time the antiquarian world was much occupied with the vexed question of the merits of the Elgin marbles, and Flaxman was one of those whose evidence before the parliamentary commission had most weight in favour of the purchase which was ultimately effected in 1816.

After his Roman period he produced for a good many years no outline designs for the engraver except three for Cowper's translations of the Latin poems of Milton (1810). Other sets of outline illustrations drawn about the same time, but not published, were one to the *Pilgrim's Progress*, and one to a Chinese tale in verse, called "The Casket," which he wrote to amuse his womenkind. In 1817 we find him returning to his old practice of classical outline illustrations and publishing the happiest of all his series in that kind, the designs to Hesiod, excellently engraved by the sympathetic hand of Blake. Immediately afterwards he was much engaged designing for the goldsmiths—a testimonial cup in honour of John Kemble, and following that, the great labour of the famous and beautiful (though quite un-Homeric) "Shield of Achilles." Almost at the same time he undertook a frieze of "Peace, Liberty and Plenty," for the duke of Bedford's sculpture gallery at Woburn, and an heroic group of Michael overthrowing Satan, for Lord Egremont's house at Petworth. His literary industry at the same time is shown by several articles on art and archaeology contributed to Rees's *Encyclopaedia* (1819–1820).

In 1820 Mrs Flaxman died, after a first warning from paralysis six years earlier. Her younger sister, Maria Denman, and the sculptor's own sister, Maria Flaxman, remained in his house, and his industry was scarcely at all relaxed. In 1822 he delivered at the Academy a lecture in memory of his old friend and generous fellow-craftsman, Canova, then lately dead; in 1823 he received from A. W. von Schlegel a visit of which that writer has left us the record. From an illness occurring soon after this he recovered sufficiently to resume both work and exhibition, but on the 3rd of December 1826 he caught cold in church, and died four days later, in his seventy-second year. Among a few intimate associates, he left a memory singularly dear; having been in companionship, although susceptible and obstinate when his religious creed—a devout Christianity with Swedenborgian admixtures—was crossed or slighted, yet in other things genial and sweet-tempered beyond most men, full of modesty and playfulness and withal of a homely dignity, a true friend and a kind master, a pure and blameless spirit.

Posterity will doubt whether it was the fault of Flaxman or of his age, which in England offered neither training nor much encouragement to a sculptor, that he is weakest when he is most ambitious, and most inspired when he makes the least effort; but so it is. Not merely does he fail when he seeks to illustrate the intensity of Dante, or to rival the tumultuousness of Michelangelo—to be intense or tumultuous he was never made; but he fails, it may almost be said, in proportion as his work is elaborate and far carried, and succeeds in proportion as it is partial and suggestive. Of his completed ideal sculptures, the "St Michael" at Petworth is the best, and is indeed admirably composed from all points of view; but it lacks fire and force, and it lacks the finer touches of the chisel; a little bas-relief like the diploma piece of the "Apollo" and "Marpessa" in the Royal Academy compares with it favourably. This is one of the very few things which he is recorded to have executed in the marble entirely with his own hand; ordinarily he entrusted the finishing work of the chisel to the Italian workmen in his employ, and was content with the smooth mechanical finish which they imitated from the Roman imitations (themselves often reworked at the Renaissance) of Greek originals. Of Flaxman's complicated monuments in the round, such as the three in Westminster Abbey and the four in St Paul's, there is scarcely one which has not something heavy and infelicitous in the arrangement, and something empty and unsatisfactory in the surface execution. But when we come to his simple monuments in relief, in these we find almost always a far finer quality. The truth is that he did not thoroughly understand composition on the great scale and in the round, but he thoroughly understood relief, and found scope in it for his remarkable gifts of harmonious design, and tender, grave and penetrating feeling. But if we would see even the happiest of his conceptions at their best, we must study them, not in the finished marble but rather in the casts from his studio sketches (marred though they have been by successive coats of paint intended for their protection) of which a comprehensive collection is preserved in the Flaxman gallery at University College. And the same is true of his happiest efforts in the classical and poetical vein, like the well-known relief of "Pandora conveyed to Earth by Mercury." Nay, going farther back still among the rudiments and first conceptions of his art, we can realize the most essential charm of his genius in the study, not of his modelled work at all, but of his sketches in pen and wash on paper. Of these the principal public collections are at University College, in the British Museum, and the Victoria & Albert Museum; many others are dispersed in public and private cabinets. Every one knows the excellence of the engraved designs to Homer, Dante, Aeschylus and Hesiod, in all cases save when the designer aims at that which he cannot hit, the terrible or the grotesque. To know Flaxman at his best it is necessary to be acquainted not only with the original studies for such designs as these (which, with the exception of the Hesiod series, are far finer than the engravings), but still more with those almost innumerable studies from real life which he was continually producing with pen, tint or pencil. These are the most delightful and suggestive sculptor's notes in existence; in them it was his habit to set down the leading and expressive lines, and generally no more, of every group that struck his fancy. There are groups of Italy and London, groups of the parlour and the nursery, of the street, the garden and the gutter; and of each group the artist knows how to seize at once the structural and the spiritual secret, expressing happily the value and suggestiveness, for his art of sculpture, of the contacts, intervals, interlacements and balancings of the various figures in any given group, and not less happily the charm of the affections which link the figures together and inspire their gestures.

The materials for the life of Flaxman are scattered in various biographical and other publications; the principal are the following:—An anonymous sketch in the *European Magazine* for 1823; an anonymous "Brief Memoir," prefixed to *Flaxman's Lectures* (ed. 1829, and reprinted in subsequent editions); the chapter in Allan Cunningham's *Lives of the Most Eminent British Painters*, &c., vol. iii.; notices in the *Life of Nollekens*, by John Thomas Smith; in the *Life of Josiah Wedgwood*, by Miss G. Meteyard (London, 1865); in the *Diaries and Reminiscences of H. Crabbe Robinson* (London, 1869), the latter an authority of great importance; in the *Lives* of Stothard, by Mrs Bray, of Constable, by Leslie, of Watson, by Dr Lonsdale, and of Blake, by Messrs Gilchrist and Rossetti; a series of illustrated essays, principally on the monumental sculpture of Flaxman, in the *Art Journal* for 1867 and 1868, by Mr G. F. Teniswood; *Essays in English Art*, by Frederick Wedmore; *The Drawings of Flaxman, in 32 plates, with Descriptions, and an Introductory Essay on the Life and Genius of Flaxman*, by Sidney Colvin (London, 1876); and the article "Flaxman," in the *Dictionary of National Biography*. (S. C.)

FLEA (O. Eng. *flêah*, or *flêa*, cognate with *flee*, to run away from, to take flight), a name typically applied to *Pulex irritans*, a well-known blood-sucking insect-parasite of man and other mammals, remarkable for its powers of leaping, and nearly cosmopolitan. In ordinary language the name is used for any species of *Siphonaptera* (otherwise known as *Aphaniptera*), which, though formerly regarded as a suborder of *Diptera* (*q.v.*), are now considered to be a separate order of insects. All *Siphonaptera*, of which more than 100 species are known, are parasitic on mammals or birds. The majority of the species belong to the family *Pulicidae*, of which *P. irritans* may be taken as the type; but the order also includes the *Sarcopsyllidae*, the females of which fix themselves firmly to their host, and the *Ceratopsyllidae*, or bat-fleas.

Fleas are wingless insects, with a laterally compressed body, small and indistinctly separated head, and short thick antennae situated in cavities somewhat behind and above the simple eyes, which are always minute and sometimes absent. The structure of the mouth-parts is different from that seen in any other insects. The actual piercing organs are the mandibles, while the upper lip or labrum forms a sucking tube. The maxillae are not piercing organs, and their function is to protect the mandibles and labrum and separate the hairs or feathers of the host. Maxillary and labial palpi are also present, and the latter, together with the labrum or lower lip, form the rostrum.

Fleas are oviparous, and undergo a very complete metamorphosis. The footless larvae are elongate, worm-like and very active; they feed upon almost any kind of waste animal matter, and when full-grown form a silken cocoon. The human flea is considerably exceeded in size by certain other species found upon much smaller hosts; thus the European *Hystrichopsylla talpae*, a parasite of the mole, shrew and other small mammals, attains a length of 5½ millimetres; another large species infests the Indian porcupine. Of the *Sarcopsyllidae* the best known species is the "jigger" or "chigoe" (*Dermatophilus penetrans*), indigenous in tropical South America and introduced into West Africa during the second half of last century. Since then this pest has spread across the African continent and even reached Madagascar. The impregnated female jigger burrows into the feet of men and dogs, and becomes distended with eggs until its abdomen attains the size and appearance of a small pea. If in extracting the insect the abdomen be ruptured, serious trouble may ensue from the resulting inflammation. At least four species of fleas (including *Pulex irritans*) which infest the common rat are known to bite man, and are believed to be the active agents in the transmission of plague from rats to human beings. (E. E. A.)

FLÈCHE (French for "arrow"), the term generally used in French architecture for a spire, but more especially employed to designate the timber spire covered with lead, which was erected over the intersection of the roofs over nave and transepts; sometimes these were small and unimportant, but in cathedrals they were occasionally of large dimensions, as in the flèche of Notre-Dame, Paris, where it is nearly 100 ft. high; this, however, is exceeded by the example of Amiens cathedral, which measures 148 ft. from its base on the cresting to its finial.

FLÉCHIER, ESPRIT (1632–1710), French preacher and author, bishop of Nîmes, was born at Pernes, department of Vaucluse, on the 10th of June 1632. He was brought up at Tarascon by his uncle, Hercule Audiffret, superior of the Congrégation des Doctrinaires, and afterwards entered the order. On the death of his uncle, however, he left it, owing to the strictness of its rules, and went to Paris, where he devoted himself to writing poetry. His French poems met with little success, but a description in Latin verse of a tournament (*carrousel, circus regius*), given by Louis XIV. in 1662, brought him a great reputation. He subsequently became tutor to Louis Urbain Lefèvre de Caumartin, afterwards *intendant* of finances and counsellor of state, whom he accompanied to Clermont-Ferrard (*q.v.*), where the king had ordered the *Grands Jours* to be held (1665), and where Caumartin was sent as representative of the sovereign. There Fléchier wrote his curious *Mémoires sur les Grand Jours tenus à Clermont*, in which he relates, in a half romantic, half historical form, the proceedings of this extraordinary court of justice. In 1668 the duke of Montausier procured for him the post of *lecteur* to the dauphin. The sermons of Fléchier increased his reputation, which was afterwards raised to the highest pitch by his funeral orations. The most important are those on Madame de Montausier (1672), which gained him the membership of the Academy, the duchesse d'Aiguillon (1675), and, above all, Marshal Turenne (1676). He was now firmly established in the favour of the king, who gave him successively the abbacy of St Séverin, in the diocese of Poitiers, the office of almoner to the dauphiness, and in 1685 the bishopric of Lavaur, from which he was in 1687 promoted to that of Nîmes. The edict of Nantes had been repealed two years before; but the Calvinists were still very numerous at Nîmes. Fléchier, by his leniency and tact, succeeded in bringing over some of them to his views, and even gained the esteem of those who declined to change their faith. During the troubles in the Cévennes (see HUGUENOTS) he softened to the utmost of his power the rigour of the edicts, and showed himself so indulgent even to what he regarded as error, that his memory was long held in veneration amongst the Protestants of that district. It is right to add, however, that some authorities consider the accounts of his leniency to have been greatly exaggerated, and even charge him with going beyond what the edicts permitted. He died at Montpellier on the 16th of February 1710. Pulpit eloquence is the branch of belles-lettres in which Fléchier excelled. He is indeed far below Bossuet, whose robust and sublime genius had no rival in that age; he does not equal Bourdaloue in earnestness of thought and vigour of expression; nor can he rival the philosophical depth or the insinuating and impressive eloquence of Massillon. But he is always ingenious, often witty, and nobody has carried farther than he the harmony of diction, sometimes marred by an affectation of symmetry and an excessive use of antithesis. His two historical works, the histories of Theodosius and of Ximenes, are more remarkable for elegance of style than for accuracy and comprehensive insight.

The last complete edition of Fléchier's works is by J. P. Migne (Paris, 1856); the *Mémoires sur les Grands Jours* was first published in 1844 by B. Gonod (2nd ed. as *Mém. sur les Gr. J. d'Auvergne*, with notice by Sainte-Beuve and an appendix by M. Chéruel, 1862). His chief works are: *Histoire de Théodose le Grand, Oraisons funèbres, Histoire du Cardinal Ximénès, Sermons de morale, Panégyriques des saints.* He left a *portrait* or *caractère* of himself, addressed to one of his friends. The *Life of Theodosius* has been translated into English by F. Manning (1693), and the "Funeral Oration of Marshal Turenne" in H. C. Fish's *History and Repository of Pulpit Eloquence* (ii., 1857). On Fléchier generally see Antonin V. D. Fabre, *La Jeunesse de Fléchier* (1882), and Adolphe Fabre, *Fléchier, orateur* (1886); A. Delacroix, *Hist. de Fléchier* (1865).

FLECKEISEN, CARL FRIEDRICH WILHELM ALFRED (1820–1899), German philologist and critic, was born at Wolfenbüttel on the 23rd of September 1820. He was educated at the Helmstedt gymnasium and the university of Göttingen. After holding several educational posts, he was appointed in 1861 to the vice-principalship of the Vitzthum'sches Gymnasium at Dresden, which he held till his retirement in 1889. He died on the 7th of August 1899. Fleckeisen is chiefly known for his labours on Plautus and Terence; in the knowledge of these authors he was unrivalled, except perhaps by Ritschl, his lifelong friend and a worker in the same field. His chief works are: *Exercitationes Plautinae* (1842), one of the most masterly productions on the language of Plautus; "Analecta Plautina," printed in *Philologus*, ii. (1847); *Plauti Comoediae*, i., ii. (1850–1851, unfinished), introduced by an *Epistula critica ad F. Ritschelium; P. Terenti Afri Comoediae* (new ed., 1898). In his editions he endeavoured to restore the text in accordance with the results of his researches on the usages of the Latin language and metre. He attached great importance to the question of orthography, and his short treatise *Fünfzig Artikel* (1861) is considered most valuable. Fleckeisen also contributed largely to the *Jahrbücher für Philologie*, of which he was for many years editor.

See obituary notice by G. Götz in C. Bursian's *Biographisches Jahrbuch für Altertumskunde* (xxiii., 1901), and article by H. Usener in *Allgemeine deutsche Biographie* (where the date of birth is given as the 20th of September).

FLECKNOE, RICHARD (*c.* 1600–1678?), English dramatist and poet, the object of Dryden's satire, was probably of English birth, although there is no corroboration of the suggestion of J. Gillow (*Bibliog. Dict. of the Eng. Catholics*, vol. ii., 1885), that he was a nephew of a Jesuit priest, William Flecknoe, or more properly Flexney, of Oxford. The few known facts of his life are chiefly derived from his *Relation of Ten Years' Travels in Europe, Asia, Affrique and America* (1655?), consisting of letters written to friends and patrons during his travels. The first of these is dated from Ghent (1640), whither he had fled to escape the troubles of the Civil War. In Brussels he met Béatrix de Cosenza, wife of Charles IV., duke of Lorraine, who sent him to Rome to secure the legalization of her marriage. There in 1645 Andrew Marvell met him, and described his leanness and his rage for versifying in a witty satire, "Flecknoe, an English Priest at Rome." He was probably, however, not in priest's orders. He then travelled in the Levant, and in 1648 crossed the Atlantic to Brazil, of which country he gives a detailed description. On his return to Europe he entered the household of the duchess of Lorraine in Brussels. In 1645 he went back to England. His royalist and Catholic convictions did not prevent him from writing a book in praise of Oliver Cromwell, *The Idea of His Highness Oliver . . .* (1659), dedicated to Richard Cromwell. This publication was discounted at the restoration by the *Heroick Portraits* (1660) of Charles II. and others of the Stuart family. John Dryden used his name as a stalking horse from behind which to assail Thomas Shadwell in *Mac Flecknoe* (1682). The opening lines run:—

"All human things are subject to decay,
And, when fate summons, monarchs must obey.
This Flecknoe found, who, like Augustus, young
Was called to empire, and had governed long;
In prose and verse was owned, without dispute,
Throughout the realms of nonsense, absolute."

Dryden's aversion seems to have been caused by Flecknoe's affectation of contempt for the players and his attacks on the immorality of the English stage. His verse, which hardly deserved his critic's sweeping condemnation, was much of it religious, and was chiefly printed for private circulation. None of his plays was acted except *Love's Dominion*, announced as a "pattern for the reformed stage" (1654), that title being altered in 1664 to *Love's Kingdom*, with a *Discourse of the English Stage.* He amused himself, however, by adding lists of the actors whom he would have selected for the parts, had the plays been staged. Flecknoe had many connexions among English Catholics, and is said by Gerard Langbaine, to have been better acquainted with the nobility than with the muses. He died probably about 1678.

A *Discourse of the English Stage*, was reprinted in W. C. Hazlitt's *English Drama and Stage* (Roxburghe Library, 1869); Robert Southey, in his *Omniana* (1812), protested against the wholesale depreciation of Flecknoe's works. See also "Richard Flecknoe" (Leipzig, 1905, in *Münchener Beiträge zur . . . Philologie*), by A. Lohr, who has given minute attention to his life and works.

FLEET, a word in all its significances, derived from the root of the verb "to fleet," from O. Eng. *fleotan*, to float or flow, which ultimately derives from an Indo-European root seen in Gr. *πλέειν*, to sail, and Lat. *pluere*, to rain; cf. Dutch *vliessen*, and Ger. *fliessen.* In English usage it survives in the name of many places, such as Byfleet and Northfleet, and in the Fleet, a stream in London that formerly ran into the Thames between the bottom of Ludgate Hill and the present Fleet Street. From the idea of "float" comes the application of the word to ships, when in company, and particularly to a large number of warships under the supreme command of a single officer, with the individual ships, or groups of ships, under individual and subordinate command. The distinction between a fleet and a squadron is often one of name only. In the British navy the various main divisions are or have been called fleets and squadrons indifferently. The word is also frequently used of a company of fishing vessels, and in fishing is also applied to a row of drift-nets fastened together. From the original meaning of the word "flowing" comes the adjectival use of the word, swift, or speedy; so also "fleeting," of something evanescent or fading away, with the idea of the fast-flowing lapse of time.

FLEET PRISON, an historic London prison, formerly situated on the east side of Farringdon Street, and deriving its name from the Fleet stream, which flowed into the Thames. Concerning its early history little is known, but it certainly dated back to Norman times. It came into particular prominence from being used as a place of reception for persons committed by the Star Chamber, and, afterwards, for debtors, and persons imprisoned for contempt of court by the court of chancery. It was burnt down in the great fire of 1666; it was rebuilt, but was destroyed in the Gordon riots of 1780 and again rebuilt in 1781–1782. In pursuance of an act of parliament (5 & 6 Vict. c. 22, 1842), by which the Marshalsea, Fleet, and Queen's Bench prisons were consolidated into one under the name of Queen's prison, it was finally closed, and in 1844 sold to the corporation of the city of London, by whom it was pulled down. The head of the prison was termed "the warden," who was appointed by patent. It became a frequent practice of the holder of the patent to "farm out" the prison to the highest bidder. It was this custom which made the Fleet prison long notorious for the cruelties inflicted on prisoners. One purchaser of the office was of particularly evil repute, by name Thomas Bambridge, who in 1728 paid, with another, the sum of £5000 to John Huggins for the wardenship. He was guilty of the greatest extortions upon prisoners, and, in the words of a committee of the House of Commons appointed to inquire into the state of the gaols of the kingdom, "arbitrarily and unlawfully loaded with irons, put into dungeons, and destroyed prisoners for debt, treating them in the most barbarous and cruel manner, in high violation and contempt of the laws of this kingdom." He was committed to Newgate, and an act was passed to prevent his enjoying the office of warden or any other office whatsoever. The liberties or rules of the Fleet were the limits within which particular prisoners were allowed to reside outside the prison walls on observing certain conditions.

Fleet Marriages.—By the law of England a marriage was recognized as valid, so long as the ceremony was conducted by a person in holy orders, even if those orders were not of the Church of England. Neither banns nor licence were necessary, and the time and place were alike immaterial. Out of this state of the marriage law, in the period of laxness which succeeded the Commonwealth, resulted innumerable clandestine marriages. They were contracted at first to avoid the expenses attendant on the public ceremony, but an act of 1696, which imposed a penalty of £100 on any clergyman who celebrated, or permitted another to celebrate, a marriage otherwise than by banns or licence, acted as a considerable check. To clergymen imprisoned for debt in the Fleet, however, such a penalty had no terrors, for they had "neither liberty, money nor credit to lose by any proceedings the bishop might institute against them." The earliest recorded date of a Fleet marriage is 1613, while the earliest recorded in a Fleet register took place in 1674, but it was only on the prohibition of marriage without banns or licence that they began to be clandestine. Then arose keen competition, and "many of the Fleet parsons and tavern-keepers in the neighbourhood fitted up a room in their respective lodgings or houses as a chapel," and employed touts to solicit custom for them. The scandal and abuses brought about by these clandestine marriages became so great that they became the object of special legislation. In 1753 Lord Hardwicke's Act (26 Geo. ii. c. 33) was passed, which required, under pain of nullity, that banns should be published according to the rubric, or a licence obtained, and that, in either case, the marriage should be solemnized in church; and that in the case of minors, marriage by licence must be by the consent of parent or guardian. This act had the effect of putting a stop to these clandestine marriages, so far as England was concerned, and henceforth couples had to fare to Gretna Green (*q.v.*).

The *Fleet Registers*, consisting of "about two or three hundred large registers" and about a thousand rough or "pocket" books, eventually came into private hands, but were purchased by the government in 1821, and are now deposited in the office of the registrar-general, Somerset House. Their dates range from 1686 to 1754. In 1840 they were declared not admissible as evidence to prove a marriage.

AUTHORITIES.—J. S. Burn, *The Fleet Registers; comprising the History of Fleet Marriages, and some Account of the Parsons and Marriage-house Keepers*, &c. (London, 1833); J. Ashton, *The Fleet: its River, Prison and Marriages* (London, 1888).

FLEETWOOD, CHARLES (d. 1692), English soldier and politician, third son of Sir Miles Fleetwood of Aldwinkle, Northamptonshire, and of Anne, daughter of Nicholas Luke of Woodend, Bedfordshire, was admitted into Gray's Inn on the 30th of November 1638. At the beginning of the Great Rebellion, like many other young lawyers who afterwards distinguished themselves in the field, he joined Essex's life-guard, was wounded at the first battle of Newbury, obtained a regiment in 1644 and fought at Naseby. He had already been appointed receiver of the court of wards, and in 1646 became member of parliament for Marlborough. In the dispute between the army and parliament he played a chief part, and was said to have been the principal author of the plot to seize King Charles at Holmby, but he did not participate in the king's trial. In 1649 he was appointed a governor of the Isle of Wight, and in 1650, as lieutenant-general of the horse, took part in Cromwell's campaign in Scotland and assisted in the victory of Dunbar. The next year he was elected a member of the council of state, and being recalled from Scotland was entrusted with the command of the forces in England, and played a principal part in gaining the final triumph at Worcester. In 1652 he married[1] Cromwell's daughter, Bridget, widow of Ireton, and was made commander-in-chief in Ireland, to which title that of lord deputy was added. The chief feature of his administration, which lasted from September 1652 till September 1655, was the settlement of the soldiers on the confiscated estates and the transplantation of the original owners, which he carried out ruthlessly. He showed also great severity in the prosecution of the Roman Catholic priests, and favoured the Anabaptists and the extreme Puritan sects to the disadvantage of the moderate Presbyterians, exciting great and general discontent, a petition being finally sent in for his recall.

Fleetwood was a strong and unswerving follower of Cromwell's policy. He supported his assumption of the protectorate and his dismissal of the parliaments. In December 1654 he became a member of the council, and after his return to England in 1655 was appointed one of the major-generals. He approved of the "Petition and Advice," only objecting to the conferring of the title of king on Cromwell; became a member of the new House of Lords; and supported ardently Cromwell's foreign policy in Europe, based on religious divisions, and his defence of the Protestants persecuted abroad. He was therefore, on Cromwell's death, naturally regarded as a likely successor, and it is said that Cromwell had in fact so nominated him. He, however, gave his support to Richard's assumption of office, but allowed subsequently, if he did not instigate, petitions from the army demanding its independence, and finally compelled Richard by force to dissolve parliament. His project of re-establishing Richard in close dependence upon the army met with failure, and he was obliged to recall the Long Parliament on the 6th of May 1659. He was appointed immediately a member of the committee of safety and of the council of state, and one of the seven commissioners for the army, while on the 9th of June he was nominated commander-in-chief. In reality, however, his power was undermined and was attacked by parliament, which on the 11th of October declared his commission void. The next day he assisted Lambert in his expulsion of the parliament and was reappointed commander-in-chief. On Monk's approach from the North, he stayed in London and maintained order. While hesitating with which party to ally his forces, and while on the point of making terms with the king, the army on the 24th of December restored the Rump, when he was deprived of his command and ordered to appear before parliament to answer for his conduct. The Restoration therefore took place without him. He was included among the twenty liable to penalties other than capital, and was finally incapacitated from holding any office of trust. His public career then closed, though he survived till the 4th of October 1692.

FLEETWOOD, WILLIAM (1656–1723), English divine, was descended of an ancient Lancashire family, and was born in the Tower of London on New Year's Day 1656. He received his education at Eton and at King's College, Cambridge. About the time of the Revolution he took orders, and was shortly afterwards made rector of St Austin's, London, and lecturer of St Dunstan's in the West. He became a canon of Windsor in 1702, and in 1708 he was nominated to the see of St Asaph, from which he was translated in 1714 to that of Ely. He died at Tottenham, Middlesex, on the 4th of August 1723. Fleetwood was regarded as the best preacher of his time. He was accurate in learning, and effective in delivery, and his character stood deservedly high in general estimation. In episcopal administration he far excelled most of his contemporaries. He was a zealous Hanoverian, and a favourite with Queen Anne in spite of his Whiggism. His opposition to the doctrine of non-resistance brought him into conflict with the tory ministry of 1712 and with Swift, but he never entered into personal controversy.

His principal writings are—*An Essay on Miracles* (1701); *Chronicum preciosum* (an account of the English coinage, 1707); and *Free Sermons* (1712), containing discourses on the death of Queen Mary, the duke of Gloucester and King William. The preface to this last was condemned to public burning by parliament, but, as No. 384 of *The Spectator*, circulated more widely than ever. A collected edition of his works, with a biographical preface, was published in 1737.

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[1] He had lost his first wife, Frances Smith; and later he had a third wife, Mary, daughter of Sir John Coke and widow of Sir Edward Hartopp.

FLEETWOOD, a seaport and watering-place in the Blackpool parliamentary division of Lancashire, England, at the mouth of the Wyre, 230 m. N.W. by N. from London, the terminus of a joint branch of the London & North-Western and Lancashire & Yorkshire railways. Pop. (1891) 9274; (1901) 12,082. It dates its rise from 1836, and takes its name from Sir Peter Hesketh Fleetwood, by whom it was laid out. The seaward views, especially northward over Morecambe Bay, are fine, but the neighbouring country is flat and of little interest. The two railways jointly are the harbour authority. The dock is provided with railways and machinery for facilitating traffic, including a large grain elevator. The shipping traffic is chiefly in the coasting and Irish trade. Passenger steamers serve Belfast and Londonderry regularly, and the Isle of Man and other ports during the season. The fisheries are important, and there are salt-works in the neighbourhood. There is a pleasant promenade, with other appointments of a watering-place. There are also barracks with a military hospital and a rifle range. Rossall school, to the S.W., is one of the principal public schools in the north of England. Rossall Hall was the seat of Sir Peter Fleetwood, but was converted to the uses of the school on its foundation in 1844. The school is primarily divided into classical and modern sides, with a special department for preparation for army, navy or professional examinations. A number of entrance scholarships and leaving scholarships tenable at the universities are offered annually. The number of boys is about 350.

FLEGEL, EDWARD ROBERT (1855–1886), German traveller in West Africa, was born on the 1st of October 1855 at Wilna, Russia. After receiving a commercial education he obtained in 1875 a position in Lagos, West Africa. In 1879 he ascended the Benue river some 125 m. above the farthest point hitherto reached. His careful survey of the channel secured him a commission from the German African Society to explore the whole Benue district. In 1880 he went up the Niger to Gomba, and then visited Sokoto, where he obtained a safe-conduct from the sultan for his intended expedition to Adamawa. This expedition was undertaken in 1882, and on the 18th of August in that year Flegel discovered the source of the Benue at Ngaundere. In 1883–1884 he made another journey up the Benue, crossing for the second time the Benue-Congo watershed. After a short absence in Europe Flegel returned to Africa in April 1885 with a commission from the German African Company and the Colonial Society to open up the Niger-Benue district to German trade. This expedition had the support of Prince Bismarck, who endeavoured, unsuccessfully, to obtain for Germany this region, already secured as a British sphere of influence by the National African Company (the Royal Niger Company). Flegel, despite a severe illness, ascended the Benue to Yola, but was unable to accomplish his mission. He returned to the coast and died at Brass, at the mouth of the Niger, on the 11th of September 1886. (See further Goldie, Sir George.)

Flegel wrote *Lose Blätter aus dem Tagebuche meiner Haussaafreunde* (Hamburg, 1885), and *Vom Niger-Benuë. Briefe aus Afrika* (edited by K. Flegel, Leipzig, 1890).

FLEISCHER, HEINRICH LEBERECHT (1801–1888), German Orientalist, was born at Schandau, Saxony, on the 21st of February 1801. From 1819 to 1824 he studied theology and oriental languages at Leipzig, subsequently continuing his studies in Paris. In 1836 he was appointed professor of oriental languages at Leipzig University, and retained this post till his death. His most important works were editions of Abulfeda's *Historia ante-Islamica* (1831–1834), and of Beidhawi's *Commentary on the Koran* (1846–1848). He compiled a catalogue of the oriental MSS. in the royal library at Dresden (1831); published an edition and German translation of Ali's *Hundred Sayings* (1837); the continuation of Babicht's edition of *The Thousand and One Nights* (vols. ix.-xii., 1842–1843); and an edition of Mahommed Ibrihim's *Persian Grammar* (1847). He also wrote an account of the Arabic, Turkish and Persian MSS. at the town library in Leipzig. He died there on the 10th of February 1888. Fleischer was one of the eight foreign members of the French Academy of Inscriptions and a knight of the German *Ordre pour le mérite.*

FLEMING, PAUL (1609–1640), German poet, was born at Hartenstein in the Saxon Erzgebirge, on the 5th of October 1609, the son of the village pastor. At the age of fourteen he was sent to school at Leipzig and subsequently studied medicine at the university. Driven away by the troubles of the Thirty Years' War, he was fortunate enough to become attached to an embassy despatched in 1634 by Duke Frederick of Holstein-Gottorp to Russia and Persia, and to which the famous traveller Adam Olearius was secretary. In 1639 the mission returned to Reval, and here Fleming, having become betrothed, determined to settle as a physician. He proceeded to Leiden to procure a doctor's diploma, but died suddenly at Hamburg on his way home on the 2nd of April 1640.

Though belonging to the school of Martin Opitz, Fleming is distinguished from most of his contemporaries by the ring of genuine feeling and religious fervour that pervades his lyric poems, even his occasional pieces. In the sonnet, his favourite form of verse, he was particularly happy. Among his religious poems the hymn beginning "In allen meinen Taten lass ich den Höchsten raten" is well known and widely sung.

Fleming's *Teutsche Poëmata* appeared posthumously in 1642; they are edited by J. M. Lappenberg, in the Bibliothek des litterarischen Vereins (2 vols., 1863; a third volume, 1866, contains Fleming's Latin poems). Selections have been edited by J. Tittmann in the second volume of the series entitled *Deutsche Dichter des siebzehnten Jahrhunderts* (Leipzig, 1870), and by H. Österley (Stuttgart, 1885). A life of the poet will be found in Varnhagen von Ense's *Biographische Denkmale*, Bd. iv. (Berlin, 1826). See also J. Straumer, *Paul Flemings Leben und Orientreise* (1892); L. G. Wysocky, *De Pauli Flemingi Germanice scriptis et ingenio* (Paris, 1892).

FLEMING, RICHARD (d. 1431), bishop of Lincoln, and founder of Lincoln College, Oxford, was born at Crofton in Yorkshire. He was descended from a good family, and was educated at University College, Oxford. Having taken his degrees, he was made prebendary of York in 1406, and the next year was junior proctor of the university. About this time he became an ardent Wycliffite, winning over many persons, some of high rank, to the side of the reformer, and incurring the censure of Archbishop Arundel. He afterwards became one of Wycliffe's most determined opponents. Before 1415 he was instituted to the rectory of Boston in Lincolnshire, and in 1420 he was consecrated bishop of Lincoln. In 1428–1429 he attended the councils of Pavia and Siena, and in the presence of the pope, Martin V., made an eloquent speech in vindication of his native country, and in eulogy of the papacy. It was probably on this occasion that he was named chamberlain to the pope. To Bishop Fleming was entrusted the execution of the decree of the council for the exhumation and burning of Wycliffe's remains. The see of York being vacant, the pope conferred it on Fleming; but the king (Henry V.) refused to confirm the appointment. In 1427 Fleming obtained the royal licence empowering him to found a college at Oxford for the special purpose of training up disputants against Wycliffe's heresy. He died at Sleaford, on the 26th of January 1431. Lincoln College was, however, completed by his trustees, and its endowments were afterwards augmented by various benefactors.

FLEMING, SIR SANDFORD (1827–), Canadian engineer and publicist, was born at Kirkcaldy, Scotland, on the 7th of January 1827, but emigrated to Canada in 1845. Great powers of work and thoroughness in detail brought him to the front, and he was from 1867 to 1880 chief engineer of the Dominion government. Under his control was constructed the Intercolonial railway, and much of the Canadian Pacific. After his retirement in 1880 he devoted himself to the study of Canadian and Imperial problems, such as the unification of time reckoning throughout the world, and the construction of a state-owned system of telegraphs throughout the British empire. After years of labour he saw the first link forged in the chain, in the opening in 1902 of the Pacific Cable between Canada and Australia. Though not a party man he strongly advocated Federation in 1864–1867, and in 1891 vehemently attacked the Liberal policy of unrestricted reciprocity with the United States. He took the deepest interest in education, and in 1880 became chancellor of Queen's University, Kingston.

He published *The Intercolonial: a History* (Montreal and London, 1876); *England and Canada* (London, 1884); and numerous *brochures* and magazine articles on scientific, social and political subjects.

FLEMING, SIR THOMAS (1544–1613), English judge, was born at Newport, Isle of Wight, in April 1544, and was called to the bar at Lincoln's Inn in 1574. He represented Winchester in parliament from 1584 to 1601, when he was returned for Southampton. In 1594 he was appointed recorder of London, and in 1595 was chosen solicitor-general in preference to Bacon. This office he retained under James I. and was knighted in 1603. In 1604 he was created chief baron of the exchequer and presided over many important state trials. In 1607 he was promoted to the chief justiceship of the king's bench, and was one of the judges at the trial of the *post-nati* in 1608, siding with the majority of the judges in declaring that persons born in Scotland after the accession of James I. were entitled to the privileges of natural-born subjects in England. He was praised by his contemporaries, more particularly Coke, for his "great judgments, integrity and discretion." He died on the 7th of August 1613 at his seat, Stoneham Park, Hampshire.

See Foss, *Lives of the Judges*.

FLEMISH LITERATURE. The older Flemish writers are dealt with in the article on Dutch Literature; after the separation of Belgium, however, from the Netherlands in 1830 there was a great revival of Flemish literature. The immediate result of the revolution was a reaction against everything associated with Dutch, and a disposition to regard the French language as the speech of liberty and independence. The provisional government of 1830 suppressed the official use of the Flemish language, which was relegated to the rank of a patois. For some years before 1830 Jan Frans Willems[1] (1793–1846) had been advocating the claims of the Flemish language. He had done his best to allay the irritation between Holland and Belgium and to prevent a separation. As archivist of Antwerp he made use of his opportunities by writing a history of Flemish letters. After the revolution his Dutch sympathies had made it necessary for him to live in seclusion, but in 1835 he settled at Ghent, and devoted himself to the cultivation of Flemish. He edited old Flemish classics, *Reinaert de Vos* (1836), the rhyming Chronicles of Jan van Heelu and Jan le Clerc, &c., and gathered round him a band of Flemish enthusiasts, the chevalier Philipp Blommaert (1809–1871), Karel Lodewijk Ledeganck (1805–1847), Fr. Rens (1805–1874), F. A. Snellaert (1809–1872), Prudens van Duyse (1804–1859), and others. Blommaert, who was born at Ghent on the 27th of August 1809, founded in 1834 in his native town the *Nederduitsche letteroefeningen*, a review for the new writers, and it was speedily followed by other Flemish organs, and by literary societies for the promotion of Flemish. In 1851 a central organization for the Flemish propaganda was provided by a society, named after the father of the movement, the "Willemsfonds." The Catholic Flemings founded in 1874 a rival "Davidsfonds," called after the energetic J. B. David (1801–1866), professor at the university of Louvain, and the author of a Flemish history of Belgium (*Vaderlandsche historie*, Louvain, 1842–1866). As a result of this propaganda the Flemish language was placed on an equality with French in law, and in administration, in 1873 and 1878, and in the schools in 1883. Finally in 1886 a Flemish Academy was established by royal authority at Ghent, where a course in Flemish literature had been established as early as 1854.

The claims put forward by the Flemish school were justified by the appearance (1837) of *In' t Wonderjaar 1566* (In the Wonderful year) of Hendrik Conscience (*q.v.*), who roused national enthusiasm by describing the heroic struggles of the Flemings against the Spaniards. Conscience was eventually to make his greatest successes in the description of contemporary Flemish life, but his historical romances and his popular history of Flanders helped to give a popular basis to a movement which had been started by professors and scholars.

The first poet of the new school was Ledeganck, the best known of whose poems are those on the "three sister cities" of Bruges, Ghent and Antwerp (*Die drie zustersteden, vaderlandsche trilogie*, Ghent, 1846), in which he makes an impassioned protest against the adoption of French ideas, manners and language, and the neglect of Flemish tradition. The book speedily took its place as a Flemish classic. Ledeganck, who was a magistrate, also translated the French code into Flemish. Jan Theodoor van Rijswijck (1811–1849), after serving as a volunteer in the campaign of 1830, settled down as a clerk in Antwerp, and became one of the hottest champions of the Flemish movement. He wrote a series of political and satirical songs, admirably suited to his public. The romantic and sentimental poet, Jan van Beers (*q.v.*), was typically Flemish in his sincere and moral outlook on life. Prudens van Duyse, whose most ambitious work was the epic *Artavelde* (1859), is perhaps best remembered by a collection (1844) of poems for children. Peter Frans Van Kerckhoven (1818–1857), a native of Antwerp, wrote novels, poems, dramas, and a work on the Flemish revival (*De Vlaemsche Beweging*, 1847).

Antwerp produced a realistic novelist in Jan Lambrecht Damien Sleeckx (1818–1901). An inspector of schools by profession, he was an indefatigable journalist and literary critic. He was one of the founders in 1844 of the *Vlaemsch België*, the first daily paper in the Flemish interest. His works include a long list of plays, among them *Jan Steen* (1852), a comedy; *Grétry*, which gained a national prize in 1861; *De Visschers van Blankenberg* (1863); and the patriotic drama of *Zannekin* (1865). His talent as a novelist was diametrically opposed to the idealism of Conscience. He was precise, sober and concrete in his methods, relying for his effect on the accumulation of carefully observed detail. He was particularly successful in describing the life of the shipping quarter of his native town. Among his novels are: *In' t Schipperskwartier* (1856), *Dirk Meyer* (1860), *Tybaerts en K^{ie}* (1867), *Kunst en Liefde* ("Art and Love," 1870), and *Vesalius in Spanje* (1895). His complete works were collected in 17 vols. (1877–1884).

Jan Renier Snieders (1812–1888) wrote novels dealing with North Brabant; his brother, August Snieders (b. 1825), began by writing historical novels in the manner of Conscience, but his later novels are satires on contemporary society. A more original talent was displayed by Anton Bergmann (1835–1874), who, under the pseudonym of "Tony," wrote *Ernest Staas, Advocat*, which gained the quinquennial prize of literature in 1874. In the same year appeared the *Novellen* of the sisters Rosalie (1834–1875) and Virginie Loveling (b. 1836). These simple and touching stories were followed by a second collection in 1876. The sisters had published a volume of poems in 1870. Virginie Loveling's gifts of fine and exact observation soon placed her in the front rank of Flemish novelists. Her political sketches, *In onze Vlaamsche gewesten* (1877), were published under the name of "W. G. E. Walter." *Sophie* (1885), *Een dure Eed* (1892), and *Het Land der Verbeelding* (1896) are among the more famous of her later works. Reimond Stÿns (b. 1850) and Isidoor Teirlinck (b. 1851) produced in collaboration one very popular novel, *Arm Vlaanderen* (1884), and some others, and have since written separately. Cyril Buysse, a nephew of Mme Loveling, is a disciple of Zola. *Het Recht van den Sterkste* ("The Right of the Strongest," 1893) is a picture of vagabond life in Flanders; *Schoppenboer* ("The Knave of Spades," 1898) deals with brutalized peasant life; and *Sursum corda* (1895) describes the narrowness and religiosity of village life.

In poetry Julius de Geyter (b. 1830), author of a rhymed translation of *Reinaert* (1874), an epic poem on Charles V. (1888), &c., produced a social epic in three parts, *Drie menschen van in*

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[1] See Max Rooses, *Keus van Dicht- en Prozawerken van J. F. Willems*, and his *Brieven* in the publications of the Willemsfonds (Ghent, 1872–1874.)

de wieg tot in het graf ("Three Men from the Cradle to the Grave," 1861), in which he propounded radical and humanitarian views. The songs of Julius Vuylsteke (1836–1903) are full of liberal and patriotic ardour; but his later life was devoted to politics rather than literature. He had been the leading spirit of a students' association at Ghent for the propagation of "*flamingant*" views, and the "Willemsfonds" owed much of its success to his energetic co-operation. His *Uit het studenten leven* appeared in 1868, and his poems were collected in 1881. The poems of Mme van Ackere (1803–1884), *née* Maria Doolaeghe, were modelled on Dutch originals. Joanna Courtmans (1811–1890), *née* Berchmans, owed her fame rather to her tales than her poems; she was above all a moralist, and her fifty tales are sermons on economy and the practical virtues. Other poets were Emmanuel Hiel (*q.v.*), author of comedies, opera libretti and some admirable songs; the abbé Guido Gezelle (1830–1899), who wrote religious and patriotic poems in the dialect of West Flanders; Lodewijk de Koninck (b. 1838), who attempted a great epic subject in *Menschdon Verlost* (1872); J. M. Dautzenberg (1808–1869), author of a volume of charming *Volksliederen*. The best of Dautzenberg's work is contained in the posthumous volume of 1869, published by his son-in-law, Frans de Cort (1834–1878), who was himself a song-writer, and translated songs from Burns, from Jasmin and from the German. The *Makamen en Ghazelen* (1866), adapted from Rückert's version of Hariri, and other volumes by "Jan Ferguut" (J. A. van Droogenbroeck, b. 1835) show a growing preoccupation with form, and with the work of Theodoor Antheunis (b. 1840), they prepare the way for the ingenious and careful workmanship of the younger school of poets, of whom Charles Polydore de Mont is the leader. He was born at Wambeke in Brabant in 1857, and became professor in the academy of the fine arts at Antwerp. He introduced something of the ideas and methods of contemporary French writers into Flemish verse; and explained his theories in 1898 in an *Inleiding tot de Poëzie*. Among Pol de Mont's numerous volumes of verse dating from 1877 onwards are *Claribella* (1893), and *Iris* (1894), which contains amongst other things a curious "*Uit de Legende van Jeschoea-ben-Jossef*," a version of the gospel story from a Jewish peasant.

Mention should also be made of the history of Ghent (*Gent van den vroegsten Tijd tot heden*, 1882–1889) of Frans de Potter (b. 1834), and of the art criticisms of Max Rooses (b. 1839), curator of the Plantin museum at Antwerp, and of Julius Sabbe (b. 1846).

See Ida van Düringsfeld, *Von der Schelde bis zur Maas. Das geistige Leben der Vlamingen* (Leipzig, 3 vols., 1861); J. Stecher, *Histoire de la littérature néerlandaise en Belgique* (1886); *Geschiedenis der Vlaamsche Letterkunde van het jaar 1830 tot heden* (1899), by Theodoor Coopman and L. Scharpé; A. de Koninck, *Bibliographie nationale* (3 vols., 1886–1897); and *Histoire politique et littéraire du mouvement flamand* (1894), by Paul Hamelius. The *Vlaamsche Bibliographie*, issued by the Flemish Academy of Ghent, by Frans de Potter, contains a list of publications between 1830 and 1890; and there is a good deal of information in the excellent *Biographisch woordenboeck der Noord- en Zuid-Nederlandsche Letterkunde* (1878) of Dr W. J. A. Huberts and others. (E. G.)

FLENSBURG (Danish, *Flensborg*), a seaport of Germany, in the Prussian province of Schleswig-Holstein, at the head of the Flensburg Fjord, 20 m. N.W. from Schleswig, at the junction of the main line Altona-Vamdrup (Denmark), with branches to Kiel and Glücksburg. Pop. (1905) 48,922. The principal public buildings are the Nikolai Kirche (built 1390, restored 1894), with a spire 295 ft. high; the Marienkirche, also a medieval church, with a lofty tower; the law courts; the theatre and the exchange. There are two gymnasia, schools of marine engineering, navigation, wood-carving and agriculture. The cemetery contains the remains of the Danish soldiers who fell at the battle of Idstedt (25th of July 1850), but the colossal Lion monument, erected by the Danes to commemorate their victory, was removed to Berlin in 1864. Flensburg is a busy centre of trade and industry, and is the most important town in what was formerly the duchy of Schleswig. It possesses excellent wharves, does a large import trade in coal, and has shipbuilding yards, breweries, distilleries, cloth and paper factories, glass-works, copper-works, soap-works and rice mills. Its former extensive trade with the West Indies has lately suffered owing to the enormous development of the North Sea ports, but it is still largely engaged in the Greenland whale and the oyster fisheries.

Flensburg was probably founded in the 12th century. It attained municipal privileges in 1284, was frequently pillaged by the Swedes after 1643, and in 1848 became the capital, under Danish rule, of Schleswig.

See Holdt, *Flensburg früher und jetzt* (1884).

FLERS, a manufacturing town of north-western France, in the arrondissement of Domfront, and department of Orne, on the Vère, 41 m. S. of Caen on the railway to Laval. Pop. (1906) 11,188. A modern church in the Romanesque style and a restored château of the 15th century are its principal buildings. There is a tribunal of commerce, a board of trade-arbitrators, a communal college and a branch of the Bank of France. Flers is the centre of a cotton and linen-manufacturing region which includes the towns of Condé-sur-Noireau and La Ferté-Macé. Manufactures are very important, and include, besides cotton and linen fabrics, of which the annual value is about £1,500,000, drugs and chemicals; there are large brick and tile works, flour mills and dyeworks.

FLETA, a treatise, with the sub-title *seu Commentarius juris Anglicani*, on the common law of England. It appears, from internal evidence, to have been written in the reign of Edward I., about the year 1290. It is for the most part a poor imitation of Bracton. The author is supposed to have written it during his confinement in the Fleet prison, hence the name. It has been conjectured that he was one of those judges who were imprisoned for malpractices by Edward I. Fleta was first printed by J. Selden in 1647, with a dissertation (2nd edition, 1685).

FLETCHER, ALICE CUNNINGHAM (1845–), American ethnologist, was born in Boston, Massachusetts, in 1845. She studied the remains of Indian civilization in the Ohio and Mississippi valleys, became a member of the Archaeological Institute of America in 1879, and worked and lived with the Omahas as a representative of the Peabody Museum of American Archaeology and Ethnology, Harvard University. In 1883 she was appointed special agent to allot lands to the Omaha tribes, in 1884 prepared and sent to the New Orleans Exposition an exhibit showing the progress of civilization among the Indians of North America in the quarter-century previous, in 1886 visited the natives of Alaska and the Aleutian Islands on a mission from the commissioner of education, and in 1887 was United States special agent in the distribution of lands among the Winnebagoes and Nez Percés. She was made assistant in ethnology at the Peabody Museum in 1882, and received the Thaw fellowship in 1891; was president of the Anthropological Society of Washington and of the American Folk-Lore Society, and vice-president of the American Association for the Advancement of Science; and, working through the Woman's National Indian Association, introduced a system of making small loans to Indians, wherewith they might buy land and houses. In 1888 she published *Indian Education and Civilization*, a special report of the Bureau of Education. In 1898 at the Congress of Musicians held at Omaha during the Trans-Mississippi Exposition she read "several essays upon the songs of the North American Indians . . . in illustration of which a number of Omaha Indians . . . sang their native melodies." Out of this grew her *Indian Story and Song from North America* (1900), illustrating "a stage of development antecedent to that in which culture music appeared."

FLETCHER, ANDREW, of Saltoun (1655–1716), Scottish politician, was the son and heir of Sir Robert Fletcher (1625–1664), and was born at Saltoun, the modern Salton, in East Lothian. Educated by Gilbert Burnet, afterwards bishop of Salisbury, who was then the parish minister of Saltoun, he completed his education by spending some years in travel and study, entering public life as member of the Scottish parliament which met in 1681. Possessing advanced political ideas, Fletcher was a fearless and active opponent of the measures introduced by John Maitland, duke of Lauderdale, the representative of

Charles II. in Scotland, and his successor, the duke of York, afterwards King James II.; but he left Scotland about 1682, subsequently spending some time in Holland as an associate of the duke of Monmouth and other malcontents.

Although on grounds of prudence Fletcher objected to the rising of 1685, he accompanied Monmouth to the west of England, but left the army after killing one of the duke's trusted advisers. This incident is thus told by Sir John Dalrymple:

> "Being sent upon an expedition, and not esteeming times of danger to be times of ceremony, he had seized for his own riding the horse of a country gentleman (the mayor of Lynne) which stood ready equipt for its master. The master hearing this ran in a passion to Fletcher, gave him opprobrious language, shook his cane and attempted to strike. Fletcher, though rigid in the duties of morality, yet having been accustomed to foreign services both by sea and land in which he had acquired high ideas of the honour of a soldier and a gentleman and of the affront of a cane, pulled out his pistol and shot him dead on the spot. The action was unpopular in countries where such refinements were not understood. A clamour was raised against it among the people of the country: in a body they waited upon the duke with their complaints; and he was forced to desire the only soldier and almost the only man of parts in his army, to abandon him."

Another, but less probable account, represents Fletcher as quitting the rebel army because he disapproved of the action of Monmouth in proclaiming himself king.

His history during the next few years is rather obscure. He probably travelled in Spain, and fought against the Turks in Hungary; and having in his absence lost his estates and been sentenced to death, he joined William of Orange at the Hague, and returned to Scotland in 1689 in consequence of the success of the Revolution of 1688. His estates were restored to him; and he soon became a leading member of the "club," an organization which aimed at reducing the power of the crown in Scotland, and in general an active opponent of the English government. In 1703, at a critical stage in the history of Scotland, Fletcher again became a member of the Scottish parliament. The failure of the Darien expedition had aroused a strong feeling of resentment against England, and Fletcher and the national party seized the opportunity to obtain a greater degree of independence for their country.

His attitude in this matter, and also to the proposal for the union of the two crowns, is thus described by a writer in the third edition of the *Encyclopaedia Britannica*:—

> "The thought of England's domineering over Scotland was what his generous soul could not endure. The indignities and oppression which Scotland lay under galled him to the heart, so that in his learned and elaborate discourses he exposed them with undaunted courage and pathetical eloquence. In that great event, the Union, he performed essential service. He got the act of security passed, which declared that the two crowns should not pass to the same head till Scotland was secured in her liberties civil and religious. Therefore Lord Godolphin was forced into the Union, to avoid a civil war after the queen's demise. Although Mr Fletcher disapproved of some of the articles, and indeed of the whole frame of the Union, yet, as the act of security was his own work, he had all the merit of that important transaction."

Soon after the passing of the Act of Union Fletcher retired from public life. Employing his abilities in another direction, he did a real, if homely, service to his country by introducing from Holland machinery for sifting grain. He died unmarried in London in September 1716.

Contemporaries speak very highly of Fletcher's integrity, but he was also choleric and impetuous. Burnet describes him as "a Scotch gentleman of great parts and many virtues, but a most violent republican and extremely passionate." In appearance he was "a low, thin man, of a brown complexion; full of fire; with a stern, sour look." Fletcher was a fine scholar and a graceful writer, and both his writings and speeches afford bright glimpses of the manners and state of the country in his time. His chief works are: *A Discourse of Government relating to Militias* (1698); *Two Discourses concerning the Affairs of Scotland* (1698); and *An Account of a Conversation concerning a right regulation of Governments for the common good of Mankind* (1704). In *Two Discourses* he suggests that the numerous vagrants who infested Scotland should be brought into compulsory and hereditary servitude; and in *An Account of a Conversation* occurs his well-known remark, "I knew a very wise man so much of Sir Christopher's (Sir C. Musgrave) sentiment, that he believed if a man were permitted to make all the ballads, he need not care who should make the laws of a nation."

The Political Works of Andrew Fletcher were published in London in 1737. See D. S. Erskine, 11th earl of Buchan, *Essay on the Lives of Fletcher of Saltoun and the Poet Thomson* (1792); J. H. Burton, *History of Scotland*, vol. viii. (Edinburgh, 1905); and A. Lang, *History of Scotland*, vol. iv. (Edinburgh, 1907).

FLETCHER, GILES (*c.* 1548–1611), English author, son of Richard Fletcher, vicar of Cranbrook, Kent, and father of the poets Phineas and Giles Fletcher, was born in 1548 or 1549. He was educated at Eton and at King's College, Cambridge, taking his B.A. degree in 1569. He was a fellow of his college, and was made LL.D. in 1581. In 1580 he had married Joan Sheafe of Cranbrook. In that year he was commissary to Dr Bridgwater, chancellor of Ely, and in 1585 he sat in parliament for Winchelsea. He was employed on diplomatic service in Scotland, Germany and Holland, and in 1588 was sent to Russia to the court of the czar Theodore with instructions to conclude an alliance between England and Russia, to restore English trade, and to obtain better conditions for the English Russia Company. The factor of the company, Jerome Horsey, had already obtained large concessions through the favour of the protector, Boris Godunov, but when Dr Fletcher reached Moscow in 1588 he found that Godunov's interest was alienated, and that the Russian government was contemplating an alliance with Spain. The envoy was badly lodged, and treated with obvious contempt, and was not allowed to forward letters to England, but the English victory over the Armada and his own indomitable patience secured among other advantages for English traders exclusive rights of trading on the Volga and their security from the infliction of torture. Fletcher's treatment at Moscow was later made the subject of formal complaint by Queen Elizabeth. He returned to England in 1589 in company with Jerome Horsey, and in 1591 he published *Of the Russe Commonwealth, Or Maner of Government by the Russe Emperour (commonly called The Emperour of Moskovia) with the manners and fashions of the people of that Countrey.* In this comprehensive account of Russian geography, government, law, methods of warfare, church and manners, Fletcher, who states that he began to arrange his material during the return journey, doubtless received some assistance from the longer experience of his travelling companion, who also wrote a narrative of his travels, published in *Purchas his Pilgrimes* (1626). The Russia Company feared that the freedom of Fletcher's criticisms would give offence to the Muscovite authorities, and accordingly damage their trade. The book was consequently suppressed, and was not reprinted in its entirety until 1856, when it was edited from a copy of the original edition for the Hakluyt Society, with an introduction by Mr Edward A. Bond.

Fletcher was appointed "Remembrancer" to the city of London, and an extraordinary master of requests in 1596, and became treasurer of St Paul's in 1597. He contemplated a history of the reign of Queen Elizabeth, and in a letter to Lord Burghley he suggested that it might be well to begin with an account from the Protestant side of the marriage of Henry VIII. and Ann Boleyn. But personal difficulties prevented the execution of this plan. He had become security to the exchequer for the debts of his brother, Richard Fletcher, bishop of London, who died in 1596, and was only then saved from imprisonment by the protection of the earl of Essex. He was actually in prison in 1601, when he addressed a somewhat ambiguous letter to Burghley from which it may be gathered that his prime offence had been an allusion to Essex's disgrace as being the work of Sir Walter Raleigh. Fletcher was employed in 1610 to negotiate with Denmark on behalf of the "Eastland Merchants," and he died next year, and was buried on the 11th of March in the parish of St Catherine Colman, London

The Russe Commonwealth was issued in an abridged form in *Hakluyt's Principal Navigations, Voyages*, &c. (vol. i. p. 473, ed. of 1598), a somewhat completer version in *Purchas his Pilgrimes* (pt. iii. ed. 1625), also as *History of Russia* in 1643 and 1657.

Fletcher also wrote *De literis antiquae Britanniae* (ed. by Phineas Fletcher, 1633), a treatise on "The Tartars," printed in *Israël Redux* (ed. by S(amuel) L(ee), 1677), to prove that they were the ten lost tribes of Israel, Latin poems published in various miscellanies, and *Licia, or Poemes of Love in Honour of the admirable and singular vertues of his Lady, to the imitation of the best Latin Poets, . . . whereunto is added the Rising to the Crowne of Richard the third* (1593). This series of love sonnets, followed by some other poems, was published anonymously. Most critics, with the notable exception of Alexander Dyce (Beaumont and Fletcher, *Works*, i. p. xvi., 1843) have accepted it as the work of Dr Giles Fletcher on the evidence afforded in the first of the *Piscatory Eclogues* of his son Phineas, who represents his father (Thelgon), as having "raised his rime to sing of Richard's climbing."

See E. A. Bond's Introduction to the Hakluyt Society's edition; also Dr A. B. Grosart's prefatory matter to *Licia* (*Fuller Worthies Library*, Miscellanies, vol. iii., 1871), and to the works (1869) of Phineas Fletcher in the same series. Fletcher's letters relative to the college dispute with the provost, Dr Roger Goad, are preserved in the Lansdowne MSS. (xxiii. art. 18 et seq.), and are translated in Grosart's edition.

FLETCHER, GILES (*c.* 1584–1623), English poet, younger son of the preceding, was born about 1584. Fuller in his *Worthies of England* says that he was a native of London, and was educated at Westminster school. From there he went to Trinity College, Cambridge, where he took his B.A. degree in 1606, and became a minor fellow of his college in 1608. He was reader in Greek grammar (1615) and in Greek language (1618). In 1603 he contributed a poem on the death of Queen Elizabeth to *Sorrow's Joy*. His great poem of *Christ's Victory* appeared in 1610, and in 1612 he edited the *Remains* of his cousin Nathaniel Pownall. It is not known in what year he was ordained, but his sermons at St Mary's were famous. Fuller tells us that the prayer before the sermon was a continuous allegory. He left Cambridge about 1618, and soon after received, it is supposed from Francis Bacon, the rectory of Alderton, on the Suffolk coast, where "his clownish and low-parted parishioners . . . valued not their pastor according to his worth; which disposed him to melancholy and hastened his dissolution." (Fuller, *Worthies of England*, ed. 1811, vol. ii. p. 82). His last work, *The Reward of the Faithful*, appeared in the year of his death (1623).

The principal work by which Giles Fletcher is known is *Christ's Victorie and Triumph, in Heaven, in Earth, over and after Death* (1610). An edition in 1640 contains seven full-page illustrative engravings by George Tate. It is in four cantos and is epic in design. The first canto, "Christ's Victory in Heaven," represents a dispute in heaven between Justice and Mercy, assuming the facts of Christ's life on earth; the second, "Christ's Victory on Earth," deals with an allegorical account of the Temptation; the third, "Christ's Triumph over Death," treats of the Passion; and the fourth, "Christ's Triumph after Death," treating of the Resurrection and Ascension, concludes with an affectionate eulogy of his brother Phineas Fletcher (*q.v.*) as "Thyrsilis." The metre is an eight-line stanza owing something to Spenser. The first five lines rhyme ababb, and the stanza concludes with a rhyming triplet, resuming the conceit which nearly every verse embodies. Giles Fletcher, like his brother Phineas, to whom he was deeply attached, was a close follower of Spenser. In his very best passages Giles Fletcher attains to a rich melody which charmed the ear of Milton, who did not hesitate to borrow very considerably from the *Christ's Victory and Triumph* in his *Paradise Regained*. Fletcher lived in an age which regarded as models the poems of Marini and Gongora, and his conceits are sometimes grotesque in connexion with the sacredness of his subject. But when he is carried away by his theme and forgets to be ingenious, he attains great solemnity and harmony of style. His descriptions of the Lady of Vain Delight, in the second canto, and of Justice and of Mercy in the first, are worked out with much beauty of detail into separate pictures, in the manner of the *Faerie Queene*.

Giles Fletcher's poem was edited (1868) for the *Fuller Worthies Library*, and (1876) for the *Early English Poets* by Dr A. B. Grosart. It is also reprinted for *The Ancient and Modern Library of Theological Literature* (1888), and in R. Cattermole's and H. Stebbing's *Sacred Classics* (1834, &c.) vol. 20. In the library of King's College, Cambridge, is a MS. *Aegidii Fletcherii versio poetica Lamentationum Jeremiae.*

FLETCHER, JOHN WILLIAM (1729–1785), English divine, was born at Nyon in Switzerland on the 12th of September 1729, his original name being DE LA FLÉCHIÈRE. He was educated at Geneva, but, preferring an army career to a clerical one, went to Lisbon and enlisted. An accident prevented his sailing with his regiment to Brazil, and after a visit to Flanders, where an uncle offered to secure a commission for him, he went to England, picked up the language, and in 1752 became tutor in a Shropshire family. Here he came under the influence of the new Methodist preachers, and in 1757 took orders, being ordained by the bishop of Bangor. He often preached with John Wesley and for him, and became known as a fervent supporter of the revival. Refusing the wealthy living of Dunham, he accepted the humble one of Madeley, where for twenty-five years (1760–1785) he lived and worked with unique devotion and zeal. Fletcher was one of the few parish clergy who understood Wesley and his work, yet he never wrote or said anything inconsistent with his own Anglican position. In theology he upheld the Arminian against the Calvinist position, but always with courtesy and fairness; his resignation on doctrinal grounds of the superintendency (1768–1771) of the countess of Huntingdon's college at Trevecca left no unpleasantness. The outstanding feature of his life was a transparent simplicity and saintliness of spirit, and the testimony of his contemporaries to his godliness is unanimous. Wesley preached his funeral sermon from the words "Mark the perfect man." Southey said that "no age ever provided a man of more fervent piety or more perfect charity, and no church ever possessed a more apostolic minister." His fame was not confined to his own country, for it is said that Voltaire, when challenged to produce a character as perfect as that of Christ, at once mentioned Fletcher of Madeley. He died on the 14th of August 1785.

Complete editions of his works were published in 1803 and 1836. The chief of them, written against Calvinism, are *Five Checks to Antinomianism*, *Scripture Scales to weigh the Gold of Gospel Truth*, and the *Portrait of St Paul*. See lives by J. Wesley (1786); L. Tyerman (1882); F. W. Macdonald (1885); J. Maratt (1902); also C. J. Ryle, *Christian Leaders of the 18th Century*, pp. 384-423 (1869).

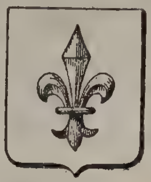
FLETCHER, PHINEAS (1582–1650), English poet, elder son of Dr Giles Fletcher, and brother of Giles the younger, noticed above, was born at Cranbrook, Kent, and was baptized on the 8th of April 1582. He was admitted a scholar of Eton, and in 1600 entered King's College, Cambridge. He graduated B.A. in 1604, and M.A. in 1608, and was one of the contributors to *Sorrow's Joy* (1603). His pastoral drama, *Sicelides or Piscatory* (pr. 1631) was written (1614) for performance before James I., but only produced after the king's departure at King's College. He had been ordained priest and before 1611 became a fellow of his college, but he left Cambridge before 1616, apparently because certain emoluments were refused him. He became chaplain to Sir Henry Willoughby, who presented him in 1621 to the rectory of Hilgay, Norfolk, where he married and spent the rest of his life. In 1627 he published *Locustae, vel Pietas Jesuitica*. *The Locusts or Apollyonists*, two parallel poems in Latin and English furiously attacking the Jesuits. Dr Grosart saw in this work one of the sources of Milton's conception of Satan. Next year appeared an erotic poem, *Brittains Ida*, with Edmund Spenser's name on the title-page. It is certainly not by Spenser, and is printed by Dr Grosart with the works of Phineas Fletcher. *Sicelides*, a play acted at King's College in 1614, was printed in 1631. In 1632 appeared two theological prose treatises, *The Way to Blessedness* and *Joy in Tribulation*, and in 1633 his *magnum opus*, *The Purple Island*. The book was dedicated to his friend Edward Benlowes, and included his *Piscatorie Eclogs and other Poetical Miscellanies*. He died in 1650, his will being proved by his widow on the 13th of December of that year. *The Purple Island, or the Isle of Man*, is a poem in twelve cantos describing in cumbrous allegory the physiological structure of the human body and the mind of man. The intellectual qualities are personified, while the veins are rivers, the bones the mountains of the island, the whole analogy being worked out with great ingenuity. The manner of Spenser is preserved throughout, but Fletcher never lost sight of his moral aim to lose himself in digressions like those of the *Faerie Queene*. What he gains in unity of design, however, he more than loses in human interest and action. The chief charm of the poem lies in its descriptions of rural scenery. The *Piscatory Eclogues* are pastorals the characters of which are represented as fisher boys on the banks of the Cam, and are interesting for the light they cast on the biography of the poet himself (Thyrsil) and his father (Thelgon). The poetry of Phineas Fletcher has not the sublimity sometimes reached by his brother Giles. The mannerisms are more pronounced and the conceits more far-fetched, but the verse is fluent, and lacks neither colour nor music.

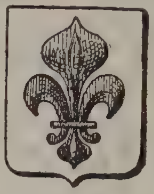
A complete edition of his works (4 vols.) was privately printed by Dr A. B. Grosart (Fuller Worthies Library, 1869).

FLEURANGES, ROBERT (III.) DE LA MARCK, Seigneur de (1491–1537), marshal of France and historian, was the son of Robert II. de la Marck, duke of Bouillon, seigneur of Sedan and Fleuranges, whose uncle was the celebrated William de la Marck, "The Wild Boar of the Ardennes." A fondness for military exercises displayed itself in his earliest years, and at the age of ten he was sent to the court of Louis XII., and placed in charge of the count of Angoulême, afterwards King Francis I. In his twentieth year he married a niece of the cardinal d'Amboise, but after three months he quitted his home to join the French army in the Milanese. With a handful of troops he threw himself into Verona, then besieged by the Venetians; but the siege was protracted, and being impatient for more active service, he rejoined the army. He then took part in the relief of Mirandola, besieged by the troops of Pope Julius II., and in other actions of the campaign. In 1512 the French being driven from Italy, Fleuranges was sent into Flanders to levy a body of 10,000 men, in command of which, under his father, he returned to Italy in 1513, seized Alessandria, and vigorously assailed Novara. But the French were defeated, and Fleuranges narrowly escaped with his life, having received more than forty wounds. He was rescued by his father and sent to Vercellae, and thence to Lyons. Returning to Italy with Francis I. in 1515, he distinguished himself in various affairs, and especially at Marignano, where he had a horse shot under him, and contributed so powerfully to the victory of the French that the king knighted him with his own hand. He next took Cremona, and was there called home by the news of his father's illness. In 1519 he was sent into Germany on the difficult errand of inducing the electors to give their votes in favour of Francis I.; but in this he failed. The war in Italy being rekindled, Fleuranges accompanied the king thither, fought at Pavia (1525), and was taken prisoner with his royal master. The emperor, irritated by the defection of his father, Robert II. de la Marck, sent him into confinement in Flanders, where he remained for some years. During this imprisonment he was created marshal of France. He employed his enforced leisure in writing his *Histoire des choses mémorables advenues du règne de Louis XII et de François I, depuis 1499 jusqu'en l'an 1521*. In this work he designates himself *Jeune Adventureux*. Within a small compass he gives many curious and interesting details of the time, writing only of what he had seen, and in a very simple but vivid style. The book was first published in 1735, by Abbé Lambert, who added historical and critical notes; and it has been reprinted in several collections. The last occasion on which Fleuranges was engaged in active service was at the defence of Péronne, besieged by the count of Nassau in 1536. In the following year he heard of his father's death, and set out from Amboise for his estate of La Marck; but he was seized with illness at Longjumeau, and died there in December 1537.

See his own book in the *Nouvelle Collection des mémoires pour servir à l'histoire de France* (edited by J. F. Michaud and J. J. F. Poujoulat, series i. vol. v. Paris, 1836 seq.).

FLEUR-DE-LIS (Fr. "lily flower"), an heraldic device, very widespread in the armorial bearings of all countries, but more particularly associated with the royal house of France. The conventional fleur-de-lis, as Littré says, represents very imperfectly three flowers of the white lily (*Lilium*) joined together, the central one erect, and each of the other two curving outwards. The fleur-de-lis is a common device in ancient decoration, notably in India and in Egypt, where it was the symbol of life and resurrection, the attribute of the god Horus. It is common also in Etruscan bronzes. It is uncertain whether the conventional fleur-de-lis was originally meant to represent the lily or white iris—the flower-de-luce of Shakespeare—or an arrow-head, a spear-head, an amulet fastened on date-palms to ward off the evil eye, &c. In Roman and early Gothic architecture the fleur-de-lis is a frequent sculptured ornament. As early as 1120 three fleurs-de-lis were sculptured on the capitals of the Chapelle Saint-Aignan at Paris. The fleur-de-lis was first definitely connected with the French monarchy in an *ordonnance* of Louis le Jeune (*c.* 1147), and was first figured on a seal of Philip Augustus in 1180. The use of the fleur-de-lis in heraldry dates from the 12th century, soon after which period it became a very common charge in France, England and Germany, where every gentleman of coat-armour desired to adorn his shield with a loan from the shield of France, which was at first *d'azur, semé de fleurs de lis d'or*. In February 1376 Charles V. of France reduced the number of fleurs-de-lis to three—in honour of the Trinity—and the kings of France thereafter bore *d'azur, à trois fleurs de lis d'or*. Tradition soon attributed the origin of the fleur-de-lis to Clovis, the founder of the Frankish monarchy, and explained that it represented the lily given to him by an angel at his baptism. Probably there was as much foundation for this legend as for the more rationalistic explanation of William Newton (*Display of Heraldry*, p. 145), that the fleur-de-lis was the figure of a reed or flag in blossom, used instead of a sceptre at the proclamation of the Frankish kings. Whatever be the true origin of the fleur-de-lis as a conventional decoration, it is demonstrably far older than the Frankish monarchy, and history does not record the reason of its adoption by the royal house of France, from which it passed into common use as an heraldic charge in most European countries. An order of the Lily, with a fleur-de-lis for badge, was established in the Roman states by Pope Paul III. in 1546; its members were pledged to defend the patrimony of St Peter against the enemies of the church. Another order of the Lily was founded by Louis XVIII. in 1816, in memory of the silver fleurs-de-lis which the comte d'Artois had given to the troops in 1814 as decorations; it was abolished by the revolution of 1830.


Middle Ages.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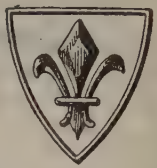
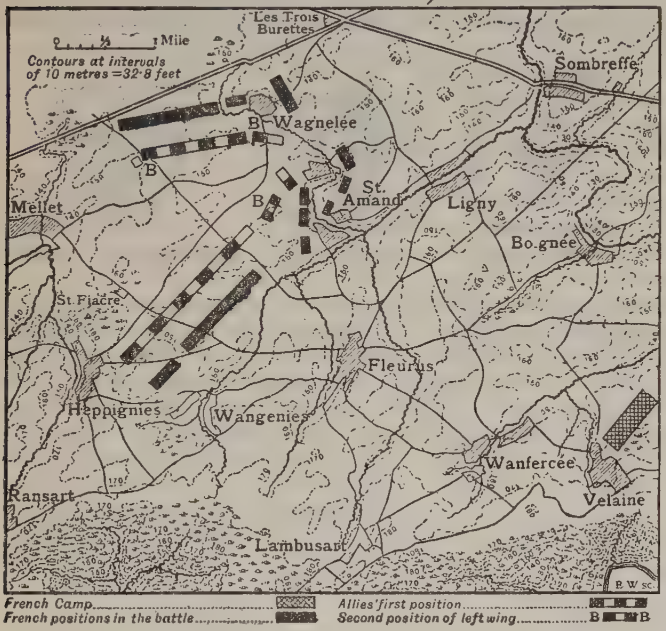

18th and 19th centuries.

FLEURUS, a village of Belgium, in the province of Hennegau, 5 m. N.E. of Charleroi, famous as the scene of several battles. The first of these was fought on August 19/29, 1622, between the forces of Count Mansfeld and Christian of Brunswick and the Spaniards under Cordovas, the latter being defeated. The second is described below, and the third and fourth, incidents of Jourdan's campaign of 1794, under French Revolutionary Wars. The ground immediately north-east of Fleurus forms the battlefield of Ligny (June 16, 1815), for which see Waterloo Campaign.

The second battle was fought on the 1st of July 1690 between 45,000 French under François-Henri de Montgomery-Bouteville, duke of Luxemburg, and 37,000 allied Dutch, Spaniards and Imperialists under George Frederick, prince of Waldeck. The latter had formed up his army between Heppignies and St Amand in what was then considered an ideal position; a double barrier of marshy brooks was in front, each flank rested on a village, and the space between, open upland, fitted his army exactly. But Luxemburg, riding up with his advanced guard from Velaine, decided, after a cursory survey of the ground, to attack the front and both flanks of the Allies' position at once—a decision which few, if any, generals then living would have dared to make, and which of itself places Luxemburg in the same rank as a tactician as his old friend and commander Condé. The left wing of cavalry was to move under cover of woods, houses and hollows to gain Wangenies, where it was to connect with the frontal attack of the French centre from Fleurus and to envelop Waldeck's right. Luxemburg himself with the right wing of cavalry and some infantry and artillery made a wide sweep round the enemy's left by way of Ligny and Les Trois Burettes, concealed by the high-standing corn. At 8 o'clock the frontal attack began by a vigorous artillery engagement, in which the French, though greatly outnumbered in guns, held their own, and three hours later Waldeck, whose attention had been absorbed by events on the front, found a long line of the enemy already formed up in his rear. He at once brought his second line back to oppose them, but while he was doing so the French leader filled up the gap between himself and the frontal assailants by posting infantry around Wagnelée, and also guns on the neighbouring hill whence their fire enfiladed both halves of the enemy's army up to the limit of their ranging power. At 1 P.M. Luxemburg ordered a general attack of his whole line. He himself scattered the cavalry opposed to him and hustled the Dutch infantry into St Amand, where they were promptly surrounded. The left and centre of the French army were less fortunate, and in their first charge lost their leader, Lieutenant-General Jean Christophe, comte de Gournay, one of the best cavalry officers in the service. But Waldeck, hoping to profit by this momentary success, sent a portion of his right wing towards St Amand, where it merely shared the fate of his left, and the day was decided. Only a quarter of the cavalry and 14 battalions of infantry (English and Dutch) remained intact, and Waldeck could do no more, but with these he emulated the last stand of the Spaniards at Rocroi fifty years before. A great square was formed of the infantry, and a handful of cavalry joined them—the French cavalry, eager to avenge Gournay, had swept away the rest. Then slowly and in perfect order, they retired into the broken ground above Mellet, where they were in safety. The French slept on the battlefield, and then returned to camp with their trophies and 8000 prisoners. They had lost some 2500 killed, amongst them Gournay and Berbier du Metz, the chief of artillery, the Allies twice as many, as well as 48 guns, and Luxemburg was able to send 150 colours and standards to decorate Notre-Dame. But the victory was not followed up, for Louis XIV. ordered Luxemburg to keep in line with other French armies which were carrying on more or less desultory wars of manœuvre on the Meuse and Moselle.

FLEURUS 1690



FLEURY [Abraham Joseph Bénard] (1750–1822), French actor, was born at Chartres on the 26th of October 1750, and began his stage apprenticeship at Nancy, where his father was at the head of a company of actors attached to the court of King Stanislaus. After four years in the provinces, he came to Paris in 1778, and almost immediately was made *sociétaire* at the Comédie Française, although the public was slow to recognize him as the greatest comedian of his time. In 1793 Fleury, like the rest of his fellow-players, was arrested in consequence of the presentation of Laya's *L'Ami des lois*, and, when liberated, appeared at various theatres until, in 1799, he rejoined the rehabilitated Comédie Française. After forty years of service he retired in 1818, and died on the 3rd of March 1822. He was notoriously illiterate, and it is probable that the interesting *Mêmoire de Fleury* owes more to its author, Lafitte, than to the subject whose "notes and papers" it is said to contain.

FLEURY, ANDRÉ HERCULE DE (1653–1743), French cardinal and statesman, was born at Lodève (Hérault) on the 22nd of June 1653, the son of a collector of taxes. Educated by the Jesuits in Paris, he entered the priesthood, and became in 1679, through the influence of Cardinal Bonzi, almoner to Maria Theresa, queen of Louis XIV., and in 1698 bishop of Fréjus. Seventeen years of a country bishopric determined him to seek a position at court. He became tutor to the king's great-grandson and heir, and in spite of an apparent lack of ambition, he acquired over the child's mind an influence which proved to be indestructible. On the death of the regent Orleans in 1723 Fleury, although already seventy years of age, deferred his own supremacy by suggesting the appointment of Louis Henri, duke of Bourbon, as first minister. Fleury was present at all interviews between Louis XV. and his first minister, and on Bourbon's attempt to break through this rule Fleury retired from court. Louis made Bourbon recall the tutor, who on the 11th of July 1726 took affairs into his own hands, and secured the exile from court of Bourbon and of his mistress Madame de Prie. He refused the title of first minister, but his elevation to the cardinalate in that year secured his precedence over the other ministers. He was naturally frugal and prudent, and carried these qualities into the administration, with the result that in 1738–1739 there was a surplus of 15,000,000 livres instead of the usual deficit. In 1726 he fixed the standard of the currency and secured the credit of the government by the regular payment thenceforward of the interest on the debt. By exacting forced labour from the peasants he gave France admirable roads, though at the cost of rousing angry discontent. During the seventeen years of his orderly government the country found time to recuperate its forces after the exhaustion caused by the extravagances of Louis XIV. and of the regent, and the general prosperity rapidy increased. Internal peace was only seriously disturbed by the severities which Fleury saw fit to exercise against the Jansenists. He imprisoned priests who refused to accept the bull *Unigenitus*, and he met the opposition of the parlement of Paris by exiling forty of its members.

In foreign affairs his chief preoccupation was the maintenance of peace, which was shared by Sir Robert Walpole, and therefore led to a continuance of the good understanding between France and England. It was only with reluctance that he supported the ambitious projects of Elizabeth Farnese, queen of Spain, in Italy by guaranteeing in 1729 the succession of Don Carlos to the duchies of Parma and Tuscany. Fleury had economized in the army and navy, as elsewhere, and when in 1733 war was forced upon him he was hardly prepared. He was compelled by public opinion to support the claims of Louis XV.'s father-in-law Stanislaus Leszczynski, ex-king of Poland, to the Polish crown on the death of Frederick Augustus I., against the Russo-Austrian candidate; but the despatch of a French expedition of 1500 men to Danzig only served to humiliate France. Fleury was driven by Chauvelin to more energetic measures; he concluded a close alliance with the Spanish Bourbons and sent two armies against the Austrians. Military successes on the

Rhine and in Italy secured the favourable terms of the treaty of Vienna (1735–1738). France had joined with the other powers in guaranteeing the succession of Maria Theresa under the Pragmatic sanction, but on the death of Charles VI. in 1740 Fleury by a diplomatic quibble found an excuse for repudiating his engagements, when he found the party of war supreme in the king's counsels. After the disasters of the Bohemian campaign he wrote in confidence a humble letter to the Austrian general Königsegg, who immediately published it. Fleury disavowed his own letter, and died a few days after the French evacuation of Prague on the 29th of January 1743. He had enriched the royal library by many valuable oriental MSS., and was a member of the French Academy, of the Academy of Science, and the Academy of Inscriptions.

Bibliography.—F. J. Bataille, *Éloge historique de M. le Cardinal A. H. de Fleury* (Strassburg, 1737); C. Frey de Neuville, *Oraison funèbre de S.E. Mgr. le Cardinal A. H. Fleury* (Paris, 1743); P. Vicaire, *Oraison funèbre du Cardinal A. H. de Fleury* (Caen, 1743); M. van Hoey, *Lettres et négotiations pour servir à l'histoire de la vie du Cardinal de Fleury* (London, 1743); *Leben des Cardinals A. H. Fleury* (Freiburg, 1743); F. Morénas, *Parallèle du ministère du Cardinal Richelieu et du Cardinal de Fleury* (Avignon, 1743); *Nachrichten von dem Leben und der Verwaltung des Cardinals Fleury* (Hamburg, 1744).

FLEURY, CLAUDE (1640–1723), French ecclesiastical historian, was born at Paris on the 6th of December 1640. Destined for the bar, he was educated at the aristocratic college of Clermont (now that of Louis-le-Grand). In 1658 he was nominated an advocate to the parlement of Paris, and for nine years followed the legal profession. But he had long been of a religious disposition, and in 1667 turned from law to theology. He had been some time in orders when Louis XIV., in 1672, selected him as tutor of the princes of Conti, with such success that the king next entrusted to him the education of the count of Vermandois, one of his natural sons, on whose death in 1683 Fleury received for his services the Cistercian abbey of Loc-Dieu, in the diocese of Rhodez. In 1689 he was appointed sub-preceptor of the dukes of Burgundy, of Anjou, and of Berry, and thus became intimately associated with Fénelon, their chief tutor. In 1696 he was elected to fill the place of La Bruyère in the French Academy; and on the completion of the education of the young princes the king bestowed upon him the rich priory of Argenteuil, in the diocese of Paris (1706). On assuming this benefice he resigned, with rare disinterestedness, that of the abbey of Loc-Dieu. About this time he began his great work, the first of the kind in France, and one for which he had been collecting materials for thirty years—the *Histoire ecclésiastique*. Fleury's evident intention was to write a history of the church for all classes of society; but at the time in which his great work appeared it was less religion than theology that absorbed the attention of the clergy and the educated public; and his work accordingly appealed to the student rather than to the popular reader, dwelling as it does very particularly on questions of doctrine, of discipline, of supremacy, and of rivalry between the priesthood and the imperial power. Nevertheless it had a great success. The first edition, printed at Paris in 20 volumes 4to, 1691, was followed by many others, among which may be mentioned that of Brussels, in 32 vols. 8vo, 1692, and that of Nismes, in 25 vols. 8vo, 1778 to 1780. The work of Fleury only comes down to the year 1414. It was continued by J. Claude Fabre and Goujet down to 1595, in 16 vols. 4to. In consulting the work of Fleury and its supplement, the general table of contents, published by Rondel, Paris, 1758, 1 vol. 4to, will be found very useful. Translations have been made of the entire work into Latin, German and Italian. The Latin translation, published at Augsburg, 1758–1759, 85 vols. 8vo, carries the work down to 1684. Fleury, who had been appointed confessor to the young king Louis XV. in 1716, because, as the duke of Orleans said, he was neither Jansenist nor Molinist, nor Ultramontanist, but Catholic, died on the 14th of July 1723. His great learning was equalled by the modest simplicity of his life and the uprightness of his conduct.

Fleury left many works besides his *Histoire ecclésiastique*. The following deserve special mention:—*Histoire du droit françois* (1674, 12mo); *Mœurs des Israélites* (1681, 12mo); *Mœurs des Chrétiens* (1682, 12mo); *Traité du choix et de la méthode des études* (1686, 2 vols. 12mo); *Les Devoirs des maîtres et des domestiques* (1688, 12mo). A number of the smaller works were published in one volume at Paris in 1807. The Roman Congregation of the Index condemned his *Catéchisme historique* (1679) and the *Institution du droit ecclésiastique* (1687).

See C. Ernst Simonetti, *Der Character eines Geschichtsschreibers in dem Leben und aus den Schriften des Abts C. Fleury* (Göttingen, 1746, 4to); C. F. P. Jaeger, *Notice sur C. Fleury, considéré comme historien de l'église* (Strassburg, 1847, 8vo); Reichlin-Meldegg, *Geschichte des Christentums*, i.

FLIEDNER, THEODOR (1800–1864), German Protestant divine, was born on the 21st of January 1800 at Epstein (near Wiesbaden), the small village in which his father was pastor. He studied theology at the universities of Giessen and Göttingen, and at the theological seminary of Herborn, and at the age of twenty he passed his final examination. After a year spent in teaching and preaching, in 1821 he accepted a call from the Protestant church at Kaiserswerth, a little town on the Rhine, a few miles below Düsseldorf. To help his people and to provide an endowment for his church, he undertook journeys in 1822 through part of Germany, and then in 1823 to Holland and England. He met with considerable success, and had opportunities of observing what was being done towards prison reform; in England he made the acquaintance of the philanthropist Elizabeth Fry. The German prisons were then in a very bad state. The prisoners were huddled together in dirty rooms, badly fed, and left in complete idleness. No one dreamed of instructing them, or of collecting statistics to form the basis of useful legislation on the subject. Fliedner, at first singly, undertook the work. He applied for permission to be imprisoned for some time, in order that he might look at prison life from the inside. This petition was refused, but he was allowed to hold fortnightly services in the Düsseldorf prison, and to visit the inmates individually. Those interested in the subject banded themselves together, and on the 18th of June 1826 the first Prison Society of Germany (*Rheinisch-Westfälischer Gefängnisverein*) was founded. In 1833 Fliedner opened in his own parsonage garden at Kaiserswerth a refuge for discharged female convicts. His circle of practical philanthropy rapidly increased. The state of the sick poor had for some time excited his interest, and it seemed to him that hospitals might be best served by an organized body of specially trained women. Accordingly in 1836 he began the first deaconess house, and the hospital at Kaiserswerth. By their ordination vows the deaconesses devoted themselves to the care of the poor, the sick and the young; but their engagements were not final—they might leave their work and return to ordinary life if they chose. In addition to these institutions Fliedner founded in 1835 an infant school, then a normal school for infant school mistresses (1836), an orphanage for orphan girls of the middle class (1842), and an asylum for female lunatics (1847). Moreover, he assisted at the foundation and in the management of similar institutions, not only in Germany, but in various parts of Europe.

In 1849 he resigned his pastoral charge, and from 1849 to 1851 he travelled over a large part of Europe, America and the East—the object of his journeys being to found "mother houses," which were to be not merely training schools for deaconesses, but also centres whence other training establishments might arise. He established a deaconess house in Jerusalem, and after his return assisted by counsel and money in the erection of establishments at Constantinople, Smyrna, Alexandria and Bucharest. Among his later efforts may be mentioned the Christian house of refuge for female servants in Berlin (connected with which other institutions soon arose) and the "house of evening rest" for retired deaconesses at Kaiserswerth. In 1855 Fliedner received the degree of doctor in theology from the university of Bonn, in recognition rather of his practical activity than of his theological attainments. He died on the 4th of October 1864, leaving behind him over 100 stations attended by 430 deaconesses; and these by 1876 had increased to 150 with an attendance of 600.

Fliedner's son Fritz Fliedner (1845–1901), after studying in Halle and Tübingen, became in 1870 chaplain to the embassy in

Madrid. He followed in his father's footsteps by founding several philanthropic institutions in Spain. He was also the author of a number of books, amongst which was an autobiography, *Aus meinem Leben. Erinnerungen und Erfahrungen* (1901).

Theodor Fliedner's writings are almost entirely of a practical character. He edited a periodical, *Der Armen und Kranken Freund*, which contained information regarding the various institutions, and also the yearly almanac of the Kaiserswerth institution. Besides purely educational and devotional works, he wrote *Buch der Märtyrer* (1852); *Kurze Geschichte der Entstehung der ersten evang. Liebesanstalten zu Kaiserswerth* (1856); *Nachricht über das Diakonissen-Werk in der Christ. Kirche* (5th ed., 1867); *Die evangel. Märtyrer Ungarns und Siebenbürgens*; and *Beschreibung der Reise nach Jerusalem und Constantinopel*. All were published at Kaiserswerth. There is a translation of the German life by C. Winkworth (London, 1867). See also G. Fliedner, *Theodor Fliedner, kurzer Abriss seines Lebens und Wirkens* (3rd ed., 1892). See also on Fliedner and his work *Kaiserswerth Deaconesses* (London, 1857); Dean John S. Howson's *Deaconesses* (London, 1862); *The Service of the Poor*, by E. C. Stephen (London, 1871); W. F. Stevenson's *Praying and Working* (London, 1865).

FLIGHT and **FLYING.** Of the many scientific problems of modern times, there are few possessing a wider or more enduring interest than that of aerial navigation (see also AERONAUTICS). To fly has always been an object of ambition with man; nor will this occasion surprise when we remember the marvellous freedom enjoyed by volant as compared with non-volant animals. The subject of aviation is admittedly one of extreme difficulty. To tread upon the air (and this is what is really meant) is, at first sight, in the highest degree utopian; and yet there are thousands of living creatures which actually accomplish this feat. These creatures, however varied in form and structure, all fly according to one and the same principle; and this is a significant fact, as it tends to show that the air must be attacked in a particular way to ensure flight. It behoves us then at the outset to scrutinize very carefully the general configuration of flying animals, and in particular the size, shape and movements of their flying organs.

Flying animals differ entirely from sailing ships and from balloons, with which they are not unfrequently though erroneously compared; and a flying machine constructed upon proper principles can have nothing in common with either of those creations. The ship floats upon water and the balloon upon air; but the ship differs from the balloon, and the ship and the balloon differ from the flying creature and flying machine. The water and air, moreover, have characteristics of their own. The analogies which connect the water with the air, the ship with the balloon, and the ship and the balloon with the flying creature and flying machine are false analogies. A sailing ship is supported by the water and requires merely to be propelled; a flying creature and a flying machine constructed on the living type require to be both supported and propelled. This arises from the fact that water is much denser than air, and because water supports on its surface substances which fall through air. While water and air are both fluid media, they are to be distinguished from each other in the following particulars. Water is comparatively very heavy, inelastic and incompressible; air, on the other hand, is comparatively very light, elastic and compressible. If water be struck with violence, the recoil obtained is great when compared with the recoil obtained from air similarly treated. In water we get a maximum recoil with a minimum of displacement; in air, on the contrary, we obtain a minimum recoil with a maximum of displacement. Water and air when unconfined yield readily to pressure. They thus form *movable fulcra* to bodies acting upon them. In order to meet these peculiarities the travelling organs of aquatic and flying animals (whether they be feet, fins, flippers or wings) are made not of rigid but of elastic materials. The travelling organs, moreover, increase in size in proportion to the tenuity of the fluid to be acted upon. The difference in size of the travelling organs of animals becomes very marked when the land animals are contrasted with the aquatic, and the aquatic with the aerial, as in figs. 1, 2 and 3.

The peculiarities of water and air as supporting media are well illustrated by a reference to swimming, diving and flying birds. A bird when swimming extends its feet simultaneously or alternately in a backward direction, and so obtains a forward recoil. The water supports the bird, and the feet simply propel. In this case the bird is lighter than the water, and the long axis of the body is horizontal (*a* of fig. 4). When the bird dives, or flies under water, the long axis of the body is inclined obliquely downwards and forwards, and the bird forces itself into and beneath the water by the action of its feet, or wings, or both. In diving or subaquatic flight the feet strike upwards and backwards, the wings downwards and *backwards* (*b* of fig. 4). In aerial flying everything is reversed. The long axis of the bird is inclined obliquely upwards and forwards, and the wings strike, not downwards and backwards, but downwards and *forwards* (*c* of fig. 4). These changes in the direction of the long axis of the bird in swimming, diving and flying, and in the direction of the stroke of the wings in sub-aquatic and aerial flight, are due to the fact that the bird is heavier than the air and lighter than the water.

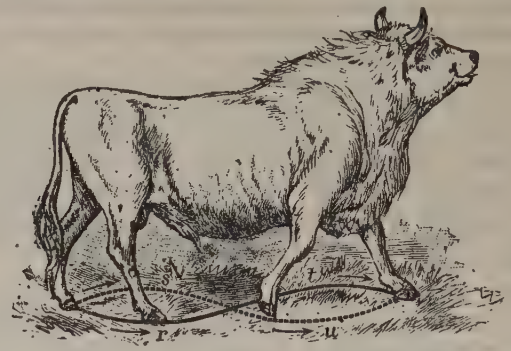


FIG. 1.—Chillingham Bull (*Bos Scoticus*). Small travelling extremities adapted for land. *r, s, t, u,* figure-of-8 described by the feet in walking.

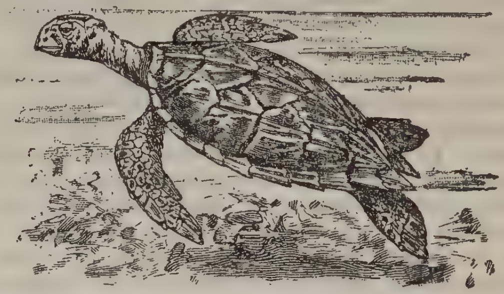


FIG. 2.—The Turtle (*Chelonia imbricata*). Enlarged travelling extremities (flippers) adapted for water.

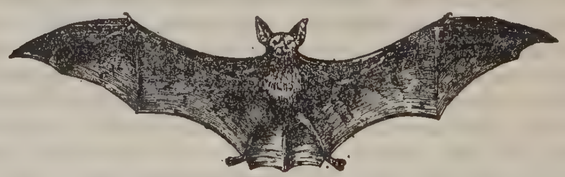


FIG. 3.—The Bat (*Phyllocina gracilis*). Greatly expanded travelling extremities adapted for air.

The physical properties of water and air explain in a great measure how the sailing ship differs from the balloon, and how the latter differs from the flying creature and flying machine constructed on the natural type. The sailing ship is, as it were, immersed in two oceans, viz. an ocean of water and an ocean of air—the former being greatly heavier and denser than the latter. The ocean of water buoys or floats the ship, and the ocean of air, or part of it in motion, swells the sails which propel the ship. The moving air, which strikes the sails directly, strikes the hull of the vessel indirectly and forces it through the water, which, as explained, is a comparatively dense fluid. When the ship is in motion it can be steered either by the sails alone, or by the rudder alone, or by both combined. A balloon differs from a sailing ship in being immersed in only one ocean, viz. the ocean of air. It resembles the ship in floating upon the air, as the ship floats upon the water; in other words, the balloon is lighter than the air, as the ship is lighter than the water. But here all analogy ceases. The ship, in virtue of its being immersed in two fluids having different densities, can be steered and made to tack about in a horizontal plane in any given direction. This in the case of the balloon, immersed in one fluid, is impossible. The balloon in a calm can only rise and fall in a vertical line. Its horizontal movements, which ought to be the more important, are accidental movements due to air currents, and cannot be controlled; the balloon, in short, cannot be guided. One might as well attempt to steer a boat carried along by currents of water in the absence of oars, sails and wind, as to steer a balloon carried along by currents of air. The balloon has no hold upon the air, and this consequently cannot be employed as a *fulcrum* for regulating its course. The balloon, because of its vast size and from its being lighter than the air, is completely at the mercy of the wind. It forms an integral part, so to speak, of the wind for the time being, and the direction of the wind in every instance determines the horizontal motion of the balloon. The force required to propel a balloon against even a moderate breeze would result in its destruction. The balloon cannot be transferred with any degree of certainty from one point of the earth's surface to another, and hence the chief danger in its employment. It may, quite as likely as not, carry its occupants out to sea. The balloon is a mere lifting machine and is in no sense to be regarded as a flying machine. It resembles the flying creature only in this, that it is immersed in the ocean of air in which it sustains itself. The mode of suspension is wholly different. The balloon floats because it is lighter than the air; the flying creature floats because it extracts from the air, by the vigorous downward action of its wings, a certain amount of upward recoil. The balloon is passive; the flying creature is active. The balloon is controlled by the wind; the flying creature controls the wind. The balloon in the absence of wind can only rise and fall in a vertical line; the flying creature can fly in a horizontal plane in any given direction. The balloon is inefficient because of its levity; the flying creature is efficient because of its weight.

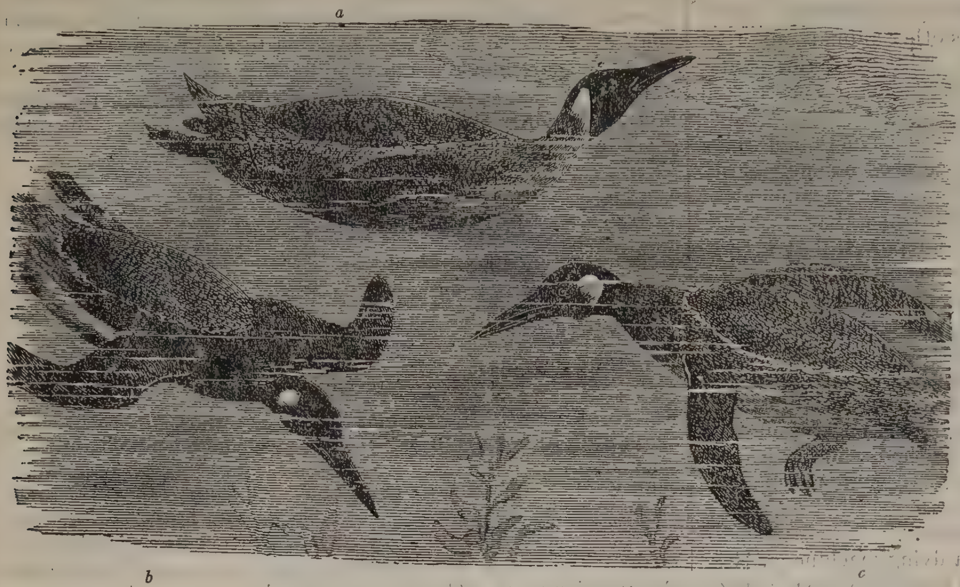


Fig. 4.—The King Penguin in the positions assumed by a bird in (*a*) swimming, (*b*) diving, and (*c*) flying.

Weight, however paradoxical it may appear, is necessary to flight. Everything which flies is vastly heavier than the air. The inertia of the mass of the flying creature enables it to control and direct its movements in the air. Many are of opinion that flight is a mere matter of levity and power. This is quite a mistake. No machine, however light and powerful, will ever fly whose travelling surfaces are not properly fashioned and properly applied to the air.

It was supposed at one time that the air sacs of birds contributed in some mysterious way to flight, but this is now known to be erroneous. The bats and some of the best-flying birds have no air sacs. Similar remarks are to be made of the heated air imprisoned within the bones of certain birds.[1] Feathers even are not necessary to flight. Insects and bats have no feathers, and yet fly well. The only facts in natural history which appear even indirectly to countenance the flotation theory are the presence of a swimming bladder in some fishes, and the existence of membranous expansions or pseudo-wings in certain animals, such as the flying fish, flying dragon and flying squirrel. As, however, the animals referred to do not actually fly, but merely dart into the air and there sustain themselves for brief intervals, they afford no real support to the theory. The so-called floating animals are depicted at figs. 5, 6 and 7.

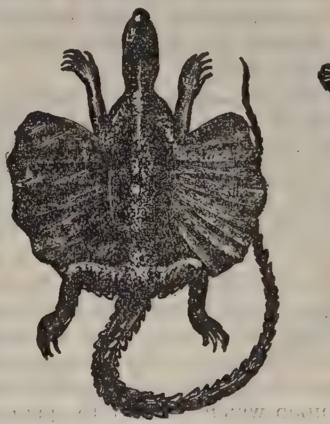


Fig. 5.—The Red-throated Dragon (*Draco haematopogon*).

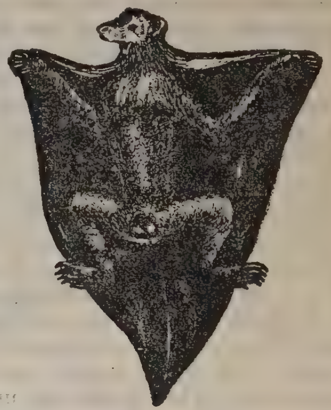


Fig. 6.—The Flying Colugo (*Galeopithecus volans*); also called flying lemur and flying squirrel.

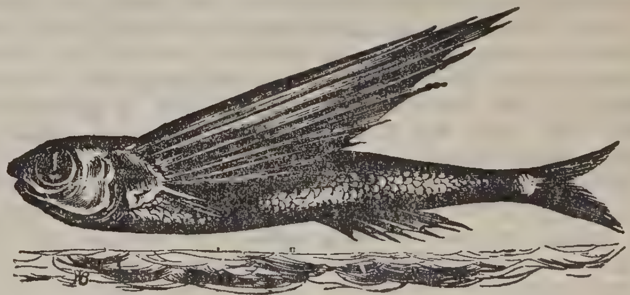


Fig. 7.—The Flying Fish (*Exocoetus exiliens*).

It has been asserted, and with some degree of plausibility, that a fish lighter than the water might swim, and that a bird lighter than the air might fly: it ought, however, to be borne in mind that, in point of fact, a fish lighter than the water could not hold its own if the water were in the least perturbed, and that a bird lighter than the air would be swept into space by even a moderate breeze without hope of return. Weight and power are always associated in living animals, and the fact that living animals are made heavier than the medium they are to navigate may be regarded as a conclusive argument in favour of weight being necessary alike to the swimming of the fish and the flying of the bird. It may be stated once for all that flying creatures are for the most part as heavy, bulk for bulk, as other animals, and that flight in every instance is the product, not of superior levity, but of *weight* and *power* directed upon properly constructed flying organs.

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[1] According to Dr Crisp, the swallow, martin, snipe and many birds of passage have no air in their bones.—*Proc. Zool. Soc. Lond.* part xxv., 1857, p. 13.

This fact is important as bearing on the construction of flying machines. It shows that a flying machine need not necessarily be a light, airy structure exposing an immoderate amount of surface. On the contrary, it favours the belief that it should be a compact and moderately heavy and powerful structure, which trusts for elevation and propulsion entirely to its flying appliances—whether actively moving wings, or screws, or aeroplanes wedged forward by screws. It should attack and subdue the air, and never give the air an opportunity of attacking or subduing it. It should smite the air intelligently and as a master, and its vigorous well-directed thrusts should in every instance elicit an upward and forward recoil. The flying machine must be *multum in parvo*. It must launch itself in the ocean of air, and must extract from that air, by means of its travelling surfaces—however fashioned and however applied—the recoil or resistance necessary to elevate and carry it forward. Extensive inert surfaces indeed are contra-indicated in a flying machine, as they approximate it to the balloon, which, as has been shown, cannot maintain its position in the air if there are air currents. A flying machine which could not face air currents would necessarily be a failure. To obviate this difficulty we are forced to fall back upon *weight*, or rather the structures and appliances which weight represents. These appliances as indicated should not be unnecessarily expanded, but when expanded they should, wherever practicable, be converted into actively moving flying surfaces, in preference to fixed or inert dead surfaces.

The question of surface is a very important one in aviation: it naturally resolves itself into one of active and passive surface. As there are active and passive surfaces in the flying animal, so there are, or should be, active and passive surfaces in the flying machine. Art should follow nature in this matter. The active surfaces in flying creatures are always greatly in excess of the passive ones, from the fact that the former virtually increase in proportion to the spaces through which they are made to travel. Nature not only distinguishes between active and passive surfaces in flying animals, but she strikes a just balance between them, and utilizes both. She regulates the surfaces to the strength and weight of the flying creature and the air currents to which the surfaces are to be exposed and upon which they are to operate. In her calculations she never forgets that her flying subjects are to control and not to be controlled by the air. As a rule she reduces the passive surfaces of the body to a minimum; she likewise reduces as far as possible the actively moving or flying surfaces. While, however, diminishing the surfaces of the flying animal as a whole, she increases as occasion demands the active or wing surfaces by wing movements, and the passive or dead surfaces by the forward motion of the body in progressive flight. She knows that if the wings are driven with sufficient rapidity they practically convert the spaces through which they move into solid bases of support; she also knows that the body in rapid flight derives support from all the air over which it passes. The manner in which the wing surfaces are increased by the wing movements will be readily understood from the accompanying illustrations of the blow-fly with its wings at rest and in motion (figs. 8 and 9). In fig. 8 the surfaces exposed by the body of the insect and the wings are, as compared with those of fig. 9, trifling. The wing would have much less purchase on fig. 8 than on fig. 9, provided the surfaces exposed by the latter were passive or dead surfaces. But they are not dead surfaces: they represent the spaces occupied by the rapidly vibrating wings, which are actively moving flying organs. As, moreover, the wings travel at a much higher speed than any wind that blows, they are superior to and control the wind; they enable the insect to dart through the wind in whatever direction it pleases.

The reader has only to imagine figs. 8 and 9 cut out in paper to realize that extensive, inert, horizontal aeroplanes[1] in a flying machine would be a mistake. It is found to be so practically, as will be shown by and by. Fig. 9 so cut out would be heavier than fig. 8, and if both were exposed to a current of air, fig. 9 would be more blown about than fig. 8.

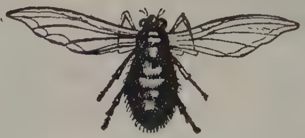

Fig. 8.—Blow-fly (*Musca vomitoria*) with its wings at rest.

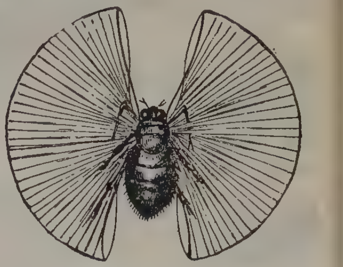

Fig. 9.—Blow-fly with its wings in motion as in flight.

It is true that in beetles and certain other insects there are the elytra or wing cases—thin, light, horny structures inclined slightly upwards—which in the act of flight are spread out and act as sustainers or gliders. The elytra, however, are comparatively long narrow structures which occupy a position in front of the wings, of which they may be regarded as forming the anterior parts. The elytra are to the delicate wings of some insects what the thick anterior margins are to stronger wings. The elytra, moreover, are not wholly passive structures. They can be moved, and the angles made by their under surfaces with the horizon adjusted. Finally, they are not essential to flight, as flight in the great majority of instances is performed without them. The elytra serve as protectors to the wings when the wings are folded upon the back of the insect, and as they are extended on either side of the body more or less horizontally when the insect is flying they contribute to flight indirectly, in virtue of their being carried forward by the body in motion.

Natural Flight.—The manner in which the wings of the insect traverse the air, so as practically to increase the basis of support, raises the whole subject of natural flight. It is necessary, therefore, at this stage to direct the attention of the reader somewhat fully to the subject of flight, as witnessed in the insect, bird and bat, a knowledge of natural flight preceding, and being in some sense indispensable to, a knowledge of artificial flight. The bodies of flying creatures are, as a rule, very strong, comparatively light and of an elongated form,—the bodies of birds being specially adapted for cleaving the air. Flying creatures, however, are less remarkable for their strength, shape and comparative levity than for the size and extraordinarily rapid and complicated movements of their wings. Prof. J. Bell Pettigrew first satisfactorily analysed those movements, and reproduced them by the aid of artificial wings. This physiologist in 1867[2] showed that all natural wings, whether of the insect, bird or bat, are screws structurally, and that they act as screws when they are made to vibrate, from the fact that they twist in opposite directions during the down and up strokes. He also explained that all wings act upon a common principle, and that they present oblique, kite-like surfaces to the air, through which they pass much in the same way that an oar passes through water in sculling. He further pointed out that the wings of flying creatures (contrary to received opinions, and as has been already indicated) strike downwards and *forwards* during the down strokes, and upwards and *forwards* during the up strokes. Lastly he demonstrated that the wings of flying creatures, when the bodies of said creatures are fixed, describe *figure-of-8 tracks* in space—the figure-of-8 tracks, when the bodies are released and advancing as in rapid flight, being opened out and converted into *waved tracks*.

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[1] By the term aeroplane is meant a thin, light, expanded structure inclined at a slight upward angle to the horizon intended to float or rest upon the air, and calculated to afford a certain amount of support to any body attached to it.

[2] "On the Various Modes of Flight in relation to Aeronautics," by J. Bell Pettigrew, *Proc. Roy. Inst.*, 1867; "On the Mechanical Appliances by which Flight is attained in the Animal Kingdom," by the same author, *Trans. Linn. Soc.*, 1867.

It may be well to explain here that a claim has been set up by his admirers for the celebrated artist, architect and engineer, Leonardo da Vinci, to be regarded as the discoverer of the principles and practice of flight (see Theodore Andrea Cook, *Spirals in Nature and Art*, 1903). The claim is, however, unwarranted; Leonardo's chief work on flight, bearing the title *Codice sul Volo degli Uccelli e Varie Altre Materie*, written in 1505, consists of a short manuscript of twenty-seven small quarto pages, with simple sketch illustrations interspersed in the text. In addition he makes occasional references to flight in his other manuscripts, which are also illustrated. In none of Leonardo's manuscripts, however, and in none of his figures, is the slightest hint given of his having any knowledge of the spiral movements made by the wing in flight or of the spiral structure of the wing itself. It is claimed that Leonardo knew the direction of the stroke of the wing, as revealed by recent researches and proved by modern instantaneous photography. As a matter of fact, Leonardo gives a wholly inaccurate account of the direction of the stroke of the wing. He states that the wing during the down stroke strikes downwards and *backwards*, whereas in reality it strikes downwards and *forwards*. In speaking of artificial flight Leonardo says: "The wings have to row downwards and *backwards* to support the machine on high, so that it moves forward." In speaking of natural flight he remarks: "If in its descent the bird rows *backwards* with its wings the bird will move rapidly; this happens because the wings strike the air which successively runs behind the bird to fill the void whence it comes." There is nothing in Leonardo's writings to show that he knew either the anatomy or physiology of the wing in the modern sense.

Pettigrew's discovery of the figure-of-8 and waved movements made by the wing in stationary and progressive flight was confirmed some two years after it was made by Prof. E. J. Marey of Paris[1] by the aid of the "sphygmograph."[2] The movements in question are now regarded as fundamental, from the fact that they are alike essential to natural and artificial flight.

The following is Pettigrew's description of wings and wing movements published in 1867:—

"The wings of insects and birds are, as a rule, more or less triangular in shape, the base of the triangle being directed towards the body, its sides anteriorly and posteriorly. They are also conical on section from within outwards and from before backwards, this shape converting the pinions into delicately graduated instruments balanced with the utmost nicety to satisfy the requirements of the muscular system on the one hand and the resistance and resiliency of the air on the other. While all wings are graduated as explained, innumerable varieties occur as to their general contour, some being falcated or scythe-like, others oblong, others rounded or circular, some lanceolate and some linear. The wings of insects may consist either of one or two pairs—the anterior or upper pair, when two are present, being in some instances greatly modified and presenting a corneous condition. They are then known as elytra, from the Gr. ἔλυτρον, a sheath. Both pairs are composed of a duplicature of the integument, or investing membrane, and are strengthened in various directions by a system of hollow, horny tubes, known to entomologists as the neurae or nervures. These nervures taper towards the extremity of the wing, and are strongest towards its root and anterior margin, where they supply the place of the arm in birds and bats. The neurae are arranged at the axis of the wing after the manner of a fan or spiral stair—the anterior one occupying a higher position than that farther back, and so of the others. As this arrangement extends also to the margins, *the wings are more or less twisted upon themselves* and present a certain degree of convexity on their superior or upper surface, and a corresponding concavity on their inferior or under surface,—their free edges supplying those fine curves which act with such efficacy upon the air in obtaining the maximum of resistance and the minimum of displacement. As illustrative examples of the form of wings alluded to, those of the beetle, bee and fly may be cited—the pinions in those insects acting as *helices*, or *twisted levers*, and elevating weights much greater than the area of the wings would seem to warrant" (figs. 10 and 11). . . . "To confer on the wings the multiplicity of movements which they require, they are supplied with double hinge or compound joints, which enable them to move not only in an upward, downward, forward and backward direction, but also at various intermediate degrees of obliquity. An insect with wings thus hinged may, as far as steadiness of body is concerned, be not inaptly compared to a compass set upon gimbals, where the universality of motion in one direction ensures comparative fixedness in another." . . . "All wings obtain their leverage by presenting oblique surfaces to the air, the degree of obliquity gradually increasing in a direction from behind, forwards and downwards, during extension when the sudden or effective stroke is being given, and gradually decreasing in an opposite direction during flexion, or when the wing is being more slowly recovered preparatory to making a second stroke. The effective stroke in insects, and this holds true also of birds, is therefore delivered *downwards and forwards*, and not, as the majority of writers believe, vertically, or even slightly backwards . . . The wing in the insect is more flattened than in the bird; and advantage is taken on some occasions of this circumstance, particularly in heavy-bodied, small-winged, quick-flying insects, *to reverse the pinion more or less completely during the down and up strokes*." . . . "This is effected in the following manner. The posterior margin of the wing is made to rotate, during the down stroke, in a direction from above downwards and from behind forwards—the anterior margin travelling in an opposite direction and reciprocating. The wing may thus be said to attack the air by a *screwing movement* from above. During the up or return stroke, on the other hand, the posterior margin rotates in a direction from below upwards and from before backwards, so that by a similar but *reverse screwing motion* the pinion attacks the air from beneath." . . . "*A figure-of-8*, compressed laterally and placed obliquely with its long axis running from left to right of the spectator, represents the movements in question. *The down and up strokes*, as will be seen from this account, *cross each other*, the wing smiting the air during its descent from above, as in the bird and bat, and during its ascent from below as in the flying fish and boy's kite" (fig. 12).

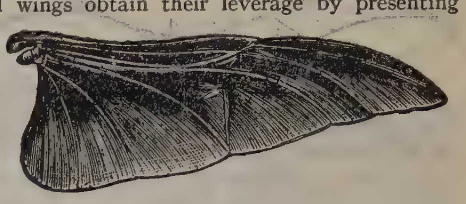

Fig. 10.—Right Wing of the Beetle (*Goliathus micans*) when at rest; seen from above.

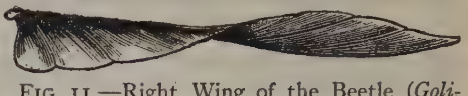

Fig. 11.—Right Wing of the Beetle (*Goliathus micans*) when in motion; seen from behind. This figure shows how the wing twists and untwists when in action, and how it forms a true screw.

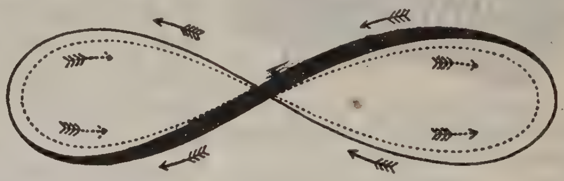

Fig. 12 shows the figure-of-8 made by the margins of the wing in extension (continuous line), and flexion (dotted line). As the tip of the wing is mid-way between its margins, a line between the continuous and dotted lines gives the figure-of-8 made by the tip. The arrows indicate the reversal of the planes of the wing, and show how the down and up strokes *cross each other*.

. . . "The figure-of-8 action of the wing explains how an insect or bird may fix itself in the air, the backward and forward reciprocating action of the pinion affording support, but no propulsion. In these instances the backward and forward strokes are made to counterbalance each other. Although the figure-of-8 represents with considerable fidelity the twisting of the wing upon its axis during extension and flexion, when the insect is playing its wings before an object, or still better when it is artificially fixed, it is otherwise when the down stroke is added and the insect is fairly on the wing and progressing rapidly. In this case the wing, in virtue of its being carried forward by the body in motion, describes an undulating or spiral course, as shown in fig. 13."

. . . "The down and up strokes are compound movements—the termination of the down stroke embracing the beginning of the up stroke, and the termination of the up stroke including the beginning of the down stroke. This is necessary in order that the down and up strokes may glide into each other in such a manner as to prevent jerking and unnecessary retardation."[3] . . .

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[1] *Revue des cours scientifiques de la France et de l' Étranger*, 1869.

[2] The sphygmograph, as its name indicates, is a recording instrument. It consists of a smoked cylinder revolving by means of clockwork at a known speed, and a style or pen which inscribes its surface by scratching or brushing away the lampblack. The movements to be registered are transferred to the style or pen by one or more levers, and the pen in turn transfers them to the cylinder, where they appear as legible tracings. In registering the movements of the wings the tips and margins of the pinions were, by an ingenious modification, employed as the styles or pens. By this arrangement the different parts of the wings were made actually to record their own movements. As will be seen from this account, the figure-of-8 or wave theory of stationary and progressive flight has been made the subject of a rigorous *experimentum crucis*.

[3] This continuity of the down into the up stroke and the converse is greatly facilitated by the elastic ligaments at the root and in the

"The wing of the bird, like that of the insect, is concavo-convex, and *more or less twisted upon itself* when extended, so that the anterior or thick margin of the pinion presents a different degree of curvature to that of the posterior or thin margin. This twisting is in a great measure owing to the manner in which the bones of the wing are twisted upon themselves, and the spiral nature of their articular surfaces—the long axes of the joints always intersecting each other at right angles, and the bones of the elbow and wrist making a quarter of a turn or so during extension and the same amount during flexion. As a result of this disposition of the articular surfaces, the wing may be shot out or extended, and retracted or flexed in nearly the same plane, the bones composing the wing rotating on their axes during either movement (fig. 14). The secondary action, or the revolving of the component bones on their own axes, is of the greatest importance in the movements of the wing, as it communicates to the hand and forearm, and consequently to the primary and secondary feathers which they bear, the precise angles necessary for flight. It in fact ensures that the wing, and the curtain or fringe of the wing which the primary and secondary feathers form, shall be screwed into and down upon the wind in extension, and unscrewed or withdrawn from the wind during flexion. The wing of the bird may therefore be compared to a huge gimlet or auger, the axis of the gimlet representing the bones of the wing, the flanges or spiral thread of the gimlet the primary and secondary feathers" (figs. 15 and 16). . . . "From this description it will be evident that by the mere rotation of the bones of the forearm and hand the maximum and minimum of resistance is secured much in the same way that this object is attained by the alternate dipping and feathering of an oar." . . . "The wing, both when at rest and when in motion, may not inaptly be compared to the blade of an ordinary screw propeller as employed in navigation. Thus the general outline of the wing corresponds closely with the outline of the propeller (figs. 11, 16 and 18), and the track described by the wing in space *is twisted upon itself* propeller fashion[1] (figs. 12, 20, 21, 22, 23). The great velocity with which the wing is driven converts the impression or blur made by it into what is equivalent to a solid for the time being, in the same way that the spokes of a wheel in violent motion, as is well understood, more or less completely occupy the space contained within the rim or circumference of the wheel" (figs. 9, 20 and 21).

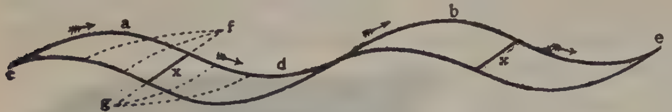

FIG. 13.—Wave track made by the wing in progressive flight. *a*, *b*, Crests of the wave; *c*, *d*, *e*, up strokes; *x*, *x*, down strokes; *f*, point corresponding to the anterior margin of the wing, and forming a centre for the downward rotation of the wing (*a*, *g*); *g*, point corresponding to the posterior margin of the wing, and forming a centre for the upward rotation of the wing (*d*, *f*).

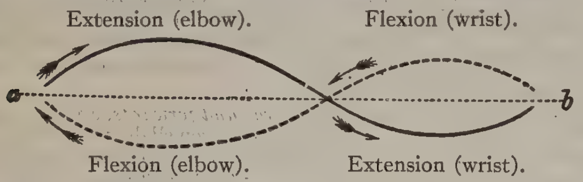

FIG. 14.—*a*, *b*, line along which the wing travels during extension and flexion. The arrows indicate the direction in which the wing is spread out in extension and closed or folded in flexion.

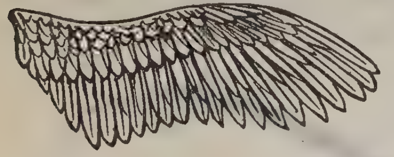

FIG. 15.—Right Wing of the Red-legged Partridge (*Perdix rubra*). Dorsal aspect as seen from above.

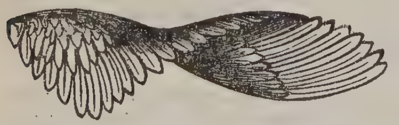

FIG. 16.—Right Wing of the Red-legged Partridge (*Perdix rubra*). Dorsal and ventral aspects as seen from behind; showing auger-like conformation of wing. Compare with figs. 11 and 18.

. . . "The wing of the bat bears a considerable resemblance to that of the insect, inasmuch as it consists of a delicate, semi-transparent, continuous membrane, supported in divers directions, particularly towards its anterior margin, by a system of osseous stays or stretchers which confer upon it the degree of rigidity requisite for flight. It is, as a rule, deeply concave on its under or ventral surface, and in this respect resembles the wing of the heavy-bodied birds. The movement of the bat's wing in extension is a *spiral* one, the spiral running alternately from below upwards and forwards and from above downwards and backwards. The action of the wing of the bat, and the movements of its component bones, are essentially the same as in the bird" (figs. 17 and 18).

. . . "The wing strikes the air precisely as a boy's kite would if it were jerked by its string, the only difference being that the kite is *pulled forwards* upon the wind by the string and the hand, whereas in the insect, bird and bat the wing is *pushed forwards* on the wind by the weight of the body and the power residing in the pinion itself" (fig. 19).[2]

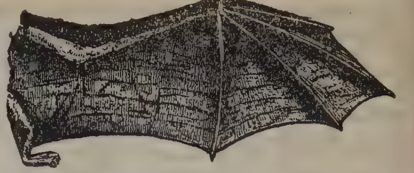

FIG. 17.—Right Wing of the Bat (*Phyllocina gracilis*). Dorsal aspect as seen from above.

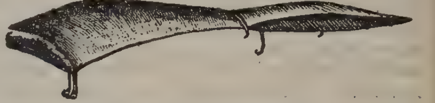

FIG. 18.—Right Wing of the Bat (*Phyllocina gracilis*). Dorsal and ventral aspects, as seen from behind. These show the screw-like configuration of the wing, and also how the wing twists and untwists during its action.

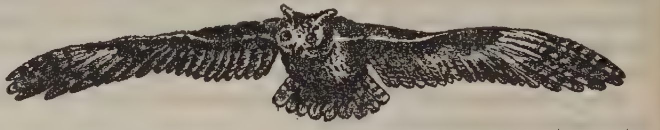

FIG. 19.—The Cape Barn-owl (*Strix capensis*), showing the kite-like surfaces presented by the ventral aspect of the wings and body in flight.

The figure-of-8 and kite-like action of the wing referred to lead us to explain how it happens that the wing, which in many instances is a comparatively small and delicate organ, can yet attack the air with such vigour as to extract from it the recoil necessary to elevate and propel the flying creature. The accompanying figures from one of Pettigrew's later memoirs[3] will serve to explain the *rationale* (figs. 20, 21, 22 and 23).

As will be seen from these figures, the wing during its vibration sweeps through a comparatively very large space. This space, as already explained, is practically a solid basis of support for the wing and for the flying animal. The wing attacks the air in such a manner as virtually to have no slip—this for two reasons. The wing reverses instantly and acts as a kite during nearly the entire down and up strokes. The angles, moreover, made by the wing with the horizon during the down and up strokes are at no two intervals the same, but (and this is a

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substance of the wing. These assist in elevating, and, when necessary, in flexing and elevating it. They counteract in some measure what may be regarded as the dead weight of the wing, and are especially useful in giving it continuous play.

[1] "The importance of the twisted configuration or screw-like form cannot be over-estimated. That this shape is intimately associated with flight is apparent from the fact that the rowing feathers of the wing of the bird are every one of them distinctly spiral in their nature; in fact, one entire rowing feather is equivalent—morphologically and physiologically—to one entire insect wing. In the wing of the martin, where the bones of the pinion are short, and in some respects rudimentary, the primary and secondary feathers are greatly developed, and banked up in such a manner that the wing as a whole presents the same curves as those displayed by the insect's wing, or by the wing of the eagle, where the bones, muscles and feathers have attained a maximum development. The conformation of the wing is such that it presents a waved appearance in every direction—the waves running longitudinally, transversely and obliquely. The greater portion of the wing may consequently be removed without essentially altering either its form or its functions. This is proved by making sections in various directions, and by finding that in some instances as much as two-thirds of the wing may be lopped off without materially impairing the power of flight."—*Trans. Roy. Soc. Edin.* vol. xxvi. pp. 325, 326.

[2] "On the Various Modes of Flight in relation to Aeronautics," *Proc. Roy. Inst.*, 1867; "On the Mechanical Appliances by which Flight is attained in the Animal Kingdom," *Trans. Linn. Soc.*, 1867, 26.

[3] "On the Physiology of Wings; being an analysis of the movements by which flight is produced in the Insect, Bat and Bird," *Trans. Roy. Soc. Edin.* vol. 26.

remarkable circumstance) they are always adapted to the speed at which the wing is travelling for the time being. The increase and decrease in the angles made by the wing as it hastens to and fro are due partly to the resistance offered by the air, and partly to the mechanism and mode of application of the wing to the air. The wing, during its vibrations, rotates upon two separate centres, the tip rotating round the root of the wing as an axis (short axis of wing), the posterior margin rotating around the anterior margin (long axis of wing). The wing is really eccentric in its nature, a remark which applies also to the rowing feathers of the bird's wing. The compound rotation goes on throughout the entire down and up strokes, and is intimately associated with the power which the wing enjoys of alternately seizing and evading the air.

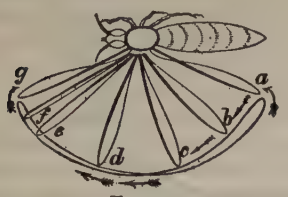

FIG. 20.

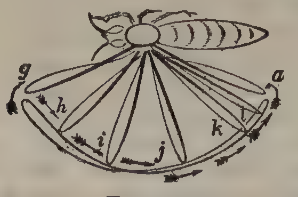

FIG. 21.

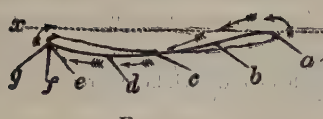

FIG. 22.

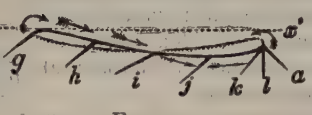

FIG. 23.

FIGS. 20, 21, 22 and 23 show the area mapped out by the left wing of the Wasp when the insect is fixed and the wing made to vibrate. These figures illustrate the various angles made by the wing with the horizon as it hastens to and fro, and show how the wing reverses and reciprocates, and how it twists upon itself in opposite directions, and describes a figure-of-8 track in space. Figs. 20 and 22 represent the forward or down stroke (*a b c d e f g*), figs. 21 and 23 the backward or up stroke (*g h i j k l a*). The terms forward and back strokes are here employed with reference to the head of the insect. *x*, *x'*, line to represent the horizon. If fig. 22, representing the down or forward stroke, be placed upon fig. 23, representing the up or backward stroke, it will be seen that *the wing crosses its own track* more or less completely at every stage of the down and up strokes.

The compound rotation of the wing is greatly facilitated by the wing being elastic and flexible. It is this which causes the wing to twist and untwist diagonally on its long axis when it is made to vibrate. The twisting referred to is partly a vital and partly a mechanical act;—that is, it is occasioned in part by the action of the muscles and in part by the greater resistance experienced from the air by the tip and posterior margin of the wing as compared with the root and anterior margin,—the resistance experienced by the tip and posterior margin causing them to reverse always subsequently to the root and anterior margin, which has the effect of throwing the anterior and posterior margins of the wing into figure-of-8 curves, as shown at figs. 9, 11, 12, 16, 18, 20, 21, 22 and 23.

The compound rotation of the wing, as seen in the bird, is represented in fig. 24.

Not the least curious feature of the wing movements is the remarkable power which the wing possesses of making and utilizing its own currents. Thus, when the wing descends it draws after it a strong current, which, being met by the wing during its ascent, greatly increases the efficacy of the up stroke. Similarly and conversely, when the wing ascends, it creates an upward current, which, being met by the wing when it descends, powerfully contributes to the efficiency of the down stroke. This statement can be readily verified by experiment both with natural and artificial wings. Neither the up nor the down strokes are complete in themselves.

The wing to act efficiently must be driven at a certain speed, and in such a manner that the down and up strokes shall glide into each other. It is only in this way that the air can be made to pulsate, and that the rhythm of the wing and the air waves can be made to correspond. The air must be seized and let go in a certain order and at a certain speed to extract a maximum recoil. The rapidity of the wing movements is regulated by the size of the wing, small wings being driven at a very much higher speed than larger ones. The different parts of the wing, moreover, travel at different degrees of velocity—the tip and posterior margin of the wing always rushing through a much greater space, in a given time, than the root and anterior margin.

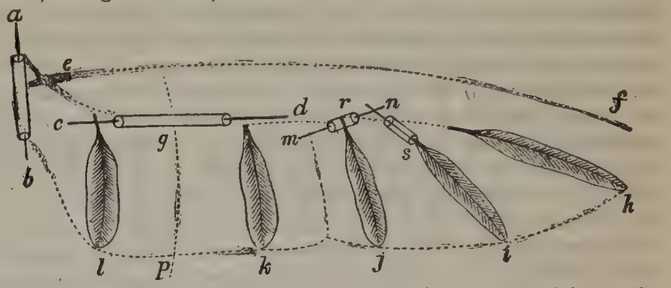

FIG. 24.—Wing of the Bird with its root (*a*, *b*) cranked forwards.

a, *b*, Short axis of the wing (axis for tip of wing, *h*).
c, *d*, Long axis (axis for posterior margin of wing, *h*, *i*, *j*, *k*, *l*).
m, *n*, Short axis of rowing feathers of wing.
r, *s*, Long axis of rowing feathers of wing. The rotation of the rowing feathers on their long axis (they are eccentrics) enables them to open or separate during the up, and close or come together during the down strokes.
e f, *g p*, concave shape presented by the under surface of the wing.

The rapidity of travel of the insect wing is in some cases enormous. The wasp, for instance, is said to ply its wings at the rate of 110, and the common house-fly at the rate of 330 beats per second. Quick as are the vibrations of natural wings, the speed of certain parts of the wing is amazingly increased. Wings as a rule are long and narrow. As a consequence, a comparatively slow and very limited movement at the root confers great range and immense speed at the tip, the speed of each portion of the wing increasing as the root of the wing is receded from. This is explained on a principle well understood in mechanics, viz. that when a wing or rod hinged at one end is made to move in a circle, the tip or free end of the wing or rod describes a much wider circle in a given time than a portion of the wing or rod nearer the hinge (fig. 25).

One naturally inquires why the high speed of wings, and why the progressive increase of speed at their tips and posterior margins? The answer is not far to seek. If the wings were not driven at a high speed, and if they were not eccentrics made to revolve upon two separate axes, they would of necessity be large cumbrous structures; but large heavy wings would be difficult to work, and what is worse, they would (if too large), instead of controlling the air, be controlled by it, and so cease to be flying organs.

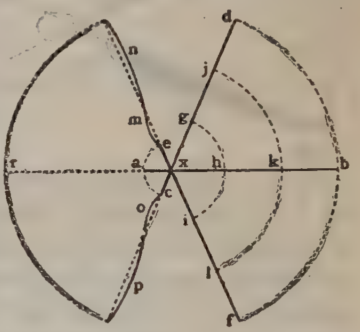

FIG. 25 shows how different portions of the wing travel at different degrees of speed. In this figure the rod *a*, *b*, hinged at *x*, represents the wing. When the wing is made to vibrate, its several portions travel through the spaces *d b f*, *j k l*, *g h i*, and *e a c* in exactly the same interval of time. The part of the wing marked *b*, which corresponds with the tip, consequently travels very much more rapidly than the part marked *a*, which corresponds with the root. *m n*, *o p*, curves made by the wing at the end of the up and down strokes; *r*, position of the wing at the middle of the stroke.

There is, however, another reason why wings should be made to vibrate at high speeds. The air, as explained, is a very light, thin, elastic medium, which yields on the slightest pressure, and unless the wings attacked it with great violence the necessary recoil or resistance could not be obtained. The atmosphere, because of its great tenuity, mobility and comparative imponderability, presents little resistance to bodies passing through it at low velocities. If, however, the speed be greatly accelerated, the action of even an ordinary cane is sufficient to elicit a recoil. This comes of the action and reaction of matter, the resistance experienced varying according to the density of the atmosphere and the shape, extent and velocity of the body acting upon it. While, therefore, scarcely any impediment is offered to the progress of an animal in motion in the air, it is often exceedingly difficult to compress the air with sufficient rapidity and energy to convert it into a suitable fulcrum for securing the necessary support and forward impetus. This arises from the fact that bodies moving in air experience a *minimum of resistance* and occasion a *maximum of displacement*. Another and very obvious difficulty is traceable to the great disparity in the weight of air as compared with any known solid, and the consequent want of buoying or sustaining power which that disparity involves. If we compare air with water we find it is nearly 1000 times lighter. To meet these peculiarities the insect, bird and bat are furnished with extensive flying surfaces in the shape of wings, which they apply with singular velocity and power to the air, as levers of the third order. In this form of lever the power is applied between the fulcrum and the weight to be raised. The power is represented by the wing, the fulcrum by the air, and the weight by the body of the flying animal. Although the third order of lever is particularly inefficient when the fulcrum is rigid and immobile, it possesses singular advantages when these conditions are reversed, that is, when the fulcrum, as happens with the air, is *elastic* and *yielding*. In this instance a very slight movement at the root of the pinion, or that end of the lever directed towards the body, is followed by an immense sweep of the extremity of the wing, where its elevating and propelling power is greatest—this arrangement ensuring that the large quantity of air necessary for support and propulsion shall be compressed under the most favourable conditions.

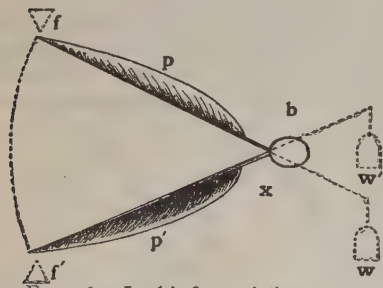

FIG. 26.—In this figure *f, f′* represent the movable fulcra furnished by the air, *p p′* the power residing in the wing, and *b* the body to be moved. In order to make the problem of flight more intelligible, the lever formed by the wing is prolonged beyond the body (*b*), and to the root of the wing so extended the weight (*w, w′*) is attached; *x* represents the universal joint by which the wing is attached to the body. When the wing ascends as shown at *p*, the air (fulcrum *f*) resists its upward passage, and forces the body (*b*) or its representative (*w*) slightly downwards. When the wing descends as shown at *p′*, the air (fulcrum *f′*) resists its downward passage, and forces the body (*b*) or its representative (*w′*) slightly upwards. From this it follows that when the wing rises the body falls, and vice versa—the wing describing the arc of a large circle (*f f′*), the body (*b*), or the weights (*w, w′*) representing it, describing the arc of a small circle.

In this process the weight of the body performs an important part, by acting upon the inclined planes formed by the wings in the plane of progression. The power and the weight may thus be said to reciprocate, the two sitting as it were side by side and blending their peculiar influences to produce a common result, as indicated at fig. 26.

When the wings descend they elevate the body, the wings being active and the body passive; when the body descends it contributes to the elevation of the wings,[1] the body being active and the wings more or less passive. It is in this way that weight forms a factor in flight, the wings and the weight of the body reciprocating and mutually assisting and relieving each other. This is an argument for employing four wings in artificial flight,—the wings being so arranged that the two which are up shall always by their fall mechanically elevate the two which are down. Such an arrangement is calculated greatly to conserve the driving power, and as a consequence, to reduce the weight.

That the weight of the body plays an important part in the production of flight may be proved by a very simple experiment. If two quill feathers are fixed in an ordinary cork, and so arranged that they expand and arch above it (fig. 27), it is found that if the apparatus be dropped from a vertical height of 3 yds. it does not fall vertically downwards, but downwards and *forwards* in a curve, the forward travel amounting in some instances to a yard and a half. Here the cork, in falling, acts upon the feathers (which are to all intents and purposes wings), and these in turn act upon the air, in such a manner as to produce a horizontal transference.

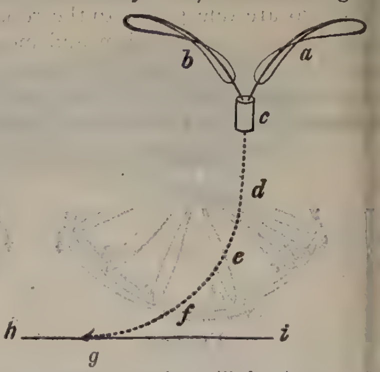

FIG. 27.—*a, b,* quill feathers; *c,* cork; *d, e, f, g,* downward and *forward* curved trajectory made by the feathers and cork before reaching the ground (*h, i*).

In order to utilize the air as a means of transit, the body in motion, whether it moves in virtue of the life it possesses, or because of a force superadded, must be heavier than air. It must tread with its wings and rise upon the air as a swimmer upon the water, or as a kite upon the wind. This is necessary for the simple reason that the body must be active, the air passive. The flying body must act against gravitation, and elevate and carry itself forward at the expense of the air and of the force which resides in it, whatever that may be. If it were otherwise—if it were rescued from the law of gravitation on the one hand, and bereft of independent movement on the other, it would float about uncontrolled and uncontrollable like an ordinary balloon.

In flight one of two things is necessary. Either the wings must attack the air with great violence, or the air in rapid motion must attack the wings: either suffices. If a bird attempts to fly in a calm, the wings must be made to smite the air after the manner of a boy's kite with great vigour and at a high speed. In this case the wings fly the bird. If, however, the bird is fairly launched in space and a stiff breeze is blowing, all that is required in many instances is to extend the wings at a slight upward angle to the horizon so that the under parts of the wings present kite-like surfaces. In these circumstances the rapidly moving air flies the bird. The flight of the albatross supplies the necessary illustration. If by any chance this magnificent bird alights upon the sea he must flap and beat the water and air with his wings with tremendous energy until he gets fairly launched. This done he extends his enormous pinions[2] and sails majestically along, seldom deigning to flap his wings, the breeze doing the work for him. A familiar illustration of the same principle may be witnessed any day when children are engaged in the pastime of kite-flying. If two boys attempt to fly a kite in a calm, the one must hold up the kite and let go when the other runs. In this case the under surface of the kite is made to strike the still air. If, however, a stiff autumn breeze be blowing, it suffices if the boy who formerly ran when the kite was let go stands still. In this case the air in rapid motion strikes the under surface of the kite and forces it up. The string and the hand are to the kite what the weight of the flying creature is to the inclined planes formed by its wings.

The area of the insect, bird and bat, when the wings are fully expanded, is greater than that of any other class of animal, their weight being proportionally less. As already stated, however, it ought never to be forgotten that even the lightest insect, bird or bat is vastly heavier than the air, and that no fixed relation exists between the weight of body and expanse of wing in any of the orders. We have thus light-bodied and large-winged insects and birds, as the butterfly and heron; and others with heavy bodies and small wings, as the beetle and partridge. Similar remarks are to be made of bats. Those apparent inconsistencies in the dimensions of the body and wings are readily explained by the greater muscular development of the heavy-bodied, small-winged insects, birds and bats, and the increased power and rapidity with which the wings in them are made to oscillate. This is of the utmost importance in the science of aviation, as showing that flight may be attained by a heavy powerful animal with comparatively small wings, as well as by a lighter one with greatly enlarged wings. While, therefore, there is apparently no correspondence between the area of the wing and the animal to be raised, there is, except in the case of sailing insects, birds and bats, an unvarying relation as to the weight and number of oscillations; so that the problem of flight would seem to resolve itself into one of weight, power, velocity and small surfaces, *versus* buoyancy, debility, diminished speed and extensive surfaces—weight in either case being a *sine qua non*.

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[1] The other forces which assist in elevating the wings are—(*a*) the elevator muscles of the wings, (*b*) the elastic properties of the wings, and (*c*) the reaction of the compressed air on the under surfaces of the wings.

[2] The wings of the albatross, when fully extended, measure across the back some 14 ft. They are exceedingly narrow, being sometimes under a foot in width.

That no fixed relation exists between the area of the wings and the size and weight of the body to be elevated is evident on comparing the dimensions of the wings and bodies of the several orders of insects, bats and birds. If such comparison be made, it will be found that the pinions in some instances diminish while the bodies increase, and the converse. No practical good can therefore accrue to aviation from elaborate measurements of the wings and body of any flying thing; neither can any rule be laid down as to the extent of surface required for sustaining a given weight in the air. The statements here advanced are borne out by the fact that the wings of insects, bats and birds may be materially reduced without impairing their powers of flight. In such cases the speed with which the wings are driven is increased in the direct ratio of the mutilation. The inference to be deduced from the foregoing is plainly this, that even in large-bodied, small-winged insects and birds the wing-surface is greatly in excess, the surplus wing area supplying that degree of elevating and sustaining power which is necessary to prevent undue exertion on the part of the volant animal. In this we have a partial explanation of the buoyancy of insects, and the great lifting power possessed by birds and bats,—the bats carrying their young without inconvenience, the birds elevating surprising quantities of fish, game, carrion, &c. (fig. 28).

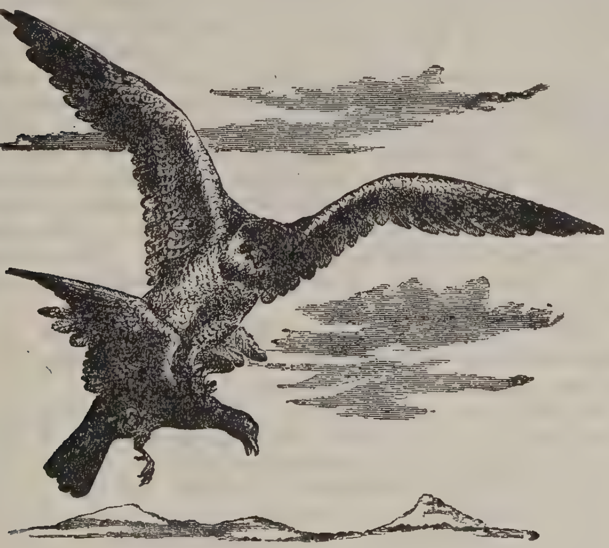

Fig. 28.—Hawk and Pigeon.

While as explained, no definite relation exists between the weight of a flying animal and the size of its flying surfaces, there being, as stated, heavy-bodied and small-winged insects, birds and bats, and the converse, and while, as has been shown, flight is possible within a wide range, the wings being, as a rule, in excess of what are required for the purposes of flight,—still it appears from the researches of L. de Lucy that there is a general law, to the effect that the larger the volant animal, the smaller, by comparison, are its flying surfaces. The existence of such a law is very encouraging so far as artificial flight is concerned, for it shows that the flying surfaces of a large, heavy, powerful flying machine will be comparatively small, and consequently comparatively compact and strong. This is a point of very considerable importance, as the object desiderated in a flying machine is elevating capacity.

De Lucy tabulated his results as under:—

Insects.				Birds.			
Names.	Flying Surface referred to the Kilogramme =2 ℔ 8 oz. 3 dwt. 2 gr. avoird. =2 ℔ 3 oz. 4·428 dr. troy.			Names.	Flying Surface referred to the Kilogramme.		
	sq. yds.	ft.	in.		sq. yds.	ft.	in.
Gnat	11	8	92	Swallow	1	1	104½
Dragon-fly (small)	7	2	56	Sparrow	0	5	142½
Coccinella (Lady-bird)	5	13	87	Turtle-dove	0	4	100½
Dragon-fly (common)	5	2	89	Pigeon	0	2	113
Tipula, or Daddy-long-legs	3	5	11	Stork	0	2	20
Bee	1	2	74½	Vulture	0	1	116
Meat-fly	1	3	54½	Crane of Australia	0	0	130
Drone (blue)	1	2	20				
Cockchafer	1	2	50				
Lucanus cervus Stag-beetle (female)	1	1	39½				
Stag-beetle (male)	0	8	33				
Rhinoceros-beetle	0	6	122½				

"It is easy, by the aid of this table, to follow the order, always decreasing, of the surfaces, in proportion as the winged animal increases in size and weight. Thus, in comparing the insects with one another, we find that the gnat, which weighs 460 times less than the stag-beetle, has 14 times more of surface. The lady-bird weighs 150 times less than the stag-beetle, and possesses 5 times more of surface, &c. It is the same with the birds. The sparrow weighs about 10 times less than the pigeon, and has twice as much surface. The pigeon weighs about 8 times less than the stork, and has twice as much surface. The sparrow weighs 339 times less than the Australian crane, and possesses 7 times more surface, &c. If now we compare the insects and the birds, the gradation will become even much more striking. The gnat, for example, weighs 97,000 times less than the pigeon, and has 40 times more surface; it weighs three millions of times less than the crane of Australia, and possesses 140 times more of surface than this latter, the weight of which is about 9 kilogrammes 500 grammes (25 ℔ 5 oz. 9 dwt. troy, 20 ℔ 15 oz. 2¼ dr. avoirdupois).

The Australian crane, the heaviest bird weighed, is that which has the smallest amount of surface, for, referred to the kilogramme, it does not give us a surface of more than 899 square centimetres (139 sq. in.), that is to say, about an eleventh part of a square metre. But every one knows that these grallatorial animals are excellent birds of flight. Of all travelling birds they undertake the longest and most remote journeys. They are, in addition, the eagle excepted, the birds which elevate themselves the highest, and the flight of which is the longest maintained."[1]

The way in which the natural wing rises and falls on the air, and reciprocates with the body of the flying creature, has a very obvious bearing upon artificial flight. In natural flight the body of the flying creature falls slightly forward in a curve when the wing ascends, and is slightly elevated in a curve when the wing descends. The wing and body are consequently always playing at cross purposes, the wing rising when the body is falling and vice versa. The alternate rise and fall of the body and wing of the bird are well seen when contemplating the flight of the gull from the stern of a steamboat, as the bird is following in the wake of the vessel. The complementary movements referred to are indicated at fig. 29, where the continuous waved line represents the trajectory made by the wing, and the dotted waved line that made by the body. As will be seen from this figure, *the wing advances both when it rises and when it falls.* It is a peculiarity of natural wings, and of artificial wings constructed on the principle of living wings, that when forcibly elevated or depressed, even in a strictly vertical direction, they inevitably dart forward. If, for instance, the wing is suddenly depressed in a vertical direction, as at *a b* of fig. 29, it at once darts downwards and forwards in a double curve (see continuous line of figure) to *c*, thus converting the vertical down stroke into a *down, oblique, forward stroke.* If, again, the wing be suddenly elevated in a strictly vertical direction, as at *c d*, the wing as certainly darts upwards and forwards in a double curve to *e*, thus converting the vertical up strokes into an *upward, oblique, forward stroke.* The same thing happens when the wing is depressed from *e* to *f* and elevated from *g* to *h*, the wing describing a *waved track* as at *e g, g i.*

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[1] *On the Flight of Birds, of Bats and of Insects, in reference to the subject of Aerial Locomotion*, by L. de Lucy (Paris).

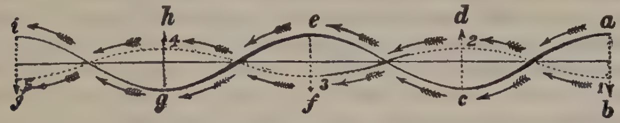

FIG. 29 shows how in progressive flight the wing and the body describe *waved tracks*,—the crests of the waves made by the wing (*a, c, e, g, i*) being placed opposite the crests of the waves made by the body 1, 2, 3, 4, 5).

There are good reasons why the wings should always be in advance of the body. A bird when flying is a body in motion; but a body in motion tends to fall not vertically downwards, but *downwards and forwards.* The wings consequently must be made to strike *forwards* and kept in advance of the body of the bird if they are to prevent the bird from falling *downwards and forwards.* If the wings were to strike backwards in aerial flight, the bird would turn a forward somersault.

That the wings invariably strike forwards during the down and up strokes in aerial flight is proved alike by observation and experiment. If any one watches a bird rising from the ground or the water, he cannot fail to perceive that the head and body are slightly tilted upwards, and that the wings are made to descend with great vigour in a downward and *forward* direction. The dead natural wing and a properly constructed artificial wing act in precisely the same way. If the wing of a gannet, just shot, be removed and made to flap in what the operator believes to be a strictly vertical downward direction, the tip of the wing, in spite of him, will dart forwards between 2 and 3 ft. —the amount of forward movement being regulated by the rapidity of the down stroke. This is a very striking experiment. The same thing happens with a properly constructed artificial wing. The down stroke with the artificial as with the natural wing is invariably converted into an oblique, downward and forward stroke. No one ever saw a bird in the air flapping its wings towards its tail. The old idea was that the wings during the down stroke *pushed* the body of the bird in an upward and forward direction; in reality the wings do not push but *pull*, and in order to pull they must always be in advance of the body to be flown. If the wings did not themselves fly *forward*, they could not possibly cause the body of the bird to fly forward. It is the wings which cause the bird to fly.

It only remains to be stated that the wing acts as a true kite, during both the down and the up strokes, its under concave or biting surface, in virtue of the forward travel communicated to it by the body of the flying creature, being closely applied to the air, during both its ascent and its descent. This explains how the wing furnishes a persistent buoyancy alike when it rises and when it falls (fig. 30).

The natural kite formed by the wing differs from the artificial kite only in this, that the former is capable of being moved in all its parts, and is more or less flexible and elastic, whereas the latter is comparatively rigid. The flexibility and elasticity of the kite formed by the natural wing are rendered necessary by the fact that the wing, as already stated, is practically hinged at its root and along its anterior margin, an arrangement which necessitates its several parts travelling at different degrees of speed, in proportion as they are removed from the axes of rotation. Thus the tip travels at a higher speed than the root, and the posterior margin than the anterior margin. This begets a *twisting diagonal movement* of the wing on its long axis, which, but for the elasticity referred to, would break the wing into fragments. The elasticity contributes also to the continuous play of the wing, and ensures that no two parts of it shall reverse at exactly the same instant. If the wing was inelastic, every part of it would reverse at precisely the same moment, and its vibration would be characterized by pauses or dead points at the end of the down and up strokes which would be fatal to it as a flying organ.

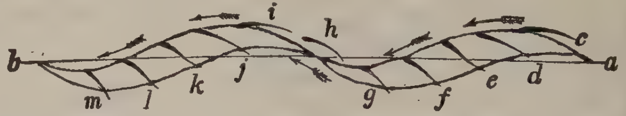

FIG. 30 shows the kite-like action of the wing during the down and up strokes, how the angles made by the wing with the horizon (*a, b*) vary at every stage of these strokes, and how the wing evades the superimposed air during the up stroke, and seizes the nether air during the down stroke. In this figure the spaces between the double dotted lines (*c g, i b*) represent the down strokes, the single dotted line (*h, i*) representing the up stroke. The kite-like surfaces and angles made by the wing with the horizon (*a, b*) during the down strokes are indicated at *c d e f g, j k l m*,—those made during the up strokes being indicated at *g h i.* As the down and up strokes run into each other, and the convex surface of the wing is always directed upwards and the concave surface downwards, it follows that the upper surface of the wing evades in a great measure the upper air, while the under surface seizes the nether air. It is easy to understand from this figure how the wing always flying forwards furnishes a persistent buoyancy.

The elastic properties of the wing are absolutely essential, when the mechanism and movements of the pinion are taken into account. A rigid wing can never be an effective flying instrument.

The kite-like surfaces referred to in natural flight are those upon which the constructors of flying machines very properly ground their hopes of ultimate success. These surfaces may be conferred on artificial wings, aeroplanes, aerial screws or similar structures; and these structures, if we may judge from what we find in nature, *should be of moderate size and elastic.* The power of the flying organs will be increased if they are driven at a comparatively high speed, and particularly if they are made to reverse and reciprocate, as in this case they will practically create the currents upon which they are destined to rise and advance. The angles made by the kite-like surfaces with the horizon should vary according to circumstances. They should be small when the speed is high, and vice versa. This, as stated, is true of natural wings. It should also be true of artificial wings and their analogues.

Artificial Flight.—We are now in a position to enter upon a consideration of artificial wings and wing movements, and of artificial flight and flying machines.

We begin with artificial wings. The first properly authenticated account of an artificial wing was given by G. A. Borelli in 1670. This author, distinguished alike as a physiologist, mathematician and mechanician, describes and figures a bird with artificial wings, each of which consists of *a rigid rod in front and flexible feathers behind.* The wings are represented as striking *vertically downwards*, as the annexed duplicate of Borelli's figure shows (fig. 31).

Borelli was of opinion that flight resulted from the application of an inclined plane, which beats the air, and which has a wedge action. He, in fact, endeavours to prove that a bird wedges itself forward upon the air by the perpendicular vibration of its wings, the wings during their action forming a wedge, the base of which (*c b e*) is directed towards the head of the bird, the apex (*a f*) being directed towards the tail (*d*). In the 196th proposition of his work (*De motu animalium*, Leiden, 1685) he states that—

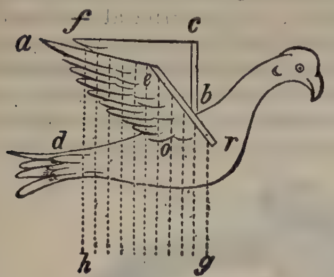

FIG. 31.

Borelli's bird with artificial wings.

r e, Anterior margin of the right wing, consisting of a rigid rod.
o a, Posterior margin of the right wing, consisting of flexible feathers.
b c, Anterior; and
f, Posterior margins of the left wing same as the right.
d, Tail of the bird.
r g, *d h*, Vertical direction of the down stroke of the wing.

> "If the expanded wings of a bird suspended in the air shall strike the undisturbed air beneath it with a motion *perpendicular to the horizon*, the bird will fly with *a transverse motion* in a plane parallel with the horizon." "If," he adds, "the wings of the bird be expanded, and the under surfaces of the wings be struck by the air *ascending perpendicularly to the horizon* with such a force as shall prevent the bird gliding downwards (*i.e.* with a tendency to glide downwards) from falling, it will be urged in a horizontal direction."
>
> The same argument is restated in different words as under:—"If the air under the wings be struck by the flexible portions of the wings (*flabella*, literally fly flaps or small fans) with a motion perpendicular to the horizon, the sails (*vela*) and flexible portions of the wings (*flabella*) will yield in an upward direction and form a wedge, the point of which is directed towards the tail. Whether, therefore, the air strikes the wings from below, or the wings strike the air from above, the result is the same,—the posterior or flexible margins of the wings *yield in an upward direction*, and in so doing urge the bird in a *horizontal direction*."

There are three points in Borelli's argument to which it is necessary to draw attention: (1) the direction of the down stroke: it is stated to be *vertically downwards*; (2) the construction of the anterior margin of the wing: it is stated to consist of *a rigid rod*; (3) the function delegated to the posterior margin of the wing: it is said *to yield in an upward direction* during the down stroke.

With regard to the first point. It is incorrect to say the wing strikes vertically downwards, for, as already explained, the body of a flying bird is a body in motion; but as a body in motion tends to fall downwards and forwards, the wing must strike downwards and forwards in order effectually to prevent its fall. Moreover, in point of fact, all natural wings, and all artificial wings constructed on the natural type, invariably strike downwards and forwards.

With regard to the second point, viz. the supposed rigidity of the anterior margin of the wing, it is only necessary to examine the anterior margins of natural wings to be convinced that they are in every case flexible and elastic. Similar remarks apply to properly constructed artificial wings. If the anterior margins of natural and artificial wings were rigid, it would be impossible to make them vibrate smoothly and continuously. This is a matter of experiment. If a rigid rod, or a wing with a rigid anterior margin, be made to vibrate, the vibration is characterized by an unequal jerky motion, at the end of the down and up strokes, which contrasts strangely with the smooth, steady fanning movement peculiar to natural wings.

As to the third point, viz. the upward bending of the posterior margin of the wing during the down stroke, it is necessary to remark that the statement is true if it means a slight upward bending, but that it is untrue if it means an extensive upward bending.

Borelli does not state the amount of upward bending, but one of his followers, E. J. Marey, maintains that during the down stroke the wing yields until its under surface makes a backward angle with the horizon of 45°. Marey further states that during the up stroke the wing yields to a corresponding extent in an opposite direction—the posterior margin of the wing, according to him, passing through an angle of 90°, plus or minus according to circumstances, every time the wing rises and falls.

That the posterior margin of the wing yields to a slight extent during both the down and up strokes will readily be admitted, alike because of the very delicate and highly elastic properties of the posterior margins of the wing, and because of the comparatively great force employed in its propulsion; but that it does not yield to the extent stated by Marey is a matter of absolute certainty. This admits of direct proof. If any one watches the horizontal or upward flight of a large bird he will observe that the posterior or flexible margin of the wing never rises during the down stroke to a perceptible extent, so that the under surface of the wing, as a whole, never looks backwards. On the contrary, he will perceive that the under surface of the wing (during the down stroke) invariably looks forwards and forms a true kite with the horizon, the angles made by the kite varying at every part of the down stroke, as shown more particularly at *c d e f g*, *i j k l m* of fig. 30.

The authors who have adopted Borelli's plan of artificial wing, and who have endorsed his mechanical views of the wing's action most fully, are J. Chabrier, H. E. G. Strauss-Dürckheim and Marey. Borelli's artificial wing, it will be remembered, consists of a rigid rod in front and a flexible sail behind. It is also made to strike vertically downwards. According to Chabrier, the wing has only one period of activity. He believes that if the wing be suddenly lowered by the depressor muscles, it is elevated solely by the reaction of the air. There is one unanswerable objection to this theory: the birds and bats, and some if not all the insects, have distinct elevator muscles, and can elevate their wings at pleasure when not flying and when, consequently, the reaction of the air is not elicited. Strauss-Dürckheim agrees with Borelli both as to the natural and the artificial wing. He is of opinion that the insect abstracts from the air by means of the inclined plane a component force (composant) which it employs to support and direct itself. In his theology of nature he describes a schematic wing as consisting of a rigid ribbing in front, and a flexible sail behind. A membrane so constructed will, according to him, be fit for flight. It will suffice if such a sail elevates and lowers itself successively. It will of its own accord dispose itself as an inclined plane, and receiving obliquely the reaction of the air, it transfers into tractile force a part of the vertical impulsion it has received. These two parts of the wing, moreover, are equally indispensable to each other.

Marey repeats Borelli and Dürckheim with very trifling modifications, so late as 1869. He describes two artificial wings, the one composed of a rigid rod and sail—the rod representing the stiff anterior margin of the wing; the sail, which is made of paper bordered with cardboard, the flexible posterior margin. The other wing consists of a rigid nervure in front and behind of thin parchment which supports fine rods of steel. He states that if the wing only elevates and depresses itself, "the resistance of the air is sufficient to produce all the other movements. In effect (according to Marey) the wing of an insect has not the power of equal resistance in every part. On the anterior margin the extended nervures make it rigid, while behind it is fine and flexible. During the vigorous depression of the wing, the nervure has the power of remaining rigid, whereas the flexible portion, being pushed in an upward direction on account of the resistance it experiences from the air, assumes an oblique position which causes the upper surface of the wing to look forwards." The reverse of this, in Marey's opinion, takes place during the elevation of the wing—the resistance of the air from above causing the upper surface of the wing to look backwards. . . . "At first," he says, "the plane of the wing is parallel with the body of the animal. It lowers itself—the front part of the wing strongly resists, the sail which follows it being flexible yields. Carried by the ribbing (the anterior margin of the wing) which lowers itself, the sail or posterior margin of the wing being raised meanwhile by the air, which sets it straight again, the sail will take an intermediate position and incline itself about 45° plus or minus according to circumstances. . . . The wing continues its movements of depression inclined to the horizon; but the impulse of the air, which continues its effect, and naturally acts upon the surface which it strikes, has the power of resolving itself into two forces, a vertical and a horizontal force; the first suffices to raise the animal, the second to move it along."[1] Marey, it will be observed, reproduces Borelli's artificial wing, and even his text, at a distance of nearly two centuries.

The artificial wing recommended by Pettigrew is a more exact imitation of nature than either of the foregoing. It is of a more or less triangular form, thick at the root and anterior margin, and thin at the tip and posterior margin. No part of it is rigid. It is, on the contrary, highly elastic and flexible throughout. It is furnished with springs at its root to contribute to its continued play, and is applied to the air by a direct piston action in such a way that it descends in a downward and forward direction during the down stroke, and ascends in an upward and forward direction during the up stroke. It elevates and propels both when it rises and falls. It, moreover, twists and untwists during its action and describes figure-of-8 and waved tracks in space, precisely as the natural wing does. The twisting is most marked at the tip and posterior margin, particularly that half of the posterior margin next the tip. The wing when in action may be divided into two portions by a line running diagonally between the tip of the wing anteriorly and the root of the wing posteriorly. The tip and posterior parts of the wing are more active than the root and anterior parts, from the fact that the tip and posterior parts (the wing is an eccentric) always travel through greater spaces, in a given time, than the root and anterior parts.

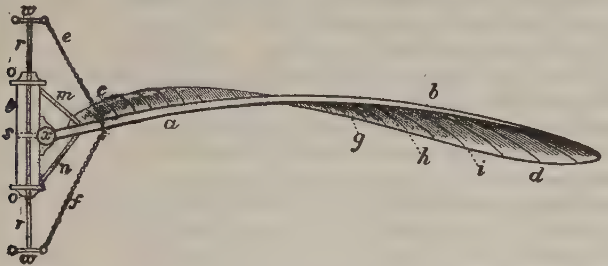

FIG. 32.—Elastic Spiral Wing, which twists and untwists during its action, to form *a mobile helix or screw.* This wing is made to vibrate by a direct piston action, and by a slight adjustment can be propelled vertically, horizontally or at any degree of obliquity.

a b, Anterior margin of wing, to which the neurae or ribs are affixed.
c d, Posterior margin of wing crossing anterior one.
x, Ball-and-socket joint at root of wing, the wing being attached to the side of the cylinder by the socket.
t, Cylinder.
r r, Piston, with cross heads (*w*, *w*) and piston head (*s*).
o o, Stuffing boxes.
e, *f*, Driving chains.
m, Superior elastic band, which assists in elevating the wing.
n, Inferior elastic band, which antagonizes *m*. The alternate stretching of the superior and inferior elastic bands contributes to the continuous play of the wing, by preventing dead points at the end of the down and up strokes. The wing is free to move in a vertical and horizontal direction and at any degree of obliquity.

The wing is so constructed that the posterior margin yields freely in a downward direction during the up stroke, while it yields comparatively little in an upward direction during the down stroke; and this is a distinguishing feature, as the wing is thus made to fold and elude the air more or less completely during the up stroke, whereas it is made to expand and seize the air with avidity during the down stroke. The oblique line referred to as running diagonally across the wing virtually divides the wing into an active and a passive part, the former elevating and propelling, the latter sustaining.

It is not possible to determine with exactitude the precise function discharged by each part of the wing, but experiment tends to show that the tip of the wing elevates, the posterior margin propels, and the root sustains.

The wing—and this is important—is driven by a direct piston action with an irregular hammer-like movement, the pinion having communicated to it a smart click at the beginning of every down stroke—the up stroke being more uniform. The following is the arrangement (fig. 32). If the artificial wing here represented (fig. 32) be compared with the natural wing as depicted at fig. 33, it will be seen that there is nothing in the one which is not virtually reproduced in the other. In addition to the foregoing, Pettigrew recommended a double elastic wing to be applied to the air like a steam-hammer, by being fixed to the head of the piston. This wing, like the single wing described, twists and untwists as it rises and falls, and possesses all the characteristics of the natural wing (fig. 34).

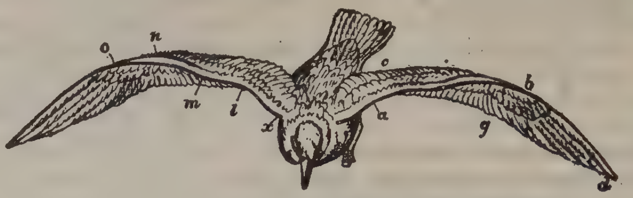

FIG. 33 shows the Spiral Elastic Wings of the Gull. Each wing forms a mobile helix or screw.

a b, Anterior margin of left wing.
c d, Posterior margin of ditto.
d g, Primary or rowing feathers of left wing.
g a, Secondary feathers ditto.
x, Root of right wing with ball-and-socket joint.
l, Elbow joint.
m, Wrist joint.
n, *o*, Hand and finger joints.

He also recommends an elastic aerial screw consisting of two blades, which taper and become thinner towards the tips and posterior margins. When the screw is made to rotate, the blades, because of their elasticity, assume a great variety of angles, the angles being least where the speed of the blades is greatest and vice versa. The pitch of the blades is thus regulated by the speed attained (fig. 35).

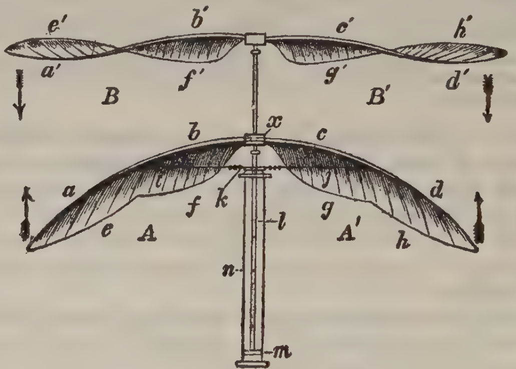

FIG. 34.—Double Elastic Wing driven by direct piston action. During the up stroke of the piston the wing is very decidedly convex on its upper surface (*a b c d*, A A′); its under surface (*e f g h*, A A′) being deeply concave and inclined obliquely upwards and forwards. It thus evades, to a considerable extent, the air during the up stroke. During the down stroke of the piston the wing is flattened out in every direction, and its extremities twisted in such a manner as to form two screws, as seen at *a′ b′ c′ d′*, *e′ f′ g′ h′*, B, B′. The active area of the wing is by this arrangement considerably diminished during the up stroke, and considerably augmented during the down stroke; the wing seizing the air with greater avidity during the down than during the up stroke. *i*, *j*, *k*, elastic band to regulate the expansion of the wing; *l*, piston; *m*, piston head; *n*, cylinder.

The peculiarity of Pettigrew's wings and screws consists in their elasticity, their twisting action, and their great comparative length and narrowness. They offer little resistance to the air when they are at rest, and when in motion the speed with which they are driven is such as to ensure that the comparatively large spaces through which they travel shall practically be converted into solid bases of support.

After Pettigrew enunciated his views (1867) as to the screw configuration and elastic properties of natural wings, and more especially after his introduction of spiral, elastic artificial wings, and elastic screws, a great revolution took place in the construction of flying models. Elastic aeroplanes were advocated by

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[1] E. J. Marey, *Revue des cours scientifiques de la France et de l'étranger* (1869).

D. S. Brown,[1] elastic aerial screws by J. Armour,[2] and elastic aeroplanes, wings and screws by Alphonse Pénaud.[3]

Pénaud's experiments are alike interesting and instructive. He constructed models to fly by three different methods:—(*a*) by means of screws acting vertically upwards; (*b*) by aeroplanes propelled horizontally by screws; and (*c*) by wings which flapped in an upward and downward direction. An account of his helicoptère or screw model appeared in the *Aeronaut* for January 1872, but before giving a description of it, it may be well to state very briefly what is known regarding the history of the screw as applied to the air.

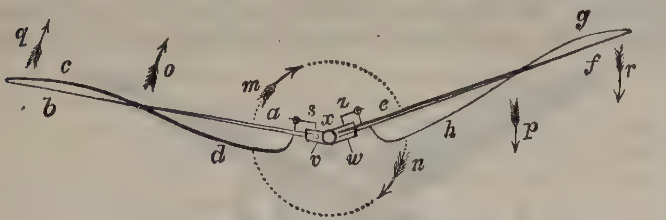

FIG. 35.—Elastic Aerial Screw with twisted blades resembling wings (*a b c d*, *e f g h*).

x, End of driving shaft.
v, *w*, Sockets in which the roots of the blades of the screw rotate, the degree of rotation being limited by steel springs (*z*, *s*).
a b, *e f*, tapering elastic rods forming anterior or thick margins of blades of screw.
d c, *h g*, Posterior or thin elastic margins of blades of screw.
The arrows *m*, *n*, *o*, *p*, *q*, *r* indicate the direction of travel.

The first suggestion on this subject was given by A. J. P. Paucton in 1768. This author, in his treatise on the *Théorie de la vis d'Archimède*, describes a machine provided with two screws which he calls a "ptérophores." In 1796 Sir George Cayley gave a practical illustration of the efficacy of the screw as applied to the air by constructing a small machine, consisting of two screws made of quill feathers, a representation of which we annex (fig. 36). Sir George writes as under:—

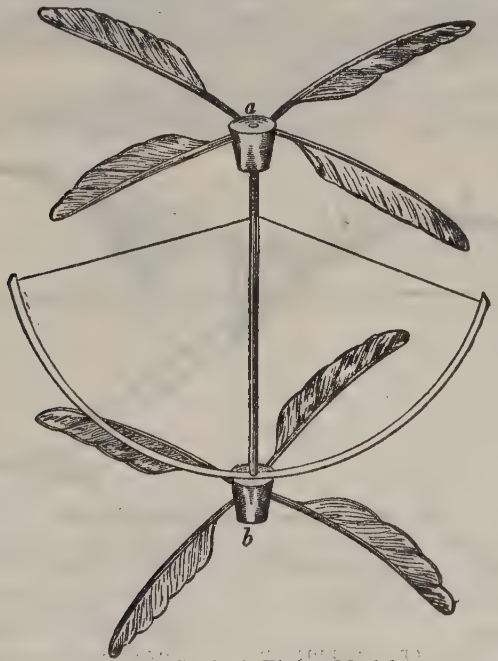

FIG. 36.—Cayley's Flying Model.

> "As it may be an amusement to some of your readers to see a machine rise in the air by mechanical means, I will conclude my present communication by describing an instrument of this kind, which any one can construct at the expense of ten minutes' labour.
>
> "*a* and *b*, fig. 36, are two corks, into each of which are inserted four wing feathers from any bird, so as to be slightly inclined like the sails of a windmill, but in opposite directions in each set. A round shaft is fixed in the cork *a*, which ends in a sharp point. At the upper part of the cork *b* is fixed a whalebone bow, having a small pivot hole in its centre to receive the point of the shaft. The bow is then to be strung equally on each side to the upper portion of the shaft, and the little machine is completed. Wind up the string by turning the flyers different ways, so that the spring of the bow may unwind them with their anterior edges ascending; then place the cork with the bow attached to it upon a table, and with a finger on the upper cork press strong enough to prevent the string from unwinding, and, taking it away suddenly, the instrument will rise to the ceiling."

Cayley's screws were peculiar, inasmuch as they were superimposed and rotated in opposite directions. He estimated that if the area of the screws was increased to 200 sq. ft., and moved by a man, they would elevate him. His interesting experiment is described at length, and the apparatus figured in *Nicolson's Journal*, 1809, p. 172.

Other experimenters, such as J. Degen in 1816 and Ottoris Sarti in 1823, followed Cayley at moderate intervals, constructing flying models on the vertical screw principle. In 1842 W. H. Phillips succeeded, it is stated, in elevating a steam model by the aid of revolving fans, which according to his account flew across two fields after having attained a great altitude; and in 1859 H. Bright took out a patent for a machine to be sustained by vertical screws. In 1863 the subject of aviation by vertical screws received a fresh impulse from the experiments of Gustave de Ponton d'Amécourt, G. de la Landelle, and A. Nadar, who exhibited models driven by clock-work springs, which ascended with graduated weights a distance of from 10 to 12 ft. These models were so fragile that they usually broke in coming in contact with the ground in their descent. Their flight, moreover, was unsatisfactory, from the fact that it only lasted a few seconds.

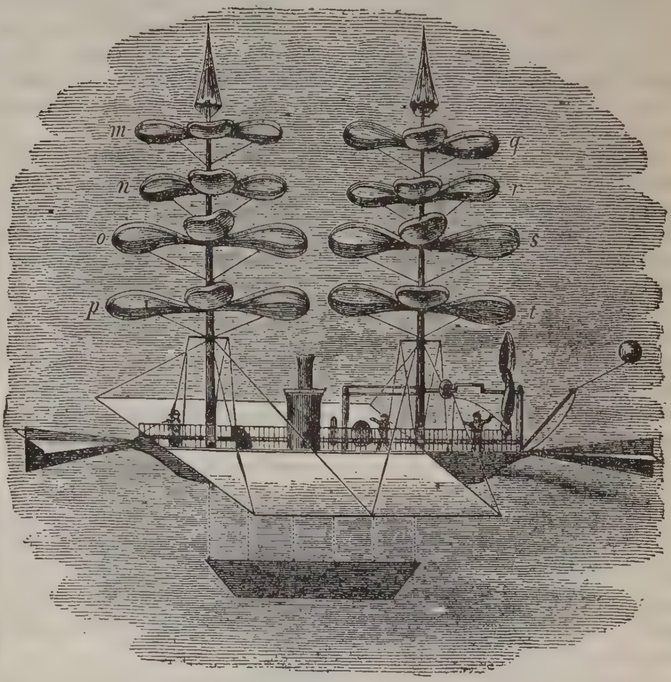

FIG. 37.—De la Landelle's Flying-machine. *m*, *n*, *o*, *p*; *q*, *r*, *s*, *t*, Screws arranged on vertical axes to act vertically upwards. The vertical axes are surmounted by two parachutes, and the body of the machine is furnished with an engine, propeller, rudders and an extensive aeroplane.

Stimulated by the success of his spring models, Ponton d'Amécourt had a small steam model constructed. This model, which was shown at the exhibition of the Aeronautical Society of Great Britain at the Crystal Palace in 1868, consisted of two superposed screws propelled by an engine, the steam for which was generated (for lightness) in an aluminium boiler. This steam model proved a failure, inasmuch as it only lifted a third of its own weight. Fig. 37 embodies de la Landelle's ideas.

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[1] "The Aero-bi-plane, or First Steps to Flight," *Ninth Annual Report of the Aeronautical Society of Great Britain*, 1874.

[2] "Resistance to Falling Planes on a Path of Translation," *Ninth Annual Report of the Aeronautical Society of Great Britain*, 1874.

[3] The *Aeronaut* for January 1872 and February 1875.

All the models referred to (Cayley's excepted[1]) were provided with rigid screws. In 1872 Pénaud discarded the rigid screws in favour of elastic ones, as Pettigrew had done some years before. Pénaud also substituted india-rubber under torsion for the whalebone and clock springs of the smaller models, and the steam of the larger ones. His hélicoptère or screw-model is remarkable for its lightness, simplicity and power. The accompanying sketch will serve to illustrate its construction (fig. 38). It consists of two superposed elastic screws (*a a*, *b b*), the upper of which (*a a*) is fixed in a vertical frame (*c*), which is pivoted in the central part (*d*) of the under screw. From the centre of the under screw an axle provided with a hook (*e*), which performs the part of a crank, projects in an upward direction. Between the hook or crank (*e*) and the centre of the upper screw (*a a*), the india-rubber in a state of torsion (*f*) extends. By fixing the lower screw and turning the upper one a sufficient number of times the requisite degree of torsion and power is obtained. The apparatus when liberated flies into the air sometimes to a height of 50 ft., and gyrates in large circles for a period varying from 15 to 30 seconds.

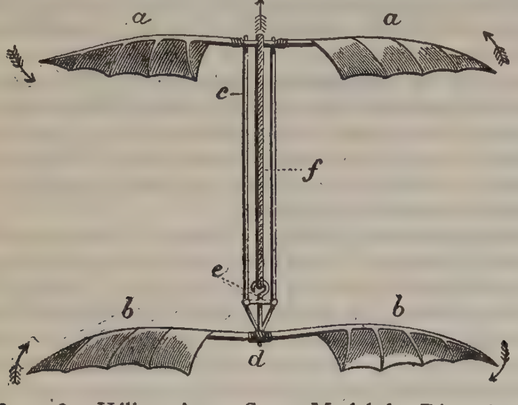

Fig. 38.—Hélicoptère or Screw-Model, by Pénaud.

Pénaud next directed his attention to the construction of a model, to be propelled by a screw and sustained by an elastic aeroplane extending horizontally. Sir George Cayley proposed such a machine in 1810, and W. S. Henson constructed and patented a similar machine in 1842. Several inventors succeeded in making models fly by the aid of aeroplanes and screws, as, *e.g.* J. Stringfellow in 1847,[2] and F. du Temple in 1857. These models flew in a haphazard sort of a way, it being found exceedingly difficult to confer on them the necessary degree of stability fore and aft and laterally. Pénaud succeeded in overcoming the difficulty in question by the invention of what he designated an automatic rudder. This consisted of a small elastic aeroplane placed aft or behind the principal aeroplane which is also elastic. The two elastic aeroplanes extended horizontally and made a slight upward angle with the horizon, the angle made by the smaller aeroplane (the rudder) being slightly in excess of that made by the larger. The motive power was india-rubber in the condition of torsion; the propeller, a screw. The reader will understand the arrangement by a reference to the accompanying drawing (fig. 39).

Models on the aeroplane screw type may be propelled by two screws, one fore and one aft, rotating in opposite directions; and in the event of only one screw being employed it may be placed in front of or behind the aeroplane.

When such a model is wound up and let go it descends about 2 ft., after which, having acquired initial velocity, it rises and flies in a forward direction at a height of from 8 to 10 ft. from the ground for a distance of from 120 to 130 ft. It flies this distance in from 10 to 11 seconds, its mean speed being something like 12 ft. per second. From experiments made with this model, Pénaud calculates that one horse-power would elevate and support 85 lb.

D. S. Brown also wrote (1874) in support of elastic aeroplanes. His experiments proved that two elastic aeroplanes united by a central shaft or shafts, and separated by a wide interval, always produce increased stability. The production of flight by the vertical flapping of wings is in some respects the most difficult, but this also has been attempted and achieved. Pénaud and A. H. de Villeneuve each constructed winged models. Marey was not so fortunate. He endeavoured to construct an artificial insect on the plan advocated by Borelli, Strauss-Dürckheim and Chabrier, but signally failed, his insect never having been able to lift more than a third of its own weight.

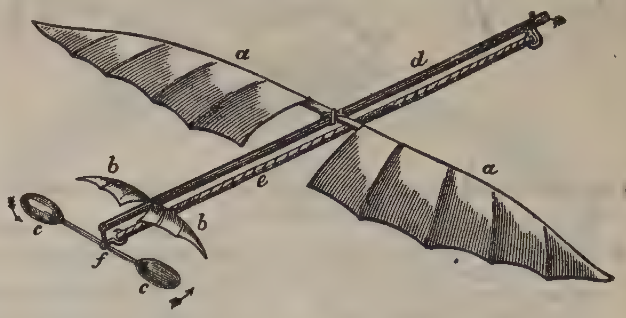

Fig. 39.—Aeroplane Model with Automatic Rudder.

a a, Elastic aeroplane.
b b, Automatic rudder.
c c, Aerial screw centred at *f*.
d, Frame supporting aeroplane, rudder and screw.
e, India-rubber, in a state of torsion, attached to hook or crank at *f*. By holding the aeroplane (*a a*) and turning the screw (*c c*) the necessary power is obtained by torsion. (Pénaud.)

De Villeneuve and Pénaud constructed their winged models on different types, the former selecting the bat, the latter the bird.

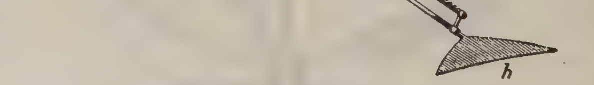

Fig. 40.—Pénaud's Artificial Flying Bird.

a b c d, *a′ b′ c′ d′*, Elastic wings, which twist and untwist when made to vibrate.
a b, *a′ b′*, Anterior margins of wings.
c d, *c′ d′*, Posterior margins of wings.
c, *c′*, Inner portions of wings attached to central shaft of model by elastic bands at *e*.
f, India-rubber in a state of torsion, which provides the motive power, by causing the crank situated between the vertical wing supports (*g*) to rotate; as the crank revolves the wings are made to vibrate by means of two rods which extend between the crank and the roots of the wings.
h, Tail of artificial bird.

De Villeneuve made the wings of his artificial bat conical in shape and comparatively rigid. He controlled the movements of the wings, and made them strike downwards and forwards in imitation of natural wings. His model possessed great power of rising. It elevated itself from the ground with ease, and flew in a horizontal direction for a distance of 24 ft., and at a velocity of 20 m. an hour. Pénaud's model differed from de Villeneuve's in being provided with elastic wings, the posterior margins of which in addition to being elastic were free to move round the anterior margins as round axes (see fig. 24). India-rubber springs were made to extend between the inner posterior parts of the wings and the frame, corresponding to the backbone of the bird.

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[1] Cayley's screws, as explained, were made of feathers, and consequently elastic. As, however, no allusion is made in his writings to the superior advantages possessed by elastic over rigid screws, it is to be presumed that feathers were employed simply for convenience and lightness. Pettigrew, there is reason to believe, was the first to advocate the employment of elastic screws for aerial purposes.

[2] Stringfellow constructed a second model, which is described and figured further on (fig. 44).

A vertical movement having been communicated by means of india-rubber in a state of torsion to the roots of the wings, the wings themselves, in virtue of their elasticity, and because of the resistance experienced from the air, twisted and untwisted and formed reciprocating screws, precisely analogous to those originally described and figured by Pettigrew in 1867. Pénaud's arrangement is shown in fig. 40.

If the left wing of Pénaud's model (*a b*, *c d* of fig. 40) be compared with the wing of the bat (fig. 18), or with Pettigrew's artificial wing (fig. 32), the identity of principle and application is at once apparent.

In Pénaud's artificial bird the equilibrium is secured by the addition of a tail. The model cannot raise itself from the ground, but on being liberated from the hand it descends 2 ft. or so, when, having acquired initial velocity, it flies horizontally for a distance of 50 or more feet, and rises as it flies from 7 to 9 ft. The following are the measurements of the model in question:—length of wing from tip to tip, 32 in.; weight of wing, tail, frame, india-rubber, &c., 73 grammes (about 2½ ounces). (J. B. P.)

Flying Machines.—Henson's flying machine, designed in 1843, was the earliest attempt at aviation on a great scale. Henson was one of the first to combine aerial screws with extensive supporting structures occupying a nearly horizontal position. The accompanying illustration explains the combination (fig. 41).

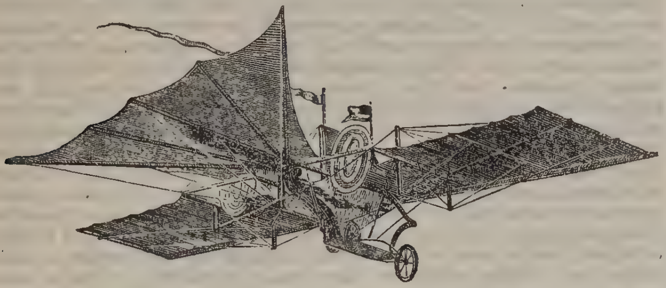

FIG. 41.—Henson's Aerostat.

"The chief feature of the invention was the very great expanse of its sustaining planes, which were larger in proportion to the weight it had to carry than those of many birds. The machine advanced with its front edge a little raised, the effect of which was to present its under surface to the air over which it passed, the resistance of which, acting upon it like a strong wind on the sails of a windmill, prevented the descent of the machine and its burden. The sustaining of the whole, therefore, depended upon the speed at which it travelled through the air, and the angle at which its under surface impinged on the air in its front. . . . The machine, fully prepared for flight, was started from the top of an inclined plane, in descending which it attained a velocity necessary to sustain it in its further progress. That velocity would be gradually destroyed by the resistance of the air to the forward flight; it was, therefore, the office of the steam-engine and the vanes it actuated simply to repair the loss of velocity; it was made, therefore, only of the power and weight necessary for that small effect." The editor of Newton's *Journal of Arts and Sciences* speaks of it thus:—"The apparatus consists of a car containing the goods, passengers, engines, fuel, &c., to which a rectangular frame, made of wood or bamboo cane, and covered with canvas or oiled silk, is attached. This frame extends on either side of the car in a similar manner to the outstretched wings of a bird; but with this difference, that the frame is immovable. Behind the wings are two vertical fan wheels, furnished with oblique vanes, which are intended to propel the apparatus through the air. The rainbow-like circular wheels are the propellers, answering to the wheels of a steam-boat, and acting upon the air after the manner of a windmill. These wheels receive motions from bands and pulleys from a steam or other engine contained in the car. To an axis at the stern of the car a triangular frame is attached, resembling the tail of a bird, which is also covered with canvas or oiled silk. This may be expanded or contracted at pleasure, and is moved up and down for the purpose of causing the machine to ascend or descend. Beneath the tail is a rudder for directing the course of the machine to the right or to the left; and to facilitate the steering a sail is stretched between two masts which rise from the car. The amount of canvas or oiled silk necessary for buoying up the machine is stated to be equal to one square foot for each half pound of weight."

F. H. Wenham, thinking to improve upon Henson, invented in 1866 what he designated his aeroplanes.[1] These were thin, light, long, narrow structures, arranged above each other in tiers like so many shelves. They were tied together at a slight upward angle, and combined strength and lightness. The idea was to obtain great sustaining area in comparatively small space with comparative ease of control. It was hoped that when the aeroplanes were wedged forward in the air by vertical screws, or by the body to be flown, each aeroplane would rest or float upon a stratum of undisturbed air, and that practically the aeroplanes would give the same support as if spread out horizontally. The accompanying figures illustrate Wenham's views (figs. 42 and 43).

Stringfellow, who was originally associated with Henson, and built a successful flying model in 1847, made a second model in 1868, in which Wenham's aeroplanes were combined with aerial screws. This model was on view at the exhibition of the Aeronautical Society of Great Britain, held at the Crystal Palace, London, in 1868. It was remarkably compact, elegant and light, and obtained the £100 prize of the exhibition for its engine, which was the lightest and most powerful so far constructed. The illustration below (fig. 44), drawn from a photograph, gives a very good idea of the arrangement—*a*, *b*, *c* representing the superimposed aeroplanes, *d* the tail, *e*, *f* the screw propellers. The superimposed aeroplanes (*a*, *b*, *c*) in this machine contained a sustaining area of 28 sq. ft., in addition to the tail (*d*). Its engine represented a third of a horse power, and the weight of the whole (engine, boiler, water, fuel, superimposed aeroplanes and

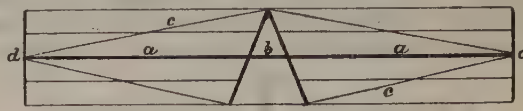

FIG. 42.—Wenham's system of Aeroplanes designed to carry a man.

a, *a*,	Thin planks, tapering at each end, and attached to a triangle.
b,	Similar plank for supporting the aeronaut.
c, *c*,	Thin bands of iron with truss planks *a*, *a*, and
d, *d*,	Vertical rods. Between these are stretched five bands of holland 15 in. broad and 16 ft. long, the total length of the web being 80 ft. This apparatus when caught by a gust of wind, actually lifted the aeronaut.

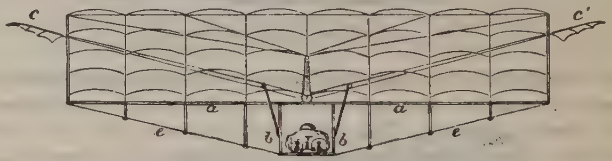

FIG. 43.—A similar system, planned by Wenham.

a, *a*,	Main spar 16 ft. long;
b, *b*,	Panels, with base board for aeronaut attached to main spar.
e, *e*,	Thin tie-band of steel with struts starting from main spar. This forms a strong light framework for the aeroplanes, consisting of six webs of thin holland 15 in. broad. The aeroplanes are kept in parallel plane by vertical divisions of holland 2 ft. wide.
c, *c′*,	Wing propellers driven by the feet.

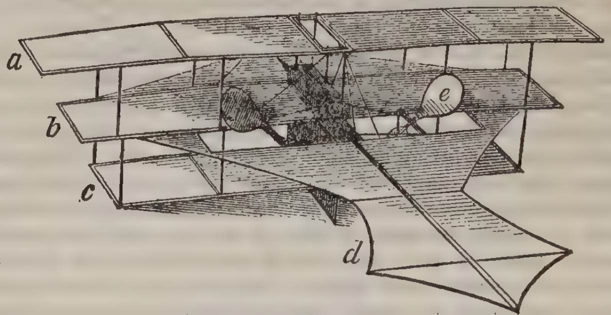

FIG. 44.—Stringfellow's Flying Machine.

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[1] "On Aerial Locomotion," *Aeronautical Society's Report* for 1867.

propellers) was under 12 ℔. Its sustaining area, if that of the tail (*d*) be included, was something like 36 sq. ft., *i.e.* 3 sq. ft. for every pound. The model was forced by its propellers along a wire at a great speed, but so far as an observer could determine, failed to lift itself, notwithstanding its extreme lightness and the comparatively very great power employed. Stringfellow, however, stated that it occasionally left the wire and was sustained by its aeroplanes alone.

The aerial steamer of Thomas Moy (fig. 45), designed in 1874, consisted of a light, powerful, skeleton frame resting on three wheels; a very effective light engine constructed on a new principle, which dispensed with the old-fashioned, cumbrous boiler; two long, narrow, horizontal aeroplanes; and two comparatively very large aerial screws. The idea was to get up the initial velocity by a preliminary run on the ground. This accomplished it was hoped that the weight of the machine would gradually be thrown upon the aeroplanes in the same way that the weight of certain birds—the eagle, *e.g.*—is thrown upon the wings after a few hops and leaps. Once in the air the aeroplanes, it was believed, would become effective in proportion to the speed attained. The machine, however, did not realize the high expectations formed of it, and like all its predecessors it was doomed to failure.

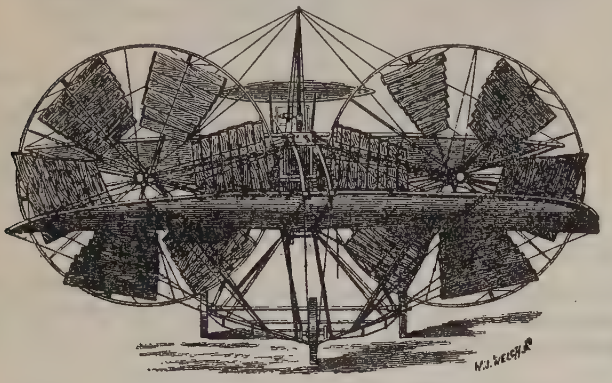


Fig. 45.—Moy's Aerial Steamer.

Two of the most famous of the next attempts to solve the problem of artificial flight, by means of aeroplanes, were those of Prof. S. P. Langley and Sir Hiram S. Maxim, who began their aerial experiments about the same time (1889–1890). By 1893–1894 both had embodied their views in models and large flying machines.

Langley, who occupied the position of secretary to the Smithsonian Institution, Washington, U.S.A., made many small flying models and one large one. These he designated "aerodromes." They were all constructed on a common principle, and were provided with extensive flying surfaces in the shape of rigid aeroplanes inclined at an upward angle to the horizon, and more or less fixed on the plan advocated by Henson. The cardinal idea was to force the aeroplanes (slightly elevated at their anterior margins) forwards, kite-fashion, by means of powerful vertical screw propellers driven at high speed—the greater the horizontal speed provided by the propellers, the greater, by implication, the lifting capacity of the aerodrome. The bodies, frames and aeroplanes of the aerodromes were strengthened by vertical and other supports, to which were attached aluminium wires to ensure absolute rigidity so far as that was possible. Langley aimed at great lightness of construction, and in this he succeeded to a remarkable extent. His aeroplanes were variously shaped, and were, as a rule, concavo-convex, the convex surface being directed upwards. He employed a competent staff of highly trained mechanics at the Smithsonian Institution, and great secrecy was observed as to his operations. He flew his smallest models in the great lecture room of the National Museum, and his larger ones on the Potomac river about 40 m. below Washington.

While Langley conducted his preliminary experiments in 1889, he did not construct and test his steam-driven flying models until 1893. These were made largely of steel and aluminium, and one of them in 1896 made the longest flight then recorded for a flying machine, namely, fully half a mile on the Potomac river. The largest aerodrome, intended to carry passengers and to be available for war purposes, was built to the order and at the expense of the American government, which granted a sum of fifty thousand dollars for its construction.

Langley's machine shown in fig. 46 was a working model, not intended to carry passengers. In configuration the body-portion closely resembled a mackerel. The backbone was a light but very rigid tube of aluminium steel, 15 ft. in length, and a little more than 2 in. in diameter. The engines were located in the portion of the framework corresponding to the head of the fish; they weighed 60 oz. and developed one horse-power. There were four boilers made of thin hammered copper and weighing a little more than 7 ℔ each; these occupied the middle portion of the fish. The fuel used was refined gasoline, and the extreme end of the tail of the fish was utilized for a storage tank with a capacity of one quart. There were twin screw propellers, which could be adjusted to different angles in practice, to provide for steering, and made 1700 revolutions a minute. The wings, or aeroplanes, four in number, consisted of light frames of tubular aluminium steel covered with china silk. The pair in front were 42 in. wide and 40 ft. from tip to tip. They could be adjusted at different angles. The machine required to be dropped from a height, or a preliminary forward impetus had to be given to it, before it could be started. Fixity of all the parts was secured by a tubular mast extending upwards and downwards through about the middle of the craft, and from its extremities ran stays of aluminium wire to the tips of the aeroplanes and the end of the tubular backbone. By this trussing arrangement the whole structure was rendered exceedingly stiff.

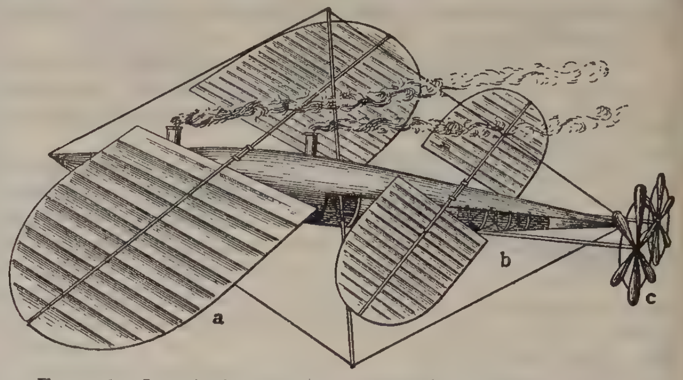


Fig. 46.—Langley's Flying Machine. *a*, Large aeroplane; *b*, Small aeroplane; *c*, Propelling screws.

In the larger aerodrome (fig. 47) the aeroplanes were concavo-convex, narrow, greatly elongated and square at their free extremities, the two propellers, which were comparatively very large, being placed amidships, so to speak. At the first trial of this machine, on the 7th of October 1903, just as it left the launching track it was jerked violently down at the front (being caught, as subsequently appeared, by the falling ways), and under the full power of its engine was pulled into the water, carrying with it its engineer. When the aerodrome rose to the surface, it was found that while the front sustaining surfaces had been broken by their impact with the water, yet the rear ones were comparatively uninjured. At the second and last attempt, on the 8th of December 1903, another disaster, again due to the launching ways, occurred as the machine was leaving the track. This time the back part of the machine, in some way still unexplained, was caught by a portion of the launching car, which caused the rear sustaining surface to break, leaving the rear entirely without support

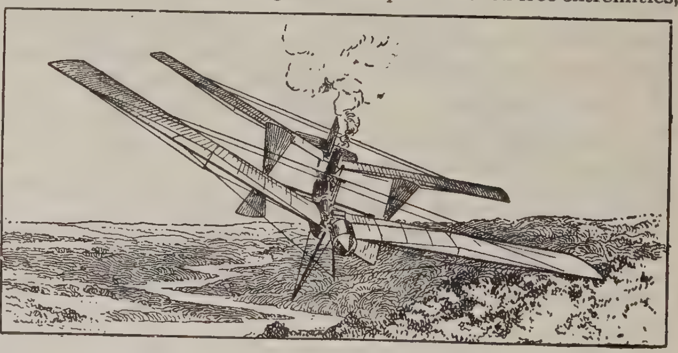


Fig. 47.—Langley's Aerodrome in flight.

and it came down almost vertically into the water. Darkness had come before the engineer, who had been in extreme danger, could aid in the recovery of the aerodrome. The boat and machine had drifted apart, and one of the tugs in its zeal to render assistance had fastened a rope to the frame of the machine in the reverse position from what it should have been attached, and had broken the frame entirely in two. Owing to lack of funds further trials were abandoned (see *Annual Report of the Smithsonian Institution*, 1904, p. 122).

Sir Hiram S. Maxim, like Langley, employed a staff of highly skilled workmen. His machine (fig. 48) consisted of a platform, on which stood a large water-tube boiler, a number of concavo-convex aeroplanes arranged in tiers like shelves, each making a slight upward angle with the horizon, two very large vertical screws placed aft and propelled by steam engines, tanks for the storage of water, naphtha, &c. The boiler was especially noteworthy. The water was contained in about 2000 bent copper tubes, only $\frac{3}{8}$ in. in external diameter, heated by over 7000 gas jets arranged in rows. The fuel was naphtha or gasoline. Steam could be got up in the short space of half a minute. The steam-generating appliances, which weighed only 1000 ℔ in all, were placed in the front of the machine. The motive power was provided by a pair of two-cylinder, compound engines, poised about 8 ft. from the ground, and about 6 ft. apart. Each of them was independently governed, and furnished together 363 horse-power in actual effect, an amount which, considering that their total weight was only 600 ℔, gave the extraordinary efficiency of over 1 horse-power for every 2 ℔ weight. The high and the low pressure cylinders were 5 and 8 in. in diameter respectively, and the stroke was 12 in. When going at full speed these engines conferred 425 revolutions per minute on the two gigantic propellers that drove the machine along. These were in appearance like two-bladed marine propellers except that they were square instead of rounded at the ends, and were broad and thin. They were built from overlapping strips of American pine, planed smooth and covered with glued canvas. They weighed 135 ℔ each, the length of each blade being close upon 9 ft. and the width at the ends $5\frac{1}{2}$ ft. The pitch was 16 ft. They were carefully stayed by steel wires to their shafts, or the first revolution would have snapped them off short. The material of which the framework was built was thin steel tubing, exceedingly light. All the wires and ties were of the best steel, capable of standing a strain of 100 tons to the square inch. The body of the machine was oblong in shape, with the fore-part cut away like a water-chute boat, and a long counter at the stern over which the propellers revolved. It had canvas stretched all over it. High overhead, like a gigantic awning, was the slightly concavo-convex main aeroplane, tilted towards the front at an imperceptible angle, and stretched taut. Its area was 1400 sq. ft., increased by side wings to 2700 sq. ft. There were also side aeroplanes arranged in tiers, and large aeroplanes in front, which were pivoted and served for vertical steering. The machine was strengthened in every direction by vertical and other supports and securely wired together at all points. It was furnished with four strong flanged wheels and ran along a light broad-gauge (9 ft.) railway track, 1800 ft. long, in the hope that when the speed reached a certain point it would leave the rails, but it was prevented from rising more than an inch or so by four arms, or outriggers, furnished with wheels, which projected from its sides and ran under an inverted wooden upper or safety track outside the railway track proper.

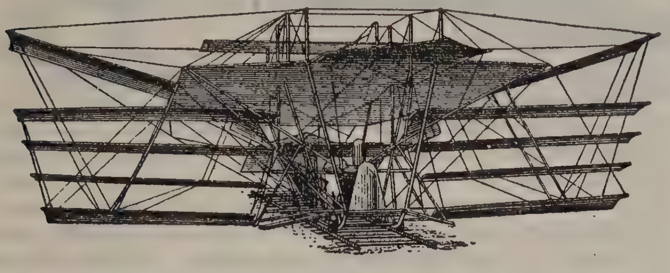


FIG. 48.—Sir H. Maxim's Flying Machine.

At a trial carried out in 1894 at Bexley, Kent, only the main aeroplane, the fore and aft rudders, and the top and bottom side planes were in position. After everything had been got in readiness, careful observers were stationed along the track, and the machine was connected to a dynamometer. The engines were then started and the pump set so as to deliver over 5000 ℔ of water per hour into the boiler. The gas was then carefully turned on until the pressure amounted to 310 ℔ per sq. in., and the dynamometer showed a thrust of more than 2100 ℔. A small safety-valve placed in the steam pipe had been adjusted so as to blow off slightly at 310 ℔ and with a strong blast at 320 ℔. The signal being given to let go, the machine darted forward at a terrific pace, and the safety-valve ceased to blow. More gas was instantly turned on, and before the machine had advanced 300 ft., the steam had mounted to 320 ℔ per sq. in., and the safety-valve was blowing off a steady blast. When the machine had travelled only a few hundred feet, all four of the small outrigger wheels were fully engaged, which showed that the machine was lifting at least 8000 ℔. The speed rapidly increased until when the machine had run about 900 ft. one of the rear axletrees, which were of 2 in. steel tubing, doubled up and set the rear end of the machine completely free. When the machine had travelled about 1000 ft., the left-hand forward wheel became disengaged from the safety track, and shortly after this the right-hand wheel broke the upper track—3 in. by 9 in. Georgia pine—and a plank became entangled in the framework of the machine. Steam had already been shut off, and the machine coming to rest fell directly to the ground, all four of its wheels sinking deeply into the turf without leaving other marks. Before making this run the wheels which were to engage the upper track were painted, and the paint left by them on the upper track indicated the exact point where the machine lifted. The area of the aeroplanes was very nearly 4000 sq. ft. and the total lifting effect was fully 10,000 ℔. The planes therefore lifted 2·5 ℔ per sq. ft., and 5 ℔ for each pound thrust. Nearly half of the power of the engines was lost in the screw slip. This showed that the diameter of the screws was not great enough; it should have been at least 22 ft.

In 1897 M. C. Ader, who had already tested, with indifferent results, two full-sized flying machines, built a third apparatus with funds furnished by the French government. This reproduced the structure of a bird with almost servile imitation, save that traction was obtained by two screw-propellers. The steam engine weighed about 7 ℔ per horse-power, but the equilibrium of the apparatus was defective.

Largely with the view of studying the problem of maintaining equilibrium, several experimenters, including Otto Lilienthal, Percy Pilcher and Octave Chanute, cultivated gliding flight by means of aeroplanes capable of sustaining a man. They depended mainly on the utilization of natural air currents, trusting for stability and balance to movements in their own bodies, or in portions of their machines which they could control. They threw themselves from natural or artificial elevations, or, facing the wind, they ran or were dragged forwards against it until they got under way and the wind caught hold of their aeroplanes. To Lilienthal in Germany belongs the double credit of demonstrating the superiority of arched over flat surfaces, and of reducing gliding flight to regular practice. He made over 2000 glides safely, using gravity as his motive power, with concave, batlike wings, in some cases with superposed surfaces (fig. 49).

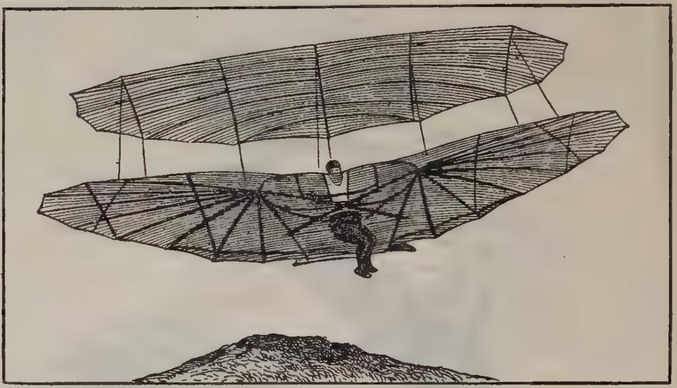


FIG. 49.—Lilienthal's Gliding Machine.

It was with a machine of the latter type that he was upset by a sudden gust of wind and killed in 1896. Pilcher in England improved somewhat on Lilienthal's apparatus, but used the same general method of restoring the balance, when endangered, by shifting the weight of the operator's body. He too made several hundred glides in safety, but finally was thrown over by a gust of wind and killed in 1899. Chanute in America confined his endeavours to the production of automatic stability, and made the surfaces movable instead of the man. He used several different forms of apparatus, including one with five superposed pairs of wings and a tail (fig. 50) and another with two continuous aeroplanes, one above the other (fig. 51). He made over 1000 glides without accident.

Similar experiments were meanwhile conducted by Wilbur and Orville Wright of Dayton, Ohio, in whose hands the glider developed into a successful flying machine. These investigators began their work in 1900, and at an early stage introduced two characteristic features—a horizontal rudder in front for steering in the vertical plane, and the flexing or bending of the ends of the main supporting aeroplanes as a means of maintaining the structure in proper balance. Their machines to begin with were merely gliders, the operator lying upon them in a horizontal position, but in 1903 a petrol motor was added, and a flight lasting 59 seconds was performed. In 1905 they made forty-five flights, in the longest of which they remained in the air for half an hour and covered a distance of 24½ m. The utmost secrecy, however, was maintained concerning their experiments, and in consequence their achievements were regarded at the time with doubt and suspicion, and it was hardly realized that their success would reach the point later achieved.

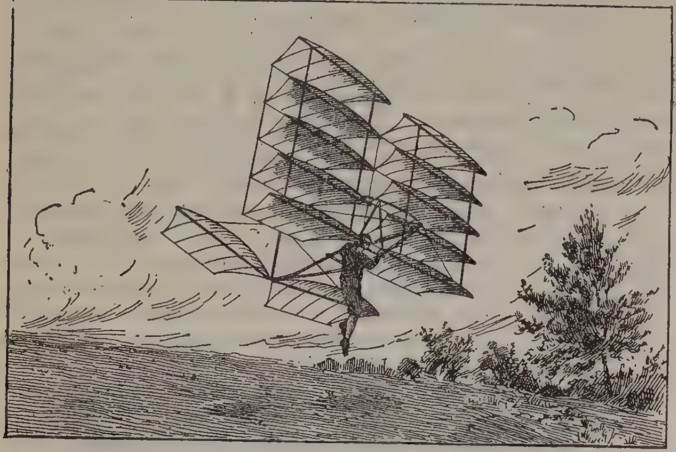


Fig. 50.—Chanute's Multiple Gliding Machine.

Thanks, however, to the efforts of automobile engineers, great improvements were now being effected in the petrol engine, and, although the certainty and trustworthiness of its action still left something to be desired, it provided the designers of flying machines with what they had long been looking for—a motor very powerful in proportion to its weight. Largely in consequence of this progress, and partly no doubt owing to the stimulus given by the activity of builders of dirigible balloons, the construction of motor-driven aeroplanes began to attract a number of workers, especially in France. In 1906 A. Santos Dumont, after a number of successful experiments with dirigible cigar-shaped gas balloons, completed an aeroplane flying machine. It consisted of the following parts:—(*a*) A system of aeroplanes arranged like the capital letter T at a certain upward angle to the horizon and bearing a general resemblance to box kites; (*b*) a pair of very light propellers driven at a high speed; and (*c*) an exceedingly light and powerful petrol engine. The driver occupied a position in the centre of the arrangement, which is shown in fig. 52. The machine was furnished with two wheels and vertical supports which depended from the anterior parts of the aeroplanes and supported it when it touched the ground on either side. With this apparatus he traversed on the 12th of November 1906 a distance of 220 metres in 21 seconds.

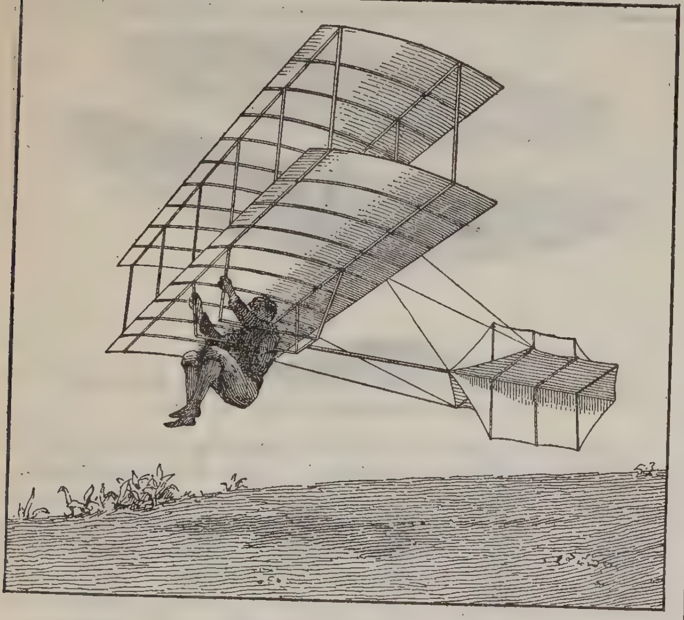


Fig. 51.—Chanute's Biplane Gliding Machine.

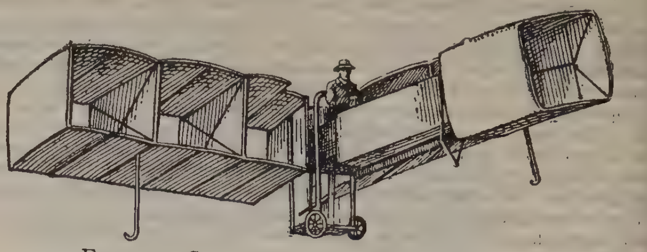
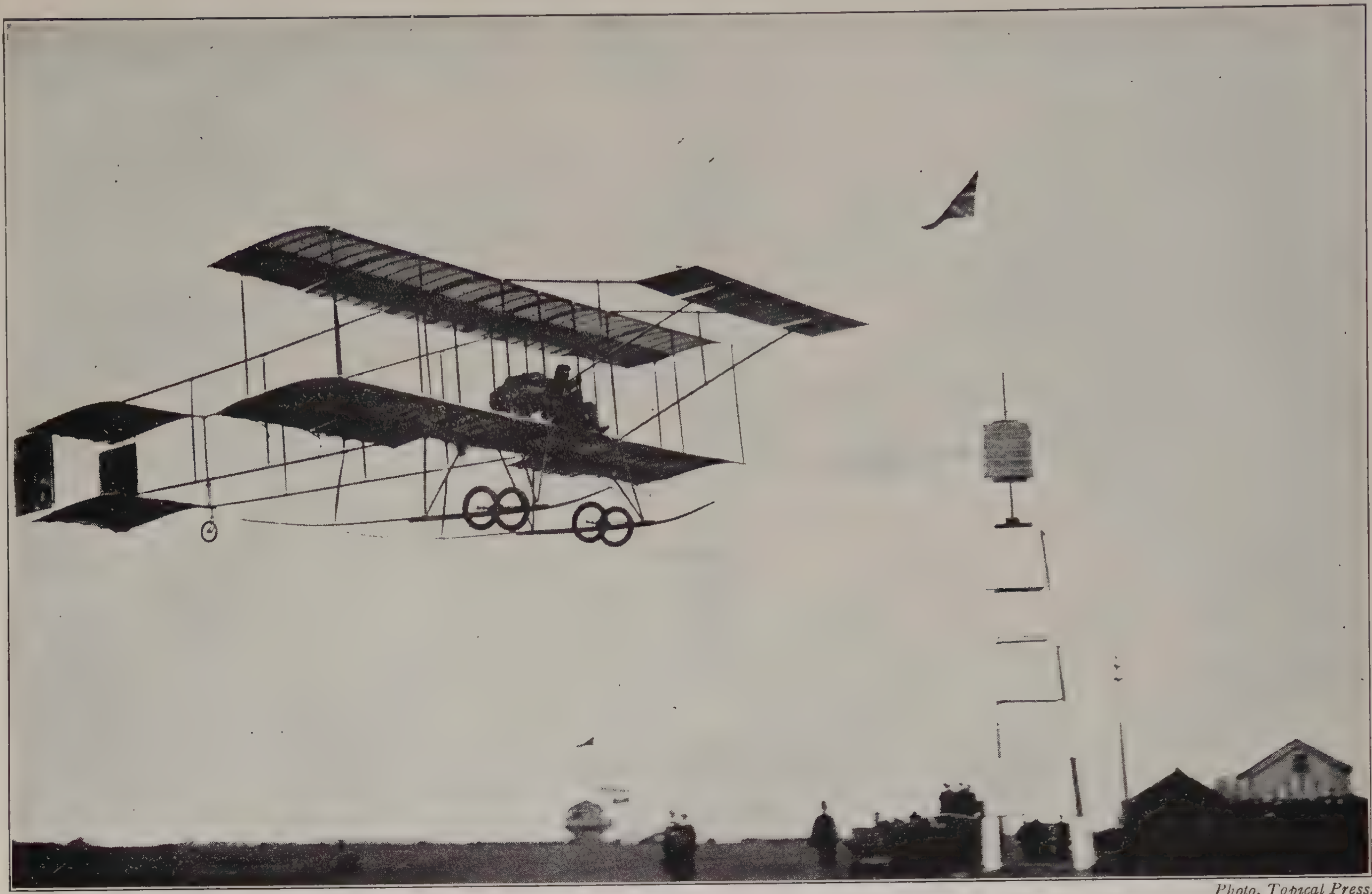


Fig. 52.—Santos Dumont's Flying Machine.

About a year later Henry Farman made several short flights on a machine of the biplane type, consisting of two main supporting surfaces one above the other, with a box-shaped vertical rudder behind and two small balancing aeroplanes in front. The engine was an eight-cylinder Antoinette petrol motor, developing 49 horse-power at 1100 revolutions a minute, and driving directly a single metal screw propeller. On the 27th of October 1906 he flew a distance of nearly half a mile at Issy-les-Molineaux, and on the 13th of January 1908 he made a circular flight of one kilometre, thereby winning the Deutsch-Archdeacon prize of £2000. In March he remained in the air for 3½ minutes, covering a distance of 1¼ m.; but in the following month a rival, Leon Delagrange, using a machine of the same type and constructed by the same makers, Messrs Voisin, surpassed this performance by flying nearly 2½ m. in 6½ minutes. In July Farman remained in the air for over 20 minutes; on the 6th of September Delagrange increased the time to nearly 30 minutes, and on the 29th of the same month Farman again came in front with a flight lasting 42 minutes and extending over nearly 24½ m.

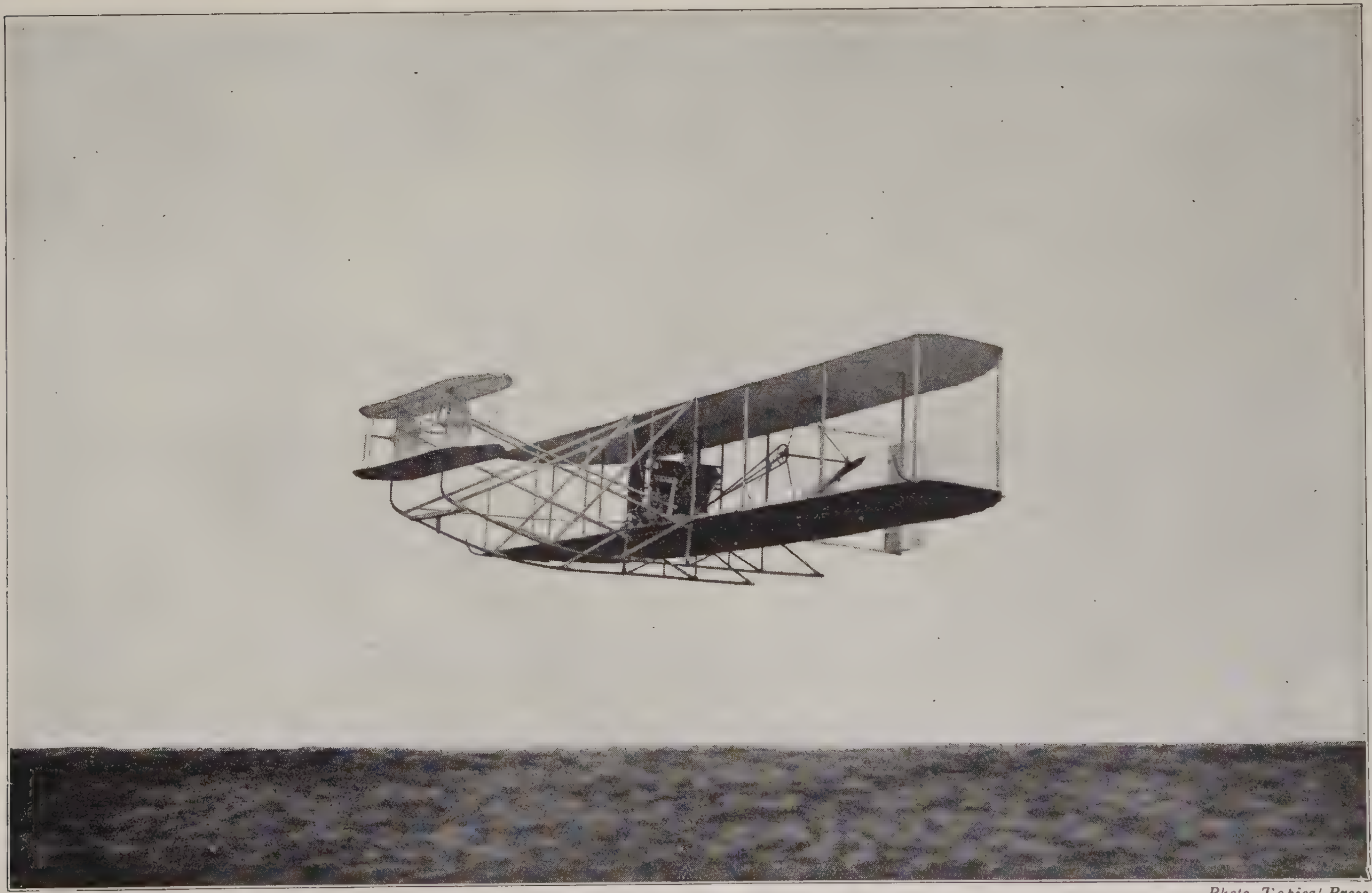
But the best results were obtained by the Wright brothers—Orville Wright in America and Wilbur Wright in France. On the 9th of September 1908 the former, at Fort Myer, Virginia, made three notable flights; in the first he remained in the air 57½ minutes and in the second 1 hour 3 minutes, while in the third he took with him a passenger and covered nearly 4 m. in 6 minutes. Three days later he made a flight of 45 m. in 1 hour 14⅓ minutes, but on the 17th he had an accident, explained as being due to one of his propellers coming into contact with a stay, by which his machine was wrecked, he himself seriously injured, and Lieutenant Selfridge, who was with him, killed. Four days afterwards Wilbur Wright at Le Mans in France beat all previous records with a flight lasting 1 hour 31 minutes 25⅘ seconds, in which he covered about 56 m.; and subsequently, on the 11th of October, he made a flight of 1 hour 9 minutes accompanied by a passenger. On the 31st of December he succeeded in remaining in the air for 2 hours 20 minutes 23 seconds.

Wilbur Wright's machine (fig. 53), that used by his brother being essentially the same, consisted of two slightly arched supporting surfaces, each 12½ metres long, arranged parallel one above the other at a distance of 1⅘ metres apart. As they were each about 2 metres wide their total area was about 50 sq. metres. About 3 metres in front of them was arranged a pair of smaller horizontal aeroplanes, shaped like a long narrow ellipse, which formed the rudder that effected changes of elevation, the driver being able by means of a lever to incline them up or down according as he desired to ascend or descend. The rudder for lateral steering was placed about 2½ metres behind the main surfaces and was formed of two vertical pivoted aeroplanes. The lever by which they were turned was connected with the device by which the ends of the main aeroplanes could be flexed simultaneously though in opposite directions; *i.e.* if the ends of the aeroplanes on one side were bent downwards, those on the



Photo, Topical Press.

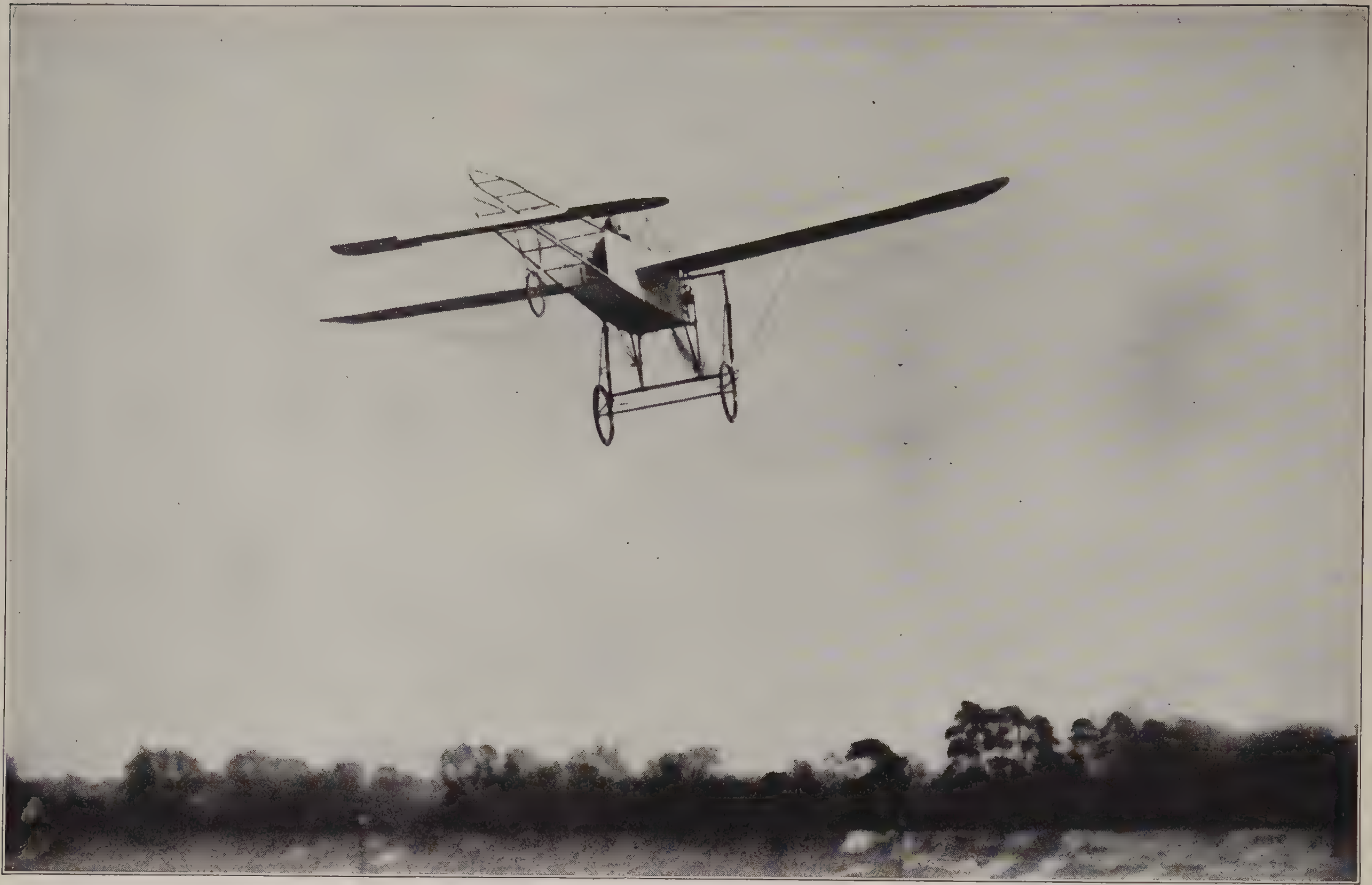
FIG. 1.—PAULHAN FLYING ON FARMAN BIPLANE.



Photo, Topical Press.

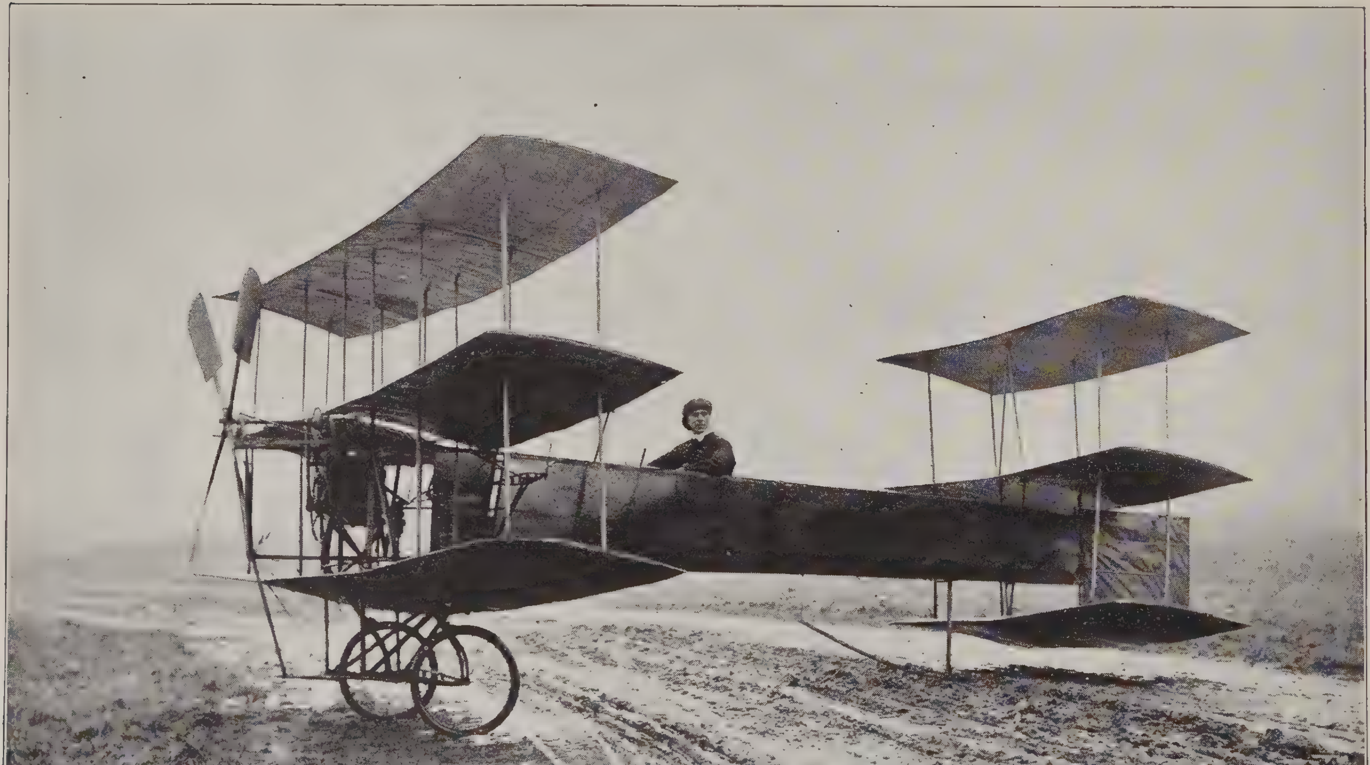
FIG. 2.—WRIGHT BIPLANE.

FLIGHT AND FLYING



Photo, Topical Press.

FIG. 3.—BLERIOT MONOPLANE.



Photo, Topical Press.

FIG. 4.—A. V. ROE'S TRIPLANE.

other were bent upwards. By the aid of this arrangement the natural cant of the machine when making a turn could be checked, if it became excessive. The four-cylinder petrol engine was placed on the lower aeroplane a little to the right of the central line, being counterbalanced by the driver (and passenger if one was carried), who sat a little to the left of the same line. Making about 1200 revolutions a minute, it developed about 24 horse-power, and was connected by chain gearing to two wooden propellers, 2½ metres in diameter and 3½ metres apart, the speed of which was about 450 revolutions a minute. The whole machine, with aeronaut, weighed about 1100 ℔, the weight of the motor being reputed to be 200 ℔.

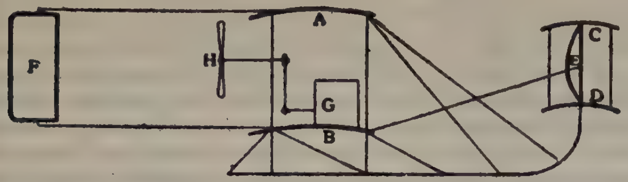


FIG. 53.—Wright Flying Machine; diagrammatic sketch.
A, B, Main supporting surfaces.
C, D, Aeroplanes of horizontal rudder with fixed semilunar fin E.
F, Vertical rudder.
G, Motor.
H, Screws.

A feature of the year 1909 was the success obtained with monoplanes having only a single supporting surface, and it was on a machine of this type that the Frenchman Blériot on July 25th flew across the English Channel from Calais to Dover in 31 minutes. Hubert Latham all but performed the same feat on an Antoinette monoplane. The year saw considerable increases in the periods for which aviators were able to remain in the air, and Roger Sommer's flight of nearly 2½ hours on August 7th was surpassed by Henry Farman on November 3rd, when he covered a distance estimated at 137¼ m. in 4 hr. 17 min. 53 sec. In both these cases biplanes were employed. Successful aviation meetings were held, among other places, at Reims, Juvisy, Doncaster and Blackpool; and at Blackpool a daring flight was made in a wind of 40 m. an hour by Latham. This aviator also proved the possibility of flying at considerable altitudes by attaining on December 1st a height of over 1500 ft., but this record was far surpassed in the following January by L. Paulhan, who on a biplane rose to a height of 1383 yds. at Los Angeles. In the course of the year three aviators were killed—Lefèvbre and Ferber in September and Fernandez in December; and four men perished in September by the destruction of the French airship "République," the gas-bag of which was ripped open by a broken propeller. In January 1910 Delagrange was killed by the fracture of one of the wings of a monoplane on which he was flying. On April 27th-28th, 1910, Paulhan successfully flew from London to Manchester, with only one stop, within 24 hours, for the *Daily Mail's* £10,000 prize.

The progress made by all these experiments at aviation had naturally created widespread interest, both as a matter of sport and also as indicating a new departure in the possibilities of machines of war. And in 1909 the British government appointed a scientific committee, with Lord Rayleigh as chairman, as a consultative body for furthering the development of the science in England.

The table below gives some details, approximately correct, of the principal experiments made with flying machines up to 1908.

REFERENCES.—Some of the books mentioned under AERONAUTICS contain details of flying machines; see H. W. L. Moedebeck, *A Pocket-book of Aeronautics*, trans. by W. Mansergh Varley (London, 1907); Sir Hiram S. Maxim, *Artificial and Natural Flight* (London, 1908); F. W. Lanchester, *Aerodynamics* and *Aerodonetics* (London, 1907 and 1908); C. C. Turner, *Aerial Navigation of To-day* (London, 1909); also two papers on "Aerial Navigation" read by Colonel G. O. Fullerton before the Royal United Service Institution in 1892 and 1906; papers read by Major B. F. S. Baden-Powell and E. S. Bruce before the Society of Arts, London, in April 1907 and December 1908 respectively; Cantor Lectures by F. W. Lanchester (Society of Arts, 1909); and the *Proceedings* of the Aeronautical Society (founded 1865), &c.

FLINCK, GOVERT (1615–1660), Dutch painter, born at Cleves in 1615, was apprenticed by his father to a silk mercer, but having secretly acquired a passion for drawing, was sent to Leuwarden, where he boarded in the house of Lambert Jacobszon, a Mennonite, better known as an itinerant preacher than as a painter. Here Flinck was joined by Jacob Backer, and the companionship of a youth determined like himself to be an artist only confirmed his passion for painting. Amongst the neighbours of Jacobszon at Leuwarden were the sons and relations of Rombert Ulenburg, whose daughter Saske married Rembrandt in 1634. Other members of the same family lived at Amsterdam, cultivating the arts either professionally or as amateurs. The pupils of Lambert probably gained some knowledge of Rembrandt by intercourse with the Ulenburgs. Certainly J. von Sandrart, who visited Holland in 1637, found Flinck acknowledged as one of Rembrandt's best pupils, and living habitually in the house of the dealer Hendrik Ulenburg at Amsterdam. For many years Flinck laboured on the lines of Rembrandt, following that master's style in all the works which he executed between 1636 and 1648; then he fell into peculiar mannerisms by imitating the swelling forms and grand action of Rubens's creations. Finally he sailed with unfortunate complacency into the Dead Sea of official and diplomatic painting. Flinck's relations with Cleves became in time very important. He was introduced to the court of the Great Elector, Frederick William of Brandenburg, who married in 1646 Louisa of Orange. He obtained the patronage of John Maurice of Orange, who was made stadtholder of Cleves in 1649. In 1652 a citizen of Amsterdam, Flinck married in 1656 an heiress, daughter of Ver Hoeven, a director of the Dutch East India Company. He was already well known even then in the patrician circles over which the burgomasters De Graef and the Echevin Six presided; he was on terms of intimacy with the poet Vondel and the treasurer Uitenbogaard. In his house, adorned with antique casts, costumes, and a noble collection of prints, he often

Year.	Experimenter.	Tip to Tip.	Surface.	Weight.	Pounds per sq. ft.	Speed per hour.	Maximum Flight.	Motor.	Horse-power.	Pounds sustained per h.p.
		Ft.	Sq. ft.	℔.		Mls.	Ft.			
1879	Tatin	6·2	7·5	3·85	0·51	18	100?	Compressed air	0·03	110?
1885 1889	Hargrave (No. 16)	5·5	26·0	5·00	0·19	10	343	„	0·06	79
1893	Phillips	22·0	136·0	402·00	3·00	28	500?	Steam	5·6	72?
1894	Maxim *	50·0	4000·0	8000·00	2·5	36	300?	„	363·00	28
1896	Langley	12·0	70·0	30·00	0·43	24	4,000	„	1·00	30
1897	Tatin and Richet	21·0	86·0	72·00	0·83	40	460	„	1·33	55
1897	Ader*	49·0	270·0	1100·00	4·00	50?	100?	„	40·00	27
1895	Lilienthal*	23·0	151·0	220·00	1·46	23	1,200	Gravity	2·00	110
1896	Pilcher*	23·0	170·0	200·00	1·17	25	900	„	2·00	100
1896	Chanute*	16·0	135·0	178·00	1·31	22	360	„	2·00	89
1906	S. Dumont*	39	560	550	0·98	22·26	2,900	Petrol	50	23
1908	W. Wright*	41	650	1100	1·7	37	295,000	Petrol	24	46

*The apparatus marked thus * carried a man or men.

received the stadtholder John Maurice, whose portrait is still preserved in the work of the learned Barleius.

The earliest of Flinck's authentic pieces is a likeness of a lady, dated 1636, in the gallery of Brunswick. His first subject picture is the “Blessing of Jacob,” in the Amsterdam museum (1638). Both are thoroughly Rembrandtesque in effect as well as in vigour of touch and warmth of flesh tints. The four “civic guards” of 1642, and “the twelve musketeers” with their president in an arm-chair (1648), in the town-hall at Amsterdam, are fine specimens of composed portrait groups. But the best of Flinck's productions in this style is the peace of Münster in the museum of Amsterdam, a canvas with 19 life-size figures full of animation in the faces, “radiant with Rembrandtesque colour,” and admirably distributed. Flinck here painted his own likeness to the left in a doorway. The mannered period of Flinck is amply illustrated in the “Marcus Curius eating Turnips before the Samnite Envoys,” and “Solomon receiving Wisdom,” in the palace on the Dam at Amsterdam. Here it is that Flinck shows most defects, being faulty in arrangement, gaudy in tint, flat and shallow in execution, and partial to whitened flesh that looks as if it had been smeared with violet powder and rouge. The chronology of Flinck's works, so far as they are seen in public galleries, comprises, in addition to the foregoing, the “Grey Beard” of 1639 at Dresden, the “Girl” of 1641 at the Louvre, a portrait group of a male and female (1646) at Rotterdam, a lady (1651) at Berlin. In November 1659 the burgomaster of Amsterdam contracted with Flinck for 12 canvases to represent four heroic figures of David and Samson and Marcus Curius and Horatius Cocles, and scenes from the wars of the Batavians and Romans. Flinck was unable to finish more than the sketches. In the same year he received a flattering acknowledgment from the town council of Cleves on the completion of a picture of Solomon which was a counterpart of the composition at Amsterdam. This and other pictures and portraits, such as the likenesses of Frederick William of Brandenburg and John Maurice of Nassau, and the allegory of “Louisa of Orange attended by Victory and Fame” and other figures at the cradle of the first-born son of the elector, have disappeared. Of several pictures which were painted for the Great Elector, none are preserved except the “Expulsion of Hagar” in the Berlin museum. Flinck died at Amsterdam on the 22nd of February 1660.

FLINDERS, MATTHEW (1774–1814), English navigator, explorer, and man of science, was born at Donington, near Boston, in Lincolnshire, on the 16th of March 1774. Matthew was at first designed to follow his father's profession of surgeon, but his enthusiasm in favour of a life of adventure impelled him to enter the royal navy, which he did on the 23rd of October 1789. After a voyage to the Friendly Islands and West Indies, and after serving in the “Bellerophon” during Lord Howe's “glorious first of June” (1794) off Ushant, Flinders went out in 1795 as midshipman in the “Reliance” to New South Wales. For the next few years he devoted himself to the task of accurately laying down the outline and bearings of the Australian coast, and he did his work so thoroughly that he left comparatively little for his successors to do. With his friend George Bass, the surgeon of the “Reliance,” in the year of his arrival he explored George's river; and, after a voyage to Norfolk Island, again in March 1796 the two friends in the same boat, the “Tom Thumb,” only 8 ft. long, and with only a boy to help them, explored a stretch of coast to the south of Port Jackson. After a voyage to the Cape of Good Hope, when he was promoted to a lieutenancy, Flinders was engaged during February 1798 in a survey of the Furneaux Islands, lying to the north of Tasmania. His delight was great when, in September of the same year, he was commissioned along with Bass, who had already explored the sea between Tasmania and the south coast to some extent and inferred that it was a strait, to proceed in the sloop “Norfolk” (25 tons) to prove conclusively that Van Diemen's Land was an island by circumnavigating it. In the same sloop, in the summer of next year, Flinders made an exploration to the north of Port Jackson, the object being mainly to survey Glasshouse Bay (Moreton Bay) and Hervey's Bay. Returning to England he was appointed to the command of an expedition for the thorough exploration of the coasts of Terra Australis, as the southern continent was still called, though Flinders is said to have been the first to suggest for it the name Australia. On the 18th of July 1801 the sloop “Investigator” (334 tons), in which the expedition sailed, left Spithead, Flinders being furnished with instructions and with a passport from the French government to all their officials in the Eastern seas. Among the scientific staff was Robert Brown, one of the most eminent English botanists; and among the midshipmen was Flinders's relative, John Franklin, of Arctic fame. Cape Leeuwin, on the south-west coast of Australia, was reached on November 6, and King George's sound on the 9th of December. Flinders sailed round the Great Bight, examining the islands and indentations on the east side, noting the nature of the country, the people, products, &c., and paying special attention to the subject of the variation of the compass. Spenser and St Vincent Gulfs were discovered and explored. On the 8th of April 1802, shortly after leaving Kangaroo Islands, at the mouth of St Vincent Gulf, Flinders fell in with the French exploring ship, “Le Géographe,” under Captain Nicolas Baudin, in the bay now known as Encounter Bay. In the narrative of the French expedition published in 1807 (when Flinders was a prisoner in the Mauritius) by M. Péron, the naturalist to the expedition, much of the land west of the point of meeting was claimed as having been discovered by Baudin, and French names were extensively substituted for the English ones given by Flinders. It was only in 1814, when Flinders published his own narrative, that the real state of the case was fully exposed. Flinders continued his examination of the coast along Bass's Strait, carefully surveying Port Phillip. Port Jackson was reached on the 9th of May 1802.

After staying at Port Jackson for about a couple of months, Flinders set out again on the 22nd of July to complete his circumnavigation of Australia. The Great Barrier Reef was examined with the greatest care in several places. The north-east entrance of the Gulf of Carpentaria was reached early in November; and the next three months were spent in an examination of the shores of the gulf, and of the islands that skirt them. An inspection of the “Investigator” showed that she was in so leaky a condition that only with the greatest precaution could the voyage be completed in her. Flinders completed the survey of the Gulf of Carpentaria, and after touching at the island of Timor, the “Investigator” sailed round the west and south of Australia, and Port Jackson was reached on the 9th of June 1803. Much suffering was endured by nearly all the members of the expedition: a considerable proportion of the men succumbed to disease, and their leader was so reduced by scurvy that his health was greatly impaired.

Flinders determined to proceed home in H.M.S. “Porpoise” as a passenger, submit the results of his work to the Admiralty, and obtain, if possible, another vessel to complete his exploration of the Australian coast. The “Porpoise” left Port Jackson on the 10th of August, accompanied by the H.E.I.C.'s ship “Bridgewater” (750 tons) and the “Cato” (450 tons) of London. On the night of the 17th the “Porpoise” and “Cato” suddenly struck on a coral reef and were rapidly reduced to wrecks. The officers and men encamped on a small sandbank near, 3 or 4 ft. above high-water, a considerable quantity of provisions, with many of the papers and charts, having been saved from the wrecks. The reef was in about 22° 11′ S. and 155° E., and about 800 m. from Port Jackson. Flinders returned to Port Jackson in a six-oared cutter in order to obtain a vessel to rescue the party. The reef was again reached on the 8th of October, and all the officers and men having been satisfactorily disposed of, Flinders on the 11th left for Jones Strait in an unsound schooner of 29 tons, the “Cumberland,” with ten companions, and a valuable collection of papers, charts, geological specimens, &c. On the 15th of December he put in at Mauritius, when he discovered that France and England were at war. The passport he possessed from the French government was for the “Investigator”; still, though he was now on board another ship, his mission was essentially the same, and the work he was on was simply a continuation of that commenced in the unfortunate vessel. Nevertheless, on her arrival at Port Louis the "Cumberland" was seized by order of the governor-general de Caen. Flinders's papers were taken possession of, and he found himself virtually a prisoner. We need not dwell on the sad details of this unjustifiable captivity, which lasted to June 1810. But there can be no doubt that the hardships and inactivity Flinders was compelled to endure for upwards of six years told seriously on his health, and brought his life to a premature end. He reached England in October 1810, after an absence of upwards of nine years. The official red-tapeism of the day barred all promotion to the unfortunate explorer, who set himself to prepare an account of his explorations, though unfortunately an important part of his record had been retained by de Caen. The results of his labours were published in two large quarto volumes, entitled *A Voyage to Terra Australis*, with a folio volume of maps. The very day (July 19, 1814) on which his work was published Flinders died, at the early age of forty. The great work is a model of its kind, containing as it does not only a narrative of his own and of previous voyages, but masterly statements of the scientific results, especially with regard to magnetism, meteorology, hydrography and navigation. Flinders paid great attention to the errors of the compass, especially to those caused by the presence of iron in ships. He is understood to have been the first to discover the source of such errors (which had scarcely been noticed before), and after investigating the laws of the variations, he suggested counter-attractions, an invention for which Professor Barlow got much credit many years afterwards. Numerous experiments on ships' magnetism were conducted at Portsmouth by Flinders, by order of the admiralty, in 1812. Besides the *Voyage*, Flinders wrote *Observations on the Coast of Van Diemen's Land, Bass's Strait*, &c., and two papers in the *Phil. Trans.*—one on the "Magnetic Needle" (1805), and the other, "Observations on the Marine Barometer" (1806). (J. S. K.)

FLINSBERG, a village and watering-place of Germany, in the Prussian province of Silesia, on the Queis, at the foot of the Iserkamm, 1450 ft. above the sea, 5 m. W. of Friedeberg, the terminus station of the railway from Greiffenberg. Pop. (1900) 1957. It contains an Evangelical and a Roman Catholic church, and has some manufactures of wooden wares. Flinsberg is celebrated for its chalybeate waters, specific in cases of feminine disorders, and used both for bathing and drinking. It is also a climatic health resort of some reputation, and the visitors number about 8500 annually.

See Adam, *Bad Flinsberg als klimatischer Kurort* (Görlitz, 1891).

FLINT, AUSTIN (1812–1886), American physician, was born at Petersham, Massachusetts, on the 20th of October 1812, and graduated at the medical department of Harvard University in 1833. From 1847 to 1852 he was professor of the theory and practice of medicine in Buffalo Medical College, of which he was one of the founders, and from 1852 to 1856 he filled the same chair in the university of Louisville. From 1861 to 1886 he was professor of the principles and practice of medicine and clinical medicine in Bellevue Hospital Medical College, New York. He wrote many text-books on medical subjects, among these being *Diseases of the Heart* (1859–1870); *Principles and Practice of Medicine* (1866); *Clinical Medicine* (1879); and *Physical Exploration of the Lungs by means of Auscultation and Percussion* (1882). He died in New York on the 13th of March 1886.

His son, AUSTIN FLINT, junr., who was born at Northampton, Massachusetts, on the 28th of March 1836, after studying at Harvard and at the university of Louisville, graduated at the Jefferson Medical College, Philadelphia, in 1857. He then became professor of physiology at the university of Buffalo (1858) and subsequently at other centres, his last connexion being with the Cornell University Medical College (1898–1906). He was better known as a teacher and writer on physiology than as a practitioner, and his *Text-book of Human Physiology* (1876) was for many years a standard book in American medical colleges. He also published an extensive *Physiology of Man* (5 vols., 1866–1874), *Chemical Examination of the Urine in Disease* (1870), *Effects of Severe and Protracted Muscular Exercise* (1871), *Source of Muscular Power* (1878), and *Handbook of Physiology* (1905). In 1896 he became a consulting physician to the New York State Hospital for the Insane.

FLINT, ROBERT (1838–), Scottish divine and philosopher, was born near Dumfries and educated at the university of Glasgow. After a few years of pastoral service, first in Aberdeen and then at Kilconquhar, Fife, he was appointed professor of moral philosophy and political economy at St Andrews in 1864. From 1876 to 1903 he was professor of divinity at Edinburgh. He contributed a number of articles to the 9th edition of the *Encyclopaedia Britannica*. His chief works are *Christ's Kingdom upon Earth* (Sermons, 1865); *Philosophy of History in Europe* (1874; partly rewritten with reference to France and Switzerland, 1894); *Theism* and *Anti-theistic Theories* (2 vols., being the Baird Lectures for 1876–1877; often reprinted); *Socialism* (1894); *Sermons and Addresses* (1899); *Agnosticism* (1903).

FLINT, TIMOTHY (1780–1840), American clergyman and writer, was born in Reading, Massachusetts, on the 11th of July 1780. He graduated at Harvard in 1800, and in 1802 settled as a Congregational minister in Lunenburg, Mass., where he pursued scientific studies with interest; and his labours in his chemical laboratory seemed so strange to the people of that retired region, that some persons supposed and asserted that he was engaged in counterfeiting. This, together with political differences, led to disagreeable complications, which resulted in his resigning his charge (1814) and becoming a missionary (1815) in the valley of the Mississippi. He was also for a short period a teacher and a farmer. His observations on the manners and character of the settlers of the Ohio and Mississippi valleys were recorded in a picturesque work called *Recollections of the Last Ten Years passed in the Valley of the Mississippi* (1826; reprinted in England and translated into French), the first account of the western states which brought to light the real life and character of the people. The success which this work met with, together with the failing health of the writer, led him to relinquish his more active labours for literary pursuits, and, besides editing the *Western Review* in Cincinnati from 1825 to 1828 and *Knickerbocker's Magazine* (New York) in 1833, he published a number of books, including *Francis Berrian, or the Mexican Patriot* (1826), his best novel; *A Condensed Geography and History of the Western States, or the Mississippi Valley* (2 vols., 1828); *Arthur Clenning* (1828), a novel; and *Indian Wars in the West* (1833). His style is vivid, plain and forcible, and his matter interesting; and his works on the western states are of great value. He died in Salem, Mass., on the 16th of August 1840.

FLINT, a city and the county-seat of Genesee county, Michigan, U.S.A., on Flint river, 68 m. (by rail) N.W. of Detroit. Pop. (1890) 9803; (1900) 13,103, of whom 2165 were foreign-born; (1910, census) 38,550. It is served by the Grand Trunk and the Père Marquette railways, and by an electric line, the Detroit United railway, connecting with Detroit. The city has a fine court-house (1904), a federal building (1908), a city hall (1908) and a public library. The Michigan school for the deaf, established in 1854, and the Oak Grove hospital (private) for the treatment of mental and nervous diseases, are here. Flint has important manufacturing interests, its chief manufactures being automobiles, wagons, carriages—Flint is called "the vehicle city,"—flour, woollen goods, iron goods, cigars, beer, and bricks and tiles; and its grain trade is of considerable importance. In 1904 the total value of the city's factory product was $6,177,170, an increase of 31·1% over that of 1900. The settlement of the place, then called the Grand Traverse of the Flint, began in 1820, but Flint's growth was very slow until 1831, when it was platted as a village; it was chartered as a city in 1855.

FLINT, or FLINTSHIRE (*sîr Gallestr*), a county of North Wales, the smallest in the country, bounded N. by the Irish Sea and the Dee estuary, N.E. by the Dee, E. by Cheshire, and S.W. by Denbighshire. Area, 257 sq. m. Included in Flint is the detached hundred of Maelor, lying 8 m. S.E. of the main part of the county, and shut in by Cheshire on the N. and N.E., by Shropshire on the S., and by Denbighshire on the W. and N.W. The Clwyd valley is common to Flint and Denbigh. Those of the Alyn and Wepre (from Ewloe Castle to the Dee) are fine. The Dee, entering the county near Overton, divides Maelor from Denbigh on the W., passes Chester and bounds most of the county on the N. The Clwyd enters Flint near Bodfary, and joining the Elwy near Rhuddlan, reaches the Irish Sea near Rhyl. The Alyn enters the county under Moel Fammau, passes Cilcen and Mold (*y Wyddgrug*), runs underground near Hesb-Alyn (Alyn's drying-up), bends south to Caergwrle, re-enters Denbighshire and joins the Dee. Llyn Helyg (willow-pool), near Whitford, is the chief lake.

Both for their influence upon the physical features and for their economic value the carboniferous rocks of Flintshire are the most important. From Prestatyn on the coast a band of carboniferous limestone passes close by Holywell and through Caerwen; it forms the Halkin Mountain east of Halkin, whence it continues past Mold to beyond the county boundary. The upper portion of this series is cherty in the north—the chert is quarried for use in the potteries of Staffordshire—but traced southward it passes into sandstones and grits; above these beds come the Holywell shales, possibly the equivalent of the Pendleside series of Lancashire and Derbyshire, while upon them lies the Gwespyr sandstone, which has been thought to correspond to the Gannister coal measures of Lancashire, but may be a representative of the Millstone Grit. Farther to the east, the coal measures, with valuable coals, some oil shale, and with fireclays and marls which are used for brick and tile-making, extend from Talacre through Flint, Northop, Hawarden and Broughton to Hope. The carboniferous rocks appear again through the intervention of a fault, in the neighbourhood of St Asaph. Silurian strata, mostly of Wenlock age, lie below the carboniferous limestone on the western border of the county. Triassic red beds of the Bunter fill the Clwyd valley and appear again on the coal measures S.E. of Chester. Lead and zinc ores have been worked in the lower carboniferous rocks in the north of the county, and caves in the same formation, at Caer Gwyn and Ffynnon Beuno, have yielded the remains of Pleistocene mammals along with palaeolithic implements. Much glacial drift obscures the older rocks on the east and north and in the vale of Clwyd. Short stretches of blown sand occur on the coast near Rhyl and Talacre.

The London & North-Western railway follows the coast-line. Other railways which cross the county are the Great Western, and the Wrexham, Mold & Connah's Quay, acquired by the Great Central company. For pasture the vale of Clwyd is well known. Oats, turnips and swedes are the chief crops. Stock and dairy farming prospers, native cattle being crossed with Herefords and Downs, native sheep with Leicesters and Southdowns, while in the thick mining population a ready market is found for meat, cheese, butter, &c. The population (81,700 in 1901) nearly doubled in the 19th century, and Flintshire to-day is one of the most densely populated counties in North Wales. The area of the ancient county is 164,744 acres, and that of the administrative county 163,025 acres. The collieries begin at Llanasa, run through Whitford, Holywell, Flint, Halkin (Halcyn), Northop, Buckley, Mold and Hawarden (Penarlâg). At Halkin, Mold, Holywell, Prestatyn and Talacre lead is raised, and is sometimes sent to Bagillt, Flint or Chester to be smelted. Zinc, formerly only worked at Dyserth, has increased in output, and copper mines also exist, as at Talargoch, together with smelting works, oil, vitriol, potash and alkali manufactories. Potteries around Buckley send their produce chiefly to Connah's Quay, whence a railway crosses the Dee to the Birkenhead (Cheshire) district. Iron seams are now thin, but limestone quarries yield building stone, lime for burning and small stone for chemical works. Fisheries are unproductive and textile manufactures small.

The county returns one member to parliament. The parliamentary borough district (returning one member), consists of Caergwrle, Caerwys, Flint, Holywell, Mold, Overton, St Asaph and Rhuddlan. In addition, there is a small part of the Chester parliamentary borough. There is one municipal borough, Flint (pop. 4625). The other urban districts are: Buckley (5780), Connah's Quay (3369), Holywell (2652), Mold (4263), Prestatyn (1261) and Rhyl (8473). Flint is in the North Wales and Chester circuit, assizes being held at Mold. The Flint borough has a separate commission of the peace, but no separate court of quarter sessions. The ancient county, which is in the dioceses of Chester, Lichfield and St Asaph, contains forty-six entire ecclesiastical parishes and districts, with parts of eleven others.

Among sites of antiquarian or historical interest, besides the fragmentary ruin of Flint Castle, the following may be mentioned;—Caerwys, near Flint, still shows traces of Roman occupation. Bodfary (Bodfari) was traditionally occupied by the Romans. Moel y gaer (bald hill of the fortress), near Northop, is a remarkably perfect old British post. Maes y Garmon (perhaps for *Meusydd Garmon*, as *y*, the article, has no significance before a proper name, and so to be translated, battlefields of Germanus). A mile from Mold is the reputed scene of *une victoire sans larmes, gagnée non par lès armes, mais par la foi* (E. H. Vollet). The Britons, says the legend, were threatened by the Picts and Saxons, at whose approach the *Alleluia* of that Easter (A.D. 430) was sung. Panic duly seized the invaders, but the victor, St Germanus, confessor and bishop of Auxerre (A.D. 380–448), had to return to the charge in 446. He has, under the name Garmon, a great titular share in British topography. At Bangor Iscoed, "the great high choir in Maelor," was the monastery, destroyed with over 2000 monks, by Æthelfred of Northumberland in 607, as (by a curious coincidence) its namesake Bangor in Ireland was sacked by the Danes in the 9th century. Bede says (ii. 2) that Bangor monastery was in seven sections, with three hundred (working) monks. The supposed lines of direction of Watt's and Offa's dykes were: Basingwerk, Halkin, Hope, Alyn valley, Oswestry (*Croes Oswallt*, "Oswald's cross"), for Watt's, and Prestatyn, Mold, Minera, across the Severn (*Hafren*, or Sabrina) for Offa's. Owain Gwynedd (Gwynedd or Venedocia, is North Wales) defeated Henry II. at Coed Ewloe (where is a tower) and at Coleshill (*Cynsyllt*). Near Pant Asa (*pant* is a bottom) is the medieval Maen Achwynfan (*achwyn*, to complain, *maen*, stone), and tumuli, menhirs (*meini hirion*) and inscribed stones are frequent throughout the county. There is a 14th-century cross in Newmarket churchyard. Caergwrle Castle seems early Roman, or even British; but most of the castles in the county date from the early Edwards.

See H. Taylor, *Flint* (London, 1883).

FLINT, a municipal borough and the county town of the above; a seaport and contributory parliamentary borough, on the south of the Dee estuary, 192 m. from London by the London & North-Western railway. Pop. (1901) 4265. The seat of great alkali manufactures, it imports chiefly sulphur and other chemicals, exporting coal, soda, potash, copper, &c. The county gaol here, as at Haverfordwest, occupied an angle of the castle, was removed to Mold, and is now Chester Castle (jointly with Cheshire).

Flint Castle was built on a lonely rock by the riverside by Edward I. Here met Edward II. and Piers Gaveston. Edward III. bestowed its constableship upon the earls of Chester, and here Richard II. surrendered to Bolingbroke. It was twice taken, after siege, by the parliamentarians, and finally dismantled in 1647. There remain a square court (with angle towers), round tower and drawbridge, all three entrusted to a constable, appointed by the crown under the Municipal Corporations Reforms Act. Made a borough by Edward I., Flint was chartered by Edward III., and by Edward the Black Prince, as earl of Chester.

FLINT (a word common in Teutonic and Scandinavian languages, possibly cognate with the Gr. πλίνθος, a tile), in petrology, a dark grey or dark brown crypto-crystalline substance which has an almost vitreous lustre, and when pure appears structureless to the unaided eye. In the mass it is dark and opaque, but thin plates or the edges of splinters are pale yellow and translucent. Its hardness is greater than that of steel, so that a knife blade leaves a grey metallic streak when drawn across its surface. Its specific gravity is 2·6 or only a little less than that of crystalline quartz. It is brittle, and when hammered readily breaks up into a powder of angular grains. The fracture is perfectly conchoidal, so that blows with a hammer detach flakes which have convex, slightly undulating surfaces. At the point of impact a bulb of percussion, which is a somewhat elevated conical mark, is produced. This serves to distinguish flints which have been fashioned by human agencies from those which have been split merely by the action of frost and the weather. The bulb is evidence of a direct blow, probably intentionally made, and is a point of some importance to archaeologists investigating Palaeolithic implements. With skill and experience a mass of flint can be worked to any simple shape by well directed strokes, and further trimming can be effected with pressure by a pointed stone in a direction slightly across the edge of the weapon. The purest flints have the most perfect conchoidal fracture, and prehistoric man is known to have quarried or mined certain bands of flint which were specially suitable for his purposes.

Silica forms nearly the whole substance of flint; calcite and dolomite may occur in it in small amounts, and analysis has also detected minute quantities of volatile ingredients, organic compounds, &c., to which the dark colour is ascribed by some authorities. These are dispelled by heat and the flint becomes white and duller in lustre. Microscopic sections show that flint is very finely crystalline and consists of quartz or chalcedonic silica; colloidal or amorphous silica may also be present but cannot form any considerable part of the rock. Spicules of sponges and fragments of other organisms, such as molluscs, polyzoa, foraminifera and brachiopods, often occur in flint, and may be partly or wholly silicified with retention of their original structure. Nodules of flint when removed from the chalk which encloses them have a white dull rough surface, and exposure to the weather produces much the same appearance on broken flints. At first they acquire a bright and very smooth surface, but this is subsequently replaced by a dull crust, resembling white or yellowish porcelain. It has been suggested that this change is due to the removal of the colloidal silica in solution, leaving behind the fibres and grains of more crystalline structure. This process must be a very slow one as, from its chemical composition, flint is a material of great durability. Its great hardness also enables it to resist attrition. Hence on beaches and in rivers, such as those of the south-east of England, flint pebbles exist in vast numbers. Their surfaces often show minute crescentic or rounded cracks which are the edges of small conchoidal fractures produced by the impact of one pebble on another during storms or floods.

Flint occurs primarily as concretions, veins and tabular masses in the white chalk of such localities as the south of England (see Chalk). It is generally nodular, and forms rounded or highly irregular masses which may be several feet in diameter. Although the flint nodules often lie in bands which closely follow the bedding, they were not deposited simultaneously with the chalk; very often the flint bands cut across the beds of the limestone and may traverse them at right angles. Evidently the flint has accumulated along fissures, such as bedding planes, joints and other cracks, after the chalk had to some extent consolidated. The silica was derived from the tests of radiolaria and the spicular skeletons of sponges. It has passed into solution, filtered through the porous matrix, and has been again precipitated when the conditions were suitable. Its formation is consequently the result of "concretionary action." Where the flints lie the chalk must have been dissolved away; we have in fact a kind of metasomatic replacement in which a siliceous rock has slowly replaced a calcareous one. The process has been very gradual and the organisms of the original chalk often have their outlines preserved in the flint. Shells may become completely silicified, or may have their cavities occupied by flint with every detail of the interior of the shell preserved in the outer surface of the cast. Objects of this kind are familiar to all collectors of fossils in chalk districts.

Chert is a coarser and less perfectly homogeneous substance of the same nature and composition as flint. It is grey, black or brown, and commonly occurs in limestone (*e.g.* the Carboniferous Limestone) in the same way as flint occurs in chalk. Some cherts contain tests of radiolaria, and correspond fairly closely to the siliceous radiolarian oozes which are gathering at the present day at the bottom of some of the deepest parts of the oceans. Brownish cherts are found in the English Greensand; these often contain remains of sponges.

The principal uses to which flint has been put are the fabrication of weapons in Palaeolithic and Neolithic times. Other materials have been employed where flint was not available, *e.g.* obsidian, chert, chalcedony, agate and quartzite, but to prehistoric man (see Flint Implements below) flint must have been of great value and served many of the uses to which steel is put at the present day. Flint gravels are widely employed for dressing walks and roads, and for rough-cast work in architecture. For road-mending flint, though very hard, is not regarded with favour, as it is brittle and pulverizes readily; binds badly, yielding a surface which breaks up with heavy traffic and in bad weather; and its fine sharp-edged chips do much damage to tires of motors and cycles. Seasoned flints from the land, having been long exposed to the atmosphere, are preferred to flints freshly dug from the chalk pits. Formerly flint and steel were everywhere employed for striking a light; and gun flints were required for fire-arms. A special industry in the shaping of gun flints long existed at Brandon in Suffolk. In 1870 about thirty men were employed. Since then the trade has become almost extinct as gun flints are in demand only in semi-savage countries where modern fire-arms are not obtainable. Powdered flint was formerly used in the manufacture of glass, and is still one of the ingredients of many of the finer varieties of pottery. (J. S. F.)

FLINT IMPLEMENTS AND WEAPONS. The excavation of these remains of the prehistoric races of the globe in river-drift gravel-beds has marked a revolution in the study of Man's history (see Archaeology). Until almost the middle of the 19th century no suspicion had arisen in the minds of British and European archaeologists that the momentous results of the excavations then proceeding in Egypt and Assyria would be dwarfed by discoveries at home which revolutionized all previous ideas of Man's antiquity. It was in 1841 that Boucher de Perthes observed in some sand containing mammalian remains, at Menchecourt near Abbeville, a flint, roughly worked into a cutting implement. This "find" was rapidly followed by others, and Boucher de Perthes published his first work on the subject, *Antiquités celtiques et antédiluviennes: mémoire sur l'industrie primitive et les arts à leur origin* (1847), in which he proclaimed his discovery of human weapons in beds unmistakably belonging to the age of the Drift. It was not until 1859 that the French archaeologist convinced the scientific world. An English mission then visited his collection and testified to the great importance of his discoveries. The "finds" at Abbeville were followed by others in many places in England, and in fact in every country where siliceous stones which are capable of being flaked and fashioned into implements are to be found. The implements occurred in beds of rivers and lakes, in the tumuli and ancient burial-mounds; on the sites of settlements of prehistoric man in nearly every land, such as the shell-heaps and lake-dwellings; but especially embedded in the high-level gravels of England and France which have been deposited by river-floods and long left high and dry above the present course of the stream. These gravels represent the Drift or Palaeolithic period when man shared Europe with the mammoth and woolly-haired rhinoceros. The worked flints of this age are, however, unevenly distributed; for while the river-gravels of south-eastern England yield them abundantly, none has been found in Scotland or the northern English counties. On the continent the same partial distribution is observable: while they occur plentifully in the north-western area of France, they are not discovered in Sweden, Norway or Denmark. The association of these flints, fashioned for use by chipping only, with the bones of animals either extinct or no longer indigenous, has justified their reference to the earlier period of the Stone Age, generally called Palaeolithic. Those flint implements, which show signs of polishing and in many cases remarkably fine workmanship, and are found in tumuli, peat-bogs and lake-dwellings mixed with the bones of common domestic animals, are assigned to the Neolithic or later Stone Age. The Palaeolithic flints are hammers, flakes, scrapers, implements worked to a cutting edge at one side, implements which resemble rude axes, flat ovoid implements worked to an edge all round, and a great quantity of spear and arrow heads. None of these is ground or polished. The Neolithic flints, on the other hand, exhibit more variety of design, are carefully finished, and the particular use of each weapon can be easily detected. Man has reached the stage of culture when he could socket a stone into a wooden handle, and fix a flaked flint as a handled dagger or knife. The workmanship is superior to that shown in any of the stone utensils made by savage tribes of historic times. The manner of making flint implements appears to have been in all ages much the same. Flint from its mode of fracture is the only kind of stone which can be chipped or flaked into almost any shape, and thus forms the principal material of these earliest weapons. The blows must be carefully aimed or the flakes dislodged will be shattered: a gun-flint maker at Brandon, Suffolk, stated that it took him two years to acquire the art.

For accounts of the gun-flint manufacture at Brandon, and detailed descriptions of ancient flint-working, see Sir John Evans, *Ancient Stone Implements* (1897), Lord Avebury's *Prehistoric Times* (1865, 1900); also Thomas Wilson, "Arrow-heads, Spear-heads and Knives of Prehistoric Times," in *Smithsonian Report* for 1897; and W. K. Moorehead, *Prehistoric Implements* (1900).

FLOAT (in O. Eng. *flot* and *flota*, in the verbal form *flêotan*; the Teutonic root is *flut-*, another form of *flu-*, seen in "flow," cf. "fleet"; the root is seen in Gr. πλέειν, to sail, Lat. *pluere*, to rain; the Lat. *fluere* and *fluctus*, wave, is not connected), the action of moving on the surface of water, or through the air. The word is used also of a wave, or the flood of the tide, river, backwater or stream, and of any object floating in water, as a mass of ice or weeds; a movable landing-stage, a flat-bottomed boat, or a raft, or, in fishing, of the cork or quill used to support a baited line or fishing-net. It is also applied to the hollow or inflated organ by means of which certain animals, such as the "Portuguese man-of-war," swim, to a hollow metal ball or piece of whinstone, &c., used to regulate the level of water in a tank or boiler, and to a piece of ivory in the cistern of a barometer. "Float" is also the name of one of the boards of a paddle-wheel or water-wheel. In a theatrical sense, it is used to denote the footlights. The word is also applied to something broad, level and shallow, as a wooden frame attached to a cart or wagon for the purpose of increasing the carrying capacity; and to a special kind of low, broad cart for carrying heavy weights, and to a platform on wheels used for shows in a procession. The term is applied also to various tools, especially to many kinds of trowels used in plastering. It is also used of a dock where vessels may float, as at Bristol, and of the trenches used in "floating" land. In geology and mining, loose rock or ore brought down by water is known as "float," and in tin-mining it is applied to a large trough used for the smelted tin. In weaving the word is used of the passing of weft threads over part of the warp without being woven in with it, also of the threads so passed. In the United States a voter not attached to any particular party and open to bribery is called a "float" or "floater."

FLOCK. 1. (A word found in Old English and Old Norwegian, from which come the Danish and Swedish words, and not in other Teutonic languages), originally a company of people, now mainly, except in figurative usages, of certain animals when gathered together for feeding or moving from place to place. For birds it is chiefly used of geese; and for other animals most generally of sheep and goats. It is from the particular application of the word to sheep that "flock" is used of the Christian Church in its relation to the "Good Shepherd," and also of a congregation of worshippers in its relation to its spiritual head.

2. (Probably from the Lat. *floccus*, but many Teutonic languages have the same word in various forms), a tuft of wool, cotton or similar substance. The name "flock" is given to a material formed of wool or cotton refuse, or of shreds of old woollen or cotton rags, torn by a machine known as a "devil." This material is used for stuffing mattresses or pillows, and also in upholstery. The name is also applied to a special kind of wall-paper, which has an appearance almost like cloth, or, in the more expensive kinds, of velvet. It is made by dusting on a specially prepared adhesive surface finely powdered fibres of cotton or silk. The word "flocculent" is used of many substances which have a fleecy or "flock"-like appearance, such as a precipitate of ferric hydrate.

FLODDEN, or FLODDEN FIELD, near the village of Branxton, in Northumberland, England (10 m. N.W. of Wooler), the scene of a famous battle fought on the 9th of September 1513 between the English and the Scots. On the 22nd of August a great Scottish army under King James IV. had crossed the border. For the moment the earl of Surrey (who in King Henry VIII.'s absence was charged with the defence of the realm) had no organized force in the north of England, but James wasted much precious time among the border castles, and when Surrey appeared at Wooler, with an army equal in strength to his own, which was now greatly weakened by privations and desertion, he had not advanced beyond Ford Castle. The English commander promptly sent in a challenge to a pitched battle, which the king, in spite of the advice of his most trusted counsellors, accepted. On the 6th of September, however, he left Ford and took up a strong position facing south, on Flodden Edge. Surrey's reproaches for the alleged breach of faith, and a second challenge to fight on Millfield Plain were this time disregarded. The English commander, thus foiled, executed a daring and skilful march round the enemy's flank, and on the 9th drew up for battle in rear of the hostile army. It is evident that Surrey was confident of victory, for he placed his own army, not less than the enemy, in a position where defeat would involve utter ruin. On his appearance the Scots hastily changed front and took post on Branxton Hill, facing north. The battle began at 4 P.M. Surrey's archers and cannon soon gained the upper hand, and the Scots, unable quietly to endure their losses, rushed to close quarters. Their left wing drove the English back, but Lord Dacre's reserve corps restored the fight on this side. In all other parts of the field, save where James and Surrey were personally opposed, the English gradually gained ground. The king's corps was then attacked by Surrey in front, and by Sir Edward Stanley in flank. As the Scots were forced back, a part of Dacre's force closed upon the other flank, and finally Dacre himself, boldly neglecting an almost intact Scottish division in front of him, charged in upon the rear of King James's corps. Surrounded and attacked on all sides, this, the remnant of the invading army, was doomed. The circle of spearmen around the king grew less and less, and in the end James and a few of his nobles were alone left standing. Soon they too died, fighting to the last man. Among the ten thousand Scottish dead were all the leading men in the kingdom of Scotland, and there was no family of importance that had not lost a member in this great disaster. The "King's Stone," said to mark the spot where James was killed, is at some distance from the actual battlefield. "Sybil's Well," in Scott's *Marmion*, is imaginary.

FLODOARD (894–966), French chronicler, was born at Epernay, and educated at Reims in the cathedral school which had been established by Archbishop Fulcon (822–900). As canon of Reims, and favourite of the archbishops Herivaeus (d. 922) and Seulfus (d. 925), he occupied while still young an important position at the archiepiscopal court, but was twice deprived of his benefices by Heribert, count of Vermandois, on account of his steady opposition to the election of the count's infant son to the archbishopric. Upon the final triumph of Archbishop Artold in 947, Flodoard became for a time his chief adviser, but withdrew to a monastery in 952, and spent the remaining years of his life in literary and devotional work. His history of the cathedral church at Reims (*Historia Remensis Ecclesiae*) is one of the most remarkable productions of the 10th century. Flodoard had been given charge of the episcopal archives, and constructed his history out of the original texts, which he generally reproduces in full; the documents for the period of Hincmar being especially valuable. The *Annales* which Flodoard wrote year by year from 919 to 966 are doubly important, by reason of the author's honesty and the central position of Reims in European affairs in his time. Flodoard's poetical works are of hardly less historical interest. The long poem celebrating the triumph of Christ and His saints was called forth by the favour shown him by Pope Leo VII., during whose pontificate he visited Rome, and he devotes fourteen books to the history of the popes.

Flodoard's works were published in full by J. P. Migne (*Patrologia Latina*, vol. 135); a modern edition of the *Annales* is the one edited by P. Lauer (Paris, 1906). For bibliography see A. Molinier, *Sources de l'histoire de France* (No. 932).

FLOE (of uncertain derivation; cf. Norse *flo*, layer, level plain), a sheet of floating ice detached from the main body of polar ice. It is of less extent than the field of "pack" ice, which is a compacted mass of greater depth drifting frequently under the influence of deep currents, while the floating floe is driven by the wind.

FLOOD, HENRY (1732–1791), Irish statesman, son of Warden Flood, chief justice of the king's bench in Ireland, was born in 1732, and was educated at Trinity College, Dublin, and afterwards at Christ Church, Oxford, where he became proficient in the classics. His father was a man of good birth and fortune, and he himself married a member of the influential Beresford family, who brought him a large fortune. In his early years he was handsome, witty, good-tempered, and a brilliant conversationalist. His judgment was sound, and he had a natural gift of eloquence which had been cultivated and developed by study of classical oratory and the practice of elocution. Flood therefore possessed every personal advantage when, in 1759, he entered the Irish parliament as member for Kilkenny in his twenty-seventh year. There was at that time no party in the Irish House of Commons that could truly be called national, and until a few years before there had been none that deserved even the name of an opposition. The Irish parliament was still constitutionally subordinate to the English privy council; it had practically no powers of independent legislation, and none of controlling the policy of the executive, which was nominated by the ministers in London (see GRATTAN, HENRY). Though the great majority of the people were Roman Catholics, no person of that faith could either enter parliament or exercise the franchise; the penal code, which made it almost impossible for a Roman Catholic to hold property, to follow a learned profession, or even to educate his children, and which in numerous particulars pressed severely on the Roman Catholics and subjected them to degrading conditions, was as yet unrepealed, though in practice largely obsolete; the industry and commerce of Ireland were throttled by restrictions imposed, in accordance with the economic theories of the period, in the interest of the rival trade of Great Britain. Men like Anthony Malone and Hely-Hutchison fully realized the necessity for far-reaching reforms, and it only needed the ability and eloquence of Flood in the Irish House of Commons to raise up an independent party in parliament, and to create in the country a public opinion with definite intelligible aims.

The chief objects for which Flood strove were the shortening of the duration of parliament—which had then no legal limit in Ireland except that of the reigning sovereign's life,—the reduction of the scandalously heavy pension list, the establishment of a national militia, and, above all, the complete legislative independence of the Irish parliament. For some years little was accomplished; but in 1768 the English ministry, which had special reasons at the moment for avoiding unpopularity in Ireland, allowed an octennial bill to pass, which was the first step towards making the Irish House of Commons in some measure representative of public opinion. It had become the practice to allow crown patronage in Ireland to be exercised by the owners of parliamentary boroughs in return for their undertaking to manage the House in the government interest. But during the viceroyalty of Lord Townsend the aristocracy, and more particularly these "undertakers" as they were called, were made to understand that for the future their privileges in this respect would be curtailed. When, therefore, an opportunity was taken by the government in 1768 for reasserting the constitutional subordination of the Irish parliament, these powerful classes were thrown into temporary alliance with Flood. In the following year, in accordance with the established procedure, a money bill was sent over by the privy council in London for acceptance by the Irish House of Commons. Not only was it rejected, but contrary to custom a reason for this course was assigned, namely, that the bill had not originated in the Irish House. In consequence parliament was peremptorily prorogued, and a recess of fourteen months was employed by the government in securing a majority by the most extensive corruption.[1] Nevertheless when parliament met in February 1771 another money bill was thrown out on the motion of Flood; and the next year Lord Townsend, the lord lieutenant whose policy had provoked this conflict, was recalled. The struggle was the occasion of a publication, famous in its day, called *Baratariana*, to which Flood contributed a series of powerful letters after the manner of Junius, one of his collaborators being Henry Grattan.

The success which had thus far attended Flood's efforts had placed him in a position such as no Irish politician had previously attained. He had, as an eminent historian of Ireland observes, "proved himself beyond all comparison the greatest popular orator that his country had yet produced, and also a consummate master of parliamentary tactics. Under parliamentary conditions that were exceedingly unfavourable, and in an atmosphere charged with corruption, venality and subserviency, he had created a party before which ministers had begun to quail, and had inoculated the Protestant constituencies with a genuine spirit of liberty and self-reliance."[2] Lord Harcourt, who succeeded Townsend as viceroy, saw that Flood must be conciliated at any price "rather than risk the opposition of so formidable a leader." Accordingly, in 1775, Flood was offered and accepted a seat in the privy council and the office of vice-treasurer with a salary of £3500 a year. For this step he has been severely criticized. The suggestion that he acted corruptly in the matter is groundless; and although it is true that he lost influence from the moment he became a minister of the crown, Flood may reasonably have held that he had a better prospect of advancing his policy by the leverage of a ministerial position than by means of any opposition party he could hope to muster in an unreformed House of Commons.[3] The result, however, was that the leadership of the national party passed from Flood to Grattan, who entered the Irish parliament in the same session that Flood became a minister.

Flood continued in office for nearly seven years. During this long period he necessarily remained silent on the subject of the independence of the Irish parliament, and had to be content with advocating minor reforms as occasion offered. He was thus instrumental in obtaining bounties on the export of Irish corn to foreign countries and some other trifling commercial concessions. On the other hand he failed to procure the passing of a Habeas Corpus bill and a bill for making the judges irremovable, while his support of Lord North's American policy still more gravely injured his popularity and reputation. But an important event in 1778 led indirectly to his recovering to some extent his former position in the country; this event was the alliance of France with the revolted American colonies. Ireland was thereby placed in peril of a French invasion, while the English government could provide no troops to defend the island. The celebrated volunteer movement was then set on foot to meet the emergency; in a few weeks more than 40,000 men, disciplined and equipped, were under arms, officered by the country gentry, and controlled by the wisdom and patriotism of Lord Charlemont. This volunteer force, in which Flood was a colonel, while vigilant for the defence of the island, soon made itself felt in politics. A Volunteer Convention, formed with all the regular organization of a representative assembly, but wielding the power of an army, began menacingly to demand the removal of the commercial restrictions which were destroying Irish prosperity. Under this pressure the government gave way; the whole colonial trade was in 1779 thrown open to Ireland for the first time, and other concessions were also extorted. Flood, who had taken an active though not a leading part in this movement, now at last resigned his office to rejoin his old party. He found to his chagrin that his former services had been to a great extent forgotten, and that he was eclipsed by Grattan. When in a debate on the constitutional question in 1779 Flood complained of the small consideration shown him in relation to a subject which he had been the first to agitate, he was reminded that by the civil law "if a man should separate from his wife, and abandon her for seven years, another might then take her and give her his protection." But though Flood had lost control of the movement for independence of the Irish parliament, the agitation, backed as it now was by the Volunteer Convention and by increasing signs of popular disaffection, led at last in 1782 to the concession of the demand, together with a number of other important reforms (see GRATTAN, HENRY).

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[1] Walpole's *George III.*, iv. 348.

[2] W. E. H. Lecky, *Leaders of Public Opinion in Ireland* (enlarged edition, 2 vols., 1903), i. 48.

[3] See Hardy's *Life of Charlemont*, i. 356.

No sooner, however, was this great success gained than a question arose—known as the Simple Repeal controversy—as to whether England, in addition to the repeal of the Acts on which the subordination of the Irish parliament had been based, should not be required expressly to renounce for the future all claim to control Irish legislation. The chief historical importance of this dispute is that it led to the memorable rupture of friendship between Flood and Grattan, each of whom assailed the other with unmeasured but magnificently eloquent invective in the House of Commons. Flood's view prevailed—for a Renunciation Act such as he advocated was ungrudgingly passed by the English parliament in 1783—and for a time he regained popularity at the expense of his rival. Flood next (28th of November 1783) introduced a reform bill, after first submitting it to the Volunteer Convention. The bill, which contained no provision for giving the franchise to Roman Catholics—a proposal which Flood always opposed—was rejected, ostensibly on the ground that the attitude of the volunteers threatened the freedom of parliament. The volunteers were perfectly loyal to the crown and the connexion with England. They carried an address to the king, moved by Flood, expressing the hope that their support of parliamentary reform might be imputed to nothing but "a sober and laudable desire to uphold the constitution . . . and to perpetuate the cordial union of both kingdoms." The convention then dissolved, though Flood had desired, in opposition to Grattan, to continue it as a means of putting pressure on parliament for the purpose of obtaining reform.

In 1776 Flood had made an attempt to enter the English House of Commons. In 1783 he tried again, this time with success. He purchased a seat for Winchester from the duke of Chandos, and for the next seven years he was a member at the same time of both the English and Irish parliaments. He reintroduced, but without success, his reform bill in the Irish House in 1784; supported the movement for protecting Irish industries; but short-sightedly opposed Pitt's commercial propositions in 1785. He remained a firm opponent of Roman Catholic emancipation, even defending the penal laws on the ground that after the Revolution they "were not laws of persecution but of political necessity"; but after 1786 he does not appear to have attended the parliament in Dublin. In the House at Westminster, where he refused to enrol himself as a member of either political party, he was not successful. His first speech, in opposition to Fox's India Bill on the 3rd of December 1783, disappointed the expectations aroused by his celebrity. His speech in opposition to the commercial treaty with France in 1787 was, however, most able; and in 1790 he introduced a reform bill which Fox declared to be the best scheme of reform that had yet been proposed, and which in Burke's opinion retrieved Flood's reputation. But at the dissolution in the same year he lost his seat in both parliaments, and he then retired to Farmley, his residence in county Kilkenny, where he died on the 2nd of December 1791.

When Peter Burrowes, notwithstanding his close personal friendship with Grattan, declared that Flood was "perhaps the ablest man Ireland ever produced, indisputably the ablest man of his own times," he expressed what was probably the general opinion of Flood's contemporaries. Lord Charlemont, who knew him intimately though not always in agreement with his policy, pronounced him to be "a man of consummate ability." He also declared that avarice made no part of Flood's character. Lord Mountmorres, a critic by no means partial to Flood, described him as a pre-eminently truthful man, and one who detested flattery. Grattan, who even after the famous quarrel never lost his respect for Flood, said of him that he was the best tempered and the most sensible man in the world. In his youth he was genial, frank, sociable and witty; but in later years disappointment made him gloomy and taciturn. As an orator he was less polished, less epigrammatic than Grattan; but a closer reasoner and a greater master of sarcasm and invective. Personal ambition often governed his actions, but his political judgment was usually sound; and it was the opinion of Bentham that Flood would have succeeded in carrying a reform bill which might have preserved Irish parliamentary independence, if he had been supported by Grattan and the rest of his party in keeping alive the Volunteer Convention in 1783. Though he never wavered in loyalty to the British crown and empire, Ireland never produced a more sincere patriot than Henry Flood.

See Warden Flood, *Memoirs of Henry Flood* (London, 1838); Henry Grattan, *Memoirs of the Life and Times of the Right Hon. H. Grattan* (5 vols., London, 1839–1846); Charles Phillips, *Recollections of Curran and some of his Contemporaries* (London, 1822); *The Irish Parliament 1775*, from an official and contemporary manuscript, edited by William Hunt (London, 1907); W. J. O'Neill Daunt, *Ireland and her Agitators*; Lord Mountmorres, *History of the Irish Parliament* (2 vols., London, 1792); W. E. H. Lecky, *History of England in the Eighteenth Century* (8 vols., London, 1878–1890); and *Leaders of Public Opinion in Ireland* (enlarged edition, 2 vols., London, 1903); J. A. Froude, *The English in Ireland*, vols. ii. and iii. (London, 1881); Horace Walpole, *Memoirs of the Reign of George III.* (4 vols., London, 1845, 1894); Sir Jonah Barrington, *Rise and Fall of the Irish Nation* (London, 1833); Francis Plowden, *Historical Review of the State of Ireland* (London, 1803); Alfred Webb, *Compendium of Irish Biography* (Dublin, 1878); F. Hardy, *Memoirs of Lord Charlemont* (London, 1812), especially for the volunteer movement, on which see also *Proceedings of the Volunteer Delegates of Ireland 1784* (Anon. Pamphlet, Brit. Mus.); also *The Charlemont Papers*, and *Irish Parl. Debates*, vols. i.-iv.). (R. J. M.)

FLOOD (in O. Eng. *flôd*, a word common to Teutonic languages, cf. Ger. *Flut*, Dutch *vloed*, from the same root as is seen in "flow," "float"), an overflow of water, an expanse of water submerging land, a deluge, hence "the flood," specifically, the Noachian deluge of Genesis, but also any other catastrophic submersion recorded in the mythology of other nations than the Hebrew (see DELUGE, THE). In the sense of "flowing water," the word is applied to the inflow of the tide, as opposed to "ebb."

FLOOD PLAIN, the term in physical geography for a plain formed of sediment dropped by a river. When the slope down which a river runs has become very slight, it is unable to carry the sediment brought from higher regions nearer its source, and consequently the lower portion of the river valley becomes filled with alluvial deposits; and since in times of flood the rush of water in the high regions tears off and carries down a greater quantity of sediment than usual, the river spreads this also over the lower valley where the plain is flooded, because the rush of water is checked, and the stream in consequence drops its extra load. These flood plains are sometimes of great extent. That of the Mississippi below Ohio has a width of from 20 to 80 m., and its whole extent has been estimated at 50,000 sq. m. Flood plains may be the result of planation, with aggradation, that is, they may be due to a graded river working in meanders from side to side, widening its valley by this process and covering the widened valley with sediment. Or the stream by cutting into another stream (piracy), by cutting through a barrier near its head waters, by entering a region of looser or softer rock, and by glacial drainage, may form a flood plain simply by filling up its valley (alluviation only). Any obstruction across a river's course, such as a band of hard rock, may form a flood plain behind it, and indeed anything which checks a river's course and causes it to drop its load will tend to form a flood plain; but it is most commonly found near the mouth of a large river, such as the Rhine, the Nile, or the Mississippi, where there are occasional floods and the river usually carries a large amount of sediment. "Levees" are formed, inside which the river usually flows, gradually raising its bed above the surrounding plain. Occasional breaches during floods cause the overloaded stream to spread in a great lake over the surrounding country, where the silt covers the ground in consequence. Sections of the Missouri flood plain made by the United States geological survey show a great variety of material of varying coarseness, the stream bed being scoured at one place, and filled at another by currents and floods of varying swiftness, so that sometimes the deposits are of coarse gravel, sometimes of fine sand, or of fine silt, and it is probable that any section of such an alluvial plain would show deposits of a similar character. The flood plain during its formation is marked by meandering, or anastomosing streams, ox-bow lakes and bayous, marshes or stagnant pools, and is occasionally completely covered with water. When the drainage system has ceased to act or is entirely diverted owing to any cause, the flood plain may become a level area of great fertility, similar in appearance to the floor of an old lake. The flood plain differs, however, inasmuch as it is not altogether flat. It has a gentle slope down-stream, and often for a distance from the sides towards the centre.

FLOOR (from O. Eng. *flor*, a word common to many Teutonic languages, cf. Dutch *vloer*, and Ger. *Flur*, a field, in the feminine, and a floor, masculine), generally the lower horizontal surface of a room, but specially employed for one covered with boarding or parquetry. The various levels of rooms in a house are designated as "ground-floor," "first-floor," "mezzanine-floor," &c. The principal floor is the storey which contains the chief apartments whether on the ground- or first-floor; in Italy they are always on the latter and known as the "piano nobile." The storey below the ground-floor is called the "basement-floor," even if only a little below the level of the pavement outside; the storey in a roof is known as the "attic-floor." The expressions one pair, two pair, &c., apply to the storeys above the first flight of stairs from the ground (see also CARPENTRY).

FLOORCLOTH, a rough flannel cloth used for domestic cleaning; also a generic term applied to a variety of materials used in place of carpets for covering floors, and known by such trade names as kamptulicon, oil-cloth, linoleum, corticine, cork-carpet, &c. Kamptulicon (καμπτός, flexible, οὖλος, thick) was patented in 1844 by E. Galloway, but did not attract much attention till about 1862. It was essentially a preparation of indiarubber masticated up with ground cork, and rolled out into sheets between heavy steam-heated rollers, sometimes over a backing of canvas. Owing to its expensiveness, it has given place to cheaper materials serving the same purpose. Oil-cloth is a coarse canvas which has received a number of coats of thick oil paint, each coat being rubbed smooth with pumice stone before the application of the next. Its surface is ornamented with patterns printed in oil colours by means of wooden blocks. Linoleum (*linum*, flax, *oleum*, oil), patented by F. Walton in 1860 and 1863, consists of oxidized linseed oil and ground cork. These ingredients, thoroughly incorporated with the addition of certain gummy and resinous matters, and of pigments such as ochre and oxide of iron as required, are pressed on to a rough canvas backing between steam-heated rollers. Patterns may be printed on its surface with oil paint, or by an improved method may be inlaid with coloured composition so that the colours are continuous through the thickness of the linoleum, instead of being on the surface only, and thus do not disappear with wear. Lincrusta-Walton is a similar material to linoleum, also having oxidized linseed oil as its base, which is stamped out in embossed patterns and used as a covering for walls.

FLOQUET, CHARLES THOMAS (1828–1896), French statesman, was born at St Jean-Pied-de-Port (Basses-Pyrénées) on the 2nd of October 1828. He studied law in Paris, and was called to the bar in 1851. The *coup d'état* of that year aroused the strenuous opposition of Floquet, who had, while yet a student, given proof of his republican sympathies by taking part in the fighting of 1848. He made his name by his brilliant and fearless attacks on the government in a series of political trials, and at the same time contributed to the *Temps* and other influential journals. When the tsar Alexander II. visited the Palais de Justice in 1867, Floquet was said to have confronted him with the cry "Vive la Pologne, monsieur!" He delivered a scathing indictment of the Empire at the trial of Pierre Bonaparte for killing Victor Noir in 1870, and took a part in the revolution of the 4th of September, as well as in the subsequent defence of Paris. In 1871 he was elected to the National Assembly by the department of the Seine. During the Commune he formed the *Ligue d'union républicaine des droits de Paris* to attempt a reconciliation with the government of Versailles. When his efforts failed, he left Paris, and was imprisoned by order of Thiers, but soon released. He became editor of the *République Française*, was chosen president of the municipal council, and in 1876 was elected deputy for the eleventh arrondissement. He took a prominent place among the extreme radicals, and became president of the group of the "Union républicaine." In 1882 he held for a short time the post of prefect of the Seine. In 1885 he succeeded M. Brisson as president of the chamber. This difficult position he filled with such tact and impartiality that he was re-elected the two following years. Having approached the Russian ambassador in such a way as to remove the prejudice existing against him in Russia since the incident of 1867, he rendered himself eligible for office; and on the fall of the Tirard cabinet in 1888 he became president of the council and minister of the interior in a radical ministry, which pledged itself to the revision of the constitution, but was forced to combat the proposals of General Boulanger. Heated debates in the chamber culminated on the 13th of July in a duel between Floquet and Boulanger in which the latter was wounded. In the following February the government fell on the question of revision, and in the new chamber of November Floquet was re-elected to the presidential chair. The Panama scandals, in which he was compelled to admit his implication, dealt a fatal blow to his career: he lost the presidency of the chamber in 1892, and his seat in the house in 1893, but in 1894 was elected to the senate. He died in Paris on the 18th of January 1896.

See *Discours et opinions de M. Charles Floquet*, edited by Albert Faivre (1885).

FLOR, ROGER DI, a military adventurer of the 13th–14th century, was the second son of a falconer in the service of the emperor Frederick II., who fell at Tagliacozzo (1268), and when eight years old was sent to sea in a galley belonging to the Knights Templars. He entered the order and became commander of a galley. At the siege of Acre by the Saracens in 1291 he was accused and denounced to the pope as a thief and an apostate, was degraded from his rank, and fled to Genoa, where he began to play the pirate. The struggle between the kings of Aragon and the French kings of Naples for the possession of Sicily was at this time going on; and Roger entered the service of Frederick, king of Sicily, who gave him the rank of vice-admiral. At the close of the war, in 1302, as Frederick was anxious to free the island from his mercenary troops (called *Almúgavares*), whom he had no longer the means of paying, Roger induced them under his leadership to seek new adventures in the East, in fighting against the Turks, who were ravaging the empire. The emperor Andronicus II. accepted his offer of service; and in September 1303 Roger with his fleet and army arrived at Constantinople. He was adopted into the imperial family, was married to a grand-daughter of the emperor, and was made grand duke and commander-in-chief of the army and the fleet. After some weeks lost in dissipation, intrigues and bloody quarrels, Roger and his men were sent into Asia, and after some successful encounters with the Turks they went into winter quarters at Cyzicus. In May 1304 they again took the field, and rendered the important service of relieving Philadelphia, then invested and reduced to extremities by the Turks. But Roger, bent on advancing his own interests rather than those of the emperor, determined to found in the East a principality for himself. He sent his treasures to Magnesia, but the people slew his Catalans and seized the treasures. He then formed the siege of the town, but his attacks were repulsed, and he was compelled to retire. Being recalled to Europe, he settled his troops in Gallipoli and other towns, and visited Constantinople to demand pay for the *Almúgavares*. Dissatisfied with the small sum granted by the emperor, he plundered the country and carried on intrigues both with and against the emperor, receiving reinforcements all the while from all parts of southern Europe. Roger was now created Caesar, but shortly afterwards the young emperor Michael Palaeologus, not daring to attack the fierce and now augmented bands of adventurers, invited Roger to Adrianople, and there contrived his assassination and the massacre of his Catalan cavalry (April 4, 1306). His death was avenged by his men in a fierce and prolonged war against the Greeks.

See Moncada, *Expedicion de los Catalanes y Aragoneses contre Turcos y Griegos* (Paris, 1840).

FLORA, in Roman mythology, goddess of spring-time and flowers, later identified with the Greek Chloris. Her festival at Rome, the Floralia, instituted 238 B.C. by order of the Sibylline books and at first held irregularly, became annual after 173. It lasted six days (April 28–May 3), the first day being the anniversary of the foundation of her temple. It included theatrical performances and animal hunts in the circus, and vegetables were distributed to the people. The proceedings were characterized by excessive merriment and licentiousness. According to the legend, her worship was instituted by Titus Tatius, and her priest, the flamen Floralis, by Numa. In art Flora was represented as a beautiful maiden, bedecked with flowers (Ovid, *Fasti*, v. 183 ff.; Tacitus, *Annals*, ii. 49).

The term " flora " is used in botany collectively for the plant-growth of a district; similarly " fauna " is used collectively for the animals.

FLORE AND BLANCHEFLEUR, a 13th-century romance. This tale, generally supposed to be of oriental origin, relates the passionate devotion of two children, and their success in overcoming all the obstacles put in the way of their love. The romance appears in differing versions in French, English, German, Swedish, Icelandic, Italian, Spanish, Greek and Hungarian. The various forms of the tale receive a detailed notice in E. Hausknecht's version of the 13th-century Middle English poem of " Floris and Blauncheflur " (*Samml. eng. Denkmäler*, vol. v. Berlin, 1885). Nothing definite can be stated of the origin of the story, but France was in the 12th and 13th centuries the chief market of romance, and the French version of the tale, *Floire et Blanchefleur*, is the most widespread. Floire, the son of a Saracen king of Spain, is brought up in constant companionship with Blanchefleur, the daughter of a Christian slave of noble birth. Floire's parents, hoping to destroy this attachment, send the boy away at fifteen and sell Blanchefleur to foreign slave-merchants. When Floire returns a few days later he is told that his companion is dead, but when he threatens to kill himself, his parents tell him the truth. He traces her to the tower of the maidens destined for the harem of the emir of Babylon, into which he penetrates concealed in a basket of flowers. The lovers are discovered, but their constancy touches the hearts of their judges. They are married, and Floire returns to his kingdom, when he and all his people adopt Christianity. Of the two 12th-century French poems (ed. Édélestand du Méril, Paris, 1856), the one contains the love story with few additions, the other is a romance of chivalry, containing the usual battles, single combats, &c. Two lyrics based on episodes of the story are printed by Paulin Paris in his *Romancero français* (Paris, 1883). The English poem renders the French version without amplifications, such as are found in other adaptations. Its author has less sentiment than his original, and less taste for detailed description. Among the other forms of the story must be noted the prose romance (*c.* 1340) of Boccaccio, *Il Filocolo*, and the 14th-century *Leggenda della reina Rosana e di Rosana sua figliuola* (pr. Leghorn, 1871). The similarity between the story of Floire and Blanchefleur and *Chante-fable of Aucassin et Nicolete*[1] has been repeatedly pointed out, and they have even been credited with a common source.

See also editions by I. Bekker (Berlin, 1844) and E. Hausknecht (Berlin, 1885); also H. Sundmacher, *Die altfr. und mittelhochdeutsche Bearbeitung der Sage von Flore et Blanscheflur* (Göttingen, 1872); H. Herzog, *Die beiden Sagenkreise von Flore und Blanscheflur* (Vienna, 1884); *Zeitschrift für deut. Altertum* (vol. xxi.) contains a Rhenish version; the Scandinavian *Flores Saga ok Blankiflùr*, ed. E. Kölbing (Halle, 1896); the 13th-century version of Konrad Fleck, *Flore und Blanscheflur*, ed. E. Sommer (Leipzig, 1846); the Swedish by G. E. Klemming (Stockholm, 1844). The English poem was also edited by Hartschorne (*English Metrical Tales*, 1829), by Laing (Abbotsford Club, 1829), and by Lumly (Early Eng. Text Soc., 1866, re-edited G. H. McKnight, 1901). J. Reinhold (*Floire et Blanchefleur*, Paris, 1906) suggests a parallelism with the story of Cupid and Psyche as told by Apuleius; also that the oriental setting does not necessarily imply a connexion with Arab tales, as the circumstances might with small alteration have been taken from the Vulgate version of the book of Esther.

FLORENCE, WILLIAM JERMYN (1831–1891), American actor, of Irish descent, whose real name was Bernard Conlin, was born on the 26th of July 1831 at Albany, N.Y., and first attracted attention as an actor at Brougham's Lyceum in 1851. Two years later he married Mrs Malvina Pray Littell (*d.* 1906), in association with whom, until her retirement in 1889, he won all his successes, notably in Benjamin Woolf's *The Mighty Dollar*, said to have been presented more than 2500 times. In 1856 they had a successful London season, Mrs Florence being one of the first American actresses to appear on the English stage. In 1889 Florence entered into partnership with Joseph Jefferson, playing Sir Lucius O'Trigger to his Bob Acres and Mrs John Drew's Mrs Malaprop on a very successful tour. His last appearance was with Jefferson on the 14th of November 1891, as Ezekiel Homespun in *The Heir-at-law*, and he died on the 18th of November in Philadelphia.

FLORENCE OF WORCESTER (d. 1118), English chronicler, was a monk of Worcester, who died, as we learn from his continuator, on the 7th of July 1118. Beyond this fact nothing is known of his life. He compiled a chronicle called *Chronicon ex chronicis* which begins with the creation and ends in 1117. The basis of his work was a chronicle compiled by Marianus Scotus, an Irish recluse, who lived first at Fulda, afterwards at Mainz. Marianus, who began his work after 1069, carried it up to 1082. Florence supplements Marianus from a lost version of the English Chronicle, and from Asser. He is always worth comparing with the extant English Chronicles; and from 1106 he is an independent annalist, dry but accurate. Either Florence or a later editor of his work made considerable borrowings from the first four books of Eadmer's *Historia novorum*. Florence's work is continued, up to 1141, by a certain John of Worcester, who wrote about 1150. John is valuable for the latter years of Henry I. and the early years of Stephen. He is friendly to Stephen, but not an indiscriminate partisan.

The first edition of these two writers is that of 1592 (by William Howard). The most accessible is that of B. Thorpe (Eng. Hist. Soc., 2 vols., 1848–1849); but Thorpe's text of John's continuation needs revision. Thorpe gives, without explanations, the insertions of an ill-informed Gloucester monk who has obscured the accurate chronology of the original. Thorpe also prints a continuation by John Taxter (died *c.* 1295), a 13th-century writer and a monk of Bury St Edmunds. Florence and John of Worcester are translated by J. Stevenson in his *Church Historians of England*, vol. ii. pt. i. (London, 1853); T. Forester's translation in Bohn's *Antiquarian Library* (London, 1854) gives the work of Taxter also. (H. W. C. D.)

FLORENCE, the county-seat of Lauderdale county, Alabama, U.S.A., on the N. bank of the Tennessee river, at the foot of Muscle Shoals Canal, and about 560 ft. above sea-level. Pop. (1880) 1359; (1890) 6012; (1900) 6478 (1952 negroes); (1910) 6689. It is served by the Southern, the Northern Alabama (controlled by the Southern), and the Louisville & Nashville railways, and by electric railway to Sheffield and Tuscumbia, and the Tennessee river is here navigable. Florence is situated in the fertile agricultural lands of the Tennessee river valley on the edge of the coal and iron districts of Alabama, and has various manufactures, including pig-iron, cotton goods, wagons, stoves, fertilizers, staves and mercantile supplies. At Florence are the state Normal College, the Florence University for Women, and the Burrell Normal School (for negroes; founded in 1903 by the American Missionary Association). Florence was founded in 1818, Andrew Jackson, afterwards president of the United States, and ex-president James Madison being among the early property holders. For several years Florence and Nashville, Tennessee, were commercial rivals, being situated respectively at the head of navigation on the Tennessee and Cumberland rivers. The first invasion of Alabama by Federal troops in the Civil War was by a gunboat raid up the Tennessee to Florence on the 8th of February 1862. On the 11th of April 1863 another Federal gunboat raid was attempted, but the vessels were repulsed by a force under Gen. S. A. Wood. On the 26th of May following, Federal troops entered Florence, and destroyed cotton mills and public and private property; but they were driven back by Gen. Philip D. Roddy (1820–1897). On the 11th of December 1863 the town was again raided, but the Federals did not secure permanent possession. Florence was chartered as a city in 1889.

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[1] Ed. H. Suchier (Paderborn, 1878, 5th ed. 1903); modern French by G. Michaut, with preface by J. Bédier (Tours, 1901); English by Andrew Lang (1887), by F. W. Bourdillon (Oxford, 1896), and by Laurence Housman (1902).

FLORENCE (Ital. *Firenze*, Lat. *Florentia*), formerly the capital of Tuscany, now the capital of a province of the kingdom of Italy, and the sixth largest city in the country. It is situated 43° 46′ N., 11° 14′ E., on both banks of the river Arno, which at this point flows through a broad fertile valley enclosed between spurs of the Apennines. The city is 165 ft. above sea-level, and occupies an area of 3 sq. m. (area of the commune, 16½ sq. m.). The geological formation of the soil belongs to the Quaternary and Pliocene period in its upper strata, and to the Eocene and Cretaceous in the lower. *Pietra forte* of the Cretaceous period is quarried north and south of the city, and has been used for centuries as paving stone and for the buildings. *Pietra serena* or *macigno*, a stone of a firm texture also used for building purposes, is quarried at Monte Ceceri below Fiesole. The soil is very fertile; wheat, Indian corn, olives, vines, fruit trees of many kinds cover both the plain and the surrounding hills; the chief non-fruit-bearing trees are the stone pine, the cypress, the ilex and the poplar, while many other varieties are represented. The gardens and fields produce an abundance of flowers, which justify the city's title of *la città dei fiori*.

Climate and Sanitary Conditions.—The climate of Florence is very variable, ranging from severe cold accompanied by high winds from the north in winter to great heat in the summer, while in spring-time sudden and rapid changes of temperature are frequent. At the same time the climate is usually very agreeable from the end of February to the beginning of July, and from the end of September to the middle of November. The average temperature throughout the year is about 57° Fahr.; the maximum heat is about 96·8°, and the minimum 36·5°, sometimes sinking to 21°. The longest day is 15 hours and 33 minutes, the shortest 8 hours and 50 minutes. The average rainfall is about 37½ inches. Epidemic diseases are rare and children's diseases mild; cholera has visited Florence several times, but the city has been free from it for many years. Diphtheria first appeared in 1868 and continued as a severe epidemic until 1872, since when it has only occurred at rare intervals and in isolated cases. Typhoid, pneumonia, tuberculosis, measles and scarlatina, and influenza are the commonest illnesses. The drainage system is still somewhat imperfect, but the water brought from the hills or from the Arno in pipes is fairly good, and the general sanitary conditions are satisfactory.

Churches.

Public Buildings.—Of the very numerous Florentine churches the Duomo (Santa Maria del Fiore) is the largest and most important, founded in 1298 on the plans of Arnolfo di Cambio, completed by Brunelleschi, and consecrated in 1436; the façade, however, was not finished until the 19th century—it was begun in 1875 on the designs of de Fabris and unveiled in 1888. Close by the Duomo is the no less famous Campanile built by Giotto, begun in 1332, and adorned with exquisite bas-reliefs. Opposite is the Baptistery built by Arnolfo di Cambio in the 13th century on the site of an earlier church, and adorned with beautiful bronze doors by Ghiberti in the 15th century. The Badia, Santo Spirito, Santa Maria Novella, are a few among the many famous and beautiful churches of Florence. The existence of these works of art attracts students from all countries, and a German art school subsidized by the imperial government has been instituted.

The streets and piazze of the city are celebrated for their splendid palaces, formerly, and in many cases even to-day the residences of the noble families of Florence. Among others we may mention the Palazzo Vecchio, formerly the seat of the government of the Republic and now the town hall, the Palazzo Riccardi, the residence of the Medici and now the prefecture, the palaces of the Strozzi, Antinori (one of the most perfect specimens of Florentine *quattrocento* architecture), Corsini, Davanzati, Pitti (the royal palace), &c. The palace of the Arte della Lana or gild of wool merchants, tastefully and intelligently restored, is the headquarters of the Dante Society. The centre of Florence, which was becoming a danger from a hygienic point of view, was pulled down in 1880–1890, but, unfortunately, sufficient care was not taken to avoid destroying certain buildings of historic and artistic value which might have been spared without impairing the work of sanitation, while the new structures erected in their place, especially those in the Piaza Vittorio Emanuele, are almost uniformly ugly and quite out of keeping with Florentine architecture. The question aroused many polemics at the time both in Italy and abroad. After the new centre was built, a society called the *Società per la difesa di Firenze antica* was formed by many prominent citizens to safeguard the ancient buildings and prevent them from destruction, and a spirit of intelligent conservatism seems now to prevail in this connexion. The city is growing in all directions, and a number of new quarters have sprung up where the houses are more sanitary than in the older parts, but unfortunately few of them evince much aesthetic feeling. The *viali* or boulevards form pleasant residential streets with gardens, and the system of building separate houses for each family (villini) instead of large blocks of flats is becoming more and more general.

Libraries.

Florence possesses four important libraries besides a number of smaller collections. The *Biblioteca Nazionale*, originally founded by Antonio Magliabecchi in 1747, enjoys the right, shared by the *Vittorio Emanuele* library of Rome, of receiving a copy of every work printed in Italy, since 1870 (since 1848 it had enjoyed a similar privilege with regard to works printed in Tuscany). It contains some 500,000 printed volumes, 700,000 pamphlets, over 9000 prints and drawings (including 284 by Albert Dürer), nearly 20,000 MSS., and 40,000 letters. The number of readers in 1904 was over 50,000. Unfortunately, however, the confusion engendered by a defective organization has long been a byword among the people; there is no printed catalogue, quantities of books are buried in packing-cases and unavailable, the collection of foreign books is very poor, hardly any new works being purchased, and the building itself is quite inadequate and far from safe; but the site of a new one has now been purchased and the plans are agreed upon, so that eventually the whole collection will be transferred to more suitable quarters. The *Biblioteca Marucelliana*, founded in 1752, contains 150,000 books, including 620 incunabula, 17,000 engravings and 1500 MSS.; it is well managed and chiefly remarkable for its collection of illustrated works and art publications. The *Biblioteca Mediceo-Laurenziana*, founded in 1571, has its origin in the library of Cosimo de' Medici the Elder, and was enlarged by Piero, Giovanni and above all by Lorenzo the Magnificent. Various princes and private persons presented it with valuable gifts and legacies, among the most important of which was the collection of *editiones principes* given by Count d'Elci, in 1841, and the Ashburnham collection of MSS. purchased by the Italian Government in 1885. It contains nearly 10,000 MSS., including many magnificent illuminated missals and Bibles and a number of valuable Greek and Latin texts, 242 incunabula and 11,000 printed books, chiefly dealing with palaeography; it is in some ways the most important of the Florentine libraries. The *Biblioteca Riccardiana*, founded in the 16th century by Romolo Riccardi, contains nearly 4000 MSS., over 32,000 books and 650 incunabula, chiefly relating to Florentine history. The state archives are among the most complete in Italy, and contain over 450,000 *filze* and *registri* and 126,000 charters, covering the period from 726 to 1856.

Galleries of Fine Arts and Museums.

Few cities are as rich as Florence in collections of works of artistic and historic interest, although the great majority of them belong to a comparatively limited period—from the 13th to the 16th century. The chief art galleries are the Uffizi, the Pitti and Accademia. The two former are among the finest in the world, and are filled with masterpieces by Raphael, Andrea del Sarto, Perugino, Ghirlandaio, Botticelli, the Lippi, and many other Florentine, Umbrian, Venetian, Dutch and Flemish artists, as well as numerous admirable examples of antique, medieval and Renaissance sculpture. The Pitti collection is in the royal palace (formerly the residence of the grand dukes), and a fine new stairway and vestibule have been constructed by royal munificence. In the Uffizi the pictures are arranged in strict chronological order. In the Accademia, which is rich in early Tuscan masters, the Botticelli and Perugino rooms deserve special mention. Other pictures are scattered about in the churches, monasteries and private palaces. Of the monasteries, that of St Mark should be mentioned, as containing many works of Fra Angelico, besides relics of Savonarola, while of the private collections the only one of importance is that of Prince Corsini. There is a splendid museum of medieval and Renaissance antiquities in the Bargello, the ancient palace of the Podestà, itself one of the finest buildings in the city; among its many treasures are works of Donatello, Ghiberti, Verrochio and other sculptors, and large collections of ivory, enamel and bronze ware. The Opera del Duomo contains models and pieces of sculpture connected with the cathedral; the Etruscan and Egyptian museum, the gallery of tapestries, the Michelangelo museum, the museum of natural history and other collections are all important in different ways.

Population.

The total population of Florence in 1905, comprising foreigners and a garrison of 5500 men, was 220,879. In 1861 it was 114,363; it increased largely when the capital of Italy was in Florence (1865–1872), but decreased or increased very slightly after the removal of the capital to Rome, and increased at a greater rate from 1881 onwards. At present the rate of increase is about 22 per 1000, but it is due to immigration, as the birth rate was actually below the death rate down to 1903, since when there has been a slight increase of the former and a decrease of the latter.

Administration.

Florence is the capital of a province of the same name, and the central government is represented by a prefect (*prefetto*), while local government is carried on by a mayor (*sindaco*) and an elective town council (*consiglio comunale*). The city is the seat of a court of cassation (for civil cases only), of a court of appeal, besides minor tribunals. It is the headquarters of an army corps, and an archiepiscopal see.

Education.

There are 22 public elementary schools for boys and 18 for girls (education being compulsory and gratuitous), with about 20,000 pupils, and 56 private schools with 5700 pupils. Secondary education is provided by one higher and four lower technical schools with 1375 pupils, three *ginnasii* or lower classical schools, and three *licei* or higher classical schools, with 1000 pupils, and three training colleges with over 700 pupils. Higher education is imparted at the university (*Istituto di studii superiori e di perfezionamento*), with 600 to 650 students; although only comprising the faculties of literature, medicine and natural science, it is, as regards the first-named faculty, one of the most important institutions in Italy. The original *Studio Fiorentino* was founded in the 14th century, and acquired considerable fame as a centre of learning under the Medici, enhanced by the presence in Florence of many learned Greeks who had fled from Constantinople after its capture by the Turks (1453). Although in 1472 some of the faculties and several of the professors were transferred to Pisa, it still retained importance, and in the 17th and 18th centuries it originated a number of learned academies. In 1859 after the annexation of Tuscany to the Italian kingdom it was revived and reorganized; since then it has become to some extent a national centre of learning and culture, attracting students from other parts of Italy, partly on account of the fact that it is in Florence that the purest Italian is spoken. The revival of classical studies on scientific principles in modern Italy may be said to have begun in Florence, and great activity has also been displayed in reviving the study of Dante, Dante lectures being given regularly by scholars and men of letters from all parts of the country, above the church of Or San Michele as in the middle ages, under the auspices of the *Società Dantesca*. Palaeography, history and Romance languages are among the other subjects to which especial importance is given. Besides the *Istituto di studii superiori* there is the *Istituto di scienze sociali* "*Cesare Alfieri*," founded by the marchese Alfieri di Sostegno for the education of aspirants to the diplomatic and consular services, and for students of economics and social sciences (about 50 students); an academy of fine arts, a conservatoire of music, a higher female training-college with 150 students, a number of professional and trade schools, and an academy of recitation. There are also many academies and learned societies of different kinds, of which one of the most important is the *Accademia della Crusca* for the study of the Italian language, which undertook the publication of a monumental dictionary.

Charities, etc.

Several of the Florence hospitals are of great antiquity, the most important being that of Santa Maria Nuova, which, founded by Folco Portinari, the father of Dante's Beatrice, has been thoroughly renovated according to modern scientific principles. There are numerous other hospitals both general and special, a foundling hospital dating from the 13th century (Santa Maria degli Innocenti), an institute for the blind, one for the deaf and dumb, &c. Most of the hospitals and other charitable institutions are endowed, but the endowments are supplemented by private contributions.

Commerce and Industry.

Florence is the centre of a large and fertile agricultural district, and does considerable business in wine, oil and grain; and supplies the neighbouring peasantry with goods of all kinds. There are no important industries, except a few flour-mills, some glass works, iron foundries, a motor car factory, straw hat factories, and power-houses supplying electricity for lighting and for the numerous tramcars. There are, however, some artistic industries in and around the city, of which the most important is the Ginori-Richard porcelain works, and the Cantagalli majolica works. There are many other smaller establishments, and the Florentine artificer seems to possess an exceptional skill in all kinds of work in which art is combined with technical ability. Another very important source of revenue is the so-called "tourist industry," which in late years has assumed immense proportions; the city contains a large number of hotels and boarding-houses which every year are filled to overflowing with strangers from all parts of the world. (L. V.*)

History

Florentia was founded considerably later than Faesulae (Fiesole), which lies on the hill above it; indeed, as its name indicates, it was built only in Roman times and probably in connexion with the construction by C. Flaminius in 187 B.C. of a road from Bononia to Arretium (which later on formed part of the Via Cassia) at the point where this road crossed the river Arnus. We hear very little of it in ancient times; it appears to have suffered at the end of the war between Marius and Sulla, and in A.D. 15 (by which period it seems to have been already a colony) it successfully opposed the project of diverting part of the waters of the Clanis into the Arno (see CHIANA). Tacitus mentions it, and Florus describes it as one of the *municipia splendidissima*. A bishop of Florence is mentioned in A.D. 313. A group of Italic cremation tombs *a pozzo* of the Villanova period were found under the pavement of the medieval Vicolo del Campidoglio. This took its name from the *Capitolium* of Roman times, the remains of which were found under the Piazza Luna; the three *cellae* were clearly traceable. The capitals of the columns were Corinthian, about 4 ft. in diameter, and it became clear that this temple had supplied building materials for S. Giovanni and S. Miniato. Fragments of a fine octagonal altar, probably belonging to the temple, were found. Remains of baths have been found close by, while the ancient amphitheatre has been found near S. Croce outside the Roman town, which formed a rectangle of about 400 by 600 yds., with four gates, the *Decumanus* being represented by the Via Strozzi and Via del Corso, and the *Cardo* by the Via Calcinara, while the Mercato Vecchio occupied the site of the Forum.

See L. A. Milani, "Reliquie di Firenze antica," in *Monumenti dei Lincei*, vi. (1896), 5 seq. (T. As.)

The first event of importance recorded is the siege of the city by the Goths, A.D. 405, and its deliverance by the Roman general Stilicho. Totila besieged Florence in 542, but was repulsed by the imperial garrison under Justin, and later it was occupied by the Goths. We find the Longobards in Tuscany in 570, and mention is made of one *Gudibrandus Dux civitatis Florentinorum*, which suggests that Florence was the capital of a duchy (one of the regular divisions of the Longobard empire). Charlemagne was in Florence in 786 and conferred many favours on the city, which continued to grow in importance owing to its situation on the road from northern Italy to Rome. At the time of the agitation against simony and the corruption of the clergy, the head of the movement in Florence was San Giovanni Gualberto, of the monastery of San Salvi. The simoniacal election of Pietro Mezzabarba as bishop of Florence (1068) caused serious disturbances and a long controversy with Rome, which ended in the triumph, after a trial by fire, of the monk Petrus Igneus, champion of the popular reform movement; this event indicates the beginnings of a popular conscience among the Florentines.

The countess Matilda.

Guelphs and Ghibellines.

Beginnings of the commune.

War with the nobles.

The potestas.

Under the Carolingian emperors Tuscany was a March or margraviate, and the marquises became so powerful as to be even a danger to the Empire. Under the emperor Otto I. one Ugo (d. 1001) was marquis, and the emperor Conrad II. (elected in 1024) appointed Boniface of Canossa marquis of Tuscany, a territory then extending from the Po to the borders of the Roman state. Boniface died in 1052, and in the following year the margraviate passed to his daughter, the famous countess Matilda, who ruled for forty years and played a prominent part in the history of Italy in that period. In the Wars of the Investitures Matilda was ever on the papal (afterwards called Guelph) side against the emperor and the faction afterwards known as Ghibelline, and she herself often led armies to battle. It is at this time that the people of Florence first began to acquire influence, and while the countess presided at the courts of justice in the name of the Empire, she was assisted by a group of great feudal nobles, judges, lawyers, &c., who formed, as elsewhere in Tuscany, the *boni homines* or *sapientes*. As the countess was frequently absent these *boni homines* gave judgment without her, thus paving the way for a free commune. The citizens found themselves in opposition to the nobility of the hills around the city, Teutonic feudatories of Ghibelline sympathies, who interfered with their commerce. Florence frequently waged war with these nobles and with other cities on its own account, although in the name of the countess, and the citizens began to form themselves into groups and associations which were the germs of the *arti* or gilds. After the death of Countess Matilda in 1115 the *grandi* or *boni homines* continued to rule and administer justice, but in the name of the people—a change hardly noticed at first, but which marks the foundation of the commune. After 1138 the *boni homines* began to be called *consules*, while the population was divided into the *grandi* or *delle torri*, *i.e.* the noble families who had towers, and the *arti* or trade and merchant gilds. At first the *consules*, of whom there seem to have been twelve, two for each *sestiere* or ward, were chosen by the men of the towers, and assisted by a council of 100 *boni homines*, in which the *arti* were predominant; the government thus came to be in the hands of a few powerful families. The republic now proceeded to extend its power. In 1125 Fiesole was sacked and destroyed, but the feudal nobles of the *contado* (surrounding country), protected by the imperial margraves, were still powerful. The early margraves had permitted the Florentines to wage war against the Alberti family, whose castles they destroyed. The emperor Lothair when in Italy forced Florence to submit to his authority, but at his death in 1137 things returned to their former state and the Florentines fought successfully against the powerful counts Guidi. Frederick Barbarossa, however, elected emperor in 1152, made his authority felt in Tuscany, and appointed one Welf of Bavaria as margrave. Florence and other cities were forced to supply troops to the emperor for his Lombard campaigns, and he began to establish a centralized imperial bureaucracy in Tuscany, appointing a *potestas*, who resided at San Miniato (whence the name of "San Miniato al Tedesco"), to represent him and exercise authority in the *contado*; this double authority of the *consoli* in the town and the *potestas* or *podestà* outside generated confusion. By 1176 the Florentines were masters of all the territory comprised in the dioceses of Florence and Fiesole; but civil commotion within the city broke out between the *consoli* and the greater nobles, headed by the Alberti and strengthened by the many feudal families who had been forced to leave their castles and dwell in the city (1177–1180). In the end the Alberti, though not victorious, succeeded in getting occasionally admitted to the consulship. Florence now formed a league with the chief cities of Tuscany, made peace with the Guidi, and humbled the Alberti whose castle of Semifonte was destroyed (1202). Later we find a *potestas* within the city, elected for a year and assisted by seven councillors and seven *rectores super capitibus artium*. This represented the triumph of the feudal party, which had gained the support of the *arti minori* or minor gilds. The *potestates* subsequently were foreigners, and in 1207 the dignity was conferred on Gualfredotto of Milan; a new council was formed, the *consiglio del comune*, while the older senate still survived. The Florentines now undertook to open the highways of commerce towards Rome, for their city was already an important industrial and banking centre.

Comune and popolo.

Battle of Montaperti (1260).

Discord among the great families broke out again, and the attempt to put an end to it by a marriage between Buondelmonte de' Buondelmonti and a daughter of the Amidei, only led to further strife (1215), although the causes of these broils were deeper and wider, being derived from the general division between Guelphs and Ghibellines all over Italy. But the work of crushing the nobles of the *contado* and of asserting the city's position among rival communes continued. In 1222 Florence waged war successfully on Pisa, Lucca and Pistoia, and during the next few years against the Sienese with varying results; although the emperor supported the latter as Ghibellines, on his departure for Germany in 1235 they were forced to accept peace on onerous terms. During the interregnum (1241–1243) following on the death of Pope Gregory IX. the Ghibelline cause revived in Tuscany and imperial authority was re-established. The tumults against the Paterine heretics (1244–1245), among whom were many Ghibelline nobles favoured by the *podestà* Pace di Pesamigola, indicate a successful Guelphic reaction; but Frederick II., having defeated his enemies both in Lombardy and in the Two Sicilies, appointed his natural son, Frederick of Antioch, imperial vicar in Tuscany, who, when civil war broke out, entered the city with 1600 German knights. The Ghibellines now triumphed completely, and in 1249 the Guelph leaders were driven into exile—the first of many instances in Florentine history of exile *en masse* of a defeated party. The attempt to seize Montevarchi and other castles where the Guelph exiles were congregated failed, and in 1250 the burghers elected thirty-six *caporali di popolo*, who formed the basis of the *primo popolo* or body of citizens independent of the nobles, headed by the *capitano del popolo*. The Ghibellines being unable to maintain their supremacy, the city came to be divided into two almost autonomous republics, the *comune* headed by the *podestà*, and the *popolo* headed by the *capitano* and militarily organized into twenty companies; the central power was represented by twelve *anziani* or elders. The *podestà*, who was always a foreigner, usually commanded the army, represented the city before foreign powers, and signed treaties. He was assisted by the *consiglio speciale* of 90 and the *consiglio generale e speciale* of 300, composed of nobles, while the *capitano del popolo* had also two councils composed of burghers, heads of the gilds, *gonfalonieri* of the companies, &c. The *anziani* had a council of 36 burghers, and then there was the *parlamento* or general assembly of the people, which met only on great occasions. At this time the *podestà's* palace (the Bargello) was built, and the gold florin was first coined and soon came to be accepted as the standard gold piece throughout Europe. But, although greatly strengthened, the Guelphs, who now may be called the democrats as opposed to the Ghibelline aristocrats, were by no means wholly victorious, and in 1251 they had to defend themselves against a league of Ghibelline cities (Siena, Pisa and Pistoia) assisted by Florentine Ghibellines; the Florentine Uberti, who had been driven into exile after their plot of 1258, took refuge in Siena and encouraged that city in its hostility to Florence. Fresh disputes about the possession of Montepulciano and other places having arisen, the Florentines declared war once more. A Florentine army assisted by Guelphs of other towns was cunningly induced to believe that Siena would surrender at the first summons; but it was met by a Sienese army reinforced by Florentine exiles, including Farinata degli Uberti and other Ghibellines, and by the cavalry of Manfred (*q.v.*) of Sicily, led by Count Giordano and the count of Arras, with the result that the Florentines were totally routed at Montaperti on the 4th of September 1260. Count Giordano entered Florence, appointed Count Guido Novello *podestà*, and began a series of persecutions against the Guelphs. The Ghibellines even proposed to raze the walls of the city, but Farinata degli Uberti strongly opposed the idea, saying that "he had fought to regain and not to ruin his fatherland."

New constitution.

During this new Ghibelline predominance (1260–1266) the old liberties were abolished, and the *popolo* was deprived of all share in the administration. But when Charles I. (*q.v.*) of Anjou descended into Italy as champion of the papacy, and Manfred was defeated and killed (1266), the *popolo*, who had acquired wealth in trade and industry, was ready to rise. After some disturbances Guido Novello and the Ghibellines were expelled, but it was not the *popolo* who triumphed; the pope and Charles were the real masters of the situation, and the Florentines found they had exchanged a foreign and Ghibelline protector for one who was foreign and Guelph. Nevertheless much of the old order was restored; the *podestà* who represented King Charles was assisted by 12 *buoni uomini*, and by the council of the 100 *buoni uomini del popolo*, "without the deliberation of whom," says Villani, "no great matter nor expenditure could be undertaken." Other bodies and magistrates were maintained, and the *capitano del popolo*, now called *capitano della massa di parte Guelfa*, tended to become a very important person. The property of the Ghibellines was confiscated, and a commission of six *capitani di parte Guelfa* appointed to administer it and in general to expend it for the persecution of the Ghibellines. The whole constitution of the republic, although of very democratic tendencies, seemed designed to promote civil strife and weaken the central power.

Florentine trade and the gilds.

While the constitution was evolving in a manner which seemed to argue small political ability and no stability in the Florentines, the people had built up a wonderful commercial organization. Each of the seven *arti maggiori* or greater gilds was organized like a small state with its councils, statutes, assemblies, magistrates, &c., and in times of trouble constituted a citizen militia. Florentine cloth especially was known and sold all over Europe, and the Florentines were regarded as the first merchants of the age. If the life of the city went on uninterruptedly even during the many changes of government and the almost endemic civil war, it was owing to the solidity of the gilds, who could carry on the administration without a government.

Cardinal Latino.

After Charles's victory over Conradin in 1268 the Florentines defeated the Sienese (1269) and made frequent raids into Pisan territory. As Charles perpetually interfered in their affairs, always favouring the *grandi* or Guelph nobles, some of the Ghibellines were recalled as a counterpoise, which, however, only led to further civil strife. Rudolph of Habsburg, elected king of the Romans in 1273, having come to terms with Pope Nicholas III., Charles was obliged in 1278 to give up his title of imperial vicar in Tuscany, which he had held during the interregnum following on the death of Frederick II. In 1279 Pope Nicholas sent his nephew, the friar preacher Latino Frangipani Malabranca, whom he had created cardinal bishop of Ostia the same year, to reconcile the parties in Florence once more. Cardinal Latino to some extent succeeded, and was granted a kind of temporary dictatorship. He raised the 12 *buoni uomini* to 14 (8 Guelphs and 6 Ghibellines), to be changed every two months; and they were assisted by a council of 100. A force of 1000 men was placed at the disposal of the *podestà* and *capitano* (now both elected by the people) to keep order and oblige the *grandi* to respect the law. The Sicilian Vespers (*q.v.*) by weakening Charles strengthened the commune, which aimed at complete independence of emperors, kings and popes. After 1282 the *signoria* was composed of the 3 (afterwards 6) *priori* of the gilds, who ended by ousting the *buoni uomini*, while a *defensor artificum et artium* takes the place of the *capitano*; thus the republic became an essentially trading community, governed by the *popolani grassi* or rich merchants.

Battle of Campaldino (1289).

Ordinamenti della Giustizia (1293).

The republic now turned to the task of breaking the power of the Ghibelline cities of Pisa and Arezzo. In 1289 the Aretini were completely defeated by the Florentines at Campaldino, a battle made famous by the fact that Dante took part in it. War against the Pisans, who had been defeated by the Genoese in the naval battle of La Meloria in 1284, was carried on in a desultory fashion, and in 1293 peace was made. But the *grandi*, who had largely contributed to the victory of Campaldino, especially men like Corso Donati and Vieri de' Cerchi, were becoming more powerful, and Charles had increased their number by creating a great many knights; but their attempts to interfere with the administration of justice were severely repressed, and new laws were passed to reduce their influence. Among other internal reforms the abolition of the last traces of servitude in 1289, and the increase in the number of *arti*, first to 12 and then to 21 (7 *maggiori* and 14 *minori*) must be mentioned. This, however, was not enough for the Florentine democracy, who viewed with alarm the increasing power and arrogance of the *grandi*, who in spite of their exclusion from many offices were still influential and constituted independent clans within the state. The law obliged each member of the clan (*consorteria*) to *sodare* for all the other members, *i.e.* to give a pecuniary guarantee to ensure payment of fines for offences committed by any one of their number, a provision made necessary by the fact that the whole clan acted collectively. But as the laws were not always enforced new and severe ones were enacted. These were the famous *Ordinamenti della Giustizia* of 1293, by which all who were not of the *arti* were definitely excluded from the signory. The *priori* were to remain in office two months and elected the *gonfaloniere*, also for two months; there were the *capitudini* or councils of the gilds, and two *savi* for each *sestiere*, with 1000 soldiers at their disposal; the number of the *grandi* families was fixed at 38 (later 72). Judgment in matters concerning the *Ordinamenti* was delivered in a summary fashion without appeal. The leading spirit of this reform was Giano della Bella, a noble who by engaging in trade had become a *popolano*; the *grandi* now tried to make him unpopular with the *popolani grassi*, hoping that without him the *Ordinamenti* would not be executed, and opened negotiations with Pope Boniface VIII. (elected 1294), who aimed at extending his authority in Tuscany. A signory adverse to Giano having been elected, he was driven into exile in 1295. The *grandi* regained some of their power by corrupting the *podestà* and by the favour of the *popolo minuto* or unorganized populace; but their quarrels among themselves prevented them from completely succeeding, while the *arti* were solid.

The Bianchi and the Neri.

In 1295 a signory favourable to the *grandi* enacted a law attenuating the *Ordinamenti*, but now the *grandi* split into two factions, one headed by the Donati, which hoped to abolish the *Ordinamenti*, and the other by the Cerchi, which had given up all hope of their abolition; afterwards these parties came to be called *Neri* (Blacks) and *Bianchi* (Whites). A plot of the Donati to establish their influence over Florence with the help of Boniface VIII. having been discovered (May 1300), serious riots broke out between the Neri and the Bianchi. The pope's attempt to unite the *grandi* having failed, he summoned Charles of Valois to come to his assistance, promising him the imperial crown; in 1301 Charles entered Italy, and was created by the pope *paciaro* or peace-maker of Tuscany, with instructions to crush the Bianchi and the *popolo* and exalt the Neri. On the 1st of November Charles reached Florence, promising to respect its laws; but he permitted Corso Donati and his friends to attack the Bianchi, and the new *podestà*, Cante dei Gabrielli of Gubbio, who had come with Charles, punished many of that faction; among those whom he exiled was the poet Dante (1302). Corso Donati, who for some time was the most powerful man in Florence, made himself many enemies by his arrogance, and was obliged to rely on the *popolo grasso*, the irritation against him resulting in a rising in which he was killed (1308). In this same year Henry of Luxemburg was elected king of the Romans and with the pope's favour he came to Italy in 1310; the Florentine exiles and all the Ghibellines of Italy regarded him as a saviour and regenerator of the country, while the Guelphs of Florence on the contrary opposed both him and the pope as dangerous to their own liberties and accepted the protection of King Robert of Naples, disregarding Henry's summons to submission. In 1312 Henry was crowned emperor as Henry VII. in Rome, but instead of the universal ruler and pacifier which he tried to be, he was forced by circumstances into being merely a German kaiser who tried to subjugate free Italian communes. He besieged Florence without success, and died of disease in 1313.

Uguccione della Fagginola and Castruccio Castracani.

The Pisans, fearing the vengeance of the Guelphs now that Henry was dead, had accepted the lordship of Uguccione della Fagginola, imperial vicar in Genoa. A brave general and an ambitious man, he captured Lucca and defeated the Florentines and their allies from Naples at Montecatini in 1315, but the following year he lost both Pisa and Lucca and had to fly from Tuscany. A new danger now threatened Florence in the person of Castruccio Castracani degli Antelminelli (*q.v.*), who made himself lord of Lucca and secured help from Matteo Visconti, lord of Milan, and other Ghibellines of northern Italy. Between 1320 and 1323 he harried the Florentines and defeated them several times, captured Pistoia, devastated their territory up to the walls of the city in spite of assistance from Naples under Raymundo de Cardona and the duke of Calabria (King Robert's son); never before had Florence been so humiliated, but while Castruccio was preparing to attack Florence he died in 1328. Two months later the duke of Calabria, who had been appointed protector of the city in 1325, died, and further constitutional reforms were made. The former councils were replaced by the *consiglio del popolo*, consisting of 300 *popolani* and presided over by the *capitano*, and the *consiglio del comune* of 250 members, half of them nobles and half *popolani*, presided over by the *podestà*. The *priori* and other officers were drawn by lot from among the Guelphs over thirty years old who were declared fit for public office by a special board of 98 citizens (1329). The system worked well at first, but abuses soon crept in, and many persons were unjustly excluded from office; trouble being expected in 1335 a captain of the guard was created. But the first one appointed, Jacopo dei Gabrielli of Gubbio, used his dictatorial powers so ruthlessly that at the end of his year of office no successor was chosen.

Attempt to capture Lucca.

The Florentines now turned their eyes towards Lucca; they might have acquired the city immediately after Castruccio's death for 80,000 florins, but failed to do so owing to differences of opinion in the signory; Martino della Scala, lord of Verona, promised it to them in 1335, but broke his word, and although their finances were not then very flourishing they allied themselves with Venice to make war on him. They were successful at first, but Venice made a truce with the Scala independently of the Florentines, and by the peace of 1339 they only obtained a part of Lucchese territory. At the same time they purchased from the Tarlati the protectorate over Arezzo for ten years. But misfortunes fell on the city: Edward III. of England repudiated the heavy debts contracted for his wars in France with the Florentine banking houses of Bardi and Peruzzi (1339), which eventually led to their failure and to that of many smaller firms, and shook Florentine credit all over the world; Philip VI. of France extorted large sums from the Florentine merchants and bankers in his dominions by accusing them of usury; in 1340 plague and famine wrought terrible havoc in Florence, and riots again broke out between the *grandi* and the *popolo*, partly on account of the late unsuccessful wars and the unsatisfactory state of the finances. To put an end to these disorders, Walter of Brienne, duke of Athens, was elected "conservator" and captain of the guard in 1342. An astute, dissolute and ambitious man, half French and half Levantine, he began his government by a policy of conciliation and impartial justice which won him great popularity. But as soon as he thought the ground was secure he succeeded in getting himself acclaimed by the populace lord of Florence for life, and on the 8th of September was carried in triumph to the Palazzo della Signoria. The *podestà* and the *capitano* assenting to this treachery, he dismissed the *gonfaloniere*, reduced the *priori* to a position of impotence, disarmed the citizens, and soon afterwards accepted the lordship of Arezzo, Volterra, Colle, San Gimignano and Pistoia. He increased his bodyguard to 800 men, all Frenchmen, who behaved with the greatest licence and brutality; by his oppressive taxes, and his ferocious cruelty towards all who opposed him, and the unsatisfactory treaties he concluded with Pisa, he accumulated bitter hatred against his rule. The *grandi* were disappointed because he had not crushed the *popolo*, and the latter because he had destroyed their liberties and interfered with the organization of the *arti*. Many unsuccessful plots against him were hatched, and having discovered one that was conducted by Antonio degli Adimari, the duke summoned the latter to the palace and detained him a prisoner. He also summoned 300 leading citizens on the pretext of wishing to consult them, but fearing treachery they refused to come. On the 26th of July 1343, the citizens rose in arms, demanded the duke's abdication, and besieged him in the palace. Help came to the Florentines from neighbouring cities, the *podestà* was expelled, and a *balìa* or provisional government of 14 was elected. The duke was forced to set Adimari and his other prisoners free, and several of his men-at-arms were killed by the populace; three of his chief henchmen, whom he was obliged to surrender, were literally torn to pieces, and finally on the 1st of August he had to resign his lordship. He departed from Florence under a strong guard a few days later, and the Fourteen cancelled all his enactments.

The duke of Athens (1342-43).

New constitution.

The expulsion of the duke of Athens was followed by several measures to humble the *grandi* still further, while the *popolo minuto* or artisans began to show signs of discontent at the rule of the merchants, and the populace destroyed the houses of many nobles. As soon as order was restored a *balìa* was appointed to reform the government, in which task it was assisted by the Sienese and Perugian ambassadors and by Simone da Battifolle. The *priori* were reduced to 8 (2 *popolani grassi*, 3 *mediani* and 3 *artifici minuti*), while the *gonfaloniere* was to be chosen in turn from each of those classes; the *grandi* were excluded from the administration, but they were still admitted to the *consiglio del comune*, the *cinque di mercanzia*, and other offices pertaining to the commune; the *Ordinamenti* were maintained but in a somewhat attenuated form, and certain *grandi* as a favour were declared to be of the *popolo*. Florence was now a thoroughly democratic and commercial republic, and its whole policy was mainly dominated by commercial considerations: its rivalry with Pisa was due to an ambition to gain secure access to the sea; its strong Guelphism was the outcome of its determination to secure the bank-business of the papacy, and its desire to extend its territory in Tuscany to the necessity for keeping open the land trade routes. Florentine democracy, however, was limited to the walls of the city, for no one of the *contado* nor any citizen of the subject towns enjoyed political rights, which were reserved for the inhabitants of Florence alone and not by any means for all of them.

Statistics.

Florence was in the 14th century a city of about 100,000 inhabitants, of whom 25,000 could bear arms; there were 110 churches, 39 religious houses; the shops of the *arte della lana* numbered over 200, producing cloth worth 1,200,000 florins; Florentine bankers and merchants were found all over the world, often occupying responsible positions in the service of foreign governments; the revenues of the republic, derived chiefly from the city customs, amounted to some 300,000 florins, whereas its ordinary expenses, exclusive of military matters and public buildings, were barely 40,000. It was already a centre of art and letters and full of fine buildings, pictures and libraries. But now that the *grandi* were suppressed politically, the lowest classes came into prominence, "adventurers without sense or virtue and of no authority for the most part, who had usurped public offices by illicit and dishonest practices" (Matteo Villani, iv. 69); this paved the way for tyranny.

In 1347 Florence was again stricken with famine, followed the next year by the most terrible plague it had ever experienced, which carried off three-fifths of the population (according to

The Great Plague (1348).

War with Milan (1351).

Villani). Yet in spite of these disasters the republic was by no means crushed; it soon regained the suzerainty of many cities which had broken off all connexion with it after the expulsion of the duke of Athens, and purchased the overlordship of Prato from Queen Joanna of Naples, who had inherited it from the duke of Calabria. In 1351 Giovanni Visconti, lord and archbishop of Milan, having purchased Bologna and allied himself with sundry Ghibelline houses of Tuscany with a view to dominating Florence, the city made war on him, and in violation of its Guelph traditions placed itself under the protection of the emperor Charles IV. (1355) for his lifetime. This move, however, was not popular, and it enabled the *grandi,* who, although excluded from the chief offices, still dominated the *parte Guelfa*, to reassert themselves. They had in 1347 succeeded in enacting a very stringent law against all who were in any way tainted with Ghibellinism, which, they themselves being above suspicion in that connexion, enabled them to drive from office many members of the *popolo minuto.* In 1358 the *parte Guelfa* made these enactments still more stringent, punishing with death or heavy fines all who being Ghibellines held office, and provided that if trustworthy witnesses were forthcoming condemnations might be passed for this offence without hearing the accused; even a non-proved charge or an *ammonizione* (warning not to accept office) might entail disfranchisement. Thus the *parte*, represented by its 6 (afterwards 9) captains, came to exercise a veritable reign of terror, and no one knew when an accusation might fall on him. The leader of the *parte* was Piero degli Albizzi, whose chief rivals were the Ricci family.

The condottieri.

Italy at this time began to be overrun by bands of soldiers of fortune. The first of these bands with whom Florence came into contact was the Great Company, commanded by the count of Lando, which twice entered Tuscany but was expelled both times by the Florentine troops (1358–1359).

In 1362 we find Florence at war with Pisa on account of commercial differences, and because the former had acquired the lordship of Volterra. The Florentines were successful until Pisa enlisted Sir John Hawkwood's English company; the latter won several battles, but were at last defeated at Cascina, and peace was made in 1364, neither side having gained much advantage. A fresh danger threatened the republic in 1367 when Charles IV., who had allied himself with Pope Urban V., Queen Joanna of Naples, and various north Italian despots to humble the Visconti, demanded that the Florentines should join the league. This they refused to do and armed themselves for defence, but eventually satisfied the emperor with a money payment.

The parte Guelfa.

The tyranny of the *parte Guelfa* still continued unabated, and the *capitani* carried an enactment by which no measure affecting the *parte* should be even discussed by the signory unless previously approved of by them. This infamous law, however, aroused so much opposition that some of the very men who had proposed it assembled in secret to discuss its abolition, and a quarrel between the Albizzi and the Ricci having weakened the *parte*, a *balìa* of 56 was agreed upon. Several of the Albizzi and the Ricci were excluded from office for five years, and a council called the Ten of Liberty was created to defend the laws and protect the weak against the strong. The *parte Guelfa* and the Albizzi still remained very influential and the attempts to abolish admonitions failed.

War with the church (1375-78).

In 1375 Florence became involved in a war which showed how the old party divisions of Italy had been obliterated. The papal legate at Bologna, Cardinal Guillaume de Noellet (d. 1394), although the church was then allied to Florence, was meditating the annexation of the city to the Holy See; he refused a request of the Florentines for grain from Romagna, and authorized Hawkwood to devastate their territory. Although a large part of the people disliked the idea of a conflict with the church, an alliance with Florence's old enemy Bernabò Visconti was made, war declared, and a *balìa* of 8, the *Otto della guerra* (afterwards called the "Eight Saints" on account of their good management) was created to carry on the campaign. Treaties with Pisa, Siena, Arezzo and Cortona were concluded, and soon no less than 80 towns, including Bologna, had thrown off the papal yoke. Pope Gregory XI. placed Florence under an interdict, ordered the expulsion of all Florentines from foreign countries, and engaged a ferocious company of Bretons to invade the republic's territory. The Eight levied heavy toll on church property and ordered the priests to disregard the interdict. They turned the tables on the pope by engaging Hawkwood, and although the Bretons by order of Cardinal Robert of Geneva (afterwards the anti-pope Clement VII.) committed frightful atrocities in Romagna, their captains were bribed by the republic not to molest its territory. By 1378 peace was made, partly through the mediation of St Catherine of Siena, and the interdict was removed in consideration of the republic's paying a fine of 200,000 florins to the pope.

Salvestro de' Medici.

The riot of the ciompi (1378).

During the war the Eight had been practically rulers of the city, but now the *parte Guelfa*, led by Lapo da Castiglionchio and Piero degli Albizzi, attempted to reassert itself by illicit interference in the elections and by a liberal use of "admonitions "(*ammonizioni*). Salvestro de' Medici, who had always opposed the *parte*, having been elected *gonfaloniere* in spite of its intrigues, proposed a law for the abolition of the admonitions, which was eventually passed (June 18, 1378), but the people had been aroused, and desired to break the power of the *parte* for good. Rioting occurred on the 21st of June, and the houses of the Albizzi and other nobles were burnt. The signory meanwhile created a *balìa* of 80 which repealed some of the laws promoted by the *parte*, and partly enfranchised the *ammoniti.* The people were still unsatisfied, the *arti minori* demanded further privileges, and the workmen insisted that their grievances against the *arti maggiori*, especially the wool trade by whom they were employed, be redressed. A large body of *ciompi* (wool carders) gathered outside the city and conspired to subvert the signory and establish a popular government. Although the plot, in which Salvestro does not seem to have played a part, was revealed, a good deal of mob violence occurred, and on the 21st of July the populace seized the *podestà's* palace, which they made their headquarters. They demanded a share in the government for the *popolo minuto*, but as soon as this was granted Tommaso Strozzi, as spokesman of the *ciompi*, obliged the signory to resign their powers to the Eight. Once the people were in possession of the palace, a *ciompo* named Michele di Lando took the lead and put a stop to disorder and pillage. He remained master of Florence for one day, during which he reformed the constitution, probably with the help of Salvestro de' Medici. Three new gilds were created, and nine priors appointed, three from the *arti maggiori*, three from the *minori*, and three from the new ones, while each of these classes in turn was to choose the *gonfaloniere* of justice; the first to hold the office was Michele di Lando. This did not satisfy the *ciompi*, and the disorders provoked by them resulted in a new government which reformed the two councils so as to exclude the lower orders. But to satisfy the people several of the *grandi*, including Piero degli Albizzi, were put to death, on charges of conspiracy, and many others were exiled. There was perpetual rioting and anarchy, and interference in the affairs of the government by the working men, while at the same time poverty and unemployment increased owing to the timidity of capital and the disorders, until at last in 1382 a reaction set in, and order was restored by the gild companies. Again a new constitution was decreed by which the *gonfaloniere* and half the *priori* were to be chosen from the *arti maggiori* and the other half from the *minori*; on several other boards the former were to be in the majority, and the three new gilds were abolished. The demagogues were executed or forced to fly, and Michele di Lando with great ingratitude was exiled. Several subsequent risings of the *ciompi*, largely of an economic character, were put down, and the Guelph families gradually regained much of their lost power, of which they availed themselves to exile their opponents and revive the odious system of *ammonizioni*.

Attempts to acquire Pisa (1402-6).

Meanwhile in foreign affairs the republic maintained its position, and in 1383 it regained Arezzo by purchase from the lieutenant of Charles of Durazzo. In 1390 Gian Galeazzo Visconti, having made himself master of a large part of northern Italy, intrigued to gain possession of Pisa and Siena. Florence, alone in resisting him, engaged Hawkwood, who with an army of 7000 men more than held his own against the powerful lord of Milan, and in 1392 a peace was concluded which the republic strengthened by an alliance with Pisa and several north Italian states. In 1393 Maso degli Albizzi was made *gonfaloniere*, and for many years remained almost master of Florence owing to his influential position in the *Arte della Lana*. A severe persecution was initiated against the Alberti and other families, who were disfranchised and exiled. Disorders and conspiracies against the merchant oligarchy continued, and although they were unsuccessful party passion was incredibly bitter, and the exiles caused the republic much trouble by intriguing against it in foreign states. In 1397–1398 Florence had two more wars with Gian Galeazzo Visconti, who, aspiring to the conquest of Tuscany, acquired the lordship of Pisa, Siena and Perugia. Hawkwood being dead, Florence purchased aid from the emperor Rupert. The Imperialists were beaten; but just as the Milanese were about to march on Florence, Visconti died. His territories were then divided between his sons and his *condottieri*, and Florence, ever keeping her eye on Pisa, now ruled by Gabriele Maria Visconti, made an alliance with Pope Boniface IX., who wished to regain Perugia and Bologna. War broke out once more, and the allies were successful, but as soon as Boniface had gained his ends he made peace, leaving the Florentines unsatisfied. In 1404 their attempt to capture Pisa single-handed failed, and Gabriele Maria placed himself under the protection of the French king. The Florentines then made overtures to France, who had supported the anti-popes all through the great schism, and suggested that they too would support the then anti-pope, Benedict XIII., in exchange for the sale of Pisa. This was agreed to, and in 1405 the city was sold to Florence for 260,000 florins; and Gino Capponi,[1] the Florentine commissioner, took possession of the citadel, but a few days later the citizens arose in arms and recaptured it from the mercenaries. There was great consternation in Florence at the news, and every man in the city "determined that he would go naked rather than not conquer Pisa" (G. Capponi). The next year that city, then ruled by Giovanni Gambacorti, was besieged by the Florentines, who blockaded the mouth of the Arno. After a six months' siege Pisa surrendered on terms (9th October 1406), and, although it was not sacked, many of the citizens were exiled and others forced to live in Florence, a depopulation from which it never recovered. Florence now acquired a great seaport and was at last able to develop a direct maritime trade.

The council of Pisa (1408).

Except in connexion with the Pisan question the republic had taken no definite side in the great schism which had divided the church since 1378, but in 1408 she appealed both to Pope Gregory XII. and the anti-pope Benedict XIII. as well as to various foreign governments in favour of a settlement, and suggested a council within her own territory. Gregory refused, but after consulting a committee of theologians who declared him to be a heretic, the council promoted by Cardinal Cossa and other independent prelates met at Pisa. This nearly led to war with King Ladislas of Naples, because he had seized Rome, which he could only hold so long as the church was divided. The council deposed both popes and elected Pietro Filargi as Alexander V. (26th of June). But Ladislas still occupied the papal states, and Florence, alarmed at his growing power and ambition, formed a league with Siena, Bologna and Louis of Anjou who laid claim to the Neapolitan throne, to drive Ladislas from Rome. Cortona, Orvieto, Viterbo and other cities were recovered for Alexander, and in January 1410 Rome itself was captured by the Florentines under Malatesta dei Malatesti. Alexander having died in May before entering the Eternal City, Cardinal Cossa was elected as John XXIII.; Florence without offending him made peace with Ladislas, who had ceased to be dangerous, and purchased Cortona of the pope. In 1413 Ladislas attacked the papal states once more, driving John from Rome, and threatened Florence; but like Henry VII., Gian Galeazzo Visconti, and other enemies of the republic, he too died most opportunely (6th of August 1414). John having lost all authority after leaving Rome, a new council was held at Constance, which put an end to the schism in 1417 with the election of Martin V. The new pope came to Florence in 1419 as he had not yet regained Rome, which was held by Francesco Sforza for Queen Joanna II. of Naples, and remained there until the following year.

No important changes in the constitution took place during this period except the appointment of two new councils in 1411 to decide on questions of peace and war. The aristocratic faction headed by Maso degli Albizzi, a wise and popular statesman, had remained predominant, and at Maso's death in 1417 he was succeeded in the leadership of the party by Niccolò da Uzzano. In 1421 Giovanni de' Medici was elected *gonfaloniere* of justice, an event which marks the beginning of that wealthy family's power. The same year the republic purchased Leghorn from the Genoese for 100,000 florins, and established a body of "Consuls of the Sea" to superintend maritime trade. Although 11,000,000 florins had been spent on recent wars Florence continued prosperous and its trade increased.

New war with the Visconti (1421-27).

In 1421 Filippo Maria Visconti, who had succeeded in reconquering most of Lombardy, seized Forlì; this induced the Florentines to declare war on him, as they regarded his approach as a menace to their territory in spite of the opposition of the peace party led by Giovanni de' Medici. The campaign was anything but successful, and the Florentines were defeated several times, with the result that their credit was shaken and several important firms failed. The pope too was against them, but when they induced the Venetians to intervene the tide of fortune changed, and Visconti was finally defeated and forced to accept peace on onerous terms (1427).

Fiscal reforms (1427).

The old systems of raising revenue no longer corresponded to the needs of the republic, and as early as 1336 the various loans made to the state were consolidated into one national debt (*monte*). Subsequently all extraordinary expenditure was met by forced loans (*prestanze*), but the method of distribution aroused discontent among the lower classes, and in 1427 a general *catasto* or assessment of all the wealth of the citizens was formed, and measures were devised to distribute the obligations according to each man's capacity, so as to avoid pressing too hardly on the poor. The *catasto* was largely the work of Giovanni de' Medici, who greatly increased his popularity thereby. He died in 1429.

Exile and return of Cosimo de' Medici (1433-34).

An attempt to capture Lucca led Florence, in alliance with Venice, into another costly war with Milan (1432–1433). The mismanagement of the campaign brought about a quarrel between the aristocratic party, led by Rinaldo degli Albizzi, and the popular party, led by Giovanni de' Medici's son Cosimo (1389–1464), although both had agreed to the war before it began. Rinaldo was determined to break the Medici party, and succeeded in getting Cosimo exiled. The Albizzi tried to strengthen their position by conferring exceptional powers on the *capitano del popolo* and by juggling with the election bags, but the Medici still had a great hold on the populace. Rinaldo's proposal for a *coup d'état* met with no response from his own party, and he failed to prevent the election of a pro-Medici signory in 1434. He and other leaders of the party were summoned to the palace to answer a charge of plotting against the state, to which he replied by collecting 800 armed followers. A revolution was only averted through the intervention of Pope Eugenius IV., who was then in Florence. A *parlamento* was summoned, and the *balìa* appointed decreed the return of Cosimo and the exile of Rinaldo degli Albizzi, Rodolfo Peruzzi, Niccolò Barbadori, and others, in spite of the feeble attempt of Eugenius to protect them. On the 6th of October 1434 Cosimo returned to Florence, and for the next three centuries the history of the city is identified with that of the house of Medici.[1]

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[1] The historian, not to be confounded with the modern historian and statesman of the same name (*q.v.*).

Cosimo's rule.

Cosimo succeeded in dominating the republic while remaining nominally a private citizen. He exiled those who opposed him, and governed by means of the *balìe*, which, re-elected every five years, appointed all the magistrates and acted according to his orders. In 1437 Florence and Venice were again at war with the Visconti, whose chief captain, Niccolò Piccinino (*q.v.*), on entering Tuscany with many Florentine exiles in his train, was signally defeated at Anghiari by the Florentines under Francesco Sforza (1440); peace was made the following year. The system of the *catasto*, which led to abuses, was abolished, and a progressive income-tax (*decima scalata*) was introduced with the object of lightening the burdens of the poor, who were as a rule Medicean, at the expense of the rich; but as it was frequently increased the whole community came to be oppressed by it in the end. Cosimo increased his own authority and that of the republic by aiding Francesco Sforza to become duke of Milan (1450), and he sided with him in the war against Venice (1452–1454). In 1452 the emperor Frederick III. passed through Florence on his way to be crowned in Rome, and was received as a friend. During the last years of Cosimo's life, affairs were less under his control, and the *gonfaloniere* Luca Pitti, a vain and ambitious man, introduced many changes, such as the abasement of the authority of the *podestà* and of the *capitano*, which Cosimo desired but was glad to attribute to others.

Piero de' Medici (the Gouty).

In 1464 Cosimo died and was succeeded, not without some opposition, by his son Piero, who was very infirm and gouty. Various plots against him were hatched, the anti-Medicean faction being called the Del Poggio party because the house of its leader Luca Pitti was on a hill, while the Mediceans were called the Del Piano party because Piero's house was in the town below; the other opposition leaders were Dietisalvi Neroni and Agnolo Acciaiuoli. But Piero's unexpected energy upset the schemes of his enemies. The death of Sforza led to a war for the succession of Milan, and the Venetians, instigated by Florentine exiles, invaded Tuscany. The war ended, after many indecisive engagements, in 1468, through the intervention of Pope Paul II.

Lorenzo the Magnificent.

Piero died in 1469, leaving two sons, Lorenzo (1449–1492) and Giuliano (1453–1478). The former at once assumed the reins of government and became ruler of Florence in a way neither Cosimo nor Piero had ever attempted; he established his domination by means of *balìe* consisting of the signory, the *accoppiatori*, and 240 other members, all Mediceans, to be renewed every five years (1471). In 1472 a quarrel having arisen with Volterra on account of a dispute concerning the alum mines, Lorenzo sent an expedition against the city, which was sacked and many of the inhabitants massacred. Owing to a variety of causes an enmity arose between Lorenzo and Pope Sixtus IV., and the latter, if not an accomplice, at all events had knowledge of the Pazzi conspiracy against the Medici (1478). The result of the plot was that, although Giuliano was murdered, Lorenzo strengthened his position, and put to death or exiled numbers of his enemies. He was excommunicated by Sixtus, who, together with King Ferdinand of Naples, waged war against him; no great successes were registered on either side at first, but eventually the Florentines were defeated at Poggio Imperiale (near Poggibonsi) and the city itself was in danger. Lorenzo's position was critical, but by his boldness in going to Naples he succeeded in concluding a peace with the king, which led to a reconciliation with the pope (1479–1480). He was received with enthusiasm on returning to Florence and became absolute master of the situation. In April 1480 a *balìa* was formed, and its most important act was the creation at Lorenzo's instance of the Council of Seventy; it was constituted for five years, but it became permanent, and all its members were Lorenzo's friends. From that time until his death the city was free from party strife under a *de facto* despotism, but after the Rinuccini conspiracy of that year the Council of Seventy passed a law declaring attempts on Lorenzo's life to be high treason. Owing to his political activity Lorenzo had neglected the business interests of his firm, and in order to make good certain heavy losses he seems to have appropriated public funds. His foreign policy, which was magnificent but expensive, rendered further forced loans necessary, and he also laid hands on the Monte delle Doti, an insurance institution to provide dowries for girls.

An attempt by the Venetians to seize Ferrara led to a general Italian war, in which Florence also took part on the side hostile to Venice, and when peace was made in 1484 the republic gained some advantages. The following year a revolt of the Neapolitan barons against King Ferdinand broke out, actively supported by Pope Innocent VIII.; Lorenzo remained neutral at first, but true to his policy of maintaining the balance of power and not wishing to see Ferdinand completely crushed, he ended by giving him assistance in spite of the king's unpopularity in Florence. Peace was made when the pope agreed to come to terms in 1486, and in 1487 Lorenzo regained Sarzana, which Genoa had taken from Florence nine years previously. The general disorders and ceaseless intrigues all over Italy required Lorenzo's constant attention, and he succeeded in making Florence "the needle of the balance of power in Italy."

Savonarola.

At this time the Dominican Fra Girolamo Savonarola (*q.v.*) was in Florence and aroused the whole city by his denunciations of ecclesiastical corruption and also of that of the Florentines. He opposed Lorenzo's government as the source of the immorality of the people, and to some extent influenced public opinion against him. Ill-health now gained on Lorenzo, and Savonarola, whom he had summoned to his bedside, refused to give absolution to the destroyer of Florentine liberties. Lorenzo, during whose rule Florence had become one of the greatest centres of art and literature in Europe, died in 1492.

Piero de' Medici.

He was succeeded by his son Piero, who had none of his father's capacity and made a number of political blunders. When Charles VIII. of France came to Italy to conquer Naples Piero decided to assist the latter kingdom, although the traditional sympathies of the people were for the French king, and when Charles entered Florentine territory and captured Sarzana, Piero went to his camp and asked pardon for opposing him. The king demanded the cession of Pisa, Leghorn and other towns, which Piero granted, but on returning to Florence on the 8th of November 1494 he found the opposition greatly strengthened and his popularity forfeited, especially when the news of his disgraceful cessions to Charles became known. He was refused admittance to the palace, and the people began to shout "Popolo e libertà!" in opposition to the Medicean cry of "Palle, Palle!" (from the Medici arms). With a small escort he fled from the city, followed soon after by his brother Giovanni.

Expulsion of the Medici (1494).

That same day Pisa rose in revolt against the Florentines, and was occupied by Charles. The expulsion of the Medici produced some disorder, but Piero Capponi (*q.v.*) and other prominent citizens succeeded in keeping the peace. Ambassadors, one of whom was Savonarola, were sent to treat with the French king, but no agreement was arrived at until Charles entered Florence on the 17th of November at the head of 12,000 men.

Charles VIII. in Florence.

In spite of their French sympathies the citizens were indignant at the seizure of Sarzana, and while they gave the king a splendid welcome, they did not like his attitude of conqueror. Charles was impressed with the wealth and refinement of the citizens, and above all with the solid fortress-like appearance of their palaces. The signory appointed Piero Capponi, a man of great ability and patriotism, and experienced in diplomacy, the *gonfaloniere* Francesco Valori, the Dominican Giorgio Vespucci, and the jurisconsult and diplomatist Domenico Bonsi, syndics to conduct the negotiations with the French king. Charles's demands by no means pleased the citizens, and the arrogance and violence of his soldiers led to riots in which they were assailed with stones in the narrow streets. When the king began to hint at the recall of Piero de' Medici, whose envoys had gained his ear, the signory ordered the citizens to be ready to fly to arms. The proposal was dropped, but Charles demanded an immense sum of money before he would leave the city; long discussions followed, and when at last he presented an insolent ultimatum the syndics refused to accept it. The king said in a threatening tone, "Then we shall sound our trumpets," whereupon Capponi tore up the document in his face and replied, "And we shall ring our bells." The king, realizing what street fighting in Florence would mean, at once came to terms; he contented himself with 120,000 florins, agreeing to assume the title of "Protector and Restorer of the liberty of Florence," and to give up the fortresses he had taken within two years, unless his expedition to Naples should be concluded sooner; the Medici were to remain banished, but the price on their heads was withdrawn. But Charles would not depart, a fact which caused perpetual disturbance in the city, and it was not until the 28th of November, after an exhortation by Savonarola whom he greatly respected, that he left Florence.

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[1] The history of Florence from 1434 to 1737 will be found in greater detail in the article MEDICI, save for the periods from 1494 to 1512 and from 1527 to 1530, during which the republic was restored. For the period from 1530 to 1860 see also under TUSCANY.

Piero Capponi.

The revived republic.

Savonarola as a statesman.

It was now intended to re-establish the government on the basis of the old republican institutions, but it was found that sixty years of Medici rule had reduced them to mere shadows, and the condition of the government, largely controlled by a *balìa* of 20 *accoppiatori* and frequently disturbed by the summoning of the *parlamento*, was utterly chaotic. Consequently men talked of nothing save of changing the constitution, but unfortunately there was no longer an upper class accustomed to public affairs, while the lower class was thoroughly demoralized. Many proposals were made, none of them of practical value, until Savonarola, who had already made a reputation as a moral reformer, began his famous series of political sermons. In the prevailing confusion the people turned to him as their only hope, and gradually a new government was evolved, each law being enacted as the result of his exhortations. A Greater Council empowered to appoint magistrates and pass laws was formed, to which all citizens *netti di specchio* (who had paid their taxes) and *beneficiati* (*i.e.* who had sat in one of the higher magistracies or whose fathers, grandfathers, or great-grandfathers had done so) were eligible together with certain others. There were 3200 such citizens, and they sat one-third at a time for six months. The Greater Council was to elect another council of 80 citizens over forty years old, also to be changed every six months; this body, which the signory must consult once a week, together with the colleges and the signory itself, was to appoint ambassadors and commissaries of war, and deal with other confidential matters. The system of forced loans was abolished and a 10% tax on real property introduced in its stead, and a law of amnesty for political offenders enacted. Savonarola also proposed a court of appeal for criminal and political crimes tried by the *Otto di guardia e balìa*; this too was agreed to, but the right of appeal was to be, not to a court as Savonarola suggested, but to the Greater Council, a fact which led to grave abuses, as judicial appeals became subject to party passions. The *parlamenti* were abolished and a *monte di pietà* to advance money at reasonable interest was created. But in spite of Savonarola's popularity there was a party called the *Bigi* (greys) who intrigued secretly in favour of the return of the Medici, while the men of wealth, called the *Arrabbiati*, although they hated the Medici, were even more openly opposed to the actual régime and desired to set up an aristocratic oligarchy. The adherents of Savonarola were called the *Piagnoni*, or snivellers, while the *Neutrali* changed sides frequently.

League against Charles VIII.

Alexander VI. against Florence.

Trial and execution of Savonarola (1498).

A league between the pope, the emperor, Venice and Spain having been made against Charles VIII., the latter was forced to return to France. On his way back he passed through Florence, and, although the republic had refused to join the league, it believed itself in danger, as Piero de' Medici was in the king's train. Savonarola was again sent to the French camp, and his eloquence turned the king from any idea he may have had of reinstating the Medici. At the same time Charles violated his promise by giving aid to the Pisans in their revolt against Florence, and did not restore the other fortresses. After the French had abandoned Italy, Piero de' Medici, encouraged by the league, enlisted a number of mercenaries and marched on Florence, but the citizens, fired by Savonarola's enthusiasm, flew to arms and prepared for an energetic resistance; owing to Piero's incapacity and the exhaustion of his funds the expedition came to nothing. At the same time the conditions of the city were not prosperous; its resources were strained by the sums paid to Charles and by the war; its credit was shaken, its trade paralysed, famine and plague visited the city, and the war to subjugate Pisa was proceeding unsatisfactorily. Worse still was the death in 1496 of one of its ablest and most disinterested statesmen, Piero Capponi. The league now attacked Florence, for Pope Alexander VI. hated Savonarola and was determined to destroy the republic, so as to reinstate the Medici temporarily and prepare the way for his own sons; the Venetians and Imperialists besieged Leghorn, and there was great misery in Florence. All this decreased Savonarola's popularity to some extent, but the enemy having been beaten at Leghorn and the league being apparently on the point of breaking up, the Florentines took courage and the friar's party was once more in the ascendant. Numerous processions were held, Savonarola's sermons against corruption and vice seemed to have temporarily transformed the citizens, and the carnival of 1497 remained famous for the burning of the "vanities" (*i.e.* indecent books and pictures and carnival masks and costumes). The friar's sermons against ecclesiastical corruption, and especially against the pope, resulted in his excommunication by the latter, in consequence of which he lost much of his influence and immorality spread once more. That same year Piero made another unsuccessful attempt on Florence. New Medici plots having been discovered, Bernardo del Nero and other prominent citizens were tried and put to death; but the party hostile to Savonarola gained ground and had the support of the Franciscans, who were hostile to the Dominican order. Pulpit warfare was waged between Savonarola and his opponents, and the matter ended in his being forbidden to preach and in a proposed ordeal by fire, which, however, never came off. The pope again and again demanded that the friar be surrendered to him, but without success, in spite of his threats of an interdict against the city. The Piagnoni were out of power, and a signory of Arrabbiati having been elected in 1498, a mob of Savonarola's opponents attacked the convent of St Mark where he resided, and he himself was arrested and imprisoned. The commission appointed to try him on charges of heresy and treason was composed of his enemies, including Doffo Spini, who had previously attempted to murder him; many irregularities were committed during the three trials, and the prisoner was repeatedly tortured. The outgoing signory secured the election of another which was of their way of thinking, and on the 22nd of May 1498 Savonarola was condemned to death and executed the following day.

The pope having been satisfied, the situation in Florence was less critical for the moment. The war against Pisa was renewed, and in 1499 the city might have been taken but for the dilatory tactics of the Florentine commander Paolo Vitelli, who was consequently arrested on a charge of treason and put to death. Louis XII. of France, who now sent an army into Italy to conquer the Milanese, obtained the support of the Florentines. Cesare Borgia, who had seized many cities in Romagna, suddenly demanded the reinstatement of the Medici in Florence, and the danger was only warded off by appointing him captain-general of the Florentine forces at a large salary (1501). The weakness of the government becoming every day more apparent, several constitutional changes were made, and many old institutions, such as that of the *podestà* and *capitano del popolo*, were abolished; finally in 1502, in order

Piero Soderini.

to give more stability to the government, the office of *gonfaloniere*, with the right of proposing laws to the signory, was made a life appointment. The election fell on Piero Soderini (1448–1522), an honest public-spirited man of no particular party, but lacking in strength of character. One useful measure which he took was the institution of a national militia at the suggestion of Niccolò Machiavelli (1505). In the meanwhile the Pisan war dragged on without much headway being made. In 1503 both Piero de' Medici and Alexander VI. had died, eliminating two dangers to the republic. Spain, who was at war with France over the partition of Naples, helped the Pisans as the enemies of Florence, France's ally (1501–1504), but when the war was over the Florentines were able to lay siege to Pisa (1507), and in 1509 the city was driven by famine to surrender and became a dependency of Florence once more.

Schismatic council of Pisa (1510).

Return of the Medici (1512).

Second expulsion of the Medici (1527).

The siege of Florence.

Surrender of Florence (1530).

Pope Julius II., after having formed the league of Cambrai with France and Spain against Venice, retired from it in 1510, and raised the cry of "Fuori i Barbari" (out with the barbarians), with a view to expelling the French from Italy. King Louis thereupon proposed an oecumenical council so as to create a schism in the Church, and demanded that it be held in Florentine territory. After some hesitation the republic agreed to the demand, and the council was opened at Pisa, whereupon the pope immediately placed Florence under an interdict. At the request of the Florentines the council removed to Milan, but this did not save them from the pope's wrath. A Spanish army under Raymundo de Cardona and accompanied by Cardinal Giovanni de' Medici and his brother Giuliano entered the republic's territory and demanded 100,000 florins, the dismissal of Soderini, and the readmission of the Medici. Soderini offered to resign, but the Greater Council supported him and preparations for defence were made. In August the Spaniards took Prato by storm and committed hideous atrocities on the inhabitants; Florence was in a panic, a group of the *Ottimati*, or nobles, forced Soderini to resign and leave the city, and Cardona's new terms were accepted, viz. the readmission of the Medici, a fine of 150,000 florins, and an alliance with Spain. On the 1st of September 1512 Giuliano and Giovanni de' Medici, and their nephew Lorenzo, entered Florence with the Spanish troops; a *parlamento* was summoned, and a packed *balìa* formed which abolished the Greater Council and created a constitution similar to that of Lorenzo the Magnificent. Giuliano became *de facto* head of the government, but he did not pursue the usual vindictive policy of his house, although he resorted to the Laurentian method of amusing the citizens with splendid festivities. In 1513, on the death of Julius II., Giovanni de' Medici was elected pope as Leo X., an event which greatly enhanced the importance of the house. In March 1514 Giuliano died, and was succeeded by Lorenzo, who was also created duke of Urbino. At his death in 1519 Cardinal Giulio de' Medici (son of the Giuliano murdered in the Pazzi conspiracy) took charge of the government; he met with some opposition and had to play off the Ottimati against the Piagnoni, but he did not rule badly and maintained at all events the outward forms of freedom. In 1523 he was created pope as Clement VII. and sent his relatives Ippolito and Alessandro, both minors and bastards, to Florence under the tutorship of Cardinal Silvio Passerini. Ippolito was styled the *Magnifico* and destined to be ruler of the republic, but Cardinal Passerini's regency proved most unpopular, and the city was soon seething with discontent. Revolts broke out and Passerini showed himself quite unequal to coping with the situation. The Ottimati were mostly anti-Medicean, and by 1527 the position was untenable. When Filippo Strozzi, and above all his wife, threw their influence in the scales against the Medici, and the magistrates declared for their expulsion from power, Passerini, Ippolito and Alessandro left Florence (17th of May 1527). A *Consiglio degli Scelti* was summoned, and a constitution similar to that of Savonarola's time was established. The Greater Council was revived and Niccolò Capponi created *gonfaloniere* for a year. But Florence was torn by factions—the Ottimati who desired an oligarchy, the Palleschi or Mediceans who generally supported them, the Adirati who opposed Capponi for his moderation, the Arrabbiati who were strongly anti-Medicean, and the Popolani who opposed the Ottimati. "It is almost impossible that a state so disorganized and corrupt as Florence then was should produce men of parts and character, but if by chance any such should arise they would be hated and persecuted, their dispositions would be soured by indignation, or they would be hunted from their country or die of grief" (Benedetto Varchi). Capponi did his best to reform the city and save the situation, and while adopting Savonarola's tone in internal affairs, he saw the dangers in the foreign situation, realizing that a reconciliation between the pope and the emperor Charles V. would prove disastrous for Florence, for Clement would certainly seize the opportunity to reinstate his family in power. Having been re-elected *gonfaloniere* in spite of much opposition in 1528, Capponi tried to make peace with the pope, but his correspondence with the Vatican resulted in a quite unjustified charge of high treason, and although acquitted he had to resign office and leave the city for six months. Francesco Carducci was elected *gonfaloniere* in his place, and on the 29th of June 1529 the pope and the emperor concluded a treaty by which the latter agreed to re-establish the Medici in Florence. Carducci made preparations for a siege, but a large part of the people were against him, either from Medicean sympathies or fear, although the Frateschi, as the believers in Savonarola's views were called, supported him strongly. A body called the *Nove della Milizia*, of whom Michelangelo Buonarroti was a member, was charged with the defence of the city, and Michelangelo (*q.v.*) himself superintended the strengthening of the fortifications. A most unfortunate choice for the chief command of the army was the appointment of Malatesta Baglioni. In August an imperial army under Philibert, prince of Orange, advanced on the city. In September Malatesta surrendered Perugia, and other cities fell before the Imperialists. All attempts to come to terms with the pope were unsuccessful, and by October the siege had begun. Although alone against papacy and empire, the citizens showed the greatest spirit and devotion, and were successful in many sorties. The finest figure produced by these events was that of Francesco Ferruccio (*q.v.*); by his defence of Empoli he showed himself a first-class soldier, and was appointed commissioner-general. He executed many rapid marches and counter-marches, assaulting isolated bodies of the enemy unexpectedly, and harassing them continually. But Malatesta was a traitor at heart and hindered the defence of the city in every way. Ferruccio, who had recaptured Volterra, marched to Gavinana above Pistoia to attack the Imperialists in the rear. A battle took place at that spot on the 3rd of August, but in spite of Ferruccio's heroism he was defeated and killed; the prince of Orange also fell in that desperate engagement. Malatesta contributed to the defeat by preventing a simultaneous attack by the besieged. The sufferings from famine within the city were now very great, and an increasingly large part of the people favoured surrender. The signory, at last realizing that Malatesta was a traitor, dismissed him; but it was too late, and he now behaved as though he were governor of Florence; when the troops attempted to enforce the dismissal he turned his guns on them. On the 9th of August the signory saw that all hope was lost and entered into negotiations with Don Ferrante Gonzaga, the new imperial commander. On the 12th the capitulation was signed: Florence was to pay an indemnity of 80,000 florins, the Medici were to be recalled, the emperor was to establish the new government, "it being understood that liberty is to be preserved." Baccio Valori, a Medicean who had been in the imperialist camp, now took charge, and the city was occupied by foreign troops. A *parlamento* was summoned, the usual packed *balìa* created, and all opposition silenced. The city was given over to Pope Clement, who, disregarding the terms of the capitulation, had Carducci and Girolami (the last *gonfaloniere*) hanged, and established Alessandro de' Medici, the natural son of Lorenzo, duke of Urbino, as head of the republic on the 5th of July 1531. The next year the signory was abolished, Alessandro created *gonfaloniere* for life, and his lordship made hereditary in his family by imperial patent. Thus Florence lost her liberty, and came to be the capital of the duchy (afterwards grand-duchy) of Tuscany (see TUSCANY).

The Grand-Duchy of Tuscany.

The Medici dynasty ruled in Tuscany until the death of Gian Gastone in 1737, when the grand-duchy was assigned to Francis, duke of Lorraine. But it was governed by a regency until 1753, when it was conferred by the empress Maria Theresa on his son Peter Leopold. During the Napoleonic wars the grand-duke Ferdinand III. of Habsburg-Lorraine was driven from the throne, and Tuscany was annexed to the French empire in 1808. In 1809 Florence was made capital of the kingdom of Etruria, but after the fall of Napoleon in 1814 Ferdinand was reinstated. He died in 1833, and was succeeded by Leopold II. In 1848 there was a liberal revolutionary movement in Florence, and Leopold granted a constitution. But civil disorders followed, and in 1849 the grand-duke returned under an Austrian escort. In 1859, after the Franco-Italian victories over the Austrians in Lombardy, by a bloodless revolution in Florence Leopold was expelled and Tuscany annexed to the Sardinian kingdom.

In 1865 Florence became the capital of the kingdom of Italy, but after the occupation of Rome in 1870 during the Franco-Prussian war, the capital was transferred to the Eternal City (1871).

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FLORES, an island in the Atlantic Ocean, belonging to Portugal, and forming part of the Azores archipelago. Pop. (1900) 8137; area, 57 sq. m. Flores and the adjacent island of Corvo (pop. 806; area, 7 sq. m.) constitute the westernmost group of the Azores, and seem but imperfectly to belong to the archipelago, from the rest of which they are widely severed. They lie also out of the usual track of navigators; but to those who, missing their course, are led thither, Flores affords good shelter in its numerous bays. Its poultry is excellent; and the cattle are numerous, but small. It derives its name from the abundance of the flowers that find shelter in its deep ravines. Its capital is Santa Cruz das Flores (2247). In 1591 Flores was the station of the English fleet before the famous sea fight between Sir R. Grenville's ship "Revenge" and a Spanish fleet of 53 vessels. See AZORES.

FLORES, an island of the Dutch East Indies, a member of the chain extending east of Java. Its length is 224 m., its greatest breadth 37 m., and its area 5850 sq. m. The existence of slate, chalk, and sandstone, eruptive rock, volcanoes and heights stretching west and east, indicates a similar structure to that of the other islands of the chain. Several volcanoes are active. Among the loftier summits are, on the south coast, Gunong Rokka (7940 ft.) and Keo (6560 ft.); with the lesser but constantly active Gunong Api, forming a peninsula; and at the south-east, Lobetobi (7120 ft.). The thickly wooded interior is little explored. The coasts have deep bays and extensive rounded gulfs, where are situated the principal villages (*kampongs*). On the north coast are Bari, Reo, Maumer and Geliting; on the east, Larantuka; and on the south, Sikka and Endeh. The rivers, known only at their mouths, seem to be unnavigable. The mean temperature is 77° to 80° F., and the yearly rainfall 43 to 47 in. For administrative purposes the island is divided into West Flores (Mangerai), attached to the government of Celebes, and Middle and East Flores (Larantuka and dependencies), attached to the residency of Timor. The population is estimated at 250,000. The people live by trade, fishing, salt-making, shipbuilding, and the cultivation of rice, maize, and palms in the plain, but there is little industry or commerce. Some edible birds' nests, rice, sandalwood and cinnamon are exported to Celebes and elsewhere. The inhabitants of the coast-districts are mainly of Malay origin. The aborigines, who occupy the interior, are of Papuan stock. They are tall and well-built, with dark or black skins. The hair is frizzly. They are pure savages; their only religion is a kind of nature-worship. They consider the earth holy and inviolable; thus in severe droughts they only dig the river-beds for water as a last resource. Portugal claimed certain portions of the island until 1859.

FLOREZ, ENRIQUE (1701–1773), Spanish historian, was born at Valladolid on the 14th of February 1701. In his fifteenth year he entered the order of St Augustine, was afterwards professor of theology at the university of Alcala, and published a *Cursus theologiae* in five volumes (1732–1738). He afterwards devoted himself to historical studies. Of these the first-fruit was his *Clave Historial*, a work of the same class as the French *Art de vérifier les dates*, and preceding it by several years. It appeared in 1743, and passed through many editions. In 1747 was published the first volume of *España Sagrada, teatro geografico-historico de la Iglesia de España*, a vast compilation of Spanish ecclesiastical history which obtained a European reputation, and of which twenty-nine volumes appeared in the author's lifetime. It was continued after his death by Manuel Risco and others, and further additions have been made at the expense of the Spanish government. The whole work in fifty-one volumes was published at Madrid (1747–1886). Its value is considerably increased by the insertion of ancient chronicles and documents not easily accessible elsewhere. Florez was a good numismatist, and published *Medallas de las Colonias* in 2 vols. (1757–1758), of which a third volume appeared in 1773. His last work was the *Memorias de las reynas Catolicas*, 2 vols. (1770). Florez led a retired, studious and unambitious life, and died at Madrid on the 20th of August 1773.

See F. Mendez, *Noticia de la vida y escritos de Henrique Florez* (Madrid, 1780).

FLORIAN, SAINT, a martyr honoured in Upper Austria. In the 8th century Puoche was mentioned as the place of his tomb, and on the site was built the celebrated monastery of canons regular, St Florian, which still exists. His *Acta* are of considerable antiquity, but devoid of historical value. Their substance is borrowed from the *Acta* of St Irenaeus of Sirmium. The cult of St Florian was introduced into Poland, together with the relics of the saint, which were brought thither in 1183 by Giles, bishop of Modena. Casimir, duke of Poland, dedicated a church at Cracow to him. He is represented in various ways, especially as a warrior holding in his hand a vessel from which he pours out flames. His protection is often sought against fire. His day in the calendar is the 4th of May.

See *Acta Sanctorum*, May, i. 461-467; B. Krusch, *Scriptores rerum Merovingicarum*, iii. 65-68; C. Cahier, *Caractéristiques des saints*, p. 490 (Paris, 1867). (H. DE.)

FLORIAN, JEAN PIERRE CLARIS DE (1755–1794), French poet and romance writer, was born on the 6th of March 1755 at the château of Florian, near Sauve, in the department of Gard. His mother, a Spanish lady named Gilette de Salgues, died when he was quite a child. His uncle and guardian, the marquis of Florian, who had married a niece of Voltaire, introduced him at Ferney and in 1768 he became page at Anet in the household of the duke of Penthièvre, who remained his friend throughout his life. Having studied for some time at the artillery school at Bapaume he obtained from his patron a captain's commission in a dragoon regiment, and in this capacity it is said he displayed a boisterous behaviour quite incongruous with the gentle, meditative character of his works. On the outbreak of the French Revolution he retired to Sceaux, but he was soon discovered and imprisoned; and though his imprisonment was short he survived his release only a few months, dying on the 13th of September 1794.

Florian's first literary efforts were comedies; his verse epistle *Voltaire et le serf du Mont Jura* and an eclogue *Ruth* were crowned by the French Academy in 1782 and 1784 respectively. In 1782 also he produced a one-act prose comedy, *Le Bon Ménage*, and in the next year *Galatée*, a romantic tale in imitation of the *Galatea* of Cervantes. Other short tales and comedies followed, and in 1786 appeared *Numa Pompilius*, an undisguised imitation of Fénelon's *Télêmaque*. In 1788 he became a member of the French Academy, and published *Estelle*, a pastoral of the same class as *Galatée*. Another romance, *Gonzalve de Cordoue*, preceded by an historical notice of the Moors, appeared in 1791, and his famous collection of *Fables* in 1792. Among his posthumous works are *La Jeunesse de Florian, ou Mémoires d'un jeune Espagnol* (1807), and an abridgment (1799) of *Don Quixote*, which, though far from being a correct representation of the original, had great and merited success.

Florian imitated Salomon Gessner, the Swiss idyllist, and his style has all the artificial delicacy and sentimentality of the Gessnerian school. Perhaps the nearest example of the class in English literature is afforded by John Wilson's (Christopher North's) *Lights and Shadows of Scottish Life*. Among the best of his fables are reckoned "The Monkey showing the Magic Lantern," "The Blind Man and the Paralytic," and "The Monkeys and the Leopard."

The best edition of Florian's *Œuvres complètes* appeared in Paris in 16 volumes, 1820; his *Œuvres inédites* in 4 volumes, 1824.

See "Vie de Florian," by L. F. Jauffret, prefixed to his *Œuvres posthumes* (1802); A. J. N. de Rosny, *Vie de Florian* (Paris, An V.); Sainte-Beuve, *Causeries du lundi*, t. iii.; A. de Montvaillant, *Florian, sa vie, ses œuvres* (1879); and *Lettres de Florian à Mme de la Briche*, published, with a notice by the baron de Barante in *Mélanges* published (1903) by the Société des bibliophiles français.

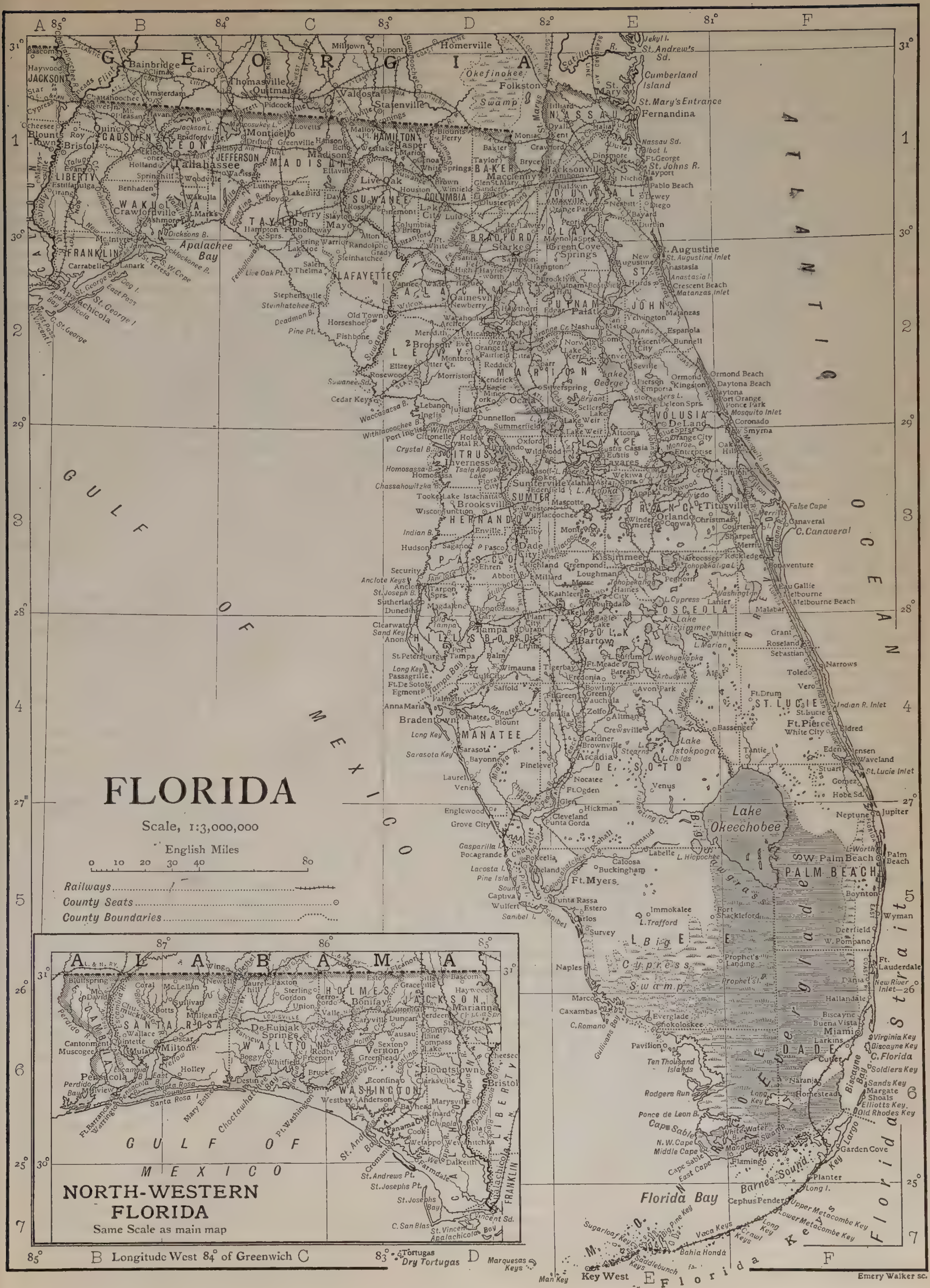
FLORIANOPOLIS (formerly *Desterro*, *Nossa Senhora do Desterro* and *Santa Catharina*, and still popularly known under the last designation), a city and port of Brazil and the capital of the state of Santa Catharina, on the western or inside shore of a large island of the same name, 485 m. S.S.W. of Rio de Janeiro, in 27° 30′ S., 48° 30′ W. Pop. (1890) 11,400, including many Germans; (1902, estimate) 16,000; of the municipality, including a large rural district and several villages (1890), 30,687. The harbour is formed by the widening of the strait separating the island from the mainland, which is nearly 2 m. wide at this point. It is approached by narrow entrances from the N. and S., which are defended by small forts. The island is mountainous and wooded, and completely shelters the harbour from easterly storms. The surroundings are highly picturesque and tropical in character, but the town itself is poorly built and unattractive. Its public buildings include the president's official residence, arsenal, lyceum, hospital and some old churches. The climate is warm for the latitude, but the higher elevations of the vicinity are noted for their mild climate and healthfulness. There are some German colonies farther up the coast whose products find a market here, and a number of small settlements along the mainland coast add something to the trade of the town. The more distant inland towns are partly supplied from this point, but difficult mountain roads tend to restrict the trade greatly. There is a considerable trade in market produce with Rio de Janeiro, but the exports are inconsiderable. Santa Catharina was formerly one of the well-known whaling stations of the South Atlantic, and is now a secondary military and naval station.

The island of Santa Catharina was originally settled by the Spanish; Cabeza de Vaca landed here in 1542 and marched hence across country to Asunción, Paraguay. The Spanish failed to establish a permanent colony, however, and the Portuguese took possession. The island was captured by a Spanish expedition under Viceroy Zeballos in 1777. A boundary treaty of that same year restored it to Portugal. In 1894 Santa Catharina fell into the possession of revolutionists against the government of President Floriano Peixoto. With the collapse of the revolution the city was occupied by the government forces, and its name was then changed to Florianopolis in honour of the president of the republic.

FLORIDA, the most southern of the United States of America, situated between 24° 30′ and 31° N. lat. and 79° 48′ and 87° 38′ W. long. It is bounded N. by Georgia and Alabama, E. by the Atlantic Ocean, S. by the Strait of Florida, which separates it from Cuba, and by the Gulf of Mexico, and W. by Alabama and the Gulf. The Florida Keys, a chain of islands extending in a general south-westerly direction from Biscayne Bay, are included in the state boundaries, and the city of Key West, on an island of the same name, is the seat of justice of Monroe county. The total area of the state is 58,666 sq. m., of which 3805 sq. m. are water surface. The coast line is greater than that of any other state, extending 472 m. on the Atlantic and 674 m. on the Gulf Coast.

The peculiar outline of Florida gives it the name of "Peninsula State." The average elevation of the surface of the state above the sea-level is less than that of any other state except Louisiana, but there is not the monotony of unbroken level which descriptions and maps often suggest. The N.W. portion of the state is, topographically, similar to south-eastern Alabama, being a rolling, hilly country; the eastern section is a part of the Atlantic coastal plain; the western coast line is less regular than the eastern, being indented by a number of bays and harbours, the largest of which are Charlotte Harbour, Tampa Bay and Pensacola Bay. Along much of the western coast and along nearly the whole of the eastern coast extends a line of sand reefs and narrow islands, enclosing shallow and narrow bodies of water, such as Indian river and Lake Worth—called rivers, lakes, lagoons, bays and harbours. In the central part of the state there is a ridge, extending N. and S. and forming a divide, separating the streams of the east coast from those of the west. Its highest elevation above sea-level is about 300 ft. The central region is remarkable for its large number of lakes, approximately 30,000 between Gainesville in Alachua county, and Lake Okeechobee. They are due largely to sinkholes or depressions caused by solution of the limestone of the region. Many of the lakes are connected by subterranean channels, and a change in the surface of one lake is often accompanied by a change in the surface of another. By far the largest of these lakes, nearly all of them shallow, is Lake Okeechobee, a body of water about 1250 sq. m. in area and almost uniformly shallow, its depth seldom being greater than 15 ft. Caloosahatchee river, flowing into the Gulf of Mexico near Charlotte Harbour, is its principal outlet. Among the other lakes are Orange, Crescent, George, Weir, Harris, Eustis, Apopka, Tohopekaliga, Kissimmee and Istokpoga. The chief feature of the southern portion of the state is the Everglades (*q.v.*), the term "Everglade State" being popularly applied to Florida. Within the state there are many swamps, the largest of which are the Big Cypress Swamp in the S. adjoining the Everglades on the W., and Okefinokee Swamp, extending from Georgia into the N.E. part of the state.

A peculiar feature of the drainage of the state is the large number of subterranean streams and of springs, always found to a greater or less extent in limestone regions. Some of them are of great size. Silver Spring and Blue Spring in Marion county, Blue Spring and Orange City Mineral Spring in Volusia county, Chipola Spring near Marianna in Jackson county, Espiritu Santo Spring near Tampa in Hillsboro county, Magnolia Springs in Clay county, Suwanee Springs in Suwanee county, White Sulphur Springs in Hamilton county, the Wekiva Springs in Orange county, and Wakulla Spring, Newport Sulphur Spring and Panacea Mineral Spring in Wakulla county are the most noteworthy. Many of the springs have curative properties, one of them, the Green Cove Spring in Clay county, discharging about 3000 gallons of sulphuretted water per minute. Not far from St Augustine a spring bursts through the sea itself with such force that the ocean breakers roll back from it as from a sunken reef. The springs often merge into lakes, and lake systems are usually the sources of the rivers, Lake George being the principal source of the St Johns, and Lake Kissimmee of the Kissimmee, while a number of smaller lakes are the source of the Oklawaha, one of the most beautiful of the Floridian rivers.



FLORIDA

Scale, 1:3,000,000

English Miles

NORTH-WESTERN FLORIDA

Same Scale as main map

Emery Walker sc.

0 10 20 30 40 80
Railways
County Seats
County Boundaries
Longitude West 84° of Greenwich
GEORGIA
ALABAMA
ATLANTIC OCEAN
GULF OF MEXICO
Florida Straits
Florida Keys
Lake Okeechobee
Everglades
Big Cypress Swamp
Florida Bay
Tallahassee
Jacksonville
St. Augustine
Gainesville
Ocala
Orlando
Tampa
Ft. Myers
Miami
Key West
Pensacola
Apalachicola
Apalachee Bay
Tortugas
Dry Tortugas
Marquesas Keys
A B C D E F
1 2 3 4 5 6 7
85° 84° 83° 82° 81°
31° 30° 29° 28° 27° 26° 25°

Of the rivers the most important are the St Johns, which flows N. from about the middle of the peninsula, empties into the Atlantic a short distance below Jacksonville, and is navigable for about 250 m. from its mouth, the Withlacoochee, flowing in a general north-westerly direction from its source in the N.E. part of Polk county, and forming near its entrance into the Gulf of Mexico the boundary between Levy and Citrus counties, and four rivers, the Escambia, the Choctawatchee, the Apalachicola, and the Suwanee, having their sources in other states and traversing the north-western part of Florida. On account of its sand reefs, the east coast has not so many harbours as the west coast. The most important harbours are at Fernandina, St Augustine, and Miami on the E. coast, and at Tampa, Key West and Pensacola on the W. coast.

The soils of Florida have sand as a common ingredient.[1] They may be divided into three classes: the pine lands, which often have a surface of dark vegetable mould, under which is a sandy loam resting on a substratum of clay, marl or limestone—areas of such soil are found throughout the state; the "hammocks," which have soil of similar ingredients and are interspersed with the pine lands—large areas of this soil occur in Levy, Alachua, Citrus, Hernando, Pasco, Gadsden, Leon, Madison, Jefferson and Jackson counties; and the alluvial swamp lands, chiefly in E. and S. Florida, the richest class, which require drainage to fit them for cultivation.

As regards climate Florida may be divided into three more or less distinct zones. North and west of a line passing through Cedar Keys and Fernandina the climate is distinctly "southern," similar to that of the Gulf states; from this line to another extending from the mouth of the Caloosahatchee to Indian river inlet the climate is semi-tropical, and is well suited to the cultivation of oranges; S. of this the climate is sub-tropical, well adapted to the cultivation of pineapples. Since the semi-tropical and sub-tropical zones are nearer the course of the Gulf Stream, and are swept by the trade winds, their temperatures are more uniform than those of the zones of southern climate; indeed, the extremes of heat (103° F.) and cold (13° F.) are felt in the region of southern climate. The mean annual temperature of the state is 70·8° F., greater in the sub-tropical than in the other climate zones, and the Atlantic coast is in general warmer than the Gulf Coast. The rainfall averages 52·09 in. per annum. On account of its warm climate, Florida has many resorts for health and pleasure, which are especially popular in the season from January to April; the more important are St Augustine, Ormond, Daytona, Palm Beach, Miami, Tampa, White Springs, Hampton Springs, Worthington Springs and Orange Springs.

No metals have ever been discovered in Florida. The principal minerals are rock phosphate and (recently more important) land and river pebble phosphate, found in scattered deposits in a belt on the "west coast" about 30 m. wide and extending from Tallahassee to Lake Okeechobee. The centre of the quarries is Dunnellon in Marion county, and pebble phosphate is found in Hillsboro, Polk, De Soto, Osceola, Citrus and Hernando counties. Although the economic value of the phosphate deposits was first realized about 1889, between 1894 and 1907 Florida produced, each year, more than half of all the phosphate rock produced in the whole United States, the yield of Florida (1,357,365 long tons) in 1907 being valued at $6,577,757; that of the whole country at $10,653,558. Florida is also the principal source in the United States for fuller's earth, a deposit of which, near Quincy, was first discovered in 1893; and clay (including kaolin) is also mined to some extent. Other minerals that have been discovered but have not been industrially developed are gypsum, lignite and cement rock. The lack of a thorough geological survey has perhaps prevented the discovery of other minerals—certainly it is responsible for a late recognition of the economic value of the known mineral resources.

The flora of N. Florida is similar to that of south-eastern North America; that of S. Florida seems to be a link between the vegetation of North America and that of South America and the West Indies, for out of 247 species of S. Florida that have been examined, 187 are common to the West Indies, Mexico and South America. The forests cover approximately 37,700 sq. m., chiefly in the northern part of the state, including about half of the peninsula, yellow pine being predominant, except in the coastal marsh lands, where cypress, found throughout the state, particularly abounds. About half of the varieties of forest trees in the United States are found, and among the peculiar species are the red bay or "Florida Mahogany," satinwood and cachibou, and the Florida yew and savin, both almost extinct. The lumber industry is important: in 1905 the total factory product of lumber and timber was valued at $10,901,650, and lumber and planing mill products were valued at $1,690,455. In 1900 this was the most valuable industry in the state; in 1905 it was second to the manufacture of tobacco. The fauna is similar in general to that of the southern United States. Among the animals are the puma, manatee (sea cow), alligator and crocodile, but the number of these has been greatly diminished by hunting. Ducks, wild turkeys, bears and wild cats (lynx) are found, but in decreasing numbers.

The fisheries are very valuable; the total number of species of fish in Florida waters is about 600, and many species found on one coast are not found on the other. The king fish and tarpon are hunted for sport, while mullet, shad, redsnappers, pompano, trout, sheepshead and Spanish mackerel are of great economic value. The sponge and oyster fisheries are also important. The total product of the fisheries in 1902 was valued at about $2,000,000.

Industry and Commerce.—The principal occupation is agriculture, in which 44% of the labouring population was engaged in 1900, but only 12·6% of the total land surface was enclosed in farms, of which only 34·6% was improved, and the total agricultural product for 1899 was valued at $18,309,104. As the number of farms increased faster than the cultivated area from 1850 to 1900, the average size of farms declined from 444 acres in 1860 to 140 in 1880 and to 106·9 in 1900, the largest class of farms being those with an acreage varying from 20 to 50 acres. Nearly three-fourths of the farms, in 1900, were cultivated by their owners, but the cash tenantry system showed an increase of 100% since 1890, being most extensively used in the cotton counties. One-third of the farms were operated by negroes, but one-half of these farms were rented, and the value of negro farm property was only one-eighth that of the entire farm property of the state. According to the state census of 1905 only 1,621,362 acres were improved; of 45,984 farms, 31,233 were worked by whites.

Fruits normally form the principal crop; the total value for 1907–8 of the fruit crops of the state (including oranges, lemons, limes, grape-fruit, bananas, guavas, pears, peaches, grapes, figs, pecans, &c.) was $6,160,299, according to the report of the State Department of Agriculture. The discovery of Florida's adaptability to the culture of oranges about 1875 may be taken as the beginning of the state's modern industrial development. But the unusual severity of the winters of 1887, 1894 and 1899 (the report of the Twelfth Census which gives the figures for this year being therefore misleading) destroyed three-fourths of the orange trees, and caused an increased attention to stock-raising, and to various agricultural products. Orange culture has recovered much of its importance, but it is carried on in the more southern counties of the state. The cultivation of pineapples, in sub-tropical Florida, is proving successful, the product far surpassing that of California, the only other state in the Union in which pineapples are grown. Grape-fruit, guavas and lemons are also successfully produced in this part of the state. The cultivation of strawberries and vegetables (cabbage, cauliflower, beets, beans, tomatoes, egg-plant, cucumbers, water-melons, celery, &c.) for northern markets, and of orchard fruits, especially plums, pears and prunes, has likewise proved successful. In 1907–8, according to the State Department of Agriculture, the total value of vegetable and garden products was $3,928,657. In 1903, according to the statistics of the United States Department of Agriculture, Indian corn ranked next to fruits (as given in the state reports), but its product as compared with that of various other states is unimportant—in 1907 it amounted to 7,017,000 bushels only; rice is the only other cereal whose yield in 1899 was greater than that of 1889, but the Florida product was surpassed (in 1899) by that of the Carolinas, Georgia, Louisiana and Texas; in 1907 the product of rice in Florida (69,000 bushels) was less than that of Texas, Louisiana, South Carolina, Arkansas and Georgia severally. Tobacco culture, which declined after 1860 on account of the competition of Cuba and Sumatra, has revived since 1885 through the introductiover and [illegible]ban and Sumatran seed; the product of 1907 (6 [illegible] contain a[illegible]as more than six times that of

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[1] Almost everywhere limestone is the underlying rock, but siliceous sands, brought out by the Atlantic rivers to the N.E., are carried the whole length of the Florida coast by marine action.

1899, the product in 1899 (1,125,600 ℔) being more than twice that of 1889 (470,443 ℔), which in turn was more than twenty times that for 1880 (21,182 ℔)—the smallest production recorded for many decades. In 1907 the average farm price of tobacco was 45 cents per ℔ higher than that of any other state. In 1899, 84% of the product was raised in Gadsden county. The sweet potato and pea-nut crops have also become very valuable; on the other hand the Census of 1900 showed a decline in acreage and production of cotton. In 1907 the acreage (265,000 acres) was less than in any cotton-growing state except Missouri and Virginia; the crop for 1907–1908 was 49,794 bales. Sea-island cotton of very high grade is grown in Alachua county. The production of sugar, begun by the early Spanish settlers, declined, but that of syrup increased. Pecan nuts are a promising crop, and many groves were planted after 1905. In 1900 there were more than 1,900,000 acres of land in the state unoccupied. The low lands of the South are being drained partly by the state and partly by private companies. Irrigation, introduced in 1888 by the orange growers, has been adopted by other farmers, especially the tobacco-growers of Gadsden county, and so the evil effects of the droughts, so common from February to June, are avoided. The value of farm property in the southern counties, which have been developed very recently, shows a steady increase, that of Hillsboro county surpassing the other counties of the state. In 1907–8, according to the state Department of Agriculture, the total value of all field crops (cotton, cereals, sugar-cane, hay and forage, sweet potatoes, &c.) was $11,856,340, and the total value of all farm products (including live stock, $20,817,804, poultry and products, $1,688,433, and dairy products, $1,728,642) was $46,371,320.

The manufactures of Florida, as compared with those of other states, are unimportant. Their product in 1900 was more than twice the product in 1890, and the product in 1905 (from establishments under the factory system only) was $50,298,290, *i.e.* 47·1% greater than in 1900. The most important industries were those that depended upon the forests, their product amounting to nearly 45% of the entire manufactured product of the state. The lumber and timber products were valued in 1905 at $10,901,650, almost twice their valuation in 1890, and an increase of 1·2% over the product of 1900. The manufacture of turpentine and rosin, material for which is obtained from the pine forests, had increased greatly in importance between 1890 and 1900, the product in 1890 being valued at only $191,859, that of 1900 at $6,469,605, and from the latter sum it increased in 1905 to $9,901,905, an increase of more than one-half. In 1900 the state ranked second and in 1905 first of all the states of the country in the value of this product; in 1905 the state's product amounted to 41·4% of that of the entire country. The manufacture of cigars and cigarettes (almost entirely of cigars, few cigarettes being manufactured), carried on chiefly by Cubans at Key West and Tampa, also increased in importance between 1890 and 1900, the products in the latter year being valued at $10,735,826, or more than one-quarter more than in 1890, and in 1905 there was a further increase of 56·2%, the gross value being $16,764,276, or nearly one-third of the total factory product of the state. In 1900 Florida ranked fourth in the manufacture of tobacco among the states of the Union, being surpassed by New York, Pennsylvania and Ohio; in 1905 it ranked third (after New York and Pennsylvania). Most of the tobacco used is imported from Cuba, though, as has been indicated, the production of the state has greatly increased since 1880. In the manufacture of fertilizers, the raw material for which is derived from the phosphate beds, Florida's aggregate product in 1900 was valued at $500,239, and in 1905 at $1,590,371, an increase of 217·9% in five years.

Florida's industrial progress has been mainly since the Civil War, for before that conflict a large part of the state was practically undeveloped. An important influence has been the railways. In 1880 the total railway mileage was 518 m.; in 1890 it was 2489 m.; in 1900, 3255 m., and in January 1909, 4,004·92 m. The largest system is the Atlantic Coast Line, the lines of which in Florida were built or consolidated by H. B. Plant (1819–1899) and once formed a part of the so-called "Plant System" of railways. The Florida East Coast Railway is also the product of one man's faith in the country, that of Henry M. Flagler (b. 1830). The Seaboard Air Line, the Louisville & Nashville, and the Georgia Southern & Florida are the other important railways. The Southern railway pene[illegible] state as far as Jacksonville, over the tracks of the [illegible] Line. A state railway commission, whose me[illegible] by the p[illegible]eople, has power to enforce its schedule of freight rates except when such rates would not pay the operating expenses of the railway. In 1881 the Florida East Coast Line Canal and Transportation Co. was organized to develop a waterway from Jacksonville to Biscayne Bay by connecting with canals the St Johns, Matanzas, and Halifax rivers, Mosquito Lagoon, Indian river, Lake Worth, Hillsboro river, New river, and Snake Creek; in 1908 this vast undertaking was completed. The development of marine commerce has been retarded by unimproved harbours, but Fernandina and Pensacola harbours have always been good. Since 1890 much has been done by the national Government, aided in many cases by the local authorities and by private enterprise, to improve the harbours and to extend the limits of river navigation. With the increase of trade between the United States and the West Indies following the Spanish-American War (1898), the business of the principal ports, notably of Fernandina, Tampa and Pensacola, greatly increased.

Population.—The population of Florida in 1880 was 269,493; in 1890, 391,422, an increase of 45·2%; and in 1900, 528,542, or a further increase of 35%; and in 1905, by a state census, 614,845; and in 1910, 752,619. In 1900, 95·5% were native born, 43·7% were coloured (including 479 Chinese, Japanese and Indians), and in 1905 the percentages were little altered. The Seminole Indians, whose number is not definitely known, live in and near the Everglades. The urban population on the basis of places having a population of 4000 or more was 16·6% of the total in 1900 and 22·7% in 1905, the percentage for Florida, as for other Southern States, being small as compared with the percentage for most of the other states of the Union. In 1900 there were 92, and, in 1905, 125 incorporated cities, towns and villages; but only 14 (in 1905, 22) of these had a population of over 2000, and only 4 (in 1905, 8) a population of more than 5000. The four in 1900 were: Jacksonville (28,429); Pensacola (17,747); Key West (17,114); and Tampa (15,839). The eight in 1905 were Jacksonville (35,301), Tampa (22,823), Pensacola (21,505), Key West (20,498), Live Oak (7200), Lake City (6409), Gainesville (5413), and St Augustine (5121). Tallahassee is the capital of the state. In 1906 the Baptists were the strongest religious denomination; the Methodists ranked second, while the Roman Catholic, Presbyterian and Protestant Episcopal churches were of relatively minor importance.

Government.—The present constitution was framed in 1885 and was ratified by the people in 1886. Its most important feature, when compared with the previous constitution of 1868, is its provision for the choice of state officials other than the governor (who was previously chosen by election) by elections instead of by the governor's appointment, but the governor, who serves for four years and is not eligible for the next succeeding term, still appoints the circuit judges, the state attorneys for each judicial circuit and the county commissioners; he may fill certain vacancies and may suspend, and with the Senate remove officers not liable to impeachment. The governor is a member of the Board of Pardons, the other members being the attorney-general, the secretary of state, the comptroller and the commissioner of agriculture; he and the secretary of state, attorney-general, comptroller, treasurer, superintendent of public instruction, and commissioner of agriculture comprise a Board of Commissioners of State Institutions; he is also a member of the Board of Education. The office of lieutenant-governor was abolished by the present constitution. The legislature meets biennially, the senators being chosen for four, the representatives for two years. By an amendment of 1896 the Senate consists of not more than 32, and the House of Representatives of not more than 68 members; by a two-thirds vote of members present the legislature may pass a bill over the governor's veto. The three judges of the Supreme Court and the seven of the circuit court serve for six years, those of the county courts for four years, and justices of the peace (one for each justice district, of which the county commissioners must form at least two in each county) hold office for four years. The constitutional qualifications for suffrage are: the age of twenty-one years, citizenship in the United States or presentation of naturalization certificates at registration centres, residence in the state one year and in the county six months, and registration. To these requirements the payment of a poll-tax has been added by legislative enactment, such an enactment having been authorized by the constitution. Insane persons and persons under guardianship are excluded by the constitution, and "all persons convicted of bribery, perjury, larceny or of infamous crime, or who shall make or become directly or indirectly interested in any bet or wager the result of which shall depend upon any election," or who shall participate as principal, second or challenger in any duel, are excluded by legislative enactment.

Amendments to the constitution may be made by a three-fifths vote of each house of the legislature, ratified by a majority vote of the people. A revision of the Constitution may be made upon a two-thirds vote of all members of both Houses of the legislature, if ratified by a majority vote of the people; a Constitutional Convention is then to be provided for by the legislature, such convention to meet within six months of the passage of the law therefor, and to consist of a number equal to the membership of the House of Representatives, apportioned among the counties, as are the members of this House.

A homestead of 160 acres, or of one-half of an acre in an incorporated town or city, owned by the head of a family residing in the state, with personal property to the value of $1000 and the improvements on the real estate, is exempt from enforced sale except for delinquent taxes, purchase money, mortgage or improvements on the property. The wife holds in her own name property acquired before or after marriage; the intermarriage of whites and negroes (or persons of negro descent to the fourth generation) is prohibited. All these are constitutional provisions. By legislative enactment whites and blacks living in adultery are to be punished by imprisonment or fine; divorces may be secured only after two years' residence in the state and on the ground of physical incapacity, adultery, extreme cruelty, habitual indulgence in violent temper, habitual drunkenness, desertion for one year, previous marriage still existing, or such relationship of the parties as is within the degrees for which marriage is prohibited by law. Legitimacy of natural children can be established by subsequent marriage of the parents, and the age of consent is sixteen years.

The bonded debt was incurred during the Reconstruction Period (1865–1875). In 1871 7% 30 year bonds to the extent of $350,000 were issued and in 1873 another issue of 6% 30 year bonds to the value of $925,000 was made. Most of these were held by the Educational Fund at the time of their maturity. By 1901 all but $267,700 of the issue of 1871 had been retired and this amount was then refunded with 3% 50 year bonds which were taken by the Educational Fund. In 1903 $616,800 of the 1873 issue was held by the Educational Fund and $148,000 by individuals. The first part of this claim was refunded by a new bond issue, also taken by the Educational Fund, the second was paid from an Indian war claim of $692,946, received from the United States government in 1902, when $132,000 bonds of 1857, held by the United States government, were also extinguished. The bonded debt was thus reduced to $884,500; and on the 1st of January 1909 the debt, consisting of refunding bonds held as educational funds, amounted to $601,567.

Penal System.—There is no penitentiary; the convicts are hired to the one highest bidder who contracts for their labour, and who undertakes, moreover, to lease all other persons convicted during the term of the lease, and sub-leases the prisoners. In 1889 the convicts were placed under the care of a supervisor of convicts, and in 1905 the law was amended so that one or more supervisors could be appointed at the will of the governors. In 1908 there were four supervisors and one state prison physician, and there are special laws designed to prevent abuses in the system. In 1908 the state received $208,148 from the lease of convicts. Decrepit prisoners were formerly leased, but in 1906 the lease excluded such as were thought unfit by the state prison physician. Women convicts were still leased with the men in 1908; of the 446 convicts committed in that year, there were 15 negro females, 356 negro males and 75 white males. In the same year 54 escaped, and 27 were recaptured. The leased convicts are employed in the turpentine and lumber industries and in the phosphate works. The 1232 convicts "on hand" at the close of 1908 were held in 38 camps, 4 being the minimum, and 160 the maximum number, at a camp. In 1908 two central hospitals for the prisoners were maintained by the lessee company. County prison camps are under the supervision of the governor and the supervisors of convicts. The state supervisors must inspect each state prison camp and each county prison camp every thirty days.

Education.—As early as 1831 an unsuccessful attempt was made to form an adequate public school fund; the first real effort to establish a common school system for the territory was made after 1835; in 1840 there were altogether 18 academies and 51 common schools, and in 1849 the state legislature made an appropriation in the interest of the public instruction of white pupils, and this was supplemented by the proceeds of land granted by the United States government for the same purpose. In 1852 Tallahassee established a public school; and in 1860 there were, according to a report of the United States census, 2032 pupils in the public schools of the state, and 4486 in "academies and other schools." The Civil War, however, interrupted the early progress, and the present system of common schools dates from the constitution of 1868 and the school law of 1869. The school revenue derived from the interest of a permanent school fund, special state and county taxes, and a poll-tax, in 1907–1908 amounted to $1,716,161; the per capita cost for each child of school age was $6·11 (white, $9·08; negro, $2·24), and the average school term was 108 days (112 for whites, 99 for negroes). The state constitution prescribes that "white and colored children shall not be taught in the same school, but impartial provision shall be made for both." The percentage of enrolment in 1907–1908 was 60 (whites, 66; negroes, 52). The percentage of attendance to enrolment was 70%,—68% for white and 74% for negro schools. Before 1905 the state provided for higher education by the Florida State College, at Tallahassee, formerly the West Florida Seminary (founded in 1857); the University of Florida, at Lake City, which was organized in 1903 by enlarging the work of the Florida Agricultural College (founded in 1884); the East Florida Seminary, at Gainesville (founded 1848 at Ocala); the normal school (for whites) at De Funiak Springs; and the South Florida Military Institute at Bartow; but in 1905 the legislature passed the Buckman bill abolishing all these state institutions for higher education and establishing in their place the university of the state of Florida and a state Agricultural Experiment Station, both now at Gainesville, and the Florida Female College at Tallahassee, which has the same standards for entrance and for graduation as the state university for men. Private educational institutions in Florida are John B. Stetson University at De Land (Baptist); Rollins College (1885) at Winter Park (non-sectarian), with a collegiate department, an academy, a school of music, a school of expression, a school of fine arts, a school of domestic and industrial arts, and a business school; Southern College (1901), at Sutherland (Methodist Episcopal, South); the Presbyterian College of Florida (1905), at Eustis; Jasper Normal Institute (1890), at Jasper, and the Florida Normal Institute at Madison. The negroes have facilities for advanced instruction in the Florida Baptist Academy, and Cookman Institute (Methodist Episcopal, South), both at Jacksonville, and in the Normal and Manual Training School (Congregational), at Orange Park. There are a school for the Blind, Deaf, and Dumb (1885) at St. Augustine, a hospital for the insane at Chattahoochee and a reform school at Marianna, all wholly supported by the state, and a Confederate soldiers' and sailors' home at Tallahassee, which is partially supported by the state.

History.—The earliest explorations and attempts at colonization of Florida by Europeans were made by the Spanish. The Council of the Indies claimed that since 1510 fleets and ships had gone to Florida, and Florida is shown on the Cantino map of 1502. In 1513 Juan Ponce de Leon (*c.* 1460–1521), who had been with Christopher Columbus on his second voyage and had later been governor of Porto Rico, obtained a royal grant authorizing him to discover and settle "Bimini,"—a fabulous island believed to contain a marvellous fountain or spring whose waters would restore to old men their youth or at least had wonderful curative powers. Soon after Easter Day he came in sight of the coast of Florida, probably near the mouth of the St Johns river. From the name of the day in the calendar, *Pascua Florida*, or from the fact that many flowers were found on the coast, the country was named Florida. De Leon seems to have explored the coast, to some degree, on both sides of the peninsula, and to have turned homeward fully convinced that he had discovered an immense island. He returned to Spain in 1514, and obtained from the king a grant to colonize "the island of Bimini and the island of Florida," of which he was appointed adelantado, and in 1521 he made another expedition, this one for colonization as well as for discovery. He seems to have touched at the island of Tortugas, so named on account of the large number of turtles found there, and to have landed at several places, but many of his men succumbed to disease and he himself was wounded in an Indian attack, dying soon afterward in Cuba. Meanwhile, in 1516, another Spaniard, Diego Miruelo, seems to have sailed for some distance along the west coast of the peninsula. The next important exploration of Florida was that of Panfilo de Narvaez. In 1527 he sailed from Cuba with about 600 men (soon reduced to less than 400), landed (early in 1528) probably at the present site of Pensacola, and for six months remained in the country, he and his men suffering terribly from exposure, hunger and fierce Indian attacks. In September, his ships being lost and his force greatly reduced in number, he hastily constructed a crazy fleet, re-embarked probably at Apalachee Bay, and lost his life in a storm probably near Pensacola Bay. Only four of his men, including Nuñez Cabeza de Vaca, succeeded after eight years of Indian captivity and of long and weary wanderings, in finding their way to Spanish settlements in Mexico. Florida was also partially explored by Ferdinando de Soto (*q.v.*) in 1539–1540. In the summer of 1559 another attempt at colonization was made by Tristan de Luna, who sailed from Vera Cruz, landed at Pensacola Bay, and explored a part of Florida and (possibly) Southern Alabama. Somewhere in that region he desired to make a permanent settlement, but he was abandoned by most of his followers and gave up his attempt in 1561.

In the following year, Jean Ribaut (1520–1565), with a band of French Huguenots, landed first near St Augustine and then at the mouth of the St Johns river, which he called the river of May, and on behalf of France claimed the country, which he described as "the fairest, fruitfullest and pleasantest of all the world"; but he made his settlement on an island near what is now Beaufort, South Carolina. In 1564 René de Laudonnière (? –*c.* 1586), with another party of Huguenots, established Fort Caroline at the mouth of the St Johns, but the colony did not prosper, and in 1565 Laudonnière was about to return to France when (on the 28th of August) he was reinforced by Ribaut and about 300 men from France. On the same day that Ribaut landed, a Spanish expedition arrived in the bay of St Augustine. It was commanded by Pedro Menéndez de Avilés (1523–1574), one of whose aims was to destroy the Huguenot settlement. This he did, putting to death almost the entire garrison at Fort Caroline "not as Frenchmen, but as Lutherans," on the 20th of September 1565. The ships of Ribaut were soon afterwards wrecked near Matanzas Inlet; he and most of his followers surrendered to Menéndez and were executed. Menéndez then turned his attention to the founding of a settlement which he named St Augustine (*q.v.*); he also explored the Atlantic coast from Cape Florida to St Helena, and established forts at San Mateo (Fort Caroline), Avista, Guale and St Helena. In 1567 he returned to Spain in the interest of his colony.

The news of the destruction of Fort Caroline, and the execution of Ribaut and his followers, was received with indifference at the French court; but Dominique de Gourgues (*c.* 1530–1593), a friend of Ribaut but probably a Catholic, organized an expedition of vengeance, not informing his men of his destination until his three ships were near the Florida coast. With the co-operation of the Indians under their chief Saturiba he captured Fort San Mateo in the spring of 1568, and on the spot where the garrison of Fort Caroline had been executed, he hanged his Spanish prisoners, inscribing on a tablet of pine the words, "I do this not as unto Spaniards but as to traitors, robbers and murderers." Feeling unable to attack St Augustine, de Gourgues returned to France.

The Spanish settlements experienced many vicissitudes. The Indians were hostile and the missionary efforts among them failed. In 1586 St Augustine was almost destroyed by Sir Francis Drake and it also suffered severely by an attack of Captain John Davis in 1665. No until the last decade of the 17th century did the Spanish authorities attempt to extend the settlements beyond the east coast. Then, jealous of the French explorations along the Gulf of Mexico, they turned their attention to the west coast, and in 1696 founded Pensacola. When the English colonies of the Carolinas and Georgia were founded, there was constant friction with Florida. The Spanish were accused of inciting the Indians to make depredations on the English settlements and of interfering with English commerce and the Spanish were in constant fear of the encroachments of the British. In 1702, when Great Britain and Spain were contending in Europe, on opposite sides, in the war of the Spanish Succession, a force from South Carolina captured St Augustine and laid siege to the fort, but being unable to reduce it for lack of necessary artillery, burned the town and withdrew at the approach of Spanish reinforcements. In 1706 a Spanish and French expedition against Charleston, South Carolina, failed, and the Carolinians retaliated by invading middle Florida in 1708 and again in 1722. In 1740 General James Edward Oglethorpe, governor of Georgia, supported by a naval force, made an unsuccessful attack upon St Augustine; two years later a Spanish expedition against Savannah by way of St Simon's Island failed, and in 1745 Oglethorpe again appeared before the walls of St Augustine, but the treaty of Aix-la-Chapelle in 1748 prevented further hostilities. Pensacola, the other centre of Spanish settlement, though captured and occupied (1719–1723) by the French from Louisiana, had a more peaceful history.

By the treaty of Paris in 1763 Florida was ceded to England in return for Havana. The provinces of East Florida and West Florida were now formed, the boundaries of West Florida being 31° N. lat. (when civil government was organized in 1767, the N. line was made 32° 28′), the Chattahoochee, and the Apalachicola rivers, the Gulf of Mexico, Mississippi Sound, Lakes Borgne, Pontchartrain and Maurepas, and the Mississippi river. A period of prosperity now set in. Civil in place of military government was instituted; immigration began; and Andrew Turnbull, an Englishman, brought over a band of about 1500 Minorcans (1769), whom he engaged in the cultivation of indigo at New Smyrna. Roads were laid out, some of which yet remain; and in the last three years of English occupation the government spent $580,000 on the two provinces. Consequently, the people of Florida were for the most part loyal to Great Britain during the War of American Independence. In 1776, the Minorcans of New Smyrna refused to work longer on the indigo plantations; and many of them removed to St Augustine, where they were protected by the authorities. Several plans were made to invade South Carolina and Georgia, but none matured until 1778, when an expedition was organized which co-operated with British forces from New York in the siege of Savannah, Georgia. In the following year, Spain having declared war against Great Britain, Don Bernardo de Galvez (1756–1794), the Spanish governor at New Orleans, seized most of the English forts in West Florida, and in 1781 captured Pensacola.

By the treaty of Paris (1783) Florida reverted to Spain, and, no religious liberty being promised, many of the English inhabitants left East and West Florida. A dispute with the United States concerning the northern boundary was settled by the treaty of 1795, the line 31° N. lat. being established.

The westward expansion of the United States made necessary American ports on the Gulf of Mexico; consequently the acquisition of West Florida as well as of New Orleans was one of the aims of the negotiations which resulted in the Louisiana Purchase of 1803. After the cession of Louisiana to the United States, the people of West Florida feared that that province would be seized by Bonaparte. They, therefore, through a convention at Buhler's Plains (July 17, 1810), formulated plans for a more effective government. When it was found that the Spanish governor did not accept these plans in good faith, another convention was held on the 26th of September which declared West Florida to be an independent state, organized a government and petitioned for admission to the American Union. On the 27th of October President James Madison, acting on a theory of Robert R. Livingston that West Florida was ceded by Spain to France in 1800 along with Louisiana, and was therefore included by France in the sale of Louisiana to the United States in 1803, declared West Florida to be under the jurisdiction of the United States. Two years later the American Congress annexed the portion of West Florida between the Pearl and the Mississippi rivers to Louisiana (hence the so-called Florida parishes of Louisiana), and that between the Pearl and the Perdido to the Mississippi Territory.

In the meantime war between Great Britain and the United States was imminent. The American government asked the Spanish authorities of East Florida to permit an American occupation of the country in order that it might not be seized by Great Britain and made a base of military operations. When the request was refused, American forces seized Fernandina in the spring of 1812, an action that was repudiated by the American government after protest from Spain, although it was authorized in official instructions. About the same time an attempt to organize a government at St Mary's was made by American sympathizers, and a petty civil war began between the Americans, who called themselves "Patriots," and the Indians, who were encouraged by the Spanish. In 1814 British troops landed at Pensacola to begin operations against the United States. In retaliation General Andrew Jackson captured the place, but in a few days withdrew to New Orleans. The British then built a fort on the Apalachicola river, and there directed expeditions of Indians and runaway negroes against the American settlements, which continued long after peace was concluded in 1814. In 1818 General Jackson, believing that the Spanish were aiding the Seminole Indians and inciting them to attack the Americans, again captured Pensacola. By the treaty of 1819 Spain formally ceded East and West Florida to the United States; the treaty was ratified in 1821, when the United States took formal possession, but civil government was not established until 1822.

Indian affairs furnished the most serious problems of the new Territory of Florida. The aborigines, who seemed to have reached a stage of civilization somewhat similar to that of the Aztecs, were conquered and exterminated or absorbed by Creeks about the middle of the 18th century. There was a strong demand for the removal of these Creek Indians, known as Seminoles, and by treaties at Payne's Landing in 1832 and Fort Gibson in 1833 the Indian chiefs agreed to exchange their Florida lands for equal territory in the western part of the United States. But a strong sentiment against removal suddenly developed, and the efforts of the United States to enforce the treaty brought on the Seminole War (1836–42), which resulted in the removal of all but a few hundred Seminoles whose descendants still live in southern Florida.

In 1845 Florida became a state of the American Union. On the 10th of January 1861 an ordinance of secession, which declared Florida to be a "sovereign and independent nation," was adopted by a state convention, and Florida became one of the Confederate States of America. The important coast towns were readily captured by Union forces; Fernandina, Pensacola and St Augustine in 1862, and Jacksonville in 1863; but an invasion of the interior in 1864 failed, the Union forces being repulsed in a battle at Olustee (on the 20th of February 1864). In 1865 a provisional governor was appointed by President Andrew Johnson, and a new state government was organized. The legislature of 1866 rejected the Fourteenth Amendment to the Federal Constitution, and soon afterwards Florida was made a part of the Third Military District, according to the Reconstruction Act of 1867. Negroes were now registered as voters by the military authorities, and another Constitutional Convention met in January and February 1868. A factional strife in the dominant party, the Republican, now began; fifteen delegates withdrew from the convention; the others framed a constitution, and then resolved themselves into a political convention. The seceding members with nine others then returned and organized; but the factions were reconciled by General George M. Meade. A new constitution was framed and was ratified by the electors, and Florida passed from under a quasi-military to a full civil government on the 4th of July 1868.

The factional strife in the Republican party continued, a number of efforts being made to impeach Governor Harrison Reed (1813–1899). The decisive year of the Reconstruction Period was 1876. The Canvassing Board, which published the election returns, cast out some votes, did not wait for the returns from Dade county, and declared the Republican ticket elected. George F. Drew (1827–1900), the Democratic candidate for governor, then secured a mandamus from the circuit court restraining the board from going behind the face of the election returns; this was not obeyed and a similar mandamus was therefore obtained from the supreme court of Florida, which declared that the board had no right to determine the legality of a particular vote. According to the new count thus ordered, the Democratic state ticket was elected. By a similar process the board's decision in favour of the election of Republican presidential electors was nullified, and the Democratic electors were declared the successful candidates; but the electoral commission, appointed by Congress, reversed this decision. (See ELECTORAL COMMISSION.)

Since 1876 Florida has been uniformly Democratic in politics.

AMERICAN GOVERNORS OF FLORIDA.

Territorial Governors.

Andrew Jackson	1821–1822
William P. Duval	1822–1834
John H. Eaton	1834–1835
Richard K. Call	1835–1840
Robert R. Reid	1840–1841
Richard K. Call	1841–1844
John Branch	1844–1845

State Governors.

William D. Moseley	1845–1849	Democrat
Thomas Brown	1849–1853	Whig
James E. Broome	1853–1857	Democrat
Madison S. Perry	1857–1861	„
John Milton	1861–1865	„
William Marvin	1865	Provisional
David S. Walker	1865–1868	Democrat
Harrison Reed	1868–1872	Republican
Ossian B. Hart	1873–1874	„
Marcellus L. Stearns	1874–1877	„
George F. Drew	1877–1881	Democrat
William D. Bloxham	1881–1885	„
Edward A. Perry	1885–1889	„
Francis P. Fleming	1889–1893	„
Henry L. Mitchell	1893–1897	„
William D. Bloxham	1897–1901	„
William S. Jennings	1901–1905	„
Napoleon B. Broward	1905–1909	„
Albert W. Gilchrist	1909–	„

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J. A. Dimock's *Florida Enchantments* (New York, 1908) are of interest. For administration, see Wilbur F. Yocum's *Civil Government of Florida* (De Land, Florida, 1904); and the *Revised Statutes of Florida* (1892). The standard history is that by G. R. Fairbanks, *History of Florida* (Philadelphia, 1871). This should be supplemented by D. G. Brinton's *Notes on the Floridian Peninsula, its Literary History, Indian Tribes and Antiquities* (Philadelphia, 1859), which has an excellent descriptive bibliography of the early explorations: Woodbury Lowery, *The Spanish Settlements within the Present Limits of the United States* (New York, vol. i., 1901; vol. ii., sub-title *Florida*, 1905); R. L. Campbell's *Historical Sketches of Colonial Florida* (Cleveland, 1892), which treats at length of the history of Pensacola; H. E. Chambers's *West Florida and its Relation to the Historical Cartography of the United States* (Johns Hopkins Studies in Historical and Political Science, Series 16, No. 5); and Herbert B. Fuller's *The Purchase of Florida; its History and Diplomacy* (Cleveland, O., 1906). The only published collections of documents relating to the state are Buckingham Smith's *Colleccion de varios documentos para la historia de la Florida y tierras adyacentes* (London, 1857), and Benjamin F. French's *Historical Collections of Louisiana* (New York, 1846–1875).

FLORIDABLANCA, DON JOSE MOÑINO Y REDONDO, Count of (1728–1808), Spanish statesman, was born at Murcia in 1728. He was the son of a retired army officer, and received a good education, which he completed at the university of Salamanca, especially applying himself to the study of law. For a time he followed the profession of an advocate, and acquired a high reputation. A more public career was opened to him by the marquis of Esquilache, then chief minister of state, who sent him ambassador to Pope Clement XIV. Successful in his mission, he was soon after appointed by Charles III. successor to his patron, and his administration was one of the most brilliant Spain had ever seen. He regulated the police of Madrid, reformed many abuses, projected canals, established many societies of agriculture and economy and many philanthropical institutions, and gave encouragement to learning, science and the fine arts. Commerce flourished anew under his rule, and the long-standing disputes with Portugal about the South American colonies were settled. He sought to strengthen the alliance of Spain with Portugal by a double marriage between the members of the royal houses, designing by this arrangement to place ultimately a Spanish prince on the throne of Portugal. But in this he failed. Floridablanca was the right-hand man of King Charles III. in his policy of domestic reform, and was much under the influence of French *philosophes* and economic writers. Like other reformers of that school he was a strong supporter of the royal authority and a convinced partisan of benevolent despotism. The French Revolution frightened him into reaction, and he advocated the support of the first coalition against France. He retained his office for three years under Charles IV.; but in 1792, through the influence of the favourite Godoy, he was dismissed and imprisoned in the castle of Pampeluna. Here he was saved from starvation only by the intervention of his brother. He was afterwards allowed to retire to his estates, and remained in seclusion till the French invasion of 1808. He was then called by his countrymen to take the presidency of the central junta. But his strength failed him, and he died at Seville on the 20th of November of the same year. He left several short treatises on jurisprudence.

See *Obras originales del Conde de Floridablanca*, edited, with biographical introduction, by A. Ferrer del Rio; in the *Biblioteca de Rivadeneyra*, vol. lix.

FLORIDOR [Josias de Soulas, Sieur de Prinefosse] (d. *c.* 1671), French actor, was born in Brie early in the 17th century, the son of a gentleman of German family who had moved to France, married there, and become a Roman Catholic. The son entered the French army, but after being promoted ensign, quitted the army for the theatre, where he took the name of Floridor. His first Paris appearance was in 1640. Three years later he was called to the company at the Hôtel de Bourgogne, where he played all the leading parts in tragedy and comedy and became the head of his profession. He was a man of superb physique and excellent carriage, with a flexible and sonorous voice, and manners of rare distinction and elegance. He was much liked at court, and Louis XIV. held him in particular esteem. He died in 1671 or 1672.

FLORIN, the name applied to several coins of the continent of Europe and to two coins struck in England at different times. The word comes through the Fr. *florin* from the Ital. *fiorino*, flower, Lat. *flos, florem*. Fiorino was the Italian name of a gold coin issued at Florence in 1252, weighing about fifty-four grains. This coin bore on the obverse a lily, from which it took its name of "the flower," on the reverse the Latin name of the city *Florentia*, from which it was also known as a "florence." "Florin" and "florence" seem to have been used in English indiscriminately as the name of this coin. The Florentine florin was held in great commercial repute throughout Europe, and similar coins were struck in Germany, other parts of Italy, France, &c. The English gold florin was introduced by Edward III. in 1343, half and quarter florins being struck at the same time. This gold florin weighed 108 grains and was to be current for six shillings. It was found, however, to be overvalued in proportion to the silver currency and was demonetized the following year. The florin did not again appear in the English coinage until 1849, when silver coins with this name, having a nominal value of two shillings (one-tenth of a pound), were struck. When first issued the "Dei gratia" was omitted from the inscription, and they were frequently referred to as the "Godless" or "graceless" florins. The D.G. was added in 1852. In 1887 a double florin or four shilling piece was issued, but its coinage was discontinued in 1890. The total value of double florins issued during these years amounted to £533,125. (See also Numismatics.)

FLORIO, GIOVANNI (1553?–1625), English writer, was born in London about 1553. He was of Tuscan origin, his parents being Waldenses who had fled from persecution in the Valtelline and taken refuge in England. His father, Michael Angelo Florio, was pastor of an Italian Protestant congregation in London in 1550. He was attached to the household of Sir William Cecil, but dismissed on a charge of immorality. He dedicated a book on the Italian language to Henry Herbert, and may have been a tutor in the family of William Herbert, earl of Pembroke. Anthony à Wood says that the Florios left England on the accession of Queen Mary, but returned after her death. The son resided for a time at Oxford, and was appointed, about 1576 tutor to the son of Richard Barnes, bishop of Durham, then studying at Magdalen College. In 1578 Florio published a work entitled *First Fruits, which yield Familiar Speech, Merry Proverbs, Witty Sentences, and Golden Sayings* (4to). This was accompanied by *A Perfect Induction to the Italian and English Tongues*. The work was dedicated to the earl of Leicester. Three years later Florio was admitted a member of Magdalen College, and became a teacher of French and Italian in the university. In 1591 appeared his *Second Fruits, to be gathered of Twelve Trees, of divers but delightsome Tastes to the Tongues of Italian and English men*; to which was annexed the *Garden of Recreation, yielding six thousand Italian Proverbs* (4to). These manuals contained an outline of the grammar, a selection of dialogues in parallel columns of Italian and English, and longer extracts from classical Italian writers in prose and verse. Florio had many patrons; he says that he "lived some years" with the earl of Southampton, and the earl of Pembroke also befriended him. His Italian and English dictionary, entitled *A World of Words*, was published in folio in 1598. After the accession of James I., Florio was named French and Italian tutor to Prince Henry, and afterwards became a gentleman of the privy chamber and clerk of the closet to the queen, whom he also instructed in languages. His *magnum opus* is the admirable translation of the *Essayes on Morall, Politike, and Millitarie Discourses of Lo. Michaell de Montaigne*, published in folio in 1603 in three books, each dedicated to two noble ladies. A second edition in 1613 was dedicated to the queen. Special interest attaches to the first edition from the circumstance that of the several copies in the British Museum library one bears the autograph of Shakespeare—long received as genuine but now supposed to be by an 18th-century hand—and another that of Ben Jonson. It was suggested by Warburton that Florio is satirized by Shakespeare under the character of Holofernes, the pompous pedant of *Love's Labour's Lost*, but it is much more likely, especially as he was one of the earl of Southampton's protégés, that he was among the personal friends of the dramatist, who may well have gained his knowledge of Italian and French from him. He had married the sister of the poet Daniel, and had friendly relations with many writers of his day. Ben Jonson sent him a copy of *Volpone* with the inscription, "To his loving father and worthy friend Master John Florio, Ben Jonson seals this testimony of his friendship and love." He is characterized by Wood, in *Athenae Oxonienses*, as a very useful man in his profession, zealous for his religion, and deeply attached to his adopted country. He died at Fulham, London, in the autumn of 1625.

FLORIS, FRANS, or more correctly FRANS DE VRIENDT, called FLORIS (1520–1570), Flemish painter, was one of a large family trained to the study of art in Flanders. Son of a stone-cutter, Cornelis de Vriendt, who died at Antwerp in 1538, he began life as a student of sculpture, but afterwards gave up carving for painting. At the age of twenty he went to Liége and took lessons from Lambert Lombard, a pupil of Mabuse, whose travels in Italy had transformed a style truly Flemish into that of a mongrel Leonardesque. Following in the footsteps of Mabuse, Lambert Lombard had visited Florence, and caught the manner of Salviati and other pupils of Michelangelo and Del Sarto. It was about the time when Schoreel, Coxcie and Heemskerk, after migrating to Rome and imitating the masterpieces of Raphael and Buonarroti, came home to execute Dutch-Italian works beneath the level of those produced in the peninsula itself by Leonardo da Pistoia, Nanaccio and Rinaldo of Mantua. Fired by these examples, Floris in his turn wandered across the Alps, and appropriated without assimilation the various mannerisms of the schools of Lombardy, Florence and Rome. Bold, quick and resolute, he saw how easy it would be to earn a livelihood and acquire a name by drawing for engravers and painting on a large scale after the fashion of Vasari. He came home, joined the gild of Antwerp in 1540, and quickly opened a school from which 120 disciples are stated to have issued. Floris painted strings of large pictures for the country houses of Spanish nobles and the villas of Antwerp patricians. He is known to have illustrated the fable of Hercules in ten compositions, and the liberal arts in seven, for Claes Jongeling, a merchant of Antwerp, and adorned the duke of Arschot's palace of Beaumont with fourteen colossal panels. Comparatively few of his works have descended to us, partly because they came to be contemned for their inherent defects, and so were suffered to perish, partly because they were soon judged by a different standard from that of the Flemings of the 16th century. The earliest extant canvas by Floris is the "Mars and Venus ensnared by Vulcan" in the Berlin Museum (1547), the latest a "Last Judgment" (1566) in the Brussels gallery. Neither these nor any of the intermediate works at Alost, Antwerp, Copenhagen, Dresden, Florence, Léau, Madrid, St Petersburg and Vienna display any charm of originality in composition or in form. Whatever boldness and force they may possess, or whatever principles they may embody, they are mere appropriations of Italian models spoiled in translation or adaptation. Their technical execution reveals a rapid hand, but none of the lustre of bright colouring; and Floris owed much of his repute to the cleverness with which his works were transferred to copper by Jerome Cock and Theodore de Galle. Whilst Floris was engaged on a Crucifixion of 27 ft., and a Resurrection of equal size, for the grand prior of Spain, he was seized with illness, and died on the 1st of October 1570 at Antwerp.

FLORUS, Roman historian, flourished in the time of Trajan and Hadrian. He compiled, chiefly from Livy, a brief sketch of the history of Rome from the foundation of the city to the closing of the temple of Janus by Augustus (25 B.C.). The work, which is called *Epitome de T. Livio Bellorum omnium annorum DCC Libri duo*, is written in a bombastic and rhetorical style, and is rather a panegyric of the greatness of Rome, whose life is divided into the four periods of infancy, youth, manhood and old age. It is often wrong in geographical and chronological details; but, in spite of its faults, the book was much used in the middle ages. In the MSS. the writer is variously given as Julius Florus, Lucius Anneus Florus, or simply Annaeus Florus. From certain similarities of style he has been identified with Publius Annius Florus, poet, rhetorician and friend of Hadrian, author of a dialogue on the question whether Virgil was an orator or poet, of which the introduction has been preserved.

The best editions are by O. Jahn (1852), C. Halm (1854), which contain the fragments of the Virgilian dialogue. There is an English translation in Bohn's *Classical Library*.

FLORUS, JULIUS, poet, orator, and jurist of the Augustan age. His name has been immortalized by Horace, who dedicated to him two of his *Epistles* (i. 3; ii. 2), from which it would appear that he composed lyrics of a light, agreeable kind. The statement of Porphyrion, the old commentator on Horace, that Florus himself wrote satires, is probably erroneous, but he may have edited selections from the earlier satirists (Ennius, Lucilius, Varro). Nothing is definitely known of his personality, except that he was one of the young men who accompanied Tiberius on his mission to settle the affairs of Armenia. He has been variously identified with Julius Florus, a distinguished orator and uncle of Julius Secundus, an intimate friend of Quintilian (*Instit.* x. 3, 13); with the leader of an insurrection of the Treviri (Tacitus, *Ann.* iii. 40); with the Postumus of Horace (*Odes*, ii. 14) and even with the historian Florus.

FLORUS, PUBLIUS ANNIUS, Roman poet and rhetorician, identified by some authorities with the historian Florus (*q.v.*). The introduction to a dialogue called *Virgilius orator an poëta* is extant, in which the author (whose name is given as Publius Annius Florus) states that he was born in Africa, and at an early age took part in the literary contests on the Capitol instituted by Domitian. Having been refused a prize owing to the prejudice against African provincials, he left Rome in disgust, and after travelling for some time set up at Tarraco as a teacher of rhetoric. Here he was persuaded by an acquaintance to return to Rome, for it is generally agreed that he is the Florus who wrote the well-known lines quoted together with Hadrian's answer by Aelius Spartianus (*Hadrian* 16). Twenty-six trochaic tetrameters, *De qualitate vitae*, and five graceful hexameters, *De rosis*, are also attributed to him. Florus is important as being the first in order of a number of 2nd-century African writers who exercised a considerable influence on Latin literature, and also the first of the *poëtae neoterici* or *novelli* (new-fashioned poets) of Hadrian's reign, whose special characteristic was the use of lighter and graceful metres (anapaestic and iambic dimeters), which had hitherto found little favour.

The little poems will be found in E. Bährens, *Poëtae Latini minores* (1879–1883); for an unlikely identification of Florus with the author of the *Pervigilium Veneris* (*q.v.*) see E. H. O. Müller, *De P. Annio Floro poëta et de Pervigilio Veneris* (1855), and, for the poet's relations with Hadrian, F. Eyssenhardt, *Hadrian und Florus* (1882); see also F. Marx in Pauly-Wissowa's *Realencyclopädie*, i. pt. 2 (1894).

FLOTOW, FRIEDRICH FERDINAND ADOLF VON, FREIHERR (1812–1883), German composer, was born on his father's estate at Teutendorf, in Mecklenburg, on the 27th of April 1812. Destined originally for the diplomatic profession, his passion for music induced his father to send him to Paris to study under Reicha. But the outbreak of the revolution in 1830 caused his return home, where he busied himself writing chamber-music and operetta until he was able to return to Paris. There he produced *Pierre et Cathérine*, *Rob Roy*, *La Duchesse de Guise*, but made his first real success with *Le Naufrage de la Méduse* at the Renaissance Théâtre in 1838. Greater, however, was the success which attended *Stradella* (1844) and *Martha* (1847), which made the tour of the world. In 1848 Flotow was again driven home by the Revolution, and in the course of a few years he produced *Die Grossfürstin* (1850), *Indra* (1853), *Rübezahl* (1854), *Hilda* (1855) and *Albin* (1856). From 1856 to 1863 he was director (Intendant) of the Schwerin opera, but in the latter year he returned to Paris, where in 1869 he produced *L' Ombre*. From that time to the date of his death he lived in Paris or on his estate near Vienna. He died on the 24th of

January 1883. Of his concert-music only the *Jubelouvertüre* is now ever heard. His strength lay in the facility of his melodies.

FLOTSAM, JETSAM and **LIGAN**, in English law, goods lost at sea, as distinguished from goods which come to land, which are technically designated *wreck*. Jetsam (the same word as *jettison*, from Lat. *jactare*, to throw) is when goods are cast into the sea, and there sink and remain under water; flotsam (*floatson*, from *float*, Lat. *flottare*) is where they continue floating on the surface of the waves; ligan (or *lagan*, from *lay* or *lie*) is where they are sunk in the sea, but tied to a cork or buoy in order to be found again. Flotsam, jetsam and ligan belong to the sovereign in the absence only of the true owner. Wreck, on the other hand (*i.e.* goods cast on shore), was by the common law adjudged to the sovereign in any case, because it was said by the loss of the ship all property was gone out of the original owner. This singular distinction which treated goods washed ashore as lost, and goods on and in the sea as not lost, is no doubt to be explained by the primitive practice of plundering wrecked ships. (See WRECK.)

FLOUNDER, a common term for flat-fish. The name is also more specially given to certain varieties, according to local usage. Thus the *Pleuronectes flesus* is the common flounder of English terminology, found along the coasts of northern Europe from the Bristol Channel to Iceland. It is particularly partial to fresh water, ascending the Rhine as far as Cologne. It rarely exceeds a length of 12 in. or a weight of 1½ lb. In American terminology the principal fish of the name are the "summer flounders" or "deep-sea flounders," also known in America as "plaice" (*Paralichthys dentatus*), as long as 3 ft. and as heavy as 15 lb; the "four-spotted flounders" (*Paralichthys oblongus*); the "common" or "winter" flounder (*Pseudopleuronectes americanus*); the "diamond flounder" (*Hysopsetta guttulata*); and the "pole flounder" (*Glyptocephalus cynoglossus*).

FLOUR and **FLOUR MANUFACTURE.** The term "flour" (Fr. *fleur*, flower, *i.e.* the best part) is usually applied to the triturated farinaceous constituents of the wheat berry (see WHEAT); it is, however, also used of other cereals and even of leguminoids when ground into a fine powder, and of many other substances in a pulverulent state, though in these cases it is usual to speak of rye flour, bean flour, &c. The flour obtained from oats is generally termed oatmeal. In Great Britain wheaten flour was commonly known in the 16th and 17th centuries as meal, and up to the beginning of the 19th century, or perhaps later, the term mealing trade was not infrequently used of the milling trade.

Primitive grinding.

The ancestor of the millstone was apparently a rounded stone about the size of a man's fist, with which grain or nuts were pounded and crushed into a rude meal. These stones are generally of hard sandstone and were evidently used against another stone, which by dint of continual hammering was broken into hollows. Sometimes the crusher was used on the surface of rocks. St Bridget's stone, on the shore of Lough Macnean, is supposed to have been a primitive Irish mill; there are many depressions in the face of the table-like rock, and it is probable that round this stone several women (for in early civilization the preparation of flour was peculiarly the duty of the women) would stand and grind, or rather pound, meal. Many such stones, known as Bullan stones, still exist in Ireland. Similar remains are found in the Orkneys and Shetlands, and it is on record that some of these stones have been used for flour-making within historic times. Richard Bennett in his *History of Corn Milling* remarks that the Seneca Indians to this day boil maize and crush it into a paste between loose stones. In the same way the Omahas pound this cereal in holes in the rocks, while the Oregon Indians parch and pound the capsules of the yellow lily, much after the fashion described by Herodotus in his account of the ancient Egyptians. In California the Indian squaws make a sort of paste by crushing acorns between a round stone or "muller," and a cuplike hollow in the surface of a rock. Crushing stones are of different shapes, ranging from the primitive ball-like implement to an elongated shape resembling the pestle of a mortar. Mullers of the latter type are not infrequent among prehistoric remains in America, while Dr Schliemann discovered several specimens of the globular form on the reputed site of the city of Troy, and also among the ruins of Mycenae. As a matter of fact stone mullers survived in highly civilized countries into modern days, if indeed they are now altogether extinct.

Saddle-stone.

The saddle-stone is the connecting link between the primitive pounder, or muller, and the quern, which was itself the direct ancestor of the millstones still used to some extent in the manufacture of flour. The saddle-stone, the first true grinding implement, consisted of a stone with a more or less concave face on which the grain was spread, and in and along this hollow surface it was rubbed and ground into coarse meal. Saddle-stones have been discovered in the sand caves of Italy, among the lake dwellings of Switzerland, in the dolmens of France, in the pit dwellings of the British Isles, and among the remains of primitive folk all the world over. The Romans of the classical period seem to have distinguished the saddle-stone from the quern. We find allusions to the *mola trusatilis*, which may be translated "the thrusting mill"; this would fairly describe a backwards and forwards motion. The *mola versatilis* evidently referred to the revolving millstone or quern. In primitive parts of the world the saddle-stone is not yet extinct, as for instance in Mexico. It is known as the *metata*, and is used both for grinding maize and for making the maize cakes known as tortillas. The same implement is apparently still in use in some parts of South America, notably in Chile.

Quern.

According to Richard Bennett, the quern, the first complete milling machine, originated in Italy and is in all probability not older than the 2nd century B.C. This is, however, a controverted point. Querns are still used in most primitive countries, nor is it certain that they have altogether disappeared from remoter districts of Scotland and Ireland. Whatever was their origin, they revolutionized flour milling. The rotary motion of millstones became the essential principle of the trituration of grain, and exists to-day in the rolls of the roller mill. The early quern appears to have differed from its descendants in that it was somewhat globular in shape, the lower stone being made conical, possibly with the idea that the ground flour should be provided with a downward flow to enable it to fall from the stones. This type did not, however, persist. Gradually the convexity disappeared and the surface of the two stones became flat or very nearly so. In the upper stone was a species of funnel, through which the grain passed as through a hopper, making its way thence, as the stone revolved, into the space between the running and the bed stone. The ground meal was discharged at the periphery. The runner, or upper stone, was provided with a wooden handle by which the stone was revolved. The typical Roman mill of the Augustan age may be seen at Pompeii. Here, in what is believed to have been a public *pistrinum* or mill, were found four pairs of millstones. The circular base of these mills is 5 ft. in diameter and 1 ft. high, and upon it was fastened the *meta*, a blunt cone about 2 ft. high, on which fitted the upper millstone or *catillus*, also conical. These mills were evidently rotated by slave labour, as there was no room for the perambulation of a horse or donkey, while the side-lugs in which the handle-bars were inserted are plainly visible. Slave labour was generally used up to the introduction of Christianity, but was finally abolished by the emperor Constantine, though even after his edict mills continued to be driven by criminals.

Use of power.

The Romans are credited by some authorities with having first applied power to the driving of millstones, which they connected with water-wheels by a horizontal spindle through the intervention of bevel gearing. But long after millstones had been harnessed to water power slave labour was largely employed as a motive force. The water-mill of the Romans was introduced at a relatively early period into Britain. Domesday Book shows that England was covered by mills of a kind at the time of the Norman conquest, and mentions some 500 mills in the counties of Norfolk and Suffolk alone. No doubt the *mola* of Domesday Book consisted of one pair of stones connected by rude gearing with a water-wheel. Windmills are said to have been introduced by the Crusaders, who brought them from the East. Steam power is believed to have been first used in a British flour mill towards the close of the 18th century, when Boulton & Watt installed a steam engine in the Albion Flour Mills in London, erected under the care of John Rennie. Another great engineer, Sir William Fairbairn, in the early days of the 19th century, left the impress of his genius on the mill and all its accessories. He was followed by other clever engineers, and in the days immediately preceding the roller period many improvements were introduced as regards the balancing and driving of millstones. The introduction of the blast and exhaust to keep the stones cool was a great step in advance, while the substitution of silk gauze for woollen or linen bolting cloth, about the middle of the 19th century, marked another era in British milling. Millstones, as used just before the introduction of roller milling, were from 4 to 4½ ft. in diameter by some 12 in. in thickness, and were usually made of a siliceous stone, known as buhr-stone, much of which came from the quarry of La Ferté-sous-Jouarre, in France.

Roller milling.

Nine-tenths, or perhaps ninety-nine hundredths, of all the flour consumed in Great Britain is made in roller mills, that is, mills in which the wheat is broken and floured by means of rollers, some grooved in varying degrees of fineness, some smooth, their work being preceded and supplemented by a wide range of other machinery. All roller mills worthy of the name are completely automatic, that is to say, from the time the raw material enters the mill warehouse till it is sacked, either in the shape of finished flour or of offals, it is touched by no human hand.

The history of roller milling extends back to the first half of the 19th century. Roller mills, that is to say, machines fitted with rolls set either horizontally, or vertically, or obliquely, for the grinding of corn, are said to have been used as far back as the 17th century, but if this be so it is certain that they were only used in a tentative manner. Towards the middle of the 19th century the firm of E. R. & F. Turner, of Ipswich, began to build roller mills for breaking wheat as a preliminary to the conversion of the resultant middlings on millstones. The rolls were made of chilled iron and were provided with serrated edges, which must have exercised a tearing action on the integuments of the berry. These mills were built to the design of a German engineer, of the name of G. A. Buchholz, and were exhibited at the London exhibition of 1862, but they never came into general use. It has also been stated that as early as 1823 a French engineer, named Collier, of Paris, patented a roller mill, while five years later a certain Malar took out another French patent, the specification of which speaks of grooves and differential speeds. But the direct ancestors of the roller mills of the present day were brought out some time in the third decade of the 19th century by a Swiss engineer named Sulzberger. His apparatus was rather cumbrous, and the chilled iron rolls with which it was fitted consumed a large amount of power relatively to the work effected. But the Pester Walz-Mühle, founded in 1839 by Count Szechenyi, a Hungarian nobleman, which took its name from the roller mills with which it was equipped by Sulzberger, was for many years a great success; some of its roller mills are said to have been kept at work for upwards of forty years, and one at least is preserved in the museum at Budapest.

Hungarian practice.

It may be noted that Hungarian wheat is hard and flinty and well adapted for treatment by rolls. Moreover, gradual reduction, as now understood, was more or less practised in Hungary, even before the introduction of roller milling. Though millstones, and not rolls, were used, yet the wheat was not floured at one operation, as in typical low or flat grinding, but was reduced to flour in several successive operations. In the first break the stones would be placed just wide enough apart to “ end ” the wheat, and in each succeeding operation the stones were brought closer together. But Hungarian milling was not then automatic in the sense in which British millers understand the word. For a long time a great deal of hand labour was employed in the merchant mills of Budapest in carrying about products from one machine to another for further treatment. This practice may have been partly due to the cheap labour available, but it was also the deliberate policy of Hungarian millers to handle in this way the middlings and fine “ dunst,” because it was maintained that only thus could certain products be delivered to the machine by which they were to be treated in the perfection of condition. The results were good so far as the finished products were concerned, but in the light of modern automatic milling the system appears uneconomical. Not only did it postulate an inordinately large staff, but it further increased the labour bill by the demand it made on the number of sub-foremen who were occupied in classifying, largely by touch, the various products, and directing the labourers under them. Hungarian milling still differs widely from milling as practised in Great Britain in being a longer system. This is due to the more minute subdivision of products, a necessary consequence of the large number of grades of flour and offals made in Hungary, where there are many intermediate varieties of middlings and “ dunst ” for which no corresponding terms are available in an English miller's vocabulary.

Semolina, middlings, dunst.

It will be convenient here to explain the meaning of three terms constantly used by millers, namely, *semolina, middlings* and *dunst*. These three products of roller mills are practically identical in composition, but represent different stages in the process of reducing the endosperm of the wheat to flour. A wheat berry is covered by several layers of skin, while under these layers is the floury kernel or endosperm. This the break or grooved rolls tend to tear and break up. The largest of these more or less cubical particles are known as semolina, whilst the medium-sized are called middlings and the smallest sized termed dunst. The last is a German word, with several meanings, but is used in this particular sense by German and Austrian millers, from whom it was doubtless borrowed by the pioneers of roller milling in England. If we were to lay a sample of fairly granular flour beside a sample of small dunst the two would be easy to distinguish, but place a magnifying glass over the flour and it would look very like the dunst. If we were to repeat this experiment on dunst and fine middlings, the former would under the glass present a strong resemblance to the middlings. The same effect would be produced by the putting side by side of large middlings and small semolina. This is a broad description of semolina, middlings and dunst. Semolina and middlings are more apt to vary in appearance than dunst, because the latter is the product of the later stages of the milling process and represents small particles of the floury kernel tolerably free from such impurities as bran or fluff. The flour producing middlings must not be confounded with the variety of wheat offal which is also known to many English millers as middlings. This consists of husk or bran, more or less comminuted, and with a certain proportion of floury particles adherent. It is only fit for feeding beasts.

Porcelain rolls.

The spread of roller milling on the continent of Europe was undoubtedly accelerated by the invention of porcelain rolls, by Friedrich Wegmann, a Swiss miller, which were brought into general use in the seventh decade of the 19th century, and are still widely employed. They are admirably fitted for the reduction of semolina, middlings and dunst into flour; and for reducing pure middlings, that is, middlings containing no bran or wheat husk, there is perhaps nothing that quite equals them. They were introduced into Great Britain in 1877, or thereabouts, and were used for several years, but ultimately they almost disappeared from British mills. This was partly due to the fact that as made at that date they were rather difficult to work, as it was not easy to keep the rolls perfectly parallel. Another drawback was their inadaptability to over-heavy feeds, to which the British, and perhaps still more the American, miller is frequently obliged to resort. However, since the beginning of the 20th century some of the most advanced flour mills in England have again taken to using porcelain rolls for some part of their reduction process.

Roller milling in England.

The birth of roller milling in Great Britain may be said to date from 1872, when Oscar Oexle, a German milling engineer, erected a set of roller mills in the Tradeston Mills, in Glasgow. This was long before the introduction of automatic roller mills. But the foundations of the millstone system were not seriously disturbed till 1877, when a party of leading British and Irish millers visited Vienna and Budapest with the object of studying roller milling in its native home. In 1878 J. H. Carter installed in the mill of J. Boland, of Dublin, what was probably the first complete automatic roller plant erected in the United Kingdom, and in 1881 a milling exhibition held at the Royal Agricultural Hall, London, showed the automatic roller system in complete operation. From that time the roller system made great progress. By 1885 many of the leading British millers had installed full roller plants, and in the succeeding ten years small roller plants were installed in many country mills. For a time there was a transition stage in which there was in operation a number of so-called "combined" plants, that is to say, mills in which the wheat was broken on millstones or disk mills, while the middlings were reduced by smooth rolls; but these gradually dropped out of being.

Well-found British flour mills at the present time are probably the best fitted in the world, and as a whole have nothing to fear from comparison with their American competitors. It is true that American millers were rather quicker to copy Hungarian milling methods so far as gradual reduction was concerned. But from about 1880 the British miller was quite awake to his position and was straining every nerve to provide himself with a plant capable of dealing with every kind of wheat. It has often been said that he commands the wheat of the whole world. This is true in a sense, but it is not true that he can always command the exact kind of wheat he requires at the price required to meet foreign competition. Therein he is at a disadvantage. But engineers have done their best to meet this weak point, and by their assistance he is able to compete under almost all conditions with the millers of the whole world.

Processes of Milling.—Fully to appreciate the various processes of modern milling, it must be remembered not only that the wheat as delivered at the mill is dusty and mixed with sand and even more objectionable refuse, but also that it contains many light grains and seeds of other plants. It is not therefore sufficient for the miller to be able to reduce the grain to flour on the most approved principles; he must also have at command the means of freeing it from foreign substances, and further of "conditioning" it, should it be damp or over dry and harsh. Again, his operations must be conducted with reference to the structure of the wheat grain. The wheat berry is a fruit, not a seed, the actual seed being the germ or embryo, a kidney-shaped body which is found at the base of the berry and is connected with the plumule or root. The germ is tough in texture and is in roller milling easily separated from the rest of the berry, being flattened instead of crushed by the rolls and thus readily sifted from the stock. The germ contains a good deal of fatty matter, which, if allowed to remain, would not increase the keeping qualities of the flour. Botanists distinguish five skins on the berry—epidermis, epicarp, endicarp, episperm and embryous membrane—but for practical purposes the number of integuments may be taken as three. The inner skin is often as thick as the outer and second skins together, which are largely composed of woody fibre; it contains the cerealin or aleurone cells, but although these are made up of a certain proportion of proteids, on account of the discolouring and diastasic action of the cerealin in flour they are best eliminated. The endosperm, or floury kernel, coming next to the inner skin, consists of starch granules which are caught as it were in the minute meshes of a net. This network is the gluten, and it may be noted that these meshes are not of equal consistency throughout the berry, but are usually finer and more dense near the husk than in the interior of the kernel. This glutinous portion is of great importance to the baker because on its quantity and quality depends the "strength" or rising power of the flour, and the aim of modern roller milling is to retain it as completely as possible, a matter of some difficulty owing to its close adherence to the husk, especially in the richest wheats. Another organ of the wheat berry which has a most important bearing on the work of the miller is the placenta, which is in effect a cord connecting the berry with its stalk or straw. The placenta serves to filter the food which the plant sucks up from the ground; it passes up the crease of the berry, and is enfolded in the middle skin, being protected on the outer side by the first and having the third or inner skin on its other side. A good deal of the matters filtered by the placenta are mineral in their nature, and such portions as are not digested remain in the crease. This is the matter which millers call "crease dirt." It is highly discolouring to flour, and must be carefully eliminated. The fuzzy end of the berry known as the beard also has a distinct function; its hairs are in reality tubes which serve to carry off superfluous moisture. They have, in common with the bran, no nutritive value. (See also WHEAT.)

In the old "flat" or "low" milling the object was to grind as perfectly as possible, at one operation, the central substance of the grain, constituting the flour, and to separate it from the embryo and outer skins constituting the bran. In "high" milling, on the other hand, the grinding is effected in a series of operations, the aim being to get as much semolina and middlings as possible from the wheat, and to make as little flour as possible during the earlier or "breaking" part of the process. It is impossible altogether to avoid the production of flour at this stage, but properly set and worked break-rolls will make as little as 15% of "break-flour," which is of less value, being contaminated with crease dirt, and also because it is weak owing to the absence of the gluten cells which adhere more readily to the middlings. Whole wheaten flour, sometimes called Graham flour, consists of the entire grain ground up to a uniform mass.

Dry cleaning.

Wheat cleaning has been well called the foundation of all good milling. In the screen house, as the wheat-cleaning department of the mill is termed, will be found an array of machinery almost equal in range and variety to that in the mill itself. The wheat, drawn by an elevator from the barge, or hoisted in sacks, is first treated by a machine known as a warehouse separator. This apparatus accomplishes its work by means of flat sieves, some of which will be of much coarser mesh than others, and of air currents, the adjustment of which is a more delicate task than might appear. The warehouse separator serves to free dirty wheat of such impurities as lumps of earth, stones, straws and sand, not to mention small seeds, also some maize, oats and barley. Great care has to be exercised in all operations of the screen house lest wheat should pass away with the screenings. Besides the warehouse separator, which is made in different types and sizes, grading and sorting cylinders, and what are known as cockle and barley cylinders, are much used in the screen house. These cylinders are provided with indents so shaped and of such size as to catch seeds which are smaller than wheat, and reject grains, as of barley or oats, which are longer than wheat. Sorting cylinders should be followed by machines known as scourers, the function of which is to free the wheat from adherent impurities. These machines are of different types, but all depend on percussive action. A vertical scourer consists of a number of steel or iron beaters attached to a vertical spindle which revolves inside a metallic woven or perforated casing, the whole being fitted with an effectual exhaust. Scourers with horizontal spindles are also in great favour. Not every wheat is suitable for scouring, but some wheats are so mingled with impurities that a severe action between the beaters and the perforated case is absolutely necessary. The most efficient scourer is that which frees the wheat from the greatest amount of impurity with a minimum of abrasion. The beaters should be adjustable to suit different kinds of wheat. Scourers are followed by brush machines which are similar to the last and are of three distinct types: solid, divided and cone brushes. In the solid variety the brush surface is continuous around the circumference of a revolving cylinder; in divided brushes there is often a set of beaters or bars covered with brush but leaving intermediate spaces; while the cone brush consists of beaters covered with fibre arranged like cones around a vertical spindle. The object of all these brushes, the cylinder containing them being fitted with an exhaust fan, is to polish the wheat and remove adhering impurities which the percussive action of the scourer may have failed to eliminate, also to remove the beard or fuzzy end and any loose portions of the outer husk. But the miller must be careful not to overdo the scouring action and unnecessarily abrade the berry, else he will have trouble with his flour, the triturated bran breaking under the rolls and producing powder which will discolour the break flour. To remove such metallic fragments as nails, pieces of wire, &c., magnets are used. These may either be of horseshoe shape, in which case they are usually set at the head of the wheat spouts, or they may consist of magnetized plates set at angles over which the wheat will slide. It is not a bad plan to place the magnets just before the first set of break-rolls, where they should ensure the arrest of steel and iron particles, which might otherwise get between the rolls and spoil the edges of their grooves, and also do damage to the sifting machines. Mention must also be made of the automatic scales which are used to check the milling value of the wheat. In principle these machines are all the same, though details of construction may vary. Each weigher is set for a given weight of grain. As soon as the receiving hopper has poured through a valve into the recipient or skip, which is hung at one end of a beam scale, a load of grain sufficient to overcome the weight hung at the other end of the beam, the inlet of grain is automatically cut off and the skip is discharged, automatically returning to take another charge. Each weighing is automatically recorded on a dial. In this way a record can be kept of the gross weight of the uncleaned wheat entering the warehouse and of the net weight of the cleaned wheat. The difference between the two weighings will, of course, represent the loss by cleaning. The percentage of flour obtained from a given wheat can be ascertained in the mill itself. In practice the second weigher is placed just before the first break.

Wet cleaning and conditioning.

The cleansing of wheat by washing only became a fine art at the close of the 19th century, though it was practised in the north of England some twenty years earlier. Briefly it may be said that certain wheats are washed to free them from extraneous matters such as adherent earth and similar impurities which could not be removed by dry cleaning without undue abrasion. Such wheats are Indians, Persians and hard Russians, and these require not only washing but also conditioning, by which is meant mellowing, before going to the rolls. With another class of wheats, such as the softer Russians and Indians, spring Americans and Canadians, hard American winters, Californians and the harder River Plates, washing and conditioning by heat is also desirable, though care must be exercised not to let the moisture penetrate into the endosperm or floury portion of the kernel. In a third and distinct class fall soft wheats, such as many kinds of Plates, soft Russians and English wheat. It is generally admitted that while wheat of the first two divisions will benefit from the application of both moisture and heat, wheat of the third class must be washed with great circumspection. The object of washing machines is to agitate the wheat in water till the adherent foreign matters are washed off and any dirt balls broken up and drained off in the waste water. To this end some washers are fitted with Archimedean worm conveyors set either at an inclined angle or horizontally or vertically; or the washer may consist of a barrel revolving in a tank partly filled with water. Another function of washing machines is to separate stones of the same size which are found in several varieties of wheat. This separation is effected by utilizing a current of water as a balance strong enough to carry wheat but not strong enough to carry stones or bodies of greater specific gravity than wheat. This current may be led up an inclined worm or may flow horizontally over a revolving tray. The washer is followed by a whizzer, which is an apparatus intended to free the berry by purely mechanical means from superfluous moisture. The typical whizzer is a vertical column fed at the bottom and delivering at the top. The wet wheat ascends by centrifugal force in a spiral direction round the column to the top, and by the time it is discharged from the spout at the top it has thrown off from its outer skin almost all its moisture, the water escaping through the perforated cover of the machine. But there still remains a certain amount of water which has penetrated the integuments more or less deeply, and to condition the berry it is treated by a combination of hot and cold air. The wheat is passed between perforated metal plates and subjected to a draught first of hot and then of cold air. The perforated plates are usually built in the shape of a column, or leg as it is often called, and this is provided with two air chambers, an upper one serving as a reservoir for hot, and the lower for cold air. The air from both chambers is discharged by pressure through the descending layers of wheat, which should not be more than an inch thick; the air is drawn in by a steel-plate fan, which is often provided with a divided casing, one side being used for cold, and the other for hot air. Coupled with the hot air side is a heater consisting of a series of circulating steam-heated pipes. The temperature of the heated air can be regulated by the supply of steam to the heater. This process of washing and conditioning, one of the most important in a flour mill, is characteristically British; millers have to deal with wheats of the most varied nature, and one object of conditioning is to bring hard and harsh, soft and weak wheats as nearly as possible to a common standard of condition before being milled. Wheat is sometimes washed to toughen the bran, an end which can also be attained by damping it from a spraying pipe as it passes along an inclined worm. Another way of toughening bran is to pass wheat through a heated cylinder, while again another process known as steaming consists of injecting steam into wheat as it passes through a metal hopper. Here the object is to cleanse to some extent, and to warm and soften (by the condensation of moisture on the grain), but these processes are imperfect substitutes for a full washing and conditioning plant. Hard wheats will not be injured by a fairly long immersion in water, always provided the subsequent whizzing and drying are efficiently carried out. The second class of semi-hard wheats already mentioned must be run more quickly through the washer and freed from the water as rapidly as possible. Still more is this necessary with really soft wheats, such as soft River Plates and the softer English varieties. Here an immersion of only a few seconds is desirable, while the moisture left by the water must be immediately and energetically thrown off by the whizzer before the grain enters the drier. Treated thus, soft wheats may be improved by washing. It is claimed that hard wheats, like some varieties of Indians, are positively improved in flavour by conditioning, and this is probably true; certain it is that English country millers, in seasons when native wheat was scarce and dear, and Indian wheat was abundant and cheap, have found the latter, mellowed by conditioning, to be an excellent substitute.

Effect of damp.

Wheats which have been exposed to the action of water during harvest do not necessarily yield unsound flour; the matter is a question of the amount of moisture absorbed. But it must be remembered that it is not so much the water itself which degrades the constituents of the wheat (starch and gluten) as the chemical changes which the dampness produces. Hence perhaps the best remedy which can be found for damp wheat is to dry it as soon as it has been harvested, either by kiln or steam drier at a heat not exceeding 120° F., until the moisture has been reduced to 10 % of the whole grain. The flour made from wheat so treated may be weak, but will not usually be unsound. The practice of drying damp flour has also good results. Long before the roller milling period it was found that only flour which had been dried (in a kiln) could safely be taken on long sea voyages, especially when the vessel had to navigate warm latitudes. It may be noted that in the days of millstone milling it was far more difficult to produce good keeping flour. The wheat berry being broken up and triturated in one operation, the flour necessarily contained a large proportion of branny particles in which cerealin, an active diastasic constituent, was present in very sensible proportions. Again, the elimination of the germ by the roller process is favourable to the production of a sounder flour, because the germ contains a large amount of oleaginous matter and has a strong diastasic action on imperfectly matured starches. The tendency of flours containing germ to become rancid is well marked. During the South African War of 1899–1902 the British army supply department had a practical proof of the diastasic action of branny particles in flour. Soldiers' bread is not usually of white colour, and the military authorities not unnaturally believed that comparatively low-grade flour, if sound, was eminently suitable for use in the field bakeries. But in the climate of South Africa flour of this description soon developed considerable acidity. Ultimately the supply department gave up buying any but the driest patent flours, and it is understood that the most suitable flour proved to be certain patents milled in Minneapolis, U.S.A., from hard spring wheat. Not only did they contain a minimum of branny and fibrous matters, but they were also the driest that could be found.

Break-rolls.

After being cleaned the wheat berry is split and broken up into increasingly fine pieces by fluted rolls or "breaks." In the earlier years of roller milling it was usual to employ more breaks than is now the case. The first pair of break-rolls used to be called the splitting rolls, because their function was supposed to be to split the berry longitudinally down its crease, so as to give the miller an opportunity of removing the dirt between the two lobes of the berry by means of a brush machine. The dirt was in many cases no more than the placenta already described, which shrivelling up took, like all vegetable fibre, a dark tint. The neat split along the crease was not, however, achieved in more than 10 % of the berries so treated. Where such rolls are still in use they are really serving as a sort of adjunct to the wheat-cleaning system. Four or five breaks are now thought sufficient, but three breaks are not recommended, except in very short systems for small country mills. Rolls are now used up to 60 in. in length, though in one of the most approved systems they never exceed 40 in.; they are made of chilled iron, and for the breaking of wheat are provided with grooving cut at a slight twist, the spiral averaging ¼ in. to the foot length, though for the last set of break-rolls, which clean up the bran, the spiral is sometimes increased to ½ in. per foot. The grooves should have sharp edges because they do better work than when blunt, giving larger semolina and middlings, with bran adherent in big flakes; small middlings, that is, little pieces of the endosperm torn away by blunt grooves, and comminuted bran, make the production of good class flour almost impossible; cut bran, moreover, brings less money. The break-rolls should never work by pressure, but nip the material fed between them at a given point; to cut or shear, not to flatten and crush, is their function. Rolls may be set either horizontally or vertically; an oblique setting has also come into favour. The feed is of the utmost importance to the correct working of a roller mill. The material should be fed in an even stream, not too thick, and leaving no part of the roll uncovered. The two rolls of each pair are run at unequal speeds, 2½ to 1 being the usual ratio on the three first breaks, while the last break is often speeded at 3 to 1 or 3½ to 1; in one of the oblique mills the difference is obtained by making the diameter of one roll 13 and of the other 10 in. and running them at equal speed. For break-rolls up to 36 in. in length 9 in. is the usual diameter; for longer rolls 10 in. is the standard. To do good work rolls must run in perfect parallelism; otherwise some parts of the material will pass untouched, while others will be treated too severely.

Scalpers.

The products of the break-rolls are treated by what are known as scalpers, which are simply machines for sorting out these products for further treatment. Scalpers may either be revolving reels or flat sieves. The sieve is the favourite form of scalper on account of its gentle action. Scalping requires a separating and sifting, not a scouring action. The break products are usually separated on a sieve covered with wire or perforated zinc plates. Generally speaking, two sieves are in one frame and are run at a slight incline. The throughs of the top sieve fall on the sieve below, while the rejections or overtails of the first sieve are fed to the next break. The "throughs," or what has passed this sieve, are graded by the next sieve, the tailings going to a purifier, while the throughs may be freed from what flour adheres to them by a centrifugal dressing machine and then treated by another purifier. A form of scalper which has come into general use on the continent of Europe, and to a lesser extent in Great Britain and America, is known as the plansifter. This machine, of Hungarian origin, is simply a collection of superimposed flat sieves in one box, and will scalp or sort out any kind of break stock very efficiently. A system of grading the tailings, that is, the rejections of the scalpers, introduced by James Harrison Carter (Carter-Zimmer patent), was known as pneumatic sorting. Its object was to supplement the work of the scalpers by classifying the tailings by means of air-currents. To this end each scalper was followed by a machine arranged somewhat like a gravity purifier; that is to say, a current of air drawn through the casing of the sorter allowed the heaviest and best material to drop down straight, while the lighter stuff was deposited in one or other of further compartments formed by obliquely placed adjustable cant boards. So searching was this grading, that from the first sorter of a four-break plant four separations would be obtained, the first going to the second break, the second joining the first separation from the second sorter and being fed to the third break, while the third went with the best separation of the third sorter to the fourth break, and the last separation from all the sorters went straight into the bran sack. The work of the break-rolls was greatly simplified and reduced by this sorting process, as each particle of broken wheat went exactly to that pair of break-rollers for which it was suitable, instead of all the material being run indiscriminately through all the break-rollers and thereby being cut up with the necessary result of increasing the production of small bran.

Purifiers.

The object of the purifier, a machine on which milling engineers have lavished much thought and labour, is to get away from the semolina and middlings as much impure matter as possible, that those products may be pure, as millers say, for reduction to flour by the smooth rolls. The purifiers used in British mills take advantage of the fact that the more valuable portions of the wheat berry are heavier than the less valuable particles, such as bran and fibrous bodies, and a current of air is employed to weigh these fragments of the wheat berry as in a balance and to separate them while they pass over a silk-covered sieve. To this end the semolina or middlings are fed on a sieve vibrated by an eccentric and set at a slight downward angle. This sieve is installed in an air-tight longitudinal wooden chamber with glass windows on either side, through which the process of purifying can be watched. Upwards through this sieve a fan constantly draws a current of air, which, raising the stock upwards, allows the heavier and better material to remain below while the lighter particles are lifted off and fall on side platforms or channels, whence they are carried forward and delivered separately. The good material drops through the meshes of the silk, and is collected by a worm. It is usual to clothe the sieve in sections with several different meshes of silk so that stock of almost identical value, but differing size, may be treated with uniform accuracy. In good purifiers the strength of the current can be regulated at will in each section. The tailings of a purifier do not usually exceed 10 to 15 % of the feed. The clothing of purifier sheets must be nicely graduated to the clothing of the preceding machines. Repurification and even tertiary purification may be necessary under certain conditions. In Hungary and other parts of Europe, gravity purifiers are much in use. Here the material is guided along an open sieve set at a slight angle, while an air-current is drawn up at an acute angle. Under the sieve may be arranged a series of inclined boards, the position of which can be varied as required. The heaviest and most valuable products resist the current and drop straight down, while lighter material is carried off to further divisions.

Smooth rolls.

From the purifier all the stock except the tailings, which may require other treatment, should go to the smooth rollers to be made into flour, but here the rollerman will have to exercise great care and discretion. Many of the remarks already made in regard to break-rolls apply to smooth rolls, notably in respect of parallelism. But instead of a cutting action, the smooth rolls press the material fed to them into flour. This pressure, however, must be applied with great discrimination, large semolina with impurities attached requiring quite different treatment from that called for by small pure middlings. The pressure on the stock must be just sufficient and no more. Reduction rolls are usually run at a differential speed of about 2 to 3. The feed must be carefully graded, because to pass stock of varying size through a pair of smooth rolls would be fatal to good work. Scratch rolls very finely grooved are used for cracking impure semolina or for reducing the tailings of purifiers. The latter often hold fragments of bran, which are best detached by rolls grooved about 36 to the inch and run at a differential of 3 to 1. The reduction requires even more roll surface than the break system. To do first-class work a mill should have at least 35 to 40 in. on the breaks and 50 in. on the reduction for each sack of 280 ℔ of flour per hour. Many engineers consider 100 to 110 in. on the break, scratch and smooth rolls not too much.

Dressing.

The dressing out of the flour from the stock reduced on smooth rolls is generally effected by centrifugal machines, which consist of a slowly revolving cylinder provided with an internal shaft on which are keyed a number of iron beaters that run at a speed of about 200 revolutions a minute, and fling the feed against the silk clothing of the cylinder. What goes through the silk is collected by a worm conveyor at the bottom of the machine. Most centrifugals have so-called "cut-off" sheets, with internal divisions in the tail end; these are intended to separate some intermediate products, which, having been freed from floury particles, are treated on some other machine, such as a pair of rolls either direct or after a purifier. The centrifugal is undoubtedly an efficient flour separator, but the plansifters already mentioned are also good flour-dressers, especially in dry climates. A plansifter mill will have no centrifugals, except one or two at the tail end where the material gets more sticky and requires more severe treatment.

The yield of flour obtained in a British roller mill averages 70 to 73 % of the wheat berry. The residue, with the exception of a very small proportion of waste, is offal, which is divided into various grades and sold. Profitable markets for British-made bran have been found in Scandinavia, and especially in Denmark. In millstone milling the yield of flour probably averaged 75 to 80 %, but a certain proportion of this was little more than offal. The length of the flour yield taken by British millers varies in different parts of the kingdom, because demand varies. In one locality high-class patents may be at a premium; in another the call is for a straight grade, *i.e.* a flour containing as much of the farinaceous substance as can be won from the wheat berry. In one district there is a sale for rich offals, that is, offals with plenty of flour adhering; in another there may be no demand for such offals. Hence, though the general principles of roller milling as given above hold good all over the country, yet in practice the work of each mill is varied more or less to suit the peculiarities of the local trade.

Bleaching of flour.

Early in the 19th century a French chemist, J. J. E. Poutet, discovered that nitrous acid and oxides of nitrogen act on some fluid and semi-fluid vegetable oils, removing their yellow tinge and converting a considerable portion of their substance into a white solid. The importance of this discovery, when the physical constitution of wheat is considered, is obvious, but it was years before any attempt was made to bleach flour. The first attempts at bleaching seem to have been made on the wheat itself rather than on the flour. In 1879 a process was patented for bleaching grain by means of chlorine gas, and about 1891 a suggestion was made for bleaching grain by means of electrolysed sea-water. In 1895 a scheme was put forward for treating grain with sulphurous acid, and about two years later it was proposed to subject both grain and flour to the influence of electric currents. In 1893 a patent was granted for the purification of flour by means of fresh air or oxygen, and three years later another inventor proposed to employ the Röntgen rays for the same purpose. In 1898 Emile Frichot took out a patent for using ozone and ozonized air for flour-bleaching. The patent (No. 1661 of 1901) taken out by J. & S. Andrews of Belfast recited that flour is known to improve greatly if kept for some time after grinding, and the purpose of the invention it covered was to bring about this improvement or conditioning not only immediately after grinding, but also to a greater extent than can be effected by keeping. The process consisted in subjecting the flour to the action of a suitable gaseous oxidizing medium; the inventors preferred air carrying a minute quantity of nitric acid or peroxide of nitrogen, but they did not confine themselves to those compounds, having found that chlorine, bromine and other substances capable of liberating oxygen were also more or less efficacious. They claimed that while exercising no deleterious action their treatment made the flour whiter, improved its baking qualities, and rendered it less liable to be attacked by mites or other organisms. Under the patent, No. 14006 of 1903, granted to J. N. Alsop of Kentucky the flour was treated with atmospheric air which had been subjected to the action of an arc or flaming discharge of electricity, with the purpose of purifying it and improving its nutritious properties. The Andrews and Alsop patents became the objects of extended litigation in the English courts, and it was held that the gaseous medium employed by Alsop was substantially the same as that employed by Andrews, though produced electrically instead of chemically, and therefore that the Alsop process was an infringement of the Andrews patent. Various other patents for more or less similar processes have also been taken out.

(G. F. Z.)

FLOURENS, GUSTAVE (1838–1871), French revolutionist and writer, a son of J. P. Flourens (1794–1867), the physiologist, was born at Paris on the 4th of August 1838. In 1863 he undertook for his father a course of lectures at the Collège de France, the subject of which was the history of mankind. His theories as to the manifold origin of the human race, however, gave offence to the clergy, and he was precluded from delivering a second course. He then went to Brussels, where he published his lectures under the title of *Histoire de l'homme* (1863); he next visited Constantinople and Athens, took part in the Cretan insurrection of 1866, spent some time in Italy, where an article of his in the *Popolo d'Italia* caused his arrest and imprisonment, and finally, having returned to France, nearly lost his life in a duel with Paul de Cassagnac, editor of the *Pays*. In Paris he devoted his pen to the cause of republicanism, and at length, having failed in an attempt to organize a revolution at Belleville on the 7th of February 1870, found himself compelled to flee from France. Returning to Paris on the downfall of Napoleon, he soon placed himself at the head of a body of 500 tirailleurs. On account of his insurrectionary proceedings he was taken prisoner at Créteil, near Vincennes, by the provisional government, and confined at Mazas on the 7th of December 1870, but was released by his men on the night of January 21–22. On the 18th of March he joined the Communists. He was elected a member of the commune by the 20th arrondissement, and was named colonel. He was one of the most active leaders of the insurrection, and in a sortie against the Versailles troops in the morning of the 3rd of April was killed in a hand-to-hand conflict at Rueil, near Malmaison. Besides his *Science de l'homme* (Paris, 1869), Gustave Flourens was the author of numerous fugitive pamphlets.

See C. Prolès, *Les Hommes de la révolution de 1871* (Paris, 1898).

FLOURENS, MARIE JEAN PIERRE (1794–1867), French physiologist, was born at Maureilhan, near Béziers, in the department of Hérault, on the 15th of April 1794. At the age of fifteen he began the study of medicine at Montpellier, where in 1823 he received the degree of doctor. In the following year he repaired to Paris, provided with an introduction from A. P. de Candolle, the botanist, to Baron Cuvier, who received him kindly, and interested himself in his welfare. At Paris Flourens engaged in physiological research, occasionally contributing to literary publications; and in 1821, at the Athénée there, he gave a course of lectures on the physiological theory of the sensations, which attracted much attention amongst men of science. His paper entitled *Recherches expérimentales sur les propriétés et les fonctions du système nerveux dans les animaux vertébrés*, in which he, from experimental evidence, sought to assign their special functions to the cerebrum, corpora quadrigemina and cerebellum, was the subject of a highly commendatory report by Cuvier, adopted by the French Academy of Sciences in 1822. He was chosen by Cuvier in 1828 to deliver for him a course of lectures on natural history at the Collège de France, and in the same year became, in succession to L. A. G. Bosc, a member of the Institute, in the division "Économie rurale." In 1830 he became Cuvier's substitute as lecturer on human anatomy at the Jardin du Roi, and in 1832 was elected to the post of titular professor, which he vacated for the professorship of comparative anatomy created for him at the museum of the Jardin the same year. In 1833 Flourens, in accordance with the dying request of Cuvier, was appointed a perpetual secretary of the Academy of Sciences; and in 1838 he was returned as a deputy for the arrondissement of Béziers. In 1840 he was elected, in preference to Victor Hugo, to succeed J. F. Michaud at the French Academy; and in 1845 he was created a commander of the legion of honour, and in the next year a peer of France. In March 1847 Flourens directed the attention of the Academy of Sciences to the anaesthetic effect of chloroform on animals. On the revolution of 1848 he withdrew completely from political life; and in 1855 he accepted the professorship of natural history at the Collège de France. He died at Montgeron, near Paris, on the 6th of December 1867.

Besides numerous shorter scientific memoirs, Flourens published—*Essai sur quelques points de la doctrine de la révulsion et de la dérivation* (Montpellier, 1813); *Expériences sur le système nerveux* (Paris, 1825); *Cours sur la génération, l'ovologie, et l'embryologie* (1836); *Analyse raisonnée des travaux de G. Cuvier* (1841); *Recherches sur le développement des os et des dents* (1842); *Anatomie générale de la peau et des membranes muqueuses* (1843); *Buffon, histoire de ses travaux et de ses idées* (1844); *Fontenelle, ou de la philosophie moderne relativement aux sciences physiques* (1847); *Théorie expérimentale de la formation des os* (1847); *Œuvres complètes de Buffon* (1853); *De la longévité humaine et de la quantité de vie sur le globe* (1854), numerous editions; *Histoire de la découverte de la circulation du sang* (1854); *Cours de physiologie comparée* (1856); *Recueil des éloges historiques* (1856); *De la vie et de l'intelligence* (1858); *De la raison, du génie, et de la folie* (1861); *Ontologie naturelle* (1861); *Examen du livre de M. Darwin sur l'Origine des Espèces* (1864). For a list of his papers see the Royal Society's *Catalogue of Scientific Papers*.

FLOWER, SIR WILLIAM HENRY (1831–1899), English biologist, was born at Stratford-on-Avon on the 30th of November 1831. Choosing medicine as his profession, he began his studies at University College, London, where he showed special aptitude for physiology and comparative anatomy and took his M.B. degree in 1851. He then joined the Army Medical Service, and went out to the Crimea as assistant-surgeon, receiving the medal with four clasps. On his return to England he became a member of the surgical staff of the Middlesex hospital, London, and in 1861 succeeded J. T. Quekett as curator of the Hunterian Museum of the Royal College of Surgeons of England. In 1870 he also became Hunterian professor, and in 1884, on the death of Sir Richard Owen, was appointed to the directorship of the Natural History Museum at South Kensington. He died in London on the 1st of July 1899. He made valuable contributions to structural anthropology, publishing, for example, complete and accurate measurements of no less than 1300 human skulls, and as a comparative anatomist he ranked high, devoting himself especially to the study of the mammalia. He was also a leading authority on the arrangement of museums. The greater part of his life was spent in their administration, and in consequence he held very decided views as to the principles upon which their specimens should be set out. He insisted on the importance of distinguishing between collections intended for the use of specialists and those designed for the instruction of the general public, pointing out that it was as futile to present to the former a number of merely typical forms as to provide the latter with a long series of specimens differing only in the most minute details. His ideas, which were largely and successfully applied to the museums of which he had charge, gained wide approval, and their influence entitles him to be looked upon as a reformer who did much to improve the methods of museum arrangement and management. In addition to numerous original papers, he was the author of *An Introduction to the Osteology of the Mammalia* (1870); *Fashion in Deformity* (1881); *The Horse: a Study in Natural History* (1890); *Introduction to the Study of Mammals, Living and Extinct* (1891); *Essays on Museums and other Subjects* (1898). He also wrote many articles for the ninth edition of the *Encyclopaedia Britannica*.

FLOWER (Lat. *flos, floris*; Fr. *fleur*), a term popularly used for the bloom or blossom of a plant, and so by analogy for the fairest, choicest or finest part or aspect of anything, and in various technical senses. Here we shall deal only with its botanical interest. It is impossible to give a rigid botanical definition of the term "flower." The flower is a characteristic feature of the highest group of the plant kingdom—the flowering plants (Phanerogams)—and is the name given to the association of organs, more or less leaf-like in form, which are concerned with the production of the fruit or seed. In modern botanical works the group is often known as the seed-plants (Spermatophyta). As the seed develops from the ovule which has been fertilized by the pollen, the essential structures for seed-production are two, viz. the pollen-bearer or *stamen* and the ovule-bearer or *carpel*. These are with few exceptions foliar structures, known in comparative morphology as sporophylls, because they bear the spores, namely, the microspores or pollen-grains which are developed in the microsporangia or pollen-sacs, and the megaspore, which is contained in the ovule or megasporangium.

In Gymnosperms (*q.v.*), which represent the more primitive type of seed-plants, the micro- or macro-sporophylls are generally associated, often in large numbers, in separate cones, to which the term "flower" has been applied. But there is considerable difference of opinion as to the relation between these cones and the more definite and elaborate structure known as the flower in the higher group of seed-plants—the Angiosperms (*q.v.*)—and it is to this more definite structure that we generally refer in using the term "flower."

Flowers are produced from flower-buds, just as leaf-shoots arise from leaf-buds. These two kinds of buds have a resemblance to each other as regards the arrangement and the development of their parts; and it sometimes happens, from injury and other causes, that the part of the axis which, in ordinary cases, would produce a leaf-bud, gives origin to a flower-bud. A flower-bud has not in ordinary circumstances any power of extension by the continuous development of its apex. In this respect it differs from a leaf-bud. In some cases, however, of monstrosity, especially seen in the rose (fig. 1), the central part is prolonged, and bears leaves or flowers. In such cases the flowers, so far as their functional capabilities are concerned, are usually abortive. This phenomenon is known as proliferation of the floral axis.

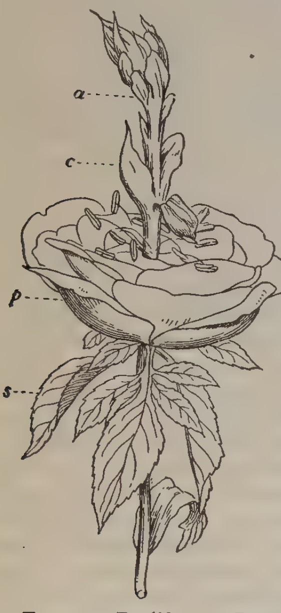

Fig. 1.—Proliferous Rose.
s, Sepals transformed into leaves.
p, Petals multiplied at the expense of the stamens, which are reduced in number.
c, Coloured leaves representing abortive carpels.
a, Axis prolonged, bearing an imperfect flower at its apex.

Flower-buds, like leaf-buds, are produced in the axil of leaves, which are called *bracts*.

Bracts.

The term *bract* is properly applied to the leaf from which the primary floral axis, whether simple or branched, arises, while the leaves which arise on the axis between the bract and the outer envelope of the flower are *bracteoles* or *bractlets*. Bracts sometimes do not differ from the ordinary leaves, as in *Veronica hederifolia*, *Vinca*, *Anagallis* and *Ajuga*. In general as regards their form and appearance they differ from ordinary leaves, the difference being greater in the upper than in the lower branches of an inflorescence. They are distinguished by their position at the base of the flower or flower-stalk. Their arrangement is similar to that of the leaves. When the flower is sessile the bracts are often applied closely to the calyx, and may thus be confounded with it, as in the order Malvaceae and species of *Dianthus* and winter aconite (*Eranthis*), where they have received the name of *epicalyx* or *calyculus*. In some Rosaceous plants an epicalyx is present, due to the formation of stipulary structures by the sepals. In many cases bracts act as protective organs, within or beneath which the young flowers are concealed in their earliest stage of growth.

When bracts become coloured, as in *Amherstia nobilis*, *Euphorbia splendens*, *Erica elegans* and *Salvia splendens*, they may be mistaken for parts of the corolla. They are sometimes mere scales or threads, and at other times are undeveloped, giving rise to the *ebracteate* inflorescence of Cruciferae and some Boraginaceae. Sometimes they are empty, no flower-buds being produced in their axil. A series of empty coloured bracts terminates the inflorescence of *Salvia Horminum*. The smaller bracts or bracteoles, which occur among the subdivisions of a branching inflorescence, often produce no flower-buds, and thus anomalies occur in the floral arrangements. Bracts are occasionally persistent, remaining long attached to the base of the peduncles, but more usually they are deciduous, falling off early by an articulation. In some instances they form part of the fruit, becoming incorporated with other organs. Thus, the cones of firs and the stroboli of the hop are composed of a series of spirally arranged bracts covering fertile flowers; and the scales on the fruit of the pine-apple are of the same nature. At the base of the general umbel in umbelliferous plants a whorl of bracts often exists, called a *general involucre*, and at the base of the smaller umbels or umbellules there is a similar leafy whorl called an *involucel* or *partial involucre*. In some instances, as in fool's-parsley, there is no general involucre, but simply an involucel; while in other cases, as in fennel or dill (fig. 15), neither involucre nor involucel is developed. In Compositae the name involucre is applied to the bracts surrounding the head of flowers (fig. 2, *i*), as in marigold, dandelion, daisy, artichoke. This involucre is frequently composed of several rows of leaflets, which are either of the same or of different forms and lengths, and often lie over each other in an imbricated manner. The leaves of the involucre are spiny in thistles and in teazel (*Dipsacus*), and hooked in burdock. Such whorled or verticillate bracts generally remain separate (*polyphyllous*), but may be united by cohesion (*gamophyllous*), as in many species of *Bupleurum* and in *Lavatera*. In Compositae besides the involucre there are frequently chaffy and setose bracts at the base of each flower, and in Dipsacaceae a membranous tube surrounds each flower. These structures are of the nature of an epicalyx. In the acorn the *cupule* or cup (fig. 3) is formed by a growing upwards of the flower-stalk immediately beneath the flower, upon which scaly or spiny protuberances appear; it is of the nature of bracts. Bracts also compose the husky covering of the hazel-nut.

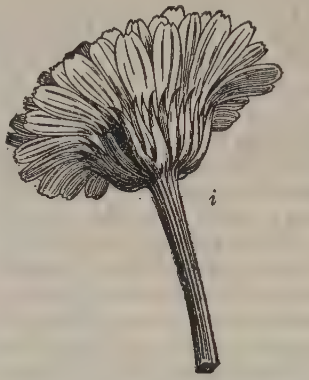

Fig. 2.—Head (capitulum) of Marigold (*Calendula*), showing a congeries of flowers, enclosed by rows of bracts, *i*, at the base, which are collectively called an involucre.

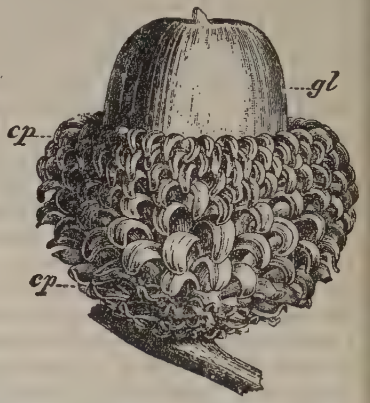

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Fig. 3.—Cupule of *Quercus Aegilops*. *cp*, Cupule; *gl*, fruit. (After Duchartre.)

When bracts become united, and overlie each other in several rows, it often happens that the outer ones do not produce flowers, that is, are empty or sterile. In the artichoke the outer imbricated scales or bracts are in this condition, and it is from the membranous white scales or bracts (*paleae*) forming the choke attached to the edible receptacle that the flowers are produced. The sterile bracts of the daisy occasionally produce capitula, and give rise to the hen-and-chickens daisy. In place of developing flower-buds, bracts may, in certain circumstances, as in proliferous or viviparous plants, produce leaf-buds.

A sheathing bract enclosing one or several flowers is called a *spathe*. It is common among Monocotyledons, as *Narcissus* (fig. 4), snow-flake, *Arum* and palms. In some palms it is 20 ft. long, and encloses 200,000 flowers. It is often associated with that form of inflorescence termed the *spadix*, and may be coloured, as in *Anthurium*, or white, as in arum lily (*Richardia aethiopica*). When the spadix is compound or branching, as in palms, there are smaller spathes, surrounding separate parts of the inflorescence. The spathe protects the flowers in their young state, and often falls off after they are developed, or hangs down in a withered form, as in some palms, *Typha* and *Pothos*. In grasses the outer scales or glumes of the spikelets are sterile bracts (fig. 5, *gl*); and in Cyperaceae bracts enclose the organs of reproduction. Bracts are frequently changed into complete leaves. This change is called *phyllody* of bracts, and is seen in species of *Plantago*, especially in the variety of *Plantago media*, called the rose-plantain in gardens, where the bracts become leafy and form a rosette round the flowering axis. Similar changes occur in *Plantago major*, *P. lanceolata*, *Ajuga reptans*, dandelion, daisy, dahlia and in umbelliferous plants. The conversion of bracts into stamens (*staminody* of bracts) has been observed in the case of *Abies excelsa*. A lengthening of the axis of the female strobilus of Coniferae is not of infrequent occurrence in *Cryptomeria japonica*, larch (*Larix europaea*), &c., and this is usually associated with a leaf-like condition of the bracts, and sometimes even with the development of leaf-bearing shoots in place of the scales.

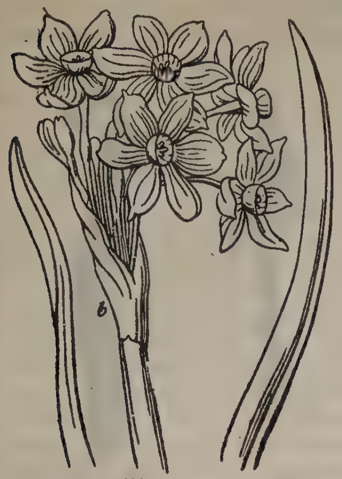


FIG. 4.—Flowers of Narcissus (*Narcissus Tazetta*) bursting from a sheathing bract *b*.

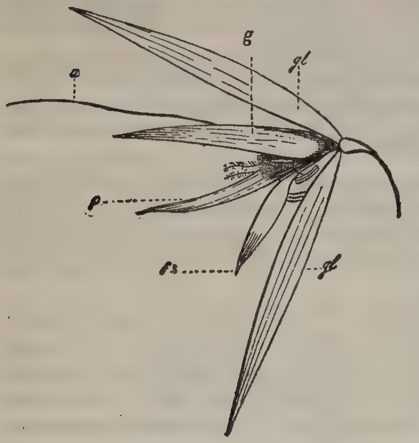


FIG. 5.—Spikelet of Oat (*Avena sativa*) laid open, showing the sterile bracts *gl*, *gl*, or empty glumes; *g*, the fertile or floral glume, with a dorsal awn *a*; *p*, the pale; *fs*, an abortive flower.

The arrangement of the flowers on the axis, or the ramification of the floral axis, is called the *inflorescence*. The primary axis of the inflorescence is sometimes called the *rachis*; its branches, whether terminal or lateral, which form the stalks supporting flowers or clusters of flowers, are *peduncles*, and if small branches are given off by it, they are called *pedicels*. A flower having a stalk is called *pedunculate* or *pedicellate*; one having no stalk is *sessile*. In describing a branching inflorescence, it is common to speak of the rachis as the *primary* floral axis, its branches as the *secondary* floral axes, their divisions as the *tertiary* floral axes, and so on; thus avoiding any confusion that might arise from the use of the terms *rachis*, *peduncle* and *pedicel*.

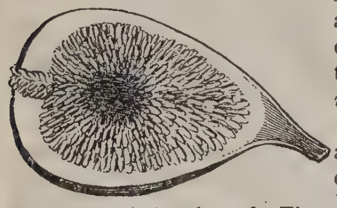
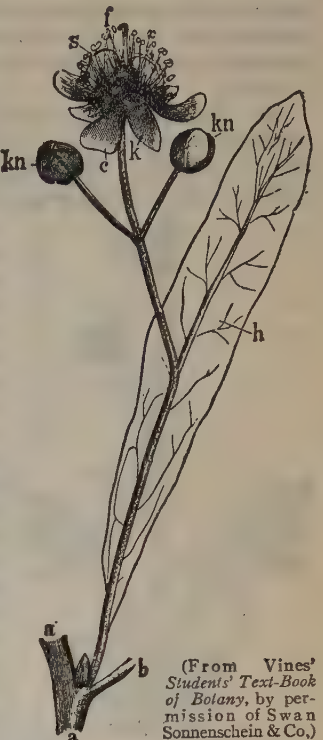


FIG. 6.—Peduncle of Fig (*Ficus Carica*), ending in a hollow receptacle, enclosing numerous male and female flowers.

The *peduncle* is simple, bearing a single flower, as in primrose; or branched, as in London-pride. It is sometimes succulent, as in the cashew, in which it forms the large coloured expansion supporting the nut; spiral, as in *Cyclamen* and *Vallisneria*; or spiny, as in *Alyssum spinosum*. When the peduncle proceeds from radical leaves, that is, from an axis which is so shortened as to bring the leaves close together in the form of a cluster, as in the primrose, auricula or hyacinth, it is termed a *scape*. The floral axis may be shortened, assuming a flattened, convex or concave form, and bearing numerous flowers, as in the artichoke, daisy and fig (fig. 6). The floral axis sometimes appears as if formed by several peduncles united together, constituting a fasciated axis, as in the cockscomb, in which the flowers form a peculiar crest at the apex of the flattened peduncles. Adhesions occasionally take place between the peduncle and the bracts or leaves of the plant, as in the lime-tree (fig. 7). The adhesion of the peduncles to the stem accounts for the extra-axillary position of flowers, as in many Solanaceae. When this union extends for a considerable length along the stem, several leaves may be interposed between the part where the peduncle becomes free and the leaf whence it originated, and it may be difficult to trace the connexion. The peduncle occasionally becomes abortive, and in place of bearing a flower, is transformed into a tendril; at other times it is hollowed at the apex, so as apparently to form the lower part of the outer whorl of floral leaves as in *Eschscholtzia*. The termination of the peduncle, or the part on which the whorls of the flower are arranged, is called the *thalamus*, *torus* or *receptacle*.



(From Vines' *Students' Text-Book of Botany*, by permission of Swan Sonnenschein & Co.)

FIG. 7.—Inflorescence of the Lime (*Tilia platyphyllos*) (nat. size).

a, Branch.
b, Petiole with axillary bud. Attached to the peduncle is the bract (*h*).
k, Calyx.
c, Corolla.
s, Stamens.
f, Ovary.
kn, Flower-bud.

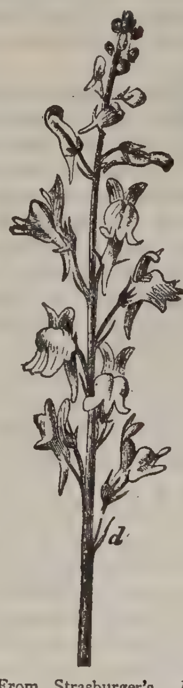


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FIG. 8.—Raceme of *Linaria striata*. *d*, bract.

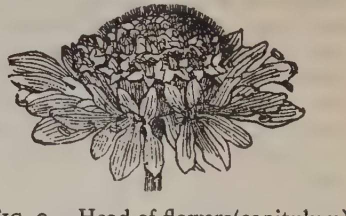

FIG. 9.—Head of flowers (capitulum) of *Scabiosa atropurpurea*. The inflorescence is simple and indeterminate, and the expansion of the flowers centripetal, those at the circumference opening first.

Inflorescence.

There are two distinct types of inflorescence—one in which the flowers arise as lateral shoots from a primary axis, which goes on elongating, and the lateral shoots never exceed in their development the length of the primary axis beyond their point of origin. The flowers are thus always *axillary*. Exceptions, such as in cruciferous plants, are due to the non-appearance of the bracts. In the other type the primary axis terminates in a single flower, but lateral axes are given off from the axils of the bracts, which again repeat the primary axis; the development of each lateral axis is stronger than that of the primary axis beyond its point of origin. The flowers produced in this inflorescence are thus *terminal*. The first kind of inflorescence is *indeterminate*, *indefinite* or *axillary*. Here the axis is either elongated, producing flower-buds as it grows, the lower expanding first (fig. 8), or it is shortened and depressed, and the outer flowers expand first (fig. 9). The expansion of the flowers is thus *centripetal*, that is, from base to apex, or from circumference to centre.

The second kind of inflorescence is *determinate, definite* or *terminal*. In this the axis is either elongated and ends in a solitary flower, which thus terminates the axis, and if other flowers are produced, they belong to secondary axes farther from the centre; or the axis is shortened and flattened, producing a number of separate floral axes, the central one expanding first, while the others are developed in succession farther from the centre. The expansion of the flowers is in this case *centrifugal*, that is, from apex to base, or from centre to circumference. It is illustrated in fig. 10, *Ranunculus bulbosus*; a' is the primary axis swollen at the base in a bulb-like manner b, and with roots proceeding from it. From the leaves which are radical proceeds the axis ending in a solitary terminal flower f'. About the middle of this axis there is a leaf or bract, from which a secondary floral axis a'' is produced, ending in a single flower f'', less advanced than the flower f'. This secondary axis bears a leaf also, from which a tertiary floral axis a''' is produced, bearing an unexpanded solitary flower f'''. From this tertiary axis a fourth is in progress of formation. Here f' is the termination of the primary axis, and this flower expands first, while the other flowers are developed centrifugally on separate axes.

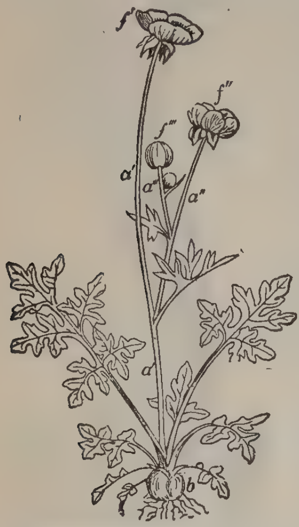

FIG. 10.—Plant of *Ranunculus bulbosus*, showing determinate inflorescence.

A third series of inflorescences, termed *mixed*, may be recognized. In them the primary axis has an arrangement belonging to the opposite type from that of the branches, or vice versa. According to the mode and degree of development of the lateral shoots and also of the bracts, various forms of both inflorescences result.

Amongst indefinite forms the simplest occurs when a lateral shoot produced in the axil of a large single foliage leaf of the plant ends in a single flower, the axis of the plant elongating beyond, as in *Veronica hederifolia, Vinca minor* and *Lysimachia nemorum*. The flower in this case is *solitary*, and the ordinary leaves become bracts by producing flower-buds in place of leaf-buds; their number, like that of the leaves of this main axis, is indefinite, varying with the vigour of the plant. Usually, however, the floral axis, arising from a more or less altered leaf or bract, instead of ending in a solitary flower, is prolonged, and bears numerous bracteoles, from which smaller peduncles are produced, and those again in their turn may be branched in a similar way. Thus the flowers are arranged in groups, and frequently very complicated forms of inflorescence result. When the primary peduncle or floral axis, as in fig. 8, is elongated, and gives off pedicels, ending in single flowers, a *raceme* is produced, as in currant, hyacinth and barberry. If the secondary floral axes give rise to tertiary ones, the raceme is branching, and forms a *panicle*, as in *Yucca gloriosa*. If in a raceme the lower flower-stalks are developed more strongly than the upper, and thus all the flowers are nearly on a level, a *corymb* is formed, which may be simple, as in fig. 11, where the primary axis a' gives off secondary axes a'', a'', which end in single flowers; or branching, where the secondary axes again subdivide. If the pedicels are very short or wanting, so that the flowers are sessile, a *spike* is produced, as in *Plantago* and vervain (*Verbena officinalis*) (fig. 12). If the spike bears unisexual flowers, as in willow or hazel (fig. 13), it is an *amentum* or *catkin*, hence such trees are called *amentiferous*; at other times it becomes succulent, bearing numerous flowers, surrounded by a sheathing bract or spathe, and then it constitutes a *spadix*, which may be simple, as in *Arum maculatum* (fig. 14), or branching as in palms. A spike bearing female flowers only, and covered with scales, is a *strobilus*, as in the hop. In grasses there are usually numerous sessile flowers arranged in small spikes, called *locustae* or *spikelets*, which are either set closely along a central axis, or produced on secondary axes formed by the branching of the central one; to the latter form the term *panicle* is applied.

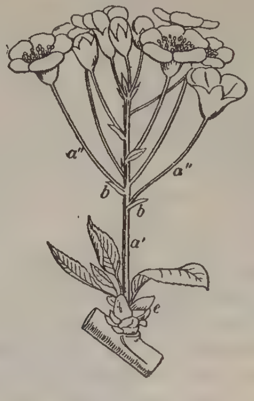

FIG. 11.

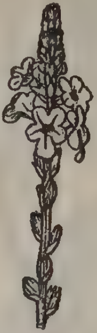

FIG. 12.

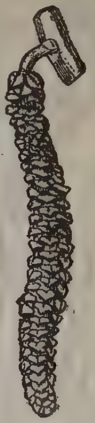

FIG. 13.

FIG. 11.—Corymb of *Cerasus Mahaleb*, terminating an abortive branch, at the base of which are modified leaves in the form of scales, e. a', Primary axis; a'', secondary axes bearing flowers; b, bract in the axils of which the secondary axes arise.

FIG. 12.—Spike of Vervain (*Verbena officinalis*), showing sessile flowers on a common rachis. The flowers at the lower part of the spike have passed into fruit, those towards the middle are in full bloom, and those at the top are only in bud.

FIG. 13.—Amentum or catkin of Hazel (*Corylus Avellana*), consisting of an axis or rachis covered with bracts in the form of scales, each of which covers a male flower, the stamens of which are seen projecting beyond the scale. The catkin falls off in a mass, separating from the branch by an articulation.

If the primary axis, in place of being elongated, is contracted, it gives rise to other forms of indefinite inflorescence. When the axis is so shortened that the secondary axes arise from a common point, and spread out as *radii* of nearly equal length, each ending in a single flower or dividing again in a similar radiating manner, an *umbel* is produced, as in fig. 15. From the primary floral axis a the secondary axes come off in a radiating or umbrella-like manner, and end in small umbels b, which are called *partial umbels* or *umbellules*. This inflorescence is seen in hemlock and other allied plants, which are hence called umbelliferous. If there are numerous flowers on a flattened, convex or slightly concave receptacle, having either very short pedicels or none, a

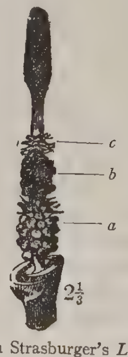

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FIG. 14.—Spadix of *Arum maculatum*. (After Wossidlo.) a, Female flowers; b, male flowers; c, hairs representing sterile flowers.

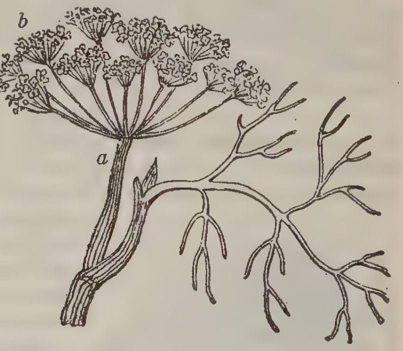

FIG. 15.—Compound umbel of Common Dill (*Anethum graveolens*), having a primary umbel a, and secondary umbels b, without either involucre or involucel.

capitulum (head) is formed, as in dandelion, daisy and other composite plants (fig. 2), also in scabious (fig. 9) and teazel. In the American button-bush the heads are globular, in some species of teazel elliptical, while in scabious and in composite plants, as sunflower, dandelion, thistle, centaury and marigold, they are somewhat hemispherical, with a flattened, slightly hollowed, or convex disk. If the margins of such a receptacle be developed upwards, the centre not developing, a concave receptacle is formed, which may partially or completely enclose a number of flowers that are generally unisexual. This gives rise to the peculiar inflorescence of *Dorstenia*, or to that of the fig (fig. 6), where the flowers are placed on the inner surface of the hollow receptacle, and are provided with bracteoles. This inflorescence has been called a *hypanthodium.*

Lastly, we have what are called *compound indefinite* inflorescences. In these forms the lateral shoots, developed centripetally upon the primary axis, bear numerous bracteoles, from which floral shoots arise which may have a centripetal arrangement similar to that on the mother shoot, or it may be different. Thus we may have a group of racemes, arranged in a racemose manner on a common axis, forming a raceme of racemes or compound raceme, as in *Astilbe*. In the same way we may have compound umbels, as in hemlock and most Umbelliferae (fig. 15), a compound spike, as in rye-grass, a compound spadix, as in some palms, and a compound capitulum, as in the hen-and-chickens daisy. Again, there may be a raceme of capitula, that is, a group of capitula disposed in a racemose manner, as in *Petasites*, a raceme of umbels, as in ivy, and so on, all the forms of inflorescence being indefinite in disposition. In *Eryngium* the shortening of the pedicels changes an umbel into a capitulum.

The simplest form of the definite type of the inflorescence is seen in *Anemone nemorosa* and in gentianella (*Gentiana acaulis*), where the axis terminates in a single flower, no other flowers being produced upon the plant. This is a *solitary terminal* inflorescence. If other flowers were produced, they would arise as lateral shoots from the bracts below the first-formed flower. The general name of *cyme* is applied to the arrangement of a group of flowers in a definite inflorescence. A *cymose* inflorescence is an inflorescence where the primary floral axis before terminating in a flower gives off one or more lateral unifloral axes which repeat the process—the development being only limited by the vigour of the plant. The floral axes are thus centrifugally developed. The cyme, according to its development, has been characterized as *biparous* or *uniparous*. In fig. 16 the biparous cyme is represented in the flowering branch of *Cerastium*. Here the primary axis t ends in a flower, which has passed into the state of fruit. At its base two leaves are produced, in each of which arise secondary axes t' t', ending in single flowers, and at the base of these axes a pair of opposite leaves is produced, giving rise to tertiary axes t'' t'', ending in single flowers, and so on. The term *dichasium* has also been applied to this form of cyme.

In the natural order Carophyllaceae (pink family) the dichasial form of inflorescence is very general. In some members of the order, as *Dianthus barbatus*, *D. carthusianorum*, &c., in which the peduncles are short, and the flowers closely approximated, with a centrifugal expansion, the inflorescence has the form of a contracted dichasium, and receives the name of *fascicle.* When the axes become very much shortened, the arrangement is more complicated in appearance, and the nature of the inflorescence can only be recognized by the order of opening of the flowers. In Labiate plants, as the dead-nettle (*Lamium*), the flowers are produced in the axil of each of the foliage leaves of the plant, and they appear as if arranged in a simple whorl of flowers. But on examination it is found that there is a central flower expanding first, and from its axis two secondary axes spring bearing solitary flowers; the expansion is thus centrifugal. The inflorescence is therefore a contracted dichasium, the flowers being sessile, or nearly so, and the clusters are called *verticillasters* (fig. 17). Sometimes, especially towards the summit of a dichasium, owing to the exhaustion of the growing power of the plant, only one of the bracts gives origin to a new axis, the other remaining empty; thus the inflorescence becomes unilateral, and further development is arrested. In addition to the dichasial form there are others where more than two lateral axes are produced from the primary floral axis, each of which in turn produces numerous axes. To this form the terms *trichasial* and *polychasial cyme* have been applied; but these are now usually designated *cymose umbels.* They are well seen in some species of *Euphorbia*. Another term, *anthela*, has been used to distinguish such forms as occur in several species of *Luzula* and *Juncus*, where numerous lateral axes arising from the primary axis grow very strongly and develop in an irregular manner.

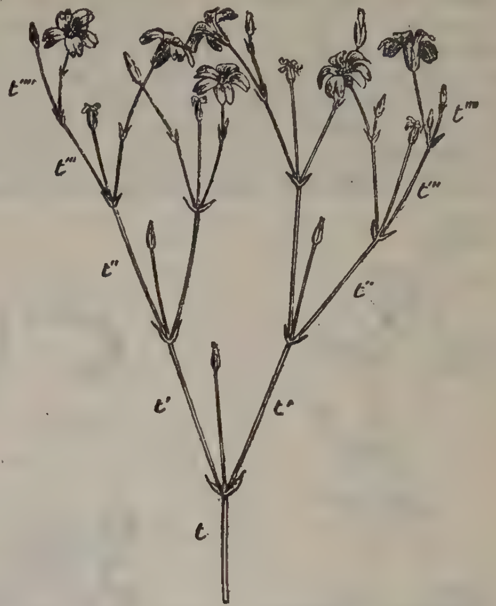

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FIG. 16.—Cymose inflorescence (dichasium) of *Cerastium collinum*; t-t'''', successive axes. (After Duchartre.)

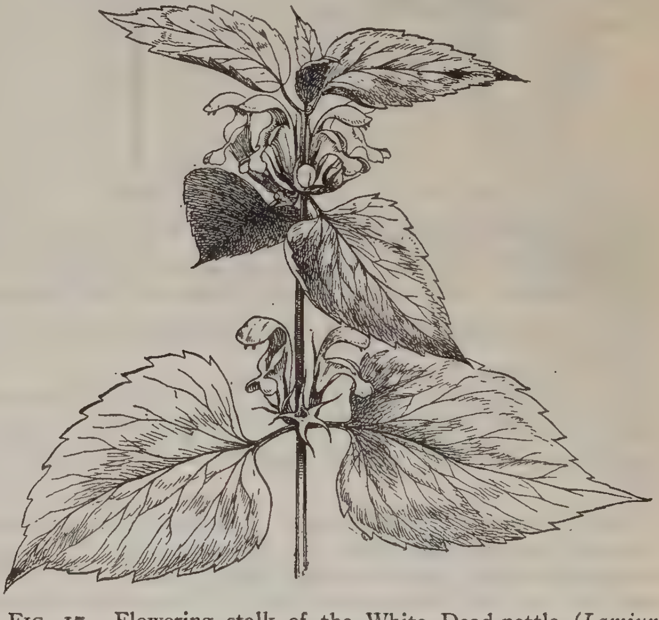

FIG. 17.—Flowering stalk of the White Dead-nettle (*Lamium album*). The bracts are like the ordinary leaves of the plant, and produce clusters of flowers in their axil. The clusters are called verticillasters, and consist of flowers which are produced in a centrifugal manner.

In the uniparous cyme a number of floral axes are successively developed one from the other, but the axis of each successive generation, instead of producing a pair of bracts, produces only one. The basal portion of the consecutive axes may become much thickened and arranged more or less in a straight line, and thus collectively form an apparent or false axis or *sympodium*, and the inflorescence thus simulates a raceme. In the true raceme, however, we find only a single axis, producing in succession a series of bracts, from which the floral peduncles arise as lateral shoots, and thus each flower is on the same side of the floral axis as the bract in the axil of which it is developed; but in the uniparous cyme the flower of each of these axes, the basal portions of which unite to form the false axis, is situated on the opposite side of the axis to the bract from which it apparently arises (fig. 18). The bract is not, however, the one from which the axis terminating in the flower arises, but is a bract produced upon it, and gives origin in its axil to a new axis, the basal portion of which, constituting the next part of the false axis, occupies the angle between this bract and its parent axis—the bract from which the axis really does arise being situated lower down upon the same side of the axis with itself. The uniparous cyme presents two forms, the *scorpioid* or *cicinal* and the *helicoid* or *bostrychoid*.

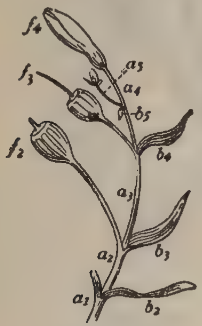

FIG. 18.

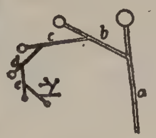

FIG. 20.

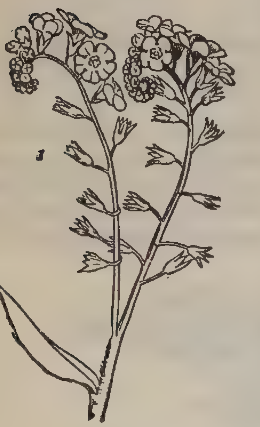

FIG. 19.

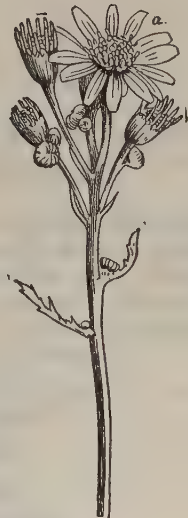

FIG. 21.

FIG. 18.—Helicoid cyme of a species of *Alstroemeria*. a_1, a_2, a_3, a_4, &c., separate axes successively developed in the axils of the corresponding bracts b_2, b_3, b_4, &c., and ending in a flower f_2, f_3, f_4, &c. The whole appears to form a simple raceme of which the axes form the internodes.

FIG. 19.—Scorpioidal or cicinal cyme of Forget-me-not (*Myosotis palustris*).

FIG. 20.—Diagram of definite floral axes a, b, c, d, e, &c.

FIG. 21.—Flowering stalk of Ragwort (*Senecio*). The flowers are in heads (capitula), and open from the circumference inwards in an indefinite centripetal manner. The heads of flowers, on the other hand, taken collectively, expand centrifugally—the central one a first.

In the scorpioid cyme the flowers are arranged alternately in a double row along one side of the false axis (fig. 19), the bracts when developed forming a second double row on the opposite side; the whole inflorescence usually curves on itself like a scorpion's tail, hence its name. In fig. 20 is shown a diagrammatic sketch of this arrangement. The false axis, a b c d, is formed by successive generations of unifloral axes, the flowers being arranged along one side alternately and in a double row; had the bracts been developed they would have formed a similar double row on the opposite side of the false axis; the whole inflorescence is represented as curved on itself. The inflorescence in the family Boraginaceae are usually regarded as true scorpioid cymes.

In the helicoid cyme there is also a false axis formed by the basal portion of the separate axes, but the flowers are not placed in a double row, but in a single row, and form a spiral or helix round the false axis. In *Alstroemeria*, as represented in fig. 18, the axis a_1 ends in a flower (cut off in the figure) and bears a leaf. From the axil of this leaf, that is, between it and the primary axis a_1 arises a secondary axis a_2, ending in a flower f_2, and producing a leaf about the middle. From the axil of this leaf a tertiary floral axis a_3, ending in a flower f_3, takes origin. In this case the axes are not arranged in two rows along one side of the false axis, but are placed at regular intervals, so as to form an elongated spiral round it.

Compound definite inflorescences are by no means common, but in *Streptocarpus polyanthus* and in several calceolarias we probably have examples. Here there are *scorpioid cymes of pairs of flowers*, each pair consisting of an older and a younger flower.

Mixed inflorescence.

Forms of inflorescence occur, in which both the definite and indefinite types are represented—*mixed* inflorescences. Thus in Composite plants, such as hawkweeds (*Hieracia*) and ragworts (*Senecio*, fig. 21), the *heads* of flowers, taken as a whole, are developed centrifugally, the terminal head first, while the *florets*, or small flowers on the receptacle, open centripetally, those at the circumference first. So also in Labiatae, such as dead-nettle (*Lamium*), the different whorls of inflorescence are developed centripetally, while the florets of the verticillaster are centrifugal. This mixed character presents difficulties in such cases as Labiatae, where the leaves, in place of retaining their ordinary form, become bracts, and thus might lead to the supposition of the whole series of flowers being one inflorescence. In such cases the cymes are described as spiked, racemose, or panicled, according to circumstances. In *Saxifraga umbrosa* (London-pride) and in the horse-chestnut we meet with a raceme of scorpioid cymes; in sea-pink, a capitulum of contracted scorpioid cymes (often called a glomerulus); in laurustinus, a compound umbel of dichasial cymes; a scorpioid cyme of capitula in *Vernonia scorpioides*. The so-called catkins of the birch are, in reality, spikes of contracted dichasial cymes. In the bell-flower (*Campanula*) there is a racemose uniparous cyme. In the privet (*Ligustrum vulgare*) there are numerous racemes of dichasia arranged in a racemose manner along an axis; the whole inflorescence thus has an appearance not unlike a bunch of grapes, and has been called a *thyrsus*.

TABULAR VIEW OF INFLORESCENCES

A. Indefinite Centripetal Inflorescence.
  I. Flowers solitary, axillary. *Vinca*, *Veronica hederifolia*.
  II. Flowers in groups, pedicellate.
    1. Elongated form (Raceme), *Hyacinth*, *Laburnum*, *Currant*.
      (Corymb), *Ornithogalum*.
    2. Contracted or shortened form (Umbel), *Cowslip*, *Astrantia*.
  III. Flowers in groups, sessile.
    1. Elongated form (Spike), *Plantago*.
      (Spikelet), *Grasses*.
      (Amentum, Catkin), *Willow*, *Hazel*.
      (Spadix) *Arum*, some *Palms*.
      (Strobilus), *Hop*.
    2. Contracted or shortened form (Capitulum), *Daisy*, *Dandelion*, *Scabious*.
  IV. Compound Indefinite Inflorescence.
    a. Compound Spike, *Rye-grass*.
    b. Compound Spadix, *Palms*.
    c. Compound Raceme, *Astilbe*.
    d. Compound Umbel, *Hemlock* and most *Umbelliferae*.
    e. Raceme of Capitula, *Petasites*.
    f. Raceme of Umbels, *Ivy*.
B. Definite Centrifugal Inflorescence.
  I. Flowers solitary, terminal. *Gentianella*, *Tulip*.
  II. Flowers in Cymes.
    1. Uniparous Cyme.
      a. Helicoid Cyme (axes forming a spiral).
        Elongated form, *Alstroemeria*.
        Contracted form, *Witsenia corymbosa*.

b. Scorpioid Cyme (axes unilateral, two rows).
Elongated form, *Forget-me-not, Symphytum, Henbane.*
Contracted form, *Erodium, Alchemilla arvensis.*
2. Biparous Cyme (Dichotomous), including 3-5-chotomous Cymes (Dichasium, Cymose Umbel, Anthela).
a. Elongated form, *Cerastium, Stellaria.*
b. Contracted form (Verticillaster), *Dead-nettle, Pelargonium.*
3. Compound Definite Inflorescence. *Streptocarpus polyanthus*, many *Calceolarias.*
C. Mixed Inflorescence.
Raceme of Scorpioid Cymes, *Horse-chestnut.*
Scorpioid Cyme of Capitula, *Vernonia scorpioides.*
Compound Umbel of Dichotomous Cymes, *Laurustinus.*
Capitulum of contracted Scorpioid Cymes (Glomerulus), *Sea-pink.*

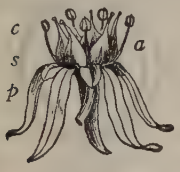

FIG. 22.

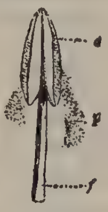

FIG. 25.

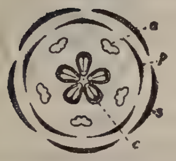

FIG. 23.

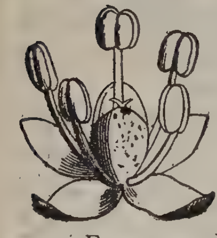

FIG. 24.

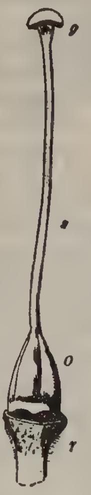

FIG. 26.

FIG. 22.—Flower of *Sedum rubens.* *s*, Sepals; *p*, petals; *a*, stamens; *c*, carpels.

FIG. 23.—Diagram of a completely symmetrical flower, consisting of four whorls, each of five parts. *s*, Sepals; *p*, petals; *a*, stamens; *c*, carpels.

FIG. 24.—Monochlamydeous (apetalous) flower of Goosefoot (*Chenopodium*), consisting of a single perianth (calyx) of five parts, enclosing five stamens, which are opposite the divisions of the perianth, owing to the absence of the petals.

FIG. 25.—Stamen, consisting of a filament (stalk) *f* and an anther *a*, containing the pollen *p*, which is discharged through slits in the two lobes of the anther.

FIG. 26.—The pistil of Tobacco (*Nicotiana Tabacum*), consisting of the ovary *o*, containing ovules, the style *s*, and the capitate stigma *g*. The pistil is placed on the receptacle *r*, at the extremity of the peduncle.

The flower.

The flower consists of the floral axis bearing the sporophylls (stamens and carpels), usually with certain protective envelopes. The axis is usually very much contracted, no internodes being developed, and the portion bearing the floral leaves, termed the *thalamus* or *torus*, frequently expands into a conical, flattened or hollowed expansion; at other times, though rarely, the internodes are developed and it is elongated. Upon this torus the parts of the flower are arranged in a crowded manner, usually forming a series of verticils, the parts of which alternate; but they are sometimes arranged spirally especially if the floral axis be elongated. In a typical flower, as in fig. 22, we recognize four distinct whorls of leaves: an outer whorl, the *calyx* of *sepals*; within it, another whorl, the parts alternating with those of the outer whorl, the *corolla* of *petals*; next a whorl of parts alternating with the parts of the corolla, the *androecium* of *stamens*; and in the centre the *gynoecium* of *carpels*. Fig. 23 is a diagrammatic representation of the arrangement of the parts of such a flower; it is known as a *floral diagram*. The flower is supposed to be cut transversely, and the parts of each whorl are distinguished by a different symbol. Of these whorls the two internal, forming the sporophylls, constitute the *essential* organs of reproduction; the two outer whorls are the protective coverings or floral *envelopes*. The sepals are generally of a greenish colour; their function is mainly protective, shielding the more delicate internal organs before the flower opens. The petals are usually showy, and normally alternate with the sepals. Sometimes, as usually in monocotyledons, the calyx and corolla are similar; in such cases the term *perianth*, or *perigone*, is applied. Thus, in the tulip, crocus, lily, hyacinth, we speak of the parts of the perianth, in place of calyx and corolla, although in these plants there is an outer whorl (calyx), of three parts, and an inner (corolla), of a similar number, alternating with them. When the parts of the calyx are in appearance like petals they are said to be *petaloid*, as in Liliaceae. In some cases the petals have the appearance of sepals, then they are *sepaloid*, as in Juncaceae. In plants, as *Nymphaea alba*, where a spiral arrangement of the floral leaves occurs, it is not easy to say where the calyx ends and the corolla begins, as these two whorls pass insensibly into each other. When both calyx and corolla are present, the plants are *dichlamydeous*; when one only is present, the flower is termed *monochlamydeous* or *apetalous*, having no petals (fig. 24). Sometimes both are absent, when the flower is *achlamydeous*, or naked, as in willow. The outermost series of the essential organs, collectively termed the *androecium*, is composed of the microsporophylls known as the staminal leaves or *stamens*. In their most differentiated form each consists of a stalk, the *filament* (fig. 25, *f*), supporting at its summit the anther (*a*), consisting of the pollen-sacs which contain the powdery *pollen* (*p*), the microspores, which is ultimately discharged therefrom. The *gynoecium* or *pistil* is the central portion of the flower, terminating the floral axis. It consists of one or more *carpels* (megasporophylls), either separate (fig. 22, *c*) or combined (fig. 24). The parts distinguished in the pistil are the *ovary* (fig. 26, *o*), which is the lower portion enclosing the *ovules* destined to become seeds, and the *stigma* (*g*), a portion of loose cellular tissue, the receptive surface on which the pollen is deposited, which is either sessile on the apex of the ovary, as in the poppy, or is separated from it by a prolonged portion called the *style* (*s*). The androecium and gynoecium are not present in all flowers. When both are present the flower is *hermaphrodite*; and in descriptive botany such a flower is indicated by the symbol ☿. When only one of those organs is present the flower is *unisexual* or *diclinous*, and is either male (*staminate*), ♂, or female (*pistillate*), ♀. A flower then normally consists of the four series of leaves—calyx, corolla, androecium and gynoecium—and when these are all present the flower is *complete*. These are usually densely crowded upon the thalamus, but in some instances, after apical growth has ceased in the axis, an elongation of portions of the receptacle by intercalary growth occurs, by which changes in the position of the parts may be brought about. Thus in *Lychnis* an elongation of the axis betwixt the calyx and the corolla takes place, and in this way they are separated by an interval. Again, in the passion-flower (*Passiflora*) the stamens are separated from the corolla by an elongated portion of the axis, which has consequently been termed the *androphore*, and in *Passiflora* also, fraxinella (fig. 27), Capparidaceae, and some other plants, the ovary is raised upon a distinct stalk termed the *gynophore*; it is thus separated from the stamens, and is said to be *stipitate*. Usually the successive whorls of the flower, disposed from below upwards or from without inwards upon the floral axis, are of the same number of parts, or are a multiple of the same number of parts, those of one whorl alternating with those of the whorls next it.

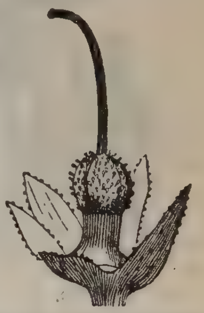

FIG. 27.—Calyx and pistil of Fraxinella (*Dictamnus Fraxinella*). The pistil consists of several carpels, which are elevated on a stalk or *gynophore* prolonged from the receptacle.

In the more primitive types of flowers the torus is more or less convex, and the series of organs follow in regular succession, culminating in the carpels, in the formation of which the growth of the axis is closed (fig. 28). This arrangement is known as hypogynous, the other series (calyx, corolla and stamens) being beneath (*hypo-*) the gynoecium. In other cases, the apex of the growing point ceases to develop, and the parts below form a cup around it, from the rim of which the outer members of the flower are developed around (*peri-*) the carpels, which are formed from the apex of the growing-point at the bottom of the cup. This arrangement is known as *perigynous* (fig. 29). In many cases this is carried farther and a cavity is formed which is roofed over by the carpels, so that the outer members of the flower spring from the edge of the receptacle which is immediately above the ovary (epigynous), hence the term epigyny (fig. 30).

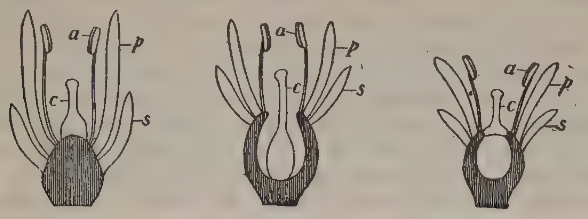

FIG. 28. FIG. 29. FIG. 30.

FIGS. 28, 29 and 30.—Diagrams illustrating hypogyny, perigyny and epigyny of the flower. *a*, Stamens; *c*, carpels; *p*, petals; *s*, sepals.

Symmetry of the flower.

When a flower consists of parts arranged in whorls it is said to be *cyclic*, and if all the whorls have an equal number of parts and are alternate it is *eucyclic* (figs. 22, 23). In contrast to the cyclic flowers are those, as in Magnoliaceae, where the parts are in spirals (*acyclic*). Flowers which are cyclic at one portion and spiral at another, as in many Ranunculaceae, are termed *hemicyclic*. In spiral flowers the distinction into series is by no means easy, and usually there is a gradual passage from sepaloid through petaloid to staminal parts, as in the water-lily family, Nymphaeaceae (figs. 31, 32), although in some plants there is no such distinction, the parts being all petaloid, as in *Trollius*. Normally, the parts of successive whorls alternate; but in some cases we find the parts of one whorl opposite or *superposed* to those of the next whorl. In some cases, as in the vine-family Ampelidaceae, this seems to be the ordinary mode of development, but the superposition of the stamens on the sepals in many plants, as in the pink family, Caryophyllaceae, is due to the suppression or abortion of the whorl of petals, and this idea is borne out by the development, in some plants of the order, of the suppressed whorl. As a rule, whenever we find the parts of one whorl superposed on those of another we may suspect some abnormality.

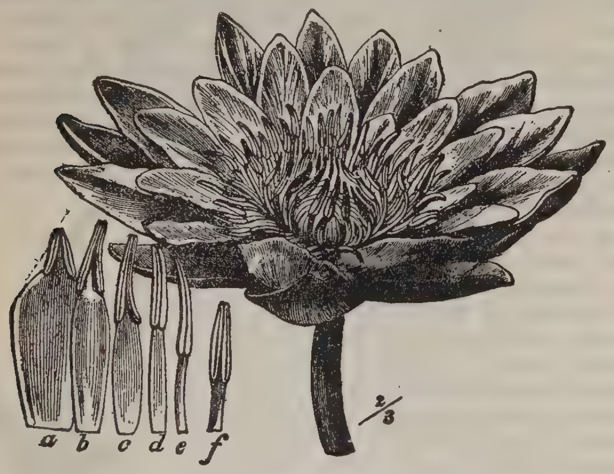

FIG. 3 FIG. 31.

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FIGS. 31 and 32.—White Water Lily. Fig. 31, flower; fig. 32, successive stages, *a-f*, in the transition from petals to stamens. (After Wossidlo.)

A flower is said to be *symmetrical* when each of its whorls consists of an equal number of parts, or when the parts of any one whorl are multiples of that preceding it. Thus, a symmetrical flower may have five sepals, five petals, five stamens and five carpels, or the number of any of these parts may be ten, twenty or some multiple of five. Fig. 23 is a diagram of a symmetrical flower, with five parts in each whorl, alternating with each other. Fig. 33 is a diagram of a symmetrical flower of stone-crop, with five sepals, five alternating petals, ten stamens and five carpels. Here the number of parts in the staminal whorl is double that in the others, and in such a case the additional five parts form a second row alternating with the others. In the staminal whorl especially it is common to find additional rows. Fig. 34 shows a symmetrical flower, with five parts in the three outer rows, and ten divisions in the inner. In this case it is the gynoecium which has an additional number of parts. Fig. 35 shows a flower of heath, with four divisions of the calyx and corolla, eight stamens in two rows, and four divisions of the pistil. In fig. 36 there are three parts in each whorl; and in fig. 37 there are three divisions of the calyx, corolla and pistil, and six stamens in two rows. In all these cases the flower is symmetrical. In Monocotyledons it is usual for the staminal whorl to be double, it rarely having more than two rows, whilst amongst dicotyledons there are often very numerous rows of stamens. The floral envelopes are rarely multiplied. Flowers in which the number of parts in each whorl is the same, are *isomerous* (of equal number); when the number in some of the whorls is different, the flower is *anisomerous* (of unequal number). The pistillate whorl is very liable to changes. It frequently happens that when it is fully formed, the number of its parts is not in conformity with that of the other whorls. In such circumstances, however, a flower has been called symmetrical, provided the parts of the other whorls are normal,—the permanent state of the pistil not being taken into account in determining symmetry. Thus fig. 38 shows a pentamerous symmetrical flower, with dimerous pistil. Symmetry, then, in botanical language, has reference to a certain definite numerical relation of parts. A flower in which the parts are arranged in twos is called *dimerous*; when the parts of the whorls are three, four or five, the flower is *trimerous*, *tetramerous* or *pentamerous*, respectively. The symmetry which is most commonly met with is trimerous and pentamerous—the former occurring generally among monocotyledons, the latter among dicotyledons. Dimerous and tetramerous symmetry occur also among dicotyledons.

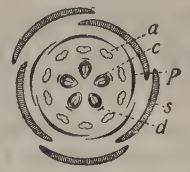


FIG. 33.

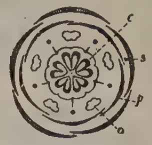


FIG. 34.

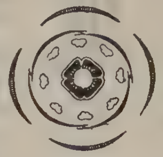


FIG. 35.

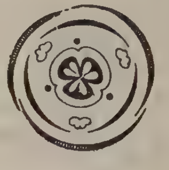


FIG. 36.

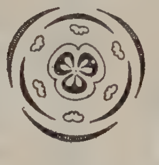


FIG. 37.

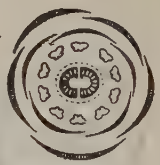


FIG. 38.

FIG. 33.—Diagrammatic section of a symmetrical pentamerous flower of Stone-crop (*Sedum*), consisting of five sepals (*s*), five petals (*p*) alternating with the sepals, ten stamens (*a*) in two rows, and five carpels (*c*) containing ovules. The dark lines (*d*) on the outside of the carpels are glands.

FIG. 34.—Diagram of the flower of Flax (*Linum*), consisting of five sepals (*s*), five petals (*p*), five stamens (*a*), and five carpels (*c*), each of which is partially divided into two. The dots represent a whorl of stamens which has disappeared. It is pentamerous, complete, symmetrical and regular.

FIG. 35.—Diagram of the flower of Heath (*Erica*), a regular tetramerous flower.

FIG. 36.—Diagram of the trimerous symmetrical flower of Iris.

FIG. 37.—Diagram of the symmetrical trimerous flower of Fritillary (*Fritillaria*).

FIG. 38.—Diagram of the flower of Saxifrage (*Saxifraga tridactylites*). The calyx and corolla consist of five parts, the stamens are ten in two rows, while the pistil has only two parts developed.

The various parts of the flower have a certain definite relation to the axis. Thus, in axillary tetramerous flowers (fig. 35), one sepal is next the axis, and is called *superior* or *posterior*; another is next the bract, and is *inferior* or *anterior*, and the other two are *lateral*; and certain terms are used to indicate that position. A plane passing through the anterior and posterior sepal and through the floral axis is termed the *median plane* of the flower; a plane cutting it at right angles, and passing through the lateral sepals, is the *lateral plane*; whilst the planes which bisect the angles formed by the lateral and median planes are the *diagonal planes*, and in these flowers the petals which alternate with the sepals are cut by the diagonal planes.

In a pentamerous flower one sepal may be superior, as in the calyx of Rosaceae and Labiatae; or it may be inferior, as in the calyx of Leguminosae (fig. 39)—the reverse, by the law of alternation, being the case with the petals. Thus, in the blossom of the pea (figs. 39, 40), the odd petal (vexillum) *st* is superior, while the odd sepal is inferior. In the order Scrophulariaceae one of the two carpels is posterior and the other anterior, whilst in Convolvulaceae the carpels are arranged laterally. Sometimes the twisting of a part makes a change in the position of other parts, as in Orchids, where the twisting of the ovary changes the position of the labellum.

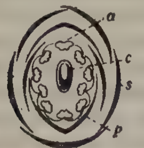


FIG. 39.—Diagram of flower of Sweet-pea (*Lathyrus*), showing five sepals (*s*), two superior, one inferior, and two lateral; five petals (*p*), one superior, two inferior, and two lateral; ten stamens in two rows (*a*); and one carpel (*c*).

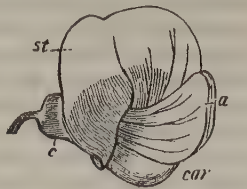


FIG. 40.—Flower of Pea (*Pisum sativum*), showing a papilionaceous corolla, with one petal superior (*st*) called the standard (vexillum), two inferior (*car*) called the keel (carina), and two lateral (*a*) called wings (alae). The calyx is marked *c*.

When the different members of each whorl are like in size and shape, the flower is said to be *regular*; while differences in the size and shape of the parts of a whorl make the flower *irregular*, as in the papilionaceous flower, represented in fig. 39. When a flower can be divided by a single plane into two exactly similar parts, then it is said to be *zygomorphic*. Such flowers as Papilionaceae, Labiatae, are examples. In contrast with this are *polysymmetrical* or actinomorphic flowers, which have a radial symmetry and can be divided by several planes into several exactly similar portions; such are all regular, symmetrical flowers. When the parts of any whorl are not equal to or some multiple of the others, then the flower is *asymmetrical*. This want of symmetry may be brought about in various ways. Alteration in the symmetrical arrangement as well as in the completeness and regularity of flowers has been traced to *suppression* or the *non-development* of parts, *degeneration* or imperfect formation, *cohesion* or union of parts of the same whorl, *adhesion* or union of the parts of different whorls, *multiplication* of parts, and *deduplication* (sometimes called *chorisis*) or splitting of parts.

By *suppression* or non-appearance of a part at the place where it ought to appear if the structure was normal, the symmetry or completeness of the flower is disturbed. This suppression when confined to the parts of certain verticils makes the flower asymmetrical. Thus, in many Caryophyllaceae, as *Polycarpon* and *Holosteum*, while the calyx and corolla are pentamerous, there are only three or four stamens and three carpels; in *Impatiens Noli-me-tangere* the calyx is composed of three parts, while the other verticils have five; in labiate flowers there are five parts of the calyx and corolla, and only four stamens; and in *Tropaeolum pentaphyllum* there are five sepals, two petals, eight stamens and three carpels. In all these cases the want of symmetry is traced to the suppression of certain parts. In the last-mentioned plant the normal number is five, hence it is said that there are three petals suppressed, as shown by the position of the two remaining ones; there are two rows of stamens, in each of which one is wanting; and there are two carpels suppressed. In many instances the parts which are afterwards suppressed can be seen in the early stages of growth, and occasionally some vestiges of them remain in the fully developed flower. By the suppression of the verticil of the stamens, or of the carpels, flowers become *unisexual* or *diclinous*, and by the suppression of one or both of the floral envelopes, monochlamydeous and achlamydeous flowers are produced. The suppression of parts of the flower may be carried so far that at last a flower consists of only one part of one whorl. In the Euphorbiaceae we have an excellent example of the gradual suppression of parts, where from an apetalous, trimerous, staminal flower we pass to one where one of the stamens is suppressed, and then to forms where two of them are wanting. We next have flowers in which the calyx is suppressed, and its place occupied by one, two or three bracts (so that the flower is, properly speaking, achlamydeous), and only one or two stamens are produced. And finally, we find flowers consisting of a single stamen with a bract. There is thus traced a *degradation*, as it is called, from a flower with three stamens and three divisions of the calyx, to one with a single bract and a single stamen.

Degeneration, or the transformation of parts, often gives rise either to an apparent want of symmetry or to irregularity in form. In unisexual flowers it is not uncommon to find vestiges of the undeveloped stamens in the form of filiform bodies or scales. In double flowers transformations of the stamens and pistils take place, so that they appear as petals. In *Canna*, what are called petals are in reality metamorphosed stamens. In the capitula of Compositae we sometimes find the florets converted into green leaves. The limb of the calyx may appear as a rim, as in some Umbelliferae; or as pappus, in Compositae and *Valeriana*. In *Scrophularia* the fifth stamen appears as a scale-like body; in other Scrophulariaceae, as in *Pentstemon*, it assumes the form of a filament, with hairs at its apex in place of an anther.

Cohesion, or the union of parts of the same whorl, and *adhesion*, or the growing together of parts of different whorls, are causes of change both as regards form and symmetry. Thus in *Cucurbita* the stamens are originally five in number, but subsequently some cohere, so that three stamens only are seen in the mature flower. Adhesion is well seen in the *gynostemium* of orchids, where the stamens and stigmas adhere. In Capparidaceae the calyx and petals occupy their usual position, but the axis is prolonged in the form of a gynophore, to which the stamens are united.

Multiplication, or an increase of the number of parts, gives rise to changes. We have already alluded to the interposition of new members in a whorl. This takes place chiefly in the staminal whorl, but usually the additional parts produced form a symmetrical whorl with the others. In some instances, however, this is not the case. Thus in the horse-chestnut there is an interposition of two stamens, and thus seven stamens are formed in the flower, which is asymmetrical.

Parts of the flower are often increased by a process of *deduplication*, or *chorisis*, *i.e.* the splitting of a part so that two or more parts are formed out of what was originally one. Thus in Cruciferous plants the staminal whorl consists of four long stamens and two short ones (*tetradynamous*). The symmetry in the flower is evidently dimerous, and the abnormality in the androecium, where the four long stamens are opposite the posterior sepals, takes place by a splitting, at a very early stage of development, of a single outgrowth into two. Many cases of what was considered chorisis are in reality due to the development of stipules from the staminal leaf. Thus in *Dicentra* and *Corydalis* there are six stamens in two bundles; the central one of each bundle alone is perfect, the lateral ones have each only half an anther, and are really stipules formed from the staminal leaf. Branching of stamens also produces apparent want of symmetry; thus, in the so-called polyadelphous stamens of Hypericaceae there are really only five stamens which give off numerous branches, but the basal portion remaining short, the branches have the appearance of separate stamens, and the flower thus seems asymmetrical.

Cultivation has a great effect in causing changes in the various parts of plants. Many alterations in form, size, number and adhesion of parts are due to the art of the horticulturist. The changes in the colour and forms of flowers thus produced are endless. In the dahlia the florets are rendered quilled, and are made to assume many glowing colours. In pelargonium the flowers have been rendered larger and more showy; and such is also the case with the *Ranunculus*, the auricula and the carnation. Some flowers, with spurred petals in their usual state, as columbine, are changed so that the spurs disappear; and others, as *Linaria*, in which one petal only is usually spurred, are altered so as to have all the petals spurred, and to present what are called *pelorian* varieties.

As a convenient method of expressing the arrangement of the parts of the flower, *floral formulae* have been devised. Several modes of expression are employed. The following is a very simple mode which has been proposed:—The several whorls are represented by the letters S (sepals), P (petals), St (stamens), C (carpels), and a figure marked after each indicates the number of parts in that whorl. Thus the formula $S_5P_5St_5C_5$ means that the flower is perfect, and has pentamerous symmetry, the whorls being isomerous. Such a flower as that of Sedum (fig. 33) would be represented by the formula $S_5P_5St_{5+5}C_5$, where St_{5+5} indicates that the staminal whorl consists of two rows of five parts each. A flower such as the male flower of the nettle (fig. 41) would be expressed $S_4P_0St_4C_0$. When no other mark is appended the whorls are supposed to be alternate; but if it is desired to mark the position of the whorls special symbols are employed. Thus, to express the superposition of one whorl upon another, a line is drawn between them, *e.g.* the symbol $S_5P_5 \mid St_5C_5$ is the formula of the flower of Primulaceae.

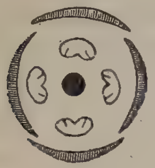


FIG. 41.

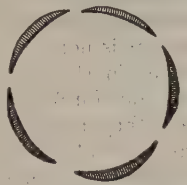


FIG. 42.

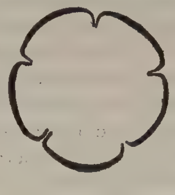


FIG. 43.

FIG. 41.—Tetramerous monochlamydeous male flower of the Nettle (*Urtica*).

FIG. 42.—Diagram to illustrate valvular or valvate aestivation, in which the parts are placed in a circle, without overlapping or folding.

FIG. 43.—Diagram to illustrate induplicative or induplicate aestivation, in which the parts of the verticil are slightly turned inwards at the edges.

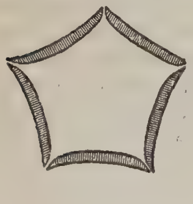


FIG. 44.

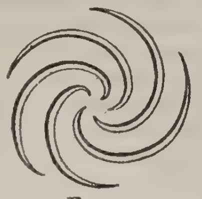


FIG. 45.

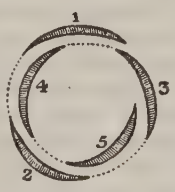


FIG. 46.

FIG. 44.—Diagram to illustrate reduplicative or reduplicate aestivation, in which the parts of the whorl are slightly turned outwards at the edges.

FIG. 45.—Diagram to illustrate contorted or twisted aestivation, in which the parts of the whorl are overlapped by each other in turn, and are twisted on their axis.

FIG. 46.—Diagram to illustrate the quincuncial aestivation, in which the parts of the flower are arranged in a spiral cycle, so that 1 and 2 are wholly external, 4 and 5 are internal, and 3 is partly external and partly overlapped by 1.

The manner in which the parts are arranged in the flower-bud with respect to each other before opening is the *aestivation* or *praefloration*. The latter terms are applied to the flower-bud in the same way as vernation is to the leaf-bud, and distinctive names have been given to the different arrangements exhibited, both by the leaves individually and in their relations to each other. As regards each leaf of the flower, it is either spread out, as the sepals in the bud of the lime-tree, or folded upon itself (conduplicate), as in the petals of some species of *Lysimachia*, or slightly folded inwards or outwards at the edges, as in the calyx of some species of clematis and of some herbaceous plants, or rolled up at the edges (involute or revolute), or folded transversely, becoming *crumpled* or *corrugated*, as in the poppy. When the parts of a whorl are placed in an exact circle, and are applied to each other by their edges only, without overlapping or being folded, thus resembling the valves of a seed-vessel, the aestivation is *valvate* (fig. 42). The edges of each of the parts may be turned either inwards or outwards; in the former case the aestivation is *induplicate* (fig. 43), in the latter case *reduplicate* (fig. 44). When the parts of a single whorl are placed in a circle, each of them exhibiting a torsion of its axis, so that by one of its sides it overlaps its neighbour, whilst its side is overlapped in like manner by that standing next to it, the aestivation is *twisted* or *contorted* (fig. 45). This arrangement is characteristic of the flower-buds of Malvaceae and Apocynaceae, and it is also seen in Convolvulaceae and Caryophyllaceae. When the flower expands, the traces of twisting often disappear, but sometimes, as in Apocynaceae, they remain. Those forms of aestivation are such as occur in cyclic flowers, and they are included under *circular* aestivation. But in spiral flowers we have a different arrangement; thus the leaves of the calyx of *Camellia japonica* cover each other partially like tiles on a house. This aestivation is *imbricate*. At other times, as in the petals of *Camellia*, the parts envelop each other completely, so as to become *convolute*. This is also seen in a transverse section of the calyx of *Magnolia grandiflora*, where each of the three leaves embraces that within it. When the parts of a whorl are five, as occurs in many dicotyledons, and the imbrication is such that there are two parts external, two internal, and a fifth which partially covers one of the internal parts by its margin, and is in its turn partially covered by one of the external parts, the aestivation is *quincuncial* (fig. 46). This quincunx is common in the corolla of Rosaceae. In fig. 47 a section is given of the bud of *Antirrhinum majus*, showing the imbricate spiral arrangement. In this case it will be seen that the part marked 5 has, by a slight change in position, become overlapped by 1. This variety of imbricate aestivation has been termed *cochlear*. In flowers such as those of the pea (fig. 40), one of the parts, the vexillum, is often large and folded over the others, giving rise to *vexillary* aestivation (fig. 48), or the carina may perform a similar office, and then the aestivation is *carinal*, as in the Judas-tree (*Cercis Siliquastrum*). The parts of the several verticils often differ in their mode of aestivation. Thus, in Malvaceae the corolla is contorted and the calyx valvate, or reduplicate; in St John's-wort the calyx is imbricate, and the corolla contorted. In Convolvulaceae, while the corolla is twisted, and has its parts arranged in a circle, the calyx is imbricate, and exhibits a spiral arrangement. In *Guazuma* the calyx is valvate, and the corolla induplicate. The circular aestivation is generally associated with a regular calyx and corolla, while the spiral aestivations are connected with irregular as well as with regular forms.

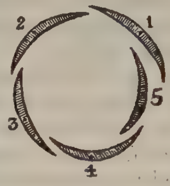


FIG. 47.

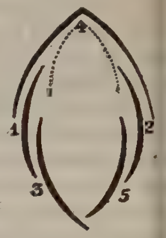


FIG. 48.

FIG. 47.—Diagram to illustrate imbricated aestivation, in which the parts are arranged in a spiral cycle, following the order indicated by the figures 1, 2, 3, 4, 5.

FIG. 48.—Diagram of a papilionaceous flower, showing vexillary aestivation.

1 and 2, The alae or wings.
3, A part of the carina or keel.
4, The vexillum or standard, which, in place of being internal, as marked by the dotted line, becomes external.
5, The remaining part of the keel.

The order of the cycle is indicated by the figures.

Calyx.

The *sepals* are sometimes *free* or separate from each other, at other times they are united to a greater or less extent; in the former case, the calyx is *polysepalous*, in the latter *gamosepalous* or *monosepalous*. The divisions of the calyx present usually the characters of leaves, and in some cases of monstrosity they are converted into leaf-like organs, as not infrequently happens in primulas. They are usually entire, but occasionally they are cut in various ways, as in the rose; they are rarely stalked. Sepals are generally of a more or less oval, elliptical or oblong form, with their apices either blunt or acute. In their direction they are erect or reflexed (with their apices downwards), spreading outwards (*divergent* or *patulous*), or arched inwards (*connivent*). They are usually of a greenish colour (*herbaceous*); but sometimes they are coloured or *petaloid*, as in the fuchsia, tropaeolum, globe-flower and pomegranate. Whatever be its colour, the external envelope of the flower is considered as the calyx. The vascular bundles sometimes form a prominent rib, which indicates the middle of the sepal; at other times they form several ribs. The venation is useful as pointing out the number of leaves which constitute a gamosepalous calyx. In a polysepalous calyx the number of the parts is indicated by Greek numerals prefixed; thus, a calyx which has three sepals is *trisepalous*; one with five sepals is *pentasepalous*. The sepals occasionally are of different forms and sizes. In Aconite one of them is shaped like a helmet (*galeate*). In a gamosepalous calyx the sepals are united in various ways, sometimes very slightly, and their number is marked by the divisions at the apex. These divisions either are simple projections in the form of acute or obtuse teeth (fig. 49); or they extend down the calyx as fissures about halfway, the calyx being *trifid* (three-cleft), *quinquefid* (five-cleft), &c., according to their number; or they reach to near the base in the form of partitions, the calyx being *tripartite*, *quadripartite*, *quinquepartite*, &c. The union of the parts may be complete, and the calyx may be quite entire or *truncate*, as in some Correas, the venation being the chief indication of the different parts. The cohesion is sometimes irregular, some parts uniting to a greater extent than others; thus a two-lipped or *labiate* calyx is formed. The upper lip is often composed of three parts, which are thus posterior or next the axis, while the lower has two, which are anterior. The part formed by the union of the sepals is called the *tube* of the calyx; the portion where the sepals are free is the *limb*.

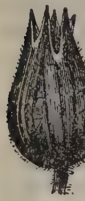


FIG. 49.

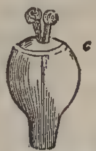
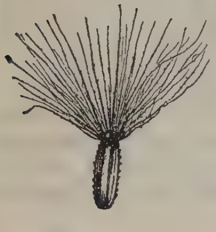


FIG. 50.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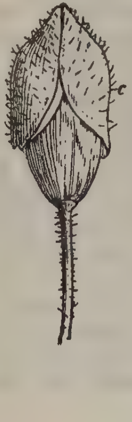

FIG. 52.

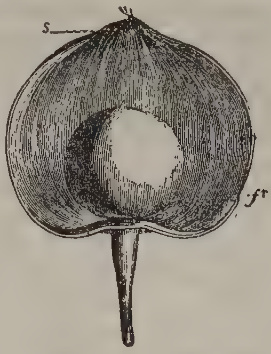

FIG. 53.

From Strasburger's *Lehrbuch der Botanik*, by permission of Gustav Fischer.

FIG. 49.—Gamosepalous five-toothed calyx of Campion (*Lychnis*).

FIG. 50.—Obsolete calyx (*c*) of Madder (*Rubia*) adherent to the pistil, in the form of a rim.

FIG. 51.—Feathery pappus attached to the fruit of Groundsel (*Senecio vulgaris*).

FIG. 52.—Caducous calyx (*c*) of Poppy. There are two sepals which fall off before the petals expand.

FIG. 53.—Fruit of *Physalis Alkekengi*, consisting of the persistent calyx (*s*), surrounding the berry (*fr*), derived from the ovary. (After Duchartre.)

Occasionally, certain parts of the sepals undergo marked enlargement. In the violet the calycine segments are prolonged downwards beyond their insertions, and in the Indian cress (*Tropaeolum*) this prolongation is in the form of a spur (*calcar*), formed by three sepals; in Delphinium it is formed by one. In Pelargonium the spur from one of the sepals is adherent to the flower-stalk. In *Potentilla* and allied genera an *epicalyx* is formed by the development of stipules from the sepals, which form an apparent outer calyx, the parts of which alternate with the true sepals. In Malvaceae an epicalyx is formed by the bracteoles. Degenerations take place in the calyx, so that it becomes dry, scaly and glumaceous (like the glumes of grasses), as in the rushes (Juncaceae); hairy, as in Compositae; or a mere rim, as in some Umbelliferae and Acanthaceae, and in Madder (*Rubia tinctorum*, fig. 50), when it is called *obsolete* or *marginate*. In Compositae, Dipsacaceae and Valerianaceae the calyx is attached to the pistil, and its limb is developed in the form of hairs called *pappus* (fig. 51). This pappus is either simple (*pilose*) or feathery (*plumose*). In *Valeriana* the superior calyx is at first an obsolete rim, but as the fruit ripens it is shown to consist of hairs rolled inwards, which expand so as to waft the fruit. The calyx sometimes falls off before the flower expands, as in poppies, and is *caducous* (fig. 52); or along with the corolla, as in *Ranunculus*, and is *deciduous*; or it remains after flowering (*persistent*) as in Labiatae, Scrophulariaceae, and Boraginaceae; or its base only is persistent, as in *Datura Stramonium*. In *Eschscholtzia* and *Eucalyptus* the sepals remain united at the upper part, and become disarticulated at the base or middle, so as to come off in the form of a lid or funnel. Such a calyx is *operculate* or *calyptrate*. The existence or non-existence of an articulation determines the deciduous or persistent nature of the calyx.

The receptacle bearing the calyx is sometimes united to the pistil, and enlarges so as to form a part of the fruit, as in the apple, pear, &c. In these fruits the withered calyx is seen at the apex. Sometimes a persistent calyx increases much after flowering, and encloses the fruit without being incorporated with it, becoming *accrescent*, as in various species of *Physalis* (fig. 53); at other times it remains in a withered or *marcescent* form, as in *Erica*; sometimes it becomes *inflated* or *vesicular*, as in sea campion (*Silene maritima*).

Corolla.

The corolla is the more or less coloured attractive inner floral envelope; generally the most conspicuous whorl. It is present in the greater number of Dicotyledons. Petals differ more from ordinary leaves than sepals do, and are much more nearly allied to the staminal whorl. In some cases, however, they are transformed into leaves, like the calyx, and occasionally leaf-buds are developed in their axil. They are seldom green, although occasionally that colour is met with, as in some species of *Cobaea*, *Hoya viridiflora*, *Gonolobus viridiflorus* and *Pentatropis spiralis*. As a rule they are highly coloured, the colouring matter being contained in the cell-sap, as in blue or red flowers, or in plastids (chromoplasts), as generally in yellow flowers, or in both forms, as in many orange-coloured or reddish flowers. The attractiveness of the petal is often due wholly or in part to surface markings; thus the cuticle of the petal of a pelargonium, when viewed with a $\frac{1}{2}$ or $\frac{1}{4}$-in. object-glass, shows beautiful hexagons, the boundaries of which are ornamented with several inflected loops in the sides of the cells.

Petals are generally glabrous or smooth; but, in some instances, hairs are produced on their surface. Petaline hairs, though sparse and scattered, present occasionally the same arrangement as those which occur on the leaves; thus, in Bombaceae they are stellate. Coloured hairs are seen on the petals of *Menyanthes*, and on the segments of the perianth of *Iris*. They serve various purposes in the economy of the flower, often closing the way to the honey-secreting part of the flower to small insects, whose visits would be useless for purposes of pollination. Although petals are usually very thin and delicate in their texture, they occasionally become thick and fleshy, as in *Stapelia* and *Rafflesia*; or dry, as in heaths; or hard and stiff, as in *Xylopia*. A petal often consists of two portions—the lower narrow, resembling the petiole of a leaf, and called the *unguis* or *claw*; the upper broader, like the blade of a leaf, and called the *lamina* or *limb*. These parts are seen in the petals of the wallflower (fig. 54). The claw is often wanting, as in the crowfoot (fig. 55) and the poppy, and the petals are then *sessile*. According to the development of veins and the growth of cellular tissue, petals present varieties similar to those of leaves. Thus the margin is either entire or divided into lobes or teeth. These teeth sometimes form a regular fringe round the margin, and the petal becomes *fimbriated*, as in the pink; or *laciniated*, as in *Lychnis Flos-cuculi*; or *crested*, as in *Polygala*. Sometimes the petal becomes pinnatifid, as in *Schizopetalum*. The median vein is occasionally prolonged beyond the summit of the petals in the form of a long process, as in *Strophanthus hispidus*, where it extends for 7 in.; or the prolonged extremity is folded downwards or inflexed, as in Umbelliferae, so that the apex approaches the base. The limb of the petal may be flat or concave, or hollowed like a boat. In Hellebore the petals become folded in a tubular form, resembling a horn (fig. 56); in aconite (fig. 58) some of the petals resemble a hollow-curved horn, supported on a grooved stalk; while in columbine, violet (fig. 57), snapdragon and *Centranthus*, one or all of them are prolonged in the form of a spur, and are *calcarate*. In *Valeriana*, *Antirrhinum* and *Corydalis*, the spur is very short, and the corolla or petal is said to be *gibbous*, or *saccate*, at the base. These spurs, tubes and sacs serve as receptacles for the secretion or containing of nectar.

A corolla is *dipetalous*, *tripetalous*, *tetrapetalous* or *pentapetalous* according as it has two, three, four or five separate petals. The general name of *polypetalous* is given to corollas having separate petals, while *monopetalous*, *gamopetalous* or *sympetalous* is applied to those in which the petals are united. This union generally takes place at the base, and extends more or less towards the apex; in *Phyteuma* the petals are united at their apices also. In some polypetalous corollas, as that of the vine, the petals are separate at the base and adhere by the apices. When the petals are equal as regards their development and size, the corolla is *regular*; when unequal, it is *irregular*. When a corolla is gamopetalous it usually happens that the lower portion forms a tube, while the upper parts are either free or partially united, so as to form a common limb, the point of union of the two portions being the *throat*, which often exhibits a distinct constriction or dilatation. The number of parts forming such a corolla can be determined by the divisions, whether existing as teeth, crenations, fissures or partitions, or if, as rarely happens, the corolla is entire, by the venation. The union may be equal among the parts, or some may unite more than others.

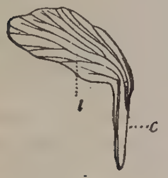

FIG. 54.

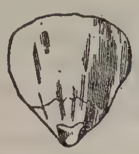

FIG. 55.

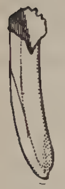

FIG. 56.

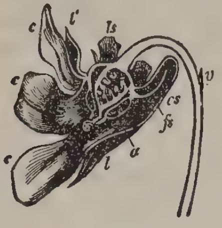

FIG. 57.

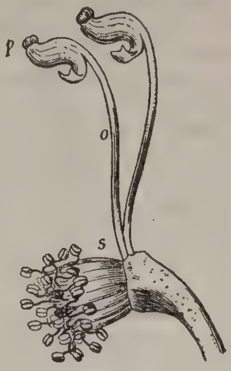

FIG. 58.

FIG. 54.—Unguiculate or clawed petal of Wallflower (*Cheiranthus Cheiri*). *c*, The claw or unguis; *l*, the blade or lamina.

FIG. 55.—Petal of Crowfoot (*Ranunculus*), without a claw, and thus resembling a sessile leaf. At the base of the petal a nectariferous scale is seen.

FIG. 56.—Tubular petal of Hellebore (*Helleborus*).

FIG. 57.—Pansy (*Viola tricolor*). Longitudinal section of flower; *v*, bracteole on the peduncle; *l*, sepals; *ls*, appendage of sepal; *c*, petals; *cs*, spur of the lower petals; *fs*, glandular appendage of the lower stamens; *a*, anthers. (After Sachs.)

(From Vines' *Students' Text-Book of Botany*, by permission of Swan Sonnenschein & Co.)

FIG. 58.—Part of the flower of Aconite (*Aconitum Napellus*), showing two irregular horn-like petals (*p*) supported on grooved stalks (*o*). These serve as nectaries. *s*, the whorl of stamens inserted on the thalamus and surrounding the pistil.

Amongst regular polypetalous corollas may be noticed the *rosaceous* corolla (fig. 59), in which there are five spreading petals, having no claws, and arranged as in the rose, strawberry and *Potentilla*; the *caryophyllaceous* corolla, in which there are five petals with long, narrow, tapering claws, as in many of the pink tribe; the *cruciform*, having four petals, often unguiculate, placed opposite in the form of a cross, as seen in wallflower, and in other plants called *cruciferous*. Of irregular polypetalous corollas the most marked is the *papilionaceous* (fig. 40), in which there are five petals:—one superior (posterior), *st*, placed next to the axis, usually larger than the rest, called the *vexillum* or *standard*; two lateral, *a*, the *alae* or wings; two inferior (anterior), partially or completely covered by the alae, and often united slightly by their lower margins, so as to form a single keel-like piece, *car*, called *carina*, or keel, which embraces the essential organs. This form of corolla is characteristic of British leguminous plants.

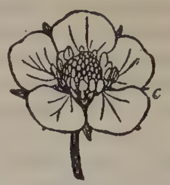

FIG. 59.—Rosaceous corolla (*c*) of the Strawberry (*Fragaria vesca*), composed of five petals without claws.

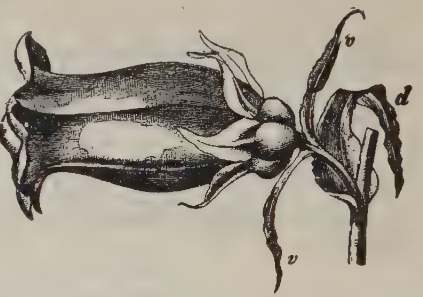

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FIG. 60.—Flower of *Campanula medium*; *d*, bract; *v*, bracteoles.

Regular gamopetalous corollas are sometimes *campanulate* or *bell-shaped*, as in (*Campanula*) (fig. 60); *infundibuliform* or *funnel-shaped*, when the tube is like an inverted cone, and the limb becomes more expanded at the apex, as in tobacco; *hypocrateriform* or *salver-shaped*, when there is a straight tube surmounted by a flat spreading limb, as in primula (fig. 61); *tubular*, having a long cylindrical tube, appearing continuous with the limb, as in *Spigelia* and comfrey; *rotate* or *wheel-shaped*, when the tube is very short, and the limb flat and spreading, as in forget-me-not, *Myosotis* (when the divisions of the rotate corolla are very acute, as in *Galium*, it is sometimes called *stellate* or *star-like*); *urceolate* or *urn-shaped*, when there is scarcely any limb, and the tube is narrow at both ends, and expanded in the middle, as in bell-heath (*Erica cinerea*). Some of these forms may become irregular in consequence of certain parts being more developed than others. Thus, in *Veronica*, the rotate corolla has one division much smaller than the rest, and in foxglove (*Digitalis*) there is a slightly irregular companulate corolla. Of irregular gamopetalous corollas there may be mentioned the *labiate* or *lipped* (fig. 62), having two divisions of the limb in the form of lips (the upper one, *u*, composed usually of two united petals, and the lower, *l*, of three), separated by a gap. In such cases the tube varies in length, and the parts in their union follow the reverse order of what occurs in the calyx, where two sepals are united in the lower lip and three in the upper. When the upper lip of a labiate corolla is much arched, and the lips separated by a distinct gap, it is called *ringent* (fig. 62). The labiate corolla characterizes the natural order Labiatae. When the lower lip is pressed against the upper, so as to leave only a chink between them, the corolla is said to be *personate*, as in snapdragon, and some other Scrophulariaceae. In some corollas the two lips become hollowed out in a remarkable manner, as in calceolaria, assuming a slipper-like appearance, similar to what occurs in the labellum of some orchids, as *Cypripedium*. When a tubular corolla is split in such a way as to form a strap-like process on one side with several tooth-like projections at its apex, it becomes *ligulate* or *strap-shaped* (fig. 63). This corolla occurs in many composite plants, as in the florets of dandelion, daisy and chicory. The number of divisions at the apex indicates the number of united petals, some of which, however, may be abortive. Occasionally some of the petals become more united than others, and then the corolla assumes a *bilabiate* or *two-lipped* form, as seen in the division of Compositae called Labiatiflorae.

Petals are sometimes suppressed, and sometimes the whole corolla is absent. In *Amorpha* and *Afzelia* the corolla is reduced to a single petal, and in some other Leguminous plants it is entirely wanting. In the natural order Ranunculaceae, some genera, such as *Ranunculus*, globe-flower and paeony, have both calyx and corolla, while others, such as clematis, anemone and *Caltha*, have only a coloured calyx. Flowers become double by the multiplication of the parts of the corolline whorl; this arises in general from a metamorphosis of the stamens.

Certain structures occur on the petals of some flowers, which received in former days the name of *nectaries*. The term nectary was very vaguely applied by Linnaeus to any part of the flower which presented an unusual aspect, as the crown (*corona*) of narcissus, the fringes of the Passion-flower, &c. If the name is retained it ought properly to include only those parts which secrete a honey-like substance, as the glandular depression at the base of the perianth of the fritillary, or on the petal of *Ranunculus* (fig. 55), or on the stamens of Rutaceae. The honey secreted by flowers attracts insects, which, by conveying the pollen to the stigma, effect fertilization. The horn-like nectaries under the galeate sepal of aconite (fig. 58) are modified petals, so also are the tubular nectaries of hellebore (fig. 56). Other modifications of some part of the flower, especially of the corolla and stamens, are produced either by degeneration or outgrowth, or by *chorisis*, or *deduplication*. Of this nature are the scales on the petals in *Lychnis*, *Silene* and *Cynoglossum*, which are formed in the same way as the ligules of grasses. In other cases, as in Samolus, the scales are alternate with the petals, and may represent altered stamens. In *Narcissus* the appendages are united to form a crown, consisting of a membrane similar to that which unites the stamens in *Pancratium*. It is sometimes difficult to say whether these structures are to be referred to the corolline or to the staminal row.

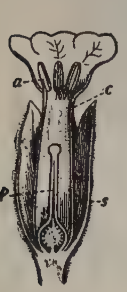

FIG. 61.

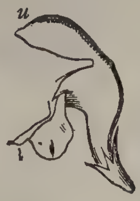

FIG. 62.

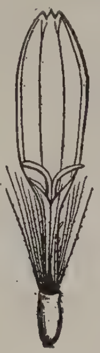

FIG. 63.

FIG. 61.—Flower of cowslip (*Primula veris*) cut vertically. *s*, Sepals joined to form a gamosepalous calyx; *c*, corolla consisting of tube and spreading limb; *a*, stamens springing from the mouth of the tube; *p*, pistil.

FIG. 62.—Irregular gamopetalous labiate corolla of the Dead-nettle (*Lamium album*). The upper lip *u* is composed of two petals united, the lower lip (*l*) of three. Between the two lips there is a gap. The throat is the part where the tube and the labiate limb join. From the arching of the upper lip this corolla is called ringent.

FIG. 63.—Irregular gamopetalous ligulate flower of Ragwort (*Senecio*). It is a tubular floret, split down on one side, with the united petals forming a straplike projection. The lines on the flat portion indicate the divisions of the five petals. From the tubular portion below, the bifid style projects slightly.

Petals are attached to the axis usually by a narrow base. When this attachment takes place by an articulation, the petals fall off either immediately after expansion (*caducous*) or after fertilization (*deciduous*). A corolla which is continuous with the axis and not articulated to it, as in campanula and heaths, may be persistent, and remain in a withered or marcescent state while the fruit is ripening. A gamopetalous corolla falls off in one piece; but sometimes the base of the corolla remains persistent, as in *Rhinanthus* and *Orobanche*.

The *stamens* and the *pistil* are sometimes spoken of as the essential organs of the flower, as the presence of both is required in order that perfect seed may be produced. As with few exceptions the stamen represents a leaf which has been specially developed to bear the pollen or microspores, it is spoken of in comparative morphology as a microsporophyll; similarly the carpels which make up the pistil are the megasporophylls (see ANGIOSPERMS). *Hermaphrodite* or *bisexual* flowers are those in which both these organs are found; *unisexual* or *diclinous* are those in which only one of these organs appears,—those bearing stamens only, being *staminiferous* or "male"; those having the pistil only, *pistilliferous* or "female." But even in plants with hermaphrodite flowers self-fertilization is often provided against by the structure of the parts or by the period of ripening of the organs. For instance, in *Primula* and *Linum* some flowers have long stamens and a pistil with a short style, the others having short stamens and a pistil with a long style. The former occur in the so-called thrum-eyed primroses (fig. 61), the latter in the "pin-eyed." Such plants are called *dimorphic*. Other plants are *trimorphic*, as species of *Lythrum*, and proper fertilization is only effected by combination of parts of equal length. In some plants the stamens are perfected before the pistil; these are called *proterandrous*, as in *Ranunculus repens*, *Silene maritima*, *Zea Mays*. In other plants, but more rarely, the pistil is perfected before the stamens, as in *Potentilla argentea*, *Plantago major*, *Coix Lachryma*, and they are termed *proterogynous*. Plants in which proterandry or proterogyny occurs are called *dichogamous*. When in the same plant there are unisexual flowers, both male and female, the plant is said to be *monoecious*, as in the hazel and castor-oil plant. When the male and female flowers of a species are found on separate plants, the term *dioecious* is applied, as in *Mercurialis* and hemp; and when a species has male, female and hermaphrodite flowers on the same or different plants, as in *Parietaria*, it is *polygamous*.

Stamens.

The stamens arise from the thalamus or torus within the petals, with which they generally alternate, forming one or more whorls, which collectively constitute the *androecium*. Their normal position is below the pistil, and when they are so placed (fig. 64, *a*) upon the thalamus they are *hypogynous*. Sometimes they become adherent to the petals, or are *epipetalous*, and the insertion of both is looked upon as similar, so that they are still hypogynous, provided they are independent of the calyx and the pistil. In other cases they are perigynous or epigynous (fig. 65). Numerous intermediate forms occur, especially amongst Saxifragaceae, where the parts are *half superior* or *half inferior*. Where the stamens become adherent to the pistil so as to form a column, the flowers are said to be *gynandrous*, as in *Aristolochia* (fig. 66). These arrangements of parts are of great importance in classification. The stamens vary in number from one to many hundreds. In acyclic flowers there is often a gradual transition from petals to stamens, as in the white water-lily (fig. 31). When flowers become double by cultivation, the stamens are converted into petals, as in the paeony, camellia, rose, &c. When there is only one whorl the stamens are usually equal in number to the sepals or petals, and are arranged opposite to the former, and alternate with the latter. The flower is then *isostemonous*. When the stamens are not equal in number to the sepals or petals, the flower is *anisostemonous*. When there is more than one whorl of stamens, then the parts of each successive whorl alternate with those of the whorl preceding it. The staminal row is more liable to multiplication of parts than the outer whorls. A flower with a single row of stamens is *haplostemonous*. If the stamens are double the sepals or petals as regards number, the flower is *diplostemonous*; if more than double, *polystemonous*. The additional rows of

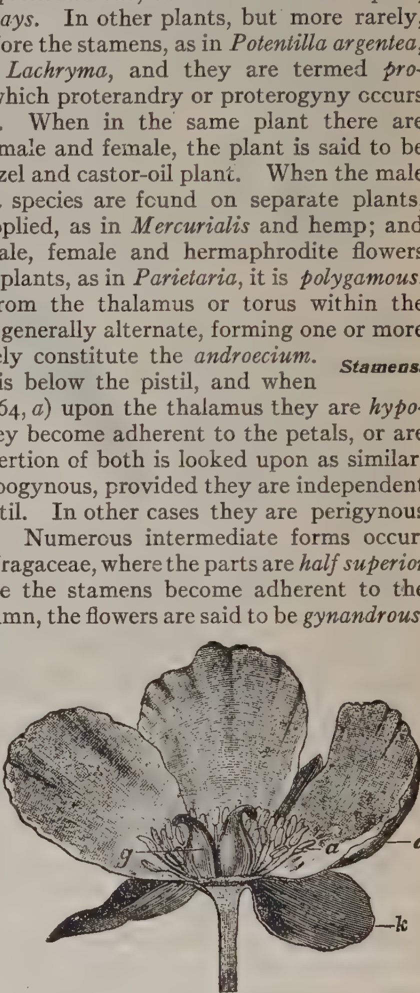

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FIG. 64.—Flower of *Paeonia peregrina*, in longitudinal section. *k*, Sepal; *c*, petal; *a*, stamens; *g*, pistil. ($\frac{1}{2}$ nat. size.)

stamens may be developed in the usual centripetal (acropetal) order, as in Rhamnaceae; or they may be interposed between the pre-existing ones or be placed outside them, *i.e.* develop centrifugally (basipetally), as in geranium and oxalis, when the flower is said to be *obdiplostemonous*. When the stamens are fewer than twenty they are said to be *definite*; when above twenty they are *indefinite*, and are represented by the symbol ∞. The number of stamens is indicated by the Greek numerals prefixed to the term *androus*; thus a flower with one stamen is *monandrous*, with two, three, four, five, six or many stamens, di-, tri-, tetr-, pent-, hex- or polyandrous, respectively.

The function of the stamen is the development and distribution of the pollen. The stamen usually consists of two parts, a contracted portion, often thread-like, termed the *filament* (fig. 25 *f*), and a broader portion, usually of two lobes, termed the *anther* (*a*), containing the powdery *pollen* (*p*), and supported upon the end of the filament. That portion of the filament in contact with the anther-lobes is termed the *connective*. If the anther is absent the stamen is abortive, and cannot perform its functions. The anther is developed before the filament, and when the latter is not produced, the anther is sessile, as in the mistletoe.

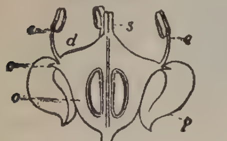

Fig. 65.—Flower of *Aralia* in vertical section. *c*, Calyx; *p*, petal; *e*, stamen; *s*, stigmas. The calyx, petals and stamens spring from above the ovary (*o*) in which two chambers are shown each with a pendulous ovule; *d*, disc between the stamens and stigmas.

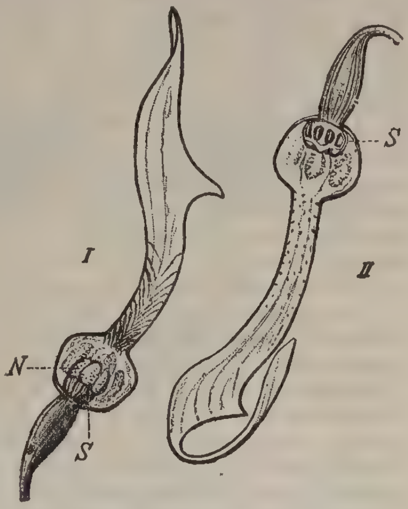

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Fig. 66.—Flowers of *Aristolochia Clematitis* cut through longitudinally. I. Young flower in which the stigma (*N*) is receptive and the stamens (*S*) have not yet opened; II. Older flower with the stamens (*S*) opened, the stigma withered, and the hairs on the corolla dried up.

The filament is usually, as its name imports, filiform or thread-like, and cylindrical, or slightly tapering towards its summit. It is often, however, thickened, compressed and flattened in various ways, becoming *petaloid* in *Canna*, *Marania*, water-lily (fig. 32); *subulate* or slightly broadened at the base and drawn out into a point like an awl, as in *Butomus umbellatus*; or *clavate*, that is, narrow below and broad above, as in *Thalictrum*. In some instances, as in *Tamarix gallica*, *Peganum Harmala*, and *Campanula*, the base of the filament is much dilated, and ends suddenly in a narrow thread-like portion. In these cases the base may give off lateral stipulary processes, as in *Allium* and *Alyssum calycinum*. The filament varies much in length and in firmness. The length sometimes bears a relation to that of the pistil, and to the position of the flower, whether erect or drooping. The filament is usually of sufficient solidity to support the anther in an erect position; but sometimes, as in grasses, and other wind-pollinated flowers, it is very delicate and hair-like, so that the anther is pendulous (fig. 105). The filament is generally continuous from one end to the other, but in some cases it is bent or jointed, becoming *geniculate*; at other times, as in the pellitory, it is spiral. It is colourless, or of different colours. Thus in fuchsia and *Poinciana*, it is red; in *Adamia* and *Tradescantia virginica*, blue; in *Oenothera* and *Ranunculus acris*, yellow.

Hairs, scales, teeth or processes of different kinds are sometimes developed on the filament. In spiderwort (*Tradescantia virginica*) the hairs are beautifully coloured, moniliform or necklace-like, and afford good objects for studying rotation of the protoplasm. Filaments are usually articulated to the thalamus or torus, and the stamens fall off after fertilization; but in *Campanula* and some other plants they are continuous with the torus, and the stamens remain persistent, although in a withered state. Changes are produced in the whorl of stamens by cohesion of the filaments to a greater or less extent, while the anthers remain free; thus, all the filaments of the androecium may unite, forming a tube round the pistil, or a central bundle when the pistil is abortive, the stamens becoming *monadelphous*, as occurs in plants of the Mallow tribe; or they may be arranged in two bundles, the stamens being *diadelphous*, as in *Polygala*, *Fumaria* and Pea; in this case the bundles may be equal or unequal. It frequently happens, especially in Papilionaceous flowers, that out of ten stamens nine are united by their filaments, while one (the posterior one) is free (fig. 68). When there are three or more bundles the stamens are *triadelphous*, as in *Hypericum aegyptiacum*, or *polyadelphous*, as in *Ricinus communis* (castor-oil). In some cases, as in papilionaceous flowers, the stamens cohere, having been originally separate, but in most cases each bundle is produced by the branching of a single stamen. When there are three stamens in a bundle we may conceive the lateral ones as of a stipulary nature. In Lauraceae there are perfect stamens, each having at the base of the filament two abortive stamens or staminodes, which may be analogous to stipules. Filaments sometimes are adherent to the pistil, forming a column (*gynostemium*), as in *Stylidium*, Asclepiadaceae, *Rafflesia*, and Aristolochiaceae (fig. 66); the flowers are then termed *gynandrous*.

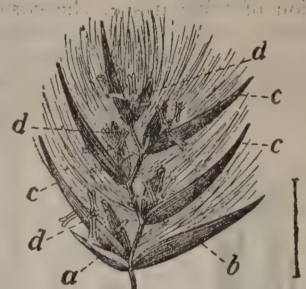

Fig. 67.—Spikelet of Reed (*Phragmites communis*) opened out. *a*, *b*, Barren glumes; *c*, fertile glumes, each enclosing one flower with its pale, *d*; the zigzag axis (*rhachilla*) bears long silky hairs.

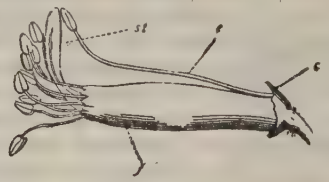

Fig. 68.

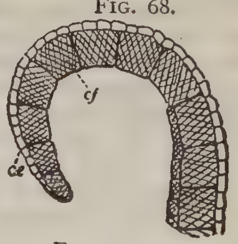

Fig. 69.

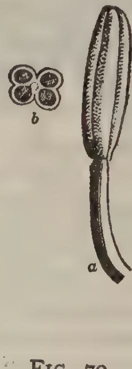

Fig. 70.

Fig. 68.—Stamens and pistil of Sweet Pea (*Lathyrus*). The stamens are diadelphous, nine of them being united by their filaments (*f*), while one of them (*e*) is free; *st*, stigma; *c*, calyx.

Fig. 69.—Portion of wall of anther of Wallflower (*Cheiranthus*). *ce*, Exothecium; *cf*, endothecium; highly magnified.

Fig. 70.—Quadrilocular or tetrathecal anther of the flowering Rush (*Butomus umbellatus*). The anther entire (*a*) with its filament; section of anther (*b*) showing the four loculi.

The anther.

The *anther* consists of lobes containing the minute powdery pollen grains, which, when mature, are discharged by a fissure or opening of some sort. There is a double covering of the anther—the outer, or *exothecium*, resembles the epidermis, and often presents stomata and projections of different kinds (fig. 69); the inner, or *endothecium*, is formed by a layer or layers of cellular tissue (fig. 69, *cf*), the cells of which have a spiral, annular, or reticulated thickening of the wall. The endothecium varies in thickness, generally becoming thinner towards the part where the anther opens, and there disappears entirely. The walls of the cells are frequently absorbed, so that when the anther attains maturity the fibres are alone left, and these by their elasticity assist in discharging the pollen. The anther is developed before the filament, and is always sessile in the first instance, and sometimes continues so. It appears at first as a simple cellular papilla of meristem, upon which an indication of two lobes soon appears. Upon these projections the rudiments of the pollen-sacs are then seen, usually four in number, two on each lobe. In each a differentiation takes place in the layers beneath the epidermis, by which an outer layer of small-celled tissue surrounds an inner portion of large cells. Those central cells are the mother-cells of the pollen, whilst the small-celled layer of tissue external to them becomes the endothecium, the exothecium being formed from the epidermal layer.

In the young state there are usually four pollen-sacs, two for each anther-lobe, and when these remain permanently complete it is a *quadrilocular* or *tetrathecal* anther (fig. 70). Sometimes, however, only two cavities remain in the anther, by union of the sacs in each lobe, in which case the anther is said to be *bilocular* or *dithecal*. Sometimes the anther has a single cavity, and becomes *unilocular*, or *monothecal*, or *dimidiate*, either by the disappearance of the partition between the two lobes, or by the abortion of one of its lobes, as in *Styphelia laeta* and *Althaea officinalis* (hollyhock). Occasionally there are numerous cavities in the anther, as in *Viscum* and *Rafflesia*. The form of the anther-lobes varies. They are generally of a more or less oval or elliptical form, or they may be globular, as in *Mercurialis annua*; at other times linear or clavate, curved, flexuose, or sinuose, as in bryony and gourd. According to the amount of union of the lobes and the unequal development of different parts of their surface an infinite variety of forms is produced. That part of the anther to which the filament is attached is the *back*, the opposite being the *face*. The division between the lobes is marked on the face of the anther by a groove or *furrow*, and there is usually on the face a *suture*, indicating the line of dehiscence. The suture is often towards one side in consequence of the valves being unequal. The stamens may cohere by their anthers, and become *syngenesious*, as in composite flowers, and in lobelia, jasione, &c.

The connective.

The anther-lobes are united to the *connective*, which is either continuous with the filament or articulated with it. When the filament is continuous with the connective, and is prolonged so that the anther-lobes appear to be united to it throughout their whole length, and lie in apposition to it and on both sides of it, the anther is said to be *adnate* or *adherent*; when the filament ends at the base of the anther, then the latter is *innate* or *erect*. In these cases the anther is to a greater or less degree fixed. When, however, the attachment is very narrow, and an articulation exists, the anthers are movable (*versatile*) and are easily turned by the wind, as in *Tritonia*, grasses (fig. 105), &c., where the filament is attached only to the middle of the connective. The connective may unite the anther-lobes completely or only partially. It is sometimes very short and is reduced to a mere point, so that the lobes are separate or free. At other times it is prolonged upwards beyond the lobes, assuming various forms, as in *Acalypha* and oleander; or it is extended backwards and downwards, as in violet (fig. 71), forming a nectar-secreting spur. In *Salvia officinalis* the connective is attached to the filament in a horizontal manner, so as to separate the two anther-lobes (fig. 72), one only of which contains pollen, the other being imperfectly developed and sterile. The connective is joined to the filament by a movable joint forming a lever which plays an important part in the pollination-mechanism. In *Stachys* the connective is expanded laterally, so as to unite the bases of the anther-lobes and bring them into a horizontal line.

Anther-dehiscence.

The opening or *dehiscence* of the anthers to discharge their contents takes place either by clefts, by valves, or by pores. When the anther-lobes are erect, the cleft is lengthwise along the line of the suture—*longitudinal dehiscence* (fig. 25). At other times the slit is horizontal, from the connective to the side, as in *Alchemilla arvensis* (fig. 73) and in *Lemna*; the dehiscence is then *transverse*. When the anther-lobes are rendered horizontal by the enlargement of the connective, then what is really longitudinal dehiscence may appear to be transverse. The cleft does not always proceed the whole length of the anther-lobe at once, but often for a time it extends only partially. In other instances the opening is confined to the base or apex, each loculament opening by a single pore, as in *Pyrola*, *Tetratheca juncea*, Rhododendron, *Vaccinium* and *Solanum* (fig. 74), where there are two, and *Poranthera*, where there are four; whilst in the mistletoe the anther has numerous pores for the discharge of the pollen. Another mode of dehiscence is the valvular, as in the barberry (fig. 75), where each lobe opens by a valve on the outer side of the suture, separately rolling up from base to apex; in some of the laurel tribe there are two such valves for each lobe, or four in all. In some Guttiferae, as *Hebradendron cambogioides* (the Ceylon gamboge plant), the anther opens by a lid separating from the apex (*circumscissile* dehiscence).

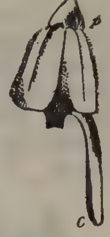

FIG. 71.

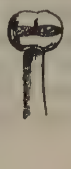

FIG. 73.

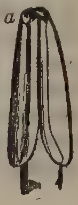

FIG. 74.

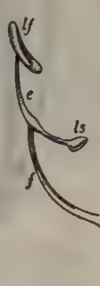

FIG. 72.

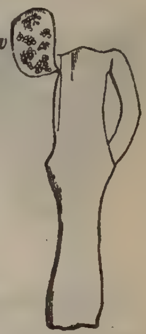

FIG. 75.

FIG. 71.—Two stamens of Pansy (*Viola tricolor*), with their two anther-lobes and the connectives (*p*) extending beyond them. One of the stamens has been deprived of its spur, the other shows its spur *c*.

FIG. 72.—Anther of *Salvia officinalis*. *lf*, fertile lobe full of pollen; *ls*, barren lobe without pollen; *e*, connective; *f*, filament.

FIG. 73.—Stamen of Lady's Mantle (*Alchemilla*), with the anther opening transversely.

FIG. 74.—Stamen of a species of Nightshade (*Solanum*), showing the divergence of the anther-lobes at the base, and the dehiscence by pores at the apex.

FIG. 75.—The stamen of the Barberry (*Berberis vulgaris*), showing one of the valves of the anther (*v*) curved upwards, bearing the pollen on its inner surface.

The anthers dehisce at different periods during the process of flowering; sometimes in the bud, but more commonly when the pistil is fully developed and the flower is expanded. They either dehisce simultaneously or in succession. In the latter case individual stamens may move in succession towards the pistil and discharge their contents, as in *Parnassia palustris*, or the outer or the inner stamens may first dehisce, following thus a centripetal or centrifugal order. These variations are intimately connected with the arrangements for transference of pollen. The anthers are called *introrse* when they dehisce by the surface next to the centre of the flower; they are *extrorse* when they dehisce by the outer surface; when they dehisce by the sides, as in *Iris* and some grasses, they are *laterally* dehiscent. Sometimes, from their versatile nature, anthers originally introrse become extrorse, as in the Passion-flower and *Oxalis*.

The usual colour of anthers is yellow, but they present a great variety in this respect. They are red in the peach, dark purple in the poppy and tulip, orange in *Eschscholtzia*, &c. The colour and appearance of the anthers often change after they have discharged their functions.

Stamens occasionally become sterile by the degeneration or non-development of the anthers, when they are known as *staminodia*, or rudimentary stamens. In *Scrophularia* the fifth stamen appears in the form of a scale; and in many Pentstemons it is reduced to a filament with hairs or a shrivelled membrane at the apex. In other cases, as in double flowers, the stamens are converted into petals; this is also probably the case with such plants as *Mesembryanthemum*, where there is a multiplication of petals in several rows. Sometimes, as in *Canna*, one of the anther-lobes becomes abortive, and a petaloid appendage is produced. Stamens vary in length as regards the corolla. Some are enclosed within the tube of the flower, as in *Cinchona* (*included*); others are *exserted*, or extend beyond the flower, as in *Littorella* or *Plantago*. Sometimes the stamens in the early state of the flower project beyond the petals, and in the progress of growth become included, as in *Geranium striatum*. Stamens also vary in their relative lengths. When there is more than one row or whorl in a flower, those on the outside are sometimes longest, as in many Rosaceae; at other times those in the interior are longest, as in *Luhea*. When the stamens are in two rows, those opposite the petals are usually shorter than those which alternate with the petals. It sometimes happens that a single stamen is longer than all the rest. A definite relation, as regards number, sometimes exists between the long and the short stamens. Thus, in some flowers the stamens are *didynamous*, having only four out of five stamens developed, and the two corresponding to the upper part of the flower longer than the two lateral ones. This occurs in Labiatae and Scrophulariaceae (fig. 76). Again, in other cases there are six stamens, whereof four long ones are arranged in pairs opposite to each other, and alternate with two isolated short ones (fig. 77), giving rise to *tetradynamous* flowers, as in Cruciferae. Stamens, as regards their direction, may be erect, turned inwards, outwards, or to one side. In the last-mentioned case they are called *declinate*, as in amaryllis, horse-chestnut and fraxinella.

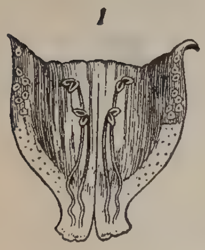

FIG. 76.—Corolla of foxglove (*Digitalis purpurea*), cut in order to show the didynamous stamens (two long and two short) which are attached to it.

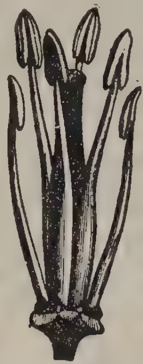

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FIG. 77.—Tetradynamous stamens (four long and two short) of wallflower (*Cheiranthus Cheiri*).

The pollen-grains or microspores contained in the anther consist of small cells, which are developed in the large thick-walled mother-cells formed in the interior of the pollen-sacs (microsporangia) of the young anther. These mother-cells are either separated from one another and float in the granular fluid which fills up the cavity of the pollen-sac, or are not so isolated. A division takes place, by which four cells are formed in each, the exact mode of division differing in dicotyledons and monocotyledons. These cells are the pollen-grains. They increase in size and acquire a cell-wall, which becomes differentiated into an outer cuticular layer, or *extine*, and an inner layer, or *intine*. Then the walls of the mother-cells are absorbed, and the pollen-grains float freely in the fluid of the pollen-sacs, which gradually disappears, and the mature grains form a powdery mass within the anther. They then either remain united in fours, or multiples of four, as in some acacias, *Periploca graeca* and *Inga anomala*, or separate into individual grains, which by degrees become mature pollen. Occasionally the membrane of the mother-cell is not completely absorbed, and traces of it are detected in a viscid matter surrounding the pollen-grains, as in Onagraceae. In orchidaceous plants the pollen-grains are united into masses, or *pollinia* (fig. 78), by means of viscid matter. In orchids each of the pollen-masses has a prolongation or stalk (*caudicle*) which adheres to a prolongation at the base of the anther (*rostellum*) by means of a viscid gland (*retinaculum*) which is either naked or covered. The term *clinandrium* is sometimes applied to the part of the column in orchids where the stamens are situated. In some orchids, as *Cypripedium*, the pollen has its ordinary character of separate grains. The number of pollinia varies; thus, in *Orchis* there are usually two, in *Cattleya* four, and in *Laelia* eight. The two pollinia in *Orchis Morio* contain each about 200 secondary smaller masses. These small masses, when bruised, divide into grains which are united in fours. In Asclepiadaceae the pollinia are usually united in pairs (fig. 79), belonging to two contiguous anther-lobes—each pollen-mass having a caudicular appendage, ending in a common gland, by means of which they are attached to a process of the stigma. The pollinia are also provided with an appendicular staminal covering (fig. 80). The extine is a firm membrane, which defines the figure of the pollen-grain, and gives colour to it. It is either smooth, or covered with numerous projections (fig. 81), granules, points or crested reticulations. The colour is generally yellow, and the surface is often covered with a viscid or oily matter. The intine is uniform in different kinds of pollen, thin and transparent, and possesses great power of extension. In some aquatics, as *Zostera*, *Zannichellia*, *Naias*, &c., only one covering exists.

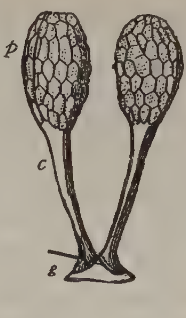


FIG. 78.

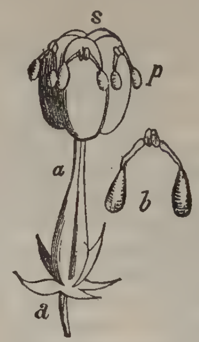


FIG. 79.

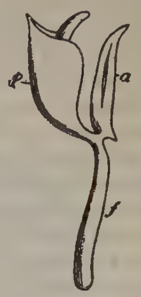


FIG. 80.

FIG. 78.—Pollinia, or pollen-masses, with their retinacula (*g*) or viscid matter attaching them at the base. The pollen masses (*p*) are supported on stalks or caudicles (*c*). These masses are easily detached by the agency of insects. Much enlarged.

FIG. 79.—Pistil of *Asclepias* (*a*) with pollen-masses (*p*) adhering to the stigma (*s*). *b*, pollen-masses, removed from the stigma, united by a gland-like body. Enlarged.

FIG. 80.—Stamen of *Asclepias*, showing filament *f*, anther *a*, and appendages *p*. Enlarged.

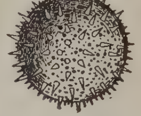
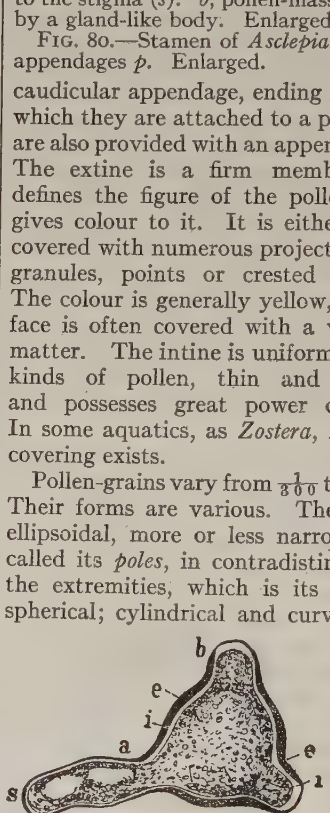


FIG. 81.—Pollen of Hollyhock (*Althaea rosea*), highly magnified.

Pollen-grains vary from $\frac{1}{300}$ to $\frac{1}{700}$ of an inch or less in diameter. Their forms are various. The most common form of grain is ellipsoidal, more or less narrow at the extremities, which are called its *poles*, in contradistinction to a line equidistant from the extremities, which is its equator. Pollen-grains are also spherical; cylindrical and curved, as in *Tradescantia virginica*; polyhedral in Dipsacaceae and Compositae; nearly triangular in section in Proteaceae and Onagraceae (fig. 82). The surface of the pollen-grain is either uniform and homogeneous, or it is marked by folds formed by thinnings of the membrane. There are also rounded portions of the membrane or pores visible in the pollen-grain; these vary in number from one to fifty, and through one



From Vines' *Students' Text-Book of Botany*, by permission of Swan Sonnenschein & Co.

FIG. 82.—Germinating pollen-grain of Epilobium (highly mag.) bearing a pollen-tube *s*; *e*, exine; *i*, intine; *abc*, the three spots where the exine is thicker in anticipation of the formation of the pollen-tube developed in this case at *a*.

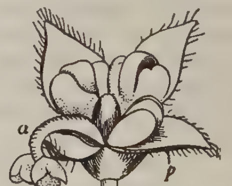


FIG. 83.—Male flower of Pellitory (*Parietaria officinalis*), having four stamens with incurved elastic filaments, and an abortive pistil in the centre. When the perianth (*p*) expands, the filaments are thrown out with force as at *a*, so as to scatter the pollen.

or more of them the pollen-tube is extended in germination of the spore. In Monocotyledons, as in grasses, there is often only one, while in Dicotyledons they number from three upwards; when numerous, the pores are either scattered irregularly, or in a regular order, frequently forming a circle round the equatorial surface. Sometimes at the place where they exist, the outer membrane, in place of being thin and transparent, is separated in the form of a lid, thus becoming *operculate*, as in the passion-flower and gourd. Within the pollen-grain is the granular protoplasm with some oily particles, and occasionally starch. Before leaving the pollen-sac a division takes place in the pollen-grain into a vegetative cell or cells, from which the tube is developed, and a generative cell, which ultimately divides to form the male cells (see ANGIOSPERMS and GYMNOSPERMS).

Pollination. When the pollen-grains are ripe, the anther dehisces and the pollen is shed. In order that fertilization may be effected the pollen must be conveyed to the stigma of the pistil. This process, termed *pollination* (see POLLINATION), is promoted in various ways,—the whole form and structure of the flower having relation to the process. In some plants, as *Kalmia* and Pellitory (fig. 83), the mere elasticity of the filaments is sufficient to effect this; in other plants pollination is effected by the wind, as in most of our forest trees, grasses, &c., and in such cases enormous quantities of pollen are produced. These plants are *anemophilous*. But the common agents for pollination are insects. To allure and attract them to visit the flower the odoriferous secretions and gay colours are developed, and the position and complicated structure of the parts of the flower are adapted to the perfect performance of the process. It is comparatively rare in hermaphrodite flowers for self-fertilization to occur, and the various forms of dichogamy, dimorphism and trimorphism are fitted to prevent this.

Disk. Under the term *disk* is included every structure intervening between the stamens and the pistil. It was to such structures that the name of *nectary* was applied by old authors. It presents great varieties of form, such as a ring, scales, glands, hairs, petaloid appendages, &c., and in the progress of growth it often contains saccharine matter, thus becoming truly nectariferous. The disk is frequently formed by degeneration or transformation of the staminal row. It may consist of processes rising from the torus, alternating with the stamens, and thus representing an abortive whorl; or its parts may be opposite to the stamens. In some flowers, as *Jatropha Curcas*, in which the stamens are not developed, their place is occupied by glandular bodies forming the disk. In Gesneraceae and Cruciferae the disk consists of tooth-like scales at the base of the stamens. The parts composing the disk sometimes unite and form a glandular ring, as in the orange; or they form a dark-red lamina covering the pistil, as in *Paeonia Moutan* (fig. 84); or a waxy lining of the hollow receptacle, as in the rose; or a swelling at the top of the ovary, as in Umbelliferae, in which the disk is said to be epigynous. The enlarged torus covering the ovary in *Nymphaea* (*Castalia*) and *Nelumbium* may be regarded as a form of disk.

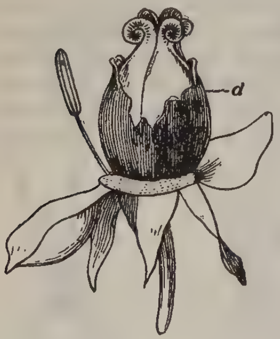


FIG. 84.—Flower of Tree Paeony (*Paeonia Moutan*), deprived of its corolla, and showing the disk in the form of a fleshy expansion (*d*) covering the ovary.

The pistil. The pistil or *gynoecium* occupies the centre or apex of the flower, and is surrounded by the stamens and floral envelopes when these are present. It constitutes the innermost whorl, which after flowering is changed into the fruit and contains the seeds. It consists essentially of two parts, a basal portion forming a chamber, the *ovary*, containing the ovules attached to a part called the *placenta*, and an upper receptive portion, the *stigma*, which is either seated on the ovary (*sessile*), as in the tulip and poppy, or is elevated on a stalk called the *style*, interposed between the ovary and stigma. The pistil consists of one or more modified leaves, the *carpels* (or *megasporophylls*). When a pistil consists of a single carpel it is *simple* or *monocarpellary* (fig. 85). When it is composed of several carpels, more or less united, it is *compound* or *polycarpellary* (fig. 86). In the first-mentioned case the terms carpel and pistil are synonymous. Each carpel has its own ovary, style (when present), and stigma, and may be regarded as formed by a folded leaf, the upper surface of which is turned inwards towards the axis, and the lower outwards, while from its margins are developed one or more *ovules*. This comparison is borne out by an examination of the flower of the double-flowering cherry. In it no fruit is produced, and the pistil consists merely of sessile leaves, the limb of each being green and folded, with a narrow prolongation upwards, as if from the midrib, and ending in a thickened portion. In *Cycas* the carpels are ordinary leaves, with ovules upon their margin.

A pistil is usually formed by more than one carpel. The carpels may be arranged either at the same or nearly the same height in a verticil, or at different heights in a spiral cycle. When they remain separate and distinct, thus showing at once the composition of the pistil, as in *Caltha*, *Ranunculus*, hellebore (fig. 86), and *Spiraea*, the term *apocarpous* is applied. Thus, in *Sedum* (fig. 22) the pistil consists of five verticillate carpels *o*, alternating with the stamens *e*. In magnolia and *Ranunculus* (fig. 89) the separate carpels are numerous and are arranged in a spiral cycle upon an elongated axis or receptacle. In the raspberry the carpels are on a conical receptacle; in the strawberry, on a swollen succulent one (fig. 87); and in the rose (fig. 88), on a hollow one. When the carpels are united, as in the pear, arbutus and chickweed, the pistil becomes *syncarpous*. The number of carpels in a pistil is indicated by the Greek numeral. A flower with a simple pistil is monogynous; with two carpels, digynous; with three carpels, trigynous, &c.

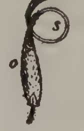


FIG. 85.

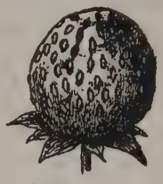
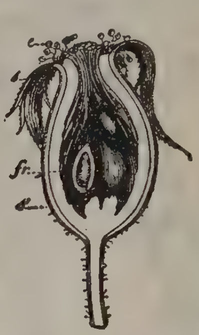


FIG. 87.



From Strasburger's *Lehrbuch der Botanik*, by permission of Gustav Fischer.

FIG. 88.

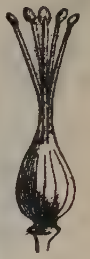


FIG. 90.

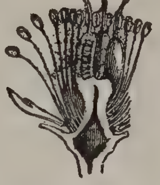


FIG. 86.

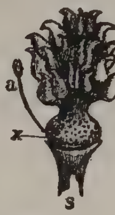


FIG. 89.

FIG. 85.—Pistil of Broom (*Cytisus*) consisting of ovary *o*, style *s*, and stigma *t*. It is formed by a single carpel.

FIG. 86.—Vertical section of the flower of Black Hellebore (*Helleborus niger*). The pistil is apocarpous, consisting of several distinct carpels, each with ovary, style and stigma. The stamens are indefinite, and are inserted below the pistil (hypogynous).

FIG. 87.—Fruit of the Strawberry (*Fragaria vesca*), consisting of an enlarged succulent receptacle, bearing on its surface the small dry seed-like fruits (achenes).

FIG. 88.—Fruit of *Rosa alba*, consisting of the fleshy hollowed axis *s′*, the persistent sepals *s*, and the carpels *fr*. The stamens (*c*) have withered. (After Duchartre.)

FIG. 89.—Pistil of *Ranunculus*. *x*, Receptacle with the points of insertion of the stamens *a*, most of which have been removed.

FIG. 90.—Syncarpous Pistil of Flax (*Linum*), consisting of five carpels, united by their ovaries, while their styles and stigmas are separate.

The union in a syncarpous pistil is not always complete; it may take place by the ovaries alone, while the styles and stigmas remain free (fig. 90), and in this case, when the ovaries form apparently a single body, the organ receives the name of *compound* ovary; or the union may take place by the ovaries and styles while the stigmas are disunited; or by the stigmas and the summit of the style only. Various intermediate states exist, such as partial union of the ovaries, as in the rue, where they coalesce at their base; and partial union of the styles, as in Malvaceae. The union is usually most complete at the base; but in Labiatae the styles are united throughout their length, and in Apocynaceae and Asclepiadaceae the stigmas only. When the union is incomplete, the number of the parts of a compound pistil may be determined by the number of styles and stigmas; when complete, the external venation, the grooves on the surface, and the internal divisions of the ovary indicate the number.

The placenta.

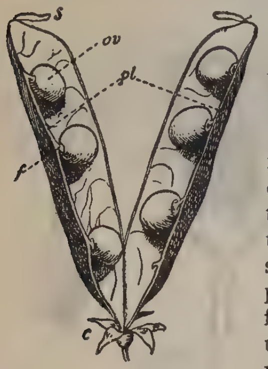


Fig. 91.—Pistil of Pea after fertilization of the ovules, developing to form the fruit. *f*, Funicle or stalk of ovule (*ov*); *pl*, placenta; *s*, withered style and stigma; *c*, persistent calyx.

The ovules are attached to the *placenta*, which consists of a mass of cellular tissue, through which the nourishing vessels pass to the ovule. The placenta is usually formed on the edges of the carpellary leaf (fig. 91)—*marginal*. In many cases, however, the placentas are formations from the axis (axile), and are not connected with the carpellary leaves. In marginal placentation the part of the carpel bearing the placenta is the *inner* or *ventral suture*, corresponding to the margin of the folded carpellary leaf, while the *outer* or *dorsal suture* corresponds to the midrib of the carpellary leaf. As the placenta is formed on each margin of the carpel it is essentially double. This is seen in cases where the margins of the carpel do not unite, but remain separate, and consequently two placentas are formed in place of one. When the pistil is formed by one carpel the inner margins unite and form usually a common marginal placenta, which may extend along the whole margin of the ovary as far as the base of the style (fig. 91), or may be confined to the base or apex only. When the pistil consists of several separate carpels, or is apocarpous, there are generally separate placentas at each of their margins. In a syncarpous pistil, on the other hand, the carpels are so united that the edges of each of the contiguous ones, by their union, form a *septum* or *dissepiment*, and the number of these septa consequently indicates the number of carpels in the compound pistil (fig. 92). When the dissepiments extend to the centre or axis, the ovary is divided into cavities or *cells*, and it may be *bilocular*, *trilocular* (fig. 92), *quadrilocular*, *quinquelocular*, or *multilocular*, according as it is formed by two, three, four, five or many carpels, each carpel corresponding to a single cell. In these cases the marginal placentas meet in the axis, and unite so as to form a single *central* one (figs. 92, 93), and the ovules appear in the central angle of the loculi. When the carpels in a syncarpous pistil do not fold inwards so that the placentas appear as projections on the walls of the ovary, then the ovary is *unilocular* (fig. 95) and th placentas are *parietal*, as in *Viola* (fig. 96). In these instance the placentas may be formed at the margin of the united contiguous leaves, so as to appear single, or the margins may not b united, each developing a placenta. Frequently the margins o the carpels, which fold in to the centre, split there into tw lamellae, each of which is curved outwards and projects into th loculament, dilating at the end into a placenta. This is well seen in Cucurbitaceae (fig. 97), *Pyrola*, &c. The carpellary leaves may fold inwards very slightly, or they may be applied in a valvate manner, merely touching at their margins, the placentas then being parietal (fig. 94), and appearing as lines or thickenings along the walls. Cases occur, however, in which the placentas are not connected with the walls of the ovary, and form what is called a *free central placenta* (fig. 98). This is seen in many of the Caryophyllaceae and Primulaceae (figs. 99, 100). In Caryophyllaceae, however, while the placenta is free in the centre, there are often traces found at the base of the ovary of the remains of septa, as if rupture had taken place, and, in rare instances, ovules are found on the margins of the carpels. But in Primulaceae no vestiges of septa or marginal ovules can be perceived at any period of growth; the placenta is always free, and rises in the centre of the ovary. Free central placentation, therefore, has been accounted for in two ways: either by supposing that the placentas in the early state were formed on the margins of

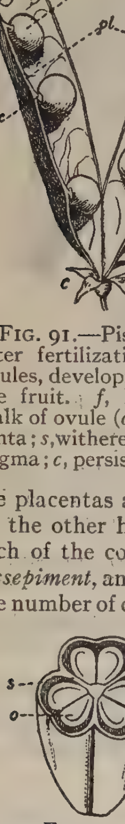


Fig. 92.

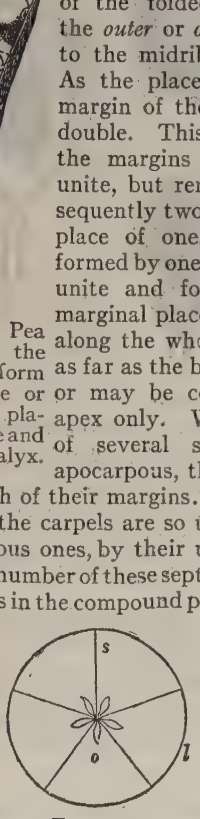


Fig. 93.

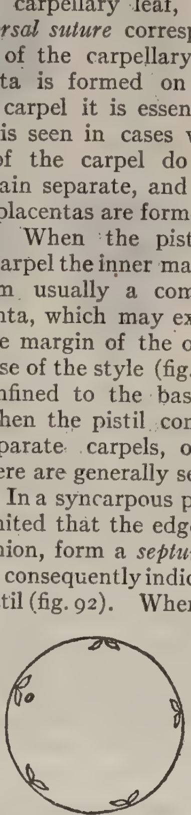


Fig. 94.

Fig. 92.—Trilocular ovary of the Lily (*Lilium*), cut transversely. *s*, Septum; *o*, ovules, which form a double row in the inner angle of each chamber. Enlarged.

Fig. 93.—Diagrammatic section of a quinquelocular ovary, composed of five carpels, the edges of which are folded inwards, and meet in the centre forming the septa, *s*. The ovules (*o*) are attached to a central placenta, formed by the union of the five ventral sutures. Dorsal suture, *l*.

Fig. 94.—Diagrammatic section of a five-carpellary ovary, in which the edges of the carpels, bearing the placentas and ovules *o*, are not folded inwards. The placentas are parietal, and the ovules appear sessile on the walls of the ovary. The ovary is unilocular.

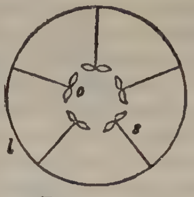


Fig. 95.

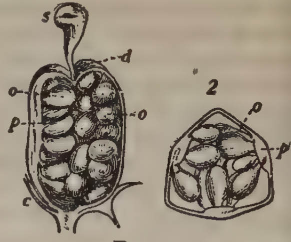


Fig. 96.

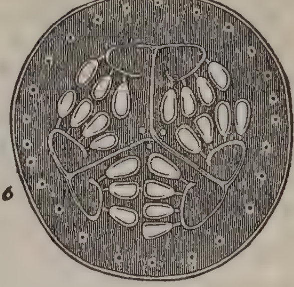


Fig. 97.

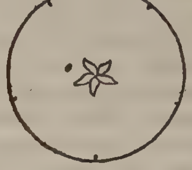


Fig. 98.

Fig. 95.—Diagrammatic section of a five-carpellary ovary, in which the septa (*s*) proceed inwards for a certain length, bearing the placentas and ovules (*o*). In this case the ovary is unilocular, and the placentas are parietal. Dorsal suture, *l*.

Fig. 96.—Pistil of Pansy (*Viola tricolor*), enlarged. 1, Vertical; 2, horizontal section; *c*, calyx; *d*, wall of ovary; *o*, ovules; *p*, placenta; *s*, stigma.

Fig. 97.—Transverse section of the fruit of the Melon (*Cucumis Melo*); showing the placentas with the seeds attached to them. The three carpels forming the pepo are separated by partitions. From the centre, processes go to circumference, ending in curved placentas bearing the ovules.

Fig. 98.—Diagrammatic section of a compound unilocular ovary, in which there are no indications of partitions. The ovules (*o*) are attached to a free central placenta, which has no connexion with the walls of the ovary.

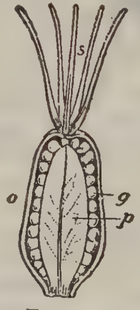


Fig. 99.

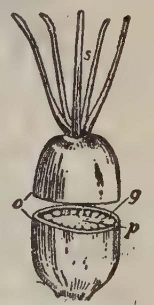


Fig. 100.

Fig. 99.—Pistil of *Cerastium hirsutum* cut vertically. *o*, Ovary; *p*, free central placenta; *g*, ovules; *s*, styles.

Fig. 100.—The same cut horizontally, and the halves separated so as to show the interior of the cavity of the ovary *o*, with the free central placenta *p*, covered with ovules *g*.

carpellary leaves, and that in the progress of development these leaves separated from them, leaving the placentas and ovules free in the centre; or by supposing that the placentas are not *marginal* but *axile* formations, produced by an elongation of the axis, and the carpels verticillate leaves, united together around the axis. The first of these views applies to Caryophyllaceae, the second to Primulaceae.

Occasionally, divisions take place in ovaries which are not formed by the edges of contiguous carpels. These are called *spurious dissepiments*. They are often horizontal, as in *Cathartocarpus Fistula*, where they consist of transverse cellular prolongations from the walls of the ovary, only developed after fertilization, and therefore more properly noticed under fruit. At other times they are vertical, as in *Datura*, where the ovary, in place of being two-celled, becomes four-celled; in Cruciferae, where the prolongation of the placentas forms a vertical partition; in *Astragalus* and *Thespesia*, where the dorsal suture is folded inwards; and in *Oxytropis*, where the ventral suture is folded inwards.

The ovary is usually of a more or less spherical or curved form, sometimes smooth and uniform on its surface, at other times hairy and grooved. The grooves usually indicate the divisions between the carpels and correspond to the dissepiments. The dorsal suture may be marked by a slight projection or by a superficial groove. When the ovary is situated on the centre of the receptacle, free from the other whorls, so that its base is above the insertion of the stamens, it is termed *superior*, as in *Lychnis*, *Primula* (fig. 61) and Peony (fig. 64) (see also fig. 28). When the margin of the receptacle is prolonged upwards, carrying with it the floral envelopes and staminal leaves, the basal portion of the ovary being formed by the receptacle, and the carpellary leaves alone closing in the apex, the ovary is *inferior*, as in pomegranate, aralia (fig. 65), gooseberry and fuchsia (see fig. 30). In some plants, as many Saxifragaceae, there are intermediate forms, in which the term *half-inferior* is applied to the ovary, whilst the floral whorls are *half-superior*.

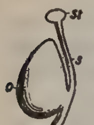


Fig. 101.

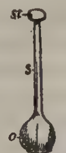


Fig. 102.

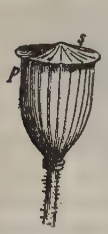


Fig. 104.

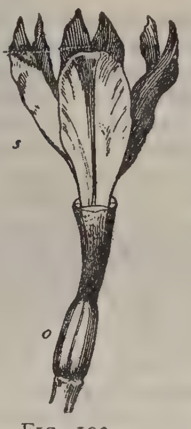


Fig. 103.

Fig. 101.—Carpel of Lady's-mantle (*Alchemilla*) with lateral style *s*; *o*, ovary, *st*, stigma. Enlarged.

Fig. 102.—Pistil of Primrose (*Primula*) composed of five carpels which are completely united; *o*, ovary; *s*, style; *st*, stigma. Enlarged.

Fig. 103.—Gynoecium of the Flower-de-Luce (*Iris*), consisting of an inferior ovary (*o*) and a style which divides into three petaloid segments (*s*), each bearing a stigma (*st*).

Fig. 104.—Capsule of Poppy, opening by pores (*p*), under the radiating peltate stigma (*s*).

The style.

The *style* proceeds from the summit of the carpel (fig. 102), and is traversed by a narrow canal, in which there are some loose projecting cells, a continuation of the placenta, constituting what is called conducting tissue, which ends in the stigma. This is particularly abundant when the pistil is ready for fertilization. In some cases, owing to more rapid growth of the dorsal side of the ovary, the style becomes *lateral* (fig. 101); this may so increase that the style appears to arise from near the base, as in the strawberry, or from the base, as in *Chrysobalanus Icaco*, when it is called *basilar*. In all these cases the style still indicates the organic apex of the ovary, although it may not be the apparent apex. When in a compound pistil the style of each carpel is thus displaced, it appears as if the ovary were depressed in the centre, and the style rising from the depression in the midst of the carpels seems to come from the torus. Such a style is *gynobasic*, and is well seen in Boraginaceae. The form of the style is usually cylindrical, more or less filiform and simple; sometimes it is grooved on one side, at other times it is flat, thick, angular, compressed and even petaloid, as in *Iris* (fig. 103) and *Canna*. In Goodeniaceae it ends in a cup-like expansion, enclosing the stigma. It sometimes bears hairs, which aid in the application of the pollen to the stigma, and are called *collecting hairs*, as in *Campanula*, and also in *Aster* and other Compositae. These hairs, during the upward growth of the style, come into contact with the already ripened pollen, and carry it up along with them, ready to be applied by insects to the mature stigma of other flowers. In *Vicia* and *Lobelia* the hairs frequently form a tuft below the stigma. The styles of a syncarpous pistil are either separate or united; when separate, they alternate with the septa; when united completely, the style is said to be *simple* (fig. 102). The style of a single carpel, or of each carpel of a compound pistil, may also be divided. Each division of the tricarpellary ovary of *Jatropha Curcas* has a *bifurcate* or forked style, and the ovary of *Emblica officinalis* has three styles, each of which is twice forked. The length of the style is determined by the relation which should subsist between the position of the stigma and that of the anthers, so as to allow the proper application of the pollen. The style is deciduous or persists after fertilization.

The stigma.

The *stigma* is the termination of the conducting tissue of the style, and is usually in direct communication with the placenta. It consists of loose cellular tissue, and secretes a viscid matter which detains the pollen, and causes it to germinate. This secreting portion is, strictly speaking, the true stigma, but the name is generally applied to all the divisions of the style on which the stigmatic apparatus is situated. The stigma alternates with the dissepiments of a syncarpous pistil, or, in other words, corresponds with the back of the loculaments; but in some cases it would appear that half the stigma of one carpel unites with half that of the contiguous carpel, and thus the stigma is opposite the dissepiments, that is, alternates with the loculaments, as in the poppy.

The divisions of the stigma mark the number of carpels which compose the pistil. Thus in *Campanula* a five-cleft stigma indicates five carpels; in Bignoniaceae, Scrophulariaceae and Acanthaceae, the two-lobed or bilamellar stigma indicates a bilocular ovary. Sometimes, however, as in Gramineae, the stigma of a single carpel divides. Its position may be terminal or lateral. In *Iris* it is situated on a cleft on the back of the petaloid divisions of the style (fig. 103). Some stigmas, as those of *Mimulus*, present sensitive flattened laminae, which close when touched. The stigma presents various forms. It may be globular, as in *Mirabilis Jalapa*; orbicular, as in *Arbutus Andrachne*; umbrella-like, as in *Sarracenia*, where, however, the proper stigmatic surface is beneath the angles of the large expansion of the apex of the style; ovoid, as in fuchsia; hemispherical; polyhedral; radiating, as in the poppy (fig. 104), where the true stigmatic rays are attached to a sort of *peltate* or shield-like body, which may represent depressed or flattened styles; *cucullate*, *i.e.* covered by a hood, in calabar bean. The lobes of a stigma are flat and pointed as in *Mimulus* and *Bignonia*, fleshy and blunt, smooth or granular, or they are feathery, as in many grasses (fig. 105) and other wind-pollinated flowers. In Orchidaceae the stigma is situated on the anterior surface of the column beneath the anther. In Asclepiadaceae the stigmas are united to the face of the anthers, and along with them form a solid mass.

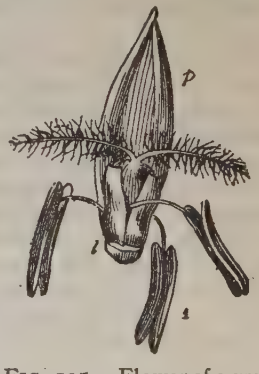
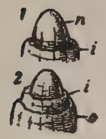


Fig. 105.—Flower of a grass with glumes removed, showing three stamens and two feathery styles. *p*, Pale; *l*, lodicules. Enlarged.

The ovule is attached to the placenta, and destined to become the seed. Ovules are most usually produced on the margins of

The ovule.

the carpellary leaves, but are also formed over the whole surface of the leaf, as in *Butomus*. In other instances they rise from the floral axis itself, either terminal, as in Polygonaceae and Piperaceae, or lateral, as in Primulaceae and Compositae. The ovule is usually contained in an ovary, and all plants in which the ovule is so enclosed are termed *angiospermous*; but in Coniferae and Cycadaceae it has no proper ovarian covering, and is called naked, these orders being denominated *gymnospermous*. In *Cycas* the altered leaf, upon the margin of which the ovule is produced, and the peltate scales, from which they are pendulous in *Zamia*, are regarded by all botanists as carpellary leaves. As for the Coniferae great discussion has arisen regarding the morphology of parts in many genera. The carpellary leaves are sometimes united in such a way as to leave an opening at the apex of the pistil, so that the ovules are exposed, as in mignonette. In *Leontice thalictroides* (Blue Cohosh), species of *Ophiopogon*, *Peliosanthes* and *Stateria*, the ovary ruptures immediately after flowering, and the ovules are exposed; and in species of *Cuphea* the placenta ultimately bursts through the ovary and corolla, and becomes erect, bearing the exposed ovules. The ovule is attached to the placenta either directly, when it is *sessile*, or by means of a prolongation *funicle* (fig. 110, *f*). This cord sometimes becomes much elongated after fertilization. The part by which the ovule is attached to the placenta or cord is its *base* or *hilum*, the opposite extremity being its *apex*. The latter is frequently turned round in such a way as to approach the base. The ovule is sometimes embedded in the placenta, as in *Hydnora*.



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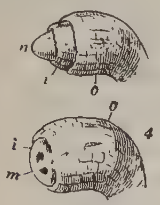


FIG. 107.

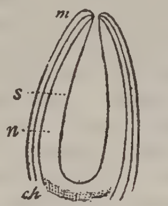


FIG. 108.

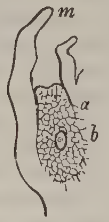


FIG. 109.

FIGS. 106 and 107.—Successive stages in the development of an ovule. *n*, Nucellus; *i*, inner; *o*, outer integument in section; *m*, micropyle.

FIG. 108.—Orthotropous ovule of *Polygonum* in section, showing the embryo-sac *s*, in the nucellus *n*, the different ovular coverings, the base of the nucellus or chalaza *ch*, and the apex of the ovule with its micropyle *m*.

FIG. 109.—Vertical section of the ovule of the Austrian Pine (*Pinus austriaca*), showing the nucellus *a*, consisting of delicate cellular tissue containing deep in its substance an embryo-sac *b*. The micropyle *m* is very wide.

The ovule appears at first as a small cellular projection from the placenta. The cells multiply until they assume a more or less enlarged ovate form constituting what has been called the *nucellus* (fig. 106, *n*), or central cellular mass of the ovule. This nucellus may remain naked, and alone form the ovule, as in some orders of parasitic plants such as Balanophoraceae, Santalaceae, &c.; but in most plants it becomes surrounded by certain coverings or integuments during its development. These appear first in the form of cellular rings at the base of the nucellus, which gradually spread over its surface (figs. 106, 107). In some cases only one covering is formed, especially amongst gamopetalous dicotyledons, as in Compositae, Campanulaceae, also in walnut, &c. But usually besides the single covering another is developed subsequently (fig. 106, *o*), which gradually extends over that first formed, and ultimately covers it completely, except at the apex. There are thus two integuments to the nucellus, an outer and an inner. The integuments do not completely invest the apex of the nucellus, but an opening termed the *micropyle* is left. The micropyle indicates the organic apex of the ovule. A single cell of the nucellus enlarges greatly to form the *embryo-sac* or megaspore (fig. 108, *s*). This embryo-sac increases in size, gradually supplanting the cellular tissue of the nucellus until it is surrounded only by a thin layer of it; or it may actually extend at the apex beyond it, as in *Phaseolu* and *Alsine media*; or it may pass into the micropyle, as i *Santalum*. In Gymnosperms it usually remains deep in th nucellus and surrounded by a thick mass of cellular tissue (fig 109). For an account of the further development of the megaspore, and the formation of the egg-cell, from which after fertilization is formed the embryo, see GYMNOSPERMS and ANGIOSPERMS.

The point where the integuments are united to the base of the nucellus is called the *chalaza* (figs. 111, 112). This is often coloured, is of a denser texture than the surrounding tissue, and is traversed by fibro-vascular bundles, which pass from the placenta to nourish the ovule.

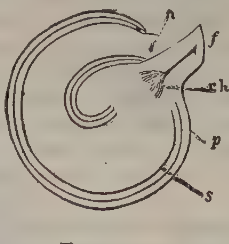


FIG. 110.

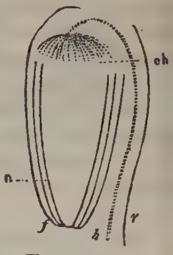


FIG. 111.

FIG. 110.—Campylotropous ovule of wall-flower (*Cheiranthus*), showing the funicle *f*, which attaches the ovule to the placenta; *p*, the outer, *s*, the inner coat, *n*, the nucellus, *ch*, the chalaza. The ovule is curved upon itself, so that the micropyle is near the funicle.

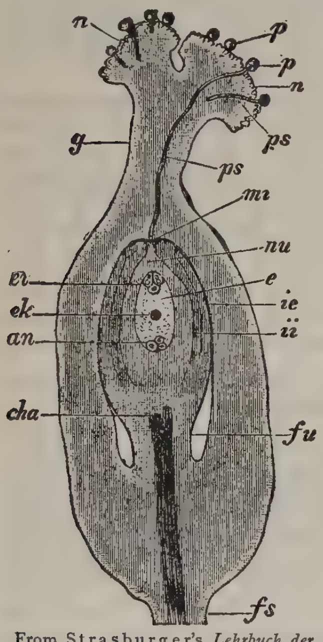
FIG. 111.—Anatropous ovule of Dandelion (*Taraxacum*), *n*, nucellus, which is inverted, so that the chalaza *ch*, is removed from the base or hilum *h*, while the micropyle *f* is near the base. The connexion between the base of the ovule and the base of the nucellus is kept up by means of the raphe *r*.

When the ovule is so developed that the chalaza is at the hilum (next the placenta), and the micropyle is at the opposite extremity, there being a short funicle, the ovule is *orthotropous*. This form is well seen in Polygonaceae (fig. 112), Cistaceae, and most gymnosperms. In such an ovule a straight line drawn from the hilum to the micropyle passes along the axis of the ovule. Where, by more rapid growth on one side than on the other, the nucellus, together with the integuments, is curved upon itself, so that the micropyle approaches the hilum, and ultimately is placed close to it, while the chalaza is at the hilum, the ovule is *campylotropous* (fig. 110). Curved ovules are found in Cruciferae, and Caryophyllaceae. The inverted or *anatropous* ovule (fig. 111) is the commonest form amongst angiosperms. In this ovule the apex with the micropyle is turned towards the point of attachment of the funicle to the placenta, the chalaza being situated at the opposite extremity; and the funicle, which runs along the side usually next the placenta, coalesces with the ovule and constitutes the *raphe* (*r*), which often forms a ridge. The anatropous ovule arises from the placenta as a straight or only slightly curved cellular process, and as it grows, gradually becomes inverted, curving from the point of origin of the integuments (cf. figs. 106, 107). As the first integument grows round it, the amount of inversion increases, and the funicle becomes adherent to the side of the nucellus. Then if a second integument be formed it covers all the free part of the ovule, but does not form on the side to which the raphe is adherent. These may be taken as the three types of ovule; but there are various intermediate forms, such as *semi-anatropous* and others.

The position of the ovule relative to the ovary varies. When there is a single ovule, with its axis vertical, it may be attached to the placenta at the base of the ovary (*basal placenta*), and is then *erect*, as in Polygonaceae and Compositae; or it may be inserted a little above the base, on a parietal placenta, with its apex upwards, and then is *ascending*, as in *Parietaria*. It may hang from an apicilar placenta at the summit of the ovary, its apex being directed downwards, and is *inverted* or *pendulous*, as in *Hippuris vulgaris*; or from a parietal placenta near the summit, and then is *suspended*, as in *Daphne Mezereum*, Polygalaceae and Euphorbiaceae. Sometimes a long funicle arises from a basal placenta, reaches the summit of the ovary, and there bending over suspends the ovule, as in *Armeria* (sea-pink); at other times the hilum appears to be in the middle, and the ovule becomes *horizontal*. When there are two ovules in the same cell, they may be either *collateral*, that is, placed side by side (fig. 92), or the one may be erect and the other inverted, as in some species of *Spiraea* and *Aesculus*; or they may be placed one above another, each directed similarly, as is the case in ovaries containing a moderate or definite number of ovules. Thus, in the ovary of Leguminous plants (fig. 91), the ovules, *o*, are attached to the extended marginal placenta, one above the other, forming usually two parallel rows corresponding to each margin of the carpel. When the ovules are *definite* (*i.e.* are uniform, and can be counted), it is usual to find their attachment so constant as to afford good characters for classification. When the ovules are very numerous (*indefinite*), while at the same time the placenta is not much developed, their position exhibits great variation, some being directed upwards, others downwards, others transversely; and their form is altered by pressure into various polyhedral shapes. In such cases it frequently happens that some of the ovules are arrested in their development and become abortive.

Fertilization.

When the pistil has reached a certain stage in growth it becomes ready for fertilization. Pollination having been effected, and the pollen-grain having reached the stigma in angiosperms, or the summit of the nucellus in gymnosperms, it is detained there, and the viscid secretion from the glands of the stigma in the former case, or from the nucellus in the latter, induce the protrusion of the intine as a pollen-tube through the pores of the grain. The pollen-tube or tubes pass down the canal (fig. 112), through the conducting tissue of the style when present, and reach the interior of the ovary in angiosperms, and then pass to the micropyle of the ovule, one pollen-tube going to each ovule. Sometimes the micropyle lies close to the base of the style, and then the pollen-tube enters it at once, but frequently it has to pass some distance into the ovary, being guided in its direction by various contrivances, as hairs, grooves, &c. In gymnosperms the pollen-grain resting on the apex of the nucellus sends out its pollen-tubes, which at once penetrate the nucellus (fig. 113). In angiosperms when the pollen-tube reaches the micropyle it passes down into the canal, and this portion of it increases considerably in size. Ultimately the apex of the tube comes in contact with the tip of the embryo-sac and perforates it. The male cells in the end of the pollen-tube are then transmitted to the embryo-sac and fertilization is effected. Consequent upon this, after a longer or shorter period, those changes commence in the embryo-sac which result in the formation of the embryo plant, the ovule also undergoing changes which convert it into the seed, and fit it for a protective covering, and a store of nutriment for the embryo. Nor are the effects of fertilization confined to the ovule; they extend to other parts of the plant. The ovary enlarges, and, with the seeds enclosed, constitutes the fruit, frequently incorporated with which are other parts of the flower, as receptacle, calyx, &c. In gymnosperms the pollen-tubes, having penetrated a certain distance down the tissue of the nucellus, are usually arrested in growth for a longer or shorter period, sometimes nearly a year. Fruit and seed are discussed in a separate article—FRUIT. (A. B. R.)



From Strasburger's *Lehrbuch der Botanik*, by permission of Gustav Fischer.

FIG. 112.—Ovary of *Polygonum Convolvulus* in longitudinal section during fertilization. (× 48.)

fs,	Stalk-like base of ovary.
fu,	Funicle.
cha,	Chalaza.
nu,	Nucellus.
mi,	Micropyle.
ii,	inner, *ie*, outer integument.
e,	Embryo-sac.
ek,	Nucleus of embryo-sac.
ei,	Egg-apparatus.
an,	Antipodal cells.
g,	Style.
n,	Stigma.
p,	Pollen-grains.
ps,	Pollen-tubes.

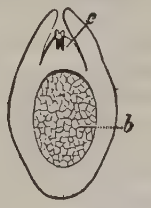


FIG. 113.—Vertical section of the ovule of the Scotch Fir (*Pinus sylvestris*) in May of the second year, showing the enlarged embryo-sac *b*, full of endosperm cells, and pollen-tubes *c*, penetrating the summit of the nucellus after the pollen has entered the large micropyle.

FLOWERS, ARTIFICIAL. Imitations of natural flowers are sometimes made for scientific purposes (as the collection of glass flowers at Harvard University, which illustrates the flora of the United States), but more often as articles of decoration and ornament. A large variety of materials have been used in their manufacture by different peoples at different times—painted linen and shavings of stained horn by the Egyptians, gold and silver by the Romans, rice-paper by the Chinese, silkworm cocoons in Italy, the plumage of highly coloured birds in South America, wax, small tinted shells, &c. At the beginning of the 18th century the French, who originally learnt the art from the Italians, made great advances in the accuracy of their reproductions, and towards the end of that century the Paris manufacturers enjoyed a world-wide reputation. About the same time the art was introduced into England by French refugees, and soon afterwards it spread also to America. The industry is now a highly specialized one and comprises a large number of operations performed by separate hands. Four main processes may be distinguished. The first consists of cutting up the various fabrics and materials employed into shapes suitable for forming the leaves, petals, &c.; this may be done by scissors, but more often stamps are employed which will cut through a dozen or more thicknesses at one blow. The veins of the leaves are next impressed by means of a die, and the petals are given their natural rounded forms by goffering irons of various shapes. The next step is to assemble the petals and other parts of the flower, which is built up from the centre outwards; and the fourth is to mount the flower on a stalk formed of brass or iron wire wrapped round with suitably coloured material, and to fasten on the leaves required to complete the spray.

FLOYD, JOHN (1572–1649), English Jesuit, was born in Cambridgeshire in 1572. He entered the Society of Jesus when at Rome in 1592 and is also known as Daniel à Jesu, Hermannus Loemelius, and George White, the names under which he published a score of controversial treatises. He had considerable fame both as a preacher and teacher, and was frequently arrested in England. His last years were spent at Louvain and he died at St Omer on the 15th of September 1649. His brother Edward Floyd was impeached and sentenced by the Commons in 1621 for speaking disparagingly of the elector palatine.

FLOYD, JOHN BUCHANAN (1807–1863), American politician, was born at Blacksburg, Virginia, on the 1st of June 1807. He was the son of John Floyd (1770–1837), a representative in Congress from 1817 to 1829 and governor of Virginia from 1830 to 1834. After graduating at South Carolina College in 1826, the son practised law in his native state and at Helena, Arkansas, and in 1839 settled in Washington county, Virginia, which in 1847–1849 and again in 1853 he represented in the state legislature. Meanwhile, from 1849 to 1852, he was governor of Virginia, in which position he recommended to the legislature the enactment of a law laying an import tax on the products of such states as refused to surrender fugitive slaves owned by Virginia masters. In March 1857 he became secretary of war in President Buchanan's cabinet, where his lack of administrative ability was soon apparent. In December 1860, on ascertaining that Floyd had honoured heavy drafts made by government contractors in anticipation of their earnings, the president requested his resignation. Several days later Floyd was indicted for malversation in office, but the indictment was overruled on technical grounds. There is no proof that he profited by these irregular transactions; in fact he went out of the office financially embarrassed. Though he had openly opposed secession before the election of Lincoln, his conduct after that event, especially after his breach with Buchanan, fell under suspicion, and he was accused of having sent large stores of government arms to Southern arsenals in anticipation of the Civil War. In the last days of his term he apparently had such an intention, but during the year 1860 the Southern States actually received less than their full quota of arms. After the secession of Virginia he was commissioned a brigadier-general in the Confederate service. He was first employed in some unsuccessful operations in western Virginia, and in February 1862 became commander of the Confederate forces at Fort Donelson, from which he fled with his second in command, General Gideon J. Pillow, on the night of February 18, leaving General Simon B. Buckner to surrender to General Grant. A fortnight later President Davis relieved him of his command. He died at Abingdon, Virginia, on the 26th of August 1863.

FLOYER, SIR JOHN (1649–1734), English physician and author, was born at Hinters in Staffordshire, and was educated at Oxford. He practised in Lichfield, and it was by his advice that Dr Johnson, when a child, was taken by his mother to be touched by Queen Anne for the king's evil on the 30th of March 1714. He died on the 1st of February 1734. Floyer was an advocate of cold bathing, introduced the practice of counting the rate of the pulse-beats, and gave an early account of the pathological changes in the lungs associated with emphysema.

His writings include:—Φαρμακο-Βάσανος: *or the Touchstone of Medicines, discovering the virtues of Vegetables, Minerals and Animals, by their Tastes and Smells* (2 vols., 1687); *The praeternatural State of animal Humours described by their sensible Qualities* (1696); *An Enquiry into the right Use and Abuses of the hot, cold and temperate Baths in England* (1697); *A Treatise of the Asthma* (1st ed., 1698); *The ancient* Ψυχρολουσία *revived, or an Essay to prove cold Bathing both safe and useful* (London, 1702; several editions 8vo; abridged, Manchester, 1844, 12mo); *The Physician's Pulse-watch* (1707–1710); *The Sibylline Oracles, translated from the best Greek copies, and compared with the sacred Prophecies* (1st ed., 1713); *Two Essays: the first Essay concerning the Creation, Aetherial Bodies, and Offices of good and bad Angels; the second Essay concerning the Mosaic System of the World* (Nottingham, 1717); *An Exposition of the Revelations* (1719); *An Essay to restore the Dipping of Infants in their Baptism* (1722); *Medicina Gerocomica, or the Galenic Art of preserving old Men's Healths* (1st ed., 1724); *A Comment on forty-two Histories described by Hippocrates* (1726).

FLUDD, or FLUD, **ROBERT** [ROBERTUS DE FLUCTIBUS] (1574–1637), English physician and mystical philosopher, the son of Sir Thomas Fludd, treasurer of war to Queen Elizabeth in France and the Low Countries, was born at Milgate, Kent. After studying at St John's College, Oxford, he travelled in Europe for six years, and became acquainted with the writings of Paracelsus. He subsequently returned to Oxford, became a member of Christ Church, took his medical degrees, and ultimately became a fellow of the College of Physicians. He practised in London with success, though it is said that he combined with purely medical treatment a good deal of faith-healing. Following Paracelsus, he endeavoured to form a system of philosophy founded on the identity of physical and spiritual truth. The universe and all created things proceed from God, who is the beginning, the end and the sum of all things, and to him they will return. The act of creation is the separation of the active principle (light) from the passive (darkness) in the bosom of the divine unity (God). The universe consists of three worlds; the archetypal (God), the macrocosm (the world), the microcosm (man). Man is the world in miniature, all the parts of both sympathetically correspond and act upon each other. It is possible for man (and even for the mineral and the plant) to undergo transformation and to win immortality. Fludd's system may be described as a materialistic pantheism, which, allegorically interpreted, he put forward as containing the real meaning of Christianity, revealed to Adam by God himself, handed down by tradition to Moses and the patriarchs, and revealed a second time by Christ. The opinions of Fludd had the honour of being refuted by Kepler, Gassendi and Mersenne. Though rapt in mystical speculation, Fludd was a man of varied attainments. He did not disdain scientific experiments, and is thought by some to be the original inventor of the barometer. He was an ardent defender of the Rosicrucians, and De Quincey considers him to have been the immediate, as J. V. Andreä was the remote, father of freemasonry. Fludd died on the 8th of September 1637.

See J. B. Craven, *Robert Fludd, the English Rosicrucian* (1902), where a list of his works is given; A. E. Waite, *The Real History of the Rosicrucians* (1887); De Quincey, *The Rosicrucians and Freemasons*; J. Hunt, *Religious Thought in England* (1870), i. 240 seq. His works were published in 6 vols., Oppenheim and Gouda, 1638.

FLÜGEL, GUSTAV LEBERECHT (1802–1870), German orientalist, was born at Bautzen on the 18th of February 1802. He received his early education at the gymnasium of his native town, and studied theology and philology at Leipzig. Gradually he devoted his attention chiefly to Oriental languages, which he studied in Vienna and Paris. In 1832 he became professor at the *Fürstenschule* of St Afra in Meissen, but ill-health compelled him to resign that office in 1850, and in 1851 he went to Vienna, where he was employed in cataloguing the Arabic, Turkish and Persian manuscripts of the court library. He died at Dresden on the 5th of July 1870.

Flügel's chief work is an edition of the bibliographical and encyclopaedic lexicon of Haji Khalfa, with Latin translation (7 vols., London and Leipzig, 1835–1858). He also brought out an edition of the Koran (Leipzig, 1834 and again 1893); then followed *Concordantiae Corani arabicae* (Leipzig, 1842 and again 1898); *Mani, seine Lehren und seine Schriften* (Leipzig, 1862); *Die grammatischen Schulen der Araber* (Leipzig, 1862); and *Ibn Kutlûbugas Krone der Lebensbeschreibungen* (Leipzig, 1862). An edition of *Kitâb-al-Fihrist*, prepared by him, was published after his death.

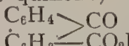
FLÜGEL, JOHANN GOTTFRIED (1788–1855), German lexicographer, was born at Barby near Magdeburg, on the 22nd of November 1788. He was originally a merchant's clerk, but emigrating to the United States in 1810, he made a special study of the English language, and returning to Germany in 1819, was in 1824 appointed lector of the English language in the university of Leipzig. In 1838 he became American consul, and subsequently representative and correspondent of the Smithsonian Institution at Washington and several other leading American literary and scientific institutions. He died at Leipzig on the 24th of June 1855.

The fame of Flügel rests chiefly on the *Vollständige englisch-deutsche und deutsch-englische Wörterbuch*, first published in 2 vols. (Leipzig) in 1830, which has had an extensive circulation not only in Germany but in England and America. In this work he was assisted by J. Sporschil, and a new and enlarged edition, edited by his son Felix Flügel (1820–1904), was published at Brunswick (1890–1892). Another edition, in two volumes, edited by Prof. Immanuel Schmidt and S. Tanger appeared (Brunswick, London & New York) in 1906. Among his other works are—*Vollständige engl. Sprachlehre* (1824–1826); *Triglotte, oder kaufmännisches Wörterbuch in drei Sprachen, Deutsch, Englisch und Französisch* (1836–1840); *Kleines Kaufmännisches Handwörterbuch in drei Sprachen* (1840); and *Praktisches Handbuch der engl. Handelscorrespondenz* (1827, 9th ed. 1873). All these have passed through several editions. In addition, Flügel also published in the English language: *A series of Commercial Letters* (Leipzig, 1822), a 9th edition of which appeared in 1874 under the title *Practical Mercantile Correspondence* and a *Practical Dictionary of the English and German Languages* (2 vols., Hamburg and Leipzig, 1847–1852; 15th ed., Leipzig, 1891). The last was continued and re-edited by his son Felix.

FLUKE (probably connected with the Ger. *flach*, flat), a name given to several kinds of fish, flat in shape, especially to the common flounder; also the name of a trematoid worm, resembling a flounder in shape, which as a parasite infects the liver and neighbouring organs of certain animals, especially sheep, and causes liver-rot. The most common is the *Fasciola hepatica* (see TREMATODES). It is also the name of a species of kidney potato. Probably from a resemblance to the shape of the fish, "fluke" is the name given to the holding-plates, triangular in shape, at the end of the arms of an anchor, and to the triangular extremities of the tail of a whale. The use of the word as a slang expression for a lucky accident appears to have been first applied in billiards to an unintentional scoring shot.

FLUME (through an O. Fr. word *flum*, from the Lat. *flumen*, a river), a word formerly used for a stream, and particularly for the tail of a mill-race. It is used in America for a very narrow gorge running between precipitous rocks, with a stream at the bottom, but more frequently is applied to an artificial channel of wood or other material for the diversion of a stream of water from a river for purposes of irrigation, for running a saw-mill, or for various processes in the hydraulic method of gold-mining (see AQUEDUCT).

FLUMINI MAGGIORE, a town of the province of Cagliari, Sardinia, 10 m. by road N. of Iglesias, and 5 m. from the W. coast. Pop. (1901) town 3908; commune 9647. It is the centre of a considerable lead and zinc mining district. Three miles to the S. are the ruins of a temple erected probably in the time of Commodus (*Corpus inscr. Lat.* x., Berlin, 1883, No. 7539). They seem to mark the site of Metalla (mines), a station on the coast road from Sulci to Tharros, and the centre of the mining district in Roman times. At Flumini Maggiore itself were found two ingots of lead, one bearing a stamp with Hadrian's name.

FLUORANTHENE, $C_{15}H_{10}$, also known as idryl, a hydrocarbon occurring with phenanthrene, pyrene, diphenyl, and other substances in "Stupp" fat (the fat obtained in working up the mercury ores in Idria), and also in the higher boiling fractions of the coal tar distillate. It was discovered by R. Fittig in 1878, who, with Gebhard and H. Liepmann, elucidated its constitution (see *Ann.*, 1879, 200, p. 1). The hydrocarbons are separated from the "Stupp" by means of alcohol, the soluble portion on distillation giving first phenanthrene and then a mixture of pyrene and fluoranthene. From the tar distillate, the chrysene can be fractionally precipitated, and the fluoranthene can be separated from most of the pyrene by fractional distillation in a partial vacuum. In either case the two hydrocarbons are finally separated by fractional crystallization of their picrates, which are then decomposed by ammonia. Fluoranthene crystallizes in large slender needles or monoclinic tables, melting at 109–110° C. and boiling at 250–251° C. (60 mm.). It is easily soluble in hot alcohol, ether and carbon bisulphide. On oxidation with chromic acid it forms a quinone, $C_{15}H_8O_2$, and an α-diphenylene keto-carboxylic acid  $\begin{array}{l}C_6H_4\\ C_6H_3\end{array}\!\!\begin{array}{l}>CO\\ —CO_2H\end{array}$. The picrate melts at 182–183° C.

FLUORENE (α-diphenylene methane), $C_{13}H_{10}$ or $(C_6H_4)_2CH_2$, a hydrocarbon found in coal-tar. It is obtained from the higher boiling fractions, after separation of naphthalene and anthracene, by fractional distillation, the portion boiling between 290–340° C. being taken. The fluorene is separated from this by placing it in a freezing mixture, and is then redistilled or crystallized from glacial acetic acid, or purified by means of its picrate. It may be prepared by distilling diphenylene ketone over zinc dust, or by heating it with hydriodic acid and phosphorus to 150–160° C.; and also by passing the vapour of diphenyl methane through a red hot tube. It crystallizes in colourless plates, possessing a violet fluorescence, melting at 112–113° and boiling at 293–295° C. By oxidation with chromic acid in glacial acetic acid solution, it is converted into diphenylene ketone $(C_6H_4)_2{\cdot}CO$; whilst on heating with hydriodic acid and phosphorus to 250–260° C. it gives a hydro derivative of composition $C_{13}H_{22}$.

FLUORESCEIN, or RESORCIN-PHTHALEIN, $C_{20}H_{12}O_5$, in chemistry, a compound discovered in 1876 by A. v. Baeyer by the condensation of phthalic anhydride with resorcin at 195–200° C. (*Ann.*, 1876, 183, p. 1). The two reacting substances are either heated alone or with zinc chloride for some hours, and the melt obtained is boiled out with water, washed by dilute alcohol, extracted by means of sodium hydrate, and the solution so obtained is precipitated by an acid. The precipitate is well washed with water and then dried. By repeating this process two or three times, the fluorescein may be obtained in a very pure condition. It forms a yellow amorphous powder, insoluble in water but soluble in alcohol, and crystallizing from the alcoholic solution in small dark red nodules. It is readily soluble in solutions of the caustic alkalis, the solution being of a dark red colour and showing (especially when largely diluted with water) a brilliant green fluorescence. It was so named on account of this last character. By brominating fluorescein in glacial acetic acid solution, *eosin* (tetrabromfluorescein) is obtained, the same compound being formed by heating 3·5-dibrom-2·4-dioxybenzoylbenzoic acid above its melting point (R. Meyer, *Ber.*, 1895, 28, p. 1576). It crystallizes from alcohol in yellowish red needles, and dyes silk, wool, and mordanted cotton a fine pink colour. When heated with caustic alkalis it yields dibromresorcin and dibrommonoresorcin-phthalein. The corresponding iodo compound is known as *erythrosin.* Fluorescein is readily nitrated, yielding a di- or tetra-nitro compound according to conditions. The entrance of the negative nitro group into the molecule weakens the central pyrone ring in the fluorescein nucleus and the di- and tetra-nitro compounds readily yield hydrates (see J. T. Hewitt and B. W. Perkins, *Jour. Chem. Soc.*, 1900, p. 1326). By the action of ammonia or amines the di-nitro fluoresceins are converted into yellow dyestuffs (F. Reverdin, *Ber.*, 1897, 30, p. 332). Other dyestuffs obtained from fluorescein are safrosine or eosin scarlet (dibromdinitrofluorescein) and rose Bengal (tetraiodotetrachlorfluorescein).

On fusion with caustic alkali, fluorescein yields resorcin, $C_6H_4(OH)_2$, and monoresorcin phthalein (dioxybenzoylbenzoic acid), $(HO)_2C_6H_3{\cdot}CO{\cdot}C\ H_4{\cdot}COOH$. With zinc dust and caustic soda it yields fluorescin. By warming fluorescein with excess of phosphorus pentachloride it yields fluorescein chloride, $C_{20}H_{10}O_3Cl_2$ (A. Baeyer), which crystallizes from alcohol in small prisms, melting at 252° C. When heated with aniline and aniline hydrochloride, fluorescein yields a colourless anilide (O. Fischer and E. Hepp, *Ber.*, 1893, 26, p. 2236), which is readily methylated by methyl iodide and potash to a fluoresceinanilidedimethyl ether, which when heated for six hours to 150° C. with acetic and hydrochloric acids, is hydrolysed and yields a colourless fluoresceindimethyl ether, which melts at 198° C. On the other hand, by heating fluorescein with caustic potash, methyl iodide and methyl alcohol, a coloured (yellow) dimethyl ether, melting at 208° C. is obtained (Fischer and Hepp). By heating the coloured dimethyl ether with caustic soda, the monomethyl ether is obtained (O. Fischer and E. Hepp, *Ber.*, 1895, 28, p. 397); this crystallizes in triclinic tables, and melts at 262° C. It is to be noted that the colourless monomethyl ether fluoresces strongly in alkaline solution, the dimethyl ether of melting point 208° fluoresces only in neutral solution (*e.g.*, in alcoholic solution), and the dimethyl ether of melting point 198° C. only in concentrated hydrochloric or sulphuric acid solution (Fischer and Hepp). Considerable discussion has taken place as to the position held by the hydroxyl groups in the fluorescein molecule, C. Graebe (*Ber.*, 1895, 28, p. 28) asserting that they were in the ortho position to the linking carbon atom of the phthalic anhydride residue. G. Heller (*Ber.*, 1895, 28, p. 312), however, showed that monoresorcin-phthalein when brominated in glacial acetic acid gives a dibrom derivative which, with fuming sulphuric acid, yields dibromxanthopurpurin (1·3-dioxy-2·4-dibromanthraquinone), a reaction which is only possible if the fluorescein (from which the monoresorcin-phthalein is derived) contains free hydroxyl groups in the para position to the linking carbon atom of the phthalic anhydride residue.

FLUORESCENCE. In a paper read before the Royal Society of Edinburgh in 1833, Sir David Brewster described a remarkable phenomenon he had discovered to which he gave the name of "internal dispersion." On admitting a beam of sunlight, condensed by a lens, into a solution of chlorophyll, the green colouring matter of leaves (see fig. 1), he was surprised to find that the path of the rays within the fluid was marked by a bright light of a blood-red colour, strangely contrasting with the beautiful green of the fluid when seen in moderate thickness. Brewster afterwards observed the same phenomenon in various vegetable solutions and essential oils, and in some solids, amongst which was fluor-spar. He believed this effect to be due to coloured particles held in suspension. A few years later, Sir John Herschel independently discovered that if a solution of quinine sulphate, which, viewed by transmitted light, appears colourless and transparent like water, were illuminated by a beam of ordinary daylight, a peculiar blue colour was seen in a thin stratum of the fluid adjacent to the surface by which the light entered. The blue light was unpolarized and passed freely through many inches of the fluid. The incident beam, after having passed through the stratum from which the blue light came, was not sensibly enfeebled or coloured, but yet it had lost the power of

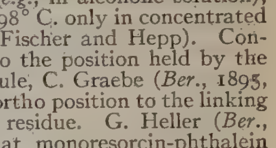


FIG. 1.

producing the characteristic blue colour when admitted into a second solution of quinine sulphate. A beam of light modified in this mysterious manner was called by Herschel "epipolized." Brewster showed that epipolic was merely a particular case of internal dispersion, peculiar only in this respect, that the rays capable of dispersion were dispersed with unusual rapidity.

The investigation of this phenomenon was afterwards taken up by Sir G. G. Stokes, to whom the greater part of our present knowledge of the subject is due. Stokes's first paper "On the Change of the Refrangibility of Light" appeared in 1852. He repeated the experiments of Brewster and Herschel, and considerably extended them. These experiments soon led him to the conclusion that the effect could not be due, as Brewster had imagined, to the scattering of light by suspended particles, but that the dispersed beam actually differed in refrangibility from the light which excited it. He therefore termed it "true internal dispersion" to distinguish it from the scattering of light, which he called "false internal dispersion." As this name, however, is apt to suggest Brewster's view of the phenomenon, he afterwards abandoned it as unsatisfactory, and substituted the word "fluorescence." This term, derived from fluor-spar after the analogy of opalescence from opal, does not presuppose any theory. To examine the nature of the fluorescence produced by quinine, Stokes formed a pure spectrum of the sun's rays in the usual manner. A test-tube, filled with a dilute solution of quinine sulphate, was placed just outside the red end of the spectrum and then gradually moved along the spectrum to the other extremity. No fluorescence was observed as long as the tube remained in the more luminous portion, but as soon as the violet was reached, a ghost-like gleam of blue light shot right across the tube. On continuing to move the tube, the blue light at first increased in intensity and afterwards died away, but not until the tube had been moved a considerable distance into the ultra-violet part of the spectrum. When the blue gleam first appeared it extended right across the tube, but just before disappearing it was confined to a very thin stratum on the side at which the exciting rays entered. Stokes varied this experiment by placing a vessel filled with the dilute solution in a spectrum formed by a train of prisms. The appearance is illustrated diagrammatically in fig. 2. The greater part of the light passed freely as if through water, but from about half-way between the Fraunhofer lines G and H to far beyond the extreme violet, the incident rays gave rise to light of a sky-blue colour, which emanated in all directions from the portion of the fluid (represented white in fig. 2) which was under the influence of the incident rays. The anterior surface of the blue space coincided, of course, with the inner surface of the glass vessel. The posterior surface marked the distance to which the incident rays were able to penetrate before they were absorbed. This distance was at first considerable, greater than the diameter of the vessel, but decreased with great rapidity as the refrangibility of the incident light increased, so that from a little beyond the extreme violet to the end, the blue space was reduced to an excessively thin stratum. This shows that the fluid is very opaque to the ultra-violet rays. The fixed lines in the violet and invisible part of the solar spectrum were represented by dark lines, or rather planes, intersecting the blue region. Stokes found that the fluorescent light is not homogeneous, for on reducing the incident rays to a narrow band of homogeneous light, and examining the dispersed beam through a prism, he found that the blue light consisted of rays extending over a wide range of refrangibility, but not into the ultra-violet.

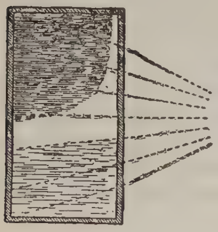


Fig. 2.

Another method, which Stokes found especially useful in examining different substances for fluorescence, was as follows. Two coloured media were prepared, one of which transmitted the upper portion of the spectrum and was opaque to the lower portion, while the second was opaque to the upper and transparent to the lower part of the spectrum. These were called b Stokes "complementary absorbents." No pair could be foun which were exactly complementary, of course, but the conditio was approximately fulfilled by several sets of coloured glasse or solutions. One such combination consisted of a deep-blu solution of ammoniacal copper sulphate and a yellow glas coloured with silver. The two media together were almos opaque. The light of the sun being admitted through a hole i the window-shutter, a white porcelain tablet was laid on a shel fastened in front of the hole. If the vessel containing the blu solution was placed so as to cover the hole, and the tablet wa viewed through the yellow glass, scarcely any light entered th eye, but if a paper washed with some fluorescent liquid were lai on the tablet it appeared brilliantly luminous. Different pair of complementary absorbents were required according to th colour of the fluorescent light. This experiment shows clearl that the light which passed through the first absorbent an which would have been stopped by the second gave rise in th fluorescent substance to rays of a different wave-length whic were transmitted by the second absorbent. Scattered light with which the true fluorescent light was often associated, wa eliminated by this method, being stopped by the secon absorbent.

Stokes also used a method, analogous to Newton's method o crossed prisms, for the purpose of analysing the fluorescent light A spectrum was produced by means of a slit and a prism, the sli being horizontal instead of vertical. The resulting very narrow spectrum was projected on a white paper moistened with a fluorescent solution, and viewed through a second prism with its refracting edge perpendicular to that of the first prism. In addition to the sloping spectrum seen under ordinary circumstances, another spectrum due to the fluorescent light alone, made its appearance, as seen in figs. 3 and 4. In this spectrum the colours do not run from left to right, but in horizontal lines. Thus the dark lines of the solar spectrum lie across the colours. The spectra in figs. 3 and 4 were obtained by V. Pierre with an improved arrangement of Stokes's method. It will be seen that, in the case of chlorophyll, the whole spectrum, far into the ultra-violet, gives rise to a short range of red fluorescent light, while the effective part of the exciting light in the case of aesculin (a glucoside occurring in horse-chestnut bark) begins a little above the fixed line G and the fluorescent light covers a wide range extending from orange to blue.

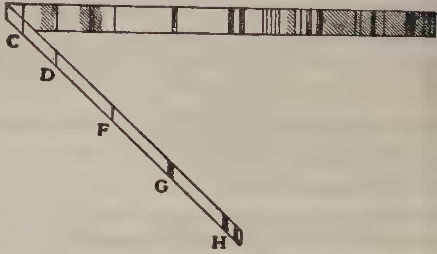


Fig. 3.—Spectrum of Chlorophyll.

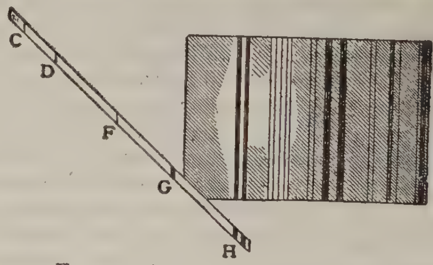


Fig. 4.—Spectrum of Aesculin.

Besides the substances already mentioned, a large number of vegetable extracts and some inorganic bodies are strongly fluorescent. Stokes found that most organic substances show signs of fluorescence. Green fluor-spar from Alston Moor exhibits a violet, uranium glass a yellowish-green fluorescence. Tincture of turmeric gives rise to a greenish light, and the extract of seeds of *Datura stramonium* a pale green light. Ordinary paraffin oil fluoresces blue. Barium platinocyanide, which is much used in the fluorescent screens employed in work with the Röntgen rays, shows a brilliant green fluorescence with ordinary light. Crystals of magnesium platinocyanide possess the remarkable property of emitting a polarized fluorescent light, the colour and plane of polarization depending on the position of the crystal with respect to the incident beam, and, if polarized light is used, on the plane of polarization of the latter.

Stokes's Law.—In all the substances examined by Stokes, the fluorescent light appeared to be of lower refrangibility than the light which excited it. Stokes considered it probable that this lowering of the refrangibility of the light was a general law which held for all substances. This is known as Stokes's law. It has been shown, however, by E. Lommel and others, that this law does not hold generally. Lommel distinguishes two kinds of fluorescence. The bodies which exhibit the first kind are those which possess strong absorption bands, of which only one remains appreciable after great dilution. These bodies are always strongly coloured and show anomalous dispersion and (in solids) surface colour. In such cases, the maximum of intensity in the fluorescent spectrum corresponds to the maximum of absorption. Stokes's law is not obeyed, for a fluorescent spectrum can be produced by means of homogeneous light of lower refrangibility than a great part of the fluorescent light. The second kind of fluorescence is the most common, and is exhibited by bodies which show absorption only in the upper part of the spectrum, *i.e.* they are usually yellow or brown or (if the absorption is in the ultra-violet) colourless. The absorption bands also are different from those of substances of the first kind, for they readily disappear on dilution. A third class of bodies is formed by those substances which exhibit both kinds of fluorescence.

Nature of Fluorescence.—No complete theory of fluorescence has yet been given, though various attempts have been made to explain the phenomenon. Fluorescence is closely allied to phosphorescence (*q.v.*), the difference consisting in the duration of the effect after the exciting cause is removed. Liquids which fluoresce only do so while the exciting light is falling on them, ceasing immediately the exciting light is cut off. In the case of solids, on the other hand, such as fluor-spar or uranium glass, the effect, though very brief, does not die away quite instantaneously, so that it is really a very brief phosphorescence. The property of phosphorescence has been generally attributed to some molecular change taking place in the bodies possessing it. That some such change takes place during fluorescence is rendered probable by the fact that the property depends upon the state of the sensitive substance; some bodies, such as barium platinocyanide, fluorescing in the solid state but not in solution, while others, such as fluorescein, only fluoresce in solution. Fluorescence is always associated with absorption, but many bodies are absorbent without showing fluorescence. A satisfactory theory would have to account for these facts as well as for the production of waves of one period by those of another, and the non-homogeneous character of the fluorescent light. Quite recently W. Voigt has sought to give a theory of fluorescence depending on the theory of electrons. Briefly, this theory assumes that the electrons which constitute the molecule of the sensitive body can exist in two or more different configurations simultaneously, and that these are in dynamical equilibrium, like the molecule in a partially dissociated gas. If the electrons have different periods of vibration in the different configurations, then it would happen that the electrons whose period nearly corresponded with that of the incident light would absorb the energy of the latter, and if they then underwent a transformation into a different configuration with a different period, this absorbed energy would be given out in waves of a period corresponding to that of the new configuration.

Applications of Fluorescence.—The phenomenon of fluorescence can be utilized for the purpose of illustrating the laws of reflection and refraction in lecture experiments since the path of a ray of light through a very dilute solution of a sensitive substance is rendered visible. The existence of the dark lines in the ultra-violet portion of the solar spectrum can also be demonstrated in a simple manner. In addition to the foregoing applications, Stokes made use of this property for studying the character of the ultra-violet spectrum of different sources of illumination and flames. He suggested also that the property would in some cases furnish a simple test for the presence of a small quantity of a sensitive substance in an organic mixture. Fluorescent screens are largely used in work with Röntgen rays. There appears to be some prospect of light being thrown on the question of molecular structure by experiments on the fluorescence of vapours. Some very interesting experiments in this direction have been performed by R. W. Wood on the fluorescence of sodium vapour.

References.—Sir G. G. Stokes, *Mathematical and Physical Papers*, vols. iii. and iv.; Müller-Pouillet, *Lehrbuch der Physik*, Bd. ii. (1897); A. Wullner, *Lehrbuch der Experimentalphysik*, Bd. iv. (1899); A. A. Winkelmann, *Handbuch der Physik*, Bd. vi. (1906); R. W. Wood, *Physical Optics* (1905). (J. R. C.)

FLUORINE (symbol F, atomic weight 19), a chemical element of the halogen group. It is never found in the uncombined condition, but in combination with calcium as fluor-spar CaF_2 it is widely distributed; it is also found in cryolite Na_3AlF_6, in fluor-apatite, $CaF_2 \cdot 3Ca_3P_2O_8$, and in minute traces in sea-water, in some mineral springs, and as a constituent of the enamel of the teeth. It was first isolated by H. Moissan in 1886 by the electrolysis of pure anhydrous hydrofluoric acid containing dissolved potassium fluoride. The U-shaped electrolytic vessel and the electrodes are made of an alloy of platinum-iridium, the limbs of the tube being closed by stoppers made of fluor-spar, and fitted with two lateral exit tubes for carrying off the gases evolved. Whilst the electrolysis is proceeding, the apparatus is kept at a constant temperature of −23° C. by means of liquid methyl chloride. The fluorine, which is liberated as a gas at the anode, is passed through a well cooled platinum vessel, in order to free it from any acid fumes that may be carried over, and finally through two platinum tubes containing sodium fluoride to remove the last traces of hydrofluoric acid; it is then collected in a platinum tube closed with fluor-spar plates. B. Brauner (*Jour. Chem. Soc.*, 1894, 65, p. 393) obtained fluorine by heating potassium fluorplumbate $3KF \cdot HF \cdot PbF_4$. At 200° C. this salt decomposes, giving off hydrofluoric acid, and between 230–250° C. fluorine is liberated.

Fluorine is a pale greenish-yellow gas with a very sharp smell; its specific gravity is 1·265 (H. Moissan); it has been liquefied, the liquid also being of a yellow colour and boiling at −187° C. It is the most active of all the chemical elements; in contact with hydrogen combination takes place between the two gases with explosive violence, even in the dark, and at as low a temperature as −210° C.; finely divided carbon burns in the gas, forming carbon tetrafluoride; water is decomposed even at ordinary temperatures, with the formation of hydrofluoric acid and "ozonised" oxygen; iodine, sulphur and phosphorus melt and then inflame in the gas; it liberates chlorine from chlorides, and combines with most metals instantaneously to form fluorides; it does not, however, combine with oxygen. Organic compounds are rapidly attacked by the gas.

Only one compound of hydrogen and fluorine is known, namely *hydrofluoric acid*, HF or H_2F_2, which was first obtained by C. Scheele in 1771 by decomposing fluor-spar with concentrated sulphuric acid, a method still used for the commercial preparation of the aqueous solution of the acid, the mixture being distilled from leaden retorts and the acid stored in leaden or gutta-percha bottles. The perfectly anhydrous acid is a very volatile colourless liquid and is best obtained, according to G. Gore (*Phil. Trans.*, 1869, p. 173) by decomposing the double fluoride of hydrogen and potassium, at a red heat in a platinum retort fitted with a platinum condenser surrounded by a freezing mixture, and having a platinum receiver luted on. It can also be prepared in the anhydrous condition by passing a current of hydrogen over dry silver fluoride. The pure acid thus obtained is a most dangerous substance to handle, its vapour even when highly diluted with air having an exceedingly injurious action on the respiratory organs, whilst inhalation of the pure vapour is followed by death. The anhydrous acid boils at 19°·5 C. (H. Moissan), and on cooling, sets to a solid mass at −102°·5 C., which melts at −92°·3 C. (K. Olszewski, *Monats. für Chemie*, 1886, 7, p. 371). Potassium and sodium readily dissolve in the anhydrous acid with evolution of hydrogen and formation of fluorides. The aqueous solution is strongly acid to litmus and dissolves most metals directly. Its most important property is that it rapidly attacks glass, reacting with the silica of the glass to form gaseous silicon fluoride, and consequently it is used for etching. T. E. Thorpe (*Jour. Chem. Soc.*, 1889, 55, p. 163) determined the vapour density of hydrofluoric acid at different temperatures, and showed that there is no approach to a definite value below about 88° C. where it reaches the value 10·29 corresponding to the molecular formula HF; at temperatures below 88° C. the value increases rapidly, showing that the molecule is more complex in its structure. (For references see J. N. Friend, *The Theory of Valency* (1909), p. 111.) The aqueous solution behaves on concentration similarly to the other halogen acids; E. Deussen (*Zeit. anorg. Chem.*, 1905, 44, pp. 300, 408; 1906, 49, p. 297) found the solution of constant boiling point to contain 43·2% HF and to boil at 110° (750 mm.).

The salts of hydrofluoric acid are known as *fluorides* and are easily obtained by the action of the acid on metals or their oxides, hydroxides or carbonates. The fluorides of the alkali metals, of silver, and of most of the heavy metals are soluble in water; those of the alkaline earths are insoluble. A characteristic property of the alkaline fluorides is their power of combining with a molecule of hydrofluoric acid and with the fluorides of the more electro-negative elements to form double fluorides, a behaviour not shown by other metallic halides. Fluorides can be readily detected by their power of etching glass when warmed with sulphuric acid; or by warming them in a glass tube with concentrated sulphuric acid and holding a moistened glass rod in the mouth of the tube, the water apparently gelatinizes owing to the decomposition of the silicon fluoride formed. The atomic weight of fluorine has been determined by the conversion of calcium, sodium and potassium fluorides into the corresponding sulphates. J. Berzelius, by converting silver fluoride into silver chloride, obtained the value 19·44, and by analysing calcium fluoride the value 19·16; the more recent work of H. Moissan gives the value 19·05.

See H. Moissan, *Le Fluor et ses composés* (Paris, 1900).

FLUOR-SPAR, native calcium fluoride (CaF_2), known also as FLUORITE or simply FLUOR. In France it is called fluorine, whilst the term fluor is applied to the element (F). All these terms, from the Lat. *fluere*, "to flow," recall the fact that the spar is useful as a flux in certain metallurgical operations. (Cf. its Ger. name *Flussspat* or *Fluss*.)

Fluor-spar crystallizes in the cubic system, commonly in cubes, either alone or combined with the octahedron, rhombic dodecahedron, four-faced cube, &c. The four-faced cube has been called the fluoroid. In fig. 1, *a* is the cube (100), *d* the rhombic dodecahedron (110), and *f* the four-faced cube (310). Fig. 2 shows a characteristic twin of interpenetrant cubes. The crystals are sometimes polysynthetic, a large octahedron, *e.g.*, being built up of small cubes. The faces are often etched or corroded. Cleavage is nearly always perfect, parallel to the octahedron.

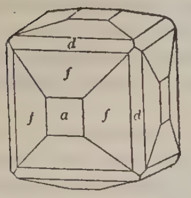


FIG. 1.

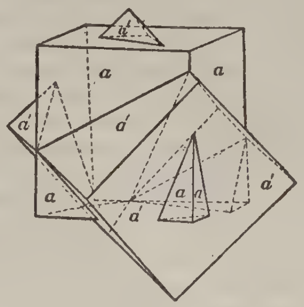


FIG. 2.

Fluor-spar has a hardness of 4, so that it is scratched by a knife, though not so readily as calcite. Its specific gravity is about 3·2. The colour is very variable, and often beautiful, but the mineral is too soft for personal decoration, though it forms a handsome material for vases, &c. In some fluor-spar the colour is disposed in bands, regularly following the contour of the crystal. As the colour is usually expelled, or much altered, by heat, it is believed to be due to an organic pigment, and the presence of hydrocarbons has been detected in many specimens by G. Wyrouboff, and other observers. H. W. Morse (*Proc. Amer. Acad.*, 1906, p. 587) obtained carbon monoxide and dioxide, hydrogen and nitrogen and small quantities of oxygen from Weardale specimens by heating. He concluded that the gases are due to the decomposition of an organic colouring matter, which has, however, no connexion with the fluorescence or thermo-luminescence of the mineral. Certain crystals from Cumberland are beautifully fluorescent, appearing purple with a bluish internal haziness by reflected light, and greenish by transmitted light. Fluor-spar, though cubic, sometimes exhibits weak double refraction, probably due to internal tension. Many kinds of fluor-spar are thermo-luminescent, *i.e.* they glow on exposure to a moderate heat, and the name of chlorophane has been given to a variety which exhibits a green glow. The mineral also phosphoresces under the Röntgen rays. Cavities containing liquid occasionally occur in crystals of fluor-spar, notably in the greasy green cubes of Weardale in Durham. A dark violet fluor-spar from Wölsendorf in Bavaria, evolves an odour of ozone when struck, and has been called antozonite. Ozone is also emitted by a violet fluor-spar from Quincié, dep. Rhône, France. In both cases the spar evolves free fluorine, which ozonizes the air.

Fluor-spar is largely employed by the metallurgist, especially in lead-smelting, and in the production of ferro-silicon and ferro-manganese. It is also used in iron and brass foundries, and has been found useful as a flux for certain gold-ores and in the reduction of aluminium. It is used as a source of hydrofluoric acid, which it evolves when heated with sulphuric acid. The mineral is also used in the production of opal glass and enamel ware. In consequence of its low refractive and dispersive power, colourless pellucid fluor-spar is valuable in the construction of apochromatic lenses, but this variety is rare. The dark violet fluor-spar of Derbyshire, known locally as "Blue John," is prized for ornamental purposes. It occurs almost exclusively at Tray Cliff, near Castleton. The dark purple spar, called by the workmen "bull beef," may be changed, by heat, to a rich amethystine tint. Being very brittle, the spar is rather difficult to work on the lathe, and is often toughened by means of resin. F. Corsi, the eminent Italian antiquary, held that fluor-spar was the material of the famous murrhine vases.

Fluor-spar is a mineral of very wide distribution. Some of the finest crystals occur in the lead-veins of the Carboniferous Limestone series in the north of England, especially at Weardale, Allendale and Alston Moor. It is also found in the lead and copper-mines of Cornwall and S. Devon, notably near Liskeard, where fine crystals have been found, with faces of the six-faced octahedron replacing the corners of the cube. In Cornwall fluor-spar is known to the miners as "cann." Fine yellow fluor-spar occurs in some of the Saxon mines, and beautiful rose-red octahedra are found in the Alps, near Göschenen. Many localities in the United States yield fluor-spar, and it is worked commercially in a few places, notably at Rosiclare in southern Illinois.

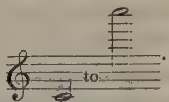
FLUSHING, formerly a township and a village of Queens county, New York, U.S.A., on Long Island, at the head of Flushing Bay, since the 1st of January 1898 a part of the borough of Queens, New York City. Flushing is served by the Long Island railroad and by electric lines. It was settled in 1644 by a company of English non-conformists who had probably been residents of Flushing in Holland, from which the new place took its name. Subsequently a large number of Quakers settled here, and in 1672 George Fox spent some time in the township. Before the War of Independence Flushing was the country-seat of many rich New Yorkers and colonial officials.

FLUSHING (Dutch *Vlissingen*), a fortified seaport in the province of Zeeland, Holland, on the south side of the island of Walcheren, at the mouth of the estuary of the western Scheldt, 4 m. by rail S. by W. of Middelburg, with which it is also connected by steam tramway and by a ship canal. There is a steam ferry to Breskens and Ter Neuzen on the coast of Zeeland-Flandres. Pop. (1900) 18,893. An important naval station and fortress up to 1867, Flushing has since aspired, under the care of the Dutch government, to become a great commercial port. In 1872 the railway was opened which, in conjunction with the regular day and night service of steamers to Queenborough in the county of Kent, forms one of the main routes between England and the east of Europe. In 1873 the great harbour, docks and canal works were completed. Yet the navigation of the port remains far behind that of Rotterdam or Antwerp, the tonnage being in 1899 about 7·9% of that of the kingdom. As a summer resort, however, Flushing has acquired considerable popularity, sea-baths and a large modern hotel being situated on the fine beach about three-quarters of a mile north-west of the town. It possesses a town hall, containing a collection of local antiquities, a theatre, an exchange, an academy of sciences and a school of navigation. The Jakobskerk, or Jacob's church, founded in 1328, contains monuments to Admiral de Ruyter (1607–1676) and the poet Jacob Bellamy (1757–1786), who were natives of Flushing. The chief industries of the town are connected with the considerable manufacture of machinery, the state railway-workshops, shipbuilding yards, Krupp iron and steel works' depot, brewing, and oil and soap manufacture. The chief imports are colonial produce and wine, wood and coal. The exports include agricultural produce (wheat and beans), shrimps and meat.

FLUTE, a word adapted from O. Fr. *fleüte*, modern *flûte*; from O. Fr. have come the Span. *flauta*, Ital. *flauto* and Ger. *Flöte*. The *New English Dictionary* dismisses the derivations suggested from Lat. *flatuare* or *flavitare*; ultimately the word must be referred to the root seen in "blow," Lat. *flare*, Ger. *blasen*, &c.

1. In music "flute" is a general term applied to wood-wind instruments consisting of a pipe pierced with lateral holes and blown directly through the mouthpiece without the intervention of a reed. The flute family is classified according to the mouthpiece used to set in vibration the column of air within the tube: *i.e.* (1) the simple lateral mouth-hole or embouchure which necessitates holding the instrument in a transverse position; (2) the whistle or fipple mouthpiece which allows the performer to hold the instrument vertically in front of him. There is a third class of pipes included among the flutes, having no mouthpiece of any sort, in which the column of air is set in vibration by blowing obliquely across the open end of the pipe, as in the ancient Egyptian nay, and the pan-pipe or syrinx (*q.v.*). The transverse flute has entirely superseded the whistle flute, which has survived only in the so-called penny whistle, in the "flute-work" of the organ (*q.v.*), and in the French flageolet.

The *Transverse Flute* or *German Flute* (Fr. *flûte traversière, flûte allemande*: Ger. *Flöte, Querflöte, Zwerchpfeiff, Schweitzerpfeiff*; Ital. *flauto traverso*) includes the *concert flute* known both as flute in C and as flute in D, the piccolo (*q.v.*) or octave flute, and the fife (*q.v.*). The modern flute consists of a tube open at one end and nominally closed at the other by means of a plug or cork stopper: virtually, however, the tube is an open one giving the consecutive harmonic series of the open pipe or of a stretched string. The primitive flute was made in one piece, but the modern instrument is composed of three adjustable joints. (1) The head-joint, plugged at the upper end and containing at about one-third of the length the mouth-hole or embouchure. This embouchure, always open when the instrument is being played, converts the closed tube into an open one, in an acoustical sense. (2) The body, containing the holes and keys necessary to produce the scale which gave the flute its original designation of D flute, the head and body together, when the holes are closed, giving the fundamental note D. Before the invention of keys, this fundamental note and the notes obtained by the successive opening of the six holes produced the diatonic scale of D major. All other semitones were obtained by what is known as cross fingering (Fr. *doigté fourchu*; Ger. *Gabelgriffe*). It became usual to consider this the typical fingering nomenclature, whatever the fundamental note given out by the flute, and to indicate the tonality by the note given out when the six lateral holes are covered by the fingers. The result is that the tonality is always a tone lower than the name of the instrument indicates. Thus the D flute is really in C, the F flute is E♭, &c. (3) The foot-joint or tail-joint containing the two additional keys for C♯ and C which extend the compass downwards, completing the chromatic scale of C in the fundamental octave.

The compass of the modern flute is three octaves with chromatic semitones from . The sound is produced by holding the flute transversely with the embouchure turned slightly outwards, the lower lip resting on the nearer edge of the embouchure, and blowing obliquely across, not into, the orifice. The flat stream of air from the lips, known as the air-reed, breaks against the sharp outer edge of the embouchure. The current of air, thus set in a flutter, produces in the stationary column of air within the tube a series of pulsations or vibrations caused by the alternate compression and rarefaction of the air and generating sounds of a pitch proportional to the length of the stationary column, which is practically somewhat longer than the length of the tube.[1] The length of this column is varied by opening the lateral finger-holes. The current or air-reed thus acts upon the air column within the flute, without passing through the tube, as a plectrum upon a string, setting it in vibration. The air column of the flute is the sound-producer, whereas in instruments with reed mouthpieces the vibrating reed is more properly the sound-producer, while the air column, acting as a resonating medium, reinforces the note of the reed by vibrating synchronously with it. If the angle[2] at which the current of air is directed against the outer edge of the embouchure be made less acute and the pressure of the breath be at the same time increased, the frequency of the alternate pulses of compression and rarefaction within the tube will be increased two, three or fourfold, forming a corresponding number of nodes and loops which results in harmonics or upper partials, respectively the octave, the twelfth, the double octave. By this means sounds of higher pitch are produced without actually shortening the length of the column of air by means of lateral holes. The acoustic theory of sound-production in the flute is one on which there is great diversity of opinion. The subject is too vast to be treated here, but readers who wish to pursue it may consult the works of Rockstro,[3] Helmholtz,[4] and others.[5] The effect of boring lateral holes in pipes is to shorten the vibrating length of the air column, which may be regarded as being effective only between the hole in question and the mouthpiece. In order to obtain this result the diameter of the hole should be equal to that of the bore; as long as the holes were covered by the fingers, this was obviously impossible. The holes, therefore, being smaller than the laws of acoustics demand, have to be placed proportionally nearer the mouthpiece in order to avoid deepening the pitch and deadening the tone. This principle was understood by wind-instrument makers of classic Greece (see AULOS and CLARINET), and has been explained by Chladni[6] and Gottfried Weber.[7]

The bore of the early flute with six finger-holes was invariably cylindrical throughout, but towards the end of the 17th century a modification took place, the head joint alone remaining cylindrical while the rest of the bore assumed the form of a cone having its smallest diameter at the open end of the tube. The

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[1] See E. F. F. Chladni, *Die Akustik* (Leipzig, 1802), p. 87.

[2] See Sonreck, "Über die Schwingungserregung und die Bewegung der Luftsäule in offenen und gedeckten Röhren," *Pogg. Ann.*, 1876, vol. 158.

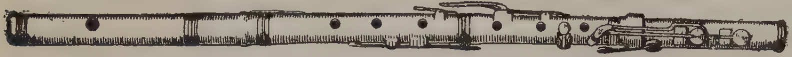
[3] *The Flute* (London, 1890), § 90-105, pp. 34-40.

[4] *Theorie der Luftschwingungen in Röhren mit offenen Enden* (Berlin, 1896). Ostwald's *Klassiker der exacten Wissenschaften*, No. 80.

[5] V. C. Mahillon, *Experimental Studies on the Resonance of Trunco-Conical and Cylindrical Air Columns*, translated by F. A. Mahan (London, 1901); D. J. Blaikley, *Acoustics in Relation to Wind Instruments* (London, 1890); Friedrich Zamminer, *Die Musik und die musikalischen Instrumente, &c.* (Giessen, 1855); *idem.* "Sur le mouvement vibratoire de l'air dans les tuyaux," *Comptes rendus*, 1855, vol. 41, &c.

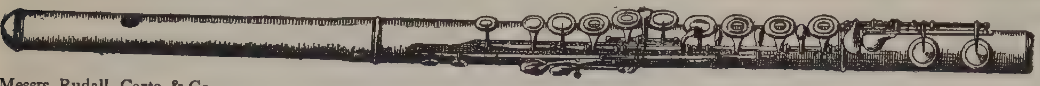
[6] *Op. cit.*, § 73, pp. 87-88, note 1.

[7] "Akustik der Blasinstrumente," *Allgem. musikal. Zeit.* (Leipzig, 1816), Bd. xviii. No. 5, p. 65 et seq. See also Ernst Euting, *Zur Geschichte der Blasinstrumente im 16. und 17. Jahrhundert.* Inaugural Dissertation, Friedrich-Wilhelms Universität. (Berlin, 15th of March 1899), p. 9.



From Captain Day's *Catalogue, &c.*, by permission of Messrs. Eyre & Spottiswoode.

FIG. 1.—Eight-keyed Cone Flute by Richard Potter. 18th century.



Messrs. Rudall, Carte & Co.

FIG. 2.—Boehm Cylinder Flute. Rockstro Model.

conoidal bore greatly improved the quality of tone and the production of the higher harmonics of the third octave. Once the conical bore had been adopted, the term flute was exclusively applied to the new instruments, the smaller flutes, then cylindrical, used in the army being designated fife (*q.v.*). At the present day in England, France and America, the favourite mode of construction is that introduced by Theobald Boehm, and known as the "cylinder flute with the parabolic head," of which more will be said further on. The successive opening of the holes and keys on the flute produces the chromatic scale of the first or fundamental octave. By increasing the pressure of the breath and slightly altering the position of the lips over the mouth-hole, the same fingering produces the notes of the fundamental octave in the next octave higher. The third octave of the compass is obtained by the production of the higher harmonics (Fr. *sons harmoniques*; Ger. *Flageolettöne*), of the fundamental scale, facilitated by the opening of certain of the finger-holes as "vent holes." The quality of tone depends somewhat on the material of which the flute is made; silver and gold produce a liquid tone of exquisite delicacy suitable for solo music, cocus-wood and ebonite a rich mellow tone of considerable power suitable for orchestral music. The tone differs further in the three registers, the lowest being slightly rough, the medium sweet and elegiac, and the third bird-like and brilliant. The proportions, position and form of the stopper and of the air chamber situated between it and the embouchure are mainly influential in giving the flute its peculiar slightly hollow timbre, due to the paucity of the upper partials of which according to Helmholtz[1] only the octave and twelfth are heard. Mr Blaikley[2] states, however, that when the fundamental D is played, he can discern the seventh partial. The technical capabilities of the flute are practically unlimited to a good player who can obtain sustained notes diminuendo and crescendo, diatonic and chromatic scales and arpeggios both legato and staccato, leaps, turns, shakes, &c. By the articulation with the tongue of the syllables *te-ke* or *ti-ke* repeated quickly for groups of double notes, or of *te-ke-ti* for triplets, an easy effective staccato is produced, known respectively as *double* or *triple tonguing*, a device understood early in the 16th century and mentioned by Martin Agricola,[3] who gives the syllables as *de* for sustained notes, *di-ri* for shorter notes, and *tel-lel-lel* for staccato passages in quick tempo.[4]

Musical instruments, such as flutes, in which a column of air is set in vibration by regular pulsations derived from a current of air directed by the lips of the executant against the side of the orifice serving as embouchure, appear to be of very ancient origin. The Hindus, Chinese and Japanese claim to have used these modes of blowing from time immemorial. The ancient Egyptians had a long pipe held obliquely and blown across the end of the pipe itself at its upper extremity; it was known as *Saïb-it*[5] and was frequently figured on the monuments. The same instrument, called "nay," is still used in Mahommedan countries. The oblique aulos of the Greeks, plagiaulos,[6] was of Egyptian origin and was perhaps at first blown from the end as described above,[7] since we know that the Greeks were familiar with that method of blowing in the syrinx or pan-pipe. The instruments preserved at the British Museum[8] having lateral embouchures show, however, that they were also acquainted—probably through the Hindus—with the transverse flute, although in the case of these specimens a reed must have been inserted into the mouth-hole or no sound would have been obtained.

The high antiquity of a lateral embouchure in Europe is generally admitted; the flute evidently penetrated from the East at some period not yet determined. A transverse flute is seen on Indian sculptures of the Gandhara school showing Greek influence, and dating from the beginning of our era (fig. 3). But although the transverse flute was evidently known to the Greeks and Romans, it did not find the same favour as the reed instruments known as auloi. We have no evidence of the survival of the transverse flute after the fall of the Roman empire until it filtered through from Byzantine sources during the early middle ages. Instances of the flute occur on a group of caskets[9] of Italo-Byzantine work of the 9th or 10th century, while of purely Byzantine origin we find examples of flutes in Greek

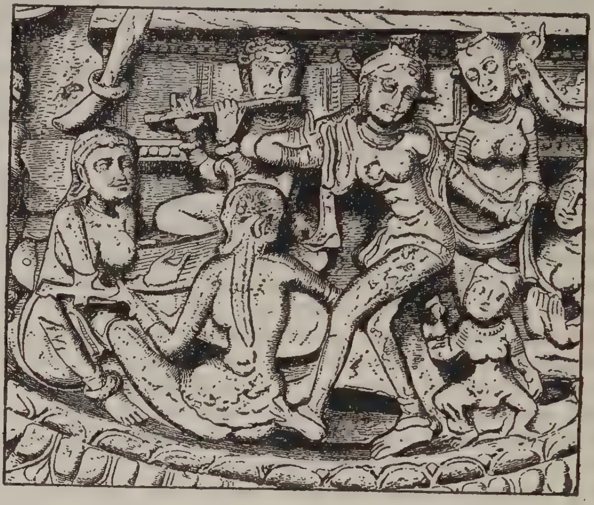


FIG. 3.—Transverse Flute. 1st or 2nd century A.D. From the Tope at Amarābati, British Museum.

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[1] *Lehre von der Tonempfindung* (Braunschweig, 1877).

[2] See additions by D. J. B. to article "Flute" in Grove's *Dictionary of Music and Musicians* (London, 1904).

[3] *Musica instrumentalis deutsch* (Wittenberg, 1528).

[4] See also L'Artusi, *Delle imperfettioni della musica moderna* (Venice, 1600), p. 4; Gottfried Weber in *Cäcilia*, Bd. ix. p. 99.

[5] See "Les Anciennes Flûtes égyptiennes," by Victor Loret in *Journal asiatique* (Paris, 1889), vol. xiv. p. 133 et seq., two careful articles based on the ancient Egyptian instruments still extant. See also Lauth, "Über die ägyptische Instrumente," *Sitzungs. der philos., philolog. und histor. Klasse. der Kgl. bayer. Akad. zu München* (1873).

[6] See Albert A. Howard, "The Aulos or Tibia," *Harvard Studies*, iv. (Boston, 1893), pp. 16-17.

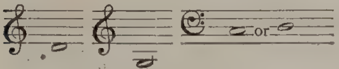
[7] Representations of flutes blown as here described have been found in Europe. See *Comptes rendus de la commission impériale archéologique* (St Petersburg, 1867), p. 45, and atlas for the same date, pl. vi. Pompeian painting given by Helbig, *Wandgemälde*, No. 7607; Zahn, vol. iii. pl. 31; Museo Borbonnico, pl. xv. No. 18; Clarac, pl. 130, 131, 139; Heuzey, *Les Figurines*, p. 136.

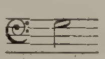
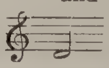
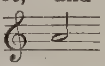
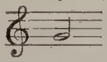
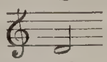
[8] There are two flutes at the British Museum (Catal. No. 84, 4-9 and 5 and 6), belonging to the Castellani collection, made of wood encased in bronze in which the mouthpiece, consisting of the head of a maenad, has a lateral hole bored obliquely into the main tube. This hole was probably intended for the reception of a reed. The pipe is stopped at the end beyond the mouthpiece as in the modern flute. There are six holes. See also the plagiaulos from Halicarnassus in the British Museum described by C. T. Newton in *History of Discoveries at Halicarnassus* (London), vol. ii. p. 339. The Louvre has two ancient statues (from the villa Borghese) representing satyrs playing upon transverse flutes. Unfortunately these marbles have been restored, especially in the details affecting our present subject, and are therefore examples of no value to us. Another statue representing a flute-player occurs in the British Museum. The instrument has been supposed to be a transverse flute, but erroneously, for the insufflation of the lateral tube against which the instrumentalist presses his lips, could not, without the intervention of a reed, excite the vibratory movement of the column of air.

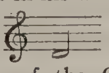
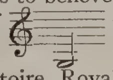
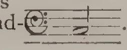
[9] Florence, Carrand Collection. See Museo Nazionale Firenze, *Catalogo* (1898), p. 205, No. 26 (description only). Illustration in *Gallerie nazionali italiane*, A. Venturi, vol. iii. (1897), p. 263, *L'Arte* (Rome, 1894), vol. i. p. 24, Hans Graeven, "Antike Vorlagen byzantinischer Elfenbeinreliefs," in *Jahrb. d. K. Preuss. Kunst-Sammlungen* (Berlin, 1897), Bd. xviii. p. 11; Hans Graeven, "Ein Reliquienkästchen aus Pirano," *id.*, 1899, Bd. xx. fig. 2 and pl. iii.

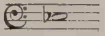
MSS.[1] preserved in Paris, at the British Museum and elsewhere. There is moreover in the cathedral of St Sophia at Kiev [2] an orchestra depicted on frescoes said to date from the 11th century; among the musicians is a flautist.

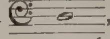
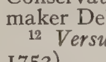
The first essentially western European trace of the transverse flute occurs in a German MS. of the 12th century, the celebrated *Hortus deliciarum* of the abbess Herrad von Landsperg.[3] Fol. 221 shows a syren playing upon the transverse flute, which Herrad explains in a legend as *tibia*; in the vocabulary the latter is translated *swegel*. In the 13th century it occurs among the miniatures of the fifty-one musicians in the beautiful MS. *Las Cantigas de Santa Maria* in the Escorial, Madrid.[4] Eustache Deschamps, a French poet of the 14th century, in one of his ballads, makes mention of the "flute traversaine," and we are justified in supposing that he refers to the transverse flute. It had certainly acquired some vogue in the 15th century, being figured in an engraving in Sebastian Virdung's celebrated work[5], where it is called "Zwerchpfeiff," and, with the drums, it already constituted the principal element of the military music. Agricola (*op. cit.*) alludes to it as the "Querchpfeiff" or "Schweizerpfeiff," the latter designation dating, it is said, from the battle of Marignan (1515), when the Swiss troops used it for the first time in war..

From Agricola onwards transverse flutes formed a complete family, said to comprise the discant, the alto and tenor, and the bass— 

respectively. Praetorius[6] designates the transverse flute as "Flauta traversa' Querpfeiff" and "Querflöt," and gives the pitch of the bass in  the tenor and alto in  and the discant in  as varieties then in use. A flute concert at that time included two discants, four altos or tenors, and two basses. The same author distinguishes between the "Traversa" and the "Schweizerpfeiff" or fife (which he also calls "Feldpfeiff," *i.e.* military flute), although the construction was the same. There were two kinds of "Feldpfeiff," in  and  respectively; they were employed exclusively with the military drum.

Mersenne's[7] account of the transverse flute, then designated "flûte d'Allemagne" or "flûte allemande" in France, and an "Air de Cour" for four flutes in his work lead us to believe that there were then in use in France the soprano flute in  the tenor or alto flute in  and the bass flute descending to . The museum of the Conservatoire Royal of Brussels possesses specimens of all these varieties except the last. All of them are laterally pierced with six finger-holes; they have a cylindrical bore, and are fashioned out of a single piece of wood. Their compass consists of two octaves and a fifth. Mersenne's tablature for fingering the flute differs but little from those of Hotteterre-le-Romain[8] and Eisel[9] for the diatonic scale; he does not give the chromatic semitones and the flute had as yet no keys.

The largest bass flute in the Brussels museum is in  at the French normal pitch A 435 double vibrations per second. It measures 0·95 m. from the centre of the blow orifice to the lower extremity of the tube. The disposition of the lateral holes is such that it is impossible to cover them with the fingers if the flute is held in the ordinary way. The instrument must be placed against the mouth in an almost vertical direction, inclining the extremity of the tube either to the right or the left. This inconvenient position makes it necessary that the instrument should be divided into two parts, enabling the player to turn the head joint that the embouchure may be most commodiously approached by the lips, which is not at all easy. The first and fourth of the six lateral holes are double in order to accommodate both right- and left-handed players, the holes not in use being stopped up with wax. The bass flute shown in fig. 4 is the facsimile of an instrument in the Museo Civico of Verona. The original, unfortunately no longer fit for use, is nevertheless sufficiently well preserved to allow of all its proportionate measurements being given. The lowest note, E♭, is obtained with a remarkable amplitude of sound, thus upsetting a very prevalent opinion that it is impossible to produce by lateral insufflation sounds which go a little lower than the ordinary limit downwards of the modern orchestral flute.[10]

The bass flute cited by Mersenne should not differ much from that of the Museo Civico at Verona. We suppose it to have been in , and that it was furnished with an open key like that which was applied to the recorders (*flûtes douces*) of the same epoch, the function of the key being to augment by another note the compass of the instrument in the lower part. A bass flute in G similar to the one in fig. 5 is figured and described in Diderot and D'Alembert's encyclopaedia [11] (1751). According to Quantz,[12] it was in France and about the middle of the 17th century that the first modifications were introduced in the manufacture of the flute. The improvements at this period consisted of the abandonment of the cylindrical bore in favour of a conical one, with the base of the cone forming the head of the instrument. At the same time the flute was made of three separate pieces called head, body, and tail or foot, which were ultimately further subdivided. The body or middle joint was divided into two pieces, so that the instrument could be tuned to the different pitches then in use by a replacement with longer or shorter pieces. It was probably about 1677, when Lully introduced the German flute into the opera, that recourse was had for the first time to keys, and that the key of D♯ was applied to the lower part of the instrument.[13] The engraving of B. Picart, dated 1707, given in Hotteterre's book, represents the flute as having reached the stage of improvement of which we have just spoken. In 1726 Quantz,[14] finding himself in Paris, had a second key applied to the flute, placed nearly at the same height as the first, that of the , intended to differentiate the D♯ and the E♭.[15] This innovation was generally well received in Germany, but does not appear to have met with corresponding success in other countries. In France and England manufacturers adopted it but rarely; in Italy it was declared useless.[16] About the same

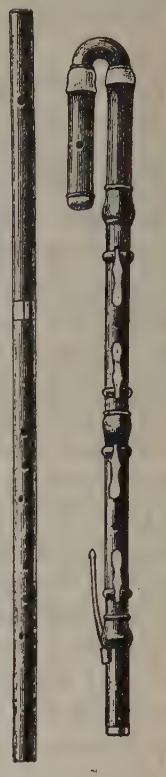


FIG. 4. FIG. 5.

FIG. 4.—Bass Flute. From Museo Civico, Verona (facsimile).

FIG. 5.—Bass Flute. Brussels Museum.

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[1] Greek MS. 510, Grégoir de Nazance 10th century, Bibliothèque Nationale, Paris; illustration in Gustave L. Schlumberger, *L'Épopée byzantine à la fin du dixième siècle* (Paris, 1896 and 1900), vol. i. p. 503. British Museum, Greek Psalter, add. MS. 19352, fol. 189b. written and illuminated *cir.* 1066 by Theodorus of Caesarea. A cylindrical flute is shown turned to the right, the left hand being uppermost. Smyrna, Library of the Evaggelike Schole B. 18, fol. 72a, A.D. 1100, illustration by Strzygowski, "Der Bilderkreis des griechischen Physiologus," in *Byzantinisches Archiv* (Leipzig, 1899), Heft 2, Taf. xi.; N. P. Kondakoff, *Histoire de l'art byzantin* (Paris, 1886 and 1891), pl. xii. 5; "Kuseyr' Amra," issued by *K. Akad. d. Wissenschaften* (Vienna, 1907), vol. ii. pl. xxxiv.

[2] A fine volume containing coloured drawings of these frescoes has been published in St Petersburg (British Museum library catalogue, sect. "Academies," St Petersburg, 1874–1887, vol. iv. Tab. 1325a).

[3] This manuscript, written towards the end of the 12th century, was preserved in the Strassburg library until 1870, when it was burnt during the bombardment of the city. See the fine reproduction in facsimile published by the *Soc. pour la conservation des monuments historiques d'Alsace*. Texte explicatif de A. Straub and G. Keller (Strassburg, 1901), pl. lvii., also C. M. Engelhardt, *Herrad von Landsperg und ihr Werk* (Stuttgart and Tübingen, 1818), twelve plates.

[4] MS. j. b. 2. Illustrated in *Critical and Bibliographical Notes on Early Spanish Music* (London, 1887), p. 119.

[5] *Musica getutscht und auszgezogen* (Basel, 1511).

[6] *Organographia* (Wolfenbüttel, 1618), pp. 24, 25, 40.

[7] *Harmonie universelle* (Paris, 1636), *Livre* v. p. 241.

[8] *Principes de la flûte traversière ou flûte d'Allemagne, de la flûte à bec et du hautbois* (Paris, 1722), p. 38.

[9] *Musicus αυτοδιδακτός oder der sich selbst informirende Musicus* (Erfurt, 1738), p. 85.

[10] Fétis, *Rapport sur la fabrication des instruments de musique à l'Exposition Universelle de Paris, en 1855*.

[11] See *Recueil de planches*, vol. iv., and article "Basse de flûte traversière," vol. ii. (Paris, 1751). See also *The Flute*, by R. S. Rockstro (London, 1890), p. 238, where the wood cut is reproduced together with a translation of the article. The Museum of the Conservatoire in Paris also possesses a bass flute by the noted French maker Delusse.

[12] *Versuch einer Anweisung die Flöte traversière zu spielen* (Berlin, 1752).

[13] Unless the contrary is stated, we have always in view, in describing the successive improvements of the flute, the treble flute in D, which is considered to be typical of the family.

[14] "Herrn Johann Joachim Quantzens-Lebenslauf, von ihm selbst entworfen," in the *Historisch-Kritische Beyträge zur Aufnahme der Musik*, by Marpurg (Berlin, 1754), p. 239. Quantz was professor of the flute to Frederick the Great.

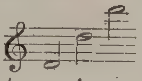
[15] See Johann Georg Tromlitz, *Ausführlicher und gründlicher Unterricht die Flöte zu spielen* (Leipzig, 1791), 1, § 7, and *Über Flöten mit mehrern Klappen* (Leipzig, 1800), cap. vii. § 21.

[16] Antonio Lorenzoni, *Saggio per ben sonare il flauto traverso* (Vicenza, 1779).

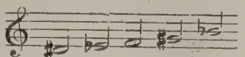
time flutes were constructed with the lower extremity lengthened sufficiently to produce the fundamental C, and furnished with a supplementary key to produce the C♯. This innovation, spoken of by Quantz[1] did not meet with a very favourable reception, and was shortly afterwards abandoned. Passing mention may be made of the drawing of a flute with a C key in the *Music-Saal* of J. F. B. Majer (Nuremberg, 1741), p. 45.

The tuning of the instrument to different pitches was effected by changes in the length, and notably by substituting a longer or shorter upper piece in the middle joint. So wide were the differences in the pitches then in use that seven such pieces for the upper portion of it were deemed necessary. The relative proportions between the different parts of the instrument being altered by these modifications in the length, it was conceived that the just relation could be re-established by dividing the foot into two pieces, below the key. These two pieces were adjusted by means of a tenon, and it was asserted that, in this way, the foot could be lengthened proportionately to the length of the middle joint. Flutes thus improved took the name of “ flûtes à registre.” The register system was, about 1752, applied by Quantz to the head joint[2] and, the embouchure section being thus capable of elongation, it was allowable to the performer, according to the opinion of this professor, to lower the pitch of the flute a semitone, without having recourse to other lengthening pieces, and without disturbing the accuracy of intonation.

The upper extremity of the flute, beyond the embouchure orifice, is closed by means of a cork stopper. On the position of this cork depends, in a great measure, the accurate tuning of the flute. It is in its right place when the accompanying octaves are true. Quantz, in speaking of this accessory, mentions the use of a nut-screw to give the required position to the cork.[3] He does not name the inventor of this appliance, but, according to Tromlitz,[4] the improvement was due to Quantz himself. The invention goes back to 1726.



When the *Method* of Quantz appeared there were still in use, besides the orchestral flute in D, the little fourth flute in G, the low fourth flute in A, and the flûte d'amour a note higher; in France they had, moreover, the little octave flute in D (octave). A bass flute in D had also been attempted (see fig. 5). When Ribock published his *Bemerkungen über die Flöte*[5] the flute had already the five keys here shown. This author states that the inventor of these new keys is not known to him, but that either Kusder, a musical instrument-maker in London, or Johann Georg Tromlitz of Leipzig was the originator, since he has not been able to trace those keys on the flutes of any other maker. Although Tromlitz does not claim for himself the invention of the keys for F, G♯ and B♭, he states that “ he had occupied himself for several years in applying these keys so as not to augment the difficulty of playing, but on the contrary to render the handling of them as easy as possible.”[6] In the later work published in 1800,[7] however, he seems to attribute the invention of these keys to Richard Potter of London; he says that he has never yet been fortunate enough to come across a good flute by that maker—“ the flute has certainly gained by the addition of the keys for F, G♯ and B♭, but this is not everything, for on such a flute much must perforce be left unattempted. . . . Only a flute with eight keys according to my invention is capable of everything.” It would seem, moreover, from circumstantial evidence stated clearly and on good authority by Rockstro[8] that the keys for F, G♯ and B♭ must have been used first in England and made by Richard Potter before 1774. The higher key of C adopted from 1786 by Tromlitz, we believe to have been first recommended by Ribock (1782).[9] Tromlitz in *Über Flöten* describes at length what may be termed the first systematic effort to overcome the difficulties created by the combination of open holes and closed keys. He attempted to solve the question by determining the positions of the holes according to the exigencies of fingering instead of subordinating them to the more arbitrary theories connected with the musical scale.



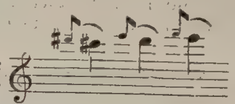
In 1785 Richard Potter improved Quantz's slide applied to the head joint as well as to the register of the foot by a double system of tubes forming double sliding air-tight joints. In the document[10] describing this improvement Potter patented the idea of lining the holes with silver tubes and of adapting metal conical valves to the keys. Potter's patent conical valves were an adaptation of the contrivance first invented by J. F. Boie or Boye of Göttingen,[11] who used pewter for the plugs, and silver for lining the holes. The keys mentioned in the patent were four—D♯, F, G♯, A♯. The idea of extending the compass of the flute downwards was taken up again about the same time by two players of the flute in London named Tacet and Florio. They devised a new disposition of the keys C and C♯, and confided the execution of their invention to Potter. In Dr Arnold's *New Instructions for the German Flute* occurs a tablature, the engraving of which goes back to the end of the 18th century, and bears the following title, “ A Complete Drawing and Concise Scale and Description of Tacet and Florio's new invented German Flute, with all the additional keys explained.” It explains the use of six keys—C, C♯, D♯, F, G♯, A♯—that are not always figured, because the employment of so many keys was at once admitted. Tromlitz himself, who, however, made flutes with nine keys—adding E♭, another F, and C♮, declared that he was not in favour of so great a complication, and that he preferred the flute with only two keys, D♯ and E♭, with a register foot joint and a cork nut-screw at the head joint. This instrument met all requirements. He was always much opposed to the use of the old keys for C♮ and C♯, because they altered the recognised quality of tone of the instrument. When Tromlitz published his method, the family of flutes had become modified. It comprehended only the typical flute in D, the flûte d'amour a minor third lower, a “ third ” flute a minor third higher, and, finally, the little octave flute.

While Tromlitz was struggling in Germany with the idea of augmenting the compass of the flute downwards by employing open keys for C♮ and C♯, an Italian, Giovanni Batista Orazi,[12] increased the scale of the instrument downwards by the application of five new keys, viz. B, B♭, A, A♭, and G. At the same time that he produced this invention[13] he conceived the plugging of the lateral holes by the valve keys then recently invented by Potter. But it was hardly possible to obtain a perfect plugging of seven lateral holes with the aid of as many keys, for the control of which there were only the two little fingers, and therefore this invention of Orazi proved a failure.

In 1808 the Rev. Frederick Nolan,[14] of Stratford, near London, conceived an open key, the lever of which, terminating by a ring, permitted the closing of a lateral hole at the same time the key was being acted upon. The combination in this double action is the embryo of the mechanism that a little later was to transform the system of the flute. Two years later Macgregor,[15] a musical-instrument maker in London, constructed a bass flute an octave lower than the ordinary flute. The idea was not new, as is proved by the existence of the bass flute mentioned above. The difference between the two instruments lies in the mechanism of the keys. That employed by Macgregor consisted of a double lever, a contrivance dating from before the middle of the 18th century, of which the application is seen in an oboe of large dimensions preserved in the National Museum at Munich.[16]

In 1811 Johann Nepomuk Capeller invented the extra D♮ hole and key, which is still in constant use on every flute of modern construction.[17]

About 1830 the celebrated French flautist Tulou added two more keys, those of F♯ and C♯, and a key, called “ de cadence,” to facilitate the accompanying shakes.



To increase the number of keys, to improve their system of plugging, and to extend the scale of the instrument in the lower region,—these had hitherto been the principal problems dealt with in the improvement of the flute. No maker, no inventor to whose labours we have called attention, had as yet devoted his attention to the rational division of the column of air by means of the lateral holes. In 1831 Theobald Boehm, a Bavarian, happening to be in London, was struck with the power of tone the celebrated English performer Charles Nicholson drew from his instrument. Boehm learned, and not without astonishment, that his English colleague obtained this result by giving the lateral holes a much greater diameter than was then usually admitted. About the same time Boehm made the acquaintance of an amateur player named Gordon, who had effected certain improvements; he had bored the lateral hole for the lower E, and had covered it with a key, while he had replaced the key for F with a ring. These innovations set Boehm about attempting a complete reform of the instrument.[1] He went resolutely to work, and during the year 1832 he produced the new flute which bears his name. This instrument is distinguished by a new mechanism of keys, as well as by larger holes disposed along the tube in geometrical progression.

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[1] See *Anweisung*, i. § 15.

[2] See *Lebenslauf, loc. cit.* p. 248, where Quantz states that he invented the adjustable head for the flute.

[3] See *Anweisung*, i. §§ 10-13 and iv. § 26.

[4] *Ausführlicher und gründlicher Unterricht die Flöte zu spielen* (Leipzig, 1791), i. cap. § 20. Compare Schilling, *Univ.-Lexikon* (Leipzig, 1835).

[5] Stendal, 1782 (published under his initials only, J. J. H. R., see p. 2).

[6] *Kurze Abhandlung von Flötenspielen* (Leipzig, 1786), p. 27.

[7] *Über Flöten*, &c., pp. 133 and 134.

[8] See *The Flute*, pp. 242-244 and 561 and 562.

[9] See *op. cit.* pp. 51 and 62.

[10] English patent, No. 1499.

[11] See Rockstro, *op. cit.* p. 197.

[12] *Saggio per costruire e suonare un flauto traverso enarmonico che ha i suoni bassi del violino* (Rome, 1797).

[13] The idea of this large flute was taken up again in 1819 by Trexler of Vienna, who called it the “ panaulon.”

[14] Patent, No. 3183. Part of the specification together with a diagram is reproduced by Rockstro, *op. cit.* pp. 273-274.

[15] Patent, No. 3349. Part of the specification together with a diagram is reproduced by Rockstro, *op. cit.* pp. 273-274.

[16] Another specimen, almost the same, constructed about 1775, and called “ Basse de Musette,” may be seen in the Museum of the Paris Conservatoire.

[17] See account of Capeller's inventions by Carl Maria von Weber in *Allgem. musikal. Zeit.* (Leipzig, 1811), pp. 377-379, a translation of which is given by Rockstro, *op. cit.* pp. 279 and 280.

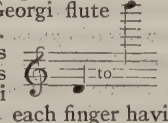
Boehm's system had preserved the key of G♯ open; Coche,[2] a professor in the Paris Conservatoire, assisted by Auguste Buffet the younger, a musical-instrument maker in that city, modified Boehm's flute by closing the G♯ with a key, wishing thus to render the new fingering more conformable to the old. He thus added a key, facilitating the shake upon C♯ with D♯, and brought about some other changes in the instrument of less importance.

Boehm had not, however, altered the bore of the flute, which had been conical from the end of the 17th century. In 1846, however, he made further experiments, and the results obtained were put in practice by the construction of a new instrument, of which the body was given a cylindrical bore, while the diameter of the head was modified at the embouchure, the head-joint becoming parabolic (see fig. 2). The inventor thus obtained a remarkable equality in the tones of the lower octave, a greater sonorousness, and a perfect accuracy of intonation, by establishing the more exact proportions which a column of air of cylindrical form permitted.

The priority of Boehm's invention was long contested, his detractors maintaining that the honour of having reconstructed the flute was due to Gordon. But an impartial investigation vindicates the claim of the former to the invention of the large lateral holes.[3] His greatest title to fame is the invention of the mechanism which allows the production of the eleven chromatic semitones intermediate between the fundamental note and its first harmonic by means of eleven holes so disposed that in opening them successively they shorten the column of air in exact proportional quantities.[4] Boehm (*Essays*, &c.) published a diagram or scheme to be adopted in determining the position of the note-holes of wind instruments for every given pitch. This diagram gives the position of the intermediate holes which he had been enabled to establish by a rule of proportion based on the law of the lengths of strings.

The Boehm flute, notwithstanding the high degree of perfection it has reached, has not secured unanimous favour; even now there are players who prefer the ordinary flute. The change of fingering required for some notes, the great delicacy and liability to derangement of the mechanism, have something to do with this. In England especially, the ordinary flute retains many partisans, thanks to the improvements introduced by a clever player, Abel Siccama, in 1845 (Patent No. 10,553). He bored the lateral holes of E and A lower, and covered them with open keys. He added some keys, and made a better disposition of the other lateral holes, of which he increased the diameter, producing thus a sonorousness almost equal to that of the Boehm flute, while yet preserving the old fingering for the notes of the first two octaves. But in spite of these improvements the old flute will not bear an impartial comparison with that of Boehm.

A flute constructed on a radically new system by Signor Carlo Tommaso Georgi and introduced in 1896 places the technique of the instrument on an entirely new and simple basis. The principal features of this flute consist in an embouchure placed at the upper extremity of the tube instead of at the side, which allows the instrument to be held in a perpendicular position; no tuning cork is required. There are eleven holes mathematically placed in the tube which give the semitones of the scale; there are no keys. The eleven holes are fingered by the fingers and thumbs, the C♯ hole being closed by the side of the left fore-finger. All the notes are obtained by means of simple fingering as far as G♯ of the third octave, the remaining notes of which are produced by cross-fingering. For the convenience of players with short fingers keys can be added, and the head of the Georgi flute can be used with any cylinder flute. The compass of the Georgi flute is almost the same as that of the concert flute; viz.



If the lower C and C♯ are required, extra holes and keys can be added. Everything that is possible on the Boehm flute is possible on the Georgi and more, owing to the simplicity of the fingering; each finger having but one duty to perform, all trills are equally easy. The tone is the true flute tone, brilliant and sympathetic.[5]

The old English *fipple flute*, or *flûte à bec*, is described under the headings RECORDER and FLAGEOLET. (V. M.; K. S.)

2. In architecture the name "flute" is given to the vertical channels (segmental, semicircular or elliptical in horizontal section) employed on the shafts of columns in the classic styles. The flutes are separated one from the other by an "arris" in the Doric order and by a "fillet" in the Ionic and Corinthian orders. The earliest fluted columns are those in Egypt, at first with plain faces without any sinking, subsequently at Karnac (1400 B.C.) with a segmental sinking equal in depth to about one-seventh of the width of the flute. The columns flanking one of the "beehive" tombs at Mycenae have segmental flutes and are the earliest Greek examples. In two of the earliest Doric temples at Metapontum and Syracuse (temple of Apollo) the flutes are also segmental, but in later examples in order to emphasize the arris they were formed of three arcs and are known as "false ellipses," and this applies to nearly all the fluting in Greek examples whether belonging to the Doric, Ionic or Corinthian orders. The number of flutes varies, there being 52 in the archaic temple of Diana at Ephesus and from 30 to 52 flutes in the Persian columns according to the diameter of the column. In the Greek Doric column 20 is the usual number, but there are 16 only in the temples of Sunium, Assos, Segesta and the temple of Apollo at Syracuse; 18 in one of the temples of Selinus and the temple of Diana at Syracuse, and 24 in the temple of Neptune at Paestum. The depth of the flute also varies; in the Propylaea at Athens the radius is equal to the width of the flute and the flute is segmental. In the Parthenon the radius of the central part of the flute is greater than the width, but the smaller arcs on either side accentuate better the arris. A similar accentuation is found in the Ionic and Corinthian orders, where the flutes are separated by fillets, and their section is always elliptical in Greek work, the depth of the flute, however, being always greater than in the Doric order. Thus, in the temple of Ilissus and the Ionic column in the cella of the temple at Bassae, the depth is about one-quarter of the width, in the Propylaea at Priene it is about one-third, and in the Erechtheum and other examples of the Greek Ionic order it is little more than one-half. The width of the fillet also varies, being as a rule one quarter of the width of the flute; and the same applies to the Greek Corinthian order. In the Roman Doric, Ionic and Corinthian orders, the flute is either segmental or semicircular, its depth being about one-third of the width in the Doric column, and in all Ionic, Corinthian and Composite columns half the width of the flute. The fillet also is much broader in Roman examples, being about one-third of the width of the flute. In Roman columns sometimes the flutes of the lower part of the shaft, about one-third of the height, are partly filled with a convex moulding, "cabling" being the usual term applied to this treatment. The French architects of the 16th and 17th centuries carried this decorative feature much farther, and in the Tuileries and the Louvre carved a series of leaves in the flutes. In a few Italian buildings, instead of the fluting of the column being vertical, it twines round the column and is known as spiral fluting; a fine example is found in the Bevilacqua palace at Verona by San Michele. Fluting is sometimes introduced into capitals, as in the tomb of Mylasa, and in friezes, as in the theatre at Cnidos, the Incantada at Salonica, and a doorway at Patara. In one of the museums at Rome is a fine sarcophagus, the sides of which are sculptured with flutes in waved lines. The coronas of many of the Roman temples were carved with flutes. In medieval buildings, fluting was occasionally introduced in imitation of Roman work, as in the churches of central Syria and of Autun and Langres in France, but in the south of Italy and Sicily it would seem to have been brought in as a variety of treatment in the decoration of the shafts carrying the arches of cloisters, as at Monreale in Sicily and in those of St John Lateran and St Paul-outside-the-Walls at Rome. (R. P. S.)

FLUX (Lat. *fluxus*, a flowing; this being also the meaning of the English term in medicine, &c.), in metallurgy, a substance introduced in the smelting of ores to promote fluidity, and to remove objectionable impurities in the form of a slag. The substances in commonest use are:—lime or limestone, to slag off silica and silicates, fluor-spar for lead, calcium and barium sulphates and calcium phosphate, and silica for removing basic substances such as limestone. Other substances are also used, but more commonly in assaying than in metallurgy. Sodium and potassium carbonates are valuable for fluxing off silica; mixed with potassium nitrate sodium carbonate forms a valuable oxidizing fusion mixture; "black flux" is a reducing flux composed of finely divided carbon and potassium carbonate, and formed by deflagrating a mixture of argol with $\frac{1}{4}$ to $\frac{1}{2}$ its weight of nitre. Borax is very frequently employed; it melts to a clear liquid and dissolves silica and many metallic oxides. Potassium bisulphate is useful in the preliminary treatment of refractory aluminous ores. Litharge and red lead are used in silver and gold assays, acting as solvents for silica and any metallic oxides present.

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[1] See *Über den Flötenbau und die neuesten Verbesserungen desselben* (Mainz, 1847); and W. S. Broadwood, *An Essay on the Construction of Flutes originally written by Theobald Boehm, published with the addition of Correspondence and other Documents* (London, 1882).

[2] *Examen critique de la flûte ordinaire comparée à la flûte Boehm* (Paris, 1838).

[3] They existed long before, however, in the Chinese *Ty* and the Japanese *Fuye*.

[4] The reader may consult with advantage Mr C. Welch's *History of the Boehm Flute* (London, 1883), wherein all the documents relating to this interesting discussion have been collected with great impartiality.

[5] For further details see Kathleen Schlesinger, *The Instruments of the Orchestra*, part i. pp. 192-194, where an illustration is given, and Paul Wetzger, *Die Flöte* (Heilbronn, 1906), pp. 23-24, and Tafel iv. No. 20.

FLY (formed on the root of the supposed original Teut. *fleugan*, to fly), a designation applied to the winged or perfect state of many insects belonging to various orders, as in butterfly (see LEPIDOPTERA), dragon-fly (*q.v.*), may-fly (*q.v.*), caddis-fly (*q.v.*), &c.; also specially employed by entomologists to mean any species of the two-winged flies, or DIPTERA (*q.v.*). In ordinary parlance *fly* is often used in the sense of the common house-fly (*Musca domestica*); and by English colonists and sportsmen in South Africa in that of a species of tsetse-fly (*Glossina*), or a tract of country ("belt") in which these insects abound (see TSETSE-FLY).

Apart from the house-fly proper (*Musca domestica*), which in England is the usual one, several species of flies are commonly found in houses; *e.g.* the *Stomoxys calcitrans*, or stable-fly; *Pollenia rudis*, or cluster-fly; *Muscina stabulans*, another stable-fly; *Calliphora erythrocephala*, blue-bottle fly, blow-fly or meat-fly, with smaller sorts of blue-bottle, *Phormia terraenovae* and *Lucilia caesar*; *Homalomyia canicularis* and *brevis*, the small house-fly; *Scenopinus fenestralis*, the black window-fly, &c. But *Musca domestica* is far the most numerous, and in many places, especially in hot weather and in hot climates, is a regular pest. Mr L. O. Howard (Circular 71 of the Bureau of Entomology U.S. Dept. of Agriculture, Washington, 1906) says that in 1900 he made a collection of the flies in dining-rooms in different parts of the United States, and out of a total of 23,087 flies, 22,808 were the common house-fly. Its geographical distribution is of the widest, and its rapidity of breeding, in manure and door-yard filth, so great that, as a carrier of germs of disease, especially cholera and typhoid, the house-fly is now recognized as a potent source of danger; and various sanitary regulations have been made, or precautions suggested, for getting rid of it. These are discussed by Mr Howard in the paper referred to, but in brief they all amount to measures of general hygiene, and the isolation, prompt removal, or proper sterilization of the animal or human excrement in which these flies breed.

FLYCATCHER, a name introduced in ornithology by Ray, being a translation of the *Muscicapa* of older authors, and applied by Pennant to an extremely common English bird, the *M. grisola* of Linnaeus. It has since been used in a general and very vague way for a great many small birds from all parts of the world, which have the habit of catching flies on the wing. Ornithologists who have trusted too much to this characteristic and to certain merely superficial correlations of structure, especially those exhibited by a broad and rather flat bill and a gape beset by strong hairs or bristles, have associated under the title of *Muscicapidae* an exceedingly heterogeneous assemblage of forms much reduced in number by later systematists. Great advance has been made in establishing as independent families the *Todidae* and *Eurylaemidae*, as well as in excluding from it various members of the *Ampelidae*, *Cotingidae*, *Tyrannidae*, *Vireonidae*, *Mniotiltidae*, and perhaps others, which had been placed within its limits. These steps have left the *Muscicapidae* a purely Old-World family of the order *Passeres*, and the chief difficulty now seems to lie in separating it from the *Campephagidae* and the *Laniidae*. Only a very few of the forms of flycatchers (which, after all the deductions above mentioned, may be reckoned to include some 60 genera or subgenera, and perhaps 250 species) can here be even named.[1]

The best-known bird of this family is that which also happens to be the type of the Linnaean genus *Muscicapa*—the spotted or grey flycatcher (*M. grisola*). It is a common summer visitant to nearly the whole of Europe, and is found throughout Great Britain, though less abundant in Scotland than in England, as well as in many parts of Ireland, where, however, it seems to be but locally and sparingly distributed. It is one of the latest migrants to arrive, and seldom reaches the British Islands till the latter part of May, when it may be seen, a small dust-coloured bird, sitting on the posts or railings of gardens and fields, ever and anon springing into the air, seizing with an audible snap of its bill some passing insect as it flies, and returning to the spot it has quitted, or taking up some similar station to keep watch as before. It has no song, but merely a plaintive or peevish call-note, uttered from time to time with a jerking gesture of the wings and tail. It makes a neat nest, built among the small twigs which sprout from the bole of a large tree, fixed in the branches of some plant trained against a wall, or placed in any hole of the wall itself that may be left by the falling of a brick or stone. The eggs are from four to six in number, of a pale greenish-blue, closely blotched or freckled with rust-colour. Silent and inconspicuous as is this bird, its constant pursuit of flies in the closest vicinity of houses makes it a familiar object to almost everybody. A second British species is the pied flycatcher (*M. atricapilla*), a much rarer bird, and in England not often seen except in the hilly country extending from the Peak of Derbyshire to Cumberland, and more numerous in the Lake District than elsewhere. It is not common in Scotland, and has only once been observed in Ireland. More of a woodland bird than the former, the brightly-contrasted black and white plumage of the cock, together with his agreeable song, readily attracts attention where it occurs. It is a summer visitant to all western Europe, but farther eastward its place is taken by a nearly allied species (*M. collaris*) in which the white of the throat and breast extends like a collar round the neck. A fourth European species (*M. parva*), distinguished by its very small size and red breast, has also strayed some three or four times to the extreme south-west of England. This last belongs to a group of more eastern range, which has received generic recognition under the name of *Erythrosterna*, and it has several relations in Asia and particularly in India, while the allies of the pied flycatchers (*Ficedula* of Brisson) are chiefly of African origin, and those of the grey or spotted flycatcher (*Muscicapa* proper[2]) are common to the two continents.

One of the most remarkable groups of *Muscicapidae* is that known as the paradise flycatchers, forming the genus *Tchitrea* of Lesson. In nearly all the species the males are distinguished by the growth of exceedingly long feathers in their tail, and by their putting on, for some part of the year at least, a plumage generally white, but almost always quite different from that worn by the females, which is of a more or less deep chestnut or bay colour, though in both sexes the crown is of a glossy steel-blue. They are found pretty well throughout Africa and tropical Asia to Japan, and seem to affect the deep shade of forests rather than the open country. The best-known species is perhaps the Indian *T. paradisi*; but the Chinese *T. incii*, and the Japanese *T. princeps*, from being very commonly represented by the artists of those nations on screens, fans and the like, are hardly less so; and the cock of the last named, with his bill of a pale greenish-blue and eyes surrounded by bare skin of the same colour—though these are characters possessed in some degree by all the species—seems to be the most beautiful of the genus. *T. bourbonnensis*, which is peculiar to the islands of Mauritius and Réunion, appears to be the only species in which the outward difference of the sexes is but slight. In *T. corvina* of the Seychelles, the adult male is wholly black, and his middle tail-feathers are not only very long but very broad. In *T. mutata* of Madagascar, some of the males are found in a blackish plumage, though with the elongated median rectrices white, while in others white predominates over the whole body; but whether this sex is here actually dimorphic, or whether the one dress is a passing phase of the other, is at present undetermined. Some of the African species, of which many have been described, seem always to retain the rufous plumage, but the long tail-feathers serve to mark the males.

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[1] Of the 30 genera or subgenera which Swainson included in his *Natural Arrangement and Relations of the Family of Flycatchers* (published in 1838), at least 19 do not belong to the *Muscicapidae* at all, and one of them, *Todus*, not even to the order *Passeres*. It is perhaps impossible to name any ornithological work whose substance so fully belies its title as does this treatise. Swainson wrote it filled with faith in the so-called "Quinary System"—that fanciful theory, invented by W. S. Macleay, which misled and kept back so many of the best English zoologists of his generation from the truth,—and, unconsciously swayed by his bias, his judgment was warped to fit his hypothesis.

[2] By some writers this section is distinguished as *Butalis* of Boie, but to do so seems contrary to rule.

A few other groups are distinguished by the brilliant blue they exhibit, as *Myiagra azurea*, and others as *Monarcha* (or *Arses*) *chrysomela* by their golden yellow. The Australian forms assigned to the *Muscicapidae* are very varied. *Sisura inquieta* has some of the habits of a water-wagtail (*Motacilla*), and hence has received the name of "dishwasher," bestowed in many parts of England on its analogue; and the many species of *Rhipidura* or fantailed flycatchers, which occur in various parts of the Australian Region, have manners still more singular—turning over in the air, it is said, like a tumbler pigeon, as they catch their prey; but concerning the mode of life of the majority of the *Muscicapidae*, and especially of the numerous African forms, hardly anything is known. (A. N.)

FLYGARE-CARLÉN, EMILIE (1807–1892), Swedish novelist, was born in Strömstad on the 8th of August 1807. Her father, Rutger Smith, was a retired sea-captain who had settled down as a small merchant, and she often accompanied him on the voyages he made along the coast. She married in 1827 a doctor named Axel Flygare, and went with him to live in the province of Småland. After his death in 1833 she returned to her old home and published in 1838 her first novel, *Waldemar Klein*. In the next year she removed to Stockholm, and married, in 1841, the jurist and poet, Johan Gabriel Carlén (1814–1875). Her house became a meeting-place for Stockholm men of letters, and for the next twelve years she produced one or two novels annually. The premature death of her son Edvard Flygare (1829–1853), who had already published three books, showing great promise, was followed by six years of silence, after which she resumed her writing until 1884. The most famous of her tales are *Rosen på Tistelön* (1842; Eng. trans. *The Rose of Tistelön*, 1842); *Enslingen på Johannesskäret* (1846; Eng. trans. *The Hermit*, 4 vols., 1853); and *Ett Köpemanshus i skärgården* (1859; *The Merchant's House on the Cliffs*). Fru Carlén published in 1878 *Minnen af svenskt författarlif 1840–1860*, and in 1887–1888 three volumes of *Efterskörd från en 80- årings författarbana*, containing her last tales. She died at Stockholm on the 5th of February 1892. Her daughter, Rosa Carlén (1836–1883), was also a popular novelist.

Emilie Flygare-Carlén's novels were collected in thirty-one volumes (Stockholm, 1869–1875).

FLYING BUTTRESS, in architecture, the term given to a structural feature employed to transmit the thrust of a vault across an intervening space, such as an aisle, chapel or cloister, to a buttress built outside the latter. This was done by throwing a semi-arch across to the vertical buttress. Though employed by the Romans and in early Romanesque work, it was generally masked by other constructions or hidden under a roof, but in the 12th century it was recognized as rational construction and emphasized by the decorative accentuation of its features, as in the cathedrals of Chartres, Le Mans, Paris, Beauvais, Reims, &c. Sometimes, owing to the great height of the vaults, two semi-arches were thrown one above the other, and there are cases where the thrust was transmitted to two or even three buttresses across intervening spaces. As a vertical buttress, placed at a distance, possesses greater power of resistance to thrust than if attached to the wall carrying the vault, vertical buttresses as at Lincoln and Westminster Abbey were built outside the chapterhouse to receive the thrust. All vertical buttresses are, as a rule, in addition weighted with pinnacles to give them greater power of resistance.

FLYING COLUMN, in military organization, an independent corps of troops usually composed of all arms, to which a particular task is assigned. It is almost always composed in the course of operations, out of the troops immediately available. Mobility being its *raison d'être*, a flying column is when possible composed of picked men and horses accompanied with the barest minimum of baggage. The term is usually, though not necessarily, applied to forces under the strength of a brigade. The "mobile columns" employed by the British in the South African War of 1899–1902, were usually of the strength of two battalions of infantry, a battery of artillery, and a squadron of cavalry—almost exactly half that of a mixed brigade. Flying columns are mostly used in savage or guerrilla warfare.

"**FLYING DUTCHMAN**," a spectre-ship popularly believed to haunt the waters around the Cape of Good Hope. The legend has several variants, but the commonest is that which declares that the captain of the vessel, Vanderdecken, was condemned for his blasphemy to sail round the cape for ever, unable to "make" a port. In the Dutch version the skipper is the ghost of the Dutch seaman Van Straaten. The appearance of the "Flying Dutchman" is considered by sailors as ominous of disaster. The German legend makes one Herr Von Falkenberg the hero, and alleges that he is condemned to sail for ever around the North Sea, on a ship without helm or steersman, playing at dice for his soul with the devil. Sir Walter Scott says the "Flying Dutchman" was originally a vessel laden with bullion. A murder was committed on board, and thereafter the plague broke out among the crew, which closed all ports to the ill-fated craft. The legend has been used by Wagner in his opera *Der fliegende Holländer*.

FLYING-FISH, the name given to two different kinds of fish. The one (*Dactylopterus*) belongs to the gurnard family (*Triglidae*), and is more properly called flying gurnard; the other (*Exocoetus*) has been called flying herring, though more nearly allied to the gar-pike than to the herring. Some other fishes with long pectoral fins (*Pterois*) have been stated to be able to fly, but this has been proved to be incorrect.

The flying gurnards are much less numerous than the *Exocoeti* with regard to individuals as well as species, there being only three or four species known of the former, whilst more than fifty have been described of the latter, which, besides, are found in numerous shoals of thousands. The *Dactylopteri* may be readily distinguished by a large bony head armed with spines, hard keeled scales, two dorsal fins, &c. The *Exocoeti* have thin, deciduous scales, only one dorsal fin, and the ventrals placed far backwards, below the middle of the body; some have long barbels at the chin. In both kinds the pectoral fins are greatly prolonged and enlarged, modified into an organ of flight, and in many species of *Exocoetus* the ventral fins are similarly enlarged, and evidently assist in the aerial evolutions of these fishes. Flying-fishes are found in the tropical and subtropical seas only, and it is a singular fact that the geographical distribution of the two kinds is nearly identical. Flying-fish are more frequently

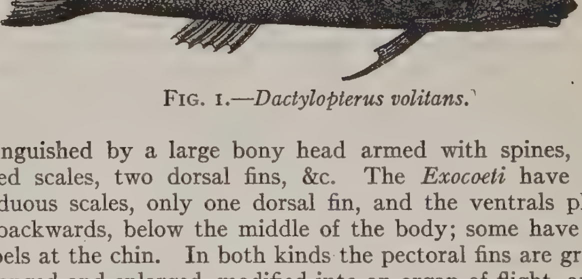


FIG. 1.—*Dactylopterus volitans.*

observed in rough weather and in a disturbed sea than during calms; they dart out of the water when pursued by their enemies or frightened by an approaching vessel, but frequently also without any apparent cause, as is also observed in many other fishes; and they rise without regard to the direction of the wind or waves. The fins are kept quietly distended, without any motion, except an occasional vibration caused by the air whenever the surface of the wing is parallel with the current of the wind. Their flight is rapid, greatly exceeding that of a ship going 10 m. an hour, but gradually decreasing in velocity and not extending beyond a distance of 500 ft. Generally it is longer when the fishes fly against, than with or at an angle to, the wind. Any vertical or horizontal deviation from a straight line is not caused at the will of the fish, but by currents of the air; thus they retain a horizontally straight course when flying with or against the wind, but are carried towards the right or left whenever the direction of the wind is at an angle with that of their flight. However, it sometimes happens that the fish during its flight immerses its caudal fin in the water, and by a stroke of its tail turns towards the right or left. In a calm the line of their flight is always also vertically straight or rather parabolic, like the course of a projectile, but it may become undulated in a rough sea, when they are flying against the course of the waves; they then frequently overtop each wave, being carried over it by the pressure of the disturbed air. Flying-fish often fall on board of vessels, but this never happens during a calm or from the lee side, but during a breeze only and from the weather side. In day time they avoid a ship, flying away from it, but during the night when they are unable to see, they frequently fly against the weather board, where they are caught by the current of the air, and carried upwards to a height of 20 ft. above the surface of the water, whilst under ordinary circumstances they keep close to it. All these observations point clearly to the fact that any deflection from a straight course is due to external circumstances, and not to voluntary action on the part of the fish.

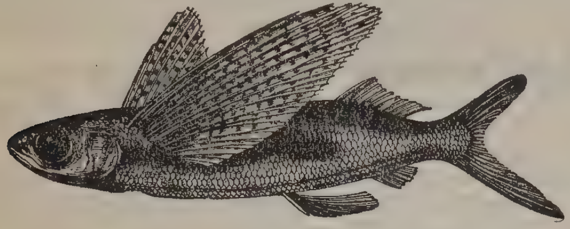


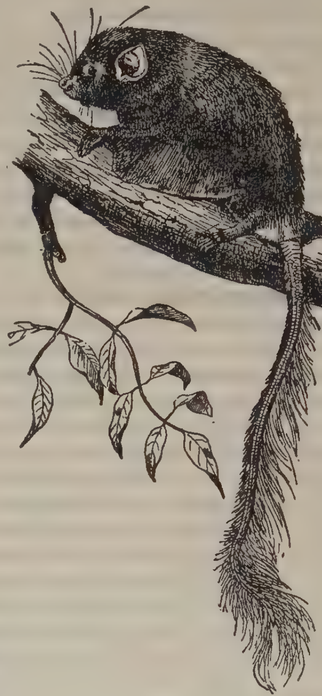
FIG. 2.—*Exocoetus callopterus.*

A little Malacopterygian fish about 4 in. long has recently been discovered in West Africa which has the habits of a fresh-water flying-fish. It has been named *Pantodon buchholzi.* It has very large pectoral fins with a remarkable muscular process attached to the inner ray. It lives in fresh-water lakes and rivers in the Congo region, and has been caught in its flight above the water in a butterfly-net.

FLYING-FOX, or, more correctly, FOX-BAT. The first name is applied by Europeans in India to the fruit-eating bats of the genus *Pteropus*, which contains more than half the family (*Pteropidae*). This genus is confined to the tropical regions of the Eastern hemisphere and Australia. It comprises numerous species, a considerable proportion of which occur in the islands of the Malay Archipelago. The flying-foxes are the largest of the bats, the kalong of Java (*Pteropus edulis*) measuring about a foot in length, and having an expanse of wing-membrane measuring 5 ft. across. Flying-foxes are gregarious, nocturnal bats, suspending themselves during the day head-downwards by thousands from the branches of trees, where with their wings gathered about them, they bear some resemblance to huge shrivelled-up leaves or to clusters of some peculiar fruit. In Batchian, according to Wallace, they suspend themselves chiefly from the branches of dead trees, where they are easily caught or knocked down by sticks, the natives carrying them home in basketfuls. They are then cooked with abundance of spices, and "are really very good eating, something like hare." Towards evening these bats bestir themselves, and fly off in companies to the village plantations, where they feed on all kinds of fruit, and so numerous and voracious are they that no garden crop has much chance of being gathered which is not specially protected from their attacks. The flying-fox of India (*Pteropus medius*) is a smaller species, but is found in great numbers wherever fruit is to be had in the Indian peninsula.

FLYING-SQUIRREL, properly the name of such members of the squirrel-group of rodent mammals as have a parachute-like expansion of the skin of the flanks, with attachments to the limbs, by means of which they are able to take long flying-leaps from tree to tree. The parachute is supported by a cartilage attached to the wrist or carpus; in addition to the lateral membrane, there is a narrow one from the cheek along the front of each shoulder to the wrist, and in the larger species a third (interfemoral) connecting the hind-limbs with the base of the long tail. Of the two widely distributed genera, *Pteromys* includes the larger and *Sciuropterus* the smaller species. The two differ in certain details of dentition, and in the greater development in the former of the parachute, especially the interfemoral portion, which in the latter is almost absent. In *Pteromys* the tail is cylindrical and comparatively thin, while in *Sciuropterus* it is broad, flat and laterally expanded, so as to compensate for the absence of the interfemoral membrane by acting as a supplementary parachute.

In general appearance flying-squirrels resemble ordinary squirrels, although they are even more beautifully coloured. Their habits, food, &c., are also very similar to those of the true squirrels, except that they are more nocturnal, and are therefore less often seen. The Indian flying-squirrel (*P. oral*) leaps with its parachute extended from the higher branches of a tree, and descends first directly and then more and more obliquely, until the flight, gradually becoming slower, assumes a horizontal direction, and finally terminates in an ascent to the branch or trunk of the tree to which it was directed. The presence of these rodents at night is made known by their screaming cries. *Sciuropterus* is represented by *S. volucella* in eastern Europe and northern Asia, and by a second species in North America, but the other species of this genus and all those of *Pteromys* are Indo-Malayan. A third genus, *Eupetaurus*, typified by a very large, long-haired, dark-grey species from the mountains to the north-west of Kashmir (*Eu. cinereus*), differs from all other members of the squirrel-family by its tall-crowned molar teeth. It has a total length of 37 in., of which 22 are taken up by the tail.



Pigmy African Flying-Squirrel
(*Idiurus zenkeri*).

In Africa the name of flying-squirrel is applied to the members of a very different family of rodents, the *Anomaluridae*, which are provided with a parachute. Since, however, this parachute is absent in some members of the family, the most distinctive character is the presence of a double row of spiny scales on the under surface of the tail, which apparently aid in climbing. The flying species are also distinguished from ordinary flying-squirrels by the circumstance that the additional bone serving for the support of the fore part of the flying-membrane rises from the elbow-joint instead of from the wrist. The family is represented by two flying genera, *Anomalurus* and *Idiurus*; the latter containing only one very minute species (shown in the cut) characterized by its small ears and elongated tail. Most of the species are West African. In habits these rodents appear to be very similar to the true flying-squirrels. The species without a parachute constitutes the genus *Zenkerella*, and looks very like an ordinary squirrel (see Rodentia).

In Australia and Papua the name flying-squirrel is applied to such marsupials as are provided with parachutes; animals which naturalists prefer to designate flying-phalangers (see Marsupialia). (R.L.*)

FLYSCH, in geology, a remarkable formation, composed mainly of sandstones, soft marls and sandy shales found extending from S.W. Switzerland eastward along the northern Alpine zone to the Vienna basin, whence it may be followed round the northern flanks of the Carpathians into the Balkan peninsula. It is represented in the Pyrenees, the Apennines, the Caucasus and extends into Asia; similar flysch-like deposits are related to the Himalayas as the European formations are to the Alps. The Flysch is not of the same age in every place; thus in the western parts of Switzerland the oldest portions probably belong to the Eocene period, but the principal development is of Oligocene age; as it is traced eastward we find in the east Alps that it descends into the upper Cretaceous, and in the Vienna region and the Carpathians it contains intercalations which clearly indicate a lower Cretaceous horizon for the lower parts. It appears indeed that this type of formation was in progress of deposition at one point or another in the regions enumerated above from Jurassic to late Tertiary times. The absence of fossils from enormous thicknesses of Flysch makes the correlation with other formations difficult; often the only indications of organisms are the abundant markings supposed to represent Algae (Chondrites, &c.), which have given rise to the term "Hieroglyphic-sandstone." The most noteworthy exceptions are perhaps the Oligocene fish-bed of Glarus, the Eocene nummulitic beds in Calabria, and the *Aptychus* beds of Waidhofen. Local phases of the Flysch have received special names; it is the "Vienna" or "Carpathian" sandstone of those regions; the "macigno" (a soft sandstone with calcareous cement) of the Maritime Alps and Apennines; the "scagliose" (scaly clays) and "alberese" (limestones) of the same places are portions of this formation. The *gris de Menton*, the *gris d'Annot* of the Basses Alps, and the *gris d'Embrun* of Chaillot appear in Switzerland as the *gris de Taveyannaz*. At several places the upper layers of the Flysch are iron-stained, as in the region of Léman and at the foot of the Dent du Midi; it is then styled the "Red-Flysch." Lenticular intercalations of gabbro, diabase, &c., occur in the Flysch in Calabria on the Pyrenees. Large exotic blocks of granite, gneiss and other crystalline rocks in coarse conglomerates are found near Vienna, near Sonthofen in Bavaria, near Lake Thun (Wild Flysch) and at other points, which have been variously regarded as indications of glaciation or of coastal conditions.

FOČA (pronounced *Fáwtcha*), a town of Bosnia, situated at the confluence of the Drina and Čehotina rivers, and encircled by wooded mountains. Pop. (1895) 4217. The town is the headquarters of a thriving industry in silver filigree-work and inlaid weapons, for which it was famous. With its territories enclosed by the frontiers of Montenegro and Novi Bazar, Foča, then known as *Chocha*, was the scene of almost incessant border warfare during the middle ages. No monuments of this period are left except the Bogomil cemeteries, and the beautiful mosques, which are the most ancient in Bosnia. The three adjoining towns of Foča, Goraždа and Ustikolina were trading-stations of the Ragusans in the 14th century, if not earlier. In the 16th century, Benedetto Ramberti, ambassador from Venice to the Porte, described the town, in his *Libri Tre delle Cose dei Turchi*, as *Cozza*, "a large settlement, with good houses in Turkish style, and many shops and merchants. Here dwells the governor of Herzegovina, whose authority extends over the whole of Servia. Through this place all goods must pass, both going and returning, between Ragusa and Constantinople."

FOCHABERS, a burgh of barony and village of Elginshire, Scotland. Pop. (1901) 981. It is delightfully situated on the Spey, about 9 m. E. by S. of Elgin, the terminus of a branch of the Highland railway connecting at Orbliston Junction with the main line from Elgin to Keith. The town was rebuilt in its present situation at the end of the 18th century, when its earlier site was required for alterations in the grounds of Gordon Castle, in which the old town cross still stands. The streets all lead at right angles to the central square, where fairs and markets are held. The public buildings include a library and reading-room, the court-house and the Milne school, named after Alexander Milne, who endowed it with a legacy of £20,000. Adjoining the town, surrounded by a park containing many magnificent old trees, stands Gordon Castle, the chief seat of the duke of Richmond and Gordon, erected in the 18th century. The antiquary George Chalmers (1742–1825) and the composer William Marshall (1748–1833) were natives of the burgh.

FOCSHANI (Rumanian *Focşani*, sometimes incorrectly written *Fokshani* or *Fokshan*), the capital of the department of Putna, Rumania; on the river Milcov, which formed the ancient frontier of the former principalities of Moldavia and Walachia. Pop. (1900) 23,783; of whom 6000 were Jews. The chief buildings are the prefecture, schools, synagogues, and many churches, including those of the Armenians and Protestants. Focshani is a commercial centre of some importance, the chief industries being oil and soap manufacture and tannery. A large wine trade is also carried on, and corn is shipped in lighters to Galatz. The annual fair is held on the 29th of April. Government explorations in the vicinity of this town show it to be rich in minerals, such as iron, copper, coal and petroleum. The line Focshani-Galatz is covered by a very strong line of fortifications, known as the Sereth Line. A congress between Russian and Turkish diplomatists was held near the town in 1772. In the neighbourhood the Turks suffered a severe defeat from the Austrians and Russians in 1789.

FOCUS (Latin for "hearth" or "fireplace"), a point at which converging rays meet, toward which they are directed, or from which diverging rays are directed; in the latter case called the virtual focus (see Microscope; Telescope; Lens). In geometry the word is used to denote certain points (see Geometry; Conic Section; and Perspective).

FOG, the name given to any distribution of solid or liquid particles in the surface layers of the atmosphere which renders surrounding objects notably indistinct or altogether invisible according to their distance. In its more intense forms it hinders and delays travellers of all kinds, by sea or land, by railway, road or river, or by the mountain path. It is sometimes so thick as to paralyse traffic altogether. According to the *New English Dictionary* the word "appears to be" a back formation from the adjective "foggy," a derivative of "fog" used with its old meaning of aftermath or coarse grass, or, in the north of Britain, of "moss." Such a formation would be reasonable, because wreaths of fog in the atmospheric sense are specially characteristic of meadows and marshes where fog, in the more ancient sense, grows.

Two other words, *mist* and *haze*, are also in common use with reference to the deterioration of transparency of the surface layers of the atmosphere caused by solid or liquid particles, and in ordinary literature the three words are used almost according to the fancy of the writer. It seems possible to draw a distinction between mist and haze that would be fairly well supported by usage. Mist may be defined as a cloud of water particles at the surface of land or sea, and would only occur when the air is nearly or actually saturated, that is, when there is little or no difference between the readings of the dry and wet bulbs; the word haze, on the other hand, may be reserved for the obscuration of the surface layers of the atmosphere when the air is dry.

It would not be difficult to quote instances in which even this distinction is disregarded in practice. Indeed, the telegraphic code of the British Meteorological Office uses the same figure for mist and haze, and formerly the Beaufort weather notation had no separate letter for haze (now indicated by *z*), though it

Description of Effects.

Name.	No.	On Land.	On Sea.	On River.
Slight Fog or Mist	1	Objects indistinct, but traffic by rail or road unimpeded	Horizon invisible, but lights and landmarks visible at working distances	Objects indistinct, but navigation unimpeded
Moderate Fog	2	Traffic by rail requires additional caution	Lights, passing vessels and landmarks generally indistinct under a mile. Fog signals are sounded	Navigation impeded, additional caution required
	3	Traffic by rail or road impeded		
Thick Fog	4	Traffic by rail or road impeded	Ships' lights and vessels invisible at ¼ mile or less	Navigation suspended
	5	Traffic by rail or road totally disorganized		

distinguished between *f*, fog, and *m*, mist. It is possible, however, that these practices may arise, not from confusion of idea, but from economy of symbols, when the meaning can be made out from a knowledge of the associated observations.

As regards the distinction between mist and fog, careful consideration of a number of examples leads to the conclusion that the word “fog” is used to indicate not so much the origin or meteorological nature of the obscurity as its effect upon traffic and travellers whether on land or sea. It is, generally speaking, “in a fog” that a traveller loses himself, and indeed the phrase has become proverbial in that sense. A “fog-bell” or “fog-horn” is sounded when the atmosphere is so thick that the aid of sound is required for navigation. A vessel is “fog-logged” or “fog-bound” when it is stopped or detained on account of thick atmosphere. A “fog-signal” is employed on railways when the ordinary signals are obliterated within working distances. A “fog-bow” is the accompaniment of conditions when a mountain traveller is apt to lose his way.

These words are used quite irrespective of the nature of the cloud which interferes with effective vision and necessitates the special provision; the word “mist” is seldom used in similar connexion. We may thus define a fog as a surface cloud sufficiently thick to cause hindrance to traffic. It will be a *thick mist* if the cloud consists of water particles, a *thick haze* if it consists of smoke or dust particles which would be persistent even in a dry atmosphere.

It is probable that sailors would be inclined to restrict the use of the word to the surface clouds met with in comparatively calm weather, and that the obscurity of the atmosphere when it is blowing hard and perhaps raining hard as well should be indicated by the terms “thick weather” or “very thick weather” and not by “fog”; but the term “fog” would be quite correctly used on such occasions from the point of view of cautious navigation. If cloud, drizzling rain, or heavy rain cause such obscurity that passing ships are not visible within working distances the sounding of a fog-horn becomes a duty.

The number of occasions upon which fog and mist may be noted as occurring with winds of different strengths may be exemplified by the following results of thirty years for St Mary's, Scilly Isles, where the observations have always been made by men of nautical experience.

Wind Force.	0 & 1	2	3	4	5	6	7	8–12	All Winds.
Number of occasions of fog per 1000 observations	8	7	9	14	6	3	<1	<1	47
Number of occasions of mist per 1000 observations	5	6	11	22	20	12	6	2	84

The use of the word “fog” in the connexion “high fog,” to describe the almost total darkness in the daytime occasionally noted in London and other large cities due to the persistent opaque cloud in the upper air without serious obscuration of the surface layers, is convenient but incorrect.

Regarding “fog” as a word used to indicate the state of the atmosphere as regards transparency considered with reference to its effect upon traffic, a scale of fog intensity has been introduced for use on land or at sea, whereby the intensity of obscurity is indicated by the numbers 1 to 5 in the table following. At sea or in the country a fog, as a rule, is white and consists of a cloud of minute water globules, of no great vertical thickness, which disperses the sunlight by repeated reflection but is fully translucent. In dust-storms and sand-storms dark or coloured fog clouds are produced such as those which are met with in the Harmattan winds off the west coast of Africa. In large towns the fog cloud is darkened and intensified by smoke, and in some cases may be regarded as due entirely to the smoke.

The physical processes which produce fogs of water particles are complicated and difficult to unravel. We have to account for the formation and maintenance of a cloud at the earth's surface; and the process of cloud-formation which is probably most usual in nature, namely, the cooling of air by rarefraction due to the reduction of pressure on ascent, cannot be invoked, except in the case of the fogs forming the cloud-caps of hills, which are perhaps not fairly included. We have to fall back upon the only other process hitherto recognized as causing cloudy condensation in the atmosphere, that is to say, the mixing of masses of mist air of different temperatures. The mixing is brought about by the slow motion of air masses, and this slow motion is probably essential to the phenomenon.

Over the sea fog is most frequently due to the cooling of a surface layer of warm air by the underlying cold water. The amount of motion of the air must be sufficient to prevent the condensation taking place at the sea surface without showing itself as a cloud. In a research on the Life History of Surface Air Currents the changes incidental to the movement of the air over the north Atlantic Ocean were traced with great care, and the above examples (Tables I, II) taken from page 72 of the work referred to are typical of the formation of sea fog by the cooling of a relatively warm current passing over cold water.

TABLE I.—*Air travelling from Northern Africa to Northern Russia, round by the Azores.*

Successive Temperatures of sea	68°	68°	67°	59°	54°F.
,, ,, ,, air	68°	70°	67°	60°	56°F.
,, States of the atmosphere	clear	clear	clear	shower	mist

TABLE II.—*Air travelling from N.W. Africa to Scotland.*

Successive Temperatures of sea	67°	63°	54° F.
,, ,, ,, air	66°	64°	53° F.
,, State of atmosphere	fair	shower	mist with shower

In conformity with this suggestion we find that fog is most liable to occur over the open ocean in those regions where, as off the Newfoundland banks, cold-water currents underlie warm air, and that it is most frequent at the season of the year when the air temperature is increasing faster than the water temperature. But it is difficult to bring this hypothesis always to bear upon actual practice, because the fog is representative of a temperature difference which has ceased to exist. One cannot therefore observe under ordinary circumstances both the temperature difference and the fog. Doubtless one requires not only the initial temperature difference but also the slow drift of air which favours cooling of the lower layers without too much mixing and consequently a layer of fog close to the surface. Such a fog, the characteristic sea fog, may be called a cold surface fog. From the conditions of its formation it is likely to be less dense at the mast-head than it is on deck.

One would expect that a cold-air current passing over a warm sea surface would give rise to an ascending current of warmed air and hence cause cumulus cloud and possibly thunder showers rather than surface fog, but one cannot resist the conclusion that sea fog is sometimes formed by slow transference of cold air over relatively warm water, giving rise to what may be called a "steaming-pot" fog. In such a case the actual surface layer in contact with the warm water would be clear, and the fog would be thicker aloft where the mixing of cold air and water vapour is more complete. Such fogs are, however, probably rare in comparison with the cold-water fogs. If the existence of a cold current over warm water were a sufficient cause of fog, as a current of warm air over cold water appears to be, the geographical distribution of notable fog would be much more widespread than it actually is, and the seasonal distribution of fog would also be other than it is.

The formation of fog over land seems to be an even more complicated process than over the sea. Certainly in some cases mistiness amounting to fog arises from the replacement of cold surface air which has chilled the earth and the objects thereon by a warm current. But this process can hardly give rise to detached masses or banks of fog. The ordinary land or valley fog of the autumn evening or winter morning is due to the combination of three causes, first the cooling of the surface layer of air at or after sunset by the radiation of the earth, or more particularly of blades of grass, secondly the slow downward flow (in the absence of wind) of the air thus cooled towards lower levels following roughly the course of the natural water drainage of the land, and thirdly the supply of moisture by evaporation from warm moist soil or from the relatively warm water surface of river or lake. In this way steaming-pot fog gradually forms and is carried downward by the natural though slow descent of the cooled air. It thus forms in wreaths and banks in the lowest parts, until perhaps the whole valley becomes filled with a cloud of mist or fog. A case of this kind in the Lake District is minutely described by J. B. Cohen (*Q. J. Roy. Met. Soc.* vol. 30, p. 211, 1904).

It will be noticed that upon this hypothesis the circumstances favourable for fog formation are (1) a site near the bottom level of the drainage area, (2) cold surface air and no wind, (3) an evening or night of vigorous radiation, (4) warm soil, and (5) abundant moisture in the surface-soil. These conditions define with reasonable accuracy the circumstances in which fog is actually observed.

The persistence of these fog wreaths is always remarkable when one considers that the particles of a fog cloud, however small they may be, must be continually sinking through the air which holds them, and that unless some upward motion of the air keeps at least a balance against this downward fall, the particles of the cloud must reach the earth or water and to that extent the cloud must disappear. In sheltered valleys it is easy to suppose that the constant downward drainage of fresh and colder fog-laden material at the surface supplies to the layers displaced from the bottom the necessary upward motion, and the result of the gradual falling of drops is only that the surface cloud gets thicker; but there are occasions when the extent and persistence of land fog seems too great to be accounted for by persistent radiation cooling. For example, in the week before Christmas of 1904 the whole of England south of the Humber was covered with fog for several days. It is of course possible that so much fog-laden air was poured down from the sides of mountains and hills that did project above the surface of the fog, as to keep the lower reaches supplied for the whole time, but without more particulars such a statement seems almost incredible. Moreover, the drifting of fog banks over the sea seems capricious and unrelated to any known circumstances of fog-formation, so that one is tempted to invoke the aid of electrification of the particles or some other abnormal condition to account for the persistence of fog. The observations at Kew observatory show that the electrical potential is abnormally high during fog, but whether that is the cause or the result of the presence of the water particles, we are not yet in a position to say. It must be remembered that a fog cloud ought to be regarded as being, generally speaking, *in process of formation* by mixing. Observations upon clouds formed experimentally in globes tend to show that if a mass of fog-bearing air could be enclosed and kept still for only a short while the fog would settle and leave the air clear. The apparently capricious behaviour of fog banks may be due to the fact that mixing is still going on in the persistent ones, but is completed in the disappearing ones.

One remarkable characteristic of a persistent fog is the coldness of the foggy air at the surface in spite of the heat of the sun's rays falling upon the upper surface of the fog. A remarkable example may be quoted from the case of London, which was under fog all day on 28th January 1909. The maximum temperature only reached 31° F., whereas at Warlingham in Surrey from which the fog lifted it was as high as 46° F.

A priori we might suppose that the formation of fog would arrest cooling by radiation, and that fog would thus act as a protection of plants against frost. The condensation of water evaporated from wet ground, which affords the material for making fog, does apparently act as a protection, and heavy watering is sometimes used to protect plants from frost, but the same cannot be said of fog itself—cooling appears to go on in spite of the formation of fog.

A third process of fog-formation, namely, the descent of a cloud from above in the form of light drizzling rain, hardly calls for remark. In so far as it is subject to rules, they are the rules of clouds and rain and are therefore independent of surface conditions.

These various causes of fog-formation may be considered with advantage in relation to the geographical distribution of fog. Statistics on this subject are not very satisfactory on account of the uncertainty of the distinction between fog and mist, but a good deal may be learned from the distribution of fog over the north Altantic Ocean and its various coasts as shown in the Monthly Meteorological Charts of the north Atlantic issued by the Meteorological Office, and the Pilot charts of the North Atlantic of the United States Hydrographic Office. Coast fog, which is probably of the same nature as land fog, is most frequent in the winter months, whereas sea fog and ocean fog is most extensive and frequent in the spring and summer. By June the fog area has extended from the Great Banks over the ocean to the British Isles, in July it is most intense, and by August it has notably diminished, while in November, which is proverbially a foggy month on land, there is hardly any fog shown over the ocean.

The various meteorological aspects of fog and its incidence in London were the subject of reports to the Meteorological Council by Captain A. Carpenter and Mr R. G. K. Lempfert, based upon special observations made in the winters of 1901–1902 and 1902–1903 in order to examine the possibility of more precise forecasts of fog.

The study of the properties and behaviour of fog is especially important for large towns in consequence of the economic and hygienic results which follow the incidence of dense fogs. The fogs of London in particular have long been a subject of inquiry. It is difficult to get trustworthy statistics on the subject in consequence of the vagueness of the practice as regards the classification of fog. For large towns there is great advantage in using a fog scale such as that given above, in which one deals only with the practical range of vision irrespective of the meteorological cause.

Accepting the classification which distinguishes between fog and haze or mist, but not between the two latter terms, as equivalent to specifying fog when the thickness amounts to the figure 2 or more on the fog scale, we are enabled to compare the frequency of fog in London by the comparison of the results at the London observing stations. The comparison was made by Mr Brodie in a paper read before the Royal Meteorological Society (*Quarterly Journal*, vol. 31, p. 15), and it appears therefrom that in recent years there has been a notable diminution of fog frequency, as indicated in the following table of the total number of days of fog in the years from 1871:—

1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
42	35	75	53	49	40	46	63	69	74	59	69	61	53	69	86	83	62	75

1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.
65	69	68	31	51	48	43	48	47	56	13	45	42	26	44	19	16	37	19

But from any statistics of the frequency occurrence of fog it must not be understood that the atmosphere of London is approaching that of the surrounding districts as regards transparency. Judged by the autographic records it is still almost opaque to sunshine strong enough to burn the card of the recorder during the winter months.

The bibliography of fog is very extensive. The titles referring to fog, mist and haze in the *Bibliography of Meteorology* (part ii.) of the U. S. Signal Office, published in 1889, number 306. Among more recent authors on the subject, besides those referred to in the text, may be mentioned:—Köppen, "Bodennebel," *Met. Zeit.* (1885); Trabert, *Met. Zeit.* (1901), p. 522; Elias in *Ergebnisse des aëronautischen Observatoriums bei Berlin*, ii. (Berlin, 1904); Scott, *Q.J.R. Met. Soc.* xix. p. 229; A. G. McAdie, "Fog Studies," *Amer. Inv.* ix. (Washington, D.C., 1902), p. 209; Buchan, "Fogs on the Coasts of Scotland," *Journ. Scot. Met. Soc.* xii. p. 3. (W. N. S.)

FOGAZZARO, ANTONIO (1842–), Italian novelist and poet, was born at Vicenza in 1842. He was a pupil of the Abate Zanella, one of the best of the modern Italian poets, whose tender, thoughtful and deeply religious spirit continued to animate his literary productions. He began his literary career with *Miranda*, a poetical romance (1874), followed in 1876 by *Valsolda*, which, republished in 1886 with considerable additions, constitutes perhaps his principal claim as a poet, which is not inconsiderable. To the classic grandeur of Carducci and D'Annunzio's impetuous torrent of melody Fogazzaro opposes a Wordsworthian simplicity and pathos, contributing to modern Italian literature wholesome elements of which it would otherwise be nearly destitute. His novels, *Malombra* (1882), *Daniele Cortis* (1887), *Misterio del Poeta* (1888), obtained considerable literary success upon their first publication, but did not gain universal popularity until they were discovered and taken up by French critics in 1896. The demand then became prodigious, and a new work, *Piccolo Mondo antico* (1896), which critics far from friendly to Fogazzaro's religious and philosophical ideas pronounced the best Italian novel since *I Promessi Sposi*, went through numerous editions. Even greater sensation was caused by his novel *Il Santo* (*The Saint*, 1906), on account of its being treated as unorthodox by the Vatican; and Fogazzaro's sympathy with the Liberal Catholic movement—his own Catholicism being well known—made this novel a centre of discussion in the Roman Catholic world.

See the biography by Molmenti (1900).

FOGELBERG, BENEDICT (or Bengt) **ERLAND** (1786–1854), Swedish sculptor, was born at Gothenburg on the 8th of August 1786. His father, a copper-founder, encouraging an early-exhibited taste for design, sent him in 1801 to Stockholm, where he studied at the school of art. There he came much under the influence of the sculptor Sergell, who communicated to him his own enthusiasm for antique art and natural grace. Fogelberg worked hard at Stockholm for many years, although his instinct for severe beauty rebelled against the somewhat rococo quality of the art then prevalent in the city. In 1818 the grant of a government pension enabled him to travel. He studied from one to two years in Paris, first under Pierre Guérin, and afterwards under the sculptor Bosio, for the technical practice of sculpture. In 1820 Fogelberg realized a dream of his life in visiting Rome, where the greater part of his remaining years were spent in the assiduous practice of his art, and the careful study and analysis of the works of the past. Visiting his native country by royal command in 1854, he was received with great enthusiasm, but nothing could compensate him for the absence of those remains of antiquity and surroundings of free natural beauty to which he had been so long accustomed. Returning to Italy, he died suddenly of apoplexy at Trieste on the 22nd of December 1854. The subjects of Fogelberg's earlier works are mostly taken from classic mythology. Of these, "Cupid and Psyche," "Venus entering the Bath," "A Bather" (1838), "Apollo Citharede," "Venus and Cupid" (1839) and "Psyche" (1854) may be mentioned. In his representations of Scandinavian mythology Fogelberg showed, perhaps for the first time, that he had powers above those of intelligent assimilation and imitation. His "Odin" (1831), "Thor" (1842), and "Balder" (1842), though influenced by Greek art, display considerable power of independent imagination. His portraits and historical figures, as those of Gustavus Adolphus (1849), of Charles XII. (1851), of Charles XIII. (1852), and of Birger Jarl, the founder of Stockholm (1853), are faithful and dignified works.

See Casimir Leconte, *L'Œuvre de Fogelberg* (Paris, 1856).

FOGGIA, a town and episcopal see (since 1855) of Apulia, Italy, the capital of the province of Foggia, situated 243 ft. above sea-level, in the centre of the great Apulian plain, 201 m. by rail S.E. of Ancona and 123 m. N.E. by E. of Naples. Pop. (1901) town, 49,031; commune, 53,134. The name is probably derived from the pits or cellars (*foveae*) in which the inhabitants store their grain. The town is the medieval successor of the ancient Arpi, 3 m. to the N.; the Normans, after conquering the district from the Eastern empire, gave it its first importance. The date of the erection of the cathedral is probably about 1179; it retains some traces of Norman architecture, and the façade has a fine figured cornice by Bartolommeo da Foggia; the crypt has capitals of the 11th (?) century. The whole church was, however, much altered after the earthquake of 1731. A gateway of the palace of the emperor Frederick II. (1223, by Bartolommeo da Foggia) is also preserved. Here died his third wife, Isabella, daughter of King John of England. Charles of Anjou died here in 1284. After his son's death, it was a prey to internal dissensions and finally came under Alphonso I. of Aragon, who converted the pastures of the Apulian plain into a royal domain in 1445, and made Foggia the place at which the tax on the sheep was to be paid and the wool to be sold. The other buildings of the town are modern. Foggia is a commercial centre of some importance for the produce of the surrounding country, and is also a considerable railway centre, being situated on the main line from Bologna to Brindisi, at the point where this is joined by the line from Benevento and Caserta. There are also branches to Rocchetta S. Antonio (and thence to either Avellino, Potenza, or Gioia del Colle), to Manfredonia, and to Lucera.

FÖHN (Ger., probably derived through Romansch *favongn*, *favoign*, from Lat. *favonius*), a warm dry wind blowing down the valleys of the Alps from high central regions, most frequently in winter. The Föhn wind often blows with great violence. It is caused by the indraft of air from the elevated region to areas of low barometric pressure in the neighbourhood, and the warmth and dryness are due to dynamical compression of the air as it descends to lower levels. Similar local winds occur in many parts of the world, as Greenland, and on the slopes of the Rocky Mountains. In the southern Alpine valleys the Föhn wind is often called sirocco, but its nature and cause are different from the true sirocco. The belief that the warm dry wind comes from the Sahara dies hard; and still finds expression in some textbooks.

For a full account of these winds see Hann, *Lehrbuch der Meteorologie*, p. 594.

FÖHR, a German island in the North Sea, belonging to the province of Schleswig-Holstein, and situated off its coast. Pop. 4500. It comprises an area of 32 sq. m., and is reached by a regular steamboat service from Husum and Dagebüll on the mainland to Wyk, the principal bathing resort on the E. coast of the island. The chief attraction of Wyk is the Sandwall, a promenade which is shaded by trees and skirts the beach. Föhr, the most fertile of the North Frisian islands, is principally marshland, and comparatively well wooded. There are numerous pleasantly-situated villages and hamlets scattered over it, of which the most frequented are Boldixum, Nieblum and Alkersum. The inhabitants are mainly engaged in the fishing industry, and are known as excellent sailors.

FOIL. 1. (Through O. Fr. from Lat. *folium*, a leaf, modern Fr. *feuille*), a leaf, and so used in heraldry and in plant names, such as the "trefoil" clover; and hence applied to anything resembling a leaf. In architecture, the word appears for the small leaf-like spaces formed by the cusps of tracery in windows or panels, and known, according to the number of such spaces, as "quatrefoil," "cinquefoil," &c. The word is also found in "counterfoil," a leaf of a receipt or cheque book, containing memoranda or a duplicate of the receipt or draft, kept by the receiver or drawer as a "counter" or check. "Foil" is particularly used of thin plates of metal, resembling a leaf, not in shape as much as in thinness. In thickness foil comes between "leaf" and "sheet" metal. In jewelry, a foil of silvered sheet copper, sometimes known as Dutch foil, is used as a backing for paste gems, or stones of inferior lustre or colour. This is coated with a mixture of isinglass and translucent colour, varying with the stones to be backed, or, if only brilliancy is required, left uncoloured, but highly polished. From this use of "foil," the word comes to mean, in a figurative sense, something which by contrast, or by its own brightness, serves to heighten the attractive qualities of something else placed in juxtaposition. The commonest "foil" is that generally known as "tinfoil." The ordinary commercial "tinfoil" usually consists chiefly of lead, and is used for the wrapping of chocolate or other sweetmeats, tobacco or cigarettes. A Japanese variegated foil gives the effect of "damaskeening." A large number of thin plates of various metals, gold, silver, copper, together with alloys of different metals are soldered together in a particular order, a pattern is hammered into the soldered edges, and the whole is hammered or rolled into a single thin plate, the pattern then appearing in the order in which the various metals were placed.

2. (From an O. Fr. *fuler* or *foler*, modern *fouler*, to tread or trample, to "full" cloth, Lat. *fullo*, a fuller), an old hunting term, used of the running back of an animal over its own tracks, to confuse the scent and baffle the hounds. It is also used in wrestling, of a "throw." Thus comes the common use of the word, in a figurative sense, with reference to both these meanings, of baffling or defeating an adversary, or of parrying an attack.

3. As the name of the weapon used in fencing (see Foil-Fencing) the word is of doubtful origin. One suggestion, based on a supposed similar use of Fr. *fleuret*, literally a "little flower," for the weapon, is that foil means a leaf, and must be referred in origin to Lat. *folium*. A second suggestion is that it means "blunted," and is the same as (2). A third is that it is an adaptation of an expression "at foils," *i.e.* "parrying." Of these suggestions, according to the *New English Dictionary*, the first has nothing to support it, the second is not supported by any evidence that in sense (2) the word ever meant to blunt. The third has some support. Finally a suggestion is made that the word is an alteration of an old word "foin," meaning a thrust with a pointed weapon. The origin of this word is probably an O. Fr. *foisne*, from the Lat. *fuscina*, a three-pronged fork.

FOIL-FENCING, the art of attack and defence with the fencing-foil. The word is used in several spellings (foyle, file, &c.) by the English writers of the last half of the 16th century, but less in the sense of a weapon of defence than merely as an imitation of a real weapon. Blunt swords for practice in fencing have been used in all ages. For the most part these were of wood and flat in general form, but when, towards the close of the 17th century, all cutting action with the small-sword was discarded (see Fencing), foil-blades were usually made of steel, and either round, three-cornered or four-cornered in form, with a button covering the point. The foil is called in French *fleuret*, and in Italian *fioretto* (literally "bud") from this button. The classic small-sword play of the 17th and 18th centuries is represented at the present time by fencing with the *épée de combat* (fighting-rapier), which is merely the modern duelling-sword furnished with a button (see Épée-de-Combat), and by foil-fencing. Foil-fencing is a conventional art, its characteristic limitation lying in the rule that no hits except those on the body shall be considered good, and not even those unless they be given in strict accordance with certain standard precepts. In épée-fencing on the contrary, a touch on any part of the person, however given, is valid. Foil-fencing is considered the basis, so far as practice is concerned, of all sword-play, whether with foil, épée or sabre.

There are two recognized schools of foil-fencing, the French and the Italian. The French method, which is now generally adopted everywhere except in Italy, is described in this article, reference being made to the important differences between the two schools.

The Foil.—The foil consists of the "blade" and the "handle." The blade, which is of steel and has a quadrangular section, consists of two parts: the blade proper, extending from the guard to the button, and the "tongue," which runs through the handle and is joined to the pommel. The blade proper is divided into the "forte," or thicker half (next the handle), and the "foible" or thinner half. Some authorities divide the blade proper into three parts, the "forte," "middle" and "foible." The handle is comprised of the "guard," the "grip" and the "pommel." The guard is a light piece of metal shaped like the figure 8 (Fr. *lunettes*, spectacles) and backed with a piece of stiff leather of the same shape. The grip, which is grasped by the hand, is a hollow piece of wood, usually wound with twine, through which the tongue of the blade passes. The pommel is a piece of metal, usually pear-shaped, to which the end of the tongue is joined and which forms the extremity of the handle. The blade from guard to button is about 33 in. long (No. 5), though a somewhat shorter and lighter blade is generally used by ladies. The handle is about 8 in. long and slightly curved downwards.

The genuine Italian foil differs from the French in having the blade a trifle longer and more whippy, and in the form of the handle, which consists of a thin, solid, bell-shaped guard from 4 to 5 in. in diameter, a straight grip and a light metal bar joining the grip with the guard, beyond the edge of which it extends slightly on each side. Of late years many Italian masters use French blades and even discard the cross-bar, retaining, however, the bell-guard.

In holding the foil, the thumb is placed on the top or convex surface of the grip (the sides of which are a trifle narrower than the top and bottom), while the palm and fingers grasp the other three sides. This is the position of "supination," or thumb-up. "Pronation" is the reverse position, with the knuckles up. The French lay stress upon holding the foil lightly, the necessary pressure being exerted mostly by the thumb and forefinger, the other fingers being used more to guide the direction of the executed movements. This is in order to give free scope to the *doigté* (fingering), or the faculty of directing the point of the foil by the action of the fingers alone, and includes the possibility of changing the position of the hand on the grip. Thus, in parrying, the end of the thumb is placed within half an inch, or even less, of the guard, while in making a lunge, the foil is held as near the pommel as possible, in order to gain additional length. It will be seen that *doigté* is impossible with the Italian foil, in holding which the forefinger is firmly interlaced with the cross-bar, preventing any movement of the hand. The lightness of grasp inculcated by the French is illustrated by the rule of the celebrated master Lafaugère: "Hold your sword as if you had a little bird in your hand, firmly enough to prevent its escape, yet not so firmly as to crush it." This lightness has for a consequence that a disarmament is not considered of any value in the French school.

To Come on Guard.—The position of "on guard" is that in which the fencer is best prepared both for attack and defence. It is taken from the position of "attention"; the feet together and at right angles with each other, head and body erect, facing forward in the same direction as the right foot, left arm and hand hanging in touch with the body, and the right arm and foil forming a straight line so that the button is about 1 yd. in front of the feet and 4 in. from the floor. From this position the movements to come "on guard" are seven in number:—

1. Raise the arm and foil and extend them towards the adversary (or master) in a straight line, the hand being opposite the eye.
2. Drop the arm and foil again until the point is about 4 in. from the floor.
3. Swing the button round so that it shall point horizontally backwards, and hold the hilt against the left thigh, the open fingers of the left hand being held, knuckles down, against the guard and along the blade.
4. Carry the foil, without altering the position of the hands, above the head until the arms are fully extended, the foil being kept horizontal and close to the body as it is lifted.
5. Let the left arm fall back behind the head to a curved position, the hand being opposite the top of the head; at the same time bring the right hand down opposite the right breast and about 8 in. from it; keeping the elbow well in and the point of the foil directed towards the opponent's eye.
6. Bend the legs by separating them at the knees but without moving the feet.
7. Shift the weight of the body on to the left leg and advance the right foot a short distance (from 14 to 18 in., according to the height of the fencer).

In the Italian school the fencer stands on guard with the right arm fully extended, the body more effaced, *i.e.* the left shoulder thrown farther back, and the feet somewhat farther apart. At the present time, however, many of the best Italian fencers have adopted the guard with crooked sword-arm, owing to their abandonment of the old long-foil blade.

The Recover (at the close of the lesson or assault).—To recover "in advance": extend the right arm at right angles with the body, drop the left arm and straighten the legs by drawing the rear foot up to the one in advance. To recover "to the rear": extend the right arm and drop the left as before, and straighten the legs by drawing the forward foot back to that in the rear.

The Salute always follows the recover, the two really forming one manœuvre. Having recovered, carry the right hand to a position just in front of the throat, knuckles out, foil vertical with point upwards; then lower and extend the arm with nails up until the point is 4 in. from the floor and slightly to the right.

To Advance.—Being on guard, take a short step forward with the right foot and let the left foot follow immediately the same distance, the position of the body not being changed. However the step, or series of steps, is made, the right foot should always move first.

To Retreat.—This is the reverse of the advance, the left foot always moving first.

The Calls (*deux appels*).—Being on guard, tap the floor twice with the right foot without altering the position of any other part of the person. The object of the calls is to test the equilibrium of the body, and they are usually executed as a preliminary to the recover.

The Lunge is the chief means of attack. It is immediately preceded by the movement of "extension," in fact the two really form one combined movement. Extension is executed by quickly extending the right arm, so that point, hand and shoulder shall have the same elevation; no other part of the person is moved. The "lunge" is then carried out by straightening the left leg and throwing forward the right foot, so that it shall be planted as far forward as possible without losing the equilibrium or preventing a quick recovery to the position of guard. The left foot remains firmly in its position, the right shoulder is advanced, and the left arm is thrown down and back (with hand open and thumb up), to balance the body. The recovery to the position of guard is accomplished by smartly throwing the body back by the exertion of the right leg, until its weight rests again on the left leg, the right foot and arms resuming their on-guard positions. The point upon which the French school lays most stress is, that the movement of extension shall, if only by a fraction of a second, actually precede the advance of the right foot. The object of this is to ensure the accuracy of the lunge, *i.e.* the direction of the point.

The Gain.—This consists in bringing up the left foot towards the right (the balance being shifted), keeping the knees bent. In this manner a step is gained and an exceptionally long lunge can be made without the knowledge of the adversary. It is a common stratagem of fencers whose reach is short.

Defence.—For the purpose of nomenclature the space on the fencer's jacket within which hits count is divided into quarters, the two upper ones being called the "high lines," and the two lower ones the "low lines." Thus a thrust directed at the upper part of the breast is called an attack in the high lines. In like manner the parries are named from the different quarters they are designed to protect. There are four traditional parries executed with the hand in supination, and four others, practically identical in execution, made with the hand held in pronation. Thus the parries defending the upper right-hand quarter of the jacket are "sixte" (sixth; with the hand in supination) and "tierce" (third; hand in pronation). Those defending the upper left-hand quarter are "quarte" (fourth; in supination) and "quinte" (fifth; in pronation). Those defending the lower right-hand quarter are "octave" (eighth; in supination) and "seconde" (second; in pronation). Those defending the lower left-hand quarter are "septime" (seventh; in supination), more generally called "demicircle," or "half-circle"; and "prime" (first; in pronation).

The Parries.—The tendency of the French school has always been towards simplicity, especially of defence, and at the present day the parries made with the knuckles up (pronation), although recognized and taught, are seldom if ever used against a strong adversary in foil-fencing, owing principally to the time lost in turning the hand. The theory of parrying is to turn aside the opponent's foil with the least possible expenditure of time and exertion, using the arm as little as possible while letting the hand and wrist do the work, and opposing the "forte" of the foil to the "foible" of the adversary's. The foil is kept pointed as directly as possible towards the adversary, and the parries are made rather with the corners than the sides of the blade. The slightest movement that will turn aside the opponent's blade is the most perfect parry. There are two kinds of parries, "simple," in which the attack is warded off by a single movement, and "counter," in which a narrow circle is described by the point of the foil round that of the opponent, which is thus enveloped and thrown aside. There are also complex parries, composed of combinations of two or more parries, which are used to meet complicated attacks, but they are all resolvable into simple parries. In parrying, the arm is bent about at right angles.

Simple Parries.—The origin of the numerical nomenclature of the parries is a matter of dispute, but it is generally believed that they received their names from the positions assumed in the process of drawing the sword and falling on guard. Thus the position of the hand and blade, the moment it is drawn from the scabbard on the left side, is practically that of the first, or "prime," parry. To go from "prime" to "seconde" it is only necessary to drop the hand and carry it across the body to the left side; thence to "tierce" is only a matter of raising the point of the sword, &c.

Parry of Prime (to ward off attacks on the—usually lower—left-hand side of the body). Hold the hand, knuckles up, opposite the left eye and the point directed towards the opponent's knee. This parry is now regarded more as an elegant evolution than a sound means of defence, and is little employed.

Parry of Seconde (against thrusts at the lower right-hand side). This is executed by a quick, not too wide movement of the hand downwards and slightly to the right, knuckles up.

Parry of Tierce (against thrusts at the upper right-hand side). A quick, dry beat on the adversary's "foible" is given, forcing it to the right, the hand, in pronation, being held opposite the middle of the right breast. This parry has been practically discarded in favour of "sixte."

Parry of Quarte (against thrusts at the upper left-hand side). This parry, perhaps the most used of all, is executed by forcing the adversary's blade to the left by a dry beat, the hand being in supination, opposite the left breast.

Parry of Quinte (against thrusts at the left-hand side, like "quarte"). This is practically a low "quarte," and is little used.

Parry of Sixte (against thrusts at the upper right-hand side). This parry is, together with " quarte," the most important of all. It is executed with the hand held in supination opposite the right breast, a quick, narrow movement throwing the adversary's blade to the right.

Parry of Septime or Half-Circle (against thrusts at the lower left-hand side) is executed by describing with the point of the foil a small semicircle downward and towards the left, the hand moving a few inches in the same direction, but kept thumb up.

Parry of Octave (against thrusts at the lower right-hand side) is executed by describing with the point of the foil a small semicircle downward and towards the right, the hand moving a few inches in the same direction, but kept thumb up.

Counter Parries (Fr. *contre*).—Although the simple parries are theoretically sufficient for defence, they are so easily deceived by feints that they are supplemented by counter parries, in which the blade describes narrow circles, following that of the adversary and meeting and turning it aside; thus the point describes a complete circle while the hand remains practically stationary. Each simple parry has its counter, made with the hand in the same position and on the same side as in the simple parry. The two most important are the " counter of quarte " and the " counter of sixte," while the counters of " septime " and " octave " are less used, and the other four at the present time practically never.

Counter of Quarte.—Being on guard in quarte (with your adversary's blade on the left of yours), if he drops his point under and thrusts in sixte, in other words at your right breast, describe a narrow circle with your point round his blade, downward to the right and then up over to the left, bringing hand and foil back to their previous positions and catching and turning aside his blade on the way. The " Counter of Sixte " is executed in a similar manner, but the circle is described in the opposite direction, throwing off the adverse blade to the right. The " Counters of Septime and Octave " are similar to the other two but are executed in the low lines.

Complex or Combined Parries are such as are composed of two or more parries executed in immediate succession, and are made in answer to feint attacks by the adversary (see below); *e.g.* being on guard in quarte, should the adversary drop his point under and feint at the right breast but deflect the point again and really thrust on the left, it is evident that the simple parry of sixte would cover the right breast but would leave the real point of attack, the left, entirely uncovered. The sixte parry is therefore followed, as a continuation of the movement, by the parry of quarte, or a counter parry. The complex parries are numerous and depend upon the attack to be met.

Engagement is the junction of the blades, the different engagements being named from the parries. Thus, if both fencers are in the position of quarte, they are said to be engaged in quarte. To engage in another line (Change of Engagement) *e.g.* from quarte to sixte, the point is lowered and passed under the adversary's blade, which is pressed slightly outward, so as to be well covered (called " opposition "). " Double Engagement " is composed of two engagements executed rapidly in succession in the high lines, the last with opposition.

Attack.—The attack in fencing comprises all movements the object of which is to place the point of the foil upon the adversary's breast, body, sides or back, between collar and belt. The space upon which hits count is called the " target " and differs according to the rules prevailing in the several countries, but is usually as above stated. In Great Britain no hits above the collar-bones count, while in America the target is only the left breast between the median line and a line running from the armpit to the belt. The reason for this limitation is to encourage accuracy.

Attacks are either "primary" or "secondary." *Primary Attacks* are those initiated by a fencer before his adversary has made any offensive movement, and are divided into " Simple," " Feint " and " Force " attacks.

Simple Attacks, the characteristic of which is pace, are those made with one simple movement only and are four in number, viz. the " Straight Lunge," the " Disengagement," the " Counter-disengagement " and the " Cut-over." The Straight-Lunge (*coup droit*), used when the adversary is not properly covered when on guard, is described above under " Lunge." The Disengagement is made by dropping the point of the foil under the opponent's blade and executing a straight lunge on the other side. It is often used to take an opponent unawares or when he presses unduly hard on your blade. The Counter-disengagement is used when the adversary moves his blade, *i.e.* changes the line of engagement, upon which you execute a narrow circle, avoiding his blade, and thrust in your original line. The Cut-over (*coupé*) is a disengagement executed by passing the point of the foil *over* that of the adversary and lunging in the opposite line. The preliminary movement of raising the point is made by the action of the hand only, the arm not being drawn back.

Feint Attacks, deceptive in character, are those which are preceded by one or more feints, or false thrusts made to lure the adversary into thinking them real ones. A feint is a simple extension, often with a slight movement of the body, threatening the adversary in a certain line, for the purpose of inducing him to parry on that side and thus leave the other open for the real thrust. At the same time any movement of the blade or any part of the body tending to deceive the adversary in regard to the nature of the attack about to follow, must also be considered a species of feint. The principal feint attacks are the " One-Two," the " One-Two-Three " and the " Double."

The " One-Two " is a feint in one line, followed (as the adversary parries) by a thrust in the original line of engagement. Thus, being engaged in quarte, you drop your point under the adversary's blade and extend your arm as if to thrust at his left breast, but instead of doing this, the instant he parries you move your point back again and lunge in quarte, *i.e.* on the side on which you were originally engaged. In feinting it is necessary that the extension of the arm and blade be so complete as really to compel the adversary to believe it a part of a real thrust in that line.

The " One-Two-Three " consists of two feints, one at each side, followed by a thrust in the line opposite to that of the original engagement. Thrusts preceded by three feints are also sometimes used. It is evident that the above attacks are useless if the adversary parries by a counter (circular parry), which must be met by a " Double." This is executed by feinting and, upon perceiving that the adversary opposes with a circular parry, by following the circle described by his point with a similar circle, deceiving (*i.e.* avoiding contact with) his blade and thrusting home.

The " Double," which is a favourite manœuvre in fencing, is a combination of a disengagement and a counter-disengagement.

Force-Attacks, the object of which is to disconcert the opponent by assaulting his blade, are various in character, the principal ones being the " Beat," the " Press," the " Glide " and the " Bind." The " Beat " is a quick, sharp blow of the forte of the foil upon the foible of the adversary's, for the purpose of opening a way for a straight lunge which follows instantly. The blow is made with the hand only. A " false beat " is a lighter blow made for the purpose of drawing out or disconcerting the opponent, and is often followed by a disengagement. The " Press " is similar in character to the beat, but, instead of striking the adverse blade, a sudden pressure is brought to bear upon it, sufficiently heavy to force it aside and allow one's own blade to be thrust home. A " false press " may be used to entice the adversary into a too heavy responsive pressure, which may then be taken advantage of by a disengagement. The " Traverse " (Fr. *froissé*, Ital. *striscio*) is a prolonged press carried sharply down the adverse blade towards the handle. The " Glide " (" Graze," Fr. *coulé*) is a stealthy sliding of one's blade down that of the adversary, without his notice, until a straight thrust can be made inside his guard. It is also used as a feint before a disengage. The " Bind " (*liement*) consists in gaining possession of the adversary's foible with one's forte, and pressing it down and across into the opposite low line, when one's own point is thrust home, the adversary's blade being still held by one's hilt. It may be also carried out from a low line into a high one. The bind is less used in the French school than in the Italian. The “Flanconnade” is a bind made by capturing the adversary’s blade in high quarte, carrying it down and thrusting in the outside line with strong opposition. Another attack carried out by means of a twist and thrust is the “Cross” (*croisé*), which is executed when the adversary’s blade is held low by passing one’s point over his wrist and forcing down both blades into seconde with a full extension of the arm. The result is to create a sudden and wide opening, and often disarms the adversary.

Secondary Attacks are those made (1) just as your adversary himself starts to attack; (2) during his attack; and (3) on the completion of his attack if it fails.

1. “Attacks on the Preparation” are a matter of judgment and quickness. They are usually attempted when the adversary is evidently preparing a complicated attack, such as the “one-two-three” or some other manœuvre, involving one or more preliminary movements. At such a time a quick thrust will often catch him unawares and score. Opportunities for preparation attacks are often given when the adversary attempts a beat preliminary to his thrust; the beat is frustrated by an “absence of the blade,” *i.e.* your blade is made to avoid contact with his by a narrow movement, and your point thrust home into the space left unguarded by the force of his unresisted beat. Or the adversary himself may create an “absence” by suddenly interrupting the contact of the blades, in the hope that, by the removal of the pressure, your blade will fly off to one side, leaving an opening; if, however, you are prepared for his “absence” a straight thrust will score.

2. The chief “Attacks on the Development,” or “Counter Attacks,” are the “Stop Thrust” and the “Time Thrust,” both made while the adversary is carrying out his own attack. The “Stop Thrust” (*coup d’arrêt*) is one made after the adversary has actually begun an attack involving two or more movements, and is only justified when it can be brought off without your being hit by the attacking adversary’s point on any part of the person. The reason for this is, that the rules of fencing decree that the fencer attacked must parry, and that, if he disregards this and attempts a simultaneous counter attack, he must touch his opponent while totally avoiding the latter’s point. Should he, however, be touched, even on the foot or mask, by the adversary, his touch, however good, is invalid. If both touches are good, that of the original attacker only counts. Stop thrusts are employed mostly against fencers who attack wildly or without being properly covered. The “Time Thrust” is delivered with opposition upon the adversary’s composite attack (one involving several movements), and, if successful, generally parries the original attack at the same time. It is not valid if the fencer employing it is touched on any part of the person.

3. “Attacks on the Completion” (*i.e.* of the adversary’s attack) are “Ripostes,” “Counter-ripostes,” “Remises” and “Renewals of Attack.”

The *Riposte* (literally, response) is an attack made, immediately after parrying successfully, by merely straightening the arm, the body remaining immovable. The “counter-riposte” is a riposte made after parrying the adversary’s riposte, and generally from the position of the lunge, or while recovering from it, since one must have attacked with a full lunge if the adversary has had an opportunity to deliver a riposte. There are three kinds of ripostes: direct, with feints and after a pause.

The “direct *riposte*” may be made instantly after parrying the adversary’s thrust by quitting his blade and straightening the arm, so that the point will touch his body on the nearest and most exposed part; or by not quitting his blade but running yours quickly down his and at the same time keeping a strong opposition (“riposte d’opposition”). The quickest direct riposte is that delivered after parrying quarte (for a right-hand fencer), and is called by the French the riposte of “*tac-au-tac*,” imitative of the sudden succession of the click of the parry and the tap of the riposting fencer’s point on his adversary’s breast. In making “ripostes with a feint” the point is not jabbed on to the opponent’s breast immediately after the parry, but one or more preliminary movements precede the actual riposte, such as a disengagement, a cut-over or a double.

Ripostes with a pause (*à temps perdu*, with lost time) are made after a second’s hesitation, and are resorted to when the fencers are too near for an accurate direct riposte, or to give the adversary time to make a quick parry, which is then deceived.

The *remise* is a thrust made after one’s first thrust has been parried and in the same line; it must be made in such a way that the adversary’s justified riposte is at the same time parried by opposition or completely avoided. It is really a renewal of the attack in the original line, while the so-called “renewal of attack” (“*redoublement d’attaque*”) is a second thrust which ignores the adversary’s riposte, but made in a different line. Both the remise and the renewal are valid only when the adversary’s riposte does not hit.

“False Attacks” are broad movements made for the purpose of drawing the adversary out or of disconcerting him. They may consist of an advance, an extension, a change of engagement, an intentional uncovering by taking a wide guard (called “invitation guard”), or any movement or combination of movements tending to make the adversary believe that a real attack is under way.

“The Assault” is a formal fencing bout or series of bouts in public, while formal fencing in private is called “loose play” or a “friendly bout.” Bouts between fencers take place on a platform about 24 ft. long and 6 ft. wide (in the United States 20 × 3 ft.). Formal bouts are usually for a number of touches, or for a certain number of minutes, the fencer who touches oftenest winning. The judges (usually three or five) are sometimes empowered to score one or more points against a competitor for breaches of good form, or for overstepping the space limits. In the United States bouts are for four minutes, with a change of places after two minutes, and the competitors are not interrupted, the winner being indicated by a vote of the judges, who take into account touches and style. In all countries contestants are required to wear jackets of a light colour, so that hits may be easily seen. Audible acknowledgment of all touches, whether on the target or not, is universally considered to be a fencer’s duty. Fencing competitions are held in Great Britain under the rules of the Amateur Fencing Association, and in the United States under those of the Amateur Fencers’ League of America.

Fencing Terms (not mentioned above): “*Cavazione*,” Ital. for disengagement. “Contraction, Parries of,” those which do not parry in the simplest manner, but drag the adverse blade into another line, *e.g.* to parry a thrust in high sixte by counter of quarte. “*Controtempo*,” Ital. for time-thrust. “Coronation,” an attack preceded by a circular movement from high sixte to high quarte (and vice versa) made famous by Lafaugère. “*Corps-à-corps*” (body to body), the position of two fencers who are at such close quarters that their persons touch; when this occurs the fencers must again come on guard. “*Coulé*,” Fr. for glide. “Disarm,” to knock the foil out of the adversary’s hand; it is of no value in the French school. “Double Hit,” when both fencers attack and hit at the same time; neither hit counts. “*Filo*,” Ital. for glide (graze). “Flying Cut-over,” a cut-over executed as a continuation of a parry, the hand being drawn back towards the body. “*Incontro*,” Ital. for double attack. “Give the blade,” to allow the adversary easy contact with the foil; it is often resorted to in order to tempt the adversary into a beat or bind. “Menace,” to threaten the adversary by an extension and forward movement of the trunk. “*Mur*,” see “Salute.” “Passage of arms,” a series of attacks and parries, ending in a successful hit. “Phrase of arms,” a series of attacks and parries ending in a hit or invalidation. “Invalidation,” a hit on some part of the person outside the target, made by the fencer whose right it is at that moment to attack or riposte; such a hit invalidates one made simultaneously or subsequently by his opponent, however good. “Rebeat,” two beats, executed as quickly as possible together, one on each side of the adversary’s blade. “*Reprises d’attaque*,” Fr. for renewed attacks. “Salute,” the courteous salutation of the public and the adversary before and after a bout. A more elaborate salute, called by the French the *Mur*, consists of a series of parries, lunges and other evolutions carried out by both fencers at the same time. Important exhibition assaults are usually preceded by the *Mur*, which is called in English the Grand Salute. “*Septime enveloppée*,” a riposte by means of a twist and thrust after a parry in septime. It envelops and masters the adverse blade, whence the name. “Secret thrusts,” the French “*bottes secrètes*,” pretended infallible attacks of which the user is supposed alone to know the method of execution; they have no real existence. "*Sforza*," Ital. for disarmament. "*Scandaglio*," Ital for examination, studying the form of an opponent at the beginning of a bout. "*Toccato!*" Ital. for "Touched!"; Fr. "*Touché.*"

Bibliography.—The literature of foil-fencing is practically identical with that of the art in general (see Fencing). The following modern works are among the best. French School: *Fencing*, in the Badminton library (1897); *Foil and Sabre*, by L. Rondelle (Boston, 1892); "Fencing," by C. Prevost in the *Encyclopaedia of Sport* (1901); *Fencing*, by Edward Breck (New York, 1906). Italian school: *Istruzione per la scherma, &c.*, by S. de Frae (Milan, 1885); *La Scherma italiana di spada e di sciabola*, by F. Masiello (Florence, 1887). (E. B.)

FOIX, PAUL DE (1528–1584), French prelate and diplomatist. He studied Greek and Roman literature at Paris, and jurisprudence at Toulouse, where shortly after finishing his curriculum he delivered a course of lectures on civil law, which gained him great reputation. At the age of nineteen he was named councillor of the parlement of Paris. Having in this capacity expressed himself favourable to the adoption of mild measures in regard to certain persons accused of Lutheranism, he was arrested, but escaped punishment, and subsequently regained the favour of the French court. At the end of 1561 he was sent ambassador to England, where he remained four years. He was then sent to Venice, and returned a short time afterwards to England to negotiate a marriage between Queen Elizabeth and the duke of Anjou. He again fulfilled several important missions during the reign of Henry III. of France. In 1577 he was made archbishop of Toulouse, and in 1579 was appointed ambassador to Rome, where he remained till his death in 1584.

Les Lettres de Messire de Paul de Foix, archevesque de Toloze et ambassadeur pour le roy auprès du pape Grégoire XIII, au roi Henry III, were published in 1628, but there are some doubts as to their authenticity. See *Gallia Christiana* (1715 seq.); M. A. Muret, *Oraison funèbre de Paul de Foix* (Paris, 1584); "Lettres de Catherine de Médicis," edited by Hector de la Ferrière (Paris, 1880 seq.) in the *Collection de documents inédits sur l'histoire de France.*

FOIX, a town of south-western France, in the middle ages capital of the counts of Foix, and now capital of the department of Ariège, 51 m. S. of Toulouse, on the Southern railway from that city to Ax. Pop. (1906) town, 4498; commune, 6750. It is situated between the Ariège and the Arget at their confluence. The old part of the town, with its ill-paved winding streets and old houses, is dominated on the west by an isolated rock crowned by the three towers of the castle (12th, 14th and 15th centuries), while to the south it is limited by the shady Promenade de Villotte. The chief church is that of St Volusien, a Gothic building of the 14th century. The town is the seat of a prefecture, a court of assizes and a tribunal of first instance, and has a lycée, training colleges, a chamber of commerce and a branch of the Bank of France. Flour-milling and iron-working are carried on. Foix probably owes its origin to an oratory founded by Charlemagne. This afterwards became an abbey, in which were laid the remains of St Volusien, archbishop of Tours in the 5th century.

The county of Foix included roughly the eastern part of the modern department of Ariège, a region watered chiefly by the Ariège and its affluents. During the later middle ages it consisted of an agglomeration of small holdings ruled by lords, who, though subordinate to the counts of Foix, had some voice in the government of the district. Protestantism obtained an early entrance into the county, and the religious struggles of the 16th and 17th centuries were carried on with much implacability therein. The estates of the county, which can be traced back to the 14th century, consisted of three orders and possessed considerable power and virility. In the 17th and 18th centuries Foix formed one of the thirty-three governments of France, and in 1790 it was incorporated in the department of Ariège.

Counts of Foix.—The counts of Foix were an old and distinguished French family which flourished from the 11th to the 15th century. They were at first feudatories of the counts of Toulouse, but chafing under this yoke they soon succeeded in throwing it off, and during the 13th and 14th centuries were among the most powerful of the French feudal nobles. Living on the borders of France, having constant intercourse with Navarre, and in frequent communication with England, they were in a position peculiarly favourable to an assertion of independence, and acted rather as the equals than as the dependents of the kings of France.

The title of count of Foix was first assumed by Roger, son of Bernard Roger, who was a younger son of Roger I., count of Carcassonne (d. 1012), when he inherited the town of Foix and the adjoining lands, which had hitherto formed part of the county of Carcassonne. Dying about 1064, Roger was succeeded by his brother Peter, who died six years later, and was succeeded in turn by his son, Roger II. This count took part in the crusade of 1095, and was afterwards excommunicated by Pope Paschal II. for seizing ecclesiastical property; but subsequently he appeased the anger of the church by rich donations, and when he died in 1125 he was succeeded by his son, Roger III. The death of Roger III. about 1149, and of his son, Roger Bernard I., in 1188, brought the county to Roger Bernard's only son, Raymond Roger, who, in 1190, accompanied the French king, Philip Augustus, to Palestine and distinguished himself at the capture of Acre. He was afterwards engaged in the wars of the Albigenses, and on being accused of heresy his lands were given to Simon IV., count of Montfort. Raymond Roger, who came to terms with the church and recovered his estates before his death in 1223, was a patron of the Provençal poets, and counted himself among their number. He was succeeded by his son, Roger Bernard II., called the Great, who assisted Raymond VII., count of Toulouse, and the Albigenses in their resistance to the French kings, Louis VIII. and Louis IX., was excommunicated on two occasions and died in 1241. His son, Roger IV., who followed, died in 1265, and was succeeded by his son, Roger Bernard III., who, more famous as a poet than as a warrior, was taken prisoner both by Philip III. of France and by Peter III. of Aragon. This count married Marguerite, daughter and heiress of Gaston VII., viscount of Béarn (d. 1290), and this union led to the outbreak of a long feud between the houses of Foix and Armagnac; a quarrel which was continued by Roger Bernard's son and successor, Gaston I., who became count in 1302, inheriting both Foix and Béarn. Becoming embroiled with the French king, Philip IV., in consequence of the struggle with the count of Armagnac, Gaston was imprisoned in Paris; but quickly regaining his freedom he accompanied King Louis X. on an expedition into Flanders in 1315, and died on his return to France in the same year. His eldest son, Gaston II., was the next count. Having become reconciled with the house of Armagnac, Gaston took part in various wars both in France and Spain, dying at Seville in 1343, when he was succeeded by his son, Gaston III. (1331–1391). Gaston III., who was surnamed Phoebus on account of his beauty, was the most famous member of the old Foix family. Like his father he assisted France in her struggle against England, being entrusted with the defence of the frontiers of Gascony; but when the French king, John II., showed a marked preference for the count of Armagnac, Gaston left his service and went to fight against the heathen in Prussia. Returning to France about 1357 he delivered some noble ladies from the attacks of the adherents of the *Jacquerie* at Meaux, and was soon at war with the count of Armagnac. During this struggle he also attacked the count of Poitiers, the royal representative in Languedoc, but owing to the intervention of Pope Innocent VI. he made peace with the count in 1360. Gaston, however, continued to fight against the count of Armagnac, who, in 1362, was defeated and compelled to pay a ransom; and this war lasted until 1377, when peace was made. Early in 1380 the count was appointed governor of Languedoc, but when Charles VI. succeeded Charles V. as king later in the same year, this appointment was cancelled. Refusing, however, to heed the royal command, and supported by the communes of Languedoc, Gaston fought for about two years against John, duke of Berry, who had been chosen as his successor, until, worsted in the combat, he abandoned the struggle and retired to his estates, remaining neutral and independent. In 1348 the count had married Agnes, daughter of Philip, count of Evreux (d. 1343), by his wife Jeanne II., queen of Navarre. By Agnes, whom he divorced in 1373, he had an only son, Gaston, who is said to have been incited by his uncle, Charles II., king of Navarre, to poison his father, and who met his death in 1381. It is probable, as Froissart says, that he was killed by his father. Left without legitimate sons, Gaston was easily persuaded to bequeath his lands to King Charles VI., who thus obtained Foix and Béarn when the count died at Orthes in 1391. Gaston was very fond of hunting, but was not without a taste for art and literature. Several beautiful manuscripts are in existence which were executed by his orders, and he himself wrote *Déduits de la chasse des bestes sauvaiges et des oiseaulx de proye.* Froissart, who gives a graphic description of his court and his manner of life, speaks enthusiastically of Gaston, saying: "I never saw none like him of personage, nor of so fair form, nor so well made," and again, "in everything he was so perfect that he cannot be praised too much."

Almost immediately after Gaston's death King Charles VI. granted the county of Foix to Matthew, viscount of Castelbon, a descendant of Count Gaston I. Dying without issue in 1398, Matthew's lands were seized by Archambault, count of Grailly and captal de Buch, the husband of his sister Isabella (d.1426), who became count of Foix in 1401. Archambault's eldest son, John (*c.* 1382–1436), who succeeded to his father's lands and titles in 1412, had married in 1402 Jeanne, daughter of Charles III., king of Navarre. Having served the king of France in Guienne and the king of Aragon in Sardinia, John became the royal representative in Languedoc, when the old quarrel between Foix and Armagnac broke out again. During the struggle between the Burgundians and the Armagnacs, he intrigued with both parties, and consequently was distrusted by the dauphin, afterwards King Charles VII. Deserting the cause of France, he then allied himself with Henry V. of England; but when Charles VII. became king in 1422, he returned to his former allegiance and became the king's representative in Languedoc and Guienne. He then assisted to suppress the marauding bands which were devastating France; fought for Aragon against Castile; and aided his brother, the cardinal of Foix, to crush some insurgents in Aragon. Peter, cardinal of Foix (1386–1464), was the fifth son of Archambault of Grailly, and was made archbishop of Arles in 1450. He took a prominent part in the struggle between the rival popes, and founded and endowed the Collège de Foix at Toulouse. The next count was John's son, Gaston IV., who married Leonora (d. 1479), a daughter of John, king of Aragon and Navarre. In 1447 he bought the viscounty of Narbonne, and having assisted King Charles VII. in Guienne, he was made a peer of France in 1458. In 1455 his father-in-law designated him as his successor in Navarre, and Louis XI. of France gave him the counties of Rousillon and Cerdagne, and made him his representative in Languedoc and Guienne; but these marks of favour did not prevent him from joining a league against Louis in 1471. His eldest son, Gaston, the husband of Madeleine, a daughter of Charles VII. of France, died in 1470, and when Gaston IV. died two years later, his lands descended to his grandson, Francis Phoebus (d. 1483), who became king of Navarre in 1479, and was succeeded by his sister Catherine (d. 1517), the wife of Jean d'Albret (d. 1516). Thus the house of Foix-Grailly was merged in that of Albret and subsequently in that of Bourbon; and when Henry of Navarre became king of France in 1589 the lands of the counts of Foix-Grailly became part of the French royal domain. A younger son of Count Gaston IV. was John (d. 1500), who received the viscounty of Narbonne from his father and married Marie, a sister of the French king Louis XII. He was on good terms both with Louis XI. and Louis XII., and on the death of his nephew Francis Phoebus, in 1483, he claimed the kingdom of Navarre against Jean d'Albret and his wife, Catherine de Foix. The ensuing struggle lasted until 1497, when John renounced his claim. He left a son, Gaston de Foix (1489–1512), the distinguished French general, and a daughter, Germaine, who became the second wife of Ferdinand I., king of Spain. In 1507 Gaston exchanged his viscounty of Narbonne with King Louis XII. for the duchy of Nemours, and as duke of Nemours he took command of the French troops in Italy. Having delivered Bologna and taken Brescia, Gaston encountered the troops of the Holy League at Ravenna in April 1512, and after putting the enemy to flight was killed during the pursuit. From the younger branch of the house of Foix-Grailly have also sprung the viscounts of Lautrec and of Meilles, the counts of Bénanges and Candale, and of Gurson and Fleix.

See D. J. Vaissète, *Histoire générale de Languedoc*, tome iv. (Paris, 1876); L. Flourac, *Jean I^{er}, comte de Foix, vicomte souverain de Béarn* (Paris, 1884); Le Père Anselme, *Histoire généalogique*, tome iii. (Paris, 1726–1733); Castillon, *Histoire du comte de Foix* (Toulouse, 1852); Madaune, *Gaston Phœbus, comte de Foix et souverain de Béarn* (Pau, 1865); and Froissart's *Chroniques*, edited by S. Luce and G. Raynaud (Paris, 1869–1897).

FOLARD, JEAN CHARLES, Chevalier de (1669–1752), French soldier and military author, was born at Avignon on the 13th of February 1669. His military ardour was first awakened by reading Caesar's *Commentaries*, and he ran away from home and joined the army. He soon saw active service, and, young as he was, wrote a manual on partisan warfare, the manuscript of which passed with Folard's other papers to Marshal Belleisle on the author's death. In 1702 he became a captain, and aide-de-camp to the duke of Vendôme, then in command of the French forces in Italy. In 1705, while serving under Vendôme's brother, the Grand Prior, Folard won the cross of St Louis for a gallant feat of arms, and in the same year he distinguished himself at the battle of Cassano, where he was severely wounded. It was during his tedious recovery from his wounds that he conceived the tactical theories to the elucidation of which he devoted most of his life. In 1706 he again rendered good service in Italy, and in 1708 distinguished himself greatly in the operations attempted by Vendôme and the duke of Burgundy for the relief of Lille, the failure of which was due in part to the disagreement of the French commanders; and it is no small testimony to the ability and tact of Folard that he retained the friendship of both. Folard was wounded at Malplaquet in 1709, and in 1711 his services were rewarded with the governorship of Bourbourg. He saw further active service in 1714 in Malta, under Charles XII. of Sweden in the north, and under the duke of Berwick in the short Spanish War of 1719. Charles XII. he regarded as the first captain of all time, and it was at Stockholm that Folard began to formulate his tactical ideas in a commentary on Polybius. On his way back to France he was shipwrecked and lost all his papers, but he set to work at once to write his essays afresh, and in 1724 appeared his *Nouvelles Découvertes sur la guerre dans une dissertation de Polybe*, followed (1727–1730) by *Histoire de Polybe traduite par . . . de Thuillier avec un commentaire . . . de M. de Folard, Chevalier de l'Ordre de St Louis.* Folard spent the remainder of his life in answering the criticisms provoked by the novelty of his theories. He died friendless and in obscurity at Avignon in 1752.

An analysis of Folard's military writings brings to light not a connected theory of war as a whole, but a great number of independent ideas, sometimes valuable and suggestive, but far more often extravagant. The central point of his tactics was his proposed column formation for infantry. Struck by the apparent weakness of the thin line of battle of the time, and arguing from the ἔμβολον or *cuneus* of ancient warfare, he desired to substitute the shock of a deep mass of troops for former methods of attack, and further considered that in defence a solid column gave an unshakable stability to the line of battle. Controversy at once centred itself upon the column. Whilst some famous commanders, such as Marshal Saxe and Guido Starhemberg, approved it and put it in practice, the weight of military opinion throughout Europe was opposed to it, and eventually history justified this opposition. Amongst the most discriminating of his critics was Frederick the Great, who is said to have invited Folard to Berlin. The Prussian king certainly caused a *précis* to be made by Colonel von Seers, and wrote a preface thereto expressing his views. The work (like others by Frederick) fell into unauthorized hands, and, on its publication (Paris, 1760) under the title *Esprit du Chev. Folard*, created a great impression. "Thus kept within bounds," said the prince de Ligne, "Folard was the best author of the time." Frederick himself said tersely that "Folard had buried diamonds in a rubbish-heap." Thus began the controversy between line and column formations, which long continued and influenced the development of tactics up to the most modern times. Folard's principal adherents in the 18th century were Joly de Maizeroy and Menil Durand.

See *Mémoires pour servir à l'histoire de M. le Chevalier de Folard* (Paris and Regensburg, 1753), and for a detailed account of Folard's works and those of his critics and supporters, Max Jähns, *Geschichte der Kriegswissenschaften*, vol. ii. pp. 1478-1493 (Munich and Leipzig, 1890).

FOLD, a pleat or bend in a flexible material, or a curve in any surface, whence its particular application in geology with which this article deals. The verb "to fold" (O. Eng. *fealdan*) meant originally to double back a piece of cloth or other material so as to form a pleat, whence has evolved its various senses of to roll up, to enclose, enfold or embrace as with the arms, to clasp the hands or arms together, &c. The word is common to Teutonic languages, cf. Ger. *falten*, Dutch *vouwen* (for *vouden*), &c., and the ultimate Indo-European root is found in Gr. πλέκειν, Lat. *plicare*, *plectere*, to plait, pleat, weave, and in the suffixes of such words as διπλάσιος, *duplex*, double, *simplex*, &c. Similarly the termination "-fold" is added to numbers implying "so many," *e.g.* twofold, hundredfold, cf. "manifold." The similar word for an enclosure or pen for animals, especially for sheep, and hence applied in a spiritual sense to a community of worshippers, or to the whole body of Christians regarded as Christ's flock, must be distinguished. In O. Eng. it is *falæd*, and cognate forms are found in Dutch *vaalt*, &c. It apparently meant a planked or boarded enclosure, cf. Dan. *fjael*, Swed. *fjöl*, plank.

In geology, a fold is a bend or curvature in the stratified rocks of the earth's crust, whereby they have been made to take up less horizontal space. The French equivalents are *pli*, *plissement*, *ridement*; in Germany, *Falte*, *Faltung*, *Sattelung* are the terms usually employed. It is comparatively rarely that bedded rocks are observed in the position in which they were first deposited, a certain amount of buckling up or sagging down of the crust being continually in progress in one region or another. In every instance therefore where, in walking over the surface, we traverse a series of strata which gradually, and without dislocations, increase or diminish in inclination, we cross part of a great curvature in the strata of the earth's crust.

Such foldings, however, can often be distinctly seen, either on some cliff or coast-line, or in the traverse of a piece of hilly or mountainous ground. The observer cannot long continue his researches in the field without discovering that the rocks of the earth's crust have been almost everywhere thrown into curves, usually so broad and gentle as to escape observation except when specially looked for. The outcrop of beds at the surface is commonly the truncation of these curves. The strata must once have risen above the present surface, and in many cases may be found descending to the surface again with a contrary dip, the intervening portion of the undulation having been worn away.

The curvature occasionally shows itself among horizontal or gently inclined strata in the form of an abrupt inclination, and then an immediate resumption of the previous flat or sloping character. The strata are thus bent up and continue on the other side of the tilt at a higher level. Such bends are called *monoclines*, *monoclinal folds* or *flexures*, because they present only one fold, or one half of a fold, instead of the two which we see in an arch or trough. The most notable instance of this structure in Britain is that of the Isle of Wight, of which a section is given in fig. 1. The Cretaceous rocks on the south side of the island rapidly rise in inclination till they become nearly vertical. The Lower Tertiary strata follow with a similar steep dip, but rapidly flatten down towards the north coast. Some remarkable cases of the same structure have been brought to light by J. W. Powell in his survey of the Colorado region.

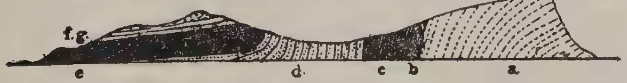


Fig. 1.—Section of the Isle of Wight—a Monoclinal Curve. *a*, Chalk; *b*, Woolwich and Reading beds; *c*, London clay; *d*, Bagshot series; *e*, Headon series; *f*, *g*, Osborne and Bembridge series.

It much more frequently happens that the strata have been bent into arches and troughs, so that they can be seen dipping under the surface on one side of the axis of a fold, and rising up again on the other side. Where they dip away from the axis of movement the structure is termed an *anticline* or *anticlinal fold*; where they dip towards the axis, it is a *syncline* or *synclinal fold*. The diagram in fig. 2 may be taken to represent a series of strata (1–17) thrown into an anticline (AA′) and syncline (BB′). A section drawn across these folds in the line CD would show the structure given in fig. 3. Here we see that, at the part of the anticlinal axis (A) where the section crosses, bed No. 4 forms the crown of the arch, Nos. 1, 2 and 3 being concealed beneath it. On the east side of the axis the strata follow each other in regular succession as far as No. 13, which, instead of passing here under the next in order, turns up with a contrary dip and forms the centre of a trough or syncline (B). From underneath No. 13 on the east side the same beds rise to the surface which passed beneath it on the west side. The particular bed marked EF has been entirely removed by denudation from the top of the anticline, and is buried deep beneath the centre of the syncline.

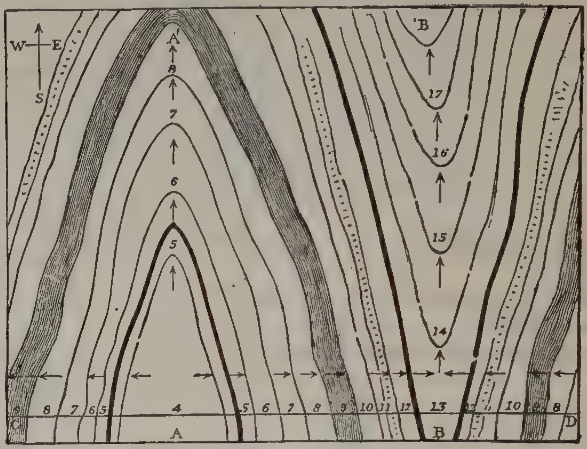
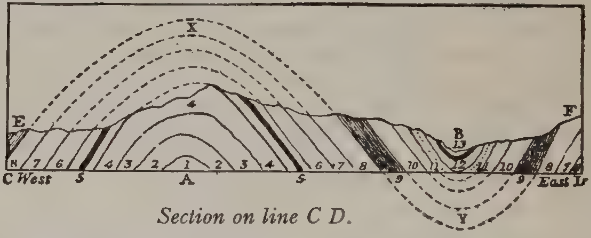


Fig. 2.—Plan of Anticlinal and Synclinal Folds.



Section on line C D.

Fig. 3.—Section of Anticlinal and Synclinal Folds on the line CD (fig. 2).

Such foldings of strata must always die out unless they are abruptly terminated by dislocations. In the cases given in fig. 2, both the arch and trough are represented as diminishing, the former towards the north, the latter towards the south. The observer in passing northwards along the axis of that anticline finds himself getting into progressively higher strata as the fold sinks down. On the other hand, in advancing southwards along the synclinal axis, he loses stratum after stratum and gets into lower portions of the series. When a fold diminishes in this way it is said to "nose out." In fig. 2 there is obviously a general inclination of the beds towards the north, besides the outward dip from the anticline and the inward dip from the syncline. Hence the anticline noses out to the north and the syncline to the south.

Simple Folds.—In describing rock-folds special terms have been assigned to certain portions of the fold; thus, the sloping sides of an anticline or syncline are known as the “ limbs,” “ slopes,” “ flanks ” or “ members ” of the fold; in an anticline, the part X, fig. 3, the angle of the bend, is the “ crest ” or “ crown ” (Ger. *Gewölbebiegung*, Fr. *charnière anticlinale*), the corresponding part of a syncline being the “ trough-core ” or “ base,” Y, fig. 3 (Ger. *Muldenbiegung*, Fr. *charnière synclinale*). The portion of an anticline which has been removed by denudation is the “ aerial arch,” dotted in fig. 3. The innermost strata in a fold constitute the “ core,” arch-core A, fig. 3, or trough-core B, in the same figure. In the majority of folds the bending of the strata has taken place about an “ axial plane ” (often called the “ axis ”), which in the examples illustrated in fig. 3 would pass through the points A and B, perpendicularly to the horizontal line CD. In powerfully folded regions the axial planes of the folds are no longer upright; they may be moderately inclined, producing an “ inversion,” “ inverted fold ” or “ overfold.” When the inclination of the axial plane is great a “ recumbent overfold ” is produced (Fr. *pli couché*, Ger. *liegende Falte*). In a fold of this kind (fig. 4) we have an “ arch limb ” (*a*), a middle limb (*b*) and a floor or “ trough limb ” (*c*). X and Y are the upper and lower bends respectively. One of the important functions of a fold is its direction; this of course depends upon the orientation of the axial plane. The crest-line of an anticline or trough-line of a syncline is rarely horizontal for any great distance; its departure from horizontality is designated the “ pitch,” and the fold is said to pitch (or dip) towards the north, &c. Most simple folds—with the exception of very shallow curvatures of wide area,—when considered in their entirety, are seen to be somewhat canoe-shaped in form. There are three variations of the simple fold dependent upon the position of the limbs, (1) the limbs may tend to diverge as they recede from the crest (fig. 3), sometimes styled an “ open anticline ”; (2) the limbs may be parallel in “ closed ” folds (commonly known as isoclinal folding); (3) the limbs may make an open angle or widen out towards the crest (fig. 4). This is known as a fan-shaped fold (Fr. *pli en éventail*, Ger. *Fächerfalte*); another variant of the same form is the mushroom fold (Fr. *pli en champignon*). The axial plane is not always extended: it may be so abbreviated that the folding appears to have taken place about a point; anticlines of this type are variously designated “ short-anticlines,” “ *brachyanticlinaux* ” or “ domes ”; similarly, there are “ short-synclines,” “ *brachysynclinaux* ” or “ cuvettes.” The dip in cases of this kind has been described as “ qua-qua versal ” or “ periclinal.”

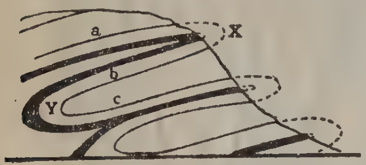


FIG. 4.

Complex Folding.—Sometimes a simple fold has been itself subjected to further folding repeated more than once, it is then termed a “ refolded fold ” (Fr. *pli replié*); fine examples may be observed in the Alps and in other mountain chains. A great regional major fold containing within itself a number of minor “ special ” or subsidiary folds is described as a “ geanticline ” (Fr. *structure en éventail composé*), or as a “ geosyncline ” (Fr. *structure en éventail renversé*). Even folds of lesser magnitude may be highly complex in regions of extreme crustal movement, and may contain smaller folds of the first, second, third or higher order (Fr. *couches gaufrées* [fig. 5]). In its smaller manifestation, this class of folding passes into “ crumpling ” or “ puckering,” where quite a large number of folds may be crowded into a single hand specimen. In “ frilling ” or “ frilled structure ” the folds have still smaller amplitude, and in many highly corrugated rocks minute folds are observable with the microscope that do not appear to the unaided eye. When a series of adjacent isoclinal overfolds has passed into a series of thrusts (see FAULT), the so-called “ imbricated ” structure (Fr. *structure imbriquée*, Ger. *Schuppenstruktur*) is generated. Occasionally crust-blocks resembling “ graben ” and “ horsts ” are circumscribed by folds instead of faults; when this is so they have been called respectively “ infolded graben ” or “ overfolded horsts.”

The heterogeneous character of great masses of strata has
always had a marked influence on the nature of the folding
some beds have yielded much more readily than others, certai
beds will be found to be faulted, while those above and below
have folded without fracture. In many examples of apparent
plasticity it can be shown that this effect has been produced
by an infinite number of minute slippings within the rock
substance.

The larger rock folds have produced important economi
results. For example, in many coal regions the deposits hav
been conserved in some districts in the synclines or “ basins,”
while they have been removed by denudation from the uplifte
anticlines in others. Near the crest of anticlines is commonl
an enriched portion of the ground in mineralized districts; and
in the case of water supply, the tilt of the strata determines th
direction of the underground flowage. Again, the most con
venient site for oil wells is the crest of an anticline or “ dome,”
where an impervious stratum imprisons the gas and oil in
subjacent saturated layer under pressure.

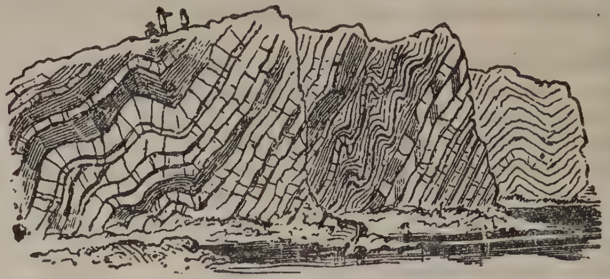


FIG. 5.—Curved and Contorted Rocks, near Old Head of Kinsale. (Du Noyer.)

For a discussion of the question of the distribution and arrange
ment of the great folded regions of the earth’s crust, see E. Suess
Das Antlitz der Erde, English translation, *The Face of the Eart*
vols. i., ii., iii., iv. (Oxford). See also E. de Margerie and A. Heim
Les Dislocations de l’écorce terrestre (Zurich, 1888); A. Rothplet
Geotektonische Probleme (Stuttgart, 1894).

FOLENGO, TEOFILO (1491–1544), otherwise known as Merlin
Coccajo or Cocajo, one of the principal Italian macaronic poets
was born of noble parentage at Cipada near Mantua on the 8t
of November 1491. From his infancy he showed great vivacit
of mind, and a remarkable cleverness in making verses. At th
age of sixteen he entered the monastery of Monte Casino nea
Brescia, and eighteen months afterwards he became a professe
member of the Benedictine order. For a few years his life as
monk seems to have been tolerably regular, and he is said
have produced a considerable quantity of Latin verse, writte
not unsuccessfully, in the Virgilian style. About the year 15
he forsook the monastic life for the society of a well-born youn
woman named Girolama Dieda, with whom he wandered abou
the country for several years, often suffering great povert
having no other means of support than his talent for versificatio
His first publication was the *Merlini Cocaii macaronicon*, whic
relates the adventures of a fictitious hero named Baldus. T
coarse buffoonery of this work is often relieved by touches
genuine poetry, as well as by graphic descriptions and acu
criticisms of men and manners. Its macaronic style is render
peculiarly perplexing to the foreigner by the frequent introducti
of words and phrases from the Mantuan patois. Though fr
quently censured for its occasional grossness of idea and e
pression, it soon attained a wide popularity, and within a ve
few years passed through several editions. Folengo’s ne
production was the *Orlandino*, an Italian poem of eight cant
written in rhymed octaves. It appeared in 1526, and bore
the title-page the new pseudonym of Limerno Pitocco (Merl
the Beggar) da Mantova. In the same year, wearied with a li
of dissipation, Folengo returned to his ecclesiastical obedien
and shortly afterwards wrote his *Chaos del tri per uno*, in whic
partly in prose, partly in verse, sometimes in Latin, sometim
in Italian, and sometimes in macaronic, he gives a veiled accou
of the vicissitudes of the life he had lived under his various nam

We next find him about the year 1533 writing in rhymed octaves a life of Christ entitled *L'Umanità del Figliuolo di Dio*; and he is known to have composed, still later, another religious poem upon the creation, fall and restoration of man, besides a few tragedies. These, however, have never been published. Some of his later years were spent in Sicily under the patronage of Don Fernando de Gonzaga, the viceroy; he even appears for a short time to have had charge of a monastery there. In 1543 he retired to Santa Croce de Campesio, near Bassano; and there he died on the 9th of December 1544.

Folengo is frequently quoted and still more frequently copied by Rabelais. The earlier editions of his *Opus macaronicum* are now extremely rare. The often reprinted edition of 1530 exhibits the text as revised by the author after he had begun to amend his life.

FOLEY, JOHN HENRY (1818–1874), Irish sculptor, was born at Dublin on the 24th of May 1818. At thirteen he began to study drawing and modelling at the schools of the Royal Dublin Society, where he took several first-class prizes. In 1835 he was admitted a student in the schools of the Royal Academy, London. He first appeared as an exhibitor in 1839 with his "Death of Abel and Innocence." "Ino and Bacchus," exhibited in 1840, gave him immediate reputation, and the work itself was afterwards commissioned to be done in marble for the earl of Ellesmere. "Lear and Cordelia" and "Death of Lear" were exhibited in 1841. "Venus rescuing Aeneas" and "The Houseless Wanderer" in 1842, "Prospero and Miranda" in 1843. In 1844 Foley sent to the exhibition at Westminster Hall his "Youth at a Stream," and was, with Calder Marshall and John Bell, chosen by the commissioners to do work in sculpture for the decoration of the Houses of Parliament. Statues of John Hampden and Selden were executed for this purpose, and received liberal praise for the propriety, dignity and proportion of their treatment. Commissions of all kinds now began to come rapidly. Fanciful works, busts, bas-reliefs, tablets and monumental statues were in great numbers undertaken and executed by him with a steady equality of worthy treatment. In 1849 he was made an associate and in 1858 a member of the Royal Academy. Among his numerous works the following may be noticed, besides those mentioned above:—"The Mother"; "Egeria," for the Mansion House; "The Elder Brother in Comus," his diploma work; "The Muse of Painting," the monument of James Ward, R.A.; "Caractacus," for the Mansion House; "Helen Faucit"; "Goldsmith" and "Burke," for Trinity College, Dublin; "Faraday"; "Reynolds"; "Barry," for Westminster Palace Yard; "John Stuart Mill," for the Thames embankment; "O'Connell" and "Gough," for Dublin; "Clyde," for Glasgow; "Clive," for Shrewsbury; "Hardinge," "Canning" and "Outram," for Calcutta; "Hon. James Stewart," for Ceylon; the symbolical group "Asia," as well as the statue of the prince himself, for the Albert Memorial in Hyde Park; and "Stonewall Jackson," in Richmond, Va. The statue of Sir James Outram is probably his masterpiece. Foley's early fanciful works have some charming qualities; but he will probably always be best remembered for the workmanlike and manly style of his monumental portraits. He died at Hampstead on the 27th of August 1874, and on the 4th of September was buried in St Paul's cathedral. He left his models to the Royal Dublin Society, his early school, and a great part of his property to the Artists' Benevolent Fund.

See W. Cosmo Monkhouse, *The Works of J. H. Foley* (1875).

FOLEY, SIR THOMAS (1757–1833), British admiral, entered the navy in 1770, and, during his time as midshipman, saw a good deal of active service in the West Indies against American privateers. Promoted lieutenant in 1778, he served under Admiral (afterwards Viscount) Keppel and Sir Charles Hardy in the Channel, and with Rodney's squadron was present at the defeat of De Lángara off Cape St Vincent in 1780, and at the relief of Gibraltar. Still under Rodney's command, he went out to the West Indies, and took his part in the operations which culminated in the victory of the 12th of April 1782. In the Revolutionary War he was engaged from the first. As flag-captain to Admiral John Gell, and afterwards to Sir Hyde Parker, Foley took part in the siege of Toulon in 1793, the action of Golfe Jouan in 1794, and the two fights off Toulon on the 13th of April and the 13th of July 1795. At St Vincent he was flag-captain to the second in command, and in the following year was sent out in command of the "Goliath" (74), to reinforce Nelson's fleet in the Mediterranean. The part played by the "Goliath" in the battle of the Nile was brilliant. She led the squadron round the French van, and this manœuvre contributed not a little to the result of the day. Whether this was done by Foley's own initiative, or intended by Nelson, has been a matter of controversy (see *Journal of the Royal United Service Institution*, 1885, p. 916). His next important service was with Nelson in the Baltic. The "Elephant" carried Nelson's flag at the battle of Copenhagen, and her captain acted as his chief-of-staff. Ill-health obliged Foley to decline Nelson's offer (made when on the point of starting for the battle of Trafalgar) of the post of Captain of the Fleet. From 1808 to 1815 he commanded in the Downs and at the peace was made K.C.B. Sir Thomas Foley rose to be full admiral and G. C. B. He died while commanding in chief at Portsmouth in 1833.

See J. B. Herbert, *Life and Services of Sir Thomas Foley* (Cardiff, 1884).

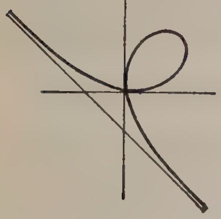
FOLI (FOLEY), **ALLAN JAMES** (1837–1899), Irish bass singer, was born at Cahir, Tipperary, on the 7th of August 1837; originally a carpenter, he studied under Bisaccia at Naples, and made his first appearance at Catania in 1862. From the opera in Paris he was engaged by Mapleson for the season of 1865, and appeared with much success in various parts. He sang in the first performance of *The Flying Dutchman* (Daland) in England in 1870, and in the first performance of Gounod's *Redemption* in 1882. He was distinguished in opera and oratorio alike for his vigorous, straightforward way of singing, and was in great request at ballad concerts. He died on the 20th of October 1899.

FOLIGNO (anc. *Fulginiae*, *q.v.*), a town and episcopal see of Umbria, Italy, 771 ft. above sea-level, in the province of Perugia, from which it is 25 m. S.E. by rail. Pop. (1901) 9532 (town), 26,278 (commune). It lies in a fertile plain, on the Topino, a tributary of the Tiber; it is almost square in shape and is surrounded by walls. It is a picturesque and interesting town; several of its churches contain paintings by Umbrian masters, notably works by Niccolò di Liberatore (or Niccolò Alunno, 1430–1502), and among them his chief work, a large altar-piece (the predella of which is in the Louvre) in S. Niccolò. The cathedral has a romanesque S. façade of 1133, restored in 1903; the interior was modernized in the 18th century. To the left of the choir is an octagonal chapel by Antonio da Sangallo the younger (1527). In the same piazza as the S. façade is the Palazzo del Governo, erected in 1350, which has a chapel with frescoes by Ottaviano Nelli of Gubbio (1424). S. Maria infra Portas is said to date from the 7th century, but from this period only the columns of the portico remain. Raphael's "Madonna di Foligno," now in the Vatican, was originally painted for the church of S. Anna. The Palazzo Orfini and the Palazzo Deli are two good Renaissance buildings.

Foligno seems to have been founded about the middle of the 8th century A.D. It changed hands often during the wars of the 13th century, and was destroyed by Perugia in 1281. From 1305 to 1439 it was governed by the family of the Trinci as deputies of the Holy See, until in the latter year one of its members went against the church. Pope Eugene IV. sent a force against Foligno, to which the inhabitants opened their gates, and the last of the Trinci, Corrado II., was beheaded. Henceforth Foligno belonged to the states of the church until 1860. It suffered from a severe earthquake in 1832. Foligno is a station on the main line from Rome (via Orte) to Ancona, and is the junction for Perugia. Three miles to the E. is the abbey of Sassovivo with cloisters of 1229, very like those of S. Paolo fuori le Mura at Rome, with pairs of small columns supporting arches, and decorations in coloured mosaic ("Cosmatesque" work). The church has been modernized.

FOLIO (properly the ablative case of the Lat. *folium*, leaf, but also frequently an adaptation of the Ital. *foglio*), a term in bibliography and printing, with reference either to the size of paper employed, or of the book, or to the pagination. In the phrase "in folio" it means a sheet of paper folded once, and thus a book bound up in sheets thus folded is a book of the largest size and is known as a "folio" (see BIBLIOGRAPHY). Similarly, "folio" is one of the sizes of paper adapted to be thus folded (see PAPER). In book-keeping the word is used for a page in a ledger on which the credit and debtor account is written; in law-writing, for a fixed number of words in a legal document, used for measurement of the length and for the addition of costs. In Great Britain, a "folio" is taken to contain 72 words, except in parliamentary and chancery documents, when the number is 90. In the U.S.A. 100 words form a "folio."

FOLIUM, in mathematics, a curve invented and discussed by René Descartes. Its cartesian equation is $x^3+y^3=3axy$. The curve is symmetrical about the line $x=y$, and consists of two infinite branches asymptotic to the line $x+y+a=0$ and a loop in the first quadrant. It may be traced by giving m various values in the equations $x=3am/(1+m^3)$, $y=3am^2$ $(1+m^3)$, since by eliminating m between these relations the equation to the curve is obtained. Hence it is *unicursal* (see CURVE). The area of the loop, which equals the area between the curve and its asymptote, is $3a/2$.



FOLKES, MARTIN (1690–1754), English antiquary, was born in London on the 29th of October 1690. He was educated at Saumur University and Clare College, Cambridge, where he so distinguished himself in mathematics that when only twenty-three years of age he was chosen a fellow of the Royal Society. He was elected one of the council in 1716, and in 1723 Sir Isaac Newton, president of the society, appointed him one of the vice-presidents. On the death of Newton he became a candidate for the presidency, but was defeated by Sir Hans Sloane, whom, however, he succeeded in 1741; in 1742 he was made a member of the French Academy; in 1746 he received honorary degrees from Oxford and Cambridge. In 1733 he set out on a tour through Italy, in the course of which he composed his *Dissertations on the Weights and Values of Ancient Coins.* Before the Society of Antiquaries, of which he was president from 1749 to 1754, he read in 1736 his *Observations on the Trajan and Antonine Pillars at Rome* and his *Table of English Gold Coins from the 18th Year of King Edward III.* In 1745 he printed the latter with another on the history of silver coinage. He also contributed both to the Society of Antiquaries and to the Royal Society other papers, chiefly on Roman antiquities. He married in 1714 Lucretia Bradshaw, an actress who had appeared at the Haymarket and Drury Lane (see Nichols's *Lit. Anecdot.* ii. 578-598).

For Sir John Hill's attack on Folkes (*Review of the Works of the Royal Soc.*, 1751), see D'Israeli, *Calamities and Quarrels of Authors* (1860), pp. 364-366.

FOLKESTONE, a municipal borough, seaport and watering-place of Kent, England, within the parliamentary borough of Hythe, 71 m. S.E. by E. of London by the South-Eastern & Chatham railway. Pop. (1891) 23,905; (1901) 30,650. This is one of the principal ports in cross-Channel communications, the steamers serving Boulogne, 30 m. distant. The older part of Folkestone lies in a small valley which here opens upon the shore between steep hills. The more modern portions extend up the hills on either hand. To the north the town is sheltered by hills rising sharply to heights of 400 to 500 ft., on several of which, such as Sugarloaf and Castle Hills, are ancient earthworks. Above the cliff west of the old town is a broad promenade called the Lees, commanding a notable view of the channel and connected by lifts with the shore below. On this cliff also stands the parish church of St Mary and St Eanswith, a cruciform building of much interest, with central tower. It is mainly Early English, but the original church, attached to a Benedictine priory, was founded in 1095 on the site of a convent established by Eanswith, daughter of Eadbald, king of Kent in 630. The site of this foundation, however, became endangered by encroachments of the sea. The monastery was destroyed at the dissolution of religious houses by Henry VIII. Folkestone inner harbour is dry at low water, but there is a deep water pier for use at low tide by the Channel steamers, by which not only the passenger traffic, but also a large general trade are carried on. The fisheries are important. Among institutions may be mentioned the grammar school, founded in 1674, the public library and museum, and a number of hospitals and sanatoria. The discontinued Harveian Institution for young men was named after William Harvey, discoverer of the circulation of the blood, a native of Folkestone (1578), who is also commemorated by a tercentenary memorial on the Lees. Folkestone is a member of the Cinque Port of Dover. It is governed by a mayor, 7 aldermen and 21 councillors. Area, 2522 acres. To the west of Folkestone, close to Shorncliffe camp, is the populous suburb of Cheriton (an urban district, pop. 7091).

Folkestone (Folcestan) was among the possessions of Earl Godwine and was called upon to supply him with ships when he was exiled from England; at the time of the Domesday Survey it belonged to Odo, bishop of Bayeux. From early times it was a member of the Cinque Port of Dover, and had to find one out of the twenty-one ships furnished by that port for the royal service. It shared the privileges of the Cinque Ports, whose liberties were exemplified at the request of the barons of Folkestone by Edward III. in 1330. The corporation, which was prescriptive, was entitled the mayor, jurats and commonalty of Folkestone. The history of Folkestone is a record of its struggle against the sea, which was constantly encroaching upon the town. In 1629 the inhabitants, impoverished by their losses, obtained licence to erect a port. By the end of the 18th century the town had become prosperous by the increase of its fishing and shipping trades, and by the middle of the 19th century one of the chief health and pleasure resorts of the south coast.

FOLKLAND (*folcland*). This term occurs three times in Anglo-Saxon documents. In a law of Edward the Elder (c. i. 2) it is contrasted with bookland in a way which shows that these two kinds of tenure formed the two main subdivisions of landownership: no one is to deny right to another in respect of folkland or bookland. By a charter of 863 (Cod. Dipl. 281), King Æthelberht exchanges five hides of folkland for five hides of bookland which had formerly belonged to a thane, granting the latter for the newly-acquired estates exemption from all fiscal exactions except the threefold public obligation of attending the fyrd and joining in the repair of fortresses and bridges. Evidently folkland was not free from the payment of *gafål* (land tax) and providing quarters for the king's men. In ealdorman Alfred's will the testator disposes freely of his bookland estates in favour of his sons and his daughter, but to a son who is not considered as rightful offspring five hides of folkland are left, provided the king consents. It is probable that folkland is meant in two or three cases when Latin documents speak of *terra rei publicae jure possessa.*

Two principal explanations have been given to this term. Allen thought that folkland was similar to the Roman *ager publicus*: it was the common property of the nation (*folc*), and the king had to dispose of it by carving out dependent tenures for his followers more or less after the fashion of continental *beneficia.* These estates remained subject to the superior ownership of the folk and of the king: they could eventually be taken back by the latter and, in any case, the heir of a holder of folkland had to be confirmed in possession by the king. A letter of Bede to the archbishop Ecgbert of York may be interpreted to apply to this kind of tenure. Kemble, K. Maurer, H. C. Lodge, Stubbs and others followed Allen's lead.

Another theory was started by Professor Vinogradoff in an article on folkland in the *English Hist. Review* for 1893. It considers folkland as landownership by folkright—at common law, as might be said in modern legal speech. In opposition to it bookland appears as landownership derived from royal privilege. The incidents recorded in the charters characterize folkland as subject to ordinary fiscal burdens and to limitations in respect of testamentary succession. Thane Wallaf has to be relieved from fiscal exactions when his estate is converted from folkland into bookland (C.D. 281). Ealdorman Alfred's son, not being recognized as legitimate, has to claim folkland not by direct succession or devise, but by the consent of the king. These incidents and limitations are thrown into relief by copious illustrations as to the fundamental features of bookland contained in the numberless "books." These are exemptions from fiscal dues and freedom of disposition of the owner. This view of the matter has been accepted by the chief modern authorities.

Bibliography.—J. Allen, *Inquiry into the Rise and Growth of Royal Prerogative in England* (London, 1849); K. Maurer, *Kritische Überschau* (1853), Band i. 102 ff.; F. W. Maitland, *Domesday Book and Beyond*, 244 ff. (Cambridge, 1897); P. Vinogradoff, "Folcland," in the *Eng. Hist. Rev.* (1893), p. 1 ff.; Sir F. Pollock, *Land Laws* (London, 1896); H. Brunner, *Deutsche Rechtsgeschichte*, Band i. (2nd ed., 293, Leipzig, 1887–1892). (P. Vi.)

FOLKLORE, a term invented in 1846 by Mr W. J. Thoms as a designation for the traditional learning of the uncultured classes of civilized nations. The word has been adopted in this sense into many foreign languages; it is sometimes regarded as the equivalent of the Ger. *Volkskunde.* But folklore is, properly speaking, the "lore *of* the folk," while *Volkskunde* is lore or learning *about* the folk, and includes not only the mental life of a people, but also their arts and crafts. The term folklore is also used to designate the science which deals with folklore; the study of survivals involves the investigation of the similar customs, beliefs, &c., of races on lower planes of culture; consequently folklore, as interpreted by the English and American societies, concerns itself as much or more with savage races as with the popular superstitions of the white races.

History.—The scientific study of folklore dates back to the first quarter of the 19th century, but folklore was collected long before that date. The organized study of folklore is a thing of recent growth. The first Folklore Society was founded in London in 1878; similar bodies now exist in the United States, France, Italy, Switzerland and especially in Germany and Austria. The folk-tale makes its appearance in literature at a very early period; Egyptian examples have come down to us from the 28th century B.C. In Greece the Homeric poems contain many folk-tale incidents; for India we have the *Jatakas* and *Panchatantra*; and for the Arabs the great collection of the *Thousand and One Nights.* Another type of folk-narrative is represented by Aesop's *Fables.* Not unnaturally beliefs and customs received less attention; our knowledge of them among the ancients is as a rule pieced together. Among the oldest professed collections are J. B. Thiers (1606–1703), *Traité des superstitions* (1679), Aubrey's *Miscellanies* (1686) and H. Bourne's (1696–1733) *Antiquitates vulgares* (1725); but they belong to the antiquarian, non-scientific period.

The pioneers of the modern scientific treatment of folklore were the brothers Grimm, by the publication of their *Kinder-und Hausmärchen* (1812–1815) and *Deutsche Mythologie* (1835). They were the first to present the folk-tale in its genuine unadulterated form. They differed from their predecessors in regarding the myth, not as the result of conscious speculation, but of a mythopoeic impulse. They were, however, disposed to press modern linguistic evidence too far and make the figures of the folk-tale the lineal representatives of ancient gods, as the folk-tales themselves were of the myths. This tendency was exaggerated by their successors, J. W. Wolf, W. Rochholz and others. At the outset of his career, W. Mannhardt (1831–1880), the forerunner of the anthropological school of folklore, shared in this mistake. Breaking away eventually from the philological schools, which interpreted myths and their supposed descendants, the folk-tales, as relating to the storm, the sun, the dawn, &c. (see Mythology), Mannhardt made folk-custom and belief his basis. To this end he set himself to collect and compare the superstitions of the peasantry; but his health was always feeble and he never completed his scheme. For a time Mannhardt's researches bore fruit neither in his own country nor abroad. In 1878 the foundation of the Folklore Society marked a new era in England, where the philological school had had few adherents; and the anthropological school soon produced evidence of its vitality in the works of Mr Andrew Lang, Dr J. G. Frazer and Professor Robertson Smith.

With the growth of our knowledge of European folk-custom and belief on the one hand, and of rites and religions of people in the lower stages of culture on the other hand, it has become abundantly clear that there is no line of demarcation between the two. Each throws light upon the other, and the superstitions of Europe are the lineal descendants of savage creeds which have their parallels all over the world in the culture of primitive peoples.

Subdivisions.—The folklore of civilized peoples may be conveniently classified under three main heads: (1) belief and custom; (2) narratives and sayings; (3) art. These again may be subdivided. The first division, *Belief and Custom,* includes (A) Superstitious beliefs and practices, including (*a*) those connected with natural phenomena or inanimate nature, (*b*) tree and plant superstitions, (*c*) animal superstitions, (*d*) ghosts and goblins, (*e*) witchcraft, (*f*) leechcraft, (*g*) magic in general and divination, (*h*) eschatology, and (*i*) miscellaneous superstitions and practices; and (B) Traditional customs, including (*a*) festival customs for which are set aside certain days and seasons, (*b*) ceremonial customs on the occasion of events such as birth, death or marriage, (*c*) games, (*d*) miscellaneous local customs, such as agricultural rites connected with the corn-spirit (see Demonology), and (*e*) dances. The second head of *Narratives and Sayings* may be subdivided (A) into (*a*) sagas or tales told as true, (*b*) Märchen or nursery tales, (*c*) fables, (*d*) drolls, apologues, cumulative tales, &c., (*e*) myths (see Mythology), and (*f*) place legends; (B) into ballads and songs (in so far as they do not come under art); and (C) into nursery rhymes, riddles, jingles, proverbs, nicknames, place rhymes, &c. The third head, *Art,* subdivides into (*a*) folk music with ballads and songs, (*b*) folk drama. Any classification, however, labours under the disadvantage of separating items which properly belong together. Thus, myths are obviously the form in which some superstitions are expressed. They may also be aetiological in their nature and form an elaborate record of a custom. Eschatological beliefs naturally take the form of myths. Traditional narratives can also be classified under art, and so on.

Literature.—The literature of the subject falls into two sharply defined classes—synthetic works and collections of folklore—of which the latter are immensely more numerous. Of the former class the most important is Dr J. G. Frazer's *Golden Bough,* which sets out from the study of a survival in Roman religion and covers a wide field of savage and civilized beliefs and customs. Especially important are the chapters on agricultural rites, in which are set forth the results of Mannhardt's researches. Other important lines of folklore research in the *Golden Bough* are those dealing with spring ceremonies, with the primitive view of the soul, with animal cults, and with sun and rain charms. Mr E. S. Hartland's *Legend of Perseus* is primarily concerned with the origin of a folk-tale, and this problem in the end is dismissed as insoluble. A large part of the book is taken up with a discussion of sympathetic magic, and especially with the "life index," an object so bound up with the life of a human being that it acts as an indication of his well-being or otherwise. The importance of children's games in the study of folklore has been recognized of recent years. An admirable collection of the games of England has been published by Mrs G. L. Gomme. With the more minute study of uncivilized peoples the problem of the diffusion of games has also come to the fore. In particular it is found that the string-game called "cat's cradle" in various forms is of very wide diffusion, being found even in Australia. The question of folk-music has recently received much attention (see Song).

Bibliography.—**Introductory works:** M. R. Cox, *Introduction to Folklore*; Kaindl, *Die Volkskunde*; Marillier in *Revue de l'histoire des religions*, xliii. 166, and other works mentioned by Kaindl.

General works: J. G. Frazer, *The Golden Bough*; E. S. Hartland, *The Legend of Perseus*; A. Lang, *Custom and Myth*, *Myth, Ritual and Religion*; Tylor, *Primitive Culture*; Liebrecht, *Zur Volkskunde.*

British Isles. England: Burne, *Shropshire Folklore*; *Denham Tracts* (F. L. S.); Harland and Wilkinson, *Lancashire Folklore*; Henderson, *Folklore of Northern Counties*; *County Folklore Series* (Printed Extracts) of the F.L.S. Wales: Elias Owen, *Welsh Folklore*; Rhys, *Celtic Folklore*. Scotland: Dalyell, *Darker Superstitions*; Gregor, *Folklore of N.E. of Scotland*; the works of J. G. Campbell, &c.

Germany: Grimm, *Deutsche Mythologie*, English translation by Stallybrass; Wuttke, *Der deutsche Volksaberglaube*; Meyer, *Deutsche Volkskunde*; Tetzner, *Die Slaven in Deutschland*; Mogk in Paul's *Grundriss der germanischen Philologie*, and the works cited by Kaindl (see above).

France: Sebillot's works; Rolland, *Faune populaire*; Laisnel de la Salle, *Croyances et légendes*.

On the Slavs see the works of Krauss and v. Wlislochi; for Bohemia, Grohmann, *Aberglaube*; for Greece, Abbott, *Macedonian Folklore*, and Rennell Rodd, *Folklore of Greece*; for Italy, Pitré's bibliography; for India, Crooke's works, and the *Indian Antiquary*. For questionnaires see *Handbook of Folklore* (Folklore Soc.); Sebillot, *Essai de questionnaires*; *Journal of American Folklore* (1890, &c.); and Kaindl's *Volkskunde*. For a bibliography of folk-tales see Hartland, *Mythology and Folk-tales*; to his list may be added Petitot's *Légendes indiennes*; Rand, *Legends of the Micmacs*; Lummis, *The Man who Married the Moon*; and the publications of the American Folklore Society. For other works see bibliographies in *Folklore* and other periodicals. On special points may be mentioned Miss Cox's *Cinderella* (Folklore Society); Kohler's works, &c. (see also bibliography to the article TALE). For games see Gomme, *English Games*; Culin, *Korean Games*; Rochholz, *Alemannisches Kinderlied*; Böhme, *Deutsches Kinderlied*; Handelmann, *Volks- und Kinderspiele*; Jayne, *String Figures*, &c.; and the bibliography to DOLL. See also Sonnenschein's *Best Books*.

The following is a list of the more important Societies and publications:—

England: Folklore Society; Folksong Society; Gipsy-lore Society.
U.S.A.: American Folklore Society.
France: *Société des traditions populaires*.
Germany: *Verein für Volkskunde*; *Hessische Vereinigung für Volkskunde*; and minor societies in Saxony, Silesia and other provinces.
Austria: *Verein für österreichische Volkskunde*.
Switzerland: *Schweizerische Gesellschaft für Volkskunde*.
Italy: *Società per lo studio delle tradizioni popolari*.

In addition to these, the anthropological societies devote more or less attention to folklore. Besides the publications of the societies mentioned above, minor societies or individuals are responsible for the following among others: Belgium, *Wallonia*; Poland, *Wisla*; France, *Melusine* (1878, 1883–1901); Bohemia, *Cesky Lid*; Denmark, *Dania*, &c.; Germany, *Zeitschrift für Völkerpsychologie* (1859–1890); *Am Urquell* (1890–1898). (N. W. T.)

FOLLEN, AUGUST (or, as he afterwards called himself, ADOLF) **LUDWIG** (1794–1855), German poet, was born at Giessen on the 21st of January 1794, the son of a district judge. He studied theology at Giessen and law at Heidelberg, and after leaving the university edited the Elberfeld *Allgemeine Zeitung*. Suspected of being connected with some radical plots, he was imprisoned for two years in Berlin. When released in 1821 he went to Switzerland, where he taught in the canton school at Aarau, farmed from 1847–1854 the estate of Liebenfels in Thurgau, and then retired to Bern, where he lived till his death on the 26th of December 1855. Besides a number of minor poems he wrote *Harfengrüsse aus Deutschland und der Schweiz* (1823) and *Malegys und Vivian* (1829), a knightly romance after the fashion of the romantic school. Of his many translations, mention may be made of the Homeric Hymns in collaboration with R. Schwenck (1814), Tasso's *Jerusalem Delivered* (1818) and *Siegfrieds Tod* from the *Nibelungenlied* (1842); he also collected and translated Latin hymns and sacred poetry (1819). In 1846 he published a brief collection of sonnets entitled *An die gottlosen Nichtswüteriche*. This was aimed at the liberal philosopher Arnold Ruge, and was the occasion of a literary duel between the two authors. Follen's posthumous poem *Tristans Eltern* (1857) may also be mentioned, but his best-known work is a collection of German poetry entitled *Bildersaal deutscher Dichtung* (1827).

FOLLEN, KARL (1795–1840), German poet and patriot, brother of A. L. Follen, was born at Romrod in Hesse-Darmstadt, on the 5th of September 1795. He first studied theology at Giessen, but after the campaign of 1814, in which, like his brother August, he took part as a Hessian volunteer, began the study of jurisprudence, and in 1818 established himself as *Privatdocent* of civil law at Giessen. Owing to being suspected of political intrigues, he removed to Jena, and thence, after the assassination of Kotzebue, fled to France. Here again the political murder of the duc de Berry, on the 14th of January 1820, led to Follen being regarded as a suspect, and he accordingly took refuge in Switzerland, where he taught for a while at the cantonal school at Coire and at the university of Basel; but the Prussian authorities imperatively demanding his surrender, he sought in 1824 the hospitality of the United States of America. Here he became an instructor in German at Harvard in 1825, and in 1830 obtained an appointment as professor of German language and literature there; but his anti-slavery agitation having given umbrage to the authorities, he forfeited his post in 1835, and was ordained Unitarian minister of a chapel at Lexington in Massachusetts in 1836. He perished at sea on board a steamboat which was totally consumed by fire while on a voyage from New York to Boston, on the night of the 13th–14th of January 1840. Follen was the author of several celebrated patriotic songs written in the interests of liberty. The best is perhaps *Horch auf, ihr Fürsten! Du Volk, horch auf!* of which Johannes Wit, called von Dörring (1800–1863), was long, though erroneously, considered the author. It was published in A. L. Follen's collection of patriotic songs, *Freie Stimmen frischer Jugend*.

His wife Elisa Lee (1787–1860), an American authoress of some reputation, published after his death his lectures and sermons, with a biography written by herself (5 vols., Boston, 1846).

FOLLETT, SIR WILLIAM WEBB (1798–1845), English lawyer, was born at Topsham in Devonshire on the 2nd of December 1798. He was the son of Captain Benjamin Follett, who had retired from the army in 1790, and engaged in business at Topsham. He received his education at Exeter grammar school and Trinity College, Cambridge, graduating in 1818. He had entered the Inner Temple in 1816 and began to practise as a pleader below the bar in 1821, but was called to the bar in 1824, and joined the western circuit in 1825. At the very outset his great qualifications were universally recognized. He was thoroughly master of his profession, and his rapid rise in it was due not only to his quick perception and sound judgment, but to his singular courtesy, kindness and sweetness of temper. In 1830 he married the eldest daughter of Sir Ambrose Harding Gifford, chief justice of Ceylon. In 1835 he was returned to parliament for Exeter. In parliament he early distinguished himself, and under the first administration of Sir Robert Peel was appointed solicitor-general (November 1834); but resigned with the ministry in April 1835. In the course of this year he was knighted. On the return of Peel to power in 1841 Sir William was again appointed solicitor-general, and in April 1844 he succeeded Sir Frederick Pollock as attorney-general. But his health, which had begun to fail him in 1838, and had been permanently injured by a severe illness in 1841, now broke down, and he was compelled to relinquish practice and to visit the south of Europe. He returned to England in March 1845; but the disease, consumption, reasserted itself, and he died in London on the 28th of June following. A statue of Follett, executed by Behnes, was erected by subscription in Westminster Abbey.

FONBLANQUE, ALBANY WILLIAM (1793–1872), English journalist, descended from a noble French Huguenot family, the Greniers of Languedoc, was born in London in 1793. John Grenier, a banker, became naturalized in England under the name of Fonblanque; and his son John Samuel Martin Fonblanque (1760–1838), a distinguished equity lawyer, and the author of a standard legal work, a *Treatise on Equity*, was the father of Albany Fonblanque; he represented the borough of Camelford in parliament; and was one of the Whig friends of George IV. when prince of Wales. At fourteen young Fonblanque was sent to Woolwich to prepare for the Royal Engineers. His health, however, failed, and for two years his studies had to be suspended. Upon his recovery he studied for some time with a view to being called to the bar. At the age of nineteen (1812) he commenced writing for the newspapers, and very soon attracted notice both by the boldness and liberality of his opinions, and by the superiority of his style to what Macaulay, when speaking of him, justly called the "rant and twaddle of the daily and weekly press" of the time. While he was eagerly taking his share in all the political struggles of this eventful period, he was also continuing his studies, devoting no less than six hours a day to the study of classics and political philosophy. Under this severe mental training his health once more broke down. His energy, however, was not impaired. He became a regular contributor to the newspapers and reviews, realizing a fair income which, as his habits were simple and temperate, secured him against pecuniary anxieties.

From 1820 to 1830 Albany Fonblanque was successively employed upon the staff of *The Times* and the *Morning Chronicle*, whilst he contributed to the *Examiner*, to the *London Magazine* and to the *Westminster Review*. In 1828 the *Examiner* newspaper, which had been purchased by the Rev. Dr Fellowes, author of the *Religion of the Universe*, &c., was given over to Fonblanque's complete control; and for a period of seventeen years (1830 to 1847) he not only sustained the high character for political independence and literary ability which the *Examiner* had gained under the direction of Leigh Hunt and his brother, John Hunt, but even compelled his political opponents to acknowledge a certain delight in the boldness and brightness of the wit directed against themselves. When it was proposed that the admirers and supporters of the paper should facilitate a reduction in its price by the payment of their subscription ten years in advance, not only did Mr Edward Bulwer (Lord Lytton) volunteer his aid, but also Mr Disraeli, who was then coquetting with radicalism. During his connexion with the *Examiner*, Fonblanque had many advantageous offers of further literary employment; but he devoted his energies and talents almost exclusively to the service of the paper he had resolved to make a standard of literary excellence in the world of journalism. Fonblanque was offered the governorship of Nova Scotia; but although he took great interest in colonial matters, and had used every effort to advocate the more generous political system which had colonial self-government for its goal, he decided not to abandon his beloved *Examiner* even for so sympathetic an employment. In 1847, however, domestic reasons induced him to accept the post of statistical secretary of the Board of Trade. This of course compelled him to resign the editorship of the *Examiner*, but he still continued to contribute largely to the paper, which, under the control of John Forster, continued to sustain its influential position. During the later years of his life Fonblanque took no prominent part in public affairs; and when he died at the age of seventy-nine (1872) he seemed, as his nephew, Edward Fonblanque, rightly observes, "a man who had lived and toiled in an age gone by and in a cause long since established."

The character of Albany Fonblanque's political activity may be judged of by a study of his *England under Seven Administrations* (1837), in comparison with the course of social and political events in England from 1826 to 1837. As a journalist, he must be regarded in the light of a reformer. Journalism before his day was regarded as a somewhat discreditable profession; men of true culture were shy of entering the hot and dusty arena lest they should be confounded with the ruder combatants who fought there before the public for hire. But the fact that Fonblanque, a man not only of strong and earnest political convictions but also of exceptional literary ability, did not hesitate to choose this field as a worthy one in which both a politician and a man of letters might usefully as well as honourably put forth his best gifts, must have helped, in no small degree, to correct the old prejudice.

See the *Life and Labours of Albany Fonblanque*, edited by his nephew, Edward Barrington de Fonblanque (London, 1874); a collection of his articles with a brief biographical notice.

FOND DU LAC, a city and the county-seat of Fond du Lac county, Wisconsin, U.S.A., about 60 m. N. of Milwaukee, at the S. end of Lake Winnebago, and at the mouth of the Fond du Lac river, which is navigable for only a short distance. Pop. (1890) 12,024; (1900) 15,110, of whom 2952 were foreign-born; (1910) 18,797. The city is a railway centre of some importance, and is served by the Chicago, Milwaukee & St Paul, the Minneapolis, St Paul & Sault St Marie, and the Chicago & North-Western railways, by interurban electric lines, and by steamboat lines connecting through the Fox river with vessels on the Great Lakes. At North Fond du Lac, just beyond the city limits, are car-shops of the two last-mentioned railways, and in the city are manufactories of machinery, automobiles, wagons and carriages, awnings, leather, beer, flour, refrigerators, agricultural implements, toys and furniture. The total value of the city's factory products in 1905 was $5,599,606, an increase of 95·7% since 1900. The city has a Protestant Episcopal cathedral, the Grafton Hall school for girls, and St Agnes hospital and convent, and a public library with about 25,000 volumes in 1908. The first settlers on the site of Fond du Lac arrived about 1835. Subsequently a village was laid out which was incorporated in 1847; a city charter was secured in 1852.

FONDI (anc. *Fundi*), a town of Campania, Italy, in the province of Caserta, 12 m. N.W. of Formia, and 11 m. E.N.E. of Terracina by road. Pop. (1901) 9930. It lies 25 ft. above sea-level, at the N. end of a plain surrounded by mountains, which extend to the sea. It occupies the site of the ancient Fundi, a Volscian town, belonging later to *Latium adjectum*, on the Via Appia, still represented by the modern high-road which passes through the centre of the town. It is rectangular in plan, and portions of its walls, partly in fine polygonal work and partly in *opus incertum*, are preserved. Both plan and walls date, no doubt, from the Roman period. The gate on the north-east still exists, and bears the inscription of three aediles who erected the gate, the towers and the wall. A similar inscription of three different aediles from the N.W. gate still exists, but not *in situ*. In the neighbourhood are the remains of several ancient villas, and along the Via Appia still stands an ancient wall of *opus reticulatum*, with an inscription, in large letters, of one Varronianus, the letters being at intervals of 25 ft. The engineering of the ancient Via Appia between Fondi and Formia, where it passes through the mountains near Itri, is remarkable.

The modern town is still enclosed by the ancient walls. The castle on the S.E. side has some 15th-century windows with beautiful tracery. Close by is the Gothic church of S. Pietro (formerly S. Maria), which was the cathedral until the see was suppressed in 1818 and united with that of Gaeta; it contains a fine pulpit with "cosmatesque" work and the fine tomb of Cristoforo Caetani (1439), two interesting 15th-century triptychs and an episcopal throne, which served for the coronation of the antipope Clement VII. in 1378. In the Dominican monastery the cell which St Thomas Aquinas sometimes occupied is shown.

The ancient city of Fundi in 338 B.C. (or 332) received (with Formiae) the *civitas sine suffragio*, because it had always secured the Romans safe passage through its territory; the people as a whole did not join Privernum in its war against Rome three years later, though Vitruvius Vacca, the leader, was a native of Fundi. It acquired the full citizenship in 188 B.C., and was partly under the control of a *praefectus*. The inscription upon some waterpipes which have been discovered shows that later it became a *municipium*. It was governed by three aediles: Horace's jest against the officious praetor (*sic*) is due to the exigencies of metre (Th. Mommsen in *Hermes*, xiii. p. 113). The family of Livia, the consort of Augustus, belonged to Fundi. During the Lombard invasions in 592 Fundi was temporarily abandoned, but it seems to have come under the rule of the papacy by A.D. 754 at any rate. Pope John VIII. ceded it with its territory to Docibile, duke of Gaeta, but its history is somewhat intricate after this period. Sometimes it appears as an independent countship, though held by members of the Caetani family, who about 1297 returned to it. In 1504 it was given to Prospero Colonna. In 1534 Khair-ed-Din Barbarossa tried to carry off Giulia Gonzaga, countess of Fondi, and sacked the city. After this Fondi was much neglected; in 1721 it was sold to the Di Sangro family, in which it still remains. Its position as a frontier town between the papal states and the kingdom of Naples, just in the territory of the latter—the Via Appia can easily be blocked either N.W. at the actual frontier called

Portella[1] or S.E. of it—affected it a good deal during the French Revolution and the events which led up to the unification of Italy.

The Lago di Fondi, which lies in the middle of the plain, and the partially drained marshes surrounding it, compelled the ancient Via Appia, followed by the modern road, to make a considerable détour. The lake was also known in classical times as *lacus Amyclanus*, from the town of Amyclae or Amunclae, which was founded, according to legend, by Spartan colonists, and probably destroyed by the Oscans in the 5th century B.C. (E. Pais in *Rendiconti dei Lincei*, 1906, 611 seq.); the bay was also known as *mare Amunclanum*.

The ancient Speluncae (mod. *Sperlonga*) on the coast also belonged to the territory of Fundi. Here was the imperial villa in which Sejanus saved the life of Tiberius, who was almost crushed by a fall of rock. Considerable remains of it, and of the caves from which it took its name, still exist 1 m. S.E. of the modern village. For modern discoveries see P. di Tucci in *Notizie degli scavi* (1880), 480; G. Patroni, *ibid.* (1898), 493. The wine of Fundi is spoken of by ancient writers, though the *ager Caecubus*, the coast plain round the Lago di Fundi, was even more renowned, and Horace frequently praises its wine; and though Pliny the Elder speaks as if its production had almost entirely ceased in his day (attributing this to neglect, but even more to the excavation works of Nero's projected canal from the lacus Avernus to Ostia), Martial mentions it often, and it is spoken of in the inscription of a wine-dealer of the time of Hadrian, together with Falernian and Setian wines (*Corpus inscript. Lat.* vi. Berlin, 1882, 9797). The plain of Fondi is the northernmost point in Italy where the cultivation of oranges and lemons is regularly carried on in modern times.

See G. Conte Colino, *Storia di Fondi* (Naples, 1902); B. Amante and R. Bianchi, *Memorie storiche e statutarie di Fondi in Campania* (Rome, 1903); T. Ashby, in *English Historical Review*, xix. (1904) 557 seq. (T. As.)

FONNI, a town of Sardinia, in the province of Sassari, 3280 ft. above sea-level, to the N.W. of Monte Gennargentu, 21 m. S. of Nuoro by road. Pop. (1901) 4323. It is the highest village in Sardinia, and situated among fine scenery with some chestnut woods. The church of the Franciscans, built in 1708, contains some curious paintings by local artists. The costumes are extremely picturesque, and are well seen on the day of St John the Baptist, the patron saint. The men's costume is similar to that worn in the district generally; the linen trousers are long and black gaiters are worn. The women wear a white chemise; over that a very small corselet, and over that a red jacket with blue and black velvet facings. The skirt is brown above and red below, with a blue band between the two colours; it is accordion-pleated. Two identical skirts are often worn, one above the other. The unmarried girls wear white kerchiefs, the married women black. A little to the N. of Fonni, by the high-road, stood the Roman station of Sorabile, mentioned in the *Antonine Itinerary* as situated 87 m. from Carales on the road to Olbia. Excavations made in 1879 and 1880 led to the discovery of the remains of this station, arranged round three sides of a courtyard some 100 ft. square, including traces of baths and other buildings, and a massive embanking wall above them, some 150 ft. in length, to protect them from landslips (F. Vivanet, in *Notizie degli scavi*, 1879, 350; 1881, 31), while a discharge certificate (*tabula honestae missionis*) of sailors who had served in the *classis Ravennas* was found in some ruins here or hereabouts (*id. ib.*, 1882, 440; T. Mommsen, *Corp. inscr. Lat.* x. 8325). Near Fonni, too, are several "menhirs" (called *pietre celtiche* in the district) and other prehistoric remains. (T. As.)

FONSAGRADA, a town of north-western Spain, in the province of Lugo; 25 m. E.N.E. of Lugo by road. Pop. (1900) 17,302. Fonsagrada is situated 3166 ft. above the sea, on the watershed between the rivers Rodil and Suarna. It is an important market for all kinds of agricultural produce, and manufactures linen and frieze; but its trade is mainly local, owing to the mountainous character of the neighbourhood, and the lack of a railway or navigable waterway, which prevent the development of any considerable export trade.

FONSECA, MANOEL DEODORO DA (1827–1892), first president of the united states of Brazil, was born at Alagoas on the 5th of August 1827, being the third son of Lieut.-Colonel Manoel Mendes da Fonseca (d. 1859). He was educated at the military school of Rio de Janeiro, and had attained the rank of captain in the Brazilian army when war broke out in 1864 against Montevideo, and afterwards against Solano Lopez, dictator of Paraguay. His courage gained him distinction, and before the close of the war in 1870 he reached the rank of colonel, and some years later that of general of division. After holding several military commands, he was appointed in 1886 governor of the province of Rio Grande do Sul. In this position he threw himself heartily into politics, espoused the republican opinions then becoming prevalent, and sheltered their exponents with his authority. After a fruitless remonstrance, the government at the close of the year removed him from his post, and recalled him to the capital as director of the service of army material. Finding that even in that post he still continued to encourage insubordination, the minister of war, Alfredo Chaves, dismissed him from office. On 14th of May 1887, in conjunction with the viscount de Pelotas, Fonseca issued a manifesto in defence of the military officers' political rights. From that time his influence was supreme in the army. In December 1888, when the Conservative Correa d'Oliveira became prime minister, Fonseca was appointed to command an army corps on the frontier of Matto Grosso. In June 1889 the ministry was overthrown, and on a dissolution an overwhelming Liberal majority was returned to the chamber of deputies. Fonseca returned to the capital in September. Divisions of opinion soon arose within the Liberal party on the question of provincial autonomy. The more extreme desired the inauguration of a complete federal system. Amongst the most vehement was Ruy Barbosa, the journalist and orator, and after some difficulty he persuaded Fonseca to head an armed movement against the government. The insurrection broke out on the 15th of November 1889. The government commander, Almeida Barreto, hastened to place himself under Fonseca's orders, and the soldiers and sailors made common cause with the insurgents. The affair was almost bloodless, the minister of marine, baron de Ladario, being the only person wounded. Fonseca had only intended to overturn the ministry, but he yielded to the insistency of the republican leaders and proclaimed a republic. A provisional government was constituted by the army and navy in the name of the nation, with Fonseca at its head. The council was abolished, and both the senate and the chamber of deputies were dissolved. The emperor was requested to leave the territory of Brazil within twenty-four hours, and on the 17th of November was embarked on a cruiser for Lisbon. On the 20th of December a decree of banishment was pronounced against the imperial family. So universal was the republican sentiment that there was no attempt at armed resistance. The provisional government exercised dictatorial powers for a year, and on the 25th of February 1891 Fonseca was elected president of the republic. He was, however, no politician, and possessed indeed little ability beyond the art of acquiring popularity. His tenure of office was short. In May be became involved in an altercation with congress, and in November pronounced its dissolution, a measure beyond his constitutional power. After a few days of arbitrary rule insurrection broke out in Rio Grande do Sul, and before the close of November Fonseca, finding himself forsaken, resigned his office. From that time he lived in retirement. He died at Rio de Janeiro on the 23rd of August 1892.

FONSECA, Amapala or Conchagua, **BAY OF,** an inlet of the Pacific Ocean in the volcanic region between the Central American republics of Honduras, Salvador and Nicaragua. The bay is unsurpassed in extent and security by any other harbour on the Pacific. It is upwards of 50 m. in greatest length, by about 30 m. in average width, with an entrance from the sea about 18 m. wide, between the great volcanoes of Conchagua (3800 ft.)

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[1] For the pass of Ad Lautulas see Terracina.

and Coseguina (3000 ft.). The lofty islands of Conchaguita and Mianguiri, with a collection of rocks called "Los Farellones," divide the entrance into four distinct channels, each of sufficient depth for the largest vessels. A channel called "El Estero Real" extends from the extreme southern point of the bay into Nicaragua for about 50 m., reaching within 20 or 25 m. of Lake Managua. The principal islands in the bay are Sacate Grande, Tigre, Gueguensi and Esposescion belonging to Honduras, and Martin Perez, Punta Sacate, Conchaguita and Mianguiri belonging to Salvador. Of these Sacate Grande is the largest, being about 7 m. long by 4 broad. The island of Tigre from its position is the most important in the bay, being about 20 m. in circumference, and rising in a cone to the height of 2500 ft. On the southern and eastern shores of the island the lava forms black rocky barriers to the waves, varying in height from 10 to 80 ft.; but on the northward and eastward are a number of *playas* or smooth, sandy beaches. Facing one of the most considerable of these is the port of Amapala (*q.v.*). Fonseca Bay was discovered in 1522 by Gil Gonzalez de Avila, and named by him after his patron, Archbishop Juan Fonseca, the implacable enemy of Columbus.

FONT (Lat. *fons*, "fountain" or "spring," Ital. *fonte*, Fr. *les fonts*), the vessel used in churches to hold the water for Christian baptism. In the apostolic period baptism was administered at rivers or natural springs (cf. Acts viii. 36), and no doubt the primitive form of the rite was by *immersion* in the water. *Infusion*—pouring water on the head of the neophyte—was early introduced into the west and north of Europe on account of the inconvenience of immersion, as well as its occasional danger; this form has never been countenanced in the Oriental churches. *Aspersion*, or sprinkling, was also admitted as valid, but recorded early examples of its use are rare (see BAPTISM). These different modes of administering baptism have caused corresponding changes in the receptacles for the water. After the cessation of persecution, when ritual and ornament began to develop openly, special buildings were erected for administering the rite of baptism. This was obviously necessary, for a large *piscina* (basin or tank) in which candidates could be immersed would occupy too much space of the church floor itself. These baptisteries consisted of tanks entered by steps (an ascent of three, and descent of four, to the water was the normal but not the invariable number) and covered with a domed chamber (see BAPTISTERY).

By the 9th century, however, the use of separate baptisteries had generally given place to that of fonts. The material of which these were made was stone, often decorative marble; as early as 524, however, the council of Lerida enacted that if a stone font were not procurable the presbyter was to provide a suitable vessel, to be used for the sacrament exclusively, which might be of any material. In the Eastern Church the font never became an important decorative article of church furniture: "The font, κολυμβήθρα (says Neale, *Eastern Church*, i. 214), in the Eastern Church is a far less conspicuous object than it is in the West. Baptism by immersion has been retained; but the font seldom or never possesses any beauty. The material is usually either metal or wood. In Russia the *columbethra* is movable and only brought out when wanted."

One of the most elaborate of early fonts is that described by Anastasius in the Lateran church at Rome, and said to have been presented thereto by Constantine the Great. It was of porphyry, overlaid with silver inside and out. In the middle were two porphyry pillars carrying a golden dish, on which burnt the Paschal lamp (having an asbestos wick and fed with balsam). On the rim of the bowl was a golden lamb, with silver statues of Christ and St. John the Baptist. Seven silver stags poured out water. This elaborate vessel was of course exceptional; the majority of early fonts were certainly much simpler. A fine early Byzantine stone example exists, or till recently existed, at Beer-Sheba.

Few if any fonts survive older than the 11th century. These are all of stone, except a few of lead; much less common are fonts of cast bronze (a fine example, dated 1112, exists at the Church of St Barthélemy, Liége). The most ancient are plain cylindrical bowls, with a circular—sometimes cruciform or quatrefoil—outline to the basin, either without support or with a single central pillar; occasionally there is more than one pillar. The basins are usually lined with lead to prevent absorption by the stone. The church of Efenechtyd, Denbigh, possesses an ancient font made of a single block of oak. Though the circular form is the commonest, early Romanesque fonts are not infrequently square; and sometimes an inverted truncated cone is found. Octagonal fonts are also known, though uncommon; hexagons are even less common, and pentagons very rare. There is a pentagonal font of this period at Cabourg, dept. Calvados, N. France.

Fonts early began to be decorated with sculpture and relief. Arcading and interlacing work are common; so are symbol and pictorial representation. A very remarkable leaden font is preserved at Strassburg, bearing reliefs representing scenes in the life of Christ. At Pont-à-Mousson on the Moselle are bas-reliefs of St John the Baptist preaching, and baptizing Christ. Caryatides sometimes take the place of the pillars, and sculptured animals and grotesques of strange design not infrequently form the base. More remarkable is the occasional persistence of pagan symbolism; an interesting example is the very ancient font from Ottrava, Sweden, which, among a series of Christian symbols and figures on its panels, bears a representation of Thor (see G. Stephens' brochure, *Thunor the Thunderer*).

In the 13th century octagonal fonts became commoner. A very remarkable example exists at the cathedral of Hildesheim in Hanover, resting on four kneeling figures, each bearing a vase from which water is running (typical of the rivers of Paradise). Above is an inscription explaining the connexion of these rivers with the virtues of temperance, courage, justice and prudence. On the sides of the cup are representations of the passage of the Jordan, of the Red Sea, the Baptism of Christ, and the Virgin and Child. The font has a conical lid, also ornamented with bas-reliefs. A cast of this font is to be seen in the Victoria and Albert Museum at South Kensington. A leaden font, with figures of Our Lord, the Virgin Mary, St Martin, and the twelve Apostles, exists at Mainz; it is dated 1328 by a set of four leonine hexameters inscribed upon it. In the 14th and succeeding centuries octagonal fonts became the rule. They are delicately ornamented with mouldings and similar decorations, in the contemporary style of Gothic architectural art. Though the basin is usually circular in 15th-century fonts, examples are not infrequently found in which the outline of the basin follows the octagonal shape of the outer surface of the vessel. Examples of this type are to be found at Strassburg, Freiburg and Basel.

In England no fonts can certainly be said to date before the Norman conquest, although it is possible that a few very rude examples, such as those of Washaway, Cornwall, and Denton, Sussex, are actually of Saxon times; of course we cannot count as "Saxon fonts" those adapted from pre-Norman sculptured stones originally designed for other purposes, such as that at Dolton, Devonshire. On the other hand, Norman fonts are very common, and are often the sole surviving relics of the Norman parish church. They are circular or square, sometimes plain, but generally covered with carving of arcades, figures, foliage, &c. Among good examples that might be instanced of this period are Alphington, Devon (inverted cone, without foot); Stoke Cannon, Devon (supported on caryatides); Ilam, Staffs (cup-shaped); Fincham, Burnham Deepdale, Sculthorpe, Toftrees, and Shernborne in Norfolk (all, especially the last, remarkable for elaborate carving); Youlgrave, Derby (with a projecting stoup in the side for the chrism—a unique detail); besides others in Lincoln cathedral; Iffley, Oxon; Newenden, Kent; Coleshill, Warwick; East Meon, Hants; Castle Frome, Herefordshire. Some of the best examples of "Norman" fonts in England (such as the notable specimen in Winchester cathedral) were probably imported from Belgium. In the Transitional period we may mention a remarkable octagonal font at Belton, Lincolnshire; in this period fall most of the leaden fonts that remain in England, of which thirty are known (7 in

Gloucestershire, 4 in Berkshire and Kent, 3 in Norfolk, Oxford and Sussex, 1 in Derby, Dorset, Lincoln, Somerset, Surrey and Wiltshire); perhaps the finest examples are at Ashover, Derbyshire, and Walton, Surrey. Early English fonts are comparatively rare. They bear the moulding, foliage and tooth ornament in the usual style of the period. A good example of an Early English font is at All Saints, Leicester; others may be seen at St Giles', Oxford, and at Lackford, Suffolk. Fonts of the Decorated period are commoner, but not so frequent as those of the preceding Norman or subsequent Perpendicular periods. Fonts of the Perpendicular period are very common, and are generally raised upon steps and a lofty stem, which, together with the body of the font, are frequently richly ornamented with panelling. It was also the custom during this period to ornament the font with shields and coats of arms and other heraldic insignia, as at Herne, Kent. The fonts of this period, however, are as a rule devoid of interest, and, like most Perpendicular work, are stiff and monotonous. There is, however, a remarkable font, with sculptured figures, belonging to the late 14th century, at West Drayton in Middlesex.

In Holyrood chapel there was a brazen font in which the royal children of Scotland were baptized. It was carried off in 1544 by Sir R. Lea, and given by him to the church at St Albans, but was afterwards destroyed by the Puritans. A silver font existed at Canterbury, which was sometimes brought to Westminster on the occasion of a royal baptism. At Chobham, Surrey, there is a leaden font covered with oaken panels of the 16th century. The only existing structure at all recalling the ancient baptisteries in English churches is found at Luton in Bedfordshire. The font at Luton belongs to the Decorated style, and is enclosed in an octagonal structure of freestone, consisting of eight pillars about 25 ft. in height, supporting a canopy. The space around the font is large enough to hold twelve adults comfortably. At the top of the canopy is a vessel for containing the consecrated water, which when required was let down into the font by means of a pipe.

In 1236 it was ordered by Edmund, archbishop of Canterbury, that baptismal fonts should be kept under lock and key, as a precaution against sorcery:—"Fontes baptismales sub sera clausi teneantur propter sortilegia." The lids appear at first to have been quite simple and flat. They gradually, however, partook of the ornamentation of the font itself, and are often of pyramidal and conical forms, highly decorated with finials, crockets, mouldings and grotesques. Sometimes these covers are very heavy and are suspended by chains to enable them to be raised at will. Very rich font covers may be seen at Ewelme, Oxon; St Gregory, Sudbury; North Walsingham, Norfolk; Worlingworth, Suffolk. The ordinary position of the font in the church was and is near the entrance, usually to the left of the south door.

See Arcisse de Caumont, *Cours d'antiquités monumentales* (Paris, 1830–1843); Francis Simpson, *A Series of Antient Baptismal Fonts* (London, 1828); Paley, *Ancient Fonts*; E. E. Viollet-le-Duc, *Dict. raisonné de l'architecture* (1858–1868), vol. v.; J. H. Parker's *Glossary of Architecture*; Francis Bond, *Fonts and Font-Covers* (London, 1908). A large number of fine illustrations of fonts, principally of the earlier periods, will be found in the volumes of the *Religuary* and *Illustrated Archaeologist*. (R. A. S. M.)

FONTAINE, PIERRE FRANÇOIS LÉONARD (1762–1853), French architect, was born at Pontoise on the 20th of September 1762. He came of a family several of whose members had distinguished themselves as architects. Leaving the college of Pontoise at the age of sixteen he was sent to L'Isle-Adam to assist in hydraulic works undertaken by the architect André. To facilitate his improvement André allowed him to have access to his plans and to copy his designs. In October 1779 he was sent to Paris to study in the school of Peyre the younger, and there began his acquaintance with Percier, which ripened into a life-long friendship. After six years of study he competed for a prize at the Academy, and, winning the second for the plan of an underground chapel, he received a pension and was sent to Rome (1785). Percier accompanied him. The Revolution breaking out soon after his return to France, he took refuge in England; but after the establishment of the consulate he was employed by Bonaparte, to whom he had been introduced by the painter, David, to restore the palace of Malmaison. Henceforth he was fully engaged in the principal architectural works executed in Paris as architect successively to Napoleon I., Louis XVIII. and Louis Philippe. In conjunction with Percier (till his death) he was employed on the arch of the Carrousel, the restoration of the Palais-Royal, the grand staircase of the Louvre, and the works projected for the union of the Louvre and the Tuileries. In 1812 he was admitted a member of the Academy of Fine Arts, and in 1813 was named first architect to the emperor. With Percier he published the following works—*Palais, maisons, et autres édifices de Rome moderne* (1802); *Descriptions de cérémonies et de fêtes* (1807 and 1810); *Recueil de décorations intérieures* (1812); *Choix des plus célèbres maisons de plaisance de Rome et des environs* (1809–1813); *Résidences des souverains, Parallèle* (1833). *L'histoire du Palais-Royal* was published by Fontaine alone, who lost Percier, his friend and associate, in 1838, and himself died in Paris on the 10th of October 1853.

FONTAINEBLEAU, a town of northern France, capital of an arrondissement in the department of Seine-et-Marne, 37 m. S.E. of Paris on the railway to Lyons. Pop. (1906) 11,108. Fontainebleau, a town of clean, wide and well-built streets, stands in the midst of the forest of Fontainebleau, nearly 2 m. from the left bank of the Seine. Of its old houses, the Tambour mansion, and a portion of that which belonged to the cardinal of Ferrara, both of the 16th century, are still preserved; apart from the palace, the public buildings are without interest. A statue of General Damesme (d. 1848) stands in the principal square, and a monument to President Carnot was erected in 1895. Fontainebleau is the seat of a subprefect and has a tribunal of first instance and a communal college. The school of practical artillery and engineering was transferred to Fontainebleau from Metz by a decree of 1871, and now occupies the part of the palace surrounding the cour des offices.

Fontainebleau has quarries of sand and sandstone, saw-mills, and manufactories of porcelain and gloves. Fine grapes are grown in the vicinity. The town is a fashionable summer resort, and during the season the president of the Republic frequently resides in the palace. This famous building, one of the largest, and in the interior one of the most sumptuous, of the royal residences of France, lies immediately to the south-east of the town. It consists of a series of courts surrounded by buildings, extending from W. to E.N.E.; they comprise the Cour du Cheval Blanc or des Adieux (thus named in memory of the parting scene between Napoleon and the Old Guard in 1814), the Cour de la Fontaine, the Cour Ovale, built on the site of a more ancient château, and the Cour d' Henri IV.: the smaller Cour des Princes adjoins the northern wing of the Cour Ovale. The exact origin of the palace and of its name (Lat. *Fons Bleaudi*) are equally unknown, but the older château was used in the latter part of the 12th century by Louis VII., who caused Thomas Becket to consecrate the Chapelle St Saturnin, and it continued a favourite residence of Philip Augustus and Louis IX. The creator of the present edifice was Francis I., under whom the architect Gilles le Breton erected most of the buildings of the Cour Ovale, including the Porte Dorée, its southern entrance, and the Salle des Fêtes, which, in the reign of Henry II., was decorated by the Italians, Francesco Primaticcio and Nicolo dell' Abbate, and is perhaps the finest Renaissance chamber in France. The Galerie de François I. and the lower storey of the left wing of the Cour de la Fontaine are the work of the same architect, who also rebuilt the two-storeyed Chapelle St Saturnin. In the same reign the Cour du Cheval Blanc, including the Chapelle de la Ste Trinité and the Galerie d'Ulysse, destroyed and rebuilt under Louis XV., was constructed by Pierre Chambiges. After Francis I., Fontainebleau owes most to Henry IV., to whom are due the Cour d' Henri IV., the Cour des Princes, with the adjoining Galerie de Diane, and Galerie des Cerfs, used as a library. Louis XIII. built the graceful horseshoe staircase in the Cour du Cheval Blanc; Napoleon I. spent 12,000,000 francs on works of restoration, and Louis XVIII., Louis Philippe and Napoleon III. devoted considerable sums to the same end. The palace is surrounded by gardens and ornamental waters—to the north the Jardin de l'Orangerie, to the south the Jardin Anglais and the Parterre, between which extends the lake known as the Bassin des Carpes, containing carp in large numbers. A space of over 200 acres to the east of the palace is covered by the park, which is traversed by a canal dating from the reign of Henry IV. On the north the park is bordered by a vinery producing fine white grapes.

Forest of Fontainebleau.—The forest of Fontainebleau is one of the most beautiful wooded tracts in France, and for generations it has been the chosen haunt of French landscape painters. Among the most celebrated spots are the Vallée de la Solle, the Gorge aux Loups, the Gorges de Franchard and d'Apremont, and the Fort l'Empereur. The whole area extends to 42,200 acres, with a circumference of 56 m. Nearly a quarter of this area is of a rocky nature, and the quarries of sandstone supplied a large part of the paving of Paris. The oak, pine, beech, hornbeam and birch are the chief varieties of trees.

It is impossible to do more than mention a few of the historical events which have taken place at Fontainebleau. Philip the Fair, Henry III. and Louis XIII. were all born in the palace, and the first of these kings died there. James V. of Scotland was there received by his intended bride; and Charles V. of Germany was entertained there in 1539. Christina of Sweden lived there for years, and the gallery is still to be seen where in 1657 she caused her secretary Monaldeschi to be put to death. In 1685 Fontainebleau saw the signing of the revocation of the edict of Nantes, and in the following year the death of the great Condé. In the 18th century it had two illustrious guests in Peter the Great of Russia and Christian VII. of Denmark; and in the early part of the 19th century it was twice the residence of Pius VII.,—in 1804 when he came to consecrate the emperor Napoleon, and in 1812–1814, when he was his prisoner.

See Pfnor, *Monographie de Fontainebleau*, with text by Champollion Figeac (Paris, 1866); *Guide artistique et historique au palais de Fontainebleau* (Paris, 1889); E. Bourges, *Recherches sur Fontainebleau* (Fontainebleau, 1896).

FONTAN, LOUIS MARIE (1801–1839), French man of letters, was born at Lorient on the 4th of November 1801. He began his career as a clerk in a government office, but was dismissed for taking part in a political banquet. At the age of nineteen he went to Paris and began to contribute to the *Tablettes* and the *Album*. He was brought to trial for political articles written for the latter paper, but defended himself so energetically that he secured the indefinite postponement of his case. The offending paper was suppressed for a time, and Fontan produced a collection of political poems, *Odes et épîtres*, and a number of plays, of which *Perkins Warbec* (1828), written in collaboration with MM. Halévy and Drouineau, was the most successful. In 1828 the *Album* was revived, and in it Fontan published a virulent but witty attack on Charles X., entitled *Le Mouton enragé* (20th June 1829). To escape the inevitable prosecution Fontan fled over the frontier, but, finding no safe asylum, he returned to Paris to give himself up to the authorities, and was sentenced to five years' imprisonment and a heavy fine. He was liberated by the revolution of 1830, and his *Jeanne la folle*, performed in the same year, gained a success due perhaps more to sympathy with the author's political principles than to the merits of the piece itself, a somewhat crude and violent picture of Breton history. A drama representing the trial of Marshal Ney, which he wrote in collaboration with Charles Dupenty, *Le Procès d'un maréchal de France* (printed 1831), was suppressed on the night of its production. Fontan died in Paris on the 10th of October 1839.

A sympathetic portrait of Fontan as a prisoner, and an analysis of his principal works, are to be found in Jules Janin's *Histoire de la littérature dramatique*, vol. i.

FONTANA, DOMENICO (1543–1607), Italian architect and mechanician, was born at Mili, a village on the Lake of Como, in 1543. After a good training in mathematics, he went in 1563 to join his elder brother, then studying architecture at Rome. He made rapid progress, and was taken into the service of Cardinal Montalto, for whom he erected a chapel in the church of Santa Maria Maggiore and the villa Negroni. When the cardinal's pension was stopped by the pope, Gregory XIII., Fontana volunteered to complete the works in hand at his own expense. The cardinal being soon after elected pope, under the name of Sixtus V., he immediately appointed Fontana his chief architect. Amongst the works executed by him were the Lateran palace, the palace of Monte Cavallo (the Quirinal), the Vatican library, &c. But the undertaking which brought Fontana the highest repute was the removal of the great Egyptian obelisk, which had been brought to Rome in the reign of Caligula, from the place where it lay in the circus of the Vatican. Its erection in front of St Peter's he accomplished in 1586. After the death of Sixtus V., charges were brought against Fontana of misappropriation of public moneys, and Clement VIII. dismissed him from his post (1592). This appears to have been just in time to save the Colosseum from being converted by Fontana into a huge cloth factory, according to a project of Sixtus V. Fontana was then called to Naples, and accepted the appointment of architect to the viceroy, the count of Miranda. At Naples he built the royal palace, constructed several canals and projected a new harbour and bridge, which he did not live to execute. The only literary work left by him is his account of the removal of the obelisk (Rome, 1590). He died at Naples in 1607, and was honoured with a public funeral in the church of Santa Anna. His plan for a new harbour at Naples was carried out only after his death. His son Giulio Cesare succeeded him as royal architect in Naples, the university of that town being his best-known building.

FONTANA, LAVINIA (1552–1614), Italian portrait-painter, was the daughter of Prospero Fontana (*q.v.*). She was greatly employed by the ladies of Bologna, and, going thence to Rome, painted the likenesses of many illustrious personages, being under the particular patronage of the family (Buoncampagni) of Pope Gregory XIII., who died in 1585. The Roman ladies, from the days of this pontiff to those of Paul V., elected in 1605, showed no less favour to Lavinia than their Bolognese sisters had done; and Paul V. was himself among her sitters. Some of her portraits, often lavishly paid for, have been attributed to Guido. In works of a different kind also she united care and delicacy with boldness. Among the chief of these are a Venus in the Berlin museum; the "Virgin lifting a veil from the sleeping infant Christ," in the Escorial; and the "Queen of Sheba visiting Solomon." Her own portrait in youth—she was accounted very beautiful—was perhaps her masterpiece; it belongs to the counts Zappi of Imola, the family into which Lavinia married. Her husband, whose name is given as Paolo Zappi or Paolo Foppa, painted the draperies in many of Lavinia's pictures. She is deemed on the whole a better painter than her father; from him naturally came her first instruction, but she gradually adopted the Caraccesque style, with strong quasi-Venetian colouring. She was elected into the Academy of Rome, and died in that city in 1614.

FONTANA, PROSPERO (1512–1597), Italian painter, was born in Bologna, and became a pupil of Innocenzo da Imola. He afterwards worked for Vasari and Perino del Vaga. It was probably from Vasari that Fontana acquired a practice of offhand, self-displaying work. He undertook a multitude of commissions, and was so rapid, that he painted, it is said, in a few weeks an entire hall in the Vitelli palace at Città di Castello. Along with daring, he had fertility of combination, and in works of parade he attained a certain measure of success, although his drawing was incorrect and his mannerism palpable. He belongs to the degenerate period of the Bolognese school, under the influence chiefly of the imitators of Raphael—Sabbatini, Sammachini and Passerotti being three of his principal colleagues. His soundest successes were in portraiture, in which branch of art he stood so high that towards 1550 Michelangelo introduced him to Pope Julius III. as a portrait-painter; and he was pensioned by this pope, and remained at the pontifical court with the three successors of Julius. Here he lived on a grand scale, and figured as a sort of arbiter and oracle among his professional brethren. Returning to Bologna, after doing some work in Fontainebleau and in Genoa, he opened a school of art, in which he became the preceptor of Lodovico and Agostino Caracci; but these pupils, standing forth as reformers and innovators, finally extinguished the academy and the vogue of Fontana. His subjects were in the way of sacred and profane history and of fable. He has left a large quantity of work in Bologna,—the picture of the "Adoration of the Magi," in the church of S. Maria delle Grazie, being considered his masterpiece —not unlike the style of Paul Veronese. He died in Rome in 1597.

FONTANE, THEODOR (1819–1898), German poet and novelist, was born at Neu-Ruppin on the 30th of December 1819. At the age of sixteen he was apprenticed to a chemist, and after qualifying as an apothecary, he found employment in Leipzig and Dresden. In 1844 he travelled in England, and settling in Berlin devoted himself from 1849 to literature. He made repeated journeys to England, interesting himself in old English ballads, and as the firstfruits of his tours published *Ein Sommer in London* (1854); *Aus England, Studien und Briefe* (1860) and *Jenseit des Tweed, Bilder und Briefe aus Schottland* (1860). Fontane was particularly attached to the Mark of Brandenburg, in which his home lay; he was proud of its past achievements, and delighted in the growth of the capital city, Berlin. The fascination which the country of his birth had for him may be seen in his delightfully picturesque *Wanderungen durch die Mark Brandenburg* (1862–1882, 4 vols.). He also described the wars of Prussia in *Der schleswig-holsteinische Krieg im Jahre 1864* (1866) and *Der deutsche Krieg von 1866* (1869). He proceeded to the theatre of war in 1870, and, being taken prisoner at Vaucouleurs, remained three months in captivity. His experiences he narrates in *Kriegsgefangen. Erlebtes 1870* (1871), and he published the result of his observations of the campaign in *Der Krieg gegen Frankreich 1870–71* (1874–1876). Like most of his contemporaries, he at first sought inspiration for his poetry in the heroes of other countries. His *Gedichte* (1851) and ballads *Männer und Helden* (1860) tell of England's glories in bygone days. Then the achievements of his own countrymen entered into rivalry, and these, as an ardent patriot, he immortalized in poem and narrative. It is, however, as a novelist that Fontane is best known. His fine historical romance *Vor dem Sturm* (1878) was followed by a series of novels of modern life: *L'Adultera* (1882); *Schach von Wuthenow* (1883); *Irrungen, Wirrungen* (1888); *Stine* (1890); *Unwiederbringlich* (1891); *Effi Briest* (1895); *Der Stechlin* (1899), in which with fine literary tact Fontane adapted the realistic methods and social criticism of contemporary French fiction to the conditions of Prussian life. He died on the 20th of September 1898 at Berlin.

Fontane's *Gesammelte Romane und Erzählungen* were published in 12 vols. (1890–1891; 2nd ed., 1905). For his life see the autobiographical works *Meine Kinderjahre* (1894) and *Von zwanzig bis dreissig* (1898), also *Briefe an seine Familie* (1905); also F. Servaes, *Theodor Fontane* (1900).

FONTANES, LOUIS, Marquis de (1757–1821), French poet and politician, was born at Niort (Deux Sèvres) on the 6th of March 1757. He belonged to a noble Protestant family of Languedoc which had been reduced to poverty by the revocation of the edict of Nantes. His father and grandfather remained Protestant, but he was himself brought up as a Catholic. His parents died in 1774–1775, and in 1777 Fontanes went to Paris, where he found a friend in the dramatist J. F. Ducis. His first published poems, some of which were inspired by English models, appeared in the *Almanach des Muses*; "Le Cri de mon cœur," describing his own sad childhood, in 1778; and "La Forêt de Navarre" in 1780. His translation from Alexander Pope, *L'Essai sur l'homme,* was published with an elaborate preface in 1783, and *La Chartreuse* and *Le Jour des morts* in the same year, *Le Verger* in 1788 and his *Épître sur l'édit en faveur des non-catholiques,* and the *Essai sur l'astronomie* in 1789. Fontanes was a moderate reformer, and in 1790 he became joint-editor of the *Modérateur.* He married at Lyons in 1792, and his wife's first child was born during their flight from the siege of that town. Fontanes was in hiding in Paris when the four citizens of Lyons were sent to the Convention to protest against the cruelties of Collot d'Herbois. The petition was drawn up by Fontanes, and the authorship being discovered, he fled from Paris and found shelter at Sevran, near Livry, and afterwards at Andelys. On the fall of Robespierre he was made professor of literature in the École Centrale des Quatre-Nations, and he was one of the original members of the Institute. In the *Mémorial,* a journal edited by La Harpe, he discreetly advocated reaction to the monarchical principle. He was exiled by the Directory and made his way to London, where he was closely associated with Chateaubriand. He soon returned to France, and his admiration for Napoleon, who commissioned him to write an *éloge* on Washington, secured his return to the Institute and his political promotion. In 1802 he was elected to the legislative chamber, of which he was president from 1804 to 1810. Other honours and titles followed. He has been accused of servility to Napoleon, but he had the courage to remonstrate with him on the judicial murder of the duc d'Enghien, and as grand master of the university of Paris (1808–1815) he consistently supported religious and monarchical principles. He acquiesced in the Bourbon restoration, and was made a marquis in 1817. He died on the 17th of March 1821 in Paris, leaving eight cantos of an unfinished epic poem entitled *La Grèce sauvée.*

The verse of Fontanes is polished and musical in the style of the 18th century. It was not collected until 1839, when Sainte-Beuve edited the *Œuvres* (2 vols.) of Fontanes, with a sympathetic critical study of the author and his career. But by that time the Romantic movement was in the ascendant and Fontanes met with small appreciation.

FONTENAY-LE-COMTE, a town of western France, capital of an arrondissement in the department of Vendée 30 m. N.E. of La Rochelle on the State railway between that town and Saumur. Pop. (1906) town, 7639; commune, 10,326. Fontenay, an ancient and straggling town, is situated a few miles south of the forest of Vouvant and on both banks of the Vendée, at the point where it becomes navigable. The church of Notre-Dame (15th to 18th centuries), which has a fine spire and a richly sculptured western entrance, and the church of St Jean (16th and 17th centuries) are the chief religious buildings. The town has several houses of the 16th and 17th centuries. The most remarkable of these is the Hôtel de Terre Neuve (1595–1600), which contains much rich decoration together with collections of furniture and tapestry. Fontenay was the birthplace of many prominent men during the 15th and 16th centuries, and the Fontaine des Quatre-Tias, a fountain in the Renaissance style, given to the town by King Francis I., commemorates the fact. The chief square is named after François Viète, the great mathematician, who was born at Fontenay in 1540. The public institutions of the town include a tribunal of first instance and a communal college. Among its industries are the manufacture of felt hats, oil and soap and timber-sawing, flour-milling and tanning. There is trade in horses, mules, timber, grain, fruit, &c.

Fontenay was in existence as early as the time of the Gauls. The affix of "comte" is said to have been applied to it when it was taken by King Louis IX. from the family of Lusignan and given to his brother Alphonse, count of Poitou, under whom it became capital of Bas-Poitou. Ceded to the English by the treaty of Brétigny in 1360 it was retaken in 1372 by Duguesclin. It suffered repeated capture during the Religious Wars of the 16th century, was dismantled in 1621 and was occupied both by the republicans and the Vendeans in the war of 1793. From 1790 to 1806 it was capital of the department of Vendée.

FONTENELLE, BERNARD LE BOVIER DE (1657–1757), French author, was born at Rouen, on the 11th of February 1657. He died in Paris, on the 9th of January 1757, having thus very nearly attained the age of 100 years. His father was an advocate settled in Rouen, his mother a sister of the two Corneille. He was educated at the college of the Jesuits in his native city, and distinguished himself by the extraordinary precocity and versatility of his talents. His teachers, who readily appreciated these, were anxious for him to join their order, but his father had designed him for the bar, and an advocate accordingly he became; but, having lost the first cause which was entrusted to him, he soon abandoned law and gave himself wholly to literary pursuits. His attention was first directed to poetry; and more than once he competed for prizes of the French Academy, but never with success. He visited Paris from time to time and established intimate relations with the abbé de Saint Pierre, the abbé Vertot and the mathematician Pierre Varignon. He witnessed, in 1680, the total failure of his tragedy *Aspar*. Fontenelle afterwards acknowledged the justice of the public verdict by burning his unfortunate drama. His opera of *Thétis et Pélée*, 1689, though highly praised by Voltaire, cannot be said to rise much above the others; and it may be regarded as significant that of all his dramatic works not one has kept the stage. His *Poésies pastorales* (1688) have no greater claim to permanent repute, being characterized by stiffness and affectation; and the utmost that can be said for his poetry in general is that it displays much of the *limae labor*, great purity of diction and occasional felicity of expression.

His *Lettres galantes du chevalier d'Her . . .*, published anonymously in 1685, was an amusing collection of stories that immediately made its mark. In 1686 his famous allegory of Rome and Geneva, slightly disguised as the rival princesses Mreo and Eenegu, in the *Relation de l'île de Bornéo*, gave proof of his daring in religious matters. But it was by his *Nouveaux Dialogues des morts* (1683) that Fontenelle established a genuine claim to high literary rank; and that claim was enhanced three years later by the appearance of the *Entretiens sur la pluralité des mondes* (1686), a work which was among the very first to illustrate the possibility of being scientific without being either uninteresting or unintelligible to the ordinary reader. His object was to popularize among his countrymen the astronomical theories of Descartes; and it may well be doubted if that philosopher ever ranked a more ingenious or successful expositor among his disciples.

Hitherto Fontenelle had made his home in Rouen, but in 1687 he removed to Paris; and in the same year he published his *Histoire des oracles*, a book which made a considerable stir in theological and philosophical circles. It consisted of two essays, the first of which was designed to prove that oracles were not given by the supernatural agency of demons, and the second that they did not cease with the birth of Christ. It excited the suspicion of the Church, and a Jesuit, by name Baltus, published a ponderous refutation of it; but the peace-loving disposition of its author impelled him to leave his opponent unanswered. To the following year (1688) belongs his *Digression sur les anciens et les modernes*, in which he took the modern side in the controversy then raging; his *Doutes sur le système physique des causes occasionnelles* (against Malebranche) appeared shortly afterwards.

In 1691 he was received into the French Academy in spite of the determined efforts of the partisans of the ancients in this quarrel, especially of Racine and Boileau, who on four previous occasions had secured his rejection. He consequently was admitted a member both of the Academy of Inscriptions and of the Academy of Sciences; and in 1697 he became perpetual secretary to the latter body. This office he actually held for the long period of forty-two years; and it was in this official capacity that he wrote the *Histoire du renouvellement de l'Académie des Sciences* (Paris, 3 vols., 1708, 1717, 1722) containing extracts and analyses of the proceedings, and also the *éloges* of the members, written with great simplicity and delicacy. Perhaps the best known of his *éloges*, of which there are sixty-nine in all, is that of his uncle Pierre Corneille. This was first printed in the *Nouvelles de la république des lettres* (January 1685) and, as *Vie de Corneille*, was included in all the editions of Fontenelle's *Œuvres*. The other important works of Fontenelle are his *Éléments de la géometrie de l'infini* (1727) and his *Apologie des tourbillons* (1752). Fontenelle forms a link between two very widely different periods of French literature, that of Corneille, Racine and Boileau on the one hand, and that of Voltaire, D'Alembert and Diderot on the other. It is not in virtue of his great age alone that this can be said of him; he actually had much in common with the *beaux esprits* of the 17th century, as well as with the *philosophes* of the 18th. But it is to the latter rather than to the former period that he properly belongs.

He has no claim to be regarded as a genius; but, as Sainte-Beuve has said, he well deserves a place "*dans la classe des esprits infiniment distingués*"—distinguished, however, it ought to be added by intelligence rather than by intellect, and less by the power of saying much than by the power of saying a little well. In personal character he has sometimes been described as having been revoltingly heartless; and it is abundantly plain that he was singularly incapable of feeling strongly the more generous emotions—a misfortune, or a fault, which revealed itself in many ways. "*Il faut avoir de l'âme pour avoir du goût.*" But the cynical expressions of such a man are not to be taken too literally; and the mere fact that he lived and died in the esteem of many friends suffices to show that the theoretical selfishness which he sometimes professed cannot have been consistently and at all times carried into practice.

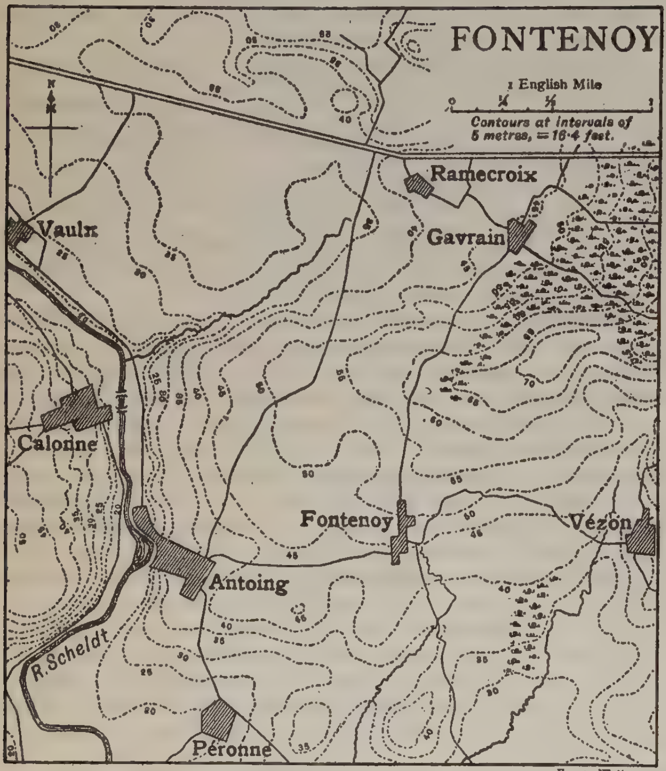
There have been several collective editions of Fontenelle's works, the first being printed in 3 vols. at the Hague in 1728–1729. The best is that of Paris, in 8 vols. 8vo, 1790. Some of his separate works have been very frequently reprinted and also translated. The *Pluralité des mondes* was translated into modern Greek in 1794. Sainte-Beuve has an interesting essay on Fontenelle, with several useful references, in the *Causeries du lundi*, vol. iii. See also Villemain, *Tableau de la littérature française au XVIII^e siècle*; the abbé Trublet, *Mémoires pour servir à l'histoire de la vie et des ouvrages de M. de Fontenelle* (1759); A. Laborde-Milaà, *Fontenelle* (1905), in the "Grands écrivains français" series; and L. Maigron, *Fontenelle, l'homme, l'œuvre, l'influence* (Paris, 1906).

FONTENOY, a village of Belgium, in the province of Hennegau, about 4 m. S.E. of Tournai, famous as the scene of the battle of Fontenoy, in which on the 11th of May 1745 the French army under Marshal Saxe defeated the Anglo-Allied army under the duke of Cumberland. The object of the French (see also AUSTRIAN SUCCESSION, WAR OF THE) was to cover the siege of the then important fortress of Tournai, that of the Allies, who slowly advanced from the east, to relieve it. Informed of the impending attack, Louis XV., with the dauphin, came with all speed to witness the operations, and by his presence to give Saxe, who was in bad health and beset with private enemies, the support necessary to enable him to command effectively. Under Cumberland served the Austrian field-marshal Königsegg, and, at the head of the Dutch contingent, the prince of Waldeck.

The right of the French position (see map) rested on the river at Antoing, which village was fortified and garrisoned, between Antoing and Fontenoy three square redoubts were constructed, and Fontenoy itself was put in a complete state of defence. On the left rear of this line, and separated from Fontenoy by some furlongs of open ground, another redoubt was made at the corner of the wood of Barry and a fifth towards Gavrain. The infantry was arrayed in deployed lines behind the Antoing-Fontenoy redoubts and the low ridge between Fontenoy and the wood; behind them was the cavalry. The approaches to Gavrain were guarded by a mounted volunteer corps called *Grassins*. At Calonne the marshal had constructed three military bridges against the contingency of a forced retreat. The force of the French was about 60,000 of all arms, not including 22,000 left in the lines before Tournai. Marshal Saxe himself, who was suffering from dropsy to such an extent that he was unable to mount his horse, slept in a wicker chariot in the midst of the troops. At early dawn of the 11th of May, the Anglo-Hanoverian army with the Austrian contingent formed up in front of Vézon, facing towards Fontenoy and the wood, while the Dutch on their left extended the general line to Péronne. The total force was 46,000, against about 52,000 whom Saxe could actually put into the line of battle.

The plan of attack arranged by Cumberland, Königsegg and Waldeck on the 10th grew out of circumstances. A preliminary skirmish had cleared the broken ground immediately about Vézon and revealed a part of the defender's dispositions. It was resolved that the Dutch should attack the front Antoing-

Fontenoy, while Cumberland should deliver a flank attack against Fontenoy and all in rear of it, by way of the open ground between Fontenoy and the wood. A great cavalry attack round the wood was projected but had to be given up, as in the late evening of the 10th the Allies' light cavalry drew fire from its southern edge. Cumberland then ordered his cavalry commander to form a screen facing Fontenoy, so as to cover the formation of the infantry. On the morning of the 11th another and most important modification had to be made. The advance was beginning when the redoubt at the corner of the wood became visible. Cumberland hastily told off Brigadier James Ingoldsby (major and brevet-colonel 1st Guards), with four regiments and an artillery detachment, to storm this redoubt which, crossing its fire with that of Fontenoy, seemed absolutely to inhibit the development of the flank attack. At 6 A.M. the brigade moved off, but it was irresolutely handled and halted time after time; and after waiting as long as possible, the British and Hanoverian cavalry under Sir James Campbell rode forward and extended in the plain, becoming at once the target for a furious cannonade which killed their leader and drove them back. Thereupon Sir John (Lord) Ligonier, whose deployment the squadrons were to have covered, let them pass to the rear, and, hearing the guns of the Dutch towards Antoing, pushed the British infantry forward through the lanes, each unit on reaching open ground covering the exit and deployment of the one in rear, all under the French cannonade. This went on for two hours, and save that it showed the magnificent discipline of the British and Hanoverian regiments, was a bad prelude to the real attack. Cumberland's own exertions brought a few small guns to the front of the Guards' Brigade, and one of the first shots from these killed Antoine Louis, duc de Gramont, colonel of the Gardes Françaises, and another Henri du Baraillon du Brocard, Saxe's artillery commander.



Emery Walker sc.

It was now 9 A.M., and while the guns from the wood redoubt battered the upright ranks of the Allies, Ingoldsby's brigade was huddled together, motionless, on the right. Cumberland himself galloped thither, and under his reproaches Ingoldsby lost the last remnants of self-possession. To Sir John Ligonier's aide-de-camp, who delivered soon afterwards a bitterly formal order to advance, Ingoldsby sullenly replied that the duke's orders were for him to advance in line with Ligonier's main body. By now, too, the Dutch advance against Antoing-Fontenoy had collapsed.

But on the right the cannonade and the blunders together had roused a stern and almost blind anger in the leaders and the men they led. Ingoldsby was wounded, and his successor, the Hanoverian general Zastrow, gave up the right attack and brought his battalions into the main body. A second half-hearted attack on Fontenoy itself, delivered by some Dutch troops, was almost made successful by the valour of two of these battalions (one of them being the then newly raised Highland regiment, the Black Watch) which came thither of their own accord. Meantime the young duke and the old Austrian field-marshal had agreed to take all risks and to storm through between Fontenoy and the wood redoubt, and had launched the great attack, one of the most celebrated in the history of war. The English infantry was in two lines. The Hanoverians on their left, owing to want of space, were compelled to file into third line behind the redcoats, and on their outer flanks were the battalions that had been with Ingoldsby. A few guns, man-drawn, accompanied the assaulting mass, and the cavalry followed. The column may have numbered 14,000 infantry. All the infantry battalions closed on their centre, the normal three ranks becoming six. If the proper distances between lines were preserved, the mass must have formed an oblong about 500 yds×600 yds (excluding the cavalry).

The duke of Cumberland placed himself at the head of the front line and gave the signal to advance. Slowly and in parade order, drums beating and colours flying, the mass advanced, straight up the gentle slope, which was swept everywhere by the flanking artillery of the defence. Then, when the first line reached the low crest on the ends of which stood the French artillery, the fire, hitherto convergent, became a full enfilade from both sides, and at the same moment the enemy's horse and foot became visible beyond. A brief pause ensued, and the front gradually contracted as regiments shouldered inwards to avoid the fire. Then the French advanced, and the Guards Brigade and the Gardes Françaises met face to face. Captain Lord Charles Hay (d. 1760), lieutenant of the First (Grenadier) Guards, suddenly ran in front of the line, took off his hat to the enemy and drank to them from a pocket flask, shouting a taunt, "We hope you will stand till we come up to you, and not swim the river as you did at Dettingen," then, turning to his own men, he called for three cheers. The astonished French officers returned the salute and gave a ragged counter-cheer. Whether or not the French, as legend states, were asked and refused to fire first, the whole British line fired one tremendous series of volleys by companies. 50 officers and 760 men of the three foremost French regiments fell at once, and at so appalling a loss the remnant broke and fled. Three hundred paces farther on stood the second line of the French, and slowly the mass advanced, firing regular volleys. It was now well inside the French position, and no longer felt the enfilade fire that swept the crest it had passed over. By now, as the rear lines closed up, the assailants were practically in square and repelled various partial attacks coming from all sides. The Régiment du Roi lost 33 officers and 345 men at the hands of the Second (Coldstream) Guards. But these counter-attacks gained a few precious minutes for the French. It was the crisis of the battle. The king, though the court meditated flight, stood steady with the dauphin at his side,—Fontenoy was the one great day of Louis XV.'s life,—and Saxe, ill as he was, mounted his horse to collect his cavalry for a charge. The British and Hanoverians were now at a standstill. More and heavier counter-strokes were repulsed, but no progress was made; their cavalry was unable to get to the front, and Saxe was by now thinking of victory. Captain Isnard of the Touraine regiment suggested artillery to batter the face of the square, preparatory to a final charge. General Löwendahl galloped up to Saxe, crying, "This is a great day for the king; they will never escape!" The nearest guns were planted in front of the assailants, and used with effect. The infantry, led by Löwendahl, fastened itself on the sides of the square, the regiments of Normandy and Vaisseaux and the

Irish Brigade conspicuous above the rest. On the front, waiting for the cannon to do its work, were the Maison du Roi, the Gendarmerie and all the light cavalry, under Saxe himself, the duke of Richelieu and count d'Estrées. The left wing of the Allies was still inactive, and troops were brought up from Antoing and Fontenoy to support the final blow. About 2 P.M. it was delivered, and in eight minutes the square was broken. As the infantry retired across the plain in small stubborn groups the French fire still made havoc in their ranks, but all attempts to close with them were repulsed by the terrible volleys, and they regained the broken ground about Vézon, whence they had come. Cumberland himself and all the senior generals remained with the rearguard.

The losses at Fontenoy were, as might be expected, somewhat less than normally heavy when distributed over the whole of both armies, but exceedingly severe in the units really engaged. Eight out of nineteen regiments of British infantry lost over 200 men, two of these more than 300. A tribute to the loyalty and discipline of the British, as compared with the generality of armies in those days, may be found in the fact that the three Guards' regiments had no "missing" men whatever. The 23rd (Royal Welsh Fusiliers) had 322 casualties. Böschlanger's Hanoverian regiment suffered even more heavily, and four others of that nation had 200 or more casualties. The total loss was about 7500, that of the French 7200. The French "Royal" regiment lost 30 officers and 645 men; some other regimental casualties have been mentioned above. The Dutch lost a bare 7% of their strength.

Fontenoy was in the 18th century what the attack of the Prussian Guards at St Privat is to-day, a *locus classicus* for military theorists. But the technical features of the battle are completely overshadowed by its epic interest, and above all it illustrates the permanent and unchangeable military characteristics of the British and French nations.

FONTEVRAULT, or FONTEVRAUD (Lat. *Fons Ebraldi*), a town of western France, in the department of Maine-et-Loire, 10 m. S.E. of Saumur by road and 2½ m. from the confluence of the Loire and Vienne. Pop. (1906) 1279. It is situated in the midst of the forest of Fontevrault. The interest of the place centres in its abbey, which since 1804 has been utilized and abused as a central house of detention for convicts. The church (12th century), of which only the choir and apse are appropriated to divine service, has a beautiful nave formerly covered by four cupolas destroyed in 1816. There is a fifth cupola above the crossing. In a chapel in the south transept are the effigies of Henry II. of England, of his wife Eleanor of Guienne, of Richard I. of England and of Isabella of Angoulême, wife of John of England—Eleanor's being of oak and the rest of stone. The cloister, refectory and chapter-house date from the 16th century. The second court of the abbey contains a remarkable building, the Tour d'Évrault (12th century), which long went under the misnomer of *chapelle funéraire*, but was in reality the old kitchen. Details and diagrams will be found in Viollet-le-Duc's *Dictionnaire de l'architecture.* There are three stories, the whole being surmounted by a pyramidal structure.

The *Order of Fontevrault* was founded about 1100 by Robert of Arbrissel, who was born in the village of Arbrissel or Arbresec, in the diocese of Rennes, and attained great fame as a preacher and ascetic. The establishment was a double monastery, containing a nunnery of 300 nuns and a monastery of 200 monks, separated completely so that no communication was allowed except in the church, where the services were carried on in common; there were, moreover, a hospital for 120 lepers and other sick, and a penitentiary for fallen women, both worked by the nuns. The basis of the life was the Benedictine rule, but the observance of abstinence and silence went beyond it in stringency. The special feature of the institute was that the abbess ruled the monks as well as the nuns. At the beginning the order had a great vogue, and at the time of Robert's death, 1117, there were several monasteries and 3000 nuns; afterwards the number of monasteries reached 57, all organized on the same plan. The institute never throve out of France; there were attempts to introduce it into Spain and England: in England there were three houses—at Ambresbury (Amesbury in Wiltshire), Nuneaton, and Westwood in Worcestershire. The nuns in England as in France were recruited from the highest families, and the abbess of Fontevrault, who was the superior-general of the whole order, was usually of the royal family of France.

See P. Hélyot, *Hist. des ordres religieuses* (1718), vi. cc. 12, 13; Max Heimbucher, *Orden und Kongregationen* (1907), i. 46; the arts. "Fontevrauld" in Wetzer and Welte, *Kirchenlexicon* (ed. 2), and in Herzog-Hauck, *Realencyklopädie* (ed. 3), supply full references to the literature. The most recent monograph is Édouard, *Fontevrault et ses monuments* (1875); for the later history see art. by Edmund Bishop in *Downside Review* (1886). (E. C. B.)

FOOD (like the verb "to feed," from a Teutonic root, whence O. Eng. *foda*; cf. "fodder"; connected with Gr. πατεῖσθαι, to feed), the general term for what is eaten by man and other creatures for the sustenance of life. The scientific aspect of human food is dealt with under NUTRITION and DIETETICS.

Infancy.—The influence of a normal diet upon the health of man (we exclude here the question of diet in illness, which must depend on the abnormal conditions existing) begins at the earliest stage of his life. No food has as yet been found so suitable for the young of all animals as their mother's milk. This, however, has not been from want of seeking. Dr Brouzet (*Sur l'éducation médicinale des enfants*, i. p. 165) had such a bad opinion of human mothers, that he expressed a wish for the state to interfere and prevent them from suckling their children, lest they should communicate immorality and disease! A still more determined pessimist was the famous chemist Van Helmont, who thought life had been reduced to its present shortness by our inborn propensities, and proposed to substitute bread boiled in beer and honey for milk, which latter he calls "brute's food." Baron Justus von Liebig, as the result of his chemical researches, introduced a "food for infants," which in more modern days has been followed by a multiplication of patent foods. A close imitation of human milk may also be made by the addition to fresh cow's milk of half its bulk of soft water, in each pint of which has been mixed a heaped-up teaspoonful of powdered "sugar of milk" and a pinch of phosphate of lime. These artificial substitutes for the natural nutriment have their value where for any reason it is not available. The wholesomest food, however, for the first six months is certainly mother's milk alone. A vigorous baby can indeed bear with impunity much rough usage, and often appears none the worse for a certain quantity of farinaceous food; but the majority do not get habituated to it without an exhibition of dislike which indicates rebellion of the bowels. It is only when the teeth are on their way to the front, as shown by dribbling, that the parotid glands secrete an active saliva capable of digesting bread stuffs. Till then anything but milk must be given tentatively, and considered in the light of a means of education for its future mode of nutrition.

The time for weaning should be fixed partly by the child's age, partly by the growth of the teeth. The first group of teeth nine times out of ten consists of the lower central front teeth, which may appear any time during the sixth and seventh month. The mother may then begin to diminish the number of suckling times; and by a month she can have reduced them to twice a day, so as to be ready when the second group makes its way through the upper front gums to cut off the supply altogether. The third group, the lateral incisors and first grinders, usually after the first anniversary of birth, give notice that solid food can be chewed. But it is prudent to let dairy milk form a considerable portion of the fare till the eye-teeth are cut, which seldom happens till the eighteenth or twentieth month.

Childhood and Youth.—At this stage of life the diet must obviously be the best which is a transition from that of infancy to that of adult age. Growth is not completed, but yet entire surrender of every consideration to the claim of growth is not possible, nor indeed desirable. Moreover, that abundance of adipose tissue, or reserve new growth, which a baby can bear is an impediment to the due education of the muscles of the boy or girl. The supply of nutriment need not be so continuous as before, but at the same time should be more frequent than for the adult. Up to at least fourteen or fifteen years of age the rule should be four meals a day, varied indeed, but nearly equal in nutritive power and in quantity, that is to say, all moderate, all sufficient. The maturity the body then reaches involves a hardening and enlargement of the bones and cartilages, and a strengthening of the digestive organs, which in healthy young persons enables us to dispense with some of the watchful care bestowed upon their diet. Three full meals a day are generally sufficient, and the requirements of mental training may be allowed to a certain extent to modify the attention to nutrition which has hitherto been paramount.

Adults.—It is only necessary here to refer to the article on DIETETICS (see also VEGETARIANISM) for a discussion of the food of normal adults; and to such headings as DIETARY (for fixed allowances) or COOKERY. Different staple articles of food are dealt with under their own headings. For animals other than man see the respective articles on them.

Among numerous books on the subject, in addition to those enumerated under DIETETICS, see Sir Henry Thompson's *Foods and Feeding* (1894); Hart's *Diet in Sickness and Health* (1896); Knight, *Food and its Functions* (1895).

FOOD PRESERVATION. The preservation of food material beyond the short term during which it naturally keeps sound and eatable has engaged human thought from the earliest dawn of civilization. Necessity compelled man to store the plenitude of one season or place against the need of another. The hunter dried, smoked and salted meat and fish, pastoral man preserved milk in the form of cheese and butter, or fermented grape-juice into wine. With the separation of country from town, the development of manufacturing nation as distinct from agricultural and food-producing people, the spreading of civilized man from torrid to arctic zones, the needs of travellers on land and sea and of armies on the march, the problem of the prevention of the natural decomposition to which nearly all food substances are liable became increasingly urgent, and forms to-day, next to the production of food, the most important problem in connexion with the feeding and the trade of nations. As long as the reasons of decomposition were unknown, all attempts at preservation were necessarily empirical, and of the numberless processes which have during modern times been proposed and attempted comparatively few have stood the test of experience. In the light of modern knowledge, however, the guiding principles appear to be very simple.

Very few organic materials undergo decomposition, as it were, of their own accord. They may lose water by evaporation, and fatty substances may alter by the absorption of oxygen from the air. They are otherwise quite stable and unchangeable while not attacked and eaten up by living organisms, or while the life with which they may be endowed is in a state of suspense. An apple is alive and in breathing undergoes its ripening change; a grain of wheat is dormant and does not alter. A substance, in order to be a food material, must be decomposable under the attack of a living organism; the energy stored in it must be available to that stream of energy which we call life, whether the life be in the form of the human consumer or of any lower organism. All decomposition of food is due to the development within the food of living organisms. Under conditions under which living organisms cannot enter or cannot develop food keeps undecomposed for an indefinite length of time. The problem of food preservation resolves itself, therefore, into that of keeping out or killing off all living things that might feed upon and thus alter the food, and as these organisms mainly belong to the family of moulds, yeasts and bacteria, modern food preservation is strictly a subject for the bacteriologist.

The changes which food undergoes on keeping are easily intelligible when once their biological origin is recognized. Yeasts cause the decomposition of saccharine substances into alcohol and carbon dioxide, acetic and lactic ferments produce from sugar or from alcohol the organic acids causing the souring of food, moulds as a rule cause oxidation and complete destruction of organic matter, nitrogenous or saccharine, while most bacteria act mainly upon the nitrogenous constituents, producing albumoses and peptones and breaking up the complex albumen-molecule into numerous smaller molecules often allied to alkaloids, generally with the production of evil-smelling gases. These processes may go on simultaneously, but more frequently take place successively in the decomposition of food, one set of organisms taking up the work of destruction as the conditions become favourable to its development and unfavourable to its predecessor. The organisms may come from the air, the soil or from animal sources. The air teems with organisms which settle and may develop when brought upon a favourable nidus; the organic matter of the soil largely consists of fungoid life; while the intestinal canal and other mucous membranes of all animals harbour bacteria, sarcinae and other organisms in countless millions. Whenever, therefore, food material is exposed to the air, or touched by the soil or by animals or man, it becomes infected with living cells, which by their development lead to its decomposition and destruction.

Fungoid organisms may be killed by heat or by chemicals; or their development may be arrested by cold, removal of water, or by the presence of agents inhibiting their growth though not destroying their life. All successful processes of food preservation depend upon one or other of these circumstances.

Preservation by Heat.—At the boiling-point of water all living cells perish, but some spores of bacteria may survive for about three hours. Few adult bacteria can live beyond 75° C. (167° F.) in the presence of water, though dry heat only kills with certainty at 140° C. (284° F.). Destruction of life takes place more rapidly in solutions showing an acid than a feebly alkaline reaction; hence acid fruit is more easily preserved than milk, which, when quite fresh, is alkaline. By cooking, therefore, food becomes temporarily sterile, until a fresh crop of organisms finds access from the air. By repeated cooking all food can be indefinitely preserved. One of the most important functions of cookery is sterilization. Civilized man unwittingly revolts against the consumption of non-sterile food, and the use of certain fungus-infected material is an inheritance from barbarous ages; few materials of animal origin are eaten raw, and in vegetables some sort of sterilizing process is attempted by washing (of salads) or removal of the outer skin (of fruits). All preparation of food for the table, cooking being the most important, tends towards preservation, but is effectual only for a few hours or days at most, unless special means are adopted to prevent reinfection. The housewife covering the jam with a thin paper soaked in brandy, or the potted meat with a thin layer of lard, attempts unconsciously to bar the road to bacteria and other minute organisms. To preserve food in a permanent manner and on a commercial scale it has to be cooked in a receptacle which must be sufficiently strong for transport, cheap, light and unattacked by the material in contact with it. None of the receptacles at present in use quite fulfils the whole of these conditions: glass and china are heavy and fragile, and their carriage is expensive; tinned iron, so-called tin-plate, is rarely quite unaffected by food materials, but owing to its strength, tenacity and cheapness, it is used on an ever-increasing scale. The sheet iron, which formerly was made of soft wrought iron, now generally consists of steel containing but very little carbon; it is cleaned by immersion in acid and covered with a very thin layer of pure tin, all excess of tin being removed by hot rollers and brushes. The layer of tin, which formerly constituted from 3 to 5% of the total weight of the plate, has, owing to the increased price of tin and the improvement in machinery, gradually become so thin that its weight is only from 1 to 3%. Not rarely, therefore, the tin-surface is imperfect, perforated or pin-holed. Tin itself is slightly attacked by all acid juices of vegetable or animal substances. With the exception of milk, all human food is slightly acid, and consequently all food that has been preserved in tin canisters contains variable traces of dissolved tin. Happily, salts of tin have but little physiological action. Nevertheless, the employment of tin-plate for very acid materials, like tomatoes, peaches, &c., is very objectionable.

The process of preservation in canisters is carried out as follows:—The canister, which has been made either by the use of solder or by folding machinery only, is packed with the material to be preserved, and a little water having been added to fill the interstices the lid is secured by soldering or folding, generally the former. Sterilization is effected by placing the tins in pressure chamhers, which are heated by steam to 120° C. or more. The tins are exposed to that temperature for such time as experience has shown to be necessary to heat the contents throughout to at least 100° C. The temperature is then allowed to fall slowly to below the boiling-point of water, when the tins can be taken out of the pressure chamber, or they are placed in pans filled with water or a solution of calcium chloride and are therein heated till thoroughly cooked. Sometimes a small aperture is pierced through the lid, to allow of the escape of the expanding air, such holes before cooling closed by means of a drop of solder. This process, which was originally introduced by François Appert early in the 19th century, is employed on an enormous scale, especially in America. The use of lacquered tins, having the inner surface of the tin covered with a heat-resisting varnish, is gradually extending. Imperfect sterilization shows itself in many cases by gas development within the tin, which causes the ends to become convex and drummy. More frequently than not the contents of the larger tins, containing meat or other animal products, are not absolutely sterile, but the conditions are mostly such that the organisms which have survived the cooking process cannot develop. When they can develop without formation of gas dangerous products of decomposition may be produced without showing themselves to taste or smell. Numerous cases of so-called ptomaine poisoning have thus occurred; these are more frequently associated with preserved fish and lobster than with meats, although no class of preserved animal food is free from liability of ptomaine formation. The formation of poisonous substances has never been traced to preserved fruit or other material poor in nitrogen. The mode of preserving food in china or glass is quite similar, but the losses by breakage are not inconsiderable. Food which has been preserved in tins is sometimes transferred to glass and re-sterilized, the feeling against "tinned" food caused by the "Chicago scandals" not having entirely subsided. Were it not for the facts that sterilization is rarely quite perfect, and that the food attacks the tin, the contents of tin canisters ought to keep for an indefinite length of time. Under existing circumstances, however, there is a distinct limit to the age of soundness of canned food.

Preservation by Chemicals.—Salt is the oldest chemical preservative and, either alone or in conjunction with saltpetre and with wood-smoke, has been used for many centuries, mainly as a meat preservative. It is used either dry in layers strewn on the surface of the meat or fish to be preserved, or in the form of brine in which the meat is submerged or which is injected into the carcasses. The preserving power of salt is but moderate. It has the great advantage that in ordinary doses it is non-injurious, that an excess at once betrays itself in the taste, and that it can be readily removed by soaking in water. When aided by wood-smoke, which depends for its preservative power upon traces of creosote and formaldehyde, it is, however, quite efficient. The addition of saltpetre is principally for the purpose of giving to the meat a bright pink tint. The strongly saline taste of pickled meat or salted butter appears gradually to have become repugnant to a large part of mankind, and other preservatives have come into use, possessing greater bactericidal power and less taste. The serious objection attaching to them is discussed in the article ADULTERATION. At the present time the use of borax or boracic acid is almost universal in England. Meat which has been exposed to the vapours of formaldehyde, and has thus been superficially sterilized, is also coming into commerce in increasing quantities. Formaldehyde in itself is distinctly poisonous, and has the property of combining with albuminoids and rendering them completely insoluble in the digestive secretions. Salicylic and benzoic acids are not infrequently used to stop fermentation of saccharine beverages or deterioration of so-called "potted meats," which are supposed to last fresh and sweet on the consumer's table for a considerable length of time. Sulphurous acid and sulphites are chiefly used in the preservation of thin ales, wine and fruit, and sodium fluoride has been found in butter. The whole of these substances possess decided and injurious physiological properties. Alcohol now rarely forms a preservative of food material, its employment being confined to small fruit. The use of sugar as a preservative depends upon the fact that, although in a dilute solution it is highly prone to fermentation and other decomposition, it possesses bactericidal properties when in the form of a concentrated syrup. A sugar solution containing 30% of water or less does not undergo any biological change; in the presence of organic acids, like those contained in fruit, growth of organisms is inhibited when the percentage of water is somewhat greater. Upon this fact depends the use of sugar in the manufacture of jams, marmalades and jellies. Moulds may grow on the surface of such saccharine preparations, but the interior remains unaffected and unaltered.

Preservation by Drying.—Food materials in which the percentage of moisture is small (not exceeding about 8%) are but little liable to bacterial growths, at most to the attacks of innocent *Penicillium.* Nature preserves the germs in seeds and nuts, which are laden with otherwise decomposable food material, by the simple expedient of water removal. The life of cereal grains and many seeds appears to be unlimited. By the removal of water the most perishable materials, like meat or eggs, can be rendered unchangeable, except so far as the inevitable oxidation of the fatty substances contained in them is concerned and which is independent of life-action. The drying of meat, upon which a generation ago inventors bestowed a great deal of attention, has become almost obsolete, excepting for comparatively small articles or animals, like ox tongues or tails and fish. It has been superseded even among less civilized communities by the spread of canned food. Fruit, however, is very largely preserved in the dried state. Grapes are sun-dried and thus form currants, raisins and sultanas, the last variety being often bleached by the addition of sulphites. Plums, apples and pears are artificially dried in ovens on wooden battens or on wire sieves; from the latter they are apt to become contaminated with notable quantities of zinc. Excellent preparations of dried vegetables, including potatoes, carrots, onions, French beans and cabbages, are also manufactured.

The utilization of meat in the form of meat extract belongs to some extent to this class of preserved foods. Its origin is due to J. von Liebig and Max von Pettenkofer, and dates from the middle of the 19th century. The soluble material is extracted mainly from beef, in Australia to some extent from mutton, by means of warm water; the albumen is coagulated by heat and removed, and the broths thus obtained are evaporated *in vacuo* until the extract contains no more than about 20% of water. One pound of extract is obtained from about 25 ℔ of lean beef.

Preservation by Refrigeration.—At or below the freezing-point of water fungoid organisms are incapable of growth and multiplication. Although it has been asserted that many of them perish when kept for some time in the frozen condition, it is certain that the vast majority of bacteria and their germs remain merely dormant. Even so highly organized structures as cereal seeds do not suffer in vitality on being kept for a considerable length of time at the far lower temperature of liquid air. Biological change is, therefore, arrested at freezing-point, and as long as that temperature is maintained food material remains unaltered, except for physical changes depending upon the evaporation of water and of volatile flavouring matters, or chemical alterations due to oxidation.

Refrigeration, therefore, affords the means of keeping for a reasonably long time, and without the addition of any preservative substance, food in a raw condition. It is the only process of preservation which from a sanitary point of view is entirely unobjectionable as ordinarily and properly employed. Its introduction on a commercial scale has more powerfully affected the economic conditions of England and, to a less degree, of the United States than any other scientific advance since the establishment of railways and steamboats. Enormous quantities of frozen carcasses, butter, fruit, vegetables and fish are introduced in the fresh condition into Great Britain and stored until required. Extreme fluctuations of supply or of price have become almost impossible, and the abundance of Australian and New Zealand ranches, and of West Indian orchards, has been made readily accessible to the British consumer. For household purposes cooling in ice-chests or ice-chambers suffices to preserve food on a comparatively small scale. The ice used for the purpose comes, to a small extent, from natural sources, stored from the winter or imported from northern countries; a far larger quantity is artificially produced by the methods described in the article on REFRIGERATING, which also contains an account of the means by which low temperatures are produced for industrial purposes of importation and storage. Fleets of steamships fitted with refrigerating machinery and insulated cold-rooms are employed in carrying the food materials, which are deposited in cold-stores at docks, warehouses, markets and hotels. The first cargo of frozen meat was shipped in July 1873 from Melbourne, but arrived in October in an unsatisfactory state. In 1875–1876 sound frozen meat came from America. The first cargo of frozen meat was successfully brought to the United Kingdom in 1880 from Australia in the "Strathleven," fitted with a Bell-Coleman air machine. The temperature in the cold-storage rooms is generally kept near 34° F., whilst in the chilling chambers a somewhat lower, and in the freezing room or chambers a much lower temperature (between 0° and 10° F.) is maintained. The carcasses to be frozen should be cooled slowly at first to ensure even freezing throughout and to prevent damage by the unequal expansion of the outer layer of ice. The carcasses when freezing must be hung separated from each other, but for storage or transportation they are packed tightly together. Fish such as salmon is washed, thoroughly cleansed, and frozen on trays. Butter should be cooled as rapidly as possible to about 10° F.; its composition as regards proportion of volatile fatty-acids, &c., remains absolutely unaltered for years. Cheese should only be cold-stored when nearly ripe and should not be frozen. Eggs must be carefully selected, each one being inspected by candle-light. They are placed in cases holding about three hundred, which are taken first to a room in which they are slowly cooled to about 33° F., and are then kept in store just below freezing-point. Particular attention must be paid to the relative humidity of the air in egg stores. Fruit should be quite fresh; grapes may be chilled to 26° F., while lemons cannot safely be kept at a lower temperature than 36°. The time during which soft fruit can be kept even in cold-store is limited, and does not exceed about six weeks.

In the early days of the chilled-meat trade considerable prejudice existed against stored meat. While in many cases the flavour of fresh meat is rather superior, the food value is in no way altered by cold-storage.[1]

Preservation by Pickling other than Salt.—For the preservation of vegetables, vinegar or other solution of acetic acid is used to a limited extent. Eggs are submerged in lime-water or a dilute solution of sodium silicate (soluble glass). During the storage of eggs the more aqueous white of egg yields by endosmosis a portion of its water to the more concentrated yolk, which thereby expands and renders its thin containing-membrane liable to rupture. Fish, such as sardines, sprats and salmon, is preserved by packing in olive or other oil.

The preservation of the most important dairy product, namely, milk, deserves a separate notice. It has already been stated that alkaline liquids, like milk, are more difficult to sterilize by heat than acid materials. In consequence of the alteration in flavour which milk undergoes by long continued boiling, and of the fact that milk forms perhaps the best medium for the growth and propagation of bacterial organisms, there is exceptional difficulty in its sterilization. As secreted by a healthy cow it is a perfectly sterile fluid, and, as shown by Sir J. Lister, when drawn under aseptic conditions and kept under such, it remains definitely fresh and sweet. Bacterial and other pollution at the time of milking arises from the animal, the stable, the milker and the vessels. In animals suffering from tuberculosis and other bacterial affections the milk may be infected within the udder. Milk as it reaches the consumer rarely contains less than 50,000 bacteria and often many millions per cubic centimetre. In fresh country cream 100 millions per cubic centimetre are not unusual. These bacteria are of many kinds, some of them spore-bearing. The spores are more difficult to kill than the adult organism. The first step towards preservation is the removal of the dirt unavoidably present, to the particles of which a considerable proportion of the bacteria adhere. Filtration through cloths or, better, the passing of the milk through centrifugals effects that removal. Subsequent treatment is preferably preceded by a breaking-up of the larger fat-globules by the projection of a jet of the milk under high pressures against a steel or agate plate, a process known as homogenizing. From homogenized milk the cream separates slowly, and does not form the coherent layer thrown up by ordinary milk. Heating is then effected either after bottling or by passing the milk continuously through pipes in which it is heated to from 160° to 170° F. By a repetition of the heating process on two or more succeeding days, complete sterilization may be effected, although a single treatment is sufficient to render the milk stable for a few days. Many forms of pasteurizing apparatus for milk are in use. Since the general introduction of pasteurization of the skim-milk used in Denmark for the feeding of calves and pigs, tuberculosis in these animals has practically disappeared. On the continent of Europe the use of sterilized milk is now very general. In England it has found little favour in households, but is making rapid progress on board ship.

Milk which has been condensed has for many years found a most extensive sale. The first efforts to condense and thus preserve milk date from 1835, when an English patent was granted to Newton. In 1849 C. N. Horsford prepared condensed milk with the addition of lactose. Commercially successful milk condensation began in 1856. The milk is heated to about 180° F. and filled into large copper vacuum pans, after having been mixed with from 10 to 12 parts of sugar per 100 parts of milk. Evaporation takes place in the pans at about 122° F., and is carried on till the milk is boiled down to such concentration that 100 parts of the condensed milk, including the sugar, contain the solids of 300 parts of milk. Sweetened condensed milk, although rarely quite sterile, keeps indefinitely, and is invariably brought into commerce in tin canisters. The preparation of sweetened condensed milk forms one of the most important branches of manufacture in Switzerland and is steadily increasing in England. Although milk can quite well be preserved in the form of condensed unsweetened milk, which dietetically possesses immense advantages over the sweetened milk in which the balance between carbohydrates and albuminoids is very unfavourable, such unsweetened milk has found little or no favour. Milk powder is manufactured under various patents, the most successful of which depends upon the addition of sodium bicarbonate and the subsequent rapid evaporation of the milk on steam-heated revolving iron cylinders. Milk powder made from skim-milk keeps well for considerable periods, but full-cream milk develops rancid or tallowy flavours by the oxidation of the finely divided butter-fat. It is largely employed in the preparation of so-called milk chocolates. (O. H.*)

FOOL (O. Fr. *fol*, modern *fou*, foolish, from a Late Latin use of *follis*, bellows, a ball filled with air, for a stupid person, a jester, a wind-bag), a buffoon or jester.

The class of professional fools or jesters, which reached its culminating point of influence and recognized place and function in the social organism during the middle ages, appears to have existed in all times and countries. Not only have there always been individuals naturally inclined and endowed to amuse others; there has been besides in most communities a definite class, the members of which have used their powers or weaknesses in this direction as a regular means of getting a livelihood. Savage jugglers, medicine-men, and even priests, have certainly much in common with the jester by profession. There existed in ancient Greece a distinct class of professed fools whose habits were not essentially different from those of the jesters of the middle ages. Of the behaviour of one of these, named Philip, Xenophon has given a picturesque account in the *Banquet*. Philip of Macedon is said to have possessed a court fool, and certainly these (as well as court poets and court philosophers, with whom they have sometimes been not unreasonably confounded) were common in a number of the petty courts at that era of civilization. *Scurrae* and *moriones* were the Roman parallels of the medieval witty fool; and during the empire the manufacture of human monstrosities was a regular practice, slaves of this kind being much in request to relieve the languid hours. The jester again has from time immemorial existed at eastern courts. Witty stories are told of Bahalul (see D'Herbelot, *s.v.*) the jester of Harun al-Reshid, which have long had a place in Western fiction. On the conquest of Mexico court fools and deformed human creatures of all kinds were found at the court of Montezuma. But that monarch no doubt hit upon one great cause of the favour of monarchs for this class when he said that "more instruction was to be gathered from them than from wiser men, for they dared to tell the truth." Douce, in his essay *On the Clowns and Fools of Shakespeare*, has made a ninefold division of English fools, according to quality and place of employment, as the domestic fool, the city or corporation fool, the tavern fool, the fool of the mysteries and moralities. The last is generally called the "vice," and is the original of the stage clowns so common among the dramatists of the time of Elizabeth, and who embody so much of the wit of Shakespeare. A very palpable classification is that which distinguishes between such creatures as were chosen to excite to laughter from some deformity of mind or body, and such as were so chosen for a certain (to all appearance generally very shallow) alertness of mind and power of repartee,—or briefly, butts and wits. The dress of the regular court fool of the middle ages was not altogether a rigid uniform. To judge from the prints and illuminations which are the sources of our knowledge on this matter, it seems to have changed considerably from time to time. The head was shaved, the coat was motley, and the breeches tight, with generally one leg different in colour from the other. The head was covered with a garment resembling a monk's cowl, which fell over the breast and shoulders, and often bore asses' ears, and was crested with a cockscomb, while bells hung from various parts of the attire. The fool's bauble was a short staff bearing a ridiculous head, to which was sometimes attached an inflated bladder, by means of which sham castigations were effected. A long petticoat was also occasionally worn, but seems to have belonged rather to the idiots than to the wits.

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[1] *Per contra*, see the article by Mary E. Pennington in the *Yearbook for 1907* (1908) of the U.S. Dept. of Agriculture, pp. 197-206, with illustrations of chickens kept in cold storage for two and three years. The results there shown cast considerable doubt on the efficiency of even refrigeration so far as an "indefinite" period is concerned; and it is suggested that the consumption of frozen meat may really account for various modern diseases.

The fool's business was to amuse his master, to excite him to laughter by sharp contrast, to prevent the over-oppression of state affairs, and, in harmony with a well-known physiological precept, by his liveliness at meals to assist his lord's digestion. The names and the witticisms of many of the official jesters at the courts of Europe have been preserved by popular or state records. In England the list is long between Hitard, the fool of Edmund Ironside, and Muckle John, the fool of Charles I., and probably the last official royal fool of England. Many are remembered from some connexion with general or literary history. Scogan was attached to Edward IV., and later was published a collection of poor jests ascribed to him, to which Andrew Boorde's name was attached, but without authority.

Will Sommers, of the time of Henry VIII., seems to have been a kind-hearted as well as a witty man, and occasionally used his influence with the king for good and charitable purposes. Armin, who, in his *Nest of Ninnies*, gives a full description of Sommers, and introduces many popular fools, says of him—

> "Only this much, he was a poor man's friend,
> And helpt the widow often in her end.
> The king would ever grant what he would crave,
> For well he knew Will no exacting knave."

The literature of the period immediately succeeding his death is full of allusions to Will Sommers.

Richard Tarleton, famous as a comic actor, cannot be omitted from any list of jesters. A book of Tarleton's *Jests* was published in 1611, and, together with his *News out of Purgatory*, was reprinted by Halliwell Phillips for the Shakespeare Society in 1844. Archie Armstrong, for a too free use of wit and tongue against Laud, lost his office and was banished the court. The conduct of the archbishop against the poor fool is not the least item of the evidence which convicts him of a certain narrow-mindedness and pettiness. In French history, too, the figure of the court-jester flits across the gay or sombre scene at times with fantastic effect. Caillette and Triboulet are well-known characters of the times of Francis I. Triboulet appears in Rabelais's romance, and is the hero of Victor Hugo's *Le Roi s'amuse*, and, with some changes, of Verdi's opera *Rigoletto*; while Chicot, the lithe and acute Gascon, who was so close a friend of Henry III., is portrayed with considerable justness by Dumas in his *Dame de Monsoreau*. In Germany Rudolph of Habsburg had his Pfaff Cappadox, Maximilian I. his Kunz von der Rosen (whose features, as well as those of Will Sommers, have been preserved by the pencil of Holbein), and many a petty court its jester after jester.

Late in the 16th century appeared *Le Sottilissime Astuzie di Bertoldo*, which is one of the most remarkable books ever written about a jester. It is by Giulio Cesare Croce, a street musician of Bologna, and is a comic romance giving an account of the appearance at the court of Alboin king of the Lombards of a peasant wonderful in ugliness, good sense and wit. The book was for a time the most popular in Italy. A great number of editions and translations appeared, and it was even versified. Though fiction, both the character and the career of Bertoldo are typical of the jester. That the private fool existed as late as the 18th century is proved by Swift's epitaph on Dicky Pearce, the earl of Suffolk's jester.

See Flögel, *Geschichte der Hofnarren* (Leipzig, 1789); Doran, *The History of Court Fools* (1858). (W. He.)

FOOLS, FEAST OF (Lat. *festum stultorum, fatuorum, follorum*, Fr. *fête des fous*), the name for certain burlesque quasi-religious festivals which, during the middle ages, were the ecclesiastical counterpart of the secular revelries of the Lord of Misrule. The celebrations are directly traceable to the pagan Saturnalia of ancient Rome, which in spite of the conversion of the Empire to Christianity, and of the denunciation of bishops and ecclesiastical councils, continued to be celebrated by the people on the Kalends of January with all their old licence. The custom, indeed, so far from dying out, was adopted by the barbarian conquerors and spread among the Christian Goths in Spain, Franks in Gaul, Alemanni in Germany, and Anglo-Saxons in Britain. So late as the 11th century Bishop Burchard of Worms thought it necessary to fulminate against the excesses connected with it (*Decretum*, xix. c. 5, Migne, *Patrologia lat.* 140, p. 965). Then, just as it appears to have been sinking into oblivion among the people, the clergy themselves gave it the character of a specific religious festival. Certain days seem early to have been set apart as special festivals for different orders of the clergy: the feast of St Stephen (December 26) for the deacons, St John's day (December 27) for the priests, Holy Innocents' Day for the boys, and for the sub-deacons Circumcision, the Epiphany, or the 11th of January. The Feast of Holy Innocents became a regular festival of children, in which a boy, elected by his fellows of the choir school, functioned solemnly as bishop or archbishop, surrounded by the elder choir-boys as his clergy, while the canons and other clergy took the humbler seats. At first there is no evidence to prove that these celebrations were characterized by any specially indecorous behaviour; but in the 12th century such behaviour had become the rule. In 1180 Jean Beleth, of the diocese of Amiens, calls the festival of the sub-deacons *festum stultorum* (Migne, *Patrol. lat.* 202, p. 79).

The burlesque ritual which characterized the Feast of Fools throughout the middle ages was now at its height. A young sub-deacon was elected bishop, vested in the episcopal *insignia* (except the mitre) and conducted by his fellows to the sanctuary. A mock mass was begun, during which the lections were read *cum farsia*, obscene songs were sung and dances performed, cakes and sausages eaten at the altar, and cards and dice played upon it.

This burlesquing of things universally held sacred, though condemned by serious-minded theologians, conveyed to the child-like popular mind of the middle ages no suggestion of contempt, though when belief in the doctrines and rites of the medieval Church was shaken it became a ready instrument in the hands of those who sought to destroy them. Of this kind of retribution Scott in *The Abbot* gives a vivid picture, the Protestants interrupting the mass celebrated by the trembling remnant of the monks in the ruined abbey church, and insisting on substituting the traditional Feast of Fools.

This naive temper of the middle ages is nowhere more conspicuously displayed than in the Feast of the Ass, which under various forms was celebrated in a large number of churches throughout the West. The ass had been introduced into the ritual of the church in the 9th century, representing either Balaam's ass, that which stood with the ox beside the manger at Bethlehem, that which carried the Holy Family into Egypt, or that on which Christ rode in triumph into Jerusalem. Often the ass was a mere incident in the Feast of Fools; but sometimes he was the occasion of a special festival, ridiculous enough to modern notions, but by no means intended in an irreverent spirit. The three most notable celebrations of the Feast of the Ass were at Rouen, Beauvais and Sens. At Rouen the feast was celebrated on Christmas Day, and was intended to represent the times before the coming of Christ. The service opened with a procession of Old Testament characters, prophets, patriarchs and kings, together with heathen prophets, including Virgil, the chief figure being Balaam on his ass. The ass was a hollow wooden effigy, within which a priest capered and uttered prophecies. The procession was followed, inside the church, by a curious combination of ritual office and mystery play, the text of which, according to the *Ordo processionis asinorum secundum Rothomagensem usum*, is given in Du Cange.

Far more singular was the celebration at Beauvais, which was held on the 14th of January, and represented the flight into Egypt. A richly caparisoned ass, on which was seated the prettiest girl in the town holding in her arms a baby or a large doll, was escorted with much pomp from the cathedral to the church of St Étienne. There the procession was received by the priests, who led the ass and its burden to the sanctuary. Mass was then sung; but instead of the ordinary responses to the *Introit*, *Kyrie*, *Gloria*, &c., the congregation chanted "Hinham" (Hee-haw) three times. The rubric of the mass for this feast actually runs: *In fine Missae Sacerdos versus ad populum vice, Ite missa est, Hinhannabit: populus vero vice, Deo Gratias, ter respondebit Hinham, Hinham, Hinham* (At the close of the mass the priest turning to the people instead of saying, *Ite missa est*, shall bray thrice: the people, instead of *Deo gratias*, shall thrice respond Hee-haw, Hee-haw, Hee-haw).

At Sens the Feast of the Ass was associated with the Feast of Fools, celebrated at Vespers on the Feast of Circumcision. The clergy went in procession to the west door of the church, where two canons received the ass, amid joyous chants, and led it to the precentor's table. Bizarre vespers followed, sung falsetto and consisting of a medley of extracts from all the vespers of the year. Between the lessons the ass was solemnly fed, and at the conclusion of the service was led by the precentor out into the square before the church (*conductus ad ludos*); water was poured on the precentor's head, and the ass became the centre of burlesque ceremonies, dancing and buffoonery being carried on far into the night, while the clergy and the serious-minded retired to matins and bed.

Various efforts were made during the middle ages to abolish the Feast of Fools. Thus in 1198 the chapter of Paris suppressed its more obvious indecencies; in 1210 Pope Innocent III. forbade the feasts of priests, deacons and sub-deacons altogether; and in 1246 Innocent IV. threatened those who disobeyed this prohibition with excommunication. How little effect this had, however, is shown by the fact that in 1265 Odo, archbishop of Sens, could do no more than prohibit the obscene excesses of the feast, without abolishing the feast itself; that in 1444 the university of Paris, at the request of certain bishops, addressed a letter condemning it to all cathedral chapters; and that King Charles VII. found it necessary to order all masters in theology to forbid it in collegiate churches. The festival was, in fact, too popular to succumb to these efforts, and it survived throughout Europe till the Reformation, and even later in France; for in 1645 Mathurin de Neuré complains in a letter to Pierre Gassendi of the monstrous fooleries which yearly on Innocents' Day took place in the monastery of the Cordeliers at Antibes. "Never did pagans," he writes, "solemnize with such extravagance their superstitious festivals as do they. . . . The lay-brothers, the cabbage-cutters, those who work in the kitchen . . . occupy the places of the clergy in the church. They don the sacerdotal garments, reverse side out. They hold in their hands books turned upside down, and pretend to read through spectacles in which for glass have been substituted bits of orange-peel."

See B. Picart, *Cérémonies et coutumes religieuses de tous les peuples* (1723); du Tilliot, *Mémoires pour servir à l'histoire de la fête des Fous* (Lausanne, 1741); Aimé Cherest, *Nouvelles recherches sur la fête des Innocents et la fête des Fous dans plusieurs églises et notamment dans celle de Sens* (Paris, 1853); Schneegans in Müller's *Zeitschrift für deutsche Kulturgeschichte* (1858); H. Böhmer, art. "Narrenfest" in Herzog-Hauck, *Realencyklop.* (ed. 1903); Du Cange, *Glossarium* (ed. 1884), *s.v.* "Festum Asinorum."

FOOLSCAP, the cap, usually of conical shape, with a cockscomb running up the centre of the back, and with bells attached, worn by jesters and fools (see Fool); also a conical cap worn by dunces. The name is given to a size of writing or printing paper, varying in size from 12×15 in. to 17×13½ in. (see Paper). The name is derived from the use of a "fool's cap" as a watermark. A German example of the watermark dating from 1479 was exhibited in the Caxton Exhibition (1877). The *New English Dictionary* finds no trustworthy evidence for the introduction of the watermark by a German, Sir John Spielmann, at his paper-mill at Dartford in 1580, and states that there is no truth in the familiar story that the Rump Parliament substituted a fool's cap for the royal arms as a watermark on the paper used for the journals of parliament.

FOOL'S PARSLEY, in botany, the popular name for *Aethusa Cynapium*, a member of the family *Umbelliferae*, and a common weed in cultivated ground. It is an annual herb, with a fusiform root and a smooth hollow branched stem 1 to 2 ft. high, with much divided (ternately pinnate) smooth leaves and small compound umbels of small irregular white flowers. The plant has a nauseous smell, and, like other members of the order (*e.g.* hemlock, water-dropwort), is poisonous.

FOOT, the lower part of the leg, in vertebrate animals consisting of tarsus, metatarsus and phalanges, on which the body rests when in an upright position, standing or moving (see Anatomy: *Superficial and Artistic*; and Skeleton: *Appendicular*). The word is also applied to such parts of invertebrate animals as serve as a foot, either for movement or attachment to a surface. "Foot" is a word common in various forms to Indo-European languages, Dutch, *voet*, Ger. *Fuss*, Dan. *fod*, &c. The Aryan root is *pod-*, which appears in Sans. *pūd*, Gr. *ποῦς*, *ποδός*, and Lat. *pes*, *pedis*. From the resemblance to the foot, in regard to its position, as the base of anything, or as the lowest member of the body, or in regard to its function of movement, the word is applied to the lowest part of a hill or mountain, the plate of a sewing-machine which holds the material in position, to the part of an organ pipe below the mouth, and the like. In printing the bottom of a type is divided by a groove into two portions known as "feet." Probably referring to the beating of the rhythm with the foot in dancing, the Gr. *ποῦς* and Lat. *pes* were applied in prosody to a grouping of syllables, one of which is stressed, forming the division of a verse. "Foot," *i.e.* foot-soldier, was formerly, with an ordinal number prefixed, the name of the infantry regiments of the British army. It is now superseded by territorial designations, but it still is used in the four regiments of the infantry of the Household, the Foot Guards. As a lineal measure of length the "foot" is of great antiquity, estimated originally by the length of a man's foot (see Weights and Measures). For the ceremonial washing of feet, see Maundy Thursday.

FOOT-AND-MOUTH DISEASE (Aphthous Fever, Epizootic Aphtha, Eczema Epizootica), a virulent contagious and inoculable malady of animals, characterized by initial fever, followed by the formation of vesicles or blisters on the tongue, palate and lips, sometimes in the nostrils, fourth stomach and intestine of cattle, and on parts of the body where the skin is thin, as on the udder and teats, between the claws, on the heels, coronet and pastern. The disease begins suddenly and spreads very rapidly. A rise of temperature precedes the vesicular eruption, which is accompanied by salivation and a peculiar "smacking" of the lips. The vesicles gradually enlarge and eventually break, exposing a red raw patch, which is very sensitive. The animal cannot feed so well as usual, suffers much pain and inconvenience, loses condition, and, if a milk-yielding creature, gives less milk, or, if pregnant, may abort. More or less lameness is a constant symptom, and sometimes the feet become very much diseased and the animal is so crippled that it has to be destroyed. It is often fatal to young animals. It is transmitted by the saliva and the discharges from the vesicles, though all the secretions and excretions are doubtless infective, as well as all articles and places soiled by them. This disease can be produced by injecting the saliva, or the lymph of the vesicles, into the blood or the peritoneal cavity.

If we were to judge by the somewhat vague descriptions of different disorders by Greek and Roman writers, this disease has been a European malady for more than 2000 years. But no reliance can be placed on this evidence, and it is not until we reach the 17th and 18th centuries that we find trustworthy proof of its presence, when it was reported as frequently prevailing extensively in Germany, Italy and France. During the 19th century, owing to the vastly extended commercial relations between civilized countries, it has, like the lung-plague, become widely diffused. In the Old World its effects are now experienced from the Caspian Sea to the Atlantic Ocean. Hungary, Lower Austria, Bohemia, Saxony and Prussia were invaded in 1834. Cattle in the Vosges and in Switzerland were attacked in 1837, and the disease extending to France, Belgium and Holland, reached England in 1839, and quickly spread over the three kingdoms (see also under Agriculture). At this time the importation of foreign animals into England was prohibited, and it was supposed that the infection must have been introduced by surplus ships' stores, probably sheep, which had not been consumed during the voyage. This invasion was followed at intervals by eleven distinct outbreaks, and since 1902 Great Britain has been free of foot-and-mouth disease. From the observations of the best authorities it would appear to be an altogether exotic malady in the west of Europe, always invading it from the east; at least, this has been the course noted in all the principal invasions. It was introduced into Denmark in 1841; and into the United States of America in 1870, from Canada, where it had been carried by diseased cattle from England. It rapidly extended through cattle traffic from the state first invaded to adjoining states, but was eventually extinguished, and does not now appear to be known in North America. It was twice introduced into Australia in 1872, but was stamped out on each occasion. It appears to be well known in India, Ceylon, Burma and the Straits Settlements. In 1870 it was introduced into the Andaman Islands by cattle imported from Calcutta, where it was then prevailing, and in the same year it appeared in South America. In South Africa it is frequently epizootic, causing great inconvenience, owing to the bullocks used for draught purposes becoming unfit for work. These cattle also spread the contagion. It is not improbable that it also prevails in central Africa, as Schweinfurth alludes to the cattle of the Dinkas suffering from a disease of the kind.

Though not usually a fatal malady, except in very young animals, or when malignant, yet it is a most serious scourge. In one year (1892) in Germany, it attacked 150,929 farms, with an estimated loss to the owners of £7,500,000 sterling. It is transmissible to nearly all the domestic animals, but its ravages are most severe among cattle, sheep, goats and swine. Human beings are also liable to infection.

The treatment of affected animals comprises a laxative diet, with salines, and the application of antiseptics and astringents to the sores. The preventive measures recommended are, isolation of the diseased animals, boiling the milk before use, and thorough disinfection of all places and substances which are capable of conveying the infection.

FOOTBALL, a game between two opposing sides played with a large inflated ball, which is propelled either by the feet alone or by both feet and hands.

Pastimes of the kind were known to many nations of antiquity, and their existence among savage tribes, such as the Maoris, Faroe Islanders, Philippine Islanders, Polynesians and Eskimos, points to their primitive nature. In Greece the ἐπίσκυρος seems to have borne a resemblance to the modern game. Of this we read in Smith's *Dictionary of Antiquities*—"It was the game at football, played in much the same way as with us, by a great number of persons divided into two parties opposed to one another." Amongst the Romans the *harpastum*, derived from the Greek verb ἁρπάζω, I seize, thus showing that carrying the ball was permissible, bore a certain resemblance. Basil Kennett, in his *Romae antiquae notitia*, terms this missile a "larger kind of ball, which they played with, dividing into two companies and striving to throw it into one another's goals, which was the conquering cast." The *harpastum* was a gymnastic game and probably played for the most part indoors. The real Roman football was played with the inflated *follis*, which was kicked from side to side over boundaries, and thus must have closely resembled the modern Association game. Tradition ascribes its introduction in northern Europe to the Roman legions. It has been played in Tuscany under the name of *Calcio* from the middle ages down to modern times.

Regarding the origin of the game in Great Britain the Roman tradition has been generally accepted, although Irish antiquarians assert that a variety of football has been played in Ireland for over 2000 years. In early times the great football festival of the year was Shrove Tuesday, though the connexion of the game with this particular date is lost in obscurity. William Fitzstephen, in his *History of London* (about 1175), speaks of the young men of the city annually going into the fields after dinner to play at the well-known game of ball on the day *quae dicitur Carnilevaria*. As far as is known this is the first distinct mention of football in England. It was forbidden by Edward II. (1314) in consequence of "the great noise in the city caused by hustling over large balls (*rageries de grosses pelotes*)." A clear reference is made "ad pilam . . . pedinam" in the Rotuli Clausarum, 39 Edward III. (1365), memb. 23, as one of the pastimes to be prohibited on account of the decadence of archery, and the same thing occurs in 12 Richard II. c. 6 (1388). Both Henry VIII. and Elizabeth enacted laws against football, which, both then and under the Stuarts and the Georges, seems to have been violent to the point of brutality, a fact often referred to by prominent writers. Thus Sir Thomas Elyot, in his *Boke named the Governour* (1531), speaks of football as being "nothyng but beastely fury and extreme violence, whereof proceedeth hurte and consequently rancour and malice to remayne with thym that be wounded, wherefore it is to be put in perpetual silence." In Stubbes' *Anatomie of Abuses* (1583) it is referred to as "a develishe pastime . . . and hereof groweth envy, rancour and malice, and sometimes brawling, murther, homicide, and great effusion of blood, as experience daily teacheth." Fifty years later (1634) Davenant is quoted (in Hone's *Table-Book*) as remarking, "I would now make a safe retreat, but methinks I am stopped by one of your heroic games called football; which I conceive (under your favour) not very conveniently civil in the streets, especially in such irregular and narrow roads as Crooked

Lane. Yet it argues your courage, much like your military pastime of throwing at cocks, since you have long allowed these two valiant exercises in the streets."

An evidence of its old popularity in Ireland is that the statutes of Galway in 1527 forbade every other sport save archery, excepting "onely the great foot balle." In the time of Charles II. football was popular at Cambridge, particularly at Magdalene College, as is evidenced by the following extract from the register book of that institution under the date 1679:—

> "That no schollers give or receive at any time any treat or collation upon account of ye football play, on or about Michaelmas Day, further than Colledge beere or ale in ye open halle to quench their thirsts. And particularly that that most vile custom of drinking and spending money—Sophisters and Freshmen together—upon ye account of making or not making a speech at that football time be utterly left off and extinguished."

It nevertheless remained for the most part a game for the masses, and never took root, except in educational institutions, among the upper classes until the 19th century. No clubs or code of rules had been formed, and the sole aim seems to have been to drive the ball through the opposing side's goal by fair means or foul. So rough did the game become that James I. forbade the heir apparent to play it, and describes the exercise in his *Basilikon Doron* as "meeter for laming than making able the users thereof." Both sexes and all ages seem to have taken part in it on Shrove Tuesday; shutters had to be put up and houses closed in order to prevent damage; and it is not to be wondered that the game fell into bad repute. Accidents, sometimes fatal, occurred; and Shrove Tuesday "football-day" gradually died out about 1830, though a relic of the custom still remained in a few places. For some thirty years football was only practised at the great English public schools, many of which possessed special games, which in practically all cases arose from the nature of the individual ground. Thus the rough, open game, with its charging, tackling and throwing, which were features of football when it was taken up by the great public schools, would have been extremely dangerous if played in the flagged and walled courts of some schools, as, for example, the old Charterhouse. Hence at such institutions the dribbling style of play, in which Mr Montague Shearman (*Football*, in the "Badminton Library") sees the origin of the Association game, came into existence. Only at Rugby (later at some other schools), which from the first possessed an extensive grass field, was the old game preserved and developed, including even its roughness, for actual "hacking" (*i.e.* intentional kicking of an opponent's legs) was not expressly abolished at Rugby until 1877. The description of the old school game at Rugby contained in *Tom Brown's School Days* has become classic.

1. *Rugby Union.*—We have seen that from early times a rudimentary game of football had been a popular form of sport in many parts of Great Britain, and that in the old-established schools football had been a regular game among the boys. In different schools there arose various developments of the original game; or rather, what, at first, must have been a somewhat rough form of horse-play with a ball began to take shape as a definite game, with a definite object and definite rules. Rugby school had developed such a game, and from football played according to Rugby rules has arisen Rugby football. It was about the middle of the 19th century that football—up till that time a regular game only among schoolboys—took its place as a regular sport among men. To begin with, men who had played the game as schoolboys formed clubs to enable them to continue playing their favourite school game, and others were induced to join them; while in other cases, clubs were formed by men who had not had the experience of playing the game at school, but who had the energy and the will to follow the example of those who had had this experience. In this way football was established as a regular game, no longer confined to schoolboys. When football was thus first started, the game was little developed or organized. Rules were very few, and often there was great doubt as to what the rules were. But, almost from the first, clubs were formed to play football according to Rugby rules—that is, according to the rules of the game as played at Rugby school. But even the Rugby rules of that date were few and vague, and indeed almos unintelligible to those who had not been at Rugby school. Stil the fact that play was according to Rugby rules produced certain uniformity; but it was not till the establishment of th English Union, and the commencement of international matches that a really definite code of rules was drawn up.

It is an interesting question to ask why it was that the game o Rugby school became so popular in preference to the games o other schools, such as Eton, Winchester or Harrow. It wa probably very largely due to the reputation and success of Rugby school under Dr Arnold, and this also led most probably to it adoption by other schools; for in 1860 many schools beside Rugby played football according to Rugby rules. The rapidity with which the game spread after the middle of the 19th century was remarkable. The Blackheath club, the senior club of th London district, was established in 1860, and Richmond, its grea rival, shortly afterwards. Before 1870, football clubs had been started in Lancashire and Yorkshire; indeed the Sheffield football club dates back to 1855. Likewise, in the universities o Oxford and Cambridge, Rugby football clubs had been formed before 1870, and by that date the game had been implanted both in Ireland and South Wales; while in Scotland, before 1860 football had taken a hold. Thus by 1870 the game had been established throughout the United Kingdom, and in many districts had been regularly played for a number of years. Rapid as, in some ways, had been the spread of the game between the years 1850 and 1870, it was as nothing to what happened in the following twenty years; for by 1890 Rugby football, together with Association football, had become the great winter amusement of the people, and roused universal interest; while to-day on any fine Saturday afternoon in winter there are tens of thousands of people playing football, while those who watch the game can be counted by the hundred thousand. The causes that led to this great increase in the game and interest taken in it were, undoubtedly, the establishment of the various national Unions and the international matches; and, of course, the local rivalry of various clubs, together with cup or other competitions prevalent in certain districts, was a leading factor. The establishment of the English Union led to a codification of the rules without which development was impossible.

In the year 1871 the English Rugby Union was founded in London. This Union was an association of some clubs and schools which joined together and appointed a committee and officials to draw up a code of rules of the game. From this beginning the English Rugby Union has become the governing body of Rugby football in England, and has been joined by practically all the Rugby clubs in England, and deals with all matters connected with Rugby football, notably the choosing of the international teams. In 1873 the Scottish Football Union was founded in Edinburgh on the same lines, and with the same objects, while in 1880 the Welsh Football Union, and in 1881 the Irish Rugby Football Union, were established as the national Unions of Wales and Ireland, though in both countries there had been previously Unions not thoroughly representative of the country. All these Unions became the chief governing body within their own country, and one of their functions was to make the rules and laws of the game; but as this had been done to start with by the English Union, the others adopted the English rules, with amendments to them from time to time. This state of affairs had one element of weakness—viz. that since all the Unions made their own rules, if ever a dispute should arise between any of them, a dead-lock was almost certain to ensue. Such a dispute did occur in 1884 between the English and Scottish Unions. This dispute eventually turned on the question of the right of the English Union to make and interpret the rules of the game, and to be the paramount authority in the game, and superior to the other Unions. Scotland, Ireland and Wales resisted this claim, and finally, in 1889, Lord Kingsburgh and Major Marindin were appointed as a commission to settle the dispute. The result was the establishment of the International Board, which consists of representatives from each Union—six from England, two from each of the others—whose duties were to settle any question that might arise between the different Unions, and to settle the rules under which international matches were to be played, these rules being invariably adopted by the various Unions as the rules of the game.

With the establishment of the International Board the organization of the game was complete. Still harmony did not prevail, and in 1895 occurred a definite disruption. A number of leading clubs in Yorkshire and Lancashire broke off from the English Union and formed the Northern Union, which since that date has had many accessions, and has become the leading body in the north of England. The question in dispute was the payment of players. Football was originally played by men for the sheer love of the game, and by men who were comparatively well-to-do, and who could give the time to play it; but with the increasing popularity of the game it became the pastime of all classes of the people, and clubs began to grow rich by "drawing big gates,"—that is, large numbers of spectators, frequently many thousands in number, paid for the privilege of witnessing the match. In these circumstances the temptation arose to reimburse the player for any out-of-pocket expenses he might be put to for playing the game, and thus it became universally recognized as legitimate to pay a player's expenses to and from a match. But in the case of working men it often meant that they lost part of their weekly wage when they had to go a distance to play a match, or to go on tour with their club—that is, go off for a few days and play one or two matches in different parts of the country—and consequently the claim was made on their behalf to recoup them for their loss of wage; while at the same time rich clubs began to be willing to offer inducements to good players to join their club, and these inducements were generally most acceptable in the form of money. In Association football (see below) professionalism—*i.e.* the hiring and paying of a player for his services—had been openly recognized. A large section of the English Union—the amateur party—would not tolerate anything that savoured of professionalism, and regarded payments made to a player for broken time as illegitimate. The result was the formation of the Northern Union, which allowed such payments, and has practically recognized professionalism. This body has also somewhat altered the laws of the game, and reduced the number of players constituting a team from fifteen to thirteen. In Scotland and Ireland Rugby footballers are strongly amateur; but wherever Rugby football is the popular game of the artisan the professional element is strong.

Besides legislation, one of the functions of the Unions is to select international teams. On the 27th of March 1871 the first international match was played between England and Scotland in Edinburgh. This was a match between teams picked from English and Scottish players. These matches from the first roused widespread interest, and were a great stimulus to the development of the game. With the exception of a few years, when there were disputes between their respective Unions, all the countries of the United Kingdom have annually played one another—England having played Scotland since 1871, Ireland since 1875 and Wales since 1880. Scotland commenced playing Ireland in 1877 and Wales in 1883, while Ireland and Wales met first in 1882 and then in 1884, and since 1887 have played annually. The qualifications of a player for any country were at first vaguely considered to be birth; but they were never definitely settled, and there has been a case of a player playing for two countries. In 1894, however, the International Board decided that no player was to play for more than one country, and this has been the only pronouncement on the question; and though birth is still looked upon as the main qualification, it is not essential. Though international matches excite interest throughout the United Kingdom, the matches between two rival clubs arouse just as much excitement in their district, particularly when the clubs may be taken as representatives of two neighbouring rival towns. But when to this rivalry there is added the inducement to play for a cup, or prize, the excitement is much more intense. Among Rugby players cup competitions have never been so popular as among Association, but the competition for the Yorkshire Cup was very keen in the days before the establishment of the Northern Union, and this undoubtedly was the main cause of the popularity of the game in that county. Similarly the competition for the South Wales Cup from 1878 to 1887 did a great deal to establish the game in that country. The method of carrying on these competitions is, that all the clubs entered are drawn by lot, in pairs, to play together in the first round; the winners of these ties are then similarly drawn in pairs for the next round, until for the final round there is only one pair left, the winner of which takes the cup. An elaboration of this competition is the "League system" of the Association game. This, likewise, has not been popular with Rugby players. Still it exists in some districts, especially where clubs are anxious to draw big gates. In the League system a certain number of clubs form a league to play one another twice each season; two points are counted for a win and one for a draw. The club which at the end of the season comes out with most points wins the competition. The advantage of this system over a cup competition is, that interest is kept up during the whole season, and one defeat does not debar a club from eventually coming out first.

It is said that wherever Britons go they take their games with them, and this has certainly been the case with Rugby football, especially in New Zealand, South Africa and Australia. An interchange of football visits between these colonies and the motherland is now an important feature in the game. These tours date from 1888, when an English team visited Australia and New Zealand. In the following season, 1889, a team of New Zealanders, some of whom were native Maories, came over to England, and by their play even then indicated how well the grammar of the game had been studied in that colony. Subsequently several British teams visited at intervals New Zealand and Australia, and in 1905 New Zealand sent home a team which eclipsed anything previously accomplished. They played altogether thirty-three matches, including fixtures with England, Ireland, Scotland and Wales, and only sustained one defeat, viz. by a try in their match with Wales, a record which speaks for itself. In 1908 a combined team of English and Welsh players toured in New Zealand and Australia, and also visited Canada on their way home. The team was not so strong as could have been wished, and though they did fairly well in Australia, they lost all three "test matches" against New Zealand. In South Africa the game is followed with equal enthusiasm, and the play is hardly inferior, if at all, to that of the New Zealanders. The first British team to visit the Cape went in 1891 through the generosity of Cecil Rhodes, who guaranteed the undertaking against loss. Teams were also sent out in 1896 and 1903; the result of matches played in each visit showing the steady improvement of the colonists. In 1906 the South Africans paid their first visit to England, and the result of their tour proved them to be equally formidable with the New Zealanders. England managed to draw with them, but Scotland was the only one of the home Unions to gain a victory. The success of these colonial visits, more especially financially, created a development very foreign to the intentions of their organizers. The Northern Union as a professional body had drifted into a somewhat parlous state, through suffering on the one hand from a lack of international matches, and on the other from the competition of Association professional teams. The great financial success resulting from the New Zealand tour of 1905 roused the attention of the Northern Union authorities, and they quickly entered into negotiations with New Zealand players to collect a team who would come over and play the Northern Union clubs, the visiting players themselves taking a share of the gate-money. For this purpose a team of New Zealanders toured the north of England in 1907, and their action caused the introduction of professional or Northern Union football in both New Zealand and Australia.

The spread of the game has not, however, been confined to English-speaking races. In France it has found fruitful soil, and numerous clubs exist in that country. Since 1906 international matches have been played between France and England, and the energy of French players, coupled with their national *élan*, makes them formidable opponents. The Rugby code has also obtained a firm footing in Canada, India, Ceylon and the Argentine.

The game itself is essentially a winter pastime, as two requisite conditions for its enjoyment are a cool atmosphere and a soft though firm turf. The field of play is an oblong, not more than 110 yds. long nor more than 75 yds. broad, and it usually approximates to these dimensions. The boundaries are marked by lines, called touch-lines, down the sides, and goal-lines along the ends. The touch-lines are continued beyond the goal-lines for a distance of not more than 25 yds.; and parallel to the goal-line and behind it, at a distance of not more than 25 yds., is drawn a line called the dead-ball line, joining the ends of the touch-lines produced. On each goal-line, at an equal distance from the touch-lines, are erected two posts, termed goal-posts, exceeding 11 ft. in height, and generally much more—averaging perhaps from 20 to 30 ft. from the ground, and placed 18 ft. 6 in. apart. At a height of 10 ft. from the ground they are joined by a cross-bar; and the object of the game is to kick the ball over the cross-bar between the upright posts, and so obtain a goal. The ball is egg-shaped (strictly an oblate spheroid), and the official dimensions are—length, 11 to 11¼ in.; length circumference, 30 to 31 in.; width circumference, 25½ to 26 in.; weight, 13 to 14½ oz. It is made of indiarubber inflated, and covered with a leather case. Halfway between the two goal-lines there is generally drawn the half-way line, but sometimes it is marked by flags on the touch-line; and 25 yds. from each goal-line there is similarly marked the 25-yds. line. In the original game the side that had gained the majority of goals won the match, and if no goal had been scored, or an equal number, the game was said to be left drawn; but a modification was adopted before long. A goal can be kicked from the field in the ordinary course of play; but from the very first a try goal could be obtained by that side one of whose players either carried the ball across his opponents' goal-line and then touched it down (*i.e.* on the ground), or touched it down after it had been kicked across the goal-line, before any of his opponents. The "try" is then proceeded with as follows: the ball is taken out by a member of the side obtaining the try in a straight line from the spot where it was "touched down," and is deposited in a selected position on the ground in the field of play, the defending side being all confined behind their own goal-line until the moment the ball is so placed on the ground, when another member of the attacking side endeavours to kick it from the ground (a "place kick") over the bar and between the goal-posts. Frequently a goal is kicked; very often not. The modification first allowed was to count that side the winner which had gained the majority of tries, provided no goal or an equal number of goals had been scored; but a majority of one goal took precedence of any number of tries. But this, too, was afterwards abolished, and a system of points instituted by which the side with the majority of points wins. The numerical value, however, of goals and tries has undergone several changes, the system in 1908 being as follows:—A try counts 3 points. A goal from a try (in which case the try shall not count) 5 points. A dropped goal (except from a mark or a penalty kick) 4 points; a dropped goal being a goal obtained by a player who drops the ball from his hands and kicks it the moment it rises off the ground, as in the "half-volley" at cricket or tennis. A goal from a mark or penalty kick 3 points. Under the Northern Union code any sort of goal counts 2 points, a try 3 points; but if a try be converted into a goal, both try and goal count, *i.e.* 5 points are scored.

In the game itself not only may the ball be kicked in the direction of the opponents' goal, but it may also be carried; but it must not be thrown forward or knocked on—that is, in the direction of the opponents' goal—though it may be thrown back. Thus the game is really a combination of football and handball. The main principle is that any one who is not "offside" is in play. A player is offside if he gets in front of the ball—that is, on the opponents' side of the ball, nearer than a colleague in possession of the ball to the opponents' goal-line; when in this position he must not interfere with an opponent or touch the ball under penalty. The leading feature of the game is t "scrummage." In old days at Rugby school there was practical no limit to the numbers of players on each side, and not infr quently there would be a hundred or more players on one sid This was never prevalent in club football; twenty a-side wa the usual number to start with, reduced in 1877 to fifteen a-sid the number still maintained. In the old Rugby big sides the ba got settled amidst a mass of players, and each side attempte to drive it through this mass by shoving, kicking, and otherwis forcing their way through with the ball in front of them. Th was the origin of the scrummage.

The game is played usually for one hour, or one hour and te minutes, sometimes for one hour and a half. Each side defend each goal in turn for half the time of play. Of the fifteen player who compose a side, the usual arrangement is that eight are calle "forwards," and form the scrummage; two "half-backs" ar posted outside the scrummage; and four "three-quarter-backs, a little behind the halves, stretch in a line across the field, thei duties being mainly to run and kick and pass the ball to othe members of their own side, and to prevent their opponents fro doing the same. In recent years, owing to the development o "passing," the field position of the half-backs has undergon a change. One stands fairly close to the scrummage and i known as the "scrum-half," the other takes a position betwee the latter and the three-quarters, and is termed the "stand-of half." Behind the three-quarters comes the "full-back" o "back," a single individual to maintain the last line of defence his duties are entirely defensive, either to "tackle" an opponen who has managed to get through, or, more usually, to catc and return long kicks. Play is started by one side kicking th ball off from the centre of the field in the direction of th opponents' goal. The ball is then caught by one of the othe side, who either kicks it or runs with it. In running he goes o until he is "tackled," or caught, by one of his opponents, unles he should choose to "pass" or throw it to another of his ow side, who, provided he be not offside, may either kick, or run or pass as he chooses. The ball in this way is kept movin until it crosses the touch-line, or goal-line, or is tackled. If the ball crosses the touch-line both sides line up at right angle to the point where it crossed the line, and the ball is thrown i straight either by one of the same side whose player carried the ball across the touch-line, or, if the ball was kicked or throw out, by one of the opposite side. If the ball crosses the goal-line either a try is gained, as explained above, or if the defending side touch it down first, the other side retire to the line 25 yds. from the goal-line, and the defending side kick it up the field. If the ball is tackled the player carrying the ball gets up from the ground as soon as possible, and the forwards at once form the scrummage by putting down their heads and getting ready to shove against one another. They shove as soon as the ball is put down between the two front rows. In the scrummage the object is, by shoving the opponents back or otherwise breaking away with the ball in front, to carry the ball in the direction of the opponents' goal-line by a series of short kicks in which the players run after the ball as fast as possible, while their opponents lie in wait to get the ball, and either by a kick or other device stop the rush. Instead, however, of the forwards breaking away with the ball, sometimes they let the ball come out of the scrummage to their half-backs, who either kick or run with it, or pass it to the three-quarter-backs, and so the game proceeds until the ball is once more "dead"—that is, brought to a standstill. The scrummage appears to be an uninteresting manœuvre, and a strange relic of bygone times; but it is not merely a manœuvre in which weight and strength alone tell—it also needs a lot of dexterity in moving the ball with the feet, applying the weight to best advantage, and also in outflanking the opposing side, as it were—usually termed wheeling—directing all the force to one side of the scrummage and thus breaking away. As a rule the game is a lively one, for the players are rarely at rest; if there is much scrummaging it is called a slow game, but, if much running and passing, a fast or an open game. The spectator, unless he be an expert, prefers the open game; but in any case the game is always a hard and exciting struggle, frequently with the balance of fortune swaying very rapidly from one side to the other, so that it is a matter of no surprise to find the British public so ardently attached to it. (C. J. N. F.; C. J. B. M.)

2. *Association.*—It is generally supposed that the English game of Association football is the outcome of the game of football as played at Cambridge University about the middle of the 19th century. In October 1863 a committee, consisting of representatives of the schools of Eton, Harrow, Rugby, Marlborough, Shrewsbury and Westminster, drew up a code of laws which settled the fundamental principle of the "Association" game, as distinguished from other forms of the game which permitted of handling and carrying the ball. In Association football the use of the hands or arms, either for the purpose of playing the ball or impeding or holding an opponent, is absolutely prohibited; "dribbling" or kicking the ball with the feet, and propelling it by the head or body, are the methods to be adopted. The Cambridge laws specially provided for "kicking" the ball. Laws 13 and 14 provided that "the ball, when in play, may be stopped by any part of the body, but may not be held or hit by the hands, arms or shoulders. All charging is fair, but holding, pushing with the hands, tripping up and shinning are forbidden."

The laws of Association football first took practical shape as the outcome of a meeting held on the 26th of October 1863 at the Freemasons' Tavern, London. The clubs which sent delegates were representative of all classes of football then played. The meeting was a momentous one, for not only was the foundation laid of the Football Association, the national association which has since then controlled the game in England, but as the outcome of the differences of opinion which existed as to "hacking" being permissible under the laws, the representatives who favoured the inclusion of the practice, which is now so roundly condemned in both the Association and Rugby games, withdrew and formed the Rugby Union.

The Cambridge laws were considered by the committee of the Football Association at their meeting on the 24th of November 1863. They took the view that those laws "embraced the true principles of the game with the greatest simplicity"; the laws were "officially" passed on the 1st of December 1863, and the first publication was made in *Bell's Life* four days later. These laws have from time to time been modified, but the principles as laid down in 1863 have been adhered to; and the Association game itself has altered very little since 1880. The usual dimensions for a ground are 120 yds. long by 80 yds. wide, and the goals are 8 yds. in width with a cross-bar from post to post 8 ft. from the ground. The ball is about 14 oz. in weight, and must be a perfect sphere from 27 to 28 in. in circumference, as distinguished from the elliptical or egg-shaped Rugby ball. A rectangular space extending to 18 yds. in front of the goals, and marked with lines on the ground, constitutes the "penalty area"; within which, at a distance of 12 yds. opposite the centre of the goal, is the "penalty kick mark." The boundary lines at the sides of the field are called the "touch-lines"; those at the ends (in the centre of which are the goals) being the "goal-lines." The game is started by a place kick from the centre of the field of play, and none of the opposite side is allowed to approach within 10 yds. of the ball when it is kicked off. When the ball passes over the touch line it has to be thrown in by one of the opposite side, and can be returned into the field of play in any direction. If it passes over the goal-line at any time without touching one of the defending side, it has to be kicked out by the goalkeeper or one of the backs from a line marked in front of goal, the spot selected being in front of the post nearest the point where the ball left the field of play. But should it touch one of the defending side in its transit over the goal-line the attacking side has the privilege of a free kick from the corner flag (a "corner kick"). This is often a great advantage, but such free kick does not produce a goal unless the ball touches one of the other players on its way to the post. Ordinarily a goal is scored when the ball goes between the goal-posts and under the cross-bar, not being thrown, knocked on or carried. The regulation duration of a game is an hour and a half, and ends are changed at forty-five minutes. The side winning the toss has the choice of ends or kick-off, and the one obtaining the majority of goals wins. A goal cannot be scored from a free kick except when the free kick has been allowed by the referee as a penalty for certain infringements of the rules by the opposite side; and if such infringement take place within the penalty area on the part of a player on the side then defending the goal, and in the judgment of the referee be intentional, a "penalty kick" is awarded to the attacking side. The penalty kick is a free kick from the penalty kick mark, all the players of the defending side being excluded from the penalty area, except the goalkeeper, who is confined to the goal-line; the result, therefore, being an almost certain goal.

A player is always in play as long as there are three of the opposite side between him and the opposite goal *at the time the ball is kicked.* This "offside" rule gives much trouble to the young player, though why it should do so it is not easy to say. The rule is simple if the words in italics are remembered. The ball must not be carried, knocked or wilfully handled under any pretence whatever, save by the goalkeeper, who is allowed to use his hands in defence of his goal, either by knocking on or throwing, within his own half of the field of play. Thus far he is entitled to go in maintaining his goal, but if he carry the ball the penalty is a free kick. There are other infringements of the rules which also involve the penalty of a free kick, among them the serious offences of tripping, hacking and jumping at a player. Players are not allowed to wear nails in their boots (except such as have their heads driven in flush with the leather), or metal plates or gutta-percha, and any player discovered infringing this rule is liable to be prohibited from taking further part in a match.

In the early 'sixties of the 19th century there were probably not more than twenty-five organized clubs playing Association football in the United Kingdom, and these were chiefly confined in the south of England to the universities and public schools. But whilst the game was being established in the south it was making steady progress in the north, particularly in Yorkshire, where the Sheffield Club had been formed as early as 1854. In 1867 the game had become so well established that it was decided to play an inter-county match. The match, which was played "in the wilds of Battersea Park," terminated in a draw, neither side having obtained a goal; and it did much to stimulate the growing popularity of the game. During the season 1870–1871, only three years later, two matches of an international character were played between Englishmen and Scotsmen in membership with the Football Association; they were not, however, recognized as "international" matches. The first real international match, England *v.* Scotland, was played on the 30th of November 1872 at Partick, Glasgow; the first international match between England and Wales was played at Kennington Oval in 1879; and that between England and Ireland at Belfast in 1882. In 1896 amateur international matches were inaugurated with Germany, Austria and Bohemia; and games are now annually played with Scotland, Wales, Ireland, France, Belgium, Germany, Holland, Austria and other continental countries. As the outcome of the international relations with Scotland, Wales and Ireland, an International Football Association Board was formed in 1882, when a universal code of laws was agreed upon. Two representatives from each of the four national associations constitute the board, whose laws are accepted and observed not only by the clubs and players of the United Kingdom but in all countries where the Association game is played. At a meeting held at Paris on the 21st of May 1904 the "International Federation of Association Football" was instituted. It consists of the recognized national associations in the respective countries; and its objects are to develop and control Association international football. The countries in federation are: Austria, Belgium, Denmark, England, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Sweden and Switzerland.

The small number of clubs taking part in the game in the early days becomes of interest when compared with the magnitude of the game in the 20th century. Association football has become one of the most popular of all national sports in the United Kingdom. It is slowly but surely taking a similar position on the continent of Europe and is making progress even in the Far East, Japan being one of its latest adherents. In the season of 1871–1872 the Football Association inaugurated its popular challenge cup competition which is now competed for by both amateur and professional clubs. In the first year fifteen clubs entered, all of which were from the south of England. The first winners of the cup were the Wanderers, who defeated the Royal Engineers in the final tie by one goal to nothing. For the first ten years the competition was mostly limited to the southern clubs, but in the season of 1881–1882 the Blackburn Rovers were only defeated in the final tie by the Old Etonians by one goal to nothing. Professionalism was then unknown in the game, and comparatively little interest was taken in it except by the players themselves. In the following season of 1882–1883 the cup was for the first time taken north by the Blackburn Olympic Club, and it remained in the north for the next nineteen years, until in the season of 1900–1901 it was again brought south by the Tottenham Hotspur Club, who defeated the Sheffield United Club at Bolton by three goals to one. In the following season the cup was again taken north by the Bury Club. In the early days of the competition a few hundred people only attended the final tie, which for many years was played at Kennington Oval in London. In the course of time, however, the interest of the public so largely increased that it became necessary to seek a ground of greater capacity; accordingly in 1893 the final was played at Fallowfield, Manchester, where it was watched by forty thousand people; in 1894 it was played at Everton and in 1895 at the Crystal Palace. The attendance during the following ten years averaged 80,000 people. The record attendance was in the season of 1900–1901, when the south were contesting with the north, the spectators then being upwards of 113,000. In the season of 1908–1909 356 clubs entered the competition; in 1910–11 the number had increased to 404.

The great development of the game necessitated many changes in the system of control. About the year 1880 (although contrary to the rules) a practice of making payment to players crept into the game in the north of England and slowly developed. After some years of debate as to the best method of dealing with this development the Football Association decided in 1885 to legalize and control the payment of players. The rules define a professional player as one who receives remuneration of any sort above his necessary hotel and travelling expenses actually paid, or is registered as a professional. They further provide that training expenses not paid by the players themselves will be considered as remuneration beyond necessary travelling and hotel expenses. Players competing for any money prizes in football contests are also considered professionals.

In 1888 the Football League, a combination of professional clubs of the north and midlands of England, was formed; and a new scheme was inaugurated for the playing of matches on what is known as the "League" principle, the essential advantage of which is that the clubs in membership of a league agree to play with each other "home and home" matches each season, and also bind themselves under certain penalties to play their best team in all league matches. Six years later the Southern League came into existence, primarily with the object of increasing the interest in the game in the south and west of England. The Football League and the Southern League very soon had their imitators, and in 1909 there were upwards of six hundred league competitions playing under the sanction and control of the Football Association. The league system also found favour in Scotland, Wales and Ireland, and has extended to most of the colonies where Association football is played. In the season of 1893–1894 the Amateur Cup Competition, restricted to amateur clubs in membership with the Football Association, was inaugurated. In the first season 32 clubs entered, and the growing popularity of the competition is shown by the fact that in the season of 1908–1909 there were 229 entries.

The Football Association, founded in 1863 with its eleven clubs, had in 1909 under its jurisdiction upwards of 10,000 amateu clubs and a quarter of a million of amateur players, and 400 professional clubs with 7000 professional players. It has also directly affiliated 52 county, district and colonial associations, and indirectly in membership a large number of minor associations which are affiliated through the county and district associations. The Army Association includes 316 army clubs in Great Britain and Ireland, together with clubs formed by the various battalions in India, South Africa, Gibraltar and other army stations; and the Royal Navy Football Association comprises all ships afloat having Association football clubs.

The regulations of the Football Association, which is the recognized administrative and legislative body for the game in England, make provision for the sanction and control of leagues and competitions; and its rules, regulations, principles and practices very largely prevail in all national associations. The king is the patron, and the council consists of 56 members, a president, 6 vice-presidents, a treasurer, 10 representatives elected by the clubs in the ten divisions into which the country is subdivided, together with representatives of the army, the navy and of county associations in England which have upwards of 50 clubs in membership, each representative being directly appointed by his association. In 1905 the Football Association became incorporated under the Joint Stock Companies Acts, and as a consequence the word "Limited" appears in its title. It is not, however, a trading body; the shareholders are not entitled to any dividend, bonus or profit, nor may the members of the council, who are the directors, receive any payment for their services. The Scottish Football Association is also an incorporated body with similar powers. Many of the leading clubs of the United Kingdom have also become incorporated, but under the regulations of the Football Association they may not pay a larger dividend to their shareholders than 5%, nor may any of the directors receive payment for their services.

The whole policy of legislation in Association football of late years has been naturally to make the game faster by bringing every one into full play. The great aim accordingly has been to encourage combination and to discourage purely individual efforts. In the early days, though there was a certain amount of cohesion, a player had to rely mainly on himself. Even up to the middle of the 'seventies dribbling was looked upon as the great desideratum; it was the essential for a forward, just as long kicks were the main object of a back. The development of the game was of course bound to change all that. The introduction of passing, long or short, but long in particular, placed the dribbler pure and simple at a discount, and necessitated methods with which he was mostly unacquainted. Combined play gradually came to be regarded as the keynote to success. Instead of one full back, as was originally the case, and one half-back, the defence gradually developed by the addition first of a second half, then of a second full back, and still later of a third half-back, until it came to show, in addition to the goalkeeper of course, two full backs and three half-backs. The eight forwards who used to constitute the attack in the earliest days of the Association have been reduced by degrees, as the science of the game became understood, until they now number only five. The effect of the transition has been to put the attack and defence on a more equal footing, and as a natural consequence to make the game more open and thereby generally more interesting and attractive. Association football is indeed, from the standpoint of the spectator, a much brighter game than it was in its infancy, the result of the new methods bringing every one of the eleven players into full relief throughtout the game. The players who, as a rule, make or mar the success of a side in modern football are the centre forward and the centre half-back. They are the pivot on which the attack and the defence respectively turn. Instead of close dribbling and following up, the new formation makes for accuracy of passing among the forwards, with intelligent support from the half-backs. The net result is practically the effective combination of the whole side. To do his part as it ought to be done every member of an eleven must work in harmony with the rest, and on a definite system, in all cases subordinating his own methods and personal interests to promote the general well-being of the side. (C. W. A.; F. J. W.)

The literature of British football is very extensive, but the following works are among the best: *Football* in the "Badminton Library" (London, 1904), where the different games played at Eton, Harrow, Rugby, Winchester and other public schools are thoroughly described; Rev. F. Marshall, *Football; the Rugby Game* (London, Cassells); J. E. Vincent, *Football; its History for Five Centuries* (London, 1885); C. J. B. Marriott and C. W. Alcock, *Football* ("Oval Series"); "Football," in the *Encyclopaedia of Sport*; *The Rugby Football Union Handbook*, Richardson, Greenwich, Official Annual; and *The Football Annual*, Merritt and Hatcher (Association Game), London.

United States.—In America the game of football has been elaborated far more than elsewhere, and involves more complications than in England. From colonial times until 1871 a kind of football generally resembling the English Association game was played on the village greens and by the students of colleges and academies. There was no running with the ball, but dribbling, called "babying," was common. In 1871 a code of rules was drawn up, but they were unsatisfactory and not invariably observed. "Batting the ball," *i.e.* striking the ball forward with the fists, was allowed. There were two backs, sixteen rushers or forwards, and two rovers or "peanutters," who lurked near the opponents' goal. During this period the first international football game was played at Yale between the college team and one made up of old Etonians, the rules being a compromise between the American and the English.

English Rugby, introduced from Canada, was first played at Harvard University, and in 1875 a match under a compromise set of rules, taken partly from the Rugby Union and partly from the existing American game, was played with Yale. The following year Yale adopted the regular Rugby Union rules, and played Harvard under these. Later, several other colleges adopted these English rules. Absence of tradition necessitated expansion of these laws, and a convention of colleges was assembled. Thenceforward annual conventions were held, which from time to time altered and amplified the rules. A college association was formed, and the game grew in popularity. Public criticism of the roughness shown in the play early threatened its existence; indeed at one time the university authorities compelled Harvard to abstain from the annual game with Yale. Changes in the rules were introduced, and the game has been characterized by less roughness and by increased skill. It has become the most popular autumn game in the United States, the principal university matches often attracting crowds of 35,000 and even 40,000 spectators. The association subsequently disbanded, but a Rules Committee, invited by the University Athletic Club of New York, made the necessary changes in the rules from time to time, and these have been accepted by the country at large. In the West associations were formed; but the game in the East is played principally under separate agreements between the contesting universities, all using, however, one code of rules. Later this Rules Committee amalgamated with a new committee of wider representation. Amateur athletic clubs as well as public and private schools have also taken up the game. The American football season lasts from the middle of September to the first of December only, owing to the severity of the American winter. Professional football is not played in America.

The American Rugby game is played by teams of eleven men on a field of 330 ft. long and 160 ft. wide, divided by chalk lines into squares with sides 5 yds. long, leaving a strip 5 ft. wide on each side of the field. Until 1903 the field was divided by latitudinal lines only and was therefore popularly called the "gridiron"; subsequently it was called the "checkerboard." The end lines are called "goal-lines," the side "touch-lines." The two lines 25 yds. from each goal-line, and the middle line, or 55 yard-line, are made broader than the rest. In the middle of each goal-line is a goal, consisting of two uprights exceeding 20 ft. in length, set 18 ft. 6 in. apart with a crossbar 10 ft. from the ground. The ball is in shape and material of the English Rugby type.

A match game consists of two periods (*halves*) of thirty-five minutes with an interval of fifteen minutes. Practice games usually have shorter halves. There are four officials: the *umpire*, whose duty it is to watch the conduct of the players and decide regarding fouls; the *referee*, who decides questions regarding the progress of the ball and of play; the *field judge* who assists the referee and keeps the time; and the *linesman*, who (with two assistants, one representing each eleven) marks the distance gained or lost in each play.

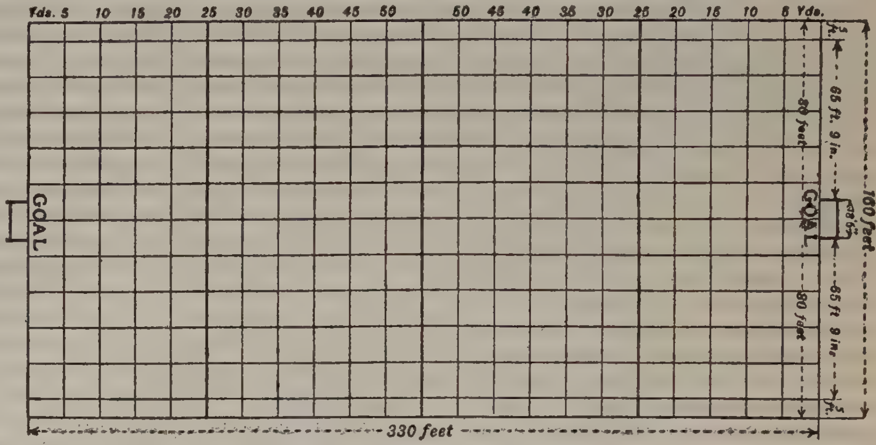


DIAGRAM OF FIELD

The football rules provide that when the ball is put in play in a scrimmage, the first man who receives the ball, commonly known as the quarter-back, may carry it forward beyond the line of scrimmage, provided in so doing he crosses such line at least 5 yds. from the point where the snapper-back put the ball in play, and furthermore, that a forward pass may be made provided the ball passes over the line of scrimmage at least 5 yds. from the point at which the ball is put in play. The field is marked off at intervals of 5 yds. with white lines parallel to the goal line, for convenience in penalizing fouls and for measuring the 10 yds. to be gained in three downs, and also at intervals of 5 yds. with white lines parallel to the side lines, in order to assist the referee in determining whether the quarter-back runs according to rule, or whether, in case of a forward pass, such pass is legally made. Thus the football field is changed from the gridiron as in 1902, to what now resembles a checkerboard, and the above diagram shows exactly how the field should be marked. As the width of the field does not divide evenly into 5 yd. spaces, it is wise to run the first line through the middle point of the field and then to mark off the 5 yds. on each side from that middle line. In order to save labour, it may be sufficient to omit the full completion of the longitudinal lines, as the object of these lines is accomplished if their points of intersection with the transverse lines are distinctly marked, for instance, by a line a foot long.

In scoring, a "touchdown" (the English Rugby "try") counts 5 points, a goal from a touchdown 6 (or one added to the 5 for the touchdown), a "goal from the field," whether from placement or drop-kick, 4, and a "safety" (the English Rugby "touchdown") 2. *Mutatis mutandis*, these are made as in English Rugby. American Rugby differs from the English game, because in the scrimmage the men are lined up opposite each other, and, although separated by the length of the ball, are engaged in a constant man-to-man contest, and also in that a system of "interference" is allowed. Furthermore, a player in the American game is put "on side" when a kicked ball strikes the ground; and forward passing, *i.e.* throwing the ball toward the opponents' goal, is permissible under certain restrictions. The costume usually consists of a close-fitting jersey with shoulders and elbows padded and reinforced with leather; short trousers with padded thighs and knees, heavy stockings and shoes with leather cleats. In the early period of the game caps were worn, but, as they were impossible to keep on, they were discarded in favour of the wearing of long hair, and the "chrysanthemum head" became the distinguishing mark of the football player. This, however, proved an inadequate protection, and some players now wear a “ head harness ” of soft padded leather. Substitutes are allowed in the places of injured players.

The object of the game is identical with that of English Rugby, and the rules in regard to fair catches, punting, drop-kicking, place-kicking, goal-kicking, passing and gentlemanly conduct are practically the same, except that, on a free kick after a fair catch, the opposing players in the American game may not come up to the mark but must keep 10 yds. in front of it. In the American game there is no scrummage in the English sense, nor is the ball thrown in at right angles after going into touch. The element of chance in both these methods of play was done away with by the enunciation of the principle of the “ possession of the ball.” In America, when the ball has gone out of bounds or a runner has been tackled and held and the ball downed, the ball is also put into play by an evolution called a scrimmage, usually called “ line-up,” which beyond the name bears no resemblance to the English scrummage. The ball, at every moment of the game, belongs theoretically either to one side or to the other. It may be lost by a fumble, or by the side in possession not being able to make the required distance of 10 yds. in three successive attempts or by a voluntary kick. In the line-up the seven line-men (*i.e.* forwards) face each other on a line parallel to the goal-lines on the spot where it was ordered down by the referee. The ball is placed on the ground by the centre-rush, also called the snapper-back, who, upon the signal being given by his quarter-back, “ snaps back ” the ball to this player, or to the full-back, by a quick movement of the hand or foot. The moment the ball is snapped-back it is in play. In every scrimmage it is a foul for the side having the ball (attacking side) to obstruct an opponent except with the body (no use may be made of hands or arms); or for the defending side to interfere with the snap-back. The defenders may use their hands and arms only to get their opponents out of the way in order to get at the man with the ball. Each member of the attacking side endeavours, of course, to prevent his opponents from breaking through and interfering with the quarter-back, who requires this protection from his line in order to have time to pass the ball to one of the backs, whom he has notified by a signal to be ready. In the United States a player may be obstructed by an off-side opponent so long as hands and arms are not used. In the line-up this is called “ blocking-off ” and “ interference ” when done to protect a friend running with the ball. Interference is one of the most important features of American football. As soon as the ball is passed to one of the half-backs for a run, for example, round one end of the line, his interference must form immediately. This means that one or more of his fellows must accompany and shield him as he runs, blocking off any opponent who trys to tackle him. The first duty of the defence against a hostile run is therefore to break up the interference, *i.e.* put these defenders out of the play, so that the runner may be reached and tackled.

The game begins by the captains tossing for choice of kick-off or goal. If the winner of the toss chooses the goal, on account of the direction of wind, the loser must kick off and send the ball at least 10 yds. into the opponents' territory from a place-kick from the 55 yds. line. The two ends of the kicking side, who are usually fast runners, get down the field after the ball as quickly as possible, in order to prevent the man who catches the kick-off from running back with the ball. When the kick-off is caught, the catcher with the aid of interference runs it back as far as possible, and as soon as he is tackled and held by his opponents the ball is down and a line-up takes place, the ball being in the possession of the catcher's side, which now attacks. In order to prevent the so-called “ block game,” once prevalent, in which neither side made any appreciable progress, the rules provide that the side in possession of the ball must make *at least 10 yds. in three successive attempts*, or, failing to do so, must surrender the ball to the enemy, or, as it is called, “ lose the ball on downs.” This is infrequent in actual play, because if, after two unsuccessful attempts, or partly successful, it becomes evident that the chances of completing the obligatory 10-yd. gain on the remaining attempt are unfavourable, a forward pass or a kick is resorted to, rather than risk losing the ball o the spot. The kick, although resulting in the loss of the ball nevertheless gives it to the enemy much nearer his goal. Whe the wind is strong the side favoured by it usually kicks ofte as the other side, not being able to kick back on equal terms is forced to play a rushing game, which is always exhausting Again, the kicking game is often resorted to by the side that ha the lead in the score, in order to save its men and yet retain th advantage. The only remaining way to advance the ball is o a free-kick after a fair catch, as in the English game. The fre kick may be either a punt, a drop-kick or a kick from placement Whenever the ball goes over the side line into touch it is brough back to the point where it crossed the line by the man wh carried it over, or, if kicked or knocked over, by a man of th side which did not kick it out, and there put in play in one o two ways. Either it may be touched to the ground and the kicked at least 10 yds. towards the opponents' goal, or it may b taken into the field at right angles to the line a distance no less than 5 yds. nor more than 15, and there put down for line-up, the player who takes it in first declaring how far he wil go, so that the opposing team may not be caught napping.

Of the seven men in the line, the centre is chosen for hi weight and ability to handle the ball cleanly in snapping back He must also, in case the full-back is to make the next play be able to throw the ball from between his legs accurately int the full-back's hands, thus saving the time that would be waste if the quarter-back were used as an intermediary. The tw “ guards,” who must also be heavy men, form with the centr the bulk of the line, protecting the backs in offence, and in defence blocking the enemy. The two “ tackles ” must be heav yet active and aggressive men, as they must not only help th centre and guards in repelling assaults on the middle of the line but also assist the ends in stopping runs round the line as wel as those between tackle and end, a favourite point of attack. The “ ends ” are chosen for their activity, sure tackling, fas running and ability to follow up the ball after a kick. Of th four players behind the line, the full-back must be a sur catcher and tackler and a fast runner. The two half-back must also be fast runners and good dodgers. One of them i often chosen for his ability to gain ground by “ bucking the line,” *i.e.* plunging through the opposing team's line. He must therefore be over the average weight, while the other half-back is called upon to gain by running round the opposing ends. The quarter-back is the commanding general and therefore the most important member of his side, as with him lies the choice of plays to be made when on the attack. Courage, coolness, promptness in decision and discrimination in the choice of plays are the qualities absolutely required for this position. As soon as his side obtains the ball, the quarter-back shouts out a signal, consisting of a series of numbers or letters, or both, which denotes a certain play that is to be carried through the moment the ball is snapped back. A good quarter-back thinks rapidly and shouts his signal for the next play as soon as a down has been called and while the scrimmage is forming, so that the plays are run off rapidly and the enemy is given as little time as possible to concentrate. The signals, which are secret and often changed to guard them from being solved by the enemy, are formed by designating every position and every space in the line, as well as kicks and other open plays, by a number or letter. Some signals are called sequence-signals, and indicate a prearranged series of plays for use in certain emergencies. Every manœuvre of the attacking side is carried out by every member of the team, the ideal being “ every man in every play every time.” As soon as a signal is given each man should know what part of the ensuing move will fall to him, in carrying the ball, interfering for the runner, or getting down the field under a punt. Every team has its own code.

About 1890 the system of interference led to momentum and mass plays (wedge-formations, tandems, &c.), *i.e.* to the grouping of bodies of men behind the line, and starting them before the ball was snapped back, so that they struck the line with an acquired momentum that was extremely severe, particularly when met by men equally determined. These plays caused frequent injuries and led to legislation against them, the most important law providing for a limitation to the number of men who could be dropped back of the line, and practically keeping seven men drawn up in the line.

Penalties are of three kinds: (1) forfeiture of the game, for refusing to play when directed to do so by the referee, and for repeated fouls made with the intention of delaying the game; (2) disqualification of players for unnecessary roughness or ungentlemanly conduct; and (3) for infringement of rules, for which certain distances are taken away from the previous gains of the side making the fouls.

The game resolves itself into a series of scrimmages interspersed with runs and kicks. The systematized development of plays places at the disposal of the quarter an infinite variety of attack, which he seeks to direct at the opposing line with bewildering rapidity and dash. During the preliminary games of the season "straight football" is generally played; that is, intricate attacks are avoided and kicks and simple plunges into the line are mainly relied upon. "Trick plays," which comprise all manœuvres of an intricate nature, are reserved for later and more important matches. Among these is the "fake (false) kick," in which the full-back takes position as if to receive the ball for a kick, but the ball is passed to a different player for a run. Another play of this kind is the "wing-shift," in which some or all of the players on one side of centre suddenly change to the other side, thus forming a mass and throwing the opponents' line out of balance. To this category belong also "double passes," "false passes," "delayed passes," "delayed runs" and "criss-crosses."

Training for football in America resembles that for other sports in regard to food and hygiene. The coaching systems at the universities differ, but there is generally a head coach, who is assisted by graduates, each of whom pays especial attention to one set of men, one to the men in the centre of the line, one to the backs, another to the ends, &c. Candidates for the teams are put through a severe course of practice in catching punts and hard-thrown passes, in quick starts, falling on the ball, tackling a mechanical dummy, in blocking, breaking through the line, and all kinds of kicking, although in matches the kicking is generally left to one or two men who have shown themselves particularly expert. Every player is taught to dive for the ball whenever he sees it on the ground, as possession is of cardinal importance in American football, and dribbling for this reason is unknown. When running with the ball the player is taught to take short steps, to follow his interference, that is, not isolate himself from his defenders, and neither to slow up nor shut his eyes when striking the opposing line. Tackling well below the waist is taught, but it is a foul to tackle below the knee. The general rule for defensive work of all kinds is "play low."

See Walter Camp, *How to play Football*, and the *Official Football Guide* (annual), both in Spalding's Athletic Library; his *Book of College Sports* (New York, 1893), his *American Football* (New York, 1894), and his *Football* (Boston, 1896)—the last in co-operation with L. F. Deland; R. H. Barbour, *The Book of School and College Sports* (New York, 1904); W. H. Lewis, *Primer of College Football* (Boston, 1896). (E. B.; W. Ca.)

FOOTE, ANDREW HULL (1806–1863), American admiral, was born at New Haven, Connecticut, on the 12th of September 1806, his father, Samuel Augustus Foote (1780–1846), being a prominent lawyer and Whig politician, who as U.S. senator moved in 1829 "Foote's resolutions" on public lands, in the discussion of which Daniel Webster made his "reply to Hayne." He entered the U.S. navy in 1822, and was commissioned lieutenant in 1830. After cruising round the world (1837–1840) in the "John Adams," he was assigned to the Philadelphia Naval Asylum, and later (1846–1848) to the Boston Navy Yard. In 1849 he was made commander of the "Perry," and engaged for two years in suppressing the slave trade on the African coast. In 1856, as commander of the "Portsmouth," he served on the East India station, under Com. James Armstrong, and he captured the Barrier Forts near Canton. From October 1858 to the outbreak of the Civil War, he was in charge of the Brooklyn Navy Yard, becoming a full captain in 1861. In August 1861 he was assigned to the command "of the naval operations upon the Western waters." His exploit in capturing Fort Henry (on the right bank of the Tennessee river) from the Confederates, on the 6th of February 1862, without the co-operation of General Grant's land forces, who had not arrived in time, was a brilliant success; but their combined attack on Fort Donelson (12 m. off, on the left bank of the Cumberland river), whither most of the Fort Henry garrison had escaped, resulted, before its surrender (Feb. 16), in heavy losses to Foote's gunboats, Foote himself being severely wounded. In March-April he co-operated in the capture of New Madrid (*q.v.*) and Island No. 10. In June he retired from his command and in July was promoted rear-admiral, and became chief of the Bureau of Equipment and Recruiting. On the 26th of June 1863 he died at New York.

See the life (1874) by Professor James Mason Hoppin (1820–1906).

FOOTE, MARY HALLOCK (1847–), American author and illustrator, was born in Milton, New York, on the 19th of November 1847, of English Quaker ancestry. She was educated at the Poughkeepsie (N.Y.) Female Collegiate Seminary and at the Cooper Institute School of Design for women, in New York. In 1876 she married Arthur De Wint Foote, a mining engineer, and subsequently lived in the mining regions of California, Idaho, Colorado and Mexico. She is best known for her stories, in which, as in her drawings, she portrays vividly the rough picturesque life, especially the mining life, of the West. Some of her best drawings appear in her own books. Among her publications are *The Led-Horse Claim* (1883), *John Bodewin's Testimony* (1886), *The Chosen Valley* (1892), *Cœur d'Alene* (1894); *The Prodigal* (1900), a novelette; *The Desert and the Sown* (1902); and several collections of short stories, including *A Touch of Sun and other Stories* (1903).

FOOTE, SAMUEL (1720–1777), English dramatist and actor, was baptized at Truro on the 27th of January 1720. Of his attachment to his native Cornwall he gives no better proofs as an author than by making the country booby Timothy (in *The Knights*) sound the praises of that county and of its manly pastimes; but towards his family he showed a loyal and enduring affection. His father was a man of good family and position. His mother, Eleanor Goodere, whom he is said in person as well as in disposition to have strongly resembled, he liberally supported in the days of his prosperity, and after her death indignantly vindicated her character from the imputations recklessly cast upon it by the revengeful spite of the duchess of Kingston. About the time when Foote came of age, he inherited his first fortune through the murder of his uncle, Sir John Dinely Goodere, Bart., by his brother, Captain Samuel Goodere. Foote was educated at the collegiate school at Worcester, and at Worcester College, Oxford, distinguishing himself in both places by mimicry and audacious pleasantries of all kinds, and, although he left Oxford without taking his degree, acquiring a classical training which afterwards enabled him neatly to turn a classical quotation or allusion, and helped to give to his prose style a certain fluency and elegance.

Foote was "designed" for the law, but certainly not by nature. In his chambers at the Temple, and in the Grecian Coffee-house hard by, he learned to know something of lawyers if not of law, and was afterwards able to jest at the jargon and to mimic the mannerisms of the bar, and to satirize the Latitats of the other branch of the profession with particular success. The famous argument in Hobson v. Nobson, in *The Lame Lovers*, is almost as good of its kind as that in Bardell v. Pickwick. But a stronger attraction drew him to the Bedford Coffee-house in Covent Garden, and to the theatrical world of which it was the social centre. After he had run through two fortunes (the second of which he appears to have inherited at his father's death), and had then passed through severe straits, he made his first appearance on the actual stage in 1744. It is said that he had married a young lady in Worcestershire; but the traces of his wife (he affirmed himself that he was married to his washerwoman) are mysterious, and probably apocryphal.

Foote's first appearance as an actor was made little more than two years after that of Garrick, as to whose merits the critics, including Foote himself, were now fiercely at war. His own first venture, as Othello, was a failure; and though he was fairly successful in genteel comedy parts, and was, after a favourable reception at Dublin, enrolled as one of the regular company at Drury Lane in the winter of 1745–1746, he had not as yet made any palpable hit. Finding that his talent lay neither in tragedy nor in genteel comedy, he had begun to wonder "where the devil it *did* lie," when his successful performance of the part of Bayes in *The Rehearsal* at last suggested to him the true outlet for his extraordinary gift of mimicry. Following the example of Garrick, he had introduced into this famous part imitations of actors, and had added a variety of other satirical comment in the way of "gag." Engaging a small company of actors, he now boldly announced for the 22nd of April 1747, at the theatre in the Haymarket "*gratis*," "a new entertainment called the *Diversions of the Morning*," to which were to be added a farce adapted from Congreve, and an epilogue "spoken by the B-d-d Coffee-house." Foote's success in these *Diversions* obtained for him the name of "the English Aristophanes," an absurd compliment, declined by Foote himself (see his letter in *The Minor*). The *Diversions* consisted of a series of imitations of actors and other well-known persons, whose various peculiarities of voice, gesture, manner or dress were brought directly before the spectators, while the epilogue introduced the wits of the Bedford engaged in ludicrous disputation, and specially "took off" an eminent physician (probably the munificent Sir William Browne, whom he afterwards caricatured in *The Devil on Two Sticks*), and a notorious quack oculist of the day. The actors ridiculed in this entertainment having at once procured the aid of the constables for preventing its repetition, Foote immediately advertised an invitation to his friends to drink a dish of tea with him at the Haymarket on the following day at noon—"and 'tis hoped there will be a great deal of comedy and some joyous spirits; he will endeavour to make the morning as diverting as possible. Tickets for this entertainment to be had at St George's coffee-house, Temple-Bar, without which no person will be admitted. N.B.—*Sir Dilbury Diddle will be there, and Lady Betty Frisk has absolutely promised.*" The device succeeded to perfection; further resistance was abandoned as futile by the actors, whom Foote mercilessly ridiculed in the "instructions to his pupils" which the entertainer pretended to impart (typifying them under characters embodying their several chief peculiarities or defects—the massive and sonorous James Quin as a watchman, the shrill-voiced Lacy Ryan as a razor-grinder, the charming Peg Woffington, whose tones had an occasional squeak in them, as an orange-woman crying her wares and the bill of the play); and Mr Foote's *Chocolate*, which was afterwards converted into an evening *Tea*, became an established favourite with the town.

In spite of this success, he seems to have contrived to spend a third fortune, and to have found it necessary to eke out his means by a speculation in small-beer, as is recorded in an amusing anecdote told of him by Johnson. But he could now command a considerable income; and when money came he seems to have freely expended it in both hospitality and charity. During his engagements at Covent Garden and at Drury Lane, of which he was joint-manager, and in professional trips to Scotland, and more especially to Ireland, he appeared both in comedies of other authors and more especially in his own. He played Hartop in his *Knights* (1749, printed 1754). *Taste* (1752), in which parts of the *Diversions* were incorporated, was followed by some eighteen pieces, the majority of which were produced at the Haymarket, the favourite home of Foote's entertainments. In 1760 he succeeded in obtaining for this theatre a licence from the lord chamberlain, afterwards (in 1766) converted into a licence for summer performances for life. The entertainments were a succession of variations on the original idea of the *Diversions* and the *Tea*. Now, it was an *Auction of Pictures* (1748), of part of which an idea may be formed from the second act of the comedy *Taste*; now, a lecture on *Orators* (1754), suggested by some bombastic discourses given by Macklin in his old age at the Piazza coffee-house in Covent Garden, where Foote had amused the audience and confounded the speaker by interposing his humorous comments. *The Orators* is preserved in the shape of a hybrid piece, which begins with a mock lecture on the art of oratory and its representatives in England, and ends with a diverting scene of a pot-house forum debate, to which Holberg's *Politician-Tinman* can hardly have been a stranger. At a later date (1773) a new device was introduced in a *Puppet-show*. The piece (unprinted) played in this by the puppets was called *Piety in Pattens*, and professed to show "by the moral how maidens of low degree might become rich from the mere effects of morality and virtue, and by the literature how thoughts of the most commonplace might be concealed under cover of words the most high flown." In other words, it was an attack upon sentimental comedy, which was still not altogether extinguished. An attack upon Garrick in connexion with the notorious Shakespeare jubilee was finally left out from the *Puppet-show*, and thus was avoided a recurrence of the quarrel which many years before had led to an interchange of epistolary thrusts, and an imitation by Woodward of the imitative Foote.

On the whole, the relations between the two public favourites became very friendly, and on Foote's part unmistakably affectionate, and they have not been always generously represented by Garrick's biographers. A comparison between the two as actors is of course out of the question; but, though Foote was a buffoon, and his tongue a scurrilous tongue, there is no authentic ground for the suggestion that his character was one of malicious heartlessness. Of Samuel Johnson's opinions of him many records remain in Boswell; when Johnson had at last found his way into Foote's company (he afterwards found it to Foote's own table) he was unable to "resist" him, and, on hearing of Foote's death, he thought the career just closed worthy of a lasting biographical record.

Meanwhile most of poor Foote's friendships in high life were probably those that are sworn across the table, and require "t'other bottle" to keep them up. It is not a pleasant picture—of Lord Mexborough and his royal guest the duke of York, and their companions, bantering Foote on his ignorance of horsemanship, and after he had weakly protested his skill, taking him out to hounds on a dangerous animal. He was thrown and broke his leg, which had to be amputated, the "patientee" (in which character he said he was now making his first appearance) consoling himself with the reflection that he would now be able to take off "old Faulkner" (a pompous Dublin alderman with a wooden leg, whom he had brought on the stage as Peter Paragraph in *The Orators*) "to the life." The duke of York made him the best reparation in his power by promising him a life-patent for the theatre in the Haymarket (1766); and Foote not only resumed his profession, as if, like Sir Luke Limp, he considered the leg he had lost "a redundancy, a mere nothing at all," but ingeniously turned his misfortune to account in two of his later pieces; *The Lame Lover* and *The Devil on Two Sticks*, while, with the true instinct of a public favourite, making constant reference to it in plays and prologues. Though the characters played by him in several of his later plays are comparatively short and light, he continued to retain his hold over the public, and about the year 1774 was beginning to think of withdrawing, at least for a time, to the continent, when he became involved in what proved a fatal personal quarrel. Neither in his entertainments nor in his comedies had he hitherto (except in Garrick's case, and it is said in Johnson's) put any visible restraint upon personal satire. *The Author*, in which, under the infinitely humorous character of Cadwallader, he had brought a Welsh gentleman of the name of Ap-Rice on the stage, had, indeed, been ultimately suppressed. But in general he had pursued his hazardous course, mercilessly exposing to public ridicule and contempt not only fribbles and pedants, quacks or supposed quacks in medicine (as in *The Devil on Two Sticks*), enthusiasts in religion, such as Dr Dodd (in *The Cozeners*) and George Whitefield and his connexion (in *The Minor*). He had not only dared the wrath of the whole Society of Antiquaries (in *The*

Nabob), and been rewarded by the withdrawal, from among the pundits who rationalized away Whittington's Cat, of Horace Walpole and other eminent members of the body, but had in the same play attacked a well-known representative of a very influential though detested element in English society,—the "Nabobs" themselves. But there was one species of cracked porcelain which he was not to try to hold up to contempt with impunity. The rumour of his intention to bring upon the stage, in the character of Lady Kitty Crocodile in *The Trip to Calais*, the notorious duchess of Kingston, whose trial for bigamy was then (1775) impending, roused his intended victim to the utmost fury; and the means and influence she had at her disposal enabled her, not only to prevail upon the lord chamberlain to prohibit the performance of the piece (in which there is no hint as to the charge of bigamy itself), but to hire agents to vilify Foote's character in every way that hatred and malice could suggest. After he had withdrawn the piece, and letters had been exchanged between the duchess and him equally characteristic of their respective writers, Foote took his revenge upon the chief of the duchess's instruments, a "Reverend Doctor" Jackson, who belonged to the "reptile" society of the journalists of the day, so admirably satirized by Foote in his comedy of *The Bankrupt*. This man he gibbeted in the character of Viper in *The Capuchin*, under which name the altered *Trip to Calais* was performed in 1776. But the resources of his enemies were not yet at an end; and a discharged servant of Foote's was suborned by Jackson to bring a charge of assault and apply for a warrant against him. Though the attempt utterly broke down, and Foote's character was thus completely cleared, his health and spirits had given way in the struggle—as to which, though he seems to have had the firm support of the better part of the public, including such men as Burke and Reynolds, the very audiences of his own theatre had been, or had seemed to be, divided in opinion. He thus resolved to withdraw, at least for a time, from the effects of the storm, let his theatre to Colman, and after making his last appearance there in May 1777, set forth in October on a journey to France. But at Dover he fell sick on the day after his arrival there, and after a few hours died (October 21st). His epitaph in St Mary's church at Dover (written by his faithful treasurer William Jewell) records that he had a hand "open as day for melting charity." His resting-place in Westminster Abbey is without any memorial.

Foote's chief power as an actor lay in his extraordinary gift of mimicry, which extended to the mental and moral, as well as the mere outward and physical peculiarities of the personages whose likeness he assumed. He must have possessed a wonderful flexibility of voice, though his tones are said to have been harsh when his voice was not disguised, and an incomparable readiness for rapidly assuming characters, both in his entertainments and in his comedies, where he occasionally "doubled" parts. The excellent "patter" of some of his plays, such as *The Liar* and *The Cozeners*, must have greatly depended for its effect upon rapidity of delivery. In person he was rather short and stout, and coarse-featured; but his overflowing humour is said to have found full expression in the irresistible sparkle of his eyes.

As a dramatic author he can only be assigned a subordinate rank. He regarded comedy as "an exact representation of the peculiar manners of that people among whom it happens to be performed; a faithful imitation of singular absurdities, particular follies, which are openly produced, as criminals are publicly punished, for the correction of individuals and as an example to the whole community." This he regarded as the *utile*, or useful purpose, of comedy; the *dulce* he conceived to be "the fable, the construction, machinery, conduct, plot, and incidents of the piece." For part at least of this view (advanced by him in the spirited and scholarly "Letter" in which he replied, "to the Reverend Author of the 'Remarks, Critical and Christian,' on *The Minor*"), he rather loftily appealed to classical authority. But he overlooked the indispensableness of the *dulce* to the comic drama under its primary aspect as a species of art. His comic genius was particularly happy in discovering and reproducing characters deserving of ridicule; and the fact that he not only took them from real life, but closely modelled them on well-known living men and women, was not in himself an artistic sin. Nor indeed was the novelty of this process absolute, though probably no other comic dramatist has ever gone so far in this course, or has pursued it so persistently. The public delighted in his "d——d fine originals," because it recognized them as copies; and he was himself proud that he had taken them from real persons, instead of their being "vamped from antiquated plays, pilfered from the French farces, or the baseless beings of the poet's brain." But the real excellence of many of Foote's comic characters lies in the fact that, besides being incomparably ludicrous types of manners, they remain admirable comic types of general human nature. Sir Gregory Gazette, and his imbecile appetite for news; Lady Pentweazel, and her preposterous vanity in her superannuated charms; Mr Cadwallader, and his view of the advantages of public schools (where children may "make acquaintances that may hereafter be useful to them; for between you and I, as to what they learn there, does not signify twopence"); Major Sturgeon and Jerry Sneak; Sir Thomas Lofty, Sir Luke Limp, Mrs Mechlin, and a score or two of other characters, are excellent comic figures in themselves, whatever their origin; and many of the vices and weaknesses exposed by Foote's vigorous satire will remain the perennial subject of comic treatment so long as a stage exists. The real defect of his plays lies in the abnormal weakness of their construction, in the absolute contempt which the great majority of them show for the invention or conduct of a plot, and in the unwarrantable subordination of the interest of the action to the exhibition of particular characters. His characters are ready-made, and the action is only incidental to them. With the exception of *The Liar* (which Foote pretended to have taken from Lope de Vega, but which was really founded on Steele's adaptation of Corneille's *Le Menteur*), and perhaps of *The Bankrupt*, there is hardly one of Foote's "comedies" in which the conception and conduct of the action rise above the exigencies of the merest farce. Not that sentimental scenes and even sentimental characters are wanting, but these familiar ingredients are as incapable of exciting real interest as an ordinary farcical action is in itself unable to produce more than transitory amusement. In his earlier plays Foote constantly resorts to the most hackneyed device of farce—a disguise. Of course Foote must have been well aware of the shortcomings of his rapidly manufactured productions; he knew that if he might sneer at "genteel comedy" as suited to the dramatists of the servants' hall, and pronounce the arts of the drama at the great houses to be "directed by the genius of insipidity," he, like the little theatre where he held sway, was looked upon as "an eccentric, a mere summer fly."

At the same time, he was inexhaustible in the devising of comic scenes of genuine farce. An oration of "old masters," an election of a suburban mayor, an examination at the College of Physicians, a newspaper conclave where paragraphs are concocted and reputations massacred—all these and other equally happy situations are brought before the mere reader with unfailing vividness. And everywhere the comic dialogue is instinct with spirit and vigour, and the comic characters are true to themselves with a buoyancy which at once raises them above the level of mere theatrical conventionalism. Foote professed to despise the mere caricaturing of national peculiarities as such, and generally used dialect as a mere additional colouring; he was, however, too wide awake to the demands of his public not to treat France and Frenchmen as fair game, and coarsely to appeal to national prejudice. His satire against those everlasting victims of English comedy and farce, the Englishman in Paris and the Englishman returned from Paris, was doubtless well warranted; while at the same time he made fun of the fact that Englishmen are nowhere more addicted to the society of their countrymen than abroad. In general, the purposes of Foote's social satire are excellent, and the abuses against which it is directed are those which it required courage to attack. The tone of his morality is healthy, and his language, though not aiming at refinement, is remarkably free from intentional grossness. He made occasional mistakes; but he was on the right side in the warfare against the pretentiousness of Cant and the effrontery of Vice, the two master evils of the age and the society in which he lived.

The following is a list of Foote's farces or "comedies" as he calls them, mostly in three, some in two acts, which remain in print. The date of production, and the character originally performed by Foote, are added to the title of each:

The Knights (1748: Hartop, who assumes the character of Sir Penurious Trifle); *Taste* (1752), in which part of the *Diversions* is incorporated; *The Englishman in Paris* (1753: Young Buck); *The Englishman returned from Paris* (1756: Sir Charles Buck); *The Author* (1757: Cadwallader); *The Minor* (1760: Smirk and Mrs Cole); *The Liar* (1762); *The Orators* (1762: Lecturer); *The Mayor of Garratt* (1763: Major Sturgeon and Matthew Mug); *The Patron* (1764: Sir Thomas Lofty and Sir Peter Peppercorn); *The Commissary* (1765: Mr Zac. Fungus); *The Devil upon Two Sticks* (1768: Devil,—alias Dr Hercules Hellebore); *The Lame Lover* (1770: Sir Luke Limp); *The Maid of Bath* (1771: Mr Flint); *The Nabob* (1772: Sir Matthew Mite); *The Bankrupt* (1773: Sir Robert Riscounter); *The Cozeners* (1774: Mr Aircastle); *The Capuchin*, a second version of *The Trip to Calais*, forbidden by the censor (1776: O'Donovan). His dramatic works were collected in 1763–1768.

BIBLIOGRAPHY.—Foote's biography may be read in W. ("Conversation") Cooke's *Memoirs of Samuel Foote* (3 vols., 1805), which contain, amidst other matter, a large collection of his good things and of anecdotes concerning him, besides two of his previously unpublished occasional pieces (with the *Tragedy à la mode*, part of the *Diversions*, in which Foote appeared as Fustian). From this source seems to have been mainly taken the biographical information in the rather grandiloquent essay on Foote prefixed by "Jon Bee"

(John Badcock, fl. 1816–1830, also known as "John Hunds") to his useful edition of Foote's Works (3 vols., 1830). Various particulars will be found in Tate Wilkinson's *Wandering Patentee* (York, 1795) and in other sources. There is an admirable essay on Foote, reprinted with additions, from the *Quarterly Review*, in John Forster's *Biographical Essays* (1858). A recent life of Foote is by Percy Fitzgerald (1910). (A. W. W.)

FOOTMAN, a name given among articles of furniture to a metal stand, usually of polished steel or brass, and either oblong or oval in shape, for keeping plates and dishes hot before a dining-room fire. In the days before the general use of hot-water dishes the footman possessed definite utility, but although it is still in occasional use, it is now chiefly regarded as an ornament. It was especially common in the hardware counties of England, where it is still frequently seen; the simple conventionality of its form is not inelegant.

FOOTSCRAY, a city of Bourke county, Victoria, Australia, on the Saltwater river, 4 m. W. of and suburban to Melbourne. Pop. (1901) 18,301. The city has large bluestone quarries from which most of the building stones in Melbourne and the neighbourhood is obtained; it is also an important manufacturing centre, with numerous sugar-mills, jute factories, soap works, woollen-mills, foundries, chemical works and many other minor industries.

FOOT-STALL, a word supposed to be a literal translation of *piedestal*, or pedestal, the lower part of a pier in architecture (see BASE).

FOPPA, VINCENZO, Italian painter, was born near Brescia. The dates of his birth and death used to be given as 1400 and 1492; but there is now good reason for substituting 1427 and 1515. He settled in Pavia towards 1456, and was the head of a Lombard school of painting which subsisted up to the advent of Leonardo da Vinci. In 1489 he returned to Brescia. His contemporary reputation was very considerable, his merit in perspective and foreshortening being recognized especially. Among his noted works are a fresco in the Brera Gallery, Milan, the "Martyrdom of St Sebastian"; and a "Crucifixion" in the Carrara gallery, Bergamo, executed in 1455. He worked much in Milan and in Genoa, but many of his paintings are now lost.

See C. J. Ffoulkes and R. Maiocchi, *Vincenzo Foppa* (1910).

FORAGE, food for cattle or horses, chiefly the provender collected for the food of the horses of an army. In early usage the word was confined to the dried forage as opposed to grass. From this word comes "foray," an expedition in search of "forage," and hence a pillaging expedition, a raid. The word "forage," directly derived from the Fr. *fourrage*, comes from a common Teutonic origin, and appears in "fodder," food for cattle. The ultimate Indo-European root, *pat*, cf. Gr. πατεῖσθαι, Lat. *pascere*, to feed, gives "food," "feed," "foster"; and appears also in such Latin derivatives as "pastor," "pasture."

FORAIN, J. L. (1852–), French painter and illustrator, was born in 1852. He became one of the leading modern Parisian caricaturists, who in his merciless exposure of the weaknesses of the *bourgeoisie* continued the work which was begun by Daumier under the second Empire. The scathing bitterness of his satire is as clearly derived from Daumier as his pictorial style can be traced to Manet and Degas; but even in his painting he never suppresses the caustic spirit that drives him to caricature. He has, indeed, been rightly called "a Degas pushed on to caricature." In his pen-and-ink work he combines extraordinary economy of means with the utmost power of expression and suggestion. Forain's popularity dates from the publication of his *Comédie parisienne*, a series of two hundred and fifty sketches republished in book form. He has contributed many admirable, if sometimes over-daring, pages to the *Figaro*, *Le Rire*, *L'Assiette au beurre*, *Le Courrier français*, and *L'Indiscret*. His political drawings for the *Figaro* were republished in book form under the title of *Doux Pays*.

FORAKER, JOSEPH BENSON (1846–), American political leader, was born near Rainsboro, Highland county, Ohio, on the 5th of July 1846. He passed his early life on a farm, enlisted as a private in the 89th Ohio Volunteer Infantry in July 1862, served throughout the Civil War, for part of the time as an aide on the staff of General H. W. Slocum, and in 1865 received a captain's brevet for "efficient services during the campaigns in North Carolina and Georgia." After the war he spent two years at the Ohio Wesleyan University and two years at Cornell. In 1869 he was admitted to the Ohio bar and began practice in Cincinnati. He was a judge of the Cincinnati Superior Court from 1879 to 1882. In 1883 he was the Republican candidate for governor of Ohio, but was defeated; in 1885 and 1887, however, he was elected, but was again defeated in 1889. He then for eight years practised law with great success in Cincinnati. In 1896 he was elected United States senator to succeed Calvin S. Brice (1845–1898); in 1902 was re-elected and served until 1909. In the Senate he was one of the aggressive Republican leaders, strongly supporting the administration of President M'Kinley (whose name he presented to the Republican National Conventions of 1896 and 1900) in the debates preceding, during, and immediately following the Spanish-American War, and later, during the administration of President Roosevelt, was conspicuous among Republican leaders for his independence. He vigorously opposed various measures advocated by the president, and led the opposition to the president's summary discharge of certain negro troops after the Brownsville raid of the 13th of August 1906 (see BROWNSVILLE, Texas).

FORAMINIFERA, in zoology, a subdivision of Protozoa, the name selected for this enormous class being that given by A. D'Orbigny in 1826 to the shells characteristic of the majority of the species. He regarded them as minute Cephalopods, whose chambers communicated by pores (foramina). Later on their true nature was discovered by F. Dujardin, working on living forms, and he referred them to his Rhizopoda, characterized by pseudopodia given off from the sarcode (protoplasm) as organs of prehension and locomotion. W. B. Carpenter in 1862 differentiated the group nearly in its present limits as "Reticularia"; and since then it has been rendered more natural by the removal of a number of simple forms (mostly freshwater) with branching but not reticulate pseudopods, to Filosa, a distinct subclass, now united with Lobosa into the restricted class of Rhizopoda.

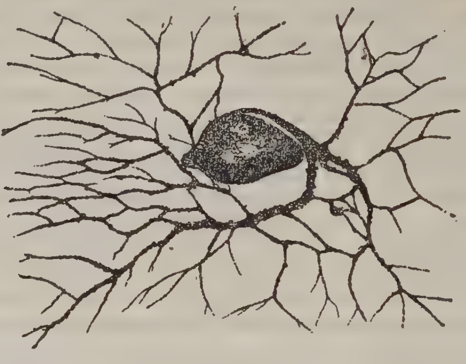


FIG. 1A.—*Lieberkühnia*, with reticulate pseudopodia.

Anatomy.—Protista Sarcodina, with simple protoplasmic bodies of *granular surface*, emitting processes which branch and *anastomose freely*, either from the whole surface or from one or more elongated processes ("stylopods"); nucleus one or more (not yet demonstrated in some little known simple forms), usually in genetic relation to granules or strands of matter of similar composition, the "chromidia" scattered through the protoplasm; body naked, or provided with a permanent investment (shell or test), membranous, gelatinous, arenaceous (of compacted or cemented granules), calcareous, or very rarely (in deep sea forms) siliceous, sometimes freely perforated, but *never latticed*; opening by one or more permanent apertures ("pylomes") or crevices between compacted sand-granules, often very complex; reproduction by fission (only in simplest naked forms), or by brood formation; in the latter case one mode of brood formation (A) eventuates in amoebiform embryos, the other (B) in flagellate zoospores which are exogamous gametes, pairing but not with those of their own brood; the coupled cell (" zygote ") when mature in the shelled species gives rise to a very small primitive test-chamber or " microsphere." The adult microspheric animal gives rise to the amoebiform brood which have a larger primitive test (" megalosphere "); and megalospheric forms appear to reproduce by the A type a series of similar forms before a B brood of gametes is finally borne, to pair and reproduce the microspheric type, which is consequently rare.

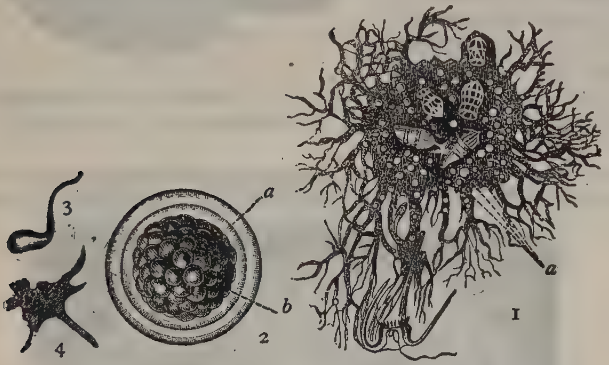


Fig. 1b.—*Protomyxa aurantiaca*, Haeck. (After Haeckel.)

1, Adult, containing two diatom frustules, and three Tintinnid ciliates, with a large Dinoflagellate just caught by the expanded reticulate pseudopodia.
2, Adult encysted and segmented.
3, Flagellate zoospore just freed from cyst.
4, Zoospore which has passed into the amoeboid state.

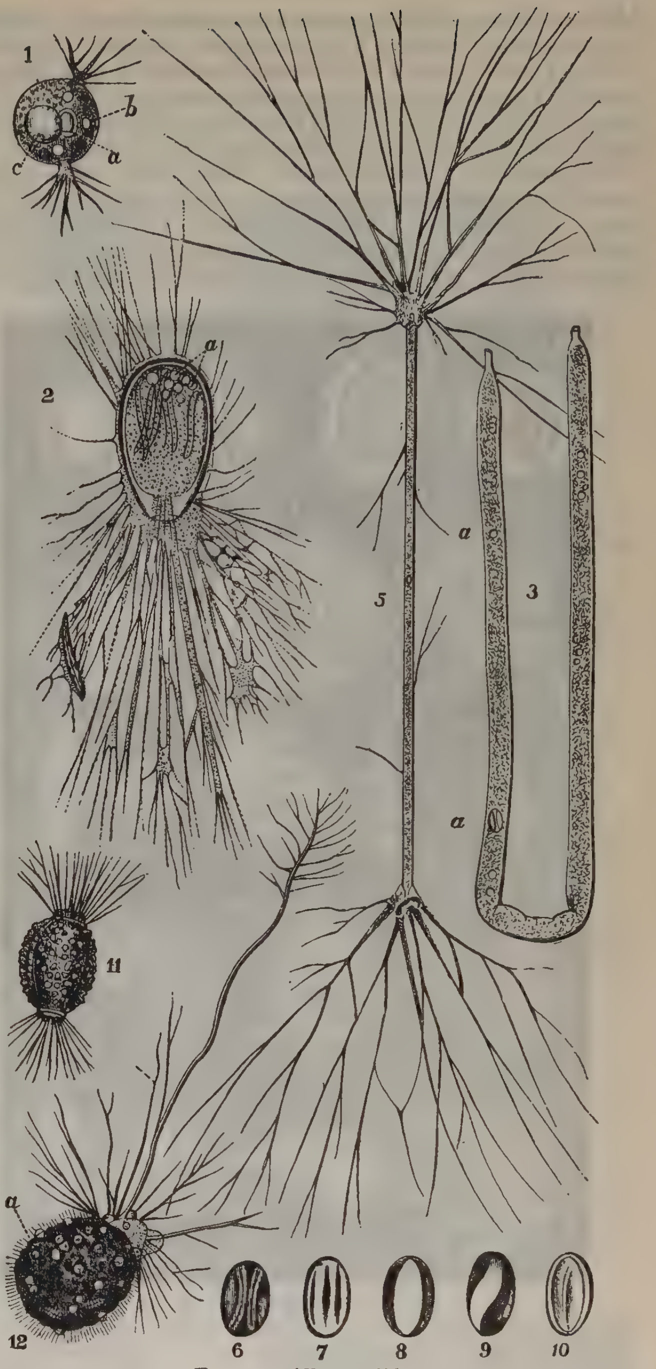


Fig. 2.—*Allogromiidea.*

1, *Diplophrys archeri*, Barker.
  a, Nucleus.
  b, Contractile vacuoles.
  c, The yellow oil-like body. Moor pools, Ireland.
2, *Allogromia oviformis*, Duj.
  a, The numerous nuclei; near these the elongated bodies represent ingested diatoms. Freshwater. Figs. 2, 3, 11, 12 belong to Rhizopoda Filosa, and are included here to show the characteristic *filose* pseudopodia in contrast with the reticulate spread of the others.
3, *Shepheardella taeniiformis*, Siddall (*Quart. Jour. Micr. Sci.*, 1880). Marine. The protoplasm is retracted at both ends into the tubular case.
  a, Nucleus.
5, *Shepheardella taeniiformis*; with pseudopodia fully expanded.
6-10, Varying appearance of the nucleus as it is carried along in the streaming protoplasm within the tube.
11, *Amphitrema wrightianum*, Archer, showing membranous shell encrusted with foreign particles. Moor pools, Ireland.
12, *Diaphorophodon mobile*, Archer.
  a, Nucleus. Moor pools, Ireland.

The shells require special study. In the lowest forms they are membranous, sometimes encrusted with sand-grains, always very simple, the only complication being the doubling of the pylome in *Diplophrys* (fig. 2, *1*), *Shepheardella* (fig. 2, *3-5*), *Amphitrema* (fig. 2, *11*), *Diaphorophodon* (fig. 2, *12*). The marine shells are, as we have seen, of cemented particles, or calcareous, glassy, and regularly perforated, or again calcareous, but porcellanous and rarely perforate. These characters have been used as a guide to classification; but some sandy forms have so large a proportion of calcareous cement that they might well be called encrusted calcareous genera, and are also not very constant in respect of the character of perforation. The porcellanous genera, however, form a compact group, the replacement of the shell by silica in forms dwelling in the red clay of the ocean abysses, where calcium carbonate is soluble, not really making any difficulty. Moreover, the shells of this group show a deflected process or neck of the embryonic chamber (" camptopyle ") at least in the megalospheric forms, whereas when such a neck exists in other groups it is straight. The opening of the shell is called the pylome. This may be a mere hole where the lateral walls of the body end, or there may be a diaphragmatic ingrowth so as to narrow the entrance. It may be a simple rounded opening, oblong or tri-multi-radiate, or branching (fig. 4, *1*); or replaced by a number of coarse pores (" ethmopyle ") (fig. 3, *5a*). Again, it may lie at the end of a narrowed tube (" stylopyle "), which in *Lagena* (fig. 3, *9*) may project outwards (" ectoselenial "), or inwards (" entoselenial "). In most groups the stylopyle is straight; but in the majority of the porcellanous shells it is bent down on the side of the shell, and constitutes the " flexopyle " of A. Kemna, which being a hybrid term should be replaced by " camptopyle." The animal usually forms a simple shell only after it has attained a certain size, and this " embryonic chamber " cannot grow further. In *Spirillina* and *Ammodiscus* there is no pylomic end-wall, and the shell continues to grow as a spiral tube; in *Cornuspira* (fig. 3, *1*) there is a slight constriction indicating the junction of a small embryonic chamber with a camptopyle, but the rest of the shell is a simple flat spiral of several turns. In the majority at least one chamber follows the first, with its own pylome at the distal end. This second chamber may rest on the first, so that the part on which it rests serves as a party-wall bounding the front of the newer chamber as well as the back of the older; and this state prevails for all added chambers in such cases. In the highest vitreous shells, however, each chamber has its complete "proper wall"; while a "supplementary skeleton," a deposit of shelly matter, binds the chambers together into a compact whole. In all cases the protoplasm from the pylome may deposit additional matter on the outside of the shell, so as to produce very characteristic sculpturing of the surface.

Compound or "polythalamic" shells derive their general form largely from the relations of successive chambers in size, shape and direction. This is well shown in the porcellanous *Miliolidae*. If we call the straight line uniting the two ends of a chamber the "polar axis," we find that successive chambers have their pylomes at alternate poles; but they lie on different meridians. In *Spiroloculina* (fig. 3, *2*) the divergence between the meridians is 180°, and the chambers are strongly incurved, so that the whole shell forms a flat spiral, of nearly circular outline. In the majority, however, the chambers are crescentic in section, their transverse prolongations being termed "alary" outgrowths, so that successive chambers overlap; when under this condition the angle of successive meridians is still 180° we have the form *Biloculina* (fig. 3, *4*), or with the alary extensions completely enveloping, *Uniloculina*; when the angle is 120° we have *Triloculina*, or 144°, *Quinqueloculina*. Again in *Peneroplis* (figs. 3, *5*, and 4) the shell begins as a flattened shell which tends to straighten out with further growth and additional chambers. In some forms (*Spirolina*, fig. 22, *3*) the chambers have a nearly circular transverse section, and the adult shell is thus crozier-shaped. In others (which may have the same sculpture, and are scarcely distinguishable as species) the chambers are short and wide, drawn out at right angles to the axis, but in the plane of the spiral, and the growing shell becomes fan-shaped or "flabelliform" (figs. 3, *5*, 4, *2*). This widening may go on till the outer chambers form the greater part of a circle, as in *Orbiculina* (fig. 3, *6-8*) where, moreover, each large chamber is subdivided by incomplete vertical bulkheads into a tier of chamberlets; each chamberlet has a distinct pylomic pore opening to the outside or to those of the next outer zone. In *Orbitolites* (figs. 5, 6) we have a centre on a somewhat Milioline type; and after a few chambers in spiral succession, complete circles of chambers are formed. In the larger forms the new zones are of greater height, and horizontal bulkheads divide the chamberlets into vertical tiers, each with its own pylomic pore.

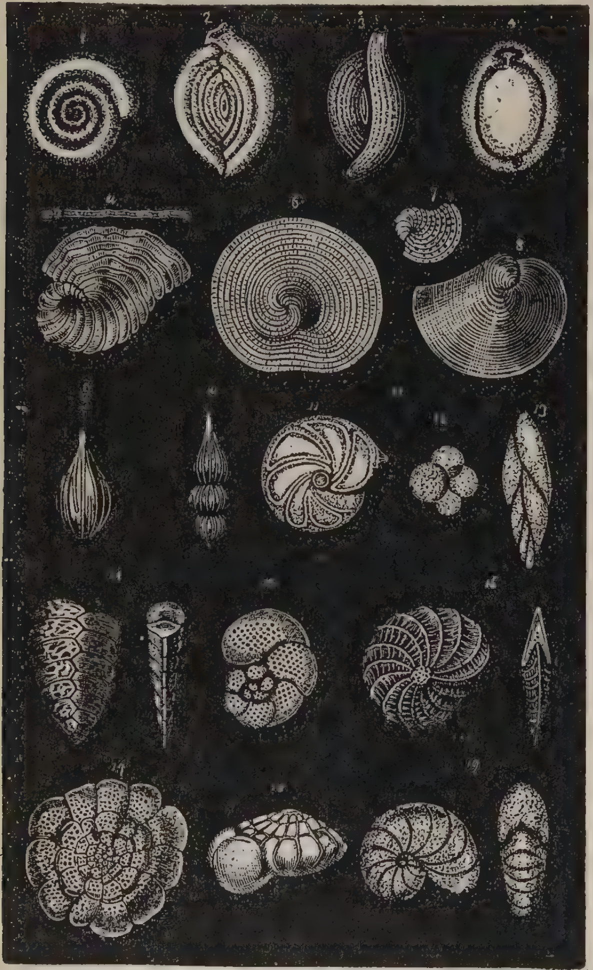


FIG. 3.—Various forms of Calcareous Foraminifera.

1, *Cornuspira*.
2, *Spiroloculina*.
3, *Triloculina*.
4, *Biloculina*.
5, *Peneroplis*.
6, *Orbiculina* (cyclical).
7, *Orbiculina* (young).
8, *Orbiculina* (spiral).
9, *Lagena*.
10, *Nodosaria*.
11, *Cristellaria*.
12, *Globigerina*.
13, *Polymorphina*.
14, *Textularia*.
15, *Discorbina*.
16, *Polystomella*.
17, *Planorbulina*.
18, *Rotalia*.
19, *Nonionina*.

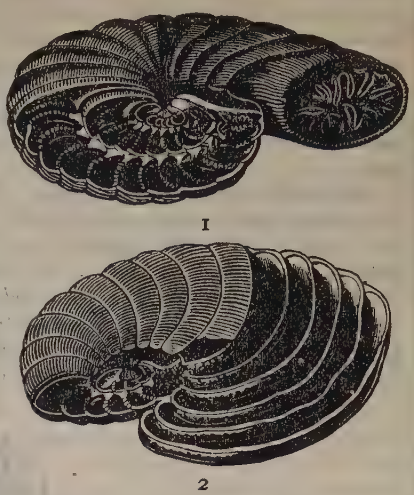


FIG. 4.—Modifications of *Peneroplis*. *1*, *Dendritina*; *2*, *Eu-Peneroplis*.

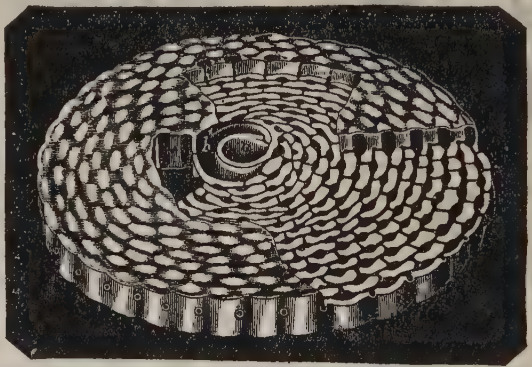


FIG. 5.—Shell of simple type of *Orbitolites*, showing primordial chamber *a*, and circumambient chamber *b*, surrounded by successive rings of chamberlets connected by circular galleries which open at the margin by pores.

The *Cheilostomellidae* (fig. 3, *13*) reproduce among perforate vitreous genera what we have already seen in the *Miliolida*: *Orbitoides* (fig. 10, *2*) and *Cycloclypeus*, among the Nummulite group, with a very finely perforate wall, recall the porcellanous *Orbiculina* and *Orbitolites*.

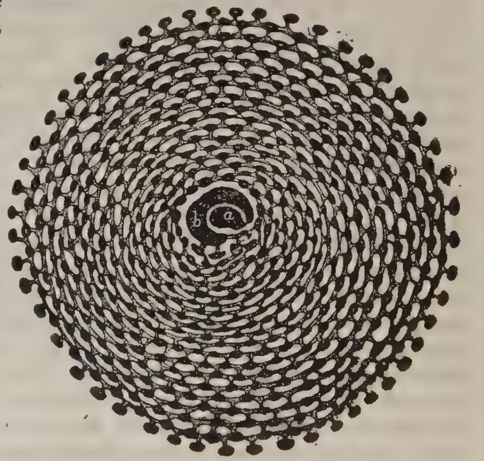


FIG. 6.—Animal of simple type of *Orbitolites*, showing primordial segment *a*, and circumambient segment *b*, surrounded by annuli of sub-segments connected by radial and circular stolon-processes.

In flat spiral forms (figs. 22, *1*, *7*; 3, *2*, *16*, *19*, &c.) all the chambers may be freely exposed; or the successive chambers be wider transversely than their predecessors and overlap by "alary extensions," becoming "nautiloid"; in extreme cases only the last turn or whorl is seen (fig. 11). When the spiral axis is conical the shell may be "rotaloid," the larger lower chambers partially concealing the upper smaller ones (fig. 3, *12*, *15*, *17*, *18*); or they may leave, as in *Patellina*, a wide central conical cavity—which, in this genus, is finally occupied by later formed "supplementary" chambers. When the successive chambers are disposed around a longitudinal central axis they may be said to "alternate" like the leaves of a plant. If the arrangement is distichous we get such forms as *Polymorphina*, *Textularia* and *Frondicularia* (fig. 3, *13*, *14*), if tristichous, *Tritaxia*. Such an arrangement may coexist with a spiral twist of the axis for at least part of its course, as in the crozier-shaped *Spiroplecta*.

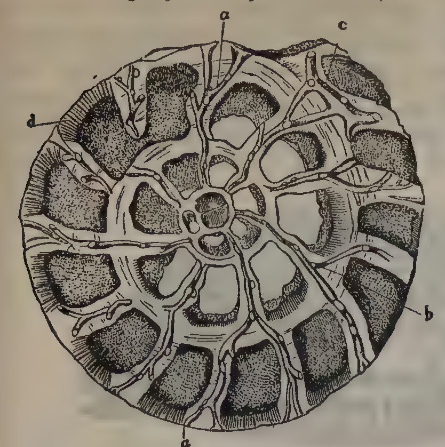


Fig. 7.—Section of *Rotalia beccarii*, showing the canal system, *a*, *b*, *c*, in the substance of the intermediate skeleton; *d*, tubulated chamber-wall.

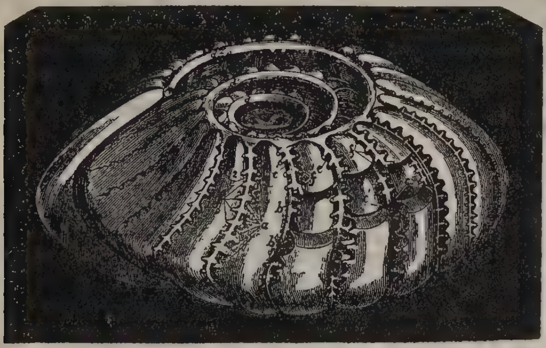


Fig. 8.—Internal cast of *Polystomella craticulata*.

a,	Retral processes, proceeding from the posterior margin of one of the segments.
b, b^1,	Smooth anterior margin of the same segment.
c, c^1,	Stolons connecting successive segments and uniting themselves with the diverging branches of the meridional canals.
d, d^1, d^2,	Three turns of one of the spiral canals.
e, e^1, e^2,	Three of the meridional canals.
f, f^1, f^2,	Their diverging branches.

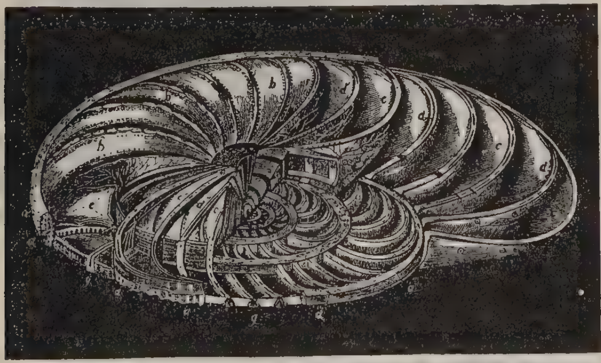


Fig. 9.—*Operculina* laid open, to show its internal structure.

a,	Marginal cord seen in cross section at *a'*.
b, *b*,	External walls of the chambers.
c, *c*,	Cavities of the chambers.
c', *c'*,	Their alar prolongations.
d, *d*,	Septa divided at *d'*, *d'*, and at *d''*, so as to lay open the interseptal canals, the general distribution of which is seen in the septa *e*, *e*; the lines radiating from *e*, *e* point to the secondary pores.
g, *g*,	Non-tubular columns.

Two phenomena interfere with the ready availability of the characters of form for classificatory ends—dimorphism and multiformity.

Dimorphism.—The majority of foraminiferal shells show two types, the rarer with a much smaller central chamber than that of the more frequent. The chambers are called microsphere and megalosphere, the forms in which they occur microsphaeric and megalosphaeric forms, respectively. We shall study below their relation to the reproductive cycle.

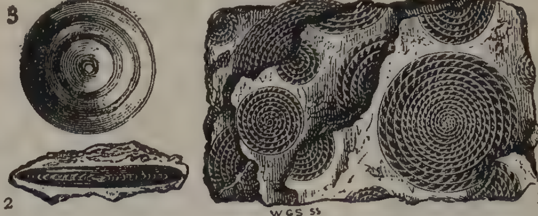


Fig. 10.—*1*, Piece of Nummulitic Limestone from the Pyrenees, showing Nummulites laid open by fracture through the median plane; *2*, vertical section of *Nummulite*; *3*, *Orbitoides*.

Multiformity.—Many of the Polythalamia show different types of chamber-succession at different ages. We have noted this phenomenon in such crozier forms as *Peneroplis*, as well as in discoid forms; it is very frequent. Thus the microspheric *Biloculina* form the first few chambers in quinqueloculine succession. The microspheric forms attain to a greater size when adult than the megalospheric; and in *Orbitolites* the microsphere has a straight outlet, orthostyle, instead of the deflected camptostyle one, so general in porcellanous types; and the spiral succession is continued for more turns before reaching the fan-shaped and finally cyclic stage. *Globigerina*, whose chambers are nearly spherical, is sometimes seen to be enclosed in a spherical test, perforate, but without a pylome, and known as *Orbulina*; the chambered Globigerina-shell is attached at first inside the wall of the *Orbulina*, but ultimately disappears. The ultimate fate of the *Orbulina* shell is unknown; but it obviously marks a turning-point in the life-cycle.

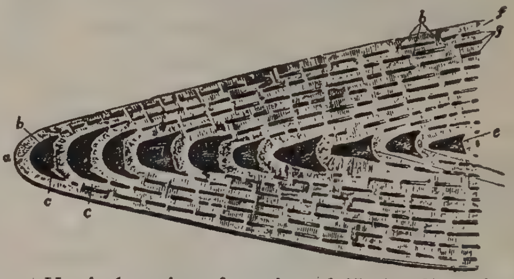


Fig. 11.—Vertical section of portion of *Nummulites*, showing the investment of the earlier whorls by the alar prolongations of the later.

a,	Marginal cord.
b,	Chamber of outer whorl.
c, *c*,	Whorl invested by *a*.
d,	One of the chambers of the fourth whorl from the margin.
e, *e'*,	Marginal portions of the enclosed whorls.
f,	Investing portion of the outer whorl.
g, *g*,	Spaces left between the investing portions of successive whorls.
h, *h*,	Sections of the partitions dividing these.

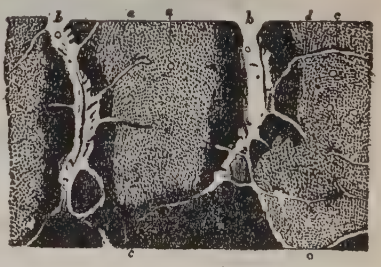


Fig. 12.—Internal surface of wall of two chambers, *a*, *a*, of *Nummulites*, showing the orifices of its minute tubuli.

b, *b*,	The septa containing canals.
c, *c*,	Extensions of these canals in the intermediate skeleton.
d, *d*,	Larger pores.

Protoplasmic Body and Reproduction.—The protoplasm is not differentiated into ecto- and endosarc, although it is often denser in the central part within the shell, and clearer in the pseudopodial ramifications and the layer (or stalk in the monothalamic forms) from which it is given off. In pelagic forms like *Globigerina* the external layer is almost if not quite identical in structure with the extracapsular protoplasm of Radiolaria (*q.v.*), being differentiated into granular strands traversing a clear jelly, rich in large vacuoles (alveoli), and uniting outside the jelly to form the basal layer of the pseudopods; these again are radiolarian in character. Hence E. R. Lankester justly enough compares the shell here to the central capsule of the Radiolarian, though the comparison must not be pushed too far. The cytoplasm contains granules of various kinds, and the internal protoplasm is sometimes pigmented. The Chrysomonad Flagellate, *Zooxanthella*, so abundant in its resting state—the so-called "yellow cells"—in the extracapsular protoplasm of Radiolaria (*q.v.*) also occurs in the outer protoplasm of many Foraminifera, not only pelagic but also bottom-dwellers, such as *Orbitolites.*

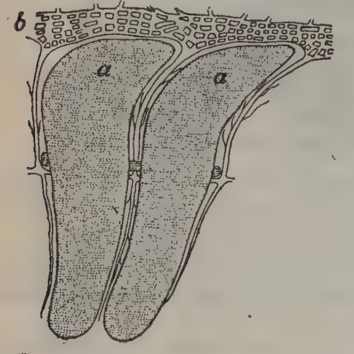


Fig. 13.—Internal cast of two chambers, *a*, *a*, of *Nummulites*, the radial canals between them passing into *b*, marginal plexus.

The nucleus is single in the Nuda and Allogromidia and in the megalospheric forms of higher Foraminifera; but microspheric forms when adult contain many simple similar nuclei. The nucleus in every case gives off granules and irregular masses ("chromidia") of similar reactions, which play an important part in reproduction. During the maturation of the microsphere the nuclei disappear; and the cytoplasm breaks up into a large number of zoospores, each of which is soon provided with a single nucleus, whether entirely derived from the parent-nucleus or from the coalescence of chromidia, or from both these sources is still uncertain. These zoospores are amoeboid; they soon secrete a shell and reveal themselves as megalospheres, the original state of the megalospheric forms. In the adult megalosphere the solitary nucleus disappears and is replaced by hosts of minute vesicular nuclei, formed by the concentration of chromidia. Each nucleus aggregates around it a proper zone of dense protoplasm; by two successive mitotic divisions each mass becomes quadri-nucleate, and splits up into four biflagellate, uninucleate zoospores. These are pairing-cells or gametes, though they will not pair with members of the same brood. In the zygote resulting from pairing two nuclei soon fuse into one; but this again divides into two; an embryonic shell is secreted, and this is the microspheric type, which is multinuclear from the first. F. Schaudinn compares the nuclei of the adult Foraminifera with the (vegetative) meganucleus of Infusora (*q.v.*) and the chromidial mass with the micronucleus, whose chief function is reproductive.

Since megalospheric forms are by far the most abundant, it seems probable that under most conditions they also give rise to megalospheric young like themselves; and that the production of zoospores, pairing to pass into the microspheric form, is only occasional, and possibly seasonal. This life-history we owe to the researches of Schaudinn and J. J. Lister.

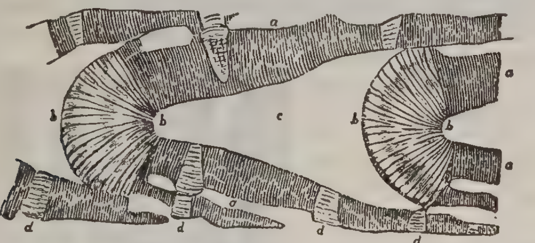


Fig. 14.—Vertical section of tubulated chamber-walls, *a*, *a*, of *Nummulites*. *b*, *b*, Marginal cord; *c*, cavity of chamber; *d*, *d*, non-tubulated columns.

In several species (notably *Patellina*) plastogamy, the union of the cytoplasmic bodies without nuclear fusion, has been noted, as a prelude to the resolution of the conjoined protoplasm into uninucleate amoebulae.

Calcituba, a porcellanous type, which after forming the embryonic chamber with its deflected pylome grows into branching stems, may fall apart into sections, or the protoplasm may escape and break up into small amoebulae. Of the reproduction of the simplest forms we know little. In *Mikrogromia* the cell undergoes fission within the test, and on its completion the daughter-cells may emerge as biflagellate zoospores.

The sandy shells are a very interesting series. In *Astrorhiza* the sand grains are loosely agglutinated, without mineral cement; they leave numerous pores for the exit of the protoplasm, and there are no true pylomes. In other forms the union of the grains by a calcareous or ferruginous cement necessitates the existence of distinct pylomes. Many of the species reproduce the varieties of form found in calcareous tests; some are finely perforated, others not. Many of the larger ones have their walls thickened internally and traversed by complex passages; this structure is called *labyrinthic* (fig. 19, *g*, *h*). The shell of *Endothyra*, a form only known to us by its abundance in Carboniferous and Triassic strata, is largely composed of calcite and is sometimes perforated.

It is noteworthy that though of similar habitat each species selects its own size or sort of sand, some utilizing the siliceous spicules of sponges. Despite the roughness of the materials, they are often so laid as to yield a perfectly smooth inner wall; and sometimes the outer wall may be as simple. As we can find no record of a deflected stylopyle to the primitive chamber of the polythalamous Arenacea, it is safe to conclude that they have no close alliance with the Porcellanea.

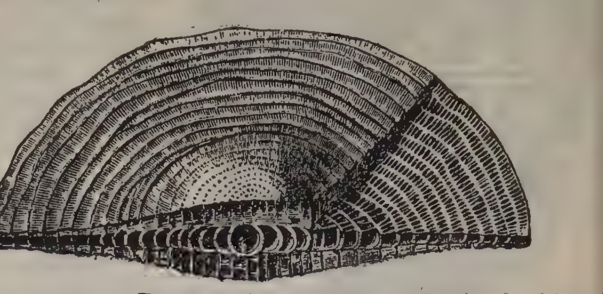


Fig. 15.—*Cycloclypeus.*

Classification.

I. NUDA.—Protoplasmic body without any pellicle or shell save in the resting encysted condition, sometimes forming colonial aggregates by coalescence of pseudopods (*Myxodictyum*), or even plasmodia (*Protomyxa*). Brood cells at first uniflagellate or amoeboid from birth. Fresh-water and marine genera *Protogenes* (Haeckel), *Biomyxa* (Leidy), *Myxodictyum* (Haeckel), *Protomyxa* (Haeckel) (fig. 1B). This group of very simple forms includes many of Haeckel's Monera, defined as "cytodes," masses of protoplasm without a nucleus. A nucleus (or nuclei) has, however, been demonstrated by improved methods of staining in so many that it is probable that this distinction will fall to the ground.

II. ALLOGROMIDIACEAE (figs. 1A, 2).—Protoplasmic body protected in adult state by an imperforate test with one or two openings (pylomes) for the exit of the stylopod; test simple, gelatinous, membranous, sometimes incrusted with foreign bodies, never calcareous nor arenaceous; reproduction by fission alone known. Fresh-water or marine genera *Allogromia* (Rhumbl.), *Myxotheca* (Schaud.), *Lieberkühnia* (Cl. & L.) (fig. 1A), *Shepheardella* (Siddall) (fig. 2, *3-10*), *Diplophrys* (Barker), *Amphitrema* (Arch.) (fig. 2, *11*), *Diaphorophodon* (Arch.) (fig. 2, *12*), are possibly Filosa. This group differs from the preceding in its simple test, but, like it, includes many fresh-water species, which possess contractile vacuoles.

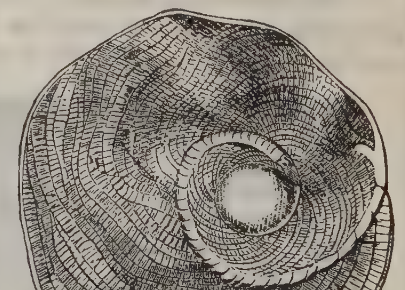
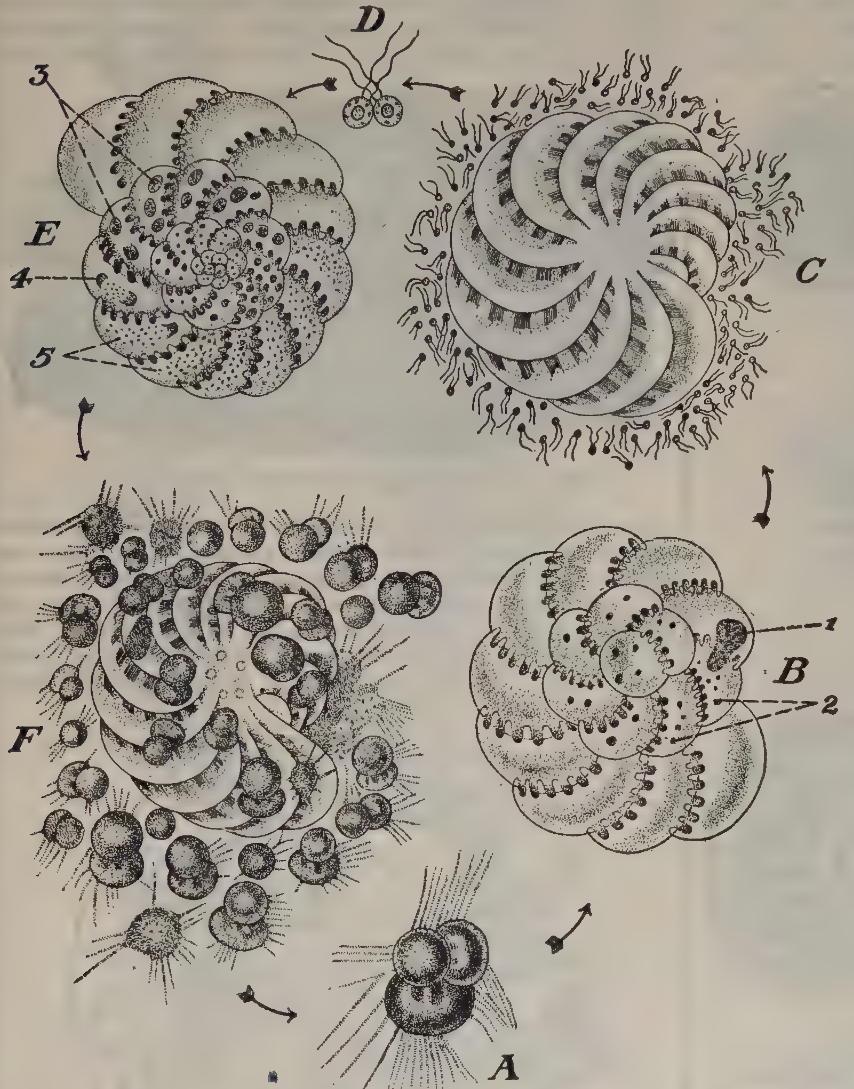


Fig. 16.—*Heterostegina.*

III. ASTRORHIZIDIACEAE.—Simple forms, rarely polythalamous (some *Rhabdamminidae*), but often branching or radiate; test arenaceous, loosely compacted and traversed by chinks for pseudopodia (*Astrorhizidae*), or dense, and opening by one or more terminal pylomes at ends of branches. Marine, 4 Fam. The test of some *Astrorhizidae* is so loose that it falls to pieces when taken out of water. *Haliphysema* is remarkable for its history in relation to the "gastraea theory." *Pilulina* has a neat globular shell of sponge-spicules and fine sand. Genera, *Astrorhiza* (Sandahl) (fig. 22), *Pilulina* (Carptr.) (fig. 19), *Saccammina* (Sars) (fig. 19), *Rhabdammina* (Sars), *Botellina* (Carptr.), *Haliphysema* (Bowerbank) (fig. 22).

IV. Lituolidaceae.—Shell arenaceous, usually fine-grained, definite and often polythalamic, recalling in structure calcareous forms. *Lituola* (Lamk.) (fig. 19), *Endothyra* (Phil.), *Ammodiscus* (Reuss), *Loftusia* (Brady), *Haplophragmium* (Reuss) (fig. 22), *Thurammina* (Brady) (fig. 22).

V. Miliolidaceae.—Shells porcellanous imperforate, almost invariably with a camptostyle leading from the embryonic chamber; *Cornuspira* (Schultze) (fig. 3); *Miliola* (Lamk.), including as subgenera *Spiroloculina* (d'Orb.) (figs. 3 and 22); *Triloculina* (d'Orb.) (fig. 3); *Biloculina* (d'Orb.) (fig. 3); *Uniloculina* (d'Orb.); *Quinqueloculina* (d'Orb.); *Peneroplis* (Montfort) (figs. 22, *3*; 3), with form *Dendritina* (fig. 4, *1*); *Orbiculina* (Lamk.) (fig. 3, *6-8*); *Orbitolites* (Lamk.) (figs. 5, 6); *Vertebralina* (d'Orb.) (fig. 22); *Squamulina* (Sch.) (fig. 22); *Calcituba* (Schaudinn).



Modified from F. Schaudinn, in Lang's *Zoologie*.

Fig. 17.—Life Cycle of *Polystomella crispa*.

A, Young megalospheric individual.
B, Adult decalcified.
C, Later stage, resolving itself into two flagellate gametes.
D, Conjugation. [zygote.
E, Microspheric individual produced from
F, The same resolved itself into pseudopodiospores which are growing into new megalospheric individuals.
1, Principal nucleus, and *2*, subsidiary nuclei of megalospheric form.
3, Nuclei.
4, Nuclei in multiple division.
5, Chromidia derived from *4*.

VI. Textulariadaceae.—Shells perforate, vitreous or (in the larger forms) arenaceous, in two or three alternating ranks (distichous or tristichous). *Textularia* (Defrance) (fig. 21).

VII. Cheilostomellaceae.—Shells vitreous, thin, the chambers doubling forwards and backwards as in *Miliolidae*. *Cheilostomella* (Reuss).

VIII. Lagenidaceae.—Shells vitreous, often sculptured, mono- or polythalamic, finely perforate; chambers flask-shaped, with a protruding or an inturned stylopyle; *Lagena* (Walker & Boys) (fig. 4, *9*); *Nodosaria* (Lamk.) (figs. 23, *4*; 4, *10*); *Polymorphina* (d'Orb.) (fig. 4, *13*); *Cristellaria* (Lamk.) (fig. 4, *11*); *Frondicularia* (Def.) (fig. 23, *3*).

IX. Globigerinidaceae.—Shells vitreous, coarsely perforated; chambers few spheroidal rapidly increasing in size; arranged in a trochoid or nautiloid spiral. *Globigerina* (Lamk.) (23, *6*; 4, *12*); *Hastigerina* (Wyville Thompson) (fig. 23, *5*); *Orbulina* (d'Orb.) (fig. 23, *8*).

X. Rotalidaceae.—Shells vitreous, finely perforate; walls thick, often double, but without an intermediate party-layer traversed by canals; form usually spiral or trochoid. *Discorbina* (Parker & Jones) (fig. 4, *15*); *Planorbulina* (d'Orb.) (fig. 4, *17*); *Rotalia* (Lamk.) (figs. 23, *1*, *2*; 7, 21); *Calcarina* (d'Orb.) (fig. 23, *10*); *Polytrema* (Risso) (fig. 23, *9*).

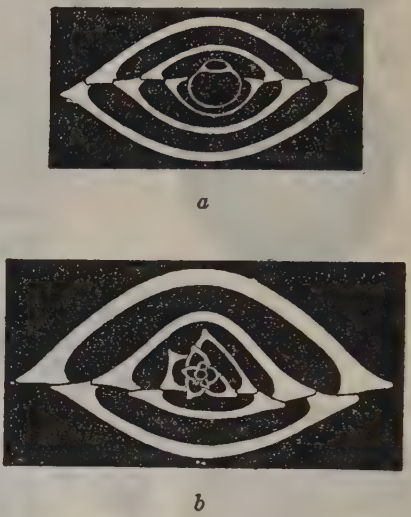


Fig. 18.—*Biloculina depressa* d'Orb., transverse sections showing dimorphism. (From Lister.)
a, Megalospheric shell × 50, showing uniform growth, biloculine throughout.
b, Microspheric shell × 90, showing multiform growth, quinqueloculine at first, and then multiform.

XI. Nummulinidaceae.—As in Rotalidaceae, but with a thicker finely perforated shell, often well developed, and a supplementary skeleton traversed by branching canals as an additional party-wall between the proper chamber-walls. *Nonionina* (d'Orb.) (fig. 4, *19*); *Fusulina* (Fischer) (fig. 20); *Polystomella* (Lamk.) (figs. 4, *16*; 8); *Operculina* (d'Orb.) (fig. 9); *Heterostegina* (d'Orb.) (fig. 16); *Cycloclypeus* (Carptr.) (fig. 15); *Nummulites* (Lamk.) (figs. 10, 11, 12, 13, 14).

"*Eozoon canadense*," described as a species of this order by J. W. Dawson and Carpenter, has been pronounced by a series of enquirers, most of whom started with a belief in its organic structure, to be merely a complex mineral concretion in ophicalcite, a rock composed of an admixture of silicates (mostly serpentine and pyroxene) and calcite.

Distribution in Vertical Space.—Owing to their lack of organs for active locomotion the Foraminifera are all crawling or attached, with the exception of a few genera (very rich in species, however) which float near the surface of the ocean, constituting part of the pelagic plankton (*q.v.*). Thus the majority are littoral or deep-sea, sometimes attached to other bodies or even burrowing in the tests of other Foraminifera; most of the fresh-water forms are sapropelic, inhabiting the layer of organic débris at the surface of the bottom mud ditches of pools, ponds and lakes. The deep-sea species below a certain depth cannot possess a calcareous shell, for this would be dissolved; and it is in these that we find limesalts sometimes replaced by silica.

The pelagic floating genera are also specially modified. Their shell is either thin or extended many times by long slender tapering spines, and the protoplasm outside has the same character as that of the Radiolaria (*q.v.*), being differentiated into jelly containing enormous vacuoles and traversed by reticulate strands of granular protoplasm. These coalesce into a peripheral zone from which protrude the pseudopods, here rather radiate than reticulate. Most genera and most species are cosmopolitan; but local differences are often marked. Foraminifera abound in the shore sands and the crevices of coral reefs. The membranous shelled forms decay without leaving traces. The sandy or calcareous shells of dead Foraminifera constitute a large proportion of littoral sand, both below and above tide marks; and, as shown in the boring on Funafuti, enter largely into the constituents of coral rock. They may accumulate in the mud of the bottom to constitute Foraminiferal ooze. The source of these shells in the latter case is double: (1) shells of bottom-dwellers accumulate on the spot; (2) shells of dead plankton forms sink down in a continuous shower, to form a layer at the bottom of the ocean, during which process the spines are dissolved by the sea-water. Thus is formed an ooze known as "Globigerina-ooze," being formed largely of that genus and its ally *Hastigerina;* below 3000 fathoms even the tests themselves are dissolved. Casts of their bodies in glauconite (a green ferrous silicate, whose composition has not yet been accurately determined) are, however, frequently left. Glauconitic casts of perforate shells, notably *Globigerina*, have been found in Lower Cambrian (*e.g.* Hollybush Sandstone), and the shells themselves in Siberian limestones of that age. It is only when we pass into the Silurian Wenlock limestone that sandy shells make their appearance. Above this horizon Foraminifera are more abundant as constituents, partial or principal of calcareous rocks, the genus *Endothyra* being indeed almost confined to Carboniferous beds. The genus *Fusulina* (fig. 20) and *Saccammina* (fig. 19) give their names (from their respective abundance) to two limestones of the Carboniferous series. Porcellanous shells become abundant only from the Lias upwards. The glauconitic grains of the Greensand formations are chiefly foraminiferal casts. Chalk is well known to consist largely of foraminiferal shells, mostly vitreous, like the north Atlantic globigerina ooze. In the Maestricht chalk more littoral conditions prevailed, and we find such large-sized species as *Orbitoides* (vitreous) and *Orbitolites* (porcellanous; figs. 5, 6), &c. In the Eocene Tertiaries the Calcaire Grossier of the Paris basin is mainly composed of Miliolid forms. Nummulites occur in English beds and in the Paris basin; but the great beds of these, forming reef-like masses of limestone, occur farther south, extending from the Pyrenees through the southern and eastern Alps to Egypt, Sinai, and on to north India. The peculiar structure occurring in the Lower Laurentian limestone, as well as other limestones of Archean age described as a Nummulitaceous genus, "*Eozoon*," by Carpenter and Dawson, and abundantly illustrated in the 9th edition of his encyclopaedia, is now universally regarded as of inorganic origin. "Looking

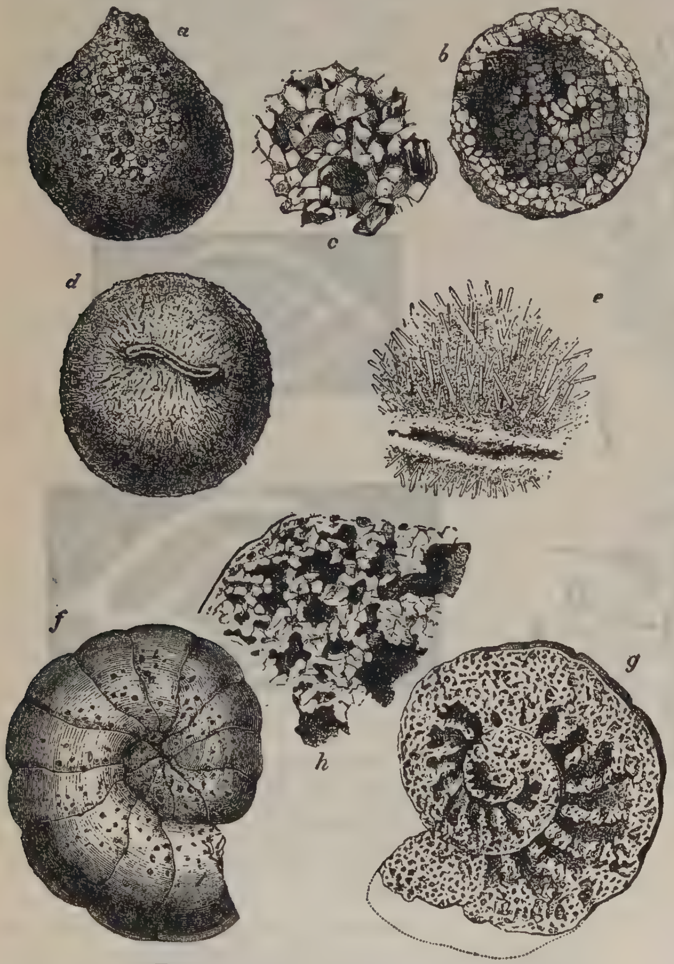


FIG. 19.—Arenaceous Foraminifera.

a, Exterior of *Saccammina*.
b, The same laid open.
c, Portion of test more highly magnified.
d, *Pilulina*.
e, Portion of test more highly [magnified.
f, Nautiloid *Lituola*, exterior.
g, Chambered interior.
h, Portion of labyrinthic chamber wall, showing component sand-grains.

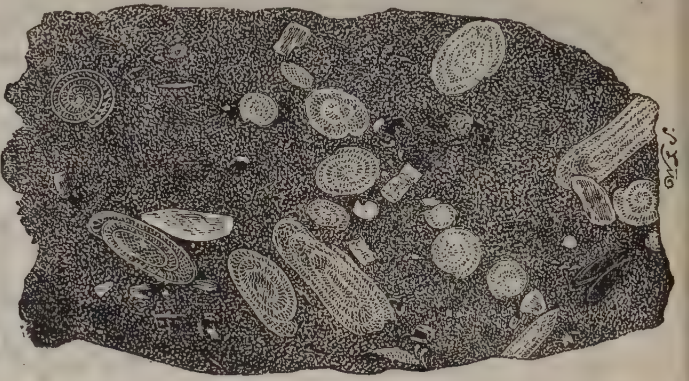


FIG. 20.—Section of *Fusulina* Limestone.

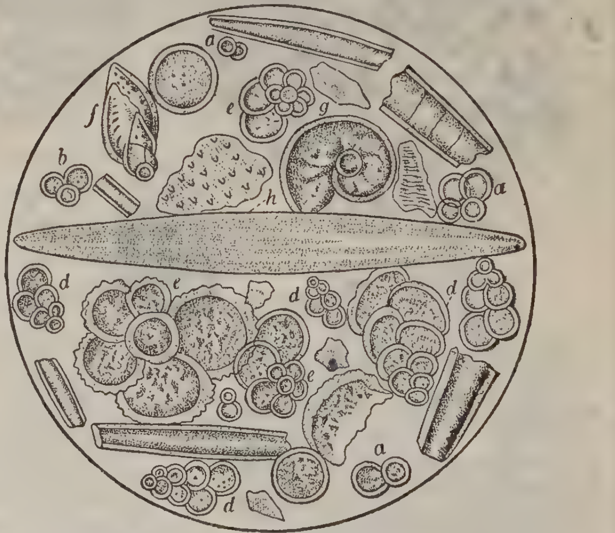


FIG. 21.—Microscopic Organisms in Chalk from Gravesend. *a, b, c, d, Textularia globulosa*; *e, e, e, e, Rotalia aspera*; *f, Textularia aculeata*; *g, Planularia hexas*; *h, Navicula.*

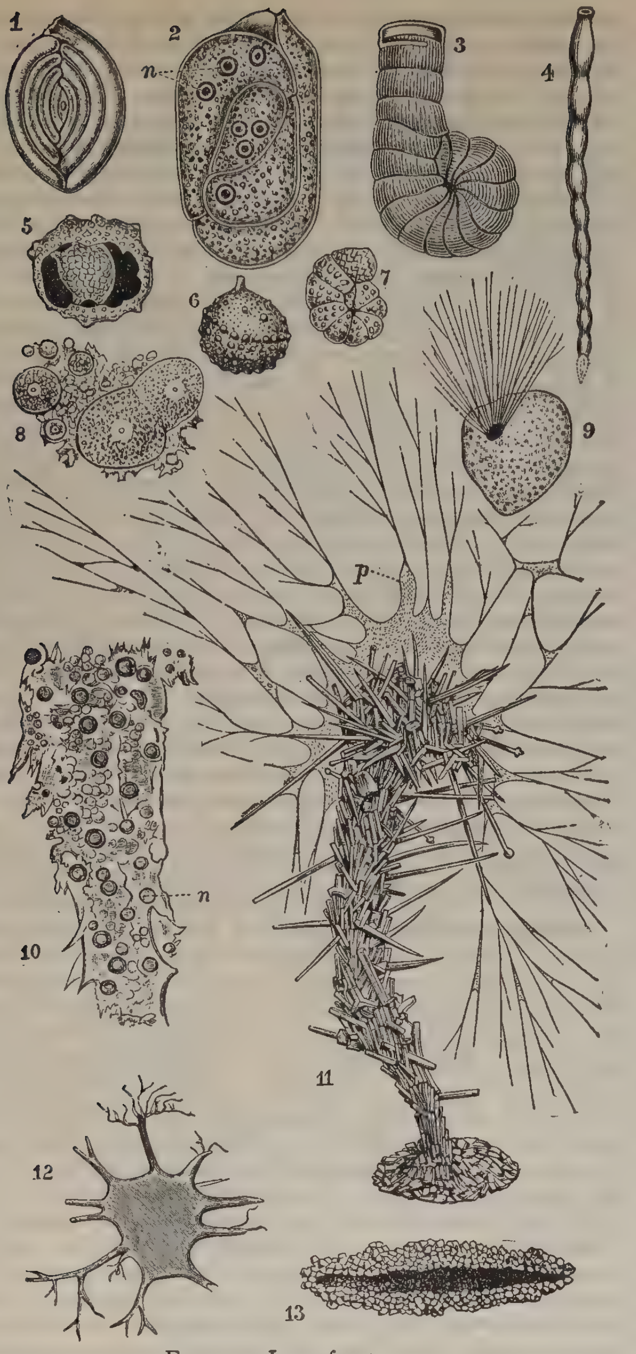


FIG. 22.—Imperforata.

1, *Spiroloculina planulata*, Lamarck, showing five "coils"; porcellanous.

2, Young ditto, with shell dissolved and protoplasm stained so as to show the seven nuclei *n*.

3, *Spirolina* (*Peneroplis*); a sculptured imperfectly coiled shell; porcellanous.

4, *Vertebralina*, a simple shell consisting of chambers succeeding one another in a straight line; porcellanous.

5, *6*, *Thurammina papillata*, Brady, a sandy form. 5 is broken open so as to show an inner chamber; recent. × 25.

7, *Haplophragmium canariensis*, a sandy form; recent.

8, Nucleated reproductive bodies (bud-spores) of *Haliphysema*.

9, *Squamulina laevis*, M. Schultze; × 40; a simple porcellanous Miliolide.

10, Protoplasmic core removed after treatment with weak chromic acid from the shell of *Haliphysema tumanovitzii*, Bow. *n*, Vesicular nuclei, stained with haematoxylin. (After Lankester.)

11, *Haliphysema tumanovitzii*; × 25 diam.; living specimen, showing the wine-glass-shaped shell built up of sand-grains and sponge-spicules, and the abundant protoplasm *p*, issuing from the mouth of the shell and spreading partly over its projecting constituents.

12, Shell of *Astrorhiza limicola*, Sand.; $\times \frac{3}{8}$; showing the branching of the test on some of the rays usually broken away in preserved specimens (original).

13, Section of the shell of *Marsipella*, showing thick walls built of sand-grains.

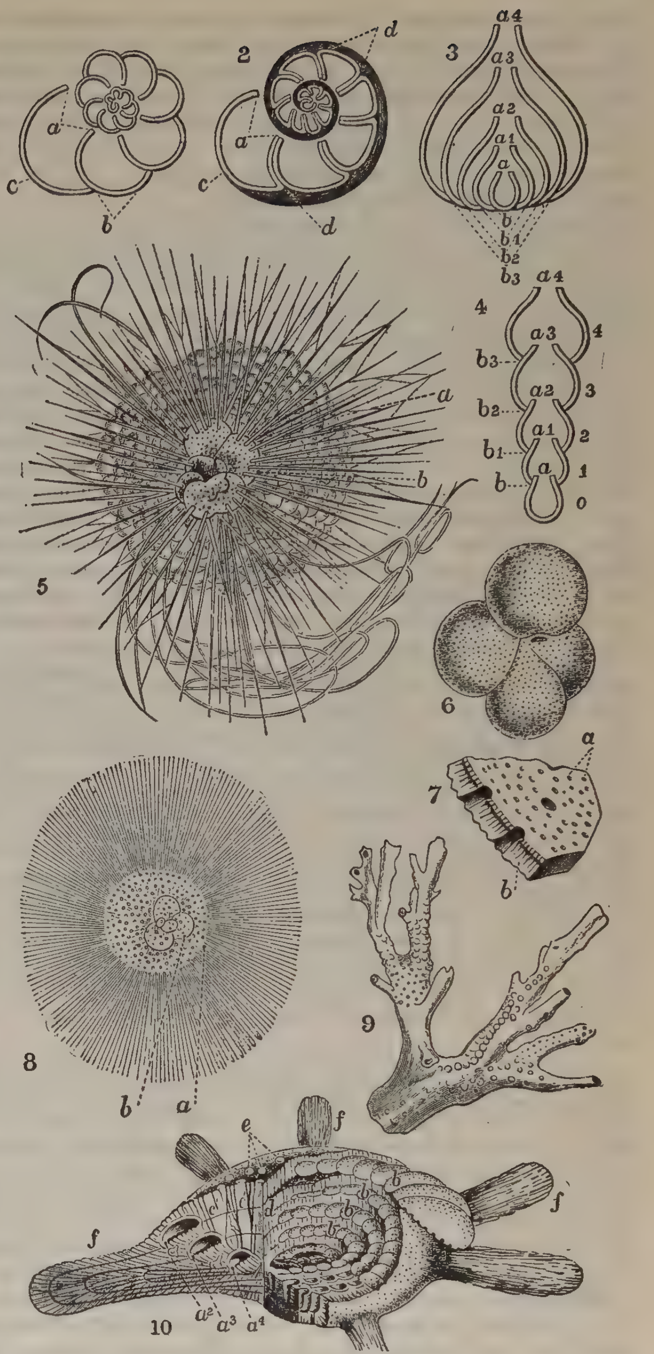


FIG. 23.—Perforata.

1, Spiral arrangement of simple chambers of a Reticularian shell, as in small *Rotalia*.

2, Ditto, with double septal walls, and supplemental shell-substance (shaded), as in large *Rotalia*.

3, Diagram to show the mode in which successively-formed chambers may completely embrace their predecessors, as in *Frondicularia*.

4, Diagram of a simple straight series of non-embracing chambers, as in *Nodosaria*.

5, *Hastigerina murrayi*, Wyv. Thomson. *a*. Bubbly (vacuolated) protoplasm, enclosing *b*, the perforated *Globigerina*-like shell (conf. central capsule of Radiolaria). From the peripheral protoplasm project, not only fine pseudopodia, but hollow spines of calcareous matter, which are set on the shell, and have an axis of active protoplasm. Pelagic; drawn in the living state.

6, *Globigerina bulloides*, d'Orb., showing the punctiform perforations of the shell and the main aperture.

7, Fragment of the shell of *Globigerina*, seen from within, and highly magnified. *a*, Fine perforations in the inner shell substances; *b*, outer (secondary) shell substance. Two coarser perforations are seen in section, and one lying among the smaller.

8, *Orbulina universa*, d'Orb. Pelagic example, with adherent radiating calcareous spines (hollow), and internally a small *Globigerina* shell. It is probably a developmental phase of *Globigerina*. *a*, *Orbulina* shell; *b*, *Globigerina* shell.

9, *Polytrema miniaceum*, Lin.; × 12. Mediterranean. Example of a branched adherent calcareous perforate Recticularian.

10, *Calcarina spengleri*, Gmel.; × 10. Tertiary, Sicily. Shell dissected so as to show the spiral arrangement of the chambers, and the copious secondary shell substance. a^2, a^3, a^4, Chambers of three successive coils in section, showing the thin primary wall (finely tubulate) of each; *b*, *b*, *b*, *b*, perforate surfaces of the primary wall of four tiers of chambers, from which the secondary shell substance has been cleared away; *c'*, *c'*, secondary or intermediate shell substance in section, showing coarse canals; *d*, section of secondary shell substance at right angles to *c'*; *e*, tubercles of secondary shell substance on the surface; *f*, *f*, club-like processes of secondary shell substance.

at the almost universal diffusion of existing Foraminifera and the continuous accumulation of their shells over vast areas of the ocean-bottom, they are certainly doing more than any other group of organisms to separate carbonate of lime from its solution in sea-water, so as to restore to the solid crust of the earth what is being continuously withdrawn from it by solution of the calcareous materials of the land above sea-level." (E. R. Lankester, "Protozoa," *Ency. Brit.* 9th ed.)

Historical.—The Foraminifera were discovered as we have seen by A. d'Orbigny. C. E. Ehrenberg added a large number of species, but it was to F. Dujardin in 1835 that we owe the recognition of their true zoological position and the characters of the living animal. W. B. Carpenter and W. C. Williamson in England contributed largely to the study of the shell, the latter being the first to call attention to its multiform character in the development of a single species, and to utilize the method of thin sections, which has proved so fertile in results. W. K. Parker and H. B. Brady, separately, and in collaboration, described an enormous number of forms in a series of papers, as well as in the monograph by the latter of the Foraminifera of the "Challenger" expedition. Munier-Chalmas and Schlumberger brought out the fact of dimorphism in the group, which was later elucidated and incorporated in the full cytological study of the life-cycle of Foraminifera by J. J. Lister and F. Schaudinn, independently, but with concurrent results.

Literature.—The chief recent books are: F. Chapman, *The Foraminifera* (1902), and J. J. Lister, "The Foraminifera," in E. R. Lankester's *Treatise on Zoology* (1903), in which full bibliographies will be found. For a final résumé of the long controversy on Eozoon, see George P. Merrill in *Report of the U.S. National Museum* (1906), p. 635. Other classifications of the Foraminifera will be found by G. H. Theodor Eimer and C. Fickert in *Zeitschr. für wissenschaftliche Zoologie*, lxv. (1899), p. 599, and L. Rhumbler in *Archiv für Protistenkunde*, iii. (1903–1904); the account of the reproduction is based on the researches of J. J. Lister, summarized in the above-cited work, and of F. Schaudinn, in *Arbeiten des kaiserlichen Gesundheitsamts*, xix. (1903). We must also cite W. B. Carpenter, W. K. Parker and T. Rymer Jones, *Introduction to the Study of the Foraminifera* (Ray Society) (1862); W. B. Carpenter, "Foraminifera," in *Ency. Brit.*, 9th ed.; W. C. Williamson, *On the Recent Foraminifera of Great Britain* (Ray Society), (1858); H. B. Brady, "The Foraminifera," in *Challenger Reports*, ix. (1884); A. Kemna, in *Ann. de la soc. royale zoologique et malacologique de Belgique*, xxxvii. (1902), p. 60; xxxix. (1904), p. 7.

Appendix.—The Xenophyophoridae are a small group of bottom-dwelling Sarcodina which show a certain resemblance to arenaceous Foraminifera, though observations in the living state show that the character of the pseudopodia is lacking. The multinucleate protoplasm is contained in branching tubes, aggregated into masses of definite form, bounded by a common wall of foreign bodies (sponge spicules, &c.) cemented into a membrane. The cytoplasm contains granules of $BaSO_4$ and pellets of faecal matter. All that is known of reproduction is the resolution of the pellets into uninucleate cells. (F. E. Schultze, *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition*, vol. xi., 1905, pt. i.) (M. Ha.)

FORBACH, a town of Germany in the imperial province of Alsace-Lorraine, on an affluent of the Rossel, and on the railway from Metz to Saarbrücken, 5½ m. S.W. of the latter. Pop. (1905) 8193. It has a Protestant and a Roman Catholic (Gothic) church, a synagogue and a Progymnasium. Its industries include the manufacture of tiles, pasteboard wares and gardening implements, while there are coal mines in the vicinity. After the battle on the neighbouring heights of Spicheren (6th of August 1870), in which the French under General Frossard were defeated by the Germans under General von Glümer, the town was occupied by the German troops, and at the conclusion of the war annexed to Germany. On the Schlossberg near the town are the ruins of the castle of the counts of Forbach, a branch of the counts of Saarbrücken.

See Besler, *Geschichte des Schlosses, der Herrschaft und der Stadt Forbach* (1895).

FORBES, ALEXANDER PENROSE (1817–1875), Scottish divine, was born at Edinburgh on the 6th of June 1817. He was the second son of John Henry Forbes, Lord Medwyn, a judge of the court of session, and grandson of Sir William Forbes of Pitsligo. He studied first at the Edinburgh Academy, then for two years under the Rev. Thomas Dale, the poet, in Kent, passed one session at Glasgow University in 1833, and, having chosen the career of the Indian civil service, completed his studies with distinction at Haileybury College. In 1836 he went to Madras and secured early promotion, but in consequence of ill-health he was obliged to return to England. He then entered Brasenose College, Oxford, where in 1841 he obtained the Boden Sanskrit scholarship, and graduated in 1844. He was at Oxford during the early years of the movement known as Puseyism, and was powerfully influenced by association with Newman, Pusey and Keble. This led him to resign his Indian appointment. In 1844 he was ordained deacon and priest in the English Church, and held curacies at Aston, Rowant and St Thomas's, Oxford; but being naturally attracted to the Episcopal Church of his native land, then recovering from long depression, he removed in 1846 to Stonehaven, the chief town of Kincardineshire. The same year, however, he was appointed to the vicarage of St Saviour's, Leeds, a church founded to preach and illustrate Tractarian principles. In 1848 Forbes was called to succeed Bishop Moir in the see of Brechin. He removed the episcopal residence to Dundee, where he resided till his death, combining the pastoral charge of the congregation with the duties of the see. When he came to Dundee the churchmen were accustomed owing to their small numbers to worship in a room over a bank. Through his energy several churches were built, and among them the pro-cathedral of St Paul's. He was prosecuted in the church courts for heresy, the accusation being founded on his primary charge, delivered and published in 1857, in which he set forth his views on the Eucharist. He made a powerful defence of the charge, and was acquitted with "a censure and an admonition." Keble wrote in his defence, and was present at his trial at Edinburgh. Forbes was a good scholar, a scientific theologian and a devoted worker, and was much beloved. He died at Dundee on the 8th of October 1875.

Principal works: *A Short Explanation of the Nicene Creed* (1852); *An Explanation of the Thirty-nine Articles* (2 vols., 1867 and 1868); *Commentary on the Seven Penitential Psalms* (1847); *Commentary on the Canticles* (1853). See Mackey's *Bishop Forbes, a Memoir.*

FORBES, ARCHIBALD (1838–1900), British war correspondent, the son of a Presbyterian minister in Morayshire, was born on the 17th of April 1838, and was educated at Aberdeen University. Entering the Royal Dragoons as a private, he gained, while in the service, considerable practical experience of military life and affairs. Being invalided from his regiment, he settled in London, and became a journalist. When the Franco-German War broke out in 1870, Forbes was sent to the front as war correspondent to the *Morning Advertiser*, and in this capacity he gained valuable information as to the plans of the Parisians for withstanding a siege. Transferring his services to the *Daily News*, his brilliant feats in the transmission of intelligence drew world-wide attention to his despatches. He was with the German army from the beginning of the campaign, and he afterwards witnessed the rise and fall of the Commune. Forbes afterwards proceeded to Spain, where he chronicled the outbreak of the second Carlist War; but his work here was interrupted by a visit to India, where he spent eight months upon a mission of investigation into the Bengal famine of 1874. Then he returned to Spain, and followed at various times the Carlist, the Republican and the Alfonsist forces. As representative of the *Daily News*, he accompanied the prince of Wales in his tour through India in 1875–1876. Forbes went through the Servian campaign of 1876, and was present at all the important engagements. In the Russo-Turkish campaign of 1877 he achieved striking journalistic successes at great personal risk. Attached to the Russian army, he witnessed most of the principal operations, and remained continuously in the field until attacked by fever. His letters, together with those of his colleagues, MacGahan and Millet, were republished by the *Daily News*. On recovering from his fever, Forbes proceeded to Cyprus, in order to witness the British occupation. The same year (1878) he went to India, and in the winter accompanied the Khyber Pass force to Jalalabad. He was present at the taking of Ali Musjid, and marched with several expeditions against the hill tribes. Burma was Forbes's next field of adventure, and at Mandalay, the capital, he had several interesting interviews with King Thibaw. He left Burma hurriedly for South Africa, where, in consequence of the disaster of Isandlwana, a British force was collecting for the invasion of Zululand. He was present at the victory of Ulundi, and his famous ride of 120 m. in fifteen hours, by which he was enabled to convey the first news of the battle to England, remains one of the finest achievements in journalistic enterprise. Forbes subsequently delivered many lectures on his war experiences to large audiences. His closing years were spent in literary work. He had some years before published a military novel entitled *Drawn from Life*, and a volume on his experiences of the war between France and Germany. These were now followed by numerous publications, including *Glimpses through the Cannon Smoke* (1880); *Souvenirs of some Continents* (1885); *William I. of Germany: a Biography* (1888); *Havelock*, in the "English Men of Action" Series (1890); *Barracks, Bivouacs, and Battles* (1891); *The Afghan Wars*, 1839–80 (1892); *Czar and Sultan* (1895); *Memories and Studies of War and Peace* (1895), in many respects autobiographic; and *Colin Campbell, Lord Clyde* (1896). He died on the 30th of March 1900.

FORBES, DAVID (1828–1876), British mineralogist, metallurgist and chemist, brother of Edward Forbes (*q.v.*), was born on the 6th of September 1828, at Douglas, Isle of Man, and received his early education there and at Brentwood in Essex. When a boy of fourteen he had already acquired a remarkable knowledge of chemistry. This subject he studied at the university of Edinburgh, and he was still young when he was appointed superintendent of the mining and metallurgical works at Espedal in Norway. Subsequently he became a partner in the firm of Evans & Askin, nickel-smelters, of Birmingham, and in that capacity during the years 1857–1860 he visited Chile, Bolivia and Peru. Besides reports for the Iron and Steel Institute, of which, during the last years of his life, he was foreign secretary, he wrote upwards of 50 papers on scientific subjects, among which are the following: "The Action of Sulphurets on Metallic Silicates at High Temperatures," *Rep. Brit. Assoc.*, 1855, pt. ii. p. 62; "The Relations of the Silurian and Metamorphic Rocks of the south of Norway," *ib.* p. 82; "The Causes producing Foliation in Rocks," *Journ. Geol. Soc.* xi., 1855; "The Chemical Composition of the Silurian and Cambrian Limestones," *Phil. Mag.* xiii. pp. 365-373, 1857; "The Geology of Bolivia and Southern Peru," *Journ. Geol. Soc.* xvii. pp. 7-62, 1861; "The Mineralogy of Chile," *Phil. Mag.*, 1865; "Researches in British Mineralogy," *Phil. Mag.*, 1867–1868. His observations on the geology of South America were given in a masterly essay, and these and subsequent researches threw much light on igneous and metamorphic phenomena and on the resulting changes in rock-formations. He also contributed important articles on chemical geology to the *Chemical News* and *Geological Magazine* (1867 and 1868). In England he was a pioneer in microscopic petrology. He was elected F.R.S. in 1858. He died in London on the 5th of December 1876.

See Obituary by P. M. Duncan in *Quart. Journ. Geol. Soc.*, vol. xxxiii., 1877, p. 41; and by J. Morris in *Geol. Mag.*, 1877, p. 45.

FORBES, DUNCAN, of Culloden (1685–1747), Scottish statesman, was born at Bunchrew or at Culloden near Inverness on the 10th of November 1685. After he had completed his studies at the universities of Edinburgh and Leiden, he was admitted advocate at the Scottish bar in 1709. His own talents and the influence of the Argyll family secured his rapid advancement, which was still further helped by his loyalty to the Hanoverian cause at the period of the rebellion in 1715. In 1722 Forbes was returned member for Inverness, and in 1725 he succeeded Dundas of Arniston as lord advocate. He inherited the patrimonial estates on the death of his brother in 1734, and in 1737 he attained to the highest legal honours in Scotland, being made lord president of the court of session. As lord advocate, he had laboured to improve the legislation and revenue of the country, to extend trade and encourage manufactures, and no less to render the government popular and respected in Scotland. In the proceedings which followed the memorable Porteous mob, for example, when the government brought in a bill for disgracing the lord provost of Edinburgh, for fining the corporation, and for abolishing the town-guard and city-gate, Forbes both spoke and voted against the measure as an unwarranted outrage on the national feeling. As lord president also he carried out some useful legal reforms; and his term of office was characterized by quick and impartial administration of the law.

The rebellion of 1745 found him at his post, and it tried all his patriotism. Some years before (1738) he had repeatedly and earnestly urged upon the government the expediency of embodying Highland regiments, putting them under the command of colonels whose loyalty could be relied upon, but officering them with the native chieftains and cadets of old families in the north. "If government," said he, "pre-engages the Highlanders in the manner I propose, they will not only serve well against the enemy abroad, but will be hostages for the good behaviour of their relations at home; and I am persuaded that it will be absolutely impossible to raise a rebellion in the Highlands." In 1739, with Sir Robert Walpole's approval, the original (1730) six companies (locally enlisted) of the Black Watch were formed into the famous "Forty-second" regiment of the line. The credit given to the earl of Chatham in some histories for this movement is an error; it rests really with Forbes and his friend Lord Islay, afterwards 3rd duke of Argyll (see the *Autobiography* of the 8th duke of Argyll, vol. i. p. 8 sq., 1906).

On the first rumour of the Jacobite rising Forbes hastened to Inverness, and through his personal influence with the chiefs of Macdonald and Macleod, those two powerful western clans were prevented from taking the field for Charles Edward; the town itself also he kept loyal and well protected at the commencement of the struggle, and many of the neighbouring proprietors were won over by his persuasions. His correspondence with Lord Lovat, published in the Culloden papers, affords a fine illustration of his character, in which the firmness of loyal principle and duty is found blended with neighbourly kindness and consideration. But at this critical juncture of affairs, the apathy of the government interfered considerably with the success of his negotiations. Advances of arms and money arrived too late, and though Forbes employed all his own means and what money he could borrow on his personal security, his resources were quite inadequate to the emergency. It is doubtful whether these advances were ever fully repaid. Part was doled out to him, after repeated solicitations that his credit might be maintained in the country; but it is evident he had fallen into disgrace in consequence of his humane exertions to mitigate the impolitic severities inflicted upon his countrymen after their disastrous defeat at Culloden. The ingratitude of the government, and the many distressing circumstances connected with the insurrection, sunk deep into the mind of Forbes. He never fairly rallied from the depression thus caused, and after a period of declining health he died on the 10th of December 1747.

Forbes was a patriot without ostentation or pretence, a true Scotsman with no narrow prejudice, an accomplished and even erudite scholar without pedantry, a man of genuine piety without asceticism or intolerance. His country long felt his influence through her reviving arts and institutions; and the example of such a character in that coarse and venal age, and among a people distracted by faction, political strife, and national antipathies, while it was invaluable to his contemporaries in a man of high position, is entitled to the lasting gratitude and veneration of his countrymen. In his intervals of leisure he cultivated with some success the study of philosophy, theology and biblical criticism. He is said to have been a diligent reader of the Hebrew Bible. His published writings, some of them of importance, include—*A Letter to a Bishop, concerning some Important Discoveries in Philosophy and Theology* (1732); *Some Thoughts concerning Religion, natural and revealed, and the Manner of Understanding Revelation* (1735); and *Reflections on Incredulity* (2nd ed., 1750).

His correspondence was collected and published in 1815, and a memoir of him (from the family papers) was written by Mr Hill Burton, and published along with a *Life of Lord Lovat*, in 1847. His statue by Roubillac stands in the Parliament House, Edinburgh.

FORBES, EDWARD (1815–1854), British naturalist, was born at Douglas, in the Isle of Man, on the 12th of February 1815. While still a child, when not engaged in reading, or in the writing of verses and drawing of caricatures, he occupied himself with the collecting of insects, shells, minerals, fossils, plants and other natural history objects. From his fifth to his eleventh year, delicacy of health precluded his attendance at any school, but in 1828 he became a day scholar at Athole House Academy in Douglas. In June 1831 he left the Isle of Man for London, where he studied drawing. In October, however, having given up all idea of making painting his profession, he returned home; and in the following month he matriculated as a student of medicine in the university of Edinburgh. His vacation in 1832 he spent in diligent work on the natural history of the Isle of Man. In 1833 he made a tour in Norway, the botanical results of which were published in Loudon's *Magazine of Natural History* for 1835–1836. In the summer of 1834 he devoted much time to dredging in the Irish Sea; and in the succeeding year he travelled in France, Switzerland and Germany.

Born a naturalist, and having no relish for the practical duties of a surgeon, Forbes in the spring of 1836 abandoned the idea of taking a medical degree, resolving to devote himself to science and literature. The winter of 1836–1837 found him at Paris, where he attended the lectures at the Jardin des Plantes on natural history, comparative anatomy, geology and mineralogy. Leaving Paris in April 1837, he went to Algiers, and there obtained materials for a paper on land and freshwater Mollusca, published in the *Annals of Natural History*, vol. ii. p. 250. In the autumn of the same year he registered at Edinburgh as a student of literature; and in 1838 appeared his first volume, *Malacologia Monensis*, a synopsis of the species of Manx Mollusca. During the summer of 1838 he visited Styria and Carniola, and made extensive botanical collections. In the following autumn he read before the British Association at Newcastle a paper on the distribution of terrestrial Pulmonifera in Europe, and was commissioned to prepare a similar report with reference to the British Isles. In 1841 was published his *History of British Star-fishes*, embodying extensive observations and containing 120 illustrations, inclusive of humorous tail-pieces, all designed by the author. On the 17th of April of the same year Forbes, accompanied by his friend William Thompson, joined at Malta H.M. surveying ship "Beacon," to which he had been appointed naturalist by her commander Captain Graves. From that date until October 1842 he was employed in investigating the botany, zoology and geology of the Mediterranean region. The results of these researches were made known in his "Report on the Mollusca and Radiata of the Aegean Sea, presented to the British Association in 1843," and in *Travels in Lycia*, published in conjunction with Lieut. (afterwards Admiral) T. A. B. Spratt in 1847. In the former treatise he discussed the influence of climate and of the nature and depth of the sea bottom upon marine life, and divided the Aegean into eight biological zones; his conclusions with respect to bathymetrical distribution, however, have naturally been modified to a considerable extent by the more recent explorations of the deep seas.

Towards the end of the year 1842 Forbes, whom family misfortunes had now thrown upon his own resources, sought and obtained the curatorship of the museum of the Geological Society of London. To the duties of that post he added in 1843 those of the professorship of botany at King's College. In November 1844 he resigned the curatorship of the Geological Society, and became palaeontologist to the Geological Survey of Great Britain. Two years later he published in the *Memoirs of the Geological Survey*, i. 336, his important essay "On the Connexion between the distribution of the existing Fauna and Flora of the British Isles, and the Geological Changes which have affected their Area, especially during the epoch of the Northern Drift." It is therein pointed out that, in accordance with the theory of their origin from various specific centres, the plants of Great Britain may be divided into five well-marked groups: the W. and S.W. Irish, represented in the N. of Spain, the S.E. Irish and S.W. English, related to the flora of the Channel Isles and the neighbouring part of France; the S.E. English, characterized by species occurring on the opposite French coast; a group peculiar to mountain summits, Scandinavian in type; and, lastly, a general or Germanic flora. From a variety of arguments the conclusion is drawn that the greater part of the terrestrial animals and flowering plants of the British Islands migrated thitherward, over continuous land, at three distinct periods, before, during and after the glacial epoch. On this subject Forbes's brilliant generalizations are now regarded as only partially true (see C. Reid's *Origin of the British Flora*, 1899). In the autumn of 1848 Forbes married the daughter of General Sir C. Ashworth; and in the same year was published his *Monograph of the British Naked-eyed Medusae* (Ray Society). The year 1851 witnessed the removal of the collections of the Geological Survey from Craig's Court to the museum in Jermyn Street, and the appointment of Forbes as professor of natural history to the Royal School of Mines just established in conjunction therewith. In 1852 was published the fourth and concluding volume of Forbes and S. Hanley's *History of British Mollusca*; also his *Monograph of the Echinodermata of the British Tertiaries* (Palaeontographical Soc.).

In 1853 Forbes held the presidency of the Geological Society of London, and in the following year he obtained the fulfilment of a long-cherished wish in his appointment to the professorship of natural history in the university of Edinburgh, vacant by the death of R. Jameson, his former teacher. Since his return from the East in 1842, the determination and arrangement of fossils, frequent lectures, and incessant literary work, including the preparation of his palaeontological memoirs, had precluded Forbes from giving that attention to the natural history pursuits of his earlier life which he had earnestly desired. It seemed that at length he was to find leisure to reduce to order his stores of biological information. He lectured at Edinburgh, in the summer session of 1854, and in September of that year he occupied the post of president of the geological section at the Liverpool meeting of the British Association. But he was taken ill just after he had commenced his winter's course of lectures in Edinburgh, and after not many days' illness he died at Wardie, near Edinburgh, on the 18th of November 1854.

See *Literary Gazette* (November 25, 1854); *Edinburgh New Philosophical Journal* (New Ser.), (1855); *Quart. Journ. Geol. Soc.* (May 1855); G. Wilson and A. Geikie, *Memoir of Edward Forbes* (1861), in which, pp. 575-583, is given a list of Forbes's writings. See also *Literary Papers*, edited by Lovell Reeve (1855). The following works were issued posthumously: "On the Tertiary Fluviomarine Formation of the Isle of Wight" (*Geol. Survey*), edited by R. A. C. Godwin-Austen (1856); "The Natural History of the European Seas," edited and continued by R. A. C. Godwin-Austen (1859).

FORBES, JAMES DAVID (1809–1868), Scottish physicist, was the fourth son of Sir William Forbes, 7th baronet of Pitsligo, and was born at Edinburgh on the 20th of April 1809. He entered the university of Edinburgh in 1825, and soon afterwards began to contribute papers to the *Edinburgh Philosophical Journal* anonymously under the signature "Δ." At the age of nineteen he became a fellow of the Royal Society of Edinburgh, and in 1832 he was elected to the Royal Society of London. A year later he was appointed professor of natural philosophy in Edinburgh University, in succession to Sir John Leslie and in competition with Sir David Brewster, and during his tenure of that office, which he did not give up till 1860, he not only proved himself an active and efficient teacher, but also did much to improve the internal conditions of the university. In 1859 he was appointed successor to Brewster in the principalship of the United College of St Andrews, a position which he held until his death at Clifton on the 31st of December 1868.

As a scientific investigator he is best known for his researches on heat and on glaciers. Between 1836 and 1844 he published in the *Trans. Roy. Soc. Ed.* four series of "Researches on Heat," in the course of which he described the polarization of heat by tourmaline, by transmission through a bundle of thin mica plates inclined to the transmitted ray, and by reflection from the multiplied surfaces of a pile of mica plates placed at the polarizing angle, and also its circular polarization by two internal reflections in rhombs of rock-salt. His work won him the Rumford medal of the Royal Society in 1838, and in 1843 he received its Royal medal for a paper on the "Transparency of the Atmosphere and the Laws of Extinction of the Sun's Rays passing through it." In 1846 he began experiments on the temperature of the earth at different depths and in different soils near Edinburgh, which yielded determinations of the thermal conductivity of trap-tufa, sandstone and pure loose sand. Towards the end of his life he was occupied with experimental inquiries into the laws of the conduction of heat in bars, and his last piece of work was to show that the thermal conductivity of iron diminishes with increase of temperature. His attention was directed to the question of the flow of glaciers in 1840 when he met Louis Agassiz at the Glasgow meeting of the British Association, and in subsequent years he made several visits to Switzerland and also to Norway for the purpose of obtaining accurate data. His observations led him to the view that a glacier is an imperfect fluid or a viscous body which is urged down slopes of a certain inclination by the mutual pressure of its parts, and involved him in some controversy with Tyndall and others both as to priority and to scientific principle. Forbes was also interested in geology, and published memoirs on the thermal springs of the Pyrenees, on the extinct volcanoes of the Vivarais (Ardêche), on the geology of the Cuchullin and Eildon hills, &c. In addition to about 150 scientific papers, he wrote *Travels through the Alps of Savoy and Other Parts of the Pennine Chain, with Observations on the Phenomena of Glaciers* (1843); *Norway and its Glaciers* (1853); *Occasional Papers on the Theory of Glaciers* (1859); *A Tour of Mont Blanc and Monte Rosa* (1855). He was also the author (1852) of the "Dissertation on the Progress of Mathematical and Physical Science," published in the 8th edition of the *Encyclopaedia Britannica*.

See *Forbes's Life and Letters*, by Principal Shairp, Professor P. G. Tait and A. Adams-Reilly (1873); *Professor Forbes and his Biographers*, by J. Tyndall (1873).

FORBES, SIR JOHN (1787–1861), British physician, was born at Cuttlebrae, Banffshire, in 1787. He attended the grammar school at Aberdeen, and afterwards entered Marischal College. After serving for nine years as a surgeon in the navy, he graduated M.D. at Edinburgh in 1817, and then began to practise in Penzance, whence he removed to Chichester in 1822. He took up his residence in London in 1840, and in the following year was appointed physician to the royal household. He was knighted in 1853, and died on the 13th of November 1861 at Whitchurch in Berkshire. Sir John Forbes was better known as an author and editor than as a practical physician. His works include the following:—*Original Cases . . illustrating the Use of the Stethoscope and Percussion in the Diagnosis of Diseases of the Chest* (1824); *Illustrations of Modern Mesmerism* (1845); *A Physician's Holiday* (1st ed., 1849); *Memorandums made in Ireland in the Autumn of 1852* (2 vols., 1853); *Sightseeing in Germany and the Tyrol in the Autumn of 1855* (1856). He was joint editor with A. Tweedie and J. Conolly of *The Cyclopaedia of Practical Medicine* (4 vols., 1833–1835); and in 1836 he founded the *British and Foreign Medical Review*, which, after a period of prosperity, involved its editor in pecuniary loss, and was discontinued in 1847, partly in consequence of the advocacy in its later numbers of doctrines obnoxious to the profession.

FORBES, a municipal town of Ashburnham county, New South Wales, Australia, 289 m. W. by N. from Sydney, on the Lachlan river, and with a station on the Great Western railway. Pop. (1901) 4313. Its importance as a commercial centre is due to its advantageous position between the northern and southern markets. It has steam-sawing and flour-mills, breweries and wool-scouring establishments; while the surrounding country produces good quantities of cereals, lucerne, wine and fruit.

FORBES-ROBERTSON, JOHNSTON (1853–), English actor, was the son of John Forbes-Robertson of Aberdeen, an art critic. He was educated at Charterhouse, and studied at the Royal Academy schools with a view to becoming a painter. But though he kept up his interest in that art, in 1874 he turned to the theatre, making his first appearance in London as Chastelard, in *Mary, Queen of Scots*. He studied under Samuel Phelps, from whom he learnt the traditions of the tragic stage. He played with the Bancrofts and with John Hare, supported Miss Mary Anderson in both England and America, and also acted at different times with Sir Henry Irving. His refined and artistic style, and beautiful voice and elocution made him a marked man on the English stage, and in Pinero's *The Profligate* at the Garrick theatre (1889), under Hare's management, he established his position as one of the most individual of London actors. In 1895 he started under his own management at the Lyceum with Mrs Patrick Campbell, producing *Romeo and Juliet*, *Hamlet*, *Macbeth* and also some modern plays; his impersonation as Hamlet was especially fine, and his capacity as a romantic actor was shown to great advantage also in John Davidson's *For the Crown* and in Maeterlinck's *Pelléas and Mélisande*. In 1900 he married the actress Gertrude Elliott, with whom, as his leading lady, he appeared at various theatres, producing in subsequent years *The Light that Failed*, Madeleine Lucette Riley's *Mice and Men*, and G. Bernard Shaw's *Caesar and Cleopatra*, Jerome K. Jerome's *Passing of the Third Floor Back*, &c. His brothers, Ian Robertson (b. 1858) and Norman Forbes (b. 1859), had also been well-known actors from about 1878 onwards.

FORBIN, CLAUDE DE (1656–1733), French naval commander, was born in Provence, of a family of high standing, in 1656. High-spirited and ungovernable in his boyhood, he ran away from his home, and through the influence of an uncle entered the navy, serving his first campaign in 1675. For a short time he quitted the navy and entered the army, but soon returned to his first choice. He made under D'Estrées the American campaign, and under Duquesne that of Algiers in 1683, on all occasions distinguishing himself by his impetuous courage. The most remarkable episode of his life was his mission to Siam. During the administration of the Greek adventurer Phaulcon in that country, the project was formed of introducing the Christian religion and European civilization, and the king sent an embassy to Louis XIV. In response a French embassy was sent out, Forbin accompanying the chevalier de Chaumont with the rank of major. When Chaumont returned to France, Forbin was induced to remain in the service of the Siamese king, and accepted, though with much reluctance, the posts of grand admiral, general of all the king's armies and governor of Bangkok. His position, however, was soon made untenable by the jealousy and intrigues of the minister Phaulcon; and at the end of two years he left Siam, reaching France in 1688. He was afterwards fully engaged in active service, first with Jean Bart in the war with England, when they were both captured and taken to Plymouth. They succeeded in making their escape and were soon serving their country again. Forbin was wounded at the battle of La Hogue, and greatly distinguished himself at the battle of Lagos. He served under D'Estrées at the taking of Barcelona, was sent ambassador to Algiers, and in 1702 took a brilliant part in the Mediterranean in the War of the Spanish Succession. In 1706 he took command of a squadron at Dunkirk, and captured many valuable prizes from the Dutch and the English. In 1708 he was entrusted with the command of the squadron which was to convey the Pretender to Scotland; but so effectually were the coasts guarded by Byng that the expedition failed, and returned to Dunkirk. Forbin was now beginning to be weighed down with the infirmities of age and the toils of service, and in 1710 he retired to a country house near Marseilles. There he spent part of his time in writing his memoirs, published in 1730, which are full of interest and are written in a graphic and attractive style. Forbin died on the 4th of March 1733.

FORCELLINI, EGIDIO (1688–1768), Italian philologist, was born at Fener in the district of Treviso and belonged to a very poor family. He went to the seminary at Padua in 1704, studied under Facciolati, and in due course attained to the priesthood. From 1724 to 1731 he held the office of rector of the seminary at Ceneda, and from 1731 to 1765 that of father confessor in the seminary of Padua. The remaining years of his life were mainly spent in his native village. He died at Padua in 1768 before the completion of the great work on which he had long co-operated with Facciolati. This was the vast *Latin Lexicon* (see FACCIOLATI), which has formed the basis of all similar works that have since been published. He was engaged with his Herculean task for nearly 35 years, and the transcription of the manuscript by Luigi Violato occupied eight years more.

FORCHHAMMER, JOHANN GEORG (1794–1865), Danish mineralogist and geologist, was born at Husum, Schleswig, on the 24th of July 1794, and died at Copenhagen on the 14th of December 1865. After studying at Kiel and Copenhagen from 1815 to 1818, he joined Oersted and Lauritz Esmarch in their mineralogical exploration of Bornholm, and took a considerable share in the labours of the expedition. In 1820 he obtained his doctor's degree by a chemical treatise *De mangano*, and immediately after set out on a journey through England, Scotland and the Faeroe Islands. In 1823 he was appointed lecturer at Copenhagen University on chemistry and mineralogy; in 1829 he obtained a similar post in the newly established polytechnic school; and in 1831 he was appointed professor of mineralogy in the university, and in 1848 became curator of the geological museum. From 1835 to 1837 he made many contributions to the geological survey of Denmark. On the death of H. C. Oersted in 1851, he succeeded him as director of the polytechnic school and secretary of the Academy of Sciences. In 1850 he began with J. Steenstrup and Worsaae various anthropological publications which gained a high reputation. As a public instructor Forchhammer held a high place and contributed potently to the progress of his favourite studies in his native country. He interested himself in such practical questions as the introduction of gas into Copenhagen, the establishment of the fire-brigade at Rosenberg and the boring of artesian wells.

Among his more important works are—*Loerebog i de enkelte Radicalers Chemi* (1842); *Danmarks geognostiske Forhold* (1835); *Om de Bornholmske Kulformationer* (1836); *Dit myere Kridt i Danmark* (1847); *Bidrag til Skildringen af Danmarks geographiske Forhold* (1858). A list of his contributions to scientific periodicals, Danish, English and German, will be found in the *Catalogue of Scientific Papers* published by the Royal Society of London. One of the most interesting and most recent is "On the Constitution of Sea Water at Different Depths and in Different Latitudes," in the *Proceedings of the Roy. Soc.* xii. (1862–1863).

FORCHHAMMER, PETER WILHELM (1801–1894), German classical archaeologist, was born at Husum in Schleswig on the 23rd of October 1801. He was educated at the Lübeck gymnasium and the university of Kiel, with which he was connected for nearly 65 years. In 1830–1834 and 1838–1840 he travelled in Italy, Greece, Asia Minor and Egypt. In 1843 he was appointed professor of philology at Kiel and director of the archaeological museum founded by himself in co-operation with Otto Jahn. He died on the 8th of January 1894. Forchhammer was a democrat in the best sense of the word, and from 1871 to 1873 represented the progressive party of Schleswig-Holstein in the German Reichstag. His published works deal chiefly with topography and ancient mythology. His travels had convinced him that a full and comprehensive knowledge of classical antiquity could only be acquired by a thorough acquaintance with Greek and Roman monuments and works of art, and a detailed examination of the topographical and climatic conditions of the chief localities of the ancient world. These principles are illustrated in his *Hellenika. Griechenland. Im Neuen das Alte* (1837), which contains his theory of the origin and explanation of the Greek myths, which he never abandoned, in spite of the attacks to which it was subjected. According to him, the myths arose from definite local (especially atmospheric and aquatic) phenomena, and represented the annually recurring processes of nature as the acts of gods and heroes; thus, in *Achill* (1853), the Trojan War is the winter conflict of the elements in that district. Other similar short treatises are: *Die Gründung Roms* (1868); *Daduchos* (1875), on the language of the myths and mythical buildings; *Die Wanderungen der Inachostochter Io* (1880); *Prolegomena zur Mythologie als Wissenschaft und Lexikon der Mythensprache* (1891). Amongst his topographical works mention may be made of: *Topographie von Athen* (1841); *Beschreibung der Ebene von Troja* (1850), a commentary on a map of the locality executed by T. A. Spratt (see *Journal of the Royal Geographical Society*, xii., 1842); *Topographia Thebarum Heptapylarum* (1854); *Erklärung der Ilias* (1884), on the basis of the topographical and physical peculiarities of the plain of Troy. His *Demokratenbüchlein* (1849), in the main a discussion of the Aristotelian theory of the state, and *Die Athener und Sokrates* (1837), in which, contrary to the almost universal opinion, he upheld the procedure of the Athenians as perfectly legal and their verdict as a perfectly just one, also deserve notice.

For a full list of his works see the obituary notice by E. Alberti in C. Bursian's *Biographisches Jahrbuch für Altertumskunde*, xx. (1897); also J. Sass in *Allgemeine deutsche Biographie*, and A. Hoeck and L. C. Pertsch, *P. W. Forchhammer* (1898).

FORCHHEIM, a town of Germany, in the kingdom of Bavaria, near the confluence of the Wiesent and the Regnitz, 16 m. S.S.E. of Bamberg. Pop. (1905) 8417. It has four Roman Catholic churches, including the Gothic Collegiate church and a Protestant church. Among the other public buildings are the progymnasium and an orphanage. The industries of the town include spinning and weaving, bleaching and dyeing, bone and glue works, brewing and paper-making. The spacious château occupies the site of the Carolingian palace which was destroyed in 1246.

Forchheim is of very early origin, having been the residence of the Carolingian sovereigns, including Charlemagne, in the 9th century. Consequently many diets were held here, and here also Conrad I. and Louis the Child were chosen German kings. The town was given by the emperor Henry II. in 1007 to the bishopric of Bamberg, and, except for a short period during the 11th century, it remained in the possession of the bishops until 1802, when it was ceded to Bavaria. In August 1796 a battle took place near Forchheim between the French and the Austrians. The fortifications of the town were dismantled in 1838.

See Hübsch, *Chronik der Stadt Forchheim* (Nüremberg, 1867).

FORD, EDWARD ONSLOW (1852–1901), English sculptor, was born in London. He received some education as a painter in Antwerp and as a sculptor in Munich under Professor Wagmüller, but was mainly self-taught. His first contribution to the Royal Academy, in 1875, was a bust of his wife, and in portraiture he may be said to have achieved his greatest success. His busts are always extremely refined and show his sitters at their best. Those (in bronze) of his fellow-artists Arthur Hacker (1894), Briton Riviere and Sir W. Q. Orchardson (1895), Sir L. Alma Tadema (1896), Sir Hubert von Herkomer and Sir John Millais (1897), and of A. J. Balfour are all striking likenesses, and are equalled by that in marble of Sir Frederick Bramwell (for the Royal Institution) and by many more. He gained the open competition for the statue of Sir Rowland Hill, erected in 1882 outside the Royal Exchange, and followed it in 1883 with "Henry Irving as Hamlet," now in the Guildhall art gallery. This seated statue, good as it is, was soon surpassed by those of Dr Dale (1898, in the city museum, Birmingham) and Professor Huxley (1900), but the colossal memorial statue of Queen Victoria (1901), for Manchester, was less successful. The standing statue of W. E. Gladstone (1894, for the City Liberal Club, London) is to be regarded as one of Ford's better portrait works. The colossal "General Charles Gordon," camel-mounted, for Chatham, "Lord Strathnairn," an equestrian group for Knightsbridge, and the "Maharajah of Mysore" (1900) comprise his larger works of the kind. A beautiful nude recumbent statue of Shelley (1892) upon a cleverly-designed base, which is not quite impeccable from the point of view of artistic taste, is at University College, Oxford, and a simplified version was presented by him to be set up on the shore of Viareggio, where the poet's body was washed up. Ford's ideal work has great charm and daintiness; his statue "Folly" (1886) was bought by the trustees of the Chantrey Fund, and was followed by other statues or statuettes of a similar order: "Peace" (1890), which secured his election as an associate of the Royal Academy, "Echo" (1895), on which he was elected full member, "The

Egyptian Singer" (1889), "Applause" (1893), "Glory to the Dead" (1901) and "Snowdrift" (1902). Ford's influence on the younger generation of sculptors was considerable and of good effect. His charming disposition rendered him extremely popular, and when he died a monument was erected to his memory (C. Lucchesi, sculptor, J. W. Simpson, architect) in St John's Wood, near to where he dwelt.

See SCULPTURE; also M. H. Spielmann, *British Sculpture and Sculptors of To-day* (London, 1901).

FORD, JOHN (1586–*c.*1640), English dramatist, was baptized on the 17th of April 1586 at Ilsington in north Devon. He came of a good family; his father was in the commission of the peace and his mother was a sister of Sir John Popham, successively attorney-general and lord chief justice. The name of John Ford appears in the university register of Oxford as matriculating at Exeter College in 1601. Like a cousin and namesake (to whom, with other members of the society of Gray's Inn, he dedicated his play of *The Lover's Melancholy*), the future dramatist entered the profession of the law, being admitted of the Middle Temple in 1602; but he seems never to have been called to the bar. Four years afterwards he made his first appearance as an author with an elegy called *Fame's Memorial, or the Earl of Devonshire deceased*, and dedicated to the widow of the earl (Charles Blount, Lord Mountjoy, "coronized," to use Ford's expression, by King James in 1603 for his services in Ireland)—a lady who would have been no unfitting heroine for one of his own tragedies of lawless passion, the famous Penelope, formerly Lady Rich. This panegyric, which is accompanied by a series of epitaphs and is composed in a strain of fearless extravagance, was, as the author declares, written "unfee'd"; it shows that Ford sympathized, as Shakespeare himself is supposed to have done, with the "awkward fate" of the countess's brother, the earl of Essex. Who the "flint-hearted Lycia" may be, to whom the poet seems to allude as his own disdainful mistress, is unknown; indeed, the record of Ford's private life is little better than a blank. To judge, however, from the dedications, prologues and epilogues of his various plays, he seems to have enjoyed the patronage of the earl, afterwards duke, of Newcastle, "himself a muse" after a fashion, and Lord Craven, the supposed husband of the ex-queen of Bohemia. Ford's tract of *Honor Triumphant, or the Peeres Challenge* (printed 1606 and reprinted by the Shakespeare Society with the *Line of Life*, in 1843), and the simultaneously published verses *The Monarches Meeting, or the King of Denmarkes Welcome into England*, exhibit him as occasionally meeting the festive demands of court and nobility; and a kind of moral essay by him, entitled *A Line of Life* (printed 1620), which contains references to Raleigh, ends with a climax of fulsome praise to the address of King James I. Yet at least one of Ford's plays (*The Broken Heart*, iii. 4) contains an implied protest against the absolute system of government generally accepted by the dramatists of the early Stuart reigns. Of his relations with his brother-authors little is known; it was natural that he should exchange complimentary verses with James Shirley, and that he should join in the chorus of laments over the death of Ben Jonson. It is more interesting to notice an epigram in honour of Ford by Richard Crashaw, morbidly passionate in one direction as Ford was in another. The lines run:

> "Thou cheat'st us, Ford; mak'st one seem two by art:
> What is Love's Sacrifice but the Broken Heart?"

It has been concluded that in the latter part of his life he gratified the tendency to seclusion for which he was ridiculed in *The Time Poets* (*Choice Drollery*, 1656) by withdrawing from business and from literary life in London, to his native place; but nothing is known as to the date of his death. His career as a dramatist very probably began by collaboration with other authors. With Thomas Dekker he wrote *The Fairy Knight* and *The Bristowe Merchant* (licensed in 1624, but both unpublished), with John Webster *A late Murther of the Sonne upon the Mother* (licensed in 1624). A play entitled *An ill Beginning has a good End*, brought on the stage as early as 1613 and attributed to Ford, was (if his) his earliest acted play; whether *Sir Thomas Overbury's Life and untimely Death* (1615) was a play is extremely doubtful; some lines of indignant regret by Ford on the same subject are still preserved. He is also said to have written, at dates unknown, *The London Merchant* (which, however, was an earlier name for Beaumont and Fletcher's *Knight of the Burning Pestle*) and *The Royal Combat*; a tragedy by him, *Beauty in a Trance*, was entered in the Stationers' Register in 1653, but never printed. These three (or four) plays were among those destroyed by Warburton's cook. *The Queen, or the Excellency of the Sea*, a play of inverted passion, containing some fine sensuous lines, printed in 1653 by Alexander Singhe for private performance, has been recently edited by W. Bang (*Materialien zur Kunde d. älteren engl. Dramas*, 13, Louvain, 1906), and is by him on internal evidence confidently claimed as Ford's. Of the plays by Ford preserved to us the dates span little more than a decade—the earliest, *The Lover's Melancholy*, having been acted in 1628 and printed in 1629, the latest, *The Lady's Trial*, acted in 1638 and printed in 1639.

When writing *The Lover's Melancholy*, it would seem that Ford had not yet become fully aware of the bent of his own dramatic genius, although he was already master of his powers of poetic expression. He was attracted towards domestic tragedy by an irresistible desire to sound the depths of abnormal conflicts between passion and circumstances, to romantic comedy by a strong though not widely varied imaginative faculty, and by a delusion that he was possessed of abundant comic humour. In his next two works, undoubtedly those most characteristically expressive of his peculiar strength, *'Tis Pity she's a Whore* (acted *c.* 1626) and *The Broken Heart* (acted *c.* 1629), both printed in 1633 with the anagram of his name *Fide Honor*, he had found horrible situations which required dramatic explanation by intensely powerful motives. Ford by no means stood alone among English dramatists in his love of abnormal subjects; but few were so capable of treating them sympathetically, and yet without that reckless grossness or extravagance of expression which renders the morally repulsive aesthetically intolerable, or converts the horrible into the grotesque. For in Ford's genius there was real refinement, except when the "suprasensually sensual" impulse or the humbler self-delusion referred to came into play. In a third tragedy, *Love's Sacrifice* (acted *c.* 1630; printed in 1633), he again worked on similar materials; but this time he unfortunately essayed to base the interest of his plot upon an unendurably unnatural possibility—doing homage to virtue after a fashion which is in itself an insult. In *Perkin Warbeck* (printed 1634; probably acted a year later) he chose an historical subject of great dramatic promise and psychological interest, and sought to emulate the glory of the great series of Shakespeare's national histories. The effort is one of the most laudable, as it was by no means one of the least successful, in the dramatic literature of this period. *The Fancies Chaste and Noble* (acted before 1636, printed 1638), though it includes scenes of real force and feeling, is dramatically a failure, of which the main idea is almost provokingly slight and feeble; and *The Lady's Trial* (acted 1638, printed 1639) is only redeemed from utter wearisomeness by an unusually even pleasingness of form. There remain two other dramatic works, of very different kinds, in which Ford co-operated with other writers, the mask of *The Sun's Darling* (acted 1624, printed 1657), hardly to be placed in the first rank of early compositions, and *The Witch of Edmonton* (printed 1658, but probably acted about 1621), in which we see Ford as a joint writer with Dekker and Rowley of one of the most powerful domestic dramas of the English or any other stage.

A few notes may be added on some of the more remarkable of the plays enumerated. A wholly baseless anecdote, condensed into a stinging epigram by Endymion Porter, asserted that *The Lover's Melancholy* was stolen by Ford from Shakespeare's papers. Undoubtedly, the madness of the hero of this play of Ford's occasionally recalls Hamlet, while the heroine is one of the many, and at the same time one of the most pleasing, parallels to Viola. But neither of them is a copy, as Friar Bonaventura in Ford's second play may be said to be a copy of Friar Lawrence, whose kindly pliability he disagreeably exaggerates, or as D'Avolos in *Love's Sacrifice* is clearly modelled on Iago. The plot of *The Lover's Melancholy*, which is ineffective because it leaves no room for suspense in the mind of the reader, seems original; in the dialogue, on the other hand, a justly famous passage in Act i. (the beautiful version of the story of the nightingale's death) is translated from Strada; while the scheme of the tedious interlude exhibiting the various forms of madness is avowedly taken, together with sundry comments, from Burton's *Anatomy of Melancholy.* Already in this play Ford exhibits the singular force of his pathos; the despondent misery of the aged Meleander, and the sweetness of the last scene, in which his daughter comes back to him, alike go to the heart. A situation —hazardous in spite of its comic substratum—between Thaumasta and the pretended Parthenophil is conducted, as Gifford points out, with real delicacy; but the comic scenes are merely stagy, notwithstanding, or by reason of, the effort expended on them by the author.

'Tis Pity she's a Whore has been justly recognized as a tragedy of extraordinary power. Mr Swinburne, in his eloquent essay on Ford, has rightly shown what is the meaning of this tragedy, and has at the same time indicated wherein consists its poison. He dwells with great force upon the different treatment applied by Ford to the characters of the two miserable lovers—brother and sister. "The sin once committed, there is no more wavering or flinching possible to him, who has fought so hard against the demoniac possession; while she who resigned body and soul to the tempter, almost at a word, remains liable to the influences of religion and remorse." This different treatment shows the feeling of the poet—the feeling for which he seeks to evoke our inmost sympathy—to oscillate between the belief that an awful crime brings with it its awful punishment (and it is sickening to observe how the argument by which the Friar persuades Annabella to forsake her evil courses mainly appeals to the physical terrors of retribution), and the notion that there is something fatal, something irresistible, and therefore in a sense self-justified, in so dominant a passion. The key-note to the conduct of Giovanni lies in his words at the close of the first scene—

> "All this I'll do, to free me from the rod
> Of vengeance; *else I'll swear my fate's my god.*"

Thus there is no solution of the conflict between passion on the one side, and law, duty and religion on the other; and passion triumphs, in the dying words of "the student struck blind and mad by passion"—

> "O, I bleed fast!
> Death, thou'rt a guest long look'd for; I embrace
> Thee and thy wounds: O, my last minute comes!
> Where'er I go, let me enjoy this grace
> Freely to view my Annabella's face."

It has been observed by J. A. Symonds that "English poets have given us the right key to the Italian temperament. . . . The love of Giovanni and Annabella is rightly depicted as more imaginative than sensual." It is difficult to allow the appositeness of this special illustration; on the other hand, Ford has even in this case shown his art of depicting sensual passion without grossness of expression; for the exception in Annabella's language to Soranzo seems to have a special intention, and is true to the pressure of the situation and the revulsion produced by it in a naturally weak and yielding mind. The entire atmosphere, so to speak, of the play is stifling, and is not rendered less so by the underplot with Hippolita.

'Tis Pity she's a Whore was translated into French by Maurice Maeterlinck under the title of *Annabella*, and represented at the Théâtre de l'Œuvre in 1894. The translator prefixes to the version an eloquent appreciation of Ford's genius, especially in his portraits of women, whose fate it is to live "dans les ténèbres, les craintes et les larmes."

Like this tragedy, *The Broken Heart* was probably founded upon some Italian or other novel of the day; but since in the latter instance there is nothing revolting in the main idea of the subject, the play commends itself as the most enjoyable, while, in respect of many excellences, an unsurpassed specimen of Ford's dramatic genius. The complicated plot is constructed with greater skill than is usual with this dramatist, and the pathos of particular situations, and of the entire character of Penthea—a woman doomed to hopeless misery, but capable of seeking to obtain for her brother a happiness which his cruelty has condemned her to forego—has an intensity and a depth which are all Ford's own. Even the lesser characters are more pleasing than usual, and some beautiful lyrics are interspersed in the play.

Of the other plays written by Ford alone, only *The Chronicle Historie of Perkin Warbeck. A Strange Truth*, appears to call for special attention. A repeated perusal of this drama suggests the judgment that it is overpraised when ranked at no great distance from Shakespeare's national dramas. Historical truth need not be taken into consideration in the matter; and if, notwithstanding James Gairdner's essay appended to his *Life and Reign of Richard III.*, there are still credulous persons left to think and assert that Perkin was not an impostor, they will derive little satisfaction from Ford's play, which with really surprising skill avoids the slightest indication as to the poet's own belief on the subject. That this tragedy should have been reprinted in 1714 and acted in 1745 only shows that the public, as is often the case, had an eye to the catastrophe rather than to the development of the action. The dramatic capabilitie of the subject are, however, great, and it afterwards attracted Schiller, who, however, seems to have abandoned it in favour o the similar theme of the Russian Demetrius. Had Shakespear treated it, he would hardly have contented himself with investing the hero with the nobility given by Ford to this personage of hi play,—for it is hardly possible to speak of a personage as a *characte* when the clue to his conduct is intentionally withheld. Nor could Shakespeare have failed to bring out with greater variety and distinctness the dramatic features in Henry VII., whom Ford depict with sufficient distinctness to give some degree of individuality to the figure, but still with a tenderness of touch which would have been much to the credit of the dramatist's skill had he been writing in the Tudor age. The play is, however, founded on Bacon's *Life*, o which the text is used by Ford with admirable discretion, and on Thomas Gainsford's *True and Wonderful History of Perkin Warbeck* (1618). The minor characters of the honest old Huntley, whom the Scottish king obliges to bestow his daughter's hand upon Warbeck and of her lover the faithful "Dalyell," are most effectively drawn, even "the men of judgment," the adventurers who surround the chief adventurer, are spirited sketches, and the Irishman among them has actually some humour; while the style of the play is, as befits a "Chronicle History," so clear and straightforward as to make it easy as well as interesting to read.

The Witch of Edmonton was attributed by its publisher to William Rowley, Dekker, Ford, "&c.," but the body of the play has been generally held to be ascribable to Ford and Dekker only. The subject of the play was no doubt suggested by the case of the reported witch, Elizabeth Sawyer, who was executed in 1621. Swinburne agrees with Gifford in thinking Ford the author of the whole of the first act; and he is most assuredly right in considering that "there is no more admirable exposition of a play on the English stage." Supposing Dekker to be chiefly responsible for the scenes dealing with the unfortunate old woman whom persecution as a witch actually drives to become one, and Ford for the domestic tragedy of the bigamist murderer, it cannot be denied that both divisions of the subject are effectively treated, while the more important part of the task fell to the share of Ford. Yet it may be doubted whether any such division can be safely assumed; and it may suffice to repeat that no domestic tragedy has ever taught with more effective simplicity and thrilling truthfulness the homely double lesson of the folly of selfishness and the mad rashness of crime.

With Dekker Ford also wrote the mask of *The Sun's Darling*; or, as seems most probable, they founded this production upon *Phaeton*, an earlier mask, of which Dekker had been sole author. Gifford holds that Dekker's hand is perpetually traceable in the first three acts of *The Sun's Darling*, and through the whole of its comic part, but that the last two acts are mainly Ford's. If so, he is the author of the rather forced occasional tribute on the accession of King Charles I., of which the last act largely consists. This mask, which furnished abundant opportunities for the decorators, musicians and dancers, in showing forth how the seasons and their delights are successively exhausted by a "wanton darling," Raybright the grandchild of the Sun, is said to have been very popular. It is at the same time commonplace enough in conception; but there is much that is charming in the descriptions, Jonson and Lyly being respectively laid under contribution in the course of the dialogue, and in one of the incidental lyrics.

Ford owes his position among English dramatists to the intensity of his passion, in particular scenes and passages where the character, the author and the reader are alike lost in the situation and in the sentiment evoked by it; and this gift is a supreme dramatic gift. But his plays—with the exception of *The Witch of Edmonton*, in which he doubtless had a prominent share—too often disturb the mind like a bad dream which ends as an unsolved dissonance; and this defect is a supreme dramatic defect. It is not the rigid or the stolid who have the most reason to complain of the insufficiency of tragic poetry such as Ford's; nor is it that morality only which, as Ithocles says in *The Broken Heart*, "is formed of books and school-traditions," which has a right to protest against the final effect of the most powerful creations of his genius. There is a morality which both

> "Keeps the soul in tune,
> At whose sweet music all our actions dance,"

and is able to physic

> "The sickness of a mind
> Broken with griefs."

Of that morality—or of that deference to the binding power within man and the ruling power above him—tragedy is the truest expounder, even when it illustrates by contrasts; but the tragic poet who merely places the problem before us, and bids us stand aghast with him at its cruelty, is not to be reckoned among the great masters of a divine art.

BIBLIOGRAPHY.—The best edition of Ford is that by Gifford, with notes and introduction, revised with additions to both text and notes by Alexander Dyce (1869). An edition of the *Dramatic Works of Massinger and Ford* appeared in 1840, with an introduction by Hartley Coleridge. The *Best Plays of Ford* were edited for the "Mermaid Series" in 1888, with an introduction by W. H. Havelock Ellis, and reissued in 1903. A. C. Swinburne's "Essay on Ford" is reprinted among his *Essays and Studies* (1875). *Perkin Warbeck* and *'Tis Pity* were translated into German by F. Bodenstedt in 1860; and the latter again by F. Blei in 1904. The probable sources of the various plays are discussed in Emil Koeppel's *Quellenstudien zu den Dramen George Chapman's, Philip Massinger's und John Ford's* (1897). (A. W. W.)

FORD, RICHARD (1796–1858), English author of one of the earliest and best of travellers' *Handbooks*, was the eldest son of Sir Richard Ford, who in 1789 was member of parliament for East Grinstead, and for many years afterwards chief police magistrate of London. His mother was the daughter and heiress of Benjamin Booth, a distinguished connoisseur in art. He was called to the bar, but never practised, and in 1830–1833 he travelled in Spain, spending much of his time in the Alhambra and at Seville. His first literary work (other than contributions to the *Quarterly Review*) was a pamphlet, *An Historical Inquiry into the Unchangeable Character of a War in Spain* (Murray, 1837), in reply to one called the *Policy of England towards Spain*, issued under the patronage of Lord Palmerston. He spent the winter of 1839–1840 in Italy, where he added largely to his collection of majolica; and soon after his return he began, at John Murray's invitation, to write his *Handbook for Travellers in Spain*, with which his name is chiefly associated. He died on the 1st of September 1858, leaving a fine private collection of pictures to his widow (d. 1910), his third wife, a daughter of Sir A. Molesworth.

FORD, THOMAS (b. *c.* 1580), English musician, of whose life little more is known than that he was attached to the court of Prince Henry, son of James I. His works also are few, but they are sufficient to show the high stage of efficiency and musical knowledge which the English school had attained at the beginning of the 17th century. They consist of canons and other concerted pieces of vocal music, mostly with lute accompaniment. The chief collection of his works is entitled *Musike of Sundrie Kinds set forth in Two Books*, &c. (1607), and the histories of music by Burney and Hawkins give specimens of his art. Together with Dowland, immortalized in one of Shakespeare's sonnets, Ford is the chief representative of the school which preceded Henry Lawes.

FORDE, FRANCIS (d. 1770), British soldier, first appears in the army list as a captain in the 39th Foot in 1746. This regiment was the first of the king's service to serve in India (hence its motto *Primus in Indis*), and Forde was on duty there when in 1755 he became major, at the same time as Eyre Coote, soon to become his rival, was promoted captain. At the express invitation of Clive, Forde resigned his king's commission to take the post of second in command of the E.I. Company's troops in Bengal. Soon after Plassey, Forde was sent against the French of Masulipatam. Though feebly supported by the motley rabble of an army which Anandraz, the local ally, brought into the field, Forde pushed ahead through difficult country and came upon the enemy entrenched at Condore. For four days the two armies faced one another; on the fifth both commanders resolved on the offensive and an encounter ensued. In spite of the want of spirit shown by Anandraz and his men, Forde in the end succeeded in winning the battle, which was from first to last a brilliant piece of work. Nor did he content himself with this; on the same evening he stormed the French camp, and his pursuit was checked only by the guns of Masulipatam itself. The place was quickly invested on the land side, but difficulties crowded upon Forde and his handful of men. For fifty days little advance was made; then Forde, seeing the last avenues of escape closing behind him, ordered an assault at midnight on the 25th of January 1759. The Company's troops lost one-third of their number, but the storm was a brilliant and astounding success. Forde received less than no reward. The Company refused to confirm his lieut.-colonel's commission, and he found himself junior to Eyre Coote, his old subaltern in the 39th Foot. Nevertheless he continued to assist Clive, and on the 25th of November 1759 won a success comparable to Condore at Chinsurah (or Biderra) against the Dutch. A year later he at last received his commission, but was still opposed by a faction of the directors which supported Coote. Clive himself warmly supported Forde in these quarrels. In 1769, with Vansittart and Scrafton, Colonel Forde was sent out with full powers to investigate every detail of Indian administration. Their ship was never heard of after leaving the Cape of Good Hope on the 27th of December.

Monographs on Condore, Masulipatam and Chinsurah will be found in Malleson's *Decisive Battles of India.*

FORDHAM, formerly a village of Westchester county, New York, U.S.A., and now a part of New York City. It lies on the mainland, along the eastern bank of the Harlem river, E. of the northern end of Manhattan Island. It is the seat of Fordham University (Roman Catholic), founded in 1841 as St John's College, and since 1846 conducted by the Society of Jesus. In 1907 the institution was rechartered as Fordham University, and now includes St John's College high school and grammar school, St John's College, the Fordham University medical school (all in Fordham), and the Fordham University law school (42 Broadway, New York City). In 1907–1908 the university had 96 instructors and (exclusive of 364 students in the high school) 236 students, of whom 105 were in St John's College, 31 in the medical school, and 100 in the law school. In Fordham still stands the house in which Edgar Allan Poe lived from 1844 to 1849 and in which he wrote "Annabel Lee," "Ulalume," &c.

The hamlet of Fordham was established in 1669 by Jan Arcer (a Dutchman, who called himself "John Archer" after coming to America), who in that year received permission from Francis Lovelace, colonial governor of New York, to settle sixteen families on the mainland close by a fording-place of the Spuyten Duyvil Creek, near where that stream enters the Harlem river. Between 1655 and 1671 Archer bought from the Indians the tract of land lying between Spuyten Duyvil Creek and the Harlem river on the east and the Bronx river on the west, and extending from the hamlet of Fordham to what is now High Bridge. In 1671 Governor Lovelace erected this tract into the manor of Fordham. In 1846 it was included with Morrisania in the township of West Farms; and in 1872 with part of the township of Yonkers was erected into the township of Kingsbridge, which in 1874 was annexed to the city of New York, and in 1898 became a part of the borough of the Bronx, New York City.

FORDUN, JOHN OF (d. *c.* 1384), Scottish chronicler. The statement generally made that the chronicler was born at Fordoun (Kincardineshire) has not been supported by any direct evidence. It is certain that he was a secular priest, and that he composed his history in the latter part of the 14th century; and it is probable that he was a chaplain in the cathedral of Aberdeen. The work of Fordun is the earliest attempt to write a continuous history of Scotland. We are informed that Fordun's patriotic zeal was roused by the removal or destruction of many national records by Edward III. and that he travelled in England and Ireland, collecting material for his history. This work is divided into five books. The first three are almost entirely fabulous, and form the groundwork on which Boece and Buchanan afterwards based their historical fictions, which were exposed by Thomas Innes in his *Critical Essay* (i. pp. 201-214). The 4th and 5th books, though still mixed with fable, contain much valuable information, and become more authentic the more nearly they approach the author's own time. The 5th book concludes with the death of King David I. in 1153. Besides these five books, Fordun wrote part of another book, and collected materials for bringing down the history to a later period. These materials were used by a continuator who wrote in the middle of the 15th century, and who is identified with Walter Bower (*q.v.*), abbot of the monastery of Inchcolm. The additions of Bower form eleven books, and bring down the narrative to the death of King James I. in 1437. According to the custom of the time, the continuator did not hesitate to interpolate Fordun's portion of the work with additions of his own, and the whole history thus compiled is known as the *Scotichronicon*.

The first printed edition of Fordun's work was that of Thomas Gale in his *Scriptores quindecim* (vol. iii.), which was published in 1691. This was followed by Thomas Hearne's (5 vols.) edition in 1722. The whole work, including Bower's continuation, was published by Walter Goodall at Edinburgh in 1759. In 1871 and 1872 Fordun's chronicle, in the original Latin and in an English translation, was edited by William F. Skene in *The Historians of Scotland.* The preface to this edition collects all the biographical details and gives full bibliographical references to MSS. and editions.

FORECLOSURE, in the law of mortgage, the extinguishment by order of the court of a mortgagor's equity of redemption. In the law of equity the object of every mortgage transaction is eventually the repayment of a debt, the mortgaged property being incidental by way of security. Therefore, although the day named for repayment of the loan has passed and the mortgagor's estate is consequently forfeited, equity steps in to mitigate the harshness of the common law, and will decree a reconveyance of the mortgaged property on payment of the principal, interest and costs. This right of the mortgagor to relief is termed his "equity of redemption." But the right must be exercised within a reasonable time, otherwise he will be foreclosed his equity of redemption and the mortgagee's possession converted into an absolute ownership. Such foreclosure is enforced in equity by a foreclosure action. An action is brought by the mortgagee against the mortgagor in the chancery division of the High Court in England, claiming that an account may be taken of the principal and interest due to the mortgagee, and that the mortgagor may be directed to pay the same, with costs, by a day to be appointed by the court and that in default thereof he may be foreclosed his equity of redemption. English county courts have jurisdiction in foreclosure actions where the mortgage or charge does not exceed £500, or where the mortgage is for more than £500, but less than that sum has been actually advanced. In a Welsh mortgage there is no right to foreclosure. (See also MORTGAGE.)

FOREIGN OFFICE, that department of the executive of the United Kingdom which is concerned with foreign affairs. The head of the Foreign Office is termed principal secretary of state for foreign affairs and his office dates from 1782. Between that date and the Revolution there had been only two secretaries of state, whose duties were divided by a geographical division of the globe into northern and southern departments. The duties of the secretary of the northern department of Europe comprised dealings with the northern powers of Europe, while the secretary of the southern department of Europe communicated with France, Spain, Portugal, Switzerland, Italy, Turkey, and also looked after Irish and colonial business, and carried out the work of the Home Office. In 1782 the duties of these two secretaries were revised, the northern department becoming the Foreign Office. The secretary for foreign affairs is the official agent of the crown in all communications between Great Britain and foreign powers; his intercourse is carried on either through the representatives of foreign states in Great Britain or through representatives of Great Britain abroad. He negotiates all treaties or alliances with foreign states, protects British subjects residing abroad, and demands satisfaction for any injuries they may sustain at the hands of foreigners. He is assisted by two under-secretaries of state (one of them a politician, the other a permanent civil servant), three assistant under-secretaries (civil servants), a librarian, a head of the treaty department and a staff of clerks. The departments of the Foreign Office are the African, American, commercial and sanitary, consular, eastern (Europe), far eastern, western (Europe), parliamentary, financial, librarian and keeper of the papers, treaties and registry. In the case of important despatches and correspondence, these, with the drafts of answers, are sent first to the permanent under-secretary, then to the prime minister, then to the sovereign and, lastly, are circulated among the members of the cabinet. The salary of the secretary for foreign affairs is £5000 per annum, that of the permanent under-secretary £2000, the parliamentary under-secretary and the first assistant under-secretary, £1500, and the other assistant under-secretaries £1200.

See Anson, *Law and Custom of the Constitution*, part ii.

FORELAND, NORTH and **SOUTH,** two chalk headlands on the Kent coast of England, overlooking the Strait of Dover, the North Foreland forming the eastern projection of the Isle of Thanet, and the South standing 3 m. N.E. of Dover. Both present bold cliffs to the sea, and command beautiful views over the strait. On the North Foreland (51° 22½′ N., 1° 27′ E.) there is a lighthouse, and on the South Foreland (51° 8½′ N., 1° 23′ E.) there are two. There is also a Foreland on the north coast of Devonshire, 2½ m. N.E. of Lynmouth, a fine projection of the highlands of Exmoor Forest, overlooking the Bristol Channel, and forming the most northerly point of the county.

FORESHORE, that part of the seashore which lies between high- and low- water mark at ordinary tides. In the United Kingdom it is ordinarily and prima facie vested in the crown, except where it may be vested in a subject by ancient grant or charter from the crown, or by prescription. Although numerous decisions, dating from 1795, have confirmed the prima facie title of the crown, S. A. Moore in his *History of the Foreshore* contends that the presumption is in favour of the subject rather than of the crown. But a subject can establish a title by proving an express grant from the crown or giving sufficient evidence of user from which a grant may be presumed. The chief acts showing title to foreshore are, taking wreck or royal fish, right of fishing, mining, digging and taking sand, seaweed, &c., embanking and enclosing. There is a public right of user in that part of the foreshore which belongs to the crown, for the purpose of navigation or fishery, but there is no right of passage over lands adjacent to the shore, except by a particular custom. So that, in order to make the right available, there must be a highway or other public land giving access to the foreshore. Thus it has been held that the public have no legal right to trespass on land above high-water mark for the purpose of bathing in the sea, though if they can get to it they may bathe there (*Blundell* v. *Catteral*, 1821, 5 B. & Ad. 268). There is no right in the public to take sand, shells or seaweed from the shore, nor, except in certain places by local custom, have fishermen the right to use the foreshore or the soil above it for drawing up their boats, or for drying their nets or similar purposes.

See S. A. Moore, *History of the Foreshore and the Law relating thereto* (1888); Coulson and Forbes, *Law of Waters* (1902).

FORESTALLING, in English criminal law, the offence of buying merchandise, victual, &c., coming to market, or making any bargain for buying the same, before they shall be in the market ready to be sold, or making any motion for enhancing the price, or dissuading any person from coming to market or forbearing to bring any of the things to market, &c. See ENGROSSING.

FOREST LAWS, the general term for the old English restriction laws, dealing with forests. One of the most cherished prerogatives of the king of England, at the time when his power was at the highest, was that of converting any portion of the country into a forest in which he might enjoy the pleasures of the chase. The earliest struggles between the king and the people testify to the extent to which this prerogative became a public grievance, and the charter by which its exercise was bounded (Carta de Foresta) was in substance part of the greatest constitutional code imposed by his barons upon King John. At common law it appears to have been the right of the king to make a forest where he pleased, provided that certain legal formalities were observed. The king having a continual care for the preservation of the realm, and for the peace and quiet of his subjects, he had therefore amongst many privileges this prerogative, viz. to have his place of recreation wheresoever he would appoint.[1] Land once afforested became subject to a peculiar system of laws, which, as well as the formalities required to constitute a valid afforestment, have been carefully ascertained by the Anglo-Norman lawyers. "A forest," says Manwood, "is a certain territory of woody grounds and fruitful pastures, privileged for wild beasts and fowls of forest, chase, and warren to rest, and abide there in the safe protection of the king, for his delight and pleasure; which territory of ground so privileged is mered and bounded with unremovable marks, meres and boundaries, either known by matter of record or by prescription; and also replenished with wild beasts of venery or chase, and with great coverts of vert, for the succour of the said beasts there to abide: for the preservation and continuance of which said place, together with the vert and venison there are particular officers, laws, and privileges belonging to the same, requisite for that purpose, and proper only to a forest and to no other place."[1] And the same author distinguishes a forest, as "the highest franchise of princely pleasure," from the inferior franchises of chase, park and warren—named in the order of their importance. The forest embraces all these, and it is distinguished by having laws and courts of its own, according to which offenders are justiceable. An offender in a chase is to be punished by the common law; an offender in a forest by the forest law. A chase is much the same as a park, only the latter is enclosed, and all of them are distinguished according to the class of wild beasts to which the privilege extended. Thus beasts of forest (the "five wild beasts of venery") were the hart, the hind, the hare, the boar and the wolf. The beasts of chase were also five, viz. the buck, the doe, the fox, the marten and the roe. The beasts and fowls of warren were the hare, the coney, the pheasant and the partridge.

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[1] Coke, 4 *Inst.*, 300.

The courts of the forest were three in number, viz. the court of attachments, swainmote and justice-seat. The court of attachments (called also the wood-mote) is held every forty days for the foresters to bring in their attachments concerning any hurt done to vert or venison (*in viridi et venatione*) in the forest, and for the verderers to receive and mark the same, but no conviction takes place. The swainmote, held three times in the year, is the court to which all the freeholders within the forest owe suit and service, and of which the verderers are the judges. In this court all offences against the forest laws may be tried, but no judgment or punishment follows. This is reserved for the justice-seat, held every third year, to which the rolls of offences presented at the court of attachment, and tried at the swainmote, are presented by verderers. The justice-seat is the court of the chief justice in eyre, who, says Coke, "is commonly a man of greater dignity than knowledge of the laws of the forests; and therefore where justice-seats are to be held some other persons whom the king shall appoint are associated with him, who together are to determine *omnia placita forestae*." There were two chief justices for the forests *intra* and *ultra Trentam* respectively. The necessary officers of a forest are a steward, verderers, foresters, regarders, agisters and woodwards. The verderer was a judicial officer chosen in full county by the freeholders in the same manner as the coroner. His office was to view and receive the attachments of the foresters, and to mark them on his rolls. A forester was "an officer sworn to preserve the vert and venison in the forest, and to attend upon the wild beasts within his bailiwick." The regarders were of the nature of visitors: their duty was to make a regard (*visitatio nemorum*) every third year, to inquire of all offences, and of the concealment of such offences by any officer of the forest. The business of the agister was to look after the pasturage of the forest, and to receive the payments for the same by persons entitled to pasture their cattle in the forests. Both the pasturage and the payment were called "agistment." The woodward was the officer who had the care of the woods and vert and presented offences at the court of attachment.

The legal conception of a forest was thus that of a definite territory within which the code of the forest law prevailed to the exclusion of the common law. The ownership of the soil might be in any one, but the rights of the proprietor were limited by the laws made for the protection of the king's wild beasts. These laws, enforced by fines often arbitrary and excessive, were a great grievance to the unfortunate owners of land within or in the neighbourhood of the forest. The offence of "purpresture" may be cited as an example. This was an encroachment on the forest rights, by building a house within the forest, and it made no difference whether the land belonged to the builder or not. In either case it was an offence punishable by fines at discretion. And if a man converted woodlands within the forest into arable land, he was guilty of the offence known as "assarting," whether the covert belonged to himself or not.

The hardships of the forest laws under the Norman kings, and their extension to private estates by the process of afforestment, were among the grievances which united the barons and people against the king in the reign of John. The Great Charter of King John contains clauses relating to the forest laws, but no separate charter of the forest. The first charter of the forest is that of Henry III., issued in 1217. "As an important piece of legislation," said Stubbs,[2] "it must be compared with the forest assize of 1184, and with 44th, 47th and 48th clauses of the charter of John. It is observable that most of the abuses which are remedied by it are regarded as having sprung up since the accession of Henry II.; but the most offensive afforestations have been made under Richard and John. These latter are at once disafforested; but those of Henry II. only so far as they had been carried out to the injury of the landowners and outside of the royal demesne." Land which had thus been once forest land and was afterwards disafforested was known as *purlieu*—derived by Manwood from the French *pur* and *lieu*, *i.e.* "a place exempt from the forest." The forest laws still applied in a modified manner to the purlieu. The benefit of the disafforestment existed only for the owner of the lands; as to all other persons the land was forest still, and the king's wild beasts were to "have free recourse therein and safe return to the forest, without any hurt or destruction other than by the owners of the lands in the purlieu where they shall be found, and that only to hunt and chase them back again towards the forest without any forestalling" (Manwood, *On the Forest Laws*—article "Purlieu").

The revival of the forest laws was one of the means resorted to by Charles I. for raising a revenue independently of parliament, and the royal forests in Essex were so enlarged that they were hyperbolically said to include the whole county. The 4th earl of Southampton was nearly ruined by a decision that stripped him of his estate near the New Forest. The boundaries of Rockingham Forest were increased from 6 m. to 60, and enormous fines imposed on the trespassers,—Lord Salisbury being assessed in £20,000, Lord Westmoreland in £19,000, Sir Christopher Hatton in £12,000 (Hallam's *Constitutional History of England*, c. viii.). By the statute 16 Charles I. c. 16 (1640) the royal forests were determined for ever according to their boundaries in the twentieth year of James, all subsequent enlargements being annulled.

The forest laws, since the Revolution, have fallen into complete disuse.

FORESTS AND FORESTRY. Although most people know what a forest (Lat. *foris*, "out of doors") is, a definition of it which suits all cases is by no means easy to give. Manwood, in his treatise of the *Lawes of the Forest* (1598), defines a forest as "a certain territory of woody grounds, fruitful pastures, privileged for wild beasts and fowls of forest, chase and warren, to rest and abide in, in the safe protection of the king, for his princely delight and pleasure." This primitive definition has, in modern times, when the economic aspect of forests came more into the foreground, given place to others, so that forest may, in a general way, now be described as "an area which is for the most part set aside for the production of timber and other forest produce, or which is expected to exercise certain climatic effects, or to protect the locality against injurious influences."

As far as conclusions can now be drawn, it is probable that the greater part of the dry land of the earth was, at some time, covered with forest, which consisted of a variety of trees and shrubs grouped according to climate, soil and configuration of the several localities. When the old trees reached their limit of life, they disappeared, and younger trees took their place. The conditions for an uninterrupted regeneration of the forest were favourable, and the result was vigorous production by the creative powers of soil and climate. Then came man, and by degrees interfered, until in most countries of the earth the area under forest has been considerably reduced. The first decided interference was probably due to the establishment of domestic animals; men burnt the forest to obtain pasture for their flocks. Subsequently similar measures on an ever-increasing scale were employed to prepare the land for agricultural purposes. More recently enormous areas of forests were destroyed by reckless cutting and subsequent firing in the extraction of timber for economic purposes.

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[1] Manwood's *Treatise of the Forest Laws* (4th edition, 1717).

[2] *Documents Illustrative of English History*, p. 338.

It will readily be understood that the distribution and character of the now remaining forests must differ enormously (see PLANTS: *Distribution*). Large portions of the earth are still covered with dense masses of tall trees, while others contain low scrub or grass land, or are desert. As a general rule, natural forests consist of a number of different species intermixed; but in some cases certain species, called gregarious, have succeeded in obtaining the upper hand, thus forming more or less pure forests of one species only. The number of species differs very much. In many tropical forests hundreds of species may be found on a comparatively small area, in other cases the number is limited. Burma has several thousand species of trees and shrubs, Sind has only ten species of trees. Central Europe has about forty species, and the greater part of northern Russia, Sweden and Norway contains forests consisting of about half a dozen species. Elevation above the sea acts similarly to rising latitude, but the effect is much more rapidly produced. Generally speaking, it may be said that the Tropics and adjoining parts of the earth, wherever the climate is not modified by considerable elevation, contain broad-leaved species, palms, bamboos, &c. Here most of the best and hardest timbers are found, such as teak, mahogany and ebony. The northern countries are rich in conifers. Taking a section from Central Africa to North Europe, it will be found that south and north of the equator there is a large belt of dense hardwood forest; then comes the Sahara, then the coast of the Mediterranean with forests of cork oak; then Italy with oak, olive, chestnut, gradually giving place to ash, sycamore, beech, birch and certain species of pine; in Switzerland and Germany silver fir and spruce gain ground. Silver fir disappears in central Germany, and the countries around the Baltic contain forests consisting chiefly of Scotch pine, spruce and birch, to which, in Siberia, larch must be added, while the lower parts of the ground are stocked with hornbeam, willow, alder and poplar. In North America the distribution is as follows: Tropical vegetation is found in south Florida, while in north Florida it changes into a subtropical vegetation consisting of evergreen broad-leaved species with pines on sandy soils. On going north in the Atlantic region, the forest becomes temperate, containing deciduous broad-leaved trees and pines, until Canada is reached, where larches, spruces and firs occupy the ground. Around the great lakes on sandy soils the broad-leaved forest gives way to pines. On proceeding west from the Atlantic region the forest changes into a shrubby vegetation, and this into the prairies. Farther west, towards the Pacific coast, extensive forests are found consisting, according to latitude and elevation above the sea, of pines, larches, fir, Thujas and Tsugas. In Japan a tropical vegetation is found in the south, comprising palms, figs, ebony, mangrove and others. This is followed on proceeding north by subtropical forests containing evergreen oaks, *Podocarpus*, tree-ferns, and, at higher elevations, *Cryptomeria* and *Chamaecyparis*. Then follow deciduous broad-leaved forests, and finally firs, spruces and larches. In India the character of the forests is governed chiefly by rainfall and elevation. Where the former is heavy evergreen forests of Guttiferae, Dipterocarpeae, Leguminosae, Euphorbias, figs, palms, ferns, bamboos and india-rubber trees are found. Under a less copious rainfall deciduous forests appear, containing teak and sal (*Shorea robusta*) and a great variety of other valuable trees. Under a still smaller rainfall the vegetation becomes sparse, containing acacias, *Dalbergia sissoo* and Tamarix. Where t rainfall is very light or *nil*, desert appears. In the Himalaya subtropical to arctic conditions are found, the forests containin according to elevation, pines, firs, deodars, oaks, chestnut magnolias, laurels, rhododendrons and bamboos. Australi again, has its own particular flora of eucalypts, of which som two hundred species have been distinguished, as well as wattle Some of the eucalypts attain an enormous height.

Utility of Forests.—In the economy of man and of natur forests are of direct and indirect value, the former chiefly throug the produce which they yield, and the latter through the i fluence which they exercise upon climate, the regulation o moisture, the stability of the soil, the healthiness and beaut of a country and allied subjects. The *indirect* utility will b dealt with first. A piece of land bare of vegetation is, throughou the year, exposed to the full effect of sun and air currents, an the climatic conditions which are produced by these agencie If, on the other hand, a piece of land is covered with a growt of plants, and especially with a dense crop of forest vegetatio it enjoys the benefit of certain agencies which modify th effect of sun and wind on the soil and the adjoining layers o air. These modifying agencies are as follows: (1) The crown of the trees intercept the rays of the sun and the falling rai they obstruct the movement of air currents, and reduce radiatio at night. (2) The leaves, flowers and fruits, augmented b certain plants which grow in the shade of the trees, form a laye of mould, or humus, which protects the soil against rapid change of temperature, and greatly influences the movement of wate in it. (3) The roots of the trees penetrate into the soil in a directions, and bind it together. The effects of these agencie have been observed from ancient times, and widely differin views have been taken of them. Of late years, however, mor careful observations have been made at so-called parallel stations that is to say, one station in the middle of a forest, and anothe outside at some distance from its edge, but otherwise expose to the same general conditions. In this way, the followin results have been obtained: (1) Forests reduce the temperatur of the air and soil to a moderate extent, and render the climat more equable. (2) They increase the relative humidity of th air, and reduce evaporation. (3) They tend to increase the precipitation of moisture. As regards the actual rainfall, thei effect in low lands is *nil* or very small; in hilly countries it i probably greater, but definite results have not yet been obtaine owing to the difficulty of separating the effect of forests from that of other factors. (4) They help to regulate the water supply produce a more sustained feeding of springs, tend to reduce violent floods, and render the flow of water in rivers more continuous. (5) They assist in preventing denudation, erosion landslips, avalanches, the silting up of rivers and low lands and the formation of sand dunes. (6) They reduce the velocity of air-currents, protect adjoining fields against cold or dry winds, and afford shelter to cattle, game and useful birds. (7) They may, under certain conditions, improve the healthiness of a country, and help in its defence. (8) They increase the beauty of a country, and produce a healthy aesthetic influence upon the people.

The *direct* utility of forests is chiefly due to their produce, the capital which they represent, and the work which they provide. The principal produce of forests consists of timber and firewood. Both are necessaries for the daily life of the people. Apart from a limited number of broad-leaved species, the conifers have become the most important timber trees in the economy of man. They are found in greatest quantities in the countries around the Baltic and in North America. In modern times iron and other materials have, to a considerable extent, replaced timber, while coal, lignite, and peat compete with firewood; nevertheless wood is still indispensable, and likely to remain so. This is borne out by the statistics of the most civilized nations. Whereas the population of Great Britain and Ireland, during the period 1880–1900, increased by about 20%, the imports of timber, during the same period, increased by 45%; in other words, every head of population in 1900 used more timber than twenty years earlier. Germany produced in 1880 about as much timber as she required; in 1899 she imported 4,600,000 tons, valued at £14,000,000, and her imports are rapidly increasing, although the yield capacity of her own forests is much higher now than it was formerly. Wood is now used for many purposes which formerly were not thought of. The manufacture of the wood pulp annually imported into Britain consumes at least 2,000,000 tons of timber. A fabric closely resembling silk is now made of spruce wood. The variety of other, or minor, produce yielded by forests is very great, and much of it is essential for the well-being of the people and for various industries. The yield of fodder is of the utmost importance in countries subject to periodic droughts; in many places field crops could not be grown successfully without the leaf-mould and brushwood taken from the forests. As regards industries, attention need only be drawn to such articles as commercial fibre, tanning materials, dye-stuffs, lac, turpentine, resin, rubber, gutta-percha, &c. Great Britain and Ireland alone import every year such materials to the value of £12,000,000, half of this being represented by rubber.

The *capital* employed in forests consists chiefly of the value of the soil and growing stock of timber. The latter is, ordinarily, of much greater value than the former wherever a sustained annual yield of timber is expected from a forest. In the case of a Scotch pine forest, for instance, the value of the growing stock is, under the above-mentioned condition, from three to five times that of the soil. The rate of interest yielded by capital invested in forests differs, of course, considerably according to circumstances, but on the whole it may, under proper management, be placed equal to that yielded by agricultural land; it is lower than the agricultural rate on the better classes of land, but higher on the inferior classes. Hence the latter are specially indicated for the forest industry, and the former for the production of agricultural crops. Forests require *labour* in a great variety of ways, such as (1) general administration, formation, tending and harvesting; (2) transport of produce; and (3) industries which depend on forests for their prime material. The labour indicated under the first head differs considerably according to circumstances, but its amount is smaller than that required if the land is used for agriculture. Hence forests provide additional labour only if they are established on surplus lands. Owing to the bulky nature of forest produce its transport forms a business of considerable magnitude, the amount of labour being perhaps equal to half that employed under the first head. The greatest amount of labour is, however, required in the working up of the raw material yielded by forests. In this respect attention may be drawn to the chair industry in and around High Wycombe in Buckinghamshire, where more than 20,000 workmen are employed in converting the beech, grown on the adjoining chalk hills, into chairs and tools of many patterns. Complete statistics for Great Britain are not available under this head, but it may be mentioned that in Germany the people employed in the forests amount to 2·3 % of the total population; those employed on transport of forest produce 1·1 %; labourers employed on the various wood industries, 8·6 %; or a total of 12 %. An important feature of the work connected with forests and their produce is that a great part of it can be made to fit in with the requirements of agriculture; that is to say, it can be done at seasons when field crops do not require attention. Thus the rural labourers or small farmers can earn some money at times when they have nothing else to do, and when they would probably sit idle if no forest work were obtainable.

Whether, or how far, the utility of forests is brought out in a particular country depends on its special conditions, such as (1) the position of a country, its communications, and the control which it exercises over other countries, such as colonies; (2) the quantity and quality of substitutes for forest produce available in the country; (3) the value of land and labour, and the returns which land yields if used for other purposes; (4) the density of population; (5) the amount of capital available for investment; (6) the climate and configuration, especially the geographical position, whether inland or on the border of the sea, &c. No general rule can be laid down, showing whether forests are required in a country, or, if so, to what extent; that question must be answered according to the special circumstances of each case.

The subjoined table shows the forests of various European states:—

Countries.	Area of Forests, in Acres.	Percentage of Total Area of Country under Forest.	Percentage of Forest Area belonging to the State.	Forest Area per Head of Population, in Acres.
Sweden	49,000,000	48	33	9·5
Norway	17,000,000	21	28	7·6
Russia, including Finland	518,000,000	40	61	5·9
Bosnia and Herzegovina	6,400,000	50	78	4·0
Bulgaria	7,600,000	30	30	2·3
Turkey	11,200,000	20	..	1·7
Servia	3,900,000	32	37	1·5
Rumania	6,400,000	18	40	1·3
Spain	21,200,000	17	84	1·2
Hungary	22,500,000	28	15	1·2
Austria	24,000,000	32	7	·9
Greece	2,000,000	13	80	·85
Luxemburg	200,000	30	..	·82
Switzerland	2,100,000	20	5	·7
Germany	35,000,000	26	34	·6
France	24,000,000	18	12	·6
Italy	10,400,000	15	4	·3
Denmark	600,000	6	24	·25
Belgium	1,300,000	18	5	·2
Portugal	770,000	3·5	8	·15
Holland	560,000	7	?	·1
Great Britain	3,000,000	4	3	·07

These data exhibit considerable differences, since the percentage of the forest area varies from 3·5 to 50, and the area per head of population from ·07 to 9·5 acres. Russia, Sweden and Norway may as yet have more forest than they require for their own population. On the other hand, Great Britain and Ireland, Germany, Denmark, Portugal, Holland, and even Belgium, France and Italy have not a sufficient forest area to meet their own requirements; at the same time, they are all sea-bound countries, and importation is easy, while most of them are under the influence of moist sea winds, which reduces to a subordinate position the importance of forests for climatic reasons.

Intimately connected with the area of forests in a country is the state of ownership—whether they belong to the state, corporations or to private persons. Where, apart from the financial aspect and the supply of work, forests are not required for the sake of their indirect effects, and where importation from other countries is easy and assured, the government of the country need not, as a rule, trouble itself to maintain or acquire forests. Where the reverse conditions exist, and especially where the cost of transport over long distances becomes prohibitive, a wise administration will take measures to assure the maintenance of a suitable proportion of the country under forest. This can be done either by maintaining or constituting a suitable area of state forests, or by exercising a certain amount of control over corporation and even private forests. Such measures are more called for in continental countries than in those which are sea-bound, as is proved by the above statistics.

Supply of Timber—Imports and Exports.—The following table shows the net imports and exports of European countries (average data, calculated from the returns of recent years).

The only timber-exporting countries of Europe are Russia, Sweden, Norway, Austria-Hungary and Rumania; all the others either have only enough for their own consumption, or import timber. Great Britain and Ireland import now upwards of 10,000,000 tons a year, Germany about 4,600,000 tons, and

Belgium about 1,300,000 tons. Holland, France, Portugal, Spain and Italy are all importing countries, as also are Asia Minor, Egypt and Algeria. The west coast of Africa exports hardwoods, and imports coniferous timber. The Cape and Natal import considerable quantities of pine and fir wood. Australasia exports hardwoods and some Kauri pine from New Zealand, but imports larger quantities of light pine and fir timber. British India and Siam export teak and small quantities of fancy woods. The West Indies and South America export hardwoods, and import pine and fir wood. The United States of America will not much longer be a genuine exporting country, since they import already almost as much timber from Canada as they export. Canada exports considerable quantities of timber. The Dominion has still a forest area of 1,250,000 sq. m., equal to 38 % of the total area, and giving 165 acres of forest for every inhabitant. Although only about one-third of the forest area can be called regular timber land, Canada possesses an enormous forest wealth, with which she might supply permanently nearly all other countries deficient in material, if the governing bodies in the several provinces would only determine to stop the present fearful waste caused by axe and fire, and to introduce a regular system of management. As matters stand, the supplies of the most valuable timber of Canada, the white or Weymouth pine (*Pinus strobus*), are nearly exhausted; the great stores of spruce in the eastern provinces are being rapidly destroyed, and the forests of Douglas fir in the western provinces have been attacked for export to the United States and to other countries.

Net Imports and Exports of European Countries.

Countries.	Quantities in Tons.		Value in £ Sterling.	
	Imports.	Exports.	Imports.	Exports.
United Kingdom	10,004,000	..	26,540,000	..
Germany	4,600,000	..	14,820,000	..
Belgium	1,300,000	..	5,040,000	..
France	1,230,000	..	3,950,000	..
Italy	620,000	..	2,100,000	..
Spain	470,000	..	1,500,000	..
Denmark	470,000	..	1,250,000	..
Switzerland	204,000	..	480,000	..
Holland	180,000	..	720,000	..
Servia	110,000	..	160,000	..
Portugal	60,000	..	200,000	..
Greece	35,000	..	130,000	..
Rumania	..	400,000	..	840,000
Norway	..	1,300,000	..	2,200,000
Austria - Hungary with Bosnia and Herzegovina	..	3,996,000	..	11,400,000
Sweden	..	4,460,000	..	7,930,000
Russia with Finland	..	6,890,000	..	10,440,000
Total	19,283,000	17,046,000	56,890,000	32,810,000
Net Imports	2,237,000		24,080,000	

These net imports are received from non-European countries. They consist chiefly of valuable hardwoods, like teak, mahogany, eucalypts and others.

Taking the remaining stocks of the whole earth together, it may be said that a sufficient quantity of hardwoods is available, but the only countries which are able to supply coniferous timber for export on a considerable scale are Russia, Sweden, Norway, Austria and Canada. As these countries have practically to supply the rest of the world, and as the management of their forests is far from satisfactory, the question of supplying light pine and fir timber, which forms the very staff of life of the wood industries, must become a very serious matter before many years have passed. Unmistakable signs of the coming crisis are everywhere visible to all who wish to see, and it is difficult to over-state the gravity of the problem, when it is remembered, for instance, that 87 % of all the timber imported into Great Britain consists of light pine and fir, and that most of the other importing countries are similarly situated. In some of these countries little or no room exists for the extension of woodland, but this statement does not apply to Great Britain and Ireland, which contain upwards of 12,000,000 acres of waste land, and 12,500,000 acres of mountain and heath land used for light grazing. One-fourth of that area, if put under forest, would produce all the timber now imported which can be grown in Britain, that is to say, about 95 % of the total.

The subjoined table shows the movements of timber within the greater part of the British empire:—

Net Imports and Exports into and from the British Empire.

Countries.	Annual Average during the Years 1884–1888.		Annual Average during the Years 1900–1903.	
	Net Imports.	Net Exports.	Net Imports.	Net Exports.
	£	£	£	£
United Kingdom	15,000,000	..	26,540,000	..
Australasia	1,284,000	..	568,000	..
Africa	72,000	..	737,000	..
West Indies, Honduras and Guiana	..	207,000	..	71,000
India, Ceylon and Mauritius	..	528,000	..	580,000
Dominion of Canada	..	4,025,000	..	4,789,000
Total	16,356,000	4,760,000	27,845,000	5,440,000
Net Imports	11,596,000		22,405,000	..
Total increase in 16 years	..	..	10,809,000	..
Average annual increase of net imports	..	..	675,562	..

Forest Management.—In early times there was practically no forest management. As long as the forests occupied considerable areas, their produce was looked upon as the free gift of nature, like air and water; men took it, used it, and even destroyed it without let or hindrance. With the gradual increase of population and the consequent reduction of the forest area, proprietary ideas developed; people claimed the ownership of certain forests, and proceeded to protect them against outsiders. Subsequently the law of the country was called in to help in protection, leading to the promulgation of special forest laws. By degrees it was found that mere protection was not sufficient, and that steps must be taken to enforce a more judicious treatment, as well as to limit the removal of timber to what the forests were capable of producing permanently. The teaching of natural science and of political economy was brought to bear upon the subject, so that now forestry has become a special science. This is recognized in many countries, amongst which Germany stands first, closely followed by France, Austria, Denmark and Belgium. Of non-European countries the palm belongs to British India, and then follow Ceylon, the Malay States, the Cape of Good Hope and Japan. The United States of America have also turned their attention to the subject. Most of the British colonies are, in this respect, as yet in a backward state, and the matter has still to be fought out in Great Britain and Ireland, though many writers have urged the importance of the question upon the public and the government. There can be no doubt that all civilized countries must, sooner or later, adopt a rational and systematic treatment of their forests.

For details as to the separate countries, see the articles under the country headings; in this article only some of the more important countries are dealt with, in so far as the history of their forestry is important. A few notes on Germany and France will be given, because in these countries forest management has been brought to highest perfection; Italy is mentioned, because she has allowed her forests to be destroyed; and a short description of forestry in the United Kingdom and in India follows. A separate section is devoted to the United States.

Germany is in general well-wooded. The winters being long and severe, an abundant supply of fuel is almost as essential as a sufficient supply of food. This necessity has led, along with a passion for the chase, to the preservation of forests, and to the establishment of an admirable system of forest cultivation, almost as carefully conducted as field tillage. The Black Forest stretches the whole length of the grand-duchy of Baden and part of the kingdom of Württemberg, from the Neckar to Basel and the Lake of Constance. The vegetation resembles that of the Vosges; forests of spruce, silver fir, Scotch pine, and, mingled with birches, beech and oak, are the chief woods met with. Until comparatively recent times large quantities of timber derived from these forests were floated down the Rhine to Holland and also shipped to England. Now the greater part of it is used locally for construction, or it is converted into paper pulp. In the grand-duchy of Hesse the Odenwald range of mountains, stretching between the Main and the Neckar, contains the chief supply of timber. In the province of Nassau there are the large wooded tracts of the Taunus mountain range and the Westerwald.

In Rhenish Prussia valuable forests lie partly in the Eifel, on the borders of Belgium, and on the mountains overhanging the Upper Moselle, but they do not furnish such stately trees as the Black Forest and the Odenwald. The Spessart, near Aschaffenburg in Bavaria, is one of the most extensive forests of middle Germany, containing large masses of fine oak and beech, with plantations of coniferous trees, such as spruce, Scotch pine and silver fir. Bavaria possesses other fine forest tracts, such as the Baierischewald on the Bohemian frontier, the Kranzberg near Munich, and the Frankenwald in the north of the kingdom. North Germany has extensive forests on the Harz and Thüringian Mountains, while in East Prussia large tracts of flat ground are covered with Scotch pine, spruce, oak and beech.

Every German state has its forest organization. In Prussia the department is presided over by the Oberland Forstmeister at Berlin, while each province, or part of a province, has an Oberforstmeister, under whom a number of Oberförsters administrate the state and communal forests. These, again, are assisted by a lower class of officials called Försters. The Oberförsters throughout Germany are educated at special schools of forestry, of which in 1909 the following nine existed:

In Prussia: at Eberswalde and Münden.
In Bavaria: at Munich and Aschaffenburg.
In Saxony: at Tharand.
In Württemberg: at Tübingen.
In Baden: at Carlsruhe.
In Hesse: at Giessen.
In the grand-duchy of Saxony: at Eisenach.

The schools at Munich, Tübingen and Giessen form part of the universities at these places; that at Carlsruhe is attached to the technical high school; the others are academies for the study of forestry only, but there is a tendency to transfer them all to the universities. The subordinate staff are trained for their work in so-called silvicultural schools, of which a large number exist. In this way the German forests have been brought to a high degree of productiveness, but the material derived from them falls far short of the requirements, although the forests occupy 26 % of the total area of the country; hence the net imports of timber amount already to 4,600,000 tons a year, and they are steadily rising.

France.—The principal timber tree of France is the oak. The cork oak is grown extensively in the south and in Corsica. The beech, ash, elm, maple, birch, walnut, chestnut and poplar are all important trees, while the silver fir and spruce form magnificent forests in the Vosges and Jura Mountains, and the Aleppo and maritime pines are cultivated in the south and south-west. About one-seventh of the entire territory is still covered with wood.

Forest legislation took its rise in France about the middle of the 16th century, and the great minister Sully urged the enforcement of restrictive forest laws. In 1669 a fixed treatment of state forests was enacted. Duhamel in 1755 published his famous work on forest trees. Reckless destruction of the forests, however, was in progress, and the Revolution of 1789 gave a fresh stimulus to the work of devastation. The usual results have followed in the frequency and destructiveness of floods, which have washed away the soil from the hillsides and valleys of many districts, especially in the south, and the frequent inundations of the last fifty years are no doubt caused by the deforesting of the sources of the Rhone and Saône. Laws were passed in 1860 and 1864, providing for the reforesting, "*reboisement*," of the slopes of mountains, and these laws take effect on private as well as state property. Thousands of acres are annually planted in the departments of Hautes and Basses Alpes; and during the summer of 1875, when much injury was done by floods in the south of France, the Durance, formerly the most dangerous in this respect of French rivers, gave little cause for anxiety, as it is round the head waters of this river that the chief plantations have been formed. While tracts formerly covered with wood have been replanted, plantations have been formed on the shifting sands or dunes along the coast of Gascony. A forest of *Pinus pinaster*, 150 m. in length, now stretches from Bayonne to the mouth of the Gironde, raised by means of sowing steadily continued since 1789; the cultivation of the pine, along with draining, has transformed low marshy grounds into productive soil extending over an area of about two million acres. The forests thus created provide annually some 600,000 tons of pit timber for the Welsh coal mines.

The state forest department is administered by the director-general, who has his headquarters at Paris, assisted by a board of administration, charged with the working of the forests, questions of rights and law, finance and plantation works.

The department is supplied with officers from the forest school at Nancy. This institution was founded in 1824, when M. Lorentz, who had studied forestry in Germany, was appointed its first director.

Italy.—The kingdom of Italy comprises such different climates that within its limits we find the birch and pines of northern Europe, and the olive, fig, manna-ash, and palm of more southern latitudes. By the republic of Venice and the duchy of Genoa forestal legislation was attempted at various periods from the 15th century downwards. These efforts were not successful, as the governments were lax in enforcing the laws. In 1789 Pius VI. issued regulations prohibiting felling without licence, and later orders were published by his successors in the pontifical states. In Lombardy the woods, which in 1830 reached nearly down to Milan, have almost disappeared. The province of Como contains only a remnant of the primitive forests, and the same may also be said of the southern slopes of Tirol. At Ravenna there is still a large forest of stone pine, *Pinus pinea*, though it has been much reduced. The plains of Tuscany are adorned with planted trees, the olive, mulberry, fig and almond. Sardinia is rich in woods, which cover one-fifth of the area, and contain a large amount of oak, *Quercus suber*, *robur* and *cerris*. In Sicily the forests have long been felled, save the zone at the base of Mount Etna.

The destruction of woods has been gradual but persistent; at the end of the 17th century the effects of denudation were first felt in the destructive force given to mountain torrents by the deforesting of the Apennines. The work of devastation continued until a comparatively recent time.

In 1867 the monastic property of Vallombrosa, Tuscany, 30 m. from Florence, was purchased by government for the purposes of a forest academy, which was opened in 1869. As only 4% of the total forest area belongs to the state, it is doubtful whether much good can now be done.

Great Britain and Ireland.—The British Isles were formerly much more extensively wooded than at present. The rapid increase of population led to the disforesting of woodland; the climate required the maintenance of household fires during a great part of the year, and the increasing demand for arable land and the extension of manufacturing industries combined to cause the diminution of woodland. The proportion of forest is now very small, and yields but a fraction of the required annual supply of timber which is imported with facility from America, northern Europe and the numerous British colonies.

Owing to the nature of the climate of the British Islands, with its abundance of atmospheric moisture and freedom from such extremes of heat and cold as are prevalent in continental

Europe, a great variety of trees are successfully cultivated. In England and Ireland oak and beech are on the whole the most plentiful trees in the low and fertile parts; in the south of Scotland the beech and ash are perhaps most common, while the Scotch fir and birch are characteristic of the arboreous vegetation in the Highlands. Although few extensive forests now exist, woods of small area, belts of planting, clumps of trees, coppice and hedgerows, are generally distributed over the country, constituting a mass of wood of considerable importance, giving a clothed appearance in many parts, and affording illustrations of skilled arboriculture not to be found in any other country.

The principal state forests in England are Windsor Park, 14,000 acres; the New Forest, &c., in Hampshire, 76,000 acres; and the Dean Forest in Gloucestershire, 22,500 acres. The total extent of crown forests is about 125,000 acres. A large proportion of the crown forests, having been formed with the object of supplying timber for the navy, consists of oak. The largest forests in Scotland are in Perthshire, Inverness-shire and Aberdeenshire. Of these the most notable are the earl of Mansfield's near Scone (8000 acres), the duke of Atholl's larch plantations near Dunkeld (10,000 acres), and in Strathspey a large extent of Scotch pine, partly native, partly planted, belonging to the earl of Seafield. In the forests of Mar and Invercauld, the native pine attains a great size, and there are also large tracts of indigenous birch in various districts. Ireland was at one time richly clothed with wood; this is proved by the abundant remains of fallen trees in the bogs which occupy a large surface of the island. In addition to the causes above alluded to as tending to disforest England, the long unsettled state of the country also conduced to the diminishing of the woodlands.

The forests of Great Britain and Ireland, in spite of the large imports of timber, have not been appreciably extended up to the present time because (1) the rate at which foreign timber has been laid down in Britain is very low, thus keeping down the price of home-grown timber; (2) foreign timber is preferred to home-grown material, because it is in many cases of superior quality, while the latter comes into the market in an irregular and intermittent manner; (3) nearly the whole of the waste lands is private property. As regards prices, it can be shown that the lowest point was reached about the year 1888, in consequence of the remarkable development of means of communication, that prices then remained fairly stationary for some years, and that about 1894 a slow but steady rise set in, showing during the years 1894–1904 an increase of about 20 % all round. This was due to the gradual approach of the coming crisis in the supply of coniferous timber to the world. It can be shown that even with present prices the growing of timber can be made to pay, provided it is carried on in a rational and economic manner. Improved silvicultural methods must be applied, so as to produce a better class of timber, and the forests must be managed according to well-arranged working plans, which provide for a regular and sustained out-turn of timber year by year, so as to develop a healthy and steady market for locally-grown material. Unfortunately the private proprietors of the waste lands are in many cases not in a financial position to plant. Starting forests demands a certain outlay in cash, and the proprietor must forgo the income, however small, hitherto derived from the land until the plantations begin to yield a return. In these circumstances the state may well be expected to help in one or all of the following ways: (1) The equipment of forest schools, where economic forestry, as elaborated by research, is taught; (2) the management of the crown forests on economic principles, so as to serve as patterns to private proprietors; (3) advances should be made to landed proprietors who desire to plant land, but are short of funds, just as is done in the case of improvements of agricultural holdings; and (4) the state might acquire surplus lands in certain parts of the country, such as congested districts, and convert them into forests. Action in these directions would soon lead to substantial benefits. The income of landed proprietors would rise, a considerable sum of money now sent abroad would remain in the country, and forest industries would spring up, thus helping to counteract the ever-increasing flow of people from the country into the large towns, where only too many must join the army of the unemployed. Even within a radius of 50 m. of London 700,000 acres of land are unaccounted for in the official agricultural returns. In Ireland more than 3,000,000 acres are waiting to be utilized, and it is well worth the consideration of the Irish Land Commissioners whether the lands remaining on their hands, when buying and breaking up large estates, should not be converted into state forests. Such a measure might become a useful auxiliary in the peaceful settlement of the Irish land question. No doubt success depends upon the probable financial results. There are at present no British statistics to prove such success; hence, by way of illustration, it may be stated what the results have been in the kingdom of Saxony, which, from an industrial point of view, is comparable with England. That country has 432,085 acres of state forests, of which about one-eighth are stocked with broad-leaved species, and seven-eighths with conifers. Some of the forests are situated on low lands, but the bulk of the area is found in the hilly parts of the country up to an elevation of 3000 ft. above the sea. The average price realized of late years per cubic foot of wood amounts to 5d., and yet to such perfection has the management been brought by a well-trained staff, that the mean annual net revenue, after meeting all expenses, comes to 21s. an acre all round. There can be no doubt that, under the more favourable climate of Great Britain, even better results can be obtained, especially if it is remembered that foreign supplies of coniferous timber must fall off, or, at any rate, the price per cubic foot rise considerably.

These things have been recognized to some extent, and a movement has been set on foot to improve matters. The Commissioners of Woods and a number of private proprietors had rational working plans prepared for their forests, and instruction in forestry has been developed. There is now a well-equipped school of forestry connected with the university of Oxford, while Cambridge is following on similar lines; instruction in forestry is given at the university of Edinburgh, the Durham College of Science, at Bangor, Cirencester and other places. The Commissioners of Woods have purchased an estate of 12,500 acres in Scotland, which will be converted into a crown forest, so as to serve as an example. The experience thus gained will prove valuable should action ever be taken on the lines suggested by a Royal Commission on Coast Erosion, Reclamation of Tidal Lands and Afforestation, which reported on the last subject in 1909.

India.—The history of forest administration in India is exceedingly instructive to all who take an interest in the welfare of the British Empire, because it places before the reader an account of the gradual destruction of the greater part of the natural forests, a process through which most other British colonies are now passing, and then it shows how India emerged triumphantly from the self-inflicted calamity. As far as information goes, India was, in the early times, for the most part covered with forest. Subsequently settlers opened out the country along fertile valleys and streams, while nomadic tribes, moving from pasture to pasture, fired alike hills and plains. This process went on for centuries. With the advent of British rule forest destruction became more rapid than ever, owing to the increase of population, extension of cultivation, the multiplication of herds of cattle, and the universal firing of the forests to produce fresh crops of grass. Then railways came, and with their extension the forests suffered anew, partly on account of the increased demand for timber and firewood, and partly on account of the fresh impetus given to cultivation along their routes. Ultimately, when failure to meet the requirements of public works was brought to notice, it was recognized that a grievous mistake had been made in allowing the forests to be recklessly destroyed. Already in the early part of the 19th century sporadic efforts were made to protect the forests in various parts of the country, and these continued intermittently; but the first organized steps were taken about the year 1855, when Lord Dalhousie was governor-general. At that time conservators of forests existed in Bombay, Madras and Burma.

Soon afterwards other appointments followed, and in 1864 an organized state department, presided over by the inspector-general of forests, was established. Since then the Indian Forest Department has steadily grown, so that it has now become of considerable importance for the welfare of the people, as well as for the Indian exchequer.

The first duty of the department was to ascertain the position and extent of the remaining forests, and more particularly of that portion which still belonged to the state. Then a special forest law was passed, which was superseded in 1878 by an improved act, providing for the legal formation of permanent state forests; the determination, regulation, and, if necessary, commutation of forest rights; the protection of the forests against unlawful acts and the punishment of forest offences; the protection of forest produce in transit; the constitution of a staff of forest officers, provision to invest them with suitable legal powers, and the determination of their duties and liabilities. The officers who administered the department in its infancy were mostly botanists and military officers. Some of these became excellent foresters. In order to provide a technically trained staff arrangements were made in 1866 by Sir Dietrich Brandis, the first inspector-general of forests, for the training of young Englishmen at the French Forest School at Nancy and at similar institutions in Germany. In 1876 the students were concentrated at Nancy, and in 1885 an English forest school for India was organized in connexion with the Royal Indian Engineering College at Cooper's Hill. In 1905 the school was transferred to the university of Oxford. The imperial forest staff of India consisted in 1909 of—officers not specially trained before entering the department, 17; officers trained in France and Germany, 23; officers trained at Cooper's Hill, 143—total 184.

In 1878 a forest school was started at Dehra Dun, United Provinces, for the training of natives of India as executive officers on the provincial staff. Since then a similar school, though on a smaller scale, has been established at Tharrawaddy in Burma. About 500 officers of this class have been appointed. In addition, there are about 11,000 subordinates, foresters and forest guards, who form the protective staff. The school at Dehra Dun has lately been converted into the Imperial Forest College.

The progress made since 1864 is really astonishing. According to the latest available returns, the areas taken under the management of the department are—reserved state forests, or permanent forest estates, 91,272 sq. m.; other state forests, 141,669 sq. m.; or a total of 232,941 sq. m., equal to 24 % of the area over which they are scattered. At present, therefore, the average charge of each member of the controlling staff comprises 1266 sq. m.; that of each executive officer, 446 sq. m.; and that of each protective official, 21 sq. m. It is the intention to increase the executive and protective staff considerably, in the same degree as the management of the forests becomes more detailed. Of the above-mentioned area the Forest Survey Branch, established in 1872, has up to date surveyed and mapped about 65,000 sq. m. From 1864 onwards efforts were made to introduce systematic management into the forests, based upon working plans, but, as the management had been provincialized, there was no central or continuous control. This was remedied in 1884, when a central Working Plans Office, under the inspector-general of forests, was established. This officer has since then controlled the preparation and execution of the plans, a procedure which has led to most beneficial results. Plans referring to about 38,000 sq. m. are now (1909) in operation, and after a reasonable lapse of time there should not be a single forest of importance which is not worked on a well-regulated plan, and on the principle of a sustained yield. While the danger of overworking the forests is thus being gradually eliminated, their yield capacity is increased by suitable silvicultural treatment and by fire protection. Formerly most of the important forests were annually or periodically devastated by jungle fires, sometimes lighted accidentally, in other cases purposely. Now 38,000 sq. m. of forest are actually protected against fire by the efforts of the department, and it is the intention gradually to extend protection to all permanent state forests. Grazing of cattle is of great importance in India; at the same time it is liable to interfere seriously with the reproduction of the forests. To meet both requirements careful and minute arrangements have been made, according to which at present 38,000 sq. m. are closed to grazing; 19,000 sq. m. are closed only against the grazing of goats, sheep and camels; while 176,000 sq. m. are open to the grazing of all kinds of cattle. The areas closed in ordinary years form a reserve of fodder in years of drought and scarcity. During famine years they are either opened to grazing, or grass is cut in them and transported to districts where the cattle are in danger of starvation. The service rendered in this way by a wise forest administration should not be underrated, since one of the most serious calamities of a famine—the want of cattle to cultivate the land—is thus, if not avoided, at any rate considerably reduced. During 1907 the government of India established a Research Institute, with six members engaged in collecting data regarding silviculture, forest botany, forest zoology, forest economics, working plans, and chemistry in connexion with forest produce and production. The institute is likely to lead to further substantial progress in the management of the forests.

The financial results of forest administration in India for the years 1865 to 1905 show the progress made:

Period.	Mean Annual Net Revenue.	Percentage of Annual Increase during Period.
	Rupees.	
1865–1870 . . .	1,372,733	. .
1870–1875 . . .	1,783,248	30
1875–1880 . . .	2,224,687	25
1880–1885 . . .	3,385,745	52
1885–1890 . . .	5,066,671	50
1890–1895 . . .	7,370,572	44
1895–1900 . . .	7,923,484	7
1900–1905 . . .	9,004,367	12

The highest percentage of increase occurred in the period 1880–1885. The revenue since 1886 has been considerably increased by the annexation of Upper Burma.

Apart from the net revenue, large quantities of produce are given free of charge, or at reduced rates, to the people of the country. Thus, in 1904–1905, the net revenue amounted to Rs. 11,062,094, while the produce given free or at reduced rates was valued at Rs. 3,500,661, making a total net benefit derived from the state forests during that year of Rs. 14,562,755, or in round figures one million pounds sterling. The out-turn during the same year amounted to 252 million cub. ft. of timber and fuel and 215 million bamboos. The receipts from the sale of other forest produce came to 9 million rupees, out of a total gross revenue of 24 million rupees.

These results are highly creditable to the government of India, which has led the way towards the introduction of rational forest management into the British empire, thus setting an example which has been followed more or less by various colonies. Even the movement in the United Kingdom during late years is due to it. Apart from India, substantial progress has been made in Cape Colony, Ceylon, the Straits Settlements and the Federated Malay States. Other British colonies are more backward in this respect. Energetic action is urgently wanted, especially in Canada and Australasia, where an enormous state property is threatened by destruction.

Literature.—The following works of special interest may be mentioned: W. Schlich, *A Manual of Forestry* (London) (vols. i., ii. and iii. by W. Schlich; vols. iv. and v. by W. R. Fisher; 3rd ed. of vol. i., 1906, of vol. ii., 1904, of vol. iii., 1905; 2nd ed. of vol. iv., 1907; 2nd ed. of vol. v., 1908); Baden-Powell, *Forest Law* (London, 1893); Brown, *The Forester* (ed. by Nisbet, Edinburgh and London, 1905); Broilliard, *Le Traitement des bois* (Paris, 1894); Huffel, *Économie forestière* (Paris, 1904–1907); Lorey, *Handbuch der Forstwissenschaft* (2nd ed. by Stoetzer, Tübingen, 1903); Rossmässler, *Der Wald.* (W. Sch.)

United States

The Forest Regions.—The great treeless region east of the Rocky Mountains separates the wooded area of the United

States into two grand divisions, which may be called the Eastern and the Western forests. The Eastern forest is characterized by the predominance, on the whole, of broad-leafed trees, the comparative uniformity of its general types over wide areas, and its naturally unbroken distribution. In the Western forest conifers are conspicuously predominant; the individual species often reaches enormous and even unequalled dimensions, the forest is frequently interrupted by treeless areas, and the transitions from one type to another are often exceedingly abrupt. Both divisions are botanically and commercially rich in species.

The Eastern forest may conveniently be subdivided into three members:

1. The Northern forest, marked by great density and large volume of standing timber, and a comparative immunity, in its virgin condition, from fire. The characteristic trees are maples, birches and beech (*Fagus atropunicea*), among the hardwoods and white pine (*Pinus strobus*), spruce (*Picea rubens* and *Picea mariana*) and hemlock (*Tsuga canadensis*) among conifers.

2. The Southern forest is on the whole less dense than the Northern, and more frequently burned over. Among its characteristic trees are the longleaf (*Pinus palustris*) and other pines, oaks, gums, bald cypress (*Taxodium distichum*) and white cedar (*Chamaecyparis thyoides*).

3. The Central Hardwood forest, which differs comparatively little from adjacent portions of the Northern and Southern forests except in the absence of conifers. Among its trees are the chestnut (*Castanea dentata*), hickories, ashes and other hardwoods already mentioned.

The Western division has two members:

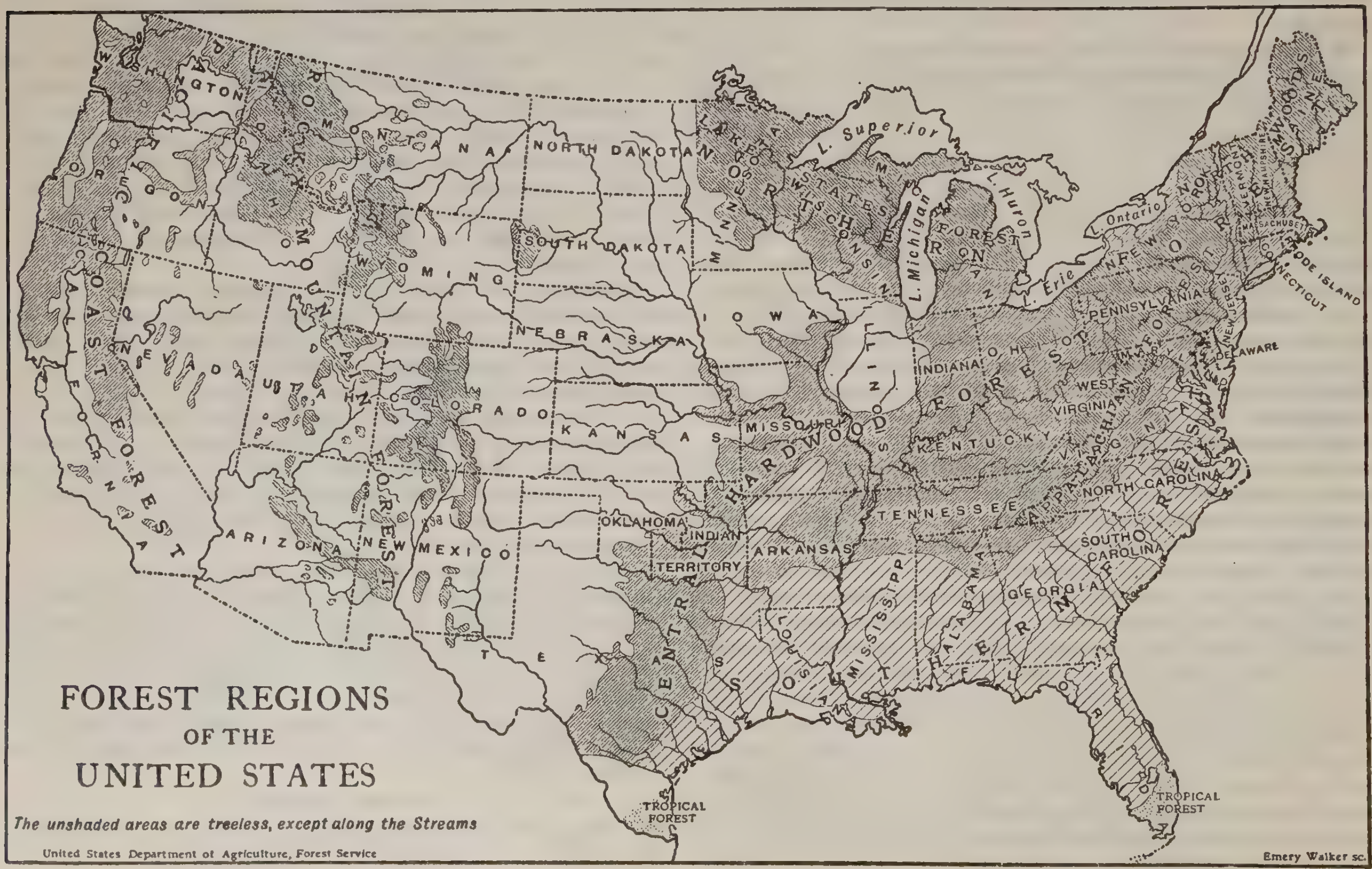
1. The Pacific Coast forest, marked by the great size of its trees and the vast accumulations of merchantable timber. Among its characteristic species are the redwood (*Sequoia sempervirens*) and the big tree (*S. Washingtoniana*), the Douglas fir (*Pseudotsuga taxifolia*), sugar pine (*Pinus lambertiana*), western hemlock (*Tsuga heterophylla*), giant arborvitae (*Thuja plicata*) and Sitka spruce (*Picea sitchensis*).

2. The Rocky Mountain forest, whose characteristic species are the western yellow pine (*Pinus ponderosa*), Engelmann spruce (*Picea engelmanni*) and lodgepole pine (*Pinus murrayana*). This forest is frequently broken by treeless areas of greater or less extent, especially towards the south, and it suffers greatly from fire. Subarid in character, except to the north and at high elevations, the vast mining interests of the region and its treeless surroundings give this forest an economic value out of proportion to the quantities of timber it contains.

This distribution of the various forests is indicated on the first of the two accompanying maps. The second map shows the situation of the national forests hereafter mentioned.

The forests of Alaska fall into two main divisions: the commercial though undeveloped forests of the south-east coast, which occur along the streams and on the lower slopes of the mountains and consist chiefly of western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), yellow cedar (*Chamaecyparis nootkatensis*) and giant arborvitae (*Thuja plicata*), usually of large size and uninjured by fire; and the vast interior forests, swept by severe fires, and consisting chiefly of white and black spruces (*Picea canadensis* and *nigra*), paper birch (*Betula papyrifera*) and aspen (*Populus tremuloides*), all of small size but of great importance in connexion with mining. Northern Alaska and the extreme western coast regions are entirely barren.

The National Forest Policy.—The forest policy of the United States may be said to have had its origin in 1799 in the enactment of a law which authorized the purchase of timber suitable for the use of the navy, or of land upon which such timber was growing. It is true that laws were in force under the early governments of Massachusetts, New Jersey and other colonies, providing for the care and protection of forest interests in various ways, but these laws were distinctly survivals of tendencies acquired in Europe, and for the most part of little use. It was not until the apparent approach of a dangerous shortage in certain timber supplies that the first real step in forest policy was taken by the United States. Successive laws passed from 1817 to 1831 strove to give larger effect to the original enactment, but without permanent influence towards the preservation of the live oak (*Quercus virginiana* Mill.), which was the object in view. A long period of inaction followed these early measures. In


WASHINGTON
OREGON
MONTANA
IDAHO
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEBRASKA
NEVADA
UTAH
COLORADO
KANSAS
ARIZONA
NEW MEXICO
OKLAHOMA
INDIAN TERRITORY
TEXAS
IOWA
MISSOURI
ARKANSAS
MINNESOTA
WISCONSIN
L. Superior
L. Michigan
L. Huron
L. Ontario
L. Erie
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW JERSEY
DELAWARE
RHODE ISLAND
CONNECTICUT
NEW YORK
VERMONT
MAINE
COAST FOREST
ROCKY MOUNTAIN FOREST
NORTHERN FOREST
CENTRAL HARDWOOD FOREST
SOUTHERN FOREST
TROPICAL FOREST
TROPICAL FOREST

FOREST REGIONS
OF THE
UNITED STATES

The unshaded areas are treeless, except along the Streams

United States Department of Agriculture, Forest Service

Emery Walker sc.

1831 the solicitor of the treasury assumed a partial responsibility for the care and protection of the public timber lands, and in 1855 this duty was transferred to the commissioner of the general land office in the Department of the Interior. The effect of these changes upon forest protection was unimportant. When, however, at the close of the Civil War railway building in the United States took on an unparalleled activity, the destruction of forests by fire and the axe increased in a corresponding ratio, and public sentiment began to take alarm. Action by several of the states slightly preceded that of the Federal government, but in 1876 Congress, acting under the inspiration of a memorial from the American Association for the Advancement of Science, authorized the appointment of an officer (Dr Franklin B. Hough) under the commissioner of agriculture, to collect and distribute information upon forest matters. His office became in 1880 the division of forestry in what is now the United States Department of Agriculture.

As the railways advanced into the treeless interior, public interest in tree-planting became keen. In 1873 Congress passed and later amended and repealed the timber culture acts, which granted homesteads on the treeless public lands to settlers who planted one-fourth of their entries with trees. Though these measures were not successful in themselves they directed attention towards forestry. The act which repealed them in 1891 contained a clause which lies at the foundation of the present forest policy of the United States. By it the president was authorized to set aside " any part of the public lands wholly or in part covered with timber or undergrowth, whether of commercial value or not, as public reservations, and the President shall, by public proclamation, declare the establishment of such reservations and the limits thereof." Some eighteen million acres had been proclaimed as reservations at the time when, in 1896, the National Academy of Sciences was asked by the secretary of the interior to make an investigation and report upon " the inauguration of a rational forest policy for the forest lands of the United States." Upon the recommendation of a commission named by the Academy, President Cleveland established more than twenty-one million acres of new reserves on the 22nd of February 1897. His action was widely misunderstood and attacked, but it awakened a public interest in forest questions without which the rapid progress of forestry in the United States since that time could never have been made.

Within a few months after the proclamation of the Cleveland reserves the present national forest policy took definite shape. Under this policy the national government holds and manages, in the common interest of all users of the forests or its products, such portions of the public lands as have been set aside by presidential proclamation in accordance with the act of 1891. These lands are held against private acquisition under the Homestead Act (except as to agricultural lands as hereafter mentioned), the Timber and Stone Act, and other laws under which the United States disposes of its unappropriated public domain, but not against private acquisition under the Mineral Land Laws. They are selected from lands believed to be more valuable for forest purposes than for agriculture, and are managed with the purpose of securing from them the best and largest possible returns, present and future, whether in the form of water for irrigation or power, of timber, of forage for stock, or of any other beneficial product. The aggregate area of the reserves, or national forests, has been steadily increased until they now include nearly all the timber lands left of the public domain.

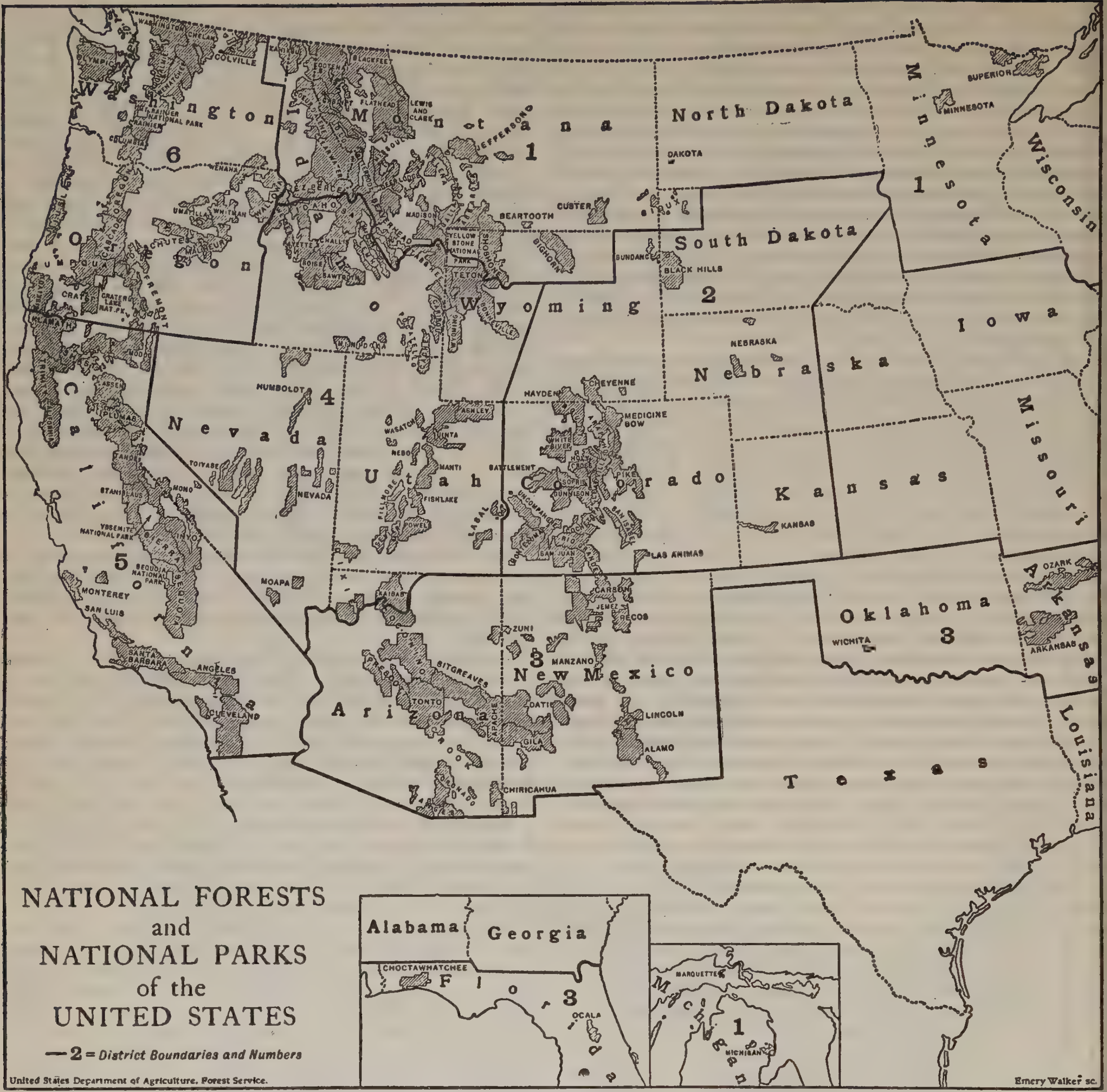
The general lines of this policy were in part laid down by the commission already mentioned, in its report submitted to the secretary of the interior, May 1, 1897, and by the act of June 4, 1897, which was largely shaped by the work of the commission. Until this act was passed the national forests had been in theory closed against any form of use; nor had the possibility of securing forest preservation by wise use received much thought from those who had favoured their creation. Such a state of affairs could not continue. Before long public opinion would have forced the opening to use of the resources thus arbitrarily locked up, and in the absence of any administrative system providing for conservative use, the national forests would inevitably have been abolished, and the whole policy of government forest holdings would have ceased. The act of June 4, 1897 was therefore of the first importance. This act conferred upon the secretary of the interior general powers for the proper management of the national forests through the general land office of his department. It provided for the designation and sale of dead, mature and large timber; authorized the secretary to permit free use of timber in small quantities by settlers, miners and residents; empowered him to " make such rules and regulations and establish such service as will insure the objects of such reservations, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction "; and made violation of the act or of such rules and regulations a misdemeanour. The statute limited the power to establish forest reservations to the purpose of improving and protecting the forest, securing favourable conditions of water flows, and furnishing a continuous supply of timber for the use and necessities of citizens of the United States. Lands found, upon due examination, to be more valuable for other purposes than for forest uses might be eliminated from any reservation, and all mineral lands within the reservations were left open to private appropriation under the mineral laws. The rights of settlers and claimants were safeguarded, and civil and criminal jurisdiction, except so far as the punishment of offences against the United States in the reservations was concerned, was reserved to the States.

While the administration of the national forests was entrusted to the general land office, the same act assigned the surveying and mapping of them to the United States Geological Survey, which has published descriptions and maps of some of the more important.

No attempt was made in the general land office to develop a technical forest service. There were, indeed, at the time of passage of the act, less than ten trained foresters in the United States, no means of training more, and very little conception of what forestry actually meant. The purpose of the administration was therefore mainly protection against trespass and fire, particularly the latter. Regulations were made giving effect to the provisions of the act of June 4, set forth above, but in the absence of technical knowledge as to what might safely be done, the tendency was rather to restrict than to extend the use of the forest. Meanwhile, however, there was rapidly developing in another branch of the government service an organization qualified for actual forest management.

One year after the passage of the act of June 4, 1897, the division of forestry in the Department of Agriculture ceased to be merely a bureau of information, and became an active agency for introducing the actual practice of forestry among private owners and for conducting the investigations upon which a sound American forest practice could be based. The work awakened great interest among forest owners, and exerted a powerful educational influence upon the country at large. The division extended its work and became (July 1, 1901) the Bureau of Forestry. It drew into its employment for a time nearly all the men who were preparing themselves in increasing numbers (at first abroad, then in the newly-founded schools in the United States) for the profession of forestry, and was soon recognized as qualified to speak authoritatively on technical questions connected with the administration of the national forests. This led to a request from the secretary of the interior for the advice of the bureau on such questions. Working plans were accordingly undertaken for a number of the forests. The general land office, however, was not ready to attempt active forest management. Though some timber was sold and the grazing of stock regulated to some extent, the main object of the land office administration continued to be protection against fire. Many of the regulations which it made could not be enforced.

The disadvantages of dispersal of the Federal government forest work among three separate agencies grew more and more apparent, until, on the 1st of February 1905, control of the 63,000,000 acres of forest reserves which up to that time had been set aside was transferred from the general land office to



NATIONAL FORESTS
and
NATIONAL PARKS
of the
UNITED STATES

—2 = *District Boundaries and Numbers*

United States Department of Agriculture. Forest Service.

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Washington
6
Oregon
California
5
Nevada
4
Idaho
Montana
1
Wyoming
Utah
Colorado
2
Arizona
New Mexico
3
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
3
Texas
Minnesota
1
Wisconsin
Iowa
Missouri
Arkansas
Louisiana
OLYMPIC
WASHINGTON
CHELAN
COLVILLE
RAINIER NATIONAL PARK
RAINIER
COLUMBIA
WENAHA
UMATILLA
WHITMAN
DESCHUTES
MALHEUR
UMPQUA
CASCADE
CRATER LAKE NAT. PK.
FREMONT
KLAMATH
TRINITY
MODOC
LASSEN
PLUMAS
TAHOE
STANISLAUS
MONO
YOSEMITE NATIONAL PARK
SIERRA
INYO
SEQUOIA NATIONAL PARK
MONTEREY
SAN LUIS
SANTA BARBARA
ANGELES
CLEVELAND
HUMBOLDT
TOIYABE
NEVADA
MOAPA
KANIKSU
KOOTENAI
BLACKFEET
FLATHEAD
LEWIS AND CLARK
JEFFERSON
MADISON
BEARTOOTH
CUSTER
BIGHORN
YELLOWSTONE NATIONAL PARK
TETON
CHALLIS
BOISE
SAWTOOTH
PAYETTE
WEISER
SUNDANCE
BLACK HILLS
DAKOTA
NEBRASKA
CHEYENNE
HAYDEN
MEDICINE BOW
ASHLEY
UINTA
WASATCH
NEBO
MANTI
FISHLAKE
POWELL
FILLMORE
DIXIE
KAIBAB
LA SAL
BATTLEMENT
WHITE RIVER
HOLY CROSS
LEADVILLE
PIKE
UNCOMPAHGRE
GUNNISON
SAN ISABEL
SAN JUAN
RIO GRANDE
MONTEZUMA
LAS ANIMAS
KANSAS
CARSON
JEMEZ
PECOS
ZUNI
MANZANO
DATIL
LINCOLN
ALAMO
GILA
APACHE
SITGREAVES
TONTO
PRESCOTT
CORONADO
CHIRICAHUA
WICHITA
OZARK
ARKANSAS
SUPERIOR
MINNESOTA
Alabama
Georgia
CHOCTAWHATCHEE
Florida
3
OCALA
MARQUETTE
Michigan
1
MICHIGAN

the Bureau of Forestry. In recognition of its new duties the designation of the bureau became the Forest Service.

Other provisions of the act which affected the transfer were that forest supervisors and rangers should be selected, so far as possible, from qualified citizens of the state or territory in which each forest was situated, and that all money received from the sale of any products or the use of any land or resources of the national forests should be covered into the treasury and constitute a special fund for their protection, administration, improvement and extension. Five days later a statute gave forest officers the power to arrest trespassers; and on the 3rd of March the lieu land selection law was repealed. This law had opened the way for grave abuses through the exchange of worthless land by private owners within the forests for an equal area of valuable timber lands outside.

The law has been modified since by the change of the old name "Forest Reserves" to "National Forests." The act of June 11, 1906, opened to homestead entry lands within national forests found by examination to be chiefly valuable for agriculture. The administration and improvement of the national forests are now provided for directly by congressional appropriation. The power to create national forests conferred on the president by the act of March 1891 has been repealed for the states of Washington, Oregon, Idaho, Montana, Wyoming and Colorado, but for no others.

The Forest Service began in earnest the development of al the resources of the national forests. Mature timber was sold wherever there was a demand for it and the permanent welfare of the forests and protection of the streams permitted, but always so as to prevent waste, guard against fire, protect young growth and ensure reproduction. Regulations were adopted which allowed small sales to be made without formality or delay secured for the government the full value of timber sold, and eliminated unnecessary routine. Care was taken to safeguard the interests of the government and provide for the maintenanc of good technical standards. The conduct of local busines was entrusted to local officers. Large transactions with genera policies were controlled from Washington, but with carefu provision for first-hand knowledge and close touch with the work in the field. Business efficiency and the convenience of the public were carefully studied. In short, an organization was created capable of handling safely, speedily and satisfactorily the complex business of making useful a forest property of vast extent, scattered through sixteen different states of an aggregate area of over 1,500,000 sq. m. and with a population of 9,000,000.

The growth since the 1st of July 1897 of the area of the national forests, of the expenditures of the government for forestry, and of the receipts from the national forests, is shown by the statement which follows. Though the act of June 4, 1897, became effective immediately upon its passage, the fiscal year 1899 was the first of actual administration, because the first for which Congress made the appropriation necessary to carry out the law.

Area of National Forests, Annual Expenditures of the Federal Government for Forestry and National Forest Administration, and Receipts from National Forests, 1898–1909.

Fiscal Year.[1]	Area of National Forests at Close of Year (June 30).	Division of Forestry (Bureau of Forestry, Forest Service).	General Land Office.	Receipts from National Forests.	Receipts from National Forests, per Acre.	Expenditures upon National Forests, per Acre.
	Acres.	$	$	$	$	$
1898	40,866,184	20,000·00	..	..	..	..
1899	46,168,439	28,520·00	175,000·00	7,534·83	0·00016	0·0038
1900	46,515,039	48,520·00	210,000·00	36,754·02	·00078	·0045
1901	46,324,479	88,520·00	325,000·00	29,250·88	·00063	·0070
1902	51,896,357	185,440·00	300,000·00	25,431·87	·00049	·0060
1903	62,211,240	291,860·00	304,135·00	45,838·08	·00074	·0054
1904	62,611,449	350,000·00	375,000·00	58,436·19	·00093	·0072
1905	85,693,422	632,232·36[2]	217,907·64[2]	73,276·15	·00085	·0059
1906	106,994,018	1,191,400·21	..	767,219·96	·00717	·0089
1907	150,832,665	1,800,595·20	..	1,571,059·44	·01041	·0097
1909	167,677,749	2,948,153·08	..	1,807,276·66	·00931	·0151

Until 1906, the sole source of receipts was the sale of timber. In the fiscal year 1907, however, timber sales furnished less than half the receipts. The following statement concerning the timber sales of the fiscal years 1904–1907 will serve to bring out the change that followed the transfer of control to the forest service in the midst of the fiscal year 1905:—

Fiscal Year.	Amount of Timber Sold.	Amount of Timber Cut.	Receipts from Timber Sales.
	Bd.-ft.	Bd.-ft.	$
1904	112,773,710	58,435,000	58,436·19
1905	113,661,508	68,475,000	73,270·15
1906	328,230,326	138,665,000	245,013·49
1907	1,044,855,000	194,872,000	686,813·12

These figures show (1) a large excess each year in the amount of timber sold over that cut and paid for; (2) nine times as much timber sold at the end of the four-year period as at the beginning and three times as much cut; and (3) a much higher price obtained per thousand board-feet at the end of the period than at the beginning. Each of these matters calls for comment. The sales are of stumpage only; the government does no logging on its own account.

1. More timber is sold each year than is cut and paid for, because many of the sales extend over several years. With increasing sales the amount sold each year for future removal has exceeded the amount to be removed during that year under sales of earlier years. Large sales covering a term of years are made because the national forests contain much overmature timber, which needs removal, but which is frequently too inaccessible to be saleable in small amounts. To prevent speculation the time allowed for cutting is never more than five years, and cutting must begin at once and be continued steadily.

2. The volume of sales has increased rapidly because much forest is ripe for the axe, the demand is strong, and control by trained men makes it safe to cut more freely. The increase is marked both in small and in large sales, but a score of sales for less than $5000 are made against one for more. The total cut is still far below the annual increment of the forests. As the demand grows restrictions must increase in order to husband the present supply until the next crop matures.

3. The stumpage price would seem on the face of the figures to have risen from about one dollar to more than three dollars per thousand board-feet. The receipts, however, for any one year are not exclusively for the timber cut in that year, since payments are made in advance. In the year 1907 the average price obtained was something less than $2·50 per thousand. It is therefore true that stumpage prices have risen greatly, although conditions new to the American lumbermen are imposed. Full utilization of all merchantable material, care of young growth in felling and logging, and the piling of brush, to be subsequently burned by the forest officers if burning is necessary, are among these conditions. Timber to be cut must first be marked by the forest officers. Sales of more than $100 in value are made only after public advertisement.

Only the simplest forms of silviculture have as yet been introduced. The vast area of the national forests, the comparatively sparse population of the West, the rough and broken character of the forests themselves, and the newness of the problems which their management presents, make the general application of intensive methods for the present impracticable. Natural reproduction is secured. The selection system is most used, often under the rough and ready method of an approximate diameter limit, with the reservation of seed trees where needed. The tendency, however, is strongly towards a more flexible and effective application of the selection principle, as a better trained field force is developed and as market conditions improve.

One conspicuous achievement was the reduction of loss by fires on the national forests. During the unusually dry season of 1905 there were only eight fires of any importance, and the area burned over amounted only to about ·16 of 1 % of the total area. In 1906 about ·12 of 1% was burned. This was accomplished by efficient patrol, co-operation of the public, and by preventive measures, such as piling and burning the brush on cut-over areas.

Since the beginning of 1906 the largest source of income from the national forests was their use for grazing. Stock-raising is one of the most important industries of the West. Formerly cattle and sheep grazed freely on all parts of the public domain. In the early days of the national forests the wisdom of permitting any grazing at all upon them was sharply questioned. Unrestricted grazing had led to friction between individuals, the deterioration of much of the range through overstocking, and serious injury to the forests and stream flow. The forests of the West, however, are largely of open growth and contain many grassy parks, the results of old fires, and many high mountain meadows. Under proper regulations the grass and other forage plants which they produce in great quantity can be used without detriment to the forests themselves, and with great benefit to the stock industry, which often can find summer pasturage nowhere else. Except in southern California grazing is now permitted on all national forests unless the watersheds furnish water for domestic use; but the time of entering and leaving, the number of head to be grazed by each applicant, and the part of the range to be occupied are carefully prescribed. Planted areas and cut-over areas are closed to stock until the young growth is safe from harm, and goats are allowed only in the brushland of the foothills.

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[1] The United States fiscal year ends June 30, and receives its designation from the calendar year in which it terminates. Thus, the fiscal year 1898 is the year July 1, 1897–June 30, 1898.

[2] Administration transferred to Bureau of Forestry, February 1, 1905.

The results of regulation, in addition to the protection of forest growth and streams, are the prevention of disputes, improved range, better stock, stable conditions in the stock industry, and the best use of the range in the interest of progress and development. The first right to graze stock on the forests is given to residents, small owners and those who have used the range before. Thus the crowding out of the weaker by the stronger and of the settler by the roving outsider has been stopped. In 1906 the forest service began to impose a moderate charge for the use of the national forest range. The following statement shows the amount of stock grazed on the national forests 1904-09, and the receipts for the grazing charge:—

Year.	Number of Cattle and Horses.	Number of Sheep and Goats.	Receipts. $
1904	610,091	1,806,722	..
1905	692,124	1,709,987	..
1906	1,015,148	5,763,100	514,692·87
1907	1,200,158	6,657,083	863,920·32
1909	1,581,404	7,819,594	1,032,185·70

A work of enormous magnitude which has now begun is planting on the national forests. At present, with low stumpage prices and incomplete utilization of forest products, clear cutting with subsequent planting is not practicable. There are, however, many million acres of denuded land within the national forests which require planting. Such planting is still confined chiefly to watersheds which supply cities and towns with water. The first planting was done in 1892, in California. Since then similar work has been done on city watersheds in Colorado, Utah, Idaho and New Mexico. Other plantations are in the Black Hills national forest, where large areas of cut-over and burned-over land are entirely without seed trees, and in the sandhill region of Nebraska. Up to 1908 about 2,000,000 seedlings had been planted, on over 2000 acres—a small beginning, but the work was entirely new and presented many hard problems.

The nursery operations of the forest service are concentrated at seven stations, located in southern California, Nebraska, Colorado, New Mexico (2), Utah and Idaho, where stock is raised for local planting and for shipment elsewhere. These nurseries are small. Their annual productive capacity is between 8,000,000 and 10,000,000 seedlings. Each nursery is practically an experimental forest-planting station, at which a large variety of species are grown and various methods are tried.

The organization of the administrative work of the national forests is by single forests. On the 1st of January 1908 the total number of forests was 165 with a total area of 162,023,190 acres (on April 7, 1909, the numbers were 146 national forests in the U.S. with 167,672,467 acres, besides two in Alaska with 26,761,626 and one in Porto Rico with 65,950 acres). In charge of each forest is a forest supervisor. Under the supervisors are forest rangers and forest guards, whose duties include patrol, marking timber and scaling logs, enforcing the regulations and conducting some of the minor business arising from the use of the forests. Guards are temporary employés; rangers are employed by the year. The supervisors report directly to and receive instructions from the central office at Washington. In this office there are four branches—operation, grazing, silviculture and products—each of which directs that part of the work which belongs to it, dealing directly with the supervisor. For inspection purposes, however, the forests are separated into six districts, in each of which is located a chief inspector with a corps of assistants. The inspectors are without administrative authority, but assist by their counsel the supervisors, and through inspection reports keep the Washington office informed of the condition of all lines of administrative work in progress. Administrative officers alternate frequently between field and office duties.

The number of forest officers in the several grades on the 1st of January 1908 were: 6 chief inspectors, 26 inspectors, 106 forest supervisors, 41 deputy forest supervisors, 820 forest rangers and 283 forest guards. The total number of employés of the forest service on the same date, including the clerical force, was 2034.

Besides the administration of the national forests, the forest service conducts general investigations, carries on an extensive educational work, and co-operates with private owners who contemplate forest management upon their own tracts. This last work is undertaken because of the need of bringing forestry into practice, the lack of trained foresters outside of the employ of the government, and the lack of information as to how to apply forestry and what returns may be obtained. Co-operation takes the form of advice upon the ground and, on occasion, of the making of working plans. The educational work of the service is performed chiefly through publications, the purpose of which is to spread very widely a knowledge of the importance of forestry to the nation and of the principles upon which its practice rests. The investigations which the service conducts extend from studies of the natural distribution and classification of American forests and of their varied silvicultural problems to statistics of lumber production and laboratory researches which bear upon the economical utilization of forest products. As examples of these researches may be mentioned tests of the strength of timber, studies of the preservative treatment of wood for various uses, wood-pulp investigations and studies in wood chemistry.

Forest Instruction.—Most of the men now in the forest service received their training in the United States. There are several professional schools of forestry. The Yale Forest School, which was opened as a department of Yale University in September 1900, offers a two-years' graduate course with abundant field work, and also conducts a summer school of forestry, especially adapted to the training of forest rangers and special students, at Milford, Pennsylvania. The university of Michigan and Harvard University also offer a two-years' graduate course in forestry. The Pennsylvania State College has recently established a four-years' undergraduate course in forestry. The Biltmore Forest School in North Carolina, the oldest of all these schools, offers a one-year course in technical forestry. A large number of the agricultural colleges give instruction in forestry. Among these are Nebraska, Minnesota, Maine, Michigan, Washington and Mississippi agricultural colleges, the university of Georgia and Iowa State College. Berea College, Kentucky, deserves special mention as a college which has done valuable work in teaching forestry without attempting to turn out professional foresters.

Forestry among the States.—Among the states forestry has hardly reached the stage of practical application on the ground. New York holds 1,500,000 acres of forest land. It has a commission to care for its forest preserve, and to protect the forest land throughout the state from fire. The constitution of the state, however, prohibits the cutting of timber on state land, and thus confines the work entirely to protection of the forest and to the planting of waste areas. Pennsylvania is at present showing the most efficient activity in working out a forest policy. It has state forests of 820,000 acres, a good fire law more and more satisfactorily enforced, and eight nurseries for growing planting material. In 1905, 160,000 white pine seedlings were set out. It has also a school for forest rangers, to be employed on the state forests, and it has just established a state professional school of forestry.

Twenty-six of the states have regularly appointed forest officers, six have carried on studies of forest conditions in co-operation with the forest service, and there is scarcely one which is not actively interested in forestry. Laws, generally good, to prevent damage from forest fires, have been enacted by practically all the states, but their enforcement has unfortunately been lax. Public sentiment, however, is making rapid progress. Among the best laws are those of Maine, New Hampshire, Minnesota, New York, Pennsylvania and Wisconsin. The New York law, for example, provides for the appointment of one or more fire-wardens in each town of the counties in which damage by fire is especially to be feared. In other counties supervisors of towns are *ex-officio* fire-wardens. A chief fire-warden has general supervision of their work. The wardens, half of the cost of whose services is paid by the state, receive compensation only for the time actually employed in fighting fires. They may command the service of any citizen to assist them. Setting fire to woods or waste lands belonging to the state or to another, if such fire results in loss, is punishable by a fine not exceeding $250 or imprisonment not exceeding one year, or both, and damages are provided for the person injured. Since fire is beyond question the most dangerous enemy of forests in the United States, the measures taken against it are of vital importance.

The following table shows the amount of forest land held by the different states, and by the territory of Hawaii:—

Area of State Forest Reservations, 1907.

Connecticut	1,360 acres
Hawaii	117,532 ,,
Indiana	2,000 ,,
Maryland	3,540 ,,
Michigan	39,000 ,,
Minnesota	42,800 ,,
New Jersey	2,474 ,,
New York	1,439,998 ,,
Pennsylvania	820,000 ,,
Wisconsin	254,072 ,,

Forestry on Private Lands.—The practice of forestry among private owners is of old date. One of the earliest instances was that of Jared Eliot, who, in 1730, began the systematic cutting of timber land to supply charcoal for an iron furnace at Old Salisbury, Connecticut. The successful planting of waste lands with timber trees in Massachusetts dates from about ten years later. But such examples were comparatively rare until recent times. At present the intelligent harvesting of timber with a view to successive crops, which is forestry, is much more common than is usually supposed. Among farmers it is especially frequent. It was begun among lumbermen by the late E. S. Coe, of Bangor, Maine, who made a practice of restricting the cut of spruce from his forests to trees 10, 12 or sometimes even 14 in. in diameter, with the result that much of his land yielded, during his life, a second crop as plentiful as the first. Many owners of spruce lands have followed his example, but until very recently without improving upon it. Systematic forestry on a large scale among lumbermen was begun in the Adirondacks during the summer of 1898 on the lands of Dr W. S. Webb and Hon. W. C. Whitney, of a combined area of over 100,000 acres, under the superintendence of the then Division of Forestry. In these forests spruce, maple, beech and birch predominate, but the spruce alone is at present of the first commercial importance. The treatment is a form of the selection system. Under it a second crop of equal yield would be ripe for the axe in thirty-five years. Spruce and pine are the only trees cut. The work had been executed, at least up to the year 1902, with great satisfaction to the owners and the lumbering contractors, as well as to the decided benefit of the forest. The lumbering is regulated by the following rules, and competent inspectors are employed to see that they are rightly carried out: (1) No trees shall be cut which are not marked. (2) All trees marked shall be cut. (3) No trees shall be left lodged in the woods, and none shall be overlooked by the skidders or haulers. (4) All merchantable logs which are as large as 6 in. in diameter at the small end must be utilized. (5) No stumps shall be cut more than 6 in. higher than the stump is wide. (6) No spruce shall be used for bridges, corduroy, skids, slides, or for any purpose except building camps, dams or booms, unless it is absolutely necessary on account of lack of other timber. (7) All merchantable spruce used for skidways must be cut into logs and hauled out. (8) Contractors must not do any unnecessary damage to young growth in lumbering; and if any is done, they must discharge the men who did it.

These two instances of forestry have been most useful and effective among lumbermen and other owners of forest land in the north-east. Among those which have followed their example are the Berlin Mills Paper Company in northern New Hampshire, the Cleveland Cliffs Iron Company in northern Michigan, and the Delaware and Hudson Railroad Company in New York, all of which have employed professional foresters.

The most notable instance of forestry in the south is on the estate of George W. Vanderbilt at Biltmore, N.C. This was the first case of systematic forestry under regular working plans in the United States. It was begun in 1891 on about 4000 acres, and has since been extended until it now covers about 100,000 acres. A professional forester with a corps of trained rangers under him is in charge of the work. The Pennsylvania Railroad has recently employed a trained forester and several assistants and has undertaken systematic forestry on a large scale.

The effect of the work of the forest service in assisting private owners is evidenced by the fact that down to the year 1908 670 wood lots and timber tracts had been examined by agents of the forest service, of which 250 were tracts over 400 acres in extent, and planting plans had been made for 436 owners covering a total area of 80,000 acres. Expert advice is also given to wood lot owners upon application by many of the state foresters.

American Practice.—The conditions under which forestry is practised in Europe and in America differ so widely that rules which are received as axiomatic in the one must often be rejected in the other. Among these conditions in America are the highly developed and specialized methods and machinery of lumbering, the greater facilities for transportation and consequent greater mobility of the lumber trade, the vast number of small holdings of forest land, and the enormous supply of low-grade wood in the timbered regions. High taxes on forest properties, cut-over as well as virgin, notably in the north-western pineries, and the firmly established habits of lumbermen, are factors of great importance. From these and other considerations it follows that such generally accepted essentials of European methods of forestry as a sustained annual yield, a permanent force of forest labourers, a permanent road system and the like, are in most cases utterly inapplicable in the United States at the present day in private forestry. Methods of forest management, to find acceptance, must there conform as closely as possible to existing methods of lumbering. Rules of marked simplicity, the observance of which will yet secure the safety of the forest, must open the way for more refined methods in the future. For the present a periodic or irregular yield, temporary means of transport, constantly changing crews, and an almost total ignorance of the silvics of all but a few of the most important trees—all combine to enforce the simplest silvicultural treatment and the utmost concentration of purpose on the two main objects of forestry, which are the production of a net revenue and the perpetuation of the forest. Such concentration has been followed in practice by complete success.

The forests with which the American forester deals are rich in species, usually endowed with abundant powers of reproduction, and, over a large part of their range, greatly dependent for their composition and general character upon the action of forest fires. Of the commercially valuable trees there may be said to be, in round numbers, a hundred out of a total forest flora of about 500 species, but many trees not yet of importance in the lumber trade will become so hereafter, as has already happened in many cases. The attention of the forester must usually be concentrated upon the growth and reproduction of a single species, and never of more than a very few. Thus the silvicultural problems which must be solved in the practice of forestry in America are fortunately less complicated than the presence of so many kinds of trees in forests of such diverse types would naturally seem to indicate.

The forest fire problem is one of the most difficult with which the American forester has to deal. It is probable that forest fires have had more to do with the character and distribution of forests in America than any other factor except rainfall. With an annual range over thousands of square miles, in many portions of the United States they occur regularly year after year on the same ground. Trees whose thick bark or abundant seeding gives them peculiar powers of resistance, frequently owe their exclusive possessions of vast areas purely to the action of fire. On the economic side fire is equally influential. The probability, or often the practical certainty, of fire after the first cut, commonly determines lumbermen to leave no merchantable tree standing. Forest fires are thus the most effective barriers to the introduction of forestry. Excessive taxation of timber land is another of almost equal effect. Because of it lumbermen hasten to cut, and afterwards often to abandon, lands which they cannot afford to hold. This evil, which only the progress of public sentiment can control, is especially prevalent in certain portions of the white pine belt.

Forest Associations.—Public sentiment in favour of the protection of forests is now widespread and increasingly effective throughout the United States. As the general understanding of the objects and methods of forestry becomes clearer, the tendency, formerly very marked, to confound ornamental tree planting and botanical matters with forestry proper is rapidly growing less. At the same time, the number and activity of associations dealing with forest matters is increasing with notable rapidity. There are now about thirty such associations in the United States. One of these, the Society of American Foresters, is composed exclusively of professional foresters. The American Forestry Association is the oldest and largest. It has been influential in preparing the ground work of popular interest in forestry, and especially in advocating and securing the adoption of the federal forest reservation policy, the most important step yet taken by the national government. It publishes as its organ a monthly magazine called *Forestry and Irrigation.* The Pennsylvania Forestry Association has been instrumental in placing that state in the forefront of forest progress. Its organ is a bi-monthly publication called *Forest Leaves.* Other states which have associations or societies of special influence in forest matters are California, Massachusetts, Minnesota, Colorado, New Hampshire, Georgia and Oregon. Arbor Day, instituted in Nebraska in 1872 as a day for shade-tree planting by farmers who had settled on the treeless prairies, has been taken up as a means of interesting school children in the planting of trees, and has spread until it is now observed in every state and territory. It continues to serve an admirable purpose.

Lumbering.—According to the census report for 1905 the capital invested in logging operations in the United States was $90,454,596, the number of employés engaged 146,596, and their wages $66,990,000; sawmills represented an invested capital of $381,621,000, and employed 223,674 persons, whose wages were $100,311,000, while planing mills represented a capital of $222,294,000 and employed 132,030 persons whose wages were $66,434,000.

All the operations of the lumber trade in the United States are controlled, and to no small degree determined, by the peculiar unit of measure which has been adopted. This unit, the board-foot, is generally defined as a board one foot long, one foot wide and one inch thick, but in reality it is equivalent to 144 cub. in. of manufactured lumber in any form. To purchase logs by this measure one must first know about what each log will yield in one-inch boards. For this purpose a scale or table is used, which gives the contents of logs of various diameters and lengths in board feet. Under such a standard the purchaser pays for nothing but the saleable lumber in each log, the inevitable waste in slabs and sawdust costing him nothing.

The table at foot gives the estimated consumption of wood for certain purposes in the United States in 1906.

In addition to this amount, an immense quantity of wood is used each year for fuel, posts and other domestic purposes, and the total annual consumption is not less than 20 billion cub. ft.

The years 1890 to 1906 were marked by rapid changes in the rank of the important timber trees with reference to the amount of timber cut, and a shifting of the important centres of production. Among coniferous trees, white pine has yielded successively to yellow pine and Douglas fir, while the scene of greatest activity has shifted from the Northern forest to the Southern, and from there is rapidly shifting to the Pacific Coast. The total cut of coniferous lumber has increased steadily, but that of the hardwoods is falling off, and in 1906 it was 15% less than in 1899, while inferior hardwoods are gradually assuming more and more importance, and the scene of greatest activity has passed from the middle west to the south and the Appalachian region.

Conifers.—The coniferous supply of the country is derived from four forest regions: (1) The Northern forest; (2) the Southern forest; (3) the Pacific Coast forest; and (4) the Rocky Mountain forest.

1. The Northern forest was long the chief source of the coniferous lumber production in the United States. The principal timber tree of this region is the white pine, usually known in Europe as the Weymouth pine. It has an average height when mature of 110 ft., with a diameter a little less than 3 ft., but the virgin timber is approaching exhaustion. White pine was one of the first trees to be cut extensively in the United States, and Maine, the pine tree state, was at first the centre of production. In 1851 the cut of white pine on the Penobscot river was 144 million ft., that of spruce 14 million and of hemlock 11 million. Thirty years later the pine cut had sunk to 23 million, spruce had risen to 118 million, and hemlock had passed pine by a million feet. Meanwhile, the centre of production had passed from the north woods to the Lake States, and for many years this region was the scene of the most vigorous lumbering activity in the world. The following figures show the cut for the Lake

Product.	Output 1906.	Equivalent Wood Volume.	Estimated Woods Waste.[1]	Estimated Mill Waste.[2]	Total Wood Volume Consumed.
		Million cub. ft.	Million cub. ft.	Million cub. ft.	Million cub. ft.
Lumber—					
Conifers	30,200,000 thousand bd. ft.	2517	1173	2170	5860
Hardwoods	7,300,000 " "	612	577	461	1650
Shingles	11,900,000 " "	107	54	109	270
Pulpwood	2,900,000 cords	261	79	..	340
Wood distillation	1,200,000 "	108	12	..	120
Heading	146,000,000 sets	32	33	45	110
Staves—					
Tight cooperage	267,000,000	22	36	32	90
Slack cooperage	1,097,000,000	27	22	21	70
Poles	3,500,000	35	15	..	50
Veneer	300,000 thousand bd. ft.	50	30	..	80
Round mine timbers	165,000,000 cub. ft.	165	35	..	200
Hewn cross ties	77,500,000	207	503	..	710
		4143	2569	2838	9550

[1] Woods waste includes tops, stumps, cull logs and butts, but does not include defective trees left or trees used for road purposes.

[2] Mill waste includes bark, kerf, slabs and edgings.

States from 1873 to 1906. It is certain that the remarkable decline in the cut of white pine which these figures show will continue still farther.

1873 . . .	3,993,780,000	1890 . . .	8,597,659,352
1874 . . .	3,751,306,000	1891 . . .	7,879,948,349
1875 . . .	3,968,553,000	1892 . . .	8,594,222,802
1876 . . .	3,879,046,000	1893 . . .	7,326,263,782
1877 . . .	3,595,333,496	1894 . . .	6,821,516,412
1878 . . .	3,629,472,759	1895 . . .	7,050,669,235
1879 . . .	4,806,943,000	1896 . . .	5,725,763,035
1880 . . .	5,651,295,000	1897 . . .	6,233,454,000
1881 . . .	6,768,856,749	1898 . . .	6,155,300,000
1882 . . .	7,552,150,744	1899 . . .	6,056,508,000
1883 . . .	7,624,789,786	1900 . . .	5,485,261,000
1884 . . .	7,935,033,054	1901 . . .	5,336,000,000
1885 . . .	7,053,094,555	1902 . . .	5,294,000,000
1886 . . .	7,425,368,443	1903 . . .	4,792,000,000
1887 . . .	7,757,916,784	1904 . . .	4,220,000,000
1888 . . .	8,388,716,460	1905 . . .	3,777,000,000
1889 . . .	8,183,050,755	1906 . . .	3,032,000,000

Second to the white pine among the coniferous lumber trees of the Northern forest is the hemlock (*Tsuga canadensis*). It is used chiefly for construction purposes and furnishes a comparatively low grade of lumber.

The spruce (*Picea rubens*) is used chiefly for lumber, but it is in large and increasing demand in the manufacture of paper pulp. For the latter purpose hemlock, poplar (*Populus tremuloides* and *P. grandidentata*) and several other woods are also employed, but on a smaller scale. The total consumption of wood for paper in the United States for 1906 was 3,660,000 cords, of which 2,500,000 was spruce. Of this, however, 720,000 cords were imported from Canada.

2. The chief product of the Southern forest is the yellow pine. This is the collective term for the longleaf, shortleaf, loblolly and Cuban pines. Of these the longleaf pine (*Pinus palustris* Mill.), called pitch-pine in Europe, is the most important. Its timber is probably superior in strength and durability to that of any other member of the genus *Pinus*, and in addition to its value as a timber tree it is the source of naval stores in the United States. The average size of the mature longleaf pine is 90 ft. in height and 20 in. in diameter. Shortleaf (*Pinus echinata*) and loblolly (*P. taeda*) are other important members of this group. Their wood very closely resembles that of the longleaf pine and is often difficult to distinguish from it. The trees are also of about the same size and height. Loblolly is, however, of more rapid growth. The total cut of yellow pine in 1906 was 11,661,000,000 board ft.; it has perhaps not yet reached its maximum, but is certainly near it.

Another important coniferous tree of the Southern forest is the bald cypress (*Taxodium distichum*), which grows in the swamps. The cut in 1906 was 839,000,000 board ft., a gain of 69% over 1899.

3. But the great supply of coniferous timber is now on the Pacific Coast. The Douglas fir (*Pseudotsuga taxifolia*), also known as Douglas spruce, red fir and Oregon pine, is the foremost tree in Oregon and Washington, and the redwood in California. When mature the Douglas fir averages 200 ft. in height and 4 ft. in diameter, and the redwood 225 ft. in height and 8 ft. in diameter. Other important trees of the Pacific Coast are sugar pine (*Pinus lambertiana*), western red cedar (*Thuja plicata*), western larch (*Larix occidentalis*), Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*) and western yellow pine (*Pinus ponderosa*). These trees will all be of increasing importance.

Logging on the Pacific Coast is characterized by the use of powerful machinery and by extreme skill in handling enormous weights. This is especially true in California, where the logs of redwood and of the big tree (*Sequoia Washingtoniana*) are often more than 10 ft. in diameter. Logging is usually done by wire cables operated by donkey-engines. The journey to the mill is usually by rail. The mills are often of great size, built on piles over tide water and so arranged that their product is delivered directly from the saws and dry kilns to vessels moored alongside. The products of the Pacific Coast forest make their way over land to the markets of the central and eastern states and into foreign markets. Among the lumber-producing states, Washington has in seven years jumped from fifth place to first, and its output has increased from 1,428,000,000 board ft. in 1899 to 4,305,000,000 ft. in 1906. Oregon and California have increased their output from 734,000,000 each in 1899 to 1,605,000,000 and 1,349,000,000 ft. respectively in 1906. Of the total output of these three states (7,259,000,000 ft.) 4,880,000,000 ft. is Douglas fir and 660,000,000 redwood.

4. The important lumber trees of the Rocky Mountain forest are the western yellow pine, the lodgepole pine, the Douglas fir and the Engelmann spruce. The Douglas fir, here extremely variable in size and value, reaches in this region average dimensions of perhaps 80 ft. in height by 2 ft. in diameter, the western yellow pine 90 ft. by 3 ft. and the Engelmann spruce 60 ft. by 2 ft. Mining, railroad and domestic uses chiefly absorb the annual timber product, which is considerable in quantity, and of vast importance to the local population. The lumber output of the Rocky Mountain region is, however, increasing very rapidly both in the north and in the south-west. One of the largest mills in the United States is in Idaho.

The following table summarizes the cut of the important coniferous species during the years 1899–1906:

Kind.	1899.	1904.	1906.	Per Cent Increase (+) or Decrease (−) since 1899.
	Million ft.	Million ft.	Million ft.	
Yellow Pine . . .	9,659	11,533	11,661	+ 20·7
Douglas Fir . . .	1,737	2,928	4,970	+ 186·2
White Pine . . .	7,742	5,333	4,584	− 40·8
Hemlock . . .	3,421	3,269	3,537	+ 3·4
Spruce . . .	1,448	1,304	1,645	+ 13·6
Western Pine . . .	944	1,279	1,387	+ 46·9
Cypress . . .	496	750	839	+ 69·3
Redwood . . .	360	519	683	+ 83·2
Cedar . . .	233	223	358	+ 53·7
	26,040	27,138	29,664	+ 14

Hardwoods.—The hardwood supply of the country is derived almost entirely from the eastern half of the continent, and comes from each of the three great Eastern forest regions.

The following table shows the cut of the important species of hardwoods for 1899 and 1906:

Kind.	1899.	1906.	Per Cent Increase (+) or Decrease (−).
	Thousand Feet.	Thousand Feet.	
Oak.	4,438,027	2,820,393	− 36·5
Maple	633,466	882,878	+ 39·4
Poplar	1,115,242	693,076	− 37·9
Red gum . . .	285,417	453,678	+ 59·0
Chestnut . . .	206,688	407,379	+ 97·1
Basswood . . .	308,069	376,838	+ 22·3
Birch	132,601	370,432	+ 179·4
Cottonwood . .	415,124	263,996	− 36·4
Beech	(*a*)	275,661	. .
Elm	456,731	224,795	− 50·8
Ash	269,120	214,460	− 20·8
Hickory . . .	96,636	148,212	+ 53·4
Tupelo. . . .	(*a*)	47,882	. .
Walnut. . . .	38,681	48,174	+ 24·5
Sycamore . . .	29,715	(*a*)	. .
All other . . .	208,504	87,637	− 58·0
Total . .	8,634,021	7,315,491	− 15·3

a Not separately reported.

Oak, which in 1899 furnished over half the entire output, has fallen off 36·5 %. Yellow poplar, which in 1899 was second among the hardwoods, has fallen off 38 % and now occupies third place; and elm, the great stand-by in slack cooperage, has fallen 50·8 %. On the other hand less valuable species like maple and red gum have advanced 39 and 59 % respectively.

The decrease is largely due to the fact that the hardwoods grow naturally on the better classes of soil, and in the eastern

United States where the population has always been the densest, and as a consequence of this, a large proportion of the original hardwood land has been cleared up and put under cultivation. The hardwood supply of the future must be obtained chiefly from the Appalachian region, where the conditions are less favourable to agriculture.

In addition to the lumber cut, enormous quantities of hardwoods are used each year for railroad ties, telephone and other poles, piles, fence posts and fuel, and there is a great amount of waste in the course of lumbering and manufacture.

Authorities.—Sargent, *Silva of North America* (Boston, 1891–1897), *Manual of Trees of North America* (Boston, 1903); Lemmon, *Handbook of West American Cone-Bearers* (San Francisco, 1895); Bruncken, *North American Forests and Forestry* (New York, 1900); Fernow, *Economics of Forestry* (New York, 1902); Pinchot, *The Adirondack Spruce* (New York, 1898); Pinchot and Graves, *The White Pine* (New York, 1896). See also the various publications of the U.S. forest service, including especially the following general works: *Forest Influences*; *Primer of Forestry*; the *Timber Supply of the United States*; the *Waning Hardwood Supply*; *Forest Products of the United States in 1906*; *Exports and Imports of Forest Products in 1906*; *Federal and State Forest Laws*; *Regulations and Instructions for the Use of the National Forests*; *The Use of the National Forests*; also part v. of the *Nineteenth and of the Twenty-first Annual Reports of the United States Geological Survey*, and vol. ix. of the *10th Census Report on the Forests of North America*; and *Reports* of the State Forestry Commissions of New York, New Hampshire, Maine, Pennsylvania, Michigan, Ohio, &c., and of the State Geological Surveys of New Jersey, Maryland and North Carolina. (G. P.)

FOREY, ÉLIE FRÉDÉRIC (1804–1872), marshal of France, was born at Paris on the 5th of January 1804, and entered the army from St Cyr in 1824. He took part in the earlier Algerian campaigns, and became captain in 1835. Four years later he was given command of a battalion of *chasseurs à pied* and in 1844 he became colonel. At the Revolution of 1848 Cavaignac made him a general of brigade. He took an active part in the *coup d'état* of the 2nd of December 1851, and Napoleon III. made him a general of division shortly afterwards. He held a superior command in the Crimean War, and in the Italian campaign of 1859 distinguished himself very greatly in the action of Montebello (20th May). In 1862 Forey was placed in command of the French expeditionary corps in Mexico, with the fullest civil and military powers, and he crowned a successful campaign by the capture of Mexico city in May 1863, receiving as his reward the marshal's bâton. From December 1863 to 1867 he held high commands in France, but in the latter year he was struck with paralysis and had to retire. Marshal Forey died at Paris on the 20th of June 1872.

FORFAR, a royal, municipal and police burgh, and capital of the county of Forfarshire, Scotland. Pop. (1901) 12,117. It lies at the east end of the Loch of Forfar in the valley of Strathmore, and is 13 m. N. by E. of Dundee by road and 21¼ m. by the Caledonian railway. It is also situated on the same company's main line to Aberdeen and sends off a branch to Brechin. The principal buildings comprise the court house, the county hall (with portraits by Raeburn, Romney, Opie and others), the town hall, the Meffan Institute (including the free library), the infirmary, poorhouse and the Reid hall, founded by Peter Reid, a merchant in the burgh who also gave the public park. The burgh unites with Montrose, Arbroath, Brechin and Inverbervie (the Montrose group of burghs) in returning one member to parliament. The Loch of Forfar, 1¼ m. long by ¼ m. wide, is drained by Dean Burn, and contains pike and perch. On a gravel bank or spit in the north-west of the lake stood a castle which was sometimes used as a residence by Margaret, queen of Malcolm Canmore. The staple industries are linen and jute manufactures, but brewing, tanning, bleaching, rope-making and iron-founding are also carried on.

Forfar is at least as old as the time of Malcolm Canmore, for the first parliament after the defeat of Macbeth met in the old castle, which stood on a mound on the northern side of the town. The parliaments of William the Lion, Alexander II. and Robert II. also assembled within its walls. The town, which was created a royal burgh by David I., was burnt down about the middle of the 13th century. Edward I. captured the castle on one of his incursions, but in 1307 Robert Bruce seized it, put its defenders to the sword and then destroyed it, its site being now marked by the town cross. Previous to the reign of James VI. the weekly market was held on Sunday, but after the union of the crowns parliament enacted that it should be held on Friday. The town sided with Charles I. during the Civil War, and Charles II. presented the Cross to it out of regard for the loyalty shown to his father. Forfar seems to have played a less reputable part in the persecution of witches. In 1661 a crown commission was issued for the trial of certain miserable creatures, some of whom were condemned to be burnt. In the same year one John Ford for his services as a witch-finder was admitted a burgess along with Lord Kinghorne. The witches' bridle, a gag to prevent them from speaking whilst being led to execution, is still preserved in the county hall. One mile to the E. lie the ruins of Restennet Priory, where a son of Robert Bruce was buried. For twenty five years after the Reformation it was used as the parish church and afterwards by the Episcopalians, until they obtained a chapel of their own in 1822.

FORFARSHIRE, or Angus, an eastern county of Scotland, bounded N. by the shires of Kincardine and Aberdeen, W. by Perthshire, S. by the Firth of Tay and E. by the North Sea. It has an area of 559,171 acres, or 873·7 sq. m. The island of Rossie and the Bell Rock belong to the shire.

Forfarshire is characterized by great variety of surface and may be divided physically into four well-marked sections. In the most northerly of these many of the rugged masses of the Grampians are found; this belt is succeeded by Strathmore, or the Howe of Angus, a fertile valley, from 6 to 8 m. broad, which is a continuation of the Howe of the Mearns, and runs south-westwards till it enters Strathearn, to the south-west of Perth; then come the Sidlaw Hills and a number of isolated heights, which in turn give way to the plain of the coast and the Firth. The mountains are all in the northern division and belong to the Binchinnin group (sometimes rather inexactly called the Braes of Angus) of the Grampian ranges. Among the highest masses, most of which lie on or near the confines of the bordering counties, are Glas Maol (3502 ft.) on the summit of which the shires of Aberdeen, Forfar and Perth meet, Cairn-na-Glasha (3484), Fafernie (3274), Broad Cairn (3268), Creag Leacach (3238), Tolmount (3143), Tom Buidhe (3140), Driesh (3105), Mount Keen (3077) and Mayar (3043), while peaks of upwards of 2000 ft. are numerous. The Sidlaw Hills—the greater part of which, however, belongs to Perthshire—are much less lofty and of less striking appearance. They have a breadth of from 3 to 6 m., the highest points within the county being Craigowl Hill (1493 ft.), Auchterhouse Hill (1399) and Gallow Hill (1242). None of the rivers is navigable, and only three are of any importance. The Isla, rising in Cairn-na-Glasha, flows southwards, then turns S.E. and finally S.W. till it enters the Tay after a course of 45 m. Its chief tributaries on the right are the Alyth, Ericht and Lunan, and on the left the Newton, Melgam and Dean. Near Bridge of Craig is the fall of Reekie Linn (70 ft.), so named from the fact that when the stream is in flood the spray rises in a dense cloud like smoke (*reek*). Near old Airlie Castle are the cascades called the Slugs of Auchrannie. The North Esk, formed by the confluence of the Lee and Mark at Invermark, after a south-easterly course of 28 m. enters the North Sea 3 m. N. of Montrose. On the right bank it receives the West Water and Cruick and on the left the Tarf and Luther. It gives the title of earl of Northesk to a branch of the Carnegie family. The South Esk rises in the Grampians near Mount Fafernie and not far from its source forms the Falls of Bachnagairn; after flowing towards the south-east, it bends eastwards near Tannadice and reaches the North Sea at Montrose, the length of its course being 48 m. Its principal affluents are the Prosen on the right and the Noran on the left. It supplies the title of earl of Southesk to another branch of the Carnegies. The lakes are small, the two largest being the Loch of Forfar and the mountain-girt Loch Lee (1 m. long by ¼ m. wide). Lintrathen (circular in shape and about ¾ m. across), to the north of Airlie Castle, supplies Dundee with drinking water. The glens of the Forfarshire

Grampians are remarkable for their beauty, and several of them for the wealth of their botanical specimens. The largest and finest of them are Glen Isla, in which are the ruins of Forter Castle, destroyed by Argyll in 1640, and the earl of Airlie's shooting-lodge of the Tulchan; Glen Clova, near the entrance to which stands Cortachy Castle, the seat of the earl of Airlie; Glen Esk and Glen Prosen.

Geology.—A great earth fracture traverses this county from near Edzell on the N.E. to Lintrathen Loch on the S.W. Between Cortachy and the south-western boundary this fault runs in Old Red Sandstone, but north-east of that place it forms the junction line of Silurian and Old Red; and in a general way we may say that on the N.W. side of the fault the metamorphosed Silurian rocks are found, while the remainder of the county is occupied by the Old Red Sandstone. On the margin of the disturbance the Silurian rocks are little-altered grey and green clay slates with bands of pebbly grit; farther towards the N.W. we find the same rocks metamorphosed into mica schists and gneisses with pebbly quartzites. Rising up through the schists between Carn Bannock and Mount Battock is a great mass of granite. The Old Red Sandstone extends from this county into Perthshire and Kincardineshire; here some 20,000 ft. of these deposits are seen; an important part being formed of volcanic tuffs and lavas which are regularly interbedded in the sandstones and conglomerates. North of Dundee some of the lower beds are traversed by intrusive dolerites, and Dundee Law is probably the remains of an old vent through which some of the contemporaneous lavas, &c., were discharged. The Old Red Rocks have been subjected to a good deal of folding, as may be seen along the coast. The principal direction of strike is from N.E. to S.W. A synclinal fold occupies Strathmore, and between Longforgan and Montrose the northern extension of the Sidlaw Hills is an anticlinal fold. Two fish-bearing beds occur in the county; from the lower one many large *Eurypterids* have been obtained. The well-known paving flags of Arbroath belong to the lower part of the formation. The Upper Old Red Sandstone is found only in one spot about a mile north of Arbroath. During the Glacial period the ice travelled south-eastward across Strathmore and over the Sidlaw Hills; abundant evidence of this transporting agent is to be seen in the form of morainic deposits, the most striking of which is the great transverse barrier of Glenairn in the valley of the S. Esk, half a mile in length and about 200 ft. high. Relics of the same period are found round the coast in the form of raised beaches at 100, 50 and 25 ft. above the present sea-level.

Climate and Agriculture.—On the whole the climate is healthy and favourable to agricultural pursuits. The mean temperature for the year is 47·3° F., for January 38° and for July 59°. The average annual rainfall is 34 in., the coast being considerably drier than the uplands. In the low-lying districts of the south the harvest is nearly as early as it is in the rest of Scotland, but in the north it is often late. The principal wheat districts are Strathmore and the neighbourhood of Dundee and Arbroath; and the yield is well up to the best Scottish average. Barley, an important crop, has increased steadily. Oats, however, though still the leading crop, have somewhat declined. Potatoes are mostly grown near the seaboard in the higher ground; turnips also are largely raised. The northern belt, where it is not waste land, has been turned into sheep walks and deer forests. The black-faced sheep are the most common in the mountainous country; cross-bred sheep in the lowlands. Though it is their native county (where they date from 1808), polled Angus are not reared so generally as in the neighbouring shire of Aberdeen, but shorthorns are a favourite stock and Irish cattle are imported for winter-feeding. Excepting in the vicinity of the towns there are no dairy farms. Horses are raised successfully, Clydesdales being the commonest breed, but the small native garrons are now little used. Pigs also are reared. Save perhaps in the case of the crofts, or very small holdings of less than 10 acres, farm management is fully abreast of the times.

Other Industries.—The staple industries are the jute and flax manufactures. Their headquarters are in Dundee, but they flourish also at other places. Shipbuilding is carried on at Dundee, Arbroath and Montrose. The manufactures of jams, confectionery, leather, machinery, soap and chemicals, are all of great and growing value. Sandstone quarries employ many hands and the deep-sea fisheries, of which Montrose is the centre, are of considerable importance. The netting of salmon at the mouth of the North Esk is also a profitable pursuit.

Two railway companies serve the county. The North British, entering from the south by the Tay Bridge, follows the coast north-eastwards, sending off at Montrose a branch to Bervie. The Caledonian runs up Strathmore to Forfar, whence it diverges due east to Guthrie, where it again resumes its north-easterly course to Dubton and Marykirk; it reaches Dundee from Perth by the shore of the estuary of the Tay, and sends branches from Dundee to Kirriemuir via Monikie and Forfar and to Alyth Junction via Newtyle, while a short line from Dubton gives it touch with Montrose.

Population and Government.—The population was 277,735 in 1891, and 284,083 in 1901, when 1303 spoke Gaelic and English, and 13 Gaelic only. The chief towns are Arbroath (pop. in 1901, 22,398), Brechin (8941), Broughty Ferry (10,484), Carnoustie (5204), Dundee (161,173), Forfar (11,397), Kirriemuir (4096), Monifieth (2134) and Montrose (12,427). Forfarshire returns one member to Parliament. It is a sheriffdom and there is a resident sheriff-substitute at Dundee and another at Forfar, the county town, and courts are held also at Arbroath. In addition to numerous board schools there are secondary schools at Dundee, Montrose, Arbroath, Brechin, Forfar and Kirriemuir, and technical schools at Dundee and Arbroath. Many of the elementary schools earn grants for higher education. The county council and the Dundee and Arbroath town councils expend the "residue" grant in subsidizing science and art and technical schools and classes, including University College, the textile school, the technical institute, the navigation school, and the workshop schools at Dundee, the technical school at Arbroath, besides cookery, dairy, dress-cutting, laundry, plumbing and veterinary science classes at different places.

History.—In the time of the Romans the country now known as Forfarshire was inhabited by Picts, of whose occupation there are evidences in remains of weems, or underground houses. Traces of Roman camps and stone forts are common, and there are vitrified forts at Finhaven, Dumsturdy Muir, the hill of Laws near Monifieth and at other points. Spearheads, battle-axes, sepulchral deposits, Scandinavian bronze pins, and other antiquarian relics testify to periods of storm and stress before the land settled down into order, towards which the Church was a powerful contributor. In the earliest days strife was frequent. The battle in which Agricola defeated Galgacus is supposed to have occurred in the Forfarshire Grampians (A.D. 84); the Northumbrian King Egfrith and the Pictish king Burde fought near Dunnichen in 685, the former being slain; conflicts with the Danes took place at Aberlemno and other spots; Elpin king of the Scots was defeated by Aengus in the parish of Liff in 730; at Restennet, about 835, the Picts and Scots had a bitter encounter. In later times the principal historical events, whether of peace or war, were more immediately connected with burghs than with the county as a whole. There is some doubt whether the county was named Angus, its title for several centuries, after a legendary Scottish prince or from the hill of Angus to the east of the church of Aberlemno. It was early governed by hereditary earls and was made a hereditary sheriffdom by David II. The first earl of Angus (by charter of 1389) was George Douglas, an illegitimate son of the 1st earl of Douglas by Margaret Stuart, who was countess of Angus in her own right. On the death of the 1st and only duke of Douglas, who was also 13th earl of Angus, in 1761, the earldom merged in the dukedom of Hamilton. Precisely when the shire became known by the name of the county town has not been ascertained, but probably the usage dates from the 16th century. Among old castles are the roofless square tower of Red Castle at the mouth of the Lunan; the tower of the castle of Auchinleck; the stronghold of Inverquharity near Kirriemuir; the castle of Finhaven; the two towers of old Edzell Castle; the ruins of Melgund Castle, which are fairly complete; the small castle of Newtyle, and the old square tower and gateway of the castle of Craig.

See A. Jervise, *Memorials of Angus and Mearns* (Edinburgh, 1895); *Land of the Lindsays* (Edinburgh, 1882); *Epitaphs and Inscriptions* (Edinburgh, 1879); Earl of Crawford, *Lives of the*

Lindsays (London, 1835); Sir W. Fraser, *History of the Carnegies* (Edinburgh, 1867); A. H. Millar, *Historical Castles and Mansions* (Paisley, 1890); G. Hay, *History of Arbroath* (Arbroath, 1876); D. D. Black, *History of Brechin* (Edinburgh, 1867).

FORFEITURE (from "forfeit," originally an offence, and hence a fine exacted as a penalty for such; derived through the O. Fr. *forfait*, from the late Lat. *foris factum*, a trespass, that which is done *foris*, outside), in English law, the term applied (1) to loss or liability to the loss of property in consequence of an offence or breach of contract; (2) to the property of which the party is deprived.

Under the common law, conviction and attainder on indictment for treason or felony was followed not only by forfeiture of the life of the offender, but also by forfeiture of his lands and goods. In the case of treason all the traitor's lands of whomsoever holden were forfeited to the king; in the case of felony (including *felo-de-se*, or suicide), the felon's lands escheated (*exceciderunt*) to his immediate lord, subject to the king's right to waste them for a year and a day. This rule did not apply to lands held in gavelkind in the county of Kent. The goods of traitors and felons were forfeited to the king. The desire of the king and his officers to realize the profits of these forfeitures was one of the chief motives for instituting the circuits of the king's justices throughout England; and from time to time conflicts arose from attempts by these justices to extend the law of treason—under which the king levied all the forfeitures—at the expense of felony, in which the lord of the felon benefited by the escheats. As regards theft, the king's rights overrode those of the owner of the stolen property, until, in the reign of Henry VIII., provision was made for restitution of the goods to the owner if he prosecuted the thief to conviction. In Pepys's *Diary*, 21st of January 1667–1668, will be found an illustration of the working of the old law. We find that on the suicide of his brother-in-law, Pepys at once applied to the king personally and obtained a grant of the brother-in-law's estate in favour of his widow and children should the inquest find a verdict of *felo-de-se*. It was common practice for persons anticipating conviction for treason or felony to assign all their property to others to avoid the forfeiture; and in some instances the accused refused to plead to the indictment and endured the *peine forte et dure*, until death supervened, to avoid these consequences of conviction. The royal rights to forfeitures arising within particular areas were frequently granted by charter to corporations or individuals. In 1897 the courts had to interpret such charters granted to the town of Nottingham in 1399 and 1448. All forfeitures and escheats with respect to conviction and attainder for treason and felony were abolished as from the 4th of July 1870, except forfeitures consequent upon the now disused process of outlawry, and the forfeitures included in the penalties of praemunire.

The term "forfeit" is also applied to penalties imposed by statute for acts or omissions which are neither treasonable nor felonious. In such statutes the forfeiture enures in favour of the crown unless the statute indicates another destination; and unless a particular method of enforcing the forfeiture is indicated it is enforceable as a debt to the crown and has priority as such. The words "forfeit and pay" are often used in imposing a pecuniary penalty for a petty misdemeanour, and where they are used the court dealing with the case must not only convict the offender but adjudicate as to the forfeiture.

Statutory forfeitures in some cases extend to specific chattels, *e.g.* of a British merchant-ship when her character as such is fraudulently dissimulated (Merch. Shipp. Act 1894, ss. 70, 76), or of goods smuggled in contravention of the customs acts or books introduced in violation of the copyright acts. Recognisances are said to be forfeited when the conditions are broken and an order of court is made for their enforcement as a crown debt against the persons bound by them.

The term "forfeiture" is now most commonly used with reference to real property, *i.e.* with reference to the rights of lords of the manor or lessors to determine the estate or interest of a copyholder or lessee for breach of the customary or contractual terms of tenure. It is also applied to express the deprivation of a limited owner of settled property, real or personal, for breach of the conditions by which his rights are limited; *e.g.* by becoming bankrupt or attempting to charge or alienate his interest. As a general rule, the courts "lean against forfeitures" of this kind; and are astute to defeat the claim of the superior landlord or other person seeking to enforce them. By legislation of 1881 and 1892 there is jurisdiction to grant relief upon terms against the forfeiture of a lease for breach of certain classes of covenant, *e.g.* to pay rent or to insure. [illegible]

FORGERY (derived through the French from Latin *fabricare*, to construct), in English law, "the fraudulent making or alteration of a writing to the prejudice of another man's right," or "the false making, or making *malo animo*, of any written instrument for the purpose of fraud or deceit." This definition, it will be seen, comprehends all fraudulent tampering with documents. "Not only the fabrication and false making of the whole of a written instrument, but a fraudulent insertion, alteration or erasure, even of a letter, in any material part of a true instrument whereby a new operation is given to it, will amount to forgery,—and this though it be afterwards executed by another person ignorant of the deceit" (Russell on *Crimes and Misdemeanours*, vol. ii.). Changing the word Dale into Sale in a lease, so that it appears to be a lease of the manor of Sale instead of the manor of Dale, is a forgery. And when a country banker's note was made payable at the house of a banker in London who failed, it was held to be forgery to alter the name of such London banker to that of another London banker with whom the country banker had subsequently made his notes payable. As to the fraud, "an intent to defraud is presumed to exist if it appears that at the time when the false document was made there was in existence a specific person, ascertained or unascertained, capable of being defrauded thereby; and this presumption is not rebutted by proof that the offender took or intended to take measures to prevent such person from being defrauded in fact, nor by the fact that he had or thought he had a right to the thing to be obtained by the false document" (Stephen's *Digest of the Criminal Law*). Thus when a man makes a false acceptance to a bill of exchange, and circulates it, intending to take it up and actually taking it up before it is presented for payment, he is guilty of forgery. Even if it be proved as a matter of fact that no person could be defrauded (as when A forges a cheque in B's name on a bank from which B had withdrawn his account), the intent to defraud will be presumed. But it would appear that if A knew that B had withdrawn his account, the absence of fraudulent intention would be inferred. A general intention to cheat the public is not the kind of fraud necessary to constitute forgery. Thus if a quack forges a diploma of the college of surgeons, in order to make people believe that he is a member of that body, he is not guilty of forgery.

The crime of forgery in English law has been from time to time dealt with in an enormous number of statutes. It was first made a statutory offence in 1562, and was punishable by fine, by standing in the pillory, having both ears cut off, the nostrils slit up and seared, the forfeiture of land and perpetual imprisonment. It was made capital, without benefit of clergy in 1634. The most notable cases of those who have suffered the extreme penalty of the law are those of the Rev. Dr W. Dodd in 1777, for forging Lord Chesterfield's name on a bond, and Henry Fauntleroy, a partner in the banking-house of Marsh, Sibbald & Co., for the appropriation by means of forged instruments of money entrusted to the bank, in 1824. "Anthony Hammond, in the title Forgery of his *Criminal Code*, has enumerated more than 400 statutes which contain provisions against the offence" (Sir J. T. Coleridge's notes to Blackstone). Blackstone notices the increasing severity of the legislature against forgery, and says that "through the number of these general and special provisions there is now hardly a case possible to be conceived wherein forgery that tends to defraud, whether in the name of a real or fictitious person, is not made a capital crime." These acts were consolidated in 1830. The later statutes, fixing penalties from penal servitude for life downwards, were consolidated by the Forgery Act 1861. It would take too much space to enumerate all the varieties of the offence with their appropriate punishments. The following condensed summary is based upon chapter xlv. of Sir J. Stephen's *Digest of the Criminal Law*:

1. Forgeries punishable with penal servitude for life as a maximum are—
   (*a*) Forgeries of the great seal, privy seal, &c.
   (*b*) Forgeries of transfers of stock, India bonds, exchequer bills, bank-notes, deeds, wills, bills of exchange, &c.
   (*c*) Obliterations or alterations of crossing on a cheque.
   (*d*) Forgeries of registers of birth, &c., or of copies thereof and others.
2. Forgeries punishable with fourteen years' penal servitude are—
   (*a*) Forgeries of debentures.
   (*b*) Forgeries of documents relating to the registering of deeds, &c.
   (*c*) Forgeries of instruments purporting to be made by the accountant general and other officers of the court of chancery, &c.
   (*d*) Drawing bill of exchange, &c., on account of another, per procuration or otherwise, without authority.
   (*e*) Obtaining property by means of a forged instrument, knowing it to be forged, or by probate obtained on a forged will, false oath, &c.
3. Forgeries punishable with seven years' penal servitude:—Forgeries of seals of courts, of the process of courts, of certificates, and of documents to be used in evidence, &c.

By the Merchandise Marks Acts 1887 and 1891, forgery of trade marks is an offence punishable on conviction by indictment with imprisonment not exceeding two years or to fine, or both, and on conviction by summary proceedings with imprisonment not exceeding four months or with a fine.

The Forged Transfers Act 1891, made retrospective by the Forged Transfers Act 1892, enables companies and local authorities to make compensation by a cash payment out of their funds for any loss arising from a transfer of their stocks, shares or securities through a forged transfer.

United States.—Forgery is made a crime by statute in most if not all the states, in addition to being a common law cheat. These statutes have much enlarged the common definition of this crime. It is also made a crime by a Federal statute (U.S. Rev. Stat., ch. 5), which includes forgery of national banknotes, letters patent, public bid, record, signature of a judge, land warrants, powers of attorney, ships' papers or custom-house documents, certificates of naturalization, &c.; the punishment is by fine or by imprisonment from one to fifteen years with or without hard labour.

In Illinois, fraudulently connecting together different parts of several banknotes or other genuine instruments so as to produce one additional note or instrument with intent to pass all as genuine, is a forgery of each of them (Rev. Stats. 1901, ch. 38, § 108). The alleged instrument must be apparently capable of defrauding (*Goodman* v. *People* [1907], 228, Ill. 154).

In Massachusetts, forgery of any note, certificate or bill of credit issued by the state treasurer and receiver general, or by any other officer, for a debt of that commonwealth, or a bank bill of any bank, is punishable by imprisonment for life or any term of years (Rev. Laws 1902, ch. 209, §§ 4 and 5).

In New York, forgery includes the false making, counterfeiting, alteration, erasure or obliteration of a genuine instrument (Penal Code, § 520). An officer or agent of a corporation who with intent to defraud sells, pledges or issues a fraudulent scrip, share certificate, is guilty of forgery in third degree. Falsely making any instrument which purports to be issued by a corporation bearing a pretended signature of a person falsely indicated as an officer of the company, is forgery just as if such person were in truth such officer (*id.* § 519). Counterfeiting railroad tickets is forgery in the third degree. Falsely certifying that the execution of a deed has been acknowledged is forgery (*id.* §511). So also is the forging a fictitious name (*People* v. *Browne* [1907], 103 N.Y. suppl. 903). Punishment for forgery in the first degree may be twenty years, in the second degree ten years, in the third degree five years.

In Pennsylvania, fraudulently making, signing, altering, uttering or publishing any written instrument other than bank bills, cheques or drafts, was punishable by fine and imprisonment "by separate or solitary confinement at labour for a term not exceeding ten years" (L. 1860, March 31); forging bank bills, &c., for a term not exceeding five years. Defacing, removing, or counterfeiting brands from lumber floating in any river is punishable by imprisonment for a term not exceeding two years or a fine (L. 1887, May 23). Fraudulently using the registered mark of another on lumber is punishable by fine or imprisonment by solitary confinement for a term not exceeding three years (*id.*).

In Tennessee, forgery may be committed by typewriting the body of and signature to an instrument which may be the subject of forgery (1906; *State* v. *Bradley*, 116 Tenn. 711).

In Vermont, the act of 1904, p. 135, no. 115, § 24, authorizes licensees to sell intoxicating liquors only on the written prescription of a legally qualified physician stating that it "is given and necessary for medicinal use." It was held that a prescription containing no such statement was invalid and the alteration thereof was not forgery (1906; *State* v. *McManus*, 78 St. 433).

Authorities.—Pollock and Maitland, *History of English Law*; Stephen, *Digest of Criminal Law*; *History of Criminal Law*; L. O. Pike, *History of Crime in England*, 1873–1876; Russell, *On Crimes*; Archbold, *Criminal Pleadings*.

FORGET-ME-NOT, or Scorpion-Grass (Ger. *Vergissmeinnicht*, Fr. *grémillet*, *scorpionne*), the name popularly applied to the small annual or perennial herbs forming the genus *Myosotis* of the natural order *Boraginaceae*, so called from the Greek μῦς, a mouse, and οὖς, an ear, on account of the shape of the leaves. The genus is represented in Europe, north Asia, North America and Australia, and is characterized by oblong or linear stem-leaves, flowers in terminal scorpioid cymes, small blue, pink or white flowers, a five-cleft persistent calyx, a salver- or funnel-shaped corolla, having its mouth closed by five short scales and hard, smooth, shining nutlets. The common or true forget-me-not, *M. palustris*, is a perennial plant growing to a height of 6 to 18 in., with rootstock creeping, stem clothed with lax spreading hairs, leaves light green, and somewhat shining, buds pink, becoming blue as they expand, and corolla rotate, broad, with retuse lobes and bright blue with a yellow centre. The divisions of the calyx extend only about one-third the length of the corolla, whereas in the other British species of *Myosotis* it is deeply cleft. The forget-me-not, a favourite with poets, and the symbol of constancy, is a frequent ornament of brooks, rivers and ditches, and, according to an old German tradition, received its name from the last words of a knight who was drowned in the attempt to procure the flower for his lady. It attains its greatest perfection under cultivation, and, as it flowers throughout the summer, is used with good effect for garden borders; a variety, *M. strigulosa*, is more hairy and erect, and its flowers are smaller. In *M. versicolor* the flowers are yellow when first open and change generally to a dull blue; sometimes they are permanently yellowish-white. Of the species in cultivation, *M. dissitiflora*, 6 to 8 in., with large handsome abundant sky-blue flowers, is the best and earliest, flowering from February onwards; it does well in light cool soils, preferring peaty ones, and should be renewed annually from seeds or cuttings. *M. rupicola*, or *M. alpestris*, 2 to 3 in., intense blue, is a fine rock plant, preferring shady situations and gritty soil; *M. azorica* (a native of the Azores) with purple, ultimately blue flowers about half an inch across, has a similar habit but larger flowers; *M. sylvatica*, 1 ft., blue, pink or white, used for spring bedding, should be sown annually in August.

FORGING, the craft of the smith, or "blacksmith," exercised on malleable iron and steel, in the production of works of constructive utility and of ornament. It differs from founding (*q.v.*) in the fact that the metal is never melted. It is essentially a moulding process, the iron or steel being worked at a full red, or white, heat when it is in a plastic and more or less pasty condition. Consequently the tools used are in the main counterparts of the shapes desired, and they mould by impact. All the operations of forging may be reduced to a few very simple ones: (1) Reducing or drawing down from a larger to a smaller section ("fullering" and "swaging"); (2) enlargement of a smaller to a larger portion ("upsetting"); (3) bending, or turning round to any angle or curvature; (4) uniting one piece of metal to another ("welding"); (5) the formation of holes by punching; and (6) severance, or cutting off. These include all the operations that are done at the anvil. In none of these processes, the last excepted, is the use of a sharp cutting tool involved, and therefore there is no violence done to the fibre of the malleable metal. Nor have the tools of the smith any sharp edges, except the cutting-off tools or "setts." The essential fact of the flow of the metal, which is viscous when at a full red heat, must never be lost sight of; and in forging wrought iron the judgment of the smith must be exercised in arranging the direction of the fibre in a way best calculated to secure maximum strength.

Fullering and swaging.

Fullering denotes the preliminary roughing-down of the material between tools having convex edges; swaging, the completion or finishing process between swages, or dies of definite shape, nearly hemispherical in form. When a bar has to be reduced from larger to smaller dimensions, it is laid upon a fuller or round-faced stake, set in the anvil, or, in some cases, on a flat face (fig. 1), and blows are dealt upon that portion of the face which lies exactly opposite with a fullering tool A, grasped by a rather loosely-fitting handle and struck on its head by a sledge. The position of the piece of work is quickly changed at brief intervals in order to bring successive portions under the action of the swages until the reduction is completed; the upper face, and if a bottom fuller is used the under face also, is thus left corrugated slightly. These corrugations are then removed either by a flatter, if the surfaces are plane (fig. 2), or by hollow swages, if the cross section is circular (fig. 3). Spring swages (fig. 4) are frequently used instead of separate "top and bottom tools." Frequently swaging is practised at once, without the preliminary detail of fullering. It is adopted when the amount of reduction is slight, and also when a steam hammer or other type of power hammer is available. This process of drawing down or fullering is, when practicable, adopted in preference to either upsetting or welding, because it is open to no objection, and involves no risk of damage to the material, while it improves the metal by consolidating its fibres. But its limitations in anvil work lie in the tediousness of the operation, when the part to be reduced is very much less in diameter, and very much longer, than the original piece of bar. Then there are other alternatives.

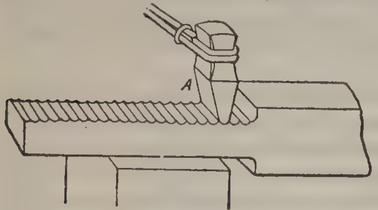

FIG. 1.

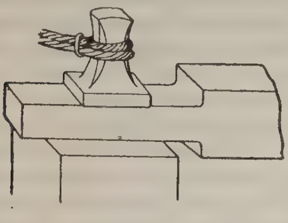
FIG. 2.

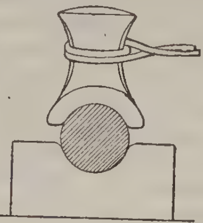
FIG. 3.

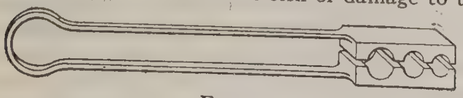
FIG. 4.

Upsetting.

If a long bar is required to have an enlargement at any portion of its length, not very much larger in diameter than the bar, nor of great length, upsetting is the method adopted. The part to be enlarged is heated, the parts adjacent remaining cold, and an end is hammered, or else lifted and dropped heavily on the anvil or on an iron plate, with the result that the heated portion becomes both shortened and enlarged (figs. 5 and 6). This process is only suitable for relatively short lengths, and has the disadvantage that the fibres of wrought iron are liable to open, and so cause weakening of the upset portion. But steel, which has no direction of fibre, can be upset without injury; this method is therefore commonly adopted in steel work, in power presses to an equal extent with drawing down. The alternative to upsetting is generally to weld a larger to a smaller bar or section, or to encircle the bar with a ring and weld the two (fig. 7), and then to impart any shape desired to the ring in swages.

Bendin

Bending is effected either by the hammer or by the simple exercise of leverage, the heated bar being pulled round a fulcrum. It is always, when practicable, preferable to cutting out a curved or angular shape with a hot sett or to welding. The continuity the fibre in iron is preserved by bending, and the risk of an i perfect weld is avoided. Hence it is a simple and safe process which is constantly being performed at the anvil. An objection to sharp bends, or those having a small radius, is tha the fibres become extended on the outer radius, the cross section bein at the same time reduced below that of the bar itself. This is met b imparting a preliminary amount of upsetting to the part to be bent sufficient to counteract the amount of reduction due to extensio of the fibres. A familiar example is seen in the corners of di cranks.

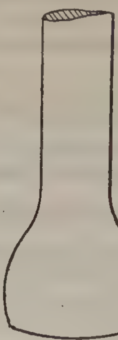
FIG. 5.

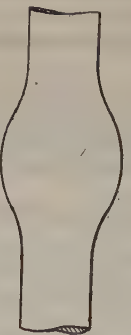
FIG. 6.

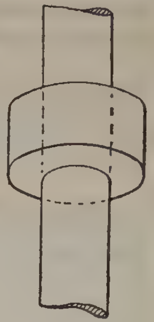
FIG. 7.

Welding.

The property possessed by pieces of iron or steel of uniting autogeneously while in a condition of semi-fusion is very valuable. When portions which differ greatly in dimensions have to be united, welding is the only method practicable at the anvil. It is also generally the best to adopt when union has to b made between pieces at right angles, or when a piece on which much work has to be done is required at the end of a long plain bar, as in the tension rods of cranes and other structures with eyes. The art of welding depends chiefly on having perfectly clean joint faces, free from scale, so that metal can unite to metal; union would be prevented by the presence of oxide or of dirt. Also it is essential to have a temperature sufficiently high, yet not such as to overheat the metal. A dazzling white, at which small particles of metal begin to drop off, is suitable for iron, but steel must not be made so hot. A very few hammer blows suffice to effect the actual union; if the joint be faulty, no amount of subsequent hammering will weld it. The forms of weld-joints include the scarf (figs. 8 and 9), the butt (fig. 10), the V (fig. 11) and the glut, one form of which is shown in fig. 12; the illustrations are of bars prepared for welding. These forms give the smith a suitable choice for different conditions. A convexity is imparted to the joint faces in order to favour the expulsion of slag and dirt during the closing of the joint; these undesirable matters become entangled between concave faces. The ends are upset or enlarged in order to leave enough metal to be dressed down flush, by swaging or by flattering. The proportional lengths of the joint faces shown are those which conform to good practice. The fluxes used for welding are numerous. Sand alone is generally dusted on wrought iron, but steel requires borax applied on the joint while in the fire, and also dusted on the joint at the anvil and on the face of the latter itself. Electric welding is largely taking the place of the hand process, but machines are required to maintain the parts in contact during the passage of the current. Butt joints are employed, and a large quantity of power is absorbed, but the output is immensely greater than that of hand-made welds.

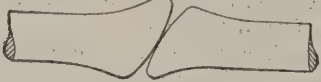
FIG. 8.

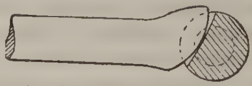
FIG. 9.

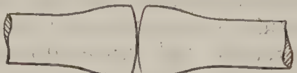
FIG. 10.

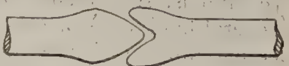
FIG. 11.

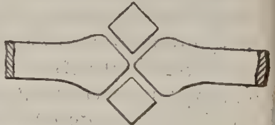
FIG. 12.

Punching.

When holes are not very large they are formed by punching, but large holes are preferably produced by bending a rod round and welding it, so forming an eye (fig. 13). Small holes are often punched simply as a preliminary stage in the formation of a larger hole by a process of drifting. A piece of work to be punched is supported either on the anvil or on a ring of metal termed a bolster, laid on the anvil, through which the burr, when severed, falls. But in making small holes through a thick mass, no burr is produced, the metal yielding sideways and forming an enlargement or boss. Examples occur in the wrought iron stanchions that carry light hand railing. In such cases the hole has to be punched from each face, meeting in the centre. Punching under power hammers is done similarly, but occupies less time.

Cutting-off. The cutting-off or severance of material is done either on hot or cold metal. In the first case the chisels used, "hot setts," have keener cutting angles than those employed for the second, termed "cold setts." One sett is held in a hole in the anvil face, the "anvil chisel," the other is handled and struck with a sledge.

The difference between iron and steel at the forge is that iron possesses a very marked fibre whereas steel does not. Many forgings therefore must be made differently according as they are in iron or in steel. In the first the fibre must never be allowed to run transversely to the axis of greatest tensile or bending stress, but must be in line therewith. For this reason many forgings, of which a common eye or loop (fig. 13) is a typical example, that would be stamped from a solid piece if made in steel, must be bent round from bar and welded if in wrought iron. Further, welding which is practically uniformly trustworthy in wrought iron, is distrusted in steel. The difference is due to the very fibrous character of iron, the welding of which gives much less anxiety to the smith than that of steel. Welds in iron are frequently made without any flux, those in steel never. Though mention has only been made of iron and steel, other alloys are forged, as those of aluminium, delta metal, &c. But the essential operations are alike, the differences being in temperature at which the forging is done and nature of the fluxes used for welding. For hardening and tempering, an important section of smith's work, see ANNEALING.

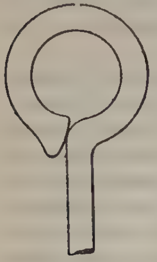
FIG. 13.

Die Forging.—The smith operating by hand uses the above methods only. There is, however, a large and increasing volume of forgings produced in other ways, and comprehended under the general terms, "die forging" or "drop forging."

Little proof is needed to show that the various operations done at the anvil might be performed in a more expeditious way by the aid of power-operated appliances; for the elementary processes of reducing, and enlarging, bending, punching, &c., are extremely simple, and the most elaborate forged work involves only a repetition of these. The fact that the material used is entirely plastic when raised to a white heat is most favourable to the method of forging in matrices or dies. A white hot mass of metal can be placed in a matrix, and stamped into shape in a few blows under a hammer with as much ease as a medal can be stamped in steel dies under a coining press. But much detail is involved in the translation of the principle into practice. The parallel between coining dies and forging dies does not go far. The blank for the coin is prepared to such exact dimensions that no surplus material is left over by the striking of the coin, which is struck while cold. But the blank used in die forging is generally a shapeless piece, taken without any preliminary preparation, a mere lump, a piece of bar or rod, which may be square or round irrespective of whether the ultimate forging is to be square, or round, or flat or a combination of forms. At the verge of the welding heat to which it is raised, and under the intensity of the impact of hammer blows rained rapidly on the upper die, the metal yields like lead, and flows and fills the dies.

Herein lies a difference between striking a coin and moulding a forging. A large amount of metal is squeezed out beyond the concavity of the forging dies, and this would, if allowed to flow over between the joints, prevent the dies from being closed on the forging. There are two methods adopted for removing this "fin," or "flash" as it is termed, one being that of suppression, applicable to circular work, the other that of stripping, applied to almost all other cases.

The suppression of fin means that the circular bar is rotated in the dies (fig. 14) through a small arc, alternating between every few blows, with the result that the fin is obliterated immediately when formed, this being done at the same time that reduction of section is being effected over a portion or the whole of the bar.

Stripping means that when a considerable amount of fin has been formed, it is removed by laying the forging on a die pierced right through with an opening of the same shape and area as the forging, and then dealing the forging a blow with the hammer. The forging is thus knocked through the die, leaving the severed or stripped fin behind. The forging is then returned to the dies and again treated, and the stripping may be repeated twice, or even oftener, before the forging can be completed.

Figs. 15 and 16 illustrate the bottom dies of a set for forging in a particular form of eye, the top dies being of exactly the same shape. The first operation takes place in fig. 15, in which a bar of metal is reduced to a globular and cylindrical form, being constantly rotated meanwhile. The shank portion is then drawn down in the parallel recess to the left. The shape of the eye is completed in fig. 16, and the shank in the recess to the left of that. Fig. 17 shows how a lever is stamped between top and bottom dies. The hole in the larger boss is formed by punching, the punches nearly meeting in the centre, and the centre for the hole to be drilled subsequently in the smaller boss is located by a conical projection in the top die.

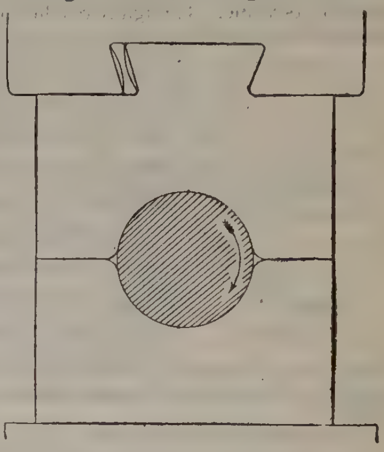
FIG. 14.

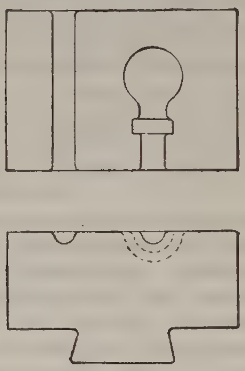
FIG. 15.

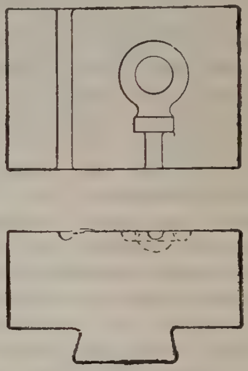
FIG. 16.

It is evident that the methods of die forging, though only explained here in barest outline, constitute a principle of extensive application.

An intricate or ornamental forging, which might occupy a smith a quarter of a day in making at the anvil, can often be produced in dies within five minutes (fig. 18). On the other hand, there is the cost of the preparation of the dies, which is often heavy, so that the question of method is resolved into the relative one of the cost of dies, distributed over the number of identical forgings required. From this point of view it is clear that given say a thousand forgings, ordered all alike, the cost of even expensive dies distributed over the whole becomes only an infinitesimal amount per forging.

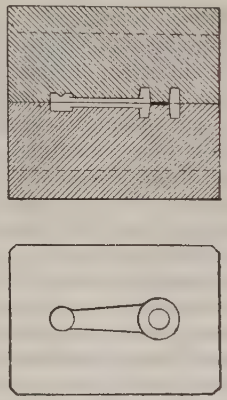
FIG. 17.

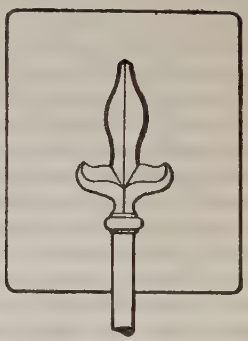
FIG. 18.

There is, further, the very important fact that forgings which are produced in dies are uniform and generally of more exact dimensions than anvil-made articles. This is seen to be an advantage when forgings have to be turned or otherwise tooled in the engineer's machine shop, since it lessens the amount of work required there.

Besides, for many purposes such forgings do not require tooling at all, or only superficial grinding, while anvil-made ones would, in consequence of their slight inaccuracies.

Yet again, die forging is a very elastic system, and herein lies much of its value. Though it reaches its highest development when thousands of similar pieces are wanted, it is also adaptable to a hundred, or even to a dozen, similar forgings. In such cases economy is secured by using dies of a very cheap character; or, by employing such dies as supplementary to anvil work for effecting neat finish to more precise dimensions than can be ensured at the anvil. In the first case use is made of dies of cast iron moulded from patterns (fig. 19) instead of having their matrices laboriously cut in steel with drills, chisels and milling tools. In the second, preliminary drawing down is done under the steam hammer, and bending and welding at the anvil, or under the steam hammer, until the forgings are brought approximately to their final shape and dimensions. Then they are reheated and inserted in the dies, when a few blows under the steam or drop hammer suffice to impart a neat and accurate finish.

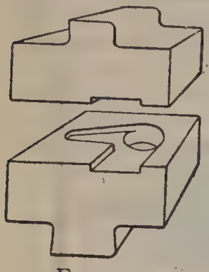

FIG. 19.

The limitations of die forging are chiefly those due to large dimensions. The system is most successful for the smallest forgings and dies which can be handled by one man without the assistance of cranes; and massive forgings are not required in such large numbers as are those of small dimensions. But there are many large articles manufactured which do not strictly come under the term forgings, in which the aid of dies actuated by powerful hydraulic presses is utilized. These include work that is bent, drawn and shaped from steel plate, of which the fittings of railway wagons constitute by far the largest proportion. The dies used for some of these are massive, and a single squeeze from the ram of the hydraulic press employed bends the steel plate between the dies to shape at once. Fairly massive forgings are also produced in these presses.

Die forging in its highest developments invades the craft of the skilled smith. In shops where it is adopted entirely, the only craftsmen required are the few who have general charge of the shops. The men who attend to the machines are not smiths, but unskilled helpers. (J. G. H.)

FORK (Lat. *furca*), an implement formed of two or more prongs at the end of a shaft or handle, the most familiar type of which is the table-fork for use in eating. In agriculture and horticulture the fork is used for pitching hay, and other green crops, manure, &c.; commonly this has two prongs, "tines"; for digging, breaking up surface soil, preparing for hand weeding and for planting the three-pronged fork is used. The word is also applied to many objects which are characterized by branching ends, as the tuning-fork, with two branching metal prongs, which on being struck vibrates and gives a musical note, used to give a standard of pitch; to the branching into two streams of a river, or the junction where a tributary runs into the main river; and in the human body, to that part where the legs branch off from the trunk.

The *furca*, two pieces of wood fastened together in the form of the letter Λ, was used by the Romans as an instrument of punishment. It was placed over the shoulders of the criminal, and his hands were fastened to it, condemned slaves were compelled to carry it about with them, and those sentenced to be flogged would be tied to it; crucifixions were sometimes carried out on a similar shaped instrument. From the great defeat of the Romans by the Samnites at the battle of the Caudine Forks (*Furculae Caudinae*), a narrow gorge, where the vanquished were compelled to pass under the yoke (*jugum*), as a sign of submission, the expression "to pass through or under the forks" has been loosely used of such a disgraceful surrender. The "forks" in any allusion to this defeat should refer to the topographical name and not to the *jugum*, which consisted of two upright spears with a third placed transversely as a cross-bar.

FORKEL, JOHANN NIKOLAUS (1749–1818), German musician, was born on the 22nd of February 1749 at Meeder in Coburg. He was the son of a cobbler, and as a practical musician, especially as a pianoforte player, achieved some eminence; but his claims to a more abiding name rest chiefly upon his literary skill and deep research as an historian of musical science and literature. He was an enthusiastic admirer of J. S. Bach, whose music he did much to popularize. His library, which was accumulated with care and discrimination at a time when rare books were cheap, forms a valuable portion of the royal library in Berlin and also of the library of the Königlicher Institut für Kirchenmusik. He was organist to the university church of Göttingen, obtained the degree of doctor of philosophy, and in 1778 became musical director of the university. He died at Göttingen on the 20th of March 1818. The following is a list of his principal works: *Über die Theorie der Musik* (Göttingen, 1777); *Musikalisch kritische Bibliothek* (Gotha, 1778); *Allgemeine Geschichte der Musik* (Leipzig, 1788). The last is his most important work. He also wrote a *Dictionary of Musical Literature*, which is full of valuable material. To his musical compositions, which are numerous, little interest is to-day to be attached. But it is worth noting that he wrote variations on the English national anthem "God save the king" for the clavichord, and that Abt Vogler wrote a sharp criticism on them, which appeared at Frankfort in 1793 together with a set of variations as he conceived they ought to be written.

FORLÌ (anc. *Forum Livii*), a town and episcopal see of Emilia, Italy, the capital of the province of Forlì, 40 m. S.E. of Bologna by rail, 108 ft. above sea-level. Pop. (1901) 15,461 (town); 43,321 (commune). Forlì is situated on the railway between Bologna and Rimini. It is connected by steam tramways with Ravenna and Meldola, and by a road through the Apennines with Pontassieve. The church of S. Mercuriale stands in the principal square, and contains, besides paintings, some good carved and inlaid choir stalls by Alessandro dei Bigni. The façade has been considerably altered, but the campanile, erected in 1178–1180, still exists; it is 252 ft. in height, square and built of brickwork, and is one of the finest of Lombard campanili. The pictures in this church are the work of Marco Palmezzano (1456–1537) and others; S. Biagio and the municipal picture gallery also contain works by him. The latter has other interesting pictures, including a fresco representing an apprentice with pestle and mortar (Pestapepe), the only authentic work in Forlì of Melozzo da Forlì (1438–1494), an eminent master whose style was formed under the influence of Piero della Francesca, and who was the master of Palmezzano; the frescoes in the Sforza chapel in SS. Biagio e Girolamo are from the former's designs, though executed by the latter. The church also contains the fine tomb (1466) of Barbara Manfredi. The cathedral (Santa Croce) has been almost entirely rebuilt since 1844. The Palazzo del Podestà, now a private house, is a brick building of the 15th century. The citadel (Rocca Ravaldina), constructed about 1360–1370, and later rebuilt, is now used as a prison. Flavio Biondo, the first Renaissance writer on the topography of ancient Rome (1388–1463), was a native of Forlì.

Of the ancient Forum Livii, which lay on the Via Aemilia, hardly anything is known. In the 12th century we find Forlì in league with Ravenna, and in the 13th the imperial count of the province of Romagna resided there. In 1275 Forlì defeated Bologna with great loss. Martin IV. sent an army to besiege it in 1282, which was driven out after severe fighting in the streets; but the town soon afterwards surrendered. In the 14th and 15th centuries it was under the government of the Ordelaffi; and in 1500 was taken by Caesar Borgia, despite a determined resistance by Caterina Sforza, widow of Girolamo Riario. Forlì finally became a part of the papal state in 1504. (T. As.)

FORLIMPOPOLI (anc. *Forum Popillii*), a village of Emilia, Italy, in the province of Forlì, from which it is 5 m. S.E. by rail, 105 ft. above sea-level. Pop. (1901) 2299 (town); 5795 (commune). The ancient Forum Popillii, a station on the Via Aemilia, was destroyed by Grimuald in 672. Whether its site is occupied by the present town is not certain; the former should perhaps be sought a mile or so farther to the S.E., where were found most of the inscriptions of which the place of discovery is certain. Forlimpopoli was again destroyed by Cardinal Albornoz in 1360, and rebuilt by Sinibaldo Ordelaffi, who constructed the well-preserved medieval castle (1380), rectangular with four circular towers at the corners. (T. As.)

FORLORN HOPE (through Dutch *verloren hoop*, from Ger. *verlorene Haufe* = "lost troop"; *Haufe*, "heap," being equivalent in the 17th century to "body of troops"; the French equivalent is *enfants perdus*), a military term (sometimes shortened to "forlorn"), used in the 16th and 17th centuries for a body of troops thrown out in front of the line of battle to engage the hostile line, somewhat after the fashion of skirmishers, though they were always solid closed bodies. These troops ran great risks, because they were often trapped between the two lines of battle as the latter closed upon one another, and fired upon or ridden down by their friends; further, their mission was to facilitate the attacks of their own main body by striking the first blow against or meeting the first shock of the fresh and unshaken enemy. In the following century (18th), when lines of masses were no longer employed, a thin line of skirmishers alone preceded the three-deep line of battle, but the term "forlorn hope" continued to be used for picked bodies of men entrusted with dangerous tasks, and in particular for the storming party at the assault of a fortress. In this last sense "forlorn hope" is often used at the present time. The misunderstanding of the word "hope" has led to various applications of "forlorn hope," such as to an enterprise offering little chance of success, or, further still from the original meaning, to the faint or desperate hope of such success.

FORM (Lat. *forma*), in general, the external shape, appearance, configuration of an object, in contradistinction to the matter of which it is composed; thus a speech may contain excellent arguments,—the *matter* may be good, while the style, grammar, arrangement,—the *form*—is bad. The term, with its adjective "formal" and the derived nouns "formality" and "formalism," is hence contemptuously used for that which is superficial, unessential, hypocritical: chap. xxiii. of Matthew's gospel is a classical instance of the distinction between the formalism of the Pharisaic code and genuine religion. With this may be compared the popular phrases "good form" and "bad form" applied to behaviour in society: so "format" (from the French) is technically used of the shape and size, *e.g.* of a book (octavo, quarto, &c.) or of a cigarette. The word "form" is also applied to certain definite objects: in printing a body of type secured in a chase for printing at one impression ("form" or "forme"); a bench without a back, such as is used in schools (perhaps to be compared with O. Fr. *s'asseoir en forme*, to sit in a row); a mould or shape on or in which an object is manufactured; the lair or nest of a hare. From its use in the sense of regulated order comes the application of the term to a class in a school ("sixth form," "fifth form," &c.); this sense has been explained without sufficient ground as due to the idea of all children in the same class sitting on a single form (bench).

The word has been used technically in philosophy with various shades of meaning. Thus it is used to translate the Platonic *ἰδέα, εἶδος*, the permanent reality which makes a thing what it is, in contrast with the particulars which are finite and subject to change. Whether Plato understood these forms as actually existent apart from all the particular examples, or as being of the nature of immutable physical laws, is matter of discussion. For practical purposes Aristotle was the first to distinguish between matter (*ὕλη*) and form (*εἶδος*). To Aristotle matter is the undifferentiated primal element: it is rather that from which things develop (*ὑποκείμενον, δύναμις*) than a thing in itself (*ἐνεργεία*). The development of particular things from this germinal matter consists in differentiation, the acquiring of particular *forms* of which the knowable universe consists (cf. CAUSATION for the Aristotelian "formal cause"). The perfection of the form of a thing is its entelechy (*ἐντελέχεια*) in virtue of which it attains its fullest realization of function (*De anima*, ii. 2, *ἡ μὲν ὕλη δύναμις τὸ δὲ εἶδος ἐντελέχεια*). Thus the entelechy of the body is the soul. The origin of the differentiation process is to be sought in a "prime mover" (*πρῶτον κινοῦν*), *i.e.* pure form entirely separate (*χωριστόν*) from all matter, eternal, unchangeable, operating not by its own activity but by the impulse which its own absolute existence excites in matter (*ὡς ἐρώμενον, οὐ κινούμενον*). The Aristotelian conception of form was nominally, though perhaps in most cases unintelligently, adopted by the Scholastics, to whom, however, its origin in the observation of the physical universe was an entirely foreign idea. The most remarkable adaptation is probably that of Aquinas, who distinguished the spiritual world with its "subsistent forms" (*formae separatae*) from the material with its "inherent forms" which exist only in combination with matter. Bacon, returning to the physical standpoint, maintained that all true research must be devoted to the discovery of the real nature or essence of things. His induction searches for the true "form" of light, heat and so forth, analysing the external "form" given in perception into simpler "forms" and their "differences." Thus he would collect all possible instances of hot things, and discover that which is present in all, excluding all those qualities which belong accidentally to one or more of the examples investigated: the "form" of heat is the residuum common to all. Kant transferred the term from the objective to the subjective sphere. All perception is necessarily conditioned by pure "forms of sensibility," *i.e.* space and time: whatever is perceived is perceived as having special and temporal relations (see SPACE AND TIME; KANT). These forms are not obtained by abstraction from sensible data, nor are they strictly speaking innate: they are obtained "by the very action of the mind from the co-ordination of its sensation."

FORMALIN, or FORMALDEHYDE, CH_2O or $H{\cdot}CHO$, the first member of the series of saturated aliphatic aldehydes. It is most readily prepared by passing the vapour of methyl alcohol, mixed with air, over heated copper or platinum. In order to collect the formaldehyde, the vapour is condensed and absorbed, either in water or alcohol. It may also be obtained, although only in small quantities, by the distillation of calcium formate. At ordinary temperatures formaldehyde is a gas possessing a pungent smell; it is a strong antiseptic and disinfectant, a 40% solution of the aldehyde in water or methyl alcohol, sold as *formalin*, being employed as a deodorant, fungicide and preservative. It is not possible to obtain the aldehyde in a pure condition, since it readily polymerizes. It is a strong reducing agent; it combines with ammonia to form *hexamethylene tetramine*, $(CH_2)_6N_4$, and easily "condenses" in the presence of many bases to produce compounds which apparently belong to the sugars (*q.v.*). It renders glue or gelatin insoluble in water, and is used in the coal-tar colour industry in the manufacture of para-rosaniline, pyronines and rosamines. Several polymers have been described. *Para-formaldehyde*, or trioxymethylene, obtained by concentrating solutions of formaldehyde *in vacuo*, is a white crystalline solid, which sublimes at about 100° C. and melts at a somewhat higher temperature, changing back into the original form. It is insoluble in cold water, alcohol and ether. A diformaldehyde is supposed to separate as white flakes when the vapour is passed into chloroform (Körber, *Pharm. Zeit.*, 1904, xlix. p. 609); F. Auerbach and H. Barschall (*Chem. Zentr.*, 1907, ii. p. 1734) obtained three polymers by acting with concentrated sulphuric acid on solutions of formaldehyde, and a fourth by heating one of the forms so obtained. The strength of solutions of formaldehyde may be ascertained by the addition of excess of standard ammonia to the aldehyde solution (hexamethylene tetramine being formed), the excess of ammonia being then estimated by titration with standard acid. On the formation of formaldehyde by the oxidation of methane at high temperatures, see W. A. Bone (*Journ. Chem. Soc.*, 1902, 81, p. 535; 1903, 83, p. 1074). Formaldehyde also appears to be a reduction product of carbon dioxide (see *Annual Reports of the Chemical Society*).

FORMAN, ANDREW (*c.* 1465–1521), Scottish ecclesiastic, was educated at the university of St Andrews and entered the service of King James IV. about 1489. He soon earned the favour of this king, who treated him with great generosity and who on several occasions sent him on important embassies to the English, the French and the papal courts. In 1501 he became bishop of Moray and in July 1513 Louis XII. of France secured his appointment as archbishop of Bourges, while pope Julius II. promised to make him a cardinal. In 1514 during a long absence from his own land Forman was nominated by Pope Leo X. to the vacant archbishopric of St Andrews and was made papal legate in Scotland, but it was some time before he secured possession of the see owing to the attempts of Henry VIII. to subject Scotland to England and to the efforts of his rivals, Gavin Douglas, the poet, and John Hepburn, prior of St Andrews, and their supporters. Eventually, however, he resigned some of his many benefices, the holding of which had made him unpopular, and through the good offices of the regent, John Stewart, duke of Albany, obtained the coveted archbishopric and the primacy of Scotland. Afterwards he was one of the vice-regents of the kingdom and he died on the 11th of March 1521. As archbishop he issued a series of constitutions which are printed in J. Robertson's *Concilia Scotiae* (1866). Mr Andrew Lang (*History of Scotland*, vol. i.) describes Forman as "the Wolsey of Scotland, and a fomenter of the war which ended at Flodden."

See the biography of the archbishop which forms vol. ii. of *The Archbishops of St Andrews*, by J. Herkless and R. K. Hannay (1909).

FORMAN, SIMON (1552–1611), English physician and astrologer, was born in 1552 at Quidham, a small village near Wilton, Wiltshire. At the age of fourteen he became apprentice to a druggist at Salisbury, but at the end of four years he exchanged this profession for that of a schoolmaster. Shortly afterwards he entered Magdalen College, Oxford, where he studied chiefly medicine and astrology. After continuing the same studies in Holland he commenced practice as a physician in Philpot Lane, London, but as he possessed no diploma, he on this account underwent more than one term of imprisonment. Ultimately, however, he obtained a diploma from Cambridge university, and established himself as a physician and astrologer at Lambeth, where he was consulted, especially as a physician, by many persons of rank, among others by the notorious countess of Essex. He expired suddenly while crossing the Thames in a boat on the 12th of September 1611.

A list of Forman's works on astrology is given in Bliss's edition of the *Athenae Oxonienses*; many of his MS. works are contained in the Bodleian Library, the British Museum and the Plymouth Library. *A Brief Description of the Forman MSS. in the Public Library, Plymouth*, was published in 1853.

FORMERET, a French architectural term for the wall-rib carrying the web or filling-in of a vault (*q.v.*).

FORMEY, JOHANN HEINRICH SAMUEL (1711–1797), Franco-German author, was born of French parentage at Berlin on the 31st of May 1711. He was educated for the ministry, and at the age of twenty became pastor of the French church at Brandenburg. Having in 1736 accepted the invitation of a congregation in Berlin, he was in the following year chosen professor of rhetoric in the French college of that city and in 1739 professor of philosophy. On the organization of the academy of Berlin in 1744 he was named a member, and in 1748 became its perpetual secretary. He died at Berlin on the 7th of March 1797. His principal works are *La Belle Wolfienne* (1741–1750, 6 vols.), a kind of novel written with the view of enforcing the precepts of the Wolfian philosophy; *Bibliothèque critique, ou mémoires pour servir à l'histoire littéraire ancienne et moderne* (1746); *Le Philosophe chrétien* (1750); *L'Émile chrétien* (1764), intended as an answer to the *Émile* of Rousseau; and *Souvenirs d'un citoyen* (Berlin, 1789). He also published an immense number of contemporary memoirs in the transactions of the Berlin Academy.

FORMIA (anc. *Formiae*, called Mola di Gaeta until recent times), a town of Campania, Italy, in the province of Caserta, from which it is 48 m. W.N.W. by rail. Pop. (1901) 5514 (town); 8452 (commune). It is situated at the N.W. extremity of the Bay of Gaeta, and commands beautiful views. It lay on the ancient Via Appia, and was much frequented as a resort by wealthy Romans. There was considerable imperial property here and along the coast as far as Sperlonga, and there are numerous remains of ancient villas along the coast and on the slopes above it. The so-called villa of Cicero contains two well-preserved *nymphaea* with Doric architecture. Its site is now occupied by the villa Caposele, once a summer residence of the kings of Naples. There are many other modern villas, and the sheltered hillsides (for the mountains rise abruptly behind the town) are covered with lemon, orange and pomegranate gardens. The now deserted promontory of the Monte Scauri to the E. is also covered with remains of ancient villas; the hill is crowned by a large tomb, known as Torre Giano. To the E. at Scauri is a large villa with substructions in "Cyclopean" work. The ancient Formiae was, according to the legend, the home of the Laestrygones, and later a Spartan colony (*Ὁρμίαι διὰ τὸ εὔορμον*, Strabo v. 3. 6, p. 233). It was a Volscian town, and, like Fundi, received the *civitas sine suffragio* from Rome in 338 (or 332 B.C.) because the passage through its territory had always been secure. This was strategically important for the Romans, as the military road definitely constructed by Appius Claudius in 312 B.C., still easily traceable by its remains, and in part followed by the high-road, traversed a narrow pass, which could easily be blocked, between Fundi and Formiae. In 188 B.C., with Fundi, it received the full citizenship, and, like it, was to a certain extent under the control of a *praefectus* sent from Rome, though it retained its three aediles. Mamurra was a native of Formia. Cicero possessed a favourite villa here, and was murdered in its vicinity in 43 B.C., but neither the villa nor the tomb can be identified with any certainty. It was devastated by Sextus Pompeius, and became a colony, with *duoviri* as chief magistrates, under Hadrian. Portus Caietae (the modern Gaeta) was dependent upon it.

See T. Ashby, "Dessins inédits de Carlo Labruzzi," in *Mélanges de l'école française de Rome* (1903), 410 seq. (T. As.)

FORMIC ACID, H_2CO_2 or $H\cdot COOH$, the first member of the series of aliphatic monobasic acids of the general formula $C_nH_{2n}O_2$. It is distinguished from the other members of the series by certain characteristic properties; for example, it shows an aldehydic character in reducing silver salts to metallic silver, and it does not form an acid chloride or an acid anhydride. Its nitrile (prussic acid) has an acid character, a property not possessed by the nitriles of the other members of the series; and, by the abstraction of the elements of water from the acid, carbon monoxide is produced, a reaction which finds no parallel in the higher members of the series. Finally, formic acid is, as shown by the determination of its affinity constant, a much stronger acid than the other acids of the series. It occurs naturally in red ants (Lat. *formica*), in stinging nettles, in some mineral waters, in animal secretions and in muscle. It may be prepared artificially by the oxidation of methyl alcohol and of formaldehyde; by the rapid heating of oxalic acid (J. Gay-Lussac, *Ann. chim. phys.*, 1831 [2] 46, p. 218), but best by heating oxalic acid with glycerin, at a temperature of 100-110° C. (M. Berthelot, *Ann.*, 1856, 98, p. 139). In this reaction a glycerol ester is formed as an intermediate product, and undergoes decomposition by the water which is also produced at the same time.

$$C_3H_5(OH)_3+H_2C_2O_4=C_3H_5(OH)_2\cdot OCHO+CO_2+H_2O$$
$$C_3H_5(OH)_2O\cdot CHO+H_2O=C_3H_5(OH)_3+H_2CO_2.$$

Many other synthetical processes for the production of the acid or its salts are known. Hydrolysis of hydrocyanic acid by means of hydrochloric acid yields formic acid. Chloroform boiled with alcoholic potash forms potassium formate (J. Dumas, *Berzelius Jahresberichte*, vol. 15, p. 371), a somewhat similar decomposition being shown by chloral and aqueous potash (J. v. Liebig, *Ann.*, 1832, 1, p. 198). Formates are also produced by the action of moist carbon monoxide on soda lime at 190–220° C. (V. Merz and J. Tibiçira, *Ber.*, 1880, 13, p. 23; A. Geuther, *Ann.*, 1880, 202, p. 317), or by the action of moist carbon dioxide on potassium (H. Kolbe and R. Schmitt, *Ann.*, 1861, 119, p. 251). H. Moissan (*Comptes rend.*, 1902, 134, p. 261) prepared potassium formate by passing a current of carbon monoxide or carbon dioxide over heated potassium hydride,

$$KH+CO_2=KHCO_2 \text{ and } KH+2CO=KHCO_2+C.$$

A concentrated acid may be obtained from the diluted acid either by neutralization with soda, the sodium salt thus obtained being then dried and heated with the equivalent quantity of anhydrous oxalic acid (Lorin, *Bull. soc. chim.*, 37, p. 104), or the lead or copper salt may be decomposed by dry sulphuretted hydrogen at 130° C. L. Maquenne (*Bull. soc. chim.*, 1888, 50, p. 662) distils the commercial acid, *in vacuo*, with concentrated sulphuric acid below 75° C.

Formic acid is a colourless, sharp-smelling liquid, which crystallizes at 0° C., melts at 8·6° C. and boils at 100·8° C. Its specific gravity is 1·22 (20°/4°). It is miscible in all proportions with water, alcohol and ether. When heated with zinc dust, the acid decomposes into carbon monoxide and hydrogen. The sodium and potassium salts, when heated to 400° C., give oxalates and carbonates of the alkali metals, but the magnesium, calcium and barium salts yield carbonates only. The free acid, when heated with concentrated sulphuric acid, is decomposed into water and pure carbon monoxide; when heated with nitric acid, it is oxidized first to oxalic acid and finally to carbon dioxide. The salts of the acid are known as *formates*, and are mostly soluble in water, those of silver and lead being the least soluble. They crystallize well and are readily decomposed. Concentrated sulphuric acid converts them into sulphates, with simultaneous liberation of carbon monoxide. The calcium salt, when heated with the calcium salts of higher homologues, gives aldehydes. The silver and mercury salts, when heated, yield the metal, with liberation of carbon dioxide and formation of free formic acid; and the ammonium salt, when distilled, gives some formamide, $HCONH_2$. The esters of the acid may be obtained by distilling a mixture of the sodium or potassium salts and the corresponding alcohol with hydrochloric or sulphuric acids.

Formamide, $HCONH_2$, is obtained by heating ethyl formate with ammonia; by heating ammonium formate with urea to 140° C.,

$$2HCO{\cdot}ONH_4+CO(NH_2)_2=2HCONH_2+(NH_4)_2CO_3;$$

by heating ammonium formate in a sealed tube for some hours at 230° C., or by the action of sodium amalgam on a solution of potassium cyanate (H. Basarow, *Ber.*, 1871, 4, p. 409). It is a liquid which boils *in vacuo* at 150°, but at 192–195° C. under ordinary atmospheric pressure, with partial decomposition into carbon monoxide and ammonia. It dissolves mercuric oxide, with the formation of mercuric formamide, $(HCONH)_2Hg$.

FORMOSA, a northern territory of the Argentine republic, bounded N. by Bolivia, N.E. and E. by Paraguay, S. by the Chaco Territory, and W. by Salta, with the Pilcomayo and Bermejo forming its northern and southern boundaries. Estimated area, 41,402 sq. m. It is a vast plain, sloping gently to the S.E., covered with marshes and tropical forests. Very little is known of it except small areas along the Bermejo and Paraguay rivers, where attempts have been made to form settlements. The unexplored interior is still occupied by tribes of wild Indians. The climate is hot, the summer temperature rising to a maximum of 104° F. Timber-cutting is the principal occupation of the settlers, though stock-raising and agriculture engage some attention in the settlements on the Paraguay. The capital, Formosa (founded 1879), is a small settlement on the Paraguay with a population of about 1000 in 1900. The settled population of the territory was 4829 in 1895, which it was estimated had increased to 13,431 in 1905. The nomadic Indians are estimated at 8000.

FORMOSA (called *Taiwan* by the Chinese, and following them by the Japanese, into whose possession it came after their war with China in 1895), an island in the western Pacific Ocean, between the Southern and the Eastern China Sea, separated from the Chinese mainland by the Formosa Strait, which has a width of about 90 m. in its narrowest part. The island is 225 m. long and from 60 to 80 m. broad, has a coast-line measuring 731 m., an area of 13,429 sq. m.—being thus nearly the same size as Kiushiu, the most southern of the four chief islands forming the Japanese empire proper—and extends from 20° 56′ to 25° 15′ N. and from 120° to 122° E. It forms part of the long line of islands which are interposed as a protective barrier between the Asiatic coast and the outer Pacific, and is the cause of the immunity from typhoons enjoyed by the ports of China from Amoy to the Yellow Sea. Along the western coast is a low plain, not exceeding 20 m. in extreme width; on the east coast there is a rich plain called Giran, and there are also some fertile valleys in the neighbourhood of Karenko and Pinan, extending up the longitudinal valleys of the rivers Karenko and Pinan, between which and the east coast the Taito range intervenes; but the rest of the island is mountainous and covered with virgin forest. In the plains the soil is generally of sand or alluvial clay, covered in the valleys with a rich vegetable mould. The scenery of Formosa is frequently of majestic beauty, and to this it is indebted for its European name, happily bestowed by the early Spanish navigators.

On the addition of Formosa to her dominions, Fuji ceased to be Japan's highest mountain, and took the third place on the list. Mount Morrison (14,270 ft.), which the Japanese re-named Niitaka-yama (New High Mountain), stands first, and Mount Sylvia (12,480 ft.), to which they give the name of Setzu-zan (Snowy Mountain), comes second. Mount Morrison stands nearly under the Tropic of Cancer. It is not volcanic, but consists of argillaceous schist and quartzite. An ascent made by Dr Honda of the imperial university of Japan showed that, up to a height of 6000 ft., the mountain is clothed with primeval forests of palms, banyans, cork trees, camphor trees, tree ferns, interlacing creepers and dense thickets of rattan or stretches of grass higher than a man's stature. The next interval of 1000 ft. has gigantic cryptomerias and chamoecyparis; then follow pines; then, at a height of 9500 ft., a broad plateau, and then alternate stretches of grass and forest up to the top, which consists of several small peaks. There is no snow. Mount Morrison, being surrounded by high ranges, is not a conspicuous object. Mount Sylvia lies in 24° 30′ N. lat. There are many other mountains of considerable elevation. In the north is Getsurôbi-zan (4101 ft.); and on either side of Setzu-zan, with which they form a range running due east and west across the island, are Jusampunzan (4698 ft.) and Kali-zan (7027 ft.). Twenty-two miles due south of Kali-zan stands Hakumosha-zan (5282 ft.), and just 20 m. due south of Hakumosha-zan begins a chain of three peaks, Suisha-zan (6200 ft.), Hoo-zan (4928), and Niitaka-yama. These five mountains, Hari-zan, Hakumosha-zan, Suisha-zan, Hoo-zan and Niitaka-yama, stand almost exactly under 121° E. long., in the very centre of the island. But the backbone of the island lies east of them, extending S. from Setzu-zan through Gokan-zan, and Noko-zan and other peaks and bending S.W. to Niitaka-yama. Yet farther south, and still lying in line down the centre of the island, are Sankyakunan-zan (3752 ft.), Shurogi-zan (5729 ft.), Poren-zan (4957 ft.), and Kado-zan (9055 ft.), and, finally, in the south-east Arugan-zan (4985 ft.). These, it will be observed, are all Japanese names, and the heights have been determined by Japanese observers. In addition to these remarkable inland mountains, Formosa's eastern shores show magnificent cliff scenery, the bases of the hills on the seaside taking the form of almost perpendicular walls as high as from 1500 to 2500 ft. Volcanic outbreaks of steam and sulphur-springs are found. Owing to the precipitous character of the east coast few rivers of any size find their way to the sea in that direction. The west coast, on the contrary, has many streams, but the only two of any considerable length are the Kotansui, which rises on Shurogi-zan, and has its mouth at Toko after a course of some 60 m. and the Seirakei, which rises on Hakumosha-zan, and enters the sea at a point 57 m. farther north after a course of 90 m.

The climate is damp, hot and malarious. In the north, the driest and best months are October, November and December; in the south, December, January, February and March. The sea immediately south of Formosa is the birthplace of innumerable typhoons, but the high mountains of the island protect it partially against the extreme violence of the wind.

Flora and Fauna.—The vegetation of the island is characterized by tropical luxuriance,—the moutainous regions being clad with dense forest, in which various species of palms, the camphor-tree (*Laurus Camphora*), and the aloe are conspicuous. Consul R. Swinhoe obtained no fewer than 65 different kinds of timber from a large yard in Taiwanfu; and his specimens are now to be seen in the museum at Kew. The tree which supplies the materials for the pith paper of the Chinese is not uncommon, and the cassia tree is found in the mountains. Travellers are especially struck with the beauty of some of the wild flowers, more especially with the lilies and convolvuluses; and European greenhouses have been enriched by several Formosan orchids and other ornamental plants. The pine-apple grows in abundance. In the lowlands of the western portion, the Chinese have introduced a large number of cultivated plants and fruit trees. Rice is grown in such quantities as to procure for Formosa, in former days, the title of the "granary of China"; and the sweet potato, taro, millet, barley, wheat and maize are also cultivated. Camphor, sugar, tea, indigo, ground peanuts, jute, hemp, oil and rattans are all articles of export.

The Formosan fauna has been but partially ascertained; but at least three kinds of deer, wild boars, bears, goats, monkeys (probably *Macacus speciosus*), squirrels, and flying squirrels are fairly common, and panthers and wild cats are not unfrequent. A poisonous but beautiful green snake is often mentioned by travellers. Pheasants, ducks, geese and snipe are abundant, and Dr C. Collingwood in his *Naturalist's Rambles in the China Seas* mentions *Ardea prasinosceles* and other species of herons, several species of fly-catchers, kingfishers, shrikes and larks, the black drongo, the *Cotyle sinensis* and the *Prinia sonitans*. Dogs are kept by the savages for hunting. The horse is hardly known, and his place is taken by the ox, which is regularly bridled and saddled and ridden with all dignity. The rivers and neighbouring seas seem to be well stocked with fish, and especial mention must be made of the turtles, flying-fish, and brilliant coral-fish which swarm in the waters warmed by the *Kurosiwo* current, the gulf-stream of the Pacific. Shell-fish form an important article of diet to both the Chinese and the aborigines along the coast—a species of *Cyrena*, a species of *Tapes, Cytheraea petechiana* and *Modiola teres* being most abundant.

Population.—The population of Formosa, according to a census in 1904, is estimated at 3,022,687, made up as follows: aborigines 104,334, Chinese 2,860,574 and Japanese 51,770. The inhabitants of Formosa may be divided into four classes: the Japanese, who are comparatively few, as there has not been much tendency to immigration; the Chinese, many of whom immigrated from the neighbourhood of Amoy and speak the dialect of that district, while others were Hakkas from the vicinity of Swatow; the subjugated aborigines, who largely intermingled with the Chinese; and the uncivilized aborigines of the eastern region who refuse to recognize authority and carry on raids as opportunity occurs. The semi-civilized aborigines, who adopted the Chinese language, dress and customs, were called Pe-pa-hwan (*Anglice* Pepo-hoans), while their wilder brethren bear the name of Chin-hwan or "green savages," otherwise Sheng-fan or "wild savages." They appear to belong to the Malay stock, and their language bears out the supposition. They are broken up into almost countless tribes and clans, many of which number only a few hundred individuals, and their language consequently presents a variety of dialects, of which no classification has yet been effected: in the district of Posia alone a member of the Presbyterian mission distinguished eight different mutually unintelligible dialects. The people themselves are described as of "middle height, broad-chested and muscular, with remarkably large hands and feet, the eyes large, the forehead round, and not narrow or receding in many instances, the nose broad, the mouth large and disfigured with betel." The custom of tattooing is universal. In the north of the island at least, the dead are buried in a sitting posture under the bed on which they have expired. Petty wars are extremely common, not only along the Chinese frontiers, but between the neighbouring clans; and the heads of the slain are carefully preserved as trophies. In some districts the young men and boys sleep in the skull-chambers, in order that they may be inspired with courage. Many of the tribes that had least intercourse with the Chinese show a considerable amount of skill in the arts of civilization. The use of Manchester prints and other European goods is fairly general; and the women, who make a fine native cloth from hemp, introduce coloured threads from the foreign stuffs, so as to produce ornamental devices. The office of chieftain is sometimes held by women.

The chief town is Taipe (called by the Japanese Taihoku), which is on the Tamsui-yei river, and has a population of about 118,000, including 5850 Japanese. Taipe may be said to have two ports; one, Tamsui, at the mouth of the river Tamsui-yei, 10 m. distant on the north-west coast, the other Kelung (called by the Japanese Kiirun), on the north-east shore, with which it is connected by rail, a run of some 18 m. The foreign settlement at Taipe lies outside the walls of the city, and is called Twatutia (Taitotei by the Japanese). Kelung (the ancient Pekiang) is an excellent harbour, and the scenery is very beautiful. There are coal-mines in the neighbourhood. Tamsui (called Tansui by the Japanese) is usually termed Hobe by foreigners. It is the site of the first foreign settlement, has a population of about 7000, but cannot be made a good harbour without considerable expenditure. On the west coast there is no place of any importance until reaching Anping (23° N. lat.), a port where a few foreign merchants reside for the sake of the sugar trade. It is an unlovely place, surrounded by mud flats, and a hotbed of malaria. It has a population of 4000 Chinese and 200 Japanese. At a distance of some 2½ m. inland is the former capital of Formosa, the walled city of Tainan, which has a population of 100,000 Chinese, 2300 Japanese, and a few British merchants and missionaries. Connected with Anping by rail (26 m.) and laying south of it is Takau, a treaty port. It has a population of 6800, and is prettily situated on two sides of a large lagoon. Six miles inland from Takau is a prosperous Chinese town called Fengshan (Japanese, Hozan). The anchorages on the east coast are Soo, Karenko and Pinan, which do not call for special notice. Forty-seven m. east of the extreme south coast there is a little island called Botel-tobago (Japanese, Koto-sho), which rises to a height of 1914 ft. and is inhabited by a tribe whose customs differ essentially from those of the natives on the main island.

Administration and Commerce.—The island is treated as an outlying territory; it has not been brought within the full purview of the Japanese constitution. Its affairs are administered by a governor-general, who is also commander-in-chief of the forces, by a bureau of civil government, and by three prefectural governors, below whom are the heads of twenty territorial divisions called *cho*; its finances are not included in the general budget of the Japanese empire; it is garrisoned by a mixed brigade taken from the home divisions; and its currency is on a silver basis. One of the first abuses with which the Japanese had to deal was the excessive use of opium by the Chinese settlers. To interdict the importation of the drug altogether, as is done in Japan, was the step advocated by Japanese public opinion. But, influenced by medical views and by the almost insuperable difficulty of enforcing any drastic import veto in the face of Formosa's large communications by junk with China, the Japanese finally adopted the middle course of licensing the preparation and sale of the drug, and limiting its use to persons in receipt of medical sanction. Under the administration of the Japanese the island has been largely developed. Among other industries gold-mining is advancing rapidly. In 1902 48,400 oz. of gold representing a value of £168,626 were obtained from the mines and alluvial washings. Coal is also found in large quantities near Kelung and sulphur springs exist in the north of the island.

An extensive scheme of railway construction has been planned, the four main lines projected being (1) from Takau to Tainan; (2) from Tainan to Kagi; (3) from Kagi to Shoka; and (4) from Shoka to Kelung; these four forming, in effect, a main trunk road running from the south-west to the north-east, its course being along the foot of the mountains that border the western coast-plains. The Takau-Tainan section (26 m.) was opened to traffic on the 3rd of November 1900, and by 1905 the whole line of 259 m. was practically complete. Harbour improvements also are projected, but in Formosa, as in Japan proper, paucity of capital constitutes a fatal obstacle to rapid development.

There are thirteen ports of export and import, but 75 % of the total business is done at Tamsui. Tea and camphor are the staple exports. The greater part of the former goes to Amoy for re-shipment to the west, but it is believed that if harbour improvements were effected at Tamsui so as to render it accessible for ocean-going steamers, shipments would be made thence direct to New York. The camphor trade being a government monopoly, the quantity exported is under strict control.

History.—The island of Formosa must have been known from a very early date to the Chinese who were established in the Pescadores. The inhabitants are mentioned in the official works of the Yuan dynasty as *Tung-fan* or eastern barbarians; and under the Ming dynasty the island begins to appear as Kilung. In the beginning of the 16th century it began to be known to the Portuguese and Spanish navigators, and the latter at least made some attempts at establishing settlements or missions. The Dutch were the first, however, to take footing in the island;

in 1624 they built a fort, Zelandia, on the east coast, where subsequently rose the town of Taiwan, and the settlement was maintained for thrity-seven years. On the expulsion of the Ming dynasty in China, a number of their defeated adherents came over to Formosa, and under a leader called in European accounts Coxinga, succeeded in expelling the Dutch and taking possession of a good part of the island. In 1682 the Chinese of Formosa recognized the emperor K'ang-hi, and the island then began to form part of the Chinese empire. From the close of the 17th century a long era of conflict ensued between the Chinese and the aborigines. A more debased population than the peoples thus struggling for supremacy could scarcely be conceived. The aborigines, *Sheng-fan*, or "wild savages," deserved the appellation in some respects, for they lived by the chase and had little knowledge even of husbandry; while the Chinese themselves, uneducated labourers, acknowledged no right except that of might. The former were not implacably cruel or vindictive. They merely clung to their homesteads, and harboured a natural resentment against the raiders who had dispossessed them. Their disposition was to leave the Chinese in unmolested possession of the plain. But some of the most valuable products of the island, as camphor and rattan, are to be found in the upland forests, and the Chinese, whenever they ventured too far in search of these products, fell into ambushes of hill-men who neither gave nor sought quarter, and who regarded a Chinese skull as a specially attractive article of household furniture. A violent rebellion is mentioned in 1788, put down only after the loss, it is said, of 100,000 men by disease and sword, and the expenditure of 2,000,000 taels of silver. Reconciliation never took place on any large scale, though it is true that, in the course of time, some fitful displays of administrative ability on the part of the Chinese, and the opening of partial means of communication, led to the pacification of a section of the *Sheng-fan*, who thenceforth became known as Pe-pa-hwan (*Pepohoan*).

In the early part of the 19th century the island was chiefly known to Europeans on account of the wrecks which took place on its coasts, and the dangers that the crews had to run from the cannibal propensities of the aborigines, and the almost equally cruel tendencies of the Chinese. Among the most notable was the loss in 1842 of the British brig "Ann," with fifty-seven persons on board, of whom forty-three were executed at Taichu. By the treaty of Tientsin (1860) Taichu was opened to European commerce, but the place was found quite unsuitable for a port of trade, and the harbour of Tam-sui was selected instead. From 1859 both Protestant and Presbyterian missions were established in the island. An attack made on those at Feng-shan (Hozan) in 1868 led to the occupation of Fort Zelandia and Anping by British forces; but this action was disapproved by the home government, and the indemnity demanded from the Chinese restored. In 1874 the island was invaded by the Japanese for the purpose of obtaining satisfaction for the murder of a shipwrecked crew who had been put to death by one of the semi-savage tribes on the southern coast, the Chinese government being either unable or unwilling to punish the culprits. A war was averted through the good offices of the British minister, Sir T. F. Wade, and the Japanese retired on payment of an indemnity of 500,000 taels. The political state of the island during these years was very bad; in a report of 1872 there is recorded a proverb among the official classes, "every three years an outbreak, every five a rebellion"; but subsequent to 1877 some improvement was manifested, and public works were pushed forward by the Chinese authorities. In 1884, in the course of belligerent proceedings arising out of the Tongking dispute, the forts at Kelung on the north were bombarded by the French fleet, and the place was captured and held for some months by French troops. An attack on the neighbouring town of Tamsui failed, but a semi-blockade of the island was maintained by the French fleet during the winter and spring of 1884–1885. The troops were withdrawn on the conclusion of peace in June 1885.

In 1895 the island was ceded to Japan by the treaty of Shimonoseki at the close of the Japanese war. The resident Chinese officials, however, refused to recognize the cession, declared a republic, and prepared to offer resistance. It is even said they offered to transfer the sovereignty to Great Britain if that power would accept it. A formal transfer to Japan was made in June of the same year in pursuance of the treaty, the ceremony taking place on board ship outside Kelung, as the Chinese commissioners did not venture to land. The Japanese were thus left to take possession as best they could, and some four months elapsed before they effected a landing on the south of the island. Takau was bombarded and captured on the 15th of October, and the resistance collapsed. Liu Yung-fu, the notorious Black Flag general, and the back-bone of the resistance, sought refuge in flight. The general state of the island when the Japanese assumed possession was that the plain of Giran on the eastern coast and the hill-districts were inhabited by semi-barbarous folk, the western plains by Chinese of a degraded type, and that between the two there existed a traditional and continuous feud, leading to mutual displays of merciless and murderous violence. By many of these Chinese settlers the Japanese conquerors, when they came to occupy the island, were regarded in precisely the same light as the Chinese themselves had been regarded from time immemorial by the aborigines. Insurrections occurred frequently, the insurgents receiving secret aid from sympathizers in China, and the difficulties of the Japanese being increased not only by their ignorance of the country, which abounds in fastnesses where bandits can find almost inaccessible refuge, but also by the unwillingness of experienced officials to abandon their home posts for the purpose of taking service in the new territory.

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FORMOSUS, pope from 891 to 896, the successor of Stephen V. (or VI.). He first appears in history when, as bishop of Porto, he was sent on an embassy to the Bulgarians. Having afterwards sided with a faction against John VIII., he was excommunicated, and compelled to take an oath never to return to Rome or again to assume his priestly functions. From this oath he was, however, absolved by Marinus, the successor of John VIII., and restored to his dignities; and on the death of Stephen V. in 891 he was chosen pope. At that time the Holy See was engaged in a struggle against the oppression of the princes of Spoleto, and a powerful party in Rome was eager to obtain the intervention of Arnulf, king of Germany, against these dangerous neighbours. Formosus himself shared this view; but he was forced to yield to circumstances and to consecrate as emperor Lambert, the young son of Guy of Spoleto. Guy had already been consecrated by Stephen V., and died in 894. In the following year Arnulf succeeded in seizing Rome, and Formosus crowned him emperor. But, as he was advancing on Spoleto against Lambert, Arnulf was seized with paralysis, and was forced to return to Germany. Overwhelmed with chagrin, Formosus died on the 4th of April 896. The discords in which he had been involved continued after his death. The validity of his acts was contested on the pretext that, having been originally bishop of Porto, he could not be a legitimate pope. The fundamental factor in these dissensions was the rivalry between the princes of Spoleto and the Carolingian house, represented by the king of Germany. The body of Formosus was disinterred in 897 by Stephen VI., and treated with contumely as that of a usurper of the papal throne; but Theodore II. restored it to Christian burial, and at a council presided over by John IX. the pontificate of Formosus was declared valid and all his acts confirmed. (L. D.*)

FORMULA (Lat. diminutive of *forma*, shape, pattern, &c., especially used of rules of judicial procedure), in general, a stereotyped form of words to be used on stated occasions, for specific purposes, ceremonies, &c. In the sciences, the word usually denotes a symbolical statement of certain facts; for example, a chemical formula exhibits the composition of a substance (see CHEMISTRY); a botanical formula gives the differentia of a plant; a dentition formula indicates the arrangement and number of the teeth of an animal.

FORNER, JUAN BAUTISTA PABLO (1756–1799), Spanish satirist and scholar, was born at Mérida (Badajoz) on the 23rd of February 1756, studied at the university of Salamanca, and was called to the bar at Madrid in 1783. During the next few years—under the pseudonyms of "Tomé Cecial," "Pablo Segarra," "Don Antonio Varas," "Bartolo," "Pablo Ignocausto," "El Bachiller Regañadientes," and "Silvio Liberio"—Forner was engaged in a series of polemics with García de la Huerta, Iriarte and other writers; the violence of his attacks was so extreme that he was finally forbidden to publish any controversial pamphlets, and was transferred to a legal post at Seville. In 1796 he became crown prosecutor at Madrid, where he died on the 17th of March 1799. Forner's brutality is almost unexampled, and his satirical writings give a false impression of his powers. His *Oración apologética por la España y su mérito literario* (1787) is an excellent example of learned advocacy, far superior to similar efforts made by Denina and Antonio Cavanilles; and his posthumous *Exequias de la lengua castellana* (printed in the *Biblioteca de autores españoles*, vol. lxiii.) testifies to his scholarship and taste.

FORRES (Gaelic, *far uis*, "near water"), a royal and police burgh of Elginshire, Scotland. Pop. (1891) 3971; (1901) 4317. It is situated on the Findhorn, which sweeps past the town and is crossed by a suspension bridge about a mile to the W., 11 m. W. of Elgin by the Highland railway, and 6 m. by road from Findhorn, its port, due north. It is one of the most ancient towns in the north of Scotland. King Donald (892–900), son of Constantine, died in Forres, not without suspicion of poisoning, and in it King Duff (961–967) was murdered. Macbeth is said to have slain Duncan in the first structure that gave its name to Castlehill, which was probably the building demolished in 1297 by the adherents of Wallace. The next castle was a royal residence from 1189 to 1371 and was occupied occasionally by William the Lion, Alexander II. and David II. It was burned down by the Wolf of Badenoch in 1390. The ruins on the hill, however, are those of a later edifice and are surmounted by a granite obelisk, 65 ft. high, raised to the memory of Surgeon James Thomson, a native of Cromarty, who at the cost of his life tended the Russian wounded on the field of the Alma. The public buildings include the town hall, a fine and commodious house on the site of the old tolbooth; the Falconer museum, containing among other exhibits several valuable fossils, and named after Dr Hugh Falconer (1808–1865), the distinguished palaeontologist and botanist, a native of the town; the mechanics' institute; the agricultural and market hall; Leanchoil hospital and Anderson's Institution for poor boys. The cross, in Decorated Gothic, stands beside the town hall. Adjoining the town on the south-east is the beautifully-wooded Cluny Hill, a favourite public resort, carrying on its summit the tower, 70 ft. high, which was erected in 1806 to the memory of Nelson, and on its southern slopes a well-known hydropathic. An excellent golf-course extends from Kinloss to Findhorn. The industries comprise the manufacture of chemicals and artificial manures, granite polishing, flour and sawmills, boot- and shoe-making, carriage-building and woollen manufactures. There is also considerable trade in cattle.

Sueno's Stone, about 23 ft. high, probably the finest sculptured monolith in Scotland, stands in a field to the east of the town. Its origin and character have given rise to endless surmises. It is carved with figures of soldiers, priests, slaughtered men and captives on one side, and on the other with a cross and Runic ornamentation. One theory is that it is a relic of the early Christian church, symbolizing the battle of life and the triumph of good over evil. According to an older tradition it was named after Sueno, son of Harold, king of Denmark, who won a victory on the spot in 1008. A third conjecture is that it commemorates the expulsion of the Danes from Moray in 1014. Skene's view is that it chronicles the struggle in 900 between Sigurd, earl of Orkney, and Maelbrigd, Maormor of Moray. Another storied stone is called the Witches' Stone, because it marks the place near Forres where Macbeth is said to have encountered the weird sisters.

Forres is one of the Inverness district group of parliamentary burghs, the other members being Nairn, Fortrose and Inverness. The town is amongst the healthiest in Scotland and has the lowest rainfall in the county.

Within 2 m. of Forres, to the S.W., lie the beautiful woods of Altyre, the seat of the Gordon-Cummings. Three miles farther south is Relugas House, the favourite residence of Sir Thomas Dick Lauder, romantically situated on a height near the confluence of the Divie and the Findhorn. Not far away stand the ruins of the old castle of Dunphail. On the left bank of the Findhorn, 3½ m. W. of Forres, is situated Brodie Castle, partly ancient and partly modern. The Brodies—the old name of their estate was Brothie, from the Irish *broth*, a ditch, in allusion to the trench that ran from the village of Dyke to the north of the house—were a family of great consequence at the period of the Covenant. Alexander Brodie (1617–1680), the fourteenth laird, was one of the commissioners who went to the Hague to treat with Charles II., and afterwards became a Scottish lord of session and an English judge. He and his son were regarded as amongst the staunchest of the Presbyterians. Farther south is the forest of Darnaway, famous for its oaks, in which stands the earl of Moray's mansion of Darnaway Castle. It occupies the site of the castle which was built by Thomas Randolph, the first earl. Attached to it is the great hall, capable of accommodating 1000 men, with an open roof of fine dark oak, the only remaining portion of the castle that was erected by Archibald Douglas, earl of Moray, in 1450. Queen Mary held a council in it in 1562. Earl Randolph's chair, not unlike the coronation chair, has been preserved. Kinloss Abbey, now in ruins, stands some 2½ m. to the N.E. of Forres. It was founded in 1150 by David I., and remained in the hands of the Cistercians till its suppression at the Reformation. Robert Reid, who ruled from 1526 to 1540, was its greatest abbot. His hobby was gardening, and it is believed that many of the 123 varieties of pears and 146 varieties of apples for which the district is famous were due to his skill and enterprise. Edward I. stayed in the abbey for a short time in 1303 and Queen Mary spent two nights in it in 1562.

FORREST, EDWIN (1806–1872), American actor, was born at Philadelphia, Pennsylvania, on the 9th of March 1806, of Scottish and German descent. He made his first stage appearance on the 27th of November 1820, at the Walnut Street theatre, in Home's *Douglas*. In 1826 he had a great success in New York as Othello. He played at Drury Lane in the *Gladiator* in 1836, but his Macbeth in 1845 was hissed by the English audience, and his affront to Macready in Edinburgh shortly afterwards—when he stood up in a private box and hissed him,—was fatal to his popularity in Great Britain. His jealousy of Macready resulted in the Astor Place riot in 1849. In 1837 he had married Catherine, daughter of John Sinclair, an English singer, and his divorce suit in 1852 was a *cause célèbre* which hurt his reputation and soured his temper. His last appearance was as Richelieu in Boston in 1871. He died on the 12th of December 1872. He had amassed a large fortune, much of which he left by will to found a home for aged actors.

See Lawrence Barrett's *Edwin Forrest* (Boston, 1881).

FORREST, SIR JOHN (1847–), West Australian statesman and explorer, son of William Forrest, of Bunbury, West Australia, was born near Bunbury, on the 22nd of August 1847, and educated at Perth, W.A. In 1865 he became connected with the Government Survey Department at Perth, and in 1869 led an exploring expedition into the interior in search of D. Leichardt, penetrating through bush and salt-marshes as far inland as

123° E. In 1870 he again made an expedition from Perth to Adelaide, along the southern shores. In 1874, with his brother Alexander Forrest (born 1849), he explored eastwards from Champion Bay, following as far as possible the 26th parallel, and striking the telegraph line between Adelaide and Port Darwin; a distance of about 2000 m. was covered in about five months with horses and without carriers, a particularly fine achievement (see AUSTRALIA: *Exploration*). John Forrest also surveyed in 1878 the north-western district between the rivers Ashburton and Lady Grey, and in 1882 the Fitzroy district. In 1876 he was made deputy surveyor-general, receiving the thanks of the colony for his services and a grant of 5000 acres of land; for a few months at the end of 1878 he acted as commissioner of crown lands and surveyor-general, being given the full appointment in 1883 and retaining it till 1890. When the colony obtained in 1890 its constitution of self-government, Sir John Forrest (who was made K.C.M.G. in 1891, and G.C.M.G. in 1901) became its first premier, and he held that position till in 1901 he joined the Commonwealth government, first as minister for defence, later as minister for home affairs and postmaster-general, resigning the office of federal treasurer in July 1907. His influence in West Australia was one of an almost autocratic character, owing to the robust vigour of his personality and his success in enforcing his views (see WESTERN AUSTRALIA: *History*). In 1897 he was made a member of the Privy Council. Sir John Forrest married in 1876 Margaret Hamersley. He published *Explorations in Australia* (1876) and *Notes on Western Australia* (1884–1887).

FORREST, NATHAN BEDFORD (1821–1877), Confederate cavalry general in the American Civil War, was born near Chapel Hill, Tennessee, on the 13th of July 1821. Before his father's death in 1837 the family had removed to Mississippi, and for some years thereafter it was supported principally by Nathan, who was the eldest son. Thus he never received any formal education (as witnessed by the uncouth phraseology and spelling of his war despatches), but he managed to teach himself with very fair success, and is said to have possessed considerable ability as a mathematician. He was in turn a horse and cattle trader in Mississippi, and a slave dealer and horse trader in Memphis, until 1859, when he took to cotton planting in north-western Mississippi, where he acquired considerable wealth. At the outbreak of the Civil War in 1861 he volunteered as a private, raised a cavalry battalion, of which he was lieut.-colonel, and in February 1862 took part in the defence of Fort Donelson, and refusing, like Generals Floyd and Pillow, to capitulate with the rest of the Confederate forces, made his way out, before the surrender, with all the mounted troops there. He was promptly made a colonel and regimental commander, and fought at Shiloh with distinction, receiving a severe wound. Shortly after this he was promoted brigadier-general (July 1862). At the head of a mounted brigade he took a brilliant part in General Bragg's autumn campaign, and in the winter of 1862–1863 he was continually active in raiding the hostile lines of communication. These raids have been the theme of innumerable discussions, and on the whole their value seems to have been overrated. At the same time, and apart from the question of their utility, Forrest's raids were uniformly bold and skilful, and are his chief title to fame in the history of the cavalry arm. Indeed, next to Stuart and Sheridan, he was the finest cavalry leader of the whole war. One of the most remarkable of his actions was his capture, near Rome, Georgia, after five days of marching and fighting, of an entire cavalry brigade under Colonel A. D. Streight (April 1863). He was present at the battle of Chickamauga in September, after which (largely on account of his criticism of General Bragg, the army commander) he was transferred to the Mississippi. Forrest was made a major-general in December 1863. In the winter of 1863–1864 he was as active as ever, and in the spring of 1864 he raided as far north as Paducah, Ky. On the 12th of April 1864 he assaulted and captured Fort Pillow, in Tennessee on the Mississippi; U.S. negro troops formed a large part of the garrison and according to survivors many were massacred after the fort had surrendered. The "Massacre of Fort Pillow" has been the subject of much controversy and there is much conflicting testimony regarding it, but it seems probable that Forrest himself had no part in it. On the 10th of June Forrest decisively defeated a superior Federal force at Brice's Cross Roads, Miss., and throughout the year, though the greatest efforts were made by the Federals to crush him, he raided in Mississippi, Tennessee and Alabama with almost unvarying success. He was once more with the main Confederate army of the West in the last disastrous campaign of Nashville, and fought stubborn rearguard actions to cover the retreat of the broken Confederates. In February 1865 he was made a lieut.-general, but the struggle was almost at an end and General James H. Wilson, one of the ablest of the Union cavalry generals, rapidly forced back the few Confederates, now under Forrest's command, and stormed Selma, Alabama, on the 2nd of April. The surrender of General Forrest and his whole command, under the agreement between General Richard Taylor and General E. S. Canby, followed on the 9th of May. After the war he lived in Memphis. He sold his cotton plantation in 1867, and for some years was president of the Selma, Marion and Memphis Railroad. He died at Memphis, Tennessee, on the 29th of October 1877.

The military character of General Forrest, apart from questions of his technical skill, horsemastership and detail special to his arm of the service, was admittedly that of a great leader. He never commanded a large force of all arms. He was uneducated, and had neither experience of nor training for the strategical handling of great armies. Yet his personality and his natural soldierly gifts were such that General Sherman considered him "the most remarkable man the Civil War produced on either side." Joseph Johnston, the Confederate general whose greatness lay above all in calm and critical judgment, said that Forrest, had he had the advantage of a thorough military training, "would have been the great central figure of the war."

See the biographies by J. A. Wyeth (1899) and J. H. Mathes (1902).

FORSKÅL, PETER (1736–1763), Swedish traveller and naturalist, was born in Kalmar in 1736. He studied at Göttingen, where he published a dissertation entitled *Dubia de principiis philosophiae recentioris* (1756). Thence he returned to his native country, which, however, he had to leave after the publication of a pamphlet entitled *Pensées sur la liberté civile* (1759). By Linnaeus he was recommended to Frederick V. of Denmark, who appointed him to accompany Carsten Niebuhr in an expedition to Arabia and Egypt in 1761. He died of the plague at Jerim in Arabia on the 11th of July 1763.

His friend and companion, Niebuhr, was entrusted with the care of editing his MSS., and published in 1775 *Descriptiones animalium, avium, amphibiorum, piscium, insectorum, vermium, quae in itin. Orient. observavit Petrus Forskål*. In the same year appeared also his account of the plants of Arabia Felix and of lower Egypt, under the title of *Flora Aegyptiaco-Arabica*.

FORSSELL, HANS LUDVIG (1843–1901), Swedish historian and political writer, the son of Adolf Forssell, a distinguished mathematician, was born at Gefle, where his father was professor, on 14th January 1843. At the age of sixteen he became a student in Upsala University, where he distinguished himself, and where, in 1866, having taken the degree of doctor, he was appointed reader in history. At the age of thirty, however, Forssell, who had already shown remarkable business capacity, was called to Stockholm, where he filled one important post after another in the Swedish civil service. In 1875 he was appointed head of the treasury, and in 1880 was transferred to the department of inland revenue, of which he continued to be president until the time of his death. In addition to the responsibilities which these offices devolved upon him, Forssell was constantly called to serve on royal commissions, and his political influence was immense. In spite of all these public duties, which he carried through with the utmost diligence, Forssell also found leisure for an abundant literary activity. Of his historical writings the most important were: *The Administrative and Economical History of Sweden after Gustavus I.* (1869–1875) and *Sweden in 1571* (1872). He was also for several years, in company with the poet Wirsén, editor of the *Swedish Literary Review*. He published two volumes of *Studies and*

Criticisms (1875, 1888). In the year 1881, at the death of the historian Anders Fryxell, Forssell was elected to the vacant seat on the Swedish Academy. The energy of Forssell was so great, and he understood so little the economy of strength, that he unquestionably overtaxed his vital force. His death, however, which occurred with great suddenness on the 2nd of August 1901 while he was staying at San Bernardino in Switzerland, was wholly unexpected. There was little of the typical Swedish urbanity in Forssell's exterior manner, which was somewhat dry and abrupt. Like many able men who have from early life administered responsible public posts, there appeared a certain want of sympathy in his demands upon others. His views were distinct, and held with great firmness; for example, he was a free-trader, and his consistent opposition to what he called "the new system" had a considerable effect on Swedish policy. He was not exactly an attractive man, but he was a capable, upright and efficient public servant. In 1867 he married Miss Zulamith Eneroth, a daughter of the well-known pomologist of Upsala; she survived him, with two sons and two daughters. (E. G.)

FORST (originally Forsta or Forste), a town of Germany, in the Prussian province of Brandenburg, on the Neisse, 44 m. S.E. of Frankfort-on-Oder. Pop. (1905) 33,757. It has two Evangelical, a Roman Catholic and an Old Lutheran church; there are two schools and two hospitals in the town. The chief industry of Forst is the manufacture of cloth, but spinning, dyeing and the making of artificial flowers are also carried on. Founded in the 13th century, Forst passed in 1667 to the duke of Saxe-Merseburg, becoming part of electoral Saxony in 1740. It was ceded to Prussia in 1815.

FORSTER, FRANÇOIS (1790–1872), French engraver, was born at Locle in Neufchâtel, on the 22nd of August 1790. In 1805 he was apprenticed to an engraver in Paris, and he also studied painting and engraving simultaneously in the École des Beaux-Arts. His preference was ultimately fixed on the latter art, and on his obtaining in 1814 the first "grand prix de gravure," the king of Prussia, who was then with the allies in Paris, bestowed on him a gold medal, and a pension of 1500 francs for two years. With the aid of this sum he pursued his studies in Rome, where his attention was devoted chiefly to the works of Raphael. In 1844 he succeeded Tardieu in the Academy. He died at Paris on the 27th of June 1872. Forster occupied the first position among the French engravers of his time, and was equally successful in historical pieces and in portraits. Among his works may be mentioned—The Three Graces, and *La Vierge de la légende*, after Raphael; *La Vierge au bas-relief*, after Leonardo da Vinci; Francis I. and Charles V., after Gros; St Cecilia, after Paul Delaroche; Albert Dürer and Henry IV., after Porbus; Wellington, after Gérard; and Queen Victoria, after Winterhalter.

FÖRSTER, FRIEDRICH CHRISTOPH (1791–1868), German historian and poet, was the second son of Karl Christoph Förster (1751–1811), and consequently a brother of the painter, Ernest Joachim Förster (1800–1885). Born at Münchengosserstadt on the Saale on the 24th of September 1791, he received his early education at Altenburg, and after a course of theology at Jena, devoted some time to archaeology and the history of art. At the outbreak of the War of Liberation in 1813, he joined the army, quickly attaining the rank of captain; and by his war-songs added to the national enthusiasm. On the conclusion of the war he was appointed professor at the school of engineering and artillery in Berlin, but on account of some democratic writings he was dismissed from this office in 1817. He then became connected with various journals until about 1829, when he received an appointment at the royal museum in Berlin, with the title of court councillor (*Hofrat*). He was the founder and secretary of the *Wissenschaftlicher Kunstverein* in Berlin, and died in Berlin on the 8th of November 1868. Förster's principal works are: *Beiträge zur neueren Kriegsgeschichte* (Berlin, 1816); *Grundzüge der Geschichte des preussischen Staates* (Berlin, 1818); *Der Feldmarschall Blücher und seine Umgebungen* (Leipzig, 1820); *Friedrich der Grosse, Jugendjahre, Bildung und Geist* (Berlin, 1822); *Albrecht von Wallenstein* (Potsdam, 1834); *Friedrich Wilhelm I., König von Preussen* (Potsdam, 1834–1835); *Die Höfe und Kabinette Europas im 18. Jahrhundert* (Potsdam, 1836–1839); *Leben und Taten Friedrichs des Grossen* (Meissen, 1840–1841); *Wallensteins Prozess* (Leipzig, 1844); and *Preussens Helden in Krieg und Frieden, neuere und neueste preussische Geschichte*, 7 volumes (Berlin, 1849–1860). The three concluding volumes of this work contain the history of the war of liberation of 1813–14–15. He brought out an edition of Hegel's works, adapted several of Shakespeare's plays for the theatre, wrote a number of poems and an historical drama, *Gustav Adolf* (Berlin, 1832).

Many of his lesser writings were collected and published as *Kriegslieder, Romanzen, Erzählungen und Legenden* (Berlin, 1838). The beginning of an autobiography of Förster, edited by H. Kletke, has been published under the title, *Kunst und Leben* (Berlin, 1873).

FORSTER, JOHANN GEORG ADAM (1754–1794), German traveller and author, was born at Nassenhuben, a small village near Danzig, on the 27th of November 1754. His father, Johann Reinhold Forster, a man of great scientific attainments but an intractable temper, was at that time pastor of the place; the family are said to have been of Scottish extraction. In 1765 the elder Forster was commissioned by the empress Catherine to inspect the Russian colonies in the province of Saratov, which gave his son an opportunity of acquiring the Russian language and the elements of a scientific education. After a few years the father quarrelled with the Russian government, and went to England, where he obtained a professorship of natural history and the modern languages at the famous nonconformist academy at Warrington. His violent temper soon compelled him to resign this appointment, and for two years he and his son earned a precarious livelihood by translations in London—a practical education, however, exceedingly useful to the younger Forster, who became a thorough master of English, and acquired many of the ideas which chiefly influenced his subsequent life. At length the turning point in his career came in the shape of an invitation for him and his father to accompany Captain Cook in his third voyage round the world. Such an expedition was admirably calculated to call forth Forster's peculiar powers. His account of Cook's voyage (*A Voyage round the World*, London, 1777; in German, Berlin, 1778–1780), is almost the first example of the glowing yet faithful description of natural phenomena which has since made a knowledge of them the common property of the educated world. The publication of this work was, however, impeded for some time by differences with the admiralty, during which Forster proceeded to the continent to obtain an appointment for his father as professor at Cassel, and found to his surprise that it was conferred upon himself. The elder Forster, however, was soon provided for elsewhere, being appointed professor of natural history at Halle. At Cassel Forster formed an intimate friendship with the great anatomist Sömmerring, and about the same time made the acquaintance of Jacobi, who gave him a leaning towards mysticism from which he subequently emancipated himself. The want of books and scientific apparatus at Cassel induced him to resort frequently to Göttingen, where he became betrothed to Therese Heyne, the daughter of the illustrious philologist, a clever and cultivated woman, but ill-suited to be Forster's wife. To be able to marry he accepted (1784) a professorship at the university of Wilna, which he did not find to his taste. The penury and barbarism of Polish circumstances are graphically described in his and his wife's letters of this period. After a few years' residence at Wilna he resigned his appointment to participate in a scientific expedition projected by the Russian government, and upon the relinquishment of this undertaking became librarian to the elector of Mainz. He actively promoted the incorporation of the left bank of the Rhine with France and in 1793 went to Paris to carry on the negotiations. Meanwhile, however, the Germans seized Mainz, and Forster—already disheartened by the turn of events in France—was cut off from all return. Domestic sorrows were added to his political troubles and he died suddenly at Paris on the 10th of January 1794.

Forster's masterpiece is his *Ansichten vom Niederrhein, von Brabant, Flandern, Holland, England und Frankreich* (1791–1794), one of the ablest books of travel of the 18th century. His style is clear and vivid; his method of describing what he sees extraordinarily plastic; above all, he has the art of presenting objects to us from their most interesting and attractive side. The same qualities are also more or less conspicuous in his minor writings. By his translation (from the English) of the *Sakuntala* of Kalidasa (1791), he first awakened German interest in Indian literature.

Forster's *Sämtliche Werke* appeared at Leipzig in 9 vols. in 1843. The *Ansichten vom Rhein*, &c., has been frequently reprinted (best edition by A. Leitzmann, Halle, 1893); Leitzmann has also published (Stuttgart, 1894) a selection of Forster's *Kleine Schriften*, which originally appeared in 6 vols. (1789–1797). His correspondence was published by his wife (2 vols., Leipzig, 1829); his *Briefwechsel mit Sömmerring* by H. Hettner (Brunswick, 1877). See J. Moleschott, *G. Forster, der Naturforscher des Volks* (1854; 3rd ed., 1874); K. Klein, *G. Forster in Mainz* (Gotha, 1863); A. Leitzmann, *G. Forster* (Vorlesung) (Halle, 1893).

FORSTER, JOHN (1812–1876), English biographer and critic, was born on the 2nd of April 1812 at Newcastle. His father, who was a Unitarian and belonged to the junior branch of a good Northumberland family, was a cattle-dealer. After being well grounded in classics and mathematics at the grammar school of his native town, John Forster was sent in 1828 to Cambridge, but after only a month's residence he removed to London, where he attended classes at University College, and was entered at the Inner Temple. He devoted himself, however, chiefly to literary pursuits. He contributed to *The True Sun*, *The Morning Chronicle* and to *The Examiner*, for which he acted as literary and dramatic critic; and the influence of his powerful individuality soon made itself felt. His *Lives of the Statesmen of the Commonwealth* (1836–1839) appeared partly in Lardner's Cyclopaedia. He published the work separately in 1840 with a *Treatise on the Popular Progress in English History*. Its merits obtained immediate recognition, and Forster became a prominent figure in that distinguished circle of literary men which included Bulwer, Talfourd, Albany, Fonblanque, Landor, Carlyle and Dickens. Forster is said to have been for some time engaged to Letitia Landon, but the engagement was broken off, and Miss Landon married George Maclean. In 1843 he was called to the bar but he never became a practising lawyer. For some years he edited the *Foreign Quarterly Review*; in 1846, on the retirement of Charles Dickens, he took charge for some months of the *Daily News*; and from 1847 to 1856 he edited the *Examiner*. From 1836 onwards he contributed to the *Edinburgh Quarterly* and *Foreign Quarterly* Reviews a variety of articles, some of which were republished in two volumes of *Biographical and Historical Essays* (1858). In 1848 appeared his admirable *Life and Times of Oliver Goldsmith* (revised in 1854). Continuing his researches into English history under the early Stuarts, he published in 1860 the *Arrest of the Five Members by Charles I.—A Chapter of English History rewritten*, and *The Debates on the Grand Remonstrance, with an Introductory Essay on English Freedom*. These were followed by his *Sir John Eliot: a Biography* (1864), elaborated from one of his earlier studies for the *Lives of Eminent British Statesmen*. In 1868 appeared his *Life of Landor*, and, on the death of his friend Alexander Dyce, Forster undertook the publication of his third edition of Shakespeare. For several years he had been collecting materials for a life of Swift, but he interrupted his studies in this direction to write his standard *Life of Charles Dickens*. He had long been intimate with the novelist, and it is by this work that John Forster is now chiefly remembered. The first volume appeared in 1872, and the biography was completed in 1874. Towards the close of 1875 the first volume of his *Life of Swift* was published; and he had made some progress in the preparation of the second at the time of his death on the 2nd of February 1876. In 1855 Forster had been appointed secretary to the lunacy commission, and from 1861 to 1872 he held the office of a commissioner in lunacy. His valuable collection of manuscripts, including the original copies of Charles Dickens's novels, together with his books and pictures, was bequeathed to South Kensington Museum.

An admirable account of him by Henry Morley is prefixed to the official handbook (1877) of the Dyce and Forster bequests.

FORSTER, JOHN COOPER (1823–1886), British surgeon, was born in 1823 in Lambeth, London, where his father and grandfather before him had been local medical practitioners. He entered Guy's hospital in 1841, was appointed demonstrator of anatomy in 1850, assistant-surgeon, 1855, and surgeon, 1870. He became a member of the College of Surgeons in 1844, fellow in 1849 and president in 1884. He was a prompt and sometimes bold operator. In 1858 he performed practically the first gastrostomy in England for a case of cancer of the oesophagus. Among his best-known papers were discussions of acupressure, syphilis, hydrophobia, intestinal obstruction, modified obturator hernia, torsion, and colloid cancer of the large intestine; and he published a book on *Surgical Diseases of Children* in 1860, founded on his experience as surgeon to the hospital for children and women in Waterloo Road. He died suddenly in London on the 2nd of March 1886.

FORSTER, WILLIAM EDWARD (1818–1886), British statesman, was born of Quaker parents at Bradpole in Dorsetshire on the 11th of July 1818. He was educated at the Friends' school at Tottenham, where his father's family had long been settled, and on leaving school he was put into business. He declined, however, on principle, to enter a brewery. Becoming in due time a woollen manufacturer in a large way at Bradford, Yorkshire (from which after his marriage he moved to Burley-in-Wharfedale), he soon made himself known as a practical philanthropist. In 1846–1847 he accompanied his father to Ireland as distributor of the Friends' relief fund for the famine in Connemara, and the state of the country made a deep impression on him. In 1849 he wrote a preface to a new edition of Clarkson's *Life of William Penn*, defending the Quaker statesman against Macaulay's criticisms. In 1850 he married Jane Martha, eldest daughter of the famous Dr Arnold of Rugby. She was not a Quaker, and her husband was formally excommunicated for marrying her, but the Friends who were commissioned to announce the sentence "shook hands and stayed to luncheon." Forster thereafter ranked himself as a member of the Church of England, for which, indeed, he was in later life charged with having too great a partiality. There were no children of the marriage, but when Mrs Forster's brother, William Arnold, died in 1859, leaving four orphans, the Forsters adopted them as their own.

One of these children was Mr H. O. Arnold-Forster (1855–1909), the well-known Liberal-Unionist member of parliament, who eventually became a member of Mr Balfour's cabinet; he was secretary to the admiralty (1900–1903), and then secretary of state for war (1903–1905), and was the author of numerous educational books published by Cassell & Co., of which firm he was a director.

W. E. Forster gradually began to take an active part in public affairs by speaking and lecturing. In 1858 he gave a lecture before the Leeds Philosophical Institution on "How we Tax India." In 1859 he stood as Liberal candidate for Leeds, but was beaten. But he was highly esteemed in the West Riding, and in 1861 he was returned unopposed for Bradford. In 1865 (unopposed) and in 1868 (at the head of the poll) he was again returned. He took a prominent part in parliament in the debates on the American Civil War, and in 1868 was made under-secretary for the colonies in Earl Russell's ministry. It was then that he first became a prominent advocate of imperial federation. In 1866 his attitude on parliamentary reform attracted a good deal of attention. His speeches were full of knowledge of the real condition of the people, and contained something like an original programme of Radical legislation. "We have other things to do," he said, "besides extending the franchise. We want to make Ireland loyal and contented; we want to get rid of pauperism in this country; we want to fight against a class which is more to be dreaded than the holders of a £7 franchise—I mean the dangerous class in our large towns. We want to see whether we cannot make for the agricultural labourer some better hope than the workhouse in his old age. We want to have Old England as well taught as New England." In these words he heralded the education campaign which occupied the country for so many years afterwards. Directly the Reform Bill had passed, the necessity of "inducing our masters to learn their letters" (in Robert Lowe's phrase) became pressing. Mr Forster and Mr Cardwell, as private members in opposition, brought in Education Bills in 1867 and 1868; and in 1868, when the Liberal party returned to office, Mr Forster was appointed vice-president of the council, with the duty of preparing a government measure for national education. The Elementary Education Bill (see EDUCATION) was introduced on the 17th of February 1870. The religious difficulty at once came to the front. The Manchester Education Union and the Birmingham Education League had already formulated in the provinces the two opposing theories, the former standing for the preservation of denominational interests, the latter advocating secular rate-aided education as the only means of protecting Nonconformity against the Church. The Dissenters were by no means satisfied with Forster's "conscience clause" as contained in the bill, and they regarded him, the ex-Quaker, as a deserter from their own side; while they resented the "25th clause," permitting school boards to pay the fees of needy children at denominational schools out of the rates, as an insidious attack upon themselves. By the 14th of March, when the second reading came on, the controversy had assumed threatening proportions; and Mr Dixon, the Liberal member for Birmingham and chairman of the Education League, moved an amendment, the effect of which was to prohibit all religious education in board schools. The government made its rejection a question of confidence, and the amendment was withdrawn; but the result was the insertion of the Cowper-Temple clause as a compromise before the bill passed. Extremists on both sides abused Forster, but the government had a difficult set of circumstances to deal with, and he acted like a prudent statesman in contenting himself with what he could get. An ideal bill was impracticable; it is to Forster's enduring credit that the bill of 1870, imperfect as it was, established at last some approach to a system of national education in England without running absolutely counter to the most cherished English ideas and without ignoring the principal agencies already in existence.

Forster's next important work was in passing the Ballot Act of 1872, but for several years afterwards his life was uneventful. In 1874 he was again returned for Bradford, in spite of Dissenting attacks, and he took his full share of the work of the Opposition Front Bench. In 1875, when Mr Gladstone "retired," he was strongly supported for the leadership of the Liberal party, but declined to be nominated against Lord Hartington. In the same year he was elected F.R.S., and made lord rector of Aberdeen University. In 1876, when the Eastern question was looming large, he visited Servia and Turkey, and his subsequent speeches on the subject were marked by studious moderation, distasteful to extremists on both sides. On Mr Gladstone's return to office in 1880 he was made chief secretary for Ireland, with Lord Cowper as lord-lieutenant. He carried the Compensation for Disturbance Bill through the Commons, only to see it thrown out in the Lords, and his task was made more difficult by the agitation which arose in consequence. During the gloomy autumn and winter of 1880–1881 Forster's energy and devotion in grappling with the situation in Ireland (see IRELAND) were indefatigable, his labour was enormous, and the personal risks he ran were many; but he enjoyed the Irish character in spite of all obstacles, and inspired genuine admiration in all his coadjutors. On the 24th of January 1881 he introduced a new Coercion Bill in the House of Commons, to deal with the growth of the Land League, and in the course of his speech declared it to be "the most painful duty" he had ever had to perform, and one which would have prevented his accepting his office if he had known that it would fall upon him. The bill passed, among its provisions being one enabling the Irish government to arrest without trial persons "reasonably suspected" of crime and conspiracy. The Irish party used every opportunity in and out of parliament for resenting this act, and Forster was kept constantly on the move between Dublin and London, conducting his campaign against crime and anarchy and defending it in the House of Commons. His scrupulous conscientiousness and anxiety to meet every reasonable claim availed him nothing with such antagonists, and the strain was intense and continuous. He was nicknamed "Buckshot" by the Nationalist press, on the supposition that he had ordered its use by the police when firing on a crowd. On the 13th of October Mr Parnell was arrested, and on the 20th the Land League was proclaimed. From that time Forster's life was in constant danger, and he had to be escorted by mounted police when he drove in Dublin. Early in March 1882 he visited some of the worst districts in Ireland, and addressed the crowd at Tullamore on the subject of outrages, denouncing the people for their want of courage in not assisting the government, but adding, "whether you do or not, it is the duty of the government to stop the outrages, and stop them we will." Forster's pluck in speaking out like this was fully appreciated in England, but it was not till after the revelations connected with the Phoenix Park murders that the dangers he had confronted were properly realized, and it became known that several plans to murder him had only been frustrated by the merest accidents. On the 2nd of May Mr Gladstone announced that the government intended to release Mr Parnell and his fellow-prisoners in Kilmainham, and that both Lord Cowper and Mr Forster had in consequence resigned; and the following Saturday Forster's successor, Lord Frederick Cavendish, was, with Mr Burke, murdered in Phoenix Park. It was characteristic of the man that Forster at once offered to go back to Dublin temporarily as chief secretary, but the offer was declined. His position naturally attracted universal attention towards him, particularly during the debates which ensued in parliament on the "Kilmainham Treaty." But Mr Gladstone's influence with the Liberal party was paramount, in spite of the damaging appearance of the compact made with Parnell, and Forster's pointed criticisms only caused thoroughgoing partisans to accuse him of a desire to avenge himself. It was not till the next session that he delivered his fiercest attack on Parnell in the debate on the address, denouncing him for his connexion with the Land League, and quoting against him the violent speeches of his supporters and the articles of his newspaper organs. It was on this occasion that Parnell, on Forster's charging him, not with directly planning or perpetrating outrages or murder, but with conniving at them, ejaculated "It's a lie"; and, replying on the next day, the Irish leader, instead of disproving Forster's charges, bitterly denounced his methods of administration. Though, during the few remaining years of his life, Forster's political record covered various interesting subjects, his connexion with these stormy times in Ireland throws them all into shadow. He died on the 6th of April 1886, on the eve of the introduction of the Home Rule Bill, to which he was stoutly opposed. In the interval there had been other questions on which he found himself at variance with Gladstonian Liberalism, for instance, as regards the Sudan and the Transvaal, nor was he inclined to stomach the claims of the Caucus or the Birmingham programme. When the Redistribution Act divided Bradford into three constituencies, Forster was returned for the central division, but he never took his seat in the new parliament.

Forster, like John Bright, was an excellent representative of the English middle-class in public life. Patriotic, energetic, independent, incorruptible, shrewd, fair-minded, he was endowed not only with great sympathy with progress, but also with a full faculty for resistance to mere democraticism. He was tall (the Yorkshiremen called him "Long Forster") and strongly though stiffly built, and, with his simple tastes and straightforward manners and methods, was a typical North-country figure. His oratory was rough and unpolished, but full of freshness and force and genuine feeling. It was Forster who, when appealing to the government at the time of Gordon's danger at Khartum, spoke of Mr Gladstone as able "to persuade most people of most things, and himself of almost anything," and though the phrase was much resented by Mr Gladstone's *entourage*, the truth that underlay it may be taken as representing the very converse of his own character. His personal difficulties with some of his colleagues, both in regard to the Education Act of 1870 and his Irish administration, must be properly understood if a complete comprehension of his political career is to be obtained. For an account of them we need only refer to the *Life of the Right Hon. W. E. Forster*, by Sir T. Wemyss Reid. (H. Ch.)

FORSYTH, PETER TAYLOR (1848–), British Nonconformist divine, was born at Aberdeen in 1848. He took first-class honours in classics at Aberdeen, subsequently studied at Göttingen (under Ritschl) and at New College, Hampstead, and entered the Congregational ministry. Having held pastorates at Shipley, Hackney, Manchester, Leicester and Cambridge, he became principal of Hackney Theological College, Hampstead, in 1901. In 1907 he delivered the Lyman Beecher lectures on preaching at Yale University, published as *Positive Preaching and Modern Mind*. Among his other publications may be mentioned *Religion in Recent Art*, and articles in the *Contemporary Review*, *Hibbert Journal*, and *London Quarterly*. He was chairman of the Congregational Union of England and Wales in 1905.

FORTALEZA (usually called Ceará by foreigners), a city and port of Brazil and the capital of the state of Ceará, on a crescent-shaped indentation of the coast-line immediately W. of Cape Mucuripe or Mocoripe, 7½ m. from the mouth of the Ceará river, in lat. 3° 42′ S., long. 38° 30′ W. Pop. (1890) of the municipality, including a large rural district, 40,902. The city stands on an open sandy plain overlooking the sea, and is regularly laid out, with broad, well-paved, gas-lighted streets and numerous squares. Owing to the aridity of the climate the vegetation is less luxuriant than in most Brazilian cities. The temperature is usually high, but it is modified by the strong sea winds. Fortaleza has suffered much from epidemics of yellow-fever, small-pox and beri-beri, but the climate is considered to be healthy. A small branch of the Ceará river, called the Pajehú, traverses the city and divides it into two parts, that on its right bank being locally known as Outeiro. Fortaleza is the see of a bishopric, created in 1854, but it has no cathedral, one of its ten churches being used for that purpose. Its public buildings include the government house, legislative chambers, bishop's palace, an episcopal seminary, a lyceum (high school), Misericordia hospital, and asylums for mendicants and the insane. The custom-house stands nearer the seashore, 1¾ m. from the railway station in the city, with which it is connected by rail. The port is the principal outlet for the products of the state, but its anchorage is an open roadstead, one of the most dangerous on the northern coast of Brazil, and all ships are compelled to anchor well out from shore and discharge into lighters. Port improvements designed by the eminent engineer Sir John Hawkshaw have been under construction for many years, but have made very slow progress. The Baturité railway, built by the national government partly to give employment to starving refugees in times of long-continued droughts, connects the city and its port with fertile regions to the S.W., and extends to Senador Pompeu, 178 m. distant. The exports include sugar, coffee, rubber, cotton, rum, rice, beans, fruits, hides and skins.

Fortaleza had its origin in a small village adjoining a fort established at this point in early colonial times. In 1654 it took the name of Villa do Forte da Assumpção, but it was generally spoken of as Fortaleza. In 1810 it became the capital of Ceará, and in 1823 it was raised to the dignity of a city under the title of Fortaleza da Nova Bragança.

FORT AUGUSTUS, a village of Inverness-shire, Scotland. Pop. (1901) 706. It is delightfully situated at the south-western extremity of Loch Ness, about 30 m. S.W. of Inverness, on the rivers Oich and Tarff and the Caledonian Canal. A branch line connects with Spean Bridge on the West Highland railway via Invergarry. The fort, then called Kilchumin, was built in 1716 for the purpose of keeping the Highlanders in check, and was enlarged in 1730 by General Wade. It was captured by the Jacobites in 1745, but reoccupied after the battle of Culloden, when it received its present name in honour of William Augustus, duke of Cumberland, the victorious general. The fort was used as a sanatorium until 1857, when it was bought by the 12th Lord Lovat, whose son presented it in 1876 to the English order of Benedictines. Within four years there rose upon its site a pile of stately buildings under the title of St Benedict's Abbey and school, a monastic and collegiate institution intended for the higher education of the sons of the Roman Catholic nobility and gentry. The series of buildings consists of the college, monastery, hospice and scriptorium—the four forming a quadrangle connected by beautiful cloisters. Amongst its benefactors were many Catholic Scots and English peers and gentlemen whose arms are emblazoned on the windows of the spacious refectory hall. The summit of the college tower is 110 ft. high.

FORT DODGE, a city and the county-seat of Webster county, Iowa, U.S.A., on the Des Moines river, 85 m. (by rail) N. by W. from Des Moines. Pop. (1890) 4871; (1900) 12,162; (1905, state census) 14,369, (2269 being foreign-born); (1910) 15,543. It is served by the Illinois Central, the Chicago Great Western, the Minneapolis & Saint Louis, and the Fort Dodge, Des Moines & Southern railways, the last an electric interurban line. Eureka Springs and Wild Cat Cave are of interest to visitors, and attractive scenery is furnished by the river and its bordering bluffs. The river is here spanned by the Chicago Great Western railway steel bridge, or viaduct, one of the longest in the country. Fort Dodge is the seat of Tobin College (420 students in 1907–1908), a commercial and business school, with preparatory, normal and classical departments, and courses in oratory and music; among its other institutions are St Paul's school (Evangelical Lutheran), two Roman Catholic schools, Corpus Christi Academy and the Sacred Heart school, Our Lady of Lourdes convent and a Carnegie library. Oleson Park and Reynold's Park are the city's principal parks. Immediately surrounding Fort Dodge is a rich farming country. To the E. of the city lies a gypsum bed, extending over an area of about 50 sq. m., and considered to be the most valuable in the United States; to the S. coal abounds; there are also limestone quarries and deposits of clay in the vicinity—the clay being, for the most part, obtained by mining. Fort Dodge is a market for the products of the surrounding country, and is a shipping centre of considerable importance. It has various manufactures, including gypsum, plaster, oatmeal, brick and tile, sewer pipe, pottery, foundry and machine-shop products, and shoes. In 1905 the value of all the factory products was $3,025,659, an increase of 200·8% over that for 1900. Fort Clark was erected on the site in 1850 to protect settlers against the Indians; in 1851 the name was changed by order of the secretary of war to Fort Dodge in honour of Colonel Henry Dodge (1782–1867), who was a lieutenant-colonel of Missouri Volunteers in the War of 1812, served with distinction as a colonel of Michigan Mounted Volunteers in the Black Hawk War, resigned from the military service in March 1833, was governor of Wisconsin Territory from 1836 to 1841 and from 1846 to 1848, and was a delegate from Wisconsin Territory to Congress from 1841 to 1845, and a United States senator from Wisconsin in 1848–1857. The fort was abandoned in 1853, and in 1854 a town was laid out. It was chartered as a city in 1869. From the gypsum beds near Fort Dodge was taken in 1868 the block of gypsum from which was modelled the "Cardiff Giant," a rudely-fashioned human figure, which was buried near Cardiff, Onondaga county, New York, where it was "discovered" late in 1869. It was then exhibited in various parts of the country as a "petrified man." The hoax was finally exposed by Professor Othniel C. Marsh of Yale; and George Hall of Binghamton, N.Y., confessed to the fraud, his object having been to discredit belief in the "giants" of Genesis vi. 4. (See "The Cardiff Giant: the True Story of a Remarkable Deception," by Andrew D. White, in the *Century Magazine*, vol. xlii., 1902.)

FORT EDWARD, a village of Washington county, New York, U.S.A., in the township of Fort Edward, on the Hudson river, 56 m. by rail N. of Albany. Pop. of the village (1900) 3521, of whom 385 were foreign-born; (1905) **3806**; (1910) **3762**; of the township, including the village (1900), 5216; (1905, 5300; (1910) 5740. The village lies mostly at the foot of a steep hill, is at the junction of the main line and the Glens Falls branch of the Delaware & Hudson railway, and is also served by electric line to Albany and Glens Falls; the barge canal connecting Lake Champlain and the Hudson river enters the Hudson here. The river furnishes good water-power, which is used in the manufacture of paper and wood pulp, the leading industry. Shirts and pottery (flower pots, jars and drain tile) are manufactured also. The village is the seat of the Fort Edward Collegiate Institute, a non-sectarian school for girls, which was founded in 1854 and until 1893 was coeducational. The village owns and operates the waterworks. Indian war parties on their way to Canada were accustomed to make a portage from this place, the head of navigation for small boats on the Hudson, to Lake George or Lake Champlain, and hence it was known as the Great Carrying Place. Governor (afterwards Sir) Francis Nicholson in 1709, in his expedition against Canada, built here a stockade which was named Fort Nicholson. Some years afterwards John Henry Lydius (1693–1791) established a settlement and protected it by a new fort, named Fort Lydius, but this was destroyed by the French and Indians in 1745. In 1755, a third fort was built by General Phineas Lyman (1716–1774), as preliminary to the expedition against Crown Point under General William Johnson, and was named Fort Lyman; in 1756 Johnson renamed it Fort Edward in honour of Edward, Duke of York. In the War for Independence Fort Edward was the headquarters of General Philip Schuyler while he and his troops were blocking the march of General Burgoyne's army from Fort Ticonderoga. When a part of Burgoyne's forces was distant only 3 or 4 m. from Fort Edward, on Fort Edward Hill, on the 27th of July 1777, the leader of an Indian band whose assistance the British had sought is supposed to have murdered Jane McCrea (*c.* 1757–1777), a young girl who had been visiting friends in Fort Edward, and who was to be escorted on that day to the British camp and there to be married to David Jones, a loyalist serving as a lieutenant in Burgoyne's army; it is possible that she was shot accidentally by Americans pursuing her Indian escorts, but her death did much to rouse local sentiment against Burgoyne and his Indian allies, and caused many volunteers to join the American army resisting Burgoyne's invasion. A monument has been erected by the Jane McCrea Chapter of the Daughters of the American Revolution near the spot where she was killed, and she is buried in Union Cemetery in Fort Edward. Fort Edward township was erected in 1818 from a part of the township of Argyle. Fort Edward village was incorporated in 1852.

See R. O. Bascom, *The Fort Edward Book* (Fort Edward, 1903).

FORTESCUE, SIR JOHN (*c.* 1394–*c.* 1476), English lawyer, the second son of Sir John Fortescue, of an ancient family in Devonshire, was born at Norris, near South Brent, in Somersetshire. He was educated at Exeter College, Oxford. During the reign of Henry VI. he was three times appointed one of the governors of Lincoln's Inn. In 1441 he was made a king's sergeant at law, and in the following year chief justice of the king's bench. As a judge Fortescue is highly recommended for his wisdom, gravity and uprightness; and he seems to have enjoyed great favour with the king, who is said to have given him some substantial proofs of esteem and regard. He held his office during the remainder of the reign of Henry VI., to whom he steadily adhered; and having faithfully served that unfortunate monarch in all his troubles, he was attainted of treason in the first parliament of Edward IV. When Henry subsequently fled into Scotland, he is supposed to have appointed Fortescue, who appears to have accompanied him in his flight, chancellor of England. In 1463 Fortescue accompanied Queen Margaret and her court in their exile on the Continent, and returned with them afterwards to England. During their wanderings abroad the chancellor wrote for the instruction of the young prince Edward his celebrated work *De laudibus legum Angliae.* On the defeat of the Lancastrian party he made his submission to Edward IV., from whom he received a general pardon dated Westminster, October 13, 1471. He died at an advanced age, but the exact date of his death has not been ascertained.

Fortescue's masterly vindication of the laws of England, though received with great favour by the learned of the profession to whom it was communicated, did not appear in print until the reign of Henry VIII., when it was published, but without a date. It was subsequently many times reprinted. Another valuable and learned work by Fortescue, written in English, was published in 1714, under the title of *The Difference between an Absolute and a Limited Monarchy.* In the Cotton library there is a manuscript of this work, in the title of which it is said to have been addressed to Henry VI.; but many passages show plainly that it was written in favour of Edward IV. A revised edition of this work, with a very valuable historical and biographical introduction, was published in 1885 by Charles Plummer, under the title *The Governance of England.* All of Fortescue's minor writings appear in *The Works of Sir John Fortescue, now first Collected and Arranged*, published in 1869 for private circulation, by his descendant, Lord Clermont.

Authorities.—Plummer's Introduction to *The Governance of England*; *Life* in Lord Clermont's edition; Gairdner's *Paston Letters*; Foss's *Lives of the Judges.*

FORTESCUE, SIR JOHN (*c.* 1531–1607), English statesman, was the eldest son of Sir Adrian Fortescue (executed in 1539), and of his second wife, Anne, daughter of Sir William Reade or Rede of Borstall in Buckinghamshire. The exact date of his birth is unrecorded.[1] He was restored in blood and to his estate at Shirburn in Oxfordshire in 1551. Through his father's mother, Alice, daughter of Sir Geoffrey Boleyn, he was a second cousin once removed from Queen Elizabeth. He acquired early a considerable reputation as a scholar and was chosen to direct the Princess Elizabeth's classical studies in Mary's reign. On the accession of Elizabeth he was appointed keeper of the great wardrobe. He was returned in 1572 to parliament for Wallingford, in 1586 for Buckingham borough, in 1588 and 1597 for Buckingham county, and in 1601 for Middlesex. In 1589 he was appointed chancellor of the exchequer and a member of the privy council. In 1592 he was knighted, and in November 1601, in addition to his two great offices, he received that of chancellor of the duchy of Lancaster. By means of his lucrative employments he amassed great wealth, with which he bought large estates in Oxfordshire and Buckinghamshire, and kept up much state and a large household. He took a prominent part in public business, was a member of the court of the star chamber and an ecclesiastical commissioner, sat on various important commissions, and as chancellor of the exchequer explained the queen's financial needs and proposed subsidies in parliament. On the death of Elizabeth he suggested that certain restrictions should be imposed on James's powers, in order probably to limit the appointment of Scotchmen to office,[2] but his advice was not followed. He was deprived by James of the chancellorship of the exchequer, but evidently did not forfeit his favour, as he retained his two other offices and entertained James several times at Henden and Salden. In 1604 Sir John, who stood for Buckinghamshire, was defeated by Sir Francis Goodwin, whose election, however, was declared void by the lord chancellor on the ground of a sentence of outlawry under which he lay, and Fortescue was by a second election returned in his place. This incident gave rise to a violent controversy, regarding the chancellor's jurisdiction in deciding disputed elections to parliament, which was repudiated by the Commons but maintained by the king. The matter after much debate was ended by a compromise, which, while leaving the principle unsettled, set aside the elections of both candidates and provided for the issue of a new writ. Fortescue was then in February 1606 returned for Middlesex, which he represented till his death on the 23rd of December 1607. He was buried in Mursley church in Buckinghamshire, where a monument was erected to his memory. His long public career was highly honourable, and he served his sovereign and country with unswerving fidelity and honesty. His learned attainments too were considerable—Camden styles him " vir integer, Graece,

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[1] The inscription on his tomb states that he was 76 at his death on the 23rd of December 1607 (Lord Clermont's *Hist. of the Family of Fortescue*, 377), but according to a statement ascribed to himself, he was born the same year as Queen Elizabeth and therefore in 1533 (Bucks. Architect. and Archaeolog. Soc. *Records of Bucks*, i. p. 89).

[2] David Lloyd's *State Worthies* (1670), 556.

Latineque apprime eruditus,"[1] and his scholarship is also praised by Lloyd, while his friendship with Sir Thomas Bodley procured gifts of books and manuscripts to the latter's library. Fortescue married (1) Cecily, daughter of Sir Edmund Ashfield of Ewelme, by whom, besides a daughter, he had two sons, Sir Francis and Sir William; and (2) Alice, daughter of Christopher Smyth of Annabels in Hertfordshire, by whom he had one daughter. His descent in the male line became extinct with the death of Sir John Fortescue, 3rd baronet, in 1717.

BIBLIOGRAPHY.—Article in the *Dict. of Nat. Biography*; Lord Clermont's *Hist. of the Family of the Fortescues*; *Hist. Notices of the Parishes of Swyncombe and Ewelme*, by A. Napier, p. 390; D. Lloyd's *State Worthies* (1670), p. 556; *Add. MSS.* 12497 f. 143 ("Sir John Fortescue's meanes of gaine by Sir R. Thikstin told me [Sir Julius Caesar]"); *Hist. MSS. Comm., Marquis of Salisbury's MSS.*; Spedding's *Life of Bacon*; Architectural and Archaeological Soc. for Bucks, *Records of Bucks*, vol. i. p. 86. (P. C. Y.)

FORTEVIOT, a village and parish of Perthshire, Scotland, on the Water of May, a right-hand affluent of the Earn, $6\frac{3}{4}$ m. S.W. of Perth. Pop. of parish (1901) 562. It is a place of remote antiquity, having been a capital of the Picts, when the district was known as Fortrenn, and afterwards of the Scots. The army led by Edward Baliol camped here before the battle of Dupplin (1332), in which the regent, Donald, earl of Mar, was slain along with 13,000 out of 30,000 men. The parish of Findo-Gask adjoining it on the N.W. contains remains of a Roman road, station and outpost, besides the "auld hoose" of Gask in which the Baroness Nairne was born, and which forms the theme of one of her most popular songs. The new house in which she died dates from 1801.

FORT GEORGE, a military station of Inverness-shire, Scotland. It lies 12 m. N.E. of Inverness, and is the terminus of the small branch line connecting with the Highland railway at Gollanfield junction. It occupies a sandy promontory forming the extreme end of the southern shore of Inner Moray Firth (also called the Firth of Inverness), which is here only 1 m. wide. There is communication by ferry with Fortrose on the opposite coast of the Black Isle. The fort was begun in 1748, partly after the plan of one of Vauban's works, and named in honour of George II. Wolfe, who saw it in course of erection in 1751, was much impressed with it and thought it would, when finished, be "the most considerable fortress and best situated in Great Britain." It covers 16 acres and contains accommodation for nearly 2200 men. It is the depot of the Seaforth Highlanders, and a military training-ground of some size and importance because the surrounding country gives ample facilities for exercise and manœuvres. General Wade's road is maintained in good order. Fort George, it is said, had almost been chosen as the place of detention for Napoleon when the claims of St Helena were put forward. About 2 m. S.E. is the fishing village of Campbelltown, in growing repute as a seaside resort. Midway between the fort and Inverness stands Castle Stuart, a shooting-box of the earl of Moray.

FORTH, a river and firth of the east of Scotland. The river is formed by two head streams, Duchray Water (12 m.) and Avondhu (10 m.), or Laggan as it is called after it leaves Loch Ard, both rising in the north-east of Ben Lomond in Stirlingshire, and uniting 1 m. west of Aberfoyle. From this point till it receives the Kelty, the Forth continues to be a Perthshire stream, but afterwards it becomes the dividing line between the counties of Perth and Stirling as far as the confluence of the Allan. Thence it belongs to Stirlingshire to a point $1\frac{1}{2}$ m. due west of Cambus, whence it serves as the boundary between the shires of Stirling and Clackmannan. Owing to the extremely tortuous character of its course between Gartmore and Alloa—the famous "links of the Forth,"—the actual length of the river is 66 m., or nearly double the distance in a direct line (30 m.) between the source of the Duchray and Kincardine, where the firth begins. The river drains an area of 645 sq. m. Its general direction is mainly easterly with a gentle trend towards the south, and the principal tributaries on the left are the Goodie, Teith, Allan and Devon, and on the right, the Kelty, Boquhan and Bannock. The alluvial plain extending from Gartmore to the county town is called the Carse of Stirling. The places of interest on the banks are Aberfoyle, Kippen, Stirling, Cambuskenneth, Alloa and Kincardine, but after it crosses the Highland line the Forth does not present many passages of remarkable beauty. There are bridges at Aberfoyle, Gartmore, Frew, Drip and Stirling (2), besides railway viaducts at Stirling and Alloa, and there are ferries at Stirling (for Cambuskenneth), Alloa (for South Alloa) and Kincardine (for Airth). The tide rises to $4\frac{1}{2}$ m. above Stirling, where the river is navigable at high water by vessels of 100 tons. There is, however, a brisk shipping trade at Alloa, where the dock accommodates vessels of at least 300 tons.

The Firth of Forth extends from Kincardine to the North Sea, that is, to an imaginary line drawn, just west of the Isle of May, from the East Neuk of Fife to the mouth of the Tyne in Haddingtonshire—a distance of 48 m. Thus, according to some calculations, the Forth measures from source to sea 114 m. The width of the firth varies from $\frac{1}{2}$ m. at Kincardine and $1\frac{1}{2}$ m. at Queensferry to $6\frac{1}{2}$ m. at Leith and $17\frac{1}{2}$ m. at the mouth. The chief affluents are, on the south, the Carron, Avon, Almond, Leith, Esk and Tyne, and on the north, the Tiel, Leven, Kiel and Dreel. The principal ports on the south shore are Grangemouth, Bo'ness, Granton and Leith, and on the north, Burntisland and Kirkcaldy; but fishery centres and holiday resorts are very numerous on both coasts. Since the opening of the Forth Bridge (see BRIDGES) in 1890 the ferries at Queensferry and Burntisland have greatly diminished in importance. The fisheries are still considerable, though the oyster trade is dwindling. The larger islands are Inchcolm, with the ruins of an abbey, Inchkeith, with fortifications and a lighthouse, and the Isle of May, with a lighthouse. The anchorage of St Margaret's Hope, with the naval base of Rosyth, lies off the shore of Fife immediately to the west of the Forth Bridge.

The Forth was the *Bodotria* of Tacitus and the Scots Water of the chroniclers of the 11th and 12th centuries; while Bede (d. 735) knew the firth as *Sinus orientalis* (the Eastern Gulf), and Nennius (fl. 796) as *Mare Friesicum* (the Frisian Sea).

FORTIFICATION AND SIEGECRAFT. "Fortification" is the military art of strengthening positions against attack. The word (Lat. *fortis*, strong, and *facere*, to make) implies the creation of defences. Thus the boy who from the top of a mound defies his comrades, or shelters from their snowballs behind a fence, is merely taking advantage of ground; but if he puts up a hurdle on his mound and stands behind that he has fortified his position.

Fortification consists of two elements, viz. *protection* and *obstacle*. The protection shields the defender from the enemy's missiles; the obstacle prevents the enemy from coming to close quarters, and delays him under fire.

Protection may be of several kinds, direct or indirect. Direct protection is given by a wall or rampart of earth, strong enough to stop the enemy's missiles. The value of this is reduced in proportion as the defender has to expose himself to return the enemy's fire, or to resist his attempts to destroy the defences. Indirect protection is given by *distance*, as for instance by a high wall placed on a cliff so that the defender on the top of the wall is out of reach of the enemy's missiles if these are of short range, such as arrows. This kind of defence was very popular in the middle ages. In the present day the same object is attained by pushing out detached forts to such a distance from the town they are protecting that the besieger cannot bombard the town as long as he is outside the forts. Another form of indirect protection of great importance is *concealment*.

The *obstacle* may consist of anything which will impede the enemy's advance and prevent him from coming to close quarters. In the earliest forms of fortification the protecting wall was also the obstacle, or it may be a wet or dry ditch, an entanglement, a swamp, a thorn hedge, a spiked palisade, or some temporary expedient, such as crows' feet or chevaux de frise. The two elements must of course be arranged in combination. The besieged must be able to defend the obstacle from their protected position, otherwise it can be surmounted or destroyed at leisure. But a close connexion is no longer essential. The effect of modern firearms permits of great elasticity in the disposition of the obstacle; and this simplifies some of the problems of defence.

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[1] *Annales*, 613.

Protection must be arranged mainly with reference to the enemy's methods of attack and the weapons he uses. The obstacle, on the other hand, should be of such a nature as to bring out the best effects of the defender's weapons. It follows from this that a well-armed force operating against a badly-armed uncivilized enemy may use with advantage very simple old-fashioned methods of protection; or even dispense with it altogether if the obstacle is a good one.

When the assailant has modern weapons the importance of protection is very great. In fact, it may be said that in proportion as missile weapons have grown more effective, the importance of protection and the difficulty of providing it have increased, while the necessity for a monumental physical obstacle has decreased.

The art of the engineer who is about to fortify consists in appreciating and harmonizing all the conditions of the problem, such as the weapons in use, nature of the ground, materials available, temper of assailants and defenders, strategical possibilities, expenditure to be incurred, and so forth. Few of these conditions are in themselves difficult to understand, but they are so many and their reactions are so complex that a real familiarity with all of them is essential to successful work. The keynote of the solution should be simplicity; but this is the first point usually lost sight of by the makers of "systems," especially by those who during a long period of peace have time to give play to their imaginations.

Fortification is usually divided into two branches, namely *permanent fortification* and *field fortification*. Permanent fortifications are erected at leisure, with all the resources that a state can supply of constructive and mechanical skill, and are built of enduring materials. Field fortifications are extemporized by troops in the field, perhaps assisted by such local labour and tools as may be procurable, and with materials that do not require much preparation, such as earth, brushwood and light timber. There is also an intermediate branch known as *semi-permanent fortification*. This is employed when in the course of a campaign it becomes desirable to protect some locality with the best imitation of permanent defences that can be made in a short time, ample resources and skilled civilian labour being available.

The *objects of fortification* are various. The vast enceintes of Nineveh and Babylon were planned so that in time of war they might give shelter to the whole population of the country except the field army, with their flocks and herds and household stuff. The same idea may be seen to-day in the walls of such cities as Kano. In the middle ages feudal lords built castles for security against the attacks of their neighbours, and also to watch over towns or bridges or fords from which they drew revenue; whilst rich towns were surrounded with walls merely for the protection of their own inhabitants and their property. The feudal castles lost their importance when the art of cannon-founding was fairly developed; and in the leisurely wars of the 17th and 18th centuries, when roads were few and bad, a swarm of fortified towns, large and small, played a great part in delaying the march of victorious armies.

In the present day isolated forts are seldom used, and only for such purposes as to block passes in mountainous districts. Fortresses are used either to protect points of vital importance, such as capital cities, military depots and dockyards, or at strategic points such as railway junctions. Combinations of fortresses are also used for more general strategic purposes, as will be explained later.

I. HISTORY

Ancient methods.

The most elementary type of fortification is the thorn *hedge*, a type which naturally recurs from age to age under primitive conditions. Thus, Alexander found the villages of the Hyrcanians defended by thick hedges, and the same arrangements may be seen to-day among the least civilized tribes of Africa. The next advance from the hedge is the *bank* of earth, with the exterior made steep by revetments of sods or hurdle-work. This has a double advantage over the hedge, as, besides being a better obstacle against assault, it gives the defenders an advantage of position in a hand-to-hand fight. Such banks formed the defences of the German towns in Caesar's time, and they were constructed with a high degree of skill. Timber being plentiful, the parapets were built of alternate layers of stones, earth and tree trunks. The latter were built in at right angles to the length of the parapet, and were thus very difficult to displace, while the earth prevented their being set on fire. The bank was often strengthened by a palisade of tree trunks or hurdle-work.

After the bank the most important step in advance for a nation progressing in the arts was the *wall*, of masonry, sun-dried brick or mud. The history of the development of the wall and of the methods of attacking it is the history of fortification for several thousand years.

The first necessity for the wall was height, to give security against escalade. The second was thickness, so that the defenders might have a platform on the top which would give them space to circulate freely and to use their weapons. A lofty wall, thick enough at the top for purposes of defence, would be very expensive if built of solid masonry; therefore the plan was early introduced of building two walls with a filling of earth or rubble between them. The face of the outer wall would be carried up a few feet above the platform, and crenellated to give protection against arrows and other projectiles.

The next forward step for the defence was the construction of *towers* at intervals along the wall. These provided flanking fire along the front; they also afforded refuges for the garrison in case of a successful escalade, and from them the platform could be enfiladed.

The evolution of the wall with towers was simple. The main requirements were despotic power and unlimited labour. Thus the finest examples of the system known to history are also amongst the earliest. One of these was Nineveh, built more than 2000 years B.C. The object of its huge perimeter, more than 50 m., has been mentioned. The wall was 120 ft. high and 30 ft. thick; and there were 1500 towers.

After this no practical advance in the art of fortification was made for a very long time, from a constructional point of view. Many centuries indeed elapsed before the inventive genius of man evolved engines and methods of attack fit to cope with such colossal obstacles.

The earliest form of attack was of course *escalade*, either by ladders or by heaping up a ramp of faggots or other portable materials. When the increasing height of walls made escalade too difficult, other means of attack had to be invented. Probably the first of these were the *ram*, for battering down the walls, and *mining*. The latter might have two objects: (*a*) to drive an underground gallery below the wall from the besiegers' position into the fortress, or (*b*) to destroy the wall itself by undermining.

The use of missile *engines* for throwing heavy projectiles probably came later. They are mentioned in the preparations made for the defence of Jerusalem against the Philistines in the 8th century B.C. They are not mentioned in connexion with the siege of Troy. At the sieges of Tyre and Jerusalem by Nebuchadrezzar in 587 B.C. we first find mention of the ram and of movable towers placed on mounds to overlook the walls.

Classical times.

The Asiatics, however, had not the qualities of mind necessary for a systematic development of siegecraft, and it was left for the Greeks practically to create this science. Taking it up in the 5th century B.C. they soon, under Philip of Macedon and Alexander, arrived at a very high degree of skill. They invented and systematized methods which were afterwards perfected by the Romans. Alexander's siegecraft was extremely practical. His successors endeavoured to improve on it by increasing the size of their missile and other engines, which, however, were so cumbrous that they were of little use. When the Romans a little later took up the science they returned to the practical methods of Alexander, and by the time of Caesar's wars had become past-masters of it. The highest development of siegecraft before the use of gunpowder was probably attained in the early days of the Roman empire. The beginning of the Christian era is therefore a suitable period at which to take a survey of the arts of fortification and siegecraft as practised by the ancients.

Conditions at opening of the Christian era.

In fortification the wall with towers was still the leading idea. The towers were preferred circular in plan, as this form offered the best resistance to the ram. The wall was usually reinforced by a ditch, which had three advantages: it increased the height of the obstacle, made the bringing up of the engines of attack more difficult, and supplied material for the filling of the wall. In special cases, as at Jerusalem and Rhodes, the enclosure walls were doubled and trebled. Citadels were also built on a large scale.

The typical site preferred by the Romans for a fortified town was on high ground sloping to a river on one side and with steep slopes falling away on the other three sides. At the highest point was a castle serving as citadel. The town enclosure was designed in accordance with the character of the surrounding country. Where the enemy's approach was easiest, the walls were higher, flanking towers stronger and ditches wider and deeper. Some of the towers were made high for look-out posts. If there was a bridge over the river, it was defended by a bridge-head on the far side; and stockades defended by towers were built out from either bank above and below the bridge, between which chains or booms could be stretched to bar the passage.

The natural features of the ground were skilfully utilized. Thus when a large town was spread over an irregular site broken by hills, the enceinte wall would be carried over the top of the hills; and in the intervening valleys the wall would not only be made stronger, but would be somewhat drawn back to allow of a flanking defence from the hill tops on either side. The walls would consist of two strong masonry faces, 20 ft. apart, the space between filled with earth and stones. Usually when the lie of the ground was favourable, the outside of the wall would be much higher than the inside, the parapet walk perhaps being but a little above the level of the town. Palisades were used to strengthen the ditches, especially before the gates.

There was little scope, however, in masonry for the genius of Roman warfare, which had a better opportunity in the active work of attack and defence. For siegecraft the Roman legions were specially apt. No modern engineer, civil or military, accustomed to rely on machinery, steam and hydraulic apparatus, could hope to emulate the feats of the legionaries. In earthworks they excelled; and in such work as building and moving about colossal wooden towers under war conditions, they accomplished things at which nowadays we can only wonder.

The attack was carried on mainly by the use of "engines," under which head were included all mechanical means of attack—towers, missile engines such as catapults and balistae, rams of different kinds, "tortoises" (see below), &c. Mining, too, was freely resorted to, also approach trenches, the use of which had been introduced by the Greeks.

The object of mining, as has been said, might be the driving of a gallery under the wall into the interior of the place, or the destruction of the wall. The latter was effected by excavating large chambers under the foundations. These were supported while the excavation was proceeding by timber struts and planking. When the chambers were large enough the timber supports were burnt and the wall collapsed. The besieged replied to the mining attack by countermines. With these they would undermine and destroy the besiegers' galleries, or would break into them and drive out the workers, either by force of arms or by filling the galleries with smoke.

Breaches in the wall were made by rams. These were of two kinds. For dislodging the cemented masonry of the face of the wall, steel-pointed heads were used; when this was done, another head, shaped like a ram's head, was substituted for battering down the filling of the wall.

For escalade they used ladders fixed on wheeled platforms; but the most important means of attack against a high wall were the movable towers of wood. These were built so high that from their tops the parapet walk of the wall could be swept with arrows and stones; and drawbridges were let down from them, by which a storming party could reach the top of the wall. The height of the towers was from 70 to 150 ft. They were moved on wheels of solid oak or elm, 6 to 12 ft. in diameter and 3 to 4 ft. thick. The ground floor contained one or two rams. The upper floors, of which there might be as many as fifteen, were furnished with missile engines of a smaller kind. The archers occupied the top floor. There also were placed reservoirs of water to extinguish fire. These were filled by force pumps and fitted with hose made of the intestines of cattle. Drawbridges, either hanging or worked on rollers, were placed at the proper height to give access to the top of the wall, or to a breach, as might be required. Apollodorus proposed to place a couple of rams in the upper part of the tower to destroy the crenellations of the wall.

The siege towers had of course to be very solidly built of strong timbers to resist the heavy stones thrown by the engines of the defence. They were protected against fire by screens of osiers, plaited rope or raw hides. Sometimes it was necessary, in order to gain greater height, to place them on high terraces of earth. In that case they would be built on the site. At the siege of Marseilles, described by Caesar, special methods of attack had to be employed on account of the strength of the engines used by the besieged and their frequent sallies to destroy the siege works. A square fort, with brick walls 30 ft. long and 5 ft. thick, was built in front of one of the towers of the town to resist sorties. This fort was subsequently raised to a height of six storeys, under shelter of a roof which projected beyond the walls, and from the eaves of which hung heavy mats made of ships' cables. The mats protected the men working at the walls, and as these were built up the roof was gradually raised by the use of endless screws. The roof was made of heavy beams and planks, over which were laid bricks and clay, and the whole was covered with mats and hides to prevent the bricks from being dislodged. This structure was completed without the loss of a man, and could only have been built by the Romans, whose soldiers were all skilled workmen.

Although these towers were provided with bridges by which storming parties could reach the top of the wall, their main object was usually to dominate the defence and keep down the fire from the walls and towers. Under this protection breaching operations could be carried on. The approaches to the wall were usually made under shelter of galleries of timber or hurdle-work, which were placed on wheels and moved into position as required. When the wall was reached, a shelter of stronger construction, known as a "rat," was placed in position against it. Under this a ram was swung or worked on rollers; or the rat might be used as a shelter for miners or for workmen cutting away the face of the wall. The great rat at Marseilles, which extended from the tower already described to the base of the tower of the city, was 60 ft. long, and built largely of great beams 2 ft. square, connected by iron pins and bands. It was unusually narrow, the ground sills of the side walls being only 4 ft. apart. This was no doubt in order to keep down the weight of the structure, which, massive as it was, had to be movable. The sloping roof and sides of timber were protected, like those of the tower, with bricks and moist clay, hides and wool mattresses. Huge stones and barrels of blazing pitch were thrown from the wall upon this rat without effect, and under its cover the soldiers loosened and removed the foundations of the tower until it fell down.

In order that it might be possible to move these heavy structures, it was usually necessary to fill up the ditch or to level the surface of the ground. For this purpose an "approach tortoise" was often used. This was a shelter, something between the ordinary gallery and the rat, which was moved end on towards the wall, and had an open front with a hood, under cover of which the earth brought up for filling the ditch was distributed.

The missile engines threw stones up to 600 ℔ weight, heavy darts from 6 to 12 ft. long, and Greek fire. Archimedes at the siege of Syracuse even made some throwing 1800 ℔. The ranges varied, according to the machine and the weight thrown, up to 600 yds. for direct fire and 1000 yds. for curved fire. At the siege of Jerusalem Titus employed three hundred catapults of different sizes and forty balistae, of which the smallest threw missiles of 75 ℔ weight. At Carthage Scipio found 120 large and 281 medium catapults, 23 large and 52 small balistae, and a great number of scorpions and other small missile engines.

Screens and mantlets for the protection of the engine-workers were used in great variety.

In addition to the above, great mechanical skill was shown in the construction of many kinds of machines for occasional purposes. A kind of jib crane of great height on a movable platform was used to hoist a cage containing fifteen or twenty men on to the wall. A long spar with a steel claw at the end, swung in the middle from a lofty frame, served to pull down the upper parts of parapets and overhanging galleries. The defenders on their side were not slow in replying with similar devices. Fenders were let down from the wall to soften the blow of the ram, or the ram heads were caught and held by cranes. Grapnels were lowered from cranes to seize the rats and overturn them. Archimedes used the same idea in the defence of Syracuse for lifting and sinking the Roman galleys. Wooden towers were built on the walls to overtop the towers of the besiegers. Many devices for throwing fire were employed. The tradition that Archimedes burnt the Roman fleet, or a portion of it, at Syracuse, by focusing the rays of the sun with reflectors, is supported by an experiment made by Buffon in 1747. With a reflector having a surface of 50 sq. ft., made up of 168 small mirrors each 6 by 8 in., lead was melted at a distance of 140 ft. and wood was set on fire at 160 ft.

The development of masonry in permanent fortification had long since reached its practical limit, and was no longer proof against the destructive methods that had been evolved. The extemporized defences were, as is always the case, worn down by a resolute besieger, and the attack was stronger than the defence.

Through the dark ages the Eastern Empire kept alive the twin sciences of fortification and siegecraft long enough for the Crusaders to learn from them what had been lost in the West.

Middle ages.

Byzantium, however, always a storehouse of military science, while conserving a knowledge of the ancient methods and the great missile engines, contributed no new ideas to fortification, so far as we know. In practice the Byzantines favoured multiplied enceintes or several concentric lines of defence. This of course is always a tendency of decadent nations.

In the West the Roman fortifications remained standing, and the Visigoths, allies of Rome, utilized their principles in the defences of Carcassonne, Toulouse, &c. in the 5th century. Viollet-le-Duc's description and illustrations of the defences of Carcassonne will give a very good idea of the methods then in use:—

> “ The Visigoth fortification of the city of Carcassonne, which is still preserved, offers an analogous arrangement recalling those described by Vegetius. The level of the town is much more elevated than the ground outside, and almost as high as the parapet walks. The curtain walls, of great thickness, are composed of two faces of small cubical masonry alternating with courses of brick; the middle portion being filled, not with earth but with rubble run with lime. The towers were raised above these curtains, and their communication with the latter might be cut off, so as to make of each tower a small independent fort; externally these towers are cylindrical, and on the side of the town square; they rest, also towards the country, upon a cubical base or foundation. We subjoin (fig. 1) the plan of one of these towers with the curtains adjoining. A is the plan of the ground-level; B the plan of the first storey at the level of the parapet. We see, at C and D, the two excavations formed in front of the gates of the tower to intercept, when the drawbridges were raised, all communication between the town or the parapet walk and the several storeys of the tower. From the first storey access was had to the upper crenellated or battlemented portion of the tower by a ladder of wood placed interiorly against the side of the flat wall. The external ground-level was much lower than that of the tower, and also beneath the ground-level of the town, from which it was reached by a descending flight of from ten to fifteen steps. Fig. 2 shows the tower and its two curtains on the side of the town; the bridges of communication are supposed to have been removed. The battlemented portion at the top is covered with a roof, and open on the side of the town in order to permit the defenders of the tower to see what was going on therein, and also to allow of their hoisting up stones and other projectiles by means of a rope and pulley. Fig. 3 shows the same tower on the side towards the country; we have added a postern, the sill of which is sufficiently raised above the ground to necessitate the use of a scaling or step ladder, to obtain ingress. The postern is defended, as was customary, by a palisade or barrier, each gate or postern being provided with a work of this kind.”

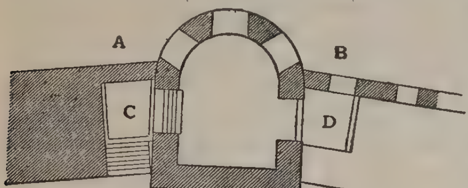


Fig. 1.—Plan of one of the Towers at Carcassonne.

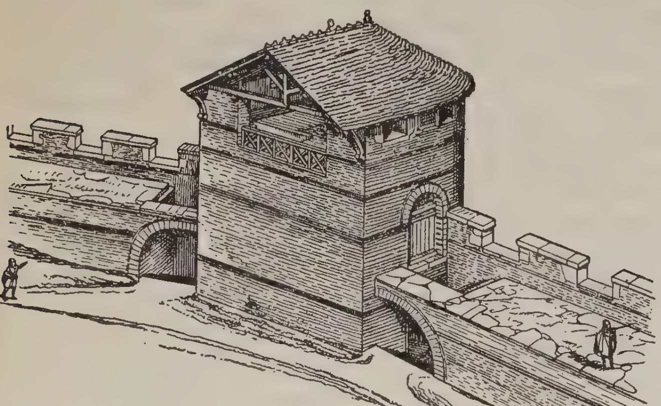


Fig. 2.—One of the Towers at Carcassonne, inside view.

Meanwhile, in western Europe, siegecraft had almost disappeared. Its perfect development was only possible for an army like that of the Romans. The Huns and Goths knew nothing of it, and the efforts of Charlemagne and others of the Frankish kings to restore the art were hampered by the fact that their warriors despised handicrafts and understood nothing but the use of their weapons. During the dark ages the towns of the Gauls retained their old Roman and Visigoth defences, which no one knew properly how to attack, and accordingly the sieges of that period dragged themselves out through long years, and if ultimately successful were so as a rule only through blockade and famine. It was not until the 11th century that siegecraft was revived in the West on the ancient lines.

Castles.

By this time a new departure of great importance had been made in the seigneurial castle (*q.v.*), which restored for some centuries a definite superiority to the defence. Built primarily as strongholds for local magnates or for small bodies of warriors dominating a conquered country, the conditions which called them into existence offered several marked advantages. The defences of a town had to follow the growth of the town, and would naturally have weak points. It was not to be expected that a town would develop itself in the manner most suitable for defence; nor indeed that any position large enough for a town could be found that would be naturally strong all round. But the site of a castle could be chosen purely for its natural strength, without regard, except as a secondary consideration, to the protection of anything outside it; and as its area was small it was often easy to find a natural position entirely suited for the purpose. In fact it frequently happened that the existence of such a position was the *raison d'être* of the castle. A small hill with steep sides might well be unapproachable in every direction by such cumbrous structures as towers and rats, while the height of the hill, added to the height of the walls, would be too much for the besiegers' missiles. If the sides of the hill were precipitous and rocky, mining became impossible, and the site was perfect for defence. A castle built under such conditions was practically impregnable; and this was the cause of the independence of the barons in the 11th and 12th centuries. They could only be reduced by blockade, and a blockade of long duration was very difficult in the feudal age.

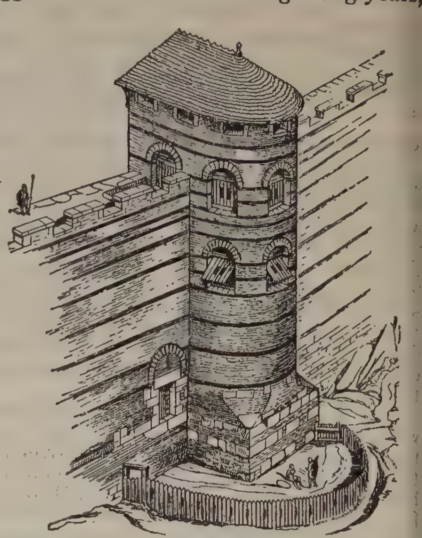


Fig. 3.—One of the Towers at Carcassonne, outside view.

A very instructive example of 12th-century work is the Château Gaillard, built by Richard Cœur-de-Lion in 1196. This great castle, with ditches and escarpments cut out of the solid rock, and extensive outworks, was completed in one year. In the article Castle will be found the plan of the main work, which is here supplemented by an elevation of the donjon (or keep). The waved face of the inner or main wall of the castle, giving a divergent fire over the front, is an interesting feature in advance of the time. So also is the masonry protection of the machicolation at the top of the donjon, a protection which at that time was usually given by wooden hoardings. After the death of Richard, Philip Augustus besieged the château, and carried it after a blockade of seven months and a regular attack of one month. In this attack the tower at A was first mined, after which the whole of that outwork was abandoned by the defenders. The outer enceinte was next captured by surprise; and finally the gate of the main wall was breached by the pioneers. When this happened a sudden rush of the besiegers prevented the remains of the garrison from gaining the shelter of the donjon, and they had to lay down their arms.

Château Gaillard, designed by perhaps the greatest general of his time, exemplifies in its brief resistance the weak points of the designs of the 12th century. It is easy to understand how at each step gained by the besiegers the very difficulties which had been placed in the way of their further advance prevented the garrison from reinforcing strongly the points attacked.

In the 13th century many influences were at work in the development of castellar fortification. The experience of such sieges as that of Château Gaillard, and still more that gained in the Crusades, the larger garrisons at the disposal of the great feudal lords, and the importance of the interests which they had to protect in their towns, led to a freer style of design. We must also take note of an essential difference between the forms of attack preferred by the Roman soldiery and by the medieval chivalry. The former, who were artisans as well as soldiers, preferred in siege works the certain if laborious methods of breaching and mining. The latter, who considered all manual labour beneath them and whose only ideal of warfare was personal combat, affected the tower and its bridge, giving access to the top of the wall rather than the rat and battering-ram. They were also fond of surprises, which the bad discipline of the time favoured.

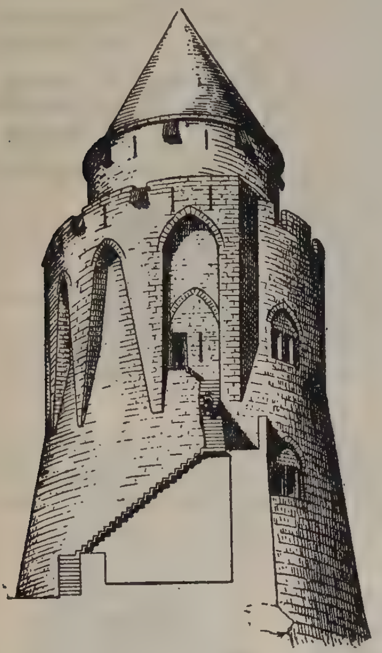


FIG. 4.—Donjon, Château Gaillard.

We find, therefore, important progress in enlarging the area of defence and in improving arrangements for flanking. The size and height of all works were increased. The keep of Coucy Castle, built in 1220, was 200 ft. high. Montargis Castle, also built about this time, had a central donjon and a large open enclosure, within which the whole garrison could move freely, to reinforce quickly any threatened point. The effect of flanking fire was increased by giving more projection to the towers, whose sides were in some cases made at right angles to the curtain walls.

We find also a tendency, the influence of which lasted long after medieval times, towards complexity and multiplication of defences, to guard against surprise and localize successful assaults. Great attention was paid to the "step by step" defence. Flanking towers were cut off from their walls and arranged for separate resistance. Complicated entrances with traps and many doors were arranged. Almost all defence was from the tops of the walls and towers, the loopholes on the lower storeys being mainly for light and air and reconnoitring. Machicouli galleries (for vertical defence) were protected either by stone walls built out on corbels, or by strong timber hoardings built in war time, for which the walls were prepared beforehand by recesses left in the masonry. Loopholes and crenelles were protected by shutters. Great care and much ingenuity were expended on details of all kinds.

Already in the 12th century the engineers of the defence had made provision for countermining, by building chambers and galleries at the base of the towers and walls. Further protection for the towers against the pioneer attack was given by carrying out the masonry in front of the tower in a kind of projecting horn. This was found later to have the further advantages of doing away with the dead ground in front of the tower unseen from the curtain, and of increasing the projection and therefore the flanking power of the tower itself. The arrangement is seen in several of the towers at Carcassonne, and has in it the germ of the idea of the bastion.

The defences of Carcassonne, remodelled in the latter half of the 13th century on the old Visigoth foundations, exemplify some of the best work of the period. Figs. 5 and 6 (reproduced from Viollet-le-Duc) show the plan of the defences of the town and castle, and a bird's-eye view of the castle with its two barbicans. The thick black line shows the main wall; beyond this are the lists and then the moat. It will be noted that the wall of the lists as well as the main wall is defended by towers. There are only two gates. That on the east is defended by two great towers and a semicircular barbican. The gate of the castle, on the west, has a most complicated approach defended by a labyrinth of gates and flanking walls, which cannot be shown on this small scale, and beyond these is a huge circular barbican in several storeys, capable of holding 1500 men. On the side of the town the castle is protected by a wide moat, and the entrance is masked by another large semicircular barbican. An interesting feature of the general arrangement is the importance which the lists have assumed. The slight wooden barricade of older times has developed into a wall with towers; and the effect is that the besieger, if he gains a footing in the lists, has a very narrow space in which to work the engines of attack. The castle, after the Roman fashion, adjoins the outer wall of the town, so that there may be a possibility of communicating with a relieving force from outside after the town has fallen. There were also several posterns, small openings made in the wall at some height above the ground, for use with rope ladders.

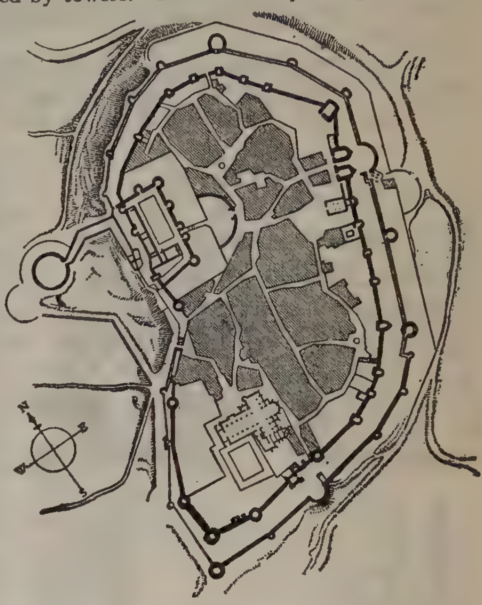


FIG. 5.—Plan of Carcassonne, 13th century.

The siegecraft of the period was still that of the ancients. Mining was the most effective form of attack, and the approach to the walls was covered by engines throwing great stones against the hoardings of the parapets, and by cross-bowmen who were sheltered behind light mantlets moved on wheels. Barrels of burning pitch and other incendiary projectiles were thrown as before; and at one siege we read of the carcasses of dead horses and barrels of sewage being thrown into the town to breed pestilence, which had the effect of forcing a capitulation.

With all this the attack was inferior to the defence. As Professor C. W. C. Oman has pointed out, the mechanical application of the three powers of tension, torsion and counterpoise (in the missile engines) had its limits. If these engines were enlarged they grew too costly and unwieldy. If they were multiplied it was impossible on account of their short range and great bulk to concentrate the fire of enough of them on a single portion of the wall.

Introduction of gunpowder.

It is difficult to give anything like an accurate account, in a small space, of the changes in fortification which took place in the first two centuries after the introduction of gunpowder. The number of existing fortifications that had to be modified was infinite, so also was the number of attempted solutions of the new problems. Engineers had not yet begun to publish descriptions of their "systems"; also the new names and terms which came into use with the new works were spread over Europe by engineers of different countries, and adopted into new languages without much accuracy.

Artillery was in use for some time before it began to have any effect on the design of fortification. The earliest cannon threw so very light a projectile that they had no effect on masonry and were more useful for the defence than the attack. Later, larger pieces were made, which acted practically as mortars, throwing stone balls with high elevation, and barrels of burning composition. In the middle of the 15th century the art of cannon-founding was much developed by the brothers Bureau in France. They introduced iron cannon balls and greatly strengthened the guns. In 1428 the English besieging Orleans were entirely defeated by the superior artillery of the besieged. By 1450 Charles VII. was furnished with so powerful a siege train that he captured the whole of the castles in Normandy from the English in one year.

But the great change came after the invasion of Italy by Charles VIII. with a greatly improved siege train in 1494. The astonishing rapidity with which castles and fortified towns fell before him proved the uselessness of the old defences. It became necessary to create a new system of defences, and, says Cosseron de Villenoisy, "thanks to the mental activity of the Renaissance and the warlike conditions prevailing everywhere, the time could not have been more favourable." There is no doubt that the engineers of Italy as a body were responsible for the first advance in fortification. There, where vital and mental energy were at boiling-point, and where the first striking demonstration of the new force had been given, the greatest intellects, men such as Leonardo da Vinci, Michelangelo and Machiavelli, busied themselves over the problem of defence.

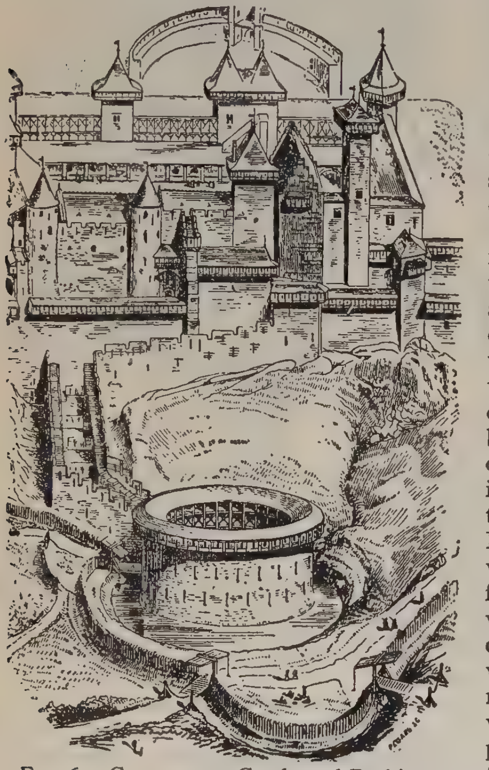


Fig. 6.—Carcassonne Castle and Barbican.

It has been claimed that Albert Dürer was the first writer on modern fortification. This was not so; Dürer's work was published in 1527, and more than one Italian engineer, certainly Martini of Siena and San Gallo, had preceded him. Also Machiavelli, writing between 1512 and 1527, had offered some most valuable criticisms and general principles. Dürer, moreover, had little influence on the progress of fortification; though we may see in his ideas, if we choose, the germ of the "polygonal" system, developed long afterwards by Montalembert. Dürer's work was to some extent a connecting link between the old fortification and the new. He proposed greatly to enlarge the old towers; and he provided both them and the curtains with vaulted chambers for guns (casemates) in several tiers, so as to command both the ditch and the ground beyond it. His projects were too massive and costly for execution, but his name is associated with the first practical gun casemates.

Before beginning to trace the effect of gunpowder on the design of fortification, it may be noted that two causes weakened the influence of the castles. First, their owners were slow to adopt the new ideas and abandon their high strong walls for low extended parapets, and, secondly, they had not the men necessary for long lines of defence. At the same time the corporations of the towns had learnt to take an active part in warfare, and provided trained and disciplined soldiers in large numbers.

When artillery became strong enough to destroy masonry from a distance two results followed: it was necessary to modify the masonry defences so as to make them less vulnerable, and to improve the means of employing the guns of the defence. For both these purposes the older castles with their restricted area were little suited, and we must now trace the development of the fortified towns.

The bulwark.

Probably the first form of construction directly due to the appearance of the new weapons was the bulwark (*boulevard*, *baluardo* or *bollwerk*). This was an outwork usually semicircular in plan, built of earth consolidated with timber and revetted with hurdles. Such works were placed as a shield in front of the gates, which could be destroyed even by the early light cannon-balls; and they offered at the same time advanced positions for the guns of the defence. They were found so useful for gun positions for flanking fire that later they were placed in front of towers or at intervals along the walls for that purpose.

This, however, was only a temporary expedient, and we have now to consider the radical modifications in designs. These affected both the construction and trace of the walls.

The wall.

The first lesson taught by improved artillery was that the walls should not be set up on high as targets, but in some manner screened. One method of doing this in the case of old works was by placing bulwarks in front of them. In other cases the lists or outer walls, being surrounded by moats, were already partially screened and suitable for conversion into the main defence; and as with improved flanking defence great height was no longer essential, the tops of the walls were in some cases cut down. In new works it was natural to sink the wall in a ditch, the earth from which was useful for making ramparts.

As regards resistance to the effect of shot, it was found that thin masonry walls with rubble filling behind them were very easily destroyed. A bank of earth behind the wall lessened the vibration of the shot, but once a breach was made the earth came down, making a slope easy of ascent. To obviate this, horizontal layers of brushwood, timber and sometimes masonry were built into the earth bank, and answered very well (fig. 7).

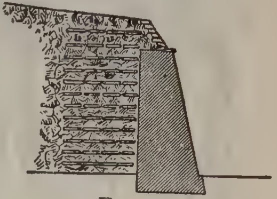


Fig. 7.

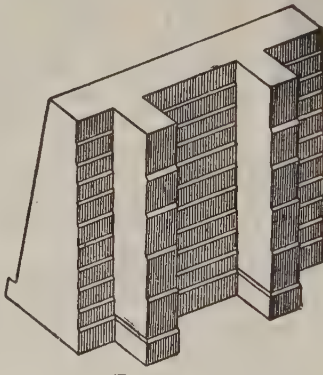


Fig. 8.

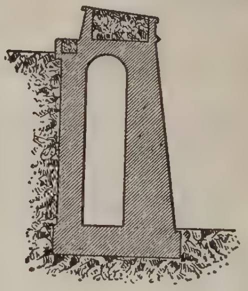


Fig. 9.

Another expedient of still greater value was the use of counterforts. The earliest counterforts were simply buttresses built *inward* from the wall into the rampart instead of *outward* (fig. 8). Their effect was to strengthen the wall and make the breaches more difficult of ascent. An alternative arrangement for strengthening the wall was an arched gallery built behind it under the rampart (fig. 9). This construction was in harmony with the idea, already familiar, of a passage in the wall from which countermines could be started; but it has the obvious weakness that the destruction of the face wall takes away one of the supports of the arch. The best arrangement, which is ascribed to Albert Dürer, was the "counter-arched revetment." This consisted of a series of arches built between the counterforts, with their axes at right angles to the face of the wall. Their advantage was that, while supporting the wall and taking all the weight of the rampart, they formed an obstacle after the destruction of the wall more difficult to surmount than the wall itself and very hard to destroy. The counter-arches might be in one, two or three tiers, according to the height of the wall (figs. 10 and 11, the latter without the earth of the rampart and showing also a countermine gallery).

A more important question, however, than the improvement of the passive defence or obstacle was the development of the active defence by artillery. For this purpose it was necessary to find room for the working of the guns. At the outset it was of course a question of modifying the existing defences at as little cost as possible. With this object the roofs of towers were removed and platforms for guns substituted, but this only gave room for one or two guns. Also the loopholes in the lower storeys of towers were converted into embrasures to give a grazing fire over the ditch; this became the commonest method of strengthening old works for cannon, but was of little use as the resulting field of fire was so small. In some cases the towers were made larger, with a semi-circular front and side walls at right angles to the curtain. Such towers built at Langres early in the 16th century had walls 20 ft. thick to resist battering.

The rampart.

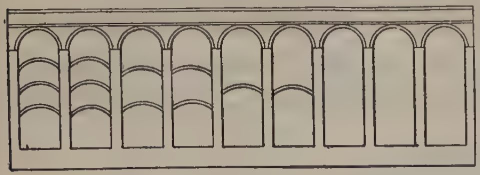


FIG. 10.

Even in new works some attempts were made to combine artillery defence with pure masonry protection. The works of Albert Dürer in theory, and the bridge-head of Schaffhausen in practice, are the best examples of this. The Italian engineers also showed much ingenuity in arranging for the defence of ditches with masonry caponiers. These were developed from external buttresses, and equally with the casemated flanking towers of Dürer contained the germs of the idea of "polygonal" defence.

The natural solution, however, which was soon generally adopted, was the rampart; that is, a bank of earth thrown up behind the wall, which, while strengthening the wall as already indicated, offered plenty of space for the disposal of the guns.

The ditch.

The *ditch*, which had only been occasionally used in ancient and medieval fortification, now became essential and characteristic. Serving as it did for the double purpose of supplying earth for a rampart and allowing the wall to be sunk for concealment, it was found also to have a definite use as an obstacle. Hitherto the wall had sufficed for this purpose, the ditch being useful mainly to prevent the besieger from bringing up his engines of attack.

When the wall (or escarp) was lowered, the obstacle offered by the ditch was increased by revetting the far side of it with a *counterscarp*. Beyond the counterscarp wall some of the earth excavated from the ditch was piled up to increase the protection given to the escarp wall. This earth was sloped down gently on the outer side to meet the natural surface of the ground in such a manner as to be swept by the fire from the ramparts and was called the *glacis*.

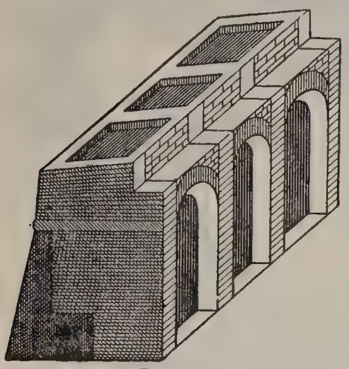


FIG. 11.

Now, however, a new difficulty arose. In all times a chief element in a successful defence has consisted in action by the besieged outside the walls. The old ditches, when they existed, had merely a slope on the far side leading up to the ground-level; and the ditch was a convenient place in which troops preparing for a sortie could assemble without being seen by the enemy, and ascend the slope to make their attack. The introduction of the counterscarp wall prevented sorties from the ditch. At first it was customary, after the introduction of the counterscarp, to leave a narrow space on the top of it, behind the glacis, for a patrol path. Eventually the difficulty was met by widening this patrol path into a space of about 30 ft., in which there was room for troops to assemble. This was known as the *covered way*.

With this last addition the ordinary elements of a profile of modern fortification were complete and are exemplified in fig. 12.

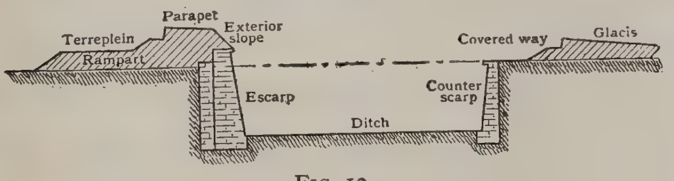


FIG. 12.

The trace.

Up to the gunpowder period the *trace* of fortifications, that is, the plan on which they were arranged on the ground, was very simple. It was merely a question of an enclosure wall adapted to the site and provided with towers at suitable intervals. The foot of the wall could be seen and defended everywhere, from the tops of the towers and the machicoulis galleries. The introduction of ramparts and artillery made this more difficult in two ways. The rampart, interposed between the defenders and the face of the wall, put a stop to vertical defence. Also with the inferior gun-carriages of the time very little depression could be given to the guns, and thus the top of the enceinte wall, with or without a rampart, was not a suitable position for guns intended to flank the ditch in their immediate neighbourhood. The problem of the "trace" therefore at the beginning of the 16th century was to rearrange the line of defence so as to give due opportunity to the artillery of the besieged, both to oppose the besiegers' breaching batteries and later to defend the breaches. At the outset the latter rôle was the more important.

In considering the early efforts of engineers to solve this problem we must remember that for economical reasons they had to make the best use they could of the existing walls. At first for flanking purposes casemates on the ditch level were used, the old flanking towers being enlarged for the purpose. Masonry galleries were constructed across the ditch, containing casemates which could fire to either side, and after this casemates were used in the counterscarps. Some use was also made of the fire from detached bulwarks. It was soon realized, however, that the flanking defence of the body of the place ought not to be dependent on outworks, and that greater freedom was required for guns than was consistent with casemate defence. The *bulwark* (which in its earliest shape suggests that it was in some sort the offspring of the barbican, placed to protect an entrance) gave plenty of space for guns, but was too detached for security. The enlarged tower, as an integral part of the lines, gave security, and its walls at right angles to the curtain gave direct flanking fire, but the guns in it were too cramped. The blending of the two ideas produced the *bastion*, an element of fortification which dominated the science for three hundred years, and so impressed itself on the imagination that to this day any strong advanced position in a defensive line is called by that name by unscientific writers. The word had been in use for a long time in connexion with extemporized towers or platforms for flanking purposes, the earliest forms being *bastille*, *bastide*, *bastillon*, and in its origin it apparently refers rather to the quality of work in the construction than to its defensive intention.

The earliest bastions were modified bulwarks with straight faces and flanks, attached to the main wall, for which the old towers often acted as keeps; and at first the terms bulwark and bastion were more or less interchangeable. Fig. 13, taken from a contemporary MS. by Viollet-le-Duc, shows a bastion added to the old wall of Troyes about 1528. On the other hand, in fig. 14 (taken from an English MS. of 1559, which again is based on the Italian work of Zanchi published in 1554), we find *a a* spoken of as "bulwarks" and *b b* as "bastilions." The triangular works between the bastilions are described as "ramparts," intended to protect the curtains from breaching fire. (We may also notice in this design the broad ditch, the counterscarp with narrow covered way, and loopholes indicating counterscarp galleries.)

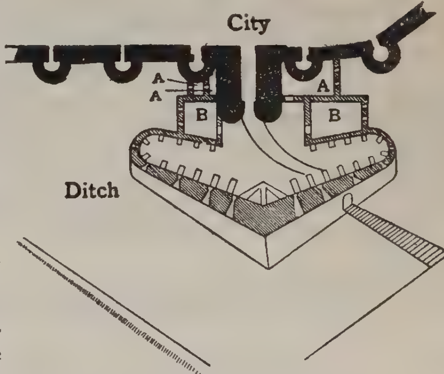


FIG. 13.—Bastion at Troyes.

Towards the end of the 16th century the term "bulwark" began to be reserved for banks of earth thrown up a little distance in front of the main wall to protect it from breaching fire, and it thus reverted to its original defensive intention. The term "bastion" henceforth denoted an artillery position connected by flanks to the main wall; and the question of the arrangement of these flanks was one of the main preoccupations of engineers.

Flanks retired, casemated or open, or sometimes in several tiers were proposed in infinite variety.

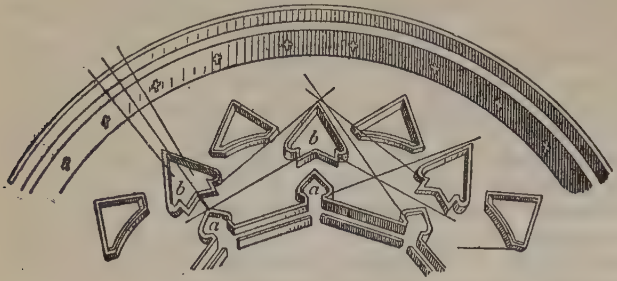


FIG. 14.

Thus, while in the early part of the 16th century the actual modification of existing defences was proceeding very slowly on account of the expense involved, the era of theoretical "systems" had begun, based on the mutual relations of flank and face. These can be grouped under three heads as follows:—

1. The *crémaillère* or indented trace: Faces and flanks succeeding each other in regular order (fig. 15).

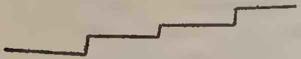


FIG. 15.

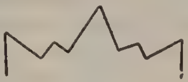


FIG. 16.

2. The *tenaille* trace: Flanks back to back between the faces (fig. 16). The development of the flanks in this case gives us the *star* trace (fig. 17).

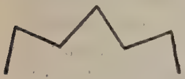


FIG. 17.

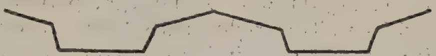


FIG. 18.

3. The *bastioned* trace: Flanks facing each other and connected by curtains (fig. 18).

In comparing these three traces it will be observed that unless casemates are used the flanking in the first two is incomplete. Guns on the ramparts of the faces cannot defend the flanks, and therefore there are "dead" angles in the ditch. In the bastioned trace there is no "dead" ground, provided the flanks are so far apart that a shot from the rampart of a flank can reach the ditch at the centre of the curtain.

The bastioned trace.

Here was therefore the parting of the ways. For those who objected to casemate fire, the bastioned trace was the way of salvation. They were soon in the majority; perhaps because the symmetry and completeness of the idea captivated the imagination. At all events the bastioned trace, once fairly developed, held the field in one form or another practically without a rival until near the end of the 18th century. The Italian engineers, who were supreme throughout most of the 16th century, started it; the French, who took the lead in the following century, developed it, and officially never deserted it until late in the 19th century, when the increasing power of artillery made enceintes of secondary importance.

It will be useful at this point to go forward a little, with a couple of explanatory figures, in order to get a grasp of the component parts of the bastioned trace as ultimately developed, and of its outworks.

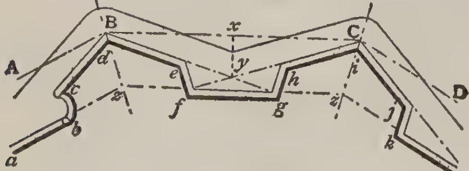


FIG. 19.

In fig. 19 ABCD represents part of an imaginary line drawn round the place to be fortified, forming a polygon, regular or irregular.

ABC is an *exterior angle* or angle of the polygon.

BC is an *exterior side*.

zz is an *interior side*.

abcdefghijk is the trace of the *enceinte*.

bcdef is a *bastion*.

zdef is a *demi-bastion*.

de is a *face* of the bastion.

ef is a *flank* of the bastion.

fg is the *curtain*.

bf is the *gorge*.

(Two demi-bastions with the connecting curtain make the bastioned front, *defghi*.)

zd bisecting the *exterior angle* ABC is the *capital* of the bastion.

xy is the *perpendicular*, the proportionate length of which to the exterior side BC (usually about one-sixth) is an important element of the trace.

*ef*C is the *angle of defence*.

BC*f* is the *diminished angle*.

cde is the *flanked angle* or *salient angle* of the bastion.

e is the *shoulder* of the bastion.

def is the *angle of the shoulder*.

efg is the *angle of the flank*.

The line of the escarp is called the *magistral line* since it regulates the trace. When plans of fortifications are given without much detail, this line, with that of the counterscarp and the crest of the parapet, are often the only ones shown,—the crest of the parapet, as being the most important line, whence the fire proceeds, being usually emphasized by a thick black line.

Fig. 20, reproduced from a French engraving of 1705, shows an imaginary place fortified as a hexagon with bastions and all the different kinds of outworks then in use. The following is the explanation of its figuring and lettering.

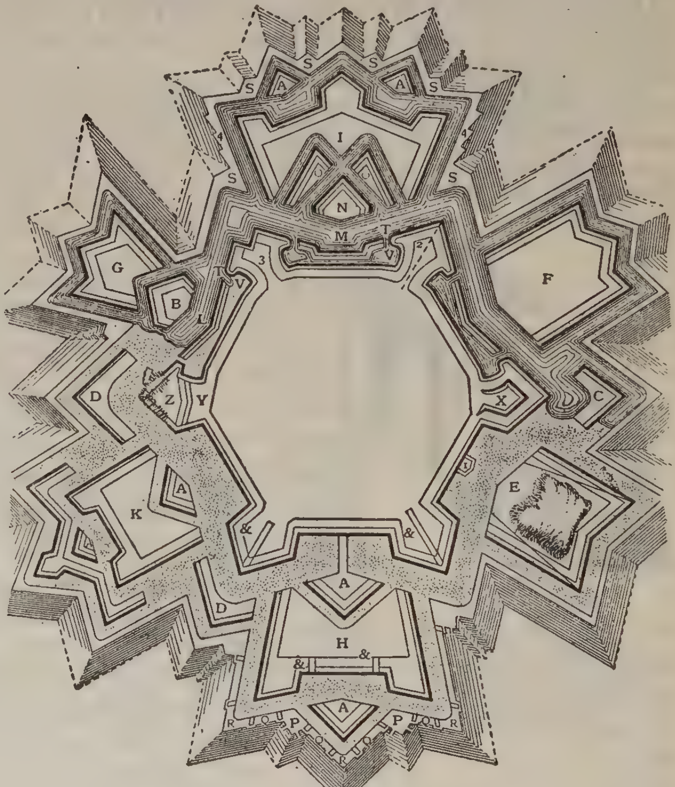


FIG. 20.

1. *Flat bastion*: Placed in the middle of a curtain when the lines of defence were too long for musketry range.

2. *Demi-bastion*: Used generally on the bank of a river.

3. *Tenaille bastion*: Used when the flanked angle is too acute; that is, less than 70°.

4. *Redans*: Used along the bank of a river, or when the parapet of the covered way can be taken in reverse from the front.

A, B. *Ravelins*.

C. *Demi-lunes*: So called from the shape of the gorge. They differ from the ravelins in being placed in front of the bastions instead of the curtains.

D. *Counter-guards*: Used instead of demi-lunes, which were then going out of fashion.

E. *Simple tenaille*.

F. *Double tenaille* (see L and M).

(If the tenaille E is reduced in width towards the gorge, as shown alternatively, it is called a *swallow-tail*. If the double tenaille is reduced as at G, it is called a *bonnet de prêtre*. Such works were rarely used.)

H. *Hornwork*: Much used for gates, &c.
I. *Crown-work.*
K. *Crowned hornwork.*
L. M. New forms of *tenaille*: (N.B.—These are the forms which ultimately retained the name.)
N. New form of work called a *demi-lune lunettée*, the ravelin N being protected by two counter-guards, O.
P. *Re-entering places of arms.*
Q. *Traverses.*
R. *Salient places of arms.*
S. *Places of arms* without *traverses.*
T. *Orillon*, to protect the flank V.
X. A *double bastion* or *cavalier.*
Y. A *retrenchment* with a ditch, of the breach Z.
&. *Traverses* to protect the terreplein of the ramparts from enfilade.

Turning back now to the middle of the 16th century we find in the early examples of the use of the bastion that there is no attempt made to defend its faces by flanking fire, the curtains being considered the only weak points of the enceinte. Accordingly, the flanks are arranged at right angles to the curtain, and the prolongation of the faces sometimes falls near the middle of it. When it was found that the faces needed protection, the first attempts to give it were made by erecting *cavaliers*, or raised parapets, behind the parapet of the curtain or in the bastions.

The first example of the complete bastioned system is found in Paciotto's citadel of Antwerp, built in 1568 (fig. 21). Here we have faces, flanks and curtain in due proportion; the faces long enough to contain a powerful battery, and the flanks able to defend both curtain and faces. The weak points of this trace, due to its being arranged on a small pentagon, are that the terreplein or interior space of the bastions is rather cramped, and the salient angles too acute.

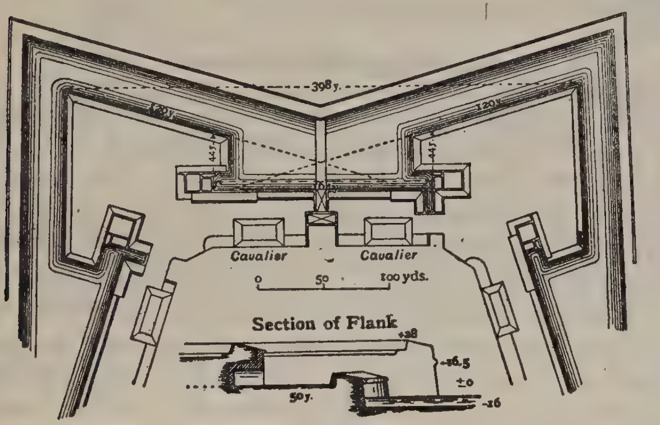


FIG. 21.

The 16th century.

In the systems published by Speckle of Strassburg in 1589 we find a distinct advance. Speckle's actual constructions in fortification are of no great importance; but he was a great traveller and observer, and in his work, published just before his death, he has evidently assimilated, and to some extent improved, the best ideas that had been put forward up to that time.

Two specimens from Speckle's work are well worth studying as connecting links between the 16th and 17th centuries.

Fig. 22 is early 16th-century work much improved. There are no outworks, except the covered way, now fully developed, with a battery in the re-entering place of arms. The bastions are large, but the faces directed on the curtain get little protection from the flanks. To make up for this they are flanked by the large cavaliers in the middle of the curtain. The careful arrangement of the flank should be noted; part of it is retired, with two tiers of fire, some of which is arranged to bear on the face of the bastion. The great saliency of the bastion is a weak point, but the whole arrangement is simple and strong.

In the second example, known as Speckle's "reinforced trace" (fig. 23), we find him anticipating the work of the next century. The ravelin is here introduced, and made so large that its faces are in prolongation of those of the bastions. Speckle's other favourite ideas are here: the cavaliers and double parapets and his own particular invention of the low batteries behind the re-entering place of arms and the gorge of the ravelin. These low batteries did not find favour with other writers, being liable to be too easily destroyed by the besiegers' batteries crowning the salients of the covered way.

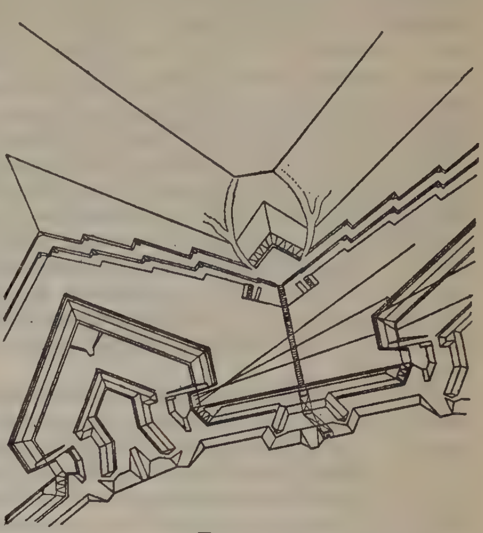


FIG. 22.

Speckle's book is of great importance as embodying the best work of the period. His own ideas are large and simple, but rather in advance of the powers of the artillery of his day.

The 17th century.

At the beginning of the 17th century we find the Italian engineers following Paciotto in developing the complete bastioned trace; but they got on to a bad line of thought in trying to reduce everything to symmetry and system. The era of geometrical fortification (or, as Sir George Clarke has called it, "drawing-board" fortification) had already begun with Marchi, and his followers busied themselves entirely in finding geometrical solutions for the application of symmetrical bastioned fronts to such imaginary forms of perimeter as the oval, club, heart, figure of eight, &c. Marchi, however, was one of the first to think of prolonging the resistance of a place by means of outworks such as the ravelin. De Villenoisy says that Busca was the first to discuss the proportions and functions of all the component parts of a front; and Floriani, about 1630, was the last of the important Italians. The characteristics of a good deal of Spanish fortification carried out at this time were, according to the same authority, that the works were well adapted to sites, and the masonry excellent but too much exposed, while the bastions were too small. The Dutch and German schools will be referred to later.

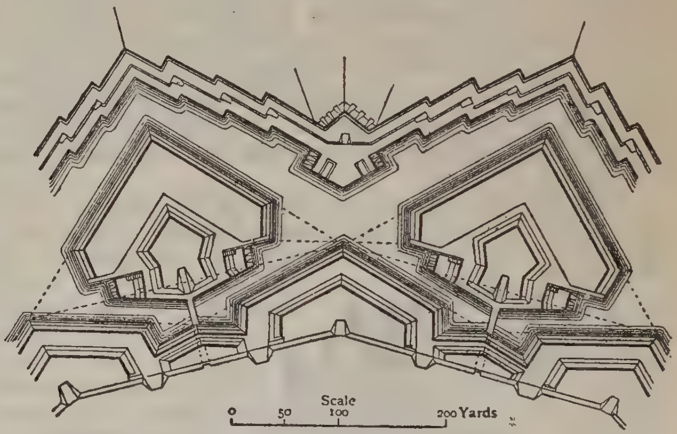


FIG. 23.—Speckle's Reinforced Trace.

The French engineers now began to take the lead in adapting the principles already established to actual sites. In the first half of the century the names of de Ville and Pagan stand out as having contributed valuable studies to the advancement of the science. In putting forward their designs they discussed very fully such practical questions as the length of the line of defence, whether this should be governed by the range of artillery or musketry fire, the length of flanks, the use in them of orillons, casemates and retired flanks, the size of bastions, &c.

It is the latter half of the 17th century, however, which is one of the most important periods in the history of fortification, chiefly because it was illuminated by the work of Vauban. It was at this time also that a prodigious output of purely theoretical fortification began, which went on till the French Revolution. Many of the "systems" published at this time were elaborated by men who had no practical knowledge of the subject, some of them priests who were engaged in educating the sons of the upper classes, and who had to teach the elements of fortification among other things. They naturally wrote treatises, which were valuable for their clearness of style; and with their industry and ingenuity the elaboration of existing methods was a very congenial task. Most of these essays took the form of multiplication and elaboration of outworks on an impossible scale, and they culminated in such fantastic extravagances as the system of Rhana, published in 1769 (fig. 24). These proposals, however, were of no practical importance.

Vauban.

The work of the real masters who knew more than they published can always be recognized by its comparative simplicity. The greatest of these was Sebastien le Prestre de Vauban (*q.v.*). Born in 1633, and busied from his eighteenth year till his death in 1707 in war or preparations for war, he earned alike by his genius, his experience, his industry and his personal character the chief place among modern military engineers. His experience alone puts him in a category apart from others. Of this it is enough to say that he took part in forty-eight sieges, forty of which he directed as chief engineer without a single failure, and repaired or constructed more than 160 places. Vauban's genius was essentially practical, and he was no believer in systems. He would say, "One does not fortify by systems but by common sense." Of new ideas in fortification he introduced practically none, but he improved and modified existing ideas with consummate skill in actual construction. His most original work was in the attack (see below), which he reduced to a scientific method most certain in its results. It is therefore one of the ironies of fate that Vauban should be chiefly known to us by three so-called "systems," known as his "first," "second" and "third." How far he was from following a system is shown by de Villenoisy, who reproduces twenty-eight fronts constructed by him between 1667 and 1698, no two of which are quite alike and most of which vary very considerably to suit local conditions.

Vauban's "first system," as variously described by other writers even in his own time, is pieced together from some of the early examples of his work. The "second system" is the "tower bastion" defence of Belfort and Landau (1684–1688), obviously suggested by a design of Castriotto's one hundred years earlier; and the "third system" is the front of Neu-Breisach (1698), which is merely Landau slightly improved. In other works, between 1688 and 1698, he did not keep to the tower bastion idea.

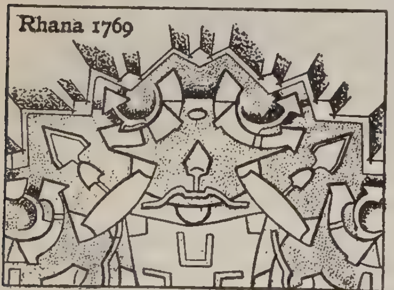


Fig. 24.

It will be convenient to take the "first system," as reproduced in the Royal Military Academy text book of fortification (fig. 25) as typical of much of Vauban's work. It may be observed that he sometimes uses the straight flank, and sometimes the curved flank with orillon. Parapets in several tiers are never used, nor cavaliers. The ravelin is almost always used. It is small, having little artillery power and giving no protection to the shoulders of the bastions. Sometimes it has flanks and occasionally a keep.

The tenaille is very generally found. In this form, viz. as a shield to the escarp of the curtain, it was probably invented by him. Fig. 25 shows two forms. In both the parapet of the tenaille had to be kept low, so that the flanks might defend a breach at the shoulder of the opposite bastion, with artillery fire striking within 12 ft. of the base of the escarp. Traverses are used for the first time on the covered way to guard against enfilade fire; and the re-entering place of arms, to which Vauban attached considerable importance, is large.

For the construction of the trace an average length of about 400 yds. (which, however, is a matter entirely dependent on the site) may be taken for the exterior side. The perpendicular, except for polygons of less than six sides, is one-sixth, and the faces of the bastions two-sevenths of the exterior side. The flanks are chords of arcs struck from the opposite shoulder as centres. An arc described with the same radius, but with the angle of the flank as a centre, and cutting the perpendicular produced outwardly, gives the salient of the ravelin; the prolongations of the faces of the ravelin fall upon the faces of the bastions at 11 yds. from the shoulders. The main ditch has a width of 38 yds. at the salient of the bastions, and the counterscarp is directed upon the shoulders of the adjoining bastions. The ditch of the ravelin is 24 yds. wide throughout.

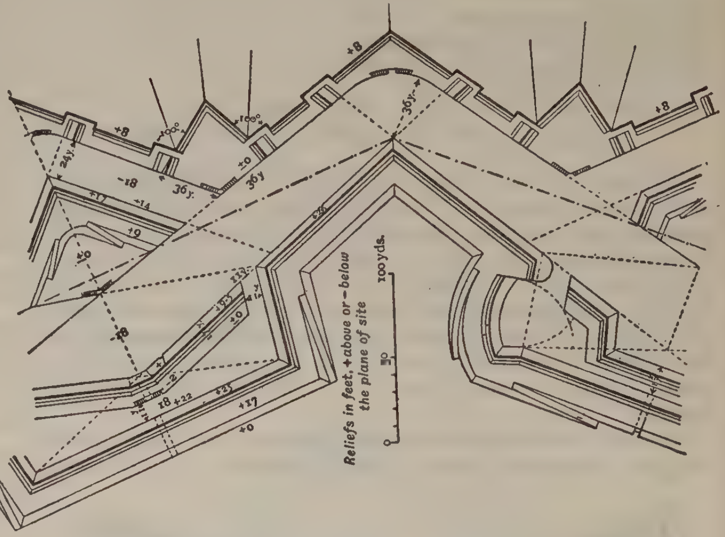


Fig. 25.—Vauban's First System.

As regards the profile the bastions and curtain have a command of 25 ft. over the country, 17 ft. over the crest of the glacis and 8 ft. over the ravelin. The ditches are 18 ft. deep throughout. The parapets are 18 ft. thick with full revetments. In his later works he used demi-revetments.

Fig. 26 shows the tower bastions of Neu-Breisach, or the so-called "third system." It is worth introducing, simply as showing that even a mind like Vauban's could not resist in old age the tendency to duplicate defences. Here the main bastions and tenaille are detached from the enceinte. The line of the enceinte is broken with flanks and further flanked by the towers. The ravelin is large and has a keep. The section through the face of the bastion shows a demi-revetment with wide berm, and a hedge as an additional obstacle.

18th and 19th centuries.

After Vauban died, though the theories continued, the valuable additions to the system were few. Among his successors in the early part of the 18th century Cormontaingne (*q.v.*) has the greatest reputation, though his experience and authority fell far short of Vauban's. He was a clear thinker and writer, and the elements of the system were distinctly advanced by him. His trace includes an enlarged ravelin with flanks, the ends of which were intended to close the gaps at the end of the tenaille, and a keep to the ravelin with flanks. He provides a very large re-entering place of arms, also with a keep, the ditches of which are carefully traced so as to be protected from enfilade by the salients of the ravelin and bastion. He was also in favour of a permanent retrenchment of the gorge of the bastion. His works were printed, with many alterations, more than twenty years after his death, to serve as a text-book for the school of Mézières. This school was established in 1748, and from this time forward there was an official school of thought, based on Vauban. Cormontaingne's work, therefore, represents the modifications of Vauban's ideas accepted by French engineers in the latter part of the 18th century. The school of Mézières was afterwards replaced by that of Metz, which carried on its traditions. Such schools are necessarily conservative, and hence, in spite of the gradual improvement in ordnance and firearms, we find the main elements of the bastioned system remaining unchanged right up to the period of the Franco-German War in 1870. Chasseloup-Laubat tells us that, before the Revolution, to attempt novelties in fortification was to write one's self down ignorant. How far the general form of the bastion with its outworks had become crystallized is evident from a cursory comparison of fig. 27 with Vauban's early work. This figure is the front of the Metz school in 1822, by General Noizet.

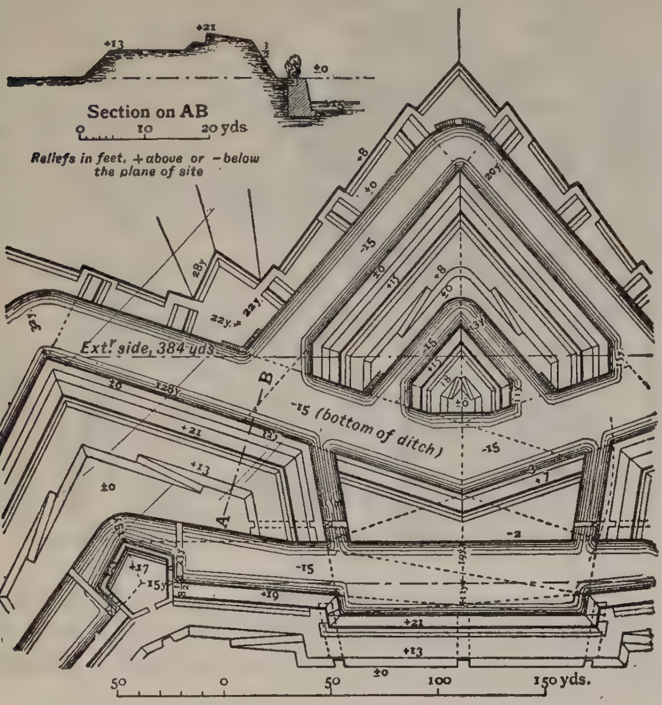


FIG. 26.—Neu-Breisach.

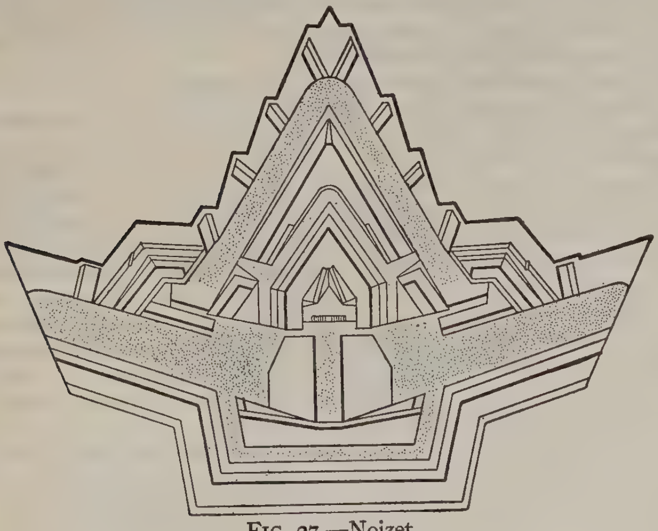


FIG. 27.—Noizet.

Since, therefore, the official view was that the general outlines of the system were sacred, the efforts of orthodox engineers from Cormontaingne's time onwards were given to improvements of detail, and mainly to retard breaching operations as long as possible. We find enormous pains being bestowed on the study of the comparative heights of the masonry walls and crest levels; with the introduction here and there of glacis slopes in the ditches, put in both to facilitate their defence and to protect portions of the escarps.

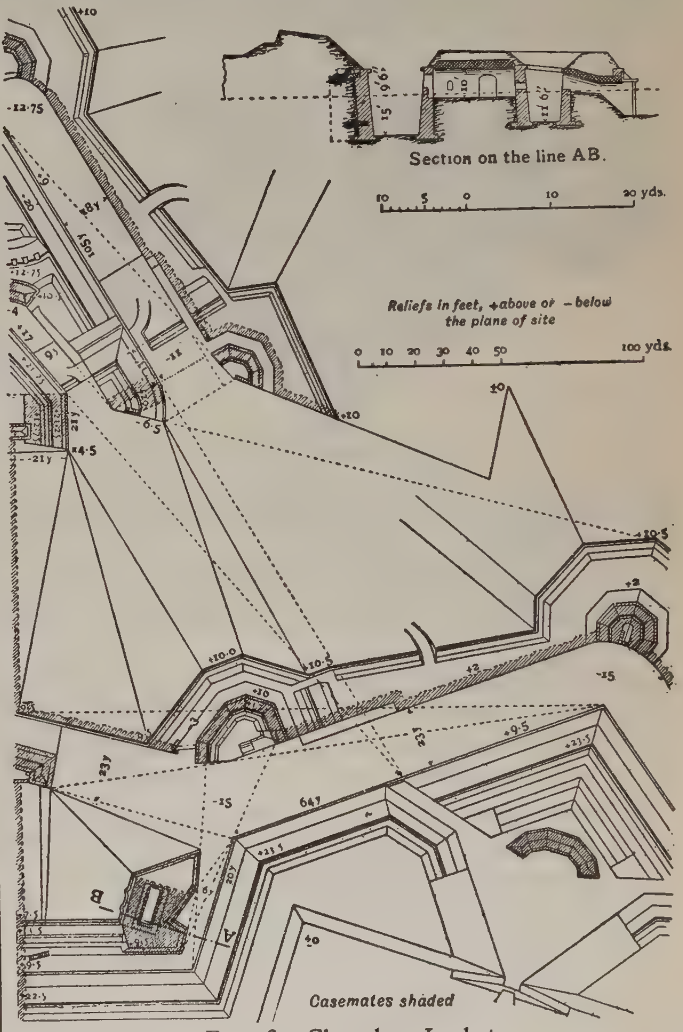
Among the unorthodox two names deserve mention. The first of these is Chasseloup-Laubat (*q.v.*), who served throughout the wars of the Republic and Empire, and constructed the fortress of Alessandria in Piedmont.

Chasseloup's main proposals to improve the bastioned system were two:

First, in order to prevent the bastions from being breached through the gaps made by the ditch of the ravelin, he threw forward the ravelin and its keep outside the main glacis. This had the further advantage of giving great saliency to the ravelin for cross-fire over the terrain of the attack. On the other hand, it made the ravelin liable to capture by the gorge. It is probable that this system would have lent itself to a splendid defence by an able commander with a strong force; but under the opposite conditions it has a dangerous element of weakness.

Secondly, in order to get freedom to use longer fronts than those admissible for the ordinary bastioned trace, he proposed to extend his exterior side up to about 650 yds. and to break the faces of his bastions; the portion next the shoulder being defended from the flank of the collateral bastion and coinciding with the line of defence, and the portion next the salient, up to about 80 yds. in length, being defended from a central keep or caponier placed in front of the tenaille. The natural criticism of this arrangement is that it combines some of the defects of both the bastioned and polygonal systems without getting the full advantages of either.

Fig. 28 shows a half front of Chasseloup's system, of ordinary length, as actually constructed. The section shows an interesting detail, viz. the Chasseloup mask—a detached mask with tunnels for the casemate guns to fire through, the intention of which is to save them from being destroyed from a distance.



Section on the line AB.
10 5 0 10 20 yds.
Reliefs in feet, +above or −below the plane of site
0 10 20 30 40 50 100 yds.
-12·75
±0
-15
B
A
±0
Casemates shaded

FIG. 28.—Chasseloup-Laubat.

The second name is that of Captain Choumara of the French Engineers, born in 1787, whose work was published in 1827.

Two leading ideas are due to him. The first is that of the "independence of parapets." A glance at any of the plans that have already been shown will show that hitherto the crests of parapets had always been traced parallel to the escarp or magistral line. Choumara pointed out that, while it was necessary for the escarp to be traced in straight lines with reference to the flanking arrangements, there was no such necessity as regards the parapets. By making the crest of the parapet quite independent of the escarp line he obtained great freedom of direction for his fire. The second idea is that of the "inner glacis." This was a glacis parapet placed in the main ditch to shield the escarp; its effect being to prevent the escarp of the body of the place from being breached in the usual way by batteries crowning the crest of the covered way.

The need for Choumara's improvements has passed by, but he was in his time a real teacher. One sentence of his strikes a resounding note: "What is chiefly required in fortification is simplicity and strength. It is not on a few little contrivances carefully hidden that one can rely for a good defence. *The fate of a place should not depend on the intelligence of a corporal shut up in a small post prepared for his detachment.*"

Before leaving the bastioned system it will be of interest to study a couple of actual and complete examples, one irregular and one regular. Fig. 29 shows the defences of Sedan as they were at the end of the 17th century. One sees the touch of Vauban here and there, but the work is for the most part apparently early 17th century. It will be observed that on the river side of the town the defence consists of very irregular bastions with duplicated wet ditches (see the Dutch style, below); and on the other side, where water is not available, strength is sought for by pushing a succession of hornworks far out.

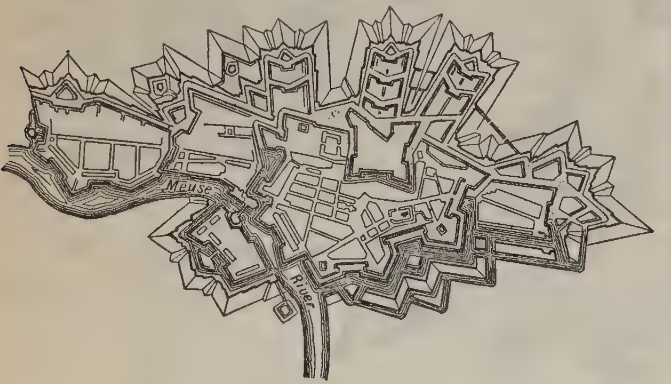


FIG. 29.—Sedan in 1705.

Fig. 30 is Saarlouis, constructed by Vauban in 1680 in his early manner, a remarkable example of symmetry. Vauban of course never thought of aiming at symmetry, which is of itself neither good nor bad, but it is interesting to note such a perfect example of the system.

It must here be remarked that the reproach of "geometrical" fortification is in no way applicable to the works of Vauban and his immediate successors. The true geometric fortification, which worshipped symmetry as a fetish, marked, as has been already pointed out, the decadence of the Italian school. Vauban and his fellows excelled in adapting works to sites, the real test of the engineer.

The bastioned system was the 17th-century solution of the fortification problem. Given an artillery and musketry of short range and too slow for effective frontal defence, a ditch is necessary as an obstacle. What is the best means of flanking the ditch and of protecting the flanking arrangements? If Vauban elected for the bastion, we must before criticizing his choice remember that he was the most experienced engineer of his day, a man of the first ability and quite without prejudice. What is matter for regret is that the authority of Vauban should have practically paralysed the French school during the 18th and most of the 19th century, so that while the conditions of attack and defence were gradually altering they could admit no change of idea, and their best men, who could not help being original, were struggling against the whole weight of official opposition.

Again, such duplication of outworks as we see at Sedan is not geometric fortification. It is a definite attempt to retard the attack, on ground favourable to it, by successive lines of defence. As to the policy of this, no axiom can be laid down. Nowadays most of us think, as Machiavelli did, that a single line of defence is best and that a second line only serves to suggest the advisability of retreat. There are also, of course, the recognized drawbacks of outworks, difficulty of retreat, of relief and so forth, and the moral effect of their loss. But the engineers of such defences as Ostend and Candia might well say, "Oh, if only when we had held on to that bastion for so many months we had had a second and a third line of permanent retrenchment to fall back upon, we could have held the place for ever." And who shall say that they were wrong? Let us at all events remember that the leading engineers of that time were men who had passed their lives in a state of war, and that we ourselves in comparison with them are the theorists.

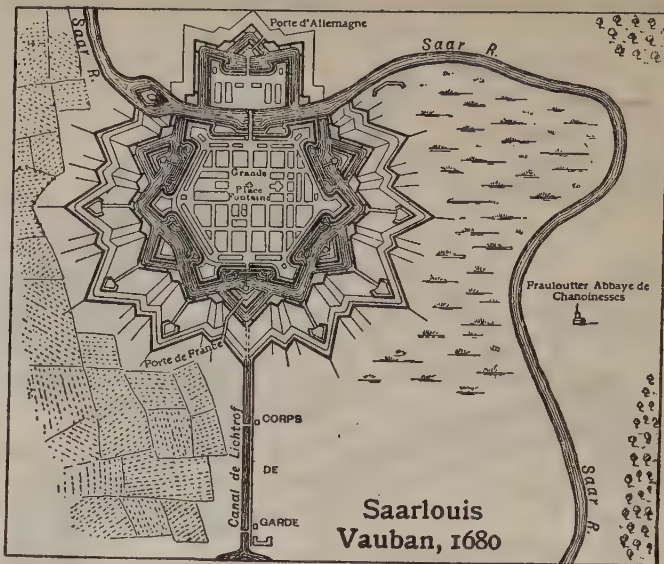


FIG. 30.

The Dutch school.

From the end of the 16th century the Dutch methods of fortification acquired a great reputation, thanks to the stout resistance offered to the Spaniards by some of their fortresses, the three years' defence of Ostend being perhaps the most striking example. Prolonged defences, which were mainly due to the desperate energy of the besieged, were credited to the quality of their defences. In point of fact the Dutch owed more to nature, and more still to their own spirit, than to art; but they showed a good deal of skill in adapting recent ideas to their needs.

Three conditions governed the development of the Dutch works at this time, viz. want of time, want of money and abundance of water. When the Netherlands began their revolt against Spain, they would no doubt have been glad enough of expensive masonry fortresses on such models as Paciotto's citadel of Antwerp. But there was neither time nor money for such works. Something had to be extemporized, and fortunately for them they had wet ditches to take the place of high revetted walls. Everywhere water was near the surface, and rivers or canals were available for inundations. A wide and shallow ditch, while making a good obstacle, was also the readiest means of obtaining earth for the ramparts. High command was, owing to the flatness of the country, unnecessary and even undesirable, as it did not allow of grazing fire.

What the Dutch actually did in strengthening their towns gives little evidence of system. Starting as a rule from an existing enceinte, sometimes a medieval wall, they would provide a broad wet ditch. No further provision was usually made on the sides of the town which were additionally protected by a river or inundation. On the other sides the wet ditch was made still broader, and sometimes contained a counterguard, sometimes ravelins and lunettes. These were quite irregular in their design and relation to each other. At the foot of the glacis would be found another but narrower wet ditch, which was a peculiarly Dutch feature; and sometimes if the town was in a bend of a river there would be a canal cut across the bend in a straight line, strengthened by several redans.

Speaking generally, they endeavoured to provide for the want of a first-class masonry obstacle by multiplication of wet ditches, and further to strengthen these obstacles by great quantities of palisading, for which purpose the timber of old ships was used. They also recognized the inherent weaknesses of wet ditches, as, for instance, that when frozen they no longer provide an obstacle; and they studied the means, not only of causing inundations, but also of arranging to empty as well as to fill the ditches at will. Simon Stevin was the leader in this work.

Nevertheless a Dutch school of design did come into existence at this time. The leaders, early in the 17th century, were Simon Stevin, Maurice and Henry of Nassau, Marollois and Freitag. The fortress of Coevorden, constructed by Prince Maurice, of which fig. 31 shows a front, is a well-known example of this, and the section shows clearly some typical features of the school.

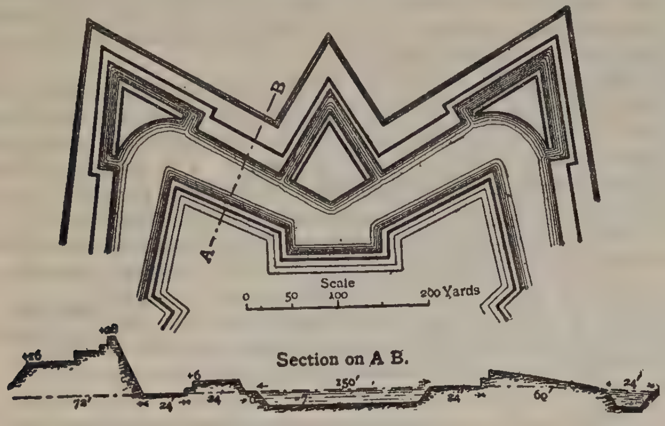


FIG. 31.—Coevorden.

The elements of the plan are those of the early bastioned trace, but we find added both ravelins and lunettes, very regular in design. There is also the ditch at the foot of the glacis, and surrounding the rampart of the enceinte a continuous fausse-braie. This work, which partook of the nature of both boulevard and counterguard, served several purposes. It was desirable that the weight of the rampart should be drawn back a little from the edge of the ditch, and the fausse-braie filled what would otherwise have been dead ground at the foot of the rampart. It also afforded a grazing fire over the ditch, which was very important, and which the rampart supported by a plunging fire.

Coehoorn.

Coehoorn (*q.v.*), the contemporary and nearest rival to Vauban, was the greatest light of the Dutch school. Like Vauban he was distinguished as a fighting engineer, both in attack and defence; but in the attack he differed from him in relying more on powerful artillery fire than systematic earthworks. He introduced the Coehoorn mortar. His "first system," which was employed at Mannheim (fig. 32), is reproduced for the sake of comparison with the Coevorden front designed a hundred years earlier. Among other points will be noticed the combination of wet and dry ditches; the very broad main ditch with counterguard; the roomy keep of the ravelin; the expansion of the fausse-brais into an independent low parapet; and the powerful flanking fire in three tiers.

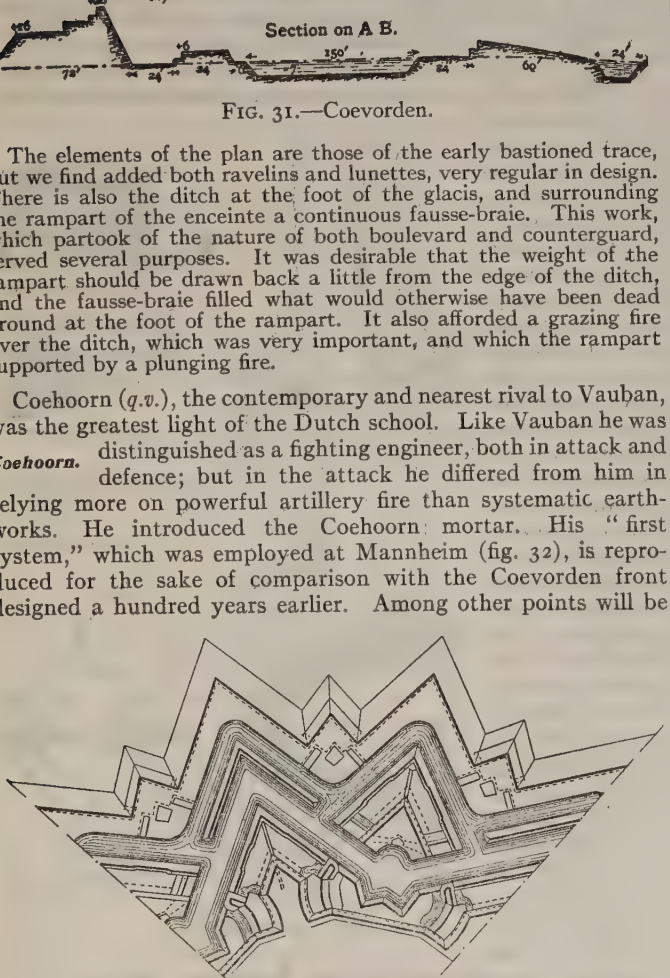


FIG. 32.—Coehoorn's First System.

German school.

The "tenaille" system and the "polygonal" system which grew out of it are mainly identified with the *German school.* That school, says von Zastrow, does not, like that of France, represent the authoritative teaching of an official establishment, but rather the general practice of the German engineers. It was founded on the principles of Dürer, Speckle and especially Rimpler, and much influenced in execution by Montalembert. "The German engineers desired a simple trace, a strong fortification with retrenchments and keeps, bomb-proof accommodation and an organization suitable for an offensive defence."

These had always been the German principles. Already in the 16th century the Prussian defences of Kustrin, Spandau and Peitz had large bomb-proof casemates sufficient for a great part of the garrison. The same thing is seen in the defences of Glogau, Schweidnitz, &c., built by Frederick the Great. These works show various applications of the tenaille system. In 1776 Frederick became acquainted with the work of Montalembert, and his influence is seen in the casemates of Kosel.

Whether through the influence of Albert Dürer or not cannot be said, but while the bastion was being developed in France the tenaille and the accompanying casemates from the first found acceptance in Germany, and thence in eastern and northern Europe. De Groote, who wrote in 1618, produced a sort of tenaille system, and may have been the inspiration of Rimpler. Dillich (1640), Landsberg the elder (1648), Griendel d'Aach (1677), Werthmuller (1685) and others advocated both bastion and tenaille, sometimes in combination; the German bastion being usually distinguished by short faces and long flanks.

Rimpler, who was present at the siege of Candia (taken by the Turks in 1669) and died at that of Vienna in 1683, exercised a great influence. He had been struck by the weakness of the early Italian bastions at Candia, and published a book in 1673 called *Fortification with Central Bastions*, which was practically the polygonal trace. Zastrow thinks that Rimpler inspired Montalembert. He left unfortunately no designs to illustrate his ideas.

Landsberg the younger (1670–1746), a major-general in the Prussian service, who saw many sieges, also had a great influence. He appears to have been the first who frankly advocated the tenaille alone, chiefly on the ground that the flank, which was the most important part of the bastioned system, was also the weakest. Fig. 33 shows his system, published in 1712.

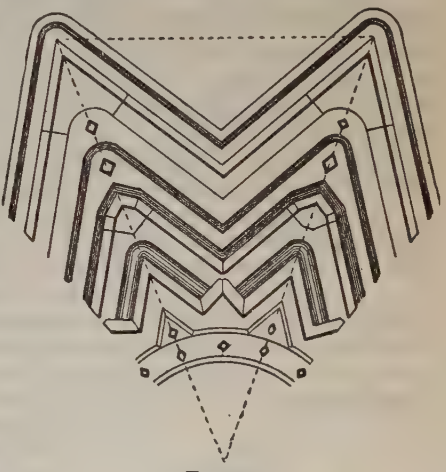


FIG. 33.

Montalembert and Carnot.

It was, however, ultimately a Frenchman, Marc René Montalembert (*q.v.*), who was the great apostle of the tenaille, though in his later years he leaned more to the polygonal trace. He objected to the bastioned trace on many grounds; principally that the bastion was a shell trap, that the flanks by crossing their fire lost the advantage of the full range of their weapons, and that the curtain was useless for defence. He took the view that the bastions with their ravelins constituted practically a tenaille trace, spoilt by the detachment of the ravelins and cramped by the presence of the curtains and flanks. His tenaille system consisted of redans, with salient angles of 60° or more, flanking each other at right angles; from which he gave to his system the name of "perpendicular fortification."

Lazare Carnot (*q.v.*), the "Organizer of Victory," was, in fortification, a follower of Montalembert, and produced in 1797 a tenaille system (fig. 34) on strong and simple lines.

In 1812 Carnot offered three systems. For a dry and level site he recommended a bastioned trace; but for wet ditches and for irregular ground, tenaille traces. Both of these latter differ from his 1797 trace in that the re-entering angle is reinforced by a tenaille whose faces are parallel to the main faces and reach almost to the salients. There are also counterguards in front of the salients, whose ends overlap the ends of the tenaille. (*N.B.* To avoid confusion between the *tenaille trace* and the *tenaille*, it should be noted that the latter is a low detached parapet placed in front of the escarp of the body of the place, partly as a shield, and partly as an additional line of defence. It is used in front of the curtain in the bastioned trace, and in the re-entering angle in the tenaille trace.)

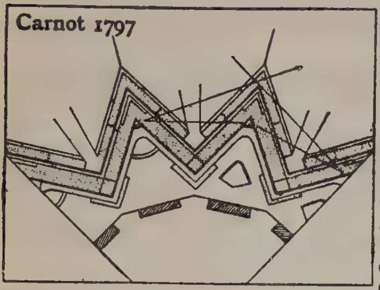


FIG. 34.

Other important features of Carnot's work were: a continuous general retrenchment, or interior parapet, following more or less the lines of the main parapet; the use of the detached wall in place of the escarp revetment; and the countersloping glacis. This last (of which Carnot was not the inventor), instead of sloping gently outwards from a crest raised about 8 ft. down to the natural level of the ground, sloped inwards from the ground-level to the bottom of the ditch. The advantage of the additional obstacle of the counterscarp was thus lost to the defence. On the other hand, the besiegers' saps, as they progressed down the glacis, were exposed to a plunging fire from the parapet.

Carnot was also, like Coehoorn, a great believer in the mortar; but while Coehoorn introduced the small portable mortar that bears his name, Carnot expected great results from a 13 in. mortar throwing 600 iron balls at each discharge. He endeavoured to prove mathematically that the discharge of these mortars would in due course kill off the whole of the besieging force. These mortars he emplaced in open fronted mortar-casemates, in concealed positions. Fig. 35 shows in section one of these mortar-casemates, placed between the parapet of the retrenchment and a detached wall.

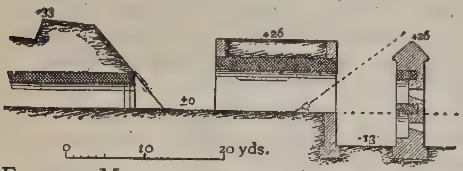


FIG. 35.—Mortar-casemate and Detached Wall.

The polygonal trace.

The leading idea of Montalembert was that for a successful defence it was necessary for the artillery to be superior to that of the enemy. This idea led him to the adoption of casemates in several tiers; in preference to open parapets, exposed to artillery fire of all kinds, high angle, ricochet and reverse. In considering the defects of bastions he had arrived at the conclusion that for flanking purposes two forms of trace were preferable; either the tenaille form, connecting the ravelins with the body of the place, or the form in which the primary flanking elements, instead of facing each other with overlapping fire, as with the bastions, should be placed back to back in the middle of the exterior side Fig. 36 is an example of this. The central flanking work resulting from this arrangement is the caponier of the early Italians, reintroduced and developed; and with it Montalembert laid the foundation of the polygonal system of our own time.

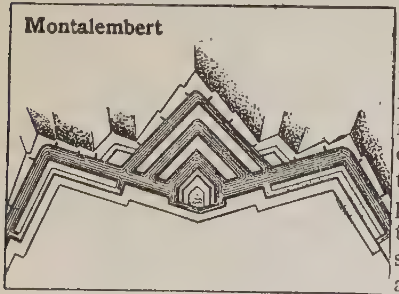


FIG. 36.—Montalembert, 1786.

Montalembert was one of the first to foresee the coming necessity for detached forts, and it was for these that he chiefly proposed to use his caponier flanking, preferring the tenaille system for large places. In abandoning the bastioned trace he was already committed to the principle of casemate defence for ditches; and the combination of this principle with his desire for an overwhelming artillery defence led him in the course of years of controversial writing into somewhat extravagant proposals. For instance, for a square fort of about 400 yds. side, he proposed over 1000 casemate guns; and one of his caponier sections shows 10 tiers of masonry gun-casemates one above the other. Confiding in the power of such an artillery, he freely exposed the upper parts of his casemates to direct fire.

Montalembert is said to have contributed more new ideas to fortification than any other man. His designs must be considered in some ways unworkable and unsound, but all the best work of the 19th century rests on his teaching. The Germans, who already used the tenaille system and made free provision of bomb-proof casemates, took from him the polygonal trace and the idea of the entrenched camp.

The polygonal system in fortification implies straight or slightly broken exterior sides, flanked by casemated caponiers. The caponier is the vital point of the front, and is protected in important works by a ravelin and keep. The essence of the system is its simplicity, which allows of its being applied to any sort of ground, level or broken, and to long or short fronts.

1815-1855, entrenched camps.

The final period of smooth bore artillery is an important one in the history of fortification. It is true that the many expensive works that were constructed at this time were obsolete almost as soon as they were finished; but this was inevitable, thanks to the pace at which the world was travelling. After the Napoleonic wars the Germanic Confederation began to strengthen its frontiers; and considering that they had not derived much strategic advantage from their existing fortresses, the Germans took up Montalembert's idea of entrenched camps, utilizing at the same time his polygonal system with modifications for the main enceintes. The Prussians began with the fortresses of Coblenz and Cologne; later Posen, Königsberg and other places were treated on the same lines. The Austrians constructed, among other places, Linz and Verona. The Germanic Confederation reinforced Mainz with improved works, and reorganized entirely Rastatt and Ulm. The Bavarians built Germersheim and Ingolstadt. While all these works were conceived in the spirit of Rimpler and Montalembert, they showed the differences of national temperament. The Prussian works, simple in design, relied upon powerful artillery fire, and exposed a good deal of masonry to the enemy's view. The Austrians covered part of their masonry with earth and gave more attention to detail.

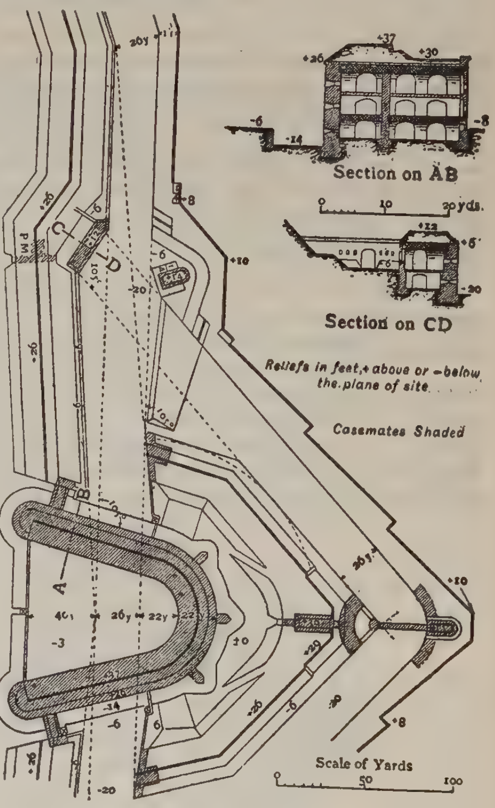


FIG. 37.—Front at Posen.

The German development of the polygonal system at this time is not of great importance, since the great masonry caponiers were designed without sufficient consideration for the increasing powers of artillery. One example (fig. 37) is given for the sake of historical comparison. It is a front of Posen.

"The exterior side of the front is about 650 yds. (600 metres) long. It is flanked by a central caponier, which is protected by a *detached bastion*. . . . The main front is broken back to flank the faces of the bastion from casemates behind the escarp, as well as from the parapet.

Posen.

"The central caponier forms the keep of the whole front and sweeps both the interior and the ditch by its flanking fire. It has two floors of gun-casemates and one for musketry, and on the top is a parapet completely commanding alike the outworks and the body of the place. It contains barrack accommodation for a battalion of 1000 men, and has a large inner courtyard closed at the gorge by a detached wall. The caponier is itself flanked by three small caponiers at the head, and one at the inner end of each flank.

"The escarp of the body of the place is a simple detached wall; that of the detached bastion is either a detached wall with piers and arches, or a counter-arched revetment. At the salient of the bastion there is a mortar battery under the rampart, and a casemated traverse for howitzers upon the terreplein. The flanks of the bastion are parallel to those of the caponier, and at the same distance from it as the faces.

"Masonry blockhouses, loopholed for musketry, are provided as keeps of the re-entering and salient places of arms. In the latter case they have stairs leading down into a counterscarp gallery, which serves as a base for countermine galleries, and is connected with the detached bastion by a gallery under the ditch. The counterscarp is not revetted if the ditch is wet.

"The angle of the polygon should not be less than 160°, in order that the prolongation of the main ditch may fall within the salients of the detached bastions of the neighbouring fronts, and the masonry of the caponiers may thus be hidden from outside view." (R.M.A. *Text-book of F. & M.E.*, 1886.)

The detached fort.

We have now reached a period when the "detached fort" becomes of more importance than the organization of the enceinte. The early conception of the rôle of detached forts in connexion with the fortress was to form an entrenched camp within which an army corps could seek safety if necessary. The idea had occurred to Vauban, who added to the permanent defences of Toulon a large camp defended by field parapets attached to one side of the fortress. The substitution of a ring of detached forts, while giving it the greater safety of permanent instead of field defences, gave also a wider area and freer scope for the operations of an army seeking shelter under the guns of a fortress, and at the same time made siege more difficult by increasing the line of investment. The use of the detached fort as a means of protecting the body of the place from bombardment had not yet been made necessary by increased range of artillery.

When these detached forts were first used by Germany the scope of the idea had evidently not been realised, as they were placed much too close to the fortress. Those at Cologne, for instance, were only some 400 or 500 yds. in advance of the ramparts. The same leading idea is seen in most of these forts as in the new enceintes; *i.e.* a lunette, with a casemated keep at the gorge. The keep is the essential part of the work, the rampart of the lunette serving to protect it from frontal artillery fire. The keep projects to the rear, so as not only to be able to flank its own gorge, but to give some support to the neighbouring works with guns protected from frontal fire. This is a valuable arrangement, which is still sometimes used. The front ditches of the lunettes were flanked by caponiers. Some of the larger forts were simple quadrangular works with casemate barracks and caponier ditch defence.

In 1830, in Austria, the archduke Maximilian made an entirely fresh departure with the defences of Linz. The idea was to provide an entrenched camp at the least possible cost, whose works should require the smallest possible garrison. With this object Linz was surrounded with a belt of circular towers spaced about 600 yds. apart. The towers, 25 metres in diameter, were enclosed by a ditch and glacis, and contained 3 tiers of casemates. The masonry was concealed from view by the ditch and glacis. On the top of the tower was an earth parapet, over which a battery of 13 guns fired *en barbette*. In order to find room for so many guns in the restricted space, the whole 13 were placed parallel and close together on a single specially designed mounting.

This new departure was received with a certain amount of approval at the time, which is somewhat difficult to account for, as a more faulty system could hardly be devised; but the experiment was never repeated.

The credit for much of the clear views and real progress made in Germany during this period is due to General von Brese-Winiari, inspector-general of the Prussian engineers.

France, for a few years after 1815, could spare little money for fortifications, and nothing was done but repairs and minor improvements on the old lines. Belgium, having some money in hand, rebuilt and improved in detail a number of bastioned fortresses which had fallen into disrepair.

In 1830 France began to follow the lead of Germany with entrenched camps. The enceinte of Paris was reconstructed, and detached forts were added at a cost, according to von Zastrow, of £8,000,000. The Belgian and German frontiers of France being considered fairly protected by the existing fortresses, they turned their attention to the Swiss and Italian frontiers, and constructed three fortresses with detached forts at Belfort, Besançon and Grenoble. The cost of the new works at Lyons was, according to the same writer, £1,000,000 without the armament. Here and elsewhere the enceinte was simplified on account of the advanced defences. That of Paris, which was influenced by political considerations, was a simple bastioned trace with rather long fronts and without ravelins or other outworks; the escarp was high and therefore exposed, and the counterscarp was not revetted.

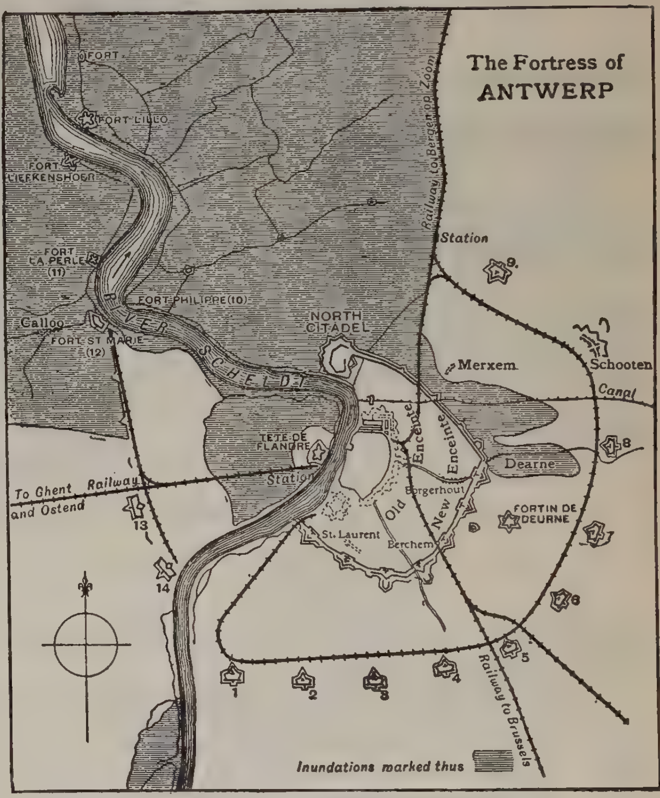


FIG. 38.

As regards the detached forts there was certainly a want of clearness of conception. Those of Paris were simply fortresses in miniature, square or pentagonal figures with bastioned fronts and containing defensible barracks. Those of Lyons were much more carefully designed, but the authors wavered between two ideas. Unwilling to give up the bastion, but evidently hankering after the new caponiers, they produced a type which it is difficult to praise. The larger works were irregular four- or five-sided figures with bastioned fronts; and practically the whole interior space was taken up by a large keep, with its ditch, on the

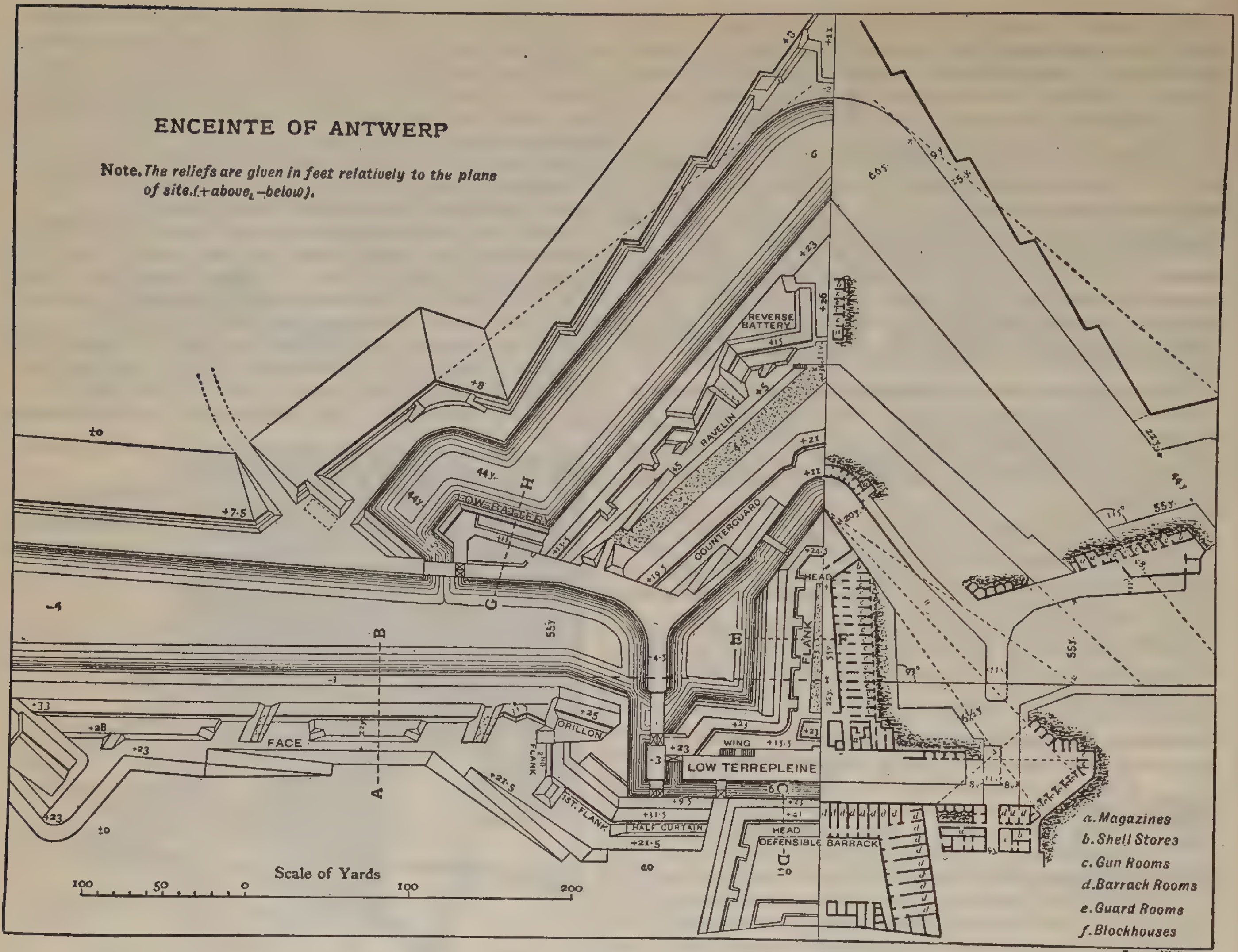

ENCEINTE OF ANTWERP
Note. The reliefs are given in feet relatively to the plane of site. (+ above, – below).
REVERSE BATTERY
RAVELIN
COUNTERGUARD
LOW BATTERY
FLANK
FACE
ORILLON
FLANK
1ST. FLANK
HALF CURTAIN
WING
LOW TERREPLEINE
HEAD
HEAD
DEFENSIBLE BARRACK
A
B
C
D
E
F
G
H
Scale of Yards
100 50 0 100 200
a. Magazines
b. Shell Stores
c. Gun Rooms
d. Barrack Rooms
e. Guard Rooms
f. Blockhouses

FIG. 39.

Emery Walker sc.

polygonal system. The smaller works, instead of a keep, had defensible barracks in the gorge.

Period from 1855 to 1870.

During the period 1855–1870 a considerable impulse was given to the science of fortification, both by the Crimean War and the arrival of the rifled gun. One immediate result of these was the condemnation of masonry exposed to artillery fire. The most important work of the period was the new scheme of defence of Antwerp, initiated in 1859. This is chiefly interesting as giving us the last and finest expression of the medieval enceinte, at a time when the war between the polygonal and bastioned traces was still raging, though the boom of the long-range guns had already given warning that a new era had begun. Antwerp is also associated with the name of General Brialmont (*q.v.*), of the Belgian engineers, whom posterity will no doubt regard as the greatest writer on fortification of the latter half of the 19th century.

Antwerp.

We give in figs. 38, 39 and 40 the general plan of the 1859 defences of Antwerp, the plan of a front of the enceinte, and its sections, as showing almost the last word of fortification before the arrival of high explosives.

The defences of Antwerp were designed, as the strategic centre of the national defence of Belgium, for an entrenched camp for 100,000 men. The length of the enceinte is about 9 m. The detached forts, which on the sides not defended by inundation are about $1\frac{1}{4}$ m. apart and from 2 to 3 m. in front of the enceinte, are powerful works, arranged for a garrison of 1000 men. They have each a frontal crest-line of over 700 yds. and are intended for an armament of 120 guns and 15 mortars.

The general arrangement of the fronts of the enceinte should be compared with the earlier German type of Posen. It will be noticed that while the large casemated caponier at Posen breaks the enceinte and flanks it both without and within, at Antwerp the caponier is detached—a much sounder arrangement—and flanks the front only. The defence of the faces rests on the width of the wet ditches and on the flanking power of the caponier; there is no attempt to add to it by fausse-braie or detached wall. The dimensions are everywhere very generous, allowing free movement for the troops of the defence; the covered way is 22 yds.

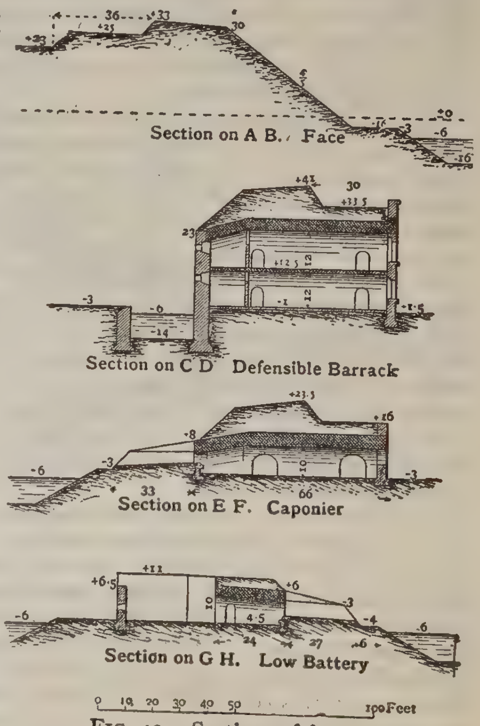

Section on A B. Face
Section on C D Defensible Barrack
Section on E F. Caponier
Section on G H. Low Battery
0 10 20 30 40 50 100 Feet

FIG. 40.—Sections of fig. 39.

wide and there is a double terreplein on the face. The parapet of the face is 27 ft. thick. The masonry of the casemate guns in the caponier, first flank and low battery, is protected by earth, *à la* Haxo.

In 1859 Austria acknowledged the influence of the new artillery with some new forts at Verona. The detached forts built by Radetzky in 1848 were only from 1000 to 2000 yds. distant from the ramparts. Those now added, of which fig. 41 is an example, were from 3000 to 4000 yds. out.

In the same year the land defences of some of the British dockyards were taken in hand. These first serious attempts at permanent fortification in England were received with approval on the continent, as constituting an advance on anything that had been done before. The detached forts intended to keep an enemy outside bombarding distance were roomy works with small keeps. The parapets were organized for artillery and the ditches were defended by caponiers or counterscarp galleries. The forts were spaced about a mile apart and arranged so as to support each other by their fire.

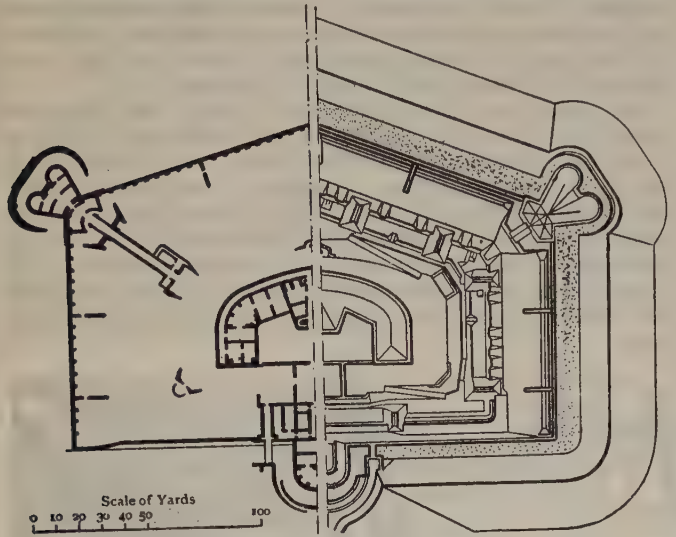


Fig. 41.—Austrian Fort at Verona.

The sieges of the Franco-German War of 1870 are alluded to in the section below dealing with the "Attack of Fortresses."

Period from 1870 to 1885.

As regards their effect on the designs of fortification the most important thing to note is the distance to which it was thought necessary to throw out the detached forts. These distances were of course influenced by the character of the ground, but for the most part they were very largely increased. Thus at Paris the fort at St Cyr was 18,000 yds. from the enceinte; at Verdun the distances varied from 2300 to 12,000 yds.; at Belfort the new forts were from 4500 to 11,500 yds. out; at Metz 2300 to 4500; and at Strassburg 5200 to 10,000. One result of these increased distances was of course to increase very largely the length of the zone of investment, and therefore the strength necessary for the besieging force.

As regards the character of the works, the typical shape adopted both in France and Germany was a very obtuse-angled lunette, shallow from front to rear. The German type had one parapet only, which was organized for artillery and heavily traversed, the living casemates being under this parapet. The ditch defence was provided for by caponiers and a detached wall (see fig. 42).

The French forts had two parapets, that in the rear being placed over living casemates (in two tiers, as shown in the section of fig. 43 by a dotted line), and commanding the front one. There was a long controversy as to whether the artillery of the fort should be on the upper or the lower parapet, the advocates of the upper parapet attaching great importance to the command that the guns would have over the country in front. The other school, objecting to having guns on the skyline, preferred to sacrifice the command and place them on the lower parapet, as in fig. 43, the infantry occupying the upper parapet. It will be observed that the bastioned trace is abandoned, the ditches, like those of the German fort, being defended by caponiers.

While a great deal of work was done on these lines, a very active controversy had already begun on the general question as to whether guns should be employed in forts at all. Some declared that the accuracy and power of artillery had already developed so far, that guns in fixed and visible positions must needs be put out of action in a very short time. The remedy proposed by these was the removal of the guns from the forts into "wing-batteries" which should be less conspicuous; but soon the broader idea was put forward of placing the guns in concealed positions and moving them from one to another by means of previously prepared roads or railways. Others declared that there was no safety for the guns outside the forts, and that the use of steel turrets and disappearing cupolas was the only solution of the difficulty. General Brialmont, who had by this time become the first European authority on fortification questions, ranged himself on the side of the turrets. The younger

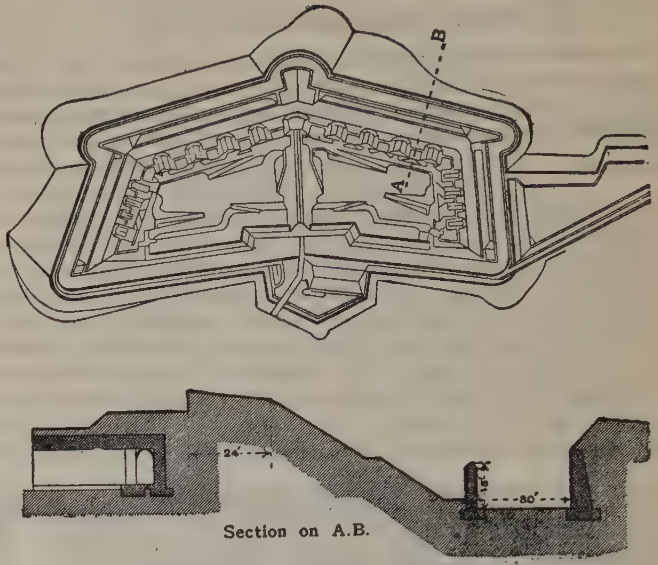


Fig. 42.—German Fort about 1880.

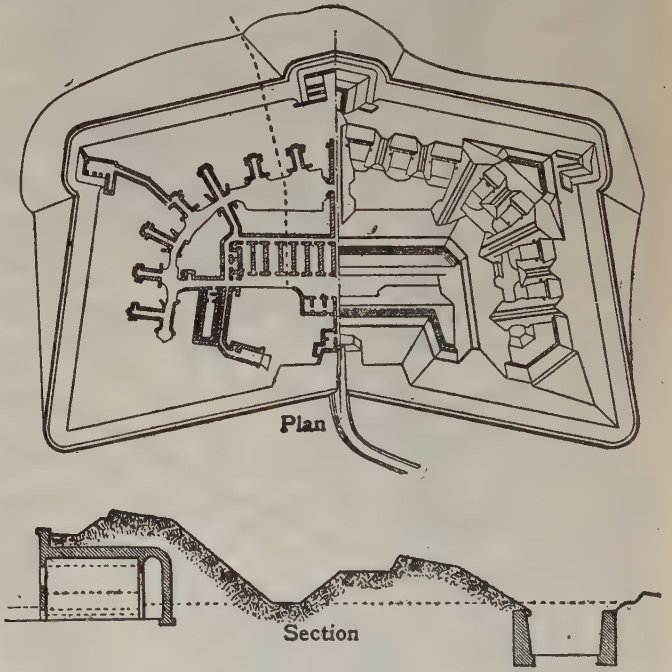


Fig. 43.—French Fort about 1880.

school were largely in favour of mobility and expressed themselves eagerly in a shower of pamphlets.

It was at this juncture that a new factor was introduced, namely, the obus-torpille, or long shell with high-explosive bursting charge. With its appearance we say good-bye to the old school and enter upon the consideration of the fortification of to-day.

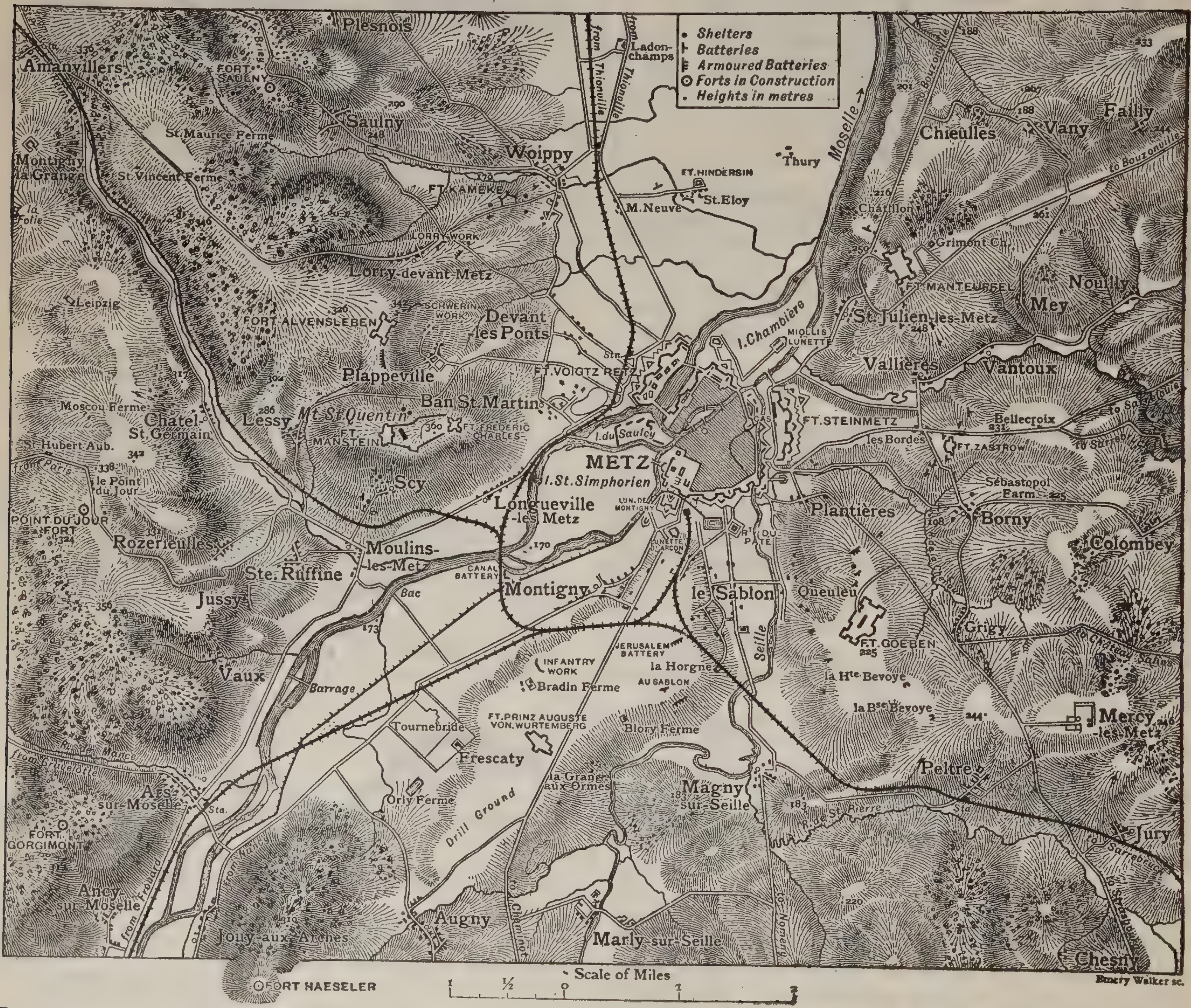
II. Modern Permanent Fortification

High-angle fire with long shell.

Modern fortification dates by universal consent from 1885. The Germans had begun experiments a year or two before this, with long shell containing large charges of gun-cotton. But it was the experiments at Fort Malmaison in France in 1886 that set the military world speculating on the future of fortification. The fort was used as a target for 8-in. shell of five calibres length containing large charges of melinite. The reported effects of these made a tremendous sensation, and it was thought at first that the days of permanent fortification were over. Magazine casemates were destroyed by a single shell, and revetment walls were overturned and practicable breaches made by two or three shells falling behind them. It must be remembered, however, that the works were not adapted to meet this kind of fire. The casemates had enough earth over them to tamp the shell thoroughly, but not enough to prevent it from coming into contact with the masonry, and the latter was not thick enough to resist the explosion of the big charges. Other experiments were made in the same direction in Germany, Holland, Belgium and Austria. The Germans used shell containing from 60 to 130 ℔ of high explosive.

After the first alarm had subsided foreign engineers set about adapting their works to meet the new projectiles. Revetments were enormously strengthened, and designed so that their weight resisted overturning. Concrete roofs were made from 6 to 10 ft. thick, and in many cases the surface of the concrete was left bare so as to expose a hard surface to the shell without any earth tamping. The idea of cupolas and shielded guns gained ground, and is now practically accepted all over the continent of Europe. In many cases the main armament, in some only the safety armament (see below), is in cupolas in the forts.

But meanwhile Europe had been flooded with literature on the subject, and the whole policy of fortification as well as its minutest details were discussed *ab ovo*. The extremists of both sides revelled in their opportunity. Some declared that, with the use of heavy guns and armour, fortresses could be made stronger than ever. Others held that modern fortresses were far too expensive, that their use led to strategic mistakes, and (arguing from certain well-known examples) that extemporized field defences could offer as good a resistance as permanent works.



• Shelters
Batteries
Armoured Batteries
⊙ Forts in Construction
. Heights in metres
Plesnois
Amanvillers
Fort Saulny
Saulny
St. Maurice Ferme
Montigny la Grange
St. Vincent Ferme
la Folie
Woippy
Ft. Kameke
Lorry Work
Lorry-devant-Metz
Ladonchamps
from Thionville
Ft. Hindersin
Thury
St. Eloy
M. Neuve
Moselle
Chieulles
Vany
Failly
to Bouzonville
Chatillon
Grimont Ch.
Ft. Manteuffel
Noully
Mey
St. Julien-les-Metz
Leipzig
Fort Alvensleben
Schwerin Work
Devant les Ponts
Plappeville
Ft. Voigtz Retz
I. Chambière
Miollis Lunette
Vallières
Vantoux
Moscou Ferme
Chatel St. Germain
Lessy
Mt. St. Quentin
Ft. Manstein
Ft. Frederic Charles
Ban St. Martin
I. du Saulcy
Ft. Steinmetz
Bellecroix
to Sarrelouis
to Sarrebruck
St. Hubert Aub.
from Paris
le Point du Jour
Point du Jour Fort
Scy
METZ
I. St. Simphorien
Longueville -les Metz
Lun. de Montigny
les Bordes
Ft. Zastrow
Sébastopol Farm
Plantières
Borny
Colombey
Rozerieulles
Moulins-les-Metz
Canal Battery
Ste. Ruffine
Montigny
Lunette d'Arçon
Ft. du Pâté
le Sablon
Queuleu
Seille
Jussy
Bac
Grigy
Ft. Goeben
Vaux
Infantry Work
Jerusalem Battery
la Horgne
au Sablon
Bradin Ferme
la Hte. Bevoye
la Bse. Bevoye
Mercy-les-Metz
Barrage
Tournebride
Ft. Prinz Auguste von Wurtemberg
Blory Ferme
Frescaty
Peltre
Ars-sur-Moselle
from Gravelotte
la Grange aux Ormes
Magny sur Seille
R. de St. Pierre
Jury
Fort Gorgimont
Orly Ferme
Drill Ground
Ancy sur Moselle
from Frouard
Jouy-aux-Arches
Augny
to Château Salins
to Nomeny
to Strasbourg
Marly-sur-Seille
Chesny
Fort Haeseler
Scale of Miles
1 ½ 0 1 2
Emery Walker sc.

From Plessix and Legrand's *Manuel complet de la fortification*, by permission.

Fig. 44.—Metz in 1899.

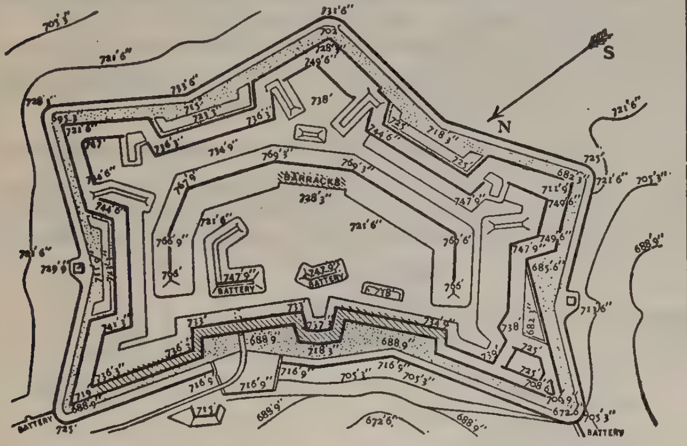
European military opinion generally is now more or less agreed on the following lines:—

1. Important places must be defended by fortresses.
2. Their girdle of forts must be far enough out to prevent the bombardment of the place.
3. An enceinte is desirable, but need not be elaborate.
4. A few guns (called "safety armament") should be in the forts, and these must be protected by armour.
5. The bulk of the artillery of the defence should be outside the forts; the direct-fire guns preferably in cupolas, the howitzers in concealed positions.
6. The forts should be connected by lines of entrenched infantry positions and obstacles, permanent bomb-proof shelters being provided for the infantry.
7. There should be ample communications—radial and peripheral—between the place and the forts, both by road and rail.
8. Special lines of communication—such as mountain passes—should be closed by barrier forts.

These considerations will now be taken somewhat more in detail, but first it will be useful to deal with the plan of Metz in 1899 (fig. 44).

Metz.

Here the fortifications of successive periods can be readily recognized. First the old enceinte, unaltered by the Germans and now *déclassée*. Next the detached forts, begun by the French engineers in 1868 and still unfinished in 1870, can be readily recognized by their bastioned trace. Among them are Fort Manteuffel, formerly St Julien, and Fort Goeben (fig. 45), formerly Queuleu. These were not altered in their general lines.



From Plessix and Legrand's *Manuel complet de la fortification*, by permission.

FIG. 45.—Fort Goeben, Metz.

This early line of detached forts, less than 3000 yds. from the enceinte, was completed by the Germans with forts of polygonal type such as Fort Prinz August. The hill of St Quentin (fig. 46), a very important point, was converted into a fortified position, with two forts and connecting parapets, and a communication running north to Fort Alvensleben.

The arrangement of wing batteries in connexion with the forts can be clearly noted at Fort Manteuffel. These are reinforced by other batteries either for the defence of the intervals or to dominate important lines of approach such as the valley of the Moselle (canal battery at Montigny). To these were added later armoured batteries.

There are also infantry positions, shelters and magazines in connexion with this line.

Finally some new forts of modern type were commenced in 1899 at about 9000 yds. from the place.

Fortresses.

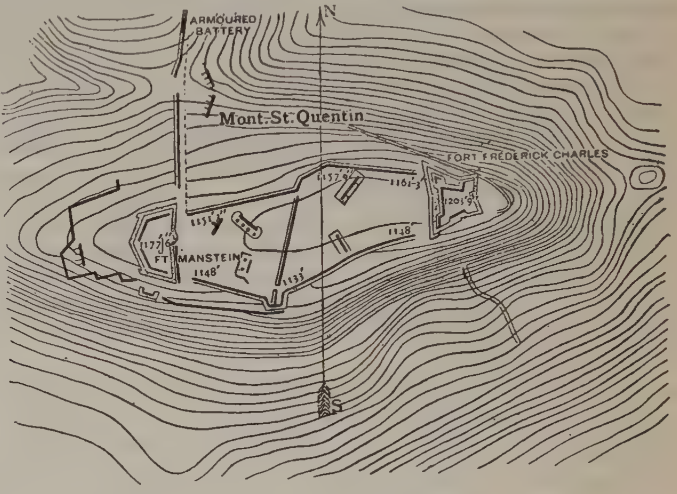
Leaving out of consideration at present the strategic use of groups of fortresses, the places which, as mentioned above, are intrinsically worth being defended as fortresses are:—

(*a*) Centres of national, industrial or military resources.
(*b*) Places which may serve as *points d'appui* for manœuvres.
(*c*) Points of intersection of important railroads.
(*d*) Bridges over considerable rivers.
(*e*) Certain lines of communication across a frontier.

Examples of (*a*) are Paris, Antwerp, Lyons, Verdun. Again for (*a*) and (*b*), as is pointed out by Plessix and Legrand, Metz in the hands of the Germans may serve both as a base of supplies and a *point d'appui* for one flank. Strassburg is a bridge-head giving the Germans a secure retreat across the Rhine if beaten in the plains of Alsace, and an opportunity of resuming the offensive when they have re-formed behind the river.

The ring of detached forts.

The distance of detached forts from the place depends on the range of the siege artillery and the distance at which it can usually be established from the forts, and is variously given by different continental writers at from 4 to 9 km. (4500 to 10,000 yds.). The bombarding range of siege howitzers with heavy shells is considered to be about 8000 yds., and if it is possible for them to be emplaced within say 2000 yds. of the forts, this would give a minimum distance of 6000 yds. from the forts to the body of the place. Some writers extend the minimum distance to 7 km., or nearly 8000 yds. In practice, however, it must happen that the position of the forts is determined to a very large extent by the lie of the ground. Thus some good positions for forts may be found within 4000 or 5000 yds. of the place, and no others suitable on the same front within 15,000 yds. In that case the question of expense might necessitate choosing the nearer positions. Some examples of the actual distances of existing forts have already been given. Others, more recent, are, at Bucharest 7-10 km., Lyons 8-10½, Copenhagen 7-8 and Paris 14-17. *Strategic pivots* are in a different category from other fortresses. While not necessarily protected from bombardment, they may yet have one or two forts thrown out from 9 to 12 km., to get advantage of ground. Such are Langres, Epinal and Belfort.



From Plessix and Legrand's *Manuel complet de la fortification*, by permission.

FIG. 46.—St Quentin position, Metz.

The Enceinte.—The desirability of this is almost universally allowed; but often it is more as a concession to tradition than for any solid reason. The idea is that behind the line of forts, which is the main defensive position, any favourable points that exist should be provisionally fortified to assist in a "step-by-step" defence: and behind these again the body of the place should be surrounded by a last line of defence, so that the garrison may resist to the last moment. It may be remarked that apart from the additional expense of an enceinte, such a position would not, under modern conditions, be the most favourable for the last stages of a defence. Again, there is the difficulty that it is practically impossible to shut in a large modern town by a continuous enceinte. It has been proposed to construct the enceinte in sections in front of the salient portions of the place. This system of course abandons several of the chief advantages claimed for an enceinte.

In actual practice enceintes have been constructed since 1870 in France and other countries, consisting of a simple wall 10 or 12 ft. high with a banquette and loopholes at intervals. This of course can only be looked upon as a measure of police. For war purposes, in face of modern artillery, it is a *reductio ad absurdum.*

The Safety Armament.—If the bulk of the artillery is to be placed in positions prepared on the outbreak of war, it is considered very necessary that a few heavy long-range guns should be permanently in position ready at any moment to keep an enemy at a distance, forcing him to open his first batteries at long range and checking the advance of his investment line. Such guns would naturally be in secure positions inside the forts, and if they are to be worked from such positions they must have armour to shield them from the concentrated fire of the numerous field artillery that a besieger could bring to bear from the first.

Artillery outside the forts constitutes the most important part of the defence, and there is room for much discussion as to whether it should have positions prepared for it beforehand

The question of artillery positions.

or should be placed in positions selected as the attack develops itself. On the one hand the preparation of the positions beforehand, which in many cases means the use of armour and concrete, increases very largely the initial expense of the defence, and ties the defender somewhat in the special dispositions that become desirable once the attack has taken shape. Moreover, such expenditure must be incurred on all the fronts of the fortress, whereas the results would only be realized on the front or fronts actually attacked. On the other hand much time and labour are involved in emplacing heavy and medium artillery with extemporized protection, and this becomes a serious consideration when one remembers how much work of all kinds is necessary in preparing a fortress against attack. Again, to avoid the danger of a successful attack on the intervals between the forts before their defences have been fully completed, the fire of the guns in the intermediate positions might be urgently required. The solution in any given case would no doubt depend on the importance of the place. In most cases a certain amount of compromise will come in, some preparation being made for batteries, without their being completed. Armoured batteries of whatever kind must in any case be prepared in peace time. It should not be overlooked that as, whatever theories may exist about successive lines of defence, the onus of the defence will now lie on the fort line, just as it formerly did on the enceintes, so that line should be fully prepared, and should not have to commence its fight in a position of inequality.

Defence of Intervals of Forts.—The frontal fire of the batteries in the intervals and the flanking fire of some of the guns in the forts will play an important part, but the main reliance should be on infantry defence. A fully prepared fortress would have practically a complete chain of infantry fighting positions and obstacles between the forts, at all events on the fronts likely to be seriously attacked. The positions would consist largely of fire trenches, with good communications; but it is pretty generally recognized that there must be some *points d'appui* in the shape of redoubts or infantry forts, and also bomb-proof shelter for men, ammunition and stores near the fighting line. This is usually included in the redoubts. If they are to resist the heaviest shell, such shelters must be built in peace time.

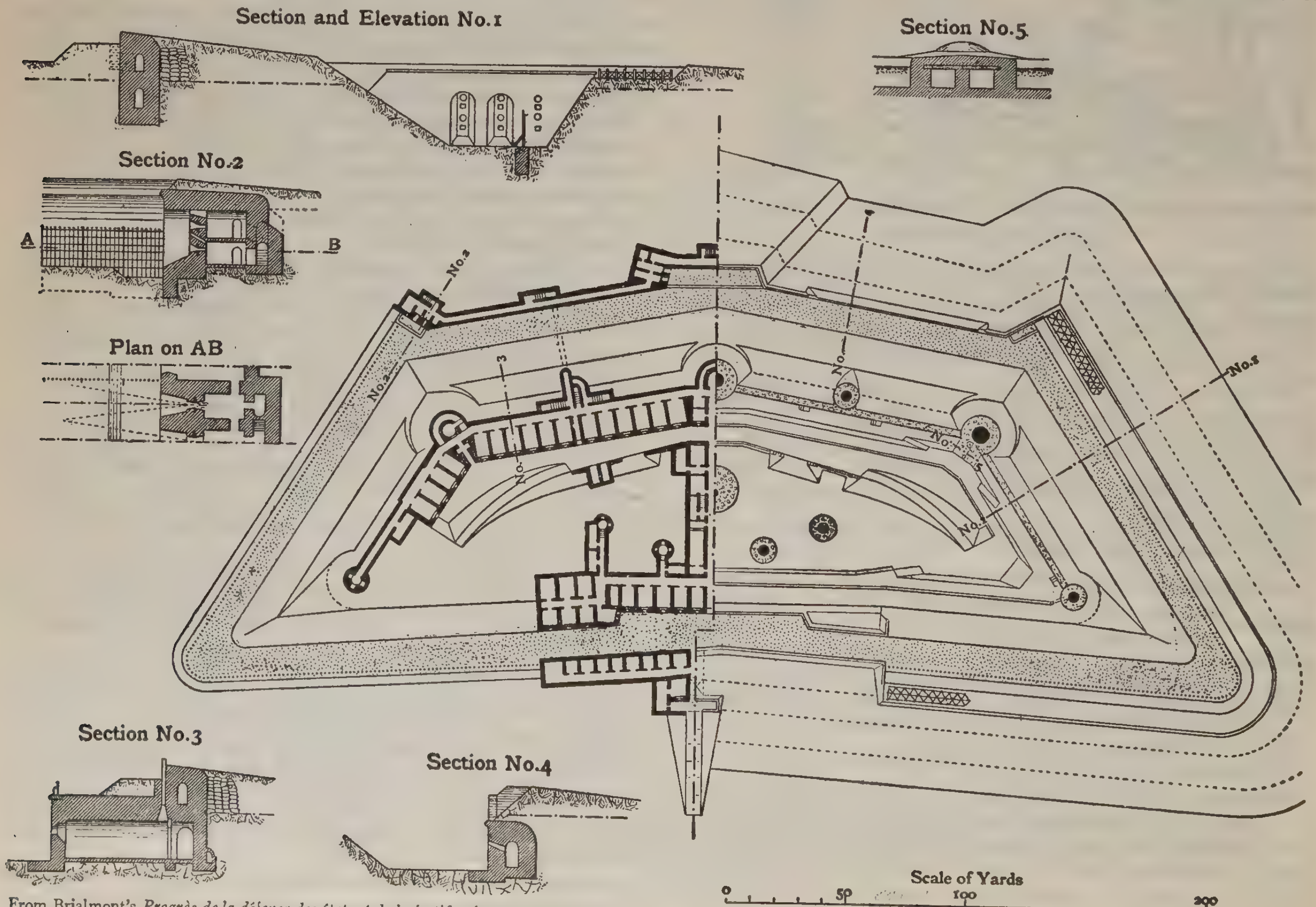
Communications are of the first importance, not merely to facilitate the movement of the enormous stores of ammunition and materials required in the fighting line, but also that defenders may fully utilize the advantage of acting on interior lines. They should include both railways and roads running from the centre of the place to the different sectors of defence, and all round, in rear of the line of forts; also ample covered approaches to the fighting line. Concealment is essential, and where the lie of the ground does not help, it must be got from earth parapets or plantations.

Barrier forts.

The principal use of barrier forts is in country where the necessary line of communication cannot be easily diverted. For instance, in a comparatively flat country a barrier fort commanding a road or railway is of little use because roads may be found passing round it, or a line of railway may be diverted for some miles to avoid it. But in mountainous country, where such diversion is impossible, it will be necessary for the enemy to capture the fort before he can advance; and the impossibility of surrounding it, the few positions from which siege artillery can be brought into play, and the fact that there is practically only one road of approach to be denied, make these positions peculiarly suitable for forts with armoured batteries. Italy makes considerable use of such forts for the defence of frontier passes.

General Brialmont's Theoretical Claim for the Defence of a Country.—Before going into details, it is worth while to state the full claim of strategic fortification advanced by General Brialmont, the most thorough of all its advocates. It is as follows:—

A. Fortify the capital.
B. Fortify the points where main lines of communication pass a strategic barrier.
C. Make an entrenched camp at the most important centre of communication in each zone of invasion: and support it by one or two places arranged so as to make a fortified district.



From Brialmont's *Progrès de la défense des états et de la fortification permanente depuis Vauban*, by permission of M. le Commandant G. Meeûs.

FIG. 47.

D. Close with barrier forts the lines necessary to an enemy across mountains or marshes.

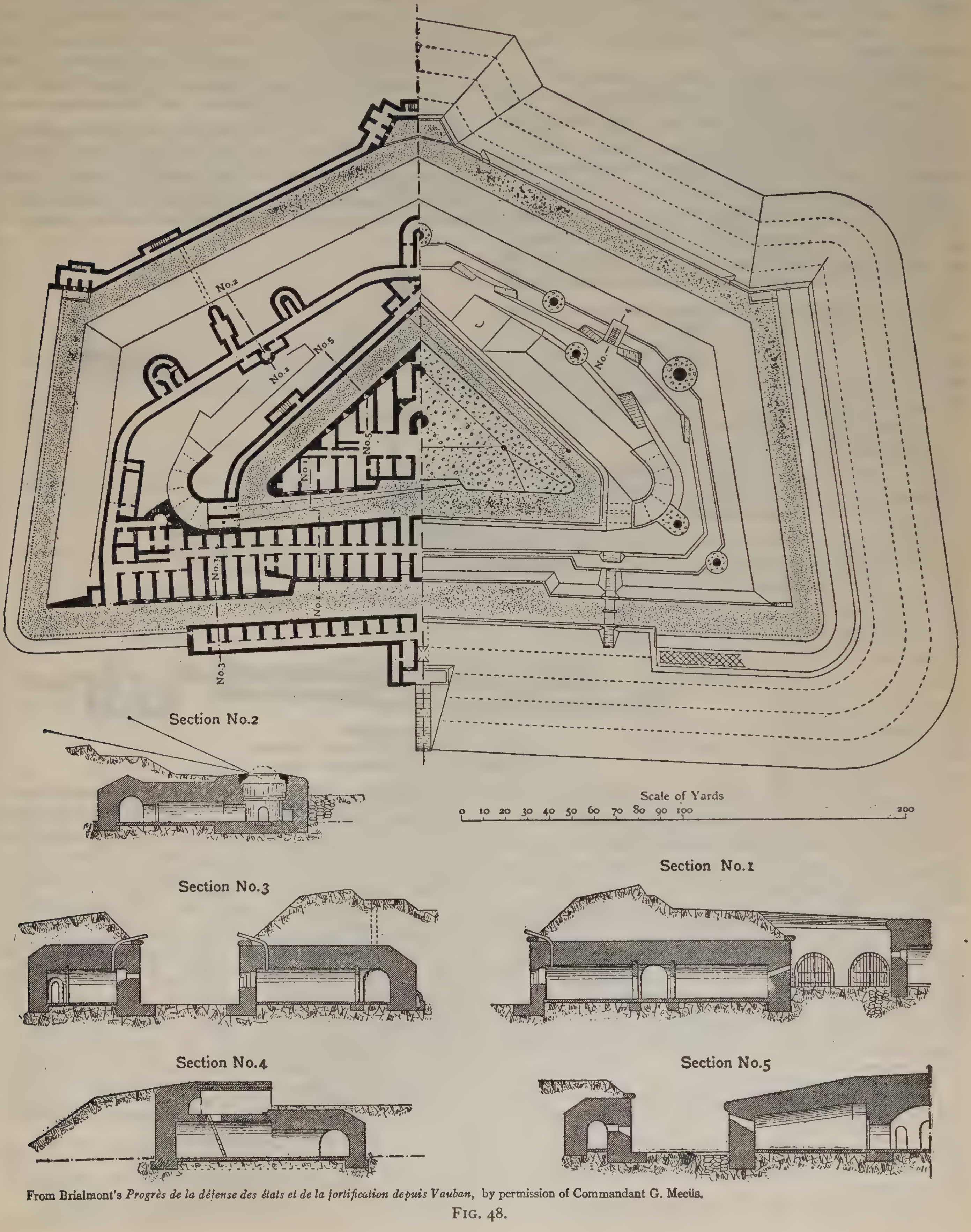
E. Make a central place behind a mountain chain as a pivot for the army watching it.

F. Defend mountain roads by provisional fortifications.

G. Make a large place in each theatre of war which is far from the principal theatre, and where the enemy might wish to establish himself.

H. Fortify coasts and harbours.

Objections to these proposals will be readily supplied by the


No.1
No.2
No.3
No.4
No.5
Section No.2
Scale of Yards
0 10 20 30 40 50 60 70 80 90 100 200
Section No.3
Section No.1
Section No.4
Section No.5

From Brialmont's *Progrès de la défense des états et de la fortification depuis Vauban*, by permission of Commandant G. Meeüs.

FIG. 48.

officials of the national treasury and the commanders-in-chief of the active armies.

Types of detached forts.

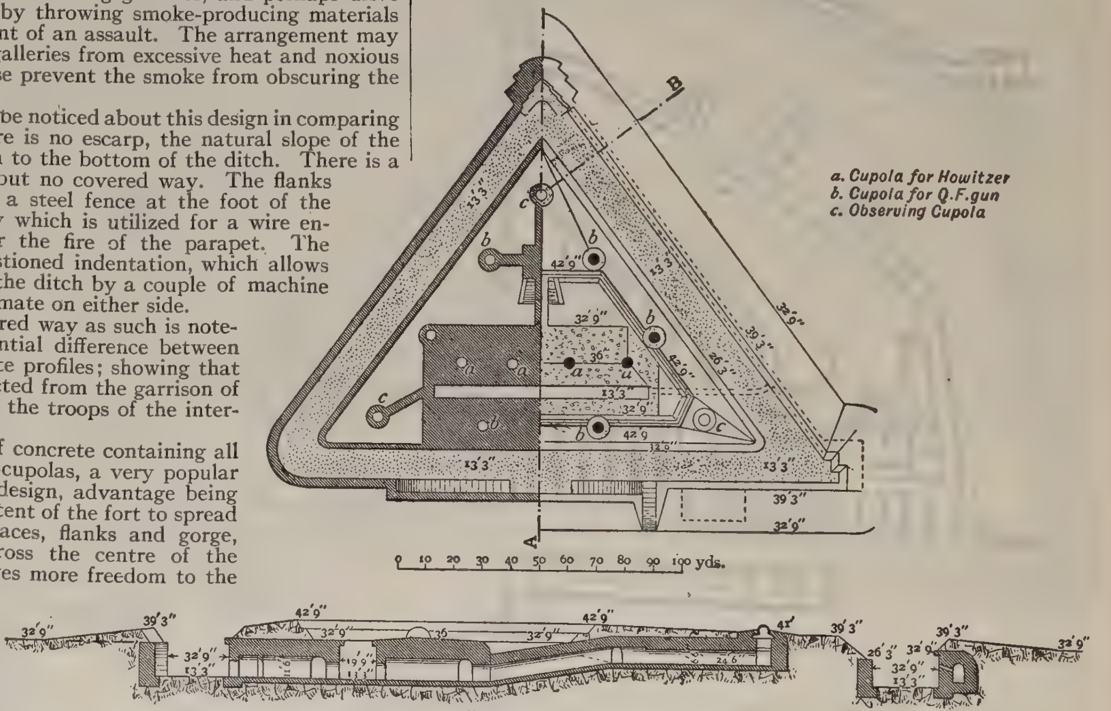
So many types of detached forts have been proposed by competent authorities, as well as actually constructed in recent years, that it is impossible here to consider all of them, and a few only will be reproduced of those which are most representative of modern continental thought.

Taking first the type of heavily armed fort, which contains guns for the artillery fight as well as safety armament, we must give precedence to General Brialmont. The two works here shown are taken from the *Progrès de la défense des états, &c.*, published in 1898. The pentagonal fort (fig. 47) has two special features. In section 1 is shown a concrete infantry parapet, with a gallery in which the defenders of the parapet may take shelter from the bombardment preceding an assault. In section 2 it will be seen that the counterscarp galleries flanking the ditch are drawn back from the face of the counterscarp. This is to counteract proposals that have been made to obscure the view from the flanking galleries, and perhaps drive the defenders out of them by throwing smoke-producing materials into the ditch at the moment of an assault. The arrangement may save the occupants of the galleries from excessive heat and noxious fumes, but will not of course prevent the smoke from obscuring the view.

The following points may be noticed about this design in comparing it with earlier types. There is no escarp, the natural slope of the rampart being carried down to the bottom of the ditch. There is a counterscarp to the faces, but no covered way. The flanks have no counterscarp, but a steel fence at the foot of the slope, and the covered way which is utilized for a wire entanglement which is under the fire of the parapet. The gorge has a very slight bastioned indentation, which allows for an efficient flanking of the ditch by a couple of machine guns placed in a single casemate on either side.

The abolition of the covered way as such is noteworthy. It marks an essential difference between the fort and the old enceinte profiles; showing that offensive action is not expected from the garrison of the fort, and is the duty of the troops of the intermediate lines.

The great central mass of concrete containing all the casemates and the gun-cupolas, a very popular feature, is omitted in this design, advantage being taken of the great lateral extent of the fort to spread the casemates under the faces, flanks and gorge, with a communication across the centre of the fort. This arrangement gives more freedom to the disposition of the cupolas. The thickness of the concrete over the casemate arches is more than 8 ft. Communication between the faces and the counterscarp galleries is obtained by posterns under the ditch. The armament, which is all protected by cupolas, is powerful. It consists of two 150-mm. (6 in.) guns, four 120-mm. (4·7 in.) guns, two 210-mm. (8·4 in.) howitzers, two 210-mm. (8·4 in.) mortars, four 57-mm. Q.F. guns for close defence. There is also a shielded electric light projector in the centre.



Section on AB.

From Brialmont's *Progrès de la défense des états, &c.*, by permission of Commandant G. Meeüs.

FIG. 49.—Fort Molsheim, Strassburg.

This fort is a great advance on General Brialmont's designs before 1885. These were marked by great complexity of earth parapets and various *chicanes* which would not long survive bombardment. This type is simple and powerful. It is also very expensive.

The second Brialmont fort (fig. 48) is selected because it shows a keep or citadel, an inner work designed to hold out after the capture of the outer parapet. General Brialmont held strongly to the necessity of keeps for all important works. History of course gives instances of citadels which have enabled the garrison to recapture the main work with assistance, or caused a really useful delay in the progress of the general attack. It affords still more instances in which the keeps have made no resistance, or none of any value. Some think that the existence of a keep encourages the defenders of the main work; others that it encourages the idea of retreat. The British school of thought is against keeps. In any case they add largely to expense.

In the present design the keep is a mass of concrete, which depends for the defence of its front ditches on counterscarp galleries in the main work, the few embrasures for frontal defence being practically useless. Its main function is to prevent the attackers from establishing themselves on the gorge, thus leaving the way open for a reinforcement from outside to enter (assisted by bamboo flying bridges) through the passages left for the purpose in the outer and inner gorge parapets.

As regards the main work, the arrangements for defence of the ditch and the armament are similar to the design last considered. This parapet has no concrete shelter for the defenders. The casemates are all collected in the keep and the gorge, with a passage all round giving access to the parapet and the cupolas.

Fig. 49 is a German work, Fort Molsheim at Strassburg. This is a simple type of triangular fort. The main mass of concrete rests on the gorge, and is divided by a narrow courtyard to give light and air to the front casemates. The fort has a medium armament for the artillery fight, consisting of four 6-in. howitzers in cupolas. On each face are two small Q.F. guns in cupolas for close defence, for which purpose, it will be seen, there is also an infantry parapet. At the angles are look-out turrets. The ditch has escarp and counterscarp, and is defended by counterscarp galleries at the angles. There is no covered way. The thickness of concrete over the casemates, where it is uncovered, is about 10 ft.

Fig. 50 is Fort Lyngby at Copenhagen. The new Copenhagen defences are very interesting, giving evidence of clear and original thought, and effectiveness combined with economy. There is one special feature worth noting about the outer ring of forts, of which Lyngby is one. These works are intended for the artillery fight only, their main armament being four 6-in. guns (in pairs) and three 6-in. howitzers, all in cupolas. The armament for immediate defence is trifling, consisting of only two 57-mm. guns and a machine-gun. There is no provision for infantry defence. The ditch has no escarp or counterscarp, and is flanked by counterscarp galleries at the salient.

It is usual in the case of works so slightly organized for their own defence, and intended only for the long-range artillery fight, to withdraw them somewhat from the front line. The Danish engineers, however, have not hesitated to put these works in the very front line, some 2000 metres in front of the permanent intermediate batteries. The object of this is to force the enemy to establish his heavy artillery at such long ranges that it will be able to afford little assistance to the trench attack of the infantry. The intermediate batteries, being withdrawn, are comparatively safe. They therefore do not require expensive protection, and can reserve their strength to resist the advance of the attack. The success of this arrangement will depend on the fighting strength of the cupolas under war conditions; and what that may be, war alone can tell us.

In the details of these works, besides the bold cutting down of defensive precautions, we may note the skilful and economical use of layers of large stones over the casemates to diminish the thickness of concrete required. The roofs of the casemates are stiffened underneath with steel rails, and steel lathing is used to prevent lumps of concrete from falling on the occupants. The living casemates look out on the gorge, getting plenty of light and air, while the magazines are under the cupolas.

The forts above described are all armed with a view to their taking an important part in the distant artillery fight. The next type to be considered (fig. 51) is selected mainly because it is a good example of the use of concealed flanking batteries, known on the continent as *batteries traditores*, which seem to be growing in popularity.

This design by Colonel Voorduin of the Dutch engineers has a

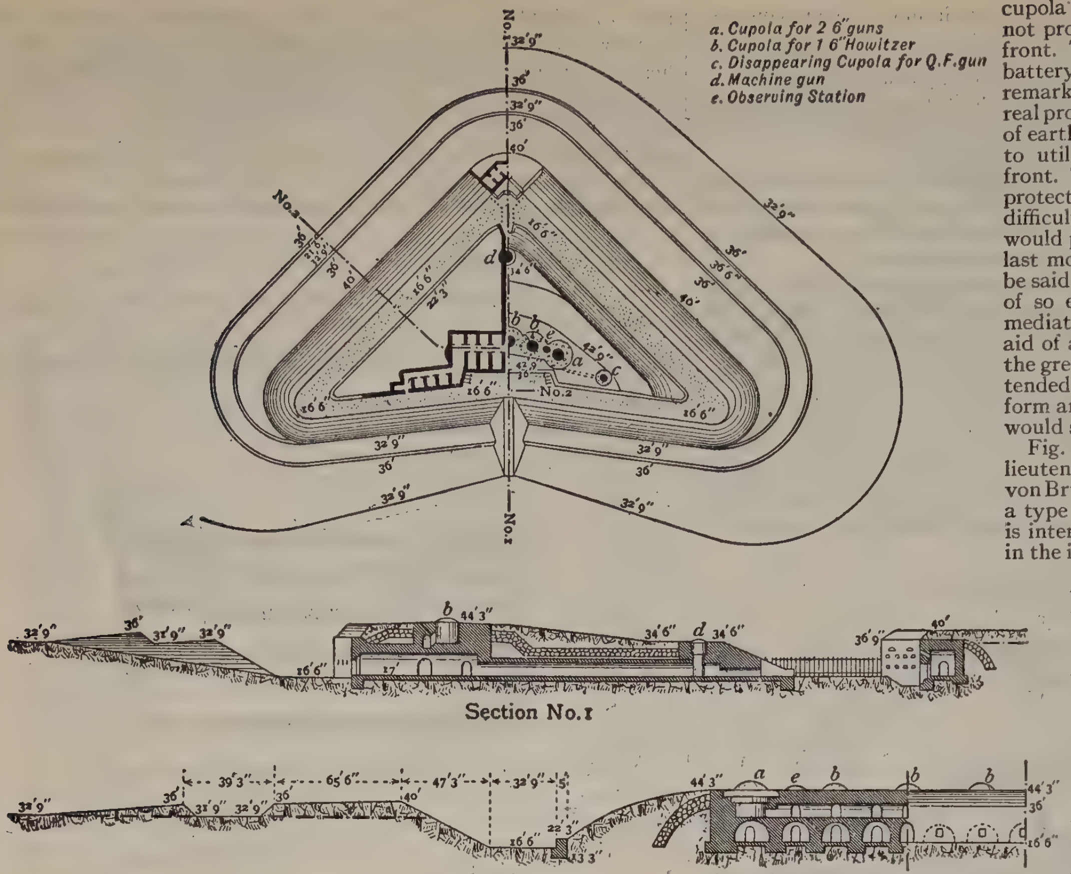


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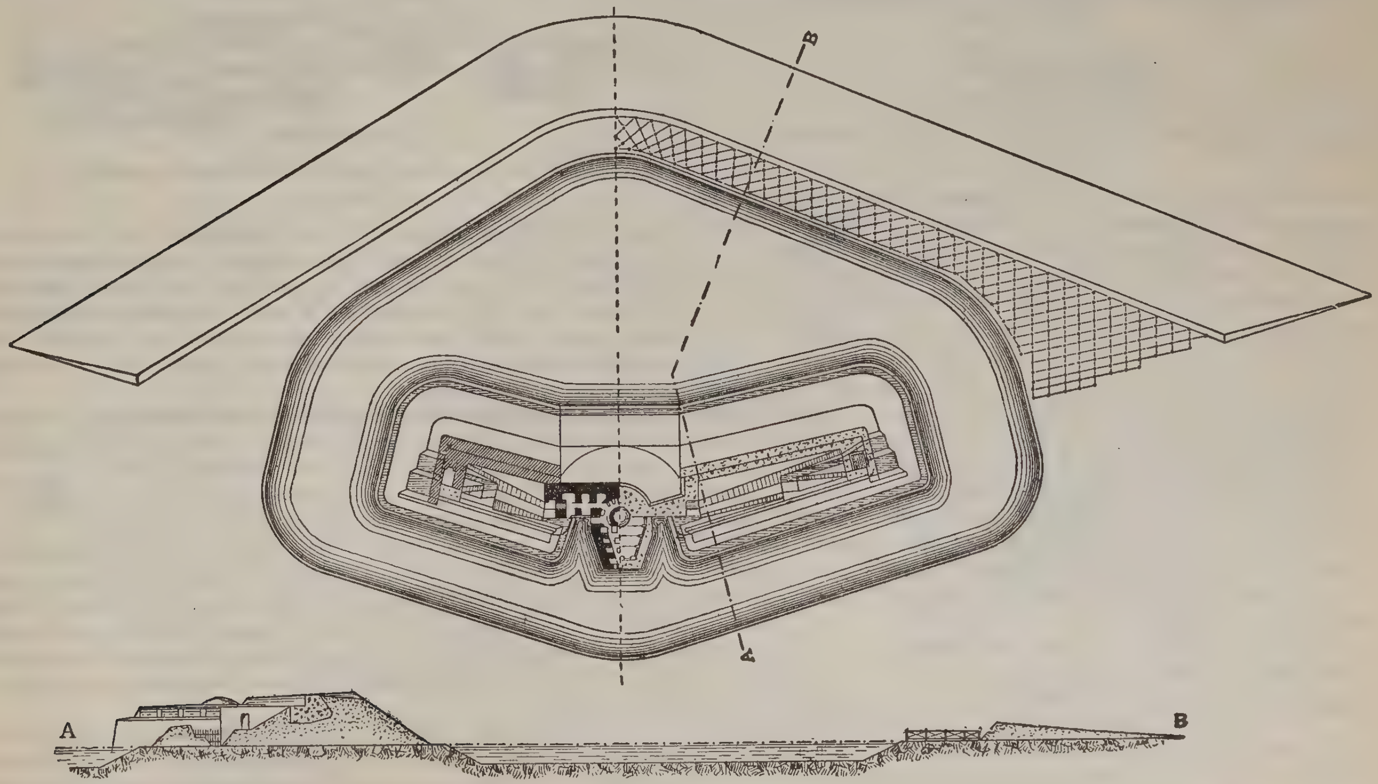
Fig. 50.—Fort Lyngby, Copenhagen.

medium armament, which is not intended for the artillery duel, but to command the immediate front of the neighbouring forts and the intervals. The fort is long and narrow, with small casemate accommodation. It contains eight 4·7-in. guns. Two of these are in a cupola concealed from view, though not protected, by a bank of earth in front. The other six are in an armoured battery behind the cupola. It may be remarked that as the cupola gets no real protection from the covering mass of earth, it would be better to be able to utilize the fire of its guns to the front. The *batterie traditore*, if properly protected overhead, would be very difficult to silence, and its flanking fire would probably be available up to the last moment. There is very much to be said both for and against the policy of so emplacing the guns. The immediate defence of the work, with the aid of a broad wet ditch, is easy; but the great mass of concrete, which is intended to form an indestructible platform and breastwork for the infantry, would seem to be a needless expense.

Fig. 52, designed by the Austrian lieutenant field-marshal Moritz Ritter von Brunner (1839–1904), is selected as a type of the intermediate fort which is intended only to be a strong point in the infantry line of defence between the main forts. It has a protected armament, but this, which consists only of four small Q.F. guns in cupolas, is for its own defence, and not to take part in the artillery duel. There is also a movable armament of four light Q.F. guns on wheels, for which a shelter is provided between the two observatory cupolas. The garrison would be a half company of infantry, for whom casemates are provided in the gorge. The gorge ditch is flanked by a caponier, but there is no flank defence for the front ditch. This is defended by a glacis parapet. At the bottom of the ditch is a wire entanglement and the glacis slope is planted with thorns. The thickness of concrete on the casemates is 2 metres (6 ft. 7 in.). This is a strong and simple form of infantry work, but considering its rôle it appears to be needlessly expensive.



From Leithner's *Beständige Befestigung*.

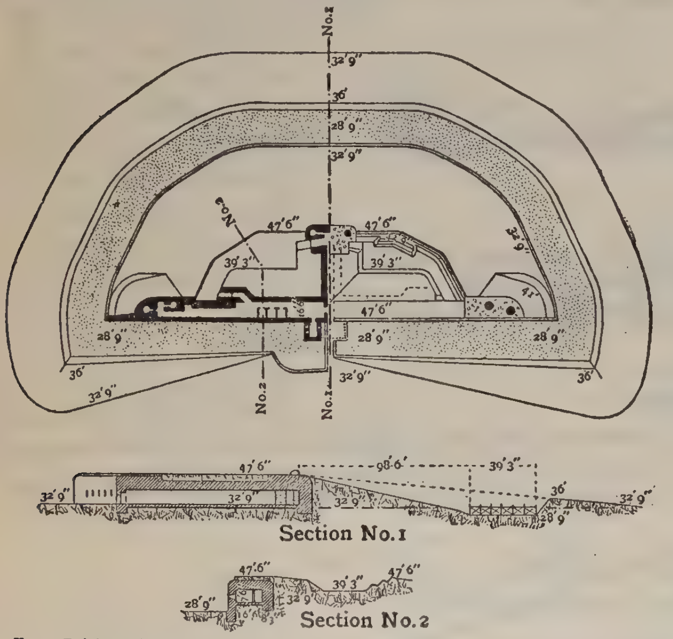
Fig. 51.

Fig. 53 is an Italian type of barrier fort in mountainous country. A powerful battery of eight medium guns protected by a Gruson shield commands the approach. The fort with its dwelling casemates is surrounded by a deep ditch flanked by counterscarp galleries. There are certain apparent weaknesses in the type, but the difficulties of the attack in such country and its limitations must be borne in mind.

Modern Details of Protection and Obstacle.—After considering the above types of fort, it will be of use to note some of the details in which modern construction has been modified to provide against the increasing power of artillery.

Bomb-proof protection.

The penetration of projectiles varies according to the nature of the soil—the lighter the better for protection. Sand offers the greatest resistance to penetration, clay the least. Since, however, the penetration of heavy shells fired from long ranges with high elevation may be 20 ft. or more in ordinary soil, we can no longer look to earth alone as a source of protection against bombardment. Again a moderate quantity of earth over a casemate increases the explosive effect of a shell by "tamping" it, that is by preventing the force of the explosion from being wasted in the open air.



From Brialmont's *Progrès de la défense des états, &c.*, by permission of Commandant G. Meeüs.

FIG. 52.

We find therefore that in most modern designs the tops of casemates are left uncovered, or with only a few inches of earth over them, in which grass may be grown for concealment.

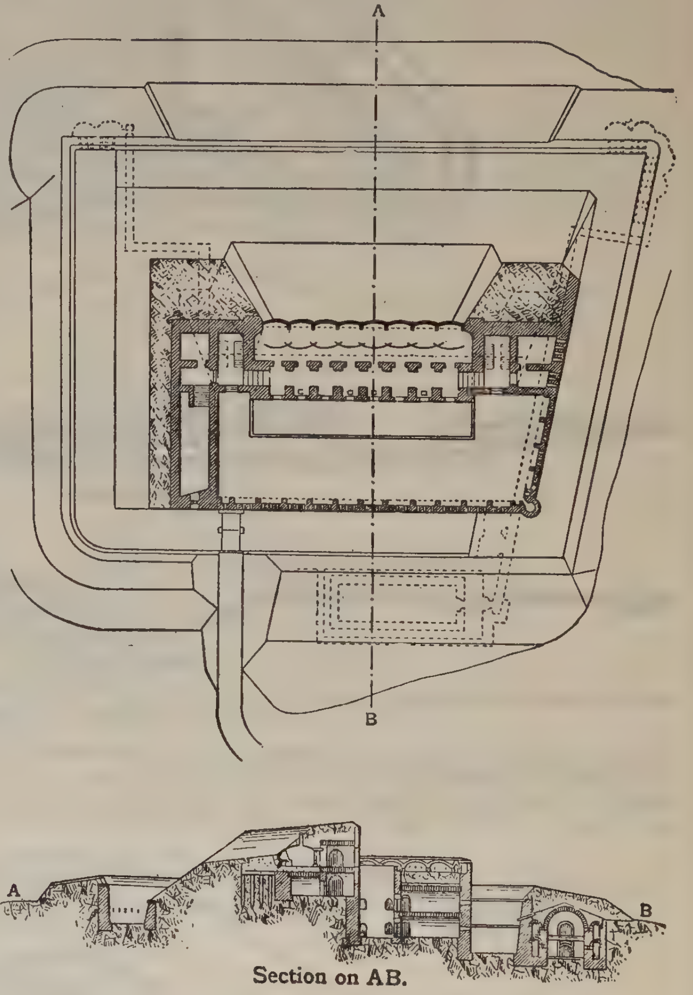
For the materials of casemates and revetment walls exposed to fire, concrete (*q.v.*) has entirely replaced masonry and brickwork, not because of its convenience in construction, but because it offers the best resistance. The exact composition of the concrete is a matter that demands great care and knowledge. It should be, like an armour plate, hard on the surface and tough within. The great thickness of 10 ft. of concrete for casemate arches, very generally prescribed on the continent in important positions, is meant to meet the danger of several successive shells striking the same spot. To stop a single shell of any siege calibre in use at present, 5 ft. of good concrete would be enough. A good deal is expected from the use of "reinforced concrete" (that is concrete strengthened by steel) both for revetment walls and casemates.

Parapets.

Parapets are frequently made continuous or glacis-wise, that is the superior slope is prolonged to the bottom of the ditch so that the whole rampart can be swept by the fire of the defenders from the crest, and there is no dead ground in front of it. It is also common to build the crest of the parapet in solid concrete, with sometimes a concrete banquette, so that bombardment shall not destroy the line the defenders have to man in repelling an assault. This concrete parapet may be further reinforced by hinged steel bullet-proof plates, to give head cover; which when not in use hang down behind the crest.

Obstacles.

The escarp is falling into disfavour, on account of the great expense of a revetment that can withstand breaching fire. A counterscarp of very solid construction is generally used. It is low and gives cover to a wire entanglement in the ditch. This may be supplemented by a steel unclimbable fence, and by entanglements or thorn plantations on the covered way and the lower slopes of the parapet. Entanglements are attached to steel posts bedded in concrete. The upper parts of revetments and the foundations of walls are protected against the action of shells, that falling steeply might act as mines to overturn them, by thick aprons of large stones. Fig. 54 shows most of these dispositions.



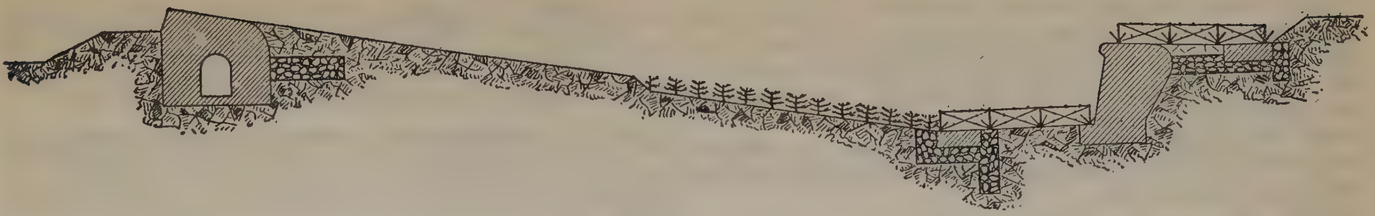
From General Rocchi's *Traccia per lo studio della fortificazione*, by permission.

FIG. 53.

Search-lights.

Electric search-lights are now used in all important works and batteries. They are usually placed in disappearing cupolas. They are of great value for discovering working parties at night, and lighting up the foreground during an attack; and since only the projector need be exposed, they are not very vulnerable. Their value, however, must not be over-estimated. The most powerful search-light can in no way compare with daylight as an illuminant, and, like all other mechanical contrivances, they have certain marked drawbacks in war. They may give rise to a false confidence; an important light may fail at a critical moment; and in foggy weather they are useless.

The use of armour (see also ARMOUR-PLATES) for coast batteries followed closely upon its employment for ships, for those were the days of short ranges and close fighting, and it seemed natural not to leave the battery in a position of inferiority to



From Deguise's *La Fortification permanente*, by permission of J. Polleunis.

FIG. 54.

the ship in the matter of protection. In England the coast battery for a generation after the Crimean War was a combination of masonry and iron; and in 1860 Brialmont employed armoured turrets at Antwerp in the forts which commanded the Scheldt. For land defence purposes, however, engineers were very slow to adopt armour. Apart from all questions of difficulty of manufacture, expense, &c., the idea was that sea and land fronts were radically different. It was pointed out that a ship gun, fired from an unsteady platform, had not enough accuracy to strike repeated blows on the same spot; so that a shield which was strong enough to resist a single shot would give complete protection. A battery on a land front, on the other hand, was exposed to an accurate fire from guns which could strike successive blows on the same spot, and break down the resistance of the strongest shield. But in time continental opinion gradually began to turn in favour of iron protection. Practical types of disappearing and revolving cupolas were produced, and many engineers were influenced in their favour by the effect of the big high-explosive shell. Eventually it was argued that, after all, the object of fortification is not to obtain a resisting power without limit, but to put the men and guns of a work in an advantageous position to defend themselves as long as possible against a superior force; and that from this point of view armour cannot but add strength to defensive works.

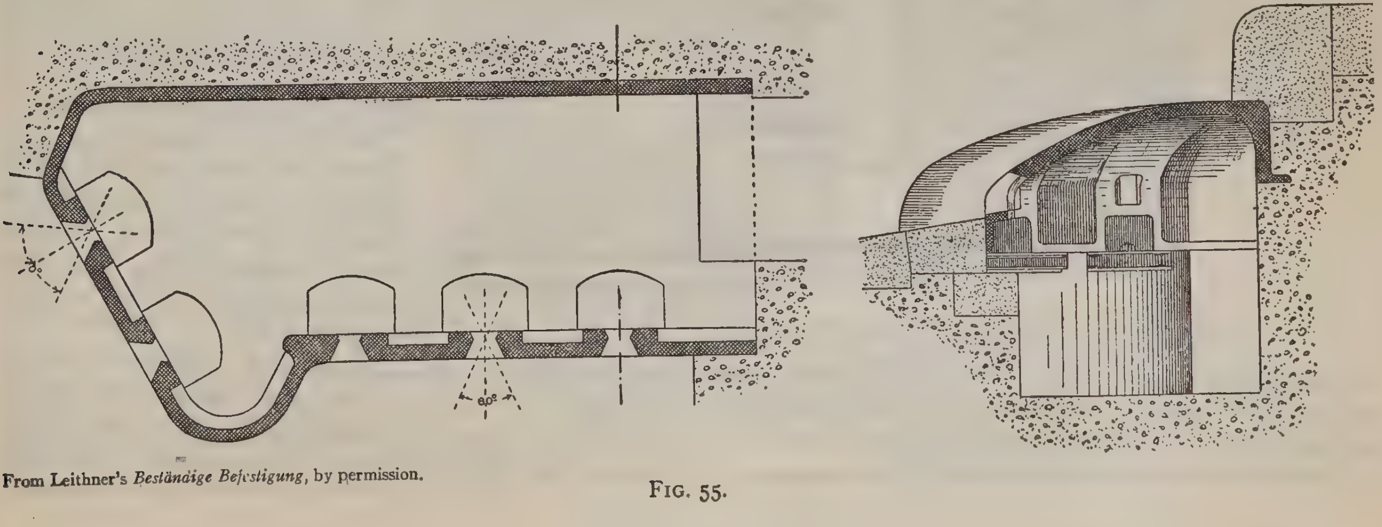
Armour.

The question has of course long passed beyond the stage of theory. Practically every European state uses iron or steel casemates and cupolas. German, Danish, Italian and other types of forts so armed have been shown. Recent French types have not been published, but it is known that cupolas are employed; and Velichko, the Russian authority, long an uncompromising opponent of armour, in the end changed his views. These countries have had to proceed gradually, by improving existing fortresses, and with such resources as could be spared from the needs of the active armies. Among the smaller states Rumania and Belgium have entered most freely into the new way. In England, which is less directly interested, opinion has been led by Sir George Clarke, since the publication in 1890 of his well-known book on fortification. Having witnessed officially the experiments at Bucharest in 1885 with a St Chamond turret and a Gruson cupola, he expressed himself very strongly against the whole system. Besides pointing out very clearly the theoretical objections to it, and the weak points of the constructions under experiment, he added: "The cost of the French turret was about £10,000 exclusive of its armament, and for this sum about six movable overbank guns of greater power could be provided." In view of the weight that belongs of right to his criticisms it is as well to point out that while this remark is quite true, yet the six guns would require also six gun detachments, with arrangements for supply, &c.; a consideration which alters the working of this apparently elementary sum. The whole object of protection is to enable a few men and guns successfully to oppose a larger number.

At the time when Sir George Clarke's first edition came out, such extravagances were before the public as Mougin's fort; "a mastless turret ship," as he called it, "buried up to the deck-level in the ground and manned by mechanics." Such ideas tended to throw discredit on the more reasonable use of armour, but whether the system be right or wrong, it exists now and has to be taken account of. Nowhere has it been applied more boldly than in Rumania. The defences of Bucharest (designed by Brialmont) consist of 18 main and 18 small forts, with intermediate batteries. The main forts are some 4500 yds. apart, and 11,000 to 12,000 yds. from the centre of the place. The typical armament of a main fort is six 6-in. guns in three cupolas (one for indirect fire), two 8·4-in. howitzers in cupolas, one 4·7-in. howitzer in a cupola, six small Q.F. guns in disappearing cupolas. The total armament of the place (all protected) is eighty-six 6-in. guns, seventy-four 8·4-in. howitzers, eighteen 4·7-in. howitzers, 127 small calibre Q.F. guns in disappearing cupolas, 476 small calibre Q.F. guns in casemates for flanking the ditches. The "Sereth Line" will be described later.

Different Forms of Protection: Casemate, Cupola, &c.—The broad difference between casemates or shielded batteries and turrets and cupolas is that the former are fixed while the latter revolve and in some cases disappear. The casemate thus has the disadvantages that the arc of fire of the gun, which has to fire through a fixed embrasure or port-hole, is very limited, and that the muzzle of the gun and the port-hole, the weak points of the system, are constantly exposed to the fire of the enemy. The advantage of the casemate lies in its comparative cheapness and the greater strength of a fixed structure. It is well suited for barrier forts (fig. 53) and other analogous positions; and the Italians amongst other nations have so employed it at such places as the end of the Mont Cenis tunnel. Steel and iron casemates are also useful as caponiers for ditch flanking (fig. 55).

Turrets and Cupolas.—The difference between a turret and a cupola is that the former is cylindrical with a flat or nearly flat top and presents a vertical target; while the latter is a flattened



From Leithner's *Beständige Befestigung*, by permission.

FIG. 55.

dome, the vertical supports of which are entirely concealed. The turret appears to be little used. The object of both forms is at once to give an all-round arc of fire to the guns and to allow of the weak point of the structure, the port-hole and muzzle of the gun, being turned away from the enemy in the intervals of firing. Both usually emerge from a mass of concrete, which is strengthened round the opening by a collar of chilled cast iron about 12 to 15 in. thick.

There are four types of cupolas, viz. (*a*) Disappearing, (*b*) Oscillating, (*c*) Central pivot, (*d*) On roller rings.

Cupolas.

(*a*) Disappearing cupolas are used chiefly for small quick-firing guns, on account of the expense of the various systems. They can be used for medium guns. The details of the best foreign systems are secret. (*b*) The oscillating turret is a Mougin type, in which the turret is supported in the centre by a knife-edge on which it can swing. The oscillation is controlled by powerful springs. The effect of it is that after firing, the front of the cupola with the port-hole swings downwards under cover, and is held there until the gun is ready to fire again. (*c*) Schumann's centre pivot is understood to be approved in Germany. It has been adopted in Rumania and Belgium for howitzer cupolas. It is only suitable for a single piece; *d* is strong and steady—the best cupola for coast batteries; *c* and *d* are best for rapid fire because they can be loaded without lowering. They are suited for long guns.

The following types are illustrated as being generally representative of the different classes of cupola.

Fig. 56 is a section of Messrs Krupp's typical cupola for one 6-in. gun. The shield is of nickel steel, the collar of cast steel. A small space is left between the cupola and its collar to prevent the possibility of the shield jamming after being damaged. The guns are muzzle-pivoting and thickened out near the muzzle by the addition of a ring, so as to close the port as much as possible. The recoil is controlled within narrow limits both to economize space and to prevent the smoke from the muzzle from getting into the cupola. To facilitate the elevation and depression of the gun (with muzzle pivotings the breech has of course to be moved through a much larger arc than with ordinary mountings) it is balanced by a counterweight. The cupola rests on a roller ring and is traversed by a winch. It can be turned through a complete circle in about one minute.

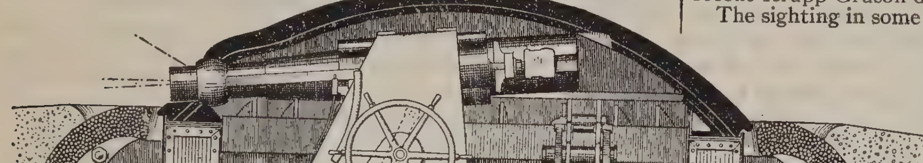


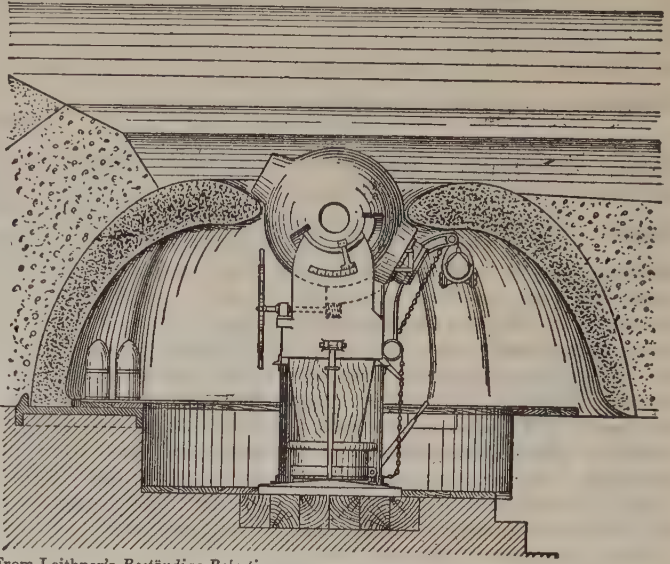
FIG. 56.—Cupola for 6-in. gun (Friedr. Krupp A.G.).

Fig. 57 shows a Schumann shielded mortar (sphere-mortar, *Kugelmörser*). In this case it will be observed that the cupola is replaced by an enlargement of the encircling collar; and the mortar (8·4-in. calibre) is enclosed in a sphere of cast iron, so as to close completely the opening of the collar in any position.

Fig. 58 shows a Gruson cupola for one 4·7-in. Q.F. howitzer.

Fig. 59 shows a disappearing turret for an electric light projector.

Fig. 60 shows a Krupp transportable cupola for a 5·7-cm. gun. This is drawn on a four-wheeled carriage, and when coming into action slides on rollers on to a platform in the parapet. It weighs about 2½ tons, and with carriage and platform about 4 tons.



From Leithner's *Beständige Befestigung.*

FIG. 57.—Gruson Spherical Mortar.

The mechanism of these cupolas is for the most part simpler than it appears. Counterweights and hand winches are much in use for the lighter natures of guns. The armouring of course keeps pace with improvements in manufacture. The chilled cast iron first made popular by the Gruson firm is now little used except for such purposes as the collar round a cupola. Wrought iron, steel and compound plates for the tops of cupolas have all been tried, the most recent Krupp-Gruson designs being of nickel steel.

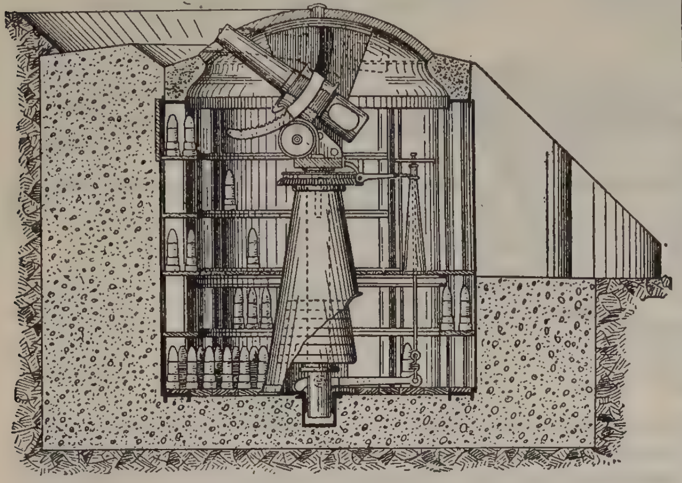
The sighting in some cases may be done by sights on the gun, with suitable enlargements in the port-hole; in others by sights affixed to the cupola itself (which of course can give horizontal direction only); in others training and elevation are given in accordance with the readings on electric dials, or instructions by telephone or speaking tube. There is of course nothing unreasonable in this in the case of indirect fire guns and howitzers, for if not firing from cupolas they would be behind the shelter of some wood or quarry.

Schumann's System: "Armoured Fronts." — Lieut.-Colonel Maximilian Schumann (1827–1889) of the Prussian engineers, who took a very prominent part in the design and advocacy of armoured defences, eventually produced a system which dispensed entirely with forts and relied on the fire of protected guns. It consists of several lines of batteries for Q.F. guns and howitzers in cupolas. He considered that such batteries would be able to defend their own front, and the infantry garrison was not to be called into action except in the case of the enemy breaking through at some point of the line.

This system was actually adopted by Rumania (1889–1892) for the Sereth Line. There are three routes by which the Russians can enter the country across the Sereth river: through Focshani, Nemolassa and Galatz. These three routes are barred by bridge-heads, those at Focshani, the most important, being on the left bank of the Milkov, a tributary of the Sereth.

The Focshani works consist of 71 batteries arranged on a semicircular front about 12 m. long and from 8000 to 10,000 yds. in advance of the bridges. The batteries are placed in three lines, which are about 500 yds. apart, and are subdivided into groups. The normal group consists of 5 batteries, of which 3 are in the first line, 1 in the second, and 1 in the third. The first-line batteries each contain five small Q.F. guns in travelling cupolas. The second-line batteries, each six small Q.F. guns in disappearing cupolas. The third-line batteries have one 120-mm. gun in a cupola, and two 210-mm. spherical mortars with Gruson shields. The immediate defence of the batteries consists of a glacis planted with thorn bushes and a wire entanglement.

The fortification of these three bridge-heads are said to have cost about £1,100,000. But the system of "armoured fronts" is never likely to be reproduced, having been condemned by all authoritative continental opinion. Its defects have been summarized by Schroeter as follows: weakness of artillery at long ranges, want of security against a surprise rush, the neglect of the use of infantry in the defence, and the difficulty of command. This last is the most serious of all. It is indeed difficult to conceive that any one should expect half-a-dozen expert gunners, each shut up in an iron box with a gun, to stop the rush of a thousand men, even by day. But imagine the feelings of the gunner on the night of a big attack, alone in his box, his nerves already strained by a preliminary bombardment and nights of watching. He hears the sounds of battle all around; he knows nothing of the progress of the attack, but expects everything, and feels every moment the door of his box being opened and the bayonet entering his back. No wise commander would submit his troops to such a test.



From Leithner's *Beständige Befestigung*.

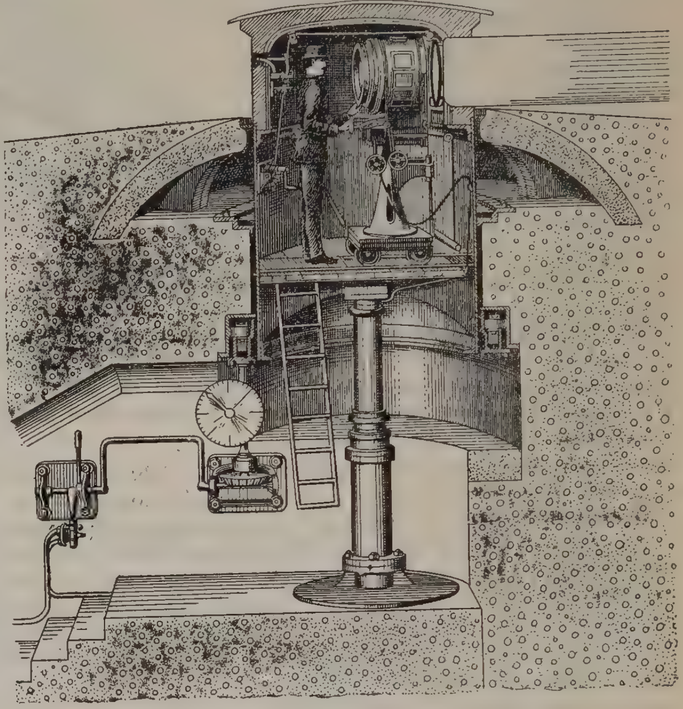
FIG. 58.—Cupola for 4·7-in. Howitzer.

Sir George Clarke and Unarmoured Systems.—Before leaving the subject of fortresses it is necessary to consider the ideas of those who, while recognizing the necessity for places permanently organized for defence, prefer to treat them more from the point of view of perfected field defences. It is to the credit of English military science that Sir George Clarke may be taken as the representative of this school of thought. His study of fortification, as he tells us, began with a history of the defence of Plevna (*q.v.*). He was led to compare the resistance made behind extemporized defences at such places as Sevastopol, Kars and Plevna, with those at other places fortified in the most complete manner known to science. From this comparison he drew the conclusion that the true strength of fortification does not depend on great masonry works intricately pieced together at vast expense, but on organization, communications and invisibility. In his 1907 edition he says:—

> "Future defences will divide themselves naturally into the following categories: (1) Permanent works wholly constructed in peace time and forming the key points of the position. (2) Gun emplacements, magazines and shelters for men in rear of the main line, all concrete structures and platforms to be completed, though some earthwork may be left until the position is placed in a state of defence. (3) Field works, trenches, &c., guarding the intervals between the permanent defences in the main line, or providing rear positions. These should be deliberately planned in time of peace ready to be put in hand at short notice. The essence of a well-fortified position is that the weapons of the defender shall obtain the utmost possible scope of action, and that those of the attacker shall have the minimum chances of effecting injury."

Infantry redoubts.

Since Sir George Clarke published his first edition in 1890 continental ideas have expanded a good deal. The foregoing statement as to the three categories of defences would be accepted anywhere now: the differences of opinion come in when we reach the stage of classifying under the first head the permanent works to be constructed in peace time. In most countries these would include forts with guns for the artillery duel, forts with safety armaments, fixed batteries with or without armour, and forts for infantry only. Sir George Clarke will have no armour for guns except in certain special cases of barrier forts. Heavy guns and howitzers requiring permanent emplacements (concrete platforms, &c.) must either be well concealed or be provided with alternative positions. The only permanent works which he admits are for infantry. They are redoubts of simple form intended for 350 or 400 men, with casemate accommodation for three-fourths of that number. Fig. 61 shows the design:—two rows of casemates, one under the front parapet, one under a parados; frontal musketry defence; obstacle consisting of entanglements, mines, &c., with or without escarp and counterscarp.



Drawn from illustration in Leithner's *Beständige Befestigung*, by permission.

FIG. 59.—Disappearing Turret for Searchlight.

> "The intervals (he says) between the infantry redoubts may be about 2500 yds.; but this will necessarily depend upon the conformation of the ground. Where there are good artillery positions falling within the sphere of protection of the redoubts, large intervals will be permissible. Thus, in the case of an extended line of defence where the ground offers marked tactical features, the idea of a continuous chain of permanent works may be abandoned in favour

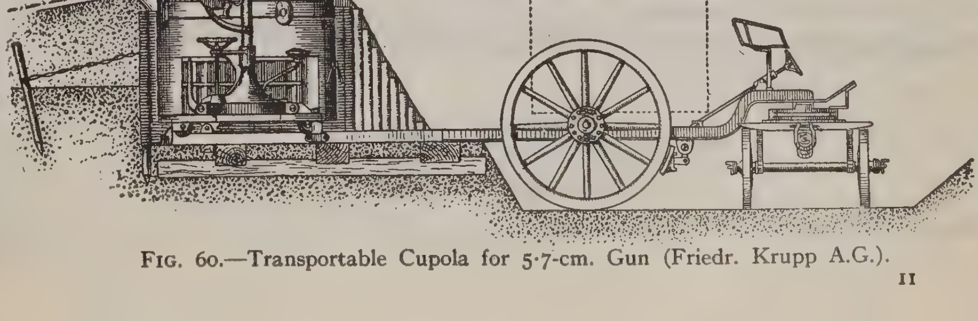
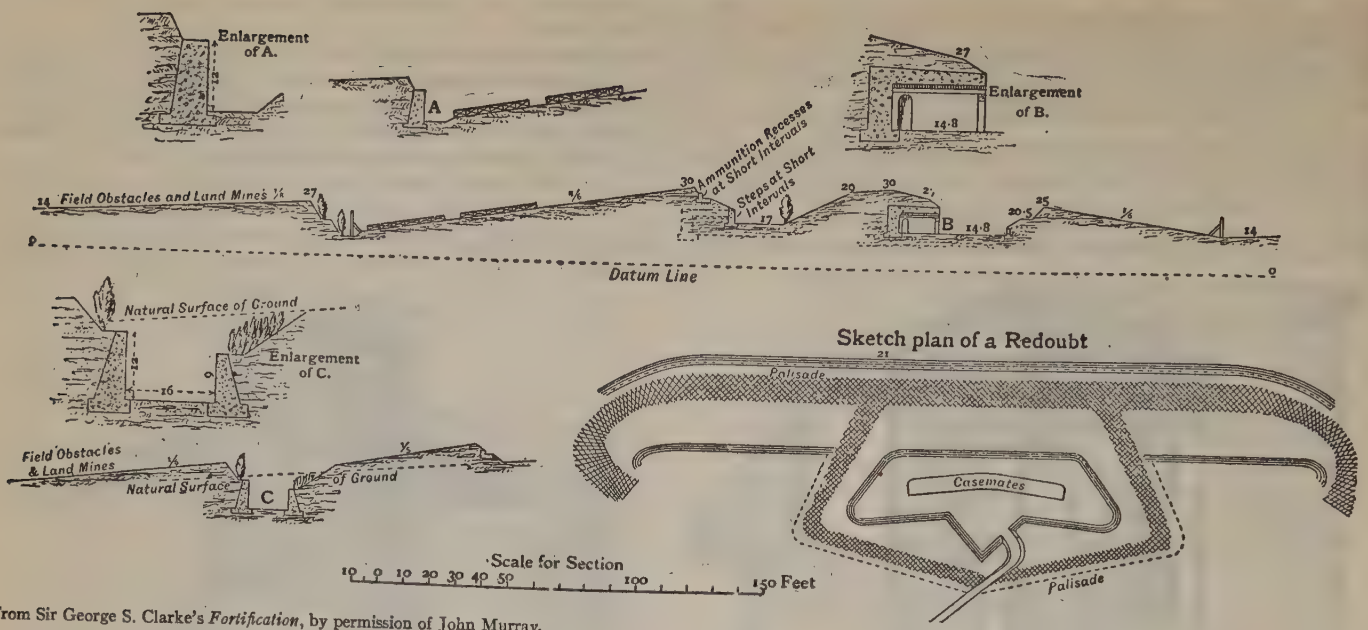


FIG. 60.—Transportable Cupola for 5·7-cm. Gun (Friedr. Krupp A.G.).


Enlargement of A.
A
27
Enlargement of B.
14·8
Field Obstacles and Land Mines ⅙
14
27
⅙
30
Ammunition Recesses at Short Intervals
Steps at Short Intervals
17
20
30
21
B
14·8
20·5
25
⅙
14
0
Datum Line
0
Natural Surface of Ground
13
16
Enlargement of C.
Field Obstacles & Land Mines
⅙
⅓
Natural Surface of Ground
C
Scale for Section
10 0 10 20 30 40 50 100 150 Feet
Sketch plan of a Redoubt
21
Palisade
Casemates
Palisade

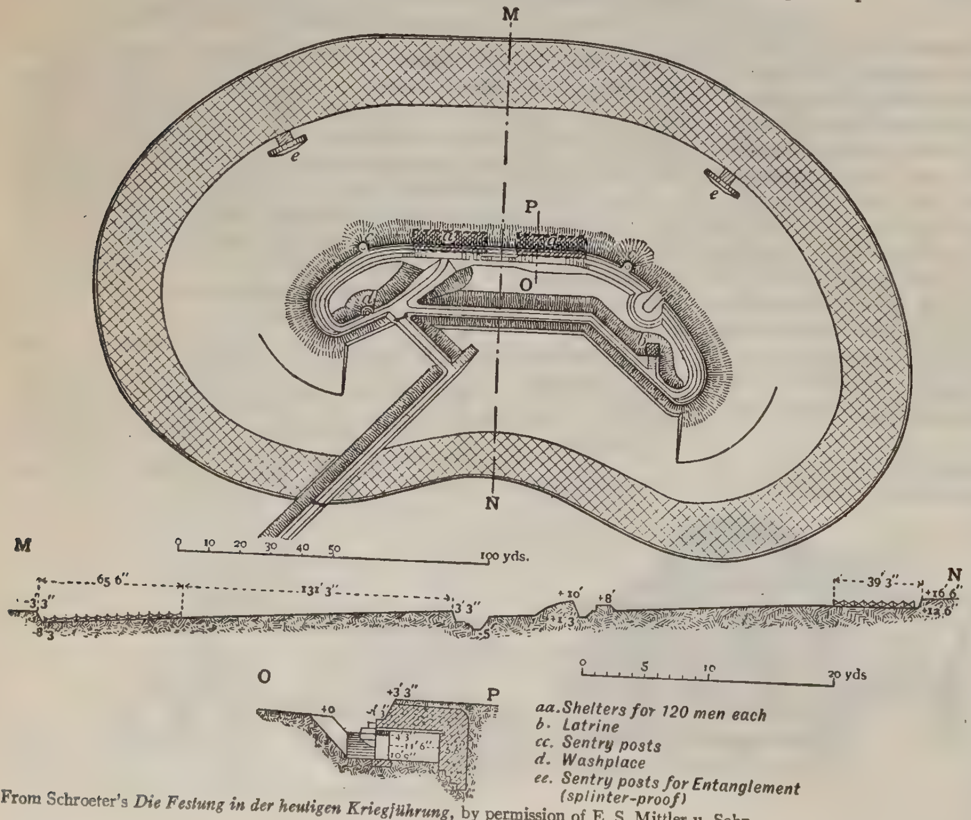
From Sir George S. Clarke's *Fortification*, by permission of John Murray.

FIG. 61.

of groups of redoubts guarding the artillery positions. In this case, the redoubts in a group might be distributed on a curve bent back in approximately horse-shoe form."

The keystones of the close defence of the fighting line in future will undoubtedly be these infantry redoubts, and therefore it is of great interest to compare with the above types two studies put forward by Schroeter (*Die Festung in der heutigen Kriegführung*), one in his first edition in 1898 (fig. 62), and the other in the second in 1905 (fig. 63). In both these the defensive arrangements are merely trenches of field profile with entanglements, the command and the obstacle being less than in Sir George Clarke's work; and it will be noticed that in the 1905 type, published after the Russo-Japanese War, the plan is much less simple and arrangements for close flanking defence have been introduced. But these works of Schroeter's are merely infantry supporting points in a line which contains forts of the triangular type with guns, and armoured batteries, as well as a very complete arrangement of field defences and communications; while Sir G. Clarke's redoubts are the only permanent works giving casemate protection in the front line.

The comparative merits of either design for an infantry redoubt are not of much importance. It is agreed that the main line of defence must consist of a more or less continuous line of field defences and obstacles, and that at some points in the line there should be infantry supporting points with bomb-proof protection capable of resisting big shells. The open question is, what additional works, if any, are required for the artillery, whether for the medium and heavy guns that will take part in the "artillery duel," or for the lighter natures that will help in the close fight and defence of the intervals. Is it best for the defenders to rely on armoured protection or on concealment for his guns?

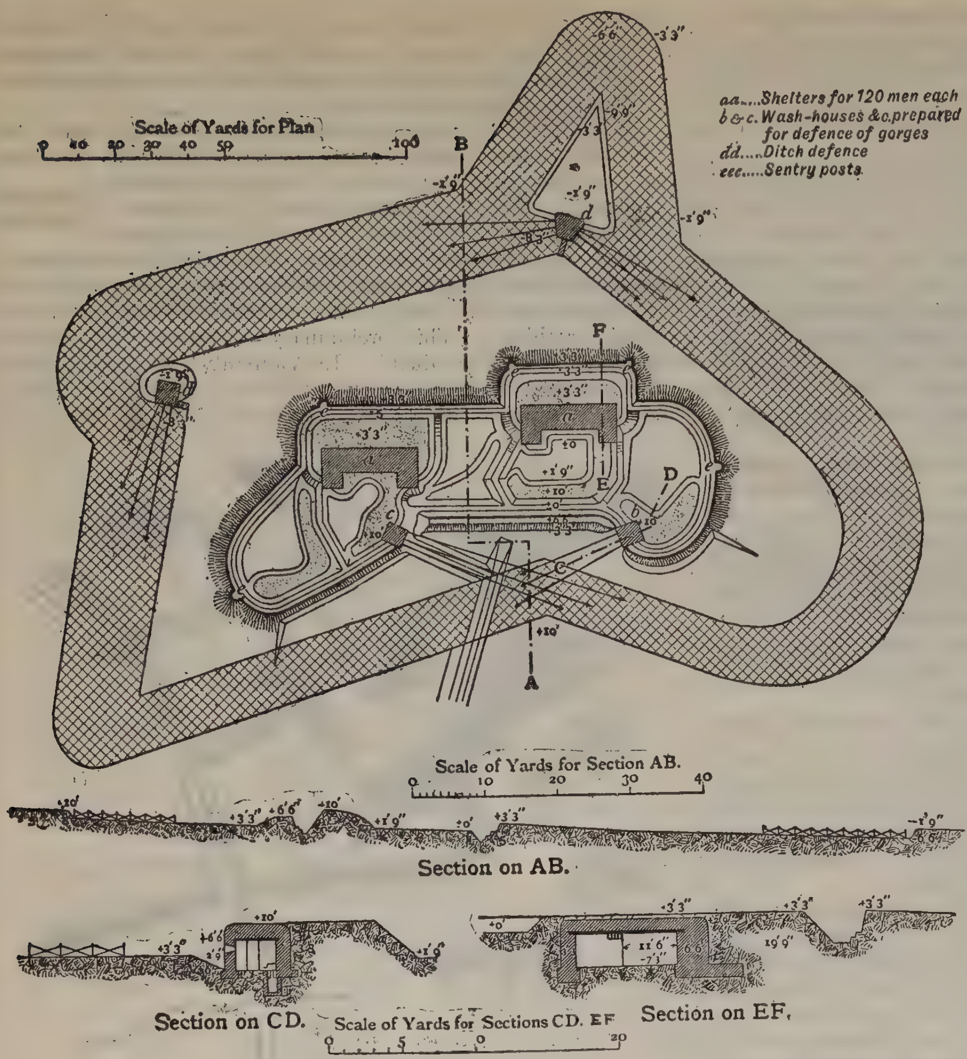

M
e
e
P
O
N
0 10 20 30 40 50 100 yds.
M
65 6"
132' 3"
39' 3"
N
-3' 3"
8' 3"
3' 3"
5
+10'
+8'
+16' 6"
13' 6"
0 5 10 20 yds
O
P
+3' 3"
+0
aa. Shelters for 120 men each
b. Latrine
cc. Sentry posts
d. Washplace
ee. Sentry posts for Entanglement (splinter-proof)

From Schroeter's *Die Festung in der heutigen Kriegführung*, by permission of E. S. Mittler u. Sohn.

FIG. 62.

Opposing views as to armour, gun positions, &c.

Official opinion outside England has certainly sanctioned armour, since all over the continent it is to some extent adopted in practice. National practice is usually based on the advice of the most distinguished officers of the day, and therefore it is unsafe to condemn it hastily. Sir George Clarke and those who are with him—and they are many, both in Great Britain and abroad—object entirely to armour. He says (*Fortification*, ed. 1907, p. 96): "The great advantage possessed by the attack in all ages has been the employment of a mobile artillery against armaments cribbed, cabined and confined by fortification. It is necessary to perpetuate this advantage?" Of course the effect of long-range weapons, in increasing the length of front that can be held by a given force, has given much greater



From Schroeter's *Die Festung in der heutigen Kriegführung*, by permission of E. S. Mittler u. Sohn.

FIG. 63.

freedom of action to the defence and this should be taken full advantage of.

The argument as to the vulnerability of shielded guns is not at present strong. Sir George says (*ib.* p. 94), "If the high angle fire . . . is ever to find a favourable opportunity, it will surely be against a cupola, the site of which can generally be determined with accuracy." On the other hand he says (p. 90), "During the long and costly experiments carried on at Bucharest in 1885–1886, 164 rounds were fired from the Krupp 21 cm. mortar at targets of about 40 sq. metres area" (about 430 sq. ft.) "without obtaining a single hit. The range was 2700 yds.; the targets were towers built upon a level plain; the shooting conditions were ideal, and the fall of each shell was telephoned back to the firing point; but it must have been evident to the least instructed observer that to attempt to group 6 or 8 shells on an invisible area 2 metres square would have been absolutely futile." These facts are adduced to prove that it is not necessary to give great thickness to concrete casemates, to resist successive bursts of shells in the same place; but surely they are equally applicable to cupolas. Again (p. 252), "The experience gained at Port Arthur was not altogether encouraging as regards the use of high angle fire. The Russian vessels in the harbour were sunk by opening their sea-valves. . . . Fire was subsequently directed upon them from 11 in. howitzers at ranges up to about 7500 yds. This was deliberate practice from siege batteries at stationary targets; but the effect was distinctly disappointing." The cupolas therefore can hardly be considered ideal targets: and the probability is that they would hold their own against both direct and indirect fire for a long time. There are other and stronger arguments against the general use of them, all of which are clearly set forth by Sir George Clarke.

The worst objections to the cupola are the military disadvantages of isolation and immobility, and the multiplication of mechanical arrangements. For a successful round from a disappearing cupola, the elevating and traversing arrangements, the elevating and loading gear of the gun, and the telephone communication, must all be in good order. At night the successful co-operation of the searchlight is also in many cases necessary.

The teaching of history is all against immobile mechanical defences. Initiative, surprise, unforeseen offensive action, keeping the besieger in ignorance of the dispositions of the garrison, and of what progress he is making: all these, with their influence on the morale of both sides, tend towards successful defences and do not point towards the use of armour.

It may further be said that the use of armour as a general rule is unnecessary, because a concealed battery is a protected one; and with the long ranges now usual for heavy guns and howitzers, there is not generally much difficulty about concealment.

In the opinion, however, of the present writer an exception must be made for guns intended to flank the line of defence, which would generally need bomb-proof over-head cover. Further, when we leave theory and come to the consideration of actual problems of defence, it will often be found that it is necessary to place guns in certain positions where good concealment cannot be got. In such cases some form of protection must be given if the guns are to engage the concealed batteries of the attack.

III. THE ATTACK OF FORTRESSES

In considering the history of siegecraft since the introduction of gunpowder, there are three main lines of development to follow, viz. the gradually increasing power of artillery, the systematizing of the works of attack, and in recent times the change that has been brought about by the effect of modern small-arm fire.

Cannon appear to have been first used in sieges as mortars, to destroy hoardings by throwing round stones and barrels of burning composition. Early in the 15th century we find cannon throwing metal balls, not only against hoarding and battlements, but also to breach the bases of the walls. It was only possible to work the guns very slowly, and archers or crossbowmen were needed in support of them, to drive the defenders from the crenellations or loopholes of the battlements. At that period the artillery was used in place of the medieval siege engines and in much the same manner. The guns of the defence were inaccurate, and being placed high on the walls were made ineffective by bad mountings, which did not allow of proper depression. The besieger therefore could place his guns close to the walls, with only the protection of a few large gabions filled with earth, set up on the ground on either side of the muzzle.

In the course of the 15th century the power of artillery was largely increased, so that walls and gates were destroyed by it in an astonishingly short time. Three results shortly followed.

The guns of the defence having gained equally in effectiveness, greater protection was needed for the attack batteries; bastions and outworks were introduced to keep the besieger at a distance from the inner walls; and the walls were sunk in ditches so that they could only be breached by batteries placed on the edge of the glacis.

Early in the 16th century fortresses were being rapidly remodelled on these lines, and the difficulties of the attack were at once very much increased. The tendency of the assailants was still to make for the curtain, which had always been considered the weak point; but the besiegers now found that they had to bring their guns right up to the edge of the ditch before they could make a breach, and in doing so had to pass over ground which was covered by the converging fire from the faces of the bastions. Towards the end of the century the attack of the curtain was delayed and the cross-fire over the ground in front increased by the introduction of ravelins.

The slight gabion protection for the siege batteries was at first replaced by strong timber shelters. These were found inadequate; but a still greater difficulty was that of bringing up the siege guns to their positions, emplacing them and maintaining communication with them under fire. In addition to this, the guns of the defence until they could be overpowered (a slow process) dominated a wide belt of ground in front of the fortress; and unless the besiegers could find some means of maintaining a strong guard close to their batteries these were liable to be destroyed by sorties from the covered way.

Siegecraft before Vauban.

Gradually the whole problem of siege work centred round the artillery. The besiegers found that they had first to bring up enough guns to overpower those of the defence; then to advance their guns to positions from which they could breach the walls; and throughout these operations to protect them against sorties. Breaches once made, the assault could follow on the old lines.

The natural solution of the difficulty of approach to the battery positions was the use of trenches. The Turks were the first to make systematic use of them, having probably inherited the idea from the Eastern Empire. The soldiers of Christendom, however, strongly disliked digging, and at first great leaders like Bayard and Montluc had themselves to use pick and shovel, to give their men an example. In due course the necessity of the trenches was recognized, but the soldiers never took kindly to them, and the difficulty was dealt with in a manner reminiscent of the feudal ages, by impressing large bodies of peasantry as workmen whenever a siege was in contemplation.

Through the 16th and most of the 17th century, therefore, we find the attack being conducted by means of trenches leading to the batteries, and supported by redoubts often called "places of arms" also made by trench work. During this period the result of a siege was always doubtful. Both trenches and batteries were arranged more or less at haphazard without any definite plan; and naturally it often happened that offensive action by the besieged against the trenches would disorder the attack and at times delay it indefinitely. Fig. 64, taken from a late 17th-century print by de Fer of Paris, gives a good idea of the general practice of that day when Vauban's methods were not yet generally known.

Another weak point about the attack was that after the escarp walls had been strengthened to resist artillery fire as has been described, there was no clear idea as to how they should be breached. The usual process was merely an indiscriminate pounding from batteries established on the crest of the glacis. Thus there were cases of sieges being abandoned after they had been carried as far as the attempt to breach.

It is in no way strange that this want of method should have characterized the attack for two centuries after artillery had begun to assert its power. At the outset many new ideas had to be assimilated. Guns were gradually growing in power; sieges were conducted under all sorts of conditions, sometimes against medieval castles, sometimes against various and widely-differing examples of the new fortification; and the military systems of the time were not favourable to the evolution of method. It is the special feature of Vauban's practical genius for siege warfare that he introduced order into this chaos and made the issue of a siege, under normal conditions, a mere matter of time, usually a very short time.

Vauban's teaching.

The whole of Vauban's teaching and practice cannot be condensed into the limits of this article, but special reference must be made to several points. The most important of these is his general arrangement of the attack. The ultimate object of the attack works was to make a breach for the assaulting columns. To do this it was necessary to establish breaching batteries on the crest of the glacis; and before this could be done it was necessary to overpower the enemy's artillery. This preliminary operation is nowadays called the "artillery duel." In Vauban's day the effective range of guns was 600 to 700 yds. He tells us that it was customary to establish batteries at 1000 yds. from the place, but that at that range they did little more than make a great deal of noise. The first object of the attack, therefore, after the preliminary operations of investment, &c., had been completed, was to establish batteries within 600 or 700 yds. of the place, to counter-batter or enfilade all the faces bearing on the front of attack; and to protect these batteries against sorties. After the artillery of the defences had been subdued—if it could not be absolutely silenced—it was necessary to push trenches to the front so that guns might be conveyed to the breaching positions and emplaced there in batteries. Throughout these processes it was necessary to protect the working parties and the batteries against sorties.

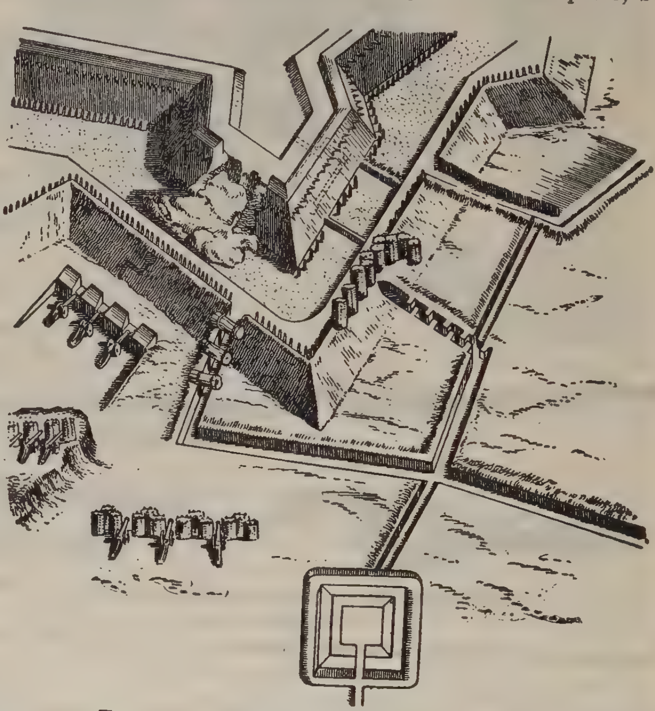


FIG. 64.—Siege-works of the 17th century.

For this purpose Vauban devised the *Places d'armes* or *lignes parallèles*. He tells us that they were first used in 1673 at the siege of Maestricht, where he conducted the attack, and which was captured in thirteen days after the opening of the trenches. The object of these parallels was to provide successive positions for the guard of the trenches, where they could be at hand to repel sorties. The latter were most commonly directed against the trenches and batteries, to destroy them and drive out the working parties. The most vulnerable points were the heads of the approach trenches. It was necessary, therefore, that the guard of the trenches should be in a position to reach the heads of the approaches more quickly than the besieged could do so from the covered way. This was provided for as follows.

The first parallel was usually established at about 600 yds. from the place, this being considered the limiting range of action of a sortie. The parallel was a trench 12 to 15 ft. wide and 3 ft. deep, the excavated earth being thrown forward to make a parapet 3 or 4 ft. high. In front of the first parallel and close to it were placed the batteries of the "first artillery position."

The attack.

While these batteries were engaged in silencing the enemy's artillery, for which purpose most of them were placed in prolongation of the faces of the fortress so as to enfilade them, the "Approach Trenches" were being pushed forward. The normal attack included a couple of bastions and the ravelin between, with such faces of the fortress as could support them; and the approach trenches (usually three sets) were directed on the capitals of the bastions and ravelin, advancing in a zigzag so arranged that the prolongations of the trenches always fell clear of the fortress and could not be enfiladed.

Fig. 65, taken from Vauban's *Attack and Defence of Places*, shows clearly the arrangement of trenches and batteries.

After the approach trenches had been carried forward nearly half-way to the most advanced points of the covered way, the "second parallel" was constructed, and again the approach trenches were pushed forward. Midway between the second parallel and the covered way, short branches called *Demi-parallels* were thrown out to either flank of the attacks: and finally at the foot of the glacis came the third parallel. Thus there was always a secure position for a sufficient guard of the trenches. Upon an alarm the working parties could fall back and the guard would advance.

Trenches were either made by *common trenchwork, flying trenchwork or sap*. In the first two a considerable length of trench was excavated at one time by a large working party extended along the trench: flying trenchwork (formerly known as flying sap) being distinguished from common trenchwork by the use of gabions, by the help of which protection could be more quickly obtained. Both these kinds of trenchwork were commenced at night, the position of the trench having been previously marked out by tape. The "tasks" or quantities of earth to be excavated by each man were so calculated that by daybreak the trench would afford a fair amount of cover. Flying trenchwork was generally used for the 2nd parallel and its approaches, and as far beyond it as possible. In proportion as the attack drew nearer to the covered way, the fire of the defenders' small-arms and wall-pieces naturally grew more effective, though by this time most of their artillery would have been dismounted by the fire of the siege batteries. It therefore became necessary before reaching the 3rd parallel to have recourse to sap.

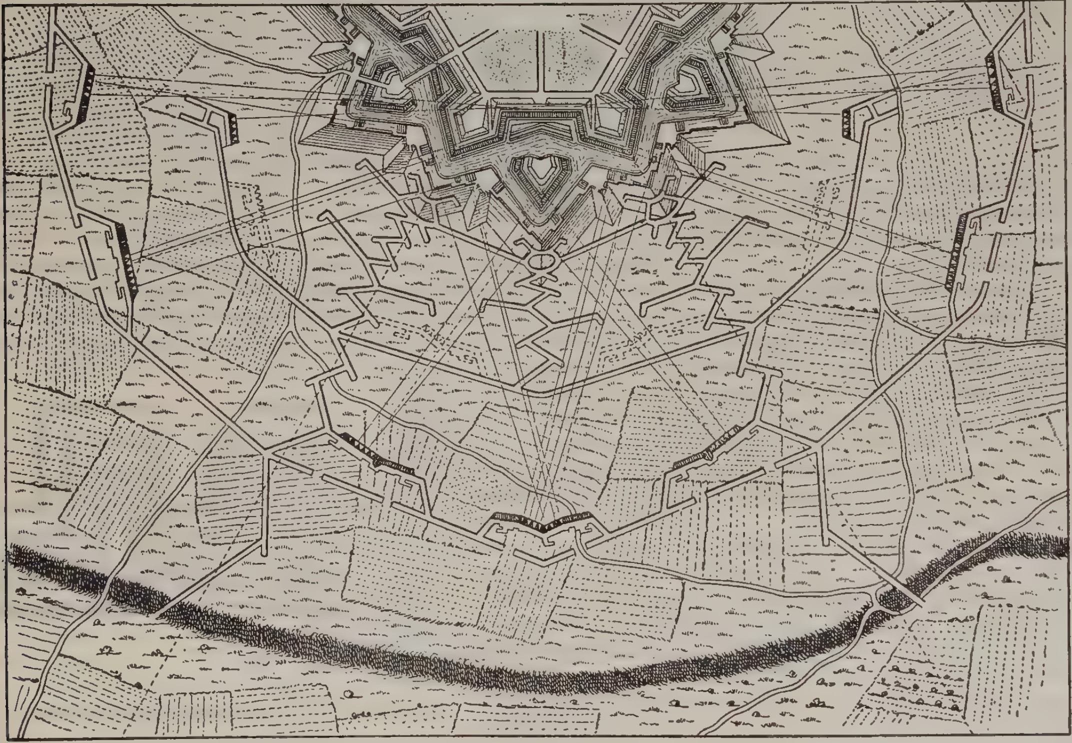


FIG. 65.—Regular Attack (Vauban).

Sapping.

Sapping required trained men. It consisted in gradually pushing forward the end of a narrow trench in the desired direction. At the sap-head was a squad of sappers. The leading man excavated a trench 1 ft. 6 in. wide and deep. To protect the head of the trench he had a shield on wheels, under cover of which he placed the gabions in position one after another as the sap-head progressed. Other men following strengthened the parapet with fascines, and increased the trench to a depth of 3 ft., and a width of 2 ft. 6 in. to 3 ft. Fig. 66, taken from Vauban's treatise on the attack, shows the process clearly. The sap after being completed to this extent could be widened at leisure to ordinary trench dimensions by infantry working parties.

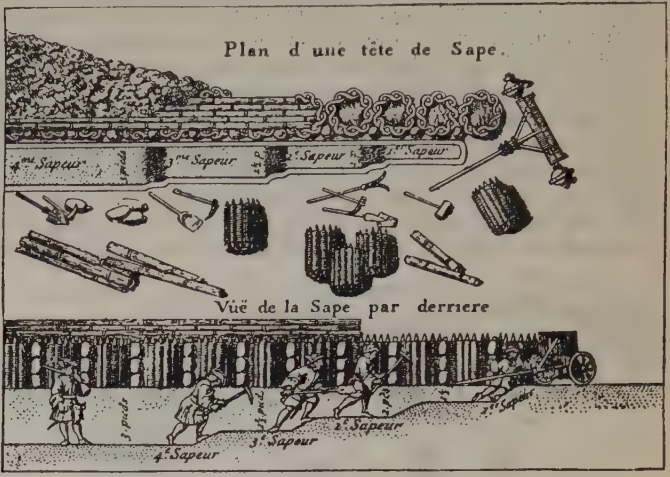


FIG. 66.—Sapping (Vauban).

As the work at the sap-head was very dangerous, Vauban encouraged his sappers by paying them on the spot at piecework rates, which increased rapidly in proportion to the risk. He thus stimulated all concerned to do their best, and reckoned that under average conditions he could depend on a rate of progress for an ordinary sap of about 50 yds. in 24 hours.

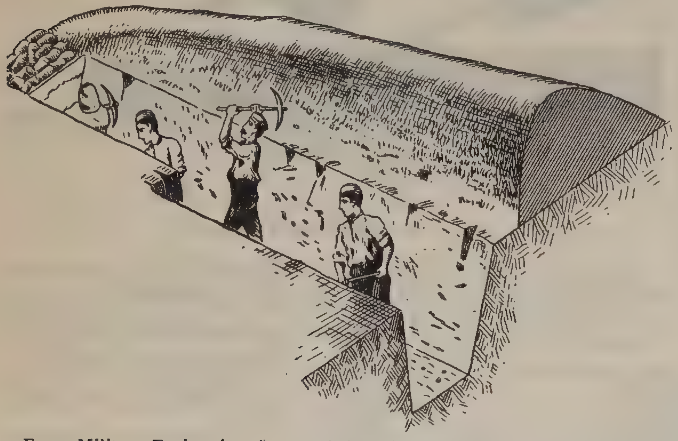
It is interesting to compare the more recent method of sapping with that above described (fig. 67 taken from the *Instruction in Military Engineering*, 1896). It is no longer possible to place gabions in position at the sap-head under fire. Accordingly the leading sapper excavates to the full depth of 4 ft. 6 in., and the rate of progress is retarded proportionately, so that an advance of only 15 to 30 yds. in 24 hours can be reckoned on instead of 50. The head of the sap is protected by a number of half-filled sandbags, which the leading sapper throws forward as he goes on.

The nearer the approaches drew to the covered way, the more oblique became the zigzags, so that little forward progress was made in proportion to the length of the trench. The approaches were then carried straight to the front, by means of the "double sap," which consisted of two single saps worked together with a parapet on each side (fig. 68). To protect these from being enfiladed from the front, traverses had to be left at intervals, usually by turning the two saps at right angles to right or left for a few feet, then forward, and so on as shown in fig. 69, the distance apart of these traverses being of course regulated by the height from which the enemy's fire commanded the trench.

The later stages in the attack are illustrated in fig. 70. From the third parallel the attack was pushed forward up the glacis by means of the double sap. It was then pushed right and left along the glacis, a little distance from the crest of the covered way. This was called "crowning" the covered way, and on the position thus gained breaching batteries were established in full view of the escarp. While the escarp was being breached, if it was intended to use a systematic attack throughout, a mine gallery (see *Mining* below) was driven under the covered way and an opening made through the counterscarp into the ditch. The sap was then pushed across the ditch, and if necessary up the breach, the defenders' resistance being kept under by musketry and artillery fire from the covered way. The ravelin and bastions were thus captured successively, and where the bastions had been retrenched the same methods were used against the retrenchment.

Later stages of the attack.

Vauban showed how to breach the escarp with the least expenditure of ammunition. This was done by making, with successive shots placed close together (which was feasible even in those days from a position so close as the crest of the covered way) horizontal and vertical cuts through the revetment wall. The portion of revetment enclosed by the cuts being thus detached from support was overturned by the pressure of the earth from the rampart. Ricochet fire was also the invention of Vauban. He showed how, in enfilading the face of a work, by using greatly reduced charges a shot could be made to drop over the crest of the parapet and skim along the terreplein, dismounting guns and killing men as it went.



From *Military Engineering*, by permission of the Controller of H. M. Stationery Office.

FIG. 67.—"Deep" Sap.

18th-century principles of defence.

The constant success of Vauban must be ascribed to method and thorough organization. There was a deadly certainty about his system that gave rise to the saying "Place assiégée, place prise." He left nothing to chance, and preferred as a rule the slow and certain progress of saps across the ditch and up the breach to the loss and delay that might follow an unsuccessful assault. His contemporary and nearest rival Coehoorn tried to shorten sieges by heavy artillery fire and attacks across the open; but in the long run his sieges were slower than Vauban's.

So much a matter of form did the attack become under these conditions, that in comparing the supposed defensive powers of different systems of fortification it was usual to calculate the number of days that would be required in each case before the breach was opened, the time being measured by the number of hours of work required for the construction of the various trenches and batteries. It began to be taken as a matter of course that no place under any circumstances could hold out more than a given number of days; and naturally, when the whole question had become one of formula, it is not surprising to find that places were very often surrendered without more than a perfunctory show of resistance.

The theory of defence at this time appeared to be that since it was impossible to arrest the now methodical and protected progress of the besiegers' trenches, no real resistance was possible until after they had reached the covered way, and this idea is at the root of the extraordinary complications of outworks and multiplied lines of ramparts that characterized the "systems" of this period. No doubt if a successor to Vauban could have brought the same genius to bear on the actual defence of plac as he did on the attack, he would have discovered that th essence of successful defence lay in offensive action outside th body of the place, viz. with trench against trench. For wan of such a man the engineers of the defence resigned themselve contentedly to the loss of the open ground outside their walls and relied either upon successive permanent lines of defence, or if these did not exist, upon extemporized retrenchments, usually at the gorge of the bastion.

It is curious that such experienced soldiers as most of them were should not have realized the fatal effect upon the minds of the defenders which this almost passive abandonment of line after line must needs produce. Even a civilian—Machiavelli—had seen into the truth of the matter years before when he said (*Treatise on the Art of War*, Book vii.): "And here I ought to give an advice . . . to those who are constructing a fortress, and that is, not to establish within its circuit fortifications which may serve as a retreat to troops who have been driven back from the first line. . . . I maintain that there is no greater danger for a fortress than rear fortifications whither troops can retire in case of a reverse; for once the soldier knows that he has a secure retreat after he has abandoned the first post, he does in fact abandon it and so causes the loss of the entire fortress."

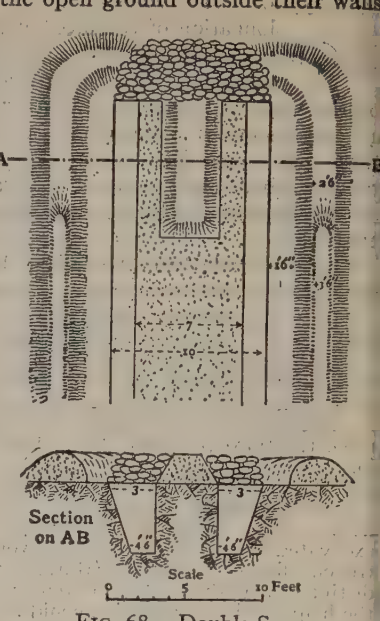


FIG. 68.—Double Sap.

It must, however, be remembered that in those days when soldiers were mostly of a separate or professional caste, the whole thing had become a matter of business. Fighting was so much regulated by the laws and customs of war that men thought nothing of giving up a place if, according to accepted opinion, the enemy had advanced so far that they could no longer hope to defend it successfully. Once this idea had set in it became hopeless to expect successful defences, save now and then when some officer of very unusual resolution was in command. This is the real reason for the feeble resistance so often made by fortresses in the 17th and 18th centuries, which has been attributed to inherent weakness in fortifications.

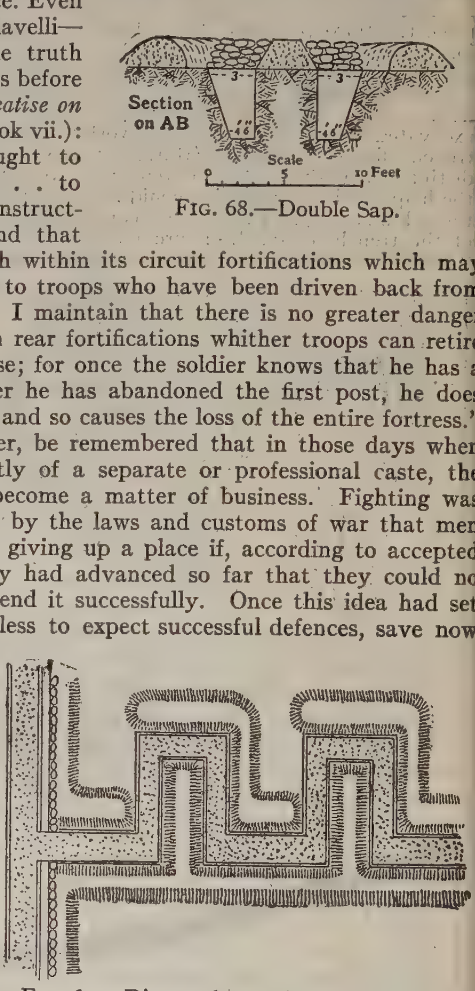


FIG. 69.—Direct advance by Double Sap.

Custom exacted that a commandant should not give up a place until there was an open breach or, perhaps, until he had stood at least one assault. Even Napoleon recognized this limitation of the powers of the defence when in the later years of his reign he was trying to impress upon his governors the importance of their charge. The limitation was perfectly unnecessary, for history at that time could have afforded plenty of instances of places that had been successfully defended for many months after breaches were opened, and assault after assault repulsed on the same breach. But the same soldiers of the 17th and 18th centuries who had created this artificial condition of affairs, established it by making it an understood thing that a garrison which surrendered without giving too much trouble after a breach had been opened should have honourable consideration; while if they put the besiegers to the pains of storming the breach, they were liable to be put to the sword.

Peninsular War.

It has been necessary to dwell at some length on the siegecraft of Vauban and his time, not merely for its historical interest, but because the system he introduced was practically unaltered until the end of the 19th century. The sieges of the Peninsular War were conducted on his lines; so was that of Antwerp in 1830; and as far as the disposition of siege trenches was concerned, the same system remained in the Crimea, the Franco-German War and the Russo-Turkish War. The sieges in the Napoleonic wars were few, except in the Iberian peninsula. These last differed from those of the Vauban period and the 18th century in this, that instead of being deliberately undertaken with ample means, against fortresses that answered to the requirements of the time, they were attempted with inadequate forces and materials, against out-of-date works. The fortresses that Wellington besieged in Spain had rudimentary outworks, and escarps that could be seen and breached from a distance. At that time, though the power of small arms had increased very slightly since the last century, there had been a distinct improvement in artillery, so that it was possible to breach a visible revetment at ranges from 500 to 1000 yds. Wellington was very badly off for engineers, siege artillery and material. Trench works could only be carried out on a small scale and slowly. Time being usually of great importance, as in the first two sieges of Badajoz, his technical advisers endeavoured to shorten sieges by breaching the escarp from a distance—a new departure—and launching assaults from trenches that had not reached the covered way. Under these circumstances the direct attacks on breaches failed several times, with great loss of life. Wellington in one or two earlier despatches reflected on his engineers for not establishing their batteries on the crest of the glacis. The failures are, however, clearly due to attempts to push sieges to a conclusion without proper preparation.

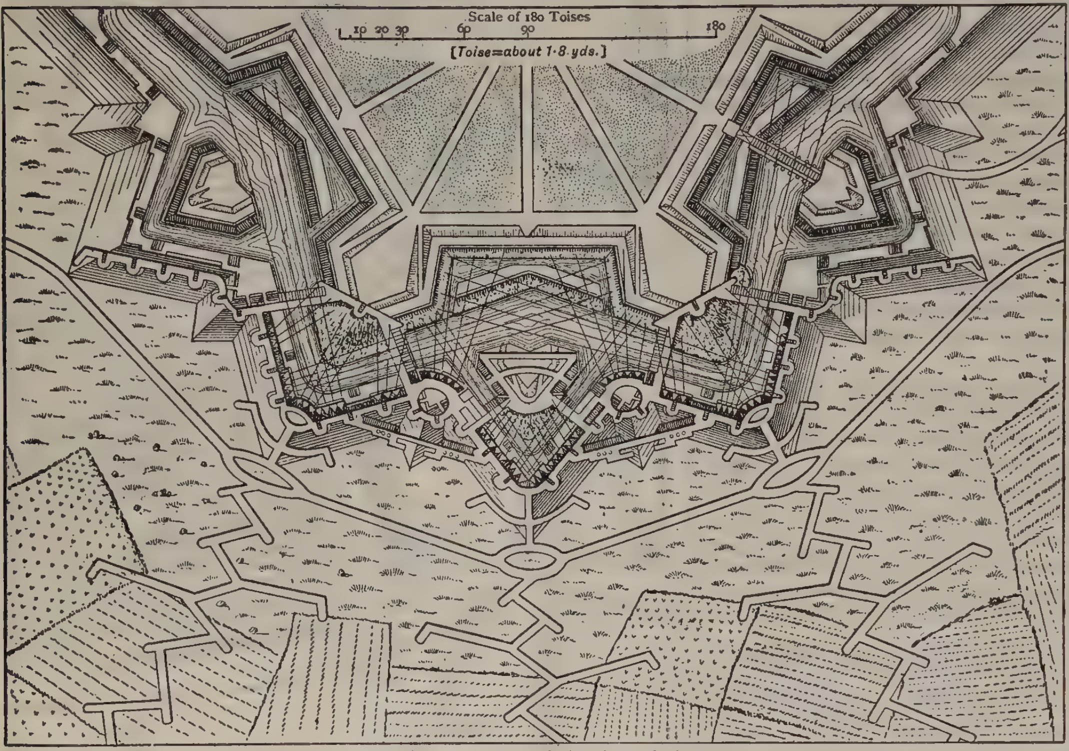


Fig. 70.—Later Stages of the Attack (Vauban).

So much has been written of late years in criticism of the fortification to what may be called the Vauban period that it is important to note what were the preparations considered necessary for a siege at that time (*Journals of Sieges in Spain, 1811 to 1814*). Sir John Jones summarizes his own experience in Spain and the data accumulated by practical engineers in former sieges from the time of Vauban onwards, in the following conclusions: The actual work of entrenching, sapping, &c., on the front attacked was much the same whether the fortress contained 5000 or 10,000 men. On the other hand the guard of the trenches was proportionate to the fighting men inside the fortress. (The total number of men had of course to be sufficient to allow three or four complete shifts or "reliefs" for all work and duties.) Adding a proportion of men for camp and other duties, he calculates, for the vigorous siege of an ordinary place situated in open country and containing 5000 men, a corps of 32,080 effectives, and remarks further that this force would be greatly exhausted after a month's service. The same place held by 10,000 would call for a besieging army of 50,830 men (guards and duties increasing, but not working parties). Thus the besieger should if possible have a superiority of 7 to 1 if the garrison numbered 5000, 6 to 1 if 10,000 and 5 to 1 if 15,000 and so on. As regards artillery, he should have as many, and if possible twice as many, guns as those of the defender on the front of attack, as well as howitzers for sweeping every line subject to enfilade and mortars for destroying traverses, &c. Later in the siege, more howitzers and mortars to clear the covered way and places of arms, and finally, after the covering of the covered way, fifty additional battering guns would be required. It is apparent from this that the practical engineers of the day looked upon a siege as a serious matter, and did not find permanent fortifications wanting in defensive strength.

Crimea.

During the long peace that followed the Napoleonic wars, one advance was made in siegecraft. In England in 1824 successful experiments were carried out in breaching an unseen wall by curved or indirect fire from howitzers. At Antwerp in 1830 the increasing power and range of artillery, and especially of howitzers, were used for bombarding purposes, the breaches there being mostly made by mines. Then came one of the world's great sieges; that of Sevastopol in 1854–1855 (see Crimean War). The outstanding lesson of Sevastopol is the value of an active defence; of going out to meet the besieger, with countertrench and countermine. This lesson has increased in value for us in proportion to the increased power of the rifle.

In comparing the resistance made behind the earthworks of Sevastopol with the recorded defences of permanent works, it is essential to remember that the conditions there were quite abnormal. Sir John Jones has told us what the relative forces of besiegers and besieged should be, and the necessary preponderance of artillery for the attack. The following quotations may be added:

"The siege corps should be sufficiently strong—(1) To invest the fortress completely, and maintain the investment against all the efforts of the garrison. (2) If a regular siege is contemplated, to execute and guard all the siege works required for it. Complete investment may sometimes be impossible, but experience has repeatedly shown that the difficulties of a siege are enormously increased if the garrison are able to draw fresh troops and supplies from outside, and to rid themselves of their sick and wounded" (Lewis). Again as regards artillery: "In a regular attack, where every point is gained inch by inch, it is impossible to succeed without overpowering the defensive artillery"; and "it is useless to attempt to sap near a place till its artillery fire is subdued . . ." (Jones).

These conditions were so far from being fulfilled at Sevastopol that (*a*) there was no investment—in fact the Russians came nearer to investing the Allies; (*b*) the Russians had the preponderance in guns almost throughout; (*c*) the Russian force in and about Sevastopol was numerically superior to that of the Allies. We must add to this that Todleben had been able to get rid of most of his civilian population, and those who remained were chiefly dockyard workmen, able to give most valuable assistance on the defence works. The circumstances were therefore exceptionally favourable to an active defence. The weak point about the extemporized earthworks, which eventually led to the fall of the place, was the want of good bomb-proof cover near the parapets.

Franco-German War.

The Franco-German War of 1870 produced no great novelty. The Germans were not anxious to undertake siege operations when it could be avoided. In several cases minor fortresses surrendered after a slight bombardment. In others, after the bombardment failed, the Germans contented themselves with establishing a blockade or detaching a small observing force. By far the most interesting siege was that of Belfort (*q.v.*). Here Colonel Denfert-Rochereau employed the active defence so successfully by extemporizing detached redoubts and fortifying outlying villages, that he obliged the besiegers (who, however, were a small force at first) to take up an investing line 25 m. long; and succeeded in holding the village of Danjoutin, 2000 yds. in advance of the enceinte, for two months after the siege began. He also used indirect fire, withdrawing guns from the ramparts and placing them in the ditches, in the open spaces of the town, &c. At Paris the French found great advantage in placing batteries in inconspicuous positions outside the forts. Their direct fire guns were at a disadvantage in being fired through embrasures. These had served their purpose when artillery fire was very inaccurate, but had now for a long time been recognized by the best engineers as out of date. The Germans since the siege of Düppel in 1864 had mounted their siege guns on "overbank" carriages; that is, high carriages which made it possible to fire the guns over the parapet of the battery without embrasures. The guns in the Paris forts which were further handicapped by conspicuous parapets and the bad shooting of the gunners were easily silenced.

At Strassburg indirect fire against escarps was used. The escarp of Lunette 53 was successfully breached by this method. The breaching battery was 870 yds. distant, and the shot struck the face of the wall at an angle (horizontally) of 55°, the effect being observed and reported from the counterscarp. 1000 rounds from 60-pounder guns sufficed to make a breach 30 yds. wide.

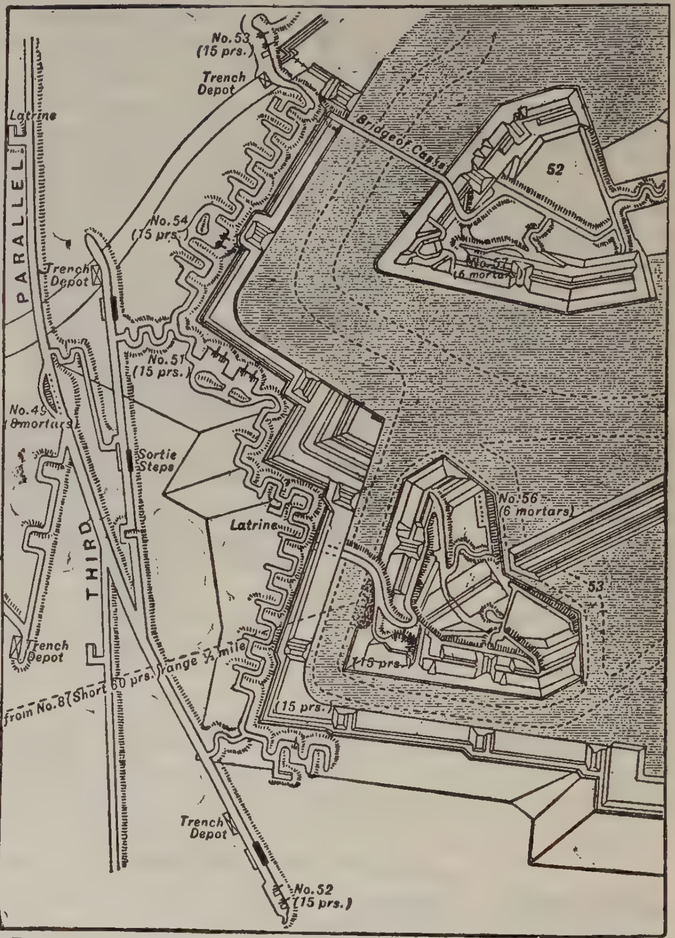
Fig. 71 is a good example of the attack in the late stages. It will be observed that batteries for mortars and field guns are established in the captured lunettes. The narrow wet ditch of Lunette 53 was crossed by a dam of earth and fascines, the headway protected by a parapet or screen of sandbags.

"Lunette 52 was unrevetted, and its ditch was more than 60 yds. wide, and 6 to 9 ft. deep. . . . It was determined to effect the passage by a cask bridge, for which the casks were furnished by breweries near at hand. . . . The formation of the bridge was begun at nightfall. A pioneer swam across, hauled over a cable, and made it fast to the hedge on the berm. Four men were stationed in the water, close to the covered way, the casks were rolled down to them one after the other, and fitted with saddles, so as to form piers . . . these piers were successively boomed out along the line of the cable. . . . In two hours the bridge was finished, and the lunette was entered. . . . The work had not been discovered by the besieged, and the formation of lodgments inside the lunette was already begun, when the noise made by some troops in passing the bridge attracted attention, and drew a fire which cost the besiegers about 50 men. A dam was afterwards substituted for the bridge, as it was repeatedly struck by shells." (*R.E. Professional Papers*, vol. xix.)

It is curious to realize that this happened at so recent a time. Such operations would be impossible now, as long as any defending guns remained in action.

Modern siege warfare.

On the whole it may be said that siegecraft gained practically nothing from the Franco-German War. The Russo-Turkish war taught less, Plevna (*q.v.*) having been defended by field works and attacked by the old-fashioned methods. For the last ten years of the 19th century military opinion was quite at a loss as to how the sieges of the future would work out. As guns and projectiles continued to improve the "attaque brusquée" proposed by von Sauer had many adherents. It was thought that a heavy bombardment would paralyse resistance and open the way for an attack, to be delivered by great numbers and with special appliances for crossing obstacles. Others thought that the strength of the defence, as manifested by the Plevna field works, would be greater than ever when the field works were backed by permanent works, good communications and the resources of a fortress. One thing was obvious—namely, that as long as the artillery of the place, of even the smallest calibres, remained unsubdued, the difficulty of trenchwork and sapping would be enormously increased, and no one seemed to have formed a clear conception of how that difficulty was to be met. A lecture delivered in Germany about 1895 is worth quoting as a fair example of the vagueness of idea then prevailing: "For the attack, the following is the actual procedure: Accumulation and preparation of material for attack before the fortress: advance of attacking artillery, covered by infantry. Artillery duel. Throwing forward of infantry: destruction of the capability for defence of the position attacked; when possible by long-range artillery fire, otherwise by the aid of the engineers. Occupation of the defensive position. Assault on the inner lines of the fortress." That seemed quite a simple prescription, but the necessary drugs were wanting. And even since Port Arthur great uncertainty as to the future of the attack remains.



From *Textbook of Fortification*, by permission of the Controller H.M. Stationery Office.

FIG. 71.—Strassburg, Lunettes 52 and 53, 1870.

Modern artillery has much simplified the construction of siege batteries. Formerly siege batteries and rampart batteries opposed each other with direct fire at ranges not too long for the unaided human eye, and the shells, travelling with low velocity, bit into the parapets, and, exploding, produced their full effect. Accordingly the task of the gunners was, by accurate fire, to destroy the parapets and embrasures, and to dismount the guns. The parapets of siege batteries were therefore made from 18 to 30 ft. thick, and the construction of such batteries, with traverses, &c., involved much work. The height of parapet necessary for proper protection being 7 ft. 6 in. to 8 ft., a great deal of labour could be saved by sinking the gun-platforms about 4 ft. below the surface level, but of course this was only possible where rock or water were not near the surface.

The effect of modern projectiles was to reduce the thickness of earth necessary for parapets. High velocity projectiles are very easily deflected upwards by even a slight bank of earth. This is especially the case with sand. Loose earth is better than compacted earth, and clay offers the least resistance to penetration. These facts were taken note of in England more than on the Continent in the design of instructional siege batteries.

The construction of batteries is moreover vastly simplified by the long ranges at which artillery will fight in future. It will as a rule be possible to place howitzer batteries in such positions that even from balloons it will be difficult to locate them; and even direct fire batteries can easily be screened from view. This renders parapets unnecessary, and probably no more protection will be used than light splinter-proof screens to stop shrapnel bullets or fragments of common shell. Moreover batteries can be constructed at leisure and by daylight.

The most important point about the modern battery is the gun platform for the larger natures of guns and howitzers. These require very solid construction to resist the heavy shock of discharge. Not long ago it was thought that the defence would have larger ordnance than the attack, as anything heavier than an 8 in. howitzer required a concrete bed, which could not be made at short notice. The Japanese, however, at Port Arthur made concrete platforms for 11 in. howitzers. It may be remarked that difficulties which loom largely in peace are often overcome easily enough under the stress of war.

Another gain to the attack is in connexion with magazines. The old powder magazines were particularly dangerous adjuncts to batteries, and had to be very carefully bomb-proofed. Such propellants as cordite, however, are comparatively harmless in the open. They are very difficult to detonate, and if set on fire do not explode like gunpowder. It is therefore unnecessary to provide bomb-proof magazines for them in connexion with the batteries.

In future sieges the question of supply will be more important than it has ever been. Leaving out of the question the bringing up of supplies from the base of operations, the task of distribution at the front is a very large one. The Paris siege manœuvres of 1894 furnish some instructive data on this point. The main siege park was at Meaux, 10 m. from the 1st artillery position, and the average distance from the 1st artillery position to the principal fort attacked was 5000 yds. The front of attack on Fort Vaujours and its collateral batteries covered 10,000 yds. There were 24 batteries in the 1st artillery position; say 100 guns, spread over a front of 4000 yds. To connect Meaux with the front, the French laid some 30 m. of narrow gauge railway largely along existing roads. The line was single, with numerous branches and sidings. They ran 11 regular trains to the front daily and half-a-dozen supplementary. The amount of artillery material sent up was over 5000 tons, without any projectiles; but it can easily be imagined that large demands were also made on transport for other purposes. For instance, one complete bakery train was sent up daily. The amount of ammunition sent up would be limited only by the power of transporting it. A siege train of 100 pieces could probably dispose of from 500 to 1000 tons of ammunition a day, at the maximum rate of firing.

But the most important question affecting the sieges of the future (putting aside accidental circumstances) will be the configuration of the ground. Assuming that local conditions do not specially favour the artillery of either side, it is highly probable that the artillery duel will result in a deadlock. If the besiegers' guns do not succeed in silencing those of the defence from the 1st or distant artillery position (which, whether they are in cupolas or in concealed positions, will in any case be an extremely difficult task), it will be necessary for the infantry to press in; to feel for weak points, and to fight for those that offer better positions for fire and observation. In doing this they will have to face the defenders' infantry, entrenched, backed by their unsilenced guns, and having secure places of assembly from which to deliver counter-attacks. The distance to which they can work forward and establish themselves under these conditions will depend on the ground. It will then be for the engineers to cross the remaining space by sap. This, under present conditions, will be a tedious process, and may even take long enough to cause the failure of the siege.

As to the manner of the sap, it will certainly be "deep," as long as the defence retains any artillery power. When the 4 ft. 6 in. sap already described was first introduced, it was known as a "deep sap"; but the sieges of the future will probably necessitate a true deep sap, that is one in which the whole of the necessary cover is got below the surface of the earth.

Such a sap may consist of an open trench, about 6 ft. deep, the whole of the excavated earth being carried away through the trench to the rear; or a blinded trench, covered in as it progresses by splinter-proof timbers and earth; or a tunnelled trench, leaving a foot or so of surface earth undisturbed. In either case nothing should be visible from the front to attract artillery fire. As the sap is completed, it will sometimes be necessary to add a slight parapet in places, to give command over the foreground for the rifles of the guard of the trenches.

The sap will have to be pushed up quite close to the defenders' trenches and obstacles. After that further progress must either be made by mining, or as seems very probable, by getting the better of the defenders in a contest with shells from short-range mortars.

Just as in the feudal ages a castle was built on some solitary eminence which lent itself to the defensive methods of the time, so in the future the detached forts and supporting points in the girdle of a fortress will be sited where smooth and gentle slopes of ground give the utmost opportunity to the defenders' fire, and the least chance of concealment to the enemy. There will be considerable latitude of choice in the defensive positions; though not, of course, the same latitude as when the existence of a precipitous hill was the *raison d'être* of the castle. In some places, as at Port Arthur, the whole country-side may by reason of its steep and broken slopes be unfavourable to the defence, though even then genius will turn the difficulties to account. But wherever it is possible the defender will provide for a space of 1000 yds. or so, swept by fire and illuminated by searchlights, in front of his lines. That space will have to be crossed by sap, and it needs little imagination to realize how great the task will be for the besieger.

There are other modern methods of siege warfare to be noticed, the use of which is common to besiegers and besieged. Much is expected of balloons; but the use of these in war is unlikely to correspond to peace expectations. They must be kept at a considerable distance from the enemy's guns, a distance which will increase as the means of range-finding improve; and as the height from which they can observe usefully is limited, so is the observers' power to search out hidden objects behind vertical screens. Thus, suppose a captive balloon at a height of 2000 ft., and distant 4000 yds. from an enemy's howitzer battery: and suppose the battery placed behind a steep hill-side or a grove of trees, at such a distance that a shell fired with 30° elevation can just clear this screen. The line of sight from the observer to the battery is inclined to the horizontal at $\frac{2000}{3\times4000}$, that is $\frac{1}{6}$, or roughly 10°. It is obvious, therefore, that the observer cannot see the battery.

Balloon observers are expected to assist the batteries by marking the effects of their fire. For this to be done on any practical scale a balloon would be required for each battery: that is, for only 100 guns, some 20 or 25 balloons. These would require an equal number of highly skilled observers (of whom there are not too many in existence), besides the other balloon personnel and accessories, and the means of making gas, which is too much to expect, even if an enemy were obliging enough to give notice of his intentions.

Telephones and all other means of transmitting intelligence rapidly are now of the utmost importance to both attack and defence. Maps marked with numbered squares are necessary for directing artillery fire, especially from cupolas. Organization in every branch will give better results than ever before, and the question of communication and transport from the base of supplies right up to the front needs detailed study, in view of the great weight of ammunition and supplies that will have to be handled.

The use of light mortars for the trenches, introduced by Coehoorn and revived with extemporized means at Port Arthur, needs great attention. It may be prophesied that the issue of important sieges in the future, when skilfully conducted on both sides with sufficient resources, will depend mainly on the energy of the defenders in trench work, on mining and countermining in connexion with the trenches, and on the use of light mortars made to throw large charges of high explosive for short distances with great accuracy.

For a brief narrative of the siege of Port Arthur in 1904, one of the greatest sieges of history, both as regards its epic interest and its military importance, the reader is referred to the article RUSSO-JAPANESE WAR.

DEFINITIONS.—The following definitions may be useful, but have no place in the evolution of the attack, to which this section is mainly devoted.

Investment.—This most necessary, almost indispensable operation of every siege consists in surrounding the fortress about to be besieged, so as to cut off its communications with the outside world. *Preliminary investment* which is carried out by cavalry and light troops before the arrival of the besieging force, consists in closing the roads so as to shut out supplies and reinforcements. *Close investment* should be of such a character as to prevent any sort of communication, even by single messengers or spies. The term "*blockade*" is sometimes loosely used instead of investment.

Lines of Circumvallation and Contravallation.—These now obsolete terms were in great use until the 19th century. The *circumvallation* was a line of parapet which the besieger made outside the investing position of his own force, to protect it when there was a chance of attack by a relieving army. The line of *contravallation* was the line of parapet and trench sometimes made by the besieger all round the town he was attacking, to check the sorties of the garrison.

Observing Force.—When circumstances make the reduction of a particular fortress in the theatre of operations unnecessary a force is often detached to "observe" it. The duty of this force will be to watch the garrison and prevent any hostile action such as raids on the lines of communications.

Bombardment.—This operation, common to all ages, consists in a general (sometimes an indiscriminate) fire against either the whole target offered by the fortress or a particular section of that target. In ancient and medieval times the effect of a bombardment—whether of ordinary missiles, of incendiary projectiles, or of poisonous matters tending to breed pestilence—upon a population closely crowded within its walls was very powerful. In the present day little military importance is attached to bombardment, since under modern conditions it cannot do much real harm.

IV. Military Mining

It has been noted already that mining is one of the most ancient resources of siege warfare. The use of gunpowder in mining operations dates from the end of the 15th century. When Shakespeare makes Fluellen say, at Henry V.'s siege of Harfleur, "th'athversary is digt himself four yards under the countermines; I think 'a will plow up all, if there is not better directions," he is anticipating the development of siegecraft by nearly 100 years. Pedro di Navarro, a Spanish officer, is credited with the first practical use of explosive mines. He employed them with great success at the siege of Naples in 1503; and afterwards, when rebuilding the Castello Nuovo after the siege, was probably the first to make permanent provision for their use in countermines. Countermining had been a measure of defence against the earlier methods of attack-mining; the object being to break into the besiegers' galleries and fight hand to hand for the possession of them. When the explosive mine was introduced, it became the object of the defenders to establish their countermines near the besiegers' galleries and destroy them by the effect of the explosion. In the 400 years or so that have passed this branch of warfare has changed less than any other. Methods of mining have not advanced much, and the increased power of high explosives as compared with gunpowder has its least advantage in moving masses of earth.

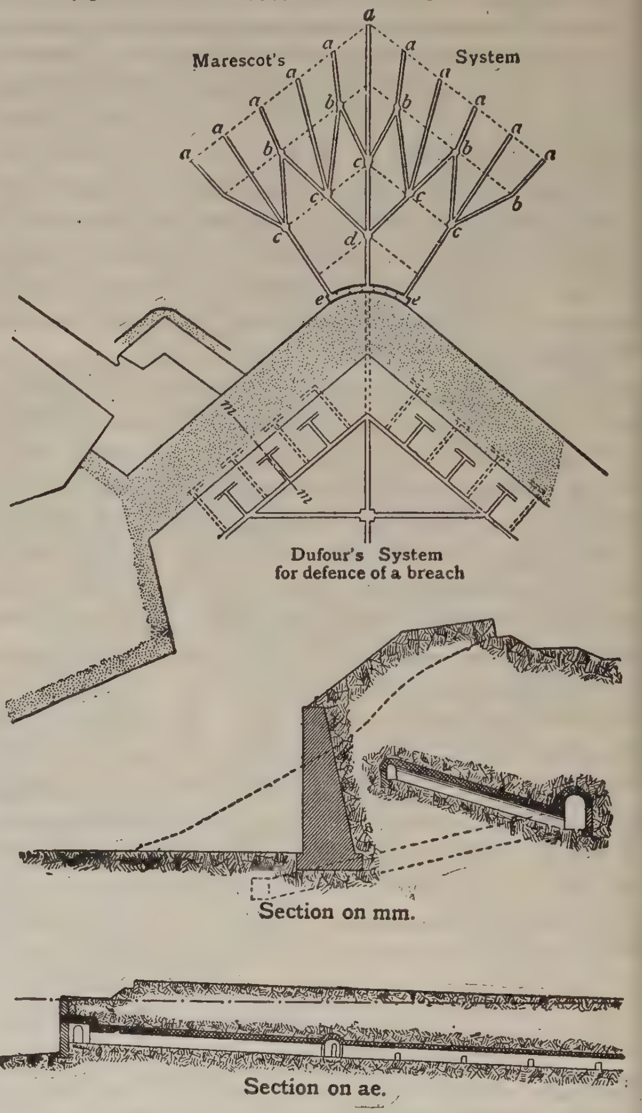
When a besieger has arrived by means of trenches within a certain distance of the enemy's works without having subdued their fire, he may find that the advance by sap becomes too slow and too dangerous. He can then advance underground by means of mine galleries, and by exploding large charges at the heads of these galleries can make a series of craters. These craters are then occupied by infantry, and are connected with each other and with the parallel in rear by trenches, thus forming a new parallel. If not interfered with by the defenders the besieger can advance in this way until he reaches the counterscarp. His mines will now be turned to a new purpose, viz. to breach the counterscarp and afterwards the escarp. This is done by placing suitable charges at intervals behind the scarps at such a height above the foundations that the pressure of the earth above the mine will more than counterbalance the resistance of the masonry.

Mines and countermines.

But if the defenders are active, they will countermine. There is as a general rule this broad difference between the mines of the defence and those of the attack, that the defenders do not wish the surface of the ground broken, lest increased opportunities of getting cover should be offered to the besiegers. The object of the defence, therefore, is to destroy the besiegers' galleries without forming craters, and for this purpose they generally endeavour to get underneath the attack galleries. The defenders may, however, wish, if the opportunity is allowed them, to explode mines under the attack parallels, in which case there is of course no objection to disturbing the surface.

> "At the commencement of the subterranean war the main object of the defence is to force the besieger to take to mining operations as early as possible, as it is a tedious operation and will prolong the siege. Every endeavour must be made to push forward countermines so as to meet and check the attack. On the approach of the opponents to each other careful listening for the enemy must be resorted to. To this end it is necessary at *irregular* intervals to suspend all work for some minutes at a time, closing doors of communication and employing experienced listeners at the heads of the countermines. This matter is a most important one, as a premature explosion of the defender's mines is a double loss to the defender, a loss of a mine and an advantage to the enemy in more than one way. As soon as the overcharged mines of the besieger have been fired, a heavy fire should be brought to bear on the craters, and if possible sorties should be made to prevent the enemy occupying them. At the same time every effort should be made underground to surround with galleries, and as it were isolate, the craters so as to prevent the besieger making a new advance from them. The efforts of the attack at this stage will probably be directed to the formation of what are called "Boule shafts" (*i.e.* shafts partially lined in which charges are hastily fired with little or no tamping), and to meet these in time the defender may resort to the use of boring tools, and so place charges somewhere in advance of the heads of the countermines. His great object must be to prevent as long as possible the besieger from getting underground again; and these occasions, when the power of resistance is temporarily equal to, if not greater than, that of the attack, should be made the most of by the defence." (Lewis, *Text-book on Fortification, &c.*, 1893.)

The defence has the advantage, in the case of fortresses, of being able to establish beforehand a system of countermine galleries in masonry. Many systems have been worked out for this purpose. A good typical arrangement is that of General Marescot, published in 1799, shown in fig. 72



From *Textbook of Fortification*, by permission of the Controller H.M. Stationery Office.

Fig. 72.

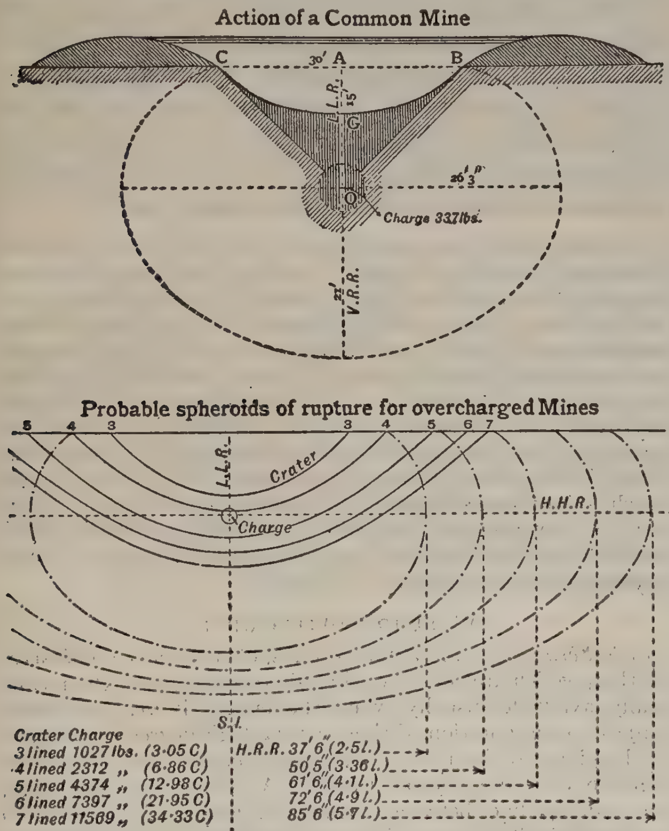
The main galleries (those running out in a straight line from the counterscarp gallery *e* to three of the points *a*) fall gently to the front to a depth of 30 or 40 ft. below the surface—the deeper they are the less they will suffer from the enemy's mines. Branch galleries (marked *c b*+*d c*) run obliquely upward from them to right and to left, leading to the mines, which are placed at various depths, according to circumstances.

Two main points must be observed in any system of countermines: the branch galleries must run obliquely forward, so as not to present their sides to the action of the enemy's mines; and the distance between the ends of the branches from adjacent main galleries should be such that the enemy cannot pass between them unheard. This distance will vary with the nature of the soil, but may be taken roughly as 20 yds. A convenient size for main galleries is 6 ft. high by 3 ft. wide: branch galleries may be 5 ft. by 3 ft. When the enemy is approaching, other branch galleries, called *listeners*, will be pushed out from main and branch galleries. The section to fig. 1 of fig. 72 shows openings left for the purpose.

Another use of mines in defence is in connexion with breaches. A permanent arrangement for this purpose, by General Dufour, is shown in fig. 72. Yet another use, on which much ingenuity was expended in the 18th century, is to extemporize retrenchments.

Different kinds of mines.

The charges of mines depend of course upon the effect which is desired. When the charge is strong enough to produce a crater, the radius of the circular opening on the surface of the ground is called the *radius of the crater*. The line drawn from the centre of the charge to the nearest surface, which is expressed in feet, is called the *line of least resistance* (L.L.R.). When a mine produces a crater the diameter of which is equal to the line of least resistance, it is called a one-lined crater; when the diameter is double the L.L.R., a *two-lined crater* and so on. *Common mines* are those which produce a two-lined crater. *Over-charged mines* produce craters greater than two-lined, and *undercharged mines* less. A *camouflet* does not produce a crater; it is used when the object is to destroy an enemy's gallery without breaking the surface. Fig. 73 shows sections of the different kinds of mines, with their craters and the effect they will produce downwards and horizontally in ordinary earth.



From *Instructions in Military Engineering*, by permission of the Controller of H.M. Stationery Office.

FIG. 73.—Mines.

Consideration of this figure will show that it is possible to place a long charge at such a depth below the surface that it will destroy all galleries of the enemy within a considerable radius, without much disturbing the surface of the ground.

Bored mines, which have been alluded to above, are a comparatively recent innovation. When the enemy is heard at work in one of his galleries and his position approximately determined by the sound, it is necessary to drive a branch gallery with all speed in that direction, and when it has advanced as far as appears necessary, to load, tamp and discharge a mine before the enemy can fire his own mine. This is one of the most delicate and dangerous operations of war, and success will fall to those who are at the same time most skilful and most determined. The work can be hastened and made less dangerous as follows: Instead of driving a branch gallery, a hole several inches in diameter is bored in the required direction. With suitable tools there is no difficulty in driving a straight bore-hole 20 or 30 ft. long. A small charge of high explosives is then pushed up to the end of the borehole and fired. This forms a small camouflet chamber by compressing the earth around it. Into this chamber the charge for the mine is passed up the bore-hole. No tamping of course is required.

Mine warfare is slow, dangerous and uncertain in its results. It will certainly delay the besiegers' advance very much and may do so indefinitely. One point is distinctly in favour of the defence, namely that when ground has been much mined it becomes charged with poisonous gases. Some explosives are less noxious than others in this way, and it will be advantageous for the attack, but not necessarily for the defence, to make use of these.

Calculation of Charges.—The quantity of powder required for a charge is expressed in lbs. in terms of L.L.R.^{3}, and the following formulae are used:

l=L.L.R. in feet, r=radius of crater in feet, c=powder charge in pounds, s=a variable dependent on the nature of the soil.

For a common mine $c=\frac{s}{10}l^3$

For an overcharged mine $c=\frac{s}{10}\{l+\cdot9(r-l.)\}^3$

For an undercharged mine $c=\frac{s}{10}\{l-\cdot9(l-r)\}^3$.

The values to be given to s are:

Nature of Soil.	Value of s.
Very light earth	0·80
Common earth	1·00
Hard sand	1·25
Earth mixed with stones	1·40
Clay mixed with loam	1·55
Inferior brickwork	1·66
Rock or good new brickwork	2·25
Very good old brickwork	2·50

Military mining is carried on by means of vertical *shafts* and horizontal or inclined *galleries*. When the soil is very stiff, very little or even no lining is required for shafts and galleries; but usually they have to be lined either with cases or frames.

Cases make a complete lining of 2 in. planking. Frames are used at intervals of 4 or 5 ft. to support a partial lining of planks. Cases are of course preferable in other respects; but in ordinary soil they take up more timber.

Shafts and galleries.

There are two kinds of gallery in ordinary use in the British service, namely the *common gallery* whose interior dimensions with cases are 5 ft. 6 in.×2 ft., and the *branch gallery* which is 4 ft.×2 ft. The *shaft* has about the same dimensions as a branch gallery. Formerly it was sometimes necessary in the systematic attack of a fortress to get guns down into the ditch. For this purpose a "great gallery" was used, 6 ft. 6 in. in height and 6 ft. 8 in. wide, internal dimensions.

Miners' Tools.—These are few and simple. The pick and shovel differ from the ordinary types in having rather shorter helves suitable for the confined space in which they are used. There is also a *push-pick*, an implement with a straight helve and a pointed shovel head 6 in. long and 3½ in. wide. The *miner's truck*, used for drawing the earth from the end of the gallery to the bottom of the shaft, is a small wooden truck holding about 2 cub. ft. of earth. Formerly the noise of the wheels of the truck passing over the uneven wooden floor of the gallery was very liable to be heard by the enemy. To obviate this they now have leather tyres and should run on battens nailed to the floor. The *miner's bucket* is a small canvas bucket with a couple of ropes attached, by which the earth can be drawn up the shaft. Nowadays, however, the truck itself has chains attached to it, by which it is drawn up, with the aid of a windlass, to the surface. By this method more earth can be taken up in one lift, and time and labour are not wasted in transferring the contents of the truck to the bucket.

Ventilation is an important point. The breath of the miners and the burning of their candles (when electric light is not available) vitiates the air in the galleries; so that even in clean ground a gallery should not be driven more than 60 ft. without providing some means of renewing the air. This is usually done by forcing fresh air, by means of a pump or bellows, through a flexible hose to the head of the gallery. Where mines have been fired close by, there is great danger from poisonous gases filtering through the soil into the gallery. This difficulty is nowadays met by the use of special apparatus, such as helmets into which fresh air is pumped, so that the wearers need not breathe the air of the gallery at all. Ventilation can also be assisted by boring holes vertically to the surface of the ground.

Where a point has been reached at which it is proposed to fire a mine, a chamber just large enough to hold the charge is cut in the side of the gallery. The object of this is to keep the charge out of the direct line of the gallery and thus increase the force of the explosion. The charge may be placed in canvas bags, barrels or boxes, precautions being taken against damp.

Charging mines.

The operation of loading is of the first importance, for if the mine is not exploded with success, not only is valuable time lost, which may give the enemy his opportunity, but it will probably be necessary to untamp the mine in order to renew the fuze; an operation attended by considerable danger. The loading of the mine should therefore be done by the officer in charge with his own hands. He has to work in a very cramped position and practically in the dark (unless with electric light) as of course no naked lights can be allowed near powder. Everything should therefore be prepared beforehand to facilitate the loading of the mine and placing of the fuze. At Chatham a 1000 ℔ mine, at the end of a gallery 136 ft. long, has been loaded in 30 minutes. The powder was passed up the gallery by hand in sandbags, and emptied into a box of the required size.

Whatever method of firing (see below) is employed, the officer who loads the mine must be careful to see that it is so arranged as to make firing certain, and that the leads passing out of the gallery are not liable to damage in the process of tamping.

Tamping.—This operation consists in filling up the head of the gallery solidly, for such a distance that there shall be no possibility of the charge wasting its force along the gallery. The distance depends on the charge and on the solidity of the tamping. For a common mine it should extend to about $\frac{3}{2}$ L.L.R. from the charge, when the tamping is of earth in sandbags; for a 3-lined crater, to about 2 L.L.R. Tamping can be improved by jamming pieces of timber across the shaft or gallery among the other filling.

Firing.—This may be done electrically, or by means of *safety* or *instantaneous fuze* or *powder hose.*

Electric firing is the safest and best, and allows of the charge being exploded at any given moment. For this purpose *electric fuzes* (for powder) or *electric detonators* (for guncotton or other high explosive) are employed. The current that fires them is passed through copper wire leads.

The safety fuze used in the British service burns at the rate of about 3 ft. a minute. Instantaneous fuze burns at the rate of a mile a minute. Both can be fired under water. They are often used in conjunction, a considerable length of instantaneous fuze, leading from the charge, being connected to a short length of safety fuze.

Powder hose, an old-time expedient, can be extemporized by making a tube of strong linen, say 1 in. in diameter, and filling it with powder. It burns at the rate of 10 to 20 ft. per second.

Explosives.—The old-fashioned gunpowder of the grained black variety is still the best for most kinds of military mines. Pebble and prism powders do not give as good results, presumably because their action is so slow that some of the gases of explosion can escape through the pores of the earth. High explosives, with their quick shattering and rending effect, are little more effective than gunpowder in actually moving large quantities of earth. Most of them give off much more poisonous fumes than gunpowder. Some recent high explosives, however, have been specially designed to be comparatively innocuous in this respect.

Effects of mines.

Some formulae have been given above for the calculation of charges. It will, however, simplify matters for the reader to record some actual instances of charges fired both in peace and war.

In the matter of scientific experiment we find Vauban as usual leading the way, and the following results among others were obtained by him at Tournay in 1686 and 1689: A charge of 162 ℔ placed 13 ft. below the surface produced a crater of 13 ft. radius (a two-lined crater, or "common mine"). Galleries were destroyed at distances equal to the L.L.R. in both horizontal and vertical directions. Double the charge, placed at double the depth, *i.e.* 324 ℔ with an L.L.R. of 27 ft. made no crater, but like the first destroyed galleries below it and on each side at distances equal to the L.L.R. A charge of 3828 ℔ with L.L.R. of 37 ft. made a two-lined crater and destroyed a gallery distant 61 ft. horizontally.

Bernard Forest de Belidor, a French engineer, made many experiments at La Fère about 1732, and 20 years later, as a general officer and inspector of miners, continued them on a larger scale. His experiments were directed towards destroying an enemy's galleries at greater distances than had hitherto been supposed possible, by means of very large charges (in proportion to the L.L.R.) which he called "globes of compression." In one of them a charge of 4320 ℔ of powder placed only 15 ft. 9 in. below the surface damaged or "compressed" a gallery distant 65 ft. horizontally. The radius of the crater was 34 ft. 8 in.

At Frederick the Great's siege of Schweidnitz in 1762 some very large charges were exploded. One of them, of 5400 ℔ with an L.L.R. of 16 ft. 3 in., made a crater of 42 ft. 3 in. radius. Readers of Carlyle's *Frederick the Great* may recall his description of the contest of the rival engineers on this occasion.

At Graudenz in 1862 (experiments) a charge of 1031 ℔ of powder placed 10 ft. deep, untamped, in a vertical shaft, made a crater of 15 ft. 6 in. radius. A charge of 412 ℔ of guncotton, calculated as being equivalent to the above charge of powder and placed under the same conditions, made a crater of 14 ft. radius. The absence of tamping in both cases of course placed the gunpowder at a disadvantage.

The Petersburg Mine, 1864.

Perhaps the most interesting mine ever fired was that at the siege of Petersburg in the American Civil War, in June 1864. The circumstances were all abnormal, and the untechnical account of it in *Battles and Leaders of the Civil War* (vol. iv.) is well worth perusal. No mining tools or materials and no military miners were available; and no one had any confidence in the success of the attempt except its originator, Lieut.-Colonel Pleasants, a mining engineer by profession, his regiment which was recruited from a mining population, and General Burnside the corps commander. The opposing entrenchments were 130 yds. apart. The mine gallery was started behind the Federal lines and driven a distance of 510 ft. till it came under a field redoubt in the Confederate lines. There two branches were made right and left, each about 38 ft. long, and in them eight mines aggregating 8000 ℔ of powder were placed. The first attempt to fire them failed, and an officer and a sergeant volunteered to enter the gallery to seek the cause of the failure. A defective splice in two lengths of fuze was thus discovered and repaired. At the second attempt all the mines were fired simultaneously with success, and made a gigantic crater 170 ft. long by 60 ft. wide and 30 ft. deep. The occupants of the redoubt, at least several hundred men (they have been stated at 1000), were blown up and mostly killed. The assault which followed, however, failed completely, for want of organization. The infantry was drawn up in readiness to advance, but no outlets had been provided from the parallel, and this and other causes delayed the occupation of the crater and gave the defending artillery a moment's respite. Thus the assailants gained the crater but could not advance beyond it in face of the defenders' fire, nor could they establish themselves within it, on its steep clay sides, for want of entrenching tools. A good many troops were sent forwards in support, but being in many cases of inferior quality, they could not be induced to go forward, and huddled in disorder in the already overcrowded crater. Over 1000 of these were captured when the Confederates retook the crater by a counter-attack and the total loss of the Federals in the attack was nearly 4000.

The wars of the last generation have done little or nothing to advance the science of military mining, but a good deal has been done in peace to improve the means. Electric lighting and electric firing of mines will be a great help; modern drilling machines may be used to go through rock; ventilating arrangements are much improved; and the use of bored mines is sure to have great developments. The Russo-Japanese War taught nothing new in mine-warfare, or as to the effects of mines, but the siege of Port Arthur had this moral among others; just as in future, in the frontal attack of positions, trench must oppose trench, so in fortress warfare mines will be more necessary than ever. It appears that they will be essential to destroy both the ditch-flanking arrangements of forts and the escarp or other permanent obstacle beyond the ditch.

V. FIELD FORTIFICATION

Field Fortifications, now more often spoken of as field defences, are those which are constructed at short notice, with the means locally available, usually when the enemy is near at hand. Subject to the question of time, a very high degree of strength can be given to them, if the military situation makes it worth while to expend sufficient labour. A century or more ago, the dividing line between permanent and field fortification was very rigidly drawn, since in those days a high masonry escarp surmounted by a rampart was essential to a permanent fortress, and these could naturally not be extemporized. Works without masonry, in other ways made as strong as possible with deep ditches and heavy timbers,—such as would require about six weeks for their construction—were known as *semi-permanent*, and were used for the defence of places which acquired strategic importance in the course of a war, but were not immediately threatened. The term *field* fortification was reserved for works constructed of lighter materials, with parapets and ditches of only moderate development. Redoubts of this class required a fortnight at most for their construction.

In modern fortification if cupolas and deep revetted ditches were essential to permanent defences, the dividing line would be equally clear. But as has been shown, this is not universally admitted, and where the resources exist, the use of our present means of construction, such as steel joists, railway rails, reinforced concrete and wire, in conjunction with the defensive power of modern fire-arms, makes it possible to extemporize in a very short time works having much of the resisting power of a permanent fortress. Further, such works can be expanded from the smallest beginnings; and, if the site is not too exposed, in the presence of the enemy.

Field fortification offers, as regards the actual constructions, a very limited scope to the engineer; and a little consideration will show that its defensive possibilities were not greatly affected by the change from machine-thrown projectiles to those fired by rude smooth-bore guns. There is therefore nothing in the history of this branch of the subject that is worth tracing, from the earliest ages to about the end of the 18th century. One or two points may be noticed. The use of obstacles is probably one of the earliest measures of defence. Long before missile weapons had acquired such an importance as to make it worth while to seek shelter from them, it would obviously have been found desirable to have some means of checking the onrush of an enemy physically or numerically superior. Hence the use by savage tribes, to this day, of pits, pointed stakes hidden in the grass, entanglements and similar obstacles. In this direction the ages have made no change, and the most highly civilized nations still use the same obstacles on occasion.

Another use of field defences common to all ages is the protection of camps at night, where small forces are operating against an enemy more numerous but inferior in arms and discipline. In daylight such an enemy is not feared, but at night his numbers might be dangerous. Hence the Roman practice of making each foot-soldier carry a couple of stakes for palisades; and the simple defence of a thorn zariba used by the British for their camps in the Sudan.

Palisades and trenches, abatis and sharpened stakes have always been used. Except wire, there is practically no new material. As to methods, the laagers of the Boers are preceded by the wagon-forts of the Hussites, and those no doubt by similar arrangements of British or Assyrian war chariots; and so in almost every direction it will be found that the expedient of to-day has had its forerunners in those of the countless yesterdays. The only really marked change in the arrangements of field defences has been caused not by gunpowder but by quick-firing rifled weapons. For that reason it is worth while to consider briefly what were the principles of field fortification at the end of the 18th century. That period has been chosen because it gives us the result of a couple of centuries of constant fighting between disciplined troops with fairly effective fire-arms. The field defences of the 19th century are transitional in character. Based mainly on the old methods, they show only faint attempts at adaptation to new conditions, and it was not till quite the end of the century that the methods now accepted began to take shape.

The essential elements of fieldworks up to the time of the Peninsular War were *command* and *obstacle*; now they are *protection* and *concealment*.

Old type of field defences.

The command and obstacle were as necessary in the days of smooth-bore muskets and guns as in those of javelins and arrows. When the enemy could get close up to a work without serious loss, and attack in close order, the defenders needed a really good obstacle in front of them. Moreover, since they could not rely on their fire alone to repulse the attack, they needed a two-deep line, with reserves close at hand, to meet it with the "arme blanche." For this purpose a parapet 7 or 8 ft. high, with a steep slope, perhaps palisaded, up which the attackers must climb after passing the obstacle, was excellent. The defenders after firing their last volley could use their bayonets from the top of the parapet with the advantage of position. The high parapet had also the advantage that the attackers could not tell what was going on inside the redoubt, and the defenders were sheltered from their fire as well from view until the last moment.

The strength of a fortified line in the 18th century depended principally on its redoubts. Lines of shelter trenches had little power of defence at the time, unless they held practically as many men as would have sufficed to fight in the open. Obstacles on the other hand had a greater value, against the inelastic tactics of the time, than they have now. A good position therefore was one which offered good fire-positions for redoubts and plenty of facilities for creating obstacles. Strong redoubts which could resist determined assaults; good obstacles in the intervals, guns in the redoubts to sweep the intervals, and troops in formed bodies kept in reserve for counter-strokes—these were the essentials in the days of the smooth-bore.

The redoubts were liable to a heavy cannonade by field-guns before the attack. To withstand this, the parapets had to be made of a suitable thickness—from 4 or 5 ft. upwards—according to the time available, the resisting nature of the soil, and the severity of the bombardment expected.

The whole of the earth for the parapet was as a rule obtained from the ditch, in order to make as much as possible of this obstacle. The garrison in all parts of the interior of the redoubt were to be sheltered, if possible, from the enemy's fire, and with this object great pains were bestowed on the principle of "defilade." The object of defilade, which was a great fetish in theoretical works, was so to arrange the height of the parapet with reference to the terreplein of a work that a straight line (not, be it observed, the trajectory of the projectiles) passing from the muzzle of a musket or gun on the most commanding point of the enemy's position, over the crest of the parapet, should just clear the head of a defender standing in any part of the work. This problem of defilade became quite out of date after the development of time shrapnel, but was nevertheless taught with great rigour till within the last twenty years.

The sectional area of the ditch was calculated so that with an addition of about 10% for expansion it would equal that of the parapet. If a wider and deeper ditch was considered necessary, the surplus earth could be used to form a glacis.

The interior of the redoubt had to afford sufficient space to allow the garrison to sleep in it, which was sometimes a matter of some difficulty if a small irregularly shaped work had to contain a strong garrison. Consideration of the plan and sections of these works will show that the banquette for infantry with its slopes, and the gun platforms, took off a good deal from the interior space within the crest-line. Guns were usually placed at the salients, where they could get the widest field of fire. They were sometimes placed on the ground level, firing through embrasures in the parapet, and sometimes on platforms so as to fire over the parapet (*en barbette*).

As in permanent fortification, immense pains were taken to elaborate theoretically the traces of works. A distinction was made between forts and redoubts, the former being those which were arranged to flank their own ditches, while the redoubts did not. Redoubts again were classed as "closed," those which had an equally strong defence all round; and "half-closed," those which had only a slight parapet or timber stockade for the gorge or rear faces. Open works (those which had no gorge defence) were named according to their trace, as *redans* and *lunettes*. A redan is a work with two faces making a salient angle. It was frequently used in connexion with straight lines of trench or breastwork. A lunette is a work with two faces, usually forming an obtuse angle, and two flanks.

The forts described in the text-books, as might be expected, were designed with great ingenuity, with bastioned or demi-bastioned fronts, star traces, and so forth, and in the same books intricate calculations were entered into to balance the *remblai* and *déblai*, that is, the amount of earth in the parapets with that excavated from the ditches. In practice such niceties of course disappeared, though occasionally when the ground allowed of it star forts and bastioned fronts were employed.

On irregular ground the first necessity was to fit the redoubt to the ground on which it stood, so as to sweep the whole of the foreground, and this was generally a sufficiently difficult matter without adding the complications of flanking defences. Sir John Jones, speaking of the traces of the several works in the Torres Vedras lines, says:—

Torres Vedras.

"The redoubts were made of every capacity, from that of fig. 74 *a*, limited by want of space on the ground it occupied to 50 men and two pieces of artillery, to that of fig. 74 *b*, for 500 men and six pieces of artillery, the importance of the object to be attained being the only guide in forming the dimensions. Many of the redoubts first thrown up, even some of the smallest, were shaped like stars, under the idea of procuring a flank defence for the ditches; but this construction was latterly rejected, it being found to cut up the interior space, and to be almost fallacious with respect to flank defence, the breadth of the exterior slopes being in some cases equal to the whole length of the flanks so obtained. Even when, from the greater size of the work, some flanking fire was thus gained, the angle formed by the faces was generally so obtuse that it demanded more coolness in the defenders than ought reasonably to be expected to aim along the ditch of the opposite face: and further, this construction prevented the fire of the work being more powerful in front than in rear.

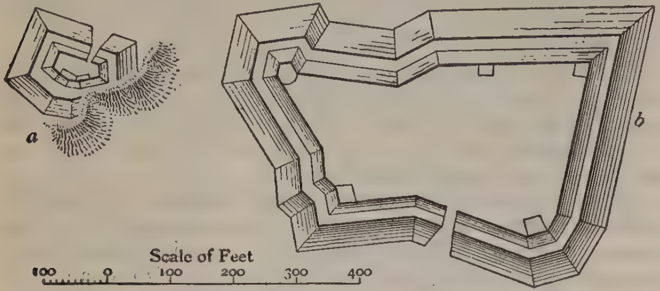


FIG. 74.—Torres Vedras Works.

In order to decide on the proper trace of a work, it is necessary to consider whether its object be to prevent an enemy establishing himself on the ground on which it is to be placed, or whether it be to insure a heavy fire of artillery on some other point in its vicinity. In the first case every consideration should be sacrificed to that of adding to its powers of self-defence by flanks or other expedients. In the second, its powers of resistance are secondary to the establishment of a powerful offensive fire and its trace cannot be too simple. Latterly, the shape of the redoubts was invariably that most fitted to the ground, or such as best parried the enfilade fire or musketry plunge of neighbouring heights, care being taken to present the front of fire deemed necessary towards the pass, or other object to be guarded; and such will generally be found the best rule of proceeding.

This recommendation, however, is not intended to apply to isolated works of large dimensions, and more particularly to those considered the key of any position. No labour or expense should be spared to render such works capable of resisting the most furious assaults, either by breaking the parapet into flanks, or forming a flank defence in the ditch; for the experience gained in the Peninsula shows that an unflanked work of even more than an ordinary field profile, if skilfully and determinedly assaulted, will generally be carried. . . . Nor does the serious evil of curtailing the interior space, which renders breaks in the outline so objectionable in small works, apply to works of large dimensions. . . . Under this view the great work on Monte Agraça (fig. 75) must be considered as very defective, the flank defence being confined to an occasional break of a few feet in the trace, caused by a change of direction in the contour of the height, whilst the interior space is more than doubly sufficient for the number of its allotted garrison to encamp.

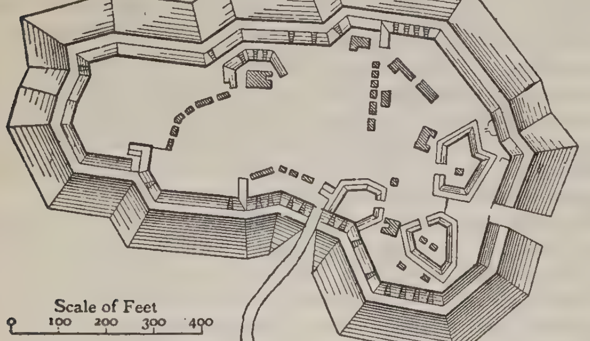


FIG. 75.—Monte Agraça, Torres Vedras.

Interior and other Defences.—This work, however, had some of its salient points . . . cut off by earthen lines of parapet, steeply revetted externally, and so traced as to serve for traverses to the interior. It had also three or four small enclosed posts formed within it; and the work at Torres Vedras (fig. 76) had each of its salient points formed into an independent post. These interior defences and retrenchments were intended to guard against a general panic amongst the garrison, which would necessarily be composed in part of indifferent troops, and also to prevent the loss of the work by the entry of the assailants at any weak or ill-defended point. Such interior lines to rally on are absolutely essential to the security of a large field-work. They serve as substitutes for a blockhouse or tower, placed in the interior of all well-constructed permanent earthen works, and merit far more attention than they generally receive.

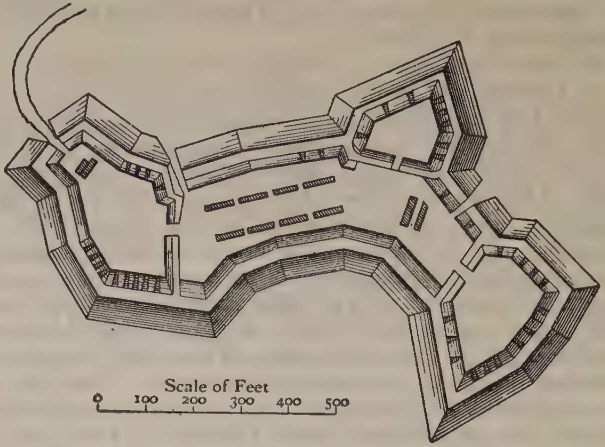


FIG. 76.—Torres Vedras Works.

The small circular windmills of stone, which were frequently found occupying salient knolls . . . readily converted into admirable interior posts of that nature. The profile of the several works varied on every face and flank, according to its liability to be attacked or cannonaded; the only general rule enforced being that all ditches should be at least 15 ft. wide at top and 10 ft. in depth, and the crest of the parapet have at least 5 ft. command over the crest of the counterscarp. No parapet exceeded 10 ft. in thickness, unless exposed to be severely cannonaded, and few more than 6 or 8 ft.; and some, on high knolls, where artillery could not by any possibility be brought against them, were made of stone or rubble less than 2 ft. in thickness, to gain more interior space, and allow full liberty for the use of the defenders' bayonets."

Fig. 77 gives two typical sections of these works.

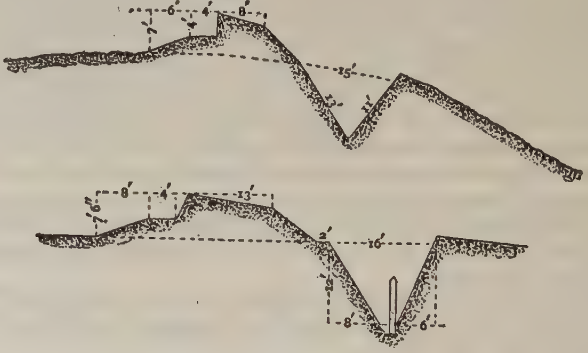


FIG. 77.

The works of Torres Vedras have been chosen for illustration because they offer very good historical examples, and also because of the value of the critical remarks of Sir John Jones, who as a captain was the engineer in charge of their construction. At the same time it must be remembered that they differ from ordinary field-works in having an unusual degree of strength, plenty of time and civilian labour having been available for their construction. In this respect they approximate more to semi-permanent works, the main reason why they did not receive under the circumstances a greater development of ditch and parapet being that in addition to the large number of works required, much labour was expended in abatis, inundations, scarping hill-sides and constructing roads.

Some further remarks of Sir John on the *situations of the works* are very instructive:—

"Many of the redoubts were placed on very elevated situations on the summit of steep hills, which gave them a most imposing appearance; but it was in reality a defect for the fire of their artillery on the object to be guarded became so plunging as to lose half its powers; the musketry could not be made to scour the face of the hill sufficiently; and during the night both arms became of most uncertain effect.

"The domineering situation of the redoubts, however, gave confidence to the young troops which composed their garrisons, protected them from a cannonade, and screened their interior from musketry, unless fired at a high angle, and consequently at random. These considerations perhaps justify the unusually elevated sites selected for most of the redoubts on the lines, though they cannot induce an approval of them as a general measure."

The chief principle of the period was thus that the redoubts were the most important features of lines of defence, and that they combined physical obstacle and protection with good musketry and artillery positions. The value of concealment was not ignored, but it was as a rule subordinated to other considerations.

19th century.

The principles of this time remained unaltered until after the Crimean War. In the American Civil War the power of the rifle began to assert itself, and it was found that a simple breastwork defended by a double rank of men could protect itself by its fire against an ordinary assault. This power of the rifle gave greatly enhanced importance to any defences that could be hastily extemporized behind walls, hedges or any natural cover. About the period of the Franco-German War other considerations came in. The increased velocity of artillery projectiles reduced in some ways their destructive effects against earth parapets, because the shell had an increasing tendency to deflect upwards on striking a bank of loose earth. Also the use of shrapnel made it impossible for troops to find cover on the terreplein of a work some distance behind the parapet.

These considerations, however, were not fully realized at that time. The reason was partly a want of touch between the engineers and the non-technical branches of most armies, and partly that original writers from the Napoleonic wars to the present day have been more occupied with the primary question of the value of field defences as a matter of tactics than with their details considered from the standpoint of fortification.

There was always an influential school of writers who declaimed against all defences, as being injurious to the offensive spirit so essential to success. Those writers who treated of the arrangements of defences devoted themselves to theoretical details of trace quite after the old style; discussing the size and shape of typical redoubts, their distance apart and relation to lines of trenches, &c. The profiles—the thick parapet with command of 7 ft. or more, the deep ditch, and the inadequate cover behind the parapet—remained as they had been for a century.

The American Civil War showed the power of rifles behind slight defences. Plevna in 1877 taught a further lesson. It proved the great resisting power of extemporized lines; but more than that, we begin to find new arrangements for protection against shell fire (see plans and sections in Greene's *The Russian Army and its Campaign in Turkey*). The trace of the works and the sections of parapet and ditch suggest Torres Vedras; but a multiplication of interior traverses and splinter-proof shelters show the necessity for a different class of protection. The parapet was designed according to the old type, for want of a better; the traverses and shelters were added later, to meet the necessities of the case. The Turks also used two or three tiers of musketry fire, as for instance one from the crest of the glacis, one from the parapet, and one from a traverse in rear of it. This, however, is a development which will not be necessary in future, thanks to magazine rifles.

Principles of modern field defences.

From 1877 to 1899 the efficiency of rifles and guns rapidly increased, and certain new principles, causing the field defences of the present day to differ radically from those of the 18th century, remained to be developed. These may be considered under the following heads: the nature of protection required, the diminished need of obstacle, and the adaptation of works to ground.

The principle that *thickness* of parapet is no longer required, to resist artillery fire, was first laid down at Chatham in 1896. The distance at which guns now engage makes direct hits on parapets comparatively rare. Further, a shell striking near the crest of a parapet may perhaps kill one man if he is in the way, and displace a bushel of earth. That is nothing. It is the contents of the shell, whether shrapnel or explosive, that is the source of danger and not the shell itself. Thus the enemy's object is to burst his common shell immediately behind the parapet, or his shrapnel a short distance in front of it, in order to get searching effect. It follows that a parapet is thick enough if it suffices to stop rifle bullets, since the same thickness will *a fortiori* keep out shrapnel bullets or splinters of shell. For this purpose 3 ft. is enough.

Real protection is gained by a trench close in rear of the parapet, deep enough to give shelter from high angle shrapnel, and narrow enough to minimize the chance of a common shell dropping into it. This protection is increased by frequent traverses across the trench.

The most essential point of all is *concealment*. In gaining this we say good-bye finally to the old type of work. Protection is now given by the trench rather than the parapet; command and the ditch-obstacle (which furnished the earth for the high parapet) are alike unnecessary. Concealment can therefore be studied by keeping the parapet down to the lowest level above the surface from which the foreground can be seen. This may be 18 in. or less.

The need of obstacle, in daylight and when the defenders are not abnormally few, has practically disappeared. For night work, or when the assailant is so strong as to be able to force home his attack in face of protected rifle fire, what is needed is not a deep ditch immediately in front of the parapet, difficult to climb, but also difficult to flank, but an obstacle that will detain him under fire at short range. It may be an entanglement, an abatis, an inundation: anything that will check the rush and make him move slowly.

In the *adaptation of works to ground*, the governing factor is the power of the rifle in frontal defence. We have seen that in Peninsular times great reliance was placed on the flanking defence of lines by guns in redoubts. Infantry extended behind a simple line of trench could not resist a strong attack without such support. Now, however, infantry behind a slight trench, with a good field of fire should be able to defend themselves against any infantry attack.

This being so, the enemy's artillery seeks to locate the trenches and to cover them with a steady hail of shells, so as to force the defenders to keep down under cover. If they can succeed in doing this, it is possible for the attacking infantry to advance, and the artillery fire is kept up until the last moment, so that the attack may have the narrowest possible space to cover after the defenders have manned their parapets and opened fire. Fig. 78 shows the action of various natures of projectiles.

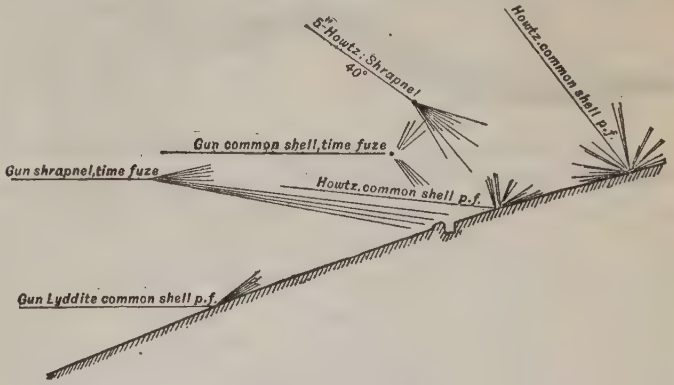


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FIG. 78.—Effect of Projectiles.

We need not here discuss the rôle of the defenders' artillery in replying to that of the enemy and playing on the attack; nor for the moment consider how far the defence of the trenches while under artillery fire can be made easier by overhead cover. The main question is—what is, in view of the nature of the attack, the best disposition of lines of trench; and do they require the addition of redoubts?

The most important point, with the object of protection, is that the trenches must not be conspicuous; this is the best defence against artillery. With the object of resistance by their own fire they must have a good view, or, as it is generally described, no *dead ground* in front of them. For this purpose 300 or 400 yds. may be enough if the ground is even and affords no cover.

This necessity for invisibility, together with the shallowness of the zone that suffices for producing a decisive fire effect, has of late years very much affected the choice of ground for a line of trenches.

Siting of trenches.

For a defensive position on high ground, it was usually laid down until the South African War that a line of trenches should be on the "military crest" (Fr. *crête militaire*), *i.e.* the highest point on the hill from which the whole of the slopes in front can be seen. Thus in the three sections of ground shown in fig. 79 it would be at *a*, *b* and *c* respectively. The simplicity of this prescription made it attractive and it came to be rather abused in the text-books. There were, even before the improvements in artillery, objections to it, because on most slopes the military crest would be found at very different elevations on different parts of the line, so that by a strict adherence to the rule some of the trenches would be placed near the top of the hill, and some in dangerous isolation near the bottom. Moreover a rounded hill has no military crest.

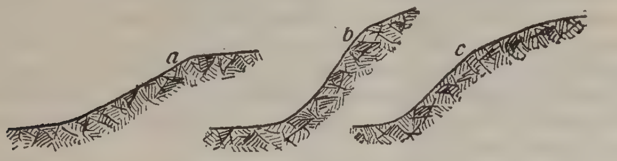


FIG. 79.

Further, we have to consider nowadays not only the position of the fire-trenches, but those of supports, reserves and artillery, and the whole question is extremely difficult.

For instance, considering the sections alone, as if they did not vary along the line, the positions at *a* and *b*, fig. 79, are bad because they are on the sky-line and therefore a good mark for artillery. That at *b* is especially bad because the slope in front is so steep that the defenders would have to expose themselves very much to fire down it, and the artillery fire against them can be kept up until the very last moment. The position *c* has the advantage of not being on the sky-line, but the position of the supports in rear is exposed.

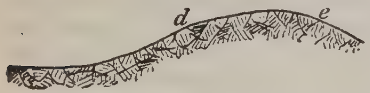


FIG. 80.

Such a position as that at *d*, fig. 80, is good, but protected or concealed communications must be made for the supports coming from *e* over the brow of the hill.

Another possible position for the infantry line is at *f*, fig. 81, with the guns on the high ground behind. They might easily be quite concealed from the enemy's artillery. The drawback is that no retirement up the exposed slope would be possible for them, except at night. The fire from *f* will be *grazing*, which will be a great advantage as compared with the *plunging* fire that would be obtained from a position up the hill.

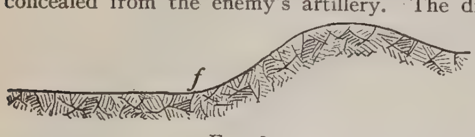


FIG. 81.

It is idle, however, to give more than the most cursory consideration to sections of imaginary positions. It is only by actual practice on the ground that skill can be attained in laying out positions, and only a trained soldier with a good eye can succeed in it. Briefly, the advantages of view and position given by high ground must be paid for in some degree by exposure to the enemy's artillery; and at least as much consideration—possibly as much labour—must be given to communications with the fire-trenches as to the trenches themselves. Irregular ground simplifies the question of concealment but also gives cover to the enemy's approach. The lie of the ground will itself dictate the position of the trenches, subject to the predispositions of the responsible officer. On flat featureless ground the general trace of the trenches should be irregular. This makes a more difficult target for artillery, and affords a certain amount of cross and flanking fire, which is a very great advantage. Great care should, however, be taken not to expose the trenches to oblique or enfilade fire; or at least to protect them, if so exposed, by traversing.

Trenches.

Concealment of trenches is generally attempted by covering the freshly turned earth of the small parapet with sods, leafy branches or grass. In this connexion it should be remembered that after a day or two cut leaves and grass wither and may become conspicuous against a green surface. Where the ground is so even that a good view of the foreground is possible from the surface level, the trench may be made without a parapet; but this entails great labour in removing and disposing of the excavated earth. A common device is to conceal the parapet as well as possible and to make a dummy trench some distance away to draw fire.

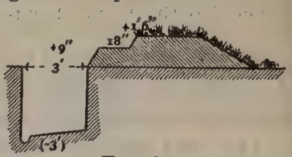


FIG. 82.

Besides the direct concealment of trenches, care must be taken that the site is not conspicuous. Thus a trench should not be placed along the meeting line of two different kinds of cultivation, or along the edge of a belt of heather on a hill-side, or where a difference of gradient is sharply defined; or where any conspicuous landmark would help the enemy's artillery to get the range.

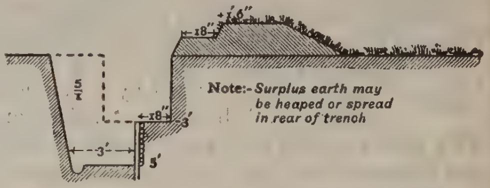
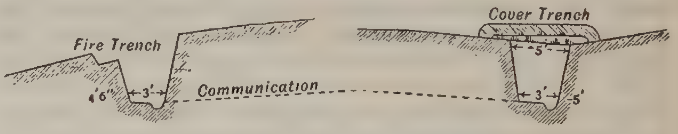

+1'6"
18"
5'
18"
3'
3'
5'
Note:- Surplus earth may be heaped or spread in rear of trench

FIG. 83.

Trenches are broadly distinguished as "fire trenches" and "cover trenches," according as they are for the firing line or supporting troops. The following simple types are taken from the 1908 edition of *Military Engineering* (part 1): "Field Defences."

Fig. 82 is the most common form of fire trench, in which labour is saved by equalizing trench and parapet. This would take 1½ to 2 hours in ordinary soil. Fig. 83 shows the same trench improved by 2 or 3 hours' more work. Fig. 84 shows a fire trench without parapet, with cover trench and communication.

The addition of a loophole of sand-bags, sodded on the top for concealment (called *head-cover*), gives increased protection, but at the cost of greater prominence for the parapet (fig. 85). Overhead cover can only be provided in fire trenches by giving the parapet still greater height and it is not usually done. Portions of the trench not used for firing can, however, be given splinter-proof protection by putting over them branches or bundles, covered with a few inches of earth: or by boards, or sheets of corrugated iron if they can be had. A better plan when time permits is to provide cover trenches immediately behind and communicating with the fire trench.

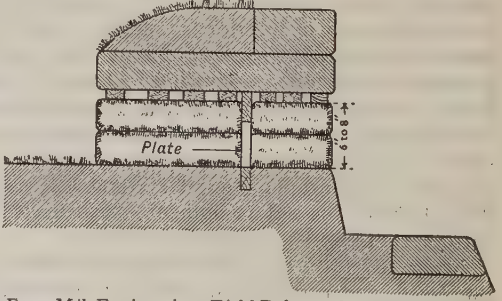


From *Mil. Engineering: Field Defences* (1908), by permission of the Controller H. M. Stationery Office.

FIG. 84.

Redoubts.

The question of redoubts has been a vexed one for years; partly they were thought to be unnecessary in view of the resisting power of a line of trenches, but chiefly because the redoubt was always imagined as one of the older type, with a high conspicuous parapet. Of course a redoubt of such a nature would be readily identified and made untenable. But the idea of a redoubt does not necessarily imply command. Its object is that it shall be capable of all-round defence. There can be no doubt that as there is always a possibility of lines being pierced somewhere, it is desirable, unless the whole line is to be thrown into confusion and forced back, to have some point at which the defenders can maintain themselves. This is not possible unless at such points there is provision for defence towards both flanks and rear, that is to say, when there are redoubts, which can hold on after certain portions of the line have been lost and thereby can localize the enemy's success and simplify



From *Mil. Engineering: Field Defences*, by permission of the Controller H. M. Stationery Office.

FIG. 85.

the action of supporting troops. In order that redoubts may exercise this function, all that is necessary is that their defenders should be able to see the ground for a furlong in front of them in every direction. Their parapets therefore, need be in no way more conspicuous than those of the neighbouring fire trenches, and in that case there is no fear of their drawing special attention from the enemy's artillery. Whatever theories may have been put forward on the subject in practice they are constantly used, and in the Russo-Japanese War, where the experience of South Africa was already available, we find them in the fighting lines on both sides

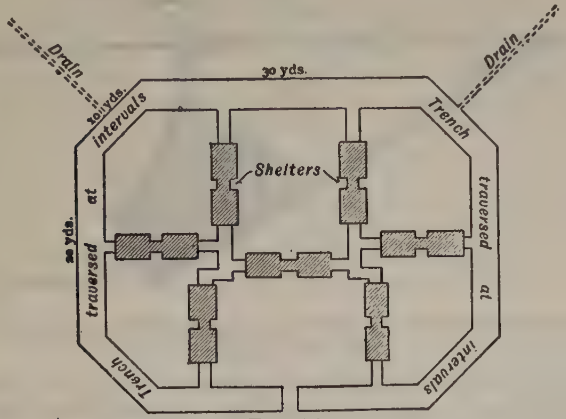


FIG. 86.

The modern type of field redoubt is a fire trench, no more conspicuous than the others, in any simple form adapted to the ground that will give effective all-round fire, such as a square with blunted angles. Enhanced strength may be given by deepening the trenches and improving the overhead cover; and special use may here be made of obstacles.

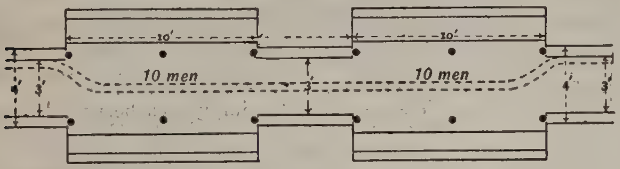


FIG. 87.

Within the redoubt cover may be provided for men in excess of those required to man the parapet, by means of cover trenches and field casemates Fig. 86 gives the general idea of such a redoubt, and figs. 87, 88 the plan and section of the interior shelters. Such a work can easily be made quite invisible from a distance. It gives excellent cover against shrapnel, but would not be tenable against howitzer common shell, if the enemy did manage to bring an accurate fire to bear on it.

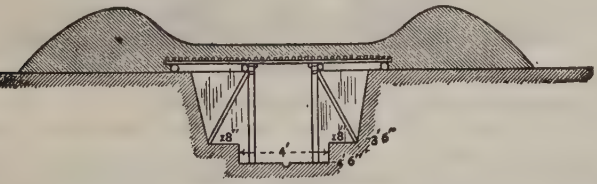


FIG 88.

Fig. 89 shows the section of a parapet with two shelters behind it for a work with a high command of 5 or 6 ft. This work would require a concealed position, which can often be found a little in rear of the firing line.

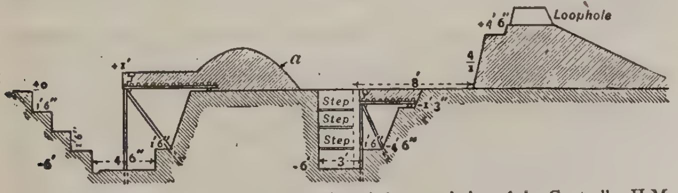


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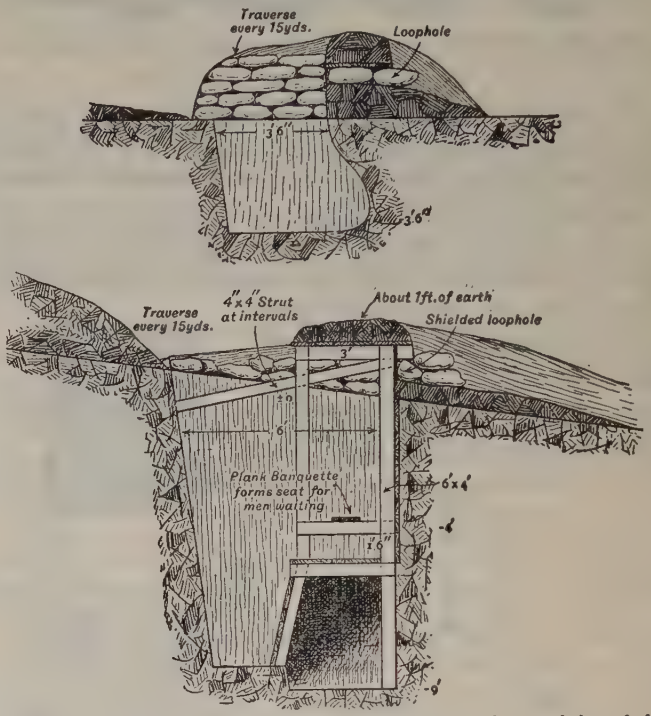
FIG. 89.

Boer, Russian and Japanese types.

In the South African War a good deal of interest was excited by a type of trench used by the Boers. It was very narrow at the surface, giving only just room for a man to stand; but undercut or hollowed out below, so that he could sit down with very good cover. Such a section is only possible in very firm soil. Apart from this, the type is really only suited to rifle pits, as a trench proper should have room for officers and N.C.O. s to move along within it. The Boers showed great skill in concealing their trenches. One good point was that there was generally something making a background immediately behind the men's heads, so that they did not stand out in relief when raised above the parapet.

In the Russo-Japanese War the Russian trenches at the outset were of old-fashioned type and very conspicuous. Later on better types were evolved. Figs. 90 and 91 are a couple of sections from Port Arthur; the first borrowed from the Boers but wider at the top. The Japanese appear to have taken their type mainly from the latest British official books, but applied them with great skill to the ground studying especially invisibility. In their prepared positions they used large redoubts manned by several companies.



From *Russo-Japanese War: British Officers' Reports*, vol. ii., by permission of the Controller H.M. Stationery Office.

FIGS. 90 and 91.

Cover for Guns.—Some degree of cover for guns, in addition to the shield, is always desirable. If the gun stands on the natural surface of the ground, the cover is called an epaulment. In that case a bank is thrown up in front of the gun, about 1 ft. high in the centre, and 3 ft. 6 in. high at the ends. On either side of the gun and close up to the bank is a small pit for the gunners. The rest of the earth for the epaulment is got from a trench in front. If the gun is sunk, the shelter is called a gun-pit.

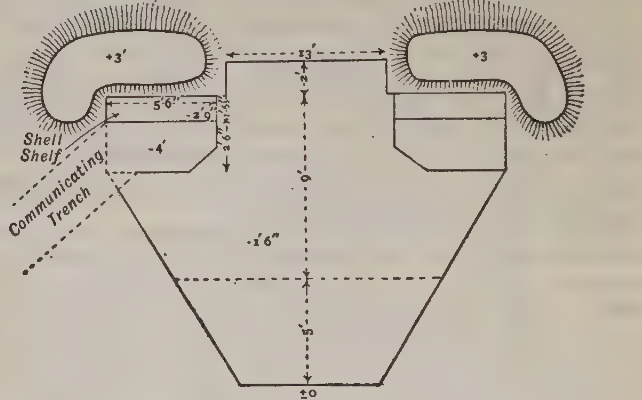


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FIG. 92.—Gun-pit.

In this case there is no bank immediately in front of the gun. Shelter can be got more quickly with a pit than an epaulment, but it is generally undesirable to break the surface of the ground.

Obstacles. The commonest forms of *obstacle* now used are *abatis* and *wire entanglements*. Fig. 93 shows a well-finished type of abatis. The branches are stripped and pointed, and the butts are buried and pegged firmly down. Wire entanglement may be added to this with advantage. An abatis should be protected from artillery fire, which is sometimes done by placing it in a shallow excavation with the earth thrown up in front of it.

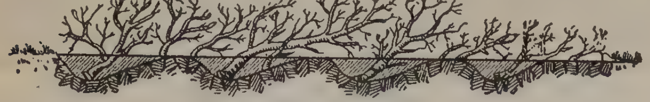

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FIG. 93.—Abatis.

Wire may be used as a *high* or *low entanglement* or as a fence or trip wire or concealed obstacle. The usual form of high wire entanglement consists of several rows of stout stakes 4 or 5 ft. long, driven firmly into the ground about 6 ft. apart, and connected horizontally and diagonally with barbed wire.

Palisades are still used, and need no description. They were formerly often made bullet-proof, but this is no longer possible. *Fraises* are seldom heard of now, though they may appear occasionally in a modified form. They were much used in connexion with deep ditches, and are palisades placed so as to project horizontally from the escarp, or sloping forward in the bottom of the ditch. *Military pits* both *deep* and *shallow* (the latter, shown in fig. 95, called *trous de loup*) are not so much used as formerly, because the obstacle is hardly worth the labour expended on it. Both, however, were employed in the Russo-Japanese War. *Crows' feet*, formerly much used as a defence against cavalry, are practically obsolete. They consisted of four iron spikes joined together at their bases in such a manner that however they were thrown down one point would always be pointing upwards (fig. 94). *Chevaux-de-frise* (*q.v.*) were formerly a much-used type of obstacle.

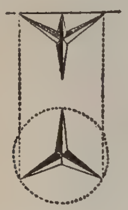

FIG. 94.—Crows' Feet.

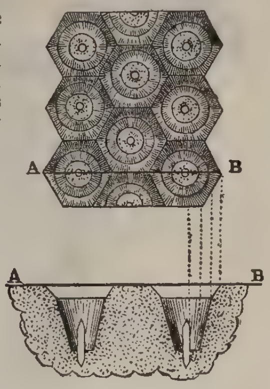

FIG. 95.—Plan and section of Trous-de-loup.

The best obstacle is that which can be made to fulfil a given object with the least expenditure of time and labour. From this point of view barbed wire is far the best. One of its greatest advantages is that it gives no cover whatever to the enemy.

Fougasses have always for convenience been classed as obstacles. A fougasse is a charge of powder buried at the bottom of a sloping pit. Over the powder is a wooden shield, 3 or 4 in. thick, and over the shield a quantity of stones are piled. The illustration, fig. 96, gives a clear idea of the arrangement. A fougasse of this form, charged with 80 ℔ of powder, will throw 5 tons of stones over a surface 160 yds. long by 120 wide. They may be fired by powder hose, fuze or electricity. Their actual effect is very often a matter of chance, but the moral effect is usually considerable.

Dams are most effective obstacles, when circumstances allow of their use. They are constructed by military engineers as small temporary dams would be in civil works.

Illumination. A most important question, especially in connexion with obstacles, is that of lighting up the foreground at night. Portable electric searchlights are most valuable, especially for detecting the enemy's movements at some distance; but their use will naturally always be restricted. Star shells and parachute lights fired from guns are not of much use for the immediate foreground, and do not burn very long. They were formerly chiefly of use in siege works, to light up an enemy's working parties. Germany has introduced lightballs fired from pistols, which will probably have a considerable future.

Various civilian forms of *flare-light* would be very useful to illuminate obstacles, but cannot well be carried in the field. *Bonfires* are very useful when material is available. They require careful treatment, *e.g.* they must be so arranged that they can be lighted instantaneously (they may be lighted automatically, by means of a trip wire and a fuze); they must give a bright light at once (this can be ensured with shavings or straw sprinkled with petroleum); they must be firmly built so that the enemy cannot destroy them easily; and if possible there should be a screen arranged behind them so that they may not light up the defence as well as the attack.

Block-houses. Blockhouses are familiar to the public from the part they played in the South African War of 1899–1902. In the old-fashioned permanent fortification they were used as keeps in such positions as re-entering places of arms and built of masonry. Stone blockhouses have long been used in the Balkans for frontier outposts; they are sometimes built cruciform, so as to get some flanking defence. In the form of bullet-proof log-cabins they have played a great part in warfare between pioneer settlers and savages.

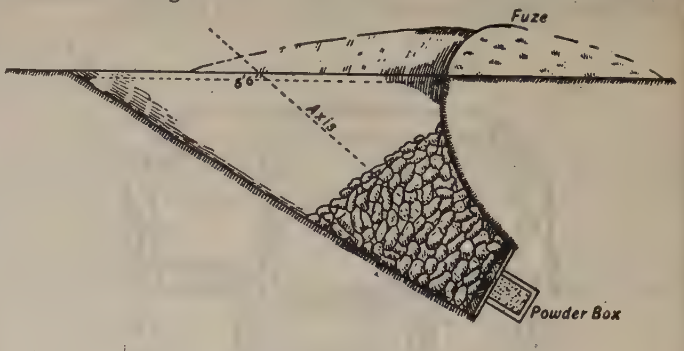

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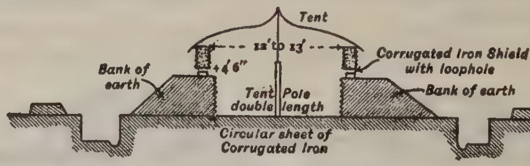
FIG. 96.—Fougasse.

In the 19th century blockhouses were usually designed to give partial protection against field artillery; the walls being built of two thicknesses of logs with earth between them, the roof flat and covered with 2 or 3 ft. of earth, and earth being piled against the walls up to the loopholes. Nowadays they are employed only in positions where it is not likely that artillery will be brought against them: but they may be made tenable for a while even under artillery fire if they are surrounded by a trench and parapet.

Blockhouses are especially useful for small posts protecting such points as railway bridges, which the enemy may attempt to destroy by cavalry raids. The essential feature is a bullet-proof loop-holed wall, arranged for all-round fire, with enough interior space for the garrison to sleep in. The roof may be simply weatherproof. Some arrangement for storing water must be provided. Circular blockhouses were very popular in South Africa. They were made of sheets of corrugated iron fastened 6 in. apart on a wooden framework, the space between the sheets being filled with small stones. The loop-holes were made of sheet-iron frames inserted in the walls. Fig. 97 shows a section of one of these blockhouses.



Tent
12' to 13'
+4'6"
Bank of earth
Tent Pole double length
Corrugated Iron Shield with loophole
Bank of earth
Circular sheet of Corrugated Iron

By permission of the Controller H.M. Stationery Office.

FIG. 97.—Blockhouse, South Africa, 1900–1902.

Woods. The defence of woods was formerly an important branch of field defences. Abatis and entanglements could readily be extemporized, trunks of trees made strong breastworks, and the wood concealed the numbers of the defenders. A wood was therefore generally considered a useful addition to a line of defence. It was customary to hold the front edge of the wood, the irregularities of the outline being utilized for frontal and flanking fire, while obstacles were disposed some 50 yds. in front. In a carefully prepared position, clearings would be made parallel to the front and some distance back from it, for support positions, and great attention was paid (in theory at least) to clearing communications, erections, signposts, &c., so that the defending troops might move freely in any desired direction.

Woods, however, had their inherent drawbacks. The ground is hard to dig, clearing involves great labour; and communication, at the best, is cramped. Nowadays a wood can hardly be considered a strong defensive element in a line. The front of it is an excellent ranging mark for artillery, and positions within the wood are not easily made, because of the difficulty of trenching, and the fact that no reasonable amount of timber will make a breastwork proof against the modern bullet. Once an enemy gets a footing within a wood, the position is more favourable to offensive than to defensive action. If a wood has to be occupied in a line of defence, it is probable that in most cases the rear edge or a line slightly behind it would be the best to fortify, though the front edge would no doubt be held by the fighting line at the outset.

Villages. The defence of villages is another question which has been much affected by recent improvements in artillery. Formerly villages were very important adjuncts to a line of defence, and strong points for a detached force to hold. There were indeed always drawbacks. The preparations for defence entailed a good deal of labour, and the defending force was scattered in houses and enclosures, so that control and united action were difficult. But the value of the ready-made protection afforded by walls was so great—and sometimes even decisive—that villages were occupied as a matter of course. This is certainly now changed, but precisely to what extent it will be impossible to say, until after the next European war. A village under fire is not now an ideal defensive position. A single shrapnel penetrating the outer wall may kill all the occupants of a room; a single field-howitzer shell may practically ruin a house. At the same time, a house or line of houses may (without any preliminary labour at all) give very good protection against shell fire to troops *behind* them. Further, the value to the defence of the slightest cover, once the infantry attack has developed, is so great that the ruins of walls and houses occupied at the right moment may prove an impregnable stronghold. This class of fighting, however, does not properly come under the present heading. For the details of the defence of walls, houses, &c., see the official *Mil. Engineering* (1908).

Entrenching under Fire.—Progress in this direction has been delayed by the reluctance of military authorities to add a portable entrenching tool to the heavy burden already carried by the infantry soldier. Further delay has resulted from the attempts of enthusiastic inventors to produce a tool that shall weigh nothing, go easily in the pocket, and be available as a pick, shovel, saw, hand-axe or cork-screw. A tool that will serve more than one use is seldom satisfactory for any.

Extemporized cover.

The object of entrenching under fire is to enable attacking infantry, when their advance is checked by the enemy's fire, to maintain the ground they have won by extemporizing cover where none exists. The need of this was first felt in the American Civil War, and towards the close of it a small entrenching spade 22 in. long and weighing only $1\frac{1}{2}$lb was introduced by Brigadier-General H. W. Benham into the Army of the Potomac. Since that time a great number of patterns have been tried, including shovel, trowel and adze types. The most popular of these has been the Linnemann spade, which is used by most continental armies and by the Japanese. The Austrian form of this tool is a rectangular spade with straight handle. The length over all is a little less than 20 in. The blade is 8 in. long by 6 wide. One side of it has a saw edge, and the other a cutting edge. For carriage, the blade is enclosed in a leather case, which is strapped to the pack or the waist-belt. In the British army the Wallace combined pick and shovel was used for some time, but was eventually dropped. There was always great doubt whether the utility of a portable entrenching tool was such as to justify the inconvenience caused to the soldier in carrying it. But the experience of the Russo-Japanese War seems to have finally established the necessity of it, and also the fact that it must generally be used lying down. For this purpose and for convenience in carrying it on the person, a very light short-handled tool is required.

The soldier lying down cannot attempt to dig a trench, but can make a little hole by his side as he lies, and put the earth in front of his head. A method introduced by the Japanese is that at each check in the advance the front line should do this, and, as they go forward, the supporting lines in succession should improve the cover thus commenced.

General remarks.

There are few things that soldiers dislike more, in the way of training, than trenchwork. For men unused to it, it is tiring and tedious work, and it is difficult for them to realize its importance. At the same time it is a commonplace of recent history that men who have been in action a few times develop a great affection for the shovel. The need of trenches grows with the growth of firearms, and the latest feature of modern tactics is the use of them in attack as well as in defence. The observation has often been made—with what truth as a general proposition we cannot here discuss—that modern battles tend more and more to resemble a siege. The weaker side, it is said, entrenches itself; the other bombards and attacks. After gaining as much ground as they can, the attacking troops wait for nightfall and entrench; perhaps making a further advance and entrenchment before dawn. In the last stage the attack might even be reduced to gaining ground by sapping. In open and featureless ground, where the rifle and gun have full play, the trench is to the modern soldier very much what the breast-plate was to the man-at-arms, an absolute essential.

The most important point in connexion with modern field fortification is the effect on both strategy and tactics of the increased resisting power of the defence. A small force well entrenched can check the frontal attack of a very much larger force, and while holding its position can make itself felt over a wider radius than ever before. This must needs have a marked effect on strategy, and it is quite possible to foresee such an ultimate triumph of field fortification as that one force should succeed in surrounding another stronger than itself, and by entrenching prevent the latter from breaking out and compel its surrender.

VI. Conclusion

In tracing the history of the science of fortification and in outlining the practice of our own time it has been necessary to dwell chiefly on the material means of defence and attack. The human element has had to be almost ignored. But here comes in the paradox, that the material means are after all the least important element of defence. Certainly it is inconceivable that the designer of a fortress should not try to make it as strong as is consistent with the object in view and the means at his disposal. And yet while engineers in all ages have sought eagerly for strength and refinements of strength, the fact remains that the best defences recorded in history owed little to the builder's art. The splendid defence in 1667 of Candia, whose enceinte, of early Italian design, was already obsolete but whose capture cost the Turks 100,000 men; the three years defence of Ostend in 1601; the holding of Arcot by Clive, are instances that present themselves to the memory at once. The very weight of the odds against them sometimes calls out the best qualities of the defenders; and the *man* when at his best is worth many times more than the *rampart* behind which he fights. But it would be a poor dependence deliberately to make a place weak in order to evoke these qualities. One cannot be sure that the garrison will rise to the occasion, and the weakness of the place has very often been found an excuse for giving it up with little or no resistance.

Very much depends on the governor. Hence the French saying, "tant vaut l'homme, tant vaut la place." Among modern men we think of Todleben (not governor, but the soul of the defence) at Sevastopol, Fenwick Williams at Kars, Denfert-Rochereau at Belfort, and Osman Pasha at Plevna. The sieges of the 16th and 17th centuries offer many instances in which the event turned absolutely on the personal qualities of the governor; in some cases distinguished by courage, skill and foresight, in others by incapacity, cowardice or treachery. The reader is referred to Carnot's *Défense des places fortes* for a most interesting summary of such cases, one or two of which are quoted below.

The spirit of the defence.

Naarden was besieged by the prince of Orange in September 1673 and defended by Philippe de Procé, sieur Dupas. The duke of Luxemburg visited the place some hours before it was invested, and arranged with Dupas to relieve him as soon as he had collected his cavalry. But the governor lost his head when he saw the enemy encamped round the place, and surrendered it before he had even lost the covered way. He was subsequently tried by a council of war and sentenced to be degraded before the troops and imprisoned for life. The reason the court gave for not condemning him to death was that they could find no regulation which condemned a man to loss of life for being a coward. (At that period the decapitation of a governor who was considered to have failed in his duty was not uncommon.) This man, however, was not wanting in physical courage. He was in prison at Grave when it was besieged a year later, obtained leave to serve as a volunteer in the defence, fought well and was killed.

A similar case occurred in the English Civil War. In 1645 the young governor of the royal post at Bletchingdon House was entertaining a party of ladies from Oxford, when Cromwell appeared and summoned him to surrender. The attacking force had no firearm more powerful than a carbine, but the governor, overawed by Cromwell's personality, yielded. Charles I., who was usually merciful to his officers, caused this governor to be shot.

A defence of another kind was that of Quillebœuf in 1592. Henry IV. had occupied it and ordered it to be fortified. Before the works had been well begun, Mayenne sent 5000 men to retake it. Bellegarde undertook its defence, with 115 soldiers, 45 gentlemen and a few inhabitants. He had ammunition but not much provisions. With these forces and a line of defence a league in length, he sustained a siege, beat off an assault on the 17th day, and was relieved immediately afterwards. The relieving forces were astonished to find that he had been defending not a fortified town but a village, with a ditch which, in the places where it had been begun, measured no more than 4 ft. wide and deep.

At that period the business aspect of siege warfare already alluded to had been recognized, but many commanders retained the old spirit of chivalry in their reluctance to say the "loth word." The gallant Marshal d'Essé, who feared nothing but the idea of dying in his bed, was lying ill at his country house when he was sent for by the king. He was ordered to take command at Thérouanne, then threatened by Charles V., and made his farewell with these words, which remind us somewhat of Grenville: "Sire, je m'y en vais donc de bon et loyal cœur; mais j'ai ouï dire que la place est mal envitaillée, non pas seulement pourvue de palles, de tranches, ni de hottes pour remparer et remuer la terre; mais lors, quand entendrez que Thérouanne est prise, dites hardiment que d'Essé est guéri de sa jaunisse et mort." And he made good his word, for he was killed at the breach by a shot from the arquebus of a Spanish soldier.

Sometimes the ardour of defence inspired the whole body of the inhabitants. Fine examples of this are the defences of Rochelle (1627) and Saint-Jean de Lône (1636), but these are too long to quote. We may, however, mention Livron, which is curious. In 1574 Henry III. sent one of his favourites, Saint Lary Bellegarde, against the Huguenots in the Dauphiné. Being entrusted with a good army, this gentleman hoped to achieve some distinction. He began by attacking the little town of Livron, which had no garrison and was defended only by the inhabitants. But he was repulsed in three assaults, and the women of the town conceived such a contempt for him that they came in crowds to empty their slops at the breach by way of insult. This annoyed him very much, and he ordered a fresh assault. The women alone sustained this one, repulsed it lightheartedly, and the siege was raised.

Arcot.

The history of siege warfare has more in it of human interest than any other branch of military history. It is full of the personal element, of the nobility of human endurance and of dramatic surprises. And more than any battles in the open field, it shows the great results of the courage of men fighting at bay. Think of Clive at Arcot. With 4 officers, 120 Europeans and 200 sepoys, with two 18-pounders and 8 lighter guns, he held the fort against 150 Europeans and some 10,000 native troops. "The fort" (says Orme) "seemed little capable of sustaining the impending siege. Its extent was more than a mile in circumference. The walls were in many places ruinous; the rampart too narrow to admit the firing of artillery; the parapet low and slightly built; several of the towers were decayed, and none of them capable of receiving more than one piece of cannon; the ditch was in most places fordable, in others dry and in some choked up," &c. These feeble ramparts were commanded almost everywhere by the enemy's musketry from the houses of the city outside the fort, so that the defenders were hardly able to show themselves without being hit, and much loss was suffered in this way. Yet with his tiny garrison, which numbered about one man for every 7 yds. of the enclosure, Clive sustained a siege of 50 days, ending with a really severe assault on two large open breaches, which was repulsed, and after which the enemy hastily decamped.

Such feats as this make arguments about *successive lines of defence* and the *necessity of keeps* seem very barren. History, as far as the writer knows, shows no instances where successive lines have been held with such brilliant results.

Clive's defence of his breaches, which by all the then accepted rules of war were untenable, brings us to another point which has been already mentioned, namely, that a garrison might honourably make terms when there was an open breach in their main line of defence. This is a question upon which Carnot delivers himself very strongly in endeavouring to impress upon French officers the necessity of defence to the last moment. Speaking of Cormontaingne's imaginary *Journal of the Attack of a Fortress* (which is carried up to the 35th day, and finishes by the words "It is now time to surrender"), he says with great scorn: "Crillon would have cried, 'It is time to begin fighting.' He would have said as at the siege of Quillebœuf, 'Crillon is within, the enemy is without.' Thus when Bayard was defending the shattered walls of Mézières, M. de Cormontaingne, if he had been there, would have said, 'It is time to surrender.' Thus when Guise was repairing the breaches of Metz under the redoubled fire of the enemy, M. de Cormontaingne, if he had been there, would have said, 'It is time to surrender.'" Carnot of course allows that Cormontaingne was personally brave. His scorn is for the accepted principle, not for the man.

Resisting "to the last."

It is interesting to contrast with this passage some remarks by Sir John Jones, made in answer to Carnot's book. He says in the notes to the second volume of the *Journals of the Sieges in Spain*: "When the breach shall be pushed properly forward, if the governor insists upon the ceremony of his last retrenchment being stormed, as by so doing he spills the blood of many brave men without a justifiable object, his life and the lives of the garrison should be made the forfeit. A system enforced by terror must be counteracted by still greater terror. Humanity towards an enemy in such a case is cruelty to one's own troops. . . . The principle to be combated is not the obligation to resist behind the breach—for where there is a good retrenchment the bastion should be disputed equally with the counter-guard or the ravelin and can as safely be so—but the doctrine that surrender shall not take place when successful resistance becomes hopeless."

Carnot's word is "fight to the last." Sir John Jones says the commander has no right to provoke further carnage when resistance is hopeless. The question of course is, When is resistance hopeless? Sir John Jones's reputation leaves little doubt that if he had been commanding a fortress on British soil he would not have thought resistance hopeless as long as there was anything whatever left to defend. The reason why these two men of similar temper are found in opposition is quite simple. When Carnot wrote, the French army occupied most of the important fortresses of Europe, and it was to the interest of the emperor that if attacked they should be held to the last moment, in order to cause the enemy as much delay and loss as possible. Jones, on the other hand, was one of the engineers who were engaged in besieging those fortresses, and his arguments were prompted by sympathy for his own countrymen whose lives were sacrificed by the prolongation of such resistance.

A century has passed since Carnot and Jones wrote, and the ideas in which they had been educated were those of the pre-Napoleonic era. In the 18th century fortresses were many, good roads few, and campaigns for the most part leisurely. To the European nations of that time, inheritors of a perennial state of war, the idea of concentrating the national resources on a short and decisive campaign had not occurred. The "knock-out blow" had not been invented. All these conditions are now so changed that new standards must be and indeed have been set up, both for the defence of places and the general employment of fortification.

As regards the conduct of the defence, the massacre of a garrison as a penalty for holding out too long would meet with no sympathy in the present day. On the other hand, the issue of modern wars is worked out so rapidly that if a fortress is well defended, with the advantage of the present weapons, there is always a chance of holding out till the close of the war. If the place is worth holding, it should as a rule be held to the bitter end on the chance of a favourable turn in affairs; moreover, the maintenance of an important siege under modern conditions imposes a severe strain on the enemy and immobilizes a large number of his troops.

Permanent defences.

In concluding this article some elementary considerations in connexion with the use of permanent defences may be noticed, though the general question of strategic fortification is outside its scope. The objects of fortification differ, as has been shown, from age to age. In former times a peaceful people exposed to the raids of piratical Norsemen might find their refuge tower essential; later, a robber-baron might look on his castle as so much capital invested; a wealthy medieval town might prove the value of its walls more than once in a generation; a country without a standing army might gain time for preparation by means of fortresses barring the roads across the frontier. But how does the question stand to-day among European countries which can mobilize their full fighting strength at a few hours' notice? It can only be answered when the circumstances of a particular country are examined.

The use and abuse of fortresses.

If we assume such an impossible case as that of two nations of equal fighting strength and equal resources standing ready in arms to defend a common frontier, and that the theatre of war presents no difficulties on either side, then the use of permanent fortifications, merely as an adjunct to military strength, is wrong. Fortresses do not decide the issue of a campaign; they can only influence it. It is better, therefore, to put all the money the fortress would have cost, and all the man-power that its maintenance implies, into the increase and equipment of the active army. For the fate of the fortress must depend utlimately on the result of the operations of the active armies. Moreover, the very assumption that resources on both sides are equal means that the nation which has spent money on permanent fortifications will have the smaller active army, and therefore condemns itself beforehand to a defensive rôle.

This general negation is only useful as a corrective to the tendency to over-fortify, for such a case cannot occur. In practice there will always be occasion for some use of fortification. A mountain range may lend itself to an economical defence by a few men and some inexpensive barrier forts. A nation may have close to its frontier an important strategic centre, such as a railway junction, or a town of the first manufacturing importance, which must be protected. In such a case it may be necessary to guard against accidents by means of a fortress. Again, if one nation is admittedly slower in mobilization than the other, it may be desirable to guard one portion of the frontier by fortresses so as to force invasion into a district where concentration against it is easiest.

As for the defence of a capital, this cannot become necessary if it stands at a reasonable distance from the frontier until the active armies have arrived at some result. If the fighting strength of the country has been practically destroyed, it is not of much use to stand a siege in the capital. There can be but one end, and it is better, as business men say, to cut losses. If the fighting strength is not entirely destroyed and can be recruited within a reasonable time, say two or three months, then it appears that under modern conditions the capital might be held for that time by means of extemporized defences. The question is one that can only be decided by going into the circumstances of each particular case.

The case of a weak country with powerful and aggressive neighbours is in a different category. If she stands alone she will be eaten up in time, fortifications or no fortifications; but if she can reckon on assistance from outside, it may be worth while to expend most of the national resources on permanent defences.

These hypothetical cases have, however, no value, except as illustrations to the most elementary arguments. The actual problems that soldiers and statesmen have to consider are too complex to be dealt with in generalities, and no mere treatise can supply the place of knowledge, thought and practice.

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FORTLAGE, KARL (1806–1881), German philosopher, was born at Osnabrück. After teaching in Heidelberg and Berlin, he became professor of philosophy at Jena (1846), a post which he held till his death. Originally a follower of Hegel, he turned to Fichte and Beneke (*q.v.*), with whose insistence on psychology as the basis of all philosophy he fully agreed. The fundamental idea of his psychology is impulse, which combines representation (which presupposes consciousness) and feeling (*i.e.* pleasure). Reason is the highest thing in nature, *i.e.* is divine in its nature, God is the absolute Ego and the empirical egos are his instruments.

Fortlage's chief works are: *Genetische Geschichte d. Philos. seit Kant* (Leipzig, 1852); *System d. Psych. als empirische Wissenschaft* (2 vols., Leipzig, 1855); *Darstellung und Kritik der Beweise für das Dasein Gottes* (Heidelberg, 1840); *Beiträge zur Psych. als Wissenschaft* (Leipzig, 1875).

FORT LEE, a borough of Bergen county, New Jersey, U.S.A., in the N.E. part of the state, on the W. bank of the Hudson river, opposite the northern part of New York City. Pop. (1905) 3433; (1910) 4472. It is connected with the neighbouring towns and cities by electric railways, and by ferry with New York City, of which it is a residential suburb. The main part of the borough lies along the summit of the Palisades; north of Fort Lee is an Interstate Palisades Park. Early in the War of Independence the Americans erected here a fortification, first called Fort Constitution but later renamed Fort Lee, in honour of General Charles Lee. The name of the fort was subsequently applied to the village that grew up in its vicinity. From the 15th of September until the 20th of November 1776 Fort Lee was held by Gen. Nathanael Greene with a garrison of 3500 men, but the capture by the British of Fort Washington on the opposite bank of the river and the crossing of the Hudson by Lord Cornwallis with 5000 men made it necessary for Greene to abandon this post and join Washington in the famous "retreat across the Jerseys." An attempt to recapture Fort Lee was made by General Anthony Wayne in 1780, but was unsuccessful. On the site of the fort a monument, designed by Carl E. Tefft and consisting of heroic figures of a Continental trooper and drummer boy, was erected in 1908. The borough of Fort Lee was incorporated in 1904.

FORT MADISON, a city and the county-seat of Lee county, Iowa, U.S.A., on the Mississippi river, in the S.E. corner of the state, and about 20 m. S.W. of Burlington. Pop. (1890) 7901; (1900) 9278, of whom 1025 were foreign-born; (1905) 8767; (1910) 8900. Fort Madison is served by the Atchison, Topeka & Santa Fé (which has repair shops here) and the Chicago, Burlington & Quincy railways. The city has various manufactures, including canned goods, chairs, paper and farm implements; the value of its factory product in 1905 was $2,378,892, an increase of 50·8% over that of 1900. Fort Madison is the seat of one of Iowa's penitentiaries. A stockade fort was erected on the site of the city in 1808, but was burned in 1813. Permanently settled in 1833, Fort Madison was laid out as a town in 1836, and was chartered as a city in 1839.

FORTROSE (Gaelic *for t'rois*, "the wood on the promontory"), a royal and police burgh, and seaport of the county of Ross and Cromarty, Scotland. Pop. (1901) 1179. It is situated on the south-eastern coast of the peninsula of the Black Isle, 8 m. due N.N.E. of Inverness, 26¼ m. by rail. It is the terminus of the Black Isle branch of the Highland railway; there is communication by steamer with Inverness and also with Fort George, 2½ m. distant, by ferry from Chanonry Ness. Fortrose consists of the two towns of Rosemarkie and Chanonry, about 1 m. apart, which were united into a free burgh by James II. in 1455 and created a royal burgh in 1590. It is a place of considerable antiquity, a monastery having been established in the 6th century by St Moluag, a friend of Columba's, and St Peter's church built in the 8th century. In 1124 David I. instituted the bishopric of Ross, with its seat here, and the town acquired some fame for its school of theology and law. The cathedral is believed to have been founded in 1330 by the countess of Ross (her canopied tomb, against the chancel wall, still exists) and finished in 1485 by Abbot Fraser, whose previous residence at Melrose is said to account for the Perpendicular features of his portion of the work. It was Early Decorated in style, cruciform in plan, and built of red sandstone, but all that is left are the south aisles of the nave and the chancel, with the chapter-house, a two-storeyed structure, standing apart near the north-eastern corner. The cathedral and bishop's palace were destroyed by order of Cromwell, who used the stones for his great fort at Inverness. Another relic of the past survives in the bell of 1460. These ruins form the chief object of interest in the town, but other buildings include the academy and the Black Isle combination poorhouse. The town is an agricultural centre of some consequence, and the harbour is kept in repair. Rosemarkie, in the churchyard of which is an ancient Celtic cross, is much resorted to for sea-bathing, and there is a golf course in Chanonry Ness. The burgh belongs to the Inverness district group of parliamentary burghs.

FORT SCOTT, a city and the county-seat of Bourbon county, Kansas, U.S.A., on the Marmaton river, about 100 m. S. of Kansas City, Missouri. Pop. (1880) 5372; (1890) 11,946; (1900) 10,322, of whom 1205 were negroes; (1910 census) 10,463. It is the point of intersection of the Kansas City, Fort Scott & Memphis (St Louis & San Francisco system), the Missouri, Kansas & Texas, and the Missouri Pacific railways, and has in consequence a large traffic. The city is built on a rolling plain. Among its institutions are an Epworth house (1899), Mercy hospital (1889), the Goodlander home, and a Carnegie library. Near the city there is a national cemetery. Fort Scott is in the midst of the Kansas mineral fields, and its trade in bituminous coal is especially important. Building stones, cement rock, clays, oil and gas, lead and zinc are also found in the neighbourhood. An excellent white sulphur water is procured from artesian wells about 800 ft. deep, and there is a mineral-water bath house. The city is also a trading centre for a rich farming region, and is a horse and mule market of considerable importance. Among its manufactures are mattresses, syrup, bricks, pottery, cement and foundry products. In 1905 the total value of the city's factory product was $1,349,026, being an increase of 89% since 1900. The city owns and operates its waterworks. The fort after which the city is named was established by the Federal government in 1842, at a time when the whole of eastern Kansas was still parcelled out among Indian tribes; it was abandoned in 1855. The town was platted in 1857, and Fort Scott was chartered as a city in 1860.

FORT SMITH, a city and the county-seat of Sebastian county, on the extreme W. border of Arkansas, U.S.A., lying about 440 ft. above sea-level, on the S. bank of the Arkansas river, at its junction with the Poteau, and at the point where the Arkansas breaks through the Boston mountains. Pop. (1890) 11,311; (1900) 11,587, of whom 2407 were of negro descent and 684 were foreign-born; (1910 census) 23,975. Transportation is afforded by the river and by six railways, the St Louis & San Francisco, the St Louis, Iron Mountain & Southern, the Arkansas Central, the Fort Smith & Western, the Midland Valley and the Kansas City Southern. A belt line round the business centre of the city facilitates freight transfers. Some of the business streets are unusually broad, and the streets in the residential district are well shaded. Fort Smith is the business centre of a fine agricultural country and of the Arkansas coal and natural gas region. It has extensive wholesale jobbing interests and a large miscellaneous trade, partly in its own manufactures, among which are cotton and timber products, chairs, mattresses and other furniture, wagons, brooms and bricks. In 1905 the total value of the factory product was $2,329,454, an increase of 66·2% since 1900. The public schools have a rich endowment: the proceeds of lands (about 200 acres) once belonging to the local military reservation, which—except the part occupied by a national cemetery—was given by Congress to the city in 1884. Near the centre of the city are a Catholic academy, convent and infirmary; and there is a Carnegie library. A United States army post was established here in 1817; the town was laid out in 1821; and the county was created in 1851. Fort Smith was incorporated as a town in 1842, and was chartered as a city in 1845. All transportation was by river and wagon until 1876, when the railway was completed from Little Rock. The military post, in earlier years the chief depôt for the western forts, was abandoned in 1871. During the Civil War Fort Smith was strongly in sympathy with the Confederacy. The fort was seized by state troops in April 1861, and was reoccupied by the Union forces in September 1863. There was considerable unrest due to border "bushwhacking" throughout the war, and several skirmishes took place here in 1864. The area of the city was more than doubled in 1905.

FORTUNA (FORTUNE), an Italian goddess of great antiquity, but apparently not native at Rome, where, according to universal Roman tradition, she was introduced by the king Servius Tullius as Fors Fortuna, and established in a temple on the Etruscan side of the Tiber outside the city, and also under other titles in other shrines. In Latium she had two famous places of worship, one at Praeneste, where there was an oracle of *Fortuna primigenia* (the first-born), frequented especially by women who, as we may suppose, desired to know the fortunes of their children or their own fortune in child-birth; the other at Antium, well known from Horace's ode (i. 35). It is highly probable that Fortuna was never a deity of the abstract idea of chance, but represented the hopes and fears of men and especially of women at different stages of their life and experience; thus we find her worshipped as time went on under numerous cult-titles, such as *muliebris*, *virilis*, *hujusce diei*, *equestris*, *redux*, &c., which connected her supposed powers with individuals, groups of individuals, or particular occasions. Gradually she became more or less closely identified with the Gr. Τύχη, and was represented on coins, &c., with a cornucopia as the giver of prosperity, a rudder as the controller of destinies, and with a wheel, or standing on a ball, to indicate the uncertainty of fortune. In this semi-Greek form she came to be worshipped over the whole empire, and Pliny (*N.H.* ii. 22) declares that in his day she was invoked in all places and every hour. She even became identified with Isis, and as *Panthea* was supposed to combine the attributes of all other deities.

The best account of this difficult subject is to be found in Roscher's *Mythological Lexicon* (*s.v.*); see also Wissowa, *Religion und Kultus der Römer*, p. 206 foll. (W. W. F.*)

FORTUNATIANUS, ATILIUS, Latin grammarian, flourished in the 4th century A.D. He was the author of a treatise on metres, dedicated to one of his pupils, a youth of senatorial rank, who desired to be instructed in the Horatian metres. The manual opens with a discussion of the fundamental ideas of metre and the chief rules of prosody, and ends with a detailed analysis of the metres of Horace. The chief authorities used are Caesius Bassus and the Latin adaptation by Juba the grammarian of the Τέχνη of Heliodorus. Fortunatianus being a common name in the African provinces, it is probable that the author was a countryman of Juba, Terentianus Maurus and Victorinus.

Editions of the *Ars* in H. Keil, *Grammatici Latini*, vi., and separately by him (1885).

FORTUNATUS, the legendary hero of a popular European chap-book. He was a native, says the story, of Famagusta in Cyprus, and meeting the goddess of Fortune in a forest received from her a purse which was continually replenished as often as he drew from it. With this he wandered through many lands, and at Cairo was the guest of the sultan. Among the treasures which the sultan showed him was an old napless hat which had the power of transporting its wearer to any place he desired. Of this hat he feloniously possessed himself, and returned to Cyprus, where he led a luxurious life. On his death he left the purse and the hat to his sons Ampedo and Andelosia; but they were jealous of each other, and by their recklessness and folly soon fell on evil days. The moral of the story is obvious: men should desire reason and wisdom before all the treasures of the world. In its full form the history of Fortunatus occupies in Karl Simrock's *Die deutschen Volksbücher*, vol. iii., upwards of 158 pages. The scene is continually shifted—from Cyprus to Flanders, from Flanders to London, from London to France; and a large number of secondary characters appear. The style and allusions indicate a comparatively modern date for the authorship; but the nucleus of the legend can be traced back to a much earlier period. The stories of Jonathas and the three jewels in the *Gesta Romanorum*, of the emperor Frederick and the three precious stones in the *Cento Novelle antiche*, of the Mazin of Khorassan in the *Thousand and one Nights*, and the flying scaffold in the *Bahar Danush*, have all a certain similarity. The earliest known edition of the German text of Fortunatus appeared at Augsburg in 1509, and the modern German investigators are disposed to regard this as the original form. Innumerable versions occur in French, Italian, Dutch and English. The story was dramatized by Hans Sachs in 1553, and by Thomas Dekker in 1600; and the latter's comedy appeared in a German translation in *Englische Komödien und Tragödien*, 1620. Ludwig Tieck has utilized the legend in his *Phantasus*, and Adelbert von Chamisso in his *Peter Schlemihl*; and Ludwig Uhland left an unfinished narrative poem entitled "Fortunatus and his Sons."

See Dr Fr. W. V. Schmidt's *Fortunatus und seine Söhne, eine Zauber-Tragödie, von Thomas Decker, mit einem Anhang*, &c. (Berlin, 1819); Joseph Johann Görres, *Die deutschen Volksbücher* (1807).

FORTUNATUS, VENANTIUS HONORIUS CLEMENTIANUS (530–609), bishop of Poitiers, and the chief Latin poet of his time, was born near Ceneda in Treviso in 530. He studied at Milan and Ravenna, with the special object of excelling as a rhetorician and poet, and in 565 he journeyed to France, where he was received with much favour at the court of Sigbert, king of Austrasia, whose marriage with Brunhild he celebrated in an *epithalamium*. After remaining a year or two at the court of Sigbert he travelled in various parts of France, visiting persons of distinction, and composing short pieces of poetry on any subject that occurred to him. At Poitiers he visited Queen Radegunda, who lived there in retirement, and she induced him to prolong his stay in the city indefinitely. Here he also enjoyed the friendship of the famous Gregory of Tours and other eminent ecclesiastics. He was elected bishop of Poitiers in 599, and died about 609. The later poems of Fortunatus were collected in 11 books, and consist of hymns (including the *Vexilla regis prodeunt*, Englished by J. M. Neale as "The royal banners forward go"), epitaphs, poetical epistles, and verses in honour of his patroness Radegunda and her sister Agnes, the abbess of a nunnery at Poitiers. He also wrote a large poem in 4 books in honour of St Martin, and several lives of the saints in prose. His prose is stiff and mechanical, but most of his poetry has an easy rhythmical flow.

An edition of the works of Fortunatus was published by C. Brower at Fulda in 1603 (2nd ed., Mainz, 1617). The edition of M. A. Luschi (Rome, 1785) was afterwards reprinted in Migne's *Patrologiae cursus completus*, vol. lxxxviii. See the edition by Leo and Krusch (Berlin, 1881–1885). There are French lives by Nisard (1880) and Leroux (1885).

FORTUNE, ROBERT (1813–1880), Scottish botanist and traveller, was born at Kelloe in Berwickshire on the 16th of September 1813. He was employed in the botanical garden at Edinburgh, and afterwards in the Royal Horticultural Society's garden at Chiswick, and upon the termination of the Chinese War in 1842 was sent out by the Society to collect plants in China. His travels resulted in the introduction to Europe of many beautiful flowers; but another journey, undertaken in 1848 on behalf of the East India Company, had much more important consequences, occasioning the successful introduction into India of the tea-plant. In subsequent journeys he visited Formosa and Japan, described the culture of the silkworm and the manufacture of rice paper, and introduced many trees, shrubs and flowers now generally cultivated in Europe. The incidents of his travels were related in a succession of interesting books. He died in London on the 13th of April 1880.

FORTUNY, MARIANO JOSE MARIA BERNARDO (1838–1874), Spanish painter, was born at Reus on the 11th of June 1838. His parents, who were in poor circumstances, sent him for education to the primary school of his native town, where he received some instruction in the rudiments of art. When he was twelve years old his parents died and he came under the care of his grandfather, who, though a joiner by trade, had made a collection of wax figures, with which he was travelling from town to town. In the working of this show the boy took an active part, modelling and painting many of the figures; and two years later, when he reached Barcelona, the cleverness of his handiwork made so much impression on some people in authority there that they induced the municipality to make him an allowance of forty-two francs monthly, so that he might be enabled to go through a systematic course of study. He entered the Academy of Barcelona and worked there for four years under Claudio Lorenzale, and in March 1857 he gained a scholarship that entitled him to complete his studies in Rome. Then followed a period of more than two years, during which he laboured steadily at copies of the old pictures to which he had access at Rome. To this period an end was put by the outbreak of the war between Spain and the emperor of Morocco, as Fortuny was sent by the authorities of Barcelona to paint the most striking incidents of the campaign. The expedition lasted for about six months only, but it made upon him an impression that was powerful enough to affect the whole course of his subsequent development, and to implant permanently in his mind a preference for the glitter and brilliancy of African colour. He returned to Spain in the summer of 1860, and was commissioned by the city of Barcelona to paint a large picture of the capture of the camps of Muley-el-Abbas and Muley-el-Hamed by the Spanish army. After making a large number of studies he went back to Rome, and began the composition on a canvas fifteen metres long; but though it occupied much of his time during the next few years, he never finished it. He busied himself instead with a wonderful series of pictures, mostly of no great size, in which he showed an astonishing command over vivacities of technique and modulations of colour. He visited Paris in 1868 and shortly afterwards married the daughter of Federico Madrazo, the director of the royal museum at Madrid. Another visit to Paris in 1870 was followed by a two years' stay at Granada, but then he returned to Rome, where he died somewhat suddenly on the 21st of November 1874 from an attack of malarial fever, contracted while painting in the open air at Naples and Portici in the summer of 1874.

The work which Fortuny accomplished during his short life is distinguished by a superlative facility of execution and a marvellous cleverness in the arrangement of brilliant hues, but the qualities of his art are those that are attainable by a master of technical resource rather than by a deep thinker. His insight into subtleties of illumination was extraordinary, his dexterity was remarkable in the extreme, and as a colourist he was vivacious to the point of extravagance. At the same time in such pictures as "La Vicaria" and "Choosing a Model," and in some of his Moorish subjects, like "The Snake Charmers" and "Moors playing with a Vulture," he showed himself to be endowed with a sensitive appreciation of shades of character and a thorough understanding of the peculiarities of a national type. His love of detail was instinctive, and he chose motives that gave him the fullest opportunity of displaying his readiness as a craftsman.

See Davillier, *Fortuny, sa vie, son œuvre, sa correspondance, &c.* (Paris, 1876); C. Yriarte, *Fortuny* (*Artistes célèbres* series) (Paris, 1889). (A. L. B.)

FORT WAYNE, a city and the county-seat of Allen county, Indiana, U.S.A., 102 m. N.E. of Indianapolis, at the point where the St Joseph and St Mary's rivers join to form the Maumee river. Pop. (1880) 26,880; (1890) 35,393; (1900) 45,115, of whom 6791 were foreign-born; (1910, census) 63,933. It is served by the Cincinnati, Hamilton & Dayton, the Fort Wayne, Cincinnati & Louisville, the Grand Rapids & Indiana, the Lake Shore & Michigan Southern, the New York, Chicago & St Louis, the Pennsylvania and the Wabash railways, and also by interurban electric lines. The site of the city is high (about 770 ft. above sea-level) and level, and its land area was in 1906 a little more than 6 sq. m. The streets are laid out on a rectangular plan and bordered by a profusion of shade trees. The city has several parks, including Lawton Park (31 acres), in which there is a monument in honour of Major-General Henry Ware Lawton (1843–1899), who lived in Fort Wayne for a time, Lake Side Park (22 acres), Reservoir Park (13 acres), Piqua Park (1 acre), and Old Fort Park (¼ acre), which is on the site of Old Fort Wayne. The educational institutions include the German Concordia Collegium (Lutheran), founded in 1839, and having 220 students in 1908, and the state school for feeble-minded youth (1879). The city has a Carnegie library. Fort Wayne is one of the most important railway centres in the Middle West, and several railways maintain here their principal car and repair shops, which add greatly to the value of its manufacturing industries; in 1905 it ranked first among the cities of the state in the value of cars constructed and repaired by steam-railway companies. The other manufactories include foundries and machine shops, iron and steel mills, knitting mills, planing mills, sash and door, car-wheel, electrical machinery, and woodenware factories and flour mills. In 1905 the total value of the factory product of the city was $15,129,562, showing an increase of 34·3% since 1900.

The Miami Indians had several villages in the immediate neighbourhood, and the principal one, Kekionaga (Miami Town or Great Miami Village), was situated on the E. bank of the St Joseph river, within the limits of the present city. On the E. bank of the St Mary's a French trading post was built about 1680. In 1749–1750 the French fort (Fort Miami) was moved to the E. bank of the St Joseph. The English occupied the fort in 1760 and Pontiac captured it in May 1763, after a siege of more than three months. In 1790 the Miami villages were destroyed. In September 1794 General Anthony Wayne built on the S. bank of the Maumee river the stockade fort which was named in his honour, the site of which forms the present Old Fort Park. By the treaty of Greenville, concluded by General Wayne on the 3rd of August 1795, a piece of land 6 sq. m. in area, including the tract of the Miami towns, was ceded to the United States, and free passage to Fort Wayne and down the Maumee to Lake Erie was guaranteed to the people of the United States by the Indians. By the treaty of Fort Wayne, concluded by General W. H. Harrison on the 7th of June 1803, the tract about Vincennes reserved to the United States by the treaty of Greenville was described and defined; by the second treaty of Fort Wayne, concluded by Harrison on the 30th of September 1809, the Indians sold to the United States about 2,900,000 acres of land, mostly S.E. of the Wabash river. In September 1813 Fort Wayne was besieged by Indians, who withdrew on the arrival, on the 12th of September, of General Harrison with about 2700 men from Kentucky and Ohio. The fort was abandoned on the 19th of April 1819 and no trace of it remains. The first permanent settlement here was made in 1815, and the village was an important fur-trading depôt until 1830. The opening of the Wabash & Erie canal in 1843 stimulated its growth. A town was platted and was made the county-seat in 1824; and in 1840 Fort Wayne was chartered as a city.

See W. A. Brice, *History of Fort Wayne* (Ft. Wayne, 1868); John B. Dillon, *History of Indiana, from its Earliest Exploration by Europeans to the Close of the Territorial Government in 1816* (Indianapolis, Ind., 1859); and Charles E. Slocum, *History of the Maumee River Basin, from the Earliest Accounts to its Organization into Counties* (Defiance, Ohio, 1905).

FORT WILLIAM, the principal town of Thunder Bay district, Ontario, Canada, 426 m. (by rail) E.S.E. of Winnipeg, on the Kaministiquia river, about a mile from Lake Superior. It is the lake terminus of the Canadian Pacific railway, of the new Grand Trunk Pacific railway, and of several steamship lines. Port Arthur, the terminus of the Canadian Northern railway, lies 4 m. to the N.E. Fort William contains numerous grain elevators, railway repair shops and docks, and has a large export trade in grain and other farm produce. Minerals are also exported from the mining district, of which it is the centre. Industries, such as saw, planing and flour mills, have also sprung up. The population was 4800 in 1901, but has since increased with great rapidity.

FORT WILLIAM, a police burgh of Inverness-shire, Scotland. Pop. (1901) 2087. It lies at the north-eastern end of Loch Linnhe, an arm of the sea, about 62 m. S.S.W. of Inverness by road or canal, and was, in bygone days, one of the keys of the Highlands. It is 122½ m. N.E. of Glasgow by the West Highland railway. The fort, at first called Kilmallie, was built by General Monk in 1655 to hold the Cameron men in subjection, and was enlarged in 1690 by General Hugh Mackay, who renamed it after William III., the burgh then being known as Maryburgh in honour of his queen. Here the perpetrators of the massacre of Glencoe met to share their plunder. The Jacobites unsuccessfully besieged it in 1715 and 1746. The fort was dismantled in 1860, and demolished in 1890 to provide room for the railway and the station. Amongst the public buildings are the Belford hospital, public hall, court house and the low-level meteorological observatory, constructed in 1891, which was in connexion with the observatory on the top of Ben Nevis, until the latter was closed in 1904. Its great industry is distilling, and the distilleries, about 2 m. N.E., are a familiar feature in the landscape. Beyond the railway station stands the obelisk to the memory of Ewen Maclachlan (1775–1822), the Gaelic poet, who was born in the parish. Fort William is a popular tourist resort and place of call for the steamers passing through the Caledonian canal. The town is the point from which the ascent of Ben Nevis—4½ m. E.S.E. as the crow flies—is commonly made. At Corpach, about 2 m. N., the Caledonian canal begins, the series of locks between here and Banavie—within little more than a mile—being known as "Neptune's Staircase." Both the Lochy and the Nevis enter Loch Linnhe immediately to the north of Fort William. A mile and a half from the town, on the Lochy, stands the grand old ruin of Inverlochy Castle, a massive quadrangular pile with a round tower at each corner, a favourite subject with landscape painters. Close by is the scene of the battle of the 2nd of February 1645, in which Montrose completely defeated the earl of Argyll. The modern castle, in the Scottish Baronial style, 1½ m. to the N.E. of this stronghold and farther from the river, is the seat of Lord Abinger.

FORT WORTH, a city and the county-seat of Tarrant county, Texas, U.S.A., about 30 m. W. of Dallas, on the S. bank of the West Fork of the Trinity river. Pop. (1880) 6663; (1890) 23,076; (1900) 26,688, of whom 1793 were foreign-born and 4249 were negroes; (1910, census) 73,312. It is served by the Chicago, Rock Island & Gulf, the Fort Worth & Denver City, the Fort Worth & Rio Grande, and the St Louis, San Francisco & Texas of the "Frisco" system, the Gulf, Colorado & Santa Fé, the Houston & Texas Central, the International & Great Northern, the Missouri, Kansas & Texas, the St Louis South-Western, the Texas & Pacific, and the Trinity & Brazos Valley (Colorado & Southern) railways. Fort Worth is beautifully situated on a level space above the river. It is the seat of Fort Worth University (coeducational), a Methodist Episcopal institution, which was established as the Texas Wesleyan College in 1881, received its present name in 1889, comprises an academy, a college of liberal arts and sciences, a conservatory of music, a law school, a medical school, a school of commerce, and a department of oratory and elocution, and in 1907 had 802 students; the Polytechnic College (coeducational; Methodist Episcopal, South), which was established in 1890, has preparatory, collegiate, normal, commercial, and fine arts departments and a summer school, and in 1906 had 12 instructors and (altogether) 696 students; the Texas masonic manual training school; a kindergarten training school; St Andrews school (Protestant Episcopal), and St Ignatius Academy (Roman Catholic). There are several good business, municipal and county buildings, and a Carnegie library. On the 3rd of April 1909 a fire destroyed ten blocks in the centre of the city. Fort Worth lies in the midst of a stock-raising and fertile agricultural region; there is an important stockyard and packing establishment just outside the city; and considerable quantities of cotton are raised in the vicinity. Among the products are packed meats, flour, beer, trunks, crackers, candy, paint, ice, paste, cigars, clothing, shoes, mattresses, woven wire beds, furniture and overalls; and there are foundries, iron rolling mills and tanneries. In 1905 the total value of the city's factory product was $5,668,391, an increase of 62.5% since 1900; Fort Worth in 1900 ranked fifth among the cities of the state in the value of its factory product; in 1905 it ranked fourth. Fort Worth's numerous railways have given it great importance as a commercial centre. The municipality owns and operates the waterworks and the electric-lighting plant.

A military post was established here in 1849, being called first Camp Worth and then Fort Worth. It was abandoned in 1853. A settlement grew up about the fort, and the city was incorporated in 1873. The fort and the settlement were named in honour of General William Jenkins Worth (1794–1849), a native of Hudson, New York, who served in the War of 1812, commanded the United States forces against the Seminole Indians in 1841–1842, served under both General Taylor and General Scott in the Mexican War, distinguishing himself at Monterey (where he earned the brevet of major-general) and in other engagements, and later commanded the department of Texas. In 1907 Fort Worth adopted a commission form of government.

FORTY, the cardinal number equal to four tens. The word is derived from the O. Eng. *feówertig*, a combination of *feówer*, four, and *tig*, an old form of "ten," used as a suffix, cf. Icel. *tiu*, Dan. *ti*, ten, and Ger. *vierzig*, forty. The name "The Forty" has been given to various bodies composed of that number of members, particularly to a judicial body in ancient Athens, who tried small cases in the rural districts, and to a court of criminal jurisdiction and two civil appeal courts in the Venetian republic. The French Academy (see ACADEMIES) has also been known as "The Forty" or "The Forty Immortals." The period just before the repeal of the corn laws in the United Kingdom is frequently alluded to, particularly by the free trade school, as the "hungry forties"; and the "roaring forties" is a sailor's name for the stormy region between the 40th and 50th latitudes N. and S., but more particularly applied to the portion of the north Atlantic lying between those latitudes.

FORUM (Lat. from *foris*, "out of doors"), in Roman antiquity, any open place used, like the Greek ἀγορά, for the transaction of mercantile, judicial or political business, sometimes merely as a promenade. It was level, rectangular in form, surrounded by porticoes, basilicas, courts of law and other public buildings. In the laws of the Twelve Tables the word is used of the vestibule of a tomb (Cicero, *De legibus*, ii. 24); in a Roman camp the forum was an open place immediately beside the praetorium; and the term was no doubt originally applied generally to the space in front of any public building or gateway. In Rome (*q.v.*) itself, however, during the period of the early history, forum was almost a proper name, denoting the flat and formerly marshy space between the Palatine and Capitoline hills (also called Forum Romanum), which probably even during the regal period afforded the accommodation necessary for such public meetings as could not be held within the area Capitolina. In early times the Forum Romanum was used for athletic games, and over the porticoes were galleries for spectators; there were also shops of various kinds. But with the growth of the city and the increase of provincial business, more than one forum became necessary, and under the empire a considerable number of *civilia* (judicial) and *venalia* (mercantile) fora came into existence. In addition to the Forum Romanum, the Fora of Caesar and Augustus belonged to the former class; the Forum *boarium* (cattle), *holitorium* (vegetable), *piscarium* (fish), *pistorium* (bread), *vinarium* (wine), to the latter. The Fora of Nerva (also called *transitorium* or *pervium*, because a main road led through it to the Forum Romanum), Trajan, and Vespasian, although partly intended to facilitate the course of public business, were chiefly erected to embellish the city. The construction of separate markets was not, however, necessarily the rule in the provincial fora; thus, in Pompeii, at the north-east end of the forum, there was a *macellum* (market), and shops for provisions and possibly money changers, and on the east side a building supposed to have been the clothworkers' exchange, and at Timgad in North Africa (a military colony founded under Trajan) the whole of the south side of the forum was occupied by shops. The forum was usually paved, and although on festal occasions chariots were probably driven through, it was not a thoroughfare and was enclosed by gates at the entrances, of which traces have been found at Pompeii. When the sites for new towns were being selected, that for the forum was in the centre, and the two main streets crossed one another close to but not through it. At Timgad the main streets are some 5 or 6 ft. lower than the forum. The word *forum* frequently appears in the names of Roman market towns; as, for example, in Forum Appii, Forum Julii (*Fréjus*), Forum Livii (*Forli*), Forum Sempronii (*Fossombrone*). These *fora* were distinguished from mere *vici* by the possession of a municipal organization, which, however, was less complete than that of a prefecture. In legal phraseology, which distinguishes the *forum commune* from the *forum privilegiatum*, and the *forum generale* from the *forum speciale*, the word is practically equivalent to "court" or "jurisdiction."

For the fora at Rome, see ROME: *Archaeology*, and works quoted.

FORUM APPII, an ancient post station on the Via Appia, 43 m. S.E. of Rome, founded, no doubt, by the original constructor of the road. Horace mentions it as the usual halt at the end of the first day's journey from Rome, and describes it as full of boatmen and cheating innkeepers. The presence of the former was due to the fact that it was the starting-point of a canal which ran parallel to the road through the Pomptine Marshes, and was used instead of it at the time of Strabo and Horace (see APPIA, VIA). It is mentioned also as a halting place in the account of Paul's journey to Rome (Acts xxviii. 15). Under Nerva and Trajan the road was repaired; one inscription records expressly the paving with silex (replacing the former gravelling) of the section from Tripontium, 4 m. N.W., to Forum Appii; the bridge near Tripontium was similarly repaired, and that at Forum Appii, though it bears no inscription, is of the same style. Only scanty relics of antiquity have been found here; a post station was placed here by Pius VI. when the Via Appia was reconstructed. (T. As.)

FORUM CLODII, a post station on the Via Clodia, about 23 m. N.W. of Rome (not 32 m. as in the *Antonine Itinerary*), situated above the western bank of the Lacus Sabatinus (mod. Lake of Bracciano), and connected with the Via Cassia at Vacanae by a branch road which ran round the N. side of the lake (*Ann. Inst.*, 1859, 43). The site is marked by the church of SS. Marcus, Marcianus and Liberatus, which was founded in the 8th or 9th century A.D. Inscriptions mentioning the Foro-Clodienses have come to light on the spot; and an inscription of the Augustan period, which probably stood over the door of a villa, calls the place Pausilypon—a name justified by the beauty of the site.

See *Notizie degli scavi* (1889), 5; D. Vaglieri, *ibid.* (1895), 342.

FORUM TRAIANI (mod. *Fordongianus*), an ancient town of Sardinia, on the river Thyrsus (Tirso), and a station on the Roman road through the centre of the island from Carales to Olbia and Turris Libisonis. Many of its ruins have been destroyed since 1860. The best preserved are the baths, erected over hot mineral springs. The tanks for collecting the water and the large central *piscina* are noteworthy. The bridge over the Tirso has been to some extent modernized. On the opposite bank are the scanty remains of an amphitheatre. Not far off is a group of *nuraghi*, of which that of St Barbara in the commune of Villanova Truschedda is one of the finest.

See Taramelli in *Notizie degli scavi* (1903), 469.

FOSBROKE, THOMAS DUDLEY (1770–1842), English antiquary, was born in London on the 27th of May 1770. He was educated at St Paul's school and Pembroke College, Oxford, graduating M.A. in 1792. In that year he was ordained and became curate of Horsley, Gloucestershire, where he remained till 1810. He then removed to Walford in Herefordshire, and remained there the rest of his life, as curate till 1830, and afterwards as vicar. His first important work, *British Monachism* (2 vols., 1802), was a compilation, from manuscripts in the British Museum and Bodleian libraries, of facts relating to English monastic life. In 1799 Fosbroke had been elected fellow of the Society of Antiquaries. The work for which he is best remembered, the *Encyclopaedia of Antiquities*, appeared in 1824. A sequel to this, *Foreign Topography*, was published in 1828. Fosbroke published many other volumes. He died at Walford on the 1st of January 1842.

FOSCARI, FRANCESCO (1373–1457), doge of Venice, belonged to a noble Venetian family, and held many of the highest offices of the republic—ambassador, president of the Forty, member of the Council of Ten, inquisitor, procurator of St Mark, *avvogadore di comun*, &c. His first wife was Maria Priuli and his second Maria Nani; of his many children all save one son (Jacopo) died young. But although a capable administrator he was ambitious and adventurous, and the reigning doge Tommaso Mocenigo, when speaking on his deathbed of the various candidates for the succession, warned the council against electing Foscari, who, he said, would perpetually plunge the republic into disastrous and costly wars. Nevertheless Foscari was elected (1423) and reigned for thirty-four years. In proclaiming the new doge the customary formula which recognized the people's share in the appointment and asked for their approval—the last vestige of popular government—was finally dropped.

Foscari's reign bore out Mocenigo's warning and was full of wars on the *terra ferma*, and through the doge's influence Venice joined the Florentines in their campaign against Milan, which was carried on with varying success for eight years. In 1430 an attempt was made on Foscari's life by a noble to whom he had refused an appointment; and three years later a conspiracy of young bloods to secure the various offices for themselves by illicit intrigues was discovered. These events, as well as the long and expensive wars and the unsatisfactory state of Venetian finances, induced Foscari to ask permission to abdicate, which was, however, refused. In 1444 began that long domestic tragedy by which the name of Foscari has become famous. The doge's son Jacopo, a cultivated and intelligent but frivolous and irresponsible youth, was in that year accused of the serious crime of having accepted presents from various citizens and foreign princes who either desired government appointments or wished to influence the policy of the republic. Jacopo escaped, but was tried in contumacy before the Council of Ten and condemned to be exiled to Napoli di Romania (Nauplia) and to have his property confiscated. But the execution of the sentence was delayed, as he was lying ill at Trieste, and eventually the penalty was commuted to banishment at Treviso (1446). Four years later Ermolao Donato, a distinguished official who had been a member of the Ten at the time of the trial, was assassinated and Jacopo Foscari was suspected of complicity in the deed. After a long inquiry he was brought to trial for the second time, and although all the evidence clearly pointed to his guilt the judges could not obtain a confession from the accused, and so merely banished him to Candia for the rest of his life, with a pension of two hundred ducats a year. In 1456 the council received information from the rector (governor) of Candia to the effect that Jacopo Foscari had been in treasonable correspondence with the duke of Milan and the sultan of Turkey. He was summoned to Venice, tried and condemned to a year's imprisonment, to be followed by a return to his place of exile. His aged father was allowed to see him while in prison, and to Jacopo's entreaties that he should obtain a full pardon for him, he replied advising him to bear his punishment without protest. When the year was up Jacopo returned to Candia, where he died in January 1457. The doge was overwhelmed with grief at this bereavement and became quite incapable of attending to business. Consequently the council decided to ask him to abdicate; at first he refused, but was finally obliged to conform to their wishes and retired on a yearly pension of 1500 ducats. Within a week Pasquale Malipiero was elected in his place and two days later (1st of November 1457) Francesco Foscari was dead.

The story is a very sad and pathetic one, but legend has added many picturesque though quite apocryphal details, most of them tending to show the iniquity and harshness of Jacopo's judges and accusers, whereas, as we have shown, he was treated with exceptional leniency. The most accurate account is contained in S. Romanin's *Storia documentata di Venezia*, lib. x. cap. iv. vii. and x. (Venice, 1855); where the original authorities are quoted; see also Berlan, *I due Foscari* (Turin, 1852). Among the poetical works on the subject Byron's tragedy is the most famous (1821), and Roger's poem *Italy* (1821); Giuseppe Verdi composed an opera on the subject entitled *I due Foscari*. (L. V.*)

FOSCOLO, UGO (1778–1827), Italian writer, was born at Zante in the Ionian Isles on the 26th of January 1778. On the death of his father, a physician at Spalatro, in Dalmatia, the family removed to Venice, and in the University of Padua Foscolo prosecuted the studies begun in the Dalmatian grammar school. The fact that amongst his Paduan masters was the abbé Cesarotti, whose version of Ossian had made that work highly popular in Italy, was not without influence on Foscolo's literary tastes, and his early knowledge of modern facilitated his studies in ancient Greek. His literary ambition revealed itself by the appearance in 1797 of his tragedy *Tieste*—a production which obtained a certain degree of success. Foscolo, who, from causes not clearly explained, had changed his Christian name Niccolo to that of Ugo, now began to take an active part in the stormy political discussions which the fall of the republic of Venice had provoked. He was a prominent member of the national committees, and addressed an ode to Napoleon the liberator, expecting from the military successes of the French general, not merely the overthrow of the effete Venetian oligarchy, but the establishment of a free republican government.

The treaty of Campo Formio (17th Oct. 1797), by which Napoleon handed Venice over to the Austrians, gave a rude shock to Foscolo, but did not quite destroy his hopes. The state of mind produced by that shock is reflected in the *Letters of Jacopo Ortis* (1798), a species of political *Werther*,—for the hero of Foscolo embodies the mental sufferings and suicide of an undeceived Italian patriot just as the hero of Goethe places before us the too delicate sensitiveness embittering and at last cutting short the life of a private German scholar. The story of Foscolo, like that of Goethe, had a groundwork of melancholy fact. Jacopo Ortis had been a real personage; he was a young student of Padua, and committed suicide there under circumstances akin to those described by Foscolo. At this period Foscolo's mind appears to have been only too familiar with the thought of suicide. Cato and the many classical examples of self-destruction scattered through the pages of Plutarch appealed to the imaginations of young Italian patriots as they had done in France to those of the heroes and heroines of the Gironde. In the case of Foscolo, as in that of Goethe, the effect produced on the writer's mind by the composition of the work seems to have been beneficial. He had seen the ideal of a great national future rudely shattered; but he did not despair of his country, and sought relief in now turning to gaze on the ideal of a great national poet. At Milan, whither he repaired after the fall of Venice, he was engaged in other literary pursuits besides the composition of *Ortis*. The friendship formed there with the great poet Parini was ever afterwards remembered with pride and gratitude. The friendship formed with another celebrated Milanese poet soon gave place to a feeling of bitter enmity. Still hoping that his country would be freed by Napoleon, he served as a volunteer in the French army, took part in the battle of the Trebbia and the siege of Genoa, was wounded and made prisoner. When released he returned to Milan, and there gave the last touches to his *Ortis*, published a translation of and commentary upon *Callimachus*, commenced a version of the *Iliad*, and began his translation of Sterne's *Sentimental Journey*. The result of a memorandum prepared for Lyons, where, along with other Italian delegates, he was to have laid before Napoleon the state of Italy, only proved that the views cherished by him for his country were too bold to be even submitted to the dictator of France. The year 1807 witnessed the appearance of his *Carme sui sepolcri*, of which the entire spirit and language may be described as a sublime effort to seek refuge in the past from the misery of the present and the darkness of the future. The mighty dead are summoned from their tombs, as ages before they had been in the masterpieces of Greek oratory, to fight again the battles of their country. The inaugural lecture on the origin and duty of literature, delivered by Foscolo in January 1809 when appointed to the chair of Italian eloquence at Pavia, was conceived in the same spirit. In this lecture Foscolo urged his young countrymen to study letters, not in obedience to academic traditions, but in their relation to individual and national life and growth. The sensation produced by this lecture had no slight share in provoking the decree of Napoleon by which the chair of national eloquence was abolished in all the Italian universities. Soon afterwards Foscolo's tragedy of *Ajax* was represented but with little success at Milan, and its supposed allusions to Napoleon rendering the author an object of suspicion, he was forced to remove from Milan to Tuscany. The chief fruits of his stay in Florence are the tragedy of *Ricciarda*, the *Ode to the Graces*, left unfinished, and the completion of his version of the *Sentimental Journey* (1813). His version of Sterne is an important feature in his personal history. When serving with the French he had been at the Boulogne camp, and had traversed much of the ground gone over by Yorick; and in his memoir of Didimo Cherico, to whom the version is ascribed, he throws much curious light on his own character. He returned to Milan in 1813, until the entry of the Austrians; thence he passed into Switzerland, where he wrote a fierce satire in Latin on his political and literary opponents; and finally he sought the shores of England at the close of 1816.

During the eleven years passed by Foscolo in London, until his death there, he enjoyed all the social distinction which the most brilliant circles of the English capital confer on foreigners of political and literary renown, and experienced all the misery which follows on a disregard of the first conditions of domestic economy. His contributions to the *Edinburgh* and *Quarterly Reviews*, his dissertations in Italian on the text of Dante and Boccaccio, and still more his English essays on Petrarch, of which the value was enhanced by Lady Dacre's admirable translations of some of Petrarch's finest sonnets, heightened his previous fame as a man of letters. But his want of care and forethought in pecuniary matters involved him in much embarrassment, and at last consigned him to a prison; and when released he felt bitterly the change in his social position, and the coldness now shown to him by many whom he had been accustomed to regard as friends. His general bearing in society —if we may accept on this point the testimony of so keen an observer and so tolerant a man as Sir Walter Scott—had unhappily not been such as to gain and retain lasting friendships. He died at Turnham Green on the 10th of October 1827. Forty-four years after his death, in 1871, his remains were brought to Florence, and with all the pride, pomp and circumstance of a great national mourning, found their final resting-place beside the monuments of Macchiavelli and Alfieri, of Michelangelo and Galileo, in Italy's Westminster Abbey, the church of Santa Croce. To that solemn national tribute Foscolo was fully entitled. For the originality of his thoughts and the splendour of his diction his country honours him as a great classic author. He had assigned to the literature of his nation higher aims than any which it previously recognized. With all his defects of character, and through all his vicissitudes of fortune, he was always a sincere and courageous patriot.

Ample materials for the study of Foscolo's character and career may be found in the complete series of his works published in Florence by Le Monnier. The series consists of *Prose letterarie*, (4 vols., 1850); *Epistolario* (3 vols., 1854); *Prose politiche* (1 vol., 1850); *Poesie* (1 vol., 1856); *Lettere di Ortis* (1 vol., 1858); *Saggi di critica storico-letteraria* (1st vol., 1859; 2nd vol., 1862). To this series must be added the very interesting work published at Leghorn in 1876, *Lettere inedite del Foscolo, del Giordani, e della Signora di Staël, a Vincenzo Monti*. The work published at Florence in the summer of 1878, *Vita di Ugo Foscolo, di Pellegrino Artusi*, throws much doubt on the genuineness of the text in Foscolo's writings as given in the complete Florence edition, whilst it furnishes some curious and original illustrations of Foscolo's familiarity with the English language. (J. M. S.)

FOSS, EDWARD (1787–1870), English lawyer and biographer, was born in London on the 16th of October 1787. He was a solicitor by profession, and on his retirement from practice in 1840, he devoted himself to the study of legal antiquities. His *Judges of England* (9 vols., 1848–1864) is a standard work, characterized by accuracy and extensive research. *Biographia Juridica, a Biographical Dictionary of English Judges*, appeared shortly after his death. He assisted in founding the Incorporated Law Society, of which he was president in 1842 and 1843. He died of apoplexy on the 27th of July 1870.

FOSSANO, a town and episcopal see of Piedmont, Italy, in the province of Cuneo, 15 m. N.E. of it by rail, 1180 ft. above sea-level. Pop. (1901) 7696 (town), 18,175 (commune). It has an imposing castle with four towers, begun by Filippo d'Acaia in 1314. The cathedral was reconstructed at the end of the 18th century. The place began to acquire some importance in the 13th century. It appears as a commune in 1237, but in 1251 had to yield to Asti. It finally surrendered in 1314 to Fillippo d'Acaia, whose successor handed it over to the house of Savoy. It lies on the main line from Turin to Cuneo, and has a branch line to Mondovì.

FOSSANUOVA, an abbey of Italy, in the province of Rome, near the railway station of Sonnino, 64 m. S.E. of Rome. It is the finest example of a Cistercian abbey, and of the Burgundian Early Gothic style, in Italy, and dates from the end of the 12th to the end of the 13th century. The church (1187–1208) is closely similar to that of Casamari. The other conventual buildings also are noteworthy. Thomas Aquinas died here in 1274.

See C. Enlart, *Origines françaises de l'architecture gothique en Italie* (Paris, 1894) (*Bibliothèque des écoles françaises d'Athènes et de Rome*, fasc. 66).

FOSSE (or Foss) **WAY,** the Early English name of a Roman road or series of roads in Britain, used later by the English, running from Lincoln by Leicester and Bath to Exeter. Almost all the Roman line is still in use as modern road or lane. It passes from Lincoln through Newark and Leicester (the Roman *Ratae*) to High Cross (*Venonae*), where it intersects Watling Street at a point often called "the centre of England." Hence it runs to Moreton-in-the-Marsh, Cirencester, Bath and Ilchester, crosses the hills near Chard, Axminster and Honiton, and enters Exeter. Antiquaries have taken it farther, usually to Totnes, but without warrant. (See further under ERMINE STREET.) (F. J. H.)

FOSSICK (probably an English dialectical expression, meaning fussy or troublesome), a term applied by the gold diggers of Australia to the search for gold by solitary individuals, in untried localities or in abandoned diggings. A "fossicker," or pocket miner, is one who buys up the right to search old claims, in the hope of finding gold overlooked by previous diggers.

FOSSOMBRONE (anc. *Forum Sempronii*), a town and episcopal see of the Marches, Italy, in the province of Pesaro and Urbino, 11 m. E.S.E. of the latter by road, 394 ft. above sea-level. Pop. (1901) town, 7531, commune, 10,847. The town is situated in the valley of the Metauro, in the centre of fine scenery, at the meeting-point of roads to Fano, to the Furlo pass and Fossato di Vico (the ancient Via Flaminia), to Urbino and to Sinigaglia, the last crossing the river by a fine bridge. The cathedral, rebuilt in 1772–1784, contains the chief work of the sculptor Domenico Rosselli of Rovezzano, a richly sculptured *ancona* of 1480. S. Francesco has a lunette by him over the portal. The library, founded by a nephew of Cardinal Passionei, contains some antiquities. Above the town is a medieval castle. There is a considerable trade in silk.

The ancient Forum Sempronii lay about 2 m. to the N.E. at S. Martino al Piano, where remains still exist. It was a station on the Via Flaminia and a *municipium*. The date of its foundation is not known. Excavations in 1879–1880 led to the discovery of a house and of other buildings on the ancient road (A.

Vernarecci in *Notizie degli scavi*, 1880, 458). It already had a bishop in the years 499–502. In 1295 the Malatesta obtained possession of it, and kept it until 1444, when it was sold, with Pesaro, to Federico di Montefeltro of Urbino, and with the latter it passed to the papacy under Urban VIII. in 1631.

FOSSOMBRONI, VITTORIO, COUNT (1754–1844), Tuscan statesman and mathematician, was born at Arezzo. He was educated at the university of Pisa, where he devoted himself particularly to mathematics. He obtained an official appointment in Tuscany in 1782, and twelve years later was entrusted by the grand duke with the direction of the works for the drainage of the Val di Chiana, on which subject he had published a treatise in 1789. In 1796 he was made minister for foreign affairs, but on the French occupation of Tuscany in 1799 he fled to Sicily. On the erection of the grand duchy into the ephemeral kingdom of Etruria, under the queen-regent Maria Louisa, he was appointed president of the commission of finance. In 1809 he went to Paris as one of the senators for Tuscany to pay homage to Napoleon. He was made president of the legislative commission on the restoration of the grand duke Ferdinand III. in 1814, and subsequently prime minister, which position he retained under the grand duke Leopold II. His administration, which was only terminated by his death, greatly contributed to promote the well-being of the country. He was the real master of Tuscany, and the bases of his rule were equality of all subjects before the law, honesty in the administration of justice and toleration of opinion, but he totally neglected the moral improvement of the people. At the age of seventy-eight he married, and twelve years afterwards died, in 1844.

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FOSTER, SIR CLEMENT LE NEVE (1841–1904), English geologist and mineralogist, the second son of Peter Le Neve Foster (for many years secretary of the Society of Arts), was born at Camberwell on the 23rd of March 1841. After receiving his early education at Boulogne and Amiens, he studied successively at the Royal School of Mines in London and at the mining college of Freiburg in Saxony. In 1860 he joined the Geological Survey in England, working in the Wealden area and afterwards in Derbyshire. Conjointly with William Topley (1841–1894) he communicated to the Geological Society of London in 1865 the now classic paper "On the superficial deposits of the Valley of the Medway, with remarks on the Denudation of the Weald." In this paper the sculpturing of the Wealden area by rain and rivers was ably advocated. Retiring from the Geological Survey in 1865, Foster devoted his attention to mineralogy and mining in Cornwall, Egypt and Venezuela. In 1872 he was appointed an inspector of mines under the home office for the S.W. of England, and in 1880 he was transferred to the N. Wales district. In 1890 he was appointed professor of mining at the Royal College of Science and he held this post until the close of his life. His later work is embodied largely in the reports of mines and quarries issued annually by the home office. He was distinguished for his extensive scientific and practical knowledge of metalliferous mining and stone quarrying. He was elected F.R.S. in 1892 and was knighted in 1903. While investigating the cause of a mining disaster in the Isle of Man in 1897 his constitution suffered much injury from carbonic-oxide gas, and he never fully recovered from the effects. He died in London on the 19th of April 1904. He published *Ore and Stone Mining*, 1894 (ed. 5, 1904); and *The Elements of Mining and Quarrying*, 1903.

FOSTER, GEORGE EULAS (1847–), Canadian politician and financier, was born in New Brunswick on the 3rd of September 1847, of U.E. Loyalist descent. After a brilliant university career at the university of Brunswick, at Edinburgh and Heidelberg, he returned to Canada and taught in various local schools, eventually becoming professor of classics and history in the local university. In 1882 he became Conservative member for King's County, N.B., in the Dominion parliament, and in 1885 entered the cabinet of Sir John Macdonald as minister of marine and fisheries; in 1888 he became minister of finance, which position he held till the defeat of his party in 1896. A careful and even brilliant financier, and a keen debater, he became known as a strong believer in protection for Canadian industries and in preferential trade within the British empire.

FOSTER, JOHN (1770–1843), English author and dissenting minister, generally known as the "Essayist," was born in a small farmhouse near Halifax, Yorkshire, on the 17th of September 1770. Partly from constitutional causes, but partly also from the want of proper companions, as well as from the grave and severe habits of his parents, his earlier years were enshrouded in a somewhat gloomy and sombre atmosphere, which was never afterwards wholly dissipated. His youthful energy, finding no proper outlet, developed within him a tendency to morbid intensity of thought and feeling; and, according to his own testimony, before he was twelve years old he was possessed of a "painful sense of an awkward but entire individuality."

The small income accruing to Foster's parents from their farm they supplemented by weaving, and at an early age he began to assist them by spinning wool by the hand wheel, and from his fourteenth year by weaving double stuffs. Even "when a child," however, he had the "feelings of a foreigner in the place"; and though he performed his monotonous task with conscientious diligence, he succeeded so indifferently in fixing his wandering thoughts upon it that his work never without difficulty passed the ordeal of inspection. He had acquired a great taste for reading, to gratify which he sometimes shut himself up alone in a barn, afterwards working at his loom "like a horse," to make up for lost time. He had also at this period "a passion for making pictures with a pen." Shortly after completing his seventeenth year he became a member of the Baptist church at Hebden Bridge, with which his parents were connected; and with the view of preparing himself for the ministerial office he began about the same time to attend a seminary at Brearley Hall conducted by his pastor Dr Fawcett.

After remaining three years at Brearley Hall he was admitted to the Baptist College, Bristol, and on finishing his course of study at this institution he obtained an engagement at Newcastle-on-Tyne, where he preached to an audience of less than a hundred persons, in a small and dingy room situated near the river at the top of a flight of steps called Tuthill Stairs. At Newcastle he remained only three months. In the beginning of 1793 he proceeded to Dublin, where, after failing as a preacher, he attempted to revive a classical and mathematical school, but with so little success that he did not prosecute the experiment for more than eight or nine months. From 1797 to 1799 he was minister of a Baptist church at Chichester, but though he applied himself with more earnestness and perseverance than formerly to the discharge of his ministerial duties, his efforts produced little apparent impression, and the gradual diminution of his hearers necessitated his resignation. After employing himself for a few months at Battersea in the instruction of twenty African youths brought to England by Zachary Macaulay, with the view of having them trained to aid as missionaries to their fellow-countrymen, he in 1800 accepted the charge of a small congregation at Downend, Bristol, where he continued about four years. In 1804, chiefly through the recommendation of Robert Hall, he became pastor of a congregation at Frome, but a swelling in the thyroid gland compelled him in 1806 to resign his charge. In the same year he published the volume of *Essays* on which his literary fame most largely if not mainly rests. They were written in the form of letters addressed to the lady whom he afterwards married, and consist of four papers,—"On a Man writing Memoirs of himself"; "On Decision of Character"; "On the Application of the Epithet Romantic"; and "On some Causes by which Evangelical Religion has been rendered unacceptable to Men of Cultivated Taste." The success of this work was immediate, and was so considerable that on resigning his charge he determined to adopt literature as his profession.

The *Eclectic Review* was the only periodical with which he established a connexion; but his contributions to that journal, which were begun in 1807, number no fewer than 185 articles. On his marriage in May 1808 he removed to Bourton-on-the-Water, a small village in Gloucestershire, where he remained till 1817, when he returned to Downend and resumed his duties to his old congregation. Here he published in 1820 his *Essay on Popular Ignorance*, which was the enlargement of a sermon originally preached on behalf of the British and Foreign School Society. In 1821 he removed to Stapleton near Bristol, and in 1822 he began a series of fortnightly lectures at Broadmead chapel, Bristol, which were afterwards published. On the settlement of Robert Hall at Bristol this service was discontinued, as in such circumstances it appeared to Foster to be "altogether superfluous and even bordering on impertinent." The health of Foster during the later years of his life was somewhat infirm, the result chiefly of the toil and effort of literary composition; and the death of his only son, his wife and the greater number of his most intimate friends combined with his bodily ailments to lend additional sombreness to his manner of regarding the events and arrangements of the present world—the "visage of death" being almost his "one remaining luminary." He died at Stapleton on the 15th of October 1843.

The cast of Foster's mind was meditative and reflective rather than logical or metaphysical, and though holding moderately Calvinistic views, his language even in preaching very seldom took the mould of theological forms. Though always retaining his connexion with the Baptist denomination, the evils resulting from organized religious communities seemed to him so great that he came to be "strongly of opinion that churches are useless and mischievous institutions, and the sooner they are dissolved the better." The only Christian observances which he regarded as of any importance were public worship and the Lord's Supper, and it so happened that he never administered the ordinance of baptism. His cast of thought is largely coloured by a constant reference to the "endless future." He was a firm believer in supernatural appearances, and cherished a longing hope that a ray of light from the other world might sometimes in this way be vouchsafed to mortals. As a writer he was most painstaking and laborious in his choice of diction, and his style has its natural consequent defects, though the result is eloquent in its way.

Besides the works already alluded to, Foster was the author of a *Discourse on Missions* (1818); "Introductory Essay" to Doddridge's *Rise and Progress of Religion* (1825); "Observations on Mr Hall's Character as a Preacher," prefixed to the collected edition of Hall's *Works* (1832); an "Introduction" to a pamphlet by Mr Marshman on the Serampore Missionaries; several political letters to the *Morning Chronicle*, and contributions to the *Eclectic Review*, published posthumously in 2 vols., 1844. *His Life and Correspondence*, edited by J. E. Ryland, was published in 1846.

FOSTER, SIR MICHAEL (1836–1907), English physiologist, was born at Huntingdon on the 8th of March 1836. After graduating in medicine at London University in 1859, he began to practise in his native town, but in 1867 he returned to London as teacher of practical physiology at University College, where two years afterwards he became professor. In 1870 he was appointed by Trinity College, Cambridge, to its praelectorship in physiology, and thirteen years later he became the first occupant of the newly-created chair of physiology in the university, holding it till 1903. He excelled as a teacher and administrator, and had a very large share in the organization and development of the Cambridge biological school. From 1881 to 1903 he was one of the secretaries of the Royal Society, and in that capacity exercised a wide influence on the study of biology in Great Britain. In 1899 he was created K.C.B., and served as president of the British Association at its meeting at Dover. In the following year he was elected to represent the university of London in parliament. Though returned as a Unionist, his political action was not to be dictated by party considerations, and he gravitated towards Liberalism; but he played no prominent part in parliament and at the election of 1906 was defeated. His chief writings were a *Textbook of Physiology* (1876), which became a standard work, and *Lectures on the History of Physiology in the 16th, 17th and 18th Centuries* (1901), which consisted of lectures delivered at the Cooper Medical College, San Francisco, in 1900. He died suddenly in London on the 29th of January 1907.

FOSTER, MYLES BIRKET (1825–1899), English painter, was born at North Shields. At the age of sixteen he entered the workshop of Ebenezer Landells, a wood engraver, with whom he worked for six years as an illustrative draughtsman, devoting himself mainly to landscape. During the succeeding fifteen years he became famous as a prolific and accomplished illustrator, but about 1861 abandoned illustration for painting, and gained wide popularity by his pictures, chiefly in water colours, of landscapes and rustic subjects, with figures, mainly of children. He was elected in 1860 associate and in 1862 full member of the Royal Society of Painters in Water Colours. His work is memorable for its delicacy and minute finish, and for its daintiness and pleasantness of sentiment.

See *Birket Foster, his Life and Work* (extra number of the *Art Journal*) by Marcus B. Huish (1890), an interesting sketch; and *Birket Foster, R.W.S.*, by H. M. Cundall (London, 1906), a very complete and fully illustrated biography.

FOSTER, STEPHEN COLLINS (1826–1864), American song and ballad writer, was born near Pittsburg, Pennsylvania, on the 4th of July 1826. He was the youngest child of a merchant of Irish descent who became a member of the state legislature and was related by marriage to President Buchanan. Stephen early showed talent for music, and played upon the flageolet, the guitar and the banjo; he also acquired a fair knowledge of French and German. He was sent to school in Towanda, Pennsylvania, and later to Athens, Pennsylvania, and when thirteen years old he wrote the song "Sadly to Mine Heart Appealing." At sixteen he wrote "Open thy Lattice, Love"; at seventeen he entered his brother's business house, Cincinnati, Ohio, where he remained about three years, composing meanwhile such popular pieces as "Old Uncle Ned," "O Susannah!" and others. He then adopted song-writing as a profession. His chief successes were songs written for the negro melodists or Christy minstrels. Besides those mentioned the following attained great popularity: "Nelly was a Lady," "Old Kentucky Home," "Old Folks at Home," "Massa's in de Cold, Cold Ground," &c. For these and other songs the composer received considerable sums, "Old Folks at Home" bringing him, it is said, 15,000 dollars. For most of his songs Foster wrote both songs and music. In 1850 he married and moved to New York, but soon returned to Pittsburg. His reputation rests chiefly on his negro melodies, many of which have been popular on both sides of the Atlantic and sung in many tongues. "Old Black Joe," the last of these negro melodies, appeared in 1861. His later songs were sentimental ballads. Among these are "Old Dog Tray," "Gentle Annie," "Willie, we have missed you," &c. His "Come where my Love lies Dreaming" is a well known vocal quartet. Although as a musician and composer Foster has little claim to high rank, his song-writing gives him a prominent place in the modern developments of popular music. He died at New York on the 13th of January 1864.

FOSTORIA, a city, partly in Seneca, partly in Hancock, and partly in Wood county, Ohio, U.S.A., 35 m. S. by E. of Toledo. Pop. (1890) 7070; (1900) 7730 (584 foreign-born); (1910) 9597 It is served by the Baltimore & Ohio, the New York, Chicago & St Louis, the Ohio Central, the Lake Erie & Western, and the Hocking Valley railways, and by two interurban electric lines. The city is situated in an agricultural region, and oil abounds in the vicinity. Among the city's manufactures are glass, flour, planing mill products, brass and iron, carriages, barrels, incandescent lamps, carbons, wire nails and fences, automobile engines and parts, railway torpedoes and muslin underwear. The waterworks are owned and operated by the municipality. In 1832, upon the coming of the first settlers, two towns, Rome and Risdon, were laid out on the site of what is now Fostoria. A bitter rivalry arose between them, but they were finally united under one government, and the city thus formed was named in honour of Charles W. Foster, whose son Charles Foster (1828–1904), governor of the state from 1880 to 1884 and secretary of the United States treasury from 1891 to 1893, did much to promote its growth. Fostoria was chartered as a city in 1854.

FOTHERGILL, JOHN (1712–1780), English physician, was born of a Quaker family on the 8th of March 1712 at Carr End in Yorkshire. He took the degree of M.D. at Edinburgh in 1736, and after visiting the continent of Europe he in 1740 settled in London, where he gained an extensive practice. In the epidemics of influenza in 1775 and 1776 he is said to have had sixty patients daily. In his leisure he made a study of conchology and botany; and at Upton, near Stratford, he had an extensive botanical garden where he grew many rare plants obtained from various parts of the world. He was the patron of Sidney Parkinson, the South Sea voyager. A translation of the Bible (1764 sq.) by Anthony Purver, a Quaker, was made and printed at his expense. His pamphlet entitled "Account of the Sore Throat attended with Ulcers" (1748) contains one of the first descriptions of diphtheria in English, and was translated into several languages. He died in London on the 26th of December 1780.

FOTHERINGHAY, a village of Northamptonshire, England, picturesquely situated on the left bank of the river Nene, 1 ½ m. from Elton station on the Peterborough branch of the London & North-Western railway. The castle, of which nothing but the earthworks and foundations remain, is famous as the scene of the imprisonment of Mary queen of Scots from September 1586 to her trial and execution on the 8th of February 1587. The earthworks, commanding a ford of the river, are apparently of very early date, and probably bore a castle from Norman times. It became an important stronghold of the Plantagenets from the time of Edward III., and was the birthplace of Richard III. in 1452. The church of St Mary and All Saints, originally collegiate, is Perpendicular, and only the nave with aisles, and the tower surmounted by an octagon, remain; but the building is in the best style of its period. Edward, second duke of York, who was killed at the battle of Agincourt in 1415, Richard, the third duke, and his duchess, Cicely (d. 1495), also his son the earl of Rutland, who with Richard himself, fell at the battle of Wakefield in 1460, are buried in the church. Their monuments were erected by Queen Elizabeth, who found the choir and tombs in ruins.

FOUCAULT, JEAN BERNARD LÉON (1819–1868), French physicist, was the son of a publisher at Paris, where he was born on the 18th of September 1819. After an education received chiefly at home, he studied medicine, which, however, he speedily abandoned for physical science, the improvement of L. J. M. Daguerre's photographic processes being the object to which he first directed his attention. During three years he was experimental assistant to Alfred Donné (1801–1878) in his course of lectures on microscopic anatomy. With A. H. L. Fizeau he carried on a series of investigations on the intensity of the light of the sun, as compared with that of carbon in the electric arc, and of lime in the flame of the oxyhydrogen blowpipe; on the interference of heat rays, and of light rays differing greatly in lengths of path; and on the chromatic polarization of light. In 1849 he contributed to the *Comptes Rendus* a description of an electromagnetic regulator for the electric arc lamp, and, in conjunction with H. V. Regnault, a paper on binocular vision. By the use of a revolving mirror similar to that used by Sir Charles Wheatstone for measuring the rapidity of electric currents, he was enabled in 1850 to demonstrate the greater velocity of light in air than in water, and to establish that the velocity of light in different media is inversely as the refractive indices of the media. For his demonstration in 1851 of the diurnal motion of the earth by the rotation of the plane of oscillation of a freely suspended, long and heavy pendulum exhibited by him at the Pantheon in Paris, and again in the following year by means of his invention the gyroscope, he received the Copley medal of the Royal Society in 1855, and in the same year he was made physical assistant in the imperial observatory at Paris. In September of that year he discovered that the force required for the rotation of a copper disk becomes greater when it is made to rotate with its rim between the poles of a magnet, the disk at the same time becoming heated by the eddy or "Foucault currents" induced in its metal. Foucault invented in 1857 the polarizer which bears his name, and in the succeeding year devised a method of giving to the speculum of reflecting telescopes the form of a spheroid or a paraboloid of revolution. With Wheatstone's revolving mirror he in 1862 determined the absolute velocity of light to be 298,000 kilometres (about 185,000 m.) a second, or 10,000 kilom. less than that obtained by previous experimenters. He was created in that year a member of the Bureau des Longitudes and an officer of the Legion of Honour, in 1864 a foreign member of the Royal Society of London, and next year a member of the mechanical section of the Institute. In 1865 appeared his papers on a modification of Watt's governor, upon which he had for some time been experimenting with a view to making its period of revolution constant, and on a new apparatus for regulating the electric light; and in the following year (*Compt. Rend.* lxiii.) he showed how, by the deposition of a transparently thin film of silver on the outer side of the object glass of a telescope, the sun could be viewed without injuring the eye by excess of light. Foucault died of paralysis on the 11th of February 1868 at Paris. From the year 1845 he edited the scientific portion of the *Journal des Débats.* His chief scientific papers are to be found in the *Comptes Rendus*, 1847–1869.

See *Revue cours scient.* vi. (1869), pp. 484-489; *Proc. Roy. Soc.* xvii. (1869), pp. lxxxiii.-lxxxiv.; Lissajous, *Notice historique sur la vie et les travaux de Léon Foucault* (Paris, 1875).

FOUCHÉ, JOSEPH, Duke of Otranto (1763–1820), French statesman, was born in a small village near Nantes on the 21st of May 1763. His father, a seafaring man, destined him for the sea; but the weakness of his frame and the precocity of his talents soon caused this idea to be given up. He was educated at the college of the Oratorians at Nantes, and showed marked aptitude for studies both literary and scientific. Desiring to enter the teaching profession he was sent to an institution kept by brethren of the same order at Paris. There also he made rapid progress, and soon entered upon tutorial duties at the colleges of Niort, Saumur, Vendôme, Juilly and Arras. At Arras he had some dealings with Robespierre at the time of the beginning of the French Revolution (1789).

In October 1790 he was transferred by the Oratorians to their college at Nantes, owing to irregularities due to his zeal for revolutionary principles; but at Nantes he showed even more democratic fervour. His abilities and the zeal with which he espoused the most subversive notions brought him into favour with the populace at Nantes; he became a leading member of the local Jacobin club; and on the dissolution of the college of the Oratorians at Nantes in May 1792, Fouché gave up all connexion with the church, whose major vows he had not taken. After the downfall of the monarchy on the 10th of August 1792, he was elected as deputy for the department of the Lower Loire to the National Convention which met at the autumnal equinox and proclaimed the republic. The literary and pedagogic sympathies of Fouché at first brought him into touch with Condorcet and the party, or group, of the Girondists; but their vacillation at the time of the trial and execution of Louis XVI. (December 1792–January 21, 1793) led him to espouse the cause of the Jacobins, the less scrupulous and more thoroughgoing champions of revolutionary doctrine. On the question of the execution of the king, Fouché, after some preliminary hesitations, expressed himself with the utmost vigour in favour of immediate execution, and denounced those who "wavered before the shadow of a king."

The crisis which resulted from the declaration of war by the Convention against England and Holland (Feb. 1, 1793), and a little later against Spain, brought Fouché into notoriety as one of the fiercest of the Jacobinical fanatics who then held power at Paris. While the armies of the first coalition threatened the north-east of France, a revolt of the royalist peasants of Brittany and la Vendée menaced the Convention on the west. That body deputed Fouché with a colleague, Villers, to proceed to the west as commissioners invested with almost dictatorial powers for the crushing of the revolt of "the whites." The vigour with which he carried out these duties earned him other work, and he soon held the post of commissioner of the republic in the department of the Nièvre. Together with Chaumette, he helped to initiate the atheistical movement, the founders of which in the autumn of 1793 began to aim at the extinction of Christianity in France. In the department of the Nièvre he ransacked the churches, sent their spoils to the treasury and established the cult of the goddess of Reason. Over the cemeteries, he ordered these words to be inscribed: "Death is an eternal sleep." He also waged war against luxury and wealth, and desired to abolish the use of money. The new cult was inaugurated at Paris at Notre Dame by the strange orgy known as "The Festival of Reason" (November 10, 1793).

Fouché then proceeded to Lyons to execute the vengeance of the Convention on that city, which had revolted against the new Jacobin tyranny. Preluding his work by a festival remarkable for its obscene parody of religious rites, he then, along with his colleague, Collot d'Herbois, set the guillotine and cannon to work with a rigour which made his name odious. Modern research, however, proves that at the close of those horrors Fouché exercised a moderating influence. Outwardly his conduct was marked by the utmost rigour, and on his return to Paris early in April 1794, he thus characterised his policy: "The blood of criminals fertilises the soil of liberty and establishes power on sure foundations." By that time Robespierre had struck down the other leaders of the atheistical party; but early in June 1794, at the time of the "Festival of the Supreme Being," Fouché ventured to mock at the theistic revival which Robespierre then inaugurated. Sharp passages of arms took place between them, and Robespierre procured the ejection of Fouché from the Jacobin Club (July 14, 1794). Fouché, however, was working with his customary skill and energy, and along with Tallien and others, managed to effect the overthrow of the theistic dictator on Thermidor 10 (July 28), 1794. The ensuing reaction in favour of more merciful methods of government threatened to sweep away the group of Terrorists who had been mainly instrumental in carrying through the *coup d'état* of Thermidor; but, thanks largely to the skill of Fouché in intrigue, they managed for a time to keep at the head of affairs. Discords, however, crept in which left him for a time almost isolated, and it needed all his ability to withstand the attacks of the moderates. A vigorous attack on him by Boissy d'Anglas, on the 9th of August 1795, caused him to be arrested, but the troubles which ensued in Vendémiaire averted the doom that seemed to be pending; and he owed his release to the amnesty which was passed on the proclamation of the new constitution of the year 1795.

In the ensuing period, known as that of the Directory (1795–1799), Fouché remained at first in obscurity, but the relations which he had with the communists, once headed by Chaumette and now by François N. ("Gracchus") Babeuf (*q.v.*), helped him to rise once more. He is said to have betrayed to the director Barras the secret of the strange plot which Babeuf and a few accomplices hatched in the year 1796; but recent research has tended to throw doubt on the assertion. His rise from poverty was slow, but in 1797 he gained an appointment for the supply of military *matériel*, which offered opportunities direct and indirect. After offering his services to the royalists, whose movement was then gathering force, he again decided to support the Jacobins and the director Barras (*q.v.*). In the *coup d'état* of Fructidor 1797 he made himself serviceable to Barras, who in 1798 appointed him to be French ambassador to the Cisalpine republic. At Milan he carried matters with so high a hand against the Gallophobes of that government that his actions were disavowed and he himself was removed; but in the confused state in which matters then were, he was able for a time to hold his own and to intrigue successfully against his successor. Early in 1799 he returned to Paris, and after a brief tenure of office as ambassador at The Hague, he became minister of police at Paris (July 20, 1799). The newly elected director, Sieyès (*q.v.*), was then in the ascendant and desired to curb the excesses of the Jacobins, who had recently reopened their club. Fouché, casting consistency to the winds, closed the Jacobins club in a manner at once daring and clever. Thereupon he hunted down the pamphleteers and editors, whether Jacobins or royalists, who were obnoxious to the government, so that at the time of the return of Bonaparte from Egypt (October 1799) the ex-Jacobin was one of the most powerful men in France.

Knowing well the unpopularity of the directors, Fouché lent himself to the schemes of Bonaparte and Sieyès for their overthrow. His activity in furthering the *coup d'état* of Brumaire 18-19 (November 9-10), 1799, procured him the favour of Bonaparte, who kept him in office (v. Napoleon I.). In the ensuing period of the Consulate (1799–1804) Fouché behaved with the utmost adroitness. While curbing the royalists and extreme Jacobins who at first alone opposed Bonaparte, Fouché was careful to temper as far as possible the arbitrary actions of the new master of France. In this difficult task he acquitted himself with so much skill as to earn at times the gratitude even of the royalists. Thus, while countermining a foolish intrigue of theirs in which the duchesse de Guiche was the chief agent, Fouché took care that she should escape. Equally skilful was his action in the affair of the so-called Aréna-Ceracchi plot, in which the *agents provocateurs* of the police were believed to have played a sinister part. The chief "conspirators" were easily ensnared and were executed when the affair of Nivôse (December 1800) enabled Bonaparte to act with rigour. This far more serious attempt (in which royalist conspirators exploded a bomb near the First Consul's carriage with results disastrous to the bystanders) was soon seen by Fouché to be the work of royalists; and when the First Consul, eager to entrap the still formidable Jacobins, sought to fasten the blame on them, Fouché firmly declared that he would not only assert but would prove that the outrage was the work of royalists. All his efforts, however, failed to avert the punishment which Bonaparte was resolved to inflict on the leading Jacobins. In other matters (especially in that known as the Plot of the Placards in the spring of 1802) Fouché was thought to have secured the Jacobins concerned from the vengeance of the First Consul. In any case the latter resolved to rid himself of a man who had too much power and too much skill in intrigue to be desirable as a subordinate. On the proclamation of Bonaparte as First Consul for life (August 1, 1802) Fouché was deprived of his office; but the blow was softened by the suppression of the ministry of police and by the attribution of most of its duties to an extended ministry of justice. Fouché also became a senator and received half of the reserve funds of the police which had accumulated during his tenure of office. He continued, however, to intrigue through his spies, whose information was so superior to that of the new minister of police as to render great services to Napoleon at the time of the Cadoudal-Pichegru conspiracy (February–March 1804).

As a result Napoleon, now emperor, brought back Fouché to the re-constituted ministry of police (July 1804); he also later on entrusted to him that of the interior. His work was no less important than at the time of the Consulate. His police agents were ubiquitous, and the terror which Napoleon and Fouché inspired, owing to their proven ability to benefit by plots, partly accounts for the absence of conspiracies after 1804. After Austerlitz (December 1805) Fouché uttered the *mot* of the occasion: "Sire, Austerlitz has shattered the old aristocracy; the boulevard St Germain no longer conspires."

That Napoleon retained some feeling of distrust, or even of fear, of Fouché was proved by his conduct in the early days of 1808. While engaged in the campaign of Spain, the emperor heard rumours that Fouché and Talleyrand, once bitter enemies, were having interviews at Paris in which Murat, king of Naples, was concerned. At once the sensitive autocrat hurried to Paris, but found nothing to incriminate Fouché. In that year Fouché received the title of duke of Otranto. During the absence of Napoleon in Austria in the campaign of 1809, the British Walcheren expedition threatened for a time the safety of

Antwerp. Fouché thereupon issued an order to the prefects of the northern departments of the empire for the mobilization of 60,000 National Guards. He added to the order a statement in which occurred the words: "Let us prove to Europe that although the genius of Napoleon can throw lustre on France, his presence is not necessary to enable us to repulse the enemy." The emperor's approval of the measure was no less marked than his disapproval of the words just quoted. The next months brought further causes of friction between emperor and minister. The latter, knowing the desire of his master for peace at the close of the year 1809, undertook on his own account to make secret overtures to the British ministry. A little later Napoleon opened negotiations and found that Fouché had forestalled him. His rage against his minister was extreme, and on the 3rd of June 1810 he dismissed him from his office. However, as it was not the emperor's custom completely to disgrace a man who might again be useful, Fouché received the governorship of Rome. He went thither, not as governor but as fugitive, for on receiving the emperor's order to give up certain important documents of his former ministry, he handed over only a few, declaring that the rest were destroyed. At this the emperor's anger burst forth again, and Fouché on learning, after his arrival at Florence, that the storm was still raging at Paris, prepared to sail to the United States. Compelled, however, by stress of weather and sickness to put back again, he found a mediator in Elisa Bonaparte, grand duchess of Tuscany, thanks to whom he was allowed to settle at Aix and finally to return to his domain of Point Carré. In 1812 he sought vainly to turn Napoleon from the projected invasion of Russia; and on the return of the emperor in haste from Smorgoni to Paris at the close of that year, the ex-minister of police was suspected of complicity in the conspiracy of General Malet, which came so strangely near to success. From this suspicion Fouché cleared himself and gave the emperor useful advice concerning internal affairs and the diplomatic situation. Nevertheless, the emperor, still distrustful of the arch-intriguer, ordered him to undertake the government of the Illyrian provinces. On the break-up of the Napoleonic system in Germany in October 1813 Fouché was ordered to repair to Rome and thence to Naples, in order to watch the movements of Murat. Before Fouché arrived at Naples Murat threw off the mask and invaded the Roman territory, whereupon Fouché received orders to return to France. He arrived at Paris on the 10th of April 1814 at the time when Napoleon was being constrained by his marshals to abdicate.

The conduct of Fouché at this crisis was characteristic. As senator he advised the senate to send a deputation to the comte d'Artois, brother of Louis XVIII., with a view to a reconciliation between the monarchy and the nation. A little later he addressed to Napoleon, then at Elba, a letter begging him in the interests of peace and of France to withdraw to the United States. To the new sovereign Louis XVIII. he sent an appeal in favour of liberty and recommending the adoption of measures which would conciliate all interests. It was not successful, but Fouché remained unmolested.

This was far from satisfying him, and when he found that there were no hopes of advancement, he entered into relations with conspirators who sought the overthrow of the Bourbons. Lafayette and Davout were concerned in the affair, but their refusal to take the course desired by Fouché and other bold spirits led to nothing being done. Soon Napoleon escaped from Elba and made his way in triumph to Paris. Shortly before his arrival at Paris (March 19, 1815) Louis XVIII. sent to Fouché an offer of the ministry of police, which he declined, saying, "It is too late; the only plan to adopt is to retreat." He then foiled an attempt of the royalists to arrest him, and on the arrival of Napoleon he received for the third time the portfolio of police. That, however, did not prevent him from entering into secret relations with Metternich at Vienna, his aim being then, as always, to prepare for all eventualities. Meanwhile he used all his powers to induce the emperor to popularise his rule, and he is said to have caused the insertion of the words "The sovereignty resides in the people; it is the source of power" in the declaration of the council of state. But the autocratic tendencies of Napoleon could scarcely be held in check, and Fouché seeing the fall of the emperor to be imminent, took measures to expedite it and secure his own interests. On the 22nd of June Napoleon abdicated for the second time, and Fouché was next day elected president of the commission which provisionally governed France. Already he was in touch with Louis XVIII., then at Ghent, and now secretly received the overtures of his agent at Paris. While ostensibly working for the recognition of Napoleon II., he facilitated the success of the Bourbon cause, and thus procured for himself a place in the ministry of Louis XVIII. Even his skill, however, was unequal to the task of conciliating hot-headed royalists who remembered his vote as regicide and his fanaticism as terrorist. He resigned office, and after acting for a brief space as ambassador at Dresden, he retired to Prague. Finally he settled at Trieste, where he died on the 25th of December 1820. He had accumulated great wealth.

Marked at the outset by fanaticism, which, though cruel, was at least conscientious, Fouché's character deteriorated in and after the year 1794 into one of calculating cunning. The transition represented all that was worst in the life of France during the period of the Revolution and Empire. In Fouché the enthusiasm of the earlier period appeared as a cold, selfish and remorseless fanaticism; in him the bureaucracy of the period 1795–1799 and the autocracy of Napoleon found their ablest instrument. Yet his intellectual pride prevented him sinking to the level of a mere tool. His relations to Napoleon were marked by a certain aloofness. He multiplied the means of resistance even to that irresistible autocrat, so that though removed from office, he was never wholly disgraced. Despised by all for his tergiversations, he nevertheless was sought by all on account of his cleverness. He repaid the contempt of his superiors and the adulation of his inferiors by a mask of impenetrable reserve or scorn. He sought for power and neglected no means to make himself serviceable to the party whose success appeared to be imminent. Yet, while appearing to be the servant of the victors, present or prospective, he never gave himself to any one party. In this versatility he resembles Talleyrand, of whom he was a coarse replica. Both professed, under all their shifts and turns, to be desirous of serving France. Talleyrand certainly did so in the sphere of diplomacy; Fouché may occasionally have done so in the sphere of intrigue.

Bibliography.—Fouché wrote some political pamphlets and reports, the chief of which are *Réflexions sur le jugement de Louis Capet* (1793); *Réflexions sur l'éducation publique* (1793); *Rapport et projet de loi relatif aux collèges* (1793); *Rapport sur la situation de Commune-Affranchie* [*Lyons*] (1794); *Lettre aux préfets concernant les prêtres*, &c. (1801); also the letters of 1815 noted above, and a *Lettre au duc de Wellington* (1817). The best life of Fouché is that by L. Madelin, *Fouché* (2 vols., Paris, 1901). The so-called *Fouché Memoirs* are not genuine, but they were apparently compiled, at least in part, from notes written by Fouché, and are often valuable, though their account of events (*e.g.* of the negotiations of 1809–1810) is not seldom untrustworthy. For those negotiations see Coquelle, *Napoléon et l'Angleterre* (Paris, 1903, Eng. trans., London, 1904). For the plots with which Fouché had to deal see E. Daudet, *La Police et les Chouans sous le Consulat et l'Empire* (Paris, 1895); P. M. C. Desmarest, *Témoignages historiques, ou quinze ans de haute police* (Paris, 1833, 2nd ed., 1900); É. Picard, *Bonaparte et Moreau* (Paris, 1905); G. A. Thierry, *Conspirateurs et gens de police; le complot de libelles* (Paris, 1903) (Eng. trans., London, 1903); H. Welschinger, *Le Duc d'Enghien* (Paris, 1888); E. Guillon, *Les Complots militaires sous le Consulat et l'Empire* (Paris, 1894). (J. Hl. R.)

FOUCHER, SIMON (1644–1696), French philosopher, was born at Dijon on the 1st of March 1644. He was the son of a merchant, and appears to have taken orders at a very early age. For some years he held the position of honorary canon at Dijon, but this he resigned in order to take up his residence in Paris. He graduated at the Sorbonne, and spent the remainder of his life in literary work in Paris, where he died on the 27th of April 1696. In his day Foucher enjoyed considerable repute as a keen opponent of Malebranche. His philosophical standpoint was one of scepticism in regard to external perception. He revived the old arguments of the Academy, and advanced them with much ingenuity against Malebranche's doctrine. Otherwise his scepticism is subordinate to orthodox belief, the fundamental dogmas of the church seeming to him intuitively evident. His object was to reconcile his religious with his philosophical creed, and to remain a Christian without ceasing to be an academician. His writings against Malebranche were collected under the title *Dissertations sur la recherche de la vérité*, 1693.

See F. Rabbe, *L'Abbé Simon Foucher* (1867); C. Jourdain in *Dictionnaire des sciences philosophiques* (1875), pp. 557-559.

FOUCQUET, JEAN, or JEHAN (*c.* 1415–1485), French painter, born at Tours, is the most representative and national French painter of the 15th century. Of his life little is known, but it is certain that he was in Italy about 1437, where he executed the portrait of Pope Eugenius IV., and that upon his return to France, whilst retaining his purely French sentiment, he grafted the elements of the Tuscan style, which he had acquired during his sojourn in Italy, upon the style of the Van Eycks, which was the basis of early 15th-century French art, and thus became the founder of an important new school. He was court painter to Louis XI. Though his supreme excellence as an illuminator and miniaturist, of exquisite precision in the rendering of the finest detail, and his power of clear characterization in work on this minute scale, have long since procured him an eminent position in the art of his country, his importance as a painter was only realized when his portraits and altarpieces were for the first time brought together from various parts of Europe in 1904, at the exhibition of the French Primitives held at the Bibliothèque Nationale in Paris. One of Foucquet's most important paintings is the diptych, formerly at Notre Dame de Melun, of which one wing, depicting Agnes Sorel as the Virgin, is now at the Antwerp Museum and the other in the Berlin Gallery. The Louvre has his oil portraits of Charles VII., of Count Wilczek, and of Jouvenal des Ursins, besides a portrait drawing in crayon; whilst an authentic portrait from his brush is in the Liechtenstein collection. Far more numerous are his illuminated books and miniatures that have come down to us. The Brentano-Laroche collection at Frankfort contains forty miniatures from a Book of Hours, painted in 1461 for Etienne Chevalier who is portrayed by Foucquet on the Berlin wing of the Melun altarpiece. From Foucquet's hand again are eleven out of the fourteen miniatures illustrating a translation of Josephus at the Bibliothèque Nationale. The second volume of this MS., unfortunately with only one of the original thirteen miniatures, was discovered and bought in 1903 by Mr Henry Yates Thompson at a London sale, and restored by him to France.

See *Œuvres de Jehan Foucquet* (Curmer, Paris, 1866–1867); A. de Champeaux and P. Gauchery, *Œuvres d'art exécutées pour le duc de Berry*; "Facsimiles of two histories by Jean Foucquet" from vols. i. and ii. of the *Anciennetés des Juifs* (London, 1902); Charles Blanc, *Histoire des peintres de toutes les écoles* (introduction); and Georges Lafenestre, *Jehan Fouquet* (Paris, 1902).

FOUGÈRES, a town of north-western France, capital of an arrondissement in the department of Ille-et-Vilaine, 30 m. N.E. of Rennes by rail. Pop. (1906) 21,847. Fougères is built on the summit and slopes of a hill on the left bank of the Nançon, a tributary of the Couesnon. It was formerly one of the strongest places on the frontier towards Normandy, and it still preserves some portions of its medieval fortifications, notably a gateway of the 15th century known as the Porte St Sulpice. The castle, which is situated in the lower part of the town, directly overlooking the Nançon, is now a picturesque ruin, but gives abundant evidence in its towers and outworks of its former strength and magnificence. The finest of the towers was erected in 1242 by Hugues of Lusignan, and named after Mélusine, the mythical foundress of the family. The churches of St Léonard and St Sulpice both date, at least in part, from the 15th century. An hôtel de ville and a belfry, both of the 15th century, are of architectural interest, and the town possesses many curious old houses. There is a statue of General B. de Lari Coisière (d. 1812), born in the town. Fougères is the seat of a subprefect, and has a tribunal of first instance, a chamber of commerce and a communal college. It is the chief industrial town of its department, being a centre for the manufacture of boots and shoes; tanning and leather-dressing and the manufacture of sail-cloth and other fabrics are also important industries. Trade is in dairy produce and in the granite of the neighbouring quarries. Fougères frequently figures in Breton history from the 11th to the 15th century. It was taken by the English in 1166, and again in 1448; and the name of Surienne, the captor on the second occasion, is still borne by one of the towers of the castle. In 1488 it was taken by the troops of Charles VIII. under la Trémoille. In the middle ages Fougères was a lordship of some importance, which in the 13th century passed into the possession of the family of Lusignan, and in 1307 was confiscated by the crown and afterwards changed hands many times. In 1793, during the wars of the Vendée, it was occupied by the insurgents.

FOUILLÉE, ALFRED JULES EMILE (1838–), French philosopher, was born at La Pouëze on the 18th of October 1838. He held several minor philosophical lectureships, and from 1864 was professor of philosophy at the lycées of Douai, Montpellier and Bordeaux successively. In 1867 and 1868 he was crowned by the Academy of Moral Science for his work on Plato and Socrates. In 1872 he was elected master of conferences at the École Normale, and was made doctor of philosophy in recognition of his two treatises, *Platonis Hippias Minor sive Socratica contra liberum arbitrium argumenta* and *La Liberté et le déterminisme*. The strain of the next three years' continuous work undermined his health and his eyesight, and he was compelled to retire from his professorship. During these years he had published works on Plato and Socrates and a history of philosophy (1875); but after his retirement he further developed his philosophical position, a speculative eclecticism through which he endeavoured to reconcile metaphysical idealism with the naturalistic and mechanical standpoint of science. In *L'Évolutionnisme des idées-forces* (1890), *La Psychologie des idées-forces* (1893), and *La Morale des idées-forces* (1907), is elaborated his doctrine of *idées-forces*, or of mind as efficient cause through the tendency of ideas to realize themselves in appropriate movement. Ethical and sociological developments of this theory succeed its physical and psychological treatment, the consideration of the antinomy of freedom being especially important. Fouillée's wife, who by a previous marriage was the mother of the poet and philosopher Jean Marie Guyau (1854–1888), is well known, under the pseudonym of "G. Bruno," as the author of educational books for children.

His other chief works are: *L'Idée moderne du droit en Allemagne, en Angleterre et en France* (Paris, 1878); *La Science sociale contemporaine* (1880); *La Propriété sociale et la démocratie* (1884); *Critique des systèmes de morale contemporains* (1883); *La Morale, l'art et la religion d'après Guyau* (1889); *L'Avenir de la métaphysique fondée sur l'expérience* (1889); *L'Enseignement au point de vue national* (1891); *Descartes* (1893); *Tempérament et caractère* (2nd ed., 1895); *Le Mouvement positiviste et la conception sociologique du monde* (1896); *Le Mouvement idéaliste et la réaction contre la science positive* (1896); *La Psychologie du peuple français* (2nd ed., 1898); *La France au point de vue moral* (1900); *L'Esquisse psychologique des peuples européens* (1903); *Nietzsche et l' "immoralisme"* (1903); *Le Moralisme de Kant* (1905).

FOULD, ACHILLE (1800–1867), French financier and politician, was born at Paris on the 17th of November 1800. The son of a rich Jewish banker, he was associated with and afterwards succeeded his father in the management of the business. As early as 1842 he entered political life, having been elected in that year as a deputy for the department of the Hautes Pyrénées. From that time to his death he actively busied himself with the affairs of his country. He readily acquiesced in the revolution of February 1848, and is said to have exercised a decided influence in financial matters on the provisional government then formed. He shortly afterwards published two pamphlets against the use of paper money, entitled, *Pas d'Assignats !* and *Observations sur la question financière*. During the presidency of Louis Napoleon he was four times minister of finance, and took a leading part in the economical reforms then made in France. His strong conservative tendencies led him to oppose the doctrine of free trade, and disposed him to hail the *coup d'état* and the new empire. On the 25th of January 1852, in consequence of the decree confiscating the property of the Orleans family, he resigned the office of minister of finance, but was on the same day appointed senator, and soon after rejoined the government as minister of state and of the imperial household. In this capacity he directed the Paris exhibition of 1855. The events of November 1860 led once more to his resignation, but he was recalled to the ministry of finance in November of the following year, and retained office until the publication of the imperial letter of the 19th of January 1867, when Émile Ollivier became the chief adviser of the emperor. During his last tenure of office he had reduced the floating debt, which the Mexican war had considerably increased, by the negotiation of a loan of 300 millions of francs (1863). Fould, besides uncommon financial abilities, had a taste for the fine arts, which he developed and refined during his youth by visiting Italy and the eastern coasts of the Mediterranean. In 1857 he was made a member of the Academy of the Fine Arts. He died at Tarbes on the 5th of October 1867.

FOULIS, ANDREW (1712–1775) and **ROBERT** (1707–1776), Scottish printers and publishers, were the sons of a Glasgow maltman. Robert was apprenticed to a barber; but his ability attracted the attention of Dr Francis Hutcheson, who strongly recommended him to establish a printing press. After spending 1738 and 1739 in England and France in company with his brother Andrew, who had been intended for the church and had received a better education, he started business in 1741 in Glasgow, and in 1743 was appointed printer to the university. In this same year he brought out *Demetrius Phalereus de elocutione*, in Greek and Latin, the first Greek book ever printed in Glasgow; and this was followed in 1774 by the famous 12mo edition of Horace which was long but erroneously believed to be immaculate: though the successive sheets were exposed in the university and a reward offered for the discovery of any inaccuracy, six errors at least, according to T. F. Dibdin, escaped detection. Soon afterwards the brothers entered into partnership, and they continued for about thirty years to issue carefully corrected and beautifully printed editions of classical works in Latin, Greek, English, French and Italian. They printed more than five hundred separate publications, among them the small editions of Cicero, Tacitus, Cornelius Nepos, Virgil, Tibullus and Propertius, Lucretius and Juvenal; a beautiful edition of the Greek Testament, in small 4to; Homer (4 vols. fol., 1756–1758); Herodotus, Greek and Latin (9 vols. 12mo, 1761); Xenophon, Greek and Latin (12 vols. 12mo, 1762–1767); Gray's Poems; Pope's Works; Milton's Poems. The Homer, for which Flaxman's designs were executed, is perhaps the most famous production of the Foulis press. The brothers spared no pains, and Robert went to France to procure manuscripts of the classics, and to engage a skilled engraver and a copper-plate printer. Unfortunately it became their ambition to establish an institution for the encouragement of the fine arts; and though one of their chief patrons, the earl of Northumberland, warned them to "print for posterity and prosper," they spent their money in collecting pictures, pieces of sculpture and models, in paying for the education and travelling of youthful artists, and in copying the masterpieces of foreign art. Their countrymen were not ripe for such an attempt, and the "Academy" not only proved a failure but involved the projectors in ruin. Andrew died on the 18th of September 1775, and his brother went to London, hoping to realize a large sum by the sale of his pictures. They were sold for much less than he anticipated, and Robert returned broken-hearted to Scotland, where he died at Edinburgh on the 2nd of June 1776. Robert was the author of a *Catalogue of Paintings with Critical Remarks*. The business was afterwards carried on under the same name by Robert's son Andrew.

See W. J. Duncan, *Notices and Documents illustrative of the Literary History of Glasgow*, printed for the Maitland Club (1831), which *inter alia* contains a catalogue of the works printed at the Foulis press, and another of the pictures, statues and busts in plaster of Paris produced at the "Academy" in the university of Glasgow.

FOULLON, JOSEPH FRANÇOIS (1717–1789), French administrator, was born at Saumur. During the Seven Years' War he was intendant-general of the armies, and intendant of the army and navy under Marshal de Belle-Isle. In 1771 he was appointed intendant of finances. In 1789, when Necker was dismissed, Foullon was appointed minister of the king's household, and was thought of by the reactionary party as a substitute. But he was unpopular on all sides. The farmers-general detested him on account of his severity, the Parisians on account of his wealth accumulated in utter indifference to the sufferings of the poor; he was reported, probably quite without foundation, to have said, "If the people cannot get bread, let them eat hay." After the taking of the Bastille on the 14th of July, he withdrew to his estate at Vitry and attempted to spread the news of his death; but he was recognized, taken to Paris, carried off with a bundle of hay tied to his back to the hôtel de ville, and, in spite of the intervention of Lafayette, was dragged out by the populace and hanged to a lamp-post on the 22nd of July 1789.

See Eugène Bonnemère, *Histoire des paysans* (4th ed., 1887), tome iii.; C. L. Chassin, *Les Élections et les cahiers de Paris en 1789*. (Paris, 1889), tomes iii. and iv.

FOUNDATION (Lat. *fundatio*, from *fundare*, to found), the act of building, constituting or instituting on a permanent basis; especially the establishing of any institution by endowing or providing it with funds for its continual maintenance. The word is thus applied also to the institutions so established, such as a college, monastery or hospital; and the terms "on the foundation," or "foundationer," are used of members of such a college or society who enjoy, as fellows, scholars, &c., the benefits of the endowment. Formerly "foundation" also meant the charter or incorporation of any such institution or society, and it is still applied to the funds used for the endowment of such institutions.

The terms "old foundation" and "new foundation" used in connexion with the organizing of English cathedral chapters have no reference to the age of the cathedrals. At the time of the Reformation under Henry VIII. the old college chapters were left unchanged, and are referred to as the "old foundations," but the monastic chapters were all suppressed, consequently new chapters had to be formed for their cathedrals and these constitute the "new foundations."

"Foundation" also means the base (natural or artificial) on which any erection is built up; generally made below the level of the ground (see FOUNDATIONS below). A foundation-stone is one of the stones at the base of a building, generally a corner-stone, frequently laid with a public ceremony to celebrate the commencement of the building. The term is also applied to the ground-work of any structure, such as, in dress-making, the underskirt over which the real skirt is hung, any material used for stiffening purposes, as "foundation muslin or net." In knitting or crochet the first stitches on to which all the rest are worked are called the "foundation chain." In gem-cutting the "foundation-square" is the first of eight squares round the edges of a brilliant made in bevel planes and from which the angles are all removed to form three-corner facets.

FOUNDATIONS, in building. The object of foundations is to distribute the weight of a structure equally over the ground. In the construction of a building the weights are concentrated at given points on piers, columns, &c., and these foundations require to be spread so as to reduce the weight to an average. In the preparation of a foundation care must be taken to prevent the lateral escape of the soil or the movement of a bed upon sloping ground, and it is also necessary to provide against any damage by the action of the atmosphere. The soils met with in ordinary practice, such as rock, gravel, chalk, clay and sand, vary as to their capabilities of bearing weight. There is no provision in any English building acts as to the load that may be placed on any of these soils, but under the New York Building Code it is provided that, where no test of the sustaining power of the soil is made, different soils, excluding mud, at the bottom of the footings shall be deemed to safely sustain the following loads to the superficial foot:

	per sq. ft.
Soft clay	1 ton.
Ordinary soft clay and sand, together in layers, wet and springy	2 tons.
Loam, clay or fine sand, firm and dry	3 tons.
Very firm coarse sand, stiff gravel or hard clay	4 tons.

Load on foundation.

A comparison of the pressure exerted on an ordinary foundation by the walls of the several thicknesses and heights provided for by the London Building Act of 1894, and a comparison of a few of the principal authorities, will be found useful in helping us to arrive at a decision as to what can safely be allowed. Take as an example a wall of the warehouse class, 70 ft. high, whose section at the base for a height of 27 ft. is 2½ bricks thick (or 22½ in.), and for the same distance in height again is 2 bricks thick (or 18 in.), the remainder to the top being 1½ bricks thick (or 14 in.). The weight of brickwork per foot run of such a wall is 4·05 tons on any area of 3·75 ft. super. of brickwork. According to the act the concrete is to project 4 in. on each side; we have then an additional area of ·66 ft. super. to add, thus making the total foundation area of each foot run of wall 4·41 ft. super. to take a weight of 4·05 tons or nearly a ton per foot super. (viz. ·9 ton.)

Another factor must, however, be taken into consideration, viz. the weight distributed from the loaded floor and from the roof. In this case there would be at least six floors, and the entire weight could hardly be taken at less than 6 tons, which would give a total weight of 10·05 tons on an area of 4·41 ft. super. or a load of 2·28 tons per foot super. This is on the assumption that no extra weight has been thrown on the foundations by openings or piers, or by girders, &c., in which case, in addition to the work being executed in cement, the foundations should be increased in area. Piers always involve a great increase of weight on the foundations, and in very many instances this increased weight, instead of being provided for by increasing the area of the foundations and so reducing the weight per foot super., is only partly met by the improper method of merely increasing the depth of the concrete, while keeping the same projection of concrete round the footings as for the walls. As an example take an iron column to carry a safe load of 80 tons, standing on a York stone template, and in turn supported by a brick pier 22½ in. square. In this case we should have, after allowing for the projection of concrete on either side, an area of 4 ft. 5 in. square, or 19·6 ft. super., and this would give a pressure of 4·1 tons per foot on the foundations, or almost twice as much as in the previous example of a warehouse wall. Here, instead of increasing the depth of the concrete, it would be necessary to increase its width; if it were made 6 ft. square, we should have an area of 36 ft. super. to take the 80 tons, and thus the pressure would only be 2·2 tons per foot, and the cost of the foundation be much the same.

If we compare a section of wall of the dwelling-house class, as prescribed by the London Building Act, we find that, taking a wall 50 ft. high and having a thickness at base of 22½ in. as for the warehouse wall to which we have referred, we have a wall weighing 3·75 tons per foot super. on an area of 4·41 feet super., or ·85 ton per foot without weight of floors and roof as against the ·9 ton in the warehouse example. To this must be added the weight of, say, 5 floors and roof at a total of 3 tons per foot run of wall, and we then have an aggregate of 6·75 tons per foot run and 1·50 tons per foot super. as against 2·28 tons in the warehouse class.

If we turn from the act to text-books we find that Colonel Seddon in the *Aide Memoir* gives the load which ordinary foundations will bear as a safe load per foot super. as follows:

	tons.
Rock, moderately hard	9
Rock of strength of good concrete	3
Rock, very soft	1·8
Firm earth	1 to 1½
Hard clay	1 to 1½
Clean dry gravel and clean sharp sand prevented from spreading sideways	1 to 1½

Most of the work in London may be classed under one of the latter heads, and according to this table we have, when we erect walls in accordance with the building act, to overload our foundations.

As to the possibility of spreading weights, we have as an example the chimney at Adkin's Soap Works in Birmingham, 312 ft. high, so arranged that its pressure on the foundations is only 1½ tons per foot super.; also the great St Rollox chimney at Glasgow, which has a pressure of 1¾ tons; the weight of the Eiffel Tower (7500 tons) is so spread over 4 bases, each 130 ft. square, that the pressure is only ·117 ton, or 2⅓ cwt., per foot super. The Tower Bridge has a load of 16 tons per foot on the granite bed under the columns of towers, reduced by spreading to an actual pressure on the clay foundation of 4 tons. The piers under the Holborn Viaduct have a load of 2¼ tons only, those of the Imperial Institute 2¼ tons, and those of the destructor cells and chimney shaft at Great Yarmouth 4 tons 6¾ cwt. per foot super. From these various examples it would appear that on sound clay or gravel foundation a load of from 2¼ to 4 tons may be employed with safety.

Trial borings.

One of the first and most important requirements in preparing drawings for a large building is to ascertain the nature of the subsoil and strata at different levels over the proposed site, so as to be able to arrange the footings accordingly at the various depths and to decide as to the various forms and methods to be employed. For this purpose trial holes or borings are sunk until a suitable bed or bottom is found, upon which the concrete foundation may safely be put. If no such solid bottom is found, as often happens near the water side, special foundations must be employed, such as dock, gridiron, cantilever and pile foundations, &c., all of which will be described hereafter. As examples of the varying subsoils we may mention the following, in which will be noticed the great depths dug before getting through the made ground: At the Bank of England there were 22 ft. of made ground resting on 4 ft. of gravel. Some of the made ground was of ancient date, and preserved relics of Roman occupation. In some parts the subsoils have been excavated for ballast or gravel, as at Kensington, or for brick earth, as at Highbury, and the pits filled in with rubbish. Rock, which forms an excellent and unchanging foundation in one situation, may prove a dangerous foundation in another. Thus chalk forms a good limestone foundation in certain positions, but when it dips towards a slope or a cliff with an outcrop of the gault or underlying clay, it is a very unsuitable foundation for any building, as the landslips in the Isle of Wight and on the Dorsetshire coast bear witness. A boring made in Tallis Street, near the Thames embankment, showed: (1) 18 in. ballast, dirty; (2) 6 in. greensand, wet and dirty; (3) 2 ft. peat clay; (4) 6 in. greensand; (5) 5½ ft. peaty bog; (6) 9 ft. running sand; and (7) 4 ft. clean ballast, resting at a depth of 23 ft. below the ground line upon blue clay. A boring at Highbury New Park gave: (1) 2 ft. made ground, (2) 18 ft. loam, (3) 9 ft. sand, (4) 4 ft. peat, and (5) 8 ft. gravel and sand. These examples show that while trial holes should always be made before designing a foundation, to ascertain the nature of the subsoil, care must be taken not to calculate upon uniformity. Thus at the block 2 of the admiralty extension new buildings (London), one of the trial holes upon the south-west side of the old buildings showed the clay to be about 29½ ft. below the surface of the ground, while actual excavation proved the dip of the clay to be such that in the execution of the new building it became necessary to underpin the north-west corner of the old building at the deepest part 42 ft. below the ground. The foundations of block 1 of the new admiralty buildings are placed in a dock, built upon the London clay at a depth of 30 ft. in solid concrete 6 ft. thick. At the Hotel Victoria, in Northumberland Avenue (London), the various subsoils are as follows: (1) 38½ ft. made ground clay and gravel mixed, (2) 4 ft. gravel and sand, (3) 6 ft. rising sand; (4) 2 ft. fine ballast, and at a depth of 50 ft. blue clay. At the south end the clay was 43 ft. down and at the north end 37 ft. The front wall was constructed on a concrete bed 9 ft. wide. The site was surrounded by a similar wall of concrete about 6 ft. wide, forming a species of boxes, and the whole was covered with a depth of 6 ft. of concrete upon which the walls were raised. The foundation for 53 Parliament Street, where running sand was encountered, was constructed with short piles, 7 or 8 ft. long and 6 in. diam., pointed and placed as close together as possible over the whole foundation, the tops were then sawn off level, and a concrete raft, 7 or 8 ft. thick, was built over the whole area. At the Institution of Civil Engineers, Great George Street, Westminster, the foundations to the two party walls upon each side of the building were carried down about 22 ft. below the pavement level, that on the west side being 22 ft. deep and that on the east side 24 ft.

Construction.

The London Building Act and the model by-laws prohibit the erection of buildings on sites that have been used as "shoots" for faecal matter or vegetable refuse, and in such cases the objectionable material must be removed prior to the commencement of building operations, and the holes from which it was taken filled up with dry brick or other rubbish well rammed. Foundations are usually executed by excavators or navvies, and the tools and implements used are boning rods, level pegs, lines, spirit level, pickaxe, various shovels, wheel-barrow, rammer or punner, &c. In digging the ordinary trenches and excavations, should the ground be loose, planking and strutting have to be employed. This consists of rough boarding put along the sides of the trenches and wedged tight with waling pieces and struts; this work is done by navvies. Figs. 1 and 2 show the general forms of planking and strutting for the different soils.

In very large works of excavation in soft soil a steam digger is used for the bulk of the work. It consists of a large steel bucket with a cutting edge; this is lowered by means of a crane into the excavation, and on being withdrawn cuts off a portion of soil which is hoisted and deposited in carts for removal to any desired position within the radius commanded by the crane. The work of trimming the excavation to a regular shape must always be done by manual labour.

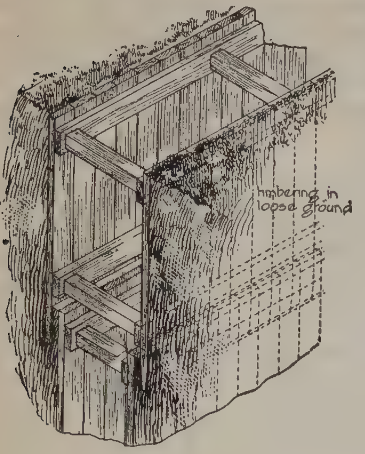

FIG. 1.

Concrete for filling into the foundations is usually mixed by navvies; for large works it is sometimes mixed by machinery.

In order that the work of excavating and constructing the foundations may proceed in a water-logged site, pumps have to be employed, and where the inrush of water is great it is usual to sink a sump hole lower than the depth required for the foundations, and to use a steam pump kept going day and night.

The foundation of a wall is required to be as follows in accordance with the London Building and Amendment Acts: "The projection of the bottom of the footings of every wall on each side of the wall shall be at least equal to half of the thickness of the wall at its base, unless an adjoining wall interferes, in which case the projection may be omitted where that wall adjoins, and the diminution of the footings of every wall shall be formed in regular offsets and the height from the bottom of such footing to the base of the wall shall be at least equal to two-thirds of the thickness of the wall at its base." (See BRICKWORK.) The base of a wall is the thickness above the footing; the footing is the brickwork built directly on the top of the concrete and diminishing in width in every course. Thus: "The projection of the bottom footing to be equal to one-half the thickness of wall on both sides" means that a 13½-in. wall would require to have three courses of footings, the bottom one being 27 in. wide. "The height from the bottom of such footing to the base of the wall shall be at least equal to two-thirds the thickness of wall at its base" means that in the case of a 13½-in. wall the height of footings would have to be 9 in., or three courses of brickwork, each measuring 3 in.

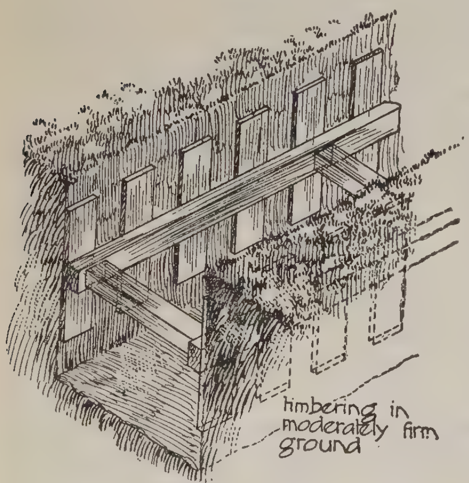
Timbering in moderately firm ground

FIG. 2.

The New York Building Code enters more fully into the requirements for the foundation of walls as regards depth than that in use in London. Section 25, Part 5, requires that every building, except buildings erected upon solid rock, or upon wharves and piers on the water front, shall have foundations of brick, stone, iron or concrete laid not less then 4 ft. below the surface of the earth, on the solid ground or level surface of rock, or upon piles or ranging timbers when solid earth or rock is not found. Piles intended to sustain a wall, pier or post, shall be spaced not more than 36 in. nor less than 20 in. on centres; they must be driven to a solid bearing if practicable, and their number must be sufficient to support the superstructure proposed. No pile shall be used of less dimensions than 5 in. at the small end and 10 in. at the butt for short piles, or piles 20 ft. or less in length. No pile shall be weighted with a load exceeding 40,000 lb. When a pile is not driven to refusal, its safe sustaining power shall be determined by the following formula: twice the weight of the hammer in tons multiplied by the height of the fall in feet divided by the least penetration of pile under the last blow in inches plus one. There are also further requirements as to piles, &c., and the commissioner of buildings must be notified when the piles are to be driven.

The New York Code, Section 26, further goes on to say that foundation walls shall be constructed to include all walls and piers built below the curb level or nearest tier of beams to the curb, to serve as supports for the walls, piers, columns, girders, posts or beams. Foundation walls shall be built of stone, brick, Portland cement concrete, iron or steel. If built of rubble stone or Portland cement concrete, they shall be at least 8 in. thicker than the wall above them to a depth of 12 ft. below the curb level, and for every additional 10 ft. or part thereof deeper, they shall be increased 4 in. in thickness. If built of brick, they shall be at least 4 in. thicker than the wall next above them to a depth of 12 ft. below the curb level, and for every additional 10 ft. or part thereof deeper, they shall be increased 4 in. in thickness. The footing or base course shall be of stone or concrete, or both, or of concrete and stepped up brickwork of sufficient thickness and area to bear safely the weight to be imposed thereon. If the footing or base course be of concrete, the concrete shall not be less than 12 in. thick; if of stone, the stones shall not be less than 2×3 ft. and at least 8 in. in thickness for walls, and not less than 10 in. in thickness if under piers, columns or posts. The footing or base course, whether formed of concrete or stone, shall be at least 12 in. wider than the bottom width of walls, and at least 12 in. wider on all sides than the bottom width of said piers, columns or posts. If the superimposed load is such as to cause undue transverse strain on a footing projecting 12 in., the thickness of such footing is to be increased so as to carry the load with safety. For small structures and for small piers sustaining light loads the commissioner of buildings having jurisdiction may, in his discretion, allow a reduction in the thickness and projection specified for footing or base courses. All base stones shall be bedded and laid crosswise, edge to edge. If stepped-up footing of brick is used in place of stone above the concrete, the offsets if laid in single courses shall each not exceed 1½ in., or, if laid in double courses, then each shall not exceed 3 in. offsetting the first course of brickwork back one-half the thickness of the concrete base, so as properly to distribute the load to be imposed thereon. It will be seen by the foregoing that the American acts are far more extensive than in London. The London Building Act mentions that the footings of a wall shall rest upon the solid ground or concrete or upon other solid substructure. The building act amendment says: "The foundations of the walls of every house or building shall be formed of a bed of good concrete not less than 9 in. thick, and projecting at least 4 in. on each side of the lowest course of footings."

Various Types of Foundations.—The most natural foundations for walls are those constructed where the walls are built directly upon the ground; this is only possible where the ground is very hard or consists of rock, and in either of these cases the ground is simply levelled and the building commenced.

The next and most universally recognized method, which might safely be said to be adopted in 95% of all modern buildings, is the system of placing a bed of concrete under the walls, digging trenches where the walls are to come until a solid bottom is reached, and in these laying the concrete. The London Building Act requires this concrete bed to be at least 4 in. wider than the bottom course of footings on each side of the wall, but it is generally made 6 in. wider on each side and in general circumstances the depth of the concrete is varied according to the weight placed upon it.

Where a site is in close proximity to a river or old water-course, &c., where deep basements are excavated, or where the ground lies low, naturally water is met with, and where water is the ground is soft. It is here that special foundations are required.

Concrete piers, legs, or stilts.

In certain cases it is necessary to use concrete legs or stilts. These are placed in such positions as to take the weights of the building, and sunk to depths of 40 ft. more or less as the case may require according to the nature of the ground; and on the tops of these stilts concrete arches or lintels are turned over (fig. 3). As an example of the stilt principle, mention may be made of some premises at Stratford and a church at South Bermondsey, London, in which concrete piers were sunk at 12 ft. centres apart and 4½ ft. square, in pot holes dug out of made ground; then concrete arches were formed over the intervening untrustworthy ground with a minimum thickness of 18 in. or the piers were connected by concrete lintels 3 ft. thick in which steel joists were embedded. At Sion College, Victoria Embankment, London, the foundations were formed with cement concrete stilts or piers 8 ft. square, and going down to the London clay; from the tops of these stilts brick arches were turned, spanning the spaces between the piers, and upon these arches the walls were built.

Pile foundations, used in the case of soft ground, for small works, consist either of stout scaffold poles or of timbers varying from 6 in. to 12 in. square according to requirements (fig. 4). The bottom ends of these timbers have an iron shoe with a point, so as to be easily driven into the ground, and the tops of the timbers have an iron band round, so that when the timbers are being driven in

Pile foundations.

the band prevents them from splitting (fig. 5). The methods of driving these piles are various. The usual plan is to erect a temporary structure, upon one side of which is a guide path faced with sheet-iron so as to give a smooth face. Up and down this guide path a heavy iron weight, called a monkey, is worked; the monkey is hoisted to the top of the guide path by means of a crab worked by hand or steam, and when released descends with a good force, and so drives the piles into the ground. The monkey usually weighs from 2 cwt. to 10 cwt. and is allowed a drop of 15 to 40 ft.

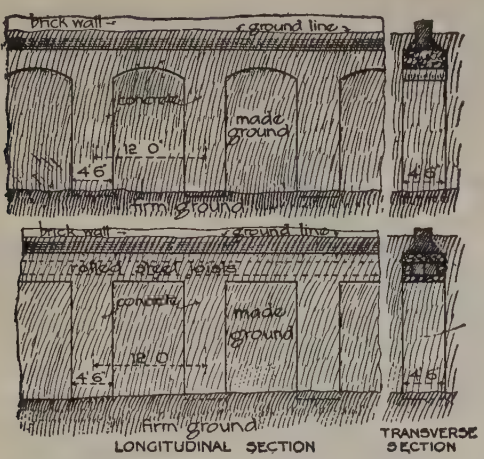

FIG. 3.

Piles are driven all round under the walls at varying intervals or under piers where the weights of a building are to be concentrated. In the erection of the Chicago public library four Norway pine piles, each with an average diameter of 13 in., were driven to a depth of 52½ ft. and loaded with a dead load of 50·7 tons per pile for a period of two weeks, and no settlement taking place 30 tons per pile was adopted as a safe load. The following are some examples of loads used in practice: passenger station, Harrison Street, Chicago, piles 50 ft. in length, each carrying 25 tons; elevator, Buffalo, N.Y., piles 20 ft. in length, weight 25 tons; Trinity church, Boston, 2 tons; Schiller building, Chicago, 55 tons per pile, but in this case the building settled considerably. All timber grillage and the tops of all piles should be kept below the lowest water level, and be capped with concrete or stone. In Boston it is obligatory to cap with blocks of granite.

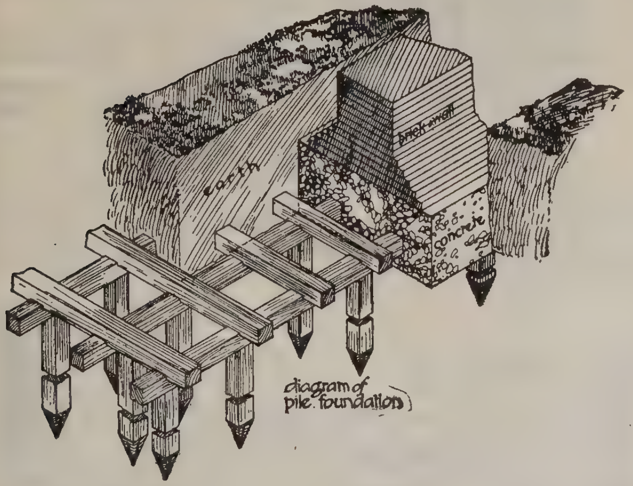

FIG. 4.

Concrete piles.

Another form of foundation takes the shape of Portland cement concrete blocks, and is used chiefly for bridges and in marshy land, &c. In some cases cylinders of brickwork are built, and the centres are filled with blocks of concrete and grouted in. The Yarmouth destructor cells and chimney shaft were built in this way; the cylinders were constructed of 9 in. brickwork built in Portland cement, the lower 4 ft. being encased in a wooden drum with cutting edge sunk into the gravel and sand at least 2 ft. The cylinders were sunk by the aid of a grab, the bottom being levelled and the concrete blocks laid by a diver. Use is also made of piles consisting of Portland cement concrete having steel rods embedded in it, and provided with iron shoes and head for driving (fig. 6).

Cast iron screw piles (fig. 7) used in very loose sandy soils, consist of large hollow cast iron columns with flat screw blades cast on the lower ends. The projection of this screw from the pile may vary from 9 in. to 18 in. with a pitch of from one-quarter to one-half of the projection, the blade making a little over one turn round the shaft. For most requirements a diameter of screw from 3½ to 4½ ft. will be found sufficient, a sandy foundation requiring the largest. The lower end of the tube is generally left open, the edge being bevelled and occasionally provided with teeth to assist in cutting into and penetrating the soil.

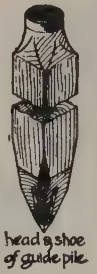

FIG. 5.

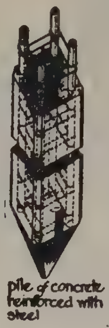

FIG. 6.

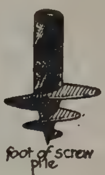

FIG. 7.

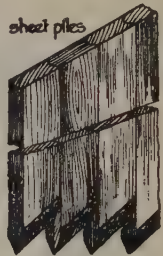

FIG. 8.

Another system of piling known as sheet piling (fig. 8), consists in driving piles into the ground at intervals, and between these, also driven into the ground, are timbers measuring 3 in. by 9 in., which form a wall to keep the soft earth up under the building. In this way the earth is prevented from spreading out and so causing the building to settle unevenly.

Plank foundations.

Another kind of foundation, known as plank foundation (fig. 9), consists of elm planks, about 9 in. by 3 in. laid across the trench and spiked together; on the top of these are laid similar planks but at right angles to the last, and upon the platform thus formed the wall is built. This method is used in soft ground.

Caissons.

Caissons are usually employed by engineers for the construction of the foundations of bridge piers, but instances of their use in foundations for buildings are to be found in the American Surety and the Manhattan Life Insurance buildings, New York City. The latter building is 242 ft. high to the parapet, and the dome and tower rise 108 ft. higher. The building is carried on 16 solid masonry piers, taken down 54 ft. below the street level to solid rock, and these piers support the 34 cast iron columns upon which the building is erected. The piers to each building were constructed by the pneumatic caisson process (see CAISSON).

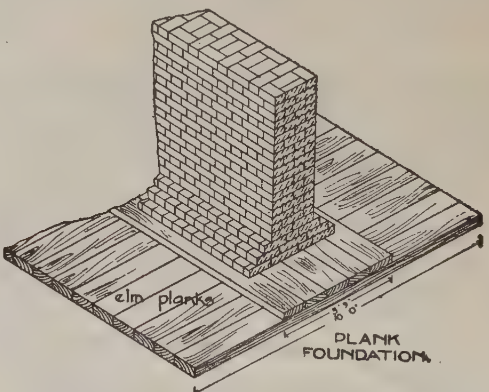

FIG. 9.

Well foundations.

A good plan for foundations when the ground is loose and sandy is to build upon wells of brickwork, a method which has been successfully practised in Madras. The wells are made circular, about 3 ft. in diameter and one brick thick. The first course is laid and cemented together on the surface of the ground when it is dry, and the earth is excavated inside and round about it to allow it to sink. Then another is laid over it and again sunk. The well is thus built downwards. The brickwork is sunk bodily to a depth of 10 ft. or more, according to building to be erected upon it, and the interior is filled up with rubble work. All the public buildings at Madras were erected upon foundations of this kind. Well foundations were employed under the city hall, Kansas City, and the Stock Exchange, Chicago.

Coffer dams. Coffer dams are wooden structures used to keep back the water whilst putting in foundations on the waterside, and are constructed with two rows of timbers, 12 in. square as piles spaced about 6 ft. apart, and filled in between with a double row of 2 in. or 3 in. boards, the space between the rows being packed with clay puddle (fig. 10). The general rule for the thickness of a coffer dam is to make it equal to the depth of water. An interesting example of a coffer dam is that at the Keyham dock extension, where piles varied in length from 65 ft. to 85 ft. They were driven in a double row 5 ft. apart, and over 13,000 were used.

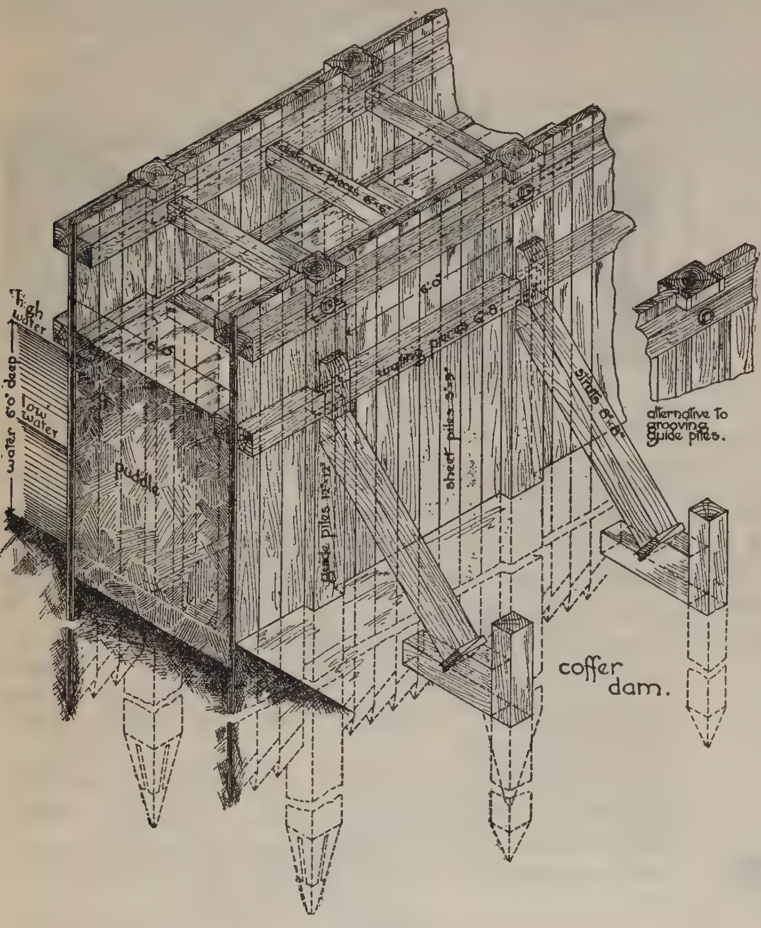

Fig. 10.

Dock foundations. Dock foundations are constructed after the fashion of a large concrete tank, and are adapted to large sites where a difficulty arises as to the ingress of water. They are considered the best method of constructing a building on soft ground and of keeping a building dry (fig. 11). This type of foundation was used at the new colonial office, Whitehall, London, and the new admiralty buildings at St James's Park, London. A few buildings treated after the style of a dock, but in some instances without the enclosing walls, are the following:

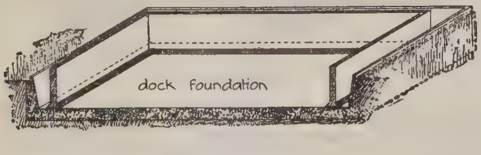

Fig. 11.

At the admiralty buildings already mentioned a concrete retaining wall completely surrounds the exterior below the ground, and is joined up to the underpinning work; the whole site being covered with concrete 6 ft. thick, a huge tank is formed of an average inside clear depth of 20 ft. in which the basements are built. The new "Old Bailey" buildings in Newgate Street, London, are constructed on a concrete table 5 ft. thick, as also are the Army and Navy Auxiliary Stores, Victoria Street. At Kennet's Wharf, near Southwark Bridge, a concrete table, 8 ft. thick, was spread all over the site, with an extra thickness under the walls. Foundations formed similarly to dock foundations, but in addition having steel joists and rods inserted in the thickness of the concrete table, to tie the whole together, are known as *gridiron* foundations.

In the Hennebique concrete system, all beams, &c., are formed with small rods and then surrounded with concrete; it is designed for floors and for spreading the weight of a building over an extended foundation on soft ground.

Cantilever foundations. Where a heavy wall is to be built against an old one and there is not sufficient room for the foundations, the plan is adopted of building pier foundations at some distance from the proposed new wall. On the top of these piers rest steel cantilevers over steel pin rockers upon cast iron bedplates; the cantilevers are secured at one end to a column, while the other ends go through the full thickness of the new wall. Upon these last ends is placed a steel girder upon which the wall is built. This construction (fig. 12) has been used in America, and in the Ritz Hotel, Piccadilly, London.

Another form of cantilever foundations was employed in the case of some premises at Carr's Lane, Birmingham, partly built over the Great Western railway tunnel (fig. 13). In this instance large piers were built below the ground at the side of the tunnel. From the tops of these piers large steel cantilevers were erected projecting over the crown of the tunnel, and on these steel girders were fixed and the building constructed upon them.

Foundations in Tunis. In modern Tunis, a section of which city is built on marshy ground, the subsoil is an oozy sediment, largely deposited by the sewage water from the ancient or Arab quarter of the city, which is situated on an adjacent hill. This semi-fluid mud has a depth of about 33 ft. To prepare the soil for supporting an ordinary house, pits from 8 ft. to 10 ft. square are excavated to a depth of about 10 ft., to the level of the ground water. A mixture is made of the excavated soil and powdered fat lime, procured from clinkers and unburnt stone from the lime-kilns, which soon crumbles to fine dust when exposed to the air. The mixture is thrown into pits in layers about 12 in. thick and rammed down for a very long time by specially trained labourers. A gang of 15 or 20 men will work at least 10 or 12 days ramming for the foundations of a moderate-sized house. An extremely hard bed is thus obtained, reaching to within 18 in. of the surface of the ground, and on this artificial bed the foundations of the building are laid. Although this method of construction is crude, it is stated that the practical results are superior to those obtained by using piles, concrete or other recognized methods, and in all cases the cost is much less, for labour is cheap.

Building on sand. A novel and interesting foundation was designed for a signal station at Cape Henlopen, Delaware. This is built on top of the highest sandhill at Cape Henlopen, so that the observer may have an unobstructed view; it rises about 80 ft. above the level of the sea and is exposed to all winds and weather, while it is absolutely required that it shall stand firmly planted in such a way that even a hurricane shall not shake it or make it tremble, since that would affect the sight of the telescope in the observatory. The usual mode of securing such a building is by means of a foundation of screw piles or of heavy timbers sunk into the sand; this method, however, has the disadvantage that if the wind shifts the sand away from around the foundation, it becomes undermined and its effect is destroyed. To avoid such an accident, recourse was had to the following design, which was considered to be cheap and at the same time to provide an effective anchorage. The building is entirely of wood; it has a cellar, above which are two rooms one above the other, and the whole is

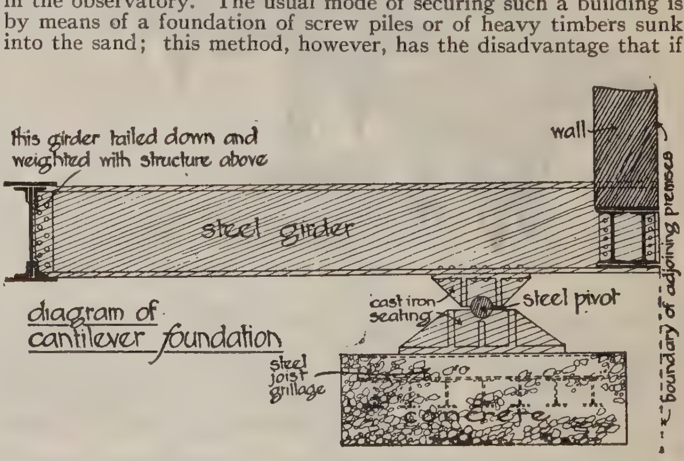
this girder tailed down and weighted with structure above
wall
steel girder
cast iron seating
steel pivot
diagram of cantilever foundation
steel joist grillage
concrete
boundary of adjoining premises

Fig. 12.

surmounted by the observatory proper. First, the ground sill is a square of 20 ft., made of yellow pine sticks mortised together and pinned with stout trunnels. The sill of the observatory is made likewise of heavy timbers, 12 ft. long. The two sills are joined together by four stout yellow pine corner posts, which in turn are mortised into both sills. The posts are 26 ft. in length. Five feet above the lower sill is the sill which supports the floor of the first room. Ten feet above this is the sill which supports the upper room. Both these sills again are mortised into the corner posts. The structure is sheathed outside with German siding, and inside with rough boards covered with felt, and again by tongued and grooved yellow pine boards. The observatory proper, octagonal in shape, is securely mortised into the top sill and covered with a corrugated iron roof conical in shape. The cellar is floored with 3 in. wood, and boarded all round on the inside of the posts. A pit was first dug in the sand about 6 ft. deep and fully 20 ft. wide on the bottom. The cellar sill was laid on this bottom, and the structure built upon it; thus the whole depth of cellar is sunk below the top of the hill or the level of the sand. The cellar was then filled up with sand and packed solid all round, consequently the building is anchored in its place by the load in the cellar, about 100 tons in weight.

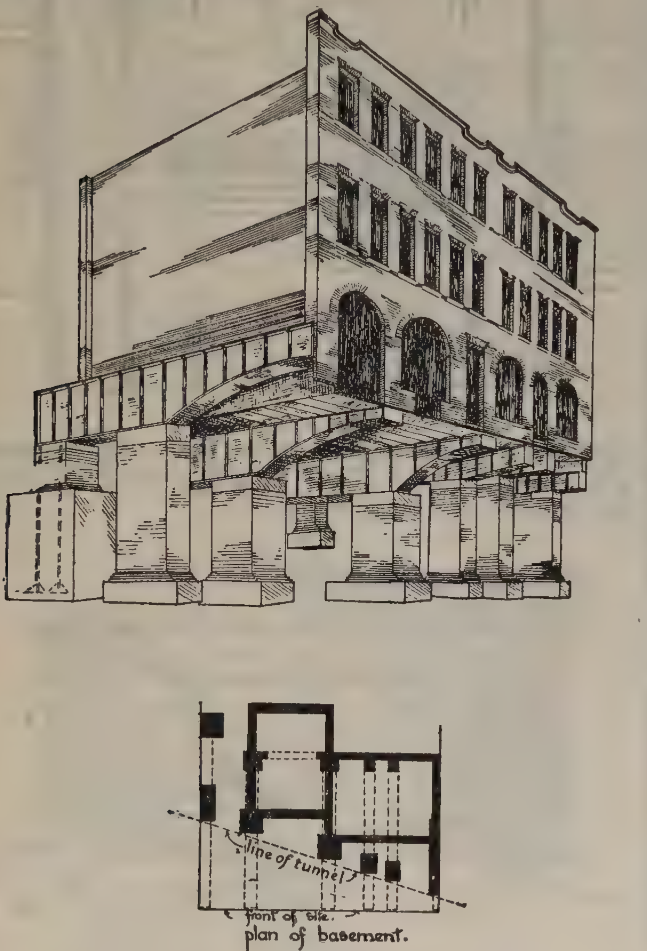

FIG. 13.—Cantilever Foundation over Railway Tunnel.

The subject of foundations, being naturally of the first importance, is one that calls for most careful study. It is not of so much importance that the ground be hard or even rocky as that it be compact and of similar consistency throughout. It is not always that a site answers to this description, and the problem of what will be the best form of foundation to use in placing a building, more especially if that building be of large dimensions and consequently great weight, on a site of soft yielding soil, is one that is often most difficult of solution. The foregoing article indicates in a brief manner some of the obstacles the architect or engineer is required to surmount before his work can even be started on its way to completion.

AUTHORITIES.—The principal books for reference on this subject are: *A Practical Treatise on Foundations*, by W. M. Patton, C. E.; *Building Construction and Superintendence*, part i., by F. E. Kidder; *Notes on Building Construction*, vols. i. ii. and iii.; *Aide Memoir*, vol. ii., by Colonel Seddon, R.E.; *Advanced Building Construction*, by C. F. Mitchell; *Modern House Construction*, by G. L. Sutcliffe; *Building Construction*, by Professor Henry Adams; *Practical Building Construction*, by J. P. Allen. (J. Bt.)

FOUNDING (from Lat. *fundere*, to pour), the process of casting in metal, of making a reproduction of a given object by running molten metal into a mould taken in sand, loam or plaster from that object. To enable the founder to prepare a mould for the casting, he must receive a pattern similar to the casting required. Some few exceptions occur, to be noted presently, but the above statement is true of perhaps 98% of all castings produced. The construction of such patterns gives employment to a large number of highly skilled men, who can only acquire the necessary knowledge through an apprenticeship lasting from five to seven years. A knowledge of two trades at least is involved in the work of pattern construction—that of the craft itself and that of the moulder and founder. Patterns have to be constructed strongly. They are generally of wood, and they thus require skill in the use of woodworking tools and the making of timber joints, together with a knowledge of the behaviour of timber, &c. Some few patterns are made in iron, brass or white metal alloys. They have to be embedded in a matrix of sand by the founder, and being enclosed, they have to be withdrawn without inflicting any damage in the way of fracture in the sand. Since cast work involves shapes that are often very intricate, including projections and hollow spaces of all forms, it is obvious that the withdrawal of the patterns without entailing tearing up and fracture of the sand must involve many difficult problems that have to be as fully understood by the pattern-maker as by the moulder. It is from this point of view that the work of the pattern-maker should be approached in the first place. No closed mould can possibly be made without one or more joints, for if a pattern is wholly enclosed in a matrix of sand it cannot be withdrawn except by making a parting in the sand, and it is not difficult to conceive that the parting in the pattern might advantageously be made to coincide, either exactly or approximately, with that of the mould. Nor must obstacles exist to the free withdrawal of patterns. They must therefore not be wider or larger in the lower than in the upper parts; actually they are made a trifle smaller or "tapered." Nor may they have any lateral extensions into the lower sand, unless these can be made to withdraw separately from the main portion of the pattern. Finally, there are many internal spaces which cannot be formed by a pattern directly in the sand, but provision for which must be made by some means extraneous to the pattern, as by cores.

A single example must illustrate the main principles which have just been stated. The object selected is a bracket which involves questions of joints, of cores, of pattern construction and of moulding. The casting, the pattern, and its mould are illustrated. Fig. 1 illustrates in plan the casting of a double bracket, the end elevation of which is seen in fig. 2; the pattern of which presents obvious difficulties in the way of withdrawal from a mould, supposing it were made just like its casting. But if it be made as in fig. 3, with the open spaces A, B, in fig. 2, occupied with core prints, and the pieces A, A in fig. 3 left loosely skewered on, everything will "deliver" freely. Moreover the pattern might be made solidly as shown in fig. 3, or else jointed and dowelled in the plane a–a, as in fig. 4, or along the upper faces of the prints b–b, fig. 3. The

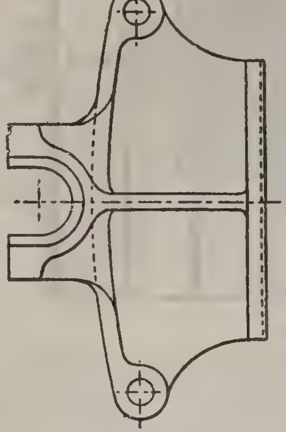

FIG. 1.

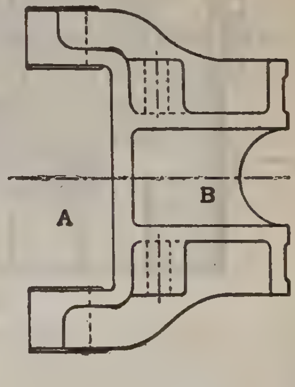

FIG. 2.

timber shadings in figs. 3 and 4 illustrate points in the most suitable arrangement of material. The prints are "boxed up." Fig. 4 shows a certain stage of the moulding, in which one half of the pattern has been "rammed" in sand, and turned over in the "bottom box," and the upper half is ready to be rammed in the "top box," with "runner pin" or "git stick" A, set in place. The lower loose piece has had its skewer removed during the ramming. Fig. 5 illustrates the mould completed and ready for pouring. The boxes have been parted, the pattern has been withdrawn, cores inserted in the impressions left by the prints, vents taken from the central body of cinders, the pouring basin made and the boxes cottered together.

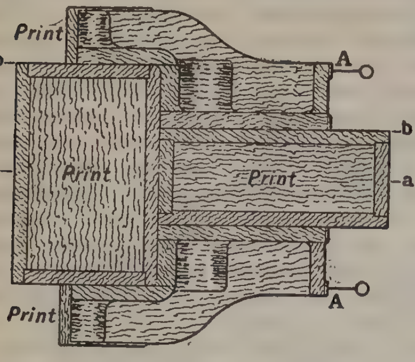

Fig. 3.

Every single detail now briefly noted in connexion with this bracket is applied and modified in an almost infinite number of ways to suit the ever varying character of foundry work. Yet this process does not touch some of the great subdivisions of moulding and casting. There is a large volume of large and heavy work for which complete patterns and core boxes are never made, because of the great expense that would be involved in the pattern construction. There are also some cases in which the methods adopted would not permit of the use of patterns, as in that group of work in which the sand or loam is "swept" to the form required for the moulds and cores by means of striking boards, loam boards, core boards or strickles. In these classes of moulding the loose green sands and core sands are not much used; instead, loam—a wet and plastic sand mixture—is employed, supported against bricks (loam moulds) or against core bars and plates, and hay ropes (loam cores). All heavy marine engine cylinders are thus made by sweeping, and all massive cores for engine cylinders and large pipes, besides much large circular and cylindrical work, as foundation cylinders, soap pans, lead pans, mortar pans, large propeller blades, &c. In these cases the edge of the striking board is a counterpart of the profile of the work swept up. Joints also have to be made in such moulds, not of course in order to provide for the removal of a pattern, but for the exposure of the separate parts in course of construction, and for closing them up, or putting them together in their due relations. These joints also are swept by the boards, generally cut to produce suitable "checks," or "registers" to ensure that they accurately fit together. Fig. 6, showing a portion of a swept-up mould, illustrates the general arrangement. A plate, A, carries a quantity of bricks, B, which are embedded in loam, and break joint. To a striking bar, C, supported in a step, a striking board or sweeping board, D, is bolted, and is swept round against plastic loam, which is afterwards dried. The check on the board at A corresponds with a similar check on the board which strikes the interior of the pan, and by which top and bottom portions of the mould are registered together. This is indicated in dotted outline. Its mould also is swept on bricks, and turned over into place, and the metal is poured into the space *b*, *b*, between the two moulds. There is also a large group of swept-up work which is not symmetrical about a centre of rotation. Then the movements of the sweeping boards are controlled by the edges of "core plates," or of "core irons" (fig. 7). Bend pipes, and the volute casings of centrifugal pumps and pipes, afford examples of this kind. In fig. 7, A is the core iron, held down by weights, and B the "strickle," sweeping up the half bend C, two such halves pasted together completing the core.

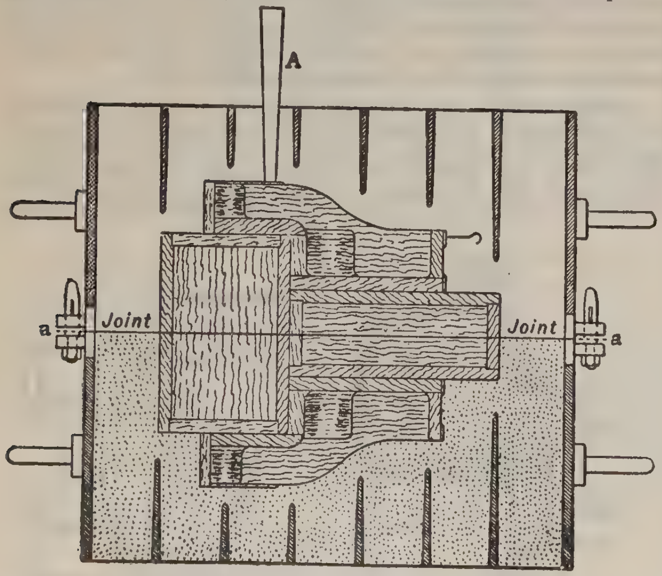

Fig. 4.

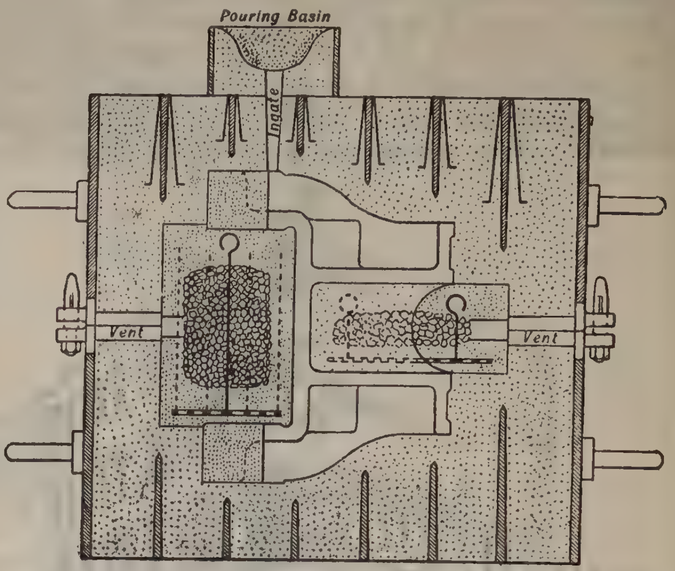

Fig. 5.

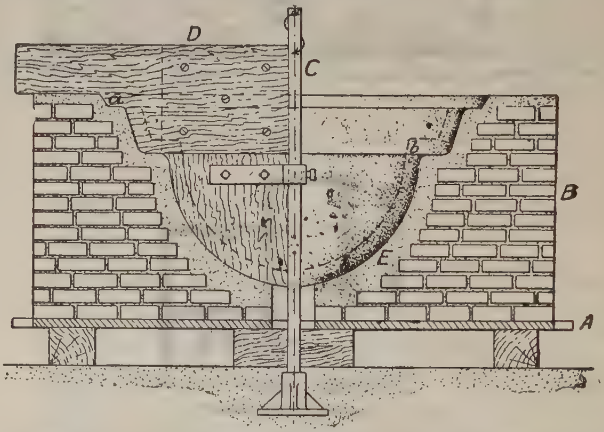

Fig. 6.

Core-making is a special department of foundry work, often involving as much detail as the construction and moulding of patterns. Two perfectly plain boxes are shown in figs. 8 and 9, in both of which provision exists for removing the box parts from the core after the latter has been rammed. Core boxes are jointed and tapered, and often have loose pieces within them, and also prints, into the impressions of which other cores are inserted.

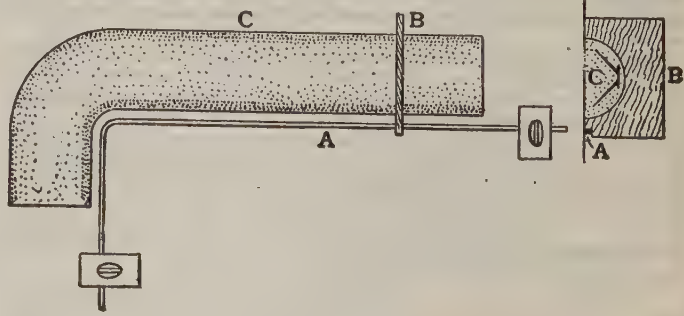

Fig. 7.

Machine-moulding.—There is a development of modern methods of founding which is effecting radical changes in some departments of foundry practice, namely, moulding by machines. The advantages of this method are manifold, and its limitations are being lessened continually. There are two broad departments between which machine-moulding is divided. One, of less importance, is that of toothed wheels; the other is that of general work, except of a very massive character.

Gear-wheel moulding machines are essentially a special adaptation of the mechanism of the dividing engine, by means of which, instead of using a complete pattern of a toothed wheel, two or three pattern teeth are used, and the machine takes charge of the correct pitching or division of the teeth moulded therefrom, leaving to the moulder the work only of turning the handle of the division plate, and ramming the sand around the pattern teeth. The result is accurate pitching, and the use of two or three teeth instead of a full pattern, together with any core boxes and striking boards that are necessary for the arms.

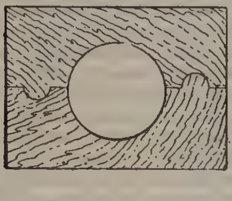

FIG. 8.

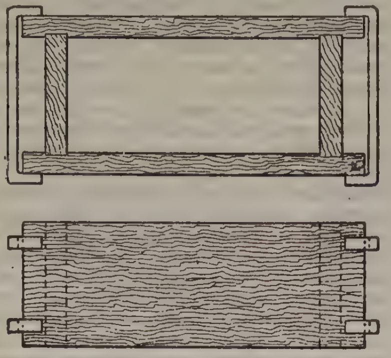

FIG. 9.

The other department of machine moulding includes nearly every conceivable class of work of small and medium dimensions. There are some dozens of distinct types of machines in use, for no one type is suitable for all classes of moulds, while some are designed specially for one or two kinds only.

The fundamental principles of operation are briefly these: The pattern parts constitute, by their method of attachment to a plate or table A (fig. 10), an integral portion of the machine, so that they must partake of certain movements which are imparted to it. Often patterns mounted, as in fig. 10, are moulded by hand, without any aid from a machine, by methods of "plate-moulding." The delivery of the pattern from the sand is invariably accomplished by a perpendicular movement of a portion of the machine (fig. 11), withdrawing either the pattern from the mould or the mould from the pattern. The important point is that the perpendicular movement, being under the coercion of the vertical guides provided in the hand machines, or the hydraulic ram in fig. 11, is free from the unsteadiness which is incidental to withdrawal by the hands of the moulder; and if the machine performed nothing more than this it would justify its existence. Little or no taper is required in the pattern, and the moulds are more nearly uniform in dimensions than hand-made moulds. But there are other advantages. In machine-moulding the joint faces for parting moulds are produced by the faces of the plates on which the pattern is mounted (figs. 10 and 11), instead of by the hands and trowel of the moulder. When the joint face is of irregular outline, as it often is, this item alone saves a good deal of time, which again is multiplied by the number of moulds repeated, often amounting to thousands. Further, provision is generally made on machine plates for the ingates and runners (fig. 10) through which the metal enters the mould, the preparation of which in hand work occupies a considerable amount of time. Another great advantage applies especially to the case of deep moulds. These give much trouble in hand-moulding in consequence of the liability of the sand to become torn up during the withdrawal of the pattern. But in machine-moulding such patterns are encircled by a plate, termed a "stripping plate," which is pierced to allow the patterns to pass through, and which, being maintained firmly on the sand during the lifting of the pattern, prevents it from becoming torn up. This is not merely a matter of convenience, but is a necessity in numerous instances. The most familiar example is that of the teeth of gear wheels, in which even a very slight amount of taper interferes with accurate engagement, and this is representative of many other portions of mechanism. These stripping plates are of metal, but in order to save the cost of filing them in iron or steel, many are cheaply made by casting a white metal alloy round the actual pattern itself in the first place, the white metal being enclosed and retained in a plain iron frame which forms the body of the plate. Lastly, many machines, but not the majority, include provision for mechanically ramming the sand around the pattern by power instead of by hand. This is really the least valuable feature of a moulding machine, because it is not applicable to any but rather shallow moulds. It is commonly used for these, but the consistence and homogeneity of a mass of sand round a pattern having deep perpendicular sides can only be ensured by careful hand ramming.

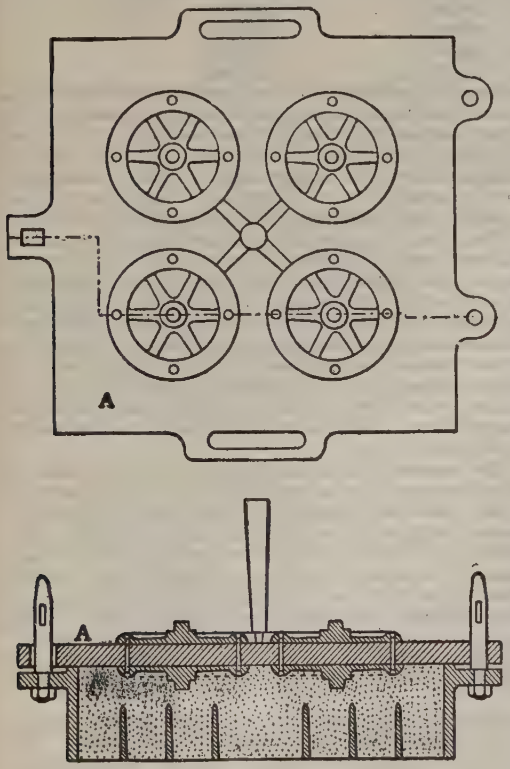

FIG. 10.

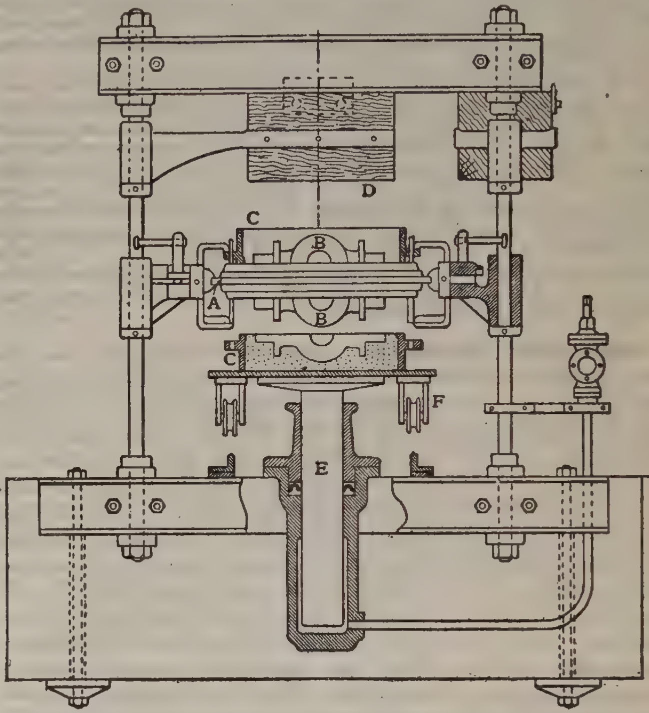

FIG. 11.

The highest economies of machine-moulding are obtained when (1) several small patterns are mounted and moulded at once on a single plate (fig. 10); (2) when top and bottom parts of a mould are produced on different machines, carrying each its moiety of the pattern; (3) when the machine and pattern details are simplified so much that the labour of trained moulders is displaced by that of unskilled attendants who are taught in a month or two the few simple operations required. That is the direction in which repetitive casting is now rapidly tending.

In fig. 11 A is the plate, which in its essentials corresponds with the plate A in fig. 10, but which in the machine is made to swivel so as to bring each half of the pattern B, B in turn uppermost for ramming in the box parts C, C. The ramming is done by hand, the final squeeze being imparted against the presser D by the action of the hydraulic ram E pushing the plate, mould and box up against D. The plate being then lowered, and turned over, the further descent of the ram withdraws the bottom box from the pattern, which is the stage seen in the illustration. Then the half mould is run away on the carriage F, provided with wheels to run on rails.

Though casting in iron, steel, the bronzes, aluminium, &c., is carried on by different men in distinct shops, yet the foregoing principles and methods apply to all alike. Work is done in green, *i.e.* moist sand, in dry sand (the moulds being dried before being used), and in plastic loam (which is subsequently dried). Hand and machine moulding are practised in each, the last-named excepted. The differences in working are those due to the various characteristics of the different metals and alloys, which involve differences in the sand mixtures used, in the dimensions of the pouring channels, of the temperature at which the metal or alloy must be poured, of the fluxing and cleansing of the metal, and other details of a practical character. Hence the practice which is suitable for one department must be modified in others. Many castings in steel would inevitably fracture if poured into moulds prepared for iron, many iron castings would fracture if poured into moulds suitable for brass, and neither brass nor steel would fill a mould having ingates proportioned suitably for iron.

A special kind of casting is that into "chill moulds," adopted in a considerable number of iron castings, such as the railway wheels in the United States, ordinary tramway wheels, the rolls of iron and steel rolling mills, the bores of cast wheel hubs, &c. The chill ranges in depth from $\frac{1}{4}$ in. to 1 in., and is produced by pouring a special mixture of mottled, or strong, iron against a cold iron surface, the parts of the casting which are not required to be chilled being surrounded by an ordinary mould of sand. The purpose of chill-casting is to produce a surface hardness in the metal.

The shrinkage of metal is a fact which has to be taken account of by the pattern-maker and moulder. A pattern and mould are made larger than the size of the casting required by the exact amount that the metal will shrink in cooling from the molten to the cold state. This amount varies from $\frac{1}{8}$ in. in 15 in., in thin iron castings, to $\frac{1}{8}$ in. in 12 in. in heavy ones. It ranges from $\frac{3}{16}$ in. to $\frac{5}{16}$ in. per foot in steel, brass and aluminium. Its variable amount has to be borne in mind in making light and heavy castings, and castings with or without cores, for massive cores retard shrinkage. It is also a fruitful cause of fracture in badly proportioned castings, particularly of those in steel. Brass is less liable to suffer in this respect than iron, and iron much less than steel. (J. G. H.)

FOUNDLING HOSPITALS, originally institutions for the reception of "foundlings," *i.e.* children who have been abandoned or exposed, and left for the public to find and save. The early history of such institutions is connected with the practice of infanticide, and in western Europe where social disorder was rife and famine of frequent occurrence, exposure and extensive sales of children were the necessary consequences. Against these evils, which were noticed by several councils, the church provided a rough system of relief, children being deposited (*jactati*) in marble shells at the church doors, and tended first by the *matricularii* or male nurses, and then by the *nutricarii* or foster-parents.[1] But it was in the 7th and 8th centuries that definite institutions for foundlings were established in such towns as Trèves, Milan and Montpellier. In the 15th century Garcias, archbishop of Valencia, was a conspicuous figure in this charitable work; but his fame is entirely eclipsed by that of St Vincent de Paul, who in the reign of Louis XIII., with the help of the countess of Joigny, Mme le Gras and other religious ladies, rescued the foundlings of Paris from the horrors of a primitive institution named La Couche (rue St Landry), and ultimately obtained from Louis XIV. the use of the Bicêtre for their accommodation. Letters patent were granted to the Paris hospital in 1670. The Hôtel-Dieu of Lyons was the next in importance. No provision, however, was made outside the great towns; the houses in the cities were overcrowded and administered with laxity; and in 1784 Necker prophesied that the state would yet be seriously embarrassed by this increasing evil.[2] From 1452 to 1789 the law had imposed on the *seigneurs de haute justice* the duty of succouring children found deserted on their territories. The first constitutions of the Revolution undertook as a state debt the support of every foundling. For a time premiums were given to the mothers of illegitimate children, the "enfants de la patrie." By the law of 12 Brumaire, An II. "Toute recherche de la paternité est interdite," while by art. 341 of the Code Napoléon, "la recherche de la matérnité est admise."

France.—The laws of France relating to this part of what is called L'Assistance Publique are the decree of January 1811, the instruction of February 1823, the decree of the 5th of March 1852, the law of the 5th of May 1869, the law of the 24th of July 1889 and the law of the 27th of June 1904. These laws carry out the general principles of the law of 7 Frimaire An V., which completely decentralized the system of national poor relief established by the Revolution. The *enfants assistés* include, besides (1) orphans and (2) foundlings proper, (3) children abandoned by their parents, (4) ill-treated, neglected or morally abandoned children whose parents have been deprived of their parental rights by the decision of a court of justice, (5) children, under sixteen years of age, of parents condemned for certain crimes, whose parental rights have been delegated by a tribunal to the state. Children classified under 1-5 are termed *pupilles de l'assistance*, "wards of public charity," and are distinguished by the law of 1904 from children under the protection of the state, classified as: (1) *enfants secourus*, *i.e.* children whose parents or relatives are unable, through poverty, to support them; (2) *enfants en dépôt*, *i.e.* children of persons undergoing a judicial sentence and children temporarily taken in while their parents are in hospital, and (3) *enfants en garde*, *i.e.* children who have either committed or been the victim of some felony or crime and are placed under state care by judicial authority. The asylum which receives all these children is a departmental (*établissement dépositaire*), and not a communal institution. The établissement dépositaire is usually the ward of an hospice, in which—with the exception of children *en dépôt*—the stay is of the shortest, for by the law of 1904, continuing the principle laid down in 1811, all children under thirteen years of age under the guardianship of the state, except the mentally or physically infirm, must be boarded out in country districts. They are generally apprenticed to some one engaged in the agricultural industry, and until majority they remain under the guardianship of the administrative commissioners of the department. The state pays the whole of the cost of inspection and supervision. The expenses of administration, the "home" expenses, for the nurse (*nourrice sédentaire*) or the wet nurse (*nourrice au sein*), the *prime de survie* (premium on survival), washing, clothes, and the "outdoor" expenses, which include (1) temporary assistance to unmarried mothers in order to prevent desertion; (2) allowances to the foster-parents (*nourriciers*) in the country for board, school-money, &c.; (3) clothing; (4) travelling-money for nurses and children; (5) printing, &c.; (6) expenses in time of sickness and for burials and apprentice fees—are borne in the proportion of two-fifths by the state two-fifths by the department, and the remaining fifth by the communes. The following figures show the number of children (exclusive of *enfants secourus*) relieved at various periods:

Year.	Number relieved.
1890	95,701
1895	121,201
1900	138,308
1905	149,803

The *droit de recherche* is conceded to the parent on payment of a small fee. The decree of 1811 contemplated the repayment of all expenses by a parent reclaiming a child. The same decree directed a *tour* or revolving box (*Drehcylinder* in Germany) to be kept at each hospital. These have been discontinued. The "Assistance Publique" of Paris is managed by a "directeur" appointed by the minister of the interior, and associated with a representative *conseil de surveillance.* The Paris Hospice des Enfants-Assistés contains about 700 beds. There are also in Paris numerous private charities for the adoption of poor children and orphans. It is impossible here to give even a sketch of the long and able controversies which have occurred in France on the principles of management of foundling hospitals, the advantages of *tours* and the system of admission *à bureau ouvert*, the transfer of orphans from one department to another, the hygiene and service of hospitals and the inspection of nurses, the education and reclamation of the children and the rights of the state in their future. Reference may be made to the works noticed at the end of this article.

Belgium.—In this country the arrangements for the relief of foundlings and the appropriation of public funds for that purpose very much resemble those in France, and can hardly be usefully described apart from the general questions of local government and poor law administration. The Commissions des Hospices Civiles, however, are purely communal bodies, although they receive pecuniary assistance from both the departments and the state. A decree of 1811 directed that there should be an asylum and a wheel for receiving foundlings in every arrondissement. The last "wheel," that of Antwerp, was closed in 1860. (See *Des Institutions de bienfaisance et de prévoyance en Belgique*, 1850 à 1860, par M. P. Lentz.)

Italy is very rich in foundling hospitals, pure and simple, orphans and other destitute children being separately provided for. (See *Della carità preventiva in Italia*, by Signor Fano.) In Rome one branch of the Santo Spirito in Sassia (so called from the Schola Saxonum built in 728 by King Ina in the Borgo) has, since the time of Pope Sixtus IV., been devoted to foundlings. The average annual number of foundlings supported is about 3000. (See *The Charitable Institutions of Rome*, by Cardinal Morichini.) In Venice the Casa degli Esposti or foundling hospital, founded in 1346, and receiving 450 children annually, is under provincial administration. The splendid legacy of the last doge, Ludovico Manin, is applied to the support of about 160 children by the "Congregazione di Carita" acting through 30 parish boards (*deputazione fraternate*).

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[1] See *Capitularia regum Francorum*, ii. 474.

[2] *De l'administration des finances*, iii. 136; see also the article "Enfant exposé" in Diderot's *Encyclopédie*, 1755, and Chamousset's *Mémoire politique sur les enfants*, 1757.

Austria.—In Austria foundling hospitals occupied a very prominent place in the general instructions which, by rescript dated 16th of April 1781, the emperor Joseph II. issued to the charitable endowment commission. In 1818 foundling asylums and lying-in houses were declared to be state institutions. They were accordingly supported by the state treasury until the fundamental law of 20th October 1860 handed them over to the provincial committees. They are now local institutions, depending on provincial funds, and are quite separate from the ordinary parochial poor institute. Admission is gratuitous when the child is actually found on the street, or is sent by a criminal court, or where the mother undertakes to serve for four months as nurse or midwife in an asylum, or produces a certificate from the parish priest and "poor-father" (the parish inspector of the poor-law administration) that she has no money. In other cases payments of 30 to 100 florins are made. When two months old the child is sent for six or ten years to the houses in the neighbourhood of respectable married persons, who have certificates from the police or the poor-law authorities, and who are inspected by the latter and by a special medical officer. These persons receive a constantly diminishing allowance, and the arrangement may be determined by 14 days' notice on either side. The foster-parents may retain the child in their service or employment till the age of twenty-two, but the true parents may at any time reclaim the foundling on reimbursing the asylum and compensating the foster-parents.

Russia.—Under the old Russian system of Peter I. foundlings were received at the church windows by a staff of women paid by the state. But since the reign of Catherine II. the foundling hospitals have been in the hands of the provincial officer of public charity (prykaz obshestvennago pryzrenya). The great central institutions (Vospitatelnoi Dom), at Moscow and St Petersburg (with a branch at Gatchina), were founded by Catherine. When a child is brought the baptismal name is asked, and a receipt is given, by which the child may be reclaimed up to the age of ten. The mother may nurse her child. After the usual period of six years in the country very great care is taken with the education, especially of the more promising children. The hospital is a valuable source of recruits for the public service. Malthus (*The Principles of Population*, vol. i. p. 434) has made a violent attack on these Russian charities. He argues that they discourage marriage and therefore population, and that the best management is unable to prevent a high mortality. He adds: "An occasional child murder from false shame is saved at a very high price if it can be done only by the sacrifice of some of the best and most useful feelings of the human heart in a great part of the nation." It does not appear, however, that the rate of illegitimacy in Russia is comparatively high; it is so in the two great cities. The rights of parents over the children were very much restricted, and those of the government much extended by a ukase issued by the emperor Nicholas in 1837. The most eminent Russian writer on this subject is M. Gourov. See his *Recherches sur les enfants trouvés*, and *Essai sur l'histoire des enfants trouvés* (Paris, 1829).

In *America*, foundling hospitals, which are chiefly private charities, exist in most of the large cities.

Great Britain.—The Foundling Hospital of London was incorporated by royal charter in 1739 "for the maintenance and education of exposed and deserted young children." The petition of Captain Thomas Coram, who is entitled to the whole credit of the foundation,[1] states as its objects "to prevent the frequent murders of poor miserable children at their birth, and to suppress the inhuman custom of exposing new-born infants to perish in the streets." At first no questions were asked about child or parent, but a distinguishing mark was put on each child by the parent. These were often marked coins, trinkets, pieces of cotton or ribbon, verses written on scraps of paper. The clothes, if any, were carefully recorded. One entry is, "Paper on the breast, clout on the head." The applications became too numerous, and a system of balloting with red, white and black balls was adopted. In 1756 the House of Commons came to a resolution that all children offered should be received, that local receiving places should be appointed all over the country, and that the funds should be publicly guaranteed. A basket was accordingly hung outside the hospital; the maximum age for admission was raised from two to twelve months, and a flood of children poured in from the country workhouses. In less than four years 14,934 children were presented, and a vile trade grew up among vagrants of undertaking to carry children from the country to the hospital,—an undertaking which, like the French *meneurs*, they often did not perform or performed with great cruelty. Of these 15,000 only 4400 lived to be apprenticed out. The total expense was about £500,000. This alarmed the House of Commons. After throwing out a bill which proposed to raise the necessary funds by fees from a general system of parochial registration, they came to the conclusion that the indiscriminate admission should be discontinued. The hospital, being thus thrown on its own resources, adopted a pernicious system of receiving children with considerable sums (*e.g.* £100), which sometimes led to the children being reclaimed by the parent. This was finally stopped in 1801; and it is now a fundamental rule that no money is received. The committee of inquiry must now be satisfied of the previous good character and present necessity of the mother, and that the father of the child has deserted it and the mother, and that the reception of the child will probably replace the mother in the course of virtue and in the way of an honest livelihood. All the children at the Foundling hospital are those of unmarried women, and they are all first children of their mothers. The principle is in fact that laid down by Fielding in *Tom Jones*—"Too true I am afraid it is that many women have become abandoned and have sunk to the last degree of vice by being unable to retrieve the first slip." At present the hospital supports about 500 children up to the age of fifteen. The average annual number of applications is over 200, and of admissions between 40 and 50. The children used to be named after the patrons and governors, but the treasurer now prepares a list. Children are seldom taken after they are twelve months old. On reception they are sent down to the country, where they stay until they are about four or five years old. At sixteen the girls are generally apprenticed as servants for four years, and the boys at the age of fourteen as mechanics for seven years. There is a small benevolent fund for adults. The musical service, which was originally sung by the blind children only, was made fashionable by the generosity of Handel, who frequently had the "Messiah" performed there, and who bequeathed to the hospital a MS. copy (full score) of his greatest oratorio. The altar-piece is West's picture of Christ presenting a little Child. In 1774 Dr Burney and Signor Giardini made an unsuccessful attempt to form in connexion with the hospital a public music school, in imitation of the Conservatorium of the Continent. In 1847, however, a successful "Juvenile Band" was started. The educational effects of music have been found excellent, and the hospital supplies many musicians to the best army and navy bands. The early connexion between the hospital and the eminent painters of the reign of George II. is one of extreme interest. The exhibitions of pictures at the Foundling, which were organized by the Dilettanti Club, undoubtedly led to the formation of the Royal Academy in 1768. Hogarth painted a portrait of Captain Coram for the hospital, which also contains his March to Finchley, and Roubillac's bust of Handel. (See *History and Objects of the Foundling Hospital, with Memoir of its Founder*, by J. Brownlow.)

In 1704 the Foundling hospital of Dublin was opened. No inquiry was made about the parents, and no money received. From 1500 to 2000 children were received annually. A large income was derived from a duty on coal and the produce of car licences. In 1822 an admission fee of £5 was charged on the parish from which the child came. This reduced the annual arrivals to about 500. In 1829 the select committee on the Irish miscellaneous estimates recommended that no further assistance should be given. The hospital had not preserved life or educated the foundlings. The mortality was nearly 4 in 5, and the total cost £10,000 a year. Accordingly in 1835 Lord Glenelg (then Irish Secretary) closed the institution.

Scotland never seems to have possessed a foundling hospital. In 1759 John Watson left funds which were to be applied to the pious and charitable purpose "of preventing child murder" by the establishment of a hospital for receiving pregnant women and taking care of their children as foundlings. But by an act of parliament in 1822, which sets forth "doubts as to the propriety" of the original purpose, the money was given to trustees to erect a hospital for the maintenance and education of destitute children.

AUTHORITIES.—*Histoire statistique et morale des enfants trouvés* by MM. Terme et Montfalcon (Paris, 1837) (the authors were eminent medical men at Lyons, connected with the administration of the foundling hospital); Remacle, *Des hospices d'enfants trouvés en Europe* (Paris, 1838); Hügel *Die Findelhäuser und das Findelwesen Europas* (Vienna, 1863); Emminghaus, "Das Armenwesen und die Armengesetzgebung," in *Europäischen Staaten* (Berlin, 1870); Sennichon, *Histoire des enfants abandonnés* (Paris, 1880); the annual *Rapport sur le service des enfants assistés du département de la Seine*; Epstein, *Studien zur Frage der Findelanstalten* (Prague, 1882); Florence D. Hill, *Children of the State* (2nd ed., 1889). For United States, see H. Folks, *Care of Neglected and Dependent Children* (1901); A. G. Warner, *American Charities* (enlarged, 1908) and *Reports of Massachusetts State Board of Charities*. Information may also be got in the *Reports on Poor Laws in Foreign Countries*, communicated to the Local Government Board by the foreign secretary; *Accounts and Papers* (1875), vol. lxv. c. 1225; *Report of Committee on the Infant Life Protection Bill* (1890); *Report of Lords Committee on the Infant Life Protection Bill* (1896). (See also CHARITY AND CHARITIES.)

FOUNTAIN (Late Lat. *fontana*, from *fons*, a spring), a term applied in a restricted sense to such outlets of water as, whether fed by natural or artificial means, have contrivances of human art at a point where the water emerges. A very early existing example is preserved in the carved Babylonian basin (about 3000 B.C.) found at Tello, the ancient Lagash, and Layard mentions an Assyrian fountain, found by him in a gorge of the river Gomel, which consists of a series of basins cut in the solid rock and descending in steps to the stream. The water had been originally led from one to the other by small conduits, the lowest of which was ornamented by two rampant lions in relief. The term is applied equally to the simpler arrangements for letting water gush into an ornamental basin or to the more elaborate ones by which water is mechanically forced into high jets; and a "fountain" may be either the ornamental receptacle or the jet of water itself. In modern times the examples of ornamental or useful fountains are legion, and it will suffice here to mention some of the more important facts of historical interest.

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[1] Addison had suggested such a charity (*Guardian*, No. 3).

Among the Greeks fountains were very common in the cities. Springs being very plentiful in Greece, little engineering skill was required to convey the water from place to place. Receptacles of sufficient size were made for it at the springs; and to maintain its purity, structures were raised enclosing and covering the receptacle. In Greece they were dedicated to gods and goddesses, nymphs and heroes, and were frequently placed in or near temples. That of Pirene at Corinth (mentioned also by Herodotus) was formed of white stone, and contained a number of cells from which the pleasant water flowed into an open basin. Legend connects it with the nymph Pirene, who shed such copious tears, when bewailing her son who had been slain by Diana, that she was changed into a fountain. The city of Corinth possessed many fountains. In one near the statues of Diana and Bellerophon the water flowed through the hoofs of the horse Pegasus. The fountain of Glauce, enclosed in the Odeum, was dedicated to Glauce, because she was said to have thrown herself into it believing that its waters could counteract the poisons of Medea. Another Corinthian fountain had a bronze statue of Poseidon standing on a dolphin from which the water flowed. The fountain constructed by Theagenes at Megara was remarkable for its size and decorations, and for the number of its columns. One at Lerna was surrounded with pillars, and the structure contained a number of seats affording a cool summer retreat. Near Pharae was a grove dedicated to Apollo, and in it a fountain of water. Pausanias gives a definite architectural detail when he says that a fountain at Patrae was reached from without by descending steps. Mystical, medicinal, surgical and other qualities, as well as supernatural origin, were ascribed to fountains. One at Cyane in Lycia was said to possess the quality of endowing all persons descending into it with power to see whatever they desired to see; while the legends of fountains and other waters with strange powers to heal are numerous in many lands. The fountain Enneacrunus at Athens was called Callirrhoe before the time the water was drawn from it by the nine pipes from which it took its later name. Two temples were above it, according to Pausanias, one dedicated to Demeter and Persephone, and the other to Triptolemus. The fountain in the temple of Erechtheus at Athens was supplied by a spring of salt water, and a similar spring supplied that in the temple of Poseidon Hippios at Mantinea.

The water-supply of Rome and the works auxiliary to it were on a scale to be expected from a people of such great practical power. The remains of the aqueducts which stretched from the city across the Campagna are amongst the most striking monuments of Italy. Vitruvius (book viii.) gives minute particulars concerning the methods to be employed for the discovery, testing and distribution of water, and describes the properties of different waters with great care, proving the importance which was attached to these matters by the Romans. The aqueducts supplied the baths and the public fountains, from which last all the populace, except such as could afford to pay for a separate pipe to their houses, obtained their water. These fountains were therefore of large size and numerous. They were formed at many of the *castella* of the aqueducts. According to Vitruvius, each *castellum* should have three pipes,—one for public fountains, one for baths and the third for private houses. Considerable revenue was drawn from the possessors of private water-pipes. The Roman fountains were generally decorated with figures and heads. Fountains were often also the ornament of Roman villas and country houses; in those so situated the water generally fell from above into a large marble basin, with at times a second fall into a still lower receptacle. Two adjacent houses in Pompeii had very remarkable fountains. One, says Gell, "is covered with a sort of mosaic consisting of vitrified tesserae of different colours, but in which blue predominates. These are sometimes arranged in not inelegant patterns, and the grand divisions as well as the borders are entirely formed and ornamented with real sea-shells, neither calcined by the heat of the eruption nor changed by the lapse of so many centuries" (*Pompeiana*, i. 196). Another of large size was similarly decorated with marine shells, and is supposed to have borne two sculptured figures, one of which, a bronze, is in the museum at Naples. This fountain projects 5 ft. 7 in. from the wall against which it is placed, and is 7 ft. wide in front, while the height of the structure up to the eaves of the pediment is 7 ft. 7 in. On a central column in the piscina was a statue of Cupid, with a dove, from the mouth of which water issued. Cicero had, at his villa at Formiae, a fountain which was decorated with marine shells.

Fountains were very common in the open spaces and at the crossways in Pompeii. They were supplied by leaden pipes from the reservoirs, and had little ornament except a human or animal head, from the mouth of which it was arranged that the water should issue. Not only did simple running fountains exist, but the remains of *jets d'eau* have been found; and a drawing exists representing a vase with a double jet of water, standing on a pedestal placed in what is supposed to have been the impluvium of a house. There was also a *jet d'eau* at the eastern end of the peristyle of the Fullonica at Pompeii.

As among the Greeks, so with the early Celts, traces of superstitious beliefs and usages with relation to fountains can be traced in monumental and legendary remains. Near the village of Primaleon in Brittany was a very remarkable monument,—one possibly unique, as giving distinct proof of the existence of an ancient cult of fountains. Here is a dolmen composed of a horizontal table supported by two stones only, one at each end. All the space beneath this altar is occupied by a long square basin formed of large flat stones, which receives a fountain of water. At Lochrist is another vestige of the Celtic cult of fountains. Beneath the church, and at the foot of the hill upon which it is built, is a sacred fountain, near which is erected an ancient chapel, which with its ivy-covered walls has a most romantic appearance. A Gothic vault protects this fountain. Miraculous virtues are still attributed to its water, and on certain days the country people still come with offerings to draw it (see La Poix de Freminville, *Antiquités de la Bretagne*, i. p. 101). In the enchanted forest of Brochelande, so famous from its connexion with Merlin, was the fountain of Baranton, which was said to possess strange characteristics. Whoever drew water from it, and sprinkled the steps therewith, produced a tremendous storm of thunder and hail, accompanied with thick darkness.

Christianity transferred to its own uses the ancient religious feeling concerning fountains. Statues of the Virgin or of saints were erected upon the rude structures that collected the water and preserved its purity. There is some uniformity in the architectural characteristics of these structures during the middle ages. A very common form in rural districts was that in which the fountain was reached by descending steps (*fontaine grotte*). A large basin received the water, sometimes from a spout, but often from the spring itself. This basin was covered by a sort of porch or vault, with at times moulded arches and sculptured figures and escutcheons. On the bank of the Clain at Poitiers is a fountain of this kind, the Fontaine Joubert, which though restored in 1597 was originally a structure of the 14th century. This kind of fountain is frequently decorated with figures of the Virgin or of saints, or with the family arms of its founder; often, too, the water is the only ornament of the structure, which bears a simple inscription. A large number of these fountains are to be found in Brittany and indeed throughout France, and the great antiquity of some of them is proved by the superstitions regarding them which still exist amongst the peasantry. A form more common in populous districts was that of a large open basin, round, square, polygonal, or lobed in form, with a columnar structure at the centre, from the lower part of which it was arranged that spouts should issue, playing into an open basin, and supplying vessels brought for the purpose in the cleanest and quickest manner. The columns take very various forms, from that of a simple regular geometrical solid, with only grotesque masks at the spouts, to that of an elaborate and ornate Gothic structure, with figures of virgins, saints and warriors, with mouldings, arches, crockets and finials. At Provins there is a fountain said to be of the 12th century, which is in form an hexagonal vase with a large column in the centre, the capital of which is pierced by three mouths, which are furnished with heads of bronze projecting far enough to cast the water into the basin. In the public market-place at Brunswick is a fountain of the 15th century, of which the central structure is made of bronze. Many fountains are still existing in France and Germany which, though their actual present structure may date no earlier than the 15th or 16th century, have been found on the place of, and perhaps may almost be considered as restorations of, pre-existing fountains. Except in Italy few fountains are of earlier date than the 14th century. Two of that date are at the abbey of Fontaine Daniel, near Mayenne, and another, of granite, is at Limoges. Some of these middle-age fountains are simple, open reservoirs enclosed in structures which, however plain, still carry the charm that belongs to the stone-work of those times. There is one of this kind at Cully, Calvados, walled on three sides, and fed from the spring by two circular openings. Its only ornamentation is a small empty niche with mouldings. At Lincoln is a fountain of the time of Henry VIII., in front of the church of St Mary Wickford. At Durham is one of octangular plan, which bears a statue of Neptune.

The decay of architectural taste in the later centuries is shown by the fountain of Limoges. It is in form a rock representing Mount Parnassus, upon which are carved in relief Apollo, the horse Pegasus, Philosophy and the Nine Muses. At the top Apollo, in the 16th-century costume, plays a harp. Rocks, grass and sheep fill up the scene.

Purely ornamental fountains and *jets d'eau* are found in or near many large cities, royal palaces and private seats. The celebrated Fontana di Trevi, at Rome, was erected early in the 18th century under Pope Clement XII., and has all the characteristics of decadence. La Fontana Paolina and those in the piazza of St Peter's are perhaps next in celebrity to that of Trevi, and are certainly in better taste. At Paris the Fontaine des Innocens (the earliest) and those of the Place Royal, of the Champs Elysées and of the Place de la Concorde are the most noticeable. The fountain of the lions and other fountains in the Alhambra palace are, with their surroundings, a very magnificent sight. The largest *jets d'eau* are those at Versailles, at the Sydenham Crystal Palace and at San Ildefonso.

About the earliest drawing of any drinking fountain in England occurs in Moxon's *Tutor to Astronomie and Geographie* (1659); it is "surmounted by a diall, which was made by Mr John Leak, and set upon a composite column at Leadenhall corner, in the majoralty of Sir John Dethick, Knight." The water springs from the top and base of the column, which stands upon a square pedestal and bears four female figures, one at least of which represents the costume of the period.

In the East the public drinking fountains are a very important institution. In Cairo alone there are three hundred. These "sebeels" are not only to be seen in the cities, but are plentiful in the fields and villages.

The Metropolitan Drinking Fountain Association (1859) has done much to provide facilities in London for both man and beast to get water to drink in the streets. And in the United States liberal provision has also been made by private and public enterprise.

FOUNTAINS ABBEY, one of the most celebrated ecclesiastical ruins in England. It lies in the sequestered valley of the river Skell, 3 m. S.W. of the city of Ripon in Yorkshire. The situation is most beautiful. The little Skell descends from the uplands of Pateley Moor to the west a clear swift stream, traversing a valley clothed with woods, conspicuous among which are some ancient yew trees which may have sheltered the monks who first sought retreat here. Steep rocky hills enclose the vale. Mainly on the north side of the stream, in an open glade, rise the picturesque and extensive ruins, the church with its stately tower, and the numerous remnants of domestic buildings which enable the great abbey to be almost completely reconstructed in the mind. The arrangements are typical of a Cistercian house (see ABBEY). Building began in earnest about 1135, and was continued steadily until the middle of the 13th century, after which the only important erection was Abbot Huby's tower (*c.* 1500). The demesne of Studley Royal (marquess of Ripon) contains the ruins. It is in part laid out in the formal Dutch style, the work of John Aislabie, lord of the manor in the early part of the 18th century. Near the abbey is the picturesque Jacobean mansion of Fountains Hall.

In 1132 the prior and twelve monks of St Mary's abbey, York, being dissatisfied with the easy life they were living, left the monastery and with the assistance of Thurstan, archbishop of York, founded a house in the valley of the Skell, where they adopted the Cistercian rule. While building their monastery the monks are said to have lived at first under an elm and then under seven yew trees called the Seven Sisters. Two years later they were joined by Hugh, dean of St Peter's, York, who brought with him a large sum of money and a valuable collection of books. His example was followed by Serlo, a monk of St Mary's abbey, York, and by Tosti, a canon of York, and others. Henry I. and succeeding sovereigns granted them many privileges. During the reign of Edward I. the monks appear to have again suffered from poverty, partly no doubt owing to the invasion of the Scots, but partly also through their own "misconduct and extravagance." On account of this Edward I. in 1291 appointed John de Berwick custodian of the abbey so that he might pay their debts from the issues of their estates, allowing them enough for their maintenance, and Edward II. in 1319 granted them exemption from taxes. After the Dissolution Henry VIII. sold the manor and site of the monastery to Sir Richard Gresham, and from him after passing through several families it came to the marquess of Ripon.

See *Victoria County History, Yorkshire*; Dugdale, *Monasticon*; Surtees Society, *Memorials of the Abbey of St Mary of Fountains*, collected and edited by J. R. Walbran (1863-78).

FOUQUÉ, FERDINAND ANDRÉ (1828–1904), French geologist and petrologist, was born at Mortain, dept. of La Manche, on the 21st of June 1828. At the age of twenty-one he entered the *École Normale* in Paris, and from 1853 to 1858 he held the appointment of keeper of the scientific collections. In 1877 he became professor of natural history at the *Collège de France*, in Paris, and in 1881 he was elected a member of the Academy of Sciences. As a stratigraphical geologist he rendered much assistance on the Geological Survey of France, but in the course of time he gave his special attention to the study of volcanic phenomena and earthquakes, to minerals and rocks; and he was the first to introduce modern petrographical methods into France. His studies of the eruptive rocks of Corsica, Santorin and elsewhere; his researches on the artificial reproduction of eruptive rocks, and his treatise on the optical characters of felspars deserve special mention; but he was perhaps best known for the joint work which he carried on with his friend Michel Lévy. He died on the 7th of March 1904. His chief publications were: *Santorin et ses éruptions*, 1879; (with A. Michel Lévy) *Minéralogie micrographique, Roches éruptives françaises* (2 vols., 1879); and *Synthèse des minéraux et des roches* (1882).

FOUQUÉ, FRIEDRICH HEINRICH KARL DE LA MOTTE, BARON (1777–1843), German writer of the romantic movement, was born on the 12th of February 1777 at Brandenburg. His grandfather had been one of Frederick the Great's generals and his father was a Prussian officer. Although not originally intended for a military career, Friedrich de la Motte Fouqué ultimately gave up his university studies at Halle to join the army, and he took part in the Rhine campaign of 1794. The rest of his life was devoted mainly to literary pursuits. Like so many of the younger romanticists, Fouqué owed his introduction to literature to A. W. Schlegel, who published his first book, *Dramatische Spiele von Pellegrin* in 1804. His next work, *Romanzen vom Tal Ronceval* (1805), showed more plainly his allegiance to the romantic leaders, and in the *Historie vom edlen Ritter Galmy* (1806) he versified a 16th-century romance of medieval chivalry. *Sigurd der Schlangentöter, ein Heldenspiel* (1808), the first modern German dramatization of the *Nibelungen* saga, attracted attention to him, and influenced considerably subsequent versions of the story, such as Hebbel's *Nibelungen* and Wagner's *Ring des Nibelungen*. These early writings indicate the lines which Fouqué's subsequent literary activity followed; his interests were divided between medieval chivalry on the one hand and northern mythology on the other. In 1813, the year of the rising against Napoleon, he again fought with the Prussian army, and the new patriotism awakened in the German people left its mark upon his writings.

Between 1810 and 1815 Fouqué's popularity was at its height; the many romances and novels, plays and epics, which he turned out with extraordinary rapidity, appealed exactly to the mood of the hour. The earliest of these are the best—*Undine*, which appeared in 1811, being, indeed, one of the most charming of all German *Märchen* and the only work by which Fouqué's memory still lives to-day. A more comprehensive idea of his powers may, however, be obtained from the two romances *Der Zauberring* (1813) and *Die Fahrten Thiodulfs des Isländers* (1815). From 1820 onwards the quality of Fouqué's work rapidly degenerated, partly owing to the fatal ease with which he wrote, partly to his inability to keep pace with the changes in German taste. He remained the belated romanticist, who, as the reading world turned to new interests, clung the more tenaciously to the paraphernalia of romanticism; but in the cold, sober light of the post-romantic age, these appeared merely flimsy and theatrical. The vitalizing imaginative power of his early years deserted him, and the sobriquet of a "Don Quixote of Romanticism" which his enemies applied to him was not unjustified.

Fouqué's first marriage had been unhappy and soon ended in divorce. His second wife, Karoline von Briest (1773–1831) enjoyed some reputation as a novelist in her day. After her death Fouqué married a third time. Some consolation for the ebbing tide of popular favour was afforded him by the munificence of Frederick William IV. of Prussia, who granted him a pension which allowed him to spend his later years in comfort. He died in Berlin on the 23rd of January 1843.

Fouqué's *Ausgewählte Werke*, edited by himself, appeared in 12 vols. (Berlin, 1841); a selection, edited by M. Koch, will be found in Kürschner's *Deutsche Nationalliteratur*, vol. 146, part ii. (Stuttgart, 1893); *Undine, Sintram*, &c., in innumerable reprints. Bibliography in Goedeke's *Grundriss zur Geschichte der deutschen Dichtung* (2nd ed., vi. pp. 115 ff., Dresden, 1898). Most of Fouqué's works have been translated, and the English versions of *Aslauga's Knight* (by Carlyle), *Sintram and his Companions* and *Undine*, have been frequently republished. For Fouqué's life cp. *Lebensgeschichte des Baron Friedrich de la Motte Fouqué. Aufgezeichnet durch ihn selbst* (Halle, 1840), (only to the year 1813), and also the introduction to Koch's selections in the *Deutsche Nationalliteratur*. (J. G. R.)

FOUQUET (or FOUCQUET), **NICOLAS** (1615–1680), viscount of Melun and of Vaux, marquis of Belle-Isle, superintendent of finance in France under Louis XIV., was born at Paris in 1615. He belonged to an influential family of the *noblesse de la robe*, and after some preliminary schooling with the Jesuits, at the age of thirteen was admitted as *avocat* at the parlement of Paris. While still in his teens he held several responsible posts, and in 1636, when just twenty, he was able to buy the post of *maître des requêtes*. From 1642 to 1650 he held various intendancies at first in the provinces and then with the army of Mazarin, and, coming thus in touch with the court, was permitted in 1650 to buy the important position of *procureur général* to the parlement of Paris. During Mazarin's exile Fouquet shrewdly remained loyal to him, protecting his property and keeping him informed of the situation at court.

Upon the cardinal's return, Fouquet demanded and received as reward the office of superintendent of the finances (1653), a position which, in the unsettled condition of the government, threw into his hands not merely the decision as to which funds should be applied to meet the demands of the state's creditors, but also the negotiations with the great financiers who lent money to the king. The appointment was a popular one with the moneyed class, for Fouquet's great wealth had been largely augmented by his marriage in 1651 with Marie de Castille, who also belonged to a wealthy family of the legal nobility. His own credit, and above all his unfailing confidence in himself, strengthened the credit of the government, while his high position at the parlement (he still remained *procureur général*) secured financial transactions from investigation. As minister of finance, he soon had Mazarin almost in the position of a suppliant. The long wars, and the greed of the courtiers, who followed the example of Mazarin, made it necessary at times for Fouquet to meet the demands upon him by borrowing upon his own credit, but he soon turned this confusion of the public purse with his own to good account. The disorder in the accounts became hopeless; fraudulent operations were entered into with impunity, and the financiers were kept in the position of clients by official favours and by generous aid whenever they needed it. Fouquet's fortune now surpassed even Mazarin's, but the latter was too deeply implicated in similar operations to interfere, and was obliged to leave the day of reckoning to his agent and successor Colbert. Upon Mazarin's death Fouquet expected to be made head of the government; but Louis XIV. was suspicious of his poorly dissembled ambition, and it was with Fouquet in mind that he made the well-known statement, upon assuming the government, that he would be his own chief minister. Colbert fed the king's displeasure with adverse reports upon the deficit, and made the worst of the case against Fouquet. The extravagant expenditure and personal display of the superintendent served to intensify the ill-will of the king. Fouquet had bought the port of Belle Isle and strengthened the fortifications, with a view to taking refuge there in case of disgrace. He had spent enormous sums in building a palace on his estate of Vaux, which in extent, magnificence, and splendour of decoration was a forecast of Versailles. Here he gathered the rarest manuscripts, the finest paintings, jewels and antiques in profusion, and above all surrounded himself with artists and authors. The table was open to all people of quality, and the kitchen was presided over by Vatel. Lafontaine, Corneille, Scarron, were among the multitude of his clients. In August 1661 Louis XIV., already set upon his destruction, was entertained at Vaux with a *fête* rivalled in magnificence by only one or two in French history, at which Molière's *Les Fâcheux* was produced for the first time. The splendour of the entertainment sealed Fouquet's fate. The king, however, was afraid to act openly against so powerful a minister. By crafty devices Fouquet was induced to sell his office of *procureur général*, thus losing the protection of its privileges, and he paid the price of it into the treasury.

Three weeks after his visit to Vaux the king withdrew to Nantes, taking Fouquet with him, and had him arrested when he was leaving the presence chamber, flattered with the assurance of his esteem. The trial lasted almost three years, and its violation of the forms of justice is still the subject of frequent monographs by members of the French bar. Public sympathy was strongly with Fouquet, and Lafontaine, Madame de Sévigné and many others wrote on his behalf; but when Fouquet was sentenced to banishment, the king, disappointed, "commuted" the sentence to imprisonment for life. He was sent at the beginning of 1665 to the fortress of Pignerol, where he undoubtedly died on the 23rd of March 1680.[1] Louis acted throughout "as though he were conducting a campaign," evidently fearing that Fouquet would play the part of a Richelieu. Fouquet bore himself with manly fortitude, and composed several mediocre translations in prison. The devotional works bearing his name are apocryphal. A report of his trial was published in Holland, in 15 volumes, in 1665–1667, in spite of the remonstrances which Colbert addressed to the States-General. A second edition under the title of *Œuvres de M. Fouquet* appeared in 1696.

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[1] Fouquet has been identified with the "Man with the Iron Mask" (see IRON MASK), but this theory is quite impossible.

See Chéruel, *Mémoires sur la vie publique et privée de Fouquet . . . d'après ses lettres et des pièces inédites* (2 vols., Paris, 1864); J. Lair, *Nicolas Foucquet, procureur général, surintendant des finances, ministre d'État de Louis XIV* (2 vols., Paris, 1890); U. V. Châtelain, *Le Surintendant Nicolas Fouquet, protecteur des lettres, des arts et des sciences* (Paris, 1905); R. Pfnor et A. France, *Le Château de Vaux-le-Vicomte dessiné et gravé* (Paris, 1888).

FOUQUIER-TINVILLE, ANTOINE QUENTIN (1746–1795), French revolutionist, was born at Hérouel, a village in the department of the Aisne. Originally a *procureur* attached to the Châtelet at Paris, he sold his office in 1783, and became a clerk under the lieutenant-general of police. He seems to have early adopted revolutionary ideas, but little is known of the part he played at the outbreak of the Revolution. When the Revolutionary Tribunal of Paris was established on the 10th of March 1793, he was appointed public prosecutor to it, an office which he filled until the 28th of July 1794. His activity during this time earned him the reputation of one of the most terrible and sinister figures of the Revolution. His function as public prosecutor was not so much to convict the guilty as to see that the proscriptions ordered by the faction for the time being in power were carried out with a due regard to a show of legality. He was as ruthless and as incorrupt as Robespierre himself; he could be moved from his purpose neither by pity nor by bribes; nor was there in his cruelty any of that quality which made the ordinary Jacobin *enragé* by turns ferocious and sentimental. It was this very quality of passionless detachment that made him so effective an instrument of the Terror. He had no forensic eloquence; but the cold obstinacy with which he pressed his charges was more convincing than any rhetoric, and he seldom failed to secure a conviction.

His horrible career ended with the fall of Robespierre and the terrorists on the 9th Thermidor. On the 1st of August 1794 he was imprisoned by order of the Convention and brought to trial. His defence was that he had only obeyed the orders of the Committee of Public Safety; but, after a trial which lasted forty-one days, he was condemned to death, and guillotined on the 7th of May 1795.

See *Mémoire pour A. Q. Fouquier ex-accusateur public près le tribunal révolutionnaire*, &c. (Paris, 1794); Domenget, *Fouquier-Tinville et le tribunal révolutionnaire* (Paris, 1878); H. Wallon, *Histoire du tribunal révolutionnaire de Paris* (1880–1882) (a work of general interest, but not always exact); George Lecocq, *Notes et documents sur Fouquier-Tinville* (Paris, 1885). See also the documents relating to his trial enumerated by M. Tourneux in *Bibliographie de l'histoire de Paris pendant la Révolution Française*, vol. i. Nos. 4445-4454 (1890).

FOURCHAMBAULT, a town of central France in the department of Nièvre, on the right bank of the Loire, 4½ m. N.W. of Nevers, on the Paris-Lyon railway. Pop. (1906) 4591. It owes its importance to its extensive iron-works, established in 1821, which give employment to 2000 workmen and produce engineering material for railway, military and other purposes. Among the more remarkable *chefs-d'œuvre* which have been produced at Fourchambault are the metal portions of the Pont du Carrousel, the iron beams of the roof of the cathedral at Chartres, and the vast spans of the bridge over the Dordogne at Cubzac. A small canal unites the works to the Lateral canal of the Loire.

FOURCROY, ANTOINE FRANÇOIS, Comte de (1755–1809), French chemist, the son of an apothecary in the household of the duke of Orleans, was born at Paris on the 15th of June 1755. He took up medical studies by the advice of the anatomist Félix Vicq d'Azyr (1748–1794), and after many difficulties caused by lack of means finally in 1780 obtained his doctor's diploma. His attention was specially turned to chemistry by J. B. M. Bucquet (1746–1780), the professor of chemistry at the Medical School of Paris, and in 1784 he was chosen to succeed P. J. Macquer (1718–1784) as lecturer in chemistry at the college of the Jardin du Roi, where his lectures attained great popularity. He was one of the earliest converts to the views of Lavoisier, which he helped to promulgate by his voluminous writings, but though his name appears on a large number of chemical and also physiological and pathological memoirs, either alone or with others, he was rather a teacher and an organizer than an original investigator. A member of the committees for public instruction and public safety, and later, under Napoleon, director general of instruction, he took a leading part in the establishment of schools for both primary and secondary education, scientific studies being especially provided for. Fourcroy died at Paris on the 16th of December 1809, the very day on which he had been created a count of the French empire. By his conduct as a member of the Convention he has been accused of contributing to the death of Lavoisier. Baron Cuvier in his *Éloge historique* of Fourcroy repels the charge, but he can scarcely be acquitted of time-serving indifference, if indeed active, though secret, participation be not proved against him.

The Royal Society's *Catalogue of Scientific Papers* enumerates 59 memoirs by Fourcroy himself, and 58 written jointly by him and others, mostly L. N. Vauquelin.

FOURIER, FRANÇOIS CHARLES MARIE (1772–1837), French socialist writer, was born at Besançon in Franche-Comté on the 7th of April 1772. His father was a draper in good circumstances, and Fourier received an excellent education at the college in his native town. After completing his studies there he travelled for some time in France, Germany and Holland. On the death of his father he inherited a considerable amount of property, which, however, was lost when Lyons was besieged by the troops of the Convention. Being thus deprived of his means of livelihood Fourier entered the army, but after two years' service as a chasseur was discharged on account of ill-health. In 1803 he published a remarkable article on European politics which attracted the notice of Napoleon, some of whose ideas were foreshadowed in it. Inquiries were made after the author, but nothing seems to have come of them. After leaving the army Fourier entered a merchant's office in Lyons, and some years later undertook on his own account a small business as broker. He obtained in this way just sufficient to supply his wants, and devoted all his leisure time to the elaboration of his first work on the organization of society.

During the early part of his life, and while engaged in commerce, he had become deeply impressed with the conviction that social arrangements resulting from the principles of individualism and competition were essentially imperfect and immoral. He proposed to substitute for these principles co-operation or united effort, by means of which full and harmonious development might be given to human nature. The scheme, worked out in detail in his first work, *Théorie des quatre mouvements* (2 vols., Lyons, 1808, published anonymously), has for foundation a particular psychological proposition and a special economical doctrine. Psychologically Fourier held what may with some laxity of language be called natural optimism,—the view that the full, free development of human nature or the unrestrained indulgence of human passion is the only possible way to happiness and virtue, and that misery and vice spring from the unnatural restraints imposed by society on the gratification of desire. This principle of harmony among the passions he regarded as his grandest discovery—a discovery which did more than set him on a level with Newton, the discoverer of the principle of attraction or harmony among material bodies. Throughout his works, in uncouth, obscure and often unintelligible language, he endeavours to show that the same fundamental fact of harmony is to be found in the four great departments,—society, animal life, organic life and the material universe. In order to give effect to this principle and obtain the resulting social harmony, it was needful that society should be reconstructed; for, as the social organism is at present constituted, innumerable restrictions are imposed upon the free development of human desire. As practical principle for such a reconstruction Fourier advocated co-operative or united industry. In many respects what he says of co-operation, in particular as to the enormous waste of economic force which the actual arrangements of society entail, still deserves attention, and some of the most recent efforts towards extension of the co-operative method, *e.g.* to house-keeping, were in essentials anticipated by him. But the full realization of his scheme demanded much more than the mere admission that co-operation is economically more efficacious than individualism. Society as a whole must be organized on the lines requisite to give full scope to co-operation and to the harmonious evolution of human nature. The details of this reorganization of the social structure cannot be given briefly, but the broad outlines may be thus sketched. Society, on his scheme, is to be divided into departments or *phalanges*, each *phalange* numbering about 1600 persons. Each *phalange* inhabits a *phalanstère* or common building, and has a certain portion of soil allotted to it for cultivation. The *phalanstères* are built after a uniform plan, and the domestic arrangements are laid down very elaborately. The staple industry of the *phalanges* is, of course, agriculture, but the various *series* and *groupes* into which the members are divided may devote themselves to such occupations as are most to their taste; nor need any occupation become irksome from constant devotion to it. Any member of a group may vary his employment at pleasure, may pass from one task to another. The tasks regarded as menial or degrading in ordinary society can be rendered attractive if advantage is taken of the proper principles of human nature: thus children, who have a natural affinity for dirt, and a fondness for "cleaning up," may easily be induced to accept with eagerness the functions of public scavengers. It is not, on Fourier's scheme, necessary that private property should be abolished, nor is the privacy of family life impossible within the *phalanstère*. Each family may have separate apartments, and there may be richer and poorer members. But the rich and poor are to be locally intermingled, in order that the broad distinction between them, which is so painful a feature in actual society, may become almost imperceptible. Out of the common gain of the *phalange* a certain portion is deducted to furnish to each member the minimum of subsistence; the remainder is distributed in shares to labour, capital and talent,—five-twelfths going to the first, four-twelfths to the second and three-twelfths to the third. Upon the changes requisite in the private life of the members Fourier was in his first work more explicit than in his later writings. The institution of marriage, which imposes unnatural bonds on human passion, is of necessity abolished; a new and ingeniously constructed system of licence is substituted for it. Considerable offence seems to have been given by Fourier's utterances with regard to marriage, and generally the later advocates of his views are content to pass the matter over in silence or to veil their teaching under obscure and metaphorical language.

The scheme thus sketched attracted no attention when the *Théorie* first appeared, and for some years Fourier remained in his obscure position at Lyons. In 1812 the death of his mother put him in possession of a small sum of money, with which he retired to Bellay in order to perfect his second work. The *Traité de l'association agricole domestique* was published in 2 vols. at Paris in 1822, and a summary appeared in the following year. After its publication the author proceeded to Paris in the hope that some wealthy capitalist might be induced to attempt the realization of the projected scheme. Disappointed in this expectation he returned to Lyons. In 1826 he again visited Paris, and as a considerable portion of his means had been expended in the publication of his book, he accepted a clerkship in an American firm. In 1829 and 1830 appeared what is probably the most finished exposition of his views, *Le Nouveau Monde industriel*. In 1831 he attacked the rival socialist doctrines of Saint-Simon and Owen in the small work *Pièges et charlatanisme de deux sectes, St Simon et Owen*. His writings now began to attract some attention. A small body of adherents gathered round him, and the most ardent of them was Victor Considérant (*q.v.*). In 1832 a newspaper, *Le Phalanstère ou la réforme industrielle* was started to propagate the views of the school, but its success was not great. In 1833 it declined from a weekly to a monthly, and in 1834 it died of inanition. It was revived in 1836 as *Le Phalange*, and in 1843 became a daily paper, *La Démocratie pacifique*. In 1850 it was suppressed.

Fourier did not live to see the success of his newspaper, and the only practical attempt during his lifetime to establish a *phalanstère* was a complete failure. In 1832 M. Baudet Dulary, deputy for Seine-et-Oise, who had become a convert, purchased an estate at Condé-sur-Vesgre, near the forest of Rambouillet, and proceeded to establish a socialist community. The capital supplied was, however, inadequate, and the community broke up in disgust. Fourier was in no way discouraged by this failure, and till his death, on the 10th of October 1837, he lived in daily expectation that wealthy capitalists would see the merits of his scheme and be induced to devote their fortunes to its realization. It may be added that subsequent attempts to establish the *phalanstère* have been uniformly unsuccessful.[1]

Fourier seems to have been of an extremely retiring and sensitive disposition. He mixed little in society, and appeared, indeed, as if he were the denizen of some other planet. Of the true nature of social arrangements, and of the manner in which they naturally grow and become organized, he must be pronounced extremely ignorant. The faults of existing institutions presented themselves to him in an altogether distorted manner, and he never appears to have recognized that the evils of actual society are immeasurably less serious than the consequences of his arbitrary scheme. Out of the chaos of human passion he supposed harmony was to be evolved by the adoption of a few theoretically disputable principles, which themselves impose restraints even more irksome than those due to actual social facts. With regard to the economic aspects of his proposed new method, it is of course to be granted that co-operation is more effective than individual effort, but he has nowhere faced the question as to the probable consequences of organizing society on the abolition of those great institutions which have grown with its growth. His temperament was too ardent, his imagination too strong, and his acquaintance with the realities of life too slight to enable him justly to estimate the merits of his fantastic views. That this description of him is not expressed in over-strong language must be clear to any one who not only considers what is true in his works,—and the portion of truth is by no means a peculiar discovery of Fourier's,—but who takes into account the whole body of his speculations, the cosmological and historical as well as the economical and social. No words can adequately describe the fantastic nonsense which he pours forth, partly in the form of general speculation on the universe, partly in the form of prophetic utterances with regard to the future changes in humanity and its material environment. From these extraordinary writings it is no extreme conclusion that there was much of insanity in Fourier's mental constitution.

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FOURIER, JEAN BAPTISTE JOSEPH (1768–1830), French mathematician, was born at Auxerre on the 21st of March 1768. He was the son of a tailor, and was left an orphan in his eighth year; but, through the kindness of a friend, admission was gained for him into the military school of his native town, which was then under the direction of the Benedictines of Saint-Maur. He soon distinguished himself as a student and made rapid progress, especially in mathematics. Debarred from entering the army on account of his lowness of birth and poverty, he was appointed professor of mathematics in the school in which he had been a pupil. In 1787 he became a novice at the abbey of St Benoît-sur-Loire; but he left the abbey in 1789 and returned to his college, where, in addition to his mathematical duties, he was frequently called to lecture on other subjects,—rhetoric, philosophy and history. On the institution of the École Normale at Paris in 1795 he was sent to teach in it, and was afterwards attached to the École Polytechnique, where he occupied the chair of analysis. Fourier was one of the savants who accompanied Bonaparte to Egypt in 1798; and during this expedition he was called to discharge important political duties in addition to his scientific ones. He was for a time virtually governor of half Egypt, and for three years was secretary of the Institut du Caire; he also delivered the funeral orations for Kléber and Desaix. He returned to France in 1801, and in the following year he was nominated prefect of Isère, and was created baron and chevalier of the Legion of Honour. He took an important part in the preparation of the famous *Description de l'Égypte* and wrote the historical introduction. He held his prefecture for fourteen years; and it was during this period that he carried on his elaborate and fruitful investigations on the conduction of heat. On the return of Napoleon from Elba, in 1815, Fourier published a royalist proclamation, and left Grenoble as Napoleon entered it. He was then deprived of his prefecture, and, although immediately named prefect of the Rhône, was soon after again deprived. He now settled at Paris, was elected to the Académie des Sciences in 1816, but in consequence of the opposition of Louis XVIII. was not admitted till the following year, when he succeeded the Abbé Alexis de Rochon. In 1822 he was made perpetual secretary in conjunction with Cuvier, in succession to Delambre. In 1826 Fourier became a member of the French Academy, and in 1827 succeeded Laplace as president of the council of the École Polytechnique. In 1828 he became a member of the government commission established for the encouragement of literature. He died at Paris on the 16th of May 1830.

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[1] Several experiments were made to this end in the United States (see COMMUNISM) by American followers of Fourier, whose doctrines were introduced there by Albert Brisbane (1809–1890). Indeed, in the years between 1840 and 1850, during which the movement waxed and waned, no fewer than forty-one *phalanges* were founded, of which some definite record can be found. The most interesting of all the experiments, not alone from its own history, but also from the fact that it attracted the support of many of the most intellectual and cultured Americans was that of Brook Farm (*q.v.*).

As a politician Fourier achieved uncommon success, but his fame chiefly rests on his strikingly original contributions to science and mathematics. The theory of heat engaged his attention quite early, and in 1812 he obtained a prize offered by the Académie des Sciences with a memoir in two parts, *Théorie des mouvements de la chaleur dans les corps solides*. The first part was republished in 1822 as *La Théorie analytique de la chaleur*, which by its new methods and great results made an epoch in the history of mathematical and physical science (see below: FOURIER'S SERIES). An English translation has been published by A. Freeman (Cambridge, 1872), and a German by Weinstein (Berlin, 1884). His mathematical researches were also concerned with the theory of equations, but the question as to his priority on several points has been keenly discussed. After his death Navier completed and published Fourier's unfinished work, *Analyse des équations indéterminées* (1831), which contains much original matter. In addition to the works above mentioned, Fourier wrote many memoirs on scientific subjects, and *éloges* of distinguished men of science. His works have been collected and edited by Gaston Darboux with the title *Œuvres de Fourier* (Paris, 1889–1890).

For a list of Fourier's publications see the *Catalogue of Scientific Papers of the Royal Society of London*. Reference may also be made to Arago, "Joseph Fourier," in the *Smithsonian Report* (1871).

FOURIER'S SERIES, in mathematics, those series which proceed according to sines and cosines of multiples of a variable, the various multiples being in the ratio of the natural numbers; they are used for the representation of a function of the variable for values of the variable which lie between prescribed finite limits. Although the importance of such series, especially in the theory of vibrations, had been recognized by D. Bernoulli, Lagrange and other mathematicians, and had led to some discussion of their properties, J. B. J. Fourier (see above) was the first clearly to recognize the arbitrary character of the functions which the series can represent, and to make any serious attempt to prove the validity of such representation; the series are consequently usually associated with the name of Fourier. More general cases of trigonometrical series, in which the multiples are given as the roots of certain transcendental equations, were also considered by Fourier.

Before proceeding to the consideration of the special class of series to be discussed, it is necessary to define with some precision what is to be understood by the representation of an arbitrary function by an infinite series. Suppose a function of a variable x to be arbitrarily given for values of x between two fixed values a and b; this means that, corresponding to every value of x such that $a \leqq x \leqq b$, a definite arithmetical value of the function is assigned by means of some prescribed set of rules. A function so defined may be denoted by $f(x)$; the rules by which the values of the function are determined may be embodied in a single explicit analytical formula, or in several such formulae applicable to different portions of the interval, but it would be an undue restriction of the nature of an arbitrarily given function to assume *à priori* that it is necessarily given in this manner, the possibility of the representation of such a function by means of a single analytical expression being the very point which we have to discuss. The variable x may be represented by a point at the extremity of an interval measured along a straight line from a fixed origin; thus we may speak of the point c as synonymous with the value $x=c$ of the variable, and of $f(c)$ as the value of the function assigned to the point c. For any number of points between a and b the function may be discontinuous, *i.e.* it may at such points undergo abrupt changes of value; it will here be assumed that the number of such points is finite. The only discontinuities here considered will be those known as ordinary discontinuities. Such a discontinuity exists at the point c if $f(c+\epsilon)$, $f(c-\epsilon)$ have distinct but definite limiting values as ϵ is indefinitely diminished; these limiting values are known as the limits on the right and on the left respectively of the function at c, and may be denoted by $f(c+0)$, $f(c-0)$. The discontinuity consists therefore of a sudden change of value of the function from $f(c-0)$ to $f(c+0)$, as x increases through the value c. If there is such a discontinuity at the point $x=0$, we may denote the limits on the right and on the left respectively by $f(+0)$, $f(-0)$.

Suppose we have an infinite series $u_1(x)+u_2(x)+\ldots+u_n(x)+\ldots$ in which each term is a function of x, of known analytical form; let any value $x=c(a \leqq c \leqq b)$ be substituted in the terms of the series, and suppose the sum of n terms of the arithmetical series so obtained approaches a definite limit as n is indefinitely increased; this limit is known as the sum of the series. If for every value of c such that $a \leqq c \leqq b$ the sum exists and agrees with the value of $f(c)$, the series $\sum_{1}^{\infty} u_n(x)$ is said to represent the function(fx) between the values a, b of the variable. If this is the case for all points within the given interval with the exception of a finite number, at any one of which either the series has no sum, or has a sum which does not agree with the value of the function, the series is said to represent "in general" the function for the given interval. If the sum of n terms of the series be denoted by $S_n(c)$, the condition that $S_n(c)$ converges to the value $f(c)$ is that, corresponding to any finite positive number δ as small as we please, a value n_1 of n can be found such that if $n \geqq n_1$, $|f(c)-S_n(c)|<\delta$.

Functions have also been considered which for an infinite number of points within the given interval have no definite value, and series have also been discussed which at an infinite number of points in the interval cease either to have a sum, or to have one which agrees with the value of the function; the narrower conception above will however be retained in the treatment of the subject in this article, reference to the wider class of cases being made only in connexion with the history of the theory of Fourier's Series.

Uniform Convergence of Series.—If the series $u_1(x)+u_2(x)+\ldots+u_2(x)+\ldots$ converge for every value of x in a given interval a to b, and its sum be denoted by $S(x)$, then if, corresponding to a finite positive number δ, as small as we please, a finite number n_1 can be found such that the arithmetical value of $S(x)-S_n(x)$, where $n \geqq n_1$ is less than δ, for every value of x in the given interval, the series is said to converge uniformly in that interval. It may however happen that as x approaches a particular value the number of terms of the series which must be taken so that $|S(x)-S_n(x)|$ may be $<\delta$, increases indefinitely; the convergence of the series is then infinitely slow in the neighbourhood of such a point, and the series is not uniformly convergent throughout the given interval, although it converges at each point of the interval. If the number of such points in the neighbourhood of which the series ceases to converge uniformly be finite, they may be excluded by taking intervals of finite magnitude as small as we please containing such points, and considering the convergence of the series in the given interval with such sub-intervals excluded; the convergence of the series is now uniform throughout the remainder of the interval. The series is said to be *in general* uniformly convergent within the given interval a to b if it can be made uniformly convergent by the exclusion of a finite number of portions of the interval, each such portion being arbitrarily small. It is known that the sum of an infinite series of continuous terms can be discontinuous only at points in the neighbourhood of which the convergence of the series is not uniform, but non-uniformity of convergence of the series does not necessarily imply discontinuity in the sum.

Form of Fourier's Series.—If it be assumed that a function $f(x)$ arbitrarily given for values of x such that $0 \leqq x \leqq l$ is capable of being represented in general by an infinite series of the form

$$A_1 \sin \frac{\pi x}{l} + A_2 \sin \frac{2\pi x}{l} + \ldots + A_n \sin \frac{n\pi x}{l} + \ldots,$$

and if it be further assumed that the series is in general uniformly convergent throughout the interval 0 to l, the form of the coefficients A can be determined. Multiply each term of the series by $\sin \frac{n\pi x}{l}$, and integrate the product between the limits 0 and l, then in virtue of the property $\int_0^l \sin \frac{n\pi x}{l} \sin \frac{n'\pi x}{l} dx = 0$, or $\frac{1}{2}l$, according as n' is not, or is, equal to n, we have $\frac{1}{2}lA_n = \int_0^l f(x) \sin \frac{n\pi x}{l} dx$, and thus the series is of the form $\frac{2}{l}\sum_1^\infty \sin \frac{n\pi x}{l} \int_0^l f(x) \sin \frac{n\pi x}{l} dx$ . . . . . (1)

This method of determining the coefficients in the series would not be valid without the assumption that the series is in general uniformly convergent, for in accordance with a known theorem the sum of the integrals of the separate terms of the series is otherwise not necessarily equal to the integral of the sum. This assumption being made, it is further assumed that $f(x)$ is such that $\int_0^l f(x) \sin \frac{n\pi x}{l} dx$ has a definite meaning for every value of n.

Before we proceed to examine the justification for the assumptions made, it is desirable to examine the result obtained, and to deduce other series from it. In order to obtain a series of the form

$$B_0 + B_1 \cos \frac{\pi x}{l} + B_2 \cos \frac{2\pi x}{l} + \ldots + B_n \cos \frac{n\pi x}{l} + \ldots$$

for the representation of $f(x)$ in the interval 0 to l, let us apply the series (1) to represent the function $f(x) \sin \frac{\pi x}{l}$; we thus find

$$\frac{2}{l}\sum_1^\infty \sin \frac{n\pi x}{l} \int_0^l f(x) \sin \frac{\pi x}{l} \sin \frac{n\pi x}{l} dx,$$

or

$$\frac{1}{l}\sum_1^\infty \sin \frac{n\pi x}{l} \int_0^l f(x) \left\{ \cos \frac{(n-1)\pi x}{l} - \cos \frac{(n+1)\pi x}{l} \right\} dx.$$

On rearrangement of the terms this becomes

$$\frac{1}{l} \sin \frac{\pi x}{l} \int_0^l f(x) dx + \frac{2}{l}\Sigma \sin \frac{\pi x}{l} \cos \frac{n\pi x}{l} \int_0^l f(x) \cos \frac{n\pi x}{l} dx,$$

hence $f(x)$ is represented for the interval 0 to l by the series of cosines

$$\frac{1}{l}\int_0^l f(x) dx + \frac{2}{l}\sum_1^\infty \cos \frac{n\pi x}{l} \int_0^l f(x) \cos \frac{n\pi x}{l} dx \quad . \quad . \quad . \quad . \quad (2)$$

We have thus seen, that with the assumptions made, the arbitrary function $f(x)$ may be represented, for the given interval, either by a series of sines, as in (1), or by a series of cosines, as in (2). Some important differences between the two series must, however, be noticed. In the first place, the series of sines has a vanishing sum when $x=0$ or $x=l$; it therefore does not represent the function at the point $x=0$, unless $f(0)=0$, or at the point $x=l$, unless $f(l)=0$, whereas the series (2) of cosines may represent the function at both these points. Again, let us consider what is represented by (1) and (2) for values of x which do not lie between 0 and l. As $f(x)$ is given only for values of x between 0 and l, the series at points beyond these limits have no necessary connexion with $f(x)$ unless we suppose that $f(x)$ is also given for such general values of x in such a way that the series continue to represent that function. If in (1) we change x into $-x$, leaving the coefficients unaltered, the series changes sign, and if x be changed into $x+2l$, the series is unaltered; we infer that the series (1) represents an odd function of x and is periodic of period $2l$; thus (1) will represent $f(x)$ in general for values of x between $\pm\infty$, only if $f(x)$ is odd and has a period $2l$. If in (2) we change x into $-x$, the series is unaltered, and it is also unaltered by changing x into $x+2l$; from this we see that the series (2) represents $f(x)$ for values of x between $\pm\infty$; only if $f(x)$ is an even function, and is periodic of period $2l$. In general a function $f(x)$ arbitrarily given for all values of x between $\pm\infty$ is neither periodic nor odd, nor even, and is therefore not represented by either (1) or (2) except for the interval 0 to l.

From (1) and (2) we can deduce a series containing both sines and cosines, which will represent a function $f(x)$ arbitrarily given in the interval $-l$ to l, for that interval. We can express by (1) the function $\frac{1}{2}\{f(x)-f(-x)\}$ which is an odd function, and thus this function is represented for the interval $-l$ to $+l$ by

$$\frac{2}{l}\,\Sigma \sin \frac{n\pi x}{l} \int_0^l \tfrac{1}{2}\{f(x)-f(-x)\} \sin \frac{n\pi x}{l} dx;$$

we can also express $\frac{1}{2}\{f(x)+f(-x)\}$, which is an even function, by means of (2), thus for the interval $-l$ to $+l$ this function is represented by

$$\frac{1}{l}\int_0^l \tfrac{1}{2}\{f(x)+f(-x)\}dx + \frac{2}{l}\sum_1^\infty \cos \frac{n\pi x}{l} \int_0^l \tfrac{1}{2}\{f(x)+f(-x)\} \cos \frac{n\pi x}{l} dx.$$

It must be observed that $f(-x)$ is absolutely independent of $f(x)$, the former being not necessarily deducible from the latter by putting $-x$ for x in a formula; both $f(x)$ and $f(-x)$ are functions given arbitrarily and independently for the interval 0 to l. On adding the expressions together we obtain a series of sines and cosines which represents $f(x)$ for the interval $-l$ to l. The integrals

$$\int_0^l f(-x) \cos \frac{n\pi x}{l} dx, \quad \int_0^l f(-x) \sin \frac{n\pi x}{l} dx$$

are equivalent to

$$-\int_0^{-l} f(x) \cos \frac{n\pi x}{l} dx, \quad +\int_0^{-l} f(x) \sin \frac{n\pi x}{l} dx,$$

thus the series is

$$\frac{1}{2l}\int_{-l}^l f(x) dx + \frac{1}{l}\sum_1^\infty \cos \frac{n\pi x}{l} \int_{-l}^l f(x) \cos \frac{n\pi x}{l} dx + \frac{1}{l}\sum_1 \sin \frac{n\pi x}{l} \int_{-l}^l f(x) \sin \frac{n\pi x}{l} dx,$$

which may be written

$$\frac{1}{2l}\int_{-l}^l f(x') dx' + \frac{1}{l}\sum_1^\infty \int_{-l}^l f(x') \cos \frac{n\pi(x-x')}{l} dx' \quad . \quad . \quad . \quad (3)$$

The series (3), which represents a function $f(x)$ arbitrarily given for the interval $-l$ to l, is what is known as Fourier's Series; the expressions (1) and (2) being regarded as the particular forms which (3) takes in the two cases, in which $f(-x) = -f(x)$, or $f(-x) = f(x)$ respectively. The expression (3) does not represent $f(x)$ at points beyond the interval $-l$ to l, unless $f(x)$ has a period $2l$. For a value of x within the interval, at which $f(x)$ is discontinuous, the sum of the series may cease to represent $f(x)$, but, as will be seen hereafter, has the value $\frac{1}{2}\{f(x+0)+f(x-0)\}$, the mean of the limits at the points on the right and the left. The series represents the function at $x=0$, unless the function is there discontinuous, in which case the series is $\frac{1}{2}\{f(+0)+f(-0)\}$; the series does not necessarily represent the function at the points l and $-l$, unless $f(l)=f(-l)$. Its sum at either of these points is $\frac{1}{2}\{f(l)+f(-l)\}$.

Examples of Fourier's Series.—(*a*) Let $f(x)$ be given from 0 to l, by $f(x)=c$, when $0 \leqq x < \frac{1}{2}l$, and by $f(x) = -c$ from $\frac{1}{2}l$ to l; it is required to find a sine series, and also a cosine series, which shall represent the function in the interval.

We have

$$\int_0^l f(x) \sin \frac{n\pi x}{l} dx = c\int_0^{\frac{1}{2}l} \sin \frac{n\pi x}{l} dx - c\int_{\frac{1}{2}l}^l \sin \frac{n\pi x}{l} dx$$

$$= \frac{cl}{n\pi}\left(\cos n\pi - 2\cos \tfrac{1}{2}n\pi + 1\right).$$

This vanishes if n is odd, and if $n=4m$, but if $n=4m+2$ it is equal to $4cl/n\pi$; the series is therefore

$$\frac{4c}{\pi}\left(\frac{1}{2}\sin \frac{2\pi x}{l} + \frac{1}{3}\sin \frac{6\pi x}{l} + \frac{1}{5}\sin \frac{10\pi x}{l} + \ldots\right).$$

For unrestricted values of x, this series represents the ordinates of the series of straight lines in fig. 1, except that it vanishes at the points 0, $\frac{1}{2}l$, l, $\frac{3}{2}l$ . . .

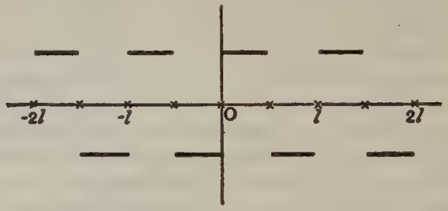

FIG. 1.

We find similarly that the same function is represented by the series

$$\frac{4c}{\pi}\left(\cos \frac{\pi x}{l} - \frac{1}{3}\cos \frac{3\pi x}{l} + \frac{1}{5}\cos \frac{5\pi x}{l} - + \ldots\right)$$

during the interval 0 to l; for general values of x the series represents the ordinate of the broken line in fig. 2, except that it vanishes at the points $\frac{1}{2}l$, $\frac{3}{2}l$ . .

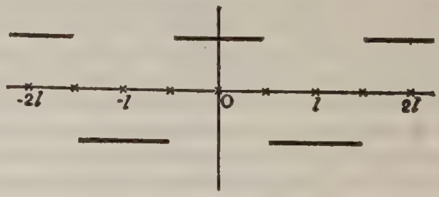

FIG. 2.

(*b*) Let $f(x)=x$ from 0 to $\frac{1}{2}l$, and $f(x)=l-x$, from $\frac{1}{2}l$ to l; then

$$\int_0^l f(x) \sin \frac{n\pi x}{l} dx = \int_0^{\frac{1}{2}l} x \sin \frac{n\pi x}{l} dx + \int_{\frac{1}{2}l}^l (l-x) \sin \frac{n\pi x}{l} dx$$

$$= -\frac{l^2}{2n\pi}\cos \frac{n\pi}{2} + \frac{l^2}{n^2\pi^2}\sin \frac{n\pi}{2} + \frac{l^2}{n\pi}\left(\cos \frac{n\pi}{2} - \cos n\pi\right)$$

$$+ \frac{l^2}{n\pi}\cos n\pi - \frac{l^2}{2n\pi}\cos \frac{n\pi}{2} + \frac{l^2}{n^2\pi^2}\sin \frac{n\pi}{2} = \frac{2l^2}{n^2\pi^2}\sin \frac{n\pi}{2}$$

hence the sine series is

$$\frac{4l}{\pi^2}\left(\sin\frac{nx}{l}-\frac{1}{3^2}\sin\frac{3\pi x}{l}+\frac{1}{5^2}\sin\frac{5\pi x}{l}-\ldots\right).$$

For general values of x, the series represents the ordinates of the row of broken lines in fig. 3.

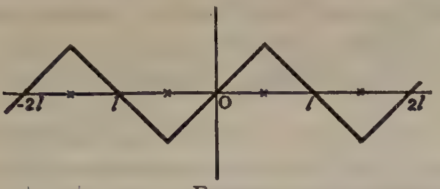

FIG. 3.

The cosine series, which represents the same function for the interval 0 to l, may be found to be

$$\frac{1}{4}l-\frac{2l}{\pi^2}\left(\cos\frac{2\pi x}{l}+\frac{1}{3^2}\cos\frac{6\pi x}{l}+\frac{1}{5^2}\cos\frac{10\pi x}{l}+\ldots\right)$$

This series represents for general values of x the ordinate of the set of broken lines in fig. 4.

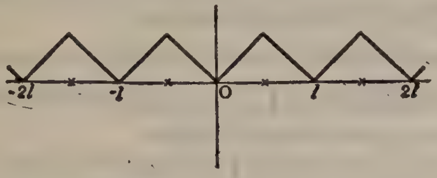

FIG. 4.

Dirichlet's Integral.—The method indicated by Fourier, but first carried out rigorously by Dirichlet, of proving that, with certain restrictions as to the nature of the function $f(x)$, that function is in general represented by the series (3), consists in finding the sum of $n+1$ terms of that series, and then investigating the limiting value of the sum, when n is increased indefinitely. It thus appears that the series is convergent, and that the value towards which its sum converges is $\frac{1}{2}\{f(x+0)+f(x-0)\}$, which is in general equal to $f(x)$. It will be convenient throughout to take $-\pi$ to π as the given interval; any interval $-l$ to l may be reduced to this by changing x into lx/π, and thus there is no loss of generality.

We find by an elementary process that

$$\tfrac{1}{2}+\cos(x-x')+\cos 2(x-x')+\ldots+\cos n(x-x')$$
$$=\frac{\sin\frac{2n+1}{2}(x'-x)}{2\sin\frac{1}{2}(x'-x)}.$$

Hence, with the new notation, the sum of the first $n+1$ terms of (3) is

$$\frac{1}{\pi}\int_{-\pi}^{\pi} f(x')\frac{\sin\frac{2n+1}{2}(x'-x)}{2\sin\frac{1}{2}(x'-x)}dx'.$$

If we suppose $f(x)$ to be continued beyond the interval $-\pi$ to π, in such a way that $f(x)=f(x+2\pi)$, we may replace the limits in this integral by $x+\pi$, $x-\pi$ respectively; if we then put $x'-x=2z$, and let $f(x')=F(z)$, the expression becomes $\frac{1}{\pi}\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}F(z)\frac{\sin mz}{\sin z}dz$, where $m=2n+1$; this expression may be written in the form

$$\frac{1}{\pi}\int_0^{\frac{\pi}{2}}F(z)\frac{\sin mz}{\sin z}dz+\frac{1}{\pi}\int_0^{\frac{\pi}{2}}F(-z)\frac{\sin mz}{\sin z}dz \quad \ldots\ldots \quad (4)$$

We require therefore to find the limiting value, when m is indefinitely increased, of $\int_0^{\frac{\pi}{2}}F(z)\frac{\sin mz}{\sin z}dz$; the form of the second integral being essentially the same. This integral, or rather the slightly more general one $\int_0^h F(z)\frac{\sin mz}{\sin z}dz$, when $0<h\leqq\frac{1}{2}\pi$, is known as Dirichlet's integral. If we write $X(z)=F(z)\frac{z}{\sin z}$, the integral becomes $\int_0^h X(z)\frac{\sin mz}{z}dz$, which is the form in which the integral is frequently considered.

The Second Mean-Value Theorem.—The limiting value of Dirichlet's integral may be conveniently investigated by means of a theorem in the integral calculus known as the second mean-value theorem. Let a, b be two fixed finite numbers such that $a<b$, and suppose $f(x)$, $\phi(x)$ are two functions which have finite and determinate values everywhere in the interval except for a finite number of points; suppose further that the functions $f(x)$, $\phi(x)$ are integrable throughout the interval, and that as x increases from a to b the function $f(x)$ is monotone, *i.e.* either never diminishes or never increases; the theorem is that

$$\int_a^b f(x)\phi(x)dx=f(a+0)\int_a^\xi\phi(x)dx+f(b-0)\int_\xi^b\phi(x)dx$$

when ξ is some point between a and b, and $f(a)$, $f(b)$ may be written for $f(a+0)$, $f(b-0)$ unless a or b is a point of discontinuity of the function $f(x)$.

To prove this theorem, we observe that, since the product of two integrable functions is an integrable function, $\int_a^b f(x)\phi(x)dx$ exists, and may be regarded as the limit of the sum of a series

$$f(x_0)\phi(x_0)(x_1-x_0)+f(x_1)\phi(x_1)(x_2-x_1)+\ldots+f(x_{n-1})\phi(x_{n-1})(x_n-x_{n-1})$$

where $x_0=a$, $x_n=b$ and $x_1, x_2 \ldots x_{n-1}$ are $n-1$ intermediate points. We can express $\phi(x_r)(x_{r+1}-x_r)$ in the form $Y_{r+1}-Y_r$, by putting

$$Y_r=\sum_{K=1}^{K=r}\phi(x_{K-1})(x_K-x_{K-1}),\ Y_0=0.$$

Writing X_r for $f(x_r)$, the series becomes

$$X_0(Y_1-Y_0)+X_1(Y_2-Y_1)+\ldots+X_{n-1}(Y_n-Y_{n-1})$$

or $\quad Y_1(X_0-X_1)+Y_2(X_1-X_2)+\ldots+Y_n(X_{n-1}-X_n)+Y_nX_n.$

Now, by supposition, all the numbers $Y_1, Y_2 \ldots Y_n$ are finite, and all the numbers $X_{r-1}-X_r$ are of the same sign, hence by a known algebraical theorem the series is equal to $M(X_0-X_n)+Y_nX_n$ where M is a number intermediate between the greatest and the least of the numbers $Y_1, Y_2, \ldots Y_n$. This remains true however many partial intervals are taken, and therefore, when their number is increased indefinitely, and their breadths are diminished indefinitely according to any law, we have

$$\int_a^b f(x)\phi(x)dx=\{f(a)-f(b)\}\overline{M}+f(b)\int_a^b\phi(x)dx$$

when M is intermediate between the greatest and least values which $\int_a^x\phi(x)dx$ can have, when x is in the given integral. Now this integral is a continuous function of its upper limit x, and therefore there is a value of x in the interval, for which it takes any particular value between the greatest and least values that it has. There is therefore a value ξ between a and b, such that $\overline{M}=\int_a^\xi\phi(x)dx$, hence

$$\int_a^b f(x)\phi(x)dx=\{f(a)-f(b)\}\int_a^\xi\phi(x)dx+f(b)\int_a^b\phi(x)dx$$
$$=f(a)\int_a^\xi\phi(x)dx+f(b)\int_\xi^b\phi(x)dx.$$

If the interval contains any finite numbers of points of discontinuity of $f(x)$ or $\phi(x)$, the method of proof still holds good, provided these points are avoided in making the subdivisions; in particular if either of the ends be a point of discontinuity of $f(x)$, we write $f(a+0)$ or $f(b-0)$, for $f(a)$ or $f(b)$, it being assumed that these limits exist.

Functions, with Limited Variation.—The condition that $f(x)$, in the mean-value theorem, either never increases or never diminishes as x increases from a to b, places a restriction upon the applications of the theorem. We can, however, show that a function $f(x)$ which is finite and continuous between a and b, except for a finite number of ordinary discontinuities, and which only changes from increasing to diminishing or vice versa, a finite number of times, as x increases from a to b, may be expressed as the difference of two functions $f_1(x)$, $f_2(x)$, neither of which ever diminishes as x passes from a to b, and that these functions are finite and continuous, except that one or both of them are discontinuous at the points where the given function is discontinuous. Let α, β be two consecutive points at which $f(x)$ is discontinuous, consider any point x_1, such that $\alpha\leqq x_1\leqq\beta$, and suppose that at the points $M_1, M_2 \ldots M_r$ between α and x_1, $f(x)$ is a maximum, and at $m_1, m_2 \ldots m_r$ it is a minimum; we will suppose, for example, that the ascending order of values is $\alpha, M_1, m_1, M_2, m_2 \ldots M_r, m_r, x_1$; it will make no essential difference in the argument if m_1 comes before M_1, or if M_r immediately precedes x_1, M_{r-1} being then the last minimum.

Let $\quad \psi(x_1)=[f(M_1)-f(\alpha+0)]+[f(M_2)-f(m_1)]+\ldots$
$$+[f(M_r)-f(m_{r-1})]+[f(x_1)-f(m_r)];$$

now let x_1 increase until it reaches the value M_{r+1} at which $f(x)$ is again a maximum, then let

$$\psi(x_1)=[f(M_1)-f(\alpha+0)]+[f(M_2)-f(m_1)]+\ldots$$
$$+[f(M_r)-f(m_{r-1})]+[f(M_{r+1})-f(m_r)];$$

and suppose as x increases beyond the value M_{r+1}, $\psi(x_1)$ remains constant until the next minimum m_{r+1} is reached, when it again becomes variable; we see that $\psi(x_1)$ is essentially positive and never diminishes as x increases.

Let

$$\chi(x_1)=[f(M_1)-f(m_1)]+[f(M_2)-f(m_1)]+\ \ldots\ +[f(M_r)-f(m_r)],$$

then let x_1 increase until it is beyond the next maximum M_{r+1}, and then let $\chi(x_1)=[f(M_1)-f(m_1)]+[f(M_2)-f(m_1)]+\ldots$

$$+[f(M_r)-f(m_r)]+[f(M_{r+1})-f(x_1)]$$

thus $\chi(x_1)$ never diminishes, and is alternately constant and variable. We see that $\psi(x_1)-\chi(x_1)$ is continuous as x_1 increases from α to β, and that $\psi(x_1)-\chi(x_1)=f(x_1)-f(\alpha+0)$, and when x_1 reaches β, we have $\psi(\beta)-\chi(x_1)=f(\beta-0)-f(\alpha+0)$. Hence it is seen that between α and β, $f(x)=[\psi(x)+f(\alpha+0)]-\chi(x)$, where $\psi(x)+f(\alpha+0)$, $\chi(x)$ are continuous and never diminish as x increases; the same reasoning applies to every continuous portion of $f(x)$, for which the functions $\psi(x)$, $\chi(x)$ are formed in the same manner; we now take $f_1(x)=\psi(x)+f(a+0)+C$, $f_2(x)=\chi(x)+C$, where C is constant between consecutive discontinuities, but may have different values in the next interval between discontinuities; the C can be so chosen that neither $f_1(x)$ nor $f_2(x)$ diminishes as x increases through a value for which $f(x)$ is discontinuous. We thus see that $f(x)=f_1(x)-f_2(x)$, where $f_1(x)$, $f_2(x)$ never diminish as x increases from a to b, and are discontinuous only where $f(x)$ is so. The function $f(x)$ is a particular case of a class of functions defined and discussed by Jordan, under the name "functions with limited variation" (*fonctions à variation bornée*); in general such functions have not necessarily only a finite number of maxima and minima.

Proof of the Convergence of Fourier's Series.—It will now be assumed that a function $f(x)$ arbitrarily given between the values $-\pi$ and $+\pi$, has the following properties:—

(*a*) The function is everywhere numerically less than some fixed positive number, and continuous except for a finite number of values of the variable, for which it may be ordinarily discontinuous.

(*b*) The function only changes from increasing to diminishing or vice versa, a finite number of times within the interval; this is usually expressed by saying that the number of maxima and minima is finite.

These limitations on the nature of the function are known as Dirichlet's conditions; it follows from them that the function is integrable throughout the interval.

On these assumptions, we can investigate the limiting value of Dirichlet's integral; it will be necessary to consider only the case of a function F(z) which does not diminish as z increases from 0 to $\frac{1}{2}\pi$, since it has been shown that in the general case the difference of two such functions may be taken. The following lemmas will be required:

1. Since

$$\int_0^{\frac{\pi}{2}}\frac{\sin mz}{\sin z}dz=\int_0^{\frac{\pi}{2}}\{1+2\cos 2z+2\cos 4z+\ldots+2\cos 2nz\}dz=\frac{\pi}{2};$$

this result holds however large the odd integer m may be.

2. If $0<\alpha<\beta\leqq\frac{\pi}{2}$,

$$\int_\alpha^\beta\frac{\sin mz}{\sin z}dz=\frac{1}{\sin\alpha}\int_\alpha^\gamma\sin mz\,dz+\frac{1}{\sin\beta}\int_\gamma^\beta\sin mz\,dz$$

where $\alpha<\gamma<\beta$, hence

$$\left|\int_\alpha^\beta\frac{\sin mz}{\sin z}dz\right|<\frac{2}{m}\left(\frac{1}{\sin\alpha}+\frac{1}{\sin\beta}\right)<\frac{4}{m\sin\alpha};$$

a precisely similar proof shows that $\left|\int_\alpha^\beta\frac{\sin mz}{z}dz\right|<\frac{4}{m\alpha}$, hence the integrals $\int_\alpha^\beta\frac{\sin mz}{\sin z}dz$, $\int_\alpha^\beta\frac{\sin mz}{z}dz$, converge to the limit zero, as m is indefinitely increased.

3. If $\alpha>0$, $\left|\int_\alpha^\infty\frac{\sin\theta}{\theta}d\theta\right|$ cannot exceed $\frac{1}{2}\pi$. For by the mean-value theorem $\left|\int_\alpha^h\frac{\sin\theta}{\theta}d\theta\right|<\frac{2}{\alpha}+\frac{2}{h}$, hence $\left|\mathrm{L}h=\infty\int_\alpha^h\frac{\sin\theta}{\theta}d\theta\right|\leqq\frac{2}{\alpha}$; in particular if $\alpha\geqq\pi$, $\left|\int_\alpha^\infty\frac{\sin\theta}{\theta}d\theta\right|\leqq\frac{2}{\pi}<\frac{\pi}{2}$.

Again $\frac{d}{d\alpha}\int_\alpha^\infty\frac{\sin\theta}{\theta}d\theta=-\frac{\sin\alpha}{\alpha}$, $\alpha>0$, therefore $\int_\alpha^\infty\frac{\sin\theta}{\theta}d\theta$ increases as α diminishes, when $\theta<\alpha<\pi$; but $\lim_{\alpha=0}\int_\alpha^\infty\frac{\sin\theta}{\theta}d\theta=\frac{\pi}{2}$, hence $\left|\int_\alpha^\infty\frac{\sin\theta}{\theta}d\theta\right|<\frac{\pi}{2}$, where $\alpha<\pi$, and $<\frac{2}{\pi}$ where $\alpha\geqq\pi$. It follows that

$$\left|\int_\alpha^\beta\frac{\sin\theta}{\theta}d\theta\right|\leqq\pi,\ \text{provided } 0\leqq\alpha<\beta.$$

To find the limit of $\int_0^{\frac{\pi}{2}}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz$, we observe that it may be written in the form

$$\mathrm{F}(0)\int^{\frac{\pi}{2}}\frac{\sin mz}{\sin z}dz+\int_0^\mu\{\mathrm{F}(z)-\mathrm{F}(0)\}\frac{\sin mz}{\sin z}dz$$
$$+\int_\mu^{\frac{\pi}{2}}\{\mathrm{F}(z)-\mathrm{F}(0)\}\frac{\sin mz}{\sin z}dz$$

where μ is a fixed number as small as we please; hence if we use lemma (1), and apply the second mean-value theorem,

$$\int_0^{\frac{\pi}{2}}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz-\frac{\pi}{2}\mathrm{F}(0)$$
$$=\int_0^\mu\{\mathrm{F}(z)-\mathrm{F}(0)\}\frac{z}{\sin z}\frac{\sin mz}{z}dz$$
$$+\{\mathrm{F}(\mu+0)-\mathrm{F}(0)\}\int_\mu^{\xi^1}\frac{\sin mz}{\sin z}dz+\{\mathrm{F}(\tfrac{1}{2}\pi-0)-\mathrm{F}(0)\}\int_{\xi^1}^{\frac{\pi}{2}}\frac{\sin mz}{\sin z}dz$$

when ξ^1 lies between μ and $\frac{1}{2}\pi$. When m is indefinitely increased, the two last integrals have the limit zero in virtue of lemma (2). To evaluate the first integral on the right-hand side, let $\mathrm{G}(z)=\{\mathrm{F}(z)-\mathrm{F}(0)\}\frac{z}{\sin z}$, and observe that G$(z)$ increases as z increases from 0 to μ, hence if we apply the mean-value theorem

$$\left|\int_0^\mu\mathrm{G}(\ )\frac{\sin mz}{z}dz\right|=\left|\mathrm{G}(\mu)\int_\xi^\mu\frac{\sin mz}{z}dz\right|$$
$$=\left|\mathrm{G}(\mu)\int_{m\xi}^{m\mu}\frac{\sin\theta}{\theta}d\theta\right|<\pi\mathrm{G}(\mu),$$

where $0<\xi<\mu$, since G(z) has the limit zero when $z=0$. If ϵ be an arbitrarily chosen positive number, a fixed value of μ may be so chosen that $\pi\mathrm{G}(\mu)<\frac{1}{2}\epsilon$, and thus that $\left|\int_0^\mu\mathrm{G}(z)\frac{\sin mz}{z}dz\right|<\frac{1}{2}\epsilon$. When μ has been so fixed, m may now be so chosen that

$$\left|\int_0^{\frac{1}{2}\pi}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz-\frac{\pi}{2}\mathrm{F}(0)\right|<\epsilon.$$

It has now been shown that when m is indefinitely increased $\int_0^{\frac{\pi}{2}}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz-\frac{\pi}{2}\mathrm{F}(0)$ has the limit zero.

Returning to the form (4), we now see that the limiting value of

$$\frac{1}{\pi}\int_0^{\frac{\pi}{2}}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz+\frac{1}{\pi}\int_0^{\frac{\pi}{2}}\mathrm{F}(-z)\frac{\sin mz}{\sin z}dz\ \text{is}\ \tfrac{1}{2}\{\mathrm{F}(+0)+\mathrm{F}(-0)\};$$

hence the sum of $n+1$ terms of the series

$$\frac{1}{2l}\int_{-l}^{l}f(x)dx+\frac{1}{l}\Sigma\int_{-l}^{l}f(x^1)\cos\frac{n\pi(x-x^1)}{l}dx$$

converges to the value $\frac{1}{2}\{f(x+0)+f(x-0)\}$, or to $f(x)$ at a point where $f(x)$ is continuous, provided $f(x)$ satisfies Dirichlet's conditions for the interval from $-l$ to l.

Proof that Fourier's Series is in General Uniformly Convergent.—To prove that Fourier's Series converges uniformly to its sum for all values of x, provided that the immediate neighbourhoods of the points of discontinuity of $f(x)$ are excluded, we have

$$\left|\int^{\frac{\pi}{2}}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz-\frac{\pi}{2}\mathrm{F}(0)\right|<\pi\mathrm{G}(\mu)+\frac{4}{m\sin\mu}\{\mathrm{F}(\mu+0)-\mathrm{F}(0)\}$$
$$+\frac{4}{m\sin\xi^1}\{\mathrm{F}(\tfrac{1}{2}\pi-0)-\mathrm{F}(0)\}$$
$$<\frac{\pi\mu}{\sin\mu}\{f(x+2\mu)-f(x)\}+\frac{4}{m\sin\mu}\{f(x+2\mu)-f(x)\}$$
$$+\frac{4}{m\sin\xi^1}\{f(x+\pi)-f(x)\}.$$

Using this inequality and the corresponding one for F$(-z)$, we have

$$|\mathrm{S}_{2n+1}(x)-f(x)|<\mu\operatorname{cosec}\mu\,[|f(x+2\mu)-f(x)|+|f(x-2\mu)-f(x)|]$$
$$+\mathrm{A}/m\operatorname{cosec}\mu,$$

where A is some fixed number independent of m. In any interval (a, b) in which $f(x)$ is continuous, a value μ_1 of μ can be chosen such that, for every value of x in (a, b), $|f(x+2\mu)-f(x)|$, $|f(x-2\mu)-f(x)|$ are less than an arbitrarily prescribed positive number ϵ, provided $\mu=\mu_1$. Also a value μ_2 of μ can be so chosen that $\epsilon\mu_2\operatorname{cosec}\mu_2<\frac{1}{2}\eta$, where η is an arbitrarily assigned positive number. Take for μ the lesser of the numbers μ_1, μ_2, then $|\mathrm{S}_{2n+1}-f(x)|<\eta+\mathrm{A}/m\operatorname{cosec}\mu$ for every value of x in (a, b). It follows that, since η and m are independent of x, $|\mathrm{S}_{2n+1}-f(x)|<2\epsilon$, provided n is greater than some fixed value n_1 dependent only on ϵ. Therefore S_{2n+1} converges to $f(x)$ uniformly in the interval (a, b).

Case of a Function with Infinities.—The limitation that $f(x)$ must be numerically less than a fixed positive number throughout the interval may, under a certain restriction, be removed. Suppose F(z) is indefinitely great in the neighbourhood of the point $z=c$, and is such that the limits of the two integrals $\int_c^{c\pm\epsilon}\mathrm{F}(z)dz$ are both zero, as ϵ is indefinitely diminished, then

$\int_0^{\frac{\pi}{2}}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz$ denotes the limit when $\epsilon=0$, $\epsilon^1=0$ of $\int_0^{c-\epsilon}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz+\int_{c+\epsilon^1}^{\frac{\pi}{2}}\mathrm{F}(z)\frac{\sin mz}{\sin z}dz$, both these limits existing; the first of these integrals has $\frac{1}{2}\pi\mathrm{F}(+0)$ for its limiting value when m is indefinitely increased, and the second has zero for its limit. The theorem therefore holds if F(z) has an infinity up to which it is absolutely integrable; this will, for example, be the case if F(z) near the point C is of the form $\chi(z)\,(z-c)^{-\mu}+\psi(z)$, where $\chi(c)$, $\psi(c)$ are finite, and $0<\mu<1$. It is thus seen that $f(x)$ may have a finite number of infinities within the given interval, provided the function is integrable through any one of these points; the function is in that case still representable by Fourier's Series.

The Ultimate Values of the Coefficients in Fourier's Series.—If $f(x)$ is everywhere finite within the given interval $-\pi$ to $+\pi$, it can be shown that a_n, b_n, the coefficients of $\cos nx$, $\sin nx$ in the series which represent the function, are such that na_n, nb_n, however great n is, are each less than a fixed finite quantity. For writing $f(x)=f_1(x)-f_2(x)$, we have

$$\int_{-\pi}^{\pi} f_1(x)\cos nx dx=f_1(-\pi+0)\int_{-\pi}^{\xi}\cos nx dx+f_1(\pi-0)\int_{\xi}^{\pi}\cos nx dx$$

hence

$$\int_{-\pi}^{\pi} f_1(x)\cos nx dx=f_1(-\pi+0)\frac{\sin n\xi}{n}+f_1(\pi-0)\frac{\sin n\xi}{n}$$

with a similar expression, with $f_2(x)$ for $f_1(x)$, ξ being between π and $-\pi$; the result then follows at once, and is obtained similarly for the other coefficient.

If $f(x)$ is infinite at $x=c$, and is of the form $\frac{\phi(x)}{(x-c)^{\mathrm{K}}}$ near the point c, where $0<\mathrm{K}<1$, the integral $\int_{-\pi}^{\pi} f(x)\cos nx dx$ contains portions of the form $\int_{c}^{c+\epsilon}\frac{\phi(x)}{(x-c)^{\mathrm{K}}}\cos nx dx$ $\int_{c-\epsilon}^{c}\frac{\phi(x)}{(x-c)^{\mathrm{K}}}\cos nx dx$; consider the first of these, and put $x=c+u$, it thus becomes $\int_{0}^{\epsilon}\frac{\phi(c+u)}{u^{\mathrm{K}}}\cos n(c+u)du$, which is of the form $\phi(c+\theta\epsilon)\int_{0}^{\epsilon}\frac{\cos n(c+u)}{u^{\mathrm{K}}}du$; now let $nu=v$, the integral becomes

$$\phi(c+\theta\epsilon)\left\{\frac{\cos nc}{n^{1-\mathrm{K}}}\int_{0}^{n\epsilon}\frac{\cos v}{v^{\mathrm{K}}}dv-\frac{\sin nc}{n^{1-\mathrm{K}}}\int_{0}^{n\epsilon}\frac{\sin v}{v^{\mathrm{K}}}dv\right\};$$

hence $n^{1-\mathrm{K}}\int_{-\pi}^{\pi} f(x)\cos nx dx$ becomes, as n is definitely increased, of the form $\phi(c)\left\{\cos nc\int_{0}\frac{\cos v}{v^{\mathrm{K}}}dv-\sin nc\int_{0}^{\infty}\frac{\sin v}{v^{\mathrm{K}}}dv\right\}$ which is finite, both the integrals being convergent and of known value. The other integral has a similar property, and we infer that $n^{1-\mathrm{K}}a_n$, $n^{1-\mathrm{K}}b_n$ are less than fixed finite numbers.

The Differentiation of Fourier's Series.—If we assume that the differential coefficient of a function $f(x)$ represented by a Fourier's Series exists, that function $f'(x)$ is not necessarily representable by the series obtained by differentiating the terms of the Fourier's Series, such derived series being in fact not necessarily convergent. Stokes has obtained general formulae for finding the series which represent $f'(x)$, $f''(x)$—the successive differential coefficients of a limited function $f(x)$. As an example of such formulae, consider the sine series (1); $f(x)$ is represented by

$$\frac{2}{l}\Sigma\sin\frac{n\pi x}{l}\int_{0}^{l} f(x)\sin\frac{n\pi x}{l}dx;$$

on integration by parts we have $\int_{0}^{l} f(x)\sin\frac{n\pi x}{l}dx$

$$=\frac{l}{n\pi}\left[f(+0)\pm f(l-0)+\Sigma\cos\frac{n\pi a}{l}\{f(a+0)-f(a-0)\}\right]$$
$$+\frac{l}{n\pi}\int_{0}^{l} f'(x)\cos\frac{n\pi x}{l}dx$$

where a represent the points where $f(x)$ is discontinuous. Hence if $f(x)$ is represented by the series $\Sigma a_n\sin\frac{n\pi x}{l}$, and $f'(x)$ by the series $\Sigma b_n\cos\frac{n\pi x}{l}$, we have the relation

$$b_n=\frac{n\pi}{l}a_n-\frac{2}{l}\left[f(+0)\pm f(l-0)+\Sigma\cos\frac{n\pi a}{l}\{f(a+0)-f(a-0)\}\right]$$

hence only when the function is everywhere continuous, and $f(+0)$, $f(l-0)$ are both zero, is the series which represents $f'(x)$ obtained at once by differentiating that which represents $f(x)$. The form of the coefficient a_n discloses the discontinuities of the function and of its differential coefficients, for on continuing the integration by parts we find

$$a_n=\frac{2}{n\pi}\left[f(+0)\pm f(l-0)+\Sigma\cos\frac{n\pi a}{l}\{f(a+0)-f(a-0)\}\right]$$
$$+\frac{2l}{n^2\pi^2}\left[f'(+0)\pm f'(l-0)+\Sigma\sin\frac{n\pi\beta}{l}\{f'(\beta+0)-f'(\beta-0)\}\right]+\&c.$$

where β are the points at which $f'(x)$ is discontinuous.

HISTORY AND LITERATURE OF THE THEORY

The history of the theory of the representation of functions by series of sines and cosines is of great interest in connexion with the progressive development of the notion of an arbitrary function of a real variable, and of the peculiarities which such a function may possess; the modern views on the foundations of the infinitesimal calculus have been to a very considerable extent formed in this connexion (see FUNCTION). The representation of functions by these series was first considered in the 18th century, in connexion with the problem of a vibrating cord, and led to a controversy as to the possibility of such expansions. In a memoir published in 1747 (*Memoirs of the Academy of Berlin*, vol. iii.) D'Alembert showed that the ordinate y at any time t of a vibrating cord satisfies a differential equation of the form $\frac{\delta^2 y}{\delta t^2}=a^2\frac{\delta^2 y}{\delta x^2}$, where x is measured along the undisturbed length of the cord, and that with the ends of the cord of length l fixed, the appropriate solution is $y=f(at+x)-f(at-x)$, where f is a function such that $f(x)=f(x+2l)$; in another memoir in the same volume he seeks for functions which satisfy this condition. In the year 1748 (*Berlin Memoirs*, vol. iv.) Euler, in discussing the problem, gave $f(x)=\alpha\sin\frac{\pi x}{l}+\beta\sin\frac{2\pi x}{l}+\ldots$ as a particular solution, and maintained that every curve, whether regular or irregular, must be representable in this form. This was objected to by D'Alembert (1750) and also by Lagrange on the ground that irregular curves are inadmissible. D. Bernoulli (*Berlin Memoirs*, vol. ix., 1753) based a similar result to that of Euler on physical intuition; his method was criticized by Euler (1753). The question was then considered from a new point of view by Lagrange, in a memoir on the nature and propagation of sound (*Miscellanea Taurensia*, 1759; *Œuvres*, vol. i.), who, while criticizing Euler's method, considers a finite number of vibrating particles, and then makes the number of them infinite; he did not, however, quite fully carry out the determination of the coefficients in Bernoulli's Series. These mathematicians were hampered by the narrow conception of a function, in which it is regarded as necessarily continuous; a discontinuous function was considered only as a succession of several different functions. Thus the possibility of the expansion of a broken function was not generally admitted. The first cases in which rational functions are expressed in sines and cosines were given by Euler (*Subsidium calculi sinuum*, Novi Comm. Petrop., vol. v., 1754-1755), who obtained the formulae

$$\tfrac{1}{2}\phi=\sin\phi-\tfrac{1}{2}\sin 2\phi+\tfrac{1}{3}\sin 3\phi\ldots$$
$$\frac{\pi^2}{12}-\frac{\phi^2}{4}=\cos\phi-\tfrac{1}{4}\cos 2\phi+\tfrac{1}{9}\cos 3\phi\ldots$$

In a memoir presented to the Academy of St Petersburg in 1777, but not published until 1798, Euler gave the method afterwards used by Fourier, of determining the coefficients in the expansions; he remarked that if Φ is expansible in the form

$$\mathrm{A}+\mathrm{B}\cos\phi+\mathrm{C}\cos 2\phi+\ldots,\text{ then }\mathrm{A}=\frac{1}{\pi}\int_{0}^{\pi}\Phi d\phi,\ \mathrm{B}=\frac{2}{\pi}\int_{0}^{\pi}\Phi\cos\phi d\phi,\ \&c.$$

The second period in the development of the theory commenced in 1807, when Fourier communicated his first memoir on the Theory of Heat to the French Academy. His exposition of the present theory is contained in a memoir sent to the Academy in 1811, of which his great treatise the *Théorie analytique de la chaleur*, published in 1822, is, in the main, a reproduction. Fourier set himself to consider the representation of a function given graphically, and was the first fully to grasp the idea that a single function may consist of detached portions given arbitrarily by a graph. He had an accurate conception of the convergence of a series, and although he did not give a formally complete proof that a function with discontinuities is representable by the series, he indicated in particular cases the method of procedure afterwards carried out by Dirichlet. As an exposition of principles, Fourier's work is still worthy of careful perusal by all students of the subject. Poisson's treatment of the subject, which has been adopted in English works (see the *Journal de l'école polytechnique*, vol. xi., 1820, and vol. xii., 1823, and also his treatise, *Théorie de la chaleur*, 1835), depends upon the equality $\int_{-\pi}^{\pi} f(a)\frac{1-h^2}{1-2h\cos(x-a)+h^2}da$

$$=\frac{1}{2\pi}\int_{-\pi}^{\pi} f(a)da+\frac{1}{\pi}\Sigma h^n\int_{-\pi}^{\pi} f(a)\cos n(x-a)da$$

where $0<h<1$; the limit of the integral on the left-hand side is evaluated when $h=1$, and found to be $\tfrac{1}{2}\{f(x+0)+f(x-0)\}$, the series on the right-hand side becoming Fourier's Series. The equality of the two limits is then inferred. If the series is assumed to be convergent when $h=1$, by a theorem of Abel's its sum is continuous with the sum for values of h less than unity, but a proof of the convergency for $h=1$ is requisite for the validity of Poisson's proof; as Poisson gave no such proof of convergency, his proof of the general theorem cannot be accepted. The deficiency cannot be removed except by a process of the same nature as that afterwards applied by Dirichlet. The definite integral has been carefully studied by Schwarz (see two memoirs in his collected works on the integration of the equation $\frac{\delta^2 u}{\delta x^2}+\frac{\delta^2 u}{\delta y^2}=0$), who showed that the limiting value of the integral depends upon the manner in which the limit is approached. Investigations of Fourier's Series were also given by Cauchy (see his "Mémoire sur les développements des fonctions en séries périodiques," *Mém. de l'Inst.*, vol. vi., also *Œuvres complètes*, vol. vii.); his method, which depends upon a use of complex variables, was accepted, with some modification, as valid by Riemann, but one at least of his proofs is no longer regarded as satisfactory. The first completely satisfactory investigation is due to Dirichlet; his first memoir appeared in *Crelle's Journal* for 1829, and the second, which is a model of clearness, in Dove's *Repertorium der Physik*. Dirichlet laid down certain definite sufficient conditions in regard to the nature of a function which is expansible, and found under these conditions the limiting value of the sum of n terms of the series. Dirichlet's determination of the sum of the series at a point of discontinuity has been criticized by Schläfli (see *Crelle's Journal*, vol. lxxii.) and by Du Bois-Reymond (*Mathem. Annalen*, vol. vii.), who maintained that the sum is really indeterminate. Their objection appears, however, to rest upon a misapprehension as to the meaning of the sum of the series; if x_1 be the point of discontinuity, it is possible to make x approach x_1, and n become indefinitely great, so that the sum of the series takes any assigned value in a certain interval, whereas we ought to make $x=x_1$ first and afterwards $n=\infty$, and no other way of going to the double limit is really admissible. Other papers by Dircksen (*Crelle*, vol. iv.) and Bessel (*Astronomische Nachrichten*, vol. xvi.), on similar lines to those by Dirichlet, are of inferior importance. Many of the investigations subsequent to Dirichlet's have the object of freeing a function from some of the restrictions which were imposed upon it in Dirichlet's proof, but no complete set of necessary and sufficient conditions as to the nature of the function has been obtained. Lipschitz (" De explicatione per series trigonometricas," *Crelle's Journal*, vol. lxiii., 1864) showed that, under a certain condition, a function which has an infinite number of maxima and minima in the neighbourhood of a point is still expansible; his condition is that at the point of discontinuity β, $|f(\beta+\delta)-f(\beta)| < B\delta^{a}$ as δ converges to zero, B being a constant, and a a positive exponent. A somewhat wider condition is

$$\underset{\delta=0}{f(\beta+\delta)-f(\beta)\}\log\delta}=0,$$

for which Lipschitz's results would hold. This last condition is adopted by Dini in his treatise (*Sopra la serie di Fourier*, &c., Pisa, 1880).

The modern period in the theory was inaugurated by the publication by Riemann in 1867 of his very important memoir, written in 1854, *Über die Darstellbarkeit einer Function durch eine trigonometrische Reihe*. The first part of his memoir contains a historical account of the work of previous investigators; in the second part there is a discussion of the foundations of the Integral Calculus, and the third part is mainly devoted to a discussion of what can be inferred as to the nature of a function respecting the changes in its value for a continuous change in the variable, if the function is capable of representation by a trigonometrical series. Dirichlet and probably Riemann thought that all continuous functions were everywhere representable by the series; this view was refuted by Du Bois-Reymond (*Abh. der Bayer. Akad.* vol. xii. 2). It was shown by Riemann that the convergence or non-convergence of the series at a particular point x depends only upon the nature of the function in an arbitrarily small neighbourhood of the point x. The first to call attention to the importance of the theory of uniform convergence of series in connexion with Fourier's Series was Stokes, in his memoir " On the Critical Values of the Sums of Periodic Series " (*Camb. Phil. Trans.*, 1847; *Collected Papers*, vol. i.). As the method of determining the coefficients in a trigonometrical series is invalid unless the series converges in general uniformly, the question arose whether series with coefficients other than those of Fourier exist which represent arbitrary functions. Heine showed (*Crelle's Journal*, vol. lxxi., 1870, and in his treatise *Kugelfunctionen*, vol. i.) that Fourier's Series is in general uniformly convergent, and that if there is a uniformly convergent series which represents a function, it is the only one of the kind. G. Cantor then showed (*Crelle's Journal*, vols. lxxii. lxxiii.) that even if uniform convergence be not demanded, there can be but one convergent expansion for a function, and that it is that of Fourier. In the *Math. Ann.* vol. v., Cantor extended his investigation to functions having an infinite number of discontinuities. Important contributions to the theory of the series have been published by Du Bois-Reymond (*Abh. der Bayer. Akademie*, vol. xii., 18/5, two memoirs, also in *Crelle's Journal*, vols. lxxiv. lxxvi. lxxix.), by Kronecker (*Berliner Berichte*, 1885), by O. Hölder (*Berliner Berichte*, 1885), by Jordan (*Comptes rendus*, 1881, vol. xcii.), by Ascoli (*Math. Annal.*, 1873, and *Annali di matematica*, vol. vi.), and by Genocchi (*Atti della R. Acc. di Torino*, vol. x., 1875). Hamilton's memoir on " Fluctuating Functions " (*Trans. R.I.A.*, vol. xix., 1842) may also be studied with profit in this connexion. A memoir by Brodén (*Math. Annalen*, vol. lii.) contains a good investigation of some of the most recent results on the subject. The scope of Fourier's Series has been extended by Lebesgue, who introduced a conception of integration wider than that due to Riemann. Lebesgue's work on Fourier's Series will be found in his treatise, *Leçons sur les séries trigonométriques* (1906); also in a memoir, "Sur les séries trigonométriques," *Annales sc. de l'école normale supérieure*, series ii. vol. xx. (1903), and in a paper " Sur la convergence des séries de Fourier," *Math. Annalen*, vol. lxiv. (1905).

AUTHORITIES.—The foregoing historical account has been mainly drawn from A. Sachse's work, " Versuch einer Geschichte der Darstellung willkürlicher Functionen einer Variabeln durch trigonometrische Reihen," published in *Schlömilch's Zeitschrift für Mathematik*, Supp., vol. xxv. 1880, and from a paper by G. A. Gibson " On the History of the Fourier Series " (*Proc. Ed. Math. Soc.* vol. xi.). Reiff's *Geschichte der unendlichen Reihen* may also be consulted, and also the first part of Riemann's memoir referred to above. Besides Dini's treatise already referred to, there is a lucid treatment of the subejct from an elementary point of view in C. Neumann's treatise, *Über die nach Kreis-, Kugel- und Cylinder-Functionen fortschreitenden Entwickelungen*. Jordan's discussion of the subject in his *Cours d'analyse* is worthy of attention; an account of functions with limited variation is given in vol. i.; see also a paper by Study in the *Math. Annalen*, vol. xlvii. On the second mean-value theorem papers by Bonnet (*Brux. Mémoires*, vol. xxiii., 1849, *Lionville's Journal*, vol. xiv., 1849), by Du Bois-Reymond (*Crelle's Journal*, vol. lxxix., 1875), by Hankel (*Zeitschrift für Math. und Physik*, vol. xiv., 1869), by Meyer (*Math. Ann.*, vol. vi., 1872) and by Hölder (*Göttinger Anzeigen*, 1894) may be consulted; the most general form of the theorem has been given by Hobson (*Proc. London Math. Soc.*, Series II. vol. vii., 1909). On the theory of uniform convergence of series, a memoir by W. F. Osgood (*Amer. Journal of Math.* xix.) may be with advantage consulted. On the theory of series in general, in relation to the functions which they can represent, a memoir by Baire (*Annali di matematica*, Series III. vol. iii.) is of great importance. Bromwich's *Theory of Infinite Series* (1908) contains much information on the general theory of series. Bôcher's " Introduction to the Theory of Fourier's Series," *Annals of Math.*, Series II. vol. vii., 1906, will be found useful. See also Carslaw's *Introduction to the Theory of Fourier's Series and Integrals, and the Mathematical Theory of the Conduction of Heat* (1906). A full account of the theory will be found in Hobson's treatise *On the Theory of Functions of a Real Variable and on the Theory of Fourier's Series* (1907). (E. W. H.)

FOURMIES, a town of northern France, in the department of Nord, on an affluent of the Sambre, 39 m. S.E. of Valenciennes by rail. Pop. (1906) 13,308. It is one of the chief centres in France for wool combing and spinning, and produces a great variety of cloths. The glass-works of Fourmies date from 1599, and were the first established in the north of France. Iron is worked in the vicinity, and there are important forges and foundries. Enamel-ware is also manufactured. In 1891 labour troubles brought about military intervention and consequent bloodshed. A board of trade arbitration and a school of commerce and industry are among the public institutions.

FOURMONT, ÉTIENNE (1683–1745), French orientalist, was born at Herbelai, near Saint Denis, on the 23rd of June 1683. He studied at the Collège Mazarin, Paris, and afterwards in the Collège Montaigu, where his attention was attracted to Oriental languages. Shortly after leaving the college he published a *Traduction du commentaire du Rabbin Abraham Aben Esra sur l'ecclésiaste*. In 1711 Louis XIV. appointed Fourmont to assist a young Chinese, Hoan-ji, in compiling a Chinese grammar. Hoan-ji died in 1716, and it was not until 1737 that Fourmont published *Meditationes Sinicae* and in 1742 *Grammatica Sinica*. He also wrote *Réflexions critiques sur les histoires des anciens peuples* (1735), and several dissertations printed in the *Mémoires* of the Academy of Inscriptions. He became professor of Arabic in the Collège de France in 1715. In 1713 he was elected a member of the Academy of Inscriptions, in 1738 a member of the Royal Society of London, and in 1742 a member of that of Berlin. He died at Paris on the 19th of December 1745.

His brother, Michel Fourmont (1690–1746), was also a member of the Academy of Inscriptions, and professor of the Syriac language in the Royal College, and was sent by the government to copy inscriptions in Greece.

An account of Étienne Fourmont's life and a catalogue of his works will be found in the second edition (1747) of his *Réflexions critiques*.

FOURNET, JOSEPH JEAN BAPTISTE XAVIER (1801–1869), French geologist and metallurgist, was born at Strassburg on the 15th of May 1801. He was educated at the École des Mines at Paris, and after considerable experience as a mining engineer he was in 1834 appointed professor of geology at Lyons. He was a man of wide knowledge and extensive research, and wrote memoirs on chemical and mineralogical subjects, on eruptive rocks, on the structure of the Jura, the metamorphism of the Western Alps, on the formation of oolitic limestones, on kaolinization and on metalliferous veins. On metallurgical subjects also he was an acknowledged authority; and he published observations on the order of sulphurability of metals (*loi de Fournet*). He died at Lyons on the 8th of January 1869. His chief publications were: *Études sur les dépôts métallifères* (Paris, 1834); *Histoire de la dolomie* (Lyons, 1847); *De l'extension des terrains houillers* (1855); *Géologie lyonnaise* (Lyons, 1861).

FOURNIER, PIERRE SIMON (1712–1768), French engraver and typefounder, was born at Paris on the 15th of September 1712. He was the son of a printer, and was brought up to his father's business. After studying drawing under the painter

Colson, he practised for some time the art of wood-engraving, and ultimately turned his attention to the engraving and casting of types. He designed many new characters, and his foundry became celebrated not only in France, but in foreign countries. Not content with his practical achievements, he sought to stimulate public interest in his art by the production of various works on the subject. In 1737 he published his *Table des proportions qu'il faut observer entre les caractères*, which was followed by several other technical treatises. In 1758 he assailed the title of Gutenberg to the honour awarded him as inventor of printing, claiming it for Schöffer, in his *Dissertation sur l'origine et les progrès de l'art de graver en bois.* This gave rise to a controversy in which Schöpflin and Baer were his opponents. Fournier's contributions to this debate were collected and reprinted under the title of *Traités historiques et critiques sur l'origine de l'imprimerie.* His principal work, however, was the *Manuel typographique*, which appeared in 2 vols. 8vo in 1764, the first volume treating of engraving and type-founding, the second of printing, with examples of different alphabets. It was the author's design to complete the work in four volumes, but he did not live to execute it. He died at Paris on the 8th of October 1768.

FOURNIER L'HÉRITIER, CLAUDE (1745–1825), French revolutionist, called "l'Américain," was born at Auzon (Haute-Loire) on the 21st of December 1745, the son of a poor weaver. He went to America to seek his fortune, and started at San Domingo an establishment for making *tafia* (an inferior quality of rum), but lost his money in a fire. Returning to France he threw himself into the Revolution with enthusiasm, and specially distinguished himself by the active part he took in the organization of the popular armed force by means of which the most famous of the revolutionary *coups* were effected. His influence was principally manifested in the insurrections of the 5th and 6th of October 1789, the 17th of July 1791, and the 20th of June and the 10th of August 1792. He was on bad terms with the majority of the politicians, and particularly with Marat, and spent a great part of his time in prison, all the governments regarding him as an agitator and accusing him of inciting to insurrection. Arrested for the first time for trying to force an entrance into the club of the Cordeliers, from which he had been expelled, he was released, but was in prison from the 12th of December 1793 to the 21st of September 1794, and again from the 9th of March 1795 to the 26th of October 1795. After the attempt on the First Consul in the rue Sainte-Nicaise he was deported to Guiana, but was allowed to return to France in 1809. In 1811, while under surveillance at Auxerre, he was accused of having provoked an *émeute* against taxes known as the *droits réunis* (afterwards called *contributions indirectes*), and was imprisoned in the Château d'If, where he remained till 1814. On the second restoration of the Bourbons Fournier was confined for about nine months in the prison of La Force. After 1816 he was left unmolested, turned royalist, and passed his last years in importuning the Restoration government for compensation for his lost property in San Domingo. He died in obscurity.

For further details see preface to F. A. Aulard's edition of Fournier's *Mémoires secrets* (Paris, 1890), published by the Société de l'histoire de la Révolution.

FOURTOU, MARIE FRANÇOIS OSCAR BARDY DE (1836–1897), French politician, was born at Ribérac (Dordogne) on the 3rd of January 1836, and represented his native department in the National Assembly after the Franco-German War. There he proved a useful adherent to Thiers, who made him minister of public works in December 1872. He was minister of religion in the cabinet of May 18-24, 1873, being the only member of the Right included by Thiers in that short-lived ministry. As minister of education, religion and the fine arts in the reconstructed cabinet of the duc de Broglie he had used his administrative powers to further clerical ends, and as minister of the interior in Broglie's cabinet in 1877 he resumed the administrative methods of the Second Empire. With a well-known Bonapartist, Baron R. C. F. Reille, as his secretary, he replaced republican functionaries by Bonapartist partisans, reserving a few places for the Legitimists. In the general elections of that year he used the whole weight of officialdom to secure a majority for the Right, to support a clerical and reactionary programme. He accompanied Marshal MacMahon in his tour through southern France, and the presidential manifesto of September, stating that the president would rely solely on the Senate should the elections prove unfavourable, was generally attributed to Fourtou. In spite of these efforts the cabinet fell, and a commission was appointed to inquire into their unconstitutional abuse of power. Fourtou was unseated in consequence of the revelations made in the report of the commission. In the Chamber of Deputies Gambetta gave the lie direct to Fourtou's allegation that the republican party opposed every republican principle that was not antiquated. A duel was fought in consequence, but neither party was injured. He was re-elected to the chamber in 1879 and entered the Senate the next year. Failing to secure re-election to the Senate in 1885 he again entered the popular chamber as Legitimist candidate in 1889, but he took no further active part in politics. He died in Paris in 1897.

His works include *Histoire de Louis XVI* (1840); *Histoire de Saint Pie V* (1845); *Mme Swetchine, sa vie et ses œuvres* (2 vols., 1859); *La Question italienne* (1860); *De la contre-révolution* (1876); and *Mémoires d'un royaliste* (2 vols., 1888).

FOUSSA, or FOSSA, the native name of *Cryptoprocta ferox*, a somewhat cat-like or civet-like mammal peculiar to Madagascar, where it is the largest carnivorous animal. It is about twice the size of a cat (5 ft. from nose to end of tail), with short close fur of nearly uniform pale brown. Little is known of its habits, except that it is nocturnal, frequently attacks and carries off goats, and especially kids, and shows great ferocity when wounded, on which account it is much dreaded by the natives. An example lived in the London zoological gardens for nearly fourteen years. See CARNIVORA.

FOWEY (usually pronounced *Foy*), a seaport and market-town in the Bodmin parliamentary division of Cornwall, England, on the Great Western railway, 25 m. by sea W. of Plymouth. Pop. (1901) 2258. It lies on the west shore of the picturesque estuary of the river Fowey, close to the water's edge, and sheltered by a screen of hills. Its church of St Nicholas is said to have been built in the 14th century, on the site of a still older edifice dedicated to St Finbar of Cork. It has a fine tower and late Norman doorway. Within are a priest's chamber over the porch, a handsome oak ceiling, a 15th-century pulpit, and some curious monuments and brasses. Place House, adjacent to the church, is a highly ornate Tudor building. A few ancient houses remain in the town. Deep-sea fishing is carried on; but the staple trade consists in the export of china clay and minerals, coal being imported. Fowey harbour, which is easy of access in clear weather, will admit large vessels at any state of the tide. St Catherine's Fort, dating from the days of Henry VIII. and now ruined, stands at the harbour's mouth, and once formed the main defence of the town. Opposite the town, and connected with it by Bodeneck Ferry, is the village of Polruan. Its main features are St Saviour's Chapel, with an ancient rood-stone, and the remains of Hall House, which was garrisoned during the civil wars of the 17th century.

Fowey (Fawy, Vawy, Fowyk) held a leading position amongst Cornish ports from the reign of Edward I. to the days of the Tudors. The numerous references to the privateering exploits of its ships in the Patent and Close Rolls and the extraordinary number of them at the siege of Calais in 1346 alike testify to its importance. During this period the king's mandates were addressed to the bailiffs or to the mayor and bailiffs, and no charter of incorporation appears to have been granted until the reign of James II. Under the second charter of 1690 the common council consisted of a mayor and eight aldermen and these with a recorder elected the free burgesses. A member for Fowey and Looe was summoned to a council at Westminster in 1340, but from that date until 1571, when it was entrusted with the privilege of returning two members, it had no parliamentary representation. By the Reform Act of 1832 it lost both its members. It had ceased to exercise its municipal functions a few years previously. In 1316 the prior of Tywardreath, as lord of the manor, obtained the right to hold a Monday market and two fairs on the feasts of St Finbar and St Lucy, but by the charter of 1690 provision was made for a Saturday market and three fairs, on the 1st of May, 10th of September and Shrove Tuesday, and only these three continue to be held.

FOWL (Dan. *Fugl*, Ger. *Vogel*), a term originally used in the sense that bird[1] now is, but, except in composition,—as sea-fowl, wild-fowl and the like,—practically almost confined[2] at present to designate the otherwise nameless species which struts on our dunghills, gathers round our barn-doors, or stocks our poultry yards—the type of the genus *Gallus* of ornithologists, of which four well-marked species are known. The *first* of these is the red jungle-fowl of the greater part of India, *G. ferrugineus*,—called by many writers *G. bankiva*,—which is undoubtedly the parent stock of all the domestic races (cf. Darwin, *Animals and Plants under Domestication*, i. pp. 233-246). It inhabits northern India from Sind to Burma and Cochin China, as well as the Malay Peninsula and many of the islands as far as Timor, besides the Philippines. It occurs on the Himalayas up to the height of 4000 ft., and its southern limits in the west of India proper are, according to Jerdon, found on the Raj-peepla hills to the south of the Nerbudda, and in the east near the left bank of the Godavery, or perhaps even farther, as he had heard of its being killed at Cummum. This species resembles in plumage what is commonly known among poultry-fanciers as the "Black-breasted game" breed, and this is said to be especially the case with examples from the Malay countries, between which and examples from India some differences are observable—the latter having the plumage less red, the ear-lappets almost invariably white, and slate-coloured legs, while in the former the ear-lappets are crimson, like the comb and wattles, and the legs yellowish. If the Malayan birds be considered distinct, it is to them that the name *G. bankiva* properly applies. This species is said to be found in lofty forests and in dense thickets, as well as in ordinary bamboo-jungles, and when cultivated land is near its haunts, it may be seen in the fields after the crops are cut in straggling parties of from 10 to 20. The crow to which the cock gives utterance morning and evening is just like that of a bantam, never prolonged as in most domestic birds. The hen breeds from January to July, according to the locality; and lays from 8 to 12 creamy-white eggs, occasionally scraping together a few leaves or a little dry grass by way of a nest. The so-called *G. giganteus*, formerly taken by some ornithologists for a distinct species, is now regarded as a tame breed of *G. ferrugineus* or *bankiva*. The *second* good species is the grey jungle-fowl, *G. sonnerati*, whose range begins a little to the northward of the limits of the preceding, and it occupies the southern part of the Indian peninsula, without being found elsewhere. The cock has the end of the shaft of the neck-hackles dilated, forming a horny plate, like a drop of yellow sealing-wax. His call is very peculiar, being a broken and imperfect kind of crow, quite unlike that of *G. ferrugineus* and more like a cackle. The two species where their respective ranges overlap, occasionally interbreed in a wild state, and the present readily crosses in confinement with domestic poultry, but the hybrids are nearly always sterile. The *third* species is the Sinhalese jungle-fowl, *G. stanleyi* (the *G. lafayettii* of some authors), peculiar to Ceylon. This also greatly resembles in plumage some domestic birds, but the cock is red beneath, and has a yellow comb with a red edge and purplish-red cheeks and wattles. He has also a singularly different voice, his crow being dissyllabic. This bird crosses readily with tame hens, but the hybrids are believed to be infertile. The *fourth* species, *G. varius* (the *G. furcatus* of some authors), inhabits Java and the islands eastwards as far as Flores. This differs remarkably from the others in not possessing hackles, and in having a large unserrated comb of red and blue and only a single chin wattle. The predominance of green in its plumage is another easy mark of distinction. Hybrids between this species and domestic birds are often produced, but they are most commonly sterile. Some of them have been mistaken for distinct species, as those which have received the names of *G. aeneus* and *G. temmincki*.

Several circumstances seem to render it likely that fowls were first domesticated in Burma or the countries adjacent thereto, and it is the tradition of the Chinese that they received their poultry from the West about the year 1400 B.C. By the Institutes of Manu, the tame fowl is forbidden, though the wild is allowed to be eaten—showing that its domestication was accomplished when they were written. The bird is not mentioned in the Old Testament nor by Homer, though he has Ἀλέκτωρ (cock) as the name of a man, nor is it figured on ancient Egyptian monuments. Pindar mentions it, and Aristophanes calls it the Persian bird, thus indicating it to have been introduced to Greece through Persia, and it is figured on Babylonian cylinders between the 6th and 7th centuries B.C. It is sculptured on the Lycian marbles in the British Museum (*c.* 600 B.C.), and E. Blyth remarks (*Ibis*, 1867, p. 157) that it is there represented with the appearance of a true jungle-fowl, for none of the wild *Galli* have the upright bearing of the tame breed, but carry their tail in a drooping position. For further particulars of these breeds see POULTRY. (A. N.)

FOWLER, CHARLES (1792–1867), English architect, was born at Cullompton, Devon, on the 17th of May 1792. After serving an apprenticeship of five years at Exeter, he went to London in 1814, and entered the office of David Laing, where he remained till he commenced practice for himself. His first work of importance was the court of bankruptcy in Basinghall Street, finished in 1821. In the following year he gained the first premium for a design for the new London bridge, which, however, was ultimately built according to the design of another architect. Fowler's other designs for bridges include one constructed across the Dart at Totnes. He was also the architect for the markets of Covent Garden and Hungerford, the new market at Gravesend, and Exeter lower market, and besides several churches he designed Devon lunatic asylum (1845), the London fever hospital (1849), and the hall of the Wax Chandlers' Company, Gresham Street (1853). For some years he was honorary secretary of the institute of British architects, and he was afterwards created vice-president. He retired from his profession in 1853, and died at Great Marlow, Bucks, on the 26th of September 1867.

FOWLER, EDWARD (1632–1714), English divine, was born in 1632 at Westerleigh, Gloucestershire, and was educated at Corpus Christi College, Oxford, afterwards migrating to Trinity College, Cambridge. He was successively rector of Norhill, Bedfordshire (1656) and of All Hallows, Bread Street, London (1673), and in 1676 was elected a canon of Gloucester, his friend Henry More, the Cambridge Platonist, resigning in his favour. In 1681 he became vicar of St Giles, Cripplegate, but after four years was suspended for Whiggism. When the Declaration of Indulgence was published in 1687 he successfully influenced the London clergy against reading it. In 1691 he was consecrated bishop of Gloucester and held the see until his death on the 26th of August 1714. Fowler was suspected of Pelagian tendencies, and his earliest book was a *Free Discourse* in defence of *The Practices of Certain Moderate Divines called Latitudinarians* (1670). *The Design of Christianity*, published by him in the following year, in which he laid stress on the moral design of revelation, was criticized by Baxter in his *How far Holiness is the Design of Christianity* (1671) and by Bunyan in his *Defence of the Doctrine of Justification by Faith* (1672), the latter describing the *Design* as "a mixture of Popery, Socinianism and Quakerism," a horrid accusation to which Fowler replied in a scurrilous pamphlet entitled *Dirt Wip'd Off*. He also published, in 1693, *Twenty-Eight Propositions, by which the Doctrine of the Trinity is endeavoured to be explained*, challenging with some success the Socinian position.

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[1] *Bird* (cognate with *breed* and *brood*) was originally the young of any animal, and an early Act of the Scottish parliament speaks of "Wolf-birdis," *i.e.* Wolf-cubs.

[2] Like *Deer* (Dan. *Dyr.* Ger. *Tier*). *Beast*, too, with some men has almost attained as much specialization.

FOWLER, JOHN (1826–1864), English inventor, was born at Melksham, Wilts, on the 11th of July 1826. He learned practical engineering at Middlesborough-on-Tees, and about 1850 invented a mechanical system for the drainage of land. In 1852 he began experiments in steam cultivation, and in 1858 the Royal Agricultural Society awarded him the prize of £500 which it had offered for a steam-cultivator that should be an economic substitute for the plough or the spade. In 1860 he founded at Hunslet, Leeds, the firm of Fowler & Co., manufacturers of agricultural machinery, traction engines, &c. He died at Ackworth, Yorkshire, on the 4th of December 1864.

FOWLER, SIR JOHN (1817–1898), English civil engineer, was born on the 15th of July 1817 at Wadsley Hall, near Sheffield, where his father was a land-surveyor. At the age of sixteen he became a pupil of John Towlerton Leather, the engineer of the Sheffield water-works. The latter's uncle, George Leather, was engineer of the Great Aire and Calder Navigation Company, of the Goole Docks, and other similar works, and Fowler passed occasionally into his employment, in which he acquired a thorough knowledge of hydraulic engineering. The era of railway construction soon swept both Fowler and his employers into its service, and one of his first employments was to oppose the route of the Midland railway, chosen by the Stephensons, which left Sheffield on a branch line, and was therefore strongly resented by the inhabitants. The prestige of the Stephensons carried all before it, but in later life Sir John Fowler had the satisfaction of seeing the opposition of his clients justified, and Sheffield placed on the main line. In 1838 he went into the office of John Urpeth Rastrick, one of the leading railway engineers of the day, where he was employed in designing bridges for the line from London to Brighton, and also in surveying for railways in Lancashire. In 1839 he went as representative of Mr Leather to take charge of the construction of the Stockton & Hartlepool railway and remained as manager of the line after it was finished. In 1844 he began his independent career as an engineer, and from the first was largely employed, more particularly in laying out the small railway systems which eventually were amalgamated under the title of the Manchester, Sheffield & Lincolnshire. In the course of this work he designed a bridge known as Torksey Bridge, which was disallowed by the Board of Trade inspector, Captain (afterwards Field-Marshal Sir) Lintorn Simmons. The engineering profession espoused Fowler's side in the controversy which followed, and as a result the verdict of the Board of Trade was modified. The episode was the beginning of a warm friendship between these distinguished representatives of civil and military engineering. Fowler was engineer of the London Metropolitan railway, the pioneer of underground railways, and noteworthy in that it was mostly made not by tunnelling, but by excavating from the surface and then covering in the permanent way; and he lived to be one of the engineers officially connected with the deep tunnelling "tube" system extensively adopted for electric railways in London. He was also engaged in the making of railways in Ireland, and in 1867 he was selected by Disraeli to serve on a commission to advise the government in respect of a proposal for a state-purchase of the Irish railway system. He also carried out considerable works in relation to the Nene Valley drainage and the reclamation of land at the Norfolk estuary.

In 1865 he was elected president of the Institution of Civil Engineers, the youngest president who had ever sat in the chair. He was strongly opposed to the project of a Channel tunnel to France, and in 1872 he endeavoured to obtain the consent of parliament to a Channel ferry scheme, whereby trains were to be transported across the strait in large ferry steamers. The proposal involved the making of enlarged harbours at Dover and Audresselles on the French coast, and the bill, after passing the Commons, was thrown out by the casting vote of the chairman of a committee of the House of Lords. In 1875 he was enabled to render, in his private capacity, a signal service to the Italian government, which was much embarrassed by impracticable proposals pressed on it by Garibaldi for a rectification of the course of the Tiber and other engineering works. He had several interviews with the Italian patriot, and persuaded him of the impracticable nature of his plan, thereby obtaining for the government leisure to devise a more reasonable scheme. For eight years from 1871 he acted as general engineering adviser in Egypt to the Khedive Ismail. He projected a railway to the Sudan, and also the reparation of the barrage. These and many other plans came to an end owing to financial reasons. But the maps and surveys for the railway were given to the war office, and proved most useful to Lord Wolseley in his Nile expedition. For his service Fowler was made K.C.M.G. (1885). He was created a baronet in 1890 on the completion of the Forth bridge, of which with his partner Sir Benjamin Baker he was joint engineer. He died at Bournemouth on the 20th of November 1898.

FOWLER, WILLIAM (*c.* 1560–1614), Scottish poet, was born about the year 1560. He attended St Leonard's college, St Andrews, between 1574 and 1578, and in 1581 he was in Paris studying civil law. In 1581 he issued a pamphlet against John Hamilton and other Catholics, who had, he said, driven him from his country. He subsequently (about ?1590) became private secretary and Master of Requests to Anne of Denmark, wife of James VI., and was renominated to these offices when the queen went to England. In 1609 his services were rewarded by a grant of 2000 acres in Ulster. His sister Susannah Fowler married Sir John Drummond, and was mother of the poet William Drummond of Hawthornden. On the title-page of *The Triumphs of Petrarke*, Fowler styles himself "P. of Hawick," which has been held to mean that he was parson of Hawick, but this is doubtful. A MS. collection of seventy-two sonnets, entitled *The Tarantula of Love*, and a translation (1587) from the Italian of the *Triumphs of Petrarke* are preserved in the library of the university of Edinburgh, in the collection bequeathed by his nephew, William Drummond. Two other volumes of his manuscript notes, scrolls of poems, &c., are preserved among the Drummond MSS., now in the library of the Society of Antiquaries of Scotland. Specimens of Fowler's verses were published in 1803 by John Leyden in his *Scottish Descriptive Poems*. Fowler contributed a prefatory sonnet to James VI.'s *Furies*; and James, in return, commended, in verse, Fowler's *Triumphs*.

FOX, CHARLES JAMES (1749–1806), British statesman and orator, was the third son of Henry Fox, 1st Lord Holland, and his wife, Lady Caroline Lennox, eldest daughter of Charles Lennox, 2nd duke of Richmond. He was born at 9 Conduit Street, Westminster, on the 24th of January 1749. The father, who treated his children with extreme indulgence, allowed him to choose his school, and he elected to go to one kept at Wandsworth by a French refugee, named Pampelonne. In a very short time he asked to be sent to Eton, where he went in 1757. At Eton he did no more work than was acceptable to him, but he had an inborn love of literature, and he laid the foundation of that knowledge of the classic languages which in after years was the delight of his life. The vehemence of his temper was controlled by an affectionate disposition. When quite a boy he checked his own tendency to fits of passion on learning that his father trusted him to cure his defects.

That he learnt anything, and that he grew up an amiable and magnanimous man, were solely due to his natural worth, for no one ever owed less to education or to family example. The relations of Lord Holland to his sons would be difficult to parallel. He not only treated them, and in particular Charles, as friends and companions in pleasure from the first, but he did his best to encourage them in dissipation. In 1763 he took Charles for a tour on the continent, introduced him to the most immoral society of the time and gave him money with which to gamble. The boy came back to Eton a precocious rake. It was his good fortune that he did go back, for he was subjected to a wholesome course of ridicule by the other boys, and was flogged by Dr Barnard, the headmaster. In 1764 Charles proceeded to Hertford College, Oxford. At Oxford, as at Eton, he read literature from natural liking, and he paid some attention to mathematics. His often quoted saying that he found mathematics entertaining was probably meant as a jest at the expense of Sir G. Macartney, to whom he was writing, and who was known to maintain that it was useless. His own account of his school and college training, given in a letter to the same correspondent (6th August 1767), is: "I employed almost my whole time at Oxford in the mathematical and classical knowledge, but more particularly in the latter, so that I understand Latin and Greek tolerably well. I am totally ignorant in every part of useful knowledge. I am more convinced every day how little advantage there is in being what at school and the university is called a good scholar: one receives a good deal of amusement from it, but that is all. At present I read nothing but Italian, which I am immoderately fond of, particularly of the poetry. . . . As for French, I am far from being so thorough a master of it as I could wish, but I know so much of it that I could perfect myself in it at any time with very little trouble, especially if I pass three or four months in France." The passage is characteristic. It shows at once his love of good literature and his thoroughness. Fox's youth was disorderly, but it was never indolent. He was incapable of half doing anything which he did at all. He did perfect himself in French, and he showed no less determination to master mere sports. At a later period when he had grown fat he accounted for his skill in taking "cut balls" at tennis by saying that he was a very "painstaking man." He was all his life a great and steady walker.

The disorders of his early years were notorious, and were a common subject of gossip. In the spring of 1767 he left Oxford and joined his father on the continent during a tour in France and Italy. In 1768 Lord Holland bought the pocket borough of Midhurst for him, and he entered on his parliamentary career, and on London society, in 1769. Within the next few years Lord Holland reaped to the full the reward for all that was good, and whatever was evil, in the training he had given his son. The affection of Charles Fox for his father was unbounded, but the passion for gambling which had been instilled in him as a boy proved the ruin of the family fortune. He kept racehorses, and bet on them largely. On the racecourse he was successful, and it is another proof of his native thoroughness that he gained a reputation as a handicapper. It is said that he won more than he lost on the course. At the gambling table he was unfortunate, and there can be little question that he was fleeced both in London and in Paris by unscrupulous players of his own social rank, who took advantage of his generosity and whose worthlessness he knew. In the ardour of his passion Fox took his losses and their consequences with an attractive gaiety. He called the room in which he did business with the Jew moneylenders his "Jerusalem chamber." When his elder brother had a son, and his prospects were injured, he said that the boy was a second Messiah, who had appeared for the destruction of the Jews. "He had his jest, and they had his estate." In 1774 Lord Holland had to find £140,000 to pay the gambling debts of his sons. For years Charles lived in pecuniary embarrassment, and during his later years, when he had given up gambling, he was supported by the contributions of wealthy friends, who in 1793 formed a fund of £70,000 for his benefit.

His public career did not supply him with a check on habits of dissipation in the shape of the responsibilities of office. He began, as was to be expected in his father's son, by supporting the court; and in 1770, when only twenty-one, he was appointed a junior lord of the admiralty with Lord North. During the violent conflict over the Middlesex election (see WILKES, JOHN) he took the unpopular side, and vehemently asserted the right of the House of Commons to exclude Wilkes. In 1772 during the proceedings against Crosby and Oliver—a part of the "Wilkes and liberty" agitation—he and Lord North were attacked by a mob and rolled in the mud. But Fox's character was incompatible with ministerial service under King George III. The king, himself a man of orderly life, detested him as a gambler and a rake. And Fox was too independent to please a master who expected obedience. In February 1772 he threw up his place to be free to oppose the Royal Marriage Act, on which the king's heart was set. He returned to office as junior lord of the treasury in December. But he was insubordinate; his sympathy with the American colonies, which were now beginning to resist the claims of the mother country to tax them, made him intolerable to the king and he was dismissed in February 1774. The death of his father on the 1st of July of that year removed an influence which tended to keep him subordinate to the court, and his friendship for Burke drew him into close alliance with the Rockingham Whigs. From the first his ability had won him admiration in the House of Commons. He had prepared to distinguish himself as an orator by the elaborate cultivation of his voice, which was naturally harsh and shrill. His argumentative force was recognized at once, but the full scope of his powers was first shown on the 2nd of February 1775, when he spoke on the disputes with the colonies. The speech is unfortunately lost, but Gibbon, who heard it, told his friend Holroyd (afterwards Earl of Sheffield) that Fox, "taking the vast compass of the question before us, discovered powers for regular debate which neither his friends hoped nor his enemies dreaded."

His great political career dates from that day. It is unique among the careers of British statesmen of the first rank, for it was passed almost wholly in opposition. Except for a few months in 1782 and 1783, and again for a few months before his death in 1806, he was out of office. If he was absolutely sincere in the statement he made to his friend Fitzpatrick, in a letter of the 3rd of February 1778, his life was all he could have wished. "I am," he wrote, "certainly ambitious by nature, but I really have, or think I have, totally subdued that passion. I have still as much vanity as ever, which is a happier passion by far, because great reputation I think I may acquire and keep, great situation I never can acquire, nor if acquired keep, without making sacrifices that I never will make." His words show that he judged himself and read the future accurately. Yet it was certainly a cause of bitter disappointment to him that he had to stand by while the country was in his opinion not only misgoverned, but led to ruin. His reputation as an orator and a political critic, which was great from the first and grew as he lived, most assuredly did not console him for his impotence as a statesman. Of the causes which rendered his brilliant capacity useless for the purpose of obtaining practical success the most important, perhaps the only one of real importance, was his personal character. Lord John Russell (afterwards Earl Russell), his friendly biographer, has to confess that Fox might have joined in the confession of Mirabeau: "The public cause suffers for the immoralities of my youth." His reputation as a rake and gambler was so well established at the very beginning of his career that when he was dismissed from office in 1774 there was a general belief among the vulgar that he had been detected in actual theft. His perfect openness, the notoriety of his bankruptcies and of the seizure of his books and furniture in execution, kept him before the world as a model of dissipation. In 1776, when he was leading the resistance to Lord North's colonial policy, he "neither abandoned gaming nor his rakish life. He was seldom in bed before five in the morning nor out of it before two at noon." At the most important crisis of his life in 1783, he almost made an ostentation of disorder and of indifference not only to appearances, but even to decency. Horace Walpole has drawn a picture of him at that time which Lord Holland, Fox's beloved and admiring nephew, speaking from his early recollections of his uncle, confesses has "some justification." Coming from such an authority the certificate may be held to confirm the substantial accuracy of Walpole. "Fox lodged in St James's Street, and as soon as he rose, which was very late, had a levée of his followers and of the gaming club at Brooks's—all his disciples. His bristly black person, and shagged breast quite open and rarely purified by any ablutions, was wrapped in a foul linen nightgown and his bushy hair dishevelled. In these cynic weeds and with Epicurean good humour did he dictate his politics, and in this school did the heir of the empire attend his lessons and imbibe them." That this cynic manner, and Epicurean speech, were only the outside of a manly and generous nature was well known to the personal friends of Fox, and is now universally allowed. But by the bulk of his contemporaries, who could not fail to see the weaknesses he ostentatiously displayed, Fox was, not unnaturally, suspected as being immoral and untrustworthy. Therefore when he came into collision with the will of the king he failed to secure the confidence of the nation which was his only support. Nor ought any critical admirer of Fox to deny that George III. was not wholly wrong when he said that the great orator "was totally destitute of discretion and sound judgment." Fox made many mistakes, due in some cases to vehemence of temperament, and in others only to be ascribed to want of sagacity. That he fought unpopular causes is a very insufficient explanation of his failure as a practical statesman. He could have profited by the reaction which followed popular excitement but for his bad reputation and his want of discretion.

During the eight years between his expulsion from office in 1774 and the fall of Lord North's ministry in March 1782 he may indeed be said to have done one very great thing in politics. He planted the seed of the modern Liberal party as opposed to the pure Whigs. In political allegiance he became a member of the Rockingham party and worked in alliance with the marquis and with Burke, whose influence on him was great. In opposing the attempt to coerce the American colonists, and in assailing the waste and corruption of Lord North's administration, as well as the undue influence of the crown, he was at one with the Rockingham Whigs. During the agitation against corruption, and in favour of honest management of the public money, which was very strong between 1779 and 1782, he and they worked heartily together. It had a considerable effect, and prepared the way for the reforms begun by Burke and continued by Pitt. But if Fox learnt much from Burke he learnt with originality. He declined to accept the revolution settlement as final, or to think with Burke that the constitution of the House of Commons could not be bettered. Fox acquired the conviction that, if the House was to be made an efficient instrument for restraining the interference of the king and for securing good government, it must cease to be filled to a very large extent by the nominees of boroughmongers and the treasury. He became a strong advocate for parliamentary reform. In all ways he was the ardent advocate of what have in later times been known as "Liberal causes," the removal of all religious disabilities and tests, the suppression of private interests which hampered the public good, the abolition of the slave trade, and the emancipation of all classes and races of men from the strict control of authority.

A detailed account of his activity from 1774 to 1782 would entail the mention of every crisis of the American War of Independence and of every serious debate in parliament. Throughout the struggle Fox was uniformly opposed to the coercion of the colonies and was the untiring critic of Lord North. While the result must be held to prove that he was right, he prepared future difficulties for himself by the fury of his language. He was the last man in the world to act on the worldly-wise maxim that an enemy should always be treated as if he may one day be a friend, and a friend as if he might become an enemy. On the 29th of November 1779 Fox was wounded in a duel with Mr William Adam, a supporter of Lord North's whom he had savagely denounced. He assailed Lord North with unmeasured invective, directed not only at his policy but at his personal character, though he well knew that the prime minister was an amiable though pliable man, who remained in office against his own wish, in deference to the king who appealed to his loyalty. When the disasters of the American war had at last made a change of ministry necessary, and the king applied to the Whigs, through the intermediary of Lord Shelburne, Fox made a very serious mistake in persuading the marquess of Rockingham not to insist on dealing directly with the sovereign. The result was the formation of a cabinet belonging, in Fox's own words, partly to the king and partly to the country—that is to say, partly of Whigs who wished to restrain the king, and partly of the king's friends, represented by Lord Shelburne, whose real function was to baffle the Whigs. Dissensions began from the first, and were peculiarly acute between Shelburne and Fox, the two secretaries of state. The old division of duties by which the southern secretary had the correspondence with the colonies and the western powers of Europe, and the northern secretary with the others, had been abolished on the formation of the Rockingham cabinet. All foreign affairs were entrusted to Fox. Lord Shelburne meddled in the negotiations for the peace at Paris. He also persuaded his colleagues to grant some rather scandalous pensions, and Fox's acquiescence in this abuse after his recent agitation against Lord North's waste did him injury. When the marquess of Rockingham died on the 1st of July 1782, and the king offered the premiership to Shelburne, Fox resigned, and was followed by a part of the Rockingham Whigs.

In refusing to serve under Shelburne he was undoubtedly consistent, but his next step was ruinous to himself and his party. On the 14th of February 1783 he formed a coalition with Lord North, based as they declared on "mutual goodwill and confidence." Plausible excuses were made for the alliance, but to the country at large this union, formed with a man whom he had denounced for years, had the appearance of an unscrupulous conspiracy to obtain office on any terms. In the House of Commons the coalition was strong enough to drive Shelburne from office on the 24th of February. The king made a prolonged resistance to the pressure put on him to accept Fox and North as his ministers (see PITT, WILLIAM). On the 2nd of April he was constrained to submit to the formation of a new ministry, in which the duke of Portland was prime minister and Fox and North were secretaries of state. The new administration was ill liked by some of the followers of both. Fox increased its unpopularity both in the House and in the country by consenting against the wish of most of his colleagues to ask for the grant of a sum of £100,000 a year to the prince of Wales. The act had the appearance of a deliberate offence to the king, who was on bad terms with his son. The magnitude of the sum, and his acquiescence in the grant of pensions by the Shelburne ministry, convinced the country that his zeal for economy was hypocritical. The introduction of the India Bill in November 1783 alarmed many vested interests, and offended the king by the provision which gave the patronage of India to a commission to be named by the ministry and removable only by parliament. The coalition, and Fox in particular, were assailed in a torrent of most telling invective and caricature. Encouraged by the growing unpopularity of his ministers, George III. gave it to be understood that he would not look upon any member of the House of Lords who voted for the India Bill as his friend. The bill was thrown out in the upper House on the 17th of December, and next day the king dismissed his ministers.

Fox now went into opposition again. The remainder of his life may be divided into four portions—his opposition to Pitt during the session of 1784; his parliamentary activity till his secession in 1797; his retirement till 1800; his return to activity and his short tenure of office before his death in 1806. During the first of these periods he deepened his unpopularity by assailing the undoubted prerogatives of the crown, by claiming for the House of Commons the right to override not only the king and the Lords but the opinion of the country, and by resisting a dissolution. This last pretension came very ill from a statesman who in 1780 had advocated yearly elections. He lost ground daily before the steady good judgment and unblemished character of Pitt. When parliament was dissolved at the end of the session of 1784, the country showed its sentiments by unseating 180 of the followers of Fox and North. Immense harm was done to both by the publication of a book called *The Beauties of Fox, North and Burke*, a compilation of their abuse of one another in recent years.

Fox himself was elected for Westminster with fewer votes than Admiral Lord Hood, but with a majority over the ministerial candidate, Sir Cecil Wray. The election was marked by an amazing outflow of caricatures and squibs, by weeks of rioting in which Lord Hood's sailors fought pitched battles in St James's Street with Fox's hackney coachmen, and by the intrepid canvassing of Whig ladies. The beautiful duchess of Devonshire

(Georgiana Spencer) is said to have won at least one vote for Fox by kissing a shoemaker who had a romantic idea of what constituted a desirable bribe. The high bailiff refused to make a return, and the confirmation of Fox's election was delayed by the somewhat mean action of the ministry. He had, however, been chosen for Kirkwall, and could fight his cause in the House. In the end he recovered damages from the high bailiff. In his place in parliament he sometimes supported Pitt and sometimes opposed him with effect. His criticism on the ministers' bill for the government of India was sound in principle, though the evils he foresaw did not arise. Little excuse can be made for his opposition to Pitt's commercial policy towards Ireland. But as Fox on this occasion aided the vested interests of some English manufacturers he secured a certain revival of popularity. His support of Pitt's Reform Bill was qualified by a just dislike of the ministers' proposal to treat the possession of the franchise by a constituency as a property and not as a trust. His unsuccessful opposition to the commercial treaty with France in 1787 was unwise and most injurious to himself. He committed himself to the proposition that France was the natural enemy of Great Britain, a saying often quoted against him in coming years. It has been excused on the ground that when he said France he meant the aggressive house of Bourbon. A statesman whose words have to be interpreted by an esoteric meaning cannot fairly complain if he is often misunderstood. In 1788 he travelled in Italy, but returned in haste on hearing of the illness of the king. Fox supported the claim of the prince of Wales to the regency as a right, a doctrine which provoked Pitt into declaring that he would "unwhig the gentleman for the rest of his life." The friendship between him and the prince of Wales (see George IV.) was always injurious to Fox. In 1787 he was misled by the prince's ambiguous assurances into denying the marriage with Mrs Fitzherbert. On discovering that he had been deceived he broke off all relations with the prince for a year, but their alliance was renewed. During these years he was always in favour of whatever measures could be described as favourable to emancipation and to humanity. He actively promoted the impeachment of Warren Hastings, which had the support of Pitt. He was always in favour of the abolition of the slave trade (which he actually effected during his short tenure of office in 1806), of the repeal of the Test Acts, and of concessions to the Roman Catholics, both in Great Britain and in Ireland.

The French Revolution affected Fox profoundly. Together with almost all his countrymen he welcomed the meeting of the states-general in 1789 as the downfall of a despotism hostile to Great Britain. But when the development of the Revolution caused a general reaction, he adhered stoutly to his opinion that the Revolution was essentially just and ought not to be condemned for its errors or even for its crimes. As a natural consequence he was the steady opponent of Pitt's foreign policy, which he condemned as a species of crusade against freedom in the interest of despotism. Between 1790 and 1800 his unpopularity reached its height. He was left almost alone in parliament, and was denounced as the enemy of his country. On the 6th of May 1791 occurred the painful scene in the House of Commons, in which Burke renounced his friendship. In 1792 there was some vague talk of a coalition between him and Pitt, which came to nothing. It should be noted that the scene with Burke took place in the course of the debate on the Quebec Bill, in which Fox displayed real statesmanship by criticizing the division of Upper from Lower Canada, and other provisions of the bill, which in the end proved so injurious as to be unworkable. In this year he carried the Libel Bill. In 1792 his ally, the duke of Portland, and most of his party left him. In 1797 he withdrew from parliament, and only came forward in 1798 to reaffirm the doctrine of the sovereignty of the people at a great Whig dinner. On the 9th of May he was dismissed from the privy council.

The interval of secession was perhaps the happiest in his life. In 1783 he formed a connexion with Elizabeth Bridget Cane, commonly known as Mrs Armstead or Armistead, an amiable and well-mannered woman to whom he was passionately attached. In company with her he established himself at St Anne's Hill near Chertsey in Surrey. In 1795 he married her privately, but did not avow his marriage till 1802. In his letters he spoke of her always as Mrs Armistead, and some of his friends—Mr Coke of Holkham, afterwards Lord Leicester, with whom he stayed every year, being one of them—would not invite her to their houses. It is hard to explain this solitary instance of shabby conduct in a thoroughly generous man towards a person to whom he was unalterably attached and who fully deserved his affection. Fox's time at St Anne's was largely spent in gardening, in the enjoyment of the country, and in correspondence on literary subjects with his nephew, the 3rd Lord Holland, and with Gilbert Wakefield, the editor of Euripides. His letters show that he had a very sincere love for, and an enlightened appreciation of, good literature. Greek and Italian were his first favourites, but he was well read in English literature and in French, and acquired some knowledge of Spanish. His favourite authors were Euripides, Virgil and Racine, whom he defends against the stock criticisms of the admirers of Corneille with equal zeal and insight.

Fox reappeared in parliament to take part in the vote of censure on ministers for declining Napoleon's overtures for a peace. The fall of Pitt's first ministry and the formation of the Addington cabinet, the peace of Amiens, and the establishment of Napoleon as first consul with all the powers of a military despot, seemed to offer Fox a chance of resuming power in public life. The struggle with Jacobinism was over, and he could have no hesitation in supporting resistance to a successful general who ruled by the sword, and who pursued a policy of perpetual aggression. During 1802 he visited Paris in company with his wife. An account of his journey was published in 1811 by his secretary, Mr Trotter, in an otherwise poor book of reminiscence. It gives an attractive picture of Fox's good-humour, and of his enjoyment of the "species of minor comedy which is constantly exhibited in common life." His main purpose in visiting Paris was to superintend the transcription of the correspondence of Barillon, which he needed for his proposed life of James II. The book was never finished, but the fragment he completed was published in 1808, and was translated into French by Armand Carrel in 1846. Fox was not favourably impressed by Napoleon. He saw a good deal of French society, and was himself much admired for his hearty defence of his rival Pitt against a foolish charge of encouraging plots for Napoleon's assassination. On his return he resumed his regular attendance in the House of Commons. The history of the renewal of the war, of the fall of Addington's ministry, and of the formation of Pitt's second administration is so fully dealt with in the article on Pitt (*q.v.*) that it need not be repeated here.

The death of Pitt left Fox so manifestly the foremost man in public life that the king could no longer hope to exclude him from office. The formation of a ministry was entrusted by the king to Lord Grenville, but when he named Fox as his proposed secretary of state for foreign affairs George III. accepted him without demur. Indeed his hostility seems to a large extent to have died out. A long period of office might now have appeared to lie before Fox, but his health was undermined. Had he lived it may be considered as certain that the war with Napoleon would have been conducted with a vigour which was much wanting during the next few years. In domestic politics Fox had no time to do more than insist on the abolition of the slave trade. He, like Pitt, was compelled to bow to the king's invincible determination not to allow the emancipation of the Roman Catholics. When a French adventurer calling himself Guillet de la Gevrillière, whom Fox at first "did the honour to take for a spy," came to him with a scheme for the murder of Napoleon, he sent a warning on the 20th of February to Talleyrand. The incident gave him an opportunity for reopening negotiations for peace. A correspondence ensued, and British envoys were sent to Paris. But Fox was soon convinced that the French ministers were playing a false game. He was resolved not to treat apart from Russia, then the ally of Great Britain, nor to consent to the surrender of Sicily, which Napoleon insisted upon, unless full compensation could be obtained for King Ferdinand. The later stages of the negotiation were not directed by Fox, but by colleagues who took over his work at the foreign office when his health began to fail in the summer of 1806. He showed symptoms of dropsy, and operations only procured him temporary relief. After carrying his motion for the abolition of the slave trade on the 10th of June, he was forced to give up attendance in parliament, and he died in the house of the duke of Devonshire, at Chiswick, on the 13th of September 1806. His wife survived him till the 8th of July 1842. No children were born of the marriage. Fox is buried in Westminster Abbey by the side of Pitt.

The striking personal appearance of Fox has been rendered very familiar by portraits and by innumerable caricatures. The latter were no doubt deliberately exaggerated, and yet a comparison between the head of Fox in Sayer's plate "Carlo Khan's triumphal entry into Leadenhall," and in Abbot's portrait, shows that the caricaturist did not depart from the original. Fox was twice painted by Sir Joshua Reynolds, once when young in a group with Lady Sarah Bunbury and Lady Susan Strangeways, and once at full length. A half-length portrait by the German painter, Karl Anton Hickel, is in the National Portrait Gallery, where there is also a terra-cotta bust by Nollekens.

AUTHORITIES.—The materials for a life of Fox were first collected by his nephew, Lord Holland, and were then revised and rearranged by Mr Allen and Lord John Russell. These materials appear as *Memoirs and Correspondence of C. J. Fox* (London, 1853–1857). On them Lord John Russell based his *Life and Times of C. J. Fox* (London, 1859–1866); Sir G. O. Trevelyan's *Early History of C. J. Fox* (London. 1880) brings new evidence; *Charles James Fox, a Political Study*, by J. L. Le B. Hammond (London, 1903), is a series of studies written by an extreme admirer. His *Speeches* were collected and published in 1815. The newspaper articles (*e.g.* in *The Times*) published on the occasion of the centenary of his death contain interesting appreciations. See also Lloyd Sanders, *The Holland House Circle* (1908). (D. H.)

FOX, EDWARD (*c.* 1496–1538), bishop of Hereford, was born about 1496 at Dursley in Gloucestershire; he is said on very doubtful authority to have been related to Richard Fox (*q.v.*). From Eton he proceeded to King's College, Cambridge, and after graduating was made secretary to Wolsey. In 1528 he was sent with Gardiner to Rome to obtain from Clement VII. a decretal commission for the trial and decision of the case between Henry VIII. and Catherine of Aragon. On his return he was elected provost of King's College, and in August 1529 was the means of conveying to the king Cranmer's historic advice that he should apply to the universities of Europe rather than to the pope. This introduction led eventually to Cranmer's promotion over Fox's head to the archbishopric of Canterbury. After a brief mission to Paris in October 1529, Fox in January 1530 befriended Latimer at Cambridge and took an active part in persuading that university and Oxford to decide in the king's favour. He was sent to employ similar methods of persuasion at the French universities in 1530–1531, and was also engaged in negotiating a closer league between England and France. In April 1533 he was prolocutor of convocation when it decided against the validity of Henry's marriage with Catherine, and in 1534 published his treatise *De vera differentia regiae potestatis et ecclesiae* (second ed. 1538, English transl. 1548). Various ecclesiastical preferments were now granted him, including the archdeaconry of Leicester (1531) and the bishopric of Hereford (1535). In 1535–1536 he was sent to Germany to discuss the basis of a political and theological understanding with the Lutheran princes and divines, and had several interviews with Luther, who could not be persuaded of the justice of Henry VIII.'s divorce. The principal result of the mission was the Wittenberg articles of 1536, which had no slight influence on the English Ten Articles of the same year. Bucer dedicated to him in 1536 his *Commentaries on the Gospels*, and Fox's Protestantism was also illustrated by his patronage of Alexander Aless, whom he defended before Convocation. Fox is credited with the authorship of several proverbial sayings, such as "the surest way to peace is a constant preparedness for war" and "time and I will challenge any two in the world." The former at any rate is only a variation of the Latin *si vis pacem, para bellum*, and probably the latter is not more original in Fox than in Philip II., to whom it is usually ascribed. Fox died on the 8th of May 1538 and was buried in the church of St Mary Mounthaw, London. His chief distinction is perhaps that he was the most Lutheran of Henry VIII.'s bishops, and was largely responsible for the Ten Articles of 1536.

See *Letters and Papers of Henry VIII.*, vols. iv.-xiv.; Cooper's *Athenae Cantabrigienses*; *Dict. Nat. Biogr.*; R. W. Dixon's *Church History*; G. Mentz, *Die Wittenberger Artikel von 1536* (1905). (A. F. P.)

FOX, GEORGE (1624–1691), the founder of the "Society of Friends" or "Quakers," was born at Drayton, Leicestershire, in July 1624. His father, Christopher Fox, called by the neighbours "Righteous Christer," was a weaver by occupation; and his mother, Mary Lago, "an upright woman and accomplished above most of her degree," was "of the stock of the martyrs." George from his childhood "appeared of another frame than the rest of his brethren, being more religious, inward, still, solid and observing beyond his years"; and he himself declares: "When I came to eleven years of age I knew pureness and righteousness; for while a child I was taught how to walk to be kept pure." Some of his relations wished that he should be educated for the ministry; but his father apprenticed him to a shoemaker, who also dealt in wool and cattle. In this service he remained till his nineteenth year. According to Penn, "he took most delight in sheep," but he himself simply says: "A good deal went through my hands. . . . People had generally a love to me for my innocency and honesty." In 1643, being upon business at a fair, and having accompanied some friends to the village public-house, he was troubled by a proposal to "drink healths," and withdrew in grief of spirit. "When I had done what business I had to do I returned home, but did not go to bed that night, nor could I sleep, but sometimes walked up and down, and sometimes prayed and cried to the Lord, who said unto me, 'Thou seest how young people go together into vanity and old people into the earth; thou must forsake all, both young and old, and keep out of all, and be a stranger unto all.' Then, at the command of God, on the ninth day of the seventh month, 1643, I left my relations and broke off all familiarity or fellowship with old or young."

Thus briefly he describes what appears to have been the greatest moral crisis in his life. The four years which followed were a time of great perplexity and distress, though sometimes "I had intermissions, and was sometimes brought into such a heavenly joy that I thought I had been in Abraham's bosom." He would go from town to town, "travelling up and down as a stranger in the earth, which way the Lord inclined my heart; taking a chamber to myself in the town where I came, and tarrying sometimes a month, more or less, in a place"; and the reason he gives for this migratory habit is that he was "afraid both of professor and profane, lest, being a tender young man, he should be hurt by conversing much with either." The same fear often led him to shun all society for days at a time; but frequently he would apply to "professors" for spiritual direction and consolation. These applications, however, never proved successful; he invariably found that his advisers "possessed not what they professed." Some recommended marriage, others enlistment as a soldier in the civil wars; one "ancient priest" bade him take tobacco and sing psalms; another of the same fraternity, "in high account," advised physic and blood-letting.

About the beginning of 1646 his thoughts began to take more definite shape. One day, approaching Coventry, "the Lord opened to him" that none were true believers but such as were born of God and had passed from death unto life; and this was soon followed by other "openings" to the effect that "being bred at Oxford or Cambridge was not enough to fit and qualify men to be ministers of Christ," and that "God who made the world did not dwell in temples made with hands." He also experienced deeper manifestations of Christ within his own soul. "When I myself was in the deep, shut up under all [the burden of corruptions], I could not believe that I should ever overcome; my troubles, my sorrows and my temptations were so great that I thought many times I should have despaired, I was so tempted. But when Christ opened to me how He was tempted by the same devil, and overcame him and bruised his head, and that through Him, and His power, light, grace and spirit, I should overcome also, I had confidence in Him; so He it was that opened to me, when I was shut up and had no hope nor faith. Christ, who had enlightened me, gave me His light to believe in; He gave me hope which He himself revealed in me; and He gave me His spirit and grace, which I found sufficient in the deeps and in weakness." In 1647 he records that at a time when all outward help had failed "I heard a voice which said, 'There is one, even Christ Jesus, that can speak to thy condition.' And when I heard it my heart did leap for joy." In the same year he first openly declared his message in the neighbourhood of Dukinfield and Manchester (see FRIENDS, SOCIETY OF).

In 1649, as he was walking towards Nottingham, he heard the bell of the "steeple house" of the city, and was admonished by an inward voice to go forward and cry against the great idol and the worshippers in it. Entering the church he found the preacher engaged in expounding the words, "We have also a more sure word of prophecy," from which the ordinary Protestant doctrine of the supreme authority of Scripture was being enforced in a manner which appeared to Fox so defective or erroneous as to call for his immediate and most energetic protest. Lifting up his voice against the preacher's doctrine, he declared that it is not by the Scripture alone, but by the divine light by which the Scriptures were given, that doctrines ought to be judged. He was carried off to prison, where he was detained for some time, and from which he was released only by the favour of the sheriff, whose sympathies he had succeeded in enlisting. In 1650 he was imprisoned for about a year at Derby on a charge of blasphemy. On his release, overwrought and weakened by six months spent "in the common gaol and dungeon," he performed what was almost the only and certainly the most pronounced act of his life which had the appearance of wild fanaticism. Through the streets of Lichfield, on market day, he walked barefoot, crying, "Woe to the bloody city of Lichfield." His own explanation of the act, connecting it with the martyrdom of a thousand Christians in the time of Diocletian, is not convincing. His proceeding was probably due to a horror of the city arising from a subconscious memory of what he must have heard in childhood from his mother ("of the stock of the martyrs") concerning a martyr, a woman, burnt in the reign of Mary at Lichfield, who had been taken thither from Mancetter, a village two miles from his home in which he had worked as a journeyman shoemaker (see *The Martyrs Glover and Lewis of Mancetter*, by the Rev. B. Richings). He must also have heard of the burning of Edward Wightman in the same city in 1612, the last person burned for heresy in England.

It would be here out of place to follow with any minuteness the details of his subsequent imprisonments, such as that at Carlisle in 1653; London 1654; Launceston 1656; Lancaster 1660, and again in 1663, whence he was taken to Scarborough in 1665; and Worcester 1673. During these terms of imprisonment his pen was not idle, as is amply shown by the very numerous letters, pastorals and exhortations which have been preserved; while during his intervals of liberty he was unwearied in the work of "declaring truth" in all parts of the country. In 1669 he married Margaret, widow of Judge Fell, of Swarthmoor, near Ulverston, who, with her family, had been among his earliest converts. In 1671 he visited Barbados, Jamaica, and the American continent, and shortly after his return in 1673 he was, as has been already noted, apprehended in Worcestershire for attending meetings that were forbidden by the law. At Worcester he suffered a captivity of nearly fourteen months. In 1677 he visited Holland along with Barclay, Penn and seven others; and this visit he repeated (with five others) in 1684. The later years of his life were spent mostly in London, where he continued to speak in public, comparatively unmolested, until within a few days of his death, which took place on the 13th of January 1691 (1690 O.S.).

William Penn has left on record an account of Fox from personal knowledge—a *Brief Account of the Rise and Progress of the People called Quakers*, written as a preface to Fox's *Journal*. Although a man of large size and great bodily strength, he was "very temperate, eating little and sleeping less." He was a man of strong personality, of measured utterance, "civil" (says Penn) "beyond all forms of breeding." From his *Journal* we gather that he had piercing eyes and a very loud voice, and wore good clothes. Unlike the Roundheads, he wore his hair long. Even before his marriage with Margaret Fell he seems to have been fairly well off; he does not appear to have worked for a living after he was nineteen, and yet he had a horse, and speaks of having money to give to those who were in need. He had much practical common-sense, and keen sympathy for all who were in distress and for animals. The mere fact that he was able to attract to himself so considerable a body of respectable followers, including such men as Ellwood, Barclay, Penington and Penn, is sufficient to prove that he possessed in a very eminent degree the power of conviction, persuasion, and moral ascendancy; while of his personal uprightness, single-mindedness and sincerity there can be no question.

The writings of Fox are enumerated in Joseph Smith's *Catalogue of Friends' Books*. The *Journal* is especially interesting; of it Sir James Mackintosh has said that "it is one of the most extraordinary and instructive narratives in the world, which no reader of competent judgment can peruse without revering the virtue of the writer." The *Journal* was originally published in London in 1694; the edition known as the Bicentenary Edition, with notes biographical and historical (reprint of 1901 or later), will be found the most useful in practice. An exact transcript of the *Journal* has been issued by the Cambridge University Press. *A Life of George Fox*, by Dr Thomas Hodgkin; *The Fells of Swarthmoor Hall*, by Maria Webb; and *The Life and Character of George Fox*, by John Stephenson Rowntree, are valuable. For a mention of other works, and for details of the principles and history of the Society of Friends, together with some further information about Fox, see the article FRIENDS, SOCIETY OF. (A. N. B.)

FOX, RICHARD (*c.* 1448–1528), successively bishop of Exeter, Bath and Wells, Durham, and Winchester, lord privy seal, and founder of Corpus Christi College, Oxford, was born about 1448 at Ropesley near Grantham, Lincolnshire. His parents belonged to the yeoman class, and there is some obscurity about Fox's early career. It is not known at what school he was educated, nor at what college, though the presumption is in favour of Magdalen, Oxford, whence he drew so many members of his subsequent foundation, Corpus Christi. He also appears to have studied at Cambridge, but nothing definite is known of the first thiry-five years of his career. In 1484 he was in Paris, whether merely for the sake of learning or because he had rendered himself obnoxious to Richard III. is a matter of speculation. At any rate he was brought into contact with the earl of Richmond, who was then beginning his quest for the English throne, and was taken into his service. In January 1485 Richard intervened to prevent Fox's appointment to the vicarage of Stepney on the ground that he was keeping company with the "great rebel, Henry ap Tuddor."

The important offices conferred on Fox immediately after the battle of Bosworth imply that he had already seen more extensive political service than can be traced in records. Doubtless Henry VII. had every reason to reward his companions in exile, and to rule like Ferdinand of Aragon by means of lawyers and churchmen rather than trust nobles like those who had made the Wars of the Roses. But without an intimate knowledge of Fox's political experience and capacity he would hardly have made him his principal secretary, and soon afterwards lord privy seal and bishop of Exeter (1487). The ecclesiastical preferment was merely intended to provide a salary not at Henry's expense; for Fox never saw either Exeter or the diocese of Bath and Wells to which he was translated in 1492. His activity was confined to political and especially diplomatic channels; so long as Morton lived, Fox was his subordinate, but after the archbishop's death he was second to none in Henry's confidence, and he had an important share in all the diplomatic work of the reign. In 1487 he negotiated a treaty with James III. of Scotland, in 1491 he baptized the future Henry VIII., in 1492 he helped to conclude the treaty of Etaples, and in 1497 he was chief commissioner in the negotiations for the famous commercial agreement with the Netherlands which Bacon seems to have been the first to call the *Magnus Intercursus*.

Meanwhile in 1494 Fox had been translated to Durham, not merely because it was a richer see than Bath and Wells but because of its political importance as a palatine earldom and its position with regard to the Borders and relations with Scotland. For these reasons rather than from any ecclesiastical scruples Fox visited and resided in his new diocese; and he occupied Norham Castle, which he fortified and defended against a Scottish raid in Perkin Warbeck's interests (1497). But his energies were principally devoted to pacific purposes. In that same year he negotiated Perkin's retirement from the court of James IV.; and in 1498–1499 he completed the negotiations for that treaty of marriage between the Scottish king and Henry's daughter Margaret which led ultimately to the union of the two crowns in 1603 and of the two kingdoms in 1707. The marriage itself did not take place until 1503, just a century before the accession of James I.

This consummated Fox's work in the north, and in 1501 he was once more translated to Winchester, then reputed the richest bishopric in England. In that year he brought to a conclusion marriage negotiations not less momentous in their ultimate results, when Prince Arthur was betrothed to Catherine of Aragon. His last diplomatic achievement in the reign of Henry VII. was the betrothal of the king's younger daughter Mary to the future emperor Charles V. In 1500 he was elected chancellor of Cambridge University, an office not confined to noble lords until a much more democratic age, and in 1507 master of Pembroke Hall in the same university. The Lady Margaret Beaufort made him one of her executors, and in this capacity as well as in that of chancellor, he had the chief share with Fisher in regulating the foundation of St John's College and the Lady Margaret professorships and readerships. His financial work brought him a less enviable notoriety, though a curious freak of history has deprived him of the credit which is his due for "Morton's fork." The invention of that ingenious dilemma for extorting contributions from poor and rich alike is ascribed as a tradition to Morton by Bacon; but the story is told in greater detail of Fox by Erasmus, who says he had it from Sir Thomas More, a well-informed contemporary authority. It is in keeping with the somewhat malicious saying about Fox reported by Tyndale that he would sacrifice his father to save his king, which after all is not so damning as Wolsey's dying words.

The accession of Henry VIII. made no immediate difference to Fox's position. If anything, the substitution of the careless pleasure-loving youth for Henry VII. increased the power of his ministry, the personnel of which remained unaltered. The Venetian ambassador calls Fox "alter rex" and the Spanish ambassador Carroz says that Henry VIII. trusted him more than any other adviser, although he also reports Henry's warning that the bishop of Winchester was, as his name implied, "a fox indeed." He was the chief of the ecclesiastical statesmen who belonged to the school of Morton, believed in frequent parliaments, and opposed the spirited foreign policy which laymen like Surrey are supposed to have advocated. His colleagues were Warham and Ruthal, but Warham and Fox differed on the question of Henry's marriage, Fox advising the completion of the match with Catherine while Warham expressed doubts as to its canonical validity. They also differed over the prerogatives of Canterbury with regard to probate and other questions of ecclesiastical jurisdiction.

Wolsey's rapid rise in 1511 put an end to Fox's influence. The pacific policy of the first two years of Henry VIII.'s reign was succeeded by an adventurous foreign policy directed mainly against France; and Fox complained that no one durst do anything in opposition to Wolsey's wishes. Gradually Warham and Fox retired from the government; the occasion of Fox's resignation of the privy seal was Wolsey's ill-advised attempt to drive Francis I. out of Milan by financing an expedition led by the emperor Maximilian in 1516. Tunstall protested, Wolsey took Warham's place as chancellor, and Fox was succeeded by Ruthal, who, said the Venetian ambassador, "sang treble to Wolsey's bass." He bore Wolsey no ill-will, and warmly congratulated him two years later when warlike adventures were abandoned at the peace of London. But in 1522 when war was again declared he emphatically refused to bear any part of the responsibility, and in 1523 he opposed in convocation the financial demands which met with a more strenuous resistance in the House of Commons.

He now devoted himself assiduously to his long-neglected episcopal duties. He expressed himself as being as anxious for the reformation of the clergy as Simeon for the coming of the Messiah; but while he welcomed Wolsey's never-realized promises, he was too old to accomplish much himself in the way of remedying the clerical and especially the monastic depravity, licence and corruption he deplored. His sight failed during the last ten years of his life, and there is no reason to doubt Matthew Parker's story that Wolsey suggested his retirement from his bishopric on a pension. Fox replied with some warmth, and Wolsey had to wait until Fox's death before he could add Winchester to his archbishopric of York and his abbey of St Albans, and thus leave Durham vacant as he hoped for the illegitimate son on whom (aged 18) he had already conferred a deanery, four archdeaconries, five prebends and a chancellorship.

The crown of Fox's career was his foundation of Corpus Christi College, which he established in 1515–1516. Originally he intended it as an Oxford house for the monks of St Swithin's, Winchester; but he is said to have been dissuaded by Bishop Oldham, who denounced the monks and foretold their fall. The scheme adopted breathed the spirit of the Renaissance; provision was made for the teaching of Greek, Erasmus lauded the institution and Pole was one of its earliest fellows. The humanist Vives was brought from Italy to teach Latin, and the reader in theology was instructed to follow the Greek and Latin Fathers rather than the scholastic commentaries. Fox also built and endowed schools at Taunton and Grantham, and was a benefactor to numerous other institutions. He died at Wolvesey on the 5th of October 1528; Corpus possesses several portraits and other relics of its founder.

See *Letters and Papers of Henry VII. and Henry VIII.*, vols. i.-iv.; *Spanish and Venetian Calendars of State Papers*; Gairdner's *Lollardy and the Reformation* and *Church History 1485–1558*; Pollard's *Henry VIII.*; Longman's *Political History*, vol. v.; other authorities cited in the article by Dr T. Fowler (formerly president of Corpus) in the *Dict. Nat. Biog.* (A. F. P.)

FOX, ROBERT WERE (1789–1877), English geologist and natural philosopher, was born at Falmouth on the 26th of April 1789. He was a member of the Society of Friends, and was descended from members who had long settled in Cornwall, although he was not related to George Fox who had introduced the community into the county. He was distinguished for his researches on the internal temperature of the earth, being the first to prove that the heat increased definitely with the depth; his observations being conducted in Cornish mines from 1815 for a period of forty years. In 1829 he commenced a series of experiments on the artificial production of miniature metalliferous veins by means of the long-continued influence of electric currents, and his main results were published in *Observations on Mineral Veins* (*Rep. Royal Cornwall Polytech. Soc.*, 1836). He was one of the founders in 1833 of the Royal Cornwall Polytechnic Society. He constructed in 1834 an improved form of deflector dipping needle. In 1848 he was elected F.R.S. His garden at Penjerrick near Falmouth became noted for the number of exotic plants which he had naturalized. He died on the 25th of July 1877. (See *A Catalogue of the Works of Robert Were Fox, F.R.S., with a Sketch of his Life*, by J. H. Collins, 1878.)

His daughter, CAROLINE FOX (1819–1871), born at Falmouth on the 24th of May 1819, is well known as the authoress of a diary, recording memories of many distinguished people, such as John Stuart Mill, John Sterling and Carlyle. Selections from her diary and correspondence (1835–1871) were published under the title of *Memories of Old Friends* (ed. by H. N. Pym, 1881; 2nd ed., 1882). She died on the 12th of January 1871.

FOX, SIR STEPHEN (1627–1716), English statesman, born on the 27th of March 1627, was the son of William Fox, of Farley, in Wiltshire, a yeoman farmer. At the age of fifteen he first obtained a situation in the household of the earl of Northumberland; then he entered the service of Lord Percy, the earl's brother, and was present with the royalist army at the battle of Worcester as Lord Percy's deputy at the ordnance board. Accompanying Charles II. in his flight to the continent, he was appointed manager of the royal household, on Clarendon's recommendation as "a young man bred under the severe discipline of Lord Percy . . . very well qualified with languages, and all other parts of clerkship, honesty and discretion." The skill with which he managed the exiguous finances of the exiled court earned him further confidence and promotion. He was employed on several important missions, and acted eventually as intermediary between the king and General Monk. Honours and emolument were his reward after the Restoration; he was appointed to the lucrative offices of first clerk of the board of green cloth and paymaster-general of the forces. In November 1661 he became member of parliament for Salisbury. In 1665 he was knighted, was returned as M.P. for Westminster on the 27th of February 1679, and succeeded the earl of Rochester as a commissioner of the treasury, filling that office for twenty-three years and during three reigns. In 1680 he resigned the paymastership and was made first commissioner of horse. In 1684 he became sole commissioner of horse. He was offered a peerage by James II., on condition of turning Roman Catholic, but refused, in spite of which he was allowed to retain his commissionerships. In 1685 he was again M. P. for Salisbury, and opposed the bill for a standing army supported by the king. During the Revolution he maintained an attitude of decent reserve, but on James's flight, submitted to William III., who confirmed him in his offices. He was again elected for Westminster in 1691 and 1695, for Cricklade in 1698, and finally in 1713 once more for Salisbury. He died on the 28th of October 1716. It is his distinction to have founded Chelsea hospital, and to have contributed £13,000 in aid of this laudable public work. Though his place as a statesman is in the second or even the third rank, yet he was a useful man in his generation, and a public servant who creditably discharged all the duties with which he was entrusted. Unlike other statesmen of his day, he grew rich in the service of the nation without being suspected of corruption, and without forfeiting the esteem of his contemporaries.

He was twice married (1651 and 1703); by his first wife, Elizabeth Whittle, he had seven sons, who predeceased him, and three daughters; by his second, Christian Hopes, he had two sons and two daughters. The elder son by the second marriage, Stephen (1704–1776), was created Lord Ilchester and Stavordale in 1747 and earl of Ilchester in 1756; in 1758 he took the additional name of Strangways, and his descendants, the family of Fox-Strangways, still hold the earldom of Ilchester. The younger son, Henry, became the 1st Lord Holland (*q.v.*).

FOX, SIR WILLIAM (1812–1893), New Zealand statesman, third son of George Townshend Fox, deputy-lieutenant for Durham county, was born in England on the 9th of June 1812, and educated at Wadham College, Oxford, where he took his degree in 1832. Called to the bar in 1842, he emigrated immediately thereafter to New Zealand, where, on the death of Captain Arthur Wakefield, killed in 1843 in the Wairau massacre, he became the New Zealand Company's agent for the South Island. While holding this position he made a memorable exploring march on foot from Nelson to Canterbury, through Cannibal Gorge, in the course of which he discovered the fertile pastoral country of Amuri. In 1848 Governor Grey made Fox attorney-general, but he gave up the post almost at once in order to join the agitation, then at its height, for a free constitution. As the political agent of the Wellington settlers he sailed to London in 1850 to urge their demands in Downing Street. The colonial office, however, refused to recognize him, and, after publishing a sketch of the New Zealand settlements, *The Six Colonies of New Zealand*, and travelling in the United States, he returned to New Zealand and again threw himself with energy into public affairs. When government by responsible ministers was at last initiated, in 1856, Fox ousted the first ministry and formed a cabinet, only to be himself beaten in turn after holding office but thirteen days. In 1861 he regained office, and was somewhat more fortunate, for he remained premier for nearly thirteen months. Again, in the latter part of 1863 he took office: this time with Sir Frederick Whitaker as premier, an arrangement which endured for another thirteen months. Fox's third premiership began in 1869 and lasted until 1872. His fourth, which was a matter of temporary convenience to his party, lasted only five weeks in March and April 1873. Soon afterwards he left politics, and, though he reappeared after some years and led the attack which overthrew Sir George Grey's ministry in 1879, he lost his seat in the dissolution which followed in that year and did not again enter parliament. He was made K.C.M.G. in 1880.

For the thirty years between 1850 and 1880 Sir William Fox was one of the half-dozen most notable public men in the colony. Impulsive and controversial, a fluent and rousing speaker, and a ready writer, his warm and sympathetic nature made him a good friend and a troublesome foe. He was considered for many years to be the most dangerous leader of the Opposition in the colony's parliament, though as premier he was at a disadvantage when measured against more patient and more astute party managers. His activities were first devoted to secure self-government for the New Zealand colonists. Afterwards his sympathies made him prominent among the champions of the Maori race, and he laboured indefatigably for their rights and to secure permanent peace with the tribes and a just settlement of their claims. It was during his third premiership that this peace, so long deferred, was at last gained, mainly through the influence and skill of Sir Donald M'Lean, native minister in the Fox cabinet. Finally, after Fox had left parliament he devoted himself, as joint-commissioner with Sir Francis Dillon Bell, to the adjustment of the native land-claims on the west coast of the North Island. The able reports of the commissioners were his last public service, and the carrying out of their recommendations gradually removed the last serious native trouble in New Zealand. When, however, in the course of the native wars from 1860 to 1870 the colonists of New Zealand were exposed to cruel and unjust imputations in England, Fox zealously defended them in a book, *The War in New Zealand* (1866), which was not only a spirited vindication of his fellow-settlers, but a scathing criticism of the generalship of the officers commanding the imperial troops in New Zealand. Throughout his life Fox was a consistent advocate of total abstinence. It was he who founded the New Zealand Alliance, and he undoubtedly aided the growth of the prohibition movement afterwards so strong in the colony. He died on the 23rd of June 1893, exactly twelve months after his wife, Sarah, daughter of William Halcombe. (W. P. R.)

FOX, a name (female, "vixen"[1]) properly applicable to the single wild British representative of the family *Canidae* (see CARNIVORA), but in a wider sense used to denote fox-like species from all parts of the world, inclusive of many from South America which do not really belong to the same group. The fox was included by Linnaeus in the same genus with the dog and the wolf, under the name of *Canis vulpes*, but at the present day is regarded by most naturalists as the type of a separate genus, and should then be known as *Vulpes alopex* or *Vulpes vulpes*. From dogs, wolves, jackals, &c., which constitute the genus *Canis* in its more restricted sense, foxes are best distinguished by the circumstance that in the skull the (postorbital) projection immediately behind the socket for the eye has its upper surface concave, with a raised ridge in front, in place of regularly convex. Another character is the absence of a hollow chamber, or sinus, within the frontal bone of the forehead. Foxes are likewise distinguished by their slighter build, longer and bushy tail, which always exceeds half the length of the head and body, sharper muzzle, and relatively longer body and shorter limbs. Then again, the ears are large in proportion to the head, the pupil of the eye is elliptical and vertical when in a strong light, and the female has six pairs of teats, in place of the three to five pairs found in dogs, wolves and jackals. From the North American grey foxes, constituting the genus or subgenus *Urocyon*, the true foxes are distinguished by the absence of a crest of erectile long hairs along the middle line of the upper surface of the tail, and also of a projection (subangular process) to the postero-inferior angle of the lower jaw. With the exception of certain South African species, foxes differ from wolves and jackals in that they do not associate in packs, but go about in pairs or are solitary.

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[1] The word is common to the Teutonic languages, cf. Dutch *vos*, Ger. *Fuchs*; the ultimate origin is unknown, but a connexion has been suggested with Sanskrit *puccha*, tail. The feminine "vixen" represents the O. Eng. *fyxen*, due to the change from *o* to *y*, and addition of the feminine termination -*en*, cf. O. Eng. *gyden*, goddess, and Ger. *Füchsin*, vixen. The *v*, for *f*, is common in southern English pronunciation; *vox*, for fox, is found in the *Ancren Riwle*, *c.* 1230.

From the Scandinavian peninsula and the British Islands the range of the fox extends eastwards across Europe and central and northern Asia to Japan, while to the south it embraces northern Africa and Arabia, Persia, Baluchistan, and the north-western districts of India and the Himalaya. On the North American side of the Atlantic the fox reappears. With such an enormous geographical range the species must of necessity present itself under a considerable number of local phases, differing from one another to a greater or less degree in the matters of size and colouring. By some naturalists many of these local forms are regarded as specifically distinct, but it seems better and simpler to class them all as local phases or races of a single species primarily characterized by the white tip to the tail and the black or dark-brown hind surface of the ear. The "foxy red" colouring of the typical race of north-western Europe is too well known to require description. From this there is a more or less nearly complete gradation on the one hand to pale-coloured forms like the white-footed fox (*V. alopex leucopus*) of Persia, N.W. India and Arabia, and on the other to the silver or black fox (*V. a. argentatus*) of North America which yields the valuable silver-tipped black fur. Silver foxes apparently also occur in northern Asia.

To mention all the other local races would be superfluous, and it will suffice to note that the North African fox is known as *V. a. niloticus*, the Himalayan as *V. a. montanus*, the Tibetan as *V. a. wadelli*, the North American red or cross fox as *V. a. pennsylvanicus*, and the Alaskan as *V. a. harrimani;* the last named, like several other animals from Alaska, being the largest of its kind.

The cunning and stratagem of the fox have been proverbial for many ages, and he has figured as a central character in fables from the earliest times, as in Aesop, down to "Uncle Remus," most notably as Reynard (*Raginohardus*, strong in counsel) in the great medieval beast-epic "Reynard the Fox" (*q.v.*). It is not unlikely that, owing to the conditions under which it now lives, these traits are even more developed in England than elsewhere. In habits the fox is to a great extent solitary, and its home is usually a burrow, which may be excavated by its own labour, but is more often the usurped or deserted tenement of a badger or a rabbit. Foxes will, however, often take up their residence in woods, or even in water-meadows with large tussocks of grass, remaining concealed during the day and issuing forth on marauding expeditions at night. Rabbits, hares, domesticated poultry, game-birds, and, when these run short, rats, mice and even insects, form the chief diet of the fox. When living near the coast foxes will, however, visit the shore at low water in search of crabs and whelks; and the old story of the fox and the grapes seems to be founded upon a partiality on the part of the creature for that fruit. Flesh that has become tainted appears to be specially acceptable; but it is a curious fact that on no account will a fox eat any kind of bird of prey.

After a gestation of from 60 to 65 days, the vixen during the month of April gives birth to cubs, of which from five to eight usually go to form a litter. When first born these are clothed with a uniform slaty-grey fur, which in due course gives place to a coat of more tawny hue than the adult livery. In a year and a half the cubs attain their full development; and from observations on captive specimens it appears that the duration of life ought to extend to some thirteen or fourteen years. In the care and defence of her young the vixen displays extraordinary solicitude and boldness, altogether losing on such occasions her accustomed timidity and caution. Like most other young animals, fox-cubs are exceedingly playful, and may be seen chasing one another in front of the mouth of the burrow, or even running after their own tails.

Young foxes can be tamed to a certain extent, and do not then emit the well-known odour to any great degree unless excited. The species cannot, however, be completely domesticated, and never displays the affectionate traits of the dog. It was long believed that foxes and dogs would never interbreed; but several instances of such unions have been recorded, although they are undoubtedly rare. When suddenly confronted in a situation where immediate escape is impossible, the fox, like the wolf, will not hesitate to resort to the death-feigning instinct. Smartness in avoiding traps is one of the most distinctive traits in the character of the species; but when a trap has once claimed its victim, and is consequently no longer dangerous, the fox is always ready to take advantage of the gratuitous meal.

Red fox-skins are largely imported into Europe for various purposes, the American imports alone formerly reaching as many as 60,000 skins annually. Silver fox is one of the most valuable of all furs, as much as £480 having been given for an unusually fine pair of skins in 1902.

Of foxes certainly distinct specifically from the typical representative of the group, one of the best known is the Indian *Vulpes bengalensis*, a species much inferior in point of size to its European relative, and lacking the strong odour of the latter, from which it is also distinguished by the black tip to the tail and the pale-coloured backs of the ears. The corsac fox (*V. corsac*), ranging from southern Russia and the Caspian provinces across Asia to Amurland, may be regarded as a northern representative of the Indian species; while the pale fox (*V. pallidus*), of the Suakin and Dongola deserts, may be regarded as the African representative of the group. Possibly the kit-fox (*V. velox*), which has likewise a black tail-tip and pale ears, may be the North American form of the same group. The northern fennec (*V. famelicus*), whose range extends apparently from Egypt and Somaliland through Palestine and Persia into Afghanistan, seems to form a connecting link between the more typical foxes and the small African species properly known as fennecs. The long and bushy tail in the northern species has a white tip and a dark gland-patch near the root, but the backs of the ears are fawn-coloured. The enormous length of the ears and the small bodily size (inferior to that of any other member of the family) suffice to distinguish the true fennec (*V. zerda*) of Algeria and Egypt, in which the general colour is pale and the tip of the relatively short tail black. South of the Zambezi the group reappears in the shape of the asse-fox or fennec (*V. cama*), a dark-coloured species, with a black tip to the long, bushy tail and reddish-brown ears.

Passing from South Africa to the north polar regions of both the Old and the New World, inclusive of Iceland, we enter the domain of the Arctic fox (*V. lagopus*), a very distinct species characterized by the hairy soles of its feet, the short, blunt ears, the long, bushy tail, and the great length of the fur in winter. The upper parts in summer are usually brownish and the under parts white; but in winter the whole coat, in this phase of the species, turns white. In a second phase of the species, the colour, which often displays a slaty hue (whence the name of blue fox), remains more or less the same throughout the year, the winter coat being, however, recognizable by the great length of the fur. Many at least of the "blue fox" skins of the fur-trade are white skins dyed. About 2000 blue fox-skins were annually imported into London from Alaska some five-and-twenty years ago. Arctic foxes feed largely on sea-birds and lemmings, laying up hidden stores of the last-named rodents for winter use.

The American grey fox, or Virginian fox, is now generally ranged as a distinct genus (or a subgenus of *Canis*) under the name of *Urocyon cinereo-argentatus*, on account of being distinguished, as already mentioned, by the presence of a ridge of long erectile hairs along the upper surface of the tail and of a projection to the postero-inferior angle of the lower jaw. The prevailing colour of the fur of the upper parts is iron-grey.

The so-called foxes of South America, such as the crab-eating fox (*C. thous*), Azara's fox (*C. azarae*), and the colpeo (*C. magellanicus*), are aberrant members of the typical genus *Canis*. On the other hand, the long-eared fox or Delalande's fox (*Otocyon megalotis*) of south and east Africa represents a totally distinct genus.

See St George Mivart, *Dogs, Jackals, Wolves and Foxes* (London, 1890); R. I. Pocock, "Ancestors and Relatives of the Dog," in *The Kennel Encyclopaedia* (London, 1907). For fox-hunting, see HUNTING. (R. L.*)

FOXE, JOHN (1516–1587), the author of the famous *Book of Martyrs*, was born at Boston, in Lincolnshire, in 1516. At the age of sixteen he is said to have entered Brasenose College, Oxford, where he was the pupil of John Harding or Hawarden, and had for room-mate Alexander Nowell, afterwards dean of St. Paul's. His authenticated connexion at the university is, however, with Magdalen College. He took his B.A. degree in 1537 and his M.A. in 1543. He was lecturer on logic in 1540–1541. He wrote several Latin plays on Scriptural subjects, of which the best, *De Christo triumphante*, was repeatedly printed, (London, 1551; Basel, 1556, &c.), and was translated into English by Richard Day, son of the printer. He became a fellow of Magdalen College in 1539, resigning in 1545. It is said that he refused to conform to the rules for regular attendance at chapel, and that he protested both against the enforced celibacy of fellows and the obligation to take holy orders within seven years of their election. The customary statement that he was expelled from his fellowship is based on the untrustworthy biography attributed to his son Samuel Foxe, but the college records state that he resigned of his own accord and *ex honesta causa*. The letter in which he protests to President Oglethorpe against the charges of irreverence, &c., brought against him is printed in Pratt's edition (vol. i. Appendix, pp. 58–61).

On leaving Oxford he acted as tutor for a short time in the house of the Lucys of Charlecote, near Stratford-on-Avon, where he married Agnes Randall. Late in 1547 or early in the next year he went to London. He found a patron in Mary Fitzroy, duchess of Richmond, and having been ordained deacon by Ridley in 1550, he settled at Reigate Castle, where he acted as tutor to the duchess's nephews, the orphan children of Henry Howard, earl of Surrey. On the accession of Queen Mary, Foxe was deprived of his tutorship by the boys' grandfather, the duke of Norfolk, who was now released from prison. He retired to Strassburg, and occupied himself with a Latin history of the Christian persecutions which he had begun at the suggestion of Lady Jane Grey. He had assistance from two clerics of widely differing opinions—from Edmund Grindal, who was later, as archbishop of Canterbury, to maintain his Puritan convictions in opposition to Elizabeth; and from John Aylmer, afterwards one of the bitterest opponents of the Puritan party. This book, dealing chiefly with Wycliffe and Huss, and coming down to 1500, formed the first outline of the *Actes and Monuments*. It was printed by Wendelin Richelius with the title of *Commentarii rerum in ecclesia gestarum* (Strasburg, 1554). In the year of its publication Foxe removed to Frankfort, where he found the English colony of Protestant refugees divided into two camps. He made a vain attempt to frame a compromise which should be accepted by the extreme Calvinists and by the partisans of the Anglican doctrine. He removed (1555) to Basel, where he worked as printer's reader to Johann Herbst or Oporinus. He made steady progress with his great book as he received reports from England of the religious persecutions there, and he issued from the press of Oporinus his pamphlet *Ad inclytos ac praepotentes Angliae proceres . . . supplicatio* (1557), a plea for toleration addressed to the English nobility. In 1559 he completed the Latin edition[1] of his martyrology and returned to England. He lived for some time at Aldgate, London, in the house of his former pupil, Thomas Howard, now duke of Norfolk, who retained a sincere regard for his tutor and left him a small pension in his will. He became associated with John Day the printer, himself once a Protestant exile. Foxe was ordained priest by Edmund Grindal, bishop of London, in 1560, and besides much literary work he occasionally preached at Paul's Cross and other places. His work had rendered great service to the government, and he might have had high preferment in the Church but for the Puritan views which he consistently maintained. He held, however, the prebend of Shipton in Salisbury cathedral, and is said to have been for a short time rector of Cripplegate.

In 1563 was issued from the press of John Day the first English edition of the *Actes and Monuments of these latter and perillous Dayes, touching matters of the Church, wherein are comprehended and described the great Persecution and horrible Troubles that have been wrought and practised by the Romishe Prelates, speciallye in this Realme of England and Scotland, from the yeare of our Lorde a thousande to the time now present. Gathered and collected according to the true Copies and Wrytinges certificatorie as well of the Parties themselves that Suffered, as also out of the Bishop's Registers, which were the Doers thereof, by John Foxe*, commonly known as the *Book of Martyrs*. Several gross errors which had appeared in the Latin version, and had been since exposed, were corrected in this edition. Its popularity was immense and signal. The Marian persecution was still fresh in men's minds, and the graphic narrative intensified in its numerous readers the fierce hatred of Spain and of the Inquisition which was one of the master passions of the reign. Nor was its influence transient. For generations the popular conception of Roman Catholicism was derived from its bitter pages. Its accuracy was immediately attacked by Catholic writers, notably in the *Dialogi sex* (1566), nominally from the pen of Alan Cope, but in reality by Nicholas Harpsfield and by Robert Parsons in *Three Conversions of England* (1570). These criticisms induced Foxe to produce a second corrected edition, *Ecclesiastical History, contayning the Actes and Monuments of things passed in every kynges tyme . . .* in 1570, a copy of which was ordered by Convocation to be placed in every collegiate church. Foxe based his accounts of the martyrs partly on authentic documents and reports of the trials, and on statements received direct from the friends of the sufferers, but he was too hasty a worker and too violent a partisan to produce anything like a correct or impartial account of the mass of facts with which he had to deal. Anthony à Wood says that Foxe "believed and reported all that was told him, and there is every reason to suppose that he was purposely misled, and continually deceived by those whose interest it was to bring discredit on his work," but he admits that the book is a monument of his industry, his laborious research and his sincere piety. The gross blunders due to carelessness have often been exposed, and there is no doubt that Foxe was only too ready to believe evil of the Catholics, and he cannot always be exonerated from the charge of wilful falsification of evidence. It should, however, be remembered in his honour that his advocacy of religious toleration was far in advance of his day. He pleaded for the despised Dutch Anabaptists, and remonstrated with John Knox on the rancour of his *First Blast of the Trumpet*. Foxe was one of the earliest students of Anglo-Saxon, and he and Day published an edition of the Saxon gospels under the patronage of Archbishop Parker. He died on the 18th of April 1587 and was buried at St Giles's, Cripplegate.

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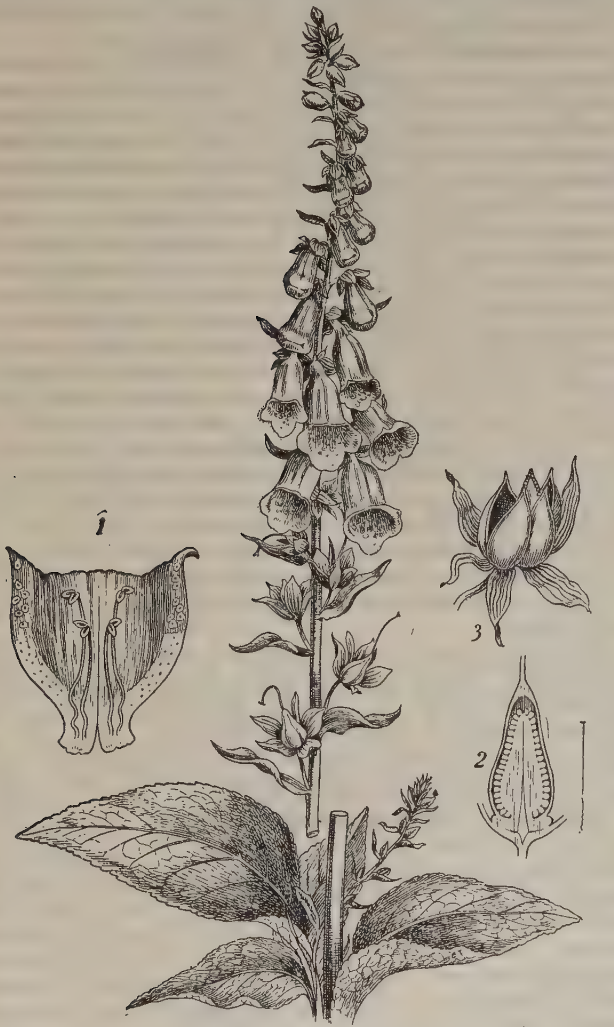
[1] Printed by Oporinus and Nicolaus Brylinger. The title is *Rerum in ecclesia gestarum . . . pars prima, in qua primum de rebus per Angliam et Scotiam gestis atque in primis de horrenda sub Maria nuper regina persecutione narratio continetur.*

A list of his Latin tracts and sermons is given by Wood, and others, some of which were never printed, appear in Bale. Four editions of the *Actes and Monuments* appeared in Foxe's lifetime. The eighth edition (1641) contains a memoir of Foxe purporting to be by his son Samuel, the MS. of which is in the British Museum (Lansdowne MS. 388). Samuel Foxe's authorship is disputed, with much show of reason, by Dr S. R. Maitland in *On the Memoirs of Foxe ascribed to his Son* (1841). The best-known modern edition of the Martyrology is that (1837–1841) by the Rev. Stephen R. Cattley, with an introductory life by Canon George Townsend. The numerous inaccuracies of this life and the frequent errors of Foxe's narrative were exposed by Dr Maitland in a series of tracts (1837–1842), collected (1841–1842) as *Notes on the Contributions of the Rev. George Townsend, M.A. . . . to the New Edition of Fox's Martyrology.* The criticism lavished on Cattley and Townsend's edition led to a new one (1846–1849) under the same editorship. A new text prepared by the Rev. Josiah Pratt was issued (1870) in the "Reformation Series" of the *Church Historians of England*, with a revised version of Townsend's *Life* and appendices giving copies of original documents. Later edition by W. Grinton Berry (1907).

Foxe's papers are preserved in the Harleian and Lansdowne collections in the British Museum. Extracts from these were edited by J. G. Nichols for the Camden Society (1859). See also W. Winters, *Biographical Notes on John Foxe* (1876); James Gairdner, *History of the English Church in the Sixteenth Century*.

FOXGLOVE, a genus of biennial and perennial plants of the natural order Scrophulariaceae. The common or purple foxglove, *D. purpurea*, is common in dry hilly pastures and rocky places and by road-sides in various parts of Europe; it ranges in Great Britain from Cornwall and Kent to Orkney, but it does not occur in Shetland or in some of the eastern counties of England. It flourishes best in siliceous soils, and is not found in the Jura and Swiss Alps. The characters of the plant are as follows: stem erect, roundish, downy, leafy below, and from 18 in. to 5 ft. or more in height; leaves alternate, crenate, rugose, ovate or elliptic oblong, and of a dull green, with the under surface downy and paler than the upper; radical leaves together with their stalks often a foot in length; root of numerous, slender, whitish fibres; flowers 1¾-2½ in. long, pendulous, on one side of the stem, purplish crimson, and hairy and marked with eye-like spots within; segments of calyx ovate, acute, cleft to the base; corolla bell-shaped with a broadly two-lipped obtuse mouth, the upper lip entire or obscurely divided; stamens four, two longer than the other two (*didynamous*); anthers yellow and bilobed; capsule bivalved, ovate and pointed; and seeds numerous, small, oblong, pitted and of a pale brown. As Parkinson remarks of the plant, "It flowreth seldome before July, and the seed is ripe in August"; but it may occasionally be found in blossom as late as September. Many varieties of the common foxglove have been raised by cultivation, with flowers varying in colour from white to deep rose and purple; in the variety *gloxinioides* the flowers are almost regular, suggesting those of the cultivated gloxinia. Other species of foxglove with variously coloured flowers have been introduced into Britain from the continent of Europe. The plants may be propagated by unflowered off-sets from the roots, but being biennials are best raised from seed.



Foxglove (*Digitalis purpurea*), one-third nat. size.

1. Corolla cut open showing the four stamens; rather more than half nat. size.
2. Unripe fruit cut lengthwise, showing the thick axial placenta bearing numerous small seeds.
3. Ripe capsule split open.

The foxglove, probably from folks'-glove, that is fairies' glove, is known by a great variety of popular names in Britain. In the south of Scotland it is called bloody fingers; farther north, dead-men's-bells; and on the eastern borders, ladies' thimbles, wild mercury and Scotch mercury. In Ireland it is generally known under the name of fairy thimble. Among its Welsh synonyms are *menyg-ellyllon* (elves' gloves), *menyg y llwynog* (fox's gloves), *bysedd cochion* (redfingers) and *bysedd y cwn* (dog's fingers). In France its designations are *gants de notre dame* and *doigts de la Vierge.* The German name *Fingerhut* (thimble) suggested to Fuchs, in 1542, the employment of the Latin adjective *digitalis* as a designation for the plant. Other species of foxglove or *Digitalis* although found in botanical collections are not generally grown. For medicinal uses see Digitalis.

FOX INDIANS, the name, from one of their clans, of an Algonquian tribe, whose former range was central Wisconsin. They call themselves Muskwakiuk, "red earth people." Owing to heavy losses in their wars with the Ojibways and the French, they allied themselves with the Sauk tribe about 1780, the two tribes being now practically one.

FOX MORCILLO, SEBASTIAN (1526?–1559?), Spanish scholar and philosopher, was born at Seville between 1526 and 1528. About 1548 he studied at Louvain, and, following the example of the Spanish Jew, Judas Abarbanel, published commentaries on Plato and Aristotle in which he endeavoured to reconcile their teaching. In 1559 he was appointed tutor to Don Carlos, son of Philip II., but did not live to take up the duties of the post, as he was lost at sea on his way to Spain. His most original work is the *De imitatione, seu de informandi styli ratione libri II.* (1554), a dialogue in which the author and his brother take part under the pseudonyms of Gaspar and Francisco Enuesia. Among Fox Morcillo's other publications are: (1) *In Topica Ciceronis paraphrasis et scholia* (1550); (2) *In Platonis Timaeum commentarii* (1554); (3) *Compendium ethices philosophiae ex Platone, Aristotele, aliisque philosophis collectum*; (4) *De historiae institutione dialogus* (1557), and (5) *De naturae philosophia.*

He is the subject of an excellent monograph by Urbano Gonzalez de Calle, *Sebastián Fox Morcillo: estudio histórico-crítico de sus doctrinas* (Madrid, 1903).

FOY, MAXIMILIEN SÉBASTIEN (1775–1825), French general and statesman, was born at Ham in Picardy on the 3rd of February 1775. He was the son of an old soldier who had fought at Fontenoy and had become post-master of the town in which he lived. His father died in 1780, and his early instruction was given by his mother, a woman of English origin and of superior ability. He continued his education at the college of Soissons, and thence passed at the age of fifteen to the artillery school of La Fère. After eighteen months' successful study he entered the army, served his first campaign in Flanders (1791–92), and was present at the battle of Jemmapes. He soon attained the rank of captain, and served successively under Dampierre, Jourdan, Pichegru and Houchard. In 1794, in consequence of having spoken freely against the violence of the extreme party at Paris, he was imprisoned by order of the commissioner of the Convention, Joseph Lebon, at Cambray, but regained his liberty soon after the fall of Robespierre. He served under Moreau in the campaigns of 1796 and 1797, distinguishing himself in many engagements. The leisure which the treaty of Campo Formio gave him he devoted to the study of public law and modern history, attending the lectures of Christoph Wilhelm von Koch (1737–1813), the famous professor of public law at Strassburg. He was recommended by Desaix to the notice of General Bonaparte, but declined to serve on the staff of the Egyptian expedition. In the campaign of Switzerland (1798) he distinguished himself afresh, though he served only with the greatest reluctance against a people which possessed republican institutions. In Masséna's brilliant campaign of 1799 Foy won the rank of *chef de brigade*. In the following year he served under Moncey in the Marengo campaign and afterwards in Tirol.

Foy's republican principles caused him to oppose the gradual rise of Napoleon to the supreme power and at the time of Moreau's trial he escaped arrest only by joining the army in Holland. Foy voted against the establishment of the empire, but the only penalty for his independence was a long delay before attaining the rank of general. In 1806 he married a daughter of General Baraguay d'Hilliers. In the following year he was sent to Constantinople, and there took part in the defence of the Dardanelles against the English fleet. He was next sent to Portugal, and thenceforward he served in the Peninsular War from first to last. Under Junot he won at last his rank of general of brigade, under Soult he held a command in the pursuit of Sir John Moore's army, and under Masséna he fought in the third invasion of Portugal (1810). Masséna reposed the greatest confidence in Foy, and employed him after Busaco in a mission to the emperor. Napoleon now made Foy's acquaintance for the first time, and was so far impressed with his merits as to make him a general of division at once. The part played by General Foy at the battle of Salamanca won him new laurels, but above all he distinguished himself when the disaster of Vittoria had broken the spirit of the army. Foy rose to the occasion; his resistance in the Pyrenees was steady and successful, and only a wound (at first thought mortal) which he received at Orthez prevented him from keeping the field to the last. At the first restoration of the Bourbons he received the grand cross of the Legion of Honour and a command, and on the return of Napoleon from Elba he declined to join him until the king had fled from the country. He held a divisional command in the Waterloo campaign, and at Waterloo was again severely wounded at the head of his division (see WATERLOO CAMPAIGN). After the second restoration he returned to civil life, devoting his energies for a time to his projected history of the Peninsular War, and in 1819 was elected to the chamber of deputies. For this position his experience and his studies had especially fitted him, and by his first speech he gained a commanding place in the chamber, which he never lost, his clear, manly eloquence being always employed on the side of the liberal principles of 1789. In 1823 he made a powerful protest against French intervention in Spain, and after the dissolution of 1824 he was re-elected for three constituencies. He died at Paris on the 28th of November 1825, and his funeral was attended, it is said, by 100,000 persons. His early death was regarded by all as a national calamity. His family was provided for by a general subscription.

The *Histoire de la guerre de la Péninsula sous Napoléon* was published from his notes in 1827, and a collection of his speeches (with memoir by Tissot) appeared in 1826 soon after his death. See Cuisin, *Vie militaire, politique, &c., du général Foy*; Vidal, *Vie militaire et politique du général Foy.*

FRAAS, KARL NIKOLAS (1810–1875), German botanist and agriculturist, was born at Rattelsdorf, near Bamberg, on the 8th of September 1810. After receiving his preliminary education at the gymnasium of Bamberg, he in 1830 entered the university of Munich, where he took his doctor's degree in 1834. Having devoted great attention to the study of botany, he went to Athens in 1835 as inspector of the court garden; and in April 1836 he became professor of botany at the university. In 1842 he returned to Germany and became teacher at the central agricultural school at Schleissheim. In 1847 he was appointed professor of agriculture at Munich, and in 1851 director of the central veterinary college. For many years he was secretary of the Agricultural Society of Bavaria, but resigned in 1861. He died at his estate of Neufreimann, near Munich, on the 9th of November 1875.

His principal works are: Στοιχεῖα τῆς Βοτανικῆς (Athens, 1835); *Synopsis florae classicae* (Munich, 1845); *Klima und Pflanzenwelt in der Zeit* (Landsh., 1847); *Histor.-encyklopäd. Grundriss der Landwirthschaftslehre* (Stuttgart, 1848); *Geschichte der Landwirthschaft* (Prague, 1851); *Die Schule des Landbaues* (Munich, 1852); *Baierns Rinderrassen* (Munich, 1853); *Die künstliche Fischerzeugung* (Munich, 1854); *Die Natur der Landwirthschaft* (Munich, 1857); *Buch der Natur für Landwirthe* (Munich, 1860); *Die Ackerbaukrisen und ihre Heilmittel* (Munich, 1866); *Das Wurzelleben der Culturpflanzen* (Berlin, 1872); and *Geschichte der Landbau und Forstwissenschaft seit dem 16*$^{\text{ten}}$ *Jahrh.* (Munich, 1865). He also founded and edited a weekly agricultural paper, the *Schranne.*

FRACASTORO [FRACASTORIUS], **GIROLAMO** [HIERONYMUS] (1483–1553), Italian physician and poet, was born at Verona in 1483. It is related of him that at his birth his lips adhered so closely that a surgeon was obliged to divide them with his incision knife, and that during his infancy his mother was killed by lightning, while he, though in her arms at the moment, escaped unhurt. Fracastoro became eminently skilled, not only in medicine and belles-lettres, but in most arts and sciences. He studied at Padua, and became professor of philosophy there in 1502, afterwards practising as a physician in Verona. It was by his advice that Pope Paul III., on account of the prevalence of a contagious distemper, removed the council of Trent to Bologna. He was the author of many works, both poetical and medical, and was intimately acquainted with Cardinal Bembo, Julius Scaliger, Gianbattista Ramusio (*q.v.*), and most of the great men of his time. In 1517, when the builders of the citadel of San Felice (Verona) found fossil mussels in the rocks, Fracastoro was consulted about the marvel, and he took the same view—following Leonardo da Vinci, but very advanced for those days—that they were the remains of animals once capable of living in the locality. He died of apoplexy at Casi, near Verona, on the 8th of August 1553; and in 1559 the town of Verona erected a statue in his honour.

The principal work of Fracastoro is a kind of medical poem entitled *Syphilidis, sive Morbi Gallici, libri tres* (Verona, 1530), which has been often reprinted and also translated into French and Italian. Among his other works (all published at Venice) are *De vini temperatura* (1534); *Homocentricorum* (1535); *De sympatha et antipathia rerum* (1546); and *De contagionibus* (1546). His complete works were published at Venice in 1555, and his poetical productions were collected and printed at Padua in 1728.

FRAGONARD, JEAN-HONORÉ (1732–1806), French painter, was born at Grasse, the son of a glover. He was articled to a Paris notary when his father's circumstances became straitened through unsuccessful speculations, but he showed such talent and inclination for art that he was taken at the age of eighteen to Boucher, who, recognizing the youth's rare gifts but disinclined to waste his time with one so inexperienced, sent him to Chardin's *atelier*. Fragonard studied for six months under the great luminist, and then returned more fully equipped to Boucher, whose style he soon acquired so completely that the master entrusted him with the execution of replicas of his paintings. Though not a pupil of the Academy, Fragonard gained the Prix de Rome in 1752 with a painting of "Jeroboam sacrificing to the Idols," but before proceeding to Rome he continued to study for three years under Van Loo. In the year preceding his departure he painted the "Christ washing the Feet of the Apostles" now at Grasse cathedral. In 1755 he took up his abode at the French Academy in Rome, then presided over by Natoire. There he benefited from the study of the old masters whom he was set to copy—always remembering Boucher's parting advice not to take Raphael and Michelangelo too seriously. He successively passed through the studios of masters as widely different in their aims and technique as Chardin, Boucher, Van Loo and Natoire, and a summer sojourn at the Villa d'Este in the company of the abbé de Saint-Non, who engraved many of Fragonard's studies of these entrancing gardens, did more towards forming his personal style than all the training at the various schools. It was in these romantic gardens, with their fountains, grottos, temples and terraces, that he conceived the dreams which he was subsequently to embody in his art. Added to this influence was the deep impression made upon his mind by the florid sumptuousness of Tiepolo, whose works he had an opportunity of studying in Venice before he returned to Paris in 1761. In 1765 his "Corésus et Callirhoé" secured his admission to the Academy. It was made the subject of a pompous eulogy by Diderot, and was bought by the king, who had it reproduced at the Gobelins factory. Hitherto Fragonard had hesitated between religious, classic and other subjects; but now the demand of the wealthy art patrons of Louis XV.'s pleasure-loving and licentious court turned him definitely towards those scenes of love and voluptuousness with which his name will ever be associated, and which are only made acceptable by the tender beauty of his colour and the virtuosity of his facile brushwork—such works as the "Serment d'amour" (Love Vow), "Le Verrou" (The Bolt), "La Culbute" (The Tumble), "La Chemise enlevée" (The Shift Withdrawn), and "The Swing" (Wallace collection), and his decorations for the apartments of Mme du Barry and the dancer Marie Guimard.

The Revolution made an end to the *ancien régime*, and Fragonard, who was so closely allied to its representatives, left Paris in 1793 and found shelter in the house of his friend Maubert at Grasse, which he decorated with the series of decorative panels known as the "Roman d'amour de la jeunesse," originally painted for Mme du Barry's pavilion at Louvreciennes. The panels in recent years came into the possession of Mr Pierpont Morgan. Fragonard returned to Paris early in the 19th century, where he died in 1806, neglected and almost forgotten. For half a century or more he was so completely ignored that Lübke, in his history of art (1873), omits the very mention of his name. But within the last thirty years he has regained the position among the masters of painting to which he is entitled by his genius. If the appreciation of his art by the modern collector can be expressed in figures, it is significant that the small and sketchy "Billet Doux," which appeared at the Cronier sale in Paris in 1905 and was subsequently exhibited by Messrs Duveen in London (1906), realized close on £19,000 at the Hôtel Drouot.

Besides the works already mentioned, there are four important pictures by Fragonard in the Wallace collection: "The Fountain of Love," "The Schoolmistress," "A Lady carving her Name on a Tree" (usually known as "Le Chiffre d'amour") and "The Fair-haired Child." The Louvre contains thirteen examples of his art, among them the "Corésus," "The Sleeping Bacchante," "The Shift Withdrawn," "The Bathers," "The Shepherd's Hour" ("L'Heure du berger"), and "Inspiration." Other works are in the museums of Lille, Besançon, Rouen, Tours, Nantes, Avignon, Amiens, Grenoble, Nancy, Orleans, Marseilles, &c., as well as at Chantilly. Some of Fragonard's finest work is in the private collections of the Rothschild family in London and Paris.

See R. Portalis, *Fragonard* (Paris, 1899), fully illustrated; Felix Naquet, *Fragonard* (Paris, 1890); Virgile Josz, *Fragonard—mœurs du XVIII^{e} siècle* (Paris, 1901); E. and J. de Goncourt, *L'Art du dix-huitième siècle—Fragonard* (Paris, 1883). (P. G. K.)

FRAHN, CHRISTIAN MARTIN (1782–1851), German numismatist and historian, was born at Rostock. He began his Oriental studies under Tychsen at the university of Rostock, and afterwards prosecuted them at Göttingen and Tübingen. He became a Latin master in Pestalozzi's famous institute in 1804, returned home in 1806, and in the following year was chosen to fill the chair of Oriental languages in the Russian university of Kazan. Though in 1815 he was invited to succeed Tychsen at Rostock, he preferred to go to St Petersburg, where he became director of the Asiatic museum and councillor of state. He died at St Petersburg.

Frahn wrote over 150 works. Among the more important are: *Numophylacium orientale Pototianum* (1813); *De numorum Bulgharicorum fonte antiquissimo* (1816); *Das muhammedanische Münzkabinet des asiatischen Museum der kaiserl. Akademie der Wissenschaften zu St Petersburg* (1821); *Numi cufici ex variis museis selecti* (1823); *Notice d'une centaine d'ouvrages arabes, &c., qui manquent en grande partie aux bibliothèques de l'Europe* (1834); and *Nova supplementa ad recensionem Num. Muham. Acad. Imp. Sci. Petropolitanae* (1855). His description of some medals struck by the Samanid and Bouid princes (1804) was composed in Arabic because he had no Latin types.

FRAME, a word employed in many different senses, signifying something joined together or shaped. It is derived ultimately from O.E. *fram*, from, in its primary meaning "forward." In constructional work it connotes the union of pieces of wood, metal or other material for purposes of enclosure as in the case of a picture or mirror frame. Frames intended for these uses are of great artistic interest but comparatively modern origin. There is no record of their existence earlier than the 16th century, but the decorative opportunities which they afforded caused speedy popularity in an artistic age, and the Renaissance found in the picture frame a rich and attractive means of expression. The impulses which made frames beautiful have long been extinct or dormant, but fine work was produced in such profusion that great numbers of examples are still extant. Frames for pictures or mirrors are usually square, oblong, round or oval, and, although they have usually been made of wood or composition overlaid upon wood, the richest and most costly materials have often been used. Ebony, ivory and tortoiseshell; crystal, amber and mother-of-pearl; lacquer, gold and silver, and almost every other metal have been employed for this purpose. The domestic frame has in fact varied from the simplest and cheapest form of a plain wooden moulding to the most richly carved examples. The introduction in the 17th century of larger sheets of glass gave the art of frame-making a great *essor*, and in the 18th century the increased demand for frames, caused chiefly by the introduction of cheaper forms of mirrors, led to the invention of a composition which could be readily moulded into stereotyped patterns and gilded. This was eventually the deathblow of the artistic frame, and since the use of composition moulding became normal, no important school of wood-carving has turned its attention to frames. The carvers of the Renaissance, and down to the middle of the 18th century, produced work which was often of the greatest beauty and elegance. In England nothing comparable to that of Grinling Gibbons and his school has since been produced. Chippendale was a great frame maker, but he not only had recourse to composition, but his designs were often extravagantly rococo. Even in France there has been no return of the great days when Oeben enclosed the looking-glasses which mirrored the Pompadour in frames that were among the choicest work of a gorgeous and artificial age. In the decoration of frames as in so many other respects France largely followed the fashions of Italy, which throughout the 16th and 17th centuries produced the most elaborate and grandiose, the richest and most palatial, of the mirror frames that have come down to us. English art in this respect was less exotic and more restrained, and many of the mirrors of the 18th century received frames the grace and simplicity of which have ensured their constant reproduction even to our own day.

FRAMINGHAM, a township of Middlesex county, Massachusetts, U.S.A., having an area of 27 sq. m. of hilly surface, dotted with lakes and ponds. Pop. (1890) 9239; (1900) 11,302, of whom 2391 were foreign-born; (1910 census) 12,948. It is served by the Boston & Albany, and the New York, New Haven & Hartford railways. Included within the township are three villages, Framingham Center, Saxonville and South Framingham, the last being much the most important. Framingham Academy was established in 1792, and in 1851 became a part of the public school system. A state normal school (the first normal school in the United States, established at Lexington in 1839, removed to Newton in 1844 and to Framingham in 1853) is situated here; and near South Framingham, in the township of Sherborn, is the state reformatory prison for women. South Framingham has large manufactories of paper tags, shoes, boilers, carriage wheels and leather board; formerly straw braid and bonnets were the principal manufactures. Saxonville manufactures worsted cloth. The value of the township's factory products increased from $3,007,301 in 1900 to $4,173,579 in 1905, or 38·8%. Framingham was first settled about 1640, and was named in honour of the English home (Framlingham) of Governor Thomas Danforth (1622–1699), to whom the land once belonged. In 1700 it was incorporated as a township. The "old Connecticut path," the Boston-to-Worcester turnpike, was important to the early fortunes of Framingham Center, while the Boston & Worcester railway (1834) made the greater fortune of South Framingham.

See J. H. Temple, *History of Framingham . . . 1640–1880* (Framingham, 1887).

FRAMLINGHAM, a market town in the Eye parliamentary division of Suffolk, 91 m. N.E. from London by a branch of the Great Eastern railway. Pop. (1901) 2526. The church of St Michael is a fine Perpendicular and Decorated building of black flint, surmounted by a tower 96 ft. high. In the interior there are a number of interesting monuments, among which the most noticeable are those of Thomas Howard, 3rd duke of Norfolk, and of Henry Howard, the famous earl of Surrey, who was beheaded by Henry VIII. The castle forms a picturesque ruin, consisting of the outer walls 44 ft. high and 8 ft. thick, 13 towers about 58 ft. high, a gateway and some outworks. About half a mile from the town is the Albert Memorial Middle Class College, opened in 1865, and capable of accommodating 300 boys. A bronze statue of the Prince Consort by Joseph Durham adorns the front terrace.

Framlingham (Frendlingham, Framalingaham) in early Saxon times was probably the site of a fortified earthwork to which St Edmund the Martyr is said to have fled from the Danes in 870. The Danes captured the stronghold after the escape of the king, but it was won back in 921, and remained in the hands of the crown, passing to William I. at the Conquest. Henry I. in 1100 granted it to Roger Bigod, who in all probability raised the first masonry castle. Hugh, son of Roger, created earl of Norfolk in 1141, succeeded his father, and the manor and castle remained in the Bigod family until 1306, when in default of heirs it reverted to the crown, and was granted by Edward II. to his half-brother Thomas de Brotherton, created earl of Norfolk in 1312. On an account roll of Framlingham Castle of 1324 there is an entry of "rent received from the borough," also of "rent from those living outside the borough," and in all probability burghal rights had existed at a much earlier date, when the town had grown into some importance under the shelter of the castle. Town and castle followed the vicissitudes of the dukedom of Norfolk, passing to the crown in 1405, and being alternately restored and forfeited by Henry V., Richard III., Henry VII., Edward VI., Mary, Elizabeth and James I., and finally sold in 1635 to Sir Robert Hitcham, who left it in 1636 to the master and fellows of Pembroke Hall, Cambridge.

In the account roll above mentioned reference is made to a fair and a market, but no early grant of either is to be found. In 1792 two annual fairs were held, one on Whit Monday, the other on the 10th of October; and a market was held every Saturday. The market day is still Saturday, but the fairs are discontinued.

See Robert Hawes, *History of Framlingham in the County of Suffolk*, edited by R. Loder (Woodbridge, 1798).

FRANC, a French coin current at different periods and of varying values. The first coin so called was one struck in gold by John II. of France in 1360. On it was the legend *Johannes Dei gracia Francorum rex*; hence, it is said, the name. It also bore an effigy of King John on horseback, from which it was called a *franc à cheval*, to distinguish it from another coin of the same value, issued by Charles V., on which the king was represented standing upright under a Gothic dais; this coin was termed a *franc à pied*. As a coin it disappeared after the reign of Charles VI., but the name continued to be used as an equivalent for the *livre tournois*, which was worth twenty sols. French writers would speak without distinction of so many livres or so many francs, so long as the sum mentioned was an even sum; otherwise livre was the correct term, thus "*trois livres*" or "*trois francs*," but "*trois livres cinq sols*." In 1795 the livre was legally converted into the franc, at the rate of 81 livres to 80 francs, the silver franc being made to weigh exactly five grammes. The franc is now the unit of the monetary system and also the money of account in France, as well as in Belgium and Switzerland. In Italy the equivalent is the lira, and in Greece the drachma. The franc is divided into 100 centimes, the lira into 100 centesimi and the drachma into 100 lepta. Gold is now the standard, the coins in common use being ten and twenty franc pieces. The twenty franc gold piece weighs 6·4516 grammes, ·900 fine. The silver coins are five, two, one, and half franc pieces. The five franc silver piece weighs 25 grammes, ·900 fine, while the franc piece weighs 5 grammes, ·835 fine. See also MONEY.

FRANÇAIS, ANTOINE, COUNT (1756–1836), better known as FRANÇAIS OF NANTES, French politician and author, was born at Beaurepaire, in the department of Isère. In 1791 he was elected to the legislative assembly by the department of Loire Inférieure, and was noted for his violent attacks upon the farmers general, the pope and the priests; but he was not re-elected to the Convention. During the Terror, as he had belonged to the Girondin party, he was obliged to seek safety in the mountains. In 1798 he was elected to the council of Five Hundred by the department of Isère, and became one of its secretaries; and in the following year he voted against the Directory. He took office under the consulate as prefect of Charente Inférieure, rose to be a member of the council of state, and in 1804 obtained the important post of director-general of the indirect taxes (*droits réunis*). The value of his services was recognized by the titles of count of the empire and grand officer of the Legion of Honour. On the second restoration he retired into private life; but from 1819 to 1822 he was representative of the department of Isère, and after the July revolution he was made a peer of France. He died at Paris on the 7th of March 1836.

Français wrote a number of works, but his name is more likely to be preserved by the eulogies of the literary men to whom he afforded protection and assistance. It is sufficient to mention *Le Manuscrit de feu M. Jérôme* (1825); *Recueil de fadaises composé sur la montagne à l'usage des habitants de la plaine* (1826); *Voyage dans la vallée des originaux* (1828); *Tableau de la vie rurale, ou l'agriculture enseignée d'une manière dramatique* (1829).

FRANÇAIS, FRANÇOIS LOUIS (1814–1897), French painter, was born at Plombières (Vosges), and, on attaining the age of fifteen, was placed as office-boy with a bookseller. After a few years of hard struggle, during which he made a precarious living by drawing on stone and designing woodcut vignettes for book illustration, he studied painting under Gigoux, and subsequently under Corot, whose influence remained decisive upon Français's style of landscape painting. He generally found his subjects in the neighbourhood of Paris, and though he never rivalled his master in lightness of touch and in the lyric poetry which is the principal charm of Corot's work, he is still counted among the leading landscape painters of his country and period. He exhibited first at the Salon in 1837 and was elected to the Académie des Beaux-Arts in 1890. Comparatively few of his pictures are to be found in public galleries, but his painting of "An Italian Sunset" is at the Luxembourg Museum in Paris. Other works of importance are "Daphnis et Chloé" (1872), "Bas Meudon" (1861), "Orpheus" (1863), "Le Bois sacré" (1864), "Le Lac de Némi" (1868).

FRANCATELLI, CHARLES ELMÉ (1805–1876), Anglo-Italian cook, was born in London, of Italian extraction, in 1805, and was educated in France, where he studied the art of cookery. Coming to England, he was employed successively by various noblemen, subsequently becoming manager of Crockford's club. He left Crockford's to become chief cook to Queen Victoria, and afterwards he was chef at the Reform Club. He was the author of *The Modern Cook* (1845), which has since been frequently republished; of a *Plain Cookery Book for the Working Classes* (1861), and of *The Royal English and Foreign Confectionery Book* (1862). Francatelli died at Eastbourne on the 10th of August 1876.

FRANCAVILLA FONTANA, a town and episcopal see of Apulia, Italy, in the province of Lecce, 22 m. by rail E. by N. of Taranto, 460 ft. above sea-level. Pop. (1901) 17,759 (town); 20,510 (commune). It is in a fine situation, and has a massive square castle of the Umperiali family, to whom, with Oria, it was sold by S. Carlo Borromeo in the 16th century for 40,000 ounces of gold, which he distributed in one day to the poor.

FRANCE, ANATOLE (1844–   ), French critic, essayist and novelist (whose real name was Jacques Anatole Thibault), was born in Paris on the 16th of April 1844. His father was a bookseller, one of the last of the booksellers, if we are to believe the Goncourts, into whose establishment men came, not merely to order and buy, but to dip, and turn over pages and discuss. As a child he used to listen to the nightly talks on literary subjects which took place in his father's shop. Nurtured in an atmosphere so essentially bookish, he turned naturally to literature. In 1868 his first work appeared, a study of Alfred de Vigny, followed in 1873 by a volume of verse, *Les Poëmes dorês*, dedicated to Leconte de Lisle, and, as such a dedication suggests, an outcome of the "Parnassian" movement; and yet another volume of verse appeared in 1876, *Les Noces corinthiennes.* But the poems in these volumes, though unmistakably the work of a man of great literary skill and cultured taste, are scarcely the poems of a man with whom verse is the highest form of expression.

He was to find his richest vein in prose. He himself, avowing his preference for a simple, or seemingly simple, style as compared with the *artistic* style, vaunted by the Goncourts—a style compounded of neologisms and "rare" epithets, and startling forms of expression—observes: "A simple style is like white light. It is complex, but not to outward seeming. In language, a beautiful and desirable simplicity is but an appearance, and results only from the good order and sovereign economy of the various parts of speech." And thus one may say of his own style that its beautiful translucency is the result of many qualities—felicity, grace, the harmonious grouping of words, a perfect measure. Anatole France is a sceptic. The essence of his philosophy, if a spirit so light, evanescent, elusive, can be said to have a philosophy, is doubt. He is a doubter in religion, metaphysics, morals, politics, aesthetics, science—a most genial and kindly doubter, and not at all without doubts even as to his own negative conclusions. Sometimes his doubts are expressed in his own person—as in the *Jardin d'épicure* (1894) from which the above extracts are taken, or *Le Livre de mon ami* (1885), which may be accepted, perhaps, as partly autobiographical; sometimes, as in *La Rôtisserie de la reine Pédauque* (1893) and *Les Opinions de M. Jérôme Coignard* (1893), or *L'Orme du mail* (1897), *Le Mannequin d'osier* (1897), *L'Anneau d'améthyste* (1899), and *M. Bergeret à Paris* (1901), he entrusts the expression of his opinions, dramatically, to some fictitious character—the abbé Coignard, for instance, projecting, as it were, from the 18th century some very effective criticisms on the popular political theories of contemporary France—or the M. Bergeret of the four last-named novels, which were published with the collective title of *Histoire contemporaine.* This series deals with some modern problems, and particularly, in *L'Anneau d'améthyste* and *M. Bergeret à Paris*, with the humours and follies of the anti-Dreyfusards. All this makes a piquant combination. Neither should reference be omitted to his *Crime de Sylvestre Bonnard* (1881), crowned by the Institute, nor to works more distinctly of fancy, such as *Balthasar* (1889), the story of one of the Magi or *Thaïs* (1890), the story of an actress and courtesan of Alexandria, whom a hermit converts, but with the loss of his own soul. His ironic comedy, *Crainquebille* (Renaissance theatre, 1903), was founded on his novel (1902) of the same year. His more recent work includes his anti-clerical *Vie de Jeanne d'Arc* (1908); his pungent satire the *Île des penguins* (1908); and a volume of stories, *Les Sept Femmes de la Barbe-Bleue* (1909). Lightly as he bears his erudition, it is very real and extensive, and is notably shown in his utilization of modern archaeological and historical research in his fiction (as in the stories in *Sur une pierre blanche*). As a critic—see the *Vie littéraire* (1888–1892), reprinted mainly from *Le Temps*—he is graceful and appreciative. Academic in the best sense, he found a place in the French Academy, taking the seat vacated by Lesseps, and was received into that body on the 24th of December 1896. In the *affaire Dreyfus* he sided with M. Zola.

For studies of M. Anatole France's talent see Maurice Bàrrès, *Anatole France* (1885); Jules Lemaître, *Les Contemporains* (2nd series, 1886); and G. Brandes, *Anatole France* (1908). In 1908 Frederic Chapman began an edition of *The works of Anatole France in an English translation* (John Lane).

FRANCE, a country of western Europe, situated between 51° 5′ and 42° 20′ N., and 4° 42′ W. and 7° 39′ E. It is hexagonal in form, being bounded N.W. by the North Sea, the Strait of Dover (*Pas de Calais*) and the English Channel (*La Manche*), W. by the Atlantic Ocean, S.W. by Spain, S.E. by the Mediterranean Sea, E. by Italy, Switzerland and Germany, N.E. by Germany, Luxemburg and Belgium. From north to south its length is about 600 m., measured from Dunkirk to the Col de Falguères; its breadth from east to west is 528 m., from the Vosges to Cape Saint Mathieu at the extremity of Brittany. The total area is estimated[1] at 207,170 sq. m., including the island of Corsica, which comprises 3367 sq. m. The coast-line of France extends for 384 m. on the Mediterranean, 700 on the North Sea, the Strait of Dover and the Channel, and 865 on the Atlantic. The country has the advantage of being separated from its neighbours over the greater part of its frontier by natural barriers of great strength, the Pyrenees forming a powerful bulwark on the south-west, the Alps on the south-east, and the Jura and the greater portion of the Vosges Mountains on the east. The frontier generally follows the crest line of these ranges. Germany possesses both slopes of the Vosges north of Mont Donon, from which point the north-east boundary is conventional and unprotected by nature.

France is geographically remarkable for its possession of great natural and historical highways between the Mediterranean and the Atlantic Ocean. The one, following the depression between the central plateau and the eastern mountains by way of the valleys of the Rhône and Saône, traverses the Côte d'Or hills and so gains the valley of the Seine; the other, skirting the southern base of the Cévennes, reaches the ocean by way of the Garonne valley. Another natural highway, traversing the lowlands to the west of the central plateau, unites the Seine basin with that of the Garonne.

Physiography.—A line drawn from Bayonne through Agen, Poitiers, Troyes, Reims and Valenciennes divides the country roughly into two dissimilar physical regions—to the west and north-west a country of plains and low plateaus; in the centre, east and south-east a country of mountains and high plateaus with a minimum elevation of 650 ft. To the west of this line the only highlands of importance are the granitic plateaus of Brittany and the hills of Normandy and Perche, which, uniting with the plateau of Beauce, separate the basins of the Seine and Loire. The highest elevations of these ranges do not exceed 1400 ft. The configuration of the region east of the dividing line is widely different. Its most striking feature is the mountainous and eruptive area known as the Massif Central, which covers south-central France. The central point of this huge tract is formed by the mountains of Auvergne comprising the group of Cantal, where the Plomb du Cantal attains 6096 ft., and that of Mont Dore, containing the Puy de Sancy (6188 ft.), the culminating point of the Massif, and to the north the lesser elevations of the Monts Dôme. On the west the downward slope is gradual by way of lofty plateaus to the heights of Limousin and Marche and the table-land of Quercy, thence to the plains of Poitou, Angoumois and Guienne. On the east only river valleys divide the Auvergne mountains from those of Forez and Margeride, western spurs of the Cévennes. On the south the Aubrac mountains and the barren plateaus known as the Causses intervene between them and the Cévennes. The main range of the Cévennes (highest point Mont Lozère, 5584 ft.) sweeps in a wide curve from the granitic table-land of Morvan in the north along the right banks of the Saône and Rhône to the Montagne Noire in the south, where it is separated from the Pyrenean system by the river Aude. On the south-western border of France the Pyrenees include

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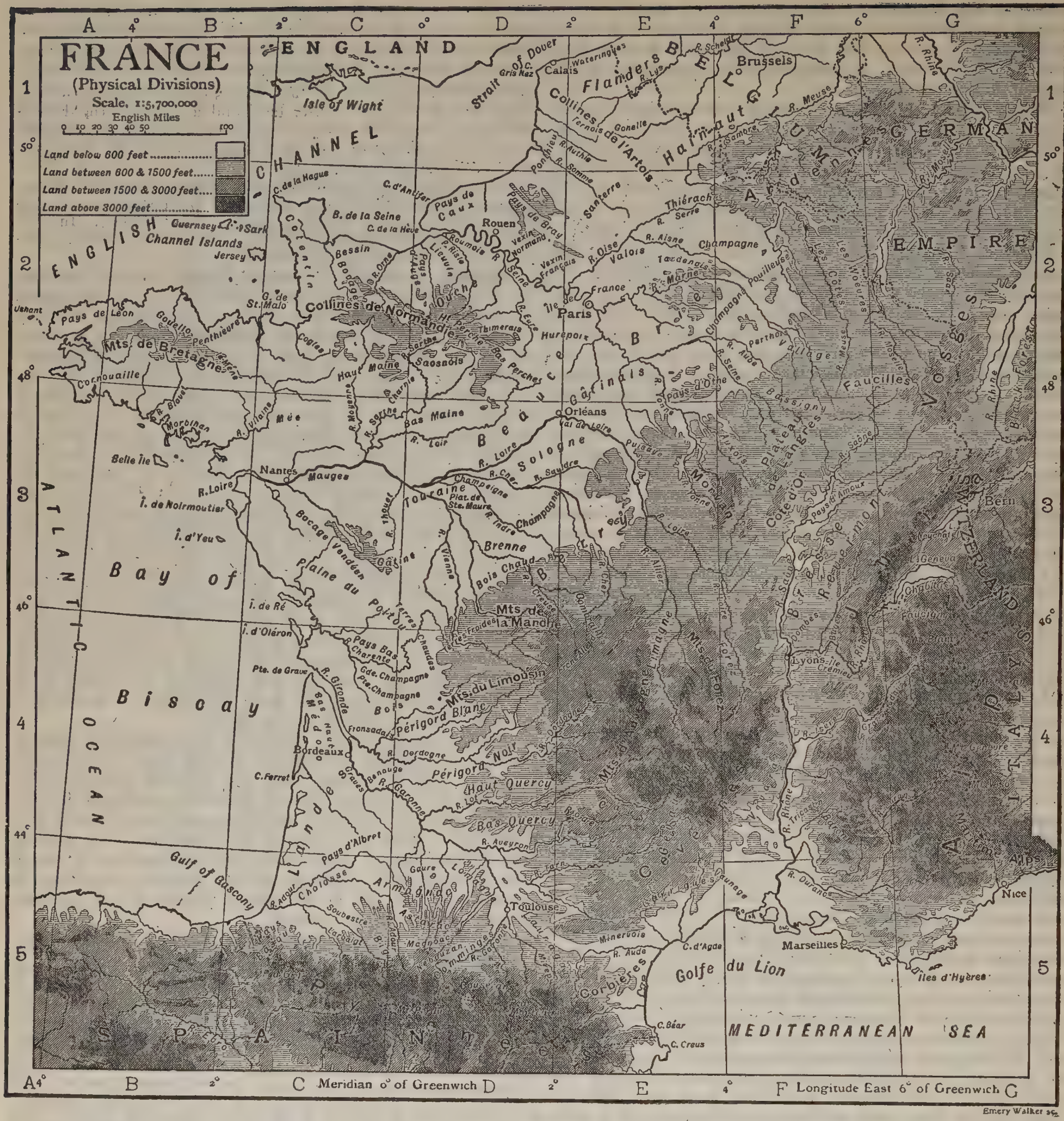
[1] By the *Service géographique de l'armée.*


FRANCE
(Physical Divisions)
Scale, 1:5,700,000
English Miles
0 10 20 30 40 50 100
Land below 600 feet
Land between 600 & 1500 feet
Land between 1500 & 3000 feet
Land above 3000 feet
ENGLAND
Isle of Wight
ENGLISH CHANNEL
Channel Islands
Guernsey
Sark
Jersey
Strait of Dover
Calais
C. Gris Nez
Flanders
Collines de l'Artois
Hainaut
BELGIUM
Brussels
Ardennes
GERMAN EMPIRE
R. Rhine
R. Meuse
R. Sambre
R. Moselle
C. de la Hague
Cotentin
B. de la Seine
Pays de Caux
Rouen
Pays de Bray
Santerre
Bessin
Collines de Normandie
Ile de France
Paris
Valois
Champagne
Thiérache
R. Aisne
R. Marne
R. Oise
R. Seine
Ushant
Pays de Léon
Mts. de Bretagne
Cornouaille
Morbihan
Belle Île
Nantes
R. Loire
Î. de Noirmoutier
Î. d'Yeu
Maine
Bas Maine
Beauce
Gâtinais
Orléans
Sologne
Touraine
Brie
Vosges
Faucilles
Bassigny
Plateau de Langres
Côte d'Or
Morvan
Jura
Berri
Brenne
Bocage Vendéen
Plaine du Poitou
Gâtine
Bay of Biscay
ATLANTIC OCEAN
I. de Ré
I. d'Oléron
Pte. de Grave
R. Gironde
Mts. de la Manche
Mts. du Limousin
Périgord Blanc
Périgord Noir
Bordeaux
C. Ferret
R. Dordogne
R. Garonne
Haut Quercy
Bas Quercy
R. Aveyron
Landes
Pays d'Albret
Gulf of Gascony
Armagnac
Toulouse
Cévennes
Mts. du Forez
Lyons
R. Rhône
R. Saône
Bern
L. Geneva
SWITZERLAND
ALPS
Maritime Alps
R. Durance
Nice
Marseilles
Îles d'Hyères
C. d'Agde
Golfe du Lion
Corbières
C. Béar
C. Creus
MEDITERRANEAN SEA
PYRENEES
SPAIN
Meridian 0° of Greenwich
Longitude East 6° of Greenwich
Emery Walker sc.

several peaks over 10,000 ft. within French territory; the highest elevation therein, the Vignemale, in the centre of the range, reaches 10,820 ft. On the north their most noteworthy offshoots are, in the centre, the plateau of Lannemezan from which rivers radiate fanwise to join the Adour and Garonne; and in the east the Corbière. On the south-eastern frontier the French Alps, which include Mont Blanc (15,800 ft.), and, more to the south, other summits over 11,000 ft. in height, cover Savoy and most of Dauphiné and Provence, that is to say, nearly the whole of France to the south and east of the Rhône. North of that river the parallel chains of the Jura form an arc of a circle with its convexity towards the north-west. In the southern and most elevated portion of the range there are several summits exceeding 5500 ft. Separated from the Jura by the defile of Belfort (Trouée de Belfort) the Vosges extend northward parallel to the course of the Rhine. Their culminating points in French territory, the Ballon d'Alsace and the Höhneck in the southern portion of the chain, reach 4100 ft. and 4480 ft. The Vosges are buttressed on the west by the Faucilles, which curve southwards to meet the plateau of Langres, and by the plateaus of Haute-Marne, united to the Ardennes on the north-eastern frontier by the wooded highlands of Argonne.

Seaboard.—The shore of the Mediterranean encircling the Gulf of the Lion (Golfe du Lion)[1] from Cape Cerbera to Martigues is low-lying and unbroken, and characterized chiefly by lagoons separated from the sea by sand-dunes. The coast, constantly encroaching on the sea by reason of the alluvium washed down by the rivers of the Pyrenees and Cévennes, is without important harbours saving that of Cette, itself continually invaded by the sand. East of Martigues the coast is rocky and of greater altitude, and is broken by projecting capes (Couronne, Croisette, Sicié, the peninsula of Giens and Cape Antibes), and by deep gulfs forming secure roadsteads such as those of Marseilles, which has the chief port in France, Toulon, with its great naval harbour, and Hyères, to which may be added the Gulf of St Tropez.

Along the Atlantic coast from the mouth of the Adour to the estuary of the Gironde there stretches a monotonous line of sand-dunes bordered by lagoons on the land side, but towards the sea harbourless and unbroken save for the Bay of Arcachon. To the north as far as the rocky point of St Gildas, sheltering the mouth of the Loire, the shore, often occupied by salt marshes (marshes of Poitou and Brittany), is low-lying and hollowed by deep bays sheltered by large islands, those of Oléron and Ré lying opposite the ports of Rochefort and La Rochelle, while Noirmoutier closes the Bay of Bourgneuf.

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[1] The etymology of this name (sometimes wrongly written Golfe de Lyon) is unknown.

Beyond the Loire estuary, on the north shore of which is the port of St Nazaire, the peninsula of Brittany projects into the ocean and here begins the most rugged, wild and broken portion of the French seaboard; the chief of innumerable indentations are, on the south the Gulf of Morbihan, which opens into a bay protected to the west by the narrow peninsula of Quiberon, the Bay of Lorient with the port of Lorient, and the Bay of Concarneau; on the west the dangerous Bay of Audierne and the Bay of Douarnenez separated from the spacious roadstead of Brest, with its important naval port, by the peninsula of Crozon, and forming with it a great indentation sheltered by Cape St Mathieu on the north and by Cape Raz on the south; on the north, opening into the English Channel, the Morlaix roads, the Bay of St Brieuc, the estuary of the Rance, with the port of St Malo and the Bay of St Michel. Numerous small archipelagoes and islands, of which the chief are Belle Île, Groix and Ushant, fringe the Breton coast. North of the Bay of St Michel the peninsula of Cotentin, terminating in the promontories of Hague and Barfleur, juts north into the English Channel and closes the bay of the Seine on the west. Cherbourg, its chief harbour, lies on the northern shore between the two promontories. The great port of Le Havre stands at the mouth of the Seine estuary, which opens into the bay of the Seine on the east. North of that point a line of high cliffs, in which occur the ports of Fécamp and Dieppe, stretches nearly to the sandy estuary of the Somme. North of that river the coast is low-lying and bordered by sand-dunes, to which succeed on the Strait of Dover the cliffs in the neighbourhood of the port of Boulogne and the marshes and sand-dunes of Flanders, with the ports of Calais and Dunkirk, the latter the principal French port on the North Sea.

To the maritime ports mentioned above must be added the river ports of Bayonne (on the Adour), Bordeaux (on the Garonne), Nantes (on the Loire), Rouen (on the Seine). On the whole, however, France is inadequately provided with natural harbours; her long tract of coast washed by the Atlantic and the Bay of Biscay has scarcely three or four good seaports, and those on the southern shore of the Channel form a striking contrast to the spacious maritime inlets on the English side.

Rivers.—The greater part of the surface of France is divided between four principal and several secondary basins.

The basin of the Rhône, with an area (in France) of about 35,000 sq. m., covers eastern France from the Mediterranean to the Vosges, from the Cévennes and the Plateau de Langres to the crests of the Jura and the Alps. Alone among French rivers, the Rhône, itself Alpine in character in its upper course, is partly fed by Alpine rivers (the Arve, the Isère and the Durance) which have their floods in spring at the melting of the snow, and are maintained by glacier-water in summer. The Rhône, the source of which is in Mont St Gothard, in Switzerland, enters France by the narrow defile of L'Écluse, and has a somewhat meandering course, first flowing south, then north-west, and then west as far as Lyons, whence it runs straight south till it reaches the Mediterranean, into which it discharges itself by two principal branches, which form the delta or island of the Camargue. The Ain, the Saône (which rises in the Faucilles and in the lower part of its course skirting the regions of Bresse and Dombes, receives the Doubs and joins the Rhone at Lyons), the Ardèche and the Gard are the affluents on the right; on the left it is joined by the Arve, the Isère, the Drôme and the Durance. The small independent river, the Var, drains that portion of the Alps which fringes the Mediterranean.

The basin of the Garonne occupies south-western France with the exception of the tracts covered by the secondary basins of the Adour, the Aude, the Hérault, the Orb and other smaller rivers, and the low-lying plain of the Landes, which is watered by numerous coast rivers, notably by the Leyre. Its area is nearly 33,000 sq. m., and extends from the Pyrenees to the uplands of Saintonge, Périgord and Limousin. The Garonne rises in the valley of Aran (Spanish Pyrenees), enters France near Bagnères-de-Luchon, has first a north-west course, then bends to the north-east, and soon resumes its first direction. Joining the Atlantic between Royan and the Pointe de Grave, opposite the tower of Cordouan. In the lower part of its course, from the Bec-d'Ambez, where it receives the Dordogne, it becomes considerably wider, and takes the name of Gironde. The principal affluents are the Ariège, the Tarn with the Aveyron and the Agout, the Lot and the Dordogne, which descends from Mont Dore-les-Bains, and joins the Garonne at Bec-d'Ambez, to form the Gironde. All these affluents are on the right, and with the exception of the Ariège, which descends from the eastern Pyrenees, rise in the mountains of Auvergne and the southern Cévennes, their sources often lying close to those of the rivers of the Loire and Rhone basins. The Neste, a Pyrenean torrent, and the Save, the Gers and the Baïse, rising on the plateau of Lannemezan, are the principal left-hand tributaries of the Garonne. North of the basin of the Garonne an area of over 3800 sq. m. is watered by the secondary system of the Charente, which descends from Chéronnac (Haute-Vienne), traverses Angoulême and falls into the Atlantic near Rochefort. Farther to the north a number of small rivers, the chief of which is the Sèvre Niortaise, drain the coast region to the south of the plateau of Gâtine.

The basin of the Loire, with an area of about 47,000 sq. m., includes a great part of central and western France or nearly a quarter of the whole country. The Loire rises in Mont Gerbier de Jonc, in the range of the Vivarais mountains, flows due north to Nevers, then turns to the north-west as far as Orléans, in the neighbourhood of which it separates the marshy region of the Sologne (*q.v.*) on the south from the wheat-growing region of Beauce and the Gâtinais on the north. Below Orléans it takes its course towards the south-west, and lastly from Saumur runs west, till it reaches the Atlantic between Paimbœuf and St Nazaire. On the right the Loire receives the waters of the Furens, the Arroux, the Nièvre, the Maine (formed by the Mayenne and the Sarthe with its affluent the Loir), and the Erdre, which joins the Loire at Nantes; on the left, the Allier (which receives the Dore and the Sioule), the Loiret, the Cher, the Indre, the Vienne with its affluent the Creuse, the Thouet, and the Sèvre-Nantaise. The peninsula of Brittany and the coasts of Normandy on both sides of the Seine estuary are watered by numerous independent streams. Amongst these the Vilaine, which passes Rennes and Redon, waters, with its tributaries, an area of 4200 sq. m. The Orne, which rises in the hills of Normandy and falls into the Channel below Caen, is of considerably less importance.

The basin of the Seine, though its area of a little over 30,000 sq. m. is smaller than that of any of the other main systems, comprises the finest network of navigable rivers in the country. It is by far the most important basin of northern France, those of the Somme and Scheldt in the north-west together covering less than 5000 sq. m., those of the Meuse and the Rhine in the north-east less than 7000 sq. m. The Seine descends from the Langres plateau, flows north-west down to Méry, turns to the west, resumes its north-westerly direction at Montereau, passes through Paris and Rouen and discharges itself into the Channel between Le Havre and Honfleur. Its affluents are, on the right, the Aube; the Marne, which joins the Seine at Charenton near Paris; the Oise, which has its source in Belgium and is enlarged by the Aisne; and the Epte; on the left the Yonne, the Loing, the Essonne, the Eure and the Rille.

Lakes.—France has very few lakes. The Lake of Geneva, which forms 32 m. of the frontier, belongs to Switzerland. The most important French lake is that of Grand-Lieu, between Nantes and Paimbœuf (Loire-Inférieure), which presents a surface of 17,300 acres. There may also be mentioned the lakes of Bourget and Annecy (both in Savoy), St Point (Jura), Paladru (Isère) and Nantua (Ain). The marshy districts of Sologne, Brenne, Landes and Dombes still contain large undrained tracts. The coasts present a number of maritime inlets, forming inland bays, which communicate with the sea by channels of greater or less width. Some of these are on the south-west coast, in the Landes, as Carcans, Lacanau, Biscarosse, Cazau, Sanguinet; but more are to be found in the south and south-east, in Languedoc and Provence, as Leucate, Sigean, Thau, Vaccarès, Berre, &c. Their want of depth prevents them from serving as roadsteads for shipping, and they are useful chiefly for fishing or for the manufacture of bay-salt.

Climate.—The north and north-west of France bear a great resemblance, both in temperature and produce, to the south of England, rain occurring frequently, and the country being consequently suited for pasture. In the interior the rains are less frequent, but when they occur are far more heavy, so that there is much less difference in the annual rainfall there as compared with the rest of the country than in the number of rainy days. The annual rainfall for the whole of France averages about 32 in. The precipitation is greatest on the Atlantic seaboard and in the elevated regions of the interior. It attains over 60 in. in the basin of the Adour (71 in. at the western extremity of the Pyrenees), and nearly as much in the Vosges, Morvan, Cévennes and parts of the central plateau. The zone of level country extending from Reims and Troyes to Angers and Poitiers, with the exception of the Loire valley and the Brie, receives less than 24 in. of rain annually (Paris about 23 in.), as also does the Mediterranean coast west of Marseilles. The prevailing winds, mild and humid, are west winds from the Atlantic; continental climatic influence makes itself felt in the east wind, which is frequent in winter and in the east of France, while the *mistral*, a violent wind from the north-west, is characteristic of the Mediterranean region. The local climates of France may be grouped under the following seven designations: (1) Sequan climate, characterizing the Seine basin and northern France, with a mean temperature of 50° F., the winters being cold, the summers mild; (2) Breton climate, with a mean temperature of 51·8° F., the winters being mild, the summers temperate, it is characterized by west and south-west winds and frequent fine rains; (3) Girondin climate (characterizing Bordeaux, Agen, Pau, &c.), having a mean of 53·6° F., with mild winters and hot summers, the prevailing wind is from the north-west, the average rainfall about 28 in.; (4) Auvergne climate, comprising the Cévennes, central plateau, Clermont, Limoges and Rodez, mean temperature 51·8° F., with cold winters and hot summers; (5) Vosges climate (comprehending Epinal, Mézières and Nancy), having a mean of 48·2° F., with long and severe winters and hot and rainy summers; (6) Rhône climate (experienced by Lyons, Chalon, Mâcon, Grenoble) mean temperature 51·8° F., with cold and wet winters and hot summers, the prevailing winds are north and south; (7) Mediterranean climate, ruling at Valence, Nîmes, Nice and Marseilles, mean temperature, 57·5° F., with mild winters and hot and almost rainless summers.

Flora and Fauna.—The flora of southern France and the Mediterranean is distinct from that of the rest of the country, which does not differ in vegetation from western Europe generally. Evergreens predominate in the south, where grow subtropical plants such as the myrtle, arbutus, laurel, holm-oak, olive and fig; varieties of the same kind are also found on the Atlantic coast (as far north as the Cotentin), where the humidity and mildness of the climate favour their growth. The orange, date-palm and eucalyptus have been acclimatized on the coast of Provence and the Riviera. Other trees of southern France are the cork-oak and the Aleppo and maritime pines. In north and central France the chief trees are the oak, the beech, rare south of the Loire, and the hornbeam; less important varieties are the birch, poplar, ash, elm and walnut. The chestnut covers considerable areas in Périgord, Limousin and Béarn; resinous trees (firs, pines, larches, &c.) form fine forests in the Vosges and Jura.

The indigenous fauna include the bear, now very rare but still found in the Alps and Pyrenees, the wolf, harbouring chiefly in the Cévennes and Vosges, but in continually decreasing areas; the fox, marten, badger, weasel, otter, the beaver in the extreme south of the Rhône valley, and in the Alps the marmot; the red deer and roe deer are preserved in many of the forests, and the wild boar is found in several districts; the chamois and wild goat survive in the Pyrenees and Alps. Hares, rabbits and squirrels are common. Among birds of prey may be mentioned the eagle and various species of hawk, and among game-birds the partridge and pheasant. The reptiles include the ringed-snake, slow-worm, viper and lizard. (R. Tr.)

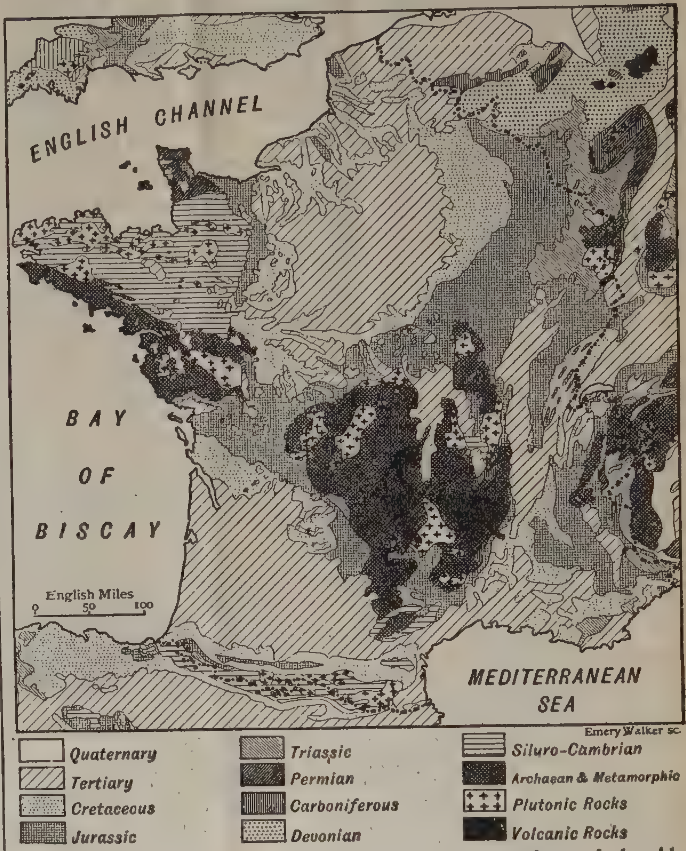
Geology.—Many years ago it was pointed out by Élie de Beaumont and Dufrénoy that the Jurassic rocks of France form upon the map an incomplete figure of 8. Within the northern circle of the 8 lie the Mesozoic and Tertiary beds of the Paris basin, dipping inwards; within the southern circle lie the ancient rocks of the Central Plateau, from which the later beds dip outwards. Outside the northern circle lie on the west the folded Palaeozoic rocks of Brittany, and on the north the Palaeozoic *massif* of the Ardennes. Outside the southern circle lie on the west the Mesozoic and Tertiary beds of the basin of the Garonne, with the Pyrenees beyond, and on the east the Mesozoic and Tertiary beds of the valley of the Rhône, with the Alps beyond.

In the geological history of France there have been two great periods of folding since Archean times. The first of these occurred towards the close of the Palaeozoic era, when a great mountain system was raised in the north running approximately from E. to W., and another chain arose in the south, running from S.W. to N.E. Of the former the remnants are now seen in Brittany and the Ardennes; of the latter the Cévennes and the Montagne Noire are the last traces visible on the surface. The second great folding took place in Tertiary times, and to it was due the final elevation of the Jura and the Western Alps and of the Pyrenees. No great mountain chain was ever raised by a single effort, and folding went on to some extent in other periods besides those mentioned. There were, moreover, other and broader oscillations which raised or lowered extensive areas without much crumpling of the strata, and to these are due some of the most important breaks in the geological series.

The oldest rocks, the gneisses and schists of the Archean period, form nearly the whole of the Central Plateau, and are also exposed in the axes of the folds in Brittany. The Central Plateau has probably been a land mass ever since this period, but the rest of the country was flooded by the Palaeozoic sea. The earlier deposits of that sea now rise to the surface in Brittany, the Ardennes, the Montagne Noire and the Cévennes, and in all these regions they are intensely folded. Towards the close of the Palaeozoic era France had become a part of a great continent; in the north the Coal Measures of the Boulonnais and the Nord were laid down in direct connexion with those of Belgium and England, while in the Central Plateau the Coal Measures were deposited in isolated and scattered basins. The Permian and Triassic deposits were also, for the most part, of continental origin; but with the formation of the Rhaetic beds the sea again began to spread, and throughout the greater part of the Jurassic period it covered nearly the whole of the country except the Central Plateau, Brittany and the Ardennes. Towards the end of the period, however, during the deposition of the Portlandian beds, the sea again retreated, and in the early part of the Cretaceous period was limited (in France) to the catchment basins of the Saône and Rhône—in the Paris basin the contemporaneous deposits were chiefly estuarine and were confined to the northern and eastern rim. Beginning with the Aptian and Albian the sea again gradually spread over the country and attained its maximum in the early part of the Senonian epoch, when once more the ancient massifs of the Central Plateau, Brittany and the Ardennes, alone rose above the waves. There was still, however, a well-marked difference between the deposits of the northern and the southern parts of France, the former consisting of chalk, as in England, and the latter of sandstones and limestones with Hippurites. During the later part of the Cretaceous period the sea gradually retreated and left the whole country dry.

During the Tertiary period arms of the sea spread into France—in the Paris basin from the north, in the basins of the Loire and the Garonne from the west, and in the Rhône area from the south. The changes, however, were too numerous and complex to be dealt with here.

In France, as in Great Britain, volcanic eruptions occurred during several of the Palaeozoic periods, but during the Mesozoic era the country was free from outbursts, except in the regions of the Alps and Pyrenees. In Tertiary times the Central Plateau was the theatre of great volcanic activity from the Miocene to the Pleistocene periods, and many of the volcanoes remain as nearly perfect cones to the present day. The rocks are mainly basalts and andesites, together with trachytes and phonolites, and some of the basaltic flows are of enormous extent.



On the geology of France see the classic *Explication de la carte géologique de la France* (Paris, vol. i. 1841, vol. ii. 1848), by Dufrénoy and Élie de Beaumont; a more modern account, with full references, is given by A. de Lapparent, *Traité de géologie* (Paris, 1906). (J. A. H.)

Population.

The French nation is formed of many different elements. Iberian influence in the south-west, Ligurian on the shores of the Mediterranean, Germanic immigrations from east of the Rhine and Scandinavian immigrations in the north-west have tended to produce ethnographical diversities which ease of intercommunication and other modern conditions have failed to obliterate. The so-called Celtic type, exemplified by individuals of rather less than average height, brown-haired and brachycephalic, is the fundamental element in the nation and peoples the region between the Seine and the Garonne; in southern France a different type, dolichocephalic, short and with black hair and eyes, predominates. The tall, fair and blue-eyed individuals who are found to the north-east of the Seine and in Normandy appear to be nearer in race to the Scandinavian and Germanic invaders; a tall and darker type with long faces and aquiline noses occurs in some parts of Franche-Comté and Champagne, the Vosges and the Perche. From the Celts has been derived the gay, brilliant and adventurous temperament easily moved to extremes of enthusiasm and depression, which combined with logical and organizing faculties of a high order, the heritage from the Latin domination, and with the industry, frugality and love of the soil natural in an agricultural people go to make up the national character. The Bretons, who most nearly represent the Celts, and the Basques, who inhabit parts of the western versant of the Pyrenees, have preserved their distinctive languages and customs, and are ethnically the most interesting sections of the nation; the Flemings of French Flanders where Flemish is still spoken are also racially distinct. The immigration of Belgians into the northern departments and of Italians into those of the south-east exercise a constant modifying influence on the local populations.

During the 19th century the population of France increased to a less extent than that of any other country (except Ireland) for which definite data exist, and during the last twenty years of that period it was little more than stationary. The following table exhibits the rate of increase as indicated by the censuses from 1876 to 1906.

	Population.
1876	36,905,788
1881	37,672,048
1886	38,218,903
1891	38,342,948
1896	38,517,975
1901	38,961,945
1906	39,252,245

Thus the rate of increase during the decade 1891–1901 was ·16%, whereas during the same period the population of England increased 1·08%. The birth-rate markedly decreased during the 19th century; despite an increase of population between 1801 and 1901 amounting to 40%, the number of births in the former was 904,000, as against 857,000 in the latter year, the diminution being accompanied by a decrease in the annual number of deaths.[1] In the following table the decrease in births and deaths for the decennial periods during the thirty years ending 1900 are compared.

	Births.	
1871–1880	935,000	or 25·4 per 1000
1881–1890	909,000	,, 23·9 ,,
1891–1900	853,000	,, 22·2 ,,
	Deaths.	
1871–1880	870,900	or 23·7 per 1000
1881–1890	841,700	,, 22·1 ,,
1891–1900	829,000	,, 21·5 ,,

About two-thirds of the French departments, comprising a large proportion of those situated in mountainous districts and in the basin of the Garonne, where the birth-rate is especially feeble, show a decrease in population. Those which show an increase usually possess large centres of industry and are already thickly populated, *e.g.* Seine and Pas-de-Calais. In most departments the principal cause of decrease of population is the attraction of great centres. The average density of population in France is about 190 to the square mile, the tendency being for the large towns to increase at the expense of the small towns as well as the rural communities. In 1901 37% of the population lived in centres containing more than 2000 inhabitants, whereas in 1861 the proportion was 28%. Besides the industrial districts the most thickly populated regions include the coast of the department of Seine-Inférieure and Brittany, the wine-growing region of the Bordelais and the Riviera.[2]

In the quinquennial period 1901–1905, out of the total number of births the number of illegitimate births to every 1000 inhabitants was 2·0, as compared with 2·1 in the four preceding periods of like duration.

In 1906 the number of foreigners in France was 1,009,415 as compared with 1,027,491 in 1896 and 1,115,214 in 1886. The departments with the largest population of foreigners were Nord (191,678), in which there is a large proportion of Belgians; Bouches-du-Rhône (123,497), Alpes-Maritimes (93,554), Var (47,475), Italians being numerous in these three departments; Seine (153,647), Meurthe-et-Moselle (44,595), Pas-de-Calais (21,436) and Ardennes (21,401).

The following table gives the area in square miles of each of the eighty-seven departments with its population according to the census returns of 1886, 1896 and 1906:

Departments.	Area, sq. m.	Population.		
		1886.	1896.	1906.
Ain	2,249	364,408	351,569	345,856
Aisne	2,867	555,925	541,613	534,495
Allier	2,849	424,582	424,378	417,961
Alpes-Maritimes	1,442	238,057	265,155	334,007
Ardèche	2,145	375,472	363,501	347,140
Ardennes	2,028	332,759	318,865	317,505
Ariège	1,893	237,619	219,641	205,684
Aube	2,326	257,374	251,435	243,670
Aude	2,448	332,080	310,513	308,327
Aveyron	3,386	415,826	389,464	377,299
Basses-Alpes	2,698	129,494	118,142	113,126
Basses-Pyrénées	2,977	432,999	423,572	426,817
Belfort, Territoire de	235	79,758	88,047	95,421
Bouches-du-Rhône	2,026	604,857	673,820	765,918
Calvados	2,197	437,267	417,176	403,431
Cantal	2,231	241,742	234,382	228,690
Charente	2,305	366,408	356,236	351,733
Charente-Inférieure	2,791	462,803	453,455	453,793
Cher	2,819	355,349	347,725	343,484
Corrèze	2,273	326,494	322,393	317,430
Corse (Corsica)	3,367	278,501	290,168	291,160
Côte-d'Or	3,392	381,574	368,168	357,959
Côtes-du-Nord	2,786	628,256	616,074	611,506
Creuse	2,164	284,942	279,366	274,094
Deux-Sèvres	2,337	353,766	346,694	339,466
Dordogne	3,561	492,205	464,822	447,052
Doubs	2,030	310,963	302,046	298,438
Drôme	2,533	314,615	303,491	297,270
Eure	2,330	358,829	340,652	330,140
Eure-et-Loir	2,293	283,719	280,469	273,823
Finistère	2,713	707,820	739,648	795,103
Gard	2,270	417,099	416,036	421,166
Gers	2,428	274,391	250,472	231,088
Gironde	4,140	775,845	809,902	823,925
Haute-Garonne	2,458	481,169	459,377	442,065
Haute-Loire	1,931	320,063	316,699	314,770
Haute-Marne	2,415	247,781	232,057	221,724
Hautes-Alpes	2,178	122,924	113,229	107,498
Haute-Saône	2,075	290,954	272,891	263,890
Haute-Savoie	1,775	275,018	265,872	260,617
Hautes-Pyrénées	1,750	234,825	218,973	209,397
Haute-Vienne	2,144	363,182	375,724	385,732
Hérault	2,403	439,044	469,684	482,799
Ille-et-Vilaine	2,699	621,384	622,039	611,805
Indre	2,666	296,147	289,206	290,216
Indre-et-Loire	2,377	340,921	337,064	337,916
Isère	3,179	581,680	568,933	562,315
Jura	1,951	281,292	266,143	257,725
Landes	3,615	302,266	292,884	293,397
Loir-et-Cher	2,479	279,214	278,153	276,019
Loire	1,853	603,384	625,336	643,943
Loire-Inférieure	2,694	643,884	646,172	666,748
Loiret	2,629	374,875	371,019	364,999
Lot	2,017	271,514	240,403	216,611
Lot-et-Garonne	2,079	307,437	286,377	274,610
Lozère	1,999	141,264	132,151	128,016
Maine-et-Loire	2,706	527,680	514,870	513,490
Manche	2,475	520,865	500,052	487,443
Marne	3,167	429,494	439,577	434,157
Mayenne	2,012	340,063	321,187	305,457
Meurthe-et-Moselle	2,038	431,693	466,417	517,508
Meuse	2,409	291,971	290,384	280,220
Morbihan	2,738	535,256	552,028	573,152
Nièvre	2,659	347,645	333,899	313,972
Nord	2,229	1,670,184	1,811,868	1,895,861

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[1] In 1907 deaths were superior in number to births by nearly 20,000.

[2] The following list comprises the three most densely-populated and the three most sparsely populated departments in France:

Inhabitants to the Square Mile.

Seine	20,803	Basses-Alpes	42
Nord	850	Hautes-Alpes	49
Rhône	778	Lozère	64

Departments.	Area, sq. m.	Population.		
		1886.	1896.	1906.
Oise	2,272	403,146	404,511	410,049
Orne	2,372	367,248	339,162	315,993
Pas-de-Calais	2,606	853,526	906,249	1,012,466
Puy-de-Dôme	3,094	570,964	555,078	535,419
Pyrénées-Orientales	1,599	211,187	208,387	213,171
Rhône	1,104	772,912	839,329	858,907
Saône-et-Loire	3,330	625,885	621,237	613,377
Sarthe	2,410	436,111	425,077	421,470
Savoie	2,389	267,428	259,790	253,297
Seine	185	2,961,089	3,340,514	3,848,618
Seine-Inférieure	2,448	833,386	837,824	863,879
Seine-et-Marne	2,289	355,136	359,044	361,939
Seine-et-Oise	2,184	618,089	669,098	749,753
Somme	2,423	548,982	543,279	532,567
Tarn	2,231	358,757	339,827	330,533
Tarn-et-Garonne	1,440	214,046	200,390	188,553
Var	2,325	283,689	309,191	324,638
Vaucluse	1,381	241,787	236,313	239,178
Vendée	2,708	434,808	441,735	442,777
Vienne	2,719	342,785	338,114	333,621
Vosges	2,279	413,707	421,412	429,812
Yonne	2,880	355,364	332,656	315,199
Total	207,076	38,218,903	38,517,975	39,252,245

The French census uses the commune as the basis of its returns, and employs the following classifications in respect to communal population: (1) Total communal population. (2) *Population comptée à part*, which includes soldiers and sailors, inmates of prisons, asylums, schools, members of religious communities, and workmen temporarily engaged in public works. (3) Total *municipal* population, *i.e.* communal population minus the *population comptée à part*. (4) *Population municipale agglomérée au chef-lieu de la commune*, which embraces the urban population as opposed to the rural population. The following tables, showing the growth of the largest towns in France, are drawn up on the basis of the fourth classification, which is used throughout this work in the articles on French towns, except where otherwise stated.

In 1906 there were in France twelve towns with a population of over 100,000 inhabitants. Their growth or decrease from 1886 to 1906 is shown in the following table:

	1886.	1896.	1906.
Paris	2,294,108	2,481,223	2,711,931
Lyons	344,124	398,867	430,186
Marseilles	249,938	332,515	421,116
Bordeaux	225,281	239,806	237,707
Lille	143,135	160,723	196,624
St Étienne	103,229	120,300	130,940
Le Havre	109,199	117,009	129,403
Toulouse	123,040	124,187	125,856
Roubaix	89,781	113,899	119,955
Nantes	110,638	107,137	118,244
Rouen	100,043	106,825	111,402
Reims	91,130	99,001	102,800

In the same years the following eighteen towns, now numbering from 50,000 to 100,000 inhabitants, each had:

	1886.	1896.	1906.
Nice	61,464	69,140	99,556
Nancy	69,463	83,668	98,302
Toulon	53,941	70,843	87,997
Amiens	68,177	74,808	78,407
Limoges	56,699	64,718	75,906
Angers	65,152	69,484	73,585
Brest	59,352	64,144	71,163
Nîmes	62,198	66,905	70,708
Montpellier	45,930	62,717	65,983
Dijon	50,684	58,355	65,516
Tourcoing	41,183	55,705	62,694
Rennes	52,614	57,249	62,024
Tours	51,467	56,706	61,507
Calais	52,839	50,818	59,623
Grenoble	43,260	50,084	58,641
Orléans	51,208	56,915	57,544
Le Mans	46,991	49,665	54,907
Troyes	44,864	50,676	51,228

Of the population in 1901, 18,916,889 were males and 19,533,899 females, an excess of females over males of 617,010, *i.e.* 1·6% or about 508 females to every 492 males. In 1881 the proportion was 501 females to every 499 males, since when the disparity has been slightly more marked at every census. Below is a list of the departments in which the number of women to every thousand men was (1) greatest and (2) least.

(1)		(2)	
Creuse	1131	Belfort	886
Côtes-du-Nord	1117	Basses-Alpes	893
Seine	1103	Var	894
Calvados	1100	Meuse	905
Cantal	1098	Hautes-Alpes	908
Seine-Inférieure	1084	Meurthe-et-Moselle	918
Basses-Pyrénées	1080	Haute-Savoie	947

Departments from which the adult males emigrate regularly either to sea or to seek employment in towns tend to fall under the first head, those in which large bodies of troops are stationed under the second.

The annual number of emigrants from France is small. The Basques of Basses-Pyrénées go in considerable numbers to the Argentine Republic, the inhabitants of Basses Alpes to Mexico and the United States, and there are important French colonies in Algeria and Tunisia.

The following table shows the distribution of the active population of France according to their occupations in 1901.

Occupation.	Males.	Females.	Total.
Forestry and agriculture	5,517,617	2,658,952	8,176,569
Manufacturing industries	3,695,213	2,124,642	5,819,855
Trade	1,132,621	689,999	1,822,620
Domestic service	223,861	791,176	1,015,037
Transport	617,849	212,794	830,643
Public service	1,157,835	139,734	1,297,569
Liberal professions	226,561	173,278	399,839
Mining, quarries	261,320	5,031	266,351
Fishing	63,372	4,400	67,772
Unclassed	14,316	4,504	18,820
Grand Total	12,910,565	6,804,510	19,715,075

Religion.

Great alterations were made with regard to religious matters in France by a law of December 1905, supplemented by a law of January 1907 (see below, *Law and Institutions*). Before that time three religions (*cultes*) were recognized and supported by the state—the Roman Catholic, the Protestant (subdivided into the Reformed and Lutheran) and the Hebrew. In Algeria the Mahommedan religion received similar recognition. By the law of 1905 all the churches ceased to be recognized or supported by the state and became entirely separated therefrom, while the adherents of all creeds were permitted to form associations for public worship (*associations cultuelles*), upon which the expenses of maintenance were from that time to devolve. The state, the departments, and the communes were thus relieved from the payment of salaries and grants to religious bodies, an item of expenditure which amounted in the last year of the old system to £1,101,000 paid by the state and £302,200 contributed by the departments and communes. Before these alterations the relations between the state and the Roman Catholic communion, by far the largest and most important in France, were chiefly regulated by the provisions of the Concordat of 1801, concluded between the first consul, Bonaparte, and Pope Pius VII. and by other measures passed in 1802.

France is divided into provinces and dioceses as follows:

Archbishoprics.	Bishoprics.
Paris	Chartres, Meaux, Orléans, Blois, Versailles.
Aix	Marseilles, Fréjus, Digne, Gap, Nice, Ajaccio.
Albi	Rodez, Cahors, Mende, Perpignan.
Auch	Aire, Tarbes, Bayonne.
Avignon	Nîmes, Valence, Viviers, Montpellier.
Besançon	Verdun, Bellay, St Dié, Nancy.
Bordeaux	Agen, Angoulême, Poitiers, Périgueux, La Rochelle, Luçon.
Bourges	Clermont, Limoges, Le Puy, Tulle, St Flour.
Cambrai	Arras.
Chambéry	Annecy, Tarentaise, St Jean-de-Maurienne.
Lyons	Autun, Langres, Dijon, St Claude, Grenoble.

Archbishoprics.	Bishoprics.
REIMS	Soissons, Châlons-sur-Marne, Beauvais, Amiens.
RENNES	Quimper, Vannes, St Brieuc.
ROUEN	Bayeux, Evreux, Sées, Coutances.
SENS	Troyes, Nevers, Moulins.
TOULOUSE	Montauban, Pamiers, Carcassonne.
TOURS	Le Mans, Angers, Nantes, Laval.

The dioceses are divided into parishes each under a parish priest known as a *curé* or *desservant* (incumbent). The bishops and archbishops, formerly nominated by the government and canonically confirmed by the pope, are now chosen by the latter. The appointment of curés rested with the bishops and had to be confirmed by the government, but this confirmation is now dispensed with. The archbishops used to receive an annual salary of £600 each and the bishops £400.

The archbishops and bishops are assisted by vicars-general (at salaries previously ranging from £100 to £180), and to each cathedral is attached a chapter of canons. A curé, in addition to his regular salary, received fees for baptisms, marriages, funerals and special masses, and had the benefit of a free house called a *presbytère*. The total personnel of state-paid Roman Catholic clergy amounted in 1903 to 36,169. The Roman priests are drawn from the seminaries, established by the church for the education of young men intending to join its ranks, and divided into lower and higher seminaries (*grands et petits séminaires*), the latter giving the same class of instruction as the *lycées*.

The number of Protestants may be estimated at about 600,000 and the Jews at about 70,000. The greatest number of Jews is to be found at Paris, Lyons and Bordeaux, while the departments of the centre and of the south along the range of the Cévennes, where Calvinism flourishes, are the principal Protestant localities, Nîmes being the most important centre. Considerable sprinklings of Protestants are also to be found in the two Charentes, in Dauphiné, in Paris and in Franche-Comté. The two Protestant bodies used to cost the state about £60,000 a year and the Jewish Church about £6000.

Both Protestant churches have a parochial organization and a presbyterian form of church government. In the Reformed Church (far the more numerous of the two bodies) each parish has a council of presbyters, consisting of the pastor and lay-members elected by the congregation. Several parishes form a consistorial circumscription, which has a consistorial council consisting of the council of presbyters of the chief town of the circumscription, the pastor and one delegate of the council of presbyters from each parish and other elected members. There are 103 circumscriptions (including Algeria), which are grouped into 21 provincial synods composed of a pastor and lay delegate from each consistory. All the more important questions of church discipline and all decisions regulating the doctrine and practice of the church are dealt with by the synods. At the head of the whole organization is a General Synod, sitting at Paris. The organization of the Lutheran Church (*Église de la confession d'Augsburg*) is broadly similar. Its consistories are grouped into two special synods, one at Paris and one at Montbéliard (for the department of Doubs and Haute-Saône and the territory of Belfort, where the churches of this denomination are principally situated). It also has a general synod—composed of 2 inspectors,[1] 5 pastors elected by the synod of Paris, and 6 by that of Montbéliard, 22 laymen and a delegate of the theological faculty at Paris—which holds periodical meetings and is represented in its relations with the government by a permanent executive commission.

The Jewish parishes, called synagogues, are grouped into departmental consistories (Paris, Bordeaux, Nancy, Marseilles, Bayonne, Lille, Vesoul, Besançon and three in Algeria). Each synagogue is served by a rabbi assisted by an officiating minister, and in each consistory is a grand rabbi. At Paris is the central consistory, controlled by the government and presided over by the supreme grand rabbi.

Agriculture.

Of the population of France some 17,000,000 depend upon agriculture for their livelihood, though only about 6,500,000 are engaged in work on the land. The cultivable land of the country occupies some 195,000 sq. m. or about 94% of the total area; of this 171,000 sq. m. are cultivated. There are besides 12,300 sq. m. of uncultivable area covered by lakes, rivers, towns, &c. Only the roughest estimate is possible as to the sizes of holdings, but in general terms it may be said that about 3 million persons are proprietors of holdings under 25 acres in extent amounting to between 15 and 20% of the cultivated area, the rest being owned by some 750,000 proprietors, of whom 150,000 possess half the area in holdings averaging 400 acres in extent. About 80% of holdings (amounting to about 60% of the cultivated area) are cultivated by the proprietor; of the rest approximately 13% are let on lease and 7% are worked on the system known as *métayage* (*q.v.*).

The capital value of land, which greatly decreased during the last twenty years of the 19th century, is estimated at £3,120,000,000, and that of stock, buildings, implements, &c., at £340,000,000. The value per acre of land, which exceeds £48 in the departments of Seine, Rhône and those fringing the north-west coast from Nord to Manche inclusive, is on the average about £29, though it drops to £16 and less in Morbihan, Landes, Basses-Pyrénées, and parts of the Alps and the central plateau.

While wheat and wine constitute the staples of French agriculture, its distinguishing characteristic is the variety of its products. *Cereals* occupy about one-third of the cultivated area. For the production of *wheat*, in respect of which France is self-supporting, French Flanders, the Seine basin, notably the Beauce and the Brie, and the regions bordering on the lower course of the Loire and the upper course of the Garonne, are the chief areas. Rye, on the other hand, one of the least valuable of the cereals, is grown chiefly in the poor agricultural territories of the central plateau and western Brittany. Buckwheat is cultivated mainly in Brittany. Oats and barley are generally cultivated, the former more especially in the Parisian region, the latter in Mayenne and one or two of the neighbouring departments. Meslin, a mixture of wheat and rye, is produced in the great majority of French departments, but to a marked extent in the basin of the Sarthe. Maize covers considerable areas in Landes, Basses-Pyrénées and other south-western departments.

	Average Acreage (Thousands of Acres).		Average Production (Thousands of Bushels).		Average Yield per Acre (Bushels).	
	1886–1895.	1896–1905.	1886–1895.	1896–1905.	1886–1895.	1896–1905.
Wheat	17,004	16,580	294,564	317,707	17·3	19·1
Meslin	720	491	12,193	8,826	16·9	17·0
Rye	3,888	3,439	64,651	56,612	16·6	16·4
Barley	2,303	1,887	47,197	41,066	20·4	21·0
Oats	9,507	9,601	240,082	253,799	25·2	26·4
Buckwheat	1,484	1,392	26,345	23,136	17·7	16·6
Maize	1,391	1,330	25,723	24,459	18·4	18·4

Forage Crops.—The mangold-wurzel, occupying four times the acreage of swedes and turnips, is by far the chief root-crop in France. It is grown largely in the departments of Nord and Pas-de-Calais and in those of the Seine basin, the southern limit of its cultivation being roughly a line drawn from Bordeaux to Lyons. The average area occupied by it in the years from 1896 to 1905 was 1,043,000 acres, the total average production being 262,364,000 cwt. and the average production per acre $10\frac{1}{2}$ tons. Clover, lucerne and sainfoin make up the bulk of artificial pasturage, while vetches, crimson clover and cabbage are the other chief forage crops.

Vegetables.—*Potatoes* are not a special product of any region, though grown in great quantities in the Bresse and the Vosges. Early potatoes and other vegetables (*primeurs*) are largely cultivated in the districts bordering the English Channel. Market-gardening is an important industry in the regions round Paris, Amiens and Angers, as it is round Toulouse, Montauban, Avignon and in southern France generally. The market-gardeners of Paris and its vicinity have a high reputation for skill in the forcing of early vegetables under glass.

Potatoes: Decennial Averages.

	Acreage.	Total Yield (Tons).	Average Yield per Acre (Tons).
1886–1895	3,690,000	11,150,000	3·02
1896–1905	3,735,000	11,594,000	3·1

Industrial Plants.[2]—The manufacture of sugar from beetroot, owing to the increased use of sugar, became highly important during the latter half of the 19th century, the industry both of cultivation and manufacture being concentrated in the northern departments of Aisne, Nord, Pas-de-Calais, Somme and Oise, the first named supplying nearly a quarter of the whole amount produced in France.

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[1] Inspectors are placed at the head of the synodal circumscriptions; their functions are to consecrate candidates for the ministry, install the pastors, &c.

[2] *Cultures industrielles*—Under this head the French group beetroot, hemp, flax and other plants, the products of which pass through some process of manufacture before they reach the consumer.

Flax and hemp showed a decreasing acreage from 1881 onwards. Flax is cultivated chiefly in the northern departments of Nord, Seine-Inférieure, Pas-de-Calais, Côtes-du-Nord, hemp in Sarthe, Morbihan and Maine-et-Loire.

Colza, grown chiefly in the lower basin of the Seine (Seine-Inférieure and Eure), is the most important of the oil-producing plants, all of which show a diminishing acreage. The three principal regions for the production of tobacco are the basin of the Garonne (Lot-et-Garonne, Dordogne, Lot and Gironde), the basin of the Isère (Isère and Savoie) and the department of Pas-de-Calais. The state controls its cultivation, which is allowed only in a limited number of departments. Hops cover only about 7000 acres, being almost confined to the departments of Nord, Côte d'Or and Meurthe-et-Moselle.

Decennial Averages 1896–1905.

	Acreage.	Production (Tons).	Average Yield per Acre (Tons).
Sugar beet . .	672,000	6,868,000	10·2
Hemp	64,856	18,451[1]	·28[1]
Flax	57,893	17,857[1]	·30[1]
Colza	102,454	47,697	·46
Tobacco . . .	41,564	22,453	·54

Vineyards (see WINE).—The vine grows generally in France, except in the extreme north and in Normandy and Brittany. The great wine-producing regions are:

1. The country fringing the Mediterranean coast and including Hérault (240,822,000 gals. in 1905), and Aude (117,483,000 gals. in 1905), the most productive departments in France in this respect.
2. The department of Gironde (95,559,000 gals. in 1905), whence come Médoc and the other wines for which Bordeaux is the market.
3. The lower valley of the Loire, including Touraine and Anjou, and the district of Saumur.
4. The valley of the Rhône.
5. The Burgundian region, including Côte d'Or and the valley of the Saône (Beaujolais, Mâconnais).
6. The Champagne.
7. The Charente region, the grapes of which furnish brandy, as do those of Armagnac (department of Gers).

The decennial averages for the years 1896–1905 were as follows:

Acreage of productive vines . . .	4,056,725
Total production in gallons . . .	1,072,622,000
Average production in gallons per acre . . .	260

Fruit.—Fruit-growing is general all over France, which, apart from bananas and pine-apples, produces in the open air all the ordinary species of fruit which its inhabitants consume. Some of these may be specially mentioned. The cider apple, which ranks first in importance, is produced in those districts where cider is the habitual drink, that is to say, chiefly in the region north-west of a line drawn from Paris to the mouth of the Loire. The average annual production of cider during the years 1896 to 1905 was 304,884,000 gallons. Dessert apples and pears are grown there and in the country on both banks of the lower Loire, the valley of which abounds in orchards wherein many varieties of fruit flourish and in nursery-gardens. The hilly regions of Limousin, Périgord and the Cévennes are the home of the chestnut, which in some places is still a staple food; walnuts grow on the lower levels of the central plateau and in lower Dauphiné and Provence, figs and almonds in Provence, oranges and citrons on the Mediterranean coast, apricots in central France, the olive in Provence and the lower valleys of the Rhône and Durance. Truffles are found under the oaks of Périgord, Comtat-Venaissin and lower Dauphiné. The mulberry grows in the valleys of the Rhône and its tributaries, the Isère, the Drôme, the Ardèche, the Gard and the Durance, and also along the coast of the Mediterranean. Silk-worm rearing, which is encouraged by state grants, is carried on in the valleys mentioned and on the Mediterranean coast east of Marseilles. The numbers of growers decreased from 139,000 in 1891 to 124,000 in 1905. The decrease in the annual average production of cocoons is shown in the preceding table.

Silk Cocoons.	1891–1895.	1896–1900.	1901–1905.
Annual average production over quinquennial periods in lb.	19,587,000	17,696,000	16,566,000

Snails are reared in some parts of the country as an article of food, those of Burgundy being specially esteemed.

Stock-raising.—From this point of view the soil of France may be divided into four categories:

1. The rich pastoral regions where dairy-farming and the fattening of cattle are carried on with most success, viz. (*a*) Normandy, Perche, Cotentin and maritime Flanders, where horses are bred in great numbers; (*b*) the strip of coast between the Gironde and the mouth of the Loire; (*c*) the Morvan including the Nivernais and the Charolais, from which the famous Charolais breed of oxen takes its name; (*d*) the central region of the central plateau including the districts of Cantal and Aubrac, the home of the famous beef-breeds of Salers and Aubrac.[2] The famous *pré-salé* sheep are also reared in the Vendée and Cotentin.

2. The poorer grazing lands on the upper levels of the Alps, Pyrenees, Jura and Vosges, the Landes, the more outlying regions of the central plateau, southern Brittany, Sologne, Berry, Champagne-Pouilleuse, the Crau and the Camargue, these districts being given over for the most part to sheep-raising.

3. The plain of Toulouse, which with the rest of south-western France produces good draught oxen, the Parisian basin, the plains of the north to the east of the maritime region, the lower valley of the Rhône and the Bresse, where there is little or no natural pasturage, and forage is grown from seed.

4. West, west-central and eastern France outside these areas, where meadows are predominant and both dairying and fattening are general. Included therein are the dairying and horse-raising district of northern Brittany and the dairying regions of Jura and Savoy.

In the industrial regions of northern France cattle are stall-fed with the waste products of the beet-sugar factories, oil-works and distilleries. *Swine*, bred all over France, are more numerous in Brittany, Anjou (whence comes the well-known breed of Craon), Poitou, Burgundy, the west and north of the central plateau and Béarn. Upper Poitou and the zone of south-western France to the north of the Pyrenees are the chief regions for the breeding of mules. Asses are reared in Béarn, Corsica, Upper Poitou, the Limousin, Berry and other central regions. Goats are kept in the mountainous regions (Auvergne, Provence, Corsica). The best poultry come from the Bresse, the district of Houdan (Seine-et-Oise), the district of Le Mans and Crèvecœur (Calvados).

The *prés naturels* (meadows) and *herbages* (unmown pastures) of France, *i.e.* the grass-land of superior quality as distinguished from *paturages et pacages*, which signifies pasture of poorer quality, increased in area between 1895 and 1905 as is shown below:

	1895 (Acres).	1905 (Acres).
Prés naturels . .	10,852,000	11,715,000
Herbages . . .	2,822,000	3,022,000

The following table shows the number of live stock in the country at intervals of ten years since 1885.

	Cattle.			Sheep and Lambs.	Pigs.	Horses.	Mules.	Asses.
	Cows.	Other Kinds.	Total.					
1885	6,414,487	6,690,483	13,104,970	22,616,547	5,881,088	2,911,392	238,620	387,227
1895	6,359,795	6,874,033	13,233,828	21,163,767	6,306,019	2,812,447	211,479	357,778
1905	7,515,564	6,799,988	14,315,552	17,783,209	7,558,779	3,169,224	198,865	365,181

Agricultural Organization.—In France the interests of agriculture are entrusted to a special ministry, comprising the following divisions: (1) forests, (2) breeding-studs (*haras*); (3) agriculture, a department which supervises agricultural instruction and the distribution of grants and premiums; (4) agricultural improvements, draining, irrigation, &c.; (5) an intelligence department which prepares statistics, issues information as to prices and markets, &c. The minister is assisted by a superior council of agriculture, the members of which, numbering a hundred, include senators, deputies and prominent agriculturists. The ministry employs inspectors, whose duty it is to visit the different parts of the country and to report on their respective position and wants. The reports which they furnish help to determine the distribution of the moneys dispensed by the state in the form of subventions to agricultural societies and in many other ways. The chief type of agricultural society is the *comice agricole*, an association for the discussion of agricultural problems and the organization of provincial shows. There are besides several thousands of local syndicates, engaged in the purchase of materials and sale of produce on the most advantageous terms for their members, credit banks and mutual insurance societies (see CO-OPERATION). Three societies demand special mention: the *Union centrale des agriculteurs de France*, to which the above syndicates are affiliated; the *Société nationale d'agriculture*, whose mission is to further agricultural progress and to supply the government with information on everything appertaining thereto and the *Société des agriculteurs de France*.

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[1] Fibre only. In the years 1896–1905, 8130 tons of hemp-seed and 12,137 tons of flax-seed was the average annual production in addition to fibre.

[2] The chief breeds of horses are the *Boulonnais* (heavy draught), the *Percheron* (light and heavy draught), the *Anglo-Norman* (light draught and heavy cavalry)and the *Tarbais* of the western Pyrenees (saddle horses and light cavalry). Of cattle besides the breeds named the *Norman* (beef and milk), the *Limousin* (beef), the *Montbéliard*, the *Bazadais*, the *Flamand*, the *Breton* and the *Parthenais* breeds may be mentioned.

Among a variety of premiums awarded by the state are those for the best cultivated estates and for irrigation works, and to the owners of the best stallions and brood-mares. *Haras* or stallion stables containing in all over 3000 horses are established in twenty-two central towns, and annually send stallions, which are at the disposal of private individuals in return for a small fee, to various stations throughout the country. Other institutions belonging to the state are the national sheep-fold of Rambouillet (Seine-et-Oise) and the cow-house of Vieux-Pin (Orne) for the breeding of Durham cows. Four different grades of institution for agricultural instruction are under state direction: (1) farm-schools and schools of apprenticeship in dairying, &c., to which the age of admission is from 14 to 16 years; (2) practical schools, to which boys of from 13 to 18 years of age are admitted. These number forty-eight, and are intended for sons of farmers of good position; (3) national schools, which are established at Grignon (Seine-et-Oise), Rennes and Montpellier, candidates for which must be 17 years of age; (4) the National Agronomic Institute at Paris, which is intended for the training of estate agents, professors, &c. There are also departmental chairs of agriculture, the holders of which give instruction in training-colleges and elsewhere and advise farmers.

Forests.—In relation to its total extent, France presents but a very limited area of forest land, amounting to only 36,700 sq. m. or about 18% of the entire surface of the country. Included under the denomination of "forest" are lands—*surfaces boisées*—which are *bush* rather than *forest*. The most wooded parts of France are the mountains and plateaus of the east and of the north-east, comprising the pine-forests of the Vosges and Jura (including the beautiful Forest of Chaux), the Forest of Haye, the Forest of Ardennes, the Forest of Argonne, &c.; the Landes, where replanting with maritime pines has transformed large areas of marsh into forest; and the departments of Var and Ariège. The Central Mountains and the Morvan also have considerable belts of wood. In the Parisian region there are the Forests of Fontainebleau (66 sq. m.), of Compiègne (56 sq. m.), of Rambouillet, of Villers-Cotterets, &c. The Forest of Orléans, the largest in France, covers about 145 sq. m. The Alps and Pyrenees are in large part deforested, but reafforestation with a view to minimizing the effects of avalanches and sudden floods is continually in progress.

Of the forests of the country approximately one-third belongs to the state, communes and public institutions. The rest belongs to private owners who are, however, subject to certain restrictions. The Department of Waters[1] and Forests (Administration des Eaux et Forêts) forms a branch of the ministry of agriculture. It is administered by a director-general, who has his headquarters at Paris, assisted by three administrators who are charged with the working of the forests, questions of rights and law, finance and plantation works. The establishment consists of 32 conservators, each at the head of a district comprising one or more departments, 200 inspectors, 215 sub-inspectors and about 300 *gardes généraux*. These officials form the higher grade of the service (*agents*). There are besides several thousand forest-rangers and other employés (*préposés*). The department is supplied with officials of the higher class from the National School of Waters and Forests at Nancy, founded in 1824.

Industries.

In France, as in other countries, the development of machinery, whether run by steam, water-power or other motive forces, has played a great part in the promotion of industry; the increase in the amount of steam horse-power employed in industrial establishments is, to a certain degree, an index to the activity of the country as regards manufactures.

The appended table shows the progress made since 1850 with regard to steam power. Railway and marine locomotives are not included.

Years.	No. of Establishments.	No. of Steam-Engines.	Total Horse-Power.
1852	6,543	6,080	76,000
1861	14,153	15,805	191,000
1871	22,192	26,146	316,000
1881	35,712	44,010	576,000
1891	46,828	58,967	916,000
1901	58,151	75,866	1,907,730
1905	61,112	79,203	2,232,263

With the exception of Loire, Bouches-du-Rhône and Rhône, the chief industrial departments of France are to be found in the north and north-east of the country. In 1901 and 1896 those in which the working inhabitants of both sexes were engaged in industry as opposed to agriculture to the extent of 50% (approximately) or over, numbered eleven, viz.:—

Departments.	Total Working Population (1901).	Industrial Population (1901).	Percentage engaged in Industry.	
			1901.	1896.
Nord	848,306	544,177	64·15	63·45
Territoire de Belfort	40,703	24,470	60·10	58·77
Loire	292,808	167,693	57·27	54·73
Seine	2,071,344	1,143,809	55·22	53·54
Bouches-du-Rhône	341,823	187,801	54·94	51·00
Rhône	449,121	243,571	54·23	54·78
Meurthe-et-Moselle	215,501	115,214	53·46	50·19
Ardennes	139,270	73,250	52·60	52·42
Vosges	208,142	107,547	51·67	51·05
Pas-de-Calais	404,153	200,402	49·58	46·55
Seine-Inférieure	428,591	206,612	48·21	49·85

The department of Seine, comprising Paris and its suburbs, which has the largest manufacturing population, is largely occupied with the manufacture of dress, millinery and articles of luxury (perfumery, &c.), but it plays the leading part in almost every great branch of industry with the exception of

Groups.	Basins.	Departments.	Average Production (Thousands of Metric Tons) 1901–1905.
Nord and Pas-de-Calais	Valenciennes	Nord, Pas-de-Calais	20,965
	Le Boulonnais	Pas-de-Calais	
Loire	St Étienne and Rive-de-Gier	Loire	3,601
	Communay	Isère	
	Ste Foy l'Argentière	Rhône	
	Roannais	Loire	
Gard	Alais	Gard, Ardèche	1,954
	Aubenas	Ardèche	
	Le Vigan	Gard	
Bourgogne and Nivernais	Decize	Nièvre	1,881
	La Chapelle-sous-Dun	Saône-et-Loire	
	Bert	Allier	
	Sincey	Côte-d'Or	
Tarn and Aveyron	Aubin	Aveyron	1,770
	Carmaux and Albi	Tarn	
	Rodez	Aveyron	
	St Perdoux	Lot	
Bourbonnais	Commentry and Doyet	Allier	994
	St Eloi	Puy-de-Dôme	
	L'Aumance	Allier	
	La Queune	Allier	

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[1] The department is also entrusted with surveillance over river-fishing, pisciculture and the amelioration of pasture.

spinning and weaving. The typically industrial region of France is the department of Nord, the seat of the woollen industry, but also prominently concerned in other textile industries, in metal working, and in a variety of other manufactures, fuel for which is supplied by its coal-fields. The following sketch of the manufacturing industry of France takes account chiefly of those of its branches which are capable in some degree of localization. Many of the great industries of the country, *e.g.* tanning, brick-making, the manufacture of garments, &c., are evenly distributed throughout it, and are to be found in or near all larger centres of population.

Coal.—The principal mines of France are coal and iron mines. The production of coal and lignite averaging 33,465,000 metric tons[1] in the years 1901–1905 represents about 73% of the total consumption of the country; the surplus is supplied from Great Britain, Belgium and Germany. The preceding table shows the average output of the chief coal-groups for the years 1901–1905 inclusive. The Flemish coal-basin, employing over 100,000 hands, produces 60% of the coal mined in France.

French lignite comes for the most part from the department of Bouches-du-Rhône (near Fuveau).

The development of French coal and lignite mining in the 19th century, together with records of prices, which rose considerably at the end of the period, is set forth in the table below:

Years.	Average Yearly Production (Thousands of Metric Tons).	Average Price per Ton at Pit Mouth (Francs).
1821–1830	1,495	10·23
1831–1840	2,571	9·83
1841–1850	4,078·5	9·69
1851–1860	6,857	11·45
1861–1870	11,831	11·61
1871–1880	16,774	14·34
1881–1890	21,542	11·55
1891–1900	29,190	11·96
1901–1905	33,465	14·18

Iron.—The iron-mines of France are more numerous than its coal-mines, but they do not yield a sufficient quantity of ore for the needs of the metallurgical industries of the country; as will be seen in the table below the production of iron in France gradually increased during the 19th century; on the other hand, a decline in prices operated against a correspondingly marked increase in its annual value.

Years.	Average Annual Production (Thousands of Metric Tons).	Price per Metric Ton (Francs).
1841–1850	1247	6·76
1851–1860	2414·5	5·51
1861–1870	3035	4·87
1871–1880	2514	5·39
1881–1890	2934	3·99
1891–1900	4206	3·37
1901–1905	6072	3·72

The department of Meurthe-et-Moselle (basins of Nancy and Longwy-Briey) furnished 84% of the total output during the quinquennial period 1901–1905, may be reckoned as one of the principal iron-producing regions of the world. The other chief producers were Pyrénées-Orientales, Calvados, Haute-Marne (Vassy) and Saône-et-Loire (Mazenay and Change).

Other Ores.—The mining of zinc, the chief deposits of which are at Malines (Gard), Les Bormettes (Var) and Planioles (Lot), and of lead, produced especially at Chaliac (Ardèche), ranks next in importance to that of iron. Iron-pyrites come almost entirely from Sain-Bel (Rhône), manganese chiefly from Ariège and Saône-et-Loire, antimony from the departments of Mayenne, Haute-Loire and Cantal. Copper and mispickel are mined only in small quantities. The table below gives the average production of zinc, argentiferous lead, iron-pyrites and other ores during the quinquennial period 1901–1905.

	Production (Thousands of Metric Tons).	Value £
Zinc	60·3	206,912
Lead	18·5	100,424
Iron-pyrites	297·2	170,312
Other ores	36·0	68,376

Salt, &c.—Rock-salt is worked chiefly in the department of Meurthe-et-Moselle, which produces more than half the average annual product of salt. For the years 1896–1905 this was 1,010,000 tons, including both rock- and sea-salt. The salt-marshes of the Mediterranean coast, especially the Étang de Berre and those of Loire-Inférieure, are the principal sources of sea-salt. Sulphur is obtained near Apt (Vaucluse) and in a few other localities of south-eastern France; bituminous schist near Autun (Saône-et-Loire) and Buxières (Allier). The most extensive peat-workings are in the valleys of the Somme; asphalt comes from Seyssel (Ain) and Puy-de-Dôme.

The mineral springs of France are numerous, of varied character and much frequented. Leading resorts are: in the Pyrenean region, Amélie-les-Bains, Bagnères-de-Luchon, Bagnères-de-Bigorre, Barèges, Cauterets, Eaux-Bonnes, Eaux-Chaudes and Dax; in the Central Plateau, Mont-Dore, La Bourboule, Bourbon l'Archambault, Vichy, Royat, Chaudes-Aigues, Vals, Lamalon; in the Alps, Aix-les-Bains and Evian; in the Vosges and Faucilles, Plombières, Luxeuil, Contrexéville, Vittel, Martigny and Bourbonne-les-Bains. Outside these main groups St Amand-les-Eaux and Foyes-les-Eaux may be mentioned.

Quarry-Products.—Quarries of various descriptions are numerous all over France. Slate is obtained in large quantities from the departments of Maine-et-Loire (Angers), Ardennes (Fumay) and Mayenne (Renazé). Stone-quarrying is specially active in the departments round Paris, Seine-et-Oise employing more persons in this occupation than any other department. The environs of Creil (Oise) and Château-Landon (Seine-et-Marne) are noted for their freestone (*pierre de taille*), which is also abundant at Euville and Lérouville in Meuse; the production of plaster is particularly important in the environs of Paris, of kaolin of fine quality at Yrieix (Haute-Vienne), of hydraulic lime in Ardèche (Le Teil), of lime phosphates in the department of Somme, of marble in the departments of Haute-Garonne (St Béat), Hautes-Pyrénées (Campan, Sarrancolin), Isère and Pas-de-Calais, and of cement in Pas-de-Calais (vicinity of Boulogne) and Isère (Grenoble). Paving-stone is supplied in large quantities by Seine-et-Oise, and brick-clay is worked chiefly in Nord, Seine and Pas-de-Calais. The products of the quarries of France for the five years 1901–1905 averaged £9,311,000 per annum in value, of which building material brought in over two-thirds.

Metallurgy.—The average production and value of iron and steel manufactured in France in the last four decades of the 19th century is shown below:

Years.	Cast Iron.		Wrought Iron and Steel.	
	Product (Thousands of Metric Tons).	Value (Thousands of £).	Product (Thousands of Metric Tons).	Value (Thousands of £).
1861–1870	1191·5	5012	844	8,654
1871–1880	1391	5783	1058·5	11,776
1881–1890	1796	5119	1376	11,488
1891–1900	2267	5762	1686	14,540
1903	2841	7334	1896	15,389

Taking the number of hands engaged in the industry as a basis of comparison, the most important departments as regards iron and steel working in 1901 were:

Department.	Chief Centres.	Hands engaged in Production of Pig-Iron and Steel.	Hands engaged in Production of Engineering Material and Manufactured Goods.
Seine		600	102,500
Nord	Lille, Anzin, Denain, Douai, Hautmont, Maubeuge	14,000	45,000
Loire	Rive-de-Gier, Firminy, St Étienne, St Chamond	9,500	17,500
Meurthe-et-Moselle	Pont-à-Mousson, Frouard, Longwy, Nancy	16,500	6,500
Ardennes	Charleville, Nouzon	800	23,000

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[1] The metric ton = 1000 kilogrammes or 2204 lb.

Rhône (Lyons), Saône-et-Loire (Le Creusot, Chalon-sur-Saône) and Loire-Inférieure (Basse-Indre, Indret, Couëron, Trignac) also play a considerable part in this industry.

The chief centres for the manufacture of cutlery are Châttelerault (Vienne), Langres (Haute-Marne) and Thiers (Puy-de-Dôme); for that of arms St Étienne, Tulle and Châttelerault; for that of watches and clocks, Besançon (Doubs) and Montbéliard (Doubs); for that of optical and mathematical instruments Paris, Morez (Jura) and St Claude (Jura); for that of locksmiths' ware the region of Vimeu (Pas-de-Calais).

There are important zinc works at Auby and St Amand (Nord) and Viviez (Aveyron) and Noyelles-Godault (Pas-de-Calais); there are lead works at the latter place, and others of greater importance at Couëron (Loire-Inférieure). Copper is smelted in Ardennes and Pas-de-Calais. The production of these metals, which are by far the most important after iron and steel, increased steadily during the period 1890–1905, and reached its highest point in 1905, details for which year are given below:

	Zinc.	Lead.	Copper.
Production (in metric tons)	43,200	24,100	7,600
Value	£1,083,000	£386,000	£526,000

Wool.—In 1901, 161,000 persons were engaged in the spinning and other preparatory processes and in the weaving of wool. The woollen industry is carried on most extensively in the department of Nord (Roubaix, Tourcoing, Fourmies). Of second rank are Reims and Sedan in the Champagne group; Elbeuf, Louviers and Rouen in Normandy; and Mazamet (Tarn).

Cotton.—In 1901, 166,000 persons were employed in the spinning and weaving of cotton, French cotton goods being distinguished chiefly for the originality of their design. The cotton industry is distributed in three principal groups. The longest established is that of Normandy, having its centres at Rouen, Havre, Evreux, Falaise and Flers. Another group in the north of France has its centres at Lille, Tourcoing, Roubaix, St Quentin and Amiens. That of the Vosges, which has experienced a great extension since the loss of Alsace-Lorraine, comprises Epinal, St Dié, Remiremont and Belfort. Other groups of less importance are situated in the Lyonnais (Roanne and Tarare) and Mayenne (Laval and Mayenne).

Silk.—The silk industry occupied 134,000 hands in 1901. The silk fabrics of France hold the first place, particularly the more expensive kinds. The industry is concentrated in the departments bordering the river Rhône, the chief centres being Lyons (Rhône), Voiron (Isère), St Étienne and St Chamond (Loire) (the two latter being especially noted for their ribbons and trimmings) and Annonay (Ardèche) and other places in the departments of Ain, Gard and Drôme.

Flax, Hemp, Jute, &c.—The preparation and spinning of these materials and the manufacture of nets and rope, together with the weaving of linen and other fabrics, give occupation to 112,000 persons chiefly in the departments of Nord (Lille, Armentières, Dunkirk), Somme (Amiens) and Maine-et-Loire (Angers, Cholet).

Hosiery, the manufacture of which employs 55,000 hands, has its chief centre in Aube (Troyes). The production of lace and guipure, occupying 112,000 persons, is carried on mainly in the towns and villages of Haute-Loire and in Vosges (Mirecourt), Rhône (Lyons), Pas-de-Calais (Calais) and Paris.

Leather.—Tanning and leather-dressing are widely spread industries, and the same may be said of the manufacture of boots and shoes, though these trades employ more hands in the department of Seine than elsewhere; in the manufacture of gloves Isère (Grenoble) and Aveyron (Millau) hold the first place amongst French departments.

Sugar.—The manufacture of sugar is carried on in the departments of the north, in which the cultivation of beetroot is general—Aisne, Nord, Somme, Pas-de-Calais, Oise and Seine-et-Marne, the three first being by far the largest producers. The increase in production in the last twenty years of the 19th century is indicated in the following table:—

Years.	Annual Average of Men employed.	Average Annual Production in Metric Tons.
1881–1891	43,108	415,786
1891–1901	42,841	696,038
1901–1906	43,061	820,553

Alcohol.—The distillation of alcohol is in the hands of three classes of persons: (1) Professional distillers (*bouilleurs et distillateurs de profession*); (2) private distillers (*bouilleurs de cru*) under state control; (3) small private distillers, not under state control, but giving notice to the state that they distil. The two last classes number over 400,000 (1903), but the quantity of alcohol distilled by them is small. Beetroot, molasses and grain are the chief sources of spirit. The department of Nord produces by far the greatest quantity, its average annual output in the decade 1895–1904 being 13,117,000 gallons, or about 26% of the average annual production of France during the same period (49,945,000 gallons). Aisne, Pas-de-Calais and Somme rank next to Nord.

Glass is manufactured in the departments of Nord (Aniche, &c.), Seine, Loire (Rive-de-Gier) and Meurthe-et-Moselle, Baccarat in the latter department being famous for its table-glass. Limoges is the chief centre for the manufacture of porcelain, and the artistic products of the national porcelain factory of Sèvres have a world-wide reputation.

The manufacture of paper and cardboard is largely carried on in Isère (Voiron), Seine-et-Oise (Essonnes), Vosges (Epinal) and of the finer sorts of paper in Charente (Angoulême). That of oil, candles and soap has its chief centre at Marseilles. Brewing and malting are localized chiefly in Nord. There are well-known chemical works at Dombasle (close to Nancy) and Chauny (Aisne) and in Rhône.

Occupations.—The following table, which shows the approximate numbers of persons engaged in the various manufacturing industries of France, who number in all about 5,820,000, indicates their relative importance from the point of view of employment:

Occupation.	1901.	1866.
Baking	163,500	. .
Milling	99,400	. .
Charcuterie	39,600	. .
Other alimentary industries . .	161,500	. .
Alimentary industries: total . . .	464,000	308,000
Gas-works	26,000	. .
Tobacco factories	16,000	. .
Oil-works	10,000	. .
Other "chemical"[1] industries . .	58,000	. .
Chemical industries: total	110,000	49,000
Rubber factories	9,000	25,000
Paper factories	61,000	
Typographic and lithographic printing	76,000	. .
Other branches of book production . .	23,000	. .
Book production: total	99,000	38,000
Spinning and weaving	892,000	1,072,000
Clothing, millinery and making up of fabrics generally	1,484,000	761,000
Basket work, straw goods, feathers . .	39,000	
Leather and skin	338,000	286,000
Joinery	153,000	. .
Builder's carpentering	94,900	. .
Wheelwright's work	82,700	. .
Cooperage	46,600	. .
Wooden shoes	52,400	. .
Other wood industries	280,400	. .
Wood industries: total	710,000	671,000
Metallurgy and metal working . .	783,000	345,000
Goldsmiths' and jewellers' work . . .	35,000	55,000
Stone-working	56,000	12,000
Construction, building, decorating .	572,000	443,000
Glass manufacture	43,000	. .
Tiles	29,000	. .
Porcelain and faïence	27,000	. .
Bricks	17,000	. .
Other kiln industries	45,000	. .
Kiln industries: total	161.000	110,000
Some 9000 individuals were engaged in unclassified industries.		

Fisheries.—The fishing population of France is most numerous in the Breton departments of Finistère, Côtes-du-Nord and Morbihan and in Pas-de-Calais. Dunkirk, Gravelines, Boulogne and Paimpol send considerable fleets to the Icelandic cod-fisheries, and St Malo, Fécamp, Granville and Cancale to those of Newfoundland. The Dogger Bank is frequented by numbers of French fishing-boats.

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[1] Includes manufactories of glue, tallow, soap, perfumery, fertilizers, soda, &c.

Besides the above, Boulogne, the most important fishing port in the country, Calais, Dieppe, Concarneau, Douarnenez, Les Sables d'Olonne, La Rochelle, Marennes and Arcachon are leading ports for the herring, sardine, mackerel and other coast-fisheries of the ocean, while Cette, Agde and other Mediterranean ports are engaged in the tunny and anchovy fisheries. Sardine preserving is an important industry at Nantes and other places on the west coast. Oysters are reared chiefly at Marennes, which is the chief French market for them, and at Arcachon, Vannes, Oléron, Auray, Cancale and Courseulles. The total value of the produce of fisheries increased from £4,537,000 in 1892 to £5,259,000 in 1902. In 1902 the number of men employed in the home fisheries was 144,000 and the number of vessels 25,481 (tonnage 127,000); in the deep-sea fisheries 10,500 men and 450 vessels (tonnage 51,000) were employed.

Communications.

Roads.—Admirable highways known as *routes nationales* and kept up at the expense of the state radiate from Paris to the great towns of France. Averaging 52½ ft. in breadth, they covered in 1905 a distance of nearly 24,000 m. The École des Ponts et Chaussées at Paris is maintained by the government for the training of the engineers for the construction and upkeep of roads and bridges. Each department controls and maintains the *routes départementales*, usually good macadamized roads connecting the chief places within its limits and extending in 1903 over 9700 m. The routes nationales and the routes départementales come under the category of *la grande voirie* and are under the supervision of the Ministry of Public Works. The urban and rural district roads, covering a much greater mileage and classed as *la petite voirie*, are maintained chiefly by the communes under the supervision of the Minister of the Interior.

Waterways.[1]—The waterways of France, 7543 m. in length, of which canals cover 3031 m., are also classed under *la grande voirie*; they are the property of the state, and for the most part are free of tolls. They are divided into two classes. Those of the first class, which comprise rather less than half the entire system, have a minimum depth of 6½ ft., with locks 126 ft. long and 17 ft. wide; those of the second class are of smaller dimensions. Water traffic, which is chiefly in heavy merchandise, as coal, building materials, and agriculture and food produce, more than doubled in volume between 1881 and 1905. The canal and river system attains its greatest utility in the north, north-east and north-centre of the country; traffic is thickest along the Seine below Paris; along the rivers and small canals of the rich departments of Nord and Pas-de-Calais and along the Oise and the canal of St Quentin whereby they communicate with Paris; along the canal from the Marne to the Rhine and the succession of waterways which unite it with the Oise; along the Canal de l'Est (departments of Meuse and Ardennes); and along the waterways uniting Paris with the Saône at Chalon (Seine, Canal du Loing, Canal de Briare, Lateral canal of the Loire and Canal du Centre) and along the Saône between Chalon and Lyons.

In point of length the following are the principal canals:

	Miles.
Est (uniting Meuse with Moselle and Saône)	270
From Nantes to Brest	225
Berry (uniting Montluçon with the canalized Cher and the Loire canal)	163
Midi (Toulouse to Mediterranean via Béziers); see CANAL	175
Burgundy (uniting the Yonne and Saône)	151
Lateral canal of Loire	137
From Marne to Rhine (on French territory)	131
Lateral canal of Garonne	133
Rhône to Rhine (on French territory)	119
Nivernais (uniting Loire and Yonne)	111
Canal de la Somme	97
Centre (uniting Saône and Loire)	81
Canal de l'Ourcq	67
Ardennes (uniting Aisne and Canal de l'Est)	62
From Rhône to Cette	77
Canal de la Haute Marne	60
St Quentin (uniting Scheldt with Somme and Oise)	58

The chief navigable rivers are:

	Total navigated Length.	First Class Navigability.
	Miles.	Miles.
Seine	339	293
Aisne	37	37
Marne	114	114
Oise	99	65
Yonne	67	53
Rhône	309	30
Saône	234	234
Adour	72	21
Garonne	289	96
Dordogne	167	26
Loire	452	35
Charente	106	16
Vilaine	91	31
Escaut (in France)	39	39
Scarpe	41	41
Lys	45	45
Aa	18	18

Railways.—The first important line in France, from Paris to Rouen, was constructed through the instrumentality of Sir Edward Blount (1809–1905), an English banker in Paris, who was afterwards for thirty years chairman of the Ouest railway. After the rejection in 1838 of the government's proposals for the construction of seven trunk lines to be worked by the state, he obtained a concession for that piece of line on the terms that the French treasury would advance one-third of the capital at 3% if he would raise the remaining two-thirds, half in France and half in England. The contract for building the railway was put in the hands of Thomas Brassey; English navvies were largely employed on the work, and a number of English engine-drivers were employed when traffic was begun in 1843. A law passed in 1842 laid the foundation of the plan under which the railways have since been developed, and mapped out nine main lines, running from Paris to the frontiers and from the Mediterranean to the Rhine and to the Atlantic coast. Under it the cost of the necessary land was to be found as to one-third by the state and as to the residue locally, but this arrangement proved unworkable and was abandoned in 1845, when it was settled that the state should provide the land and construct the earthworks and stations, the various companies which obtained concessions being left to make the permanent way, provide rolling stock and work the lines for certain periods. Construction proceeded under this law, but not with very satisfactory results, and new arrangements had to be made between 1852 and 1857, when the railways were concentrated in the hands of six great companies, the Nord, the Est, the Ouest, the Paris-Lyon-Méditerranée, the Orléans and the Midi. Each of these companies was allotted a definite sphere of influence, and was granted a concession for ninety-nine years from its date of formation, the concessions thus terminating at various dates between 1950 and 1960. In return for the privileges granted them the companies undertook the construction out of their own unaided resources of 1500 m. of subsidiary lines, but the railway expenditure of the country at this period was so large that in a few years they found it impossible to raise the capital they required. In these circumstances the state agreed to guarantee the interest on the capital, the sums it paid in this way being regarded as advances to be reimbursed in the future with interest at 4%. This measure proved successful and the projected lines were completed. But demands for more lines were constantly arising, and the existing companies, in view of their financial position, were disinclined to undertake their construction. The government therefore found itself obliged to inaugurate a system of direct subventions, not only to the old large companies, but also to new small ones, to encourage the development of branch and local lines, and local authorities were also empowered to contribute a portion of the required capital. The result came to be that many small lines were begun by companies that had not the means to complete them, and again the state had to come to the rescue. In 1878 it agreed to spend £20,000,000 in purchasing and completing a number of these lines, some of which were handed over to the great companies, while others were retained in the hands of the government, forming the system known as the Chemins de Fer de l'État. Next year a large programme of railway expansion was adopted, at an estimated cost to the state of £140,000,000, and from 1880 to 1882 nearly £40,000,000 was expended and some 1800 m. of line constructed. Then there was a change in the financial situation, and it became difficult to find the money required. In these circumstances the conventions of 1883 were concluded, and the great companies partially relieved the government of its obligations by agreeing to contribute a certain proportion of the cost of the new lines and to provide the rolling stock for working them. In former cases when the railways had had recourse to state aid, it was the state whose contributions were fixed, while the railways were left to find the residue; but on this occasion the position was reversed. The state further guaranteed a minimum rate of interest on the capital invested, and this guarantee, which by the convention of 1859 had applied to "new" lines only, was now extended to cover both "old" and "new" lines, the receipts and expenditure from both kinds being lumped together. As before, the sums paid out in respect of guaranteed dividend were to be regarded as advances which were to be paid back to the state out of the profits made, when these permitted, and when the advances were wiped out, the profits, after payment of a certain dividend, were to be divided between the state and the railway, two-thirds going to the former and one-third to the latter. All the companies, except the Nord, have at one time or another had to take advantage of the guarantee, and the fact that the Ouest had been one of the most persistent and heavy borrowers in this respect was one of the reasons that induced the government to take it over as from the 1st of January 1909. By the 1859 conventions the state railway system obtained an entry into Paris by means of running powers over the Ouest from Chartres, and its position was further improved by the exchange of certain lines with the Orléans company.

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[1] See the *Guide officiel de la navigation intérieure* issued by the ministry of public works (Paris, 1903).

The great railway systems of France are as follows:

1. The Nord, which serves the rich mining, industrial and farming districts of Nord, Pas-de-Calais, Aisne and Somme, connecting with the Belgian railways at several points. Its main lines run from Paris to Calais, via Creil, Amiens and Boulogne, from Paris to Lille, via Creil and Arras, and from Paris to Maubeuge via Creil, Tergnier and St Quentin.
2. The Ouest-État, a combination of the West and state systems. The former traversed Normandy in every direction and connected Paris with the towns of Brittany. Its chief lines ran from Paris to Le Havre via Mantes and Rouen, to Dieppe via Rouen, to Cherbourg, to Granville and to Brest. The state railways served a large portion of western France, their chief lines being from Nantes via La Rochelle to Bordeaux, and from Bordeaux via Saintes, Niort and Saumur to Chartres.
3. The Est, running from Paris via Châlons and Nancy to Avricourt (for Strassburg), via Troyes and Langres to Belfort and on via Basel to the Saint Gotthard, and via Reims and Mezières to Longwy.
4. The Orléans, running from Paris to Orléans, and thence serving Bordeaux via Tours, Poitiers and Angoulême, Nantes via Tours and Angers, and Montauban and Toulouse via Vierzon and Limoges.
5. The Paris-Lyon-Méditerranée, connecting Paris with Marseilles via Moret, Laroche, Dijon, Mâcon and Lyons, and with Nîmes via Moret, Nevers and Clermont-Ferrand. It establishes communication between France and Switzerland and Italy via Mâcon and Culoz (for the Mt. Cenis Tunnel) and via Dijon and Pontarlier (for the Simplon), and also has a direct line along the Mediterranean coast from Marseilles to Genoa via Toulon and Nice.
6. The Midi (Southern) has lines radiating from Toulouse to Bordeaux via Agen, to Bayonne via Tarbes and Pau, and to Cette via Carcassonne, Narbonne and Béziers. From Bordeaux there is also a direct line to Bayonne and Irun (for Madrid), and at the other end of the Pyrenees a line leads from Narbonne to Perpignan and Barcelona.

The following table, referring to lines "of general interest," indicates the development of railways after 1885:

Year.	Mileage.	Receipts in Thousands of £.	Expenses in Thousands of £.	Passengers carried (1000's).	Goods carried (1000 Metric Tons).
1885	18,650	42,324	23,508	214,451	75,192
1890	20,800	46,145	24,239	241,119	92,506
1895	22,650	50,542	27,363	348,852	100,834
1900	23,818	60,674	32,966	453,193	126,830
1904	24,755	60,589	31,477	433,913	130,144

Narrow gauge and normal gauge railways "of local interest" covered 3905 m. in 1904.

Commerce.

After entering on a régime of free trade in 1860 France gradually reverted towards protection; this system triumphed in the Customs Law of 1892, which imposed more or less considerable duties on imports—a law associated with the name of M. Méline. While raising the taxes both on agricultural products and manufactured goods, this law introduced, between France and all the powers trading with her, relations different from those in the past. It left the government free either to apply to foreign countries the general tariff or to enter into negotiations with them for the application, under certain conditions, of a minimum tariff. The policy of protection was further accentuated by raising the impost on corn from 5 to 7 francs per hectolitre (2¾ bushels). This system, however, which is opposed by a powerful party, has at various times undergone modifications. On the one hand it became necessary, in face of an inadequate harvest, to suspend in 1898 the application of the law on the import of corn. On the other hand, in order to check the decline of exports and neutralize the harmful effects of a prolonged customs war, a commercial treaty was in 1896 concluded with Switzerland, carrying with it a reduction, in respect of certain articles, of the imposts which had been fixed by the law of 1892. An accord was likewise in 1898 effected with Italy, which since 1886 had been in a state of economic rupture with France, and in July 1899 an accord was concluded with the United States of America. Almost all other countries, moreover, share in the benefit of the minimum tariff, and profit by the modifications it may successively undergo.

Being in the main a self-supporting country France carries on most of her trade within her own borders, and ranks below Great Britain, Germany and the United States in volume of exterior trade. The latter is subdivided into *general* commerce, which includes all goods entering or leaving the country, and *special* commerce which includes imports for home use and exports of home produce. The above table shows the developments of French trade during the years from 1876 to 1905 by means of quinquennial averages. A permanent body (the *commission permanente des valeurs*) fixes the average prices of the

Commerce, in Millions of Pounds Sterling.

	General			Special		
	Imports.	Exports.	Total.	Imports.	Exports.	Total.
1876–1880	210·1	175·3	385·4	171·7	135·1	306·8
1881–1885	224·1	177·8	401·9	183·4	135·3	318·7
1886–1890	208·2	179·4	387·6	168·8	137·6	306·4
1891–1895	205·9	178·6	384·5	163·0	133·8	296·8
1896–1900	237·8	201·0	438·8	171·9	150·8	322·7
1901–1905	233·3	227·5	460·8	182·8	174·7	357·5

	Imports.		Exports.	
	Value (Thousands of £).	Per cent of Total Value.	Value (Thousands of £).	Per cent of Total Value.
Articles of Food—				
1886–1890	58,856	34·9	30,830	22·4
1891–1895	50,774	30·9	28,287	21·1
1896–1900	42,488	24·9	27,838	18·6
1901–1905	33,631	18·4	28,716	16·5
Raw Materials [1]				
1886–1890	85,778	50·8	33,848	24·6
1891–1895	88,211	54·3	32,557	24·4
1896–1900	101,727	59·2	40,060	26·6
1901–1905	116,580	63·8	47,385	27·1
Manufactured Articles [2]				
1886–1890	24,125	14·3	72,917	53·0
1891–1895	24,054	14·8	72,906	54·5
1896–1900	27,330	15·9	82,270	54·8
1901–1905	32,554	17·8	98,582	56·4

[1] Includes horses, mules and asses.

[2] Except certain manufactures which come under the category of articles of food.

articles in the customs list; this value is estimated at the end of the year in accordance with the variations that have taken place and is applied provisionally to the following year.

Amongst imports raw materials (wool, cotton and silk, coal, oilseeds, timber, &c.) hold the first place, articles of food (cereals, wine, coffee, &c.) and manufactured goods (especially machinery) ranking next. Amongst exports manufactured goods (silk, cotton and woollen goods, fancy wares, apparel, &c.) come before raw materials and articles of food (wine and dairy products bought chiefly by England).

Divided into these classes the imports and exports (special trade) for quinquennial periods from 1886 to 1905 averaged as shown in the preceding table.

The decline both in imports and in exports of articles of food, which is the most noteworthy fact exhibited in the preceding table, was due to the almost prohibitive tax in the Customs Law of 1892, upon agricultural products.

The average value of the principal articles of import and export (special trade) over quinquennial periods following 1890 is shown in the two tables below.

Principal Imports (Thousands of £).

	1891–1895.	1896–1900.	1901–1905.
Coal, coke, &c.	7,018	9,883	10,539
Coffee	6,106	4,553	3,717
Cotton, raw	7,446	7,722	11,987
Flax	2,346	2,435	3,173
Fruit and seeds (oleaginous)	7,175	6,207	8,464
Hides and skins, raw	6,141	5,261	6,369
Machinery	2,181	3,632	4,614
Silk, raw	9,488	10,391	11,765
Timber	6,054	6,284	6,760
Wheat	10,352	5,276	1,995
Wine	9,972	10,454	5,167
Wool, raw	13,372	16,750	16,395

Principal Exports (Thousands of £).

	1891–1895.	1896–1900.	1901–1905.
Apparel	4,726	4,513	5,079
Brandy and other spirits	2,402	1,931	1,678
Butter	2,789	2,783	2,618
Cotton manufactures	4,233	5,874	7,965
Haberdashery [1]	5,830	6,039	6,599
Hides, raw	2,839	3,494	4,813
Hides, tanned or curried	4,037	4,321	4,753
Iron and steel, manufactures of	..	2,849	4,201
Millinery	1,957	3,308	4,951
Motor cars and vehicles	..	160	2,147
Paper and manufactures of	2,095	2,145	2,551
Silk, raw, thrown, waste and cocoons	4,738	4,807	6,090
Silk and waste silk, manufactures of	9,769	10,443	11,463
Wine	8,824	9,050	9,139
Wool, raw	5,003	7,813	9,159
Wool, manufactures of	11,998	10,190	8,459

The following were the countries sending the largest quantities of goods (special trade) to France (during the same periods as in previous table).

Trade with Principal Countries. Imports (Thousands of £).

	1891–1895.	1896–1900.	1901–1905.
Germany	13,178	13,904	17,363
Belgium	15,438	13,113	13,057
United Kingdom	20,697	22,132	22,725
Spain	10,294	10,560	6,525 [2]
United States	15,577	18,491	19,334
Argentine Republic	7,119	10,009	10,094

Other countries importing largely into France are Russia, Algeria and British India, whose imports in each case averaged over £9,000,000 in value in the period 1901–1905; China (average value £7,000,000); and Italy (average value £6,000,000).

The following are the principal countries receiving the exports of France (special trade), with values for the same periods.

Trade with Principal Countries. Exports (Thousands of £).

	1891–1895.	1896–1900.	1901–1905.
Germany	13,712	16,285	21,021
Belgium	19,857	22,135	24,542
United Kingdom	39,310	45,203	49,156
United States	9,337	9,497	10,411
Algeria	7,872	9,434	11,652

The other chief customers of France were Switzerland and Italy, whose imports from France averaged in 1901–1905 nearly £10,000,000 and over £7,200,000 respectively in value. In the same period Spain received exports from France averaging £4,700,000.

The trade of France was divided between foreign countries and her colonies in the following proportions (imports and exports combined).

	General Trade.		Special Trade.	
	Foreign Countries.	Colonies.	Foreign Countries.	Colonies.
1891–1895	92·00	8·00	90·89	9·11
1896–1900	91·18	8·82	89·86	10·14
1901–1905	90·41	9·59	88·78	11·22

The respective shares of the leading customs in the trade of the country is approximately shown in the following table, which gives the value of their exports and imports (general trade) in 1905 in millions sterling.

	£		£
Marseilles	88·8	Boulogne	17·5
Le Havre	79·5	Calais	14·1
Paris	42·8	Dieppe	13·5
Dunkirk	34·8	Rouen	11·3
Bordeaux	27·4	Belfort-Petit-Croix	10·7

In the same year the other chief customs in order of importance were Tourcoing, Jeumont, Cette, St Nazaire and Avricourt.

The chief local bodies concerned with commerce and industry are the *chambres de commerce* and the *chambres consultatives d'arts et manufactures*, the members of which are elected from their own number by the traders and industrialists of a certain standing. They are established in the chief towns, and their principal function is to advise the government on measures for improving and facilitating commerce and industry within their circumscription. See also BANKS AND BANKING; SAVINGS BANKS; POST AND POSTAL SERVICE.

Shipping.—The following table shows the increase in tonnage of sailing and steam shipping engaged in foreign trade entered and cleared at the ports of France over quinquennial periods from 1890.

	Entered.		Cleared.	
	French.	Foreign.	French.	Foreign.
1891–1895	4,277,967	9,947,893	4,521,928	10,091,000
1896–1900	4,665,268	12,037,571	5,005,563	12,103,358
1901–1905	4,782,101	14,744,626	5,503,463	14,823,217

The increase of the French mercantile marine (which is fifth in importance in the world) over the same period is traced in the following table. Vessels of 2 net tons and upwards are enumerated.

	Sailing.		Steam.		Total.	
	Number of Vessels.	Tonnage.	Number of Vessels.	Tonnage.	Number of Vessels.	Tonnage.
1891–1895	14,183	402,982	1182	502,363	15,365	905,345
1896–1900	14,327	437,468	1231	504,674	15,558	942,142
1901–1905	14,867	642,562	1388	617,536	16,255	1,260,098

At the beginning of 1908 the total was 17,193 (tonnage, 1,402,647); of these 13,601 (tonnage, 81,833) were vessels of less than 20 tons, while 502 (tonnage, 1,014,506) were over 800 tons.

The increase in the tonnage of sailing vessels, which in other countries tends to decline, was due to the bounties voted by parliament to its merchant sailing fleet with the view of increasing the number of skilled seamen. The prosperity of the French shipping trade is hampered by the costliness of shipbuilding and by the scarcity of outward-bound cargo. Shipping has been fostered by paying bounties for vessels constructed in France and sailing under the French flag, and by reserving the coasting trade, traffic between France and Algeria, &c., to French vessels. Despite these monopolies, three-fourths of the shipping in French ports is foreign, and France is without shipping companies comparable in importance to those of other great maritime nations. The three chief companies are the *Messageries Maritimes* (Marseilles and Bordeaux), the *Compagnie Générale Transatlantique* (Le Havre, St Nazaire and Marseilles) and the *Chargeurs Réunis* (Le Havre).

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[1] Includes small fancy wares, toys, also wooden wares and furniture, brushes, &c.

[2] Decrease largely due to Spanish-American War (1898).

Government and Administration.

Central Government.—The principles upon which the French constitution is based are representative government (by two chambers), manhood suffrage, responsibility of ministers and irresponsibility of the head of the state. Alterations or modifications of the constitution can only be effected by the National Assembly, consisting of both chambers sitting together *ad hoc.* The legislative power resides in these two chambers—the Senate and the Chamber of Deputies; the executive is vested in the president of the republic and the ministers. The members of both chambers owe their election to universal suffrage; but the Senate is not elected directly by the people and the Chamber of Deputies is.

The Chamber of Deputies, consisting of 584 members, is elected by the *scrutin d'arrondissement* (each elector voting for one deputy) for a term of four years, the conditions of election being as follows: Each arrondissement sends one deputy if its population does not exceed 100,000, and an additional deputy for every additional 100,000 inhabitants or fraction of that number. Every citizen of twenty-one years of age, unless subject to some legal disability, such as actual engagement in military service, bankruptcy or condemnation to certain punishments, has a vote, provided that he can prove a residence of six months' duration in any one town or commune. A deputy must be a French citizen, not under twenty-five years old. Each candidate must make, at least five days before the elections, a declaration setting forth in what constituency he intends to stand. He may only stand for one, and all votes given for him in any other than that specified in the declaration are void. To secure election a candidate must at the first voting poll an absolute majority and a number of votes equal to one-fourth of the number of electors. If a second poll is necessary a relative majority is sufficient.

The Senate (see below, *Law and Institutions*) is composed of 300 members who must be French citizens at least forty years of age. They are elected by the "*scrutin de liste*" for a period of nine years, and one-third of the body retires every three years. The department which is to elect a senator when a vacancy occurs is settled by lot.

Both senators and deputies receive a salary of £600 per annum. No member of a family that has reigned in France is eligible for either chamber.

Bills may be proposed either by ministers (in the name of the president of the republic), or by private members, and may be initiated in either chamber, but money-bills must be submitted in the first place to the Chamber of Deputies. Every bill is first examined by a committee, a member of which is chosen to "report" on it to the chamber, after which it must go through two readings (*délibérations*), before it is presented to the other chamber. Either house may pass a vote of no confidence in the government, and in practice the government resigns in face of the passing of such a vote by the deputies, but not if it is passed by the Senate only. The chambers usually assemble in January each year, and the ordinary session lasts not less than five months; usually it continues till July. There is an extraordinary session from October till Christmas.

The president (see below, *Law and Institutions*) is elected for seven years, by a majority of votes, by the Senate and Chamber of Deputies sitting together as the National Assembly. Any French citizen may be chosen president, no fixed age being required. The only exception to this rule is that no member of a royal family which has once reigned in France can be elected. The president receives 1,200,000 francs (£48,000) a year, half as salary, half for travelling expenses and the charges incumbent upon the official representative of the country. Both the chambers are summoned by the president, who has the power of dissolving the Chamber of Deputies with the assent of the Senate. When a change of Government occurs the president chooses a prominent parliamentarian as premier and president of the council. This personage, who himself holds a portfolio, nominates the other ministers, his choice being subject to the ratification of the chief of the state. The ministerial council (*conseil des ministres*) is presided over by the president of the republic; less formal meetings (*conseils de cabinet*) under the presidency of the premier, or even of some other minister, are also held.

The ministers, whether members of parliament or not, have the right to sit in both chambers and can address the house whenever they choose, though a minister may only vote in the chamber of which he happens to be a member. There are twelve ministries[1] comprising those of justice; finance; war; the interior; marine; colonies; public instruction and fine arts; foreign affairs; commerce and industry; agriculture; public works; and labour and public thrift. Individual ministers are responsible for all acts done in connexion with their own departments, and the body of ministers collectively is responsible for the general policy of the government.

The council of state (*conseil d'état*) is the principal council of the head of the state and his ministers, who consult it on various legislative problems, more particularly on questions of administration. It is divided for despatch of business into four sections, each of which corresponds to a group of two or three ministerial departments, and is composed of (1) 32 councillors "*en service ordinaire*" (comprising a vice-president and sectional presidents), and 19 councillors "*en service extraordinaire*," *i.e.* government officials who are deputed to watch the interests of the ministerial departments to which they belong, and in matters not concerned with those departments have a merely consultative position; (2) 32 *maîtres des requêtes*; (3) 40 auditors.

The presidency of the council of state belongs *ex officio* to the minister of justice.

The theory of "*droit administratif*" lays down the principle that an agent of the government cannot be prosecuted or sued for acts relating to his administrative functions before the ordinary tribunals. Consequently there is a special system of administrative jurisdiction for the trial of "*le contentieux administratif*" or disputes in which the administration is concerned. The council of state is the highest administrative tribunal, and includes a special "*Section du contentieux*" to deal with judicial work of this nature.

Local Government.—France is divided into 86 administrative departments (including Corsica) or 87 if the Territory of Belfort, a remnant of the Haut Rhin department, be included. These departments are subdivided into 362 arrondissements, 2911 cantons and 36,222 communes.

Departments.	Capital Towns.	Ancient Provinces.[2]
Ain	Bourg	Bourgogne (Bresse, Bugey, Valromey, Dombes).
Aisne	Laon	Île-de-France; Picardie.
Allier	Moulins	Bourbonnais.
Alpes-Maritimes	Nice	
Ardèche	Privas	Languedoc (Vivarais).
Ardennes	Mézières	Champagne.
Ariège	Foix	Foix; Gascogne (Cousérans).
Aube	Troyes	Champagne; Bourgogne.
Aude	Carcassonne	Languedoc.
Aveyron	Rodez	Guienne (Rouergue).

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[1] The administration of posts, telegraphs and telephones is assigned to the ministry of commerce and industry or to that of public works.

[2] The province or provinces named are those out of which the department was chiefly formed.

Departments.	Capital Towns.	Ancient Provinces.
BASSES-ALPES	Digne	Provence.
BASSES-PYRÉNÉES	Pau	Béarn; Gascogne (Basse-Navarre, Soule, Labourd).
BELFORT, TERRITOIRE DE	Belfort	Alsace.
BOUCHES-DU-RHÔNE	Marseilles	Provence.
CALVADOS	Caen	Normandie (Bessin, Bocage).
CANTAL	Aurillac	Auvergne.
CHARENTE	Angoulême	Angoumois; Saintonge.
CHARENTE-INFÉRIEURE	La Rochelle	Aunis; Saintonge.
CHER	Bourges	Berry; Bourbonnais.
CORRÈZE	Tulle	Limousin.
CÔTE-D'OR	Dijon	Bourgogne (Dijonnais, Auxois).
CÔTES-DU-NORD	St Brieuc	Bretagne.
CREUSE	Guéret	Marche.
DEUX-SÈVRES	Niort	Poitou.
DORDOGNE	Périgueux	Guienne (Périgord).
DOUBS	Besançon	Franche-Comté; Montbéliard.
DRÔME	Valence	Dauphiné.
EURE	Évreux	Normandie; Perche.
EURE-ET-LOIR	Chartres	Orléanais; Normandie.
FINISTÈRE	Quimper	Bretagne.
GARD	Nîmes	Languedoc.
GERS	Auch	Gascogne (Astarac, Armagnac).
GIRONDE	Bordeaux	Guienne (Bordelais, Bazadais).
HAUTE-GARONNE	Toulouse	Languedoc; Gascogne (Comminges).
HAUTE-LOIRE	Le Puy	Languedoc (Velay); Auvergne; Lyonnais.
HAUTE-MARNE	Chaumont	Champagne (Bassigny, Vallage).
HAUTES-ALPES	Gap	Dauphiné.
HAUTE-SAÔNE	Vesoul	Franche-Comté.
HAUTE-SAVOIE	Annecy	
HAUTES-PYRÉNÉES	Tarbes	Gascogne.
HAUTE-VIENNE	Limoges	Limousin; Marche.
HÉRAULT	Montpellier	Languedoc.
ILLE-ET-VILAINE	Rennes	Bretagne.
INDRE	Châteauroux	Berry.
INDRE-ET-LOIRE	Tours	Touraine.
ISÈRE	Grenoble	Dauphiné.
JURA	Lons-le-Saunier	Franche-Comté.
LANDES	Mont-de-Marsan	Gascogne (Landes, Chalosse).
LOIRE	St-Étienne	Lyonnais.
LOIRE-INFÉRIEURE	Nantes	Bretagne.
LOIRET	Orléans	Orléanais (Orléanais proper, Gâtinais, Dunois).
LOIR-ET-CHER	Blois	Orléanais.
LOT	Cahors	Guienne (Quercy).
LOT-ET-GARONNE	Agen	Guienne; Gascogne.
LOZÈRE	Mende	Languedoc (Gévaudan).
MAINE-ET-LOIRE	Angers	Anjou.
MANCHE	St-Lô	Normandie (Cotentin).
MARNE	Châlons-sur-Marne	Champagne.
MAYENNE	Laval	Maine; Anjou.
MEURTHE-ET-MOSELLE	Nancy	Lorraine; Trois-Évêchés.
MEUSE	Bar-le-Duc	Lorraine (Barrois, Verdunois).
MORBIHAN	Vannes	Bretagne.
NIÈVRE	Nevers	Nivernais; Orléanais.
NORD	Lille	Flandre; Hainaut.
OISE	Beauvais	Île-de-France.
ORNE	Alençon	Normandie; Perche.
PAS-DE-CALAIS	Arras	Artois; Picardie.
PUY-DE-DÔME	Clermont-Ferrand	Auvergne.
PYRÉNÉES-ORIENTALES	Perpignan	Roussillon; Languedoc.
RHÔNE	Lyon	Lyonnais; Beaujolais.
SAÔNE-ET-LOIRE	Mâcon	Bourgogne.
SARTHE	Le Mans	Maine; Anjou.
SAVOIE	Chambéry	
SEINE	Paris	Île-de-France.
SEINE-ET-MARNE	Melun	Île-de-France; Champagne.
SEINE-ET-OISE	Versailles	Île-de-France.
SEINE-INFÉRIEURE	Rouen	Normandie.
SOMME	Amiens	Picardie.
TARN	Albi	Languedoc (Albigeois).
TARN-ET-GARONNE	Montauban	Guienne; Gascogne; Languedoc.
VAR	Draguignan	Provence.
VAUCLUSE	Avignon	Comtat; Venaissin; Provence; Principauté d'Orange.
VENDÉE	La Roche-sur-Yon	Poitou.
VIENNE	Poitiers	Poitou; Touraine.
VOSGES	Épinal	Lorraine.
YONNE	Auxerre	Bourgogne; Champagne.
CORSE (CORSICA)	Ajaccio	Corse.

Before 1790 France was divided into thirty-three great and seven small military governments, often called provinces, which are, however, to be distinguished from the provinces formed under the feudal system. The great governments were: Alsace, Saintonge and Angoumois, Anjou, Artois, Aunis, Auvergne, Béarn and Navarre, Berry, Bourbonnais, Bourgogne (Burgundy), Bretagne (Brittany), Champagne, Dauphiné, Flandre, Foix, Franche-Comté, Guienne and Gascogne (Gascony), Île-de-France, Languedoc, Limousin, Lorraine, Lyonnais, Maine, Marche, Nivernais, Normandie, Orléanais, Picardie, Poitou, Provence, Roussillon, Touraine and Corse. The eight small governments were: Paris, Boulogne and Boulonnais, Le Havre, Sedan, Toulois, Pays Messin and Verdunois and Saumurois.

At the head of each department is a prefect, a political official nominated by the minister of the interior and appointed by the president, who acts as general agent of the government and representative of the central authority. To aid him the prefect has a general secretary and an advisory body (*conseil de préfecture*), the members of which are appointed by the president, which has jurisdiction in certain classes of disputes arising out of administration and must, in certain cases, be consulted, though the prefect is not compelled to follow its advice. The prefect supervises the execution of the laws; has wide authority in regard to policing, public hygiene and relief of pauper children; has the nomination of various subordinate officials; and is in correspondence with the subordinate functionaries in his department, to whom he transmits the orders and instructions of the government. Although the management of local affairs is in the hands of the prefect his power with regard to these is checked by a deliberative body known as the general council (*conseil général*). This council, which consists for the most part of business and professional men, is elected by universal suffrage, each canton in the department contributing one member. The general council controls the departmental administration of the prefect, and its decisions on points of local government are usually final. It assigns its quota of taxes (*contingent*) to each arrondissement, authorizes the sale, purchase or exchange of departmental property, superintends the management thereof, authorizes the construction of new roads, railways or canals, and advises on matters of local interest. Political questions are rigorously excluded from its deliberations. The general council, when not sitting, is represented by a permanent delegation (*commission départementale*).

As the prefect in the department, so the sub-prefect in the arrondissement, though with a more limited power, is the representative of the central authority. He is assisted, and in some degree controlled, in his work by the district council (*conseil d'arrondissement*), to which each canton sends a member, chosen by universal suffrage. As the arrondissement has neither property nor budget, the principal business of the council is to allot to each commune its share of the direct taxes imposed on the arrondissement by the general council.

The canton is purely an administrative division, containing, on an average, about twelve communes, though some exceptional communes are big enough to contain more than one canton. It is the seat of a justice of the peace, and is the electoral unit for the general council and the district council.

The communes, varying greatly in area and population, are the administrative units in France. The chief magistrate of the commune is the mayor (*maire*), who is (1) the agent of the central government and charged as such with the local promulgation and execution of the general laws and decrees of the country; (2) the executive head of the municipality, in which capacity he supervises the police, the revenue and public works of the commune, and acts as the representative of the corporation in general. He also acts as registrar of births, deaths and marriages, and officiates at civil marriages. Mayors are usually assisted by deputies (*adjoints*). In a commune of 2500 inhabitants or less there is one deputy; in more populous communes there may be more, but in no case must the number exceed twelve, except at Lyons, where as many as seventeen are allowed. Both mayors and deputy mayors are elected by and from among members of the municipal council for four years. This body consists, according to the population of the commune, of from 10 to 36 members, elected for four years on the principle of the *scrutin de liste* by Frenchmen who have reached the age of twenty-one years and have a six months' residence qualification.

The local affairs of the commune are decided by the municipal council, and its decisions become operative after the expiration of a month, save in matters which involve interests transcending those of the commune. In such cases the prefect must approve them, and in some cases the sanction of the general council or even ratification by the president is necessary. The council also chooses communal delegates to elect senators; and draws up the list of *répartiteurs*, whose function is to settle how the commune's share of direct taxes shall be allotted among the taxpayers. The sub-prefect then selects from this list ten of whom he approves for the post. The meetings of the council are open to the public.

Justice.

The ordinary judicial system of France comprises two classes of courts: (1) civil and criminal, (2) special, including courts dealing only with purely commercial cases; in addition there are the administrative courts, including bodies, the Conseil d'État and the Conseils de Préfecture, which deal, in their judicial capacity, with cases coming under the *droit administratif*. Mention may also be made of the Tribunal des Conflits, a special court whose function it is to decide which is the competent tribunal when an administration and a judicial court both claim or refuse to deal with a given case.

Taking the first class of courts, which have both civil and criminal jurisdiction, the lowest tribunal in the system is that of the *juge de paix*.

In each canton is a *juge de paix*, who in his capacity as a civil judge takes cognizance, without appeal, of disputes where the amount sought to be recovered does not exceed £12 in value. Where the amount exceeds £12 but not £24 an appeal lies from his decision to the court of first instance. In some particular cases where special promptitude or local knowledge is necessary, as disputes between hotelkeepers and travellers, and the like, he has jurisdiction (subject to appeal to the court of first instance) up to £60. He has also a criminal jurisdiction in *contraventions*, *i.e.* breaches of law punishable by a fine not exceeding 12s. or by imprisonment not exceeding five days. If the sentence be one of imprisonment or the fine exceeds 4s., appeal lies to the court of first instance. It is an important function of the *juge de paix* to endeavour to reconcile disputants who come before him, and no suit can be brought before the court of first instance until he has endeavoured without success to bring the parties to an agreement.

Tribunaux de première instance, also called *tribunaux d'arrondissement*, of which there is one in every arrondissement (with few exceptions), besides serving as courts of appeal from the *juges de paix* have an original jurisdiction in matters civil and criminal. The court consists of a president, one or more vice-presidents and a variable number of judges. A *procureur*, or public prosecutor, is also attached to each court. In civil matters the tribunal takes cognizance of actions relating to personal property to the value of £60, and actions relating to land to the value of 60 fr. (£2: 8s.) per annum. When it deals with matters involving larger sums an appeal lies to the courts of appeal. In penal cases its jurisdiction extends to all offences of the class known as *délits*—offences punishable by a more serious penalty than the "contraventions" dealt with by the *juge de paix*, but not entailing such heavy penalties as the code applies to *crimes*, with which the assize courts (see below) deal. When sitting in its capacity as a criminal court it is known as the *tribunal correctionnel*. Its judgments are invariably subject in these matters to appeal before the court of appeal.

There are twenty-six courts of appeal (*cours d'appel*), to each of which are attached from one to five departments.

Cours d'Appel.	Departments depending on them.
PARIS	Seine, Aube, Eure-et-Loir, Marne, Seine-et-Marne, Seine-et-Oise, Yonne.
AGEN	Gers, Lot, Lot-et-Garonne.
AIX	Basses-Alpes, Alpes-Maritimes, Bouches-du-Rhône, Var.
AMIENS	Aisne, Oise, Somme.
ANGERS	Maine-et-Loire, Mayenne, Sarthe.
BASTIA	Corse.
BESANÇON	Doubs, Jura, Haute-Saône, Territoire de Belfort.
BORDEAUX	Charente, Dordogne, Gironde.
BOURGES	Cher, Indre, Nièvre.
CAEN	Calvados, Manche, Orne.
CHAMBÉRY	Savoie, Haute-Savoie.
DIJON	Côte-d'Or, Haute-Marne, Saône-et-Loire.
DOUAI	Nord, Pas-de-Calais.
GRENOBLE	Hautes-Alpes, Drôme, Isère.
LIMOGES	Corrèze, Creuse, Haute-Vienne.
LYONS	Ain, Loire, Rhône.
MONTPELLIER	Aude, Aveyron, Hérault, Pyrénées-Orientales.
NANCY	Meurthe-et-Moselle, Meuse, Vosges, Ardennes.
NÎMES	Ardèche, Gard, Lozère, Vaucluse.

Cours d'Appel.	Departments depending on them.
ORLÉANS	Indre-et-Loire, Loir-et-Cher, Loiret.
PAU	Landes, Basses-Pyrénées, Hautes-Pyrénées.
POITIERS	Charente-Inférieure, Deux-Sèvres, Vendée, Vienne.
RENNES	Côtes-du-Nord, Finistère, Ille-et-Vilaine, Loire-Inférieure, Morbihan.
RIOM	Allier, Cantal, Haute-Loire, Puy-de-Dôme.
ROUEN	Eure, Seine-Inférieure.
TOULOUSE	Ariège, Haute-Garonne, Tarn, Tarn-et-Garonne.

At the head of each court, which is divided into sections (*chambres*), is a *premier président*. Each section (*chambre*) consists of a *président de chambre* and four judges (*conseillers*). *Procureurs-généraux* and *avocats-généraux* are also attached to the *parquet*, or permanent official staff, of the courts of appeal. The principal function of these courts is the hearing of appeals both civil and criminal from the courts of first instance; only in some few cases (*e.g.* discharge of bankrupts) do they exercise an original jurisdiction. One of the sections is termed the *chambre des mises en accusation*. Its function is to examine criminal cases and to decide whether they shall be referred for trial to the lower courts or the *cours d'assises*. It may also dismiss a case on grounds of insufficient evidence.

The *cours d'assises* are not separate and permanent tribunals. Every three months an assize is held in each department, usually at the chief town, by a *conseiller*, appointed *ad hoc*, of the court of appeal upon which the department depends. The *cour d'assises* occupies itself entirely with offences of the most serious type, classified under the penal code as *crimes*, in accordance with the severity of the penalties attached. The president is assisted in his duties by two other magistrates, who may be chosen either from among the *conseillers* of the court of appeal or the presidents or judges of the local court of first instance. In this court and in this court alone there is always a jury of twelve. They decide, as in England, on facts only, leaving the application of the law to the judges. The verdict is given by a simple majority.

In all criminal prosecutions, other than those coming before the *juge de paix*, a secret preliminary investigation is made by an official called a *juge d'instruction*. He may either dismiss the case at once by an order of "non-lieu," or order it to be tried, when the prosecution is undertaken by the *procureur* or *procureur-général*. This process in some degree corresponds to the manner in which English magistrates dismiss a case or commit the prisoner to quarter sessions or assizes, but the powers of the *juge d'instruction* are more arbitrary and absolute.

The highest tribunal in France is the *cour de cassation*, sitting at Paris, and consisting of a first president, three sectional presidents and forty-five *conseillers*, with a ministerial staff (*parquet*) consisting of a *procureur-général* and six advocates-general. It is divided into three sections: the Chambre des Requêtes, or court of petitions, the civil court and the criminal court. The *cour de cassation* can review the decision of any other tribunal, except administrative courts. Criminal appeals usually go straight to the criminal section, while civil appeals are generally taken before the Chambre des Requêtes, where they undergo a preliminary examination. If the demand for rehearing is refused such refusal is final; but if it is granted the case is then heard by the civil chamber, and after argument *cassation* (annulment) is granted or refused. The Court of Cassation does not give the ultimate decision on a case; it pronounces, not on the question of fact, but on the legal principle at issue, or the competence of the court giving the original decision. Any decision, even one of a *cour d'assises*, may be brought before it in the last resort, and may be *cassé*—annulled. If it pronounces *cassation* it remits the case to the hearing of a court of the same order.

Commercial courts (*tribunaux de commerce*) are established in all the more important commercial towns to decide as expeditiously as possible disputed points arising out of business transactions. They consist of judges, chosen, from among the leading merchants, and elected by *commerçants patentés depuis cinq ans*, *i.e.* persons who have held the licence to trade (see FINANCE) for five years and upwards. In the absence of a *tribunal de commerce* commercial cases come before the ordinary *tribunal d'arrondissement*.

In important industrial towns tribunals called *conseils de prud'hommes* are instituted to deal with disputes between employers and employees, actions arising out of contracts of apprenticeship and the like. They are composed of employers and workmen in equal numbers and are established by decree of the council of state, advised by the minister of justice. The minister of justice is notified of the necessity for a *conseil de prud'hommes* by the prefect, acting on the advice of the municipal council and the Chamber of Commerce or the Chamber of Arts and Manufactures. The judges are elected by employers and workmen of a certain standing. When the amount claimed exceeds £12 appeal lies to the *tribunaux d'arrondissement*.

Police.—Broadly, the police of France may be divided into two great branches—administrative police (*la police administrative*) and judicial police (*la police judiciairé*), the former having for its object the maintenance of order, and the latter charged with tracing out offenders, collecting the proofs, and delivering the presumed offenders to the tribunals charged by law with their trial and punishment. Subdivisions may be, and often are, named according to the particular duties to which they are assigned, as *la police politique*, *police des mœurs*, *police sanitaire*, &c. The officers of the judicial police comprise the *juge de paix* (equivalent to the English police magistrate), the *maire*, the *commissaire de police*, the *gendarmerie* and, in rural districts, the *gardes champêtres* and the *gardes forestiers*. *Gardiens de la paix* (sometimes called *sergents de ville*, *gardes de ville* or *agents de police*) are not to be confounded with the gendarmerie, being a branch of the administrative police and corresponding more or less nearly with the English equivalent "police constables," which the gendarmerie do not, although both perform police duty. The gendarmerie, however, differ from the agents or gardes both in uniform and in the fact that they are for the most part country patrols. The organization of the Paris police, which is typical of that in other large towns, may be outlined briefly. The central administration (*administration centrale*) comprises three classes of functions which together constitute *la police*. First there is the office or *cabinet* of the prefect for the general police (*la police générale*), with bureaus for various objects, such as the safety of the president of the republic, the regulation and order of public ceremonies, theatres, amusements and entertainments, &c.; secondly, the judicial police (*la police judiciaire*), with numerous bureaus also, in constant communication with the courts of judicature; thirdly, the administrative police (*la police administrative*) including bureaus, which superintend navigation, public carriages, animals, public health, &c. Concurrently with these divisions there is the municipal police, which comprises all the agents in enforcing police regulations in the streets or public thoroughfares, acting under the orders of a chief (*chef de la police municipale*) with a central bureau. The municipal police is divided into two principal branches—the service in uniform of the *agents de police* and the service out of uniform of *inspecteurs de police*. In Paris the municipal police are divided among the twenty arrondissements, which the uniform police patrol (see further PARIS and POLICE).

Prisons.—The prisons of France, some of them attached to the ministry of the interior, are complex in their classification. It is only from the middle of the 19th century that close attention has been given to the principle of individual separation. Cellular imprisonment was, however, partially adopted for persons awaiting trial. Central prisons, in which prisoners lived and worked in association, had been in existence from the commencement of the 19th century. These prisons received all sentenced to short terms of imprisonment, the long-term convicts going to the *bagnes* (the great convict prisons at the arsenals of Rochefort, Brest and Toulon), while in 1851 transportation to penal colonies was adopted. In 1869 and 1871 commissions were appointed to inquire into prison discipline, and as a consequence of the report of the last commission, issued in 1874, the principle of cellular confinement was put in operation the following year. There were, however, but few prisons in France adapted for the cellular system, and the process of reconstruction has been slow. In 1898 the old Paris prisons of Grande-Roquette, Saint-Pélagie and Mazas were demolished, and to replace them a large prison with 1500 cells was erected at Fresnes-lès-Rungis. There are (1) the *maison d'arrêt*, temporary places of durance in every arrondissement for persons charged with offences, and those sentenced to more than a year's imprisonment who are awaiting transfer to a *maison centrale*; (2) the *maison de justice*, often part and parcel of the former, but only existing in the assize court towns for the safe custody of those tried or condemned at the assizes; (3) departmental prisons, or *maisons de correction*, for summary convictions, or those sentenced to less than a year, or, if provided with sufficient cells, those amenable to separate confinement; (4) *maisons centrales* and *pénitenciers agricoles*, for all sentenced to imprisonment for more than a year, or to hard labour, or to those condemned to *travaux forcés* for offences committed in prison. There are eleven *maisons centrales*, nine for men (Loos, Clairvaux, Beaulieu, Poissy, Melun, Fontevrault, Thouars, Riom and Nîmes); two for women (Rennes and Montpellier). The *pénitenciers agricoles* only differ from the *maisons centrales* in the matter of régime; there are two—at Castelluccio and at Chiavari (Corsica). There are also reformatory establishments for juvenile offenders, and *dépôts de sûreté* for prisoners who are travelling, at places where there are no other prisons. For the penal settlements at a distance from France see DEPORTATION.

Finance.

At the head of the financial organization of France, and exercising a general jurisdiction, is the minister of finance, who co-ordinates in one general budget the separate budgets prepared by his colleagues and assigns to each ministerial department the sums necessary for its expenses.

Budget.

The financial year in France begins on the 1st of January, and the budget of each financial year must be laid on the table of the Chamber of Deputies in the course of the ordinary session of the preceding year in time for the discussion upon it to begin in October and be concluded before the 31st of December. It is then submitted to a special commission of the Chamber of Deputies, elected for one year, who appoint a general reporter and one or more special reporters for each of the ministries. When the Chamber of Deputies has voted the budget it is submitted to a similar course of procedure in the Senate. When the budget has passed both chambers it is promulgated by the president under the title of *Loi des finances*. In the event of its not being voted before the 31st of December, recourse is had to the system of "provisional twelfths" (*douzièmes provisoires*), whereby the government is authorized by parliament to incur expenses for one, two or three months on the scale of the previous year. The expenditure of the government has several times been regulated for as long as six months upon this system.

Taxation.

In each department an official collector (*Trésorier payeur général*) receives the taxes and public revenue collected therein and accounts for them to the central authority in Paris. In view of his responsibilities he has, before appointment, to pay a large deposit to the treasury. Besides receiving taxes, they pay the creditors of the state in their departments, conduct all operations affecting departmental loans, buy and sell government stock (*rentes*) on behalf of individuals, and conduct certain banking operations. The *trésorier* nearly always lives at the chief town of the department, and is assisted by a *receveur particulier des finances* in each arrondissement (except that in which the *trésorier* himself resides). From the *receveur* is demanded a security equal to five times his total income. The direct taxes are actually collected by *percepteurs*. In the commune an official known as the *receveur municipal* receives all moneys due to it, and, subject to the authorization of the mayor, makes all payments due from it. In communes with a revenue of less than £2400 the *percepteur* fulfils the functions of *receveur municipal*, but a special official may be appointed in communes with large incomes.

The direct taxes fall into two classes. (1) *Impôts de répartition* (apportionment), the amount to be raised being fixed in advance annually and then apportioned among the departments. They include the land tax,[1] the personal and habitation tax (*contribution personnelle-mobilière*), and door and window tax. (2) *Impôts de quotité*, which are levied directly on the individual, who pays his quota according to a fixed tariff. These comprise the tax on buildings[1] and the trade-licence tax (*impôt des patentes*). Besides these, certain other taxes (*taxes assimilées aux contributions directes*) are included under the heading of direct taxation, *e.g.* the tax on property in mortmain, dues for the verification of weights and measures, the tax on royalties from mines, on horses, mules and carriages, on cycles, &c.

The land tax falls upon land not built upon in proportion to its net yearly revenue. It is collected in accordance with a register of property (*cadastre*) drawn up for the most part in the first half of the 19th century, dealing with every piece of property in France, and giving its extent and value and the name of the owner. The responsibility of keeping this register accurate and up to date is divided between the state, the departments and the communes, and involves a special service and staff of experts. *The building tax* consists of a levy of 3·20% of the rental value of the property, and is charged upon the owner.

The personal and habitation tax consists in fact of two different taxes, one imposing a fixed capitation charge on all citizens alike of every department, the charge, however, varying according to the department from 1 fc. 50 c. (1s. 3d.) to 4 fcs. 50 c. (3s. 9d.), the other levied on every occupier of a furnished house or of apartments in proportion to its rental value.

The tax on doors and windows is levied in each case according to the number of apertures, and is fixed with reference to population, the inhabitants of the more populous paying more than those of the less populous communes.

The trade-licence tax (*impôt des patentes*) is imposed on every person carrying on any business whatever; it affects professional men, bankers and manufacturers, as well as wholesale and retail traders, and consists of (1) a fixed duty levied not on actual profits but with reference to the extent of a business or calling as indicated by number of employés, population of the locality and other considerations. (2) An assessment on the letting value of the premises in which a business or profession is carried on.

The administrative staff includes, for the purpose of computing the individual quotas of the direct taxes, a director assisted by *contrôleurs* in each department and subordinate to a central authority in Paris, the *direction générale des contributions directes*.

The indirect taxes comprise the charges on registration; stamps; customs; and a group of taxes specially described as "indirect taxes."

Registration (*enregistrement*) *duties* are charged on the transfer of property in the way of business (*à titre onéreux*); on changes in ownership effected in the way of donation or succession (*à titre gratuit*), and on a variety of other transactions which must be registered according to law. The revenue from *stamps* includes as its chief items the returns from stamped paper, stamps on goods traffic, securities and share certificates and receipts and cheques.

The *Direction générale de l'enregistrement, des domaines et du timbre*, comprising a central department and a director and staff of agents in each department, combines the administration of state property (not including forests) with the exaction of registration and stamp duties.

The Customs (*douane*), at one time only a branch of the administration of the *contributions indirectes*, were organized in 1869 as a special service. The central office at Paris consists of a *directeur général* and two *administrateurs*, nominated by the president of the republic. These officials form a council of administration presided over by the minister of finance. The service in the departments comprises *brigades*, which are actually engaged in guarding the frontiers, and a clerical staff (*service de bureau*) entrusted with the collection of the duties. There are twenty-four districts, each under the control of a *directeur*, assisted by inspectors, sub-inspectors and other officials. The chief towns of these districts are Algiers, Bayonne, Besançon, Bordeaux, Boulogne, Brest, Chambéry, Charleville, Dunkirk, Épinal, La Rochelle, Le Havre, Lille, Lyons, Marseilles, Montpellier, Nancy, Nantes, Nice, Paris, Perpignan, Rouen, St-Malo, Valenciennes. There is also an official performing the functions of a director at Bastia, in Corsica.

The group specially described as indirect taxes includes those on alcohol, wine, beer, cider and other alcoholic drinks, on passenger and goods traffic by railway, on licences to distillers, spirit-sellers, &c., on salt and on sugar of home manufacture. The collection of these excise duties as well as the sale of matches, tobacco and gunpowder to retailers, is assigned to a special service in each department subordinated to a central administration. To the above taxes must be added the *tax on Stock Exchange transactions* and the *tax of 4% on dividends from stocks and shares* (*other than state loans*).

Other main sources of revenue are: the *domains and forests* managed by the state; *government monopolies*, comprising tobacco, matches, gunpowder; *posts, telegraphs, telephones*; and *state*

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[1] The tax on land (*propriétés non bâties*) and that on buildings (*propriétés bâties*) are included under the head of *contribution foncière*.

railways. An administrative tribunal called the *cour des comptes* subjects the accounts of the state's financial agents (*trésoriers-payeurs, receveurs* of registration fees, of customs, of indirect taxes, &c.) and of the communes[1] to a close investigation, and a vote of definitive settlement is finally passed by parliament. The Cour des Comptes, an ancient tribunal, was abolished in 1791, and reorganized by Napoleon I. in 1807. It consists of a president and 110 other officials, assisted by 25 auditors. All these are nominated for life by the president of the republic. Besides the accounts of the state and of the communes, those of charitable institutions[1] and training colleges[1] and a great variety of other public establishments are scrutinized by the Cour des Comptes.

The following table shows the rapid growth of the state revenue of France during the period 1875–1905, the figures for the specified years representing millions of pounds.

1875.	1880.	1885.	1890.	1895.	Average 1896–1900.	Average 1901–1905.
108	118	122	129	137	144	147

Of the revenue in 1905 (150½ million pounds) the four direct taxes produced approximately 20 millions. Other principal items of revenue were: Registration 25 millions, stamps 7½ millions, customs 18 millions, inland revenue on liquors 16½ millions, receipts from the tobacco monopoly 18 millions, receipts from post office 10½ millions.

Expenditure.

Since 1875 the expenditure of the state has passed through considerable fluctuations. It reached its maximum in 1883, descended in 1888 and 1889, and since then has continuously increased. It was formerly the custom to divide the credits voted for the discharge of the public services into two heads—the ordinary and extraordinary budget. The ordinary budget of expenditure was that met entirely by the produce of the taxes, while the extraordinary budget of expenditure was that which had to be incurred either in the way of an immediate loan or in aid of the funds of the floating debt. The policy adopted after 1890 of incorporating in the ordinary budget the expenditure on war, marine and public works, each under its own head, rendered the "extraordinary budget" obsolete, but there are still, besides the ordinary budget, *budgets annexes*, comprising the credits voted to certain establishments under state supervision, *e.g.* the National Savings Bank, state railways, &c. The growth of the expenditure of France is shown in the following summary figures, which represent millions of pounds.

1875.	1880.	1885.	1890.	1895.	Average 1896–1900.	Average 1901–1905.
117	135	139	132	137	143	147

The chief item of expenditure (which totalled 148 million pounds in 1905) is the service of the public debt, which in 1905 cost 48¼ million pounds sterling. Of the rest of the sum assigned to the ministry of finance (59¾ millions in all) 8½ millions went in the expense of collection of revenue. The other ministries with the largest outgoings were the ministry of war (the expenditure of which rose from 25½ millions in 1895 to over 30 millions in 1905), the ministry of marine (10¾ millions in 1895, over 12½ millions in 1905), the ministry of public works (with an expenditure in 1905 of over 20 millions, 10 millions of which was assigned to posts, telegraphs and telephones) and the ministry of public instruction, fine arts and public worship, the expenditure on education having risen from 7½ millions in 1895 to 9½ millions in 1905.

Public Debt.—The national debt of France is the heaviest of any country in the world. Its foundation was laid early in the 15th century, and the continuous wars of succeeding centuries, combined with the extravagance of the monarchs, as well as deliberate disregard of financial and economic conditions, increased it at an alarming rate. The duke of Sully carried out a revision in 1604, and other attempts were made by Mazarin and Colbert, but the extravagances of Louis XV. swelled it again heavily. In 1764 the national debt amounted to 2,360,000,000 livres, and the annual change to 93,000,000 livres. A consolidation was effected in 1793, but the lavish issue of assignats (*q.v.*) destroyed whatever advantage might have accrued, and the debt was again dealt with by a law of the 9th of Vendémiaire year VI. (27th of September 1797), the annual interest paid yearly to creditors then amounting to 40,216,000 francs (£1,600,000). During the Directory a sum of £250,000 was added to the interest charge, and by 1814 this annual charge had risen to £2,530,000. This large increase is to be accounted for by the fact that during the Napoleonic régime the government steadily refused to issue inconvertible paper currency or to meet war expenditure by borrowing. The following table shows the increase of the funded debt since 1814.[2]

Date.		Nominal Capital (Millions of £).	Interest (Millions of £).
April 1,	1814 . . .	50¾	2½
April 1,	1830 . . .	177	8
March 1,	1848 . . .	238¼	9¾
January 1,	1852 . . .	220¾	9½
,,	1871 . . .	498¼	15½
,,	1876 . . .	796¼	30
,,	1887 . . .	986½	34¼
,,	1895 . . .	1038¾[3]	32½
,,	1905 . . .	1037¼	31

The French debt as constituted in 1905 was made up of funded debt and floating debt as follows:

Funded Debt.

Perpetual 3% *rentes*	£888,870,400
Terminable 3% *rentes*	148,490,400
Total of funded debt	£1,037,360,800
Guarantees to railway companies, &c. (in capital)	£89,724,080
Other debt in capital	46,800,840

Floating Debt.

Exchequer bills	£9,923,480
Liabilities on behalf of communes and public establishments, including departmental services	17,366,520
Deposit and current accounts of Caisse des dépôts, &c., including savings banks	15,328,840
Caution money of Trésoriers payeurs-généraux	1,431,680
Other liabilities	6,456,200
Total of floating debt	£50,506,720

Departmental Finances.—Every department has a budget of its own, which is prepared and presented by the prefect, voted by the departmental council and approved by decree of the president of the republic. The ordinary receipts include the revenues from the property of the department, the produce of *additional centimes*, which are levied in conjunction with the direct taxes for the maintenance of both departmental and communal finances, state subventions and contributions of the communes towards certain branches of poor relief and to maintenance of roads. The chief expenses of the departments are the care of pauper children and lunatics, the maintenance of high-roads and the service of the departmental debt.

Communal Finances.—The budget of the commune is prepared by the mayor, voted by the municipal council and approved by the prefect. But in communes the revenues of which exceed £120,000, the budget is always submitted to the president of the republic. The ordinary revenues include the produce of "additional centimes" allocated to communal purposes, the rents and profits of communal property, sums produced by municipal taxes and dues, concessions to gas, water and other companies, and by the *octroi* (*q.v.*) or duty on a variety of articles imported into the commune for local consumption. The repairing of highways, the upkeep of public buildings, the support of public education, the remuneration of numerous officials connected with the collection of state taxes, the keeping of the *cadastre*, &c., constitute the principal objects of communal expenditure.

Both the departments and the communes have considerable public debts. The departmental debt in 1904 stood at 24 million pounds, and the communal debt at 153 million pounds. (R. Tr.)

Army.

Recruiting and Strength.—Universal compulsory service was adopted after the disasters of 1870–1871, though in principle it had been established by Marshal Niel's reforms a few years before that date. The most important of the recruiting laws passed since 1870 are those of 1872, 1889 and 1905, the last the "loi de deux ans" which embodies the last efforts of the French war department to keep pace with the ever-growing numbers of the German empire. Compulsory service with the colours is in Germany no longer universal, as there are twice as many able-bodied men presented by the recruiting commissions as the active army can absorb. France, with a greatly inferior population, now trains every man who is physically capable. This law naturally made a deep impression on military Europe, not merely because the period of colour service was reduced—Germany had taken this step years before—but because of the almost entire absence of the usual exemptions.

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[1] With revenues of over £1200.

[2] For a history of the French debt, see C. F. Bastable, *Public Finance* (1903).

[3] In 1894 the rentes then standing at 4½% were reduced to 3½%, and in 1902 to 3%.

Even bread-winners are required to serve, the state pensioning their dependants (75 centimes per diem, up to 10% of the strength) during their period of service. Dispensations, and also the one-year voluntariat, which had become a short cut for the so-called "intellectual class" to employment in the civil service rather than a means of training reserve officers, were abolished. Every Frenchman therefore is a member of the army practically or potentially from the age of twenty to the age of forty-five. Each year there is drawn up in every commune a list of the young men who attained the age of twenty during the previous year. These young men are then examined by a revising body (*Conseil de révision cantonal*) composed of civil and military officials. Men physically unfit are wholly exempted, and men who have not, at the time of the examination, attained the required physical standard are put back for re-examination after an interval. Men who, otherwise suitable, have some slight infirmity are drafted into the non-combatant branches. The minimum height for the infantry soldier is 1·54 m., or 5 ft. $\frac{1}{2}$ in., but men of special physique are taken below this height. In 1904, under the old system of three-years' service with numerous total and partial exemptions, 324,253 men became liable to incorporation, of whom 25,432 were rejected as unfit, 55,265 were admitted as one-year volunteers, 62,160 were put back, 27,825 had already enlisted with a view to making the army a career, 5257 were taken for the navy, and thus, with a few extra details and casualties, the contingent for full service dwindled to 147,549 recruits. In 1906, 326,793 men had to present themselves, 25,348 had already enlisted, 4923 went to the navy, 68,526 were put back, 33,777 found unfit, which, deducting 3128 details, gives an actual incorporated contingent of 191,091 young men of twenty-one to serve for two full years (in each case, for the sake of comparison, men put back from former years who were enrolled are omitted). In theory a two-years' contingent of course should be half as large again as a three-years' one, but in practice, France has not men enough for so great an increase. Still the law of 1905 provides a system whereby there is room with the colours for every available man, and moreover ensures his services. The net gain in the 1906 class is not far short of 50,000, and the proportion of the new contingent to the old is practically 5 : 4. The *loi des cadres* of 1907 introduced many important changes of detail supplementary to the *loi de deux ans*. Important changes were also made in the provisions and administration of military law. The active army, then, at a given moment, say November 1, 1908, is composed of all the young men, not legally exempted, who have reached the age of twenty in the years 1906 and 1907. It is at the disposal of the minister of war, who can decree the recall of all men discharged to the reserve the previous year and all those whose time of service has for any reason been shortened. The reserves of the active army are composed of those who have served the legal period in the active army. These are recalled twice, in the eleven years during which they are members of the reserve, for refresher courses. The active army and its reserve are not localized, but drawn from and distributed over the whole of France. The advantages of a purely territorial system have tempted various War Ministers to apply it, but the results were not good, owing to the want of uniformity in the military qualities and the political subordination of the different districts. One result of this is that mobilization and concentration are much slower processes than they are in Germany.

The Territorial Army and its reserve (members of which undergo two short periods of training) are, however, allocated to local service. The soldier spends six years in the Territorial Army, and six in the reserve of the Territorial Army. The reserves of the active army and the Territorial Army and its reserve can only be recalled to active service in case of emergency and by decree of the head of the state.

The total service rendered by the individual soldier is thus twenty-five years. He is registered at the age of twenty, is called to the colours on the 1st of October of the next year, discharged to the active army reserve on the 30th of September of the second year thereafter, to the Territorial Army at the same date thirteen complete years after his incorporation, and finally discharged from the reserve of the Territorial Army on the twenty-fifth anniversary of his entry into the active army. On November 1, 1908, then the active army was composed of the classes registered 1906 and 1907, the reserve of the classes 1895–1905, the Territorial Army of those of 1889–1894 and the Territorial Army reserve of those of 1883–1888.

In 1906 the peace strength of the army in France was estimated at 532,593 officers and men; in Algeria 54,580; in Tunis 20,320; total 607,493. Deducting vacancies, sick and absent, the effective strength of the active army in 1906 was 540,563; of the gendarmerie and Garde Républicaine 24,512; of colonial troops in the colonies 58,568. The full number of persons liable to be called upon for military service and engaged in such service is calculated (1908) as 4,800,000, of whom 1,350,000 of the active army and the younger classes of army reserve would constitute the field armies set on foot at the outbreak of war. 150,000 horses and mules are maintained on a peace footing and 600,000 on a war footing.

Organization.—The general organization of the French army at home is based on the system of permanent army corps, the headquarters of which are as follows: I. Lille, II. Amiens, III. Rouen, IV. Le Mans, V. Orléans, VI. Châlons-sur-Marne, VII. Besançon, VIII. Bourges, IX. Tours, X. Rennes, XI. Nantes, XII. Limoges, XIII. Clermont-Ferrand, XIV. Lyons, XV. Marseilles, XVI. Montpellier, XVII. Toulouse, XVIII. Bordeaux, XIX. Algiers and XX. Nancy. Each army corps consists in principle of two infantry divisions, one cavalry brigade, one brigade of horse and field artillery, one engineer battalion and one squadron of train. But certain army corps have a special organization. The VI. corps (Châlons) and the VII. (Besançon) consist of three divisions each, and the XIX. (Algiers) has three divisions of its own as well as the division occupying Tunis. In addition to these corps there are eight permanent cavalry divisions with headquarters at Paris, Lunéville, Meaux, Sedan, Reims, Lyons, Melun and Dôle. The military government of Paris is independent of the army corps system and comprises, besides a division of the colonial army corps (see below), $3\frac{1}{2}$ others detached from the II., III., IV. and V. corps, as well as the 1st and 3rd cavalry divisions and many smaller bodies of troops. The military government of Lyons is another independent and special command; it comprises practically the XIV. army corps and the 6th cavalry division. The infantry division consists of 2 brigades, each of 2 regiments of 3 or 4 battalions (the 4 battalion regiments have recently been reduced for the most part to 3), with 1 squadron cavalry and 12 batteries, attached from the corps troops, in war a proportion of the artillery would, however, be taken back to form the corps artillery (see ARTILLERY and TACTICS). The cavalry division consists of 2 or 3 brigades, each of 2 regiments or 8 squadrons, with 2 horse artillery batteries attached. The army corps consists of headquarters, 2 (or 3) infantry divisions, 1 cavalry brigade, 1 artillery brigade (2 regiments, comprising 21 field and 2 horse batteries), 1 engineer battalion, &c. In war a group of "Rimailho" heavy howitzers (see ORDNANCE: *Heavy Field and Light Siege Units*) would be attached. It is proposed, and accepted in principle, to increase the number of guns in the army corps by converting the horse batteries in 18 army corps to field batteries, which, with other measures, enables the number of the latter to be increased to 36 (144 guns).

The organization of the "metropolitan troops" by regiments is (*a*) 163 regiments of line infantry, some of which are affected to "regional" duties and do not enter into the composition of their army corps for war, 31 battalions of *chasseurs à pied*, mostly stationed in the Alps and the Vosges, 4 regiments of Zouaves, 4 regiments of Algerian tirailleurs (natives, often called Turcos[1]), 2 foreign legion regiments, 5 battalions of African light infantry (disciplinary regiments), &c.; (*b*) 12 regiments of cuirassiers, 32 of dragoons, 21 of *chasseurs à cheval*, 14 of hussars, 6 of *chasseurs d'Afrique* and 4 of Spahis (Algerian natives); (*c*) 40 regiments of artillery, comprising 445 field batteries, 14 mountain batteries and 52 horse batteries (see, however, above), 18 battalions of garrison artillery, with in addition 13 companies of artificers, &c.; (*d*) 6 regiments of engineers forming 22 battalions, and 1 railway regiment; (*e*) 20 squadrons of train, 27 legions of gendarmerie and the Paris Garde Républicaine, administrative and medical units.

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[1] Algerian native troops are recruited by voluntary enlistment. But in 1908, owing to the prevailing want of trained soldiers in France, it was proposed to set free the white troops in Algeria by applying the principles of universal service to the natives, as in Tunis.

Colonial Troops.—These form an expeditionary army corps in France to which are attached the actual corps of occupation to the various colonies, part white, part natives. The colonial army corps, headquarters at Paris, has three divisions, at Paris, Toulon and Brest.

The French colonial (formerly marine) infantry, recruited by voluntary enlistment, comprises 18 regiments and 5 independent battalions (of which 12 regiments are at home), 74 batteries of field, fortress and mountain artillery (of which 32 are at home), with a few cavalry and engineers, &c., and other services in proportion. The native troops include 13 regiments and 8 independent battalions. The strength of this army corps is 28,700 in France and 61,300 in the colonies.

Command.—The commander-in-chief of all the armed forces is the president of the Republic, but the practical direction of affairs lies in the hand of the minister of war, who is assisted by the *Conseil supérieur de la guerre*, a body of senior generals who have been selected to be appointed to the higher commands in war. The vice-president is the destined commander-in-chief of the field armies and is styled the generalissimo. The chief of staff of the army is also a member of the council. In war the latter would probably remain at the ministry of war in Paris, and the generalissimo would have his own chief of staff. The ministry of war is divided into branches for infantry, cavalry, &c.—and services for special subjects such as military law, explosives, health, &c. The general staff (*état major de l'armée*) has its functions classed as follows: personnel; material and finance; 1st bureau (organization and mobilization), 2nd (intelligence), 3rd (military operations and training) and 4th (communications and transport); and the famous historical section. The president of the Republic has a military household, and the minister a cabinet, both of which are occupied chiefly with questions of promotion, patronage and decorations.

The general staff and also the staff of the corps and divisions are composed of certificated (*brevetés*) officers who have passed all through the École de Guerre. In time of peace an officer is attached to the staff for not more than four years. He must then return to regimental duty for at least two years.

The officers of the army are obtained partly from the old-established military schools, partly from the ranks of the non-commissioned officers, the proportion of the latter being about one-third of the total number of officers. Artillery and engineer officers come from the École Polytechnique, infantry and cavalry from the École spéciale militaire de St-Cyr. Other important training institutions are the staff college (École supérieure de Guerre) which trains annually 70 to 90 selected captains and lieutenants; the musketry school of Châlons, the gymnastic school at Joinville-le-Pont and the schools of St Maixent, Saumur and Versailles for the preparation of non-commissioned officers for commissions in the infantry, cavalry, artillery and engineers respectively. The non-commissioned officers are, as usual in universal service armies, drawn partly from men who voluntarily enlist at a relatively early age, and partly from men who at the end of their compulsory period of service are re-engaged. Voluntary enlistments in the French army are permissible, within certain limits, at the age of eighteen, and the *engagés* serve for at least three years. The law further provides for the re-engagement of men of all ranks, under conditions varying according to their rank. Such re-engagements are for one to three years' effective service but may be extended to fifteen. They date from the time of the legal expiry of each man's compulsory active service. *Rengagés* receive a bounty, a higher rate of pay and a pension at the conclusion of their service. The total number of men who had re-enlisted stood in 1903 at 8594.

Armament.—The field artillery is armed with the 75 mm. gun, a shielded quick-firer (see ORDNANCE: *Field Equipments*, for illustration and details); this weapon was the forerunner of all modern models of field gun, and is handled on tactical principles specially adapted for it, which gives the French field artillery a unique position amongst the military nations. The infantry, which was the first in Europe to be armed with the magazine rifle, still carries this, the Lebel, rifle which dates from 1886. It is believed, however, that a satisfactory type of automatic rifle (see RIFLE) has been evolved and is now (1908) in process of manufacture. Details are kept strictly secret. The cavalry weapons are a straight sword (that of the heavy cavalry is illustrated in the article SWORD), a bamboo lance and the Lebel carbine.

It is convenient to mention in this place certain institutions attached to the war department and completing the French military organization. The Hôtel des Invalides founded by Louis XIV. and Louvois is a house of refuge for old and infirm soldiers of all grades. The number of the inmates is decreasing; but the institution is an expensive one. In 1875 the "Invalides" numbered 642, and the hôtel cost the state 1,123,053 francs. The order of the Legion of Honour is treated under KNIGHTHOOD AND CHIVALRY. The *médaille militaire* is awarded to private soldiers and non-commissioned officers who have distinguished themselves or rendered long and meritorious services. This was introduced in 1852, carries a yearly pension of 100 frs. and has been granted occasionally to officers.

Fortifications.—After 1870 France embarked upon a policy of elaborate frontier and inner defences, with the object of ensuring, as against an unexpected German invasion, the time necessary for the effective development of her military forces, which were then in process of reorganization. Some information as to the types of fortification adopted in 1870–1875 will be found in FORTIFICATION AND SIEGECRAFT. The general lines of the scheme adopted were as follows: On the Meuse, which forms the principal natural barrier on the side of Lorraine, Verdun (*q.v.*) was fortified as a large entrenched camp, and along the river above this were constructed a series of *forts d'arrêt* (see MEUSE LINE) ending in another entrenched camp at Toul (*q.v.*). From this point a gap (the *trouée d'Épinal*) was left, so as "in some sort to canalize the flow of invasion" (General Bonnal), until the upper Moselle was reached at Épinal (*q.v.*). Here another entrenched camp was made and from it the "Moselle line" (*q.v.*) of *forts d'arrêt* continues the barrier to Belfort (*q.v.*), another large entrenched camp, beyond which a series of fortifications at Montbéliard and the Lomont range carries the line of defence to the Swiss border, which in turn is protected by works at Pontarlier and elsewhere. In rear of these lines Verdun-Toul and Épinal-Belfort, respectively, lie two large defended areas in which under certain circumstances the main armies would assemble preparatory to offensive movements. One of these areas is defined by the three fortresses, La Fère, Laon and Reims, the other by the triangle, Langres—Dijon—Besançon. On the side of Belgium the danger of irruption through neutral territory, which has for many years been foreseen, is provided against by the fortresses of Lille, Valenciennes and Maubeuge, but (with a view to tempting the Germans to attack through Luxemburg, as is stated by German authorities) the frontier between Maubeuge and Verdun is left practically undefended. The real defence of this region lies in the field army which would, if the case arose, assemble in the area La Fère-Reims-Laon. On the Italian frontier the numerous *forts d'arrêt* in the mountains are strongly supported by the entrenched camps of Besançon, Grenoble and Nice. Behind all this huge development of fixed defences lie the central fortresses of Paris and Lyons. The defences of the Spanish frontier consist of the entrenched camps of Bayonne and Perpignan and the various small *forts d'arrêt* of the Pyrenees. Of the coast defences the principal are Toulon, Antibes, Rochefort, Lorient, Brest, Oléron, La Rochelle, Belle-Isle, Cherbourg, St-Malo, Havre, Calais, Gravelines and Dunkirk.

A number of the older fortresses, dating for the most part from Louis XIV.'s time, are still in existence, but are no longer of military importance. Such are Arras, Longwy, Mézières and Montmédy.

Navy.

Central Administration.—The head of the French navy is the Minister of Marine, who like the other ministers is appointed by decree of the head of the state, and is usually a civilian. He selects for himself a staff of civilians (the *cabinet du ministre*), which is divided into bureaux for the despatch of business. The head of the cabinet prepares for the consideration of the minister all the business of the navy, especially questions of general importance. His chief professional assistant is the *chef d'état-major général* (chief of the general staff), a vice-admiral, who is responsible for the organization of the naval forces, the mobilization and movements of the fleet, &c.

The central organization also comprises a number of departments (*services*) entrusted with the various branches of naval administration, such as administration of the active fleet, construction of ships, arsenals, recruiting, finance, &c. The minister has the assistance of the *Conseil supérieur de la Marine*, over which he presides, consisting of three vice-admirals, the chief of staff and some other members. The *Conseil supérieur* devotes its attention to all questions touching the fighting efficiency of the fleet, naval bases and arsenals and coast defence. Besides the *Conseil supérieur* the minister is advised on a very wide range of naval topics (including pay, quarters and recruiting) by the *Comité consultatif de la Marine*. Advisory committees are also appointed to deal with special subjects, *e.g.* the *commissions de classement* which attend to questions of promotion in the various branches of the navy, the naval works council and others.

The French coast is divided into five naval arrondissements, which have their headquarters at the five naval ports, of which Cherbourg, Brest, and Toulon are the most important, Lorient and Rochefort being of lesser degree. All are building and fitting-out yards. Each arrondissement is divided into sous-arrondissements, having their centres in the great commercial ports, but this arrangement is purely for the embodiment of the men of the Inscription Maritime, and has nothing to do with the dockyards as naval arsenals. In each arrondissement the vice-admiral, who is naval prefect, is the immediate representative of the minister of marine, and has full direction and command of the arsenal, which is his headquarters. He is thus commander-in-chief, as also governor-designate for time of war, but his authority does not extend to ships belonging to organized squadrons or divisions. The naval prefect is assisted by a rear-admiral as chief of the staff (except at Lorient and Rochefort, where the office is filled by a captain), and a certain number of other officers, the special functions of the chief of the staff having relation principally to the efficiency and *personnel* of the fleet, while the "major-general," who is usually a rear-admiral, is concerned chiefly with the *matériel*. There are also directors of stores, of naval construction, of the medical service, and of the submarine defences (which are concerned with torpedoes, mines and torpedo-boats), as well as of naval ordnance and works. The prefect directs the operations of the arsenal, and is responsible for its efficiency and for that of the ships which are there in reserve. In regard to the constitution and maintenance of the naval forces, the administration of the arsenals is divided into three principal departments, the first concerned with naval construction, the second with ordnance, including gun-mountings and small-arms, and the third with the so-called submarine defences, dealing with all torpedo *matériel*.

The French navy is manned partly by voluntary enlistment, partly by the transference to the navy of a certain proportion of each year's recruits for the army, but mainly by a system known as *inscription maritime*. This system, devised and introduced by Colbert in 1681, has continued, with various modifications, ever since. All French sailors between the ages of eighteen and fifty must be enrolled as members of the *armée de mer*. The term sailor is used in a very wide sense and includes all persons earning their living by navigation on the sea, or in the harbours or roadsteads, or on salt lakes or canals within the maritime domain of the state, or on rivers and canals as far as the tide goes up or sea-going ships can pass. The inscript usually begins his service at the age of twenty and passes through a period of obligatory service lasting seven years, and generally comprising five years of active service and two years furlough.

Besides the important harbours already referred to, the French fleet has naval bases at Oran in Algeria, Bizerta in Tunisia, Saigon in Cochin China and Hongaj in Tongking, Diégo-Suarez in Madagascar, Dakar in Senegal, Fort de France in Martinique, Nouméa in New Caledonia.

The ordnance department of the navy is carried on by a large detachment of artillery officers and artificers provided by the war office for this special duty.

The fleet is divided into the Mediterranean squadron, the Northern squadron, the Atlantic division, the Far Eastern division, the Pacific division, the Indian Ocean division, the Cochin China division.

The chief naval school is the *École navale* at Brest, which is devoted to the training of officers; the age of admission is from fifteen to eighteen years, and pupils after completing their course pass a year on a frigate school. At Paris there is a more advanced school (*École supérieure de la Marine*) for the supplementary training of officers. Other schools are the school of naval medicine at Bordeaux with annexes at Toulon, Brest and Rochefort; schools of torpedoes and mines and of gunnery at Toulon, &c., &c. The *écoles d'hydrographie* established at various ports are for theoretical training for the higher grades of the merchant service. (See also NAVY.)

The total personnel of the *armée de mer* in 1909 is given as 56,800 officers and men. As to the number of vessels, which fluctuates from month to month, little can be said that is wholly accurate at any given moment, but, very roughly, the French navy in 1909 included 25 battleships, 7 coast defence ironclads, 19 armoured cruisers, 36 protected cruisers, 22 sloops, gunboats, &c., 45 destroyers, 319 torpedo boats, 71 submersibles and submarines and 8 auxiliary cruisers. It was stated that, according to proposed arrangements, the principal fighting elements of the fleet would be, in 1919, 34 battleships, 36 armoured cruisers, 6 smaller cruisers of modern type, 109 destroyers, 170 torpedo boats and 171 submersibles and submarines. The budgetary cost of the navy in 1908 was stated as 312,000,000 fr. (£12,480,000). (C. F. A.)

Education.

The burden of public instruction in France is shared by the communes, departments and state, while side by side with the public schools of all grades are private schools subjected to a state supervision and certain restrictions. At the head of the whole organization is the minister of public instruction. He is assisted and advised by the superior council of public instruction, over which he presides.

France is divided into sixteen *académies* or educational districts, having their centres at the seats of the universities. The capitals of these *académies*, together with the departments included in them, are tabulated below:

Académies.	Departments included in them.
PARIS	Seine, Cher, Eure-et-Loir, Loir-et-Cher, Loiret, Marne, Oise, Seine-et-Marne, Seine-et-Oise.
AIX	Bouches-du-Rhône, Basses-Alpes, Alpes-Maritimes, Corse, Var, Vaucluse.
BESANÇON	Doubs, Jura, Haute-Saône, Territoire de Belfort.
BORDEAUX	Gironde, Dordogne, Landes, Lot-et-Garonne, Basses-Pyrénées.
CAEN	Calvados, Eure, Manche, Orne, Sarthe, Seine-Inférieure.
CHAMBÉRY	Savoie, Haute-Savoie.
CLERMONT-FERRAND	Puy-de-Dôme, Allier, Cantal, Corrèze, Creuse, Haute-Loire.
DIJON	Côte-d'Or, Aube, Haute-Marne, Nièvre, Yonne.
GRENOBLE	Isère, Hautes-Alpes, Ardèche, Drôme.
LILLE	Nord, Aisne, Ardennes, Pas-de-Calais, Somme.
LYONS	Rhône, Ain, Loire, Saône-et-Loire.

Académies.	Departments included in them.
MONTPELLIER	Hérault, Aude, Gard, Lozère, Pyrénées-Orientales.
NANCY	Meurthe-et-Moselle, Meuse, Vosges.
POITIERS	Vienne, Charente, Charente-Inférieure, Indre, Indre-et-Loire, Deux-Sèvres, Vendée, Haute-Vienne.
RENNES	Ille-et-Vilaine, Côtes-du-Nord, Finistère, Loire-Inférieure, Maine-et-Loire, Mayenne, Morbihan.
TOULOUSE	Haute-Garonne, Ariège, Aveyron, Gers, Lot, Hautes-Pyrénées, Tarn, Tarn-et-Garonne.

There is also an *académie* comprising Algeria.

For the administrative organization of education in France see EDUCATION.

Any person fulfilling certain legal requirements with regard to capacity, age and character may set up privately an educational establishment of any grade, but by the law of 1904 all religious congregations are prohibited from keeping schools of any kind whatever.

Primary Instruction.—All primary public instruction is free and compulsory for children of both sexes between the ages of six and thirteen, but if a child can gain a certificate of primary studies at the age of eleven or after, he may be excused the rest of the period demanded by law. A child may receive instruction in a public or private school or at home. But if the parents wish him to be taught in a private school they must give notice to the mayor of the commune of their intention and the school chosen. If educated at home, the child (after two years of the compulsory period has expired) must undergo a yearly examination, and if it is unsatisfactory the parents will be compelled to send him to a public or private school.

Each commune is in theory obliged to maintain at least one public primary school, but with the approval of the minister, the departmental council may authorize a commune to combine with other communes in the upkeep of a school. If the number of inhabitants exceed 500, the commune must also provide a special school for girls, unless the Departmental Council authorizes it to substitute a mixed school. Each department is bound to maintain two primary training colleges, one for masters, the other for mistresses of primary schools. There are two higher training colleges of primary instruction at Fontenay-aux-Roses and St Cloud for the training of mistresses and masters of training colleges and higher primary schools.

The Laws of 1882 and 1886 "laicized" the schools of this class, the former suppressing religious instruction, the latter providing that only laymen should be eligible for masterships. There were also a great many schools in the control of various religious congregations, but a law of 1904 required that they should all be suppressed within ten years from the date of its enactment.

Public primary schools include (1) *écoles maternelles*—infant schools for children from two to six years old; (2) elementary primary schools—these are the ordinary schools for children from six to thirteen; (3) higher primary schools (*écoles primaires supérieures*) and "supplementary courses"; these admit pupils who have gained the certificate of primary elementary studies (*certificat d'études primaires*), offer a more advanced course and prepare for technical instruction; (4) primary technical schools (*écoles manuelles d'apprentissage, écoles primaires supérieures professionnelles*) kept by the communes or departments. Primary courses for adults are instituted by the prefect on the recommendation of the municipal council and academy inspector.

Persons keeping private primary schools are free with regard to their methods, programmes and books employed, except that they may not use books expressly prohibited by the superior council of public instruction. Before opening a private school the person proposing to do so must give notice to the mayor, prefect and academy inspector, and forward his diplomas and other particulars to the latter official.

Secondary Education.—Secondary education is given by the state in *lycées*, by the communes in *collèges* and by private individuals and associations in private secondary schools. It is not compulsory, nor is it entirely gratuitous, but the fees are small and the state offers a great many scholarships, by means of which a clever child can pay for its own instruction. Cost of tuition (simply) ranges from £2 to £16 a year. The lycées also take boarders—the cost of boarding ranging from £22 to £52 a year. A lycée is founded in a town by decree of the president of the republic, with the advice of the superior council of public instruction. The municipality has to pay the cost of building, furnishing and upkeep. At the head of the lycée is the principal (*proviseur*), an official nominated by the minister, and assisted by a teaching staff of professors and *chargés de cours* or teachers of somewhat lower standing. To become professor in a lycée it is necessary to pass an examination known as the "*agrégation*," candidates for which must be licentiates of a faculty (or have passed through the *École normale supérieure*).

The system of studies—reorganized in 1902—embraces a full curriculum of seven years, which is divided into two periods. The first lasts four years, and at the end of this the pupil may obtain (after examination) the "certificate of secondary studies." During the second period the pupil has a choice of four courses: (1) Latin and Greek; (2) Latin and sciences; (3) Latin and modern languages; (4) sciences and modern languages. At the end of this period he presents himself for a degree called the *Baccalauréat de l'enseignement secondaire*. This is granted (after two examinations) by the faculties of letters and sciences jointly (see below), and in most cases it is necessary for a student to hold this general degree before he may be enrolled in a particular faculty of a university and proceed to a Baccalauréat in a particular subject, such as law, theology or medicine.

The collèges, though of a lower grade, are in most respects similar to the lycées, but they are financed by the communes: the professors may have certain less important qualifications in lieu of the "*agrégation*." Private secondary schools are subjected to state inspection. The teachers must not belong to any congregation, and must have a diploma of aptitude for teaching and the degree of "*licencié*." The establishment of lycées for girls was first attempted in 1880. They give an education similar to that offered in the lycées for boys—with certain modifications—in a curriculum of five or six years. There is a training-college for teachers in secondary schools for girls at Sèvres.

Higher education is given by the state in the universities, and in special higher schools; and, since the law of 1875 established the freedom of higher education, by private individuals and bodies in private schools and "faculties" (*facultés libres*). The law of 1880 reserved to the state "faculties" the right to confer degrees, and the law of 1896 established various universities each containing one or more faculties. There are five kinds of faculties: medicine, letters, science, law and Protestant theology. The faculties of letters and sciences, besides granting the *Baccalauréat de l'enseignement secondaire*, confer the degrees of licentiate and doctor (*la Licence, le Doctorat*). The faculties of medicine confer the degree of doctor of medicine. The faculties of theology confer the degrees of bachelor, licentiate and doctor of theology. The faculties of law confer the same degrees in law and also grant "certificates of capacity," which enable the holder to practise as an *avoué*; a *licence* is necessary for the profession of barrister. Students of the private faculties have to be examined by and take their degrees from the state faculties. There are 2 faculties of Protestant theology (Paris and Montauban); 12 faculties of law (Paris, Aix, Bordeaux, Caen, Grenoble, Lille, Lyons, Montpellier, Nancy, Poitiers, Rennes, Toulouse); 3 faculties of medicine (Paris, Montpellier and Nancy), and 4 joint faculties of medicine and pharmacy (Bordeaux, Lille, Lyons, Toulouse); 15 faculties of sciences (Paris, Besançon, Bordeaux, Caen, Clermont, Dijon, Grenoble, Lille, Lyons, Marseilles, Montpellier, Nancy, Poitiers, Rennes, Toulouse); 15 faculties of letters (at the same towns, substituting Aix for Marseilles). The private faculties are at Paris (the Catholic Institute with a faculty of law); Angers (law, science and letters); Lille (law, medicine and pharmacy, science, letters); Lyons (law, science, letters); Marseilles (law); Toulouse (Catholic Institute with faculties of theology and letters). The work of the faculties of medicine and pharmacy is in some measure shared by the *écoles supérieures de pharmacie* (Paris, Montpellier, Nancy), which grant the highest degrees in pharmacy, and by the *écoles de plein exercice de médecine et de pharmacie* (Marseilles, Rennes and Nantes) and the more numerous *écoles préparatoires de médecine et de pharmacie*; there are also *écoles préparatoires à l'enseignement supérieur des sciences et des lettres* at Chambéry, Rouen and Nantes.

Besides the faculties there are a number of institutions, both state-supported and private, giving higher instruction of various special kinds. In the first class must be mentioned the Collège de France, founded 1530, giving courses of highest study of all sorts, the Museum of Natural History, the École des Chartes (palaeography and archives), the School of Modern Oriental Languages, the École Pratique des Hautes Études (scientific research), &c. All these institutions are in Paris. The most important free institution in this class is the École des Sciences Politiques, which prepares pupils for the civil services and teaches a great number of political subjects, connected with France and foreign countries, not included in the state programmes.

Commercial and technical instruction is given in various institutions comprising national establishments such as the *écoles nationales professionnelles* of Armentières, Vierzon, Voiron and Nantes for the education of working men; the more advanced *écoles d'arts et métiers* of Châlons, Angers, Aix, Lille and Cluny; and the Central School of Arts and Manufactures at Paris; schools depending on the communes and state in combination, *e.g.* the *écoles pratiques de commerce et d'industrie* for the training of clerks and workmen; private schools controlled by the state, such as the *écoles supérieures de commerce*; certain municipal schools, such as the Industrial Institute of Lille; and private establishments, *e.g.* the school of watch-making at Paris. At Paris the École Supérieure des Mines and the École des Ponts et Chaussées are controlled by the minister of public works, the École des Beaux-Arts, the École des Arts Décoratifs and the Conservatoire National de Musique et de Déclamation by the under-secretary for fine arts and other schools mentioned elsewhere are attached to several of the ministries. In the provinces there are national schools of fine art and of music and other establishments and free subventioned schools.

In addition to the educational work done by the state, communes and private individuals, there exist in France a good many societies which disseminate instruction by giving courses of lectures and holding classes both for children and adults. Examples of such bodies are the Society for Elementary Instruction, the Polytechnic Association, the Philotechnic Association and the French Union of the Young at Paris; the Philomathic Society of Bordeaux; the Popular Education Society at Havre; the Rhone Society of Professional Instruction at Lyons; the Industrial Society of Amiens and others.

The highest institution of learning is the *Institut de France*, founded and kept up by the French government on behalf of science and literature, and composed of five academies: the *Académie française*, the *Académie des Inscriptions et Belles-Lettres*, the *Académie des Sciences*, the *Académie des Beaux-Arts* and the *Académie des Sciences Morales et Politiques* (see ACADEMIES). The *Académie de Médecine* is a separate body.

Poor Relief (*Assistance publique*).—In France the pauper, *as such*, has no legal claim to help from the community, which however, is bound to provide for destitute children (see FOUNDLING HOSPITALS) and pauper lunatics (both these being under the care of the department), aged and infirm people without resources and victims of incurable illness, and to furnish medical assistance gratuitously to those without resources who are afflicted with curable illness. The funds for these purposes are provided by the department, the commune and the central authority.

There are four main types of public benevolent institutions, all of which are communal in character: (1) The *hôpital*, for maternity cases and cases of curable illness; (2) the *hospice*, where the aged poor, cases of incurable malady, orphans, foundlings and other children without means of support, and in some cases lunatics, are received; (3) the *bureau de bien-faisance*, charged with the provision of out-door relief (*secours à domicile*) in money or in kind, to the aged poor or those who, though capable of working, are prevented from doing so by illness or strikes; (4) the *bureau d'assistance*, which dispenses free medical treatment to the destitute.

These institutions are under the supervision of a branch of the ministry of the interior. The hospices and hôpitaux and the bureaux de bienfaisance, the foundation of which is optional for the commune, are managed by committees consisting of the mayor of the municipality and six members, two elected by the municipal council and four nominated by the prefect. The members of these committees are unpaid, and have no concern with ways and means which are in the hands of a paid treasurer (*receveur*). The bureaux de bienfaisance in the larger centres are aided by unpaid workers (*commissaires* or *dames de charité*), and in the big towns by paid inquiry officers. *Bureaux d'assistance* exist in every commune, and are managed by the combined committees of the hospices and the bureaux de bienfaisance or by one of these in municipalities, where only one of those institutions exists.

No poor-rate is levied in France. Funds for hôpitals, hospices and bureaux de bienfaisance comprise:

1. A 10% surtax on the fees of admission to places of public amusement.
2. A proportion of the sums payable in return for concessions of land in municipal cemeteries.
3. Profits of the communal Monts de Piété (pawn-shops).
4. Donations, bequests and the product of collections in churches.
5. The product of certain fines.
6. Subventions from the departments and communes.
7. Income from endowments.

(R. TR.)

Colonies.

In the extent and importance of her colonial dominion France is second only to Great Britain. The following table gives the name, area and population of each colony and protectorate as well as the date of acquisition or establishment of a protectorate. It should be noted that the figures for area and population are, as a rule, only estimates, but in most instances they probably approximate closely to accuracy. Detailed notices of the separate countries will be found under their several heads:

Colony.	Date of Acquisition.	Area in sq. m.	Population.
In Asia—			
Establishments in India	1683–1750	200	273,000
In Indo-China—			
Annam	1883	60,000	6,000,000
Cambodia	1863	65,000	1,500,000
Cochin-China	1862	22,000	3,000,000
Tongking	1883	46,000	6,000,000
Laos	1893	100,000	600,000
Kwang-Chow-Wan	1898	325	189,000
Total in Asia	..	293,525	17,562,000
In Africa and the Indian Ocean—			
Algeria	1830–1847	185,000	5,231,850
Algerian Sahara	1872–1890	760,000	..
Tunisia	1881	51,000	2,000,000
West Africa—			
Senegal	1626	74,000	1,800,000
Upper Senegal and Niger (including part of Sahara)	1880	1,580,000	4,000,000
Guinea	1848	107,000	2,500,000
Ivory Coast	1842	129,000	2,000,000
Dahomey	1863–1894	40,000	1,000,000
Congo (French Equatorial Africa)—			
Gabun	1839	700,000	376,000
Mid. Congo	1882		259,000
Ubangi-Chad	1885–1899		3,015,000
Madagascar	1885–1896	228,000	2,664,000
Nossi-be Island	1840		
Ste Marie Island	1750		
Comoro Islands	1843–1886	760	82,000
Somali Coast	1862–1884	12,000	50,000
Réunion	1643	965	173,315
St Paul	1892	3	uninhabited
Amsterdam		19	
Kerguelen[1]	1893	1,400	
Total in Africa and Indian Ocean.		3,869,147	25,151,165
In America—			
Guiana	1626	51,000	30,000
Guadeloupe	1634	619	182,112
Martinique	1635	380	182,024
St Pierre and Miquelon	1635	92	6,500
Total in America		52,092	400,636
In Oceania—			
New Caledonia and Dependencies	1854–1887	7,500	72,000
Establishments in Oceania	1841–1881	1,641	34,300
Total in Oceania		9,141	106,300
Grand Total		4,223,905	43,220,101

It will be seen that nearly all the colonies and protectorates lie within the tropics. The only countries in which there is a considerable white population are Algeria, Tunisia and New Caledonia. The "year of acquisition" in the table, when one date only is given, indicates the period when the country or some part of it first fell under French influence, and does not imply continuous possession since.

Government.—The principle underlying the administration of the French possessions overseas, from the earliest days until the close of the 19th century, was that of "domination" and "assimilation," notwithstanding that after the loss of Canada and the sale of Louisiana France ceased to hold any considerable colony in which Europeans could settle in large numbers. With the vast extension of the colonial empire in tropical countries in the last quarter of the 19th century the evils of the system of assimilation, involving also intense centralization, became obvious. This, coupled with the realization of the fact that the value to France of her colonies was mainly commercial, led at length to the abandonment of the attempt to impose on a great number of diverse peoples, some possessing (as in Indo-China and parts of West Africa) ancient and highly complex civilizations, French laws, habits of mind, tastes and manners. For the policy of assimilation there was substituted the policy of "association," which had for aim the development of the colonies and protectorates upon natural, *i.e.* national, lines. Existing civilizations were respected, a considerable degree of autonomy was granted, and every effort made to raise the moral and economic status of the natives. The first step taken in this direction was in 1900 when a law was passed which laid down that the colonies were to provide for their own civil expenditure. This law was followed by further measures tending to decentralization and the protection of the native races.

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[1] Kerguelen lies in the Great Southern Ocean, but is included here for the sake of convenience.

The system of administration bears nevertheless many marks of the "assimilation" era. None of the French possessions is self-governing in the manner of the chief British colonies. Several colonies, however, elect members of the French legislature, in which body is the power of fixing the form of government and the laws of each colony or protectorate. In default of legislation the necessary measures are taken by decree of the head of the state; these decrees having the force of law. A partial exception to this rule is found in Algeria, where all laws in force in France before the conquest of the country are also (in theory, not in practice) in force in Algeria. In all colonies Europeans preserve the political rights they held in France, and these rights have been extended, in whole or in part, to various classes of natives. Where these rights have not been conferred, native races are *subjects* and not *citizens*. To this rule Tunisia presents an exception, Tunisians retaining their nationality and laws.

In addition to Algeria, which sends three senators and six deputies to Paris and is treated in many respects not as a colony but as part of France, the colonies represented in the legislature are: Martinique, Guadeloupe and Réunion (each electing one senator and two deputies), French India (one senator and one deputy), Guiana, Senegal and Cochin-China (one deputy each). The franchise in the three first-named colonies is enjoyed by all classes of inhabitants, white, negro and mulatto, who are all French citizens. In India the franchise is exercised without distinction of colour or nationality; in Senegal the electors are the inhabitants (black and white) of the communes which have been given full powers. In Guiana and Cochin-China the franchise is restricted to citizens, in which category the natives (in those colonies) are not included.[1] The inhabitants of Tahiti though accorded French citizenship have not been allotted a representative in parliament. The colonial representatives enjoy equal rights with those elected for constituencies in France.

The oversight of all the colonies and protectorates save Algeria and Tunisia is confided to a minister of the colonies (law of March 20, 1894)[2] whose powers correspond to those exercised in France by the minister of the interior. The colonial army is nevertheless attached (law of 1900) to the ministry of war. The colonial minister is assisted by a number of organizations of which the most important is the superior council of the colonies (created by decree in 1883), an advisory body which includes the senators and deputies elected by the colonies, and delegates elected by the universal suffrage of all citizens in the colonies and protectorates which do not return members to parliament. To the ministry appertains the duty of fixing the duties on foreign produce in those colonies which have not been, by law, subjected to the same tariff as in France. (Nearly all the colonies save those of West Africa and the Congo have been, with certain modifications, placed under the French tariff.) The budget of all colonies not possessing a council general (see below) must also be approved by the minister. Each colony and protectorate, including Algeria, has a separate budget. As provided by the law of 1900 all local charges are borne by the colonies—supplemented at need by grants in aid—but the military expenses are borne by the state. In all the colonies the judicature has been rendered independent of the executive.

The colonies are divisible into two classes, (1) those possessing considerable powers of local self-government, (2) those in which the local government is autocratic. To this second class may be added the protectorates (and some colonies) where the native form of government is maintained under the supervision of French officials.

Class (1) includes the American colonies, Réunion, French India, Senegal, Cochin-China and New Caledonia. In these colonies the system of assimilation was carried to great lengths. At the head of the administration is a governor under whom is a secretary-general, who replaces him at need. The governor is aided by a privy council, an advisory body to which the governor nominates a minority of unofficial members, and a council general, to which is confided the control of local affairs, including the voting of the budget. The councils general are elected by universal suffrage of all citizens and those who, though not citizens, have been granted the political franchise. In Cochin-China, in place of a council general, there is a colonial council which fulfils the functions of a council general.

In the second class of colonies the governor, sometimes assisted by a privy council, on which non-official members find seats, sometimes simply by a council of administration, is responsible only to the minister of the colonies. In Indo-China, West Africa, French Congo and Madagascar, the colonies and protectorates are grouped under governors-general, and to these high officials extensive powers have been granted by presidential decree. The colonies under the governor-general of West Africa are ruled by lieutenant-governors with restricted powers, the budget of each colony being fixed by the governor-general, who is assisted by an advisory government council comprising representatives of all the colonies under his control. In Indo-China the governor-general has under his authority the lieutenant-governor of the colony of Cochin-China, and the residents superior at the courts of the kings of Cambodia and Annam and in Tongking (nominally a viceroyalty of Annam). There is a superior council for the whole of Indo-China on which the natives and the European commercial community are represented, while in Cochin-China a privy council, and in the protectorates a council of the protectorate, assists in the work of administration. In each of the governments general there is a financial controller with extensive powers who corresponds directly with the metropolitan authorities (decree of March 22, 1907). Details and local differences in form of government will be found under the headings of the various colonies and protectorates.

Colonial Finance.—The cost of the extra-European possessions, other than Algeria and Tunisia, to the state is shown in the expenses of the colonial ministry. In the budget of 1885 these expenses were put at £1,380,000; in 1895 they had increased to £3,200,000 and in 1900 to £5,100,000. In 1905 they were placed at £4,431,000. Fully three-fourths of the state contributions is expenditure on military necessities; in addition there are subventions to various colonies and to colonial railways and cables, and the expenditure on the penitentiary establishments; an item not properly chargeable to the colonies. In return the state receives the produce of convict labour in Guiana and New Caledonia. Save for the small item of military expenditure Tunisia is no charge to the French exchequer. The similar expenses of Algeria borne by the state are not separately shown, but are estimated at £2,000,000.

The colonial budgets totalled in 1907 some £16,760,000, being divisible into six categories: Algeria £4,120,000; Tunisia £3,640,000; Indo-China[3] about £5,000,000; West Africa £1,600,000; Madagascar £960,000; all other colonies combined £1,440,000.

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[1] In 1906 the number of registered electors in these colonies was 199,055, of whom 106,695 exercised their suffrage.

[2] In the case of Madagascar by decree of the 11th of December 1895.

[3] The Indo-China budget is reckoned in piastres, a silver coin of fluctuating value (1s. 10d. to 2s.). The budget of 1907 balanced at 50,000,000 piastres.

The authorized colonial loans, omitting Algeria and Tunisia, during the period 1884–1904 amounted to £19,200,000, the sums paid for interest and sinking funds on loans varying from £600,000 to £800,000 a year. The amount of French capital invested in French colonies and protectorates, including Algeria and Tunisia, was estimated in 1905 at £120,000,000, French capital invested in foreign countries at the same date being estimated at ten times that amount (see *Ques. Dip. et Col.*, February 16, 1905).

Commerce.—The value of the external trade of the French possessions, exclusive of Algeria and Tunisia, increased in the ten years 1896–1905 from £18,784,060 to £34,957,479. In the last-named year the commerce of Algeria amounted to £24,506,020 and that of Tunisia to £5,969,248, making a grand total for French colonial trade in 1905 of £65,432,746. The figures were made up as follows:

	Imports.	Exports.	Total.
Algeria . . .	£15,355,500	£9,150,520	£24,506,020
Tunisia . . .	3,638,185	2,331,063	5,969,248
Indo-China . .	10,182,411	6,750,306	16,932,717
West Africa . .	3,874,698	2,248,317	6,123,015
Madagascar . .	1,247,936	914,024	2,161,960
All other colonies .	4,258,134	5,481,652	9,739,786
Total	£38,556,864	£26,875,882	£65,432,746

Over three-fourths of the trade of Algeria and Tunisia is with France and other French possessions. In the other colonies and protectorates more than half the trade is with foreign countries. The foreign countries trading most largely with the French colonies are, in the order named, British colonies and Great Britain, China and Japan, the United States and Germany. The value of the trade with British colonies and Great Britain in 1905 was over £7,200,000. (F. R. C.)

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HISTORY

Prehistoric Gaul.

The identity of the earliest inhabitants of Gaul is veiled in obscurity, though philologists, anthropologists and archaeologists are using the glimmer of traditions collected by ancient historians to shed a faint twilight upon that remote past. The subjugation of those primitive tribes did not mean their annihilation: their blood still flows in the veins of Frenchmen; and they survive also on those megalithic monuments (see STONE MONUMENTS) with which the soil of France is dotted, in the drawings and sculptures of caves hollowed out along the sides of the valleys, and in the arms and ornaments yielded by sepulchral tumuli, while the names of the rivers and mountains of France probably perpetuate the first utterances of those nameless generations.

The first peoples of whom we have actual knowledge are the Iberians and Ligurians. The Basques who now inhabit both sides of the Pyrenean range are probably the last representatives of the Iberians, who came from Spain to settle between the Mediterranean and the Bay of Biscay. The Ligurians, who exhibited the hard cunning characteristic of the Genoese Riviera, must have been descendants of that Indo-European vanguard who occupied all northern Italy and the centre and south-east of France, who in the 7th century B.C. received the Phocaean immigrants at Marseilles, and who at a much later period were encountered by Hannibal during his march to Rome, on the banks of the Rhône, the frontier of the Iberian and Ligurian territories. Upon these peoples it was that the conquering minority of Celts or Gauls imposed themselves, to be succeeded at a later date by the Roman aristocracy.

Iberians and Ligurians.

Empire of the Celts.

The Roman Conquest.

When Gaul first enters the field of history, Rome has already laid the foundation of her freedom, Athens dazzles the eastern Mediterranean with her literature and her art, while in the west Carthage and Marseilles are lining opposite shores with their great houses of commerce. Coming from the valley of the Danube in the 6th century, the Celts or Gauls had little by little occupied central and southern Europe long before they penetrated into the plains of the Saône, the Seine, and the Loire as far as the Spanish border, driving out the former inhabitants of the country. A century later their political hegemony, extending from the Black Sea to the Strait of Gibraltar, began to disintegrate, and the Gauls then embarked on more distant migrations, from the Columns of Hercules to the plateaux of Asia Minor, taking Rome on their way. Their empire in Gaul, encroached upon in the north by the Belgae, a kindred race, and in the south by the Iberians, gradually contracted in area and eventually crumbled to pieces. This process served the turn of the Romans, who little by little had subjugated first the Cisalpine Gauls and afterwards those inhabiting the south-east of France, which was turned into a Roman province in the 2nd century. Up to this time Hellenism and the mercantile spirit of the Jews had almost exclusively dominated the Mediterranean littoral, and at first the Latin spirit only won foothold for itself in various spots on the western coast—as at Aix in Provence (123 B.C.) and at Narbonne (118 B.C.). A refuge of Italian pauperism in the time of the Gracchi, after the triumph of the oligarchy the Narbonnaise became a field for shameless exploitation, besides providing, under the proconsulate of Caesar, an excellent point of observation whence to watch the intestine quarrels between the different nations of Gaul.

Political divisions of Gaul.

These are divided by Caesar in his *Commentaries* into three groups: the Aquitanians to the south of the Garonne; the Celts, properly so called, from the Garonne to the Seine and the Marne; and the Belgae, from the Seine to the Rhine. But these ethnological names cover a very great variety of half-savage tribes, differing in speech and in institutions, each surrounded by frontiers of dense forests abounding in game. On the edges of these forests stood isolated dwellings like sentinel outposts; while the inhabitants of the scattered hamlets, caves hollowed in the ground, rude circular huts or lake-dwellings, were less occupied with domestic life than with war and the chase. On the heights, as at Bibracte, or on islands in the rivers, as at Lutetia, or protected by marshes, as at Avaricum, *oppida*—at once fortresses and places of refuge, like the Greek Acropolis—kept watch and ward over the beaten tracks and the rivers of Gaul.

Political institutions of Gaul.

These primitive societies of tall, fair-skinned warriors, blue-eyed and red-haired, were gradually organized into political bodies of various kinds—kingdoms, republics and federations—and divided into districts or *pagi* (*pays*) to which divisions the minds of the country folk have remained faithfully attached ever since. The victorious aristocracy of the kingdom dominated the other classes, strengthened by the prestige of birth, the ownership of the soil and the practice of arms. Side by side with this martial nobility the Druids constituted a priesthood unique in ancient times; neither hereditary as in India, nor composed of isolated priests as in Greece, nor of independent colleges as at Rome, it was a true corporation, which at first possessed great moral authority, though by Caesar's time it had lost both strength and prestige. Beneath these were the common people attached to the soil, who did not count for much, but who reacted against the insufficient protection of the regular institutions by a voluntary subordination to certain powerful chiefs.

Caesar in Gaul.

This impotence of the state was a permanent cause of those discords and revolts, which in the 1st century B.C. were so singularly favourable to Caesar's ambition. Thus after eight years of incoherent struggles, of scattered revolts, and then of more and more energetic efforts, Gaul, at last aroused by Vercingetorix, for once concentrated her strength, only to perish at Alesia, vanquished by Roman discipline and struck at from the rear by the conquest of Britain (58–50 B.C.).

Roman Gaul.

This defeat completely altered the destiny of Gaul, and she became one of the principal centres of Roman civilization. Of the vast Celtic empire which had dominated Europe nothing now remained but scattered remnants in the farthest corners of the land, refuges for all the vanquished Gaels, Picts or Gauls; and of its civilization there lingered only idioms and dialects—Gaelic, Pict and Gallic—which gradually dropped out of use. During five centuries Gaul was unfalteringly loyal to her conquerors; for to conquer is nothing if the conquered be not assimilated by the conqueror, and Rome was a past-mistress of this art. The personal charm of Caesar and the prestige of Rome are not of themselves sufficient to explain this double conquest. The generous and enlightened policy of the imperial administration asked nothing of the people of Gaul but military service and the payment of the tax; in return it freed individuals from patronal domination, the people from oligarchic greed or Druidic excommunication, and every one in general from material anxiety. Petty tyrannies gave place to the great *Pax Romana.* The Julio-Claudian dynasty did much to attach the Gauls to the empire; they always occupied the first place in the mind of Augustus, and the revolt of the Aeduan Julius Sacrovir, provoked by the census of A.D. 21, was easily repressed by Tiberius. Caligula visited Gaul and founded literary competitions at Lyons, which had become the political and intellectual capital of the country. Claudius, who was a native of Lyons, extended the right of Roman citizenship to many of his fellow-townsmen, gave them access to the magistracy and to the senate, and supplemented the annexation of Gaul by that of Britain. The speech which he pronounced on this occasion was engraved on tables of bronze at Lyons, and is the first authentic record of Gaul's admission to the citizenship of Rome. Though the crimes of Nero and the catastrophes which resulted from his downfall, provoked the troubles of the year A.D. 70, the revolt of Sabinus was in the main an attempt by the Germans to pillage Gaul and the prelude to military insurrections. The government of the Flavians and the Antonines completed a definite reconciliation. After the extinction of the family of Augustus in the 1st century Gaul had made many emperors—Galba, Otho, Vitellius, Vespasian and Domitian; and in the 2nd century she provided Gauls to rule the empire—Antoninus (138–161) came from Nîmes and Claudius from Lyons, as did also Caracalla later on (211–217).

Material and political transformation of Roman Gaul.

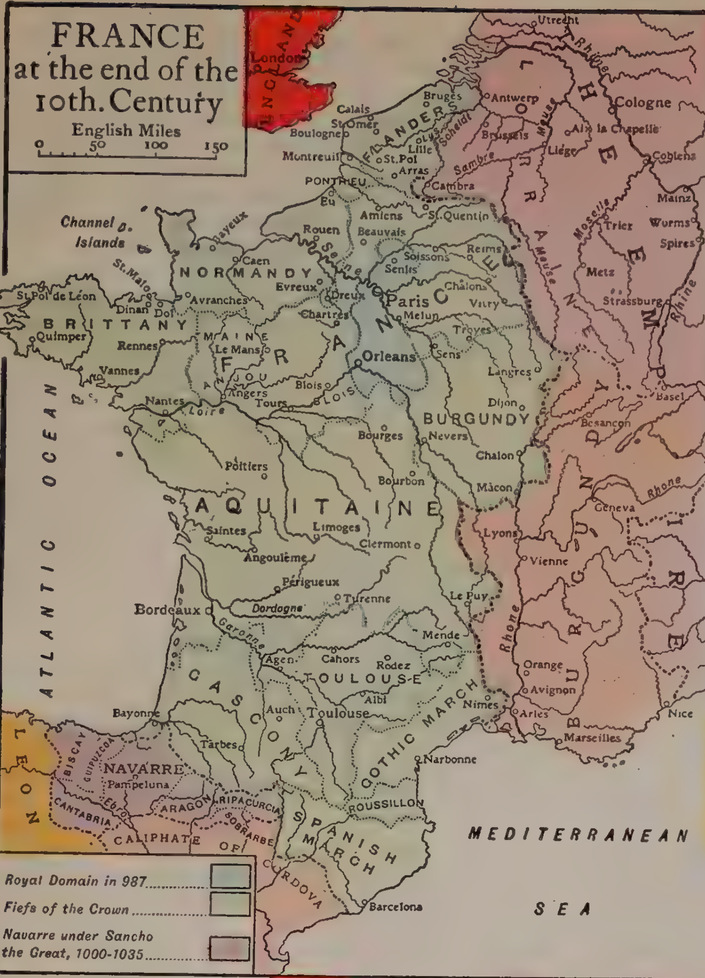
The romanization of the Gauls, like that of the other subject nations, was effected by slow stages and by very diverse means, furnishing an example of the constant adaptability of Roman policy. It was begun by establishing a network of roads with Lyons as the central point, and by the development of a prosperous urban life in the increasingly wealthy Roman colonies; and it was continued by the disintegration into independent cities of nearly all the Gaulish states of the Narbonnaise, together with the substitution of the Roman collegial magistracy for the isolated magistracy of the Gauls. This alteration came about more quickly in the north-east in the Rhine-land than in the west and the centre, owing to the near neighbourhood of the legions on the frontiers. Rome was too tolerant to impose her own institutions by force; it was the conquered peoples who collectively and individually solicited as a favour the right of adopting the municipal system, the magistracy, the sacerdotal and aristocratic social system of their conquerors. The edict of Caracalla, at the beginning of the 3rd century, by conferring the right of citizenship on all the inhabitants of the empire, completed an assimilation for which commercial relations, schools, a taste for officialism, and the adaptability and quick intelligence of the race had already made preparation. The Gauls now called themselves Romans and their language Romance. There was neither oppression on the one hand nor servility on the other to explain this abandonment of their traditions. Thanks to the political and religious unity which a common worship of the emperor and of Rome gave them, thanks to administrative centralization tempered by a certain amount of municipal autonomy, Gaul prospered throughout three centuries.

Decline of the imperial authority in Gaul.

But this stability of the Roman peace had barely been realized when events began to threaten it both from within and without. The *Pax Romana* having rendered any armed force unnecessary amid a formerly very bellicose people, only eight legions mounted guard over the Rhine to protect it from the barbarians who surrounded the empire. The raids made by the Germans on the eastern frontiers, the incessant competitions for the imperial power, and the repeated revolts of the Pretorian guard, gradually undermined the internal cohesion of Gaul; while the insurrections of the Bagaudae aggravated the destruction wrought by a grasping treasury and by barbarian incursions; so that the anarchy of the 3rd century soon aroused separatist ideas. Under Postumus Gaul had already attempted to restore an independent though short-lived empire (258–267); and twenty-eight years later the tetrarchy of Diocletian proved that the blood now circulated with difficulty from the heart to the extremities of an empire on the eve of disintegration. Rome was to see her universal dominion gradually menaced from all sides. It was in Gaul that the decisive revolutions of the time were first prepared; Constantine's crusades to overthrow the altars of paganism, and Julian's campaigns to set them up again. After Constantine the emperors of the East in the 4th century merely put in an occasional appearance at Rome; they resided at Milan or in the prefectorial capitals of Gaul—at Arles, at Treves (Trier), at Reims or in Paris. The ancient territorial divisions—Belgium, Gallia Lugdunensis (Lyonnaise), Gallia Narbonensis (Narbonnaise)—were split up into seventeen little provinces, which in their turn were divided into two dioceses. Thus the great historic division was made between southern and northern France. Roman nationality persisted, but the administrative system was tottering.

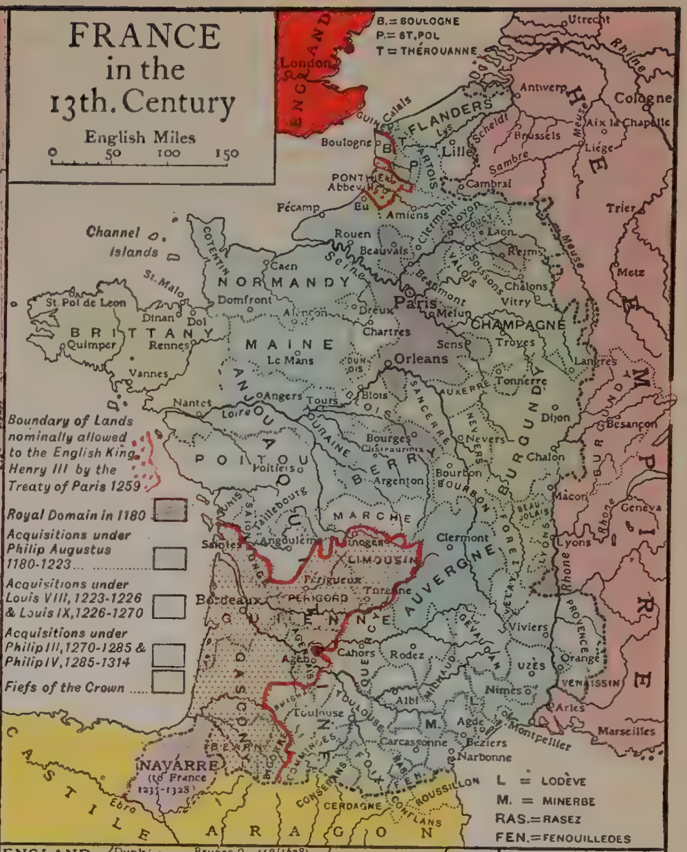
Social disorganization of Gaul.

Upon ground that had been so well levelled by Roman legislation aristocratic institutions naturally flourished. From the 4th century onward the balance of classes was disturbed by the development of a landed aristocracy that grew more powerful day by day, and by the corresponding ruin of the small proprietors and industrial and commercial corporations. The members of the *curia* who assisted the magistrates in the cities, crushed by the burden of taxes, now evaded as far as possible public office or senatorial honours. The vacancies left in this middle class by this continual desertion were not compensated for by the progressive advance of a lower class destitute of personal property and constantly unsettled in their work. The peasants, no less than the industrial labourers, suffered from the absence of any capital laid by, which alone could have enabled them to improve their land or to face a time of bad harvests. Having no credit they found themselves at the mercy of their neighbours, the great landholders, and by degrees fell into the position of tenants, or into servitude. The curia was thus emptied both from above and from below. It was in vain that the emperors tried to rivet the chains of the curia in this hereditary bondage, by attaching the small proprietor to his glebe, like the artisan to his gild and the soldier to his legion. To such a miserable pretence of freedom they all preferred servitude, which at least ensured them a livelihood; and the middle class of freemen thus became gradually extinct.



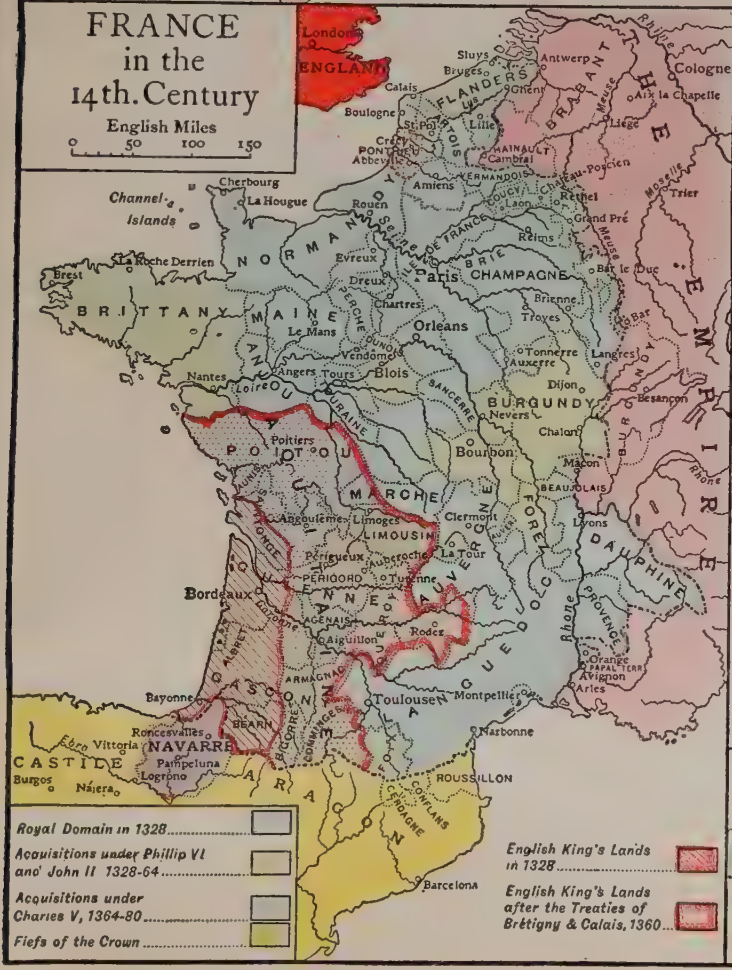
FRANCE at the end of the 10th. Century

English Miles
0 50 100 150
Royal Domain in 987
Fiefs of the Crown
Navarre under Sancho the Great, 1000-1035
ENGLAND
London
ATLANTIC OCEAN
MEDITERRANEAN SEA
Channel Islands
NORMANDY
BRITTANY
MAINE
ANJOU
FRANCE
FLANDERS
LORRAINE
BURGUNDY
AQUITAINE
GASCONY
TOULOUSE
GOTHIC MARCH
SPANISH MARCH
NAVARRE
CALIPHATE OF CORDOVA
ARAGON
RIPACURCIA
SOBRARBE
CASTILLA
LEON
CANTABRIA
BISCAY
GUIPUZCOA
ROUSSILLON
THE EMPIRE
BURGUNDY
Paris
Orleans
Rouen
Bordeaux
Poitiers
Nantes
Barcelona
Narbonne
Marseilles



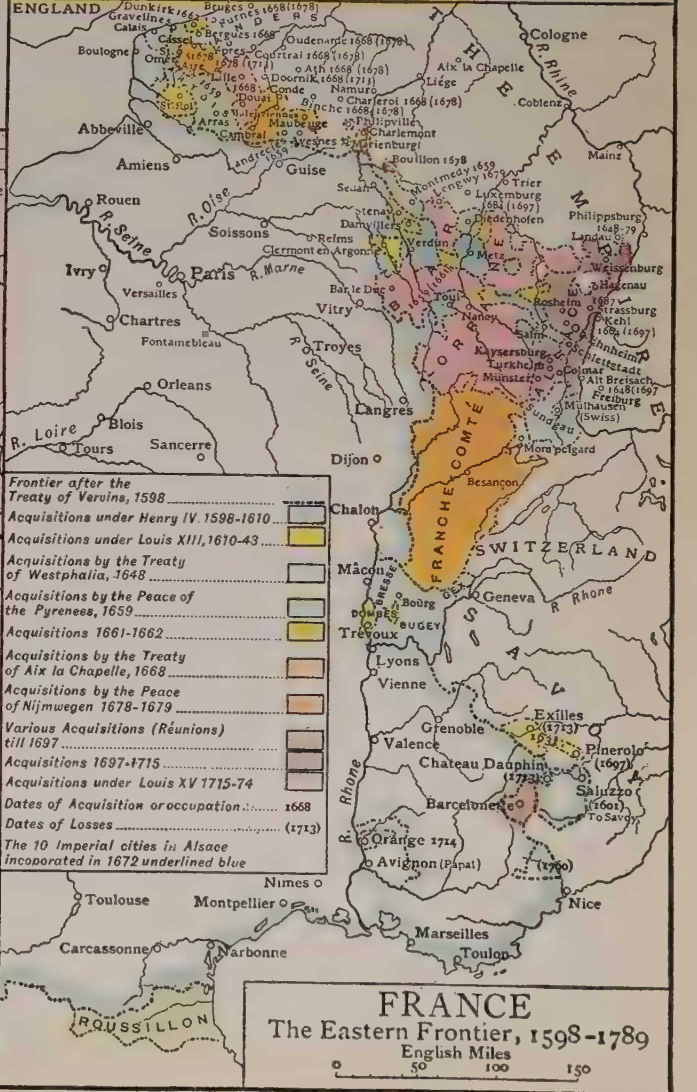
FRANCE in the 13th. Century

English Miles
0 50 100 150
B.= BOULOGNE
P.= ST. POL
T = THÉROUANNE
Boundary of Lands nominally allowed to the English King Henry III by the Treaty of Paris 1259
Royal Domain in 1180
Acquisitions under Philip Augustus 1180-1223
Acquisitions under Louis VIII, 1223-1226 & Louis IX, 1226-1270
Acquisitions under Philip III, 1270-1285 & Philip IV, 1285-1314
Fiefs of the Crown
L = LODÈVE
M. = MINERBE
RAS. = RASEZ
FEN. = FENOUILLÈDES
ENGLAND
London
FLANDERS
ARTOIS
PONTHIEU
NORMANDY
BRITTANY
MAINE
ANJOU
POITOU
BERRY
MARCHE
LIMOUSIN
PERIGORD
AUVERGNE
CHAMPAGNE
BURGUNDY
GASCONY
NAVARRE (to France 1233-1328)
BEARN
CASTILE
ARAGON
THE EMPIRE
Channel Islands
Paris
Orleans



FRANCE in the 14th. Century

English Miles
0 50 100 150
Royal Domain in 1328
Acquisitions under Phillip VI and John II 1328-64
Acquisitions under Charles V, 1364-80
Fiefs of the Crown
English King's Lands in 1328
English King's Lands after the Treaties of Brétigny & Calais, 1360
ENGLAND
London
Channel Islands
FLANDERS
BRABANT
HAINAULT
NORMANDY
BRITTANY
MAINE
ANJOU
POITOU
MARCHE
LIMOUSIN
PERIGORD
GUIENNE
AGENAIS
GASCONY
BEARN
NAVARRE
CASTILE
ARAGON
CHAMPAGNE
BRIE
BURGUNDY
FOREZ
DAUPHINE
PROVENCE
LANGUEDOC
AUVERGNE
THE EMPIRE
Paris
Orleans
Bordeaux
Toulouse
Barcelona



FRANCE The Eastern Frontier, 1598-1789

English Miles
0 50 100 150
Frontier after the Treaty of Vervins, 1598
Acquisitions under Henry IV. 1598-1610
Acquisitions under Louis XIII, 1610-43
Acquisitions by the Treaty of Westphalia, 1648
Acquisitions by the Peace of the Pyrenees, 1659
Acquisitions 1661-1662
Acquisitions by the Treaty of Aix la Chapelle, 1668
Acquisitions by the Peace of Nijmwegen 1678-1679
Various Acquisitions (Réunions) till 1697
Acquisitions 1697-1715
Acquisitions under Louis XV 1715-74
Dates of Acquisition or occupation 1668
Dates of Losses (1713)
The 10 Imperial cities in Alsace incoporated in 1672 underlined blue
ENGLAND
THE EMPIRE
LORRAINE
FRANCHE COMTÉ
SWITZERLAND
SAVOY
BRESSE
ROUSSILLON
Paris
Versailles
Dijon
Lyons
Strassburg
Besançon
Geneva
Marseilles
Toulon
Nice

Emery Walker sc

Absorption of land and power by the aristocracy of Gaul.

The aristocracy, on the contrary, went on increasing in power, and eventually became masters of the situation. It was through them that the emperor, theoretically absolute, practically carried on his administration; but he was no longer either strong or a divinity, and possessed nothing but the semblance of omnipotence. His official despotism was opposed by the passive but invincible competition of an aristocracy, more powerful than himself because it derived its support from the revived relation of patron and dependants. But though the aristocracy administered, yet they did not govern. They suffered, as did the Empire, from a general state of lassitude. Like their private life, their public life, no longer stimulated by struggles and difficulties, had become sluggish; their power of initiative was enfeebled. Feeling their incapacity they no longer embarked on great political schemes; and the army, the instrument by which such schemes were carried on, was only held together by the force of habit. In this society, where there was no traffic in anything but wealth and ideas, the soldier was nothing more than an agitator or a parasite. The egoism of the upper classes held military duty in contempt, while their avarice depopulated the countryside, whence the legions had drawn their recruits. And now come the barbarians! A prey to perpetual alarm, the people entrenched themselves behind those high walls of the *oppida* which Roman security had razed to the ground, but imperial impotence had restored, and where life in the middle ages was destined to vegetate in unrestful isolation.

Intellectual decadence of Gaul.

Amidst this general apathy, intellectual activity alone persisted. In the 4th century there was a veritable renaissance in Gaul, the last outburst of a dying flame, which yet bore witness also to the general decadence. The agreeable versification of an amateur like Ausonius, the refined panegyrics of a Eumenius, disguising nullity of thought beneath elegance of form, already foretold the perilous sterility of scholasticism. Art, so widespread in the wealthy villas of Gaul, contented itself with imitation, produced nothing original and remained mediocre. Human curiosity, no longer concerned with philosophy and science, seemed as though stifled, religious polemics alone continuing to hold public attention. Disinclination for the self-sacrifice of active life and weariness of the things of the earth lead naturally to absorption in the things of heaven. After bringing about the success of the Asiatic cults of Mithra and Cybele, these same factors now assured the triumph over exhausted paganism of yet another oriental religion—Christianity—after a duel which had lasted two centuries.

Christianity in Gaul.

This new faith had appeared to Constantine likely to infuse young and healthy blood into the Empire. In reality Christianity, which had contributed not a little to stimulate the political unity of continental Gaul, now tended to dissolve it by destroying that religious unity which had heretofore been its complement. Before this there had been complete harmony between Church and State; but afterwards came indifference and then disagreement between political and religious institutions, between the City of God and that of Caesar. Christianity, introduced into Gaul during the 1st century of the Christian era by those foreign merchants who traded along the coasts of the Mediterranean, had by the middle of the 2nd century founded communities at Vienne, at Autun and at Lyons. Their propagandizing zeal soon exposed them to the wrath of an ignorant populace and the contempt of the educated; and thus it was that in A.D. 177, under Marcus Aurelius, the Church of Lyons, founded by St Pothinus, suffered those persecutions which were the effective cause of her ultimate victory. These Christian communities, disguised under the legally authorized name of burial societies, gradually formed a vast secret cosmopolitan association, superimposed upon Roman society but incompatible with the Empire. Christianity had to be either destroyed or absorbed. The persecutions under Aurelian and Diocletian almost succeeded in accomplishing the former; the Christian churches were saved by the instability of the existing authorities, by military anarchy and by the incursions of the barbarians. Despite tortures and martyrdoms, and thanks to the seven apostles sent from Rome in 250, during the 3rd century their branches extended all over Gaul.

Triumph of Christianity in Gaul.

The emperors had now to make terms with these churches, which served to group together all sorts of malcontents, and this was the object of the edict of Milan (313), by which the Church, at the outset simply a Jewish institution, was naturalized as Roman; while in 325 the Council of Nicaea endowed her with unity. But for the security and the power thus attained she had to pay with her independence. On the other hand, pagan and Christian elements in society existed side by side without intermingling, and even openly antagonistic to each other—one aristocratic and the other democratic. In order to induce the masses of the people once more to become loyal to the imperial form of government the emperor Julian tried by founding a new religion to give its functionaries a religious prestige which should impress the popular mind. His plan failed; and the emperor Theodosius, aided by Ambrose, bishop of Milan, preferred to make the Christian clergy into a body of imperial and conservative officials; while in return for their adhesion he abolished the Arian heresy and paganism itself, which could not survive without his support. Thenceforward it was in the name of Christ that persecutions took place in an Empire now entirely won over to Christianity.

Organization of the Church.

In Gaul the most famous leader of this first merciless, if still perilous crusade, was a soldier-monk, Saint Martin of Tours. Thanks to him and his disciples in the middle of the 4th century and the beginning of the 5th many of the towns possessed well-established churches; but the militant ardour of monks and centuries of labour were needed to conquer the country districts, and in the meantime both dogma and internal organization were subjected to important modifications. As regards the former the Church adopted a course midway between metaphysical explanations and historical traditions, and reconciled the more extreme theories; while with the admission of pagans a great deal of paganism itself was introduced. On the other hand, the need for political and social order involved the necessity for a disciplined and homogeneous religious body; the exercise of power, moreover, soon transformed the democratic Christianity of the earlier churches into a federation of little conservative monarchies. The increasing number of her adherents, and her inexperience of government on such a vast and complicated scale, obliged her to comply with political necessity and to adopt the system of the state and its social customs. The Church was no longer a fraternity, on a footing of equality, with freedom of belief and tentative as to dogma, but an authoritative aristocratic hierarchy. The episcopate was now recruited from the great families in the same way as the imperial and the municipal public services. The Church called on the emperor to convoke and preside over her councils and to combat heresy; and in order more effectually to crush the latter she replaced primitive independence and local diversity by uniformity of doctrine and worship, and by the hierarchy of dioceses and ecclesiastical provinces. The heads of the Church, her bishops, her metropolitans, took the titles of their pagan predecessors as well as their places, and their jurisdiction was enforced by the laws of the state. Rich and powerful chiefs, they were administrators as much as priests: Germanus (Germain), bishop of Auxerre (d. 448), St Eucherius of Lyons (d. 450), Apollinaris Sidonius of Clermont (d. *c.* 490) assumed the leadership of society, fed the poor, levied tithes, administered justice, and in the towns where they resided, surrounded by priests and deacons, ruled both in temporal and spiritual matters.

The Church's independence of the Empire.

But the humiliation of Theodosius before St Ambrose proved that the emperor could never claim to be a pontiff, and that the dogma of the Church remained independent of the sovereign as well as of the people; if she sacrificed her liberty it was but to claim it again and maintain it more effectively amid the general languor. The Church thus escaped the unpopularity of this decadent empire, and during the 5th century she provided a refuge for all those who, wishing to preserve the Roman unity, were terrified by the blackness of the horizon. In fact, whilst in the Eastern Church the metaphysical ardour of the Greeks was spending itself in terrible combats in the oecumenical councils over the interpretation of the Nicene Creed, the clergy of Gaul, more simple and strict in their faith, abjured these theological logomachies; from the first they had preferred action to criticism and had taken no part in the great controversy on free-will raised by Pelagius. Another kind of warfare was about to absorb their whole attention; the barbarians were attacking the frontiers of the Empire on every side, and their advent once again modified Gallo-Roman civilization.

The barbarian invasion.

For centuries they had been silently massing themselves around ancient Europe, whether Iberian, Celtic or Roman. Many times already during that evening of a decadent civilization, their threatening presence had seemed like a dark cloud veiling the radiant sky of the peoples established on the Mediterranean seaboard. The cruel lightning of the sword of Brennus had illumined the night, setting Rome or Delphi on fire. Sometimes the storm had burst over Gaul, and there had been need of a Marius to stem the torrent of Cimbri and Teutons, or of a Caesar to drive back the Helvetians into their mountains. On the morrow the western horizon would clear again, until some such disaster as that which befell Varus would come to mortify cruelly the pride of an Augustus. The Romans had soon abandoned hope of conquering Germany, with its fluctuating frontiers and nomadic inhabitants. For more than two centuries they had remained prudently entrenched behind the earthworks that extended from Cologne to Ratisbon (Regensburg); but the intestine feuds which prevailed among the barbarians and were fostered by Rome, the organization under bold and turbulent chiefs of the bands greedy for booty, the pressing forward on populations already settled of tribes in their rear; all this caused the Germanic invasion to filter by degrees across the frontier. It was the work of several generations and took various forms, by turns and simultaneously colonization and aggression; but from this time forward the *pax romana* was at an end. The emperors Probus, Constantine, Julian and Valentinian, themselves foreigners, were worn out with repulsing these repeated assaults, and the general enervation of society did the rest. The barbarians gradually became part of the Roman population; they permeated the army, until after Theodosius they recruited it exclusively; they permeated civilian society as colonists and agriculturists, till the command of the army and of important public duties was given over to a Stilicho or a Crocus. Thus Rome allowed the wolves to mingle with the dogs in watching over the flock, just at a time when the civil wars of the 4th century had denuded the Rhenish frontier of troops, whose numbers had already been diminished by Constantine. Then at the beginning of the 5th century, during a furious irruption of Germans fleeing before Huns, the *limes* was carried away (406–407); and for more than a hundred years the torrent of fugitives swept through the Empire, which retreated behind the Alps, there to breathe its last.

The Germans in Gaul.

Whilst for ten years Alaric's Goths and Stilicho's Vandals were drenching Italy with blood, the Vandals and the Alani from the steppes of the Black Sea, dragging in their wake the reluctant German tribes who had been allies of Rome and who had already settled down to the cultivation of their lands, invaded the now abandoned Gaul, and having come as far as the Pyrenees, crossed over them. After the passing of this torrent the Visigoths, under their kings Ataulphus, Wallia and Theodoric, still dazzled by the splendours of this immense empire, established themselves like submissive vassals in Aquitaine, with Toulouse as their capital. About the same time the Burgundians settled even more peaceably in Rhenish Gaul, and, after 456, to the west of the Jura in the valleys of the Saône and the Rhone.

The Franks before Clovis.

The original Franks of Germany, already established in the Empire, and pressed upon by the same Huns who had already forced the Goths across the Danube, passed beyond the Rhine and occupied north-eastern Gaul; Ripuarians of the Rhine establishing themselves on the Sambre and the Meuse, and Salians in Belgium, as far as the great fortified highroad from Bavai to Cologne. Accepted as allies, and supported by Roman prestige and by the active authority of the general Aetius, all these barbarians rallied round him and the Romans of Gaul, and in 451 defeated the hordes of Attila, who had advanced as far as Orleans, at the great battle of the Catalaunian plains.

The clergy and the barbarians.

Thus at the end of the 5th century the Roman empire was nothing but a heap of ruins, and fidelity to the empire was now only maintained by the Catholic Church; she alone survived, as rich, as much honoured as ever, and more powerful, owing to the disappearance of the imperial officials for whom she had found substitutes, and the decadence of the municipal bodies into whose inheritance she had entered. Owing to her the City of God gradually replaced the Roman imperial polity and preserved its civilization; while the Church allied herself more closely with the new kingdoms than she had ever done with the Empire. In the Gothic or Burgundian states of the period the bishops, after having for a time opposed the barbarian invaders, sought and obtained from their chief the support formerly received from the emperor. Apollinaris Sidonius paid court to Euric, since 476 the independent king of the Visigoths, against whom he had defended Auvergne; and Avitus, bishop of Vienne, was graciously received by Gundibald, king of the Burgundians. But these princes were Arians, *i.e.* foreigners among the Catholic population; the alliance sought for by the Church could not reach her from that source, and it was from the rude and pagan Franks that she gained the material support which she still lacked. The conversion of Clovis was a master-stroke; it was fortunate both for himself and for the Franks. Unity in faith brought about unity in law.

Clovis, the Frankish chief.

Clovis was king of the Sicambrians, one of the tribes of the Salian Franks. Having established themselves in the plains of Northern Gaul, but driven by the necessity of finding new land to cultivate, in the days of their king Childeric they had descended into the fertile valleys of the Somme and the Oise. Clovis's victory at Soissons over the last troops left in the service of Rome (486) extended their settlements as far as the Loire. By his conversion, which was due to his wife Clotilda and to Remigius, bishop of Reims, more than to the victory of Tolbiac over the Alamanni, Clovis made definitely sure of the Roman inhabitants and gave the Church an army (496). Thenceforward he devoted himself to the foundation of the Frankish monarchy by driving the exhausted and demoralized heretics out of Gaul, and by putting himself in the place of the now enfeebled emperor. In 500 he conquered Gundibald, king of the Burgundians, reduced him to a kind of vassalage, and forced him into reiterated promises of conversion to orthodoxy. In 507 he conquered and killed Alaric II., king of the Arian Visigoths, and drove the latter into Spain. Legend adorned his campaign in Aquitaine with miracles; the bishops were the declared allies of both him and his son Theuderich (Thierry) after his conquest of Auvergne.

Clovis as a Roman officer.

At Tours he received from the distant emperor at Constantinople the diploma and insignia of *patricius* and Roman consul, which legalized his military conquests by putting him in possession of civil powers. From this time forward a great historic transformation was effected in the eyes of the bishops and of the Gallo-Romans; the Frankish chief took the place of the ancient emperors. Instead of blaming him for the murder of the lesser kings of the Franks, his relatives, by which he had accomplished the union of the Frankish tribes, they saw in this the hand of God rewarding a faithful soldier and a converted pagan. He became their king, their new David, as the Christian emperors had formerly been; he built churches, endowed monasteries, protected St Vaast (Vedastus, d. 540), first bishop of Arras and Cambrai, who restored Christianity in northern Gaul. Like the emperors before him Clovis, too, reigned over the Church. Of his own authority he called together a council at Orleans in 511, the year of his death. He was already the grand distributor of ecclesiastical benefices, pending the time when his successors were to confirm the episcopal elections, and his power began to take on a more and more absolute character. But though he felt the ascendant influence of Christian teaching, he was not really penetrated by its spirit; a professing Christian, and a friend to the episcopate, Clovis remained a barbarian, crafty and ruthless. The bloody tragedies which disfigured the end of his reign bear sad witness to this; they were a fit prelude to that period during the course of which, as Gregory of Tours said, "barbarism was let loose."

The sons of Clovis.

The conquest of Gaul, begun by Clovis, was finished by his sons: Theuderich, Chlodomer, Childebert and Clotaire. In three successive campaigns, from 523 to 532, they annihilated the Burgundian kingdom, which had maintained its independence, and had endured for nearly a century. Favoured by the war between Justinian, the East Roman emperor, and Theodoric's Ostrogoths, the Frankish kings divided Provence among them as they had done in the case of Burgundy. Thus the whole of Gaul was subjected to the sons of Clovis, except Septimania in the south-east, where the Visigoths still maintained their power. The Frankish armies then overflowed into the neighbouring countries and began to pillage them. Their disorderly cohorts made an attack upon Italy, which was repulsed by the Lombards, and another on Spain with the same want of success; but beyond the Rhine they embarked upon the conquest of Germany, where Clovis had already reduced to submission the country on the banks of the Maine, later known as Franconia. In 531 the Thuringians in the centre of Germany were brought into subjection by his eldest son, King Theuderich, and about the same time the Bavarians were united to the Franks, though preserving a certain autonomy. The Merovingian monarchy thus attained the utmost limits of its territorial expansion, bounded as it was by the Pyrenees, the Alps and the Rhine; it exercised influence over the whole of Germany, which it threw open to the Christian missionaries, and its conquests formed the first beginnings of German history.

Civil wars.

But to these wars of aggrandizement and pillage succeeded those fratricidal struggles which disgraced the whole of the sixth century and arrested the expansion of the Merovingian power. When Clotaire, the last surviving son of Clovis, died in 561, the kingdom was divided between his four sons like some piece of private property, as in 511, and according to the German method. The capitals of these four kings—Charibert, who died in 567, Guntram, Sigebert and Chilperic—were Paris, Orleans, Reims and Soissons—all near one another and north of the Loire, where the Germanic inhabitants predominated; but their respective boundaries were so confused that disputes were inevitable. There was no trace of a political idea in these disputes; the mutual hatred of two women aggravated jealousy to the point of causing terrible civil wars from 561 to 613, and these finally created a national conflict which resulted in the dismemberment of the Frankish empire. Recognized, in fact, already as separate provinces were Austrasia, or the eastern kingdom, Neustria, or north-west Gaul and Burgundy; Aquitaine alone was as yet undifferentiated.

Fredegond and Brunhilda.

Sigebert had married Brunhilda, the daughter of a Visigoth king; she was beautiful and well educated, having been brought up in Spain, where Roman civilization still flourished. Chilperic had married Galswintha, one of Brunhilda's sisters, for the sake of her wealth; but despite this marriage he had continued his amours with a waiting-woman named Fredegond, who pushed ambition to the point of crime, and she induced him to get rid of Galswintha. In order to avenge her sister, Brunhilda incited Sigebert to begin a war which terminated in 575 with the assassination of Sigebert by Fredegond at the very moment when, thanks to the help of the Germans, he had gained the victory, and with the imprisonment of Brunhilda at Rouen. Fredegond subsequently caused the death of Merovech (Mérovée), the son of Chilperic, who had been secretly married to Brunhilda, and that of Bishop Praetextatus, who had solemnized their union. After this, Fredegond endeavoured to restore imperial finance to a state of solvency, and to set up a more regular form of government in her Neustria, which was less romanized and less wealthy than Burgundy, where Guntram was reigning, and less turbulent than the eastern kingdom, where most of the great warlike chiefs with their large landed estates were somewhat impatient of royal authority. But the accidental death of two of her children, the assassination of her husband in 584, and the advice of the Church, induced her to make overtures to her brother-in-law Guntram. A lover of peace through sheer cowardice, and as depraved in his morals as Chilperic, Guntram had played a vacillating and purely self-interested part in the family tragedy. He declared himself the protector of Fredegond, but his death in 593 delivered up Burgundy and Neustria to Brunhilda's son Childebert, king of Austrasia, in consequence of the treaty of Andelot, made in 587. An ephemeral triumph, however; for Childebert died in 596, followed a year later by Fredegond.

The fall of Brunhilda.

The whole of Gaul was now handed over to three children: Childebert's two sons, Theudebert and Theuderich (Thierry), and the son of Fredegond, Clotaire II. The latter, having vanquished the two former at Latofao in 596, was in turn beaten by them at Dormelles in 600, and a year later a fresh fratricidal struggle broke out between the two grandsons of the aged Brunhilda. Theuderich joined with Clotaire against Theodobert, and invaded his brother's kingdom, conquering first an army of Austrasians and then one composed of Saxons and Thuringians. Strife began again in 613 in consequence of Theuderich's desire to join Austrasia to Neustria, but his death delivered the kingdoms into the hands of Clotaire II. This weak king leant for support upon the nobles of Burgundy and Austrasia, impatient as they were of obedience to a woman and the representative of Rome. The ecclesiastical party also abandoned Brunhilda because of her persecution of their saints, after which Clotaire, having now got the upper hand, thanks to the defection of the Austrasian nobles, of Arnulf, bishop of Metz, with his brother Pippin, and of Warnachaire, mayor of the palace, made a terrible end of Brunhilda in 613. Her long reign had not lacked intelligence and even greatness; she alone, amid all these princes, warped by self-indulgence or weakened by discord, had behaved like a statesman, and she alone understood the obligations of the government she had inherited. She wished to abolish the fatal tradition of dividing up the kingdom, which so constantly prevented any possible unity; in opposition to the nobles she used her royal authority to maintain the Roman principles of order and regular administration. Towards the Church she held a courteous but firm policy, renewing relations between the Frankish kingdom and the pope; and she so far maintained the greatness of the Empire that tradition associated her name with the Roman roads in the north of France, entitling them "les chaussées de Brunehaut."

Clotaire II.

Like his grandfather, Clotaire II. reigned over a once more united Gaul of Franks and Gallo-Romans, and like Clovis he was not too well obeyed by the nobles; moreover, his had been a victory more for the aristocracy than for the crown, since it limited the power of the latter. Not that the permanent constitution of the 18th of October 614 was of the nature of an anti-monarchic revolution, for the royal power still remained very great, decking itself with the pompous titles of the Empire, and continuing to be the dominant institution; but the reservations which Clotaire II. had to make in conceding the demands of the bishops and great laymen show the extent and importance of the concessions these latter were already aiming at. The bishops, the real inheritors of the imperial idea of government, had become great landowners through enormous donations made to the Church, and allied as they were to the aristocracy, whence their ranks were continually recruited, they had gradually identified themselves with the interests of their class and had adopted its customs; while thanks to long minorities and civil wars the aristocracy of the high officials had taken an equally important social position. The treaty of Andelot in 587 had already decided that the benefices or lands granted to them by the kings should be held for life. In the 7th century the Merovingian kings adopted the custom of summoning them all, and not merely the officials of their *Palatium*, to discuss political affairs; they began, moreover, to choose their counts or administrators from among the great landholders. This necessity for approval and support points to yet another alteration in the nature of the royal power, absolute as it was in theory.

The mayors of the palace.

The Mayoralty of the Palace aimed a third and more serious blow at the royal authority. By degrees, the high officials of the *Palatium*, whether secular or ecclesiastical, and also the provincial counts, had rallied round the mayors of the palace as their real leaders. As under the Empire, the Palatium was both royal court and centre of government, with the same bureaucratic hierarchy and the same forms of administration; and the mayor of the palace was premier official of this itinerant court and ambulatory government. Moreover, since the palace controlled the whole of each kingdom, the mayors gradually extended their official authority so as to include functionaries and agents of every kind, instead of merely those attached immediately to the king's person. They suggested candidates for office for the royal selection, often appointed office-holders, and, by royal warrant, supported or condemned them. Mere subordinates while the royal power was strong, they had become, owing to the frequent minorities, and to civil wars which broke the tradition of obedience, the all-powerful ministers of kings nominally absolute but without any real authority. Before long they ceased to claim an even greater degree of independence than that of Warnachaire, who forced Clotaire II. to swear that he should never be deprived of his mayoralty of Burgundy; they wished to take the first place in the kingdoms they governed, and to be able to attack neighbouring kingdoms on their own account. A struggle, motived by self-interest, no doubt; but a struggle, too, of opposing principles. Since the Frankish monarchy was now in their power some of them tried to re-establish the unity of that monarchy in all its integrity, together with the superiority of the State over the Church; others, faithless to the idea of unity, saw in the disintegration of the state and the supremacy of the nobles a warrant for their own independence. These two tendencies were destined to strive against one another during an entire century (613–714), and to occasion two periods of violent conflict, which, divided by a kind of renascence of royalty, were to end at last in the triumphant substitution of the Austrasian mayors for royalty and aristocracy alike.

First struggle between monarchy and mayoralty.

The first struggle began on the accession of Clotaire II., when Austrasia, having had a king of her own ever since 561, demanded one now. In 623 Clotaire was obliged to send her his son Dagobert and even to extend his territory. But in Dagobert's name two men ruled, representing the union of the official aristocracy and the Church. One, Pippin of Landen, derived his power from his position as mayor of the palace, from great estates in Aquitaine and between the Meuse and the Rhine, and from the immense number of his supporters; the other, Arnulf, bishop of Metz, sprang from a great family, probably of Roman descent, and was besides immensely wealthy in worldly possessions. By the union of their forces Pippin and Arnulf were destined to shape the future. They had already, in 613, treated with Clotaire and betrayed the hopes of Brunhilda, being consequently rewarded with the guardianship of young Dagobert. Burgundy followed the example of Austrasia, demanded the abolition of the mayoralty, and in 627 succeeded in obtaining her independence of Neustria and Austrasia and direct relations with the king.

Renascence of monarchy under Dagobert, 629-639.

The death of Clotaire (629) was the signal for a revival of the royal power. Dagobert deprived Pippin of Landen of his authority and forced him to fly to Aquitaine; but still he had to give the Austrasians his son Sigebert III. for their king (634). He made administrative progresses through Neustria and Burgundy to recall the nobles to their allegiance, but again he was forced to designate his second son Clovis as king of Neustria. He did subdue Aquitaine completely, thanks to his brother Charibert, with whom he had avoided dividing the kingdom, and he tried to restore his own demesne, which had been despoiled by the granting of benefices or by the pious frauds of the Churc In short, this reign was one of great conquests, impossibl except under a strong government. Dagobert's victories ove Samo, king of the Slavs along the Elbe, and his subjugatio of the Bretons and the Basques, maintained the prestige of th Frankish empire; while the luxury of his court, his taste fo the fine arts (ministered to by his treasurer Eloi[1]), his numerou achievements in architecture—especially the abbey of St Denis burial-place of the kings of France—the brilliance and the powe of the churchmen who surrounded him and his revision of the Salic law, ensured for his reign, in spite of the failure of his plans for unity, a fame celebrated in folksong and ballad.

The "Rois fainéants" (do-nothing kings).

But for barbarous nations old-age comes early, and afte Dagobert's death (639), the monarchy went swiftly to its doom. The mayors of the palace again became supreme, and the kings not only ceased to appoint them, but might not even remove them from office. Such mayors were Aega and Erchinoald, in Neustria, Pippin and Otto in Austrasia, and Flaochat in Burgundy. One of them, Grimoald, son of Pippin, actually dared to take the title of king in Austrasia (640). This was a premature attempt and barren of result, yet it was significant; and not less so is the fact that the palace in which these mayors bore rule was a huge association of great personages, laymen and ecclesiastics who seem to have had much more independence than in the 6th century. We find the dukes actually raising troops without the royal sanction, and even against the king. In 641 the mayor Flaochat was forced to swear that they should hold their offices for life; and though these offices were not yet hereditary, official dynasties, as it were, began to be established permanently within the palace. The crown lands, the governorships, the different offices, were looked upon as common property to be shared between themselves. Organized into a compact body they surrounded the king and were far more powerful than he. In the general assembly of its members this body of officials decided the selection of the mayor; it presented Flaochat to the choice of Queen Nanthilda, Dagobert's widow; after long discussion it appointed Ebroïn as mayor; it submitted requests that were in reality commands to the Assembly of Bonneuil in 616 and later to Childeric in 670. Moreover, the countries formerly subdued by the Franks availed themselves of this opportunity to loosen the yoke; Thuringia was lost by Sigebert in 641, and the revolt of Alamannia in 643 set back the frontier of the kingdom from the Elbe to Austrasia. Aquitaine, hitherto the common prey of all the Frankish kings, having in vain tried to profit by the struggles between Fredegond and Brunhilda, and set up an independent king, Gondibald, now finally burst her bonds in 670. Then came a time when the kings were mere children, honoured with but the semblance of respect, under the tutelage of a single mayor, Erbroïn of Neustria.

Struggle between Ebroïn and Léger.

This representative of royalty, chief minister for four-and-twenty years (656–681), attempted the impossible, endeavouring to re-establish unity in the midst of general dissolution and to maintain intact a royal authority usurped everywhere by the hereditary power of the great palatine families. He soon stirred up against himself all the dissatisfied nobles, led by Léger (Leodegarius), bishop of Autun and his brother Gerinus. Clotaire III.'s death gave the signal for war. Ebroïn's enemies set up Childeric II. in opposition to Theuderich, the king whom he had chosen without summoning the great provincial officials. Despite a temporary triumph, when Childeric was forced to recognize the principle of hereditary succession in public offices, and when the mayoralties of Neustria and Burgundy were alternated to the profit of both, Léger soon fell into disgrace and was exiled to that very monastery of Luxeuil to which Ebroïn had been relegated. Childeric having regained the mastery restored the mayor's office, which was immediately disputed by the two rivals; Ebroïn was successful and established himself as mayor of the palace in the room of Leudesius, a partisan of Léger (675),

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[1] St Eligius, bishop of Noyon, apostle of the Belgians and Frisians (d. 659?).

Battle of Tertry.

following this up by a distribution of offices and dignities right and left among his adherents. Léger was put to death in 678, and the Austrasians, commanded by the Carolingian Pippin II., with whom many of the chief Neustrians had taken refuge, were dispersed near Laon (680). But Ebroïn was assassinated next year in the midst of his triumph, having like Fredegond been unable to do more than postpone for a quarter of a century the victory of the nobles and of Austrasia; for his successor, Berthar, was unfitted to carry on his work, having neither his gifts and energy nor the powerful personality of Pippin. Berthar met his death at the battle of Tertry (687), which gave the king into the hands of Pippin, as also the royal treasure and the mayoralty, and by thus enabling him to reward his followers made him supreme over the Merovingian dynasty. Thenceforward the degenerate descendants of Clovis offered no further resistance to his claims, though it was not until 752 that their line became extinct.

In that year the Merovingian dynasty gave place to the rule of Pippin II. of Heristal, who founded a Carolingian empire fated to be as ephemeral as that of the Merovingians. This political victory of the aristocracy was merely the consummation of a slow subterranean revolution which by innumerable reiterated blows had sapped the structure of the body politic, and was about to transfer the people of Gaul from the Roman monarchical and administrative government to the sway of the feudal system.

Causes of the fall of the Merovingians.

The Merovingian kings, mere war-chiefs before the advent of Clovis, had after the conquest of Gaul become absolute hereditary monarchs, thanks to the disappearance of the popular assemblies and to the perpetual state of warfare. They concentrated in their own hands all the powers of the empire, judicial, fiscal and military; and even the so-called "rois fainéants" enjoyed this unlimited power, in spite of the general disorder and the civil wars. To make their authority felt in the provinces they had an army of officials at their disposal—a legacy, this, from imperial Rome—who represented them in the eyes of their various peoples. They had therefore only to keep up this established government, but they could not manage even this much; they allowed the idea of the common interests of kings and their subjects gradually to die out, and forgetting that national taxes are a necessary impost, a charge for service rendered by the state, they had treated these as though they were illicit and unjustifiable spoils. The taxpayers, with the clergy at their head, adopted the same idea, and every day contrived fresh methods of evasion. Merovingian justice was on the same footing as Merovingian finance: it was arbitrary, violent and self-seeking. The Church, too, never failed to oppose it—at first not so much on account of her own ambitions as in a more Christian spirit—and proceeded to weaken the royal jurisdiction by repeated interventions on behalf of those under sentence, afterwards depriving it of authority over the clergy, and then setting up ecclesiastical tribunals in opposition to those held by the dukes and counts. At last, just as the kingdom had become the personal property of the king, so the officials—dukes, counts, royal vicars, tribunes, *centenarii*—who had for the most part bought their unpaid offices by means of presents to the monarch, came to look upon the public service rather as a mine of official wealth than as an administrative organization for furthering the interests, material or moral, of the whole nation. They became petty local tyrants, all the more despotic because they had nothing to fear save the distant authority of the king's *missi*, and the more rapacious because they had no salary save the fines they inflicted and the fees that they contrived to multiply. Gregory of Tours tells us that they were robbers, not protectors of the people, and that justice and the whole administrative apparatus were merely engines of insatiable greed. It was the abuses thus committed by the kings and their agents, who did not understand the art of gloving the iron hand, aided by the absolutely unfettered licence of conduct and the absence of any popular liberty, that occasioned the gradual increase of charters of immunity.

Immunity.

Immunity was the direct and personal privilege which forbade any royal official or his agents to decide cases, to levy taxes, or to exercise any administrative control on the domains of a bishop, an abbot, or one of the great secular nobles. On thousands of estates the royal government gradually allowed the law of the land to be superseded by local law, and public taxation to change into special contributions; so that the duties of the lower classes towards the state were transferred to the great landlords, who thus became loyal adherents of the king but absolute masters on their own territory. The Merovingians had no idea that they were abdicating the least part of their authority, nevertheless the deprivations acquiesced in by the feebler kings led of necessity to the diminution of their authority and their judicial powers, and to the abandonment of public taxation. They thought that by granting immunity they would strengthen their direct control; in reality they established the local independence of the great landowners, by allowing royal rights to pass into their hands. Then came confusion between the rights of the sovereign and the rights of property. The administrative machinery of the state still existed, but it worked in empty air: its taxpayers disappeared, those who were amenable to its legal jurisdiction slipped from its grasp, and the number of those whose affairs it should have directed dwindled away. Thus the Merovingians had shown themselves incapable of rising above the barbarous notion that royalty is a personal asset to the idea that royalty is of the state, a power belonging to the nation and instituted for the benefit of all. They represented in society nothing more than a force which grew feebler and feebler as other forces grew strong; they never stood for a national magistracy.

Disruption of the social framework.

Society no less than the state was falling asunder by a gradual process of decay. Under the Merovingians it was a hierarchy wherein grades were marked by the varied scale of the *wergild*, a man being worth anything from thirty to six hundred gold pieces. The different degrees were those of slave, freedman, tenant-farmer and great landowner. As in every social scheme where the government is without real power, the weakest sought protection of the strongest; and the system of patron, client and journeyman, which had existed among the Romans, the Gauls and the Germans, spread rapidly in the 6th and 7th centuries, owing to public disorder and the inadequate protection afforded by the government. The Church's patronage provided some with a refuge from violence; others ingratiated themselves with the rich for the sake of shelter and security; others again sought place and honour from men of power; while women, churchmen and warriors alike claimed the king's direct and personal protection.

The beneficium.

This hierarchy of persons, these private relations of man to man, were recognized by custom in default of the law, and were soon strengthened by another and territorial hierarchy. The large estate, especially if it belonged to the Church, very soon absorbed the few fields of the freeman. In order to farm these, the Church and the rich landowners granted back the holdings on the temporary and conditional terms of tenancy-at-will or of the *beneficium*, thus multiplying endlessly the land subject to their overlordship and the men who were dependent upon them as tenants. The kings, like private individuals and ecclesiastical establishments, made use of the *beneficium* to reward their servants; till finally their demesne was so reduced by these perpetual grants that they took to distributing among their champions land owning the overlordship of the Church, or granted their own lands for single lives only. These various "benefactions" were, as a rule, merely the indirect methods which the great landowners employed in order to absorb the small proprietor. And so well did they succeed, that in the 6th and 7th centuries the provincial hierarchy consisted of the cultivator, the holder of the *beneficium* and the owner; while this dependence of one man upon another affected the personal liberty of a large section of the community, as well as the condition of the land. The great landowner tended to become not only lord over his tenants, but also himself a vassal of the king.

Pippin of Heristal.

Thus by means of immunities, of the *beneficium* and of patronage, society gradually organized itself independently of the state, since it required further security. Such extra security was first provided by the conqueror of Tertry; for Pippin II. represented the two great families of Pippin and of Arnulf, and consequently the two interests then paramount, *i.e.* land and religion, while he had at his back a great company of followers and vast landed estates. For forty years (615–655) the office of mayor of Austrasia had gone down in his family almost continuously in direct descent from father to son. The death of Grimoald had caused the loss of this post, yet Ansegisus (Ansegisel), Arnulf's son and Pippin's son-in-law, had continued to hold high office in the Austrasian palace; and about 680 his son, Pippin II., became master of Austrasia, although he had held no previous office in the palace. His dynasty was destined to supplant that of the Merovingian house.

Pippin of Heristal was a pioneer; he it was who began all that his descendants were afterwards to carry through. Thus he gathered the nobles about him not by virtue of his position, but because of his own personal prowess, and because he could assure them of justice and protection; instead of being merely the head of the royal palace he was the absolute lord of his own followers. Moreover, he no longer bore the title of mayor, but that of duke or prince of the Franks; and the mayoralty, like the royal power now reduced to a shadow, became an hereditary possession which Pippin could bestow upon his sons. The reigns of Theuderich III., Clovis III. or Childebert III. are of no significance except as serving to date charters and diplomas. Pippin it was who administered justice in Austrasia, appointed officials and distributed dukedoms; and it was Pippin, the military leader, who defended the frontiers threatened by Frisians, Alamanni and Bavarians. Descended as he was from Arnulf, bishop of Metz, he was before all things a churchman, and behind his armies marched the missionaries to whom the Carolingian dynasty, of which he was the founder, were to subject all Christendom. Pippin it was, in short, who governed, who set in order the social confusions of Neustria, who, after long wars, put a stop to the malpractices of the dukes and counts, and summoned councils of bishops to make good regulations. But at his death in 714 the child-king Dagobert III. found himself subordinated to Pippin's two grandsons, who, being minors, were under the wardship of their grandmother Plectrude.

Charles Martel (715-741).

Pippin's work was almost undone—a party among the Neustrians under Raginfrid, mayor of the palace, revolted against Pippin II.'s adherents, and Radbod, duke of the Frisians, joined them. But the Austrasians appealed to an illegitimate son of Pippin, Charles Martel, who had escaped from the prison to which Plectrude, alarmed at his prowess, had consigned him, and took him for their leader. With Charles Martel begins the great period of Austrasian history. Faithful to the traditions of the Austrasian mayors, he chose kings for himself—Clotaire IV., then Chilperic II. and lastly Theuderich IV. After Theuderich's death (737) he left the throne vacant until 742, but he himself was king in all but name; he presided over the royal tribunals, appointed the royal officers, issued edicts, disposed of the funds of the treasury and the churches, conferred immunities upon adherents, who were no longer the king's nobles but his own, and even appointed the bishops, though there was nothing of the ecclesiastic about himself. He decided questions of war and peace, and re-established unity in Gaul by defeating the Neustrians and the Aquitanian followers of Duke Odo (Eudes) at Vincy in 717. When Odo, brought to bay, appealed for help to the Arab troops of Abd-ar-Rahman, who after conquering Spain had crossed the Pyrenees, Charles, like a second Clovis, saved Catholic Christendom in its peril by crushing the Arabs at Tours (732). The retreat of the Arabs, who were further weakened by religious disputes, enabled him to restore Frankish rule in Aquitaine in spite of Hunald, son of Odo. But Charles's longest expeditions were made into Germany, and in these he sought the support of the Church, then the greatest of all powers since it was the depositary of the Roman imperial tradition.

Charles Martel and the Church.

No less unconscious of his mission than Clovis had been, Charles Martel also was a soldier of Christ. He protected the missionaries who paved the way for his militant invasions. Without him the apostle of Germany, the English monk Boniface, would never have succeeded in preserving the purity of the faith and keeping the bishops submissive to the Holy See. The help given by Charles had two very far-reaching results. Boniface was the instrument of the union of Rome and Germany, of which union the Holy Roman Empire in Germany was in the 10th century to become the most perfect expression, continuing up to the time of Luther. And Boniface also helped on the alliance between the papacy and the Carolingian dynasty, which, more momentous even than that between Clovis and the bishops of Gaul, was to sanctify might by right.

Charles Martel and Gregory III.

This union was imperative for the bishops of Rome if they wished to establish their supremacy, and their care for orthodoxy by no means excluded all desire of domination. Mere religious authority did not secure to them the obedience of either the faithful or the clergy; moreover, they had to consider the great secular powers, and in this respect their temporal position in Italy was growing unbearable. Their relations with the East Roman emperor (sole lord of the world after the Roman Senate had sent the imperial insignia to Constantinople in 476) were confined to receiving insults from him or suspecting him of heresy. Even in northern Italy there was no longer any opposition to the progress of the Lombards, the last great nation to be established towards the end of the 6th century within the ancient Roman empire—their king Liudprand clearly intended to seize Italy and even Rome itself. Meanwhile from the south attacks were being made by the rebel dukes of Spoleto and Beneventum. Pope Gregory III. cherished dreams of an alliance with the powerful duke of the Franks, as St Remigius before him had thought of uniting with Clovis against the Goths. Charles Martel had protected Boniface on his German missions: he would perhaps lend Gregory the support of his armies. But the warrior, like Clovis aforetime, hesitated to put himself at the disposal of the priest. When it was a question of winning followers or keeping them, he had not scrupled to lay hands on ecclesiastical property, nor to fill the Church with his friends and kinsfolk, and this alliance might embarrass him. So if he loaded the Roman ambassadors with gifts in 739, he none the less remembered that the Lombards had just helped him to drive the Saracens from Provence. However, he died soon after this, on the 22nd of October 741, and Gregory III. followed him almost immediately.

The Carolingian dynasty.

Feeling his end near, Charles, before an assembly of nobles, had divided his power between his two sons, Carloman and Pippin III. The royal line seemed to have been forgotten for six years, but in 742 Pippin brought a son of Chilperic II. out of a monastery and made him king. This Childeric III. was but a shadow—and knew it. He made a phantom appearance once every spring at the opening of the great annual national convention known as the Campus Martius (Champ de Mars): a dumb idol, his chariot drawn in leisurely fashion by oxen, he disappeared again into his palace or monastery. An unexpected event re-established unity in the Carolingian family. Pippin's brother, the pious Carloman, became a monk in 747, and Pippin, now sole ruler of the kingdom, ordered Childeric also to cut off his royal locks; after which, being king in all but name, he adopted that title in 752. Thus ended the revolution which had been going on for two centuries.

Pippin the Short, 752-768.

The disappearance of Grippo, Pippin's illegitimate brother, who, with the help of all the enemies of the Franks—Alamanni, Aquitanians and Bavarians—had disputed his power, now completed the work of centralization, and Pippin had only to maintain it. For this the support of the Church was indispensable, and Pippin understood the advantages of such an alliance better than Charles Martel. A son of the Church, a protector of bishops, a president of councils, a collector of relics, devoted to Boniface (whom he invited, as papal legate, to reform the clergy of Austrasia), he astutely accepted the new claims of the vicar of St Peter to the headship of the Church, perceiving the value of an alliance with this rising power.

Sacred character of the new monarchy.

Prudent enough to fear resistance if he usurped the Merovingian crown, Pippin the Short made careful preparations for his accession, and discussed the question of the dynasty with Pope Zacharias. Receiving a favourable opinion, he had himself anointed and crowned by Boniface in the name of the bishops, and was then proclaimed king in an assembly of nobles, counts and bishops at Soissons in November 751. Still, certain disturbances made him see that aristocratic approval of his kingship might be strengthened if it could claim a divine sanction which no Merovingian had ever received. Two years later, therefore, he demanded a consecration of his usurpation from the pope, and in St Denis on the 28th of July 754 Stephen II. crowned and anointed not only Pippin, but his wife and his two sons as well.

Pippin and the Papacy.

The political results of this custom of coronation were all-important for the Carolingians, and later for the first of the Capets. Pippin was hereby invested with new dignity, and when Boniface's anointing had been confirmed by that of the pope, he became the head of the Frankish Church, the equal of the pope. Moreover, he astutely contrived to extend his priestly prestige to his whole family; his royalty was no longer merely a military command or a civil office, but became a Christian priesthood. This sacred character was not, however, conferred gratuitously. On the very day of his coronation Pippin allowed himself to be proclaimed patrician of the Romans by the pope, just as Clovis had been made consul. This title of the imperial court was purely honorary, but it attached him still more closely to Rome, though without lessening his independence. He had besides given a written promise to defend the Church of Rome, and that not against the Lombards only. Qualified by letters of the papal chancery as "liberator and defender of the Church," his armies twice (754–756) crossed the Alps, despite the opposition of the Frankish aristocracy, and forced Aistulf, king of the Lombards, to cede to him the exarchate of Ravenna and the Pentapolis. Pippin gave them back to Pope Stephen II., and by this famous donation founded that temporal power of the popes which was to endure until 1870. He also dragged the Western clergy into the pope's quarrel with the emperor at Constantinople, by summoning the council of Gentilly, at which the iconoclastic heresy was condemned (767). Matters being thus settled with Rome, Pippin again took up his wars against the Saxons, against the Arabs (whom he drove from Narbonne in 758), and above all against Waïfer, duke of Aquitaine, and his ally, duke Tassilo of Bavaria. This last war was carried on systematically from 760 to 768, and ended in the death of Waïfer and the definite establishment of the Frankish hold on Aquitaine. When Pippin died, aged fifty-four, on the 24th of September 768, the whole of Gaul had submitted to his authority.

Charlemagne.

Pippin left two sons, and before he died he had, with the consent of the dignitaries of the realm, divided his kingdom between them, making the elder, Charles (Charlemagne), king of Austrasia, and giving the younger, Carloman, Burgundy, Provence, Septimania, Alsace and Alamannia, and half of Aquitaine to each. On the 9th of October 768 Charles was enthroned at Noyon in solemn assembly, and Carloman at Soissons. The Carolingian sovereignty was thus neither hereditary nor elective, but was handed down by the will of the reigning king, and by a solemn acceptance of the future king on the part of the nobles. In 771 Carloman, with whom Charles had had disputes, died, leaving sons; but bishops, abbots and counts all declared for Charles, save a few who took refuge in Italy with Desiderius, king of the Lombards. Desiderius, whose daughter Bertha or Desiderata Charles, despite the pope, had married at the instance of his mother Bertrade, supported the rights of Carloman's sons, and threatened Pope Adrian in Rome itself after he had despoiled him of Pippin's territorial gift. At the pope's appeal Charles crossed the Alps, took Verona and Pavia after a long siege, assumed the iron crown of the Lombard kings (June 774), and made a triumphal entry into Rome, which had not formed part of the pope's desires. Pippin's donation was restored, but the protectorate was no longer so distant, respectful and intermittent as the pope liked. After the departure of the imperious conqueror, a fresh revolt of the Lombards of Beneventum under Arichis, Desiderius's son-in-law, supported by a Greek fleet, obliged Pope Adrian to write fresh entreaties to Charlemagne; and in two campaigns (776–777) the latter conquered the whole Lombard kingdom. But another of Desiderius's daughters, married to the powerful duke Tassilo of Bavaria, urged her husband to avenge her father, now imprisoned in the monastery of Corbie. After endless intrigues, however, the duke, hemmed in by three different armies, had in his turn to submit (788), and all Italy was now subject to Charlemagne. These wars in Italy, even the fall of the Lombard kingdom and the recapture of the duchy of Bavaria, were merely episodes: Charlemagne's great war was against the Saxons and lasted thirty years (772–804).

Organization of the conquests.

The work of organizing the three great Carolingian conquests—Aquitaine, Italy and Saxony—had yet to be done. Charlemagne approached it with a moderation equal to the vigour which he had shown in the war. But by multiplying its advance-posts, the Frankish kingdom came into contact with new peoples, and each new neighbour meant a new enemy. Aquitaine bordered upon Mussulman Spain; the Avars of Hungary threatened Bavaria with their tireless horsemen; beyond the Elbe and the Saal the Slavs were perpetually at war with the Saxons, and to the north of the Eider were the Danes. All were pagans; all enemies of Charlemagne, defender of Christ's Church, and hence the appointed conqueror of the world.

Wars with the Arabs, Slavs and Danes.

Various causes—the weakening of the Arabs by the struggle between the Omayyads and the Abbasids just after the battle of Tours; the alliance of the petty Christian kings of the Spanish peninsula; an appeal from the northern amirs who had revolted against the new caliphate of Cordova (755)—made Charlemagne resolve to cross the Pyrenees. He penetrated as far as the Ebro, but was defeated before Saragossa; and in their retreat the Franks were attacked by Vascons, losing many men as they came through the passes. This defeat of the rear-guard, famous for the death of the great Roland and the treachery of Ganelo, induced the Arabs to take the offensive once more and to conquer Septimania. Charlemagne had created the kingdom of Aquitaine especially to defend Septimania, and William, duke of Toulouse, from 790 to 806, succeeded in restoring Frankish authority down to the Ebro, thus founding the Spanish March with Barcelona as its capital. For two centuries and a half the Avars, a remnant of the Huns entrenched in the Hungarian Mesopotamia, had made descents alternately upon the Germans and upon the Greeks of the Eastern empire. They had overrun Bavaria in the very year of its subjugation by Charlemagne (788), and it took an eight-years' struggle to destroy the robber stronghold. The empire thus pushed its frontier-line on from the Elbe to the Oder, ever as it grew menaced by increasing dangers. The sea came to the help of the depopulated land, and Danish pirates, Widukind's old allies, came in their leathern boats to harry the coasts of the North Sea and the Channel. Permanent armies and walls across isthmuses were alike useless; Charlemagne had to build fleets to repulse his elusive foes (808–810), and even after forty years of war the danger was only postponed.

Charlemagne's empire.

Meanwhile Pippin's Frankish kingdom, vast and powerful as it had been, was doubled. All nations from the Oder to the Elbe and from the Danube to the Atlantic were subject or tributary, and Charlemagne's power even crossed these frontiers. At his summons Christian princes and Mussulman amirs flocked to his palaces. The kings of Northumbria and Sussex, the kings of the Basques and of Galicia, Arab amirs of Spain and Fez, and even the caliph of Bagdad came to visit him in person or sent gifts by the hands of ambassadors. A great warrior and an upright ruler, his conquests recalled those of the great Christian emperors, and the Church completed the parallel by training him in her lore. This still barely civilized German literally went to school to the English Alcuin and to Peter of Pisa, who, between two campaigns, taught him history, writing, grammar and astronomy, satisfying also his interest in sacred music, literature (religious literature especially), and the traditions of Rome and Constantinople. Why should he not be the heir of their Caesars? And so, little by little, this man of insatiable energy was possessed by the ambition of restoring the Empire of the West in his own favour.

Charlemagne emperor (800).

There were, however, two serious obstacles in the way: first, the supremacy of the emperor of the East, which though nominal rather than real was upheld by peoples, princes, and even by popes; secondly, the rivalry of the bishops of Rome, who since the early years of Adrian's pontificate had claimed the famous "Donation of Constantine" (*q.v.*). According to that apocryphal document, the emperor after his baptism had ceded to the sovereign pontiff his imperial power and honours, the purple chlamys, the golden crown, "the town of Rome, the districts and cities of Italy and of all the West." But in 797 the empress of Constantinople had just deposed her son Constantine VI. after putting out his eyes, and the throne might be considered vacant; while on the other hand, Pope Leo III., who had been driven from Rome by a revolt in 799, and had only been restored by a Frankish army, counted for little beside the Frankish monarch, and could not but submit to the wishes of the Carolingian court. So when next year the king of the Franks went to Rome in person, on Christmas Eve of the year 800 and in the basilica of St Peter the pope placed on his head the imperial crown and did him reverence "after the established custom of the time of the ancient emperors." The Roman ideal, handed down in tradition through the centuries, was here first revived.

This event, of capital importance for the middle ages, was fertile in results both beneficial and the reverse. It brought about the rupture between the West and Constantinople. Then Charlemagne raised the papacy on the ruins of Lombardy to the position of first political power in Italy; and the universal Church, headed by the pope, made common cause with the Empire, which all the thinkers of that day regarded as the ideal state. Confusion between these powers was inevitable, but at this time neither Charles, the pope, nor the people had a suspicion of the troubles latent in the ceremony that seemed so simple. Thirdly, Charlemagne's title of emperor strengthened his other title of king of the Franks, as is proved by the fact that at the great assembly of Aix-la-Chapelle in 802 he demanded from all, whether lay or spiritual, a new oath of allegiance to himself as Caesar. His increased power came rather from moral value, from the prestige attaching to one who had given proof of it, than from actual authority over men or centralization; this is shown by the division between the Empire and feudalism. Universal sovereignty claimed as a heritage from Rome had a profound influence upon popular imagination, but in no way modified that tendency to separation of the various nations which was already manifest. Charles himself in his government preferred to restore the ancient Empire by vigorous personal action, rather than to follow old imperial traditions; he introduced cohesion into his "palace," and perfect centralization into his official administration, inspiring his followers and servants, clerical and lay, with a common and determined zeal. The system was kept in full vigour by the *missi dominici*, who regularly reported or reformed any abuses of administration, and by the courts, military, judicial or political, which brought to Charlemagne the strength of the wealth of his subjects, carrying his commands and his ideas to the farthest limits of the Empire. Under him there was in fact a kind of early renaissance after centuries of barbarism and ignorance.

The Carolingian Renaissance.

This emperor, who assumed so high a tone with his subjects, his bishops and his counts, who undertook to uphold public order in civil life, held himself no less responsible for the eternal salvation of men's souls in the other world. Thanks to Charlemagne, and through the restoration of order and of the schools, a common civilization was prepared for the varied elements of the Empire. By his means the Church was able to concentrate in the palatine academy all the intellectual culture of the middle ages, having preserved some of the ancient traditions of organization and administration and guarded the imperial ideal. Charlemagne apparently wished, like Theodoric, to use German blood and Christian unity to bring back life to the great body of the Empire. Not the equal of Caesar or Augustus in genius or in the lastingness of his work, he yet recalls them in his capitularies, his periodic courts, his official hierarchy, his royal emissaries, his ministers, his sole right of coinage, his great public works, his campaigns against barbarism and heathenry, his zeal for learning and literature, and his divinity as emperor. Once more there existed a great public entity such as had not been seen for many years; but its duration was not to be a long one.

Dissolution of the Frankish Empire.

Charlemagne had for the moment succeeded in uniting western Europe under his sway, but he had not been able to arrest its evolution towards feudal dismemberment. He had, doubtless conscientiously, laboured for the reconstitution of the Empire; but it often happens that individual wills produce results other than those at which they aimed, sometimes results even contrary to their wishes, and this was what happened in Charlemagne's case. He had restored the superstructure of the imperial monarchy, but he had likewise strengthened and legalized methods and institutions till then private and insecure, and these, passing from custom into law, undermined the foundations of the structure he had thought himself to be repairing. A quarter of a century after his death his Empire was in ruins.

The practice of giving land as a *beneficium* to a grantee who swore personal allegiance to the grantor had persisted, and by his capitularies Charlemagne had made these personal engagements, these contracts of immunity—hitherto not transferable, nor even for life, but quite conditional—regular, legal, even obligatory and almost indissoluble. The *beneficium* was to be as practically irrevocable as the oath of fidelity. He submitted to the yoke of the social system and feudal institutions at the very moment when he was attempting to revive royal authority; he was ruler of the state, but ruler of vassals also. The monarchical principle no longer sufficed to ensure social discipline; the fear of forfeiting the grant became the only powerful guarantee of obedience, and as this only applied to his personal vassals, Charlemagne gave up his claim to direct obedience from the rest of the people, accepting the mediation of the counts, lords and bishops, who levied taxes, adjudicated and administered in virtue of the privileges of patronage, not of the right of the state. The very multiplication of offices, so noticeable at this time, furthered this triumph of feudalism by multiplying the links of personal dependence, and neutralizing more and more the direct action of the central authority. The frequent convocations of military assemblies, far from testifying to political liberty, was simply a means of communicating the emperor's commands to the various feudal groups.

Thus Charlemagne, far from opposing, systematized feudalism, in order that obedience and discipline might pass from one man to another down to the lowest grades of society, and he succeeded for his own lifetime. No authority was more weighty or more respected than that of this feudal lord of Gaul, Italy and Germany; none was more transient, because it was so purely personal.

Causes for the dissolution of the Empire.

When the great emperor was buried at Aix-la-Chapelle in 814, his work was entombed with him. The fact was that his successors were incapable of maintaining it. Twenty-nine years after his death the Carolingian Empire had been divided into three kingdoms; forty years later one alone of these kingdoms had split into seven; while when a century had passed France was a litter of tiny states each practically independent. This disintegration was caused neither by racial hate nor by linguistic patriotism. It was the weakness of princes, the discouragement of freemen and landholders confronted by an inexorable system of financial and military tyranny, and the incompatibility of a vast empire with a too primitive governmental system, that wrecked the work of Charlemagne.

Louis the Pious (814-840).

The Empire fell to Louis the Pious, sole survivor of his three sons. At the Aix assembly in 813 his father had crowned him with his own hand, thus avoiding the papal sanction that had been almost forced upon himself in 800. Louis was a gentle and well-trained prince, but weak and prone to excessive devotion to the Church. He had only reigned a few years when dissensions broke out on all sides, as under the Merovingians. Charlemagne had assigned their portions to his three sons in 781 and again in 806; like Charles Martel and Pippin the Short before him, however, what he had divided was not the imperial authority, nor yet countries, but the whole system of fiefs, offices and adherents which had been his own patrimony. The division that Louis the Pious made at Aix in 817 among his three sons, Lothair, Pippin and Louis, was of like character, since he reserved the supreme authority for himself, only associating Lothair, the eldest, with him in the government of the empire. Following the advice of his ministers Walla and Agobard, supporters of the policy of unity, Louis the Pious put Bernard of Italy, Charlemagne's grandson, to death for refusing to acknowledge Lothair as co-emperor; crushed a revolt in Brittany; and carried on among the Danes the work of evangelization begun among the Slavs. A fourth son, Charles, was born to him by his second wife, Judith of Bavaria. Jealousy arose between the children of the two marriages. Louis tried in vain to satisfy his sons and their followers by repeated divisions—at Worms (829) and at Aix (831)—in which there was no longer question of either unity or subordination. Yet his elder sons revolted against him in 831 and 832, and were supported by Walla and Agobard and by their followers, weary of all the contradictory oaths demanded of them. Louis was deposed at the assembly of Compiègne (833), the bishops forcing him to assume the garb of a penitent; but he was re-established on his throne in St Etienne at Metz, the 28th of February 835, from which time until his death in 840 he fell more and more under the influence of his ambitious wife, and thought only of securing an inheritance for Charles, his favourite son.

The sons of Louis the Pious.

The Strassburg oath.

Hardly was Louis buried in the basilica of Metz before his sons flew to arms. The first dynastic war broke out between Lothair, who by the settlement of 817 claimed the whole monarchy with the imperial title, and his brothers Louis and Charles. Lothair wanted, with the Empire, the sole right of patronage over the adherents of his house, but each of these latter chose his own lord according to individual interests, obeying his fears or his preferences. The three brothers finished their discussion by fighting for a whole day (June 25th, 841) on the plain of Fontanet by Auxerre; but the battle decided nothing, so Charles and Louis, in order to get the better of Lothair, allied themselves and their vassals by an oath taken in the plain of Strassburg (Feb. 14th, 842). This, the first document in the vulgar tongue in the history of France and Germany, was merely a mutual contract of protection for the two armies, which nevertheless did not risk another battle. An amicable division of the imperial succession was arranged, and after an assessment of the empire which took almost a year, an agreement was signed at Verdun in August 843.

Partition of the Empire at Verdun (843).

This was one of the important events in history. Each brother received an equal share of the dismembered empire. Louis had the territory on the right bank of the Rhine, with Spires, Worms and Mainz "because of the abundance of wine." Lothair took Italy, the valleys of the Rhone, the Saône and the Meuse, with the two capitals of the empire, Aix-la-Chapelle and Rome, and the title of emperor. Charles had all the country watered by the Scheldt, the Seine, the Loire and the Garonne, as far as the Atlantic and the Ebro. The partition of Verdun separated once more, and definitively, the lands of the eastern and western Franks. The former became modern Germany, the latter France, and each from this time forward had its own national existence. However, as the boundary between the possessions of Charles the Bald and those of Louis was not strictly defined, and as Lothair's kingdom, having no national basis, soon disintegrated into the kingdoms of Italy, Burgundy and Arles, in Lotharingia, this great undefined territory was to serve as a tilting-ground for France and Germany on the very morrow of the treaty of Verdun and for ten centuries after.

Charles the Bald (843-877).

Charles the Bald was the first king of western France. Anxious as he was to preserve Charlemagne's traditions of government, he was not always strong enough to do so, and warfare within his own dominions was often forced on him. The Norse pirates who had troubled Charlemagne showed a preference for western France, justified by the easy access afforded by river estuaries with rich monasteries on their shores. They began in 841 with the sack of Rouen; and from then until 912, when they made a settlement in one part of the country, though few in numbers they never ceased attacking Charles's kingdom, coming in their ships up the Loire as far as Auvergne, up the Garonne to Toulouse, and up the Seine and the Scheldt to Paris, where they made four descents in forty years, burning towns, pillaging treasure, destroying harvests and slaughtering the peasants or carrying them off into slavery. Charles the Bald thus spent his life sword in hand, fighting unsuccessfully against the Bretons, whose two kings, Nomenoé and Erispoé, he had to recognize in turn; and against the people of Aquitaine, who, in full revolt, appealed for help to his brother, Louis the German. He was beaten everywhere and always: by the Bretons at Ballon (845) and Juvardeil (851); by the people of Aquitaine near Angoulême (845); and by the Northmen, who several times extorted heavy ransoms from him. Before long, too, Louis the German actually allied himself with the people of Brittany and Aquitaine, and invaded France at the summons of Charles the Bald's own vassals. Though the treaty of Coblenz (860) seemed to reconcile the two kings for the moment, no peace was ever possible in Charles the Bald's kingdom. His own son Charles, king of Aquitaine, revolted, and Salomon proclaimed himself king of Brittany in succession to Erispoé, who had been assassinated. To check the Bretons and the Normans, who were attacking from the Atlantic and the Mediterranean, Charles the Bald found himself obliged to entrust the defence of the country to Robert the Strong, ancestor of the house of Capet and duke of the lands between Loire and Seine. Robert the Strong, however, though many times victorious over the incorrigible pirates, was killed by them in a fight at Brissarthe (866).

Division of the kingdom into large fiefs.

Despite all this, Charles spoke authoritatively in his capitularies, and though incapable of defending western France, coveted other crowns and looked obstinately eastwards. He managed to become king of Lorraine on the death of his nephew Lothair II., and emperor and king of Germany on that of his other nephew Louis II. (875); though only by breaking the compact of the year 800. In 876, the year before his death, he took a third crown, that of Italy, though not without a fresh defeat at Andernach by Louis the German's troops. His titles increased, indeed, but not his power; for while his kingdom was thus growing in area it was falling to pieces. The duchy with which he rewarded Robert the Strong was only a military command, but became a powerful fief. Baldwin I. (d. 879), count of Flanders, turned the country between the Scheldt, the Somme and the sea into another feudal principality. Aquitaine and Brittany were almost independent, Burgundy was in full revolt, and within thirty years Rollo, a Norman leader, was to be master of the whole of the lower Seine from the Cotentin to the Somme. The fact was that between the king's inability to defend the kingdom, and the powerlessness of nobles and peasants to protect themselves from pillage, every man made it his business to seek new protectors, and the country, in spite of Charles the Bald's efforts, began to be covered with strongholds, the peasant learning to live beneath the shelter of the donjon keeps. Such vassals gave themselves utterly to the lord who guarded them, working for him sword or pickaxe in hand. The king was far away, the lord close at hand. Hence the sixty years of terror and confusion which came between Charlemagne and the death of Charles the Bald suppressed the direct authority of the king in favour of the nobles, and prepared the way for a second destruction of the monarchy at the hands of a stronger power (see FEUDALISM).

Establishment of feudalism.

Before long Charles the Bald's followers were dictating to him; and in the disaffection caused by his feebleness and cowardice prelates and nobles allied themselves against him. If they acknowledged the king's authority at the assemblies of Yütz (near Thionville) in 844, they forced from him a promise that they should keep their fiefs and their dignities; and while establishing a right of control over all his actions they deprived him of his right of jurisdiction over them. Despite Charles's resistance his royal power dwindled steadily: an appeal to Hincmar, archbishop of Reims, entailed concessions to the Church. In 856 some of his vassals deserted him and went over to Louis the German. To win them back Charles had to sign a new charter, by the terms of which loyalty was no longer a one-sided engagement but a reciprocal contract between king and vassal. He gave up his personal right of distributing the fiefs and honours which were the price of adherence, and thus lost for the Carolingians the free disposal of the immense territories they had gradually usurped; they retained the over-lordship, it is true, but this over-lordship, without usufruct and without choice of tenant, was but a barren possession.

Decay of the Carolingian power.

Like their territories public authority little by little slipped from the grasp of the Carolingians, largely because of their abuse of their too great power. They had concentrated the entire administration in their own hands. Like Charlemagne, Louis the Pious and Charles the Bald were omnipotent. There were no provincial assemblies, no municipal bodies, no merchant-gilds, no autonomous churches; the people had no means of making themselves heard; they had no place in an administration which was completely in the hands of a central hierarchy of officials of all ranks, from dukes to *scabini*, with counts, viscounts and *centenarii* in between. However, these dukes and counts were not merely officials: they too had become lords of *fideles*, of their own *advocati*, *centenarii* and *scabini*, whom they nominated, and of all the free men of the county, who since Charlemagne's time had been first allowed and then commanded to "commend" themselves to a lord, receiving feudal benefices in return. Any deprivation or supersession of the count might impoverish, dispossess or ruin the vassals of the entire county; so that all, vassals or officials, small and great, feeling their danger, united their efforts, and lent each other mutual assistance against the permanent menace of an overweening monarchy. Hence, at the end of the 9th century, the heredity of offices as well as of fiefs. In the disordered state of society official stability was a valuable warrant of peace, and the administrative hierarchy, lay or spiritual, thus formed a mould for the hierarchy of feudalism. There was no struggle with the king, simply a cessation of obedience; for without strength or support in the kingdom he was powerless to resist. In vain Charles the Bald affirmed his royal authority in the capitularies of Quierzy-sur-Oise (857), Reims (860), Pistes (864), Gondreville (872) and Quierzy-sur-Oise (877); each time in exchange for assent to the royal will and renewal of oaths he had to acquiesce in new safeguards against himself and by so much to diminish that power of protection against violence and injustice for which the weak had always looked to the throne. Far from forbidding the relation of lord and vassal, Charles the Bald imposed it upon every man in his kingdom, himself proclaiming the real incapacity and failure of that theoretic royal power to which he laid claim. Henceforward royalty had no servants, since it performed no service. There was no longer the least hesitation over the choice between liberty with danger and subjection with safety; men sought and found in vassalage the right to live, and willingly bartered away their liberty for it.

Louis the Stammerer (877–879).

Louis III. and Carloman (879–884).

The degeneration of the monarchy was clearly apparent on the death of Charles the Bald, when his son, Louis the Stammerer, was only assured of the throne, which had passed by right of birth under the Merovingians and been hereditary under the earlier Carolingians, through his election by nobles and bishops under the direction of Hugh the Abbot, successor of Robert the Strong, each voter having been won over by gift of abbeys, counties or manors. When Louis died two years later (879), the same nobles met, some at Creil, the rest at Meaux, and the first party chose Louis of Germany, who preferred Lorraine to the crown; while the rest anointed Louis III. and Carloman, sons of the late king, themselves deciding how the kingdom was to be divided between the two princes. Thus the king no longer chose his own vassals; but vassals and fief-holders actually elected their king according to the material advantages they expected from him. Louis III. and Carloman justified their election by their brilliant victories over the Normans at Saucourt (881) and near Epernay (883); but at their deaths (882–884), the nobles, instead of taking Louis's boy-son, Charles the Simple, as king, chose Charles the Fat, king of Germany, because he was emperor and seemed powerful. He united once more the dominions of Charlemagne; but he disgraced the imperial throne by his feebleness, and was incapable of using his immense army to defend Paris when it was besieged by the Normans. Expelled from Italy, he only came to France to buy a shameful peace. When he died in January 888 he had not a single faithful vassal, and the feudal lords resolved never again to place the sceptre in a hand that could not wield the sword.

Charles the Fat. (884–888.)

Death-struggle of the Carolingians (888–987).

The death-struggle of the Carolingians lasted for a century of uncertainty and anarchy, during which time the bishops, counts and lords might well have suppressed the monarchy had they been hostile to it. Such, however, was not their policy; on the contrary, they needed a king to act as agent for their private interests, since he alone could invest their rank and dignities with an official and legitimate character. They did not at once agree on Charles's successor; for some of them chose Eudes (Odo), son of Robert the Strong, for his brilliant defence of Paris against the Normans in 885; others Guy, duke of Spoleto in Italy, who had himself crowned at Langres; while many wished for Arnulf, illegitimate son of Carloman, king of Germany and emperor. Eudes was victor in the struggle, and was crowned and anointed at Compiègne on the 29th of February 888; but five years later, meeting with defeat after defeat at the hands of the Normans, his followers deserted from him to Charles the Simple, grandson of Charles the Bald, who was also supported by Fulk, archbishop of Reims.

King Odo (888–893).

Charles the Simple (893–929).

This first Carolingian restoration took place on the 28th of January 893, and thenceforward throughout this warlike period from 888 to 936 the crown passed from one dynasty to the other according to the interests of the nobles. After desperate strife, an agreeement between the two rivals, Arnulf's support, and the death of Odo, secured it for Charles III., surnamed the Simple. His subjects remained faithful to him for a good while, as he put an end to the Norman invasions which had desolated the kingdom for two centuries, and cowed those barbarians, much to the benefit of France. By the treaty of St Clair-sur-Epte (911) their leader Rolf (Rollo) obtained one of Charles's daughters in marriage and the district of the Lower Seine which the Normans had long occupied, on condition that he and his men ceased their attacks and accepted Christianity. Having thus tranquillized the west, Charles took advantage of Louis the Child's death, and conquered Lorraine, in spite of opposition from Conrad, king of Germany (921). But his preference for his new conquest, and for a Lorrainer of low birth named Hagano, aroused the jealousy and discontent of his nobles. They first elected Robert, count of Paris (923), and then after his death in a successful battle near Soissons against Charles the

Rudolph of Burgundy (923-936).

Simple, Rudolph of Burgundy, his son-in-law. But Herbert of Vermandois, one of the successful combatants at Soissons, coveted the countship of Laon, which Rudolph refused him; and he thereupon proclaimed Charles the Simple, who had confided his cause to him, as king once more. Seeing his danger Rudolph ceded the countship to Herbert, and Charles was relegated to his prison until his death in 929. After unsuccessful wars against the nobles of the South, against the Normans, who asserted that they were bound to no one except Charles the Simple, and against the Hungarians (who, now the Normans were pacified, were acting their part in the East), Rudolph had a return of good fortune in the years between 930 and 936, despite the intrigues of Herbert of Vermandois. Upon his death the nobles assembled to elect a king; and Hugh the Great, Rudolph's brother-in-law, moved by irresolution as much as by prudence, instead of taking the crown, preferred to restore the Carolingians once more in the person of Charles the Simple's son, Louis d'Outremer, himself claiming numerous privileges and enjoying the exercise of power unencumbered by a title which carried with it the jealousy of the nobles.

Louis IV. the Foreigner (936-954.)

This restoration was no more peaceful than its predecessor. The Carolingians had as it were a fresh access of energy, and the struggle against the Robertinians went on relentlessly. Both sides employed similar methods: one was supported by Normandy, the other by Germany; the archbishop of Reims was for the Carolingians, the Robertinians had to be content with the less influential bishop of Sens. Louis soon proved to Hugh the Great, who was trying to play the part of a mayor of the palace, that he was by no means a *roi fainéant*; and the powerful duke of the Franks, growing uneasy, allied himself with Herbert of Vermandois, William of Normandy and his brother-in-law Otto I. king of Germany, who resented the loss of Lorraine. Louis defended himself with energy, aided chiefly by the nobles of the South, by his relative Edmund, king of the English, and then by Otto himself, whose brother-in-law he also had become. A peace advantageous to him was made in 942, and on the deaths of his two opponents, Herbert of Vermandois and William of Normandy, all seemed to be going well for him; but his guardianship of Richard, son of the duke of Normandy, aroused fresh strife, and on the 13th of July 945 he fell into an ambush and suffered a captivity similar to his father's of twenty-two years before. No one had befriended Charles the Simple, but Louis had his wife Gerberga, who won over to his cause the kings of England and Germany and even Hugh. Hugh set him free, insisting, as payment for his aid, on the cession of Laon, the capital of the kingdom and the last fortified town remaining to the Carolingians (946). Louis was hardly free before he took vengeance, harried the lands of his rival, restored to the archiepiscopal throne of Reims Artald, his faithful adviser, in place of the son of Herbert of Vermandois, and managed to get Hugh excommunicated by the council of Ingelheim (948) and by the pope. A two years' struggle wearied the rivals, and they made peace in 950. Louis once more held Laon, and in the following year further strengthened his position by a successful expedition into Burgundy. Still his last years were not peaceful; for besides civil wars there were two Hungarian invasions of France (951 and 954).

Lothair (954-986).

Louis's sudden death in 954 once more placed the Carolingian line in peril, since he had not had time to have his son Lothair crowned. For a third time Hugh had the disposal of the crown, and he was no more tempted to take it himself in 954 than in 923 or 936: it was too profitless a possession. Thanks to Hugh's support and to the good offices of Otto and his brother Bruno, archbishop of Cologne and duke of Lorraine, Lothair was chosen king and crowned at Reims. Hugh exacted, as payment for his disinterestedness and fidelity, a renewal of his sovereignty over Burgundy with that of Aquitaine as well; he was in fact the viceroy of the kingdom, and others imitated him by demanding indemnities, privileges and confirmation of rights, as was customary at the beginning of a reign. Hugh strengthened his position in Burgundy, Lorraine and Normandy by means of marriages; but just as his power was at its height he died (956). His death and the minority of his sons, Hugh Capet and Eudes, gave the Carolingian dynasty thirty years more of life.

For nine years (956–965) Bruno, archbishop of Cologne, was regent of France, and thanks to him there was a kind of *entente cordiale* between the Carolingians and the Robertinians and Otto. Bruno made Lothair recognize Hugh as duke of France and Eudes as duke of Burgundy; but the sons preserved the father's enmity towards king Louis, despite the archbishop's repeated efforts. His death deprived Lothair of a wise and devoted guardian, even if it did set him free from German influence; and the death of Odalric, archbishop of Reims, in 969, was another fatal loss for the Carolingians, succeeded as he was by Adalbero, who, though learned, pious and highly intelligent, was none the less ambitious. On the death of Otto I. (973) Lothair wished to regain Lorraine; but his success was small, owing to his limited resources and the uncertain support of his vassals. In 980, regretting his fruitless quarrel with Otto II., who had ravaged the whole country as far as Paris, and fearing that even with the support of the house of Vermandois he would be crushed like his father Louis IV. between the duke of France and the emperor, who could count on the archbishop of Reims, Lothair made peace with Otto—a great mistake, which cost him the prestige he had gained among his nobles by his fairly successful struggle with the emperor, drawing down upon him, moreover, the swift wrath of Hugh, who thought himself tricked. Otto, meanwhile, whom he was unwise enough to trust, made peace secretly with Hugh, as it was his interest to play off his two old enemies one against the other. However, Otto died first (983), leaving a three-year-old son, Otto III., and Lothair, hoping for Lorraine, upheld the claims of Henry of Bavaria, who wished to oust Otto. This was a war-signal for Archbishop Adalbero and his adviser Gerbert, devoted to the idea of the Roman empire, and determined that it should still be vested in the race of Otto, which had always been beneficent to the Church.

Louis V. (986-987).

They decided to set the Robertinians against the Carolingians, and on their advice Hugh Capet dispersed the assembly of Compiègne which Lothair had commissioned to examine Adalbero's behaviour. On Lothair's death in 986, Hugh surrounded his son and successor, Louis V., with intrigues. Louis was a weak-minded and violent young man with neither authority nor prestige, and Hugh tried to have him placed under tutelage. After Louis V.'s sudden death, aged twenty, in 987, Adalbero and Gerbert, with the support of the reformed Cluniac clergy, at the Assembly of Senlis eliminated from the succession the rightful heir, Charles of Lorraine, who, without influence or wealth, had become a stranger in his own country, and elected Hugh Capet, who, though rich and powerful, was superior neither in intellect nor character. Thus the triple alliance of Adalbero's bold and adroit imperialism with the cautious and vacillating ambition of the duke of the Franks, and the impolitic hostility towards Germany of the ruined Carolingians, resulted in the unlooked-for advent of the new Capetian dynasty.

Dismemberment of the kingdom.

This event completed the evolution of the forces that had produced feudalism, the basis of the medieval social system. The idea of public authority had been replaced by one that was simpler and therefore better fitted for a half-civilized society—that of dependence of the weak on the strong, voluntarily entered on by means of mutual contract. Feudalism had gained ground in the 8th century; feudalism it was which had raised the first Carolingian to the throne as being the richest and most powerful person in Austrasia; and Charlemagne with all his power had been as utterly unable as the Merovingians to revive the idea of an abstract and impersonal state. Charlemagne's vassals, however, had needed him; while from Charles the Bald onward it was the king who needed the vassals—a change more marked with each successive prince. The feudal system had in fact turned against the throne, the vassals using it to secure a permanent hold upon offices and fiefs, and to get possession of estates and of power. After Charles the Bald's death royalty had only, so to speak, a shell—administrative officialdom. No longer firmly rooted in the soil, the monarchy was helpless before local powers which confronted it, seized upon the land, and cut off connexion between throne and people. The king, the supreme lord, was the only lord without lands, a nomad in his own realms, merely lingering there until starved out. Feudalism claimed its new rights in the capitulary of Quierzy-sur-Oise in 857; the rights of the monarchy began to dwindle in 877.

But vassalage could only be a cause of disintegration, not of unity, and that this disintegration did not at once spread indefinitely was due to the dozen or so great military commands —Flanders, Burgundy, Aquitaine, &c.—which Charles the Bald had been obliged to establish on a strong territorial basis. One of these great vassals, the duke of France, was amply provided with estates and offices, in contrast to the landless Carolingian, and his power, like that of the future kings of Prussia and Austria, was based on military authority, for he had a frontier—that of Anjou. Then the inevitable crisis had come. For a hundred years the great feudal lords had disposed of the crown as they pleased, handing it back and forward from one dynasty to another. At the same time the contrast between the vast proportions of the Carolingian empire and its feeble administrative control over a still uncivilized community became more and more accentuated. The Empire crumbled away by degrees. Each country began to lead its own separate existence, stammering its own tongue; the different nations no longer understood one another, and no longer had any general ideas in common. The kingdoms of France and Germany, still too large, owed their existence to a series of dispossessions imposed on sovereigns too feeble to hold their own, and consisted of a great number of small states united by a very slight bond. At the end of the 10th century the duchy of France was the only central part of the kingdom which was still free and without organization. The end was bound to come, and the final struggle was between Laon, the royal capital, and Reims, the ecclesiastical capital, the former carrying with it the soil of France, and the latter the crown. The Capets captured the first in 985 and the other in 987. Thenceforth all was over for the Carolingians, who were left with no heritage save their great name.

The House of Capet.

Was the day won for the House of Capet? In the 11th century the kings of that line possessed meagre domains scattered about in the Ile de France among the seigniorial possessions of Brie, Beauce, Beauvaisis and Valois. They were hemmed in by the powerful duchy of Normandy, the counties of Blois, Flanders and Champagne, and the duchy of Burgundy. Beyond these again stretched provinces practically impenetrable to royal influence: Brittany, Gascony, Toulouse, Septimania and the Spanish March. The monarchy lay stifling in the midst of a luxuriant feudal forest which surrounded its only two towns of any importance: Paris, the city of the future, and Orleans, the city of learning. Its power, exercised with an energy tempered by prudence, ran to waste like its wealth in a suzerainty over turbulent vassals devoid of common government or administration, and was undermined by the same lack of social discipline among its vassals which had sapped the power of the Carolingians. The new dynasty was thus the poorest and weakest of the great civil and ecclesiastical lordships which occupied the country from the estuary of the Scheldt to that of the Llobregat, and bounded approximately by the Meuse, the Saône and the ridge of the Cévennes; yet it cherished a great ambition which it revealed at times during its first century (987–1108)—a determination not to repeat the Carolingian failure. It had to wait two centuries after the revolution of 987 before it was strong enough to take up the dormant tradition of an authority like that of Rome; and until then it cunningly avoided unequal strife in which, victory being impossible, reverses might have weakened those titles, higher than any due to feudal rights, conferred by the heritage of the Caesars and the coronation at Reims, and held in reserve for the future.

Hugh Capet (987-996).

The new dynasty thus at first gave the impression rather of decrepitude than of youth, seeming more a continuation of the Carolingian monarchy than a new departure. Hugh Capet's reign was one of disturbance and danger; behind his dim personality may be perceived the struggle of greater forces—royalty and feudalism, the French clergy and the papacy, the kingdom of France and the Empire. Hugh Capet needed more than three years and the betrayal of his enemy into his hands before he could parry the attack of a quite second-rate adversary, Charles of Lorraine (990), the last descendant of Charlemagne. The insubordination of several great vassals—the count of Vermandois, the duke of Burgundy, the count of Flanders—who treated him as he had treated the Carolingian king; the treachery of Arnulf, archbishop of Reims, who let himself be won over by the empress Theophano; the papal hostility inflamed by the emperor against the claim of feudal France to independence,—all made it seem for a time as though the unity of the Roman empire of the West would be secured at Hugh's expense and in Otto's favour; but as a matter of fact this papal and imperial hostility ended by making the Capet dynasty a national one. When Hugh died in 996, he had succeeded in maintaining his liberty mainly, it is true, by diplomacy, not force, despite opposing powers and his own weakness. Above all, he had secured the future by associating his son Robert with him on the throne; and although the nobles and the archbishop of Reims were disturbed by this suspension of the feudal right of election, and tried to oppose it, they were unsuccessful.

Robert the Pious (996-1031).

Robert the Pious, a crowned monk, resembled his father in eschewing great schemes, whether from timidity or prudence; yet from 996 to 1031 he preserved intact the authority he had inherited from Hugh, despite many domestic disturbances. He maintained a defiant attitude towards Germany; increased his heritage; strengthened his royal title by the addition of that of duke of Burgundy after fourteen years of pillage; and augmented the royal domain by adding several countships on the south-east and north-west. Limited in capacity, he yet understood the art of acquisition.

Henry I. (1031-1060).

Henry I., his son, had to struggle with a powerful vassal, Eudes, count of Chartres and Troyes, and was obliged for a time to abandon his father's anti-German policy. Eudes, who was rash and adventurous, in alliance with the queen-mother, supported the second son, Robert, and captured the royal town of Sens. In order to retake it Henry ceded the beautiful valley of the Saône and the Rhône to the German emperor Conrad, and henceforth the kingdom of Burgundy was, like Lorraine, to follow the fortunes of Germany. Henry had besides to invest his brother with the duchy of Burgundy—a grave error which hampered French politics during three centuries. Like his father, he subsequently managed to retrieve some of the crown lands from William the Bastard, the too-powerful duke of Normandy; and he made a praiseworthy though fruitless attempt to regain possession of Lorraine for the French crown. Finally, by the coronation of his son Philip (1059) he confirmed the hereditary right of the Capets, soon to be superior to the elective rights of the bishops and great barons of the kingdom. The chief merit of these early Capets, indeed, was that they had sons, so that their dynasty lasted on without disastrous minorities or quarrels over the division of inheritance.

Philip I. (1060-1108).

Philip I. achieved nothing during his long reign of forty-eight years except the necessary son, Louis the Fat. Unsuccessful even in small undertakings he was utterly incapable of great ones; and the two important events of his reign took place, the one against his will, the other without his help. The first, which lessened Norman aggression in his kingdom, was William the Bastard's conquest of England (1066); the second was the First Crusade preached by the French pope Urban II. (1095). A few half-hearted campaigns against recalcitrant vassals and a long and obstinate quarrel with the papacy over his adulterous union with Bertrade de Montfort, countess of Anjou, represented the total activity of Philip's reign; he was greedy and venal, by no means disdaining the petty profits of brigandage, and he never left his own domains.

Louis VI. the Fat (1108-1137).

After a century's lethargy the house of Capet awoke once more with Louis VI. and began the destruction of the feudal polity. For thirty-four years of increasing warfare this active and energetic king, this brave and persevering soldier, never spared himself, energetically policing the royal demesne against such pillagers as Hugh of Le Puiset or Thomas of Marle. There was, however, but little difference yet between a count of Flanders or of Chartres and Louis VI., the possessor of a but small and perpetually disturbed realm, who was praised by his minister, the monk Suger, for making his power felt as far as distant Berri! This was clearly shown when he attempted to force the great feudal lords to recognize his authority. His bold endeavour to establish William Clito in Flanders ended in failure; and his want of strength was particularly humiliating in his unfortunate struggle with Henry I., king of the English and duke of Normandy, who was powerful and well served, the real master of a comparatively weak baronage. Louis only escaped being crushed because he remembered, as did his successors for long after him, that his house owed its power to the Church.

The Church has never loved weakness; she has always had a secret sympathy for power, whatever its source, when she could hope to capture it and make it serve her ends. Louis VI. defended her against feudal robbers; and she supported him in his struggles against the nobles, making him, moreover, by his son's marriage with the heiress of Aquitaine, the greatest and richest landholder of the kingdom. But Louis was not the obedient tool she wished for. With equal firmness and success he vindicated his rights, whether against the indirect attacks of the papacy on his independence, or the claims of the ecclesiastical courts which, in principle, he made subordinate to the jurisdiction of the crown; whether in episcopal elections, or in ecclesiastical reforms which might possibly imperil his power or his revenues. The prestige of this energetic king, protector of the Church, of the infant communes in the towns, and of the peasants as against the constant oppressions of feudalism, became still greater at the end of his reign, when an invasion of the German emperor Henry V. in alliance with Henry Beauclerk of Normandy (Henry I. of England), rallied his subjects round the oriflamme of St Denis, awakening throughout northern France the unanimous and novel sentiment of national danger.

Louis VII. the Young (1137-1180).

The second crusade.

Unfortunately his successor, Louis VII., almost destroyed his work by a colossal blunder, although circumstances seemed much in his favour. Germany and England, the two powers especially to be dreaded, were busy with internal troubles and quarrels of succession. On the other hand, thanks to his marriage with Eleanor of Aquitaine, Louis's own domains had been increased by the greater part of the country between the Loire and the Pyrenees; while his father's minister, the monk Suger, continued to assist him with his moderation and prudence. His first successes against Theobald of Champagne, who for thirty years had been the most dangerous of the great French barons and had refused a vassal's services to Louis VI., as well as the adroit diplomacy with which he wrested from Geoffrey the Fair, count of Anjou, a part of the Norman Vexin long claimed by the French kings, in exchange for permitting him to conquer Normandy, augured well for his boldness and activity, had he but confined them to serving his own interests. The second crusade, undertaken to expiate his burning of the church of Vitry, inaugurated a series of magnificent but fruitless exploits; while his wife was the cause of domestic quarrels still more disastrous. Piety and a thirst for glory impelled Louis to take the lead in this fresh expedition to the Holy Land, despite the opposition of Suger, and the hesitation of the pope, Bernard of Clairvaux and the barons. The alliance with the German king Conrad III. only enhanced the difficulties of an enterprise already made hazardous by the misunderstandings between Greeks and Latins. The Crusade ended in the double disaster of military defeat and martial dishonour (1147–1149); and Suger's death in 1151 deprived Louis of a counsellor who had exercised the regency skilfully and with success, just at the very moment when his divorce from Eleanor was to jeopardize the fortunes of the Capets.

Rivalry of Capets and Angevins.

For the proud and passionate Eleanor married, two months later (May 1152), the young Henry, count of Anjou and duke of Normandy, who held, besides these great fiefs, the whole of the south-west of France, and in two years' time the crown of England as well. Henry and Louis at once engaged in the first Capet-Angevin duel, destined to last a hundred years (1152–1242). When France and England thus entered European history, their conditions were far from being equal. In England royal power was strong; the size of the Angevin empire was vast, and the succession assured. It was only abuse of their too-great powers that ruined the early Angevin kings. France in the 12th century was merely a federation of separate states, jealously independent, which the king had to negotiate with rather than rule; while his own possessions, shorn of the rich heritage of Aquitaine, were, so to speak, swamped by those of the English king. For some time it was feared that the French kingdom would be entirely absorbed in consequence of the marriage between Louis's daughter and Henry II.'s eldest son. The two rivals were typical of their states, Henry II. being markedly superior to Louis in political resource, military talent and energy. He failed, however, to realize his ambition of shutting in the Capet king and isolating him from the rest of Europe by crafty alliances, notably that with the emperor Frederick Barbarossa—while watching an opportunity to supplant him upon the French throne. It is extraordinary that Louis should have escaped final destruction, considering that Henry had subdued Scotland, retaken Anjou from his brother Geoffrey, won a hold over Brittany, and schemed successfully for Languedoc. But the Church once more came to the rescue of her devoted son. The retreat to France of Pope Alexander III., after he had been driven from Rome by the emperor Frederick in favour of the anti-pope Victor, revived Louis's moral prestige. Henry II.'s quarrel with Thomas Becket, archbishop of Canterbury, which ran its course in France (1164–1171) as a struggle for the independence and reform of the Church, both threatened by the Constitutions of Clarendon, and ended with the murder of Becket in 1172, gave Louis yet another advantage over his rival. Finally the birth of Philip Augustus (1165), after thirty years of childless wedlock, saved the kingdom from a war of succession just at the time when the powerful Angevin sway, based entirely upon force, was jeopardized by the rebellion of Henry II.'s sons against their father. Louis naturally joined the coalition of 1173, but showed no more vigour in this than in his other wars; and his fate would have been sealed had not the pope checked Henry by the threat of an interdict, and reconciled the combatants (1177). Louis had still time left to effect the coronation of his son Philip Augustus (1179), and to associate him with himself in the exercise of the royal power for which he had grown too old and infirm.

Philip Augustus (1180-1223).

Philip Augustus, who was to be the bitterest enemy of Henry II. and the Angevins, was barely twenty before he revealed the full measure of his cold energy and unscrupulous ambition. In five years (1180–1186) he rid himself of the overshadowing power of Philip of Alsace, count of Flanders, and his own uncles, the counts of Champagne; while the treaty of May 20th, 1186, was his first rough lesson to the feudal leagues, which he had reduced to powerlessness, and to the subjugated duke of Burgundy and count of Flanders. Northern and eastern France recognized the suzerainty of the Capet, and Philip Augustus was now bold enough to attack Henry II., the master of the west, whose friendly neutrality (assured by the treaty of Gisors) had made possible the successive defeats of the great French barons. Like his father, Philip understood how to make capital out of the quarrels of the aged and ailing Henry II. with his sons, especially with Richard, who claimed his French heritage in his father's lifetime, and raised up enemies for the disunited Angevins even in Germany. After two years of constant defeat, Henry's capitulation at Azai proved once more that fortune is never with the old. The English king had to submit himself to "the advice and desire of the king of France," doing him homage for all continental fiefs (1187–1189).

Philip Augustus and Richard Cœur de Lion.

The defection of his favourite son John gave Henry his death-blow, and Philip Augustus found himself confronted by a new king of England, Richard Cœur de Lion, as powerful, besides being younger and more energetic. Philip's ambition could not rest satisfied with the petty principalities of Amiens, Vermandois and Valois, which he had added to the royal demesne. The third crusade, undertaken, sorely against Philip's will, in alliance with Richard, only increased the latent hostility between the two kings; and in 1191 Philip abandoned the enterprise in order to return to France and try to plunder his absent rival. Despite his solemn oath no scruples troubled him: witness the large sums of money he offered to the emperor Henry VI. if he would detain Richard, who had been made prisoner by the duke of Austria on his return from the crusade; and his negotiations with his brother John Lackland, whom he acknowledged king of England in exchange for the cession of Normandy. But Henry VI. suddenly liberated Richard, and in five years that "devil set free" took from Philip all the profit of his trickery, and shut him off from Normandy by the strong fortress of Château-Gaillard (1194–1199).

Philip Augustus and John Lackland.

Happily an accident which caused Richard's death at the siege of Chalus, and the evil imbecility of his brother and successor, John Lackland, brilliantly restored the fortunes of the Capets. The quarrel between John and his nephew Arthur of Brittany gave Philip Augustus one of those opportunities of profiting by family discord which, coinciding with discontent among the various peoples subject to the house of Anjou, had stood him in such good stead against Henry II. and Richard. He demanded renunciation on John's part, not of Anjou only, but of Poitou and Normandy—of all his French-speaking possessions, in fact—in favour of Arthur, who was supported by William des Roches, the most powerful lord of the region of the Loire. Philip's divorce from Ingeborg of Denmark, who appealed successfully to Pope Innocent III., merely delayed the inevitable conflict. John of England, moreover, was a past-master in the art of making enemies of his friends, and his conduct towards his vassals of Aquitaine furnished a judicial pretext for conquest. The royal judges at Paris condemned John, as a felon, to death and the forfeiture of his fiefs (1203), and the murder of Arthur completed his ruin. Philip Augustus made a vigorous onslaught on Normandy in right of justice and of superior force, took the formidable fortress of Château-Gaillard on the Seine after several months' siege, and invested Rouen, which John abandoned, fleeing to England. In Anjou, Touraine, Maine and Poitou, lords, towns and abbeys made their submission, won over by Philip's bribes despite Pope Innocent III.'s attempts at intervention. In 1208 John was obliged to own the Plantagenet continental power as lost. There were no longer two rival monarchies in France; the feudal equilibrium was destroyed, to the advantage of the duchy of France.

But Philip in his turn nearly allowed himself to be led into an attempt at annexing England, and so reversing for his own benefit the work of the Angevins (1213); but, happily for the future of the dynasty, Pope Innocent III. prevented this. Thanks to the ecclesiastical sanction of his royalty, Philip had successfully braved the pope for twenty years, in the matter of Ingeborg and again in that of the German schism, when he had supported Philip of Swabia against Otto of Brunswick, the pope's candidate. In 1213, John Lackland, having been in conflict with Innocent regarding the archiepiscopal see of Canterbury, had made submission and done homage for his kingdom, and Philip wished to take vengeance for this at the expense of the rebellious vassals of the north-west, and of Renaud and Ferrand, counts of Boulogne and Flanders, thus combating English influence in those quarters.

Coalition against Philip Augustus. (1214).

This was a return to the old Capet policy; but it was also menacing to many interests, and sure to arouse energetic resistance. John seized the opportunity to consolidate against Philip a European coalition, which included most of the feudal lords in Flanders, Belgium and Lorraine, and the emperor Otto IV. So dangerous did the French monarchy already seem! John began operations with an attack from Anjou, supported by the notably capricious nobles of Aquitaine, and was routed by Philip's son at La Roche aux Moines, near Angers, on the 2nd of July 1214. Twenty-five days later the northern allies, intending to surprise the smaller French army on its passage over the bridge at Bouvines, themselves sustained a complete defeat. This first national victory had not only a profound effect on the whole kingdom, but produced consequences of far-reaching importance: in Germany it brought about Otto's fall before Frederick II.; in England it introduced the great drama of 1215, the first act of which closed with Magna Carta—John Lackland being forced to acknowledge the control of his barons, and to share with them the power he had abused and disgraced. In France, on the contrary, the throne was exalted beyond rivalry, raised far above a feudalism which never again ventured on acts of independence or rebellion. Bouvines gave France the supremacy of the West. The feudalism of Languedoc was all that now remained to conquer.

The whole world, in fact, was unconsciously working for Philip Augustus. Anxious not to risk his gains, but to consolidate them by organization, Philip henceforth until his death in 1223 operated through diplomacy alone, leaving to others the toil and trouble of conquests, the advantages of which were not for them. When his son Louis wished to wrest the English crown from John, now crushed by his barons, Philip intervened without seeming to do so, first with the barons, then with Innocent III., supporting and disowning his son by turns; until the latter, held in check by Rome, was forced to sign the treaty of Lambeth (1217). When the Church and the needy and fanatical nobles of northern and central France destroyed the feudal dynasty of Toulouse and the rich civilization of the south in the Albigensian crusade, it was for Philip Augustus that their leader, Simon de Montfort, all unknowing, conquered Languedoc. At last, instead of the two Frances of the *langue d'oc* and the *langue d'oïl*, there was but one royal France comprising the whole kingdom.

Administration of Philip Augustus.

Philip Augustus was not satisfied with the destruction of a turbulent feudalism; he wished to substitute for it such unity and peace as had obtained in the Roman Empire; and just as he had established his supremacy over the feudal lords, so now he managed to extend it over the clergy, and to bend them to his will. He took advantage of their weakness in the midst of an age of violence. By contracts of "pariage" the clergy claimed and obtained the king's protection even in places beyond the king's jurisdiction, to their common advantage. Philip thus set the feudal lords one against the other; and against them all, first the Church, then the communes. He exploited also the townspeople's need for security and the instinct of independence which made them claim a definite place in the feudal hierarchy. He was the actual creator of the communes, although an interested creator, since they made a breach in the fortress of feudalism and extended the royal authority far beyond the king's demesne. He did even more: he gave monarchy the instruments of which it still stood in need, gathering round him in Paris a council of men humble in origin, but wise and loyal; while in 1190 he instituted *baillis* and seneschals throughout his enlarged dominions, all-powerful over the nobles and subservient to himself. He filled his treasury with spoils harshly wrung from all classes; thus inaugurating the monarchy's long and patient labours at enlarging the crown lands bit by bit through taxes on private property. Finally he created an army, no longer the temporary feudal *ost*, but a more or less permanent royal force. By virtue of all these organs of government the throne guaranteed peace, justice and a secure future, having routed feudalism with sword and diplomacy. Philip's son was the first of the Capets who was not crowned during his father's lifetime; a fact clearly showing that the principle of heredity had now been established beyond discussion.

Louis VIII. (1223-1226).

Louis VIII.'s short reign was but a prolongation of Philip's in its realization of his two great designs: the recovery from Henry III. of England of Poitou as far as the Garonne; and the crusade against the Albigenses, which with small pains procured him the succession of Amaury de Montfort, and the Languedoc of the counts of Toulouse, if not the whole of Gascony. Louis VIII. died on his return from this short campaign without having proved his full worth.

Universal French activity.

But the history of France during the 11th and 12th centuries does not entirely consist of these painful struggles of the Capet dynasty to shake off the fetters of feudalism. France, no longer split up into separate fragments, now began to exercise both intellectual and military influence over Europe. Everywhere her sons gave proof of rejuvenated activity. The Christian missions which others were reviving in Prussia and beginning in Hungary were undertaken on a vaster scale by the Capets. These "elder sons of the Church" made themselves responsible for carrying out the "work of God," and French pilgrims in the Holy Land prepared the great movement of the Crusades against the infidels. Religious faith, love of adventure, the hope of making advantageous conquests, anticipations of a promised paradise—all combined to force this advance upon the Orient, which though failing to rescue the sepulchre of Christ, the ephemeral kingdoms of Jerusalem and Cyprus, the dukedom of Athens, or the Latin empire of Constantinople, yet gained for France that prestige for military glory and religious piety which for centuries constituted her strength in the Levant (see CRUSADES). At the call of the pope other members of the French chivalry also made victorious expeditions against the Mussulmans, and founded the Christian kingdom of Portugal. Obeying that enterprising spirit which was to take them to England half a century later, Normans descended upon southern Italy and wrested rich lands from Greeks and Saracens.

Intellectual development.

In the domain of intellect the advance of the French showed a no less dazzling and a no less universal activity; they sang as well as they fought, and their epics were worthy of their swordsmanship, while their cathedrals were hymns in stone as ardent as their soaring flights of devotion. In this period of intense religious life France was always in the vanguard. It was the ideas of Cluniac monks that freed the Church from feudal supremacy, and in the 11th century produced a Pope Gregory VII.; the spirit of free investigation shown by the heretics of Orleans inspired the rude Breton, Abelard, in the 12th century; and with Gerbert and Fulbert of Chartres the schools first kindled that brilliant light which the university of Paris, organized by Philip Augustus, was to shed over the world from the heights of Sainte-Geneviève. In the quarrels of the priesthood under the Empire it was St Bernard, the great abbot of Clairvaux, who tried to arrest the papacy on the slippery downward path of theocracy; finally, it was in Suger's church of St Denis that French art began that struggle between light against darkness which, culminating in Notre-Dame and the Sainte-Chapelle, was to teach the architects of the world the delight of building with airiness of effect. The old basilica which contains the history of the monarchy sums up the whole of Gothic art to this day, and it was Suger who in the domain of art and politics brought forward once more the conception of unity. The courteous ideal of French chivalry, with its "delectable" language, was adopted by all seigniorial Europe, which thus became animated, as it were, by the life-blood of France. Similarly, in the universal movement of those forces which made for freedom, France began the age-long struggle to maintain the rights of civil society and continually to enlarge the social categories. The townsman enriched by commerce and the emancipated peasant tried more or less valiantly to shake off the yoke of the feudal system, which had been greatly weakened, if not entirely broken down, by the crusades. Grouped around their belfry-towers and organized within their gilds, they made merry in their free jocular language over their own hardships, and still more over the vices of their lords. They insinuated themselves into the counsels of their ignorant masters, and though still sitting humbly at the feet of the barons, these upright and well-educated servitors were already dreaming of the great deeds they would do when their tyrants should have vacated their high position, and when royalty should have summoned them to power.

Louis IX. (1226-1270).

Blanche of Castile.

By the beginning of the 13th century the Capet monarchy was so strong that the crisis occasioned by the sudden death of Louis VIII. was easily surmounted by the foreign woman and the child whom he left behind him. It is true that that woman was Blanche of Castile, and that child the future Louis IX. A virtuous and very devout Spanish princess, Blanche assumed the regency of the kingdom and the tutelage of her child, and carried them on for nine years with so much force of character and capacity for rule that she soon impressed the clamorous and disorderly leaders of the opposition (1226–1235). By the treaty of Meaux (1229), her diplomacy combined with the influence of the Church to prepare effectually for the annexation of Languedoc to the kingdom, supplementing this again by a portion of Champagne; and the marriage of her son to Margaret of Provence definitely broke the ties which held the country within the orbit of the German empire. She managed also to keep out of the great quarrel between Frederick II. and the papacy which was convulsing Germany. But her finest achievement was the education of her son; she taught him that lofty religious morality which in his case was not merely a rule for private conduct, but also a political programme to which he remained faithful even to the detriment of his apparent interests. With Louis IX. morality for the first time permeated and dominated politics; he had but one end: to do justice to every one and to reconcile all Christendom in view of a general crusade.

Louis IX.'s policy of arbitration.

The oak of Vincennes, under which the king would sit to mete out justice, cast its shade over the whole political action of Louis IX. He was the arbiter of townspeople, of feudal lords and of kings. The interdiction of the judicial duel, the "quarantaine le roi," *i.e.* "the king's truce of forty days" during which no vengeance might be taken for private wrongs, and the *assurement*,[1] went far to diminish the abuses of warfare by allowing his mediation to make for a spirit of reconciliation throughout his kingdom. When Thibaud (Theobald), count of Champagne, attempted to marry the daughter of Pierre Mauclerc, duke of Brittany, without the king's consent, Louis IX., who held the county of Champagne at his mercy, contented himself with exacting guarantees of peace. Beyond the borders of France, at the time of the emperor Frederick II.'s conflict with a papacy threatened in its temporal powers, though he made no response to Frederick's appeal to the civil authorities urging them to present a solid front against the pretensions of the Church, and though he energetically supported the latter, yet he would not admit her right to place kingdoms under interdict, and refused the imperial crown which Gregory IX. offered him for one of his brothers. He always hoped to bring about an honourable agreement between the two adversaries, and in his estimation the advantages of peace outweighed personal interest. In matters concerning the succession in Flanders, Hainaut and Navarre; in the quarrels of the princes regarding the Empire, and in those of Henry III. of England with his barons; it was because of his justice and his disinterestedness that he was appealed to as a trusted mediator. His conduct towards Henry III. was certainly a most characteristic example of his behaviour.

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[1] The *assurement* (*assecuratio*, *assecuramentum*) differed from the truce, which was a suspension of hostilities by mutual consent, in so far as it was a peace forced by judicial authority on one of the parties at the request of the other. The party desiring protection applied for the *assurement*, either before or during hostilities, to any royal, seigniorial or communal judge, who thereupon cited the other party to appear and take an oath that he would assure the person, property and dependents of his adversary (*qu'il l'assurera, elle et les siens*). This custom, which became common in the 13th century, of course depended for its effectiveness on the degree of respect inspired in the feudal nobles by the courts. It was difficult, for instance, to refuse or to violate an *assurement* imposed by a royal *bailli* or by the parlement itself. See A. Luchaire, *Manuel des institutions françaises* (Paris, 1892), p. 233.—(W. A. P.)

Louis IX. and Henry III.

The king of England had entered into the coalition formed by the nobility of Poitou and the count of Toulouse to prevent the execution of the treaty of 1229 and the enfeoffment of Poitou to the king's brother Alphonse. Louis IX. defeated Henry III. twice within two days, at Taillebourg and at Saintes, and obliged him to demand a truce (1242). It was forbidden that any lord should be a vassal both of the king of France and of the king of England. After this Louis IX. had set off upon his first crusade in Egypt (1248–54), and on his return he wanted to make this truce into a definite treaty and to “ set love ” between his children and those of the English king. By a treaty signed at Paris (1259), Henry III. renounced all the conquests of Philip Augustus, and Louis IX. those of his father Louis VIII.—an example unique in history of a victorious king spontaneously giving up his spoil solely for the sake of peace and justice, yet proving by his act that honesty is the best policy; for monarchy gained much by that moral authority which made Louis IX. the universal arbitrator.

The crusade of Tunis.

But his love of peace and concord was not always “ sans grands despens ” to the kingdom. In 1258, by renouncing his rights over Roussillon and the countship of Barcelona, conquered by Charlemagne, he made an advantageous bargain because he kept Montpellier; but he committed a grave fault in consenting to accept the offers regarding Sicily made by Pope Urban IV. to his brother the count of Anjou and Provence. That was the origin of the expeditions into Italy on which the house of Valois was two centuries later to squander the resources of France unavailingly, compromising beyond the Alps its interests in the Low Countries and upon the Rhine. But Louis IX.'s worst error was his obsession with regard to the crusades, to which he sacrificed everything. Despite the signal failure of the first crusade, when he had been taken prisoner; despite the protests of his mother, of his counsellors, and of the pope himself, he flung himself into the mad adventure of Tunis. Nowhere was his blind faith more plainly shown, combined as it was with total ignorance of the formidable migrations that were convulsing Asia, and of the complicated game of politics just then proceeding between the Christian nations and the Moslems of the Mediterranean. At Tunis he found his death, on the 25th of August 1270.

Philip III., the Bold (1270-1285).

The death of Louis IX. and that of his brother Alphonse of Poitiers, heir of the count of Toulouse, made Philip III., the Bold, legitimate master of northern France and undisputed sovereign of southern France. From the latter he detached the *comtat* Venaissin in 1274 and gave it to the papacy, which held it until 1791. But he had not his father's great soul nor disinterested spirit. Urged by Pope Martin IV. he began the fatal era of great international wars by his unlucky crusade against the king of Aragon, who, thanks to the massacre of the Sicilian Vespers, substituted his own predominance in Sicily for that of Charles of Anjou. Philip returned from Spain only to die at Perpignan, ending his insignificant reign as he had begun it, amid the sorrows of a disastrous retreat (1270–1285). His reign was but a halting-place of history between those of Louis IX. and Philip the Fair, just when the transition was taking place from the last days of the middle ages to the modern epoch.

Philip IV. the Fair (1285-1314).

The middle ages had been dominated by four great problems. The first of these had been to determine whether there should be a universal empire exercising tutelage over the nations; and if so, to whom this empire should belong, to pope or emperor. The second had been the extension to the East of that Catholic unity which reigned in the West. Again, for more than a century, the question had also been debated whether the English kings were to preserve and increase their power over the soil of France. And, finally, two principles had been confronting one another in the internal life of all the European states: the feudal and the monarchical principles. France had not escaped any of these conflicts; but Philip the Fair was the initiator or the instrument (it is difficult to say which) who was to put an end to both imperial and theocratic dreams, and to the international crusades; who was to remove the political axis from the centre of Europe, much to the benefit of the western monarchies, now definitely emancipated from the feudal yoke and firmly organized against both the Church and the barons. The hour had come for Dante, the great Florentine poet, to curse the man who was to dismember the empire, precipitate the fall of the papacy and discipline feudalism.

Litigious character of Philip the Fair's reign.

Modern in his practical schemes and in his calculated purpose, Philip the Fair was still more so in his method, that of legal procedure, and in his agents, the lawyers. With him the French monarchy defined its ambitions, and little by little forsook its feudal and ecclesiastical character in order to clothe itself in juridical forms. His aggressive and litigious policy and his ruthless financial method were due to those lawyers of the south and of Normandy who had been nurtured on Roman law in the universities of Bologna or Montpellier, had practised chicanery in the provincial courts, had gradually thrust themselves into the great arena of politics, and were now leading the king and filling his parlement. It was no longer upon religion or morality, it was upon imperial and Roman rights that these *chevaliers ès lois* based the prince's omnipotence; and nothing more clearly marks the new tradition which was being elaborated than the fact that all the great events of Philip the Fair's reign were lawsuits.

Philip the Fair and the Papacy.

The first of these was with the papacy. The famous quarrel between the priesthood and the Empire, which had culminated at Canossa under Gregory VII., in the apotheosis of the Lateran council under Innocent III., and again in the fall of the house of Hohenstaufen under Innocent IV., was reopened with the king of France by Boniface VIII. The quarrel began in 1294 about a question of money. In his bull *Clericis laicos* the pope protested against the taxes levied upon the French clergy by the king, whose expenses were increasing with his conquests. But he had not insisted; because Philip, between feudal vassals ruined by the crusades and lower classes fleeced by everybody, had threatened to forbid the exportation from France of any ecclesiastical gold and silver. In 1301 and 1302 the arrest of Bernard Saisset, bishop of Pamiers, by the officers of the king, and the citation of this cleric before the king's tribunal for the crime of *lèse-majesté*, revived the conflict and led Boniface to send an order to free Saisset, and to put forward a claim to reform the kingdom under the threat of excommunication. In view of the gravity of the occasion Philip made an unusually extended appeal to public opinion by convoking the states-general at Notre-Dame in Paris (1302). Whatever were their views as to the relations between ecclesiastical and secular jurisdiction, the French clergy, ruined by the dues levied by the papal court, ranged themselves on the national side with the nobility and the *bourgeoisie*; whereupon the king, with a bold stroke far ahead of his time, gave tit for tat. His chancellor, Nogaret, went to Anagni to seize the pope and drag him before a council; but Boniface died without confessing himself vanquished. As a matter of fact the king and his lawyers triumphed, where the house of Swabia had failed. After the death of Boniface the splendid fabric of the medieval theocracy gave place to the rights of civil society, the humiliation of Avignon, the disruption of the great schism, the vain efforts of the councils for reform, and the radical and heretical solutions of Wycliffe and Huss.

Philip the Fair and the Templars.

The affair of the Templars was another legal process carried out by the same Nogaret. Of course this military religious order had lost utility and justification when the Holy Land had been evacuated and the crusades were over. Their great mistake had lain in becoming rich, and rich to excess, through serving as bankers to princes, kings and popes; for great financial powers soon became unpopular. Philip took advantage of this hatred of the lower classes and the cowardice of his creature, Pope Clement V., to satisfy his desire for money. The trial of the order (1307–1313) was a remarkable example of the use of the religious tribunal of the Inquisition as a political instrument. There was a dramatic completeness about this unexpected result of the crusades. A general arbitrary arrest of the Templars, the sequestration of their property, examination under torture, the falsifying of procedure, extortion of money from the pope, the *auto-da-fé* of innocent victims, the dishonest pillaging of their goods by the joint action of the king and the pope: such was the outcome of this vast process of secularization, which foreshadowed the events of the 16th and 18th centuries.

Philip the Fair and Edward I.

External policy had the same litigious character. Philip the Fair instituted suits against his natural enemies, the king of England and the count of Flanders, foreign princes holding possessions within his kingdom; and against the emperor, whose ancient province of Lorraine and kingdom of Arles constantly changed hands between Germany and France. Philip began by interfering in the affairs of Sicily and Aragon, his father's inheritance; after which, on the pretext of a quarrel between French and English sailors, he set up his customary procedure: a citation of the king of England before the parlement of Paris, and in case of default a decree of forfeiture; the whole followed by execution—that is to say by the unimportant war of 1295. A truce arranged by Boniface VIII. restored Guienne to Edward I., gave him the hand of Philip's sister for himself and that of the king's daughter for his son (1298).

Philip the Fair and Flanders.

A still more lengthy and unfortunate suit was the attempt of Philip the Fair and his successors to incorporate the Flemish fief like the English one (1300–1326), thus coming into conflict with proud and turbulent republics composed of wool and cloth merchants, weavers, fullers and powerful counts. Guy de Dampierre, count of Namur, who had become count of Flanders on the death of his mother Margaret II. in 1279—an ambitious, greedy and avaricious man—was arrested at the Louvre on account of his attempt to marry his daughter to Edward I.'s eldest son without the consent of his suzerain Philip. Released after two years, he sided definitely with the king of England when the latter was in arms against Philip; and being only weakly supported by Edward, he was betrayed by the nobles who favoured France, and forced to yield up not only his personal liberty but the whole of Flanders (1300). The Flemings, however, soon wearying of the oppressive administration of the French governor, Jacques de Châtillon, and the recrudescence of patrician domination, rose and overwhelmed the French chivalry at Courtrai (1302)—a prelude to the coming disasters of the Hundred Years' War. Philip's double revenge, on sea at Zierikzee and on land at Mons-en-Pévèle (1304), led to the signing of a treaty at Athis-sur-Orge (1305).

Eastern policy of Philip the Fair.

The efforts of Philip the Fair to expand the limits of his kingdom on the eastern border were more fortunate. His marriage had gained him Champagne; and he afterwards extended his influence over Franche Comté, Bar and the bishoprics of Lorraine, acquiring also Viviers and the important town of Lyons—all this less by force of arms than by the expenditure of money. Disdaining the illusory dream of the imperial crown, still cherished by his legal advisers, he pushed forward towards that fluctuating eastern frontier, the line of least resistance, which would have yielded to him had it not been for the unfortunate interruption of the Hundred Years' War.

The sons of Philip the Fair (1314–1328).

His three sons, Louis X., Philip V. the Tall, and Charles IV., continued his work. They increased the power of the monarchy politically by destroying the feudal reaction excited in 1314 by the tyrannical conduct of the jurists, like Enguerrand de Marigny, and by the increasing financial extortions of their father; and they also—notably Philip V., one of the most hard-working of the Capets—increased it on the administrative side by specializing the services of justice and of finance, which were separated from the king's council. Under these mute self-effacing kings the progress of royal power was only the more striking. With them the senior male line of the house of Capet became extinct.

The royal house of Capet.

During three centuries and a half they had effected great things: they had founded a kingdom, a royal family and civil institutions. The land subject to Hugh Capet in 987, barely representing two of the modern departments of France, in 1328 covered a space equal to fifty-nine of them. The political unity of the kingdom was only fettered by the existence of four large isolated fiefs: Flanders on the north, Brittany on the west, Burgundy on the east and Guienne on the south. The capital, which for long had been movable, was now established in the Louvre at Paris, fortified by Philip Augustus. Like the fiefs, feudal institutions at large had been shattered. The Roman tradition which made the will of the sovereign law, gradually propagated by the teaching of Roman law—the law of servitude, not of liberty—and already proclaimed by the jurist Philippe de Beaumanoir as superior to the customs, had been of immense support to the interest of the state and the views of the monarchs; and finally the Capets, so humble of origin, had created organs of general administration common to all in order to effect an administrative centralization. In their grand council and their domains they would have none but silent, servile and well-disciplined agents. The royal exchequer, which was being painfully elaborated in the *chambre des comptes*, and the treasury of the crown lands at the Louvre, together barely sufficed to meet the expenses of this more complicated and costly machinery. The uniform justice exercised by the parlement spread gradually over the whole kingdom by means of *cas royaux* (royal suits), and at the same time the royal coinage became obligatory. Against this exaltation of their power two adversaries might have been formidable; but one, the Church, was a captive in Babylon, and the second, the people, was deprived of the communal liberties which it had abused, or humbly effaced itself in the states-general behind the declared will of the king. This well-established authority was also supported by the revered memory of "Monseigneur Saint Louis"; and it is this prestige, the strength of this ideal superior to all other, that explains how the royal prerogative came to survive the mistakes and misfortunes of the Hundred Years' War.

Advent of the Valois.

On the extinction of the direct line of the Capets the crown passed to a younger branch, that of the Valois. Its seven representatives (1328–1498) were on the whole very inferior to the Capets, and, with the exception of Charles V. and Louis XI., possessed neither their political sense nor even their good common sense; they cost France the loss of her great advantage over all other countries. During this century and a half France passed through two very severe crises; under the first five Valois the Hundred Years' War imperilled the kingdom's independence; and under Louis XI. the struggle against the house of Burgundy endangered the territorial unity of the monarchy that had been established with such pains upon the ruins of feudalism.

Philip VI. (1328–1350).

Charles the Fair having died and left only a daughter, the nation's rights, so long in abeyance, were once more regained. An assembly of peers and barons, relying on two precedents under Philip V. and Charles IV., declared that "no woman, nor therefore her son, could in accordance with custom succeed to the monarchy of France." This definite decision, to which the name of the Salic law was given much later, set aside Edward III., king of England, grandson of Philip the Fair, nephew of the late kings and son of their sister Isabel. Instead it gave the crown to the feudal chief, the hard and coarse Philip VI. of Valois, nephew of Philip the Fair. This at once provoked war between the two monarchies, English and French, which, including periods of truce, lasted for a hundred and sixteen years. Of active warfare there were two periods, both disastrous to begin with, but ending favourably: one lasted from 1337 to 1378 and the other from 1413 to 1453, thirty-three years of distress and folly coming in between.

The Hundred Years' War.

However, the Hundred Years' War was not mainly caused by the pretensions of Edward III. to the throne of the Capets; since after having long hesitated to do homage to Philip VI. for his possessions in Guienne, Edward at last brought himself to it—though certainly only after lengthy negotiations, and even threats of war in 1331. It is true that six years later he renounced his homage and again claimed the French inheritance; but this was on the ground of personal grievances, and for economic and political reasons. There was a natural rivalry between Edward III. and Philip VI., both of them young, fond of the life of chivalry, festal magnificence, and the "belles apertises d'armes." This rivalry was aggravated by the enmity between Philip VI. and Robert of Artois, his brother-in-law, who, after having warmly supported the disinheriting of Edward III., had been convicted of deceit in a question of succession, had revenged himself on Philip by burning his waxen effigy, and had been welcomed with open arms at Edward's court. Philip VI. had taken reprisals against him in 1336 by making his parlement declare the forfeiture of Edward's lands and castles in Guienne; but the Hundred Years' War, at first simply a feudal quarrel between vassal and suzerain, soon became a great national conflict, in consequence of what was occurring in Flanders.

The communes of Flanders, rich, hard-working, jealous of their liberties, had always been restive under the authority of their counts and the influence of their suzerain, the king of France. The affair at Cassel, where Philip VI. had avenged the injuries done by the people of Bruges in 1325 to their count, Louis of Nevers, had also compromised English interests. To attack the English through their colonies, Guienne and Flanders, was to injure them in their most vital interests—cloth and claret; for England sold her wool to Bruges in order to pay Bordeaux for her wine. Edward III. had replied by forbidding the exportation of English wool, and by threatening the great industrial cities of Flanders with the transference to England of the cloth manufacture—an excellent means of stirring them up against the French, as without wool they could do nothing. Workless, and in desperation, they threw themselves on Edward's mercy, by the advice of a rich citizen of Ghent, Jacob van Artevelde (*q.v.*); and their last scruples of loyalty gave way when Edward decided to follow the counsels of Robert of Artois and of Artevelde, and to claim the crown of France.

The defeat at Sluys.

The defeat at Crécy and the taking of Calais.

The war began, like every feudal war of that day, with a solemn defiance, and it was soon characterized by terrible disasters. The destruction of the finest French fleet that had yet been seen, surprised in the port of Sluys, closed the sea to the king of France; the struggle was continued on land, but with little result. Flanders tired of it, but fortunately for Edward III. Brittany now took fire, through a quarrel of succession, analogous to that in France, between Charles of Blois (who had married the daughter of the late duke and was a nephew of Philip VI., by whom he was supported) and John of Montfort, brother of the old duke, who naturally asked assistance from the king of England. But here, too, nothing important was accomplished; the capture of John of Montfort at Nantes deprived Edward of Brittany at the very moment when he finally lost Flanders by the death of Artevelde, who was killed by the people of Ghent in 1345. Under the influence of Godefroi d'Harcourt, whom Philip VI. had wished to destroy on account of his ambitions with regard to the duchy of Normandy, Edward III. now invaded central France, ravaged Normandy, getting as near to Paris as Saint-Germain; and profiting by Philip VI.'s hesitation and delay, he reached the north with his spoils by dint of forced marches. Having been pursued and encountered at Crécy, Edward gained a complete victory there on the 26th of April 1346. The seizure of Calais in 1347, despite heroic resistance, gave the English a port where they could always find entry into France, just when the queen of England had beaten David of Scotland, the ally of France, at Neville's Cross, and when Charles of Blois, made prisoner in his turn, was held captive in London. The Black Death put the finishing touch to the military disasters and financial upheavals of this unlucky reign; though before his death in 1350 Philip VI. was fortunate enough to augment his territorial acquisitions by the purchase of the rich port of Montpellier, as well as by that of Dauphiné, which extended to the Alpine frontier, and was to become the appanage of the eldest son of the king of France (see DAUPHINÉ and DAUPHIN).

John the Good (1350).

Defeat at Poitiers.

Philip VI.'s successor was his son John the Good—or rather, the stupid and the spendthrift. This noble monarch was unspeakably brutal (as witness the murders, simply on suspicion, of the constable Raoul de Brienne, count of Eu, and of the count of Harcourt) and incredibly extravagant. His need of money led him to debase the currency eighty-one times between 1350 and 1355. And this money, so necessary for the prosecution of the war with England, which had been interrupted for a year, thanks to the pope's intervention, was lavished by him upon his favourite, Charles of La Cerda. The latter was murdered in 1354 by order of Charles of Navarre, the king's son-in-law, who also prevented the levying of the taxes voted by the states in 1355 with the object of replenishing the treasury. The Black Prince took this opportunity to ravage the southern provinces, and then marched to join the duke of Lancaster and Charles of Navarre in Normandy. John the Good managed to bring the English army to bay at Maupertuis, not far from Poitiers; but the battle was conducted with such a want of intelligence on his part that the French army was overwhelmed, though very superior in numbers, and King John was made prisoner, after a determined resistance, on the 19th of September 1356.

The states of 1355-1356.

Robert le Coq and Étienne Marcel.

The disaster at Poitiers almost led to the establishment in France of institutions analogous to those which England owed to Bouvines. The king a prisoner, the dauphin discredited and deserted, and the nobility decimated, the people—that is to say, the states-general—could raise their voice. Philip the Fair had never regarded the states-general as a financial institution, but merely as a moral support. Now, however, in order to obtain substantial help from taxes instead of mere driblets, the Valois needed a stronger lever than cunning or force. War against the English assured them the support of the nation. Exactions, debasement of the currency and extortionate taxation were ruinous palliatives, and insufficient to supply a treasury which the revenue from crown lands and various rights taken from the nobles could not fill even in times of peace. By the 14th century the motto "*N'impose qui ne veut*" (*i.e.* no taxation without consent) was as firmly established in France as in England. After Crécy Philip VI. called the states together regularly, that he might obtain subsidies from them, as an assistance, an "aid" which subjects could not refuse their suzerain. In return for this favour, which the king could not claim as a right, the states, feeling their power, began to bargain, and at the session of November 1355 demanded the participation of all classes in the tax voted, and obtained guarantees both for its levy and the use to be made of it. A similar situation in England had given birth to political liberty; but in France the great crisis of the early 15th century stifled it. It was with this money that John the Good got himself beaten and taken prisoner at Poitiers. Once more the states-general had to be convoked. Confronted by a pale weakly boy like the dauphin Charles and the remnants of the discredited council, the situation of the states was stronger than ever. Predominant in influence were the deputies from the towns, and above all the citizens of the capital, led by Robert le Coq, bishop of Laon, and Étienne Marcel, provost of the merchants of Paris. Having no cause for confidence in the royal administration, the states refused to treat with the dauphin's councillors, and proposed to take him under their own tutelage. He himself hesitated whether to sacrifice the royal authority, or else, without resources or support, to resist an assembly backed by public opinion. He decided for resistance. Under pretext of grave news received from his father, and of an interview at Metz with his uncle, the emperor Charles IV., he begged the states to adjourn till the 3rd of November 1356. This was a political *coup d'état*, and when the time had expired he attempted a financial *coup d'état* by debasing the currency. An uprising obliged him to call the states-general together again in February 1357, when they transformed themselves into a deliberative, independent and permanent assembly by means of the *Grande Ordonnance*.

The Grande Ordonnance of 1357.

In order to make this great French charter really effective resistance to the royal authority should have been collective, national and even popular, as in the case of the charters of 1215 and 1258 in England. But the lay and ecclesiastical feudal lords continued to show themselves in France, as everywhere else except across the Straits of Dover, a cause of division and oppression. Moreover, the states were never really general; those of the Langue d'oc and the Langue d'oil sometimes acted together; but there was never a common understanding between them and always two Frances within the kingdom. Besides, they only represented the three classes who alone had any social standing at that period: the nobles, the clergy, and the burgesses of important towns. Étienne Marcel himself protested against councillors "*de petit état.*" Again, the states, intermittently convoked according to the king's good pleasure, exercised neither periodical rights nor effective control, but fulfilled a duty which was soon felt as onerous. Indifference and satiety spread speedily; the bourgeoisie forsook the reformers directly they had recourse to violence (February 1358), and the Parisians became hostile when Étienne Marcel complicated his revolutionary work by intrigues with Navarre, releasing from prison the grandson of Louis X., the Headstrong, an ambitious, fine-spoken courter of popularity, covetous of the royal crown. The dauphin's flight from Paris excited a wild outburst of monarchist loyalty and anger against the capital among the nobility and in the states-general of Compiègne. Marcel, like the dauphin, was not a man to turn back. But neither the support of the peasant insurgents—the "Jacques"—who were annihilated in the market of Meaux, nor a last but unheeded appeal to the large towns, nor yet the uncertain support of Charles the Bad, to whom Marcel in despair proposed to deliver up Paris, saved him from being put to death by the royalist party of Paris on the 31st of July 1358.

Isolated as he was, Étienne Marcel had been unable either to seize the government or to create a fresh one. In the reaction which followed his downfall royalty inherited the financial administration which the states had set up to check extravagance. The "*élus*" and the superintendents, instead of being delegates of the states, became royal functionaries like the *baillis* and the provosts; imposts, hearth-money (*fouage*), salt-tax (*gabelle*), sale-dues (*droits de vente*), voted for the war, were levied during the whole of Charles V.'s reign and added to his personal revenue. The opportunity of founding political liberty upon the vote and the control of taxation, and of organizing the administration of the kingdom so as to ensure that the entire military and financial resources should be always available, was gone beyond recall.

The treaty of Brétigny.

Re-establishing the royal authority in Paris was not enough; an end had to be put to the war with England and Navarre, and this was effected by the treaty of Brétigny (1360). King John ceded Poitou, Saintonge, Agenais, Périgord and Limousin to Edward III., and was offered his liberty for a ransom of three million gold crowns; but, unable to pay that enormous sum, he returned to his agreeable captivity in London, where he died in 1364.

Charles V. (1364-1380).

Yet through the obstinacy and selfishness of John the Good, France, in stress of suffering, was gradually realizing herself. More strongly than her king she felt the shame of defeat. Local or municipal patriotism waxed among peasants and townsfolk, and combined with hatred of the English to develop national sentiment. Many of the conquered repeated that proud, sad answer of the men of Rochelle to the English: "We will acknowledge you with our lips; but with our hearts, never!"

The "Grandes Compagnies."

The peace of Brétigny brought no repose to the kingdom. War having become a congenial and very lucrative industry, its cessation caused want of work, with all the evils that entails. For ten years the remnants of the armies of England, Navarre and Brittany—the "Grandes Compagnies," as they were called—ravaged the country; although Charles V., "*durement subtil et sage,*" succeeded in getting rid of them, thanks to du Guesclin, one of their chiefs, who led them to any place where fighting was going on—to Brittany, Alsace, Spain. Charles also had all towns and large villages fortified; and being a man of affairs he set about undoing the effect of the treaty of Brétigny by alliances with Flanders, whose heiress he married to his brother Philip, duke of Burgundy; with Henry, king of Castile, and Ferdinand of Portugal, who possessed fine navies; and, finally, with the emperor Charles IV. Financial and military preparations were made no less seriously when the harsh administration of the Black Prince, to whom Edward III. had given Guienne in fief, provoked the nobles of Gascony to complain to Charles V. Cited before the court of Paris, the Black Prince refused to attend, and war broke out in Gascony, Poitou and Normandy, but with fresh tactics (1369). Whilst the English adhered to the system of wide circuits, under Chandos or Robert Knolles, Charles V. limited himself to defending the towns and exhausting the enemy without taking dangerous risks. Thanks to the prudent constable du Guesclin, sitting quietly at home he reconquered bit by bit what his predecessors had lost upon the battlefield, helm on head and sword in hand; and when he died in 1380, after the decease of both Edward III. and the Black Prince, the only possessions of England in a liberated but ruined France were Bayonne, Bordeaux, Brest, Cherbourg and Calais.

Charles VI. (1380-1422).

The king's uncles and the Marmousets.

The revolt of the Maillotins.

The death of Charles V. and dynastic revolutions in England stopped the war for thirty-five years. Then began an era of internal disorder and misery. The men of that period, coarse, violent and simple-minded, with few political ideas, loved brutal and noisy pleasures—witness the incredible festivities at the marriage of Charles VI., and the assassinations of the constable de Clisson, the duke of Orleans and John the Fearless. It would have needed an energetic hand to hold these passions in check; and Charles VI. was a gentle-natured child, twelve years of age, who attained his majority only to fall into a second childhood. Thence arose a question which remained without reply during the whole of his reign. Who should have possession of the royal person, and, consequently, of the royal power? Should it be the uncles of the king, or his followers Clisson and Bureau de la Rivière, whom the nobles called in mockery the *Marmousets*? His uncles first seized the government, each with a view to his own particular interests, which were by no means those of the kingdom at large. The duke of Anjou emptied the treasury in conquering the kingdom of Naples, at the call of Queen Joanna of Sicily. The duke of Berry seized upon Languedoc and the wine-tax. The duke of Burgundy, heir through his wife to the countship of Flanders, wanted to crush the democratic risings among the Flemings. Each of them needed money, but Charles V., pricked by conscience on his death-bed, forbade the levying of the hearth-tax (1380). His brother's attempt to re-establish it set Paris in revolt. The *Maillotins* of Paris found imitators in other great towns; and in Auvergne and Vivarais the *Tuchins* renewed the Jacquerie. Revolutionary attempts between 1380 and 1385 to abolish all taxes were echoed in England, Florence and Flanders. These isolated rebellions, however, were crushed by the ever-ready coalition of royal and feudal forces at Roosebeke (1382). Taxes and subsidies were maintained and the hearth-money re-established.

The death of the duke of Anjou at Bari (1384) gave preponderant influence to Philip the Bold, duke of Burgundy, who increased the large and fruitless expenses of his Burgundian

Madness of Charles VI.

policy to such a point that on the return of a last unfortunate expedition into Gelderland Charles VI., who had been made by him to marry Isabel of Bavaria, took the government from his uncles on the 3rd of May 1389, and recalled the *Marmousets*. But this young king, aged only twenty, very much in love with his young wife and excessively fond of pleasure, soon wrecked the delicate poise of his mental faculties in the festivities of the Hôtel Saint-Paul; and a violent attack of Pierre de Craon on the constable de Clisson having led to an expedition against his accomplice, the duke of Brittany, Charles was seized by insanity on the road. The *Marmousets* were deposed, the king's brother, the duke of Orleans, set aside, and the old condition of affairs began again (1392).

Struggle between the Armagnacs and the Burgundians.

The struggle was now between the two branches of the royal family, the Orleanist and the Burgundian, between the aristocratic south and the democratic north; while the deposition of Richard II. of England in favour of Henry of Lancaster permitted them to vary civil war by war against the foreigner. Philip the Bold, duke of Burgundy, the king's uncle, had certain advantages over his rival Louis of Orleans, Charles VI.'s brother: superiority in age, relations with the Lancastrians and with Germany, and territorial wealth and power. The two adversaries had each the same scheme of government: each wanted to take charge of Charles VI., who was intermittently insane, and to exclude his rival from the pillage of the royal exchequer; but this rivalry of desires brought them into opposition on all the great questions of the day—the war with England, the Great Schism and the imperial election. The struggle became acute when John the Fearless of Burgundy succeeded his father in 1404. Up to this time the queen, Isabel of Bavaria, had been held in a kind of dependency upon Philip of Burgundy, who had brought about her marriage; but less eager for influence than for money, since political questions were unintelligible to her and her situation was a precarious one, she suddenly became favourable to the duke of Orleans. Whether due to passion or caprice this cost the duke his life, for John the Fearless had him assassinated in 1407, and thus let loose against one another the Burgundians and the Armagnacs, so-called because the son of the murdered duke was the son-in-law of the count of Armagnac (see ARMAGNAC). Despite all attempts at reconciliation the country was divided into two parties. Paris, with her tradesmen—the butchers in particular—and her university, played an important part in this quarrel; for to be master of Paris was to be master of the king. In 1413 the duke of Burgundy gained the upper hand there, partly owing to the rising of the *Cabochiens*, *i.e.* the butchers led by the skinner Simon Caboche, partly to the hostility of the university to the Avignon pope and partly to the Parisian bourgeoisie.

The Ordonnance Cabochienne, 1413.

Amid this reign of terror and of revolt the university, the only moral and intellectual force, taking the place of the impotent states-general and of a parlement carefully restricted to the judiciary sphere, vainly tried to re-establish a firm monarchical system by means of the *Ordonnance Cabochienne*; but this had no effect, the government being now at the mercy of the mob, themselves at the mercy of incapable hot-headed leaders. The struggle ended in becoming one between factions of the townsmen, led respectively by the *hûchier* Cirasse and by Jean Caboche. The former overwhelmed John the Fearless, who fled from Paris; and the Armagnacs, re-entering on his exit, substituted white terror for red terror, from the 12th of December 1413 to the 28th of July 1414. The butchers' organization was suppressed and all hope of reform lost. Such disorders allowed Henry V. of England to take the offensive again.

Agincourt.

The Armagnacs were in possession of Paris and the king when Henry V. crushed them at Agincourt on the 25th of October 1415. It was as at Crécy and Poitiers; the French chivalry, accustomed to mere playing at battle in the tourneys, no longer knew how to fight. Charles of Orleans being a captive and his father-in-law, the count of Armagnac, highly unpopular, John the Fearless, hitherto prudently neutral, re-entered Paris, amid scenes of carnage, on the invitation of the citizen Perrinet le Clerc.

The treaty of Troyes, 1420.

Secure from interference, Henry V. had occupied the whole of Normandy and destroyed in two years the work of Philip Augustus. The duke of Burgundy, feeling as incapable of coming to an understanding with the masterful Englishman as of resisting him unaided, tried to effect a reconciliation with the Armagnacs, who had with them the heir to the throne, the dauphin Charles; but his assassination at Montereau in 1419 nearly caused the destruction of the kingdom, the whole Burgundian party going over to the side of the English. By the treaty of Troyes (1420) the son of John the Fearless, Philip the Good, in order to avenge his father recognized Henry V. (now married to Catherine, Charles VI.'s daughter) as heir to the crown of France, to the detriment of the dauphin Charles, who was disavowed by his mother and called in derision "the soi-disant dauphin of Viennois." When Henry V. and Charles VI. died in 1422, Henry VI.—son of Henry V. and Catherine—was proclaimed at Paris king of France and of England, with the concurrence of Philip the Good, duke of Burgundy. Thus in 1428 the English occupied all eastern and northern France, as far as the Loire; while the two most important civil powers of the time, the parlement and the university of Paris, had acknowledged the English king.

Charles VII. (1422-1461).

But the cause of greatest weakness to the French party was still Charles VII. himself, the king of Bourges. This youth of nineteen, the ill-omened son of a madman and of a Bavarian of loose morals, was a symbol of France, timorous and mistrustful. The châteaux of the Loire, where he led a restless and enervating existence, held an atmosphere little favourable to enthusiasm and energy. After his victories at Cravant (1423) and Verneuil (1424), the duke of Bedford, appointed regent of the kingdom, had given Charles VII. four years' respite, and these had been occupied in violent intrigues between the constable de Richemont[1] and the sire de la Trémoille, the young king's favourites, and solely desirous of enriching themselves at his expense. The king, melancholy spectacle as he was, seemed indeed to suit that tragic hour when Orleans, the last bulwark of the south, was besieged by the earl of Salisbury, now roused from inactivity (1428). He had neither taste nor capacity like Philip VI. or John the Good for undertaking "belles apertises d'armes"; but then a lack of chivalry combined with a temporizing policy had not been particularly unsuccessful in the case of his grandfather Charles V.

Joan of Arc.

Powerful aid now came from an unexpected quarter. The war had been long and cruel, and each successive year naturally increased feeling against the English. The damage done to Burgundian interests by the harsh yet impotent government of Bedford, disgust at the iniquitous treaty of Troyes, the monarchist loyalty of many of the warriors, the still deeper sentiment felt by men like Alain Chartier towards "Dame France," and the "great misery that there was in the kingdom of France"; all these suddenly became incarnate in the person of Joan of Arc, a young peasant of Domrémy in Lorraine. Determined in her faith and proud in her meekness, in opposition to the timid counsels of the military leaders, to the interested delays of the courtiers, to the scruples of the experts and the quarrelling of the doctors, she quoted her "voices," who had, she said, commissioned her to raise the siege of Orleans and to conduct the gentle dauphin to Reims, there to be crowned. Her sublime folly turned out to be wiser than their wisdom; in two months, from May to July 1429, she had freed Orleans, destroyed the prestige of the English army at Patay, and dragged the doubting and passive king against his will to be crowned at Reims. All this produced a marvellous revulsion of political feeling throughout France, Charles VII. now becoming incontestably "him to whom the kingdom of France ought to belong." After Reims Joan's first thought was for Paris, and to achieve the final overthrow of the English; while Charles VII. was already sighing for the easy life of Touraine, and recurring to that policy of truce which was so strongly urged by his counsellors, and so keenly irritating to the clear-sighted Joan of Arc. A check before Paris allowed the jealousy of La Trémoille to waste the heroine for eight months on operations of secondary importance, until the day when she was captured by the Burgundians under the walls of Compiègne, and sold by them to the English. The latter incontinently prosecuted her as a heretic; they had, indeed, a great interest in seeing her condemned by the Church, which would render her conquests sacrilegious. After a scandalous four months' duel between this simple innocent girl and a tribunal of crafty malevolent ecclesiastics and doctors of the university of Paris, Joan was burned alive in the old market-place of Rouen, on the 30th of May 1431 (see Joan of Arc).

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[1] Earl of Richmond; afterwards Arthur, duke of Brittany (*q.v.*).

On Charles VII.'s part this meant oblivion and silence until the day when in 1450, more for his own sake than for hers, he caused her memory to be rehabilitated; but Joan had given the country new life and heart. From 1431 to 1454 the struggle against the English went on energetically; and the king, relieved in 1433 of his evil genius, La Trémoille, then became a man once more, playing a kingly part under the guidance of Dunois, Richemont, La Hire and Saintrailles, leaders of worth on the field of battle. Moreover, the English territory, a great triangle, with the Channel for base and Paris for apex, was not a really solid position. Yet the war seemed interminable; until at last Philip of Burgundy, for long embarrassed by his English alliance, decided in 1435 to become reconciled with Charles VII. This was in consequence of the death of his sister, who had been married to Bedford, and the return of his brother-in-law Richemont into the French king's favour. The treaty of Arras, which made him a sovereign prince for life, though harsh, at all events gave a united France the opportunity of expelling the English from the east, and allowed the king to re-enter Paris in 1436. From 1436 to 1439 there was a terrible repetition of what happened after the Peace of Brétigny; famine, pestilence, extortions and, later, the aristocratic revolt of the Praguerie, completed the ruin of the country. But thanks to the permanent tax of the *taille* during this time of truce Charles VII. was able to effect the great military reform of the Compagnies d'Ordonnance, of the Francs-Archers, and of the artillery of the brothers Bureau. From this time forward the English, ruined, demoralized and weakened both by the death of the duke of Bedford and the beginnings of the Wars of the Roses, continued to lose territory on every recurrence of conflict. Normandy was lost to them at Formigny (1450), and Guienne, English since the 12th century, at Castillon (1453). They kept only Calais; and now it was their turn to have a madman, Henry VI., for king.

Consequences of the Hundred Years' War.

France issued from the Hundred Years' War victorious, but terribly ruined and depopulated. It is true she had definitely freed her territory from the stranger, and through the sorrows of defeat and the menace of disruption had fortified her national solidarity, and defined her patriotism, still involved in and not yet dissociated from loyalty to the monarchy. A happy awakening, although it went too far in establishing royal absolutism; and a victory too complete, in that it enervated all the forces of resistance. The nation, worn out by the long disorders consequent on the captivity of King John and the insanity of Charles VI., abandoned itself to the joys of peace. Preferring the solid advantage of orderly life to an unstable liberty, it acquiesced in the abdication of 1439, when the States consented to taxation for the support of a permanent army without any periodical renewal of their authorization. No doubt by the prohibition to levy the smallest *taille* the feudal lords escaped direct taxation; but from the day when the privileged classes selfishly allowed the taxing of the third estate, provided that they themselves were exempt, they opened the door to monarchic absolutism. The principle of autocracy triumphed everywhere over the remnants of local or provincial authority, in the sphere of industry as in that of administration; while the gild system became much more rigid. A loyal bureaucracy, far more powerful than the phantom administration of Bourges or of Poitiers, gradually took the place of the court nobility; and thanks to this the institutions of control which the war had called into power—the provincial states-general—were nipped in the bud, withered by the people's poverty of political idea and by the blind worship of royalty. Without the nation's concurrence the king's creatures were now to endow royalty with all the organs necessary for the exertion of authority; by which imprudent compliance, and above all thanks to Jacques Cœur (*q.v.*), the financial independence of the provinces disappeared little by little, and all the public revenues were left at the discretion of the king alone (1436–1440). By this means, too, and chiefly owing to the constable de Richemont and the brothers Bureau, the first permanent royal army was established (1445).

Monarchical centralization.

Henceforward royalty, strengthened by victory and organized for the struggle, was able to reduce the centrifugal social forces to impotence. The parlement of Paris saw its monopoly encroached upon by the court of Toulouse in 1443, and by the parlement of Grenoble in 1453. The university of Paris, compromised with the English, like the parlement, witnessed the institution and growth of privileged provincial universities. The Church of France was isolated from the papacy by the Pragmatic Sanction of Bourges (1438) only to be exploited and enslaved by royalty. Monarchic centralization, interrupted for the moment by the war, took up with fresh vigour its attacks upon urban liberties, especially in the always more independent south. It caused a slackening of that spirit of communal initiative which had awakened in the midst of unprecedented disasters. The decimated and impoverished nobility proved their impotence in the coalitions they attempted between 1437 and 1442, of which the most important, the Praguerie, fell to pieces almost directly, despite the support of the dauphin himself.

Social life.

The life of society, now alarmingly unstable and ruthlessly cruel, was symbolized by the *danse macabre* painted on the walls of the cemeteries; the sombre and tragic art of the 15th century, having lost the fine balance shown by that of the 13th, gave expression in its mournful realism to the general state of exhaustion. The favourite subject of the mysteries and of other artistic manifestations was no longer the triumphant Christ of the middle ages, nor the smiling and teaching Christ of the 13th century, but the Man of sorrows and of death, the naked bleeding Jesus, lying on the knees of his mother or crowned with thorns. France, like the Christ, had known all the bitterness and weakness of a Passion.

The war of independence over, after a century of fatigue, regrets and doubts, royalty and the nation, now more united and more certain of each other, resumed the methodic and utilitarian war of widening boundaries. Leaving dreams about crusades to the poets, and to a papacy delivered from schism, Charles VII. turned his attention to the ancient appanage of Lothair, Alsace and Lorraine, those lands of the north and the east whose frontiers were constantly changing, and which seemed to invite aggression. But the chance of annexing them without great trouble was lost; by the fatal custom of appanages the Valois had set up again those feudal institutions which the Capets had found such difficulty in destroying, and Louis XI. was to make sad experience of this.

The House of Burgundy.

To the north and east of the kingdom extended a wide territory of uncertain limits; countries without a chief like Alsace; principalities like Lorraine, ecclesiastical lordships like the bishopric of Liége; and, most important of all, a royal appanage, that of the duchy of Burgundy, which dated back to the time of John the Good. Through marriages, conquests and inheritance, the dukes of Burgundy had enormously increased their influence; while during the Hundred Years' War they had benefited alternately by their criminal alliance with the English and by their self-interested reconciliation with their sovereign. They soon appeared the most formidable among the new feudal chiefs so imprudently called into being by Louis XI.'s predecessors. Fleeing from the paternal wrath which he had drawn down upon himself by his ambition and by his unauthorized marriage with Charlotte of Savoy, the future Louis XI. had passed five years of voluntary exile at the court of the chief of the House of Burgundy, Philip the Good; and he was able to appreciate the territorial power of a duchy which extended from the Zuyder Zee to the Somme, with all the country between the Saône and the Loire in addition, and its geographical position as a commercial intermediary between Germany, England and France. He had traversed the fertile country of Flanders; he had visited the rich commercial and industrial republics of Bruges and Ghent, which had escaped the disasters of the Hundred Years' War; and, finally, he had enjoyed a hospitality as princely as it was self-interested at Brussels and at Dijon, the two capitals, where he had seen the brilliancy of a court unique in Europe for the ideal of chivalric life it offered.

Louis XI. (1461–1483).

But the dauphin Louis, although a bad son and impatient for the crown, was not dazzled by all this. With very simple tastes, an inquiring mind, and an imagination always at work, he combined a certain easy good-nature which inspired confidence, and though stingy in spending money on himself, he could be lavish in buying men either dangerous or likely to be useful. More inclined to the subtleties of diplomacy than to the risks of battle, he had recognized and speedily grasped the disadvantages of warfare. The duke of Burgundy, however rich and powerful, was still the king's vassal; his wide but insecure authority, of too rapid growth and unpopular, lacked sovereign rights. Hardly, therefore, had Louis XI. heard of his father's death than he made his host aware of his perfectly independent spirit, and his very definite intention to be master in his own house.

The Leagues of the Public Weal.

But by a kind of poetic justice, Louis XI. had for seven years, from 1465 to 1472, to struggle against fresh Pragueries, called Leagues of the Public Weal (presumably from their disregard of it), composed of the most powerful French nobles, to whom he had set the example of revolt. His first proceedings had indeed given no promise of the moderation and prudence afterwards to characterize him; he had succeeded in exasperating all parties; the officials of his father, "the well-served," whom he dismissed in favour of inferiors like Jean Balue, Oliver le Daim and Tristan Lermite; the clergy, by abrogating the Pragmatic Sanction; the university of Paris, by his ill-treatment of it; and the nobles, whom he deprived of their hunting rights, among them being those whom Charles VII. had been most careful to conciliate in view of the inevitable conflict with the duke of Burgundy—in particular, Francis II., duke of Brittany. The repurchase in 1463 of the towns of the Somme (to which Philip the Good, now grown old and engaged in a quarrel with his son, the count of Charolais, had felt obliged to consent on consideration of receiving four hundred thousand gold crowns), and the intrigues of Louis XI. during the periodical revolts of the Liégois against their prince-bishop, set the powder alight. On three different occasions (in 1465, 1467 and 1472), Louis XI.'s own brother, the duke of Berry, urged by the duke of Brittany, the count of Charolais, the duke of Bourbon, and the other feudal lords, attempted to set up six kingdoms in France instead of one, and to impose upon Louis XI. a regency which should give them enormous pensions. This was their idea of Public Weal.

Charles the Bold.

The interview at Péronne.

Louis XI. won by his favourite method, diplomacy rather than arms. At the time of the first league, the battle of Montlhéry (16th of July 1465) having remained undecided between the two equally badly organized armies, Louis XI. conceded everything in the treaties of Conflans and Saint-Maur—promises costing him little, since he had no intention of keeping them. But during the course of the second league, provoked by the recapture of Normandy, which he had promised to his brother in exchange for Berry, he was nearly caught in his own trap. On the 15th of June 1467 Philip the Good died, and the accession of the count of Charolais was received with popular risings. In order to embarrass him Louis XI. had secretly encouraged the people of Liége to revolt; but preoccupied with the marriage of Charles the Bold with Margaret of York, sister of Edward IV. of England, he wished to negotiate personally with him at Péronne, and hardly had he reached that place when news arrived there of the revolt of Liége amid cries of "Vive France." Charles the Bold, proud, violent, pugnacious, as treacherous as his rival, a hardier soldier, though without his political sagacity, imprisoned Louis in the tower where Charles the Simple had died as a prisoner of the count of Vermandois. He only let him depart when he had sworn in the treaty of Péronne to fulfil the engagements made at Conflans and Saint-Maur to assist in person at the subjugation of rebellious Liége, and to give Champagne as an appanage to his ally the duke of Berry.

Ruin of the feudal coalitions.

Louis XI., supported by the assembly of notables at Tours (1470), had no intention of keeping this last promise, since the duchy of Champagne would have made a bridge between Burgundy and Flanders—the two isolated branches of the house of Burgundy. He gave the duke of Berry distant Guienne. But death eventually rid him of the duke in 1472, just when a third league was being organized, the object of which was to make the duke of Berry king with the help of Edward IV., king of England. The duke of Brittany, Francis II., was defeated; Charles the Bold, having failed at Beauvais in his attempt to recapture the towns of the Somme which had been promised him by the treaty of Conflans, was obliged to sign the peace of Senlis (1472). This was the end of the great feudal coalitions, for royal vengeance soon settled the account of the lesser vassals; the duke of Alençon was condemned to prison for life; the count of Armagnac was killed; and "the Germans" were soon to disembarrass Louis of Charles the Bold.

Charles the Bold's imperial dreams.

Charles had indeed only signed the peace so promptly because he was looking eastward towards that royal crown and territorial cohesion of which his father had also dreamed. The king, he said of Louis XI., is always ready. He wanted to provide his future sovereignty with organs analogous to those of France; a permanent army, and a judiciary and financial administration modelled on the French parlement and exchequer. Since he could not dismember the kingdom of France, his only course was to reconstitute the ancient kingdom of Lotharingia; while the conquest of the principality of Liége and of the duchy of Gelderland, and the temporary occupation of Alsace, pledged to him by Sigismund of Austria, made him greedy for Germany. To get himself elected king of the Romans he offered his daughter Mary, his eternal candidate for marriage, to the emperor Frederick III. for his son. Thus either he or his son-in-law Maximilian would have been emperor.

Fall of Charles the Bold.

But the Tarpeian rock was a near neighbour of the Capitol. Frederick—distrustful, and in the pay of Louis XI.—evaded a meeting arranged at Trier, and Burgundian influence in Alsace was suddenly brought to a violent end by the putting to death of its tyrannical agent, Peter von Hagenbach. Charles thought to repair the rebuff of Trier at Cologne, and wasted his resources in an attempt to win over its elector by besieging the insignificant town of Neuss. But the "universal spider"—as he called Louis XI.—was weaving his web in the darkness, and was eventually to entangle him in it. First came the reconciliation, in his despite, of those irreconcilables, the Swiss and Sigismund of Austria; and then the union of both with the duke of Lorraine, who was also disturbed at the duke of Burgundy's ambition. In vain Charles tried to kindle anew the embers of former feudal intrigues; the execution of the duke of Nemours and the count of Saint Pol cooled all enthusiasm. In vain did he get his dilatory friends, the English Yorkists, to cross the Channel; on the 29th of August 1475, at Picquigny, Louis XI. bribed them with a sum of seventy-five thousand crowns to forsake him, Edward further undertaking to guarantee the loyalty of the duke of Brittany. Exasperated, Charles attacked and took Nancy, wishing, as he said, "to skin the Bernese bear and wear its fur." To the hanging of the brave garrison of Granson the Swiss responded by terrible reprisals at Granson and at Morat (March to June 1476); while the people of Lorraine finally routed Charles at Nancy on the 5th of January 1477, the duke himself falling in the battle.

Ruin of the house of Burgundy.

The central administration of Burgundy soon disappeared, swamped by the resurgence of ancient local liberties; the army fell to pieces; and all hope of joining the two limbs of the great eastern duchy was definitely lost. As for the remnants that were left, French provinces and imperial territory, Louis XI. claimed the whole. He seized everything, alleging different rights in each place; but he displayed such violent haste and such trickery that he threw the heiress of Burgundy, in despair, into the arms of Maximilian of Austria. At the treaty of Arras (December 1482) Louis XI. received only Picardy, the Boulonnais and Burgundy; by the marriage of Charles the Bold's daughter the rest was annexed to the Empire, and later to Spain. Thus by Louis XI.'s short-sighted error the house of Austria established itself in the Low Countries. An age-long rivalry between the houses of France and Austria was the result of this disastrous marriage; and as the son who was its issue espoused the heiress of a now unified Spain, France, hemmed in by the Spaniards and by the Empire, was thenceforward to encounter them everywhere in her course. The historical progress of France was once more endangered.

The administration of Louis XI.

The reasons of state which governed all Louis XI.'s external policy also inspired his internal administration. If they justified him in employing lies and deception in international affairs, in his relations with his subjects they led him to regard as lawful everything which favoured his authority; no question of right could weigh against it. The army and taxation, as the two chief means of domination within and without the kingdom, constituted the main bulwarks of his policy. As for the nobility, his only thought was to diminish their power by multiplying their number, as his predecessors had done; while he reduced the rebels to submission by his iron cages or the axe of his gossip Tristan Lermite. The Church was treated with the same unconcerned cynicism; he held her in strict tutelage, accentuating her moral decadence still further by the manner in which he set aside or re-established the Pragmatic Sanction, according to the fluctuations of his financial necessities or his Italian ambitions. It has been said that on the other hand he was a king of the common people, and certainly he was one of them in his simple habits, in his taste for rough pleasantries, and above all in his religion, which was limited to superstitious practices and small devoutnesses. But in the states of Tours in 1468 he evinced the same mistrust for fiscal control by the people as for the privileges of the nobility. He inaugurated that autocratic rule which was to continue gaining strength until Louis XV.'s time. Louis XI. was the king of the bourgeoisie; he exacted much from them, but paid them back with interest by allowing them to reduce the power of all who were above them and to lord it over all who were below. As a matter of fact Louis XI.'s most faithful ally was death. Saint-Pol, Nemours, Charles the Bold, his brother the duke of Berry, old René of Anjou and his nephew the count of Maine, heir to the riches of Provence and to rights over Naples—the skeleton hand mowed down all his adversaries as though it too were in his pay; until the day when at Plessis-les-Tours it struck a final blow, claimed its just dues from Louis XI., and carried him off despite all his relics on the 30th of August 1483.

Charles VIII. and Brittany (1483-1498).

The Mad War, 1485.

There was nothing noble about Louis XI. but his aims, and nothing great but the results he attained; yet however different he might have been he could not have done better, for what he achieved was the making of France. This was soon seen after his death in the reaction which menaced his work and those who had served him; but thanks to himself and to his true successor, his eldest daughter Anne, married to the sire de Beaujeu, a younger member of the house of Bourbon, the set-back was only partial. Strife began immediately between the numerous malcontents and the Beaujeu party, who had charge of the little Charles VIII. These latter prudently made concessions: reducing the *taille*, sacrificing some of Louis XI.'s creatures to the rancour of the parlement, and restoring a certain number of offices or lands to the hostile princes (chief of whom was the duke of Orleans), and even consenting to a convocation of the states-general at Tours (1484). But the elections having been favourable to royalty, the Beaujeu family made the states reject the regency desired by the duke of Orleans, and organize the king's council after their own views. When they subsequently eluded the conditions imposed by the states, the deputies—nobles, clergy and burgesses—showed their incapacity to oppose the progress of despotism. In vain did the malcontent princes attempt to set up a new League of Public Weal, the *Guerre folle* (Mad War), in which the duke of Brittany, Francis II., played the part of Charles the Bold, dragging in the people of Lorraine and the king of Navarre. In vain did Charles VIII., his majority attained, at once abandon in the treaty of Sablé the benefits gained by the victory of Saint-Aubin du Cormier (1488). In vain did Henry VII. of England, Ferdinand the Catholic, and Maximilian of Austria try to prevent the annexation of Brittany by France; its heiress Anne, deserted by every one, made peace and married Charles VIII. in 1491. There was no longer a single great fief in France to which the malcontents could fly for refuge.

A policy of "magnificence."

It now remained to consolidate the later successes attained by the policy of the Valois—the acquisition of the duchies of Burgundy and Brittany; but instead there was a sudden change and that policy seemed about to be lost in dreams of recapturing the rights of the Angevins over Naples, and conquering Constantinople. Charles VIII., a prince with neither intelligence nor resolution, his head stuffed with chivalric romance, was scarcely freed from his sister's control when he sought in Italy a fatal distraction from the struggle with the house of Austria. By this "war of magnificence" he caused an interruption of half a century in the growth of national sentiment, which was only revived by Henry II.; and he was not alone in thus leaving the bone for the shadow: his contemporaries, Ferdinand the Catholic when delivered from the Moors, and Henry VII. from the power of the English nobles, followed the same superficial policy, not taking the trouble to work for that real strength which comes from the adhesion of willing subjects to their sovereign. They only cared to aggrandize themselves, without thought of national feeling or geographical conditions. The great theorist of these "conquistadores" was Machiavelli. The regent, Anne of Beaujeu, worked in her daughter's interest to the detriment of the kingdom, by means of a special treaty destined to prevent the property of the Bourbons from reverting to the crown; while Anne of Brittany did the like for her daughter Claude. Louis XII., the next king of France, thought only of the Milanese; Ferdinand the Catholic all but destroyed the Spanish unity at the end of his life by his marriage with Germaine de Foix; while the house of Austria was for centuries to remain involved in this petty course of policy. Ministers followed the example of their self-seeking masters, thinking it no shame to accept pensions from foreign sovereigns. The preponderating consideration everywhere was direct material advantage; there was disproportion everywhere between the means employed and the poverty of the results, a contradiction between the interests of the sovereigns and those of their subjects, which were associated by force and not naturally blended. For the sake of a morsel of Italian territory every one forgot the permanent necessity of opposing the advance of the Turkish crescent, the two horns of which were impinging upon Europe on the Danube and on the Mediterranean.

Italy and Germany were two great tracts of land at the mercy of the highest bidder, rich and easy to dominate, where these coarse and alien kings, still reared on medieval traditions, were for fifty years to gratify their love of conquest. Italy was their

The wars in Italy.

first battlefield; Charles VIII. was summoned thither by Lodovico Il Moro, tyrant of Milan, involved in a quarrel with his rival, Ferdinand II. of Aragon. The Aragonese had snatched the kingdom of Naples from the French house of Anjou, whose claims Louis XI. had inherited in 1480. To safeguard himself in the rear Charles VIII. handed over Roussillon and Cerdagne (Cerdaña) to Ferdinand the Catholic (that is to say, all the profits of Louis XI.'s policy); gave enormous sums of money to Henry VII. of England; and finally, by the treaty of Senlis ceded Artois and Franche-Comté to Maximilian of Austria. After these fool's bargains the paladin set out for Naples in 1494. His journey was long and triumphant, and his return precipitate; indeed it very nearly ended in a disaster at Fornovo, owing to the first of those Italian holy leagues which at the least sign of friction were ready to turn against France. At the age of twenty-eight, however, Charles VIII. died without issue (1498).

Louis XII. (1498-1515).

The accession of his cousin, Louis of Orleans, under the title of Louis XII., only involved the kingdom still further in this Italian imbroglio. Louis did indeed add the fief of Orleans to the royal domain and hastened to divorce Jeanne of France in order to marry Anne, the widow of his predecessor, so that he might keep Brittany. But he complicated the Naples affair by claiming Milan in consideration of the marriage of his grandfather, Louis of Orleans, to Valentina, daughter of Gian Galeazzo Visconti, duke of Milan. In 1499, appealed to by Venice, and encouraged by his favourite, Cardinal d'Amboise (who was hoping to succeed Pope Alexander VI.), and also by Cesare Borgia, who had lofty ambitions in Italy, Louis XII. conquered Milan in seven months and held it for fourteen years; while Lodovico Sforza, betrayed by his Swiss mercenaries, died a prisoner in France. The kingdom of Naples was still left to recapture; and fearing to be thwarted by Ferdinand of Aragon, Louis XII. proposed to this master of roguery that they should divide the kingdom according to the treaty of Granada (1500). But no sooner had Louis XII. assumed the title of king of Naples than Ferdinand set about despoiling him of it, and despite the bravery of a Bayard and a Louis d'Ars, Louis XII., being also betrayed by the pope, lost Naples for good in 1504. The treaties of Blois occasioned a vast amount of diplomacy, and projects of marriage between Claude of France and Charles of Austria, which came to nothing but served as a prelude to the later quarrels between Bourbons and Habsburgs.

It was Pope Julius II. who opened the gates of Italy to the horrors of war. Profiting by Louis XII.'s weakness and the emperor Maximilian's strange capricious character, this martial pope sacrificed Italian and religious interests alike in order to re-establish the temporal power of the papacy. Jealous of Venice, at that time the Italian state best provided with powers of expansion, and unable to subjugate it single-handed, Julius succeeded in obtaining help from France, Spain and the Empire. The league of Cambrai (1508) was his finest diplomatic achievement. But he wanted to be sole master of Italy; so in order to expel the French "barbarians" whom he had brought in, he appealed to other barbarians who were far more dangerous—Spaniards, Germans and Swiss—to help him against Louis XII., and stabbed him from behind with the Holy League of 1511.

Louis XII. and Julius II.

Weakened by the death of Cardinal d'Amboise, his best counsellor, Louis XII. tried vainly in the assembly of Tours and in the unsuccessful council of Pisa to alienate the French clergy from a papacy which was now so little worthy of respect. But even the splendid victories of Gaston de Foix could not shake that formidable coalition; and despite the efforts of Bayard, La Palice and La Trémoille, it was the Church that triumphed. Julius II. died in the hour of victory; but Louis XII. was obliged to evacuate Milan, to which he had sacrificed everything, even France itself, with that political stupidity characteristic of the first Valois. He died almost immediately after this, on the 1st of January 1515, and his subjects, recognizing his thrift, his justice and the secure prosperity of the kingdom, forgot the seventeen years of war in which they had not been consulted, and rewarded him with the fine title of Father of his People.

Francis I. (1515-1547).

As Louis XII. left no son, the crown devolved upon his cousin and son-in-law the count of Angoulême, Francis I. No sooner king, Francis, in alliance with Venice, renewed the chimerical attempts to conquer Milan and Naples; also cherishing dreams of his own election as emperor and of a partition of Europe. The heroic episode of Marignano, when he defeated Cardinal Schinner's Swiss troops (13–15 of September 1515), made him master of the duchy of Milan and obliged his adversaries to make peace. Leo X., Julius II.'s successor, by an astute volte-face exchanged Parma and the Concordat for a guarantee of all the Church's possessions, which meant the defeat of French plans (1515). The Swiss signed the permanent peace which they were to maintain until the Revolution of 1789; while the emperor and the king of Spain recognized Francis II.'s very precarious hold upon Milan. Once more the French monarchy was pulled up short by the indignation of all Italy (1518).

Character of Francis I.

The question now was how to occupy the military activity of a young, handsome, chivalric and gallant prince, "ondoyant et divers," intoxicated by his first victory and his tardy accession to fortune. This had been hailed with joy by all who had been his comrades in his days of difficulty; by his mother, Louise of Savoy, and his sister Marguerite; by all the rough young soldiery; by the nobles, tired of the bourgeois ways of Louis XI. and the patriarchal simplicity of Louis XII.; and finally by all the aristocracy who expected now to have the government in their own hands. So instead of heading the crusade against the Turks, Francis threw himself into the electoral contest at Frankfort, which resulted in the election of Charles V., heir of Ferdinand the Catholic, Spain and Germany thus becoming united. Pope Leo X., moreover, handed over three-quarters of Italy to the new emperor in exchange for Luther's condemnation, thereby kindling that rivalry between Charles V. and the king of France which was to embroil the whole of Europe throughout half a century (1519–1559), from Pavia to St Quentin.

Rivalry of Francis I. and Charles V.

Defeat at Pavia and treaty of Madrid.

The territorial power of Charles V., heir to the houses of Burgundy, Austria, Castile and Aragon, which not only arrested the traditional policy of France but hemmed her in on every side; his pretensions to be the head of Christendom; his ambition to restore the house of Burgundy and the Holy Roman Empire; his grave and forceful intellect all rendered rivalry both inevitable and formidable. But the scattered heterogeneity of his possessions, the frequent crippling of his authority by national privileges or by political discords and religious quarrels, his perpetual straits for money, and his cautious calculating character, almost outweighed the advantages which he possessed in the terrible Spanish infantry, the wealthy commerce of the Netherlands, and the inexhaustible mines of the New World. Moreover, Francis I. stirred up enmity everywhere against Charles V., and after each defeat he found fresh support in the patriotism of his subjects. Immediately after the treaty of Madrid (1526), which Francis I. was obliged to sign after the disaster at Pavia and a period of captivity, he did not hesitate between his honour as a gentleman and the interests of his kingdom. Having been unable to win over Henry VIII. of England at their interview on the Field of the Cloth of Gold, he joined hands with Suleiman the Magnificent, the conqueror of Mohács; and the Turkish cavalry, crossing the Hungarian *Puszta*, made their way as far as Vienna, while the mercenaries of Charles V., under the constable de Bourbon, were reviving the saturnalia of Alaric in the sack of Rome (1527). In Germany, Francis I. assisted the Catholic princes to maintain their political independence, though he did not make the capital he might have made of the reform movement. Italy remained faithful to the vanquished in spite of all, while even Henry VIII. of England, who only needed bribing, and Wolsey, accessible to flattery, took part in the temporary coalition. Thus did France, menaced with disruption, embark upon a course of action imposed upon her by the harsh conditions of the treaty of Madrid—otherwise little respected—and later by those of Cambrai (1529); but it was not till later, too late indeed, that it was defined and became a national policy.

Further prosecution of romantic expeditions.

The truce at Nice.

After having, despite so many reverses and mistakes, saved Burgundy, though not Artois nor Flanders, and joined to the crown lands the domains of the constable de Bourbon who had gone over to Charles V., Francis I. should have had enough of defending other people's independence as well as his own, and should have thought more of his interests in the north and east than of Milan. Yet between 1531 and 1547 he manifested the same regrets and the same invincible ambition for that land of Italy which Charles V., on his side, regarded as the basis of his strength. Their antagonism, therefore, remained unabated, as also the contradiction of an official agreement with Charles V., combined with secret intrigues with his enemies. Anne de Montmorency, now head of the government in place of the headstrong chancellor Duprat, for four years upheld a policy of reconciliation and of almost friendly agreement between the two monarchs (1531–1535). The death of Francis I.'s mother, Louise of Savoy (who had been partly instrumental in arranging the peace of Cambrai), the replacement of Montmorency by the bellicose Chabot, and the advent to power of a Burgundian, Granvella, as Charles V.'s prime minister, put an end to this double-faced policy, which attacked the Calvinists of France while supporting the Lutherans of Germany; made advances to Clement VII. while pretending to maintain the alliance with Henry VIII. (just then consummating the Anglican schism); and sought an alliance with Charles V. without renouncing the possession of Italy. The death of the duke of Milan provoked a third general war (1536–1538); but after the conquest of Savoy and Piedmont and a fruitless invasion of Provence by Charles V., it resulted in another truce, concluded at Nice, in the interview at Aigues-mortes, and in the old contradictory policy of the treaty of Cambrai. This was confirmed by Charles V.'s triumphal journey through France (1539).

Fourth outbreak of war.

Rivalry between Madame d'Etampes, the imperious mistress of the aged Francis I., and Diane de Poitiers, whose ascendancy over the dauphin was complete, now brought court intrigues and constant changes in those who held office, to complicate still further this wearisome policy of ephemeral "combinazioni" with English, Germans, Italians and Turks, which urgent need of money always brought to naught. The disillusionment of Francis I., who had hitherto hoped that Charles V. would be generous enough to give Milan back to him, and then the assassination of Rincon, his ambassador at Constantinople, led to a fourth war (1544–1546), in the course of which the king of England went over to the side of Charles V.

Royal absolutism under Francis I.

Unable in the days of his youth to make Italy French, when age began to come upon him, Francis tried to make France Italian. In his château at Blois he drank greedily of the cup of Renaissance art; but he found the exciting draughts of diplomacy which he imbibed from Machiavelli's *Prince* even more intoxicating, and he headed the ship of state straight for the rock of absolutism. He had been the first king "*du bon plaisir*" ("of his own good pleasure")—a "Caesar," as his mother Louise of Savoy proudly hailed him in 1515—and to a man of his gallant and hot-headed temperament love and war were schools little calculated to teach moderation in government. Italy not only gave him a taste for art and letters, but furnished him with an arsenal of despotic maxims. Yet his true masters were the jurists of the southern universities, passionately addicted to centralization and autocracy, men like Duprat and Poyet, who revived the persistent tradition of Philip the Fair's legists. Grouped together on the council of affairs, they managed to control the policy of the common council, with its too mixed and too independent membership. They successfully strove to separate "the grandeur and superexcellence of the king" from the rest of the nation; to isolate the nobility amid the seductions of a court lavish in promises of favour and high office; and to win over the bourgeoisie by the buying and selling and afterwards by the hereditary transmission of offices. Thanks to their action, feudalism was attacked in its landed interest in the person of the constable de Bourbon; feudalism in its financial aspect by the execution of superintendent Semblançay and the special privileges of towns and provinces by administrative centralization. The bureaucracy became a refuge for the nobles, and above all for the bourgeois, whose fixed incomes were lowered by the influx of precious metals from the New World, while the wages of artisans rose. All those time-worn medieval institutions which no longer allowed free scope to private or public life were demolished by the legists in favour of the monarchy.

The concordat of 1516.

Their masterstroke was the Concordat of 1516, which meant an immense stride in the path towards absolutism. While Germany and England, where ultramontane doctrines had been allowed to creep in, were seeking a remedy against the economic exactions of the papacy in a reform of dogma or in schism, France had supposed herself to have found this in the Pragmatic Sanction of Bourges. But to the royal jurists the right of the churches and abbeys to make appointments to all vacant benefices was a guarantee of liberties valuable to the clergy, but detestable to themselves because the clergy thus retained the great part of public wealth and authority. By giving the king the ecclesiastical patronage they not only made a docile instrument of him, but endowed him with a mine of wealth, even more productive than the sale of offices, and a power of favouring and rewarding that transformed a needy and ill-obeyed king into an absolute monarch. To the pope they offered a mess of pottage in the shape of *annates* and the right of canonical institution, in order to induce him to sell the Church of France to the king. By this royal reform they completely isolated the monarchy, in the presumptuous pride of omnipotence, upon the ruins of the Church and the aristocracy, despite both the university and the parlement of Paris.

Thus is explained Francis I.'s preoccupation with Italian adventures in the latter part of his reign, and also the inordinate squandering of money, the autos-da-fé in the provinces and in Paris, the harsh repression of reform and free thought, and the sale of justice; while the nation became impoverished and the state was at the mercy of the caprices of royal mistresses—all of which was to become more and more pronounced during the twelve years of Henry II.'s government.

Henry II. (1547–1559.)

Henry II. shone but with a reflected light—in his private life reflected from his old mistress, Diane de Poitiers, and in his political action reflected from the views of Montmorency or the Guises. He only showed his own personality in an egoism more narrow-minded, in hatred yet bitterer than his father's; or in a haughty and jealous insistence upon an absolute authority which he never had the wit to maintain.

Henry II. and Charles V.

The struggle with Charles V. was at first delayed by differences with England. The treaty of Ardres had left two bones of contention: the cession of Boulogne to England and the exclusion of the Scotch from the terms of peace. At last the regent, the duke of Somerset, endeavoured to arrange a marriage between Edward VI., then a minor, and Mary Stuart, who had been offered in marriage to the dauphin Francis by her mother, Marie of Lorraine, a Guise who had married the king of Scotland. The transference of Mary Stuart to France, and the treaty of 1550 which restored Boulogne to France for a sum of 400,000 crowns, suspended the state of war; and then Henry II.'s opposition to the imperial policy of Charles V. showed itself everywhere: in Savoy and Piedmont, occupied by the French and claimed by Philibert Emmanuel, Charles V.'s ally; in Navarre, unlawfully conquered by Ferdinand the Catholic and claimed by the family of Albret; in Italy, where, aided and abetted by Pope Paul III., Henry II. was trying to regain support; and, finally, in Germany, where after the victory of Charles V. at Mühlberg (1547) the Protestant princes called Henry II. to their aid, offering to

Defence of Metz. ***Truce of Vaucelles.***

subsidize him and cede to him the towns of Metz, Toul and Verdun. The Protestant alliance was substituted for the Turkish alliance, and Henry II. hastened to accept the offers made to him (1552); but this was rather late in the day, for the reform movement had produced civil war and evoked fresh forces. The Germans, in whom national feeling got the better of imperialistic ardour, as soon as they saw the French at Strassburg, made terms with the emperor at Passau and permitted Charles to use all his forces against Henry II. The defence of Metz by Francis of Guise was admirable and successful; but in Picardy operations continued their course without much result, owing to the incapacity of the constable de Montmorency. Fortunately, despite the marriage of Charles V.'s son Philip to Mary Tudor, which gave him the support of England (1554), and despite the religious pacification of Germany through the peace of Augsburg (1555), Charles V., exhausted by illness and by thirty years of intense activity, in the truce of Vaucelles abandoned Henry II.'s conquests—Piedmont and the Three Bishoprics. He then abdicated the government of his kingdoms, which he divided between his son Philip II. and his brother Ferdinand (1556). A double victory, this, for France.

Henry II. and Philip II. ***Peace of Cateau-Cambrésis.***

Henry II.'s resumption of war, without provocation and without allies, was a grave error; but more characterless than ever, the king was urged to it by the Guises, whose influence since the defence of Metz had been supreme at court and who were perhaps hoping to obtain Naples for themselves. On the other hand, Pope Paul IV. and his nephew Carlo Caraffa embarked upon the struggle, because as Neapolitans they detested the Spaniards, whom they considered as "barbarous" as the Germans or the French. The constable de Montmorency's disaster at Saint Quentin (August 1557), by which Philip II. had not the wit to profit, was successfully avenged by Guise, who was appointed lieutenant-general of the kingdom. He took Calais by assault in January 1558, after the English had held it for two centuries, and occupied Luxemburg. The treaty of Cateau-Cambrésis (August 1559) finally put an end to the Italian follies, Naples, Milan and Piedmont; but it also lost Savoy, making a gap in the frontier for a century. The question of Burgundy was definitely settled, too; but the Netherlands had still to be conquered. By the possession of the three bishoprics and the recapture of Calais an effort towards a natural line of frontier and towards a national policy seemed indicated; but while the old soldiers could not forget Marignano, Ceresole, nor Italy perishing with the name of France on her lips, the secret alliance between the cardinal of Lorraine and Granvella against the Protestant heresy foretold the approaching subordination of national questions to religious differences, and a decisive attempt to purge the kingdom of the new doctrines.

The Reformation.

The origin and general history of the religious reformation in the 16th century are dealt with elsewhere (see Church History and Reformation). In France it had originally no revolutionary character whatever; it proceeded from traditional Gallican theories and from the innovating principle of humanism, and it began as a protest against Roman decadence and medieval scholasticism. It found its first adherents and its first defenders among the clerics and learned men grouped around Faber (Lefèvre) of Étaples at Meaux; while Marguerite of Navarre, "des Roynes la non pareille," was the indefatigable Maecenas of these innovators, and the incarnation of the Protestant spirit at its purest. The reformers shook off the yoke of systems in order boldly to renovate both knowledge and faith; and, instead of resting on the abstract *a priori* principles within which man and nature had been imprisoned, they returned to the ancient methods of observation and analysis. In so doing, they separated intellectual from popular life; and acting in this spirit, through the need of a moral renaissance, they reverted to primitive Christianity, substituting the inner and individual authority of conscience for the general and external authority of the Church. Their efforts would not, however, have sufficed if they had not been seconded by events; pure doctrine would not have given birth to a church, nor that church to a party; in France, as in Germany, the religious revolution was conditioned by an economic and social revolution.

The economic renaissance due to the great maritime discoveries had the consequence of concentrating wealth in the hands of the bourgeoisie. Owing to their mental qualities, their tendencies and their resources, the bourgeoisie had been, if not alone, at least most apt in profiting by the development of industry, by the extension of commerce, and by the formation of a new and mobile means of enriching themselves. But though the bourgeois had acquired through capitalism certain sources of influence, and gradually monopolized municipal and public functions, the king and the peasants had also benefited by this revolution. After a hundred and fifty years of foreign war and civil discord, at a period when order and unity were ardently desired, an absolute monarchy had appeared the only power capable of realizing such aspirations. The peasants, moreover, had profited by the reduction of the idle landed aristocracy; serfdom had decreased or had been modified; and the free peasants were more prosperous, had reconquered the soil, and were selling their produce at a higher rate while they everywhere paid less exorbitant rents. The victims of this process were the urban proletariat, whose treatment by their employers in trade became less and less protective and beneficent, and the nobility, straitened in their financial resources, uprooted from their ancient strongholds, and gradually despoiled of their power by a monarchy based on popular support. The unlimited sovereignty of the prince was established upon the ruins of the feudal system; and the capitalism of the merchants and bankers upon the closing of the trade-gilds to workmen, upon severe economic pressure and upon the exploitation of the artisans' labour.

Transformation of religious reform into party politics.

Though reform originated among the educated classes it speedily found an echo among the industrial classes of the 16th century, further assisted by the influence of German and Flemish journeymen. The popular reform-movement was essentially an urban movement; although under Francis I. and Henry II. it had already begun to spread into the country. The artisans, labourers and small shop-keepers who formed the first nucleus of the reformed church were numerous enough to provide an army of martyrs, though too few to form a party. Revering the monarchy and established institutions, they endured forty years of persecution before they took up arms. It was only during the second half of Henry II.'s reign that Protestantism, having achieved its religious evolution, became a political party. Weary of being trodden under foot, it now demanded much more radical reform, quitting the ranks of peaceable citizens to pass into the only militant class of the time and adopt its customs. Men like Coligny, d'Andelot and Condé took the place of the timid Lefèvre of Étaples and the harsh and bitter Calvin; and the reform party, in contradiction to its doctrines and its doctors, became a political and religious party of opposition, with all the compromises that presupposes. The struggle against it was no longer maintained by the university and the parlement alone, but also by the king, whose authority it menaced.

Royal persecution under Francis I. and Henry II.

With his intrepid spirit, his disdain for ecclesiastical authority and his strongly personal religious feeling, Francis I. had for a moment seemed ready to be a reformer himself; but deprived by the Concordat of all interest in the confiscation of church property, aspiring to political alliance with the pope, and as mistrustful of popular forces as desirous of absolute power and devoted to Italy, he paused and then drew back. Hence came the revocation in 1540 of the edict of tolerance of Coucy (1535), and the massacre of the Vaudois (1545). Henry II., a fanatic, went still further in his edict of Châteaubriant (1551), a code of veritable persecution, and in the *coup d'état* carried out in the parlement against Antoine du Bourg and his colleagues (1559). At the same time the pastors of the reformed religion, met in synod at Paris, were setting down their confession of faith founded upon the Scriptures, and their ecclesiastical discipline founded upon the independence of the churches. Thenceforward Protestantism adopted a new attitude, and refused obedience to the orders of a persecuting monarchy when contrary to its faith and its interests. After the saints came men. Hence those wars of religion which were to hold the monarchy in check for forty years and even force it to come to terms.

Francis II. (1559-1560).

In slaying Henry II. Montgomery's lance saved the Protestants for the time being. His son and successor, Francis II., was but a nervous sickly boy, bandied between two women: his mother, Catherine de' Medici, hitherto kept in the background, and his wife, Mary Stuart, queen of Scotland, who being a niece of the Guises brought her uncles, the constable Francis and the cardinal of Lorraine, into power. These ambitious and violent men took the government out of the hands of the constable de Montmorency and the princes of the blood: Antoine de Bourbon, king of Navarre, weak, credulous, always playing a double game on account of his preoccupation with Navarre; Condé, light-hearted and brave, but not fitted to direct a party; and the cardinal de Bourbon, a mere nonentity. The only plan which these princes could adopt in the struggle, once they had lost the king, was to make a following for themselves among the Calvinist malcontents and the gentlemen disbanded after the Italian wars. The Guises, strengthened by the failure of the conspiracy of Amboise, which had been aimed at them, abused the advantage due to their victory. Despite the edict of Romorantin, which by giving the bishops the right of cognizance of heresy prevented the introduction of the Inquisition on the Spanish model into France; despite the assembly of Fontainebleau, where an attempt was made at a compromise acceptable to both Catholics and moderate Calvinists; the reform party and its Bourbon leaders, arrested at the states-general of Orleans, were in danger of their lives. The death of Francis II. in December 1560 compromised the influence of the Guises and again saved Protestantism.

Charles IX. (1560-1574).

Charles IX. also was a minor, and the regent should legally have been the first prince of the blood, Antoine de Bourbon; but cleverly flattered by the queen-mother, Catherine de' Medici, he let her take the reins of government. Hitherto Catherine had been merely the resigned and neglected wife of Henry II., and though eloquent, insinuating and ambitious, she had been inactive. She had attained the age of forty-one when she at last came into power amidst the hopes and anxieties aroused by the fall of the Guises and the return of the Bourbons to fortune. Indifferent in religious matters, she had a passion for authority, a characteristically Italian adroitness in intrigue, a fine political sense, and the feeling that the royal authority might be endangered both by Calvinistic passions and Catholic violence. She decided for a system of tolerance; and Michel de l'Hôpital, the new chancellor, was her spokesman at the states of Orleans (1560). He was a good and honest man, moderate, conciliatory and temporizing, anxious to lift the monarchy above the strife of parties and to reconcile them; but he was so little practical that he could believe in a reformation of the laws in the midst of all the violent passions which were now to be let loose. These two, Catherine and her chancellor, attempted, like Charles V. at Augsburg, to bring about religious pacification as a necessary condition for the maintenance of order; but they were soon overwhelmed by the different factions.

The parties.

On one side was the Catholic triumvirate of the constable de Montmorency, the duke of Guise, and the marshal de St André; and on the other the Huguenot party of Condé and Coligny, who, having obtained liberty of conscience in January 1561, now demanded liberty of worship. The colloquy at Poissy between the cardinal of Lorraine and Theodore Beza (September 1561), did not end in the agreement hoped for, and the duke of Guise so far abused its spirit as to embroil the French Calvinists with the German Lutherans. The rupture seemed irremediable when the assembly of Poissy recognized the order of the Jesuits, which the French church had held in suspicion since its foundation. However, yielding to the current which was carrying the greater part of the nation towards reform, and despite the threats of Philip II. who dreaded Calvinistic propaganda in his Netherlands, Michel de l'Hôpital promulgated the edict of January 17, 1562—a true charter of enfranchisement for the Protestants. But the pressure of events and of parties was too strong; the policy of toleration which had miscarried at the council of Trent had no chance of success in France.

Edict of tolerance.

Character of the religious wars.

The triumvirate's relations with Spain and Rome were very close; they had complete ascendancy over the king and over Catherine; and now the massacre of two hundred Protestants at Vassy on the 1st of March 1562 made the cup overflow. The duke of Guise had either ordered this, or allowed it to take place, on his return from an interview with the duke of Württemberg at Zabern, where he had once more demanded the help of his Lutheran neighbours against the Calvinists; and the Catholics having celebrated this as a victory the signal was given for the commencement of religious wars. When these eight fratricidal wars first began, Protestants and Catholics rivalled one another in respect for royal authority; only they wished to become its masters so as to get the upper hand themselves. But in course of time, as the struggle became embittered, Catholicism itself grew revolutionary; and this twofold fanaticism, Catholic and Protestant, even more than the ambition of the leaders, made the war a ferocious one from the very first. Beginning with surprise attacks, if these failed, the struggle was continued by means of sieges and by terrible exploits like those of the Catholic Montluc and the Protestant des Adrets in the south of France. Neither of these two parties was strong enough to crush the other, owing to the apathy and continual desertions of the gentlemen-cavaliers who formed the élite of the Protestant army and the insufficient numbers of the Catholic forces. Allies from outside were therefore called in, and this it was that gave a European character to these wars of religion; the two parties were parties of foreigners, the Protestants being supported by German *Landsknechts* and Elizabeth of England's cavalry, and the royal army by Italian, Swiss or Spanish auxiliaries. It was no longer patriotism but religion that distinguished the two camps. There were three principal theatres of war: in the north Normandy and the valley of the Loire, where Orleans, the general centre of reform, ensured communications between the south and Germany; in the south-west Gascony and Guienne; in the south-east Lyonnais and Vivarais.

First religious war.

In the first war, which lasted for a year (1562–1563), the triumvirs wished to secure Orleans, previously isolated. The threat of an English landing decided them to lay siege to Rouen, and it was taken by assault; but this cost the life of the versatile Antoine de Bourbon. On the 19th of December 1562 the duke of Guise barred the way to Dreux against the German reinforcements of d'Andelot, who after having threatened Paris were marching to join forces with the English troops for whom Coligny and Condé had paid by the cession of Havre. The death of marshal de St André, and the capture of the constable de Montmorency and of Condé, which marked this indecisive battle, left Coligny and Guise face to face. The latter's success was of brief duration; for on the 18th of February 1563 Poltrot de Méré assassinated him before Orleans, which he was trying to take once and for all. Catherine, relieved by the loss of an inconvenient preceptor, and by the disappearance of the other leaders, became mistress of the Catholic party, of whose strength and popularity she had now had proof, and her idea was to make peace at once on the best terms possible. The egoism of Condé, who got himself made lieutenant-general of the kingdom, and bargained for freedom of worship for the Protestant nobility only, compromised the future of both his church and his party, though rendering possible the peace of Amboise, concluded the 19th of March

1563. All now set off together to recapture Havre from the English.

Peace of Amboise (1563).

Second civil war.

Peace of Longjumeau.

The peace, however, satisfied no one; neither Catholics (because of the rupture of religious unity) nor the parlements; the pope, the emperor and king of Spain alike protested against it. Nor yet did it satisfy the Protestants, who considered its concessions insufficient, above all for the people. It was, however, the maximum of tolerance possible just then, and had to be reverted to; Catherine and Charles IX. soon saw that the times were not ripe for a third party, and that to enforce real toleration would require an absolute power which they did not possess. After three years the Guises reopened hostilities against Coligny, whom they accused of having plotted the murder of their chief; while the Catholics, egged on by the Spaniards, rose against the Protestants, who had been made uneasy by an interview between Catherine and her daughter Elizabeth, wife of Philip II. of Spain, at Bayonne, and by the duke of Alva's persecutions of the reformed church of the Netherlands—a daughter-church of Geneva, like their own. The second civil war began like the first with a frustrated attempt to kidnap the king, at the castle of Montceaux, near Meaux, in September 1567; and with a siege of Paris, the general centre of Catholicism, in the course of which the constable de Montmorency was killed at Saint-Denis. Condé, with the men-at-arms of John Casimir, son of the Count Palatine, tried to starve out the capital; but once more the defection of the nobles obliged him to sign a treaty of peace at Longjumeau on the 23rd of March 1568, by which the conditions of Amboise were re-established. After the attempt at Montceaux the Protestants had to be contented with Charles IX.'s word.

Third war.

Peace of St Germain (1570.)

This peace was not of long duration. The fall of Michel de l'Hôpital, who had so often guaranteed the loyalty of the Huguenots, ruined the moderate party (May 1568). Catholic propaganda, revived by the monks and the Jesuits, and backed by the armed confraternities and by Catherine's favourite son, the duke of Anjou, now entrusted with a prominent part by the cardinal of Lorraine; Catherine's complicity in the duke of Alva's terrible persecution in the Netherlands; and her attempt to capture Coligny and Condé at Noyers all combined to cause a fresh outbreak of hostilities in the west. Thanks to Tavannes, the duke of Anjou gained easy victories at Jarnac over the prince of Condé, who was killed, and at Moncontour over Coligny, who was wounded (March–October 1569); but these successes were rendered fruitless by the jealousy of Charles IX. Allowing the queen of Navarre to shut herself up in La Rochelle, the citadel of the reformers, and the king to loiter over the siege of Saint Jean d'Angély, Coligny pushed boldly forward towards Paris and, having reached Burgundy, defeated the royal army at Arnay-le-duc. Catherine had exhausted all her resources; and having failed in her project of remarrying Philip II. to one of her daughters, and of betrothing Charles IX. to the eldest of the Austrian archduchesses, exasperated also by the presumption of the Lorraine family, who aspired to the marriage of their nephew with Charles IX.'s sister, she signed the peace of St Germain on the 8th of August 1570. This was the culminating point of Protestant liberty; for Coligny exacted and obtained, first, liberty of conscience and of worship, and then, as a guarantee of the king's word, four fortified places: La Rochelle, a key to the sea; La Charité, in the centre; Cognac and Montauban in the south.

Coligny and the Netherlands.

St Bartholomew, August 24, 1572.

The Guises set aside, Coligny, supported as he was by Jeanne d'Albret, queen of Navarre, now received all Charles IX.'s favour. Catherine de' Medici, an inveterate matchmaker, and also uneasy at Philip II.'s increasing power, made advances to Jeanne, proposing to marry her own daughter, Marguerite de Valois, to Jeanne's son, Henry of Navarre, now chief of the Huguenot party. Coligny was a Protestant, but he was a Frenchman before all; and wishing to reconcile all parties in a national struggle, he "trumpeted war" (*cornait la guerre*) against Spain in the Netherlands—despite the lukewarmness of Elizabeth of England and the Germans, and despite the counter-intrigues of the pope and of Venice. He succeeded in getting French troops sent to the Netherlands, but they suffered defeat. None the less Charles IX. still seemed to see only through the eyes of Coligny; till Catherine, fearing to be supplanted by the latter, dreading the results of the threatened war with Spain, and egged on by a crowd of Italian adventurers in the pay of Spain—men like Gondi and Birague, reared like herself in the political theories and customs of their native land—saw no hope but in the assassination of this rival in her son's esteem. A murderous attack upon Coligny, who had opposed the candidature of Catherine's favourite son, the duke of Anjou, for the throne of Poland, having only succeeded in wounding him and in exciting the Calvinist leaders, who were congregated in Paris for the occasion of Marguerite de Valois' marriage with the king of Navarre, Catherine and the Guises resolved together to put them all to death. There followed the wholesale massacre of St Bartholomew's Eve, in Paris and in the provinces; a natural consequence of public and private hatreds which had poisoned the entire social organism. This massacre had the effect of preventing the expedition into Flanders, and destroying Francis I.'s policy of alliance with the Protestants against the house of Austria.

The party of the politiques.

Fourth War. Edict of Boulogne (1573.)

Catherine de' Medici soon perceived that the massacre of St Bartholomew had settled nothing. It had, it is true, dealt a blow to Calvinism just when, owing to the reforms of the council of Trent, the religious ground had been crumbling beneath it. Moreover, within the party itself a gulf had been widening between the pastors, supported by the Protestant democracy and the political nobles. The reformers had now no leaders, and their situation seemed as perilous as that of their co-religionists in the Netherlands; while the sieges of La Rochelle and Leiden, the enforced exile of the prince of Orange, and the conversion under pain of death of Henry of Navarre and the prince of Condé, made the common danger more obvious. Salvation came from the very excess of the repressive measures. A third party was once more formed, composed of moderates from the two camps, and it was recruited quite as much by jealousy of the Guises and by ambition as by horror at the massacres. There were the friends of the Montmorency party—Damville at their head; Coligny's relations; the king of Navarre; Condé; and a prince of the blood, Catherine de' Medici's third son, the duke of Alençon, tired of being kept in the background. This party took shape at the end of the fourth war, followed by the edict of Boulogne (1573), forced from Charles IX. when the Catholics were deprived of their leader by the election of his brother, the duke of Anjou, as king of Poland. A year later the latter succeeded his brother on the throne of France as Henry III. This meant a new lease of power for the queen-mother.

Fifth War.

Henry III. (1574-1589).

The *politiques*, as the supporters of religious tolerance and an energetic repression of faction were called, offered their alliance to the Huguenots, but these, having formed themselves, by means of the Protestant Union, into a sort of republic within the kingdom, hesitated to accept. It is, however, easy to bring about an understanding between people in whom religious fury has been extinguished either by patriotism or by ambition, like that of the duke of Alençon, who had now escaped from the Louvre where he had been confined on account of his intrigues. The compact was concluded at Millau; Condé becoming a Protestant once more in order to treat with Damville, Montmorency's brother. Henry of Navarre escaped from Paris. The new king, Henry III., vacillating and vicious, and Catherine herself, eager for war as she was, had no means of separating the Protestants and the *politiques*. Despite the victory of Guise at Dormans, the agreement between the duke of Alençon and John Casimir's German army obliged the royal party to grant all that the allied forces demanded of them in the "peace of Monsieur," signed at Beaulieu on the 6th of May 1576, the duke of Alençon receiving the appanage of Anjou, Touraine and Berry, the king of Navarre Guienne, and Condé Picardy, while the Protestants were granted freedom of worship in all parts of the kingdom except Paris, the rehabilitation of Coligny and the other victims of St Bartholomew, their fortified towns, and an equal number of seats in the courts of the parlements.

Peace of Monsieur (1576).

The Catholic League.

This was going too fast; and in consequence of a reaction against this too liberal edict a fourth party made its appearance, that of the Catholic League, under the Guises—Henry le Balafré, duke of Guise, and his two brothers, Charles, duke of Mayenne, and Louis, archbishop of Reims and cardinal. With the object of destroying Calvinism by effective opposition, they imitated the Protestant organization of provincial associations, drawing their chief supporters from the upper middle class and the lesser nobility. It was not at first a demagogy maddened by the preaching of the irreconcilable clergy of Paris, but a union of the more honest and prudent classes of the nation in order to combat heresy. Despite the immorality and impotence of Henry III. and the Protestantism of Henry of Navarre, this party talked of re-establishing the authority of the king; but in reality it inclined more to the Guises, martyrs in the good cause, who were supported by Philip II. of Spain and Pope Gregory XIII. A sort of popular government was thus established to counteract the incapacity of royalty, and it was in the name of the imperilled rights of the people that, from the States of Blois onward, this Holy League demanded the re-establishment of Catholic unity, and set the religious right of the nation in opposition to the divine right of incapable or evil-doing kings (1576).

The States of Blois (1576).

Sixth War and peace of Bergerac (1577). Seventh War and peace of Fleix (1580).

In order to oust his rival Henry of Guise, Henry III. made a desperate effort to outbid him in the eyes of the more extreme Catholics, and by declaring himself head of the League degraded himself into a party leader. The League, furious at this stroke of policy, tried to impose a council of thirty-six advisers upon the king. But the deputies of the third estate did not support the other two orders, and the latter in their turn refused the king money for making war on the heretics, desiring, they said, not war but the destruction of heresy. This would have reduced Henry III. to impotence; fortunately for him, however, the break of the Huguenots with the "Malcontents," and the divisions in the court of Navarre and in the various parties at La Rochelle, allowed Henry III., after two little wars in the south west, during which fighting gradually degenerated into brigandage, to sign terms of peace at Bergerac (1577), which much diminished the concessions made in the edict of Beaulieu. This peace was confirmed three years after by that of Fleix. The suppression of both the leagues was stipulated for (1580). It remained, however, a question whether the Holy League would submit to this.

Union between the Guises and Philip II.

The death of the duke of Anjou after his mad endeavour to establish himself in the Netherlands (1584), and the accession of Henry of Navarre, heir to the effeminate Henry III., reversed the situations of the two parties: the Protestants again became supporters of the principle of heredity and divine right; the Catholics appealed to right of election and the sovereignty of the people. Could the crown of the eldest daughter of the Church be allowed to devolve upon a relapsed heretic? Such was the doctrine officially preached in pulpit and pamphlet. But between Philip II. on the one hand—now master of Portugal and delivered from William of Orange, involved in strife with the English Protestants, and desirous of avenging the injuries inflicted upon him by the Valois in the Netherlands—and the Guises on the other hand, whose cousin Mary Stuart was a prisoner of Queen Elizabeth, there was a common interest in supporting one another and pressing things forward. A definite agreement was made between them at Joinville (December 31, 1584), the religious and popular pretext being the danger of leaving the kingdom to the king of Navarre, and the ostensible end to secure the succession to a Catholic prince, the old Cardinal de Bourbon, an ambitious and violent man of mean intelligence; while the secret aim was to secure the crown for the Guises, who had already attempted to fabricate for themselves a genealogy tracing their descent from Charlemagne. In the meantime Philip II., being rid of Don John of Austria, whose ambition he dreaded, was to crush the Protestants of England and the Netherlands; and the double result of the compact at Joinville was to allow French politics to be controlled by Spain, and to transform the wars of religion into a purely political quarrel.

The committee of Sixteen at Paris.

Eighth war of the three Henries.

The pretensions of the Guises were, in fact, soon manifested in the declaration of Péronne (March 30, 1585) against the foul court of the Valois; they were again manifested in a furious agitation, fomented by the secret council of the League at Paris, which favoured the Guises, and which now worked on the people through their terror of Protestant retaliations and the Church's peril. Incited by Philip II., who wished to see him earning his pension of 600,000 golden crowns, Henry of Guise began the war in the end of April, and in a few days the whole kingdom was on fire. The situation was awkward for Henry III., who had not the courage to ask Queen Elizabeth for the soldiers and money that he lacked. The crafty king of Navarre being unwilling to alienate the Protestants save by an apostasy profitable to himself, Henry III., by the treaty of Nemours (July 7, 1585), granted everything to the head of the League in order to save his crown. By a stroke of the pen he suppressed Protestantism, while Pope Sixtus V., who had at first been unfavourable to the treaty of Joinville as a purely political act, though he eventually yielded to the solicitations of the League, excommunicated the two Bourbons, Henry and Condé. But the duke of Guise's audacity did not make Henry III. forget his desire for vengeance. He hoped to ruin him by attaching him to his cause. His favourite Joyeuse was to defeat the king of Navarre, whose forces were very weak, while Guise was to deal with the strong reinforcement of Germans that Elizabeth was sending to Henry of Navarre. Exactly the contrary happened. By the defeat of Joyeuse at Coutras Henry III. found himself wounded on his strongest side; and by Henry of Guise's successes at Vimory and Auneau the Germans, who should have been his best auxiliaries against the League, were crushed (October-November 1587).

Day of the Barricades.

Assassination of the Guises at the second states-general of Blois.

The League now thought they had no longer anything to fear. Despite the king's hostility the duke of Guise came to Paris, urged thereto by Philip II., who wanted to occupy Paris and be master of the Channel coasts whilst he launched his invincible Armada to avenge the death of Mary Stuart in 1587. On the Day of the Barricades (May 12, 1588) Henry III. was besieged in the Louvre by the populace in revolt; but his rival dared not go so far as to depose the king, and appeased the tumult. The king, having succeeded in taking refuge at Chartres, ended, however, by granting him in the Act of Union all that he had refused in face of the barricades—the post of lieutenant-general of the kingdom and the proscription of Protestantism. At the second assembly of the states of Blois, called together on account of the need for money (1588), all of Henry III.'s enemies who were elected showed themselves even bolder than in 1576 in claiming the control of the financial administration of the kingdom; but the destruction of the Armada gave Henry III., already exasperated by the insults he had received, new vigour. He had the old Cardinal de Bourbon imprisoned, and Henry of Guise and his brother the cardinal assassinated (December 23, 1588). On the 5th of January, 1589, died his mother, Catherine de' Medici, the astute Florentine.

"Now I am king!" cried Henry III. But Paris being dominated by the duke of Mayenne, who had escaped assassination, and by the council of "Sixteen," the chiefs of the League, most of the provinces replied by open revolt, and Henry III.

Assassination of Henry III.

had no alternative but an alliance with Henry of Navarre. Thanks to this he was on the point of seizing Paris, when in his turn he was assassinated on the 1st of August 1589 by a Jacobin monk, Jacques Clément; with his dying breath he designated the king of Navarre as his successor.

The Bourbons.

Between the popular League and the menace of the Protestants it was a question whether the new monarch was to be powerless in his turn. Henry IV. had almost the whole of his kingdom to conquer. The Cardinal de Bourbon, king according to the League and proclaimed under the title of Charles X., could count upon the Holy League itself, upon the Spaniards of the Netherlands, and upon the pope. Henry IV. was only supported by a certain number of the Calvinists and by the Catholic minority of the *Politiques*, who, however, gradually induced the rest of the nation to rally round the only legitimate prince. The nation wished for the establishment of internal unity through religious tolerance and the extinction of private organizations; it looked for the extension of France's external power through the abasement of the house of Spain, protection of the Protestants in the Netherlands and Germany, and independence of Rome. Henry IV., moreover, was forced to take an oath at the camp of Saint Cloud to associate the nation in the affairs of the kingdom by means of the states-general. These three conditions were interdependent; and Henry IV., with his persuasive manners, his frank and charming character, and his personal valour, seemed capable of keeping them all three.

Henry IV. (1589-1610).

The first thing for this soldier-king to do was to conquer his kingdom and maintain its unity. He did not waste time by withdrawing towards the south; he kept in the neighbourhood of Paris, on the banks of the Seine, within reach of help from Elizabeth; and twice—at Arques and at Ivry (1589–1590)—he vanquished the duke of Mayenne, lieutenant-general of the League. But after having tried to seize Paris (as later Rouen) by a *coup-de-main*, he was obliged to raise the siege in view of reinforcements sent to Mayenne by the duke of Parma. Pope Gregory XIV., an enthusiastic supporter of the League and a strong adherent of Spain, having succeeded Sixtus V., who had been very lukewarm towards the League, made Henry IV.'s position still more serious just at the moment when, the old Cardinal de Bourbon having died, Philip II. wanted to be declared the protector of the kingdom in order that he might dismember it, and when Charles Emmanuel of Savoy, a grandson of Francis I., and Charles III., duke of Lorraine, a son-in-law of Henry II., were both of them claiming the crown. Fortunately, however, the Sixteen had disgusted the upper bourgeoisie by their demagogic airs; while their open alliance with Philip II., and their acceptance of a Spanish garrison in Paris had offended the patriotism of the *Politiques* or moderate members of the League. Mayenne, who oscillated between Philip II. and Henry IV., was himself obliged to break up and subdue this party of fanatics and theologians (December 1591). This game of see-saw between the *Politiques* and the League furthered his secret ambition, but also the dissolution of the kingdom; and the pressure of public opinion, which desired an effective monarchy, put an end to this temporizing policy and caused the convocation of the states-general in Paris (December 1592). Philip II., through the duke of Feria's instrumentality, demanded the throne for his daughter Isabella, grand-daughter of Henry II. through her mother. But who was to be her husband? The archduke Ernest of Austria, Guise or Mayenne? The parlement cut short these bargainings by condemning all ultramontane pretensions and Spanish intrigues. The unpopularity of Spain, patriotism, the greater predominance of national questions in public opinion, and weariness of both religious disputation and indecisive warfare, all these sentiments were expressed in the wise and clever pamphlet entitled the *Satire Ménippée*. What had been a slow movement between 1585 and 1592 was quickened by Henry IV.'s abjuration of Protestantism at Saint-Denis on the 23rd of July 1593.

States-general of 1592.

Abjuration of Henry IV., July 23, 1593.

The coronation of the king at Chartres in February 1594 completed the rout of the League. The parlement of Paris declared against Mayenne, who was simply the mouthpiece of Spain, and Brissac, the governor, surrendered the capital to the king. The example of Paris and Henry IV.'s clemency rallied round him all prudent Catholics, like Villeroy and Jeannin, anxious for national unity; but he had to buy over the adherents of the League, who sold him his own kingdom for sixty million francs. The pontifical absolution of September 17, 1595, finally stultified the League, which had been again betrayed by the unsuccessful plot of Jean Chastel, the Jesuit's pupil.

Peace of Vervins.

Nothing was now left but to expel the Spaniards, who under cover of religion had worked for their own interests alone. Despite the brilliant charge of Fontaine-Française in Burgundy (June 5, 1595), and the submission of the heads of the League, Guise, Mayenne, Joyeuse, and Mercœur, the years 1595–1597 were not fortunate for Henry IV.'s armies. Indignant at his conversion, Elizabeth, the Germans, and the Swiss Protestants deserted him; while the taking of Amiens by the Spaniards compromised for the moment the future both of the king and the country. But exhaustion of each other, by which only England and Holland profited, brought about the Peace of Vervins. This confirmed the results of the treaty of Cateau-Cambrésis (May 2, 1598), that is to say, the decadence of Spanish power, and its inability either to conquer or to dismember France.

Edict of Nantes, 1598.

The League, having now no reason for existence, was dissolved; but the Protestant party remained very strong, with its political organization and the fortified places which the assemblies of Millau, Nîmes and La Rochelle (1573–1574) had established in the south and the west. It was a republican state within the kingdom, and, being unwilling to break with it, Henry IV. came to terms by the edict of Nantes, on the 13th of April 1598. This was a compromise between the royal government and the Huguenot government, the latter giving up the question of public worship, which was only authorized where it had existed before 1597 and in two towns of each *bailliage*, with the exception of Paris; but it secured liberty of conscience throughout the kingdom, state payment for its ministers, admission to all employments, and courts composed equally of Catholics and Protestants in the parlements. An authorization to hold synods and political assemblies, to open schools, and to occupy a hundred strong places for eight years at the expense of the king, assured to the Protestants not only rights but privileges. In no other country did they enjoy so many guarantees against a return of persecution. This explains why the edict of Nantes was not registered without some difficulty.

Results of the religious wars.

Thus the blood-stained 16th century closed with a promise of religious toleration and a dream of international arbitration. This was the end of the long tragedy of civil strife and of wars of conquest, mingled with the sound of madrigals and psalms and pavanes. It had been the golden age of the arquebus and the viol, of sculptors and musicians, of poets and humanists, of fratricidal conflicts and of love-songs, of *mignons* and martyrs. At the close of this troubled century peace descends upon exhausted passions; and amidst the choir of young and ardent voices celebrating the national reconciliation, the tocsin no longer sounds its sinister and persistent bass. Despite the leagues of either faith, religious liberty was now confirmed by the more free and generous spirit of Henry IV.

Why was this king at once so easygoing and so capricious? Why, again, had the effort and authority of feudal and popular resistance been squandered in the follies of the League and to further the ambitions of the rebellious Guises? Why had the monarchy been forced to purchase the obedience of the upper classes and the provinces with immunities which enfeebled it without limiting it? At all events, when the kingdom had been reconquered from the Spaniards and religious strife ended, in order to fulfil his engagements, Henry IV. need only have associated the nation with himself in the work of reconstructing the shattered monarchy. But during the atrocious holocausts formidable states had grown up around France, observing her and threatening her; and on the other hand, as on the morrow of the Hundred Years' War, the lassitude of the country, the lack of political feeling on the part of the upper classes and their selfishness, led to a fresh abdication of the nation's rights. The need of living caused the neglect of that necessity for control which had been maintained by the states-general from 1560 to 1593. And this time, moderation on the part of the monarchy no longer made for success. Of the two contrary currents which have continually mingled and conflicted throughout the course of French history, that of monarchic absolutism and that of aristocratic and democratic liberty, the former was now to carry all before it.

The Bourbons. France in 1610.

The kingdom was now issuing from thirty-eight years of civil war. Its inhabitants had grown unaccustomed to work; its finances were ruined by dishonesty, disorder, and a very heavy foreign debt. The most characteristic symptom of this distress was the brigandage carried on incessantly from 1598 to 1610. Side by side with this temporary disorder there was a more serious administrative disorganization, a habit of no longer obeying the king. The harassed population, the municipalities which under cover of civil war had resumed the right of self-government, and the parlements elated with their social importance and their security of position, were not alone in abandoning duty and obedience. Two powers faced each other threateningly: the organized and malcontent Protestants; and the provincial governors, all great personages possessing an armed following, theoretically agents of the king, but practically independent. The Montmorencys, the D'Epernons, the Birons, the Guises, were accustomed to consider their offices as hereditary property. Not that these two powers entered into open revolt against the king; but they had adopted the custom of recriminating, of threatening, of coming to understandings with the foreign powers, which with some of them, like Marshal Biron, the D'Entragues and the duc de Bouillon, amounted to conspiracy (1602–1606).

Character of Henry IV.

As to the qualifications of the king: he had had the good fortune not to be educated for the throne. Without much learning and sceptical in religious matters, he had the lively intelligence of the Gascon, more subtle than profound, more brilliant than steady. Married to a woman of loose morals, and afterwards to a devout Italian, he was gross and vulgar in his appetites and pleasures. He had retained all the habits of a country gentleman of his native Béarn, careless, familiar, boastful, thrifty, cunning, combined since his sojourn at the court of the Valois with a taint of corruption. He worked little but rapidly, with none of the bureaucratic pedantry of a Philip II. cloistered in the dark towers of the Escurial. Essentially a man of action and a soldier, he preserved his tone of command after he had reached the throne, the inflexibility of the military chief, the conviction of his absolute right to be master. Power quickly intoxicated him, and his monarchy was therefore anything but parliamentary. His personality was everything, institutions nothing. If, at the gathering of the notables at Rouen in 1596, Henry IV. spoke of putting himself in tutelage, that was but preliminary to a demand for money. The states-general, called together ten times in the 16th century, and at the death of Henry III. under promise of convocation, were never assembled. To put his absolute right beyond all control he based it upon religion, and to this sceptic disobedience became a heresy. He tried to make the clergy into an instrument of government by recalling the Jesuits, who had been driven away in 1594, partly from fear of their regicides, partly because they have always been the best teachers of servitude; and he gave the youth of the nation into the hands of this cosmopolitan and ultramontane clerical order. His government was personal, not through departments; he retained the old council though reducing its members; and his ministers, taken from every party, were never—not even Sully—anything more than mere clerks, without independent position, mere instruments of his good pleasure. Fortunately this was not always capricious.

The achievements of Henry IV.

Henry IV. soon realized that his most urgent duty was to resuscitate the corpse of France. Pilfering was suppressed, and the revolts of the malcontents—the *Gauthiers* of Normandy, the *Croquants* and *Tard-avisés* of Périgord and Limousin—were quelled, adroitly at first, and later with a sterner hand. He then provided for the security of the country districts, and reduced the taxes on the peasants, the most efficacious means of making them productive and able to pay. Inspired by Barthélemy de Laffémas (1545–1612), controller-general of commerce, and by Olivier de Serres (1539–1619),[1] Henry IV. encouraged the culture of silk, though without much result, had orchards planted and marshes drained; while though he permitted the free circulation of wine and corn, this depended on the harvests. But the twofold effect of civil war—the ruin of the farmers and the scarcity and high price of rural labour—was only reduced arbitrarily and by fits and starts.

Industrial policy of Henry IV.

Despite the influence of Sully, a convinced agrarian because of his horror of luxury and love of economy, Henry IV. likewise attempted amelioration in the towns, where the state of affairs was even worse than in the country. But the edict of 1597, far from inaugurating individual liberty, was but a fresh edition of that of 1581, a second preface to the legislation of Colbert, and in other ways no better respected than the first. As for the new features, the syndical courts proposed by Laffémas, they were not even put into practice. Various industries, nevertheless, concurrent with those of England, Spain and Italy, were created or reorganized: silk-weaving, printing, tapestry, &c. Sully at least provided renascent manufacture with the roads necessary for communication and planted them with trees. In external commerce Laffémas and Henry IV. were equally the precursors of Colbert, freeing raw material and prohibiting the import of products similar to those manufactured within the kingdom. Without regaining that preponderance in the Levant which had been secured after the victory of Lepanto and before the civil wars, Marseilles still took an honourable place there, confirmed by the renewal in 1604 of the capitulations of Francis I. with the sultan. Finally, the system of commercial companies, antipathetic to the French bourgeoisie, was for the first time practised on a grand scale; but Sully never understood that movement of colonial expansion, begun by Henry II. in Brazil and continued in Canada by Champlain, which had so marvellously enlarged the European horizon. His point of view was altogether more limited than that of Henry IV.; and he did not foresee, like Elizabeth, that the future would belong to the peoples whose national energy took that line of action.

The work of Sully.

His sphere was essentially the superintendence of finance, to which he brought the same enthusiasm that he had shown in fighting the League. Vain and imaginative, his reputation was enormously enhanced by his "Économies royales"; he was no innovator, and being a true representative of the nation at that period, like it he was but lukewarm towards reform, accepting it always against the grain. He was not a financier of genius; but he administered the public moneys with the same probity and exactitude which he used in managing his own, retrieving alienated property, straightening accounts, balancing expenditure and receipts, and amassing a reserve in the Bastille. He did not reform the system of *aides* and *tailles* established by Louis XI. in 1482; but by charging much upon indirect taxation, and slightly lessening the burden of direct taxation, he avoided an appeal to the states-general and gave an illusion of relief.

Nevertheless, economic disasters, political circumstances and the personal government of Henry IV. (precursor in this also

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[1] Olivier de Serres, sieur de Pradel, spent most of his life on his model farm at Pradel. In 1599 he dedicated a pamphlet on the cultivation of silk to Henry IV., and in 1600 published his *Théâtre d'agriculture et ménage des champs*, which passed through nineteen editions up to 1675.

Criticism of Henry IV.'s achievement.

of Louis XIV.) rendered his task impossible or fatal. The nobility remained in debt and disaffected; and the clergy, more remarkable for wealth and breeding than for virtues, were won over to the ultramontane ideas of the triumphant Jesuits. The rich bourgeoisie began more and more to monopolize the magistracy; and though the country-people were somewhat relieved from the burden which had been crushing them, the working-classes remained impoverished, owing to the increase of prices which followed at a distance the rise of wages. Moreover, under insinuating and crafty pretexts, Henry IV. undermined as far as he could the right of control by the states-general, the right of remonstrance by the parlements, and the communal franchises, while ensuring the impoverishment of the municipalities by his fiscal methods. Arbitrary taxation, scandalous intervention in elections, forced candidatures, confusion in their financial administration, bankruptcy and revolt on the part of the tenants: all formed an anticipation of the personal rule of Richelieu and Louis XIV.

Edict of La Paulette.

Thus Henry IV. evinced very great activity in restoring order and very great poverty of invention in his methods. His sole original creation, the edict of La Paulette in 1604, was disastrous. In consideration of an annual payment of one-sixtieth of the salary, it made hereditary offices which had hitherto been held only for life; and the millions which it daily poured into the royal exchequer removed the necessity for seeking more regular and better distributed resources. Political liberty and social justice were equally the losers by this extreme financial measure, which paved the way for a catastrophe.

Foreign policy of Henry IV.

In foreign affairs the abasement of the house of Austria remained for Henry IV., as it had been for Francis I. and Henry II., a political necessity, while under his successors it was to become a mechanical obsession. The peace of Vervins had concluded nothing. The difference concerning the marquisate of Saluzzo, which the duke of Savoy had seized upon in 1588, profiting by Henry III.'s embarrassments, is only worth mentioning because the treaty of Lyons (1601) finally dissipated the Italian mirage, and because, in exchange for the last of France's possessions beyond the Alps, it added to the royal domain the really French territory of La Bresse, Bugey, Valromey and the district of Gex. The great external affair of the reign was the projected war upon which Henry IV. was about to embark when he was assassinated. The "grand design" of Sully, the organization of a "Christian Republic" of the European nations for the preservation of peace, was but the invention of an irresponsible minister, soured by defeat and wishing to impress posterity. Henry IV., the least visionary of kings, was between 1598 and 1610 really hesitating between two great contradictory political schemes: the war clamoured for by the Protestants, politicians like Sully, and the nobility; and the Spanish alliance, to be cemented by marriages, and preached by the ultramontane Spanish camarilla formed by the queen, Père Coton, the king's confessor, the minister Villeroy, and Ubaldini, the papal nuncio. Selfish and suspicious, Henry IV. consistently played this double game of policy in conjunction with president Jeannin. By his alliance with the Grisons (1603) he guaranteed the integrity of the Valtellina, the natural approach to Lombardy for the imperial forces; and by his intimate union with Geneva he controlled the routes by which the Spaniards could reach their hereditary possessions in Franche-Comté and the Low Countries from Italy. But having defeated the duke of Savoy he had no hesitation in making sure of him by a marriage; though the Swiss might have misunderstood the treaty of Brusol (1610) by which he gave one of his daughters to the grandson of Philip II. On the other hand he astonished the Protestant world by the imprudence of his mediation between Spain and the rebellious United Provinces (1609). When the succession of Cleves and of Jülich, so long expected and already discounted by the treaty of Halle (1610), was opened up in Germany, the great war was largely due to an access of senile passion for the charms of the princesse de Condé. The stroke of Ravaillac's knife caused a timely descent of the curtain upon this new and tragi-comic Trojan War. Thus, here as elsewhere, we see a vacillating hand-to-mouth policy, at the mercy of a passion for power or for sensual gratification. The *Cornette blanche* of Arques, the *Poule au pôt* of the peasant, successes as a lover and a dashing spirit, have combined to surround Henry IV. with a halo of romance not justified by fact.

The regency of Marie de' Medici.

The extreme instability of monarchical government showed itself afresh after Henry IV.'s death. The reign of Louis XIII., a perpetual regency by women, priests, and favourites, was indeed a curious prelude to the grand age of the French monarchy. The eldest son of Henry IV. being a minor, Marie de' Medici induced the parlement to invest her with the regency, thanks to Villeroy and contrary to the last will of Henry IV. This second Florentine, at once jealous of power and incapable of exercising it, bore little resemblance to her predecessor. Light-minded, haughty, apathetic and cold-hearted, she took a sort of passionate delight in changing Henry IV.'s whole system of government. Who would support her in this? On one side were the former ministers, Sillery and president Jeannin, ex-leaguers but loyalists, no lovers of Spain and still less of Germany; on the other the princes of the blood and the great nobles, Condé, Guise, Mayenne and Nevers, apparently still much more faithful to French ideas, but in reality convinced that the days of kings were over and that their own had arrived. Instead of weakening this aristocratic agitation by the see-saw policy of Catherine de' Medici, Marie could invent no other device than to despoil the royal treasure by distributing places and money to the chiefs of both parties. The savings all expended and Sully fallen into disgrace, she lost her influence and became the almost unconscious instrument of an ambitious man of low birth, the Florentine Concini, who was to drag her down with him in his fall; petty shifts became thenceforward the order of the day.

Louis XIII. (1610–1643).

Thus Villeroy thought fit to add still further to the price already paid to triumphant Madrid and Vienna by disbanding the army, breaking the treaty of Brusol, and abandoning the Protestant princes beyond the Rhine and the trans-Pyrenean Moriscos. France joined hands with Spain in the marriages of Louis XIII. with Anne of Austria and Princess Elizabeth with the son of Philip III., and the Spanish ambassador was admitted to the secret council of the queen. To soothe the irritation of England the duc de Bouillon was sent to London to offer the hand of the king's sister to the prince of Wales. Meanwhile, however, still more was ceded to the princes than to the kings; and after a pretence of drawing the sword against the prince of Condé, rebellious through jealousy of the Italian surroundings of the queen-mother, recourse was had to the purse. The peace of Sainte Menehould, four years after the death of Henry IV., was a virtual abdication of the monarchy (May 1614); it was time for a move in the other direction. Villeroy inspired the regent with the idea of an armed expedition, accompanied by the little king, into the West. The convocation of the states-general was about to take place, wrung, as in all minorities, from the royal weakness—this time by Condé; so the elections were influenced in the monarchist interest. The king's majority, solemnly proclaimed on the 28th of October 1614, further strengthened the throne; while owing to the bungling of the third estate, who did not contrive to gain the support of the clergy and the nobility by some sort of concessions, the states-general, the last until 1789, proved like the others a mere historic episode, an impotent and inorganic expedient. In vain Condé tried to play with the parlement of Paris the same game as with the states-general, in a sort of anticipation of the Fronde. Villeroy demurred; and the parlement, having illegally assumed a political rôle, broke with Condé and effected a reconciliation with the court. After this double victory Marie de' Medici could at last undertake the famous journey to Bordeaux and consummate the Spanish marriages. In order not to countenance by his presence an act which had been the pretext for his opposition, Condé rebelled once more in August 1615; but he was again pacified by the governorships and pensions of the peace of Loudun (May 1616).

Concini, Marshal d'Ancre.

But Villeroy and the other ministers knew not how to reap the full advantage of their victory. They had but one desire, to put themselves on a good footing again with Condé, instead of applying themselves honestly to the service of the king. The "marshals," Concini and his wife Leonora Galigai, more influential with the queen and more exacting than ever, by dint of clever intrigues forced the ministers to retire one after another; and with the last of Henry IV.'s "greybeards" vanished also all the pecuniary reserves left. Concini surrounded himself with new men, insignificant persons ready to do his bidding, such as Barbin or Mangot, while in the background was Richelieu, bishop of Luçon. Condé now began intrigues with the princes whom he had previously betrayed; but his pride dissolved in piteous entreaties when Thémines, captain of the guard, arrested him in September 1616. Six months later Concini had not even time to protest when another captain, Vitry, slew him at the Louvre, under orders from Louis XIII., on the 24th of April 1617.

Richelieu had appeared behind Marie de' Medici; Albert de Luynes rose behind Louis XIII., the neglected child whom he had contrived to amuse. "The tavern remained the same, having changed nothing but the bush." De Luynes was made a duke and marshal in Concini's place, with no better title; while the duc d'Epernon, supported by the queen-mother (now in disgrace at Blois), took Condé's place at the head of the opposition. The treaties of Angoulême and Angers (1619–1620), negotiated by Richelieu, recalled the "unwholesome" treaties of Sainte-Menehould and Loudun. The revolt of the Protestants was more serious. Goaded by the vigorous revival of militant Catholicism which marked the opening of the 17th century, de Luynes tried to put a finishing touch to the triumph of Catholicism in France, which he had assisted, by abandoning in the treaty of Ulm the defence of the small German states against the ambition of the ruling house of Austria, and by sacrificing the Protestant Grisons to Spain. The re-establishment of Catholic worship in Béarn was the pretext for a rising among the Protestants, who had remained loyal during these troublous years; and although the military organization of French Protestantism, arranged by the assembly of La Rochelle, had been checked in 1621, by the defection of most of the reformed nobles, like Bouillon and Lesdiguières, de Luynes had to raise the disastrous siege of Montauban. Death alone saved him from the disgrace suffered by his predecessors (December 15, 1621).

Return of Marie de' Medici.

From 1621 to 1624 Marie de' Medici, re-established in credit, prosecuted her intrigues; and in three years there were three different ministries: de Luynes was succeeded by the prince de Condé, whose Montauban was found at Montpellier; the Brûlarts succeeded Condé, and having, like de Luynes, neglected France's foreign interests, they had to give place to La Vieuville; while this latter was arrested in his turn for having sacrificed the interests of the English Catholics in the negotiations regarding the marriage of Henrietta of France with the prince of Wales. All these personages were undistinguished figures beyond whom might be discerned the cold clear-cut profile of Marie de' Medici's secretary, now a cardinal, who was to take the helm and act as viceroy during eighteen years.

Cardinal Richelieu 1624–1642.

Richelieu came into power at a lucky moment. Every one was sick of government by deputy; they desired a strong hand and an energetic foreign policy, after the defeat of the Czechs at the White Mountain by the house of Austria, the Spanish intrigues in the Valtellina, and the resumption of war between Spain and Holland. Richelieu contrived to raise hope in the minds of all. As president of the clergy at the states-general of 1614 he had figured as an adherent of Spain and the ultramontane interest; he appeared to be a representative of that religious party which was identical with the Spanish party. But he had also been put into the ministry by the party of the *Politiques*, who had terminated the civil wars, acclaimed Henry IV., applauded the Protestant alliance, and by the mouth of Miron, president of the third estate, had in 1614 proclaimed its intention to take up the national tradition once more. Despite the concessions necessary at the outset to the partisans of a Catholic alliance, it was the programme of the *Politiques* that Richelieu adopted and laid down with a master's hand in his Political Testament.

Louis XIII. and Richelieu.

To realize it he had to maintain his position. This was very difficult with a king who "wished to be governed and yet was impatient at being governed." Incapable of applying himself to great affairs, but of sane and even acute judgment, Louis XIII. excelled only in a passion for detail and for manual pastimes. He realized the superior qualities of his minister, though with a lively sense of his own dignity he often wished him more discreet and less imperious; he had confidence in him but did not love him. Cold-hearted and formal by nature, he had not even self-love, detested his wife Anne of Austria—too good a Spaniard—and only attached himself fitfully to his favourites, male or female, who were naturally jealously suspected by the cardinal. He was accustomed to listen to his mother, who detested Richelieu as her ungrateful protégé. Neither did he love his brother, Gaston of Orleans, and the feeling was mutual; for the latter, remaining for twenty years heir-presumptive to a crown which he could neither defend nor seize, posed as the beloved prince in all the conspiracies against Richelieu, and issued from them each time as a Judas. Add to this that Louis XIII., like Richelieu himself, had wretched health, aggravated by the extravagant medicines of the day; and it is easy to understand how this pliable disposition which offered itself to the yoke caused Richelieu always to fear that his king might change his master, and to declare that "the four square feet of the king's cabinet had been more difficult for him to conquer than all the battlefields of Europe."

Richelieu, therefore, passed his time in safeguarding himself from his rivals and in spying upon them; his suspicious nature, rendered still more irritable by his painful practice of a dissimulation repugnant to his headstrong character, making him fancy himself threatened more than was actually the case. He brutally suppressed six great plots, several of which were scandalous, and had more than fifty persons executed; and he identified himself with the king, sincerely believing that he was maintaining the royal authority and not merely his own. He had a preference for irregular measures rather than legal prosecutions, and a jealousy of all opinions save his own. He maintained his power through the fear of torture and of special commissions. It was Louis XIII. whose cold decree ordained most of the rigorous sentences, but the stain of blood rested on the cardinal's robe and made his reasons of state pass for private vengeance. Chalais was beheaded at Nantes in 1626 for having upheld Gaston of Orleans in his refusal to wed Mademoiselle de Montpensier, and Marshal d'Ornano died at Vincennes for having given him bad advice in this matter; while the duellist de Boutteville was put to the torture for having braved the edict against duels. The royal family itself was not free from his attacks; after the Day of Dupes (1630) he allowed the queen-mother to die in exile, and publicly dishonoured the king's brother Gaston of Orleans by the publication of his confessions; Marshal de Marillac was put to the torture for his ingratitude, and the constable de Montmorency for rebellion (1632). The birth of Louis XIV. in 1638 confirmed Richelieu in power. However, at the point of death he roused himself to order the execution of the king's favourite, Cinq-Mars, and his friend de Thou, guilty of treason with Spain (1642).

Financial policy of Richelieu.

Absolute authority was not in itself sufficient; much money was also needed. In his state-papers Richelieu has shown that at the outset he desired that the Huguenots should share no longer in public affairs, that the nobles should cease to behave as rebellious subjects, and the powerful provincial governors as suzerains over the lands committed to their charge. With his passion for the uniform and the useful on a grand scale, he hoped by means of the Code

Michaud to put an end to the sale of offices, to lighten imposts, to suppress brigandage, to reduce the monasteries, &c. To do this it would have been necessary to make peace, for it was soon evident that war was incompatible with these reforms. He chose war, as did his Spanish rival and contemporary Olivares. War is expensive sport; but Richelieu maintained a lofty attitude towards finance, disdained figures, and abandoned all petty details to subordinate officials like D'Effiat or Bullion. He therefore soon reverted to the old and worse measures, including the debasement of coinage, and put an extreme tension on all the springs of the financial system. The land-tax was doubled and trebled by war, by the pensions of the nobles, by an extortion the profits of which Richelieu disdained neither for himself nor for his family; and just when the richer and more powerful classes had been freed from taxes, causing the wholesale oppression of the poorer, these few remaining were jointly and severally answerable. Perquisites, offices, forced loans were multiplied to such a point that a critic of the times, Guy Patin, facetiously declared that duties were to be exacted from the beggars basking in the sun. Richelieu went so far as to make poverty systematic and use famine as a means of government. This was the price paid for the national victories.

Thus he procured money at all costs, with an extremely crude fiscal judgment which ended by exasperating the people; hence numerous insurrections of the poverty-stricken; Dijon rose in revolt against the *aides* in 1630, Provence against the tax-officers (*élus*) in 1631, Paris and Lyons in 1632, and Bordeaux against the increase of customs in 1635. In 1636 the *Croquants* ravaged Limousin, Poitou, Angoumois, Gascony and Périgord; in 1639 it needed an army to subdue the *Va-nu-pieds* (bare-feet) in Normandy. Even the *rentiers* of the Hôtel-de-Ville, big and little, usually very peaceable folk, were excited by the curtailment of their incomes, and in 1639 and 1642 were roused to fury.

Struggle with the Protestants.

Every one had to bend before this harsh genius, who insisted on uniformity in obedience. After the feudal vassals, decimated by the wars of religion and the executioner's hand, and after the recalcitrant taxpayers, the Protestants, in their turn, and by their own fault, experienced this. While Richelieu was opposing the designs of the pope and of the Spaniards in the Valtellina, while he was arming the duke of Savoy and subsidizing Mansfeld in Germany, Henri, duc de Rohan, and his brother Benjamin de Rohan, duc de Soubise, the Protestant chiefs, took the initiative in a fresh revolt despite the majority of their party (1625). This Huguenot rising, in stirring up which Spanish diplomacy had its share, was a revolt of discontented and ambitious individuals who trusted for success to their compact organization and the ultimate assistance of England. Under pressure of this new danger and urged on by the Catholic *dévôts*, supported by the influence of Pope Urban VIII., Richelieu concluded with Spain the treaty of Monzon (March 5, 1626), by which the interests of his allies Venice, Savoy and the Grisons were sacrificed without their being consulted. The Catholic Valtellina, freed from the claims of the Protestant Grisons, became an independent state under the joint protection of France and Spain; the question of the right of passage was left open, to trouble France during the campaigns that followed; but the immediate gain, so far as Richelieu was concerned, was that his hands were freed to deal with the Huguenots.

Soubise had begun the revolt (January 1625) by seizing Port Blavet in Brittany, with the royal squadron that lay there, and in command of the ships thus acquired, combined with those of La Rochelle, he ranged the western coast, intercepting commerce. In September, however, Montmorency succeeded, with a fleet of English and Dutch ships manned by English seamen, in defeating Soubise, who took refuge in England. La Rochelle was now invested, the Huguenots were hard pressed also on land, and, but for the reluctance of the Dutch to allow their ships to be used for such a purpose, an end might have been made of the Protestant opposition in France; as it was, Richelieu was forced to accept the mediation of England and conclude a treaty with the Huguenots (February 1626).

Peace of Alais, 1629.

He was far, however, from forgiving them for their attitude or being reconciled to their power. So long as they retained their compact organization in France he could undertake no successful action abroad, and the treaty was in effect no more than a truce that was badly observed. The oppression of the French Protestants was but one of the pretexts for the English expedition under James I.'s favourite, the duke of Buckingham, to La Rochelle in 1627; and, in the end, this intervention of a foreign power compromised their cause. When at last the citizens of the great Huguenot stronghold, caught between two dangers, chose what seemed to them the least and threw in their lot with the English, they definitely proclaimed their attitude as anti-national; and when, on the 29th of October 1628, after a heroic resistance, the city surrendered to the French king, this was hailed not as a victory for Catholicism only, but for France. The taking of La Rochelle was a crushing blow to the Huguenots, and the desperate alliance which Rohan, entrenched in the Cévennes, entered into with Philip IV. of Spain, could not prolong their resistance. The amnesty of Alais, prudent and moderate in religious matters, gave back to the Protestants their common rights within the body politic. Unfortunately what was an end for Richelieu was but a first step for the Catholic party.

Richelieu and the Catholics.

The little Protestant group eliminated, Richelieu next wished to establish Catholic religious uniformity; for though in France the Catholic Church was the state church, unity did not exist in it. There were no fixed principles in the relations between king and church, hence incessant conflicts between Gallicans and Ultramontanes, in which Richelieu claimed to hold an even balance. Moreover, a Catholic movement for religious reform in the Church of France began during the 17th century, marked by the creation of seminaries, the foundation of new orthodox religious orders, and the organization of public relief by Saint Vincent de Paul. Jansenism was the most vigorous contemporary effort to renovate not only morals but Church doctrine (see JANSENISM). But Richelieu had no love for innovators, and showed this very plainly to du Vergier de Hauranne, abbot of Saint Cyran, who was imprisoned at Vincennes for the good of Church and State. In affairs of intellect dragooning was equally the policy; and, as Corneille learnt to his cost, the French Academy was created in 1635 simply to secure in the republic of letters the same unity and conformity to rules that was enforced in the state.

Destruction of public spirit.

Before Richelieu, there had been no effective monarchy and no institutions for controlling affairs; merely advisory institutions which collaborated somewhat vaguely in the administration of the kingdom. Had the king been willing these might have developed further; but Richelieu ruthlessly suppressed all such growth, and they remained embryonic. According to him, the king must decide in secret, and the king's will must be law. No one might meddle in political affairs, neither parlements nor states-general; still less had the public any right to judge the actions of the government. Between 1631 and the edict of February 1641 Richelieu strove against the continually renewed opposition of the parlements to his system of special commissions and judgments; in 1641 he refused them any right of interference in state affairs; at most would he consent occasionally to take counsel with assemblies of notables. Provincial and municipal liberties were no better treated when through them the king's subjects attempted to break loose from the iron ring of the royal commissaries and intendants. In Burgundy, Dijon saw her municipal liberties restricted in 1631; the provincial assembly of Dauphiné was suppressed from 1628 onward, and that of Languedoc in 1629; that of Provence was in 1639 replaced by communal assemblies, and that of Normandy was prorogued from 1639 to 1642. Not that Richelieu was hostile to them in principle; but he was obliged at all hazards to find money for the upkeep of the army, and the provincial states were a slow and heavy machine to put in motion. Through an excessive reaction against the disintegration that had menaced the kingdom after the dissolution of the League, he fell into the abuse of over-centralization; and depriving the people of the habit of criticizing governmental action, he taught them a fatal acquiescence in uncontrolled and undisputed authority. Like one of those physical forces which tend to reduce everything to a dead level, he battered down alike characters and fortresses; and in his endeavours to abolish faction, he killed that public spirit which, formed in the 16th century, had already produced the *République* of Bodin, de Thou's *History of his Times*, La Boetie's *Contre un*, the *Satire Ménippée*, and Sully's *Économies royales*.

Methods employed by Richelieu.

In order to establish this absolute despotism Richelieu created no new instruments, but made use of a revolutionary institution of the 16th century, namely "intendants" (*q.v.*), agents who were forerunners of the commissaries of the Convention, gentlemen of the long robe of inferior condition, hated by every one, and for that reason the more trustworthy. He also drew most of the members of his special commissions from the grand council, a supreme administrative tribunal which owed all its influence to him.

The results.

However, having accomplished all these great things, the treasury was left empty and the reforms were but ill-established; for Richelieu's policy increased poverty, neglected the toiling and suffering peasants, deserted the cause of the workers in order to favour the privileged classes, and left idle and useless that bourgeoisie whose intellectual activity, spirit of discipline, and civil and political culture would have yielded solid support to a monarchy all the stronger for being limited. Richelieu completed the work of Francis I.; he endowed France with the fatal tradition of autocracy. This priest by education and by turn of mind was indifferent to material interests, which were secondary in his eyes; he could organize neither finance, nor justice, nor an army, nor the colonies, but at the most a system of police. His method was not to reform, but to crush. He was great chiefly in negotiation, the art *par excellence* of ecclesiastics. His work was entirely abroad; there it had more continuity, more future, perhaps because only in his foreign policy was he unhampered in his designs. He sacrificed everything to it; but he ennobled it by the genius and audacity of his conceptions, by the energetic tension of all the muscles of the body politic.

External policy of Richelieu.

The Thirty Years' War in fact dominated all Richelieu's foreign policy; by it he made France and unmade Germany. It was the support of Germany which Philip II. had lacked in order to realize his Catholic empire; and the election of the archduke Ferdinand II. of Styria as emperor gave that support to his Spanish cousins (1619). Thenceforward all the forces of the Habsburg monarchy would be united, provided that communication could be maintained in the north with the Netherlands and in the south with the duchy of Milan, so that there should be no flaw in the iron vice which locked France in on either side. It was therefore of the highest importance to France that she should dominate the valleys of the Alps and Rhine. As soon as Richelieu became minister in 1624 there was an end to cordial relations with Spain. He resumed the policy of Henry IV., confining his military operations to the region of the Alps, and contenting himself at first with opposing the coalition of the Habsburgs with a coalition of Venice, the Turks, Bethlen Gabor, king of Hungary, and the Protestants of Germany and Denmark. But the revolts of the French Protestants, the resentment of the nobles at his dictatorial power, and the perpetual ferment of intrigues and treason in the court, obliged him almost immediately to draw back. During these eight years, however, Richelieu had pressed on matters as fast as possible.

Temporizing policy, except in Italy, 1624-1630.

While James I. of England was trying to get a general on the cheap in Denmark to defend his son-in-law, the elector palatine, Richelieu was bargaining with the Spaniards in the treaty of Monzon (March 1626); but as the strained relations between France and England forced him to conciliate Spain still further by the treaty of April 1627, the Spaniards profited by this to carry on an intrigue with Rohan, and in concert with the duke of Savoy, to occupy Montferrat when the death of Vicenzo II. (December 26, 1627) left the succession of Mantua, under the will of the late duke, to Charles Gonzaga, duke of Nevers, a Frenchman by education and sympathy. But the taking of La Rochelle allowed Louis to force the pass of Susa, to induce the duke of Savoy to treat with him, and to isolate the Spaniards in Italy by a great Italian league between Genoa, Venice and the dukes of Savoy and Mantua (April 1629). Unlike the Valois, Richelieu only desired to free Italy from Spain in order to restore her independence.

The fact that the French Protestants in the Cévennes were again in arms enabled the Habsburgs and the Spaniards to make a fresh attack upon the Alpine passes; but after the peace of Alais Richelieu placed himself at the head of forty thousand men, and stirred up enemies everywhere against the emperor, victorious now over the king of Denmark as in 1621 over the elector palatine. He united Sweden, now reconciled with Poland, and the Catholic and Protestant electors, disquieted by the edict of Restitution and the omnipotence of Wallenstein; and he aroused the United Provinces. But the disaffection of the court and the more extreme Catholics made it impossible for him as yet to enter upon a struggle against both Austria and Spain; he was only able to regulate the affairs of Italy with much prudence. The intervention of Mazarin, despatched by the pope, who saw no other means of detaching Italy from Spain than by introducing France into the affair, brought about the signature of the armistice of Rivalte on the 4th of September 1630, soon developed into the peace of Cherasco, which re-established the agreement with the still fugitive duke of Savoy (June 1631). Under the harsh tyranny of Spain, Italy was now nothing but a lifeless corpse; young vigorous Germany was better worth saving. So Richelieu's envoys, Brulart de Léon and Father Joseph, disarmed[1] the emperor at the diet of Regensburg, while at the same time Louis XIII. kept Casale and Pinerolo, the gates of the Alps. Lastly, by the treaty of Fontainebleau (May 30th, 1631), Maximilian of Bavaria, the head of the Catholic League, engaged to defend the king of France against all his enemies, even Spain, with the exception of the emperor. Thus by the hand of Richelieu a union against Austrian imperialism was effected between the Bavarian Catholics and the Protestants who dominated in central and northern Germany.

Richelieu and Gustavus Adolphus.

Twice had Richelieu, by means of the purse and not by force of arms, succeeded in reopening the passes of the Alps and of the Rhine. The kingdom at peace and the Huguenot party ruined, he was now able to engage upon his policy of prudent acquisitions and apparently disinterested alliances. But Gustavus Adolphus, king of Sweden, called in by Richelieu and Venice to take the place of the played-out king of Denmark, brought danger to all parties. He would not be content merely to serve French interests in Germany, according to the terms of the secret treaty of Bärwalde (June 1631); but, once master of Germany and the rich valley of the Rhine, considered chiefly the interests of Protestantism and Sweden. Neither the prayers nor the threats of Richelieu, who wished indeed to destroy Spain but not Catholicism, nor the death of Gustavus Adolphus at Lützen (1632), could repair the evils caused by this immoderate ambition. A violent Catholic reaction against the Protestants ensued; and the union of Spain and the Empire was consolidated just when that of the Protestants was dissolved at Nördlingen, despite the efforts of Oxenstierna (September 1634). Moreover, Wallenstein, who had been urged by Richelieu to set up an independent kingdom in Bohemia, had been killed on the 23rd of February 1634. In the course of a year Württemberg and Franconia were reconquered from the Swedes; and the duke of Lorraine, who had taken the side of the Empire, called in the Spanish and the imperial forces to open the road to the Netherlands through Franche-Comté.

His allies no longer able to stand alone, Richelieu was obliged to intervene directly (May 19th, 1635). By the treaty of Saint-Germain-en-Laye he purchased the army of Bernard of Saxe-

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[1] Ferdinand is reported to have said: "Le capucin m'a désarmé avec son scapulaire et a mis dans capuchon six bonnets électoraux."

The French Thirty Years' War.

Weimar; by that of Rivoli he united against Spain the dukes of Modena, Parma and Mantua; he signed an open alliance with the league of Heilbronn, the United Provinces and Sweden; and after these alliances military operations began, Marshal de la Force occupying the duchy of Lorraine. Richelieu attempted to operate simultaneously in the Netherlands by joining hands with the Dutch, and on the Rhine by uniting with the Swedes; but the bad organization of the French armies, the double invasion of the Spaniards as far as Corbie and the imperial forces as far as the gates of Saint-Jean-de-Losne (1636), and the death of his allies, the dukes of Hesse-Cassel, Savoy and Mantua at first frustrated his efforts. A decided success was, however, achieved between 1638 and 1640, thanks to Bernard of Saxe-Weimar and afterwards to Guébriant, and to the parallel action of the Swedish generals, Banér, Wrangel and Torstensson. Richelieu obtained Alsace, Breisach and the forest-towns on the Rhine; while in the north, thanks to the Dutch and owing to the conquest of Artois, marshals de la Meilleraye, de Châtillon and de Brézé forced the barrier of the Netherlands. Turin, the capital of Piedmont, was taken by Henri de Lorraine, comte d'Harcourt; the alliance with rebellious Portugal facilitated the occupation of Roussillon and almost the whole of Catalonia, and Spain was reduced to defending herself; while the embarrassments of the Habsburgs at Madrid made those of Vienna more tractable. The diet of Regensburg, under the mediation of Maximilian of Bavaria, decided in favour of peace with France, and on the 25th of December 1641 the preliminary settlement at Hamburg fixed the opening of negotiations to take place at Münster and Osnabrück. Richelieu's death (December 4, 1642) prevented him from seeing the triumph of his policy, but it can be judged by its results; in 1624 the kingdom had in the east only the frontier of the Meuse to defend it from invasion; in 1642 the whole of Alsace, except Strassburg, was occupied and the Rhine guarded by the army of Guébriant. Six months later, on the 14th of May 1643, Louis XIII. rejoined his minister in his true kingdom, the land of shades.

Mazarin, 1643-1661.

But thanks to Mazarin, who completed his work, France gathered in the harvest sown by Richelieu. At the outset no one believed that the new cardinal would have any success. Every one expected from Anne of Austria a change in the government which appeared to be justified by the persecutions of Richelieu and the disdainful unscrupulousness of Louis XIII. On the 16th of May the queen took the little four-year-old Louis XIV. to the parlement of Paris which, proud of playing a part in politics, hastened, contrary to Louis XIII.'s last will, to acknowledge the command of the little king, and to give his mother "free, absolute and entire authority." The great nobles were already looking upon themselves as established in power, when they learnt with amazement that the regent had appointed as her chief adviser, not Gaston of Orleans, but Mazarin. The political revenge which in their eyes was owing to them as a body, the queen claimed for herself alone, and she made it a romantic one. This Spaniard of waning charms, who had been neglected by her husband and insulted by Richelieu, now gave her indolent and full-blown person, together with absolute power, into the hands of the Sicilian. Whilst others were triumphing openly, Mazarin, in the shadow and silence of the interregnum, had kept watch upon the heart of the queen; and when the old party of Marie de' Medici and Anne of Austria wished to come back into power, to impose a general peace, and to substitute for the Protestant alliances an understanding with Spain, the arrest of François de Vendôme, duke of Beaufort, and the exile of other important nobles proved to the great families that their hour had gone by (September 1643).

Mazarin justified Richelieu's confidence and the favour of Anne of Austria. It was upon his foreign policy that he relied to maintain his authority within the kingdom. Thanks to him, the duke of Enghien (Louis de Bourbon, afterwards prince of Condé), appointed commander-in-chief at the age of twenty-two, caused the downfall of the renowned Spanish infantry at Rocroi; and he discovered Turenne, whose prudence tempered Condé's overbold ideas. It was he too who by renewing the traditional alliances and resuming against Bavaria, Ferdinand III.'s most powerful ally, the plan of common action with Sweden which Richelieu had sketched out, pursued it year after year: in 1644 at Freiburg im Breisgau, despite the death of Guébriant at Rottweil; in 1645 at Nördlingen, despite the defeat of Marienthal; and in 1646 in Bavaria, despite the rebellion of the Weimar cavalry; to see it finally triumph at Zusmarshausen in May 1648. With Turenne dominating the Eiser and the Inn, Condé victorious at Lens, and the Swedes before the gates of Prague, the emperor, left without a single ally, finally authorized his plenipotentiaries to sign on the 24th of October 1648 the peace about which negotiations had been going on for seven years. Mazarin had stood his ground notwithstanding the treachery of the duke of Bavaria, the defection of the United Provinces, the resistance of the Germans, and the general confusion which was already pervading the internal affairs of the kingdom.

Treaties of Westphalia.

The dream of the Habsburgs was shattered. They had wished to set up a centralized empire, Catholic and German; but the treaties of Westphalia kept Germany in its passive and fragmentary condition; while the Catholic and Protestant princes obtained formal recognition of their territorial independence and their religious equality. Thus disappeared the two principles which justified the Empire's existence; the universal sovereignty to which it laid claim was limited simply to a German monarchy much crippled in its powers; and the enfranchisement of the Lutherans and Calvinists from papal jurisdiction cut the last tie which bound the Empire to Rome. The victors' material benefits were no less substantial: the congress of Münster ratified the final cession of the Three Bishoprics and the conquest of Alsace, and Breisach and Philippsburg completed these acquisitions. The Spaniards had no longer any hope of adding Luxemburg to their Franche-Comté; while the Holy Roman Empire in Germany, taken in the rear by Sweden (now mistress of the Baltic and the North Sea), cut off for good from the United Provinces and the Swiss cantons, and enfeebled by the recognized right of intervention in German affairs on the part of Sweden and France, was now nothing but a meaningless name.

Mazarin had not been so fortunate in Italy, where in 1642 the Spanish remained masters. Venice, the duchy of Milan and the duke of Modena were on his side; the pope and the grand-duke of Tuscany were trembling, but the romantic expedition of the duke of Guise to Naples, and the outbreak of the Fronde, saved Spain, who had refused to take part in the treaties of Westphalia and whose ruin Mazarin wished to compass.

State of the kingdom.

It was, however, easier for Mazarin to remodel the map of Europe than to govern France. There he found himself face to face with all the difficulties that Richelieu had neglected to solve, and that were now once more giving trouble. The *Lit de Justice* of the 18th of May 1643 had proved authority to remain still so personal an affair that the person of the king, insignificant though that was, continued to be regarded as its absolute depositary. Thus regular obedience to an abstract principle was under Mazarin as incomprehensible to the idle and selfish nobility as it had been under Richelieu. The parlement still kept up the same extra-judicial pretensions; but beyond its judicial functions it acted merely as a kind of town-crier to the monarchy, charged with making known the king's edicts. Yet through its right of remonstrance it was the only body that could legally and publicly intervene in politics; a large and independent body, moreover, which had its own demands to make upon the monarchy and its ministers. Richelieu, by setting his special agents above the legal but complicated machinery of financial administration, had so corrupted it as to necessitate radical reform; all the more so because financial charges had been increased to a point far beyond what the nation could bear. With four armies to keep up, the insurrection in Portugal to maintain, and pensions to serve the needs of the allies, the burden had become a crushing one.

Richelieu and Mazarin.

Richelieu had been able to surmount these difficulties because he governed in the name of a king of full age, and against isolated adversaries; while Mazarin had the latter against him in a coalition which had lasted ten years, with the further disadvantages of his foreign origin and a royal minority at a time when every one was sick of government by ministers. He was the very opposite of Richelieu, as wheedling in his ways as the other had been haughty and scornful, as devoid of vanity and rancour as Richelieu had been full of jealous care for his authority; he was gentle where the other had been passionate and irritable, with an intelligence as great and more supple, and a far more grasping nature.

Financial difficulties.

It was the fiscal question that arrayed against Mazarin a coalition of all petty interests and frustrated ambitions; this was always the Achilles' heel of the French monarchy, which in 1648 was at the last extremity for money. All imposts were forestalled, and every expedient for obtaining either direct or indirect taxes had been exhausted by the methods of the financiers. As the country districts could yield nothing more, it became necessary to demand money from the Parisians and from the citizens of the various towns, and to search out and furbish up old disused edicts—edicts as to measures and scales of prices—at the very moment when the luxury and corruption of the *parvenus* was insulting the poverty and suffering of the people, and exasperating all those officials who took their functions seriously.

Rebellion of the parlement.

A storm burst forth in the parlement against Mazarin as the patron of these expedients, the occasion for this being the edict of redemption by which the government renewed for nine years the "Paulette" which had now expired, by withholding four years' salary from all officers of the Great Council, of the *Chambres des comptes*, and of the *Cour des aides*. The parlement, although expressly exempted, associated itself with their protest by the decree of union of May 13, 1648, and deliberations in a body upon the reform of the state. Despite the queen's express prohibition, the insurrectionary assembly of the Chambre Saint Louis criticized the whole financial system, founded as it was upon usury, claimed the right of voting taxes, respect for individual liberty, and the suppression of the intendants, who were a menace to the new bureaucratic feudalism. The queen, haughty and exasperated though she was, yielded for the time being, because the invasion of the Spaniards in the north, the arrest of Charles I. of England, and the insurrection of Masaniello at Naples made the moment a critical one for monarchies; but immediately after the victory at Lens she attempted a *coup d'état*, arresting the leaders, and among them Broussel, a popular member of the parlement (August 26, 1648). Paris at once rose in revolt—a Paris of swarming and unpoliced streets, that had been making French history ever since the reign of Henry IV., and that had not forgotten the barricades of the League. Once more a pretence of yielding had to be made, until Condé's arrival enabled the court to take refuge at Saint-Germain (January 15, 1649).

The Fronde (1648-1652).

Civil war now began against the rebellious coalition of great nobles, lawyers of the parlement, populace, and mercenaries just set free from the Thirty Years' War. It lasted four years, for motives often as futile as the Grande Mademoiselle's ambition to wed little Louis XIV., Cardinal de Retz's red hat, or Madame de Longueville's stool at the queen's side; it was, as its name of *Fronde* indicates, a hateful farce, played by grown-up children, in several acts.

The Fronde of the Parlement.

Its first and shortest phase was the Fronde of the Parlement. At a period when all the world was a little mad, the parlement had imagined a loyalist revolt, and, though it raised an armed protest, this was not against the king but against Mazarin and the persons to whom he had delegated power. But the parlement soon became disgusted with its allies—the princes and nobles, who had only drawn their swords in order to beg more effectively with arms in their hands; and the Parisian mob, whose fanaticism had been aroused by Paul de Gondi, a warlike ecclesiastic, a Catiline in a cassock, who preached the gospel at the dagger's point. When a suggestion was made to the parlement to receive an envoy from Spain, the members had no hesitation in making terms with the court by the peace of Rueil (March 11, 1649), which ended the first Fronde.

The Fronde of the Princes.

As an *entr'acte*, from April 1649 to January 1650, came the affair of the *Petits Maîtres*: Condé, proud and violent; Gaston of Orleans, pliable and contemptible; Conti, the simpleton; and Longueville, the betrayed husband. The victor of Lens and Charenton imagined that every one was under an obligation to him, and laid claim to a dictatorship so insupportable that Anne of Austria and Mazarin—assured by Gondi of the concurrence of the parlement and people—had him arrested. To defend Condé the great conspiracy of women was formed: Madame de Chevreuse, the subtle and impassioned princess palatine, and the princess of Condé vainly attempted to arouse Normandy, Burgundy and the mob of Bordeaux; while Turenne, bewitched by Madame de Longueville, allowed himself to become involved with Spain and was defeated at Rethel (December 15, 1650). Unfortunately, after his custom when victor, Mazarin forgot his promises—above all, Gondi's cardinal's hat. A union was effected between the two Frondes, that of the Petits Maîtres and that of the parlements, and Mazarin was obliged to flee for safety to the electorate of Cologne (February 1651), whence he continued to govern the queen and the kingdom by means of secret letters. But the heads of the two Frondes—Condé, now set free from prison at Havre, and Gondi who detested him—were not long in quarrelling fatally. Owing to Mazarin's exile and to the king's attainment of his majority (September 5, 1651) quiet was being restored, when the return of Mazarin, jealous of Anne of Austria, nearly brought about another reconciliation of all his opponents (January 1652). Condé resumed civil war with the support of Spain, because he was not given Mazarin's place; but though he defeated the royal army at Bléneau, he was surprised at Étampes, and nearly crushed by Turenne at the gate of Saint-Antoine. Saved, however, by the Grande Mademoiselle, daughter of Gaston of Orleans, he lost Paris by the disaster of the Hôtel de Ville July 4, 1652), where he had installed an insurrectionary government. A general weariness of civil war gave plenty of opportunity after this to the agents of Mazarin, who in order to facilitate peace made a pretence of exiling himself for a second time to Bouillon. Then came the final collapse: Condé having taken refuge in Spain for seven years, Gaston of Orleans being in exile, Retz in prison, and the parlement reduced to its judiciary functions only, the field was left open for Mazarin, who, four months after the king, re-entered in triumph that Paris which had driven him forth with jeers and mockery (February 1653).

The administration of Mazarin.

The task was now to repair these four years of madness and folly. The nobles who had hoped to set up the League again, half counting upon the king of Spain, were held in check by Mazarin with the golden dowries of his numerous nieces, and were now employed by him in warfare and in decorative court functions; while others, De Retz and La Rochefoucauld, sought consolation in their Memoirs or their Maxims, one for his mortifications and the other for his rancour as a statesman out of employment. The parlement, which had confused political power with judiciary administration, was given to understand, in the session of April 13, 1655, at Vincennes, that the era of political manifestations was over; and the money expended by Gourville, Mazarin's agent, restored the members of the parlement to docility. The power of the state was confided to middle-class men, faithful servants during the evil days: Abel Servien, Michel le Tellier, Hugues de Lionne. Like Henry IV. after the League, Mazarin, after having conquered the Fronde, had to buy back bit by bit the kingdom he had lost, and, like Richelieu, he spread out a network of agents, thenceforward regular and permanent, who assured him of that security without which he could never have carried on his vast plunderings in peace and quiet. His imitator and superintendent, Fouquet, the Maecenas of the future Augustus, concealed this gambling policy beneath the lustre of the arts and the glamour of a literature remarkable for elevation of thought and vigour of style, and further characterized by the proud though somewhat restricted freedom conceded to men like Corneille, Descartes and Pascal, but soon to disappear.

War with Spain.

Peace of the Pyrenees.

It was also necessary to win back from Spain the territory which the Frondeurs had delivered up to her. Both countries, exhausted by twenty years of war, were incapable of bringing it to a successful termination, yet neither would be first to give in; Mazarin, therefore, disquieted by Condé's victory at Valenciennes (1656), reknit the bond of Protestant alliances, and, having nothing to expect from Holland, he deprived Spain of her alliance with Oliver Cromwell (March 23, 1657). A victory in the Dunes by Turenne, now reinstalled in honour, and above all the conquest of the Flemish seaboard, were the results (June 1658); but when, in order to prevent the emperor's intervention in the Netherlands, Mazarin attempted, on the death of Ferdinand III., to wrest the Empire from the Habsburgs, he was foiled by the gold of the Spanish envoy Peñaranda (1657). When the abdication of Christina of Sweden caused a quarrel between Charles Gustavus of Sweden and John Casimir of Poland, by which the emperor and the elector of Brandenburg hoped to profit, Mazarin (August 15, 1658) leagued the Rhine princes against them; while at the same time the substitution of Pope Alexander VII. for Innocent X., and the marriage of Mazarin's two nieces with the duke of Modena and a prince of the house of Savoy, made Spain anxious about her Italian possessions. The suggestion of a marriage between Louis XIV. and a princess of Savoy decided Spain, now brought to bay, to accord him the hand of Maria Theresa as a chief condition of the peace of the Pyrenees (November 1659). Roussillon and Artois, with a line of strongholds constituting a formidable northern frontier, were ceded to France; and the acquisition of Alsace and Lorraine under certain conditions was ratified. Thus from this long duel between the two countries Spain issued much enfeebled, while France obtained the preponderance in Italy, Germany, and throughout northern Europe, as is proved by Mazarin's successful arbitration at Copenhagen and at Oliva (May–June 1660). That dream of Henry IV. and Richelieu, the ruin of Philip II.'s Catholic empire, was made a realized fact by Mazarin; but the clever engineer, dazzled by success, took the wrong road in national policy when he hoped to crown his work by the Spanish marriage.

Louis XIV. (1661–1715).

The development of events had gradually enlarged the royal prerogative, and it now came to its full flower in the administrative monarchy of the 17th century. Of this system Louis XIV. was to be the chief exponent. His reign may be divided into two very distinct periods. The death of Colbert and the revocation of the edict of Nantes brought the first to a close (1661–1683–1685); coinciding with the date when the Revolution in England definitely reversed the traditional system of alliances, and when the administration began to disorganize. In the second period (1685–1715) all the germs of decadence were developed until the moment of final dissolution.

Education of Louis XIV.

In a monarchy so essentially personal the preparation of the heir to the throne for his position should have been the chief task. Anne of Austria, a devoted but unintelligent mother, knew no method of dealing with her son, save devotion combined with the rod. His first preceptors were nothing but courtiers; and the most intelligent, his valet Laporte, developed in the royal child's mind his natural instinct of command, a very lively sense of his rank, and that nobly majestic air of master of the world which he preserved even in the commonest actions of his life. The continual agitations of the Fronde prevented him from persevering in any consistent application during those years which are the most valuable for study, and only instilled in him a horror of revolution, parliamentary remonstrance, and disorder of all kinds; so that this recollection determined the direction of his government. Mazarin, in his later years, at last taught him his trade as king by admitting him to the council, and by instructing him in the details of politics and of administration. In 1661 Louis XIV. was a handsome youth of twenty-two, of splendid health and gentle serious mien; eager for pleasure, but discreet and even dissimulating; his rather mediocre intellectual qualities relieved by solid common sense; fully alive to his rights and his duties.

His political ideas.

The duties he conscientiously fulfilled, but he considered he need render no account of them to any one but his Maker, the last humiliation for God's vicegerent being "to take the law from his people." In the solemn language of the "Memoirs for the Instruction of the Dauphin" he did but affirm the arbitrary and capricious character of his predecessors' action. As for his rights, Louis XIV. looked upon these as plenary and unlimited. Representative of God upon earth, heir to the sovereignty of the Roman emperors, a universal suzerain and master over the goods and the lives of his vassals, he could conceive no other bounds to his authority than his own interests or his obligations towards God, and in this he was a willing believer of Bossuet. He therefore had but two aims: to increase his power at home and to enlarge his kingdom abroad. The army and taxation were the chief instruments of his policy. Had not Bodin, Hobbes and Bossuet taught that the force which gives birth to kingdoms serves best also to feed and sustain them? His theory of the state, despite Grotius and Jurieu, rejected as odious and even impious the notion of any popular rights, anterior and superior to his own. A realist in principle, Louis XIV. was terribly utilitarian and egotistical in practice; and he exacted from his subjects an absolute, continual and obligatory self-abnegation before his public authority, even when improperly exercised.

The forms of Louis XIV.'s monarchy.

This deified monarch needed a new temple, and Versailles, where everything was his creation, both men and things, adored its maker. The highest nobility of France, beginning with the princes of the blood, competed for posts in the royal household, where an army of ten thousand soldiers, four thousand servants, and five thousand horses played its costly and luxurious part in the ordered and almost religious pageant of the king's existence. The "*anciennes cohues de France*," gay, familiar and military, gave place to a stilted court life, a perpetual adoration, a very ceremonious and very complicated ritual, in which the demigod "pontificated" even "in his dressing-gown." To pay court to himself was the first and only duty in the eyes of a proud and haughty prince who saw and noted everything, especially any one's absence. Versailles, where the delicate refinements of Italy and the grave politeness of Spain were fused and mingled with French vivacity, became the centre of national life and a model for foreign royalties; hence if Versailles has played a considerable part in the history of civilization, it also seriously modified the life of France. Etiquette and self-seeking became the chief rules of a courtier's life, and this explains the division of the nobility into two sections: the provincial squires, embittered by neglect; and the courtiers, who were ruined materially and intellectually by their way of living. Versailles sterilized all the idle upper classes, exploited the industrious classes by its extravagance, and more and more broke relations between king and kingdom.

Louis XIV.'s ministers.

But however divine, the king could not wield his power unaided. Louis XIV. called to his assistance a hierarchy of humbly submissive functionaries, and councils over which he regularly presided. Holding the very name of *roi fainéant* in abhorrence, he abolished the office of mayor of the palace—that is to say, the prime minister—thus imposing upon himself work which he always regularly performed. In choosing his collaborators his principle was never to select nobles or ecclesiastics, but persons of inferior birth. Neither the immense fortunes amassed by these men, nor the venality and robust vitality which made their families veritable races of ministers, altered the fact that De Lionne, Le Tellier, Louvois and Colbert were in themselves of no account, even though the parts they played were much more important than Louis XIV. imagined. This was the age of plebeians, to the great indignation of the duke and peer Saint Simon. Mere

Royal despotism.

reflected lights, these satellites professed to share their master's horror of all individual and collective rights of such a nature as to impose any check upon his public authority. Louis XIV. detested the states-general and never convoked them, and the parlements were definitely reduced to silence in 1673; he completed the destruction of municipal liberties, under pretext of bad financial administration; suffered no public, still less private criticism; was ruthless when his exasperated subjects had recourse to force; and made the police the chief bulwark of his government. Prayers and resignation were the only solace left for the hardships endured by his subjects. All the ties of caste, class, corporation and family were severed; the jealous despotism of Louis XIV. destroyed every opportunity of taking common action; he isolated every man in private life, in individual interests, just as he isolated himself more and more from the body social. Freedom he tolerated for himself alone.

Louis XIV. and the Church.

Declaration of the Four Articles.

His passion for absolutism made him consider himself master of souls as well as bodies, and Bossuet did nothing to contravene an opinion which was, indeed, common to every sovereign of his day. Louis XIV., like Philip II., pretending to not only political but religious authority, would not allow the pope to share it, still less would he abide any religious dissent; and this gave rise to many conflicts, especially with the pope, at that time a temporal sovereign both at Rome and at Avignon, and as the head of Christendom bound to interfere in the affairs of France. Louis XIV.'s pride caused the first struggle, which turned exclusively upon questions of form, as in the affair of the Corsican Guard in 1662. The question of the right of *regale* (right of the Crown to the revenues of vacant abbeys and bishoprics), which touched the essential rights of sovereignty, further inflamed the hostility between Innocent XI. and Louis XIV. Conformably with the traditions of the administrative monarchy in 1673, the king wanted to extend to the new additions to the kingdom his rights of receiving the revenues of vacant bishoprics and making appointments to their benefices, including taking oaths of fidelity from the new incumbents. A protest raised by the bishops of Pamiers and Aleth, followed by the seizure of their revenues, provoked the intervention of Innocent XI. in 1678; but the king was supported by the general assembly of the clergy, which declared that, with certain exceptions, the *regale* extended over the whole kingdom (1681). The pope ignored the decisions of the assembly; so, dropping the *regale*, the king demanded that, to obviate further conflict, the assembly should define the limits of the authority due respectively to the king, the Church and the pope. This was the object of the Declaration of the Four Articles: the pope has no power in temporal matters; general councils are superior to the pope in spiritual affairs; the rules of the Church of France are inviolable; decisions of the pope in matters of faith are only irrevocable by consent of the Church. The French laity transferred to the king this quasi-divine authority, which became the political theory of the *ancien régime*; and since the pope refused to submit, or to institute the new bishops, the Sorbonne was obliged to interfere. The affair of the "diplomatic prerogatives," when Louis XIV. was decidedly in the wrong, made relations even more strained (1687), and the idea of a schism was mooted with greater insistence than in 1681. The death of Innocent XI. in 1689 allowed Louis XIV. to engage upon negotiations rendered imperative by his check in the affair of the Cologne bishopric, where his candidate was ousted by the pope's. In 1693, under the pontificate of Innocent XII., he went, like so many others, to Canossa.

Recipient now of immense ecclesiastical revenues, which, owing to the number of vacant benefices, constituted a powerful engine of government, Louis XIV. had immense power over the French Church. Religion began to be identified with the state; and the king combated heresy and dissent, not only as a religious duty, but as a matter of political expediency, unity of faith being obviously conducive to unity of law.

Louis XIV. and the Protestants.

Suppression of the edict of Nantes (1685).

Richelieu having deprived the Protestants of all political guarantees for their liberty of conscience, an anti-Protestant party (directed by a cabal of religious devotees, the *Compagnie du Saint Sacrement*) determined to suppress it completely by conversions and by a jesuitical interpretation of the terms of the edict of Nantes. Louis XIV. made this impolitic policy his own. His passion for absolutism, a religious zeal that was the more active because it had to compensate for many affronts to public and private morals, the financial necessity of augmenting the free donations of the clergy, and the political necessity of relying upon that body in his conflicts with the pope, led the king between 1661 and 1685 to embark upon a double campaign of arbitrary proceedings with the object of nullifying the edict, conversions being procured either by force or by bribery. The promulgation and application of systematic measures from above had a response from below, from the corporation, the urban workshop, and the village street, which supported ecclesiastical and royal authority in its suppression of heresy, and frequently even went further: individual and local fanaticism co-operating with the head of the state, the *intendants*, and the military and judiciary authorities. Protestants were successively removed from the states-general, the consulates, the town councils, and even from the humblest municipal offices; they were deprived of the charge of their hospitals, their academies, their colleges and their schools, and were left to ignorance and poverty; while the intolerance of the clergy united with chicanery of procedure to invade their places of worship, insult their adherents, and put a stop to the practice of their ritual. Pellisson's methods of conversion, considered too slow, were accelerated by the violent persecution of Louvois and by the king's galleys, until the day came when Louis XIV., deceived by the clergy, crowned his record of complaisant legal methods by revoking the edict of Nantes. This was the signal for a Huguenot renaissance, and the Camisards of the Cévennes held the royal armies in check from 1703 to 1711. Notwithstanding this, however, Louis XIV. succeeded only too well, since Protestantism was reduced both numerically and intellectually. He never perceived how its loss threw France back a full century, to the great profit of foreign nations; while neither did the Church perceive that she had been firing on her own troops.

Louis XIV. and the Jansenists.

The same order of ideas produced the persecution of the Jansenists, as much a political as a religious sect. Founded by a bishop of Ypres on the doctrine of predestination, and growing by persecution, it had speedily recruited adherents among the disillusioned followers of the Fronde, the Gallican clergy, the higher nobility, even at court, and more important still, among learned men and thinkers, such as the great Arnauld, Pascal and Racine. Pure and austere, it enjoined the strictest morals in the midst of corruption, and the most dignified self-respect in face of idolatrous servility. Amid general silence it was a formidable and much dreaded body of opinion; and in order to stifle it Louis XIV., the tool of his confessor, the Jesuit Le Tellier, made use of his usual means. The nuns of Port Royal were in their turn subjected to persecution, which, after a truce between 1666 and 1679, became aggravated by the affair of the *regale*, the bishops of Aleth and Pamiers being Jansenists. Port Royal was destroyed, the nuns dispersed, and the ashes of the dead scattered to the four winds. The bull *Unigenitus* launched by Pope Clement XI. in 1713 against a Jansenist book by Father Quesnel rekindled a quarrel, the end of which Louis XIV. did not live to see, and which raged throughout the 18th century.

Louis XIV. and the Libertins.

Bossuet, Louis XIV.'s mouthpiece, triumphed in his turn over the quietism of Madame Guyon, a mystic who recognized neither definite dogmas nor formal prayers, but abandoned herself "to the torrent of the forces of God." Fénelon, who in his *Maximes des Saints* had given his adherence to her doctrine, was obliged to submit in 1699; but Bossuet could not make the spirit of authority prevail against the religious criticism of a Richard Simon or the philosophical polemics of a Bayle. He might exile their persons; but their doctrines, supported by the scientific and philosophic work of Newton and Leibnitz, were to triumph over Church and religion in the 18th century.

The chaos of the administrative system caused difficulties no less great than those produced by opinions and creeds. Traditional rights, differences of language, provincial autonomy, ecclesiastical assemblies, parlements, governors, intendants—vestiges of the past, or promises for the future—all jostled against and thwarted each other. The central authority had not yet acquired a vigorous constitution, nor destroyed all the intermediary authorities. Colbert now offered his aid in making Louis XIV. the sole pivot of public life, as he had already become the source of religious authority, thanks to the Jesuits and to Bossuet.

Colbert.

Colbert, an agent of Le Tellier, the honest steward of Mazarin's dishonest fortunes, had a future opened to him by the fall of Fouquet (1661). Harsh and rough, he compelled admiration for his delight in work, his aptitude in disentangling affairs, his desire of continually augmenting the wealth of the state, and his regard for the public welfare without forgetting his own. Born in a draper's shop, this great administrator always preserved its narrow horizon, its short-sighted imagination, its taste for detail, and the conceit of the parvenu; while with his insinuating ways, and knowing better than Fouquet how to keep his distance, he made himself indispensable by his *savoir-faire* and his readiness for every emergency. He gradually got everything into his control: finance, industry, commerce, the fine arts, the navy and colonies, the administration, even the fortifications, and—through his uncle Pussort—the law, with all the profits attaching to its offices.

Colbert and finance.

His first care was to restore the exhausted resources of the country and to re-establish order in finance. He began by measures of liquidation: the *Chambre ardente* of 1661 to 1665 to deal with the farmers of the revenue, the condemnation of Fouquet, and a revision of the funds. Next, like a good man of business, Colbert determined that the state accounts should be kept as accurately as those of a shop; but though in this respect a great minister, he was less so in his manner of levying contributions. He kept to the old system of revenues from the demesne and from imposts that were reactionary in their effect, such as the *taille*, aids, salt-tax (*gabelle*) and customs; only he managed them better. His forest laws have remained a model. He demanded less of the *taille*, a direct impost, and more from indirect aids, of which he created the code—not, however, out of sympathy for the common people, towards whom he was very harsh, but because these aids covered a greater area and brought in larger returns. He tried to import more method into the very unequal distribution of taxation, less brutality in collection, less confusion in the fiscal machine, and more uniformity in the matter of rights; while he diminished the debts of the much-involved towns by putting them through the bankruptcy court. With revolutionary intentions as to reform, this only ended, after several years of normal budgets, in ultimate frustration. He could never make the rights over the drink traffic uniform and equal, nor restrict privileges in the matter of the *taille*; while he was soon much embarrassed, not only by the coalition of particular interests and local immunities, which made despotism acceptable by tempering it, but also by Louis XIV.'s two master-passions for conquest and for building. To his great chagrin he was obliged to begin borrowing again in 1672, and to have recourse to "*affaires extraordinaires*"; and this brought him at last to his grave.

Colbert and industry.

Order was for Colbert the prime condition of work. He desired all France to set to work as he did "with a contented air and rubbing his hands for joy"; but neither general theories nor individual happiness preoccupied his attention. He made economy truly political: that is to say, the prosperity of industry and commerce afforded him no other interest than that of making the country wealthy and the state powerful. Louis XIV.'s aspirations towards glory chimed in very well with the extremely positive views of his minister; but here too Colbert was an innovator and an unsuccessful one. He wanted to give 17th-century France the modern and industrial character which the New World had imprinted on the maritime states; and he created industry on a grand scale with an energy of labour, a prodigious genius for initiative and for organization; while, in order to attract a foreign clientèle, he imposed upon it the habits of meticulous probity common to a middle-class draper. But he maintained the legislation of the Valois, who placed industry in a state of strict dependency on finance, and he instituted a servitude of labour harder even than that of individuals; his great factories of soap, glass, lace, carpets and cloth had the same artificial life as that of contemporary Russian industry, created and nourished by the state. It was therefore necessary, in order to compensate for the fatal influence of servitude, that administrative protection should be lavished without end upon the royal manufactures; moreover, in the course of its development, industry on a grand scale encroached in many ways upon the resources of smaller industries. After Colbert's day, when the crutches lent by privilege were removed, his achievements lost vigour; industries that ministered to luxury alone escaped decay; the others became exhausted in struggling against the persistent and teasing opposition of the municipal bodies and the bourgeoisie—conceited, ignorant and terrified at any innovation—and against the blind and intolerant policy of Louis XIV.

Colbert and commerce.

Colbert, in common with all his century, believed that the true secret of commerce and the indisputable proof of a country's prosperity was to sell as many of the products of national industry to the foreigner as possible, while purchasing as little as possible. In order to do this, he sometimes figured as a free-trader and sometimes as a protectionist, but always in a practical sense; if he imposed prohibitive tariffs, in 1664 and 1667, he also opened the free ports of Marseilles and Dunkirk, and engineered the *Canal du midi*. But commerce, like industry, was made to rely only on the instigation of the state, by the intervention of officials; here, as throughout the national life, private initiative was kept in subjection and under suspicion. Once more Colbert failed; with regard to internal affairs, he was unable to unify weights and measures, or to suppress the many custom-houses which made France into a miniature Europe; nor could he in external affairs reform the consulates of the Levant. He did not understand that, in order to purge the body of the nation from its traditions of routine, it would be necessary to reawaken individual energy in France. He believed that the state, or rather the bureaucracy, might be the motive power of national activity.

Colbert and the colonies.

His colonial and maritime policy was the newest and most fruitful part of his work. He wished to turn the eyes of contemporary adventurous France towards her distant interests, the wars of religion having diverted her attention from them to the great profit of English and Dutch merchants. Here too he had no preconceived ideas; the royal and monopolist companies were never for him an end but a means; and after much experimenting he at length attained success. In the course of twenty years he created many dependencies of France beyond sea. To her colonial empire in America he added the greater part of Santo Domingo, Tobago and Dominica; he restored Guiana; prepared for the acquisition of Louisiana by supporting Cavelier de la Salle; extended the suzerainty of the king on the coast of Africa from the Bay of Arguin to the shores of Sierra Leone, and instituted the first commercial relations with India. The population of the Antilles doubled; that of Canada quintupled; while if in 1672 at the time of the war with Holland Louis XIV. had listened to him, Colbert would have sacrificed his pride to the acquisition of the rich colonies of the Netherlands. In order to attach and defend these colonies Colbert created a navy which became his passion; he took convicts to man the galleys in the Mediterranean, and for the fleet in the Atlantic he established the system of naval reserve which still obtains. But, in the 18th century, the monarchy, hypnotized by the classical battle-fields of Flanders and Italy, madly squandered the fruits of Colbert's work as so much material for barter and exchange.

Colbert and the administration.

In the administration, the police and the law, Colbert preserved all the old machinery, including the inheritance of office. In the great codification of laws, made under the direction of his uncle Pussort, he set aside the parlement of Paris, and justice continued to be ill-administered and cruel. The police, instituted in 1667 by La Reynie, became a public force independent of magistrates and under the direct orders of the ministers, making the arbitrary royal and ministerial authority absolute by means of *lettres de cachet* (*q.v.*), which were very convenient for the government and very terrible for the individuals concerned.

Provincial administration was no longer modified; it was regularized. The intendant became the king's factotum, not purchasing his office but liable to dismissal, the government's confidential agent and the real repository of royal authority, the governor being only for show (see INTENDANT).

Ruin of Colbert's work.

Colbert's system went on working regularly up to the year 1675; from that time forward he was cruelly embarrassed for money, and, seeking new sources of revenue, begged for subsidies from the assembly of the clergy. He did not succeed either in stemming the tide of expense, nor in his administration, being in no way in advance of his age, and not perceiving that decisive reform could not be achieved by a government dealing with the nation as though it were inert and passive material, made to obey and to pay. Like a good Cartesian he conceived of the state as an immense machine, every portion of which should receive its impulse from outside—that is from him, Colbert. Leibnitz had not yet taught that external movement is nothing, and inward spirit everything. As the minister of an ambitious and magnificent king, Colbert was under the hard necessity of sacrificing everything to the wars in Flanders and the pomp of Versailles—a gulf which swallowed up all the country's wealth;—and, amid a society which might be supposed submissively docile to the wishes of Louis XIV., he had to retain the most absurd financial laws, making the burden of taxation weigh heaviest on those who had no other resources than their labour, whilst landed property escaped free of charge. Habitual privation during one year in every three drove the peasants to revolt: in Boulonnais, the Pyrenees, Vivarais, in Guyenne from 1670 onwards and in Brittany in 1675. Cruel means of repression assisted natural hardships and the carelessness of the administration in depopulating and laying waste the countryside; while Louis XIV.'s martial and ostentatious policy was even more disastrous than pestilence and famine, when Louvois' advice prevailed in council over that of Colbert, now embittered and desperate. The revocation of the edict of Nantes vitiated through a fatal contradiction all the efforts of the latter to create new manufactures; the country was impoverished for the benefit of the foreigner to such a point that economic conditions began to alarm those private persons most noted for their talents, their character, or their regard for the public welfare; such as La Bruyère and Fénelon in 1692, Bois-Guillebert in 1697 and Vauban in 1707. The movement attracted even the ministers, Boulainvilliers at their head, who caused the intendants to make inquiry into the causes of this general ruin. There was a volume of attack upon Colbert; but as the fundamental system remained unchanged, because reform would have necessitated an attack upon privilege and even upon the constitution of the monarchy, the evil only went on increasing. The social condition of the time recalls that of present-day Morocco, in the high price of necessaries and the extortions of the financial authorities; every man was either soldier, beggar or smuggler.

Under Pontchartrain, Chamillard and Desmarets, the expenses of the two wars of 1688 and 1701 attained to nearly five milliards. In order to cover this recourse was had as usual, not to remedies, but to palliatives worse than the evil: heavy usurious loans, debasement of the coinage, creation of stocks that were perpetually being converted, and ridiculous charges which the bourgeois, sickened with officialdom, would endure no longer. Richelieu himself had hesitated to tax labour; Louis XIV. trod the trade organizations under foot. It was necessary to have recourse to revolutionary measures, to direct taxation, ignoring all class distinction. In 1695 the graduated poll-tax was a veritable *coup d'état* against privileged persons, who were equally brought under the tax; in 1710 was added the tithe (*dixième*), a tax upon income from all landed property. Money scarce, men too were lacking; the institution of the militia, the first germ of obligatory enlistment, was a no less important innovation. But these were only provisionary and desperate expedients, superposed upon the old routine, a further charge in addition to those already existing; and this entirely mechanical system, destructive of private initiative and the very sources of public life, worked with difficulty even in time of peace. As Louis XIV. made war continually the result was the same as in Spain under Philip II.: depopulation and bankruptcy within the kingdom and the coalitions of Europe without.

Recourse to revolutionary measures.

Foreign policy of Louis XIV.

In 1660 France was predominant in Europe; but she aroused no jealousy except in the house of Habsburg, enfeebled and divided against itself. It was sufficient to remain faithful to the practical policy of Henry IV., of Richelieu and of Mazarin: that of moderation in strength. This Louis XIV. very soon altered, while yet claiming to continue it; he superseded it by one principle: that of replacing the proud tyranny of the Habsburgs of Spain by another. He claimed to lay down the law everywhere, in the preliminary negotiations between his ambassador and the Spanish ambassador in London, in the affair of the salute exacted from French vessels by the English, and in that of the Corsican guard in Rome; while he proposed to become the head of the crusade against the Turks in the Mediterranean as in Hungary.

The eclipse of the great idea of the balance of power in Europe was no sudden affair; the most flourishing years of the reign were still enlightened by it: witness the repurchase of Dunkirk from Charles II. in 1662, the cession of the duchies of Bar and of Lorraine and the war against Portugal. But soon the partial or total conquest of the Spanish inheritance proved "the grandeur of his beginnings and the meanness of his end." Like Philip the Fair and like Richelieu, Louis XIV. sought support for his external policy in that public opinion which in internal matters he held so cheap; and he found equally devoted auxiliaries in the jurists of his parlements.

War of Devolution, 1667.

It was thus that the first of his wars for the extension of frontiers began, the War of Devolution. On the death of his father-in-law, Philip IV. of Spain, he transferred into the realm of politics a civil custom of inheritance prevailing in Brabant, and laid claim to Flanders in the name of his wife Maria Theresa. The Anglo-Dutch War (1665–1667), in which he was by way of supporting the United Provinces without engaging his fleet, retarded this enterprise by a year. But after his mediation in the treaty of Breda (July 1667), when Hugues de Lionne, secretary of state for foreign affairs, had isolated Spain, he substituted soldiers for the jurists and cannon for diplomacy in the matter of the queen's rights.

The secretary of state for war, Michel le Tellier, had organized his army; and thanks to his great activity in reform, especially after the Fronde, Louis XIV. found himself in possession of an army that was well equipped, well clothed, well provisioned, and very different from the rabble of the Thirty Years' War, fitted out by dishonest jobbing contractors. Severe discipline, suppression of fraudulent interference, furnishing of clothes and equipment by the king, regulation of rank among the officers, systematic revictualling of the army, settled means of manufacturing and furnishing arms and ammunition, placing of the army under the direct authority of the king, abolition of great military charges, subordination of the governors of strongholds, control by the civil authority over the soldiers effected by means of paymasters and commissaries of stores; all this organization of the royal army was the work of le Tellier.

His son, François Michel le Tellier, marquis de Louvois, had one sole merit, that of being his father's pupil. A *parvenu* of the middle classes, he was brutal in his treatment of the lower orders and a sycophant in his behaviour towards the powerful; prodigiously active, ill-obeyed—as was the custom—but much dreaded. From 1677 onwards he did but finish perfecting Louis XIV.'s army in accordance with the suggestions left by his father, and made no fundamental changes: neither the definite abandonment of the feudal *arrière-ban* and of recruiting—sources of disorder and insubordination—nor the creation of the militia, which allowed the nation to penetrate into all the ranks of the army, nor the adoption of the gun with the bayonet,—which was to become the *ultima ratio* of peoples as the cannon was that of sovereigns,—nor yet the uniform, intended to strengthen *esprit de corps*, were due to him. He maintained the institutions of the day, though seeking to diminish their abuse, and he perfected material details; but misfortune would have it that instead of remaining a great military administrator he flattered Louis XIV.'s megalomania, and thus caused his perdition.

The triple alliance of the Hague.

Under his orders Turenne conquered Flanders (June-August 1667); and as the queen-mother of Spain would not give in, Condé occupied Franche Comté in fourteen days (February 1668). But Europe rose up in wrath; the United Provinces and England, jealous and disquieted by this near neighbourhood, formed with Sweden the triple alliance of the Hague (January 1668), ostensibly to offer their mediation, though in reality to prevent the occupation of the Netherlands. Following the advice of Colbert and de Lionne, Louis XIV. appeared to accede, and by the treaty of Aix-la-Chapelle he preserved his conquests in Flanders (May 1668).

Peace of Aix-la-Chapelle.

War with Holland.

Peace of Nijmwegen, 1678.

This peace was neither sufficient nor definite enough for Louis XIV.; and during four years he employed all his diplomacy to isolate the republic of the United Provinces in Europe, as he had done for Spain. He wanted to ruin this nation both in a military and an economic sense, in order to annex to French Flanders the rest of the Catholic Netherlands allotted to him by a secret treaty for partitioning the Spanish possessions, signed with his brother-in-law the emperor Leopold on the 19th of January 1668. Colbert—very envious of Holland's wealth—prepared the finances, le Tellier the army and de Lionne the alliances. In vain did the grand-pensionary of the province of Holland, Jan de Witt, offer concessions of all kinds; both England, bound by the secret treaty of Dover (January 1670), and France had need of this war. Avoiding the Spanish Netherlands, Louis XIV. effected the passage of the Rhine in June 1672; and the disarmed United Provinces, which had on their side only Brandenburg and Spain, were occupied in a few days. The brothers de Witt, in consequence of their fresh offer to treat at any price, were assassinated; the broken dykes of Muiden arrested the victorious march of Condé and Turenne; while the popular and military party, directed by the stadtholder William of Orange, took the upper hand and preached resistance to the death. "The war is over," said the new secretary of state for foreign affairs, Arnauld de Pomponne; but Louvois and Louis XIV. said no. The latter wished not only to take possession of the Netherlands, which were to be given up to him with half of the United Provinces and their colonial empire; he wanted "to play the Charlemagne," to re-establish Catholicism in that country as Philip II. had formerly attempted to do, to occupy all the territory as far as the Lech, and to exact an annual oath of fealty. But the patriotism and the religious fanaticism of the Dutch revolted against this insupportable tyranny. Power had passed from the hands of the burghers of Amsterdam into those of William of Orange, who on the 30th of August 1673, profiting by the arrest of the army brought about by the inundation and by the fears of Europe, joined in a coalition with the emperor, the king of Spain, the duke of Lorraine, many of the princes of the Empire, and with England, now at last enlightened as to the projects of Catholic restoration which Louis XIV. was planning with Charles II. It was necessary to evacuate and then to settle with the United Provinces, and to turn against Spain. After fighting for five years against the whole of Europe by land and by sea, the efforts of Turenne, Condé and Duquesne culminated at Nijmwegen in fresh acquisitions (1678). Spain had to cede to Louis XIV., Franche Comté, Dunkirk and half of Flanders. This was another natural and glorious result of the treaty of the Pyrenees. The Spanish monarchy was disarmed.

Truce of Ratisbon.

But Louis XIV. had already manifested that unmeasured and restless passion for glory, that claim to be the exclusive arbiter of western Europe, that blind and narrow insistence, which were to bear out his motto "*Seul contre tous.*" Whilst all Europe was disarming he kept his troops, and used peace as a means of conquest. Under orders from Colbert de Croissy the jurists came upon the scene once more, and their unjust decrees were sustained by force of arms. The *Chambres de Réunion* sought for and joined to the kingdom those lands which were not actually dependent upon his new conquests, but which had formerly been so: such as Saarbrücken, Deux Ponts (Zweibrücken) and Montbéliard in 1680, Strassburg and Casale in 1681. The power of the house of Habsburg was paralysed by an invasion of the Turks, and Louis XIV. sent 35,000 men into Belgium; while Luxemburg was occupied by Créqui and Vauban. The truce of Ratisbon (Regensburg) imposed upon Spain completed the work of the peace of Nijmwegen (1684); and thenceforward Louis XIV.'s terrified allies avoided his clutches while making ready to fight him.

William of Orange.

League of Augsburg.

This was the moment chosen by Louis XIV.'s implacable enemy, William of Orange, to resume the war. His surprise of Marshal Luxembourg near Mons, after the signature of the peace of Nijmwegen, had proved that in his eyes war was the basis of his authority in Holland and in Europe. His sole arm of support amidst all his allies was not the English monarchy, sold to Louis XIV., but Protestant England, jealous of France and uneasy about her independence. Being the husband of the duke of York's daughter, he had an understanding in this country with Sunderland, Godolphin and Temple—a party whose success was retarded for several years by the intrigues of Shaftesbury. But Louis XIV. added mistake to mistake; and the revocation of the edict of Nantes added religious hatreds to political jealousies. At the same time the Catholic powers responded by the league of Augsburg (July 1686) to his policy of unlimited aggrandisement. The unsuccessful attempts of Louis XIV. to force his partisan Cardinal Wilhelm Egon von Fürstenberg (see FÜRSTENBERG: *House*) into the electoral see of Cologne; the bombardment of Genoa; the humiliation of the pope in Rome itself by the marquis de Lavardin; the seizure of the Huguenot emigrants at Mannheim, and their imprisonment at Vincennes under pretext of a plot, precipitated the conflict. The question of the succession in the Palatinate, where Louis XIV. supported the claims of his sister-in-law the duchess of Orleans, gave the signal for a general war. The French armies devastated the Palatinate instead of attacking William of Orange in the Netherlands, leaving him free to disembark at Torbay, usurp the throne of England, and construct the Grand Alliance of 1689.

War of the Grand Alliance.

Far from reserving all his forces for an important struggle elsewhere, foreshadowed by the approaching death of Charles II. of Spain, Louis XIV., isolated in his turn, committed the error of wasting it for a space of ten years in a war of conquest, by which he alienated all that remained to him of European sympathy. The French armies, notwithstanding the disappearance of Condé and Turenne, had still glorious days before them with Luxembourg at Fleurus, at Steenkirk and at Neerwinden (1690–1693), and with Catinat in Piedmont, at Staffarda, and at Marsaglia; but these successes alternated with reverses. Tourville's fleet, victorious at Beachy Head, came to grief at La Hogue (1692); and though the expeditions to Ireland in favour of James II. were unsuccessful, thanks to the Huguenot Schomberg, Jean Bart and Duguay-

Trouin ruined Anglo-Dutch maritime commerce. Louis XIV. assisted in person at the sieges of Mons and Namur, operations for which he had a liking, because, like Louvois, who died in 1691, he thought little of the French soldiery in the open field. After three years of strife, ruinous to both sides, he made the first overtures of peace, thus marking an epoch in his foreign policy; though William took no unfair advantage of this, remaining content with the restitution of places taken by the *Chambres de Réunion*, except Strassburg, with a frontier-line of fortified places for the Dutch, and with the official deposition of the Stuarts. But the treaty of Ryswick (1697) marked the condemnation of the policy pursued since that of Nijmwegen. While signing this peace Louis XIV. was only thinking of the succession in Spain. By partitioning her in advance with the other strong powers, England and Holland, by means of the treaties of the Hague and of London (1698–1699),—as he had formerly done with the emperor in 1668,—he seemed at first to wish for a pacific solution of the eternal conflict between the Habsburgs and the Bourbons, and to restrict himself to the perfecting of his natural frontiers; but on the death of Charles II. of Spain (1700) he claimed everything in favour of his grandson, the duke of Anjou, now appointed universal heir, though risking the loss of all by once more letting himself fall into imprudent and provocative action in the dynastic interest.

Peace of Ryswick.

War of the Spanish Succession.

English public opinion, desirous of peace, had forced William III. to recognize Philip V. of Spain; but Louis XIV.'s maintenance of the eventual right of his grandson to the crown of France, and the expulsion of the Dutch, who had not recognized Philip V., from the Barrier towns, brought about the Grand Alliance of 1701 between the maritime Powers and the court of Vienna, desirous of partitioning the inheritance of Charles II. The recognition of the Old Pretender as James III., king of England, was only a response to the Grand Alliance, but it drew the English Tories into an inevitable war. Despite the death of William III. (March 19, 1702) his policy triumphed, and in this war, the longest in the reign, it was the names of the enemy's generals, Prince Eugène of Savoy, Mazarin's grand-nephew, and the duke of Marlborough, which sounded in the ear, instead of Condé, Turenne and Luxembourg. Although during the first campaigns (1701–1703) in Italy, in Germany and in the Netherlands success was equally balanced, the successors of Villars—thanks to the treason of the duke of Savoy—were defeated at Höchstädt and Landau, and were reduced to the defensive (1704). In 1706 the defeats at Ramillies and Turin led to the evacuation of the Netherlands and Italy, and endangered the safety of Dauphiné. In 1708 Louis XIV. by a supreme effort was still able to maintain his armies; but the rout at Oudenarde, due to the misunderstanding between the duke of Burgundy and Vendôme, left the northern frontier exposed, and the cannons of the Dutch were heard at Marly. Louis XIV. had to humble himself to the extent of asking the Dutch for peace; but they forgot the lesson of 1673, and revolted by their demands at the Hague, he made a last appeal to arms and to the patriotism of his subjects at Malplaquet (September 1709). After this came invasion. Nature herself conspired with the enemy in the disastrous winter of 1709.

Peace of Utrecht, 1713.

What saved Louis XIV. was not merely his noble constancy of resolve, the firmness of the marquis de Torcy, secretary of state for foreign affairs, the victory of Vendôme at Villaviciosa, nor the loyalty of his people. The interruption of the conferences at Gertruydenberg having obliged the Whigs and Marlborough to resign their power into the hands of the Tories, now sick of war, the death of the emperor Joseph I. (April 1711), which risked the reconstruction of Charles V.'s colossal and unwieldy monarchy upon the shoulders of the archduke Charles, and Marshal Villars' famous victory of Denain (July 1712) combined to render possible the treaties of Utrecht, Rastatt and Baden (1713–1714). These gave Italy and the Netherlands to the Habsburgs, Spain and her colonies to the Bourbons, the places on the coast and the colonial commerce to England (who had the lion's share), and a royal crown to the duke of Savoy and the elector of Brandenburg. The peace of Utrecht was to France what the peace of Westphalia had been to Austria, and curtailed the former acquisitions of Louis XIV.

End of Louis XIV.'s reign.

The ageing of the great king was betrayed not only by the fortune of war in the hands of Villeroy, la Feuillade, or Marsin; disgrace and misery at home were worse than defeat. By the strange and successive deaths of the Grand Dauphin (1711), the duke and duchess of Burgundy (1712)—who had been the only joy of the old monarch—and of his two grandsons (1712–1714), it seemed as though his whole family were involved under the same curse. The court, whose sentimental history has been related by Madame de la Fayette, its official splendours by Loret, and its intrigues by the duc de Saint-Simon, now resembled an infirmary of morose invalids, presided over by Louis XIV.'s elderly wife, Madame de Maintenon, under the domination of the Jesuit le Tellier. Neither was it merely the clamours of the people that arose against the monarch. All the more remarkable spirits of the time, like prophets in Israel, denounced a tyranny which put Chamillart at the head of the finances because he played billiards well, and Villeroy in command of the armies although he was utterly untrustworthy; which sent the "patriot" Vauban into disgrace, banished from the court Catinat, the Père la Pensée, "exiled" to Cambrai the too clear sighted Fénelon, and suspected Racine of Jansenism and La Fontaine of independence.

Disease and famine; crushing imposts and extortions; official debasement of the currency; bankruptcy; state prisons; religious and political inquisition; suppression of all institutions for the safe-guarding of rights; tyranny by the intendants; royal, feudal and clerical oppression burdening every faculty and every necessary of life; "monstrous and incurable luxury"; the horrible drama of poison; the twofold adultery of Madame de Montespan; and the narrow bigotry of Madame de Maintenon—all concurred to make the end of the reign a sad contrast with the splendour of its beginning. When reading Molière and Racine, Bossuet and Fénelon, the campaigns of Turenne, or Colbert's ordinances; when enumerating the countless literary and scientific institutions of the great century; when considering the port of Brest, the Canal du Midi, Perrault's colonnade of the Louvre, Mansart's Invalides and the palace of Versailles, and Vauban's fine fortifications—admiration is kindled for the radiant splendour of Louis XIV.'s period. But the art and literature expressed by the genius of the masters, reflected in the tastes of society, and to be taken by Europe as a model throughout a whole century, are no criterion of the social and political order of the day. They were but a magnificent drapery of pomp and glory thrown across a background of poverty, ignorance, superstition, hypocrisy and cruelty; remove it, and reality appears in all its brutal and sinister nudity. The corpse of Louis XIV., left to servants for disposal, and saluted all along the road to Saint Denis by the curses of a noisy crowd sitting in the *cabarets*, celebrating his death by drinking more than their fill as a compensation for having suffered too much from hunger during his lifetime—such was the coarse but sincere epitaph which popular opinion placed on the tomb of the "Grand Monarque." The nation, restive under his now broken yoke, received with a joyous anticipation, which the future was to discount, the royal infant whom they called Louis the Well-beloved, and whose funeral sixty years later was to be greeted with the same proofs of disillusionment.

Character of the eighteenth century.

The death of Louis XIV. closed a great era of French history; the 18th century opens upon a crisis for the monarchy. From 1715 to 1723 came the reaction of the Regency, with its marvellous effrontery, innovating spirit and frivolous immorality. From 1723 to 1743 came the mealy-mouthed despotism of Cardinal Fleury, and his apathetic policy within and without the kingdom. From 1743 to 1774 came the personal rule of Louis XV., when all the different powers were in conflict—the bishops and parlement quarrelling, the government fighting against the clergy and the magistracy, and public opinion in declared opposition to the state. Till at last, from 1774 to 1789, came Louis XVI. with his honest illusions.

his moral pusillanimity and his intellectual impotence, to aggravate still further the accumulated errors of ages and to prepare for the inevitable Revolution.

The Regency (1715-1723).

The 18th century, like the 17th, opened with a political *coup d'état.* Louis XV. was five years old, and the duke of Orleans held the regency. But Louis XIV. had in his will delegated all the power of the government to a council on which the duke of Maine, his legitimated son, had the first, but Madame de Maintenon and the Jesuits the predominant place. This collective administration, designed to cripple the action of the regent, encountered a twofold opposition from the nobles and the parlement; but on the 2nd of September 1715 the emancipated parlement set aside the will in favour of the duke of Orleans, who thus together with the title of regent had all the real power. He therefore reinstituted the parlement in its ancient right of remonstrance (suspended since the declarations of 1667 and 1673), and handed over ministerial power to the nobility, replacing the secretaries of state by six councils composed in part of great nobles, on the advice of the famous duc de Saint-Simon. The duc de Noailles, president of the council of finance, had the direction of this "Polysynodie."

Philip of Orleans.

The duke of Orleans, son of the princess palatine and Louis XIV.'s brother, possessed many gifts—courage, intelligence and agility of mind—but he lacked the one gift of using these to good advantage. The political crisis that had placed him in power had not put an end to the financial crisis, and this, it was hoped, might be effected by substituting partial and petty bankruptcies for the general bankruptcy cynically advocated by Saint-Simon. The reduction of the royal revenues did not suffice to fill the treasury; while the establishment of a chamber of justice (March 1716) had no other result than that of demoralizing the great lords and ladies already mad for pleasure, by bringing them into contact with the farmers of the revenue who purchased impunity from them. A very clever Scotch adventurer named John Law (*q.v.*) now offered his assistance in dealing with the enormous debt of more than three milliards, and in providing the treasury. Being well acquainted with the mechanism of banking, he had adopted views as to cash, credit and the circulation of values which contained an admixture of truth and falsehood. Authorized after many difficulties to organize a private bank of deposit and account, which being well conceived prospered and revived commerce, Law proposed to lighten the treasury by the profits accruing to a great maritime and colonial company. Payment for the shares in this new Company of the West, with a capital of a hundred millions, was to be made in credit notes upon the government, converted into 4% stock. These aggregated funds, needed to supply the immense and fertile valley of the Mississippi, and the annuities of the treasury destined to pay for the shares, were non-transferable. Law's idea was to ask the bank for the floating capital necessary, so that the bank and the Company of the West were to be supplementary to each other; this is what was called Law's system. After the chancellor D'Aguesseau and the duc de Noailles had been replaced by D'Argenson alone, and after the *lit de justice* of the 26th of August 1718 had deprived the parlement, hostile to Law, of the authority left to it, the bank became royal and the Company of the West universal. But the royal bank, as a state establishment, asked for compulsory privilege to increase the emission of its credit notes, and that they should receive a premium upon all metallic specie. The Company of the Indies became the grantee for the farming of tobacco, the coinage of metals, and farming in general; and in order to procure funds it multiplied the output of shares, which were adroitly launched and became more and more sought for on the exchange in the rue Quincampoix. This soon caused a frenzy of stock-jobbing, which disturbed the stability of private fortunes and social positions, and depraved customs and manners with the seductive notion of easily obtained riches. The nomination of Law to the controller-generalship, re-established for his benefit on the resignation of D'Argenson (January 5, 1720), let loose still wilder speculation; till the day came when he could no longer face the terrible difficulty of meeting both private irredeemable shares with a variable return, and the credit notes redeemable at sight and guaranteed by the state. Gold and silver were proscribed; the bank and the company were joined in one; the credit notes and the shares were assimilated. But credit cannot be commanded either by violence or by expedients; between July and September 1720 came the suspension of payments, the flight of Law, and the disastrous liquidation which proved once again that respect for the state's obligations had not yet entered into the law of public finance.

The Anglo-Dutch Alliance.

Reaction on a no less extensive scale characterized foreign policy during the Regency. A close alliance between France and her ancient enemies, England and Holland, was concluded and maintained from 1717 to 1739: France, after thirty years of fighting, between two periods of bankruptcy; Holland reinstalled in her commercial position; and England, seeing before her the beginning of her empire over the seas—all three had an interest in peace. On the other hand, peace was imperilled by Philip V. of Spain and by the emperor (who had accepted the portion assigned to them by the treaty of Utrecht, while claiming the whole), by Savoy and Brandenburg (who had profited too much by European conflicts not to desire their perpetuation), by the crisis from which the maritime powers of the Baltic were suffering, and by the Turks on the Danube. The dream of Cardinal Alberoni, Philip V.'s minister, was to set fire to all this inflammable material in order to snatch therefrom a crown of some sort to satisfy the maternal greed of Elizabeth Farnese; and this he might have attained by the occupation of Sardinia and the expedition to Sicily (1717–1718), if Dubois, a priest without a religion, a greedy parvenu and a diplomatist of second rank, though tenacious and full of resources as a minister, had not placed his common sense at the disposal of the regent's interests and those of European peace. He signed the triple alliance at the Hague, succeeding with the assistance of Stanhope, the English minister, in engaging the emperor therein, after attempting this for a year and a half. Whilst the Spanish fleet was destroyed before Syracuse by Admiral Byng, the intrigue of the Spanish ambassador Cellamare with the duke of Maine to exclude the family of Orleans from the succession on Louis XV.'s death was discovered and repressed; and Marshal Berwick burned the dockyards at Pasajes in Spain. Alberoni's dream was shattered by the treaty of London in 1720.

Seized in his turn with a longing for the cardinal's hat, Dubois paid for it by the registering of the bull *Unigenitus* and by the persecution of the Jansenists which the regent had stopped. After the majority of Louis XV. had been proclaimed on the 16th of February 1723, Dubois was the first to depart; and four months after his disappearance the duke of Orleans, exhausted by his excesses, carried with him into the grave that spirit of reform which he had compromised by his frivolous voluptuousness (December 2, 1723).

Ministry of the duc de Bourbon.

The Regency had been the making of the house of Orleans; thenceforward the question was how to humble it, and the duc de Bourbon, now prime minister—a great-grandson of the great Condé, but a narrow-minded man of limited intelligence, led by a worthless woman—set himself to do so. The marquise de Prie was the first of a series of publicly recognized mistresses; from 1723 to 1726 she directed foreign policy and internal affairs despite the king's majority, moved always more by a spirit of vengeance than by ambition. This sad pair were dominated by the self-interested and continual fear of becoming subject to the son of the Regent, whom they detested; but danger came upon them from elsewhere. They found standing in their way the very man who had been the author of their fortunes, Louis XV.'s tutor, uneasy in the exercise of a veiled authority; for the churchman Fleury knew how to wait, on condition of ultimately attaining his end. Neither the festivities given at Chantilly in honour of the king, nor the dismissal (despite the most solemn promises) of the Spanish infanta, who had been betrothed to Louis XV., nor yet the young king's marriage to Maria Leszczynska (1725)—a marriage negotiated by the marquise de Prie in order to bar the throne from the Orleans family—could alienate the sovereign from his old master. The irritation kept up by the agents of Philip V., incensed by this affront, and the discontent aroused by the institutions of the *cinquantième* and the militia, by the re-establishment of the feudal tax on Louis XV.'s joyful accession, and by the resumption of a persecution of the Protestants and the Jansenists which had apparently died out, were cleverly exploited by Fleury; and a last ill-timed attempt by the queen to separate the king from him brought about the fall of the duc de Bourbon, very opportunely for France, in June 1726.

Cardinal Fleury, 1726-1743.

From the hands of his unthinking pupil Fleury eventually received the supreme direction of affairs, which he retained for seventeen years. He was aged seventy-two when he thus obtained the power which had been his unmeasured though not ill-calculated ambition. Soft-spoken and polite, crafty and suspicious, he was pacific by temperament and therefore allowed politics to slumber. His turn for economics made Orry,[1] the controller-general of finance, for long his essential partner. The latter laboured at re-establishing order in fiscal affairs; and various measures like the impost of the *dixième* upon all property save that of the clergy, together with the end of the corn famine, sufficed to restore a certain amount of well-being. Religious peace was more difficult to secure; in fact politico-religious quarrels dominated all the internal policy of the kingdom during forty years, and gradually compromised the royal authority. The Jesuits, returned to power in 1723 with the duc de Bourbon and in 1726 with Fleury, rekindled the old strife regarding the bull *Unigenitus* in opposition to the Gallicans and the Jansenists. The retractation imposed upon Cardinal de Noailles, and his replacement in the archbishopric of Paris by Vintimille, an unequivocal Molinist, excited among the populace a very violent agitation against the court of Rome and the Jesuits, the prelude to a united Fronde of the Sorbonne and the parlement. Fleury found no other remedy for this agitation—in which appeal was made even to miracles—than *lits de justice* and *lettres de cachet*; Jansenism remained a potent source of trouble within the heart of Catholicism.

Fleury's foreign policy.

This worn-out septuagenarian, who prized rest above everything, imported into foreign policy the same mania for economy and the same sloth in action. He naturally adopted the idea of reconciling Louis XIV.'s descendants, who had all been embroiled ever since the Polish marriage. He succeeded in this by playing very adroitly on the ambition of Elizabeth Farnese and her husband Philip V., who was to reign in France notwithstanding any renunciation that might have taken place. Despite the birth of a dauphin (September 1729), which cut short the Spanish intrigues, the reconciliation was a lasting one (treaty of Seville); it led to common action in Italy, and to the installation of Spanish royalties at Parma, Piacenza, and soon after at Naples. Fleury, supported by the English Hanoverian alliance, to which he sacrificed the French navy, obliged the emperor Charles VI. to sacrifice the trade of the Austrian Netherlands to the maritime powers and Central Italy to the Bourbons, in order to gain recognition for his Pragmatic Sanction. The question of the succession in France lay dormant until the end of the century, and Fleury thought he had definitely obtained peace in the treaty of Vienna (1731).

War of the Polish Succession (1733-1738).

The war of the Polish succession proved him to have been deceived. On the death of Augustus II. of Saxony, king of Poland, Louis XV.'s father-in-law had been proclaimed king by the Polish diet. This was an ephemeral success, ill-prepared and obtained by taking a sudden advantage of national sentiment; it was soon followed by a check, owing to a Russian and German coalition and the baseness of Cardinal Fleury, who, in order to avoid intervening, pretended to tremble before an imaginary threat of reprisals on the part of England. But Chauvelin, the keeper of the seals, supported by public opinion, avenged on the Rhine and the Po the unlucky heroism of the comte de Plélo at Danzig,[2] the vanished dream of the queen, the broken word of Louis XV., and the treacherous abandonment of Poland. Fleury never forgave him for this: Chauvelin had checkmated him with war; he checkmated Chauvelin with peace, and hastened to replace Marshals Berwick and Villars by diplomatists. The third treaty of Vienna (1738), the reward of so much effort, would only have claimed for France the little duchy of Bar, had not Chauvelin forced Louis XV. to obtain Lorraine for his father-in-law—still hoping for the reversion of the crown; but Fleury thus rendered impossible any influence of the queen, and held Stanislaus at his mercy. In order to avenge himself upon Chauvelin he sacrificed him to the cabinets of Vienna and London, alarmed at seeing him revive the national tradition in Italy.

The Eastern question.

Fleury hardly had time to breathe before a new conflagration broke out in the east. The Russian empress Anne and the emperor Charles VI. had planned to begin dismembering the Turkish empire. More fortunate than Plélo, Villeneuve, the French ambassador at Constantinople, endeavoured to postpone this event, and was well supported; he revived the courage of the Turks and provided them with arms, thanks to the comte de Bonneval (*q.v.*), one of those adventurers of high renown whose influence in Europe during the first half of the eighteenth century is one of the most piquant features of that period. The peace of Belgrade (September 1739) was, by its renewal of the capitulations, a great material success for France, and a great moral victory by the rebuff to Austria and Russia.

War of the Austrian Succession.

France had become once more the arbiter of Europe, when the death of the emperor Charles VI. in 1740 opened up a new period of wars and misfortunes for Europe and for the pacific Fleury. Every one had signed Charles VI.'s Pragmatic Sanction, proclaiming the succession-rights of his daughter, the archduchess Maria Theresa; but on his death there was a general renunciation of signatures and an attempt to divide the heritage. The safety of the house of Austria depended on the attitude of France; for Austria could no longer harm her. Fleury's inclination was not to misuse France's traditional policy by exaggerating it, but to respect his sworn word; he dared not press his opinion, however, and yielded to the fiery impatience of young hot-heads like the two Belle-Isles, and of all those who, infatuated by Frederick II., felt sick of doing nothing at Versailles and were backed up by Louis XV.'s bellicose mistresses. He had to experience the repeated defections of Frederick II. in his own interests, and the precipitate retreat from Bohemia. He had to humble himself before Austria and the whole of Europe; and it was high time for Fleury, now fallen into second childhood, to vanish from the scene (January 1743).

Personal rule of Louis XV.

Louis XV. was at last to become his own prime minister and to reign alone; but in reality he was more embarrassed than pleased by the responsibility incumbent upon him. He therefore retained the persons who had composed Fleury's staff; though instead of being led by a single one of them, he fell into the hands of several, who disputed among themselves for the ascendancy: Maurepas, incomparable in little things, but neglectful of political affairs; D'Argenson, bold, and strongly attached to his work as minister of war; and the cardinal de Tencin, a frivolous and worldly priest. Old Marshal de Noailles tried to incite Louis XV. to take his kingship in earnest, thinking to cure him by war of his effeminate passions; and, in the spring of 1744, the king's grave illness at Metz gave a momentary hope of reconciliation between him and the deserted queen. But the duc de Richelieu, a roué who had joined hands with the sisters of the house of Nesle and was jealous of Marshal de Noailles, soon regained his lost ground; and, under the influence of this panderer to his pleasures, Louis XV. settled down into a life of vice. Holding aloof from active affairs, he tried to relieve the incurable boredom of satiety in the violent exercise of hunting, in supper-parties with his intimates, and in spicy indiscretions. Brought up religiously and to shun the society of women, his first experiences in adultery had been made with many scruples and intermittently. Little by little, however, jealous of power, yet incapable of exercising it to any purpose, he sank into a sensuality which became utterly shameless under the influence of his chief mistress the duchesse de Châteauroux.

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[1] Jean Orry Louis Orry de Fulvy (1703–1751), counsel to the parlement in 1723, intendant of finances in 1737, founded at Vincennes the manufactory of porcelain which was bought in 1750 by the farmers general and transferred to Sèvres.

[2] Louis Robert Hippolyte de Bréhan, comte de Plélo (1699–1734), a Breton by birth, originally a soldier, was at the time of the siege of Danzig French ambassador to Denmark. Enraged at the return to Copenhagen, without having done anything, of the French force sent to help Stanislaus, he himself led it back to Danzig and fell in an attack on the Russians on the 27th of May 1734. Plélo was a poet of considerable charm, and well-read both in science and literature.

See Marquis de Bréhan, *Le Comte de Plélo* (Nantes, 1874); R. Rathery, *Le Comte de Plélo* (Paris, 1876); and P. Boyé, *Stanislaus Leszczynski et le troisième traité de Vienne* (Paris, 1898).

Madame de Pompadour.

Hardly had a catastrophe snatched her away in the zenith of her power when complete corruption and the flagrant triumph of egoism supervened with the accession to power of the marquise de Pompadour, and for nearly twenty years (1745–1764) the whims and caprices of this little *bourgeoise* ruled the realm. A prime minister in petticoats, she had her political system: reversed the time-honoured alliances of France, appointed or disgraced ministers, directed fleets and armies, concluded treaties, and failed in all her enterprises! She was the queen of fashion in a society where corruption blossomed luxuriantly and exquisitely, and in a century of wit hers was second to none. Amidst this extraordinary instability, when everything was at the mercy of a secret thought of the master, the mistress alone held lasting sway; in a reign of all-pervading satiety and tedium, she managed to remain indispensable and bewitching to the day of her death.

Peace of Aix-la-Chapelle.

Meanwhile the War of the Austrian Succession broke out again, and never had secretary of state more intricate questions to solve than had D'Argenson. In the attempt to make a stage-emperor of Charles Albert of Bavaria, defeat was incurred at Dettingen, and the French were driven back on the Rhine (1743). The Bavarian dream dissipated, victories gained in Flanders by Marshal Saxe, another adventurer of genius, at Fontenoy, Raucoux and Lawfeld (1745–1747), were hailed with joy as continuing those of Louis XIV.; even though they resulted in the loss of Germany and the doubling of English armaments. The "disinterested" peace of Aix-la-Chapelle (October 1748) had no effectual result other than that of destroying in Germany, and for the benefit of Prussia, a balance of power that had yet to be secured in Italy, despite the establishment of the Spanish prince Philip at Parma. France, meanwhile, was beaten at sea by England, Maria Theresa's sole ally. While founding her colonial empire England had come into collision with France; and the rivalry of the Hundred Years' War had immediately sprung up again between the two countries. Engaged already in both Canada and in India (where Dupleix was founding an empire with a mere handful of men), it was to France's interest not to become involved in war upon the Rhine, thus falling into England's continental trap. She did fall into it, however: for the sake of conquering Silesia for the king of Prussia, Canada was left exposed by the capture of Cape Breton; while in order to restore this same Silesia to Maria Theresa, Canada was lost and with it India.

The Seven Years' War, 1756–1763.

France had worked for the king of Prussia from 1740 to 1748; now it was Maria Theresa's game that was played in the Seven Years' War. In 1755, the English having made a sudden attack upon the French at sea, and Frederick II. having by a fresh *volte-face* passed into alliance with Great Britain, Louis XV.'s government accepted an alliance with Maria Theresa in the treaty of the 1st of May 1756. Instead of remaining upon the defensive in this continental war—merely accessory as it was—he made it his chief affair, and placed himself under the petticoat government of three women, Maria Theresa, Elizabeth of Russia and the marquise de Pompadour. This error—the worst of all—laid the foundations of the Prussian and British empires. By three battles, victories for the enemies of France—Rossbach in Germany, 1757, Plassey in India, 1757, and Quebec in Canada, 1759 (owing to the recall of Dupleix, who was not bringing in large enough dividends to the Company of the Indies, and to the abandonment of Montcalm, who could not interest any one in "a few acres of snow"), the expansion of Prussia was assured, and the British relieved of French rivalry in the expansion of their empire in India and on the North American continent.

Treaties of Paris and Hubertusburg.

Owing to the blindness of Louis XV. and the vanity of the favourite, the treaties of Paris and Hubertusburg (1763) once more proved the French splendid in their conceptions, but deficient in action. Moreover, Choiseul, secretary of state for foreign affairs since 1758, made out of this deceptive Austrian alliance a system which put the finishing touch to disaster; and after having thrown away everything to satisfy Maria Theresa's hatred of Frederick II., the reconciliation between these two irreconcilable Germans at Neisse and at Neustadt (1769–1770) was witnessed by France, to the prejudice of Poland, one of her most ancient adherents. The expedient of the Family Compact, concluded with Spain in 1761—with a view to taking vengeance upon England, whose fleets were a continual thorn in the side to France—served only to involve Spain herself in misfortune. Choiseul, who at least had a policy that was sometimes in the right, and who was very anxious to carry it out, then realized that the real quarrel had to be settled with England. Amid the anguish of defeat and of approaching ruin, he had an acute sense of the actualities of the case, and from 1763 to 1766 devoted himself passionately to the reconstruction of the navy. To compensate for the loss of the colonies he annexed Lorraine (1766), and by the acquisition of Corsica in 1768 he gave France an intermediary position in the Mediterranean, between friendly Spain and Italy, looking forward to the time when it should become a stepping-stone to Africa.

First partition of Poland.

But Louis XV. had two policies. The incoherent efforts which he made to repair by the secret diplomacy of the comte de Broglie the evils caused by his official policy only aggravated his shortcomings and betrayed his weakness. The contradictory intrigues of the king's secret proceedings in the candidature of Prince Xavier, the dauphine's brother, and the patriotic efforts of the confederation of Bar, contributed to bring about the Polish crisis which the partition of 1772 resolved in favour of Frederick II.; and the Turks were in their turn dragged into the same disastrous affair. Of the old allies of France, Choiseul preserved at least Sweden by the *coup d'état* of Gustavus III.; but instead of being as formerly the centre of great affairs, the cabinet of Versailles lost all its credit, and only exhibited before the eyes of contemptuous Europe France's extreme state of decay.

Internal policy of Louis XV.

The nation felt this humiliation, and showed all the greater irritation as the want of cohesion in the government and the anarchy in the central authority became more and more intolerable in home affairs. Though the administration still possessed a fund of tradition and a personnel which, including many men of note, protected it from the enfeebling influence of the court, it looked as though chance regulated everything so far as the government was concerned. These fluctuations were owing partly to the character of Louis XV., and partly also to the fact that society in the 18th century was too advanced in its ideas to submit without resistance to the caprice of such a man. His mistresses were not the only cause of this; for ever since Fleury's advent political parties had come to the fore. From 1749 to 1757 the party of religious devotees grouped round the queen and the king's daughters, with the dauphin as chief and the comte D'Argenson and Machault d'Arnouville, keeper of the seals, as lieutenants, had worked against Madame de Pompadour (who leant for support upon the parlements, the Jansenists and the philosophers) and had gained the upper hand. Thenceforward poverty, disorders, and consequently murmurs increased. The financial reform attempted by Machault d'Arnouville between 1745 and 1749—a reduction of the debt through the impost of the twentieth and the edict of 1749 against the extensive property held in mortmain by the Church—after his disgrace only resulted in failure. The army, which D'Argenson (likewise dismissed by Madame de Pompadour) had been from 1743 to 1747 trying to restore by useful reforms, was riddled by cabals. Half the people in the kingdom were dying of hunger, while the court was insulting poverty by its luxury and waste; and from 1750 onwards political ferment was everywhere manifest. It found all the more favourable foothold in that the Church, the State's best ally, had made herself more and more unpopular. Her refusal of the sacraments to those who would not accept the bull *Unigenitus* (1746) was exploited in the eyes of the masses, as in those of more enlightened people was her selfish and short-sighted resistance to the financial plans of Machault. The general discontent was expressed by the parlements in their attempt to establish a political supremacy amid universal confusion, and by the popular voice in pamphlets recalling by their violence those of the League. Every one expected and desired a speedy revolution that should put an end to a policy which alternated between overheated effervescence, abnormal activity and lethargy. Nothing can better show the point to which things had descended than the attempted assassination of Louis the Well-beloved by Damiens in 1757.

Choiseul.

Choiseul was the means of accelerating this revolution, not only by his abandonment of diplomatic traditions, but still more by his improvidence and violence. He reversed the policy of his predecessors in regard to the parlement. Supported by public opinion, which clamoured for guarantees against abitrary power, the parlements had dared not only to insist on being consulted as to the budget of the state in 1763, but to enter upon a confederation throughout the whole of France, and on repeated occasions to ordain a general strike of the judicial authorities. Choiseul did not hesitate to attack through *lits de justice* or by exile a judiciary oligarchy which doubtless rested its pretensions merely on wealth, high birth, or that encroaching spirit that was the only counteracting agency to the monarchy. Louis XV., wearied with their clamour, called them to order. Choiseul's religious policy was no less venturesome; after the condemnation in 1759 of the Jesuits who were involved in the bankruptcy of Father de la Valette, their general, in the Antilles, he had the order dissolved for refusing to modify its constitution (1761–1764). Thus, not content with encouraging writers with innovating ideas to the prejudice of traditional institutions, he attacked, in the order of the Jesuits, the strongest defender of these latter, and delivered over the new generation to revolutionary doctrines.

The Triumvirate, 1770–1774.

A woman had elevated him into power; a woman brought him to the ground. He succumbed to a coalition of the chancellor Maupeou, the duc d'Aiguillon and the Abbé Terray, which depended on the favour of the king's latest mistress, Madame du Barry (December 1770); and the Jesuits were avenged by a stroke of authority similar to that by which they themselves had suffered. Following on an edict registered by the *lit de justice*, which forbade any remonstrance in political matters, the parlement had resigned, and had been imitated by the provincial parlements; whereupon Maupeou, an energetic chancellor, suppressed the parlements and substituted superior councils of magistrates appointed by the king (1771). This reform was justified by the religious intolerance of the parlements; by their scandalous trials of Calas, Pierre Paul Sirven (1709–1777), the chevalier de la Barre and the comte de Lally; by the retrograde spirit that had made them suppress the Encyclopaedia in 1759 and condemn *Émile* in 1762; and by their selfishness in perpetuating abuses by which they profited. But this reform, being made by the minister of a hated sovereign, only aided in exasperating public opinion, which was grateful to the parlements in that their remonstrances had not always been fruitless.

Ancient influences and institutions.

Thus all the buttresses of the monarchical institution began to fall to pieces: the Church, undermined by the heresy of Jansenism, weakened by the inroads of philosophy, discredited by evil-livers among the priesthood, and divided against itself, like all losing parties; the nobility of the court, still brave at heart, though incapable of exertion and reduced to beggary, having lost all respect for discipline and authority, not only in the camp, but in civilian society; and the upper-class officials, narrow-minded and egotistical, unsettling by their opposition the royal authority which they pretended to safeguard. Even the "liberties," among the few representative institutions which the *ancien régime* had left intact in some provinces, turned against the people. The estates opposed most of the intelligent and humane measures proposed by such intendants as Tourny and Turgot to relieve the peasants, whose distress was very great; they did their utmost to render the selfishness of the privileged classes more oppressive and vexatious.

The new ideas.

Thus the terrible prevalence of poverty and want; the successive famines; the mistakes of the government; the scandals of the Parc aux Cerfs; and the parlements playing the Roman senate: all these causes, added together and multiplied, assisted in setting a general fermentation to work. The philosophers only helped to precipitate a movement which they had not created; without pointing to absolute power as the cause of the trouble, and without pretending to upset the traditional system, they attempted to instil into princes the feeling of new and more precise obligations towards their subjects. Voltaire, Montesquieu, the Encyclopaedists and the Physiocrats (recurring to the tradition of Bayle and Fontenelle), by dissolving in their analytical crucible all consecrated beliefs and all fixed institutions, brought back into the human society of the 18th century that humanity which had been so rudely eliminated. They demanded freedom of thought and belief with passionate insistence; they ardently discussed institutions and conduct; and they imported into polemics the idea of natural rights superior to all political arrangements. Whilst some, like Voltaire and the Physiocrats, representatives of the privileged classes and careless of political rights, wished to make use of the omnipotence of the prince to accomplish desirable reforms, or, like Montesquieu, adversely criticized despotism and extolled moderate governments, other, plebeians like Rousseau, proclaimed the theory of the social contract and the sovereignty of the people. So that during this reign of frivolity and passion, so bold in conception and so poor in execution, the thinkers contributed still further to mark the contrast between grandeur of plan and mediocrity of result.

The preaching of all this generous philosophy, not only in France, but throughout the whole of Europe, would have been in vain had there not existed at the time a social class interested in these great changes, and capable of compassing them. Neither the witty and lucid form in which the philosophers clothed their ideas in their satires, romances, stage-plays and treatises, nor the salons of Madame du Deffand, Madame Geoffrin and Mademoiselle de Lespinasse, could possibly have been sufficiently far-reaching or active centres of political propaganda. The former touched only the more highly educated classes; while to the latter, where privileged individuals alone had entry, novelties were but an undiluted stimulant for the jaded appetites of persons whose ideas of good-breeding, moreover, would have drawn the line at martyrdom.

The bourgeoisie—the incarnation of new ideas.

The class which gave the Revolution its chiefs, its outward and visible forms, and the irresistible energy of its hopes, was the *bourgeoisie*, intelligent, ambitious and rich; in the forefront the capitalists and financiers of the *haute bourgeoisie*, farmers-general and army contractors, who had supplanted or swamped the old landed and military aristocracy, had insensibly reconstructed the interior of the ancient social edifice with the gilded and incongruous materials of wealth, and in order to consolidate or increase their monopolies, needed to secure themselves against the arbitrary action of royalty and the bureaucracy.

Next came the crowd of stockholders and creditors of the state, who, in face of the government's "extravagant anarchy," no longer felt safe from partial or total bankruptcy. More powerful still, and more masterful, was the commercial, industrial and colonial *bourgeoisie*; because under the Regency and under Louis XV. they had been more productive and more creative. Having gradually revolutionized the whole economic system, in Paris, in Lyons, in Nantes, in Bordeaux, in Marseilles, they could not tamely put up with being excluded from public affairs, which had so much bearing upon their private or collective enterprises. Finally, behind this *bourgeoisie*, and afar off, came the crowd of serfs, rustics whom the acquisition of land had gradually enfranchised, and who were the more eager to enjoy their definitive liberation because it was close at hand.

Transformation of manners and customs.

The habits and sentiments of French society showed similar changes. From having been almost exclusively national during Louis XIV.'s reign, owing to the perpetual state of war and to a sort of proud isolation, it had gradually become cosmopolitan. After the peace of Aix-la-Chapelle, France had been flooded from all quarters of the civilized world, but especially from England, by a concourse of refined and cultured men well acquainted with her usages and her universal language, whom she had received sympathetically. Paris became the brain of Europe. This revolution in manners and customs, coinciding with the revolution in ideas, led in its turn to a transformation in feeling, and to new aesthetic needs. Gradually people became sick of openly avowed gallantry, of shameless libertinism, of moral obliquity and of the flattering artifices of vice; a long shudder ran through the selfish torpor of the social body. After reading the *Nouvelle-Héloïse*, *Clarissa* and *Sir Charles Grandison*, fatigued and wearied society revived as though beneath the fresh breezes of dawn. The principle of examination, the reasoned analysis of human conditions and the discussion of causes, far from culminating in disillusioned nihilism, everywhere aroused the democratic spirit, the life of sentiment and of human feeling: in the drama, with Marivaux, Diderot and La Chaussée; in art, with Chardin and Greuze; and in the salons, in view of the suppression of privilege. So that to Louis XV.'s cynical and hopeless declaration: "Apres moi le déluge," the setting 18th century responded by a belief in progress and an appeal to the future. A long-drawn echo from all classes hailed a revolution that was possible because it was necessary.

If this revolution did not burst forth sooner, in the actual lifetime of Louis XV., if in Louis XVI.'s reign there was a renewal of loyalty to the king, before the appeal to liberty was made, that is to be explained by this hope of recovery. But Louis XVI.'s reign (1774–1792) was only to be a temporary halting-place, an artifice of history for passing through the transition period whilst elaborating the transformation which was to revolutionize, together with France, the whole world.

Louis XVI.

Louis XVI. was twenty years of age. Physically he was stout, and a slave to the Bourbon fondness for good living; intellectually a poor creature and but ill-educated, he loved nothing so much as hunting and locksmith's work. He had a taste for puerile amusements, a mania for useless little domestic economies in a court where millions vanished like smoke, and a natural idleness which achieved as its masterpiece the keeping a diary from 1766 to 1792 of a life so tragic, which was yet but a foolish chronicle of trifles. Add to this that he was a virtuous husband, a kind father, a fervent Christian and a good-natured man full of excellent intentions, yet a spectacle of moral pusillanimity and ineptitude.

Marie Antoinette.

From 1770 onwards lived side by side with this king, rather than at his side, the archduchess Marie Antoinette of Austria—one of the very graceful and very frivolous women who were to be found at Versailles, opening to life like the flowers she so much loved, enamoured of pleasure and luxury, delighting to free herself from the formalities of court life, and mingling in the amusements of society; lovable and loving, without ceasing to be virtuous. Flattered and adored at the outset, she very soon furnished a sinister illustration to Beaumarchais' *Basile*; for evil tongues began to calumniate the queen: those of her brothers-in-law, the duc d'Aiguillon (protector of Madame du Barry and dismissed from the ministry), and the Cardinal de Rohan, recalled from his embassy in Vienna. She was blamed for her friendship with the comtesse de Polignac, who loved her only as the dispenser of titles and positions; and when weary of this persistent begging for rewards, she was taxed with her preference for foreigners who asked nothing. People brought up against her the debts and expenditure due to her belief in the inexhaustible resources of France; and hatred became definite when she was suspected of trying to imitate her mother Maria Theresa and play the part of ruler, since her husband neglected his duty. They then became persuaded that it was she who caused the weight of taxation; in the most infamous libels comparison was made between her freedom of behaviour and that of Louis XV.'s former mistresses. Private envy and public misconceptions very soon summed up her excessive unpopularity in the menacing nickname, "L'Autrichienne." (See MARIE ANTOINETTE.)

Foreign policy of Louis XVI.

All this shows that Louis XVI. was not a monarch capable of directing or suppressing the inevitable revolution. His reign was but a tissue of contradictions. External affairs seemed in even a more dangerous position than those at home. Louis XVI. confided to Vergennes the charge of reverting to the traditions of the crown and raising France from the humiliation suffered by the treaty of Paris and the partition of Poland. His first act was to release French policy from the Austrian alliance of 1756; in this he was aided both by public opinion and by the confidence of the king—the latter managing to set aside the desires of the queen, whom the ambition of Maria Theresa and Joseph II. hoped to use as an auxiliary. Vergennes' object was a double one: to free the kingdom from English supremacy and to shake off the yoke of Austria. Opportunities offered themselves simultaneously. In 1775 the English colonies in America rebelled, and Louis XVI., after giving them secret aid and encouragement almost from the first, finally in February 1778, despite Marie Antoinette, formed an open alliance with them; while when Joseph II., after having partitioned Poland, wanted in addition to balance the loss of Silesia with that of Bavaria, Vergennes prevented him from doing so. In vain was he offered a share in the partition of the Netherlands by way of an inducement. France's disinterested action in the peace of Teschen (1779) restored to her the lost adherence of the secondary states. Europe began to respect her again when she signed a Franco-Dutch-Spanish alliance (1779–1780), and when, after the capitulation of the English at Yorktown, the peace of Versailles (1783) crowned her efforts with at least formal success. Thenceforward, partly from prudence and partly from penury, Vergennes cared only for the maintenance of peace—a not too easy task, in opposition to the greed of Catherine II. and Joseph II., who now wished to divide the Ottoman empire. Joseph II., recognizing that Louis XVI. would not sacrifice the "sick man" to him, raised the question of the opening of the Scheldt, against the Dutch. Vainly did Joseph II. accuse his sister of ingratitude and complain of her resistance; the treaty of Fontainebleau in 1785 maintained the rights of Holland. Later on, Joseph II., sticking to his point, wanted to settle the house of Bavaria in the Netherlands; but Louis XVI. supported the confederation of princes (Fürstenbund) which Frederick II. called together in order to keep his turbulent neighbour within bounds. Vergennes completed his work by signing a commercial treaty in 1786 with England, whose commerce and industry were favoured above others, and a second in 1787 with Russia. He died in 1787, at an opportune moment for himself; though he had temporarily raised France's position in Europe, his work was soon ruined by the very means taken to secure its successes: warfare and armaments had hastened the "hideous bankruptcy."

From the very beginning of his reign Louis XVI. fell into

Internal policy of Louis XVI.

contradictions and hesitation in internal affairs, which could not but bring him to grief. He tried first of all to govern in accordance with public opinion, and was induced to flatter it beyond measure; in an extreme of inconsistency he re-established the parlements, the worst enemies of reform, at the very moment when he was calling in the reformers to his councils.

Turgot, 1774-1776.

Turgot, the most notable of these latter, was well fitted to play his great part as an enlightened minister, as much from the principle of hard work and domestic economy traditional in his family, as from a maturity of mind developed by extensive study at the Sorbonne and by frequenting the salons of the Encyclopaedists. He had proved this by his capable administration in the paymaster's office at Limoges, from 1761 to 1774. A disciple of Quesnay and of Gournay, he tried to repeat in great affairs the experience of liberty which he had found successful in small, and to fortify the unity of the nation and the government by social, political and economic reforms. He ordained the free circulation of grain within the kingdom, and was supported by Louis XVI. in the course of the flour-war (*guerre des farines*) (April–May 1775); he substituted a territorial subsidy for the royal *corvée*—so burdensome upon the peasants—and thus tended to abolish privilege in the matter of imposts; and he established the freedom of industry by the dissolution of privileged trade corporations (1776). Finance was in a deplorable state, and as controller-general he formulated a new fiscal policy, consisting of neither fresh taxation nor loans, but of retrenchment. At one fell stroke the two auxiliaries on which he had a right to count failed him: public opinion, clamouring for reform on condition of not paying the cost; and the king, too timid to dominate public opinion, and not knowing how to refuse the demands of privilege. Economy in the matter of public finance implies a grain of severity in the collection of taxes as well as in expenditure. By the former Turgot hampered the great interests; by the second he thwarted the desires of courtiers not only of the second rank but of the first. Therefore, after he had aroused the complaints of the commercial world and the bourgeoisie, the court, headed by Marie Antoinette, profited by the general excitement to overthrow him. The Choiseul party, which had gradually been reconstituted, under the influence of the queen, the princes, parlement, the prebendaries, and the trade corporations, worked adroitly to eliminate this reformer of lucrative abuses. The old courtier Maurepas, jealous of Turgot and desirous of remaining a minister himself, refrained from defending his colleague; and when Turgot, who never knew how to give in, spoke of establishing assemblies of freeholders in the communes and the provinces, in order to relax the tension of over-centralization, Louis XVI., who never dared to pass from sentiment to action, sacrificed his minister to the rancour of the queen, as he had already sacrificed Malesherbes (1776). Thus the first governmental act of the queen was an error, and dissipated the hope of replacing special privileges by a general guarantee given to the nation, which alone could have postponed a revolution. It was still too early for a Fourth of August; but the queen's victory was none the less vain, since Turgot's ideas were taken up by his successors.

Necker, 1776-1781.

The first of these was Necker, a Genevese financier. More able than Turgot, though a man of smaller ideas, he abrogated the edicts registered by the *lits de justice*; and unable or not daring to attack the evil at its root, he thought he could suppress its symptoms by a curative process of borrowing and economy. Like Turgot he failed, and for the same reasons. The American war had finally exhausted the exchequer, and, in order to replenish it, he would have needed to inspire confidence in the minds of capitalists; but the resumption in 1778 of the plan of provincial assemblies charged with remodelling the various imposts, and his *compte-rendu* in which he exhibited the monarchy paying its pensioners for their inactivity as it had never paid its agents for their zeal, aroused a fresh outburst of anger. Necker was carried away in his turn by the reaction he had helped to bring about (1781).

The return of feudalism to the offensive.

Having fought the oligarchy of privilege, the monarchy next tried to rally it to its side, and all the springs of the old régime were strained to the breaking-point. The military rule of the marquis de Ségur eliminated the plebeians from the army; while the great lords, drones in the hive, worked with a kind of fever at the enforcement of their seigniorial rights; the feudal system was making a last struggle before dying. The Church claimed her right of ordering the civil estate of all Frenchmen as an absolute mistress more strictly than ever. Joly de Fleury and D'Ormesson, Necker's successors, pushed their narrow spirit of reaction and the temerity of their inexperience to the furthest limit; but the reaction which reinforced the privileged classes was not sufficient to fill the coffers of the treasury, and Marie Antoinette, who seemed gifted with a fatal perversity of instinct, confided the finances of the kingdom to Calonne, an upper-class official and a veritable Cagliostro of finance.

Calonne, 1783-1787.

From 1783 to 1787, this man organized his astounding system of falsification all along the line. His unbridled prodigality, by spreading a belief in unlimited resources, augmented the confidence necessary for the success of perpetual loans; until the day came when, having exhausted the system, he tried to suppress privilege and fall back upon the social reforms of Turgot, and the financial schemes of Necker, by suggesting once more to the assembly of notables a territorial subsidy from all landed property. He failed, owing to the same reaction that was causing the feudal system to make inroads upon the army, the magistracy and industry; but in his fall he put on the guise of a reformer, and by a last wild plunge he left the monarchy, already compromised by the affair of the Diamond Necklace (*q.v.*), hopelessly exposed (April 1787).

Loménie de Brienne.

The volatile and brilliant archbishop Loménie de Brienne was charged with the task of laying the affairs of the *ancien régime* before the assembly of notables, and with asking the nation for resources, since the monarchy could no longer provide for itself; but the notables refused, and referred the minister to the states-general, the representative of the nation. Before resorting to this extremity, Brienne preferred to lay before the parlement his two edicts regarding a stamp duty and the territorial subsidy; to be met by the same refusal, and the same reference to the states-general. The exile of the parlement to Troyes, the arrest of various members, and the curt declaration of the king's absolute authority (November 9, 1787) were unsuccessful in breaking down its resistance. The threat of Chrétien François de Lamoignon, keeper of the seals, to imitate Maupeou, aroused public opinion and caused a fresh confederation of the parlements of the kingdom. The royal government was too much exhausted to overthrow even a decaying power like that of the parlements, and being still more afraid of the future representatives of the French people than of the supreme courts, capitulated to the insurgent parlements. The recalled parlement seemed at the pinnacle of power.

Recall of Necker.

Its next action ruined its ephemeral popularity, by claiming the convocation of the states-general "according to the formula observed in 1614," as already demanded by the estates of Dauphiné at Vizille on the 21st of July 1788. The exchequer was empty; it was necessary to comply. The royal declaration of the 23rd of September 1788 convoked the states-general for the 1st of May 1789, and the fall of Brienne and Lamoignon followed the recall of Necker. Thenceforward public opinion, which was looking for something quite different from the superannuated formula of 1614, abandoned the parlements, which in their turn disappeared from view; for the struggle beginning between the privileged classes and the government, now at bay, had given the public, through the states-general, that means of expression which they had always lacked.

The conflict immediately changed ground, and an engagement began between privilege and the people over the twofold question of the number of deputies and the mode of voting. Voting by head, and the double representation of the third estate (*tiers état*); this was the great revolution; voting by order meant the

Prelude to the states-general.

The electorate.

continued domination of privilege, and the lesser revolution. The monarchy, standing apart, held the balance, but needed a decisive policy. Necker, with little backing at court, could not act energetically, and Louis XVI., wavering between Necker and the queen, chose the attitude most convenient to his indolence and least to his interest: he remained neutral, and his timidity showed clearly in the council of the 27th of December 1788. Separating the two questions which were so closely connected, and despite the sensational brochure of the abbé Sieyès, "What is the Third Estate?" he pronounced for the doubling of the third estate without deciding as to the vote by head, yet leaving it to be divined that he preferred the vote by order. As to the programme there was no more decisive resolution; but the edict of convocation gave it to be understood that a reform was under consideration: "the establishment of lasting and permanent order in all branches of the administration." The point as to the place of convocation gave rise to a compromise between the too-distant centre of France and too-tumultuous Paris. Versailles was chosen "because of the hunting!" In the procedure of the elections the traditional system of the states-general of 1614 was preserved, and the suffrage was almost universal, but in two kinds: for the third estate nearly all citizens over twenty-five years of age, paying a direct contribution, voted—peasants as well as bourgeois; the country clergy were included among the ecclesiastics; the smaller nobility among the nobles; and finally, Protestants were electors and eligible.

The addresses.

According to custom, documents (*cahiers*) were drawn up, containing a list of grievances and proposals for reform. All the orders were agreed in demanding prudently modified reform: the vote on the budget, order in finance, regular convocation of the states-general, and a written constitution in order to get rid of arbitrary rule. The address of the clergy, inspired by the great prelates, sought to make inaccurate lamentations over the progress of impiety a means of safeguarding their enormous spiritual and temporal powers, their privileges and exemptions, and their vast wealth. The nobility demanded voting by order, the maintenance of their privileges, and, above all, laws to protect them against the arbitrary proceedings of royalty. The third estate insisted on the vote by head, the graduated abolition of privilege in all governmental affairs, a written constitution and union. The programme went on broadening as it descended in the social scale.

The elections.

The elections sufficed finally to show that the *ancien régime*, characterized from the social point of view by inequality, from the political point of view by arbitrariness, and from the religious point of view by intolerance, was completed from the administrative point of view by inextricable disorder. As even the extent of the jurisdiction of the *bailliages* was unknown, convocations were made at haphazard, according to the good pleasure of influential persons, and in these assemblies decisions were arrived at by a process that confused every variety of rights and powers, and was governed by no logical principle; and in this extreme confusion terms and affairs were alike involved.

The counter-currents of the Revolution.

Whilst the bureaucracy of the *ancien régime* sought for desperate expedients to prolong its domination, the whole social body gave signs of a yet distant but ever nearing disintegration. The revolution was already complete before it was declared to the world. Two distinct currents of disaffection, one economic, the other philosophic, had for long been pervading the nation. There had been much suffering throughout the 17th and 18th centuries; but no one had hitherto thought of a politico-social rising. But the other, the philosophic current, had been set going in the 18th century; and the policy of despotism tempered by privilege had been criticized in the name of liberty as no longer justifying itself by its services to the state. The ultramontane and oppressively burdensome church had been taunted with its lack of Christian charity, apostolic poverty and primitive virtue. All vitality had been sapped from the old order of nobles, reduced in prestige by the *savonnette à vilains* (office purchased to ennoble the holder), enervated by court life, and so robbed of its roots in the soil, from which it had once drawn its strength, that it could no longer live save as a ruinous parasite on the central monarchy. Lastly, to come to the bottom of the social scale, there were the common people, taxable at will, subject to the arbitrary and burdensome forced labour of the *corvée*, cut off by an impassable barrier from the privileged classes whom they hated. For them the right to work had been asserted, among others by Turgot, as a natural right opposed to the caprices of the arbitrary and selfish aristocracy of the corporations, and a breach had been made in the tyranny of the masters which had endeavoured to set a barrier to the astonishing outburst of industrial force which was destined to characterize the coming age.

The outward and visible progress of the Revolution, due primarily to profound economic disturbance, was thus accelerated and rendered irresistible. Economic reformers found a moral justification for their dissatisfaction in philosophical theories; the chance conjunction of a philosopho-political idea with a national deficit led to the preponderance of the third estate at the elections, and to the predominance of the democratic spirit in the states-general. The third estate wanted civil liberty above all; political liberty came second only, as a means and guarantee for the former. They wanted the abolition of the feudal system, the establishment of equality and a share in power. Neither the family nor property was violently attacked; the church and the monarchy still appeared to most people two respectable and respected institutions. The king and the privileged classes had but so to desire it, and the revolution would be easy and peaceful.

Meeting of the states-general.

Louis XVI. was reluctant to abandon a tittle of his absolute power, nor would the privileged classes sacrifice their time-honoured traditions; they were inexorable. The king, more ponderous and irresolute every day, vacillated between Necker the liberal on one side and Marie Antoinette, whose feminine pride was opposed to any concessions, with the comte d'Artois, a mischievous nobody who could neither choose a side nor stick to one, on the other. When the states-general opened on the 5th of May 1789 Louis XVI. had decided nothing. The conflict between him and the Assembly immediately broke out, and became acute over the verification of the mandates; the third estate desiring this to be made in common by the deputies of the three orders, which would involve voting by head, the suppression of classes and the preponderance of the third estate. On the refusal of the privileged classes and after an interval of six weeks, the third estate, considering that they represented 96% of the nation, and in accordance with the proposal of Sieyès, declared that they represented the nation and therefore were authorized to take resolutions unaided, the first being that in future no arrangement for taxation could take place without their consent.

Oath of the tennis-court.

The king, urged by the privileged classes, responded to this first revolutionary act, as in 1614, by closing the Salle des Menus Plaisirs where the third estate were sitting; whereupon, gathered in one of the tennis-courts under the presidency of Bailly, they swore on the 20th of June not to separate before having established the constitution of the kingdom.

The Lit de Justice of June 23, 1789.

Louis XVI. then decided, on the 23rd, to make known his policy in a royal *lit de justice*. He declared for the lesser reform, the fiscal, not the social; were this rejected, he declared that "he alone would arrange for the welfare of his people." Meanwhile he annulled the sitting of the 17th, and demanded the immediate dispersal of the Assembly. The third estate refused to obey, and by the mouth of Bailly and Mirabeau asserted the legitimacy of the Revolution. The refusal of the soldiers to coerce the Assembly showed that the monarchy could no longer rely on the army; and a few days later, when the lesser nobility and the lower ranks of the clergy had united with the third estate whose cause was their own, the king yielded, and on the 27th of June commanded both orders to join in the National Assembly, which was thereby

Taking of the Bastille.

recognized and the political revolution sanctioned. But at the same time, urged by the “ infernal cabal ” of the queen and the comte d'Artois, Louis XVI. called in the foreign regiments—the only ones of which he could be certain—and dismissed Necker. The Assembly, dreading a sudden attack, demanded the withdrawal of the troops. Meeting with a refusal, Paris opposed the king's army with her citizen-soldiers; and by the taking of the Bastille, that mysterious dark fortress which personified the *ancien régime*, secured the triumph of the Revolution (July 14). The king was obliged to recall Necker, to mount the tricolor cockade at the Hôtel de Ville, and to recognize Bailly as mayor of Paris and La Fayette as commander of the National Guard, which remained in arms after the victory. The National Assembly had right on its side after the 20th of June and might after the 14th of July. Thus was accomplished the Revolution which was to throw into the melting-pot all that had for centuries appeared fixed and stable.

Spontaneous anarchy.

As Paris had taken her Bastille, it remained for the towns and country districts to take theirs—all the Bastilles of feudalism. Want, terror and the contagion of example precipitated the disruption of governmental authority and of the old political status; and sudden anarchy dislocated all the organs of authority. Upon the ruins of the central administration temporary authorities were founded in various isolated localities, limited in area but none the less defiant of the government. The provincial assemblies of Dauphiné and elsewhere gave the signal; and numerous towns, following the example of Paris, instituted municipalities which substituted their authority for that of the intendants and their subordinates. Clubs were openly organized, pamphlets and journals appeared, regardless of administrative orders; workmen's unions multiplied in Paris, Bordeaux and Lyons, in face of drastic prohibition; and anarchy finally set in with the defection of the army in Paris on the 23rd of June, at Nancy, at Metz and at Brest. The crying abuses of the old régime, an insignificant factor at the outset, soon combined with the widespread agrarian distress, due to the unjust distribution of land, the disastrous exploitation of the soil, the actions of the government, and the severe winter of 1788. Discontent showed itself in pillage and incendiarism on country estates; between March and July 1789 more than three hundred agrarian riots took place, uprooting the feudal idea of property, already compromised by its own excesses. Not only did pillaging take place; the boundaries or property were also ignored, and people no longer held themselves bound to pay taxes. These *jacqueries* hastened the movement of the regular revolution.

The night of August 4.

The decrees of the 4th of August, proposed by those noble “ patriots ” the duc d'Aiguillon and the vicomte de Noailles, who had already on the 23rd of June made armed resistance to the evacuation of the Hall of Assembly, put the final touch to the revolution begun by the provincial assemblies, by liberating land and labour, and proclaiming equality among all Frenchmen. Instead of exasperating the demands of the peasants and workmen by repression and raising civil war between the bourgeoisie and the proletariat, they drew a distinction between personal servitude, which was suppressed, and the rights of contract, which were to be redeemed—a laudable but impossible distinction. The whole feudal system crumbled before the revolutionary insistence of the peasants; for their masters, bourgeois or nobles, terrified by prolonged riots, capitulated and gradually had to consent to make the resolutions of the 4th of August a reality.

Elaboration of the constitution.

Overjoyed by this social liberation, the Assembly awarded Louis XVI. the title of “ renewer of French liberty ”; but remaining faithful to his hesitating policy of the 23rd of June, he ratified the decrees of the 4th of August, only with a very ill grace. On the other hand, the privileged classes, and notably the clergy, who saw the whole traditional structure of their power threatened, now rallied to him, and when after the 28th of August the Assembly set to work on the new constitution, they combined in the effort to recover some of the position they had lost. But whatever their theoretical agreement on social questions, politically they were hopelessly at odds. The bourgeoisie, conscious of their opportunity, decided for a single chamber against the will of the noblesse; against that of the king they declared it permanent, and, if they accorded him a suspensory veto, this was only in order to guard them against the extreme assertion of popular rights. Thus the progress of the Revolution, so far, had left the mass of the people still excluded from any constitutional influence on the government, which was in the hands of the well-to-do classes, which also controlled the National Guard and the municipalities. The irritation of the disfranchised proletariat was moreover increased by the appalling dearness of bread and food generally, which the suspicious temper of the times—fomented by the tirades of Marat in the *Ami du peuple*—ascribed to English intrigues in revenge for the aid given by France to the American colonies, and to the treachery in high places that made these intrigues successful. The climax came with the rumour that the court was preparing a new military *coup d'état*, a rumour that seemed to be confirmed by indiscreet toasts proposed at a banquet by the officers of the guard at Versailles; and on the night of the 5th to the 6th of October a Parisian mob forced the king and royal family to return with them to Paris amid cries of “ We are bringing the baker, the baker's wife and the little baker's boy! ” The Assembly followed; and henceforth king and Assembly were more or less under the influence of the whims and passions of a populace maddened by want and suspicion, by the fanatical or unscrupulous incitements of an unfettered press, and by the unrestrained oratory of obscure demagogues in the streets, the cafés and the political clubs.

Convened for the purpose of elaborating a system that should conciliate all interests, the Assembly thus found itself forced into a conflict between the views of the people, who feared betrayal, and the court, which dreaded being overwhelmed. This schism was reflected in the parties of the Assembly; the absolutists of the extreme Right; the moderate monarchists of the Right and Centre; the constitutionalists of the Left Centre and Left; and, finally, on the extreme Left the democratic revolutionists, among whom Robespierre sat as yet all but unnoticed. Of talent there was enough and to spare in the Assembly; what was conspicuously lacking was common sense and a practical knowledge of affairs. Of all the orators who declaimed from the tribune, Mirabeau alone realized the perils of the situation and possessed the power of mind and will to have mastered them. Unfortunately, however, he was discredited by a disreputable past, and yet more by the equivocal attitude he had to assume in order to maintain his authority in the Assembly while working in what he believed to be the true interests of the court. His political ideal for France was that of the monarchy, rescued from all association with the abuses of the old régime and “ broad-based upon the people's will ”; his practical counsel was that the king should frankly proclaim this ideal to the people as his own, should compete with the Assembly for popular favour, while at the same time using every means to win over those by whom his authority was flouted. For a time Mirabeau influenced the counsels of the court through the comte de Montmorin; but the king neither trusted him nor could be brought to see his point of view, and Marie Antoinette, though she resigned herself to negotiating with him, was very far from sympathizing with his ideals. Finally, all hope of the conduct of affairs being entrusted to him was shattered when the Assembly passed a law forbidding its members to become ministers.

Declaration of the rights of man.

The attempted reconciliation with the king having failed, the Assembly ended by working alone, and made the control that it should have exerted an instrument, not of co-operation but of strife. It inaugurated its legislative labours by a metaphysical declaration of the Rights of Man and of the Citizen (October 2, 1789). This enunciation of universal verities, the bulk of which have, sooner or later, been accepted by all civilized nations as "the gospel of modern times," was inspired by all the philosophy of the 18th century in France and by the *Contrat Social*. It comprised various rational and humane ideas, no longer theological, but profoundly and deliberately thought out: ideas as to the sovereign-right of the nation, law by general consent, man superior to the pretensions of caste and the fetters of dogma, the vindication of the ideal and of human dignity. Unable to rest on historic precedent like England, the Constituent Assembly took as the basis for its labours the tradition of the thinkers.

The constitution.

Upon the principles proclaimed in this Declaration the constitution of 1791 was founded. Its provisions are discussed elsewhere (see the section below on *Law and Institutions*); here it will suffice to say that it established under the sovereign people, for the king was to survive merely as the supreme executive official, a wholly new model of government in France, both in Church and State. The historic divisions of the realm were wiped out; for the old provinces were substituted eighty-three departments; and with the provinces vanished the whole organization, territorial, administrative and ecclesiastical, of the *ancien régime*. In one respect, indeed, the system of the old monarchy remained intact; the tradition of centralization established by Louis XIV. was too strong to be overthrown, and the destruction of the historic privileges and immunities with which this had been ever in conflict only served to strengthen this tendency. In 1791 France was pulverized into innumerable administrative atoms incapable of cohesion; and the result was that Paris became more than ever the brain and nerve-centre of France. This fact was soon to be fatal to the new constitution, though the administrative system established by it still survives. Paris was in effect dominated by the armed and organized proletariat, and this proletariat could never be satisfied with a settlement which, while proclaiming the sovereignty of the people, had, by means of the property qualification for the franchise, established the political ascendancy of the middle classes. The settlement had, in fact, settled nothing; it had, indeed, merely intensified the profound cleavage between the opposing tendencies; for if the democrats were alienated by the narrow franchise, the Civil Constitution of the Clergy, which cut at the very roots of the Catholic system, drove into opposition to the Revolution not only the clergy themselves but a vast number of their flocks.

The policy of the Assembly, moreover, hopelessly aggravated its misunderstanding with the king. Louis, indeed, accepted the constitution and attended the great Feast of Federation (July 14, 1790), when representatives from all the new departments assembled in the Champ de Mars to ratify the work of the Assembly; but the king either could not or would not say the expected word that would have dissipated mistrust. The Civil Constitution of the Clergy, too, seemed to him not only to violate his rights as a king, but his faith as a Christian also; and when the emigration of the nobility and the death of Mirabeau (April 2, 1791) had deprived him of his natural supporters and his only adviser, resuming the old plan of withdrawing to the army of the marquis de Bouillé at Metz, he made his ill-fated attempt to escape from Paris (June 20, 1791). The flight to Varennes was an irreparable error; for during the king's absence and until his return the insignificance of the royal power became apparent. La Fayette's fusillade of the republicans, who demanded the deposition of the king (July 17, 1791), led to a definite split between the democratic party and the bourgeois party. Vainly did Louis, brought back a captive to Paris, swear on the 14th of September 1791 solemnly mere lip-service to the constitution; the mistrustful party of revolution abandoned the constitution they had only just obtained, and to guard against the sovereign's mental reservations and the selfish policy of the middle classes, appealed to the main force of the people. The conflict between the *ancien régime* and the National Assembly ended in the defeat of the royalists.

The Legislative Assembly (Oct. 1, 1791–Sept. 20, 1792).

Through lassitude or disinterestedness the men of 1791, on Robespierre's suggestion, had committed one last mistake, by leaving the task of putting the constitution into practice to new men even more inexperienced than themselves. Thus the new Assembly's time was occupied in a conflict between the Legislative Assembly and the king, who plotted against it; and, as a result, the monarchy, insulted by the proceedings of the 20th of June, was eliminated altogether by those of the 10th of August 1792.

The parties.

The new Assembly which had met on the 1st of October 1791 had a majority favourable to the constitutional monarchy and to the bourgeois franchise. But, among these bourgeois those who were called Feuillants, from the name of their club (see Feuillants, Club of the), desired the strict and loyal application of the constitution without encroaching upon the authority of the king; the triumvirate, Duport, Barnave and Lameth, were at the head of this party. The Jacobins, on the contrary, considered that the king should merely be hereditary president of the Republic, to be deposed if he attempted to violate the constitution, and that universal suffrage should be established. The dominant group among these was that of the Girondins or Girondists, so called because its most brilliant members had been elected in the Gironde (see Girondists). But the republican party was more powerful without than within. Their chief was not so much Robespierre, president of the parliamentary and bourgeois club of the Jacobins (*q.v.*), which had acquired by means of its two thousand affiliated branches great power in the provinces, as the advocate Danton, president of the popular and Parisian club of the Cordeliers (*q.v.*). Between the Feuillants and the Jacobins, the independents, incapable of keeping to any fixed programme, vacillated sometimes to the right, sometimes to the left.

Royalist intrigues.

The émigrés.

Declaration of Pilnitz.

The decrees.

The war.

But the best allies of the republicans against the Feuillants were the royalists pure and simple, who cared nothing about the constitution, and claimed to "extract good from the excess of evil." The election of a Jacobin, Pétion, instead of Bailly, the resigning mayor, and La Fayette, the candidate for office, was their first achievement. The court, on its side, showed little sign of a conciliatory spirit, though, realizing its danger, it attempted to restrain the foolish violence of the *émigrés*, *i.e.* the nobles who after the suppression of titles of nobility in 1790 and the arrest of the king at Varennes, had fled in a body to Coblenz and joined Louis XVI.'s brothers, the counts of Provence and Artois. They it was who set in motion the national and European conflict. Under the prince of Condé they had collected a little army round Trier; and in concert with the "Austrian Committee" of Paris they solicited the armed intervention of monarchical Europe. The declaration of Pilnitz, which was but an excuse for non-interference on the part of the emperor and the king of Prussia, interested in the prolongation of these internal troubles, was put forward by them as an assurance of forthcoming support (August 27, 1791). At the same time the application of the Civil Constitution of the Clergy roused the whole of western La Vendée; and in face of the danger threatened by the refractory clergy and by the army of the *émigrés*, the Girondins set about confounding the court with the Feuillants in the minds of the public, and compromising Louis XVI. by a national agitation, denouncing him as an accomplice of the foreigner. Owing to the decrees against the comte de Provence, the emigrants, and the refractory priests, voted by the Legislative Assembly in November 1791, they forced Louis XVI. to show his hand by using his veto, so that his complicity should be plainly declared, to replace his Feuillant ministry—disparate in birth, opinions and ambitions—by the Girondin ministry of Dumouriez-Roland (March 10), no more united than the other, but believers in a republican crusade for the overthrow of thrones, that of Louis XVI. first of all; and finally to declare war against the king of Bohemia and Hungary, a step also desired by the court in the hope of ridding itself of the Assembly at the first note of victory (April 20, 1792).

Proceedings of June 20.

But when, owing to the disorganization of the army through emigration and desertion, the ill-prepared Belgian war was followed by invasion and the trouble in La Vendée increased, all France suspected a betrayal. The Assembly, in order to reduce the number of hostile forces, voted for the exile of all priests who had refused to swear to the Civil Constitution and the substitution of a body of twenty thousand volunteer national guards, under the authority of Paris, for the king's constitutional guard (May 27–June 8, 1792). Louis XVI.'s veto and the dismissal of the Girondin ministry—thanks to an intrigue of Dumouriez, analogous to that of Mirabeau and as ineffectual—dismayed the Feuillants and maddened the Girondins; the latter, to avert popular fury, turned it upon the king. The *émeute* of the 20th of June, a burlesque which, but for the persistent good-humour of Louis XVI., might have become a tragedy, alarmed but did not overthrow the monarchy.

Manifesto of Brunswick.

The bourgeoisie, the Assembly, the country and La Fayette, one of the leaders of the army, now embarked upon a royalist reaction, which would perhaps have been efficacious, had it not been for the entry into the affair of the Prussians as allies of the Austrians, and for the insolent manifesto of the duke of Brunswick. The Assembly's cry of "the country in danger" (July 11) proved to the nation that the king was incapable of defending France against the foreigner; and the appeal of the federal volunteers in Paris gave to the opposition, together with the war-song of the Marseillaise, the army which had been refused by Louis XVI., now disarmed. The vain attempts of the Gironde to reconcile the king and the Revolution, the ill-advised decree of the Assembly on the 8th of August, freeing La Fayette from his guilt in forsaking his army; his refusal to vote for the deposition of the king, and the suspected treachery of the court, led to the success of the republican forces when, on the 10th of August, the mob of Paris organized by the revolutionary Commune rose against the monarchy.

The insurrectional commune of Paris.

The September massacres.

The suspension and imprisonment of the king left the supreme authority nominally in the hands of the Assembly, but actually in those of the Commune, consisting of delegates from the administrative sections of Paris. Installed at the Hôtel de Ville this attempted to influence the discredited government, entered into conflict with the Legislative Assembly, which considered its mission at an end, and paralyzed the action of the executive council, particularly during the bloody days of September, provoked by the discovery of the court's intrigues with the foreigner, by the treachery of La Fayette, the capture of Longwy, the investiture of Verdun by the Prussians (August 19–30), and finally by the incendiary placards of Marat. Danton, a master of diplomatic and military operations, had to avoid any rupture with the Commune. Fortunately, on the very day of the dispersal of the Legislative Assembly, Dumouriez saved France from a Prussian invasion by the victory of Valmy, and by unauthorized negotiations which prefigured those of Bonaparte at Léoben (September 22, 1792).

The popular insurrection against Louis XVI. determined the simultaneous fall of the bourgeois régime and the establishment of the democracy in power. The Legislative Assembly, without a mandate for modifying a constitution that had become inapplicable with the suspension of the monarch, had before disappearing convoked a National Convention, and as the reward of the struggle for liberty had replaced the limited franchise by universal suffrage. Public opinion became republican from an excess of patriotism, and owing to the propaganda of the Jacobin club; while the decree of the 25th of August 1792, which marked the destruction of feudalism, now abolished in principle, caused the peasants to rally definitely to the Republic.

This had hardly been established before it became distracted by the fratricidal strife of its adherents, from September 22, 1792, to the 18th Fructidor (September 4, 1797). The electoral assemblies, in very great majority, had desired this Republic to be democratic and equalizing in spirit, but on the face of it, liberal, uniform and propagandist; in consequence, the 782 deputies of the Convention were not divided on principles, but only by personal rivalries and ambition. They all wished for a unanimity and harmony impossible to obtain; and being unable to convince they destroyed one another.

The Convention, Sept. 21, 1792–Oct. 26, 1795.

The parties.

The Girondins in the Convention played the part of the Feuillants in the Legislative Assembly. Their party was not well disciplined, they purposely refrained from making it so, and hence their ruin. Oratorically they represented the spirit of the South; politically, the ideas of the bourgeoisie in opposition to the democracy—which they despised although making use of it—and the federalist system, from an objection to the preponderance of Paris. Paris, on the other hand, had elected only deputies of the Mountain, as the more advanced of the Jacobins were called, that party being no more settled and united than the others. They drew support from the Parisian democracy, and considered the decentralization of the Girondins as endangering France's unity, circumstances demanding a strong and highly concentrated government; they opposed a republic on the model of that of Rome to the Polish republic of the Gironde. Between the two came the *Plaine*, the *Marais*, the troop of trembling bourgeois, sincerely attached to the Revolution, but very moderate in the defence of their ideas; some seeking a refuge from their timidity in hard-working committees, others partaking in the violence of the Jacobins out of weakness or for reasons of state.

The Girondins.

The Girondins were the first to take the lead; in order to retain it they should have turned the Revolution into a government. They remained an exclusive party, relying on the mob but with no influence over it. Without a leader or popular power, they might have found both in Danton; for, occupied chiefly with the external danger, he made advances towards them, which they repulsed, partly in horror at the proceedings of September, but chiefly because they saw in him the most formidable rival in the path of the government. They waged war against him as relentlessly as did the Constitutionalists against Mirabeau, whom he resembled in his extreme ugliness and his volcanic eloquence. They drove him into the arms of Robespierre, Marat and the Commune of Paris. On the other hand, after the 23rd of September they declared Paris dangerous for the Convention, and wanted to reduce it to "eighty-three influential members." Danton and the Mountain responded by decreeing the unity and indivisibility of the Republic, in order to emphasize the suspicions of federalism which weighed upon the Girondins.

Trial and death of Louis XVI.

The trial of Louis XVI. still further enhanced the contrasts of ideas and characters. The discovery of fresh proofs of treachery in the iron chest (November 20, 1792) gave the Mountain a pretext for forcing on the clash of parties and raising the question not of legality but of public safety. By the execution of the king (January 21, 1793) they "cast down a king's head as a challenge to the kings of Europe." In order to preserve popular favour and their direction of the Republic, the Girondins had not dared to pronounce against the sentence of death, but had demanded an appeal to the people which was rejected; morally weakened by this equivocal attitude they were still more so by foreign events.

First European coalition.

The king's death did not result in the unanimity so much desired by all parties; it only caused the reaction on themselves of the hatred which had been hitherto concentrated upon the king, and also an augmentation in the armies of the foreigner, which obliged the revolutionists to face all Europe. There was a coalition of monarchs, and the people of La Vendée rose in defence of their faith. Dumouriez, the conqueror of Jemappes (November 6, 1792), who invaded Holland, was beaten by the Austrians (March 1793). A levy of 300,000 men was ordered; a Committee of General Security was charged with the search for suspects; and thenceforward military occurrences called forth parliamentary crises and popular upheavals. Girondins and Jacobins unjustly accused one another of leaving the traitors, the conspirators, the "stipendiaries of Coblenz" unpunished. To avert the danger threatened by popular dissatisfaction, the Gironde was persuaded to vote for the creation of a revolutionary tribunal to judge suspects, while out of spite against Danton who demanded it, they refused the strong government which might have made a stand against the enemy (March 10, 1793). This was the first of the exceptional measures which were to call down ruin upon them. Whilst the insurrection in La Vendée was spreading, and Dumouriez falling back upon Neerwinden, sentence of death was laid upon *émigrés* and refractory priests; the treachery of Dumouriez, disappointed in his Belgian projects, gave grounds for all kinds of suspicion, as that of Mirabeau had formerly done, and led the Gironde to propose the new government which they had refused to Danton. The transformation of the provisional executive council into the Committee of Public Safety—omnipotent save in financial matters—was voted because the Girondins meant to control it; but Danton got the upper hand (April 6).

First committee of public safety.

Struggle between the commune and the Gironde.

The Girondins, discredited in Paris, multiplied their attacks upon Danton, now the master: they attributed the civil war and the disasters of the foreign campaign to the despotism of the Paris Commune and the clubs; they accused Marat of instigating the September massacres; and they began the supreme struggle by demanding the election of a committee of twelve deputies, charged with breaking up the anarchic authorities in Paris (May 18). The complete success of the Girondin proposals; the arrest of Hébert—the violent editor of the *Père Duchêne*; the insurrection of the Girondins of Lyons against the Montagnard Commune; the bad news from La Vendée—the military reverses; and the economic situation which had compelled the fixing of a maximum price of corn (May 4) excited the "moral insurrections" of May 31 and June 2. Marat himself sounded the tocsin, and Hanriot, at the head of the Parisian army, surrounded the Convention. Despite the efforts of Danton and the Committee of Public Safety, the arrest of the Girondins sealed the victory of the Mountain.

Fall of the Gironde.

The threat of the Girondin Isnard was fulfilled. The federalist insurrection, to avenge the violation of national representation, responded to the Parisian insurrection. Sixty-nine departmental governments protested against the violence done to the Convention; but the ultra-democratic constitution of 1793 deprived the Girondins, who were arming in the west, the south and the centre, of all legal force. To the departments that were hostile to the dictatorship of Paris, and the tyranny of Danton or Robespierre, it promised the referendum, an executive of twenty-four citizens, universal suffrage, and the free exercise of religion. The populace, who could not understand this parliamentary quarrel, and were in a hurry to set up a national defence, abandoned the Girondins, and the latter excited the enthusiasm of only one person, Charlotte Corday, who by the murder of Marat ruined them irretrievably. The battle of Brécourt was a defeat without a fight for their party without stamina and their general without troops (July 13); while on the 31st of October their leaders perished on the guillotine, where they had been preceded by the queen, Marie Antoinette. The Girondins and their adversaries were differentiated by neither religious dissensions nor political divergency, but merely by a question of time. The Girondins, when in power, had had scruples which had not troubled them while scaling the ladder; idols of Paris, they had flattered her in turn, and when Paris scorned them they sought support in the provinces. A great responsibility for this defeat of the liberal and republican bourgeoisie, whom they represented, is to be laid upon Madame Roland, the Egeria of the party. An ardent patriot and republican, her relations with Danton resembled those of Marie Antoinette with Mirabeau, in each case a woman spoilt by flattery, enraged at indifference. She was the ruin of the Gironde, but taught it how to die.

The fall of the Gironde left the country disturbed by civil war, and the frontiers more seriously threatened than before Valmy. Bouchotte, a totally inefficient minister for war, the Commune's man of straw, left the army without food or ammunition, while the suspected officers remained inactive. In the Angevin Vendée the incapable leaders let themselves be beaten at Aubiers, Beaupréau and Thouars, at a time when Cathelineau was taking possession of Saumur and threatening Nantes, the capture of which would have permitted the insurgents in La Vendée to join those of Brittany and receive provisions from England. Meanwhile, the remnants of the Girondin federalists were overcome by the disguised royalists, who had aroused the whole of the Rhône valley from Lyons to Marseilles, had called in the Sardinians, and handed over the fleet and the arsenal at Toulon to the English, whilst Paoli left Corsica at their disposal. The scarcity of money due to the discrediting of the assignats, the cessation of commerce, abroad and on the sea, and the bad harvest of 1793, were added to all these dangers, and formed a serious menace to France and the Convention.

The dictatorship of the first committee of public safety.

This meant a hard task for the first Committee of Public Safety and its chief Danton. He was the only one to understand the conditions necessary to a firm government; he caused the adjournment of the decentralizing constitution of 1793, and set up a revolutionary government. The Committee of Public Safety, now a permanency, annulled the Convention and was itself the central authority, its organization in Paris being the twelve committees substituted for the provisional executive committee and the six ministers, the Committee of General Security for the maintenance of the police, and the arbitrary Revolutionary Tribunal. The execution of its orders in the departments was carried out by omnipotent representatives "on mission" in the armies, by popular societies—veritable missionaries of the Revolution—and by the revolutionary committees which were its backbone.

Danton's failure.

Despite this Reign of Terror Danton failed; he could neither dominate foes within nor divide those without. Representing the sane and vigorous democracy, and like Jefferson a friend to liberty and self-government, he had been obliged to set up the most despotic of governments in face of internal anarchy and foreign invasion. Being of a temperament that expressed itself only in action, and neither a theorist nor a cabinet-minister, he held the views of a statesman without having a following sufficient to realize them. Moreover, the proceedings of the 2nd of June, when the Commune of Paris had triumphed, had dealt him a mortal blow. He is his turn tried to stem the tumultuous current which had borne him along, and to prevent discord; but the check to his policy of an understanding with Prussia and with Sardinia, to whom, like Richelieu and D'Argenson, he offered the realization of her transalpine ambition in exchange for Nice and Savoy, was added to the failure of his temporizing methods in regard to the federalist insurgents, and of his military operations against La Vendée. A man of action and not of cunning shifts, he succumbed on the 10th of July to the blows of his own government, which had passed from his hands into those of Robespierre, his ambitious and crafty rival.

Second committee of public safety.

The second Committee of Public Safety lasted until the 27th of July 1794. Composed of twelve members, re-eligible every month, and dominated by the triumvirate, Robespierre, Saint-Just and Couthon, it was stronger than ever, since it obtained the right of appointing leaders, disposed of money, and muzzled the press. Many of its members were sons of the bourgeoisie, men who having been educated at college, thanks to some charitable agency, in the pride of learning, and raised above their original station, were ready for anything but had achieved nothing. They had plenty of talent at command, were full of classical tirades against tyranny, and, though sensitive enough in their private life, were bloodthirsty butchers in their public relations. Such were Robespierre, Saint-Just, Couthon, Billaud-Varenne, Cambon, Thuriot, Collot d'Herbois, Barrère and Prieur de la Marne. Working hand in hand with these politicians, not always in accordance with them, but preserving a solid front, were the specialists, Carnot, Robert Lindet, Jean Bon Saint-André and Prieur de la Côte d'Or, honourable men, anxious above all to safeguard their country. At the head of the former type Robespierre, without special knowledge or exceptional talent, devoured by jealous ambition and gifted with cold grave eloquence, enjoyed a great moral ascendancy, due to his incorruptible purity of life and the invariably correct behaviour that had been wanting in Mirabeau, and by the persevering will which Danton had lacked. His marching orders were: no more temporizing with the federalists or with generals who are afraid of conquering; war to the death with all Europe in the name of revolutionary propaganda and the monarchical tradition of natural frontiers; and fear, as a means of government. The specialists answered foreign foes by their organization of victory; as for foes at home, the triumvirate crushed them beneath the Terror.

Defeat of the coalition.

France was saved by them and by that admirable outburst of patriotism which provided 750,000 patriots for the army through the general levy of the 16th of August 1793, aided, moreover, by the mistakes of her enemies. Instead of profiting by Dumouriez's treachery and the successes in La Vendée, the Coalition, divided over the resuscitated Polish question, lost time on the frontiers of this new Poland of the west which was sacrificing itself for the sake of a Universal Republic. Thus in January 1794 the territory of France was cleared of the Prussians and Austrians by the victories at Hondschoote, Wattignies and Wissembourg; the army of La Vendée was repulsed from Granville, overwhelmed by Hoche's army at Le Mans and Savenay, and its leaders shot; royalist sedition was suppressed at Lyons, Bordeaux, Marseilles and Toulon; federalist insurrections were wiped out by the terrible massacres of Carrier at Nantes, the atrocities of Lebon at Arras, and the wholesale executions of Fouché and Collot d'Herbois at Lyons; Louis XVI. and Marie Antoinette guillotined, the *émigrés* dispersed, denied or forsaken by all Europe.

The new parties.

The party of tolerance.

But the triumphant Mountain was not as united as it boasted. The second Committee of Public Safety had now to struggle against two oppositions: one of the left, represented by Hébert, the Commune of Paris and the Cordeliers; another of the right, Danton and his followers. The former would not admit that the Terror was only a temporary method of defence; for them it was a permanent system which was even to be strengthened in order to crush all who were hostile to the Revolution. Their sanguinary violence was combined with an anti-religious policy, not atheistical, but inspired by mistrust of the clergy, and by a civic and deistic creed that was a direct outcome of the federations. To these latter were due the substitution of the Republican for the Gregorian calendar, and the secular Feasts of Reason (November 19, 1793). The followers of Hébert wanted to push forward the movement of May 31, 1793, in order to become masters in their turn; while those of Danton were by way of arresting it. They considered it time to re-establish the reign of ordinary laws and justice; sick of bloodshed, with Camille Desmoulins they demanded a "Committee of Clemency." A deist and therefore hostile to "anti-religious masquerades," while uneasy at the absolute authority of the Paris Commune, which aimed at suppressing the State, and at its armed propaganda abroad, Robespierre resumed the struggle against its illegal power, so fatal to the Gironde. His boldness succeeded (March 24, 1794), and then, jealous of Danton's activity and statesmanship, and exasperated by the jeers of his friends, he rid himself of the party of tolerance by a parody of justice (April 5).

Robespierre's dictatorship.

9th Thermidor.

Robespierre now stood alone. During five months, while affecting to be the representative of "a reign of justice and virtue," he laboured at strengthening his politico-religious dictatorship—already so formidably armed—with new powers. "The incorruptible wanted to become the invulnerable" and the scaffold of the guillotine was crowded. By his dogma of the supreme state Robespierre founded a theocratic government with the police as an Inquisition. The festival of the new doctrine, which turned the head of the new pontiff (June 8), the *loi de Prairial*, or "code of legal murder" (June 10), which gave the deputies themselves into his hand; and the multiplication of executions at a time when the victory of Fleurus (June 25) showed the uselessness and barbarity of this aggravation of the Reign of Terror provoked against him the victorious coalition of revenge, lassitude and fear. Vanquished and imprisoned, he refused to take part in the illegal action proposed by the Commune against the Convention. Robespierre was no man of action. On the 9th Thermidor (July 27, 1794) he fell into the gulf that had opened on the 31st of May, and through which the 18th Brumaire was visible.

Third committee of public safety.

Although brought about by the Terrorists, the tragic fall of Robespierre put an end to the Reign of Terror; for their chiefs having disappeared, the subordinates were too much divided to keep up the dictatorship of the third Committee of Public Safety, and reaction soon set in. After a change in *personnel* in favour of the surviving Dantonists, came a limitation to the powers of the Committee of Public Safety, now placed in dependence upon the Convention; and next followed the destruction of the revolutionary system, the Girondin decentralization and the resuscitation of departmental governments; the reform of the Revolutionary Tribunal on the 10th of August; the suppression of the Commune of Paris on the 1st of September, and of the salary of forty *sous* given to members of the sections; the abolition of the maximum, the suppression of the Guillotine, the opening of the prisons, the closing of the Jacobin club (November 11), and the henceforward insignificant existence of the popular societies.

Resuscitation of the royalist party.

Popular risings of Germinal and Prairial.

Power reverted to the Girondins and Dantonists, who re-entered the Convention on the 18th of December; but with them re-entered likewise the royalists of Lyons, Marseilles and Toulon, and further, after the peace of Basel, many young men set free from the army, hostile to the Jacobins and defenders of the now moderate and peace-making Convention. These *muscadins* and *incroyables*, led by Fréron, Tallien and Barras—former revolutionists who had become aristocrats—profited by the restored liberty of the press to prepare for days of battle in the salons of the *merveilleuses* Madame Tallien, Madame de Staël and Madame Récamier, as the *sans-culottes* had formerly done in the clubs. The remnants of Robespierre's faction became alarmed at this Thermidor reaction, in which they scented royalism. Aided by famine, by the suppression of the maximum, and by the imminent bankruptcy of the assignats, they endeavoured to arouse the working classes and the former Hanriot companies against a government which was trying to destroy the republic, and had broken the busts of Marat and guillotined Carrier and Fouquier-Tinville, the former public prosecutor. Thus the risings of the 12th Germinal (April 1, 1795) and of the 1st Prairial (May 20) were economic revolts rather than insurrections excited by the deputies of the Mountain; in order to suppress them the reactionaries called in the army. Owing to this first intervention of the troops in politics, the Committee of Public Safety, which aimed not so much at a moderate policy as at steering a middle course between the Thermidorians of the Right and of the Left, was able to dispense with the latter.

The white terror.

The royalists now supposed that their hour had come. In the south, the companions of Jehu and of the Sun inaugurated a "White Terror," which had not even the apparent excuse of the public safety or of exasperated patriotism. At the same time they prepared for a twofold insurrection against the republic—in the west with the help of England, and in the east with that of Austria—by an attempt to bribe General Pichegru. But though the heads of the government wanted to put an end to the Revolution they had no thought of restoring the monarchy in favour of the Comte de Provence, who had taken the title of Louis XVIII. on hearing of the death of the dauphin in the Temple, and still less of bringing back the *ancien régime*. Hoche crushed the insurrection of the Chouans and the Bretons at Quiberon on the 2nd of July 1795, and Pichegru, scared, refused to entangle himself any further.

The constitution of the year III.

The 13th Vendémiaire.

To cut off all danger from royalists or terrorists the Convention now voted the Constitution of the year III.; suppressing that of 1793, in order to counteract the terrorists, and re-establishing the bourgeois limited franchise with election in two degrees—a less liberal arrangement than that granted from 1789 to 1792. The chambers of the Five Hundred and of the Ancients were elected by the moneyed and intellectual aristocracy, and were to be re-elected by thirds annually. The executive authority, entrusted to five Directors, was no more than a definite and very strong Committee of Public Safety; but Sieyès, the author of the new constitution, in opposition to the royalists, had secured places of refuge for his party by reserving posts as directors for the regicides, and two-thirds of the deputies' seats for members of the Convention. In self-defence against this continuance of the policy and the *personnel* of the Convention—a modern "Long Parliament"—the royalists, persistent street-fighters and masters in the "sections" after the suppression of the daily indemnification of forty *sous*, attempted the insurrection of the 13th Vendémiaire (October 5, 1795), which was easily put down by General Bonaparte.

Military achievements of the convention.

Treaty of Basel.

Thus the bourgeois republic reaped the fruits of its predecessor's external policy. After the freeing of the land in January 1794 an impulse had been given to the spirit of conquest which had gradually succeeded to the disinterested fever of propaganda and overheated patriotism. This it was which had sustained Robespierre's dictatorship; and, owing to the "amalgam" and the re-establishment of discipline, Belgium and the left bank of the Rhine had been conquered and Holland occupied, simultaneously with Kosciusko's rising in Poland, Prussia's necessity of keeping and extending her Polish acquisitions, Robespierre's death, the prevalent desires of the majority, and the continued victories of Pichegru, Jourdan and Moreau, enfeebled the coalition. At Basel (April–July 1795) republican France, having rejoined the concert of Europe, signed the long-awaited peace with Prussia, Spain, Holland and the grand-duke of Tuscany. But thanks to the past influence of the Girondin party, who had caused the war, and of the regicides of the Mountain, this peace not only ratified the conquest of Belgium, the left bank of the Rhine and Santo Domingo, but paved the way for fresh conquests; for the old spirit of domination and persistent hostility to Austria attracted the destinies of the Revolution definitely towards war.

Internal achievements.

The work of internal construction amidst this continued battle against the whole world had been no less remarkable. The Constituent Assembly had been more destructive than constructive; but the Convention preserved intact those fundamental principles of civil liberty which had been the main results of the Revolution: the equality so dear to the French, and the sovereignty of the people—the foundation of democracy. It also managed to engage private interests in state reform by creating the Grand Livre de la Dette Publique (September 13–26, 1793), and enlisted peasant and bourgeois savings in social reforms by the distribution and sale of national property. But with views reaching beyond equality of rights to a certain equality of property, the committees, as regards legislation, poor relief and instruction, laid down principles which have never been realized, save in the matter of the metric system; so that the Convention which was dispersed on the 16th of October 1795 made a greater impression on political history and social ideas than on institutions. Its disappearance left a great blank.

The Directory.

During four years the Directory attempted to fill this blank. Being the outcome of the Constitution of the year III., it should have been the organizing and pacifying government of the Republic; in reality it sought not to create, but to preserve its own existence. Its internal weakness, between the danger of anarchy and the opposition of the monarchists, was extreme; and it soon became discredited by its own *coups d'état* and by financial impotence in the eyes of a nation sick of revolution, aspiring towards peace and the resumption of economic undertakings. As to foreign affairs, its aggressive policy imperilled the conquests that had been the glory of the Convention, and caused the frontiers of France, the defence of which had been a point of honour with the Republic, to be called in question. Finally, there was no real government on the part of the five directors: La Révellière-Lépeaux, an honest man but weak; Reubell, the negotiator of the Hague; Letourneur, an officer of talent; Barras, a man of intrigue, corrupt and without real convictions; and Carnot, the only really worthy member. They never understood one another, and never consulted together in hours of danger, save to embroil matters in politics as in war. Leaning on the bourgeois, conservative, liberal and anti-clerical republicans, they were no more able than was the Thermidor party to re-establish the freedom that had been suspended by revolutionary despotism; they created a ministry of police, interdicted the clubs and popular societies, distracted the press, and with partiality undertook the separation of Church and State voted on the 18th of September 1794. Their real defence against counter revolution was the army; but, by a further contradiction, they reinforced the army attached to the Revolution while seeking an alliance with the peace-making bourgeoisie. Their party had therefore no more homogeneity than had their policy.

The parties.

Moreover the Directory could not govern alone; it had to rely upon two other parties, according to circumstances: the republican-democrats and the disguised royalists. The former, purely anti-royalist, thought only of remedying the sufferings of the people. Roused by the collapse of the assignats, following upon the ruin of industry and the arrest of commerce, they were still further exasperated by the speculations of the financiers, by the jobbery which prevailed throughout the administration, and by the sale of national property which had profited hardly any but the bourgeoisie. After the 13th Vendémiaire the royalists too, deceived in their hopes, were expecting to return gradually to the councils, thanks to the high property qualification for the franchise. Under the name of "moderates" they demanded an end to this war which England continued and Austria threatened to recommence, and that the Directory from self-interested motives refused to conclude; they desired the abandonment of revolutionary proceedings, order in finance and religious peace.

Struggle against the royalists.

Struggle against the republican-democrats and the socialists.

Babeuf.

The Directory, then, was in a minority in the country, and had to be ever on the alert against faction; all possible methods seemed legitimate, and during two years appeared successful. Order was maintained in France, even the royalist west being pacified, thanks to Hoche, who finished his victorious campaign of 1796 against Stofflet, Charette and Cadoudal, by using mild and just measures to complete the subjection of the country. The greatest danger lay in the republican-democrats and their socialist ally, François Noel ("Gracchus") Babeuf (*q.v.*). The former had united the Jacobins and the more violent members of the Convention in their club, the Société du Panthéon; and their fusion, after the closing of the club, with the secret society of the Babouvists lent formidable strength to this party, with which Barras was secretly in league. The terrorist party, deprived of its head, had found a new leader, who, by developing the consequences of the Revolution's acts to their logical conclusion, gave first expression to the levelling principle of communism. He proclaimed the right of property as appertaining to the state, that is, to the whole community; the doctrine of equality as absolutely opposed to social inequality of any kind—that of property as well as that of rank; and finally the inadequacy of the solution of the agrarian question, which had profited scarcely any one, save a new class of privileged individuals. But these socialist demands were premature; the attack of the camp of Grenelle upon constitutional order ended merely in the arrest and guillotining of Babeuf (September 9, 1796–May 25, 1797).

Financial policy of the Directory.

The liquidation of the financial inheritance of the Convention was no less difficult. The successive issues of assignats, and the multiplication of counterfeits made abroad, had so depreciated this paper money that an assignat of 100 francs was in February 1796 worth only 30 centimes; while the government, obliged to accept them at their nominal value, no longer collected any taxes and could not pay salaries. The destruction of the plate for printing assignats, on the 18th of February 1796, did not prevent the drop in the forty milliards still in circulation. Territorial mandates were now tried, which inspired no greater confidence, but served to liquidate two-thirds of the debt, the remaining third being consolidated by its dependence on the Grand Livre (September 30, 1797). This widespread bankruptcy, falling chiefly on the bourgeoisie, inaugurated a reaction which lasted until 1830 against the chief principle of the Constituent Assembly, which had favoured indirect taxation as producing a large sum without imposing any very obvious burden. The bureaucrats of the old system—having returned to their offices and being used to these indirect taxes—lent their assistance, and thus the Directory was enabled to maintain its struggle against the Coalition.

External policy.

All system in finance having disappeared, war provided the Directory, now *in extremis*, with a treasury, and was its only source for supplying constitutional needs; while it opened a path to the military commanders who were to be the support and the glory of the state. England remaining invulnerable in her insular position despite Hoche's attempt to land in Ireland in 1796, the Directory resumed the traditional policy against Austria of conquering the natural frontiers, Carnot furnishing the plans; hence the war in southern Germany, in which Jourdan and Moreau were repulsed by an inferior force under the archduke Charles, and Bonaparte's triumphant Italian campaign. Chief of an army that he had made irresistible, not by honour but by glory, and master of wealth by rapine, Bonaparte imposed his will upon the Directory, which he provided with funds. After having separated the Piedmontese from the Austrians, whom he drove back into Tyrol, and repulsed offensive reprisals of Wurmser and Alvinzi on four occasions, he stopped short at the preliminary negotiations of Léoben just at the moment when the Directory, discouraged by the problem of Italian reconstitution, was preparing the army of the Rhine to re-enter the field under the command of Hoche. Bonaparte thus gained the good opinion of peace-loving Frenchmen; he partitioned Venetian territory with Austria, contrary to French interests but conformably with his own in Italy, and henceforward was the decisive factor in French and European policy, like Caesar or Pompey of old. England, in consternation, offered in her turn to negotiate at Lille.

Struggle against the royalists.

These military successes did not prevent the Directory, like the Thermidorians, from losing ground in the country. Every strategic truce since 1795 had been marked by a political crisis; peace reawakened opposition. The constitutional party, royalist in reality, had made alarming progress, chiefly owing to the Babouvist conspiracy; they now tried to corrupt the republican generals, and Condé procured the treachery of Pichegru, Kellermann and General Ferrand at Besançon. Moreover, their Clichy club, directed by the abbé Brottier, manipulated Parisian opinion; while many of the refractory priests, having returned after the liberal Public Worship Act of September 1795, made active propaganda against the principles of the Revolution, and plotted the fall of the Directory as maintaining the State's independence of the Church. Thus the partial elections of the year V. (May 20, 1797) had brought back into the two councils a counter-revolutionary majority of royalists, constitutionalists of 1791, Catholics and moderates. The Director Letourneur had been replaced by Barthélemy, who had negotiated the treaty of Basel and was a constitutional monarchist. So that the executive not only found it impossible to govern, owing to the opposition of the councils and a vehement press-campaign, but was distracted by ceaseless internal conflict. Carnot and Barthélemy wished to meet ecclesiastical opposition by legal measures only, and demanded peace; while Barras, La Révellière and Reubell saw no other remedy save military force. The attempt of the counter-revolutionaries to make an army for themselves out of the guard of the Legislative Assembly, and the success of the Catholics, who had managed at the end of August 1797 to repeal the laws against refractory priests, determined the Directory to appeal from the rebellious parliament to the ready swords of Augereau and Bernadotte. On the 18th Fructidor (September 4, 1797) Bonaparte's lieutenants, backed up by the whole army, stopped the elections in forty-nine departments, and deported to Guiana many deputies of both councils, journalists and non-juring priests, as well as the director Barthélemy, though Carnot escaped into Switzerland. The royalist party was once more overthrown, but with it the republican constitution itself. Thus every act of violence still further confirmed the new empire of the army and the defeat of principles, preparing the way for military despotism.

18th Fructidor.

Aggressive policy of the Directory.

Political and financial *coups d'état* were not enough for the directors. In order to win back public opinion, tired of internecine quarrels and sickened by the scandalous immorality of the generals and of those in power, and to remove from Paris an army which after having given them a fresh lease of life was now a menace to them, war appeared their only hopeful course. They attempted to renew the designs of Louis XIV. and anticipate those of Napoleon. But Bonaparte saw what they were planning; and to the rupture of the negotiations at Lille and an order for the resumption of hostilities he responded by a fresh act of disobedience and the infliction on the Directory of the peace of Campo-Formio, on October 17, 1797. The directors were consoled for this enforced peace by acquiring the left bank of the Rhine and Belgium, and for the forfeiture of republican principles by attaining what had for so long been the ambition of the monarchy. But the army continued a menace. To avoid disbanding it, which might, as after the peace of Basel, have given the counter-revolution further auxiliaries, the Directory appointed Bonaparte chief of the Army of England, and employed Jourdan to revise the conscription laws so as to make military service a permanent duty of the citizen, since war was now to be the permanent object of policy. The Directory finally conceived the gigantic project of bolstering up the French Republic—the triumph of which was celebrated by the peace of Campo-Formio—by forming the neighbouring weak states into tributary vassal republics. This system had already been applied to the Batavian republic in 1795, to the Ligurian and Cisalpine republics in June 1797; it was extended to that of Mülhausen on the 28th of January 1798, to the Roman republic in February, to the Helvetian in April, while the Parthenopaean republic (Naples) was to be established in 1799. This was an international *coup de force*, which presupposed that all these nations in whose eyes independence was flaunted would make no claim to enjoy it; that though they had been beaten and pillaged they would not learn to conquer in their turn; and that the king of Sardinia, dispossessed of Milan, the grand-duke of Tuscany who had given refuge to the pope when driven from Rome, and the king of Naples, who had opened his ports to Nelson's fleet, would not find allies to make a stand against this hypocritical system.

Coup d'état of the 22nd Floréal.

What happened was exactly the contrary. Meanwhile, the armies were kept in perpetual motion, procuring money for the impecunious Directory, making a diversion for internal discontent, and also permitting of a "reversed Fructidor," against the anarchists, who had got the upper hand in the partial elections of May 1798. The social danger was averted in its turn after the clerical danger had been dissipated. The next task was to relieve Paris of Bonaparte, who had already refused to repeat Hoche's unhappy expedition to Ireland and to attack England at home without either money or a navy. The pecuniary

Bonaparte in Egypt.

The second coalition.

resources of Berne and the wealth of Rome fortunately tided over the financial difficulty and provided for the expedition to Egypt, which permitted Bonaparte to wait "for the fruit to ripen"—*i.e.* till the Directory should be ruined in the eyes of France and of all Europe. The disaster of Aboukir (August 1, 1798) speedily decided the coalition pending between England, Austria, the Empire, Portugal, Naples, Russia and Turkey. The Directory had to make a stand or perish, and with it the Republic. The directors had thought France might retain a monopoly in numbers and in initiative. They soon perceived that enthusiasm is not as great for a war of policy and conquest as for a war of national defence; and the army dwindled, since a country cannot bleed itself to death. The law of conscription was voted on the 5th of September 1798; and the tragedy of Rastadt, where the French commissioners were assassinated, was the opening of a war, desired but ill-prepared for, in which the Directory showed hesitation in strategy and incoherence in tactics, over a disproportionate area in Germany, Switzerland and Italy. Military reverses were inevitable, and responsibility for them could not be shirked. As though shattered by a reverberant echo from the cannon of the Trebbia, the Directory crumbled to pieces, succumbing on the 18th of June 1799 beneath the reprobation showered on Treilhard, Merlin de Douai, and La Révellière-Lépeaux. A few more military disasters, royalist insurrections in the south, Chouan disturbances in Normandy, Orleanist intrigues and the end came. To soothe the populace and protect the frontier more was required than the resumption, as in all grave crises of the Revolution, of terrorist measures such as forced taxation or the law of hostages; the new Directory, Sieyès presiding, saw that for the indispensable revision of the constitution "a head and a sword" were needed. Moreau being unattainable, Joubert was to be the sword of Sieyès; but, when he was killed at the battle of Novi, the sword of the Revolution fell into the hands of Bonaparte.

Coup d'état of the 18th Brumaire.

Although Brune and Masséna retrieved the fight at Bergen and Zürich, and although the Allies lingered on the frontier as they had done after Valmy, still the fortunes of the Directory were not restored. Success was reserved for Bonaparte, suddenly landing at Fréjus with the prestige of his victories in the East, and now, after Hoche's death, appearing as sole master of the armies. He manœuvred among the parties as on the 13th Vendémiaire. On the 18th Brumaire of the year VIII. France and the army fell together at his feet. By a twofold *coup d'état*, parliamentary and military, he culled the fruits of the Directory's systematic aggression and unpopularity, and realized the universal desires of the rich bourgeoisie, tired of warfare; of the wretched populace; of landholders, afraid of a return to the old order of things; of royalists, who looked upon Bonaparte as a future Monk; of priests and their people, who hoped for an indulgent treatment of Catholicism; and finally of the immense majority of the French, who love to be ruled and for long had had no efficient government. There was hardly any one to defend a liberty which they had never known. France had, indeed, remained monarchist at heart for all her revolutionary appearance; and Bonaparte added but a name, though an illustrious one, to the series of national or local dictatorships, which, after the departure of the weak Louis XVI., had maintained a sort of informal republican royalty.

The Consulate, Sept. 11, 1799–May 18, 1804.

On the night of the 19th Brumaire a mere ghost of an Assembly abolished the constitution of the year III., ordained the provisionary Consulate, and legalized the *coup d'état* in favour of Bonaparte. A striking and singular event; for the history of France and a great part of Europe was now for fifteen years to be summed up in the person of a single man (see NAPOLEON).

The constitution of the year VIII.

This night of Brumaire, however, seemed to be a victory for Sieyès rather than for Bonaparte. He it was who originated the project which the legislative commissions, charged with elaborating the new constitution, had to discuss. Bonaparte's cleverness lay in opposing Daunou's plan to that of Sieyès, and in retaining only those portions of both which could serve his ambition. Parliamentary institutions annulled by the complication of three assemblies—the Council of State which drafted bills, the Tribunate which discussed them without voting them, and the Legislative Assembly which voted them without discussing them; popular suffrage, mutilated by the lists of notables (on which the members of the Assemblies were to be chosen by the conservative senate); and the triple executive authority of the consuls, elected for ten years: all these semblances of constitutional authority were adopted by Bonaparte. But he abolished the post of Grand Elector, which Sieyès had reserved for himself, in order to reinforce the real authority of the First Consul himself—by leaving the two other consuls, Cambacérès and Lebrun, as well as the Assemblies, equally weak. Thus the aristocratic constitution of Sieyès was transformed into an unavowed dictatorship, a public ratification of which the First Consul obtained by a third *coup d'état* from the intimidated and yet reassured electors—reassured by his dazzling but unconvincing offers of peace to the victorious Coalition (which repulsed them), by the rapid disarmament of La Vendée, and by the proclamations in which he filled the ears of the infatuated people with the new talk of stability of government, order, justice and moderation. He gave every one a feeling that France was governed once more by a real statesman, that a pilot was at the helm.

The Consulate.

Bonaparte had now to rid himself of Sieyès and those republicans who had no desire to hand over the republic to one man, particularly of Moreau and Masséna, his military rivals. The victory of Marengo (June 14, 1800) momentarily in the balance, but secured by Desaix and Kellermann, offered a further opportunity to his jealous ambition by increasing his popularity. The royalist plot of the Rue Saint-Nicaise (December 24, 1800) allowed him to make a clean sweep of the democratic republicans, who despite their innocence were deported to Guiana, and to annul Assemblies that were a mere show by making the senate omnipotent in constitutional matters; but it was necessary for him to transform this deceptive truce into the general pacification so ardently desired for the last eight years. The treaty of Lunéville, signed in February 1801 with Austria who had been disarmed by Moreau's victory at Hohenlinden, restored peace to the continent, gave nearly the whole of Italy to France, and permitted Bonaparte to eliminate from the Assemblies all the leaders of the opposition in the discussion of the Civil Code. The Concordat (July 1801), drawn up not in the Church's interest but in that of his own policy, by giving satisfaction to the religious feeling of the country, allowed him to put down the constitutional democratic Church, to rally round him the consciences of the peasants, and above all to deprive the royalists of their best weapon. The "Articles Organiques" hid from the eyes of his companions in arms and councillors a reaction which, in fact if not in law, restored to a submissive Church, despoiled of her revenues, her position as the religion of the state. The peace of Amiens with England (March 1802), of which France's allies, Spain and Holland, paid all the costs, finally gave the peacemaker a pretext for endowing himself with a Consulate, not for ten years but for life, as a recompense from the nation. The Rubicon was crossed on that day: Bonaparte's march to empire began with the constitution of the year X. (August 1802).

Internal reorganization.

Before all things it was now necessary to reorganize France, ravaged as she was by the Revolution, and with her institutions in a state of utter corruption. The touch of the master was at once revealed to all the foreigners who rushed to gaze at the man about whom, after so many catastrophes and strange adventures, Paris, "la ville lumière," and all Europe were talking. First of all, Louis XV.'s system of roads was improved and that of Louis XVI.'s canals developed; then industry put its shoulder to the wheel; order and discipline were re-established everywhere, from the frontiers to the capital, and brigandage suppressed; and finally there was Paris, the city of cities! Everything was in process of transformation:

a second Rome was arising, with its forum, its triumphal arches, its shows and parades; and in this new Rome of a new Caesar fancy, elegance and luxury, a radiance of art and learning from the age of Pericles, and masterpieces rifled from the Netherlands, Italy and Egypt illustrated the consular peace. The Man of Destiny renewed the course of time. He borrowed from the *ancien régime* its plenipotentiaries; its over-centralized, strictly utilitarian administrative and bureaucratic methods; and afterwards, in order to bring them into line, the subservient pedantic scholasticism of its university. On the basis laid down by the Constituent Assembly and the Convention he constructed or consolidated the funds necessary for national institutions, local governments, a judiciary system, organs of finance, banking, codes, traditions of conscientious well-disciplined labour, and in short all the organization which for three-quarters of a century was to maintain and regulate the concentrated activity of the French nation (see the section *Law and Institutions*). Peace and order helped to raise the standard of comfort. Provisions, in this Paris which had so often suffered from hunger and thirst, and lacked fire and light, had become cheap and abundant; while trade prospered and wages ran high. The pomp and luxury of the *nouveaux riches* were displayed in the salons of the good Joséphine, the beautiful Madame Tallien, and the "divine" Juliette Récamier.

The republican opposition.

But the republicans, and above all the military, saw in all this little but the fetters of system; the wily despotism, the bullying police, the prostration before authority, the sympathy lavished on royalists, the recall of the *émigrés*, the contempt for the Assemblies, the purification of the Tribunate, the platitudes of the servile Senate, the silence of the press. In the formidable machinery of state, above all in the creation of the Legion of Honour, the Concordat, and the restoration of indirect taxes, they saw the rout of the Revolution. But the expulsion of persons like Benjamin Constant and Madame de Staël sufficed to quell this Fronde of the salons. The expedition to San Domingo reduced the republican army to a nullity; war demoralized or scattered the leaders, who were jealous of their "comrade" Bonaparte; and Moreau, the last of his rivals, cleverly compromised in a royalist plot, as Danton had formerly been by Robespierre, disappeared into exile. In contradistinction to this opposition of senators and republican generals, the immense mass of the people received the ineffaceable impression of Bonaparte's superiority. No suggestion of the possibility of his death was tolerated, of a crime which might cut short his career. The conspiracy of Cadoudal and Pichegru, after Bonaparte's refusal to give place to Louis XVIII., and the political execution of the duc d'Enghien, provoked an outburst of adulation, of which Bonaparte took advantage to put the crowning touch to his ambitious dream.

Napoleon emperor May 18, 1804-April 6, 1814.

The decision of the senate on the 18th of May 1804, giving him the title of emperor, was the counterblast to the dread he had excited. Thenceforward "the brow of the emperor broke through the thin mask of the First Consul." Never did a harder master ordain more imperiously, nor understand better how to command obedience. "This was because," as Goethe said, "under his orders men were sure of accomplishing their ends. That is why they rallied round him, as one to inspire them with that kind of certainty." Indeed no man ever concentrated authority to such a point, nor showed mental abilities at all comparable to his: an extraordinary power of work, prodigious memory for details and fine judgment in their selection; together with a luminous decision and a simple and rapid conception, all placed at the disposal of a sovereign will. No head of the state gave expression more imperiously than this Italian to the popular passions of the French of that day: abhorrence for the emigrant nobility, fear of the *ancien régime*, dislike of foreigners, hatred of England, an appetite for conquest evoked by revolutionary propaganda, and the love of glory. In this Napoleon was a soldier of the people: because of this he judged and ruled his contemporaries. Having seen their actions in the stormy hours of the Revolution, he despised them and looked upon them as incapable of disinterested conduct, conceited, and obsessed by the notion of equality. Hence his colossal egoism, his habitual disregard of others, his jealous passion for power, his impatience of all contradiction, his vain untruthful boasting, his unbridled self-sufficiency and lack of moderation—passions which were gradually to cloud his clear faculty of reasoning. His genius, assisted by the impoverishment of two generations, was like the oak which admits beneath its shade none but the smallest of saplings. With the exception of Talleyrand, after 1808 he would have about him only mediocre people, without initiative, prostrate at the feet of the giant: his tribe of paltry, rapacious and embarrassing Corsicans; his admirably subservient generals; his selfish ministers, docile agents, apprehensive of the future, who for fourteen long years felt a prognostication of defeat and discounted the inevitable catastrophe.

So France had no internal history outside the plans and transformations to which Napoleon subjected the institutions of the Consulate, and the after-effects of his wars. Well knowing that his fortunes rested on the delighted acquiescence of France, Napoleon expected to continue indefinitely fashioning public opinion according to his pleasure. To his contempt for men he added that of all ideas which might put a bridle on his ambition; and to guard against them, he inaugurated the Golden Age of the police that he might tame every moral force to his hand. Being essentially a man of order, he loathed, as he said, all demagogic action, Jacobinism and visions of liberty, which he desired only for himself. To make his will predominant, he stifled or did violence to that of others, through his bishops, his gendarmes, his university, his press, his catechism. Nourished like Frederick II. and Catherine the Great in 18th-century maxims, neither he nor they would allow any of that ideology to filter through into their rough but regular ordering of mankind. Thus the whole political system, being summed up in the emperor, was bound to share his fall.

Napoleon's political idea.

Although an enemy of idealogues, in his foreign policy Napoleon was haunted by grandiose visions. A condottiere of the Renaissance living in the 19th century, he used France, and all those nations annexed or attracted by the Revolution, to resuscitate the Roman conception of the Empire for his own benefit. On the other hand, he was enslaved by the history and aggressive idealism of the Convention, and of the republican propaganda under the Directory; he was guided by them quite as much as he guided them. Hence the immoderate extension given to French activity by his classical Latin spirit; hence also his conquests, leading on from one to another, and instead of being mutually helpful interfering with each other; hence, finally, his not entirely coherent policy, interrupted by hesitation and counter-attractions. This explains the retention of Italy, imposed on the Directory from 1796 onward, followed by his criminal treatment of Venice, the foundation of the Cisalpine republic—a foretaste of future annexations—the restoration of that republic after his return from Egypt, and in view of his as yet inchoate designs, the postponed solution of the Italian problem which the treaty of Lunéville had raised.

Marengo inaugurated the political idea which was to continue its development until his Moscow campaign. Napoleon dreamed as yet only of keeping the duchy of Milan, setting aside Austria, and preparing some new enterprise in the East or in Egypt. The peace of Amiens, which cost him Egypt, could only seem to him a temporary truce; whilst he was gradually extending his authority in Italy, the cradle of his race, by the union of Piedmont, and by his tentative plans regarding Genoa, Parma, Tuscany and Naples. He wanted to make this his Cisalpine Gaul, laying siege to the Roman state on every hand, and preparing in the Concordat for the moral and material servitude of the pope. When he recognized his error in having raised the papacy from decadence by restoring its power over all the churches, he tried in vain to correct it by the *Articles Organiques* —wanting, like Charlemagne, to be the legal protector of the pope, and eventually master of the Church. To conceal his plan he aroused French colonial aspirations against England, and also the memory of the spoliations of 1763, exasperating English jealousy of France, whose borders now extended to the Rhine, and laying hands on Hanover, Hamburg and Cuxhaven. By the "Recess" of 1803, which brought to his side Bavaria, Württemberg and Baden, he followed up the overwhelming tide of revolutionary ideas in Germany, to stem which Pitt, back in power, appealed once more to an Anglo-Austro-Russian coalition against this new Charlemagne, who was trying to renew the old Empire, who was mastering France, Italy and Germany; who finally on the 2nd of December 1804 placed the imperial crown upon his head, after receiving the iron crown of the Lombard kings, and made Pius VII. consecrate him in Notre-Dame.

After this, in four campaigns from 1805 to 1809, Napoleon transformed his Carolingian feudal and federal empire into one modelled on the Roman empire. The memories of imperial Rome were for a third time, after Caesar and Charlemagne, to modify the historical evolution of France. Though the vague plan for an invasion of England fell to the ground Ulm and Austerlitz obliterated Trafalgar, and the camp at Boulogne put the best military resources he had ever commanded at Napoleon's disposal.

Treaty of Presburg, 1805.

In the first of these campaigns he swept away the remnants of the old Roman-Germanic empire, and out of its shattered fragments created in southern Germany the vassal states of Bavaria, Baden, Württemberg, Hesse-Darmstadt and Saxony, which he attached to France under the name of the Confederation of the Rhine; but the treaty of Presburg gave France nothing but the danger of a more centralized and less docile Germany. On the other hand, Napoleon's creation of the kingdom of Italy, his annexation of Venetia and her ancient Adriatic empire—wiping out the humiliation of 1797—and the occupation of Ancona, marked a new stage in his progress towards his Roman Empire. His good fortune soon led him from conquest to spoliation, and he complicated his master-idea of the grand empire by his Family Compact; the clan of the Bonapartes invaded European monarchies, wedding with princesses of blood-royal, and adding kingdom to kingdom. Joseph replaced the dispossessed Bourbons at Naples; Louis was installed on the throne of Holland; Murat became grand-duke of Berg, Jerome son-in-law to the king of Württemberg, and Eugène de Beauharnais to the king of Bavaria; while Stéphanie de Beauharnais married the son of the grand-duke of Baden.

Jena.

Eylau and Friedland.

Peace of Tilsit, July 8, 1807.

Continental blockade.

Meeting with less and less resistance, Napoleon went still further and would tolerate no neutral power. On the 6th of August 1806 he forced the Habsburgs, left with only the crown of Austria, to abdicate their Roman-Germanic title of emperor. Prussia alone remained outside the Confederation of the Rhine, of which Napoleon was Protector, and to further her decision he offered her English Hanover. In a second campaign he destroyed at Jena both the army and the state of Frederick William III., who could not make up his mind between the Napoleonic treaty of Schönbrunn and Russia's counter-proposal at Potsdam (October 14, 1806). The butchery at Eylau and the vengeance taken at Friedland finally ruined Frederick the Great's work, and obliged Russia, the ally of England and Prussia, to allow the latter to be despoiled, and to join Napoleon against the maritime tyranny of the former. After Tilsit, however (July 1807), instead of trying to reconcile Europe to his grandeur, Napoleon had but one thought: to make use of his success to destroy England and complete his Italian dominion. It was from Berlin, on the 21st of November 1806, that he had dated the first decree of a continental blockade, a monstrous conception intended to paralyze his inveterate rival, but which on the contrary caused his own fall by its immoderate extension of the empire. To the coalition of the northern powers he added the league of the Baltic and Mediterranean ports, and to the bombardment of Copenhagen by an English fleet he responded by a second decree of blockade, dated from Milan on the 17th of December 1807.

But the application of the Concordat and the taking of Naples led to the first of those struggles with the pope, in which we formulated two antagonistic doctrines: Napoleon declarin himself Roman emperor, and Pius VII. renewing the theocrat affirmations of Gregory VII. The former's Roman ambition wa made more and more plainly visible by the occupation of th kingdom of Naples and of the Marches, and the entry of Miollis int Rome; while Junot invaded Portugal, Radet laid hands on th pope himself, and Murat took possession of formerly Roman Spai whither Joseph was afterwards to be transferred. But Napoleo little knew the flame he was kindling. No more far-seeing tha the Directory or the men of the year III., he thought that, wit energy and execution, he might succeed in the Peninsula as h had succeeded in Italy in 1796 and 1797, in Egypt, and in Hesse and that he might cut into Spanish granite as into Italian mosai or "that big cake, Germany." He stumbled unawares upon th revolt of a proud national spirit, evolved through ten histori centuries; and the trap of Bayonne, together with the enthron ing of Joseph Bonaparte, made the contemptible prince of th Asturias the elect of popular sentiment, the representative o religion and country.

Bailen.

Napoleon thought he had Spain within his grasp, and now suddenly everything was slipping from him. The Peninsula became the grave of whole armies and a battlefield for England. Dupont capitulated at Bailen into the hands of Castaños, and Junot at Cintra to Wellesley; while Europe trembled at this first check to the hitherto invincible imperial armies. To reduce Spanish resistance Napoleon had in his turn to come to terms with the tsar Alexander at Erfurt; so that abandoning his designs in the East, he could make the Grand Army evacuate Prussia and return in force to Madrid.

Wagram.

Peace of Vienna.

Thus Spain swallowed up the soldiers who were wanted for Napoleon's other fields of battle, and they had to be replaced by forced levies. Europe had only to wait, and he would eventually be found disarmed in face of a last coalition; but Spanish heroism infected Austria, and showed the force of national resistance. The provocations of Talleyrand and England strengthened the illusion: Why should not the Austrians emulate the Spaniards? The campaign of 1809, however, was but a pale copy of the Spanish insurrection. After a short and decisive action in Bavaria, Napoleon opened up the road to Vienna for a second time; and after the two days' battle at Essling, the stubborn fight at Wagram, the failure of a patriotic insurrection in northern Germany and of the English expedition against Antwerp, the treaty of Vienna (December 14, 1809), with the annexation of the Illyrian provinces, completed the colossal empire. Napoleon profited, in fact, by this campaign which had been planned for his overthrow. The pope was deported to Savona beneath the eyes of indifferent Europe, and his domains were incorporated in the Empire; the senate's decision on the 17th of February 1810 created the title of king of Rome, and made Rome the capital of Italy. The pope banished, it was now desirable to send away those to whom Italy had been more or less promised. Eugène de Beauharnais, Napoleon's stepson, was transferred to Frankfort, and Murat carefully watched until the time should come to take him to Russia and instal him as king of Poland. Between 1810 and 1812 Napoleon's divorce of Josephine, and his marriage with Marie Louise of Austria, followed by the birth of the king of Rome, shed a brilliant light upon his future policy. He renounced a federation in which his brothers were not sufficiently docile; he gradually withdrew power from them; he concentrated all his affection and ambition on the son who was the guarantee of the continuance of his dynasty. This was the apogee of his reign.

Beginning of the end. Uprising of nationalism.

But undermining forces were already at work: the faults inherent in his unwieldy achievement. England, his chief enemy, was persistently active; and rebellion both of the governing and the governed broke out everywhere. Napoleon felt his impotence in coping with the Spanish insurrection, which he underrated, while yet unable to suppress it altogether. Men like Stein, Hardenberg and Scharnhorst were secretly preparing Prussia's retaliation. Napoleon's material omnipotence could not stand against the moral force of the pope, a prisoner at Fontainebleau; and this he did not realize. The alliance arranged at Tilsit was seriously shaken by the Austrian marriage, the threat of a Polish restoration, and the unfriendly policy of Napoleon at Constantinople. The very persons whom he had placed in power were counteracting his plans: after four years' experience Napoleon found himself obliged to treat his Corsican dynasties like those of the *ancien régime*, and all his relations were betraying him. Caroline conspired against her brother and against her husband; the hypochondriacal Louis, now Dutch in his sympathies, found the supervision of the blockade taken from him, and also the defence of the Scheldt, which he had refused to ensure; Jerome, idling in his harem, lost that of the North Sea shores; and Joseph, who was attempting the moral conquest of Spain, was continually insulted at Madrid. The very nature of things was against the new dynasties, as it had been against the old.

Treachery.

After national insurrections and family recriminations came treachery from Napoleon's ministers. Talleyrand betrayed his designs to Metternich, and had to be dismissed; Fouché corresponded with Austria in 1809 and 1810, entered into an understanding with Louis, and also with England; while Bourrienne was convicted of peculation. By a natural consequence of the spirit of conquest he had aroused, all these parvenus, having tasted victory, dreamed of sovereign power: Bernadotte, who had helped him to the Consulate, played Napoleon false to win the crown of Sweden; Soult, like Murat, coveted the Spanish throne after that of Portugal, thus anticipating the treason of 1813 and the defection of 1814; many persons hoped for "an accident" which might resemble the tragic end of Alexander and of Caesar. The country itself, besides, though flattered by conquests, was tired of self-sacrifice. It had become satiated; "the cry of the mothers rose threateningly" against "the Ogre" and his intolerable imposition of wholesale conscription. The soldiers themselves, discontented after Austerlitz, cried out for peace after Eylau. Finally, amidst profound silence from the press and the Assemblies, a protest was raised against imperial despotism by the literary world, against the excommunicated sovereign by Catholicism, and against the author of the continental blockade by the discontented bourgeoisie, ruined by the crisis of 1811.

Degeneration of Napoleon.

Napoleon himself was no longer the General Bonaparte of his campaign in Italy. He was already showing signs of physical decay; the Roman medallion profile had coarsened, the obese body was often lymphatic. Mental degeneration, too, betrayed itself in an unwonted irresolution. At Eylau, at Wagram, and later at Waterloo, his method of acting by enormous masses of infantry and cavalry, in a mad passion for conquest, and his misuse of his military resources, were all signs of his moral and technical decadence; and this at the precise moment when, instead of the armies and governments of the old system, which had hitherto reigned supreme, the nations themselves were rising against France, and the events of 1792 were being avenged upon her. The three campaigns of two years brought the final catastrophe.

Russian campaign.

Campaigns of 1813-14.

Napoleon had hardly succeeded in putting down the revolt in Germany when the tsar himself headed a European insurrection against the ruinous tyranny of the continental blockade. To put a stop to this, to ensure his own access to the Mediterranean and exclude his chief rival, Napoleon made a desperate effort in 1812 against a country as invincible as Spain. Despite his victorious advance, the taking of Smolensk, the victory on the Moskwa, and the entry into Moscow, he was vanquished by Russian patriotism and religious fervour, by the country and the climate, and by Alexander's refusal to make terms. After this came the lamentable retreat, while all Europe was concentrating against him. Pushed back, as he had been in Spain, from bastion to bastion, after the action on the Beresina, Napoleon had to fall back upon the frontiers of 1809, and then—having refused the peace offered him by Austria at the congress of Prague, from a dread of losing Italy, where each of his victories had marked a stage in the accomplishment of his dream—on those of 1805, despite Lützen and Bautzen, and on those of 1802 after his defeat at Leipzig, where Bernadotte turned upon him, Moreau figured among the Allies, and the Saxons and Bavarians forsook him. Following his retreat from Russia came his retreat from Germany. After the loss of Spain, reconquered by Wellington, the rising in Holland preliminary to the invasion and the manifesto of Frankfort which proclaimed it, he had to fall back upon the frontiers of 1795; and then later was driven yet farther back upon those of 1792, despite the wonderful campaign of 1814 against the invaders, in which the old Bonaparte of 1796 seemed to have returned. Paris capitulated on the 30th of March, and the "Delenda Carthago," pronounced against England, was spoken of Napoleon. The great empire of East and West fell in ruins with the emperor's abdication at Fontainebleau.

Downfall of the Empire.

The military struggle ended, the political struggle began. How was France to be governed? The Allies had decided on the eviction of Napoleon at the Congress of Châtillon; and the precarious nature of the Bonapartist monarchy in France itself was made manifest by the exploit of General Malet, which had almost succeeded during the Russian campaign, and by Lainé's demand for free exercise of political rights, when Napoleon made a last appeal to the Legislative Assembly for support. The defection of the military and civil aristocracy, which brought about Napoleon's abdication, the refusal of a regency, and the failure of Bernadotte, who wished to resuscitate the Consulate, enabled Talleyrand, vice-president of the senate and desirous of power, to persuade the Allies to accept the Bourbon solution of the difficulty. The declaration of St Ouen (May 2, 1814) indicated that the new monarchy was only accepted upon conditions. After Napoleon's abdication, and exile to the island of Elba, came the Revolution's abdication of her conquests: the first treaty of Paris (May 30th) confirmed France's renunciation of Belgium and the left bank of the Rhine, and her return within her pre-revolutionary frontiers, save for some slight rectifications.

Faults of the Bourbons.

The Hundred Days. March-June 1815.

After the scourge of war, the horrors of conscription, and the despotism which had discounted glory, every one seemed to rejoice in the return of the Bourbons, which atoned for humiliations by restoring liberty. But questions of form, which aroused questions of sentiment, speedily led to grave dissensions. The hurried armistice of the 23rd of April, by which the comte d'Artois delivered over disarmed France to her conquerors; Louis XVIII.'s excessive gratitude to the prince regent of England; the return of the *émigrés*; the declaration of St Ouen, dated from the nineteenth year of the new reign; the charter of June 4th, "*concédée et octroyée*," maintaining the effete doctrine of legitimacy in a country permeated with the idea of national sovereignty; the slights put upon the army; the obligatory processions ordered by Comte Beugnot, prefect of police; all this provoked a conflict not only between two theories of government but between two groups of men and of interests. An avowedly imperialist party was soon again formed, a centre of heated opposition to the royalist party; and neither Baron Louis' excellent finance, nor the peace, nor the charter of June 4th—which despite the irritation of the *émigrés* preserved the civil gains of the Revolution—prevented the man who was its incarnation from seizing an opportunity to bring about another military *coup d'état*. Having landed in the Bay of Jouan on the 1st of March, on the 20th Napoleon re-entered the Tuileries in triumph, while Louis XVIII. fled to Ghent. By the *Acte additionnel* of the 22nd of April he induced Carnot and Fouché—the last of the Jacobins—and the heads of the Liberal opposition, Benjamin Constant and La Fayette, to side with him against the hostile Powers of Europe, occupied in dividing the spoils at Vienna. He proclaimed his intention of founding a new democratic empire; and French policy was thus given another illusion, which was to be exploited with fatal success by Napoleon's namesake. But the cannon of Waterloo ended this adventure (June 18, 1815), and, thanks to Fouché's treachery, the triumphal progress of

Milan, Rome, Naples, Vienna, Berlin, and even of Moscow, was to end at St Helena.

Louis XVIII.

The consequences of the Hundred Days were very serious; France was embroiled with all Europe, though Talleyrand's clever diplomacy had succeeded in causing division over Saxony and Poland by the secret Austro-Anglo-French alliance of the 3rd of January 1815, and the Coalition destroyed both France's political independence and national integrity by the treaty of peace of November 20th: she found herself far weaker than before the Revolution, and in the power of the European Alliance. The Hundred Days divided the nation itself into two irreconcilable parties: one ultra-royalist, eager for vengeance and retaliation, refusing to accept the Charter; the other imperialist, composed of Bonapartists and Republicans, incensed by their defeat—of whom Béranger was the Tyrtaeus—both parties equally revolutionary and equally obstinate. Louis XVIII., urged by his more fervent supporters towards the *ancien régime*, gave his policy an exactly contrary direction; he had common-sense enough to maintain the Empire's legal and administrative tradition, accepting its institutions of the Legion of Honour, the Bank, the University, and the imperial nobility—modifying only formally certain rights and the conscription, since these had aroused the nation against Napoleon. He even went so far as to accept advice from the imperial ministers Talleyrand and Fouché. Finally, as the chief political organization had become thoroughly demoralized, he imported into France the entire constitutional system of England, with its three powers, king, upper hereditary chamber, and lower elected chamber; with its plutocratic electorate, and even with details like the speech from the throne, the debate on the address, &c. This meant importing also difficulties such as ministerial responsibility, as well as electoral and press legislation.

Louis XVIII., taught by time and misfortune, wished not to reign over two parties exasperated by contrary passions and desires; but his dynasty was from the outset implicated in the struggle, which was to be fatal to it, between old France and revolutionary France. Anti-monarchical, liberal and anti-clerical France at once recommenced its revolutionary work; the whole 19th century was to be filled with great spasmodic upheavals, and Louis XVIII. was soon overwhelmed by the White Terrorists of 1815.

Vindictive sentences against men like Ney and Labédoyère were followed by violent and unpunished action by the White Terror, which in the south renewed the horrors of St Bartholomew and the September massacres. The elections of August 14, 1815, made under the influence of these royalist and religious passions, sent the "*Chambre introuvable*" to Paris, an unforeseen revival of the *ancien régime*. Neither the substitution of the duc de Richelieu's ministry for that of Talleyrand and Fouché, nor a whole series of repressive laws in violation of the charter, were successful in satisfying its tyrannical loyalism, and Louis XVIII. needed something like a *coup d'état*, in September 1816, to rid himself of the "ultras."

The Constitutional party's rule.

He succeeded fairly well in quieting the opposition between the dynasty and the constitution, until a reaction took place between 1820 and 1822. State departments worked regularly and well, under the direction of Decazes, Lainé, De Serre and Pasquier, power alternating between two great well-disciplined parties almost in the English fashion, and many useful measures were passed: the reconstruction of finance stipulated for as a condition of evacuation of territory occupied by foreign troops; the electoral law of February 5, 1817, which, by means of direct election and a qualification of three hundred francs, renewed the preponderance of the *bourgeoisie*; the Gouvion St-Cyr law of 1818, which for half a century based the recruiting of the French army on the national principle of conscription; and in 1819, after Richelieu's dismissal, liberal regulations for the press under control of a commission. But the advance of the Liberal movement, and the election of the generals—Foy, Lamarque, Lafayette and of Manuel, excited the "ultras" and caused the dismissal of Richelieu; while that of the constitutional bishop Grégoire led to the modification in a reactionary direction of the electoral law of 1817. The assassination of the duc de Berry, second son of the comte d'Artois (attributed to the influence of Liberal ideas), caused the downfall of Decazes, and caused the king—more weak and selfish than ever—to override the charter and embark upon a reactionary path. After 1820, Madame du Cayla, a trusted agent of the ultra-royalist party, gained great influence over the king; and M. de Villèle, its leader, supported by the king's brother, soon eliminated the Right Centre by the dismissal of the duc de Richelieu, who had been recalled to tide over the crisis—just as the fall of M. Decazes had signalized the defeat of the Left Centre (December 15, 1821)—and moderate policy thus received an irreparable blow.

The reaction of 1820.

Thenceforward the government of M. de Villèle—a clever statesman, but tied to his party—did nothing for six years but promulgate a long series of measures against Liberalism and the social work of the Revolution; to retain power it had to yield to the impatience of the comte d'Artois and the majority. The suspension of individual liberty, the re-establishment of the censorship; the electoral right of the "double vote," favouring taxation of the most oppressive kind; and the handing over of education to the clergy: these were the first achievements of this anti-revolutionary ministry. The Spanish expedition, in which M. de Villèle's hand was forced by Montmorency and Chateaubriand, was the united work of the association of Catholic zealots known as the Congregation and of the autocratic powers of the Grand Alliance; it was responded to—as at Naples and in Spain—by secret Carbonari societies, and by severely repressed military conspiracies. Politics now bore the double imprint of two rival powers: the Congregation and Carbonarism. By 1824, nevertheless, the dynasty seemed firm—the Spanish War had reconciled the army, by giving back military prestige; the Liberal opposition had been decimated; revolutionary conspiracies discouraged; and the increase of public credit and material prosperity pleased the whole nation, as was proved by the "*Chambre retrouvée*" of 1824. The law of septennial elections tranquillized public life by suspending any legal or regular manifestation by the nation for seven years.

Charles X.

Victory of the constitutional parties, 1827.

It was the monarchy which next became revolutionary, on the accession of Charles X. (September 16, 1824). This inconsistent prince soon exhausted his popularity, and remained the fanatical head of those *émigrés* who had learnt nothing and forgotten nothing. While the opposition became conservative as regards the Charter and French liberties, the king and the clerical party surrounding him challenged the spirit of modern France by a law against sacrilege, by a bill for re-establishing the right of primogeniture, by an indemnity of a milliard francs, which looked like compensation given to the *émigrés*, and finally by the "*loi de liberté et d'amour*" against the press. The challenge was so definite that in 1826 the Chamber of Peers and the Academy had to give the Villèle ministry a lesson in Liberalism, for having lent itself to this *ancien régime* reaction by its weakness and its party-promises. The elections "*de colère et de vengeance*" of January 1827 gave the Left a majority, and the resultant short-lived Martignac ministry tried to revive the Right Centre which had supported Richelieu and Decazes (January 1828). Martignac's accession to power, however, had only meant personal concessions from Charles X., not any concession of principle: he supported his ministry but was no real stand-by. The Liberals, on the other hand, made bargains for supporting the moderate royalists, and Charles X. profited by this to form a fighting ministry in conjunction with the prince de Polignac, one of the *émigrés*, an ignorant and visionary person, and the comte de Bourmont, the traitor of Waterloo. Despite all kinds of warnings, the former tried by a *coup d'état* to put into practice his theories of the supremacy of the royal prerogative; and the battle of Navarino, the French occupation of the Morea, and the Algerian expedition could not make the nation forget this conflict at home. The united opposition of monarchist

The Revolution of 1830.

Liberals and imperialist republicans responded by legal resistance, then by a popular *coup d'état*, to the ordinances of July 1830, which dissolved the intractable Chamber, eliminated licensed dealers from the electoral list, and muzzled the press. After fighting for three days against the troops feebly led by the Marmont of 1814, the workmen, driven to the barricades by the deliberate closing of Liberal workshops, gained the victory, and sent the white flag of the Bourbons on the road to exile.

Republican and Orleanist parties.

The rapid success of the "Three Glorious Days" ("*les Trois Glorieuses*"), as the July Days were called, put the leaders of the parliamentary opposition into an embarrassing position. While they had contented themselves with words, the small Republican-Imperialist party, aided by the almost entire absence of the army and police, and by the convenience which the narrow, winding, paved streets of those times offered for fighting, had determined upon the revolution and brought it to pass. But the Republican party, which desired to re-establish the Republic of 1793, recruited chiefly from among the students and workmen, and led by Godefroy Cavaignac, the son of a Conventionalist, and by the chemist Raspail, had no hold on the departments nor on the dominating opinion in Paris. Consequently this premature attempt was promptly seized upon by the Liberal *bourgeoisie* and turned to the advantage of the Orleanist party, which had been secretly organized since 1829 under the leadership of Thiers, with the *National* as its organ. Before the struggle was yet over, Benjamin Constant, Casimir Périer, Lafitte, and Odilon Barrot had gone to fetch the duke of Orleans from Neuilly, and on receiving his promise to defend the Charter and the tricolour flag, installed him at the Palais Bourbon as lieutenant-general of the realm, while La Fayette and the Republicans established themselves at the Hôtel de Ville.

Louis Philippe.

An armed conflict between the two governments was imminent, when Lafayette, by giving his support to Louis Philippe, decided matters in his favour. In order to avoid a recurrence of the difficulties which had arisen with the Bourbons, the following preliminary conditions were imposed upon the king: the recognition of the supremacy of the people by the title of "king of the French by the grace of God and the will of the people," the responsibility of ministers, the suppression of hereditary succession to the Chamber of Peers, now reduced to the rank of a council of officials, the suppression of article 14 of the charter which had enabled Charles X. to supersede the laws by means of the ordinances, and the liberty of the press. The qualification for electors was lowered from 300 to 200 francs, and that for eligibility from 1000 to 500 francs, and the age to 25 and 30 instead of 30 and 40; finally, Catholicism lost its privileged position as the state religion. The *bourgeois* National Guard was made the guardian of the charter. The liberal ideas of the son of Philippe Égalité, the part he had played at Valmy and Jemappes, his gracious manner and his domestic virtues, all united in winning Louis Philippe the good opinion of the public.

The bourgeois monarchy.

He now believed, as did indeed the great majority of the electors, that the revolution of 1830 had changed nothing but the head of the state. But in reality the July monarchy was affected by a fundamental weakness. It sought to model itself upon the English monarchy, which rested upon one long tradition. But the tradition of France was both twofold and contradictory, *i.e.* the Catholic-legitimist and the revolutionary. Louis Philippe had them both against him. His monarchy had but one element in common with the English, namely, a parliament elected by a limited electorate. There was at this time a cause of violent outcry against the English monarchy, which, on the other hand, met with firm support among the aristocracy and the clergy. The July monarchy had no such support. The aristocracy of the *ancien régime* and of the Empire were alike without social influence; the clergy, which had paid for its too close alliance with Charles X. by a dangerous unpopularity, and foresaw the rise of democracy, was turning more and more towards the people, the future source of all power. Even the monarchical principle itself had suffered from the shock, having proved by its easy defeat how far it could be brought to capitulate. Moreover, the victory of the people, who had shown themselves in the late struggle to be brave and disinterested, had won for the idea of national supremacy a power which was bound to increase. The difficulty of the situation lay in the doubt as to whether this expansion would take place gradually and by a progressive evolution, as in England, or not.

The parties.

Now Louis Philippe, beneath the genial exterior of a bourgeois and peace-loving king, was entirely bent upon recovering an authority which was menaced from the very first on the one hand by the anger of the royalists at their failures, and on the other hand by the impatience of the republicans to follow up their victory. He wanted the insurrection to stop at a change in the reigning family, whereas it had in fact revived the revolutionary tradition, and restored to France the sympathies of the nationalities and democratic parties oppressed by Metternich's "system." The republican party, which had retired from power but not from activity, at once faced the new king with the serious problem of the acquisition of political power by the people, and continued to remind him of it. He put himself at the head of the party of progress ("parti du mouvement") as opposed to the ("parti de la cour") court party, and of the "resistance," which considered that it was now necessary "to check the revolution in order to make it fruitful, and in order to save it." But none of these parties were homogeneous; in the chamber they split up into a republican or radical Extreme Left, led by Garnier-Pagès and Arago; a dynastic Left, led by the honourable and sincere Odilon Barrot; a constitutional Right Centre and Left Centre, differing in certain slight respects, and presided over respectively by Thiers, a wonderful political orator, and Guizot, whose ideas were those of a strict doctrinaire; not to mention a small party which clung to the old legitimist creed, and was dominated by the famous *avocat* Berryer, whose eloquence was the chief ornament of the cause of Charles X.'s grandson, the comte de Chambord. The result was a ministerial majority which was always uncertain; and the only occasion on which Guizot succeeded in consolidating it during seven years resulted in the overthrow of the monarchy.

The Republicans crushed.

Louis Philippe first summoned to power the leaders of the party of "movement," Dupont de l'Eure, and afterwards Lafitte, in order to keep control of the progressive forces for his own ends. They wished to introduce democratic reforms and to uphold throughout Europe the revolution, which had spread from France into Belgium, Germany, Italy and Poland, while Paris was still in a state of unrest. But Louis Philippe took fright at the attack on the Chamber of Peers after the trial of the ministers of Charles X., at the sack of the church of Saint Germain l'Auxerrois and the archbishop's palace (February, 1831), and at the terrible strike of the silk weavers at Lyons. Casimir Périer, who was both a Liberal and a believer in a strong government, was then charged with the task of heading the resistance to advanced ideas, and applying the principle of non-intervention in foreign affairs (March 13, 1831). After his death by cholera in May 1832, the agitation which he had succeeded by his energy in checking at Lyons, at Grenoble and in the Vendée, where it had been stirred up by the romantic duchess of Berry, began to gain ground. The struggle against the republicans was still longer; for having lost all their chance of attaining power by means of the Chamber, they proceeded to reorganize themselves into armed secret societies. The press, which was gaining that influence over public opinion which had been lost by the parliamentary debates, openly attacked the government and the king, especially by means of caricature. Between 1832 and 1836 the Soult ministry, of which Guizot, Thiers and the duc de Broglie were members, had to combat the terrible insurrections in Lyons and Paris (1834). The measures of repression were threefold: military repression, carried out by the National Guard and the regulars, both under the command of Bugeaud; judicial repression, effected by the great trial of April 1835;

and legislative repression, consisting in the laws of September, which, when to mere ridicule had succeeded acts of violence, such as that of Fieschi (July 28th, 1835), aimed at facilitating the condemnation of political offenders and at intimidating the press. The party of “ movement ” was vanquished.

The bourgeois policy.

But the July Government, born as it was of a popular movement, had to make concessions to popular demands. Casimir Périer had carried a law dealing with municipal organization, which made the municipal councils elective, as they had been before the year VIII.; and in 1833 Guizot had completed it by making the *conseils généraux* also elective. In the same year the law dealing with primary instruction had also shown the mark of new ideas. But now that the bourgeoisie was raised to power it did not prove itself any more liberal than the aristocracy of birth and fortune in dealing with educational, fiscal and industrial questions. In spite of the increase of riches, the bourgeois régime maintained a fiscal and social legislation which, while it assured to the middle class certainty and permanence of benefits, left the labouring masses poor, ignorant, and in a state of incessant agitation.

The socialist party.

The Orleanists, who had been unanimous in supporting the king, disagreed, after their victory, as to what powers he was to be given. The Left Centre, led by Thiers, held that he should reign but not govern; the Right Centre, led by Guizot, would admit him to an active part in the government; and the third party (tiers-parti) wavered between these two. And so between 1836 and 1840, as the struggle against the king's claim to govern passed from the sphere of outside discussion into parliament, we see the rise of a bourgeois socialist party, side by side with the now dwindling republican party. It no longer confined its demands to universal suffrage, on the principle of the legitimate representation of all interests, or in the name of justice. Led by Saint-Simon, Fourier, P. Leroux and Lamennais, it aimed at realizing a better social organization for and by means of the state. But the question was by what means this was to be accomplished. The secret societies, under the influence of Blanqui and Barbès, two revolutionaries who had revived the traditions of Babeuf, were not willing to wait for the complete education of the masses, necessarily a long process. On the 12th of May 1839 the *Société des Saisons* made an attempt to overthrow the bourgeoisie by force, but was defeated. Democrats like Louis Blanc, Ledru-Rollin and Lamennais continued to repeat in support of the wisdom of universal suffrage the old profession of faith: *vox populi, vox Dei*. And finally this republican doctrine, already confused, was still further complicated by a kind of mysticism which aimed at reconciling the most extreme differences of belief, the Catholicism of Buchez, the Bonapartism of Cormenin, and the humanitarianism of the cosmopolitans. It was in vain that Auguste Comte, Michelet and Quinet denounced this vague humanitarian mysticism and the pseudo-liberalism of the Church. The movement had now begun.

The Bonapartist revival.

At first these moderate republicans, radical or communist, formed only imperceptible groups. Among the peasant classes, and even in the industrial centres, warlike passions were still rife. Louis Philippe tried to find an outlet for them in the Algerian war, and later by the revival of the Napoleonic legend, which was held to be no longer dangerous, since the death of the duke of Reichstadt in 1832. It was imprudently recalled by Thiers' *History of the Consulate and Empire*, by artists and poets, in spite of the prophecies of Lamartine, and by the solemn translation of Napoleon I.'s ashes in 1840 to the Invalides at Paris.

Parliamentary opposition to the royal power.

All theories require to be based on practice, especially those which involve force. Now Louis Philippe, though as active as his predecessors had been slothful, was the least warlike of men. His only wish was to govern personally, as George III. and George IV. of England had done, especially in foreign affairs, while at home was being waged the great duel between Thiers and Guizot, with Molé as intermediary. Thiers, head of the cabinet of the 22nd of February 1836, an astute man but not pliant enough to please the king, fell after a few months, in consequence of his attempt to stop the Carlist civil war in Spain, and to support the constitutional government of Queen Isabella. Louis Philippe hoped that, by calling upon Molé to form a ministry, he would be better able to make his personal authority felt. From 1837 to 1839 Molé aroused opposition on all hands; this was emphasized by the refusal of the Chambers to vote one of those endowments which the king was continually asking them to grant for his children, by two dissolutions of the Chambers, and finally by the Strasburg affair and the stormy trial of Louis Napoleon, son of the former king of Holland (1836–1837). At the elections of 1839 Molé was defeated by Thiers, Guizot and Barrot, who had combined to oppose the tyranny of the “ Château,” and after a long ministerial crisis was replaced by Thiers (March 1, 1840). But the latter was too much in favour of war to please the king, who was strongly disposed towards peace and an alliance with Great Britain, and consequently fell at the time of the Egyptian question, when, in answer to the treaty of London concluded behind his back by Nicholas I. and Palmerston on the 15th of July 1840, he fortified Paris and proclaimed his intention to give armed support to Mehemet Ali, the ally of France (see MEHEMET ALI). But the violence of popular Chauvinism and the renewed attempt of Louis Napoleon at Boulogne proved to the holders of the doctrine of peace at any price that in the long-run their policy tends to turn a peaceful attitude into a warlike one, and to strengthen the absolutist idea.

Guizot's ministry.

In spite of all, from 1840 to 1848 Louis Philippe still further extended his activity in foreign affairs, thus bringing himself into still greater prominence, though he was already frequently held responsible for failures in foreign politics and unpopular measures in home affairs. The catchword of Guizot, who was now his minister, was: Peace and no reforms. With the exception of the law of 1842 concerning the railways, not a single measure of importance was proposed by the ministry. France lived under a régime of general corruption: parliamentary corruption, due to the illegal conduct of the deputies, consisting of slavish or venal officials; electoral corruption, effected by the purchase of the 200,000 electors constituting the “ *pays légal*,” who were bribed by the advantages of power; and moral corruption, due to the reign of the plutocracy, the bourgeoisie, a hard-working, educated and honourable class, it is true, but insolent, like all newly enriched parvenus in the presence of other aristocracies, and with unyielding selfishness maintaining an attitude of suspicion towards the people, whose aspirations they did not share and with whom they did not feel themselves to have anything in common. This led to a slackening in political life, a sort of exhaustion of interest throughout the country, an excessive devotion to material prosperity. Under a superficial appearance of calm a tempest was brewing, of which the industrial writings of Balzac, Eugène Sue, Lamartine, H. Heine, Vigny, Montalembert and Tocqueville were the premonitions. But it was in vain that they denounced this supremacy of the bourgeoisie, relying on its two main supports, the suffrage based on a property qualification and the National Guard, for its rallying-cry was the “ Enrichissez-vous ” of Guizot, and its excessive materialism gained a sinister distinction from scandals connected with the ministers Teste and Cubières, and such mysterious crimes as that of Choiseul-Praslin.[1] In vain also did they point out that mere riches are not so much a protection to the ministry who are in power as a temptation to the majority excluded from power by this barrier of wealth.

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[1] Charles Laure Hugues Théobald, duc de Choiseul-Praslin (1805–1847), was deputy in 1839, created a peer of France in 1840. He had married a daughter of General Sebastiani, with whom he lived on good terms till 1840, when he entered into open relations with his children's governess. The duchess threatened a separation; and the duke consented to send his mistress out of the house, but did not cease to correspond with and visit her. On the 18th of August 1847 the duchess was found stabbed to death, with more than thirty wounds, in her room. The duke was arrested on the 20th and imprisoned in the Luxembourg, where he died of poison, self-administered on the 24th. It was, however, popularly believed that the government had smuggled him out of the country and that he was living under a feigned name in England.

It was in vain that beneath the inflated *haute bourgeoisie* which speculated in railways and solidly supported the Church, behind the shopkeeper clique who still remained Voltairian, who enviously applauded the pamphlets of Cormenin on the luxury of the court, and who were bitterly satirized by the pencil of Daumier and Gavarni, did the thinkers give voice to the mutterings of an immense industrial proletariat, which were re-echoing throughout the whole of western Europe.

Guizot's Foreign Policy.

In face of this tragic contrast Guizot remained unmoved, blinded by the superficial brilliance of apparent success and prosperity. He adorned by flights of eloquence his invariable theme: no new laws, no reforms, no foreign complications, the policy of material interests. He preserved his yielding attitude towards Great Britain in the affair of the right of search in 1841, and in the affair of the missionary Pritchard at Tahiti (1843–1845). And when the marriage of the duc de Montpensier with a Spanish infanta in 1846 had broken this *entente cordiale* to which he clung, it was only to yield in turn to Metternich, when he took possession of Cracow, the last remnant of Poland, to protect the *Sonderbund* in Switzerland, to discourage the Liberal ardour of Pius IX., and to hand over the education of France to the Ultramontane clergy. Still further strengthened by the elections of 1846, he refused the demands of the Opposition formed by a coalition of the Left Centre and the Radical party for parliamentary and electoral reform, which would have excluded the officials from the Chambers, reduced the electoral qualification to 100 francs, and added to the number of the electors the *capacitaires* whose competence was guaranteed by their education. For Guizot the whole country was represented by the "*pays légal*," consisting of the king, the ministers, the deputies and the electors. When the Opposition appealed to the country, he flung down a disdainful challenge to what "les brouillons et les badauds appellent le peuple." The challenge was taken up by all the parties of the Opposition in the campaign of the banquets got up somewhat artificially in 1847 in favour of the extension of the franchise. The monarchy had arrived at such a state of weakness and corruption that a determined minority was sufficient to overthrow it. The prohibition of a last banquet in Paris precipitated the catastrophe. The monarchy which for fifteen years had overcome its adversaries collapsed on the 24th of February 1848 to the astonishment of all.

Campaign of the banquets.

The Revolution of Feb. 24, 1848.

The industrial population of the faubourgs on its way towards the centre of the town was welcomed by the National Guard, among cries of "Vive la réforme." Barricades were raised after the unfortunate incident of the firing on the crowd in the Boulevard des Capucines. On the 23rd Guizot's cabinet resigned, abandoned by the *petite bourgeoisie*, on whose support they thought they could depend. The heads of the Left Centre and the dynastic Left, Molé and Thiers, declined the offered leadership. Odilon Barrot accepted it, and Bugeaud, commander-in-chief of the first military division, who had begun to attack the barricades, was recalled. But it was too late. In face of the insurrection which had now taken possession of the whole capital, Louis Philippe decided to abdicate in favour of his grandson, the comte de Paris. But it was too late also to be content with the regency of the duchess of Orleans. It was now the turn of the Republic, and it was proclaimed by Lamartine in the name of the provisional government elected by the Chamber under the pressure of the mob.

The Provisional Government.

This provisional government with Dupont de l'Eure as its president, consisted of Lamartine for foreign affairs, Crémieux for justice, Ledru-Rollin for the interior, Carnot for public instruction, Gondchaux for finance, Arago for the navy, and Bedeau for war. Garnier-Pagès was mayor of Paris. But, as in 1830, the republican-socialist party had set up a rival government at the Hôtel de Ville, including L. Blanc, A. Marrast, Flocon, and the workman Albert, which bid fair to involve discord and civil war. But this time the Palais Bourbon was not victorious over the Hôtel de Ville. It had to consent to a fusion of the two bodies, in which, however, the predominating elements were the moderate republicans. It was doubtful what would eventually be the policy of the new government. One party, seeing that in spite of the changes in the last sixty years of all political institutions, the position of the people had not been improved, demanded a reform of society itself, the abolition of the privileged position of property, the only obstacle to equality, and as an emblem hoisted the red flag. The other party wished to maintain society on the basis of its ancient institutions, and rallied round the tricolour.

Universal suffrage.

The Executive Commission.

The first collision took place as to the form which the revolution of 1848 was to take. Were they to remain faithful to their original principles, as Lamartine wished, and accept the decision of the country as supreme, or were they, as the revolutionaries under Ledru-Rollin claimed, to declare the republic of Paris superior to the universal suffrage of an insufficiently educated people? On the 5th of March the government, under the pressure of the Parisian clubs, decided in favour of an immediate reference to the people, and direct universal suffrage, and adjourned it till the 26th of April. In this fateful and unexpected decision, which instead of adding to the electorate the educated classes, refused by Guizot, admitted to it the unqualified masses, originated the Constituent Assembly of the 4th of May 1848. The provisional government having resigned, the republican and anti-socialist majority on the 9th of May entrusted the supreme power to an executive commission consisting of five members: Arago, Marie, Garnier-Pagès, Lamartine and Ledru-Rollin. But the spell was already broken. This revolution which had been peacefully effected with the most generous aspirations, in the hope of abolishing poverty by organizing industry on other bases than those of competition and capitalism, and which had at once aroused the fraternal sympathy of the nations, was doomed to be abortive.

The result of the general election, the return of a constituent assembly predominantly moderate if not monarchical, dashed the hopes of those who had looked for the establishment, by a peaceful revolution, of their ideal socialist state; but they were not prepared to yield without a struggle, and in Paris itself they commanded a formidable force. In spite of the preponderance of the "tricolour" party in the provisional government, so long as the voice of France had not spoken, the socialists, supported by the Parisian proletariat, had exercised an influence on policy out of all proportion to their relative numbers or personal weight. By the decree of the 24th of February the provisional government had solemnly accepted the principle of the "right to work," and decided to establish "national workshops" for the unemployed; at the same time a sort of industrial parliament was established at the Luxembourg, under the presidency of Louis Blanc, with the object of preparing a scheme for the organization of labour; and, lastly, by the decree of the 8th of March the property qualification for enrolment in the National Guard had been abolished and the workmen were supplied with arms. The socialists thus formed, in some sort, a state within the state, with a government, an organization and an armed force.

In the circumstances a conflict was inevitable; and on the 15th of May an armed mob, headed by Raspail, Blanqui and Barbès, and assisted by the proletariat Guard, attempted to overwhelm the Assembly. They were defeated by the bourgeois battalions of the National Guard; but the situation none the less remained highly critical. The national workshops were producing the results that might have been foreseen. It was impossible to provide remunerative work even for the genuine unemployed, and of the thousands who applied the greater number were employed in perfectly useless digging and refilling; soon even this expedient failed, and those for whom work could not be invented were given a half wage of 1 franc a day. Even this pitiful dole, with no obligation to work, proved attractive, and all over France workmen threw up their jobs and streamed to Paris, where they swelled the ranks of the army under the red flag. It was soon clear that the continuance of this experiment would mean financial ruin; it had been proved by the *émeute* of the 15th of May that it constituted a perpetual menace

The June Days.

to the state; and the government decided to end it. The method chosen was scarcely a happy one. On the 21st of June M. de Falloux decided in the name of the parliamentary commission on labour that the workmen should be discharged within three days and such as were able-bodied should be forced to enlist. A furious insurrection at once broke out. Throughout the whole of the 24th, 25th and 26th of June, the eastern industrial quarter of Paris, led by Pujol, carried on a furious struggle against the western quarter, led by Cavaignac, who had been appointed dictator. Vanquished and decimated, first by fighting and afterwards by deportation, the socialist party was crushed. But they dragged down the Republic in their ruin. This had already become unpopular with the peasants, exasperated by the new land tax of 45 centimes imposed in order to fill the empty treasury, and with the *bourgeois*, in terror of the power of the revolutionary clubs and hard hit by the stagnation of business. By the "massacres" of the June Days the working classes were also alienated from it; and abiding fear of the "Reds" did the rest. "France," wrote the duke of Wellington at this time, "needs a Napoleon! I cannot yet see him . . . Where is he?"[1]

The Constitution of 1848.

France indeed needed, or thought she needed, a Napoleon; and the demand was soon to be supplied. The granting of universal suffrage to a society with Imperialist sympathies, and unfitted to reconcile the principles of order with the consequences of liberty, was indeed bound, now that the political balance in France was so radically changed, to prove a formidable instrument of reaction; and this was proved by the election of the president of the Republic. On the 4th of November 1848 was promulgated the new constitution, obviously the work of inexperienced hands, proclaiming a democratic republic, direct universal suffrage and the separation of powers; there was to be a single permanent assembly of 750 members elected for a term of three years by the *scrutin de liste*, which was to vote on the laws prepared by a council of state elected by the Assembly for six years; the executive power was delegated to a president elected for four years by direct universal suffrage, *i.e.* on a broader basis than that of the chamber, and not eligible for re-election; he was to choose his ministers, who, like him, would be responsible. Finally, all revision was made impossible since it involved obtaining three times in succession a majority of three-quarters of the deputies in a special assembly. It was in vain that M. Grévy, in the name of those who perceived the obvious and inevitable risk of creating, under the name of a president, a monarch and more than a king, proposed that the head of the state should be no more than a removable president of the ministerial council. Lamartine, thinking that he was sure to be the choice of the electors under universal suffrage, won over the support of the Chamber, which did not even take the precaution of rendering ineligible the members of families which had reigned over France. It made the presidency an office dependent upon popular acclamation.

Louis Napoleon.

The election was keenly contested; the socialists adopted as their candidate Ledru-Rollin, the republicans Cavaignac; and the recently reorganized Imperialist party Prince Bonaparte. Louis Napoleon, unknown in 1835, and forgotten or despised since 1840, had in the last eight years advanced sufficiently in the public estimation to be elected to the Constituent Assembly in 1848 by five departments. He owed this rapid increase of popularity partly to blunders of the government of July, which had unwisely aroused the memory of the country, filled as it was with recollections of the Empire, and partly to Louis Napoleon's campaign carried on from his prison at Ham by means of pamphlets of socialistic tendencies. Moreover, the monarchists, led by Thiers and the committee of the Rue de Poitiers, were no longer content even with the safe dictatorship of the upright Cavaignac, and joined forces with the Bonapartists. On the 10th of December the peasants gave over 5,000,000 votes to a name: Napoleon, which stood for order at all costs, against 1,400,000 for Cavaignac.

Expedition to Rome.

For three years there went on an indecisive struggle between the heterogeneous Assembly and the prince who was silently awaiting his opportunity. He chose as his ministers men but little inclined towards republicanism, for preference Orleanists, the chief of whom was Odilon Barrot. In order to strengthen his position, he endeavoured to conciliate the reactionary parties, without committing himself to any of them. The chief instance of this was the expedition to Rome, voted by the Catholics with the object of restoring the papacy, which had been driven out by Garibaldi and Mazzini. The prince-president was also in favour of it, as beginning the work of European renovation and reconstruction which he already looked upon as his mission. General Oudinot's entry into Rome provoked in Paris a foolish insurrection in favour of the Roman republic, that of the Château d'Eau, which was crushed on the 13th of June 1849. On the other hand, when Pius IX., though only just restored, began to yield to the general movement of reaction, the president demanded that he should set up a Liberal government. The pope's dilatory reply having been accepted by his ministry, the president replaced it on the 1st of November by the Fould-Rouher cabinet.

The Legislative Assembly.

"Loi Falloux."

Electoral law of May 31.

This looked like a declaration of war against the Catholic and monarchist majority in the Legislative Assembly which had been elected on the 28th of May in a moment of panic. But the prince-president again pretended to be playing the game of the Orleanists, as he had done in the case of the Constituent-Assembly. The complementary elections of March and April 1850 having resulted in an unexpected victory for the advanced republicans, which struck terror into the reactionary leaders, Thiers, Berryer and Montalembert, the president gave his countenance to a clerical campaign against the republicans at home. The Church, which had failed in its attempts to gain control of the university under Louis XVIII. and Charles X., aimed at setting up a rival establishment of its own. The *Loi Falloux* of the 15th of March 1850, under the pretext of establishing the liberty of instruction promised by the charter, again placed the teaching of the university under the direction of the Catholic Church, as a measure of social safety, and, by the facilities which it granted to the Church for propagating teaching in harmony with its own dogmas, succeeded in obstructing for half a century the work of intellectual enfranchisement effected by the men of the 18th century and of the Revolution. The electoral law of the 31st of May was another class law directed against subversive ideas. It required as a proof of three years' domicile the entries in the record of direct taxes, thus cutting down universal suffrage by taking away the vote from the industrial population, which was not as a rule stationary. The law of the 16th of July aggravated the severity of the press restrictions by re-establishing the "caution money" (*cautionnement*) deposited by proprietors and editors of papers with the government as a guarantee of good behaviour. Finally, a skilful interpretation of the law on clubs and political societies suppressed about this time all the Republican societies. It was now their turn to be crushed like the socialists.

Struggle between the President and the Assembly.

But the president had only joined in Montalembert's cry of "Down with the Republicans!" in the hope of effecting a revision of the constitution without having recourse to a *coup d'état*. His concessions only increased the boldness of the monarchists; while they had only accepted Louis Napoleon as president in opposition to the Republic and as a step in the direction of the monarchy. A conflict was now inevitable between his personal policy and the majority of the Chamber, who were, moreover, divided into legitimists and Orleanists, in spite of the death of Louis Philippe in August 1850. Louis Napoleon skilfully exploited their projects for a restoration of the monarchy, which he knew to be unpopular in the country, and which gave him the opportunity of furthering his own personal ambitions. From the 8th of August to the 12th of November 1850 he went about France stating the case for a revision of the constitution in speeches which he varied according to each place; he held reviews, at which cries of “*Vive Napoléon*” showed that the army was with him; he superseded General Changarnier, on whose arms the parliament relied for the projected monarchical *coup d'état*; he replaced his Orleanist ministry by obscure men devoted to his own cause, such as Morny, Fleury and Persigny, and gathered round him officers of the African army, broken men like General Saint-Arnaud; in fact he practically declared open war.

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[1] T. T. de Martens, *Recueil des traités*, &c., xii. 248.

Coup d'État of Dec. 2, 1851.

His reply to the votes of censure passed by the Assembly, and their refusal to increase his civil list, was to hint at a vast communistic plot in order to scare the bourgeoisie, and to denounce the electoral law of the 31st of May in order to gain the support of the mass of the people. The Assembly retaliated by throwing out the proposal for a partial reform of that article of the constitution which prohibited the re-election of the president and the re-establishment of universal suffrage (July). All hope of a peaceful issue was at an end. When the questors called upon the Chamber to have posted up in all barracks the decree of the 6th of May 1848 concerning the right of the Assembly to demand the support of the troops if attacked, the Mountain, dreading a restoration of the monarchy, voted with the Bonapartists against the measure, thus disarming the legislative power. Louis Napoleon saw his opportunity. On the night between the 1st and 2nd of December 1851, the anniversary of Austerlitz, he dissolved the Chamber, re-established universal suffrage, had all the party leaders arrested, and summoned a new assembly to prolong his term of office for ten years. The deputies who had met under Berryer at the *Mairie* of the tenth arrondissement to defend the constitution and proclaim the deposition of Louis Napoleon were scattered by the troops at Mazas and Mont Valérian. The resistance organized by the republicans within Paris under Victor Hugo was soon subdued by the intoxicated soldiers. The more serious resistance in the departments was crushed by declaring a state of siege and by the “mixed commissions.” The plebiscite of the 20th of December ratified by a huge majority the *coup d' état* in favour of the prince-president, who alone reaped the benefit of the excesses of the Republicans and the reactionary passions of the monarchists.

The Second Empire.

The second attempt to revive the principle of 1789 only served as a preface to the restoration of the Empire. The new anti-parliamentary constitution of the 14th of January 1852 was to a large extent merely a repetition of that of the year VIII. All executive power was entrusted to the head of the state, who was solely responsible to the people, now powerless to exercise any of their rights. He was to nominate the members of the council of state, whose duty it was to prepare the laws, and of the senate, a body permanently established as a constituent part of the empire. One innovation was made, namely, that the Legislative Body was elected by universal suffrage, but it had no right of initiative, all laws being proposed by the executive power. This new and violent political change was rapidly followed by the same consequence as had attended that of Brumaire. On the 2nd of December 1852, France, still under the effect of the Napoleonic *virus*, and the fear of anarchy, conferred almost unanimously by a plebiscite the supreme power, with the title of emperor, upon Napoleon III.

But though the machinery of government was almost the same under the Second Empire as it had been under the First, the principles upon which its founder based it were different. The function of the Empire, as he loved to repeat, was to guide the people internally towards justice and externally towards perpetual peace. Holding his power by universal suffrage, and having frequently, from his prison or in exile, reproached former oligarchical governments with neglecting social questions, he set out to solve them by organizing a system of government based on the principles of the “Napoleonic Idea,” *i.e.* of the emperor, the elect of the people as the representative of the democracy, and as such supreme; and of himself, the representative of the great Napoleon, “who had sprung armed from the Revolution like Minerva from the head of Jove,” as the guardian of the social gains of the revolutionary epoch. But he soon proved that social justice did not mean liberty; for he acted in such a way that those of the principles of 1848 which he had preserved became a mere sham. He proceeded to paralyze all those active national forces which tend to create the public spirit of a people, such as parliament, universal suffrage, the press, education and associations. The Legislative Body was not allowed either to elect its own president or to regulate its own procedure, or to propose a law or an amendment, or to vote on the budget in detail, or to make its deliberations public. It was a dumb parliament. Similarly, universal suffrage was supervised and controlled by means of official candidature, by forbidding free speech and action in electoral matters to the Opposition, and by a skilful adjustment of the electoral districts in such a way as to overwhelm the Liberal vote in the mass of the rural population. The press was subjected to a system of *cautionnements*, *i.e.* “caution money,” deposited as a guarantee of good behaviour, and *avertissements*, *i.e.* requests by the authorities to cease publication of certain articles, under pain of suspension or suppression; while books were subject to a censorship. France was like a sick-room, where nobody might speak aloud. In order to counteract the opposition of individuals, a *surveillance* of suspects was instituted. Orsini's attack on the emperor in 1858, though purely Italian in its motive, served as a pretext for increasing the severity of this régime by the law of general security (*sûreté générale*) which authorized the internment, exile or deportation of any suspect without trial. In the same way public instruction was strictly supervised, the teaching of philosophy was suppressed in the *Lycées*, and the disciplinary powers of the administration were increased. In fact for seven years France had no political life. The Empire was carried on by a series of plebiscites. Up to 1857 the Opposition did not exist; from then till 1860 it was reduced to five members: Darimon, Émile Ollivier, Hénon, J. Favre and E. Picard. The royalists waited inactive after the new and unsuccessful attempt made at Frohsdorf in 1853, by a combination of the legitimists and Orleanists, to re-create a living monarchy out of the ruin of two royal families. Thus the events of that ominous night in December were closing the future to the new generations as well as to those who had grown up during forty years of liberty.

Material prosperity a condition of despotism.

But it was not enough to abolish liberty by conjuring up the spectre of demagogy. It had to be forgotten, the great silence had to be covered by the noise of festivities and material enjoyment, the imagination of the French people had to be distracted from public affairs by the taste for work, the love of gain, the passion for good living. The success of the imperial despotism, as of any other, was bound up with that material prosperity which would make all interests dread the thought of revolution. Napoleon III., therefore, looked for support to the clergy, the great financiers, industrial magnates and landed proprietors. He revived on his own account the “Let us grow rich” of 1840. Under the influence of the Saint-Simonians and men of business great credit establishments were instituted and vast public works entered upon: the Crédit foncier de France, the Crédit mobilier, the conversion of the railways into six great companies between 1852 and 1857. The rage for speculation was increased by the inflow of Californian and Australian gold, and consumption was facilitated by a general fall in prices between 1856 and 1860, due to an economic revolution which was soon to overthrow the tariff wall, as it had done already in England. Thus French activity flourished exceedingly between 1852 and 1857, and was merely temporarily checked by the crisis of 1857. The universal Exhibition of 1855 was its culminating point. Art felt the effects of this increase of comfort and luxury. The great enthusiasms of the romantic period were over; philosophy became sceptical and literature merely amusing. The festivities of the court at Compiègne set the fashion for the bourgeoisie, satisfied with this energetic government which kept such good guard over their bank balances.

If the Empire was strong, the emperor was weak. At once headstrong and a dreamer, he was full of rash plans, but irresolute

Napoleon III.'s Ideas.

in carrying them out. An absolute despot, he remained what his life had made him, a conspirator through the very mysticism of his mental habit, and a revolutionary by reason of his demagogic imperialism and his democratic chauvinism. In his opinion the artificial work of the congress of Vienna, involving the downfall of his own family and of France, ought to be destroyed, and Europe organized as a collection of great industrial states, united by community of interests and bound together by commercial treaties, and expressing this unity by periodical congresses presided over by himself, and by universal exhibitions. In this way he would reconcile the revolutionary principle of the supremacy of the people with historical tradition, a thing which neither the Restoration nor the July monarchy nor the Republic of 1848 had been able to achieve. Universal suffrage, the organization of Rumanian, Italian and German nationality, and commercial liberty; this was to be the work of the Revolution. But the creation of great states side by side with France brought with it the necessity for looking for territorial compensation elsewhere, and consequently for violating the principle of nationality and abjuring his system of economic peace. Napoleon III.'s foreign policy was as contradictory as his policy in home affairs, "L'Empire, c'est la paix," was his cry; and he proceeded to make war.

The Crimean War.

So long as his power was not yet established, Napoleon III. made especial efforts to reassure European opinion, which had been made uneasy by his previous protestations against the treaties of 1815. The Crimean War, in which, supported by England and the king of Sardinia, he upheld against Russia the policy of the integrity of the Turkish empire, a policy traditional in France since Francis I., won him the adherence both of the old parties and and the Liberals. And this war was the prototype of all the rest. It was entered upon with no clearly defined military purpose, and continued in a hesitating way. This was the cause, after the victory of the allies at the Alma (September 14, 1854), of the long and costly siege of Sevastopol (September 8, 1855). Napoleon III., whose joy was at its height owing to the signature of a peace which excluded Russia from the Black Sea, and to the birth of the prince imperial, which ensured the continuation of his dynasty, thought that the time had arrived to make a beginning in applying his system. Count Walewski, his minister for foreign affairs, gave a sudden and unexpected extension of scope to the deliberations of the congress which met at Paris in 1856 by inviting the plenipotentiaries to consider the questions of Greece, Rome, Naples, &c. This motion contained the principle of all the upheavals which were to effect such changes in Europe between 1859 and 1871. It was Cavour and Piedmont who immediately benefited by it, for thanks to Napoleon III. they were able to lay the Italian question before an assembly of diplomatic Europe.

The War in Italy.

It was not Orsini's attack on the 14th of January 1858 which brought this question before Napoleon. It had never ceased to occupy him since he had taken part in the patriotic conspiracies in Italy in his youth. The triumph of his armies in the East now gave him the power necessary to accomplish this mission upon which he had set his heart. The suppression of public opinion made it impossible for him to be enlightened as to the conflict between the interests of the country and his own generous visions. The sympathy of all Europe was with Italy, torn for centuries past between so many masters; under Alexander II. Russia, won over since the interview of Stuttgart by the emperor's generosity rather than conquered by armed force, offered no opposition to this act of justice; while England applauded it from the first. The emperor, divided between the empress Eugénie, who as a Spaniard and a devout Catholic was hostile to anything which might threaten the papacy, and Prince Napoleon, who as brother-in-law of Victor Emmanuel favoured the cause of Piedmont, hoped to conciliate both sides by setting up an Italian federation, intending to reserve the presidency of it to Pope Pius IX., as a mark of respect to the moral authority of the Church. Moreover, the very difficulty of the undertaking appealed to the emperor, elated by his recent success in the Crimea. At the secret meeting between Napoleon and Count Cavour (July 20, 1858) the eventual armed intervention of France, demanded by Orsini before he mounted the scaffold, was definitely promised.

The peace of Villafranca.

The ill-advised Austrian ultimatum demanding the immediate cessation of Piedmont's preparations for war precipitated the Italian expedition. On the 3rd of May 1859 Napoleon declared his intention of making Italy "free from the Alps to the Adriatic." As he had done four years ago, he plunged into the war with no settled scheme and without preparation; he held out great hopes, but without reckoning what efforts would be necessary to realize them. Two months later, in spite of the victories of Montebello, Magenta and Solferino, he suddenly broke off, and signed the patched-up peace of Villafranca with Francis Joseph (July 9). Austria ceded Lombardy to Napoleon III., who in turn ceded it to Victor Emmanuel; Modena and Tuscany were restored to their respective dukes, the Romagna to the pope, now president of an Italian federation. The mountain had brought forth a mouse.

The Italian problem.

The reasons for this breakdown on the part of the emperor in the midst of his apparent triumph were many. Neither Magenta nor Solferino had been decisive battles. Further, his idea of a federation was menaced by the revolutionary movement which seemed likely to drive out all the princes of central Italy, and to involve him in an unwelcome dispute with the French clerical party. Moreover, he had forgotten to reckon with the Germanic Confederation, which was bound to come to the assistance of Austria. The mobilization of Prussia on the Rhine, combined with military difficulties and the risk of a defeat in Venetian territory, rather damped his enthusiasm, and decided him to put an end to the war. The armistice fell upon the Italians as a bolt from the blue, convincing them that they had been betrayed; on all sides despair drove them to sacrifice their jealously guarded independence to national unity. On the one hand the Catholics were agitating throughout all Europe to obtain the independence of the papal territory; and the French republicans were protesting, on the other hand, against the abandonment of those revolutionary traditions, the revival of which they had hailed so enthusiastically. The emperor, unprepared for the turn which events had taken, attempted to disentangle this confusion by suggesting a fresh congress of the Powers, which should reconcile dynastic interests with those of the people. After a while he gave up the attempt and resigned himself to the position, his actions having had more wide-reaching results than he had wished. The treaty of Zürich proclaimed the fallacious principle of non-intervention (November 10, 1859); and then, by the treaty of Turin of the 24th of May 1860, Napoleon threw over his ill-timed confederation. He conciliated the mistrust of Great Britain by replacing Walewski, who was hostile to his policy, by Thouvenel, an anti-clerical and a supporter of the English alliance, and he counterbalanced the increase of the new Italian kingdom by the acquisition of Nice and Savoy. Napoleon, like all French governments, only succeeded in finding a provisional solution for the Italian problem.

Catholic and protectionist opposition.

But this solution would only hold good so long as the emperor was in a powerful position. Now this Italian war, in which he had given his support to revolution beyond the Alps, and, though unintentionally, compromised the temporal power of the popes, had given great offence to the Catholics, to whose support the establishment of the Empire was largely due. A keen Catholic opposition sprang up, voiced in L. Veuillot's paper the *Univers*, and was not silenced even by the Syrian expedition (1860) in favour of the Catholic Maronites, who were being persecuted by the Druses. On the other hand, the commercial treaty with Great Britain which was signed in January 1860, and which ratified the free-trade policy of Richard Cobden and Michael Chevalier, had brought upon French industry the sudden shock of foreign competition. Thus both Catholics and protectionists made the discovery that absolutism may be an excellent thing when it serves their ambitions or interests, but a bad thing when it is exercised at their expense. But Napoleon, in order to restore the prestige of the Empire before the newly-awakened hostility of public opinion, tried to gain from the Left the support which he had lost from the Right. After the return from Italy the general amnesty of the 16th of August 1859 had marked the evolution of the absolutist empire towards the liberal, and later parliamentary empire, which was to last for ten years.

The Liberal Empire.

Napoleon began by removing the gag which was keeping the country in silence. On the 24th of November 1860, "by a *coup d'état* matured during his solitary meditations," like a conspirator in his love of hiding his mysterious thoughts even from his ministers, he granted to the Chambers the right to vote an address annually in answer to the speech from the throne, and to the press the right of reporting parliamentary debates. He counted on the latter concession to hold in check the growing Catholic opposition, which was becoming more and more alarmed by the policy of *laissez-faire* practised by the emperor in Italy. But the government majority already showed some signs of independence. The right of voting on the budget by sections, granted by the emperor in 1861, was a new weapon given to his adversaries. Everything conspired in their favour: the anxiety of those candid friends who were calling attention to the defective budget; the commercial crisis, aggravated by the American Civil War; and above all, the restless spirit of the emperor, who had annoyed his opponents in 1860 by insisting on an alliance with Great Britain in order forcibly to open the Chinese ports for trade, in 1863 by his ill-fated attempt to put down a republic and set up a Latin empire in Mexico in favour of the archduke Maximilian of Austria, and from 1861 to 1863 by embarking on colonizing experiments in Cochin China and Annam.

The policy of nationalism.

The same inconsistencies occurred in the emperor's European politics. The support which he had given to the Italian cause had aroused the eager hopes of other nations. The proclamation of the kingdom of Italy on the 18th of February 1861 after the rapid annexation of Tuscany and the kingdom of Naples had proved the danger of half-measures. But when a concession, however narrow, had been made to the liberty of one nation, it could hardly be refused to the no less legitimate aspirations of the rest. In 1863 these "new rights" again clamoured loudly for recognition, in Poland, in Schleswig and Holstein, in Italy, now indeed united, but with neither frontiers nor capital, and in the Danubian principalities. In order to extricate himself from the Polish *impasse*, the emperor again had recourse to his expedient—always fruitless because always inopportune—of a congress. He was again unsuccessful: England refused even to admit the principle of a congress, while Austria, Prussia and Russia gave their adhesion only on conditions which rendered it futile, *i.e.* they reserved the vital questions of Venetia and Poland.

Thus Napoleon had yet again to disappoint the hopes of Italy, let Poland be crushed, and Germany triumph over Denmark in the Schleswig-Holstein question. These inconsistencies resulted in a combination of the opposition parties, Catholic, Liberal and Republican, in the *Union libérale*. The elections of May-June 1863 gained the Opposition forty seats and a leader, Thiers, who at once urgently gave voice to its demand for "the necessary liberties."

The régime of concessions.

It would have been difficult for the emperor to mistake the importance of this manifestation of French opinion, and in view of his international failures, impossible to repress it. The sacrifice of Persigny, minister of the interior, who was responsible for the elections, the substitution for the ministers without portfolio of a sort of presidency of the council filled by Rouher, the "Vice-Emperor," and the nomination of V. Duruy, an anti-clerical, as minister of public instruction, in reply to those attacks of the Church which were to culminate in the Syllabus of 1864, all indicated a distinct rapprochement between the emperor and the Left. But though the opposition represented by Thiers was rather constitutional than dynastic, there was another and irreconcilable opposition, that of the amnestied or voluntarily exiled republicans, of whom Victor Hugo was the eloquent mouthpiece. Thus those who had formerly constituted the governing classes were again showing signs of their ambition to govern. There appeared to be some risk that this movement among the *bourgeoisie* might spread to the people. As Antaeus recruited his strength by touching the earth Napoleon believed that he would consolidate his menaced power by again turning to the labouring masses, by whom that power had been established.

Industrial policy of the Empire.

This industrial policy he embarked upon as much from motives of interest as from sympathy, out of opposition to the *bourgeoisie*, which was ambitious of governing or desirous of his overthrow. His course was all the easier, since he had only to exploit the prejudices of the working classes. They had never forgotten the *loi Chapelle* of 1791, which by forbidding all combinations among the workmen had placed them at the mercy of their employers, nor had they forgotten how the limited suffrage had conferred upon capital a political monopoly which had put it out of reach of the law, nor how each time they had left their position of rigid isolation in order to save the Charter or universal suffrage, the triumphant *bourgeoisie* had repaid them at the last with neglect. The silence of public opinion under the Empire and the prosperous state of business had completed the separation of the labour party from the political parties. The visit of an elected and paid labour delegation to the Universal Exhibition of 1862 in London gave the emperor an opportunity for re-establishing relations with that party, and these relations were to his mind all the more profitable, since the labour party, by refusing to associate their social and industrial claims with the political ambitions of the *bourgeoisie*, maintained a neutral attitude between the parties, and could, if necessary, divide them, while by its keen criticism of society it aroused the conservative instincts of the *bourgeoisie* and consequently checked their enthusiasm for liberty. A law of the 23rd of May 1863 gave the workmen the right, as in England, to save money by creating co-operative societies. Another law, of the 25th of May 1864, gave them the right to enforce better conditions of labour by organizing strikes. Still further, the emperor permitted the workmen to imitate their employers by establishing unions for the permanent protection of their interests. And finally, when the *ouvriers*, with the characteristic French tendency to insist on the universal application of a theory, wished to substitute for the narrow utilitarianism of the English trade-unions the ideas common to the wage-earning classes of the whole world, he put no obstacles in the way of their leader M. Tolain's plan for founding an International Association of Workers (*Société Internationale des Travailleurs*). At the same time he encouraged the provision made by employers for thrift and relief and for improving the condition of the working-classes.

Sadowa (1866).

Thus assured of support, the emperor, through the mouthpiece of M. Rouher, who was a supporter of the absolutist régime, was able to refuse all fresh claims on the part of the Liberals. He was aided by the cessation of the industrial crisis as the American civil war came to an end, by the apparent closing of the Roman question by the convention of the 15th of September, which guaranteed to the papal states the protection of Italy, and finally by the treaty of the 30th of October 1864, which temporarily put an end to the crisis of the Schleswig-Holstein question. But after 1865 the momentary agreement which had united Austria and Prussia for the purpose of administering the conquered duchies gave place to a silent antipathy which foreboded a rupture. Yet, though the Austro-Prussian War of 1866 was not unexpected, its rapid termination and fateful outcome came as a severe and sudden shock to France. Napoleon had hoped to gain fresh prestige for his throne and new influence for France by an intervention at the proper moment between combatants equally matched and mutually exhausted. His calculations were upset and his hopes dashed by the battle of Sadowa (Königgrätz) on the 4th of July. The treaty of Prague put an end to the secular rivalry of Habsburg and Hohenzollern for the hegemony of Germany, which had been France's opportunity; and Prussia could afford to humour the just claims of Napoleon by establishing between her North German Confederation and the South German states the illusory frontier of the Main. The belated efforts of the French emperor to obtain "compensation" on the left bank of the Rhine, at the expense of the South German states, made matters worse. France realized with an angry surprise that on her eastern frontier had arisen a military power by which her influence, if not her existence, was threatened; that in the name of the principle of nationality unwilling populations had been brought under the sway of a dynasty by tradition militant and aggressive, by tradition the enemy of France; that this new and threatening power had destroyed French influence in Italy, which owed the acquisition of Venetia to a Prussian alliance and to Prussian arms; and that all this had been due to Napoleon, outwitted and outmanœuvred at every turn, since his first interview with Bismarck at Biarritz in October 1865.

Further concessions of Napoleon III.

Struggle between Ollivier and Rouher.

All confidence in the excellence of imperial régime vanished at once. Thiers and Jules Favre as representatives of the Opposition denounced in the Legislative Body the blunders of 1866. Émile Ollivier split up the official majority by the amendment of the 45, and gave it to be understood that a reconciliation with the Empire would be impossible until the emperor would grant entire liberty. The recall of the French troops from Rome, in accordance with the convention of 1864, also led to further attacks by the Ultramontane party, who were alarmed for the papacy. Napoleon III. felt the necessity for developing "the great act of 1860" by the decree of the 19th of January 1867. In spite of Rouher, by a secret agreement with Ollivier the right of interpellation was restored to the Chambers. Reforms in press supervision and the right of holding meetings were promised. It was in vain that M. Rouher tried to meet the Liberal opposition by organizing a party for the defence of the Empire, the "Union dynastique." But the rapid succession of international reverses prevented him from effecting anything.

The year 1867.

The year 1867 was particularly disastrous for the Empire. In Mexico "the greatest idea of the reign" ended in a humiliating withdrawal before the ultimatum of the United States, while Italy, relying on her new alliance with Prussia and already forgetful of her promises, was mobilizing the revolutionary forces to complete her unity by conquering Rome. The chassepots of Mentana were needed to check the Garibaldians. And when the imperial diplomacy made a belated attempt to obtain from the victorious Bismarck those territorial compensations on the Rhine, in Belgium and in Luxemburg, which it ought to have been possible to exact from him earlier at Biarritz, Benedetti added to the mistake of asking at the wrong time the humiliation of obtaining nothing (see LUXEMBURG). Napoleon did not dare to take courage and confess his weakness. And finally was seen the strange contrast of France, though reduced to such a state of real weakness, courting the mockery of Europe by a display of the external magnificence which concealed her decline. In the Paris transformed by Baron Haussmann and now become almost exclusively a city of pleasure and frivolity, the opening of the Universal Exhibition was marked by Berezowski's attack on the tsar Alexander II., and its success was clouded by the tragic fate of the unhappy emperor Maximilian of Mexico. Well might Thiers exclaim, "There are no blunders left for us to make."

Peace or war.

But the emperor managed to commit still more, of which the consequences both for his dynasty and for France were irreparable. Old, infirm and embittered, continually keeping his ministers in suspense by the uncertainty and secrecy of his plans, surrounded by a people now bent almost entirely on pleasure, and urged on by a growing opposition, there now remained but two courses open to Napoleon III.: either to arrange a peace which should last, or to prepare for a decisive war. He allowed himself to drift in the direction of war, but without bringing things to a necessary state of preparation. It was in vain that Count Beust revived on behalf of the Austrian government the project abandoned by Napoleon since 1866 o a settlement on the basis of the *status quo* with reciprocal disarmament. Napoleon refused, on hearing from Colonel Stoffel his military attaché at Berlin, that Prussia would not agree to disarmament. But he was more anxious than he was willing to show. A reconstitution of the military organization seemed to him to be necessary. This Marshal Niel was unable to obtain either from the Bonapartist Opposition, who feared the electors, in whom the old patriotism had given place to the commercial or cosmopolitan spirit, or from the Republican opposition, who were unwilling to strengthen the despotism. Both of them were blinded by party interest to the danger from outside.

Action of the revolutionaries.

The emperor's good fortune had departed; he was abandoned by men and disappointed by events. He had vainly hoped that, though by the laws of May-June 1868, granting the freedom of the press and authorizing meetings, he had conceded the right of speech, he would retain the right of action; but he had played into the hands of his enemies. Victor Hugo's *Châtiments*, the insults of Rochefort's *Lanterne*, the subscription for the monument to Baudin, the deputy killed at the barricades in 1851, followed by Gambetta's terrible speech against the Empire on the occasion of the trial of Delescluze, soon showed that the republican party was irreconcilable, and bent on the Republic. On the other hand, the Ultramontane party were becoming more and more discontented, while the industries formerly protected were equally dissatisfied with the free-trade reform. Worse still, the working classes had abandoned their political neutrality, which had brought them nothing but unpopularity, and gone over to the enemy. Despising Proudhon's impassioned attacks on the slavery of communism, they had gradually been won over by the collectivist theories of Karl Marx or the revolutionary theories of Bakounine, as set forth at the congresses of the International. At these Labour congresses, the fame of which was only increased by the fact that they were forbidden, it had been affirmed that the social emancipation of the worker was inseparable from his political emancipation. Henceforth the union between the internationalists and the republican bourgeois was an accomplished fact. The Empire, taken by surprise, sought to curb both the middle classes and the labouring classes, and forced them both into revolutionary actions. On every side took place strikes, forming as it were a review of the effective forces of the Revolution.

The parliamentary Empire.

The elections of May 1869, made during these disturbances, inflicted upon the Empire a serious moral defeat. In spite of the revival by the government of the cry of the red terror, Ollivier, the advocate of conciliation, was rejected by Paris, while 40 irreconcilables and 116 members of the Third Party were elected. Concessions had to be made to these, so by the *senatus-consulte* of the 8th of September 1869 a parliamentary monarchy was substituted for personal government. On the 2nd of January 1870 Ollivier was placed at the head of the first homogeneous, united and responsible ministry. But the republican party, unlike the country, which hailed this reconciliation of liberty and order, refused to be content with the liberties they had won; they refused all compromise, declaring themselves more than ever decided upon the overthrow of the Empire. The murder of the journalist Victor Noir by Pierre Bonaparte, a member of the imperial family, gave the revolutionaries their long desired opportunity (January 10). But the *émeute* ended in a failure, and the emperor was able to answer the personal threats against him by the overwhelming victory of the plebiscite of the 8th of May 1870.

The Franco-German war.

But this success, which should have consolidated the Empire, determined its downfall. It was thought that a diplomatic success should complete it, and make the country forget liberty for glory. It was in vain that after the parliamentary revolution of the 2nd of January that prudent statesman Comte Daru revived, through Lord Clarendon, Count Beust's plan of disarmament after Sadowa. He met with a refusal from Prussia and from the imperial *entourage*. The Empress Eugénie was credited with

The Hohenzollern candidature.

the remark, "If there is no war, my son will never be emperor." The desired pretext was offered on the 3rd of July 1870 by the candidature of a Hohenzollern prince for the throne of Spain. To the French people it seemed that Prussia, barely mistress of Germany, was reviving against France the traditional policy of the Habsburgs. France, having rejected for dynastic reasons the candidature of a Frenchman, the duc de Montpensier, saw herself threatened with a German prince. Never had the emperor, now both physically and morally ill, greater need of the counsels of a clear-headed statesman and the support of an enlightened public opinion if he was to defeat the statecraft of Bismarck. But he could find neither.

The declaration of war.

Ollivier's Liberal ministry, wishing to show itself as jealous for national interests as any absolutist ministry, bent upon doing something great, and swept away by the force of that opinion which it had itself set free, at once accepted the war as inevitable, and prepared for it with a light heart. In face of the decided declaration of the duc de Gramont, the minister for foreign affairs, before the Legislative Body of the 6th of July, Europe, in alarm, supported the efforts of French diplomacy and obtained the withdrawal of the Hohenzollern candidature. This did not suit the views either of the war party in Paris or of Bismarck, who wanted the other side to declare war. The ill-advised action of Gramont in demanding from King William one of those promises for the future which are humiliating but never binding, gave Bismarck his opportunity, and the king's refusal was transformed by him into an insult by the "editing" of the Ems telegram. The chamber, in spite of the desperate efforts of Thiers and Gambetta, now voted by 246 votes to 10 in favour of the war.

France isolated.

France found herself isolated, as much through the duplicity of Napoleon as through that of Bismarck. The disclosure to the diets of Munich and Stuttgart of the written text of the claims laid by Napoleon on the territories of Hesse and Bavaria had since the 22nd of August 1866 estranged southern Germany from France, and disposed the southern states to sign the military convention with Prussia. Owing to a similar series of blunders, the rest of Europe had become hostile. Russia, which it had been Bismarck's study both during and after the Polish insurrection of 1863 to draw closer to Prussia, learnt with annoyance, by the same indiscretion, how Napoleon was keeping his promises made at Stuttgart. The hope of gaining a revenge in the East for her defeat of 1856 while France was in difficulties made her decide on a benevolent neutrality. The disclosure of Benedetti's designs of 1867 on Belgium and Luxemburg equally ensured an unfriendly neutrality on the part of Great Britain. The emperor counted at least on the alliance of Austria and Italy, for which he had been negotiating since the Salzburg interview (August 1867). But Austria, having suffered at his hands in 1859 and 1866, was not ready and asked for a delay before joining in the war; while the hesitating friendships of Italy could only be won by the evacuation of Rome. The chassepots of Mentana, Rouher's "Never," and the hostility of the Catholic empress to any secret article which should open to Italy the gates of the capital, deprived France of her last friend.

Sedan. Fall of the Empire.

Marshal Leboeuf's armies were no more effective than Gramont's alliances. The incapacity of the higher officers of the French army, the lack of preparation for war at headquarters, the selfishness and shirking of responsibility on the part of the field officers, the absence of any fixed plan when failure to mobilize had destroyed all chance of the strong offensive which had been counted on, and the folly of depending on chance, as the emperor had so often done successfully, instead of scientific warfare, were all plainly to be seen as early as the insignificant engagement of Saarbrücken. Thus the French army proceeded by diastrous stages from Weissenburg, Forbach, Froeschweiler, Borny, Gravelotte, Noisseville and Saint-Privat to the siege of Metz and the slaughter at Illy. By the capitulation of Sedan the Empire lost its only support, the army, and fell. Paris was left unprotected and emptied of troops, with only a woman at the Tuileries, a terrified Assembly at the Palais-Bourbon, a ministry, that of Palikao, without authority, and leaders of the Opposition who fled as the catastrophe approached. (P. W.)

The Third Republic 1870–1909

Government of National Defence, 1870.

The Third Republic may be said to date from the revolution of the 4th of September 1870, when the republican deputies of Paris at the hôtel de ville constituted a provisional government under the presidency of General Trochu, military governor of the capital. The Empire had fallen, and the emperor was a prisoner in Germany. As, however, since the great Revolution régimes in France have been only passing expedients, not inextricably associated with the destinies of the people, but bound to disappear when accounted responsible for national disaster, the surrender of Louis Napoleon's sword to William of Prussia did not disarm the country. Hostilities were therefore continued. The provisional government had to assume the part of a Committee of National Defence, and while insurrection was threatening in Paris, it had, in the face of the invading Germans, to send a delegation to Tours to maintain the relations of France with the outside world. Paris was invested, and for five months endured siege, bombardment and famine. Before the end of October the capitulation of Metz, by the treason of Marshal Bazaine, deprived France of the last relic of its regular army. With indomitable courage the garrison of Paris made useless sorties, while an army of irregular troops vainly essayed to resist the invader, who had reached the valley of the Loire. The acting Government of National Defence, thus driven from Tours, took refuge at Bordeaux, where it awaited the capitulation of Paris, which took place on the 29th of January 1871. The same day the preliminaries of peace were signed at Versailles, which, confirmed by the treaty of Frankfort of the 10th of May, transferred from France to Germany the whole of Alsace, excepting Belfort, and a large portion of Lorraine, including Metz, with a money indemnity of two hundred millions sterling.

Foundation of the Third Republic, 1871.

On the 13th of February 1871 the National Assembly, elected after the capitulation of Paris, met at Bordeaux and assumed the powers hitherto exercised by the Government of National Defence. Since the meeting of the states-general in 1789 no representative body in France had ever contained so many men of distinction. Elected to conclude a peace, the great majority of its members were monarchists, Gambetta, the rising hope of the republicans, having discredited his party in the eyes of the weary population by his efforts to carry on the war. The Assembly might thus have there and then restored the monarchy had not the monarchists been divided among themselves as royalist supporters of the comte de Chambord, grandson of Charles X., and as Orleanists favouring the claims of the comte de Paris, grandson of Louis Philippe. The majority being unable to unite on the essential point of the choice of a sovereign, decided to allow the Republic, declared on the morrow of Sedan, to liquidate the disastrous situation. Consequently, on the 17th of February the National Assembly elected Thiers as "Chief of the Executive Power of the French Republic," the abolition of the Empire being formally voted a fortnight later. The old minister of Louis Philippe, who had led the opposition to the Empire, and had been the chief opponent of the war, was further marked out for the position conferred on him by his election to the Assembly in twenty-six departments in recognition of his tour through Europe after the first defeats, undertaken in the patriotic hope of obtaining the intervention of the Powers on behalf of France. Thiers composed a ministry, and announced that the first duty of the government

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[1] In the 14th volume of his *L'Empire libéral* (1909) M. Émile Ollivier gives a detailed and illuminating account of the events that led up to the war. He indignantly denies that he ever said that he contemplated it "with a light heart," and says that he disapproved of Gramont's demand for "guarantees," to which he was not privy. His object is to prove that France was entrapped by Bismarck into a position in which she was bound in honour to declare war. (Ed.)

before examining constitutional questions, would be to reorganize the forces of the nation in order to provide for the enormous war indemnity which had to be paid to Germany before the territory could be liberated from the presence of the invader. The tacit acceptance of this arrangement by all parties was known as the "*pacte de Bordeaux.*" Apart from the pressure of patriotic considerations, it pleased the republican minority to have the government of France officially proclaimed a Republic, while the monarchists thought that pending their choice of a monarch it might popularize their cause not to have it associated with the imposition of the burden of war taxation. From this fortuitous and informal transaction, accepted by a monarchical Assembly, sprang the Third Republic, the most durable régime established in France since the ancient monarchy disappeared in 1792.

The Commune.

The Germans marched down the Champs Elysées on the 1st of March 1871, and occupied Paris for forty-eight hours. The National Assembly then decided to remove its sittings to Versailles; but two days before its arrival at the palace, where the king of Prussia had just been proclaimed German emperor, an insurrection broke out in Paris. The revolutionary element, which had been foremost in proclaiming the Republic on the 4th of September, had shown signs of disaffection during the siege. On the conclusion of the peace the triumphal entry of the German troops, the threatened disbanding of the national guard by an Assembly known to be anti-republican, and the resumption of orderly civic existence after the agitated life of a suffering population isolated by siege, had excited the nerves of the Parisians, always prone to revolution. The Commune was proclaimed on the 18th of March, and Paris was declared to be a free town, which recognized no government but that chosen by the people within its walls, the communard theory being that the state should consist of a federation of self-governing communes subject to no central power. Administrative autonomy was not, however, the real aim of the insurgent leaders. The name of the Commune had always been a rallying sign for violent revolutionaries ever since the Terrorists had found their last support in the municipality of Paris in 1794. In 1871 among the communard chiefs were revolutionaries of every sect, who, disagreeing on governmental and economic principles, were united in their vague but perpetual hostility to the existing order of things. The regular troops of the garrison of Paris followed the National Assembly to Versailles, where they were joined by the soldiers of the armies of Sedan and Metz, liberated from captivity in Germany. With this force the government of the Republic commenced the second siege of Paris, in order to capture the city from the Commune, which had established the parody of a government there, having taken possession of the administrative departments and set a minister at the head of each office. The second siege lasted six weeks under the eyes of the victorious Germans encamped on the heights overlooking the capital. The presence of the enemy, far from restraining the humiliating spectacle of Frenchmen waging war on Frenchmen in the hour of national disaster, seemed to encourage the fury of the combatants. The communards, who had begun their reign by the murder of two generals, concluded it, when the Versailles troops were taking the city, with the massacre of a number of eminent citizens, including the archbishop of Paris, and with the destruction by fire of many of the finest historical buildings, including the palace of the Tuileries and the hôtel de ville. History has rarely known a more unpatriotic crime than that of the insurrection of the Commune; but the punishment inflicted on the insurgents by the Versailles troops was so ruthless that it seemed to be a countermanifestation of French hatred for Frenchmen in civil disturbance rather than a judicial penalty applied to a heinous offence. The number of Parisians killed by French soldiers in the last week of May 1871 was probably 20,000, though the partisans of the Commune declared that 36,000 men and women were shot in the streets or after summary court-martial.

It is from this point that the history of the Third Republic commences. In spite of the doubly tragic ending of the war the vitality of the country seemed unimpaired. With ease an without murmur it supported the new burden of taxation calle for by the war indemnity and by the reorganization of the shattered forces of France. Thiers was thus aided in his task of liberating the territory from the presence of the enemy. His proposal at Bordeaux to make the "*essai loyal*" of the Republic, as the form of government which caused the least division among Frenchmen, was discouraged by the excesses of the Commune which associated republicanism with revolutionary disorder. Nevertheless, the monarchists of the National Assembly received a note of warning that the country might dispense with their services unless they displayed governmental capacity, when in July 1871 the republican minority was largely increased at the bye-elections. The next month, within a year of Sedan, a provisional constitution was voted, the title of president of the French Republic being then conferred on Thiers. The monarchists consented to this against their will; but they had their own way when they conferred constituent powers on the Assembly in opposition to the republicans, who argued that it was a usurpation of the sovereignty of the people for a body elected for another purpose to assume the power of giving a constitution to the land without a special mandate from the nation. The debate gave Gambetta his first opportunity of appearing as a serious politician. The "*fou furieux*" of Tours, whom Thiers had denounced for his efforts to prolong the hopeless war, was about to become the chief support of the aged Orleanist statesman whose supreme achievement was to be the foundation of the Republic.

Republicans an Monarchists after the war.

1872: Thiers and Gambetta.

It was in 1872 that Thiers practically ranged himself with Gambetta and the republicans. The divisions in the monarchical party made an immediate restoration impossible. This situation induced some of the moderate deputies, whose tendencies were Orleanist, to support the organization of a Republic which now no longer found its chief support in the revolutionary section of the nation, and it suited the ideas of Thiers, whose personal ambition was not less than his undoubted patriotism. Having become unexpectedly chief of the state at seventy-four he had no wish to descend again to the position of a minister of the Orleans dynasty which he had held at thirty-five. So, while the royalists refused to admit the claims of the comte de Paris, the old minister of Louis Philippe did his best to undermine the popularity of the Orleans tradition, which had been great among the Liberals under the Second Empire. He moved the Assembly to restore to the Orleans princes the value of their property confiscated under Louis Napoleon. This he did in the well-founded belief that the family would discredit itself in the eyes of the nation by accepting two millions sterling of public money at a moment when the country was burdened with the war indemnity. The incident was characteristic of his wary policy, as in the face of the anti-republican majority in the Assembly he could not openly break with the Right; and when it was suggested that he was too favourable to the maintenance of the Republic he offered his resignation, the refusal of which he took as indicating the indispensable nature of his services. Meanwhile Gambetta, by his popular eloquence, had won for himself in the autumn a triumphal progress, in the course of which he declared at Grenoble that political power had passed into the hands of "*une couche sociale nouvelle*," and he appealed to the new social strata to put an end to the comedy of a Republic without republicans. When the Assembly resumed its sittings, order having been restored in the land disturbed by war and revolution, the financial system being reconstituted and the reorganization of the army planned, Thiers read to the house a presidential message which marked such a distinct movement towards the Left that Gambetta led the applause. "The Republic exists," said the president, "it is the lawful government of the country, and to devise anything else is to devise the most terrible of revolutions."

The year 1873 was full of events fateful for the history of France. It opened with the death of Napoleon III. at Chislehurst; but the disasters amid which the Second Empire had ended were too recent for the youthful promise of his heir to be regarded as having any connexion with the future fortunes of France, except by the small group of Bonapartists. Thiers remained the centre of interest. Much as the monarchists disliked him, they at first shrank from upsetting him before they were ready with a scheme of monarchical restoration, and while Gambetta's authority was growing in the land. But when the Left Centre took alarm at the return of radical deputies at numerous by-elections the reactionaries utilized the divisions in the republican party, and for the only time in the history of the Third Republic they gave proof of parliamentary adroitness. The date for the evacuation of France by the German troops had been advanced, largely owing to Thiers' successful efforts to raise the war indemnity. The monarchical majority, therefore, thought the moment had arrived when his services might safely be dispensed with, and the campaign against him was ably conducted by a coalition of Legitimists, Orleanists and Bonapartists. The attack on Thiers was led by the duc de Broglie, the son of another minister of Louis Philippe and grandson of Madame de Staël. Operations began with the removal from the chair of the Assembly of Jules Grévy, a moderate republican, who was chosen president at Bordeaux, and the substitution of Buffet, an old minister of the Second Republic who had rallied to the Empire. A debate on the political tendency of the government brought Thiers himself to the tribune to defend his policy. He maintained that a conservative Republic was the only régime possible, seeing that the monarchists in the Assembly could not make a choice between their three pretenders to the throne. A resolution, however, was carried which provoked the old statesman into tendering his resignation. This time it was not declined, and the majority with unseemly haste elected as president of the Republic Marshal MacMahon, duc de Magenta, an honest soldier of royalist sympathies, who had won renown and a ducal title on the battlefields of the Second Empire. In the eyes of Europe the curt dismissal of the aged liberator of the territory was an act of ingratitude. Its justification would have been the success of the majority in forming a stable monarchical government; but the sole result of the 24th of May 1873 was to provide a definite date to mark the opening of the era of anti-republican incompetency in France which has lasted for more than a generation, and has been perhaps the most effective guardian of the Third Republic.

Resignation of Thiers.

Marshal MacMahon president of the Republic.

The political incompetency of the reactionaries was fated never to be corrected by the intelligence of its princes or of its chiefs, and the year which saw Thiers dismissed to make way for a restoration saw also that restoration indefinitely postponed by the fatal action of the legitimist pretender. The comte de Paris went to Frohsdorf to abandon to the comte de Chambord his claims to the crown as the heir of the July Monarchy, and to accept the position of dauphin, thus implying that his grandfather Louis Philippe was a usurper. With the "Government of Moral Order" in command the restoration of the monarchy seemed imminent, when the royalists had their hopes dashed by the announcement that "Henri V." would accept the throne only on the condition that the nation adopted as the standard of France the white flag—at the very sight of which Marshal MacMahon said the rifles in the army would go off by themselves. The comte de Chambord's refusal to accept the tricolour was probably only the pretext of a childless man who had no wish to disturb his secluded life for the ultimate benefit of the Orleans family which had usurped his crown, had sent him as a child into exile, and outraged his mother the duchesse de Berry. Whatever his motive, his decision could have no other effect than that of establishing the Republic, as he was likely to live for years, during which the comte de Paris' claims had to remain suspended. It was not possible to leave the land for ever under the government improvised at Bordeaux when the Germans were masters of France; so the majority in the Assembly decided to organize another provisional government on more regular lines, which might possibly last till the comte de Chambord had taken the white flag to the grave, leaving the way to the throne clear for the comte de Paris. On the 19th of November 1873 a Bill was passed which instituted the Septennate, whereby the executive power was confided to Marshal MacMahon for seven years. It also provided for the nomination of a commission of the National Assembly to take in hand the enactment of a constitutional law. Before this an important constitutional innovation had been adopted. Under Thiers there were no changes of ministry. The president of the Republic was perpetual prime minister, constantly dismissing individual holders of portfolios, but never changing at one moment the whole council of ministers. Marshal MacMahon, the day after his appointment, nominated a cabinet with a vice-president of the council as premier, and thus inaugurated the system of ministerial instability which has been the most conspicuous feature of the government of the Third Republic. Under the Septennate the ministers, monarchist or moderate republican, were socially and perhaps intellectually of a higher class than those who governed France during the last twenty years of the 19th century. But the duration of the cabinets was just as brief, thus displaying the fact, already similarly demonstrated under the Restoration and the July Monarchy, that in France parliamentary government is an importation not suited to the national temperament.

The comte de Chambord.

The Septennate.

The duc de Broglie was the prime minister in MacMahon's first two cabinets which carried on the government of the country up to the first anniversary of Thiers' resignation. The duc de Broglie's defeat by a coalition of Legitimists and Bonapartists with the Republicans displayed the mutual attitude of parties. The Royalists, chagrined that the fusion of the two branches of the Bourbons had not brought the comte de Chambord to the throne, vented their rage on the Orleanists, who had the chief share in the government without being able to utilize it for their dynasty. The Bonapartists, now that the memory of the war was receding, were winning elections in the provinces, and were further encouraged by the youthful promise of the Prince Imperial. The republicans had so improved their position that the duc d'Audiffret-Pasquier, great-nephew of the chancellor Pasquier, tried to form a coalition ministry with M. Waddington, afterwards ambassador of the Republic in London, and other members of the Left Centre. Out of this uncertain state of affairs was evolved the constitution which has lasted the longest of all those that France has tried since the abolition of the old monarchy in 1792. Its birth was due to chance. Not being able to restore a monarchy, the National Assembly was unwilling definitively to establish a republic, and as no limit was set by the law on the duration of its powers, it might have continued the provisional state of things had it not been for the Bonapartists. That party displayed so much activity in agitating for a plebiscite, that when the rural voters at by-elections began to rally to the Napoleonic idea, alarm seized the constitutionalists of the Right Centre who had never been persuaded by Thiers' exhortations to accept the Republic. Consequently in January 1875 the Assembly, having voted the general principle that the legislative power should be exercised by a Senate and a Chamber of Deputies, without any mention of the executive régime, accepted by a majority of one a momentous resolution proposed by M. Wallon, a member of the Right Centre. It provided that the president of the Republic should be elected by the absolute majority of the Senate and the Chamber united as a National Assembly, that he should be elected for seven years, and be eligible for re-election. Thus by one vote the Republic was formally established, "the Father of the Constitution" being M. Wallon, who began his political experiences in the Legislative Assembly of 1849, and survived to take an active part in the Senate until the twentieth century.

Constitution voted, 1875.

The Republic being thus established, General de Cissey, who had become prime minister, made way for M. Buffet, but retained his portfolio of war in the new coalition cabinet, which contained some distinguished members of the two central groups, including M. Léon Say. A fortnight previously, at the end of February

Provisions of the Constitution of 1875.

1875, were passed two statutes defining the legislative and executive powers in the Republic, and organizing the Senate. These joined to a third enactment, voted in July, form the body of laws known as the "Constitution of 1875," which though twice revised, lasted without essential alteration to the twentieth century. The legislative power was conferred on a Senate and a Chamber of Deputies, which might unite in congress to revise the constitution, if they both agreed that revision was necessary, and which were bound so to meet for the election of the president of the Republic when a vacancy occurred. It was enacted that the president so elected should retain office for seven years, and be eligible for re-election at the end of his term. He was also held to be irresponsible, except in the case of high treason. The other principal prerogatives bestowed on the presidential office by the constitution of 1875 were the right of initiating laws concurrently with the members of the two chambers; the promulgation of the laws; the right of dissolving the Chamber of Deputies before its legal term on the advice of the Senate, and that of adjourning the sittings of both houses for a month; the right of pardon; the disposal of the armed forces of the country; the reception of diplomatic envoys, and, under certain limitations, the power to ratify treaties. The constitution relieved the president of the responsibility of private patronage, by providing that every act of his should be countersigned by a minister. The constitutional law provided that the Senate should consist of 300 members, 75 being nominated for life by the National Assembly, and the remaining 225 elected for nine years by the departments and the colonies. Vacancies among the life members, after the dissolution of the National Assembly, were filled by the Senate until 1884, when the nominative system was abolished, though the survivors of it were not disturbed. The law of 1875 enacted that the elected senators, who were distributed among the departments on a rough basis of population, should be elected for nine years, a third of them retiring triennially. It was provided that the senatorial electors in each department should be the deputies, the members of the *conseil général* and of the *conseils d'arrondissement*, and delegates nominated by the municipal councils of each commune. As the municipal delegates composed the majority in each electoral college, Gambetta called the Senate the Grand Council of the Communes; but in practice the senators elected have always been the nominees of the local deputies and of the departmental councillors (*conseillers généraux*).

Scrutin d'arrondissement and scrutin de liste.

The Constitutional Law further provided that the deputies should be elected to the Chamber for four years by direct manhood suffrage, which had been enjoyed in France ever since 1848. The laws relating to registration, which is of admirable simplicity in France, were left practically the same as under the Second Empire. From 1875 to 1885 the elections were held on the basis of *scrutin d'arrondissement*, each department being divided into single-member districts. In 1885 *scrutin de liste* was tried, the department being the electoral unit, and each elector having as many votes as there were seats ascribed to the department without the power to cumulate—like the voting in the city of London when it returned four members. In 1889 *scrutin d'arrondissement* was resumed. The payment of members continued as under the Second Empire, the salary now being fixed at 9000 francs a year in both houses, or about a pound sterling a day. The Senate and the Chamber were endowed with almost identical powers. The only important advantage given to the popular house in the paper constitution was its initiative in matters of finance, but the right of rejecting or of modifying the financial proposals of the Chamber was successfully upheld by the Senate. In reality the Chamber of Deputies has overshadowed the upper house. The constitution did not prescribe that ministers should be selected from either house of parliament, but in practice the deputies have been in cabinets in the proportion of five to one in excess of the senators. Similarly the very numerous ministerial crises which have taken place under the Third Republic have with the rarest exceptions been caused by votes in the lower chamber. Among minor differences between the two houses ordained by the constitution was the legal minimum age of thei members, that of senators being forty and of deputies twenty-five It was enacted, moreover, that the Senate, by presidentia decree, could be constituted into a high court for the trial o certain offences against the security of the state.

1876: Political parties under the new Constitution.

The constitution thus produced, the fourteenth since the Revolution of 1789, was the issue of a monarchical Assembly forced by circumstances to establish a republic. It was therefore distinguished from others which preceded it in that it contained no declaration of principle and no doctrinal theory. The comparative excellence of the work must be recognized, seeing that it has lasted. But it owed its duration, as it owed its origin and its character, to the weakness of purpose and to the dissensions of the monarchical parties. The first legal act under the new constitution was the selection by the expiring National Assembly of seventy-five nominated senators, and here the reactionaries gave a crowning example of that folly which has ever marked their conduct each time they have had the chance of scoring an advantage against the Republic. The principle of nomination had been carried in the National Assembly by the Right and opposed by the Republicans. But the quarrels of the Legitimists with the duc de Broglie and his party were so bitter that the former made a present of the nominated element in the Senate to the Republicans in order to spite the Orleanists; so out of seventy-five senators nominated by the monarchical Assembly, fifty-seven Republicans were chosen. Without this suicidal act the Republicans would have been in a woeful minority in the Senate when parliament met in 1876 after the first elections under the new system of parliamentary government. The slight advantage which, in spite of their self-destruction, the reactionaries maintained in the upper house was outbalanced by the republican success at the elections to the Chamber. In a house of over 500 members only about 150 monarchical deputies were returned, of whom half were Bonapartists. The first cabinet under the new constitution was formed by Dufaure, an old minister of Louis Philippe like Thiers, and like him born in the 18th century. The premier now took the title of president of the council, the chief of the state no longer presiding at the meetings of ministers, though he continued to be present at their deliberations. Although the republican victories at the elections were greatly due to the influence of Gambetta, none of his partisans was included in the ministry, which was composed of members of the two central groups. At the end of 1876 Dufaure retired, but nearly all his ministers retained their portfolios under the presidency of Jules Simon, a pupil of Victor Cousin, who first entered political life in the Constituent Assembly of 1848, and was later a leading member of the opposition in the last seven years of the Second Empire.

The Seize Mai 1877.

The premiership of Jules Simon came to an end with the abortive *coup d'état* of 1877, commonly called from its date the *Seize Mai*. After the election of Marshal MacMahon to the presidency, the clerical party, irritated at the failure to restore the comte de Chambord, commenced a campaign in favour of the restitution of the temporal power to the Pope. It provoked the Italian government to make common cause with Germany, as Prince Bismarck was likewise attacked by the French clericals for his ecclesiastical policy. At last Jules Simon, who was a liberal most friendly to Catholicism, had to accept a resolution of the Chamber, inviting the ministry to adopt the same disciplinary policy towards the Church which had been followed by the Second Empire and the Monarchy of July. It was on this occasion that Gambetta used his famous expression, "*Le cléricalisme, voilà l'ennemi.*" Some days later a letter appeared in the *Journal officiel*, dated 16th May 1877, signed by President MacMahon, informing Jules Simon that he had no longer his confidence, as it was clear that he had lost that influence over the Chamber which a president of the Council ought to exercise. The dismissal of the prime minister and the presidential acts which followed did not infringe the letter of the new constitution; yet the proceeding was regarded as a *coup d'état* in favour of the clerical reactionaries. The duc de

Broglie formed an anti-republican ministry, and Marshal MacMahon, in virtue of the presidential prerogative conferred by the law of 1875, adjourned parliament for a month. When the Chamber reassembled the republican majority of 363 denounced the coalition of parties hostile to the Republic. The president, again using his constitutional prerogative, obtained the authorization of the Senate to dissolve the Chamber. Meanwhile the Broglie ministry had put in practice the policy, favoured by all parties in France, of replacing the functionaries hostile to it with its own partisans. But in spite of the administrative electoral machinery being thus in the hands of the reactionaries, a republican majority was sent back to the Chamber, the sudden death of Thiers on the eve of his expected return to power, and the demonstration at his funeral, which was described as a silent insurrection, aiding the rout of the monarchists. The duc de Broglie resigned, and Marshal MacMahon sent for General de Rochebouet, who formed a cabinet of unknown reactionaries, but it lasted only a few days, as the Chamber refused to vote supply. Dufaure was then called back to office, and his moderate republican ministry lasted for the remainder of the MacMahon presidency.

Thus ended the episode of the *Seize Mai*, condemned by the whole of Europe from its inception. Its chief effects were to prove again to the country the incompetency of the monarchists, and by associating in the public mind the Church with this ill-conceived venture, to provoke reprisals from the anti-clericals when they came into power. After the storm, the year 1878 was one of political repose. The first international exhibition held at Paris after the war displayed to Europe how the secret of France's recuperative power lay in the industry and artistic instinct of the nation. Marshal MacMahon presided with dignity over the fêtes held in honour of the exhibition, and had he pleased he might have tranquilly fulfilled the term of his Septennate. But in January 1879 he made a difference of opinion on a military question an excuse for resignation, and Jules Grévy, the president of the Chamber, was elected to succeed him by the National Assembly, which thus met for the first time under the Constitutional Law of 1875.

1879: Jules Grévy president of the Republic.

Henceforth the executive as well as the legislative power was in the hands of the republicans. The new president was a leader of the bar, who had first become known in the Constituent Assembly of 1848 as the advocate of the principle that a republic would do better without a president. M. Waddington was his first prime minister, and Gambetta was elected president of the Chamber. The latter, encouraged by his rivals in the idea that the time was not ripe for him openly to direct the affairs of the country, thus put himself, in spite of his occult dictatorship, in a position of official self-effacement from which he did not emerge until the jealousies of his own party-colleagues had undermined the prestige he had gained as chief founder of the Republic. The most active among them was Jules Ferry, minister of Education, who having been a republican deputy for Paris at the end of the Empire, was one of the members of the provisional government proclaimed on 4th September 1870. Borrowing Gambetta's cry that clericalism was the enemy, he commenced the work of reprisal for the *Seize Mai*. His educational projects of 1879 were thus anti-clerical in tendency, the most famous being article 7 of his education bill, which prohibited members of any "unauthorized" religious orders exercising the profession of teaching in any school in France, the disability being applied to all ecclesiastical communities, excepting four or five which had been privileged by special legislation. This enactment, aimed chiefly at the Jesuits, was advocated with a sectarian bitterness which will be associated with the name of Jules Ferry long after his more statesmanlike qualities are forgotten. The law was rejected by the Senate, Jules Simon being the eloquent champion of the clericals, whose intrigues had ousted him from office. The unauthorized orders were then dissolved by decree; but though the forcible expulsion of aged priests and nuns gave rise to painful scenes, it cannot be said that popular feeling was excited in their favour, so grievously had the Church blundered in identifying itself with the conspiracy of the *Seize Mai*.

Jules Ferry.

Meanwhile the death of the Prince Imperial in Zululand had shattered the hopes of the Bonapartists, and M. de Freycinet, a former functionary of the Empire, had become prime minister at the end of 1879. He had retained Jules Ferry at the ministry of Education, but unwilling to adopt all his anti-clerical policy, he resigned the premiership in September 1880. The constitution of the first Ferry cabinet secured the further exclusion from office of Gambetta, to which, however, he preferred his "occult dictatorship." In August he had, as president of the Chamber, accompanied M. Grévy on an official visit to Cherbourg, and the acclamations called forth all over France by his speech, which was a hopeful defiance to Germany, encouraged the wily chief of the state to aid the republican conspiracy against the hero of the Republic. In 1881 the only political question before the country was the destiny of Gambetta. His influence in the Chamber was such that in spite of the opposition of the prime minister he carried his electoral scheme of *scrutin de liste*, descending from the presidential chair to defend it. Its rejection by the Senate caused no conflict between the houses. The check was inflicted not on the Chamber, but on Gambetta, who counted on his popularity to carry the lists of his candidates in all the republican departments in France as a quasi-plebiscitary demonstration in his favour. His rivals dared not openly quarrel with him. There was the semblance of a reconciliation between him and Ferry, and his name was the rallying-cry of the Republic at the general election, which was conducted on the old system of *scrutin d'arrondissement*.

The triumph for the Republic was great, the combined force of reactionary members returned being less than one-fifth of the new Chamber. M. Grévy could no longer abstain from asking Gambetta to form a ministry, but he had bided his time till jealousy of the "occult power" of the president of the Chamber had undermined his position in parliament. Consequently, when on the 14th of November 1881 Gambetta announced the composition of his cabinet, ironically called the "*grand ministère*," which was to consolidate the Republic and to be the apotheosis of its chief, a great feeling of disillusion fell on the country, for his colleagues were untried politicians. The best known was Paul Bert, a man of science, who as the "reporter" in the Chamber of the Ferry Education Bill had distinguished himself as an aggressive free-thinker, and he inappropriately was named minister of public worship. All the conspicuous republicans who had held office refused to serve under Gambetta. His cabinet was condemned in advance. His enemies having succeeded in ruining its composition, declared that the construction of a one-man machine was ominous of dictatorship, and the "*grand ministère*" lived for only ten weeks.

Gambetta prime minister.

Gambetta was succeeded in January 1882 by M. de Freycinet, who having first taken office in the Dufaure cabinet of 1877, and having continued to hold office at intervals until 1899, was the most successful specimen of a "*ministrable*"—as recurrent portfolio-holders have been called under the Third Republic. His second ministry lasted only six months. The failure of Gambetta, though pleasing to his rivals, discouraged the republican party and disorganized its majority in the Chamber. M. Duclerc, an old minister of the Second Republic, then became president of the council, and before his short term of office was run Gambetta died on the last day of 1882, without having had the opportunity of displaying his capacity as a minister or an administrator. He was only forty-four at his death, and his fame rests on the unfulfilled promise of a brief career. The men who had driven him out of public life and had shortened his existence were the most ostentatious of the mourners at the great pageant with which he was buried, and to have been of his party was in future the popular trade-mark of his republican enemies.

Death of Gambetta.

Gambetta's death was followed by a period of anarchy, during which Prince Napoleon, the son of Jerome, king of Westphalia, placarded the walls of Paris with a manifesto. The Chamber thereupon voted the exile of the members of the families which

Opportunism.

had reigned in France. The Senate rejected the measure, and a conflict arose between the two houses. M. Duclerc resigned the premiership in January 1883 to his minister of the Interior, M. Fallières, a Gascon lawyer, who became president of the Senate in 1899 and president of the Republic in 1906. He held office for three weeks, when Jules Ferry became president of the council for the second time. Several of the closest of Gambetta's friends accepted office under the old enemy of their chief, and the new combination adopted the epithet "opportunist," which had been invented by Gambetta in 1875 to justify the expediency of his alliance with Thiers. The Opportunists thenceforth formed an important group standing between the Left Centre, which was now excluded from office, and the Radicals. It claimed the tradition of Gambetta, but the guiding principle manifested by its members was that of securing the spoils of place. To this end it often allied itself with the Radicals, and the Ferry cabinet practised this policy in 1883 when it removed the Orleans princes from the active list in the army as the illogical result of the demonstration of a Bonaparte. How needless was this proceeding was shown a few months later when the comte de Chambord died, as his death, which finally fused the Royalists with the Orleanists, caused no commotion in France.

Revision of the Constitution, 1884.

Tongking.

The year 1884 was unprecedented seeing that it passed without a change of ministry. Jules Ferry displayed real administrative ability, and as an era of steady government seemed to be commencing, the opportunity was taken to revise the Constitution. The two Chambers therefore met in congress, and enacted that the republican form of government could never be the subject of revision, and that all members of families which had reigned in France were ineligible for the presidency of the Republic—a repetition of the adventure of Louis Bonaparte in the middle of the century being thus made impossible. It also decided that the clauses of the law of 1875 relating to the organization of the Senate should no longer have a constitutional character. This permitted the reform of the Upper House by ordinary parliamentary procedure. So an organic law was passed to abolish the system of nominating senators, and to increase the number of municipal delegates in the electoral colleges in proportion to the population of the communes. The French nation, for the first time since it had enjoyed political life, had revised a constitution by pacific means without a revolution. Gambetta being out of the way, his favourite electoral system of *scrutin de liste* had no longer any terror for his rivals, so it was voted by the Chamber early in 1885. Before the Senate had passed it into law the Ferry ministry had fallen at the end of March, after holding office for twenty-five months, a term rarely exceeded in the annals of the Third Republic. This long tenure of power had excited the dissatisfaction of jealous politicians, and the news of a slight disaster to the French troops in Tongking called forth all the pent-up rancour which Jules Ferry had inspired in various groups. By the exaggerated news of defeat Paris was excited to the brink of a revolution. The approaches of the Chamber were invaded by an angry mob, and Jules Ferry was the object of public hate more bitter than any man had called forth in France since Napoleon III. on the days after Sedan. Within the Chamber he was attacked in all quarters. The Radicals took the lead, supported by the Monarchists, who remembered the anti-clerical rigour of the Ferry laws, by the Left Centre, not sorry for the tribulation of the group which had supplanted it, and by place-hunting republicans of all shades. The attack was led by a politician who disdained office. M. Georges Clémenceau, who had originally come to Paris from the Vendée as a doctor, had as a radical leader in the Chamber used his remarkable talent as an overthrower of ministries, and nearly every one of the eight ministerial crises which had already occurred during the presidency of Grévy had been hastened by his mordant eloquence.

Elections of 1885.

The next prime minister was M. Brisson, a radical lawyer and journalist, who in April 1885 formed a cabinet of "concentration" —that is to say, it was recruited from various groups with the idea of concentrating all republican forces in opposition to the reactionaries. MM. de Freycinet and Carnot, afterwards president of the Republic, represented the moderate element in this ministry, which superintended the general elections under *scrutin de liste*. That system was recommended by its advocates as a remedy for the rapid decadence in the composition of the Chamber. Manhood suffrage, which had returned to the National Assembly a distinguished body of men to conclude peace with Germany, had chosen a very different type of representative to sit in the Chamber created by the constitution of 1875. At each succeeding election the standard of deputies returned grew lower, till Gambetta described them contemptuously as "*sous-vétérinaires*," indicating that they were chiefly chosen from the petty professional class, which represented neither the real democracy nor the material interests of the country. His view was that the election of members by departmental lists would ensure the candidature of the best men in each region, who under the system of single-member districts were apt to be neglected in favour of local politicians representing narrow interests. When his death had removed the fear of his using *scrutin de liste* as a plebiscitary organization, parliament sanctioned its trial. The result was not what its promoters anticipated. The composition of the Chamber was indeed transformed, but only by the substitution of reactionary deputies for republicans. Of the votes polled, 45% were given to the Monarchists, and if they had obtained one-half of the abstentions the Republic would have come to an end. At the same time the character of the republican deputies returned was not improved; so the sole effect of *scrutin de liste* was to show that the electorate, weary of republican dissensions, was ready to make a trial of monarchical government, if only the reactionary party proved that it contained statesmen capable of leading the nation. So menacing was the situation that the republicans thought it wise not further to expose their divisions in the presidential election which was due to take place at the end of the year. Consequently, on the 28th of December 1885, M. Grévy, in spite of his growing unpopularity, was elected president of the Republic for a second term of seven years.

General Boulanger.

The Brisson cabinet at once resigned, and on the 7th of January 1886 its most important member, M. de Freycinet, formed his third ministry, which had momentous influence on the history of the Republic. The new minister of war was General Boulanger, a smart soldier of no remarkable military record; but being the nominee of M. Clémenceau, he began his official career by taking radical measures against commanding officers of reactionary tendencies. He thus aided the government in its campaign against the families which had reigned in France, whose situation had been improved by the result of the elections. The fêtes given by the comte de Paris to celebrate his daughter's marriage with the heir-apparent of Portugal moved the republican majority in the Chambers to expel from France the heads of the houses of Orleans and of Bonaparte, with their eldest sons. The names of all the princes on the army list were erased from it, the decree being executed with unseemly ostentation by General Boulanger, who had owed early promotion to the protection of the duc d'Aumale, and on that prince protesting he was exiled too. Meanwhile General Boulanger took advantage of Grévy's unpopularity to make himself a popular hero, and at the review, held yearly on the 14th of July, the anniversary of the fall of the Bastille, his acclamation by the Parisian mob showed that he was taking an unexpected place in the imagination of the people. He continued to work with the Radicals, so when they turned out M. de Freycinet in December 1886, one of their group, M. Goblet, a lawyer from Amiens, formed a ministry, and retained Boulanger as minister of war. M. Clémenceau, however, withdrew his support from the general, who was nevertheless loudly patronized by the violent radical press. His bold attitude towards Germany in connexion with the arrest on the German frontier of a French official named Schnaebele so roused the enthusiasm of the public, that M. Goblet was not sorry to resign in May 1887 in order to get rid of his too popular colleague.

The Wilson scandal.

To form the twelfth of his ministries, Grévy called upon M. Rouvier, an Opportunist from Marseilles, who had first held office in Gambetta's short-lived cabinet. General Boulanger was sent to command a *corps d'armée* at Clermont-Ferrand; but the popular press and the people clamoured for the hero who was said to have terrorized Prince Bismarck, and they encouraged him to play the part of a plebiscitary candidate. There were grave reasons for public discontent. Parliament in 1887 was more than usually sterile in legislation, and in the autumn session it had to attend to a scandal which had long been rumoured. The son-in-law of Grévy, Daniel Wilson, a prominent deputy who had been an under secretary of state, was accused of trafficking the decoration of the Legion of Honour, and of using the Elysée, the president's official residence, where he lived, as an agency for his corrupt practices. The evidence against him was so clear that his colleagues in the Chamber put the government into a minority in order to precipitate a presidential crisis, and on Grévy refusing to accept this hint, a long array of politicians, representing all the republican groups, declined his invitation to aid him in forming a new ministry, all being bent on forcing his resignation. Had General Boulanger been a man of resolute courage he might at this crisis have made a *coup d'état*, for his popularity in the street and in the army increased as the Republic sank deeper into scandal and anarchy. At last, when Paris was on the brink of revolution, Grévy was prevailed on to resign. The candidates for his succession to the presidency were two ex-prime ministers, MM. Ferry and de Freycinet, and Floquet, a barrister, who had been conspicuous in the National Assembly for his sympathy with the Commune. The Monarchists had no candidate ready, and resolved to vote for Ferry, because they believed that if he were elected his unpopularity with the democracy would cause an insurrection in Paris and the downfall of the Republic. MM. de Freycinet and Floquet each looked for the support of the Radicals, and each had made a secret compact, in the event of his election, to restore General Boulanger to the war office. But M. Clémenceau, fearing the election of Jules Ferry, advised his followers to vote for an "outsider," and after some manœuvring the congress elected by a large majority Sadi Carnot.

M. Carnot president of the Republic, 1887.

The new president, though the nominee of chance, was an excellent choice. The grandson of Lazare Carnot, the "organizer of victory" of the Convention, he was also a man of unsullied probity. The tradition of his family name, only less glorious than that of Bonaparte in the annals of the Revolution, was welcome to France, almost ready to throw herself into the arms of a soldier of fortune, while his blameless repute reconciled some of those whose opposition to the Republic had been quickened by the mean vices of Grévy. But the name and character of Carnot would have been powerless to check the Boulangist movement without the incompetency of its leader, who was getting the democracy at his back without knowing how to utilize it. The new president's first prime minister was M. Tirard, a senator who had held office in six of Grévy's ministries, and he formed a cabinet of politicians as colourless as himself. The early months of 1888 were occupied with the trial of Wilson, who was sentenced to two years' imprisonment for fraud, and with the conflicts of the government with General Boulanger, who was deprived of his command for coming to Paris without leave. Wilson appealed against his sentence, and General Boulanger was elected deputy for the department of the Aisne by an enormous majority. It so happened that the day after his election a presidential decree was signed on the advice of the minister of war removing General Boulanger from the army, and the court of appeal quashed Wilson's conviction. Public feeling was profoundly moved by the coincidence of the release of the relative of the ex-president by the judges of the Republic on the same day that its ministers expelled from the army the popular hero of universal suffrage.

Boulangism.

As General Boulanger had been invented by the Radicals it was thought that a Radical cabinet might be a remedy to cope with him, so M. Floquet became president of the council in April 1888, M. de Freycinet taking the portfolio of war, which he retained through many ministries. M. Floquet's chief achievement was a duel with General Boulanger, in which, though an elderly civilian, he wounded him. Nothing, however, checked the popularity of the military politician, and though he was a failure as a speaker in the Chamber, several departments returned him as their deputy by great majorities. The Bonapartists had joined him, and while in his manifestos he described himself as the defender of the Republic, the mass of the Monarchists, with the consent of the comte de Paris, entered the Boulangist camp, to the dismay both of old-fashioned Royalists and of many Orleanists, who resented his recent treatment of the duc d'Aumale. The centenary of the taking of the Bastille was to be celebrated in Paris by an international exhibition, and it appeared likely that it would be inaugurated by General Boulanger, so irresistible seemed his popularity. In January 1889 he was elected member for the metropolitan department of the Seine with a quarter of a million votes, and by a majority of eighty thousand over the candidate of the government. Had he marched on the Elysée the night of his election, nothing could have saved the parliamentary Republic; but again he let his chance go by. The government in alarm proposed the restoration of *scrutin d'arrondissement* as the electoral system for *scrutin de liste*. The change was rapidly enacted by the two Chambers, and was a significant commentary on the respective advantages of the two systems. M. Tirard was again called to form a ministry, and he selected as minister of the interior M. Constans, originally a professor at Toulouse, who had already proved himself a skilful manipulator of elections when he held the same office in 1881. He was therefore given the supervision of the machinery of centralization with which it was supposed that General Boulanger would have to be fought at the general election. That incomplete hero, however, saved all further trouble by flying the country when he heard that his arrest was imminent. The government, in order to prevent any plebiscitary manifestation in his favour, passed a law forbidding a candidate to present himself for a parliamentary election in more than one constituency; it also arraigned the general on the charge of treason before the Senate sitting as a high court, and he was sentenced in his absence to perpetual imprisonment. Such measures were needless. The flight of General Boulanger was the death of Boulangism. He alone had saved the Republic which had done nothing to save itself. Its government had, on the contrary, displayed throughout the crisis an anarchic feebleness and incoherency which would have speeded its end had the leader of the plebiscitary movement possessed sagacity or even common courage.

Boulanger's flight.

The elections of 1889 showed how completely the reactionaries had compromised their cause in the Boulangist failure. Instead of 45% of the votes polled as in 1885, they obtained only 21%, and the comte de Paris, the pretender of constitutional monarchy, was irretrievably prejudiced by his alliance with the military adventurer who had outraged the princes of his house. A period of calm succeeded the storm of Boulangism, and for the first time under the Third Republic parliament set to work to produce legislation useful for the state, without rousing party passion, as in its other period of activity when the Ferry education laws were passed. Before the elections of 1889 the reform of the army was undertaken, the general term of active compulsory service was made three years, while certain classes hitherto dispensed from serving, including ecclesiastical seminarists and lay professors, had henceforth to undergo a year's military training. The new parliament turned its attention to social and labour questions, as the only clouds on the political horizon were the serious strikes in the manufacturing districts, which displayed the growing political organization of the socialist party. Otherwise nothing disturbed the calm of the country. The young duc d'Orléans vainly tried to ruffle it by breaking his exile in order to claim his citizen's right to perform his military service. The cabinet was rearranged in March 1890, M. de Freycinet becoming prime minister for the fourth time, and retaining the portfolio of war. All seemed to point to the consolidation of the Republic, and even the Church made signals of reconciliation. Cardinal Lavigerie, a patriotic missionary and statesman, entertained the officers of the fleet at Algiers, and proposed the toast of the Republic to the tune of the "Marseillaise" played by his *pères blancs*. The royalist Catholics protested, but it was soon intimated that the archbishop of Algiers' demonstration was approved at Rome. The year 1891 was one of the few in the annals of the Republic which passed without a change of ministry, but the agitations of 1892 were to counterbalance the repose of the two preceding years.

The papal encyclical, 1892.

The first crisis arose out of the peacemaking policy of the Pope. Following up his intimation to the archbishop of Algiers, Leo XIII. published in February 1892 an encyclical, bidding French Catholics accept the Republic as the firmly established form of government. The papal injunction produced a new political group called the "Ralliés," the majority of its members being Monarchists who rallied to the Republic in obedience to the Vatican. The most conspicuous among them was Comte Albert de Mun, an eloquent exponent in the Chamber of legitimism and Christian socialism. The extreme Left mistrusted the adhesion of the new converts to the Republic, and ecclesiastical questions were the constant subjects of acrimonious debates in parliament. In the course of one of them M. de Freycinet found himself in a minority. He ceased to be prime minister, being succeeded by M. Loubet, a lawyer from Montélimar, who had previously held office for three months in the first Tirard cabinet; but M. de Freycinet continued to hold his portfolio of war. The confusion of the republican groups kept pace with the disarray of the reactionaries, and outside parliament the frequency of anarchist outrages did not increase public confidence. The only figure in the Republic which grew in prestige was that of M. Carnot, who in his frequent presidential tours dignified his office, though his modesty made him unduly efface his own personality.

The Panama scandal.

When the autumn session of 1892 began all other questions were overwhelmed by the bursting of the Panama scandal. The company associated for the piercing of the Isthmus of Panama, undertaken by M. de Lesseps, the maker of the Suez Canal, had become insolvent some years before. Fifty millions sterling subscribed by the thrift of France had disappeared, but the rumours involving political personages in the disaster were so confidently asserted to be reactionary libels, that a minister of the Republic, afterwards sent to penal servitude for corruption, obtained damages for the publication of one of them. It was known that M. de Lesseps was to be tried for misappropriating the money subscribed; but considering the vast sums lost by the public, little interest was taken in the matter till it was suddenly stirred by the dramatic suicide of a well-known Jewish financier closely connected with republican politicians, driven to death, it was said, by menaces of blackmail. Then succeeded a period of terror in political circles. Every one who had a grudge against an enemy found vent for it in the press, and the people of Paris lived in an atmosphere of delation. Unhappily it was true that ministers and members of parliament had been subsidized by the Panama company. Floquet, the president of the Chamber, avowed that when prime minister he had laid hands on £12,000 of the company's funds for party purposes, and his justification of the act threw a light on the code of public morality of the parliamentary Republic. Other politicians were more seriously implicated on the charge of having accepted subsidies for their private purposes, and emotion reached its height when the cabinet ordered the prosecution of two of its members for corrupt traffic of their offices. These two ministers were afterwards discharged, and they seem to have been accused with recklessness; but their prosecution by their own colleagues proved that the statesmen of the Republic believed that their high political circles were sapped with corruption. Finally, only twelve senators and deputies were committed for trial, and the only one convicted was a minister of M. de Freycinet's third cabinet, who pleaded guilty to receiving large bribes from the Panama company. The public regarded the convicted politician as a scapegoat, believing that there were numerous delinquents in parliament, more guilty than he, who had not even been prosecuted. This feeling was aggravated by the sentence passed, but afterwards remitted, on the aged M. de Lesseps, who had involved French people in misfortune only because he too sanguinely desired to repeat the triumph he had achieved for France by his great work in Egypt.

Within the nation the moral result of the Panama affair was a general feeling that politics had become under the Republic a profession unworthy of honest citizens. The sentiment evoked by the scandal was one of sceptical lassitude rather than of indignation. The reactionaries had crowned their record of political incompetence. At a crisis which gave legitimate opportunity to a respectable and patriotic Opposition they showed that the country had nothing to expect from them but incoherent and exaggerated invective. If the scandal had come to light in the time of General Boulanger the parliamentary Republic would not have survived it. As it was, the sordid story did little more than produce several changes of ministry. M. Loubet resigned the premiership in December 1892 to M. Ribot, a former functionary of the Empire, whose ministry lived for three stormy weeks. On the first day of 1893 M. Ribot formed his second cabinet, which survived till the end of March, when he was succeeded by his minister of education, M. Charles Dupuy, an ex-professor who had never held office till four months previously. M. Dupuy, having taken the portfolio of the interior, supervised the general election of 1893, which took place amid the profound indifference of the population, except in certain localities where personal antagonisms excited violence. An intelligent Opposition would have roused the country at the polls against the régime compromised by the Panama affair. Nothing of the sort occurred, and the electorate preferred the doubtful probity of their republican representatives to the certain incompetence of the reactionaries. The adversaries of the Republic polled only 16% of the votes recorded, and the chief feature of the election was the increased return of socialist and radical-socialist deputies. When parliament met it turned out the Dupuy ministry, and M. Casimir-Périer quitted the presidency of the Chamber to take his place. The new prime minister was the bearer of an eminent name, being the grandson of the statesman of 1831, and the great-grandson of the owner of Vizille, where the estates of Dauphiné met in 1788, as a prelude to the assembling of the states-general the next year. His acceptance of office aroused additional interest because he was a minister possessed of independent wealth, and therefore a rare example of a French politician free from the imputation of making a living out of politics. Neither his repute nor his qualities gave long life to his ministry, which fell in four months, and M. Dupuy was sent for again to form a cabinet in May 1894.

Assassination of president Carnot.

Casimir-Perier president, 1894.

Before the second Dupuy ministry had been in office a month President Carnot died by the knife of an anarchist at Lyons. He was perhaps the most estimable politician of the Third Republic. Although the standard of political life was not elevated under his presidency, he at all events set a good personal example, and to have filled unscathed the most conspicuous position in the land during a period unprecedented for the scurrility of libels on public men was a testimony to his blameless character. As the term of his septennate was near, parliament was not unprepared for a presidential election, and M. Casimir-Périer, who had been spoken of as his possible successor, was elected by the Congress which met at Versailles on the 27th of June 1894, three days after Carnot's assassination. The election of one who bore respectably a name not less distinguished in history than that of Carnot seemed to ensure that the Republic would reach the end of the century under the headship of a president of exceptional prestige. But instead of remaining chief of the state for seven years, in less than seven months M. Casimir-Périer astonished France and Europe by his resignation. Scurrilously defamed by the socialist press, the new president found that the Republicans in the Chamber were not disposed to defend him in his high office; so, on the 15th of January 1895, he seized the occasion of the retirement of the Dupuy ministry to address a message to the two houses intimating his resignation of the presidency, which, he said, was endowed with too many responsibilities and not sufficient powers.

Félix Faure president, 1895.

This time the Chambers were unprepared for a presidential vacancy, and to fill it in forty-eight hours was necessarily a matter of haphazard. The choice of the congress fell on Félix Faure, a merchant of Havre, who, though minister of marine in the retiring cabinet, was one of the least-known politicians who had held office. The selection was a good one, and introduced to the presidency a type of politician unfortunately rare under the Third Republic—a successful man of business. Félix Faure had a fine presence and polished manners, and having risen from a humble origin he displayed in his person the fact that civilization descends to a lower social level in France than elsewhere. Although he was in a sense a man of the people the Radicals and Socialists in the Chambers had voted against him. Their candidate, like almost all democratic leaders in France, had never worked with his hands—M. Brisson, the son of an attorney at Bourges, a member of the Parisian bar, and perpetual candidate for the presidency. Nevertheless the Left tried to take possession of President Faure. His first ministry, composed of moderate republicans and presided over by M. Ribot, lasted until the autumn session of 1895, when it was turned out and a radical cabinet was formed by M. Léon Bourgeois, an ex-functionary, who when a prefect had been suspected of reactionary tendencies.

The Bourgeois cabinet of 1895 was remarkable as the first ministry formed since 1877 which did not contain a single member of the outgoing cabinet. It was said to be exclusively radical in its composition, and thus to indicate that the days of "republican concentration" were over, and that the Republic, being firmly established, an era of party government on the English model had arrived. The new ministry, however, on analysis did not differ in character from any of its predecessors. Seven of its members were old office-holders of the ordinary "ministrable" type. The most conspicuous was M. Cavaignac, the son of the general who had opposed Louis Bonaparte in 1848, and the grandson of J. B. Cavaignac, the regicide member of the Convention. Like Carnot and Casimir-Périer, he was, therefore, one of those rare politicians of the Republic who possessed some hereditary tradition. An ambitious man, he was now classed as a Radical on the strength of his advocacy of the income-tax, the principle of which has never been popular in France, as being adverse to the secretive habits of thrift cultivated by the people, which are a great source of the national wealth. The radicalism of the rest of the ministry was not more alarming in character, and its tenure of office was without legislative result. Its fall, however, occasioned the only constitutionally interesting ministerial crisis of the twenty-four which had taken place since Grévy's election to the presidency sixteen years before. The Senate, disliking the fiscal policy of the government, refused to vote supply in spite of the support which the Chamber gave to the ministry. The collision between the two houses did not produce the revolutionary rising which the Radicals predicted, and the Senate actually forced the Bourgeois cabinet to resign amid profound popular indifference.

The new prime minister was M. Méline, who began his long political career as a member of the Commune in 1871, but was so little compromised in the insurrection that Jules Simon gave him an under-secretaryship in his ministry of 1876. After that he was once a cabinet minister, and was for a year president of the Chamber. He was chiefly known as a protectionist; but it was as leader of the Progressists, as the Opportunists now called themselves, that he formed his cabinet in April 1896, which was announced as a moderate ministry opposed to the policy of the Radicals. It is true that it made no attempt to tax incomes, but otherwise its achievements did not differ from those of other ministries, radical or concentration, except in its long survival. It lasted for over two years, and lived as long as the second Ferry cabinet. Its existence was prolonged by certain incidents of the Franco-Russian alliance. The visit of the Tsar to Paris in October 1896, being the first official visit paid by a European sovereign to the Republic, helped the government over the critical period at which ministries usually succumbed, and it was further strengthened in parliament by the invitation to the president of the Republic to return the imperial visit at St Petersburg in 1897. The Chamber came to its normal term that autumn; but a law had been passed fixing May as the month for general elections, and the ministry was allowed to retain office till the dissolution at Easter 1898.

Franco-Russian alliance.

The long duration of the Méline government was said to be a further sign of the arrival of an era of party government with its essential accompaniment, ministerial stability. But in the country there was no corresponding sign that the electorate was being organized into two parties of Progressists and Radicals; while in the Chamber it was ominously observed that persistent opposition to the moderate ministry came from nominal supporters of its views, who were dismayed at one small band of fellow-politicians monopolizing office for two years. The last election of the century was therefore fought on a confused issue, the most tangible results being the further reduction of the Monarchists, who secured only 12% of the total poll, and the advance of the Socialists, who obtained nearly 20% of the votes recorded. The Radicals returned were less numerous than the Moderates, but with the aid of the Socialists they nearly balanced them. A new group entitled Nationalist made its appearance, supported by a miscellaneous electorate representing the malcontent element in the nation of all political shades from monarchist to revolutionary socialist. The Chamber, so composed, was as incoherent as either of its predecessors. It refused to re-elect the radical leader M. Brisson as its president, and then refused its confidence to the moderate leader M. Méline. M. Brisson, the rejected of the Chamber, was sent for to form a ministry, on the 28th of June 1898, which survived till the adjournment, only to be turned out when the autumn session began. M. Charles Dupuy thus became prime minister for the third time with a cabinet of the old concentration pattern, and for the third time in less than five years under his premiership the Presidency of the Republic became vacant. Félix Faure had increased in pomposity rather than in popularity. His contact with European sovereigns seems to have made him over-conscious of his superior rank, and he cultivated habits which austere republicans make believe to be the monopoly of frivolous courts. The regular domesticity of middle-class life may not be disturbed with impunity when age is advancing, and Félix Faure died with tragic unexpectedness on the 16th of February 1899. The joys of his high office were so dear to him that nothing but death would have induced him to lay it down before the term of his septennate. There was therefore no candidate in waiting for the vacancy; and as Paris was in an agitated mood the majority in the Congress elected M. Loubet president of the Republic, because he happened to hold the second place of dignity in the state, the presidency of the Senate, and was, moreover, a politician who had the confidence of the republican groups as an adversary of plebiscitary pretensions. His only competitor was M. Méline, whose ambitions were not realized, in spite of the alliance of his Progressist supporters with the Monarchists and Nationalists. The Dupuy ministry lasted till June 1899, when a new cabinet was formed by M. Waldeck-Rousseau, who, having held office under Gambetta and Jules Ferry, had relinquished politics for the bar, of which he had become a distinguished leader. Though a moderate republican, he was the first prime minister to give portfolios to socialist politicians. This was the distinguishing feature of the last cabinet of the century—the thirty-seventh which had taken office in the twenty-six years which had elapsed since the resignation of Thiers in 1873.

1899: death of President Faure.

M. Loubet president.

It is now necessary to go back a few years in order to refer to a matter which, though not political in its origin, in its development filled the whole political atmosphere of France in the closing period of the 19th century. Soon after the failure of the Boulangist movement a journal was founded at Paris called the

Anti-Semitic movement.

Libre Parole. Its editor, M. Drumont, was known as the author of *La France juive*, a violent anti-Semitic work, written to denounce the influence exercised by Jewish financiers in the politics of the Third Republic. It may be said to have started the anti-Semitic movement in France, where hostility to the Jews had not the pretext existing in those lands which contain a large Jewish population exercising local rivalry with the natives of the soil, or spoiling them with usury. That state of things existed in Algeria, where the indigenous Jews were made French citizens during the Franco-Prussian War to secure their support against the Arabs in rebellion. But political anti-Semitism was introduced into Algeria only as an offshoot of the movement in continental France, where the great majority of the Jewish community were of the same social class as the politicians of the Republic. Primarily directed against the Jewish financiers, the movement was originally looked upon as a branch of the anti-capitalist propaganda of the Socialists. Thus the *Libre Parole* joined with the revolutionary press in attacking the repressive legislation provoked by the dynamite outrages of the anarchists, clerical reactionaries who supported it being as scurrilously abused by the anti-Semitic organ as its republican authors. The Panama affair, in the exposure of which the *Libre Parole* took a prominent part soon after its foundation, was also a bond between anti-Semites and Socialists, to whom, however, the Monarchists, always incapable of acting alone, united their forces. The implication of certain Jewish financiers with republican politicians in the Panama scandal aided the anti-Semites in their special propaganda, of which a main thesis was that the government of the Third Republic had been organized by its venal politicians for the benefit of Jewish immigrants from Germany, who had thus enriched themselves at the expense of the laborious and unsuspecting French population. The *Libre Parole*, which had become a popular organ with reactionaries and with malcontents of all classes, enlisted the support of the Catholics by attributing the anti-religious policy of the Republic to the influence of the Jews, skilfully reviving bitter memories of the enaction of the Ferry decrees, when sometimes the laicization of schools or the expulsion of monks and nuns had been carried out by a Jewish functionary. Thus religious sentiment and race prejudice were introduced into a movement which was at first directed against capital; and the campaign was conducted with the weapons of scurrility and defamation which had made an unlicensed press under the Third Republic a demoralizing national evil.

Condemnation of Captain Dreyfus.

An adroit feature of the anti-Semitic campaign was an appeal to national patriotism to rid the army of Jewish influence. The Jews, it was said, not content with directing the financial, and thereby the general policy of the Republic, had designs on the French army, in which they wished to act as secret agents of their German kindred. In October 1894 the *Libre Parole* announced that a Jewish officer of artillery attached to the general staff, Captain Alfred Dreyfus, had been arrested on the charge of supplying a government of the Triple Alliance with French military secrets. Tried by court-martial, he was sentenced to military degradation and to detention for life in a fortress. He was publicly degraded at Paris in January 1895, a few days before Casimir-Périer resigned the presidency of the Republic, and was transported to the Île du Diable on the coast of French Guiana. His conviction, on the charge of having betrayed to a foreign power documents relating to the national defence, was based on the alleged identity of his handwriting with that of an intercepted covering-letter, which contained a list of the papers treasonably communicated. The possibility of his innocence was not raised outside the circle of his friends; the Socialists, who subsequently defended him, even complained that common soldiers were shot for offences less than that for which this richly connected officer had been only transported. The secrecy of his trial did not shock public sentiment in France, where at that time all civilians charged with crime were interrogated by a judge in private, and where all accused persons are presumed guilty until proved innocent. In a land subject to invasion there was less disposition to criticize the decision of a military tribunal acting in the defence of the nation even than there would have been in the case of a doubtful judgment passed in a civil court. The country was practically unanimous that Captain Dreyfus had got his deserts. A few, indeed, suggested that had he not been a Jew he would never have been accused; but the greater number replied that an ordinary French traitor of Gentile birth would have been forgotten from the moment of his condemnation. The pertinacity with which some of his co-religionists set to work to show that he had been irregularly condemned seemed to justify the latter proposition. But it was not a Jew who brought about the revival of the affair. Colonel Picquart, an officer of great promise, became head of the intelligence department at the war office, and in 1896 informed the minister of his suspicion that the letter on which Dreyfus had been condemned was written by a certain Major Esterhazy. The military authorities, not wishing to have the case reopened, sent Colonel Picquart on foreign service, and put in his place Colonel Henry. The all-seeing press published various versions of the incident, and the anti-Semitic journals denounced them as proofs of a Jewish conspiracy against the French army.

Dreyfusards and anti-Dreyfusards.

At the end of 1897 M. Scheurer-Kestner, an Alsatian devoted to France and a republican senator, tried to persuade his political friends to reopen the case; but M. Méline, the prime minister, declared in the name of the Republic that the Dreyfus affair no longer existed. The fact that the senator who championed Dreyfus was a Protestant encouraged the clerical press in its already marked tendency to utilize anti-Semitism as a weapon of ecclesiastical warfare. But the religious side-issues of the question would have had little importance had not the army been involved in the controversy, which had become so keen that all the population, outside that large section of it indifferent to all public questions, was divided into "Dreyfusards" and "anti-Dreyfusards." The strong position of the latter was due to their assuming the position of defenders of the army, which, at an epoch when neither the legislature nor the government inspired respect, and the Church was the object of polemic, was the only institution in France to unite the nation by appealing to its martial and patriotic instincts. That is the explanation of the enthusiasm of the public for generals and other officers by whom the trial of Dreyfus and subsequent proceedings had been conducted in a manner repugnant to those who do not favour the arbitrary ways of military dictatorship, which, however, are not unpopular in France. The acquittal of Major Esterhazy by a court-martial, the conviction of Zola by a civil tribunal for a violent criticism of the military authorities, and the imprisonment without trial of Colonel Picquart for his efforts to exonerate Dreyfus, were practically approved by the nation. This was shown by the result of the general elections in May 1898. The clerical reactionaries were almost swept out of the Chamber, but the overwhelming republican majority was practically united in its hostility to the defenders of Dreyfus, whose only outspoken representatives were found in the socialist groups. The moderate Méline ministry was succeeded in June 1898 by the radical Brisson ministry. But while the new prime minister was said to be personally disposed to revise the sentence on Dreyfus, his civilian minister of war, M. Cavaignac, was as hostile to revision as any of his military predecessors—General Mercier, under whom the trial took place, General Zurlinden, and General Billot, a republican soldier devoted to the parliamentary régime.

Political results of Dreyfus agitation.

The radical minister of war in July 1898 laid before the Chamber certain new proofs of the guilt of Dreyfus, in a speech so convincing that the house ordered it to be placarded in all the communes of France. The next month Colonel Henry, the chief of the intelligence department, confessed to having forged those new proofs, and then committed suicide. M. Cavaignac thereupon resigned office, but declared that the crime of Henry did not prove the innocence of Dreyfus. Many, however, who had hitherto accepted the judgment of 1894, reflected that the offence of a guilty man did not need new crime for its proof. It was further remarked that the forgery had been committed by the intimate colleague of the officers of the general staff, who had zealously protected Esterhazy, the suspected author of the document on which Dreyfus had been convicted. An uneasy misgiving became widespread; but partisan spirit was too excited for it to cause a general revulsion of feeling. Some journalists and politicians of the extreme Left had adopted the defence of Dreyfus as an anti-clerical movement in response to the intemperate partisanship of the Catholic press on the other side. Other members of the socialist groups, not content with criticizing the conduct of the military authorities in the Dreyfus affair, opened a general attack on the French army,—an unpopular policy which allowed the anti-Dreyfusards to utilize the old revolutionary device of making the word "patriotism" a party cry. The defamation and rancour with which the press on both sides flooded the land obscured the point at issue. However, the Brisson ministry just before its fall remitted the Dreyfus judgment to the criminal division of the cour de cassation—the supreme court of revision in France. M. Dupuy formed a new cabinet in November 1898, and made M. de Freycinet minister of war, but that adroit office-holder, though a civilian and a Protestant, did not favour the anti-military and anti-clerical defenders of Dreyfus. The refusal of the Senate, the stronghold of the Republic, to re-elect M. Scheurer-Kestner as its vice-president, showed that the opportunist minister of war understood the feeling of parliament, which was soon displayed by an extraordinary proceeding. The divisional judges, to whom the case was remitted, showed signs that their decision would be in favour of a new trial of Dreyfus. The republican legislature, therefore, disregarding the principle of the separation of the powers, which is the basis of constitutional government, took the arbitrary step of interfering with the judicial authority. It actually passed a law withdrawing the partly-heard cause from the criminal chamber of the cour de cassation, and transferring it to the full court of three divisions, in the hope that a majority of judges would thus be found to decide against the revision of the sentence on Dreyfus.

This flagrant confusion of the legislative with the judicial power displayed once more the incompetence of the French rightly to use parliamentary institutions; but it left the nation indifferent. It was during the passage of the bill that the president of the Republic suddenly died. Félix Faure was said to be hostile to the defenders of Dreyfus and disposed to utilize the popular enthusiasm for the army as a means of making the presidential office independent of parliament. The Chambers, therefore, in spite of their anti-Dreyfusard bias, were determined not to relinquish any of their constitutional prerogative. The military and plebiscitary parties were now fomenting the public discontent by noisy demonstrations. The president of the Senate, M. Loubet, as has been mentioned, was known to have no sympathy with this agitation, so he was elected president of the Republic by a large majority at the congress held at Versailles on 18th February 1899. The new president, who was unknown to the public, though he had once been prime minister for nine months, was respected in political circles; but his elevation to the first office of the State made him the object of that defamation which had become the chief characteristic of the partisan press under the Third Republic. He was recklessly accused of having been an accomplice of the Panama frauds, by screening certain guilty politicians when he was prime minister in 1892, and because he was not opposed to the revision of the Dreyfus sentence he was wantonly charged with being bought with Jewish money. Meanwhile the united divisions of the cour de cassation were, in spite of the intimidation of the legislature, reviewing the case with an independence worthy of praise in an ill-paid magistracy which owed its promotion to political influence. Instead of justifying the suggestive interference of parliament it revised the judgment of the court-martial, and ordered Dreyfus to be re-tried by a military tribunal at Rennes. The Dupuy ministry, which had wished to prevent this decision, resigned, and M. Waldeck-Rousseau formed a heterogeneous cabinet in which Socialists, who for the first time took office, had for their colleague as minister of war General de Galliffet, whose chief political fame had been won as the executioner of the Communards after the insurrection of 1871. Dreyfus was brought back from the Devil's Island, and in August 1899 was put upon his trial a second time. His old accusers, led by General Mercier, the minister of war of 1894, redoubled their efforts to prove his guilt, and were permitted by the officers composing the court a wide license according to English ideas of criminal jurisprudence. The published evidence did not, however, seem to connect Dreyfus with the charges brought against him. Nevertheless the court, by a majority of five to two, found him guilty, and with illogical inconsequence added that there were in his treason extenuating circumstances. He was sentenced to ten years' detention, and while it was being discussed whether the term he had already served would count as part of his penalty, the ministry completed the inconsequency of the situation by advising the president of the Republic to pardon the prisoner. The result of the second trial satisfied neither the partisans of the accused, who desired his rehabilitation, some of them reproaching him for accepting a pardon, nor his adversaries, whose vindictiveness was unsated by the penalty he had already suffered. But the great mass of the French people, who are always ready to treat a public question with indifference, were glad to be rid of a controversy which had for years infected the national life.

Second trial of Dreyfus.

Real character of the Dreyfus agitation.

The Dreyfus affair was severely judged by foreign critics as a miscarriage of justice resulting from race-prejudice. If that simple appreciation rightly describes its origin, it became in its development one of those scandals symptomatic of the unhealthy political condition of France, which on a smaller scale had often recurred under the Third Republic, and which were made the pretext by the malcontents of all parties for gratifying their animosities. That in its later stages it was not a question of race-persecution was seen in the curious phenomenon of journals owned or edited by Jews leading the outcry against the Jewish officer and his defenders. That it was not a mere episode of the rivalry between Republicans and Monarchists, or between the advocates of parliamentarism and of military autocracy, was evident from the fact that the most formidable opponents of Dreyfus, without whose hostility that of the clericals and reactionaries would have been ineffective, were republican politicians. That it was not a phase of the anti-capitalist movement was shown by the zealous adherence of the socialist leaders and journalists to the cause of Dreyfus; indeed, one remarkable result of the affair was its diversion of the socialist party and press for several years from their normal campaign against property. The Dreyfus affair was utilized by the reactionaries against the Republic, by the clericals against the non-Catholics, by the anti-clericals against the Church, by the military party against the parliamentarians, and by the revolutionary socialists against the army. It was also conspicuously utilized by rival republican politicians against one another, and the chaos of political groups was further confused by it.

The State trial of 1899.

An epilogue to the Dreyfus affair was the trial for treason before the Senate, at the end of 1899, of a number of persons, mostly obscure followers either of M. Déroulède the poet, who advocated a plebiscitary republic, or of the duc d'Orléans, the pretender of the constitutional monarchy. On the day of President Faure's funeral M. Déroulède had vainly tried to entice General Roget, a zealous adversary of Dreyfus, who was on duty with his troops, to march on the Elysée in order to evict the newly-elected president of the Republic. Other demonstrations against M. Loubet ensued, the most offensive being a concerted assault upon him on the racecourse at Auteuil in June 1899. The subsequent resistance to the police of a band of anti-Semites threatened with arrest, who barricaded themselves in a house in the rue Chabrol, in the centre of Paris, and, with the marked approval of the populace, sustained a siege for several weeks, indicated that the capital was in a condition not far removed from anarchy. M. Déroulède, indicted at the assizes of the Seine for his misdemeanour on the day of President Faure's funeral, had been triumphantly acquitted. It was evident that no jury would convict citizens prosecuted for political offences and the government therefore decided to make use of the article of the Law of 1875, which allowed the Senate to be constituted a high court for the trial of offences endangering the state. A respectable minority of the Senate, including M. Wallon, the venerable "Father of the Constitution" of 1875, vainly protested that the framers of the law intended to invest the upper legislative chamber with judicial power only for the trial of grave crimes of high treason, and not of petty political disorders which a well-organized government ought to be able to repress with the ordinary machinery of police and justice. The outvoted protest was justified by the proceedings before the High Court, which, undignified and disorderly, displayed both the fatuity of the so-called conspirators and the feebleness of the government which had to cope with them. The trial proved that the plebiscitary faction was destitute of its essential factor, a chief to put forward for the headship of the state, and that it was resolved, if it overturned the parliamentary system, not to accept under any conditions the duc d'Orléans, the only pretender before the public. It was shown that royalists and plebiscitary republicans alike had utilized as an organization of disorder the anti-Semitic propaganda which had won favour among the masses as a nationalist movement to protect the French from foreign competition. The evidence adduced before the high court revealed, moreover, the curious fact that certain Jewish royalists had given to the duc d'Orléans large sums of money to found anti-Semitic journals as the surest means of popularizing his cause.

French parties at the close of the 19th century.

The last year of the 19th century, though uneventful for France, was one of political unrest. This, however, did not take the form of ministerial crises, as, for the fourth time since responsible cabinets were introduced in 1873, a whole year, from the 1st of January to the 31st of December, elapsed without a change of ministry. The prime minister, M. Waldeck-Rousseau, though his domestic policy exasperated a large section of the political world, including one half of the Progressive group which he had helped to found, displayed qualities of statesmanship always respected in France, but rarely exhibited under the Third Republic. He had proved himself to be what the French call *un homme de gouvernement*—that is to say, an authoritative administrator of unimpassioned temperament capable of governing with the arbitrary machinery of Napoleonic centralization. His alliance with the extreme Left and the admission into his cabinet of socialist deputies, showed that he understood which wing of the Chamber it was best to conciliate in order to keep the government in his hands for an abnormal term. The advent to office of Socialists disquieted the respectable and prosperous commercial classes, which in France take little part in politics, though they had small sympathy with the nationalists, who were the most violent opponents of the Waldeck-Rousseau ministry. The alarm caused by the handing over of important departments of the state to socialist politicians arose upon a danger which is not always understood beyond the borders of France. Socialism in France is a movement appealing to the revolutionary instincts of the French democracy, advocated in vague terms by the members of rival groups or sects. Thus the increasing number of socialist deputies in parliament had produced no legislative results, and their presence in the cabinet was not feared on that account. The fear which their office-holding inspired was due to the immense administrative patronage which the centralized system confides to each member of the government. French ministers are wont to bestow the places at their disposal on their political friends, so the prospect of administrative posts being filled all over the land by revolutionaries caused some uneasiness. Otherwise the presence of Socialists on the ministerial bench seemed to have no other effect than that of partially muzzling the socialist groups in the Chamber. The opposition to the government was heterogeneous. It included the few Monarchists left in the Chamber, the Nationalists, who resembled the Boulangists of twelve years before, and who had added anti-Semitism to the articles of the revisionist creed, and a number of republicans, chiefly of the old Opportunist group, which had renewed itself under the name of Progressist at the time when M. Waldeck-Rousseau was its most important member in the Senate.

The ablest leaders of this Opposition were all malcontent Republicans; and this fact seemed to show that if ever any form of monarchy were restored in France, political office would probably remain in the hands of men who were former ministers of the Third Republic. Thus the most conspicuous opponents of the cabinet were three ex-prime ministers, MM. Méline, Charles Dupuy and Ribot. Less distinguished republican "ministrables" had their normal appetite for office whetted in 1900 by the international exhibition at Paris. It brought the ministers of the day into unusual prominence, and endowed them with large subsidies voted by parliament for official entertainments. The exhibition was planned on too ambitious a scale to be a financial success. It also called forth the just regrets of those who deplored the tendency of Parisians under the Third Republic to turn their once brilliant city into an international casino. Its most satisfactory feature was the proof it displayed of the industrial inventiveness and the artistic instinct of the French. The political importance of the exhibition lay in the fact that it determined the majority in the Chamber not to permit the foreigners attracted by it to the capital to witness a ministerial crisis. Few strangers of distinction, however, came to it, and not one sovereign of the great powers visited Paris; but the ministry remained in office, and M. Waldeck-Rousseau had uninterrupted opportunity of showing his governmental ability. The only change in his cabinet took place when General de Galliffet resigned the portfolio of war to General André. The army, as represented by its officers, had shown symptoms of hostility to the ministry in consequence of the pardon of Dreyfus. The new minister of war repressed such demonstrations with proceedings of the same arbitrary character as those which had called forth criticism in England when used in the Dreyfus affair. In both cases the high-handed policy was regarded either with approval or with indifference by the great majority of the French nation, which ever since the Revolution has shown that its instincts are in favour of authoritative government. The emphatic support given by the radical groups to the autocratic policy of M. Waldeck-Rousseau and his ministers was not surprising to those who have studied the history of the French democracy. It has always had a taste for despotism since it first became a political power in the days of the Jacobins, to whose early protection General Bonaparte owed his career. On the other hand liberalism has always been repugnant to the masses, and the only period in which the Liberals governed the country was under the régime of limited suffrage—during the Restoration and the Monarchy of July.

The most important event in France during the last year of the century, not from its political result, but from the lessons it taught, was perhaps the Paris municipal election. The quadrennial renewal of all the municipal councils of France took place in May 1900. The municipality of the capital had been for many years in the hands of the extreme Radicals and the revolutionary Socialists. The Parisian electors now sent to the Hôtel de Ville a council in which the majority were Nationalists, in general sympathy with the anti-Semitic and plebiscitary movements. The nationalist councillors did not, however, form one solid party, but were divided into five or six groups, representing every shade of political discontent, from monarchism to revisionist-socialism. While the electorate of Paris thus pronounced for the revision of the Constitution, the provincial elections, as far as they had a political bearing, were favourable to the ministry and to the Republic. M. Waldeck-Rousseau accepted the challenge of the capital, and dealt with its representatives with the arbitrary weapons of centralization which the Republic had inherited from the Napoleonic settlement of the Revolution. Municipal autonomy is unknown in France, and the town council of Paris has to submit to special restrictions on its liberty of action. The prefect of the Seine is always present at its meetings as agent of the government and the minister of

Paris and the provinces.

the interior can veto any of its resolutions. The Socialists, when their party ruled the municipality, clamoured in parliament for the removal of this administrative control. But now being in a minority they supported the government in its anti-autonomic rigours. The majority of the municipal council authorized its president to invite to a banquet, in honour of the international exhibition, the provincial mayors and a number of foreign municipal magnates, including the lord mayor of London. The ministers were not invited, and the prefect of the Seine thereupon informed the president of the municipality that he had no right, without consulting the agent of the government, to offer a banquet to the provincial mayors; and they, with the deference which French officials instinctively show to the central authority, almost all refused the invitation to the Hôtel de Ville. The municipal banquet was therefore abandoned, but the government gave one in the Tuileries gardens, at which no fewer than 22,000 mayors paid their respects to the chief of the state. These events showed that, as in the Terror, as at the *coup d'état* of 1851, and as in the insurrection of the Commune, the French provinces were never disposed to follow the political lead of the capital, whether the opinions prevailing there were Jacobin or reactionary. These incidents displayed the tendency of the French democracy, in Paris and in the country alike, to submit to and even to encourage the arbitrary working of administrative centralization. The elected mayors of the provincial communes, urban and rural, quitted themselves like well-drilled functionaries of the state, respectful of their hierarchical superiors, just as in the days when they were the nominees of the government; while the population of Paris, in spite of its perennial proneness to revolution, accepted the rebuff inflicted on its chosen representatives without any hostile demonstration. The municipal elections in Paris afforded fresh proof of the unchanging political ineptitude of the reactionaries. The dissatisfaction of the great capital with the government of the Republic might, in spite of the reluctance of the provinces to follow the lead of Paris, have had grave results if skilfully organized. But the anti-republican groups, instead of putting forward men of high ability or reputation to take possession of the Hôtel de Ville, chose their candidates among the same inferior class of professional politicians as the Radicals and the Socialists whom they replaced on the municipal council.

France at the opening of the 20th century.

The beginning of a century of the common era is a purely artificial division of time. Yet it has often marked a turning-point in the history of nations. This was notably the case in France in 1800. The violent and anarchical phases of the Revolution of 1789 came to an end with the 18th century; and the dawn of the 19th was coincident with the administrative reconstruction of France by Napoleon, on lines which endured with little modification till the end of that century, surviving seven revolutions of the executive power. The opening years of the 20th century saw no similar changes in the government of the country. The Third Republic, which was about to attain an age double that reached by any other régime since the Revolution, continued to live on the basis of the Constitution enacted in 1875, before it was five years old. Yet it seems not unlikely that historians of the future may take the date 1900 as a landmark between two distinct periods in the evolution of the French nation.

Results of the Dreyfus affair.

With the close of the 19th century the Dreyfus affair came practically to an end. Whatever the political and moral causes of the agitation which attended it, its practical result was to strengthen the Radical and Socialist parties in the Republic, and to reduce to unprecedented impotence the forces of reaction. This was due more to the maladroitness of the Reactionaries than to the virtues or the prescience of the extreme Left, as the imprisonment of the Jewish captain, which agitated and divided the nation, could not have been inflicted without the ardent approval of Republicans of all shades of opinion. But when the majority at last realized that a mistake had been committed, the Reactionaries, in great measure through their own unwise policy, got the chief credit for it. Consequently, as the clericals formed the militant section of the anti-Republican parties, and as the Radical-Socialists were at that time keener in their hostility to the Church than in their zeal for social or economic reform, the issue of the Dreyfus affair brought about an anti-clerical movement, which, though initiated and organized by a small minority, met with nothing to resist it in the country, the reactionary forces being effete and the vast majority of the population indifferent. The main and absorbing feature therefore of political life in France in the first years of the 20th century was a campaign against the Roman Catholic Church, unparalleled in energy since the Revolution. Its most striking result was the rupture of the Concordat between France and the Vatican. This act was additionally important as being the first considerable breach made in the administrative structure reared by Napoleon, which had hitherto survived all the vicissitudes of the 19th century. Concurrently with this the influence of the Socialist party in French policy largely increased. A primary principle professed by the Socialists throughout Europe is pacificism, and its dissemination in France acted in two very different ways. It encouraged in the French people a growth of anti-military spirit, which showed some sign of infecting the national army, and it impelled the government of the Republic to be zealous in cultivating friendly relations with other powers. The result of the latter phase of pacificism was that France, under the Radical-Socialist administrations of the early years of the 20th century, enjoyed a measure of international prestige of that superficial kind which is expressed by the state visits of crowned heads to the chief of the executive power, greater than at any period since the Second Empire.

Church policy.

The voting of the law which separated the Church from the state will probably mark a capital date in French history; so, as the ecclesiastical policy of successive ministries filled almost entirely the interior chronicles of France for the first five years of the new century, it will be convenient to set forth in order the events which during that period led up to the passing of the Separation Act.

The French legislature during the first session of the 20th century was chiefly occupied with the passing of the Associations Law. That measure, though it entirely changed the legal position of all associations in France, was primarily directed against the religious associations of the Roman Catholic Church. Their influence in the land, according to the anti-clericals, had been proved by the Dreyfus affair to be excessive. The Jesuits were alleged, on their own showing, to exercise considerable power over the officers of the army, and in this way to have been largely responsible for the blunders of the Dreyfus case. Another less celebrated order, which took an active part against Dreyfus, the Assumptionists, had achieved notoriety by its journalistic enterprise, its cheap newspapers of wide circulation being remarkable for the violence of their attacks on the institutions and men of the Republic. The mutual antagonism between the French government and religious congregations is a tradition which dates from the ancient monarchy and was continued by Napoleon I. long before the Third Republic adopted it in the legislation associated with the names of Jules Ferry and Paul Bert. The prime minister, under whose administration the 20th century succeeded the 19th, was M. Waldeck-Rousseau, who had been the colleague of Paul Bert in Gambetta's *grand ministère*, and in 1883 had served under Jules Ferry in his second ministry. He had retired from political life, though he remained a member of the Senate, and was making a large fortune at the bar, when in June 1899, at pecuniary sacrifice, he consented to form a ministry for the purpose of "liquidating" the Dreyfus affair. In 1900, the year after the second condemnation of Dreyfus and his immediate pardon by the government, M. Waldeck-Rousseau in a speech at Toulouse announced that legislation was about to be undertaken on the subject of associations.

At that period the hostility of the Revolution to the principle of associations of all kinds, civil as well as religious, was still enforced by the law. With the exception of certain commercial societies subject to special legislation, no association composed of more than twenty persons could be formed without governmental authorization which was always revocable, the restriction applying equally to political and social clubs and to religious communities. The law was the same for all, but was differently applied. Authorization was rarely refused to political or social societies, though any club was liable to have its authorization withdrawn and to be shut up or dissolved. But to religious orders new authorization was practically never granted. Only four of them, the orders of Saint Lazare, of the Saint Esprit, of the Missions Étrangères and of Saint Sulpice, were authorized under the Third Republic—their authorization dating from the First Empire and the Restoration. The Frères de la Doctrine Chrétienne were also recognized, not, however, as a religious congregation under the jurisdiction of the minister of public worship, but as a teaching body under that of the minister of education. All the great historical orders, preaching, teaching or comtemplative, were "unauthorized"; they led a precarious life on sufferance, having as corporations no civil existence, and being subject to dissolution at a moment's notice by the administrative authority. In spite of this disability and of the decrees of 1880 directed against unauthorized monastic orders they had so increased under the anti-clerical Republic, that the religious of both sexes were more numerous in France at the beginning of the 20th century than at the end of the ancient monarchy. Moreover, in the twenty years during which unauthorized Orders had been supposed to be suppressed under the Ferry Decrees, their numbers had become six times more numerous than before, while it was the authorized Congregations which had diminished. The bare catalogue of the religious houses in the land, with the value of their properties (estimated by M. Waldeck-Rousseau at a milliard—£40,000,000) filled two White Books of two thousand pages, presented to parliament on the 4th of December 1900. The hostility to the Congregations was not confined to the anti-clericals. The secular clergy were suffering materially from the enterprising competition of their old rivals the regulars. Had the legislation for defining the legal situation of the religious orders been undertaken with the sole intention of limiting their excessive growth, such a measure would have been welcome to the parochial clergy. But they saw that the attack upon the congregations was only preliminary to a general attack upon the Church, in spite of the sincere assurances of the prime minister, a statesman of conservative temperament, that no harm would accrue to the secular clergy from the passing of the Associations Law.

Associations Bill.

In January 1901, on the eve of the first debate in the Chamber of Deputies on the Associations bill, a discussion took place which showed that the rupture of the Concordat might be nearing the range of practical politics, though parliament was as yet unwilling to take it into consideration. The archbishop of Paris, Cardinal Richard, had published a letter addressed to him by Leo XIII. deploring the projected legislation as being a breach of the Concordat under which the free exercise of the Catholic religion in France was assured. The Socialists argued that this letter was an intolerable intervention on the part of the Vatican in the domestic politics of the Republic, and proposed that parliament should after voting the Associations Law proceed to separate Church and State. M. Waldeck-Rousseau, the prime minister, calm and moderate, declined to take this view of the pope's letter, and the resolution was defeated by a majority of more than two to one. But another motion, proposed by a Nationalist, that the Chamber should declare its resolve to maintain the Concordat, was rejected by a small majority. The discussion of the Associations bill was then commenced by the Chamber and went on until the Easter recess. Its main features when finally voted were that the right to associate for purposes not illicit should be henceforth free of all restrictions, though "juridical capacity" would be accorded only to such associations as were formally notified to the administrative authority. The law did not, however, accord liberty of association to religious "Congregations," none of which could be formed without a special statute, and any constituted without such authorization would be deemed illicit. The policy of the measure, as applying to religious orders, was attacked by the extreme Right and the extreme Left from their several standpoints. The clericals proposed that under the new law all associations, religious as well as civil, should be free. The Socialists proposed that all religious communities, authorized or unauthorized, should be suppressed. The prime minister took a middle course. But he went farther than the moderate Republicans, with whom he was generally classed. While he protected the authorized religious orders against the attacks of the extreme anti-clericals, he accepted from the latter a new clause which disqualified any member of an unauthorized order from teaching in any school. This was a blow at the principle of liberty of instruction, which had always been supported by Liberals of the old school, who had no sympathy with the pretensions of clericalism. Consequently this provision, though voted by a large majority, was opposed by the Liberals of the Republican party, notably by M. Ribot, who had been twice prime minister, and M. Aynard, almost the sole survivor of the Left Centre. It was remarked that in these, as in all subsequent debates on ecclesiastical questions, the ablest defenders of the Church were not found among the clericals, but among the Liberals, whose primary doctrine was that of tolerance, which they believed ought to be applied to the exercise of the religion nominally professed by a large majority of the nation. Few of the ardent professors of that religion gave effective aid to the Church during that period of crisis. M. de Mun still used his eloquence in its defence, but the brilliant Catholic orator had entered his sixtieth year with health impaired, and among the young reactionary members there was not one who displayed any talent. At the other end of the Chamber M. Viviani, a Socialist member for Paris, made an eloquent speech. As was anticipated the bill received no serious opposition in the Senate. Though not in sympathy with the attacks of the Socialists in the Chamber on property, the Upper House had as a whole no objection to their attacks on the Church, and had become a more persistently anti-clerical body than the Chamber of Deputies. The bill was therefore passed without any serious amendments, even those which were moved for the purpose of affirming the principle of liberty of education being supported by very few Republican senators. In the debates some of the utterances of the prime minister were important. On the proposal of M. Rambaud, a professor who was minister of education in the Méline cabinet of 1896, that religious associations should be authorized by decree and not by law, M. Waldeck-Rousseau said that inasmuch as vows of poverty and celibacy were illegal, nothing but a law would suffice to give legality to any association in which such vows were imposed on the members. It was thus laid down by the responsible author of the law that the third clause, providing that any association founded for an illicit cause was null, applied to religious communities. On the other hand the prime minister in another speech repudiated the suggestion that the proposed law was aimed against any form of religion. He argued that the religious orders, far from being essential to the existence of the Church, were a hindrance to the work of the parochial clergy, and that inasmuch as the religious orders were organizations independent of the State they were by their nature and influence a danger to the State. Consequently their regulation had become necessary in the interests both of Church and State. The general suppression of religious congregations, the prime minister said, was not contemplated; the case of each one would be decided on its merits, and he had no doubt that parliament would favourably consider the authorization of those whose aim was to alleviate misery at home or to extend French influence abroad. The tenor of M. Waldeck-Rousseau's speech was eminently Concordatory. One of his chief arguments against the religious orders was that they were not mentioned in the Concordat, and that their unregulated existence prejudiced the interests of the Concordatory clergy. The speech was therefore an official declaration in favour of the maintenance of the relations between Church and State. That being so, it is important to notice that by a majority of nearly two to one the Senate voted the placarding of the prime minister's speech in all the communes of France, and that the mover of the resolution was M. Combes, senator of the Charente-Inférieure, a politician of advanced views who up to that date had held office only once, when he was minister of education and public worship for about six months, in the Bourgeois administration in 1895–1896.

Socialism.

The "Law relating to the contract of Association" was promulgated on the 2nd of July 1901, and its enactment was the only political event of high importance that year. The Socialists, except in their anti-clerical capacity, were more active outside parliament than within. Early in the year some formidable strikes took place. At Montceau-les-Mines in Burgundy, where labour demonstrations had often been violent, a new feature of a strike was the formation of a trade-union by the non-strikers, who called their organization "the yellow trade-union" (*le syndicat jaune*) in opposition to the red trade-union of the strikers, who adopted the revolutionary flag and were supported by the Socialist press. At the same time the dock-labourers at Marseilles went out on strike, by the orders of an international trade-union in that port, as a protest against the dismissal of a certain number of foreigners. The number of strikes in France had increased considerably under the Waldeck-Rousseau government. Its opponents attributed this to the presence in the cabinet of M. Millerand, who had been ranked as a Socialist. On the other hand, the revolutionary Socialists excommunicated the minister of commerce for having joined a "bourgeois government" and retired from the general congress of the Socialist party at Lyons, where MM. Briand and Viviani, themselves future ministers, persuaded the majority not to go so far. The federal committee of miners projected a general strike in all the French coal-fields, and to that end organized a referendum. But of 125,000 miners inscribed on their lists nearly 70,000 abstained from voting, and although the general strike was voted in October by a majority of 34,000, it was not put into effect. Another movement favoured by the Socialists was that of anti-militarism. M. Hervé, a professor at the lycée of Sens, had written, in a local journal, the *Pioupiou de l'Yonne*, on the occasion of the departure of the conscripts for their regiments, some articles outraging the French flag. He was prosecuted and acquitted at the assizes at Auxerre in November, a number of his colleagues in the teaching profession coming forward to testify that they shared his views. The local educational authority, the academic council of Dijon, however, dismissed M. Hervé from his official functions, and its sentence was confirmed by the superior council of public education to which he had appealed. Thereupon the Socialists in the Chamber, under the lead of M. Viviani, violently attacked the Government shortly before the prorogation at the end of the year. M. Leygues, the minister of education, defended the policy of his department with equal vigour, declaring that if a professor in the "university" claimed the right of publishing unpatriotic and anti-military opinions he could exercise it only on the condition of giving up his employment under government—a thesis which was supported by the entire Chamber with the exception of the Socialists. This manifestation of anti-military spirit, though not widespread, was the more striking as it followed close upon a second visit of the emperor and empress of Russia to France, which took place in September 1901 and was of a military rather than of a popular character. The Russian sovereigns did not come to Paris. After a naval display at Dunkirk, where they landed, they were the guests of President Loubet at Compiègne, and concluded their visit by attending a review near Reims of the troops which had taken part in the Eastern manœuvres. Compared with the welcome given by the French population to the emperor and empress in 1896 their reception on this occasion was not enthusiastic. By not visiting Paris they seemed to wish to avoid contact with the people, who were persuaded by a section of the press that the motive of the imperial journey to France was financial. The Socialists openly repudiated the Russian alliance, and one of them, the mayor of Lille, who refused to decorate his municipal buildings when the sovereigns visited the department of the Nord, was neither revoked nor suspended, although he publicly based his refusal on grounds insulting to the tsar.

It may be mentioned that the census returns of 1901 showed that the total increase of the population of France since the previous census in 1896 amounted only to 412,364, of which 289,662 was accounted for by the capital, while on the other hand the population of sixty out of eighty-seven departments had diminished.

As the quadrennial election of the Chamber of Deputies was due to take place in the spring of 1902, the first months of that year were chiefly occupied by politicians in preparing for it, though none of them gave any sign of being aware that the legislation to be effected by the new Chamber would be the most important which any parliament had undertaken under the constitution of 1875. At the end of the recess the prime minister in a speech at Saint Etienne, the capital of the Loire, of which department he was senator, passed in review the work of his ministry. With regard to the future, on the eve of the election which was to return the Chamber destined to disestablish the Church, he assured the secular clergy that they must not consider the legislation of the last session as menacing them: far from that, the recent law, directed primarily against those monastic orders which were anti-Republican associations, owning political journals and organizing electioneering funds (whose members he described as "moines ligueurs et moines d'affaires"), would be a guarantee of the Republic's protection of the parochial clergy. The presence of his colleague, M. Millerand, on this occasion showed that M. Waldeck-Rousseau did not intend to separate himself from the Radical-Socialist group which had supported his government; and the next day the Socialist minister of commerce, at Firminy, a mining centre in the same department, made a speech deprecating the pursuit of unpractical social ideals, which might have been a version of Gambetta's famous discourse on opportunism edited by an economist of the school of Léon Say. The Waldeck-Rousseau programme for the elections seemed therefore to be an implied promise of a moderate opportunist policy which would strengthen and unite the Republic by conciliating all sections of its supporters. When parliament met, M. Delcassé, minister for foreign affairs, on a proposal to suppress the Embassy to the Vatican, declared that even if the Concordat were ever revoked it would still be necessary for France to maintain diplomatic relations with the Holy See. On the other hand, the ministry voted, against the moderate Republicans, for an abstract resolution, proposed by M. Brisson, in favour of the abrogation of the Loi Falloux of 1850, which law, by abolishing the monopoly of the "university," had established the principle of liberty of education. Another abstract resolution, supported by the government, which subsequently become law, was voted in favour of the reduction of the terms of compulsory military service from three years to two.

Resignation of Waldeck-Rousseau.

The general elections took place on the 27th of April 1902, with the second ballots on the 11th of May, and were favourable to the ministry, 321 of its avowed supporters being returned and 268 members of the Opposition, including 140 "Progressist" Republicans, many of whom were deputies whose opinions differed little from those of M. Waldeck-Rousseau. In Paris the government lost a few seats which were won by the Nationalist group of reactionaries. The chief surprise of the elections was the announcement made by M. Waldeck-Rousseau on the 20th of May, while the president of the Republic was in Russia on a visit to the tsar, of his intention to resign office. No one but the prime minister's intimates knew that his shattered health was the true cause of his resignation, which was attributed to the unwillingness of an essentially moderate man to be the leader of an advanced party and the instrument of an immoderate policy. His retirement from public life at this crisis was the most important event of its kind since the death of his old master Gambetta. He had learned opportunist statesmanship in the short-lived *grand ministère* and in the long-lived Ferry administration of 1883–

1885, after which he had become an inactive politician in the Senate, while making a large fortune at the bar. In spite of having eschewed politics he had been ranked in the public mind with Gambetta and Jules Ferry as one of the small number of politicians of the Republic who had risen high above mediocrity. While he had none of the magnetic exuberance which furthered the popularity of Gambetta, his cold inexpansiveness had not made him unpopular as was his other chief, Jules Ferry. Indeed, his unemotional coldness was one of the elements of the power with which he dominated parliament; and being regarded by the nation as the strong man whom France is always looking for, he was the first prime minister of the Republic whose name was made a rallying cry at a general election. Yet the country gave him a majority only for it to be handed over to other politicians to use in a manner which he had not contemplated. On the 3rd of June 1902 he formally resigned office, his ministry having lasted for three years, all but a few days, a longer duration than that of any other under the Third Republic.

M. Combes prime minister.

M. Loubet called upon M. Léon Bourgeois, who had already been prime minister under M. Félix Faure, to form a ministry, but he had been nominated president of the new Chamber. The president of the Republic then offered the post to M. Brisson, who had been twice prime minister in 1885 and 1898, but he also refused. A third member of the Radical party was then sent for, M. Emile Combes, and he accepted. The senator of the Charente Inférieure, in his one short term of office in the Bourgeois ministry, had made no mark. But he had attained a minor prominence in the debates of the Senate by his ardent anti-clericalism. He had been educated as a seminarist and had taken minor orders, without proceeding to the priesthood, and had subsequently practised as a country doctor before entering parliament. M. Combes retained two of the most important members of the Waldeck-Rousseau cabinet, M. Delcassé, who had been at the foreign office for four years, and General André, who had become war minister in 1900 on the resignation of General de Galliffet. General André was an ardent Dreyfusard, strongly opposed to clerical and reactionary influences in the army. Among the new ministers was M. Rouvier, a colleague of Gambetta in the *grand ministère* and prime minister in 1887, whose participation in the Panama affair had caused his retirement from official life. Being a moderate opportunist and reputed the ablest financier among French politicians, his return to the ministry of finance reassured those who feared the fiscal experiments of an administration supported by the Socialists. The nomination as minister of marine of M. Camille Pelletan (the son of Eugène Pelletan, a notable adversary of the Second Empire), who had been a Radical-Socialist deputy since 1881, though new to office, was less reassuring. M. Combes reserved for himself the departments of the interior and public worship, meaning that the centralized administration of France should be in his own hands while he was keeping watch over the Church. But in spite of the prime minister's extreme anti-clericalism there was no hint made in his ministerial declaration, on the 10th of June 1902, on taking office that there would be any question of the new Chamber dealing with the Concordat or with the relations of Church and state. M. Combes, however, warned the secular clergy not to make common cause with the religious orders, against which he soon began vigorous action. Before the end of June he directed the Préfets of the departments to bring political pressure to bear on all branches of the public service, and he obtained a presidential decree closing a hundred and twenty-five schools, which had been recently opened in buildings belonging to private individuals, on the ground that they were conducted by members of religious associations and that this brought the schools under the law of 1901. Such action seemed to be opposed to M. Waldeck-Rousseau's interpretation of the law; but the Chamber having supported M. Combes he ordered in July the closing of 2500 schools, conducted by members of religious orders, for which authorization had not been requested. This again seemed contrary to the assurances of M. Waldeck-Rousseau, and it called forth vain protests in the name of liberty from Radicals of the old school, such as M. Goblet, prime minister in 1886, and from Liberal Protestants, such as M. Gabriel Monod. The execution of the decrees closing the schools of the religious orders caused some violent agitation in the provinces during the parliamentary recess. But the majority of the departmental councils, at their meetings in August, passed resolutions in favour of the governmental policy, and a movement led by certain Nationalists, including M. Drumont, editor of the anti-semitic *Libre Parole*, and M. François Coppée, the Academician, to found a league having similar aims to those of the "passive resisters" in our country, was a complete failure. On the reassembling of parliament, both houses passed votes of confidence in the ministry and also an act supplementary to the Associations Law penalizing the opening of schools by members of religious orders.

Humbert affair.

In spite of the ardour of parliamentary discussions the French public was less moved in 1902 by the anti-clerical action of the government than by a vulgar case of swindling known as the "Humbert affair." The wife of a former deputy for Seine-et-Marne, who was the son of M. Gustave Humbert, minister of justice in 1882, had for many years maintained a luxurious establishment, which included a political salon, on the strength of her assertion that she and her family had inherited several millions sterling from one Crawford, an Englishman. Her story being believed by certain bankers she had been enabled to borrow colossal sums on the legend, and had almost married her daughter as a great heiress to a Moderate Republican deputy who held a conspicuous position in the Chamber. The flight of the Humberts, the exposure of the fraud and their arrest in Spain excited the French nation more deeply than the relative qualities of M. Waldeck-Rousseau and M. Combes or the woes of the religious orders. A by-election to the Senate in the spring of 1902 merits notice as it brought back to parliament M. Clémenceau, who had lived in comparative retirement since 1893 when he lost his seat as deputy for Draguignan, owing to a series of unusually bitter attacks made against him by his political enemies. He had devoted his years of retirement to journalism, taking a leading part in the Dreyfus affair on the side of the accused. His election as senator for the Var, where he had formerly been deputy, was an event of importance unanticipated at the time.

Anti-clerical movement.

The year 1903 saw in progress a momentous development of the anti-clerical movement in France, though little trace of this is found in the statute-book. The chief act of parliament of that year was one which interested the population much more than any law affecting the Church. This was an act regulating the privileges of the *bouilleurs de cru*, the peasant proprietors who, permitted to distil from their produce an annual quantity of alcohol supposed to be sufficient for their domestic needs, in practice fabricated and sold so large an amount as to prejudice gravely the inland revenue. As there were a million of these illicit distillers in the land they formed a powerful element in the electorate. The crowded and excited debates affecting their interests, in which Radicals and Royalists of the rural districts made common cause against Socialists and Clericals of the towns, were in striking contrast with the less animated discussions concerning the Church. The prime minister, an anti-clerical zealot, bitterly hostile to the Church of which he had been a minister, took advantage of the relative indifference of parliament and of the nation in matters ecclesiastical. The success of M. Combes in his campaign against the Church was an example of what energy and pertinacity can do. There was no great wave of popular feeling on the question, no mandate given to the deputies at the general election or asked for by them. Neither was M. Combes a popular leader or a man of genius. He was rather a trained politician, with a fixed idea, who knew how to utilize to his ends the ability and organization of the extreme anti-clerical element in the Chamber, and the weakness of the extreme clerical party. The majority of the Chamber did not share the prime minister's animosity towards the Church, for which at the same time it had not the least enthusiasm, and under the concordatory lead of M. Waldeck-Rousseau it would have been content to curb clerical pretensions without having recourse to extreme measures of repression. It was, however, equally content to follow the less tolerant guidance of M. Combes. Thus, early in the session of 1903 it approved of his circular forbidding the priests of Brittany to make use of the Breton language in their religious instruction under pain of losing their salaries. It likewise followed him on the 26th of January when he declined to accept, as being premature and unpractical, a Socialist resolution in favour of suppressing the budget of public worship, though the majority was indeed differently composed on those two occasions. In the Senate on the 29th of January M. Waldeck-Rousseau indicated what his policy would have been had he retained office, by severely criticizing his successor's method of applying the Associations Law. Instead of asking parliament to judge on its merits each several demand for authorization made by a congregation, the government had divided the religious orders into two chief categories, teaching orders and preaching orders, and had recommended that all should be suppressed by a general refusal of authorization. The Grande Chartreuse was put into a category by itself as a trading association and was dissolved; but Lourdes, which with its crowds of pilgrims enriched the Pyrenean region and the railway companies serving it, was spared for electioneering reasons. A dispute arose between the government and the Vatican on the nomination of bishops to vacant sees. The Vatican insisted on the words "*nobis nominavit*" in the papal bulls instituting the bishops nominated by the chief of the executive in France under the Concordat. M. Combes objected to the pronoun, and maintained that the complete nomination belonged to the French government, the Holy See having no choice in the matter, but only the power of canonical institution. This produced a deadlock, with the consequence that no more bishops were ever again appointed under the Concordat, which both before and after the Easter recess M. Combes now threatened to repudiate. These menaces derived an increased importance from the failing health of the pope. Leo XIII. had attained the great age of ninety-three, and on the choice of his successor grave issues depended. He died on the 20th of July 1903. The conclave indicated as his successor his secretary of state, Cardinal Rampolla, an able exponent of the late pope's diplomatic methods and also a warm friend of France. It was said to be the latter quality which induced Austria to exercise its ancient power of veto on the choice of a conclave, and finally Cardinal Sarto, patriarch of Venice, a pious prelate inexperienced in diplomacy, was elected and took the title of Pius X. In September the inauguration of a statue of Renan at Tréguier, his birthplace, was made the occasion of an anti-clerical demonstration in Catholic and reactionary Brittany, at which the prime minister made a militant speech in the name of the freethinkers of France, though Renan was a Voltairian aristocrat who disliked the aims and methods of modern Radical-Socialists. In the course of his speech M. Combes pointed out that the anti-clerical policy of the government had not caused the Republic to lose prestige in the eyes of the monarchies of Europe, which were then showing it unprecedented attentions. This assertion was true, and had reference to the visit of the king of England to the president of the Republic in May and the projected visit of the king of Italy. That of Edward VII., which was the first state visit of a British sovereign to France for nearly fifty years, was returned by President Loubet in July, and was welcomed by all parties, excepting some of the reactionaries. M. Millevoye, a Nationalist deputy for Paris, in the *Patrie* counselled the Parisians to remember Fashoda, the Transvaal War, and the attitude of the English in the Dreyfus affair, and to greet the British monarch with cries of "*Vivent les Boers.*" M. Déroulède, the most interesting member of the Nationalist party, wrote from his exile at Saint-Sébastien protesting against the folly of this proceeding, which merits to be put on record as an example of the incorrigible ineptitude of the reactionaries in France. The incident served only to prove their complete lack of influence on popular feeling, while it damaged the cause of the Church at a most critical moment by showing that the only persons in France willing to insult a friendly monarch who was the guest of the nation, belonged to the clerical party. Of the royal visits that of the king of Italy was the more important in its immediate effects on the history of France, as will be seen in the narration of the events of 1904.

The session of 1904 began with the election of a new president of the Chamber, on the retirement of M. Bourgeois. The choice fell on M. Henri Brisson, an old Radical, but not a Socialist, who had held that post in 1881 and had subsequently filled it on ten occasions, the election to the office being annual. The narrow majority he obtained over M. Paul Bertrand, a little-known moderate Republican, by secret ballot, followed by the defeat of M. Jaurès, the Socialist leader, for one of the vice-presidential chairs, showed that one half of the Chamber was of moderate tendency. But, as events proved, the Moderates lacked energy and leadership, so the influence of the Radical prime minister prevailed. In a debate on the 22nd of January on the expulsion of an Alsatian priest of French birth from a French frontier department by the French police, M. Ribot, who set an example of activity to younger men of the moderate groups, reproached M. Combes with reducing all questions in which the French nation was interested to the single one of anti-clericalism, and the prime minister retorted that it was solely for that purpose that he took office. In pursuance of this policy a bill was introduced, and was passed by the Chamber before Easter, interdicting from teaching all members of religious orders, authorized or not authorized. Among other results this law, which the Senate passed in the summer, swept out of existence the schools of the Frères de la Doctrine Chrétienne (Christian Brothers) and closed in all 2400 schools before the end of the year.

This drastic act of anti-clerical policy, which was a total repudiation by parliament of the principle of liberty of education, should have warned the authorities of the Church of the relentless attitude of the government. The most superficial observation ought to have shown them that the indifference of the nation would permit the prime minister to go to any length, and common prudence should have prevented them from affording him any pretext for more damaging measures. The President of the Republic accepted an invitation to return the visit of the king of Italy. When it was submitted to the Chamber on March 25th, 1904, a reactionary deputy moved the rejection of the vote for the expenses of the journey on the ground that the chief of the French executive ought not to visit the representative of the dynasty which had plundered the papacy. The amendment was rejected by a majority of 502 votes to 12, which showed that at a time of bitter controversy on ecclesiastical questions French opinion was unanimous in approving the visit of the president of the Republic to Rome as the guest of the king of Italy. Nothing could be more gratifying to the entire French nation, both on racial and on traditional grounds, than such a testimony of a complete revival of friendship with Italy, of late years obscured by the Triple Alliance. Yet the Holy See saw fit to advance pretensions inevitably certain to serve the ends of the extreme anti-clericals, whose most intolerant acts at that moment, such as the removal of the crucifixes from the law-courts, were followed by new electoral successes. Thus the reactionary majority on the Paris municipal council was displaced by the Radical-Socialists on the 1st of May, the day that M. Loubet returned from his visit to Rome. On the 16th of May M. Jaurès' Socialist organ, *L'Humanité*, published the text of a protest, addressed by the pope to the powers having diplomatic relations with the Vatican, against the visit of the president of the Republic to the King of Italy. This document, dated the 28th of April, was offensive in tone both to France and to Italy. It intimated that while Catholic sovereigns refrained from visiting the person who, contrary to right, exercised civil sovereignty in Rome, that "duty" was even more "imperious" for the ruler of France by reason of the "privileges" enjoyed by that country from the Concordat; that the journey of M. Loubet to "pay homage" within the pontifical see to that person was an insult to the sovereign pontiff; and that only for reasons of special gravity was the nuncio permitted to remain in Paris. The publication of this document caused some joy among the extreme clericals, but this was nothing to the exultation of the extreme anti-clericals, who saw that the prudent diplomacy of Leo XIII., which had risen superior to many a provocation of the French government, was succeeded by a papal policy which would facilitate their designs in a manner unhoped for. Moderate men were dismayed, seeing that the Concordat was now in instant danger; but the majority of the French nation remained entirely indifferent to its fate. Within a week France took the initiative by recalling the ambassador to the Vatican, M. Nisard, leaving a third-secretary in charge. In the debate in the Chamber upon the incident, the foreign minister, M. Delcassé, said that the ambassador was recalled, not because the Vatican had protested against the visit of the president to the king of Italy, but because it had communicated this protest, in terms offensive to France, to foreign powers. The Chamber on the 27th of May approved the recall of the ambassador by the large majority of 420 to 90. By a much smaller majority it rejected a Socialist motion that the Nuncio should be given his passports. The action of the Holy See was not actually an infringement of the Concordat; so the government, satisfied with the effect produced on public opinion, which was now quite prepared for a rupture with the Vatican, was willing to wait for a new pretext, which was not long in coming. Two bishops, Mgr. Geay of Laval and Mgr. Le Nordez of Dijon, were on bad terms with the clerical reactionaries in their dioceses. The friends of the prelates, including some of their episcopal brethren, thought that their chief offence was their loyalty to the Republic, and it was an unfortunate coincidence that these bishops, subjected to proceedings which had been unknown under the long pontificate of Leo XIII., should have been two who had incurred the animosity of anti-republicans. Their enemies accused Mgr. Geay of immorality and Mgr. Le Nordez of being in league with the freemasons. The bishop of Laval was summoned by the Holy Office, without any communication with the French government, to resign his see, and he submitted the citation forthwith to the minister of public worship. The French chargé d'affaires at the Vatican was instructed to protest against this grave infringement of an article of the Concordat, and, soon after, against another violation of the Concordat committed by the Nuncio, who had written to the bishop of Dijon ordering him to suspend his ordinations, the Nuncio being limited, like all other ambassadors, to communicating the instructions of his government through the intermediary of the minister for foreign affairs. The Vatican declined to give any satisfaction to the French government and summoned the two bishops to Rome under pain of suspension. So the French chargé d'affaires was directed to leave Rome, after having informed the Holy See that the government of the Republic considered that the mission of the apostolic Nuncio in Paris was terminated. Thus came to an end on the 30th of July 1904 the diplomatic relations which under the Concordat had subsisted between France and the Vatican for more than a hundred years.

Diplomatic crisis with Rome.

Twelve days later M. Waldeck-Rousseau died, having lived just long enough to see this unanticipated result of his policy. It was said that his resolve to regulate the religious associations arose from his feeling that whatever injustice had been committed in the Dreyfus case had been aggravated by the action of certain unauthorized orders. However that may be, his own utterances showed that he believed that his policy was one of finality. But he had not reckoned that his legislation, which needed hands as calm and impartial as his own to apply it, would be used in a manner he had not contemplated by sectarian politicians who would be further aided by the self-destructive policy of the highest authorities of the Church. When parliament assembled for the autumn session a general feeling was expressed, by moderate politicians as well as by supporters of the Combes ministry, that disestablishment was inevitable. The prime minister said that he had been long in favour of it, though the previous year he had intimated to M. Nisard, ambassador to the Vatican, that he had not a majority in parliament to vote it. But the papacy and the clergy had since done everything to change that situation. The Chamber did not move in the matter beyond appointing a committee to consider the general question, to which M. Combes submitted in his own name a bill for the separation of the churches from the State.

During the last three months of 1904 public opinion was diverted to the cognate question of the existence of masonic delation in the army. M. Guyot de Villeneuve, Nationalist deputy for Saint Denis, who had been dismissed from the army by General de Galliffet in connexion with the Dreyfus affair, brought before the Chamber a collection of documents which, it seemed, had been abstracted from the Grand Orient of France, the headquarters of French freemasonry, by an official of that order. These papers showed that an elaborate system of espionage and delation had been organized by the freemasons throughout France for the purpose of obtaining information as to the political opinions and religious practices of the officers of the army, and that this system was worked with the connivance of certain officials of the ministry of war. Its aim appeared to be to ascertain if officers went to mass or sent their children to convent schools or in any way were in sympathy with the Roman Catholic religion, the names of officers so secretly denounced being placed on a black-list at the War Office, whereby they were disqualified for promotion. There was no doubt about the authenticity of the documents or of the facts which they revealed. Radical ex-ministers joined with moderate Republicans and reactionaries in denouncing the system. Anti-clerical deputies declared that it was no use to cleanse the war office of the influence of the Jesuits, which was alleged to have prevailed there, if it were to be replaced by another occult power, more demoralizing because more widespread. Only the Socialists and a few of the Radical-Socialists in the Chamber supported the action of the freemasons. General André, minister of war, was so clearly implicated, with the evident approval of the prime minister, that a revulsion of feeling against the policy of the anti-clerical cabinet began to operate in the Chamber. Had the opposition been wisely guided there can be little doubt that a moderate ministry would have been called to office and the history of the Church in France might have been changed. But the reactionaries, with their accustomed folly, played into the hands of their adversaries. The minister of war had made a speech which produced a bad impression. As he stepped down from the tribune he was struck in the face by a Nationalist deputy for Paris, a much younger man than he. The cowardly assault did not save the minister, who was too deeply compromised in the delation scandal. But it saved the anti-clerical party, by rallying a number of waverers who, until this exhibition of reactionary policy, were prepared to go over to the Moderates, from the "bloc," as the ministerial majority was called. The Nationalist deputy was committed to the assizes on the technical charge of assaulting a functionary while performing his official duties. Towards the end of the year, on the eve of his trial, he met with a violent death, and the circumstances which led to it, when made public, showed that this champion of the Church was a man of low morality. General André had previously resigned and was succeeded as minister of war by M. Berteaux, a wealthy stock-broker and a Socialist.

War Office difficulties.

The Combes cabinet could not survive the delation scandal, in spite of the resignation of the minister of war and the ineptitude of the opposition. On the 8th of January 1905, two days before parliament met, an election took place in Paris to fill the vacancy caused by the death of the Nationalist deputy who had assaulted General André. The circumstances of his death, at that time partially revealed, did not deter the electors from choosing by a large majority a representative of the same party, Admiral Bienaimé, who the previous year had been removed for political reasons from the post of maritime prefect at Toulon, by M. Camille Pelletan, minister of marine. A more serious check to the Combes ministry was given by the refusal of the Chamber to re-elect as president M. Brisson, who was defeated by a majority of twenty-

Fall of the Combes ministry.

five by M. Doumer, ex-Governor-General of Indo-China, who, though he had entered politics as a Radical, was now supported by the anti-republican reactionaries as well as by the moderate Republicans. A violent debate arose on the question of expelling from the Legion of Honour certain members of that order, including a general officer, who had been involved in the delation scandal. M. Jaurès, the eloquent Socialist deputy for Albi, who played the part of *Éminence grise* to M. Combes in his anti-clerical campaign, observed that the party which was now demanding the purification of the order had been in no hurry to expel from it Esterhazy long after his crimes had been proved in connexion with the Dreyfus case. The debate was inconclusive, and the government on the 14th of January obtained a vote of confidence by a majority of six. But M. Combes, whose animosity towards the church was keener than his love of office, saw that his ministry would be constantly liable to be put in a minority, and that thus the consideration of separation might be postponed until after the general elections of 1906. So he announced his resignation in an unprecedented manifesto addressed to the president of the Republic on the 18th January.

Second Rouvier ministry.

M. Rouvier, minister of finance in the outgoing government, was called upon for the second time in his career to form a ministry. A moderate opportunist himself, he intended to form a coalition cabinet in which all groups of Republicans, from the Centre to the extreme Left, would be represented. But he failed, and the ministry of the 24th of January 1905 contained no members of the Republican opposition which had combated M. Combes. The prime minister retained the portfolio of finance; M. Delcassé remained at the foreign office, which he had directed since 1898, and M. Berteaux at the war office; M. Etienne, member for Oran, went to the ministry of the interior; another Algerian deputy, M. Thomson, succeeded M. Camille Pelletan at the ministry of marine, which department was said to have fallen into inefficiency; public worship was separated from the department of the interior and joined with that of education under M. Bienvenu-Martin, Radical-Socialist deputy for Auxerre, who was new to official life. Although M. Rouvier, as befitted a politician of the school of Waldeck-Rousseau, disliked the separation of the churches from the state, he accepted that policy as inevitable. After the action of the Vatican in 1904, which had produced the rupture of diplomatic relations with France, many moderates who had been persistent in their opposition to the Combes ministry, and even certain Nationalists, accepted the principle of separation, but urged that it should be effected on liberal terms. So on the 27th of January, after the minister of education and public worship had announced that the government intended to introduce a separation bill, a vote of confidence was obtained by a majority of 373 to 99, half of the majority being opponents of the Combes ministry of various Republican and reactionary groups, while the minority was composed of 84 Radicals and Socialists and only 15 reactionaries.

The Separation Law.

On the 21st of March the debates on the separation of the churches from the state began. A commission had been appointed in 1904 to examine the subject. Its reporter was M. Aristide Briand, Socialist member for Saint Etienne. According to French parliamentary procedure, the reporter of a commission, directed to draw up a great scheme of legislation, can make himself a more important person in conducting it through a house of legislature than the minister in charge of the bill. This is what M. Briand succeeded in doing. He produced with rapidity a " report " on the whole question, in which he traced with superficial haste the history of the Church in France from the baptism of Clovis, and upon this drafted a bill which was accepted by the government. He thus at one bound came from obscurity into the front rank of politicians, and in devising a revolutionary measure learned a lesson of moderate statesmanship. In conducting the debates he took the line of throwing the responsibility for the rupture of the Concordat on the pope. The leadership of the Opposition fell on M. Ribot, who had been twice prime minister of the Republic and was not a practising Catholic. He recognized that separation had become inevitable, but argued that it could be accomplished as a permanent act only in concert with the Holy See. The clerical party in the Chamber did little in defence of the Church. The abbés Lemire and Gayraud, the only ecclesiastics in parliament, spoke with moderation, and M. Groussau, a Catholic jurist, attacked the measure with less temperate zeal; but the best serious defence of the interests of the Church came from the Republican centre. Few amendments from the extreme Left were accepted by M. Briand, whose general tone was moderate and not illiberal. One feature of the debates was the reluctance of the prime minister to take part in them, even when financial clauses were discussed in which his own office was particularly concerned. The bill finally passed the Chamber on the 3rd of July by 341 votes against 233, the majority containing a certain number of conservative Republicans and Nationalists. At the end the Radical-Socialists manifested considerable discontent at the liberal tendencies of M. Briand, and declared that the measure as it left the Chamber could be considered only provisional. In the Senate it underwent no amendment whatever, not a single word being altered. The prime minister, M. Rouvier, never once opened his lips during the lengthy debates, in the course of which M. Clémenceau, as a philosophical Radical who voted for the bill, criticized it as too concordatory, while M. Méline, as a moderate Republican, who voted against it, predicted that it would create such a state of things as would necessitate new negotiations with Rome a few years later. It was finally passed by a majority of 181 to 102, the complete number of senators being 300, and three days later, on the 9th of December 1905, it was promulgated as law by the president of the Republic.

The main features of the act were as follows. The first clauses guaranteed liberty of conscience and the free practice of public worship, and declared that henceforth the Republic neither recognized nor remunerated any form of religion, except in the case of chaplains to public schools, hospitals and prisons. It provided that after inventories had been taken of the real and personal property in the hands of religious bodies, hitherto remunerated by the state, to ascertain whether such property belonged to the state, the department, or the commune, all such property should be transferred to associations of public worship (*associations cultuelles*) established in each commune in accordance with the rules of the religion which they represented, for the purpose of carrying on the practices of that religion. As the Vatican subsequently refused to permit Catholics to take part in these associations, the important clauses relating to their organization and powers became a dead letter, except in the case of the Protestant and Jewish associations, which affected only a minute proportion of the religious establishments under the act. Nothing, therefore, need be said about them except that the chief discussions in the Chamber took place with regard to their constitution, which was so amended, contrary to the wishes of the extreme anti-clericals, that many moderate critics of the original bill thought that thereby the regular practice of the Catholic religion, under episcopal control, had been safeguarded. A system of pensions for ministers of religion hitherto paid by the state was provided, according to the age and the length of service of the ecclesiastics interested, while in small communes of under a thousand inhabitants the clergy were to receive in any case their full pay for eight years. The bishops' palaces were to be left gratuitously at the disposal of the occupiers for two years, and the presbyteries and seminaries for five years. This provision too became a dead letter, owing to the orders given by the Holy See to the clergy. Other provisions enacted that the churches should not be used for political meetings, while the services held in them were protected by the law from the acts of disturbers. As the plenary operation of the law depended on the *associations cultuelles*, the subsequent failure to create those bodies makes it useless to give a complete exposition of a statute of which they were an essential feature.

The passing of the Separation Law was the chief act of the last year of the presidency of M. Loubet. One other important measure has to be noted, the law reducing compulsory military service to two years. The law of 1889 had provided a general service of three years, with an extensive system of dispensations accorded to persons for domestic reasons, or because they belonged to certain categories of students, such citizens being let off with one year's service with the colours or being entirely exempted. The new law exacted two years' service from every Frenchman, no one being exempted save for physical incapacity. Under the act of 1905 even the cadets of the military college of Saint Cyr and of the Polytechnic had to serve in the ranks before entering those schools. Anti-military doctrines continued to be encouraged by the Socialist party, M. Hervé, the professor who had been revoked in 1901 for his suggestion of a military strike in case of war and for other unpatriotic utterances, being elected a member of the administrative committee of the Unified Socialist party, of which M. Jaurès was one of the chiefs. At a congress of elementary schoolmasters at Lille in August, anti-military resolutions were passed and a general adherence was given to the doctrines of M. Hervé. At Longwy, in the Eastern coal-field, a strike took place in September, during which the military was called out to keep order and a workman was killed in a cavalry charge. The minister of war, M. Berteaux, visited the scene of the disturbance, and was reported to have saluted the red revolutionary flag which was borne by a procession of strikers singing the "Internationale."

During the autumn session in November M. Berteaux suddenly resigned the portfolio of war during a sitting of the Chamber, and was succeeded by M. Etienne, minister of the interior, a moderate politician who inspired greater confidence. Earlier in the year other industrial strikes of great gravity had taken place, notably at Limoges, among the potters, where several deaths took place in a conflict with the troops and a factory was burnt. Even more serious were the strikes in the government arsenals in November. At Cherbourg and Brest only a small proportion of the workmen went out, but at Lorient, Rochefort and especially at Toulon the strikes were on a much larger scale. In 1905 solemn warnings were given in the Chamber of the coming crisis in the wine-growing regions of the South. Radical-Socialists such as M. Doumergue, the deputy for Nîmes and a member of the Combes ministry, joined with monarchists such as M. Lasies, deputy of the Gers, in calling attention to the distress of the populations dependent on the vine. They argued that the wines of the South found no market, not because of the alleged over-production, but because of the competition of artificial wines; that formerly only twenty departments of France were classed in the atlas as wine-producing, but that thanks to the progress of chemistry seventy departments were now so described. The deputies of the north of France and of Paris, irrespective of party, opposed these arguments, and the government, while promising to punish fraud, did not seem to take very seriously the legitimate warnings of the representatives of the South.

The Republic continued to extend its friendly relations with foreign powers, and the end of M. Loubet's term of office was signalized by a procession of royal visits to Paris, some of which the president returned. At the end of May the king of Spain came and narrowly escaped assassination from a bomb which was thrown at him by a Spaniard as he was returning with the president from the opera. In October M. Loubet returned this visit at Madrid and went on to Lisbon to see the king of Portugal, being received by the queen, who was the daughter of the comte de Paris and the sister of the duc d'Orléans, both exiled by the Republic. In November the king of Portugal came to Paris, and the president of the Republic also received during the year less formal visits from the kings of England and of Greece.

Resignation of M. Delcasse.

One untoward international event affecting the French ministry occurred in June 1905. M. Delcassé (see section on *Exterior Policy*), who had been foreign minister longer than any holder of that office under the Republic, resigned, and it was believed that he had been sacrificed by the prime minister to the exigencies of Germany, which power was said to be disquieted at his having, in connexion with the Morocco question, isolated Germany by promoting the friendly relations of France with England, Spain and Italy. Whether it be true or not that the French government was really in alarm at the possibility of a declaration of war by Germany, the impression given was unfavourable, nor was it removed when M. Rouvier himself took the portfolio of foreign affairs.

M. Fallières president of the Republic.

The year 1906 is remarkable in the history of the Third Republic in that it witnessed the renewal of all the public powers in the state. A new president of the Republic was elected on the 17th of January ten days after the triennial election of one third of the senate, and the general election of the chamber of deputies followed in May—the ninth which had taken place under the constitution of 1875. The senatorial elections of the 7th of January showed that the delegates of the people who chose the members of the upper house and represented the average opinion of the country approved of the anti-clerical legislation of parliament. The election of M. Fallières, president of the senate, to the presidency of the Republic was therefore anticipated, he being the candidate of the parliamentary majorities which had disestablished the church. At the congress of the two chambers held at Versailles on the 17th of January he received the absolute majority of 449 votes out of 849 recorded. The candidate of the Opposition was M. Paul Doumer, whose anti-clericalism in the past was so extreme that when married he had dispensed with a religious ceremony and his children were unbaptized. So the curious spectacle was presented of the Moderate Opportunist M. Fallières being elected by Radicals and Socialists, while the Radical candidate was supported by Moderates and Reactionaries. For the second time a president of the senate, the second official personage in the Republic, was advanced to the chief magistracy, M. Loubet having been similarly promoted. As in his case, M. Fallières owed his election to M. Clémenceau. When M. Loubet was elected M. Clémenceau had not come to the end of his retirement from parliamentary life; but in political circles, with his powerful pen and otherwise, he was resuming his former influence as a "king-maker." He knew of the precariousness of Félix Faure's health and of the indiscretions of the elderly president. So when the presidency suddenly became vacant in January 1899 he had already fixed his choice on M. Loubet, as a candidate whose unobtrusive name excited no jealousy among the republicans. At that moment, owing to the crisis caused by the Dreyfus affair, the Republic needed a safe man to protect it against the attacks of the plebiscitary party which had been latterly favoured by President Faure. M. Constans, it was said, had in 1899 desired the presidency of the senate, vacant by M. Loubet's promotion, in preference to the post of ambassador at Constantinople. But M. Clémenceau, deeming that his name had been too much associated with polemics in the past, contrived the election of M. Fallières to the second place of dignity in the Republic, so as to have another safe candidate in readiness for the Elysée in case President Loubet suddenly disappeared. M. Loubet, however, completed his septennate, and to the end of it M. Fallières was regarded as his probable successor. As he fulfilled his high duties in the senate inoffensively without making enemies among his political friends, he escaped the fate which had awaited other presidents-designate of the Republic. Previously to presiding over the senate this Gascon advocate, who had represented his native Lot-et-Garonne, in either chamber, since 1876, had once been prime minister for three weeks in 1883. He had also held office in six other ministries, so no politician in France had a larger experience in administration and in public affairs.

On New Year's Day 1906, the absence of the Nuncio from the presidential reception of the diplomatic body marked conspicuously the rupture of the Concordat; for hitherto the representative of the Holy See had ranked as *doyen* of the ambassadors to the Republic, whatever the relative seniority of his colleagues, and in the name of all the foreign powers had officially saluted the chief of the state. On the 20th of January the inventories of the churches were commenced, under the 3rd clause of the

Separation Act, for the purpose of assessing the value of the furniture and other objects which they contained. In Paris they occasioned some disturbance; but as the protesting rioters were led by persons whose hostility to the Republic was more notorious than their love for religion, the demonstrations were regarded as political rather than religious. In certain rural districts, where the church had retained its influence and where its separation from the state was unpopular, the taking of the inventories was impeded by the inhabitants, and in some places, where the troops were called out to protect the civil authorities, further feeling was aroused by the refusal of officers to act. But, as a rule, this first manifest operation of the Separation Law was received with indifference by the population. One region where popular feeling was displayed in favour of the church was Flanders, where, in March, at Boeschepe on the Belgian frontier, a man was killed during the taking of an inventory. This accident caused the fall of the ministry. The moderate Republicans in the Chamber, who had helped to keep M. Rouvier in office, withheld their support in a debate arising out of the incident, and the government was defeated by thirty-three votes. M. Rouvier resigned, and the new president of the Republic sent for M. Sarrien, a Radical of the old school from Burgundy, who had been deputy for his native Saône-et-Loire from the foundation of the Chamber in 1876 and had previously held office in four cabinets. In M. Sarrien's ministry of the 14th of March 1906 the president of the council was only a minor personage, its real conductor being M. Clémenceau, who accepted the portfolio of the interior. Upon him, therefore devolved the function of "making the elections" of 1906, as it is the minister at the Place Beauvau, where all the wires of administrative government are centralized, who gives the orders to the prefectures at each general election. As in France ministers sit and speak in both houses of parliament, M. Clémenceau, though a senator, now returned, after an absence of thirteen years, to the Chamber of Deputies, in which he had played a mighty part in the first seventeen years of its existence. His political experience was unique. From an early period after entering the Chamber in 1876 he had exercised there an influence not exceeded by any deputy. Yet it was not until 1906, thirty years after his first election to parliament, that he held office—though in 1888 he just missed the presidency of the Chamber, receiving the same number of votes as M. Méline, to whom the post was allotted by right of seniority. He now returned to the tribune of the Palais Bourbon, on which he had been a most formidable orator. During his career as deputy his eloquence was chiefly destructive, and of the nineteen ministries which fell between the election of M. Grévy to the presidency of the Republic in 1879 and his own departure from parliamentary life in 1893 there were few of which the fall had not been expedited by his mordant criticism or denunciation. He now came back to the scene of his former achievements not to attack but to defend a ministry. Though his old occupation was gone, his re-entry excited the keenest interest, for at sixty-five he remained the biggest political figure in France. After M. Clémenceau the most interesting of the new ministers was M. Briand, who was not nine years old when M. Clémenceau had become conspicuous in political life as the mayor of Montmartre on the eve of the Commune. M. Briand had entered the Chamber, as Socialist deputy for Saint Étienne, only in 1902. The mark he had made as "reporter" of the Separation Bill has been noted, and on that account he became minister of education and public worship—the terms of the Separation Law necessitating the continuation of a department for ecclesiastical affairs. As he had been a militant Socialist of the "unified" group of which M. Jaurès was the chief, and also a member of the superior council of labour, his appointment indicated that the new ministry courted the support of the extreme Left. It, however, contained some moderate men, notably M. Poincaré, who had the repute of making the largest income at the French bar after M. Waldeck-Rousseau gave up his practice, and who became for the second time minister of finance. The portfolios of the colonies and of public works were also given to old ministers of moderate tendencies, M. Georges Leygues and M. Barthou. A former prime minister, M. Léon Bourgeois, went to the foreign office, over which he had already presided, besides having represented France at the peace conference at the Hague; while MM. Étienne and Thomson retained their portfolios of war and marine. The cabinet contained so many men of tried ability that it was called the ministry of all the talents. But the few who understood the origin of the name knew that it would be even more ephemeral than was the British ministry of 1806; for the fine show of names belonged to a transient combination which could not survive the approaching elections long enough to leave any mark in politics.

The Sarrien ministry.

M. Clémenceau minister of the interior.

Before the elections took place grave labour troubles showed that social and economical questions were more likely to give anxiety to the government than any public movement resulting from the disestablishment of the church. Almost the first ministerial act of M. Clémenceau was to visit the coal basin of the Pas de Calais, where an accident causing great loss of life was followed by an uprising of the working population of the region, which spread into the adjacent department of the Nord and caused the minister of the interior to take unusual precautions to prevent violent demonstrations in Paris on Labour Day, the 1st of May. The activity of the Socialist leaders in encouraging anti-capitalist agitation did not seem to alarm the electorate. Nor did it show any sympathy with the appeal of the pope, who in his encyclical letter, *Vehementer nos*, addressed to the French cardinals on the 11th of February, denounced the Separation Law. So the result of the elections of May 1906 was a decisive victory for the anti-clericals and Socialists.

Progress of socialism.

A brief analysis of the composition of the Chamber of Deputies is always impossible, the limits of the numerous groups being ill-defined. But in general terms the majority supporting the radical policy of the *bloc* in the last parliament, which had usually mustered about 340 votes, now numbered more than 400, including 230 Radical-Socialists and Socialists. The gains of the extreme Left were chiefly at the expense of the moderate or progressist republicans, who, about 120 strong in the old Chamber, now came back little more than half that number. The anti-republican Right, comprising Royalists, Bonapartists and Nationalists, had maintained their former position and were about 130 all told. The general result of the polls of the 6th and 20th of May was thus an electoral vindication of the advanced policy adopted by the old Chamber and a repudiation of moderate Republicanism; while the stationary condition of the reactionary groups showed that the tribulations inflicted by the last parliament on the church had not provoked the electorate to increase its support of clerical politicians.

The Vatican, however, declined to recognize this unmistakable demonstration. The bishops, taking advantage of their release from the concordatory restrictions which had withheld from them the faculty of meeting in assembly, had met at a preliminary conference to consider their plan of action under the Separation Law. They had adjourned for further instructions from the Holy See, which were published on the 10th of August 1906, in a new encyclical *Gravissimo officii*, wherein, to the consternation of many members of the episcopate, the pope interdicted the *associations cultuelles*, the bodies which, under the Separation Law, were to be established in each parish, to hold and to organize the church property and finances, and were essential to the working of the act. On the 4th of September the bishops met again and passed a resolution of submission to the Holy See. In spite of their loyalty they could not but deplore an injunction which inevitably would cause distress to the large majority of the clergy after the act came into operation on the 12th of December 1906. They knew only too well how hopeless was the idea that the distress of the clergy would call forth any revulsion of popular feeling in France. The excitement of the public that summer over a painful clerical scandal in the diocese of Chartres showed that the interest taken by the mass of the population in church matters was not of a kind which would aid the clergy in their difficult situation.

The Clémenceau ministry.

At the close of the parliamentary recess M. Sarrien resigned the premiership on the pretext of ill-health, and by a presidential decree of the 25th of October 1906 M. Clémenceau, who had been called to fill the vacancy, took office. MM. Bourgeois, Poincaré, Étienne and Leygues retired with M. Sarrien. The new prime minister placed at the foreign office M. Pichon, who had learned politics on the staff of the *Justice*, the organ of M. Clémenceau, by whose influence he had entered the diplomatic service in 1893, after eight years in the chamber of deputies. He had been minister at Pekin during the Boxer rebellion and resident at Tunis, and he was now radical senator for the Jura. M. Caillaux, a more adventurous financier than M. Rouvier or M. Poincaré, who had been Waldeck-Rousseau's minister of finance, resumed that office. The most significant appointment was that of General Picquart to the war office. The new minister when a colonel had been willing to sacrifice his career, although he was an anti-Semite, to redressing the injustice which he believed had been inflicted on a Jewish officer—whose second condemnation, it may be noted, had been quashed earlier in 1906. M. Viviani became the first minister of labour (*Travail et Prévoyance sociale*). The creation of the office and the appointment of a socialist lawyer and journalist to fill it showed that M. Clémenceau recognized the increasing prominence of social and industrial questions and the growing power of the trade-unions.

The acts and policy of the Clémenceau ministry and the events which took place during the years that it held office are too near the present time to be appraised historically. It seems not unlikely that the first advent to power, after thirty-five years of strenuous political life, of one who must be ranked among the ablest of the twenty-seven prime ministers of the Third Republic will be seen to have been coincident with an important evolution in the history of the French nation. The separation of the Roman Catholic Church from the state, by the law of December 1905, had deprived the Socialists, the now most powerful party of the extreme Left, of the chief outlet for their activity, which hitherto had chiefly found its scope in anti-clericalism. Having no longer the church to attack they turned their attention to economical questions, the solution of which had always been their theoretical aim. At the same period the law relating to the Contract of Association of 1901, by removing the restrictions (save in the case of religious communities) which previously had prevented French citizens from forming association without the authorization of the government, had formally abrogated the individualistic doctrine of the Revolution, which in all its phases was intolerant of associations. The law of June 1791 declared the destruction of all corporations of persons engaged in the same trade or profession to be a fundamental article of the French constitution, and it was only in the last six years of the Second Empire that some tolerance was granted to trade-unions, which was extended by the Third Republic only in 1884. In that year the prohibition of 1791 was repealed. Not quite 70 unions existed at the end of 1884. In 1890 they had increased to about 1000, in 1894 to 2000, and in 1901, when the law relating to the Contract of Association was passed, they numbered 3287 with 588,832 members. The law of 1901 did not specially affect them; but this general act, completely emancipating all associations formed for secular purposes, was a definitive break with the individualism of the Revolution which had formed the basis of all legislation in France for nearly a century after the fall of the ancient monarchy. It was an encouragement and at the same time a symptom of the spread of anti-individualistic doctrine. This was seen in the accelerated increase of syndicated workmen during the years succeeding the passing of the Associations Law, who in 1909 were over a million strong. The power exercised by the trade-unions moved the functionaries of the government, a vast army under the centralized system of administration, numbering not less than 800,000 persons, to demand equal freedom of association for the purpose of regulating their salaries paid by the state and their conditions of labour. This movement brought into new relief the long-recognized incompatibility of parliamentary government with administrative centralization as organized by Napoleon.

In another direction the increased activity in the rural districts of the Socialists, who hitherto had chiefly worked in the industrial centres, indicated that they looked for support from the peasant proprietors, whose ownership in the soil had hitherto opposed them to the practice of collectivist doctrine. In the summer of 1907 an economic crisis in the wine-growing districts of the South created a general discontent which spread to other rural regions. The Clémenceau ministry, while opposing the excesses of revolutionary socialism and while incurring the strenuous hostility of M. Jaurès, the Socialist leader, adopted a programme which was more socialistic than that of any previous government of the republic. Under its direction a bill for the imposition of a graduated income tax was passed by the lower house, involving a scheme of direct taxation which would transform the interior fiscal system of France. But the income tax was still only a project of law when M. Clémenceau unexpectedly fell in July 1909, being succeeded as prime minister by his colleague M. Briand. His ministry had, however, passed one important measure which individualists regarded as an act of state-socialism. It took a long step towards the nationalization of railways by purchasing the important Western line and adding it to the relatively small system of state railways. Previously a more generally criticized act of the representatives of the people was not of a nature to augment the popularity of parliamentary institutions at a period of economic crisis, when senators and deputies increased their own annual salary, or indemnity as it is officially called, to 15,000 francs. (J. E. C. B.)

Exterior Policy 1870–1909

The new epoch.

The Franco-German War marks a turning-point in the history of the exterior policy of France as distinct as does the fall of the ancient monarchy or the end of the Napoleonic epoch. With the disappearance of the Second Empire, by its own fault, on the field of Sedan in September 1870, followed in the early months of 1871 by the proclamation of the German empire at Versailles and the annexation of Alsace and Lorraine under the treaty of peace of Frankfort, France descended from its primacy among the nations of continental Europe, which it had gradually acquired in the half-century subsequent to Waterloo. It was the design of Bismarck that united Germany, which had been finally established under his direction by the war of 1870, should take the place hitherto occupied by France in Europe. The situation of France in 1871 in no wise resembled that after the French defeat of 1815, when the First Empire, issue of the Revolution, had been upset by a coalition of the European monarchies which brought back and supported on his restored throne the legitimate heir to the French crown. In 1871 the Republic was founded in isolation. France was without allies, and outside its frontiers the form of its executive government was a matter of interest only to its German conquerors. Bismarck desired that France should remain isolated in Europe and divided at home. He thought that the Republican form of government would best serve these ends. The revolutionary tradition of France would, under a Republic, keep aloof the monarchies of Europe, whereas, in the words of the German ambassador at Paris, Prince Hohenlohe, a "monarchy would strengthen France and place her in a better position to make alliances and would threaten our alliances." At the same time Bismarck counted on governmental instability under a Republic to bring about domestic disorganization which would so disintegrate the French nation as to render it unformidable as a foe and ineffective as an ally. The Franco-German War thus produced a situation unprecedented in the mutual relations of two great European powers. From that situation resulted all the exterior policy of France, for a whole generation, colonial as well as foreign.

In 1875 Germany saw France in possession of a constitution which gave promise of durability if not of permanence. German opinion had already been perturbed by the facility and speed with which France had paid off the colossal war indemnity exacted by the conqueror, thus giving proof of the inexhaustible resources of the country and of its powers of recuperation. The successful reorganization of the French army under the military law of 1872 caused further alarm when there appeared to be some possibility of the withdrawal of Russia from the Dreikaiserbund, which had set the seal on Germany's triumph and France's abasement in Europe. It seemed, therefore, as though it might be expedient for Germany to make a sudden aggression upon France before that country was adequately prepared for war, in order to crush the nation irreparably and to remove it from among the great powers of Europe.

The constitution of the Third Republic was voted by the National Assembly on the 25th of February 1875. The new constitution had to be completed by electoral laws and other complementary provisions, so it could not become effective until the following year, after the first elections of the newly founded Senate and Chamber of Deputies. M. Buffet was then charged by the president of the republic, Marshal MacMahon, to form a provisional ministry in which the duc Decazes, who had been foreign minister since 1873, was retained at the Quai d'Orsay. The cabinet met for the first time on the 11th of March, and ten days later the National Assembly adjourned for a long recess.

The crisis of 1875.

It was during that interval that occurred the incident known as "The Scare of 1875." The Kulturkampf had left Prince Bismarck in a state of nervous irritation. In all directions he was on the look out for traces of Ultramontane intrigue. The clericals in France after the fall of Thiers had behaved with great indiscretion in their desire to see the temporal power of the pope revived. But when the reactionaries had placed MacMahon at the head of the state, their divisions and their political ineptitude had shown that the government of France would soon pass from their hands, and of this the voting of the Republican constitution by a monarchical assembly was the visible proof. Nevertheless Bismarck, influenced by the presence at Berlin of a French ambassador, M. de Gontaut-Biron, whom he regarded as an Ultramontane agent, seems to have thought otherwise. A military party at Berlin affected alarm at a law passed by the French Assembly on the 12th of March, which continued a provision increasing from three to four the battalions of each infantry regiment, and certain journals, supposed to be inspired by Bismarck, argued that as the French were preparing, it might be well to anticipate their designs before they were ready. Europe was scared by an article on the 6th of May in *The Times*, professing to reveal the designs of Bismarck, from its Paris correspondent, Blowitz, who was in relations with the French foreign minister, the duc Decazes, and with Prince Hohenlohe, German ambassador to France, both being prudent diplomatists, and, though Catholics, opposed to Ultramontane pretensions. Europe was astounded at the revelation and alarmed at the alleged imminence of war. In England the Disraeli ministry addressed the governments of Russia, Austria and Italy, with a view to restraining Germany from its aggressive designs, and Queen Victoria wrote to the German emperor to plead the cause of peace. It is probable that there was no need either for this intervention or for the panic which had produced it. We know now that the old emperor William was steadfastly opposed to a fresh war, while his son, the crown prince Frederick, who then seemed likely soon to succeed him for a long reign, was also determined that peace should be maintained. The scare had, however, a most important result, in sowing the seeds of the subsequent Franco-Russian alliance. Notwithstanding that the tsar Alexander II. was on terms of affectionate intimacy with his uncle, the emperor William, he gave a personal assurance to General Le Flô, French ambassador at St Petersburg, that France should have the "moral support" of Russia in the case of an aggression on the part of Germany. It is possible that the danger of war was exaggerated by the French foreign minister and his ambassador at Berlin, as is the opinion of certain French historians, who think that M. de Gontaut-Biron, as an old royalist, was only too glad to see the Republic under the protection, as it were, of the most reactionary monarchy of Europe. At the same time Bismarck's denials of having acted with terrorizing intent cannot be accepted. He was more sincere when he criticized the ostentation with which the Russian Chancellor, Prince Gortchakoff, had claimed for his master the character of the defender of France and the obstacle to German ambitions. It was in memory of this that, in 1878 at the congress of Berlin, Bismarck did his best to impair the advantages which Russia had obtained under the treaty of San Stefano.

Congress of Berlin.

The events which led to that congress put into abeyance the prospect of a serious understanding between France and Russia. The insurrection in Herzegovina in July 1875 reopened the Eastern question, and in the Orient the interests of France and Russia had been for many years conflicting, as witness the controversy concerning the Holy Places, which was one of the causes of the Crimean War. France had from the reign of Louis XIV. claimed the exclusive right of protecting Roman Catholic interests in the East. This claim was supported not only by the monarchists, for the most part friendly to Russia in other respects, who directed the foreign policy of the Third Republic until the Russo-Turkish War of 1877, but by the Republicans, who were coming into perpetual power at the time of the congress of Berlin—the ablest of the anti-clericals, Gambetta, declaring in this connexion that "anti-clericalism was not an article of exportation." The defeat of the monarchists at the elections of 1877, after the "Seize Mai," and the departure from office of the duc Decazes, whose policy had tended to prepare the way for an alliance with the tsar, changed the attitude of French diplomacy towards Russia. M. Waddington, the first Republican minister for foreign affairs, was not a Russophil, while Gambetta was ardently anti-Russian, and he, though not a minister, was exercising that preponderant influence in French politics which he retained until 1882, the last year of his life. Many Republicans considered that the monarchists, whom they had turned out, favoured the support of Russia not only as a defence against Germany, which was not likely to be effective so long as a friendly uncle and nephew were reigning at Berlin and at St Petersburg respectively, but also as a possible means of facilitating a monarchical restoration in France. Consequently at the congress of Berlin M. Waddington and the other French delegates maintained a very independent attitude towards Russia. They supported the resolutions which aimed at diminishing the advantages obtained by Russia in the war, they affirmed the rights of France over the Holy Places, and they opposed the anti-Semitic views of the Russian representatives. The result of the congress of Berlin seemed therefore to draw France and Russia farther apart, especially as Gambetta and the Republicans now in power were more disposed towards an understanding with England. The contrary, however, happened. The treaty of Berlin, which took the place of the treaty of San Stefano, was the ruin of Russian hopes. It was attributed to the support given by Bismarck to the anti-Russian policy of England and Austria at the congress, the German chancellor having previously discouraged the project of an alliance between Russia and Germany. The consequence was that the tsar withdrew from the Dreikaiserbund, and Germany, finding the support of Austria inadequate for its purposes, sought an understanding with Italy. Hence arose the Triple Alliance of 1882, which was the work of Bismarck, who thus became eventually the author of the Franco-Russian alliance, which was rather a sedative for the nervous temperament of the French than a remedy necessary for their protection. The twofold aim of the Triplice was the development of the Bismarckian policy of the continued isolation of France and of the maintenance of the situation in Europe acquired by the German empire in 1871. The most obvious alliance for Germany was that with Russia, but it was clear that it could be obtained only at the price of Russia having a free hand to satisfy its ambitions in the East. This not only would have irritated England against Germany, but also Austria, and so might have brought about a Franco-Austrian alliance, and a day of reckoning for Germany for the combined rancours of two nations, left by 1866 and 1871. It was thus that Germany allied itself first with Austria and then with Italy, leaving Russia eventually to unite with France.

Egyptian question.

As the congress of Berlin took in review the general situation of the Turkish empire, it was natural that the French delegates should formulate the position of France in Egypt. Thus the powers of Europe accepted the maintenance of the *condominium* in Egypt, financial and administrative, of England and France. Egypt, nominally a province of the Turkish empire, had been invested with a large degree of autonomy, guaranteed by an agreement made in 1840 and 1841 between the Porte and the then five great powers, though some opposition was made to France being a party to this compact. By degrees Austria, Prussia and Russia (as well as Italy when it attained the rank of a great power) had left the international control of Egypt to France and England by reason of the preponderance of the interests of those two powers on the Nile.

In 1875 the interests of England in Egypt, which had hitherto been considered inferior to those of France, gained a superiority owing to the purchase by the British government of the shares of the khedive Ismail in the Suez Canal. Whatever rivalry there may have been between England and France, they had to present a united front to the pretensions of Ismail, whose prodigalities made him impatient of the control which they exercised over his finances. This led to his deposition and exile. The control was re-established by his successor Tewfik on the 4th of September 1879. The revival ensued of a so-called national party, which Ismail for his own purposes had encouraged in its movement hostile to foreign domination. In September 1881 took place the rising led by Arabi, by whose action an assembly of notables was convoked for the purpose of deposing the government authorized by the European powers. The fear lest the sultan should intervene gave an appearance of harmony to the policy of England and France, whose interests were too great to permit of any such interference. At the end of 1879 the first Freycinet cabinet had succeeded that of M. Waddington and had in turn been succeeded in September 1880 by the first Ferry cabinet. In the latter the foreign minister was M. Barthélemy Saint-Hilaire, an aged philosopher who had first taken part in politics when he helped to dethrone Charles X. in 1830. In September 1881 he categorically invited the British government to join France in a military intervention to oppose any interference which the Porte might attempt, and the two powers each sent a war-ship to Alexandria. On the 14th of November Gambetta formed his *grand ministère*, in which he was foreign minister. Though it lasted less than eleven weeks, important measures were taken by it, as Arabi had become under-secretary for war at Cairo, and was receiving secret encouragement from the sultan. On the 7th of January 1882, at the instance of Gambetta, a joint note was presented by the British and French consuls to the khedive, to the effect that their governments were resolved to maintain the *status quo*, Gambetta having designed this as a consecration of the Anglo-French alliance in the East. Thereupon the Porte protested, by a circular addressed to the powers, against this infringement of its suzerainty in Egypt. Meanwhile, the assembly of notables claimed the right of voting the taxes and administering the finances of the country, and Gambetta, considering this as an attempt to emancipate Egypt from the financial control of Europe, moved the British government to join with France in protesting against any interference on the part of the notables in the budget. But when Lord Granville accepted this proposal Gambetta had fallen, on the 26th of January, being succeeded by M. de Freycinet, who for the second time became president of the council and foreign minister. Gambetta fell nominally on a scheme of partial revision of the constitution. It included the re-establishment of *scrutin de liste*, a method of voting to which many Republicans were hostile, so this gave his enemies in his own party their opportunity. He thus fell the victim of republican jealousy, nearly half the Republicans in the chamber voting against him in the fatal division. The subsequent debates of 1882 show that many of Gambetta's adversaries were also opposed to his policy of uniting with England on the Egyptian question. Henceforth the interior affairs of Egypt have little to do with the subject we are treating; but some of the incidents in France which led to the English occupation of Egypt ought to be mentioned. M. de Freycinet was opposed to any armed intervention by France; but in the face of the feeling in the country in favour of maintaining the traditional influence of France in Egypt, his declarations of policy were vague. On the 23rd of February 1882 he said that he would assure the non-exclusive preponderance in Egypt of France and England by means of an understanding with Europe, and on the 11th of May that he wished to retain for France its peculiar position of privileged influence. England and France sent to Alexandria a combined squadron, which did not prevent a massacre of Europeans there on the 11th of June, the khedive being now in the hands of the military party under Arabi. On the 11th of July the English fleet bombarded Alexandria, the French ships in anticipation of that action having departed the previous day. On the 18th of July the Chamber debated the supplementary vote for the fleet in the Mediterranean, M. de Freycinet declaring that France would take no active part in Egypt except as the mandatory of the European powers. This was the occasion for the last great speech of Gambetta in parliament. In it he earnestly urged close co-operation with England, which he predicted would otherwise become the mistress of Egypt, and in his concluding sentences he uttered the famous "*Ne rompez jamais l'alliance anglaise.*" A further vote, proposed in consequence of Arabi's open rebellion, was abandoned, as M. de Freycinet announced that the European powers declined to give France and England a collective mandate to intervene in their name. In the Senate on the 25th of July M. Scherer, better known as a philosopher than as a politician, who had Gambetta's confidence, read a report on the supplementary votes which severely criticized the timidity and vacillation of the government in Egyptian policy. Four days later in the Chamber M. de Freycinet proposed an understanding with England limited to the protection of the Suez Canal. Attacked by M. Clémenceau on the impossibility of separating the question of the canal from the general Egyptian question, the ministry was defeated by a huge majority, and M. de Freycinet fell, having achieved the distinction of being the chief instrument in removing Egypt from the sphere of French interest.

Some of the Republicans whose votes turned out M. de Freycinet wanted Jules Ferry to take his place, as he was considered to be a strong man in foreign policy, and Gambetta, for this reason, was willing to see his personal enemy at the head of public affairs. But this was prevented by M. Clémenceau and the extreme Left, and the new ministry was formed by M. Duclerc, an old senator whose previous official experience had been under the Second Republic. On its taking office on the 7th of August, the ministerial declaration announced that its policy would be in conformity with the vote which, by refusing supplies for the occupation of the Suez Canal, had overthrown M. de Freycinet. The declaration characterized this vote as "a measure of reserve and of prudence but not as an abdication." Nevertheless the action of the Chamber—which was due to the hostility to Gambetta of rival leaders, who had little mutual affection, including MM. de Freycinet, Jules Ferry, Clémenceau and the president of the Republic, M. Grévy, rather than to a desire to abandon Egypt—did result in the abdication of France. After England single-handed had subdued the rebellion and restored the authority of the khedive, the latter signed a decree on the 11th of January 1883 abolishing the joint control of England and France. Henceforth Egypt continued to be a frequent topic of debate in the Chambers; the interests of France in respect of the Egyptian finances, the judicial system and other institutions formed the subject of diplomatic correspondence, as did the irritating question of the eventual evacuation of Egypt by England. But though it caused constant friction between the two countries up to the Anglo-French convention of the 8th of April 1904, there was no longer a French active policy with regard to Egypt. The lost predominance of France in that country did, however, quicken French activity in other regions of northern Africa.

Algerian policy.

Tunis.

The idea that the Mediterranean might become a French lake has, in different senses, been a preoccupation for France and for its rivals in Europe ever since Algeria became a French province by a series of fortuitous incidents—an insult offered by the dey to a French consul, his refusal to make reparation, and the occasion it afforded of diverting public attention in France from interior affairs after the Revolution of 1830. The French policy of preponderance in Egypt had only for a secondary aim the domination of the Mediterranean. The French tradition in Egypt was a relic of Napoleon's vain scheme to become emperor of the Orient even before he had made himself emperor of the West. It was because Egypt was the highway to India that under Napoleon III. the French had constructed the Suez Canal, and for the same reason England could never permit them to become masters of the Nile delta. But the possessors of Algeria could extend their coast-line of North Africa without seriously menacing the power which held Gibraltar and Malta. It was Italy which objected to a French occupation of Tunis. Algeria has never been officially a French "colony." It is in many respects administered as an integral portion of French territory, the governor-general, as agent of the central power, exercising wide jurisdiction. Although the Europeans in Algeria are less than a seventh of the population, and although the French are actually a minority of the European inhabitants—Spaniards prevailing in the west, Italians and Maltese in the east—the three departments of Constantine, Algiers and Oran are administered like three French departments. Consequently, when disturbances occurred on the borderland separating Constantine from Tunis, the French were able to say to Europe that the integrity of their national frontier was threatened by the proximity of a turbulent neighbour. The history of the relations between Tunis and France were set forth, from the French standpoint, in a circular, of which Jules Ferry was said to be the author, addressed by the foreign minister, M. Barthélemy Saint-Hilaire on the 9th of May 1881, to the diplomatic agents of France abroad. The most important point emphasized by the French minister was the independence of Tunis from the Porte, a situation which would obviate difficulties with Turkey such as had always hampered the European powers in Egypt. In support of this contention a protest made by the British government in 1830, against the French conquest of Algiers, was quoted, as in it Lord Aberdeen had declared that Europe had always treated the Barbary states as independent powers. On the other hand, there was the incident of the bey of Tunis having furnished to Turkey a contingent during the Crimean War, which suggested a recognition of its vassalage to the Sublime Porte. But in 1864, when the sultan had sent a fleet to La Goulette to affirm his "rights" in Tunis, the French ambassador at Constantinople intimated that France declined to have Turkey for a neighbour in Algeria. France also in 1868 essayed to obtain control over the finances of the regency; but England and Italy had also large interests in the country, so an international financial commission was appointed. In 1871, when France was disabled after the war, the bey obtained from Constantinople a firman of investiture, thus recognizing the suzerainty of the Porte. Certain English writers have reproached the Foreign Office for its lack of foresight in not taking advantage of France's disablement by establishing England as the preponderant power in Tunis. The fact that five-sixths of the commerce of Tunis is now with France and Algeria may seem to justify such regrets. Yet by the light of subsequent events it seems probable that England would have been diverted from more profitable undertakings had she been saddled with the virtual administration and military occupation of a vast territory which such preponderance would have entailed. The wonder is that this opportunity was not seized by Italy; for Mazzini and other workers in the cause of Italian unity, before the Bourbons had been driven from Naples, had cast eyes on Tunis, lying over against the coasts of Sicily at a distance of barely 100 m., as a favourable field for colonization and as the key of the African Mediterranean. But when Rome became once more the capital of Italy, Carthage was not fated to fall again under its domination and the occasion offered by France's temporary impotence was neglected. In 1875 when France was rapidly recovering, there went to Tunis as consul an able Frenchman, M. Roustan, who became virtual ruler of the regency in spite of the resistance of the representative of Italy. French action was facilitated by the attitude of England. On the 26th of July 1878 M. Waddington wrote to the marquis d'Harcourt, French ambassador in London, that at the congress of Berlin Lord Salisbury had said to him—the two delegates being the foreign ministers of their respective governments—in reply to his protest, on behalf of France, against the proposed English occupation of Cyprus, "Do what you think proper in Tunis: England will offer no opposition." This was confirmed by Lord Salisbury in a despatch to Lord Lyons, British ambassador in Paris, on the 8th of August, and it was followed in October by an intimation made by the French ambassador at Rome that France intended to exercise a preponderant influence in Tunis. Italy was not willing to accept this situation. In January 1881 a tour made by King Humbert in Sicily, where he received a Tunisian mission, was taken to signify that Italy had not done with Tunis, and it was answered in April by a French expedition in the regency sent from Algeria, on the pretext of punishing the Kroumirs who had been marauding on the frontier of Constantine. It was on this occasion that M. Barthélemy Saint-Hilaire issued the circular quoted above. France nominally was never at war with Tunis; yet the result of the invasion was that that country became virtually a French possession, although officially it is only under the protection of France. The treaty of El Bardo of the 12th of May 1881, confirmed by the decree of the 22nd of April 1882, placed Tunis under the protectorate of France. The country is administered under the direction of the French Foreign Office, in which there is a department of Tunisian affairs. The governor is called minister resident-general of France, and he also acts as foreign minister, being assisted by seven French and two native ministers.

Extension of African territory.

The annexation of Tunis was important for many reasons. It was the first successful achievement of France after the disasters of the Franco-German War, and it was the first enterprise of serious utility to France undertaken beyond its frontiers since the early period of the Second Empire. It was also important as establishing the hegemony of France on the southern shores of the Mediterranean. When M. Jules Cambon became governor-general of Algeria, his brother M. Paul Cambon having been previously French resident in Tunis and remaining the vigilant ambassador to a Mediterranean power, a Parisian wit said that just as Switzerland had its *Lac des quatre* Cantons, so France had made of the midland sea its *Lac des deux Cambons*. The *jeu d'esprit* indicated what was the primary significance to the French of their becoming masters of the Barbary coast from the boundary of Morocco to that of Tripoli. Apart from the Mediterranean question, when the scramble for Africa began and the Hinterland doctrine was asserted by European powers, the possession of this extended coast-line resulted in France laying claim to the Sahara and the western Sudan. Consequently, on the maps, the whole of north-west Africa, from Tunis to the Congo, is claimed by France with the exception of the relatively small areas on the coast belonging to Morocco, Spain, Portugal, Liberia, Germany and England. On this basis, in point of area, France is the greatest African power, in spite of British annexations in south and equatorial Africa, its area being estimated at 3,866,950 sq. m. (including 227,950 in Madagascar) as against 2,101,411 more effectively possessed by Great Britain. The immensity of its domain on paper is no doubt a satisfaction to a people which prefers to pursue its policy of colonial expansion without the aid of emigration. The acquisition of Tunis by France is also important as an example of the system of protectorate as applied to colonization. Open annexation might have more gravely irritated the powers having interests in the country. England, in spite of Lord Salisbury's suggestions to the French foreign minister, was none too pleased with France's policy; while Italy, with its subjects outnumbering all other European settlers in the regency, was in a mood to accept a pretext for a quarrel for the reasons already mentioned. Apart from these considerations the French government favoured a protectorate because it did not wish to make of Tunis a second Algeria. While the annexation of the latter had excellent commercial results for France, it had not been followed by successful colonization, though it had cost France 160 millions sterling in the first sixty years after it became French territory. The French cannot govern at home or abroad without a centralized system of administration. The organization of Algeria, as departments of France with their administrative divisions, was not an example to imitate. In the beylical government France found, ready-made, a sufficiently centralized system, such as did not exist in Algeria under native rule, which could form a basis of administration by French functionaries under the direction of the Quai d'Orsay. The result has not been unpleasing to the numerous advocates in France of protectorates as a means of colonization. According to M. Paul Leroy-Beaulieu, the most eminent French authority on colonization, who knows Tunis well, a protectorate is the most pacific, the most supple, and the least costly method of colonization in countries where an organized form of native government exists; it is the system in which the French can most nearly approach that of English crown colonies. One evil which it avoids is the so-called representative system, under which senators and deputies are sent to the French parliament not only from Algeria as an integral part of France, but from the colonies of Martinique, Guadeloupe and French India, while Cochin-China, Guiana and Senegal send deputies alone. These sixteen deputies and seven senators attach themselves to the various Moderate, Radical and Socialist groups in parliament, which have no connexion with the interests of the colonies; and the consequent introduction of French political controversies into colonial elections has not been of advantage to the oversea possessions of France. From this the protectorate system has spared Tunis, and the paucity of French immigration will continue to safeguard that country from parliamentary representation. After twenty years of French rule, of 120,000 European residents in Tunis, not counting the army, only 22,000 were French, while nearly 70,000 were Italian. If under a so-called representative system the Italians had demanded nationalization, for the purpose of obtaining the franchise, complications might have arisen which are not to be feared under a protectorate.

The protectorate system.

But of all the results of the French annexation of Tunis, the most important was undoubtedly the Triple Alliance, into which Italy entered in resentment at having been deprived of the African territory which seemed marked out as its natural field for colonial expansion. The most manifest cause of Italian hostility towards France had passed away four years before the annexation of Tunis, when the reactionaries, who had favoured the restitution of the temporal power of the pope, fell for ever from power. The clericalism of the anti-republicans, who favoured a revival of the fatal policy of the Second Empire whereby France, after Magenta and Solferino, had by leaving its garrison at St Angelo, been the last obstacle to Italian unity, was one of the chief causes of their downfall. For after the war with Germany, the mutilated land and the vanquished nation had need to avoid wanton provocations of foreign powers. Henceforth the French Republic, governed by Republicans, was to be an anti-clerical force in Europe, sympathizing with the Italian occupation of Rome. But to make Italy realize that France was no longer the enemy of complete Italian unity it would have been necessary that all causes of irritation between the two Latin sister nations were removed. Such causes of dissension did, however, remain, arising from economic questions. The maritime relations of the two chief Mediterranean powers were based on a treaty of navigation of 1862—when Venice was no party to it being an Austrian port—which Crispi denounced as a relic of Italian servility towards Napoleon III. Commercial rivalry was induced by the industrial development of northern Italy, when freed from Austrian rule. Moreover, the emigrant propensity of the Italians flooded certain regions of France with Italian cheap labour, with the natural result of bitter animosity between the intruders and the inhabitants of the districts thus invaded. The annexation of Tunis, coming on the top of these causes of irritation, exasperated Italy. A new treaty of commerce was nevertheless signed between the two countries on the 3rd of November 1881. Unfortunately for its stability, King Humbert the previous week had gone to Vienna to see the emperor of Austria. In visiting in his capital the former arch-enemy of Italian unity, who could never return the courtesy, Rome being interdicted for Catholic sovereigns by the "prisoner of the Vatican," Humbert had only followed the example of his father Victor Emmanuel, who went both to Berlin and to Vienna in 1873. But that was when in France the duc de Broglie was prime minister of a clerical government of which many of the supporters were clamouring for the restitution of the temporal power. King Humbert's visit to Vienna at the moment when Gambetta, the great anti-clerical champion, was at the height of his influence was significant for other reasons. Since the 7th of October 1879 Germany and Austria had been united by a defensive treaty, and though its provisions were not published until 1888, the two central empires were known to be in the closest alliance. The king of Italy's visit to Vienna, where he was accompanied by his ministers Depretis and Mancini, had therefore the same significance as though he had gone to Berlin also. On the 20th of May 1882 was signed the treaty of the Triple Alliance, which for many years bound Italy to Germany in its relations with the continental powers. The alliance was first publicly announced on the 13th of March 1883, in the Italian Chamber, by Signor Mancini, minister for foreign affairs. The aim of Italy in joining the combination was alliance with Germany, the enemy of France. The connexion with Austria was only tolerated because it secured a union with the powerful government of Berlin. It effected the complete isolation of France in Europe. An understanding between the French Republic and Russia, which alone could alter that situation, was impracticable, as its only basis seemed to be the possibility of having a common enemy in Germany or even in England. But that double eventuality was anticipated by a secret convention concluded at Skiernewice in September 1884 by the tsar and the German emperor, in which they guaranteed to one another a benevolent neutrality in case of hostilities between England and Russia arising out of the Afghan question.

The Triple Alliance.

It will be convenient here to refer to the relations of France with Germany and Italy respectively in the years succeeding the signature of the Triple Alliance. With Germany both Gambetta, who died ten weeks before the treaty was announced and who was a strong Russophobe, and his adversary Jules Ferry were inclined to come to an understanding. But in this they had not the support of French opinion. In September 1883 the king of Spain had visited the sovereigns of Austria and Germany. Alphonso XII., to prove that this journey was not a sign of hostility to France, came to Paris on his way home on Michaelmas Day on an official visit to President Grévy. Unfortunately it was announced that the German emperor had made the king colonel of a regiment of Uhlans garrisoned at Strassburg, the anniversary of the taking of which city was being celebrated by the emperor by the inauguration of a monument made out of cannon taken from the French, on the very eve of King Alphonso's arrival. Violent protests were made in Paris in the monarchical and in not a few republican journals, with the result that the king of Spain was hooted by the crowd as he drove with the president from the station to his embassy, and again on his way to dine the same night at the Elysée. The incident was closed by M. Grévy's apologies and by the retirement of the minister of war, General Thibaudin, who under pressure from the extreme Left had declined to meet *le roi uhlan*. Though it displayed the bitter hostility of the population towards Germany, the incident did not aggravate Franco-German relations. This was due to the policy of the prime minister, Jules Ferry, who to carry it out made himself foreign minister in November, in the place of Challemel-Lacour, who resigned.

Franco-German relations.

Jules Ferry's idea was that colonial expansion was the surest means for France to recover its prestige, and that this could be obtained only by maintaining peaceful relations with all the powers of Europe. His consequent unpopularity caused his fall in April 1885, and the next year a violent change of military policy was marked by the arrival of General Boulanger at the ministry of war, where he remained, in the Freycinet and Goblet cabinets, from January 1886 to the 17th of May 1887. His growing popularity in France was answered by Bismarck, who asked for an increased vote for the German army, indicating that he considered Boulanger the coming dictator for the war of revenge; so when the Reichstag, on the 14th of January 1887, voted the supplies for three years, instead of for the seven demanded by the chancellor, it was dissolved. Bismarck redoubled his efforts in the press and in diplomacy, vainly attempting to come to an understanding with Russia and with more success moving the Vatican to order the German Catholics to support him. He obtained his vote for seven years in March, and the same month renewed the Triple Alliance. In April the Schnaebelé incident seemed nearly to cause war between France and Germany. The commissary-special, an agent of the ministry of the interior, at Pagny-sur-Moselle, the last French station on the frontier of the annexed territory of Lorraine, having stepped across the boundary to regulate some official matter with the corresponding functionary on the German side, was arrested. It was said that Schnaebelé was arrested actually on French soil, and on whichever side of the line he was standing he had gone to meet the German official at the request of the latter. Bismarck justified the outrage in a speech in the Prussian Landtag which suggested that it was impossible to live at peace with a nation so bellicose as the French. In France the incident was regarded as a trap laid by the chancellor to excite French opinion under the aggressive guidance of Boulanger, and to produce events which would precipitate a war. The French remained calm, in spite of the growing popularity of Boulanger. The Goblet ministry resigned on the 17th of May 1887 after a hostile division on the budget, and the opportunity was taken to get rid of the minister of war, who posed as the coming restorer of Alsace and Lorraine to France. The Boulangist movement soon became anti-Republican, and the opposition to it of successive ministries improved the official relations of the French and German governments. The circumstances attending the fall of President Grévy the same year strengthened the Boulangist agitation, and Jules Ferry, who seemed indicated as his successor, was discarded by the Republican majority in the electoral congress, as a revolution was threatened in Paris if the choice fell on "the German Ferry." Sadi Carnot was consequently elected president of the Republic on the 3rd of December 1887. Three months later, on the 9th of March 1888, died the old emperor William who had personified the conquest of France by Germany. His son, the pacific emperor Frederick, died too, on the 15th of June, so the accession of William II., the pupil of Bismarck, at a moment when Boulanger threatened to become plebiscitary dictator of France, was ominous for the peace of Europe. But in April 1889 Boulanger ignominiously fled the country, and in March 1890 Bismarck fell. France none the less rejected all friendly overtures made by the young emperor. In February 1891 his mother came to Paris and was unluckily induced to visit the scenes of German triumph near the capital—the ruins of St Cloud and the Château of Versailles where the German empire was proclaimed. The incident called forth such an explosion of wrath from the French press that it was clear that France had not forgotten 1871. By this time, however, France was no longer isolated and at the mercy of Germany, which by reason of the increase of its population while that of France had remained almost stationary, was, under the system of compulsory military service in the two countries, more than a match for its neighbour in a single-handed conflict. Even the Triple Alliance ceased to be a terror for France. An understanding arose between France and Russia preliminary to the Franco-Russian alliance, which became the pivot of French exterior relations until the defeat of Russia in the Japanese war of 1904. So the second renewal of the Triplice was forthwith answered by a visit of the French squadron to Kronstadt in July 1891.

France and Italy.

While such were the relations between France and the principal party to the Triple Alliance, the same period was marked by bitter dissension between France and Italy. Tunis had made Italy Gallophobe, but the diplomatic relations between the two countries had been courteous until the death of Depretis in 1887. When Crispi succeeded him as prime minister, and till 1891 was the director of the exterior policy of Italy, a change took place. Crispi, though not the author of the Triple Alliance, entered with enthusiasm into its spirit of hostility to France. The old Sicilian revolutionary hastened to pay his respects to Bismarck at Friedrichsruh in October 1887, the visit being highly approved in Italy. Before that the French Chamber had, in July 1886, by a small majority, rejected a new treaty of navigation between France and Italy, this being followed by the failure to renew the commercial treaty of 1881. Irritating incidents were of constant occurrence. In 1888 a conflict between the French consul at Massowah and the Italians who occupied that Abyssinian port induced Bismarck to instruct the German ambassador in Paris to tell M. Goblet, minister for foreign affairs in the Floquet cabinet, in case he should refer to the matter, that if Italy were involved thereby in complications it would not stand alone—this menace being communicated to Crispi by the Italian ambassador at Berlin and officially printed in a green-book. But after Bismarck's fall relations improved a little, and in April 1890 the Italian fleet was sent to Toulon to salute President Carnot in the name of King Humbert, though this did not prevent the French government being suspected of having designs on Tripoli. Italian opinion was again incensed against France by the action of the French clericals, represented by a band of Catholic "pilgrims" who went to Rome to offer their sympathy to the pope in the autumn of 1891, and outraged the burial-place of Victor Emmanuel by writing in the visitors' register kept at the Pantheon the words "*Vive le pape.*" In August 1893 a fight took place at Aigues Mortes, the medieval walled city on the salt marshes of the Gulf of Lyons, between French and Italian workmen, in which seven Italians were killed. But Crispi had gone out of office early in 1891, and the ministers who succeeded him were more disposed to prevent a rupture between Italy and France. Crispi became prime minister again in December 1893, but this time without the portfolio of foreign affairs. He placed at the Consulta Baron Blanc, who though a strong partisan of the Triple Alliance was closely attached to France, being a native of Savoy, where he spent his yearly vacations on French soil. That the relations between the two nations were better was shown by what occurred after the murder of President Carnot in June 1894. The fact that the assassin was an Italian might have caused trouble a little earlier; but the grief of the Italians was so sincere, as shown by popular demonstrations at Rome, that no anti-Italian violence took place in France, and in the words of the French ambassador, M. Billot, Caserio's crime seemed likely to further an understanding between the two peoples. The movement was very slight and made no progress during the short presidency of M. Casimir-Périer. On the 1st of November 1894 Alexander III. died, when the Italian press gave proof of the importance attributed by the Triplice to the Franco-Russian understanding by expressing a hope that the new tsar would put an end to it. But on the 10th of June 1895, the foreign minister, M. Hanotaux, intimated to the French Chamber that the understanding had become an alliance, and on the 17th the Russian ambassador in Paris conveyed to M. Félix Faure, who was now president of the Republic, the collar of St Andrew, while the same day the French and Russian men-of-war, invited to the opening of the Kiel Canal, entered German waters together. The union of France with Russia was no doubt one cause of the cessation of Italian hostility to France; but others were at work. The inauguration of the statue of MacMahon at Magenta the same week as the announcement of the Franco-Russian alliance showed that there was a disposition to revive the old sentiment of fraternity which had once united France with Italy. More important was the necessity felt by the Italians of improved commercial relations with the French. Crispi fell on the 4th of March 1896, after the news of the disaster to the Italian troops at Adowa, the war with Abyssinia being a disastrous legacy left by him. The previous year he had caused the withdrawal from Paris of the Italian ambassador Signor Ressmann, a friend of France, transferring thither Count Tornielli, who during his mission in London had made a speech, after the visit of the Italian fleet to Toulon, which qualified him to rank as a *misogallo*. But with the final disappearance of Crispi the relations of the two Latin neighbours became more natural. Commerce between them had diminished, and the business men of both countries, excepting certain protectionists, felt that the commercial rupture was mutually prejudicial. Friendly negotiations were initiated on both sides, and almost the last act of President Félix Faure before his sudden death—M. Delcassé being then foreign minister—was to promulgate, on the 2nd of February 1899, a new commercial arrangement between France and Italy which the French parliament had adopted. By that time M. Barrère was ambassador at the Quirinal and was engaged in promoting cordial relations between Italy and France, of which Count Tornielli in Paris had already become an ardent advocate. Italy remained a party to the Triple Alliance, which was renewed for a third period in 1902. But so changed had its significance become that in October 1903 the French Republic received for the first time an official visit from the sovereigns of Italy. This reconciliation of France and Italy was destined to have most important results outside the sphere of the Triple Alliance. The return visit which President Loubet paid to Victor Emmanuel III. in April 1904, it being the first time that a French chief of the state had gone to Rome since the pope had lost the temporal sovereignty, provoked a protest from the Vatican which caused the rupture of diplomatic relations between France and the Holy See, followed by the repudiation of the Concordat by an act passed in France, in 1905, separating the church from the state.

Russian alliance.

While the decadence of the Triple Alliance had this important effect on the domestic affairs of France, its inception had produced the Franco-Russian alliance, which took France out of its isolation in Europe, and became the pivot of its exterior policy. It has been noted that in the years succeeding the Franco-Prussian War the tsar Alexander II. had shown a disposition to support France against German aggression, as though to make up for his neutrality during the war, which was so benevolent for Germany that his uncle William I. had ascribed to it a large share of the German victory. The assassination of Alexander II. by revolutionaries in 1881 made it difficult for the new autocrat to cultivate closer relations with a Republican government, although the Third Republic, under the influence of Gambetta, to whom its consolidation was chiefly due, had repudiated that proselytizing spirit, inherited from the great Revolution, which had disquieted the monarchies of Europe in 1848 and had provoked their hostility to the Second Republic. But the Triple Alliance which was concluded the year after the murder of the tsar indicated the possible expediency of an understanding between the two great powers of the West and the East, in response to the combination of the three central powers of Europe,—though Bismarck after his fall revealed that in 1884 a secret treaty was concluded between Germany and Russia, which was, however, said to have in view a war between England and Russia. Internal dissension on the subject of colonial policy in the far East, followed by the fall of Jules Ferry and the Boulangist agitation were some of the causes which prevented France from strengthening its position in Europe by seeking a formal understanding with Russia in the first part of the reign of Alexander III. But when the Boulangist movement came to an end, entirely from the incompetency of its leader, it behoved the government of the Republic to find a means of satisfying the strong patriotic sentiment revealed in the nation, which, directed by a capable and daring soldier, would have swept away the parliamentary republic and established a military dictatorship in its place. The Franco-Russian understanding provided that means, and Russia was ready for it, having become, by the termination in 1890 of the secret treaty with Germany, not less isolated in Europe than France. In July 1891, when the French fleet visited Kronstadt the incident caused such enthusiasm throughout the French nation that the exiled General Boulanger's existence would have been forgotten, except among his dwindling personal followers, had he not put an end to it by suicide two months later at Brussels. The Franco-Russian understanding united all parties, not in love for one another but in the idea that France was thereby about to resume its place in Europe. The Catholic Royalists ceased to talk of the restitution of the temporal power of the pope in their joy at the deference of the government of the republic for the most autocratic monarchy of Christendom; the Boulangists, now called Nationalists, hoped that it would lead to the war of revenge with Germany, and that it might also be the means of humiliating England, as shown by their resentment at the visit of the French squadron to Portsmouth on its way home from Kronstadt. It is, however, extremely improbable that the understanding and subsequent alliance would have been effected had the Boulangist movement succeeded. For the last thing that the Russian government desired was war with Germany. What it needed and obtained was security against German aggression on its frontier and financial aid from France; so a French plebiscitary government, having for its aim the restitution of Alsace and Lorraine, would have found no support in Russia. As the German chancellor, Count von Caprivi, said in the Reichstag on the 27th of November 1891, a few weeks after a Russian loan had been subscribed in France nearly eight times over, the naval visit to Kronstadt had not brought war nearer by one single inch. Nevertheless when in 1893 the Russian fleet paid a somewhat tardy return visit to Toulon, where it was reviewed by President Carnot, a party of Russian officers who came to Paris was received by the population of the capital, which less than five years before had acclaimed General Boulanger, with raptures which could not have been exceeded had they brought back to France the territory lost in 1871. In November 1894, Alexander III. died, and in January 1895, M. Casimir-Périer resigned the presidency of the Republic, to which he had succeeded only six months before on the assassination of M. Carnot. So it was left to Nicholas II. and President Félix Faure to proclaim the existence of a formal alliance between France and Russia. It appears that in 1891 and 1892, at the time of the first public manifestations of friendship between France and Russia, in the words of M. Ribot, secret conventions were signed by him, being foreign minister, and M. de Freycinet, president of the council, which secured for France "the support of Russia for the maintenance of the equilibrium in Europe"; and on a later occasion the same statesman said that it was after the visit of the empress Frederick to Paris in 1891 that Alexander III. made to France certain offers which were accepted. The word "alliance" was not publicly used by any minister to connote the relations of France with Russia until the 10th of June 1895, when M. Hanotaux used the term with cautious vagueness amid the applause of the Chamber of Deputies. Yet not even when Nicholas II. came to France in October 1896 was the word "alliance" formally pronounced in any of the official speeches. But the reception given to the tsar and tsaritsa in Paris, where no European sovereign had come officially since William of Germany passed down the Champs Elysées as a conqueror, was of such a character that none could doubt that this was the consecration of the alliance. It was at last formally proclaimed by Nicholas II., on board a French man-of-war, on the occasion of the visit of the president of the Republic to Russia in August 1897. From that date until the formation of M. Briand's cabinet in 1909, nine different ministries succeeded one another and five ministers of foreign affairs; but they all loyally supported the Franco-Russian alliance, although its popularity diminished in France long before the war between Russia and Japan, which deprived it of its efficacy in Europe. In 1901 Nicholas II. came again to France and was the guest of President

Loubet at Compiègne. His visit excited little enthusiasm in the nation, which was disposed to attribute it to Russia's financial need of France; while the Socialists, now a strong party which provided the Waldeck-Rousseau ministry with an important part of its majority in the Chamber, violently attacked the alliance of the Republic with a reactionary autocracy. However anomalous that may have been it did not prevent the whole French nation from welcoming the friendship between the governments of Russia and of France in its early stages. Nor can there be any doubt that the popular instinct was right in according it that welcome. France in its international relations was strengthened morally by the understanding and by the alliance, which also served as a check to Germany. But its association with Russia had not the results hoped for by the French reactionaries. It encouraged them in their opposition to the parliamentary Republic during the Dreyfus agitation, the more so because the Russian autocracy is anti-Semitic. It also made a Nationalist of one president of the Republic, Félix Faure, whose head was so turned by his imperial frequentations that he adopted some of the less admirable practices of princes, and also seemed ready to assume the bearing of an autocrat. His sudden death was as great a relief to the parliamentary Republicans as it was a disappointment to the plebiscitary party, which anti-Dreyfusism, with its patriotic pretensions, had again made a formidable force in the land. But the election of the pacific and constitutional M. Loubet as president of the Republic at this critical moment in its history counteracted any reactionary influence which the Russian alliance might have had in France; so the general effect of the alliance was to strengthen the Republic and to add to its prestige. The visit of the tsar to Paris, the first paid by a friendly sovereign since the Second Empire, impressed a population, proud of its capital, by an outward sign which seemed to show that the Republic was not an obstacle to the recognition by the monarchies of Europe of the place still held by France among the great powers. Before M. Loubet laid down office the nation, grown more republican, saw the visit of the tsar followed by those of the kings of England and of Italy, who might never have been moved to present their respects to the French Republic had not Russia shown them the way.

Relations with England.

While the French rejoiced at the Russian alliance chiefly as a check to the aggressive designs of Germany, they also liked the association of France with a power regarded as hostile to England. This traditional feeling was not discouraged by one of the chief artificers of the alliance, Baron Mohrenheim, Russian ambassador in Paris, who until 1884 had filled the same position in London, where he had not learned to love England, and who enjoyed in France a popularity rarely accorded to the diplomatic agent of a foreign power. An *entente cordiale* has since been initiated between England and France. But it is necessary to refer to the less agreeable relations which existed between the two countries, as they had some influence on the exterior policy of the Third Republic. England and France had no causes of friction within Europe. But in its policy of colonial expansion, during the last twenty years of the 19th century, France constantly encountered England all over the globe. The first important enterprise beyond the seas seriously undertaken by France after the Franco-German War, was, as we have seen, in Tunis. But even before that question had been mentioned at the congress of Berlin, in 1878, France had become involved in an adventure in the Far East, which in its developments attracted more public attention at home than the extension of French territory in northern Africa. Had these pages been written before the end of the 19th century it would have seemed necessary to trace the operations of France in Indo-China with not less detail than has been given to the establishment of the protectorate in Tunis. But French hopes of founding a great empire in the Far East came to an end with the partial resuscitation of China and the rise to power of Japan. As we have seen, Jules Ferry's idea was that in colonial expansion France would find the best means of recovering prestige after the defeat of 1870–71 in the years of recuperation when it was essential to be diverted from European complications. Jules Ferry was not a friend of Gambetta, in spite of later republican legends. But the policy of colonial expansion in Tunis and in Indo-China, associated with Ferry's name, was projected by Gambetta to give satisfaction to France for the necessity, imposed, in his opinion, on the French government, of taking its lead in foreign affairs from Berlin. How Jules Ferry developed that system we know now from Bismarck's subsequent expressions of regret at Ferry's fall. He believed that, had Ferry remained in power, an amicable arrangement would have been made between France and Germany, a formal agreement having been almost concluded to the effect that France should maintain peaceable and friendly relations with Germany, while Bismarck supported France in Tunis, in Indo-China and generally in its schemes of oversea colonization. Even though the friendly attitude of Germany towards those schemes was not official the contrast was manifest between the benevolent tone of the German press and that of the English, which was generally hostile. Jules Ferry took his stand on the position that his policy was one not of colonial conquest, but of colonial conservation, that without Tunis, Algeria was insecure, that without Tongking and Annam, there was danger of losing Cochin-China, where the French had been in possession since 1861. It was on the Tongking question that Ferry fell. On the 30th of March 1885, on the news of the defeat of the French troops at Lang-Son, the Chamber refused to vote the money for carrying on the campaign by a majority of 306 to 149. Since that day public opinion in France has made amends to the memory of Jules Ferry. His patriotic foresight has been extolled. Criticism has not been spared for the opponents of his policy in parliament of whom the most conspicuous, M. Clémenceau and M. Ribot, have survived to take a leading part in public affairs in the 20th century. The attitude of the Parisian press, which compared Lang-Son with Sedan and Jules Ferry with Émile Ollivier, has been generally deplored, as has that of the public which was ready to offer violence to the fallen minister, and which was still so hostile to him in 1887 that the congress at Versailles was persuaded that there would be a revolution in Paris if it elected "the German Ferry" president of the Republic. Nevertheless his adversaries in parliament, in the press and in the street have been justified—not owing to their superior sagacity, but owing to a series of unexpected events which the most foreseeing statesmen of the world never anticipated. The Indo-China dream of Jules Ferry might have led to a magnificent empire in the East to compensate for that which Dupleix lost and Napoleon failed to reconquer.

The Russian alliance, which came at the time when Ferry's policy was justified in the eyes of the public, too late for him to enjoy any credit, gave a new impetus to the French idea of establishing an empire in the Far East. In the opinion of all the prophets of Europe the great international struggle in the near future was to be that of England with Russia for the possession of India. If Russia won, France might have a share in the dismembered Indian empire, of which part of the frontier now marched with that of French Indo-China, since Burma had become British and Tongking French. Such aspirations were not formulated in white-books or in parliamentary speeches. Indeed, the apprehension of difficulty with England limited French ambition on the Siamese frontier. That did not prevent dangerous friction arising between England and France on the question of the Mekong, the river which flows from China almost due south into the China Sea traversing the whole length of French Indo-China, and forming part of the eastern boundary of Upper Burma and Siam. The aim of France was to secure the whole of the left bank of the Mekong, the highway of commerce from southern China. The opposition of Siam to this delimitation was believed by the French to be inspired by England, the supremacy of France on the Mekong river being prejudicial to British commerce with China. The inevitable rivalry between the two powers reached an acute crisis in 1893, the British ambassador in Paris being Lord Dufferin, who well understood the question, upper Burma having been annexed to India under his viceroyalty in 1885. The matter was not settled until 1894, when not only was the French claim to the left bank of the Mekong allowed, but the neutrality of a 25-kilometre zone on the Siamese bank was conceded as open to French trade. It is said that at one moment in July 1893 England and France were more nearly at war than at any other international crisis under the Third Republic, not excluding that of Fashoda, though the acute tension between the governments was unknown to the public.

The Panama affair had left French public opinion in a nervous condition. Fantastic charges were brought not only in the press, but in the chamber of deputies, against newspapers and politicians of having accepted bribes from the British government. At the general election in August and September 1893 M. Clémenceau was pursued into his distant constituency in the Var by a crowd of Parisian politicians, who brought about his defeat less by alleging his connexion with the Panama scandal than by propagating the legend that he was the paid agent of England. The official republic, which changed its prime minister three times and its foreign minister twice in 1893, M. Develle filling that post in the Ribot and Dupuy ministries and M. Casimir-Périer in his own, repudiated with energy the calumnies as to the attempted interference of England in French domestic affairs. But the successive governments were not in a mood to make concessions in foreign questions, as all France was under the glamour of the preliminary manifestations of the Russian alliance. This was seen, a few weeks after the elections, in the wild enthusiasm with which Paris received Admiral Avelane and his officers, who had brought the Russian fleet to Toulon to return the visit of the French fleet to Kronstadt in 1891. The death of Marshal MacMahon, who had won his first renown in the Crimea, and his funeral at the Invalides while the Russians were in Paris, were used to emphasize the fact that the allies before Sebastopol were no longer friends. The projector of the French empire in the Far East did not live to see this phase of the seeming justification of the policy which had cost him place and popularity. Jules Ferry had died on the 17th of March 1893, only three weeks after his triumphant rehabilitation in the political world by his election to the presidency of the Senate, the second post in the state. The year he died it seemed as though with the active aid of Russia and the sympathy of Germany the possessions of France in south-eastern Asia might have indefinitely expanded into southern China. A few years later the defeat of Russia by Japan and the rise of the sea-power of the Japanese practically ended the French empire in Indo-China. What the French already had at the end of the last century is virtually guaranteed to them only by the Anglo-Japanese alliance. It is in the irony of things that these possessions which were a sign of French rivalry with England should now be secured to France by England's friendliness. For it is now recognized by the French that the defence of Indo-China is impossible.

African policy.

French and English rivalry.

Had the French dream been realized of a large expansion of territory into southern China, the success of the new empire would have been based on free Chinese labour. This might have counterbalanced an initial obstacle to all French colonial schemes, more important than those which arise from international difficulties—the reluctance of the French to establish themselves as serious colonists in their oversea possessions. We have noted how Algeria, which is nearer to Toulon and Marseilles than are Paris and Havre, has been comparatively neglected by the French, after eighty years of occupation, in spite of the amenity of its climate and its soil for European settlers. The new French colonial school advocates the withdrawal of France from adventures in distant tropical countries which can be reached only by long sea voyages, and the concentration of French activity in the northern half of the African continent. Madagascar is, as we have seen, counted as Africa in computing the area of French colonial territory. But it lies entirely outside the scheme of African colonization, and in spite of the loss of life and money incurred in its conquest, its retention is not popular with the new school, although the first claim of France to it was as long ago as the reign of Louis XIII., when in 1642 a company was founded under the protection of Richelieu for the colonization of the island. The French of the 19th and 20th centuries may well be considered less enterprising in both hemispheres than were their ancestors of the 17th, and Madagascar, after having been the cause of much ill-feeling between England and France under the Third Republic down to the time of its formal annexation, by the law of the 9th of August 1896, is not now the object of much interest among French politicians. On the African continent it is different. When the Republic succeeded to the Second Empire the French African possessions outside Algiers were inconsiderable in area. The chief was Senegal, which though founded as a French station under Louis XIII., was virtually the creation of Faidherbe under the Second Empire, even in a greater degree than were Tunis and Tongking of Jules Ferry under the Third Republic. There was also Gabun, which is now included in French Congo. Those outposts in the tropics became the starting-points for the expansion of a French sphere of influence in north Africa, which by the beginning of the 20th century made France the nominal possessor of a vast territory stretching from the equatorial region on the gulf of Guinea to the Mediterranean. A large portion of it is of no importance, including the once mysterious Timbuktu and the wilds of the waterless Sahara desert. But the steps whereby these wide tracts of wilderness and of valuable territory came to be marked on the maps in French colours, by international agreement, are important, as they were associated with the last serious official dispute between England and France before the period of *entente*. M. Hanotaux, who was foreign minister for the then unprecedented term of four years, from 1894 to 1898, with one short interval of a few months, has thrown an instructive light on the feeling with which French politicians up to the end of the 19th century regarded England. He declared in 1909, with the high authority of one who was during years of Anglo-French tension the mouthpiece of the Republic in its relations with other powers, that every move in the direction of colonial expansion made by France disquieted and irritated England. He complained that when France, under the stimulating guidance of Jules Ferry, undertook the reconstitution of an oversea domain, England barred the way—in Egypt, in Tunis, in Madagascar, in Indo-China, in the Congo, in Oceania. Writing with the knowledge of an ex-foreign minister, who had enjoyed many years of retirement to enable him to weigh his words, M. Hanotaux asserted without any qualification that when he took office England "had conceived a triple design, to assume the position of heir to the Portuguese possessions in Africa, to destroy the independence of the South African republics, and to remain in perpetuity in Egypt." We have not to discuss the truth of those propositions, we have only to note the tendency of French policy; and in so doing it is useful to remark that the official belief of the Third Republic in the last period of the 19th century was that England was the enemy of French colonial expansion all over the globe, and that in the so-called scramble for Africa English ambition was the chief obstacle to the schemes of France. M. Hanotaux, with the authority of official knowledge, indicated that the English project of a railway from the Cape of Good Hope to Cairo was the provocation which stimulated the French to essay a similar adventure; though he denied that the Marchand mission and other similar expeditions about to be mentioned were conceived with the specific object of preventing the accomplishment of the British plan. The explorations of Stanley had demonstrated that access to the Great Lakes and the Upper Nile could be effected as easily from the west coast of Africa as from other directions. The French, from their ancient possession of Gabun, had extended their operations far to the east, and had by treaties with European powers obtained the right bank of the Ubanghi, a great affluent of the Congo, as a frontier between their territory and that of the Congo Independent State. They thus found themselves, with respect to Europe, in possession of a region which approached the valley of the Upper Nile. Between the fall of Jules Ferry in 1885 and the beginning of the Russian alliance came a period of decreased activity in French colonial expansion. The unpopularity of the Tongking expedition was one of the causes of the popularity of General Boulanger, who diverted the French public from distant enterprises to a contemplation of the German frontier, and when Boulangism came to an end the Panama affair took its place in the interest it excited. But the colonial party in France did not lose sight of the possibility of establishing a position on the Upper Nile.

Upper Nile exploration.

The partition of Africa seemed to offer an occasion for France to take compensation for the English occupation of Egypt. In 1892 the Budget Commission, on the proposal of M. Étienne, deputy for Oran, who had three times been colonial under secretary, voted 300,000 francs for the despatch of a mission to explore and report on those regions, which had not had much attention since the days of Emin. But the project was not then carried out. Later, parliament voted a sum six times larger for strengthening the French positions on the Upper Ubanghi and their means of communication with the coast. But Colonel Monteil's expedition, which was the consequence of this vote, was diverted, and the 1,800,000 francs were spent at Loango, the southern port of French Congo, and on the Ivory Coast, the French territory which lies between Liberia and the British Gold Coast Colony, where a prolonged war ensued with Samory, a Nigerian chieftain. In September 1894, M. Delcassé being colonial minister, M. Liotard was appointed commissioner of the Upper Ubanghi with instructions to extend French influence in the Bahr-el-Ghazal up to the Nile. In addition to official missions, numerous expeditions of French explorers took place in Central Africa during this period, and negotiations were continually going on between the British and French governments. Towards the end of 1895 Lord Salisbury, who had succeeded Lord Kimberley at the foreign office, informed Baron de Courcel, the French ambassador, that an expedition to the Upper Nile was projected for the purpose of putting an end to Mahdism. M. Hanotaux was not at this moment minister of foreign affairs. He had been succeeded by M. Berthelot, the eminent chemist, who resigned that office on the 26th of March 1896, a month before the fall of the Bourgeois cabinet of which he was a member, in consequence of a question raised in the chamber on this subject of the English expedition to the Soudan. According to M. Hanotaux, who returned to the Quai d'Orsay, in the Méline ministry, on the 29th of April 1896, Lord Salisbury at the end of the previous year, in announcing the expedition confidentially to M. de Courcel, had assured him that it would not go beyond Dongola without a preliminary understanding with France. There must have been a misunderstanding on this point, as after reaching Dongola in September 1896 the Anglo-Egyptian army proceeded up the Nile in the direction of Khartoum.

Marchand mission.

Before M. Hanotaux resumed office the Marchand mission had been formally planned. On the 24th of February 1896 M. Guieysse, colonial minister in the Bourgeois ministry, had signed Captain Marchand's instructions to the effect that he must march through the Upper Ubanghi, in order to extend French influence as far as the Nile, and try to reach that river before Colonel Colvile, who was leading an expedition from the East. He was also advised to conciliate the Mahdi if the aim of the mission could be benefited thereby. M. Liotard was raised to the rank of governor of the Upper Ubanghi, and in a despatch to him the new colonial minister, M. André Lebon, wrote that the Marchand mission was not to be considered a military enterprise, it being sent out with the intention of maintaining the political line which for two years M. Liotard had persistently been following, and of which the establishment of France in the basin of the Nile ought to be the crowning reward. Two days later, on the 25th of June 1896, Captain Marchand embarked for Africa.

Fashoda.

This is not the place for a description of his adventures in crossing the continent or when he encountered General Kitchener at Fashoda, two months after his arrival there in July 1898 and a fortnight after the battle of Omdurman and the capture of Khartoum. The news was made known to Europe by the sirdar's telegrams to the British government in September announcing the presence of the French mission at Fashoda. Then ensued a period of acute tension between the French and English governments, which gave the impression to the public that war between the two countries was inevitable. But those who were watching the situation in France on the spot knew that there was no question of fighting. France was unprepared, and was also involved in the toils of the Dreyfus affair. Had the situation been that of a year later, when the French domestic controversy was ending and the Transvaal War beginning, England might have been in a very difficult position. General Kitchener declined to recognize a French occupation of any part of the Nile valley. A long discussion ensued between the British and French governments, which was ended by the latter deciding on the 6th of November 1898 not to maintain the Marchand mission at Fashoda. Captain Marchand refused to return to Europe by way of the Nile and Lower Egypt, marching across Abyssinia to Jibuti in French Somaliland, where he embarked for France. He was received with well-merited enthusiasm in Paris. But the most remarkable feature of his reception was that the ministry became so alarmed lest the popularity of the hero of Fashoda should be at the expense of that of the parliamentary republic, that it put an end to the public acclamations by despatching him secretly from the capital—a somewhat similar treatment having been accorded to General Dodds in 1893 on his return to France after conquering Dahomey. The Marchand mission had little effect on African questions at issue between France and Great Britain, as a great settlement had been effected while it was on its way across the continent.

Convention of 1898.

On the 14th of June 1898, the day before the fall of the Méline ministry, when M. Hanotaux finally quitted the Quai d'Orsay, a convention of general delimitation was signed at Paris by that minister and by the British ambassador, Sir Edmund Monson, which as regards the respective claims of England and France covered in its scope the whole of the northern half of Africa from Senegambia and the Congo to the valley of the Nile. Comparatively little attention was paid to it amid the exciting events which followed, so little that M. de Courcel has officially recorded that three months later, on the eve of the Fashoda incident, Lord Salisbury declared to him that he was not sufficiently acquainted with the geography of Africa to express an opinion on certain questions of delimitation arising out of the success of the British expedition on the Upper Nile. The convention of June 1898 was, however, of the highest importance, as it affirmed the junction into one vast territory of the three chief African domains of France, Algeria and Tunis, Senegal and the Niger, Chad and the Congo, thus conceding to France the whole of the north-western continent with the exception of Morocco, Liberia and the European colonies on the Atlantic. This arrangement, which was completed by an additional convention on the 21st of March 1899, made Morocco a legitimate object of French ambition.

The entente with England.

The other questions which caused mutual animosity between England and France in the decline of the 19th century had nothing whatever to do with their conflicting international interests. The offensive attitude of the English press towards France on account of the Dreyfus affair was repaid by the French in their criticism of the Boer War. When those sentimental causes of mutual irritation had become less acute, the press of the two countries was moved by certain influences to recognize that it was in their interest to be on good terms with one another. The importance of their commerical relations was brought into relief as though it were a new fact. At last in 1903 state visits between the rulers of England and of France took place in their respective capitals, for the first time since the early days of the Second Empire, followed by an Anglo-French convention signed on the 8th of April 1904. By this an arrangement was come to on outstanding questions of controversy between England and France in various parts of the world. France undertook not to interfere with the action of England in Egypt, while England made a like undertaking as to French influence in Morocco. France conceded certain of its fishing rights in Newfoundland which had been a perpetual source of irritation between the two countries for nearly two hundred years since the treaty of Utrecht of 1713. In return England made several concessions to France in Africa, including that of the Los Islands off Sierra Leone and some rectifications of frontier on the Gambia and between the Niger and Lake Chad. Other points of difference were arranged as to Siam, the New Hebrides and Madagascar. The convention of 1904 was on the whole more advantageous for England than for France. The free hand which England conceded to France in dealing with Morocco was a somewhat burdensome gift owing to German interference; but the incidents which arose from the Franco-German conflict in that country are as yet too recent for any estimate of their possible consequences.

The work of M. Delcassé.

One result was the retirement of M. Delcassé from the foreign office on the 6th of June 1905. He had been foreign minister for seven years, a consecutive period of rare length, only once exceeded in England since the creation of the office, when Castlereagh held it for ten years, and one of prodigious duration in the history of the Third Republic. He first went to the Quai d'Orsay in the Brisson ministry of June 1898, remained there during the Dupuy ministry of the same year, was reappointed by M. Waldeck-Rousseau in his cabinet which lasted from June 1899 to June 1902, was retained in the post by M. Combes till his ministry fell in January 1905, and again by his successor M. Rouvier till his own resignation in June of that year. M. Delcassé had thus an uninterrupted reign at the foreign office during a long critical period of transition both in the interior politics of France and in its exterior relations. He went to the Quai d'Orsay when the Dreyfus agitation was most acute, and left it when parliament was absorbed in discussing the separation of church and state. He saw the Franco-Russian alliance lose its popularity in the country even before the Russian defeat by the Japanese in the last days of his ministry. Although in the course of his official duties at the colonial office he had been partly responsible for some of the expeditions sent to Africa for the purpose of checking British influence, he was fully disposed to pursue a policy which might lead to a friendly understanding with England. In this he differed from M. Hanotaux, who was essentially the man of the Franco-Russian alliance, owing to it much of his prestige, including his election to the French Academy, and Russia, to which he gave exclusive allegiance, was then deemed to be primarily the enemy of England. M. Delcassé on the contrary, from the first, desired to assist a *rapprochement* between England and Russia as preliminary to the arrangement he proposed between England and France. He was foreign minister when the tsar paid his second visit to France, but there was no longer the national unanimity which welcomed him in 1896. M. Delcassé also accompanied President Loubet to Russia when he returned the tsar's second visit in 1902. But exchange of compliments between France and Russia were no longer to be the sole international ceremonials within the attributes of the French foreign office; M. Delcassé was minister when the procession of European sovereigns headed by the kings of England and of Italy in 1903 came officially to Paris, and he went with M. Loubet to London and to Rome on the president's return visits to those capitals—the latter being the immediate cause of the rupture of the concordat with the Vatican, though M. Delcassé was essentially a concordatory minister. His retirement from the Rouvier ministry in June 1905 was due to pressure from Germany in consequence of his opposition to German interference in Morocco. His resignation took place just a week after the news had arrived of the destruction of the Russian fleet by the Japanese, which completed the disablement of the one ally of France. The impression was current in France that Germany wished to give the French nation a fright before the understanding with England had reached an effective stage, and it was actually believed that the resignation of M. Delcassé averted a declaration of war. Although that belief revived to some extent the fading enmity of the French towards the conquerors of Alsace-Lorraine, the fear which accompanied it moved a considerable section of the nation to favour an understanding with Germany in preference to, or even at the expense of, friendly relations with England. M. Clémenceau, who only late in life came into office, and attained it at the moment when a better understanding with England was progressing, had been throughout his long career, of all French public men in all political groups, the most consistent friend of England. His presence at the head of affairs was a guarantee of amicable Anglo-French relations, so far as they could be protected by statesmanship.

By reason of the increased duration and stability of ministries, the personal influence of ministers in directing the foreign policy of France has in one sense become greater in the 20th century than in those earlier periods when France had first to recuperate its strength after the war and then to take its exterior policy from Germany. Moreover, not only have cabinets lasted longer, but the foreign minister has often been retained in a succession of them. Of the thirty years which in 1909 had elapsed since Marshal MacMahon retired and the republic was governed by republicans, in the first fifteen years from 1879 to 1894 fourteen different persons held the office of minister of foreign affairs, while six sufficed for the fifteen years succeeding the latter date. One must not, however, exaggerate the effect of this greater stability in office-holding upon continuity of policy, which was well maintained even in the days when there was on an average a new foreign minister every year. Indeed the most marked breach in the continuity of the foreign policy of France has been made in that later period of long terms of office, which, with the repudiation of the Concordat, has seen the withdrawal of the French protectorate over Roman Catholic missions in the East—though it is too soon to estimate the result. In another respect France has under the republic departed a long way from a tradition of the Quai d'Orsay. It no longer troubles itself on the subject of nationalities. Napoleon III., who had more French temperament than French blood in his constitution, was an idealist on this question, and one of the causes of his own downfall and the defeat of France was his sympathy in this direction with German unity. Since Sedan little has been done in France to further the doctrine of nationalities. A faint echo of it was heard during the Boer war, but French sympathy with the struggling Dutch republics of South Africa was based rather on anti-English sentiment than on any abstract theory. (J. E. C. B.)

Bibliography of French History.—The scientific study of the history of France only begins with the 16th century. It was hampered at first by the traditions of the middle ages and by a servile imitation of antiquity. Paulus Aemilius of Verona (*De rebus gestis Francorum*, 1517), who may be called the first of modern historians, merely applies the oratorical methods of the Latin historiographers. It is not till the second half of the century that history emancipates itself; Catholics and Protestants alike turn to it for arguments in their religious and political controversies. François Hotman published (1574) his *Franco-Gallia*; Claude Fauchet his *Antiquités gauloises et françoises* (1579); Étienne Pasquier his *Recherches de la France* (1611), "the only work of erudition of the 16th century which one can read through without being bored." Amateurs like Petau, A. de Thou, Bongars and Peiresc collected libraries to which men of learning went to draw their knowledge of the past; Pierre Pithou, one of the authors of the *Satire Ménippée*, published the earliest annals of France (*Annales Francorum*, 1588, and *Historiae Francorum scriptores coetanei XI.*, 1596), Jacques Bongars collected in his *Gesta Dei per Francos* (1611–1617) the principal chroniclers of the Crusades. Others made a study of chronology like J. J. Scaliger (*De emendatione temporum*, 1583; *Thesaurus temporum*, 1606), sketched the history of literature, like François Grudé, sieur of La Croix in Maine (*Bibliothèque françoise*, 1584), and Antoine du Verdier (*Catalogue de tous les auteurs qui ont écrit ou traduit en françois*, 1585), or discussed the actual principles of historical research, like Jean Bodin (*Methodus ad facilem historiarum cognitionem*, 1566) and Henri Lancelot Voisin de La Popelinière (*Histoire des histoires*, 1599).

But the writers of history are as yet very inexpert; the *Histoire générale des rois de France* of Bernard de Girard, seigneur de Haillan (1576), the *Grandes Annales de France* of François de Belleforest (1579), the *Inventaire général de l'histoire de France* of Jean de Serres (1597), the *Histoire générale de France depuis Pharamond* of Scipion Dupleix (1621–1645), the *Histoire de France* (1643–1651) of François Eudes de Mézeray, and above all his *Abrégé chronologique de l'histoire* *de France* (1668), are compilations which were eagerly read when they appeared, but are worthless nowadays. Historical research lacked method, leaders and trained workers; it found them all in the 17th century, the golden age of learning which was honoured alike by laymen, priests and members of the monastic orders, especially the Benedictines of the congregation of St Maur. The publication of original documents was carried on with enthusiasm. To André Duchesne we owe two great collections of chronicles: the *Historiae Normannorum scriptores antiqui* (1619) and the *Historiae Francorum scriptores*, continued by his son François (5 vols., 1636–1649). These publications were due to a part only of his prodigious activity; his papers and manuscripts, preserved in the Bibliothèque Nationale at Paris, are an inexhaustible mine. Charles du Fresne, seigneur du Cange, published Villehardouin (1657) and Joinville (1668); Étienne Baluze, the *Capitularia regum Francorum* (1674), the *Nova collectio conciliorum* (1677), the *Vitae paparum Avenionensium* (1693). The clergy were very much aided in their work by their private libraries and by their co-operation; Père Philippe Labbe published his *Bibliotheca nova manuscriptorum* (1657), and began (1671) his *Collection des conciles*, which was successfully completed by his colleague Père Cossart (18 vols.). In 1643 the Jesuit Jean Bolland brought out vol. i. of the *Acta sanctorum*, a vast collection of stories and legends which has not yet been completed beyond the 4th of November. (See BOLLANDISTS.) The Benedictines, for their part, published the *Acta sanctorum ordinis sancti Benedicti* (9 vols., 1668–1701). One of the chief editors of this collection, Dom Jean Mabillon, published on his own account the *Vetera analecta* (4 vols., 1675–1685) and prepared the *Annales ordinis sancti Benedicti* (6 vols., 1703–1793). To Dom Thierri Ruinart we owe good editions of Gregory of Tours and Fredegarius (1699). The learning of the 17th century further inaugurated those specialized studies which are important aids to history. Mabillon in his *De re diplomatica* (1681) creates the science of documents or diplomatics. Adrien de Valois lays a sound foundation for historical geography by his critical edition of the *Notitia Galliarum* (1675). Numismatics finds an enlightened pioneer in François Leblanc (*Traité historique des monnaies de France*, 1690). Du Cange, one of the greatest of the French scholars who have studied the middle ages, has defined terms bearing on institutions in his *Glossarium mediae et infimae latinitatis* (1678), recast by the Benedictines (1733), with an important supplement by Dom Carpentier (1768), republished twice during the 19th century, with additions, by F. Didot (1840–1850), and by L. Favre at Niort (1883–1888); this work is still indispensable to every student of medieval history. Finally, great biographical or bibliographical works were undertaken; the *Gallia christiana*, which gave a chronological list of the archbishops, bishops and abbots of the Gauls and of France, was compiled by two twin brothers, Scévole and Louis de Sainte-Marthe, and by the two sons of Louis (4 vols., 1656); a fresh edition, on a better plan, and with great additions, was begun in 1715 by Denys de Sainte-Marthe, continued throughout the 18th century by the Benedictines, and finished in the 19th century by Barthélemy Hauréau (1856–1861).

As to the nobility, a series of researches and publications, begun by Pierre d'Hozier (d. 1660) and continued well on into the 19th century by several of his descendants, developed into the *Armorial général de la France*, which was remodelled several times. A similar work, of a more critical nature, was carried out by Père Anselme (*Histoire généalogique de la maison de France et des grands officiers de la couronne*, 1674) and by Père Ange and Père Simplicien, who completed the work (3rd ed. in 9 vols., 1726–1733). Critical bibliography is especially represented by certain Protestants, expelled from France by the revocation of the Edict of Nantes. Pierre Bayle, the sceptic, famous for his *Dictionnaire critique* (1699), which is in part a refutation of the *Dictionnaire historique et géographique* published in 1673 by the Abbé Louis Moréri, was the first to publish the *Nouvelles de la république des lettres* (1684–1687), which was continued by Henri Basnage de Beauval under the title of *Histoire des ouvrages des savants* (24 vols.). In imitation of this, Jean Le Clerc successively edited a *Bibliothèque universelle et historique* (1686–1693), a *Bibliothèque choisie* (1703–1713), and a *Bibliothèque ancienne et moderne* (1714–1727). These were the first of our "periodicals."

The 18th century continues the traditions of the 17th. The Benedictines still for some time hold the first place. Dom Edmond Martène visited numerous archives (which were then closed) in France and neighbouring countries, and drew from them the material for two important collections: *Thesaurus novus anecdotorum* (9 vols., 1717, in collaboration with Dom Ursin Durand) and *Veterum scriptorum collectio* (9 vols., 1724–1733). Dom Bernard de Montfaucon also travelled in search of illustrated records of antiquity; private collections, among others the celebrated collection of Gaignières (now in the Bibliothèque Nationale), provided him with the illustrations which he published in his *Monuments de la monarchie françoise* (5 vols., 1729–1733). The text is in two languages, Latin and French. Dom Martin Bouquet took up the work begun by the two Duchesnes, and in 1738 published vol. i. of the Historians of France (*Rerum Gallicarum et Francicarum scriptores*), an enormous collection which was intended to include all the sources of the history of France, grouped under centuries and reigns. He produced the first eight volumes himself; his work was continued by several collaborators, the most active of whom was Dom Michel J. Brial, and already comprised thirteen volumes when it was interrupted by the Revolution. In 1733, Antoine Rivet de La Grange produced vol. i. of the *Histoire littéraire de la France*, which in 1789 numbered twelve volumes. While Dom C. François Toustaint and Dom René Prosper Tassin published a *Nouveau Traité de diplomatique* (6 vols., 1750–1765), others were undertaking the *Art de vérifier les dates* (1750; new and much enlarged edition in 1770). Still others, with more or less success, attempted histories of the provinces.

In the second half of the 18th century, the ardour of the Benedictines of St Maur diminished, and scientific work passed more and more into the hands of laymen. The Académie des Inscriptions et Belles-lettres, founded in 1663 and reorganized in 1701, became its chief instrument, numbering among its members Denis François Secousse, who continued the collection of *Ordonnances des rois de France*, begun (1723) by J. de Laurière; J.-B. de La Curne de Sainte Palaye (*Mémoires sur l'ancienne chevalerie*, 1759–1781; *Glossaire de la langue française depuis son origine jusqu'à la fin de Louis XIV*, printed only in 1875–1882); J.-B. d'Anville (*Notice sur l'ancienne Gaule tirée des monuments*, 1760); and L. G. de Bréquigny, the greatest of them all, who continued the publication of the *Ordonnances*, began the *Table chronologique des diplômes concernant l'histoire de France* (3 vols., 1769–1783), published the *Diplomata, chartae, ad res Francicas spectantia* (1791, with the collaboration of La Porte du Theil), and directed fruitful researches in the archives in London, to enrich the *Cabinet des chartes*, where Henri Bertin (1719–1792), an enlightened minister of Louis XV., had in 1764 set himself the task of collecting the documentary sources of the national history. The example set by the religious orders and the government bore fruit. The general assembly of the clergy gave orders that its *Procès verbaux* (9 vols., 1767–1789) should be printed; some of the provinces decided to have their history written, and mostly applied to the Benedictines to have this done. Brittany was treated by Dom Lobineau (1707) and Dom Morice (1742); the duchy of Burgundy by Dom Urbain Plancher (1739–1748); Languedoc by Dom Dominique Vaissète (1730–1749, in collaboration with Dom Claude de Vic; new ed. 1873–1893); for Paris, its secular history was treated by Dom Michel Félibien and Dom Lobineau (1725), and its ecclesiastical history by the abbé Lebeuf (1745–1760; new ed. 1883–1890).

This ever-increasing stream of new evidence aroused curiosity, gave rise to pregnant comparisons, developed and sharpened the critical sense, but further led to a more and more urgent need for exact information. The Académie des Inscriptions brought out its *Histoire de l'Académie avec les mémoires de littérature tirés de ses registres* (vol. i. 1717; 51 vols. appeared before the Revolution, with five indexes; *vide* the *Bibliographie* of Lasteyrie, vol. iii. pp. 256 et seq.). Other collections, mostly of the nature of bibliographies, were the *Journal des savants* (111 vols., from 1665 to 1792; *vide* the *Table méthodique* by H. Cocheris, 1860); the *Journal de Trévoux*, or *Mémoires pour l'histoire des sciences et des beaux-arts*, edited by Jesuits (265 vols., 1701–1790); the *Mercure de France* (977 vols., from 1724 to 1791). To these must be added the dictionaries and encyclopaedias: the *Dictionnaire de Moréri*, the last edition of which numbers 10 vols. (1759); the *Dictionnaire géographique, historique et politique des Gaules et de la France*, by the abbé J. J. Expilly (6 vols., 1762–1770; unfinished); the *Répertoire universel et raisonné de jurisprudence civile, criminelle, canonique et bénéficiale*, by Guyot (64 vols., 1775–1786; supplement in 17 vols., 1784–1785), reorganized and continued by Merlin de Douai, who was afterwards one of the *Montagnards*, a member of the Directory, and a count under the Empire.

The historians did not use to the greatest advantage the treasures of learning provided for them; they were for the most part superficial, and dominated by their political or religious prejudices. Thus works like that of Père Gabriel Daniel (*Histoire de France*, 3 vols., 1713), of Président Hénault (*Abrégé chronologique*, 1744; 25 editions between 1770 and 1834), of the abbé Paul François Velly and those who completed his work (*Histoire de France*, 33 vols., 1765 to 1783), of G. H. Gaillard (*Histoire de la rivalité de la France et de l'Angleterre*, 11 vols., 1771–1777), and of L. P. Anquetil (1805), in spite of the brilliant success with which they met at first, have fallen into a just oblivion. A separate place must be given to the works of the theorists and philosophers: *Histoire de l'ancien gouvernement de la France*, by the Comte de Boulainvilliers (1727), *Histoire critique de l'établissement de la monarchie françoise dans les deux Gaules*, by the abbé J. B. Dubos (1734); *L'Esprit des lois*, by the président de Montesquieu (1748); the *Observations sur l'histoire de France*, by the abbé de Mably (1765); the *Théorie de la politique de la monarchie française*, by Marie Pauline de Lézardière (1792). These works have, if nothing else, the merit of provoking reflection.

At the time of the Revolution this activity was checked. The religious communities and royal academies were suppressed, and France violently broke with even her most recent past, which was considered to belong to the *ancien régime*. When peace was re-established, she began the task of making good the damage which had been done, but a greater effort was now necessary in order to revive the spirit of the institutions which had been overthrown. The new state, which was, in spite of all, bound by so many ties to the former order of things, seconded this effort, and during the whole of the 19th century, and even longer, had a strong influence on historical production. The section of the Institut de France, which in 1816 assumed the old name of Académie des Inscriptions et Belles-lettres, began to reissue the two series of the *Mémoires* and of the *Notices et extraits des manuscrits tirés de la bibliothèque royale* (the first volume had appeared in 1787); began (1844) that of the *Mémoires présentés par divers savants* and the *Comptes rendus* (subject index 1857–1900, by G. Ledos, 1906); and continued the *Recueil des historiens de France*, the plan of which was enlarged by degrees (*Historiens des croisades, obituaires, pouillés, comptes*, &c.), the *Ordonnances* and the *Table chronologique des diplômes*. During the reign of Louis Philippe, the ministry of the interior reorganized the administration of the archives of the departments, communes and hospitals, of which the *Inventaires sommaires* are a mine of precious information (see the *Rapport au ministre*, by G. Servois, 1902). In 1834 the ministry of public instruction founded a committee, which has been called since 1881 the Comité des Travaux historiques et scientifiques, under the direction of which have been published: (1) the *Collection des documents inédits relatifs à l'histoire de France* (more than 260 vols. have appeared since 1836); (2) the *Catalogue général des manuscrits des bibliothèques de France*; (3) the *Dictionnaires topographiques* (25 vols. have appeared)); and the *Répertoires archéologiques* of the French departments (8 vols. between 1861 and 1888); (4) several series of *Bulletins*, the details of which will be found in the *Bibliographie* of Lasteyrie. At the same time were founded or reorganized, both in Paris and the departments, numerous societies, devoted sometimes partially and sometimes exclusively to history and archaeology; the Académie Celtique (1804), which in 1813 became the Société des Antiquaires de France (general index by M. Prou, 1894); the Société de l'Histoire de France (1834); the Société de l'École des Chartes (1839); the Société de l'Histoire de Paris et de l'Île-de-France (1874; four decennial indexes), &c. The details will be found in the excellent *Bibliographie générale des travaux historiques et archéologiques publiés par les sociétés savantes de France*, which has appeared since 1885 under the direction of Robert de Lasteyrie.

Individual scholars also associated themselves with this great literary movement. Guizot published a *Collection de mémoires relatifs à l'histoire de France* (31 vols., 1824–1835); Buchon, a *Collection des chroniques nationales françaises écrites en langue vulgaire du XIII^e au XVI^e siècle* (47 vols., 1824–1829), and a *Choix de chroniques et mémoires sur l'histoire de France* (14 vols., 1836–1841); Petitot and Monmerqué, a *Collection de mémoires relatifs à l'histoire de France* (131 vols., 1819–1829); Michaud and Poujoulat, a *Nouvelle Collection de mémoires pour servir a l'histoire de France* (32 vols., 1836–1839); Barrière and de Lescure, a *Bibliothèque de mémoires relatifs à l'histoire de France pendant le XVIII^e siècle* (30 vols., 1855–1875); and finally Berville and Barrière, a *Collection des mémoires relatifs à la Révolution Française* (55 vols., 1820–1827). The details are to be found in the *Sources de l'histoire de France*, by Alfred Franklin (1876). The abbé J. P. Migne in his *Patrologia Latina* (221 vols., 1844–1864), re-edited a number of texts anterior to the 13th century. Under the second empire, the administration of the imperial archives at Paris published ten volumes of documents (*Monuments historiques*, 1866; *Layettes du trésor des chartes*, 1863, which were afterwards continued up to 1270; *Actes du parlement de Paris*, 1863–1867), not to mention several volumes of *Inventaires*. The administration of the Bibliothèque impériale had printed the *Catalogue général de l'histoire de France* (10 vols., 1855–1870; vol. xi., containing the alphabetical index to the names of the authors, appeared in 1895). Other countries also supplied a number of useful texts; there is much in the English Rolls series, in the collection of *Chroniques belges*, and especially in the *Monumenta Germaniae historica*.

At the same time the scope of history and its auxiliary sciences becomes more clearly defined; the École des Chartes produces some excellent palaeographers, as for instance Natalis de Wailly (*Éléments de paléographie*, 1838), and L. Delisle (*q.v.*), who has also left traces of his profound researches in the most varied departments of medieval history (*Bibliographie des travaux de M. Léopold Delisle*, 1902); Anatole de Barthélemy made a study of coins and medals, Douët d'Arcq and G. Demay of seals. The works of Alexandre Lenoir (*Musée des monuments français*, 1800–1822), of Arcisse de Caumont (*Histoire de l'architecture du moyen âge*, 1837; *Abécédaire ou rudiment d'archéologie*, 1850), of A. Napoléon Didron (*Annales archéologiques*, 1844), of Jules Quicherat (*Mélanges d'archéologie et d'histoire*, published after his death, 1886), and the dictionaries of Viollet le Duc (*Dictionnaire raisonné de l'architecture française*, 1853–1868; *Dictionnaire du mobilier français*, 1855) displayed to the best advantage one of the most brilliant sides of the French intellect, while other sciences, such as geology, anthropology, the comparative study of languages, religions and folk-lore, and political economy, continued to enlarge the horizon of history. The task of writing the general history of a country became more and more difficult, especially for one man, but the task was none the less undertaken by several historians, and by some of eminence. François Guizot treated of the *Histoire de la civilisation en France* (1828–1830); Augustin Thierry after the *Récits des temps mérovingiens* (1840) published the *Monuments de l'histoire du tiers état* (1849–1856), the introduction to which was expanded into a book (1855); Charles Simonde de Sismondi produced a mediocre *Histoire des français* in 31 vols. (1821–1844), and Henri Martin a *Histoire de France* in 16 vols. (1847–1854), now of small use except for the two or three last centuries of the *ancien régime*. Finally J. Michelet, in his *Histoire de France* (17 vols., 1833–1856) and his *Histoire de la Révolution* (7 vols., 1847–1853), aims at reviving the very soul of the nation's past.

After the Franco-German War begins a better organization of scientific studies, modelled on that of Germany. The École des Hautes Études, established in 1868, included in its programme the critical study of the sources, both Latin and French, of the history of France; and from the *séminaire* of Gabriel Monod came men of learning, already prepared by studying at the École des Chartes: Paul Viollet, who revived the study of the history of French law; Julien Havet, who revived that of Merovingian diplomatics; Arthur Giry, who resumed the study of municipal institutions where it had been left by A. Thierry, prepared the *Annales carolingiennes* (written by his pupils, Eckel, Favre, Lauer, Lot, Poupardin), and brought back into honour the study of diplomatics (*Manuel de diplomatique*, 1894); Auguste Molinier, author of the *Sources de l'histoire de France* (1902–1904; general index, 1906), &c. Auguste Longnon introduced at the École des Hautes Études the study of historical geography (*Atlas historique de la France*, in course of publication since 1888). The universities, at last reorganized, popularized the employment of the new methods. The books of Fustel de Coulanges and Achille Luchaire on the middle ages, and those of A. Aulard on the revolution, gave a strong, though well-regulated, impetus to historical production. The École du Louvre (1881) increased the value of the museums and placed the history of art among the studies of higher education, while the Musée archéologique of St-Germain-en-Laye offered a fruitful field for research on Gallic and Gallo-Roman antiquities. Rich archives, hitherto inaccessible, were thrown open to students; at Rome those of the Vatican (*Registres pontificaux*, published by students at the French school of archaeology, since 1884); at Paris, those of the Foreign Office (*Recueil des instructions données aux ambassadeurs depuis le traité de Westphalie*, 16 vols., 1885–1901; besides various collections of diplomatic papers, inventories, &c.). Those of the War Office were used by officers who published numerous documents bearing on the wars of the Revolution and the Empire, and on that of 1870–1871). In 1904 a commission, generously endowed by the French parlement, was entrusted with the task of publishing the documents relating to economic and social life of the time of the Revolution, and four volumes had appeared by 1908. Certain towns, Paris, Bordeaux, &c., have made it a point of honour to have their chief historical monuments printed. The work now becomes more and more specialized. *L'Histoire de France*, by Ernest Lavisse (1900, &c.), is the work of fifteen different authors. It is therefore more than ever necessary that the work should be under sound direction. The *Manuel de bibliographie historique* of Ch. V. Langlois (2nd edition, 1901–1904) is a good guide, as is his *Archives de l'histoire de France* (1891, in collaboration with H. Stein).

Besides the special bibliographies mentioned above, it will be useful to consult the *Bibliothèque historique* of Père Jacques Lelong (1719; new ed. by Fevret de Fontette, 5 vols., 1768–1778); the *Geschichte der historischen Forschung und Kunst* of Ludwig Wachler (2 vols., 1812–1816); *the Bibliographie de la France*, established in 1811 (1st series, 1811–1856, 45 vols.; 2nd series, 1 vol. per annum since 1857); the publications of the Société de Bibliographie (*Polybiblion*, from 1868 on, &c.); the *Bibliographie de l'histoire de France*, by Gabriel Monod (1888); the *Répertoire* of the abbé Ulysse Chevalier (*Biobibliographie*; new ed. 1903–1907; and *Topobibliographie*, 1894–1899). Bearing exclusively on the middle ages are the *Bibliotheca historica medii aevi* of August Potthast (new ed. 1896) and the *Manuel* (*Les Sources de l'histoire de France*, 1901, &c.) of A. Molinier; but the latter is to be continued up to modern times, the 16th century having already been begun by Henri Hausser (1st part, 1906). Finally, various special reviews, besides teaching historical method by criticism and by example, try to keep their readers *au courant* with literary production; the *Revue critique d'histoire et de littérature* (1866 fol.), the *Revue des questions historiques* (1866 fol.), the *Revue historique* (1876 fol.), the *Revue d'histoire moderne et contemporaine*, accompanied annually by a valuable *Répertoire méthodique* (1898 fol.); the *Revue de synthèse historique* (1900 fol.), &c. (C. B.*)

French Law and Institutions

Celtic Period.—The remotest times to which history gives us access with reference to the law and institutions formerly existing in the country which is now called France are those in which the dominant race at least was Celtic. On the whole, our knowledge is small of the law and institutions of these Celts, or Gauls, whose tribes constituted independent Gaul. For their reconstruction, modern scholars draw upon two sources; firstly, there is the information furnished by the classical writers and by Caesar and Strabo in particular, which is trustworthy but somewhat scanty; the other source, which is not so pure, consists in the accounts found in those legal works of the middle ages written in the neo-Celtic dialects, the most important and the greater number of which belong to Ireland. A reconstruction from them is always hazardous, however delicate and scientific be the criticism which is brought to bear on it, as in the case of d'Arbois de Jubainville, for example. Moreover, in the historical evolution of French institutions those of the Celts or Gauls are of little importance. Not one of them can be shown to have survived in later law. What has survived of the Celtic race is the blood and temperament, still found in a great many Frenchmen, certain traits which the ancients remarked in the Gauls being still recognizable: *bellum gerere et argute loqui.*

Roman Period.—It was the Roman conquest and rule which really formed Gaul, for she was Romanized to the point of losing almost completely that which persists most stubbornly in a conquered nation, namely, the language; the Breton-speaking population came to France later, from Britain. The institutions of Roman Gaul became identical with those of the Roman empire, provincial and municipal government undergoing the same evolution as in the other parts of the empire. It was under Roman supremacy too, as M. d'Arbois de Jubainville has shown, that the ownership of land became personal and free in Gaul. The law for the Gallo-Romans was that which was administered by the *conventus* of the magistrate; there are only a few peculiarities, mere Gallicisms, resulting from conventions or usage, which are pointed out by Roman jurisconsults of the classical age. The administrative reforms of Diocletian and Constantine applied to Gaul as to the rest of the empire. Gaul under this rule consisted of seventeen provinces, divided between two dioceses, ten in the diocese of the Gauls, under the authority of the praetorian prefect, who resided at Treves; and the other seven in the *dioecesis septem provinciarum*, under the authority of a *vicarius*. The Gallo-Romans became Christian with the other subjects of the empire; the Church extended thither her powerful organization modelled on the administrative organization, each *civitas* having a bishop, just as it had a *curia* and municipal magistrates. But, although endowed with privileges by the Christian emperors, the Church did not yet encroach upon the civil power. She had the right of acquiring property, of holding councils, subject to the imperial authority, and of the free election of bishops. But only the first germs of ecclesiastical jurisdiction are to be traced. In virtue of the laws, the bishops were privileged arbitrators, and in the matter of public sins exercised a disciplinary jurisdiction over the clergy and the faithful. In the second half of the 4th century, monasteries appeared in Gaul. After the fall of the Western empire, there was left to the Gallo-Romans as an expression of its law, which was also theirs, a written legislation. It consisted of the imperial constitutions, contained in the Gregorian, Hermogenian and Theodosian codes (the two former being private compilations, and the third an official collection), and the writings of the five jurists (Gaius, Papinian, Paulus, Ulpian and Modestinus), to which Valentinian III. had in 426 given the force of law.

The Barbarian Invasion.—The invasions and settlements of the barbarians open a new period. Though there were robbery and violence in every case, the various barbarian kingdoms set up in Gaul were established under different conditions. In those of the Burgundians and Visigoths, the owners of the great estates, which had been the prevailing form of landed property in Roman Gaul, suffered partial dispossession, according to a system the rules regulating which can, in the case of the Burgundians, be traced almost exactly. It is doubtful whether a similar process took place in the case of the Frankish settlements, but their first conquests in the north and east seem to have led to the extermination or total expulsion of the Gallo-Roman population. It is impossible to say to what extent, in these various settlements, the system of collective property prevailing among the Germanic tribes was adopted. Another important difference was that, in embracing Christianity, some of the barbarians became Arians, as in the case of the Visigoths and Burgundians; others Catholic, as in the case of the Franks. This was probably the main cause of the absorption of the other kingdoms into the Frankish monarchy. In each case, however, the barbarian king appeared as wishing not to overthrow the Roman administration, but to profit by its continuation. The kings of the Visigoths and Burgundians were at first actually representatives of the Western empire, and Clovis himself was ready to accept from the emperor Anastasius the title of consul; but these were but empty forms, similar to the fictitious ties which long existed or still exist between China or Turkey and certain parts of their former empires, now separated from them for ever.

As soon as the Merovingian monarch had made himself master of Gaul, he set himself to maintain and keep in working order the administrative machinery of the Romans, save that the administrative unit was henceforth no longer the *provincia* but the *civitas*, which generally took the name of *pagus*, and was placed under the authority of a count, *comes* or *grafio* (*Graf*). Perhaps this was not entirely an innovation, for it appears that at the end of the Roman supremacy certain *civitates* had already a *comes*. Further, several *pagi* could be united under the authority of a *dux*. The *pagus* seems to have generally been divided into hundreds (*centenae*).

But the Roman administrative machinery was too delicate to be handled by barbarians; it could not survive for long, but underwent changes and finally disappeared. Thus the Merovingians tried to levy the same direct taxes as the Romans had done, the *capitatio terrena* and the *capitatio humana*, but they ceased to be imposts reassessed periodically in accordance with the total sum fixed as necessary to meet the needs of the state, and became fixed annual taxes on lands or persons; finally, they disappeared as general imposts, continuing to exist only as personal or territorial dues. In the same way the Roman municipal organization, that of the *curiae*, survived for a considerable time under the Merovingians, but was used only for the registration of written deeds; under the Carolingians it disappeared, and with it the old senatorial nobility which had been that of the Empire. The administration of justice (apart from the king's tribunal) seems to have been organized on a system borrowed partly from Roman and partly from Germanic institutions; it naturally tends to assume popular forms. Justice is administered by the count (*comes*) or his deputy (*centenarius* or *vicarius*), but on the verdict of notables called in the texts *boni homines* or *rachimburgii*. This takes place in an assembly of all the free subjects, called *mallus*, at which every free man is bound to attend at least a certain number of times a year, and in which are promulgated the general acts emanating from the king. The latter could issue commands or prohibitions under the name of *bannus*, the violation of which entailed a fine of 60 *solidi*; the king also administered justice (*in palatio*), assisted by the officers of his household, his jurisdiction being unlimited and at the same time undefined. He could hear all causes, but was not bound to hear any, except, apparently, accusations of deliberate failure of justice and breach of trust on the part of the *rachimburgii*.

But what proved the great disturbing element in Gallo-Roman society was the fact that the conquerors, owing to their former customs and the degree of their civilization, were all warriors, men whose chief interest was to become practised in the handling of arms, and whose normal state was that of war. It is true that under the Roman empire all the men of a *civitas* were obliged, in case of necessity, to march against the enemy, and under the Frankish monarchy the count still called together his *pagenses* for this object. But the condition of the barbarian was very different; he lived essentially for fighting. Hence those gatherings or annual reviews of the *Campus Martius*, which continued so long, in Austrasia at least. They constituted the chief armed force; for mercenary troops, in spite of the assertions of some to the contrary, play at this period only a small part. But this military class, though not an aristocracy (for among the Franks the royal race alone was noble), was to a large extent independent, and the king had to attach these *leudes* or *fideles* to himself by gifts and favours. At the same time the authority of the king gradually underwent a

Character of the Merovingian kingship.

change in character, though he always claimed to be the successor of the Roman emperor. It gradually assumed that domestic or personal character that, among the Germans, marked most of the relations between men. The household of the king gained in political importance, by reason that the heads of the principal offices in the palace became at the same time high public officials. There was, moreover, a body of men more especially attached to the king, the *antrustions* (*q.v.*) and the commensals (*convivae regis*) whose *weregeld* (*i.e.* the price of a man's life in the system of compensation then prevalent) was three times greater than that of the other subjects of the same race.

The Frankish monarch had also the power of making laws, which he exercised after consulting the chief men of the kingdom, both lay and ecclesiastical, in the *placita*, which were meetings differing from the *Campus Martius* and apparently modelled principally on the councils of the Church. But throughout the kingdom in many places the direct authority of the king over the people ceased to make itself felt. The *immunitates*, granted chiefly to the great ecclesiastical properties, limited this authority in a curious way by forbidding public officials to exercise their functions in the precinct of land which was *immunis*. The judicial and fiscal rights frequently passed to the landowner, who in any case became of necessity the intermediary between the supreme power and the people. In regard to this last point, moreover, the case seems to have been the same with all the great landowners or *potentes*, whose territory was called *potestas*, and who gained a real authority over those living within it; later in the middle ages they were called *homines potestatis* (*hommes de poeste*).

Other principles, arising perhaps less from Germanic custom strictly speaking than from an inferior level of civilization, also contributed towards the weakening of the royal power. The monarch, like his contemporaries, considered the kingdom and the rights of the king over it to be his property; consequently, he had the power of dealing with it as if it were a private possession; it is this which gave rise to the concessions of royal rights to individuals, and later to the partitions of the kingdom, and then of the empire, between the sons of the king or emperor, to the exclusion of the daughters, as in the division of an inheritance in land. This proved one of the chief weaknesses of the Merovingian monarchy.

Position of the Church.

In order to rule the Gallo-Romans, the barbarians had had inevitably to ask the help of the Church, which was the representative of Roman civilization. Further, the Merovingian monarch and the Catholic Church had come into close alliance in their struggle with the Arians. The result for the Church had been that she gained new privileges, but at the same time became to a certain extent dependent. Under the Merovingians the election of the bishop *a clero et populo* is only valid if it obtains the assent (*assensus*) of the king, who often directly nominates the prelate. But at the same time the Church retains her full right of acquiring property, and has her jurisdiction partially recognized; that is to say, she not only exercises more freely than ever a disciplinary jurisdiction, but the bishop, in place of the civil power, administers civil and criminal justice over the clergy. The councils had for a long time forbidden the clergy to cite one another before secular tribunals; they had also, in the 6th century, forbidden secular judges under pain of excommunication to cite before them and judge the clergy, without permission of the bishop. A decree of Clotaire II. (614) acknowledged the validity of these claims, but not completely; a precise interpretation of the text is, however, difficult.

Carolingian period.

Beginnings of the feudal system.

The Merovingian dynasty perished of decay, amid increasing anarchy. The crown passed, with the approval of the papacy, to an Austrasian mayor of the palace and his family, one of those mayors of the palace (*i.e.* chief officer of the king's household) who had been the last support of the preceding dynasty. It was then that there developed a certain number of institutions, which offered themselves as useful means of consolidating the political organism, and were in reality the direct precursors of feudalism. One was the royal benefice (*beneficium*), of which, without doubt, the Church provided both the model and, in the first instance, the material. The model was the *precaria*, a form of concession by which it was customary for the Church to grant the possession of her lands to free men; this practice she herself had copied from the five-years leases granted by the Roman exchequer. Gradually, however, the *precaria* had become a concession made, in most cases, free and for life. As regards the material, when the Austrasian mayors of the palace (probably Charles Martel) wished to secure the support of the *fideles* by fresh benefits, the royal treasury being exhausted, they turned to the Church, which was at that time the greatest landowner, and took lands from her to give to their warriors. In order to disguise the robbery it was decided—perhaps as an afterthought—that these lands should be held as *precariae* from the Church, or from the monastic houses which had furnished them. Later, when the royal treasury was reorganized, the grants of land made by the kings naturally took a similar form: the *beneficium*, as a free grant for life. Under the Merovingians royal grants of land were in principle made in full ownership, except, as Brunner has shown, that provision was made for a revocation under certain circumstances. No special services seem to have been attached to the benefice, whether granted by the king or by some other person, but, in the second half of the 9th century at least, the possession of the benefice is found as the characteristic of the military class and the form of their pay. This we find clearly set forth in the treatise *de ecclesiis et capellis* of Hincmar of Reims. The *beneficium*, in obedience to a natural law, soon tended to crystallize into a perpetual and hereditary right. Another institution akin to the *beneficium* was the *senioratus*; by the *commendatio*, a form of solemn contract, probably of Germanic origin, and chiefly characterized by the placing of the hands between those of the lord, a man swore absolute fidelity to another man, who became his *senior*. It became the generally received idea (as expressed in the capitularies) that it was natural and normal for every free man to have a *senior*. At the same time a benefice was never granted unless accompanied by the *commendatio* of the beneficiary to the grantor. As the most important *seniores* were thus bound to the king and received from him their benefices, he expected through them to command their men; but in reality the king disappeared little by little in the *senior*. The king granted as benefices not only lands, but public functions, such as those of count or *dux*, which thus became possessions, held, first for life, and later as hereditary properties. The Capitulary of Kiersy-sur-Oise (877), which was formerly considered to have made fiefs legally and generally hereditary, only proves that it was already the custom for benefices of this kind, *honores*, to pass from the father to one of the sons.

Reforms of Charlemagne.

Charlemagne, while sanctioning these institutions, tried to arrest the political decomposition. He reorganized the administration of justice, fixing the respective jurisdictions of the count and the *centenarius*, substituting for the *rachimburgii* permanent *scabini*, chosen by the count in the presence of the people, and defining the relations of the count, as the representative of the central authority, with the *advocati* or *judices* of *immunitates* and *potestates*. He reorganized the army, determining the obligations and the military outfit of free men according to their means. Finally, he established those regular inspections by the *missi dominici* which are the subject of so many of his capitularies. From the *De ordine palatii* of Hincmar of Reims, who follows the account of a contemporary of the great emperor, we learn that he also regularly established two general assemblies, *conventus* or *placita*, in the year, one in the autumn, the other in the spring, which were attended by the chief officials, lay and ecclesiastical. It was here that the capitularies (*q.v.*) and all important measures were first drawn up and then promulgated. The revenues of the Carolingian monarch (which are no longer indentical with the finances of the state) consisted chiefly in the produce of the royal lands (*villae*), which the king and his suite often came and

Carolingian fiscal system.

The Church under Charlemagne.

consumed on the spot; and it is known how carefully Charlemagne regulated the administration of the *villae*. There were also the free gifts which the great men were bound, according to custom, to bring to the *conventus*, the contributions of this character from the monasteries practically amounting to a tax; the regular personal or territorial dues into which the old taxes had resolved themselves; the profits arising from the courts (the royal *bannus*, and the *fredum*, or part of the compensation-money which went to the king); finally, numberless requisitions in kind, a usage which had without doubt existed continuously since Roman times. The Church was loaded with honours and had added a fresh prerogative to her former privileges, namely, the right of levying a real tax in kind, the *tithe*. Since the 3rd century she had tried to exact the payment of tithes from the faithful, interpreting as applicable to the Christian clergy the texts in the Old Testament bearing on the Levites; Gallican councils had repeatedly proclaimed it as an obligation, though, it appears, with little success. But from the reign of Pippin the Short onwards the civil law recognized and sanctioned this obligation, and the capitularies of Charlemagne and Louis the Debonnaire contain numerous provisions dealing with it. Ecclesiastical jurisdiction extended farther and farther, but Charlemagne, the protector of the papacy, maintained firmly his authority over the Church. He nominated its dignitaries, both bishops and abbots, who were true ecclesiastical officials, parallel with the lay officials. In each *pagus*, bishop and count owed each other mutual support, and the *missi* on the same circuit were ordinarily a count and a bishop. In the first collection of capitularies, that of Ansegisus, two books out of four are devoted to ecclesiastical capitularies.

The law under the Frank monarchy.

What, then, was the private and criminal law of this Frankish monarchy which had come to embrace so many different races? The men of Roman descent continued under the Roman law, and the conquerors could not hope to impose their customs upon them. The authorized expression of the Roman law was henceforth to be found in the *Lex romana Wisigothorum* or *Breviarium Alarici*, drawn up by order of Alaric II. in 506. It is an abridgment of the codes, of that of Theodosius especially, and of certain of the writings of the jurists included under the Law of Citations. As to the barbarians, they had hitherto had nothing but customs, and these customs, of which the type nearest to the original is to be found in the oldest text of the *Lex Salica*, were nothing more than a series of tariffs of compensations, that is to say, sums of money due to the injured party or his family in case of crimes committed against individuals, for which crimes these compensations were the only penalty. They also introduced a barbarous system of trial, that by compurgation, *i.e.* exculpation by the oath of the defendant supported by a certain number of *cojurantes*, and that by ordeal, later called *judicium Dei*. In each new kingdom the barbarians naturally kept their own laws, and when these men of different races all became subject to the Frankish monarchy, there evolved itself a system (called the *personnalité des lois*) by which every subject had, in principle, the right to be tried by the law of the race to which he belonged by birth (or sometimes for some other reason, such as emancipation or marriage). When the two adversaries were of different race, it was the law of the defendant which had to be applied. The customs of the barbarians had been drawn up in Latin. Sometimes, as in the case of the first text of the Salic law, the system on which they were compiled is not exactly known; but it was generally done under the royal authority. At this period only these written documents bear the name of "law" (*leges romanorum*; *leges barbarorum*), and at least the tacit consent of the people seems to have been required for these collections of laws, in accordance with an axiom laid down in a later capitulary; *lex fit consensu populi et constitutione regis*. It is noteworthy, too, that in the process of being drawn up in Latin, most of the *leges barbarorum* were very much Romanized.

In the midst of this diversity, a certain number of causes tended to produce a partial unity. The capitularies, which had in themselves the force of law, when there was no question of modifying the *leges*, constituted a legislation which was the same for all; often they inflicted corporal punishment for grave offences, which applied to all subjects without distinction. Usage and individual convenience led to the same result. The Gallo-Romans, and even the Church itself, to a certain extent, adopted the methods of trial introduced by the Germans, as was likely in a country relapsing into barbarism. On the other hand, written acts became prevalent among the barbarians, and at the same time they assimilated a certain amount of Roman law; for these acts continued to be drawn up in Latin, after Roman models, which were in most cases simply misinterpreted owing to the general ignorance. The type is preserved for us in those collections of *Formulae*, of which complete and scientific editions have been published by Eugène de Rozière and Carl Zeumer. During this period, too, the Gallican Church adopted the collection of councils and decretals, called later the *Codex canonum ecclesiae Gallicanae*, which she continued to preserve. This collection was that of Dionysius Exiguus, which was sent to Charlemagne in 774 by Pope Adrian I. But in the course of the 9th century apocryphal collections were also formed in the Gallican Church: the False Capitularies of Benedictus Levita, and the False Decretals of Isidorus Mercator (see DECRETALS).

All the subjects of the Frankish monarchy were not of equal status. There was, strictly speaking, no nobility, both the Roman and the Germanic nobility having died out; but slavery continued to exist. The Church, however, was preparing the transformation of the slave into the serf, by giving force and validity to their marriages, in cases, at least, when the master had approved of them, and by forbidding the latter unjustly to seize the slave's *peculium*. But between the free man (*ingenuus*) and the slave lay a number of persons of intermediate status; they possessed legal personality but were subject to incapacities of various kinds, and had to perform various duties towards other men. There was, to begin with, the Roman colonist (*colonus*), a class as to the origin of which there is still a controversy, and of which there is no clear mention in the laws before the 4th century; they and their children after them were attached perpetually to a certain piece of land, which they were allowed to cultivate on payment of a rent. There were, further, the *liti* (*litus* or *lidus*), a similar class of Germanic origin; also the greater number of the freedmen or descendants of freedmen. Many free men who had fled to the great landowners for protection took, by arrangement or by custom, a similar position. Under the Merovingian régime, and especially under the Carolingians, the occupation of the land tended to assume the character of tenure; but free ownership of land continued to exist under the name of *alod* (*alodis*), and there is even evidence for the existence of this in the form of small properties, held by free men; the capitularies contain numerous complaints and threats against the counts, who endeavoured by the abuse of their power to obtain the surrender of these properties.

Anarchy and feudal origins.

Period of Anarchy and the Rise of Feudalism.—The 10th and 11th centuries were a period of profound anarchy, during which feudalism was free to develop itself and to take definitive shape. At that time the French people may be said to have lived without laws, without even fixed customs and without government. The legislative power was no longer exercised, for the last Carolingian capitularies date from the year 884, and the first laws of the Capetian kings (if they may be called laws) do not appear till during the 12th century. During this period the old capitularies and *leges* fell into disuse and in their place territorial customs tended to grow up, their main constituents being furnished by the law of former times, but which were at the outset ill-defined and strictly local. As to the government, if the part played by the Church be excepted, we shall see that it could be nothing but the application of brute force. In this anarchy, as always happens under similar conditions, men drew together and formed themselves into groups for mutual defence. A nucleus was formed which was to become the new social unit, that is to say, the feudal group. Of this the centre was a chief, around whom gathered men capable of bearing arms, who commended themselves to him according to the old form of vassalage, *per manus*. They owed him fidelity and assistance, the support of their arms but not of their purse, save in quite exceptional cases; while he owed them protection. Some of them lived in his castle or fortified house, receiving their equipment only and eating at his table. Others received lands from him, which were, or later became, fiefs, on which they lived *casati*. The name fief, *feudum*, does not appear, however, till towards the end of this period; these lands are frequently called *beneficia* as before; the term most in use at first, in many parts, is *casamentum*. The fief, moreover, was generally held for life and did not become generally hereditary till the second half of the 11th century. The lands kept by the chief and those which he granted to his men were for the most part rented from him, or from them, for a certain amount in money or in kind. All these conditions had already existed previously in much the same form; but the new development is that the chief was no longer, as before, merely an intermediary between his men and the royal power. The group had become in effect independent, so organized as to be socially and politically self-sufficient. It constituted a small army, led, naturally, by the chief, and composed of his feudatories, supplemented in case of need by the *rustici*. It also formed an assembly in which common interests were discussed, the lord, according to custom, being bound to consult his feudatories and they to advise him to the best of their power. It also formed a court of justice, in which the feudatories gave judgment under the presidency of their lord; and all of them claimed to be subject only to the jurisdiction of this tribunal composed of their peers. Generally they also judged the villeins (*villani*) and the serfs dependent on the group, except in cases where the latter obtained as a favour judges of their own status, which was, however, at that time a very rare occurrence.

Under these conditions a nobility was formed, those men becoming nobles who were able to devote themselves to the profession of arms and were either chiefs or soldiers in one of the groups which have just been described. The term designating a noble, *miles*, corresponds also to that of knight (Fr. *chevalier*, Low Lat. *caballerius*), for the reason that chivalry, of which the origins are uncertain, represents essentially the technical skill and professional duties of this military class. Every noble was destined on coming of age to become a knight, and the knight equally as a matter of course received a fief, if he had not one already by hereditary title. This nobility, moreover, was not a caste but could be indefinitely recruited by the granting of fiefs and admission to knighthood (see KNIGHTHOOD AND CHIVALRY).

Private war.

The state of anarchy was by now so far advanced that war became an individual right, and the custom of private war arose. Every man had in principle the right of making war to defend his rights or to avenge his wrongs. Later on, doubtless, in the 13th century, this was a privilege of the noble (*gentilhomme*); but the texts defining the limits which the Church endeavoured to set to this abuse, namely, the Peace of God and the Truce of God, show that this was at the outset a power possessed by men of all classes. Even a man who had appeared in a court of law and received judgment had the choice of refusing to accept the judgment and of making war instead. Justice, moreover, with its frequent employment of trial by combat, did not essentially differ from private war.

It is unnecessary to go further and to affirm, with certain historians of our time, for example Guilhermoz and Sée, that the only free men at that time, besides the clergy, were the nobles, all the rest being serfs. There are many indications which lead us to assume, not only in the towns but even in the country districts, the existence of a class of men of free status who were not *milites*, the class later known in the 13th century as *vilains*, *hommes de poeste*, and, later, *roturiers*. The fact more probably was that only the nobles and ecclesiastics were exempt from the exactions of the feudal lords; while from all the others the seigneurs could at pleasure levy the *taille* (a direct and arbitrary tax), and those innumerable rights then called *consuetudines*. Free ownership, the *allodium*, even under the form of small freeholds, still existed by way of exception in many parts.

Had, then, the main public authority disappeared? This is practically the contention of certain writers, who, like M. Sée, maintain that real property, the possession of a domain, conferred on the big landed proprietor all rights of taxation, command and coercion over the inhabitants of his domain, who, according to this view, were always serfs. But this is an exaggeration of the thesis upheld by old French authors, who saw in feudalism, though in a different sense, a confusion of property with sovereignty. It appears that in this state of political disintegration each part of the country which had a homogeneous character tended to form itself into a higher unit. In this unit there arose a powerful lord, generally a duke, a count, or a viscount, who sometimes came to be called the *capitalis dominus*. He was either a former official of the monarchy, whose function had become hereditary, or a usurper who had formed himself on this model. He laid claim to an authority other than that conferred by the possession of real property. He still claimed to exercise over the whole of his former district certain rights, which we see him sometimes surrendering for the benefit of churches or monasteries. His court of justice was held in the highest honour, and to it were referred the most important affairs. But in this district there were generally a number of more or less powerful lords, who as a rule had as yet no particular feudal title and are often given the name of *principes*. Often, but not always, they had commended themselves to this duke or count by doing homage.

The royal power.

On the other hand, the royal power continued to exist, being recognized by a considerable part of old Gaul, the *regnum Francorum*. But under the last of the Carolingians it had in fact become elective, as is shown by the elections of Odo and Robert before that of Hugh Capet. The electors were the chief lords and prelates of the *regnum Francorum*. But following a clever policy, each king during his lifetime took as partner of his kingdom his eldest son and consecrated and crowned him in advance, so that the first of the Capetians revived the principle of heredity in favour of the eldest son, while establishing the hereditary indivisibility of the kingdom. This custom was recognized at the accession of Louis the Fat, but the authority of the king was very weak, being merely a vague allegiance. His only real authority lay where his own possessions were, or where there had not arisen a duke, a count, or lord of equal rank with them. He maintained, however, a general right of administering justice, a *curia*, the jurisdiction of which seems to have been universal. It is true that the parties in a suit had to submit themselves to it voluntarily, and could accept or reject the judgment given, but this was at that time the general rule. The king dispensed justice surrounded by the officers of his household (*domestici*), who thus formed his council; but these were not the only ones to assist him, whether in court or council. Periodically, at the great yearly festivals, he called together the chief lords and prelates of his kingdom, thus carrying on the tradition of the Carolingian *placita* or *conventus*; but little by little, with the appropriation of the *honores*, the character of the gathering changed; it was no longer an assembly of officials but of independent lords. This was now called the *curia regis*.

The Church.

While the power of the State was almost disappearing, that of the Church, apart from the particular acts of violence of which she was often the victim, continued to grow. Her jurisdiction gained ground, since her procedure was reasonable and comparatively scientific (except that she admitted to a certain extent compurgation by oath and the *judicia Dei*, with the exception of trial by combat). Not only was the privilege of clergy, by which accused clerks were brought under her jurisdiction, almost absolute, but she had cognizance of a number of causes in which laymen only were concerned, marriage and everything nearly or remotely affecting it, wills, crimes and offences against religion; and even contracts, when the two parties wished it or when the agreement was made on oath, came within her competence. Such, then, were the ecclesiastical or Christian courts (*cours d'église, course de chrétienté*). The Church, moreover, remained in close connexion with the crown, the king preserving a quasi-ecclesiastical character, while the royal prerogatives with regard to the election of bishops were maintained more successfully than the rights of the crown, though in many of the great fiefs they none the less passed to the count or the duke. It was at this time too that the Church tried to break the last ties which still kept her more or less dependent on the civil power; this was the true import of the Investiture Contest (see Investiture, and Church History), though this was not very acute in France.

The feudal monarchy.

Roman law.

The customs.

The period of the true feudal monarchy is embraced by the 12th and 13th centuries, that is to say, it was at this time that the crown again assumed real strength and authority; but so far it had no organs and instruments save those which were furnished by feudalism, now organized under a regular hierarchy, of which the king was the head, the "sovereign enfeoffer of the kingdom" (*souverain fieffeux du royaume*), as he came later on to be called. This new position of affairs was the result of three great factors: the revival of Roman Law, the final organization of feudalism and the rise of the privileged towns. The revival of Roman law began in France and Italy in the second half of the 11th century, developing with extraordinary brilliance in the latter country at the university of Bologna, which was destined for a long time to dominate Europe. Roman law spread rapidly in the French schools and universities, except that of Paris, which was closed to it by the papacy; and the influence of this study was so great that it transformed society. On the one hand it contributed largely to the reconstitution of the royal power, modelling the rights of the king on those of the Roman emperor. On the other hand it wrought a no less profound change in private law. From this time dates the division of old France into the *Pays de droit écrit*, in which Roman law, under the form in which it was codified by Justinian, was received as the ordinary law; and the *Pays de coutume*, where it played only a secondary part, being generally valid only as *ratio scripta* and not as *lex scripta*. In this period the customs also took definitive form, and over and above the local customs properly so called there were formed customs known as *general*, which held good through a whole province or *bailliage*, and were based on the jurisprudence of the higher jurisdictions.

Final organization of feudalism.

Feudal character of justice.

The final organization of feudalism resulted from the struggle for organization which was proceeding in each district where the more powerful lords compelled the others to do them homage and become their vassals; the *capitalis dominus* had beneath him a whole hierarchy, and was himself a part of the feudal system of France (see Feudalism). Doubtless in the case of lords like the dukes of Brittany and Burgundy, the king could not actually demand the strict fulfilment of the feudal obligations; but the principle was established. The question now arises, did free and absolute property, the *allodium*, entirely disappear in this process, and were all lands held as tenures? It continued to exist, by way of exception, in most districts, unchanged save in the burden of proof of ownership, with which, according to the customs, sometimes the lord and sometimes the holder of the land was held charged. In one respect, however, namely in the administration of justice, the feudal hierarchy had absolute sway. Towards the end of the 13th century Beaumanoir clearly laid down this principle: "All secular jurisdiction in France is held from the king as a fief or an *arrière-fief*." Henceforth it could also be said that "All justice emanates from the king." The law concerning fiefs became settled also from another point of view, the fief becoming patrimonial; that is to say, not only hereditary, but freely alienable by the vassal, subject in both cases to certain rights of transfer due to the lord, which were at first fixed by agreement and later by custom. The most salient features of feudal succession were the right of primogeniture and the perference given to heirs-male; but from the 13th century onwards the right of primogeniture, which had at first involved the total exclusion of the younger members of a family, tended to be modified, except in the case of the chief lords, the eldest son obtaining the preponderant share or *préciput*. Non-noble (*roturier*) tenancies also became patrimonial in similar circumstances, except that in their case there was no right of primogeniture nor any privilege of males. The tenure of serfs did not become alienable, and only became hereditary by certain devices.

Rise of the privileged towns.

Feudal society next saw the rise of a new element within it: the privileged towns. At this time many towns acquired privileges, the movement beginning towards the end of the 11th century; they were sanctioned by a formal concession from the lord to whom the town was subject, the concession being embodied in a charter or in a record of customs (*coutume*). Some towns won for themselves true political rights, for instance the right of self-administration, rights of justice over the inhabitants, the right of not being taxed except by their own consent, of maintaining an armed force, and of controlling it themselves. Others only obtained civil rights, *e.g.* guarantees against the arbitrary rights of justice and taxation of the lord or his provost. The chief forms of municipal organization at this time were the *commune jurée* of the north and east, and the *consulat*, which came from Italy and penetrated as far as Auvergne and Limousin. The towns with important privileges formed in feudal society as it were a new class of lordships; but their lords, that is to say their burgesses, were inspired by quite a new spirit. The crown courted their support, taking them under its protection, and championing the causes in which they were interested (see Commune). Finally, it is in this period, under Philip Augustus, that the great fiefs began to be effectually reannexed to the crown, a process which, continued by the kings up to the end of the *ancien régime*, refounded for their profit the territorial sovereignty of France.

Great officers of the crown and peers of France.

The crown maintained the machinery of feudalism, the chief central instruments of which were the great officers of the crown, the seneschal, butler, constable and chancellor, who were to become irremovable officials, those at least who survived. But this period saw the rise of a special college of dignitaries, that of the Twelve Peers of France, consisting of six laymen and six ecclesiastics, which took definitive shape at the beginning of the 13th century. We cannot yet discern with any certainty by what process it was formed, why those six prelates and those six great feudatories in particular were selected rather than others equally eligible. But there is no doubt that we have here a result of that process of feudal organization mentioned above; the formation of a similar assembly of twelve peers occurs also in a certain number of the great fiefs. Besides the part which they played at the consecration of kings, the peers of France formed a court in which they judged one another under the presidency of the king, their overlord, according to feudal custom. But the *cour des pairs* in this sense was not separate from the *curia regis*, and later from the parlement of Paris, of which the peers of France were by right members. From this time, too, dates another important institution, that of the *maîtres des requêtes*.

Growth of the royal power.

The legislative power of the crown again began to be exercised during the 12th century, and in the 13th century had full authority over all the territories subject to the crown. Beaumanoir has a very interesting theory on this subject. The right of war tends to regain its natural equilibrium, the royal power following the Church in the endeavour to check private wars. Hence arose the *quarantaine le roi*, due to Philip Augustus or Saint Louis, by which those relatives of the parties to a quarrel who had not been present at the quarrel were rendered immune from attack for forty days after it; and above all the *assurements* imposed by the king or lord; on these points too Beaumanoir has an interesting theory. The rule was, moreover, already in force by which private wars had to cease during the time that the king was engaged in a foreign war. But the most appreciable progress took place in the administrative and judicial institutions. Under Philip Augustus arose the royal *baillis* (see BAILIFF: section *Bailli*), and seneschals (*q.v.*), who were the representatives of the king in the provinces, and superior judges. At the same time the form of the feudal courts tended to change, as they began more and more to be influenced by the Romano-canonical law. Saint Louis had striven to abolish trial by combat, and the Church had condemned other forms of ordeal, the *purgatio vulgaris*. In most parts of the country the feudal lords began to give place in the courts of law to the provosts (*prévôts*) and *baillis* of the lords or of the crown, who were the judges, having as their councillors the *avocats* (advocates) and *procureurs* (procurators) of the assize. The feudal courts, which were founded solely on the relations of homage and tenure, before which the vassals and tenants as such appeared, disappeared in part from the 13th century on. Of the seigniorial jurisdictions there soon remained only the *hautes* or *basses justices* (in the 14th century arose an intermediate grade, the *moyenne justice*), all of which were considered to be concessions of the royal power, and so delegations of the public authority. As a result of the application of Roman and canon law, there arose the *appeal* strictly so called, both in the class of royal and of seigniorial jurisdictions, the case in the latter instance going finally before a royal court, from which henceforth there was no appeal. In the 13th century too appeared the theory of crown cases (*cas royaux*), cases which the lords became incompetent to try and which were reserved for the royal court. Finally, the *curia regis* was gradually transformed into a regular court of justice, the *Parlement* (*q.v.*), as it was already called in the second half of the 13th century. At this time the king no longer appeared in it regularly, and before each session (for it was not yet a permanent body) a list of properly qualified men was drawn up in advance to form the parlement, only those whose names were on the list being capable of sitting in it. Its main function had come to be that of a final court of appeal. At the various sessions, which were regularly held at Paris, appeared the *baillis* and seneschals, who were called upon to answer for the cases they had judged and also for their administration. The accounts were received by members of the parlement at the Temple, and this was the origin of the Cour or Chambre des Comptes.

Nobles, commons and the Church in the 13th century.

At the end of this period the nobility became an exclusive class. It became an established rule that a man had to be noble in order to be made a knight, and even in order to acquire a fief; but in this latter respect the king made exceptions in the case of *roturiers*, who were licensed to take up fiefs, subject to a payment known as the *droits de franc-fief*. The *roturiers*, or villeins who were not in a state of thraldom, were already a numerous class not only in the towns but in the country. The Church maintained her privileges; a few attempts only were made to restrain the abuse, not the extent, of her jurisdiction. This jurisdiction was, during the 12th century, to a certain extent regularized, the bishop nominating a special functionary to hold his court; this was the *officialis* (Fr. *official*), whence the name of *officialité* later applied in France to the ecclesiastical jurisdictions. On one point, however, her former rights were diminished. She preserved the right of freely acquiring personal and real property, but though she could still acquire feudal tenures she could not keep them; the customs decided that she must *vider les mains*, that is, alienate the property again within a year and a day. The reason for this new rule was that the Church, the ecclesiastical establishment, is a proprietor who does not die and in principle does not surrender her property; consequently, the lords had no longer the right of exacting the transfer duties on those tenures which she acquired. It was possible, however, to compromise and allow the Church to keep the tenure on condition of the consent not only of the lord directly concerned, but of all the higher lords up to the *capitalis dominus*; it goes without saying that this concession was only obtained by the payment of pecuniary compensations, the chief of which was the *droit d'amortissement*, paid to these different lords. In this period the form of the episcopal elections underwent a change, the electoral college coming to consist only of the canons composing the chapter of the cathedral church. But except for the official candidatures, which were abused by the kings and great lords, the elections were regular; the Pragmatic Sanction, attributed to Saint Louis, which implies the contrary, is nowadays considered apocryphal by the best critics.

Changes in criminal law.

Finally, it must be added that during the 13th century criminal law was profoundly modified. Under the influence of Roman law a system of arbitrary penalties replaced those laid down by the customs, which had usually been fixed and cruel. The criminal procedure of the feudal courts had been based on the right of accusation vested only in the person wronged and his relations; for this was substituted the inquisitorial procedure (*processus per inquisitionem*), which had developed in the canon law at the very end of the 12th century, and was to become the *procédure à l'extraordinaire* of the *ancien régime*, which was conducted in secret and without free defence and debate. Of this procedure torture came to be an ordinary and regular part.

The customs.

The customs, which at that time contained almost the whole of the law for a great part of France, were not fixed by being written down. In that part of France which was subject to customary law (*la France coutumière*) they were defined when necessary by the verdict of a jury of practitioners in what was called the *enquête par turbes*; some of them, however, were, in part at least, authentically recorded in seigniorial charters, *chartes de ville* or *chartes de coutume*. Their rules were also recorded by experts in private works or collections called *livres coutumiers*, or simply *coutumiers* (customaries). The most notable of these are *Les Coutumes de Beauvoisis* of Philippe de Beaumanoir, which Montesquieu justly quotes as throwing light on those times; also the *Très ancienne coutume de Normandie* and the *Grand Coutumier de Normandie*; the *Conseil à un ami* of Pierre des Fontaines, the *Établissements de Saint Louis*; the *Livre de jostice et de plet*. At the same time the clerks of important judges began to collect in registers notable decisions; it is in this way that we have preserved to us the old decisions of the exchequer of Normandy, and the *Olim* registers of the parlement of Paris.

The Limited Monarchy.—The 14th and 15th centuries were the age of the limited monarchy. Feudal institutions kept their political importance; but side by side with them arose others of which the object was the direct exercise of the royal authority; others also arose from the very heart of feudalism, but at the same time transformed its laws in order to adapt them to the new needs of the crown. In this period certain rules for the succession to the throne were fixed by precedents: the exclusion of women and of male descendants in the female line, and the principle that a king could not by an act of will change the succession of the crown. The old *curia regis* disappeared and was replaced by the parlement as to its judicial functions, while to fulfil its deliberative functions there was formed a new body, the royal council (*conseil du roi*), an administrative and governing council, which was in no way of a feudal character. The number of its members was at first small, but they tended to increase; soon the brevet of *conseiller du roi en ses conseils* was given to numerous representatives of the clergy and nobility, the great officers of the crown becoming members by right. Side by side with these officials, whose power was then at its height, there were gradually evolved more subservient ministers who could be dispensed with at will; the *secrétaires des commandements du roi* of the 15th century, who in the 16th century developed into the *secrétaires d'état*, and were themselves descended from the *clercs du secret* and *secrétaires des finances* of the 14th century. The College of the Twelve Peers of France had not its full numbers at the end of the 13th century; the six ecclesiastical peerages existed and continued to exist to the end, together with the archbishopric and bishoprics to which they were attached, not being suppressed; but several of the great fiefs to which six lay peerages had been attached had been annexed to the crown. To fill these vacancies, Philip the Fair raised the duchies of Brittany and Anjou and the countship of Artois to the rank of peerages of France. This really amounted to changing the nature of the institution; for the new peers held their rank merely at the king's will, though the rank continued to belong to a great barony and to be handed down with it. Before long peers began to be created when there were no gaps in the ranks of the College, and there was a constant increase in the numbers of the lay peers.

States general and provincial estates.

At the beginning of the 14th century appeared the states general (*états généraux*), which were often convoked, though not at fixed intervals, throughout the whole of the 14th century and the greater part of the 15th. Their power reached its height at a critical moment of the Hundred Years' War during the reign of King John. At the same time there arose side by side with them, and from the same causes, the provincial estates, which were in miniature for each province what the states general were for the whole kingdom. Of these provincial assemblies some were founded in one or other of the great fiefs, being convoked by the duke or count under the pressure of the same needs which led the king to convoke the states general; others, in provinces which had already been annexed to the crown, probably had their origin in the councils summoned by the *bailli* or seneschal to aid him in his administration. Later it became a privilege for a province to have its own assembly; those which did so were never of right subject to the royal *taille*, and kept, at least formally, the right of sanctioning, by means of the assembly, the subsidies which took its place. Hence it became the endeavour of the crown to suppress these provincial assemblies, which in the 14th century were to be found everywhere; from the outset of the 15th century they began to disappear in central France.

Royal taxation.

The most characteristic feature of this period was the institution of universal taxation by the crown. So far the king's sole revenues were those which he exacted, in his capacity of feudal lord, wherever another lord did not intervene between him and the inhabitants, in addition to the income arising from certain crown rights which he had preserved or regained. But these revenues, known later as the income of the royal domain and later still as the *finances ordinaires*, became insufficient in proportion as the royal power increased; it became a necessity for the monarch to be able to levy imposts throughout the whole extent of the provinces annexed to the crown, even upon the subjects of the different lords. This he could only do by means of the co-operation of those lords, lay and ecclesiastical, who alone had the right of taxing their subjects; the co-operation of the privileged towns, which had the right to tax themselves, was also necessary. It was in order to obtain this consent that the states general, in most cases, and the provincial assemblies, in all cases, were convoked. In some cases, however, the king adopted different methods; for instance, he sometimes utilized the principle of the feudal aids. In cases where his vassals owed him, as overlord, a pecuniary aid, he substituted for the sum paid directly by his vassals a tax levied by his own authority on their subjects. It is in this way that for thirty years the necessary sums were raised, without any vote from the states general, to pay the ransom of King John. But in principle the taxes were in the 14th century sanctioned by the states general. Whatever form they took, they were given the generic name of Aids or *auxilia*, and were considered as occasional and extraordinary subsidies, the king being obliged in principle to "live of his own" (*vivre de son domaine*). Certain aids, it is true, tended to become permanent under the reign of Charles VI.; but the taxes subject to the consent of the states general were at first the sole resource of Charles VII. In the second half of his reign the two chief taxes became permanent: in 1435 that of the aids (a tax on the sale of articles of consumption, especially on wine), with the formal consent of the states general, and that of the *taille* in 1439. In the latter case the consent of the states general was not given; but only the nobility protested, for at the same time as the royal *taille* became permanent the seigniorial *taille* was suppressed. These imposts were increased, on the royal authority, by Louis XI. After his death the states general, which met at Tours in 1484, endeavoured to re-establish the periodical vote of the tax, and only granted it for two years, reducing it to the sum which it had reached at the death of Charles VII. But the promise that they would again be convoked before the expiry of two years was not kept. These imposts and that of the *gabelle* were henceforth permanent. Together with the taxes there was evolved the system of their administration. Their main outlines were laid down by the states general in the reign of King John, in 1355 and the following years. For the administration of the subsidies which they granted, they nominated from among their own numbers *surintendants généraux* or *généraux des finances*, and further, for each diocese or equivalent district, *élus*. Both had not only the active administration but also judicial rights, the latter constituting courts of the first instance and the former courts of final appeal. After 1360 the crown again adopted this organization, which had before been only temporary; but henceforth *généraux* and *élus* were nominated by the king. The *élus*, or *officiers des élections*, only existed in districts which were subject to the royal *taille*; hence the division, so important in old France, into *pays d'élections* and *pays d'états*. The *élus* kept both administration and jurisdiction; but in the higher stage a differentiation was made: the *généraux des finances*, who numbered four, kept the administration, while their jurisdiction as a court of final appeal was handed over to another body, the *cour des aides*, which had already been founded at the end of the 14th century. Besides the four *généraux des finances*, who administered the taxation, there were four Treasurers of France (*trésoriers de France*), who administered the royal domain; and these eight officials together formed in the 15th century a kind of ministry of finance to the monarchy.

The army.

The army also was organized. On the one hand, the military service attached to the fiefs was transformed for the profit of the king, who alone had the right of making war: it became the *arrière-ban*, a term which had formerly applied to the *levée en masse* of all the inhabitants in times of national danger. Before the 14th century the king had only had the power of calling upon his own immediate vassals for service. Henceforth all possessors of fiefs owed him, whether within the kingdom or on the frontiers, military service without pay and at their own expense. This was for long an important resource for the king. But Charles VII. organized an army on another footing. It comprised the *francs-archers* furnished by the parishes, a militia which was only summoned in case of war, but in time of peace had to practise archery, and companies of *gendarmerie* or heavy cavalry, forming a permanent establishment, which were called *compagnies d'ordonnance*. It was chiefly to provide for the expense of the first nucleus of a permanent army that the *taille* itself had been made permanent.

The new army led to the institution of the governors of provinces, who were to command the troops quartered there. At first they were only appointed for the frontiers and fortified places, but later the kingdom was divided into *gouvernements généraux*. There were at first twelve of these, which were called in the middle of the 16th century the *douze anciens gouvernements*. Although, strictly speaking, they had only military powers, the governors, always chosen from among the great lords, became in the provinces the direct representatives of the king and caused the *baillis* and seneschals to take a secondary place.

The law courts.

The courts of law continued to develop on the lines already laid down. The parlement, which had come to be a judicial committee nominated every year, but always consisting in fact of the same persons, changed in the course of the 14th century into a body of magistrates who were permanent but as yet subject to removal. During this period were evolved its organization and definitive features (see PARLEMENT). The provincial parlements had arisen after and in imitation of that of Paris, and had for the most part taken the place of some superior jurisdiction which had formerly existed in the same district when it had been independent (like Provence) or had formed one of the great fiefs (like Normandy or Burgundy). It was during this period also that the parlements acquired the right of opposing the registration, that is to say, the promulgation of laws, of revising them, and of making representations (*remontrances*) to the king when they refused the registration, giving the reasons for such refusal. The other royal jurisdictions were completed (see Bailiff, Châtelet). Besides them arose another of great importance, which was of military origin, but came to include all citizens under its sway. These were the provosts of the marshals of France (*prévôts des maréchaux de France*), who were officers of the *Maréchaussée* (the gendarmerie of the time); they exercised criminal jurisdiction without appeal in the case of crimes committed by vagabonds and fugitives from justice, this class being called their *gibier* (game), and of a number of crimes of violence, whatever the rank of the offender. Further, another class of officers was created in connexion with the law courts: the "king's men" (*gens du roi*), the *procureurs* and *avocats du roi*, who were at first simply those lawyers who represented the king in the law courts, or pleaded for him when he had some interest to follow up or to defend. Later they became officers of the crown. In the case of the *procureurs du roi* this development took place in the first half of the 14th century. Their duty was not only to represent the king in the law courts, whether as plaintiff or defendant, but also to take care that in each case the law was applied, and to demand its application. From this time on the *procureurs du roi* had full control over matters concerning the public interest, and especially over public prosecution. In this period, too, appeared what was afterwards called *justice retenue*, that is to say, the justice which the king administered, or was supposed to administer, in person. It was based on the idea that, since all justice and all judicial power reside in the king, he could not deprive himself of them by delegating their exercise to his officers and to the feudal lords. Consequently he could, if he thought fit, take the place of the judges and call up a case before his own council. He could reverse even the decisions of the courts of final appeal, and in some cases used this means of appealing against the decrees of the parlements (*proposition d'erreur, requête civile, pourvoi en révision*). In these cases the king was supposed to judge in person; in reality they were examined by the *maîtres des requêtes* and submitted to the royal council (*conseil du roi*), at which the king was always supposed to be present and which had in itself no power of giving a decision. For this purpose there was soon formed a special committee of the council, which was called the *conseil privé* or *de justice*. At the end of the 15th century, Charles VIII., in order to relieve the council of some of its functions, created a new final court, the *grand conseil*, to deal with a number of these cases. But before long it again became the custom to appeal to the *conseil du roi*, so that the *grand conseil* became almost useless. The king frequently, by means of *lettres de justice*, intervened in the procedure of the courts, by granting *bénéfices*, by which rules which were too severe were modified, and faculties or facilities for overcoming difficulties arising from flaws in contracts or judgments, cases at that time not covered by the common law. By *lettres de grâce* he granted reprieve or pardon in individual cases. The most extreme form of intervention by the king was made by means of *lettres de cachet* (*q.v.*), which ordered a subject to go without trial into a state prison or into exile.

The Church.

The condition of the Church changed greatly during this period. The jurisdiction of the *officialités* was very much reduced, even over the clergy. They ceased to be competent to judge actions concerning the possession of real property, in which the clergy were defendants. In criminal law the theory of the *cas privilégié*, which appears in the 14th century, enabled the royal judges to take action against and judge the clergy for all serious crimes, though without the power of inflicting any penalties but arbitrary fines, the ecclesiastical judge remaining competent, in accordance with the privileges of clergy, to try the offender for the same crime as what was technically called a *délit commun*. The development of jurisprudence gradually removed from the *officialités* causes of a purely secular character in which laymen only were concerned, such as wills and contracts; and in matrimonial cases their jurisdiction was limited to those in which the *foedus matrimonii* was in question. For the acquisition of real property by ecclesiastical establishments the consent of the king to the amortizement was always necessary, even in the case of allodial lands; and if it was a case of feudal tenures the king and the direct overlords alone kept their rights, the intermediate lords being left out of the question.

Papal encroachments.

As regards the conferring of ecclesiastical benefices, from the 14th century onwards the papacy encroached more and more upon the rights of the bishops, in whose gift the inferior benefices generally were, and of the electors, who usually conferred the superior benefices; at the same time it exacted from newly appointed incumbents heavy dues, which were included under the generic name of annates (*q.v.*). During the Great Schism of the Western Church, these abuses became more and more crying, until by a series of edicts, promulgated with the consent and advice of the parlement and the clergy, the Gallican Church was restored to the possession of its former liberties, under the royal authority. Thus France was ready to accept the decrees of reform issued by the council of Basel (*q.v.*), which she did, with a few modifications, in the Pragmatic Sanction of Charles VII., adopted after a solemn assembly of the clergy and nobles at Bourges and registered by the parlement of Paris in 1438. It suppressed the annates and most of the means by which the popes disposed of the inferior benefices: the reservations and the *gratiae expectativae*. For the choice of bishops and abbots, it restored election by the chapters and convents. The Pragmatic Sanction, however, was never recognized by the papacy, nor was it consistently and strictly applied by the royal power. The transformation of the civil and criminal law under the influence of Roman and canon law had become more and more marked. The production of the *coutumiers*, or *livres de pratiques*, also continued. The chief of them were: in the 14th century, the *Stylus Vetus Curiae Parlamenti* of Guillaume de Breuil; the *Très ancienne coutume de Bretagne*; the *Grand Coutumier de France*, or *Coutumier de Charles VI.*; the *Somme rural* of Boutillier; in the 15th century, for Auvergne, the *Practica forensis* of Masuer. Charles VII., in an article of the Grand Ordonnance of Montil-les-Tours (1453), ordered the general customs to be officially recorded under the supervision of the crown. It was an enormous work, which would almost have transformed them into written laws; but up to the 16th century little recording was done, the procedure established by the Ordonnance for the purpose not being very suitable.

Government under the absolute monarchy.

The Absolute Monarchy.—From the 16th century to the Revolution was the period of the absolute monarchy, but it can be further divided into two periods: that of the establishment of this régime, from 1515 to about 1673; and that of the *ancien régime* when definitively established, from 1673 to 1789. The reigns of Francis I. and Henry II. clearly laid down the principle of the absolute power of the crown and applied it effectually, as is plainly seen from the temporary disappearance of the states general, which were not assembled under these two reigns. There were merely a few assemblies of notables chosen by the royal power, the most important of which was that of Cognac, under Francis I., summoned to advise on the non-fulfilment of the treaty of Madrid. It is true that in the second half of the 16th century the states general reappeared. They were summoned in 1560 at Orleans, then in 1561 at Pontoise, and in 1576 and 1588 at Blois. The League even convoked one, which was held at Paris in 1593. This represented a crucial and final struggle. Two points were then at issue: firstly, whether France was to be Protestant or Catholic; secondly, whether she was to have a limited or an absolute monarchy. The two problems were not necessarily bound up with one another. For if the Protestants desired political liberty, many of the Catholics wished for it too, as is proved by the writings of the time, and even by the fact that the League summoned the estates. But the states general of the 16th century, in spite of their good intentions and the great talents which were at their service, were dominated by religious passions, which made them powerless for any practical purpose. They only produced a few great ordinances of reform, which were not well observed. They were, however, to be called together yet again, as a result of the disturbances which followed the death of Henry IV.; but their dissensions and powerlessness were again strikingly exemplified and they did not reappear until 1789. Other bodies, however, which the royal power had created, were to carry on the struggle against it. There were the parlements, the political rivals of the states general. Thanks to the principle according to which no law came into effect so long as it had not been registered by them, they had, as we have seen, won for themselves the right of a preliminary discussion of those laws which were presented to them, and of refusing registration, explaining their reasons to the king by means of the *remontrances*. The royal power saw in this merely a concession from itself, a consultative power, which ought to yield before the royal will, when the latter was clearly manifested, either by *lettres de jussion* or by the actual words and presence of the king, when he came in person to procure the registration of a law in a so-called *lit de justice*. But from the 16th century onwards the members of the parlements claimed, on the strength of a historical theory, to have inherited the powers of the ancient assemblies (the Merovingian and Carolingian *placita* and the *curia regis*), powers which they, moreover, greatly exaggerated. The successful assertion of this claim would have made them at once independent of and necessary to the crown. During the minority of kings, they had possessed, in fact, special opportunities for asserting their pretensions, particularly when they had been called upon to intervene in the organization of the regency. It is on this account that at the beginning of the reign of Louis XIV. the parlement of Paris wished to take part in the government, and in 1648, in concert with the other supreme courts of the capital, temporarily imposed a sort of charter of liberties. But the first Fronde, of which the parlement was the centre and soul, led to its downfall, which was completed when later on Louis XIV. became all-powerful. The ordinance of 1667 on civil procedure, and above all a declaration of 1673, ordered the parlement to register the laws as soon as it received them and without any modification. It was only after this registration that they were allowed to draw up remonstrances, which were henceforth futile. The nobles, as a body, had also become politically impotent. They had been sorely tried by the wars of religion, and Richelieu, in his struggles against the governors of the provinces, had crushed their chief leaders. The second Fronde was their last effort (see FRONDE). At the same time the central government underwent changes. The great officers of the crown disappeared one by one. The office of constable of France was suppressed by purchase during the first half of the 17th century, and of those in the first rank only the chancellor survived till the Revolution. But though his title could only be taken from him by condemnation on a capital charge, the king was able to deprive him of his functions by taking from him the custody and use of the seal of France, which were entrusted to a *garde des sceaux*. Apart from the latter, the king's real ministers were the secretaries of state, generally four in number, who were always removable and were not chosen from among the great nobles. For purposes of internal administration, the provinces were divided among them, each of them corresponding by despatches with those which were assigned to him. Any other business (with the exception of legal affairs, which belonged to the chancellor, and finance, of which we shall speak later) was divided among them according to convenience. At the end of the 16th century, however, were evolved two regular departments, those of war and foreign affairs. Under Francis I. and Henry II., the chief administration of finance underwent a change; for the four *généraux des finances*, who had become too powerful, were substituted the *intendants des finances*, one of whom soon became a chief minister of finance, with the title *surintendant*. The *généraux des finances*, like the *trésoriers de France*, became provincial officials, each at the head of a *généralité* (a superior administrative district for purposes of finance); under Henry III. the two functions were combined and assigned to the *bureaux des finances*. The fall of Fouquet led to the suppression of the office of *surintendant*; but soon Colbert again became practically a minister of finance, under the name of *contrôleur général des finances*, both title and office continuing to exist up to the Revolution.

The *conseil du roi*, the origin of which we have described, was an important organ of the central government, and for a long time included among its members a large number of representatives of the nobility and clergy. Besides the councillors of state (*conseillers d'état*), its ordinary members, the great officers of the crown and secretaries of state, princes of the blood and peers of France were members of it by right. Further, the king was accustomed to grant the brevet of councillor to a great number of the nobility and clergy, who could be called upon to sit in the council and give an opinion on matters of importance. But in the 17th century the council tended to differentiate its functions, forming three principal sections, one for political, one for financial, and the third for legal affairs. Under Louis XIV. it took a definitely professional, administrative and technical character. The *conseillers à brevet* were all suppressed in 1673, and the peers of France ceased to be members of the council. The political council, or *conseil d'en haut*, had no *ex officio* members, not even the chancellor; the secretary of state for foreign affairs, however, necessarily had entry to it; it also included a small number of persons chosen by the king and bearing the title of ministers of state (*ministres d'état*). The other important sections of the *conseil du roi* were the *conseil des finances*, organized after the fall of Fouquet, and the *conseil des dépêches*, in which sat the four secretaries of state and where everything concerned with internal administration (except finance) was dealt with, including the legal business connected with this administration. As to the government and the preparation of laws, under Louis XIV. and Louis XV., the *conseil du roi* often passed into the background, when, as the saying went, a minister who was projecting some important measure *travaillait seul avec le roi* (worked alone with the king), having from the outset gained the king's ear.

Provincial administration.

The chief authority in the provincial administration belonged in the 16th century to the governors of the provinces, though, strictly speaking, the governor had only military powers in his *gouvernement*; for, as we have seen, he was the direct representative of the king for general purposes. But at the end of this century were created the intendants of the provinces, who, after a period of conflict with the governors and the parlements, became absolute masters of the administration in all those provinces which had no provincial estates, and the instruments of a complete administrative centralization (see INTENDANT).

The towns.

The towns having a *corps de ville*, that is to say, a municipal organization, preserved in the 16th century a fairly wide autonomy, and played an important part in the wars of religion, especially under the League. But under Louis XIV. their independence rapidly declined. They were placed under the tutelage of the intendants, whose sanction, or that of the *conseil du roi*, was necessary for all acts of any importance. In the closing years of the 17th century, the municipal officials ceased, even in principle, to be elective. Their functions ranked as offices which were, like royal offices, saleable and heritable. The pretext given by the edicts were the intrigues and dissensions caused by the elections; the real cause was that the government wanted to sell these offices, which is proved by the fact that it frequently allowed towns to redeem them and to re-establish the elections.

Sale of offices.

The sale of royal offices is one of the characteristic features of the *ancien régime*. It had begun early, and, apparently, with the office of councillor of the parlement of Paris, when this became permanent, in the second half of the 14th century. It was first practised by magistrates who wished to dispose of their office in favour of a successor of their own choice. The *resignatio in favorem* of ecclesiastical benefices served as model, and at first care was taken to conceal the money transaction between the parties. The crown winked at these resignations in consideration of a payment in money.

But in the 16th century, under Francis I. at the latest, the crown itself began officially to sell offices, whether newly created or vacant by the death of their occupiers, taking a fee from those upon whom they were conferred. Under Charles IX. the right of resigning *in favorem* was recognized by law in the case of royal officials, in return for a payment to the treasury of a certain proportion of the price. In the case of judicial offices there was a struggle for at least two centuries between the system of sale and another, also imitated from canon law, *i.e.* the election or presentation of candidates by the legal corporations. The ordinances of the second half of the 16th century, granted in answer to complaints of the states general, restored and confirmed the latter system, giving a share in the presentation to the towns or provincial notables and forbidding sales. The system of sale, however, triumphed in the end, and, in the case of judges, had, moreover, a favourable result, assuring to them that irremovability which Louis XI. had promised in vain; for, under this system, the king could not reasonably dismiss an official arbitrarily without refunding the fee which he had paid. On the other hand, it contributed to the development of the *épices*, or dues paid by litigants to the judges. The system of sale, and with it irremovability, was extended to all official functions, even to financial posts. The process was completed by the recognition of the rights in the sale of offices as hereditary, *i.e.* the right of resigning the office on payment of a fee, either in favour of a competent descendant or of a third party, passed to the heirs of an official who had died without having exercised this right himself. It was established under Henry IV. in 1604 by the system called the *Paulette*, in return for the payment by the official of an annual fee (*droit annuel*) which was definitely fixed at a hundredth part of the price of the office. Thus these offices, though the royal nomination was still required as well as the professional qualifications required by the law, became heritable property in virtue of the finance attached to them. This led to the formation of a class of men who, though bound in many ways to the crown, were actually independent. Hence the tendency in the 18th century to create new and important functions under the form, not of offices, but of simple commissions.

Fundamental laws of France.

In this period of the history of France were evolved and defined the essential principles of the old public law. There were, in the first place, the *fundamental laws of the realm*, which were true constitutional principles, established for the most part not by law but by custom, and considered as binding in respect of the king himself; so that, although he was sovereign, he could neither abrogate, nor modify, nor violate them. There was, however, some discussion as to what rules actually came under this category, except in the case of two series about which there was no doubt. These were, on the one hand, those which dealt with the succession to the crown and forbade the king to change its order, and those which proclaimed the inalienability of the royal domain, against which no title by prescription was valid. This last principle, introduced in the 14th century, had been laid down and defined by the edict of Moulins in 1566; it admitted only two exceptions: the formation of appanages (*q.v.*), and selling (*engagement*), to meet the necessities of war, with a perpetual option of redeeming it.

There was in the second place the theory of the rights, franchises and liberties of the Gallican Church, formed of elements some of which were of great antiquity, and based on the conditions which had determined the relations of the Gallican Church with the crown and papacy during the Great Schism and under the Pragmatic Sanction of Bourges, and defined at the end of the 16th and the beginning of the 17th century. This body of doctrine was defined by the writings of three men especially, Guy Coquille, Pierre Pithou and Pierre Dupuy, and was solemnly confirmed by the declaration of the clergy of France, or *Déclaration des quatres articles* of 1682, and by the edict which promulgated it. Its substance was based chiefly on three principles: firstly, that the temporal power was absolutely independent of the spiritual power; secondly, that the pope had authority over the clergy of France in temporal matters and matters of discipline only by the consent of the king; thirdly, that the king had authority over and could legislate for the Gallican Church in temporal matters and matters of discipline. The old public law provided a safeguard against the violation of these rules. This was the process known as the *appel comme d'abus*, formed of various elements, some of them very ancient, and definitely established during the 16th century. It was heard before the parlements, but could, like every other case, be evoked before the royal council. Its effect was to annul any act of the ecclesiastical authority due to abuse or contrary to French law. The clergy were, when necessary, reduced to obedience by means of arbitrary fines and by the seizure of their temporalities. The Pragmatic Sanction had been abrogated and replaced by the Concordat of 1515, concluded between Francis I. and Leo X., which remained in force until suppressed by the Constituent Assembly. The Concordat, moreover, preserved many of the enactments of the Pragmatic Sanction, notably those which protected the collation of the inferior benefices from the encroachments of the papacy, and which had introduced reforms in certain points of discipline. But in the case of the superior benefices (bishoprics and abbeys) election by the chapters was suppressed. The king of France nominated the candidate, to whom the pope gave canonical institution. As a matter of fact, the pope had no choice; he had to institute the nominee of the king, unless he could show his unworthiness or incapacity, as the result of inquiries regularly conducted in France; for the pope it was, as the ancient French authors used to say, a case of compulsory collation. The annates were re-established at the time of the Concordat, but considerably diminished in comparison with what they had been before the Pragmatic Sanction. We must add, to complete this account, that many of the inferior benefices, in France as in the rest of Christendom, were conferred according to the rules of patronage, the patron, whether lay or ecclesiastic, presenting a candidate whom the bishop was bound to appoint, provided he was neither incapable nor unsuitable. There was some difficulty in getting the Concordat registered by the parlement of Paris, and the latter even announced its intention of not taking the Concordat into account in those cases concerning benefices which might come before it. The crown found an easy method of making this opposition ineffectual, namely, to transfer to the Grand Conseil the decision of cases arising out of the application of the Concordat.

In the 16th century also, contributions to the public services drawn from the immense possessions of the clergy were regularized. Since the second half of the 12th century at least, the kings had in times of urgent need asked for subsidies from the church, and ever since the Saladin tithe (*dime saladine*) of Philip Augustus this contribution had assumed the form of a tithe, taking a tenth part of the revenue of the benefices for a given period. Tithes of this kind were fairly frequently granted by the clergy of France, either with the pope's consent or without (this being a disputed point). After the conclusion of the Concordat, Leo X. granted the king a tithe (*décime*) under the pretext of a projected war against the Turks; hitherto concessions of this kind had been made by the papacy in view of the Crusades or of wars against heretics. The concession was several times renewed, until, by force of custom, the levying of these tithes became permanent. But in the middle of the 16th century the system changed. The crown was heavily in debt, and its needs had increased. The property of the clergy having been threatened by the states general of 1560 and 1561, the king proposed to them to remit the bulk of the tithes and other dues, in return for the payment by them of a sum equivalent to the proceeds of the taxes which he had mortgaged. A formal contract to this effect was concluded at Poissy in 1561 between the king and the clergy of France, represented by the prelates who were then gathered together for the Colloquy of Poissy with the Protestants, and some of those who had been sitting at the states general of Pontoise. The fulfilment of this agreement was, however, evaded by the king, who diverted part of the funds provided by the clergy from their proper purpose. In 1580, after a period of ten years which had been agreed on, a new assembly of the clergy was called together and, after protesting against this action, renewed the agreement, which was henceforward always renewed every ten years. Such was the definitive form of the contribution of the clergy, who also acquired the right of themselves assessing and levying these taxes on the holders of benefices. Thus every ten years there was a great assembly of the clergy, the members of which were elected. There were two stages in the election, a preliminary one in the dioceses and a further election in the ecclesiastical provinces, each province sending four deputies to the general assembly, two of the first rank, that is to say, chosen from the episcopate, and two of the second rank, which included all the other clergy. The *dons gratuits* (benevolences) voted by the assembly comprised a fixed sum equivalent to the old tithes and supplementary sums paid on one occasion only, which were sometimes considerable. The church, on her side, profited by this arrangement in order to obtain the commutation or redemption of the taxes affecting ecclesiastics considered as individuals. This settlement only applied to the "clergy of France," that is to say, to the clergy of those districts which were united to the crown before the end of the 16th century. The provinces annexed later, called *pays étrangers*, or *pays conquis*, had in this matter, as in many others, an arrangement of their own. At last, under Louis XV. the edict of 1749, *concernant les établissements et acquisitions des gens de mainmorte*, was completely effective in subordinating the acquisition of property by ecclesiastical establishments to the consent and control of the crown, rendering them incapable of acquiring real property by bequests.

At the end of the 16th century a wise law had been made which, in spite of the traces which it bore of past struggles, had established a reasonable balance among the Christians of France. The edict of Nantes, in 1598, granted the Protestants full civil rights, liberty of conscience and public worship in many places, and notably in all the royal *bailliages*. The Catholics, whose religion was essentially a state religion, had never accepted this arrangement as final, and at last, in 1685, under Louis XIV., the edict of Nantes was revoked and the Protestant pastors expelled from France. Their followers were forbidden to leave the country, but many succeeded nevertheless in escaping abroad. The position of those who remained behind was peculiar. Laws passed in 1715 and 1724 established the legal theory that there were no longer any Protestants in France, but only *vieux catholiques* and *nouveaux convertis*. The result was that henceforth they had no longer any regular civil status, the registers containing the lists of Catholics enjoying civil rights being kept by the Catholic clergy.

The form of government established under Louis XIV. was preserved without any fundamental modification under Louis XV. After the death of Louis XIV., however, the regent, under the inspiration of the duc de St Simon, made trial of a system of which the latter had made a study while in a close correspondence with the duke of Burgundy. It consisted in substituting for the authority of the ministers, secretaries of state and controller-general councils, or governmental bodies, mainly composed of great lords and prelates. These only lasted for a few years, when a return was made to the former organization. The parlements had regained their ancient rights in consequence of the parlement of Paris having, in 1715, set aside the will of Louis XIV. as being contrary to the fundamental laws of the kingdom, in that it laid down rules for the composition of the council of regency, and limited the power of the regent. This newly revived power they exercised freely, and all the more so since they were the last surviving check on the royal authority. During this reign there were numerous conflicts between them and the government, the causes of this being primarily the innumerable incidents to which the bull *Unigenitus* gave rise, and the increase of taxation; proceedings against Jesuits also figure conspicuously in the action of the parlements. They became at this period the avowed representatives of the nation; they contested the validity of the registration of laws in the *lits de justice*, asserting that laws could only be made obligatory when the registration had been freely endorsed by themselves. Before the registration of edicts concerning taxation they demanded a statement of the financial situation and the right of examining the accounts. Finally, by the theory of the *classes*, which considered the various parlements of France as parts of one and the same body, they established among them a political union. These pretensions the crown refused to recognize. Louis XV. solemnly condemned them in a *lit de justice* of December 1770, and in 1771 the chancellor Maupeou took drastic measures against them. The magistrates of the parlement of Paris were removed, and a new parlement was constituted, including the members of the *grand conseil*, which had also been abolished. The *cour des aides* of Paris, which had made common cause with the parlement, was also suppressed. Many of the provincial parlements were reorganized, and a certain number of useful reforms were carried out in the jurisdiction of the parlement of Paris; the object of these, however, was in most cases that of diminishing its importance. These actions, the *coup d'état* of the chancellor Maupeou, as they were called, produced an immense sensation. The repeated conflicts of the reign of Louis XV. had already given rise to a whole literature of books, pamphlets and tracts in which the rights of the crown were discussed. At the same time the political philosophy of the 18th century was disseminating new principles, and especially those of the supremacy of the people and the differentiation of powers, the government of England also became known among the French. Thus men's minds were being prepared for the Revolution.

The personal government of Louis XVI. from 1774 to 1789 was chiefly marked by two series of facts. Firstly, there was the partial application of the principles propounded by the French economists of this period, the Physiocrats, who had a political doctrine peculiar to themselves. They were not in favour of political liberty, but attached on the contrary to the absolute monarchy, of which they did not fear the abuses because they were convinced that so soon as they should be known, reason (*évidence*) alone would suffice to make the crown respect the "natural and essential laws of bodies politic" (*Lois naturelles et essentielles des sociétés politiques*, the title of a book by Mercier de La Rivière). On the other hand, they favoured civil and economic liberty. They wished, in particular, to decentralize the administration and restore to the landed proprietors the administration and levying of taxes, which they wished to reduce to a tax on land only. This school came into power with Turgot, who was appointed controller-general of the finances, and laid the foundations of many reforms. He actually accomplished for the moment one very important reform, namely, the suppression of the trade and craft gilds (*communautés, jurandes et maîtrises*). This organization, which was common to the whole of Europe (see GILDS), had taken definitive shape in France in the 13th and 14th centuries, but had subsequently been much abused. Turgot suppressed the privileges of the *maîtres*, who alone had been able to work on their own account, or to open shops and workshops, and thus proclaimed the freedom of labour, industry and commerce. However, the old organization, slightly amended, was restored under his successor Necker. It was Turgot's purpose to organize provincial and other inferior assemblies, whose chief business was to be the assessment of taxes. Necker applied this idea, partially and experimentally, by creating a few of these provincial assemblies in various *généralités* of the *pays d'élections*. A general reform on these lines and on a very liberal basis was proposed by Calonne to the assembly of notables in 1787, and it was brought into force for all the *pays d'élections*, though not under such good conditions, by an edict of the same year. Louis XVI. had inaugurated his reign by the restoration of the parlements; all the bodies which had been suppressed by Maupeou and all the officials whom he had dismissed were restored, and all the bodies and officials created by him were suppressed. But it was not long before the old struggle between the crown and parlements again broke out. It began by the conservative opposition offered by the parlement of Paris to Turgot's reforms. But the real struggle broke out in 1787 over the edicts coming from the assembly of notables, and particularly over the two new taxes, the stamp duty and the land tax. The parlement of Paris refused to register them, asserting that the consent of the taxpayers, as represented by the states general, was necessary to fresh taxation. The struggle seemed to have come to an end in September; but in the following November it again broke out, in spite of the king's promise to summon the states general. It reached its height in May 1788, when the king had created a *cour plénière* distinct from the parlements, the chief function of which was to register the laws in their stead. A widespread agitation arose, amounting to actual anarchy, and was only ended by the recall of Necker to power and the promise to convoke the states general for 1789.

The army.

Various Institutions.—The permanent army which, as has been stated above, was first established under Charles VII., was developed and organized during the *ancien régime*. The *gendarmerie* or heavy cavalry was continuously increased in numbers. On the other hand, the *francs archers* fell into disuse after Louis XI.; and, after a fruitless attempt had been made under Francis I. to establish a national infantry, the system was adopted for this also of recruiting permanent bodies of mercenaries by voluntary enlistment. First there were the "old bands" (*vieilles bandes*), chiefly those of Picardy and Piedmont, and at the end of the 16th century appeared the first regiments, the number of which was from time to time increased. There were also in the service and pay of the king French and foreign regiments, the latter principally Swiss, Germans and Scots. The system of purchase penetrated also to the army. Each regiment was the property of a great lord; the captain was, so to speak, owner of his company, or rather a contractor, who, in return for the sums paid him by the king, recruited his men and gave them their uniform, arms and equipment. In the second half of the reign of Louis XIV. appeared the militia (*milices*). To this force each parish had to furnish one recruit, who was at first chosen by the assembly of the inhabitants, later by drawing lots among the bachelors or widowers without children, who were not exempt. The militia was very rarely raised from the towns. The purpose for which these men were employed varied from time to time. Sometimes, as under Louis XIV., they were formed into special active regiments. Under Louis XV. and Louis XVI. they were formed into *régiments provinciaux*, which constituted an organized reserve. But their chief use was during war, when they were individually incorporated into various regiments to fill up the gaps.

Under Louis XV., with the duc de Choiseul as minister of war, great and useful reforms were effected in the army. Choiseul suppressed what he called the "farming of companies" (*compagnie-ferme*); recruiting became a function of the state, and voluntary enlistment a contract between the recruit and the state. Arms, uniform and equipment were furnished by the king. Choiseul also equalized the numbers of the military units, and his reforms, together with a few others effected under Louis XVI., produced the army which fought the first campaigns of the Revolution.

System of taxation.

One of the most distinctive features of the *ancien régime* was excessive taxation. The taxes imposed by the king were numerous, and, moreover, hardly any of them fell on all parts of the kingdom. To this territorial inequality was added the inequality arising from privileges. Ecclesiastics, nobles, and many of the crown officials were exempted from the heaviest imposts. The chief taxes were the *taille* (*q.v.*), the *aides* and the *gabelle* (*q.v.*), or monopoly of salt, the consumption of which was generally made compulsory up to the amount determined by regulations. In the 17th and 18th centuries certain important new taxes were established: from 1695 to 1698 the *capitation*, which was re-established in 1701 with considerable modifications, and in 1710 the tax of the *dixième*, which became under Louis XV. the tax of the *vingtièmes*. These two imposts had been established on the principle of equality, being designed to affect every subject in proportion to his income; but so strong was the system of privileges, that as a matter of fact the chief burden fell upon the roturiers. The income of a roturier who was not exempt was thus subject in turn to three direct imposts: the *taille*, the *capitation* and the *vingtièmes*, and the apportioning or assessment of these was extremely arbitrary. In addition to indirect taxation strictly so called, which was very extensive in the 17th and 18th centuries, France under the *ancien régime* was subject to the *traites*, or customs, which were not only levied at the frontiers on foreign trade, but also included many internal custom-houses for trade between different provinces. Their origin was generally due to historical reasons; thus, among the *provinces reputées étrangères* were those which in the 14th century had refused to pay the aids for the ransom of King John, also certain provinces which had refused to allow customs offices to be established on their foreign frontier. Colbert had tried to abolish these internal duties, but had only succeeded to a limited extent.

The indirect taxes, the *traites* and the revenues of the royal domain were farmed out by the crown. At first a separate contract had been made for each impost in each *élection*, but later they were combined into larger lots, as is shown by the name of one of the customs districts, *l'enceinte des cinq grosses fermes*. From the reign of Henry IV. on the levying of each indirect impost was farmed *en bloc* for the whole kingdom, a system known as the *fermes générales*; but the real *ferme générale*, including all the imposts and revenues which were farmed in the whole of France, was only established under Colbert. The *ferme générale* was a powerful company, employing a vast number of men, most of whom enjoyed various privileges. Besides the royal taxes, seigniorial imposts survived under the form of tolls and market dues. The lords also often possessed local monopolies, *e.g.* the right of the common bakehouse (*four banal*), which were called the *banalités*.

Courts of law.

The organization of the royal courts of justice underwent but few modifications during the *ancien régime*. The number of parlements, of *cours des aides* and of *cours des comptes* increased; in the 17th century the name of *conseil supérieur* was given to some new bodies which actually discharged the functions of the parlement, this being the period of the decline of the parlement. In the 16th century, under Henry II., had been created *présidiaux*, or courts of final jurisdiction, intended to avoid numerous appeals in small cases, and above all to avoid a final appeal to the parlements. Seigniorial courts survived, but were entirely subordinate to the royal jurisdictions and were badly officered by ill-paid and ignorant judges, the lords having long ago lost the right to sit in them in person. Their chief use was to deal with cases concerning the payment of feudal dues to the lord. Both lawyers and people would have preferred only two degrees of justice; and an ordinance of May 1788 realized this desire in the main. It did not suppress the seigniorial jurisdictions, but made their extinction a certainty by allowing litigants to ignore them and go straight to the royal judges. This was, however, reversed on the recall of Necker and the temporary triumph of the parlements.

Ecclesiastical courts.

The ecclesiastical jurisdictions survived to the end, but with diminished scope. Their competency had been considerably reduced by the Ordinance of Villers Cotterets of 1539, and by an edict of 1693. But a series of ingenious legal theories had been principally efficacious in gradually depriving them of most of the cases which had hitherto come under them. In the 18th century the privilege of clergy did not prevent civil suits in which the clergy were defendants from being almost always taken before secular tribunals, and ever since the first half of the 17th century, for all grave offences, or *cas privilégiés*, the royal judge could pronounce a sentence of corporal punishment on a guilty cleric without this necessitating his previous degradation. The inquiry into the case was, it is true, conducted jointly by the royal and the ecclesiastical judge, but each of them pronounced his sentence independently. All cases concerning benefices came before the royal judges. Finally, the *officialités* had no longer as a rule any jurisdiction over laymen, even in the matter of marriage, except in questions of betrothals, and sometimes in cases of opposition to marriages.

The parish priests, however, continued to enter declarations of baptisms, marriages and burials in registers kept according to the civil laws.

The "customs."

The general customs of the *pays coutumiers* were almost all officially recorded in the 16th century, definite procedure for this purpose having been adopted at the end of the 15th century. Drafts were prepared by the officials of the royal courts in the chief town of the district in which the particular customs were valid, and were then submitted to the government. The king then appointed commissioners to visit the district and promulgate the customs on the spot. For the purpose of this *publication* the lords, lay and ecclesiastical, of the district, with representatives of the towns and of various bodies of the inhabitants, were summoned for a given day to the chief town. In this assembly each article was read, discussed and put to the vote. Those which were approved by the majority were thereupon decreed (*décrêtés*) by the commissioners in the king's name; those which gave rise to difficulties were put aside for the parlement to settle when it registered the *coutume*. The *coutumes* in this form became practically written law; henceforward their text could only be modified by a formal revision carried out according to the same procedure as the first version. Throughout the 16th century a fair number of *coutumes* were thus revised (*reformées*), with the express object of profiting by the observations and criticisms on the first text which had appeared in published commentaries and notes, the most important of which were those of Charles Dumoulin. In the 16th century there had been a revival of the study of Roman law, thanks to the historical school, among the most illustrious representatives of which were Jacques Cujas, Hugues Doneau and Jacques Godefroy; but this study had only slight influence on practical jurisprudence. Certain institutions, however, such as contracts and obligations, were regulated throughout the whole of France by the principles of Roman law.

Legislation by *ordonnances*, *édits*, *déclarations* or *lettres patentes*, emanating from the king, became more and more frequent; but the character of the *grandes ordonnances*, which were of a far-reaching and comprehensive nature, underwent a change during this period. In the 14th, 15th and 16th centuries they had been mainly *ordonnances de réformation* (*i.e.* revising previous laws), which were most frequently drawn up after a sitting of the states general, in accordance with the suggestions submitted by the deputies. The last of this type was the ordinance of 1629, promulgated after the states general of 1614 and the assemblies of notables which had followed it. In the 17th and 18th centuries they became essentially *codifications*, comprising a systematic and detailed statement of the whole branch of law. There are two of these series of codifying ordinances: the first under Louis XIV., inspired by Colbert and carried out under his direction. The chief ordinances of this group are that of 1667 on civil procedure (code of civil procedure); that of 1670 on the examination of criminal cases (code of penal procedure); that of 1673 on the commerce of merchants, and that of 1681 on the regulation of shipping, which form between them a complete code of commerce by land and sea. The ordinance of 1670 determined the formalities of that secret and written criminal procedure, as opposed to the hearing of both parties in a suit, which formerly obtained in France; it even increased its severity, continuing the employment of torture, binding the accused by oath to speak the truth, and refusing them counsel save in exceptional cases. The second series of codifications was made under Louis XV., through the action of the chancellor d'Aguesseau. Its chief result was the regulation, by the ordinances of 1731, 1735 and 1747, of deeds of gift between living persons, wills, and property left in trust. Under Louis XVI. some mitigation was made of the criminal law, notably the abolition of torture.

Land tenure.

The feudal régime, in spite of the survival of seigniorial courts and tolls, was no longer of any political importance; but it still furnished the common form of real property. The fief, although it still implied homage from the vassal, no longer involved any service on his part (excepting that of the *arrière-ban* due to the king); but when a fief changed hands the lord still exacted his *profits*. Tenures held by *roturiers*, in addition to some similar rights of transfer, were generally subject to periodical and fixed contributions for the profit of the lord. This system was still further complicated by tenures which were simply real and not feudal, *e.g.* that by payment of ground rent, which were superadded to the others, and had become all the heavier since, in the 18th century, royal rights of transfer had been added to the feudal rights. The inhabitants of the country districts were longing for the liberation of real property.

Serfdom.

Serfdom had disappeared from most of the provinces of the kingdom; among all the *coutumes* which were officially codified, not more than ten or so still recognized this institution. This had been brought about especially by the agency of the custom by which serfs had been transformed into *roturiers*. An edict of Louis XVI. of 1779 abolished serfdom on crown lands, and mitigated the condition of the serfs who still existed on the domains of individual lords. The nobility still remained a privileged class, exempt from certain taxes. Certain offices were restricted to the nobility; according to an edict of Louis XVI. (1781) it was even necessary to be a noble in order to become an officer in the army. In fact, the royal favours were reserved for the nobility. Certain rules of civil and criminal procedure also distinguished nobles from *roturiers*. The acquisition of fiefs had ceased to bring nobility with it, but the latter was derived from three sources: birth, *lettres d'anoblissement* granted by the king and appointment to certain offices. In the 17th and 18th centuries the peers of France can be reckoned among the nobility, forming indeed its highest grade, though the rank of peer was still attached to a fief, which was handed down with it; on the eve of the Revolution there were thirty-eight lay peers. The rest of the nation, apart from the ecclesiastics, consisted of the *roturiers*, who were not subject to the disabilities of the serfs, but had not the privileges of the nobility. Hence the three orders (estates) of the kingdom: the clergy, the nobility and the *tiers état* (third estate). An edict of Louis XVI. had made a regular civil status possible to the Protestants, and had thrown open offices and professions to them, though not entirely; but the exercise of their religion was still forbidden.

The three estates.

The Revolution.—With the Revolution France entered the ranks of constitutional countries, in which the liberty of men is guaranteed by fixed and definite laws; from this time on, she has had always (except in the interval between two revolutions) a written constitution, which could not be touched by the ordinary legislative power. The first constitution was that of 1791; the states general of 1789, transformed by their own will, backed by public opinion, into the Constituent Assembly, drew it up on their own authority. But their work did not stop there. They abolished the whole of the old public law of France and part of the criminal law, or rather, transformed it in accordance with the principles laid down by the political philosophy of the 18th century. The principles which were then proclaimed are still, on most points, the foundation of modern French law. The development resulting from this extraordinary impetus can be divided into two quite distinct phases: the first, from 1789 to the *coup d'état* of the 18th Brumaire in the year VIII., was the continuation of the impulse of the Revolution; the second includes the Consulate and the first Empire, and was, as it were, the marriage or fusion of the institutions arising from the Revolution with those of the *ancien régime*.

The Constitutions of the Revolution.

On the whole, the constitutional law of the Revolution is a remarkably united whole, if we consider only the two consitutions which were effectively applied during this first phase, that of the 3rd of September 1791, and that of the 5th Fructidor in the year III. It is true that between them occurred the ultra-democratic constitution of the 24th of June 1793, the first voted by the Convention; but although this was ratified by the popular vote, to which it had been directly submitted, in accordance with a principle proclaimed by the Convention and kept in force under the Consulate and the Empire, it was never carried into effect. It was first suspended by the establishment of the revolutionary government strictly so called, and after Thermidor, under the pretext of completing it, the Convention put it aside and made a new one, being taught by experience. As long as it existed it was the sovereign assembly of the Convention itself which really exercised the executive power, governing chiefly by means of its great committees.

The constitution of 1791 was without doubt monarchical, in so far as it preserved royalty. The constitution of the year III. was, on the contrary, republican. The horror of monarchy was still so strong at that time that an executive college was created, a Directory of five members, one of whom retired every year; they were elected by a complicated and curious procedure, in which each of the two legislative councils played a distinct part. But this difference, though apparently essential, was not in reality very profound; this is proved, for example, by the fact that the Directory had distinctly more extensive powers than those conferred on Louis XVI. by the Constituent Assembly. On almost all points of importance the two constitutions were similar. They were both preceded by a statement of principles, a "Declaration of the Rights of Man and of the Citizen." They were both based on two principles which they construed alike: the sovereignty of the people and the separation of powers. Both of them (with the exception of what has been said with regard to the ratification of constitutions after 1793) recognized only representative government. From the principle of the sovereignty of the people they had not deduced universal suffrage; though, short of this, they had extended the suffrage as far as possible. According to the constitution of 1791, in addition to the conditions of age and residence, an elector was bound to pay a direct contribution equivalent to three days' work; the constitution of the year III. recognized the payment of any direct contribution as sufficient; it even conferred on every citizen the right of having himself enrolled, without any other qualification than a payment equivalent to three days' work, and thus to become an elector. Further, neither of the two constitutions admitted of a direct suffrage; the elections were carried out in two stages, and only those who paid at a higher rating could be chosen as electors for the second stage. The executive power, which was in the case of both constitutions clearly separated from the legislative, could not initiate legislation. The Directory had no veto; Louis XVI. had with difficulty obtained a merely suspensive veto, which was overridden in the event of three legislatures successively voting against it. The right of dissolution was possessed by neither the king nor the Directory. Neither the king's ministers nor those of the Directory could be members of the legislative body, nor could they even be chosen from among its ranks. The ministers of Louis XVI. had, however, thanks to an unfortunate inspiration of the Constituent Assembly of 1791, the right of entry to, and, to a certain extent, of speaking in the Legislative Assembly; the constitution of the year III. showed greater wisdom in not bringing them in any way into contact with the legislative power. The greatest and most notable difference between the two constitutions was that that of 1791 established a single chamber which was entirely renewed every two years; that of the year III., on the contrary, profiting by the lessons of the past, established two chambers, one-third of the members of which were renewed every year. Moreover, the two chambers, the Council of Five Hundred and the Council of Ancients, were appointed by the same electors, and almost the only difference between their members was that of age.

Abolition of the "ancien régime."

The Revolution entirely abolished the *ancien régime*, and in the first instance whatever remained of feudalism. The Constituent Assembly, in the course of its immense work of settlement, wished to draw distinctions, abolishing absolutely, without indemnity, all rights which had amounted in the beginning to a usurpation and could not be justified, *e.g.* serfdom and seigniorial courts of justice. On the other hand, it declared subject to redemption such feudal charges as had been the subject of contract or of a concession of lands. But as it was almost impossible to discover the exact origin of various feudal rights, the Assembly had proceeded to do this by means of certain legal assumptions which sometimes admitted of a proof to the contrary. It carefully regulated the conditions and rate of repurchase, and forbade the creation in the future of any perpetual charge which could not be redeemed: a principle that has remained permanent in French law. This was a rational and equitable solution; but in a period of such violent excitement it could not be maintained. The Legislative Assembly declared the abolishment without indemnity of all feudal rights for which the original deed of concession could not be produced; and to produce this was, of course, in most cases impossible. Finally, the Convention entirely abolished all feudal rights, and commanded that the old deeds should be destroyed; it maintained on the contrary, though subject to redemption, those tenures and charges which were solely connected with landed property and not feudal.

With feudalism had been abolished serfdom. Further, the Constituent Assembly suppressed nobility; it even forbade any one to assume and bear the titles, emblems and arms of nobility. Thus was established the equality of citizens before the law. The Assembly also proclaimed the liberty of labour and industry, and suppressed the corporations of artisans and workmen, the *jurandes* and *maîtrises*, as Turgot had done. But, in order to maintain this liberty of the individual, it forbade all associations between workers or employers, fearing that such contracts would again lead to the formation of corporations similar to the old ones. It even forbade and declared punishable, as being contrary to the declaration of the rights of man and the citizen, combinations or strikes, or an agreement between workmen or employers to refuse to work or to give work except on given conditions. Such, for a long time, was French legislation on this point.

Administrative reorganization.

The Constituent Assembly gave to France a new administrative division, that into departments, districts, cantons and communes; and this division, which was intended to make the old provincial distinctions disappear, had to serve all purposes, the department being the unit for all public services. This settlement was definitive, with the exception of certain modifications in detail, and exists to the present day. But there was a peculiar administrative organism depending on this arrangement. The constitution of 1791, it is true, made the king the titulary head of the executive power; but the internal administration of the kingdom was not actually in his hands. It was deputed, under his orders, to bodies elected in each department, district and commune. The municipal bodies were directly elected by citizens duly qualified; other bodies were chosen by the method of double election. Each body consisted of two parts: a council, for deliberative purposes, and a *bureau* or *directoire* chosen by the council from among its numbers to form the executive. These were the only instruments for the general administration and for that of the direct taxes. The king could, it is true, annul the illegal acts of these bodies, but not dismiss their members; he could merely suspend them from exercising their functions, but the matter then went before the Legislative Assembly, which could maintain or remit the suspension as it thought fit. The king had not a single agent chosen by himself for general administrative purposes. This was a reaction, though a very exaggerated one, against the excessive centralization of the *ancien régime*, and resulted in an absolute administrative anarchy. The organization of the revolutionary government partly restored the central authority; the councils of the departments were suppressed; the Committee of Public Safety and the "representatives of the people on mission" were able to remove and replace the members of the elected bodies; and also, by an ingenious arrangement, national agents were established in the districts. The constitution of the year III. continued in this course, simplifying the organization established by the Constituent Assembly, while maintaining its principle. The department had an administration of five members, elected as in the past, but having executive as well as deliberative functions. The district was suppressed. The communes retained only a municipal agent elected by themselves, and the actual municipal body, the importance of which was considerably increased, was removed to the canton, and consisted of the municipal agents from each commune, and a president elected by the duly qualified citizens of the canton. The Directory was represented in each departmental and communal administration by a commissary appointed and removable by itself, and could dismiss the members of these administrations.

Judicial system.

The Constituent Assembly decided on the complete reorganization of the judicial organization. This was accomplished on a very simple plan, which realized that ideal of the two degrees of justice which, as we have noticed, was that of France under the *ancien régime*. In the lower degrees it created in each canton a justice of the peace (*juge de paix*), the idea and name of which were borrowed from England, but which differed very much from the English justice of the peace. He judged, both with and without appeal, civil cases of small importance; and, in cases which did not come within his competency, it was his duty to try to reconcile the parties. In each district was established a civil court composed of five judges. This completed the judicial organization, except for the court of cassation, which had functions peculiar to itself, never judging the facts of the case but only the application of the law. For cases coming under the district court, the Assembly had not thought fit to abolish the guarantee of the appeal in cases involving sums above a certain figure. But by a curious arrangement the district tribunals could hear appeals from one another. With regard to penal prosecutions, there was in each department a criminal court which judged crimes with the assistance of a jury; it consisted of judges borrowed from district courts, and had its own president and public prosecutor. Correctional tribunals, composed of *juges de paix*, dealt with misdemeanours. The Assembly preserved the commercial courts, or consular jurisdictions, of the *ancien régime*. There was a court of cassation, the purpose of which was to preserve the unity of jurisprudence in France; it dealt with matters of law and not of fact, considering appeals based on the violation of law, whether in point of matter or of form, and if such violation were proved, sending the matter before another tribunal of the same rank for re-trial. All judges were elected for a term of years; the *juges de paix* by the primary assembly of the canton, the district judges by the electoral assembly consisting of the electors of the second degree for the district, the members of the court of cassation by the electors of the departments, who were divided for the purpose into two series, which voted alternately. The Constituent Assembly did, it is true, require professional guarantees, by proof of a more or less extended exercise of the profession of lawyer from all judges except the *juges de paix*. But the system was really the same as that of the administrative organization. The king only appointed the *commissaires du roi* attached to the district courts, criminal tribunals and the court of cassation; but the appointment once made could not be revoked by him. These commissaries fulfilled one of the functions of the old *ministère public*, their duty being to demand the application of laws. The Convention did not change this general organization; but it suppressed the professional guarantees required in the case of candidates for a judgeship, so that henceforth all citizens were eligible; and it also caused new elections to take place. Moreover, the Convention, either directly or by means of one of its committees, not infrequently removed and replaced judges without further election. The constitution of the year III. preserved this system, but introduced one considerable modification. It suppressed the district courts, and in their place created in each department a civil tribunal consisting of twenty judges. The idea was a happy one, for it gave the courts more importance, and therefore more weight and dignity. But this reform, beneficial as it would be nowadays, was at the time premature, in view of the backward condition of means of communication.

The army.

The Constituent Assembly suppressed the militia and maintained the standing army, according to the old type, the numbers of which were henceforth to be fixed every year by the Legislative Assembly. The army was to be recruited by voluntary enlistment, careful rules for which were drawn up; the only change was in the system of appointment to ranks; promotion went chiefly by seniority, and in the lower ranks a system of nomination by equals or inferiors was organized. The Assembly proclaimed, however, the principle of compulsory and personal service, but under a particular form, that of the National Guard, to which all qualified citizens belonged, and in which almost all ranks were conferred by election. Its chief purpose was to maintain order at home; but it could be called upon to furnish detachments for defence against foreign invasion. This was an institution which, with many successive modifications, and after various long periods of inactivity followed by a revival, lasted more than three-quarters of a century, and was not suppressed till 1871. For purposes of war the Convention, in addition to voluntary enlistments and the resources furnished by the National Guards, and setting aside the forced levy of 200,000 men in 1793, decided on the expedient of calling upon the communes to furnish men, a course which revived the principle of the old militia. But the Directory drew up an important military law, that of the 6th Fructidor of the year VI., which established compulsory military service for all, under the form of conscription strictly so called. Frenchmen aged from 20 to 25 (*défenseurs conscrits*) were divided into five classes, each including the men born in the same year, and were liable until they were 25 years old to be called up for active service, the whole period of service not exceeding four years. No class was called upon until the younger classes had been exhausted, and the sending of substitutes was forbidden. This law, with a few later modifications, provided for the French armies up to the end of the Empire.

Taxation.

The Constituent Assembly abolished nearly all the taxes of the *ancien régime*. Almost the only taxes preserved were the stamp duty and that on the registration of acts (the old *contrôle* and *centième denier*), and these were completely reorganized; the customs were maintained only at the frontiers for foreign trade. In the establishment of new taxes the Assembly was influenced by two sentiments: the hatred which had been inspired by the former arbitrary taxation, and the influence of the school of the Physiocrats. Consequently it did away with indirect taxation on objects of consumption, and made the principal direct tax the tax on land. Next in importance were the *contribution personnelle et mobilière* and the *patentes*. The essential elements of the former were a sort of capitation-tax equivalent to three days' work, which was the distinctive and definite sign of a qualified citizen, and a tax on personal income, calculated according to the rent paid. The *patentes* were paid by traders, and were also based on the amount of rent. These taxes, though considerably modified later, are still essentially the basis of the French system of direct taxation. The Constituent Assembly had on principle repudiated the tax on the gross income, much favoured under the *ancien régime*, which everybody had felt to be arbitrary and oppressive. The system of public contributions under the Convention was arbitrary and revolutionary, but the councils of the Directory, side by side with certain bad laws devised to tide over temporary crises, made some excellent laws on the subject of taxation. They resumed the regulation of the land tax, improving and partly altering it, and also dealt with the *contribution personnelle et mobilière*, the *patentes*, and the stamp and registration duties. It was at this time, too, that the door and window tax, which still exists, was provisionally established; there was also a partial reappearance of indirect taxation, in particular the *octrois* of the towns, which had been suppressed by the Constituent Assembly.

Religious liberty.

The Constituent Assembly gave the Protestants liberty of worship and full rights; it also gave Jews the status of citizen, which they had not had under the *ancien régime*, together with political rights. With regard to the Catholic Church, the Assembly placed at the disposal of the nation the property of the clergy, which had already, in the course of the 18th century, been regarded by most political writers as a national possession; at the same time it provided for salaries for the members of the clergy and pensions for those who had been monks. It abolished tithes and the religious orders, and forbade the re-formation of the latter in the future. The ecclesiastical districts were next reorganized, the department being always taken as the chief unit, and a new church was organized by the civil constitution of the clergy, the bishops being elected by the electoral assembly of the department (the usual electors), and the curés by the electoral assembly of the district. This was an unfortunate piece of legislation, inspired partly by the old Gallican spirit, partly by the theories on civil religion of J. J. Rousseau and his school, and, together with the civic oath imposed on the clergy, it was a source of endless troubles. The constitutional church established in this way was, however, abolished as a state institution by the Convention. By laws of the years III. and IV. the Convention and the Directory, in proclaiming the liberty of worship, declared that the Republic neither endowed nor recognized any form of worship. Buildings formerly consecrated to worship, which had not been alienated, were again placed at the disposal of worshippers for this purpose, but under conditions which were hard for them to accept.

Civil law.

The Assemblies of the Revolution, besides the laws which, by abolishing feudalism, altered the character of real property, passed many others concerning civil law. The most important are those of 1792, passed by the Legislative Assembly, which organized the registers of the *état civil* kept by the municipalities, and laid down rules for marriage as a purely civil contract. Divorce was admitted to a practically unlimited extent; it was possible not only for causes determined by law, and by mutual consent, but also for incompatibility of temper and character proved, by either husband or wife, to be of a persistent nature. Next came the laws of the Convention as to inheritance, imposing perfect equality among the natural heirs and endeavouring to ensure the division of properties. Illegitimate children were considered by these laws as on the same level with legitimate children. The Convention and the councils of the Directory also made excellent laws on the administration of *hypothèques*, and worked at the preparation of a Civil Code (see CODE NAPOLÉON). In criminal law their work was still more important. In 1791 the Constituent Assembly gave France her first penal code. It was inspired by humanitarian ideas, still admitting capital punishment, though accompanied by no cruelty in the execution; but none of the remaining punishments was for life. Long imprisonment with hard labour was introduced. Finally, as a reaction against the former system of arbitrary penalties, there came a system of fixed penalties determined, both as to its assessment and its nature, for each offence, which the judge could not modify. The Constituent Assembly also reformed the procedure of criminal trials, taking English law as model. It introduced the jury, with the double form of *jury d'accusation* and *jury de jugement*. Before the judges procedure was always public and oral. The prosecution was left in principle to the parties concerned, plaintiffs or *dénonciateurs civiques*, and the preliminary investigation was handed over to two magistrates; one was the *juge de paix*, as in English procedure at this period, and the other a magistrate chosen from the district court and called the *directeur du jury*. The Convention, before separating, passed the *Code des délits et des peines* of the 3rd Brumaire in the year IV. This piece of work, which was due to Merlin de Douai, was intended to deal with criminal procedure and penal law; but only the first part could be completed. It was the procedure established by the Constituent Assembly, but further organized and improved.

Criminal law.

The Consulate and the Empire.—The constitutional law of the Consulate and the Empire is to be found in a series of documents called later the *Constitutions de l'Empire*, the constitution promulgated during the Hundred Days being consequently given the name of *Acte additionnel aux Constitutions de l'Empire*. These documents consist of (1) the Constitution of the 22nd Frimaire of the year VIII., the work of Sieyès and Bonaparte, the text on which the others were based; (2) the *senatus consulte* of the 16th Thermidor in the year X., establishing the consulate for life; and (3) the *senatus consulte* of the 28th Floréal in the year XII., which created the Empire. These constitutional acts, which were all, whether in their full text or in principle, submitted to the popular vote by means of a *plébiscite*, had all the same object: to assure absolute power to Napoleon, while preserving the forms and appearance of liberty. Popular suffrage was maintained, and even became universal; but, since the system was that of suffrage in many stages, which, moreover, varied very much, the citizens in effect merely nominated the candidates, and it was the Senate, playing the part of *grand électeur* which Sieyès had dreamed of as his own, which chose from among them the members of the various so-called elected bodies, even those of the political assemblies. According to the constitution of the year VIII., the first consul (to whom had been added two colleagues, the second and third consuls, who did not disappear until the Empire) possessed the executive power in the widest sense of the word, and he alone could initiate legislation. There were three representative assemblies in existence, elected as we have seen; but one of them, the Corps Législatif, passed laws without discussing them, and without the power of amending the suggestions of the government. The Tribunate, on the contrary, discussed them, but its vote was not necessary for the passing of the law. The Senate was the guardian and preserver of the constitution; in addition to its role of *grand électeur*, its chief function was to annul laws and acts submitted to it by the Tribunate as being unconstitutional. This original organization was naturally modified during the course of the Consulate and the Empire; not only did the emperor obtain the right of directly nominating senators, and the princes of the imperial family, and grant dignitaries of the Empire that of entering the Senate by right; but a whole body, the Tribunate, which was the only one which could preserve some independence, disappeared, without resort having been had to a plebiscite; it was modified and weakened by *senatus consulte* of the year X., and was suppressed in 1807 by a mere *senatus consulte*. The importance of another body, on the contrary, the *conseil d'état*, which had been formed on the improved type of the ancient *conseil du roi*, and consisted of members appointed by Napoleon and carefully chosen, continually increased. It was this body which really prepared and discussed the laws; and it was its members who advocated them before the Corps Législatif, to which the Tribunate also sent orators to speak on its behalf. The ministers, who had no relation with the legislative power, were merely the agents of the head of the state, freely chosen by himself. Napoleon, however, found these powers insufficient, and arrogated to himself others, a fact which the Senate did not forget when it proclaimed his downfall. Thus he frequently declared war upon his own authority, in spite of the provisions to the contrary made by the constitution of the year VIII.; and similarly, under the form of *décrets*, made what were really laws. They were afterwards called *décrets-lois*, and those that were not indissolubly associated with the political régime of the Empire, and survived it, were subsequently declared valid by the court of cassation, on the ground that they had not been submitted to the Senate as unconstitutional, as had been provided by the constitution of the year VIII.

Administrative changes under Consulate and Empire.

This period saw the rise of a whole new series of great organic laws. For administrative organization, the most important was that of the 28th Pluviôse in the year VIII. It established as chief authority for each department a prefect, and side by side with him a *conseil général* for deliberative purposes; for each *arrondissement* (corresponding to the old *district*) a sub-prefect (*sous-préfet*) and a *conseil d'arrondissement*; and for each *commune*, a mayor and a municipal council. But all these officials, both the members of the councils and the individual agents, were appointed by the head of the state or by the prefect, so that centralization was restored more completely than ever. Together with the prefect there was also established a *conseil* *de préfecture*, having administrative functions, and generally acting as a court of the first instance in disputes and litigation arising out of the acts of the administration; for the Constituent Assembly had removed such cases from the jurisdiction of the civil tribunals, and referred them to the administrative bodies themselves. The final appeal in these disputes was to the *conseil d'état*, which was supreme judge in these matters. In 1807 was created another great administrative jurisdiction, the *cour des comptes*, after the pattern of that which had existed under the *ancien régime*.

Judicial changes.

Judicial organization had also been fundamentally altered. The system of election was preserved for a time in the case of the *juges de paix* and the members of the court of cassation, but finally disappeared there, even where it had already been no more than a form. The magistrates were in principle appointed for life, but under the Empire a device was found for evading the rule of irremovability. For the judgment of civil cases there was a court of first instance in every arrondissement, and above these a certain number of courts of appeal, each of which had within its province several departments. The separate criminal tribunals were abolished in 1809 by the *Code d'Instruction Criminelle*, and the magistrates forming the *cour d'assises*, which judged crimes with the aid of a jury, were drawn from the courts of appeal and from the civil tribunals. The *jury d'accusation* was also abolished by the *Code d'Instruction Criminelle*, and the right of pronouncing the indictment was transferred to a chamber of the court of appeal. The correctional tribunals were amalgamated with the civil tribunals of the first instance. The *tribunal de cassation*, which took under the Empire the name of *cour de cassation*, consisted of magistrates appointed for life, and still kept its powers. The *ministère public* (consisting of imperial *avocats* and *procureurs*) was restored in practically the same form as under the *ancien régime*.

Taxation.

The former system of taxation was preserved in principle, but with one considerable addition: Napoleon re-established indirect taxation on articles of consumption, which had been abolished by the Constituent Assembly; the chief of these were the duties on liquor (*droits réunis*, or excise) and the monopoly of tobacco.

The Concordat.

The Concordat concluded by Napoleon with the papacy on the 26th Messidor of the year IX. re-established the Catholic religion in France as the form of worship recognized and endowed by the state. It was in principle drawn up on the lines of that of 1516, and assured to the head of the French state in his dealings with the papacy the same prerogatives as had formerly been enjoyed by the kings; the chief of these was that he appointed the bishops, who afterwards had to ask the pope for canonical institution. The territorial distribution of dioceses was preserved practically as it had been left by the civil constitution of the clergy. The state guaranteed the payment of salaries to bishops and curés; and the pope agreed to renounce all claims referring to the appropriation of the goods of the clergy made by the Constituent Assembly. Later on, a decree restored to the *fabriques* (vestries) such of their former possessions as had not been alienated, and the churches which had not been alienated were restored for the purposes of worship. The law of the 18th Germinal in the year X., ratifying the Concordat, reasserted, under the name of *articles organiques du culte catholique*, all the main principles contained in the old doctrine of the liberties of the Gallican Church. The Concordat did not include the restoration of the religious orders and congregations; Napoleon sanctioned by decrees only a few establishments of this kind.

The university.

One important creation of the Empire was the university. The *ancien régime* had had its universities for purposes of instruction and for the conferring of degrees; it had also, though without any definite organization, such secondary schools as the towns admitted within their walls, and the primary schools of the parishes. The Revolution suppressed the universities and the teaching congregations. The constitution of the year III. proclaimed the liberty of instruction and commanded that public schools, both elementary and secondary, should be established. Under the Directory there was in each department an *école centrale*, in which all branches of human knowledge were taught. Napoleon, developing ideas which had been started in the second half of the 18th century, founded by laws and decrees of 1806, 1808 and 1811 the Université de France, which provided and organized higher, secondary and primary education; this was to be the monopoly of the state, carried on by its *facultés*, *lycées* and primary schools. No private educational establishment could be opened without the authorization of the state.

The Codes.

But chief among the documents dating from this period are the Codes, which still give laws to France. These are the Civil Code of 1804, the *Code de Procédure Civile* of 1806, the *Code de Commerce* of 1807, the *Code d'Instruction Criminelle* of 1809, and the *Code Pénal* of 1810. These monumental works, in the elaboration of which the *conseil d'état* took the chief part, contributed, to a greater or less extent, towards the fusion of the old law of France with the laws of the Revolution. It was in the case of the *Code Civil* that this task presented the greatest difficulty (see CODE NAPOLÉON). The *Code de Commerce* was scarcely more than a revised and emended edition of the *ordonnances* of 1673 and 1681; while the *Code de Procédure Civile* borrowed its chief elements from the *ordonnance* of 1667. In the case of the *Code d'Instruction Criminelle* a distinctly new departure was made; the procedure introduced by the Revolution into courts where judgment was given remained public and oral, with full liberty of defence; the preliminary procedure, however, before the examining court (*juge d'instruction* or *chambre des mises en accusation*) was borrowed from the *ordonnance* of 1670; it was the procedure of the old law, without its cruelty, but secret and written, and generally not in the presence of both parties. The *Code Pénal* maintained the principles of the Revolution, but increased the penalties. It substituted for the system of fixed penalties, in cases of temporary punishment, a maximum and a minimum, between the limits of which judges could assess the amount. Even in the case of misdemeanours, it admitted the system of extenuating circumstances, which allowed them still further to decrease and alter the penalty in so far as the offence was mitigated by such circumstances. (See further under NAPOLEON I.)

Constitutional monarchy.

The Restored Monarchy.—The Restoration and the Monarchy of July, though separated by a revolution, form one period in the history of French institutions, a period in which the same régime was continued and developed. This was the constitutional monarchy, with a parliamentary body consisting of two chambers, a system imitated from England. The same constitution was preserved under these two monarchies—the charter granted by Louis XVIII. in 1814. The revolution of 1830 took place in defence of the charter which Charles X. had violated by the *ordonnances* of July, so that this charter was naturally preserved under the "July Monarchy." It was merely revised by the Chamber of Deputies, which had been one of the movers of the revolution, and by what remained of the House of Peers. In order to give the constitution the appearance of originating in the will of the people, the preface, which made it appear to be a favour granted by the king, was destroyed. The two chambers acquired the initiative in legislation, which had not been recognized as theirs under the Restoration, but from this time on belonged to them equally with the king. The sittings of the House of Peers were henceforth held in public; but this chamber underwent another and more fundamental transformation. The peers were nominated by the king, with no limit of numbers, and according to the charter of 1814 their appointment could be either for life or hereditary; but, in execution of an ordinance of Louis XVIII., during the Restoration they were always appointed under the latter condition. Under the July Monarchy their tenure of office was for life, and the king had to choose them from among twenty-two classes of notables fixed by law. The franchise for the election of the Chamber of Deputies had been limited by a system of money qualifications; but while, under the

Restoration, it had been necessary, in order to be an elector, to pay three hundred francs in direct taxation, this sum was reduced in 1831 to two hundred francs, while in certain cases even a smaller amount sufficed. In order to be elected as a deputy it was necessary, according to the charter of 1814, to pay a thousand francs in direct taxation, and according to that of 1830 five hundred francs. From 1817 onwards there was direct suffrage, the electors directly electing the deputies. The idea of those who had framed the charter of 1814 had been to give the chief influence to the great landed proprietors, though the means adopted to this end were not adequate: in 1830 the chief aim had been to give a preponderating influence to the middle and lower middle classes, and this had met with greater success. The House of Peers, under the name of *cour des pairs*, had also the function of judging attempts and plots against the security of the state, and it had frequently to exercise this function both under the Restoration and the July Monarchy.

This was a period of parliamentary government; that is, of government by a cabinet, resting on the responsibility of the ministers to the Chamber of Deputies. The only interruption was that caused by the resistance of Charles X. at the end of his reign, which led to the revolution of July. Parliamentary government was practised regularly and in an enlightened spirit under the Restoration, although the Chamber had not then all the powers which it has since acquired. It is noteworthy that during this period the right of the House of Peers to force a ministry to resign by a hostile vote was not recognized. By the creation of a certain number of new peers, a *fournée de pairs*, as it was then called, the majority in this House could be changed when necessary. But the government of the Restoration had to deal with two extreme parties of a very opposite nature: the *Ultras*, who wished to restore as far as possible the *ancien régime*, to whom were due the acts of the *chambre introuvable* of 1816, and later the laws of the ministry of Villèle, especially the law of sacrilege and that voting compensation to the dispossessed nobles, known as the *milliard des émigrés*; and on the other hand the *Liberals*, including the Bonapartists and Republicans, who were attached to the principles of the Revolution. In order to prevent either of these parties from predominating in the chamber, the government made a free use of its power of dissolution. It further employed two means to check the progress of the Liberals; firstly, there were various alterations successively made in the electoral law, and the press laws, frequently restrictive in their effect, which introduced the censorship and a preliminary authorization in the case of periodical publications, and gave the correctional tribunals jurisdiction in cases of press offences. The best electoral law was that of 1817, and the best press laws were those of 1819; but these were not of long duration. Under the July Monarchy parliamentary government, although its machinery was further perfected, was not so brilliant. The majorities in the Chamber of Deputies were often uncertain, so much so, that more than once the right of dissolution was exercised in order to try by new elections to arrive at an undivided and certain majority. King Louis Philippe, though soberminded, wished to exercise a personal influence on the policy of the cabinet, so that there were then two schools, represented respectively by Thiers and Guizot, one of which held the theory that "the king reigns but does not govern"; while the other maintained that he might exercise a personal influence, provided that he could rely on a ministry supported by a majority of the Chamber of Deputies. But the weak point in the July Monarchy was above all the question of the franchise. A powerful movement of opinion set in towards demanding an extension, some wishing for universal suffrage, but the majority proposing what was called the *adjonction des capacités*, that is to say, that to the number of qualified electors should be added those citizens who, by virtue of their professions, capacity or acquirements, were inscribed after them on the general list for juries. But the government obstinately refused all electoral reform, and held to the law of 1831. It also refused parliamentary reform, by which was meant a rule which would have made most public offices incompatible with the position of deputy, the Chamber of Deputies being at that time full of officials. The press, thanks to the Charter, was perfectly free, without either censorship or preliminary authorization, and press offences were judged by a jury.

The system of the Empire retained.

In another respect also the Restoration and the July Monarchy were at one, the second continuing the spirit of the first, viz. in maintaining in principle the civil, legal and administrative institutions of the Empire. The preface to the charter of 1814 sanctioned and guaranteed most of the legal rights won by the Revolution; even the alienation of national property was confirmed. It was said, it is true, that the old nobility regained their titles, and that the nobility of the Empire kept those which Napoleon had given them; but these were merely titles and nothing more; there was no privileged nobility, and the equality of citizens before the law was maintained. Judicial and administrative organization, the system of taxation, military organization, the relations of church and state, remained the same, and the university also continued to exist. The government did, it is true, negotiate a new Concordat with the papacy in 1817, but did not dare even to submit it to the chambers. The most important reform was that of the law concerning recruiting for the army. The charter of 1814 had promised the abolition of conscription, in the form in which it had been created by the law of the year VI. The law of the 10th of March 1818 actually established a new system. The contingent voted by the chambers for annual incorporation into the standing army was divided up among all the cantons; and, in order to furnish it, lots were drawn among all the men of a certain class, that is to say, among the young Frenchmen who arrived at their majority that year. Those who were not chosen by lot were definitely set free from military service. The sending of substitutes, a custom which had been permitted by Napoleon, was recognized. This was the type of all the laws on recruiting in France, of which there were a good number in succession up to 1867. On other points they vary, in particular as to the duration of service, which was six years, and later eight years, under the Restoration; but the system remained the same.

The Restoration produced a code, the *Code forestier* of 1827, for the regulation of forests (*eaux et forêts*). In 1816 a law had abolished divorce, making marriage indissoluble, as it had been in the old law. But the best laws of this period were those on finance. Now, for the first time, was introduced the practice of drawing up regular budgets, voted before the year to which they applied, and divided since 1819 into the budget of expenditure and budget of receipts.

Together with other institutions of the Empire, the Restoration had preserved the exaggerated system of administrative centralization established in the year VIII.; and proposals for its relaxation submitted to the chambers had come to nothing. It was only under the July Monarchy that it was relaxed. The municipal law of the 21st of March 1831 made the municipal councils elective, and extended widely the right of voting in the elections for them; the *maires* and their assistants continued to be appointed by the government, but had to be chosen from among the members of the municipal councils. The law of the 22nd of June 1833 made the general councils of the departments also elective, and brought the *adjonction des capacités* into effect for their election. The powers of these bodies were enlarged in 1838, and they gained the right of electing their president. In 1833 was granted another liberty, that of primary education; but in spite of violent protestations, coming especially from the Catholics, secondary and higher education continued to be a monopoly of the state. Many organic laws were promulgated, one concerning the National Guard, which was reorganized in order to adapt it to the system of citizen qualifications; one in 1832 on the recruiting of the army, fixing the period of service at seven years; and another in 1834 securing the status of officers. A law of the 11th of June 1842 established the great railway lines. In 1832 the *Code Pénal* and *Code d'Instruction Criminelle* were revised, with the object of lightening penalties; the system of extenuating circumstances, as recognized by a jury, was extended to the judgment of all crimes. There was also a revision of Book III. of the *Code de Commerce*, treating of bankruptcy. Finally, from this period date the laws of the 3rd of May 1841, on expropriation for purposes of public utility, and of the 30th of June 1838, on the treatment of the insane, which is still in force. Judicial organization remained as it was, but the amount of the sum up to which civil tribunals of the first instance could judge without appeal was raised from 1000 francs to 1500, and the competency of the *juges de paix* was widened.

The Second Republic and the Second Empire.—From the point of view of constitutional law, the Second Republic and the Second Empire were each in a certain sense a return to the past. The former revived the tradition of the Assemblies of the Revolution; the latter was obviously and avowedly an imitation of the Consulate and the First Empire.

Republican constitution of 1848.

The provisional government set up by the revolution of the 24th of February 1848 proclaimed universal suffrage, and by this means was elected a Constituent Assembly, which sat till May 1849, and, after first organizing various forms of another provisional government, passed the Republican constitution of the 4th of November 1848. This constitution, which was preceded by a preface recalling the Declarations of Rights of the Revolution, gave the legislative power to a single permanent assembly, elected by direct universal suffrage, and entirely renewed every three years. The executive authority, with very extensive powers, was given to a president of the Republic, also elected by the universal and direct suffrage of the French citizens. The constitution was not very clear upon the point of whether it adopted parliamentary government in the strict sense, or whether the president, who was declared responsible, was free to choose his ministers and to retain or dismiss them at his own pleasure. This gave rise to an almost permanent dispute between the president, who claimed to have his own political opinions and to direct the government, and the Assembly, which wished to carry on the traditions of cabinet government and to make the ministers fully responsible to itself. Consequently, in January 1851, a solemn debate was held, which ended in the affirmation of the responsibility of ministers to the Assembly. On the other hand, the president, though very properly given great power by the constitution, was not immediately eligible for re-election on giving up his office. Now Louis Napoleon, who was elected president on the 10th of December 1848 by a huge majority, wished to be re-elected. Various propositions were submitted to the Assembly in July 1851 with a view to modifying the constitution; but they could not succeed, as the number of votes demanded by the constitution for the convocation of a Constituent Assembly was not reached. Moreover, the Legislative Assembly elected in May 1849 was very different from the Constituent Assembly of 1848. The latter was animated by that spirit of harmony and, in the main, of adhesion to the Republic which had followed on the February Revolution. The new assembly, on the contrary, was composed for the most part of representatives of the old parties, and had monarchist aspirations. By the unfortunate law of the 31st of May 1850 it even tried by a subterfuge to restrict the universal suffrage guaranteed by the constitution. It suspended the right of holding meetings, but, on the whole, respected the liberty of the press. It was especially impelled to these measures by the growing fear of socialism. The result was the *coup d'état* of the 2nd of December 1851. A detail of some constitutional importance is to be noticed in this period. The *conseil d'état*, which had remained under the Restoration and the July Monarchy an administrative council and the supreme arbiter in administrative trials, acquired new importance under the Second Republic. The ordinary *conseillers d'état* (*en service ordinaire*) were elected by the Legislative Assembly, and consultation with the *conseil d'état* was often insisted on by the constitution or by law. This was the means of obtaining a certain modifying power as a substitute for the second chamber, which had not met with popular approval. During its short existence the Second Republic produced many important laws. It abolished the penalty of death for political crimes, and suppressed negro slavery in the colonies. The election of *conseillers généraux* was thrown open to universal suffrage, and the municipal councils were allowed to elect the *maires* and their colleagues. The law of the 15th of March 1850 established the liberty of secondary education, but it conferred certain privileges on the Catholic clergy, a clear sign of the spirit of social conservatism which was the leading motive for its enactment. Certain humanitarian laws were passed, applying to the working classes.

Constitution of Jan. 14, 1852.

Restoration of the Empire.

With the *coup d'état* of the 2nd of December 1851 began a new era of constitutional plebiscites and disguised absolutism. The proclamations of Napoleon on the 2nd of December contained a criticism of parliamentary government, and formulated the wish to restore to France the constitutional institutions of the Consulate and the Empire, just as she had preserved their civil, administrative and military institutions. Napoleon asked the people for the powers necessary to draw up a constitution on these principles; the plebiscite issued in a vast majority of votes in his favour, and the constitution of the 14th of January 1852 was the result. It bore a strong resemblance to the constitution of the First Empire after 1807. The executive power was conferred on Louis Napoleon for ten years, with the title of president of the Republic and very extended powers. Two assemblies were created. The conservative Senate, composed of *ex officio* members (cardinals, marshals of France and admirals) and life members appointed by the head of the state, was charged with the task of seeing that the laws were constitutional, of opposing the promulgation of unconstitutional laws, and of receiving the petitions of citizens; it had also the duty of providing everything not already provided but necessary for the proper working of the constitution. The second assembly was the *Corps Législatif*, elected by direct universal suffrage for six years, which passed the laws, the government having the initiative in legislation. This body was not altogether a *corps des muets*, as in the year VIII., but its powers were very limited; thus the general session assured to it by the constitution was only for three months, and it could only discuss and put to the vote amendments approved by the *conseil d'état*; the ministers did not in any way come into contact with it and could not be members of it, being responsible only to the head of the state, and only the Senate having the right of accusing them before a high court of justice. The *conseil d'état* was composed in the same way and had the same authority as it had possessed from the year VIII. to 1814; and it was the members of it who supported projected laws before the Corps Législatif. To this was added a Draconian press legislation; not only were press offences, many of which were mere expressions of opinion, judged not by a jury but by the correctional tribunals; but further, political papers could not be founded without an authorization, and were subject to a regular administrative discipline; they could be warned, suspended or suppressed without a trial, by a simple act of the administration. The constitution of January 1852 was still Republican in name, though less so than that of the year VIII. The period corresponding with the Consulate was also shorter in the case of Louis Napoleon. The year 1852 had not come to an end before a *senatus consulte*, that of the 10th of November, ratified by a plebiscite, re-established the imperial rank in favour of Napoleon III.; it also conferred on him certain new powers, especially with reference to the budget and foreign treaties; thus various cracks, which experience had revealed in the original structure of the Empire, were filled up. This period was called that of the *empire autoritaire*. Further features of it were the free appointment of the *maires* by the emperor, the oath of fidelity to him imposed on all officials, and the legal organization of official candidatures for the elections. Two measures marked the highest point reached by this system: the *loi de sureté générale* of the 27th of February 1858, which allowed the government to intern in France or Algeria, or to exile certain French citizens, without a trial. The other was the *senatus consulte* of the 17th of February 1858, which made the validity of candidatures for the Corps Législatif subject

The empire libéral.

to a preliminary oath of fidelity on the part of the candidate. But for various causes, which cannot be examined here, a series of measures was soon to be initiated which were gradually to lead back again to political liberty, and definitively to found what has been called the *empire libéral.* One by one the different rules and proceedings of parliamentary government as it had existed in France regained their force. The first step was the decree of the 24th of November 1860, which re-established for each ordinary session the address voted by the chambers in response to the speech from the throne. In 1867 this movement took a more decisive form. It led to a new constitution, that of the 21st of May 1870, which was again ratified by popular suffrage. While maintaining the Empire and the imperial dynasty, it organized parliamentary government practically in the form in which it had operated under the July Monarchy, with two legislative chambers, the Senate and the Corps Législatif, the consent of both of which was necessary for legislation, and which, together with the emperor, had the initiative in this matter. The laws of the 11th of May 1868 and the 6th of June 1868 restored to a certain extent the liberty of the press and of holding meetings, though without abolishing offences of opinion, or again bringing press offences under the jurisdiction of a jury. Laws of the 22nd and 23rd of July 1870 gave the *conseils généraux*, whose powers had been somewhat widened, the right of electing their presidents, and provided that the *maires* and their colleagues should be chosen from among the members of the municipal councils.

Economic and social reforms under the Second Empire.

The legislation of the Second Empire led to a considerable number of reforms. Its chief aim was the development of commerce, industry and agriculture, and generally the material prosperity of the country. The Empire, though restricting liberty in political matters, increased it in economic matters. Such were the decrees and laws of 1852 and 1853 relating to land-banks (*établissements de crédit foncier*) and that of 1857 on trade-marks, those of 1863 and 1867 on commercial companies, that of 1858 on general stores (*magasins généraux*) and warrants, that of 1856 on drainage, that of 1865 on the *associations syndicales de propriétaires*, that of 1866 on the mercantile marine. The law of the 14th of June 1865 introduced into France the institution, borrowed from England, of cheques. But of still greater importance for economic development than all these laws were the treaties concluded by the emperor with foreign powers, in order to introduce, as far as possible, free exchange of commodities; the chief of these, which was the model of all the others, was that concluded with Great Britain on the 23rd of January 1860. Moreover, the law of the 25th of May 1864 admitted for the first time the right of strikes and lock-outs among workmen or employers, annulling articles 414 and following of the *Code Pénal*, which had so far made them a penal offence, even when not accompanied by fraudulent practices, threats or violence, tending to hinder the liberty of labour. The superannuation fund (*caisse des retraites pour la vieillesse*), supported by voluntary payments from those participating in it, which had been created by the law of the 18th of June 1850, was reorganized and perfected, and a law of the 11th of July 1868 established, with the guarantee of the state, two funds for voluntary insurance, one in case of death, the other against accidents occurring in industrial or agricultural employment. A decree of 1863 established in principle the freedom of bakeries, and another in 1864 that of theatrical management.

Commercial treaties.

Reforms in the criminal law.

Criminal law was the subject of important legislation. Two codes were promulgated on special points, the codes of military justice for the land forces (1857) and for the naval forces (1858). But the common law was also largely remodelled. A law of the 10th of June 1858, it is true, created certain new crimes, with a view to protecting the members of the imperial family, and that of the 17th of July 1856 increased the powers and independence of the *juges d'instruction*; but, on the other hand, useful improvements were introduced by laws of 1856 and 1865, and notably with regard to precautionary detention and provisional release with or without bail. A law of the 20th of May 1863 organized a simple and rapid procedure, copied from that followed in England before the police courts, for summary jurisdiction. A law of 1868 permitted the revision of criminal trials after the death of the condemned person. But the most far-reaching reforms took place in 1854, namely, the abolition of the total loss of civil rights which formerly accompanied condemnation to imprisonment for life, and the law of the 30th of May on penal servitude (*travaux forcés*) which substituted transportation to the colonies for the system of continental convict prisons. Finally, in 1863, there was a revision of the *Code Pénal*, which, in the process of lightening penalties, made a certain number of crimes into misdemeanours, and in consequence transferred the judgment of them from the assize courts to the correctional tribunals. In civil legislation may be noted the law of the 23rd of March 1855 on hypothecs (see CODE NAPOLÉON); that of the 22nd of July 1857, which abolished seizure of the person (*contrainte par corps*) for civil and commercial debts; and finally, the law of the 14th of July 1866, on literary copyright. The system of taxation was hardly modified at all, except for the establishment of a tax on the income arising from investments (shares and bonds of companies) in 1857, and the tax on carriages (1862). On the 1st of February 1868 was promulgated an important military law, which, however, passed the Corps Législatif with some difficulty. It asserted the principle of universal compulsory military service, at least, in time of war. It preserved, however, the system of drawing lots to determine the annual contingent to be incorporated into the standing army; the term of service was fixed at five years, and it was still permissible to send a substitute. But able-bodied men who were not included in the annual contingent formed a reserve force called the *garde nationale mobile*, each department organizing its own section. These *gardes mobiles*, though they were not effectively organized or exercised under the Empire, took part in the war of 1870–71.

Civil legislation.

Taxation and army.

The Third Republic.—The Third Republic had at first a provisional government, unanimously acclaimed by the people of Paris. It was accepted by France, exercised full powers, and sustained by no means ingloriously a desperate struggle against the enemy; a certain number of its *décrets-lois* are still in force. After the capitulation of Paris, a National Assembly was elected to treat with Germany. It was elected in accordance with the electoral law of 1849, which had been revived with a few modifications, and it met at Bordeaux to the number of 753 members on the 13th of February 1871. It was a sovereign assembly, since France had no longer a constitution, and for this very reason it claimed from the outset constituent powers; the Republican party at the time, however, contested this claim, the majority in the assembly being frankly monarchist, though divided as to the choice of a monarch. But for some time the National Assembly either could not or would not exercise this power, and up to 1875 affairs remained in a provisional state, legalized and regulated this time by the Assembly. This was an application, though unconscious, of a form of government which M. Grévy had proposed to the Constituent Assembly in 1848. There was a single assembly, with one man elected by it as head of the executive power (the first to be elected was M. Thiers, who received the title of president of the Republic in August 1871), who was responsible to the Assembly and governed with the help of ministers chosen by himself, who were also responsible to it. Thiers fell on the 24th of May 1873. His place was taken by Marshal MacMahon, on whom the Assembly later conferred, in November 1873, the position of president of the Republic for seven years, when the refusal of the comte de Chambord to accept the tricolour in place of the white flag of the Bourbons had made any attempt to restore the monarchy impossible. Henceforth the definitive adoption of the Republican form of government became inevitable, and the opinion of the country began to turn in this direction, as was shown by the elections of deputies which took place to fill up the gaps occurring in the Assembly. The Assembly, however, shrank from the inevitable

Definitive establishment of the Republic.

solution, and when a discussion was begun in January 1875 on the projected constitutional laws prepared by the *commission des trente*, the only proposals made by the latter were for a more complete organization of the powers of one man, Marshal MacMahon. But on the 30th of January 1875 was adopted, by 353 votes to 352, an amendment by M. Wallon which provided for the election of an indefinite succession of presidents of the Republic; this amounted to a definitive recognition of the Republic. In this connexion it has often been said that the Republic was established by a majority of one. This is not an accurate statement, for it was only the case on the first reading of the law; the majority on the second and third readings increased until it became considerable. There was a strong movement in the direction of a reconciliation between the parties; and there had been a *rapprochement* between the Republicans and the Right Centre. At the end of February were passed and promulgated two constitutional laws, that of the 25th of February 1875, on the organization of the public powers, and that of the 24th of February 1875, on the organization of the senate. In the middle of the year they were supplemented by a third, that of the 16th of July 1875, on the relations between the public powers.

The French Constitution.

Thus was built up the actual constitution of France. It differs fundamentally, both in form and contents, from previous constitutions. As to its form, instead of a single methodical text divided into an uninterrupted series of articles, it consisted of three distinct laws. As to matter, it is obviously a work of an essentially practical nature, the result of compromise and reciprocal concessions. It does not lay down any theoretical principles, and its provisions, which were arrived at with difficulty, confine themselves strictly to what is necessary to ensure the proper operation of the governmental machinery. The result is a compromise between Republican principles and the rules of constitutional and parliamentary monarchy. On this account it has been accused, though unjustly, of being too monarchical. Its duration, by far the longest of any French constitution since 1791, is a sign of its value and vitality. It is in fact a product of history, and not of imagination. Its composition is as follows. The legislative power was given to two elective chambers, having equal powers, the vote of both of which is necessary for legislation, and both having the right of initiating and amending laws. The constitution assures them an ordinary session of five months, which opens by right on the second Tuesday in January. One house, the Chamber of Deputies, is elected by direct universal suffrage and is entirely renewed every four years; the other, the Senate, consists of 300 members, divided by the law of the 27th of February 1875 into two categories; 75 of the senators were elected for life and irremovable, and the first of them were elected by the National Assembly, but afterwards it was the Senate itself which held elections to fill up vacancies. The 225 remaining senators were elected by the departments and by certain colonies, among which they were apportioned in proportion to the population; they are elected for nine years, a third of the house being renewed every three years. The electoral college in each department which nominated them included the deputies, the members of the general council of the department and of the councils of the arrondissements, and one delegate elected by each municipal council, whatever the importance of the commune. This was practically a system of election in two and, partly, three degrees, but with this distinguishing feature, that the electors of the second degree had not been chosen purely with a view to this election, but chiefly for the exercise of other functions. The most important elements in this electoral college were the delegates from the municipal councils, and by giving one delegate to each, to Paris just as to the smallest commune in France, the National Assembly intended to counterbalance the power of numbers, which governed the elections for the Chamber of Deputies, and, at the same time, to give a preponderance to the country districts. The 75 irremovable senators were another precaution against the danger from violent waves of public opinion. The executive power was entrusted to a president, elected for seven years (as Marshal MacMahon had been in 1873), by the Chamber and the Senate, combined into a single body under the name of National Assembly. He is always eligible for re-election, and is irresponsible except in case of high treason. His powers are of the widest, including the initiative in legislation jointly with the two chambers, the appointment to all civil and military offices, the disposition, and, if he wish it, the leadership of the armed forces, the right of pardon, the right of negotiating treaties with foreign powers, and, in principle, of ratifying them on his own authority, the consent of the two chambers being required only in certain cases defined by the constitution. The nomination of *conseillers d'état* for ordinary service, whom the National Assembly had made elective, as in 1848, and elected itself, was restored to the president of the Republic, together with the right of dismissing them. But these powers he can only exercise through the medium of a ministry, politically and jointly responsible to the chambers, and forming a council, over which the president usually presides.

The French Republic is essentially a parliamentary republic. The right of dissolving the Chamber of Deputies before the expiration of its term of office belongs to the president, but in order to do so he must have, besides a ministry which will take the responsibility for it, the preliminary sanction of the Senate. The Senate is at the same time a high court of justice, which can judge the president of the Republic and ministers accused of crimes committed by them in the exercise of their functions; in these two cases the prosecution is instituted by the Chamber of Deputies. The Senate can also be called upon to judge any person accused of an attempt upon the safety of the state, who is then seized by a decree of the president of the Republic, drawn up in the council of ministers. Possible revision of the constitution is provided for very simply: it has to be proposed as a law, and for its acceptance a resolution passed by each chamber separately, by an absolute majority, is necessary. The revision is then carried out by the Senate and the Chamber of Deputies to form a National Assembly. There have been two revisions since 1875. The first time, in 1879, it was simply a question of transferring the seat of the government and of the chambers back to Paris from Versailles, where it had been fixed by one of the constitutional laws. The second time, in 1884, more fundamental modifications were required. The most important point was to change the composition and election of the Senate. With a view to this, the new constitutional law of the 14th of August 1884 abolished the constitutional character of a certain number of articles of the law of the 24th of February 1875, thus making it possible to modify them by an ordinary law. This took place in the same year; the 75 senators for life were suppressed for the future by a process of extinction, and their seats divided among the most populous departments. Further, in the electoral college which elects the senators, there was allotted to the municipal councils a number of delegates proportionate to the number of members of the councils, which depends on the importance of the commune. The law of the 14th of August 1884 also modified the constitution in another important respect. The law of the 25th of February 1875 had admitted the possibility not only of a partial, but even of a total revision, which could affect and even change the form of the state. The law of the 14th of August 1884, however, declared that no proposition for a revision could be accepted which aimed at changing the republican form of government. The composition of the Chamber of Deputies was not fixed by the constitution, and consequently admitted more easily of variation. Since 1871 the mode of election has oscillated between the *scrutin de liste* for the departments and the *scrutin uninominal* for the arrondissements. The organic law of the 30th of November 1875 had established the latter system; in 1885 the *scrutin de liste* was established by law, but in 1889 the *scrutin d'arrondissement* was restored; and in this same year, on account of the ambitions of General Boulanger and the suggestion which was made for a sort of plebiscite in his favour, was passed the law on plural candidatures, which forbids anyone to become a candidate for the Chamber of Deputies in more than one district at a time.

Working of the constitution.

The system established by the constitution of 1875 has worked excellently in some of its departments; for instance, the mode of electing the president of the Republic. Between 1875 and 1906 there were seven elections, sometimes under tragic or very difficult conditions; the election has always taken place without delay or obstruction, and the choice has been of the best. The high court of justice, which has twice been called into requisition, in 1889 and in 1899–1900, has acted as an efficient check, in spite of the difficulties confronting such a tribunal when feeling runs high. Parliamentary government in the form set up by the constitution, besides the criticism to which this system is open in all countries where it is established, even in England, met with special difficulties in France. In the first place, the useful but rather secondary rôle assigned to the president of the Republic has by no means satisfied all those who have occupied this high office. Two presidents have resigned on the ground that their powers were insufficient. Another, even after re-election, had to withdraw in face of the opposition of the two chambers, being no longer able to obtain a parliamentary ministry. It is difficult, however, to accept the theory of an eminent American political writer, Mr John W. Burgess,[1] that in order to attain to a position of stable equilibrium, the French Republic ought to adopt the presidential system of the United States. In France this sharp division between the two powers has never been observed except in those periods when the representative assemblies were powerless, under the First and Second Empires. It is true that the apparent multiplicity of parties and their lack of discipline, together with the French procedure of *interpellations* and the orders of the day by which they are concluded, make the formation of homogeneous and lasting cabinets difficult; but since the end of the 19th century there has been great progress in this respect. Another difficulty arose in 1896. The Senate, appealing to the letter of the constitution and relying on its elective character, claimed the right of forcing a ministry to resign by its vote, in the same way as the Chamber of Deputies. The Senate was victorious in the struggle, and forced the ministry presided over by M. Léon Bourgeois to resign; but the precedent is not decisive, for in order to gain its ends the Senate had recourse to the means of refusing to sanction the taxes, declining to consider the proposals for the supplies necessary for the Madagascar expedition so long as the ministry which it was attacking was in existence. The weakest point in the French parliamentary organism is perhaps the right of dissolution. It is difficult of application, for the reason that the president must obtain the preliminary consent of the Senate before exercising it; moreover, this valuable right has been discredited by its abuse by Marshal MacMahon in the campaign of the 16th of May 1877, on which occasion he exercised his right of dissolution against a chamber, the moderate but decidedly republican majority in which was re-elected by the country.

Reforms under the Third Republic.

The religious congregations.

Education.

Separation of church and state.

The legislative reforms carried out under the Third Republic are very numerous. As to public law, it is only possible to mention here those of a really organic character, chief among which are those which safeguard and regulate the exercise of the liberties of the individual. The law of the 30th of June 1881, modified in 1901, established the right of holding meetings. Public meetings, whether for ordinary or electoral purposes, may be held without preliminary authorization; the law of 1881 prescribed a declaration made by a certain number of citizens enjoying full civil and political rights, which is now remitted. The only really restrictive provision is that which does not allow them to be held in the public highway, but only in an enclosed space. But this is made necessary by the customs of France. The law of the 21st of July 1881 on the press is one of the most liberal in the world. By it all offences committed by any kind of publication are submitted to a jury; the punishment for the mere expression of obnoxious opinions is abolished, the only punishment being for slander, libel, defamation, inciting to crime, and in certain cases the publication of false news. The law of the 1st of July 1901 established in France the right of forming associations. It recognizes the legality of all associations strictly so called, the objects of which are not contrary to law or to public order or morality. On condition of a simple declaration to the administrative authority, it grants them a civil status in a wide sense of the term. Religious congregations, on the contrary, which are not authorized by a law, are forbidden by this law. This was not a new principle, but the traditional rule in France both before and after the Revolution, except that under certain governments authorization by decree had sufficed. As a matter of fact the unauthorized congregations had been tolerated for a long time, although on various occasions, and especially in 1881, their partial dissolution had been proclaimed by decrees. The law of 1901 dissolved them all, and made it an offence to belong to such a congregation. The members of unauthorized congregations, and later, in 1904, even those of the authorized congregations, were disqualified from teaching in any kind of establishment. The liberty of primary education was confirmed and reorganized by the law of the 30th of October 1886, which simply deprived the clergy of the privileges granted them by the law of 1850, though the latter remains in force with regard to the liberty of secondary education. A law passed by the National Assembly (July 12, 1875) established the liberty of higher education. It even went beyond this, for it granted to students in private *facultés* who aspired to state degrees the right of being examined before a board composed partly of private and partly of state professors. The law of the 18th of March 1880 abolished this privilege. Another law, that of the 22nd of March 1882, made primary education obligatory, though allowing parents to send their children either to private schools or to those of the state; the law of the 16th of June 1881 established secular (*laïque*) education in the case of the latter. The Third Republic also organized secondary education for girls in lycées or special colleges (*collèges de fille*). Finally, a law of the 10th of July 1896 dealing with higher education and the faculties of the state reorganized the universities, which form distinct bodies, enjoying a fairly wide autonomy. A law of the 19th of December 1905, abrogating that of the 18th Germinal in the year X., which had sanctioned the Concordat, proclaimed the separation of the church from the state. It is based on the principle of the secular state (*état laïque*) which recognizes no form of religion, though respecting the right of every citizen to worship according to his beliefs, and it aimed at organizing associations of citizens, the object of which was to collect the funds and acquire the property necessary for the maintenance of worship, under the form of *associations cultuelles*, differing in certain respects from the associations sanctioned by the law of the 1st of July 1901, but having a wider scope. It also handed over to these regularly formed associations the property of the ecclesiastical establishments formerly in existence, while taking precautions to ensure their proper application, and allowed the associations the free use of the churches and places of worship belonging to the state, the departments or the communes. If no *association cultuelle* was founded in a parish, the property of the former *fabrique* should devolve to the commune. But this law was condemned by the papacy, as contrary to the church hierarchy; and almost nowhere were *associations cultuelles* formed, except by Protestants and Jews, who complied with the law. After many incidents, but no church having been closed, a new law of the 2nd of January 1907 was enacted. It permits the public exercise of any cult, by means of ordinary associations regulated by the law of the 1st of July 1901, and even of public meetings summoned by individuals. Failing all associations, either *cultuelles* or others, churches, with their ornaments and furniture, are left to the disposition of the faithful and ministers, for the purpose of exercising the cult; and, on certain conditions, the long use of them can be granted as a free gift to ministers of the cult.

Among the organic laws concerning administrative affairs there are two of primary importance; that of the 10th of

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[1] *Political Science and Comparative Constitutional Law* (Boston, 1896).

Administrative changes.

August 1871, on the *conseils généraux*, considerably increased the powers and independence of these elective bodies, which have become important deliberative assemblies, their sessions being held in public. The law of 1871 created a new administrative organ for the departments, the *commission départmentale*, elected by the council-general of the department from among its own members and associated with the administration of the prefect. The other law is the municipal law of the 5th of April 1884, which effected a widespread decentralization; the *maires* and their *adjoints* are elected by the municipal council.

Reorganization of the army.

The war of 1870–71 necessarily led to a modification of the military organization. The law of the 25th of July 1872 established the principle of compulsory service for all, first in the standing army, the period of service in which was fixed at five years, then in the reserve, and finally in the territorial army. But the application of this principle was by no means absolute, only holding good in time of war. Each annual class was divided into two parts, by means of drawing lots, and in time of peace one of these parts had only a year of service with the active army. The previous exemptions, based either on the position of supporter of the family (as in the case of the son of a widow or aged father, &c.) or on equivalent services rendered to the state (as in the case of young ecclesiastics or members of the teaching profession), were preserved, but only held good for service in the active army in times of peace. Finally, the system of conditional engagement for a year allowed young men, for the purposes of study or apprenticeship to their profession, only to serve a year with the active army in time of peace. By this means it was sought to combine the advantages of an army of veterans with those of a numerous and truly national army. But the conditional volunteering (*volontariat conditionnel*) for a year was open to too great a number of people, and so brought the system into discredit. As those who profited by it had to be clothed and maintained at their own expense, and the sum which they had to furnish for this purpose was generally fixed at 1500 francs, it came to be considered the privilege of those who could pay this sum. A new law of the 15th of July 1889 lessened the difference between the two terms which it attempted to reconcile. It reduced the term of service in the active army to three years, and the exemptions, which were still preserved, merely reduced the period to a year in times of peace. The same reduction was also granted to those who were really pursuing important scientific, technical or professional studies; the system was so strict on this point that the number of those who profited by those exemptions did not amount to 2000 in a year. This was a compromise between two opposing principles; the democratic principle of equality, being the stronger, was bound to triumph. The law of the 21st of March 1905 reduced the term of service in the active army to two years, but made it equal for all, admitting of no exemption, but only certain facilities as to the age at which it had to be accomplished.

Justice and taxation.

In 1883 the judicial *personnel* was reorganized and reduced in number. With the exception of a few modifications the main lines of judicial organization remained the same. In 1879 the conseil d'état was also reorganized. The whole fabric of administrative jurisdiction was carefully organized, and almost entirely separated from the active administration.

The system of taxation has remained essentially unaltered; we may notice, however, the laws of 1897, 1898 and 1900, which abolished or lessened the duties on so called *hygienic* drinks (wine, beer, cider), and the financial law of 1901, which rearranged and increased the transfer fees, and established a system of progressive taxation in the case of succession dues.

Labour legislation.

The labour laws, which generally partook of the nature both of public and of private law, are a sign of our times. Under the Third Republic they have been numerous, the most notable being: the law of the 21st of March 1884 on professional syndicates, which introduced the liberty of association in matters of this kind before it became part of the common law (see Trade Unions); the law of the 9th of April 1898 on the liability for accidents incurred during work, and those which have completed it; that of the 22nd of December 1892 on conciliation and arbitration in the case of collective disputes between employers and workmen; that of the 29th of June 1893 on the hygiene and safeguarding of workers in industrial establishments, and the laws which regulate the work of children and women in factories; finally, that of the 15th of July 1893 on free medical attendance (see Labour Legislation).

Criminal law.

As to criminal law, there have been more than fifty enactments, mostly involving important modifications, due to more scientific ideas of punishment, so that we may say that it has been almost entirely recast since the establishment of the Third Republic. The separate system applied in cases of preventive detention and imprisonment for short periods; liberation before the expiry of the term of sentence, subject to the condition that no fresh offence shall be committed within a given time; transportation to the colonies of habitual offenders; the remission of the penalty in the case of first offenders, and the lapsing of the penalty when a certain time has gone by without a fresh condemnation; greater facilities for the rehabilitation of condemned persons, which now became simply a matter for the courts, and occurred as a matter of course at the end of a certain time; such were the chief results of this legislation. Finally, the law of the 8th of December 1897 completely altered the form of the preliminary examination before the *juge d'instruction*, which had been the weakest point in the French criminal procedure, though it was still held in private; the new law made this examination really a hearing of both sides, and made the appearance of counsel for the defence practically compulsory.

As to private law, both civil and commercial, we could enumerate between 1871 and 1906 more than a hundred laws which have modified it, sometimes profoundly, and have for the most part done very useful work without attracting much attention. They are generally examined and drawn up by commissions of competent men, and pass both chambers almost without discussion. There have, however, been a few which aroused public interest and even deep feeling. Firstly, there was the law of the 27th of July 1884, and those which completed it; this law re-established divorce, which had been abolished since 1816, but only permitted it for certain definite causes determined by law. On the other hand, the law of the 6th of February 1893 increased the liberty and independence of a woman who was simply judicially separated, in order to encourage separation, as opposed to divorce, when the conditions allowed it. The law of the 25th of March 1896 on the succession of illegitimate children, who were recognized by the parents, treated them not in the same way as legitimate children, but gave them the title of heirs in the succession of their father and mother, together with much greater rights than they had possessed under the *Code Civil*. The law of the 24th of July 1899, on the protection of children who are ill-treated or morally neglected, also modified some of the provisions of the law as applied to the family, with a view to greater justice and humanity. Finally, on the occasion of the centenary of the *Code Civil* (see Code Napoléon), a commission, composed of members of the chambers, magistrates, professors of law, lawyers, political writers, and even novelists and dramatic authors, was given the task of revising the whole structure of the code.

See generally Adhémar Esmein, *Cours élémentaire d'histoire du droit français* (6th ed., 1906); J. Brissand, *Cours d'histoire générale du droit français public et privé* (1904); Ernest Glasson, *Histoire du droit et des institutions en France* (1887–1904); Paul Viollet, *Histoire des institutions politiques et administratives de la France* (3rd ed., 1903); Fustel de Coulanges, *Histoire des institutions politiques de l'ancienne France*; Jacques Flach, *Les Origines de l'ancienne France* (1875–1889); Achille Luchaire, *Histoire des institutions monarchiques de la France sous les premiers Capétiens* (2nd ed., 1900); Hippolyte Taine, *Les Origines de la France contemporaine* (1878–1894); Adhémar Esmein, *Eléments de droit constitutionnel français et comparé* (4th ed., 1906); Léon Duguit et Henry Monnier, *Les Constitutions et les principales lois politiques de la France depuis 1789* (1898). (J. P. E.)

FRANCESCHI, JEAN BAPTISTE, Baron (1766–1813), French general, was born at Bastia on the 5th of December 1766 and entered the French service in 1793. He took part in the operations in Corsica in the following year, and received a wound at the siege of San Fiorenzo. After this he left the island and was appointed a field officer in the French Army of Italy, with which he served from 1795 to 1799. He served as a general officer in the campaign of Marengo, in the Naples campaign of 1805–1806, and in the Peninsular War from 1807 to 1809. He was created a baron by Napoleon. He commanded a Neapolitan brigade in the Russian War of 1812, and after the retreat from Moscow took refuge, with the remnant of his command, in Danzig, where in the course of the siege of 1813 he died on the 19th of March.

Two other generals of brigade in Napoleon's wars bore the name of Franceschi, and the three have often been mistaken for each other. The first was born at Lyons, Jean Baptiste Marie Franceschi-Delonne (1767–1810), who served throughout the Revolutionary campaign on the Rhine, took part in the campaign of Zürich in 1799, and distinguished himself very greatly by his escape from, and subsequent return to, Genoa, when in 1800 Masséna was closely besieged in that city. He became a cavalry colonel in 1803, was promoted general of brigade on the field of Austerlitz, and served in southern Italy and in Spain on the staff of King Joseph Bonaparte. During the Peninsular War he won great distinction as a cavalry general, and in 1810 Napoleon made him a baron. At this time he was a prisoner in the hands of the Spaniards, into whose hands he had fallen while bearing important despatches during the campaign of Talavera. He was harshly treated by his captors, and died at Carthagena on the 23rd of October 1810. The second was François Franceschi-Losio (1770–1810), born at Milan, who entered the French Revolutionary army in 1795. He served through the Italian campaign of 1796–97, and subsequently, like Franceschi-Delonne, with Masséna at Zürich and at Genoa, and at the headquarters of King Joseph in Italy and Spain. He was killed in a duel by the Neapolitan colonel Filangieri in 1810.

FRANCESCHI, PIERO (or Pietro) **DE'** (*c.* 1416–1492), Italian painter of the Umbrian school. This master is generally named Piero della Francesca (Peter, son of Frances), the tradition being that his father, a woollen-draper named Benedetto, had died before his birth. This is not correct, for the mother's name was Romana, and the father continued living during many years of Piero's career. The painter is also named Piero Borghese, from his birthplace, Borgo San Sepolcro, in Umbria. The true family name was, as above stated, Franceschi, and the family still exists under the name of Martini-Franceschi.

Piero first received a scientific education, and became an adept in mathematics and geometry. This early bent of mind and course of study influenced to a large extent his development as a painter. He had more science than either Paolo Uccello or Mantegna, both of them his contemporaries, the former older and the latter younger. Skilful in linear perspective, he fixed rectangular planes in perfect order and measured them, and thus got his figures in true proportional height. He preceded and excelled Domenico Ghirlandajo in projecting shadows, and rendered with considerable truth atmosphere, the harmony of colours, and the relief of objects. He was naturally therefore excellent in architectural painting, and, in point of technique, he advanced the practice of oil-colouring in Italy.

The earliest trace that we find of Piero as a painter is in 1439, when he was an apprentice of Domenico Veneziano, and assisted him in painting the chapel of S. Egidio, in S. Maria Novella of Florence. Towards 1450 he is said to have been with the same artist in Loreto; nothing of his, however, can now be identified in that locality. In 1451 he was by himself, painting in Rimini, where a fresco still remains. Prior to this he had executed some extensive frescoes in the Vatican; but these were destroyed when Raphael undertook on the same walls the "Liberation of St Peter" and other paintings. His most extensive extant series of frescoes is in the choir of S. Francesco in Arezzo,—the "History of the Cross," beginning with legendary subjects of the death and burial of Adam, and going on to the entry of Heraclius into Jerusalem after the overthrow of Chosroes. This series is, in relation to its period, remarkable for effect, movement, and mastery of the nude. The subject of the "Vision of Constantine" is particularly vigorous in chiaroscuro; and a preparatory design of the same composition was so highly effective that it used to be ascribed to Giorgione, and might even (according to one authority) have passed for the handiwork of Correggio or of Rembrandt. A noted fresco in Borgo San Sepolcro, the "Resurrection," may be later than this series; it is preserved in the Palazzo de' Conservatori. An important painting of the "Flagellation of Christ," in the cathedral of Urbino, is later still, probably towards 1470. Piero appears to have been much in his native town of Borgo San Sepolcro from about 1445, and more especially after 1454, when he finished the series in Arezzo. He grew rich there, and there he died, and in October 1492 was buried.

Two statements made by Vasari regarding "Piero della Francesca" are open to much controversy. He says that Piero became blind at the age of sixty, which cannot be true, as he continued painting some years later; but scepticism need perhaps hardly go to the extent of inferring that he was never blind at all. Vasari also says that Fra Luca Pacioli, a disciple of Piero in scientific matters, defrauded his memory by appropriating his researches without acknowledgment. This is hard upon the friar, who constantly shows a great reverence for his master in the sciences. One of Pacioli's books was published in 1509, and speaks of Piero as still living. Hence it has been propounded that Piero lived to the patriarchal age of ninety-four or upwards; but, as it is now stated that he was buried in 1492, we must infer that there is some mistake in relation to Pacioli's remark—perhaps the date of writing was several years earlier than that of publication. Piero was known to have left a manuscript of his own on perspective; this remained undiscovered for a long time, but eventually was found by E. Harzen in the Ambrosian library of Milan, ascribed to some supposititious "Pietro, Pittore di Bruges." The treatise shows a knowledge of perspective as dependent on the point of distance.

In the National Gallery, London, are three paintings attributed to Piero de' Franceschi. Another work, a profile of Isotta da Rimini, may safely be rejected. The "Baptism of Christ," which used to be the altar-piece of the Priory of the Baptist in Borgo San Sepolcro, is an important example; and still more so the "Nativity," with the Virgin kneeling, and five angels singing to musical instruments. This is a very interesting and characteristic specimen, and has indeed been praised somewhat beyond its deservings on aesthetic grounds.

Piero's earlier style was energetic but unrefined, and to the last he lacked selectness of form and feature. The types of his visages are peculiar, and the costumes (as especially in the Arezzo series) singular. He used to work assiduously from clay models swathed in real drapery. Luca Signorelli was his pupil, and probably to some extent Perugino; and his own influence, furthered by that of Signorelli, was potent over all Italy. Belonging as he does to the Umbrian school, he united with that style something of the Sienese and more of the Florentine mode.

Besides Vasari and Crowe & Cavalcaselle, the work by W. G. Waters, *Piero della Francesca* (1899) should be consulted.

(W. M. R.)

FRANCESCHINI, BALDASSARE (1611–1689), Italian painter of the Tuscan school, named, from Volterra the place of his birth, Il Volterrano, or (to distinguish him from Ricciarelli) Il Volterrano Giuniore, was the son of a sculptor in alabaster. At a very early age he learned from Cosimo Daddi some of the elements of art, and he started as an assistant to his father. This employment being evidently below the level of his talents, the marquises Inghirami placed him, at the age of sixteen, under the Florentine painter Matteo Rosselli. In the ensuing year he had advanced sufficiently to execute in Volterra some frescoes, skilful in foreshortening, followed by other frescoes for the Medici family in the Valle della Petraia. In 1652 the marchese Filippo Niccolini, being minded to employ Franceschini upon the frescoes for the cupola and back-wall of his chapel in S. Croce, Florence, despatched him to various parts of Italy to perfect his style. The painter, in a tour which lasted some months, took more especially to the qualities distinctive of the schools of Parma and Bologna, and in a measure to those of Pietro da Cortona, whose acquaintance he made in Rome. He then undertook the paintings commissioned by Niccolini, which constitute his most noted performance, the design being good, and the method masterly. Franceschini ranks higher in fresco than in oil painting. His works in the latter mode were not unfrequently left unfinished, although numerous specimens remain, the cabinet pictures being marked by much sprightliness of invention. Among his best oil paintings of large scale is the "St John the Evangelist" in the church of S. Chiara at Volterra. One of his latest works was the fresco of the cupola of the Annunziata, Florence, which occupied him for two years towards 1683, a production of much labour and energy. Franceschini died of apoplexy at Volterra on the 6th of January 1689. He is reckoned among those painters of the decline of art to whom the general name of "machinist" is applied.

He is not to be confounded with another Franceschini of the same class, and of rather later date, also of no small eminence in his time—the Cavaliere Marcantonio Franceschini (1648–1729), who was a Bolognese.

FRANCHE-COMTÉ, a province of France from 1674 to the Revolution. It was bounded on the E. by Switzerland, on the S. by Bresse and Bugey, on the N. by Lorraine, and on the W. by the duchy of Burgundy and by Bassigny, embracing to the E. of the Jura the valley of the Saône and most of that of the Doubs. Under the Romans it corresponded to *Maxima Sequanorum*, and after having formed part of the kingdom of Burgundy was in the early part of the middle ages split up into the four countships of Portois, Varais, Amons and Escuens. In the 10th century these four countships were united to form a whole, which came to be called the countship of Burgundy, and belonged at that time to the family of the counts of Mâcon.

The limits of the countship were definitely settled under Otto William, son of Albert or Adalbert, king of Italy (†1027), who on the death of his father-in-law, Henry (1002), tried to seize the duchy of Burgundy, but without success. The countship, which formed a fief dependent on the kingdom of Burgundy, passed to Renaud I., the second son of Otto William. When the kingdom of Burgundy was joined to the Germanic empire, he refused to pay homage to the emperor Henry III., whose suzerainty over him never existed except in theory. William I., surnamed the Great or Headstrong (1059–1087), still further added to the power of his house by marrying Etiennette, heiress of the count of Vienne, and by acquiring from his cousin Guy, when the latter became a monk at Cluny, the countship of Mâcon. One of his sons, Guy, became pope, under the name of Calixtus II. His grandson, Renaud III. (1097–1148), in his turn refused to pay homage to the emperor Lothair, who retaliated by confiscating his dominions and giving them to Conrad of Zähringen. Renaud, however, succeeded in maintaining until his death his possession of the countships of Burgundy, Vienne and Mâcon. He left as sole heiress a daughter, Beatrix, whom his brother William III. imprisoned, in order to make an attempt on her inheritance; she was set free, however, by the emperor Frederick Barbarossa, who married her in 1156.

On the death of Beatrix (1185) the countship of Burgundy passed to Otto I. (1190–1200), the youngest but one of her sons, who had to dispute its possession with Stephen, count of Auxonne, the grandson of William III. Beatrix, the daughter and heiress of Otto I. (1200–1231), married Otto, duke of Meran (†1234), under whose government the inhabitants of Besançon, which had been since the time of Frederick Barbarossa an imperial city, formed themselves definitely into a *commune*. Alix, daughter of Beatrix and of Otto of Meran, and heiress to the countship of Burgundy, married Hugh of Chalon, son of John the Ancient or the Wise (d. 1248), and a descendant of William III. and consequently of William the Headstrong, thus bringing the countship back into the family of its former lords. His son Otto IV. (1279–1303) engaged in war against the bishop of Basel, and the German king Rudolph I., who supported the latter, entered Franche-Comté and besieged Besançon, but without success (1289). Otto, in fulfilment of the treaties of Ervennes and Vincennes (1291–1295) gave Jeanne, his daughter by Mahaut of Artois, in marriage to Philip, count of Poitiers, son of Philip the Fair. The latter took over the administration of the countship in spite of strong opposition from the nobles of the country, but their leader, John of Chalon-Arlay, was compelled to make his submission. Another of Otto's daughters married Charles IV., the Handsome, and both princesses, together with their sister-in-law Margaret of Burgundy, were concerned in the celebrated trial of the Tour de Nesle. Jeanne, however, continued to govern her countship when Philip her husband became king of France (Philip V., "the Long"). Jeanne, their daughter and heiress, married Odo IV., duke of Burgundy (1330–1347), and her sister Margaret became the wife of Louis II., count of Flanders. The countship returned to Margaret at the death of Odo IV., who was succeeded in his duchy by his grandson Philip of Rouvre.

The marriage of Philip the Bold with Margaret, daughter of Louis of Mâle, caused Franche-Comté to pass to the princes of the ducal house of Burgundy, who kept it up till the death of Charles the Bold (1477). On his death Louis XI. laid claim to the government of the countship as well as of the duchy, as trustee for the property of the princess Mary, who was closely related to him and destined to marry the dauphin (later Charles VIII.). French garrisons occupied the principal towns, and the lord of Craon was appointed governor of the country. In consequence of his severity there was a general rising, and at the same time Mary married Maximilian, archduke of Austria, to whom her father had formerly betrothed her (Aug. 1477). The French were expelled from the fortified towns and Craon beaten by the people of Dôle. Charles of Amboise, who took his place, reconquered the province, and even Besançon submitted to the authority of the king of France, who promised to respect its privileges.

On the death of Louis XI. (1483), the estates of Franche-Comté recognized as sovereign his son Charles, who was betrothed to the little Margaret of Burgundy, daughter of Maximilian and Mary (d. 1482), but when Charles VIII. refused Margaret's hand in order to marry Anne of Brittany there was a fresh rising, and the French were again driven out. The treaty of Senlis (23rd May 1483) put an end to the struggle: Charles abandoned all his pretensions, and Maximilian was thus left in possession of Franche-Comté, the sovereignty of which he handed on to his son Philip and ultimately to the crown of Spain. He had, however, constituted his daughter Margaret sovereign-governess of Franche-Comté for life, and under the administration of this princess (who died in 1530), as under the rule of Charles V., the country enjoyed comparative independence, paying a "*don gratuit*" of 200,000 livres every three years, and being actually governed by the parliament of Dôle, and by governors chosen from the nobility of the country. It was Franche-Comté which furnished Philip II. of Spain with one of his best counsellors, Cardinal Perrenot de Granvella.

In the 16th century the country was disturbed by the preaching of Protestant doctrines, which gained adherents especially in the district of Montbéliard, and later by the wars between France and Spain. In 1595 the armies of Henry IV. levied contributions on Besançon and other towns; but the people of Franche-Comté succeeded in obtaining special terms of neutrality in order to shelter themselves from injury from either of the parties in the war, and enjoyed a period of calm under the government of the infanta Isabella Clara Eugénie and the archduke Albert (1599–1621). But the country suffered greatly from the ravages of the Thirty Years' War, from the presence of the army of the Condés, which besieged Dôle, from the devastation of the troops of Gallas, and later of those of Bernard of Saxe-Weimar. The peace of Westphalia (1648) confirmed Spain in the possession of Franche-Comté. In 1668 the French again entered it, and the conquest, of which the foundations had been laid by the intrigues of the abbot of Watteville and the French party constituted by him, was easily accomplished by Condé and Luxemburg, Louis XIV. directing the army in Franche-Comté for some time in person. None the less, the country was restored to Spain at the peace of Aix-la-Chapelle (1668), but in 1674 Louis headed another expedition there. Besançon capitulated after a siege of twenty-seven days, and Dôle and Salins also fell into the hands of the invaders.

In 1678 the treaty of Nijmwegen gave Franche-Comté to France (the principality of Montbéliard remaining in the possession of the house of Württemberg, which had acquired it by marriage), and it was in celebration of this conquest that the Arc de Triomphe of the Portes Saint Denis and Saint Martin at Paris was erected. Franche-Comté became a military government (*gouvernement*). The estates ceased to meet, and the old "*don gratuit*" was replaced by a tax which became increasingly heavy. Louis made Besançon, which Vauban fortified, into the capital of the province, and transferred to it the parliament and the university, the seat of which had hitherto been Dôle. For purposes of administration, the county was divided among the four great *bailliages* of Besançon, Dôle, Amont (chief town Vesoul) and Aval (chief town Salins). At the Revolution were formed from it the departments of Jura, Doubs and Haute-Saône.

See Dunod, *Histoire des Sequanois; Hist. du comté de Bourgogne* (Dijon, 1735–1740); E. Clerc, *Essai sur l'histoire de la Franche-Comté* (2nd ed., Besançon, 1870). (R. Po.)

FRANCHISE (from O. Fr. *franchise*, freedom, *franc*, free), in English law, a royal privilege or branch of the crown's prerogative subsisting in the hands of a subject. A franchise is an incorporeal hereditament, and arises either from royal grants or from prescription which presupposes a grant. Such franchises are bodies corporate, the right to hold a fair, market, ferry, free fishery, &c. The term is also applied to the right of voting at elections and the qualifications upon which that right is based (see REGISTRATION; REPRESENTATION; VOTE). In the United States the term is especially applied to the right or powers of partial appropriation of public property by exclusive use, or to a privilege of a public nature conferred on a corporation created for the purpose.

FRANCIA (*c.* 1450–1517), a Bolognese painter, whose real name was Francesco Raibolini, his father being Marco di Giacomo Raibolini, a carpenter, descended from an old and creditable family, was born at Bologna about 1450. He was apprenticed to a goldsmith currently named Francia, and from him probably he got the nickname whereby he is generally known; he moreover studied design under Marco Zoppo. The youth was thus originally a goldsmith, and also an engraver of dies and niellos, and in these arts he became extremely eminent. He was particularly famed for his dies for medals; he rose to be mint-master at Bologna, and retained that office till the end of his life. A famous medal of Pope Julius II. as liberator of Bologna is ascribed to his hand, but not with certainty. As a type-founder he made for Aldus Manutius the first italic type.

At a mature age—having first, it appears, become acquainted with Mantegna—he turned his attention to painting. His earliest known picture is dated 1494 (not 1490, as ordinarily stated). It shows so much mastery that one is compelled to believe that Raibolini must before then have practised painting for some few years. This work is now in the Bologna gallery,—the "Virgin enthroned, with Augustine and five other saints." It is an oil picture, and was originally painted for the church of S. Maria della Misericordia, at the desire of the Bentivoglio family, the rulers of Bologna. The same patrons employed him upon frescoes in their own palace; one of "Judith and Holophernes" is especially noted, its style recalling that of Mantegna. Francia probably studied likewise the works of Perugino; and he became a friend and ardent admirer of Raphael, to whom he addressed an enthusiastic sonnet. Raphael cordially responded to the Bolognese master's admiration, and said, in a letter dated in 1508, that few painters or none had produced Madonnas more beautiful, more devout, or better portrayed than those of Francia. If we may trust Vasari—but it is difficult to suppose that he was entirely correct—the exceeding value which Francia set on Raphael's art brought him to his grave. Raphael had consigned to Francia his famous picture of "St Cecilia," destined for the church of S. Giovanni in Monte, Bologna; and Francia, on inspecting it, took so much to heart his own inferiority, at the advanced age of about sixty-six, to the youthful Umbrian, that he sickened and shortly expired on the 6th of January 1517. A contemporary record, after attesting his pre-eminence as a goldsmith, jeweller and painter, states that he was "most handsome in person and highly eloquent."

Distanced though he may have been by Raphael, Francia is rightly regarded as the greatest painter of the earlier Bolognese school, and hardly to be surpassed as representing the art termed "antico-moderno," or of the "quattrocento." It has been well observed that his style is a medium between that of Perugino and that of Giovanni Bellini; he has somewhat more of spontaneous naturalism than the former, and of abstract dignity in feature and form than the latter. The magnificent portrait in the Louvre of a young man in black, of brooding thoughtfulness and saddened profundity of mood, would alone suffice to place Francia among the very great masters, if it could with confidence be attributed to his hand, but in all probability its real author was Franciabigio; it had erewhile passed under the name of Raphael, of Giorgione, or of Sebastian del Piombo. The National Gallery, London, contains two remarkably fine specimens of Francia, once combined together as principal picture and lunette,—the "Virgin" and "Child and St Anna" enthroned, surrounded by saints, and (in the lunette) the "Pietà," or lamentation of angels over the dead Saviour. They come from the Buonvisi chapel in the church of S. Frediano, Lucca, and were among the master's latest paintings. Other leading works are—in Munich, the "Virgin" sinking on her knees in adoration of the Divine Infant, who is lying in a garden within a rose trellis; in the Borghese gallery, Rome, a Peter Martyr; in Bologna, the frescoes in the church of St Cecilia, illustrating the life of the saint, all of them from the design of Raibolini, but not all executed by himself. His landscape backgrounds are of uncommon excellence. Francia had more than 200 scholars. Marcantonio Raimondi, the famous engraver, is the most renowned of them; next to him Amico Aspertini, and Francia's own son Giacomo, and his cousin Julio. Lorenzo Costa was much associated with Francia in pictorial work.

Among the authorities as to the life and work of Francia may be mentioned J. A. Calvi, *Memorie della vita di Francesco Raibolini* (1812), and especially G. C. Williamson, *Francia* (1900). (W. M. R.)

FRANCIA, JOSÉ GASPAR RODRIGUEZ (*c.* 1757–1840), dictator of Paraguay, was born probably about 1757. According to one account he was of French descent; but the truth seems to be that his father, Garcia Rodriguez Francia, was a native of S. Paulo in Brazil, and came to Paraguay to take charge of a plantation of black tobacco for the government. He studied theology at the college of Cordova de Tucuman, and is said to have been for some time a professor in that faculty; but he afterwards turned his attention to the law, and practised in Asuncion. Having attained a high reputation at once for ability and integrity, he was selected for various important offices. On the declaration of Paraguayan independence in 1811, he was appointed secretary to the national junta, and exercised an influence on affairs greatly out of proportion to his nominal position. When the congress or junta of 1813 changed the constitution and established a duumvirate, Dr Francia and the Gaucho general Yegres were elected to the office. In 1814 he secured his own election as dictator for three years, and at the end of that period he obtained the dictatorship for life. In the accounts which have been published of his administration we find a strange mixture of capacity and caprice, of far-sighted wisdom and reckless infatuation, strenuous endeavours after a high ideal and flagrant violations of the simplest principles of justice. He put a stop to the foreign commerce of the country, but carefully fostered its internal industries; was disposed to be hospitable to strangers from other lands, and kept them prisoners for years; lived a life of republican simplicity, and punished with Dionysian severity the slightest want of respect. As time went on he appears to have grown more arbitrary and despotic. Deeply imbued with the principles of the French Revolution, he was a stern antagonist of the church. He abolished the Inquisition, suppressed the college of theology, did away with the tithes, and inflicted endless indignities on the priests. He discouraged marriage both by precept and example, and left behind him several illegitimate children. For the extravagances of his later years the plea of insanity has been put forward. On the 20th of September 1840 he was seized with a fit and died.

The first and fullest account of Dr Francia was given to the world by two Swiss surgeons, Rengger and Longchamp, whom he had detained from 1819 to 1825—*Essai historique sur la révolution de Paraguay et la gouvernement dictatorial du docteur Francia* (Paris, 1827). Their work was almost immediately translated into English under the title of *The Reign of Doctor Joseph G. R. De Francia in Paraguay* (1827). About eleven years after there appeared at London *Letters on Paraguay*, by J. P. and W. P. Robertson, two young Scotsmen whose hopes of commercial success had been rudely destroyed by the dictator's interference. The account which they gave of his character and government was of the most unfavourable description, and they rehearsed and emphasized their accusations in *Francia's Reign of Terror* (1839) and *Letters on South America* (3 vols., 1843). From the very pages of his detractors Thomas Carlyle succeeded in extracting materials for a brilliant defence of the dictator "as a man or sovereign of iron energy and industry, of great and severe labour." It appeared in the *Foreign Quarterly Review* for 1843, and is reprinted in his *Critical and Miscellaneous Essays.* Sir Richard F. Burton gives a graphic sketch of Francia's life and a favourable notice of his character in his *Letters from the Battlefields of Paraguay* (1870), while C. A. Washburn takes up a hostile position in his *History of Paraguay* (1871).

FRANCIABIGIO (1482–1525), Florentine painter. The name of this artist is generally given as Mercantonio Franciabigio; it appears, however, that his only real ascertained name was Francesco di Cristofano; and that he was currently termed Francia Bigio, the two appellatives being distinct. He was born in Florence, and studied under Albertinelli for some months. In 1505 he formed the acquaintance of Andrea del Sarto; and after a while the two painters set up a shop in common in the Piazza del Grano. Franciabigio paid much attention to anatomy and perspective, and to the proportions of his figures, though these are often too squat and puffy in form. He had a large stock of artistic knowledge, and was at first noted for diligence. As years went on, and he received frequent commissions for all sorts of public painting for festive occasions, his diligence merged in something which may rather be called workmanly offhandedness. He was particularly proficient in fresco, and Vasari even says that he surpassed all his contemporaries in this method—a judgment which modern connoisseurship does not accept. In the court of the Servites (or cloister of the Annunziata) in Florence he painted in 1513 the "Marriage of the Virgin," as a portion of a series wherein Andrea del Sarto was chiefly concerned. The friars having uncovered this work before it was quite finished, Franciabigio was so incensed that, seizing a mason's hammer, he struck at the head of the Virgin, and some other heads; and the fresco, which would otherwise be his masterpiece in that method, remains thus mutilated. At the Scalzo, in another series of frescoes on which Andrea was likewise employed, he executed in 1518–1519 the "Departure of John the Baptist for the Desert," and the "Meeting of the Baptist with Jesus"; and, at the Medici palace at Poggio a Caiano, in 1521, the "Triumph of Cicero." Various works which have been ascribed to Raphael are now known or reasonably deemed to be by Franciabigio. Such are the "Madonna del Pozzo," in the Uffizi Gallery; the half figure of a "Young Man," in the Louvre (see also FRANCIA); and the famous picture in the Fuller-Maitland collection, a "Young Man with a Letter." These two works show a close analogy in style to another in the Pitti gallery, avowedly by Franciabigio, a "Youth at a Window," and to some others which bear this painter's recognized monogram. The series of portraits, taken collectively, placed beyond dispute the eminent and idiosyncratic genius of the master. Two other works of his, of some celebrity, are the "Calumny of Apelles," in the Pitti, and the "Bath of Bathsheba" (painted in 1523), in the Dresden gallery.

FRANCIS (Lat. *Franciscus*, Ital. *Francesco*, Span. *Francisco*, Fr. *François*, Ger. *Franz*), a masculine proper name meaning "Frenchman." As a Christian name it originated with St Francis of Assisi, whose baptismal name was Giovanni, but who was called Francesco by his father on returning from a journey in France. The saint's fame made the name exceedingly popular from his day onwards.

FRANCIS I. (1708–1765), Roman emperor and grand duke of Tuscany, second son of Leopold Joseph, duke of Lorraine, and his wife Elizabeth Charlotte, daughter of Philip, duke of Orleans, was born on the 8th of December 1708. He was connected with the Habsburgs through his grandmother Eleanore, daughter of the emperor Ferdinand III., and wife of Charles Leopold of Lorraine. The emperor Charles VI. favoured the family, who, besides being his cousins, had served the house of Austria with distinction. He had designed to marry his daughter Maria Theresa to Clement, the elder brother of Francis. On the death of Clement he adopted the younger brother as her husband. Francis was brought up at Vienna with Maria Theresa on the understanding that they were to be married, and a real affection arose between them. At the age of fifteen, when he was brought to Vienna, he was established in the Silesian duchy of Teschen, which had been mediatized and granted to his father by the emperor in 1722. He succeeded his father as duke of Lorraine in 1729, but the emperor, at the end of the Polish War of Succession, desiring to compensate his candidate Stanislaus Leszczynski for the loss of his crown in 1735, persuaded Francis to exchange Lorraine for the reversion of the grand duchy of Tuscany. On the 12th of February 1736 he was married to Maria Theresa, and they went for a short time to Florence, when he succeeded to the grand duchy in 1737 on the death of John Gaston, the last of the ruling house of Medici. His wife secured his election to the Empire on the 13th of September 1745, in succession to Charles VII., and she made him co-regent of her hereditary dominions. Francis was well content to leave the reality of power to his able wife. He had a natural fund of good sense and some business capacity, and was a useful assistant to Maria Theresa in the laborious task of governing the complicated Austrian dominions, but his functions appear to have been of a purely secretarial character. He died suddenly in his carriage while returning from the opera at Innsbruck on the 18th of August 1765.

See A. von Arneth, *Geschichte Maria Theresias* (Vienna, 1863–1879).

FRANCIS II. (1768–1835), the last Roman emperor, and, as Francis I., first emperor of Austria, was the son of Leopold II., grand-duke of Tuscany, afterwards emperor, and of his wife Maria Louisa, daughter of Charles III. of Spain. He was born at Florence on the 12th of February 1768. In 1784 he was brought to Vienna to complete his education under the eye of his uncle the emperor Joseph II., who was childless. Joseph was repelled by the frigid and retiring character of his nephew, and is said to have treated him with an impatient contempt which confirmed his natural timidity; but after the marriage of Francis to Elizabeth of Württemberg (1788) their relations improved. At the close of his uncle's reign he saw some service in the ill-conducted war with Turkey, and kept a careful diary of his experiences. The death of his wife in childbirth on the 18th of February 1790 was followed by the death of his uncle on the 20th; and Francis acted as regent with Prince Kaunitz until his father came from Florence. On the 19th of September he married his first cousin Maria Theresa, daughter of Ferdinand, king of Naples, by whom he was the father of his successor Ferdinand I., of Maria Louisa, wife of Napoleon, and of the archduke Francis, father of the emperor Francis Joseph. After her death (1807) he married Maria Ludovica Beatrix of Este (1808), and when she died he made a fourth marriage with Carolina Augusta of Bavaria (1816).

He succeeded to the Austrian dominions and the empire on the death of his father on the 1st of March 1792. The position was a trying one for a young prince twenty-four years of age. The dominions of the house of Austria, widely scattered in the Low Countries, Germany and Italy, were exposed to the attacks of the French revolutionary governments and of Napoleon. He was dragged into all the coalitions against France, and in the early days of his reign he had to guard against the ambition of Prussia, and the aggressions of Russia in Poland and Turkey.

For long he had no adviser save such diplomatists as Prince Kaunitz and Thugut, who had been trained in the old Austrian diplomacy. His own best quality was an invincible patience supported by reliance on the loyalty of his subjects, and a sense of his duty to the state. (For the general events of this reign till 1815 see EUROPE, AUSTRIA, NAPOLEON, FRENCH REVOLUTIONARY WARS, &c.) The emperor's firmness averted what would have been an irreparable loss of position. Seeing that the Empire was in the last stage of dissolution, and that, even were it to survive, it would pass from the house of Habsburg to that of Bonaparte, he in 1804 assumed the title of hereditary emperor of Austria. The object of this prudent measure was double. In the first place, he guarded against the danger that his house should sink to a lower rank than the Russian or the French. In the second place, he gave some semblance of unity to his complex dominions in Germany, Bohemia, Hungary and Italy, by providing a common title for the supreme ruler. His action was justified when, in 1806, the establishment of the Confederation of the Rhine forced him to abdicate the empty title of Holy Roman emperor.

In 1805 he made an important change in the working of his administration. He had hitherto been assisted by a cabinet minister who was in direct relation with all the "chanceries" and boards which formed the executive government, and who acted as the channel of communication between them and the emperor, and was in fact a prime minister. In 1805 Napoleon insisted on the removal of Count Colloredo, who held the post. From that time forward the emperor Francis acted as his own prime minister, superintending every detail of his administration. In foreign affairs after 1809 he reposed full confidence in Prince Metternich. But Metternich himself declared at the close of his life that he had sometimes held Europe in the palm of his hand, but never Austria. Francis was sole master, and is entitled to whatever praise is due to his government. It follows that he must bear the blame for its errors. The history of the Austrian empire under his rule and since his death bears testimony to both his merits and his limitations. His indomitable patience and loyalty to his inherited task enabled him to triumph over Napoleon. By consenting to the marriage of his daughter, Marie Louise, to Napoleon in 1810, he gained a respite which he turned to good account. By following the guidance of Metternich in foreign affairs he was able to intervene with decisive effect in 1813. The settlement of Europe in 1815 left Austria stronger and more compact than she had been in 1792, and that this was the case was largely due to the emperor.

During the twenty years which preceded his death in 1835, Francis continued to oppose the revolutionary spirit. He had none of the mystical tendencies of the tsar Alexander I., and only adhered to the half fantastic Holy Alliance of 1815 out of pure politeness. But he was wholly in sympathy with the policy of "repression" which came, in popular view, to be identified with the Holy Alliance; and though Metternich was primarily responsible for the part played by Austria in the "policing" of Europe, Francis cannot but be held personally responsible for the cruel and impolitic severities, associated especially with the sinister name of the fortress prison of the Spielberg, which made so many martyrs to freedom. It is not surprising that Francis was denounced by Liberals throughout Europe as a tyrant and an obscurantist. But though at home, as abroad, he met all suggestions of innovation by a steady refusal to depart from old ways, he was always popular among the mass of his subjects, who called him "our good Kaiser Franz." In truth, if in the spirit of the traditional *Landesvater* he chastised his disobedient children mercilessly, he was essentially a well-meaning ruler who forwarded the material and moral good of his subjects according to his lights. But he held that, by the will of God, the whole sovereign authority resided in his person, and could not be shared with others without a dereliction of duty on his part and disastrous consequences; and his capital error as a ruler of Austria was that he persisted in maintaining a system of administration which depended upon the indefatigable industry of a single man, and was entirely outgrown by the modern development of his subjects. Before his death, government in Austria was almost choked, and it broke down under a successor who had not his capacity for work. Like his ancestor Philip II. of Spain, Francis carried caution, and a disposition to sleep upon every possible proposal, to a great length. He died on the 2nd of March 1835.

See Baron J. A. Helfert, *Kaiser Franz und die österreichischen Befreiungs-Kriege* (Vienna, 1867). Ample bibliographies will be found in Krones von Marchland's *Grundriss der österreichischen Geschichte* (Berlin, 1882).

FRANCIS I. (1494–1547), king of France, son of Charles of Valois, count of Angoulême, and Louise of Savoy, was born at Cognac on the 12th of September 1494. The count of Angoulême, who was the great-grandson of King Charles V., died in 1496, and Louise watched over her son with passionate tenderness. On the accession of Louis XII. in 1498, Francis became heir-presumptive. Louis invested him with the duchy of Valois, and gave him as tutor Marshal de Gié, and, after Gié's disgrace in 1503, the sieur de Boisy, Artus Gouffier. François de Rochefort, abbot of St Mesmin, instructed Francis and his sister Marguerite in Latin and history; Louise herself taught them Italian and Spanish; and the library of the château at Amboise was well stocked with romances of the Round Table, which exalted the lad's imagination. Francis showed an even greater love for violent exercises, such as hunting, which was his ruling passion, and tennis, and for tournaments, masquerades and amusements of all kinds. His earliest gallantries are described by his sister in the 25th and 42nd stories of the *Heptameron*. In 1507 Francis was betrothed to Claude, the daughter of Louis XII., and in 1508 he came to court. In 1512 he gained his first military experience in Guienne, and in the following year he commanded the army of Picardy. He married Claude on the 18th of May 1514, and succeeded Louis XII. on the 1st of January 1515. Of noble bearing, and, in spite of a very long and large nose, extremely handsome, he was a sturdy and valiant knight, affable, courteous, a brilliant talker and a facile poet. He had a sprightly wit, some delicacy of feeling, and some generous impulses which made him amiable. These brilliant qualities, however, were all on the surface. At bottom the man was frivolous, profoundly selfish, unstable, and utterly incapable of consistency or application. The ambassadors remarked his negligence, and his ministers complained of it. Hunting, tennis, jewelry and his gallantry were the chief preoccupations of his life.

His character was at once authoritative and weak. He was determined to be master and to decide everything himself, but he allowed himself to be dominated and easily persuaded. Favourites, too, without governing entirely for him, played an important part in his reign. His capricious humour elevated and deposed them with the same disconcerting suddenness. In the early years of his reign the conduct of affairs was chiefly in the hands of Louise of Savoy, Chancellor Antoine Duprat, Secretary Florimond Robertet, and the two Gouffiers, Boisy and Bonnivet. The royal favour then elevated Anne de Montmorency and Philippe de Chabot, and in the last years of the reign Marshal d'Annebaud and Cardinal de Tournon. Women too had always a great influence over Francis—his sister, Marguerite d'Angoulême, and his mistresses. Whatever the number of these, he had only two titular mistresses—at the beginning of the reign Françoise de Châteaubriant, and from about 1526 to his death Anne de Pisseleu, whom he created duchesse d'Étampes and who entirely dominated him. It has not been proved that he was the lover of Diane de Poitiers, nor does the story of "La belle Ferronnière" appear to rest on any historical foundation.[1]

Circumstances alone gave a homogeneous character to the foreign policy of Francis. The struggle against the emperor Charles V. filled the greater part of the reign. In reality, the policy of Francis, save for some flashes of sagacity, was irresolute and vacillating. Attracted at first by Italy, dreaming of fair feats of prowess, he led the triumphal Marignano expedition, which gained him reputation as a knightly king and as the most powerful prince in Europe. In 1519, in spite of wise counsels, he stood candidate for the imperial crown. The election of Charles V. caused an inevitable rivalry between the two monarchs which accentuated still further the light and chivalrous temper of the king and the cold and politic character of the emperor. Francis's personal intervention in this struggle was seldom happy. He did not succeed in gaining the support of Henry VIII. of England at the interview of the Field of the Cloth of Gold in 1520; his want of tact goaded the Constable de Bourbon to extreme measures in 1522–1523; and in the Italian campaign of 1525 he proved himself a mediocre, vacillating and foolhardy leader, and by his blundering led the army to the disaster of Pavia (the 25th of February 1525), where, however, he fought with great bravery. "Of all things," he wrote to his mother after the defeat, "nothing remains to me but honour and life, which is safe"—the authentic version of the legendary phrase "All is lost save honour." He strove to play the part of royal captive heroically, but the prison life galled him. He fell ill at Madrid and was on the point of death. For a moment he thought of abdicating rather than of ceding Burgundy. But this was too great a demand upon his fortitude, and he finally yielded and signed the treaty of Madrid, after having drawn up a secret protest. After Madrid he wavered unceasingly between two courses, either that of continuing hostilities, or the policy favoured by Montmorency of peace and understanding with the emperor. At times he had the sagacity to recognize the utility of alliances, as was shown by those he concluded with the Porte and with the Protestant princes of Germany. But he could never pledge himself frankly in one sense or the other, and this vacillation prevented him from attaining any decisive results. At his death, however, France was in possession of Savoy and Piedmont.

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[1] On this point see Paulin Paris, *Études sur le règne de François Ier*.

In his religious policy Francis showed the same instability. Drawn between various influences, that of Marguerite d'Angoulême, the du Bellays, and the duchesse d'Etampes, who was in favour of the Reformation or at least of toleration, and the contrary influence of the uncompromising Catholics, Duprat, and then Montmorency and de Tournon, he gave pledges successively to both parties. In the first years of the reign, following the counsels of Marguerite, he protected Jacques Lefèvre of Etaples and Louis de Berquin, and showed some favour to the new doctrines. But the violence of the Reformers threw him into the arms of the opposite party. The affair of the Placards in 1534 irritated him beyond measure, and determined him to adopt a policy of severity. From that time, in spite of occasional indulgences shown to the Reformers, due to his desire to conciliate the Protestant powers, Francis gave a free hand to the party of repression, of which the most active and most pitiless member was Cardinal de Tournon; and the end of the reign was sullied by the massacre of the Waldenses (1545).

Francis introduced new methods into government. In his reign the monarchical authority became more imperious and more absolute. His was the government "*du bon plaisir.*" By the unusual development he gave to the court he converted the nobility into a brilliant household of dependants. The Concordat brought the clergy into subjection, and enabled him to distribute benefices at his pleasure among the most docile of his courtiers. He governed in the midst of a group of favourites, who formed the *conseil des affaires.* The states-general did not meet, and the remonstrances of the parlement were scarcely tolerated. By centralizing the financial administration by the creation of the *Trésor de l'Épargne*, and by developing the military establishments, Francis still further strengthened the royal power. His government had the vices of his foreign policy. It was uncertain, irregular and disorderly. The finances were squandered in gratifying the king's unbridled prodigality, and the treasury was drained by his luxurious habits, by the innumerable gifts and pensions he distributed among his mistresses and courtiers, by his war expenses and by his magnificent buildings. His government, too, weighed heavily upon the people, and the king was less popular than is sometimes imagined.

Francis owes the greater measure of his glory to the artists and men of letters who vied in celebrating his praises. He was pre-eminently the king of the Renaissance. Of a quick and cultivated intelligence, he had a sincere love of letters and art. He holds a high place in the history of humanism by the foundation of the Collège de France; he did not found an actual college, but after much hesitation instituted in 1530, at the instance of Guillaume Budé (Budaeus), *Lecteurs royaux*, who in spite of the opposition of the Sorbonne were granted full liberty to teach Hebrew, Greek, Latin, mathematics, &c. The humanists Budé, Jacques Colin and Pierre Duchâtel were the king's intimates, and Clément Marot was his favourite poet. Francis sent to Italy for artists and for works of art, but he protected his own countrymen also. Here, too, he showed his customary indecision, wavering between the two schools. At his court he installed Benvenuto Cellini, Francesco Primaticcio and Rosso del Rosso, but in the buildings at Chambord, St Germain, Villers-Cotterets and Fontainebleau the French tradition triumphed over the Italian.

Francis died on the 31st of March 1547, of a disease of the urinary ducts according to some accounts, of syphilis according to others. By his first wife Claude (d. 1524) he had three sons and four daughters: Louise, who died in infancy; Charlotte, who died at the age of eight; Francis (d. 1536); Henry, who came to the throne as Henry II.; Madeleine, who became queen of Scotland; Charles (d. 1545); and Margaret, duchess of Savoy. In 1530 he married Eleanor, the sister of the emperor Charles V.

Authorities.—For the official acts of the reign, the *Catalogue des actes de François I^{er}*, published by the Académie des Sciences morales et politiques (Paris, 1887–1907), is a valuable guide. The *Bibliothèque Nationale*, the *National Archives*, &c., contain a mass of unpublished documents. Of the published documents, see N. Camuzat, *Meslanges historiques* . . . (Troyes, 1619); G. Ribier, *Lettres et mémoires d'estat* (Paris, 1666); *Letters de Marguerite d'Angoulême*, ed. by F. Genin (Paris, 1841 and 1842); the *Correspondence of Castillon and Marillac* (ed. by Kaulek, Paris, 1885), of *Odet de Selve* (ed. by Lefèvre-Pontalis, Paris, 1888), and of *Guillaume Pellicier* (ed. by Tausserat-Radel, Paris, 1900); *Captivité du roi François I^{er}*, and *Poésies de François I^{er}* (both ed. by Champollion-Figeac, Paris, 1847, of doubtful authenticity); *Relations des ambassadeurs vénitiens*, &c. Of the memoirs and chronicles, see the journal of Louise of Savoy in S. Guichenon's *Histoire de la maison de Savoie*, vol. iv. (ed. of 1778–1780); *Journal de Jean Barillon*, ed. by de Vaissière (Paris, 1897–1899); *Journal d'un bourgeois de Paris*, ed. by Lalanne (Paris, 1854); *Cronique du roy François I^{er}*, ed. by Guiffrey (Paris, 1868); and the memoirs of Fleuranges, Montluc, Tavannes, Vieilleville, Brantôme and especially Martin du Bellay (coll. Michaud and Poujoulat). Of the innumerable secondary authorities, see especially Paulin Paris, *Études sur le règne de François I^{er}* (Paris, 1885), in which the apologetic tendency is excessive; and H. Lemonnier in vol. v. (Paris, 1903–1904) of E. Lavisse's *Histoire de France*, which gives a list of the principal secondary authorities. There is a more complete bibliographical study by V. L. Bourrilly in the *Revue d'histoire moderne et contemporaine*, vol. iv. (1902–1903). The printed sources have been catalogued by H. Hauser, *Les Sources de l'histoire de France, XVI^{e} siècle*, tome ii. (Paris, 1907). (J. I.)

FRANCIS II. (1544–1560), king of France, eldest son of Henry II. and of Catherine de' Medici, was born at Fontainebleau on the 19th of January 1544. He married the famous Mary Stuart, daughter of James V. of Scotland, on the 25th of April 1558, and ascended the French throne on the 10th of July 1559. During his short reign the young king, a sickly youth and of feeble understanding, was the mere tool of his uncles Francis, duke of Guise, and Charles, cardinal of Lorraine, into whose hands he virtually delivered the reins of government. The exclusiveness with which they were favoured, and their high-handed proceedings, awakened the resentment of the princes of the blood, Anthony king of Navarre and Louis prince of Condé, who gave their countenance to a conspiracy (conspiracy of Amboise) with the Protestants against the house of Guise. It was, however, discovered shortly before the time fixed for its execution in March 1560, and an ambush having been prepared, most of the conspirators were either killed or taken prisoners. Its leadership and organization had been entrusted to Godfrey de Barri, lord of la Renaudie (d. 1560); and the prince of Condé, who was not present, disavowed all connexion with the plot. The duke of Guise was now named lieutenant-general of the kingdom, but his Catholic leanings were somewhat held in check by the chancellor Michel de l'Hôpital, through whose mediation the edict of Romorantin, providing that all cases of heresy should be decided by the bishops, was passed in May 1560, in opposition to a proposal to introduce the Inquisition. At a meeting of the states-general held at Orleans in the December following, the prince of Condé, after being arrested, was condemned to death, and extreme measures were being enacted against the Huguenots; but the deliberations of the Assembly were broken off, and the prince was saved from execution, by the king's somewhat sudden death, on the 5th of the month, from an abscess in the ear.

PRINCIPAL AUTHORITIES.—"Lettres de Catherine de Médicis," edited by Hector de la Ferrière (1880 seq.), and "Négociations . . . relatives au règne de François II," edited by Louis Paris (1841), both in the *Collection de documents inédits sur l'histoire de France*; notice of Francis, duke of Guise, in the *Nouvelle Collection des mémoires pour servir à l'histoire de France*, edited by J. F. Michaud and J. J. F. Poujoulat, series i. vol. vi. (1836 seq.); *Mémoires de Condé servant d'éclaircissement . . . à l'histoire de M. de Thou*, vols. i and ii. (1743); Pierre de la Place, *Commentaires de l'estat de la religion et de la république sous les rois Henri II, François II, Charles IX* (1565); and Louis Régnier de la Planche, *Histoire de l'estat de France . . . sous . . . François II* (*Panthéon littéraire*, new edition, 1884). See also Ernest Lavisse, *Histoire de France* (vol. vi. by J. H. Mariéjol, 1904), which contains a bibliography.

FRANCIS I. (1777–1830), king of the Two Sicilies, was the son of Ferdinand IV. (I.) and Maria Carolina of Austria. He married Clementina, daughter of the emperor Leopold II. of Austria, in 1796, and at her death Isabella, daughter of Charles IV. of Spain. After the Bourbon family fled from Naples to Sicily in 1806, and Lord William Bentinck, the British resident, had established a constitution and deprived Ferdinand IV. of all power, Francis was appointed regent (1812). On the fall of Napoleon his father returned to Naples and suppressed the Sicilian constitution and autonomy, incorporating his two kingdoms into that of the Two Sicilies (1816); Francis then assumed the revived title of duke of Calabria. While still heir-apparent he professed liberal ideas, and on the outbreak of the revolution of 1820 he accepted the regency apparently in a friendly spirit towards the new constitution. But he was playing a double game and proved to be the accomplice of his father's treachery. On succeeding to the throne in 1825 he cast aside the mask of liberalism and showed himself as reactionary as his father. He took little part in the government, which he left in the hands of favourites and police officials, and lived with his mistresses, surrounded by soldiers, ever in dread of assassination. During his reign the only revolutionary movement was the outbreak on the Cilento (1828), savagely repressed by the marquis Delcarretto, an ex-Liberal turned reactionary.

See Nisco, *Il Reame di Napoli sotto Francesco I* (Naples, 1893).

FRANCIS II. (1836–1894), king of the Two Sicilies, son of Ferdinand II. and Maria Cristina of Savoy, was the last of the Bourbon kings of Naples. His education had been much neglected and he proved a man of weak character, greatly influenced by his stepmother Maria Theresa of Austria, by the priests, and by the *Camarilla*, or reactionary court set. He ascended the throne on the death of his father (22nd of May 1859). As prime minister he at once appointed Carlo Filangieri, who, realizing the importance of the Franco-Piedmontese victories in Lombardy, advised Francis to accept the alliance with Piedmont proposed by Cavour. On the 7th of June a part of the Swiss Guard mutinied, and while the king mollified them by promising to redress their grievances, General Nunziante collected other troops, who surrounded the mutineers and shot them down. The incident resulted in the disbanding of the whole Swiss Guard, the strongest bulwark of the dynasty. Cavour again proposed an alliance to divide the papal states between Piedmont and Naples, the province of Rome excepted, but Francis rejected an idea which to him savoured of sacrilege. Filangieri strongly advocated a constitution as the only measure which might save the dynasty, and on the king's refusal he resigned. Meanwhile the revolutionary parties were conspiring for the overthrow of the Bourbons in Calabria and Sicily, and Garibaldi was preparing for a raid in the south. A conspiracy in Sicily was discovered and the plotters punished with brutal severity, but Rosalino Pilo and Francesco Crispi had organized the movement, and when Garibaldi landed at Marsala (May 1860) he conquered the island with astonishing ease. These events at last frightened Francis into granting a constitution, but its promulgation was followed by disorders in Naples and the resignation of ministers, and Liborio Romano became head of the government. The disintegration of the army and navy proceeded apace, and Cavour sent a Piedmontese squadron carrying troops on board to watch events. Garibaldi, who had crossed the straits of Messina, was advancing northwards and was everywhere received by the people as a liberator. Francis, after long hesitations and even an appeal to Garibaldi himself, left Naples (6th of September) with his wife Maria Sophia, the court, the diplomatic corps (the French and English ministers excepted), and went by sea to Gaeta, where a large part of the army was concentrated. The next day Garibaldi entered Naples, was enthusiastically welcomed, and formed a provisional government. King Victor Emmanuel had decided on the invasion of the papal states, and after occupying Romagna and the Marche entered the Neapolitan kingdom. Garibaldi's troops defeated the Neapolitan royalists on the Volturno (1st and 2nd of October), while the Piedmontese captured Capua. Only Gaeta, Messina, and Civitella del Tronto still held out, and the siege of the former by the Piedmontese began on the 6th of November 1860. Both Francis and Maria Sophia behaved with great coolness and courage, and even when the French fleet, whose presence had hitherto prevented an attack by sea, was withdrawn, they still resisted; it was not until the 12th of February 1861 that the fortress capitulated. Thus the kingdom of Naples was incorporated in that of Italy, and the royal pair from that time forth led a wandering life in Austria, France and Bavaria. Francis died on the 27th of December 1894 at Arco in Tirol. His widow survived him.

Francis II. was weak-minded, stupid and vacillating, but, although his short reign was stained with some cruel massacres and persecutions, he was less of a tyrant than his father. The courage and dignity he displayed during his reverses inspired pity and respect. But the fact that he protected brigandage in his former dominions and countenanced the most abominable crimes in the name of legitimism greatly diminished the sympathy which was felt for the fallen monarch.

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FRANCIS IV. (1779–1846) duke of Modena, was the son of the archduke Ferdinand, Austrian governor of Lombardy, who acquired the duchy of Modena through his wife Marie Beatrice, heiress of the house of Este as well as of many fiefs of the Malaspina, Pio da Carpi, Pico della Mirandola, Cibò, and other families. At the time of the French invasion (1796) Francis was sent to Vienna to be educated, and in 1809 was appointed governor of Galicia. Later he went to Sardinia, where the exiled King Victor Emmanuel I. and his wife Maria Theresa were living in retirement. The latter arranged a marriage between her daughter Marie Beatrice and Francis, and a secret family compact was made whereby if the king and his two brothers died without male issue, the Salic law would be changed so that Francis should succeed to the kingdom instead of Charles Albert of Carignano (N. Bianchi, *Storia della diplomazia europea in Italia*, i. 42-43). On the fall of Napoleon in 1814 Francis received the duchy of Modena, including Massa-Carrara and Lunigiana; his mother's advice was "to be above the law . . . never to forgive the Republicans of 1796, nor to listen to the complaints of his subjects, whom nothing satisfies; the poorer they are the quieter they are" (Silingardi, "Ciro Menotti," in *Rivista europea*, Florence, 1880).

The duke was well received at Modena; inordinately ambitious, strong-willed, immensely rich, avaricious but not unintelligent, he soon proved one of the most reactionary despots in Italy.

He still hoped to acquire either Piedmont or some other part of northern Italy, and he was in touch with the Sanfedisti and the Concistoro, reactionary Catholic associations opposed to the Carbonari, but not always friendly to Austria. Against the Carbonari and other Liberals he issued the severest edicts, and although there was no revolt at Modena in 1821 as in Piedmont and Naples, he immediately instituted judicial proceedings against the supposed conspirators. Some 350 persons were arrested and tortured, 56 being condemned to death (only a few of them were executed) and 237 to imprisonment; a large number, however, escaped, including Antonio Panizzi (afterwards director of the British Museum). The ferocious police official Besini who conducted the trials was afterwards murdered. The duke actually proposed to Prince Metternich, the Austrian chancellor, an agreement whereby the various Italian rulers were to arrest every Liberal in the country on a certain day, but the project fell through owing to opposition from the courts of Florence and Rome. At the congress of Verona Metternich made another attempt to secure the Piedmontese succession for Francis, but without success. The duke became ever more despotic; Modena swarmed with spies and informers, education was hampered, feudalism strengthened; for the duke hoped to consolidate his power by means of the nobility, and the least expression of liberalism, or even failure to denounce a Carbonaro, involved arrest and imprisonment. But strange to say, in 1830 we find Francis actually coquetting with revolution. Having lost all hope of acquiring the Piedmontese throne, he entered into negotiations with the French Orleanist party with a view to obtaining its support in his plans for extending his dominions. He was thus brought into touch with Ciro Menotti (1798–1831) and the Modenese Liberals; what the nature of the connexion was is still obscure, but it was certainly short-lived and merely served to betray the Carbonari. As soon as Francis learned that a conspiracy was on foot to gain possession of the town, he had Menotti and several other conspirators arrested on the night of the 3rd of February 1831, and sent the famous message to the governor of Reggio: "The conspirators are in my hands; send me the hangman" (there is some doubt as to the authenticity of the actual words). But the revolt broke out in other parts of the duchy and in Romagna, and Francis retired to Mantua with Menotti. A provisional government was formed at Modena which proclaimed that "Italy is one," but the duke returned a few weeks later with Austrian troops, and resistance was easily quelled. Then the political trials began; Menotti and two others were executed, and hundreds condemned to imprisonment. The population was now officially divided into four classes, viz. "very loyal, loyal, less loyal, and disloyal," and the reaction became worse than ever, the duke interfering in the minutest details of administration, such as hospitals, schools, and roads. New methods of procedure were introduced to deal with political trials, but the ministerial cabal by which the country was administered intrigued and squabbled to such an extent that it had to be dismissed.

On the 20th of February 1846 Francis died. Although he had many domestic virtues and charming manners, was charitable in times of famine, and was certainly the ablest of the Italian despots, Liberalism was in his eyes the most heinous of crimes, and his reign is one long record of barbarous persecution. (L. V.*)

FRANCIS V. (1819–1875), duke of Modena, son of Francis IV., succeeded his father in 1846. Although less cruel and also less intelligent than his father, he had an equally high opinion of his own authority. His reign began with disturbances at Fivizzano and Pontremoli, which Tuscany surrendered to him according to treaty but against the wishes of the inhabitants (1847), and at Massa and Carrara, where the troops shot down the people. Feeling his position insecure, the duke asked for and obtained an Austrian garrison, but on the outbreak of revolution throughout Italy and at Vienna in 1848, further disorders occurred in the duchy, and on the 20th of March he fled with his family to Mantua. A provisional government was formed, and volunteers were raised who fought with the Piedmontese against Austria. But after the Piedmontese defeat Francis returned to Modena, with Austrian assistance, in August and conferred many appointments on Austrian officers. Like his father, he interfered in the minutest details of administration, and instituted proceedings against all who were suspected of Liberalism. Not content with the severity of his judges, he overrode their sentences in favour of harsher punishments. The disturbances at Carrara were ruthlessly suppressed, and the prisons filled with politicals. In 1859 numbers of young Modenese fled across the frontier to join the Piedmontese army, as war with Austria seemed imminent; and after the Austrian defeat at Magenta the duke left Modena to lead his army in person against the Piedmontese, taking with him the contents of the state treasury and many valuable books, pictures, coins, tapestries and furniture from the palace. The events of 1859–1860 made his return impossible; and after a short spell of provisional government the duchy was united to Italy. He retired to Austria, and died at Munich in November 1875.

Bibliography.—N. Bianchi, *I Ducati Estensi* (Turin, 1852); Galvani, *Memorie di S.A.R. Francesco IV* (Modena, 1847); *Documenti riguardanti il governo degli Austro-Estensi in Modena* (Modena, 1860); C. Tivaroni, *L'Italia durante il dominio austriaco*, i. 606-653 (Turin, 1892), and *L'Italia degli Italiani*, i. 114-125 (Turin, 1895); Silingardi, "Ciro Menotti," in the *Rivista europea* (Florence, 1880); F. A. Gualterio, *Gli ultimi rivolgimenti italiani* (Florence, 1850); Bayard de Volo, *Vita di Francesco V* (4 vols., Modena, 1878–1885).
(L. V.*)

FRANCIS OF ASSISI, ST. (1181 or 1182–1226), founder of the Franciscans (*q.v.*), was born in 1181 or 1182 at Assisi, one of the independent municipal towns of Umbria. He came from the upper middle class, his father, named Pietro Bernardone, being one of the larger merchants of the city. Bernardone's commercial enterprises made him travel abroad, and it was from the fact that the father was in France at the time of his son's birth that the latter was called Francesco. His education appears to have been of the slightest, even for those days. It is difficult to decide whether words of the early biographers imply that his youth was not free from irregularities; in any case, he was the recognized leader of the young men of the town in their revels; he was, however, always conspicuous for his charity to the poor. When he was twenty (1201) the neighbouring and rival city of Perugia attempted to restore by force of arms the nobles who had been expelled from Assisi by the burghers and the populace, and Francis took part in the battle fought in the plain that lies between the two cities; the men of Assisi were defeated and Francis was among the prisoners. He spent a year in prison at Perugia, and when peace was made at the end of 1202 he returned to Assisi and recommenced his old life.

Soon a serious and prolonged illness fell upon him, during which he entered into himself and became dissatisfied with his way of life. On his recovery he set out on a military expedition, but at the end of the first day's march he fell ill, and had to stay at Spoleto and return to Assisi. This disappointment brought on again the spiritual crisis he had experienced in his illness, and for a considerable time the conflict went on within him. One day he gave a banquet to his friends, and after it they sallied forth with torches, singing through the streets, Francis being crowned with garlands as the king of the revellers; after a time they missed him, and on retracing their steps they found him in a trance or reverie, a permanently altered man. He devoted himself to solitude, prayer and the service of the poor, and before long went on a pilgrimage to Rome. Finding the usual crowd of beggars before St Peter's, he exchanged his clothes with one of them, and experienced an overpowering joy in spending the day begging among the rest. The determining episode of his life followed soon after his return to Assisi; as he was riding he met a leper who begged an alms; Francis had always had a special horror of lepers, and turning his face he rode on; but immediately an heroic act of self-conquest was wrought in him; returning he alighted, gave the leper all the money he had about him, and kissed his hand. From that day he gave himself up to the service of the lepers and the hospitals. To the confusion of his father and brothers he went about dressed in rags, so that his old companions pelted him with mud.

Things soon came to a climax with his father: in consequence of his profuse alms to the poor and to the restoration of the ruined church of St Damian, his father feared his property would be dissipated, so he took Francis before the bishop of Assisi to have him legally disinherited; but without waiting for the documents to be drawn up, Francis cast off his clothes and gave them back to his father, declaring that now he had better reason to say "Our Father which art in heaven," and having received a cloak from the bishop, he went off into the woods of Mount Subasio singing a French song; some brigands accosted him and he told them he was the herald of the great king (1206).

The next three years he spent in the neighbourhood of Assisi in abject poverty and want, ministering to the lepers and the outcasts of society. It was now that he began to frequent the ruined little chapel of St Mary of the Angels, known as the Portiuncula, where much of his time was passed in prayer. One day while Mass was being said therein, the words of the Gospel came to Francis as a call: "Everywhere on your road preach and say—The kingdom of God is at hand. Cure the sick, raise the dead, cleanse the lepers, drive out devils. Freely have you received, freely give. Carry neither gold nor silver nor money in your girdles, nor bag, nor two coats, nor sandals, nor staff, for the workman is worthy of his hire" (Matt. x. 7-10). He at once felt that this was his vocation, and the next day, layman as he was, he went up to Assisi and began to preach to the poor (1209). Disciples joined him, and when they were twelve in number Francis said: "Let us go to our Mother, the holy Roman Church, and tell the pope what the Lord has begun to do through us, and carry it out with his sanction." They obtained the sanction of Innocent III., and returning to Assisi they gave themselves up to their life of apostolic preaching and work among the poor.

The character and development of the order are traced in the article FRANCISCANS; here the story of Francis's own life and the portrayal of his personality will be attempted. To delineate in a few words the character of the Poverello of Assisi is indeed a difficult task. There is such a many-sided richness, such a tenderness, such a poetry, such an originality, such a distinction revealed by the innumerable anecdotes in the memoirs of his disciples, that his personality is brought home to us as one of the most lovable and one of the strongest of men. It is probably true to say that no one has ever set himself so seriously to imitate the life of Christ and to carry out so literally Christ's work in Christ's own way. This was the secret of his love of poverty as manifested in the following beautiful prayer which he addressed to our Lord: "Poverty was in the crib and like a faithful squire she kept herself armed in the great combat Thou didst wage for our redemption. During Thy passion she alone did not forsake Thee. Mary Thy Mother stopped at the foot of the Cross, but poverty mounted it with Thee and clasped Thee in her embrace unto the end; and when Thou wast dying of thirst, as a watchful spouse she prepared for Thee the gall. Thou didst expire in the ardour of her embraces, nor did she leave Thee when dead, O Lord Jesus, for she allowed not Thy body to rest elsewhere than in a borrowed grave. O poorest Jesus, the grace I beg of Thee is to bestow on me the treasure of the highest poverty. Grant that the distinctive mark of our Order may be never to possess anything as its own under the sun for the glory of Thy name, and to have no other patrimony than begging" (in the *Legenda 3 Soc.*). This enthusiastic love of poverty is certainly the keynote of St Francis's spirit; and so one of his disciples in an allegorical poem (translated into English as *The Lady of Poverty* by Montgomery Carmichael, 1901), and Giotto in one of the frescoes at Assisi, celebrated the "holy nuptials of Francis with Lady Poverty."

Another striking feature of Francis's character was his constant joyousness; it was a precept in his rule, and one that he enforced strictly, that his friars should be always rejoicing in the Lord. He retained through life his early love of song, and during his last illness he passed much of his time in singing. His love of nature, animate and inanimate, was very keen and manifested itself in ways that appear somewhat naïve. His preaching to the birds is a favourite representation of St Francis in art. All creatures he called his "brothers" or "sisters"—the chief example is the poem of the "Praises of the Creatures," wherein "brother Sun," "sister Moon," "brother Wind," and "sister Water" are called on to praise God. In his last illness he was cauterized, and on seeing the burning iron he addressed "brother Fire," reminding him how he had always loved him and asking him to deal kindly with him. It would be an anachronism to think of Francis as a philanthropist or a "social worker" or a revivalist preacher, though he fulfilled the best functions of all these. Before everything he was an ascetic and a mystic—an ascetic who, though gentle to others, wore out his body by self-denial, so much so that when he came to die he begged pardon of "brother Ass the body" for having unduly ill treated it: a mystic irradiated with the love of God, endowed in an extraordinary degree with the spirit of prayer, and pouring forth his heart by the hour in the tenderest affections to God and our Lord. St Francis was a deacon but not a priest.

From the return of Francis and his eleven companions from Rome to Assisi in 1209 or 1210, their work prospered in a wonderful manner. The effect of their preaching, and their example and their work among the poor, made itself felt throughout Umbria and brought about a great religious revival. Great numbers came to join the new order which responded so admirably to the needs of the time. In 1212 Francis invested St Clara (*q.v.*) with the Franciscan habit, and so instituted the "Second Order," that of the nuns. As the friars became more and more numerous their missionary labours extended wider and wider, spreading first over Italy, and then to other countries. Francis himself set out, probably in 1212, for the Holy Land to preach the Gospel to the Saracens, but he was shipwrecked and had to return. A year or two later he went into Spain to preach to the Moors, but had again to return without accomplishing his object (1215 probably). After another period of preaching in Italy and watching over the development of the order, Francis once again set out for the East (1219). This time he was successful; he made his way to Egypt, where the crusaders were besieging Damietta, got himself taken prisoner and was led before the sultan, to whom he openly preached the Gospel. The sultan sent him back to the Christian camp, and he passed on to the Holy Land. Here he remained until September 1220. During his absence were manifested the beginnings of the troubles in the order that were to attain to such magnitude after his death. The circumstances under which, at an extraordinary general chapter convoked by him shortly after his return, he resigned the office of minister-general (September 1220) are explained in the article FRANCISCANS: here, as illustrating the spirit of the man, it is in place to cite the words in which his abdication was couched: "Lord, I give Thee back this family which Thou didst entrust to me. Thou knowest, most sweet Jesus, that I have no more the power and the qualities to continue to take care of it. I entrust it, therefore, to the ministers. Let them be responsible before Thee at the Day of Judgment, if any brother by their negligence, or their bad example, or by a too severe punishment, shall go astray." These words seem to contain the mere truth: Francis's peculiar religious genius was probably not adapted for the government of an enormous society spread over the world, as the Friars Minor had now become.

The chief works of the next years were the revision and final redaction of the Rule and the formation or organization of the "Third Order" or "Brothers and Sisters of Penance," a vast confraternity of lay men and women who tried to carry out, without withdrawing from the world, the fundamental principles of Franciscan life (see TERTIARIES).

If for no other reason than the prominent place they hold in art, it would not be right to pass by the Stigmata without a special mention. The story is well known; two years before his death Francis went up Mount Alverno in the Apennines with some of his disciples, and after forty days of fasting and prayer and contemplation, on the morning of the 14th of September 1224 (to use Sabatier's words), "he had a vision: in the warm rays of the rising sun he discerned suddenly a strange figure. A seraph with wings extended flew towards him from the horizon and inundated him with pleasure unutterable. At the centre of the vision appeared a cross, and the seraph was nailed to it. When the vision disappeared Francis felt sharp pains mingling with the delights of the first moment. Disturbed to the centre of his being he anxiously sought the meaning of it all, and then he saw on his body the Stigmata of the Crucified." The early authorities represent the Stigmata not as bleeding wounds, the holes as it were of the nails, but as fleshy excrescences resembling in form and colour the nails, the head on the palm of the hand, and on the back as it were a nail hammered down. In the first edition of the *Vie*, Sabatier rejected the Stigmata; but he changed his mind, and in the later editions he accepts their objective reality as an historically established fact; in an appendix he collects the evidence: there exists what is according to all probability an autograph of Br. Leo, the saint's favourite disciple and companion on Mount Alverno at the time, which describes the circumstances of the stigmatization; Elias of Cortona (*q.v.*), the acting superior, wrote on the day after his death a circular letter wherein he uses language clearly implying that he had himself seen the Stigmata, and there is a considerable amount of contemporary authentic second hand evidence. On the strength of this body of evidence Sabatier rejects all theories of fraud or hallucination, whatever may be the explanation of the phenomena.

Francis was so exhausted by the sojourn on Mount Alverno that he had to be carried back to Assisi. The remaining months of his life were passed in great bodily weakness and suffering, and he became almost blind. However, he worked on with his wonted cheerfulness and joyousness. At last, on the 3rd of October 1226, he died in the Portiuncula at the age of forty-five. Two years later he was canonized by Gregory IX., whom, as Cardinal Hugolino of Ostia, he had chosen to be the protector of his order.

The works of St Francis consist of the Rule (in two redactions), the Testament, spiritual admonitions, canticles and a few letters. They were first edited by Wadding in 1623. Two critical editions were published in 1904, one by the Franciscans of Quaracchi near Florence, the other (in a longer and a shorter form) by Professor H. Boehmer of Bonn. Sabatier and Goetz (see below) have investigated the authenticity of the several works; and the four lists, while exhibiting slight variations, are in substantial accord. Besides the works, properly so called, there is a considerable amount of traditional matter—anecdotes, sayings, sermons—preserved in the biographies and in the *Fioretti*;[1] a great deal of this matter is no doubt substantially authentic, but it is not possible to subject it to any critical sifting.

Note on Sources.—The sources for the life of St Francis and early Franciscan history are very numerous, and an immense literature has grown up around them. Any attempt to indicate even a selection of this literature would here be impossible and also futile; for the discovery of new documents has by no means ceased, and the criticism of the materials is still in full progress, nor can it be said that final results have yet emerged from the discussion. Students will find the chief materials in the following collections: *Archiv für Litteratur und Kirchengeschichte des Mittelalters* (ed. by Ehrle and Denifle, 1885, &c.); publications of the Franciscans of Quaracchi (list to be obtained from Herder, Freiburg im Breisgau); and the two series edited by Paul Sabatier, *Collection d'études et de documents sur l'histoire religieuse et littéraire du moyen âge* (5 vols. published up to 1906) and *Opuscules de critique historique* (12 fascicules): the easiest and most consecutive way of following the controversy is by the aid of the "Bulletin Hagiographique" in *Analecta Bollandiana*. Relatively popular accounts of the most important sources are supplied in the introductory chapters of Sabatier's *Vie de S. François* and *Speculum perfectionis*, and Lempp's *Frère Élie de Cortone*.

Concerning the life of St Francis and the beginnings of the order, the chief documents that come under discussion are: the two *Lives* by Thomas of Celano (1228 and 1248 respectively; Eng. trans. with introduction by A. G. Ferrers Howell, 1908), of which the only critical edition is that of Friar Ed. d'Alençon (1906); the so-called *Legenda trium sociorum*; the *Speculum perfectionis*, discovered by Paul Sabatier and edited in 1898 (Eng. trans. by Sebastian Evans, *Mirror of Perfection*, 1899). Sabatier's theory as to the nature of these documents was, in brief, that the *Speculum perfectionis* was the first of all the Lives of the saint, written in 1227 by Br. Leo, his favourite and most intimate disciple, and that the *Legenda 3 Soc.* is what it claims to be—the handiwork of Leo and the two other most intimate companions of Francis, compiled in 1246; these are the most authentic and the only true accounts, Thomas of Celano's Lives being written precisely in opposition to them, in the interests of the majority of the order that favoured mitigations of the Rule especially in regard to poverty. For ten years the domain of Franciscan origins was explored and discussed by a number of scholars; and then the whole ground was reviewed by Professor W. Goetz of Munich in a study entitled *Die Quellen zur Geschichte des hl. Franz von Assisi* (1904). His conclusions are substantially the same as those of Père van Ortroy, the Bollandist, and Friar Lemmens, an Observant Franciscan, and are the direct contrary of Sabatier's: the *Legenda 3 Soc.* is a forgery; the *Speculum perfectionis* is a compilation made in the 14th century, also in large measure a forgery, but containing an element (not to be precisely determined) derived from Br. Leo; on the other hand, Thomas of Celano's two Lives are free from the "tendencies" ascribed to them by Sabatier, and that of 1248 was written with the collaboration of Leo and the other companions; thus the best sources of information are those portions of the *Speculum* that can with certainty be carried back to Br. Leo, and the Lives by Thomas of Celano, especially the second *Life*. Goetz's criticism of the documents is characterized by exceeding carefulness and sobriety. Of course he does not suppose that his conclusions are in all respects final; but his investigations show that the time has not yet come when a biography of St Francis could be produced answering to the demands of modern historical criticism. The official life of St Francis is St Bonaventura's *Legenda*, published in a convenient form by the Franciscans of Quaracchi (1898); Goetz's estimate of it (*op. cit.*) is much more favourable than Sabatier's.

Paul Sabatier's fascinating and in many ways sympathetic *Vie de S. François* (1894; 33rd ed., 1906; Eng. trans. by L. S. Houghton, 1901) will probably for a long time to come be accepted by the ordinary reader as a substantially correct portrait of St Francis; and yet Goetz declares that the most competent and independent critics have without any exception pronounced that Sabatier has depicted St Francis a great deal too much from the standpoint of modern religiosity, and has exaggerated his attitude in face of the church (*op. cit.* p. 5). In articles in the *Hist. Vierteljahrsschrift* (1902, 1903) Goetz has shown that Sabatier's presentation of St Francis's relations with the ecclesiastical authority in general, and with Cardinal Hugolino (Gregory IX.) in particular, is largely based on misconception; that the development of the order was not forced on Francis against his will; and that the differences in the order did not during Francis's lifetime attain to such a magnitude as to cause him during his last years the suffering depicted by Sabatier. This from a Protestant historian like Goetz is most valuable criticism. In truth Sabatier's St Francis is an anachronism—a man at heart, a modern pietistic French Protestant of the most liberal type, with a veneer of 13th century Catholicism.

Of lives of St Francis in English may be mentioned those by Mrs Oliphant (2nd ed., 1871) and by Canon Knox Little (1897). For general information and references to the literature of the subject, see Otto Zöckler, *Askese und Mönchtum* (1897), ii. 470-493, and his article in Herzog's *Realencyklopädie* (ed. 3), "Franz von Assisi" (1899); also Max Heimbucher, *Orden und Kongregationen* (1896), i. § 38. The chapter on St Francis in Emile Gebhart's *Italie mystique* (ed. 3, 1899) is very remarkable; indeed, though this writer is as little ecclesiastically-minded as Sabatier himself, his general picture of the state of religion in Italy at the time is far truer; here also Sabatier has given way to the usual temptation of biographers to exalt their hero by depreciating everybody else. (E. C. B.)

FRANCIS OF MAYRONE [FRANCISCUS DE MAYRONIS] (d. 1325), scholastic philosopher, was born at Mayrone in Provence. He entered the Franciscan order and subsequently went to Paris, where he was a pupil of Duns Scotus. At the Sorbonne he acquired a great reputation for ability in discussion, and was known as the *Doctor Illuminatus* and *Magister Acutus*. He became a professor of philosophy, and took part in the discussions on the nature of Universals. Following Duns Scotus, he adopted the Platonic theory of ideas, and denied that Aristotle had made any contribution to metaphysical speculation. It is a curious commentary on the theories of Duns Scotus that one pupil, Francis, should have taken this course, while another pupil, Occam, should have used his arguments in a diametrically opposite direction and ended in extreme Nominalism.

His works were collected and published at Venice in 1520 under the title *Praeclarissima ac multum subtilia scripta Illuminati Doctoris Francisci de Mayronis, &c.*

FRANCIS OF PAOLA (or PAULA), **ST**, founder of the Minims, a religious order in the Catholic Church, was born of humble parentage at Paola in Calabria in 1416, or according to the Bollandists 1438. As a boy he entered a Franciscan friary, but left it and went to live as a hermit in a cave on the seashore near Paola. Soon disciples joined him, and with the bishop's approval he built a church and monastery. At first they called themselves "Hermits of St Francis"; but the object they proposed to themselves was to go beyond even the strict Franciscans in fasts and bodily austerities of all kinds, in poverty and in humility; and therefore, as the Franciscans were the Minors (*minores*, less), the new order took the name of Minims (*minimi*, least). By 1474 a number of houses had been established in southern Italy and Sicily, and the order was recognized and approved by the pope. In 1482 Louis XI. of France, being on his deathbed and hearing the reports of the holiness of Francis, sent to ask him to come and attend him, and at the pope's command he travelled to Paris. On this occasion Philip de Comines in his *Memoirs* says: "I never saw any man living so holily, nor out of whose mouth the Holy Ghost did more manifestly speak." He remained with Louis till his death, and Louis' successor, Charles VIII., held him in such high esteem that he kept him in Paris, and enabled him to found various houses of his order in France; in Spain and Germany, too, houses were founded during Francis's lifetime. He never left France, and died in 1507 in the monastery of his order at Plessis-les-Tours.

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[1] *The Little Flowers of St Francis.*

The Rule was so strict that the popes long hesitated to confirm it in its entirety; not until 1506 was it finally sanctioned. The most special feature is an additional vow to keep a perpetual Lent of the strictest kind, not only flesh meat but fish and all animal products—eggs, milk, butter, cheese, dripping—being forbidden, so that the diet was confined to bread, vegetables, fruit and oil, and water was the only drink. Thus in matter of diet the Minims surpassed in austerity all orders in the West, and probably all permanently organized orders in the East. The strongly ascetical spirit of the Minims manifested itself in the title borne by the superiors of the houses—not abbot (father), or prior, or guardian, or minister, or rector, but corrector; and the general superior is the corrector-general. Notwithstanding its extreme severity the order prospered. At the death of the founder it had five provinces—Italy, France, Tours, Germany, Spain. Later there were as many as 450 monasteries, and some missions in India. There never was a Minim house in England or Ireland. It ranks as one of the Mendicant orders. In 1909 there were some twenty monasteries, mostly in Sicily, but one in Rome (S. Andrea delle Fratte), and one in Naples, in Marseilles and in Cracow. There have been Minim nuns (only one convent has survived, till recently at Marseilles) and Minim Tertiaries, in imitation of the Franciscan Tertiaries. The habit of the Minims is black.

See Helyot, *Hist. des ordres religieux* (1714), vii. c. 56; Max Heimbucher, *Orden und Kongregationen* (1896), i. § 52; the article "Franz von Paula" in Wetzer und Welte, *Kirchenlexicon* (ed. 2), and in Herzog, *Realencyklopädie* (ed. 3); Catholic *Dictionary*, art. "Minims." (E. C. B.)

FRANCIS (François) OF SALES, ST (1567–1622), bishop of Geneva and doctor of the Church (1877), was born at the castle of Sales, near Annecy, Savoy. His father, also François, comte de Sales, but better known as M. de Boisy, a nobleman and soldier, had been employed in various affairs of state, but in 1560, at the age of thirty-eight, settled down on his ancestral estates and married Françoise de Sionnay, a Savoyard like himself, and an heiress. St Francis, the first child of this union, was born in August 1567 when his mother was in her fifteenth year. M. de Boisy was renowned for his experience and sound judgment, and both parents were distinguished by piety, love of peace, charity to the poor, qualities which early showed themselves in their eldest son.

He received his education first at La Roche, in the Arve valley, then at the college of Annecy, founded by Eustace Chappius, ambassador in England of Charles V., in 1549. At the age of thirteen or fourteen he went to the Jesuit College of Clermont at Paris, where he stayed till the summer of 1588, and where he laid the foundations of his profound knowledge, while perfecting himself in the exercises of a young nobleman and practising a life of exemplary virtue. At this time also he developed an ardent love of France, a country which was politically in antagonism with his own, though so closely linked to it geographically, socially and by language. At the end of 1588 he went to Padua, to take his degree in canon and civil law, a necessary prelude in Savoy at that time to distinction in a civil career. His heart, however, especially from the date of his receiving the tonsure (1578), was already turned towards the Church, and he gave his attention even more to theology, under the great masters Antonio Possevino, S.J., and Gesualdo, afterwards general of the Friars Minor, than to his legal course. "At Padua," he said to a friend, "I studied law to please my father, and theology to please myself." In that licentious university Francis found the greatest difficulty in resisting attacks on his virtue, and once at least had to draw his sword to defend his personal safety against a band of ruffians. The gentleness for which he was already renowned was not that of a weak, but of a strong character. He returned to Savoy in 1592, and, while seeking the occasion to overcome his father's resistance to his resolution of embracing the ecclesiastical profession, took the diploma of advocate to the senate. Meantime, without his knowledge, his friends procured for him the post of provost of the chapter of Geneva, an honour which reconciled M. de Boisy to the sacrifice of more ambitious hopes. After a year of zealous work as preacher and director he was sent by the bishop, Claude de Granier, to try and win back the province of Chablais, which had embraced Calvinism when usurped by Bern in 1535, and had retained it even after its restitution to Savoy in 1564. At first the people refused to listen to him, for he was represented to them as an instrument of Satan, and all who had dealings with him were threatened with the vengeance of the consistory. He therefore wrote out his message on sheets which were passed from hand to hand, and these, with the spectacle of his virtues and disinterestedness, soon produced a strong effect. The sheets just spoken of still exist in the Chigi library at Rome, and were published, though with many alterations, in 1672, under the title of *Les Controverses*. This must be considered the first work of St Francis.

The re-erection of a wayside cross in Annemasse, at the gates of Geneva, amid an enormous concourse of converts, an event which closed the three years of his apostolate, led to the composition of the *Défense . . . de la Croix*, published in 1600. An illness brought on by toil and privation forced him to leave his work to others for nearly a year, but in August 1598 he returned to his field of labour, and in October of that year practically the whole country was Catholic again. Up to that time preaching and conference had been the only weapons employed. The stories of the use of soldiers to produce simulated conversions are incorrect.[1] Possibly the lamentable events of the campaigns of 1589 in Gex and Chablais have been applied to the period 1594–1598. In October of this last year, however, the duke of Savoy, who came then to assist in person at the great religious feasts which celebrated the return of the country to unity of faith, expatriated such of the leading men as obstinately refused even to listen to the Catholic arguments. He also forbade Calvinist ministers to reside in the Chablais, and substituted Catholic for Huguenot officials. St Francis concurred in these measures, and, three years later, even requested that those who, as he said, "follow their heresy, rather as a party than a religion," should be ordered either to conform or to leave their country, with leave to sell their goods. His conduct, judged not by a modern standard, but by the ideas of his age, will be found compatible with the highest Christian charity, as that of the duke with sound political prudence. At this time he was nominated to the pope as coadjutor of Geneva,[1] and after a visit to Rome he assisted Bishop de Granier in the administration of the newly converted countries and of the diocese at large.

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[1] This, at least, is the account given by Catholic authorities. Less favourable is the view taken by non-Catholic historians, which seems in some measure to be confirmed by St Francis himself. According to this, Duke Charles Emmanuel of Savoy, who succeeded his more tolerant father in 1580, was determined to reduce the Chablais to the Catholic religion, by peaceful means if possible, by force if necessary. After two years of preaching Francis wrote to the duke (*Œuvres compl.* ii. p. 551): "During 27 months I have scattered the seed of the Word of God in this miserable land; shall I say among thorns or on stony ground? Certainly, save for the conversion of the seigneur d'Avully and the advocate Poncet, I have little to boast of." In the winter of 1596–1597 Francis was at Turin, and at his suggestion the duke decided on a regular plan for the coercion of the refractory Protestants. This plan anticipated that employed later by Louis XIV. against the Huguenots in France. The Calvinist ministers were expelled; Protestant books were confiscated and destroyed; the acts of Protestant lawyers and officials were declared invalid. The country was flooded with Jesuits and friars, whose arguments were reinforced by quartering troops, veterans of the Indian wars in Mexico, on the refractory inhabitants. Those whose stubborn persistence in error survived all these inducements to repent were sent into exile. See the article "Franz von Sales" by J. Ehni in Herzog-Hauck, *Realencyklopädie* (3rd ed., Leipzig, 1899). (W. A. P.)

In 1602 he made his second visit to the French capital, when his transcendent qualities brought him into the closest relations with the court of Henry IV., and made him the spiritual father of that circle of select souls who centred round Madame Acarie. Among the celebrated personages who became his life friends from this time were Pierre de Bérulle, founder of the French Oratorians, Guillaume Duval, the scholar, and the duc de Bellegarde, the latter a special favourite of the king, who begged to be allowed to share the Saint's friendship. At this time also his gift as a preacher became fully recognized, and de Sanzéa, afterwards bishop of Bethlehem, records that Duval exhorted all his students of the Sorbonne to listen to him and to imitate this, "the true and excellent method of preaching." His principles are expressed in the admirable letter to André Frémyot of October 1604.

De Granier died in September 1602, and the new bishop entered on the administration of his vast diocese, which, as a contemporary says, "he found brick and left marble." His first efforts were directed to securing a virtuous and well-instructed clergy, with its consequence of a people worthy of their pastors. All his time was spent in preaching, confessing, visiting the sick, relieving the poor. His zeal was not confined to his diocese. In concert with Jeanne Françoise Frémyot (1572–1641), widow of the baron de Chantal, whose acquaintance he made while preaching through Lent at Dijon in 1604, he founded the order of the Visitation, in favour of "strong souls with weak bodies," as he said, deterred from entering the orders already existing, by their inability to undertake severe corporal austerities. The institution rapidly spread, counting twenty houses before his death and eighty before that of St Jeanne. The care of his diocese and of his new foundation were not enough for his ardent charity, and in 1609 he published his famous *Introduction to a Devout Life*, a work which was at once translated into the chief European languages and of which he himself published five editions. In 1616 appeared his *Treatise on the Love of God*, which teaches that perfection of the spiritual life to which the former work is meant to be the "Introduction."

The important Lents of 1617 and 1618 at Grenoble were a prelude to a still more important apostolate in Paris, "the theatre of the world," as St Vincent de Paul calls it. This third visit to the great city lasted from the autumn of 1618 to that of 1619; the direct object of it was to assist in negotiating the marriage of the prince of Piedmont with Chrétienne of France, but nearly all his time was spent in preaching and works of mercy, spiritual or corporal. He was regarded as a living saint. St Vincent scarcely left him, and has given the most extraordinary testimonies (as yet unpublished) of his heroic virtues. Mère Angélique Arnaud, who at this time put herself under his direction and wished to join the Order of the Visitation, attracted by its humility and sweetness, may be named as the most interesting of his innumerable penitents of this period. He returned to Savoy, and after three years more of unwearying labour died at Lyons on the 28th of December 1622. A universal outburst of veneration followed; indeed his cult had already begun, and after an episcopal inquiry the pontifical commission in view of his beatification was instituted by decree of the 21st of July 1626, a celerity unique in the annals of the Congregation of Rites. The depositions of witnesses were returned to Rome in 1632, but meantime the forms of the Roman chancery had been changed by Urban VIII., and the advocates could not at once continue their work. Eventually a new commission was issued in 1656, and on its report, into which were inserted nineteen of the former depositions, the "servant of God" was beatified in 1661. The canonization took place in 1665.

Besides the works which we have named, there were published posthumously his *Entretiens*, *i.e.* a selection of the lectures given to the Visitation, reported by the sisters who heard them, some of his sermons, a large number of his letters, various short treatises of devotion. The first edition of his united or so-called "Complete" works was published at Toulouse in 1637. Others followed in 1641, 1647, 1652, 1663, 1669, 1685. The *Lettres* and *Opuscules* were republished in 1768.

The only modern editions of the complete works which it is worth while to name are those of Blaise (1821), Virès (1856–1858), Migne (1861), and the critical edition published by the Visitation of Annecy, of which the 14th volume appeared in 1905.

The biography of St Francis de Sales was written immediately after his death by the celebrated P. de La Rivière and Dom John de St François (Goulu), as well as by two other authors of less importance. The saint's nephew and successor, Charles Auguste de Sales, brought out a more extended life, Latin and French, in 1635. The lives of Giarda (1650), Maupas du Tour (1657) and Cotolendi (1687) add little to Charles Auguste. Marsollier's longer life, in two volumes (1700), is quite untrustworthy; still more so that by Loyau d'Amboise (1833), which is rather a romance than a biography. The lives by Hamon (1856) and Pérennès (1860), without adding much to preceding biographies, are serious and edifying. A complete life, founded on the lately discovered process of 1626 and the new letters, was being prepared by the author of the present article at the time of his death. With the Lives must be mentioned the *Esprit du B. F. de Sales* by Camus, bishop of Belley, who, amid innumerable errors, gives various interesting traits and sayings of his saintly friend. Among the very numerous modern studies may be named an essay by Leigh Hunt entitled "The Gentleman Saint" (*The Seer*, pt. ii. No. 41); a remarkable *causerie* by Sainte-Beuve (*Lundis*, 3rd Jan. 1853); *Le Réveil du sentiment religieux en France au XVII*^{e} *siècle*, by Strowski (Paris, 1898); *Four Essays on S. F. de S.* and *Three Essays on S. F. de S. as Preacher*, by Canon H. B. Mackey. (H. B. M.)

FRANCIS, SIR PHILIP (1740–1818), English politician and pamphleteer, the supposed author of the *Letters of Junius*, and the chief antagonist of Warren Hastings, was born in Dublin on the 22nd of October 1740. He was the only son of Dr Philip Francis (*c.* 1708–1773), a man of some literary celebrity in his time, known by his translations of Horace, Aeschines and Demosthenes. He received the rudiments of an excellent education at a free school in Dublin, and afterwards spent a year or two (1751–1752) under his father's roof at Skeyton rectory, Norfolk, and elsewhere, and for a short time he had Gibbon as a fellow-pupil. In March 1753 he entered St Paul's school, London, where he remained for three years and a half, becoming a proficient classical scholar. In 1756, immediately on his leaving school, he was appointed to a junior clerkship in the secretary of state's office by Henry Fox (afterwards Lord Holland), with whose family Dr Francis was at that time on intimate terms; and this post he retained under the succeeding administration. In 1758 he was employed as secretary to General Bligh in the expedition against Cherbourg; and in the same capacity he accompanied the earl of Kinnoul on his special embassy to the court of Portugal in 1760.

In 1761 he became personally known to Pitt, who, recognizing his ability and discretion, once and again made use of his services as private amanuensis. In 1762 he was appointed to a principal clerkship in the war office, where he formed an intimate friendship with Christopher D'Oyly, the secretary of state's deputy, whose dismissal from office in 1772 was hotly resented by "Junius"; and in the same year he married Miss Macrabie, the daughter of a retired London merchant. His official duties brought him into direct relations with many who were well versed in the politics of the time. In 1763 the great constitutional questions arising out of the arrest of Wilkes began to be sharply canvassed. It was natural that Francis, who from a very early age had been in the habit of writing occasionally to the newspapers, should be eager to take an active part in the discussion, though his position as a government official made it necessary that his intervention should be carefully disguised. He is known to have written to the *Public Ledger* and *Public Advertiser*, as an advocate of the popular cause, on many occasions about and after the year 1763; he frequently attended debates in both Houses of Parliament, especially when American questions were being discussed; and between 1769 and 1771 he is also known to have been favourable to the scheme for the overthrow of the Grafton government and afterwards of that of Lord North, and for persuading or forcing Lord Chatham into power. In January 1769 the first of the *Letters of Junius* appeared, and the series was continued till January 21, 1772. They had been preceded by others under various signatures such as "Candor," "Father of Candor," "Anti-Sejanus," "Lucius," "Nemesis," which have all been attributed, some of them certainly in error, to one and the same hand. The authorship of the *Letters of Junius* has been assigned to Francis on a variety of grounds (see JUNIUS).

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[1] With the title of Nicopolis *in partibus*.—ED.

In March 1772 Francis finally left the war office, and in July of the same year he left England for a tour through France, Germany and Italy, which lasted until the following December. On his return he was contemplating emigration to New England, when in June 1773 Lord North, on the recommendation of Lord Barrington, appointed him a member of the newly constituted supreme council of Bengal at a salary of £10,000 per annum. Along with his colleagues Monson and Clavering he reached Calcutta in October 1774, and a long struggle with Warren Hastings, the governor-general, immediately began. These three, actuated probably by petty personal motives, combined to form a majority of the council in harassing opposition to the governor-general's policy; and they even accused him of corruption, mainly on the evidence of Nuncomar. The death of Monson in 1776, and of Clavering in the following year, made Hastings again supreme in the council. But a dispute with Francis, more than usually embittered, led in August 1780 to a minute being delivered to the council board by Hastings, in which he stated that "he judged of the public conduct of Mr Francis by his experience of his private, which he had found to be void of truth and honour." A duel was the consequence, in which Francis received a dangerous wound (see HASTINGS, WARREN). Though his recovery was rapid and complete, he did not choose to prolong his stay abroad. He arrived in England in October 1781, and was received with little favour.

Little is known of the nature of his occupations during the next two years, except that he was untiring in his efforts to procure first the recall, and afterwards the impeachment of his hitherto triumphant adversary. In 1783 Fox produced his India Bill, which led to the overthrow of the coalition government. In 1784 Francis was returned by the borough of Yarmouth, Isle of Wight; and although he took an opportunity to disclaim every feeling of personal animosity towards Hastings, this did not prevent him, on the return of the latter in 1785, from doing all in his power to bring forward and support the charges which ultimately led to the impeachment resolutions of 1787. Although excluded by a majority of the House from the list of the managers of that impeachment, Francis was none the less its most energetic promoter, supplying his friends Burke and Sheridan with all the materials for their eloquent orations and burning invectives. At the general election of 1790 he was returned member for Bletchingley. He sympathized warmly and actively with the French revolutionary doctrines, expostulating with Burke on his vehement denunciation of the same. In 1793 he supported Grey's motion for a return to the old constitutional system of representation, and so earned the title to be regarded as one of the earliest promoters of the cause of parliamentary reform; and he was one of the founders of the "Society of the Friends of the People." The acquittal of Hastings in April 1795 disappointed Francis of the governor-generalship, and in 1798 he had to submit to the additional mortification of a defeat in the general election. He was once more successful, however, in 1802, when he sat for Appleby, and it seemed as if the great ambitions of his life were about to be realized when the Whig party came into power in 1806. His disappointment was great when the governor-generalship was, owing to party exigencies, conferred on Sir Gilbert Elliot (Lord Minto); he declined, it is said, soon afterwards the government of the Cape, but accepted a K.C.B. Though re-elected for Appleby in 1806, he failed to secure a seat in the following year; and the remainder of his life was spent in comparative privacy.

Among the later productions of his pen were, besides the *Plan of a Reform in the Election of the House of Commons*, pamphlets entitled *Proceedings in the House of Commons on the Slave Trade* (1796), *Reflections on the Abundance of Paper in Circulation and the Scarcity of Specie* (1810), *Historical Questions Exhibited* (1818), and a *Letter to Earl Grey on the Policy of Great Britain and the Allies towards Norway* (1814). His first wife, by whom he had six children, died in 1806, and in 1814 he married his second wife, Emma Watkins, who long survived him, and who left voluminous manuscripts relating to his biography. Francis died on the 23rd of December 1818. In his domestic relations he was exemplary, and he lived on terms of mutual affection with a wide circle of friends. He was, however, full of vindictiveness, dissimulation and treachery, and there can be little doubt that in his historic conflict with Warren Hastings unworthy personal motives played a leading part.

BIBLIOGRAPHY.—For the evidence identifying Francis with Junius see the article JUNIUS, and the authorities there cited. See also *Memoirs of Sir Philip Francis, with Correspondence and Journals*, by Joseph Parkes and Herman Merivale (2 vols., London, 1867); *The Francis Letters*, edited by Beata Francis and Eliza Keary (2 vols., London, 1901); Sir J. F. Stephen, *The Story of Nuncomar and the Impeachment of Sir E. Impey* (2 vols., London, 1885); Lord Macaulay's *Essay* on "Warren Hastings"; G. B. Malleson, *Life of Warren Hastings* (London, 1894); G. W. Forrest, *The Administration of Warren Hastings, 1772–1785* (Calcutta, 1892); Sir Leslie Stephen's article on Francis in *Dict. of Nat. Biog.* vol. xx.

FRANCIS JOSEPH I. (1830–), emperor of Austria, king of Bohemia, and apostolic king of Hungary, was the eldest son of the archduke Francis Charles, second son of the reigning emperor Francis I., being born on the 18th of August 1830. His mother, the archduchess Sophia, was daughter of Maximilian I., king of Bavaria. She was a woman of great ability and strong character, and during the years which followed the death of the emperor Francis was probably the most influential personage at the Austrian court; for the emperor Ferdinand, who succeeded in 1835, was physically and mentally incapable of performing the duties of his office; as he was childless, Francis Joseph was in the direct line of succession. During the disturbances of 1848, Francis Joseph spent some time in Italy, where, under Radetzky, at the battle of St Lucia, he had his first experience of warfare. At the end of that year, after the rising of Vienna and capture of the city by Windischgrätz, it was clearly desirable that there should be a more vigorous ruler at the head of the empire, and Ferdinand, now that the young archduke was of age, was able to carry out the abdication which he and his wife had long desired. All the preparations were made with the utmost secrecy; on the 2nd of December 1848, in the archiepiscopal palace at Olmütz, whither the court had fled from Vienna, the emperor abdicated. His brother resigned his rights of succession to his son, and Francis Joseph was proclaimed emperor. Ferdinand retired to Prague, where he died in 1875.

The history of the Dual Monarchy during his reign is told under the heading of AUSTRIA-HUNGARY, and here it is only necessary to deal with its personal aspects. The young emperor was during the first years of his reign completely in the hands of Prince Felix Schwarzenberg, to whom, with Windischgrätz and Radetzky, he owed it that Austria had emerged from the revolution apparently stronger than it had been before. The first task was to reduce Hungary to obedience, for the Magyars refused to acknowledge the validity of the abdication in so far as it concerned Hungary, on the ground that such an act would only be valid with the consent of the Hungarian parliament. A further motive for their attitude was that Francis Joseph, unlike his predecessor, had not taken the oath to observe the Hungarian constitution, which it was the avowed object of Schwarzenberg to overthrow. In the war which followed the emperor himself took part, but it was not brought to a successful conclusion till the help of the Russians had been called in. Hungary, deprived of her ancient constitution, became an integral part of the Austrian empire. The new reign began, therefore, under sinister omens, with the suppression of liberty in Italy, Hungary and Germany. In 1853 a Hungarian named Lebenyi attempted to assassinate the emperor, and succeeded in inflicting a serious wound with a knife. With the death of Schwarzenberg in 1852 the personal government of the emperor really began, and with it that long series of experiments of which Austria has been the subject. Generally it may be said that throughout his long reign Francis Joseph remained the real ruler of his dominions; he not only kept in his hands the appointment and dismissal of his ministers, but himself directed their policy, and owing to the great knowledge of affairs, the unremitting diligence and clearness of apprehension, to which all who transacted business with him have borne testimony, he was able to keep a very real control even of the details of government.

The recognition of the separate status of Hungary, and the restoration of the Magyar constitution in 1866, necessarily made some change in his position, and so far as concerns Hungary he fully accepted the doctrine that ministers are responsible to parliament. In the other half of the monarchy (the so-called Cisleithan) this was not possible, and the authority and influence of the emperor were even increased by the contrast with the weaknesses and failures of the parliamentary system. The most noticeable features in his reign were the repeated and sudden changes of policy, which, while they arose from the extreme difficulty of finding any system by which the Habsburg monarchy could be governed, were due also to the personal idiosyncrasies of the emperor. First we have the attempt at the autocratic centralization of the whole monarchy under Bach; the personal influence of the emperor is seen in the conclusion of the Concordat with Rome, by which in 1855 the work of Joseph II. was undone and the power of the papacy for a while restored. The foreign policy of this period brought about the complete isolation of Austria, and the "ingratitude" towards Russia, as shown during the period of the Crimean War, which has become proverbial, caused a permanent estrangement between the two great Eastern empires and the imperial families. The system led inevitably to bankruptcy and ruin; the war of 1859, by bringing it to an end, saved the monarchy. After the first defeat Francis Joseph hastened to Italy; he commanded in person at Solferino, and by a meeting with Napoleon arranged the terms of the peace of Villafranca. The next six years, both in home and foreign policy, were marked by great vacillation. In order to meet the universal discontent and the financial difficulties constitutional government was introduced; a parliament was established in which all races of the empire were represented, and in place of centralized despotism was established Liberal centralization under Schmerling and the German Liberals. But the Magyars refused to send representatives to the central parliament; the Slavs, resenting the Germanizing policy of the government, withdrew; and the emperor had really withdrawn his confidence from Schmerling long before the constitution was suspended in 1865 as a first step to a reconciliation with Hungary. In the complicated German affairs the emperor in vain sought for a minister on whose knowledge and advice he could depend. He was guided in turn by the inconsistent advice of Schmerling, Rechberg, Mensdorff, not to mention more obscure counsellors, and it is not surprising that Austria was repeatedly outmatched and outwitted by Prussia. In 1863, at the *Fürstentag* in Frankfort, the emperor made an attempt by his personal influence to solve the German question. He invited all the German sovereigns to meet him in conference, and laid before them a plan for the reconstruction of the confederation. The momentary effect was immense; for some of the halo of the Holy Empire still clung round the head of the house of Habsburg, and Francis Joseph was welcomed to the ancient free city with enthusiasm. In spite of this, however, and of the skill with which he presided over the debates, the conference came to nothing owing to the refusal of the king of Prussia to attend.

The German question was settled definitively by the battle of Königgrätz in 1866; and the emperor Francis Joseph, with characteristic Habsburg opportunism, was quick to accommodate himself to the new circumstances. Above all, he recognized the necessity for reconciling the Magyars to the monarchy; for it was their discontent that had mainly contributed to the collapse of the Austrian power. He had already, in 1859, as the result of a visit to Budapest, made certain modifications in the Bach system by way of concession to Magyar sentiment, and in 1861 he had had an interview with Deák, during which, though unconvinced by that statesman's arguments, he had at least assured himself of his loyalty. He now made Beust, Bismarck's Saxon antagonist, the head of his government, as the result of whose negotiations with Deák the Austro-Hungarian Compromise of 1867 was agreed upon. A law was passed by the Hungarian diet regularizing the abdication of Ferdinand; at the beginning of June Francis Joseph signed the inaugural diploma and took the oath in Magyar to observe the constitution; on the 8th he was solemnly crowned king of Hungary. The traditional coronation gift of 100,000 florins he assigned to the widows and orphans of those who had fallen in the war against Austria in 1849.

Once having accepted the principle of constitutional government, the emperor-king adhered to it loyally, in spite of the discouragement caused by party struggles embittered by racial antagonisms. If in the Cisleithan half of the monarchy parliamentary government broke down, this was through no fault of the emperor, who worked hard to find a *modus vivendi* between the factions, and did not shrink from introducing manhood suffrage in the attempt to establish a stable parliamentary system. This expedient, indeed, probably also conveyed a veiled threat to the Magyar chauvinists, who, discontented with the restrictions placed upon Hungarian independence under the Compromise, were agitating for the complete separation of Austria and Hungary under a personal union only; for universal suffrage in Hungary would mean the subordination of the Magyar minority to the hitherto subject races. For nearly forty years after the acceptance of the Compromise the attitude of the emperor-king towards the Magyar constitution had been scrupulously correct. The agitation for the completely separate organization of the Hungarian army, and for the substitution of Magyar for German in words of command in Hungarian regiments, broke down the patience of the emperor, tenacious of his prerogative as supreme "war lord" of the common army. A Hungarian deputation which came to Vienna in September 1905 to urge the Magyar claims was received ungraciously by the emperor, who did not offer his hand to the members, addressed them in German, and referred them brusquely to the chancellor, Count Goluchowski. This incident caused a considerable sensation, and was the prelude to a long crisis in Hungarian affairs, during which the emperor-king, while quick to repair the unfortunate impression produced by his momentary pique, held inflexibly to his resolve in the matter of the common army.

In his relations with the Slavs the emperor displayed the same conciliatory disposition as in the case of the Magyars; but though he more than once held out hopes that he would be crowned at Prague as king of Bohemia, the project was always abandoned. In this, indeed, as in other cases, it may be said that the emperor was guided less by any abstract principles than by a common-sense appreciation of the needs and possibilities of the moment. Whatever his natural prejudices or natural resentments, he never allowed these to influence his policy. The German empire and the Italian kingdom had been built up out of the ruins of immemorial Habsburg ambitions; yet he refused to be drawn into an alliance with France in 1869 and 1870, and became the mainstay of the Triple Alliance of Austria-Hungary, Germany and Italy. His reputation as a consistent moderating influence in European policy and one of the chief guarantors of European peace was indeed rudely shaken in October 1908, the year in which he celebrated his sixty years' jubilee as emperor, by the issue of the imperial rescript annexing Bosnia and Herzegovina to the Habsburg dominions, in violation of the terms of the treaty of Berlin. But his opportunism was again justified by the result. Europe lost an ideal; but Austria gained two provinces.

In his private life the emperor was the victim of terrible catastrophes—his wife, his brother and his only son having been destroyed by sudden and violent deaths. He married in 1854 Elizabeth, daughter of Maximilian Joseph, duke of Bavaria, who belonged to the younger and non-royal branch of the house of Wittelsbach. The empress, who shared the remarkable beauty common to all her family, took little part in the public life of Austria. After the first years of married life she was seldom seen in Vienna, and spent much of her time in travelling. She built a castle of great beauty and magnificence, called the Achilleion, in the island of Corfu, where she often resided. In 1867 she accompanied the emperor to Budapest, and took much interest in the reconciliation with the Magyars. She became a good Hungarian scholar, and spent much time in Hungary. An admirable horsewoman, in later years she repeatedly visited England and Ireland for the hunting season. In 1897 she was assassinated at Geneva by an Italian anarchist; previous attempts had been made on her and on her husband during a visit to Trieste.

There was one son of the marriage, the crown prince Rudolph (1857–1889). A man of much ability and promise, he was a good linguist, and showed great interest in natural history. He published two works, *Fifteen Days on the Danube* and *A Journey in the East*, and also promoted the publication of an important illustrated work giving a full description of the whole Austro-Hungarian monarchy; he personally shared the labours of the editorial work. In 1881 he married Stéphanie, daughter of the king of the Belgians. On 30th January 1889 he committed suicide at Mayerling, a country house near Vienna. He left one daughter, Elizabeth, who was betrothed to Count Alfred Windischgrätz in 1901. In 1900 his widow, the crown princess Stéphanie, married Count Lonyay; by this she sacrificed her rank and position within the Austrian monarchy. Besides the crown prince the empress gave birth to three daughters, of whom two survive: Gisela (born 1857), who married a son of the prince regent of Bavaria; and Marie Valerie (born 1868), who married the archduke Franz Salvator of Tuscany.

See J. Emmer, *Kaiser Franz Joseph* (2 vols., Vienna, 1898); J. Schnitzer, *Franz Joseph I. und seine Zeit* (2 vols., *ib.*, 1899); *Viribis unitis. Das Buch vom Kaiser*, with introduction by J. A. v. Halfert, ed. M. Herzig (*ib.*, 1898); R. Rostok, *Die Regierungszeit des K. u. K. Franz Joseph I.* (3rd ed. *ib.*, 1903).

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